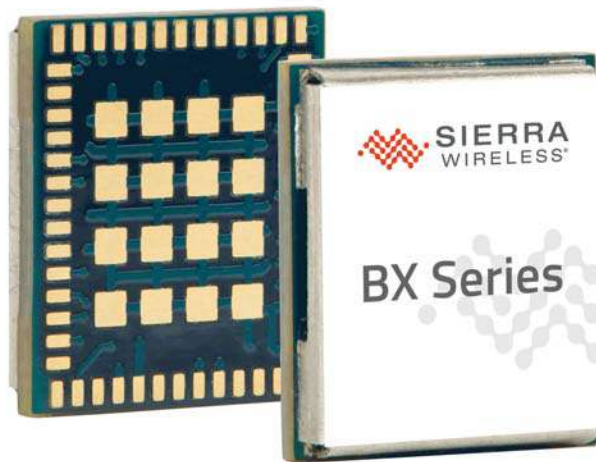




# AirPrime BX310x Wi-Fi/BT Module

## Product Technical Specification



**SIERRA**  
WIRELESS®

41111444  
Rev 2

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*Note: Some airlines may permit the use of cellular phones while the aircraft is on the ground and the door is open. Sierra Wireless modems may be used at this time.*

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## Revision History

| Revision number | Release date | Changes                    |
|-----------------|--------------|----------------------------|
| 1               | August 2017  | Creation (limited release) |
| 2               | October 2017 | General release            |

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# >> 1: Introduction

This document defines and illustrates the AirPrime BX310x (BX3100, BX3105) Wi-Fi/BT Host-less module's high-level product features, interfaces, and hardware features (including electrical and mechanical performance criteria).

## 1.1 Module Variants

AirPrime BX310x module variants include:

- AirPrime BX3100—External antenna connection
- AirPrime BX3105—Embedded antenna

## 1.2 General RF/Software Features

The AirPrime BX310x is a low-power, small form-factor self-contained Wi-Fi/Bluetooth (Wi-Fi/BT) module.

With an embedded software suite, the BX310x is an ideal solution for developers who want to quickly and cost-effectively integrate Wi-Fi/BT functionality into their products.

The following table summarizes the module's supported wireless frequencies:

**Table 1-1: Supported RF Frequencies**

| Technology | RF band                    | Notes                              |
|------------|----------------------------|------------------------------------|
| Wi-Fi      | • 2.4GHz (2.400–2.485 GHz) | • 802.11b/g/n/e/i                  |
|            |                            | • Max data rate—MCS7 HT40 150 Mbps |
| Bluetooth  |                            | • v4.2 BR/EDR and BLE compliant    |

### 1.2.1 Wi-Fi

The AirPrime BX310x supports 2.4 GHz Wi-Fi operation. Key features include:

- TCP/IP
- 802.11 b/g/n/e/i
- Connection methods—BSS STA, SoftAP, Wi-Fi Direct (Wi-Fi P2P)
- Transmit power—Adjustable, up to 21 dBm (maximum)

For a list of additional supported Wi-Fi functionality, protocols, and features, see [Features on page 12](#).

### 1.2.2 Bluetooth

The AirPrime BX310x supports 2.4 GHz Bluetooth classic and BLE operation. Key features include:

- Bluetooth v4.2 BR/EDR and BLE compliant
- SPP (Serial Port Profile)

For a list of additional supported Bluetooth functionality, protocols, and features, see [Features on page 12](#).



## 1.2.3 Interfaces

The AirPrime BX310x provides the following interfaces and peripheral connectivity:

- Power supply—See [Power Supply Ratings on page 15](#).
- RF—See [RF on page 18](#).
- UART serial link—See [UART on page 23](#).
- ADC—See [ADC on page 24](#).
- Voltage measurement—See [Voltage Measurement on page 24](#).
- I<sup>2</sup>C—See [I2C Interface on page 24](#).
- Digital audio (I<sup>2</sup>S)—See [I2S Interface \(Digital Audio\) on page 26](#).
- GPIOs—See [General Purpose Input/Output \(GPIO\) on page 26](#).
- SPI bus—See [SPI Bus on page 27](#).
- SDIO—See [Secure Digital IO \(SDIO\) Interface on page 28](#).
- Module enable—See [Module Enable on page 28](#).
- System clock outputs—See [Clock on page 29](#).
- PWM—See [PWM on page 29](#).

## 1.2.4 Configuration Utility

The AirPrime BX310x includes a browser-based utility for device configuration. For usage details, refer to the AirPrime BX Series Development Kit User Guide available at [source.sierrawireless.com](http://source.sierrawireless.com) (forthcoming).

## 1.3 General Hardware Features

### 1.3.1 Physical Dimensions and Connection Interface

AirPrime BX310x modules are compact, robust, fully shielded and labeled modules with the dimensions noted in [Table 1-2](#).

**Table 1-2: AirPrime BX310x Dimensions<sup>a</sup>**

| Parameter | Nominal             |        | Tolerance | Units |
|-----------|---------------------|--------|-----------|-------|
|           | BX3100 <sup>b</sup> | BX3105 |           |       |
| Length    | 11.5                | 13.5   | ±0.10     | mm    |
| Width     | 9.5                 | 11.5   | ±0.10     | mm    |
| Thickness | 2.4                 | 2.4    | ±0.20     | mm    |
| Weight    | TBD                 | TBD    | TBD       | g     |

a. Dimensions are accurate as of the release date of this document.

b. BX3100 is a CF3 xSmall module, which belongs to the Common Flexible Form Factor (CF3) family of WWAN modules

The AirPrime BX310x module is an LGA form factor device. All electrical and mechanical connections are made through the 70 Land Grid Array (LGA) pads on the bottom side of the PCB. (See [Figure 6-1 on page 33](#) for details.)

The LGA pads have the following distribution:

**Table 1-3: LGA Pad Types**

| Pad Type/Quantity |               | Dimensions   | Pitch           |
|-------------------|---------------|--------------|-----------------|
| Signal Pads       | 54 outer pads | 0.75x0.35 mm | 0.65 mm         |
| Ground Pads       | 16 inner pads | 1.0x1.0 mm   | 1.83 mm/1.48 mm |

# 2: Functional Specifications

## 2.1 Architecture

The following figure presents an overview of the AirPrime BX310x module's internal architecture and external interfaces.

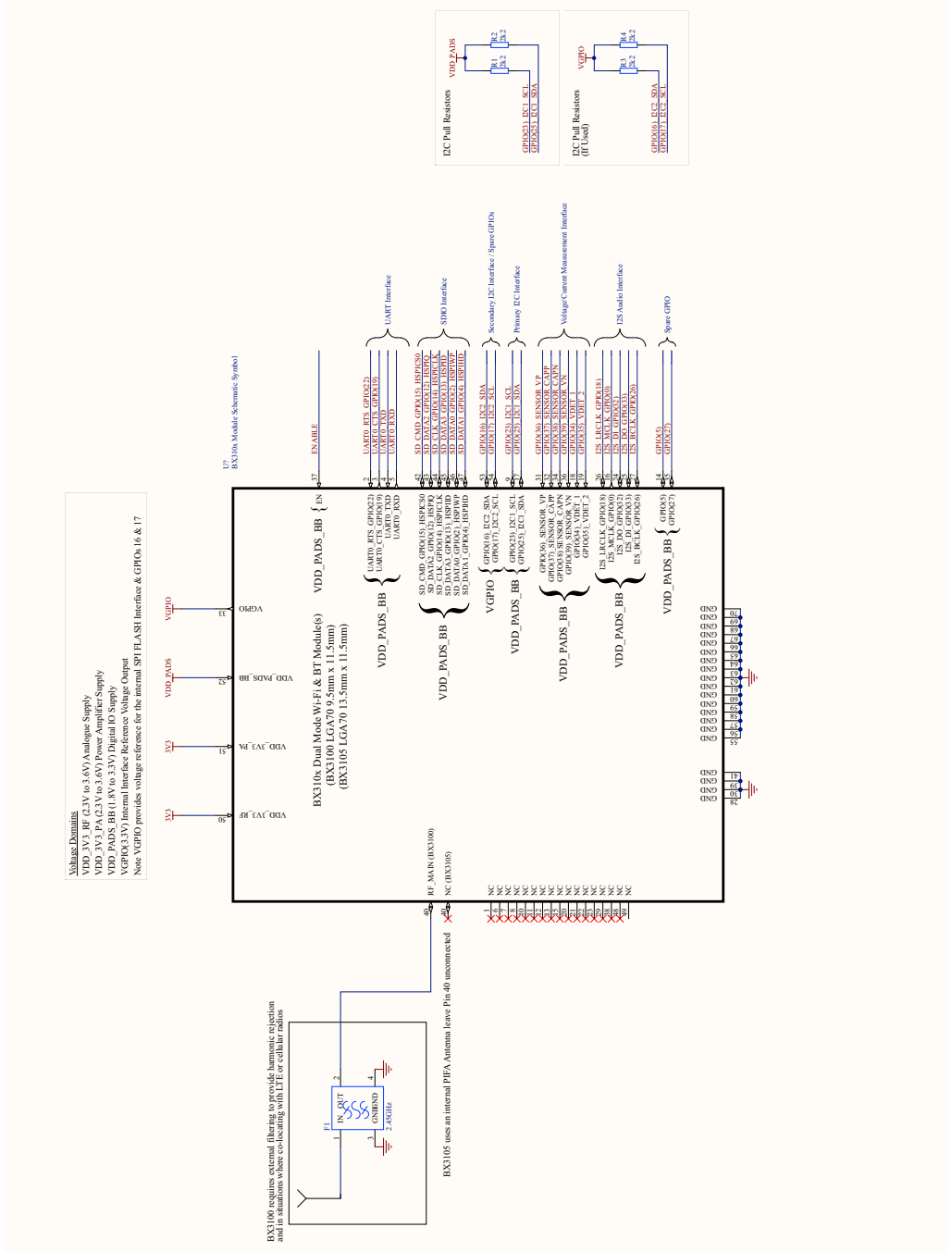


Figure 2-1: AirPrime BX310x Application Schematic

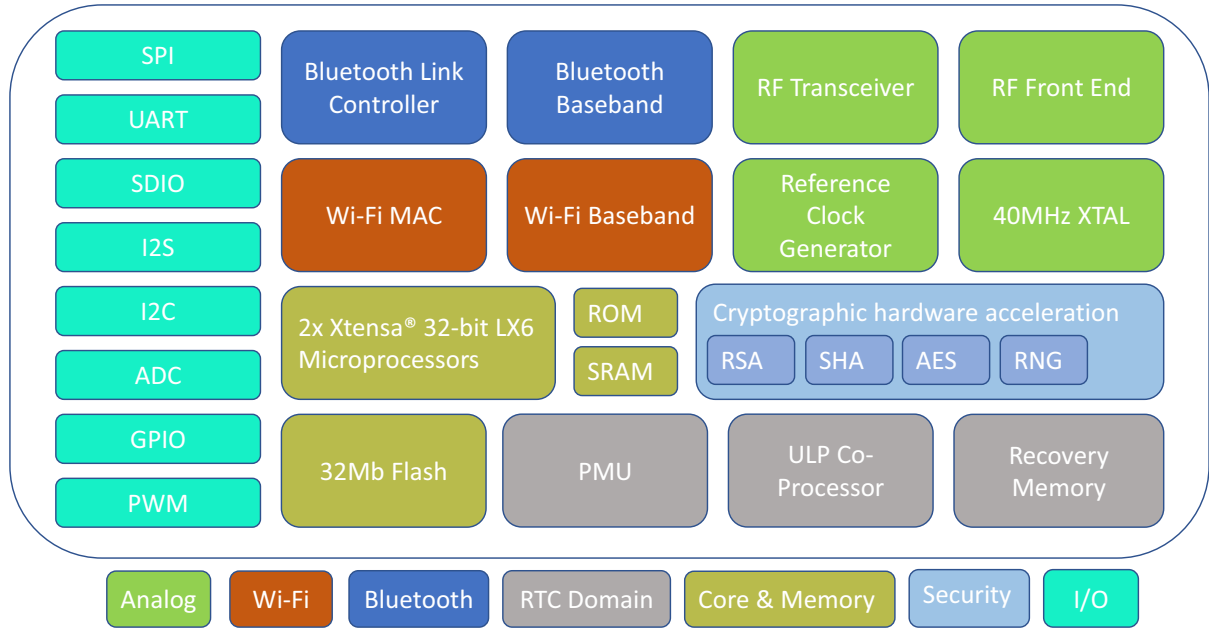


Figure 2-2: Block diagram

## 2.2 Features

Table 2-1 summarizes the AirPrime BX310x module’s RF (Wi-Fi and Bluetooth), Power, software, and hardware capabilities.

*Note: Table contents are preliminary and subject to change.*

**Table 2-1: AirPrime BX310x Capabilities**

| Feature | Description   |
|---------|---|
| Module  | <ul style="list-style-type: none"> <li>Secure boot</li> <li>Secure update</li> <li>FOTA (Firmware update Over The Air)</li> <li>Sierra Wireless AirVantage support</li> <li>CF3-compliant footprint (BX3100)</li> </ul> |

**Table 2-1: AirPrime BX310x Capabilities (Continued)**

| Feature | Description  |
|---------|--|
| Wi-Fi   | <ul style="list-style-type: none"> <li>• Protocols: <ul style="list-style-type: none"> <li>• 802.11 b/g/n/e/i</li> <li>• 802.11 n (2.4 GHz), up to 150 Mbps; MCS0-7 in 20/40 MHz bandwidths</li> <li>• Receiving STBC (Space-time Block Code) 2x1</li> <li>• 802.11 e: QoS for wireless multimedia technology</li> <li>• Additional 802.11i security features (pre-authentication, TSN, etc.)</li> <li>• WMM-PS, UAPSD</li> <li>• A-MPDU, A-MSDU aggregation</li> <li>• Block ACK (RTS/CTS/ACK/BA)</li> <li>• Fragmentation/defragmentation</li> <li>• CCMP (CBC-MAC, counter model), TKIP (MIC, RC4), WAPI (SMS4), WEP (RC4), CRC</li> <li>• Frame encapsulation (802.11h/RFC 1042)</li> <li>• Pre-authentication, TSN</li> </ul> </li> <li>• Supported channels—1–14</li> <li>• Autoconnection—After device reset, automatically connects to available AP based on previous configuration</li> <li>• Infrastructure BSS Station mode/SoftAP mode: AP mode, STA mode, concurrent AP/STA mode</li> <li>• Up to 8 simultaneous Wi-Fi clients</li> <li>• IP configuration—IP address in STA mode via DHCP or static assignment</li> <li>• Authentication (security) modes: WPA, WPA2, WPA/WPA2, WPA2 Enterprise</li> <li>• UMA-compliant and certified</li> <li>• Open interface for various upper layer authentication schemes over EAP (e.g. TLS, PEAP, LEAP, SIM, AKA, customer-specific)</li> <li>• Adaptive rate fallback algorithm</li> <li>• Automatic retransmission/response on slow hosts</li> </ul> |

**Table 2-1: AirPrime BX310x Capabilities (Continued)**

| Feature          | Description   |
|------------------|---|
| Bluetooth        | <ul style="list-style-type: none"> <li>• Bluetooth v4.2 BR/EDR and BLE compliant</li> <li>• Supported channels: BT Classic—0–78; BLE—0–39</li> <li>• Supported v4.2 modes: BR (Basic Rate); EDR (Enhanced Data Rate); LE (Low Energy)</li> <li>• BT classic mandatory features</li> <li>• BT low-energy mandatory features</li> <li>• Class 1/Class 2/Class 3 transmitter without external power amplifier</li> <li>• Class 1 operation without external PA</li> <li>• Enhanced power control (&gt;30 dB dynamic control range)</li> <li>• +10 dBm transmitting power</li> <li>• NZIF receiver with -98 dBm sensitivity</li> <li>• Modulation—p/4 DQPSK, 8 DPSK</li> <li>• ACL, SCO, eSCO, AFH</li> <li>• Adaptive Frequency Hopping (AFH)</li> <li>• BT 4.2 controller and host stack</li> <li>• Service Discover Protocol (SDP)</li> <li>• General Access Profile (GAP)</li> <li>• Security Manage Protocol (SMP)</li> <li>• Bluetooth Low Energy (BLE)</li> <li>• ATT/GATT</li> <li>• BLE Beacon</li> <li>• SPP, RFCOMM</li> <li>• Profiles: SPPAutoconnection—After device reset, automatically connects to available AP based on previous configuration.</li> <li>• UART features: GATT profiles, Data transfer (HTTP, HTTPS, MQTT, TCP/UDP), Define personal services</li> <li>• Roles—Simultaneous Central (access point)/Peripheral (client)</li> <li>• Simultaneous connections:               <ul style="list-style-type: none"> <li>• Up to 7 (total) simultaneous connections, including up to 3 BLE connections</li> <li>• Simultaneous BT Classic and BLE connections</li> </ul> </li> <li>• PCM/I2S</li> </ul> |
| Configuration    | Device configuration methods: <ul style="list-style-type: none"> <li>• Built-in web-based configuration utility. See <a href="#">Configuration Utility on page 9</a>.</li> <li>• AT commands available over UART, Wi-Fi, and BT links. Refer to AirPrime BX310x AT Command Reference at <a href="http://source.sierrawireless.com">source.sierrawireless.com</a>.</li> </ul>  |
| Security         | <ul style="list-style-type: none"> <li>• All standard IEEE802.11 security features, including WFA, WPA/WPA2, WAPI</li> <li>• Secure boot</li> <li>• Flash encryption</li> <li>• Cryptographic hardware acceleration: AES, HASH (SHA-2) library, RSA, ECC, Random Number Generator (RNG)</li> </ul>  |
| Power management | Multiple power modes to reduce power consumption: Active, Radio off, Light sleep, Deep sleep, Hibernation<br>Sleep Patterns: Association sleep pattern, ULP sensor-monitored pattern  |

## 3: Technical Specifications

### 3.1 Environmental

The environmental specifications for operation and storage of the AirPrime BX310x are defined in Table 3-1.

**Table 3-1: Environmental Specifications**

| Parameter                     | Range                            |
|-------------------------------|----------------------------------|
| Ambient Operating Temperature | -40°C to +85°C                   |
| Ambient Storage Temperature   | -40°C to +105°C<br>(Recommended) |
| Ambient Humidity              | TBD                              |

### 3.2 Power Supply Ratings

DC power is supplied via the pins described in [Table 3-2 on page 15](#).

---

*Note: Operation above the maximum specified operating voltage (see [Table 3-10 on page 20](#)) is not recommended, and specified typical performance or functional operation of the device is neither implied nor guaranteed.*

---

**Table 3-2: Power Supply Pins**

| Pin | Name       | Voltage  | Direction | Function  |
|-----|------------|----------|-----------|---|
| 33  | VGPI0      | 3.3V     | Output    | Supply voltage reference for secondary I2C interface (pins 53/54) |
| 50  | VDD_3V3_RF | 2.7–3.6V | Input     | RF/Analog signal power supply                                     |
| 51  | VDD_3V3_PA | 2.7–3.6V | Input     | Internal Power Amplifier power supply                             |
| 52  | VDD_3V3_BB | 1.8–3.3V | Input     | Baseband/Digital I/O power supply                                 |

### 3.2.1 Power Management

The AirPrime BX310x switches between several power modes to minimize current consumption. The following tables describe these modes and their typical current consumption:

**Table 3-3: Power Modes—Descriptions**

| Power Mode  | CPU   | Wi-Fi / BT radio / baseband | RTC | ULP co-processor | Notes   |
|-------------|-------|-----------------------------|-----|------------------|---|
| Active      | On    | On                          | On  | On               | Fully functional  |
| Radio off   | On    | Off                         | On  | On               |   |
| Light sleep | Pause | Off                         | On  | On               | Wake up events will wake the module.                      |
| Deep sleep  | Off   | Off                         | On  | On/Off           | Connection data stored in RTC memory                      |
| Hibernate   | Off   | Off                         | Off | Off              | Only RTC timer or specific RTC GPIOs can wake the module. |

**Table 3-4: Power Modes—Typical Current Consumption**

| Power Mode     | Description                               | Current Consumption        |
|----------------|---|----------------------------|
| Active (RF on) | Wi-Fi Tx packet 13 dB~21 dBm              | 160~260 mA                 |
|                | Wi-Fi/BT Tx packet 0 dBm                  | 120 mA                     |
|                | Wi-Fi/BT Rx and listening                 | 80~90 mA                   |
|                | Association sleep patter (by Light-sleep) | 0.9 mA@DTIM3, 1.2 mA@DTIM1 |
| Modem-sleep    | CPU is powered on.                        | Max speed: 20 mA           |
|                |   | Normal speed: 5~10 mA      |
|                |   | Slow speed: 3 mA           |
| Light-sleep    | -   | 0.8 mA                     |
| Deep-sleep     | ULP processor powered on                  | 0.15 mA                    |
|                | ULP sensor-monitored pattern              | 25 $\mu$ A @ 1% duty       |
|                | RTC timer + RTC memory                    | 10 $\mu$ A                 |
| Hibernation    | RTC timer only                            | 5 $\mu$ A                  |

### 3.2.2 Current Consumption

Current consumption measurements are conducted at the module antenna port with 3.0 V supply at 25°C ambient temperature.



All transmitter measurements are based on 90% duty cycle and continuous transmit mode.

**Table 3-5: RF Current Consumption Specifications**

| Mode  | Min | Typ | Max | Unit |
|---|-----|-----|-----|------|
| Transmit 802.11b, DSSS 1 Mbps, POUT=+18.0 dBm           | -   | 225 | -   | mA   |
| Transmit 802.11b, CCK 11 Mbps, POUT=+18.0 dBm           | -   | 205 | -   | mA   |
| Transmit 802.11g, OFDM 54 Mbps, POUT = +14 dBm          | -   | 160 | -   | mA   |
| Transmit 802.11n, MCS7 HT20, POUT=+11.5 dBm             | -   | 152 | -   | mA   |
| Transmit 802.11n, MCS7 HT40, POUT=+11.5 dBm             | -   | 152 | -   | mA   |
| Receive 802.11b, packet length=1024 bytes, -80 dBm      | -   | 85  | -   | mA   |
| Receive 802.11g, packet length=1024 bytes, -70 dBm      | -   | 85  | -   | mA   |
| Receive 802.11n HT20, packet length=1024 bytes, -65 dBm | -   | 80  | -   | mA   |
| Receive 802.11n HT40, packet length=1024 bytes, -65 dBm | -   | 80  | -   | mA   |
| Power Save, DTIM 1                                      |     | TBD |     | mA   |
| Power Save, DTIM 3                                      |     | TBD |     | mA   |
| Power Save, DTIM 10                                     |     | TBD |     | mA   |
| Continuous Transmit Bluetooth 1 Mbps                    |     | TBD |     | mA   |
| Continuous Transmit Bluetooth 2 Mbps                    |     | TBD |     | mA   |
| Continuous Transmit Bluetooth 3 Mbps                    |     | TBD |     | mA   |
| Continuous Bluetooth Receive                            |     | TBD |     | mA   |
| 1.28 sec page scan (non-interlaced)                     |     | TBD |     | mA   |
| 1.28 sec LE ADV   |     | TBD |     | mA   |
| 1.28 sec Sniff as master                                |     | TBD |     | mA   |
| 1.28 sec Sniff as slave                                 |     | TBD |     | mA   |
| Modem Sleep   |     | 10  |     | mA   |
| Light Sleep   |     | 0.8 |     | mA   |
| Deep Sleep  |     | 25  |     | μA   |
| Hibernation   |     | 5   |     | μA   |

## 3.3 RF

### 3.3.1 Generic Radio

Measurements conducted at 25°C ambient temperature.

**Table 3-6: Generic Radio Characteristics**

| Description              | Min | Typ  | Max   | Unit |
|--------------------------|-----|------|-------|------|
| BX3100 RF Port Impedance |     | 50   |       | Ω    |
| Frequency Band           | 2.4 | 2.45 | 2.485 | GHz  |
| BX3105 Antenna Gain      |     | TBD  |       | dBi  |

### 3.3.2 Wi-Fi Radio

Measurements conducted at 25°C ambient temperature.

**Table 3-7: Generic Radio Characteristics**

| Description   | Min | Typ  | Max | Unit |
|---|-----|------|-----|------|
| Transmit 802.11b, CCK 11 Mbps, Output Power, EVM and Mask Compliant         |     | 18.0 |     | dBm  |
| Transmit 802.11g, OFDM 54 Mbps, Output Power, EVM and Mask Compliant        |     | 14.0 |     | dBm  |
| Transmit 802.11n, MCS7 HT20 72.2 Mbps, Output Power, EVM and Mask Compliant |     | 11.5 |     | dBm  |
| Transmit 802.11n, MCS7 HT40 135 Mbps, Output Power, EVM and Mask Compliant  |     | 11.5 |     | dBm  |
| Receiver Sensitivity 11b DSSS, 1 Mbps                                       |     | TBD  |     | dBm  |
| Receiver Sensitivity 11b CCK, 11 Mbps                                       |     | TBD  |     | dBm  |
| Receiver Sensitivity 11g OFDM, 6 Mbps                                       |     | TBD  |     | dBm  |
| Receiver Sensitivity 11g OFDM, 54 Mbps                                      |     | TBD  |     | dBm  |
| Receiver Sensitivity 11n HT20 OFDM, 72.2 Mbps                               |     | TBD  |     | dBm  |
| Receiver Sensitivity 11n HT40 OFDM, 135 Mbps                                |     | TBD  |     | dBm  |
| BX3100 Harmonics 2F0  |     | -35  |     | dBm  |
| BX3100 Harmonics 3F0  |     | -50  |     | dBm  |

### 3.3.3 Bluetooth Radio

Measurements conducted at 25°C ambient temperature.

**Table 3-8: Generic Radio Characteristics**

| Description  | Min | Typ | Max | Unit |
|--|-----|-----|-----|------|
| Transmit Power BR 1 Mbps, ACR & Modulation Compliant |     | TBD |     | dBm  |
| Transmit Power BR 2 Mbps, ACR & Modulation Compliant |     | TBD |     | dBm  |
| Transmit Power BR 3 Mbps, ACR & Modulation Compliant |     | TBD |     | dBm  |
| Transmit Power LE 1 Mbps, ACR & Modulation Compliant |     | TBD |     | dBm  |
| Receiver Sensitivity BR 1 Mbps                       |     | TBD |     | dBm  |
| Receiver Sensitivity EDR 2 Mbps                      |     | TBD |     | dBm  |
| Receiver Sensitivity EDR 3 Mbps                      |     | TBD |     | dBm  |
| Receiver Sensitivity LE 1 Mbps                       |     | TBD |     | dBm  |
| Out-of-band blocking performance 30 MHz~2000 MHz     |     | TBD |     | dBm  |
| Out-of-band blocking performance 2500 MHz~3000 MHz   |     | TBD |     | dBm  |
| Out-of-band blocking performance 3000 MHz~12.5 GHz   |     | TBD |     | dBm  |

## 3.4 Electrical Specifications

### 3.4.1 Absolute Maximum Ratings

**Table 3-9: Absolute Maximum Ratings**

| Parameter        |                           | Min                  | Max                  | Units |
|------------------|---------------------------|----------------------|----------------------|-------|
| V <sub>IL</sub>  | Input low voltage         | -0.3                 | 0.25×V <sub>IO</sub> | V     |
| V <sub>IH</sub>  | Input high voltage        | 0.75×V <sub>IO</sub> | 3.3                  | V     |
| I <sub>IL</sub>  | Input leakage current     | -                    | 50                   | nA    |
| V <sub>OL</sub>  | Output low voltage        | -                    | 0.1×V <sub>IO</sub>  | V     |
| V <sub>OH</sub>  | Output high voltage       | 0.8×V <sub>IO</sub>  | -                    | V     |
| C <sub>pad</sub> | Input pin capacitance     | -                    | 2                    | pF    |
| V <sub>IO</sub>  | VDDIO                     | 1.8                  | 3.3                  | V     |
| I <sub>MAX</sub> | Maximum drive capability  | -                    | 12                   | mA    |
| T <sub>STR</sub> | Storage temperature range | -40                  | 150                  | °C    |

**Table 3-10: Recommended Operating Conditions**

| Parameter        |                                  | Min                 | Typ                 | Max                 | Units |
|------------------|----------------------------------|---------------------|---------------------|---------------------|-------|
| V <sub>BAT</sub> | Battery regulator supply voltage | 2.8                 | 3.3                 | 3.6                 | V     |
| V <sub>IO</sub>  | I/O supply voltage               | 1.8                 | 3.3                 | 3.3                 | V     |
| T <sub>OPR</sub> | Operating temperature range      | -40                 | -                   | 85                  | °C    |
| V <sub>IL</sub>  | CMOS low level input voltage     | 0                   | -                   | 0.3×V <sub>IO</sub> | V     |
| V <sub>IH</sub>  | CMOS high level input voltage    | 0.7×V <sub>IO</sub> | -                   | V <sub>IO</sub>     | V     |
| V <sub>TH</sub>  | CMOS threshold voltage           | -                   | 0.5×V <sub>IO</sub> | -                   | V     |

## 3.5 Mechanical

## 3.6 Mechanical Drawings

The AirPrime BX310x module's LGA footprint is a 70-pad array of copper pads (see [Physical Dimensions and Connection Interface on page 9](#)). The following drawings illustrate the device footprint and dimensions.



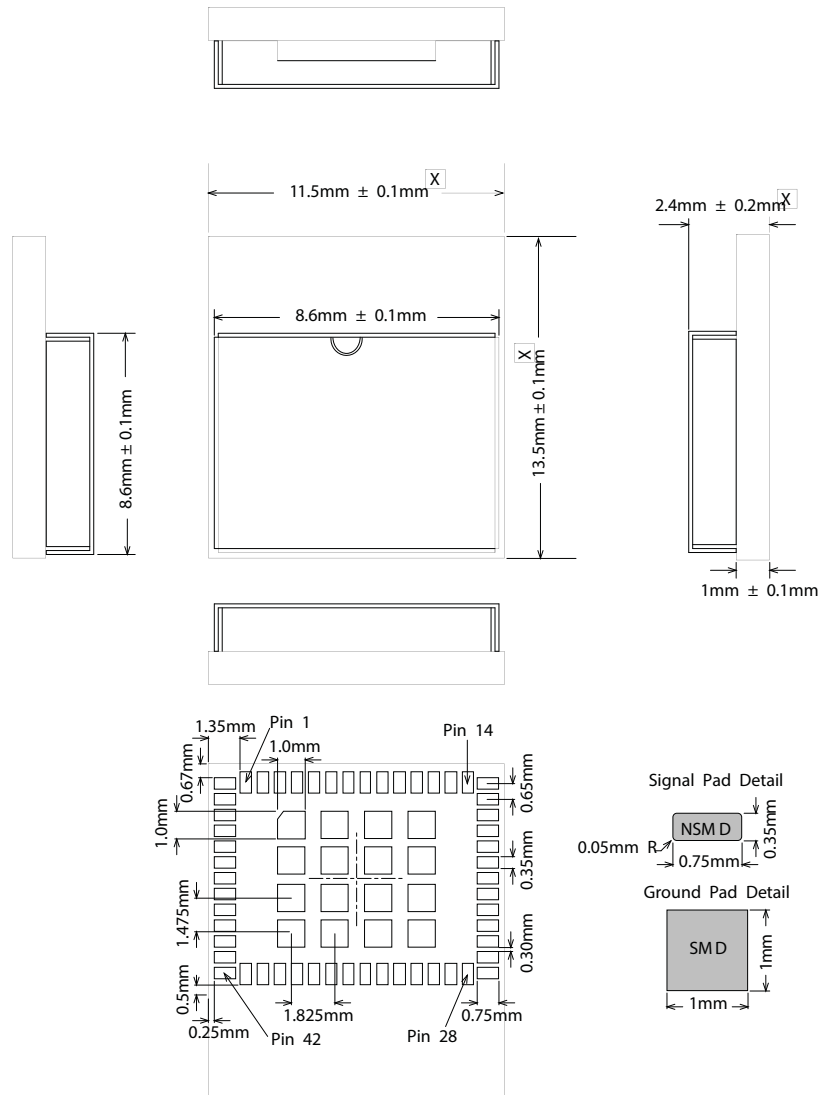


Figure 3-2: AirPrime BX3105 Mechanical Drawing

### 3.7 Antenna

The AirPrime BX3100 uses an LGA pad (pin 40—RF\_MAIN), which the application must connect to an external antenna.

The AirPrime BX3105 includes an integrated PCB antenna. Leave the LGA pad (pin 40) unconnected.

# >> 4: Interfaces Specification

## 4.1 Overview

This section describes the interfaces supported by the AirPrime BX310x embedded module and provides specific voltage, timing, and circuit recommendations for each interface.

## 4.2 UART

The AirPrime BX310x provides one UART interface for asynchronous communication between the AirPrime BX310x module and a host device (e.g. a PC or host processor):

- UART0—4-wire, RS-232-compliant interface

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*Note: Up to two additional UART interfaces can be added by configuring GPIOs using AT commands.*

---

Flow control is managed using:

- RTS/CTS signals (This method is required for higher UART interface speeds.)  
or
- Software XON/XOFF

[Table 4-1 on page 23](#) describes the signals used for UART0.

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*Note: UART signals are named with respect to the module, and directions are listed with respect to the module. For example, UART0\_RXD is an output from the module to the host.*

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**Table 4-1: UART0 Pins<sup>a</sup>**

| Pin | Interface | Name      | Direction | Function                    | Voltage Level |
|-----|-----------|-----------|-----------|-----------------------------|---------------|
| 2   | UART0     | UART0_RTS | I         | Ready To Send, flow control | VDD_PADS_BB   |
| 3   |           | UART0_CTS | O         | Clear To Send, flow control |               |
| 4   |           | UART0_TXD | I         | Transmit Data               |               |
| 5   |           | UART0_RXD | O         | Receive Data                |               |

a. If UART0 pins are not used, leave open.

## 4.3 ADC

The AirPrime BX310x provides two general purpose ADC (Analog to Digital Converter) inputs that are used to measure analog voltages.

**Table 4-2: ADC Interface Pins<sup>a</sup>**

| Pin | Signal name | Direction <sup>b</sup> | Function                    | Voltage Level |
|-----|-------------|------------------------|-----------------------------|---------------|
| 18  | VDET_1      | I                      | Analog to Digital Converter | VDD_PADS_BB   |
| 19  | VDET_2      | I                      |                             |               |

- a. Leave open any pins that are not used.  
b. Signal direction with respect to the module.

## 4.4 Voltage Measurement

The AirPrime BX310x supports the measurement of analog voltages using the following methods:

- ADCs—Two input pins that can be used for direct voltage measurements. See [ADC on page 24](#).
- Combination of four GPIOs and external capacitors—Small analog signals can be measured by configuring (using AT commands) the pins in [Table 4-3](#) below to support a low-noise programmable gain amplifier with the addition of external 270 pF capacitors between pins 31/32 and pins 34/36. The internal ULP-coprocessor is also designed to measure the voltages while operating in the sleep mode, to enable low power consumption; the CPU can be woken up by a threshold setting and/or via other triggers.

**Table 4-3: Voltage-measurement GPIO Pins<sup>a</sup>**

| Pin | Signal Name | Direction <sup>b</sup> | Voltage level |
|-----|-------------|------------------------|---------------|
| 31  | SENSOR_VP   | I                      | VDD_PADS_BB   |
| 32  | SENSOR_CAPP | I                      |               |
| 34  | SENSOR_CAPN | I                      |               |
| 36  | SENSOR_VN   | I                      |               |

- a. Leave open any pins that are not used.  
b. Signal direction with respect to the module.

## 4.5 I<sup>2</sup>C Interface

The AirPrime BX310x module provides two I<sup>2</sup>C (Inter-Integrated Circuit) dedicated serial ports (bus interface) based on [8] The I2C Bus Specification, Version 2.1, January 2000 (Phillips Semiconductor document number 9398 393 40011).



The interfaces use the pins indicated in [Table 4-4](#).

**Table 4-4: I<sup>2</sup>C Interface Pins<sup>a</sup>**

| Pin | Signal name | Direction | Function                | Voltage Level |
|-----|-------------|-----------|-------------------------|---------------|
| 9   | I2C1_SCL    | I/O       | Primary I2C interface   | VDD_PADS_BB   |
| 17  | I2C1_SDA    | I/O       | Primary I2C interface   |               |
| 53  | I2C2_SDA    | I/O       | Secondary I2C interface | VGPIO         |
| 54  | I2C2_SCL    | I/O       | Secondary I2C interface |               |

a. Leave open any pins that are not used.

This implementation of the I<sup>2</sup>C interface includes the following characteristics:

- Supported voltage:
  - Primary I2C (1.8 V/3.3 V, configurable)
  - Secondary I2C (3.3 V)
- Standard-mode interface—Data transfer rates up to 100 kbit/s
- Fast-mode interface—Data transfer rates up to 400 kbit/s)
- Master mode operation
- Addressing modes—7-bit; 10-bit; Dual addressing mode

External 2.2 kΩ pull-up resistors must be applied to I<sup>2</sup>C signals (see [Figure 4-1 on page 25](#)).

For I<sup>2</sup>C bus details, including I2C bus waveform and timing details, refer to the I2C Bus Specification.

### 4.5.1 Application

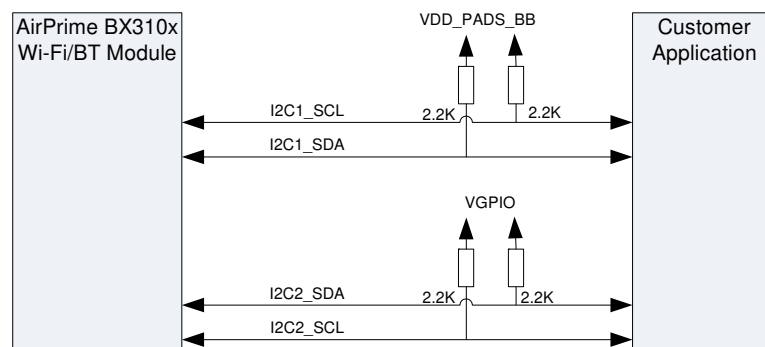


Figure 4-1: Example of I<sup>2</sup>C Bus Application

## 4.6 I2S Interface (Digital Audio)

*Note: Interface support is forthcoming.*

The AirPrime BX310x provides a 4-wire I<sup>2</sup>S (digital audio) interface that can be used to transfer serial digital audio to or from an external stereo DAC/ADC, and supports the following features:

- Modes—Master, Slave
- Transmission format—Full duplex, Half duplex
- Resolution (bits per frame)—8, 16, 32, 40, 48
- Channels—Input, Output
- Bit clock—10 kHz–40 MHz
- Supported audio interfaces (forthcoming)—PDM (Pulse Density Modulation), BT PCM (Pulse Code Modulation)

The interface uses the pins indicated in [Table 4-5](#).

**Table 4-5: I2S Interface Pins<sup>a</sup>**

| Pin | Signal name | Direction <sup>b</sup> | Function                           | Voltage Level |
|-----|-------------|------------------------|------------------------------------|---------------|
| 16  | I2S_MCLK    | O                      | I2S MasterClock                    | VDD_PADS_BB   |
| 24  | I2S_DO      | O                      | I2S Data Out                       |               |
| 25  | I2S_DI      | I                      | I2S Data In                        |               |
| 26  | I2S_LRCLK   | I/O                    | I2S Left-Right Clock (Word Select) |               |
| 27  | I2S_BCLK    | I/O                    | I2S Bit Clock                      |               |

- a. Leave open any pins that are not used.  
 b. Signal direction with respect to the module.

## 4.7 General Purpose Input/Output (GPIO)

The AirPrime BX310x defines several GPIOs for customer use, as described in [Table 4-6](#) and [Table 4-7](#).

*Note: The pins carrying the 'Alternate function' GPIOs are multi-function. The alternate interfaces (SDIO or SPI) can be selected via an AT command.*

**Table 4-6: GPIO Pins (Dedicated)<sup>a</sup>**

| Pin | Signal Name | Direction | Default State        | Function            | Voltage Level |
|-----|-------------|-----------|----------------------|---------------------|---------------|
| 14  | GPIO(5)     | I/O       | No pull <sup>b</sup> | General purpose I/O | VDD_PADS_BB   |
| 35  | GPIO(27)    | I/O       |                      |                     |               |

- a. Leave open any pins that are not used.  
 b. Internal configuration of all GPIOs—no internal pull-ups

**Table 4-7: GPIO Pins (Alternate function)<sup>a</sup>**

| Pin | Signal Name | Direction | Default State        | Function            | Voltage Level |
|-----|-------------|-----------|----------------------|---------------------|---------------|
| 42  | GPIO(15)    | I/O       | No pull <sup>b</sup> | General purpose I/O | VDD_PADS_BB   |
| 43  | GPIO(12)    |           |                      |                     |               |
| 44  | GPIO(14)    |           |                      |                     |               |
| 45  | GPIO(13)    |           |                      |                     |               |
| 46  | GPIO(2)     |           |                      |                     |               |
| 47  | GPIO(4)     |           |                      |                     |               |

- a. Leave open any pins that are not used.
- b. Internal configuration of all GPIOs—no internal pull-ups

## 4.8 SPI Bus

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*Note: Interface support is forthcoming.*

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The AirPrime BX310x provides one 6-wire Serial Flash SPI-compatible interface.

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*Note: Traditional 4-wire (MOSI/MISO/SCLK/SS) SPI can also be implemented over using appropriate pins.*

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[Table 4-8 on page 27](#) describes the SPI interface pins.

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*Note: The pins carrying the SPI interface are multi-function. The alternate interfaces (SDIO or GPIO) can be selected via an AT command.*

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**Table 4-8: SPI Pin Descriptions<sup>a</sup>**

| Pin | Signal Name | Direction <sup>b</sup> | Function          | Voltage Level |
|-----|-------------|------------------------|-------------------|---------------|
| 42  | HSPICS0     | I/O                    | SPI Chip Select   | VDD_PADS_BB   |
| 43  | HSPIQ       | I/O                    | SPI Data In       |               |
| 44  | HSPICK      | I/O                    | SPI Clock         |               |
| 45  | HSPID       | I/O                    | SPI Data Out      |               |
| 46  | HSPiWP      | O                      | SPI Write Protect |               |
| 47  | HSPiHD      | O                      | SPI Hold          |               |

- a. Leave open any pins that are not used.
- b. Signal direction with respect to the module.

## 4.9 Secure Digital IO (SDIO) Interface

*Note: Interface support is forthcoming.*

The AirPrime BX310x defines one SDIO slave-controller interface (SD 2.0-compliant), which allows a host controller to access the module (the slave device) on the SDIO bus.

The following features are supported:

- Data transfer rates—0–50 MHz
- Block size—Up to 512 bytes
- Interrupts—module-initiated and host-initiated
- Module-initiated data transfer via host interrupt
- Configurable features—Sampling, driving clock edge
- Registers for direct access by host

Table 4-9 describes the signals used for SDIO.

*Note: The pins carrying the SDIO interface are multi-function. The alternate interfaces (GPIO or SPI) can be selected via an AT command.*

**Table 4-9: SDIO Pin Descriptions<sup>a</sup>**

| Pin | Signal Name | Direction | Function        | Voltage Level |
|-----|-------------|-----------|-----------------|---------------|
| 42  | SD_CMD      | I/O       | SDIO command    | VDD_PADS_BB   |
| 43  | SD_DATA2    | I/O       | SDIO data bit 2 |               |
| 44  | SD_CLK      | I/O       | SDIO clock      |               |
| 45  | SD_DATA3    | I/O       | SDIO data bit 3 |               |
| 46  | SD_DATA0    | I/O       | SDIO data bit 0 |               |
| 47  | SD_DATA1    | I/O       | SDIO data bit 1 |               |

a. Leave open any pins that are not used.

## 4.10 Module Enable

The AirPrime BX310x uses the ENABLE (Module Enable) signal to turn the module on/off:

- Turn module on—Drive ENABLE high (to VDD\_PADS\_BB)
- Turn module off—Drive ENABLE low (to 0V)

**Table 4-10: Enable Pin Description<sup>a</sup>**

| Pin | Signal Name | Direction <sup>b</sup> | Function          | Voltage Level |
|-----|-------------|------------------------|-------------------|---------------|
| 37  | ENABLE      | I                      | Start/stop module | VDD_PADS_BB   |

a. Leave open any pins that are not used.

b. Signal direction with respect to the module.

## 4.11 Clock

The AirPrime BX310x outputs the I2S Master Clock (pin 16, GPIO(0)\_I2S\_MCLK) and can output a configurable RTC on some GPIOs (details TBD).

## 4.12 PWM

The AirPrime BX310x supports the use of any signal in [Table 6-1 on page 33](#) that includes “(GPIOx)” in its name as a PWM, via AT command configuration.

## >> 5: Regulatory Certifications

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**Caution:** *Unauthorized modifications or changes not expressly approved by Sierra Wireless could void compliance with regulatory rules, and thereby your authority to use this equipment.*

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The BX3100/BX3105 module is designed to meet, and upon commercial release, will meet the requirements of the following regulatory bodies and regulations, where applicable:

- Federal Communications Commission (FCC) of the United States
- The Certification and Engineering Bureau of Industry Canada (IC)
- Ministry of Internal Affairs and Communications (MIC) of Japan
- Radio Equipment Directive of the European Union

Upon commercial release, the following industry certification will have been obtained, where applicable:

- Bluetooth SIG

Additional certifications and details on specific country approvals may be obtained upon customer request — contact your Sierra Wireless account representative for details.

Additional testing and certification may be required for the end product with an embedded BX3100/BX3105 module and are the responsibility of the OEM. Sierra Wireless offers professional services-based assistance to OEMs with the testing and certification process, if required.

### United States

The BX3100/BX3105 module, upon commercial release, will have been granted modular approval by the FCC. Integrators may use the BX3100/BX3105 module in their end products without additional FCC certification if the following conditions are met.

- At least 20 cm separation distance between the antenna and the user's body must be maintained at all times.
- The BX3100/BX3105 module must not be collocated with any other transmitter within a host device.
- The regulatory label on the end product must include the text “Contains FCC ID: TBD” and the following compliance statement:

*This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.*

A user manual with the end product must clearly indicate the operating requirements and conditions to ensure compliance with current FCC RF exposure guidelines.

The end product with an embedded BX3100/BX3105 module may also need to meet the FCC Part 15 unintentional emission requirements and be properly authorized per FCC Part 15 Subpart B.

## Canada

The BX3100/BX3105 module, upon commercial release, will have been granted modular approval by IC. Integrators may use the BX3100/BX3105 module in their end products without additional IC certification if the following conditions are met.

- At least 20 cm separation distance between the antenna and the user's body must be maintained at all times.
- The BX3100/BX3105 module must not be collocated with any other transmitter within a host device.
- The regulatory label on the end product must include the text "Contains IC : TBD" and the following compliance statement:

*This device complies with Industry Canada license-exempt RSS standard(s). Operation is subject to the following two conditions: (1) this device may not cause interference, and (2) this device must accept any interference, including interference that may cause undesired operation of the device.*

*Le présent appareil est conforme aux CNR d'Industrie Canada applicables aux appareils radio exempts de licence. L'exploitation est autorisée aux deux conditions suivantes: (1) l'appareil ne doit pas produire de brouillage, et (2) l'utilisateur de l'appareil doit accepter tout brouillage radioélectrique subi, même si le brouillage est susceptible d'en compromettre le fonctionnement.*

## Bluetooth Qualification Program (BQP)

- In case no other non-certified Bluetooth components are incorporated, the BX3100/BX3105's BQP marking certification allows users to integrate the module into products without the need to obtain subsequent and separate approval.
- The BX3100/BX3105 has been approved by the Bluetooth Qualification Body (BQB) to use the Bluetooth trademark and to offer official Bluetooth functionality. The approval according to the V4.2 Bluetooth specification confirms that the module complies with the Bluetooth specification and will successfully operate with other products supporting the same profile. BQP certification also ensures that the module has gone through safety assessment. This certification was granted through a combination of product performance testing and interoperability testing. This certification applies globally.

### Labelling

- Products complying with all relevant requirements are allowed to bear the official Bluetooth logo

For further information regarding the BQP certification requirements please review the following websites:

Bluetooth Special Interest Group:

<https://www.bluetooth.org/apps/content/>

## >> 6: Pinout

The system interface of the AirPrime BX310x is through the LGA pattern on the bottom of the PCB.

AirPrime BX310x pins are divided into three functional categories:

- Core functions and associated pins—Cover all the mandatory features for M2M connectivity and will be available by default across all CF3 family of modules. These Core functions are always available and always at the same physical pin locations. A customer platform using only these functions and associated pins is guaranteed to be forward and/or backward compatible with the next generation of CF3 modules.
- Extension functions and associated pins—Bring additional capabilities to the customer. Whenever an Extension function is available on a module, it is always at the same pin location.
- Custom functions and associated pins—These are module-specific and make use of specific chipset functions and I/Os.

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**Warning:** *Custom features should be used with caution as there is no guarantee that the custom functions available on a given module will be available on other CF3 modules.*

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Pins marked as "Leave open" or "Reserved" should not be used or connected.



## 6.1 Pin Configuration

Figure 6-1 illustrates the pin configuration of the AirPrime BX310x module.

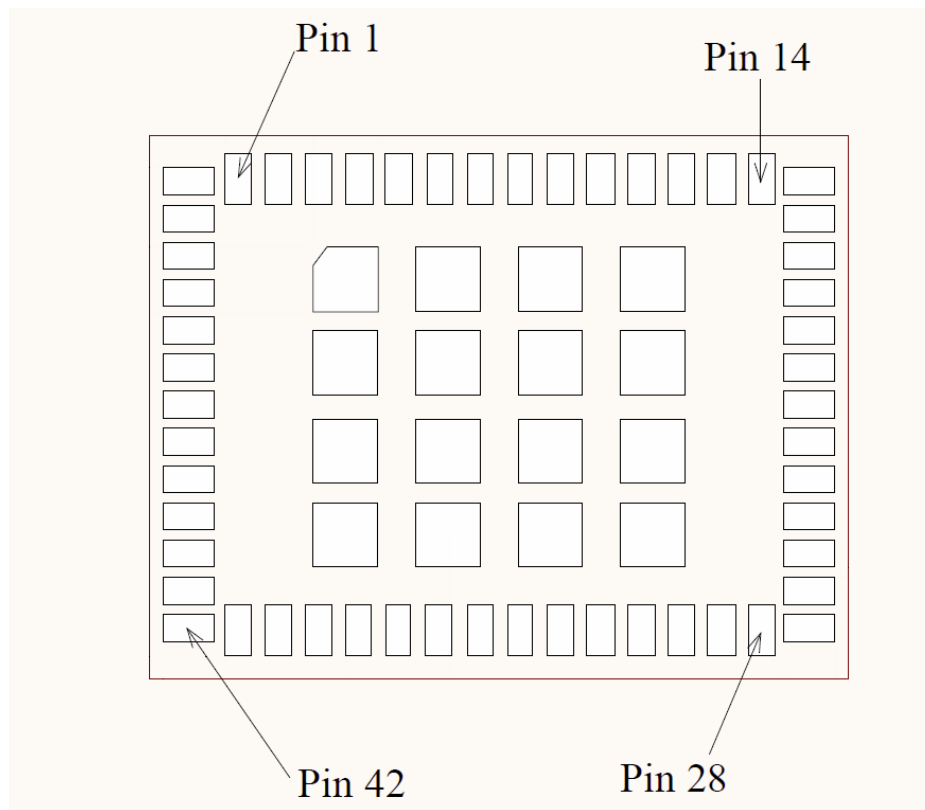


Figure 6-1: Pin Configuration (Bottom View)

## 6.2 Pin Description

Table 6-1 on page 33 lists detailed information for the LGA pins.

**Important:** Leave open all pins that are not used.

Table 6-1: Pin Definitions

| Pin | Signal name        | Group     | I/O <sup>a</sup> | Voltage     | PU/<br>PD <sup>b</sup> | Active <sup>c</sup> | Function              | Type <sup>d</sup> |
|-----|--------------------|-----------|------------------|-------------|------------------------|---------------------|-----------------------|-------------------|
| 1   | Reserved           | NoConnect |                  | -           | -                      | -                   | -                     | E                 |
| 2   | UART0_RTS_GPIO(22) | UART0     | I                | VDD_PADS_BB | PU                     | L                   | UART0 Request To Send | C                 |
| 3   | UART0_CTS_GPIO(19) | UART0     | O                | VDD_PADS_BB | PU                     | L                   | UART0 Clear To Send   | C                 |
| 4   | UART0_TXD          | UART0     | I                | VDD_PADS_BB | PU                     | L                   | UART0 Transmit Data   | C                 |
| 5   | UART0_RXD          | UART0     | O                | VDD_PADS_BB | PU                     | L                   | UART0 Receive Data    | C                 |
| 6   | Reserved           | NoConnect | -                | -           | -                      | -                   | -                     | E                 |

**Table 6-1: Pin Definitions (Continued)**

| Pin | Signal name | Group       | I/O <sup>a</sup> | Voltage     | PU/<br>PD <sup>b</sup> | Active <sup>c</sup> | Function                           | Type <sup>d</sup> |
|-----|-------------|-------------|------------------|-------------|------------------------|---------------------|------------------------------------|-------------------|
| 7   | Reserved    | NoConnect   | -                | -           | -                      | -                   | -                                  | E                 |
| 8   | Reserved    | NoConnect   | -                | -           | -                      | -                   | -                                  | E                 |
| 9   | GPIO(23)    | GPIO        | I/O              | VDD_PADS_BB | NP                     | SW                  | General Purpose I/O                | C                 |
|     | I2C1_SCL    | I2C1        | I/O              |             | PUE                    | L                   | Primary I2C interface—Clock        |                   |
| 10  | Reserved    | NoConnect   | -                | -           | -                      | -                   | -                                  | C                 |
| 11  | Reserved    | NoConnect   | -                | -           | -                      | -                   | -                                  | E                 |
| 12  | Reserved    | NoConnect   | -                | -           | -                      | -                   | -                                  | E                 |
| 13  | Reserved    | NoConnect   | -                | -           | -                      | -                   | -                                  | E                 |
| 14  | GPIO(5)     | GPIO        | I/O              | VDD_PADS_BB | NP                     | SW                  | General Purpose I/O                | E                 |
| 15  | Reserved    | NoConnect   | -                | -           | -                      | -                   | -                                  | E                 |
| 16  | I2S_MCLK    | I2S         | O                | VDD_PADS_BB | NP                     | H                   | I2S Master Clock                   | E                 |
|     | GPIO(0)     | GPIO        | I/O              |             | NP                     | SW                  | General Purpose I/O                |                   |
| 17  | GPIO(25)    | GPIO        | I/O              | VDD_PADS_BB | NP                     | SW                  | General Purpose I/O                | E                 |
|     | I2C1_SDA    | I2C1        | I/O              |             | PUE                    | L                   | Primary I2C interface—Data         |                   |
| 18  | VDET_1      | VoltMeasure | I                | VDD_PADS_BB | NP                     | H                   | ADC input for voltage measurement  | C                 |
|     | GPIO(34)    | GPIO        | I/O              |             | NP                     | SW                  | General Purpose I/O                |                   |
| 19  | VDET_2      | VoltMeasure | I                | VDD_PADS_BB | NP                     | H                   | ADC input for voltage measurement  | C                 |
|     | GPIO(35)    | GPIO        | I/O              |             | NP                     | SW                  | General Purpose I/O                |                   |
| 20  | Reserved    | NoConnect   | -                | -           | -                      | -                   | -                                  | C                 |
| 21  | Reserved    | NoConnect   | -                | -           | -                      | -                   | -                                  | C                 |
| 22  | Reserved    | NoConnect   | -                | -           | -                      | -                   | -                                  | C                 |
| 23  | Reserved    | NoConnect   | -                | -           | -                      | -                   | -                                  | C                 |
| 24  | I2S_DO      | I2S         | O                | VDD_PADS_BB | PD                     | H                   | I2S Data Out                       | E%%               |
|     | GPIO(32)    | GPIO        | I/O              |             | NP                     | SW                  | General Purpose I/O                |                   |
| 25  | I2S_DI      | I2S         | I                | VDD_PADS_BB | PD                     | H                   | I2S Data In                        | E%%               |
|     | GPIO(33)    | GPIO        | I/O              |             | NP                     | SW                  | General Purpose I/O                |                   |
| 26  | I2S_LRCLK   | I2S         | I/O              | VDD_PADS_BB | PD                     | L/H                 | I2S Left-Right Clock (Word Select) | E                 |
|     | GPIO(18)    | GPIO        | I/O              |             | NP                     | SW                  | General Purpose I/O                |                   |
| 27  | I2S_BCLK    | I2S         | I/O              | VDD_PADS_BB | PD                     | H                   | I2S Bit Clock                      | E                 |
|     | GPIO(26)    | GPIO        | I/O              |             | NP                     | SW                  | General Purpose I/O                |                   |
| 28  | GND         | Ground      | 0V               | 0V          | -                      | -                   | Ground                             | C                 |
| 29  | Reserved    | NoConnect   | -                | -           | -                      | -                   | -                                  | E                 |

Table 6-1: Pin Definitions (Continued)

| Pin | Signal name | Group       | I/O <sup>a</sup> | Voltage     | PU/<br>PD <sup>b</sup> | Active <sup>c</sup> | Function  | Type <sup>d</sup> |
|-----|-------------|-------------|------------------|-------------|------------------------|---------------------|---|-------------------|
| 30  | GND         | Ground      | 0V               | 0V          | -                      | -                   | Ground  | C                 |
| 31  | GPIO(36)    | GPIO        | I/O              | VDD_PADS_BB | NP                     | SW                  | General Purpose I/O   | C                 |
|     | SENSOR_VP   | VoltMeasure | I                |             | NP                     | H                   | ADC input for voltage measurement                                 |                   |
| 32  | GPIO(37)    | GPIO        | I/O              | VDD_PADS_BB | NP                     | SW                  | General Purpose I/O   | C                 |
|     | SENSOR_CAPP | VoldMeasure | I                |             | NP                     | H                   | ADC input for voltage measurement                                 |                   |
| 33  | VGPIO       | Power       | O                | 3.3V        |                        |                     | Reference voltage output  | C                 |
| 34  | GPIO(38)    | GPIO        | I/O              | VDD_PADS_BB | NP                     | SW                  | General Purpose I/O   | C                 |
|     | SENSOR_CAPN | VoltMeasure | I                |             | NP                     | H                   | ADC input for voltage measurement                                 |                   |
| 35  | GPIO(27)    | GPIO        | I/O              | VDD_PADS_BB | NP                     | L                   | General Purpose I/O   | E                 |
| 36  | GPIO(39)    | GPIO        | I/O              | VDD_PADS_BB | NP                     | SW                  | General Purpose I/O   | C                 |
|     | SENSOR_VN   | VoltMeasure | I                |             | NP                     | H                   | ADC input for voltage measurement                                 |                   |
| 37  | ENABLE      | Control     | I                | VDD_PADS_BB |                        | L                   | Turn module on/off  | C                 |
| 38  | Reserved    | NoConnect   | -                | -           | -                      | -                   | -   | E                 |
| 39  | GND         | Ground      | 0V               | 0V          | -                      | -                   | Ground  | C                 |
| 40  | RF_MAIN     | RF          | I/O              |             | -                      | -                   | (BX3100) RF antenna, DC blocked<br>(BX3105) Leave pin unconnected | C                 |
| 41  | GND         | Ground      | 0V               | 0V          | -                      | -                   | Ground  | C                 |
| 42  | SD_CMD      | SDIO        | I/O              | VDD_PADS_BB | NP                     | H                   | SDIO Command  | E                 |
|     | HSPICS0     | SPI         | I/O              |             | NP                     | SW                  | SPI Chip Select   | C                 |
|     | GPIO(15)    | GPIO        | I/O              |             | NP                     | SW                  | General Purpose I/O   | E                 |
| 43  | SD_DATA2    | SDIO        | I/O              | VDD_PADS_BB | NP                     | H                   | SDIO Data bit 2   | E                 |
|     | HSPIQ       | SPI         | I/O              |             | NP                     | SW                  | SPI Data In   | C                 |
|     | GPIO(12)    | GPIO        | I/O              |             | NP                     | SW                  | General Purpose I/O   | E                 |
| 44  | SD_CLK      | SDIO        | I/O              | VDD_PADS_BB | NP                     | H                   | SDIO Clock  | E                 |
|     | HSPICLK     | SPI         | I/O              |             | NP                     | SW                  | SPI Clock (output from Master)                                    | C                 |
|     | GPIO(14)    | GPIO        | I/O              |             | NP                     | SW                  | General Purpose I/O   | E                 |
| 45  | SD_DATA3    | SDIO        | I/O              | VDD_PADS_BB | NP                     | H                   | SDIO Data bit 3   | E                 |
|     | HSPID       | SPI         | I/O              |             | NP                     | SW                  | SPI Data Out  | C                 |
|     | GPIO(13)    | GPIO        | I/O              |             | NP                     | SW                  | General Purpose I/O   | E                 |
| 46  | SD_DATA0    | SDIO        | I/O              | VDD_PADS_BB | NP                     | H                   | SDIO Data bit 0   | E                 |
|     | HSPIWP      | SPI         | O                |             | NP                     | SW                  | SPI Write Protect   | E                 |
|     | GPIO(2)     | GPIO        | I/O              |             | NP                     | SW                  | General Purpose I/O   | E                 |

**Table 6-1: Pin Definitions (Continued)**

| Pin        | Signal name | Group     | I/O <sup>a</sup> | Voltage                              | PU/<br>PD <sup>b</sup> | Active <sup>c</sup> | Function   | Type <sup>d</sup> |
|------------|-------------|-----------|------------------|--------------------------------------|------------------------|---------------------|--|-------------------|
| 47         | SD_DATA1    | SDIO      | I/O              | VDD_PADS_BB                          | NP                     | H                   | SDIO Data bit 1                                  | E                 |
|            | HSPIHD      | SPI       | O                |                                      | NP                     | SW                  | SPI Hold   | E                 |
|            | GPIO(4)     | GPIO      | I/O              |                                      | NP                     | SW                  | General Purpose I/O                              | E                 |
| 48         | Reserved    | NoConnect | -                | -                                    | -                      | -                   | -  | E                 |
| 49         | Reserved    | NoConnect | -                | -                                    | -                      | -                   | -  | E                 |
| 50         | VDD_3V3_RF  | Power     | I                | 2.8 (Min)<br>3.3V (Typ)<br>3.6 (Max) | -                      | -                   | 3.3v nominal supply for Analog/RF                | C                 |
| 51         | VDD_3V3_PA  | Power     | I                | 2.8 (Min)<br>3.3V (Typ)<br>3.6 (Max) | -                      | -                   | 3.3v nominal supply for Internal Power Amplifier | C                 |
| 52         | VDD_PADS_BB | Power     | I                | 1.8 (Min)<br>3.3V (Typ)<br>3.6 (Max) | -                      | -                   | 3.3v nominal supply for Baseband and Digital I/O | C                 |
| 53         | GPIO(16)    | GPIO      | I/O              | VGPIO                                | NP                     | SW                  | General Purpose I/O                              | C                 |
|            | I2C2_SDA    | I2C2      | I/O              |                                      | PUE                    | L                   | Primary I2C interface—Data                       |                   |
| 54         | GPIO(17)    | GPIO      | I/O              | VDD_PADS_BB                          | NP                     | SW                  | General Purpose I/O                              | C                 |
|            | I2C2_SCL    | I2C2      | I/O              |                                      | PUE                    | L                   | Primary I2C interface—Clock                      |                   |
| G1–<br>G16 | Ground      | Ground    | 0V               | 0V                                   | -                      | -                   | Ground   | C                 |

- a. I/O: Signal direction with respect to the module
- b. PU/PD: NP—No Pull; PD—Pull Down; PU—Pull Up; PUE—Pull Up External
- c. Active: H—High; L—Low; SW—Software defined
- d. Type: C—Core; E—Extended; K—Custom

## 7: Abbreviations

**Table 7-1: Acronyms and Definitions**

| Acronym or term | Definition                                  |
|-----------------|---|
| AFH             | Adaptive Frequency Rate Hopping             |
| AP              | Access Point                                |
| BLE             | Bluetooth Low Energy                        |
| BR              | Basic Rate                                  |
| BSS             | Basic Service Set                           |
| BT              | Bluetooth (Classic)                         |
| EDR             | Enhanced Data Rate                          |
| EDR             | Enhanced Data Rate                          |
| GAP             | Generic Access Profile                      |
| GAP             | General Access Profile                      |
| GATT            | General Attribute Profile                   |
| HTTP            | Hypertext Transfer Protocol                 |
| HTTPS           | Hypertext Transfer Protocol Secure          |
| LE              | Low Energy                                  |
| MQTT            | Message Queuing Telemetry Transport         |
| PAN             | Personal Area Network                       |
| RFCOMM          | Radio Frequency Communication               |
| SDP             | Service Discover Protocol                   |
| SMP             | Security Manage Protocol                    |
| SPP             | Bluetooth Serial Port Profile               |
| STA             | Station (client)                            |
| UART            | Universal Asynchronous Receiver-Transmitter |
| Wi-Fi           | Wireless Networking                         |
| WPA             | Wi-Fi Protected Access                      |
| WPA2            | Wi-Fi Protected Access 2                    |
| WPS             | Wi-Fi Protected Setup                       |