

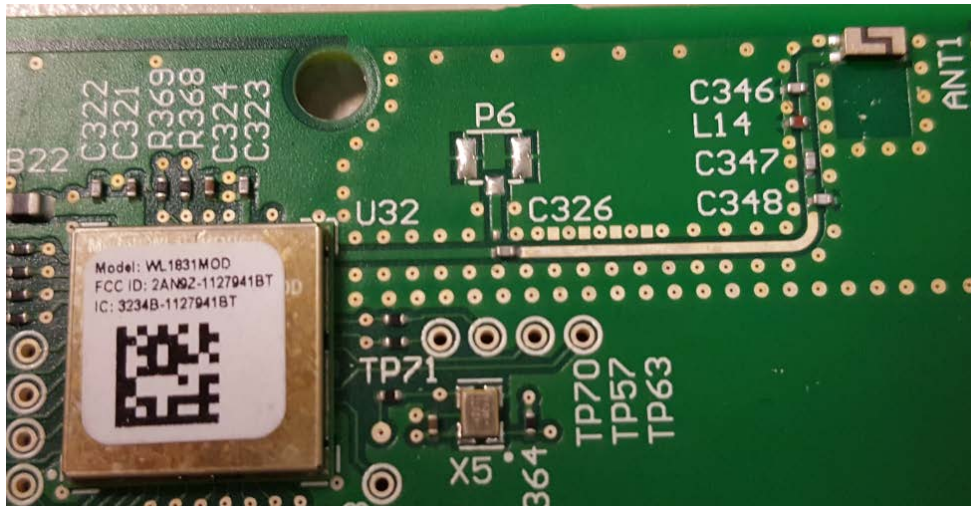
Module Integration

This document describes how to integrate the TI WL1831MOD radio module into a final product with a chip Antenna in a SISO system.

The WL1831MOD is a surface mount Bluetooth and Wi-Fi combo radio module in the WL18XX family from Texas Instruments. The module data sheet can be found at the manufacturer's web site below:

<http://www.ti.com/wireless-connectivity/simplelink-solutions/wi-fi/products.html>

The module is shown below, along with the transmission line connecting it to the matching network and chip antenna.



The module connects back to the host through multiple interfaces. All of these interfaces operate at a nominal supply voltage of 1.8V. The pin assignments of these signals are showing in Table 1 and Figure 1.

DC Input Power:

The radio module power is regulated internally by the module. Power is applied to the VBAT_IN terminals with a voltage in the range of 2.9-4.8V. The I/O voltage of the module is set by applying 1.8V to the VIO_IN Terminal.

Slow Clock:

The radio requires a 32.768 kHz square wave input at the EXT_32K input terminal of the module.

Bluetooth UART:

The Bluetooth subsystem is controlled via an HCI 4-wire UART interface operating at 1.8V.

Bluetooth PCM:

The Bluetooth PCM can be used for BT Audio and can operate in either a master or slave configuration. If they are not used they should be not connected. (NC)

WLAN Host Interface

The WLAN interfaces uses a 4-bit SDIO Interface back to the host operating at 1.8V. The host must provide PU using a 10-K resistor for all non-CLK SDIO signals.

In order to follow the wakeup/shutdown requirements, the WL_EN (pin number 40) should be connected to host GPIO. Must be pulled high for WLAN operation. This GPIO should have internal pull-up allowing the WL18xx pin to remain high on host suspend. In order to enable WOW feature, a pull up on the line is required during HOST shutdown.

IRQ_WL should be connected to host GPIO. This GPIO should be able to wake the host from suspend, therefore it's better to always connect the pin (number 14) to the always on domain of the Host. The IRQ_WL pin serves as interrupt generation from WL18xx to the host.

Table 1: Device Pinout

Pin #	Signal	Function	Pin #	Signal	Function
1	GND		33	GND	
2	NC	Reserved for future use, NC	34	GND	
3	NC	Reserved for future use, NC	35	GND	
4	NC	Reserved for future use, NC	36	EXT_32K	Input clock of 32.768 kHz
5	NC	Reserved for future use, NC	37	GND	
6	WL_SDIO_CMD_1V8	WLAN SDIO Command	38	VIO_IN	Sets I/O voltage.
7	GND		39	GND	
8	WL_SDIO_CLK	WLAN CDIO CLK, must be driven by host	40	WLAN_EN	Hi = Enable
9	GND		41	BT_EN	Hi = Enable
10	WL_SDIO_CMD_1V8	WLAN SDIO data bit 0	42	WL_UART_DBG	Used for Debug
11	WL_SDIO_D1_1V8	WLAN SDIO data bit 1	43	BT_UART_DBG	Used for Debug
12	WL_SDIO_D2_1V8	WLAN SDIO data bit 2	44	GND	
13	WL_SDIO_D3_1V8	WLAN SDIO data bit 3	45	GND	
14	WL_IRQ_1V8	WLAN SDIO IRQ	46	VBAT_IN	Power Supply Input: 2.9-4.8V
15	GND		47	VBAT_IN	Power Supply Input: 2.9-4.8V
16	GND		48	GND	
17	GND		49	GND	
18	RF_ANT2	NC if not used	50	BT_HCI_RTS_1V8	UART RTS to Host
19	GND		51	BT_HCI_CTS_1V8	UART CTS to Host
20	GND		52	BT_HCI_TX_1V8	UART TX to Host

21	NC	Reserved for future use, NC	53	BT_HCI_RX_1V8	UART RX to Host
22	NC	Reserved for future use, NC	54	GND	
23	GND		55	GND	
24	GND		56	BT_AUD_IN	BT Audio, NC if not used
25	NC	Reserved for future use, NC	57	BT_AUD_OUT	BT Audio, NC if not used
26	GPIO2	Used for Debug	58	BT_AUD_FSYNC	BT Audio, NC if not used
27	GPIO1	Used for Debug	59	GND	
28	GND		60	BT_AUD_CLK	BT Audio, NC if not used
29	GND		61	GND	
30	GND		62	NC	Reserved for future use, NC
31	GND		63	GND	
32	RF_ANT1	RF Antenna Connection	64	GND	

Figure 1: Device Pinout.

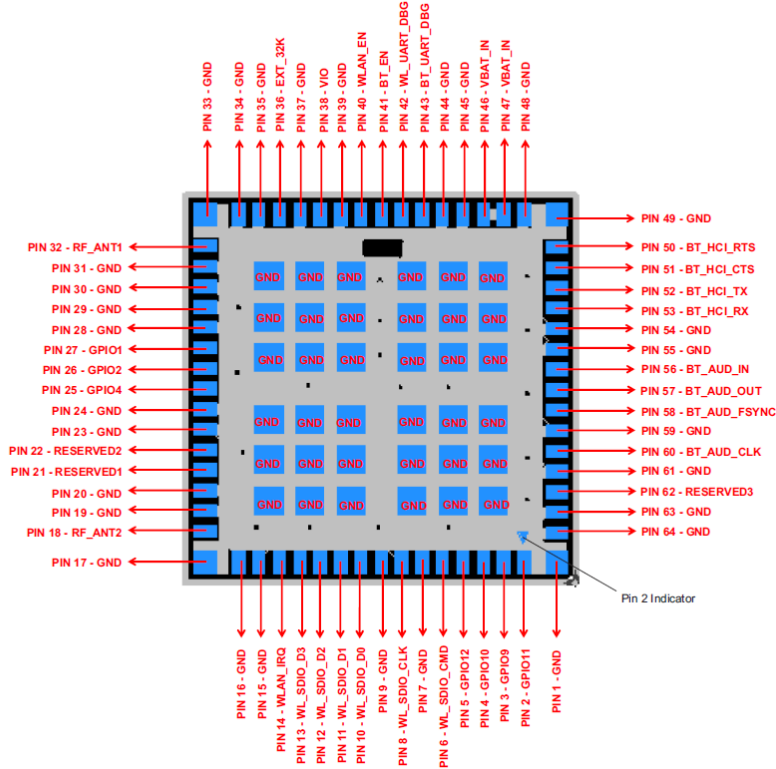
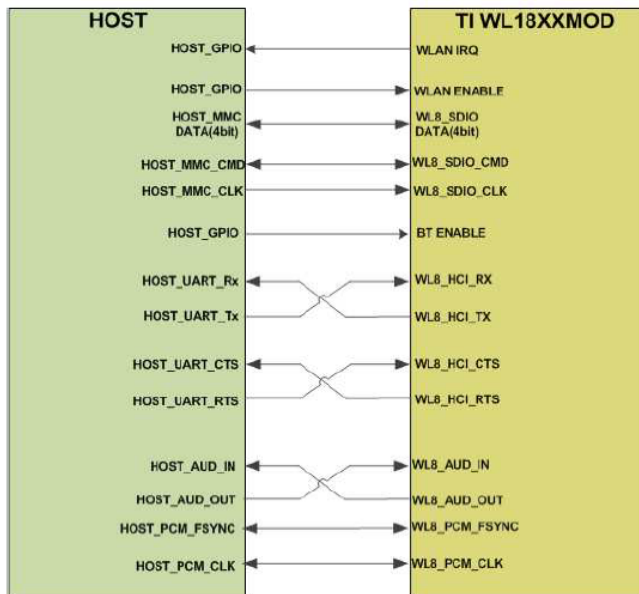


Figure 2: Host Connections



Antenna Connection:

The antenna is connected to terminal RF_ANT1 on the radio module. The connection between the antenna and RF_ANT1 should be made with a 50 ohm transmission line. A matching network will be needed to match the antenna and should be placed right before the antenna input.

Avoid routing any analog or digital signals on the signal layer directly underneath any of the radio, matching network or antenna. All of the ground pins on the module must be connected to the main PCB.

This device is intended only for OEM integrators under the following conditions:

- The antenna must be installed so that 20 cm is maintained between the antenna and users.
- The transmitter module cannot be co-located with any other transmitter or antenna.
- The radio transmitter can operate only using a chip antenna with a maximum gain of 2.2dBi.

Labeling

If the FCC identification number is not visible when the module is installed inside another device, then the outside of the device into which the module is installed must also display a label referring to the enclosed module. This exterior label can use wording such as the following: “Contains Transmitter Module FCC ID: 2AN9Z-1127941BT” or “Contains 2AN9Z-1127941BT.” Any similar wording that expresses the same meaning may be used.

Regulatory Compliance

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.

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications.

However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio, TV reception, or other devices which can be determined by turning the equipment on and off, the user is encouraged to try to correct the interference by one or more of the following measures:

Reorient or relocate the receiving antenna (on the radio, TV, or other device).

Increase the separation between the equipment and receiver.

Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.

Consult the dealer of the device for help.

Any changes or modifications made to the device that are not expressly approved by Respironics may void the user's authority to operate the equipment.

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