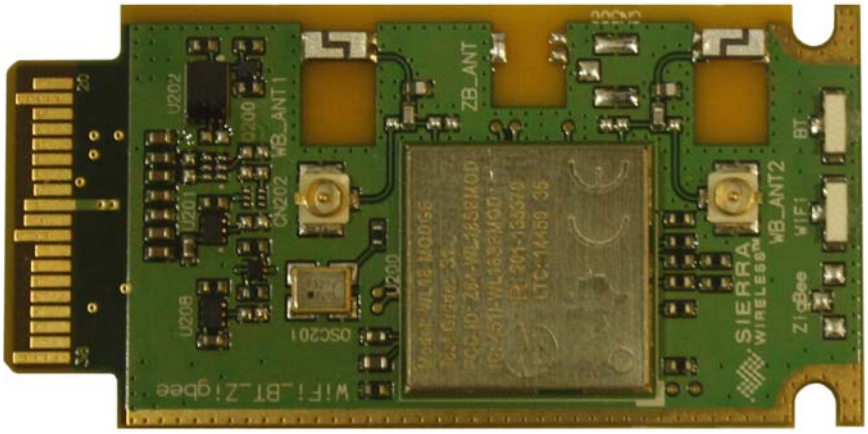
Wi-Fi IoT Expansion Card

Product Specification



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Rev 2
Contents subject to change

Important Notice

Due to the nature of wireless communications, transmission and reception of data can never be guaranteed. Data may be delayed, corrupted (i.e., have errors) or be totally lost. Although significant delays or losses of data are rare when wireless devices such as the Sierra Wireless modem are used in a normal manner with a well-constructed network, the Sierra Wireless modem should not be used in situations where failure to transmit or receive data could result in damage of any kind to the user or any other party, including but not limited to personal injury, death, or loss of property. Sierra Wireless accepts no responsibility for damages of any kind resulting from delays or errors in data transmitted or received using the Sierra Wireless modem, or for failure of the Sierra Wireless modem to transmit or receive such data.

Safety and Hazards

Do not operate the Sierra Wireless modem in areas where blasting is in progress, where explosive atmospheres may be present, near medical equipment, near life support equipment, or any equipment which may be susceptible to any form of radio interference. In such areas, the Sierra Wireless modem **MUST BE POWERED OFF**. The Sierra Wireless modem can transmit signals that could interfere with this equipment.

Do not operate the Sierra Wireless modem in any aircraft, whether the aircraft is on the ground or in flight. In aircraft, the Sierra Wireless modem **MUST BE POWERED OFF**. When operating, the Sierra Wireless modem can transmit signals that could interfere with various onboard systems.

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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Document details

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Revision History

Revision number	Release date	Changes
1	July 2016	Created
2	October 2016	Added system block diagram

1: Wi-Fi IoT Expansion Card Specification

1.1 Overview

The Sierra Wireless Wi-Fi IoT Expansion Card is an open hardware reference design based on the IoT Expansion Card specification. The card provides concurrent 2.4 GHz Wi-Fi and Bluetooth/Bluetooth LE functionality with low power consumption to host platforms for use in PAN (Personal Area Networks) and other applications.

This expansion card provides the following functionality:

- 2.4 GHz Wi-Fi/Bluetooth/Bluetooth LE
  - Wi-Fi: 802.11bgn, SISO
  - Bluetooth: v4.1, Dual mode Bluetooth/Bluetooth LE; Digital PCM audio
  - Concurrent Wi-Fi/Bluetooth over single antenna
- Antenna—Integrated ceramic SMD 2.4 GHz antenna for Wi-Fi/Bluetooth/Bluetooth LE radio. (Optional u.FL antenna may be used for improved performance.)

Note: If using the integrated antenna, make sure the signal is not shielded by the host platform.

1.2 Specifications

The following tables describe key features and specifications of the Wi-Fi IoT Expansion Card:

- Table 1-1, Hardware Features, on page 4
- Table 1-2, IoT Expansion Card Specifications, on page 5
- Table 1-3, Software Interface Support, on page 6

Table 1-1: Hardware Features

Feature		Notes
Antennas	Integrated ceramic SMD 2.4 GHz (ANT201)	• ANT201—Wi-Fi/Bluetooth
	u.FL connector	• CN202 (ANT201) *Note: To use the u.FL connector, refer to the schematic available at http://mangoh.io for required hardware modifications.*
Status LEDs	Green LEDs	• D210—WLAN_EN. Indicates Wi-Fi radio is active. • D211—BT_EN. Indicates Bluetooth is active.
2.4 GHz Wi-Fi/ Bluetooth/Bluetooth Low Energy (LE) module	Part# WL1831MOD	See http://www.ti.com/product/WL1831MOD for module specifications.

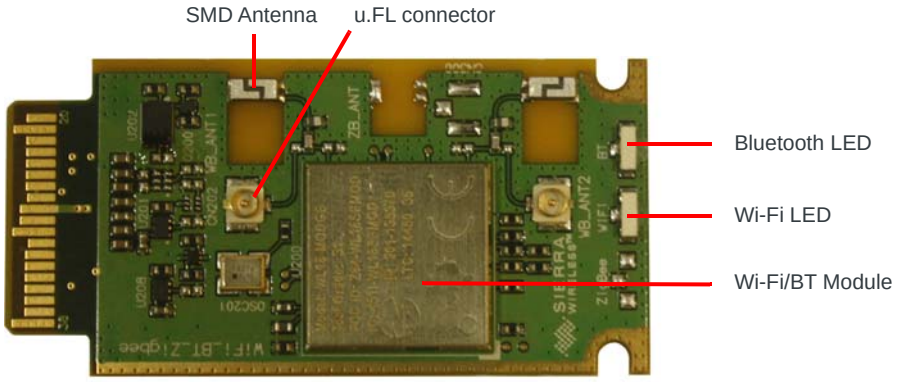

Figure 1-1: Wi-Fi Expansion Card Top View

Table 1-2: IoT Expansion Card Specifications

Parameter	Value/Range	Notes
Power Specifications		
Power Category	1	Power consumption < 2.5 W
Power Supplies (Voltage Rails)	1.8V 3.3V	
Mechanical Specifications		
Height Category	1	Top height ≤14.00 mm
Dimensions	Length: 42.50 mm Width: 22.30 mm	Per IoT Expansion Card specification
# of slots required	1	
mangOH Green Slot Restriction	Slot 0	Card requires interfaces that are implemented only on Slot 0.
Hot Swappable	No	
Environmental Specifications		
Ambient Operating Temperature	Expansion Card—Temperature not tested. Wi-Fi/BT chip—Commercial range (-20C to 70C).	Reference design. Not tested for compliance with IoT Expansion Card Design Specification.

Table 1-3: Software Interface Support

Interface	Supported
USB	Yes
SDIO	Yes
UART	Yes
SPI	No
n_RESET	Yes
ADC	No
I^2C	Yes
PCM	Yes
I2S	No
GPIO	Yes
n_CARD_DETECT	Yes
PPS	No

1.3 Schematics

Schematics for the Wi-Fi IoT Expansion Card and other expansion cards are available at http://mangoh.io.

1.4 Pinout

Table 1-4: Pins Supported

Pin	Signal	Supported	Notes
1	VCC_5VC	-	
2	USB_D+	-	
3	USB_D-	-	
4	GND	Yes	
5	SDIO_CLK	Yes	
6	SDIO_CMD	Yes	
7	SDIO_DAT3/CD	Yes	
8	SDIO_DAT2	Yes	
9	SDIO_DAT1	Yes	
10	SDIO_DAT0	Yes	

Table 1-4: Pins Supported (Continued)

Pin	Signal	Supported	Notes
11	VCC_1V8	Yes	
12	UART_TXD	Yes	
13	UART_RXD	Yes	
14	UART_CTS	Yes	
15	UART_RTS	Yes	
16	SPI_CLK	-	
17	SPI_MISO	-	
18	SPI_MOSI	-	
19	SPI_SS/MRDY	-	
20	ADC0	-	
21	GND	Yes	
22	I2C_SDA	Yes	
23	I2C_SCL	Yes	
24	GPIO_1	Yes	Connects to Wi-Fi IRQ signal. *Note: If the host device uses an AirPrime WP75xx/8548, this must be connected to the WP module's GPIO42 signal (LGA pin 109).*
25	GPIO_2	-	
26	GPIO_3	Yes	BT_EN
	SPI_SRDY	-	
27	GPIO_4	Yes	WLAN_EN
28	VCC_3V3	Yes	
29	VCC_3V3	Yes	
30	GND	Yes	
31	n_CARD_DETECT	Yes	
32	n_RESET	Yes	
33	PCM_DIN	Yes	Used for Bluetooth audio
	I2S_IN	-	
34	PCM_DOUT	Yes	Used for Bluetooth audio
	I2S_OUT	-	
35	PCM_SYNC	Yes	Used for Bluetooth audio
	I2S_WS	-	

Table 1-4: Pins Supported (Continued)

Pin	Signal	Supported	Notes
36	PCM_CLK	Yes	Used for Bluetooth audio
	I2S_CLK	-	
37	PPS	-	
38	GND	Yes	

1.5 System Block

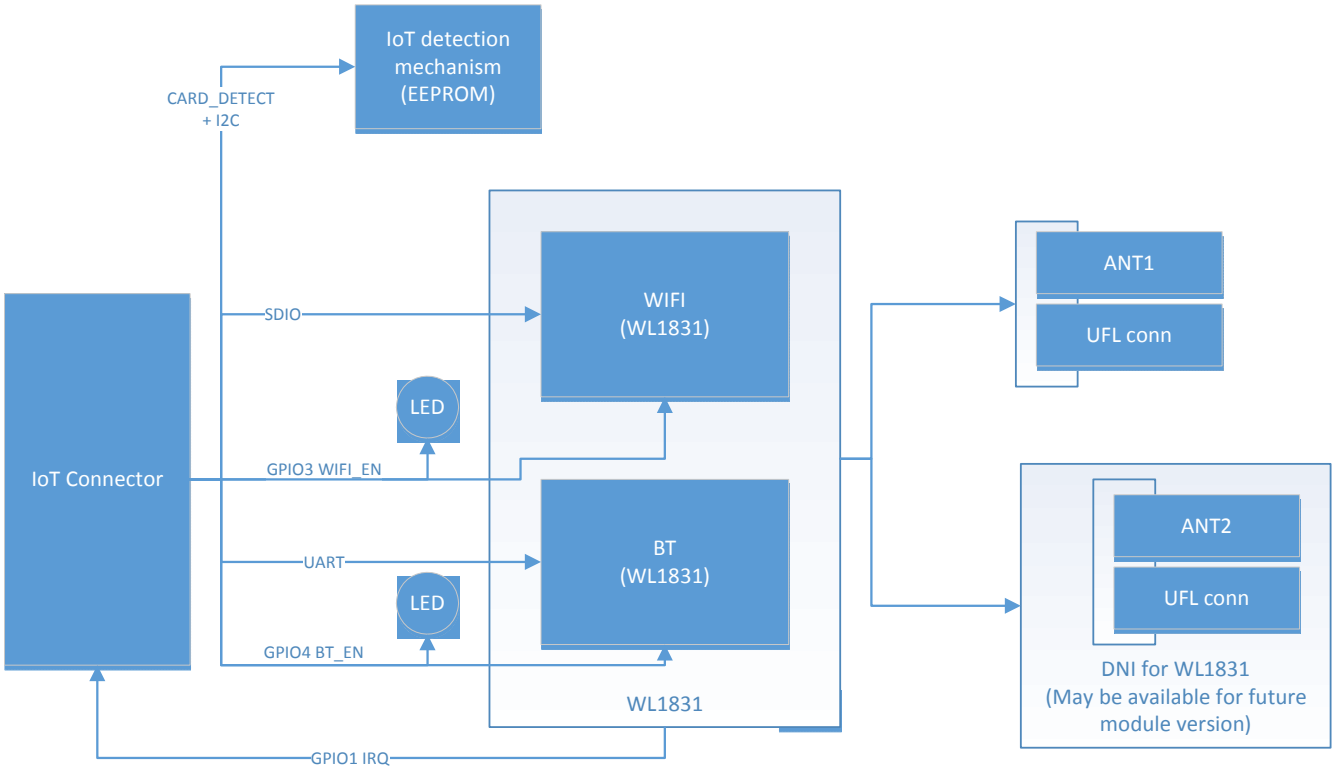

Figure 1-2: Wi-Fi IoT Expansion Card System Block

1.6 Sample Applications

For Wi-Fi development, refer to the mangOH Green Tutorial—Wi-Fi Expansion Card, available at http://mangoh.io.

For Bluetooth development, refer to https://github.com/mangOH/mangOH/wiki/Bluetooth-WL18xx-driver-for-mangOH.