SST12CP12

2.4 GHz 256 QAM High-Power Amplifier

Features

- High Gain:
  - Typically 33 dB gain across 2.4–2.5 GHz over temperature -40°C to +85°C
- High linear output power, typical performance:
  - 1.75% dynamic EVM up to 23 dBm, MCS8, 256 QAM, 40 MHz
  - 2.5% EVM up to 24 dBm, 802.11n, HT40
  - 3% EVM up to 25 dBm for 54 Mbps 802.11g signal
  - Meets 802.11g OFDM spectrum mask requirement up to 28.5 dBm
  - Meets 802.11b ACPR requirement up to 28.5 dBm
- High-speed power-up/down
  - Turn on/off time (10%-90%) <100 ns
- 10:1 VSWR survivability (unconditionally stable up to 28.5 dBm)
- On-chip power detection
  - 20 dB dynamic range
  - VSWR- and temperature-insensitive
- Simple input/output matching
- Packages available
  - 16-contact UQFN (3mm x 3mm)
- All non-Pb (lead-free) devices are RoHS compliant

Applications

- WLAN (IEEE 802.11b/g/n)
- AP router
- WiMax (IEEE 802.16e)
- Home RF
- Cordless phones
- 2.4 GHz ISM wireless equipment
- 1.8-2.3 GHz femtocell base stations

Product Description

SST12CP12 is a high-power, 256 QAM power amplifier (PA) based on the highly-reliable InGaP/GaAs HBT technology.

Operating over the 2.4–2.5 GHz frequency band, the PA will typically provide 33 dB gain with 25% power-added efficiency @ P_{OUT} = 28 dBm for 802.11g.

SST12CP12 has excellent linearity, providing less than 1.75%

dynamic EVM up to 23 dBm with MCS8, 40 MHz bandwidth modulation. It will also provide typically 3% added EVM at 25 dBm output power with 54 Mbps 802.11g operation while meeting 802.11g spectrum mask at 28.5 dBm. SST12CP12 also has a single-ended power detector for active power control.

The power amplifier IC also features high-speed power-up/-down control with the V_{REF} control pins.

SST12CP12 is offered in 16-contact UQFN package. See Figure 2-1 for pin assignments and Table 3-1 for pin descriptions.

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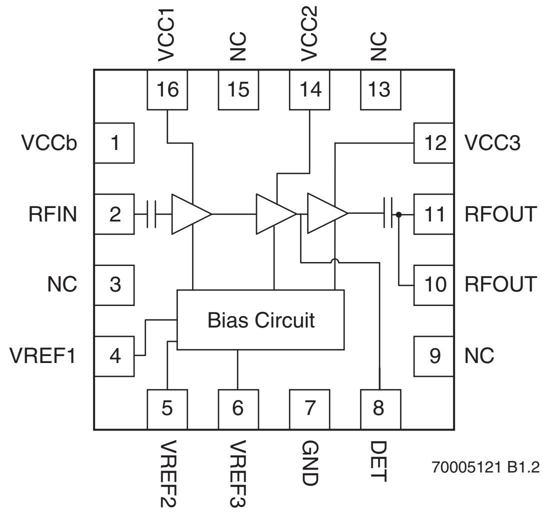
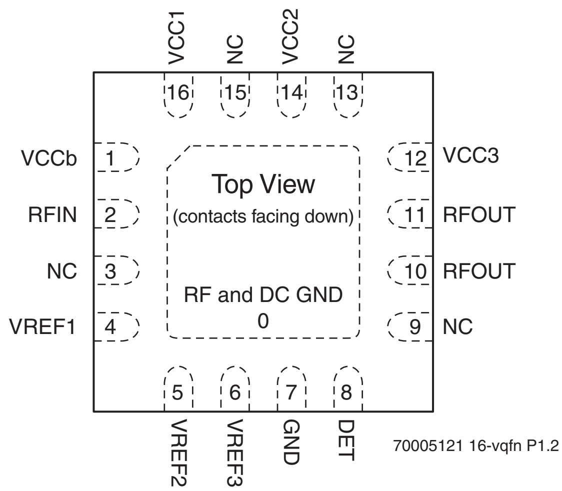
1.0 FUNCTIONAL BLOCKS

FIGURE 1-1: FUNCTIONAL BLOCK DIAGRAM



2.0 PIN ASSIGNMENTS

FIGURE 2-1: PIN ASSIGNMENTS FOR 16-CONTACT UQFN



3.0 PIN DESCRIPTIONS

TABLE 3-1: PIN DESCRIPTION

Symbol	Pin No.	Pin Name	Type[1]	Function
GND	0	Ground		The center pad should be connected to RF ground with several low inductance, low resistance vias.
VCCb	1	Power Supply		Bias circuit supply
RFIN	2		I	RF input, DC decoupled
NC	3	No Connection		Unconnected, no internal connection
VREF1	4	Power Supply	PWR	1st stage idle-current control
VREF2	5	Power Supply	PWR	2nd stage idle-current control
VREF3	6	Power Supply	PWR	3rd stage idle-current control
GND	7	Ground		
Det	8		O	On-chip power detector
NC	9	No Connection		Unconnected, no internal connection
RFOUT	10		O	RF output
RFOUT	11		O	RF output
VCC3	12	Power Supply	PWR	Power supply, 3rd stage
NC	13	No Connection		Unconnected, no internal connection
VCC2	14	Power Supply	PWR	Power supply, 2nd stage
NC	15	No Connection		Unconnected pins.
VCC1	16	Power Supply	PWR	Power supply, 1st stage

1. I=Input, O=Output

4.0 ELECTRICAL SPECIFICATIONS

The AC and DC specifications for the power amplifier interface signals. Refer to Table 4-2 for the DC voltage and current specifications. Refer to Figures 5-1 through 6-5 for the RF performance.

Absolute Maximum Stress Ratings (Applied conditions greater than those listed under “Absolute Maximum Stress Ratings” may cause permanent damage to the device. This is a stress rating only and functional operation of the device at these conditions or conditions greater than those defined in the operational sections of this data sheet is not implied. Exposure to absolute maximum stress rating conditions may affect device reliability.)

Input power to pins 2 and 3 (P_{IN}) . . . . 5 dBm
Supply Voltage at pins 5, 12, 14, 16 (V_{CC}). . . . . +6V
Reference voltage to pins 4 (V_{REF1}) and pin 7 (V_{REF2}) . . . .+3.5V
DC supply current (I_{CC}) . . . . 750 mA
Operating Temperature (T_A) . . . . -40ºC to +85ºC
Storage Temperature (T_{STG}) . . . . -40ºC to +120ºC
Maximum Junction Temperature (T_J) . . . . +150ºC
Surface Mount Solder Reflow Temperature . . . . 260°C for 10 seconds

TABLE 4-1: OPERATING RANGE

Range	Ambient Temp	V_{CC}
Industrial	-40°C to +85°C	3.0V to 5.0V

TABLE 4-2: DC ELECTRICAL CHARACTERISTICS AT 25ºC

Symbol	Parameter	Min.	Typ	Max.	Unit
V_{CC}	Supply Voltage at pins 5, 12, 14, 16	4.0	5.0	5.5	V
I_{CC}	Average Current at 100% duty cycle				
	for 802.11g, 28.5 dBm		670		mA
	for 802.11b, 28.5 dBm		670		mA
	for 256 QAM, 27 dBm		600		mA
I_{CQ}	Idle current for 802.11g to meet EVM<3% @24.5 dBm, 100% duty cycle		375		mA
V_{REG}	Reference Supply	2.90	3.10	3.15	V

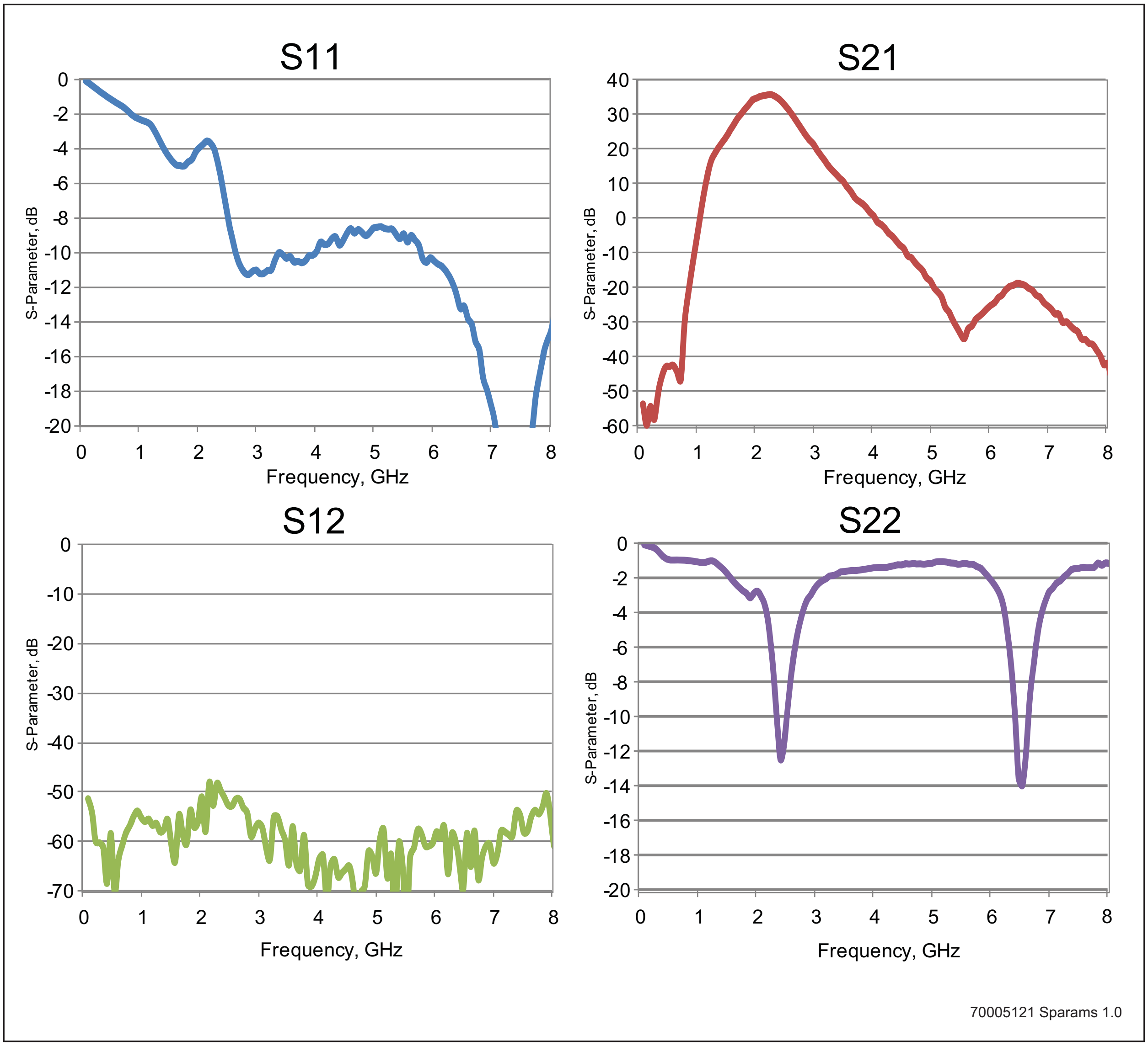
TABLE 4-3: AC ELECTRICAL CHARACTERISTICS FOR CONFIGURATION AT 25ºC

Symbol	Parameter	Min.	Typ	Max.	Unit
F_{L-U}	Frequency range in 802.11b/g and 256 QAM applications	2400		2500	MHz
P_{OUT}	Output power at 3% EVM with 802.11g OFDM at 54 Mbps		25		dBm
	Output power at 1.75% dynamic EVM with MCS8, 40 MHz		23		dBm
	Output power meeting 802.11g spectral mask		28.5		dBm
	Output power meeting 256 QAM spectral mask		27		dBm
	Output power meeting 802.11b spectral mask		28.5		dBm
G	Power gain	32	33		dB
G_{VAR}	Gain variation over 40 MHz			±0.5	dB
2f	Harmonics at 29 dBm, 802.11b mask compliance		-21		dBm/MHz
2f	Harmonics at 27 dBm		-38		dBm/MHz

5.0 TYPICAL PERFORMANCE CHARACTERISTICS

Test Conditions: V_{CC} = 5.0V, V_{REG} = 3.1V, T_A = 25°C Unless otherwise specified

FIGURE 5-1: S-PARAMETERS



6.0 256 QAM APPLICATIONS

Typical Dynamic Performance Characteristics
Test Conditions: V_{CC} = 5.0V, V_{REG} = 3.1 V, T_A = 25°C, MCS8 40 MHz signal, data duty cycle 23% (60 µs on /200 µs idle) unless otherwise specified

FIGURE 6-1: EVM VERSUS OUTPUT POWER, 100% DUTY CYCLE

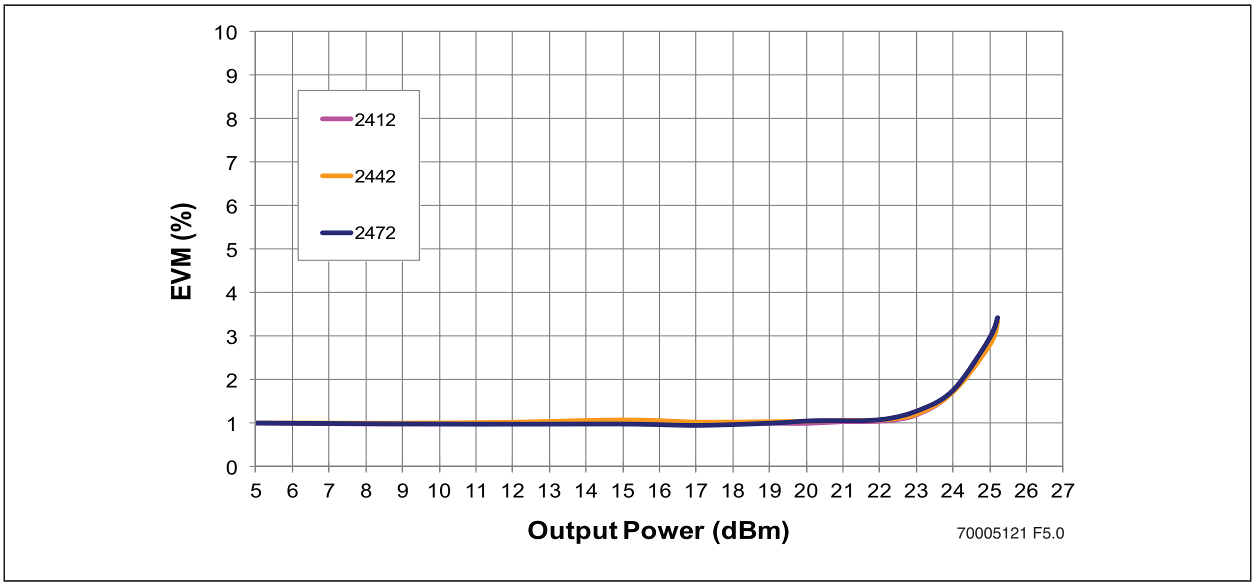
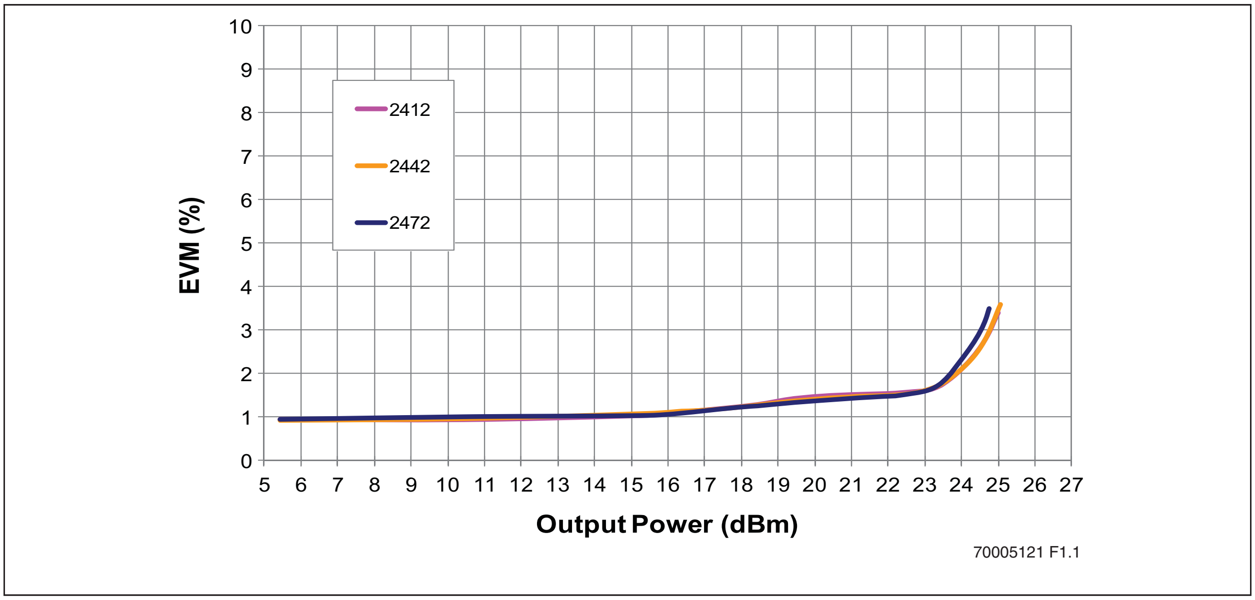


FIGURE 6-2: DYNAMIC EVM VERSUS OUTPUT POWER, 23% DUTY CYCLE



256 QAM APPLICATIONS (CONTINUED)

FIGURE 6-3: POWER GAIN VERSUS OUTPUT POWER

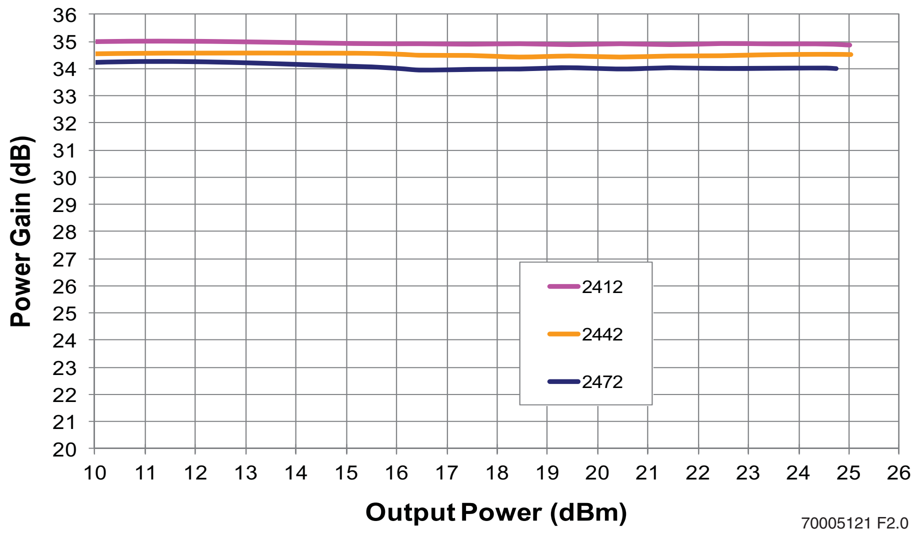
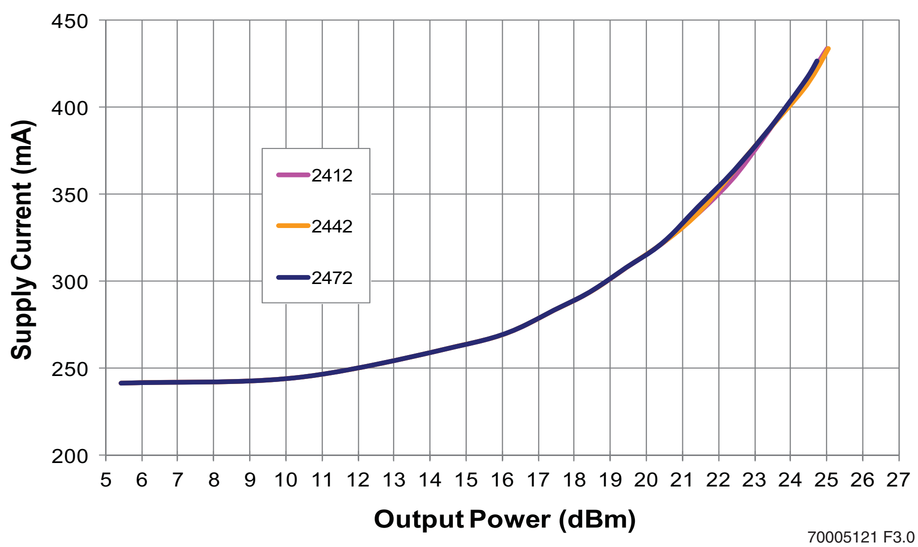


FIGURE 6-4: INSTANTANEOUS SUPPLY CURRENT VERSUS OUTPUT POWER FOR DYNAMIC OPERATION, 23% DUTY CYCLE



256 QAM APPLICATIONS (CONTINUED)

FIGURE 6-5: INSTANTANEOUS DETECTOR VOLTAGE VERSUS OUTPUT POWER

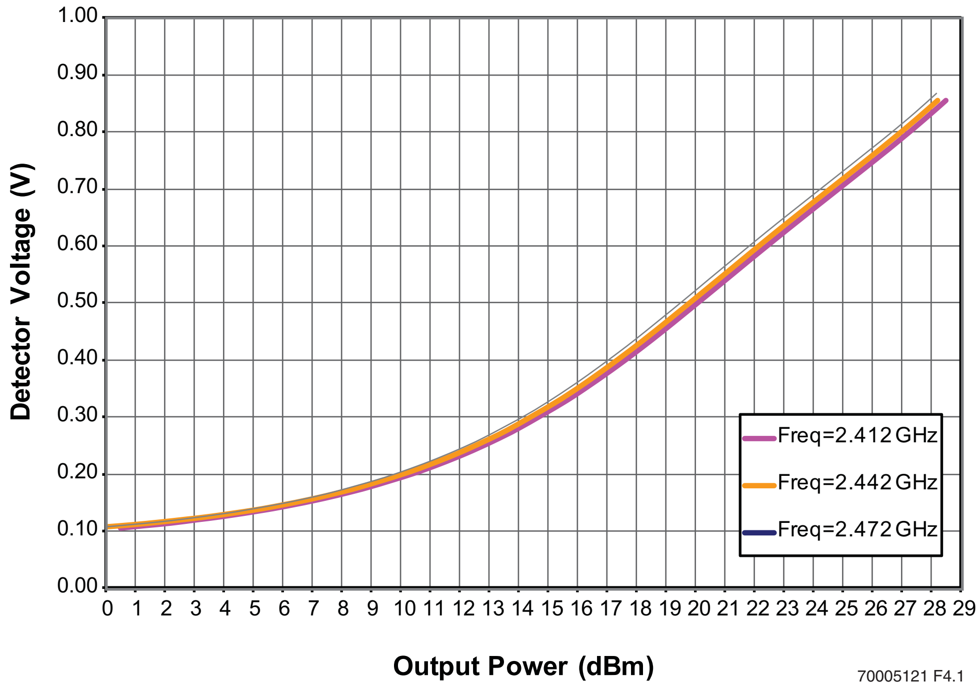
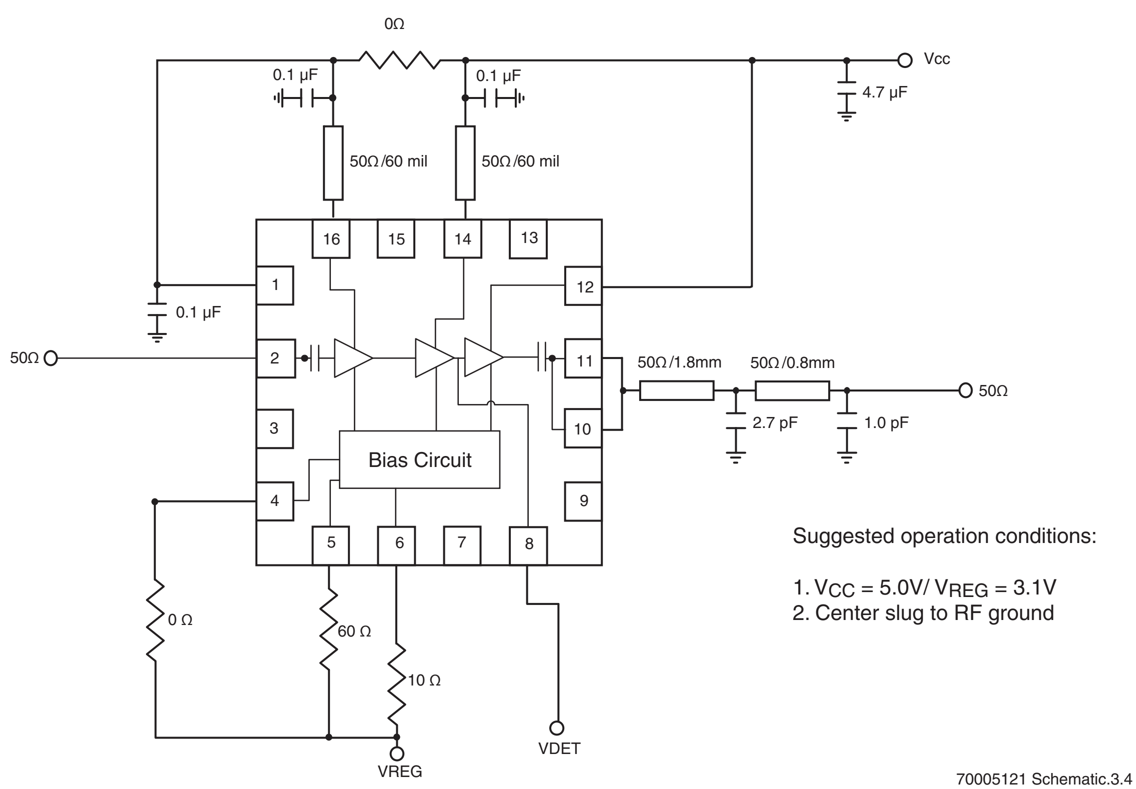
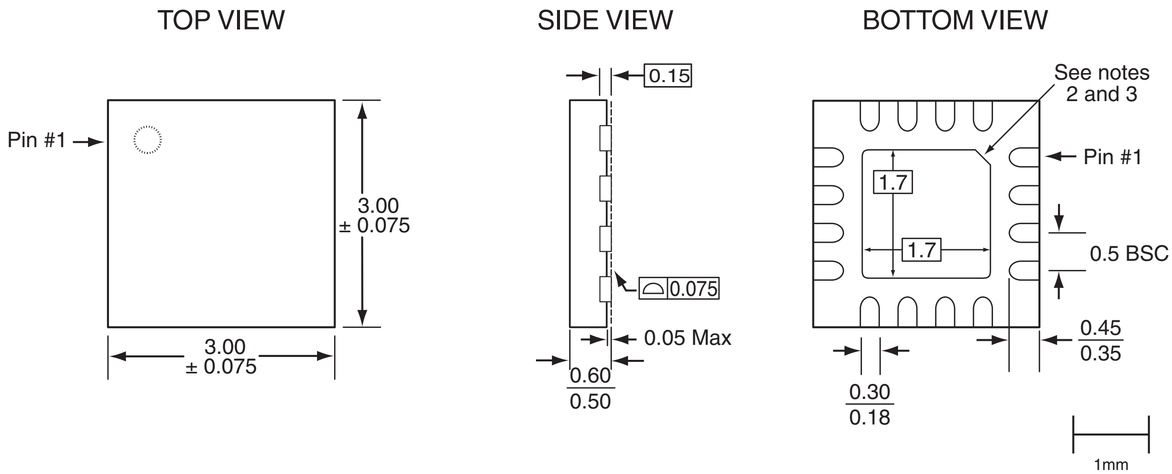


FIGURE 6-6: TYPICAL SCHEMATIC FOR 256 QAM APPLICATIONS



7.0 PACKAGE INFORMATION

FIGURE 7-1: 16-CONTACT ULTRA-THIN QUAD FLAT NO-LEAD (UQFN) PACKAGE CODE: QUC



Note: 1. Complies with JEDEC JEP95 MO-248D, variant UEED-4 except external paddle nominal dimensions.
2. From the bottom view, the pin #1 indicator may be either a 45-degree chamfer or a half-circle notch.
3. The external paddle is electrically connected to the die back-side and possibly to certain V_{SS} leads. This paddle can be soldered to the PC board; it is suggested to connect this paddle to the V_{SS} of the unit. Connection of this paddle to any other voltage potential can result in shorts and/or electrical malfunction of the device.
4. Untoleranced dimensions are nominal target dimensions.
5. All linear dimensions are in millimeters (max/min).

16-uqfn-3x3-QUC-0.0

TABLE 7-1: REVISION HISTORY

Revision	Description	Date
A	• Initial release of data sheet	Apr 2013
B	• Updated Table 4-2 on page 5 • Revised Figure 6-5 on page 10	Sep 2013

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8.0 PRODUCT IDENTIFICATION SYSTEM

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PART NO.	XXX
Device	Package

Device:	SST12CP12	= 2.4 GHz High-power and High-gain Power Amplifier
Package:	QUCE	= UQFN (3mm x 3mm), 0.6 max thickness 16-contact
Evaluation Kit Flag	K	= Evaluation Kit

Valid Combinations:

SST12CP12-QUCE
SST12CP12-QUCE-K

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