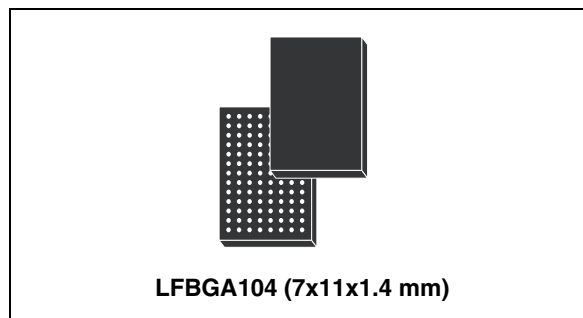


Features

- GPS multichip module:
 - STA2058 TESEO Baseband
 - STA5620 RF Front-end
- Complete embedded memory system:
 - Flash 256 KB + 16 Kbytes
 - RAM 64 Kbytes.
- 66-MHz ARM7TDMI 32 bit processor
- High performance GPS engine (HPGPS)
- SBAS (WAAS and EGNOS) supported
- Sensitivity (-146 dBm acquisition, -159 dBm tracking)
- Time to first fix (1 s reacquisition, 2.5 s hot start, 34 s warm start, 39 s cold start)
- Accuracy (2 m autonomous)
- Extensive GPS receiver interfaces: 32 GPIOs, 4 UARTs, 2 SPIs, 2 I2Cs, 1 CAN 2.0, 1 USB 1.1, 1 HDLC and 4 channels ADC
- Compatible with L1 signal (C/A code)
- ST proprietary technology
 - CMOS Flash embedded technology for STA2058
 - BiCMOS Sige technology for STA5620
- LFBGA104 lead-free package
- -40 °C to 85 °C operating temperature range



- Evaluation kits:
 - STA8058 module reference designs (17x19 mm and 25x25 mm)
 - Evaluation board hosting STA8058 module

Description

STA8058 TESEO MCM is a fully embedded GPS engine integrating STA2058 TESEO baseband and STA5620 RF front-end. The embedded Flash memory enables the equipment manufacturer to load the entire GPS software (including tracking, acquisition, navigation and data output) after customising its interfaces to his needs.

A standard GPS library is available from ST. By combining the ARM7TDMI microcontroller core with on-chip Flash/RAM, 16-channel GPS correlator DSP, RF Front-end and an extensive range of interfaces on single package solution, the STA8058 provides a highly-flexible and cost-effective solution for GPS applications.

Table 1. Device summary

| Order code | Package | Packing | Automotive grade | CAN |
|------------|----------------------------|---------------|------------------|-----|
| STA8058 | LFBGA104 (7 x 11 x 1.4 mm) | Tray | No | No |
| STA8058TR | LFBGA104 (7 x 11 x 1.4 mm) | Tape and reel | No | No |
| STA8058A | LFBGA104 (7 x 11 x 1.4 mm) | Tray | Yes | Yes |
| STA8058ATR | LFBGA104 (7 x 11 x 1.4 mm) | Tape and reel | Yes | Yes |

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1 Features summary

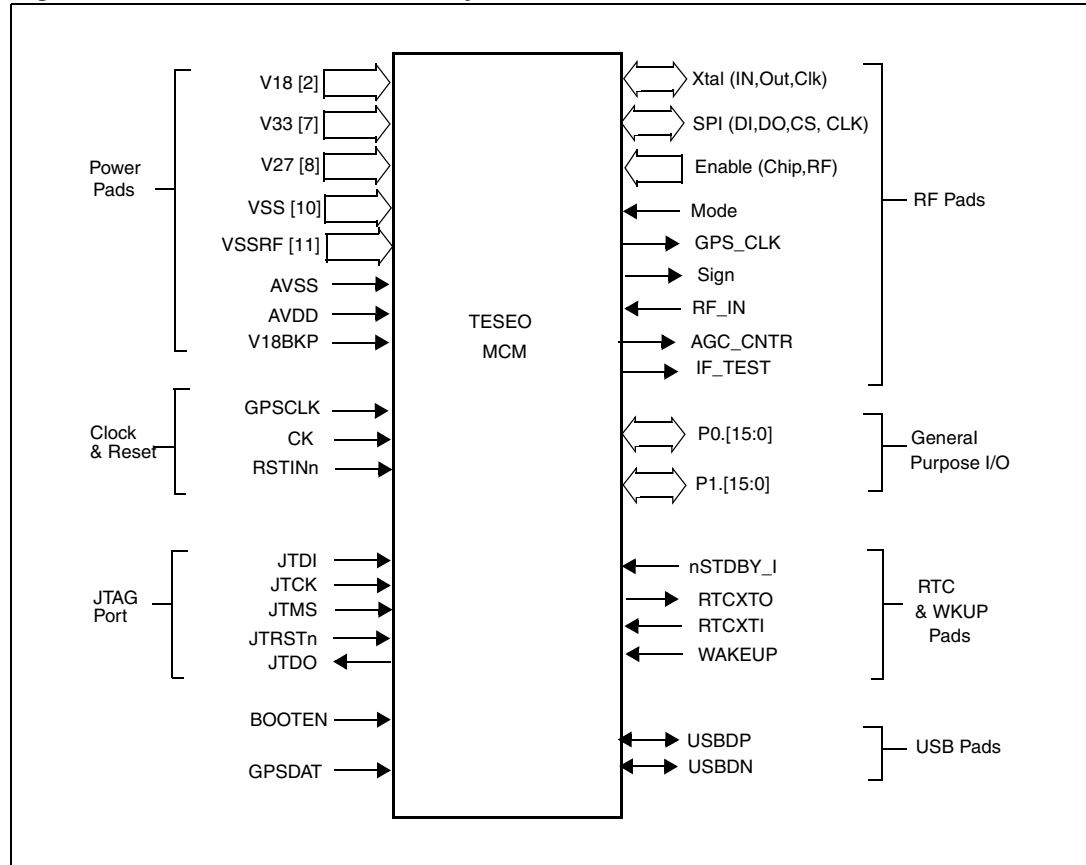
- ARM7TDMI 16/32 bit RISC CPU based host microcontroller running at a frequency up to 66 MHz.
- Complete Embedded Memory System:
 - Flash 256 Kbytes + 16 Kbytes (100 KB erasing/programming cycles)
 - RAM 64 Kbytes.
- 16 channel High performance GPS correlation DSP.
- ST proprietary technology:
 - CMOS Flash embedded technology for baseband
 - BiCMOS Sige for radio front-end
- SBAS (WAAS and EGNOS) supported.
- -40 °C to 85 °C operating temperature range.
- 104-pin LFBGA104 package.
- Power supply:
 - 3.0 V to 3.6 V operating supply range for input/output periphery
 - 3.0 V to 3.6 V operating supply range for A/D converter reference
 - 1.8 V operating supply range for core supply provided by internal voltage regulator with external stabilization capacitor or by external supply voltage
 - 2.4 V to 3 V operating supply range for RF front-end section
- Reset and clock control unit able to provide low power modes (WAIT, SLOW, STOP, Standby) and to generate the internal clock from the external reference through integrated PLL.
- 32 programmable general purpose I/O, each pin programmable independently as digital input or digital output; 30 are multiplexed with peripheral functions; 16 can generate an interrupt on input level/transition.
- Real time clock module with 32 kHz low power oscillator and separate power supply to continue running during stand-by mode.
- 16-bit Watchdog timer with 8 bits prescaler for system reliability and integrity.
- One CAN module compliant with the CAN specification V2.0 part B (active) and bit rate can be programmed up to 1 MBaud.
- Four 16-bit programmable timers with 7 bit prescaler, up to two input capture/output compare, one pulse counter function, one PWM channel with selectable frequency each.
- 4 channels 12-bit sigma-delta analog to digital converter, single channel or multi channel conversion modes, single-shot or continuous conversion modes, sample rate 1 kHz, conversion range 0-2.5V .
- Three serial communication interfaces (UART) allow full duplex, asynchronous, communications with external devices, independently programmable TX and RX baud rates up to 625K baud.
- One UART adapted to suit smart card interface needs, for asynchronous SC as defined by ISO 7816-3. It includes SC clock generation.
- Two serial peripheral interfaces (SPI) allow full duplex, synchronous communications with external devices, master or slave operation, max baud rate of 5.5Mb/s. One SPI may be used as multimedia card interface.

- Two I²C interfaces provide multi-master and slave functions, support normal and fast I²C mode (400 KHz), 7/10 bit addressing modes. One I²C Interface is multiplexed with one SPI, so either 2 x SPI + 1 x I²C or 1 x SPI + 2 x I²C may be used at a time.
- Enhanced interrupt controller supports 32 interrupt vectors, independently maskable, with interrupt vector table for faster response and 16 priority levels, software programmable for each source. Up to 2 maskable interrupts may be mapped on FIQ.
- Wake-up unit allows exiting from powerdown modes by detection of an event on two external pins (one is active high and other is active low) or on internal Real Time Clock alarm.
- USB unit V1.1 compliant, software configurable endpoint setting, USB suspend/resume support
- High level data link controller (HDLC) unit supports full duplex operating mode, NRZ, NRZI, FM0 and MANCHESTER modes, and internal 8-bit Baud Rate Generator.
- RF front-end features:
 - LOW IF (4 MHz) architecture
 - Compatible with GPS L1 signal
 - VGA gain internally regulated
 - On chip programmable PLL
 - SPI interface

2 Pin description

2.1 Logic symbol

Figure 1. STA8058 TESEO MCM symbol



2.2 System block diagram

Figure 2. STA8058 TESEO baseband block diagram

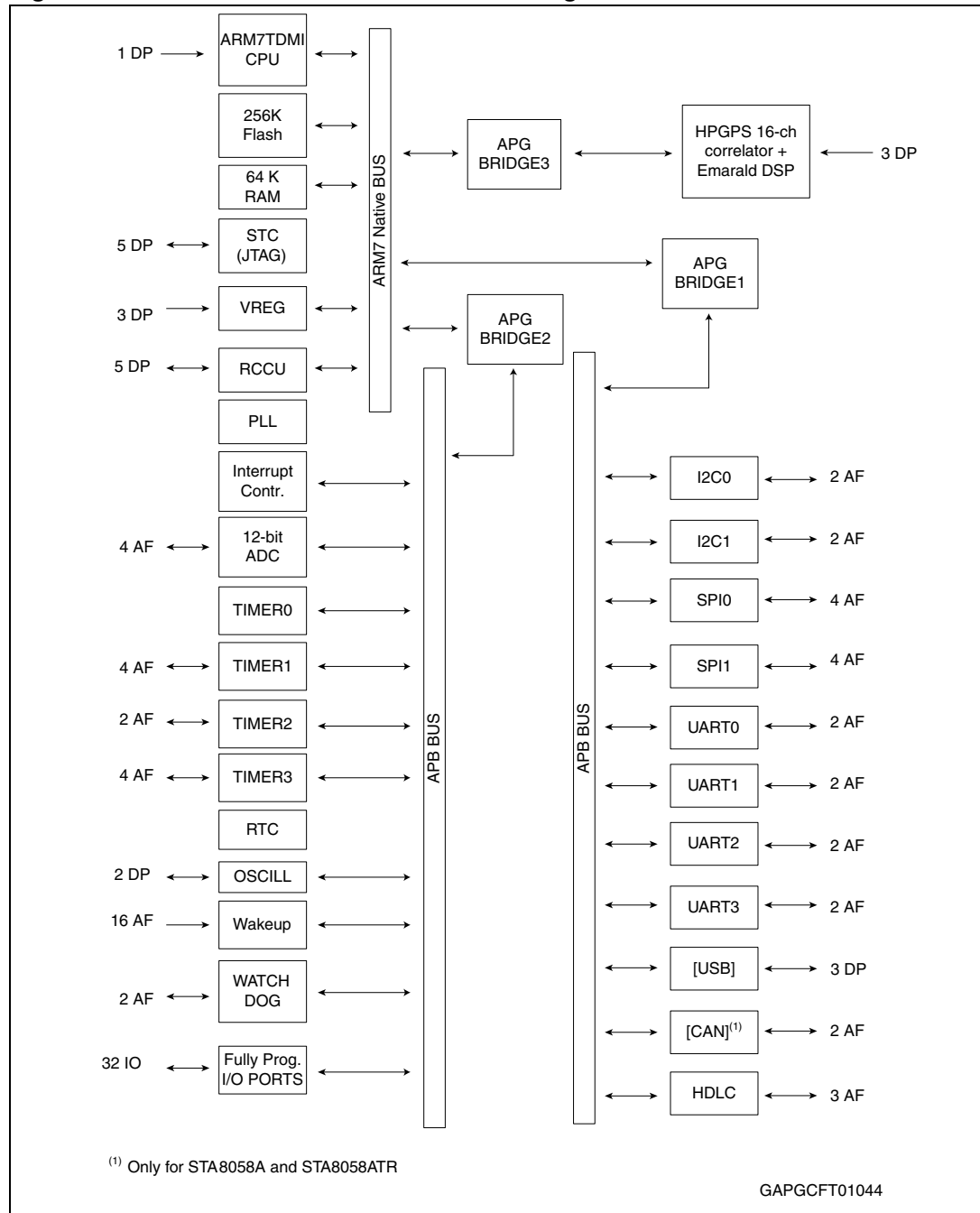


Figure 3. STA5620 RF front-end

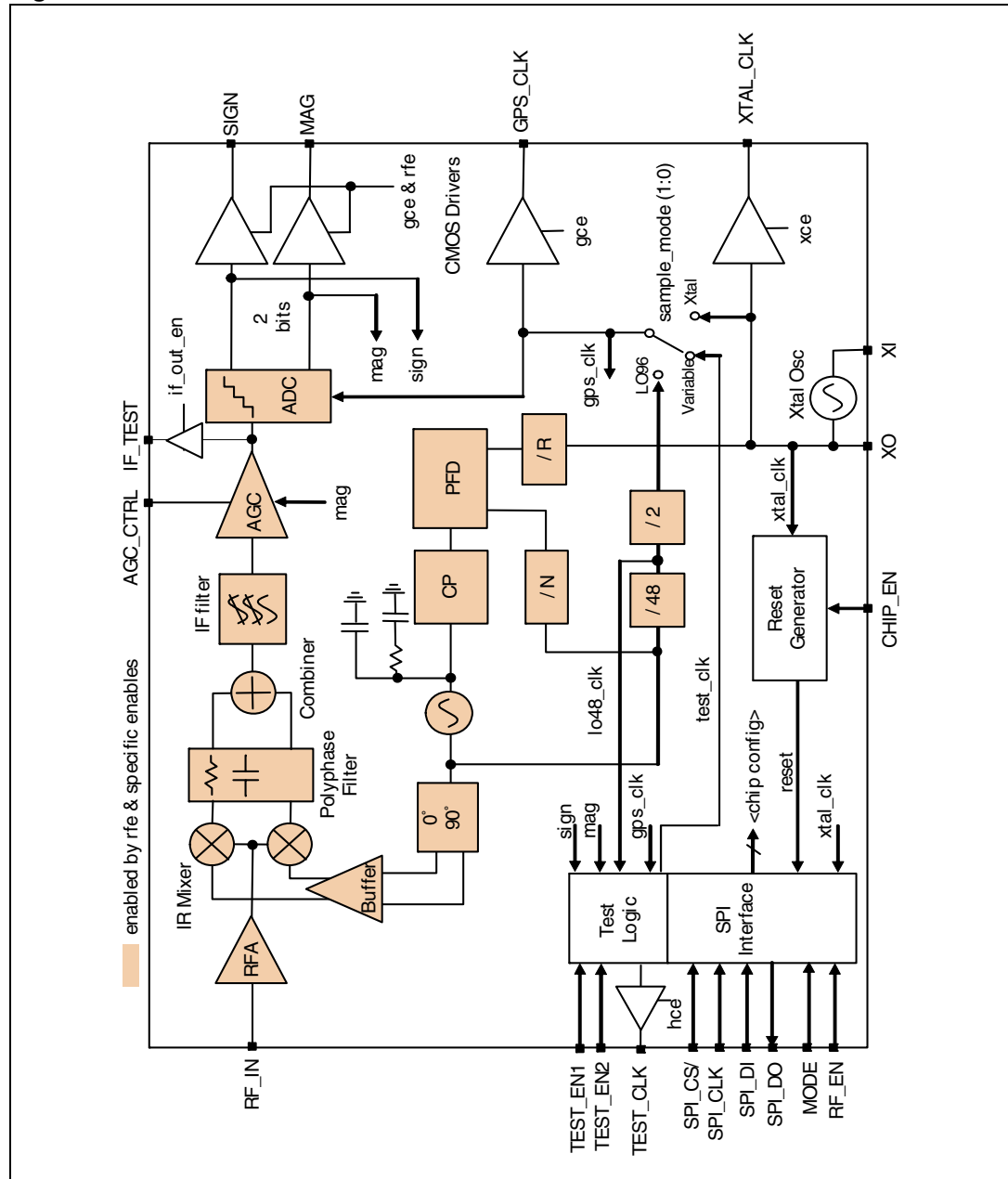
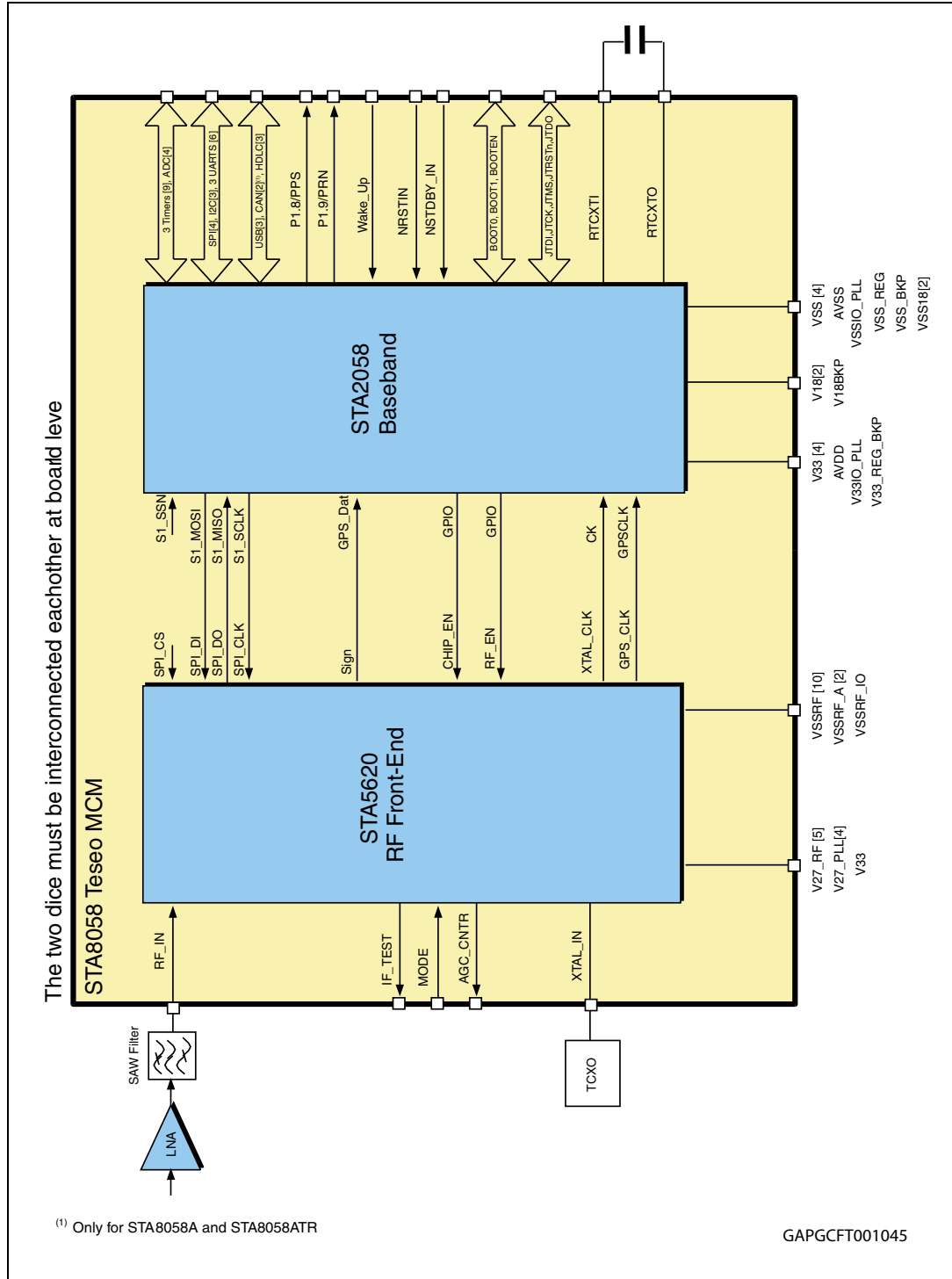


Figure 4. STA8058 TESEO MCM block diagram



2.3 LFBGA104 ball out

Table 2. Ball out for LFBGA104 package

| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 |
|----------|--------------------------------|-----------------------------|----------------------------|----------------------------|-----------------------------|------------------------------|----------------------------|---------------------------|---------|----------|----------|---------|---------|
| A | VSS | AVSS | AVDD | V18BKP | RTCXTO | RTCXTI | V33REG_BKP | GPSDAT | nJTRST | RF_EN | XTAL_OUT | XTAL_IN | VSSRF |
| B | P1.2/ T3_OCMPA/ AIN.2 | VSS18 | V18 | VSSBKP | NSTDBY_IN | V33 | VSSREG | GPSCLK | GPS_CLK | CHIP_EN | V27PLL | V27PLL | V27PLL |
| C | P1.1/ T3_ICAPA/ AIN.1 | P1.0/ T3_OCMPB/ AIN.0 | P1.4/ T1_ICAPA | P1.5/ T1_ICAPB | NRSTIN | PO.15/ WAKEUP | CK | P0.5/ S1_MOSI | SPI_DI | XTAL_CLK | VSSRF | V27PLL | V27RF |
| D | V33IO_PLL | P1.3/ T3_ICAPB/ AIN.3 | P1.7/ T1_OCMPA | VSS | VSS | JTCK | JTDO | P0.6/S1_SCLK | SPI_CLK | MODE | VSSRF | VSSRF | VSSRF_A |
| E | VSSIO_PLL | P1.8/PPS | P1.9/ PRN.11 | P1.6/ T1_OCMPB | VSS18 | P0.13/ U2_RX/ T2_OCMPA | JTMS | JTDI | SPI_CS | IF_TEST | VSSRF | VSSRF | RF_IN |
| F | P1.11/ CANRX ⁽¹⁾ | USBDP | P1.10/ USBCLK | P0.3/ SO_SSN/ I1.SDA | V18 | P0.14/ U2_TX/ T2.ICAPA | V33 | P0.4/ S1_MISO | SPI_DO | AGC_CNTR | VSSRF | VSSRF | VSSRF_A |
| G | P1.12/ CANTX ⁽¹⁾ | USBDN | P0.1/ SO_MOSI/ U3.RX | P0.0/ SO_MISO/ U3.TX | P0.7/S1_SSN | P0.9/ UO_TX/ BOOT.0 | P0.11/ U1_TX/ BOOT.1 | BOOTEN | SIGN | V27RF | V27RF | V27RF | VSSRF |
| H | VSS | P1.13/ HCLK/ IO.SCL | P1.14/ HRXD/ IO.SDA | P1.15/ HTXD | P0.2/ SO_SCLK/ I1.SCL | PO.12/ SCCLK | PO.8/ UO_RX/ U0.TX | P0.10/ U1_RX/ U1.TX | V33 | VSSRF:IO | V33 | V27RF | VSSRF |

1. Only for STA8058A and STA8058ATR.

2.4 Power supply pins

Table 3. Power supply pins

| Symbol | I/O | Function | LFBGA104 |
|------------------------|-----|--|----------------------|
| V ₃₃ | - | Digital supply voltage for I/O circuitry (3.3 Volt) | B6, F7, G10, H9, H11 |
| V _{SS} | - | Digital ground for I/O circuitry | A1, D4, D5, H1 |
| V _{33IO-PLL} | - | Digital supply voltage for I/O circuitry and for PLL reference (3.3V) | D1 |
| V _{SSIO-PLL} | - | Digital ground for I/O circuitry and for PLL reference | E1 |
| V _{33REG_BKP} | - | Digital supply voltage for backup block I/O circuitry and for Ballast I/O (3.3V) | A7 |
| V _{SSREG} | - | Digital ground for Ballast I/O | B7 |
| V ₁₈ | - | Digital supply voltage for core circuitry (1.8 Volt): When using the internal voltage regulator, this pin shall not be driven by an external voltage supply, but a capacitance of at least 10µF (Tantalum, low series resistance) + 33nF (ceramic) shall be connected between these pins and V _{SS18} to guarantee on-chip voltage stability. | B3, F5 |
| V _{SS18} | - | Digital ground for core circuitry | B2, E5 |
| V _{18BKP} | - | Digital supply voltage for backup block (RTC, oscillator, Wake-up controller - 1.8 Volt): when using the internal voltage regulator, this pin shall not be driven by an external voltage supply, but a capacitance of at least 1µF shall be connected between this pin and V _{SSBKP} to guarantee on-chip voltage stability. | A4 |

Table 3. Power supply pins (continued)

| Symbol | I/O | Function | LFBGA104 |
|----------------------|-----|--|--|
| V _{SSBKP} | - | Digital ground for backup logic | B4 |
| AV _{DD} | - | Analog supply voltage for the A/D converter | A3 |
| AV _{SS} | - | Analog supply ground for the A/D converter | A2 |
| V _{27RF} | - | Analog supply voltage for RF chain (2.7V) | C13, G10, G11, G12, H12 |
| V _{27PLL} | - | Analog supply voltage for PLL embedded into RF part (2.7V) | B11, B12, B13, C12 |
| V _{SSRF} | - | Analog supply ground for RF core | A13, C11, D11, D13, E11, E12, F11, F12, G13, H13 |
| V _{SSRF_A} | - | Analog supply ground for RF amplifier | D13, F13 |
| V _{SSRF_IO} | - | Analog supply ground for RF IO circuitry | H10 |

Note: V₃₃ and V_{33IO-PLL} are all internally connected. Same for V_{SS} and V_{SSIO-PLL}.
All V_{SS}, V_{SS18}, V_{SSBKP}, AV_{SS}, V_{SSRF}, V_{SSRF_A} and V_{SSRF_IO} pins must be tied together to the common ground plane, taking care of noise filtering, especially on AV_{SS}, V_{SSRF}, V_{SSRF_A} and V_{SSRF_IO}

3 Electrical characteristics

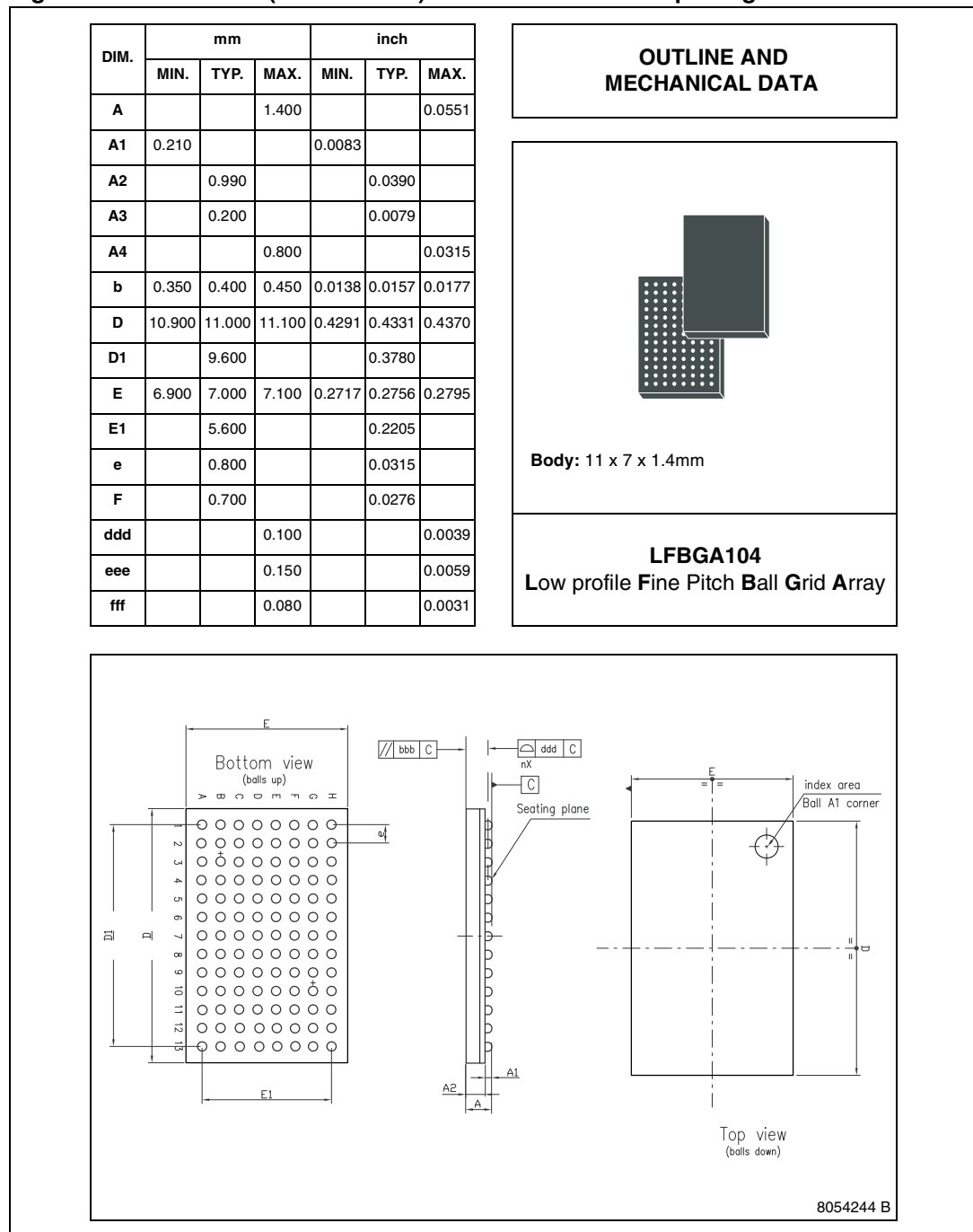
See STA2058 (Teseo Baseband) and STA5620 (RF Front-end) datasheet for related data.

4 Package information

In order to meet environmental requirements, ST offers these devices in different grades of ECOPACK® packages, depending on their level of environmental compliance. ECOPACK® specifications, grade definitions and product status are available at: www.st.com.

ECOPACK® is an ST trademark.

Figure 5. LFBGA104 (11x7x1.4mm) mechanical data and package dimensions



5 Revision history

Table 4. Document revision history

| Date | Revision | Changes |
|-------------|----------|--|
| 25-Oct-2007 | 1 | Initial release. |
| 19-Mar-2009 | 2 | Updated Table 1: Device summary on page 1 . Updated ECOPACK description in Section 4: Package information on page 12 . |
| 23-Oct-2012 | 3 | Updated Table 1: Device summary Updated Figure 2: STA8058 TESEO baseband block diagram and Figure 4: STA8058 TESEO MCM block diagram Updated Table 2: Ball out for LFBGA104 package |
| 17-Sep-2013 | 4 | Updated Disclaimer |

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