

UNLEASH

# RF Manual 16th edition

Application and design manual

for High Performance RF products

June 2012

NXP

# NXP enables you to unleash the performance of next-generation RF and microwave designs

NXP's RF Manual is one of the most important reference tools on the market for today's RF designers. It features our complete range of RF products, from low- to high-power signal conditioning, organized by application and function, and with a focus on design-in support.

When it comes to RF, the first thing on the designer's mind is to meet the specified performance. NXP brings clarity to every aspect of your design challenge, so you can unleash the performance of your RF and microwave designs. NXP delivers a portfolio of high-performance RF technology that allows you to differentiate your product – no matter where in the RF world you are. That's why customers trust us with their mission-critical designs. Whether it's LDMOS and GaN for high-power RF applications or Si and SiGe:C BiCMOS for your small-signal needs, we've got you covered. Our broad portfolio of far-reaching technologies gives you the freedom to design with confidence.

Shipping more than four billion RF products annually, NXP is a clear industry leader in High Performance RF. From satellite receivers, cellular base stations, and broadcast transmitters to ISM (industrial, scientific, medical) and aerospace and defense applications, you will find the High Performance RF products that will help you realize a clear advantage in your products, your reputation, and your business.

So if you're looking to improve your RF performance, design a highly efficient signal chain, or break new ground with an innovative ISM application, NXP will help you unleash the performance of your next-generation RF and microwave designs.

**UNLEASH** RF

## What's new?

This RF Manual provides updated information on RF applications that are grouped as follows: wireless and broadband communication infrastructure, TV and satellite, portable devices, automotive, ISM, and aerospace and defense.

We describe in detail the new developments in our core technologies, QUBiC4 (SiGe:C) and LDMOS. We have also added GaN technology to our product offering; this key technology lets high-power amplifiers deliver very high efficiency in next-generation wireless communication systems.

New products include GaN power amplifiers, a complete line of overmolded plastic (OMP) RF power transistors and MMICs, and our eighth generation LDMOS transistors (Gen8). Next-generation devices and improved products include GPS LNAs, medium power amplifiers, IF gain blocks, satellite LNB ICs and CATV modules.

Our portfolio for the wireless communication infrastructure has expanded, with a comprehensive set of amplifiers (low noise, variable gain, medium power, and high power Doherty amplifiers), mixers, IQ modulators and synthesizers, so you can build a highly efficient signal chain for transmit line-ups and receive chains.

The Design Support section is updated and includes all available tools, documents, materials and links that ease the design-in of our products.

*We're relentless in our commitment to RF innovation, and have the infrastructure and insight to inspire confidence in your performance-critical applications. We bring focus to complex RF problems so you are free to push the performance limits of your application, realize your design vision, and gain a competitive edge for your enterprise. What you are reading is more than a guide, it's a tool that lets you unleash your RF performance: the 16th edition of the RF Manual.*

Kind regards,



John Croteau

Sr. Vice President & General Manager
Business Line High Performance RF

**RF Manual web page**
www.nxp.com/rfmanual

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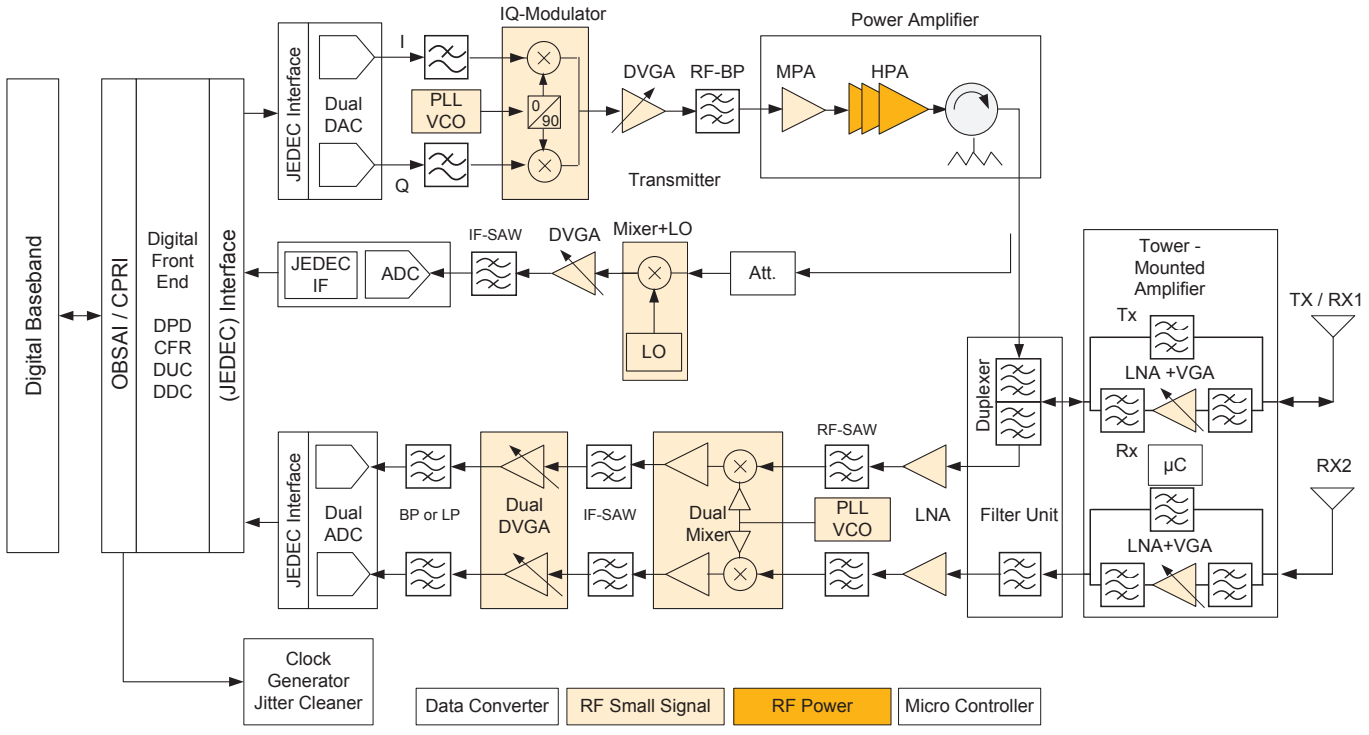
# 1. Products by application

## 1.1 Wireless communication infrastructure

### 1.1.1 Base stations (all cellular standards and frequencies)

See also brochure: 'Your partner in Mobile Communication Infrastructure design', NXP document number 9397 750 16837.

**Application diagram**




*The block diagram above shows transmit (upper part, Tx) and receive (lower part, Rx) functions of a base station, and includes the Tx feedback function (middle part, Tx feedback).*

*The signals generated in the "Digital Baseband & Control" block follow the requirements of the air-interface standard. These signals are interfaced to the DAC via serial interface SER. The SER can use the LVDS or JEDEC standard. After the signals are fed to the I-DAC and Q-DAC, they are converted to the analog domain. Before the I and Q signals enter the IQ modulator, they are first low-pass filtered to remove any aliasing signals. At the IQ modulator, the signals are up-converted to RF using an LO signal coming from the PLL/VCO device, typically called the LO generator. Due to device aging and variation in cell load, the up-converted signals are fed to the VGA to control the power level. An additional band-pass filter is needed to remove the out-of-band spurs. The clean signal is fed to the RF power board, where the desired transmit power is made. Finally, the RF power signal is fed to the antenna via a duplexer.*

*Directly after the final-stage amplifier, a signal coupler picks up a certain amount of the RF signal, which is attenuated and then down-mixed using the IF mixer. This signal is called the observation signal, and is used to derive coefficients for the digital pre-distortion algorithm. Since power levels vary, the observation is first fed to the VGA to control the power level, and after band-pass filtering, the signal is converted to the digital domain using an ADC. The same serial interface is used to send the digital signals to the baseband processor.*

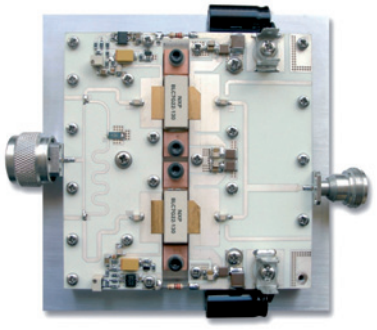
*At the receiver, the received signal directly after the duplexer is fed to the LNA for direct amplification, since the received signal level is quite low. If the first LNA is mounted in the tower top, a long RF cable is used to interface the RF signals with a base transceiver station (BTS). A second LNA is used to amplify the received signals. Band-pass filtering is applied to reduce the out-of-band signals levels before these signals are applied to the IF mixer. Signal levels that change dramatically require a VGA to maintain the full scale ranges of the I-ADC and Q-ADC for optimal conversion performance. Low-pass filtering is used before the ADC to remove the aliasing signals. These digital signals are interfaced to the baseband using a serial interface such as JEDEC.*

*The sample clocks and LO signals are derived from clock cleaners and PLLs respectively. This is denoted as Clock and PLL / VCO in the block diagram. This set-up is required to make a synchronized system. Typically denoted in SNRs, and in order to improve reception quality, the receive function is equipped with a second receiver, called a diversity receiver.*

## Recommended products

| Function | Product | $f_{min}$ (MHz) | $f_{max}$ (MHz) | P1dB (W) | Matching | Package | Type |
|---|---|---|---|---|---|---|---|
| HPA | Driver | 700 | 2200 | 10 | - | SOT1179 | BLP7G22-10* |
| | Driver/final | 2110 | 2170 | 40 | I/O | SOT1121 | BLF6G22L(S)-40P |
| | | 2500 | 2700 | 40 | I/O | SOT1121 | BLF6G27L(S)-40P |
| | MMIC | 2000 | 2200 | 60 | I/O | SOT1212 | BLM7G22S-60PB(G)* |
| | Final | 700 | 1000 | 160 | - | SOT467 | BLF6H10L(S)-160 |
| | | 700 | 1000 | 200 | I/O | SOT1244C | BLF8G10LS-200GV |
| | | 700 | 1000 | 270 | I/O | SOT1244C | BLF8G10LS-270GV |
| | | 850 | 960 | 300 | I/O | SOT539 | BLF8G10L(S)-300P* |
| | | 900 | 1000 | 140 | O | SOT1224 | BLP7G09S-140P(G)* |
| | | 920 | 960 | 160 | I/O | SOT502 | BLF8G10L(S)-160* |
| | | 920 | 960 | 250 | I/O | SOT502 | BLF7G10L(S)-250 |
| | | 1800 | 1900 | 260 | I/O | SOT539B | BLF7G20LS-260A* |
| | | 1805 | 1880 | 250 | I/O | SOT539 | BLF7G20L(S)-250P |
| | | 2000 | 2200 | 160 | I/O | SOT502B | BLF7G22L(S)-160* |
| | | 2000 | 2200 | 200 | I/O | SOT1244C | BLF8G22LS-200GV* |
| | | 2000 | 2200 | 270 | I/O | SOT1244C | BLF8G22LS-270GV* |
| | | 2500 | 2700 | 100 | I/O | SOT502 | BLF7G27L(S)-100 |
| | | 2500 | 2700 | 140 | I/O | SOT502 | BLF7G27L(S)-140 |
| | | 3400 | 3600 | 100 | I/O | SOT502 | BLF6G38(LS)-100 |
| | Integrated Doherty | 2010 | 2025 | 50 | O | SOT1130 | BLD6G21L(S)-50 |

* Check status in section 3.1, as this type is not yet released for mass production












## Product highlight:
## BLF8G10LS-160

160 W LDMOS power transistor for base W-CDMA base station and multi-carrier applications at frequencies from 920 to 960 MHz.

### Features

- Excellent ruggedness
- High efficiency
- Low $R_{th}$ providing excellent thermal stability
- Designed for broadband operation (920 to 960 MHz)
- Lower output capacitance for improved performance in Doherty applications
- Low memory effects for excellent pre-distortability
- Internally matched for ease of use
- Integrated ESD protection
- Compliant to Restriction of Hazardous Substances (RoHS) Directive 2002/95/EC

| Function | Product | | Package | Type |
|---|---|---|---|---|
| Discrete attenuator | RF diode | PIN diode | SOT753 | BAP64Q |
| | | | SOT753 | BAP70Q |
| | | | Various | BAP64^ |

| Function | Product | | Package | Type |
|---|---|---|---|---|
| LNA (low noise amplifier) | RF transistor | SiGe:C transistor | SOT343F | BFU725F/N1 |
| | | | | BFU690F |
| | | | | BFU730F |
| | | | | BFU760F |
| | | | | BFU790F |
| | MMIC | SiGe:C MMIC | SOT650 | BGU7051 |
| | | | | BGU7052 |
| | | | | BGU7053 |
| | | | SOT1301 | BGU7060 |
| | | | | BGU7061 |
| | | | | BGU7062 |
| | | | | BGU7063 |

| Function | Product | Gain range | Package | Type |
|---|---|---|---|---|
| Single VGA (variable-gain amplifier) | MMIC | 31 dB | SOT617 | BGA7210 |
| | | | | BGA7204 |

| Function | Product | Gain range | Package | Type |
|---|---|---|---|---|
| Dual VGA (variable-gain amplifier) | MMIC | 24 dB | SOT617 | BGA7350 |
| | | 28 dB | | BGA7351 |

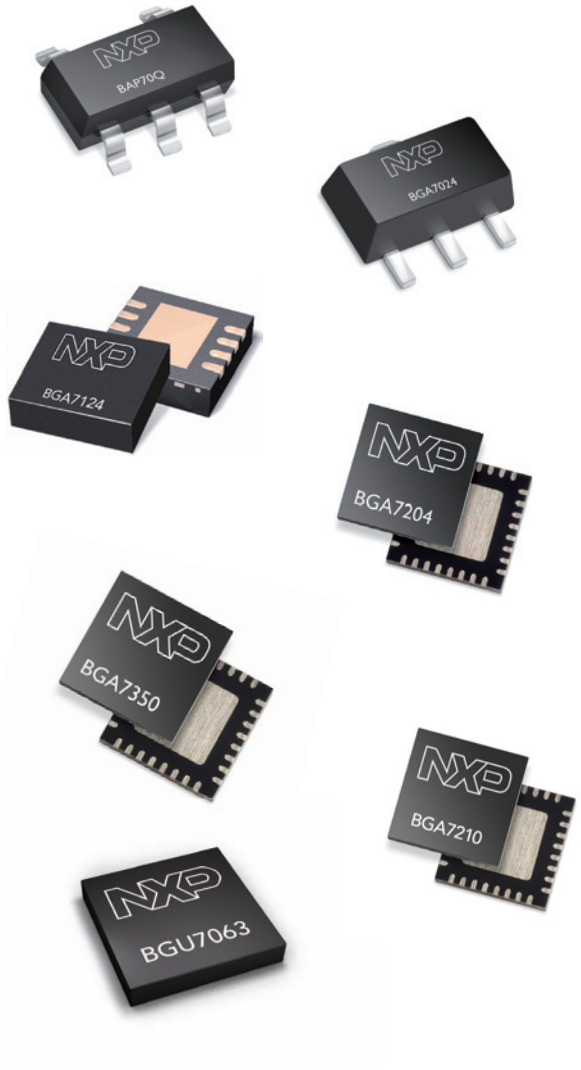
| Function | Product | $P_L$ (1dB) @ 940 MHz | Package | Type |
|---|---|---|---|---|
| MPA (medium power amplifier) | MMIC | 24 dBm | SOT89 | BGA7024 |
| | | 28 dBm | | BGA7027 |
| | | 25 dBm | SOT908 | BGA7124 |
| | | 28 dBm | | BGA7127 |
| | | 30 dBm | | BGA7130 |

| Function | Product | Frequency | Package | Type |
|---|---|---|---|---|
| Dual mixer | MMIC | 0.7 - 1.2 GHz | SOT1092 | BGX7220 |
| | | 1.7 -2.7 GHz | | BGX7221 |

| Function | Product | Noise | Package | Type |
|---|---|---|---|---|
| PLL + VCO (LO generator) | MMIC | 131 dBc/Hz @ 1 MHz offset @ 5.3 GHz | SOT617 | BGX7300* |

| Function | Product | Output power | Package | Type |
|---|---|---|---|---|
| IQ modulator | MMIC | 0 dBm | SOT616 | BGX7100 |
| | | 4 dBm | | BGX7101 |

* Check status in section 3.1, as this type is not yet released for mass production for mass production
^ SOD523, SOD323, SOT23 & SOT323




## Product highlight:
## Digital VGAs BGA7204 & BGA7210

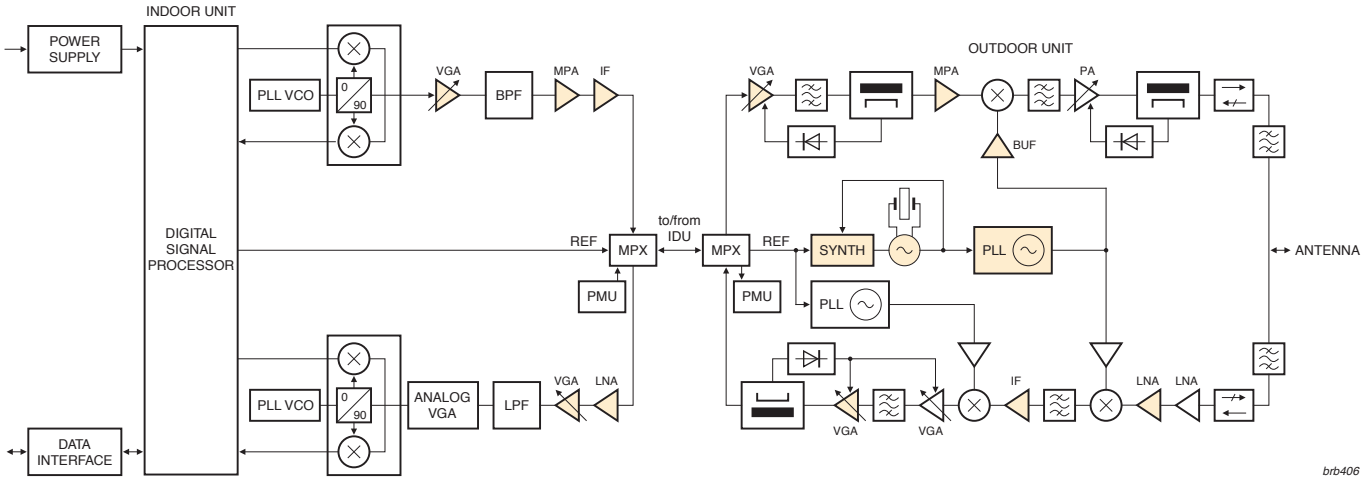
These 6-bit digital VGAs offer high linearity (35 dBm @ 2.2-2.8 GHz) and high output power (23 dBm @ 2.2-2.8 GHz) across a large bandwidth without external matching. Smart routing with no connection crosses simplifies design and decreases footprint by 25%. The unique power-save mode can effectively reduce the current consumption in TDD systems up to 45%. The BGA7210 adds flexible current distribution across its two amplifiers, depending on the attenuation state, to save current.

### Features

- Internally matched for 50 Ω
  - BGA7204 = 0.4 to 2.75 GHz
  - BGA7210 = 0.7 to 3.8 GHz
- High maximum power gain
  - BGA7204 = 18.5 dB
  - BGA7210 = 30 dB
- High output third-order intercept, $IP3_O$
  - BGA7204 = 38 dB
  - BGA7210 = 39 dB
- Attenuation range of 31.5 dB, 0.5 dB step size (6 bit)
- Fast switching power-save mode (power-down pin)
- Digitally controlled current setting from 120 to 195 mA with an optimum at 185mA (BGA7210 only)
- Simple control interfaces (SPI)
- ESD protection on all pins (HBM 4 kV; CDM 2 kV)

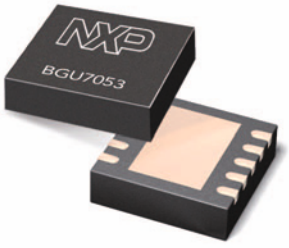
## 1.1.2 Point-to-point communications

### Application diagram













### Recommended products

#### Indoor unit

| Function | Product | Gain range | Package | Type |
|---|---|---|---|---|
| Single VGA (variable-gain amplifier) | MMIC | 23 dB | SOT617 | BGA7202 |
| | | 31 dB | | BGA7204 |

| Function | Product | Gain range | Package | Type |
|---|---|---|---|---|
| Dual VGA (variable-gain amplifier) | MMIC | 24 dB | SOT617 | BGA7350 |
| | | 28 dB | | BGA7351 |

| Function | Product | $P_L$ (1dB) @ 940 MHz | Package | Type |
|---|---|---|---|---|
| MPA (medium power amplifier) | MMIC | 24 dBm | SOT89 | BGA7024 |
| | | 28 dBm | | BGA7027 |
| | | 25 dBm | SOT908 | BGA7124 |
| | | 28 dBm | | BGA7127 |
| | | 30 dBm | | BGA7130 |

| Function | Product | Output power | Package | Type |
|---|---|---|---|---|
| IQ modulator | MMIC | 0 dBm | SOT616 | BGX7100 |
| | | 4 dBm | | BGX7101 |

| Function | Product | | Package | Type |
|---|---|---|---|---|
| IF | IF gain block | MMIC | SOT363 | BGA2800 |
| | | | | BGA2801 |
| | | | | BGA2815 |
| | | | | BGA2816 |
| | MMIC | General-purpose wideband amplifiers | | BGM1012 |
| | | | | BGA2714 |
| | | | | BGA2748 |
| | | | | BGA2771 |

| Function | Product | | Package | Type |
|---|---|---|---|---|
| LNA | RF MMIC | SiGe:C MMIC | SOT891 | BGU7003 |
| | | | SOT650 | BGU7051 |
| | | | | BGU7052 |
| | | | | BGU7053 |
| | | | SOT1301 | BGU7060 |
| | | | | BGU7061 |
| | | | | BGU7062 |
| | | | | BGU7063 |
| | RF transistor | SiGe:C transistor | SOT343F | BFU725F/N1 |
| | | | | BFU710F |
| | | | | BFU730F |
| | | Wideband transistor | SOT343R | BFG425W |
| | | | | BFG424W |
| | | | SOT143R | BFG325/XR |

## Outdoor unit

| Function | Product | Gain range | Package | Type |
|---|---|---|---|---|
| Single VGA (variable-gain amplifier) | MMIC | 31 dB | SOT617 | BGA7210 |
| | | | | BGA7204 |

| Function | Product | $P_L$ (1dB) @ 940 MHz | Package | Type |
|---|---|---|---|---|
| MPA (medium power amplifier) | MMIC | 24 dBm | SOT89 | BGA7024 |
| | | 28 dBm | | BGA7027 |
| | | 25 dBm | SOT908 | BGA7124 |
| | | 28 dBm | | BGA7127 |
| | | 30 dBm | | BGA7130 |

| Function | Product | | Package | Type |
|---|---|---|---|---|
| Buffer | RF transistor | SiGe:C transistor | SOT343F | BFU725F/N1 |
| | | | | BFU730F |
| | | | | BFU760F |
| | | | | BFU790F |

| Function | Product | | Package | Type |
|---|---|---|---|---|
| LNA | RF transistor | SiGe:C transistor | SOT343F | BFU725F/N1 |
| | | | | BFU730F |
| | | | | BFU760F |
| | | | | BFU790F |

| Function | Product | | Package | Type |
|---|---|---|---|---|
| IF | IF gain block | MMIC | SOT363 | BGA2800 |
| | | | | BGA2801 |
| | | | | BGA2815 |
| | | | | BGA2816 |
| | | | | BGA2850 |
| | | | | BGA2865 |
| | | | | BGA2866 |
| | MMIC | General-purpose wideband amplifiers | | BGM1014 |
| | | | | BGM1013 |
| | | | | BGM1012 |
| | | | | BGA2714 |

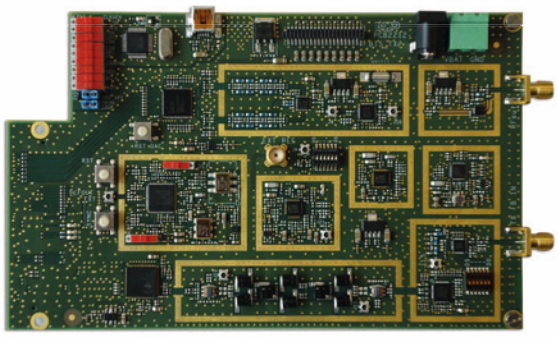
| Function | Product | Gain range | Package | Type |
|---|---|---|---|---|
| Dual VGA (variable-gain amplifier) | MMIC | 24 dB | SOT617 | BGA7350 |
| | | 28 dB | | BGA7351 |

| Function | Product | Noise | Package | Type |
|---|---|---|---|---|
| PLL + VCO (LO generator) | MMIC | -131 dBc/Hz @ 1 MHz offset @ 5.3 GHz | SOT617 | BGX7300* |

| Function | Product | | Package | Type |
|---|---|---|---|---|
| Oscillator | RF transistor | Wideband transistor | SOT343R | BFG424W |
| | | | | BFG425W |
| | | SiGe:C transistor | SOT343F | BFU725F/N1 |
| | | | | BFU730F |
| | | | | BFU760F |
| | | | | BFU790F |

* Check status in section 3.1, as this type is not yet released for mass production

## NXP BTS Tx component demonstrator board









### Product highlight:
### BGA7350 MMIC variable-gain amplifier

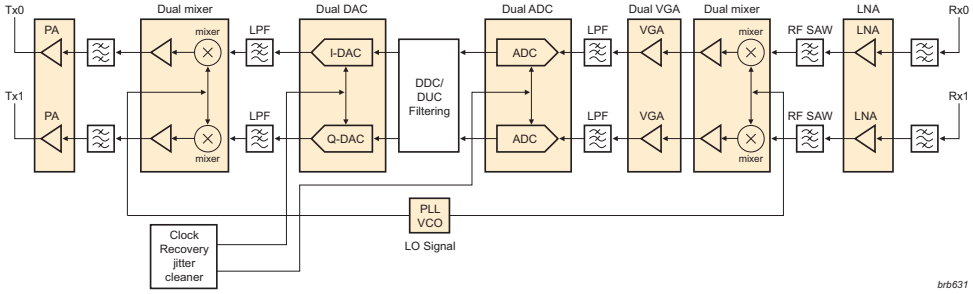
The BGA7350 MMIC is a dual independent digitally controlled IF variable-gain amplifier (VGA) operating from 50 to 250 MHz. Each IF VGA amplifies with a gain range of 24 dB and, at its maximum gain setting, delivers 17 dBm output power at 1 dB gain compression with superior linear performance. The BGA7350 is optimized for a differential gain error of less than ±0.1 dB for accurate gain control and has a total integrated gain error of less than ±0.4 dB. It is housed in a 32-pin leadless HVQFN package (5 x 5 mm).

### Features

- Dual independent digitally controlled 24 dB gain range VGAs, with 5-bit control interface
- 50 to 250 MHz frequency operating range
- Gain step size: 1 dB ± 0.1 dB
- 18.5 dB power gain
- Fast gain stage switching capability
- 17 dBm output power at 1 dB gain compression
- 5 V single supply operation with power-down control
- Logic-level shutdown control pin reduces supply current
- ESD protection at all pins
- Unconditionally stable

## 1.1.3 Repeater

### Application diagram




### Recommended products

| Function | Product | $f_{min}$ (MHz) | $f_{max}$ (MHz) | P1dB (W) | Matching | Package | Type |
|---|---|---|---|---|---|---|---|
| HPA | Driver | 700 | 2200 | 10 | - | SOT1179 | BLP7G22-10* |
| | | 2300 | 2700 | 10 | I | SOT975 | BLF6G27-10(G) |
| | Driver/final | 700 | 1000 | 45 | I | SOT608 | BLF6G10(S)-45 |
| | | 1450 | 1550 | 40 | I/O | SOT1135 | BLF6G15L(S)-40RN |
| | | 1800 | 2000 | 45 | I/O | SOT608 | BLF6G20(S)-45 |
| | | 2110 | 2170 | 40 | I/O | SOT1121 | BLF6G22L(S)-40P |
| | | 2500 | 2700 | 40 | I/O | SOT1121 | BLF6G27L(S)-40P |
| | | 3400 | 3800 | 50 | I/O | SOT502 | BLF6G38(LS)-50 |
| | Integrated Doherty | 2010 | 2025 | 50 | O | SOT1130 | BLD6G21L(S)-50 |
| | | 2110 | 2170 | 50 | I/O | SOT1130 | BLD6G22L(S)-50 |




| Function | Product | $P_{L(1\ dB)}$ @ 940 MHz | Package | Type |
|---|---|---|---|---|
| MPA (medium power amplifier) | MMIC | 24 dBm | SOT89 | BGA7024 |
| | | 28 dBm | | BGA7027 |
| | | 25 dBm | SOT908 | BGA7124 |
| | | 28 dBm | | BGA7127 |
| | | 30 dBm | | BGA7130 |

| Function | Product | Gain range | Package | Type |
|---|---|---|---|---|
| Dual VGA (variable-gain amplifier) | MMIC | 24 dB | SOT617 | BGA7350 |
| | | 28 dB | | BGA7351 |

| Function | Product | Frequency range | Package | Type |
|---|---|---|---|---|
| Dual mixer | MMIC | 1.7 - 2.7 GHz | SOT1092 | BGX7220 |
| | | 0.7 - 1.2 GHz | | BGX7221 |

| Function | Product | Package | Type |
|---|---|---|---|
| LNA | SiGe:C MMIC | SOT650 | BGU7051 |
| | | | BGU7052 |
| | | | BGU7053 |
| | | SOT1301 | BGU7060 |
| | | | BGU7061 |
| | | | BGU7062 |
| | | | BGU7063 |




| Function | Product | Noise | Package | Type |
|---|---|---|---|---|
| PLL + VCO (LO generator) | MMIC | -131 dBc/Hz @ 1 MHz offset @ 5.3 GHz | SOT617 | BGX7300* |

* Check status in section 3.1, as this type is not yet released for mass production

### Product highlight: BGX7221 MMIC dual down-mixer

The BGX7221 combines a pair of high performance, high linearity down-mixers for use in receivers that have a common local oscillator used with, for example, main and diversity paths. The device covers frequency bands from 1700 to 2700 MHz with an extremely flat behavior.

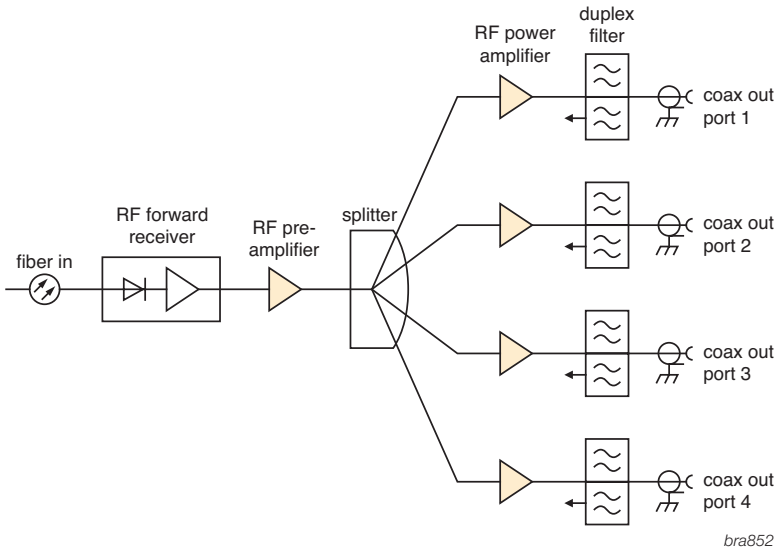
### Features

- 8.5 dB conversion gain over all bands
- 13 dBm input, 1 dB compression point
- 25.5 dBm input third-order intercept point
- 10 dB (typ) small signal noise figure
- Integrated active biasing
- Single +5 V supply operation
- Power-down per mixer with hardware control pins
- Low bias current in power-down mode
- Matched 50 Ω single-ended RF and LO input impedances
- ESD protection at all pins

# 1.2 Broadband communication infrastructure

## 1.2.1 CATV optical (optical node with multiple out-ports)

### Application diagram




### Recommended products

| Function | Product | Frequency | Package | Type |
|---|---|---|---|---|
| RF forward receiver | Forward path receiver | 870 MHz | SOT115 | BGO807C |
| | | | SOT115 | BGO807CE |

| Function | Product | Frequency | Gain (dB) | Type |
|---|---|---|---|---|
| RF pre-amplifier | Power doubler | 870 MHz | 18.2 - 18.8 | BGD812 |
| | Push-pulls | 870 MHz | 18 - 19 | BGY885A |
| | | | 21 - 22 | BGY887 |
| | | 1 GHz | 23 - 24.5 | CGY1043 |
| | | | 27 - 28.5 | CGY1047 |

| Function | Product | Frequency | Gain (dB) | Type |
|---|---|---|---|---|
| RF power amplifier | Power doublers | 870 MHz | 22 - 24 | CGD942C |
| | | | 24 - 26 | CGD944C |
| | | 1 GHz | 22 - 23.5 | CGD1042Hi |
| | | | 26.5 - 28 | CGD1046Hi |



### Product highlight: BGO807CE optical receiver

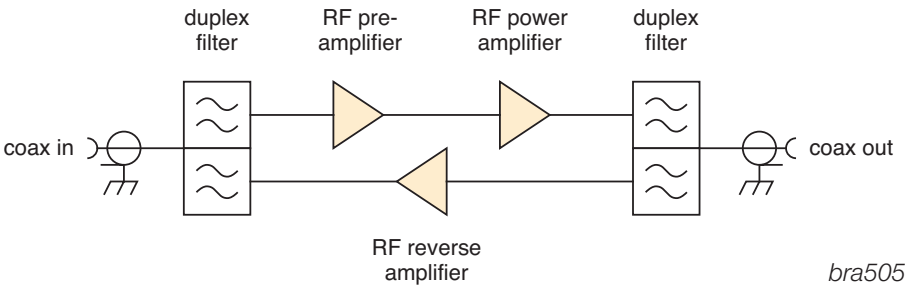
The BGO807CE is an integrated optical receiver module that provides high output levels and includes an integrated temperature-compensated circuitry. In your optical node design, BGO807CE enables a high performance/ price ratio and ruggedness. When upgrading an HFC network from analog to digital, our BGO807CE is the perfect fit.

### Features

- Excellent linearity
- Low noise
- Excellent flatness
- Standard CATV outline
- Rugged construction
- Gold metallization ensures excellent reliability
- High optical input power range

## 1.2.2 CATV electrical (line extenders)

### Application diagram




*bra505*

### Recommended products

| Function | Product | Frequency | Gain (dB) | Type |
|---|---|---|---|---|
| RF pre-amplifier | Push-pulls | 550 MHz | 33.5 - 35.5 | BGY588C |
| | | 750 MHz | 33.2 - 35.2 | BGE788C |
| | | | 18 - 19 | BGY785A |
| | | | 21 - 22 | BGY787 |
| | | 870 MHz | 18 - 19 | BGY885A |
| | | | 21 - 22 | BGY887 |
| | | | 33.5 - 34.5 | BGY888 |
| | | | 34.5 - 36.5 | CGY888C |
| | | 1003 MHz | 18 - 19 | BGY1085A |
| | | | 21 - 22.5 | CGY1041 |
| | | | 23 - 24.5 | CGY1043 |
| | | | 27 - 28.5 | CGY1047 |
| | | | 29 - 31 | CGY1049 |
| | | | 32 - 34 | CGY1032 |

| Function | Product | Frequency | Gain (dB) | Type |
|---|---|---|---|---|
| RF reverse amplifier | Reverse hybrids | 5-75 MHz | 29.2 - 30.8 | BGY68 |
| | | 5-120 MHz | 24.5 - 25.5 | BGY66B |
| | | 5-200 MHz | 23.5 - 24.5 | BGY67A |

All available in SOT115 package

| Function | Product | Frequency | Gain (dB) | Type |
|---|---|---|---|---|
| RF power amplifier | Power doublers | 750 MHz | 18.2 - 18.8 | BGD712 |
| | | | 18.2 - 18.8 | BGD712C |
| | | | 20 - 20.6 | BGD714 |
| | | 870 MHz | 18.2 - 18.8 | BGD812 |
| | | | 19.7 - 20.3 | BGD814 |
| | | | 22 - 23 | CGD942C |
| | | | 24 - 26 | CGD944C |
| | | 1003 MHz | 22 - 24 | CGD1042H |
| | | | 24 - 26 | CGD1044H |
| | | | 19.5 - 22 | CGD1040Hi |
| | | | 22 - 23.5 | CGD1042Hi |
| | | | 23.5 - 25.5 | CGD1044Hi |
| | | | 26 - 28 | CGD1046Hi |
| | | | 22 - 24 | CGD982HCi |
| | | | 23.5 - 25.5 | CGD985HCi |
| | | | 26 - 28 | CGD987HCi |



### Product highlight: CGD1046Hi

Capable of supporting high output power, the CGD1046Hi is primarily designed for use in fiber deep-optical-node applications (N+1/2/3). This 1 GHz hybrid amplifier solution offers an extended temperature range, high-power overstress capabilities in case of surges, and high ESD levels. The result is a low cost of ownership, with durability and superior ruggedness.

### Features

- High output power
- High power gain for power doublers
- Extremely low noise
- Dark Green products
- GaAs HFET dies for high-end applications
- Rugged construction
- Superior levels of ESD protection
- Integrated ringwave protection
- Design optimized for digital channel loading
- Temperature-compensated gain response
- Optimized heat management
- Excellent temperature resistance

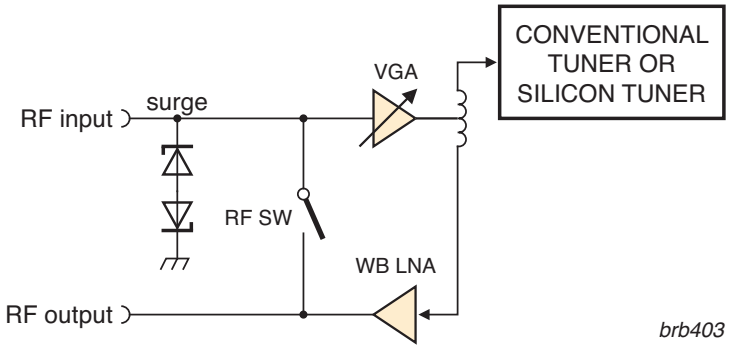
**Looking for more information on our wideband LNAs supporting multi-tuner applications in TVs, DVR/PVRs, and STBs? See section 2.3.1 LNAs with programmable gain & bypass option for improved tuner performance.**



# 1.3 TV and satellite

## 1.3.1 Network interface module (NIM) for TV reception

### Application diagram




### Recommended products

| Function | Product | $V_{cc}$ (V) | Gain (db) | Package | Type |
|---|---|---|---|---|---|
| LNA | MMIC | 5 | 10 | SOT363 | BGU7031 |
| | | 5 | 10 | SOT363 | BGU7032 |
| | | | -2 | | |
| | | 5 | 10 | SOT363 | BGU7033 |
| | | | 5 | | |
| | | | -2 | | |
| | | 3.3 | 10 | SOT363 | BGU7041 |
| | | 3.3 | 10 | SOT363 | BGU7042 |
| | | | -2 | | |
| | | 3.3 | 14 | SOT363 | BGU7044 |
| | | 3.3 | 14 | SOT363 | BGU7045 |
| | | | -2 | | |







**Product highlight:**

**Make a high-performance active splitter in a NIM tuner with the BGU703x/ BGU704x**

Today's TV tuners require complicated signal handling and benefit from flexibility in design. The front-end of a TV signal receiver is no longer just a tuned receiver, but has evolved into an RF network interface module (NIM) with tuned demodulators, active splitters, and remodulators. The active splitter requires an LNA with excellent linearity. NXP has developed two new series of LNA/VGA MMICs (BGU703x/BGU704x), designed especially for high linearity (P3O of 29 dBm) in low-noise applications such as an active splitter in a NIM tuner. The BGU703x family operates at a supply voltage of 5 V and is intended for use with normal can tuners. The BGU704x family operates at 3.3 V and works seamlessly with our Si tuner ICs, which also operate at 3.3 V.

## Recommended products

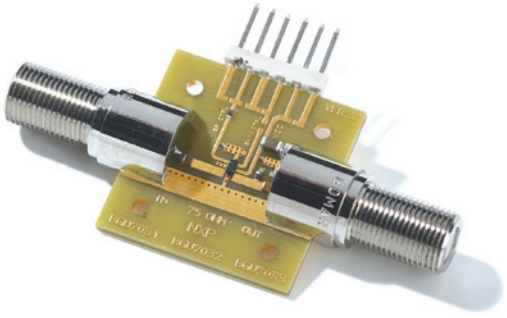
| Function | Product | | Package | Type |
|---|---|---|---|---|
| RF Switch / PLT switch | MOSFET | 5 V silicon RF switch | SOT23 | BF1107 |
| | | | SOT143B | BF1108 |
| | | | SOT143R | BF1108R |
| | | | SOT343 | BF1108W |
| | | | SOT343R | BF1108WR |
| | | 3.3 V silicon RF switch | SOT143B | BF1118 |
| | | | SOT143R | BF1118R |
| | | | SOT343 | BF1118W |
| | | | SOT343R | BF1118WR |

| Function | Product | | Package | Type |
|---|---|---|---|---|
| AGC control amplifier | MOSFET | 2-in-1 with band switch @ 5 V | SOT363 | BF1215 |
| | | 2-in-1 @ 5 V | SOT363 | BF1216 |
| | | 5 V | SOT343 | BF1217 |

Note: given that there is now an LNA before the MOSFET, the gain of these MOSFETs is made slightly lower and the cross-modulation somewhat higher. That way, the MOSFET is not under AGC even under nominal RF input level.




## BGU703x evaluation board

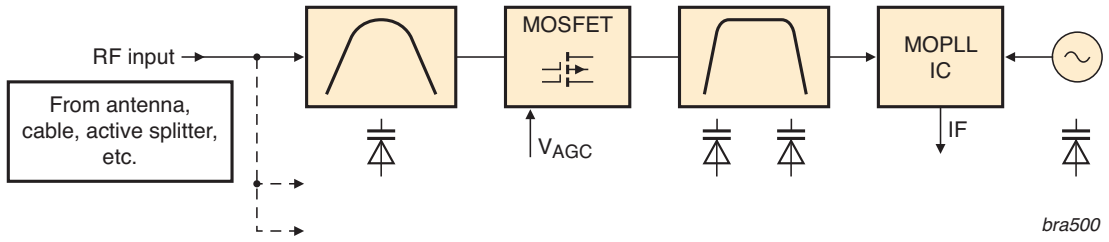


## Product highlight:
## Save energy with the BF11x8

The BF11x8 series are small-signal, RF-switching MOSFETs that can be used to switch RF signals up to 1 GHz. Using the BF11x8 series as an RF switch saves a considerable amount of energy. When a recording device (DVD-R, HDD-R, VCR, DVR) is powered off, viewers can still watch TV, although the antenna is looped via the recording device. Without the BF11x8, the antenna signal is lost. When power to the recording device is on, the BF11x8 is open, so the RF signal travels via the recording device to the TV tuner. When power to the recording device is off, the BF11x8 closes. This ensures that the RF signal is looped through directly to the TV tuner and guarantees TV reception. This saves energy because the recording device can be powered off.

## 1.3.2 Basic TV tuner

### Application diagram






### Recommended products

| Function | Product | | Package | Type |
|---|---|---|---|---|
| Input filter | Varicap diode | VHF low | SOD323 | BB152 |
| | | | SOD523 | BB182 |
| | | VHF high | SOD323 | BB153 |
| | | | SOD523 | BB178 |
| | | | SOD523 | BB187 |
| | | | SOD882D | BB178LX |
| | | | SOD882D | BB187LX |
| | | UHF | SOD323 | BB149A |
| | | | SOD882D | BB179LX |
| | | | SOD523 | BB179 |
| | | | SOD523 | BB189 |

| Function | Product | | Package | Type |
|---|---|---|---|---|
| RF pre-amplifier | MOSFET | 5 V | SOT143 | BF1201 |
| | | | SOT143 | BF1202 |
| | | | SOT143 | BF1105 |
| | | | SOT143 | BF1211 |
| | | | SOT143 | BF1212 |
| | | 2-in-1 @ 5 V | SOT363 | BF1102R |
| | | | SOT363 | BF1203 |
| | | | SOT363 | BF1204 |
| | | | SOT363 | BF1206 |
| | | | SOT363 | BF1207 |
| | | | SOT666 | BF1208 |
| | | | SOT666 | BF1208D |
| | | | SOT363 | BF1210 |
| | | | SOT363 | BF1214 |
| | | | SOT363 | BF1218 |

| Function | Product | Package | Type |
|---|---|---|---|
| Bandswitching | Bandswitch diode | SOD523 | BA277 |
| | | SOD523 | BA891 |
| | | SOD523 | BA591 |

| Function | Product | | Package | Type |
|---|---|---|---|---|
| Bandpass filter | Varicap diode | VHF low | SOD323 | BB152 |
| | | | SOD523 | BB182 |
| | | VHF high | SOD323 | BB153 |
| | | | SOD882D | BB178LX |
| | | | SOD523 | BB178 |
| | | | SOD882D | BB187LX |
| | | | SOD523 | BB187 |
| | | UHF | SOD323 | BB149A |
| | | | SOD882D | BB179LX |
| | | | SOD523 | BB179 |
| | | | SOD523 | BB189 |

| Function | Product | | Package | Type |
|---|---|---|---|---|
| Oscillator | Varicap diode | VHF low | SOD323 | BB152 |
| | | | SOD523 | BB182 |
| | | VHF high | SOD323 | BB153 |
| | | | SOD882D | BB178LX |
| | | | SOD523 | BB178 |
| | | | SOD882D | BB187LX |
| | | | SOD523 | BB187 |
| | | UHF | SOD323 | BB149A |
| | | | SOD882D | BB179LX |
| | | | SOD523 | BB179 |
| | | | SOD523 | BB189 |

| Function | Product | | Package | Type |
|---|---|---|---|---|
| RF pre-amplifier | MOSFET | 2-in-1 with band switch @ 5 V | SOT363 | BF1215 |
| | | 2-in-1 @ 5 V | SOT363 | BF1216 |
| | | 5 V | SOT343 | BF1217 |

### Product highlight:
### BGU7045 1 GHz wideband low-noise amplifier with bypass

The BGU7045 MMIC is a 3.3 V wideband amplifier with bypass mode. It is designed specifically for high-linearity, low-noise applications over a frequency range of 40 MHz to 1 GHz. It is especially suited to set-top box applications. The LNA is housed in a 6-pin SOT363 plastic SMD package.

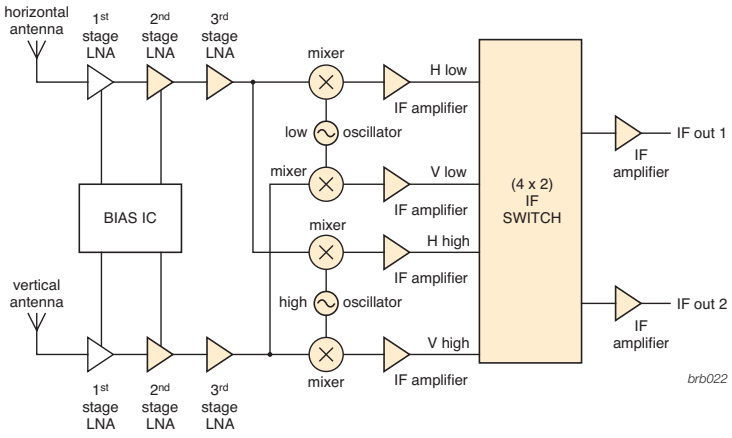
### Features

- Internally biased
- Noise figure of 2.8 dB
- High linearity with an $IP3_O$ of 29 dBm
- 75 Ω input and output impedance
- Power-down during bypass mode
- Bypass mode current consumption < 5 mA
- ESD protection > 2 kV HBM and >1.5 kV CDM on all pins

## 1.3.3 Satellite outdoor unit, twin low-noise block (LNB) with discrete components

**Looking for fully integrated mixer / oscillator / downconverter for universal single LNB?**
**See section 2.3.2 Complete satellite portfolio for all LNB architectures**

### Application diagram







### Recommended products

| Function | Product | | Package | Type |
|---|---|---|---|---|
| 2nd & 3rd stage LNA | RF transistor | SiGe:C transistor | SOT343F | BFU710F |
| | | | | BFU730F |

| Function | Product | | Package | Type |
|---|---|---|---|---|
| Oscillator | RF bipolar transistor | Wideband transistor | SOT343 | BFG424W |
| | | | SOT343F | BFG424F |
| | RF transistor | SiGe:C transistor | SOT343F | BFU660F |
| | | | | BFU710F |
| | | | | BFU730F |

| Function | Product | | Package | Type |
|---|---|---|---|---|
| IF switch | RF diode | PIN diode | Various | BAP64^ |
| | | | Various | BAP51^ |
| | | | Various | BAP1321^ |
| | | | Various | BAP50^ |
| | | | Various | BAP63^ |

| Function | Product | | Package | Type |
|---|---|---|---|---|
| 1st stage IF amplifier | MMIC | IF gain block | SOT363 | BGA2800 |
| | | | SOT363 | BGA2801 |
| | | | SOT363 | BGA2802 |
| | | | SOT363 | BGA2803 |
| | | | SOT363 | BGA2815 |
| | | | SOT363 | BGA2816 |
| | | | SOT363 | BGA2817 |
| | | | SOT363 | BGA2818 |
| | | | SOT363 | BGA2850 |
| | | | SOT363 | BGA2851 |
| | | | SOT363 | BGA2866 |
| | RF bipolar transistor | Wideband transistor | SOT343 | BFG424W |
| | | | SOT343F | BFG424F |

| Function | Product | | Package | Type |
|---|---|---|---|---|
| Output stage IF amplifier | MMIC | IF gain block | SOT363 | BGA2800 |
| | | | SOT363 | BGA2801 |
| | | | SOT363 | BGA2815 |
| | | | SOT363 | BGA2816 |
| | | | SOT363 | BGA2818 |
| | | | SOT363 | BGA2850 |
| | | | SOT363 | BGA2865 |
| | | | SOT363 | BGA2866 |
| | | | SOT363 | BGA2867 |
| | | | SOT363 | BGA2870 |
| | | | SOT363 | BGA2874 |
| | | | SOT363 | BGM1014 |
| | RF bipolar transistor | Wideband transistor | SOT343 | BFG325 |
| 2nd stage LNA | RF transistor | SiGe:C | SOT343F | BFU710F |
| | | | | BFU730F |

| Function | Product | | Package | Type |
|---|---|---|---|---|
| Mixer | RF transistor | SiGe:C transistor | SOT343F | BFU710F |
| | | | | BFU730F |

^ Also available in ultra-small leadless package SOD882D

### Product highlight:
### BGA28xx-family of IF gain blocks

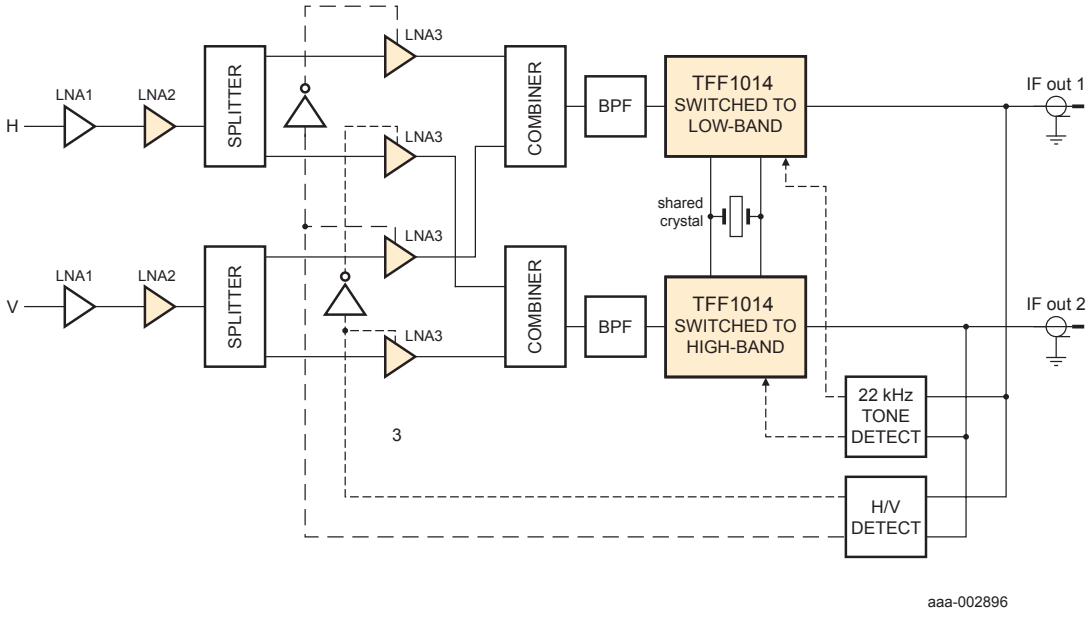
The BGA28xx IF gain blocks are silicon Monolitic Microwave Integrated Circuit (MMIC) wideband amplifiers with internal matching circuitry in a 6-pin SOT363 plastic SMD package.

### Features

- No output inductor necessary when used at the output stage
- Internally matched to 50 Ω
- Reverse isolation > 30 dB up to 2 GHz
- Good linearity with low second- and third-order products
- Unconditionally stable (K > 1)

## 1.3.4 Satellite outdoor unit, twin low-noise block (LNB) with integrated mixer / oscillator / downconverter

### Application diagram




### Recommended products

| Function | Product | | Package | Type |
|---|---|---|---|---|
| 2nd & 3rd stage LNA | RF transistor | SiGe:C transistor | SOT343F | BFU710F |
| | | | | BFU730F |

| Function | Product | Package | Type |
|---|---|---|---|
| Mixer/ oscillator/ downconverter | RF IC | SOT763 | TFF1014HN |




### Product highlight:

### Industry's lowest-power integrated Ku-band downconverters

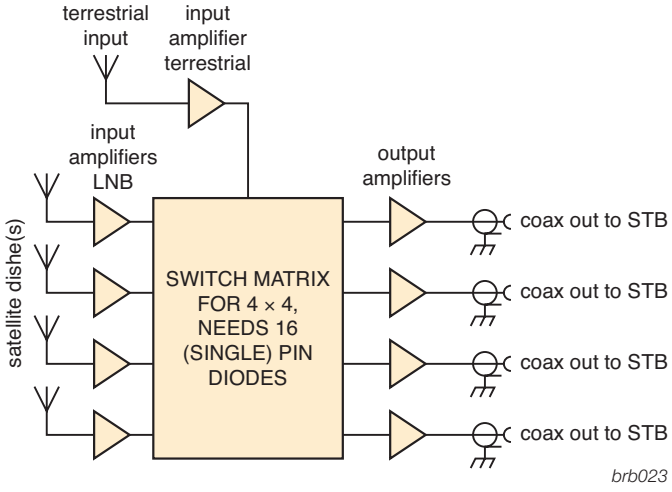
These Universal DVB-S compliant Ku-band downconverters consume about 50% less current (52 mA) than other integrated solutions. They are fully integrated (PLL synthesizer/mixer/IF gain block) and RF tested – which results in significantly decreased manufacturing time. Stability of the local oscillator is guaranteed, which improves overall system reliability over temperature and time, and eliminates the need for manual alignment in production.

### Features

- Ultra-low current consumption ($I_{CC}$ = 52 mA)
- Low phase noise (1.5° RMS typ)
- Integration bandwidth from 10 kHz to 13 MHz
- Small PCB footprint
  - DHVQFN16 package (2.5 x 3.5 x 0.85 mm)
  - Only 7 external components
  - No inductors necessary

## 1.3.5 Satellite multi-switch box - 4 x 4 (up to 16 x 16) / DiSEqC / SMATV

### Application diagram




### Recommended products

| Function | Product | | Package | Type |
|---|---|---|---|---|
| Input amplifier terrestrial | MMIC | General purpose medium power amplifier | SOT89 | BGA6289 |
| | | | | BGA6489 |
| | | | | BGA6589 |
| | | | | BGA7024 |
| | | | SOT908 | BGA7124 |

| Function | Product | | Package | Type |
|---|---|---|---|---|
| Input amplifier LNB | MMIC | General purpose amplifier | SOT363 | BGA2771 |
| | | | SOT363 | BGA2866 |
| | | | SOT363 | BGA2867 |
| | | | SOT363 | BGA2818 |
| | RF bipolar transistor | Wideband transistor | SOT343 | BFG325 |
| | | | SOT343 | BFG425W |
| | | | SOT143 | BFG520 |
| | | | SOT143 | BFG540 |
| | | SiGe:C transistor | SOT343F | BFU660F |
| | | | | BFU725F/N1 |
| | | | | BFU730F |

| Function | Product | | Package | Type |
|---|---|---|---|---|
| Switch matrix | RF diode | PIN diode | Various | BAP50^ |
| | | | | BAP51^ |
| | | | | BAP63^ |
| | | | | BAP64^ |
| | | | | BAP70^ |
| | | | | BAP1321^ |
| | RF transistor | SiGe:C transistor | SOT343F | BFU725F/N1 |
| | | | | BFU730F |

^ Also available in ultra-small leadless package SOD882D




| Function | Product | | Package | Type |
|---|---|---|---|---|
| Output amplifier | MMIC | General purpose medium power amplifier | SOT89 | BGA6289 |
| | | | | BGA6489 |
| | | | | BGA6589 |
| | | | | BGA7024 |
| | | | SOT908 | BGA7124 |
| | | General purpose amplifier | SOT363 | BGM1011 |
| | | | SOT363 | BGA2869 |
| | RF bipolar transistor | Wideband transistor | SOT223 | BFG135 |
| | | | SOT223 | BFG 591 |
| | | | SOT223 | BFG198 |
| | | | SOT143 | BFG540 |
| | | SiGe:C transistor | SOT343F | BFU725F/N1 |
| | | | | BFU730F |

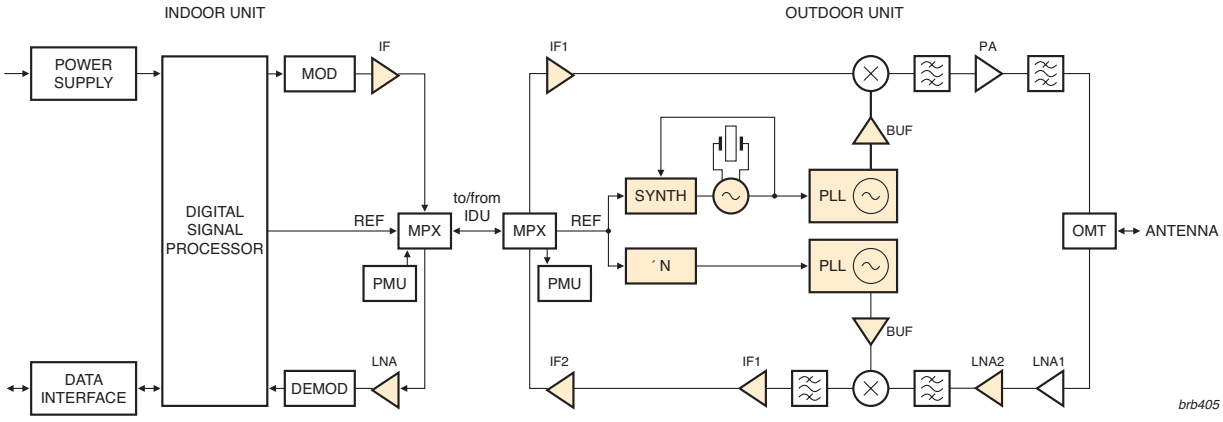
### Product highlight:
### PIN diodes for switching matrix

In addition to delivering outstanding RF performance, this component simplifies design-in because of its extremely low forward resistance, diode capacitance, and series inductance. Significant board space is saved by supplying a range of highly compact package options, including SOD523, SOD323 and leadless SOD882D.

### Features

- High isolation, low distortion, low insertion loss
- Low forward resistance (Rd) and diode capacitance (Cd)
- Ultra-small package options

## Application diagram




## Recommended products

### Indoor unit

| Function | Product | | Package | Type |
|---|---|---|---|---|
| IF | MMIC | IF gain block | SOT363 | BGA2714 |
| | | | | BGA2748 |
| | | | | BGA2771 |
| | | | | BGA2800 |
| | | | | BGA2801 |
| | | | | BGA2815 |
| | | | | BGA2816 |
| | | | | BGM1012 |

| Function | Product | | Package | Type |
|---|---|---|---|---|
| LNA | RF transistor | SiGe:C transistor | SOT343F | BFU725F/N1 |
| | | | | BFU710F |
| | | | | BFU725F/N1 |
| | | | | BFU730F |
| | | Wideband transistor | SOT343R | BFG425W |
| | | | | BFG424W |
| | | | SOT143R | BFG325/XR |







### Product highlight:
### TFF1003HN Low phase noise LO generator for VSAT applications

The TFF1003HN is a Ku-band frequency generator intended for low phase noise local-oscillator (LO) circuits for Ku-band VSAT transmitters and transceivers. The specified phase noise complies with IESS-308 from Intelsat.

### Features

- Phase noise compliant with IESS-308 (Intelsat)
- LO generator with VCO range: 12.8 to 13.05 GHz
- Input signal 50 to 816 MHz
- Divider settings: 16, 32, 64, 128, or 256
- Output level −5 dBm; stability ±2 dB
- Third- or fourth-order
- Internally stabilized voltage references for loop filter

## Recommended products

### Outdoor unit

| Function | Product | | Package | Type |
|---|---|---|---|---|
| IF | MMIC | IF gain block | SOT363 | BGA2800 |
| | | | | BGA2801 |
| | | | | BGA2815 |
| | | | | BGA2816 |
| | | | | BGA2850 |
| | | | | BGA2865 |
| | | | | BGA2866 |
| | | | | BGM1014 |
| | | | | BGM1013 |
| | | | | BGM1012 |
| | | | | BGA2714 |

| Function | Product | | Package | Type |
|---|---|---|---|---|
| LNA2 | RF transistor | SiGe:C transistor | SOT343F | BFU610F |
| | | | | BFU630F |
| | | | | BFU660F |
| | | | | BFU690F |
| | | | | BFU710F |
| | | | | BFU725F/N1 |
| | | | | BFU730F |
| | | | | BFU760F |
| | | | | BFU790F |
| | MMIC | SiGe:C MMIC | SOT891 | BGU7003 |

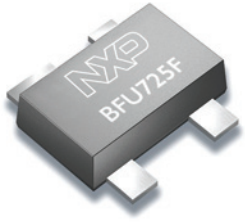
| Function | Product | | Package | Type |
|---|---|---|---|---|
| PLL | RF IC | SiGe:C IC | SOT616 | TFF1003HN |
| | | | | TFF1007HN |
| | | | | TFF11xxxHN^ |




| Function | Product | | Package | Type |
|---|---|---|---|---|
| Oscillator | RF transistor | Wideband transistor | SOT343R | BFG424W |
| | | | | BFG425W |
| | | SiGe:C transistor | SOT343F | BFU610F |
| | | | | BFU630F |
| | | | | BFU660F |
| | | | | BFU690F |
| | | | | BFU710F |
| | | | | BFU725F/N1 |
| | | | | BFU730F |
| | | | | BFU760F |
| | | | | BFU790F |

| Function | Product | | Package | Type |
|---|---|---|---|---|
| Synth | RF diode | Varicap diode | SOD523 | BB202 |

| Function | Product | | Package | Type |
|---|---|---|---|---|
| Buffer | RF transistor | SiGe:C transistor | SOT343F | BFU610F |
| | | | | BFU630F |
| | | | | BFU660F |
| | | | | BFU690F |
| | | | | BFU710F |
| | | | | BFU725F/N1 |
| | | | | BFU730F |
| | | | | BFU760F |
| | | | | BFU790F |




^ 17 different types with LO ranges: 7-15 GHz, see 3.4.4

## Product highlight:
## TFF1007HN Low phase noise LO generator for VSAT applications

The TFF1007HN is a Ku-band frequency generator intended for low phase noise local-oscillator (LO) circuits for Ku-band VSAT transmitters and transceivers. The specified phase noise complies with IESS-308 from Intelsat.

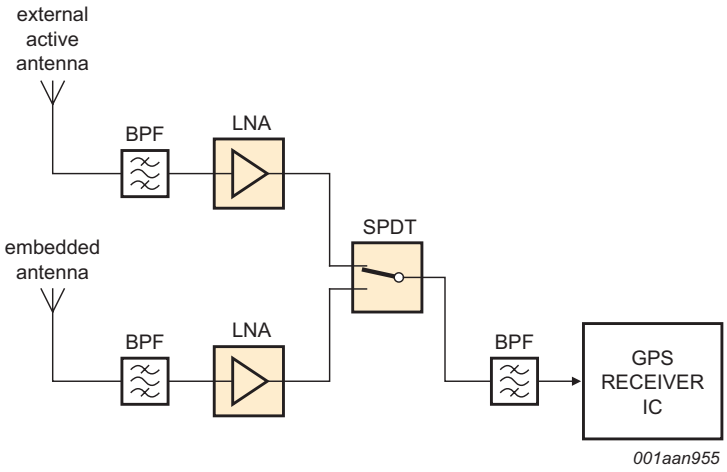
### Features

- Divider settings: 64
- Input signal 230.46 to 234.38 MHz
- Internally stabalized voltage references for loop filter and output power level
- LO generator with VCO range: 14.75 to 15 GHz
- Output level -4 dBm minimum
- Phase noise compliant with IESS-308 (Intelsat)
- Third- or fourth-order PLL

# 1.4 Portable devices

## 1.4.1 GPS

### Application diagram












### Recommended products

| Function | Product | | Package | Type |
|---|---|---|---|---|
| SPDT switch | RF diode | PIN diode | Various | BAP64^ |
| | | | | BAP1321^ |
| | | | | BAP51^ |

| Function | Product | | Package | Type |
|---|---|---|---|---|
| LNA | RF transistor | SiGe:C transistor | SOT343F | BFU725F /N1 |
| | | | | BFU710F |
| | | | | BFU730F |
| | MMIC | SiGe:C MMIC | SOT891 | BGU7003 |
| | | | SOT886 | BGU7003W |
| | | | | BGU7004 |
| | | | | BGU7005 |
| | | | | BGU7007 |
| | | | | BGU7008 |
| | | | | BGU8007 |
| | | | WL-CSP | BGU8006 |

^ Also available in ultra-small leadless package SOD882D

### Product highlight:
### BGU8007 SiGe:C LNA MMIC for GPS, GLONASS, and Galileo

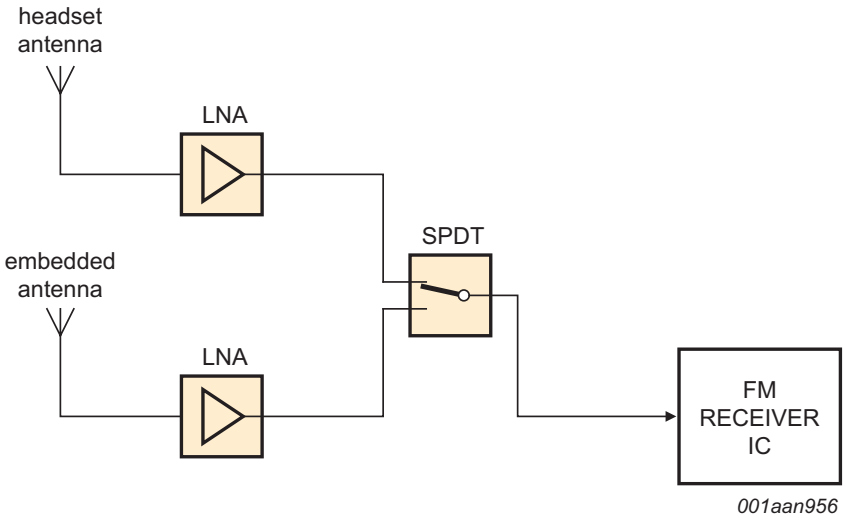
The BGU8007 is a low-noise amplifier (LNA) for GNSS receiver applications in a plastic leadless 6-pin extremely-small SOT886 package. It requires only one external matching inductor and one external decoupling capacitor.

### Features

- Covers full GNSS L1 band, from 1559 to 1610 MHz
- Noise figure (NF) = 0.75 dB
- Gain = 19.5 dB
- High 1 dB compression point of -12 dBm
- High out-of-band IP3$_i$ of 4 dBm
- Supply voltage 1.5 to 2.85 V
- Power-down mode current consumption < 1 µA
- Optimized performance at low supply current of 4.8 mA
- Integrated temperature stabilized bias for easy design
- Requires only one input matching inductor and one supply decoupling capacitor

## 1.4.2 FM radio

### Application diagram




### Recommended products

| Function | Product | | Package | Type |
|---|---|---|---|---|
| SPDT switch | RF diode | PIN diode | Various | BAP64^ |
| | | | | BAP 65^ |
| | | | | BAP1321^ |
| | | | | BAP51^ |

| Function | Product | | Package | Type |
|---|---|---|---|---|
| LNA | RF transistor | SiGe:C transistor | SOT343F | BFU725F /N1 |
| | MMIC | SiGe:C MMIC | SOT1209 | BGU6101 |
| | | | | BGU6102 |
| | | | | BGU6104 |
| | | | SOT891 | BGU7003 |
| | | | SOT886 | BGU7003W |

^ Also available in ultra-small leadless package SOD882D




### Product highlight: BGU6102 MMIC wideband amplifier

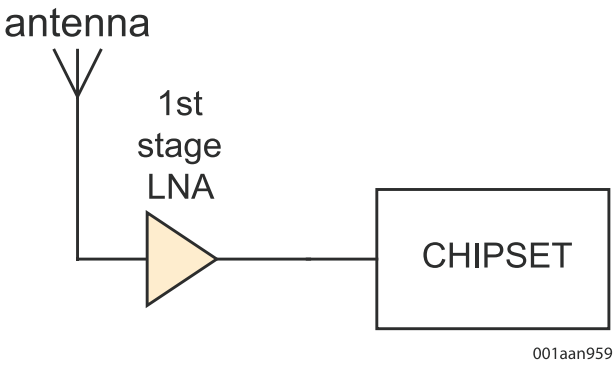
The BGU6102 is an unmatched MMIC featuring an integrated bias-enable function and a wide supply voltage. It is part of a family of three products (BGU6101, BGU6102, BGU6104), and is optimized for 2 mA operation.

### Features

- Applicable between 40 MHz and 4 GHz
- High ohmic FM LNA: 13 dB gain and 1.0 dB NF at 100 MHz
- 50 Ω FM LNA: 15 dB gain and 1.3 dB NF at 100 MHz
- Integrated temperature-stabilized bias for easy design
- Bias current configurable with external resistor
- Power-down mode current consumption < 6 µA
- ESD protection > 1 kV Human Body Model (HBM) on all pins
- Supply voltage from 1.5 to 5 V

## 1.4.3 China Mobile Multimedia Broadcasting (CMMB) in UHF band 470 – 862 MHz

### Application diagram




### Recommended products

| Function | Product | | Package | Type |
|---|---|---|---|---|
| LNA | MMIC | SiGe:C MMIC | SOT891 | BGU7003 |
| | | | SOT886 | BGU7003W |
| | | | SOT1209 | BGU6101 |
| | | | | BGU6102 |
| | | | | BGU6104 |







### Product highlight: BGU7003W MMIC wideband amplifier

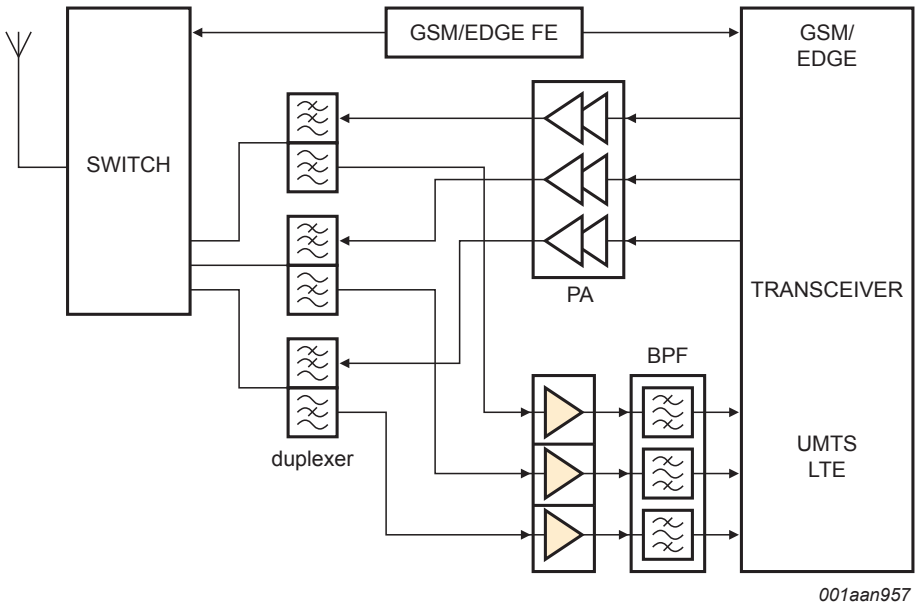
The BGU7003W MMIC is a wideband amplifier in SiGe:C technology for high-speed, low-noise applications. It is housed in a plastic leadless 6-pin extremely thin small outline SOT886 package.

### Features

- Low-noise, high-gain microwave MMIC
- Bias current configurable with external resistor
- Noise figure NF = 1.2 dB at 600 MHz
- Insertion power gain = 19.5 dB at 600 MHz
- Power-down mode current consumption < 1 µA
- Optimized performance at low supply current of 5 mA
- ESD protection > 1 kV HBM on all pins

## 1.4.4 Cellular receiver

### Application diagram




### Recommended products

| Function | Product | | Package | Type |
|---|---|---|---|---|
| LNA | MMIC | SiGe:C MMIC | SOT891 | BGU7003 |
| | | | SOT886 | BGU7003W |




### Product highlight:
### BGU7003 MMIC wideband amplifier

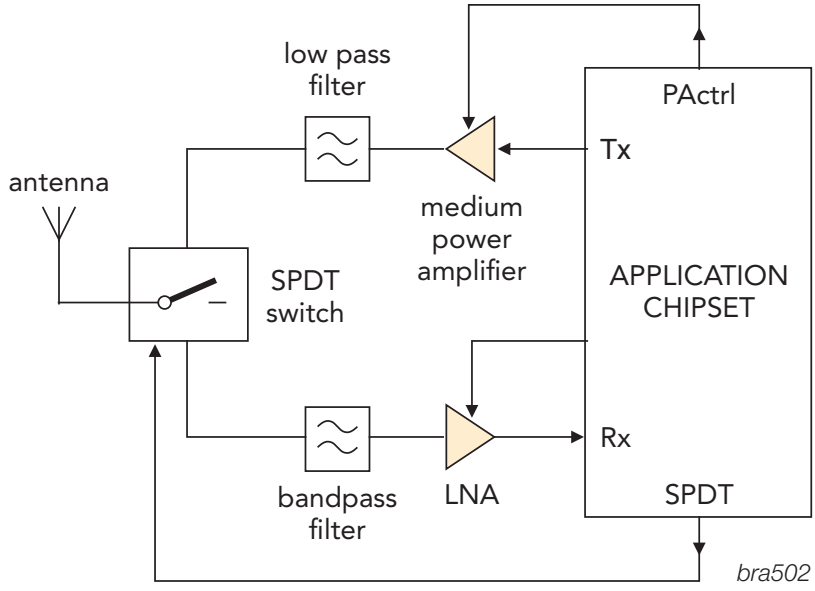
The BGU7003 MMIC is a wideband amplifier in SiGe:C technology for high-speed, low-noise applications. It is housed in a plastic leadless 6-pin extremely thin small outline SOT886 package.

### Features

- Applicable between 40 MHz and 6 GHz
- LTE LNA: 1 dB NF, 18.5 dB gain and -5 dBm IIP3 at 750 MHz
- Integrated temperature-stabilized bias for easy design
- Bias current configurable with external resistor
- Power-down mode current consumption < 1 µA
- ESD protection > 1 kV Human Body Model (HBM) on all pins

## 1.4.5 802.11n DBDC and 802.11ac WLAN

### Application diagram




### Recommended products

| Function | Product | | Package | Type |
|---|---|---|---|---|
| Medium power amplifier | MMIC | Medium power amplifier | SOT89 | BGA7024 |
| | | | | BGA7027 |
| | | | SOT908 | BGA7124 |
| | | | | BGA7127 |

| Function | Product | | Package | Type |
|---|---|---|---|---|
| LNA | RF transistor | SiGe:C transistor | SOT343F | BFU730F |
| | | | | BFU760F |
| | MMIC | SiGe:C MMIC | SOT883C | BFU730LX |







### Product highlight:
### BFU760F NPN silicon germanium microwave transistor

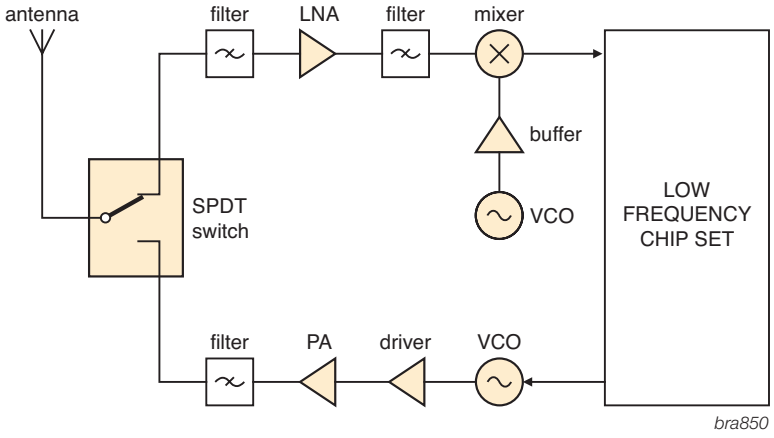
The BGU760F is part of the family of 6th (Si) and 7th (SiGe:C) generation RF transistors and can be used to perform nearly any RF function. These next-generation wideband transistors offer the best RF noise figure versus gain performance, drawing the lowest current. This performance allows for better signal reception at low power and enables RF receivers to operate more robustly in noisy environments.

### Features

- System optimized gain of 12.5 dB @ 2.4 GHz and 11 dB @ 5.5 GHz
- Low noise figure (NF) of 1.1 dB @ 2.4 GHz and 5.5 GHz
- High input 1 dB gain compression ($P_{i(1dB)}$) of -8 dBm @ 2.4 GHz and -5 dBm @ 5.5 GHz
- High input third order intercept point $IP3_I$ of +3 dBm @ 2.4 GHz and +8 dBm @ 5.5 GHz
- Only 8 external components required

## 1.4.6 Generic RF front-end

### Application diagram







### Recommended products

| Function | Product | | Package | Type |
|---|---|---|---|---|
| SPDT switch | RF diode | Bandswitch diode | SOD523 | BA277 |
| | | | SOD323 | BA591 |
| | | PIN diode | Various | BAP51^ |
| | | | Various | BAP1321^ |

| Function | Product | | Package | Type |
|---|---|---|---|---|
| LNA | RF bipolar transistor | Wideband transistor | SOT23 | PBR951 |
| | | | SOT323 | PRF957 |
| | | | SOT323 | PRF947 |
| | | SiGe:C transistor | SOT343F | BFU610F |
| | | | | BFU630F |
| | | | | BFU660F |
| | | | | BFU690F |
| | | | | BFU710F |
| | | | | BFU725F/N1 |
| | | | | BFU730F |
| | | | | BFU760F |
| | | | | BFU790F |
| | MMIC | Low-noise wideband ampl. | SOT1209 | BGU6101 |
| | | | | BGU6102 |
| | | | | BGU6104 |

| Function | Product | | Package | Type |
|---|---|---|---|---|
| Driver | RF bipolar transistor | Wideband transistor | SOT323 | PRF957 |
| | | | SOT23 | PBR951 |
| | MMIC | Gen-purp wideband amp | SOT363 | BGA2771 |
| | | | SOT363 | BGA2866 |

| Function | Product | | Package | Type |
|---|---|---|---|---|
| Mixer | RF bipolar transistor | Wideband transistor | SOT343 | BFG410W |
| | | | SOT343 | BFG425W |
| | | | SOT343 | BFG480W |
| | MMIC | Linear mixer | SOT363 | BGA2022 |

| Function | Product | | Package | Type |
|---|---|---|---|---|
| Buffer | RF bipolar transistor | Wideband transistor | SOT23 | PBR951 |
| | | | SOT323 | PRF957 |
| | | | SOT323 | PRF947 |
| | | | SOT416 | PRF949 |

| Function | Product | | Package | Type |
|---|---|---|---|---|
| Power amplifier | MMIC | General-purpose wideband amplifier | SOT89 | BGA6289 |
| | | | | BGA6489 |
| | | | | BGA6589 |
| | | | | BGA7024 |
| | | | | BGA7027 |

| Function | Product | | Package | Type |
|---|---|---|---|---|
| VCO | Varicap diodes | VCO varicap diodes | SOD523 | BB198 |
| | | | SOD323 | BB156 |

^ Also available in ultra-small leadless package SOD882D

### Product highlight:

### BFU790F silicon NPN germanium microwave transistor

Silicon NPN germanium microwave transistor for high-speed, low-noise applications in a plastic, 4-pin dual-emitter SOT343F package.

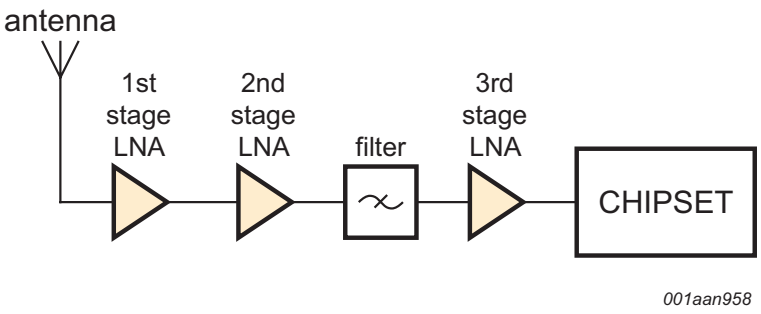
### Features

- Low-noise, high-linearity microwave transistor
- 110 GHz $f_T$ silicon germanium technology
- High maximum output power at 1 dB compression of 20 dBm at 1.8 GHz

# 1.5 Automotive

## 1.5.1 SDARS & HD radio

### Application diagram




### Recommended products

| Function | Product | | Package | Type |
|---|---|---|---|---|
| 1st stage LNA | MMIC | Low-noise wideband amplifier | SOT343F | BFU730F |

| Function | Product | | Package | Type |
|---|---|---|---|---|
| 2nd stage LNA | MMIC | General-purpose wideband amplifier | SOT343F | BFU690F |
| | | | SOT363 | BGA2869 |
| | | | | BGA2851 |
| | | | | BGA2803 |

| Function | Product | | Package | Type |
|---|---|---|---|---|
| 3rd stage LNA | RF transistor | SiGe:C transistor | SOT343F | BFU690F |
| | | | | BFU725F/N1 |
| | | | | BFU790F |




### Product highlight:

### BFU730F NPN wideband silicon germanium RF transistor

The BGU730F is part of the family of 6th (Si) and 7th (SiGe:C) generation RF transistors and can be used to perform nearly any RF function. These next-generation wideband transistors offer the best RF noise figure versus gain performance, drawing the lowest current. This performance allows for better signal reception at low power and enables RF receivers to operate more robustly in noisy environments.

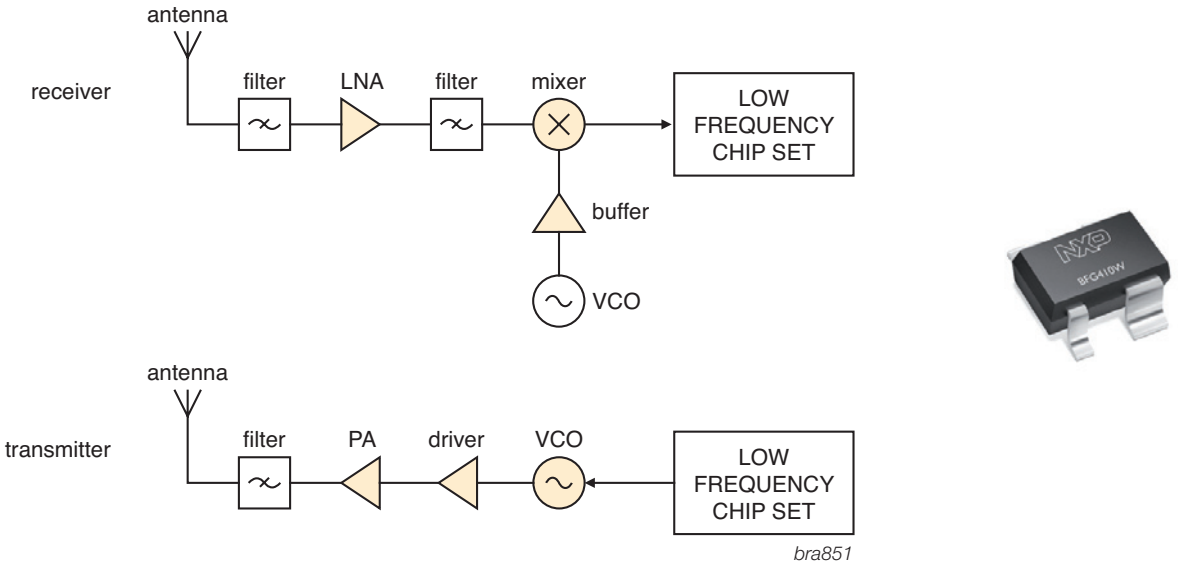
### Features

At 2.3 GHz

- High maximum power gain (Gp) of 17.6 dB
- Noise figure (NF) of 0.8 dB
- Input 1dB gain compression ($P_{i(1dB)}$) of -15 dBm
- Input third order intercept point $IP3_i$ of +4.7 dBm

## 1.5.2 Remote keyless entry, RF generic front-end with dedicated antenna for reception and transmission

### Application diagram




bra851



### Recommended products

| Function | Product | | Package | Type |
|---|---|---|---|---|
| LNA | RF bipolar transistor | Wideband transistor | SOT23 | PBR951 |
| | | | SOT323 | PRF957 |
| | | | SOT323 | PRF947 |
| | MMIC | Low-noise wideband ampl. | SOT1209 | BGU6101 |
| | | | | BGU6102 |
| | | | | BGU6104 |
| | | SiGe:C MMIC | SOT886 | BGU7003W |

| Function | Product | | Package | Type |
|---|---|---|---|---|
| Driver | RF bipolar transistor | Wideband transistor | SOT323 | PRF957 |
| | | | SOT23 | PBR951 |
| | MMIC | Gen-purp wideband amp | SOT363 | BGA2771 |
| | | | SOT363 | BGA2866 |

| Function | Product | | Package | Type |
|---|---|---|---|---|
| VCO | Varicap diodes | VCO varicap diodes | SOD323 | BB148 |
| | | | SOD323 | BB149A |
| | | | SOD523 | BB198 |
| | | | SOD323 | BB156 |

^ AEC-Q101 qualified (some limitations apply)

| Function | Product | | Package | Type |
|---|---|---|---|---|
| Mixer | RF bipolar transistor | Wideband transistor | SOT343 | BFG410W |
| | | | SOT343 | BFG425W |
| | | | SOT343 | BFG480W |

| Function | Product | | Package | Type |
|---|---|---|---|---|
| Buffer | RF bipolar transistor | Wideband transistor | SOT23 | PBR951 |
| | | | SOT323 | PRF957 |
| | | | SOT323 | PRF947 |
| | | | SOT416 | PRF949 |

| Function | Product | | Package | Type |
|---|---|---|---|---|
| Power amplifier | RF bipolar transistor | Wideband transistor | SOT323 | PRF957 |
| | | | SOT23 | PBR951 |
| | MMIC | General-purpose wideband amplifier | SOT363 | BGA2771 |
| | | | SOT363 | BGA2866 |
| | | | SOT908 | BGA7124 |

### Product highlight:
### Varicap diodes as VCO

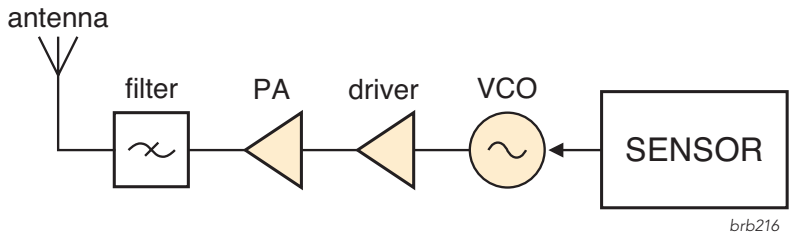
Varicap diodes are principally used as voltage varicap capacitors, with their diode function a secondary option. These devices are ideal for voltage controlled oscillators (VCOs) in ISM band applications.

### Features

- Excellent linearity
- Excellent matching
- Very low series resistance
- High capacitance ratio

## 1.5.3 Tire pressure monitoring system

### Application diagram




### Recommended products

| Function | Product | | Package | Type |
|---|---|---|---|---|
| PA | RF bipolar transistor | Wideband transistor | SOT23 | BFR92A |
| | | | SOT323 | BFR92AW |
| | | | SOT23 | BFR94A^ |
| | | | SOT323 | BFR93AW |
| | | | SOT323 | BFR94AW^ |

| Function | Product | | Package | Type |
|---|---|---|---|---|
| Driver | RF bipolar transistor | Wideband transistor | SOT323 | PRF957 |
| | | | SOT23 | PBR951 |
| | MMIC | Amplifier | SOT363 | BGA2031/1 |
| | | Gen-purp wideband amp | SOT363 | BGA2771 |
| | | | SOT363 | BGA2866 |

| Function | Product | | Package | Type |
|---|---|---|---|---|
| VCO | Varicap diodes | VCO varicap diodes | SOD523 | BB198 |
| | | | SOD323 | BB156 |

^ AEC-Q101 qualified (some limitations apply)




### Product highlight: BGU6101 MMIC wideband amplifier

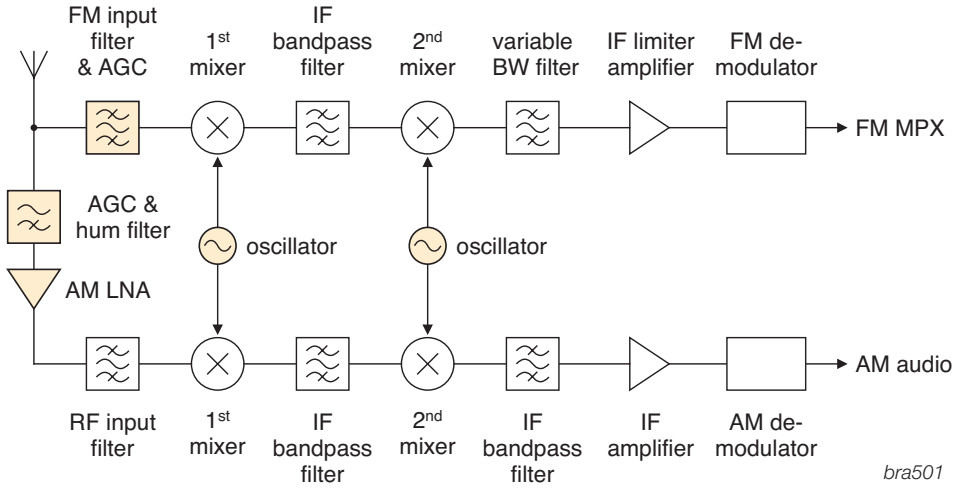
The BGU6101 is an unmatched MMIC featuring an integrated bias-enable function and a wide supply voltage. It is part of a family of three products (BGU6101, BGU6102, BGU6104), and is optimized for 2 mA operation.

### Features

- Applicable between 40 MHz and 6 GHz
- 13 dB gain and 0.8 dB NF at 450 MHz
- 50 Ω FM LNA: 15 dB gain and 1.4 dB NF at 100 MHz
- Integrated temperature-stabilized bias for easy design
- Bias current configurable with external resistor
- Power-down mode current consumption < 1 µA
- ESD protection > 1 kV Human Body Model (HBM) on all pins

## 1.5.4 Car radio receiver (CREST ICs: TEF6860HL, TEF6862HL)

### Application diagram




### Recommended products

| Function | Product | | Package | Type |
|---|---|---|---|---|
| AM LNA | RF transistor | JFET | SOT23 | BF862 |

| Function | Product | | Package | Type |
|---|---|---|---|---|
| FM input filter & AGC | RF diode | Varicap diode | SOT23 | BB201^ |
| | | | SOT23 | BB207 |
| | | PIN diode | SOD523 | BAP70-02 |
| | | | SOD323 | BAP70-03 |

^ OIRT

| Function | Product | | Package | Type |
|---|---|---|---|---|
| AGC & hum filter | RF diode | PIN diode | SOT363 | BAP70AM |

| Function | Product | | Package | Type |
|---|---|---|---|---|
| Oscillator | RF diode | Varicap diode | SOD323 | BB156 |
| | | | SOD523 | BB208-02 |

Note 1:
The following recommended discrete products are applicable for NICEPACS, CCC and DDICE: NICE:TEA6840H,TEA6845H,TEA6846H, NICEPACS:TEA6848H,TEA6849H; CCC:TEF6901H,TEF6903H; DDICE:TEA6721HL. All recommended discrete products are applicable, excluding AM LNA in: DICE2:TEF6730HWCE.

Note 2:
Phones and portable radios (IC:TEA5767/68) use varicap BB202 as the FM oscillator.

### Product highlight:
### BF862 junction field effect transistor

Our tuning portfolio contains advanced products for car radio reception applications and in-vehicle media platforms. The NXP devices for this application ensure excellent reception quality and ease of design-in. Performance is demonstrated in reference designs. The high-performance junction FET BG862 is specially designed for AM radio amplifiers.

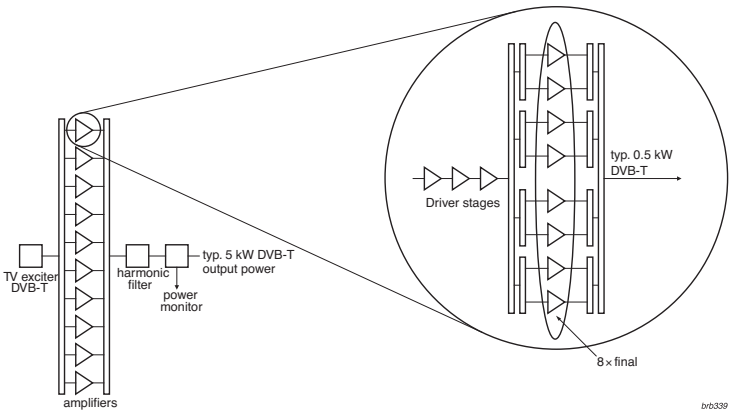
### Features

- High transition frequency and optimized input capacitance for excellent sensitivity
- High transfer admittance resulting in high gain
- Encapsulated in the versatile and easy-to-use SOT23 package

# 1.6 Industrial, scientific & medical (ISM)

## 1.6.1 Broadcast / ISM

### Application diagram




### Recommended broadcast products

| Function | Product | $f_{min}$ (MHz) | $f_{max}$ (MHz) | P1dB (W) | VDS (V) | $\eta_D$ (%) | $G_p$ (dB) | Test signal | Package | Type |
|---|---|---|---|---|---|---|---|---|---|---|
| HPA | Driver | 10 | 500 | 20 | 50 | 70 | 27.5 | CW | SOT467C | BLF571 |
| | | 1 | 1400 | 35 | 32 | 63 | 19 | CW | SOT467C | BLF642 |
| | Final | 1 | 1000 | 100 | 40 | 60 | 21 | CW | SOT467 | BLF871(S) |
| | | 1 | 1000 | 140 | 50 | 49 | 21 | CW | SOT467 | BLF881(S) |
| | | 10 | 1400 | 200 | 32 | 70 | 18 | pulsed | SOT1121 | BLF647P(S)* |
| | | 10 | 128 | 1200 | 50 | 75 | 28.5 | pulsed | SOT539A | BLF178P |
| | | 470 | 860 | 500 | 42 | 47 | 21 | CW | SOT539A | BLF879P |
| | | 470 | 860 | 300 | 50 | 46 | 21 | CW | SOT1121 | BLF884P(S) |
| | | 470 | 860 | 600 | 50 | 46 | 21 | CW | SOT539 | BLF888A(S) |
| | | 470 | 860 | 600 | 50 | 46 | 21 | CW | SOT539 | BLF888B(S) |

### Recommended ISM products

| Function | Product | $f_{min}$ (MHz) | $f_{max}$ (MHz) | P1dB (W) | Matching | VDS (V) | $\eta_D$ (%) | $G_p$ (dB) | Test signal | Package | Type |
|---|---|---|---|---|---|---|---|---|---|---|---|
| HPA | Driver | 1 | 2500 | 12 | I | 28 | 60 | 19 | CW | SOT975 | BLF25M612(G)* |
| | Final | 10 | 128 | 600 | - | 50 | 75 | 28 | pulsed | SOT539 | BLF174XR(S)* |
| | | 10 | 128 | 1400 | - | 50 | 72 | 29 | pulsed | SOT539 | BLF178XR(S) |
| | | 10 | 500 | 200 | - | 50 | 70 | 24 | pulsed | SOT1121 | BLF572XR(S)* |
| | | 10 | 500 | 600 | - | 50 | 70 | 26 | pulsed | SOT539 | BLF574XR(S)* |
| | | 10 | 500 | 1400 | - | 50 | 69 | 23 | pulsed | SOT539 | BLF578XR(S) |
| | | 1300 | 1300 | 250 | I | 50 | 56 | 17 | CW | SOT1121 | BLF6G13L(S)-250P |
| | | 2400 | 2500 | 180 | I/O | 28 | 55 | 12 | CW | SOT539 | BLF2425M6L(S)180P* |
| | | 2400 | 2500 | 140 | I/O | 28 | 52 | 17.5 | CW | SOT502 | BLF2425M7L(S)140* |
| | | 2400 | 2500 | 200 | I/O | 28 | 52 | 15 | CW | SOT502 | BLF2425M7L(S)200* |
| | | 2400 | 2500 | 250 | I/O | 28 | 55 | 15 | CW | SOT539 | BLF2425M7L(S)250P* |

* Check status in section 3.1, as this type is not yet released for mass production

### Product highlight: BLF578XR Power LDMOS transistor

Designed for broadband operation, this 1400 W extremely rugged LDMOS power transistor supports broadcast and industrial applications in the HF to 500 MHz band. This product is an enhanced version of the BLF578. It uses NXP's XR process to provide maximum ruggedness capability in the most severe applications without compromising RF performance.

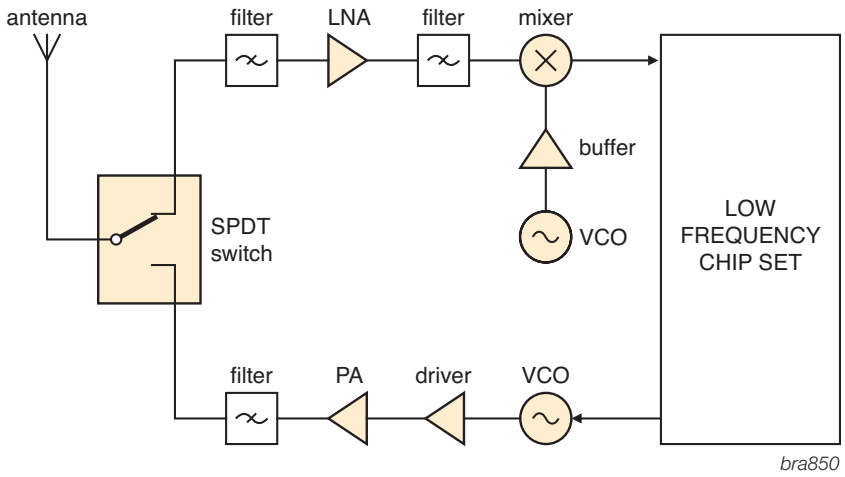
### Features

- Output power = 1400 W
- Power gain = 23 dB
- High Efficiency = 69 %
- Integrated ESD protection
- Excellent ruggedness
- Excellent thermal stability

## 1.6.2 E-metering, RF generic front-end with a single antenna / ZigBee

### Application diagram

**Looking for a wireless microcontroller platform with chipsets, modules and supporting software? See section 2.5.6 Setting the benchmark for ultra low-power and high-performance wireless connectivity solutions.**




bra850




### Recommended products

| Function | Product | | Package | Type |
|---|---|---|---|---|
| SPDT Switch | RF diode | Bandswitch diode | SOD523 | BA277 |
| | | | SOD323 | BA591 |
| | | PIN diode | Various | BAP51^ |
| | | | Various | BAP1321^ |

| Function | Product | | Package | Type |
|---|---|---|---|---|
| LNA | RF transistor | SiGe:C transistor | SOT343F | BFU610F |
| | | | | BFU630F |
| | | | | BFU660F |
| | | | | BFU690F |
| | | | | BFU710F |
| | | | | BFU725F/N1 |
| | | | | BFU730F |
| | | | | BFU760F |
| | | | | BFU790F |
| | MMIC | SiGe:C MMIC | SOT886 | BGU7003W |

| Function | Product | | Package | Type |
|---|---|---|---|---|
| Driver | RF bipolar transistor | Wideband transistor | SOT343 | BFG425W |
| | MMIC | Gen-purp wideband amp | SOT363 | BGA2771 |
| | | | SOT363 | BGA2866 |

^ Also available in ultra-small leadless package SOD882D

| Function | Product | | Package | Type |
|---|---|---|---|---|
| Mixer | RF bipolar transistor | Wideband transistor | SOT343 | BFG410W |
| | | | SOT343 | BFG425W |
| | | | SOT343 | BFG480W |
| | MMIC | Linear mixer | SOT363 | BGA2022 |

| Function | Product | | Package | Type |
|---|---|---|---|---|
| Buffer | RF bipolar transistor | Wideband transistor | SOT23 | PBR951 |
| | | | SOT323 | PRF957 |
| | | | SOT323 | PRF947 |
| | | | SOT416 | PRF949 |

| Function | Product | | Package | Type |
|---|---|---|---|---|
| Medium power amplifier | RF bipolar transistor | Wideband transistor | SOT343 | BFG21W |
| | MMIC | General-purpose wideband amplifier | SOT89 | BGA6289 |
| | | | | BGA6489 |
| | | | | BGA6589 |
| | | | SOT908 | BGA7124 |
| | | | SOT908 | BGA7127 |

| Function | Product | | Package | Type |
|---|---|---|---|---|
| VCO | Varicap diodes | VCO varicap diodes | SOD523 | BB198 |
| | | | SOD323 | BB156 |

### Product highlight:
### BGA7127 MMIC medium power amplifier

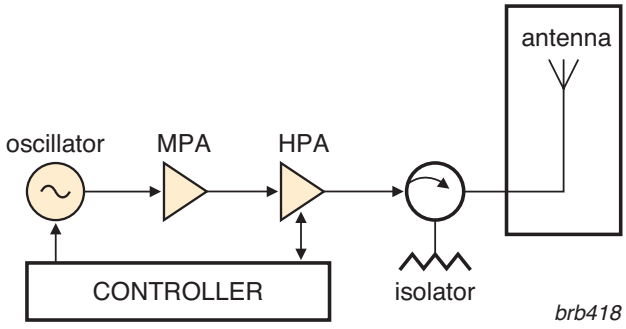
The BGA7127 MMIC is a one-stage driver amplifier offered in a low-cost, ultra-small SOT908 leadless package. It delivers 27 dBm output power at 1 dB gain compression and superior performance for various narrowband-tuned application circuits at frequencies up to 2700 MHz.

### Features

- Operating range: 400 to 2700 MHz
- 16 dB small signal gain at 2 GHz
- 27 dBm output power at 1 dB gain compression
- Integrated active biasing
- 3.3 / 5 V single-supply operation
- Simple quiescent current adjustment
- 1 µA shutdown mode

## 1.6.3 RF microwave furnace application

### Application diagram




### Recommended products

| Function | Product | Package | Type |
|---|---|---|---|
| Oscillator | RF transistor | SOT343R | BFG410W |
| | | | BFG424W |
| | | | BFG425W |
| | | SOT343F | BFG424F |
| | | | BFU610F |
| | | | BFU630F |
| | | | BFU660F |
| | | | BFU690F |
| | | | BFU710F |
| | | | BFU725F/N1 |
| | | | BFU730F |
| | | | BFU760F |
| | | | BFU790F |




| Function | Product | Package | Type |
|---|---|---|---|
| MPA (medium power amplifier) | MMIC | SOT89 | BGA6289 |
| | | | BGA6489 |
| | | | BGA6589 |
| | | SOT908 | BGA7124 |
| | | SOT89 | BGA7024 |
| | | SOT908 | BGA7127 |
| | | SOT89 | BGA7027 |
| | | SOT908 | BGA7130 |

* Check status in section 3.1, as this type is not yet released for mass production

| Function | Product | $f_{min}$ (MHz) | $f_{max}$ (MHz) | P1dB (W) | $\eta_D$ (%) | $G_p$ (dB) | test signal | Package | Type |
|---|---|---|---|---|---|---|---|---|---|
| HPA | Driver | 1 | 2500 | 12 | 60 | 19 | CW | SOT975 | BLF25M612(G) |
| | Final | 2400 | 2500 | 180 | 55 | 12 | CW | SOT539 | BLF2425M6L(S)180P |
| | | 2400 | 2500 | 140 | 52 | 17.5 | CW | SOT502 | BLF2425M7L(S)140* |
| | | 2400 | 2500 | 200 | 52 | 15 | CW | SOT502 | BLF2425M7L(S)200 |
| | | 2400 | 2500 | 250 | 55 | 15 | CW | SOT539 | BLF2425M7L(S)250P* |

### Product highlight:
### New family for ISM 2.45 GHz

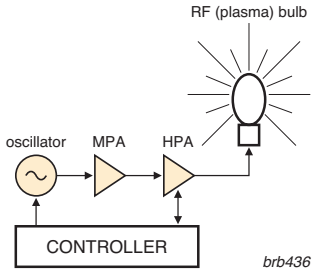
NXP's 6th and 7th generation LDMOS technology, along with advanced packaging concepts, enables power amplifiers that deliver best-in-class performance at 2.45 GHz. The unsurpassed ruggedness and low thermal resistance, along with the intrinsic efficiency of the LDMOS process, make these transistors ideally suited for furnace applications.

### Features
- Excellent ruggedness
- Consistent device performance
- Low thermal resistance for unrivalled reliability
- Ease of design

## 1.6.4 RF plasma lighting

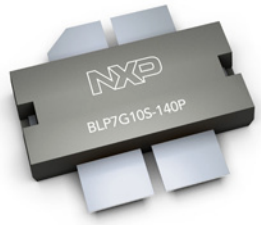
**Looking for more information on RF plasma lighting?**
**See section 2.5.2 RF-driven plasma lighting: The next revolution in light sources are powered by solid-state RF technology**

### Application diagram




### Recommended products

| Function | Product | Package | Type |
|---|---|---|---|
| Oscillator | RF transistor | SOT143 | BFG520 |
| | | SOT143 | BFG325/XR |
| | | SOT23 | BFR520 |
| | | SOT323 | BFR92AW |
| | | SOT323 | BFR93AW |
| | | SOT323 | BFS520 |
| | | SOT343 | BFG520W |
| | | SOT343 | BFG325W/XR |
| | | SOT363 | BFM520 |
| | | SOT416 | BFR520T |




| Function | Product | Package | Type |
|---|---|---|---|
| MPA (medium power amplifier) | MMIC | SOT89 | BGA6289 |
| | | | BGA6489 |
| | | | BGA6589 |
| | | SOT908 | BGA7124 |
| | | SOT89 | BGA7024 |
| | | SOT908 | BGA7127 |
| | | SOT89 | BGA7027 |
| | | SOT908 | BGA7130 |

| Function | Product | $f_{min}$ (MHz) | $f_{max}$ (MHz) | P1dB (W) | Package | Type |
|---|---|---|---|---|---|---|
| HPA | Driver | 1 | 2500 | 12 | SOT975 | BLF25M612(G)* |
| | | 10 | 500 | 20 | SOT467C | BLF571 |
| | Final | 1 | 1000 | 100 | SOT467 | BLF871(S) |
| | | 10 | 500 | 300 | SOT502 | BLF573(S) |
| | | 10 | 500 | 600 | SOT539A | BLF574 |
| | | 10 | 500 | 600 | SOT539 | BLF574XR(S)* |
| | | 10 | 500 | 1200 | SOT539A | BLF578 |
| | | 10 | 500 | 1400 | SOT539 | BLF578XR(S) |
| | | 688 | 1000 | 200 | SOT502 | BLF6G10(LS)-200RN |
| | | 700 | 1000 | 135 | SOT502 | BLF6G10(LS)-135RN |
| | | 700 | 1000 | 160 | SOT502 | BLF6G10(LS)-160RN |
| | | 2400 | 2500 | 180 | SOT539 | BLF2425M6L(S)180P* |
| | | 2400 | 2500 | 140 | SOT502 | BLF2425M7L(S)140 |
| | | 2400 | 2500 | 200 | SOT502 | BLF2425M7L(S)200* |
| | | 2400 | 2500 | 250 | SOT539 | BLF2425M7L(S)250P |

* Check status in section 3.1, as this type is not yet released for mass production

### Product highlight: LDMOS enables RF lighting

NXP's 50 V high-voltage LDMOS process enables highest power at the extreme ruggedness levels necessary for this kind of application.
BLF578: 1200 W CW operation - highest power LDMOS

### Features

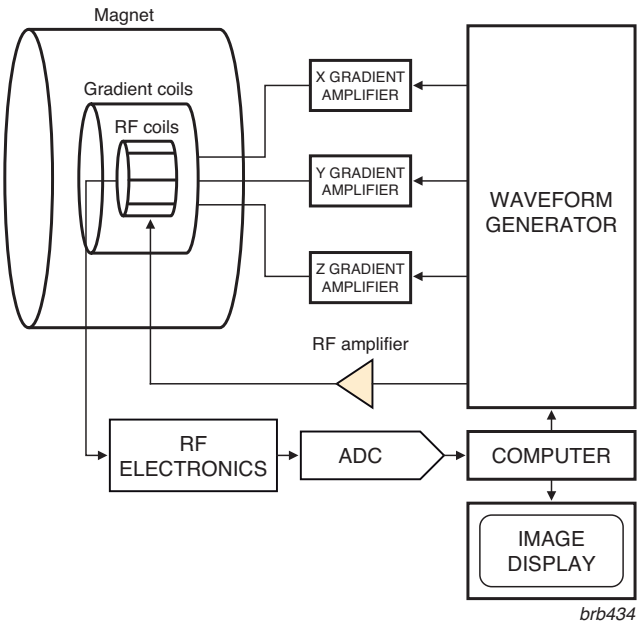
- Highest power device
- Unprecedented ruggedness
- Low thermal resistance for reliable operation
- Consistent device performance
- Broadband device for flexible use

## 1.6.5 Medical imaging

**Looking for more information on medical applications?**
**See section 2.5.1 Medical applications driven by RF power: From imaging to cancer treatment, a flexible and versatile technology in the doctor's toolbox**



### Application diagram




### Recommended products

| Function | Product | $f_{min}$ (MHz) | $f_{max}$ (MHz) | P1dB (W) | Package | Type |
|---|---|---|---|---|---|---|
| HPA | Driver | 1 | 2500 | 12 | SOT975 | BLF25M612(G)* |
| | | 10 | 500 | 20 | SOT467C | BLF571 |
| | Final | 1 | 1000 | 100 | SOT467 | BLF871(S) |
| | | 10 | 500 | 300 | SOT502 | BLF573(S) |
| | | 10 | 500 | 600 | SOT539A | BLF574 |
| | | 10 | 500 | 600 | SOT539 | BLF574XR(S)* |
| | | 10 | 500 | 1200 | SOT539A | BLF578 |
| | | 10 | 500 | 1400 | SOT539 | BLF578XR(S) |
| | | 688 | 1000 | 200 | SOT502 | BLF6G10(LS)-200RN |
| | | 700 | 1000 | 135 | SOT502 | BLF6G10(LS)-135RN |
| | | 700 | 1000 | 160 | SOT502 | BLF6G10(LS)-160RN |
| | | 2400 | 2500 | 140 | SOT502 | BLF2425M7L(S)140 |
| | | 2400 | 2500 | 180 | SOT539 | BLF2425M6L(S)180P* |
| | | 2400 | 2500 | 200 | SOT502 | BLF2425M7L(S)200* |
| | | 2400 | 2500 | 250 | SOT539 | BLF2425M7L(S)250P |

* Check status in section 3.1, as this type is not yet released for mass production

### Product highlight:
### LDMOS in emerging medical applications

NXP's line of 50 V high-voltage LDMOS devices enables highest power output and features unequalled ruggedness for pulsed operation in MRI and NMR applications. The high power densities enable compact amplifier design.

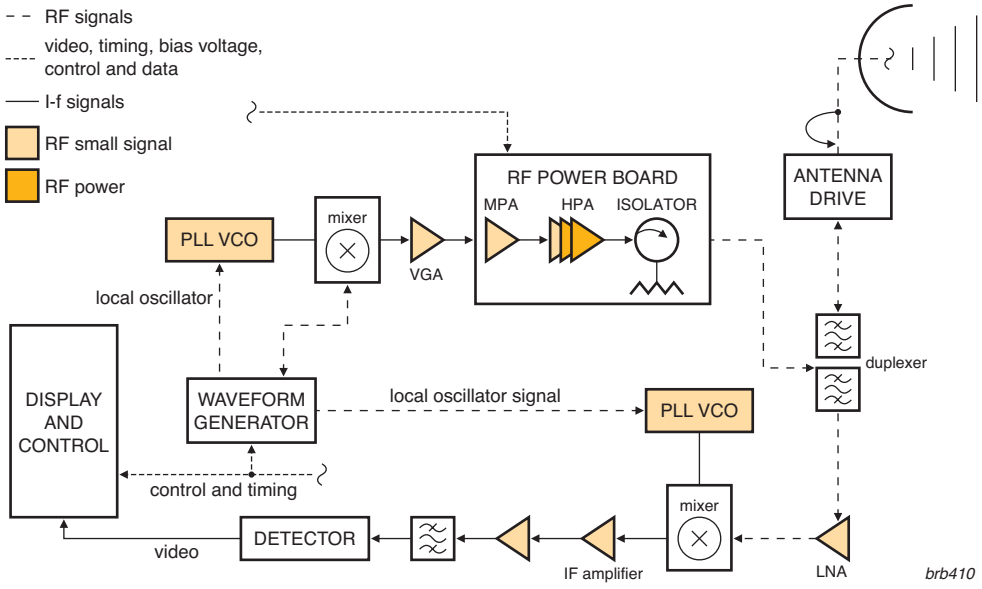
### Features

- Best broadband efficiency
- Highest power (density) devices
- Unrivalled ruggedness
- Consistent device performance

# 1.7 Aerospace and defense

## 1.7.1 Microwave products for L- and S-band radar and avionics applications

### Application diagram




### Recommended products

| Function | Product | $f_{min}$ (MHz) | $f_{max}$ (MHz) | P1dB (W) | VDS (V) | $\eta_D$ (%) | $G_p$ (dB) | Package | Type |
|---|---|---|---|---|---|---|---|---|---|
| HPA | Driver | 500 | 1400 | 25 | 50 | 50 | 19 | SOT467C | BLL6H0514-25 |
| | | 1030 | 1090 | 10 | 36 | 40 | 16 | SOT467C | BLA1011-10 |
| | | 1030 | 1090 | 2 | 36 | - | 16 | SOT538A | BLA1011-2 |
| | | 2700 | 3100 | 6 | 32 | 33 | 15 | SOT975C | BLS6G2731-6G |
| | | 2700 | 3500 | 30 | 32 | 50 | 13 | SOT1135 | BLS6G2735L(S)-30 |
| | | 3100 | 3500 | 20 | 32 | 45 | 15.5 | SOT608 | BLS6G3135(S)-20 |
| | Final | 400 | 1000 | 600 | 50 | 57 | 20 | SOT539 | BLU6H0410L(S)-600P |
| | | 500 | 1400 | 130 | 50 | 50 | 17 | SOT1135 | BLL6H0514L(S)-130 |
| | | 960 | 1215 | 250 | 36 | 50 | 13.5 | SOT502A | BLA0912-250R |
| | | 960 | 1215 | 500 | 50 | 50 | 17 | SOT634A | BLA6H0912-500 |
| | | 1030 | 1090 | 200 | 28 | 65 | 20 | SOT502 | BLA6G1011LS-200RG |
| | | 1030 | 1090 | 600 | 48 | 52 | 17 | SOT539A | BLA6H1011-600 |
| | | 1200 | 1400 | 250 | 36 | 45 | 15 | SOT502A | BLL6G1214L-250 |
| | | 1200 | 1400 | 500 | 50 | 50 | 17 | SOT539A | BLL6H1214-500 |
| | | 1200 | 1400 | 250 | 50 | 55 | 17 | SOT502 | BLL6H1214L(S)-250 |
| | | 2700 | 3100 | 130 | 32 | 50 | 12 | SOT922-1 | BLS6G2731S-130 |
| | | 2700 | 2900 | 350 | 32 | 50 | 13.5 | SOT539 | BLS7G2729L(S)-350P |
| | | 2900 | 3300 | 150 | 32 | 47 | 13.5 | SOT922-1 | BLS7G2933S-150 |
| | | 3100 | 3500 | 120 | 32 | 43 | 11 | SOT502 | BLS6G3135(S)-120 |
| | | 3100 | 3500 | 350 | 32 | 43 | 10 | SOT539 | BLS7G3135L(S)-350P* |

* Check status in section 3.1, as this type is not yet released for mass production

**Product highlight:**

**BLS7G2729L-350P LDMOS S-band radar power transistor**

Designed for S-band operation (2.7 to 2.9 GHz), this internally matched LDMOS power transistor for rader applications delivers an output power of 350 W and a power gain of 13.5 dB at an efficiency of 50 %.

**Features**

- Easy power control
- Integrated ESD protection
- High flexibility with respect to pulse formats
- Excellent ruggedness
- Excellent thermal stability

| Function | Product | | Package | Type |
|---|---|---|---|---|
| LNA (low-noise amplifier) & Mixer | RF transistor | SiGe:C transistor | SOT343F | BFU710F |
| | | | | BFU725F/N1 |
| | | | | BFU730F |

| Function | Product | | Package | Type |
|---|---|---|---|---|
| IF amplifier | MMIC | MMIC | SOT363 | BGA2800 |
| | | | | BGA2801 |
| | | | | BGA2815 |
| | | | | BGA2816 |
| | | | | BGA2850 |
| | | | | BGA2865 |
| | | | | BGA2866 |
| | | General-purpose wideband amplifiers | | BGM1014 |
| | | | | BGM1013 |
| | | | | BGM1012 |

| Function | Product | | Package | Type |
|---|---|---|---|---|
| PLL/VCO LO generator | RF IC | SiGe:C IC | SOT616 | TFF1003HN |
| | | | | TFF1007HN |
| | | | | TFF11xxxHN^ |

| Function | Product | Gain range | Package | Type |
|---|---|---|---|---|
| Single VGA (variable-gain amplifier) | MMIC | 31 dB | SOT617 | BGA7210 |
| | | | | BGA7204 |

| Function | Product | Gain range | Package | Type |
|---|---|---|---|---|
| Dual VGA (variable-gain amplifier) | MMIC | 24 dB | SOT617 | BGA7350 |
| | | 28 dB | | BGA7351 |

| Function | Product | $P_{L(1\ dB)}$ @ 940 MHz | Package | Type |
|---|---|---|---|---|
| MPA (medium power amplifier) | MMIC | 24 dBm | SOT89 | BGA7024 |
| | | 28 dBm | | BGA7027 |
| | | 25 dBm | SOT908 | BGA7124 |
| | | 28 dBm | | BGA7127 |
| | | 30 dBm | | BGA7130 |

^ 17 different types with LO ranges: 7-15 GHz, see 3.4.4












## Product highlight:
## BGA28xx-family of IF gain blocks

The BGA28xx IF gain blocks are silicon Monolitic Microwave Integrated Circuit (MMIC) wideband amplifiers with internal matching circuitry in a 6-pin SOT363 plastic SMD package.

### Features
- No output inductor necessary when used at the output stage
- Internally matched to 50 Ω
- Reverse isolation > 30 dB up to 2 GHz
- Good linearity with low second order

# 2. Focus applications, products & technologies

## 2.1 Wireless communication infrastructure

### 2.1.1 Build a highly efficient signal chain with RF components for transmit line-ups and receive chains

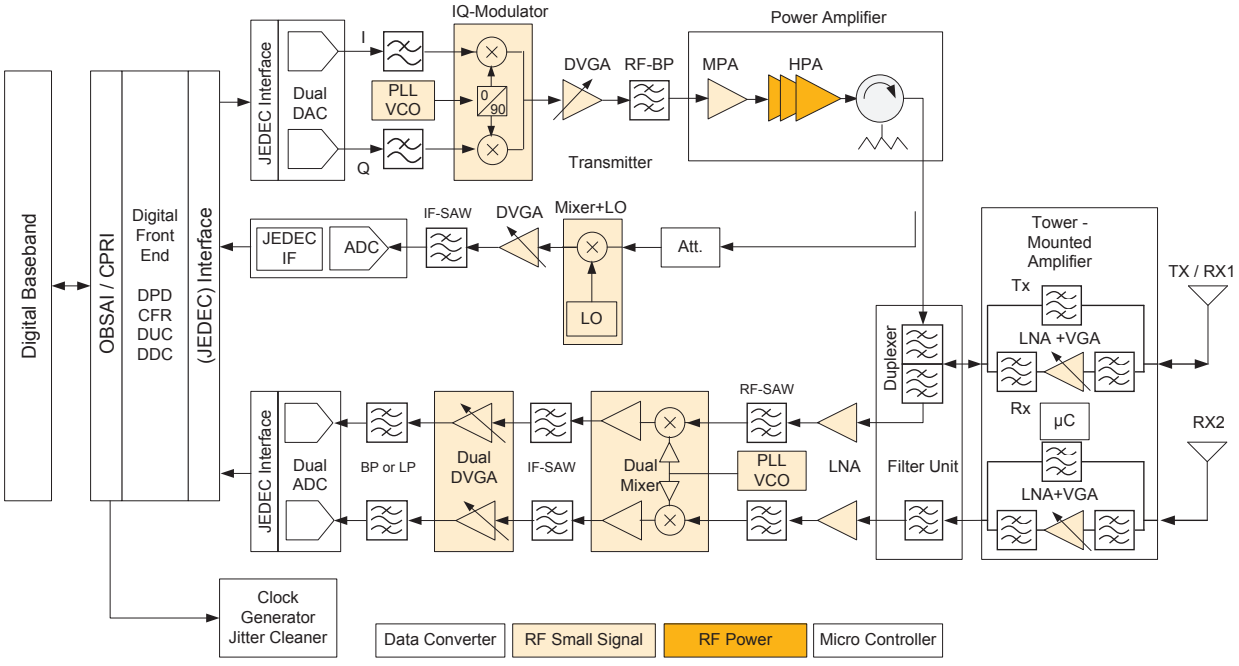
As a global leader in RF technology and component design, NXP Semiconductors offers a complete portfolio of RF products, from low- to high-power signal conditioning that delivers advanced performance and helps simplify your design and the development process. Our solutions range from discrete devices to modular building blocks, so you can design a highly efficient signal chain.

**State-of-the-art QUBiC4**

NXP's industry-leading QUBiC4 technology, available since 2002, has been widely deployed in the field and offers more consistent parameter performance compared to GaAs technology. It speeds the migration from GaAs to silicon and delivers more functionality in less space. High integration reduces the design footprint and enables more cost-competitive designs. It also improves reliability and offers significant savings in manufacturing expenditures.

**Application diagram of base station (all cellular standards and frequencies)**

The block diagram below shows base station transmit (upper part, Tx) and receive (lower part, Rx) functions, and includes the Tx feedback function (middle part, Tx feedback).




**Digital wideband VGAs with high linearity & flexible current settings**

These 6-bit digital VGAs (BGA7204 & BGA7210) offer high linearity (35 dBm @ 2.2-2.8 GHz) and high output power (23 dBm @ 2.2-2.8 GHz) across a large bandwidth without external matching. Smart routing with no connection crosses simplifies design and decreases footprint by 25%.

The unique power-save mode can effectively reduce the current consumption in TDD systems up to 45%. The BGA7210 adds flexible current distribution across its two amplifiers, depending on the attenuation state, to save current.

## Dual digital IF VGAs

The BGA7350 and BGA7351 are dual, independently controlled receive IF VGAs that operate from 50 to 250 MHz. Integrated matching improves performance in the receiver chain, because the VGA can drive the filter directly into the analog-to-digital converter to ensure a constant input level. The BGA7350 has a gain range of 24 dB, while the BGA7351 has a range of 28 dB. For both devices, the maximum gain setting delivers at least 16 dBm output power at 1 dB gain compression (P1dB). For gain control, each amplifier uses a separate digital gain-control code, which is provided externally through two sets of five bits. The resulting gain flatness is 0.1 dB.

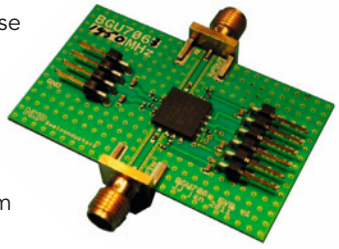



## Medium power amplifier

The NXP MPAs (BGA7x2x/BGA7x3x) are based on a one-stage amplifier, available in a low-cost surface-mount package. It delivers a set of available output power from 24 to 30 dBm. All cover the frequency range from 400 to 2700 MHz.

## Low-noise amplifiers up to 2.8 GHz

Designed for high linearity and low noise, these monolithic SiGe:C BiCMOS LNAs (BGU7051, BUG7052 & BGU7053) deliver 18-24 dB gain, 3-5 dB more gain than equivalents, along with low power consumption. The RF input power overdrive of 20 dBm and the high ESD protection (HBM 4 kV; CDM 2 kV) make these devices extremely rugged. Integrated biasing circuitry, 3.3 V supply voltage and low external component count (only 6 capacitors) ensures easy system integration.

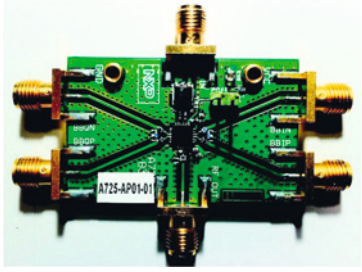


## Integrated base station LNAs with lowest NF for the complete LNA chain

NXP provides the industry's only fully Integrated base station LNA that can be tailored to the needs of individual OEMs for optimal fit in their Rx line-ups. By integrating three stages in one monolithic design, these SiGe:C BiCMOS LNAs (BGU706x) deliver the industry's lowest noise figure for a receive chain (0.9 dB), while saving up to 80% in component cost. Additionally, the analog gain control up to 35 dB, RF input power overdrive of 10-15 dBm, and high linearity (0.9-2.5 dBm IP3I at maximum gain) make them very suitable in small cell sizes.

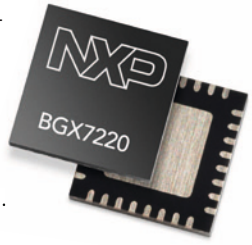
## IQ modulators

The BGX7100 and BGX7101 devices combine high performance, high linearity I and Q modulation paths for use in radio frequency up-conversion. It supports RF frequency outputs in the range from 400 to 4000 MHz. The BGX710x IQ modulator is performance-independent of the IQ common mode voltage. The modulator provides a typical output 1 dB compression point (PL(1dB)) value of 12 dBm and a typical 27 dBm output third-order intercept point ($IP3_O$). Unadjusted sideband suppression and carrier feed through are 50 dBc and −45 dBm respectively. A hardware control pin provides a fast power-down/power-up mode functionality which allows significant power saving. The BGX7101 is 4 dB higher gain compared to the BGX7100.



## Dual mixers

The BGX722x device combines a pair of high-performance, high-linearity down-mixers for use in receivers having a common local oscillator (e.g. having main and diversity paths). Each mixer provides an input 1 dB compression point (P1dB) above 13 dBm, with an input third-order intercept point (IIP3) of 26 dBm. The small-signal noise figure (NF) is below 10 dB whereas under large signal blocking conditions the NF is typically 19 dB. Isolation between mixers is at least 40 dB.




## Synthesizer with an integrated VCO (LO generator)

The BGX7300 is a low phase noise wideband synthesizer with an integrated VCO which allows the implementation of an integer-N or fractional-N Phase-Locked Loop (PLL). The integrated voltage controlled oscillator (VCO) supports a fundamental frequency range from 2.2 GHz up to 4.4 GHz. The BGX7300 has dual differential RF outputs, each with output power up to +5 dBm. The VCO frequency can by divided by 1/2/4/8/16/32 before being fed to the RF outputs. Hence the generated output frequency can be as low as 68.75MHz. For isolation purpose, each RF output can be muted or forced into power-down mode using a hardware pin or SPI sofware control. A dedicated differential input stage lets the BGX7300 work with an external VCO. Most of the characteristics are programmable via a 3- or 4-wire Serial Peripheral Interface bus (SPI). Each VCO is powered from an internally regulated voltage source providing sufficient power supply rejection. The device is designed to operate from 3.3 V nominal supply voltage connected to the supply pins.

**Selection guides of the listed components are available in Chapter 3 (3.4.1 & 3.4.2).**

## 2.1.2 Digital wideband VGAs with high linearity & flexible current settings

### *NXP digital VGAs BGA7204 & BGA7210*

These 6-bit digital VGAs offer high linearity (35 dBm @ 2.2-2.8 GHz) and high output power (23 dBm @ 2.2-2.8 GHz) across a large bandwidth without external matching. Smart routing with no connection crosses simplifies design and decreases footprint by 25%. The unique power-save mode can effectively reduce the current consumption in TDD systems up to 45%. The BGA7210 adds flexible current distribution across its two amplifiers, depending on the attenuation state, to save current.

**Key features**

- Internally matched for 50 Ω
  - BGA7204 = 0.4 to 2.75 GHz
  - BGA7210 = 0.7 to 3.8 GHz
- High maximum power gain
  - BGA7204 = 18.5 dB
  - BGA7210 = 30 dB
- High output third-order intercept, $IP3_O$
  - BGA7204 = 38 dBm
  - BGA7210 = 39 dBm
- Attenuation range of 31.5 dB, 0.5 dB step size (6 bit)
- High output power, $P_{L(1dB)}$
  - BGA7204 = 21 dBm
  - BGA7210 = 23 dBm
- Fast switching power-save mode (power down pin)
- Digitally controlled current setting from 120 to 195 mA with an optimum at 185mA (BGA7210 only)
- Simple control interfaces
  - BGA7204 SPI and parallel
  - BGA7210 SPI
- ESD protection on all pins (HBM 4 kV; CDM 2 kV)
- HVQFN32 (5 x 5 x 0.85 mm)

**Key benefits**

- Wideband operation supports platforms with multiple frequency ranges
- Smart lead routing produces simpler design, decreases footprint by 25%
- Power-save mode can reduce current consumption in TDD systems up to 45%
- Flexible current setting (BGA7210) saves power
- Monolithic design enables high quality

**Applications**

- GSM, W-CDMA, WiMAX, LTE base stations
- Wireless point-to-point and repeaters
- Cable modem termination systems
- Temperature-compensation circuits




**OM7921 – BGA7210 customer evaluation kit (also available OM7922 – BGA7204 CEK)**



The NXP BGA7204 and BGA7210 are monolithic digital variable-gain amplifiers (VGAs) that operate over an extremely wide range with high linearity and high output power.

Designed for the transmit path of wireless architectures, these VGAs can be used to control the power level to the power amplifier. The up-converted signals are fed to the VGA, and thus help compensate for variations in cell load and the presence of aging infrastructure equipment.

The BGA7204 operates in the range between 0.4 and 2.75 GHz, while the BGA7210 operates between 0.7 and 3.8 GHz. By supporting more than 2 GHz of bandwidth, these devices can be used to populate several frequency bands.

An integrated power-save mode makes it possible to reduce consumption even more, to just 15 mA during a receive slot. This can effectively reduce the current consumption in Time Division Duplexing (TDD) systems up to 45%.

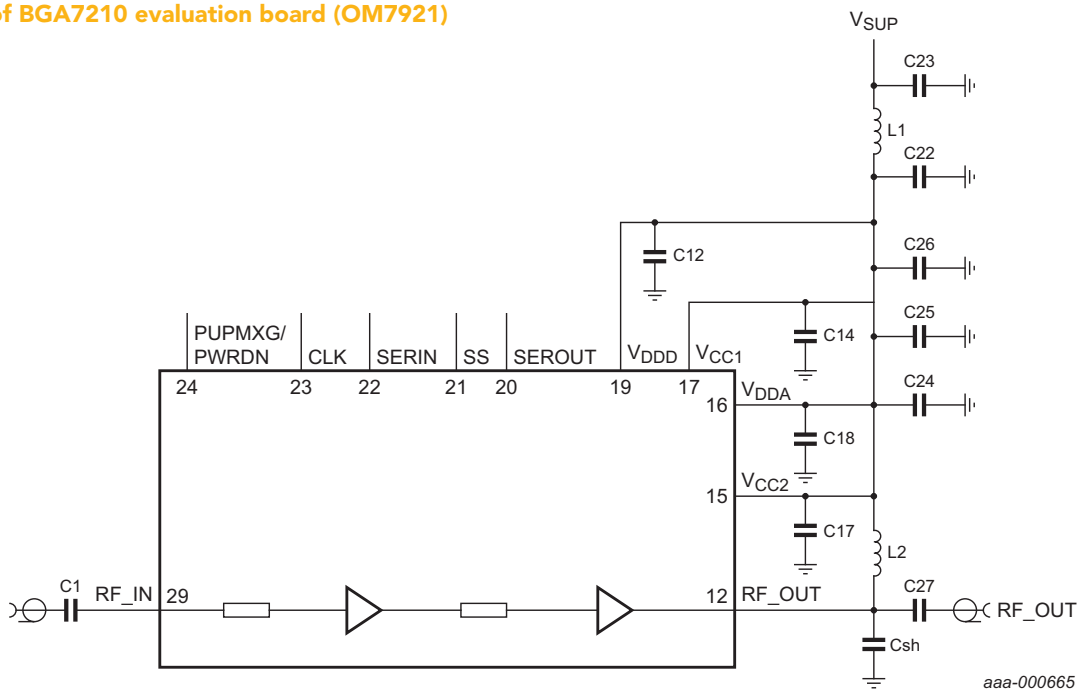
The BGA7210 builds on the BGA7204 by adding flexible current setting across its two amplifiers, depending on the attenuation state. The serial peripheral interface is used to set the attenuation state, and, using a similar method, to set the current through the first and second amplifiers. The desired configuration is set by software and enables current savings of as much as 75 mA.

Higher output power, higher peak gain, and smaller attenuator step sizes enable engineers to use fewer components and provide greater control to maintain and optimize performance in the transmit chain.

Smart routing (with no connection crosses) reduces the number of board connections, simplifies design-in, and decreases the design footprint by 25%. The monolithic design increases reliability and ensures high quality.



## Schematic of BGA7210 evaluation board (OM7921)




## Digital VGAs

| Type number | Package | $f_{range}$ [min] (MHz) | $f_{range}$ [max] (MHz) | @ $V_{CC}$ (V) | @ $I_{CC}$ [typ] (mA) | $G_P$ @ minimum attenuation (dB) | Attenuation range (dB) | $IP3_O$ [typ] (dBm) | $P_{L(1dB)}$ [typ] (dBm) | NF [typ] (dB) |
|---|---|---|---|---|---|---|---|---|---|---|
| BGA7204 | SOT617-3 | 400 | 700 | 5 | 115 | 18.5 | 31.5 | 38.0 | 21.0 | 7.0 |
| | | 700 | 1450 | 5 | 115 | 18.5 | 31.5 | 37.5 | 21.0 | 6.5 |
| | | 1450 | 2100 | 5 | 115 | 17.5 | 30.5 | 36.0 | 20.5 | 6.5 |
| | | 2100 | 2750 | 5 | 115 | 16.5 | 30.0 | 34.0 | 20.0 | 7.0 |
| BGA7210 | SOT617-3 | 700 | 1400 | 5 | 185 | 30.0 | 31.5 | 39.0 | 21.0 | 6.5 |
| | | 1400 | 1700 | 5 | 185 | 29.5 | 31.5 | 37.0 | 21.0 | 6.5 |
| | | 1700 | 2200 | 5 | 185 | 29.0 | 31.5 | 35.0 | 21.0 | 6.5 |
| | | 2200 | 2800 | 5 | 185 | 28.0 | 30.5 | 35.0 | 23.0 | 7.0 |
| | | 3400 | 3800 | 5 | 185 | 26.0 | 29.5 | 27.0 | 19.0 | 8.0 |

## 2.1.3 Doherty amplifier technology for state-of-the-art wireless infrastructure

*Best-in-class PA designs enable considerable energy savings*

NXP's latest power amplifier designs let the wireless infrastructure run with significantly higher energy efficiency – towards "Green Base Stations". In order to achieve the highest efficiencies currently possible, NXP combines its latest generations of LDMOS technology (Gen7 & 8) with the Doherty concept. The high performance of our LDMOS technology, matched with the efficiency of the Doherty technology, creates power amplifiers that offer high efficiency and high gain, are easily linearizable, and are more cost-effective to operate.

Developed by W.H. Doherty in 1936, the Doherty amplifier remained largely unused because the dominant mobile communication system modulation techniques (FM, GMSK, and EDGE) did not require high peak-to-average ratio (PAR) signals. For today's base stations, however, transmitting 3G, 4G, and multi-carrier signals makes the high power and added efficiency of the Doherty approach the preferred option for most service providers.

NXP's Doherty designs ensure high efficiency while maintaining a very similar peak power capability of two transistors combined. The input and output sections are internally matched, benefiting the amplifiers with high gain, good gain flatness, and phase linearity over a wide frequency band.

**Integrated Doherty**

NXP offers the world's first fully integrated Doherty designs. From the outside these devices look like ordinary transistors. In fact, they are completely integrated Doherty amplifiers that readily deliver the associated high efficiency levels for base station applications. With the ease of design-in of an ordinary Class AB transistor, they also provide significant space and cost savings.

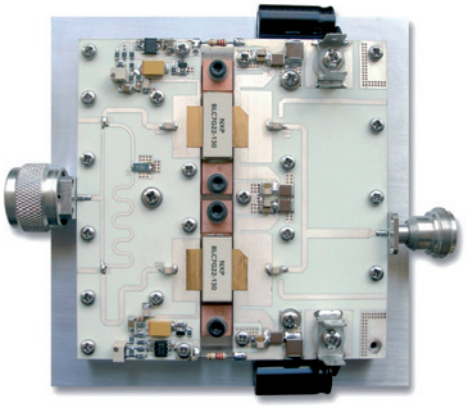
**Key features & benefits**

- Contains splitter, main and peak amplifier, delay lines, and combiner in one package
  - 40% efficiency @ 10 W average power
  - No additional tuning in manufacturing
- Design is as easy as with a single Class AB transistor
- Ideally suited for space-constrained applications (e.g. remote radio heads, antenna arrays)
- Currently available for TD-SCDMA (BLD6G21L(S)-50) and W-CDMA (BLD22L(S)-50); see section 3.7.1.4 for details

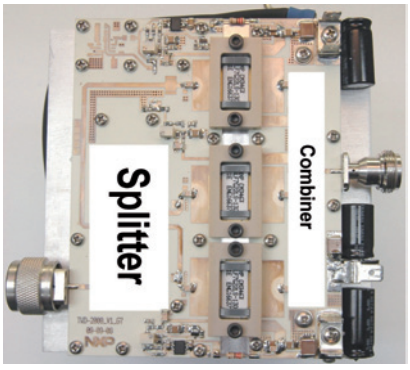


## Discrete Doherty amplifiers

In addition to the integrated versions, NXP offers product demonstrators for very efficient, high-power, discrete two- and three-way Doherty amplifiers. The two-way designs, based on the BLF7G22LS-130 device, deliver 47.0 dBm (50 W) with 43% efficiency and 15.7 dB gain for W-CDMA applications.



Our flagship three-way Doherty demonstrator achieves 48% efficiency at 48 dBm (63 W) average output power and 15.0 dB gain with a two-carrier W-CDMA signal. The current design covers the W-CDMA standard for band 1 operation and is tailored towards high-yield, minimum-tuning, volume manufacturing.




## Key features & benefits

- Most efficient Doherty amplifier designs available to date
- Production-proven, consistent designs
- NXP's LDMOS provides unsurpassed ruggedness
- Currently available for the following frequency bands:
  - 728 to 821 MHz
  - 869 to 960 MHz
  - 1805 to 1880 MHz (DCS)
  - 1930 to 1990 MHz (PCS)
  - 1880 to 2025 MHz (TD-SCDMA)
  - 2110 to 2170 MHz (UMTS / LTE)
  - 2300 to 2400 MHz (WiBRO / LTE)
  - 2500 to 2700 MHz (WiMAX / LTE)
  - 3300 to 3800 MHz (WiMAX)

All of our product demonstrators are supported by comprehensive documentation and hardware.
Please see section 3.7.1.8 for a complete list of available designs.



## Power LDMOS Doherty designs

| Freq band (MHz) | PPEAK (dBm) | POUT-AVG (dBm) | VDS (V) | Gain (dB) | Drain Eff. (%) | Type | Main transistor | Peak transistor |
|---|---|---|---|---|---|---|---|---|
| 869-894 | 59.2 | 50.4 | 28 | 16 | 52 | 3-WAY | BLF7G10LS-250 | 2x BLF7G10LS-250 |
| 920-960 | 57.3 | 49.3 | 30 | 16 | 50 | ASYM | BLF8G10LS-160 | BLF7G10LS-250 |
| 1526-1555 | 56.6 | 48.6 | 28 | 18.4 | 42 | SYM | BLF7G15LS-200 | BLF7G15LS-200 |
| 1805-1880 | 58.6 | 51 | 28 | 16 | 47.6 | 3-WAY | BLF7G20LS-200 | 2x BLF7G20LS-200 |
| 1930-1990 | 58.2 | 50 | 28 | 16 | 40 | SYM | BLF7G20LS-250P | BLF7G20LS-250P |
| 2010-2025 | 52.2 | 44 | 28 | 15.6 | 43 | SYM | 1/2 BLF7G21LS-160P | 1/2 BLF7G21LS-160P |
| 2110-2170 | 56.5 | 49 | 28 | 14.2 | 46 | ASYM | BLF7G22LS-160 | BLF7G22LS-200 |
| 2110-2170 | 57.2 | 49.2 | 28 | 16 | 47 | 3-WAY | BLF7G22LS-160 | 2x BLF7G22L(S)-160 |
| 2300-2400 | 56.8 | 48.5 | 30 | 15 | 42 | 3-WAY | BLF7G24LS-100 | 2x BLF7G24LS-100 |
| 2620-2690 | 55.2 | 47.2 | 30 | 15 | 41 | ASYM | BLF7G27LS-100 | BLF7G27LS-140 |

## 2.1.4 The new generation of LDMOS RF power for wireless infrastructures: NXP's Gen8

NXP announced last year the 8th generation of its renowned RF power device portfolio for base stations. Listening carefully to the world's leading infrastructure providers and understanding their requirements, we took a holistic approach to the development of Gen8. This means that we scrutinized every detail of a power transistor and reconsidered the entire "transistor system" to ceate a new generation that performs markedly better than its predecessors, and its competitors, and again sets standards for the industry.

### Gen8 addresses the key trends in the wireless infrastructure industry

- Increasing signal bandwidths up to 100 MHz to enable full-band operation
- Cost sensitivity: peak powers up to 270 Watts in SOT502-sized packages
- Reduction in the size/weight/volume of the cabinet
- The ongoing need for greater electrical efficiency to reduce cooling requirements and operational expenditures
- Ever-increasing output power
- The need to deploy multi-standard and future-proof solutions

Gen8 is the answer to all these often conflicting requirements. The package and die design, as well as the input and output match structures, have been optimized to enable wideband, affordable, compact, multi-standard, and highly efficient Doherty power amplifiers. Solutions for all cellular frequency bands are currently being sampled and are in production or will be released throughout 2012.




### The first wave of Gen8 transistors

| Type | $f_{min}$ (MHz) | $f_{max}$ (MHz) | P1dB (W) | Matching | Package | Planned release | Description |
|---|---|---|---|---|---|---|---|
| BLF8G10L(S)-160 | 920 | 960 | 160 | I/O | SOT502 | Released | Gen8 ceramic LDMOS transistor for GSM, WCDMA & LTE applications |
| BLF8G10L(S)-160V | 700 | 1000 | 160 | I/O | SOT1244 | Released | Gen8 ceramic LDMOS transistor for GSM, WCDMA & LTE applications |
| BLF8G10LS-200GV | 700 | 1000 | 200 | I/O | SOT1244C | Q412 | Gen8 ceramic LDMOS transistor for GSM, WCDMA & LTE applications (gull-wing) |
| BLF8G10LS-270GV | 700 | 1000 | 270 | I/O | SOT1244C | Q412 | Gen8 ceramic LDMOS transistor for GSM, WCDMA & LTE applications (gull-wing) |
| BLF8G10L(S)-300P | 850 | 960 | 300 | I/O | SOT539 | Q312 | Gen8 ceramic push-pull LDMOS transistor for GSM, WCDMA & LTE applications (gull-wing) |
| BLF8G10LS-400PGV | 700 | 1000 | 400 | I/O | SOT1242C | Q412 | Gen8 ceramic push-pull LDMOS transistor for GSM, WCDMA & LTE applications (gull-wing) |
| BLF8G20L(S)-200V | 1800 | 2000 | 200 | I/O | SOT1120 | Released | Gen8 ceramic LDMOS transistor for GSM & LTE applications |
| BLF8G20LS-270GV | 1800 | 2000 | 270 | I/O | SOT1244C | Q412 | Gen8 ceramic LDMOS transistor for GSM & LTE applications (gull-wing) |
| BLF8G20LS-270PGV | 1800 | 2000 | 270 | I/O | SOT1242C | Q412 | Gen8 ceramic push-pull LDMOS transistor for GSM & LTE applications (gull-wing) |
| BLF8G22LS-160BV | 2000 | 2200 | 160 | I/O | SOT1120B | Released | Gen8 ceramic LDMOS transistor for WCDMA & LTE applications |
| BLF8G22LS-200GV | 2000 | 2200 | 200 | I/O | SOT1244C | Q312 | Gen8 ceramic LDMOS transistor for WCDMA & LTE applications (gull-wing) |
| BLF8G22LS-270GV | 2000 | 2200 | 270 | I/O | SOT1244C | Q312 | Gen8 ceramic LDMOS transistor for WCDMA & LTE applications (gull-wing) |
| BLF8G22LS-400PGV | 2000 | 2200 | 400 | I/O | SOT1242C | Q312 | Gen8 ceramic push-pull LDMOS transistor for WCDMA & LTE applications (gull-wing) |
| BLF8G24L(S)-200P | 2300 | 2400 | 200 | I/O | SOT539 | Q312 | Gen8 ceramic push-pull LDMOS transistor for WCDMA & LTE applications |
| BLF8G27LS-140G | 2500 | 2700 | 140 | I/O | SOT502E | Q412 | Gen8 ceramic LDMOS transistor for WCDMA & LTE applications (gull-wing) |
| BLF8G27LS-140V | 2600 | 2700 | 140 | I/O | SOT1244B | Q412 | Gen8 ceramic LDMOS transistor for WCDMA & LTE applications |
| BLF8G27LS-200PGV | 2500 | 2700 | 200 | I/O | SOT1242C | Q412 | Gen8 ceramic push-pull LDMOS transistor for WCDMA & LTE applications (gull-wing) |
| BLF8G27LS-280PGV | 2500 | 2700 | 280 | I/O | SOT1242C | Q412 | Gen8 ceramic push-pull LDMOS transistor for WCDMA & LTE applications (gull-wing) |

Note: All devices are internally matched (I/O)

# 2.2 Broadband communication infrastructure

## 2.2.1 Connecting people, protecting your network: NXP's CATV C-family for the Chinese SARFT standard

Specially designed for the Chinese Hybrid Fiber Coax (HFC) infrastructure, NXP's CATV C-family offers a total solution for cable TV networks. It is both flexible enough for connecting rural communities as part of China's "Connecting to Every Village" program and powerful enough for upgrading major cities from analog to high-end digital services. All C-type devices are compliant with the Chinese State Administration for Radio, Film and Television (SARFT) standard, and cover most HFC applications in the 550 MHz to 1 GHz range.



**Products**

- BGY588C, BGE788C and CGY888C push-pull amplifiers
- BGD712C, CGD944C, CGD942C, CGD982HCi, CGD985HCi and CGD987HCi power doublers
- BGO807C, BGO807CE optical receivers

**Benefits**

- Compliant with Chinese SARFT HFC networks standard
- Transparent cap allows confirmation of product authenticity
- Rugged construction
- Highest by Design internal ESD protection

**Features**

- Excellent linearity, stability, and reliability
- High power gain
- Extremely low noise
- Silicon nitride passivity
- GaAs HFET dies for high-end devices

The BGY588C, BGE788C and BGD712C devices cover the frequency range from 550 MHz to 750 MHz. Extending the C-family portfolio into the high-end segment, the CGD944C, CGD942C, CGY888C and BGO807C operate between 40 and 870 MHz and have been specifically tested under Chinese raster conditions. Manufactured using our GaAs HFET die process, the CGD942C and CGD944C are high-gain, high-performance 870 MHz power doublers. The CGD982HCi, CGD985HCi and CGD987HCi operate from 40 to 1003 MHz and are specified for 870 MHz and 1 GHz. These power doublers are optimized for the Chinese SARFT standard. They are capable of satisfying the demanding requirements of top-end applications, including high-power optical nodes.

Our GaAs HFET MMIC dies are designed to provide the best ESD protection levels, without the external TVS components normally used with GaAs pHEMT devices.

All CATV C-type devices feature a transparent cap that makes it easy to distinguish them from counterfeit products.

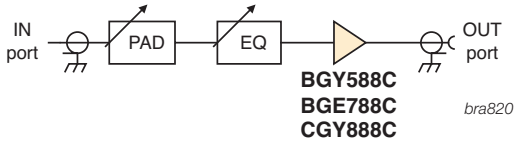
**C-family application information**

**NXP C-family by application**

| Application | BGY588C | BGE788C | CGY888C | BGD712C | BGO807C BGO807CE | CGD942C CGD944C | CGD982HCi CGD985HCi CGD987HCi |
|---|---|---|---|---|---|---|---|
| Optical node | | | | • | • | • | • |
| Optical receiver | | | | • | • | • | • |
| Distribution amplifier | | | • | • | | • | • |
| Line-extender amplifier | | | • | • | | • | • |
| Terminating amplifier | • | • | • | | | | |

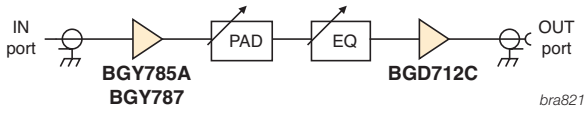
### BGY588C, BGE788C, and CGY888C

The last stage of an HFC network structure is called a 'terminating amplifier' or, since it's close to the subscriber, a "user amplifier." terminating amplifier requires a single module such as the BGY588C for 550 MHz, the BGE788C for 750 MHz and the CGY888C for 870 MHz systems. These modules fit perfectly in the Chinese "Connecting to Every Village" projects.




### BGD712C

The BGD712C is a 750 MHz, 18 dB power doubler module. It has been designed for 750 MHz optical nodes including ordinary or optical receivers and distribution amplifiers. It can also be used in line-extender amplifiers together with a 750 MHz push-pull module, such as the BGY785A or the BGY787. As such it can be used widely in Chinese "Connecting to Every Village" projects.

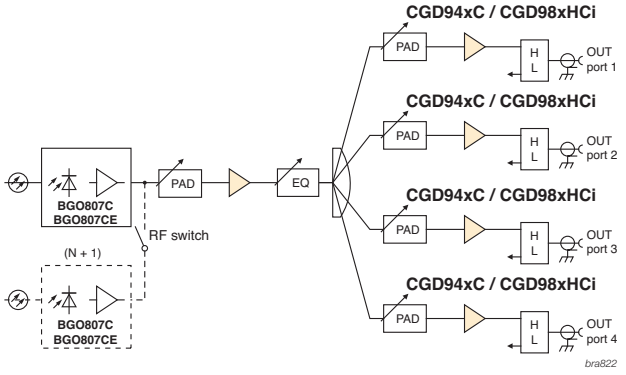



### CGD944C and CGD942C

Our full GaAs power doubler modules, the CGD942C and the CGD944C offer high output power and better CTB and CSO than other modules. Designed for high-end HFC networks containing optical nodes with multiple out-ports, these modules enable each port to directly cover at least 125 subscribers. These two devices are ideal when used in upgrading HFC networks to 870 MHz.

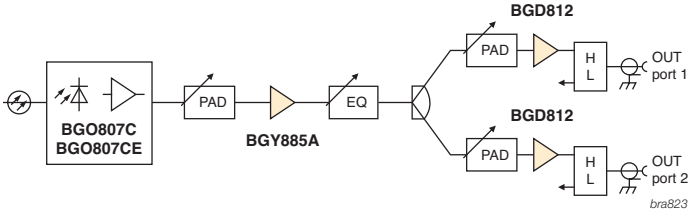
### CGD982HCi, CGD985HCi, and CGD987HCi

Our newest GaAs power doubler modules, the CGD982HCi, the CGD985HCi and the CGD987HCi are customized designs for CATV hybrid fiber coax Chinese networks operating in the 40 to 1003 MHz bandwidth, and specified with the Chinese cable TV network official loading raster on top of the traditional NTSC loading rasters. For use in optical notes for fiber deep applications where the output power level needs to be at its highest.




### BGO807C

The BGO807C is an integrated optical receiver module that provides high output levels with integrated temperature-compensated circuitry. In an optical node design, the BGO807C enables a high performance / price ratio and ruggedness. When upgrading an HFC network from analog to digital, the BGO807C is the perfect fit.



## NXP CATV C-family for the Chinese SARFT standard

### Push-pull amplifiers

| Parameters | | BGY588C | BGE788C | CGY888C |
|---|---|---|---|---|
| Power gain (dB) | Typ | 34.5 | 34.2 | 35.5 |
| Slope cable equivalent (dB) | Range | 0.2 - 1.7 | 0.3 - 2.3 | 1.5 typ. |
| Composite triple beat (dB) | Max | -57 | -49 | -68 typ. |
| Composite 2nd order distortion (dB) | Max | -62 | -52 | -66 typ. |
| Noise (@ $f_{max}$) (dB) | Max | 8 | 8 | 4 typ. |
| Total current consumption (mA) | Typ | 325 | 305 | 280 |
| Frequency range (MHz) | Range | 40 - 550 | 40 - 750 | 40 - 870 |



### Power doublers

| Parameters | | BGD712C | CGD942C | CGD944C | CGD982HCi | CGD985HCi | CGD987HCi |
|---|---|---|---|---|---|---|---|
| Power gain (dB) | Typ | 18.5 | 23 | 25 | 23 | 24.5 | 27 |
| Slope cable equivalent (dB) | Range | 0.5 - 1.5 | 1 - 2 | 1 - 2 | 0.5 - 2 | 0.5 - 2 | 0.7 - 2 |
| Composite triple beat (dB) | Max | -62 | -66 typ. | -66 typ. | -66 | -66 | -66 |
| Composite 2nd order distortion (dB) | Max | -63 | -66 typ. | -66 typ. | -69 | -69 | -66 |
| Noise (@ $f_{max}$) (dB) | Max | 7 | 5 | 5 | 5.5 | 5.5 | 5.5 |
| Total current consumption (mA) | Typ | 395 | 450 | 450 | 440 | 440 | 440 |
| Frequency range (MHz) | Range | 40 - 750 | 40 - 870 | 40 - 870 | 40 - 1003 | 40 - 1003 | 40 - 1003 |

### Optical receiver

| Parameters | | BGO807C | BGO807CE |
|---|---|---|---|
| Responsivity ($R_{min}$) | Min | 800 | 800 |
| Slope cable equivalent (dB) | Range | 0 - 2 | 0 - 2 |
| Composite triple beat (dB) | Max | -71 | -69 |
| Composite 2nd order distortion (dB) | Typ | -54 | -53 |
| Noise (@ $f_{max}$) (dB) | Max | 8.5 | 8.5 |
| Total current consumption (mA) | Typ | 190 | 190 |
| Frequency range (MHz) | Range | 40 - 870 | 40 - 870 |
| Connector | | - / SC0 / FC0 | |

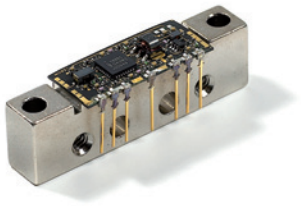


## 2.2.2 Highly efficient line-up of 1 GHz GaAs modules for sustainable CATV networks

### *NXP high gain power doublers CGD104xHi and push-pulls CGY104*

Designed for 1 GHz "sustainable networks," these high-performance GaAs devices enable extended bandwidth and higher data rates. They deliver increased network capacity and make way for high-end services like HDTV, VoIP, and digital simulcasting.





New CATV GaAs platform layout

**Key features**

- Excellent linearity, stability, and reliability
- High power gain for power doublers
- Extremely low noise
- Dark Green products
- GaAs HFET dies for high-end applications
- Rugged construction
- Superior levels of ESD protection
- Integrated ringwave protection
- Design optimized for digital channel loading
- Temperature compensated gain response
- Optimized heat management
- Excellent temperature resistance

**Key benefits**

- Simple upgrade to 1-GHz capable networks
- Low total cost of ownership
- High power-stress capability
- Highly automated assembly

**Key applications**

- Hybrid Fiber Coax (HFC) applications
- Line extenders
- Trunk amplifiers
- Fiber deep-optical-node (N+0/1/2)
- Bridgers

The NXP power doublers CGD104xH and CGD104xHi are ideal for use in line extenders and trunk amplifiers. They support fiber deep-optical-node applications (N+0/1/2), delivering the highest output power on the market today. The GaAs HFET die process delivers high gain, excellent CTB and CSO ratings, and lower current.

The new NXP CGY104x push-pull family is the first line-up on the market to combine very low noise, best-in-class distortion parameters, and low, "carbon footprint" capabilities. It delivers the best performance for the lowest power consumption, so it reduces OPEX and $CO_2$ emissions

All of NXP's 1 GHz solutions are designed for durability and offer superior ruggedness, an extended temperature range, high-power overstress capabilities, and extremely high ESD levels. As a result, they also reduce the cost of ownership.

The GaAs die is inserted in an HVQFN package that is then mounted on thermal vias that manage heat transfer to the heat sink. Temperature-control circuitry keeps the module's high performance stable over a wide range of temperature. Assembly is fully automated and requires almost no human intervention, so repeatability remains very high.

## Upcoming products

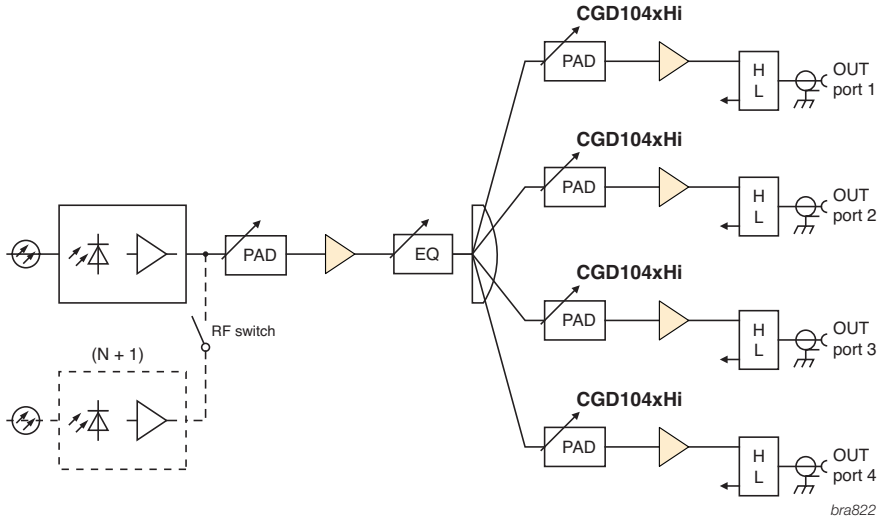
Additional push-pulls, currently under development, will extend the capabilities of the power doublers even further, supporting almost all modern HFC applications. The push-pull CGY1041 will deliver a gain of 21 dB, the CGY1043 a gain of 23 dB, the CGY1049 a gain of 29 dB and the CGY1032 a gain of 32 dB. NXP is also developing a new, highly integrated power doubler. The CGD1046Hi will deliver, in one IC, a 26 dB power gain with 60 dBmV output power and excellent ESD protection, for the ultimate in high-quality, distortionless devices.

## CATV 1 GHz power doublers

| | | CATV 1 GHz power doublers | | | | | |
|---|---|---|---|---|---|---|---|
| Parameters | | CGD1040Hi | CGD1042H | CGD1042Hi | CGD1044H | CGD1044Hi | CGD1046Hi |
| Power gain (dB) | Typ | 21 | 23 | 23 | 25 | 25 | 27 |
| Slope cable equivalent (dB) | Typ | 1.5 | 1.5 | 1.5 | 1 | 1.5 | 0.5 - 2.0 |
| Composite triple beat (dB) | Typ | -69 | -69 | -69 | -69 | -69 | -73 |
| Composite 2nd order distortion (dB) | Typ | -68 | -68 | -68 | -68 | -68 | -68 |
| Noise (@ $f_{max}$) (dB) | Max | 6 | 6 | 6 | 6 | 6 | 5 |
| Total current consumption (mA) | Typ | 440 | 450 | 440 | 450 | 440 | 460 |
| Frequency range (MHz) | Range | 40 - 1003 | 40 - 1003 | 40 - 1003 | 40 - 1003 | 40 - 1003 | 40 - 1003 |

## CATV 1 GHz push-pulls

| | | CATV 1 GHz push-pulls | | | | |
|---|---|---|---|---|---|---|
| Parameters | | CGY1041 | CGY1043 | CGY1047 | CGY1049 | CGY1032 |
| Power gain (dB) | Typ | 22 | 24 | 28 | 30 | 33 |
| Slope cable equivalent (dB) | Typ | 2 | 2 | 2 | 1.6 | 1.8 |
| Composite triple beat (dB) | Typ | -62 | -62 | -64 | -62 | -62 |
| Composite 2nd order distortion (dB) | Typ | -64 | -64 | -66 | -64 | -64 |
| Noise (@ $f_{max}$) (dB) | Max | 5 | 5 | 4.5 | 5 | 5 |
| Total current consumption (mA) | Typ | 250 | 250 | 250 | 250 | 265 |
| Frequency range (MHz) | Range | 40 - 1003 | 40 - 1003 | 40 - 1003 | 40 - 1003 | 40 - 1003 |




An optical node with multiple out-ports using the CGD1040Hi / CGD1042Hi / CGD1044Hi / CGD1046Hi

# 2.3 TV and satellite

## 2.3.1 LNAs with programmable gain & bypass option for improved tuner performance

### *NXP LNAs BGU703x &BGU704x for TVs/STBs*

Designed for high linearity and low noise, these 3.3 and 5 V wideband LNAs support multi-tuner applications in TVs, DVR/PVRs, and STBs operating between 40 MHz and 1 GHZ. A unique programmable gain with bypass mode compensates for tuner switch signal loss (important in multi-tuner systems), and improves overall system performance by 7 to 10 dB.

**Key features**

- Internally biased
- Fixed $G_p$ = 10 dB: BGU7031 (5 V), BGU7041 (3.3 V), and Fixed $G_p$ = 14 dB: BGU7044 (3.3 V)
- Programmable between $G_p$ = 10 dB and bypass: BGU7032 (5 V), BGU7042 (3.3 V), and programmable between $G_p$ = 14 dB and bypass: BGU7045 (3.3 V)
- Programmable between $G_p$ = 10 dB, 5 dB and bypass: BGU7033 (5 V)
- Flat gain between 40 MHz and 1 GHz
- Output power at 1 dB gain compression ($P_{L(1\ dB)}$) ranging from 9 to 14 dBm
- Noise figure as low as 2.8 dB
- High linearity with an OIP3 of 29 dBm
- 75 Ω input and output impedance
- Power-down during bypass mode
- ESD protection >2 kV HBM, >1.5 kV CDM on all pins

**Key trends**

- Multiple tuners in TV, DVR/PVR, and set-top box applications, requiring improved signal handling
- Use of 3.3 V Si tuner ICs, perfect match with our 3.3 V LNAs (BGU704x)

**Applications**

- Terrestrial and cable set-top boxes (STBs)
- Silicon and can tuners
- Personal and digital video recorders (PVRs and DVRs)
- Home networking and in-house signal distribution

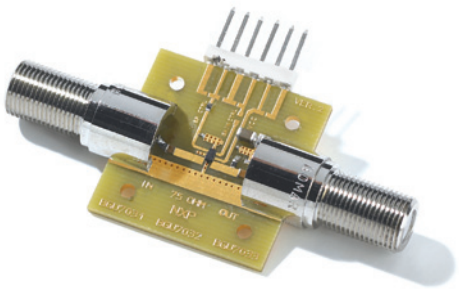
NXP's BGU703x and BGU704x low-noise amplifiers (LNAs) upgrade overall picture quality with improved signal handling (NF, dynamic range), while reducing the number of external components.

Produced in NXP's own QUBiC4+ Si BiCMOS process, they improve signal handling by compensating for the signal loss at the tuner switch. This can improve system performance by as much as 7 to 10 dB.

The BGU7031, BGU7041, and BGU7044 are LNAs with fixed gain. The BGU7032, BGU7042, and BGU7045 have an additional bypass mode, and the BGU7033 adds two gain levels along with the bypass mode. In bypass mode, the devices consume less than 5 mA of current. Integrated biasing and 75 Ω matching reduces footprint by eliminating as many as 15 components compared to discrete solutions.

All the devices can be used with discrete or Si can tuners, as well as with on-board tuners. They deliver more robust ESD performance compared to GaAs solutions, withstanding >2 kV human body model (HBM) and >1.5 kV charged device model (CDM).

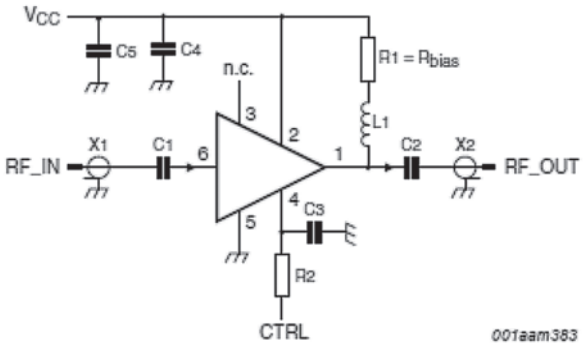
**BGU703x evaluation board**



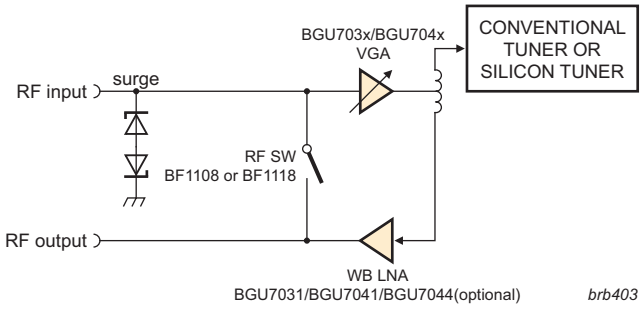
## LNAs for set-top boxes (75 Ω)

| Type | Package | Frequency range | Mode | @ | | Gain [1] | NF | $P_{L(1dB)}$ | OIP3 | FL [2] | $RL_{out}$ | $RL_{in}$ |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | $V_{CC}$ | $I_{CC}$ | | | | | | | |
| | | (MHz) | | (V) | (mA) | (dB) | (dB) | (dBm) | (dBm) | (dB) | (dB) | (dB) |
| BGU7031 | SOT363 | 40 - 1000 | $G_p$ 10 dB | 5 | 43 | 10 | 4.5 | 14 | 29 | -0.2 | 12 | 18 |
| BGU7032 | SOT363 | 40 - 1000 | $G_p$ 10 dB | 5 | 43 | 10 | 4.5 | 14 | 29 | -0.2 | 12 | 18 |
| | | | Bypass | 5 | 4 | -2 | 2.5 | - | 29 | -0.2 | 8 | 8 |
| BGU7033 | SOT363 | 40 - 1000 | $G_p$ 10 dB | 5 | 43 | 10 | 4.5 | 14 | 29 | -0.2 | 12 | 18 |
| | | | $G_p$ 5 dB | 5 | 43 | 5 | 6 | 9 | 29 | -0.2 | 12 | 17 |
| | | | Bypass | 5 | 4 | -2 | 2.5 | - | 29 | -0.2 | 8 | 8 |
| BGU7041 | SOT363 | 40 - 1000 | $G_p$ 10 dB | 3.3 | 38 | 10 | 4 | 12 | 29 | -0.2 | 12 | 21 |
| BGU7042 | SOT363 | 40 - 1000 | $G_p$ 10 dB | 3.3 | 38 | 10 | 4 | 12 | 29 | -0.2 | 12 | 21 |
| | | | Bypass | 3.3 | 3 | -2 | 2.5 | - | 29 | -0.2 | 10 | 10 |
| BGU7044 | SOT363 | 40 - 1000 | $G_p$ 14 dB | 3.3 | 34 | 14 | 2.8 | 13 | 29 | -0.2 | 12 | 20 |
| BGU7045 | SOT363 | 40 - 1000 | $G_p$ 14 dB | 3.3 | 34 | 14 | 2.8 | 13 | 29 | -0.2 | 12 | 20 |
| | | | Bypass | 3.3 | 3 | -2 | 2.5 | - | 27 | -0.2 | 10 | 9 |

## Block diagram




## Application diagram of an active splitter with passive loop-through



## 2.3.2 Complete satellite portfolio for all LNB architectures

### *NXP Satellite LNB devices TFF101xHN, BFU710F/730F, and BGA28xx*

Designed for use in LNAs, mixers, and IF amplifiers, these robust, small-footprint products are the latest additions to NXP's leading portfolio for satellite LNB architectures. They are manufactured in NXP's groundbreaking QUBiC4X SiGe:C and QUBiC4+ process technologies.

**Fully integrated Ku-band downconverters TFF101xHN**

The TFF101xHN is a family of fully integrated downconverters for Ku-band LNBs. They give the best RF performance in terms of phase noise, gain, and noise figure at the lowest current consumption in the market.

**Ku-band downconverter TFF101xHN/N1 for LNB**

- Typical application: Universal single LNB & twin LNB
- Ultra-low current consumption: 52 mA over PVT
- Only 7 external components
- No inductors
- Single supply domain: 5 V
- Uses low-cost fundamental 25 MHz crystal
- High PL1dBo = 6 dBm / 3OIPo = 16 dBm
- Best-in-class PN < 1.4 deg RMS
  - 10 kHz to 13 MHz integration bandwidth
- Multiple gain types available
  - TFF1014HN/N1 36 dB
  - TFF1015HN/N1 39 dB
  - TFF1017HN/N1 42 dB
  - TFF1018HN/N1 45 dB
- Flat gain over frequency (< 2 dBpp)
- Input & output matched 50 Ω
- Small leadless DHVQFN16 package (2.5 x 3.5 x 0.85 mm)

**RF transistors BFU710F/730F**

The BFU710F and BFU730F are wideband RF transistors that can be used as an LNA or as a mixer for a DBS LNB in the Ku-band. In either application, they deliver good noise and linearity, a higher gain at a lower current consumption compared to their GaAs pHEMT equivalents, and the cost advantage of silicon.

**BFU710F as LNA in Ku-band LNB**

- Typical application: LNA2 for single-output LNB
- Overall similar RF performance to GaAs pHemt LNAs
- Power consumption: 3.5 mA
- Single supply: 3/5/6 V
- High RF gain: 13.5 dB
- Low noise figure: 1.6 dB
- Linearity (OIP3): 12 dBm

**BFU710F as mixer in Ku-band LNB**

- Typical application: Active mixer for single-output LNB
- Single supply 3/5/6 V
- Low power consumption: 2.5 mA
- LO drive < 0 dBm
- SSB noise figure < 8 dB (including BPF at the input)
- SSB conversion gain > 5 dB (including BPF at the input)
- Linearity (OIP3) > 0 dBm
- LO-RF isolation min 20 dB
- RF match better than 10 dB
- IF match better than 8 dB

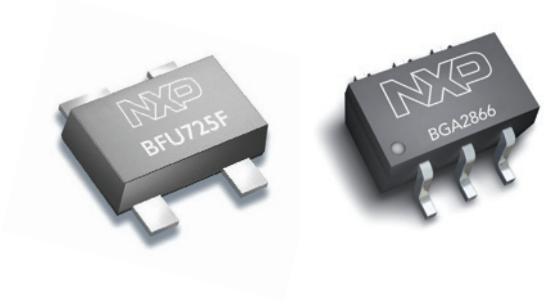
**BFU730F as LNA in Ku-band LNB**

- Typical application: LNA2 and LNA3 for multi-output LNB
- Overall similar RF performance to GaAs pHemt LNAs
- Power consumption: 11 mA
- Single supply 3/5/6 V
- Very high RF gain: 11.5 dB
- Low noise figure: 1.25 dB
- Linearity (OIP3) > 17 dBm
- Return loss > 10 dB

**MMICs BGA28xx as IF amplifiers (first stage & output stage)**

For compatibility with existing designs, the series uses market standard packages: the SOT363 and the pin-compliant SOT363F. The pinning is identical to NXP's current gain block family, and the blocks deliver similar noise figures. New features include flatter gain, a positive gain slope, improved P1dB vs Icc, and no necessity for an output inductor.

- Internally matched at 50 Ω
- Gain slope > 0.5 dB



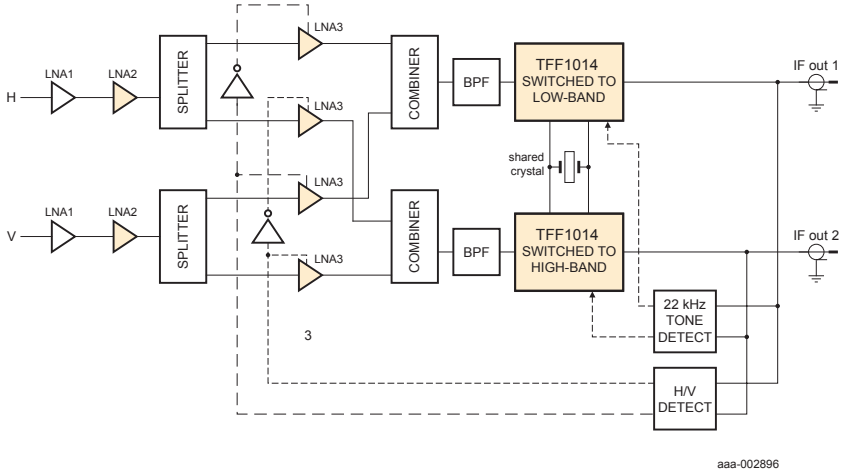
- Single supply voltage: 3.3 or 5 V
- Reverse isolation: > 30 dB up to 2 GHz
- Best-in-class power vs current consumption
- Noise figure: 4 to 6 dB at 1 GHz
- Unconditionally stable (K > 1)
- High-compression-point models work without output inductor
- 6-pin SOT363 plastic SMD package

These products – the integrated downconverters TFF101xHN, the wideband transistors BFU710F/730F for LNA and mixer functionality, and the BGA28xx series of IF MMICs – are the most recent additions to NXP's leading portfolio for satellite LNB. They join the other discrete products, including oscillators, amplifiers, and switches, to provide complete coverage for all LNB architectures.

Since the ICs, transistors, and the MMICs are manufactured in NXP's industry-leading QUBiC4X SiGe:C and QUBiC4+ process, they offer better overall RF performance and are more robust than their GaAs equivalents and offer the added cost advantage of silicon. The process technology also enables higher integration, for added features. NXP owns the industrial base for production (wafer fab, test, assembly), so volume supplies can be assured.

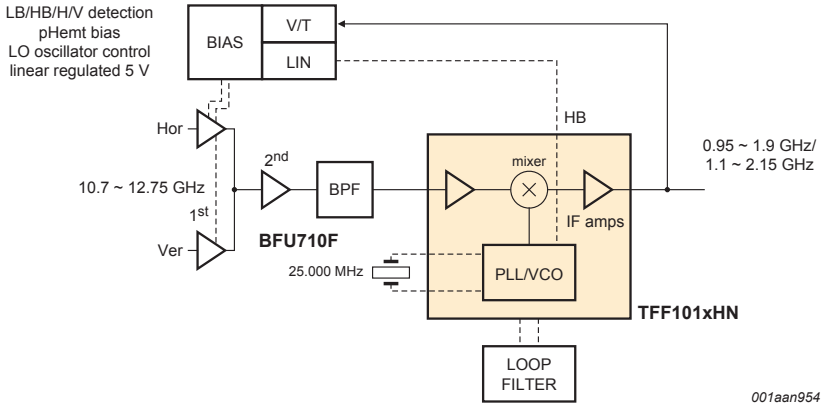


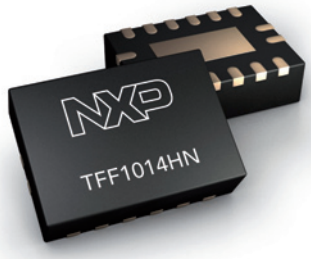
## Satellite outdoor unit, twin low noise block (LNB) with integrated mixer/ oscillator/ downconverter




Note: Also see section 1.3.4 Satellite outdoor unit, twin low noise block (LNB) with integrated mixer/ oscillator/ downconverter

## Fully integrated mixer/oscillator/downconverter

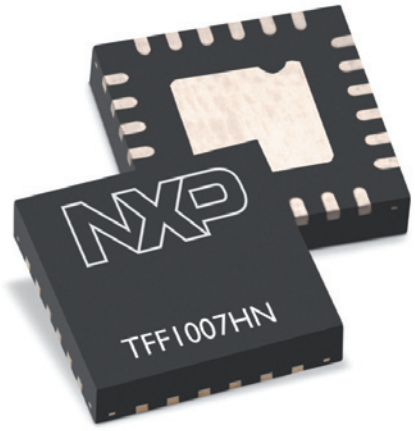


## 2.3.3 VSAT, 2-way communication via satellite

*Design a Ku-/ Ka-band VSAT transceiver that meets IESS-308 with NXP's Ku-/ Ka-band RF LO generators*

The TFF100xHN family are Ku-band RF PLLs, with integrated VCO intended for low phase-noise local-oscillator (LO) circuits in Ku- & Ka-band VSAT transmitters and transceivers. Manufactured in a high-performance SiGe:C process, these devices deliver extremely low phase noise and comply with the IESS-308 from Intelsat.




**Features**

- Phase noise compliant with IESS-308 (Intelsat)
- Differential input and output
- Divider settings at 16, 32, 64, 128, or 256
- Lock-detect output
- SiGe:C technology (120 GHz $f_T$ process)
- HVQFN24 (SOT616-1) package

**Applications**

- VSAT block upconverters
- VSAT down conversion
- Local oscillator signal generation

VSAT networks are commonly used to transmit narrowband data, such as point-of-sale transactions for credit cards, or to transmit broadband data that supports satellite Internet access to a remote location, VoIP, or video.

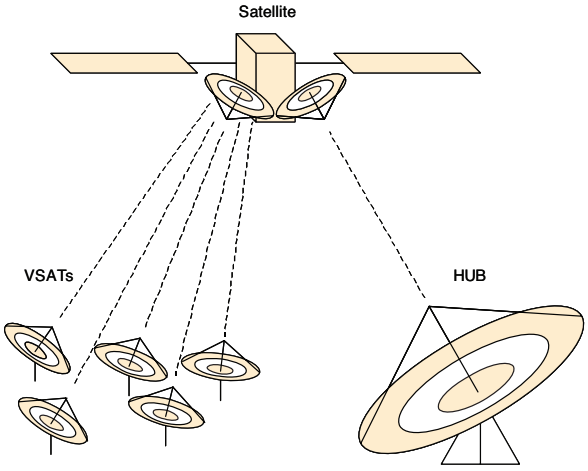
The network typically consists of a dish antenna, an outdoor unit, and an indoor unit. The outdoor unit is used for frequency translation between RF and IF, and usually includes a microwave-based uplink/downlink separator, a low noise block (LNB) for receiving the downlink signals, and a block Upconverter (BUC).

The VSAT ICs can be used to create the LO generator for a linear BUC (meaning the IF or RF conversion is done by mixing with an LO).

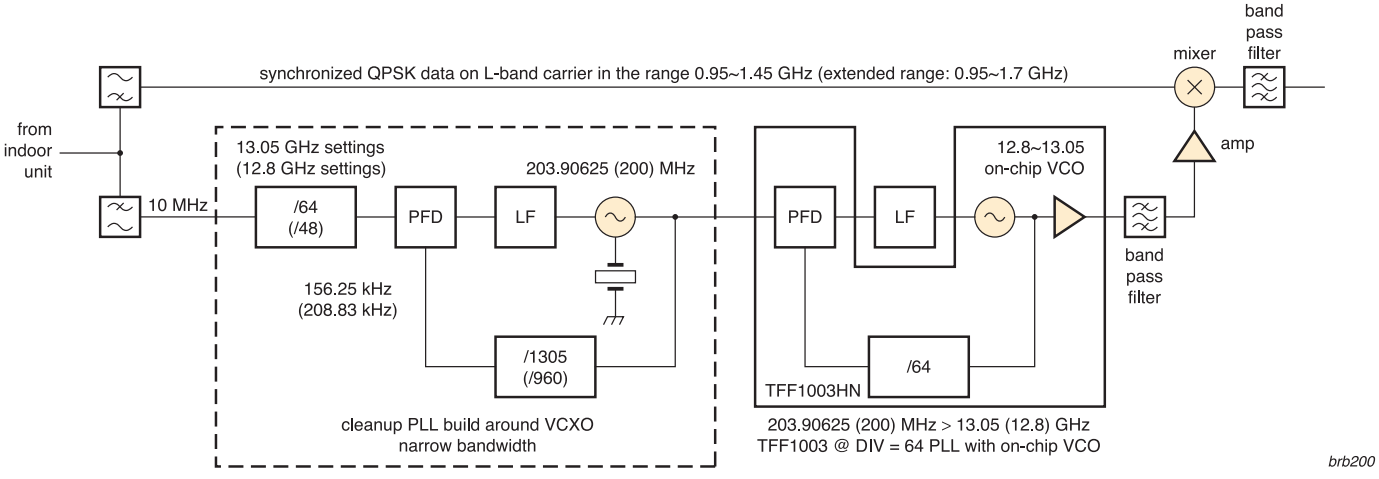
To enable precise frequency and time multiplexing, the downlink signal provides an accurate frequency reference of 10 MHz. The indoor unit frequency multiplexes this with the uplink IF signal, and the LO signal in the BUC needs to be frequency-locked to the reference.

The TFF100xHN ICs are housed in a 24-pin HVQFN (SOT616-1) package. The pins have been assigned for optimal performance. Three voltage domains are used to separate the block on the IC, and two pins for each output (OUT-P and OUT-N) have been reserved to match a typical layout using a linewidth of Z = 50 Ω microstrip on a 20-mil RO4003 board (1.1 mm).

The ground pins have been placed next to the reference input and the output, and, to minimize crossings in the application, all the supply pins are on the same side of the IC.




Typical VSAT network




Complete LO generator for linear BUC with TFF1003HN

| Type | Package | $f_{IN(REF)}$ | $V_{cc}$ | $I_{cc}$ | PLL phase noise @ N=64 @ 100 kHz | PLL | Output buffer | | Input |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | | $f_{o(RF)}$ | $P_o$ | $RL_{out(RF)}$ | $S_i$ |
| | | | Typ | | Max | | Typ | Max | Min |
| | | (MHz) | (V) | (mA) | (dBc/Hz) | (GHz) | (dBm) | (dB) | (dBm) |
| TFF1003HN | SOT616 | 50 - 815 | 3.3 | 100 | -92 | 12.8 - 13.05 | -5 | -10 | -10 |
| TFF1007HN | SOT616 | 228.78 - 234.38 | 3.3 | 130 | -104 | 14.62 - 15 | -3 | -10 | -10 |

| Type | Application | $I_{cc}$ (mA) | Single supply (V) | RF gain (dB) | NF (dB) | OIP3 (dBm) |
|---|---|---|---|---|---|---|
| BFU710F | Ku-band LNA2 for single output LNB | 3.5 | 3/5/6 | 13.5 | 1.6 | 12 |
| BFU730F | Ku-band LNA2 and LNA3 for multiple output LNB | 11 | 3/5/6 | 11.5 | 1.25 | 17 |

| Type | Application | $I_{cc}$ (mA) | Single supply (V) | LO drive | SSB NF (dB) | SSB conversion gain (dB) | LO-RF isolation (dB) |
|---|---|---|---|---|---|---|---|
| BFU710F | Ku-band active mixer for single output LNB | 2.5 | 3/5/6 | < 0 dBm | < 8 dB | > 5 dB | min 20 |

## 2.3.4 Low noise LO generators for microwave & mmWave radios

### *NXP LO generators (integrated VCO/PLL) TFF11xxxHN*

Manufactured in NXP's breakthrough QUBiC4X SiGe:C process technology, these highly integrated, alignment-free LO generators are low-power and low-spurious solutions that simplify design-in and lower the total cost of ownership.




**Features**

- TFF11xxxHN family: lowest-noise LO generators for a full family in 7 to 15 GHz range
- Maximum power consumption for all types is 330 mW (typ)
- Phase-noise compliant with IESS-308 (Intelsat)
- Proven QUBiC4X SiGe:C technology (120 GHz $f_T$ process)
- External loop filter
- Differential input and output
- Lock-detect output
- Internally stabilized voltage reference for loop filter
- 24-pin HVQFN (SOT616-1) package

**Applications: TFF11xxxHN family**

- Industrial/medical test and measurement equipment
- Electronic warfare (EW)
- Electronic countermeasures (ECM)
- Point-to-point
- Point-to-multipoint
- Satellite communication/VSAT
- Radar systems

These low noise local-oscillator (LO) generators, optimized for use in many different microwave applications between 7 and 15 GHz, deliver highly accurate performance in a small footprint. They require no alignment or frequency modification on the production line, so they simplify manufacturing. High integration saves board space and makes design-in easier, for lower overall cost and faster development.

Since these ICs are manufactured in NXP's industry-leading QUBiC4X SiGe:C process, they offer better overall RF performance, are more robust than their GaAs equivalents, and consume much less power. The process technology also enables higher integration, for added features. NXP owns the industrial base for production (wafer fab, test, assembly), so volume supplies can be assured.

The TFF1003HN is the basis for the entire family of LO generators. It has VCO coverage of 12.8 to 13.05 GHz and accepts input signals from 50 to 816 MHz. The divider can be set for 16, 32, 64, 128, or 256, and the output level is -5 dBm with a stability of ±2 dB. The family of LO generators is completed by a range of 18 different devices operating in a center frequency ranging from 7 to 15 GHz. The RF performance of all these devices is consistent with the TFF1003HN.

All the LO generators have low power dissipation (330 mW typ), and all are available in a space-saving 24-pin HVQFN package.

**Full portfolio overview of low noise LO generators for general microwave applications in section 3.4.4**

# 2.4 Portable devices

## 2.4.1 The best reception of GNSS signals with the smallest footprint

### *NXP SiGe:C GPS LNAs BGU700x/BGU8007*

NXP's GPS low-noise amplifiers offer the best reception of weak signals because of dynamic suppression of strong cellular and WLAN transmit signals. Moreover, as only two external components are required, designers can save up to 50% in PCB size and 10% in component cost.



**Key features**

- Low noise figure: 0.75 dB
- System-optimized gain of 16.5 or 19 dB
- Adaptive biasing dynamically suppresses strong cellular and WLAN transmit signals, resulting in improved linearity of 10 dB better IP3 under -40 to -20 dBm jamming conditions and effective GPS output with jammer powers up to -15 dBm
- AEC-Q100 qualified (BGU7004, BGU7008) for highest reliability in harsh conditions
- Only two external components required
- Small 6-pin leadless package: 1.45 x 1.0 x 0.5 mm

**Key benefits**

- Maintains optimal GPS signal reception for as long as possible
- Significant PCB size savings (50%)
- Lower component cost (10%)

**Applications**

- Smart phones, feature phones
- Tablets
- Personal Navigation Devices (PNDs)
- Digital Still Camera (DSCs)
- Digital Video Camera (DVCs)
- RF front-end modules (used in phones)
- Complete GPS chipset modules (used in DSCs)
- Automotive applications (BGU7004/8): toll collection, emergency call

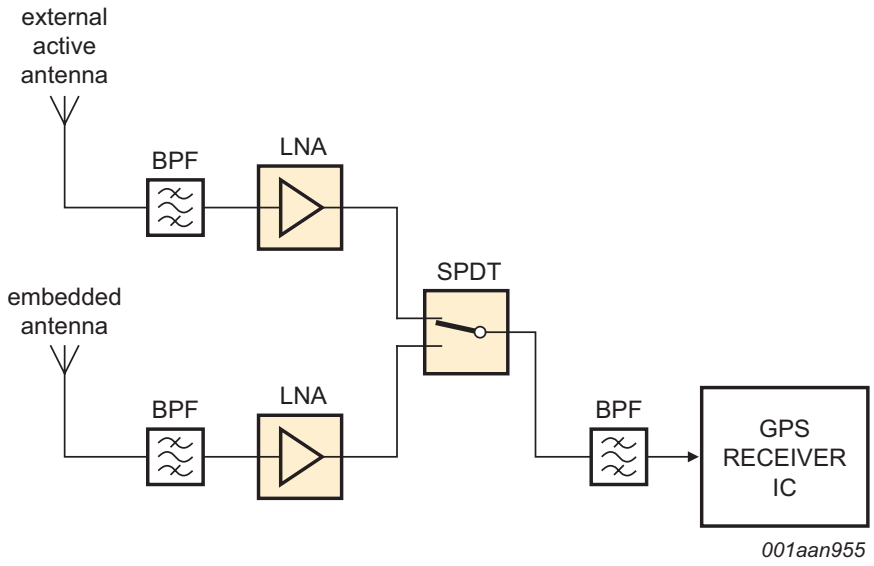
These SiGe:C low-noise amplifiers (LNAs) improve the reception of GPS signals, including GloNass and Galileo. Available in extremely small 6-pin packages, they reduce footprint, lower cost, and enhance reception in systems that use an active or patch antenna.

GPS has become a standard feature in a very wide range of consumer products, from personal navigation devices to digital video cameras, watches, electric cars, and more. GPS signal power levels are weak and below the noise floor at -155 dBm. In many of these products, especially smart phones, strong transmitters such as WLAN and cellular can drive the GPS LNA into compression. When the GPS LNA is in compression, it has lower gain, and that can worsen GPS reception. Also, when the LNA is in compression, it generates intermodulation products and harmonics from the transmitter signals, which can overpower the weak GPS signals and lead to no GPS reception.

The NXP BGU700x/BGU8007 series use adaptive biasing to immediately detect any output power from jammers, and compensate by temporarily increasing the current. As a result, optimal GPS signal reception is maintained for as long as possible.

Each device in the BGU700x/BGU8007 series requires only one input matching inductor and one supply decoupling capacitor to complete the design. This creates a very compact design and lowers the bill of materials. Designers can save up to 50% in PCB size and 10% in component cost. For example, the BGU7005 is in a 1.45 x 1 mm package with application area at only 4.53 $mm^2$. This is 50% smaller than a comparable solution with a 9.06 $mm^2$ application area.

## Application diagram




## Smallest footprint

| Type | Package | Package size | MMIC * | | | | | SMD's Appl. | SMD size | | SMD's area | Appl. area |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | X | Y | Pins | Pitch | Area | | X | Y | | |
| | | mm | mm | mm | # | mm | $mm^2$ | # | mm | mm | $mm^2$ | $mm^2$ |
| BGU7005/7 | SOT886 | 1.45 x 1 | 1.7 | 1.25 | 6 | 0.5 | 2.13 | 2 | 1.5 | 0.8 | 2.4 | 4.53 |
| Competitor | Wafer-level package | 1.26 x 0.86 | 1.5 | 1.1 | 6 | 0.4 | 1.65 | 6 | 1.5 | 0.8 | 7.2 | 8.85 |
| Competitor | Wafer-level package | 0.86 x 0.86 | 1.1 | 1.1 | 4 | 0.4 | 1.21 | 4 | 1.5 | 0.8 | 4.8 | 6.01 |
| Competitor | Thin small leadless package | 2 x 1.3 | 2.25 | 1.55 | 6 | 0.5 | 3.49 | 4 | 1.5 | 0.8 | 4.8 | 8.29 |
| Competitor | Thin small leadless package | 1.4 x 1.26 | 1.65 | 1.5 | 6 | 0.48 | 2.48 | 4 | 1.5 | 0.8 | 4.8 | 7.28 |
| Competitor | Thin small outline non-leaded | 1.5 x 1.5 | 1.75 | 1.75 | 6 | 0.5 | 3.06 | 5 | 1.5 | 0.8 | 6 | 9.06 |

* Includes keep-out area on PCB (a commonly used assembly rule)

## SiGe:C GPS LNAs

| Type | Package | @ 1.575 GHz | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Supply voltage | | Supply current | | | Insertion power gain | | | Noise figure | Input power at 1 dB gain compression | | | | | | | | | | Input third-order intercept point $f_1$ = 1713 MHz, $f_2$ = 1851 MHz | | | | | | | | | |
| | | $V_{cc}$ | | $I_{cc}$ | | | $\lvert s_{21}\rvert^2$ | | | NF | $P_{L(1dB)}$ | | | | | | | | | | IP3$_i$ | | | | | | | | | |
| | | (V) | | (mA) | | | (dB) | | | (dB) | (dBm) | | | | | | | | | | (dBm) | | | | | | | | | |
| | | Min | Max | Min | Typ | Max | Min | Typ | Max | Typ | $V_{cc}$ = 1.5 V, Min | $V_{cc}$ = 1.5 V, Typ | $V_{cc}$ = 1.8 V, Min | $V_{cc}$ = 1.8 V, Typ | $V_{cc}$ = 2.2 V, Min | $V_{cc}$ = 2.2 V, Typ | $V_{cc}$ = 2.5 V, $I_{cc}$ = 5 mA | $V_{cc}$ = 2.85 V, Min | $V_{cc}$ = 2.85 V, Typ | $V_{cc}$ = 1.5 V, Min | $V_{cc}$ = 1.5 V, Typ | $V_{cc}$ = 1.8 V, Min | $V_{cc}$ = 1.8 V, Typ | $V_{cc}$ = 2.2 V, Min | $V_{cc}$ = 2.2 V, Typ | $V_{cc}$ = 2.5 V, $I_{cc}$ = 5 mA | $V_{cc}$ = 2.85 V, Min | $V_{cc}$ = 2.85 V, Typ |
| BGU7003 | SOT891 | 2.2 | 2.85 | 3 | - | 15 | 16 | 18.3 | 20 | 0.8 | - | - | - | - | - | - | -20 | - | - | - | - | - | - | - | - | 0 | - | - |
| BGU7004^ | SOT886 | 1.5 | 2.85 | - | 4.5 | - | - | 16.5* | - | 0.9 | - | - | -14 | -11 | - | - | - | -11 | -8 | - | - | 5 | 9 | - | - | - | 5 | 12 |
| BGU7005 | SOT886 | 1.5 | 2.85 | - | 4.5 | - | - | 16.5* | - | 0.9 | - | - | -14 | -11 | - | - | - | -11 | -8 | - | - | 5 | 9 | - | - | - | 5 | 12 |
| BGU7007 | SOT886 | 1.5 | 2.85 | - | 4.8 | - | - | 18.5** | - | 0.9 | - | - | -15 | -12 | - | - | - | -14 | -11 | - | - | 1 | 4 | - | - | - | 2 | 5 |
| BGU7008^ | SOT886 | 1.5 | 2.85 | - | 4.8 | - | - | 18.5** | - | 0.9 | - | - | -15 | -12 | - | - | - | -14 | -11 | - | - | 1 | 4 | - | - | - | 2 | 5 |
| BGU8007 | SOT886 | 1.5 | 2.2 | - | 4.6 | - | - | 19.0*** | - | 0.75# | -15 | -12 | - | - | -13 | -10 | - | - | - | 1 | 4 | - | - | 2 | 5 | - | - | - |

* 16.5 dB without jammer / 17.5 dB with jammer
** 18.5 dB without jammer / 19.5 dB with jammer
*** 19.0 dB without jammer / 20.5 dB with jammer

^ AEC-Q101 qualified (some limitations apply)
# Evaluation board losses excluded

## 2.5 Industrial, scientific & medical

### 2.5.1 Medical applications driven by RF power: From imaging to cancer treatment, a flexible and versatile technology in the doctor's toolbox



RF technology is making its way into all kinds of medical applications, ranging from the well-known imaging techniques (MRI, EPRI) over low frequency, external heat treatment, and electro-surgical tools, to minimally invasive endoscopic cancer treatment (RF ablation). One clear trend is the increasing share of RF-based technologies for ablation. Another is the trend towards higher RF frequencies (several GHz) and higher powers (> 100 W) in order to achieve higher spatial resolution, better control, and shorter treatment times.

RF radiation is not a new technology in medicine. It is currently used for imaging purposes in MRI (magnetic resonance imaging) and EPRI (electron paramagnetic resonance imaging), techniques that employ frequencies from a few megahertz to about 500 MHz. Other well-known external heat-treatments to rejuvenate skin or relieve muscle pain make use of frequencies around 480 kHz – not too demanding in terms of RF. Surgical equipment to cut and simultaneously coagulate blood vessels runs off RF at about 5 MHz. The latter application belongs to a class of treatment techniques that is growing rapidly and uses RF radiation to deposit energy locally at various parts of the body – in general to "ablate" (remove) unwanted tissue. Inside the body, the RF energy heats the surrounding tissue until it is desiccated and/or necrotized. The damaged tissue will later be re-absorbed by the surrounding, living tissue. Further application examples for RF ablation include cancer treatment in the lung, kidney, breast, bone and liver, removal of varicose veins, treatment of heart arrhythmia, and a growing list of other applications that benefit from the high control and feedback possible with RF.

Another advantage of RF in this context is the fact that it can be applied via small catheters ending in antennas that deploy the RF signal. Unlike older, direct-current techniques, the tissue is heated only very locally around the antenna. Neighboring nerves (and the heart) are not stimulated. This led to the development of a variety of specialized catheters, used during minimally invasive surgery, along with ultrasound or X-ray imaging to determine the exact location of the RF-active part. During the treatment, the impedance of the surrounding tissue can be monitored and the end-point determined. With proper catheters, one can even achieve "self limitation" due to the reduced uptake of RF energy in desiccated tissue. Likewise, the RF frequency can be used to tune the energy deposition zone around the catheter: the higher the frequency, the smaller the penetration depth – and hence the volume to deposit the RF energy – in the watery tissue.

With the trend towards higher RF frequencies and powers, the complexity of RF generators and the requirements for the device technology also increase. Above 10 MHz, say, up to 3.8 GHz, the technology of choice for power amplifiers is Si LDMOS (laterally diffused metal oxide semiconductor). This technology has proven to be powerful, efficient, and rugged in base stations, radar systems, broadcast transmitters, and other industrial, scientific, and medical (ISM) applications. LDMOS is available from up to 50 V supply to achieve power levels up to 1,200 W per single device, with outstanding ruggedness and high gain and efficiency. To drive and control the LDMOS power amplifier stages, it takes voltage-controlled oscillators, phase locked loops, and medium power amplifiers. These parts of the RF signal chain are conveniently available based on reliable and high-volume SiGe:C (QUBiC) semiconductor technologies. Going a step further, one can even use high-speed converters to drive the signal chain entirely from the digital domain, for full and easy control over the shape and modulation of the applied RF.

#### RF implications

These in-situ medical applications and, in general, most of the ISM applications, usually form highly mismatched RF loads during some part of the usage cycle. This in turn means that, without protection or other measures, all of the "injected" RF power reflects back into the final stage of the amplifier and needs to be dissipated in the transistor(s), and most likely destroys the device(s) if this situation lasts too long. LDMOS transistors are designed to be extremely rugged and generally withstand these mismatch situations without degrading over time.

This device ruggedness, or the ability to withstand "harsh" RF conditions in general, be it mismatch or extremely short pulse rise and fall times, is essential for reliable device performance. RF power companies have gone to great lengths to achieve best-in-class device ruggedness. The technologies have been hardened under the most stringent ruggedness tests during development, which is particularly true for the 50 V technology. Among other factors, the base resistance of the parasitic bipolar and the drain extension of the LDMOS device play key roles in this respect.

This ruggedness, combined with the power density and the high efficiencies achievable, make LDMOS the preferred technology for RF power amplifiers up to 3.8 GHz.

## 2.5.2 RF-driven plasma lighting: The next revolution in light sources are powered by solid-state RF technology

Recent developments in RF power technology, such as improved cost structure, ruggedness, and power levels of up to 1200 W per device, have enabled a breakthrough light source technology, called 'RF plasma lighting'. All RF plasma lighting sources make use of a small, electrode-less quartz lightbulb that contains argon gas and metal halide mixtures. The bulb is powered by direct RF radiation, which ignites the gas mixtures to create and power a bright plasma, the color of which can be tuned by the composition of its constituents.

This technology works without any additional electrodes in the bulb, unlike standard high-intensity discharge lamps. No electrodes means very long operating lifetimes, since the contamination and wire erosion that lead to decreased efficiency and eventual lamp failure are precluded. The RF light source lives up to 50,000 hrs when it reaches 50% of its original light output. Typical high-intensity discharge lamps, by comparison, achieve 20,000 hrs operating life. Another strong point of the plasma light is its efficiency: 1 W of RF power is converted to 130-140 lm of light. This leads to very compact, very bright lamps that easily emit 10,000 to 20,000 lm of white light with a close-to-sunlight color rendition.

The key enabler for the RF light source is RF technology, based on Si LDMOS RF power transistors. LDMOS technology operating at 28 V is the leading RF power technology for cellular base stations or broadcast transmitters as final amplifier stages in the frequency range between a few MHz up to 3.8 GHz. Recently, another LDMOS format, 50 V LDMOS, has emerged for use in broadcast, ISM, defense and avionics applications. It combines high power density to achieve power levels up to 1,200 W per single device and outstanding ruggedness, with high gain and efficiency at frequencies of up to 1.5 GHz.

### Comparison of lighting technologies

The table below summarizes currently available technologies that generate bright light with varying degrees of efficiency. It lists a few key parameters, including lifetime, luminous flux, efficacy, color rendition index, color temperature, start-up time, and re-strike time (time to start after switch-off from normal operation).

| Type | Lifetime (hrs) | Luminous flux (klm) | Efficacy (lm/W) | Color rendering | Color temperature (K) | Start-up time (s) | Re-strike time (s) |
|---|---|---|---|---|---|---|---|
| Incandescent | 2,000 | 1,700 | 10 to 17 | 100 | 3200 | 0.1 | 0.1 |
| Fluorescent | 10,500 | 3,000 | 115 | 51 to 76 | 2940 to 6430 | 0.3 | 0.1 |
| LED | 25,000 | 130 | 60 to 100 | 30 | 6000 | 0.1 | 0.1 |
| HID (high-intensity discharge) | 20,000 | 25,000 | 65 to 115 | 40 to 94 | 4000 to 5400 | 60 | 480 |
| RF plasma | 50,000 | 25,000 | 100 to140 | 70 to 94 | 4000 to 5500 | 30 | 25 |

*Table 1: Comparison of light generation. Note: numbers are only valid for a qualitative comparison. Source: www.wikipedia.org and references therein.*

The plasma light source is among the brightest and most efficient available to date and boasts a very long life time. Important to note is the high brightness per bulb: much brighter than LEDs, for example. Consequently, it takes multiple LEDs to generate the light output of a single plasma light source. Hence, LED luminaries for street lighting will be considerably larger than those for plasma light sources.

### RF implications

The RF plasma lighting sources can operate at a wide range of RF frequencies, but initial applications typically focus at frequencies of around a few hundred megahertz. At these frequencies both the 28 and 50 V LDMOS technologies can be used, yielding high efficiency values of 70% to more than 80% and low-heat dissipation making compact plasma lamp designs possible.

The RF-driven plasma light is a perfect example of novel applications that can be powered by RF energy in the industrial, scientific, and medical (ISM) realm. Established technologies use RF to pump a gas discharge in a laser cavity. These "gas discharge" applications and, in general, most of the ISM applications, typically form highly mismatched RF loads during some part of the usage cycle. In the case of gas discharges, for example, the gas cavity acts as an "open circuit" during switch-on. This in turn means that without protection or other measures, all of the "injected" RF power reflected back into the final stage of the amplifier needs to be dissipated in the transistor(s) right there and most likely destroys the device(s) if this situation lasts too long. After the discharge strikes, the load impedance reverts to "matched," eventually, and the transistor sees an acceptable load. Obviously, these mismatched conditions occur every time the plasma is "switched on," exerting strain on the finals. LDMOS transistors are designed to be extremely rugged and generally withstand these mismatch situations without degrading over time.

This ruggedness, combined with the high power density and efficiency achievable, make LDMOS the preferred technology for RF lighting and other equally demanding applications in the ISM realm.

## 2.5.3 QUBiC4 Si and SiGe:C transistors for any RF function

### *NXP wideband transistors BFU6x0F & BFU7x0F*

These next-generation devices offer the best RF noise figure versus gain performance, drawing the lowest current. This performance allows for better signal reception at low power and enables RF receivers to operate more robustly in noisy environments.

**Key features**

- 40/110 GHz transition frequency allows for applications up to 18 GHz and beyond
- High gain of 13.5 dB at 12 GHz with a low noise figure of 1.45 dB
- High linearity of 34 dBm (OIP3) at 1.8 GHz
- Consuming only 3 mA to generate 13.5 dB gain at 12 GHz
- Plastic surface-mount SOT343F package for high performance and easy manufacturing




**Applications**

- Wideband applications that require
  - Low-noise amplifiers
  - High linearity and high output amplifiers
  - Buffer amplifiers
  - Mixers
  - Oscillators




The devices in this family of sixth- (Si) and seventh- (SiGe:C) generation RF transistors can be used to perform nearly any RF function. For example, the BFUx10F, BFUx30F, BFU725/N1 can be used as low-noise amplifiers, while the BFUx60F and BFUx90F can be used as high-linearity and high-output amplifiers. Other options include using these transistors as buffer amplifiers, mixers, and oscillators.

Higher transition frequencies (40 to 110 GHz) enable higher application frequencies (24/77 GHz car radar, 18 GHz Ka band, 3.5-3.7 WiMas, etc.), and the devices meet the low current requirements of wideband applications.

As a result, these devices are ideal for use in a very wide range of applications: second and third LNA stage and mixer stage in DBS LNBs, Ka/Ku band DROs, satellite radio (SDARS) LNA, C-band/X-band high-output buffer amplifiers, AMR, WLAN/WiFi, ZigBee, Bluetooth, FM radio, GPS, cellular (LTE, UMTS), mobile TV, RKE, high-linearity applications, low current battery-equipped applications, low-noise amplifiers for microwave communications systems, medium output power applications, microwave driver/buffer applications, and more.



**Selection guide – function**

| Function | LNAs, mixers, frequency multipliers, buffers | | | High-linearity, high-output amplifiers & drivers | | | Oscillators | | |
|---|---|---|---|---|---|---|---|---|---|
| Frequency range | <6 GHz | 6 GHz – 12 GHz | 12 GHz – +18 GHz | <6 GHz | 6 GHz – 12 GHz | 12 GHz – 18 GHz | <6 GHz | 6 GHz – 12 GHz | 12 GHz – +18 GHz |
| Type / Band | L,S,C | X, Ku low | Ku high, Ka | L,S,C | X, Ku low | Ku high | L,S,C | X, Ku low | Ku high, Ka |
| BFU610F | • | • | | | | | | | • |
| BFU630F | • | • | | • | | | • | | • |
| BFU660F | • | | | • | | | • | • | |
| BFU690F | • | | | • | | | • | • | |
| BFU725F/N1 | • | • | • | • | • | | • | | • |
| BFU710F | • | • | • | | | | | | • |
| BFU730F | • | • | • | • | • | • | • | | • |
| BFU760F | • | • | | • | • | | • | | |
| BFU790F | • | | | • | | | • | | |

Red = application note available on NXP.com

**Selection guide – specification**

| Typenumber | Package | Package name | generation | $f_T$ [typ] (GHz) | $V_{CEO}$ [max] (V) | $I_C$ [max] (mA) | $P_{tot}$ [max] (mW) | Polarity | NF (dB) | @ f (GHz) | @ $I_C$ (mA) | @ $V_{CE}$ (V) | NF (dB) | @ f (GHz) | @ $I_C$ (mA) | @ $V_{CE}$ (V) | $PL_{(1dB)}$ [typ] (dBm) | @ f (GHz) | @ $I_C$ (mA) | @ $V_{CE}$ (V) | IP3 [typ] (dBm) | @ f (GHz) | @ $I_C$ (mA) | @ $V_{CE}$ (V) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| BFU610F | SOT343F | DFP4 | 6th | 15 | 5.5 | 10 | 136 | NPN | 1.1 | 2.4 | 2 | 2 | 1.7 | 5.8 | 2 | 2 | 3 | 5.8 | 10 | 1.5 | 18 | 5.8 | 10 | 1.5 |
| BFU630F | SOT343F | DFP4 | 6th | 21 | 5.5 | 30 | 200 | NPN | 0.85 | 2.4 | 3 | 2 | 1.3 | 5.8 | 3 | 2 | 12.5 | 5.8 | 30 | 2.5 | 27.5 | 5.8 | 30 | 2.5 |
| BFU660F | SOT343F | DFP4 | 6th | 21 | 5.5 | 60 | 225 | NPN | 0.6 | 1.5 | 6 | 2 | 1.2 | 5.8 | 6 | 2 | 18.5 | 5.8 | 60 | 4 | 28 | 5.8 | 40 | 4 |
| BFU690F | SOT343F | DFP4 | 6th | 18 | 5.5 | 100 | 230 | NPN | 0.6 | 1.5 | 15 | 2 | 0.7 | 2.4 | 15 | 2 | 20 | 2.4 | 70 | 4 | 33 | 2.4 | 70 | 4 |
| BFU710F | SOT343F | DFP4 | 7th | 43 | 2.8 | 10 | 136 | NPN | 0.85 | 5.8 | 2 | 2 | 1.45 | 12 | 2 | 2 | 4.5 | 5.8 | 5 | 2.5 | 19.5 | 5.8 | 10 | 1.5 |
| BFU725F/N1 | SOT343F | DFP4 | 7th | 55 | 2.8 | 40 | 136 | NPN | 0.7 | 5.8 | 5 | 2 | 1.1 | 12 | 5 | 2 | 8 | 5.8 | 25 | 2 | 19 | 5.8 | 25 | 2 |
| BFU730F | SOT343F | DFP4 | 7th | 55 | 2.8 | 30 | 197 | NPN | 0.8 | 5.8 | 5 | 2 | 1.3 | 12 | 5 | 2 | 12.5 | 5.8 | 15 | 2.5 | 29 | 5.8 | 20 | 2.5 |
| BFU760F | SOT343F | DFP4 | 7th | 45 | 2.8 | 70 | 220 | NPN | 0.4 | 1.5 | 12 | 2 | 0.5 | 2.4 | 12 | 2 | 18.5 | 5.8 | 30 | 2.5 | 33 | 5.8 | 30 | 2.5 |
| BFU790F | SOT343F | DFP4 | 7th | 25 | 2.8 | 100 | 234 | NPN | 0.4 | 1.5 | 20 | 2 | 0.5 | 2.4 | 20 | 2 | 19 | 2.4 | 60 | 2.5 | 34 | 2.4 | 30 | 2.5 |

## 2.5.4 Building on decades of innovation in microwave and radar

NXP builds on more than 50 years of history in semiconductor technology and component design. For more than three decades we have led in providing high-performance RF technologies for microwave applications. The company has built a strong position in the field of RF small-signal and power transistors for microwave amplifiers with best-in-class Si devices and processing technologies.

We were the first semiconductor company to supply S-band transistors (2700 to 3500 MHz) based on laterally diffused metal-oxide-silicon (LDMOS). To further strengthen our position towards the future, we are currently developing new high-power and high-bandwidth technologies based on gallium nitride (GaN) material.

Another enabling technology is NXP's BICMOS process QUBiC, which is available in several variants with $f_T$ up to 200 GHz, each specialized to address specific small-signal RF applications.

The product portfolio encompasses:

- Low-noise amplifiers (LNAs)
- Variable-gain amplifiers (VGAs)
- Mixers
- Local oscillators (LOs)
- LO generators

NXP now also focuses on architectural breakthroughs and has developed highly integrated products for microwave and millimeter wave. One example is a family of LO generators from 7 to 15 GHz with integrated PLL and VCO. Another example is an integrated RF power module in S-band (3.1-3.5 GHz) at 200 W.

### RF small-signal product highlight

Manufactured in NXP's breakthrough QUBiC4X SiGe:C process technology, these highly integrated, alignment-free LO generators TFF1xxxHN are low-power, low-spurious solutions that simplify design-in and lower the total cost of ownership.

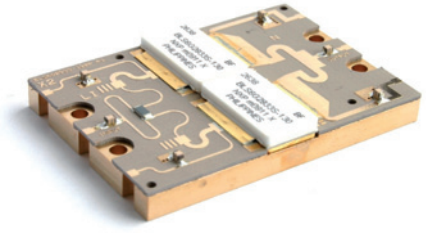



### Features

- Lowest noise LO generators for 7 to 15 GHz range
- Maximum power consumption for all types, typical 330 mW
- Phase-noise compliant with IESS-308 (Intelsat)
- Proven QUBiC4X SiGe:C technology (120 GHz $f_T$ process)
- External loop filter
- Differential input and output
- Lock-detect output
- Internally stabilized voltage reference for loop filter

### RF power product highlight

The BLS6G2933P-200 is the first LDMOS-based, industry-standard pallet produced by NXP. This pallet offers more than 40% efficiency and includes the complete bias network for S-band applications.



## Features

- Reduces component count and considerably simplifies radar system design
- P1 dB output power 200 W
- Efficiency > 40%
- Industry-standard footprint
- 50 Ω in/out matched for entire bandwidth
- Lightweight heat sink included
- The advantages of LDMOS over Bipolar
  - Higher gain and better efficiency
  - Better ruggedness – overdrive without risk to 5 dB
  - Improved pulse droop and insertion phase
  - Consistent performance – no tuning required
  - Improved thermal characteristics – no thermal runaway
  - Non-toxic packaging and RoHS-compliance

## Microwave applications and bands of operation

| System | Frequency |
|---|---|
| VHF and UHF | <1 GHz |
| L-band | 1200 - 1400 MHz |
| S-band | 2700 - 3500 MHz |
| X-band | 8000 - 12000 MHz |
| **Commercial avionics** | |
| DME (Distance Measuring Equipment) | 978 - 1215 MHz |
| Transponders | |
| Mode A / Mode S / Mode C / TCAS | 1030 - 1090 MHz |
| **Military avionics** | |
| IFF transponders (Identification, Friend or Foe) | 1030 - 1090 MHz |
| TACAN (Tactical Air Navigation) | 960 - 1215 MHz |
| JTIDS / MIDS (Joint Tactical Information Distribution System) | 960 - 1215 MHz |
| Marine radar | 9300 - 9500 MHz |

**For a complete list of products, see the respective small-signal and power microwave pages in chapter 3**

## 2.5.5 Digital broadcasting at its best

*The BLF881 / BLF888A transistor line-up enables today's most powerful and efficient digital broadcast transmitter applications*

### BLF881

This transistor is based on NXP's 50 V LDMOS technology and features 120 W RF output power for broadcast transmitter and industrial applications. An unmatched device, the BLF881 can be used in the HF to 1 GHz range. The excellent ruggedness and broadband performance of this device make it ideal for digital transmitter applications – either on its own or as a driver in combination with the high-power transistor BLF888A.

The BLF881 is also available in an earless version, the BLF881S, which enables an even more compact PCB design.

### BLF888A

Running from a 50 V supply voltage, the BLF888A is a 600 W LDMOS RF power transistor for broadcast transmitter and industrial applications. Being a matched device, the BLF888A is optimized for digital signal broadcasting and can deliver 120 W average DVB-T output power over the full UHF band from 470 MHz to 860 MHz with 20 dB power gain and 31% drain efficiency. The excellent ruggedness of this transistor (it withstands a VSWR in excess of 40:1) makes it the ultimate choice as final stage for digital transmitter applications – ideally accompanied by a BLF881 as the driver. This device is also available in an earless package, denoted BLF888AS, to enable surface-mount assembly processes and take optimum advantage of the very low thermal resistance of the package.

### Key features and benefits

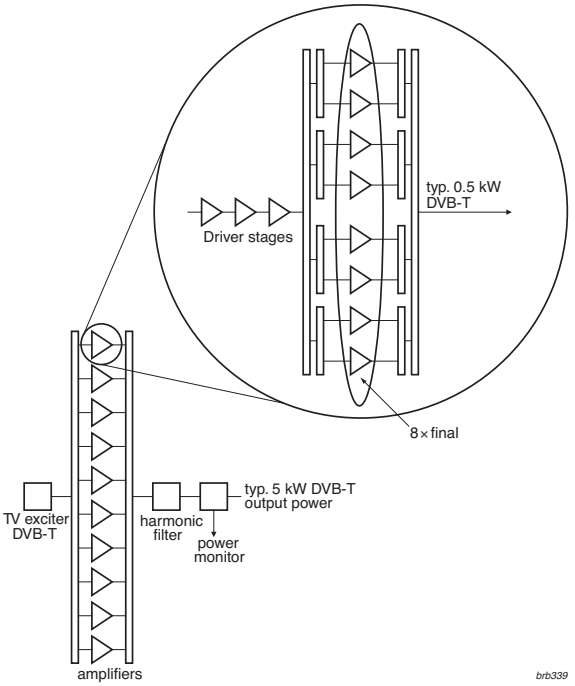
- Excellent efficiency and reliability
- Highest power levels in the market
- Best-in-class ruggedness designed into all devices
- Best broadband performance
- Easy power control
- Best-in-class design support
- Low thermal resistance design for unrivalled reliability
- Advanced flange material for optimum thermal behavior and reliability
- Designed for broadband operation (470 to 860 MHz)

### Key applications

- Analog and digital TV transmitters








| Type | Product | $f_{min}$ (MHz) | $f_{max}$ (MHz) | P1dB (W) | Matching | VDS (V) | $P_L$ (W) | $\eta_D$ (%) | $G_p$ (dB) | Test signal | Package |
|---|---|---|---|---|---|---|---|---|---|---|---|
| BLF642 | Driver | 1 | 1400 | 35 | - | 32 | 35 | 63 | 19 | CW | SOT467C |
| BLF884P(S) | Final | 470 | 860 | 300 | I | 50 | 150 | 46 | 21 | CW | SOT1121 |
| BLF879P | | 470 | 860 | 500 | I | 42 | 200 | 47 | 21 | CW | SOT539A |
| BLF888A(S) | | 470 | 860 | 600 | I | 50 | 250 | 46 | 21 | CW | SOT539 |
| BLF888B(S) | | 470 | 860 | 600 | I | 50 | 250 | 46 | 21 | CW | SOT539 |
| BLF881(S) | | 1 | 1000 | 140 | - | 50 | 140 | 49 | 21 | CW | SOT467 |

## 2.5.6 Setting the benchmark for ultra low-power and high-performance wireless connectivity solutions

*NXPs JN5148/2 wireless microcontroller platform with chipsets, modules, and supporting software*

NXP provides a complete package for the development of IEEE802.15.4-based wireless network solutions, incorporating all the necessary hardware and software components. NXP's JN514x range of wireless microcontroller chips provides the optimum hardware platform for designing wireless network nodes that combine high-performance processing and radio communications. NXP also supplies JN514x wireless microcontrollers mounted on modules, and evaluation kits that simplify the development of custom applications.



### Products

- JN5142-J01 for JenNet-IP Smart Devices, JN5148-J01 for JenNet-IP Gateways
- JN5148-001 for JenNet and IEEE802.15.4, JN5142-001 for RF4CE and IEEE802.15.4
- JN5148-Z01 for ZigBee applications
- JN5148-001-M00, JN5148-001-M03, JN5148-001-M04: modules for JenNet and IEEE802.15.4

### Key features

- Ultra low-power MCU together with an IEEE802.15.4-compliant radio transceiver
- Enhanced 32-bit RISC processor for high performance and low power
- On-chip ROM and RAM for storage of application, networking stack, and software libraries
- A rich mix of analog and digital peripherals
- Low-current solution for long battery-life
- Standard-power and high-power modules
- Software Developer's Kit (SDK), including JenNet, JenNet-IP and ZigBee networking stacks

### Key applications

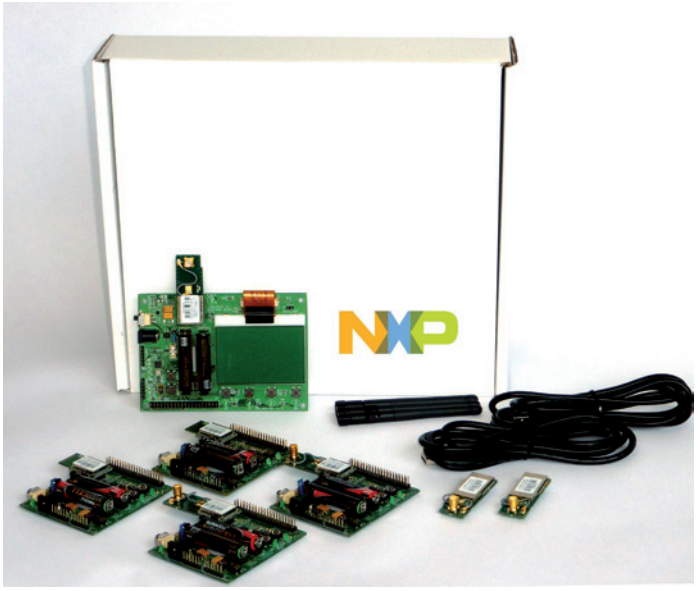
- Smart lighting / smart energy / smart grid
- Utilities metering
- Home and commercial building automation and control
- Remote control
- Security systems
- Location-aware services – eg asset management

### Software

A selection of network protocol stacks, based on the industry-standard IEEE802.15.4, is available to support the wireless connectivity requirements of your application. These include JenNet, JenNet-IP, and ZigBee PRO, which are provided as a set of software libraries.

JenNet is suitable for all proprietary applications. ZigBee PRO is used for smart energy and other applications where ZigBee interoperability is required. JenNet-IP provides IPv6 connectivity to the end node and is rapidly emerging as a standard for lighting and automation applications in buildings.

### Evaluation kit



# 2.6 Technology

## 2.6.1 The first mainstream semiconductor company to offer GaN products

### *NXP Galium-Nitride (GaN) broadband amplifiers*

### A disruptive technology, setting new performance boundaries for RF power amplifiers

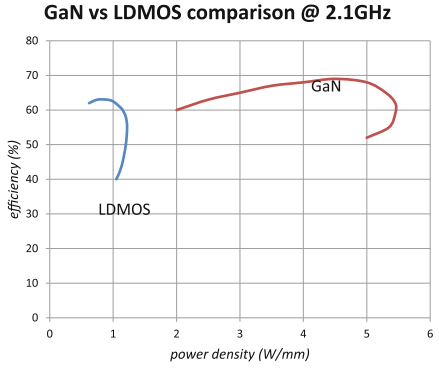
If independent market research claims come true, GaN product sales will exceed 300 Musd in 2014. This can only happen if GaN is made available through mainstream semiconductor companies, and NXP is the first to make this happen. So, what is it about GaN and RF power applications? Simply put, GaN makes a step increase in efficiency and power density performance over Si LDMOS in most applications. This can be quantified in the Johnson's Figure of Merit (FoM) – a combination of significant RF performance variables that has a baseline for Si at 1 and leads to a FoM for GaN of 324. To put this into some context, GaAs, another commonly used compound material in RF, has a FoM of 1.44. With such a high FoM rating, GaN truly represents a breakthrough technology.

GaN products are termed High-Electron Mobility Transistors (HEMT), a name that captures one of the intrinsic benefits of GaN: the high electron drift velocity. These transistors are depletion-mode devices, that is, devices that are normally on, without the need for applying a gate bias. A negative gate bias will be needed to switch the transistors off. This biasing is not straightforward, but at NXP, we've developed complete solutions (not just individual components) that include a tried and tested bias circuit. We also provide continuous application support throughout the life of the product.

A further advantage of GaN is that it is a very hard structure able to withstand very high temperatures. NXP's GaN transistors will be specified to a maximum temperature of 250 °C, compared to 225 °C for Si LDMOS. Special packages are required to support such high temperatures. In this area, NXP's GaN customers benefit from our 30-year legacy in RF power products, and our large industrial base. As a GaN supplier, we deliver excellence in product reliability and cost, and give our customers a high degree of confidence in the supply chain. It's part of what's needed to take GaN to the mainstream.

The first NXP GaN products will be unmatched broadband amplifiers for use in applications requiring high RF performance across a wide range of frequencies up to 3.5 GHz. NXP's first generation GaN process is designed for products operating from a 50V supply voltage, delivering best-in-class efficiency and linearity. The products will use industry-standard package footprints enabling customers to adopt NXP's products into existing designs without changing the mechanical design.

Next-generation GaN devices from NXP will be super-efficient, enabling a breakthrough in performance for the largest RF power market segment: cellular base stations. In turn this technology will enable a departure from linear amplifier topologies with the onset of switched mode power amplifier (SMPA) concepts. NXP's commitment to exploit the technology in a full portfolio of products will also lead to products for higher frequency applications up to 10 GHz.

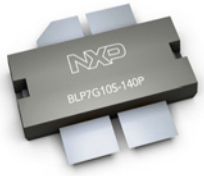



**GaN RF power amplifiers**

| Type | $f_{min}$ (MHz) | $f_{max}$ (MHz) | $P_{out}$ (W) | Matching | $V_{DS}$ (V) | $\eta_D$ (%) | $G_p$ (dB) | Test signal | Package | Planned release | Applications |
|---|---|---|---|---|---|---|---|---|---|---|---|
| CLF1G0035-50 | 0 | 3500 | 50 | - | 50 | 54 | 14.2 | Pulsed | SOT467 | Q312 | Cellular, WiMAX, ISM, avionics, S-band, general purpose |
| CLF1G0035-100 | 0 | 3500 | 100 | - | 50 | 52 | 14.8 | Pulsed | SOT467 | Q412 | Cellular, WiMAX, ISM, avionics, S-band, general purpose |
| CLF1G0035-200 | 0 | 3500 | 200 | - | 50 | 50 | 14.2 | Pulsed | SOT1228 | Q313 | Cellular, WiMAX, ISM, avionics, S-band, general purpose |
| CLF1G0060-10 | 0 | 6000 | 10 | - | 50 | 54 | 14 | Pulsed | SOT1227 | Q113 | Cellular, WiMAX, ISM, avionics, S-band, general purpose |
| CLF1G0060-30 | 0 | 6000 | 30 | - | 50 | 54 | 14 | Pulsed | SOT1227 | Q113 | Cellular, WiMAX, ISM, avionics, S-band, general purpose |
| CLF2G2536-100 | 2500 | 3600 | 100 | I/O | 28 | 65 | 13 | Pulsed | SOT1135 | Q413 | Cellular, WiMAX, S-band |
| CLF2G2536-300 | 2500 | 3600 | 300 | I/O | 28 | 65 | 13 | Pulsed | SOT502 | Q413 | Cellular, WiMAX, S-band |
| CLF3G4060-30 | 4000 | 6000 | 30 | I/O | 28 | 55 | 13 | Pulsed | SOT1135 | Q114 | C-band |
| CLF3G4060-350 | 4000 | 6000 | 350 | I/O | 28 | 55 | 13 | Pulsed | SOT502 | Q114 | C-band |

## 2.6.2 Completing NXP's RF power transistor offering: products in plastic packages (OMP)

NXP is currently developing a complete line of overmolded plastic (OMP) RF power transistors and MMICs with peak powers ranging from 3 to 500 W. The main benefit of plastic packages is cost effectiveness with little or no impact on performance. The range of plastic devices will complement the extensive range of RF power products that NXP offers in ceramic packages for all frequency ranges and applications up to 2.45 GHz.




### Products in development

- Single-stage broadband drivers in HSOP-outlines, from 3 to 10 W
- Single-stage OMP drivers from 25 to 45 W, replacing their ceramic equivalents for cost-sensitive applications
- Dual-stage MMICs from 30 to 60 W that can be used as high-gain drivers or combined as low-power dual-stage Doherty amplifiers
- Fully integrated plug-and-play Doherty PAs in a single package (50 to 100 W)
- Final transistors in OMP package (SOT502-sized) ranging from 140 to 200 W in frequency bands from 730 MHz to 2.2 GHz
- Final transistors in OMP package (SOT502-sized) ranging from 3 to 500 W in ISM frequency bands from a few MHz up to 2.45 GHz

Some of these products are available for sampling now, while the rest of the portfolio will be rolled out throughout 2012.



### RF power products in plastic packages (OMP)

| Type | $f_{min}$ (MHz) | $f_{max}$ (MHz) | P1dB (W) | Matching | Package | Description |
|---|---|---|---|---|---|---|
| BLP7G22-10 | 700 | 2200 | 10 | - | SOT1179 | Gen7 OMP LDMOS transistor for WCDMA & GSM applications |
| BLM7G22S-60PB(G) | 2000 | 2200 | 60 | I/O | SOT1212 | Gen7 LDMOS MMIC for WCDMA applications (gull-wing) |
| BLP7G07S-140P(G) | 700 | 900 | 140 | O | SOT1224 | Gen7 OMP push-pull LDMOS transistor for GSM, WCDMA & LTE applications (gull-wing) |
| BLP7G09S-140P(G) | 900 | 1000 | 140 | O | SOT1224 | Gen7 OMP push-pull LDMOS transistor for GSM, WCDMA & LTE applications (gull-wing) |

## 2.6.3 Looking for a leader in SiGe:C? You just found us!

### *NXP QUBiC4 process technology*

NXP's innovative, high-performance SiGe:C QUBiC4 process lets customers implement more functions into less space, with the added benefits of competitive cost, superb reliability, and significant manufacturing advantages. Our state-of-the-art QUBiC4 technology and extensive IP availability speed the migration from GaAs components to silicon by enabling cutting-edge products with best-in-class low noise performance, linearity, power consumption, immunity to out-of-band signals, spurious performance, and output power. QUBiC is a mature process that has been in mass production since 2002 and has had continuous performance upgrades added ever since. The QUBiC4 process is automotive-qualified and dual-sourced in two high-volume, NXP-owned 8-inch waferfabs that provide flexible, low-cost manufacturing with high yields and very low ppm in the field.

**There are three QUBiC4 variants, each with its own benefits for specific application areas**

**QUBiC4+**

The QUBiC4+ BiCMOS process features 0.25 µm CMOS with 5 metal layers for integration of dense digital logic-based smart functionality, a rich set of active and passive devices for high-frequency mixed-signal designs, including thick top metal layers for high-quality inductors. The device set includes 35 GHz $f_T$ NPNs with 3.8 V breakdown voltage (BVce0) and low noise figure (NF < 1.1 dB @ 2 GHz), 5 GHz $f_T$ VPNPs, a 28 GHz high-voltage NPN with 5.9 V breakdown voltage, differential and single-ended varicaps with Q-factor > 30, scalable inductors with Q-factor > 20, 800 MHz FT lateral PNPs, 0.25 µm CMOS, 137, 220 & 12 to 2000 ohm/sq. poly and active resistors, a 270 ohm/sq. SiCr thin film resistor, a 5.7 fF/µm2 oxide capacitor and a 5 fF/µm2 MIM capacitor, 1 to 6 fF/µm2 oxide capacitors and various other devices including L-PNPs, isolated NMOS, 3.3 V CMOS and RF-CMOS transistors capacitor. The QUBiC4+ process is silicon-based and ideal for applications up to 5 GHz ($f_T$ = 35 GHz, NF < 1.1 dB @ 2 GHz), as well as for medium power amplifiers up to 33 dBm.

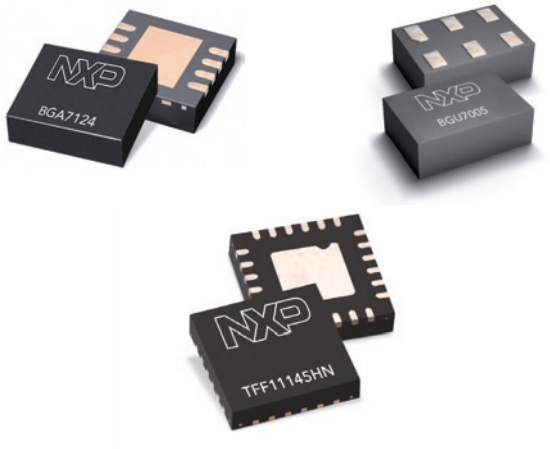
**QUBiC4X**

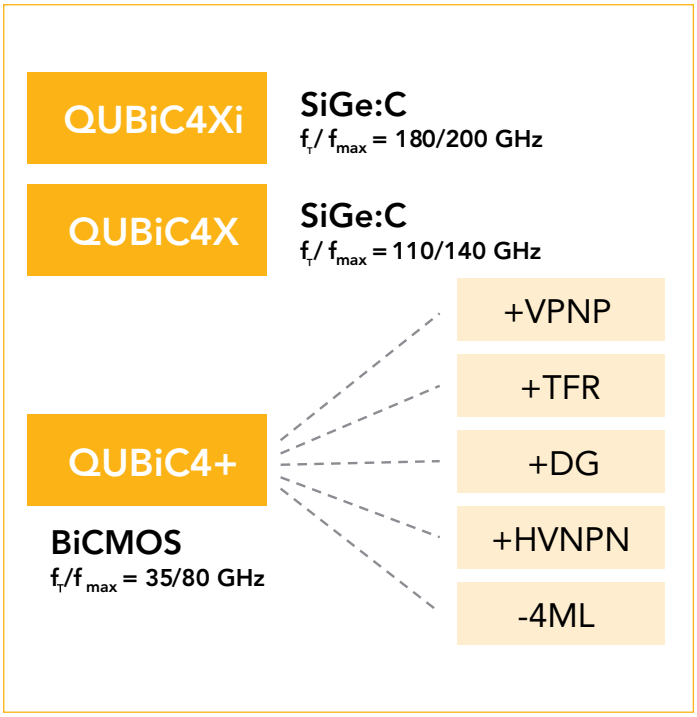
The QUBiC4X BiCMOS process is a SiGe:C-based extension of the QUBiC process for high-frequency mixed-signal designs and offers a rich set of devices, including a 110 GHz $f_T$ NPN with 2.0 V breakdown voltage and very low noise figure (NF < 1.0 dB @ 10 GHz), 0.25 µm CMOS, a variety of resistors, a 5.7 fF/µm2 oxide capacitor, and a 5 fF/µm2 MIM capacitor.

The QUBiC4X is ideal for applications that typically operate at up to 30 GHz ($f_T$ = 110 GHz , NF < 1.0 dB @ 10 GHz) and ultra-low noise applications such as LNAs and mixers.

**QUBiC4Xi**

The QUBiC4Xi BiCMOS process further enhances the QUBiC4X process and offers an additional feature set of devices for high-frequency mixed-signal designs. These include 180 GHz $f_T$ NPNs with 1.4 V breakdown voltage and ultra-low noise figure (NF < 0.7 dB @ 10 GHz), 0.25 µm CMOS, several resistors, a 5.7 fF/µm2 oxide capacitor and a 5 fF/µm2 MIM capacitor. QUBiC4Xi represents the newest SiGe:C process, with improved $f_T$ (> 200 GHz) and even lower noise figure (NF < 0.6 dB @ 10 GHz). It is ideal for applications beyond 30 GHz, such as LO generators.






## QUBiC4+

- Baseline, 0.25 µm CMOS, single poly, 5 metal
- Digital gate density 26k gates/mm$^2$
- $f_T/f_{MAX}$= 35/80 GHz
- +TFR – Thin Film Resistor
- +DG – Dual Gate Oxide MOS
- +HVNPN – High Voltage NPN
- +VPNP – Vertical PNP (high $V_{early}$)
- -4ML – high-density 5fF/µm$^2$ MIM capacitor
- Wide range of active and high-quality passive devices
- Optimized for up to 5 GHz applications

## QUBiC4X

- SiGe:C process
- $f_T/f_{MAX}$= 110/140 GHz
- Optimized for applications up to 30 GHz

## QUBiC4Xi

- SiGe:C process
- Improves $f_T/f_{max}$ up to 180/200 GHz
- Optimized for ultra-low noise microwave above 30 GHz



| Features | QUBiC4+ | QUBiC4X | QUBiC4Xi |
|---|---|---|---|
| Release for production | 2004 | 2006 | 2008 |
| CMOS/bipolar | CMOS 0.25 um, bipolar 0.4 um, double poly, deep trench, Si | CMOS 0.25 um, bipolar LV 0.4 um, double poly, deep trench, SiGe:C | CMOS 0.25 um, bipolar LV 0.3 um, double poly, deep trench, SiGe:C |
| LV NPN $f_T/F_{max}$ (GHz) | 35/80 (Si) | 110/140 (SiGe:C) | 180/200 (SiGe:C) |
| HV NPN $f_T/F_{max}$ (GHz) | 28/70 (Si) | 60/120 (SiGe:C) | 90/200 (SiGe:C) |
| NPN BVce0: HV/LV ** | 5.9 / 3.8 V | 3.2 / 2.0 V | 2.5 / 1.4 V |
| V-PNP $f_T$ / BVcb0 (GHz / V) | 5 / >9 | Planned | Planned |
| CMOS voltage / dual gate | 2.5 / 3.3 V | 2.5 V | 2.5 V |
| Noise figure NPN (dB) | 2 GHz: 1.1 | 10 GHz: 1.0 | 10 GHz: 0.6 |
| RFCMOS $f_T$ (GHz) | NMOS 58, PMOS 19 | NMOS 58, PMOS 19 | NMOS 58, PMOS 19 |
| Isolation (60 dB @ 10 GHz) | STI and DTI | STI and DTI | STI and DTI |
| Interconnection (AlCu with CMP W Plugs) | 5 LM, 3 µm top metal | 5 LM, 3 µm top metal 2 µm M4 | 5 LM, 3 µm top metal |
| Capacitors | NW, DN, Poly-Poly 5fF/um2 MIM | NW, DN, Poly-Poly 5fF/um2 MIM | NW, DN, Poly-Poly 5fF/um2 MIM |
| Resistors (Ω/sq) | Poly (64/137/220/2K) Active (12, 57), high-precision SiCr (270) | Poly (64/220/330/2K), Active (12, 57), high-precision SiCr (tbd) | Poly (64/220/330/2K), Active (12, 57), high-precision SiCr (tbd) |
| Varicaps (single-ended & differential) | 1x single-ended, Q > 40 3x differential, Q 30-180 | 1x single-ended, Q > 40 3x differential, Q 30-180 | 1x single-ended, Q > 40 3x differential, Q 30-180 |
| Inductors (1.5nH @ 2 GHz) - scalable | Q > 21, thick metal, deep trench isolation, high R substrate | Q > 21, thick metal, deep trench isolation, high R substrate | Q > 21, thick metal, deep trench isolation, high R substrate |
| Other devices | LPNP, isolated NMOS, VPNP, transformers | Isolated-NMOS, transformers | Isolated-NMOS, transformers |
| Mask count | 32 (MIM) / 34 / 33 (HVNPN) / 35 (VPNP) | 36 (MIM) | 36 (MIM) |

## 2.6.4 High-performance, small-size packaging enabled by NXP's leadless package platform and WL-CSP technology

**RF small-signal packaging is driven by two major trends which partly overlap**

- Lower parasitics for better RF performance
- Smaller form factors for portable applications

**To cope with these trends, NXP uses several approaches**

- For non-space-restricted applications the use of flat-pack packages instead of gull-wing versions reduces the parasitic impedance because of shorter lead length (e.g. SOT343F instead of SOT343). This results in better RF performance in the Ku and Ka bands (13-20GHz). To reduce PCB board space, a smaller version (SOT1206) is also available.




SOT343




SOT343F




SOT1206

- For space-restricted applications there are two routes to reduce the form factor and parasitics:
  - Leadless package platform
  - Wafer Level Chip Scale Package (WL-CSP) technology

The leadless package (UTLP) platform (>25 variants already released) is highly flexible with respect to package size, package height, and I/O pitch. For example, the 6-pin packages range in size from 1.45 x 1 x 0.5 mm with 0.5 mm pitch to 0.8 x 0.8 x 0.35 mm with 0.3 mm pitch. Package height of 0.25 mm is planned.

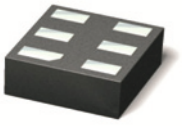
Because of the compact size of the design, wire lengths and parasitic impedance are also restricted. The absence of leads further reduces the inductance.



SOT886



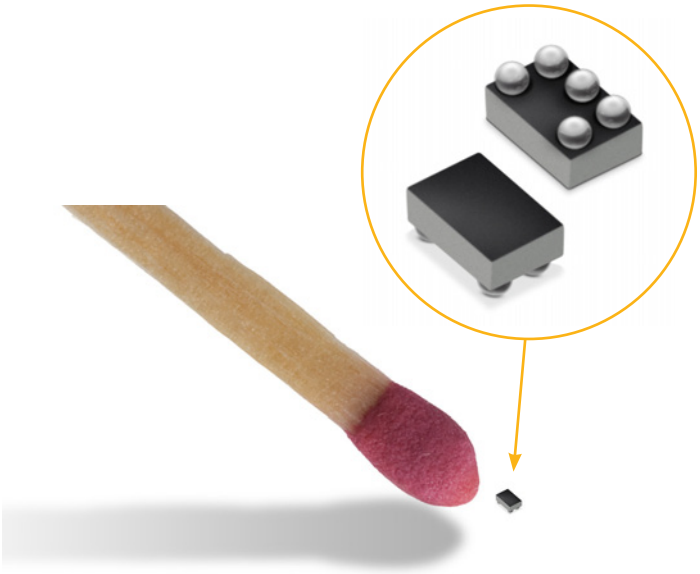
SOT891



SOT1208

Wafer Level Chip Scale Package technology is ideally for RF functions where the I/O pitch has to fit within the chip area. With larger pitches and smaller designs (and thus little effective chip area), it is more cost-effective to do the fan-out using a leadless package instead of increasing the chip size.

The absence of wires gives the lowest parasitic inductance available.



0.65 x 0.44 x 0.29 mm (incl. 0.09 mm balls)
5 I/Os @ 0.22 mm pitch

# 3. Products by function

NXP RF product catalog:
http://www.nxp.com/rf

## 3.1 New products

DEV = in development
CQS = customer qualification samples
RFS = release for supply

| Type | Application / description | Expected status June 2012 | Planned release | Section |
|---|---|---|---|---|
| **NEW: Wideband transistors** | | | | |
| BFU730LX | Gen7 wideband transistor | RFS | Released | 3.3.1 |
| **NEW: SiGe:C LNAs (for e.g. GPS)** | | | | |
| BGU8007 | GPS LNA, 19.0 dB gain, AEC-Q100 | RFS | Released | 3.4.1 |
| BGU7003W | General-purpose unmatched LNA for FM radio | RFS | Released | 3.4.1 |
| BGU6101 | Unmatched wideband MMIC w/ bias enable function & wide range of supply voltage | RFS | Released | 3.4.1 |
| BGU6102 | Unmatched wideband MMIC w/ bias enable function & wide range of supply voltage | RFS | Released | 3.4.1 |
| BGU6104 | Unmatched wideband MMIC w/ bias enable function & wide range of supply voltage | RFS | Released | 3.4.1 |
| **NEW: LNAs for set-top boxes** | | | | |
| BGU7044 | LNA for STB tuning | RFS | Released | 3.4.1 |
| BGU7045 | LNA for STB tuning | RFS | Released | 3.4.1 |
| **NEW: General-purpose wideband amplifiers (50 Ω gain blocks)** | | | | |
| BGA2874 | IF gain block 30.5 dB, 2.5 V | RFS | Released | 3.4.1 |
| BGA2817 | IF gain block 24 dB, 3 V | RFS | Released | 3.4.1 |
| BGA2818 | IF gain block 31 dB, 3 V | RFS | Released | 3.4.1 |
| BGA2851 | IF gain block 25 dB, 5 V | RFS | Released | 3.4.1 |
| BGA2867 | IF gain block 27 dB, 5 V | RFS | Released | 3.4.1 |
| BGA2869 | IF gain block 32.5 dB, 5 V | RFS | Released | 3.4.1 |
| **NEW: Medium power amplifier MMICs** | | | | |
| BGA7014 | Medium power amplifier, 12.0 dB ,13.0 dBm P1dB, SOT89 | Dev | Q4 2012 | 3.4.1 |
| BGA7017 | Medium power amplifier, 13.5 dB, 16.5 dBm P1dB, SOT89 | Dev | Q4 2012 | 3.4.1 |
| BGA7020 | Medium power amplifier, 13.0 dB, 18.5 dBm P1dB, SOT89 | Dev | Q4 2012 | 3.4.1 |
| BGA7130 | Medium power amplifier, 18.0 dB, 30 dBm P1dB, SOT908 | RFS | Released | 3.4.1 |
| **NEW: VGAs for wireless infrastructures** | | | | |
| BGA7351 | 50 MHz to 250 MHz high linearity variable gain amplifier - 28 dB gain range | RFS | Released | 3.4.1 |
| BGA7210 | 400 MHz to 2750 MHz high linearity variable gain amplifier | RFS | Released | 3.4.1 |
| BGA7204 | 700 MHz to 3800 MHz high linearity variable gain amplifier | RFS | Released | 3.4.1 |
| **NEW: LNAs for wireless infrastructures** | | | | |
| BGU7051 | LNA 900 MHz - from 0.5 to 1.5 GHz | RFS | Released | 3.4.1 |
| BGU7052 | LNA 1.9 GHz - from 1.5 to 2.5 GHz | RFS | Released | 3.4.1 |
| BGU7053 | LNA 2.5 GHz - from 2.3 to 2.8 GHz | RFS | Released | 3.4.1 |
| BGU7060 | LNA with variable gain from 700 to 800 MHz | RFS | Released | 3.4.1 |
| BGU7061 | LNA with variable gain from 700 to 950 MHz | RFS | Released | 3.4.1 |
| BGU7062 | LNA with variable gain from 1710 to 1785 MHz | RFS | Released | 3.4.1 |
| BGU7063 | LNA with variable gain from 1920 to 1980 MHz | RFS | Released | 3.4.1 |

| Type | Application / description | Expected status June 2012 | Planned release | Section |
|---|---|---|---|---|
| **NEW: PLL + VCO (LO generator) for wireless infrastructures** | | | | |
| BGX7300 | Rx LO generator, 400 MHz to 3 GHz | DEV | Q4 2012 | 3.4.2 |
| **NEW: IQ modulators for wireless infrastructures** | | | | |
| BGX7100 | IQ modulator, ouput power 0 dBm | RFS | Released | 3.4.2 |
| BGX7101 | IQ modulator, ouput power 4 dBm | RFS | Released | 3.4.2 |
| **NEW: Dual mixers for wireless infrastructures** | | | | |
| BGX7220 | Dual mixer, NF 8 dB, IIP3 30 dBm, P < 1 W, 700 MHz to 1.2 GHz | RFS | Released | 3.4.2 |
| BGX7221 | Dual mixer, NF 10 dB, IIP3 23 dBm, P < 1 W, 1.7GHz to 2.7 GHz | RFS | Released | 3.4.2 |
| **NEW: RF power transistors for base stations** | | | | |
| BLF6G15L(S)-40RN | Gen6 ceramic driver LDMOS transistor for GSM, WCDMA & LTE applications | RFS | Released | 3.7.1 |
| BLF6H10L(S)-160 | Gen6 ceramic high-voltage LDMOS transistor for GSM, WCDMA & LTE applications | DEV | Q312 | 3.7.1 |
| BLF7G20LS-260A | Gen7 ceramic asymmetrical Doherty LDMOS transistor for GSM & LTE applications | DEV | Q412 | 3.7.1 |
| BLF7G24L(S)-160P | Gen7 ceramic push-pull LDMOS transistor for WCDMA & LTE applications | RFS | Released | 3.7.1 |
| BLF7G27LS-90PG | Gen7 ceramic push-pull LDMOS transistor for WCDMA & LTE applications (gull-wing) | RFS | Released | 3.7.1 |
| BLF8G10L(S)-160V | Gen8 ceramic LDMOS transistor for GSM, WCDMA & LTE applications | RFS | Released | 3.7.1 |
| BLF8G10LS-200GV | Gen8 ceramic LDMOS transistor for GSM, WCDMA & LTE applications (gull-wing) | DEV | Q412 | 3.7.1 |
| BLF8G10LS-270GV | Gen8 ceramic LDMOS transistor for GSM, WCDMA & LTE applications (gull-wing) | DEV | Q412 | 3.7.1 |
| BLF8G10L(S)-300P | Gen8 ceramic push-pull LDMOS transistor for GSM, WCDMA & LTE applications (gull-wing) | DEV | Q312 | 3.7.1 |
| BLF8G10LS-400PGV | Gen8 ceramic push-pull LDMOS transistor for GSM, WCDMA & LTE applications (gull-wing) | DEV | Q412 | 3.7.1 |
| BLF8G20L(S)-200V | Gen8 ceramic LDMOS transistor for GSM & LTE applications | RFS | Released | 3.7.1 |
| BLF8G20LS-270GV | Gen8 ceramic LDMOS transistor for GSM & LTE applications (gull-wing) | DEV | Q412 | 3.7.1 |
| BLF8G20LS-270PGV | Gen8 ceramic push-pull LDMOS transistor for GSM & LTE applications (gull-wing) | DEV | Q412 | 3.7.1 |
| BLF8G22LS-160BV | Gen8 ceramic LDMOS transistor for WCDMA & LTE applications | RFS | Released | 3.7.1 |
| BLF8G22LS-200GV | Gen8 ceramic LDMOS transistor for WCDMA & LTE applications (gull-wing) | DEV | Q312 | 3.7.1 |
| BLF8G22LS-270GV | Gen8 ceramic LDMOS transistor for WCDMA & LTE applications (gull-wing) | DEV | Q312 | 3.7.1 |
| BLF8G22LS-400PGV | Gen8 ceramic push-pull LDMOS transistor for WCDMA & LTE applications (gull-wing) | DEV | Q312 | 3.7.1 |
| BLF8G24L(S)-200P | Gen8 ceramic push-pull LDMOS transistor for WCDMA & LTE applications | DEV | Q312 | 3.7.1 |
| BLF8G27LS-140G | Gen8 ceramic LDMOS transistor for WCDMA & LTE applications (gull-wing) | DEV | Q412 | 3.7.1 |
| BLF8G27LS-140V | Gen8 ceramic LDMOS transistor for WCDMA & LTE applications | DEV | Q412 | 3.7.1 |
| BLF8G27LS-200PGV | Gen8 ceramic push-pull LDMOS transistor for WCDMA & LTE applications (gull-wing) | DEV | Q412 | 3.7.1 |
| BLF8G27LS-280PGV | Gen8 ceramic push-pull LDMOS transistor for WCDMA & LTE applications (gull-wing) | DEV | Q412 | 3.7.1 |
| BLM7G22S-60PB(G) | Gen7 LDMOS MMIC for WCDMA applications (gull-wing) | DEV | Q312 | 3.7.1 |
| BLP7G07S-140P(G) | Gen7 OMP push-pull LDMOS transistor for GSM, WCDMA & LTE applications (gull-wing) | DEV | Q412 | 3.7.1 |
| BLP7G09S-140P(G) | Gen7 OMP push-pull LDMOS transistor for GSM, WCDMA & LTE applications (gull-wing) | DEV | Q412 | 3.7.1 |
| BLP7G22-10 | Gen7 OMP LDMOS transistor for WCDMA & GSM applications | DEV | Q312 | 3.7.1 |
| **NEW: RF power transistors for broadcast / ISM applications** | | | | |
| BLF174XR(S) | XR ceramic push-pull LDMOS transistor for ISM applications | DEV | Q312 | 3.7.2 |
| BLF178XR(S) | XR ceramic push-pull LDMOS transistor for FM broadcast & ISM applications | RFS | Released | 3.7.2 |
| BLF2425M6L(S)180P | Gen6 ceramic push-pull LDMOS transistor for 2.45 GHz ISM applications | DEV | Q312 | 3.7.2 |
| BLF2425M7L(S)140 | Gen7 ceramic LDMOS transistor for 2.45GHz ISM applications | RFS | Released | 3.7.2 |
| BLF2425M7L(S)200 | Gen7 ceramic LDMOS transistor for 2.45GHz ISM applications | DEV | Q412 | 3.7.2 |
| BLF2425M7L(S)250P | Gen7 ceramic push-pull LDMOS transistor for 2.45 GHz ISM applications | RFS | Released | 3.7.2 |
| BLF25M612(G) | Gen6 ceramic LDMOS driver transistor for 2.45 GHz ISM applications (gull-wing) | DEV | Q312 | 3.7.2 |
| BLF572XR(S) | XR ceramic push-pull LDMOS transistor for ISM applications | DEV | Q412 | 3.7.2 |
| BLF574XR(S) | XR ceramic push-pull LDMOS transistor for ISM applications | DEV | Q312 | 3.7.2 |
| BLF578XR(S) | XR ceramic push-pull LDMOS transistor for UHF broadcast & ISM applications | RFS | Released | 3.7.2 |
| BLF647P(S) | Ceramic push-pull LDMOS transistor for broadband applications | DEV | Q312 | 3.7.2 |

| Type | Application / description | Expected status June 2012 | Planned release | Section |
|---|---|---|---|---|
| **NEW: RF power transistors for aerospace and defense** | | | | |
| BLL6G1214LS-250 | Gen6 ceramic LDMOS transistor for L-band applications | RFS | Released | 3.7.3 |
| BLL6H1214LS-500 | Gen6 high-voltage ceramic LDMOS transistor for L-band applications | DEV | Q412 | 3.7.3 |
| BLS6G2735L(S)-30 | Gen6 ceramic LDMOS driver transistor for S-band radar applications | RFS | Released | 3.7.3 |
| BLS7G2729L(S)-350P | Gen7 ceramic push-pull LDMOS transistor for S-band radar applications | RFS | Released | 3.7.3 |
| BLS7G3135L(S)-350P | Gen7 ceramic push-pull LDMOS transistor for S-band radar applications | DEV | Q412 | 3.7.3 |
| BLU6H0410L(S)-600P | Gen6 high-voltage ceramic push-pull LDMOS transistor for UHF band radar applications | RFS | Released | 3.7.3 |
| **NEW: Gallium Nitride (GaN) RF power amplifiers** | | | | |
| CLF1G0060-10 | Gen1 GaN broadband amplifier | DEV | Q113 | 3.7.4 |
| CLF1G0060-30 | Gen1 GaN broadband amplifier | DEV | Q113 | 3.7.4 |
| CLF1G0035-50 | Gen1 GaN broadband amplifier | DEV | Q312 | 3.7.4 |
| CLF1G0035-100 | Gen1 GaN broadband amplifier | DEV | Q412 | 3.7.4 |
| **NEW: Low-power wireless microcontrollers and networking stacks** | | | | |
| JN5142-J01 | JenNet-IP | RFS | Released | 3.8 |
| JN5142-001 | RF4CE / IEEE802.15.4 | RFS | Released | 3.8 |
| JN5148-J01 | JenNet-IP | RFS | Released | 3.8 |
| JN5148-001 | JenNet / IEEE802.15.4 | RFS | Released | 3.8 |
| JN5148-Z01 | ZigBee | RFS | Released | 3.8 |
| JN5148-001-M00 | JenNet / IEEE802.15.4 | RFS | Released | 3.8 |
| JN5148-001-M03 | JenNet / IEEE802.15.4 | RFS | Released | 3.8 |
| JN5148-001-M04 | JenNet / IEEE802.15.4 | RFS | Released | 3.8 |
| JenNet | Networking stack | RFS | Released | 3.8 |
| JenNet-IP | Networking stack | RFS | Released | 3.8 |
| ZigBee PRO | Networking stack | RFS | Released | 3.8 |

# 3.2 RF diodes

## 3.2.1 Varicap diodes

Varicap selection guide on www.nxp.com/varicaps
Easy-to-use parametric filters help you choose the right varicap for your design.

### Why choose NXP's varicap diodes:

- Reference designs for TV and radio tuning
- Direct matching process
- Small tolerances
- Short lead time
- Complete portfolio covering broad range of frequencies and packages (including leadless)
- Reliable volume supply

### VCO and FM radio tuning varicap diodes

| Type | Package | Number of diodes | Config-uration | @ f = 1 MHz | | | | | | | | | | | | r$_s$ typ | r$_s$ max | @ f = |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | C$_d$ min | C$_d$ typ | C$_d$ max | @ V$_R$ = | C$_d$ min | C$_d$ typ | C$_d$ max | @ V$_R$ = | C$_{d1}$/C$_{d2}$ min | C$_{d1}$/C$_{d2}$ max | @ V1 = | @ V2 = | | | |
| | | | | (pF) | (pF) | (pF) | (V) | (pF) | (pF) | (pF) | (V) | | | (V) | (V) | (Ω) | (Ω) | (MHz) |
| BB145B | SOD523 | 1 | SG | 6.4 | - | 7.2 | 1 | 2.55 | - | 2.95 | 4 | 2.2 | - | 1 | 4 | - | 0.6 | 470 |
| BB156 | SOD323 | 1 | SG | 14.4 | 16 | 17.6 | 1 | 4.2 | 4.8 | 5.4 | 7.5 | 2.7 | 3.9 | 1 | 7.5 | 0.4 | 0.7 | 470 |
| BB198 | SOD523 | 1 | SG | 25 | - | 28.5 | 1 | 4.8 | - | 6.8 | 4 | - | - | - | - | - | 0.8 | 100 |
| BB199 | SOD523 | 1 | SG | 36.5 | - | 42.5 | 0.5 | 11.8 | - | 13.8 | 2 | 2.8 | - | 0.5 | 2 | 0.25 | - | 100 |
| BB201 | SOT23 | 2 | CC | 89 | 95 | 102 | 1 | 25.5 | 27.6 | 29.7 | 7.5 | 3.1 | 3.8 | 1 | 7.5 | 0.25 | 0.5 | 100 |
| BB202^^ | SOD523 | 1 | SG | 28.2 | - | 33.5 | 0.2 | 7.2 | - | 11.2 | 2.3 | 2.5 | - | 0.2 | 2.3 | 0.35 | 0.6 | 100 |
| BB207^ | SOT23 | 2 | CC | 76 | 81 | 86 | 1 | 25.5 | 27.6 | 29.7 | 7.5 | 2.6 | 3.3 | 1 | 7.5 | 0.2 | 0.4 | 100 |
| BB208-02^ | SOD523 | 1 | SG | 19.9 | - | 23.2 | 1 | 4.5 | - | 5.4 | 7.5 | 3.7 | 5.2 | 1 | 7.5 | 0.35 | 0.5 | 100 |
| BB208-03^ | SOD323 | 1 | SG | 19.9 | - | 23.2 | 1 | 4.5 | - | 5.4 | 7.5 | 3.7 | 5.2 | 1 | 7.5 | 0.35 | 0.5 | 100 |

^ Includes special design for FM car radio (CREST-IC:TEF6860)
^^ Includes special design for mobile phone tuner ICs

Type of connection: CC: common cathode
SG: single

### TV / VCR / DVD / HDD varicap diodes - UHF tuning

| Type | Package | @ f = 1 MHz | | | | | | | | | r$_s$ typ | r$_s$ max | @ f = | @ C$_d$ = | ΔC$_d$/C$_d$ | @ V$_1$ = | @ V$_2$ = | @ N$_s$ = |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | C$_d$ min | C$_d$ typ | C$_d$ max | @ V$_R$ = | C$_{d1}$/C$_{d2}$ min | C$_{d1}$/C$_{d2}$ typ | C$_{d1}$/C$_{d2}$ max | @ V$_1$ = | @ V$_2$ = | | | | | | | | |
| | | (pF) | (pF) | (pF) | (V) | | | | (V) | (V) | (Ω) | (Ω) | (MHz) | (pF) | | (V) | (V) | |
| Matched | | | | | | | | | | | | | | | | | | |
| BB149 | SOD323 | 1.9 | 2.1 | 2.25 | 28 | 8.2 | 9 | 10 | 1 | 28 | - | 0.75 | 470 | 9 | 2 | 0.5 | 28 | 10 |
| BB149A | SOD323 | 1.951 | 2.1 | 2.225 | 28 | 8.45 | 9 | 10.9 | 1 | 28 | 0.6 | 0.75 | 470 | 9 | 2 | 1 | 28 | 10 |
| **BB179** | SOD523 | 1.951 | 2.1 | 2.225 | 28 | 8.45 | 9 | 10.9 | 1 | 28 | 0.6 | 0.75 | 470 | 9 | 2 | 1 | 28 | 10 |
| **BB179B** | SOD523 | 1.9 | 2.1 | 2.25 | 28 | 8.45 | 9 | 10 | 1 | 28 | 0.6 | 0.75 | 470 | 9 | 2 | 1 | 28 | 10 |
| **BB179BLX** | SOD882D | 1.9 | - | 2.25 | 28 | - | 9 | - | 1 | 28 | 0.65 | - | 470 | 9 | 2 | 1 | 28 | 10 |
| BB179LX | SOD882D | 1.95 | 2.1 | 2.22 | 28 | 8.45 | 9 | 10.9 | 1 | 28 | 0.65 | - | 470 | 30 | 2 | 1 | 28 | 5 |
| BB184 | SOD523 | 1.87 | 2 | 2.13 | 10 | 6 | 7 | - | 1 | 10 | 0.65 | - | 470 | 9 | 2 | 1 | 10 | 5 |
| **BB189** | SOD523 | 1.89 | 2.04 | 2.18 | 25 | 6.3 | 7.3 | - | 2 | 25 | 0.65 | 0.7 | 470 | 9 | 1.8 | 2 | 25 | 10 |
| Unmatched | | | | | | | | | | | | | | | | | | |
| BB135 | SOD323 | 1.7 | - | 2.1 | 28 | 8.9 | - | 12 | 0.5 | 28 | - | 0.75 | 470 | 9 | - | - | - | - |

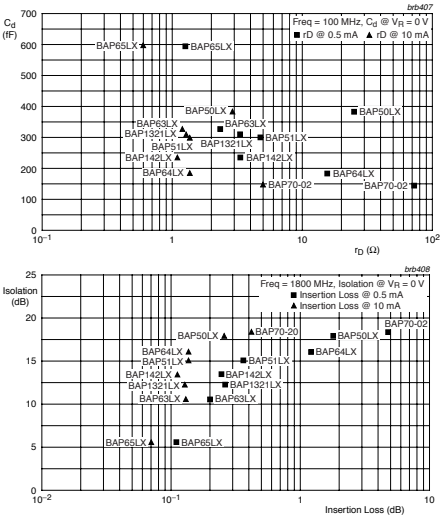
**Bold** = highly recommended product

## TV / VCR / DVD / HDD varicap diodes - VHF tuning

| Type | Package | @ f = 1 MHz | | | | | | | | | $r_s$ typ | $r_s$ max | @ f = | @ $C_d$ = | $\Delta C_d/C_d$ | @ $V_1$ = | @ $V_2$ = | @ $N_s$ = |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | $C_d$ min | $C_d$ typ | $C_d$ max | @ $V_R$ = | $C_{d1}/C_{d2}$ min | $C_{d1}/C_{d2}$ typ | $C_{d1}/C_{d2}$ max | @ $V_1$ = | @ $V_2$ = | | | | | | | | |
| | | (pF) | (pF) | (pF) | (V) | | | | (V) | (V) | (Ω) | (Ω) | (MHz) | (pF) | | (V) | (V) | |
| Matched | | | | | | | | | | | | | | | | | | |
| BB148 | SOD323 | 2.4 | 2.6 | 2.75 | 28 | 14.5 | 15 | - | 1 | 28 | - | 0.9 | 100 | 12 | 2 | 0.5 | 28 | 10 |
| BB152 | SOD323 | 2.48 | 2.7 | 2.89 | 28 | 20.6 | 22 | - | 1 | 28 | 1 | 1.2 | 100 | 30 | 2 | 1 | 28 | 10 |
| BB153 | SOD323 | 2.361 | 2.6 | 2.754 | 28 | 13.5 | 15 | - | 1 | 28 | 0.65 | 0.8 | 100 | 30 | 2 | 1 | 28 | 10 |
| **BB178** | SOD523 | 2.361 | 2.6 | 2.754 | 28 | 13.5 | 15 | - | 1 | 28 | 0.65 | 0.8 | 100 | 30 | 2 | 1 | 28 | 10 |
| **BB178LX** | SOD882D | 2.36 | 2.6 | 2.75 | 28 | 13.5 | 15 | - | 1 | 28 | 0.7 | - | 470 | 30 | 2 | 1 | 28 | 5 |
| **BB182** | SOD523 | 2.48 | 2.7 | 2.89 | 28 | 20.6 | 22 | - | 1 | 28 | 1 | 1.2 | 100 | 30 | 2 | 1 | 28 | 10 |
| **BB187** | SOD523 | 2.57 | 2.75 | 2.92 | 25 | 11 | - | - | 2 | 25 | - | 0.75 | 470 | - | 2 | 2 | 25 | 10 |
| **BB187LX** | SOD882D | 2.57 | 2.75 | 2.92 | 25 | 11 | - | - | 2 | 25 | - | 0.75 | 470 | - | 2 | 2 | 25 | 10 |
| Unmatched | | | | | | | | | | | | | | | | | | |
| BB131 | SOD323 | 0.7 | - | 1.055 | 28 | 12 | - | 16 | 0.5 | 28 | - | 3 | 470 | 9 | - | - | - | - |
| BB181 | SOD523 | 0.7 | - | 1.055 | 28 | 12 | - | 16 | 0.5 | 28 | - | 3 | 470 | 9 | - | - | - | - |
| BBY40 | SOT23 | 4.3 | - | 6 | 25 | 5 | - | 6.5 | 3 | 25 | - | 0.7 | 200 | 25 | - | - | - | - |

## 3.2.2 PIN diodes

PIN diode selection guide on www.nxp.com/pindiodes
Easy-to-use parametric filters help you choose the right PIN diode for your design.




### Why choose NXP's PIN diodes:

- Broad portfolio
- Unrivalled performance
- Short lead time
- Low series inductance
- Low insertion loss
- Low capacitance




For more information: www.nxp.com/pindiodes

### PIN diodes: typical $r_D$ @ 1 mA ≤ 2, switching diodes

| Type | Package | Number of diodes | Config | $V_R$ max (V) | IF max (mA) | @ f = 100 MHz | | | | | | @ f = 1 MHz | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | @ IF = 0.5 mA | | @ IF = 1 mA | | @ IF = 10 mA | | @ $V_R$ = 0 V | @ $V_R$ = 1 V | | @ $V_R$ = 20 V | |
| | | | | | | $r_D$ typ (Ω) | $r_D$ max (Ω) | $r_D$ typ (Ω) | $r_D$ max (Ω) | $r_D$ typ (Ω) | $r_D$ max (Ω) | $C_d$ typ (pF) | $C_d$ typ (pF) | $C_d$ max (pF) | $C_d$ typ (pF) | $C_d$ max (pF) |
| **BAP65LX** | SOD882D | 1 | SG | 30 | 100 | - | - | 0.94 | - | 0.49 | 0.9 | 0.61 | 0.48 | 0.85 | 0.37 | - |
| BAP65-02 | SOD523 | 1 | SG | 30 | 100 | - | - | 1 | - | 0.56 | 0.9 | 0.65 | 0.55 | 0.9 | 0.375 | - |
| BAP65-03 | SOD323 | 1 | SG | 30 | 100 | - | - | 1 | - | 0.56 | 0.9 | 0.65 | 0.55 | 0.9 | 0.375 | - |
| BAP65-05 | SOT23 | 2 | CC | 30 | 100 | - | - | 1 | - | 0.56 | 0.9 | 0.7 | 0.575 | 0.9 | 0.425 | - |
| BAP65-05W | SOT323 | 2 | CC | 30 | 100 | - | - | 1 | - | 0.56 | 0.9 | 0.7 | 0.575 | 0.9 | 0.425 | - |
| **BAP63LX** | SOD882D | 1 | SG | 50 | 100 | 2.3 | 3.3 | 1.87 | 3 | 1.19 | 1.8 | 0.34 | 0.29 | - | 0.24 | 0.3 |
| BAP63-02 | SOD523 | 1 | SG | 50 | 100 | 2.5 | 3.5 | 1.95 | 3 | 1.17 | 1.8 | 0.36 | 0.32 | - | 0.25 | 0.32 |
| BAP63-03 | SOD323 | 1 | SG | 50 | 100 | 2.5 | 3.5 | 1.95 | 3 | 1.17 | 1.8 | 0.4 | 0.35 | - | 0.27 | 0.32 |
| BAP63-05W | SOT323 | 2 | CC | 50 | 100 | 2.5 | 3.5 | 1.95 | 3 | 1.17 | 1.8 | 0.4 | 0.35 | - | 0.3 | 0.35 |

### PIN diode: selection on isolation and insertion loss in SOD882D

| Type | ISL (isolation ) | | | IL (Insertion loss) | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | f = 900 MHz | f = 1800 MHz | f = 2450 MHz | f = 900 MHz | | | | f = 1800 MHz | | | | f = 2450 MHz | | | |
| | VR = 0 V | VR = 0 V | VR = 0 V | IF = 0.5 mA | IF = 1 mA | IF = 10 mA | IF = 100 mA | IF = 0.5 mA | IF = 1 mA | IF = 10 mA | IF = 100 mA | IF = 0.5 mA | IF = 1 mA | IF = 10 mA | IF = 100 mA |
| BAP65LX | 10 | 5.5 | 3.9 | 0.09 | 0.06 | 0.06 | 0.05 | 0.09 | 0.07 | 0.07 | 0.06 | 0.10 | 0.08 | 0.08 | 0.07 |
| BAP63LX | 15.9 | 10.5 | 8.3 | 0.20 | 0.17 | 0.12 | 0.11 | 0.20 | 0.17 | 0.13 | 0.11 | 0.21 | 0.19 | 0.15 | 0.15 |
| BAP55LX | 19 | 14 | 12 | 0.24 | 0.17 | 0.08 | 0.05 | 0.25 | 0.18 | 0.09 | 0.07 | 0.26 | 0.19 | 0.10 | 0.08 |
| BAP1321LX | 17 | 12 | 10 | 0.25 | 0.19 | 0.11 | 0.09 | 0.26 | 0.20 | 0.13 | 0.11 | 0.27 | 0.21 | 0.14 | 0.12 |
| BAP142LX | 18 | 13 | 11 | 0.24 | 0.18 | 0.10 | 0.07 | 0.24 | 0.19 | 0.11 | 0.09 | 0.25 | 0.25 | 0.12 | 0.10 |
| BAP51LX | 19 | 15 | 13 | 0.36 | 0.25 | 0.12 | 0.90 | 0.36 | 0.26 | 0.14 | 0.10 | 0.38 | 0.27 | 0.15 | 0.12 |
| BAP64LX | 22 | 16 | 14 | 1.22 | 0.22 | 0.12 | 0.09 | 1.21 | 0.23 | 0.13 | 0.10 | 1.22 | 0.24 | 0.15 | 0.11 |
| BAP50LX | 20.3 | 17.9 | 16.5 | 1.82 | 1.07 | 0.25 | - | 1.80 | 1.06 | 0.26 | - | 1.81 | 1.08 | 0.27 | - |

**Bold** = highly recommended product

## PIN diodes: typical $r_D$ @ 1 mA = 2.2 - 2.4, switching diodes

| Type | Package | Number of diodes | Config | $V_R$ max (V) | IF max (mA) | @ f = 100 MHz | | | | | | @ f = 1 MHz | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | @ IF = 0.5 mA | | @ IF = 1 mA | | @ IF = 10 mA | | @ $V_R$ = 0 V | @ $V_R$ = 1 V | | @ $V_R$ = 20 V | |
| | | | | | | $r_D$ typ (Ω) | $r_D$ max (Ω) | $r_D$ typ (Ω) | $r_D$ max (Ω) | $r_D$ typ (Ω) | $r_D$ max (Ω) | $C_d$ typ (pF) | $C_d$ typ (pF) | $C_d$ max (pF) | $C_d$ typ (pF) | $C_d$ max (pF) |
| **BAP55LX** | SOD882D | 1 | SG | 50 | 100 | 3.3 | 4.5 | 2.2 | 3.3 | 0.8 | 1.2 | 0.28 | 0.23 | - | 0.18 | 0.28 |
| BAP1321-02 | SOD523 | 1 | SG | 60 | 100 | 3.4 | 5 | 2.4 | 3.6 | 1.2 | 1.8 | 0.4 | 0.35 | 0.45 | 0.25 | 0.32 |
| BAP1321-03 | SOD323 | 1 | SG | 60 | 100 | 3.4 | 5 | 2.4 | 3.6 | 1.2 | 1.8 | 0.4 | 0.35 | 0.45 | 0.25 | 0.32 |
| BAP1321-04 | SOT23 | 2 | SR | 60 | 100 | 3.4 | 5 | 2.4 | 3.6 | 1.2 | 1.8 | 0.42 | 0.375 | 0.45 | 0.275 | 0.325 |
| **BAP1321LX** | SOD882D | 1 | SG | 60 | 100 | 3.3 | 5 | 2.4 | 3.6 | 1.2 | 1.8 | 0.32 | 0.27 | 0.38 | 0.21 | 0.28 |
| **BAP142LX** | SOD882D | 1 | SG | 50 | 100 | 3.3 | 5 | 2.4 | 3.6 | 1 | 1.8 | 0.25 | 0.22 | - | 0.16 | 0.26 |

## PIN diodes: typical $r_D$ @ 1 mA = 3.2 - 3.6, switching diodes

| Type | Package | Number of diodes | Config | $V_R$ max (V) | IF max (mA) | @ f = 100 MHz | | | | | | @ f = 1 MHz | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | @ IF = 0.5 mA | | @ IF = 1 mA | | @ IF = 10 mA | | @ $V_R$ = 0 V | @ $V_R$ = 1 V | | @ $V_R$ = 20 V | |
| | | | | | | $r_D$ typ (Ω) | $r_D$ max (Ω) | $r_D$ typ (Ω) | $r_D$ max (Ω) | $r_D$ typ (Ω) | $r_D$ max (Ω) | $C_d$ typ (pF) | $C_d$ typ (pF) | $C_d$ max (pF) | $C_d$ typ (pF) | $C_d$ max (pF) |
| **BAP51LX** | SOD882D | 1 | SG | 60 | 100 | 4.9 | 9 | 3.2 | 6.5 | 1.4 | 2.5 | 0.3 | 0.22 | 0.4 | 0.17 | 0.3 |
| BAP51-02 | SOD523 | 1 | SG | 60 | 50 | 5.5 | 9 | 3.6 | 6.5 | 1.5 | 2.5 | 0.4 | 0.3 | 0.55 | 0.2 | 0.35 |
| BAP51-03 | SOD323 | 1 | SG | 50 | 50 | 5.5 | 9 | 3.6 | 6.5 | 1.5 | 2.5 | 0.4 | 0.3 | 0.55 | 0.2 | 0.35 |
| BAP51-04W | SOT323 | 2 | SR | 50 | 50 | 5.5 | 9 | 3.6 | 6.5 | 1.5 | 2.5 | 0.4 | 0.3 | 0.55 | 0.2 | 0.35 |
| BAP51-05W | SOT323 | 2 | CC | 50 | 50 | 5.5 | 9 | 3.6 | 6.5 | 1.5 | 2.5 | 0.4 | 0.3 | 0.55 | 0.2 | 0.35 |
| BAP51-06W | SOT323 | 2 | CA | 50 | 50 | 5.5 | - | 3.6 | - | 2 | - | 0.4 | 0.3 | - | 0.2 | - |

## PIN diodes: typical $r_D$ @ 1 mA = 10, attenuator/switching diodes

| Type | Package | Number of diodes | Config | $V_R$ max (V) | IF max (mA) | @ f = 100 MHz | | | | | | @ f = 1 MHz | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | @ IF = 0.5 mA | | @ IF = 1 mA | | @ IF = 10 mA | | @ $V_R$ = 0 V | @ $V_R$ = 1 V | | @ $V_R$ = 20 V | |
| | | | | | | $r_D$ typ (Ω) | $r_D$ max (Ω) | $r_D$ typ (Ω) | $r_D$ max (Ω) | $r_D$ typ (Ω) | $r_D$ max (Ω) | $C_d$ typ (pF) | $C_d$ typ (pF) | $C_d$ max (pF) | $C_d$ typ (pF) | $C_d$ max (pF) |
| **BAP64Q** | SOT753 | 4 | SR | 100 | 100 | 20 | 40 | 10 | 20 | 2 | 3,8 | 0.52 | 0.37 | - | 0.23 | 0.35 |
| BAP64-02 | SOD523 | 1 | SG | 175 | 100 | 20 | 40 | 10 | 20 | 2 | 3.8 | 0.48 | 0.35 | - | 0.23 | 0.35 |
| BAP64-03 | SOD323 | 1 | SG | 175 | 100 | 20 | 40 | 10 | 20 | 2 | 3.8 | 0.48 | 0.35 | - | 0.23 | 0.35 |
| BAP64-04 | SOT23 | 2 | SR | 175 | 100 | 20 | 40 | 10 | 20 | 2 | 3.8 | 0.52 | 0.37 | - | 0.23 | 0.35 |
| BAP64-04W | SOT323 | 2 | SR | 100 | 100 | 20 | 40 | 10 | 20 | 2 | 3.8 | 0.52 | 0.37 | - | 0.23 | 0.35 |
| BAP64-05 | SOT23 | 2 | CC | 175 | 100 | 20 | 40 | 10 | 20 | 2 | 3.8 | 0.52 | 0.37 | - | 0.23 | 0.35 |
| BAP64-05W | SOT323 | 2 | CC | 100 | 100 | 20 | 40 | 10 | 20 | 2 | 3.8 | 0.52 | 0.37 | - | 0.23 | 0.35 |
| BAP64-06 | SOT23 | 2 | CA | 175 | 100 | 20 | 40 | 10 | 20 | 2 | 3.8 | 0.52 | 0.37 | - | 0.23 | 0.35 |
| BAP64-06W | SOT323 | 2 | CA | 100 | 100 | 20 | 40 | 10 | 20 | 2 | 3.8 | 0.52 | 0.37 | - | 0.23 | 0.35 |
| **BAP64LX^** | SOD882D | 1 | SG | 60 | 100 | 31 | 50 | 16 | 26 | 2.6 | 4.4 | 0.48 | 0.34 | - | 0.17* | 0.3* |

^ = attenuator / switching diode  *= @ VR = 20 V

## PIN diodes: typical $r_D$ @ 1 mA = 14 - 16, attenuator diodes

| Type | Package | Number of diodes | Config | $V_R$ max (V) | IF max (mA) | @ f = 100 MHz | | | | | | @ f = 1 MHz | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | @ IF = 0.5 mA | | @ IF = 1 mA | | @ IF = 10 mA | | @ $V_R$ = 0 V | @ $V_R$ = 1 V | | @ $V_R$ = 5 V | |
| | | | | | | $r_D$ typ (Ω) | $r_D$ max (Ω) | $r_D$ typ (Ω) | $r_D$ max (Ω) | $r_D$ typ (Ω) | $r_D$ max (Ω) | $C_d$ typ (pF) | $C_d$ typ (pF) | $C_d$ max (pF) | $C_d$ typ (pF) | $C_d$ max (pF) |
| BAP50-02 | SOD523 | 1 | SG | 50 | 50 | 25 | 40 | 14 | 25 | 3 | 5 | 0.4 | 0.3 | 0.55 | 0.22 | 0.35 |
| BAP50-03 | SOD323 | 1 | SG | 50 | 50 | 25 | 40 | 14 | 25 | 3 | 5 | 0.4 | 0.3 | 0.55 | 0.2 | 0.35 |
| BAP50-04 | SOT23 | 2 | SR | 50 | 50 | 25 | 40 | 14 | 25 | 3 | 5 | 0.45 | 0.35 | 0.6 | 0.3 | 0.5 |
| BAP50-04W | SOT323 | 2 | SR | 50 | 50 | 25 | 40 | 14 | 25 | 3 | 5 | 0.45 | 0.35 | 0.6 | 0.3 | 0.5 |
| BAP50-05 | SOT23 | 2 | CC | 50 | 50 | 25 | 40 | 14 | 25 | 3 | 5 | 0.45 | 0.3 | 0.5 | 0.35 | 0.6 |
| BAP50-05W | SOT323 | 2 | CC | 50 | 50 | 25 | 40 | 14 | 25 | 3 | 5 | 0.45 | 0.35 | 0.6 | 0.3 | 0.5 |
| **BAP50LX** | SOD882D | 1 | SG | 50 | 50 | 26 | 40 | 14 | 25 | 3 | 5 | 0.4 | 0.28 | 0.55 | 0.19 | 0.35 |

## PIN diodes: typical $r_D$ @ 1 mA = 40, attenuator diodes

| Type | Package | Number of diodes | Config | $V_R$ max (V) | IF max (mA) | @ f = 100 MHz | | | | | | @ f = 1 MHz | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | @ IF = 0.5 mA | | @ IF = 1 mA | | @ IF = 10 mA | | @ $V_R$ = 0 V | @ $V_R$ = 1 V | | @ $V_R$ = 20 V | |
| | | | | | | $r_D$ typ (Ω) | $r_D$ max (Ω) | $r_D$ typ (Ω) | $r_D$ max (Ω) | $r_D$ typ (Ω) | $r_D$ max (Ω) | $C_d$ typ (pF) | $C_d$ typ (pF) | $C_d$ max (pF) | $C_d$ max (pF) | $C_d$ typ (pF) |
| **BAP70Q** | SOT753 | 4 | SR | 50 | 100 | 77 | 100 | 40 | 50 | 5.4 | 7 | 0.6 | 0.43 | - | 0.25 | 0.3 |
| **BAP70-02** | SOD523 | 1 | SG | 50 | 100 | 77 | 100 | 40 | 50 | 5.4 | 7 | 0.57 | 0.4 | - | 0.2 | 0.25 |
| **BAP70-03** | SOD323 | 1 | SG | 50 | 100 | 77 | 100 | 40 | 50 | 5.4 | 7 | 0.57 | 0.4 | - | 0.2 | 0.25 |
| BAP70-04W | SOT323 | 2 | SR | 50 | 100 | 77 | 100 | 40 | 50 | 5.4 | 7 | 0.6 | 0.43 | - | 0.25 | 0.3 |
| BAP70-05 | SOT23 | 2 | CC | 50 | 100 | 77 | 100 | 40 | 50 | 5.4 | 7 | 0.6 | 0.43 | - | 0.25 | 0.3 |
| **BAP70AM** | SOT363 | 4 | SR | 50 | 100 | 77 | 100 | 40 | 50 | 5.4 | 7 | 0.57 | 0.4 | - | 0.2 | 0.25 |

**Bold** = highly recommended product  SG = single  SR = series  CC = common cathode  CA = common anode

## 3.2.3 Band-switch diodes

**Why choose NXP's band-switch diodes:**

- Reliable volume supplier
- Short lead time
- Low series inductance
- Low insertion loss
- Low capacitance
- High reverse isolation

| Type | Package | $V_R$ max (V) | IF max (mA) | $r_D$ max (Ω) | @ IF = (mA) | @ f = (MHz) | $C_d$ max (pF) | @ $V_R$ = (V) | @ f = (MHz) |
|---|---|---|---|---|---|---|---|---|---|
| **BA277** | SOD523 | 35 | 100 | 0.7 | 2 | 100 | 1.2 | 6 | 1 |
| BA591 | SOD323 | 35 | 100 | 0.7 | 3 | 100 | 0.9 | 3 | 1 |
| BA891 | SOD523 | 35 | 100 | 0.7 | 3 | 100 | 0.9 | 3 | 1 |
| BAT18 | SOT23 | 35 | 100 | 0.7 | 5 | 200 | 1 | 20 | 1 |

## 3.2.4 Schottky diodes

Schottky diode selection guide on www.nxp.com/rfschottkydiodes
Easy-to-use parametric filters help you choose the right Schottky diode for your design.

**Why choose NXP's Schottky diodes:**

- Low diode capacitance
- Low forward voltage
- Single- and triple-isolated diode
- Small package

**Applications**

- Digital applications:
  - Ultra high-speed switching
  - Clamping circuits
- RF applications:
  - Diode ring mixer
  - RF detector
  - RF voltage doubler

**Low-capacitance Schottky diodes**

| Type | Package | Configuration | $V_R$ max. (V) | $I_F$ max. (mA) | $V_F$ max. (mV) | $C_D$ max. (pF) |
|---|---|---|---|---|---|---|
| BAT17 | SOT23 | Single | 4 | 30 | 450 @ IF = 1 mA | 1 @ VR = 0 V |
| PMBD353 | SOT23 | Dual-series | 4 | 30 | 450 @ IF = 1 mA | 1 @ VR = 0 V |
| PMBD354^ | SOT23 | Dual-series | 4 | 30 | 450 @ IF = 1 mA | 1 @ VR = 0 V |
| 1PS76SB17 | SOD323 | Single | 4 | 30 | 450 @ IF = 1 mA | 1 @ VR = 0 V |
| 1PS66SB17 | SOT666 | Triple-isolated | 4 | 30 | 450 @ IF = 1 mA | 1 @ VR = 0 V |
| 1PS79SB17 | SOD523 | Single | 4 | 30 | 450 @ IF = 1 mA | 1 @ VR = 0 V |
| 1PS88SB82 | SOT363 | Triple-isolated | 15 | 30 | 340 @ IF = 1 mA | 1 @ VR = 0 V |
| 1PS70SB82 | SOT323 | Single | 15 | 30 | 340 @ IF = 1 mA | 1 @ VR = 0 V |
| 1PS70SB84 | SOT323 | Dual-series | 15 | 30 | 340 @ IF = 1 mA | 1 @ VR = 0 V |
| 1PS70SB85 | SOT323 | Dual c.c | 15 | 30 | 340 @ IF = 1 mA | 1 @ VR = 0 V |
| 1PS70SB86 | SOT323 | Dual c.a. | 15 | 30 | 340 @ IF = 1 mA | 1 @ VR = 0 V |
| 1PS66SB82 | SOT666 | Triple-isolated | 15 | 30 | 340 @ IF = 1 mA | 1 @ VR = 0 V |
| 1PS10SB82 | SOD882 | Single | 15 | 30 | 340 @ IF = 1 mA | 1 @ VR = 0 V |

**Bold** = highly recommended product ^ Diodes have matched capacitance

# 3.3 RF Bipolar transistors

## 3.3.1 Wideband transistors

RF wideband transistor selection guide on www.nxp.com/rftransistors
Easy-to-use parametric filters help you choose the right RF wideband transistor for your design.

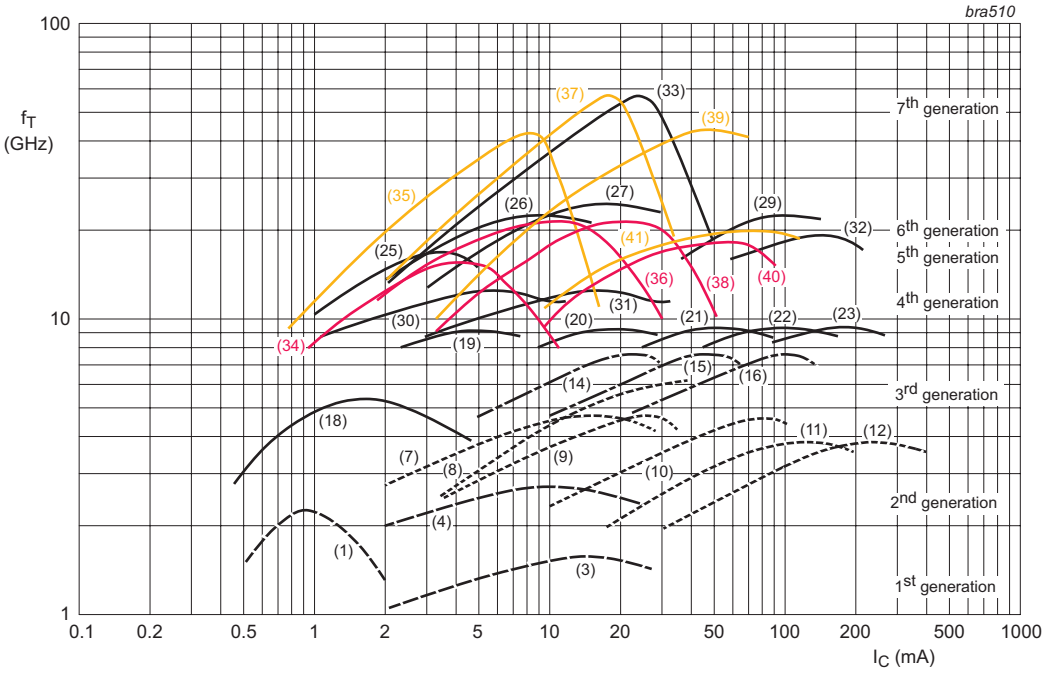
**Why choose NXP's wideband transistors:**

- Broad portfolio (1st - 7th generation)
- Short lead time
- Smallest packages
- Volume delivery

**Wideband transistors**

The $f_T$-$I_C$ curve represents transition frequency ($f_T$) characteristics as a function of collector current ($I_C$) for the seven generations of RF wideband transistors. A group of transistors having the same $I_C$ and similar $f_T$ represents a curve. The curve number matches with products in the selection tables of this section (third column of each table), detailing their RF characteristics.

**Wideband transistors line-up per frequency**



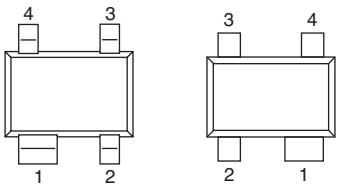




Figure 1 Figure 2

| Pin | Description |
|---|---|
| | Type (Figure 1) |
| 1 | Collector |
| 2 | Base |
| 3 | Emitter |
| 4 | Emitter |
| | Type/X (Figure 1) |
| 1 | Collector |
| 2 | Emitter |
| 3 | Base |
| 4 | Emitter |
| | Type/XR (Figure 2) |
| 1 | Collector |
| 2 | Emitter |
| 3 | Base |
| 4 | Emitter |

## Wideband transistors

| Function | LNAs, mixers, frequency multipliers, buffers | | | High-linearity, high-output amplifiers and drivers | | | Oscillators | | |
|---|---|---|---|---|---|---|---|---|---|
| Frequency range | <6 GHz | 6 GHz – 12 GHz | 12 GHz – +18 GHz | <6 GHz | 6 GHz – 12 GHz | 12 GHz – 18 GHz | <6 GHz | 6 GHz – 12 GHz | 12 GHz – +18 GHz |
| Band / Type | L,S,C | X, Ku low | Ku high, Ka | L,S,C | X, Ku low | Ku high | L,S,C | X, Ku low | Ku high, Ka |
| BFU610F | • | • | | | | | | | • |
| BFU630F | • | • | | • | | | • | | • |
| BFU660F | • | | | • | | | • | • | |
| BFU690F | • | | | • | | | • | • | |
| BFU725F/N1 | • | • | • | • | • | | • | | • |
| BFU710F | • | • | • | | | | | | • |
| BFU730F | • | • | • | • | • | • | • | | • |
| BFU760F | • | • | | • | • | | • | | |
| BFU790F | • | | | • | | | • | | |

Red = application note available on NXP.com

## RF power transistors for portable equipment (VHF)

| Type | Package | $V_{CEO}$ (max) (V) | $I_C$ (max) (mA) | $P_{tot}$ (max) (mW) | Polarity | GUM (typ) (dB) | @ f = (MHz) | @ $I_C$ = (mA) | @ $V_{CE}$ = (V) |
|---|---|---|---|---|---|---|---|---|---|
| BFG10 | SOT143 | 8 | 250 | 400 | NPN | 7 | 1900 | 1 | 3.6 |
| BFG10/X | SOT143 | 8 | 250 | 400 | NPN | 7 | 1900 | 1 | 3.6 |
| BFG10W/X | SOT343 | 10 | 250 | 400 | NPN | 7 | 1900 | 1 | 3.6 |
| BLT50 | SOT223 | 10 | 500 | 2000 | NPN | - | - | - | - |
| BLT70 | SOT223H | 8 | 250 | 2100 | NPN | - | - | - | - |
| BLT80 | SOT223 | 10 | 250 | 2000 | NPN | - | - | - | - |
| BLT81 | SOT223 | 9.5 | 500 | 2000 | NPN | - | - | - | - |

## RF wideband transistors generations 1 to 3

| Type | Generation | Curve | Package | $f_T$ (typ) (GHz) | $V_{CEO}$ (max) (V) | $I_C$ (max) (mA) | $P_{tot}$ (max) (mW) | Polarity | GUM (typ) (dB) | @ f = (MHz) | @ $I_C$ = (mA) | @ $V_{CE}$ = (V) | GUM (typ) (dB) | @ f = (MHz) | @ $I_C$ = (mA) | @ $V_{CE}$ = (V) | NF (typ) (dB) | @ f = (MHz) | @ $I_C$ = (mA) | @ $V_{CE}$ = (V) | NF (typ) (dB) | @ f = (MHz) | @ $I_C$ = (mA) | @ $V_{CE}$ = (V) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| BFS17 | 1 | 3 | SOT23 | 1 | 15 | 25 | 300 | NPN | - | - | - | - | - | - | - | - | 4.5 | 500 | 2 | 5 | - | - | - | - |
| **BFS17W** | 1 | 3 | SOT323 | 1.6 | 15 | 50 | 300 | NPN | - | - | - | - | - | - | - | - | 4.5 | 500 | 2 | 5 | - | - | - | - |
| BFT25 | 1 | 1 | SOT23 | 2.3 | 5 | 6.5 | 30 | NPN | 18 | 500 | 1 | 1 | 12 | 800 | 1 | 1 | 3.8 | 500 | 1 | 1 | - | - | - | - |
| BFG25A/X | 2 | 18 | SOT143B | 5 | 5 | 6.5 | 32 | NPN | - | - | - | - | 18 | 1000 | 0.5 | 1 | 1.8 | 1000 | 0.5 | 1 | - | - | - | - |
| BFG25AW | 2 | 18 | SOT343N | 5 | 5 | 6.5 | 500 | NPN | - | - | - | - | 16 | 2000 | 0.5 | 1 | 2 | 1000 | 1 | 1 | - | - | - | - |
| BFG25AW/X | 2 | 18 | SOT343N | 5 | 5 | 6.5 | 500 | NPN | 16 | 1000 | 0.5 | 1 | 8 | 2000 | 0.5 | 1 | 2 | 1000 | 1 | 1 | - | - | - | - |
| BFG31 | 2 | 10 | SOT223 | 5 | -15 | -100 | 1000 | PNP | 16 | 500 | -70 | -10 | 12 | 800 | -70 | -10 | - | - | - | - | - | - | - | - |
| BFG35 | 2 | 11 | SOT223 | 4 | 18 | 150 | 1000 | NPN | 15 | 500 | 100 | 10 | 11 | 800 | 100 | 10 | - | - | - | - | - | - | - | - |
| BFG92A/X | 2 | 7 | SOT143B | 5 | 15 | 25 | 400 | NPN | 16 | 1000 | 15 | 10 | 11 | 2000 | 15 | 10 | 2 | 1000 | 5 | 10 | 3 | 2000 | 5 | 10 |
| BFG97 | 2 | 10 | SOT223 | 5.5 | 15 | 100 | 1000 | NPN | 16 | 500 | 70 | 10 | 12 | 800 | 70 | 10 | - | - | - | - | - | - | - | - |
| BFQ149 | 2 | 10 | SOT89 | 5 | -15 | -100 | 1000 | PNP | 12 | 500 | -50 | -10 | - | - | - | - | 3.75 | 500 | -50 | -10 | - | - | - | - |
| BFQ18A | 2 | 11 | SOT89 | 4 | 18 | 150 | 1000 | NPN | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| BFQ19 | 2 | 10 | SOT89 | 5.5 | 15 | 100 | 1000 | NPN | 11.5 | 500 | 50 | 10 | 7.5 | 800 | 50 | 10 | 3.3 | 500 | 50 | 10 | - | - | - | - |
| BFR106 | 2 | 10 | SOT23 | 5 | 15 | 100 | 500 | NPN | - | - | - | - | 11.5 | 800 | 30 | 6 | 3.5 | 800 | 30 | 6 | - | - | - | - |
| BFR92A | 2 | 7 | SOT23 | 5 | 15 | 25 | 300 | NPN | 14 | 1000 | 15 | 10 | 8 | 2000 | 15 | 10 | 3 | 2000 | 5 | 10 | 2.1 | 1000 | 5 | 10 |
| **BFR92AW** | 2 | 7 | SOT323 | 5 | 15 | 25 | 300 | NPN | 14 | 1000 | 15 | 10 | 8 | 2000 | 15 | 10 | 2 | 1000 | 5 | 10 | 3 | 2000 | 5 | 10 |
| BFS17A | 2 | 4 | SOT23 | 2.8 | 15 | 25 | 300 | NPN | - | - | - | - | 13.5 | 800 | 14 | 10 | 2.5 | 800 | 2 | 5 | - | - | - | - |
| BFS25A | 2 | 18 | SOT323 | 5 | 5 | 6.5 | 32 | NPN | - | - | - | - | 13 | 1000 | 0.5 | 1 | 1.8 | 1000 | 1 | 1 | - | - | - | - |
| BFT25A | 2 | 18 | SOT23 | 5 | 5 | 6.5 | 32 | NPN | - | - | - | - | 15 | 1000 | 0.5 | 1 | 1.8 | 1000 | 0.5 | 1 | - | - | - | - |
| BFT92 | 2 | 7 | SOT23 | 5 | -15 | -25 | 300 | PNP | 18 | 500 | -14 | -10 | - | - | - | - | 2.5 | 500 | -5 | -10 | - | - | - | - |
| BFT92W | 2 | 7 | SOT323 | 4 | -15 | -35 | 300 | PNP | 17 | 500 | -15 | -10 | 11 | 1000 | -15 | -10 | 2.5 | 500 | -5 | -10 | 3 | 1000 | -5 | -10 |
| BFT93 | 2 | 9 | SOT23 | 5 | -12 | -35 | 300 | PNP | 16.5 | 500 | -30 | -5 | | | | | 2.4 | 500 | -10 | -5 | - | - | - | - |
| BFT93W | 2 | 9 | SOT323 | 4 | -12 | -50 | 300 | PNP | 15.5 | 500 | -30 | -5 | 10 | 1000 | -30 | -5 | 2.4 | 500 | -10 | -5 | 3 | 1000 | -10 | -5 |
| BFG135 | 3 | 16 | SOT223 | 7 | 15 | 150 | 1000 | NPN | 16 | 500 | 100 | 10 | 12 | 800 | 100 | 10 | - | - | - | - | - | - | - | - |
| BFG198 | 3 | 15 | SOT223 | 8 | 10 | 100 | 1000 | NPN | 18 | 500 | 50 | 8 | 15 | 800 | 50 | 8 | - | - | - | - | - | - | - | - |
| BFG590 | 3 | 22 | SOT143B | 5 | 15 | 200 | 400 | NPN | 13 | 900 | 80 | 4 | 7.5 | 2000 | 80 | 4 | - | - | - | - | - | - | - | - |
| BFG590/X | 3 | 22 | SOT143B | 5 | 15 | 200 | 400 | NPN | 13 | 900 | 80 | 4 | 7.5 | 2000 | 80 | 4 | - | - | - | - | - | - | - | - |
| BFG591 | 3 | 22 | SOT223 | 7 | 15 | 200 | 2000 | NPN | 13 | 900 | 70 | 12 | 7.5 | 2000 | 70 | 12 | - | - | - | - | - | - | - | - |
| BFG67 | 3 | 14 | SOT143B | 8 | 10 | 50 | 380 | NPN | 17 | 1000 | 15 | 8 | 10 | 2000 | 15 | 8 | 1.7 | 1000 | 15 | 8 | 2.5 | 2000 | 5 | 8 |
| BFG67/X | 3 | 14 | SOT143B | 8 | 10 | 50 | 380 | NPN | 17 | 1000 | 15 | 8 | 10 | 2000 | 15 | 8 | 1.7 | 1000 | 15 | 8 | 2.5 | 2000 | 5 | 8 |
| BFG93A | 3 | 8 | SOT143B | 6 | 12 | 35 | 300 | NPN | 16 | 1000 | 30 | 8 | 10 | 2000 | 30 | 8 | 1.7 | 1000 | 5 | 8 | 2.3 | 2000 | 5 | 8 |
| BFG93A/X | 3 | 8 | SOT143B | 6 | 12 | 35 | 300 | NPN | 16 | 1000 | 30 | 8 | 10 | 2000 | 30 | 8 | 1.7 | 1000 | 5 | 8 | 2.3 | 2000 | 5 | 8 |
| BFG94 | 3 | 8 | SOT223 | 6 | 12 | 60 | 700 | NPN | - | - | - | - | 13.5 | 1000 | 45 | 10 | 2.7 | 500 | 45 | 10 | 3 | 1000 | 45 | 10 |
| BFQ591 | 3 | 22 | SOT89 | 7 | 15 | 200 | 2250 | NPN | 11 | 900 | 70 | 12 | 5.5 | 2000 | 70 | 12 | - | - | - | - | - | - | - | - |
| BFQ67W | 3 | 14 | SOT323 | 8 | 10 | 50 | 300 | NPN | 13 | 1000 | 15 | 8 | 8 | 2000 | 15 | 8 | 1.3 | 1000 | 5 | 8 | 2.7 | 2000 | 15 | 8 |
| BFR93A | 3 | 8 | SOT23 | 6 | 12 | 35 | 300 | NPN | 13 | 1000 | 30 | 8 | 7 | 2000 | 30 | 8 | 1.9 | 1000 | 5 | 8 | 3 | 2000 | 5 | 8 |
| **BFR94A^** | 3 | 8 | SOT23 | 6 | 12 | 35 | 300 | NPN | 13 | 1000 | 30 | 8 | 7 | 2000 | 30 | 8 | 1.9 | 1000 | 5 | 8 | 3 | 2000 | 5 | 8 |
| BFR93AR | 3 | 8 | SOT23 | 6 | 12 | 35 | 300 | NPN | 13 | 1000 | 30 | 8 | 7 | 2000 | 30 | 8 | 1.9 | 1000 | 5 | 8 | 3 | 2000 | 5 | 8 |
| **BFR93AW** | 3 | 8 | SOT323 | 5 | 12 | 35 | 300 | NPN | 13 | 1000 | 30 | 8 | 8 | 2000 | 30 | 8 | 1.5 | 1000 | 5 | 8 | 2.1 | 2000 | 5 | 8 |
| **BFR94AW^** | 3 | 8 | SOT323 | 5 | 12 | 35 | 300 | NPN | 13 | 1000 | 30 | 8 | 8 | 2000 | 30 | 8 | 1.5 | 1000 | 5 | 8 | 2.1 | 2000 | 5 | 8 |

**Bold** = highly recommended product ^ AEC-Q101 qualified (some limitations apply)

## RF wideband transistors generations 4 and 4.5

| Type | Generation | Curve | Package | $f_T$ (typ) (GHz) | $V_{CEO}$ (max) (V) | $I_C$ (max) (mA) | $P_{tot}$ (max) (mW) | Polarity | GUM (typ) (dB) | @ f = (MHz) | @ $I_C$ = (mA) | @ $V_{CE}$ = (V) | NF (typ) (dB) | @ f = (MHz) | @ $I_C$ = (mA) | @ $V_{CE}$ = (V) | NF (typ) (dB) | @ f = (MHz) | @ $I_C$ = (mA) | @ $V_{CE}$ = (V) | PL(1dB) (typ) (dBmW) | @ $V_{CE}$ = (V) | @ f = (MHz) | @ $I_C$ = (mA) | IP3 (typ) (dBm) | @ IC = (mA) | @ VCE = (V) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| BFG505 | 4 | 19 | SOT143B | 9 | 15 | 18 | 150 | NPN | 13 | 2000 | 5 | 6 | 1.6 | 900 | 5 | 6 | 1.9 | 2000 | 1.25 | 6 | 4 | 6 | 900 | 5 | 10 | 5 | 6 |
| BFG505/X | 4 | 19 | SOT143B | 9 | 15 | 18 | 150 | NPN | 13 | 2000 | 5 | 6 | 1.6 | 900 | 5 | 6 | 1.9 | 2000 | 1.25 | 6 | 4 | 6 | 900 | 5 | 10 | 5 | 6 |
| BFG505W | 4 | 19 | SOT343N | 9 | 15 | 18 | 500 | NPN | 12 | 2000 | 5 | 6 | 1.6 | 900 | 5 | 6 | 1.9 | 2000 | 1.25 | 6 | 4 | 6 | 900 | 5 | 10 | 5 | 6 |
| BFG505W/X | 4 | 19 | SOT343N | 9 | 15 | 18 | 500 | NPN | 12 | 2000 | 5 | 6 | 1.6 | 900 | 5 | 6 | 1.9 | 2000 | 1.25 | 6 | 4 | 6 | 900 | 5 | 10 | 5 | 6 |
| BFG505W/XR | 4 | 19 | SOT343R | 9 | 15 | 18 | 500 | NPN | 12 | 2000 | 5 | 6 | 1.6 | 900 | 5 | 6 | 1.9 | 2000 | 1.25 | 6 | 4 | 6 | 900 | 5 | 10 | 5 | 6 |
| BFG520 | 4 | 20 | SOT143B | 9 | 15 | 70 | 300 | NPN | 13 | 2000 | 20 | 6 | 1.6 | 900 | 20 | 6 | 1.9 | 2000 | 5 | 6 | 17 | 6 | 900 | 20 | 26 | 20 | 6 |
| **BFG520/X** | 4 | 20 | SOT143B | 9 | 15 | 70 | 300 | NPN | 13 | 2000 | 20 | 6 | 1.6 | 900 | 20 | 6 | 1.9 | 2000 | 5 | 6 | 17 | 6 | 900 | 20 | 26 | 20 | 6 |
| BFG520/XR | 4 | 20 | SOT143R | 9 | 15 | 70 | 300 | NPN | 13 | 2000 | 20 | 6 | 1.6 | 900 | 20 | 6 | 1.9 | 2000 | 5 | 6 | 17 | 6 | 900 | 20 | 26 | 20 | 6 |
| BFG520W | 4 | 20 | SOT343N | 9 | 15 | 70 | 500 | NPN | 11 | 2000 | 20 | 6 | 1.1 | 900 | 5 | 6 | 1.85 | 2000 | 5 | 6 | 17 | 6 | 900 | 20 | 26 | 20 | 6 |
| **BFG520W/X** | 4 | 20 | SOT343N | 9 | 15 | 70 | 500 | NPN | 11 | 2000 | 20 | 6 | 1.1 | 900 | 5 | 6 | 1.85 | 2000 | 5 | 6 | 17 | 6 | 900 | 20 | 26 | 20 | 6 |
| BFG540 | 4 | 21 | SOT143B | 9 | 15 | 120 | 400 | NPN | 11 | 2000 | 40 | 8 | 1.3 | 900 | 10 | 8 | 2.1 | 2000 | 10 | 8 | 21 | 8 | 900 | 40 | 34 | 40 | 8 |
| BFG540/X | 4 | 21 | SOT143B | 9 | 15 | 120 | 400 | NPN | 11 | 2000 | 40 | 8 | 1.3 | 900 | 10 | 8 | 2.1 | 2000 | 10 | 8 | 21 | 8 | 900 | 40 | 34 | 40 | 8 |
| BFG540/XR | 4 | 21 | SOT143R | 9 | 15 | 120 | 400 | NPN | 11 | 2000 | 40 | 8 | 1.3 | 900 | 10 | 8 | 2.1 | 2000 | 10 | 8 | 21 | 8 | 900 | 40 | 34 | 40 | 8 |
| BFG540W | 4 | 21 | SOT343N | 9 | 15 | 120 | 500 | NPN | 10 | 2000 | 40 | 8 | 1.3 | 900 | 10 | 8 | 2.1 | 2000 | 10 | 8 | 21 | 8 | 900 | 40 | 34 | 40 | 8 |
| BFG540W/X | 4 | 21 | SOT343N | 9 | 15 | 120 | 500 | NPN | 10 | 2000 | 40 | 8 | 1.3 | 900 | 10 | 8 | 2.1 | 2000 | 10 | 8 | 21 | 8 | 900 | 40 | 34 | 40 | 8 |
| BFG540W/XR | 4 | 21 | SOT343R | 9 | 15 | 120 | 500 | NPN | 10 | 2000 | 40 | 8 | 1.3 | 900 | 10 | 8 | 2.1 | 2000 | 10 | 8 | 21 | 8 | 900 | 40 | 34 | 40 | 8 |
| BFG541 | 4 | 21 | SOT223 | 9 | 15 | 120 | 650 | NPN | 9 | 2000 | 40 | 8 | 1.3 | 900 | 10 | 8 | 2.1 | 2000 | 10 | 8 | 21 | 8 | 900 | 40 | 34 | 40 | 8 |
| BFM505 | 4 | 19 | SOT363A | 9 | 8 | 18 | 500 | NPN | 10 | 2000 | 5 | 3 | 1.1 | 900 | 1 | 3 | 1.9 | 2000 | 5 | 3 | - | - | - | - | - | - | - |
| BFM520 | 4 | 20 | SOT363A | 9 | 8 | 70 | 1000 | NPN | 9 | 2000 | 20 | 3 | 1.2 | 900 | 5 | 3 | 1.9 | 2000 | 5 | 3 | - | - | - | - | - | - | - |
| BFQ540 | 4 | 21 | SOT89 | 9 | 15 | 120 | 1,200 | NPN | - | - | - | - | 1.9 | 900 | 40 | 8 | - | - | - | - | - | - | - | - | - | - | - |
| BFQ67 | 4 | 14 | SOT23 | 8 | 10 | 50 | 300 | NPN | 8 | 2000 | 15 | 8 | 1.7 | 1000 | 15 | 8 | 2.7 | 2000 | 15 | 8 | - | - | - | - | - | - | - |
| BFR505 | 4 | 19 | SOT23 | 9 | 15 | 18 | 150 | NPN | 10 | 2000 | 5 | 6 | 1.2 | 900 | 5 | 6 | 1.9 | 2000 | 5 | 6 | 4 | 6 | 900 | 5 | 10 | 5 | 6 |
| **BFR505T** | 4 | 19 | SOT416 | 9 | 15 | 18 | 150 | NPN | 10 | 2000 | 5 | 6 | 1.2 | 900 | 1.25 | 6 | 1.9 | 2000 | 1.25 | 6 | 5 | 6 | 900 | 5 | 10 | 5 | 6 |
| BFR520 | 4 | 20 | SOT23 | 9 | 15 | 70 | 300 | NPN | 9 | 2000 | 20 | 6 | 1.1 | 900 | 5 | 6 | 1.9 | 2000 | 5 | 6 | 17 | 6 | 900 | 20 | 26 | 20 | 6 |
| **BFR520T** | 4 | 20 | SOT416 | 9 | 15 | 70 | 150 | NPN | 9 | 2000 | 20 | 6 | 1.1 | 900 | 5 | 6 | 1.9 | 2000 | 5 | 6 | 17 | 6 | 900 | 20 | 26 | 20 | 6 |
| **BFR540** | 4 | 21 | SOT23 | 9 | 15 | 120 | 500 | NPN | 7 | 2000 | 40 | 8 | 1.3 | 900 | 10 | 8 | 2.1 | 2000 | 10 | 8 | 21 | 8 | 900 | 40 | 34 | 40 | 8 |
| BFS505 | 4 | 19 | SOT323 | 9 | 15 | 18 | 150 | NPN | 10 | 2000 | 5 | 6 | 1.2 | 900 | 1.25 | 6 | 1.9 | 2000 | 1.25 | 6 | 4 | 6 | 900 | 5 | 10 | 5 | 6 |
| BFS520 | 4 | 20 | SOT323 | 9 | 15 | 70 | 300 | NPN | 9 | 2000 | 20 | 6 | 1.1 | 900 | 5 | 6 | 1.9 | 2000 | 5 | 6 | 17 | 6 | 900 | 20 | 26 | 20 | 6 |
| BFS540 | 4 | 21 | SOT323 | 9 | 15 | 120 | 500 | NPN | 8 | 2000 | 40 | 8 | 1.3 | 900 | 10 | 8 | 2.1 | 2000 | 10 | 8 | 21 | 8 | 900 | 40 | 34 | 40 | 8 |
| PBR941 | 4 | 20 | SOT23 | 8 | 10 | 50 | 360 | NPN | 9.5 | 2000 | 15 | 6 | 1.4 | 1000 | 5 | 6 | 2 | 2000 | 5 | 6 | - | - | - | - | - | - | - |
| PBR951 | 4 | 21 | SOT23 | 8 | 10 | 100 | 365 | NPN | 8 | 2000 | 30 | 6 | 1.3 | 1000 | 5 | 6 | 2 | 2000 | 5 | 6 | - | - | - | - | - | - | - |
| PRF947 | 4 | 20 | SOT323 | 8.5 | 10 | 50 | 250 | NPN | 10 | 2000 | 15 | 6 | 1.5 | 1000 | 5 | 6 | 2.1 | 2000 | 5 | 6 | - | - | - | - | - | - | - |
| **PRF949** | 4 | 20 | SOT416 | 9 | 10 | 50 | 150 | NPN | 10 | 2000 | 15 | 6 | 1.5 | 1000 | 5 | 6 | 2.1 | 2000 | 5 | 6 | - | - | - | - | - | - | - |
| PRF957 | 4 | 21 | SOT323 | 8.5 | 10 | 100 | 270 | NPN | 9.2 | 2000 | 30 | 6 | 1.3 | 1000 | 5 | 6 | 1.8 | 2000 | 5 | 6 | - | - | - | - | - | - | - |
| BFG310/XR | 4.5 | 30 | SOT143R | 14 | 6 | 10 | 60 | NPN | 18 | 1800 | 5 | 3 | - | - | - | - | 1 | 2000 | 1 | 3 | 1.8 | 3 | 1800 | 5 | 8.5 | 5 | 3 |
| BFG310W/XR | 4.5 | 30 | SOT343R | 14 | 6 | 10 | 60 | NPN | 18 | 1800 | 5 | 3 | - | - | - | - | 1 | 2000 | 1 | 3 | 1.8 | 3 | 1800 | 5 | 8.5 | 5 | 3 |
| **BFG325/XR** | 4.5 | 31 | SOT143R | 14 | 6 | 35 | 210 | NPN | 18.3 | 1800 | 15 | 3 | - | - | - | - | 1.1 | 2000 | 3 | 3 | 8.7 | 3 | 1800 | 15 | 19.4 | 15 | 3 |
| **BFG325W/XR** | 4.5 | 31 | SOT343R | 14 | 6 | 35 | 210 | NPN | 18.3 | 1800 | 15 | 3 | - | - | - | - | 1.1 | 2000 | 3 | 3 | 8.7 | 3 | 1800 | 15 | 19.4 | 15 | 3 |

## RF wideband transistors generations 5 to 7

| Type | Generation | Curve | Package | $f_T$ (typ) (GHz) | $V_{CEO}$ (max) (V) | $I_C$ (max) (mA) | $P_{tot}$ (max) (mW) | Polarity | GUM (typ) (dB) | @ f = (MHz) | @ $I_C$ = (mA) | @ $V_{CE}$ = (V) | NF (typ) (dB) | @ f = (MHz) | @ $I_C$ = (mA) | @ $V_{CE}$ = (V) | NF (typ) (dB) | @ f = (MHz) | @ $I_C$ = (mA) | @ $V_{CE}$ = (V) | PL(1dB) (typ) (dBmW) | @ $V_{CE}$ = (V) | @ f = (MHz) | @ $I_C$ = (mA) | IP3 (typ) (dBm) | @ IC = (mA) | @ VCE = (V) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **BFG21W** | 5 | 32 | SOT343R | - | 4.5 | 500 | 600 | NPN | 10 | 1900 | 1 | 3.6 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| BFG403W | 5 | 25 | SOT343R | 17 | 4.5 | 3.6 | 16 | NPN | 22 | 2000 | 3 | 2 | 1 | 900 | 1 | 2 | 1.6 | 2000 | 1 | 2 | 5 | 1 | 900 | 1 | 6 | 1 | 1 |
| BFG410W | 5 | 26 | SOT343R | 22 | 4.5 | 12 | 54 | NPN | 21 | 2000 | 10 | 2 | 0.9 | 900 | 1 | 2 | 1.2 | 2000 | 1 | 2 | 5 | 2 | 2000 | 10 | 15 | 10 | 2 |
| BFG424F | 5 | 27 | SOT343F | 25 | 4.5 | 30 | 135 | NPN | 23 | 2000 | 25 | 2 | 0.8 | 900 | 2 | 2 | 1.2 | 2000 | 2 | 2 | 12 | 2 | 2000 | 25 | 22 | 25 | 2 |
| BFG424W | 5 | 27 | SOT343R | 25 | 4.5 | 30 | 135 | NPN | 22 | 2000 | 25 | 2 | 0.8 | 900 | 2 | 2 | 1.2 | 2000 | 2 | 2 | 12 | 2 | 2000 | 25 | 22 | 25 | 2 |
| **BFG425W** | 5 | 27 | SOT343R | 25 | 4.5 | 30 | 135 | NPN | 20 | 2000 | 25 | 2 | 0.8 | 900 | 2 | 2 | 1.2 | 2000 | 2 | 2 | 12 | 2 | 2000 | 25 | 22 | 25 | 2 |
| BFG480W | 5 | 29 | SOT343R | 21 | 4.5 | 250 | 360 | NPN | 16 | 2000 | 80 | 2 | 1.2 | 900 | 8 | 2 | 1.8 | 2000 | 8 | 2 | 20 | 3.6 | 2000 | 1 | 28 | 80 | 2 |
| **BFU610F** | 6 | 34 | SOT343F | 40 | 5 | 10 | 50 | NPN | 21 | 5800 | 8 | 2 | 0.75 | 2400 | 1 | 2 | 1.4 | 5800 | 1 | 2 | - | - | - | - | 14 | 8 | 5 |
| **BFU630F** | 6 | 35 | SOT343F | 40 | 5 | 30 | 130 | NPN | 28 | 2400 | 25 | 2 | 0.58 | 1500 | 5 | 2 | 0.73 | 2400 | 5 | 2 | - | - | - | - | 23 | 25 | 5 |
| **BFU660F** | 6 | 36 | SOT343F | 40 | 5 | 70 | 200 | NPN | 28.5 | 1500 | 60 | 2 | 0.6 | 1500 | 20 | 2 | 0.75 | 2400 | 20 | 2 | - | - | - | - | 30 | 60 | 5 |
| **BFU690F** | 6 | 37 | SOT343F | 40 | 5 | 100 | 300 | NPN | 25.6 | 1500 | 90 | 2 | 0.7 | 1500 | 50 | 2 | 0.9 | 2400 | 50 | 2 | - | - | - | - | 35 | 90 | 5 |
| **BFU710F** | 7 | 38 | SOT343F | 70 | 2.8 | 10 | 30 | NPN | 16.5 | 12000 | 8 | 2 | 0.9 | 5800 | 2 | 2 | 1.5 | 12000 | 2 | 2 | - | - | - | - | 14.5 | 8 | 2 |
| **BFU725F/N1** | 7 | 33 | SOT343F | 70 | 2.8 | 40 | 136 | NPN | 18 | 5800 | 25 | 2 | 0.47 | 2400 | 5 | 2 | 0.7 | 5800 | 5 | 2 | 8 | 2 | 5800 | 25 | 19 | 25 | 2 |
| **BFU730F** | 7 | 39 | SOT343F | 70 | 2.8 | 30 | 130 | NPN | 18.5 | 5800 | 25 | 2 | 0.56 | 2400 | 5 | 2 | 0.8 | 5800 | 5 | 2 | - | - | - | - | 20.5 | 25 | 2 |
| **BFU730LX** | 7 | - | SOT883C | 53 | 3.0 | 30 | 160 | NPN | 13.3 | 5800 | 25 | 2 | 0.55 | 2400 | 5 | 2 | 0.8 | 5800 | 5 | 2 | - | - | - | - | 26 | 12.4 | 2.3 |
| **BFU760F** | 7 | 40 | SOT343F | 70 | 2.8 | 70 | 200 | NPN | 25 | 2400 | 60 | 2 | 0.5 | 1500 | 20 | 2 | 0.6 | 2400 | 20 | 2 | - | - | - | - | 23 | 60 | 2 |
| **BFU790F** | 7 | 41 | SOT343F | 70 | 2.8 | 100 | 250 | NPN | 20.4 | 2400 | 90 | 2 | 0.56 | 1500 | 50 | 2 | 0.7 | 2400 | 50 | 2 | - | - | - | - | 24 | 90 | 2 |

**Bold** = highly recommended product

# 3.4 RF ICs

## 3.4.1 RF MMIC amplifiers and mixers

RF MMIC amplifiers and mixers selection guide on www.nxp.com/mmics
Easy-to-use parametric filters help you choose the right zRF MMIC for your design.

### Why choose NXP's RF MMIC amplifiers and mixers:

- Reduced RF component count
- Easy circuit design-in
- Reduced board size
- Short time-to-market
- Broad portfolio
- Volume delivery
- Short lead time




### General-purpose wideband amplifiers (50 Ω)

| Type | Package | | | Gp [dB] | | | PI(1dB) [dBm] | | | NF [dB] | | | IP3o[dBm] | | Zout | External Inductor |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Vcc (V) | Is (mA) | 250 MHz | 500 MHz | 750 MHz | 250 MHz | 500 MHz | 750 MHz | 250 MHz | 500 MHz | 750 MHz | 250 MHz | 750 MHz | [Ohm] | |
| **BGA2870** | SOT363 | 2.5 | 15.6 | 31.2 | 31.1 | 31.0 | 5.0 | 4.0 | 4.0 | 3.1 | 3.2 | 3.7 | 15.0 | 13.0 | 50 | N |
| **BGA2874** | SOT363 | 2.5 | 16.0 | 31.1 | 31.0 | 30.6 | 5.0 | 4.0 | 4.0 | 3.0 | 3.1 | 3.4 | 19.0 | 17.0 | 50 | N |
| | | | | 250 MHz | 950 MHz | 2150 MHz | 250 MHz | 950 MHz | 2150 MHz | 250 MHz | 950 MHz | 2150 MHz | 950 MHz | 2150 MHz | | |
| **BGA2800** | SOT363 | 3 | 10.5 | 19.9 | 20.5 | 20.2 | | | -2.0 | 3.7 | 3.6 | 3.7 | 11.0 | 8.0 | 50 | N |
| **BGA2803** | SOT363 | 3 | 5.8 | 23.6 | 23.4 | 23.0 | -6.0 | -6.0 | -8.0 | 3.7 | 3.6 | 3.4 | 5.0 | 2.0 | 50 | N |
| BGA2748 | SOT363 | 3 | 5.7 | 17.6 | 21.9 | 17.8 | | -9.2 | -10.9 | 1.7 | 1.9 | 2.4 | -1.9 | -1.4 | 50 | N |
| BGA2714 | SOT363 | 3 | 4.6 | 20.7 | 20.4 | 20.8 | -7.8 | -7.9 | -9.0 | 2.4 | 2.2 | 3.0 | 2.1 | 0.0 | 50 | N |
| BGA2801 | SOT363 | 3 | 14.3 | 22.2 | 22.4 | 23.0 | 2.0 | 2.0 | 0.0 | 3.8 | 3.8 | 3.9 | 14.0 | 9.0 | 50 | N |
| **BGA2802** | SOT363 | 3 | 12.5 | 25.6 | 25.8 | 25.5 | 3.0 | 1.0 | -3.0 | 4.2 | 4.1 | 3.6 | 13.0 | 6.0 | 50 | N |
| **BGA2815** | SOT363 | 3 | 18.2 | 25.8 | 25.3 | 25.2 | 8.0 | 5.0 | 1.0 | 3.7 | 3.8 | 3.7 | 17.0 | 10.0 | 50 | N |
| **BGA2817** | SOT363 | 3 | 20.0 | 24.5 | 24.7 | 25.1 | 6.0 | 6.0 | 5.0 | 3.9 | 3.9 | 3.8 | 18.0 | 15.0 | 50 | N |
| BGA2819 | SOT363 | 3 | 16.0 | 27.0 | 27.0 | 28.0 | | 2.0 | 1.0 | | 3.2 | 3.3 | 12.0 | 11.0 | 50 | N |
| BGM1012 | SOT363 | 3 | 14.6 | 19.6 | 20.0 | 20.4 | | 6.0 | 3.4 | 4.9 | 4.8 | 4.9 | 18.0 | 13.0 | 50 | Y |
| **BGA2816** | SOT363 | 3 | 22.0 | 31.9 | 32.0 | 26.9 | 7.0 | 5.0 | | 3.2 | 3.2 | 3.2 | 15.0 | 8.0 | 50 | N |
| **BGA2818** | SOT363 | 3 | 19.9 | 30.1 | 29.8 | 30.0 | 7.0 | 6.0 | 4.0 | 3.5 | 3.3 | 3.3 | 18.0 | 14.0 | 50 | N |
| BGA2819 | SOT363 | 3 | 18.0 | 30.0 | 30.0 | 31.0 | 5.0 | 5.0 | 3.0 | 3.0 | 3.1 | 3.4 | 16.0 | 14.0 | 50 | N |
| **BGA2850** | SOT363 | 5 | 9.1 | 23.2 | 24.0 | 22.9 | | | -2.0 | 4.2 | 4.1 | 4.0 | 10.0 | 8.0 | 50 | N |
| **BGA2851** | SOT363 | 5 | 7.0 | 23.3 | 24.7 | 25.2 | -3.0 | -4.0 | -5.0 | 4.0 | 3.2 | 3.0 | 8.0 | 5.0 | 50 | N |
| BGA2715 | SOT363 | 5 | 4.3 | 15.6 | 21.5 | 23.3 | | -8.0 | -8.5 | 2.6 | 2.6 | 3.1 | 2.3 | 0.6 | 50 | N |
| BGA2717 | SOT363 | 5 | 8.0 | 20.0 | 24.2 | 25.1 | | -2.6 | -3.1 | 2.3 | 2.3 | 2.9 | 10.0 | 6.3 | 50 | N |
| BGA2712 | SOT363 | 5 | 12.3 | 21.1 | 21.2 | 22.0 | | 0.2 | -2.0 | 4.2 | 3.9 | 4.3 | 11.0 | 6.0 | 50 | N |
| **BGA2866** | SOT363 | 5 | 17.4 | 23.2 | 23.9 | 24.3 | 4.0 | 4.0 | 3.0 | 3.9 | 3.8 | 3.9 | 17.0 | 12.0 | 50 | N |
| **BGA2867** | SOT363 | 5 | 21.7 | 26.4 | 27.2 | 27.2 | 6.8 | 6.5 | 4.9 | 3.7 | 3.8 | 3.7 | 18.8 | 14.1 | 50 | N |
| BGA2709 | SOT363 | 5 | 23.5 | 22.5 | 22.7 | 23.0 | | 8.3 | 5.7 | 4.3 | 4.0 | 5.1 | 22.0 | 14.0 | 50 | Y |
| BGA2716 | SOT363 | 5 | 15.9 | 22.4 | 22.8 | 22.9 | | 8.9 | 6.1 | 5.5 | 5.3 | 5.5 | 22.2 | 15.9 | 50 | Y |
| BGA2776 | SOT363 | 5 | 24.4 | 22.9 | 23.2 | 23.2 | | 7.2 | 6.0 | 4.7 | 4.9 | 5.3 | 18.6 | 14.4 | 50 | Y |
| **BGA2865** | SOT363 | 5 | 26.4 | 30.9 | 32.2 | 29.6 | 9.0 | 8.0 | 2.0 | 3.8 | 3.9 | 4.0 | 19.0 | 10.0 | 50 | N |
| BGA2868 | SOT363 | 5 | 26.0 | 31.5 | 32.8 | 33.5 | | 11.0 | 8.5 | | 4.0 | 4.1 | 23.5 | 21.5 | 50 | N |
| **BGA2869** | SOT363 | 5 | 22.0 | 30.9 | 30.9 | 32.2 | 8.8 | 8.8 | 7.6 | 3.8 | 3.9 | 4.0 | 20.0 | 19.0 | 50 | N |
| BGM1013 | SOT363 | 5 | 27.5 | 35.3 | 35.6 | 32.1 | | 13.0 | 8.1 | 4.6 | 4.6 | 4.9 | 22.7 | 18.6 | 75 | Y |
| BGM1014 | SOT363 | 5 | 21.0 | 30.2 | 32.2 | 34.3 | | 11.2 | 5.7 | 4.3 | 4.2 | 4.2 | 20.5 | 15.1 | 75 | Y |

### General-purpose LNA MMICs

| Type | Package | | | $\|S21\|^2$ [dB] | | | | | PI(1dB) [dBm] | | | $NF_{min}$ [dB] | | | | | IP3o [dBm] | | | | | ESD protection |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | $V_{cc}$ (V) | Is (mA) | 450 MHz | 900 MHz | 1800 MHz | 2400 MHz | 5800 MHz | 450 MHz | 900 MHz | 2400 MHz | 450 MHz | 900 MHz | 1800 MHz | 2400 MHz | 5800 MHz | 450 MHz | 900 MHz | 1800 MHz | 2400 MHz | 5800 MHz | kV HBM |
| BGA2001 | SOT343R | 2.5 | 4.0 | | 18.0 | 14.0 | | | | | | | 1.3 | 1.3 | | | | -7.4 | -4.5 | | | - |
| BGA2002 [1] | SOT343R | 2.5 | 4.0 | | 18.0 | 14.0 | | | | | | | 1.3 | 1.3 | | | | -7.4 | -4.5 | | | - |
| BGA2003 | SOT343R | 2.5 | 10.0 | | 19.0 | 14.0 | | | | | | | 1.8 | 1.8 | | | | -6.5 | -4.8 | | | - |
| BGA2011 | SOT363 | 3 | 15.0 | | 19.0 | | | | | | | | 1.5 | | | | | 10.0 | | | | - |
| BGA2012 | SOT363 | 3 | 7.0 | | | 16.0 | | | | | | | | 1.7 | | | | | 10.0 | | | - |
| **BGU7003** | SOT891 | 2.5 | 5.0 | | 20.0 | | 15.2 | 11.4 | | | | | 0.6 | | 0.8 | 1.5 | | | | | | 1 |
| **BGU7003W** | SOT886 | 2.5 | 5.0 | | 20.0 | | 15.2 | 11.4 | | | | | 0.6 | | 0.8 | 1.5 | | | | | | 1 |
| **BGU6101** | SOT1209 | 3 | 1.5 | 13.0 | 12.0 | | 13.0 [2] | | -11.0 | -11.5 | -6.5 (2) | 0.8 | 0.8 | | 1.3 (2) | | -2.5 | -2.0 | | 6.5 [2] | 3 | |
| **BGU6102** | SOT1209 | 3 | 3.0 | 18.5 | 16.5 | | 14.0 [3] | | -5.0 | -5.5 | 0 (3) | 0.7 | 0.8 | | 1.2 (3) | | 5.5 | 6.0 | | 11.5 [3] | 3 | |
| **BGU6104** | SOT1209 | 3 | 6.0 | 22.5 | 18.5 | | 12.8 [4] | | 0.5 | 0.5 | 6.5 (4) | 0.8 | 0.8 | | 1.1 (4) | | 11.0 | 12.0 | | 18.5 [4] | 3 | |

[1] AEC-Q101 qualified [2] $I_{cc}$ 3 mA [3] $I_{cc}$ 6 mA [4] $I_{cc}$ 12 mA

**Bold** = highly recommended product **Bold red** = new, highly recommended product

## SiGe:C LNAs (for GPS and others)

| Type | Package | @ 1.575 GHz | | | | | | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Supply voltage | | Supply current | | | Insertion power gain | | | Noise figure | Input power at 1 dB gain compression | | | | | | | | Input third-order intercept point $f_1$ = 1713 MHz, $f_2$ = 1851 MHz | | | | | | | | | |
| | | $V_{cc}$ | | $I_{cc}$ | | | $\|s_{21}\|^2$ | | | NF | $P_{L(1dB)}$ | | | | | | | | $IP3_i$ | | | | | | | | | |
| | | (V) | | (mA) | | | (dB) | | | (dB) | (dBm) | | | | | | | | (dBm) | | | | | | | | | |
| | | Min | Max | Min | Typ | Max | Min | Typ | Max | Typ | $V_{cc}$ = 1.5 V, Min | $V_{cc}$ = 1.5 V, Typ | $V_{cc}$ = 1.8 V, Min | $V_{cc}$ = 1.8 V, Typ | $V_{cc}$ = 2.2 V, Min | $V_{cc}$ = 2.2 V, Typ | $V_{cc}$ = 2.5 V, $I_{cc}$ = 5 mA | $V_{cc}$ = 2.85 V, Min | $V_{cc}$ = 2.85 V, Typ | $V_{cc}$ = 1.5 V, Min | $V_{cc}$ = 1.5 V, Typ | $V_{cc}$ = 1.8 V, Min | $V_{cc}$ = 1.8 V, Typ | $V_{cc}$ = 2.2 V, Min | $V_{cc}$ = 2.2 V, Typ | $V_{cc}$ = 2.5 V, $I_{cc}$ = 5 mA | $V_{cc}$ = 2.85 V, Min | $V_{cc}$ = 2.85 V, Typ |
| BGU7003 | SOT891 | 2.2 | 2.85 | 3 | - | 15 | 16 | 18.3 | 20 | 0.8 | - | - | - | - | - | - | -20 | - | - | - | - | - | - | - | 0 | - | - |
| BGU7004^ | SOT886 | 1.5 | 2.85 | - | 4.5 | - | - | 16.5* | - | 0.9 | - | - | -14 | -11 | - | - | - | -11 | -8 | - | - | 5 | 9 | - | - | - | 5 | 12 |
| BGU7005 | SOT886 | 1.5 | 2.85 | - | 4.5 | - | - | 16.5* | - | 0.9 | - | - | -14 | -11 | - | - | - | -11 | -8 | - | - | 5 | 9 | - | - | - | 5 | 12 |
| BGU7007 | SOT886 | 1.5 | 2.85 | - | 4.8 | - | - | 18.5** | - | 0.9 | - | - | -15 | -12 | - | - | - | -14 | -11 | - | - | 1 | 4 | - | - | - | 2 | 5 |
| BGU7008^ | SOT886 | 1.5 | 2.85 | - | 4.8 | - | - | 18.5** | - | 0.9 | - | - | -15 | -12 | - | - | - | -14 | -11 | - | - | 1 | 4 | - | - | - | 2 | 5 |
| BGU8006 | WL-CSP | 1.5 | 3.1 | - | 4.1 | - | - | 17.5**** | - | 0.6# | - | - | - | -10 | - | - | - | - | -8 | - | - | - | 5 | - | - | - | - | 8 |
| BGU8007 | SOT886 | 1.5 | 2.2 | - | 4.6 | - | - | 19.0*** | - | 0.75# | -15 | -12 | - | - | -13 | -10 | - | - | - | 1 | 4 | - | - | 2 | 5 | - | - | - |

* 16.5 dB without jammer / 17.5 dB with jammer
** 18.5 dB without jammer / 19.5 dB with jammer
*** 19.0 dB without jammer / 20.5 dB with jammer
**** 17.5 dB without jammer / 19 dB with jammer

^ AEC-Q101 qualified (some limitations apply)
# Evaluation board losses excluded

## LNAs for set-top boxes (75 Ω)

| Type | Package | Frequency range | Mode | @ | | Gain (1) | NF | $P_{L(1dB)}$ | OIP3 | FL (2) | $RL_{out}$ | $RL_{in}$ |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | $V_{CC}$ | $I_{CC}$ | | | | | | | |
| | | (MHz) | | (V) | (mA) | (dB) | (dB) | (dBm) | (dBm) | (dB) | (dB) | (dB) |
| BGU7031 | SOT363 | 40 - 1000 | $G_p$ 10 dB | 5 | 43 | 10 | 4.5 | 14 | 29 | -0.2 | 12 | 18 |
| BGU7032 | SOT363 | 40 - 1000 | $G_p$ 10 dB | 5 | 43 | 10 | 4.5 | 14 | 29 | -0.2 | 12 | 18 |
| | | | Bypass | 5 | 4 | -2 | 2.5 | - | 29 | -0.2 | 8 | 8 |
| BGU7033 | SOT363 | 40 - 1000 | $G_p$ 10 dB | 5 | 43 | 10 | 4.5 | 14 | 29 | -0.2 | 12 | 18 |
| | | | $G_p$ 5 dB | 5 | 43 | 5 | 6 | 9 | 29 | -0.2 | 12 | 17 |
| | | | Bypass | 5 | 4 | -2 | 2.5 | - | 29 | -0.2 | 8 | 8 |
| BGU7041 | SOT363 | 40 - 1000 | $G_p$ 10 dB | 3.3 | 38 | 10 | 4 | 12 | 29 | -0.2 | 12 | 21 |
| BGU7042 | SOT363 | 40 - 1000 | $G_p$ 10 dB | 3.3 | 38 | 10 | 4 | 12 | 29 | -0.2 | 12 | 21 |
| | | | Bypass | 3.3 | 3 | -2 | 2.5 | - | 29 | -0.2 | 10 | 10 |
| BGU7044 | SOT363 | 40 - 1000 | $G_p$ 14 dB | 3.3 | 34 | 14 | 2.8 | 13 | 29 | -0.2 | 12 | 20 |
| BGU7045 | SOT363 | 40 - 1000 | $G_p$ 14 dB | 3.3 | 34 | 14 | 2.8 | 13 | 29 | -0.2 | 12 | 20 |
| | | | Bypass | 3.3 | 3 | -2 | 2.5 | - | 27 | -0.2 | 10 | 9 |

## LNAs for wireless infrastructures (50 Ω)

| Type | Package | @ $V_{CC}$ | @ $I_{CC}$ | frange | frange | Gass | NF | $P_{L(1dB)}$ | $IP3_O$ | $RL_{in}$ | $RL_{out}$ |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | [typ] | [typ] | [min] | [max] | [typ] | [typ] | [typ] | [typ] | [typ] | [typ] |
| | | (V) | (mA) | (MHz) | (MHz) | (dB) | (dB) | (dBm) | (dBm) | (dB) | (dB) |
| BGU7051 | SOT650-1 | 3.3 | 65 | 500 | 750 | 23.5 | 0.6 | 17 | 32 | 27.5 | 18 |
| | | | | 750 | 850 | 21.5 | 0.63 | 16.5 | 32 | 26 | 17.5 |
| | | | | 900 | 1500 | 21 | 0.65 | 16.5 | 33 | 24.5 | 18 |
| BGU7052 | SOT650-1 | 3.3 | 80 | 1500 | 1750 | 21.5 | 0.76 | 15.5 | 37 | 23 | 22 |
| | | | | 1850 | 1900 | 20 | 0.76 | 14.5 | 35.5 | 23 | 22 |
| | | | | 1950 | 2500 | 19.7 | 0.79 | 14.5 | 35 | 22 | 21 |
| BGU7053 | SOT650-1 | 3.3 | 90 | 2300 | 2500 | 18.5 | 0.85 | 13.5 | 36 | 23 | 19.5 |
| | | | | 2700 | 2800 | 17.5 | 0.9 | 13 | 36 | 26 | 23 |
| BGU7060 | SOT1301AA | 5 | 200 | 700 | 800 | 3 | 21 | 11 | 25.5 | 20 | 19 |
| | | | | | | 12 | 15 | 7.5 | 22.5 | 20 | 19 |
| | | | | | | 18 | 7.2 | -7 | 4.5 | 20 | 19 |
| | | | | | | 35 | 1 | -12.5 | 2.5 | 24 | 19 |
| BGU7061 | SOT1301AA | 5 | 200 | 800 | 950 | 3 | 21 | 11 | 25.5 | 20 | 19 |
| | | | | | | 12 | 15 | 7.5 | 22.5 | 20 | 19 |
| | | | | | | 18 | 7.2 | -7 | 4.5 | 20 | 19 |
| | | | | | | 35 | 1 | -12.5 | 2.5 | 24 | 19 |
| BGU7062 | SOT1301AA | 5 | 185 | 1710 | 1785 | 3 | 20.6 | 10.7 | 25.6 | 23 | 16 |
| | | | | | | 12 | 15 | 5.4 | 21 | 23 | 16 |
| | | | | | | 18 | 9.3 | -7 | 3.4 | 23 | 16 |
| | | | | | | 35 | 0.98 | -12.8 | 1 | 26 | 16 |
| BGU7063 | SOT1301AA | 5 | 190 | 1920 | 1980 | 18 | 6.4 | -6.4 | 5.4 | 35 | 15 |
| | | | 230 | | | 35 | 1.05 | -12.5 | 0.9 | 31 | 15 |



## General-purpose medium power amplifiers

| Type | Package | @ $V_{CC}$ | @ $I_{CC}$ | Frequency range | RF input frequency | Gain | $P_{L(1dB)}$ | $IP3_O$ | NF |
|---|---|---|---|---|---|---|---|---|---|
| | | [typ] | [typ] | [min] | [max] | [typ] | [typ] | [typ] | [typ] |
| | | (V) | (mA) | (MHz) | (MHz) | (dB) | (dBm) | (dBm) | (dB) |
| BGA6289 | SOT89 | 4.1 | 84 | 100-3000 | 900 | 15.0 | 31.0 | 17.0 | 3.5 |
| | | | | | 1800 | 13.0 | 28.0 | 15.0 | 3.7 |
| BGA6489 | SOT89 | 5.1 | 78 | 100-3000 | 900 | 20.0 | 33.0 | 20.0 | 3.1 |
| | | | | | 1800 | 16.0 | 30.0 | 17.0 | 3.3 |
| BGA6589 | SOT89 | 4.8 | 81 | 100-3000 | 900 | 22.0 | 33.0 | 21.0 | 3 |
| | | | | | 1800 | 17.0 | 32.0 | 20.0 | 3.3 |
| **BGA7014*** | SOT89 | 5 | 70 | 30-6000 | 2000 | 12.0 | 13.0 | 26.0 | 6.2 |
| | | | | | 4000 | 13.5 | 10.0 | 20.5 | 6.0 |
| **BGA7017*** | SOT89 | 5 | 87 | 30-6000 | 2000 | 12.0 | 16.5 | 29.0 | 6.4 |
| | | | | | 4000 | 13.5 | 11.5 | 23.0 | 6.3 |
| **BGA7020*** | SOT89 | 5 | 120 | 30-6000 | 2000 | 13.0 | 18.5 | 33.0 | 6.5 |
| | | | | | 4000 | 14.0 | 14.0 | 26.0 | 6.2 |
| **BGA7024** | SOT89 | 5 | 110 | 400 - 2700 | 940 | 22.0 | 24.0 | 37.5 | 2.9 |
| | | | | | 1960 | 16.0 | 25.5 | 38.0 | 3.7 |
| | | | | | 2140 | 15.0 | 25.5 | 38.0 | 3.7 |
| | | | | | 2445 | 14.0 | 24.5 | 37.5 | 4.0 |
| **BGA7027** | SOT89 | 5 | 165 | 400 - 2700 | 940 | 19.0 | 29.0 | 41.5 | 2.6 |
| | | | | | 1960 | 11.5 | 27.5 | 43.0 | 3.8 |
| | | | | | 2140 | 11.0 | 28.0 | 42.5 | 3.9 |
| **BGA7124** | SOT908 | 5 | 140 | 400 - 2700 | 940 | 23.0 | 25.0 | 38.5 | 5.2 |
| | | | | | 1960 | 16.5 | 24.5 | 38.0 | 4.6 |
| | | | | | 2140 | 16.0 | 24.5 | 37.5 | 4.8 |
| | | | | | 2445 | 14.0 | 23.5 | 36.0 | 5.4 |
| **BGA7127** | SOT908 | 5 | 180 | 400 - 2700 | 940 | 20.0 | 27.5 | 41.5 | 3.1 |
| | | | | | 1960 | 13.0 | 28.5 | 42.5 | 4.5 |
| | | | | | 2140 | 12.0 | 28.0 | 42.0 | 4.6 |
| | | | | | 2445 | 10.5 | 27.5 | 41.5 | 4.7 |
| **BGA7130** | SOT908 | 5 | 450 | 400 - 2700 | 750 | 18.0 | 30.0 | 43.0 | 5.0 |
| | | | | | 2140 | 10.0 | 30.0 | 44.0 | 5.0 |

## VGAs for wireless infrastructures

| Type | Package | type | @ $V_{CC}$ | @ $I_{CC}$ | $f_{range}$ | $f_{range}$ | Gp @ minimum attenuation | Attenuation range | NF | $P_{L(1dB)}$ | $IP3_O$ |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | [typ] | [typ] | [min] | [max] | (dB) | (dB) | [typ] | [typ] | [typ] |
| | | | (V) | (mA) | (MHz) | (MHz) | | | (dB) | (dBm) | (dBm) |
| **BGA7204** | SOT617-3 | single | 5 | 115 | 400 | 700 | 18.5 | 31.5 | 7 | 21 | 38 |
| | | | 5 | 115 | 700 | 1450 | 18.5 | 31.5 | 6.5 | 21 | 37.5 |
| | | | 5 | 115 | 1450 | 2100 | 17.5 | 30.5 | 6.5 | 20.5 | 36 |
| | | | 5 | 115 | 2100 | 2750 | 16.5 | 30 | 7 | 20 | 34 |
| **BGA7210** | SOT617-3 | single | 5 | 185 | 700 | 1400 | 30 | 31.5 | 6.5 | 21 | 39 |
| | | | 5 | 185 | 1400 | 1700 | 29.5 | 31.5 | 6.5 | 21 | 37 |
| | | | 5 | 185 | 1700 | 2200 | 29 | 31.5 | 6.5 | 21 | 35 |
| | | | 5 | 185 | 2200 | 2800 | 28 | 30.5 | 7 | 23 | 35 |
| | | | 5 | 185 | 3400 | 3800 | 26 | 29.5 | 8 | 19 | 27 |
| BGA7350 | SOT617-1 | dual | 5 | 245 | 50 | 250 | 18.5 | 24 | 6 | 17 | 43 |
| **BGA7351** | SOT617-1 | dual | 5 | 280 | 50 | 250 | 22 | 28 | 6 | 16.5 | 46 |

## 2-stage variable-gain linear amplifier

| Type | Package | @ | | Frequency range | @ 900 MHz | | | | @ 1900 MHz | | | | Limits | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | $V_s$ | $I_s$ | | Gain[1] | DG[2] | $P_{1dB}$ | ACPR | Gain[1] | DG[2] | $P_{1dB}$ | ACPR | $V_s$ | $I_s$ | $P_{tot}$ |
| | | (V) | (mA) | | (dB) | (dB) | (dBm) | (dBc) | (dB) | (dB) | (dBm) | (dBc) | (V) | (mA) | (mW) |
| BGA2031/1 | SOT363 | 3 | 51 | 800-2500 | 24 | 62 | 11 | 49 | 23 | 56 | 13 | 49 | 3.3 | 77 | 200 |

[1] Gain = GP, power gain [2] DG = gain control range

## Wideband linear mixer

| Type | Package | @ | | RF input | IF output | @ 880 MHz | | | @ 1900 MHz | | | Limits | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | $V_s$ | $I_s$ | Frequency range | Frequency range | NF | Gain[1] | OIP3 | NF | Gain[1] | OIP3 | $V_s$ | $I_s$ | $P_{tot}$ |
| | | (V) | (mA) | | | (dB) | (dB) | (dBm) | (dB) | (dB) | (dBm) | (V) | (mA) | (mW) |
| BGA2022 | SOT363 | 3 | 6 | 800 - 2500 | 50 - 500 | 9 | 5 | 4 | 9 | 6 | 10 | 4 | 10 | 40 |

[1] Gain = GP, power gain [2] DG = gain control range

**Bold** = highly recommended product
**Bold red** = new, highly recommended product

* Check status in section 3.1, as this type is not yet released for mass production

## 3.4.2 Wireless infrastructure ICs

### Low-noise PLL + VCO (LO generator) for wireless infrastructures

| Type | Package | @ $V_{CC}$ | @ $I_{CC}$ | fi(ref) | VCO output frequency (MHz) | RF output frequency (MHz) | Normalized phase noise | Phase noise @ 1MHz | Integrated RMS phase error | Programmable output power |
|---|---|---|---|---|---|---|---|---|---|---|
| | | [typ] | [typ] | [min] | | | [max] | [max] | [max] | [typ] |
| | | (V) | (mA) | (MHz) | | | (dBc/Hz) | (dBc/Hz) | deg | (dBm) |
| **BGX7300*** | SOT1092-2 | 3.3 | 150 | 10 - 250 | 2200 - 2750<br>2750 - 3500<br>3500 - 4400 | 68 - 4400 | -225 | -134 (2.2 GHz carrier)<br>-133 (3.0 GHz carrier)<br>-131 (4.2 GHz carrier) | 0.24°<br>@ 2.1 GHz | -5 to +5 |

### IQ modulators for wireless infrastructure

| Type | Package | @ $V_{CC}$ | @ $I_{CC}$ | flo range | flo | Po | BWmod | Nflr(o) * | $P_{L(1dB)}$ | $IP2_O$ | $IP3_O$ | SBS | CF |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | [typ] | [typ] | | | [typ] | [typ] | [typ] | [typ] | [typ] | [typ] | [typ] | [typ] |
| | | (V) | (mA) | (MHz) | (MHz) | (dBm) | (MHz) | (dBm/Hz) | (dBm) | (dBm) | (dBm) | (dBc) | (dBm) |
| **BGX7100** | SOT616-3 | 5 | 165 | 400 - 4000 | 750 | -0.2 | 400 | -159/-158.5 | 11.5 | 71 | 29 | 55 | -55 |
| | | | 165 | | 910 | | | -159/-158.5 | 11.5 | 72 | 29 | 49 | -55 |
| | | | 173 | | 1840 | | | -158.5/-158 | 11.5 | 69 | 27 | 47 | -50 |
| | | | 173 | | 1960 | | | -158.5/-158 | 11.5 | 72.5 | 27 | 49 | -48 |
| | | | 178 | | 2140 | | | -158.5/-158 | 11.5 | 74 | 27 | 51 | -45 |
| | | | 178 | | 2650 | | | -158/-158 | 11.5 | 62 | 26 | 60 | -45 |
| | | | 184 | | 3650 | | | -158/-158 | 11.5 | 60 | 25 | 53 | -43 |
| **BGX7101** | SOT616-3 | 5 | 172 | 400 - 4000 | 750 | 4 | 650 | -159/-158.5 | 12 | 71 | 28 | 63 | -51 |
| | | | 172 | | 910 | | | -159/-158.5 | 12 | 75 | 28 | 49 | -57 |
| | | | 180 | | 1840 | | | -158.5/-158 | 12 | 71 | 27 | 55 | -50 |
| | | | 180 | | 1960 | | | -158.5/-158 | 12 | 72 | 27 | 57 | -47 |
| | | | 178 | | 2140 | | | -158.5/-158 | 12 | 75 | 27 | 63 | -45 |
| | | | 182 | | 2650 | | | -158/-158 | 12 | 65 | 26 | 50 | -45 |
| | | | 188 | | 3650 | | | -158/-158 | 12 | 65 | 25 | 57 | -42 |

* Without modulation/with modulation

### Dual mixers for wireless infrastructure

| Type | Package | @ $V_{CC}$ | @ $I_{CC}$ | RF input frequency | RF input frequency | Local oscillator frequency | Local oscillator frequency | Second-order spurious rejection 2RF-2LO | NFSSB single-sideband | $IP3_i$ | Gconv |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | [typ] | [typ] | [min] | [max] | [min] | [max] | [max] | [typ] | [typ] | [typ] |
| | | (V) | (mA) | (MHz) | (MHz) | (MHz) | (MHz) | (dBc) | (dB) | (dBm) | (dB) |
| **BGX7220** | SOT1092-2 | 5 | 330 | 700 | 950 | 500 | 1150 | -60 | 10 | 26 | 8 |
| **BGX7221** | SOT1092-2 | 5 | 365 | 1400 | 2700 | 1500 | 2500 | -60 | 10 | 25.5 | 8.5 |

**Bold red** = new, highly recommended product

* Check status in section 3.1, as this type is not yet released for mass production

## 3.4.3 Satellite LNB RF ICs

| Type | Package | Input freq range | $V_{cc}$ | I | $G_{conv}$ | NF | OIP3 | LO Freq | Integrated Phase noise density (degrees RMS) |
|---|---|---|---|---|---|---|---|---|---|
| | | | (V) | (mA) | (dB) | (dB) | (dB) | (GHz) | |
| **TFF1014HN** | SOT763-1 | 10.7 - 12.75 | 5 | 52 | 36 | 7 | 13 | 9.75 / 10.6 | 1.5 |
| **TFF1015HN** | SOT763-1 | 10.7 - 12.75 | 5 | 52 | 39 | 7 | 13 | 9.75 / 10.6 | 1.5 |
| **TFF1017HN** | SOT763-1 | 10.7 - 12.75 | 5 | 52 | 42 | 7 | 13 | 9.75 / 10.6 | 1.5 |
| **TFF1018HN** | SOT763-1 | 10.7 - 12.75 | 5 | 52 | 45 | 7 | 13 | 9.75 / 10.6 | 1.5 |

## 3.4.4 Low-noise LO generators for VSAT and general microwave applications

### Why choose NXP's low-noise LO generators:

- Lowest total cost of ownership
- Alignment-free concept
- Easy circuit design-in
- Improved LO stability




### Low-noise LO generators for VSAT applications

| Type | Package | $f_{IN(REF)}$ | $V_{CC}$ | $I_{CC}$ | PLL phase noise @ N=64, @ 100 kHz | PLL | Output buffer | | Input |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | | $f_{o(RF)}$ | Po | $RL_{out(RF)}$ | $S_i$ |
| | | | Typ | Typ | Max | | Typ | Max | Min |
| | | (MHz) | (V) | (mA) | (dBc/Hz) | (GHz) | (dBm) | (dB) | (dBm) |
| **TFF1003HN** | SOT616 | 50 - 815 | 3.3 | 100 | -92 | 12.8 - 13.05 | -5 | -10 | -10 |
| **TFF1007HN** | SOT616 | 230.46 - 234.38 | 3.3 | 100 | -104 | 14.62 - 15 | -3 | -10 | -10 |

### Low-noise LO generators for general microwave applications

| Type | Package | $f_{IN(REF)}$ | $V_{CC}$ | $I_{CC}$ | PLL phase noise @ N=64 | | PLL | | | Output buffer | | Input | Frequency band |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | fo(RF) | | | Po | RLout(RF) | $S_i$ | |
| | | | Typ | Typ | @ 100 kHz | @ 10 MHz | Min | Typ | Max | Typ | Max | Min | |
| | | (MHz) | (V) | (mA) | (dBc/Hz) | (dBc/Hz) | (GHz) | (GHz) | (GHz) | (dBm) | (dB) | (dBm) | |
| TFF11070HN* | SOT616 | 27 - 448 | 3.3 | 100 | -95 | -131 | 6.84 | 7 | 7.16 | -5 | -10 | -10 | C |
| TFF11073HN* | SOT616 | 28 - 468 | 3.3 | 100 | -95 | -131 | 7.16 | 7.33 | 7.49 | -5 | -10 | -10 | C |
| TFF11077HN* | SOT616 | 29 - 490 | 3.3 | 100 | -95 | -131 | 7.49 | 7.67 | 7.84 | -5 | -10 | -10 | C |
| TFF11080HN* | SOT616 | 31 - 513 | 3.3 | 100 | -95 | -131 | 7.84 | 8.02 | 8.21 | -5 | -10 | -10 | C. X |
| TFF11084HN* | SOT616 | 32 - 537 | 3.3 | 100 | -95 | -131 | 8.21 | 8.4 | 8.59 | -5 | -10 | -10 | X |
| TFF11088HN* | SOT616 | 34 - 562 | 3.3 | 100 | -95 | -131 | 8.59 | 8.79 | 8.99 | -5 | -10 | -10 | X |
| TFF11092HN* | SOT616 | 35 - 588 | 3.3 | 100 | -95 | -131 | 8.99 | 9.2 | 9.41 | -5 | -10 | -10 | X |
| TFF11094HN* | SOT616 | 36-600 | 3.3 | 100 | -95 | -131 | 9.00 | 9.4 | 9.6 | -5 | -10 | -10 | X |
| TFF11096HN* | SOT616 | 37 - 616 | 3.3 | 100 | -95 | -131 | 9.41 | 9.63 | 9.85 | -5 | -10 | -10 | X |
| TFF11101HN* | SOT616 | 38 - 644 | 3.3 | 100 | -95 | -131 | 9.85 | 10.07 | 10.31 | -5 | -10 | -10 | X |
| TFF11105HN* | SOT616 | 40 - 674 | 3.3 | 100 | -95 | -131 | 10.31 | 10.54 | 10.79 | -5 | -10 | -10 | Ku |
| TFF11110HN* | SOT616 | 42 - 706 | 3.3 | 100 | -95 | -131 | 10.79 | 11.03 | 11.29 | -5 | -10 | -10 | Ku |
| TFF11115HN* | SOT616 | 44 - 738 | 3.3 | 100 | -95 | -131 | 11.29 | 11.55 | 11.81 | -5 | -10 | -10 | Ku |
| TFF11121HN* | SOT616 | 46 - 773 | 3.3 | 100 | -95 | -131 | 11.81 | 12.09 | 12.36 | -5 | -10 | -10 | Ku |
| TFF11126HN* | SOT616 | 48 - 809 | 3.3 | 100 | -95 | -131 | 12.36 | 12.65 | 12.94 | -5 | -10 | -10 | Ku |
| TFF11132HN* | SOT616 | 51 - 846 | 3.3 | 100 | -95 | -131 | 12.9 | 13.2 | 13.5 | -5 | -10 | -10 | Ku |
| TFF11139HN* | SOT616 | 53 - 886 | 3.3 | 100 | -95 | -131 | 13.54 | 13.85 | 14.17 | -5 | -10 | -10 | Ka |
| TFF11145HN* | SOT616 | 55 - 927 | 3.3 | 100 | -95 | -131 | 14.17 | 14.5 | 14.83 | -5 | -10 | -10 | Ka |
| TFF11152HN* | SOT616 | 58 - 970 | 3.3 | 100 | -95 | -131 | 14.83 | 15.18 | 15.52 | -5 | -10 | -10 | Ka |

**Bold** = highly recommended product

* To be released on request, please consult your local NXP representative or authorized distributor

# 3.5 RF MOS transistors

## 3.5.1 JFETs

JFET selection guide on www.nxp.com/rffets
Easy-to-use parametric filters help you choose the right junction field effect transistor for your design.

### Why choose NXP's JFETs:

- Reliable volume supplier
- Short lead time
- Broad portfolio

### N-channel junction field-effect transistors for switching

| Type | Package | $V_{DS}$ | $I_G$ | CHARACTERISTICS | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | $I_{DSS}$ | | $V_{gsoff}$ | | $R_{DSON}$ | $C_{rs}$ | | $t_{on}$ | | $t_{off}$ | | |
| | | (V) | (mA) | (mA) | | (V) | | (Ω) | (pF) | | (ns) | | (ns) | | |
| | | max | max | min | max | min | max | max | min | max | typ | max | typ | max | |
| BSR56 | SOT23 | 40 | 50 | 50 | - | 4 | 10 | 25 | - | 5 | - | - | - | 25 | |
| BSR57 | SOT23 | 40 | 50 | 20 | 100 | 2 | 6 | 40 | - | 5 | - | - | - | 50 | |
| BSR58 | SOT23 | 40 | 50 | 8 | 80 | 0.8 | 4 | 60 | - | 5 | - | - | - | 100 | |
| PMBFJ108 | SOT23 | 25 | 50 | 80 | - | 3 | 10 | 8 | - | 15 | 4 | - | 6 | - | |
| PMBFJ109 | SOT23 | 25 | 50 | 40 | - | 2 | 6 | 12 | - | 15 | 4 | - | 6 | - | |
| PMBFJ110 | SOT23 | 25 | 50 | 10 | - | 0.5 | 4 | 18 | - | 15 | 4 | - | 6 | | |
| PMBFJ111 | SOT23 | 40 | 50 | 20 | - | 3 | 10 | 30 | - | typ.3 | 13 | - | 35 | - | |
| PMBFJ112 | SOT23 | 40 | 50 | 5 | - | 1 | 5 | 50 | - | typ.3 | 13 | - | 35 | - | |
| PMBFJ113 | SOT23 | 40 | 50 | 2 | - | 0.5 | 3 | 100 | - | typ.3 | 13 | - | 35 | - | |
| PMBF4391 | SOT23 | 40 | 50 | 50 | 150 | 4 | 10 | 30 | - | 3.5 | - | 15 | - | 20 | |
| PMBF4392 | SOT23 | 40 | 50 | 25 | 75 | 2 | 5 | 60 | - | 3.5 | - | 15 | - | 35 | |
| PMBF4393 | SOT23 | 40 | 50 | 5 | 30 | 0.5 | 3 | 100 | - | 3.5 | - | 15 | - | 50 | |

### P-channel junction field-effect transistors for switching

| Type | Package | $V_{DS}$ | $I_G$ | CHARACTERISTICS | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | $I_{DSS}$ | | $V_{gsoff}$ | | $R_{DSON}$ | $C_{rs}$ | | $t_{on}$ | | $t_{off}$ | | |
| | | (V) | (mA) | (mA) | | (V) | | (Ω) | (pF) | | (ns) | | (ns) | | |
| | | max | max | min | max | min | max | max | min | max | typ | max | typ | max | |
| PMBFJ174 | SOT23 | 30 | 50 | 20 | 135 | 5 | 10 | 85 | typ.4 | | 7 | - | 15 | - | |
| PMBFJ175 | SOT23 | 30 | 50 | 7 | 70 | 3 | 6 | 125 | typ.4 | | 15 | - | 30 | - | |
| PMBFJ176 | SOT23 | 30 | 50 | 2 | 35 | 1 | 4 | 250 | typ.4 | | 35 | - | 35 | - | |
| PMBFJ177 | SOT23 | 30 | 50 | 1.5 | 20 | 0.8 | 2.25 | 300 | typ.4 | | 45 | - | 45 | - | |

## N-channel junction field-effect transistors for general RF applications

| Type | Package | $V_{DS}$ | $I_G$ | CHARACTERISTICS | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | $I_{DSS}$ | | $V_{gsoff}$ | | \|Yfs\| | | $C_{rs}$ | |
| | | (V) | (mA) | (mA) | | (V) | | (mS) | | (pF) | |
| | | max | max | min | max | min | max | min | max | min | max |
| DC, LF, and HF amplifiers | | | | | | | | | | | |
| BF545A | SOT23 | 30 | 10 | 2 | 6.5 | 0.4 | 7.5 | 3 | 6.5 | 0.8 | - |
| BF545B | SOT23 | 30 | 10 | 6 | 15 | 0.4 | 7.5 | 3 | 6.5 | 0.8 | - |
| BF545C | SOT23 | 30 | 10 | 12 | 25 | 0.4 | 7.5 | 3 | 6.5 | 0.8 | - |
| BF556A | SOT23 | 30 | 10 | 3 | 7 | 0.5 | 7.5 | 4.5 | - | 0.8 | - |
| BF556B | SOT23 | 30 | 10 | 6 | 13 | 0.5 | 7.5 | 4.5 | - | 0.8 | - |
| BF556C | SOT23 | 30 | 10 | 11 | 18 | 0.5 | 7.5 | 4.5 | - | 0.8 | - |
| Pre-amplifiers for AM tuners in car radios | | | | | | | | | | | |
| BF861A | SOT23 | 25 | 10 | 2 | 6.5 | 0.2 | 1.0 | 12 | 20 | 2.1 | 2.7 |
| BF861B | SOT23 | 25 | 10 | 6 | 15 | 0.5 | 1.5 | 16 | 25 | 2.1 | 2.7 |
| BF861C | SOT23 | 25 | 10 | 12 | 25 | 0.8 | 2 | 20 | 30 | 2.1 | 2.7 |
| **BF862** | SOT23 | 20 | 10 | 10 | 25 | 0.3 | 2 | 35 | - | typ=1.9 | - |
| RF stages FM portables, car radios, main radios & mixer stages | | | | | | | | | | | |
| BF510[1] | SOT23 | 20 | 10 | 0.7 | 3 | typ. 0.8 | | 2.5 | | 0.4 | 0.5 |
| BF511[1] | SOT23 | 20 | 10 | 2.5 | 7 | typ. 1.5 | | 4 | | 0.4 | 0.5 |
| BF512[1] | SOT23 | 20 | 10 | 6 | 12 | typ. 2.2 | | 6 | | 0.4 | 0.5 |
| BF513[1] | SOT23 | 20 | 10 | 10 | 18 | typ. 3 | | 7 | | 0.4 | 0.5 |
| Low-level general-purpose amplifiers | | | | | | | | | | | |
| BFR30 | SOT23 | 25 | 5 | 4 | 10 | < 5 | | 1 | 4 | 1.5 | - |
| BFR31 | SOT23 | 25 | 5 | 1 | 5 | < 2.5 | | 1.5 | 4.5 | 1.5 | - |
| General-purpose amplifiers | | | | | | | | | | | |
| BFT46 | SOT23 | 25 | 5 | 0.2 | 1.5 | < 1.2 | | > 1 | | 1.5 | - |
| AM input stages UHF/VHF amplifiers | | | | | | | | | | | |
| PMBFJ308 | SOT23 | 25 | 50 | 12 | 60 | 1 | 6.5 | > 10 | | 1.3 | 2.5 |
| PMBFJ309 | SOT23 | 25 | 50 | 12 | 30 | 1 | 4 | > 10 | | 1.3 | 2.5 |
| **PMBFJ310** | SOT23 | 25 | 50 | 24 | 60 | 2 | 6.5 | > 10 | | 1.3 | 2.5 |
| **PMBFJ620** | SOT363 | 25 | 50 | 24 | 60 | 2 | 6.5 | 10 | | 1.3 | 2.5 |

[1] Asymmetrical

## 3.5.2 MOSFETs

RF MOSFET selection guide on www.nxp.com/rffets Easy-to-use parametric filters help you choose the right RF MOSFET for your design.

### Why choose NXP's MOSFETs:

- Reference designs for TV tuning
- Short lead time
- Broad portfolio
- Smallest packages
- 2-in-1 FETs for tuner applications
- Reliable volume supply
- Best performance MOSFETs for TV tuning




## N-channel, single MOSFETs for switching

| Type | Package | $V_{DS}$ | Characteristics | | | | | | | | | | | | | | MODE |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | $I_D$ | $I_{DSS}$ | | $V_{GS(th)}$ | | $R_{DSON}$ | $C_{rs}$ | | $t_{on}$ | | $t_{off}$ | | $\|S_{21(on)}\|^2$ | $\|S_{21(off)}\|^2$ | |
| | | (V) | (mA) | (mA) | | (V) | | (Ω) | (pF) | | (ns) | | (ns) | | (dB) | (dB) | |
| | | max | max | min | max | min | max | max | min | max | typ | max | typ | max | max | min | |
| BSS83 | SOT143 | 10 | 50 | - | - | 0.1 | 2 | 45 | typ.0.6 | | - | 1 | - | 5 | - | - | enh. |
| Silicon RF Switches | | | | | | | | | | | | | | | | | |
| **BF1107** | SOT23 | 3 | 10 | - | 100 | - | 7 | 20 | - | - | - | - | - | - | 2.5 | 30 | depl. |
| **BF1108** | SOT143B | 3 | 10 | - | 100 | - | 7 | 20 | - | - | - | - | - | - | 3 | 30 | depl. |
| **BF1108R** | SOT143R | 3 | 10 | - | 100 | - | 7 | 20 | - | - | - | - | - | - | 3 | 30 | depl. |
| **BF1108W** | SOT343 | 3 | 10 | - | 100 | - | 7 | 20 | - | - | - | - | - | - | 3 | 30 | depl |
| **BF1108WR** | SOT343R | 3 | 10 | - | 100 | - | 7 | 20 | - | - | - | - | - | - | 3 | 30 | depl |
| **BF1118** | SOT143B | 3 | 10 | - | 100 | - | 7 | 22 | - | - | - | - | - | - | 3 | 30 | depl |
| **BF1118R** | SOT143R | 3 | 10 | - | 100 | - | 7 | 22 | - | - | - | - | - | - | 3 | 30 | depl |
| **BF1118W** | SOT343 | 3 | 10 | - | 100 | - | 7 | 22 | - | - | - | - | - | - | 3 | 30 | depl |
| **BF1118WR** | SOT343R | 3 | 10 | - | 100 | - | 7 | 22 | - | - | - | - | - | - | 3 | 30 | depl |

**Bold** = highly recommended product

## N-channel, dual-gate MOSFETs

| Type | Package | $V_{DS}$ | $I_D$ | Characteristics | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | $I_{DSX}$ | | $V_{GS(th)}$ | | \|Yfs\| | | $C_{is}$ | $C_{os}$ | F @ 800 MHz | VHF | UHF |
| | | (V) | (mA) | (mA) | | (V) | | (mS) | | (pF) | (pF) | (dB) | | |
| | | max | max | min | max | min | max | min | max | typ | typ | typ | | |
| With external bias | | | | | | | | | | | | | | |
| BF908 | SOT143 | 12 | 40 | 3 | 27 | - | -2 | 36 | 50 | 3.1 | 1.7 | 1.5 | X | X |
| BF908R | SOT143R | 12 | 40 | 3 | 27 | - | -2 | 36 | 50 | 3.1 | 1.7 | 1.5 | X | X |
| BF908WR | SOT343R | 12 | 40 | 3 | 27 | - | -2 | 36 | 50 | 3.1 | 1.7 | 1.5 | X | X |
| BF991 | SOT143 | 20 | 20 | 4 | 25 | - | -2.5 | 10 | - | 2.1 | 1.1 | 1 | X | - |
| BF992 | SOT143 | 20 | 40 | - | - | - | -1.3 | 20 | - | 4 | 2 | 1.2[1] | X | - |
| BF994S | SOT143 | 20 | 30 | 4 | 20 | - | -2.5 | 15 | - | 2.5 | 1 | 1[1] | X | - |
| BF996S | SOT143 | 20 | 30 | 4 | 20 | - | -2.5 | 15 | - | 2.3 | 0.8 | 1.8 | - | X |
| BF998 | SOT143 | 12 | 30 | 2 | 18 | - | -2.0 | 21 | - | 2.1 | 1.05 | 1 | X | X |
| BF998R | SOT143R | 12 | 30 | 2 | 18 | - | -2.0 | 21 | - | 2.1 | 1.05 | 1 | X | X |
| BF998WR | SOT343R | 12 | 30 | 2 | 18 | - | -2.5 | 22 | - | 2.1 | 1.05 | 1 | X | X |
| Fully internal bias | | | | | | | | | | | | | | |
| BF1105 | SOT143 | 7 | 30 | 8 | 16 | 0.3 | 1.2 | 25 | - | 2.2[3] | 1.2[2] | 1.7 | X | X |
| BF1105R | SOT143R | 7 | 30 | 8 | 16 | 0.3 | 1.2 | 25 | - | 2.2[3] | 1.2[2] | 1.7 | X | X |
| BF1105WR | SOT343R | 7 | 30 | 8 | 16 | 0.3 | 1.2 | 25 | - | 2.2[3] | 1.2[2] | 1.7 | X | X |
| Partly internal bias | | | | | | | | | | | | | | |
| BF904A | SOT143 | 7 | 30 | 8 | 13 | 0.3 | 1 | 22 | 30 | 2.2 | 1.3 | 2 | X | X |
| BF904AR | SOT143R | 7 | 30 | 8 | 13 | 0.3 | 1 | 22 | 30 | 2.2 | 1.3 | 2 | X | X |
| BF904AWR | SOT343R | 7 | 30 | 8 | 13 | 0.3 | 1 | 22 | 30 | 2.2 | 1.3 | 2 | X | X |
| BF909A | SOT143 | 7 | 40 | 12 | 20 | 0.3 | 1 | 36 | 50 | 3.6 | 2.3 | 2 | X | X |
| BF909AR | SOT143R | 7 | 40 | 12 | 20 | 0.3 | 1 | 36 | 50 | 3.6 | 2.3 | 2 | X | X |
| BF909AWR | SOT343R | 7 | 40 | 12 | 20 | 0.3 | 1 | 36 | 50 | 3.6 | 2.3 | 2 | X | X |
| BF1102(R)[4] | SOT363 | 7 | 40 | 12 | 20 | 0.3 | 1.2 | 36 | - | 2.8[3] | 1.6[2] | 2 | X | X |
| BF1201 | SOT143 | 10 | 30 | 11 | 19 | 0.3 | 1.2 | 23 | 35 | 2.6 | 0.9 | 1.9 | X | X |
| BF1201R | SOT143R | 10 | 30 | 11 | 19 | 0.3 | 1.2 | 23 | 35 | 2.6 | 0.9 | 1.9 | X | X |
| BF1201WR | SOT343R | 10 | 30 | 11 | 19 | 0.3 | 1.2 | 23 | 35 | 2.6 | 0.9 | 1.9 | X | X |
| BF1202 | SOT143 | 10 | 30 | 8 | 16 | 0.3 | 1.2 | 25 | 40 | 1.7 | 0.85 | 1.1 | X | X |
| BF1202R | SOT143R | 10 | 30 | 8 | 16 | 0.3 | 1.2 | 25 | 40 | 1.7 | 0.85 | 1.1 | X | X |
| BF1202WR | SOT343R | 10 | 30 | 8 | 16 | 0.3 | 1.2 | 25 | 40 | 1.7 | 0.85 | 1.1 | X | X |
| BF1203[5] | SOT363 | 10 | 30 | 11 | 19 | 0.3 | 1.2 | 23 | 35 | 2.6 | 0.9 | 1.9 | X | - |
| | | 10 | 30 | 8 | 16 | 0.3 | 1.2 | 25 | 40 | 1.7 | 0.85 | 1.1 | - | X |
| BF1204[4] | SOT363 | 10 | 30 | 8 | 16 | 0.3 | 1.2 | 25 | 40 | 1.7 | 0.85 | 1.1 | X | X |
| BF1206[5] | SOT363 | 6 | 30 | 14 | 23 | 0.3 | 1.0 | 33 | 48 | 2.4 | 1.1 | 1.6 | X | - |
| | | 6 | 30 | 9 | 17 | 0.3 | 1.0 | 29 | 44 | 1.7 | 0.85 | 1.4 | - | X |
| **BF1207**[5][7][8] | SOT363 | 6 | 30 | 13 | 23 | 0.3 | 1.0 | 25 | 40 | 2.2 | 0.9 | 1.4 | X | - |
| | | 6 | 30 | 9 | 19 | 0.3 | 1.0 | 26 | 41 | 1.8 | 0.8 | 1.4 | - | X |
| BF1208[5][6][7] | SOT666 | 6 | 30 | 14 | 24 | 0.3 | 1 | 26 | 41 | 2.2 | 0.9 | 1.4 | X | - |
| | | 6 | 30 | 9 | 17 | 0.3 | 1 | 28 | 43 | 2 | 0.85 | 1.4 | - | X |
| **BF1208D**[5][6][7] | SOT666 | 6 | 30 | 14 | 24 | 0.3 | 1 | 26 | 41 | 2.1 | 0.8 | 1.1 | X | - |
| | | 6 | 30 | 10 | 20 | 0.3 | 1 | 25 | 40 | 2.1 | 0.85 | 1.4 | - | X |
| **BF1210**[5][6] | SOT363 | 6 | 30 | 14 | 24 | 0.3 | 1 | 26 | 41 | 2.2 | 0.9 | 1.4 | X | - |
| | | 6 | 30 | 9 | 17 | 0.3 | 1 | 28 | 43 | 2 | 0.85 | 1.4 | - | X |
| **BF1211** | SOT143 | 6 | 30 | 11 | 19 | 0.3 | 1.0 | 25 | 40 | 2.1 | 0.9 | 1.3 | X | - |
| **BF1211R** | SOT143R | 6 | 30 | 11 | 19 | 0.3 | 1.0 | 25 | 40 | 2.1 | 0.9 | 1.3 | X | - |
| **BF1211WR** | SOT343 | 6 | 30 | 11 | 19 | 0.3 | 1.0 | 25 | 40 | 2.1 | 0.9 | 1.3 | X | - |
| **BF1212** | SOT143 | 6 | 30 | 8 | 16 | 0.3 | 1.0 | 28 | 43 | 1.7 | 0.9 | 1.1 | - | X |
| **BF1212R** | SOT143R | 6 | 30 | 8 | 16 | 0.3 | 1.0 | 28 | 43 | 1.7 | 0.9 | 1.1 | - | X |
| **BF1212WR** | SOT343 | 6 | 30 | 8 | 16 | 0.3 | 1.0 | 28 | 43 | 1.7 | 0.9 | 1.1 | - | X |
| **BF1214**[4] | SOT363 | 6 | 30 | 13 | 23 | 0.3 | 1.0 | 25 | 35 | 2.2 | 0.9 | 1.4 | X | X |
| **BF1218**[5][6][7] | SOT363 | 6 | 30 | 14 | 24 | 0.3 | 1 | 26 | 41 | 2.1 | 0.8 | 1.1 | X | - |
| | | 6 | 30 | 10 | 20 | 0.3 | 1 | 25 | 40 | 2.1 | 0.85 | 1.4 | - | X |

(1) @ 200 MHz
(2) $C_{oss}$
(3) $C_{ig}$
(4) Two equal dual gate MOSFETs in one package
(5) Two low-noise gain amplifiers in one package
(6) Transistor A: fully internal bias, transistor B: partly internal bias
(7) Internal switching function
(8) Transistor A: partly internal bias, transistor B: fully internal bias

## N-channel, dual-gate MOSFETs for set-top boxes

| Type | Package | $V_{DS}$ | $I_D$ | Characteristics | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | $I_{DSX}$ | $V_{(th)gs}$ | | \|Yfs\| | $C_{is}$ | $C_{OS}$ | F @ 800 MHz | X-Mod @ 40 dB gain reduction |
| | | (V) | (mA) | (mA) | (V) | | (mS) | (pF) | (pF) | (dB) | (dB) |
| | | max | max | max | min | max | typ | typ | typ | typ | typ |
| **BF1215** [1][2][3] | SOT363 | 6 | 30 | 19.5 | 0.3 | 1 | 27 | 2.5 | 0.8 | 1.9 | 107 |
| | | | 30 | 23 | 0.3 | 1 | 27 | 2.5 | 0.8 | 1.9 | 107 |
| **BF1216**[1] | SOT363 | 6 | 30 | 19.5 | 0.3 | 1 | 27 | 2.5 | 0.8 | 1.9 | 107 |
| | | | 30 | 23 | 0.3 | 1 | 27 | 2.5 | 0.8 | 1.9 | 107 |
| **BF1217** | SOT343 | | 30 | 23 | 0.3 | 1 | 27 | 2.5 | 0.8 | 1.9 | 107 |

(1) Two low-noise gain amplifiers in one package
(2) Transistor A: fully internal bias, transistor B: partly internal bias
(3) Internal switching function
**Bold** = highly recommended product



# 3.6 RF modules

CATV module selection guide on www.nxp.com/catv
Easy-to-use parametric filters help you choose the right CATV module for your design.

**Why choose NXP's RF modules:**

- Excellent linearity, stability, and reliability
- Rugged construction
- Extremely low noise
- High power gain
- Low total cost of ownership

**CATV types for Chinese (C-types) and 1 GHz GaAs HFET line-ups**

The C-types are specially designed for the Chinese market, customized for two major governmental projects. The GaAs HFET family includes a complete 1 GHz line-up for high-end applications around the world.

C-types (China)

- CATV push-pulls, section 3.6.2: BGY588C, BGE788C, CGY888C
- CATV power doublers, section 3.6.3: BGD712C, CGD982HCi, CGD985HCi, CGD987HCi
- CATV optical receivers, section 3.6.4: BGO807C, BGO807CE

1 GHz GaAs HFET high-end hybrids

- CATV push-pulls, section 3.6.2 : CGY1032, CGY1041, CGY1043, CGY1047, CGY1049
- CATV power doublers, section 3.6.3: CGD1040Hi, CGD1042Hi, CGD1044Hi, CGD1046Hi, CGD1042H, CGD1044H



## 3.6.1 CATV push-pulls

| Type | Frequency range (MHz) [1] | Gain (dB) | Slope (dB) | FL (dB) [2] | $RL_{IN}/RL_{OUT}$ (dB) | CTB (dB) [3] | $X_{mod}$ (dB) [3] | CSO (dB) [3] | @ Ch | @ Vo (dBmV) | NF @ $f_{max}$ (dB) | $I_{tot}$ (mA) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| BGY588C | 40-550 | 33.5 - 35.5 | 0.2 - 1.7 | 0.5 | 16 / 16 | -57 | | -62 | 77 | 44 | 8 | 345 |
| BGY785A | 40-750 | 18 - 19 | 0 - 2 | 0.1 | 20 / 20 | -54.5 | -57.5 | -62 | 110 | 44 | 6 | 225 |
| BGE788C | | 33.2 - 35.2 | 0.3 - 2.3 | 0.6 | 16 / 16 | -49 | | -52 | 110 | 44 | 8 | 325 |
| BGY787 | | 21 - 22 | 0 - 1.5 | 0.2 | 20 / 20 | -54.5 | -54 | -57.5 | 110 | 44 | 5 | 220 |
| BGE787B | | 28.5 - 29.5 | 0.2 - 2.2 | 0.45 | 20 / 20 | -48 | -52 | -56 | 110 | 44 | 6.5 | 340 |
| BGE885 | 40-870 | 16.5 - 17.5 | 0.2 - 1.2 | 0.5 | 14 / 14 | | | | | | 8 | 240 |
| BGX885N | | 16.5 - 17.5 | 0.2 - 1.4 | 0.3 | 20 / 20 | | | | | | 8 | 240 |
| BGY885A | | 18 - 19 | 0 - 2 | 0.2 | 20 / 20 | -65 | -65 | -67 | 49 | 44 | 6 | 225 |
| BGY887 | | 21 - 22 | 0.2 - 2 | 0.2 | 20 / 20 | -64.5 | -64.5 | -67.5 | 49 | 44 | 5 | 220 |
| CGY888C | | 34.5 - 36.5 | 1.5 | 0.25 | 20 / 20 | -65 | -72 | -63 | 112 | 44 | 4 | 280 |
| BGY835C | | 33.5 - 34.5 | 0.5 - 2.5 | 0.5 | 20 / 20 | -60 | | -55 | 49 | 44 | 7 | 340 |
| BGY887B | | 28.5 - 29.5 | 0.5 - 2.5 | 0.5 | 20 / 20 | -60 | -60 | -60 | 49 | 44 | 6.5 | 340 |
| BGY888 | | 33.5 - 34.5 | 0.5 - 2.5 | 0.2 | 20 / 20 | -63.5 | -63 | -64 | 49 | 44 | 5.5 | 325 |

## 3.6.2 CATV push-pulls 1 GHz

| Type | Frequency range (MHz) [1] | Gain (dB) | Slope (dB) | FL (dB) [1] | $RL_{IN}/RL_{OUT}$ (dB) | CTB (dB) [3] | $X_{mod}$ (dB) [3] | CSO (dB) [3] | @ Ch | @ Vo (dBmV) | NF @ $f_{max}$ (dB) | $I_{tot}$ (mA) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **CGY1041** | 40 - 1003 | 21 - 22.5 | 1.2 - 2.7 | 0.9 | 20 / 18 | -62 | -58 | -64 | 79 NTSC channels + 75 digital channels | 44 | 4.3 | 265 |
| **CGY1043** | | 23 - 24.5 | 1.2 - 2.7 | 0.9 | 20 / 18 | -62 | -58 | -64 | 79 NTSC channels + 75 digital channels | 44 | 4.2 | 265 |
| **CGY1047** | | 27 - 28.5 | 1.5 - 2.5 | 0.8 | 20 / 18 | -64 | -60 | -66 | 79 NTSC channels + 75 digital channels | 44 | 4.5 | 250 |
| **CGY1049** | | 29 - 31 | 0.85 - 2.35 | 0.85 | 20 / 18 | -62 | -58 | -64 | 79 NTSC channels + 75 digital channels | 44 | 4.5 | 265 |
| **CGY1032** | | 32 - 34 | 1.05 - 2.55 | 0.85 | 20 / 18 | -62 | -58 | -64 | 79 NTSC channels + 75 digital channels | 44 | 4.4 | 265 |
| BGY1085A | | 18 - 19 | 0 - 2 | 0.3 | 20 / 20 | -53 | -54 | -56 | 150 | 40 | 7.5 | 240 |

**Bold** = highly recommended product

## 3.6.3 CATV power doublers

| Type | Frequency range (MHz) [1] | Gain (dB) | Slope (dB) | FL (dB) [1] | $RL_{IN}/RL_{OUT}$ (dB) | CTB (dB) [3] | $X_{mod}$ (dB) [3] | CSO (dB) [3] | @ Ch | @ Vo (dBmV) | NF @ $f_{max}$ (dB) | $I_{tot}$ (mA) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| BGD712 | 40 - 750 | 18.2 - 18.8 | 0.5 - 1.5 | 0.35 | 17 / 17 | -62 | -63 | -63 | 112 | 44 | 7 | 395 |
| BGD712C | | 18.2 - 18.8 | 0.5 - 1.5 | 0.35 | 17 / 17 | -62 | | -63 | 112 | 44 | 7 | 410 |
| BGD714 | | 20 - 20.6 | 0.5 - 1.5 | 0.35 | 23 / 23 | -61 | -62 | -62 | 112 | 44 | 7 | 395 |
| BGD812 | 40 - 870 | 18.2 - 18.8 | 0.4 - 1.4 | 0.5 | 25 / 23 | -57 | -62 | -58 | 132 | 44 | 7.5 | 395 |
| BGD814 | | 19.7 - 20.3 | 0.5 - 1.5 | 0.5 | 25 / 24 | -56 | -61 | -57 | 132 | 44 | 7.5 | 395 |
| BGD816L | | 21.2 - 21.8 | 0.5 - 1.5 | 0.5 | 22 / 25 | -55 | -58 | -56 | 132 | 44 | 7.5 | 360 |
| CGD942C | | 22 - 24 | 1 - 2 | 0.5 | 20 / 20 | -66 | -66 | -66 | 98 | 48 | 3.5 | 450 |
| CGD944C | | 24 - 26 | 1 - 2 | 0.5 | 20 / 20 | -66 | -66 | -66 | 98 | 48 | 3.5 | 450 |
| **CGD1040HI** | 40 - 1003 | 19.5 - 22 | 0.5 - 2 | 1 | 20 / 20 | -70 | -66 | -76 | 79 | 58.4 | 5.5 | 440 |
| **CGD1042HI** | | 22 - 23.5 | 0.5 - 2 | 1 | 20 / 20 | -70 | -65 | -75 | 79 | 58.4 | 5.5 | 440 |
| **CGD1044HI** | | 23.5 - 25.5 | 0.5 - 2 | 1 | 20 / 20 | -70 | -64 | -75 | 79 | 58.4 | 5 | 440 |
| **CGD1046HI** | | 26.5 - 28 | 0.7 - 2.2 | 1 | 20 / 20 | -75 | -68 | -70 | 79 | 56.4 | 5 | 450 |
| CGD1042H | | 22 - 24 | 1.5 | 0.5 | 20 / 21 | -75 | -67 | -76 | 79 | 59 | 5 | 450 |
| CGD1044H | | 24 - 26 | 1 | 0.5 | 20 / 21 | -75 | -67 | -76 | 79 | 59 | 5 | 450 |
| **CGD982HCI** | | 22 - 24 | 0.5 - 2 | 1 | 20 / 20 | -66 | -68 | -69 | 98 | 48 | 5.5 | 440 |
| **CGD985HCI** | | 23.5 - 25.5 | 0.5 - 2 | 1 | 20 / 20 | -66 | -68 | -69 | 98 | 48 | 5 | 440 |
| **CGD987HCI** | | 26 - 28 | 0.7 - 2 | 1 | 20 / 20 | -66 | -68 | -66 | 98 | 48 | 5 | 440 |

## 3.6.4 CATV optical receivers

| Type | Frequency range (MHz) [1] | S (V/W) [4] | Slope (dB) | FL (dB) [1] | $RL_{OUT}$ (dB) | IMD3 (dB) [3] | IMD2 (dB) [3] | @ $f_{measured}$ (MHz) | @ $P_{i(opt)}$ (mW) | NF @ $f_{max}$ (dB) | $I_{tot}$ (mA) | Connectors |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| BGO807C | 40 - 870 | 750 | 0 - 2 | 1 | 11 | -71 | -55 | 854.5 | 1 | 8.5 | 205 | FC and SC |
| **BGO807CE** | | 750 | 0 - 2 | 1 | 11 | -69 | -53 | 854.5 | 1 | 8.5 | 205 | FC and SC |

## 3.6.5 CATV reverse hybrids

| Type | Frequency range (MHz) [1] | Gain (dB) | Slope (dB) | FL (dB) [1] | $RL_{IN}/RL_{OUT}$ (dB) | CTB (dB) [3] | $X_{mod}$ (dB) [3] | CSO (dB) [3] | @ Ch | @ Vo (dBmV) | NF @ $f_{max}$ (dB) | $I_{tot}$ (mA) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| BGY68 | 5 - 75 | 29.2 - 30.8 | -0.2 - 0.5 | 0.2 | 20 / 20 | -68 | -60 | | 4 | 50 | 3.5 | 135 |
| BGY66B | 5 - 120 | 24.5 - 25.5 | -0.2 - 0.5 | 0.2 | 20 / 20 | -66 | -54 | | 14 | 48 | 5 | 135 |
| BGY67 | 5 - 200 | 21.5 - 22.5 | -0.2 - 0.5 | 0.2 | 20 / 20 | -67 | -60 | | 22 | 50 | 5.5 | 215 |
| BGY67A | | 23.5 - 24.5 | -0.2 - 0.5 | 0.2 | 20 / 20 | -67 | -59 | | 22 | 50 | 5.5 | 215 |
| BGR269 | | 34.5 - 35.5 | -0.2 - 0.6 | 0.5 | 20 / 20 | -57 | -50 | -66 | 28 | 50 | 5.5 | 160 |

**Bold** = highly recommended product

[1] Frequency range: minimum and maximum frequency in MHz at which data are characterized (@ Ch / @ Vo)

[2] FL is flatness of frequency response

[3] The number of channels and the output voltage at which CTB, $X_{mod}$, CSO, IMD2, and IMD3 are characterized, are @ $f_{max}$

[4] S is minimum responsivity of optical receivers

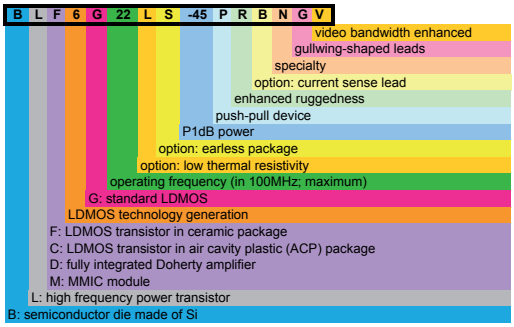


# 3.7 RF power transistors

**NEW:** RF power transistor selection guide on www.nxp.com/rfpower
Easy-to-use parametric filters help you choose the right RF power transistor for your design.

## 3.7.1 RF power transistors for base stations

### Device naming conventions RF power transistors for base stations




### Why choose NXP's RF power transistors for base stations:

- Leading technology (generations 6, 7, and 8 of LDMOS)
- Highest efficiency
- Best ruggedness
- Advanced Doherty amplifier designs
- Very broad band (video bandwidth enhanced) devices
- Industry's first 3.8 GHz Doherty
- Industry's first three-way, 900 MHz Doherty
- Industry's first 50 V, 600 W, single-package Doherty

NXP offers complete line-ups of RF power transistors operating from 800 MHz right up to 3.8 GHz for base stations, covering all cellular technologies [MC-GSM/EDGE, TDMA, (TD-S)CDMA, W-CDMA/UMTS, LTE] and WiMAX infrastructures.

#### 3.7.1.1 0.7 - 1.0 GHz line-up

| | | | | | | Test signal performance | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Type | Product | $f_{min}$ (MHz) | $f_{max}$ (MHz) | P1dB (W) | Matching | VDS (V) | $P_L$ (W) | BO (dB) | $\eta_D$ (%) | $G_p$ (dB) | Test signal | Package |
| BLP7G22-10* | Driver | 700 | 2200 | 10 | - | 28 | 2 | 7.0 | 26 | 17 | 2-c WCDMA | SOT1179 |
| BLM6G10-30(G) | MMIC | 920 | 960 | 30 | I/O | 28 | 2 | 11.8 | 11.5 | 29 | 2-c WCDMA | SOT822 |
| BLF6G10L-40BRN | Driver/final | 700 | 1000 | 40 | I | 28 | 2.5 | 12.0 | 15 | 23 | 2-c WCDMA | SOT1112A |
| BLF6G10(S)-45 | | 700 | 1000 | 45 | I | 28 | 1 | 16.5 | 8 | 23 | 2-c WCDMA | SOT608 |
| **BLP7G07S-140P(G)*** | Final | 700 | 900 | 140 | O | 28 | 35 | 6.0 | 28 | 19 | 2-c WCDMA | SOT1224 |
| **BLF8G10L(S)-300P*** | | 850 | 960 | 300 | I/O | 28 | 60 | 7.0 | 30 | 19 | 2-c WCDMA | SOT539 |
| BLF8G10L(S)-160 | | 920 | 960 | 160 | I/O | 30 | 35 | 6.6 | 29 | 19.7 | 2-c WCDMA | SOT502 |
| BLF7G10L(S)-250 | | 920 | 960 | 250 | I/O | 30 | 60 | 6.2 | 30.5 | 19.5 | 2-c WCDMA | SOT502 |
| BLF6G10(LS)-200RN | | 688 | 1000 | 200 | I | 28 | 40 | 7.0 | 28.5 | 20 | 2-c WCDMA | SOT502 |
| BLF6G10(LS)-135RN | | 700 | 1000 | 135 | I | 28 | 26.5 | 7.1 | 28 | 21 | 2-c WCDMA | SOT502 |
| **BLF6H10L(S)-160** | | 700 | 1000 | 160 | - | 50 | 45 | 5.5 | 30 | 20 | 2-c WCDMA | SOT467 |
| BLF6G10(LS)-160RN | | 700 | 1000 | 160 | I | 32 | 32 | 7.0 | 27 | 22.5 | 2-c WCDMA | SOT502 |
| **BLF8G10L(S)-160V*** | | 700 | 1000 | 160 | I/O | 30 | 35 | 6.6 | 28 | 30 | 2-c WCDMA | SOT1244 |
| **BLF8G10LS-200GV*** | | 700 | 1000 | 200 | I/O | 28 | 45 | 6.5 | 28 | 19.3 | 2-c WCDMA | SOT1244C |
| BLF6G10L(S)-260PRN | | 700 | 1000 | 260 | I | 28 | 40 | 8.1 | 26.5 | 22 | 2-c WCDMA | SOT539 |
| **BLF8G10LS-270GV*** | | 700 | 1000 | 270 | I/O | 28 | 56 | 6.8 | 28 | 19.6 | 2-c WCDMA | SOT1244C |
| **BLF8G10LS-400PGV*** | | 700 | 1000 | 400 | I/O | 28 | 79 | 7.0 | 27 | 19.4 | 2-c WCDMA | SOT1242C |
| **BLP7G09S-140P(G)*** | | 900 | 1000 | 140 | O | 28 | 35 | 6.0 | 28 | 19 | 2-c WCDMA | SOT1224 |

**Bold red** = new, highly recommended product

* Check status in section 3.1, as this type is not yet released for mass production

### 3.7.1.2 1.4 - 1.7 GHz line-up

| | | | | | | Test signal performance | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Type | Product | $f_{min}$ (MHz) | $f_{max}$ (MHz) | P1dB (W) | Matching | VDS (V) | $P_L$ (W) | BO (dB) | $\eta_D$ (%) | $G_p$ (dB) | Test signal | Package |
| BLF6G21-10G | Driver | 1 | 2200 | 10 | - | 28 | 0.7 | 11.5 | 15 | 18.5 | 2-c WCDMA | SOT538A |
| BLP7G22-10 | | 700 | 2200 | 10 | - | 28 | 2 | 7.0 | 26 | 17 | 2-c WCDMA | SOT1179 |
| BLF6G15L-40BRN | Driver/final | 1450 | 1550 | 40 | I/O | 28 | 2.5 | 12.0 | 13 | 22 | 2-c WCDMA | SOT1112A |
| **BLF6G15L(S)-40RN*** | | 1450 | 1550 | 40 | I/O | 28 | 2.5 | 12.0 | 13 | 21.5 | 2-c WCDMA | SOT1135 |
| BLF7G15LS-200 | Final | 1450 | 1550 | 200 | I/O | 28 | 50 | 6.0 | 29 | 19.5 | 2-c WCDMA | SOT502B |
| BLF6G15L-250PBRN | | 1450 | 1550 | 250 | I/O | 28 | 60 | 6.2 | 33 | 18.5 | 2-c WCDMA | SOT1110A |
| BLF7G15LS-300P | | 1450 | 1550 | 300 | I/O | 28 | 85 | 5.5 | 31 | 18 | 2-c WCDMA | SOT539B |

### 3.7.1.3 1.8 - 2.0 GHz line-up

| | | | | | | Test signal performance | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Type | Product | $f_{min}$ (MHz) | $f_{max}$ (MHz) | P1dB (W) | Matching | VDS (V) | $P_L$ (W) | BO (dB) | $\eta_D$ (%) | $G_p$ (dB) | Test signal | Package |
| BLF6G21-10G | Driver | 1 | 2200 | 10 | - | 28 | 0.7 | 11.5 | 15 | 18.5 | 2-c WCDMA | SOT538A |
| BLP7G22-10 | | 700 | 2200 | 10 | - | 28 | 2 | 7.0 | 26 | 17 | 2-c WCDMA | SOT1179 |
| BLF6G20(S)-45 | Driver/final | 1800 | 2000 | 45 | I/O | 28 | 2.5 | 12.6 | 14 | 19.2 | 2-c WCDMA | SOT608 |
| BLF7G20L(S)-90P | Final | 1427 | 2170 | 90 | I/O | 28 | 40 | 3.5 | 41 | 19.5 | GSM EDGE | SOT1121 |
| BLF6G20(LS)-75 | | 1800 | 2000 | 75 | I/O | 28 | 29.5 | 4.1 | 37.5 | 19 | GSM EDGE | SOT502 |
| BLF6G20(LS)-110 | | 1800 | 2000 | 110 | I/O | 28 | 25 | 6.4 | 32 | 19 | 2-c WCDMA | SOT502 |
| BLF6G20LS-140 | | 1800 | 2000 | 140 | I/O | 28 | 35.5 | 6.0 | 30 | 16.5 | 2-c WCDMA | SOT502B |
| BLF7G20LS-140P | | 1800 | 2000 | 140 | I/O | 28 | 60 | 3.7 | 41 | 17.5 | GSM EDGE | SOT1121B |
| BLF6G20(LS)-180RN | | 1800 | 2000 | 180 | I/O | 30 | 40 | 6.5 | 27 | 17.2 | 2-c WCDMA | SOT502 |
| **BLF8G20L(S)-200V*** | | 1800 | 2000 | 200 | I/O | 28 | 55 | 5.6 | 33 | 17.5 | 2-c WCDMA | SOT1120 |
| BLF6G20S-230PRN | | 1800 | 2000 | 230 | I/O | 28 | 65 | 5.5 | 32 | 17.5 | 2-c WCDMA | SOT539B |
| **BLF7G20LS-260A*** | | 1800 | 1900 | 260 | I/O | 28 | 50 | 7.2 | 44 | 15.5 | 2-c WCDMA | SOT539B |
| **BLF8G20LS-270GV*** | | 1800 | 2000 | 270 | I/O | 28 | 50 | 7.3 | 25 | 17.8 | 2-c WCDMA | SOT1244C |
| **BLF8G20LS-270PGV*** | | 1800 | 2000 | 270 | I/O | 28 | 56 | 6.8 | 28 | 19.4 | 2-c WCDMA | SOT1242C |
| BLF7G20L(S)-200 | | 1805 | 1990 | 200 | I/O | 28 | 55 | 5.6 | 33 | 18 | 2-c WCDMA | SOT502 |
| BLF7G20L(S)-250P | | 1805 | 1880 | 250 | I/O | 28 | 70 | 5.5 | 35 | 18 | 2-c WCDMA | SOT539 |
| BLD6G21L(S)-50 | Integrated Doherty | 2010 | 2025 | 50 | O | 28 | 8 | 8.0 | 43 | 14.5 | TD-SCDMA | SOT1130 |

### 3.7.1.4 2.0 - 2.2 GHz line-up

| | | | | | | Test signal performance | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Type | Product | $f_{min}$ (MHz) | $f_{max}$ (MHz) | P1dB (W) | Matching | VDS (V) | $P_L$ (W) | BO (dB) | $\eta_D$ (%) | $G_p$ (dB) | Test signal | Package |
| BLF6G21-10G | Driver | 1 | 2200 | 10 | - | 28 | 0.7 | 11.5 | 15 | 18.5 | 2-c WCDMA | SOT538A |
| **BLP7G22-10*** | | 700 | 2200 | 10 | - | 28 | 2 | 7.0 | 26 | 17 | 2-c WCDMA | SOT1179 |
| BLF3G21-6 | | 1800 | 2200 | 6 | - | 26 | 6 | 0.0 | 39 | 15.5 | CW | SOT538A |
| BLF3G21-30 | | 1800 | 2200 | 30 | - | 26 | 30 | 0.0 | 35 | 13.5 | CW | SOT467C |
| BLF6G22L(S)-40P | Driver/final | 2110 | 2170 | 40 | I/O | 28 | 13.5 | 4.7 | 30 | 19 | 2-c WCDMA | SOT1121 |
| BLF6G22L-40BN | | 2000 | 2200 | 40 | I/O | 28 | 2.5 | 12.0 | 16 | 19 | 2-c WCDMA | SOT1112A |
| BLF6G22(S)-45 | | 2000 | 2200 | 45 | I/O | 28 | 2.5 | 12.6 | 13 | 18.5 | 2-c WCDMA | SOT608 |
| BLM6G22-30(G) | MMIC | 2100 | 2200 | 30 | I/O | 28 | 2 | 11.8 | 9 | 29.5 | 2-c WCDMA | SOT822 |
| **BLM7G22S-60PB(G)*** | | 2000 | 2200 | 60 | I/O | 28 | 3.2 | 12.7 | 10 | 30 | 2-c WCDMA | SOT1212 |
| BLF7G21LS-160 | Final | 1800 | 2050 | 160 | I/O | 28 | 45 | 5.5 | 34 | 18 | 2-c WCDMA | SOT1121B |
| BLF7G21L(S)-160P | | 1800 | 2050 | 160 | I/O | 28 | 45 | 5.5 | 34 | 18 | 2-c WCDMA | SOT1121 |
| BLF6G22LS-75 | | 2000 | 2200 | 75 | I/O | 28 | 17 | 6.4 | 30.5 | 18.7 | 2-c WCDMA | SOT502B |
| BLF6G22LS-100 | | 2000 | 2200 | 100 | I/O | 28 | 25 | 6.0 | 29 | 18.5 | 2-c WCDMA | SOT502B |
| BLF7G22L(S)-100P | | 2000 | 2200 | 100 | I/O | 28 | 20 | 7.0 | 28.5 | 19.1 | 2-c WCDMA | SOT1121B |
| BLF6G22LS-130 | | 2000 | 2200 | 130 | I/O | 28 | 30 | 6.4 | 28.5 | 17 | 2-c WCDMA | SOT502B |
| BLF7G22L(S)-130 | | 2000 | 2200 | 130 | I/O | 28 | 30 | 6.4 | 32 | 18.5 | 2-c WCDMA | SOT502 |
| BLF7G22L(S)-160 | | 2000 | 2200 | 160 | I/O | 28 | 43 | 5.7 | 30 | 18 | 2-c WCDMA | SOT502B |
| **BLF8G22LS-160BV*** | | 2000 | 2200 | 160 | I/O | 32 | 55 | 4.6 | 30 | 18.5 | 2-c WCDMA | SOT1120B |
| BLF6G22(LS)-180PN | | 2000 | 2200 | 180 | I/O | 32 | 50 | 5.6 | 27.5 | 17.5 | 2-c WCDMA | SOT539 |
| BLF6G22(LS)-180RN | | 2000 | 2200 | 180 | I/O | 30 | 40 | 6.5 | 25 | 16 | 2-c WCDMA | SOT502 |
| **BLF8G22LS-200GV*** | | 2000 | 2200 | 200 | I/O | 28 | 48 | 6.2 | 28 | 20.2 | 2-c WCDMA | SOT1244C |
| **BLF8G22LS-270GV*** | | 2000 | 2200 | 270 | I/O | 28 | 50 | 7.3 | 26 | 17.8 | 2-c WCDMA | SOT1244C |
| **BLF8G22LS-400PGV*** | | 2000 | 2200 | 400 | I/O | 28 | 50 | 9.0 | 26 | 18 | 2-c WCDMA | SOT1242C |
| BLF7G22L(S)-200 | | 2110 | 2170 | 200 | I/O | 28 | 55 | 5.6 | 31 | 18.5 | 2-c WCDMA | SOT502 |
| BLF7G22L(S)-250P | | 2110 | 2170 | 250 | I/O | 28 | 70 | 5.5 | 31 | 18.5 | 2-c WCDMA | SOT539 |
| BLD6G22L(S)-50 | Integrated Doherty | 2110 | 2170 | 50 | I/O | 28 | 8 | 8.0 | 40 | 14 | TD-SCDMA | SOT1130 |

### 3.7.1.5 2.3 - 2.4 GHz line-up

| | | | | | | Test signal performance | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Type | Product | $f_{min}$ (MHz) | $f_{max}$ (MHz) | P1dB (W) | Matching | VDS (V) | $P_L$ (W) | BO (dB) | $\eta_D$ (%) | $G_p$ (dB) | Test signal | Package |
| BLF6G27-10(G) | Driver | 2300 | 2700 | 10 | I | 28 | 2 | 7.0 | 20 | 19 | N-CDMA/IS95 | SOT975 |
| BLF7G24L(S)-100 | Final | 2300 | 2400 | 100 | I/O | 28 | 20 | 7.0 | 27 | 18 | N-CDMA/IS95 | SOT502 |
| BLF7G24L(S)-140 | | 2300 | 2400 | 140 | I/O | 28 | 30 | 6.7 | 26.5 | 18.5 | N-CDMA/IS95 | SOT502 |
| BLF7G24L(S)-160P* | | 2300 | 2400 | 160 | I/O | 28 | 30 | 7.3 | 27.5 | 18.5 | N-CDMA/IS95 | SOT539 |
| BLF8G24L(S)-200P* | | 2300 | 2400 | 200 | I/O | 28 | 60 | 5.2 | 30 | 16.5 | 1-c WCDMA | SOT539 |

**Bold red** = new, highly recommended product

* Check status in section 3.1, as this type is not yet released for mass production

### 3.7.1.6 2.5 - 2.7 GHz line-up

| | | | | | | Test signal performance | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Type | Product | $f_{min}$ (MHz) | $f_{max}$ (MHz) | P1dB (W) | Matching | VDS (V) | $P_L$ (W) | BO (dB) | $\eta_D$ (%) | $G_p$ (dB) | Test signal | Package |
| BLF6G27-10(G) | Driver | 2300 | 2700 | 10 | I | 28 | 2 | 7.0 | 20 | 19 | N-CDMA/IS95 | SOT975 |
| BLF6G27L(S)-40P | Driver/final | 2500 | 2700 | 40 | I/O | 28 | 20 | 3.0 | 37 | 17.5 | 1-c WCDMA | SOT1121 |
| BLF6G27(S)-45 | | 2500 | 2700 | 45 | I/O | 28 | 7 | 8.1 | 24 | 18 | N-CDMA/IS95 | SOT608 |
| BLF6G27L(S)-50BN | | 2500 | 2700 | 50 | I/O | 28 | 3 | 12.2 | 14.5 | 16.5 | 2-c WCDMA | SOT1112 |
| BLF7G27L(S)-75P | Final | 2300 | 2700 | 75 | I/O | 28 | 12 | 8.0 | 26 | 17 | N-CDMA/IS95 | SOT1121 |
| BLF6G27(LS)-75 | | 2500 | 2700 | 75 | I/O | 28 | 9 | 9.2 | 23 | 17 | N-CDMA/IS95 | SOT502 |
| BLF7G27L(S)-90P | | 2500 | 2700 | 90 | I/O | 28 | 16 | 7.5 | 29 | 18.5 | N-CDMA/IS95 | SOT1121 |
| **BLF7G27LS-90PG*** | | 2500 | 2700 | 90 | I/O | 28 | 16 | 7.5 | 27.5 | 17.5 | N-CDMA/IS95 | SOT1121C |
| BLF6G27(LS)-100 | | 2500 | 2700 | 100 | I/O | 28 | 14 | 8.5 | 23 | 17 | 1-c WCDMA | SOT502 |
| BLF7G27L(S)-100 | | 2500 | 2700 | 100 | I/O | 28 | 25 | 6.0 | 28 | 18 | N-CDMA/IS95 | SOT502 |
| BLF6G27(LS)-135 | | 2500 | 2700 | 135 | I/O | 32 | 20 | 8.3 | 22.5 | 16 | N-CDMA/IS95 | SOT502 |
| BLF7G27L(S)-140 | | 2500 | 2700 | 140 | I/O | 28 | 30 | 6.7 | 22 | 16.5 | N-CDMA/IS95 | SOT502 |
| BLF8G27LS-140 | | 2500 | 2700 | 140 | I/O | 28 | 50 | 4.5 | 31 | 18 | 2-c WCDMA | SOT502B |
| **BLF8G27LS-140G*** | | 2500 | 2700 | 140 | I/O | 28 | 50 | 4.5 | 31 | 18 | 2-c WCDMA | SOT502E |
| BLF7G27L(S)-150P | | 2500 | 2700 | 150 | I/O | 28 | 30 | 7.0 | 26 | 16.5 | N-CDMA/IS95 | SOT539 |
| **BLF8G27LS-200PGV*** | | 2500 | 2700 | 200 | I/O | 28 | 32 | 8.0 | 23 | 17 | 2-c WCDMA | SOT1242C |
| **BLF8G27LS-280PGV*** | | 2500 | 2700 | 280 | I/O | 28 | 50 | 7.5 | 21 | 16.4 | 2-c WCDMA | SOT1242C |
| **BLF8G27LS-140V*** | | 2600 | 2700 | 140 | I/O | 32 | 45 | 4.9 | 30 | 16.5 | 2-c WCDMA | SOT1244B |
| BLF7G27L-200PB | | 2600 | 2700 | 200 | I/O | 32 | 65 | 4.9 | 29 | 16.5 | 2-c WCDMA | SOT1110A |

### 3.7.1.7 3.5 - 3.8 GHz line-up

| | | | | | | Test signal performance | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Type | Product | $f_{min}$ (MHz) | $f_{max}$ (MHz) | P1dB (W) | Matching | VDS (V) | $P_L$ (W) | BO (dB) | $\eta_D$ (%) | $G_p$ (dB) | Test signal | Package |
| BLF6G38-10(G) | Driver | 3400 | 3600 | 10 | I/O | 28 | 2 | 7.0 | 20 | 14 | N-CDMA/IS95 | SOT975 |
| BLF6G38(S)-25 | | 3400 | 3800 | 25 | I/O | 28 | 4.5 | 7.4 | 24 | 15 | N-CDMA/IS95 | SOT608 |
| BLF6G38(LS)-50 | Driver/final | 3400 | 3800 | 50 | I/O | 28 | 9 | 7.4 | 23 | 14 | N-CDMA/IS95 | SOT502 |
| BLF6G38(LS)-100 | Final | 3400 | 3600 | 100 | I/O | 28 | 18.5 | 7.3 | 21.5 | 13 | N-CDMA/IS95 | SOT502 |

### 3.7.1.8 Power LDMOS Doherty designs

| Freq band (MHz) | PPEAK (dBm) | POUT-AVG (dBm) | VDS (V) | Gain (dB) | Drain efficiency (%) | Type | Main transistor | Peak transistor |
|---|---|---|---|---|---|---|---|---|
| **728-821 MHz** | | | | | | | | |
| 790-821 | 55.5 | 47 | 28 | 19 | 42 | SYM | 1/2 BLF6G10L(S)-260PRN | 1/2 BLF6G10L(S)-260PRN |
| 790-821 | 57.2 | 49.5 | 32 | 20 | 42 | SYM | BLF6G10LS-200RN | BLF6G10LS-200RN |
| 728-768 | 58 | 50 | 32 | 20.5 | 47 | SYM | BLF6G10LS-200RN | BLF6G10LS-200RN |
| **869-960 MHz** | | | | | | | | |
| 920-960 | 46 | 38 | 28 | 24 | 51 | SYM | BLF6G21-10G | BLF6G21-10G |
| 869-894 | 52 | 44 | 28 | 20 | 48 | SYM | BLF6G10S-45 | BLF6G10S-45 |
| 869-894 | 52.7 | 44.5 | 28 | 15 | 50 | 3-WAY | BLF6G10S-45 | 2x BLF6G10S-45 |
| 920-960 | 54.7 | 47.5 | 28 | 17.3 | 48 | SYM | BLF6G10LS-135RN | BLF6G10LS-135RN |
| 920-960 | 55.1 | 47.1 | 28 | 20.5 | 44 | SYM | 1/2 BLF6G10L(S)-260PRN | 1/2 BLF6G10L(S)-260PRN |
| 920-960 | 56.2 | 48 | 28 | 18.5 | 40 | SYM | BLF6G10LS-135RN | BLF6G10LS-135RN |
| 920-960 | 56.6 | 50 | 30 | 18.8 | 44.5 | SYM | BLF6G10LS-200RN | BLF6G10LS-200RN |
| 920-960 | 57 | 49.2 | 28 | 15.8 | 48 | SYM | BLF7G10LS-250 | BLF7G10LS-250 |
| 920-960 | 57.1 | 49 | 30 | 16.1 | 46.7 | ASYM | BLF8G10LS-160 | BLF7G10LS-250 |
| 920-960 | 57.1 | 49 | 28 | 15 | 48 | 3-WAY | BLF8G10LS-160 | 2x BLF8G10LS-160 |
| 869-894 | 57.2 | 49.3 | 28 | 16.5 | 49.5 | SYM | BLF7G10LS-250 | BLF7G10LS-250 |
| 920-960 | 57.3 | 49.3 | 30 | 16 | 50 | ASYM | BLF8G10LS-160 | BLF7G10LS-250 |
| 869-894 | 57.5 | 50.8 | 30 | 18 | 48.8 | ASYM | BLF6G10LS-200RN | BLF7G10LS-250 |
| 925-960 | 57.7 | 49.7 | 28 | 20.5 | 40 | SYM / MPPM | BLF6G10L(S)-260PRN | BLF6G10L(S)-260PRN |
| 869-894 | 57.9 | 52 | 28 | 18.2 | 50.1 | SYM / MMPP | BLF6G10LS-260PRN | BLF6G10LS-260PRN |
| 869-894 | 58 | 50 | 32 | 20.5 | 46 | SYM | BLF6G10-200RN | BLF6G10-200RN |
| 869-894 | 58.9 | 52 | 28 | 16.1 | 49.1 | ASYM | BLF6G10LS-200RN | 2x BLF7G10LS-250 |
| 925-960 | 58.9 | 50.9 | 32 | 22 | 47 | SYM / MMPP | BLF6G10L(S)-260PRN | BLF6G10L(S)-260PRN |
| 869-894 | 59.2 | 50.4 | 28 | 16 | 52 | 3-WAY | BLF7G10LS-250 | 2x BLF7G10LS-250 |
| **1476-1555 MHz** | | | | | | | | |
| 1526-1555 | 56.6 | 48.6 | 28 | 18.4 | 42 | SYM | BLF7G15LS-200 | BLF7G15LS-200 |
| 1476-1511 | 58.1 | 49.6 | 28 | 16 | 42 | ASYM | BLF7G15LS-200 | BLF7G15LS-300P |
| 1476-1511 | 58.6 | 50.6 | 32 | 16.5 | 42 | SYM | BLF6G15LS-250PBRN | BLF6G15LS-250PBRN |
| **1805-1880 MHz (DCS)** | | | | | | | | |
| 1805-1880 | 48 | 40 | 28 | 15.4 | 42.4 | SYM | 1/2 BLF6G22LS-40P | 1/2 BLF6G22LS-40P |
| 1805-1880 | 50 | 42.8 | 28 | 15.8 | 48 | SYM | 1/2 BLF7G20LS-90P | 1/2 BLF7G20LS-90P |
| 1805-1880 | 52.5 | 44.5 | 28 | 16 | 44 | SYM | 1/2 BLF7G21LS-160P | 1/2 BLF7G21LS-160P |
| 1845-1880 | 52.6 | 45 | 28 | 14.5 | 46.5 | SYM | 1/2 BLF7G21LS-160P | 1/2 BLF7G21LS-160P |
| 1805-1880 | 54 | 47 | 28 | 16 | 49 | SYM | BLF6G20LS-110 | BLF6G20LS-110 |
| 1805-1880 | 55 | 49 | 28 | 15.5 | 47 | SYM | BLF7G21LS-160P | BLF7G21LS-160P |
| 1805-1880 | 55.4 | 47.5 | 31 | 16.3 | 49 | ASYM | BLF7G20LS-90P | BLF7G21LS-160P |
| 1805-1880 | 55.5 | 47 | 28 | 16 | 41 | SYM | 1/2 BLF7G20L(S)-250P | 1/2 BLF7G20L(S)-250P |
| 1805-1880 | 56.1 | 48.1 | 30 | 15.2 | 48 | ASYM | BLF7G20LS-90P | BLF7G20LS-200 |
| 1805-1880 | 56.5 | 49 | 28 | 32 | 45.5 | ASYM | BLF6G21-10G | BLF7G20LS-200 |

**Bold red** = new, highly recommended product

* Check status in section 3.1, as this type is not yet released for mass production

| Freq band (MHz) | PPEAK (dBm) | POUT-AVG (dBm) | VDS (V) | Gain (dB) | Drain efficiency (%) | Type | Main transistor | Peak transistor |
|---|---|---|---|---|---|---|---|---|
| 1805-1880 | 57.1 | 49 | 28 | 14.3 | 45.1 | 3-WAY | BLF7G21LS-160P | 2x BLF7G21LS-160P |
| 1805-1880 | 57.5 | 49.5 | 30 | 16 | 42 | SYM | BLF7G20LS-200 | BLF7G20LS-200 |
| 1805-1880 | 57.5 | 50.5 | 28 | 14 | 48 | ASYM | BLF7G20LS-200 | BLF7G20LS-250P |
| 1805-1880 | 57.8 | 50.4 | 30 | 16 | 41.5 | SYM | BLF7G20LS-250P | BLF7G20LS-250P |
| 1805-1880 | 57.9 | 50 | 32 | 15.5 | 37 | SYM / MMPP | BLF6G20-230PRN | BLF6G20-230PRN |
| 1805-1880 | 58.2 | 50 | 28 | 16 | 42 | SYM MPPM | BLF7G20LS-250P | BLF7G20LS-250P |
| 1805-1880 | 58.6 | 51 | 28 | 16 | 47.6 | 3-WAY | BLF7G20LS-200 | 2x BLF7G20LS-200 |
| 1805-1880 | 58.7 | 51 | 30 | 15.8 | 47 | 3-WAY | BLF7G20LS-200 | 2x BLF7G20LS-200 |
| **1930-1990 MHz (PCS)** | | | | | | | | |
| 1930-1990 | 53 | 45 | 28 | 16.5 | 40 | SYM | BLF6G20-75 | BLF6G20-75 |
| 1930-1990 | 54.3 | 47.4 | 28 | 16.7 | 48.2 | SYM | BLF6G20LS-110 | BLF6G20LS-110 |
| 1930-1990 | 55.2 | 47.2 | 28 | 16 | 40 | SYM | 1/2 BLF7G20LS-250P | 1/2 BLF7G20LS-250P |
| 1930-1990 | 55.5 | 47.5 | 28 | 14.5 | 46 | ASYM | BLF7G20LS-90P | BLF7G20LS-200 |
| 1930-1990 | 55.7 | 49 | 28 | 14.5 | 48 | ASYM | BLF7G21LS-160P | BLF7G20LS-200 |
| 1930-1990 | 56 | 48 | 31 | 15.3 | 38 | SYM | BLF6G20LS-140 | BLF6G20LS-140 |
| 1930-1990 | 56 | 48 | 28 | 14.8 | 45 | ASYM | BLF7G20LS-140P | BLF7G20LS-200 |
| 1930-1990 | 57 | 49 | 30 | 17.2 | 41 | SYM | BLF7G20LS-200 | BLF7G20LS-200 |
| 1930-1990 | 57 | 49.5 | 28 | 15.1 | 46 | ASYM | BLF7G21LS-160P | 2x BLF7G21LS-160P |
| 1930-1990 | 58.2 | 50 | 28 | 16 | 40 | SYM | BLF7G20LS-250P | BLF7G20LS-250P |
| 1930-1990 | 56.8 | 49.1 | 28 | 32 | 42.3 | ASYM | BLF6G21-10G | BLF7G20LS-200 |
| 1930-1990 | 58.5 | 50.5 | 30 | 15.7 | 43 | 3-WAY | BLF7G20LS-200 | 2x BLF7G20LS-200 |
| **1805-2025 MHz (TD-SCDMA)** | | | | | | | | |
| 2010-2025 | 47 | 39 | 28 | 14.4 | 41 | SYM | BLD6G21L(S)-50 | BLD6G21L(S)-50 |
| 1880-2025 | 50 | 42 | 28 | 17 | 46 | SYM | 1/2 BLF7G20L(S)-90P | 1/2 BLF7G20L(S)-90P |
| 2010-2025 | 50 | 42 | 28 | 17.2 | 47.2 | SYM | 1/2 BLF7G20L(S)-90P | 1/2 BLF7G20L(S)-90P |
| 1805-2050 | 52 | 44.5 | 28 | 15.2 | 41.5 | SYM | 1/2 BLF7G21LS-160P | 1/2 BLF7G21LS-160P |
| 2010-2025 | 52.2 | 44 | 28 | 15.6 | 43 | SYM | 1/2 BLF7G21LS-160P | 1/2 BLF7G21LS-160P |
| 1880-1920 | 52.5 | 44.5 | 28 | 16 | 44 | SYM | 1/2 BLF7G21LS-160P | 1/2 BLF7G21LS-160P |
| **2110-2170 MHz (UMTS / LTE)** | | | | | | | | |
| 2110-2170 | 47 | 39 | 28 | 13 | 38 | SYM | BLD6G22L(S)-50 | BLD6G22L(S)-50 |
| 2110-2170 | 48.3 | 40 | 28 | 17 | 44 | SYM | 1/2 BLF6G22LS-40P | 1/2 BLF6G22LS-40P |
| 2110-2170 | 48.5 | 40.5 | 28 | 17.2 | 46 | SYM | 1/2 BLF6G22L-40P | 1/2 BLF6G22L-40P |
| 2110-2170 | 54.7 | 46.5 | 28 | 16.5 | 43 | SYM | BLF6G22LS-100 | BLF6G22LS-100 |
| 2110-2170 | 54.9 | 47 | 28 | 17 | 43 | SYM | BLF7G22L(S)-130 | BLF7G22L(S)-130 |
| 2110-2170 | 55 | 47 | 28 | 17 | 43 | SYM | 1/2 BLF7G22LS-250P | 1/2 BLF7G22LS-250P |
| 2110-2170 | 55 | 47 | 28 | 15.5 | 38 | SYM | BLF6G22L(S)-130 | BLF6G22L(S)-130 |
| 2110-2170 | 55.5 | 46.4 | 28 | 15 | 43 | ASYM | BLF7G22L(S)-130 | BLF7G22L(S)-200 |
| 2110-2170 | 55.7 | 49 | 28 | 14.5 | 47 | ASYM | BLF7G22LS-130 | BLF7G22LS-200 |
| 2110-2170 | 55.9 | 47.9 | 28 | 17.3 | 42 | SYM | BLF7G22LS-160 | BLF7G22LS-160 |
| 2110-2170 | 56 | 48 | 28 | 15 | 48 | 3-WAY | BLF7G22L(S)-130 | 2x BLF7G22L(S)-130 |
| 2110-2170 | 56.5 | 48.5 | 28 | 16.2 | 41 | SYM | BLF7G22L(S)-200 | BLF7G22L(S)-200 |
| 2110-2170 | 56.5 | 49 | 28 | 14.2 | 46 | ASYM | BLF7G22LS-160 | BLF7G22LS-200 |
| 2110-2170 | 57.2 | 49.2 | 28 | 16 | 47 | 3-WAY | BLF7G22LS-160 | 2x BLF7G22L(S)-160 |
| 2110-2170 | 58 | 50 | 32 | 17.5 | 40 | SYM | BLF7G22LS-250P | BLF7G22LS-250P |
| **2300-2400 MHz (WiBRO / LTE)** | | | | | | | | |
| 2300-2400 | 49.5 | 42 | 28 | 14.6 | 44 | SYM | 1/2 BLF7G27L(S)-75P | 1/2 BLF7G27L(S)-75P |
| 2300-2400 | 53 | 45 | 28 | 15 | 42.3 | SYM | 1/2 BLF7G24LS-160P | 1/2 BLF7G24LS-160P |
| 2300-2400 | 54.1 | 47 | 28 | 15.5 | 45 | SYM | BLF7G24LS-100 | BLF7G24LS-100 |
| 2300-2400 | 55 | 47.5 | 28 | 15.2 | 44 | ASYM | BLF7G24LS-100 | BLF7G24LS-140 |
| 2300-2400 | 56.2 | 48.5 | 30 | 15 | 40 | SYM | BLF7G24LS-140 | BLF7G24LS-140 |
| 2300-2400 | 56.8 | 48.5 | 30 | 15 | 42 | 3-WAY | BLF7G24LS-100 | 2x BLF7G24LS-100 |
| **2500-2700 MHz (WiMAX / LTE)** | | | | | | | | |
| 2620-2690 | 46.9 | 39 | 28 | 14.6 | 46.2 | ASYM | BLF6G27-10G | 1/2 BLF6G27LS-40P |
| 2580-2620 | 48.2 | 40 | 28 | 14.4 | 41 | SYM | 1/2 BLF6G27LS-40P | 1/2 BLF6G27LS-40P |
| 2620-2690 | 48.2 | 40 | 28 | 14.6 | 44 | SYM | 1/2 BLF6G27LS-40P | 1/2 BLF6G27LS-40P |
| 2570-2620 | 49.5 | 42 | 28 | 15 | 43 | SYM | 1/2 BLF7G27L(S)-75P | 1/2 BLF7G27L(S)-75P |
| 2500-2700 | 50 | 42 | 28 | 15 | 37.5 | SYM | BLF6G27S-45 | BLF6G27S-45 |
| 2500-2700 | 50.3 | 42.3 | 28 | 14.5 | 39 | SYM | 1/2 BLF7G27LS-90P | 1/2 BLF7G27LS-90P |
| 2500-2600 | 52 | 44 | 28 | 14 | 40 | 3-WAY | BLF6G27-45 | 2x BLF6G27-45 |
| 2600-2700 | 52 | 44 | 28 | 14 | 40 | 3-WAY | BLF6G27-45 | 2x BLF6G27-45 |
| 2600-2700 | 52 | 44 | 28 | 14 | 40 | ASYM | BLF6G27-45 | BLF6G27(LS)-100 |
| 2500-2700 | 52.5 | 44.5 | 28 | 14 | 38 | SYM | 1/2 BLF7G27LS-150P | 1/2 BLF7G27LS-150P |
| 2570-2620 | 54.1 | 47 | 28 | 15.2 | 43 | SYM | BLF7G27LS-100 | BLF7G27LS-100 |
| 2620-2690 | 55.2 | 47.2 | 30 | 15 | 41 | ASYM | BLF7G27LS-100 | BLF7G27LS-140 |
| 2545-2575 | 55.3 | 47.3 | 28 | 15 | 41 | ASYM | BLF7G27LS-100 | BLF7G27LS-140 |
| 2570-2620 | 55.4 | 47 | 28 | 15 | 40.4 | ASYM | BLF7G27LS-100 | BLF7G27LS-140 |
| **3300-3800 MHz (WiMAX)** | | | | | | | | |
| 3400-3600 | 51 | 43 | 28 | 11.5 | 32 | SYM | BLF6G38-50 | BLF6G38-50 |
| 3500-3700 | 52 | 45 | 28 | 10 | 30 | ASYM | BLF6G38LS-50 | BLF6G38LS-100 |

## 3.7.2 RF power transistors for broadcast / ISM applications

**Why choose NXP's RF power transistors for broadcast / ISM applications:**

- Highest power
- Best ruggedness
- Best broadband performance
- Best-in-class design support
- Very low thermal resistance design for unrivalled reliability

NXP's leading LDMOS technologies, together with advanced package concepts, enable power amplifiers that deliver best-in-class performance. We offer the industry's highest power and best ruggedness for all broadcast technologies. Our portfolio includes transistors for Ultra High Frequency (UHF), Very High Frequency (VHF), and High Frequency (HF) applications and covers ISM frequency bands.

### 3.7.2.1 0-1000 MHz (UHF/VHF/HF/ISM) LDMOS line-up

| Type | Product | $f_{min}$ (MHz) | $f_{max}$ (MHz) | P1dB (W) | VDS (V) | $P_L$ (W) | $\eta_D$ (%) | $G_p$ (dB) | Test signal | Package |
|---|---|---|---|---|---|---|---|---|---|---|
| BLF571 | Driver | 10 | 500 | 20 | 50 | 20 | 70 | 27,5 | CW | SOT467C |
| BLF645 | Final | 1 | 1400 | 100 | 32 | 100 | 56 | 18 | CW | SOT540A |
| BLF871(S) | | 1 | 1000 | 100 | 40 | 100 | 60 | 21 | CW | SOT467 |
| BLF647 | | 1 | 800 | 300 | 32 | 150 | 60 | 12,5 | CW | SOT540A |
| **BLF572XR(S)*** | | 10 | 500 | 200 | 50 | 200 | 70 | 24 | pulsed | SOT1121 |
| **BLF647P(S)*** | | 10 | 1400 | 200 | 32 | 200 | 70 | 18 | pulsed | SOT1121 |
| BLF573(S) | | 10 | 500 | 300 | 50 | 300 | 70 | 27.2 | CW | SOT502 |
| BLF369 | | 10 | 500 | 500 | 32 | 500 | 60 | 18 | CW | SOT800-2 |
| BLF574 | | 10 | 500 | 600 | 50 | 500 | 70 | 26.5 | CW | SOT539A |
| **BLF574XR(S)*** | | 10 | 500 | 600 | 50 | 600 | 70 | 26 | pulsed | SOT539 |
| BLF578 | | 10 | 500 | 1200 | 50 | 1000 | 75 | 26 | CW | SOT539A |
| **BLF578XR(S)*** | | 10 | 500 | 1400 | 50 | 1400 | 69 | 23 | pulsed | SOT539 |
| BLF861A | | 470 | 860 | 150 | 32 | 150 | 60 | 14 | CW | SOT540A |
| **BLF174XR(S)** | | 10 | 128 | 600 | 50 | 600 | 75 | 28 | pulsed | SOT539 |
| **BLF178XR(S)** | | 10 | 128 | 1400 | 50 | 1400 | 72 | 29 | pulsed | SOT539 |

### 3.7.2.2 UHF 470-860 MHz LDMOS line-up

| Type | Product | $f_{min}$ (MHz) | $f_{max}$ (MHz) | P1dB (W) | VDS (V) | $P_L$ (W) | $\eta_D$ (%) | $G_p$ (dB) | Test signal | Package |
|---|---|---|---|---|---|---|---|---|---|---|
| BLF642 | Driver | 1 | 1400 | 35 | 32 | 35 | 63 | 19 | CW | SOT467C |
| BLF871(S) | Final | 1 | 1000 | 100 | 40 | 100 | 60 | 21 | CW | SOT467 |
| BLF881(S) | | 1 | 1000 | 140 | 50 | 140 | 49 | 21 | CW | SOT467 |
| BLF878 | | 470 | 860 | 300 | 42 | 300 | 46 | 21 | CW | SOT979A |
| BLF884P(S) | | 470 | 860 | 300 | 50 | 150 | 46 | 21 | CW | SOT1121 |
| BLF879P | | 470 | 860 | 500 | 42 | 200 | 47 | 21 | CW | SOT539A |
| BLF888 | | 470 | 860 | 500 | 50 | 250 | 46 | 19 | CW | SOT979A |
| BLF888A(S) | | 470 | 860 | 600 | 50 | 250 | 46 | 21 | CW | SOT539 |
| BLF888B(S) | | 470 | 860 | 600 | 50 | 250 | 46 | 21 | CW | SOT539 |

### 3.7.2.3 2.45 GHz ISM LDMOS transistor line-up

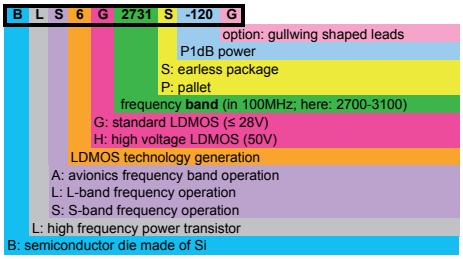
| Type | Product | $f_{min}$ (MHz) | $f_{max}$ (MHz) | P1dB (W) | VDS (V) | $P_L$ (W) | $\eta_D$ (%) | $G_p$ (dB) | Test signal | Package |
|---|---|---|---|---|---|---|---|---|---|---|
| **BLF25M612(G)** | Driver | 1 | 2500 | 12 | 28 | 12 | 60 | 19 | CW | SOT975 |
| **BLF2425M7L(S)140** | Final | 2400 | 2500 | 140 | 28 | 140 | 52 | 17.5 | CW | SOT502 |
| **BLF2425M6L(S)180P** | | 2400 | 2500 | 180 | 28 | 180 | 55 | 12 | CW | SOT539 |
| **BLF2425M7L(S)200** | | 2400 | 2500 | 200 | 28 | 200 | 52 | 15 | CW | SOT502 |
| **BLF2425M7L(S)250P** | | 2400 | 2500 | 250 | 28 | 250 | 55 | 15 | CW | SOT539 |

**Bold red** = new, highly recommended product

* Check status in section 3.1, as this type is not yet released for mass production

## 3.7.3 RF power transistors for aerospace and defense

### Device naming conventions RF power transistors for aerospace and defense




### Why choose NXP's microwave RF power transistors

- High gain
- High efficiency
- Highest reliability
- Improved pulse droop and insertion phase
- Improved ruggedness - overdrive without risk to +5 dB
- Reduces component count and helps simplify L- and S-band radar design
- Uses non-toxic, RoHS-compliant packages

### 3.7.3.1 Avionics LDMOS transistors

| Type | Product | $f_{min}$ (MHz) | $f_{max}$ (MHz) | P1dB (W) | VDS (V) | $P_L$ (W) | $\eta_D$ (%) | $G_p$ (dB) | Test signal | Package |
|---|---|---|---|---|---|---|---|---|---|---|
| BLA1011-2 | Driver | 1030 | 1090 | 2 | 36 | 2 | - | 16 | pulsed | SOT538A |
| BLA1011-10 | | 1030 | 1090 | 10 | 36 | 10 | 40 | 16 | pulsed | SOT467C |
| BLA1011(S)-200R | Final | 1030 | 1090 | 200 | 36 | 200 | 50 | 15 | pulsed | SOT502 |
| BLA6G1011-200R | | 1030 | 1090 | 200 | 28 | 200 | 65 | 20 | pulsed | SOT502A |
| BLA6G1011LS-200RG | | 1030 | 1090 | 200 | 28 | 200 | 65 | 20 | pulsed | SOT502 |
| BLA0912-250R | | 960 | 1215 | 250 | 36 | 250 | 50 | 13.5 | pulsed | SOT502A |
| BLA1011-300 | | 1030 | 1090 | 300 | 32 | 300 | 57 | 16.5 | pulsed | SOT957A |
| BLA6H0912-500 | | 960 | 1215 | 500 | 50 | 450 | 50 | 17 | pulsed | SOT634A |
| BLA6H1011-600 | | 1030 | 1090 | 600 | 48 | 600 | 52 | 17 | pulsed | SOT539A |
| **BLU6H0410L(S)-600P** | | 400 | 1000 | 600 | 50 | 600 | 57 | 20 | pulsed | SOT539 |

### 3.7.3.2 L-band LDMOS transistors

| Type | Product | $f_{min}$ (MHz) | $f_{max}$ (MHz) | P1dB (W) | VDS (V) | $P_L$ (W) | $\eta_D$ (%) | $G_p$ (dB) | Test signal | Package |
|---|---|---|---|---|---|---|---|---|---|---|
| BLL6H0514-25 | Driver | 500 | 1400 | 25 | 50 | 25 | 50 | 19 | pulsed | SOT467C |
| BLL1214-35 | | 1200 | 1400 | 35 | 36 | 35 | 43 | 13 | pulsed | SOT467C |
| BLL6H0514L(S)-130 | Final | 500 | 1400 | 130 | 50 | 130 | 50 | 17 | pulsed | SOT1135 |
| BLL1214-250R | | 1200 | 1400 | 250 | 36 | 250 | 47 | 13 | pulsed | SOT502A |
| BLL6G1214L-250 | | 1200 | 1400 | 250 | 36 | 250 | 45 | 15 | pulsed | SOT502A |
| **BLL6H1214L(S)-250** | | 1200 | 1400 | 250 | 50 | 250 | 55 | 17 | pulsed | SOT502 |
| **BLL6H1214(LS)-500** | | 1200 | 1400 | 500 | 50 | 500 | 50 | 17 | pulsed | SOT539A |

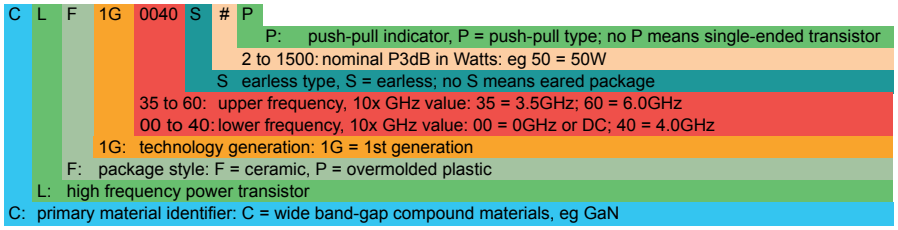
**Bold red** = new, highly recommended product

### 3.7.3.3 S-band LDMOS transistors

| Type | Product | $f_{min}$ (MHz) | $f_{max}$ (MHz) | P1dB (W) | VDS (V) | $P_L$ (W) | $\eta_D$ (%) | $G_p$ (dB) | Test signal | Package |
|---|---|---|---|---|---|---|---|---|---|---|
| BLS6G2731-6G | Driver | 2700 | 3100 | 6 | 32 | 6 | 33 | 15 | pulsed | SOT975C |
| BLS6G3135(S)-20 | | 3100 | 3500 | 20 | 32 | 20 | 45 | 15.5 | pulsed | SOT608 |
| **BLS6G2735L(S)-30** | | 2700 | 3500 | 30 | 32 | 30 | 50 | 13 | pulsed | SOT1135 |
| BLS2933-100 | Final | 2900 | 3300 | 100 | 32 | 100 | 40 | 8 | pulsed | SOT502A |
| BLS7G2325L-105 | | 2300 | 2500 | 105 | 30 | 105 | 55 | 16.5 | pulsed | SOT502A |
| BLS6G2731(S)-120 | | 2700 | 3100 | 120 | 32 | 120 | 48 | 13.5 | pulsed | SOT502 |
| BLS6G3135(S)-120 | | 3100 | 3500 | 120 | 32 | 120 | 43 | 11 | pulsed | SOT502 |
| BLS6G2731S-130 | | 2700 | 3100 | 130 | 32 | 130 | 50 | 12 | pulsed | SOT922-1 |
| BLS6G2933S-130 | | 2900 | 3300 | 130 | 32 | 130 | 47 | 12.5 | pulsed | SOT922-1 |
| BLS7G2933S-150 | | 2900 | 3300 | 150 | 32 | 150 | 47 | 13.5 | pulsed | SOT922-1 |
| **BLS7G2729L(S)-350P** | | 2700 | 2900 | 350 | 32 | 350 | 50 | 13.5 | pulsed | SOT539 |
| **BLS7G3135L(S)-350P** | | 3100 | 3500 | 350 | 32 | 350 | 43 | 10 | pulsed | SOT539 |

## 3.7.4 Gallium Nitride (GaN) RF power amplifiers

### Device naming conventions GaN RF power amplifiers




| Type | $f_{min}$ (MHz) | $f_{max}$ (MHz) | $P_{out}$ (W) | Matching | VDS (V) | $\eta_D$ (%) | $G_p$ (dB) | Test signal | Package | Applications |
|---|---|---|---|---|---|---|---|---|---|---|
| **CLF1G0060-10*** | 0 | 6000 | 10 | - | 50 | 54 | 14 | Pulsed | SOT1227 | Cellular, WiMAX, ISM, avionics, S-band, general purpose |
| **CLF1G0060-30*** | 0 | 6000 | 30 | - | 50 | 54 | 14 | Pulsed | SOT1227 | Cellular, WiMAX, ISM, avionics, S-band, general purpose |
| **CLF1G0035-50*** | 0 | 3500 | 50 | - | 50 | 54 | 14.2 | Pulsed | SOT467 | Cellular, WiMAX, ISM, avionics, S-band, general purpose |
| **CLF1G0035-100*** | 0 | 3500 | 100 | - | 50 | 52 | 14.8 | Pulsed | SOT467 | Cellular, WiMAX, ISM, avionics, S-band, general purpose |

# 3.8 Wireless microcontroller chipsets and modules

| Type | Module/ single chip | Application | TX power | Receiver sensitivity | TX current | RX current | Operating voltage | Form factor |
|---|---|---|---|---|---|---|---|---|
| **JN5148-001-M00** | Module | 2.4-2.4835 GHz JenNet & IEEE802.15.4 | +2.5 dBm | –95 dBm | 15 mA | 17.5 mA | 2.3-3.6 V | Integral antenna 18 x 32 mm |
| **JN5148-001-M03** | Module | 2.4-2.4835 GHz JenNet & IEEE802.15.4 | +2.5 dBm | –95 dBm | 15 mA | 17.5 mA | 2.3-3.6 V | U.FL connector 18 x 30 mm |
| **JN5148-001-M04** | Module | 2.4-2.4835 GHz JenNet & IEEE802.15.4 | +20 dBm | –98 dBm | 110mA | 23 mA | 2.7-3.6 V | U.FL connector 18 x 41 mm |
| **JN5142-J01** | Single chip | 2.4-2.4835 GHz JenNet-IP | +2.5 dBm | –95 dBm | 15 mA | 17.5 mA | 2.3-3.6 V | 6 x 6 mm QFN40 |
| **JN5148-J01** | Single chip | 2.4-2.4835 GHz JenNet-IP | +2.5 dBm | –95 dBm | 15 mA | 17.5 mA | 2.3-3.6 V | 8 x 8 mm QFN56 |
| **JN5142-001** | Single chip | 2.4-2.4835 GHz RF4CE & IEEE802.15.4 | +2.5 dBm | –95 dBm | 15 mA | 17.5 mA | 2.3-3.6 V | 6 x 6 mm QFN40 |
| **JN5148-001** | Single chip | 2.4-2.4835 GHz JenNet & IEEE802.15.4 | +2.5 dBm | –95 dBm | 15 mA | 17.5 mA | 2.3-3.6 V | 8 x 8 mm QFN56 |
| **JN5148-Z01** | Single chip | 2.4-2.4835 GHz ZigBee PRO | +2.5 dBm | –95 dBm | 15 mA | 17.5 mA | 2.3-3.6 V | 8 x 8 mm QFN56 |

**Bold red** = new, highly recommended product

* Check status in section 3.1, as this type is not yet released for mass production

# 4. Design support

This chapter will guide you through the available tools, documents, materials, and links that ease the design-in of our products.

## 4.1 Knowing NXP's RF portfolio

Beyond this RF Manual, you can learn about NXP's broad RF portfolio through the NXP Technical Academy, various webinars and the NXP channel on YouTube.

The NXP Technical Academy provides training modules where you can learn about our products and applications, watch hands-on trainings and even get certified! The training modules can be viewed on mobile devices as well.

NXP provides RF webinars on a regular basis. (www.nxp.com/news/meet-nxp/webinars-and-podcasts.html#rf)

On NXP's YouTube channel (www.youtube.com/user/nxpsemiconductors), there are short videos that explain NXP's portfolio, application information, tips and tricks to optimize your systems performance, and more.

## 4.2 Product selection on NXP.com

Every RF product has its own webpage on the NXP website. Pages can be accessed in several ways: by product tree, by application area, or via cross-reference search. Or, simply type 'nxp <product>' in the Google search bar.

### Product tree and parametric search

The product tree (www.nxp.com/products/rf) categorizes the product by function. The parametric search tool allows you to refine the selection based on performance requirements.

### Application area

To find out what NXP offers in each application area, use the Explore Application section of the NXP website.

### Cross reference

NXP maintains a cross-reference of competitor products and NXP alternatives. This list can be searched online via the search tool bar on the NXP website or off-line by installing the X-Reference-Tool.

## 4.3 Product evaluation

NXP offers a broad range of support material for evaluating RF products and optimizing the performance of your application.

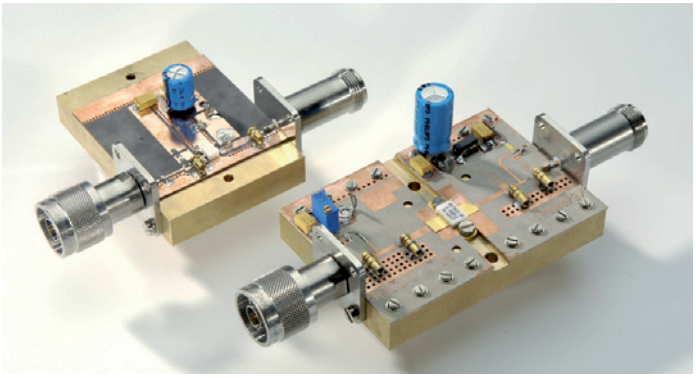
### Data sheets and application notes

The first chapter of this RF Manual includes application diagrams, recommended type numbers, and product highlights. More in-depth application information is available in the second chapter, in product data sheets or in the Application Notes section of the NXP website (www.nxp.com/products/all_appnotes).

### Simulation tools

To help you evaluate our products in your specific application, NXP offers various simulation tools, including small-signal touchstone S-parameters and parametric models that let you customize the biasing conditions. The parametric models are based on best-in-class Mextram models and RFLDMOS models developed by Philips Research, a recognized leader in physics-based models. The parametric models fully support AC, DC, S-parameter, harmonic balance, and time-domain simulations. These models allow designers to assess the performance of complex systems at an early stage of the development process.

The models are available for Advanced Design System (ADS), Microwave Office (MWO) and Ansoft Designer. Spice versions of the parametric models, which can be used with almost any commercial design tool, are also available.



### Customer evaluation kits and samples

Several kits are available for evaluation of our products. Boards are provided with industry-standard RF connectors to facilitate measurements and integration in your application. The features and content of each kit are described on the NXP website and are listed on the corresponding product page. On the Customer Evaluation Kits page you can also find support materials, such as the latest user manuals and software updates. You can order small quantities of all products to build and evaluate prototypes. To obtain a kit or order samples, please contact your local NXP representative or authorized distributor.



## 4.4 Additional design-in support

If you need additional design-in support, please contact your local NXP sales representative or authorized distributor. You can also submit a question using the web form on the NXP website.

## 4.5 Application notes

| Product category | Filename | Description |
|---|---|---|
| Amplifiers | AN11152 | Reducing the Spurs at RF_out caused by the biasing choke during fast switching on and off in TDD system |
| Amplifiers | AN11148 | BGU7003 1900MHz to 2100MHz LNA Application |
| PLL's and Oscillators | AN11144 | Universal Single LNB with TFF101x FIMOD IC |
| Amplifiers | AN11135 | Replacing HMC625 by NXP BGA7204 |
| Amplifiers | AN11130 | Bias module for 50 V GaN demonstration boards |
| Transistors | AN11118 | BFU725F/N1 1.5 GHz LNA evaluation board |
| Amplifiers | AN11103 | Externally-matched 900 MHz LNA using BGU7005 |
| Transistors | AN11102 | BFU725F/N1 2.4 GHz LNA evaluation board |
| Amplifiers | AN11101 | BGU7007 GPS front end evaluation board |
| Amplifiers | AN11091 | Ohmic FM LNA for embedded Antenna in Portable applications with BGU6102 |
| Amplifiers | AN11090 | 50 Ohm FM LNA for embedded Antenna in Portable applications with BGU6102 |
| Amplifiers | AN11086 | BGU7003 LNA application for GPS L2 band |
| Amplifiers | AN11072 | BGU7003 400MHz and 900 MHz applicaiton |
| Amplifiers | AN11068 | BGU7005 matching options for improved LTE jammer immunity |
| Transistors | AN11066 | SDARS active antenna 1st stage LNA with BFU730F, 2.33 GHz |
| Amplifiers | AN11062 | Broadband DVB-T UHF power amplifier with the BLF888A |
| Amplifiers | AN11035 | 50 Ohm FM LNA for embedded Antenna in Portable applications with BGU7003W |
| Amplifiers | AN11034 | High Ohmic FM LNA for embedded Antenna in Portable applications with BGU7003W |
| Transistors | AN11024 | SDARS active antenna 2nd stage LNA with BFU690, 2.33 GHz |
| Transistors | AN11010 | Single stage Ku band LNA using BFU730F |
| Transistors | AN11007 | Single stage 5-6 GHz WLAN LNA with BFU730F |
| Transistors | AN11006 | Single stage 2.3_2.7GHz LNA with BFU730F |
| Amplifiers | AN10967 | BLF578 demo for 352 MHz 1kW CW power |
| Amplifiers | AN10953 | BLF645 10 MHz to 600 MHz 120 W amplifier |
| Amplifiers | AN10951 | 1805 MHz to 1880 MHz asymmetrical Doherty amplifier with the BLF7G20LS-90P and BLF7G21LS-160P |
| Amplifiers | AN10945 | 174 MHz to 230 MHz DVB-T power amplifier with the BLF881 |
| Amplifiers | AN10944 | 1930 MHz to 1990 MHz Doherty amplifier using the BLF7G20LS-200 |
| Amplifiers | AN10933 | 2.5 GHz to 2.7 GHz Doherty power amplifier using the BLF7G27LS-150P |
| Amplifiers | AN10923 | 1.5GHz Doherty power amplifier for base station applications using the BLF6G15L-250PBRN |
| Amplifiers | AN10921 | BLF7G20LS-200 Doherty 1.805-1.88 GHz RF power amplifier |
| Amplifiers | AN10896 | Mounting and Soldering of RF transistors |
| Amplifiers | AN10885 | Doherty RF performance analysis using the BLF7G22LS-130 |
| Amplifiers | AN10882 | Dependency of BLF578 gate bias voltage on temperature |
| Amplifiers | AN10869 | Broadband DVB-T UHF power amplifier with the BLF888 |
| Amplifiers | AN10858 | 174 MHz to 230 MHz DVB-T power amplifier with the BLF578 |
| Amplifiers | AN10847 | Doherty RF performance using the BLF6G20-230PRN |
| Amplifiers | AN10800 | Using the BLF578 in the 88 MHz to 108 MHz FM band |
| Amplifiers | AN10714 | Using the BLF574 in the 88-108 MHz FM band |

# 4.6 Simulation models

## 4.6.1 Simulation models for RF power devices

Updates of this overview are available in PDF format at: http://www.nxp.com/wcm_documents/models/RFPower_Model_Overview.pdf

| Type | ADS model | Microwave Office model |
|---|---|---|
| BLA6G1011-200R | Available | Available |
| BLA6G1011L-200RG | Available | Available |
| BLA6G1011LS-200RG | Available | Available |
| BLA6H0912-500 | Available | Available |
| BLA6H1011-600 | Available | Available |
| BLF369 | Available | |
| BLF3G21-6 | Available | |
| BLF571 | Available | Available |
| BLF573 | Available | Available |
| BLF573S | Available | Available |
| BLF574 | Available | Available |
| BLF578 | Available | Available |
| BLF645 | Available | Available |
| BLF6G10-135RN | Available | Available |
| BLF6G10-200RN | Available | |
| BLF6G10-45 | Available | Available |
| BLF6G10L-260PRN | Available | |
| BLF6G10L-40BRN | Available | |
| BLF6G10LS-135RN | Available | Available |
| BLF6G10LS-200RN | Available | |
| BLF6G10LS-260PRN | Available | |
| BLF6G10S-45 | Available | Available |
| BLF6G15L-250PBRN | Available | |
| BLF6G15L-40BRN | Available | |
| BLF6G20-180RN | Available | |
| BLF6G20-230PRN | Available | |
| BLF6G20-45 | Available | Available |
| BLF6G20LS-180RN | Available | |
| BLF6G20S-230PRN | Available | |
| BLF6G20S-45 | Available | Available |
| BLF6G21-10G | Available | Available |
| BLF6G22-180RN | Available | |
| BLF6G22-45 | Available | Available |
| BLF6G22L-40P | Available | |
| BLF6G22LS-180RN | Available | |
| BLF6G22LS-40P | Available | |
| BLF6G22S-45 | Available | Available |
| BLF6G27-10 | Available | |
| BLF6G27-10G | Available | Available |
| BLF6G27-135 | Available | |
| BLF6G27-45 | Available | Available |
| BLF6G27-75 | Available | |
| BLF6G27L-40P | Available | |
| BLF6G27LS-135 | Available | |
| BLF6G27LS-40P | Available | |
| BLF6G27LS-75 | Available | |
| BLF6G27S-45 | Available | Available |
| BLF6G38-10 | Available | |
| BLF6G38-100 | Available | |
| BLF6G38-10G | Available | Available |
| BLF6G38-25 | Available | Available |
| BLF6G38-50 | Available | Available |
| BLF6G38LS-100 | Available | |
| BLF6G38LS-50 | Available | Available |
| BLF6G38S-25 | Available | Available |
| BLF7G15LS-300P | Available | |
| BLF7G15LS-200 | Available | |
| BLF7G20L-200 | Available | |
| BLF7G20L-250P | Available | |
| BLF7G20L-90P | Available | |
| BLF7G20LS-140P | Available | |
| BLF7G20LS-200 | Available | |
| BLF7G20LS-250P | Available | |
| BLF7G20LS-90P | Available | |
| BLF7G21L-160P | Available | |
| BLF7G21LS-160P | Available | |
| BLF7G22L-130 | Available | Available |
| BLF7G22L-160 | Available | |
| BLF7G22L-200 | Available | |
| BLF7G22L-250P | Available | |
| BLF7G22LS-130 | Available | Available |
| BLF7G22LS-160 | Available | |
| BLF7G22LS-200 | Available | |
| BLF7G22LS-250P | Available | |
| BLF7G24L-100 | Available | |
| BLF7G24L-140 | Available | |
| BLF7G24LS-100 | Available | |
| BLF7G24LS-140 | Available | |
| BLF7G27L-100 | Available | |
| BLF7G27L-140 | Available | |
| BLF7G27L-150P | Available | |
| BLF7G27L-200PB | Available | |
| BLF7G27L-75P | Available | |
| BLF7G27L-90P | Available | |
| BLF7G27LS-100 | Available | |
| BLF7G27LS-140 | Available | |
| BLF7G27LS-150P | Available | |
| BLF7G27LS-75P | Available | |
| BLF7G27LS-90P | Available | |
| BLF871 | Available | Available |
| BLF871S | Available | Available |
| BLF878 | Available | Available |
| BLF881 | Available | Available |
| BLF881S | Available | Available |
| BLF888 | Available | |
| BLF888A | Available | Available |
| BLF888AS | Available | Available |
| BLL6H0514-25 | Available | Available |
| BLL6H0514L-130 | Available | Available |
| BLL6H0514LS-130 | Available | Available |
| BLL6H1214-500 | Available | |
| BLL6H1214L-250 | Available | Available |
| BLL6H1214LS-250 | Available | Available |
| BLM6G22-30 | Available | |
| BLS6G2731-6G | Available | |
| BLS6G2731S-130 | Available | Available |
| BLS6G3135-120 | Available | Available |
| BLS6G3135-20 | Available | |
| BLS6G3135S-120 | Available | Available |
| BLS6G3135S-20 | Available | |

## 4.6.2 Simulation models for RF bipolar wideband transistors

| | | | | ADS 2009 design kit v2.2 | | | Microwave Office design kit | | | Ansoft Designer design kit | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Type | Evaluation board | S-parameters | Spice model | S-parameters | Spice model | Mextram model | S-parameters | Spice model | Mextram model | S-parameters | Spice model | Mextram model |
| BFG67 | | √ | √ | √ | √ | | √ | √ | | √ | √ | |
| BFG67/X | | | √ | | √ | | | √ | | √ | √ | |
| BFG10 | | | √ | | √ | | | √ | | √ | √ | |
| BFG10W | | | √ | | √ | | | √ | | √ | √ | |
| BFG10W/X | | | √ | | √ | | | √ | | √ | √ | |
| BFG135 | | √ | √ | √ | √ | | √ | √ | | √ | √ | |
| BFG198 | | √ | √ | √ | √ | | √ | √ | | √ | √ | |
| BFG21W | √ | √ | √ | √ | √ | | √ | √ | | √ | √ | |
| BFG25A/X | | √ | √ | √ | √ | | √ | √ | | √ | √ | |
| BFG25AW/X | | | √ | | √ | | | √ | | √ | √ | |
| BFG31 | | √ | √ | √ | √ | | √ | √ | | √ | √ | |
| BFG35 | | √ | √ | √ | √ | | √ | √ | | √ | √ | |
| BFG310/XR | | √ | √ | √ | √ | | √ | √ | | √ | √ | |
| BFG310W/XR | | √ | √ | √ | √ | | √ | √ | | √ | √ | |
| BFG325/XR | | √ | √ | √ | √ | | √ | √ | | √ | √ | |
| BFG325W/XR | | √ | √ | √ | √ | | √ | √ | | √ | √ | |
| BFG403W | | √ | √ | √ | √ | | √ | √ | | √ | √ | |
| BFG410W | √ | √ | √ | √ | √ | | √ | √ | | √ | √ | |
| BFG424F | | √ | √ | √ | √ | | √ | √ | | √ | √ | |
| BFG424W | √ | √ | √ | √ | √ | | √ | √ | | √ | √ | |
| BFG425W | √ | √ | √ | √ | √ | | √ | √ | | √ | √ | |
| BFG480W | √ | √ | √ | √ | √ | | √ | √ | | √ | √ | |
| BFG505 | | √ | √ | √ | √ | | √ | √ | | √ | √ | |
| BFG505/X | | | √ | | √ | | | √ | | √ | √ | |
| BFG505W/X | | | √ | | √ | | | √ | | √ | √ | |
| BFG520 | | √ | √ | √ | √ | | √ | √ | | √ | √ | |
| BFG520W | | √ | √ | √ | √ | | √ | √ | | √ | √ | |
| BFG520X | | | √ | | √ | | | √ | | √ | √ | |
| BFG520/XR | | | √ | | √ | | | √ | | √ | √ | |
| BFG540 | | √ | √ | √ | √ | | √ | √ | | √ | √ | |
| BFG540/X | | | √ | | √ | | | √ | | √ | √ | |
| BFG540/XR | | | √ | | √ | | | √ | | √ | √ | |
| BFG540W | | √ | √ | √ | √ | | √ | √ | | √ | √ | |
| BFG541 | | √ | √ | √ | √ | | √ | √ | | √ | √ | |
| BFG590 | | √ | √ | √ | √ | | √ | √ | | √ | √ | |
| BFG590/X | | | √ | | √ | | | √ | | √ | √ | |
| BFG591 | | √ | √ | √ | √ | | √ | √ | | √ | √ | |
| BFG92A/X | | | √ | | √ | | | √ | | √ | √ | |
| BFG93A | | √ | √ | √ | √ | | √ | √ | | √ | √ | |
| BFG94 | | √ | √ | √ | √ | | √ | √ | | √ | √ | |
| BFG97 | | √ | √ | √ | √ | | √ | √ | | √ | √ | |
| BFM505 | | √ | √ | √ | √ | | √ | √ | | √ | √ | |
| BFM520 | | √ | √ | √ | √ | | √ | √ | | √ | √ | |
| BFQ149 | | √ | √ | √ | √ | | √ | √ | | √ | √ | |
| BFG18A | | √ | √ | √ | √ | | √ | √ | | √ | √ | |
| BFQ19 | | √ | √ | √ | √ | | √ | √ | | √ | √ | |
| BFQ540 | | | √ | | √ | | | √ | | √ | √ | |
| BFQ67 | | √ | √ | √ | √ | | √ | √ | | √ | √ | |
| BFQ67W | | √ | √ | √ | √ | | √ | √ | | √ | √ | |
| BFR106 | | √ | √ | √ | √ | | √ | √ | | √ | √ | |
| BFR505 | | √ | √ | √ | √ | | √ | √ | | √ | √ | |
| BFR505T | | | √ | | √ | | | √ | | √ | √ | |
| BFR520 | | √ | √ | √ | √ | | √ | √ | | √ | √ | |
| BFR540 | | √ | √ | √ | √ | | √ | √ | | √ | √ | |
| BFR92A | | √ | √ | √ | √ | | √ | √ | | √ | √ | |
| BFR92AW | | √ | √ | √ | √ | | √ | √ | | √ | √ | |
| BFR93A | | √ | √ | √ | √ | | √ | √ | | √ | √ | |
| BFR93AW | | √ | √ | √ | √ | | √ | √ | | √ | √ | |
| BFS17 | | √ | √ | √ | √ | | √ | √ | | √ | √ | |
| BFS17A | | √ | √ | √ | √ | | √ | √ | | √ | √ | |
| BFS17W | | √ | √ | √ | √ | | √ | √ | | √ | √ | |
| BFS25A | | √ | √ | √ | √ | | √ | √ | | √ | √ | |
| BFS505 | | √ | √ | √ | √ | | √ | √ | | √ | √ | |
| BFS520 | | √ | √ | √ | √ | | √ | √ | | √ | √ | |

## 4.6.2 Simulation models for RF bipolar wideband transistors (continued)

| | | | | ADS 2009 design kit v2.2 | | | Microwave Office design kit | | | Ansoft Designer design kit | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Type | Evaluation board | S-parameters | Spice model | S-parameters | Spice model | Mextram model | S-parameters | Spice model | Mextram model | S-parameters | Spice model | Mextram model |
| BFS540 | | √ | √ | √ | √ | | √ | √ | | √ | √ | |
| BFT25 | | √ | | √ | | | √ | | | | | |
| BFT25A | | √ | √ | √ | √ | | √ | √ | | √ | √ | |
| BFT92 | | √ | √ | √ | √ | | √ | √ | | √ | √ | |
| BFT92W | | √ | √ | √ | √ | | √ | √ | | √ | √ | |
| BFT93 | | √ | √ | √ | √ | | √ | √ | | √ | √ | |
| BFT93W | | √ | √ | √ | √ | | √ | √ | | √ | √ | |
| BFU725F | √ | √ | √ | √ | √ | | √ | √ | | √ | √ | |
| BFU725F/N1 | √ | √ | √ | √ | √ | | √ | √ | | √ | √ | |
| BFU610F | √ | √ | √ | | √ | √ | | √ | | | √ | |
| BFU630F | √ | √ | √ | | √ | √ | | √ | | | √ | |
| BFU660F | √ | √ | √ | | √ | √ | | √ | | | √ | |
| BFU690F | √ | √ | √ | | √ | √ | | √ | | | √ | |
| BFU710F | √ | √ | √ | | √ | √ | | √ | | | √ | |
| BFU730F | √ | √ | √ | | √ | | | √ | | | √ | |
| BFU730LX | √ | √ | | | | √ | | | | | | |
| BFU760F | √ | √ | √ | | √ | √ | | √ | | | √ | |
| BFU790F | √ | √ | √ | | √ | √ | | √ | | | √ | |
| PBR941 | | √ | √ | √ | √ | | √ | √ | | √ | √ | |
| PBR951 | | √ | √ | √ | √ | | √ | √ | | √ | √ | |
| PRF947 | | √ | √ | √ | √ | | √ | √ | | √ | √ | |
| PRF949 | | √ | √ | √ | √ | | √ | √ | | √ | √ | |
| PRF957 | | √ | √ | √ | √ | | √ | √ | | √ | √ | |

## 4.6.3 Simulation models for RF MOSFET transistors

| | | | | ADS 2009 design kit v2.2 | | | Microwave Office design kit | | | Ansoft Designer design kit | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Type | Evaluation board | S-parameters | Spice model | S-parameters | Spice model | Mextram model | S-parameters | Spice model | Mextram model | S-parameters | Spice model | Mextram model |
| BF1211 | | √ | | √ | | | √ | | | √ | | |
| BF1211R | | √ | | √ | | | √ | | | √ | | |
| BF1211WR | | √ | | √ | | | √ | | | √ | | |
| BF1212 | | √ | | √ | | | √ | | | √ | | |
| BF1212R | | √ | | √ | | | √ | | | √ | | |
| BF1212WR | | √ | | √ | | | √ | | | √ | | |
| BF511 | | √ | | √ | | | √ | | | √ | | |
| BF513 | | √ | | √ | | | √ | | | √ | | |
| BF862 | | √ | √ | √ | | | √ | | | √ | | |
| BF904 | | | √ | | √ | | | √ | | | √ | |
| BF908 | | | √ | | √ | | | √ | | | √ | |
| BF909 | | | √ | | √ | | | √ | | | √ | |
| BF998 | | | √ | | √ | | | √ | | | √ | |

## 4.6.4 Simulation models for RF varicap diodes

| | | | | ADS 2009 design kit v2.2 | | | Microwave Office design kit | | | Ansoft Designer design kit | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Type | Evaluation board | S-parameters | Spice model | S-parameters | Spice model | Mextram model | S-parameters | Spice model | Mextram model | S-parameters | Spice model | Mextram model |
| BB145B | | | √ | | √ | | | √ | | | √ | |
| BB149 | | | √ | | √ | | | √ | | | √ | |
| BB149A | | | √ | | √ | | | √ | | | √ | |
| BB156 | | | √ | | √ | | | √ | | | √ | |
| BB179 | | | √ | | √ | | | √ | | | √ | |
| BB179B | | | √ | | √ | | | √ | | | √ | |
| BB201 | | | √ | | √ | | | √ | | | √ | |
| BB202 | | | √ | | √ | | | √ | | | √ | |
| BB207 | | | √ | | √ | | | √ | | | √ | |
| BB208-2 | | | √ | | √ | | | √ | | | √ | |

## 4.6.5 Simulation models for RF MMIC amplifiers

| | | | | ADS 2009 design kit v2.2 | | | Microwave Office design kit | | | Ansoft Designer design kit | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Type | Evaluation board | S-parameters | Spice model | S-parameters | Spice model | Mextram model | S-parameters | Spice model | Mextram model | S-parameters | Spice model | Mextram model |
| BGA2001 | √ | √ | | √ | | | √ | | | √ | | |
| BGA2002 | √ | | | | | | | | | | | |
| BGA2003 | √ | √ | | √ | | | √ | | | √ | | |
| BGA2711 | √ | √ | | √ | | | √ | | | √ | | |
| BGA2748 | √ | √ | | √ | | | √ | | | √ | | |
| BGA2771 | √ | √ | | √ | | | √ | | | √ | | |
| BGA2776 | √ | √ | | √ | | | √ | | | √ | | |
| BGA2709 | √ | √ | | √ | | | √ | | | √ | | |
| BGA2712 | √ | √ | | √ | | | √ | | | √ | | |
| BGA2714 | √ | | | | | | | | | | | |
| BGA2715 | √ | √ | | √ | | | √ | | | √ | | |
| BGA2716 | √ | √ | | √ | | | √ | | | √ | | |
| BGA2717 | | √ | | √ | | | √ | | | √ | | |
| BGA2011 | √ | √ | | √ | | | √ | | | √ | | |
| BGA2012 | √ | √ | | √ | | | √ | | | √ | | |
| BGA2031 | √ | | | | | | | | | | | |
| BGA6289 | √ | √ | | √ | | | √ | | | √ | | |
| BGA6489 | √ | √ | | √ | | | √ | | | √ | | |
| BGA6589 | √ | √ | | √ | | | √ | | | √ | | |
| BGA2800 | √ | √ | | √ | | | √ | | | √ | | |
| BGA2801 | √ | √ | | √ | | | √ | | | √ | | |
| BGA2815 | √ | √ | | √ | | | √ | | | √ | | |
| BGA2816 | √ | √ | | √ | | | √ | | | √ | | |
| BGA2850 | √ | √ | | √ | | | √ | | | √ | | |
| BGA2865 | √ | √ | | √ | | | √ | | | √ | | |
| BGA2866 | √ | √ | | √ | | | √ | | | √ | | |
| BGA7024 | √ | √ | | | | | | | | | | |
| BGA7027 | √ | √ | | | | | | | | | | |
| BGA7124 | √ | √ | | | | | | | | | | |
| BGA7127 | √ | √ | | √ | | | √ | | | √ | | |
| BGM1011 | √ | √ | | √ | | | √ | | | √ | | |
| BGM1012 | √ | √ | | √ | | | √ | | | √ | | |
| BGM1013 | √ | √ | | √ | | | √ | | | √ | | |
| BGM1014 | √ | √ | | √ | | | √ | | | √ | | |
| BGU6102 | √ | | | | | | | | | | | |
| BGU7031 | √ | | | | | | | | | | | |
| BGU7032 | √ | | | | | | | | | | | |
| BGU7033 | √ | | | | | | | | | | | |
| BGU7041 | √ | | | | | | | | | | | |
| BGU7042 | √ | | | | | | | | | | | |
| BGU7044 | √ | | | | | | | | | | | |
| BGU7045 | √ | | | | | | | | | | | |
| BGU7050 | √ | | | | | | | | | | | |
| BGU7051 | √ | | | | | | | | | | | |
| BGU7052 | √ | | | | | | | | | | | |
| BGU7053 | √ | | | | | | | | | | | |
| BGU7061 | √ | | | | | | | | | | | |
| BGU7062 | √ | | | | | | | | | | | |
| BGU7063 | √ | | | | | | | | | | | |
| BGU7064 | √ | | | | | | | | | | | |
| BGU7003 | √ | √ | | | | | | | | | | |
| BGU7003W | √ | | | | | | | | | | | |
| BGU7004 | √ | √ | | | | | | | | | | |
| BGU7005 | √ | √ | | | | | | | | | | |
| BGU7007 | √ | √ | | | | | | | | | | |
| BGU8007 | √ | √ | | | | | | | | | | |

# 5. Cross-references & replacements

**NXP cross-references:**
http://www.nxp.com/xref/nxp?typenumber

**NXP end-of-life:**
http://www.nxp.com/products/eol/

## 5.1 Cross-references: manufacturer types versus NXP types

### In alphabetical order of manufacturer type

Abbreviations:

| | |
|---|---|
| Base station | Base station power transistors |
| Broadcasts | Broadcast power transistors |
| BS diode | Band switch diode |
| CATV OR | CATV optical receiver |
| CATV PD | CATV power doubler |
| CATV PPA | CATV push-pull amplifier |
| CATV PPA/HG | CATV push-pull amplifier high gain |
| CATV RA | CATV reverse amplifier |
| FET | Field-effect transistor |
| A&D | Microwave power transistors |
| MMIC | Monolithic microwave integrated circuit |
| Varicap | Varicap diode |
| WB trs 1-4 | Wideband transistor 1-4 generation |
| WB trs 5-7 | Wideband transistor 5-7 generation |

| Manufacturer type | Manufacturer | NXP type | Product family |
|---|---|---|---|
| 3001 | Microsemi | BLS7G3135LS-350P | A&D |
| 3003 | Microsemi | BLS7G3135L-350P | A&D |
| 3005 | Microsemi | BLS6G3135S-20 | A&D |
| 10502 | Microsemi | BLA1011-200R | A&D |
| AH125 | Triquint | BGA7127 | MMIC |
| SXB-4089 | RFMD | BGA7127 | MMIC |
| 0510-50A | Microsemi | BLF1043 | Broadcast |
| 1011LD110A | Microsemi | BLA1011-300 | A&D |
| 1011LD110B | Microsemi | BLA1011S-200 | A&D |
| 1014-12 | Microsemi | BLL1214-250R | A&D |
| 1014-2 | Microsemi | BLL1214-35 | A&D |
| 1014-6A | Microsemi | BLL6G1214L-250 | A&D |
| 10AM20 | Microsemi | BLF1046 | Broadcast |
| 1617-35 | Microsemi | BLL6G1214LS-250 | A&D |
| 1SS314 | Toshiba | BA591 | BS diode |
| 1SS356 | Rohm | BA591 | BS diode |
| 1SS381 | Toshiba | BA277 | BS diode |
| 1SS390 | Rohm | BA891 | BS diode |
| 1SV172 | Toshiba | BAP50-04 | PIN diode |
| 1SV214 | Toshiba | BB149 | Varicap |
| 1SV214 | Toshiba | BB149A | Varicap |
| 1SV215 | Toshiba | BB153 | Varicap |
| 1SV228 | Toshiba | BB201 | Varicap |
| 1SV231 | Toshiba | BB152 | Varicap |
| 1SV232 | Toshiba | BB148 | Varicap |
| 1SV233 | Sanyo | BAP70-03 | PIN diode |
| 1SV234 | Sanyo | BAP64-04 | PIN diode |
| 1SV239 | Toshiba | BB145B | Varicap |
| 1SV241 | Sanyo | BAP64-02 | PIN diode |
| 1SV246 | Sanyo | BAP64-04W | PIN diode |

| Manufacturer type | Manufacturer | NXP type | Product family |
|---|---|---|---|
| 1SV247 | Sanyo | BAP70-02 | PIN diode |
| 1SV248 | Sanyo | BAP50-02 | PIN diode |
| 1SV249 | Sanyo | BAP50-04W | PIN diode |
| 1SV250 | Sanyo | BAP50-03 | PIN diode |
| 1SV251 | Sanyo | BAP50-04 | PIN diode |
| 1SV252 | Toshiba | BAP50-04W | PIN diode |
| 1SV254 | Toshiba | BB179 | Varicap |
| 1SV263 | Sanyo | BAP50-02 | PIN diode |
| 1SV264 | Sanyo | BAP50-04W | PIN diode |
| 1SV266 | Sanyo | BAP50-03 | PIN diode |
| 1SV267 | Sanyo | BAP50-04 | PIN diode |
| 1SV269 | Toshiba | BB148 | Varicap |
| 1SV270 | Toshiba | BB156 | Varicap |
| 1SV271 | Toshiba | BAP50-03 | PIN diode |
| 1SV278 | Toshiba | BB179 | Varicap |
| 1SV279 | Toshiba | BB179 | Varicap |
| 1SV282 | Toshiba | BB178 | Varicap |
| 1SV282 | Toshiba | BB187 | Varicap |
| 1SV283 | Toshiba | BB178 | Varicap |
| 1SV283 | Toshiba | BB187 | Varicap |
| 1SV284 | Toshiba | BB156 | Varicap |
| 1SV288 | Toshiba | BB152 | Varicap |
| 1SV290 | Toshiba | BB182 | Varicap |
| 1SV294 | Sanyo | BAP70-03 | PIN diode |
| 1SV305 | Toshiba | BB202 | Varicap |
| 1SV307 | Toshiba | BAP51-03 | PIN diode |
| 1SV308 | Toshiba | BAP51-02 | PIN diode |
| 1T362 | PEC | BB149 | Varicap |
| 1T362A | PEC | BB149A | Varicap |
| 1T363A | PEC | BB153 | Varicap |

| Manufacturer type | Manufacturer | NXP type | Product family |
|---|---|---|---|
| 1T368A | PEC | BB148 | Varicap |
| 1T369 | PEC | BB152 | Varicap |
| 1T379 | PEC | BB131 | Varicap |
| 1T397 | PEC | BB152 | Varicap |
| 1T399 | PEC | BB148 | Varicap |
| 1T402 | PEC | BB179B | Varicap |
| 1T403 | PEC | BB178 | Varicap |
| 1T404A | PEC | BB187 | Varicap |
| 1T405A | PEC | BB187 | Varicap |
| 1T406 | PEC | BB182 | Varicap |
| 1T408 | PEC | BB187 | Varicap |
| 2324-12L | Microsemi | BLS6G2731S-120 | A&D |
| 2324-20 | Microsemi | BLS6G2731-6G | A&D |
| 2324-25 | Microsemi | BLS6G2731-120 | A&D |
| 2424-25 | Microsemi | BLS6G2731S-130 | A&D |
| 2F1G20DS | RFHIC | CGD1040Hi | CATV PD |
| 2F1G20DS | RFHIC | CGD1042H | CATV PD |
| 2F1G20P | RFHIC | CGY1041 | CATV PP |
| 2F1G22DS | RFHIC | CGD1042H | CATV PD |
| 2F1G22DS | RFHIC | CGD1042Hi | CATV PD |
| 2F1G22DS | RFHIC | CGD982HCi | CATV PD |
| 2F1G23P | RFHIC | CGY1041 | CATV PP |
| 2F1G23P | RFHIC | CGY1043 | CATV PP |
| 2F1G24D | RFHIC | CGD1044Hi | CATV PD |
| 2F1G24D | RFHIC | CGD985HCi | CATV PD |
| 2F1G24DS | RFHIC | CGD1044H | CATV PD |
| 2F722DS | RFHIC | BGD816L | CATV PD |
| 2F8718P | RFHIC | BGY885A | CATV PP |
| 2F8719DS | RFHIC | BGD812 | CATV PD |
| 2F8720DS | RFHIC | BGD814 | CATV PD |
| 2F8723P | RFHIC | BGY887 | CATV PP |
| 2F8734P | RFHIC | CGY888C | CATV PP |
| 2N4856 | Standard | BSR56 | FET |
| 2N4857 | Standard | BSR57 | FET |
| 2N4858 | Standard | BSR58 | FET |
| 2SC4094 | Renesas Electronics | BFG520/XR | WB trs 1-4 |
| 2SC4095 | Renesas Electronics | BFG520/XR | WB trs 1-4 |
| 2SC4182 | Renesas Electronics | BFS17W | WB trs 1-4 |
| 2SC4184 | Renesas Electronics | BFS17W | WB trs 1-4 |
| 2SC4185 | Renesas Electronics | BFS17W | WB trs 1-4 |
| 2SC4186 | Renesas Electronics | BFR92AW | WB trs 1-4 |
| 2SC4226 | Renesas Electronics | PRF957 | WB trs 1-4 |
| 2SC4227 | Renesas Electronics | BFQ67W | WB trs 1-4 |
| 2SC4228 | Renesas Electronics | BFS505 | WB trs 1-4 |
| 2SC4247 | Toshiba | BFR92AW | WB trs 1-4 |
| 2SC4248 | Toshiba | BFR92AW | WB trs 1-4 |
| 2SC4315 | Toshiba | BFG520/XR | WB trs 1-4 |
| 2SC4320 | Toshiba | BFG520/XR | WB trs 1-4 |
| 2SC4321 | Toshiba | BFQ67W | WB trs 1-4 |
| 2SC4325 | Toshiba | BFS505 | WB trs 1-4 |
| 2SC4394 | Toshiba | PRF957 | WB trs 1-4 |
| 2SC4536 | Renesas Electronics | BFQ19 | WB trs 1-4 |
| 2SC4537 | Renesas Electronics | BFR93AW | WB trs 1-4 |
| 2SC4592 | Renesas Electronics | BFG520/XR | WB trs 1-4 |
| 2SC4593 | Renesas Electronics | BFS520 | WB trs 1-4 |
| 2SC4703 | Renesas Electronics | BFQ19 | WB trs 1-4 |
| 2SC4784 | Renesas Electronics | BFS505 | WB trs 1-4 |
| 2SC4807 | Renesas Electronics | BFQ18A | WB trs 1-4 |
| 2SC4842 | Toshiba | BFG540W/XR | WB trs 1-4 |
| 2SC4899 | Renesas Electronics | BFS505 | WB trs 1-4 |
| 2SC4900 | Renesas Electronics | BFG520/XR | WB trs 1-4 |
| 2SC4901 | Renesas Electronics | BFS520 | WB trs 1-4 |
| 2SC4988 | Renesas Electronics | BFQ540 | WB trs 1-4 |
| 2SC5011 | Renesas Electronics | BFG540W/XR | WB trs 1-4 |
| 2SC5012 | Renesas Electronics | BFG540W/XR | WB trs 1-4 |
| 2SC5065 | Toshiba | PRF957 | WB trs 1-4 |
| 2SC5085 | Toshiba | PRF957 | WB trs 1-4 |
| 2SC5087 | Toshiba | BFG520/XR | WB trs 1-4 |
| 2SC5088 | Toshiba | BFG540W/XR | WB trs 1-4 |
| 2SC5090 | Toshiba | BFS520 | WB trs 1-4 |
| 2SC5092 | Toshiba | BFG520/XR | WB trs 1-4 |
| 2SC5095 | Toshiba | BFS505 | WB trs 1-4 |
| 2SC5107 | Toshiba | BFS505 | WB trs 1-4 |
| 2SC5463 | Toshiba | BFQ67W | WB trs 1-4 |
| 2SC5508 | Renesas Electronics | BFU660F | WB trs 5-7 |
| 2SC5508 | Renesas Electronics | BFU660F | WB trs 5-7 |
| 2SC5593 | Renesas Electronics | BFG410W | WB trs 5-7 |

| Manufacturer type | Manufacturer | NXP type | Product family |
|---|---|---|---|
| 2SC5594 | Renesas Electronics | BFG425W | WB trs 5-7 |
| 2SC5623 | Renesas Electronics | BFG410W | WB trs 5-7 |
| 2SC5624 | Renesas Electronics | BFG425W | WB trs 5-7 |
| 2SC5631 | Renesas Electronics | BFQ540 | WB trs 1-4 |
| 2SC6023 | Sanyo | BFG424W | WB trs 5-7 |
| 2SK210BL | Renesas Electronics | PMBFJ309 | FET |
| 2SK508 | Renesas Electronics | PMBFJ308 | FET |
| 3SK290 | Renesas Electronics | BF998WR | FET |
| AD8376 | ADI | BGA7350 | MMIC |
| AD8376 | ADI | BGA7351 | MMIC |
| ADL5354 | ADI | BGX7221 | MMIC |
| ADL5356 | ADI | BGX7221 | MMIC |
| ADL5358 | ADI | BGX7220 | MMIC |
| ADL5372 | ADI | BGX710x | MMIC |
| ADL5375 | ADI | BGX710x | MMIC |
| ADL5812 | ADI | BGX7221 | MMIC |
| ADRF660x | ADI | BGX721x | MMIC |
| AH115-S8G | Triquint | BLF8G27LS-140V | Base station |
| AH116-S8G | Triquint | BLF6G10-135RN | Base station |
| AH118 | Triquint | BGA7024 | MMIC |
| AH118 | Triquint | BGA7024 | MMIC |
| AH118 | Triquint | BGA7124 | MMIC |
| AH118 | Triquint | BGA7124 | MMIC |
| AH125 | Triquint | BGA7027 | MMIC |
| AH125 | Triquint | BGA7127 | MMIC |
| AH212-EG | Triquint | BLF6G38-10 | Base station |
| AH212-S8G | Triquint | BLF6G38-100 | Base station |
| AH215 | Triquint | BGA7130 | MMIC |
| AH215 | Triquint | BGA7130 | MMIC |
| AH215-S8G | Triquint | BLF6G27-10 | Base station |
| AH225-S8G | Triquint | BLF6G27-10G | Base station |
| AH312-S8G | Triquint | BLF7G24L-100 | Base station |
| AH314-G | Triquint | BLF6G27LS-100 | Base station |
| AH315-G | Triquint | BLF6G10-160RN | Base station |
| AH315-G | Triquint | BLF6G10-200RN | Base station |
| AH315-G | Triquint | BLF7G24L-140 | Base station |
| AH315-G | Triquint | BLF7G24L-160P | Base station |
| AH315-G | Triquint | BLF6G27LS-135 | Base station |
| AH315-G | Triquint | BLF6G27LS-40P | Base station |
| AN26112A | Panasonic | BGU7045 | MMIC |
| AN26120A | Panasonic | BGU7042 | MMIC |
| AN26122A | Panasonic | BGU7045 | MMIC |
| BA592 | Infineon | BA591 | BS diode |
| BA595 | Infineon | BAP51-03 | PIN diode |
| BA595 | Infineon | BAP70-03 | PIN diode |
| BA597 | Infineon | BAP70-03 | PIN diode |
| BA885 | Infineon | BAP70-03 | PIN diode |
| BA892 | Infineon | BA891 | BS diode |
| BA892-02V | Infineon | BA277 | PIN diode |
| BA892-02V | Infineon | BA891 | PIN diode |
| BA892V-02V-GS08 | Vishay | BA891 | PIN diode |
| BA895 | Infineon | BAP70-02 | PIN diode |
| BAR14-1 | Infineon | BAP70-03 | PIN diode |
| BAR15-1 | Infineon | BAP70-03 | PIN diode |
| BAR16-1 | Infineon | BAP70-03 | PIN diode |
| BAR17 | Infineon | BAP50-03 | PIN diode |
| BAR50-02L | Infineon | BAP50LX | PIN diode |
| BAR50-02V | Infineon | BAP50-02 | PIN diode |
| BAR50-02V | Infineon | BAP50-03 | PIN diode |
| BAR50-02V | Infineon | BAP50-05 | PIN diode |
| BAR50-03W | Infineon | BAP70-02 | PIN diode |
| BAR60 | Infineon | BAP50-03 | PIN diode |
| BAR61 | Infineon | BAP50-03 | PIN diode |
| BAR63 | Infineon | BAP63-03 | PIN diode |
| BAR63-02L | Infineon | BAP63-02 | PIN diode |
| BAR63-02L | Infineon | BAP63LX | PIN diode |
| BAR63-02V | Infineon | BAP63-02 | PIN diode |
| BAR63-02W | Infineon | BAP63-02 | PIN diode |
| BAR63-03W | Infineon | BAP63-03 | PIN diode |
| BAR63-05 | Infineon | BAP63-05W | PIN diode |
| BAR63-05W | Infineon | BAP63-05W | PIN diode |
| BAR63V-02V-GS08 | Vishay | BAP63-02 | PIN diode |
| BAR63V-05W-GS08 | Vishay | BAP63-05W | PIN diode |
| BAR64-02LRH | Infineon | BAP64LX | PIN diode |
| BAR64-02V | Infineon | BAP64-02 | PIN diode |
| BAR64-02W | Infineon | BAP64-02 | PIN diode |
| BAR64-03W | Infineon | BAP64-03 | PIN diode |

| Manufacturer type | Manufacturer | NXP type | Product family |
|---|---|---|---|
| BAR64-04 | Infineon | BAP64-04 | PIN diode |
| BAR64-04W | Infineon | BAP64-04W | PIN diode |
| BAR64-05 | Infineon | BAP64-05 | PIN diode |
| BAR64-05W | Infineon | BAP64-05W | PIN diode |
| BAR64-06 | Infineon | BAP64-06 | PIN diode |
| BAR64-06W | Infineon | BAP64-06W | PIN diode |
| BAR64V-02V-GS08 | Vishay | BAP64-02 | PIN diode |
| BAR64V-04-GS08 | Vishay | BAP64-04 | PIN diode |
| BAR64V-05-GS08 | Vishay | BAP64-05 | PIN diode |
| BAR64V-06-GS08 | Vishay | BAP64-06 | PIN diode |
| BAR64V-06W-GS08 | Vishay | BAP64-06W | PIN diode |
| BAR65-02L | Infineon | BAP65LX | PIN diode |
| BAR65-02V | Infineon | BAP65-02 | PIN diode |
| BAR65-02W | Infineon | BAP65-02 | PIN diode |
| BAR65-03W | Infineon | BAP65-03 | PIN diode |
| BAR65V-02V-GS08 | Vishay | BAP65-02 | PIN diode |
| BAR66 | Infineon | BAP1321-04 | PIN diode |
| BAR67-02W | Infineon | BAP1321-02 | PIN diode |
| BAR67-03W | Infineon | BAP1321-03 | PIN diode |
| BAT18-04 | Infineon | BAT18 | PIN diode |
| BB304C | Renesas Electronics | BF1201WR | FET |
| BB304M | Renesas Electronics | BF1201R | FET |
| BB305C | Renesas Electronics | BF1201WR | FET |
| BB305M | Renesas Electronics | BF1201R | FET |
| BB403M | Renesas Electronics | BF909R | FET |
| BB501C | Renesas Electronics | BF1202WR | FET |
| BB501M | Renesas Electronics | BF1202R | FET |
| BB502C | Renesas Electronics | BF1202WR | FET |
| BB502M | Renesas Electronics | BF1202R | FET |
| BB503C | Renesas Electronics | BF1202WR | FET |
| BB503M | Renesas Electronics | BF1202R | FET |
| BB535 | Infineon | BB149 | Varicap |
| BB545 | Infineon | BB149A | Varicap |
| BB555 | Infineon | BB179B | Varicap |
| BB565 | Infineon | BB179 | Varicap |
| BB601M | Renesas Electronics | BF1202 | FET |
| BB639 | Infineon | BB148 | Varicap |
| BB639 | Infineon | BB153 | Varicap |
| BB640 | Infineon | BB152 | Varicap |
| BB641 | Infineon | BB152 | Varicap |
| BB659 | Infineon | BB178 | Varicap |
| BB664 | Infineon | BB178 | Varicap |
| BB664 | Infineon | BB187 | Varicap |
| BB669 | Infineon | BB152 | Varicap |
| BB814 | Infineon | BB201 | Varicap |
| BB831 | Infineon | BB131 | Varicap |
| BB833 | Infineon | BB131 | Varicap |
| BB835 | Infineon | BB131 | Varicap |
| BBY58-02V | Infineon | BB202 | Varicap |
| BBY65 | Infineon | BB202 | Varicap |
| BF1005R | Infineon | BF1105R | FET |
| BF1005S | Infineon | BF1105 | FET |
| BF1005SR | Infineon | BF1105R | FET |
| BF2030 | Infineon | BF1211 | FET |
| BF2030 | Infineon | BF1212 | FET |
| BF2030R | Infineon | BF1211R | FET |
| BF2030R | Infineon | BF1212R | FET |
| BF2030W | Infineon | BF1211WR | FET |
| BF2030W | Infineon | BF1212WR | FET |
| BF2040 | Infineon | BF909 | FET |
| BF2040R | Infineon | BF909R | FET |
| BF2040W | Infineon | BF909WR | FET |
| BF5020 | Infineon | BF1212 | FET |
| BF5020R | Infineon | BF1212R | FET |
| BF5020W | Infineon | BF1212WR | FET |
| BF5030W | Infineon | BF909WR | FET |
| BF770A | Infineon | BFR93A | WB trs 1-4 |
| BF771 | Infineon | PBR951 | WB trs 1-4 |
| BF771W | Infineon | BFS540 | WB trs 1-4 |
| BF772 | Infineon | BFG540 | WB trs 1-4 |
| BF775 | Infineon | BFR92A | WB trs 1-4 |
| BF775A | Infineon | BFR92A | WB trs 1-4 |
| BF775W | Infineon | BFR92AW | WB trs 1-4 |
| BF851A | Standard | BF861A | FET |
| BF851B | Standard | BF861B | FET |
| BF851C | Standard | BF861C | FET |
| BF994S | Vishay | BF994S | FET |

| Manufacturer type | Manufacturer | NXP type | Product family |
|---|---|---|---|
| BF996S | Vishay | BF996S | FET |
| BF998 | Infineon | BF998 | FET |
| BF998 | Vishay | BF998 | FET |
| BF998-GS08 | Vishay | BF998 | FET |
| BF998R | Vishay | BF998R | FET |
| BF998R | Infineon | BF998R | FET |
| BF998R-GS08 | Vishay | BF998R | FET |
| BF998RW | Vishay | BF998WR | FET |
| BF998W | Infineon | BF998WR | FET |
| BFG135A | Infineon | BFG135 | WB trs 1-4 |
| BFG193 | Infineon | BFG198 | WB trs 1-4 |
| BFG194 | Infineon | BFG31 | WB trs 1-4 |
| BFG196 | Infineon | BFG541 | WB trs 1-4 |
| BFG19S | Infineon | BFG97 | WB trs 1-4 |
| BFG235 | Infineon | BFG135 | WB trs 1-4 |
| BFP180 | Infineon | BFG505/X | WB trs 1-4 |
| BFP181 | Infineon | BFG67/X | WB trs 1-4 |
| BFP181T-GS08 | Vishay | BFG67/X | WB trs 1-4 |
| BFP182 | Infineon | BFG67/X | WB trs 1-4 |
| BFP183 | Infineon | BFG520/X | WB trs 1-4 |
| BFP183R | Infineon | BFG520/XR | WB trs 1-4 |
| BFP183T-GS08 | Vishay | BFG520/X | WB trs 1-4 |
| BFP183TW-GS08 | Vishay | BFG520W/X | WB trs 1-4 |
| BFP193 | Infineon | BFG540/X | WB trs 1-4 |
| BFP193W | Infineon | BFG540W/XR | WB trs 1-4 |
| BFP196T-GS08 | Vishay | BFG540/X | WB trs 1-4 |
| BFP196TR-GS08 | Vishay | BFG540/XR | WB trs 1-4 |
| BFP196TRW-GS08 | Vishay | BFG540W/XR | WB trs 1-4 |
| BFP196TW-GS08 | Vishay | BFG540W/X | WB trs 1-4 |
| BFP196W | Infineon | BFG540W/XR | WB trs 1-4 |
| BFP280 | Infineon | BFG505/X | WB trs 1-4 |
| BFP405 | Infineon | BFG410W | WB trs 5-7 |
| BFP420 | Infineon | BFG425W | WB trs 5-7 |
| BFP450 | Infineon | BFG480W | WB trs 5-7 |
| BFP620 | Infineon | BFU660F | WB trs 5-7 |
| BFP640 | Infineon | BFU630F, BFU660F | WB trs 5-7 |
| BFP650 | Infineon | BFU690F, BFU760F, BFU790F | WB trs 5-7 |
| BFP67-GS08 | Vishay | BFG67/X | WB trs 1-4 |
| BFP67R-GS08 | Vishay | BFG67/X | WB trs 1-4 |
| BFP720 | Infineon | BFU710F, BFU730F | WB trs 5-7 |
| BFP740 | Infineon | BFU710F, BFU730F | WB trs 5-7 |
| BFP740 | Infineon | BFU725F | WB trs 5-7 |
| BFP740F | Infineon | BFU725F | WB trs 5-7 |
| BFP750 | Infineon | BFU690F, BFU760F, BFU790F | WB trs 5-7 |
| BFP81 | Infineon | BFG92A/X | WB trs 1-4 |
| BFP92A-GS08 | Vishay | BFG92A/X | WB trs 1-4 |
| BFP93A | Infineon | BFG93A/X | WB trs 1-4 |
| BFP93A-GS08 | Vishay | BFG93A/X | WB trs 1-4 |
| BFQ193 | Infineon | BFQ540 | WB trs 1-4 |
| BFQ19S | Infineon | BFQ19 | WB trs 1-4 |
| BFQ67-GS08 | Vishay | BFQ67W | WB trs 1-4 |
| BFR106 | Infineon | BFR106 | WB trs 1-4 |
| BFR180 | Infineon | BFR505 | WB trs 1-4 |
| BFR180W | Infineon | BFS505 | WB trs 1-4 |
| BFR181 | Infineon | BFR520 | WB trs 1-4 |
| BFR181T-GS08 | Vishay | BFR520 | WB trs 1-4 |
| BFR181TW-GS08 | Vishay | BFS520 | WB trs 1-4 |
| BFR181W | Infineon | BFS520 | WB trs 1-4 |
| BFR182 | Infineon | PBR941 | WB trs 1-4 |
| BFR182W | Infineon | PRF947 | WB trs 1-4 |
| BFR183 | Infineon | PBR951 | WB trs 1-4 |
| BFR183T-GS08 | Vishay | PBR951 | WB trs 1-4 |
| BFR183TW-GS08 | Vishay | PRF957 | WB trs 1-4 |
| BFR183W | Infineon | PRF957 | WB trs 1-4 |
| BFR193 | Infineon | PBR951 | WB trs 1-4 |
| BFR193TW-GS08 | Vishay | PRF957 | WB trs 1-4 |
| BFR193W | Infineon | PRF957 | WB trs 1-4 |
| BFR196T-GS08 | Vishay | BFR540 | WB trs 1-4 |
| BFR196TW-GS08 | Vishay | BFS540 | WB trs 1-4 |
| BFR35AP | Infineon | BFR92A | WB trs 1-4 |
| BFR92AL | Freescale | BFR92A | WB trs 1-4 |
| BFR92AW-GS08 | Vishay | BFR92AW | WB trs 1-4 |
| BFR92P | Infineon | BFR92A | WB trs 1-4 |
| BFR92W | Infineon | BFR92AW | WB trs 1-4 |
| BFR93A | Infineon | BFR93A | WB trs 1-4 |

| Manufacturer type | Manufacturer | NXP type | Product family |
|---|---|---|---|
| BFR93AL | Freescale | BFR93A | WB trs 1-4 |
| BFR93AW | Infineon | BFR93AW | WB trs 1-4 |
| BFR93AW-GS08 | Vishay | BFR93AW | WB trs 1-4 |
| BFR93-GS08 | Vishay | BFR93A | WB trs 1-4 |
| BFS17-GS08 | Vishay | BFS17 | WB trs 1-4 |
| BFS17-GS08 | Vishay | BFS17A | WB trs 1-4 |
| BFS17L | Freescale | BFS17 | WB trs 1-4 |
| BFS17P | Infineon | BFS17A | WB trs 1-4 |
| BFS17W | Infineon | BFS17W | WB trs 1-4 |
| BFS17W-GS08 | Vishay | BFS17W | WB trs 1-4 |
| BFS481 | Infineon | BFM505 | WB trs 1-4 |
| BFS483 | Infineon | BFM520 | WB trs 1-4 |
| BFT92 | Infineon | BFT92 | WB trs 1-4 |
| BFT93 | Infineon | BFT93 | WB trs 1-4 |
| BG3123 | Infineon | BF1203 | FET |
| BG3123R | Infineon | BF1203 | FET |
| BG3130 | Infineon | BF1214 | FET |
| BG3130R | Infineon | BF1214 | FET |
| BG3430R | Infineon | BF1207 | FET |
| BG5120K | Infineon | BF1210 | FET |
| BG5130R | Infineon | BF1206 | FET |
| BG5412K | Infineon | BF1208D | FET |
| BGA428 | Infineon | BGU7003 | MMIC |
| BGA461 | Infineon | BGU7003 | MMIC |
| BGA615 | Infineon | BGU7007 | MMIC |
| BGA715 | Infineon | BGU8007 | MMIC |
| BGA915 | Infineon | BGU7005 | MMIC |
| BGB707 | Infineon | BGU6102 | MMIC |
| BGB717 | Infineon | BGU6102 | MMIC |
| BIC701C | Renesas Electronics | BF1105WR | FET |
| BIC701M | Renesas Electronics | BF1105R | FET |
| BIC702C | Renesas Electronics | BF1105WR | FET |
| BIC702M | Renesas Electronics | BF1105R | FET |
| BIC801M | Renesas Electronics | BF1105 | FET |
| BSR111 | Standard | PMBFJ111 | FET |
| BSR112 | Standard | PMBFJ112 | FET |
| BSR113 | Standard | PMBFJ113 | FET |
| BSR174 | Standard | PMBFJ174 | FET |
| BSR175 | Standard | PMBFJ175 | FET |
| BSR176 | Standard | PMBFJ176 | FET |
| BSR177 | Standard | PMBFJ177 | FET |
| CA901 | Standard | BGX885N | CATV PPA |
| CA901A | Standard | BGX885N | CATV PPA |
| CMM6004-SC | Mimix | BGA7024 | MMIC |
| CMM6004-SC | Mimix | BGA7124 | MMIC |
| CMM6004-SC | Mimix | BGA7124 | MMIC |
| CMM6004-SC | Mimix | BGA7204 | MMIC |
| CMY91 | Infineon | BGA2022 | MMIC |
| CMY91 | Infineon | BGA2022 | WB trs 1-4 |
| CXE1089Z | RFMD | BGA6489 | MMIC |
| CXE1089Z | RFMD | BGA6589 | MMIC |
| D10040180GT | RFMD | CGD1042H | CATV PD |
| D10040180GTH | RFMD | CGD1042H | CATV PD |
| D10040200GT | RFMD | CGD1042H | CATV PD |
| D10040200GTH | RFMD | CGD1042H | CATV PD |
| D10040200P1 | RFMD | CGD1042H | CATV PD |
| D10040200PH1 | RFMD | CGD1042H | CATV PD |
| D10040220GT | RFMD | CGD1042H | CATV PD |
| D10040220GTH | RFMD | CGD1042H | CATV PD |
| D10040230P1 | RFMD | CGD1042H | CATV PD |
| D10040230PH1 | RFMD | CGD1042H | CATV PD |
| D10040240GT | RFMD | CGD1044H | CATV PD |
| D10040240GTH | RFMD | CGD1044H | CATV PD |
| D10040250GT | RFMD | CGD1044H | CATV PD |
| D10040250GTH | RFMD | CGD1044H | CATV PD |
| D10040270GT | RFMD | CGD1044H | CATV PD |
| D10040270GTH | RFMD | CGD1044H | CATV PD |
| D10040270GTL | RFMD | CGD1044H | CATV PD |
| D8740180GT | RFMD | CGD942C | CATV PD |
| D8740180GTH | RFMD | CGD942C | CATV PD |
| D8740220GT | RFMD | CGD942C | CATV PD |
| D8740220GTH | RFMD | CGD942C | CATV PD |
| D8740240GT | RFMD | CGD944C | CATV PD |
| D8740240GTH | RFMD | CGD944C | CATV PD |
| D8740250GT | RFMD | CGD944C | CATV PD |
| D8740250GTH | RFMD | CGD944C | CATV PD |
| D8740270GT | RFMD | CGD944C | CATV PD |
| D8740270GTH | RFMD | CGD944C | CATV PD |
| D8740320GT | RFMD | CGD888C | CATV PD |
| D8740320GTH | RFMD | CGD888C | CATV PD |
| EC2C03C | Sanyo | BB145B | Varicap |
| FSD273TA | Skyworks | BB148 | Varicap |
| FSD273TA | Skyworks | BB178 | Varicap |
| HBFP0405 | Agilent | BFG410W | WB trs 5-7 |
| HBFP0420 | Agilent | BFG425W | WB trs 5-7 |
| HBFP0450 | Agilent | BFG480W | WB trs 5-7 |
| HMC454ST89E | Hittite | BGA7027 | MMIC |
| HMC454ST89E | Hittite | BGA7127 | MMIC |
| HMC454ST89E | Hittite | BGA7127 | MMIC |
| HMC617LP3 | Hittite | BGU7051 | MMIC |
| HMC618LP3 | Hittite | BGU7052 | MMIC |
| HMC625 | Hittite | BGA7204 | MMIC |
| HMC667LP2 | Hittite | BGU7053 | MMIC |
| HSC277 | Renesas Electronics | BA277 | BS diode |
| HSMP3800 | Agilent | BAP70-03 | PIN diode |
| HSMP3802 | Agilent | BAP50-04 | PIN diode |
| HSMP3804 | Agilent | BAP50-05 | PIN diode |
| HSMP3810 | Agilent | BAP50-03 | PIN diode |
| HSMP3814 | Agilent | BAP50-05 | PIN diode |
| HSMP381B | Agilent | BAP50-03 | PIN diode |
| HSMP381C | Agilent | BAP50-05 | PIN diode |
| HSMP381F | Agilent | BAP64-05W | PIN diode |
| HSMP3820 | Agilent | BAP1321-03 | PIN diode |
| HSMP3822 | Agilent | BAP1321-04 | PIN diode |
| HSMP3830 | Agilent | BAP64-03 | PIN diode |
| HSMP3832 | Agilent | BAP64-04 | PIN diode |
| HSMP3833 | Agilent | BAP64-06 | PIN diode |
| HSMP3834 | Agilent | BAP64-05 | PIN diode |
| HSMP3860 | Agilent | BAP50-03 | PIN diode |
| HSMP3862 | Agilent | BAP50-04 | PIN diode |
| HSMP3864 | Agilent | BAP50-05 | PIN diode |
| HSMP386B | Agilent | BAP50-02 | PIN diode |
| HSMP386E | Agilent | BAP50-04W | PIN diode |
| HSMP386L | Agilent | BAP50-05W | PIN diode |
| HSMP3880 | Agilent | BAP51-03 | PIN diode |
| HSMP3890 | Agilent | BAP51-03 | PIN diode |
| HSMP3892 | Agilent | BAP64-04 | PIN diode |
| HSMP3894 | Agilent | BAP64-05 | PIN diode |
| HSMP3895 | Agilent | BAP51-02 | PIN diode |
| HSMP389B | Agilent | BAP51-02 | PIN diode |
| HSMP389C | Agilent | BAP64-04 | PIN diode |
| HSMP389F | Agilent | BAP51-05W | PIN diode |
| HVB14S | Renesas Electronics | BAP50-04W | PIN diode |
| HVC131 | Renesas Electronics | BAP65-02 | PIN diode |
| HVC132 | Renesas Electronics | BAP51-02 | PIN diode |
| HVC200A | Renesas Electronics | BB178 | Varicap |
| HVC200A | Renesas Electronics | BB187 | Varicap |
| HVC202A | Renesas Electronics | BB179 | Varicap |
| HVC202B | Renesas Electronics | BB179B | Varicap |
| HVC300A | Renesas Electronics | BB182 | Varicap |
| HVC300B | Renesas Electronics | BB182 | Varicap |
| HVC306A | Renesas Electronics | BB187 | Varicap |
| HVC306B | Renesas Electronics | BB187 | Varicap |
| HVC355B | Renesas Electronics | BB145B | Varicap |
| HVC359 | Renesas Electronics | BB202 | Varicap |
| HVC363A | Renesas Electronics | BB178 | Varicap |
| HVC376B | Renesas Electronics | BB198 | Varicap |
| HVC376B | Renesas Electronics | BB202 | Varicap |
| HVD132 | Renesas Electronics | BAP51-02 | PIN diode |
| HVU131 | Renesas Electronics | BAP65-03 | PIN diode |
| HVU132 | Renesas Electronics | BAP51-03 | PIN diode |
| HVU202(A) | Renesas Electronics | BB149 | Varicap |
| HVU202(A) | Renesas Electronics | BB149A | Varicap |
| HVU300A | Renesas Electronics | BB152 | Varicap |
| HVU307 | Renesas Electronics | BB148 | Varicap |
| HVU315 | Renesas Electronics | BB148 | Varicap |
| HVU316 | Renesas Electronics | BB131 | Varicap |
| HVU363A | Renesas Electronics | BB148 | Varicap |
| HVU363A | Renesas Electronics | BB153 | Varicap |
| HVU363B | Renesas Electronics | BB148 | Varicap |
| IB0912L200 | Integra | BLA1011-200R | A&D |
| IB0912L30 | Integra | BLA1011-2 | A&D |
| IB0912L70 | Integra | BLA1011-200 | A&D |
| IB0912M210 | Integra | BLA0912-250 | A&D |

| Manufacturer type | Manufacturer | NXP type | Product family |
|---|---|---|---|
| IB0912M350 | Integra | BLA0912-250R | A&D |
| IB0912M500 | Integra | BLA6H0912-500 | A&D |
| IB0912M600 | Integra | BLA1011-10 | A&D |
| IB0912M70 | Integra | BLL6H0514LS-130 | A&D |
| IB1011S1000 | Integra | BLA6G1011LS-200RG | A&D |
| IB1011S1500 | Integra | BLA6H1011-600 | A&D |
| IB1011S190 | Integra | BLA1011S-200 | A&D |
| IB1011S250 | Integra | BLA1011S-200R | A&D |
| IB1011S350 | Integra | BLA6G1011-200R | A&D |
| IB1011S70 | Integra | BLA1011-300 | A&D |
| IB1214M130 | Integra | BLL6H1214-500 | A&D |
| IB1214M150 | Integra | BLL6G1214L-250 | A&D |
| IB1214M300 | Integra | BLL6G1214LS-250 | A&D |
| IB1214M32 | Integra | BLL1214-250R | A&D |
| IB1214M375 | Integra | BLL6H1214L-250 | A&D |
| IB1214M55 | Integra | BLL1214-35 | A&D |
| IB1214M6 | Integra | BLL1214-250 | A&D |
| IB2729M25 | Integra | BLS7G2729LS-350P | A&D |
| IB2729M5 | Integra | BLS7G2729L-350P | A&D |
| IB2731M110 | Integra | BLS6G2731-6G | A&D |
| IB2731MH110 | Integra | BLS6G2731S-130 | A&D |
| IB2731MH25 | Integra | BLS6G2731S-120 | A&D |
| IB2931MH155 | Integra | BLS6G2933S-130 | A&D |
| IB2931MH55 | Integra | BLS2933-100 | A&D |
| IB2934M100 | Integra | BLS7G2933S-150 | A&D |
| IB3135MH100 | Integra | BLS7G3135LS-350P | A&D |
| IB3135MH20 | Integra | BLS6G3135-20 | A&D |
| IB3135MH45 | Integra | BLS6G3135S-120 | A&D |
| IB3135MH5 | Integra | BLS6G3135-120 | A&D |
| IB3135MH65 | Integra | BLS6G3135S-20 | A&D |
| IB3135MH75 | Integra | BLS7G3135L-350P | A&D |
| IB450S300 | Integra | BLF578XR | Broadcast |
| IB450S500 | Integra | BLF544 | Broadcast |
| IDM165L650 | Integra | BLF1043 | Broadcast |
| IDM175CW300 | Integra | BLF369 | Broadcast |
| IDM265L650 | Integra | BLF1046 | Broadcast |
| IDM30512CW100 | Integra | BLF574XRS | Broadcast |
| IDM30512CW20 | Integra | BLF574 | Broadcast |
| IDM30512CW50 | Integra | BLF574XR | Broadcast |
| IDM500CW120 | Integra | BLF572XR | Broadcast |
| IDM500CW150 | Integra | BLF572XRS | Broadcast |
| IDM500CW200 | Integra | BLF573 | Broadcast |
| IDM500CW300 | Integra | BLF573S | Broadcast |
| IDM500CW80 | Integra | BLF571 | Broadcast |
| ILD0506EL350 | Integra | BLF988 | Broadcast |
| ILD0912M150HV | Integra | BLL6H0514-25 | A&D |
| ILD0912M15HV | Integra | BLU6H0410LS-600P | A&D |
| ILD0912M400HV | Integra | BLL6H0514L-130 | A&D |
| ILD0912M60 | Integra | BLU6H0410L-600P | A&D |
| ILD1214M10 | Integra | BLL6H1214LS-250 | A&D |
| ILD1214M60 | Integra | BLL6H1214LS-500 | A&D |
| ILD2731M140 | Integra | BLS6G2731-120 | A&D |
| ILD2735M120 | Integra | BLS6G2735L-30 | A&D |
| ILD2933M130 | Integra | BLS6G2735LS-30 | A&D |
| INA-51063 | Agilent | BGA2001 | MMIC |
| JDP2S01E | Toshiba | BAP65-02 | PIN diode |
| JDP2S01U | Toshiba | BAP65-03 | PIN diode |
| JDP2S02AFS | Toshiba | BAP51-02 | PIN diode |
| JDP2S02AS | Toshiba | BAP51-03 | PIN diode |
| JDP2S02T | Toshiba | BAP63-02 | PIN diode |
| JDP2S04E | Toshiba | BAP50-02 | PIN diode |
| JDS2S03S | Toshiba | BA891 | BS diode |
| KP2310R | Toko | BAP64-04W | PIN diode |
| KTK920* | KEC | BF1108 | FET |
| KTK920BT | KEC | BF1108 | FET |
| KTK920T | KEC | BF1108R | FET |
| KV1835E | Toko | BB199 | Varicap |
| LTC5590 | Linear Technology | BGX7220 | MMIC |
| LTC5591 | Linear Technology | BGX7221 | MMIC |
| LTC5592 | Linear Technology | BGX7221 | MMIC |
| MA2S077 | Standard | BA277 | BS diode |
| MA2S357 | Panasonic | BB178 | Varicap |
| MA2S357 | Panasonic | BB187 | Varicap |
| MA2S372 | Panasonic | BB179 | Varicap |
| MA2S374 | Panasonic | BB182 | Varicap |
| MA2SV01 | Renesas Electronics | BB202 | Varicap |
| MA357 | Panasonic | BB153 | Varicap |

| Manufacturer type | Manufacturer | NXP type | Product family |
|---|---|---|---|
| MA366 | Panasonic | BB148 | Varicap |
| MA368 | Panasonic | BB131 | Varicap |
| MA372 | Panasonic | BB149 | Varicap |
| MA372 | Panasonic | BB149A | Varicap |
| MA4CP101A | Panasonic | BAP65-03 | PIN diode |
| MA4P274-1141 | Panasonic | BAP51-03 | PIN diode |
| MA4P275-1141 | Panasonic | BAP65-03 | PIN diode |
| MA4P275CK-287 | Panasonic | BAP65-05 | PIN diode |
| MA4P277-1141 | Panasonic | BAP70-03 | PIN diode |
| MA4P278-287 | Panasonic | BAP70-03 | PIN diode |
| MA4P789-1141 | Panasonic | BAP1321-03 | PIN diode |
| MA4P789ST-287 | Panasonic | BAP1321-04 | PIN diode |
| MAX19985A | MAXIM | BGX7220 | MMIC |
| MAX19995 | MAXIM | BGX7221 | MMIC |
| MAX2634 | Maxim | BGU6102 | MMIC |
| MAX2657 | Maxim | BGU8007 | MMIC |
| MAX2658 | Maxim | BGU7005 | MMIC |
| MAX2659 | Maxim | BGU7005 | MMIC |
| MAX2667 | Maxim | BGU8007 | MMIC |
| MAX2687 | Maxim | BGU7005 | MMIC |
| MAX2694 | Maxim | BGU7005 | MMIC |
| MC7712 | Renesas Electronics | BGY785A | CATV PPA |
| MC7716 | Renesas Electronics | BGY787 | CATV PPA |
| MC7722 | Renesas Electronics | BGY785A | CATV PPA |
| MC7726 | Renesas Electronics | BGY787 | CATV PPA |
| MC-7831 | Renesas Electronics | BGY885A | CATV PP |
| MC7831-HA | Renesas Electronics | BGY1085A | CATV PP |
| MC-7831-HA | Renesas Electronics | BGY1085A | CATV PP |
| MC-7832 | Renesas Electronics | BGY887 | CATV PP |
| MC7832-HA | Renesas Electronics | CGY1041 | CATV PP |
| MC-7832-HA | Renesas Electronics | CGY1041 | CATV PP |
| MC-7833 | Renesas Electronics | BGY887B | CATV PP |
| MC-7836 | Renesas Electronics | BGY887B | CATV PP |
| MC-7836 | Renesas Electronics | CGY1047 | CATV PP |
| MC-7846 | Renesas Electronics | CGD942C | CATV PD |
| MC-7847 | Renesas Electronics | CGD944C | CATV PD |
| MC7852 | Renesas Electronics | BGY885A | CATV PPA |
| MC7866 | Renesas Electronics | BGD816L | CATV PD |
| MC-7882 | Renesas Electronics | BGD814 | CATV PD |
| MC-7883 | Renesas Electronics | CGD942C | CATV PD |
| MC-7884 | Renesas Electronics | CGD944C | CATV PD |
| MC-7891 | Renesas Electronics | CGD1042H | CATV PD |
| MC7893 | Renesas Electronics | CGD1042Hi | CATV PD |
| MC7893 | Renesas Electronics | CGD982HCi | CATV PD |
| MC-7893 | Renesas Electronics | CGD1042H | CATV PD |
| MC7894 | Renesas Electronics | CGD1044Hi | CATV PD |
| MC7894 | Renesas Electronics | CGD985HCi | CATV PD |
| MC-7894 | Renesas Electronics | CDG1044H | CATV PD |
| MC7896 | Renesas Electronics | CGD1046Hi | CATV PD |
| MC7896 | Renesas Electronics | CGD987HCi | CATV PD |
| MC-7896 | Renesas Electronics | CGD1044H | CATV PD |
| MCH4009 | Sanyo | BFG424F | WB trs 5-7 |
| MD7IC18120GNR1 | Freescale | BLF6G20-180RN | Base station |
| MD7IC18120NR1 | Freescale | BLF6G20-230PRN | Base station |
| MD7IC2050GNR1 | Freescale | BLF7G20LS-200 | Base station |
| MD7IC21100GNR1 | Freescale | BLF6G22-45 | Base station |
| MD7IC21100NBR1 | Freescale | BLF6G22L-40BN | Base station |
| MD7IC21100NR1 | Freescale | BLF6G22LS-40BN | Base station |
| MD7IC2250GNR1 | Freescale | BLF6G22LS-100 | Base station |
| MD7IC2250NBR1 | Freescale | BLF6G22LS-130 | Base station |
| MD7IC2250NR1 | Freescale | BLF6G22LS-180PN | Base station |
| MD7IC2755GNR1 | Freescale | BLF6G27-100 | Base station |
| MD7IC2755NR1 | Freescale | BLF6G27-135 | Base station |
| MD8IC970GNR1 | Freescale | BLF8G10LS-400PGV | Base station |
| MD8IC970NR1 | Freescale | BLF8G10L-300P | Base station |
| MDS60L | Microsemi | BLA1011S-200R | A&D |
| MGA631P8 | Avago | BGU7051 | MMIC |
| MGA632P8 | Avago | BGU7052 | MMIC |
| MGA632P8 | Avago | BGU7053 | MMIC |
| MHVIC915NR2 | Freescale | BLF6G10LS-135RN | Base station |
| MHW10186N | Freescale | BGY1085A | CATV PP |
| MHW10236N | Freescale | CGY1043 | CATV PP |
| MHW10247AN | Freescale | CGD1044H | CATV PD |
| MHW10276N | Freescale | CGY1047 | CATV PP |
| MHW1224 | Freescale | BGY67 | CATV RA |
| MHW1244 | Freescale | BGY67A | CATV RA |
| MHW1253LA | Freescale | BGY67A | CATV RA |

| Manufacturer type | Manufacturer | NXP type | Product family |
|---|---|---|---|
| MHW1254L | Freescale | BGY68 | CATV RA |
| MHW1254LA | Freescale | BGY68 | CATV RA |
| MHW1304L | Freescale | BGY68 | CATV RA |
| MHW1304LA | Freescale | BGY68 | CATV RA |
| MHW1304LAN | Freescale | BGY68 | CATV RA |
| MHW1346 | Freescale | BGY67A | CATV RA |
| MHW1353LA | Freescale | BGY67A | CATV RA |
| MHW1354LA | Freescale | BGY68 | CATV RA |
| MHW7182B | Freescale | BGY785A | CATV PPA |
| MHW7182C | Freescale | BGY785A | CATV PPA |
| MHW7185C2 | Freescale | BGD712 | CATV PD |
| MHW7185CL | Freescale | BGD712 | CATV PD |
| MHW7205C | Freescale | BGD714 | CATV PD |
| MHW7205CL | Freescale | BGD714 | CATV PD |
| MHW7205CLN | Freescale | BGD714 | CATV PD |
| MHW7222 | Freescale | BGY787 | CATV PPA |
| MHW7222A | Freescale | BGY787 | CATV PPA |
| MHW7222B | Freescale | BGY787 | CATV PPA |
| MHW7242A | Freescale | BGE787B | CATV PPA/HG |
| MHW7272A | Freescale | BGE787B | CATV PPA/HG |
| MHW7292 | Freescale | BGE787B | CATV PPA/HG |
| MHW7292A | Freescale | BGE787B | CATV PPA/HG |
| MHW7292AN | Freescale | BGE787B | CATV PPA/HG |
| MHW8182B | Freescale | BGY885A | CATV PPA |
| MHW8182C | Freescale | BGY885A | CATV PPA |
| MHW8182CN | Freescale | BGY885A | CATV PP |
| MHW8185 | Freescale | BGD814 | CATV PD |
| MHW8185L | Freescale | BGD812 | CATV PD |
| MHW8188AN | Freescale | CGD942C | CATV PD |
| MHW8205 | Freescale | BGD814 | CATV PD |
| MHW820L | Freescale | BGD814 | CATV PD |
| MHW8222BN | Freescale | BGY887 | CATV PP |
| MHW8227A | Freescale | CGD942C | CATV PD |
| MHW8227AN | Freescale | CGD942C | CATV PD |
| MHW8247A | Freescale | CGD944C | CATV PPA |
| MHW8247AN | Freescale | CGD944C | CATV PD |
| MHW8292 | Freescale | BGY887B | CATV PPA |
| MHW8342 | Freescale | BGY888 | CATV PPA |
| MHW8342N | Freescale | CGY888C | CATV PP |
| MHW9182B | Freescale | BGY1085A | CATV PPA |
| MHW9182C | Freescale | BGY1085A | CATV PPA |
| MHW9182CN | Freescale | BGY1085A | CATV PP |
| MHW9186 | Freescale | BGY885A | CATV PPA |
| MHW9186A | Freescale | BGY885A | CATV PPA |
| MHW9187N | Freescale | CGD942C | CATV PD |
| MHW9188AN | Freescale | CGD942C | CATV PD |
| MHW9188N | Freescale | CGD942C | CATV PD |
| MHW9227AN | Freescale | CGD942C | CATV PD |
| MHW9242A | Freescale | CGD1042 | CATV PD |
| MHW9247 | Freescale | CGD944C | CATV PD |
| MHW9247A | Freescale | CGD944C | CATV PD |
| MHW9247AN | Freescale | CGD944C | CATV PD |
| MHW9247N | Freescale | CGD944C | CATV PD |
| MHWJ7185A | Freescale | BGD712 | CATV PD |
| MHWJ7205A | Freescale | BGD714 | CATV PD |
| MHWJ7292 | Freescale | BGE787B | CATV PPA/HG |
| MHWJ9182 | Freescale | BGY1085A | CATV PPA |
| MMBF4391 | Freescale | PMBF4391 | FET |
| MMBF4392 | Freescale | PMBF4392 | FET |
| MMBF4393 | Freescale | PMBF4393 | FET |
| MMBF4860 | Freescale | PMBFJ112 | FET |
| MMBF5484 | Freescale | BFR31 | FET |
| MMBFJ113 | Freescale | PMBFJ113 | FET |
| MMBFJ174 | Freescale | PMBFJ174 | FET |
| MMBFJ175 | Freescale | PMBFJ175 | FET |
| MMBFJ176 | Freescale | PMBFJ176 | FET |
| MMBFJ177 | Freescale | PMBFJ177 | FET |
| MMBFJ308 | Freescale | PMBFJ308 | FET |
| MMBFJ309 | Freescale | PMBFJ309 | FET |
| MMBFJ310 | Freescale | PMBFJ310 | FET |
| MMBFU310 | Freescale | PMBFJ310 | FET |
| MMBR5031L | Freescale | BFS17 | WB trs 1-4 |
| MMBR5179L | Freescale | BFS17A | WB trs 1-4 |
| MMBR571L | Freescale | PBR951 | WB trs 1-4 |
| MMBR901L | Freescale | BFR92A | WB trs 1-4 |
| MMBR911L | Freescale | BFR93A | WB trs 1-4 |
| MMBR920L | Freescale | BFR93A | WB trs 1-4 |

| Manufacturer type | Manufacturer | NXP type | Product family |
|---|---|---|---|
| MMBR931L | Freescale | BFT25A | WB trs 1-4 |
| MMBR941BL | Freescale | PBR941 | WB trs 1-4 |
| MMBR941L | Freescale | PBR941 | WB trs 1-4 |
| MMBR951AL | Freescale | PBR951 | WB trs 1-4 |
| MMBR951L | Freescale | PBR951 | WB trs 1-4 |
| MMBV105GLT1 | ONSemicond. | BB156 | Varicap |
| MMBV109LT1 | ONSemicond. | BB148 | Varicap |
| MMG2001NT1 | Freescale | BGD816L | CATV PD |
| MMG2001T1 | Freescale | BGD816L | CATV PD |
| MMG3004NT1 | Freescale | BGA7027 | MMIC |
| MMG3004NT1 | Freescale | BGA7127 | MMIC |
| MMG3004NT1 | Freescale | BGA7127 | MMIC |
| MMG3014 | Freescale | BGA7024 | MMIC |
| MMG3014 | Freescale | BGA7124 | MMIC |
| MMG3014 | Freescale | BGA7124 | MMIC |
| MMG3014 | Freescale | BGA7204 | MMIC |
| MRF282ZR1 | Freescale | BLF7G20LS-250P | Base station |
| MRF577 | Freescale | PRF957 | WB trs 1-4 |
| MRF5811L | Freescale | BFG93A/X | WB trs 1-4 |
| MRF5P21045NR1 | Freescale | BLF6G22LS-180RN | Base station |
| MRF5S9100NBR1 | Freescale | BLF6G10-135RN | Base station |
| MRF5S9101NBR1 | Freescale | BLF6G10LS-200RN | Base station |
| MRF5S9150HR3 | Freescale | BLF6G10-160RN | Base station |
| MRF5S9150HSR3 | Freescale | BLF6G10-200RN | Base station |
| MRF6P24190HR6 | Freescale | BLF6G27-10G | Base station |
| MRF6P24190HR6 | Freescale | BLF7G24LS-160P | Base station |
| MRF6P27160HR5 | Freescale | BLF7G27L-150P | Base station |
| MRF6P27160HR5 | Freescale | BLF8G27LS-140 | Base station |
| MRF6P27160HR6 | Freescale | BLF7G27L-90P | Base station |
| MRF6P27160HR6 | Freescale | BLF8G27LS-140G | Base station |
| MRF6S18060NR1 | Freescale | BLF6G20-110 | Base station |
| MRF6S18060NR1 | Freescale | BLF6G20-180PN | Base station |
| MRF6S20010GNR1 | Freescale | BLF6G22LS-75 | Base station |
| MRF6S20010NR1 | Freescale | BLF6G22S-45 | Base station |
| MRF6S21050LR3 | Freescale | BLF7G22L-130 | Base station |
| MRF6S21050LSR3 | Freescale | BLF7G22L-160 | Base station |
| MRF6S21100HR3 | Freescale | BLF7G22LS-130 | Base station |
| MRF6S21140HR3 | Freescale | BLF7G22LS-160 | Base station |
| MRF6S21190HSR3 | Freescale | BLF8G22LS-200GV | Base station |
| MRF6S24140HR3 | Freescale | BLF7G24L-100 | Base station |
| MRF6S24140HR3 | Freescale | BLF7G27L-75P | Base station |
| MRF6S24140HSR3 | Freescale | BLF7G24L-140 | Base station |
| MRF6S24140HSR3 | Freescale | BLF7G27LS-75P | Base station |
| MRF6S27015GNR1 | Freescale | BLF7G22LS-250P | Base station |
| MRF6S27015NR1 | Freescale | BLF6G27-10 | Base station |
| MRF6S27085HR3 | Freescale | BLF7G27LS-100 | Base station |
| MRF6S27085HR3 | Freescale | BLF8G27LS-200GV | Base station |
| MRF6S27085HR5 | Freescale | BLF8G27LS-200PGV | Base station |
| MRF6S27085HSR3 | Freescale | BLF8G27LS-280PGV | Base station |
| MRF6S27085HSR5 | Freescale | BLF7G27L-135 | Base station |
| MRF6V10010NR4 | Freescale | BLA1011-200R | A&D |
| MRF6V12250HR3 | Freescale | BLA0912-250 | A&D |
| MRF6V12250HR5 | Freescale | BLA0912-250R | A&D |
| MRF6V12250HSR3 | Freescale | BLA6H0912-500 | A&D |
| MRF6V12500HR5 | Freescale | BLA1011-10 | A&D |
| MRF6V12500HSR3 | Freescale | BLA1011-2 | A&D |
| MRF6V12500HSR5 | Freescale | BLA1011-200 | A&D |
| MRF6V13250HR3 | Freescale | BLF6G15L-500H | Base station |
| MRF6V13250HR3 | Freescale | BLF6G15LS-250PBRN | Base station |
| MRF6V13250HR3 | Freescale | BLL6G1214LS-250 | A&D |
| MRF6V13250HR3 | Freescale | BLL6H1214LS-500 | A&D |
| MRF6V13250HR5 | Freescale | BLF6G15LS-500H | Base station |
| MRF6V13250HR5 | Freescale | BLF6G15LS-40RN | Base station |
| MRF6V13250HR5 | Freescale | BLL6H1214-500 | A&D |
| MRF6V13250HSR3 | Freescale | BLF6G13L-250P | Base station |
| MRF6V13250HSR3 | Freescale | BLF7G20L-90P | Base station |
| MRF6V13250HSR3 | Freescale | BLL6H1214L-250 | A&D |
| MRF6V13250HSR5 | Freescale | BLF6G13LS-250P | Base station |
| MRF6V13250HSR5 | Freescale | BLF7G20LS-90P | Base station |
| MRF6V13250HSR5 | Freescale | BLL6H1214LS-250 | A&D |
| MRF6V14300HR3 | Freescale | BLL1214-250 | A&D |
| MRF6V14300HR5 | Freescale | BLL1214-250R | A&D |
| MRF6V14300HSR3 | Freescale | BLF7G15LS-200 | Base station |
| MRF6V14300HSR3 | Freescale | BLL1214-35 | A&D |
| MRF6V14300HSR5 | Freescale | BLF7G15LS-300P | Base station |
| MRF6V14300HSR5 | Freescale | BLL6G1214L-250 | A&D |
| MRF6V2010NBR1 | Freescale | BLF573S | Broadcast |

| Manufacturer type | Manufacturer | NXP type | Product family |
|---|---|---|---|
| MRF6V2010NBR5 | Freescale | BLF574 | Broadcast |
| MRF6V2010NR1 | Freescale | BLF574XR | Broadcast |
| MRF6V2150NBR1 | Freescale | BLF574XRS | Broadcast |
| MRF6V2150NBR5 | Freescale | BLF578 | Broadcast |
| MRF6V2150NR1 | Freescale | BLF578XR | Broadcast |
| MRF6V3090NBR1 | Freescale | BLF647PS | Broadcast |
| MRF6V3090NBR5 | Freescale | BLF202 | Broadcast |
| MRF6V3090NR1 | Freescale | BLF242 | Broadcast |
| MRF6V3090NR5 | Freescale | BLF244 | Broadcast |
| MRF6VP11KHR5 | Freescale | BLF145 | Broadcast |
| MRF6VP11KHR6 | Freescale | BLF147 | Broadcast |
| MRF6VP21KHR5 | Freescale | BLF175 | Broadcast |
| MRF6VP21KHR6 | Freescale | BLF177 | Broadcast |
| MRF6VP2600HR5 | Freescale | BLF647P | Broadcast |
| MRF6VP3091NBR1 | Freescale | BLF245 | Broadcast |
| MRF6VP3091NBR5 | Freescale | BLF245B | Broadcast |
| MRF6VP3091NR1 | Freescale | BLF246 | Broadcast |
| MRF6VP3091NR5 | Freescale | BLF878 | Broadcast |
| MRF6VP3450HR5 | Freescale | BLF879P | Broadcast |
| MRF6VP3450HR6 | Freescale | BLF884P | Broadcast |
| MRF6VP3450HSR5 | Freescale | BLF884PS | Broadcast |
| MRF6VP3450HSR6 | Freescale | BLF888 | Broadcast |
| MRF6VP41KHR5 | Freescale | BLF248 | Broadcast |
| MRF6VP41KHR6 | Freescale | BLF369 | Broadcast |
| MRF6VP41KHR7 | Freescale | BLF571 | Broadcast |
| MRF6VP41KHSR5 | Freescale | BLF572XR | Broadcast |
| MRF6VP41KHSR6 | Freescale | BLF572XRS | Broadcast |
| MRF6VP41KHSR7 | Freescale | BLF573 | Broadcast |
| MRF7P20040HR3 | Freescale | BLF6G22-180PN | Base station |
| MRF7P20040HSR3 | Freescale | BLF6G22-180RN | Base station |
| MRF7S15100HR3 | Freescale | BLF6G15L-250PBRN | Base station |
| MRF7S15100HSR3 | Freescale | BLF6G15L-40BRN | Base station |
| MRF7S15100HSR5 | Freescale | BLF6G15L-40RN | Base station |
| MRF7S18170HSR3 | Freescale | BLF6G20-40 | Base station |
| MRF7S21080HSR3 | Freescale | BLF8G22LS-270GV | Base station |
| MRF7S21110HR3 | Freescale | BLF8G22LS-400PGV | Base station |
| MRF7S21110HSR3 | Freescale | BLM7G22S-60PB | Base station |
| MRF7S27130HR3 | Freescale | BLF6G27-45 | Base station |
| MRF7S27130HSR3 | Freescale | BLF6G27-75 | Base station |
| MRF7S35015HSR3 | Freescale | BLS6G3135S-20 | A&D |
| MRF7S35120HSR3 | Freescale | BLS7G3135L-350P | A&D |
| MRF7S38075HR3 | Freescale | BLF6G38-10 | Base station |
| MRF8P18265HR5 | Freescale | BLF6G20-45 | Base station |
| MRF8P18265HR6 | Freescale | BLF6G20-75 | Base station |
| MRF8P18265HSR5 | Freescale | BLF6G20LS-110 | Base station |
| MRF8P18265HSR6 | Freescale | BLF6G20LS-140 | Base station |
| MRF8P20160HR3 | Freescale | BLF8G20LS-270GV | Base station |
| MRF8P20160HR5 | Freescale | BLF8G20LS-270PGV | Base station |
| MRF8P20160HSR3 | Freescale | BLF7G20L-200 | Base station |
| MRF8P20160HSR5 | Freescale | BLF7G20L-250P | Base station |
| MRF8P20161HSR3 | Freescale | BLF8G20L-200V | Base station |
| MRF8P20161HSR5 | Freescale | BLF8G20LS-200V | Base station |
| MRF8P23080HR3 | Freescale | BLM7G22S-60PBG | Base station |
| MRF8P23080HR5 | Freescale | BLD6G21L-50 | Base station |
| MRF8P23080HSR3 | Freescale | BLD6G21LS-50 | Base station |
| MRF8P23080HSR5 | Freescale | BLM6G22-30 | Base station |
| MRF8P23160WHR3 | Freescale | BLM6G22-30G | Base station |
| MRF8P23160WHR5 | Freescale | BLD6G22L-50 | Base station |
| MRF8P23160WHSR3 | Freescale | BLD6G22LS-50 | Base station |
| MRF8P23160WHSR5 | Freescale | BLF6G22L-40P | Base station |
| MRF8P26080HR3 | Freescale | BLF6G27L-40P | Base station |
| MRF8P26080HR5 | Freescale | BLF6G27L-50BN | Base station |
| MRF8P26080HSR3 | Freescale | BLF6G27LS-100 | Base station |
| MRF8P26080HSR5 | Freescale | BLF6G27LS-135 | Base station |
| MRF8P29300HR5 | Freescale | BLF7G27LS-140 | Base station |
| MRF8P29300HR5 | Freescale | BLS6G2731-120 | A&D |
| MRF8P29300HR6 | Freescale | BLF7G27LS-150P | Base station |
| MRF8P29300HR6 | Freescale | BLS6G2731-6G | A&D |
| MRF8P29300HSR5 | Freescale | BLF7G27LS-90P | Base station |
| MRF8P29300HSR5 | Freescale | BLS6G2731S-120 | A&D |
| MRF8P29300HSR6 | Freescale | BLF7G27LS-90PG | Base station |
| MRF8P29300HSR6 | Freescale | BLS6G2731S-130 | A&D |
| MRF8P8300HR5 | Freescale | BLF6G10LS-160RN | Base station |
| MRF8P8300HR6 | Freescale | BLF6G10LS-260PRN | Base station |
| MRF8P8300HSR5 | Freescale | BLF6G10S-45 | Base station |
| MRF8P8300HSR6 | Freescale | BLF6H10L-160 | Base station |
| MRF8P9040GNR1 | Freescale | BLF6G10-45 | Base station |

| Manufacturer type | Manufacturer | NXP type | Product family |
|---|---|---|---|
| MRF8P9040NBR1 | Freescale | BLF6G10L-260PBM | Base station |
| MRF8P9040NR1 | Freescale | BLF6G10L-260PRN | Base station |
| MRF8S18120HR3 | Freescale | BLF6G20LS-180RN | Base station |
| MRF8S18120HR5 | Freescale | BLF6G20LS-75 | Base station |
| MRF8S18120HSR3 | Freescale | BLF6G20S-230PRN | Base station |
| MRF8S18120HSR5 | Freescale | BLF6G20S-45 | Base station |
| MRF8S18260HR5 | Freescale | BLF7G20LS-140P | Base station |
| MRF8S18260HR6 | Freescale | BLF7G20LS-260A | Base station |
| MRF8S18260HSR5 | Freescale | BLF7G21L-160P | Base station |
| MRF8S18260HSR6 | Freescale | BLF7G21LS-160 | Base station |
| MRF8S23120HR3 | Freescale | BLF6G22LS-40P | Base station |
| MRF8S23120HR5 | Freescale | BLF7G22L-200 | Base station |
| MRF8S23120HSR3 | Freescale | BLF7G22L-250P | Base station |
| MRF8S23120HSR5 | Freescale | BLF7G22LS-200 | Base station |
| MRF8S26060HR3 | Freescale | BLF7G27L-200PB | Base station |
| MRF8S26060HSR5 | Freescale | BLF8G27LS-140V | Base station |
| MRF8S8260HR3 | Freescale | BLF8G10L-160V | Base station |
| MRF8S8260HR5 | Freescale | BLF8G10LS-160V | Base station |
| MRF8S8260HSR3 | Freescale | BLF8G10LS-200GV | Base station |
| MRF8S8260HSR5 | Freescale | BLF8G10LS-270GV | Base station |
| MRF917 | Freescale | BFQ67W | WB trs 1-4 |
| MRF927 | Freescale | BFS25A | WB trs 1-4 |
| MRF9411L | Freescale | BFG520/X | WB trs 1-4 |
| MRF947 | Freescale | BFS520 | WB trs 1-4 |
| MRF947A | Freescale | PRF947 | WB trs 1-4 |
| MRF9511L | Freescale | BFG540/X | WB trs 1-4 |
| MRF957 | Freescale | PRF957 | WB trs 1-4 |
| MRFE6P3300HR3 | Freescale | BLF888A | Broadcast |
| MRFE6P3300HR5 | Freescale | BLF578XRS | Broadcast |
| MRFE6P9220HR3 | Freescale | BLF7G10LS-250 | Base station |
| MRFE6S8046GNR1 | Freescale | BLF8G10LS-300P | Base station |
| MRFE6S8046NR1 | Freescale | BLF7G10L-250 | Base station |
| MRFE6S9125NBR1 | Freescale | BLF6H10LS-160 | Base station |
| MRFE6S9125NR1 | Freescale | BLF8G10L-160 | Base station |
| MRFE6S9160HSR3 | Freescale | BLM6G10-30 | Base station |
| MRFE6S9205HSR3 | Freescale | BLM6G10-30G | Base station |
| MRFE6VP8600HR5 | Freescale | BLF888AS | Broadcast |
| MRFE6VP8600HR6 | Freescale | BLF888B | Broadcast |
| MRFE6VP8600HSR5 | Freescale | BLF888BS | Broadcast |
| MRFG35003ANT1 | Freescale | BLU6H0410L-600P | A&D |
| MS1078 | Microsemi | BLF145 | Broadcast |
| MS1281 | Microsemi | BLF177 | Broadcast |
| MS1336 | Microsemi | BLF175 | Broadcast |
| MS1337 | Microsemi | BLF147 | Broadcast |
| MS1504 | Microsemi | BLF248 | Broadcast |
| MS1505 | Microsemi | BLF178XRS | Broadcast |
| MS1506 | Microsemi | BLF178XR | Broadcast |
| MS2267 | Microsemi | BLA1011-10 | A&D |
| MS2272 | Microsemi | BLA6H0912-500 | A&D |
| MT4S200T | Toshiba | BFG424W | WB trs 5-7 |
| MT4S200U | Toshiba | BFG425W | WB trs 5-7 |
| MT4S34U | Toshiba | BFG410W | WB trs 5-7 |
| MV2109G | ONSemicond. | BB182LX | Varicap |
| MW6S004NT1 | Freescale | BLF6G21-10G | Base station |
| MW6S004NT1 | Freescale | BLF1043 | Broadcast |
| MW7IC008NT1 | Freescale | BLF988 | Broadcast |
| MW7IC2020NT1 | Freescale | BLF7G21LS-160P | Base station |
| MW7IC2425GNR1 | Freescale | BLF7G24L-160P | Base station |
| MW7IC2425GNR1 | Freescale | BLF8G24L-200P | Base station |
| MW7IC2425NBR1 | Freescale | BLF7G24LS-100 | Base station |
| MW7IC2425NBR1 | Freescale | BLF8G24LS-200P | Base station |
| MW7IC2425NR1 | Freescale | BLF7G24LS-140 | Base station |
| MW7IC2425NR1 | Freescale | BLS7G2325L-105 | Base station |
| MW7IC2725GNR1 | Freescale | BLF6G27LS-40P | Base station |
| MW7IC2725NBR1 | Freescale | BLF6G27LS-50BN | Base station |
| MW7IC2725NR1 | Freescale | BLF6G27LS-75 | Base station |
| MW7IC2750GNR1 | Freescale | BLF6G27S-45 | Base station |
| MW7IC2750NBR1 | Freescale | BLF7G27L-100 | Base station |
| MW7IC2750NR1 | Freescale | BLF7G27L-140 | Base station |
| MW7IC3825GNR1 | Freescale | BLF6G38-100 | Base station |
| MW7IC3825NBR1 | Freescale | BLF6G38-10G | Base station |
| MW7IC3825NR1 | Freescale | BLF6G38-25 | Base station |
| MW7IC915NT1 | Freescale | BLF6G10L-40BRN | Base station |
| MWE6IC9100NBR1 | Freescale | BLF8G10LS-160 | Base station |
| NESG2021M05 | Renesas Electronics | BFU610F | WB trs 5-7 |
| NESG2031M05 | Renesas Electronics | BFU630F | WB trs 5-7 |
| NESG2101M05 | Renesas Electronics | BFU660F | WB trs 5-7 |

| Manufacturer type | Manufacturer | NXP type | Product family |
|---|---|---|---|
| NESG2101M05 | Renesas Electronics | BFU760F | WB trs 5-7 |
| NESG2101M05 | Renesas Electronics | BFU790F | WB trs 5-7 |
| NESG3031M05 | Renesas Electronics | BFU730F | WB trs 5-7 |
| NESG3032M14 | Renesas Electronics | BFU725F | WB trs 5-7 |
| NJG1140KA1 | JRC | BGU7044 | MMIC |
| PRF947B | Motorola | PRF947 | WB trs 1-4 |
| PRF947B | Infineon | PRF947 | WB trs 1-4 |
| PTF 080101S - 10 W | Infineon | BLF8G10L-300P | Base station |
| PTF 081301E | Infineon | BLF8G10LS-300P | Base station |
| PTF 081301F | Infineon | BLF7G10L-250 | Base station |
| PTF 140451E | Infineon | BLF1046 | Broadcast |
| PTF 140451F | Infineon | BLF145 | Broadcast |
| PTF 141501E - 150 W | Infineon | BLF147 | Broadcast |
| PTFA 041501E | Infineon | BLF6G10LS-200RN | Base station |
| PTFA 041501F | Infineon | BLF6G10-135RN | Base station |
| PTFA 043002E - 300 W | Infineon | BLF6G21-10G | Base station |
| PTFA 043002E - 300 W | Infineon | BLF1043 | Broadcast |
| PTFA 070601E - 60 W | Infineon | BLF6G10L-260PRN | Base station |
| PTFA 070601F - 60 W | Infineon | BLF6G10L-40BRN | Base station |
| PTFA 071701E - 170 W | Infineon | BLF6G10LS-135RN | Base station |
| PTFA 071701F - 170 W | Infineon | BLF6G10LS-160RN | Base station |
| PTFA 072401EL - 240 W | Infineon | BLF6G10LS-260PRN | Base station |
| PTFA 072401FL - 240 W | Infineon | BLF6G10S-45 | Base station |
| PTFA 072401FL - 240 W | Infineon | BLF6H10L-160 | Base station |
| PTFA 080551E - 55 W | Infineon | BLF6H10LS-160 | Base station |
| PTFA 080551F - 55 W | Infineon | BLF8G10L-160 | Base station |
| PTFA 081501E - 150 W | Infineon | BLF8G10L-160V | Base station |
| PTFA 081501F - 150 W | Infineon | BLF8G10LS-160V | Base station |
| PTFA 082201E - 220 W | Infineon | BLF8G10LS-200GV | Base station |
| PTFA 082201F - 220 W | Infineon | BLF8G10LS-270GV | Base station |
| PTFA 091201E - 120 W | Infineon | BLM6G10-30 | Base station |
| PTFA 091201F - 120 W | Infineon | BLM6G10-30G | Base station |
| PTFA 142401EL - 240 W | Infineon | BLF175 | Broadcast |
| PTFA 142401FL - 240 W | Infineon | BLF177 | Broadcast |
| PTFA 210601E - 60 W | Infineon | BLF6G20-40 | Base station |
| PTFA 210601F - 60 W | Infineon | BLF6G20-45 | Base station |
| PTFA 210701E - 70 W | Infineon | BLF6G20-75 | Base station |
| PTFA 210701F - 70 W | Infineon | BLF6G20LS-110 | Base station |
| PTFA 211801E - 180 W | Infineon | BLF6G20LS-140 | Base station |
| PTFA 211801F - 180 W | Infineon | BLF6G20LS-180RN | Base station |
| PTFA 212001E - 200 W | Infineon | BLF6G20LS-75 | Base station |
| PTFA 212001F - 200 W | Infineon | BLF6G20S-230PRN | Base station |
| PTFA 240451E - 45 W | Infineon | BLF6G27-75 | Base station |
| PTFA 241301E - 130 W | Infineon | BLF6G27L-40P | Base station |
| PTFA 241301F - 130 W | Infineon | BLF6G27L-50BN | Base station |
| PTFA 260451E - 45 W | Infineon | BLF6G27LS-100 | Base station |
| PTFA 261301E - 130 W | Infineon | BLF6G27LS-135 | Base station |
| PTFA 261301F - 130 W | Infineon | BLF6G27LS-40P | Base station |
| PTFB 082817 FH - 250 W | Infineon | BLF6G10L-260PBM | Base station |
| PTFB 082817 FH - 250 W | Infineon | BLF8G10LS-400PGV | Base station |
| PTFB 091507FH - 150 W | Infineon | BLF7G10LS-250 | Base station |
| PTFB 093608FV - 360 W | Infineon | BLF8G10LS-160 | Base station |
| PTFB 210801FA - 80 W | Infineon | BLF6G20S-45 | Base station |
| PTFB 211501E - 150 W | Infineon | BLF7G20LS-140P | Base station |
| PTFB 211501F - 150 W | Infineon | BLF7G20LS-260A | Base station |
| PTFB 211503EL - 150 W | Infineon | BLF7G21L-160P | Base station |
| PTFB 211503FL - 150 W | Infineon | BLF7G21LS-160 | Base station |
| PTFB 211803EL - 180 W | Infineon | BLF7G21LS-160P | Base station |
| PTFB 211803FL - 180 W | Infineon | BLF8G20L-200V | Base station |
| PTFB 212503EL - 240 W | Infineon | BLF8G20LS-200V | Base station |
| PTFB 212503FL - 240 W | Infineon | BLF8G20LS-270GV | Base station |
| PTFB 213004F - 300 W | Infineon | BLF8G20LS-270PGV | Base station |
| PTFB 241402F - 2x70W | Infineon | BLF7G24L-140 | Base station |
| PTFB 241402F - 2x70W | Infineon | BLF6G27-45 | Base station |
| PTMA 080152M - 20 W | Infineon | BLF6G10-160RN | Base station |
| PTMA 080302M - 30 W | Infineon | BLF6G10-200RN | Base station |
| PTMA 080304M - 2 X 15 W | Infineon | BLF6G10-45 | Base station |
| PTMA 180402M - 40 W | Infineon | BLF6G20-110 | Base station |
| PTMA 210152M - 20 W | Infineon | BLF6G20-180PN | Base station |
| PTMA 210452EL - 45 W | Infineon | BLF6G20-180RN | Base station |
| PTMA 210452FL - 45 W | Infineon | BLF6G20-230PRN | Base station |
| R0605250L | RFMD | BGS67A | CATV RA |
| R0605250L | Standard | BGY66B | CATV RA |
| R0605300L | Standard | BGY68 | CATV RA |
| R0605300L | RFMD | BGY68 | CATV RA |
| R1005250L | RFMD | BGY66B | CATV RA |
| R2005200P12 | RFMD | BGY67 | CATV RA |

| Manufacturer type | Manufacturer | NXP type | Product family |
|---|---|---|---|
| R2005240 | Standard | BGY67A | CATV RA |
| R2005240 | RFMD | BGY67A | CATV RA |
| R2005240P12 | RFMD | BGY67A | CATV RA |
| R2005350L | RFMD | BGR269 | CATV RA |
| RF3826 | RFMD | BLF7G24L-100 | Base station |
| RF3863 | RFMD | BGU7051 | MMIC |
| RF3863 | RFMD | BGU7052 | MMIC |
| RF3863 | RFMD | BGU7053 | MMIC |
| RF3928 | RFMD | BLS7G2933S-150 | A&D |
| RF3928B | RFMD | BLS6G2933S-130 | A&D |
| RF3931 | RFMD | BLF6G38-10 | Base station |
| RF3931 | RFMD | BLS6G3135-120 | A&D |
| RF3932 | RFMD | BLF6G38-100 | Base station |
| RF3933 | RFMD | BLF6G38-10G | Base station |
| RF3934 | RFMD | BLF6G38-25 | Base station |
| RFFC2072 | RFMD | BGX721x | MMIC |
| RFG1M09090 | RFMD | BLF6G10-200RN | Base station |
| RFG1M09180 | RFMD | BLF6G10-45 | Base station |
| RFG1M20090 | RFMD | BLF6G20-110 | Base station |
| RFG1M20180 | RFMD | BLF6G20-180PN | Base station |
| RFHA1000 | RFMD | BLF6G10-135RN | Base station |
| RFHA1003 | RFMD | BLF6G10LS-200RN | Base station |
| RFHA1006 | RFMD | BLF6G10-160RN | Base station |
| RFHA3942 | RFMD | BLS7G3135LS-350P | A&D |
| RN142G | Rohm | BAP1321-03 | PIN diode |
| RN142S | Rohm | BAP1321-02 | PIN diode |
| RN242CS | Rohm | BAP51LX | PIN diode |
| RN731V | Rohm | BAP50-03 | PIN diode |
| RN739D | Rohm | BAP50-04 | PIN diode |
| RN739F | Rohm | BAP50-04W | PIN diode |
| S10040200P | RFMD | CGY1041 | CATV PP |
| S10040220GT | RFMD | CGY1041 | CATV PP |
| S10040220P | RFMD | CGY1041 | CATV PP |
| S10040230GT | RFMD | CGY1043 | CATV PP |
| S10040240P | RFMD | CGY1043 | CATV PP |
| S10040280GT | RFMD | CGY1047 | CATV PP |
| S10040340 | RFMD | CGY1034 | CATV PP |
| S595T | Vishay | BF1105 | FET |
| S595TR | Vishay | BF1105R | FET |
| S595TRW | Vishay | BF1105WR | FET |
| S7540185 | Standard | BGY785A | CATV PPA |
| S7540215 | Standard | BGY787 | CATV PPA |
| S8740180GT | RFMD | BGY885A | CATV PP |
| S8740190 | Standard | BGD812 | CATV PD |
| S8740190 | RFMD | BGY885A | CATV PP |
| S8740200P | RFMD | BGY887 | CATV PP |
| S8740220 | Standard | BGD814 | CATV PD |
| S8740220GT | RFMD | BGY887 | CATV PP |
| S8740220P | RFMD | BGY887 | CATV PP |
| S8740230 | Standard | BGD816L | CATV PD |
| S8740240GT | RFMD | BGY887 | CATV PP |
| S8740240P | RFMD | BGY887 | CATV PP |
| S8740240P12 | RFMD | BGY887 | CATV PP |
| S8740260GT | RFMD | CGY887A | CATV PP |
| S8740280GT | RFMD | CGY887B | CATV PP |
| S8740340 | RFMD | CGY888C | CATV PP |
| S8740340PT | RFMD | CGY888C | CATV PP |
| SD1013 | Microsemi | BLF178P | Broadcast |
| SD1013-03 | Microsemi | BLF174XRS | Broadcast |
| SD1014-06 | Microsemi | BLF174XR | Broadcast |
| SD1526-01 | Microsemi | BLA0912-250R | A&D |
| SDV701Q | AUK | BB179 | Varicap |
| SDV704Q | AUK | BB178 | Varicap |
| SDV705Q | AUK | BB182 | Varicap |
| SGA8343Z | Sirenza | BFG425W | WB trs 5-7 |
| SKY65048 | Skyworks | BGU7051 | MMIC |
| SKY65066 | Skyworks | BGU7053 | MMIC |
| SKY65084 | Skyworks | BGU7052 | MMIC |
| SMA3101 | Sanyo | BGA2851 | MMIC |
| SMA3101 | Sanyo | BGA2851 | MMIC |
| SMA3103 | Sanyo | BGA2867 | MMIC |
| SMA3103 | Sanyo | BGA2867 | MMIC |
| SMA3107 | Sanyo | BGA2803 | MMIC |
| SMA3107 | Sanyo | BGA2803 | MMIC |
| SMA3109 | Sanyo | BGA2817 | MMIC |
| SMA3109 | Sanyo | BGA2817 | MMIC |
| SMA3111 | Sanyo | BGA2851 | MMIC |

| Manufacturer type | Manufacturer | NXP type | Product family |
|---|---|---|---|
| SMA3111 | Sanyo | BGA2851 | MMIC |
| SMA3113 | Sanyo | BGA2869 | MMIC |
| SMA3113 | Sanyo | BGA2869 | MMIC |
| SMA3117 | Sanyo | BGA2869 | MMIC |
| SMA3117 | Sanyo | BGA2869 | MMIC |
| SMP1302-004 | Skyworks | BAP50-05 | PIN diode |
| SMP1302-005 | Skyworks | BAP50-04 | PIN diode |
| SMP1302-011 | Skyworks | BAP50-03 | PIN diode |
| SMP1302-074 | Skyworks | BAP50-05W | PIN diode |
| SMP1302-075 | Skyworks | BAP50-04W | PIN diode |
| SMP1302-079 | Skyworks | BAP50-02 | PIN diode |
| SMP1304-001 | Skyworks | BAP70-03 | PIN diode |
| SMP1304-011 | Skyworks | BAP70-03 | PIN diode |
| SMP1307-001 | Skyworks | BAP70-03 | PIN diode |
| SMP1307-011 | Skyworks | BAP70-03 | PIN diode |
| SMP1320-004 | Skyworks | BAP65-05 | PIN diode |
| SMP1320-011 | Skyworks | BAP65-03 | PIN diode |
| SMP1320-074 | Skyworks | BAP65-05W | PIN diode |
| SMP1321-001 | Skyworks | BAP1321-03 | PIN diode |
| SMP1321-005 | Skyworks | BAP1321-04 | PIN diode |
| SMP1321-011 | Skyworks | BAP1321-03 | PIN diode |
| SMP1321-075 | Skyworks | BAP1321-04 | PIN diode |
| SMP1321-079 | Skyworks | BAP1321-02 | PIN diode |
| SMP1322-004 | Skyworks | BAP65-05 | PIN diode |
| SMP1322-011 | Skyworks | BAP65-03 | PIN diode |
| SMP1322-074 | Skyworks | BAP65-05W | PIN diode |
| SMP1322-079 | Skyworks | BAP65-02 | PIN diode |
| SMP1340-011 | Skyworks | BAP63-03 | PIN diode |
| SMP1340-079 | Skyworks | BAP63-02 | PIN diode |
| SMP1352-011 | Skyworks | BAP64-03 | PIN diode |
| SMP1352-079 | Skyworks | BAP64-02 | PIN diode |
| SMV1235-004 | Skyworks | BB181 | Varicap |
| SMV1236-004 | Skyworks | BB156 | Varicap |
| SST111 | Standard | PMBFJ111 | FET |
| SST112 | Standard | PMBFJ112 | FET |
| SST113 | Standard | PMBFJ113 | FET |
| SST174 | Standard | PMBFJ174 | FET |
| SST175 | Standard | PMBFJ175 | FET |
| SST176 | Standard | PMBFJ176 | FET |
| SST177 | Standard | PMBFJ177 | FET |
| SST201 | Standard | BFT46 | FET |
| SST202 | Standard | BFR31 | FET |
| SST203 | Standard | BFR30 | FET |
| SST308 | Standard | PMBFJ308 | FET |
| SST309 | Standard | PMBFJ309 | FET |
| SST310 | Standard | PMBFJ310 | FET |
| SST4391 | Standard | PMBF4391 | FET |
| SST4392 | Standard | PMBF4392 | FET |
| SST4393 | Standard | PMBF4393 | FET |
| SST4856 | Standard | BSR56 | FET |
| SST4857 | Standard | BSR57 | FET |
| SST4859 | Standard | BSR56 | FET |
| SST4860 | Standard | BSR57 | FET |
| SST4861 | Standard | BSR58 | FET |
| SVC201SPA | Sanyo | BB187 | Varicap |
| SXA-389B | RFMD | BGA7024 | MMIC |
| SXA-389B | RFMD | BGA7124 | MMIC |
| SXA-389B | RFMD | BGA7124 | MMIC |
| SXA-389B | RFMD | BGA7204 | MMIC |
| SXB-4089 | RFMD | BGA7027 | MMIC |
| SXB-4089 | RFMD | BGA7127 | MMIC |
| T1G4005528-FS | Triquint | BLF6G38-25 | Base station |
| T1G4005528-FS | Triquint | BLS6G3135-120 | A&D |
| T1G4005528-FS | Triquint | BLS6G3135-20 | A&D |
| T1L2003028-SP | Triquint | BLL6H0514L-130 | A&D |
| T1P2701012-SP | Triquint | BLS6G2731-120 | A&D |
| TAN150 | Microsemi | BLS7G2325L-105 | A&D |
| TAN250A | Microsemi | BLL6H1214LS-500 | A&D |
| TAN300 | Microsemi | BLL6H1214LS-250 | A&D |
| TAN350 | Microsemi | BLL6H1214L-250 | A&D |
| TAN75A | Microsemi | BLL6H1214-500 | A&D |
| TBB1016 | Renesas Electronics | BF1204 | FET |
| TMF3201J | AUK | BF1204 | FET |
| TMF3202Z | AUK | BF1202WR | FET |
| TMPF4091 | Standard | PMBF4391 | FET |
| TMPF4092 | Standard | PMBF4392 | FET |
| TMPF4093 | Standard | PMBF4393 | FET |
| TMPF4391 | Standard | PMBF4391 | FET |
| TMPF4392 | Standard | PMBF4392 | FET |
| TMPF4393 | Standard | PMBF4393 | FET |
| TMPFB246A | Standard | BSR56 | FET |
| TMPFB246B | Standard | BSR57 | FET |
| TMPFB246C | Standard | BSR58 | FET |
| TMPFJ111 | Standard | PMBFJ111 | FET |
| TMPFJ112 | Standard | PMBFJ112 | FET |
| TMPFJ113 | Standard | PMBFJ113 | FET |
| TMPFJ174 | Standard | PMBFJ174 | FET |
| TMPFJ175 | Standard | PMBFJ175 | FET |
| TMPFJ176 | Standard | PMBFJ176 | FET |
| TMPFJ177 | Standard | PMBFJ177 | FET |
| TPR400 | Microsemi | BLA1011-2 | A&D |
| TPR400 | Microsemi | BLA1011-200 | A&D |
| TPR400A | Microsemi | BLA6G1011-200R | A&D |
| TPR500 | Microsemi | BLL1214-250 | A&D |
| TPR500A | Microsemi | BLA6H1011-600 | A&D |
| TPR700 | Microsemi | BLA6G1011LS-200RG | A&D |
| TRF370315 | TI | BGX710x | MMIC |
| TRF370417 | TI | BGX710x | MMIC |
| TRF3705 | TI | BGX710x | MMIC |
| TSDF54040 | Vishay | BF1102 | FET |
| TSDF54040-GS08 | Vishay | BF1102 | FET |
| TSDF54040X-GS08 | Vishay | BF1102 | FET |
| TSDF54040XR-GS08 | Vishay | BF1102R | FET |
| uPC2709 | Renesas Electronics | BGA2709 | MMIC |
| uPC2711 | Renesas Electronics | BGA2711 | MMIC |
| uPC2712 | Renesas Electronics | BGA2712 | MMIC |
| uPC2745 | Renesas Electronics | BGA2001 | MMIC |
| uPC2746 | Renesas Electronics | BGA2001 | MMIC |
| uPC2748 | Renesas Electronics | BGA2748 | MMIC |
| uPC2771 | Renesas Electronics | BGA2771 | MMIC |
| uPC3224 | Renesas Electronics | BGA2851 | MMIC |
| uPC3224 | Renesas Electronics | BGA2851 | MMIC |
| uPC3226 | Renesas Electronics | BGA2867 | MMIC |
| uPC3226 | Renesas Electronics | BGA2867 | MMIC |
| uPC3227 | Renesas Electronics | BGA2851 | MMIC |
| uPC3227 | Renesas Electronics | BGA2851 | MMIC |
| uPC3232 | Renesas Electronics | BGA2869 | MMIC |
| uPC3232 | Renesas Electronics | BGA2869 | MMIC |
| uPC3240 | Renesas Electronics | BGA2802 | MMIC |
| uPC3240 | Renesas Electronics | BGA2802 | MMIC |
| uPC3241 | Renesas Electronics | BGA2817 | MMIC |
| uPC3241 | Renesas Electronics | BGA2817 | MMIC |
| uPC8112 | Renesas Electronics | BGA2022 | MMIC |
| UPC8230TU | Renesas Electronics | BGU7007 | MMIC |
| UPC8236T6N | Renesas Electronics | BGU8007 | MMIC |
| uPD5740T6N | Renesas Electronics | BGU7045 | MMIC |
| uPD5756T6N | Renesas Electronics | BGU7045 | MMIC |
| UTV005 | Microsemi | BLF888B | Broadcast |
| UTV005P | Microsemi | BLF888AS | Broadcast |
| UTV010 | Microsemi | BLF888A | Broadcast |
| UTV020 | Microsemi | BLF888 | Broadcast |
| UTV040 | Microsemi | BLF884PS | Broadcast |
| UTV080 | Microsemi | BLF884P | Broadcast |
| UTV120 | Microsemi | BLF879P | Broadcast |
| UTV200 | Microsemi | BLF878 | Broadcast |
| UTV8100B | Microsemi | BLF861A | Broadcast |

# 5.2 Cross-references: NXP discontinued types versus NXP replacement types

## In alphabetical order of manufacturer discontinued type

Abbreviations:

| | |
|---|---|
| BS diode | Band switch diode |
| CATV | Community antenna television system |
| FET | Field effect transistor |
| Varicap | Varicap diode |
| WB trs | Wideband transistor |
| RFP trs | RF Power transistor |

| NXP discontinued type | Product family NXP | Replacement type NXP |
|---|---|---|
| BA277-01 | BS diode | BA277 |
| BA278 | BS diode | BA277 |
| BA792 | BS diode | BA591 |
| BAP142L | PIN diode | BAP142LX |
| BAP51-01 | PIN diode | BAP51LX |
| BAP51L | PIN diode | BAP51LX |
| BAP55L | PIN diode | BAP55LX |
| BB132 | Varicap | BB152 |
| BB145 | Varicap | BB145B |
| BB145B-01 | Varicap | BB145B |
| BB151 | Varicap | BB135 |
| BB157 | Varicap | BB187 |
| BB178L | Varicap | BB178LX |
| BB179BL | Varicap | BB179BLX |
| BB179L | Varicap | BB179LX |
| BB181LX | Varicap | BB181 |
| BB182B | Varicap | BB182 |
| BB182LX | Varicap | BB182 |
| BB187L | Varicap | BB187LX |
| BB190 | Varicap | BB149 |
| BB202LX | Varicap | BB202 |
| BB804 | Varicap | BB207 |
| BBY42 | Varicap | BBY40 |
| BF1101 | FET | BF1211 |
| BF1101R | FET | BF1211R |
| BF1101WR | FET | BF1211WR |
| BF1203 | FET | BF1203 |
| BF1205 | FET | BF1210 |
| BF1205C | FET | BF1210 |
| BF1206F | FET | BF1208 |
| BF245A | FET | BF545A |
| BF245B | FET | BF545B |
| BF245C | FET | BF545C |
| BF689K | WB trs | BFS17 |
| BF763 | WB trs | BFS17 |
| BF851A | FET | BF861A |
| BF851C | FET | BF861C |
| BF992/01 | FET | BF992 |
| BFC505 | WB trs | BFM505 |
| BFC520 | WB trs | BFM520 |
| BFET505 | WB trs | BFM505 |
| BFET520 | WB trs | BFM520 |
| BFG17A | WB trs | BFS17A |
| BFG197 | WB trs | BFG198 |
| BFG197/X | WB trs | BFG198 |
| BFG25AW/XR | WB trs | BFG25AW/X |
| BFG410W/CA | WB trs | BFG410W |
| BFG425W/CA | WB trs | BFG425W |
| BFG505/XR | WB trs | BFG505/X |
| BFG505W/XR | WB trs | BFG505 |
| BFG520W/XR | WB trs | BFG520W/X |
| BFG590/XR | WB trs | BFG590/X |
| BFG590W | WB trs | BFG590 |
| BFG590W/XR | WB trs | BFG590 |
| BFG67/XR | WB trs | BFG67 |
| BFG92A | WB trs | BFG92A/X |

| NXP discontinued type | Product family NXP | Replacement type NXP |
|---|---|---|
| BFG92A/XR | WB trs | BFG92A/X |
| BFG93A/XR | WB trs | BFG93A/X |
| BFQ34/01 | WB trs | BFG35 |
| BFR92 | WB trs | BFR92A |
| BFR92AR | WB trs | BFR92A |
| BFR92AT | WB trs | BFR92AW |
| BFR93 | WB trs | BFR92A |
| BFR93AT | WB trs | BFR93AW |
| BFR93R | WB trs | BFR93A |
| BFU510 | WB trs | BFU725F/N1 |
| BFU540 | WB trs | BFU725F/N1 |
| BFU725F | WB trs | BFU725F/N1 |
| BGA2031 | WB trs | BGA2031/1 |
| BGD502 | CATV | BGD712 |
| BGD602D | CATV | BGD712 |
| BGD702 | CATV | BGD712 |
| BGD702D | CATV | BGD712 |
| BGD702D/08 | CATV | BGD712 |
| BGD702N | CATV | BGD712 |
| BGD704 | CATV | BGD714 |
| BGD704N | CATV | BGD714 |
| BGD802 | CATV | BGD812 |
| BGD802N | CATV | BGD812 |
| BGD802N/07 | CATV | BGD812 |
| BGD804 | CATV | BGD814 |
| BGD804N | CATV | BGD814 |
| BGD804N/02 | CATV | BGD814 |
| BGD902 | CATV | BGD812 |
| BGD902L | CATV | BGD812 |
| BGD904 | CATV | BGD814 |
| BGD904L | CATV | BGD814 |
| BGD906 | CATV | CGD942C |
| BGE788 | CATV | BGE788C |
| BGE847BO/FC | CATV | BGO827/SC0 |
| BGE847BO/FC0 | CATV | BGO827/SC0 |
| BGE847BO/FC1 | CATV | BGO827/SC0 |
| BGE847BO/SC | CATV | BGO827/SC0 |
| BGE847BO/SC0 | CATV | BGO827/SC0 |
| BGE887BO/FC | CATV | BGO827/SC0 |
| BGE887BO/FC1 | CATV | BGO827/SC0 |
| BGE887BO/SC | CATV | BGO827/SC0 |
| BGO807C | CATV | BGO807C/FCO |
| BGO807CE | CATV | BGO807CE/SCO |
| BGO827 | CATV | BGO807CE/FCO |
| BGO827/SCO | CATV | BGO807CE/SCO |
| BGO847/FC0 | CATV | BGO827/SC0 |
| BGO847/FC01 | CATV | BGO827/SC0 |
| BGO847/SC0 | CATV | BGO827/SC0 |
| BGQ34/01 | WB trs | BFG35 |
| BGU2003 | WB trs | BGA2003 |
| BGX885/02 | CATV | BGX885N |
| BGY1085A/07 | CATV | BGY1085A |
| BGY585A | CATV | BGY785A |
| BGY587 | CATV | BGY787 |
| BGY587B | CATV | BGE787B |
| BGY588N | CATV | BGY588C |

| NXP discontinued type | Product family NXP | Replacement type NXP |
|---|---|---|
| BGY66B/04 | CATV | BGY66B |
| BGY67/04 | CATV | BGY67 |
| BGY67/09 | CATV | BGY67 |
| BGY67/14 | CATV | BGY67 |
| BGY67/19 | CATV | BGY67 |
| BGY67A/04 | CATV | BGY67A |
| BGY67A/14 | CATV | BGY67A |
| BGY68/01 | CATV | BGY68 |
| BGY685A | CATV | BGY785A |
| BGY685AD | CATV | BGY785A |
| BGY685AL | CATV | BGY785A |
| BGY687 | CATV | BGY787 |
| BGY687B | CATV | BGE787B |
| BGY687B/02 | CATV | BGE787B |
| BGY785A/07 | CATV | BGY785A |
| BGY785A/09 | CATV | BGY785A |
| BGY785AD | CATV | BGY785A |
| BGY785AD/06 | CATV | BGY785A |
| BGY785AD/8M | CATV | BGY885A |
| BGY787/02 | CATV | BGY787 |
| BGY787/07 | CATV | BGY787 |
| BGY787/09 | CATV | BGY787 |
| BGY847BO/SC | CATV | BGO827/SC0 |
| BGY883 | CATV | BGY885A |
| BGY887/02 | CATV | BGY887 |
| BGY887BO/SC | CATV | BGO827/SC0 |
| BLC6G22-100 | RFP trs | BLF6G22-100 |
| BLC6G22-100 | RFP trs | BLF6G22LS-100 |
| BLF1822-10 | RFP trs | BLF6G21-10G |
| BLF2043 | RFP trs | BLF6G21-10G |
| BLF2045 | RFP trs | BLF6G20-45BLF6G22-45 |
| BLF3G22-30 | RFP trs | BLF6G22-45 |
| BLF4G08LS-160A | RFP trs | BLF6G10LS-160RN |
| BLF4G08LS-160A | RFP trs | BLF6G10LS-160RN |
| BLF6G10-135RN | RFP trs | BLF6G10LS-135RN |
| BLF6G10-160RN | RFP trs | BLF6G10LS-160RN |
| BLF6G10-160RNL | RFP trs | BLF6G10-200RN |
| BLF6G20-180RN | RFP trs | BLF7G20LS-200 |
| BLF6G20-40 | RFP trs | BLF6G20-45 |
| BLF6G20S-230PRN | RFP trs | BLF7G20LS-250P |
| BLF6G22-180RN | RFP trs | BLF7G22LS-200 |

| NXP discontinued type | Product family NXP | Replacement type NXP |
|---|---|---|
| BLF6G22LS-180PN | RFP trs | BLF7G22LS-200 |
| BLF6G22LS-75 | RFP trs | BLF7G22LS-100 |
| BLF6G27-10 | RFP trs | BLF6G27-10G |
| BLF6G27-10 | RFP trs | BLF6G27-10G |
| BLF6G27-135 | RFP trs | BLF7G27L-135 |
| BLF6G27LS-135 | RFP trs | BLF7G27LS-140 |
| BLF6G27LS-135 | RFP trs | BLF7G27LS-140 |
| BLF6G27LS-75S | RFP trs | BLF6G27LS-75 |
| BLF6G27LS-75S | RFP trs | BLF6G27LS-75 |
| BLF6G38-10 | RFP trs | BLF6G38-10G |
| BLF6G38-10 | RFP trs | BLF6G38-10G |
| BLS2731-110 | RFP trs | BLS6G2731-120 |
| BLS2731-110T | RFP trs | BLS6G2731-120 |
| BLS2731-20 | RFP trs | BLS6G2731-6G |
| BLS2731-50 | RFP trs | BLS6G2731-6G |
| CGD1042 | CATV | CGD1042H |
| CGD1044 | CATV | CGD1044H |
| CGD914 | CATV | CGD1042H |
| CGY887A | CATV | CGY1043 |
| CGY887B | CATV | CGY1047 |
| GD923 | CATV | CGD942C |
| J108 | FET | PMBFJ108 |
| J109 | FET | PMBFJ109 |
| J110 | FET | PMBFJ110 |
| J111 | FET | PMBFJ111 |
| J112 | FET | PMBFJ112 |
| J113 | FET | PMBFJ113 |
| J174 | FET | PMBFJ174 |
| J175 | FET | PMBFJ175 |
| J176 | FET | PMBFJ176 |
| J177 | FET | PMBFJ177 |
| OM7650 | CATV | BGY588C |
| OM7670 | CATV | BGE788C |
| ON4831-2 | CATV | BGY885A |
| ON4876 | CATV | BGY1085A |
| ON4890 | CATV | BGD712 |
| ON4990 | CATV | BGD885 |
| PMBT3640/AT | WB trs | BFS17 |
| PN4392 | FET | PMBF4392 |
| PN4393 | FET | PMBF4393 |
| TFF1004HN | Satellite IC | TFF1014HN |

# 6. Packing and packaging information

## 6.1 Packing quantities per package with relevant ordering code

| | Package | Package dimensions L x W x H (mm) | Packing quantity | Product 12NC ending | Packing method |
|---|---|---|---|---|---|
|  | SOD323/SC-76 | 1.7 x 1.25 x 0.9 | 3,000 | 115 | 8 mm tape and reel |
| | | | 10,000 | 135 | 8 mm tape and reel |
|  | SOD523/SC-79 | 1.2 x 0.8 x 0.6 | 3,000 | 115 | 8 mm tape and reel |
| | | | 10,000 | 135 | 8 mm tape and reel |
| | | | 8,000 | 315 | 2 mm pitch tape and reel |
| | | | 20,000 | 335 | 2 mm pitch tape and reel |
|  | SOD882D | 1.0 x 0.6 x 0.4 | 10,000 | 315 | reel |
|  | SOT23 | 2.9 x 1.3 x 0.9 | 3,000 | 215 | 8 mm tape and reel |
| | | | 10,000 | 235 | 8 mm tape and reel |
|  | SOT54 | 4.6 x 3.9 x 5.1 | 5,000 | 112 | bulk, delta pinning |
| | | | 5,000 | 412 | bulk, straight leads |
| | | | 10,000 | 116 | tape and reel, wide pitch |
| | | | 10,000 | 126 | tape ammopack, wide pitch |
|  | SOT89/SC-62 | 4.5 x 2.5 x 1.5 | 1,000 | 115 | 12 mm tape and reel |
| | | | 4,000 | 135 | 12 mm tape and reel |
|  | SOT115 | 44.5 x 13.65 x 20.4 | 100 | 112 | 4 tray/box |
|  | SOT143(N/R) | 2.9 x 1.3 x 0.9 | 3,000 | 215 | 8 mm tape and reel |
| | | | 10,000 | 235 | 8 mm tape and reel |
|  | SOT223/SC-73 | 6.7 x 3.5 x 1.6 | 1,000 | 115 | 12 mm tape and reel |
| | | | 4,000 | 135 | 12 mm tape and reel |
|  | SOT307 | 10 x 10 x 1.75 | 1,500 | 518 | 13" tape and reel dry pack |
| | | | 96 | 551 | 1 tray dry pack |
| | | | 480 | 557 | 5 tray dry pack |
|  | SOT323/SC-70 | 2.0 x 1.25 x 0.9 | 3,000 | 115 | 8 mm tape and reel |
| | | | 10,000 | 135 | 8 mm tape and reel |
|  | SOT341 | 5.3 x 10.2 x 2.0 | 1,000 | 118 | 13" tape and reel |
| | | | 658 | 112 | tube |
|  | SOT343(N/R) | 2.0 x 1.25 x 0.9 | 3,000 | 115 | 8 mm tape and reel |
| | | | 10,000 | 135 | 8 mm tape and reel |
|  | SOT343F | 2.1 x 1.25 x 0.7 | 3,000 | 115 | 8 mm tape and reel |
|  | SOT360 | 6.5 x 4.4 x 0.9 | 2,500 | 118 | 16 mm tape and reel |
|  | SOT363/SC-88 | 2.0 x 1.25 x 0.9 | 3,000 | 115 | 8 mm tape and reel |
| | | | 10,000 | 135 | 8 mm tape and reel |
|  | SOT401 | 5 x 5 x 1.4 | 2,000 | 118 | 13" tape and reel |
| | | | 360 | 151 | 1 tray |
|  | SOT403 | 5.0 x 4.4 x 0.9 | 2,500 | 118 | 12 mm tape and reel |
|  | SOT416/SC-75 | 1.6 x 0.8 x 0.75 | 3,000 | 115 | 8 mm tape and reel |
|  | SOT467B | 9.78 x 18.29 x 4.67 | 60 | 112 | blister, tray |
| | | | 20 | 112 | blister, tray |
|  | SOT467C | 20.45 x 18.54 x 4.67 | 60 | 112 | blister, tray |
| | | | 20 | 112 | blister, tray |
|  | SOT502A | 19.8 x 9.4 x 4.1 | 60 | 112 | blister, tray |
| | | | 300 | 135 | reel |

| | Package | Package dimensions L x W x H (mm) | Packing quantity | Product 12NC ending | Packing method |
|---|---|---|---|---|---|
|  | SOT502B | 19.8 x 9.4 x 4.1 | 60 | 112 | blister, tray |
| | | | 100 | 118 | reel |
|  | SOT538A | 5.1 x 4.1 x 2.6 | 160 | 112 | blister, tray |
|  | SOT539A | 31.25 x 9.4 x 4.65 | 60 | 112 | blister, tray |
| | | | 300 | 135 | reel |
|  | SOT540A | 21.85 x 10.2 x 5.4 | 60 | 112 | blister, tray |
|  | SOT608A | 10.1 x 10.1 x 4.2 | 60 | 112 | blister, tray |
| | | | 60 | 112 | blister, tray |
| | | | 300 | 135 | reel |
|  | SOT608B | 10.1 x 10.1 x 4.2 | 60 | 112 | blister, tray |
| | | | 100 | 118 | reel |
| | | | 300 | 135 | reel |
|  | SOT616 | 4.0 x 4.0 x 0.85 | 6,000 | 118 | 12 mm tape and reel |
| | | | 1,500 | 115 | 8 mm tape and reel |
| | | | 100 | 551 | tray |
|  | SOT617 | 5 x 5 x 0.85 | 6,000 | 118 | tape and reel |
|  | SOT618 | 6 x 6 x 0.85 | 4,000 | 118 | 13" tape and reel |
| | | | 1,000 | 515 | 7" tape and reel dry pack |
| | | | 490 | 551 | 1 tray dry pack |
| | | | 2,450 | 157 | 5 tray |
|  | SOT638 | 14 x 14 x 1 | 1,000 | 518 | 13" tape and reel dry pack |
| | | | 90 | 551 | 1 tray dry pack |
| | | | 450 | 557 | 5 tray dry pack |
|  | SOT650-1 | 3.0 x 3.0 x 0.85 | 6,000 | 118 | reel |
|  | SOT666 | 1.6 x 1.2 x 0.7 | 4,000 | 115 | 8 mm tape and reel |
|  | SOT684 | 8 x 8 x 0.85 | 1,000 | 518 | 13" tape and reel dry pack |
| | | | 260 | 151 | 1 tray |
| | | | 260 | 551 | 1 tray dry pack |
| | | | 1,300 | 157 | 5 tray dry pack |
|  | SOT724 | 8.7 x 3.9 x 1.47 | 2,500 | 118 | 16 mm tape and reel |
|  | SOT753 | 2.9 x 1.5 x 1.0 | 3,000 | 125 | 8 mm tape and reel |
|  | SOT763-1 | 2.5 x 3.5 x 0.85 | 3,000 | 115 | reel |
| | | | 6,000 | 135 | |
|  | SOT778 | 6.0 x 6.0 x 0.85 | 490 | 551 | tray |
| | | | 4,000 | 518 | multiple trays |
|  | SOT822-1 | 15.9 x 11 x 3.6 | 180 | 127 | tube |
|  | SOT834-1 | 15.9 x 11 x 3.15 | 180 | 127 | tube |
|  | SOT883 | 1.0 x 0.6 x 0.5 | 3,000 | 115 | 8 mm tape and reel |
|  | SOT886 | 1.45 x 1.0 x 0.5 | 5,000 | 115 | 8 mm tape and reel |
|  | SOT891 | 1.0 x 1.0 x 0.5 | 5,000 | 132 | 8 mm tape and reel |
|  | SOT908 | 3.0 x 3.0 x 0.85 | 6,000 | 118 | 12 mm tape and reel |
|  | SOT922-1 | 17.4 x 9.4 x 3.88 | 60 | 112 | blister, tray |
|  | SOT975B | 6.5 x 6.5 x 3.3 | 180 | 112 | blister, tray |
| | | | 100 | 118 | tape and reel |
|  | SOT975C | 6.5 x 6.5 x 3.3 | 180 | 112 | blister, tray |
| | | | 100 | 118 | tape and reel |
|  | SOT979A | 31.25 x 10.2 x 5.3 | 60 | 112 | blister, tray |
|  | SOT1110A | 41.28 x 17.12 x 5.36 | 60 | 112 | blister, tray |
| | | | 100 | 118 | reel |
|  | SOT1110B | 41.15 x 36.32 x 4.68 | 60 | 112 | blister, tray |

| | Package | Package dimensions L x W x H (mm) | Packing quantity | Product 12NC ending | Packing method |
|---|---|---|---|---|---|
|  | SOT1112A | 16.65 x 20.32 x 4.205 | 60<br>100 | 112<br>118 | blister, tray<br>reel |
|  | SOT1112B | 16.65 x 15.22 x 4.205 | 60<br>100 | 112<br>118 | blister, tray<br>reel |
|  | SOT1120A | 9.4 x 19.815 x 4.1 | 60<br>100 | 112<br>118 | blister, tray<br>reel |
|  | SOT1120B | 9.4 x 19.815 x 4.1 | 60<br>100 | 112<br>118 | blister, tray<br>reel |
|  | SOT1121A | 34.16 x 19.94 x 4.75 | 60<br>100 | 112<br>118 | blister, tray<br>reel |
|  | SOT1121B | 20.70 x 19.94 x 4.75 | 60<br>100 | 112<br>118 | blister,tray<br>reel |
|  | SOT1121C | 13.4 x 20.575 x 3.785 | DEV | DEV | DEV |
|  | SOT1130A | 20.45 x 17.12 x 4.65 | 60 | 112 | blister, tray |
|  | SOT1130B | 9.91 x 17.12 x 4.65 | 60 | 112 | blister, tray |
|  | SOT1135A | 20.45 x 19.94 x 4.65 | 60<br>100 | 112<br>118 | blister, tray<br>reel |
|  | SOT1135B | 16.65 x 9.78 x 4.205 | 60<br>100 | 112<br>118 | blister, tray<br>reel |
|  | SOT1135C | 16.65 x 9.78 x 4.205 | 60<br>100 | 112<br>118 | blister, tray<br>reel |
|  | SOT1138 | 19.48 x 20.57 x 3.9 | DEV | DEV | DEV |
|  | SOT1179 | 4.0 x 6.0 x 0.85 | DEV | DEV | DEV |
|  | SOT1198-1 | 10.0 x 5.5 x 0.8 | 1000 | 115 | reel |
|  | SOT1204 | 13.2 x 20.57 x 3.9 | DEV | DEV | DEV |
|  | SOT1209 | 2 x 1.3 x 0.35 | 5000 | 147 | 8 mm tape and reel |
|  | SOT1240B | 21.60 x 20.575 x 3.875 | DEV | DEV | DEV |
|  | SOT1240C | 18.00 x 20.575 x 3.875 | DEV | DEV | DEV |
|  | SOT1242B | 22.60 x 32.45 x 4.455 | DEV | DEV | DEV |
|  | SOT1242C | 18.00 x 32.45 x 4.455 | DEV | DEV | DEV |
|  | SOT1244B | 19.43 x 20.575 x 3.875 | DEV | DEV | DEV |
|  | SOT1244C | 18.00 x 20.575 x 3.875 | DEV | DEV | DEV |

## 6.2 Marking codes

In general, device marking includes the part number, some manufacturing information and the NXP logo. If packages are too small for the full-length part number a shorter, coded part number – marking code – is used (where % = placeholder for manufacturing site code). The full-length part number is always printed on the packing label on the box or bulk-pack in which the devices are supplied.

p = made in Hong Kong
t = made in Malaysia
W = made in China

| Marking code | Final product | Package |
|---|---|---|
| 10% | BAT18 | SOT23 |
| 13% | BB207 | SOT23 |
| 20% | BF545A | SOT23 |
| 21% | BF545B | SOT23 |
| 22% | BF545C | SOT23 |
| 24% | BF556A | SOT23 |
| 25% | BF556B | SOT23 |
| 26% | BF556C | SOT23 |
| 28% | BF861A | SOT23 |
| 29% | BF861B | SOT23 |
| 30% | BF861C | SOT23 |
| 31% | BFR505 | SOT23 |
| 32% | BFR520 | SOT23 |
| 33% | BFR540 | SOT23 |
| 34% | BFT25A | SOT23 |
| 35% | ON4288 | SOT23 |
| 36% | ON4690 | SOT23 |
| 38% | PMBFJ108 | SOT23 |
| 39% | PMBFJ109 | SOT23 |
| 40% | PMBFJ110 | SOT23 |
| 41% | PMBFJ111 | SOT23 |
| 42% | PMBFJ112 | SOT23 |
| 47% | PMBFJ113 | SOT23 |
| 48% | PMBFJ308 | SOT23 |
| 49% | PMBFJ309 | SOT23 |
| 50% | PMBFJ310 | SOT23 |
| 1 | BA277 | SOD523 |
| 2 | BB182 | SOD523 |
| 2 | BB182/L | SOD523 |
| 4 | BB189 | SOD523 |
| 4 | BB189/L | SOD523 |
| 7 | BA891 | SOD523 |
| 7 | BA891/L | SOD523 |
| 8 | BB178 | SOD523 |
| 8 | BB178/L | SOD523 |
| 9 | BB179 | SOD523 |
| 9 | BB179/L | SOD523 |
| %1V | BFR93AW/DG | SOT323 |
| %1W | BAP51-05W | SOT323 |
| %6G | PMBF4393 | SOT23 |
| %6J | PMBF4391 | SOT23 |
| %6K | PMBF4392 | SOT23 |
| %6N | ON5088 | SOT343 |
| %6S | PMBFJ176 | SOT23 |
| %6W | PMBFJ175 | SOT23 |
| %6X | PMBFJ174 | SOT23 |
| %6Y | PMBFJ177 | SOT23 |
| %7N | ON5087 | SOT343 |
| %8N | ON5089 | SOT343 |
| %AB | BF1210 | SOT363 |
| %BG | PMBFJ177/DG | SOT23 |
| %E7 | BGA2800 | SOT363 |
| %E8 | BGA2801 | SOT363 |
| %E9 | BGA2815 | SOT363 |
| %EA | BGA2816 | SOT363 |
| %EB | BGA2850 | SOT363 |
| %EC | BGA2865 | SOT363 |
| %ED | BGA2866 | SOT363 |
| %M1 | BF908 | SOT143 |
| %M2 | BF908R | SOT143 |
| %M3 | BF909 | SOT143 |
| %M4 | BF909R | SOT143 |

| Marking code | Final product | Package |
|---|---|---|
| %M5 | BF909A | SOT143 |
| %M6 | BF909AR | SOT143 |
| %M7 | BF904A | SOT143 |
| %M8 | BF904AR | SOT143 |
| %M9 | BSS83 | SOT143 |
| %M9 | ON4906 | SOT143 |
| %MA | BF991 | SOT143 |
| %MB | BF992 | SOT143 |
| %MC | BF904 | SOT143 |
| %MD | BF904R | SOT143 |
| %ME | BFG505 | SOT143 |
| %MF | BFG520 | SOT143 |
| %MG | BFG540 | SOT143 |
| %MH | BFG590 | SOT143 |
| %MK | BFG505/X | SOT143 |
| %ML | BFG520/X | SOT143 |
| %MM | BFG540/X | SOT143 |
| %MM | ON4832 | SOT143 |
| %MN | BFG590/X | SOT143 |
| %MP | BFG520/XR | SOT143 |
| %MP | ON4973 | SOT143 |
| %MR | BFG540/XR | SOT143 |
| %MS | BFG10 | SOT143 |
| %MT | BFG10/X | SOT143 |
| %MU | BFG25A/X | SOT143 |
| %MV | BFG67/X | SOT143 |
| %MW | BFG92A/X | SOT143 |
| %MX | BFG93A/X | SOT143 |
| %MY | BF1100 | SOT143 |
| %MZ | BF1100R | SOT143 |
| %VA | BGU7041 | SOT363 |
| %VB | BGU7042 | SOT363 |
| LE | BAP64LX | SOD882D |
| L4 | BB179LX | SOD882D |
| LC | BAP55LX | SOD882D |
| L3 | BB178LX | SOD882D |
| 1A | BGU6101 | SOT1209 |
| 1B | BGU6102 | SOT1209 |
| 1B% | BGA2717 | SOT363 |
| 1C | BGU6104 | SOT1209 |
| 1C% | BAP50-05 | SOT23 |
| 1N% | BAP70-04W | SOT323 |
| 2A% | BF862 | SOT23 |
| 2E | PRF949/DG | SOT416 |
| 2L | BF1208 | SOT666 |
| 2N | BF1206F | SOT666 |
| 4A | BF1208D | SOT666 |
| 4K% | BAP64-04 | SOT23 |
| 4L% | BAP50-04 | SOT23 |
| 4W% | BAP64-04W | SOT323 |
| 5K% | BAP64-05 | SOT23 |
| 5W% | BAP64-05W | SOT323 |
| 6F% | BAP1321-04 | SOT23 |
| 6K% | BAP64-06 | SOT23 |
| 6W% | BAP50-04W | SOT323 |
| 7K% | BAP65-05 | SOT23 |
| 8K% | BAP70-05 | SOT23 |
| A1 | BA591 | SOD323 |
| A1 | BB208-02 | SOD523 |
| A1 | BGA2001 | SOT343 |
| A1 | BAP64Q | SOT753 |
| A2 | BB208-03 | SOD323 |

| Marking code | Final product | Package |
|---|---|---|
| A2 | BB184 | SOD523 |
| A2 | BGA2002 | SOT343 |
| A2 | BAP70Q | SOT753 |
| A2% | BGA2022 | SOT363 |
| A3 | BAP64-03 | SOD323 |
| A3 | BB198 | SOD523 |
| A3 | BGA2003 | SOT343 |
| A3% | BGA2031/1 | SOT363 |
| A5 | BAP51-03 | SOD323 |
| A5% | BGA2011 | SOT363 |
| A6% | BGA2012 | SOT363 |
| A7% | BFG310W/XR | SOT343 |
| A8 | BAP50-03 | SOD323 |
| A8% | BFG325W/XR | SOT343 |
| A8% | PMBFJ620 | SOT363 |
| A9 | BAP70-03 | SOD323 |
| AC | BGU7005 | SOT886 |
| B3 | BGU7003 | SOT891 |
| B5% | BSR12 | SOT23 |
| B6 | BGU7007 | SOT886 |
| B6% | BGA2715 | SOT363 |
| B7 | BGU7008 | SOT886 |
| B7% | BF862/B | SOT23 |
| B7% | BFU725F/N1 | SOT343 |
| B7% | BGA2716 | SOT363 |
| BA% | BGA2714 | SOT363 |
| BCp | BFQ591 | SOT89 |
| C | BB179B | SOD523 |
| C1% | BGM1011 | SOT363 |
| C2% | BGM1012 | SOT363 |
| C4% | BGM1013 | SOT363 |
| C5% | BGM1014 | SOT363 |
| CL | BAP70-03/DG | SOD323 |
| D1 | BFU610F | SOT343 |
| D2 | BAP63-03 | SOD323 |
| D2 | BFU630F | SOT343 |
| D3 | BAP65-03 | SOD323 |
| D3 | BFU660F | SOT343 |
| D4 | BFU690F | SOT343 |
| D5 | BFU710F | SOT343 |
| D6 | BFU730F | SOT343 |
| D7 | BFU760F | SOT343 |
| D8 | BFU790F | SOT343 |
| E1% | BFS17 | SOT23 |
| E1% | BFS17/FD | SOT23 |
| E1% | ON4438 | SOT23 |
| E1% | BFS17W | SOT323 |
| E2% | BFS17A | SOT23 |
| E2% | ON5023 | SOT23 |
| E2% | BGA2712 | SOT363 |
| E3% | BGA2709 | SOT363 |
| E6 | BAP55L | SOD882 |
| FB | BFQ19 | SOT89 |
| FF | BFQ18A | SOT89 |
| FG | BFQ149 | SOT89 |
| G2 | BA278 | SOD523 |
| G2% | BGA2711 | SOT363 |
| G3% | BGA2748 | SOT363 |
| G4% | BGA2771 | SOT363 |
| G5% | BGA2776 | SOT363 |
| K1 | BAP51-02 | SOD523 |
| K2 | BAP51-05W | SOD523 |

| Marking code | Final product | Package |
|---|---|---|
| K4 | BAP50-02 | SOD523 |
| K5 | BAP63-02 | SOD523 |
| K6 | BAP65-02 | SOD523 |
| K7 | BAP1321-02 | SOD523 |
| K8 | BAP70-02 | SOD523 |
| K9 | BB199 | SOD523 |
| L1 | BB202LX | SOD882T |
| L2 | BB202 | SOD523 |
| L2 | BAP51LX | SOD882T |
| L2% | BF1203 | SOT363 |
| L3 | BB178LX | SOD882T |
| L3% | BF1204 | SOT363 |
| L4 | BB179LX | SOD882T |
| L4% | BF1205 | SOT363 |
| L5 | BB179BLX | SOD882T |
| L6 | BB181LX | SOD882T |
| L6% | BF1206 | SOT363 |
| L7 | BB182LX | SOD882T |
| L8 | BA792 | SOD110 |
| L8 | BB187LX | SOD882T |
| L9% | BF1208 | SOT363 |
| LA | BF1201WR | SOT343 |
| LA% | BF1201 | SOT143 |
| LB | BAP50LX | SOD882T |
| LB% | BF1201R | SOT143 |
| LB% | PBR941B | SOT23 |
| LC | BAP55LX | SOD882T |
| LD | BAP63LX | SOD882T |
| LD% | BF1202 | SOT143 |
| LD% | BF1202/L | SOT143 |
| LE | BAP64LX | SOD882T |
| LE | BF1202WR | SOT343 |
| LE | BF1202WR/L | SOT343 |
| LE% | BF1202R | SOT143 |
| LF | BAP65LX | SOD882T |
| LF% | BF1211 | SOT143 |
| LG | BAP142LX | SOD882T |
| LG% | BF1212 | SOT143 |
| LH | BAP1321LX | SOD882T |
| LH% | BF1211R | SOT143 |
| LJ% | BGU7044 | SOT363 |
| LK% | BF1212R | SOT143 |
| LK% | BGU7045 | SOT363 |
| LP% | BGA2867 | SOT363 |
| LR% | BGA2874 | SOT363 |
| LS% | BGA2817 | SOT363 |
| M1% | BFR30 | SOT23 |
| M2% | BFR31 | SOT23 |
| M2% | BF1207 | SOT363 |
| M26 | BF908 | SOT143 |
| M27 | BF908R | SOT143 |
| M28 | BF909 | SOT143 |
| M29 | BF909R | SOT143 |
| M3% | BFT46 | SOT23 |
| M33 | BF909A | SOT143 |
| M34 | BF909AR | SOT143 |
| M4% | BF1215 | SOT363 |
| M4% | BSR56 | SOT23 |
| M41 | BF904A | SOT143 |
| M42 | BF904AR | SOT143 |
| M5% | BSR57 | SOT23 |
| M5% | BF1216 | SOT363 |
| M56 | BF1100 | SOT143 |
| M57 | BF1100R | SOT143 |
| M6% | BSR58 | SOT23 |
| M6% | BF1205C | SOT363 |
| M7% | BF1218 | SOT363 |
| M74 | BSS83 | SOT143 |
| M74 | ON4906 | SOT143 |
| M91 | BF991 | SOT143 |
| M92 | BF992 | SOT143 |
| MA% | BGA2802 | SOT363 |
| MB | BF998WR | SOT343 |
| MB% | BGA2803 | SOT363 |
| MC | BF904WR | SOT343 |
| MC% | BGA2851 | SOT363 |
| MD | BF908WR | SOT343 |
| ME | BF909WR | SOT343 |
| MF | BF1100WR | SOT343 |
| MG | BF909AWR | SOT343 |
| MG% | BF994S | SOT143 |

| Marking code | Final product | Package |
|---|---|---|
| MH | BF904AWR | SOT343 |
| MH% | BF996S | SOT143 |
| MK | BF1211WR | SOT343 |
| ML | BF1212WR | SOT343 |
| ML | BF1212WR/L | SOT343 |
| MO% | BF998 | SOT143 |
| MO% | BF998R | SOT143 |
| MO4 | BF904 | SOT143 |
| MO6 | BF904R | SOT143 |
| N | BB181 | SOD523 |
| N0 | BFR505T | SOT416 |
| N0% | BFS505 | SOT323 |
| N0% | BFM505 | SOT363 |
| N2 | BFR520T | SOT416 |
| N2% | BFS520 | SOT323 |
| N2% | BFM520 | SOT363 |
| N3 | BFG520W | SOT343 |
| N33 | BFG505 | SOT143 |
| N36 | BFG520 | SOT143 |
| N37 | BFG540 | SOT143 |
| N38 | BFG590 | SOT143 |
| N39 | BFG505/X | SOT143 |
| N4 | BFG520W/X | SOT343 |
| N4 | BFQ540 | SOT89 |
| N4% | BFS540 | SOT323 |
| N42 | BFG520/X | SOT143 |
| N43 | BFG540/X | SOT143 |
| N43 | ON4832 | SOT143 |
| N44 | BFG590/X | SOT143 |
| N48 | BFG520/XR | SOT143 |
| N49 | BFG540/XR | SOT143 |
| N6% | BFS25A | SOT323 |
| N7 | BFG540W/X | SOT343 |
| N70 | BFG10 | SOT143 |
| N71 | BFG10/X | SOT143 |
| N8 | BFG540W/XR | SOT343 |
| N9 | BFG540W | SOT343 |
| N9% | BAP70AM | SOT363 |
| NA | BF1105WR | SOT343 |
| NA% | BF1105R | SOT143 |
| NB | BF1109WR | SOT343 |
| NB% | BF1109R | SOT143 |
| NC | BF1101WR | SOT343 |
| NC% | BF1101R | SOT143 |
| ND | BFG424W | SOT343 |
| ND% | BF1101 | SOT143 |
| NE | BFG424F | SOT343 |
| NE% | BF1105 | SOT143 |
| NF% | BF1109 | SOT143 |
| NG% | BF1108 | SOT143 |
| NG% | BF1108/L | SOT143 |
| NH% | BF1108R | SOT143 |
| NL% | BFR94A | SOT23 |
| 33* | BFR540 | SOT143 |
| P1 | BB131 | SOD323 |
| P1 | BFG21W | SOT343 |
| P2% | BFR92A | SOT23 |
| P2% | ON4640 | SOT23 |
| P2% | BFR92AW | SOT323 |
| P3 | BFG403W | SOT343 |
| p3A | BGA6289 | SOT89 |
| P4 | BFG410W | SOT343 |
| p4A | BGA6489 | SOT89 |
| P5 | BB135 | SOD323 |
| P5 | BFG425W | SOT343 |
| p5A | BGA6589 | SOT89 |
| P6 | BFG480W | SOT343 |
| p6K | BGA7024 | SOT89 |
| p6L | BGA7027 | SOT89 |
| P8 | BB148 | SOD323 |
| P9 | BB149 | SOD323 |
| PB | BB152 | SOD323 |
| PC | BB153 | SOD323 |
| PF | BB156 | SOD323 |
| PL | BB149A | SOD323 |
| R2% | BFR93A | SOT23 |
| R2% | BFR93AW | SOT323 |
| R5% | BFR93AR | SOT23 |
| R7% | BFR106 | SOT23 |
| R8% | BFG93A | SOT143 |
| S | BAP64-02 | SOD523 |

| Marking code | Final product | Package |
|---|---|---|
| S1% | BFG310/XR | SOT143 |
| S2% | BFG325/XR | SOT143 |
| S2% | BBY40 | SOT23 |
| S3% | BF1107 | SOT23 |
| S6% | BF510 | SOT23 |
| S7% | BF511 | SOT23 |
| S8% | BF512 | SOT23 |
| S9% | BF513 | SOT23 |
| SB% | BF1214 | SOT363 |
| SB% | BF1214/L | SOT363 |
| SC% | BB201 | SOT23 |
| SC% | BGU7031 | SOT363 |
| SD% | BGU7032 | SOT363 |
| SE% | BGU7033 | SOT363 |
| T5 | BFG10W/X | SOT343 |
| TA% | BGA2818 | SOT363 |
| TB% | BGA2819 | SOT363 |
| UW | BGU7003W | SOT886 |
| UY | BGU7004 | SOT886 |
| UZ | BGU8007 | SOT886 |
| V0% | PBR941 | SOT23 |
| V0% | PRF947 | SOT323 |
| V1 | BFG25AW/X | SOT343 |
| V1% | BFT25 | SOT23 |
| V11 | BFG25A/X | SOT143 |
| V12 | BFG67/X | SOT143 |
| V14 | BFG92A/X | SOT143 |
| V15 | BFG93A/X | SOT143 |
| V2% | BFQ67 | SOT23 |
| V2% | ON5042 | SOT23 |
| V2% | BFQ67W | SOT323 |
| V3% | BFG67 | SOT143 |
| V4% | BAP64-06W | SOT323 |
| V6% | BAP65-05W | SOT323 |
| V8 | BAP1321-03 | SOD323 |
| VA | BF1217WR | SOT343 |
| VB | BF1118W | SOT343 |
| VC | BF1118WR | SOT343 |
| VC% | BF1118 | SOT143 |
| VD% | BF1118R | SOT143 |
| W1 | BF1102 | SOT363 |
| W1% | BFT92 | SOT23 |
| W1% | BFT92W | SOT323 |
| W2% | PBR951 | SOT23 |
| W2% | PRF957 | SOT323 |
| W2% | BF1102R | SOT363 |
| W4% | BAP50-05W | SOT323 |
| W6% | BAP51-04W | SOT323 |
| W7% | BAP51-06W | SOT323 |
| W9% | BAP63-05W | SOT323 |
| X | BB187 | SOD523 |
| X | BB187/L | SOD523 |
| X1% | BFT93 | SOT23 |
| X1% | BFT93W | SOT323 |
| XG% | BFR94AW | SOT323 |
| YC% | BGA2870 | SOT363 |
| Z | BB145B | SOD523 |
| ZA% | BFU668F | SOT343 |
| ZC | BFU710LX | SOT883 |
| ZD | BFU730LX | SOT883 |
| ZE | BFU760LX | SOT883 |
| ZF | BFU790LX | SOT883 |
| ZK% | ON5052 | SOT23 |
| ZX% | BGA2022/C | SOT363 |

# 7. Abbreviations

| | |
|---|---|
| 3-way | Doherty design using 3 discrete transistors |
| AM | Amplitude Modulation |
| ASIC | Application Specific Integrated Circuit |
| ASYM | Asymmetrical design of Doherty (main and peak device are different) |
| BPF | Band Pass Filter |
| BUC | Block Upconverter |
| CATV | Community Antenna Television |
| CDMA | Code Division Multiple Access |
| CMMB | Chinese Multimedia Mobile Broadcasting |
| CMOS | Complementary Metal Oxide Semiconductor |
| CQS | Customer Qualification Samples |
| DAB | Digital Audio Broadcasting |
| DECT | Digital Enhanced Cordless Telecommunications |
| DiSEqC | Digital Satellite Equipment Control |
| DSB | Digital Signal Processor |
| DVB | Digital Video Broadcasting |
| EDGE | Enhanced Data Rates for GSM Evolution |
| ESD | Electro Static Device |
| FET | Field Effect Transistor |
| FM | Frequency Modulation |
| GaAs | Gallium Arsenide |
| GaN | Gallium Nitride |
| Gen | Generation |
| GPS | Global Positioning System |
| GSM | Global System for Mobile communications |
| HBT | Heterojunction Bipolar Transistor |
| HDTV | High Definition Television |
| HF | High Frequency (3-30 MHz) |
| HFC | Hybrid Fiber Coax |
| HFET | Heterostructure Field Effect Transistor |
| HPA | High Power Amplifier |
| HVQFN | Plastic thermally enHanced Very thin Quad Flat pack No leads |
| IF | Intermediate Frequency |
| ISM | Industrial, Scientific, Medical - reserved frequency bands |
| LDMOS | Laterally Diffused Metal-Oxide-Semiconductor |
| LNA | Low Noise Amplifier |
| LNB | Low Noise Block |
| LO | Local Oscillator |
| LPF | Low Pass Filter |
| MESFET | Metal Semiconductor Field Effect Transistor |
| MMIC | Monolithic Microwave Integrated Circuit |
| MMPP | Main and peak devices realized separately in halves of push-pull transistor |
| MPPM | Main and peak device realized in same push-pull transistor (2 times) |
| MoCA | Multimedia over Coax Alliance |
| MOSFET | Metal–Oxide–Semiconductor Field Effect Transistor |
| MPA | Medium Power Amplifier |
| MRI | Magnetic Resonance Imaging |
| NF | Noise Figure |
| NIM | Network Interface Module |
| NMR | Nuclear Magnetic Resonance |
| PA | Power Amplifier |
| PAR | Peak to Average Ratio |
| PEP | Peak Envelope Power |
| pHEMT | pseudomorphic High Electron Mobility Transistor |
| PLL | Phase Locked Loop |
| QUBiC | Quality BiCMOS |
| RF | Radio Frequency |
| RFS | Release for Supply |
| RoHS | Restriction of Hazardous Substances |
| Rx | Receive |
| SARFT | State Administration for Radio, Film and Television |
| SER | Serializer |
| SiGe:C | Sillicon Germanium Carbon |
| SMATV | Satellite Master Antenna Television |
| SMD | Surface Mounted Device |
| SPDT | Single Pole, Double Throw |
| SYM | Symmetrical design of Doherty (main and peak device are the same type of transistor) |
| TD-SCDMA | Time Division-Synchronous Code Division Multiple Access |
| TCAS | Traffic Collision Avoidance Systems |
| TMA | Tower Mounted Amplifier |
| TTFF | Time to First Fix |
| Tx | Transmit |
| UHF | Ultra High Frequency (470-860 MHz) |
| UMTS | Universal Mobile Telecommunications System |
| VCO | Voltage Controlled Oscillator |
| VGA | Variable Gain Amplifier |
| VHF | Very High Frequency (30-300 MHz) |
| VoIP | Voice over Internet Protocol |
| VSAT | Very Small Aperture Terminal |
| WCDMA | Wideband Code Division Multiple Access |
| WiMAX | Worldwide Interoperability for Microwave Access |
| WLAN | Wireless Local Area Network |

# 8. Contacts and web links

How to contact your authorized distributor or local NXP representative.

## Authorized distributors

Asia Pacific:
http://www.nxp.com/profile/sales/asia_pacific_dist

Europe / Africa / Middle East:
http://www.nxp.com/profile/sales/europe_dist

North America:
http://www.nxp.com/profile/sales/northamerica_dist

## Local NXP offices

Asia Pacific:
http://www.nxp.com/profile/sales/asia_pacific

Europe / Africa / Middle East:
http://www.nxp.com/profile/sales/europe

North America:
http://www.nxp.com/profile/sales/northamerica

## Web links

NXP Semiconductors:
http://www.nxp.com

NXP RF Manual web page:
http://www.nxp.com/rfmanual

NXP varicaps:
http://www.nxp.com/varicaps

NXP RF PIN diodes:
http://www.nxp.com/pindiodes

NXP RF schottky diodes:
http://www.nxp.com/rfschottkydiodes

NXP RF MMICs:
http://www.nxp.com/mmics

NXP RF wideband transistors:
http://www.nxp.com/rftransistors

NXP RF power & base stations:
http://www.nxp.com/rfpower

NXP RF FETs:
http://www.nxp.com/rffets

NXP RF CATV electrical & optical:
http://www.nxp.com/catv

NXP RF applications:
http://www.nxp.com/rf

NXP application notes:
http://www.nxp.com/technical-support-portal/50812/50961

NXP cross-references:
http://www.nxp.com

NXP packaging:
http://www.nxp.com/package

NXP end-of-life:
http://www.nxp.com/products/eol

NXP quality handbook:
http://www.standardics.nxp.com/quality/handbook

NXP literature:
http://www.nxp.com/products/discretes/documentation

NXP sales offices and distributors:
http://www.nxp.com/profile/sales

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# Notes

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