Datasheet

WB45NBT

Version 3.0

REVISION HISTORY

Version	Date	Notes	Approver
1.0	15 May 2015	Initial Release	Jonathan Kaye
1.02	1 July 2014	Added product image Updated recommended DC supply voltage on VCC 1.8V to 1.8 V +/- 2%.	Andrew Chen
1.03	25 July 2014	Updated 1.8 VDC to +/-2% in the Specifications table Updated the Supply Voltage in the Specifications table Added the updated product images	Andrew Chen
1.04	03 Sept 2014	Removed SDC reference from part number. Added new photo	Andrew Chen
1.05	15 Sept 2014	Updated Molex mating connector – changed Molex 55560 Series 80 Pin Connector P/N 55560-**0804** to Molex 55560 Series 80 Pin Connector P/N 55560-**0807** due to unavailability of former part.	Andrew Chen
1.06	16 Sept 2014	Removed CAN interface references.	Andrew Chen
1.07	10 June 2015	Updated the Tx power and Rx sensitivity numbers.	Andrew Chen
1.08	2 Oct 2015	Fixed links in document	Andrew Chen
1.09	12 Oct 2015	Added link to Molex data sheets	John Imboden
1.10	27 April 2016	Updated Frequency Band and Operating Channel information in the Specifications table	Andrew Chen
1.11	12 May 2016	Added certification info & IDs for FCC, IC, ETSI, MIC, and KC	John Imboden
2.0	02 Aug 2016	Changed from *Hardware Integration Guide* to *Datasheet*	Sue White
2.1	24 Aug 2016	Removed *pending* status of WFA and CCX	John Imboden
2.2	21 Feb 2017	Updated FCC data to 24 non-overlapping channels	Jay White
2.3	10 Mar 2017	Updated 5 GHz frequency bands and operating channels info.	Kris Sidle
2.4	19 Apr 2017	Fixed FCC frequency range. Added section for MIC Requirements.	Sue White
2.5	7 June 2017	Minor updates to voltage supply current rating: 1.8 V changed from 500 mA to 250 mA; 3.3 V changed from 1000 mA to 900 mA	Andrew Chen
2.6	13 June 2017	Changed **1.8 VDC ±5%** to **1.8 VDC -2% to+5%** in the *Input Voltage Requirements* section.	Andrew Chen
2.7	13 June 2017	Changed the maximum supply voltage for the 1.8V VCC from 1.84 to 1.89 volts	Chris Cole
2.8	15 June 2017	Updated EU DoC with new RED standards	Tom Smith
2.9	06 Feb 2018	Removed SPI Slave references Removed EN 55022:2010 from the EU DoC	Chris Cole
2.10	16 May 2018	New template; updated IC Regulatory section	Maggie Teng
2.11	06 Mar 2019	Updated logos and URLs	Sue White
2.12	23 Oct 2019	Updated warranty information	Jay White
2.13	02 Sept 2020	Updated Regulatory section including new ETSI standards	Jay White
2.14	21 Oct 2020	Updated regulatory information	Ryan Urness
2.15	25 Nov 2020	Fixed FCC ID error	Jay White
3.0	21 Feb 2021	Moved detailed regulatory information to a separate document	Jonathan Kaye

CONTENTS

1 SCOPE

This document describes key hardware aspects of the Laird WB45NBT wireless bridge module. This document is intended to assist device manufacturers and related parties with the integration of this module into their host devices. Data in this document are drawn from a number of sources including data sheets for the QUALCOMM Atheros AR6003, CSR CSR8510, and Atmel AT91SAM9G25.

Note that the information in this document is subject to change. Please refer to the WB45NBT product page for the most recent documentation.

2 OPERATIONAL DESCRIPTION

This device is a Laird WB45NBT wireless bridge module, a wireless communications subsystem that may be integrated into a variety of host devices via a number of available electronic and logical interfaces. The Laird WB45NBT provides complete enterprise-class Wi-Fi connectivity with an integrated TCP/IP stack, full support for IEEE 802.11a/b/g/n and Bluetooth 4.0 dual-mode air standards with a fully integrated security supplicant providing 802.11i/WPA2 Enterprise authentication, data encryption, and BT protocol stacks.

The WB45NBT has a wide variety of interfaces including Fast Ethernet, serial UART, Hi-Speed USB, SPI, and I2C. The wireless bridge may be configured, monitored, and managed via a Command Line Interface (CLI) over an available dedicated console port, via a web interface over a wireless or Ethernet interface or via a remote SDK interface over wireless or Ethernet.

The WB45NBT incorporates a Wi-Fi SiP module using Qualcomm Atheros AR6003 which supports IEEE 802.11a/b/g/n. The CSR (CSR8510) Bluetooth chip supports Bluetooth standard 4.0 which includes the Bluetooth Low Energy (BLE) and legacy modes. The product features an ARM9 processor running at 400 MHz, 64 MB of Lower Power DDR (LPDDR) memory, and 128 MB of NAND flash storage running at 1.8 V to minimize power consumption. Several GPIO lines are available for data acquisition and similar applications. The platform runs an embedded Linux operating system based on the 3.x kernel. A Software Developer's Kit (SDK) with Application Programming Interfaces (API) and software tools are available for the development of custom software applications on the device.

The WB45NBT measures 40 mm long by 40 mm wide by 3.8 mm thick. The wireless bridge physically interfaces to the host device via an 80-pin board to board (B2B) connector (Molex SlimStack™ 54722 Series 80 pin connector P/N 54722-0804), which mates to a 1.5 mm stacking height mating part from Molex 55560 Series P/N 55560-0807. The WB45NBT may be secured to the host device via available grounded mounting holes. The WB45NBT operates at temperatures between -20° and + 70° degrees Celsius.

Contingent on compliance results, WB45NBT is a fully integrated module. It has its own RF shielding and does not require shielding provided by the host device into which it is installed in order to maintain compliance with applicable regulatory standards. As such, the device may be tested in a standalone configuration via a breakout board (BB45NBT). The BB45NBT schematic is available as a design reference in the software downloads tab of the WB45NBT product page.

The WB45NBT provides two U.FL type antenna connectors; the main antenna (for Wi-Fi) and the auxiliary (for Bluetooth) work separately to get the best coexistence performance. Supported host device antenna types include dipole and monopole antennas.

Regulatory operational requirements are included in this document and may be incorporated into the operating manual of any device into which the WB45NBT is installed. The WB45NBT is designed for installation into mobile devices which typically operate at distances greater than 20 cm from the human body and portable devices which typically operate at distances less than 20 cm from the human body. See Documentation Requirements for more information.

3   BLOCK DIAGRAM
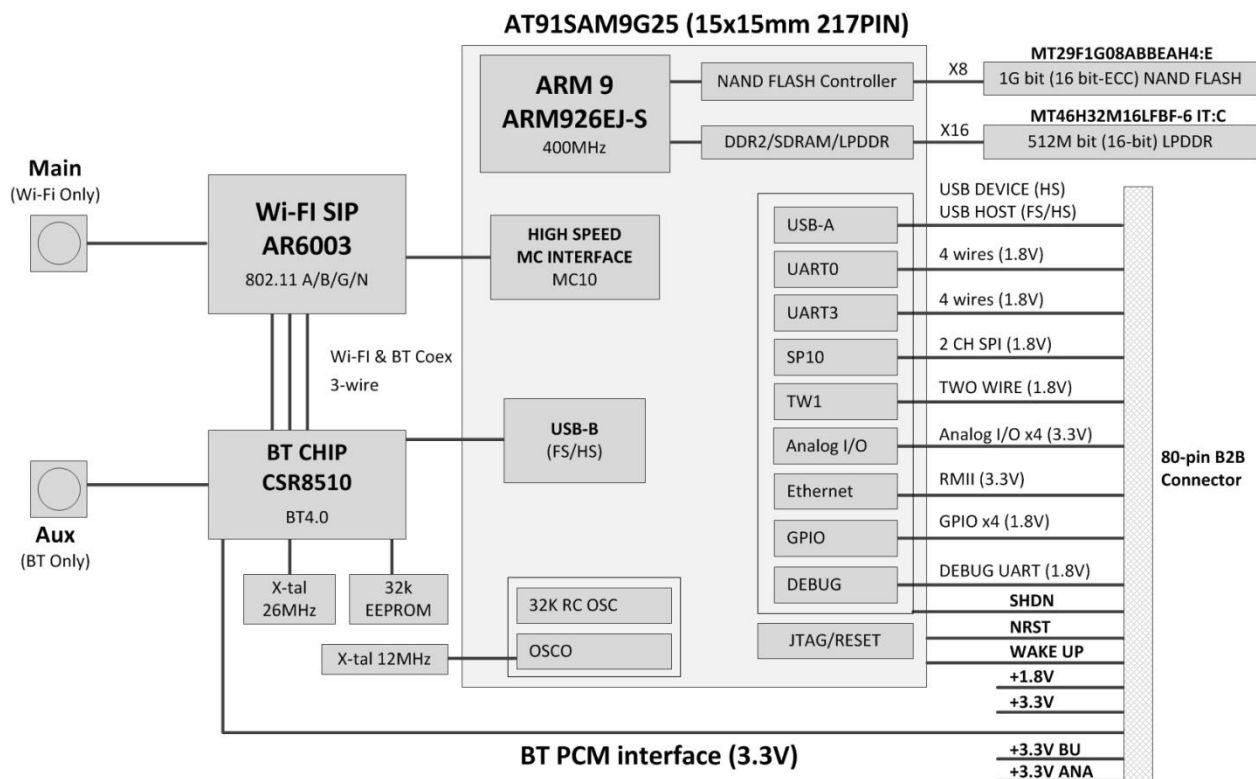
Note: Transmitter frequencies for Wi-Fi are 2412-2462 MHz and 5180-5805 MHz. Transmitter frequencies for Bluetooth are 2402-2480 MHz.

Note: Bluetooth functions on the AUX antenna and Wi-Fi operates at the Main antenna only.

4   SPECIFICATIONS

Feature	Description
Physical Interface	Pitch: 0.5 mm Stacking height: 1.50 mm Molex 54722 Series 80 Pin Connector P/N 54722-0804 **Mating part:** Molex 55560 Series 80 Pin Connector P/N 55560-0807 **Note:** See Mounting for mating connector options.
Ethernet Interface (3.3 V signal level)	10/100 Mbps RMII (Reduced Media Independent Interface)
Asynchronous Serial Port Interfaces (1.8 V signal level)	Four-wire UART with hardware handshaking (up to 921,600 baud) Two-wire UART (console) for debug purpose

Americas: +1-800-492-2320
Europe: +44-1628-858-940
Hong Kong: +852 2923 0610

Feature	Description
SPI Interface (1.8 V signal level)	Five Wire and Master modes supported with 2 chip select
USB Interfaces	Configurable USB Host port/Device port to support USB full speed and high speed data rates
Two Wire Interface (1.8V signal level)	Two-wire I2C (Inter-IC)
Debug Interface	Two-wire UART (console) for debug purpose
Digital GPIO (1.8 V signal level)	4 digital General Purpose I/O (GPIO)
Analog GPIO (3.3 V signal level)	4 analog General Purpose I/O (GPIO)
PCM interface	13-bit or 16-bit linear, 8-bit µ-law or A-law companded sample formats
Antenna Interface	2 Hirose U.FL connectors for Wi-Fi (Main) and BT (Aux) separately, 50 ohm **Note:** Wi-Fi and BT sharing a single antenna is NOT currently supported.
Wi-Fi Interface	Qualcomm Atheros AR6003 1X1 802.11 a/b/g/n on 20 MHz bandwidth
Bluetooth Interface	CSR CSR8510 Bluetooth 4.0 dual-mode (EDR+BLE)
Processor Chip Set	Atmel 400 MHz ARM 9, P/N AT91SAM9G25-CU
Operating System	Embedded Linux, 3.x kernel
Memory	64 MB LPDDR
Storage	128 MB SLC NAND flash
Input Voltage Requirements	3.3 VDC +/-5% (Backup) 3.3 VDC ±5% (system) 1.8 VDC -2% to +5% (Memory and I/O interface) **Note:** Voltage ripple must be less than 30 mV.

Current Consumption

Note: These current consumption measurements were taken using Linux kernel version 3.8.0.

Note: Standby refers to the radio operating while connected to an AP but not transmitting or receiving.

Mode		1.8 V Average	3.3 V Average
802.11a	Transmit	78	325
	Receive	95	71
	Standby	13	56
802.11b	Transmit	74	278
	Receive	91	57
	Standby	13	56
802.11g	Transmit	80	265
	Receive	91	57
	Standby	13	56
802.11n (2.4 GHz)	Transmit	80	285
	Receive	91	57
	Standby	13	56
802.11n (5 GHz)	Transmit	78	335

Feature	Description			
		Receive	95	70
		Standby	13	56
	Sleep	N/A	11	31

Note: Average current was measured with a Fluke 87V DMM. Standby current was measured with a Yokogawa DL9140 oscilloscope and 700937 current probe; the unit was connected to an AP. Tx current reflects constant transmit test mode. During testing, the WB45NBT was set to USB device mode.

Feature	Description
Operating Temperature	-20° to +70°C (-4°F to 158°F)
Operating Humidity	10 to 90% (non-condensing)
Storage Temperature	-30° to 85°C (-22° to 185°F)
Storage Humidity	10 to 90% (non-condensing)
Maximum Electrostatic Discharge	Maximum Contact Discharge (CD): 4 kV Maximum Air Discharge (AD): 8 kV
Length/Width/Thickness	40 mm (1.57 in.) x 40 mm (1.57 in.) x 3.8 mm (0.15 in.) **Note:** Length, width, and thickness measurements include the metal shielding.
Weight	6.8 g (0.24 oz.)
Mounting	Connector and through holes. Refer to **Mechanical Specifications** for additional information. Recommended: **Connector:** ▪ Mating part: Molex 55560 Series 80 Pin Connector P/N 55560-0807 ▪ Stand-off: EMI STOP F40M20-151126D4BM http://www.emistop.com
Wi-Fi Media	Direct Sequence-Spread Spectrum (DSSS) Complementary Code Keying (CCK) Orthogonal Frequency Divisional Multiplexing (OFDM)
Wi-Fi Media Access Protocol	Carrier sense multiple access with collision avoidance (CSMA/CA)
Network Architecture	Infrastructure and ad hoc
Wi-Fi Standards	IEEE 802.11a, 802.11b, 802.11d, 802.11e, 802.11g, 802.11h, 802.11i, 802.11n
Wi-Fi Data Rates Supported	802.11a (OFDM): 6, 9, 12, 18, 24, 36, 48, 54 Mbps 802.11b (DSSS, CCK): 1, 2, 5.5, 11 Mbps 802.11g (OFDM): 6, 9, 12, 18, 24, 36, 48, 54 Mbps 802.11n (OFDM, HT20, MCS 0-7): 6.5,13,19.5, 26, 39,52, 58.5, 72.2 Mbps 7.2,14.4, 21.7, 28.9,43.3, 57.8, 65 Mbps
Modulation	BPSK @ 1, 6, 6.5, 7.2 and 9 Mbps QPSK @ 2, 12, 13, 14.4,18, 19.5 and 21.7 Mbps CCK @ 5.5 and 11 Mbps 16-QAM @ 24, 26, 28.9, 36, 39 and 43.3 Mbps 64-QAM @ 48, 52, 54, 57.8, 58.5, 65, and 72.2 Mbps

Feature	Description
802.11n Spatial Streams	1X1 SISO (Single Input, Single Output)
Regulatory Domain Support	FCC EU MIC (Japan) KC (Korea)

2.4 GHz Frequency Bands	EU:	2.4 GHz to 2.483 GHz	MIC:	2.4 GHz to 2.495 GHz
	FCC:	2.4 GHz to 2.483 GHz	KC:	2.4 GHz to 2.483 GHz

2.4 GHz Operating Channels	EU:	13 (3 non-overlapping)	MIC:	14 (4 non-overlapping)
	FCC:	11 (3 non-overlapping)	KC:	13 (3 non-overlapping)

5 GHz Frequency Bands	**EU** 5.15 GHz to 5.35 GHz (Ch 36/40/44/48/52/56/60/64) 5.47 GHz to 5.725 GHz (Ch 100/104/108/112/116/120/124/128/132/136/140) **FCC** 5.15 GHz to 5.35 GHz (Ch 36/40/44/48/52/56/60/64) 5.47 GHz to 5.725 GHz (Ch 100/104/108/112/116/120/124/128/ 132/136/140) 5.725 GHz to 5.85 GHz (Ch 149/153/157/161/165) **MIC (Japan)** 5.15 GHz to 5.35 GHz (Ch 36/40/44/48/52/56/60/64) 5.47 GHz to 5.725 GHz (Ch 100/104/108/112/116/120/124/128/ 132/136/140) **KC** 5.15 GHz to 5.35 GHz (Ch 36/40/44/48/52/56/60/64) 5.47 GHz to 5.725 GHz (Ch 100/104/108/112/116/120/124) 5.725 GHz to 5.825 GHz (Ch 149/153/157/161)

5 GHz Operating Channels	EU:19 non-overlapping) FCC: 24 non-overlapping	MIC: 19 non-overlapping KC: 19 non-overlapping

Maximum Transmit Power
 	
Note: Maximum transmits power varies according to individual country regulations. All values nominal, +/-2 dBm.
 	
Note: Summit 45 series radios support a single spatial stream and 20 MHz channel bandwidth at 2.4GHz.
	802.11a
	  6 Mbps 15 dBm (31.623 mW)
	  54 Mbps 12 dBm (19.953 mW)
	802.11b
	  1 Mbps 16 dBm (39.81 mW)
	  11 Mbps 16 dBm (39.81mW)
	802.11g
	  6 Mbps 16 dBm (39.81 mW)
	  54 Mbps 12 dBm (25.12 mW)
	802.11n (2.4 GHz)
	  6.5 Mbps (MCS0) 16 dBm (39.81 mW)
	  65 Mbps (MCS7) 12 dBm (15.85 mW)
	802.11n (5 GHz HT20)
	  6.5 Mbps (MCS0) 15 dBm (31.62mW)
	  65 Mbps (MCS7) 12 dBm (15.85mW)
	Bluetooth
	  6 dBm (3.98 mW) (Class 1)

Feature	Description
Typical Receiver Sensitivity **Note:** All values nominal, +/-3 dBm. Variant by channels.	**802.11a:** 6 Mbps -90 dBm 54 Mbps -73 dBm (PER <= 10%) **802.11b:** 1 Mbps -89 dBm 11 Mbps -82 dBm (PER <= 8%) **802.11g:** 6 Mbps -85 dBm 54 Mbps -68 dBm (PER <= 10%) **802.11n (2.4 GHz)** MCS0 Mbps -86 dBm MCS7 Mbps -65 dBm **802.11n (5 GHz HT20)** MCS0 Mbps -90 dBm MCS7 Mbps -70 dBm **Bluetooth:** 1 Mbps -89 dBm 2 Mbps -91 dBm 3 Mbps -85 dBm
Security	**Standards** ▪ Wireless Equivalent Privacy (WEP) ▪ Wi-Fi Protected Access (WPA) ▪ IEEE 802.11i (WPA2) **Encryption** ▪ Wireless Equivalent Privacy (WEP, RC4 Algorithm) ▪ Temporal Key Integrity Protocol (TKIP, RC4 Algorithm) ▪ Advanced Encryption Standard (AES, Rijndael Algorithm) **Encryption Key Provisioning** ▪ Static (40-bit and 128-bit lengths) ▪ Pre-Shared (PSK) ▪ Dynamic **802.1X Extensible Authentication Protocol Types** ▪ EAP-FAST ▪ PEAP-MSCHAPv2 ▪ EAP-TLS ▪ PEAP-TLS ▪ EAP-TTLS ▪ LEAP ▪ PEAP-GTC

Feature	Description	
Regulatory Compliance	**EU**	
	EN 300 328	62311:2008
	EN 301 489-1	EN 50665:2017
	EN 301 489-17	EN 50385:2017
	EN 301 893	EU 2015/863 (RoHS 3)
	FCC	**ISED Canada**
	47 CFR FCC Part 15.247	ICES-003
	47 CFR FCC Part 15.407	ANSI C63.4:2014
	47 CFR FCC Part 2.1091	RSS-102
	FCC Part 15 Subpart B Class B	RSS-247
	AS/NZS	**MIC**
	AS/NZS 2772.2:2011	ARIB STD-T66 version 3.6 / RCR STD-33 version 5.4
	AS/NZS 4268:2017	Article 2 paragraph 1 item (19)/ item (19)-2
		ARIB STD-T71 version 6.0
		Article 2 paragraph 1 item (19)-3/ item (19)-3-2
	KC	**NCC**
	KC-2014-R-012	LP0002 Section 3.10.1 (2016-08-23)
		LP0002 Section 4.7 (2016-08-23)
	China	**Brazil**
Certifications	**Wi-Fi Alliance** 802.11a, 802.11b, 802.11g , 802.11n WPA Enterprise WPA2 Enterprise Cisco Compatible Extensions (Version 4)	
Warranty	One-year warranty	
	All specifications are subject to change without notice	

4.1   Absolute Maximum Ratings

Parameter	Comments	Conditions	Min.	Typ.	Max.	Unit
Input Voltage	3.3V VCC pin	With respect to ground	-0.3	-	3.8	V
	1.8V VCC pin		-0.3	-	2.0	V
	Any 3.3V IO pin		-0.3	-	3.8	V
	Any 1.8V IO pin		-0.3		2.0	V
RF input		Maximum RF input from the antenna port (reference to 50 ohm)			+10	dBm

Note: Voltage operated over the maximum limit may cause permanent damage to the device. These are stress ratings only; functional operation of the device at these or any other conditions beyond those indicated under Recommended Operating Conditions is not implied. Exposure to absolute-maximum-rated conditions for extended periods may affect device reliability.

https://www.lairdconnect.com/
© Copyright 2020 Laird Connectivity, Inc.
All Rights Reserved
10
Americas: +1-800-492-2320
Europe: +44-1628-858-940
Hong Kong: +852 2923 0610

4.2 Recommended Operating Conditions and DC Power Electrical Characteristics

Parameter	Comments	Conditions	Min.	Typ.	Max.	Unit
Supply Voltage	3.3 V/3.3 V_BU/3.3 V_ANA (+/-5%) 1.8 V VCC (-2% to +5%)		3.14 1.76	3.3 1.8	3.47 1.89	V
Voltage Ripple	3.3 V/3.3 V_BU 3.3 V_ANA/1.8 V		-	-	30	mV
Recommend voltage supply current rating	3.3 V_BU 3.3 V_ANA 3.3 V 1.8 V			- 	10 100 900 250	mA
DC Output Current	Analog IO pin	3.3 V signal level	-	-	8	mA
DC Output Current	Digital IO pin	1.8 V signal level	-	-	2	mA
Voltage Rise Time	At power on	3.3 V/3.3 VBU/1.8 V	-	-	5	ms
Operating Current	WLAN sub-system	Continuous receive	-	TBD		mA
		IEEE PSM	TBD	-	-	
		Continuous transmit (3.3 V/1.8 V)	-	330/85	400/100	
	Bluetooth sub-system	Continuous receive	-	TBD		mA
		Continuous transmit				
	CPU sub-system	Varies with system load	-	TBD		mA
Operating Temperature			-20	25	+70	°C

4.3 Power on Sequence
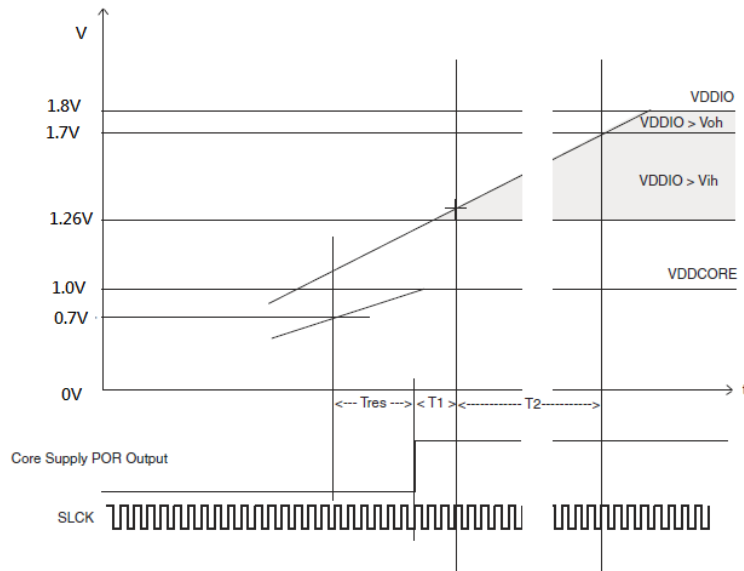
Notes: Apply the 3.3 V (backup and system) and 1.8 V (memory & interface I/O) at the same time.

The CPU implements the internal POR (Power-On-Reset) and guarantees that the power sources will reach their target values prior to the release of POR.

Tres=30 us, T1=66 us, T2=352 us (minimum)

Establish the VDDIO/CDDIOP (1.8 V for memory and interface I/O) and VCCBU (3.3 V) first, then VDDPLL (1.0 V from LDO), and the VDDCORE (1.0 V from DC-DC regulator) to ensure reliable device operation. This is implemented on the WB45NBT; apply 3.3 V (backup and system) and 1.8 V (memory and interface I/O) at the same time.

4.3.1 DC Electrical Characteristics (3.3 V signal level)

I/O Indicates whether the signal is input or output state.

PU/PD Indicates whether Pull-Up, Pull-Down, or nothing is enabled.

ST Indicates if Schmitt Trigger is enabled.

TR Tri-state

Parameter	Conditions	Min.	Typ.	Max.	Unit
AIO [0-3]			I/O;PU;ST		
IRQ (Interrupt Request)			I;PU;ST		
SHDN (Shut-down)			O;PU		
WKUP (Wake-up)			I;ST		
ETXEN;ETX[0-1];ERXER;ERX[0-1];EMDC;EMDIO;ECRSDV;EREF_CLK			**Note**: PU;ST		
VIL	Input Low-Level Voltage	-0.3	-	0.8	V
VIH	Input High-Level Voltage	2.0		3.6	V
VOL	Output Low-Level Voltage			0.4	V
VOH	Output High-Level Voltage	2.9			V

https://www.lairdconnect.com/ 12
© Copyright 2020 Laird Connectivity, Inc.
All Rights Reserved

Americas: +1-800-492-2320
Europe: +44-1628-858-940
Hong Kong: +852 2923 0610

Parameter	Conditions	Min.	Typ.	Max.	Unit
VT-	Schmitt trigger Negative-going threshold Voltage	0.8	1.1		V
VT+	Schmitt trigger Positive-going threshold Voltage		1.6	2.0	V
VHYS	Schmitt trigger Hysteresis	0.5		0.75	V
RPULLUP	Pull-up/Pull-down Resistance	40	75	190	KΩ
IO	Output Current			8	mA

4.3.2 DC Electrical Characteristics (1.8 V signal level)

I/O	Indicates whether the signal is input or output state.
PU/PD	Indicates whether Pull-Up, Pull-Down or nothing is enabled.
ST	Indicates if Schmitt Trigger is enabled.
TR	Tri-state

Parameter	Conditions	Min.	Typ.	Max.	Unit
GPIO [0-3] TWCK1 (Two-wire Serial Clock);TWD1 (Two-wire Serial Data) WOW WIFI_GPIO URTS0;UCTS0;URXD0;UTXD0;URTS3;UCTS3;URXD3;UTXD3 DTXD;DRXD PCM_CLK;PCM_SYNC;PCM_OUT;PCM_IN				I/O; PU;ST **Note**: PU;ST O I/O **Notes:** PU;ST PU;ST PD;TR	
VIL	Input Low-Level Voltage	-0.3	-	0.54	V
VIH	Input High-Level Voltage	1.26		2.1	V
VOL	Output Low-Level Voltage			0.4	V
VOH	Output High-Level Voltage	1.4			V
VT-	Schmitt trigger Negative-going threshold Voltage			0.54	V
VT+	Schmitt trigger Positive-going threshold Voltage	0.54			V
VHYS	Schmitt trigger Hysteresis	0.28		0.6	V
RPULLUP	Pull-up/Pull-down Resistance	240		1000	KΩ
IO	Output Current			2	mA

Note: We recommend that 1.8 V signal I/O pins should not be used to drive the external circuit directly due to its weak drive capability. A buffer/driver should be used in such applications.

5 PIN DEFINITIONS

Table 1: Pin Definitions

#	Pin Name	Section	I/O	Reference	Description	If unused
1	+3.3V_ANA		-	-	+3.3 V for analog I/O interface	3.3 V must be supplied
2	+3.3V_BU		-	-	+3.3 V for system back up	3.3 V must be supplied
3	GND		-	Ground	Ground	Must be connected to GND
4	GND		-	Ground	Ground	Must be connected to GND
5	AIO-1 *VBUS_EN	Analog I/O	I/O *O	+3.3 V_ANA	Analog I/O *USB interface in Host mode; used to control (High enable) the USB bus power (5 V).	
6	WKUP		I	+3.3 V_BU	Wake up the processor from deep sleep mode. Low active to wake up the CPU. Internal 100k pull-up	
7	SHDN		O	+3.3 V_BU	Shut down the external power supply for the module to save power consumption. Low active to shut down the power supply. Internal 100K pull-up	
8	AIO-0 *VBUS_SENS	Analog I/O	I/O *I	+3.3 V_ANA	Analog I/O *When USB interfaces in Device mode; It is used to sense the USB bus power (5 V). **Note:** A voltage divider is needed to implement. Please reference the BB45NBT design.	
9	AIO-3	Analog I/O	I/O	+3.3 V_ANA	Analog I/O	
10	AIO-2 *OVER_CURRENT	Analog I/O	I/O *I	+3.3 V_ANA	Analog I/O *When USB interfaces in Host mode; It is used to sense the USB bus power (5V) running over the current limit. **Note:** A voltage switch is needed to implement. Please reference the BB45NBT design.	
11	IRQ	Control	I	+3.3 V	External Interrupt Input	
12	GND		-	Ground	Ground	Must be connected to GND

#	Pin Name	Section	I/O	Reference	Description	If unused
13	GND		-	Ground	Ground	Must be connected to GND
14	EMDC	Ethernet	O	+3.3 V	Ethernet Management Data Clock	
15	ETXEN	Ethernet	O	+3.3 V	Ethernet Transmit Enable	
16	GND		-	Ground	Ground	Must be connected to GND
17	ETX0	Ethernet	O	+3.3 V	Ethernet Transmit Data 0	
18	ETX1	Ethernet	O	+3.3 V	Ethernet Transmit Data 1	
19	ERXER	Ethernet	I	+3.3 V	Ethernet Receive Error	
20	ERX0	Ethernet	I	+3.3 V	Ethernet Receive Data 0	
21	GND		-	Ground	Ground	Must be connected to GND
22	ERX1	Ethernet	I	+3.3 V	Ethernet Receive Data 1	
23	REF_CLK	Ethernet	I	+3.3 V	Ethernet 50MHz Clock	Leave open
24	ECRSDV	Ethernet	I	+3.3 V	Ethernet Receive Data Valid	
25	GND		-	Ground	Ground	Must be connected to GND
26	EMDIO	Ethernet	I/O	+3.3 V	Ethernet Management Data Input/Output	
27	TWD1		I/O	+1.8 V	Twist wire bus Data (I2C Data line)	
28	GND		-	Ground	Ground	Must be connected to GND
29	TWCK1		O	+1.8 V	Twist wire bus Clock (I2C Clock line)	
30	+1.8V		-	-	1.8 V for Memory (NAND/LPDDR), bus interface and Wi-Fi/BT bus configuration.	
31	GND		-	Ground	Ground	Must be connected to GND
32	GND		-	Ground	Ground	Must be connected to GND
33	GPIO-0	GPIO	I/O	+1.8 V	General I/O 0	Leave open
34	GPIO-1	GPIO	I/O	+1.8 V	General I/O 1	Leave open
35	GPIO-2	GPIO	I/O	+1.8 V	General I/O 2	Leave open
36	GPIO-3	GPIO	I/O	+1.8 V	General I/O 3	Leave open
37	GND		-	Ground	Ground	Must be connected to GND
38	GND		-	Ground	Ground	Must be connected to GND
39	URXD3	UART3	I	+1.8 V	UART3 Receive Data	Leave open

#	Pin Name	Section	I/O	Reference	Description	If unused
40	URTS3	UART3	O	+1.8 V	UART3 Ready To Send	Leave open
41	UTXD3	UART3	O	+1.8 V	UART3 Transmit Data	Leave open
42	UCTS3	UART3	I	+1.8 V	UART3 Clear To Send	Leave open
43	GND		-	Ground	Ground	Must be connected to GND
44	GND		-	Ground	Ground	Must be connected to GND
45	URXD0	UART0	I	+1.8 V	UART0 Receive Data	Leave open
46	URTS0	UART0	O	+1.8 V	UART0 Ready To Send	Leave open
47	UTXD0	UART0	O	+1.8 V	UART0 Transmit Data	Leave open
48	UCTS0	UART0	I	+1.8 V	UART0 Clear To Send	Leave open
49	GND		-	Ground	Ground	Must be connected to GND
50	GND		-	Ground	Ground	Must be connected to GND
51	SPI0_CSn1	SPI0	O	+1.8 V	SPI0 Chip Select. Active Low *Only for SPI in Master mode.	Leave open
52	SPI0_MISO	SPI0	I	+1.8 V	SPI0 Master In	Leave open
53	GND		-	Ground	Ground	Must be connected to GND
54	SPI0_MOSI	SPI0	O	+1.8 V	SPI0 Master Out	Leave open
55	SPI0_CLK	SPI0	O	+1.8 V	SPI0 Serial Clock (Master:O)	Leave open
56	SPI0_CSn0	SPI0	O	+1.8 V	SPI0 Chip Select. (Master:O) Active Low	Leave open
57	GND		-	Ground	Ground	Must be connected to GND
58	GND		-	Ground	Ground	Must be connected to GND
59	DRXD	DBGU	I	+1.8 V	Debug UART Receive Data	47K Pull-Up
60	+3.3V		-	-	3.3V for CPU,Wi-Fi and BT	3.3V must be supplied
61	DTXD	DBGU	O	+1.8V	Debug UART Transmit Data	Leave Open
62	+3.3V		-	-	3.3V for CPU,Wi-Fi and BT	3.3V must be supplied
63	GND		-	Ground	Ground	Must be connected to GND
64	GND		-	Ground	Ground	Must be connected to GND
65	HHSDPA	USB Device	I/O		USB (Host/Device) D+	
66	NRST	Control	I	+1.8V	CPU Reset; Low active.	Leave open
67	HHSDMA	USB Device	I/O		USB (Host/Device) D-	

#	Pin Name	Section	I/O	Reference	Description	If unused
68	WOW		O	+1.8V	Wake On Wireless LAN	
69	GND		-	Ground	Ground	Must be connected to GND
70	Wi-Fi GPIO		I/O	+1.8V	Reserved for Wi-Fi GPIO	Leave open
71	GND		-	Ground	Ground	Must be connected to GND
72	GND		-	Ground	Ground	Must be connected to GND
73	PCM_CLK		I O	+1.8V +1.8V	PCM CLK input when BT acts as Slave PCM CLK output when BT acts as Master	Leave open
74	PCM_IN		I	+1.8V	PCM signal input.	
75	GND		-	Ground	Ground	Must be connected to GND
76	GND		-	Ground	Ground	Must be connected to GND
77	PCM_SYNC		I/O	+1.8V	PCM signal sync	
78	PCM_OUT		O	+1.8V	PCM signal output	
79	GND		-	Ground	Ground	Must be connected to GND
80	GND		-	Ground	Ground	Must be connected to GND

6   MECHANICAL SPECIFICATION
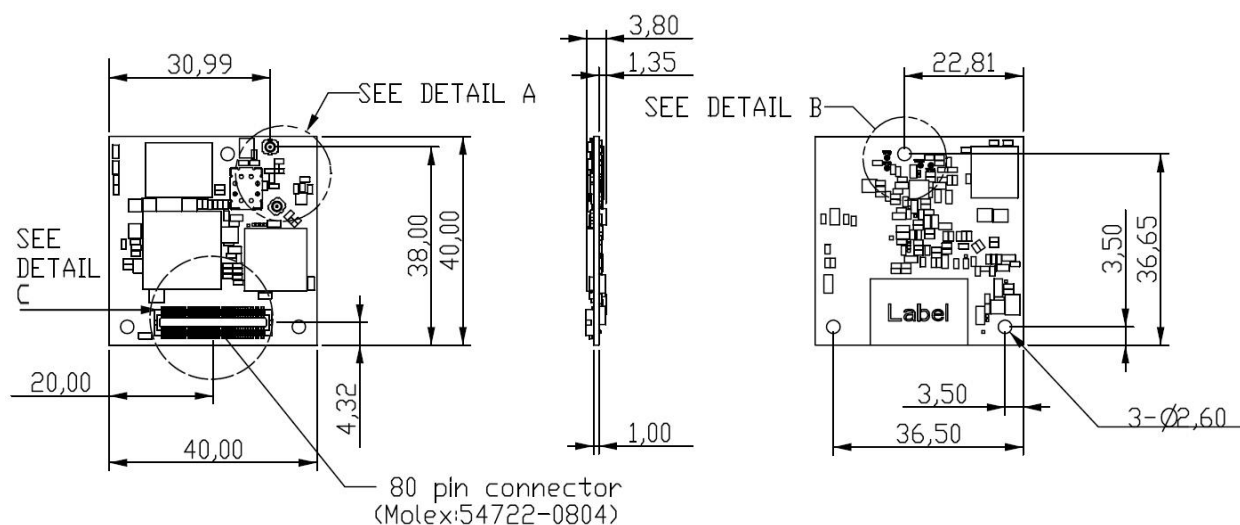
RF U.FL connector — Bluetooth Connector, Wi-Fi Connector
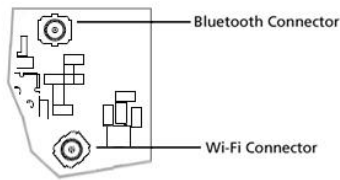
DETAIL A
SCALE 2,000

Test Pad

DETAIL B
SCALE 2,000

80 pin connector — pin 1, pin 79, pin 2, pin 80
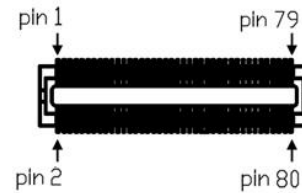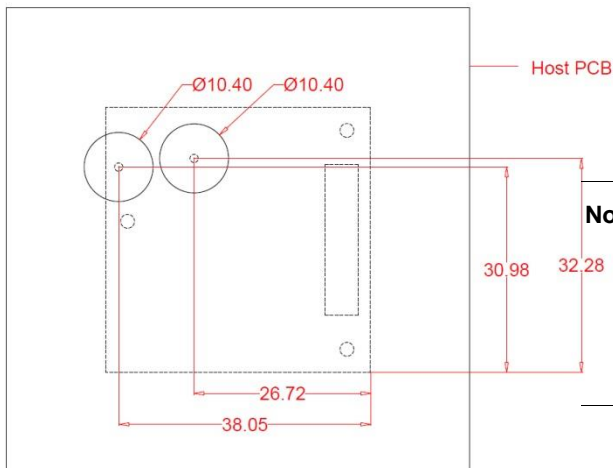
DETAIL C

The following diagram shows the recommended clearance holes in the host PCB for U.FL antenna connectors.

Host PCB

Ø10.40 Ø10.40

30.98   32.28

26.72
38.05

Note: Laird recommends that you mount the module off the edge of the board or cut out one corner and place the module in the corner to limit the cutout area. This is necessary to meet the low height requirement of the module.

Figure 1: Recommended clearance holes for antenna connectors

Figure 2: WB45NBT (Top)   *Figure 3: WB45NBT (Bottom)*

Note: The WB45NBT is shipped in trays with the connector facing up.

Americas: +1-800-492-2320
Europe: +44-1628-858-940
Hong Kong: +852 2923 0610

7 REGULATORY

Note: For complete regulatory information, refer to the WB45NBT Regulatory Information document which is also available from the WB45NBT product page.

The WB45NBT holds current certifications in the following countries:

Country/Region	Regulatory ID
USA (FCC)	SQG-WB45NBT
EU	N/A
Canada (ISED)	3147A-WB45NBT
Taiwan (NCC)	CCAF16LP1980T0
Japan (MIC)	201-140137
Korea (KC)	MSIP-CRM-LAI-WB45NBT
Australia	N/A
New Zealand	N/A
Brazil	05725-17-10188
China (SRRC)	2018AJ0489 (M)

8 ORDERING INFORMATION

Product Name	Description	Part Number
WB45NBT	802.11a/b/g/n - BT 4.0 Communications Subsystem	WH-WB45NBT
DVK-WB45NBT	Development Breakout board WB45NBT module included	DVK-WB45NBT

9   ADDITIONAL ASSISTANCE

Please contact your local sales representative or our support team for further assistance:

Laird Connectivity
Support Centre: https://www.lairdconnect.com/resources/support

Email: wireless.support@lairdconnectivity.com

Phone: Americas: +1-800-492-2320
Europe: +44-1628-858-940
Hong Kong: +852 2923 0610

Web: https://www.lairdconnect.com/products

Note: Information contained in this document is subject to change.

---

https://www.lairdconnect.com/   20

© Copyright 2020 Laird Connectivity, Inc.
All Rights Reserved

Americas: +1-800-492-2320
Europe: +44-1628-858-940
Hong Kong: +852 2923 0610