

**WiBear11n**  
**IEEE 802.11a/b/g/n WLAN, Bluetooth 3.0+EDR Module**  
**Data Sheet**

**Version 1.20**  
**October 2014**

## Introduction

The WiBear11n industrial universal module is targeted for integration into different OEM products. The module is designed for both simultaneous and independent operation of the following:

IEEE 802.11a/b/g/n payload data rates for Wireless Local Area Network (WLAN), Bluetooth 3.0+High Speed (HS) and Bluetooth 2.1+EDR.

It provides a complete end-to-end solution for low-power applications. It includes an integrated MAC/Baseband processor and RF front-end components and can connect to a host processor through an SDIO interface.

The WiBear11n modules are offered in four versions (see ordering information and block diagram).

Host drivers for common operating systems such as Linux and Windows 7 are available.

The modules are radio type approved for Europe (CE), US (FCC) and Industry Canada (IC) (pending).

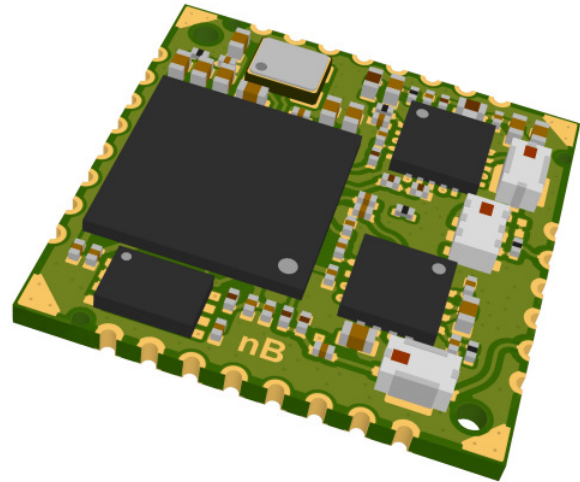


Figure 1: Physical outlook

## Applications

- WLAN and Bluetooth networks
- Audio/video devices and accessories
- Access to laptops, mobile phones etc.
- Automotive and industrial networking
- Home / building automation

## Key Features

- Standards: IEEE 802.11a/b/g/n/e/i/h/d/k/r/w
- WLAN 802.11a/b/g/n station and micro access point operation (up to 8 clients supported)
- Support of Wi-Fi direct mode
- 802.11n 1x1 SISO
- 802.11 PHY data rates up to 72 Mbps (20 MHz channel) and up to 150 Mbps (40 MHz channel)
- Hardware 64- and 128-bit encryption AES engine performance
- Embedded security supplicant
- WAPI encryption is supported by hardware
- Background scan mode
- Bluetooth 3.0 + HS (High Speed)
- Bluetooth 2.1 + EDR (backward compatibility)
- Wide temperature operation range -40°C to +85°C
- Compact 14.8mm x 14.8mm footprint, surface mounting
- SDIO high-speed interface
- Support for low-power modes
- CE/FCC/IC compliant
- RoHS compliant
- Automotive qualification tests (climatic, mechanical, and operating life tests) according to VW 80000 / ISO 16750-4 (report pending)

## Ordering Information

**Table 1:** Ordering information

Order Number	Model	Description
AN00J93170	WiBear11n-SF1	WiBear11n-SF1 Module
AN00J93174	WiBear11n-SF2	WiBear11n-SF2 Module
AN00J93172	WiBear11n-DF1	WiBear11n-DF1 Module
AN00J93176	WiBear11n-DF2	WiBear11n-DF2 Module
AN00J94359	WiBear11n-SF1	WiBear11n-SF1 Module, tape&reel package (500 pcs)
AN00J94361	WiBear11n-SF2	WiBear11n-SF2 Module, tape&reel package (500 pcs)
AN00J94360	WiBear11n-DF1	WiBear11n-DF1 Module, tape&reel package (500 pcs)
AN00J94362	WiBear11n-DF2	WiBear11n-DF2 Module, tape&reel package (500 pcs)
AN00J93704	WiBear11n-DF1_EK	Evaluation Kit with WiBear11n-DF1 Module
AN00J93705	WiBear11n-DF2_EK	Evaluation Kit with WiBear11n-DF2 Module

Note: Shielded modules available on special request.

**IMDS number:** 355902511

**Customs Tariff Numbers:**

HTC / TARIC: 85177090

ECCN number: 3A001

EORI no.: DE4665759

## Product Variants

**Table 2:** Product variants

Model	Description
WiBear11n-SF1	Single-band WLAN (IEEE 802.11 b/g/n, 2.4 GHz only) and Bluetooth module. Module has one joint antenna connector for WLAN and Bluetooth operation (see block diagram). WiBear11n-SF1/-DF1 is recommended for cost effective AP solution, AP without or rare Bluetooth traffic or cost effective station with one system antenna.
WiBear11n-SF2	Single-band WLAN (IEEE 802.11 b/g/n, 2.4 GHz only) and Bluetooth module. Module has separated antenna connectors for WLAN and Bluetooth operation (see block diagram). Overall performance (throughput) is maximized for AP mode with simultaneous Bluetooth traffic. Two system antennas are required (one for WLAN and one for Bluetooth) with 30 dB or better isolation between antennas (orthogonal oriented antennas with more than 50...60 mm. distance between). May be recommended for higher performance of AP.
WiBear11n-DF1	Dual-band WLAN (IEEE 802.11 a/b/g/n, 2.4 and 5 GHz) and Bluetooth module with one joint antenna connector for WLAN and Bluetooth. Similar to WiBear11n-SF1.
WiBear11n-DF2	Dual-band WLAN (IEEE 802.11 a/b/g/n, 2.4 and 5 GHz) and Bluetooth module which has separated antenna connectors for WLAN and Bluetooth. Similar to WiBear11n-SF2.

Note: For maximum throughput during simultaneous WLAN (AP) and Bluetooth operation, the Bluetooth Coexistence Arbiter (BCA) settings should be optimized by the host system software.

## Block Diagrams

### WiBear11n-SF1

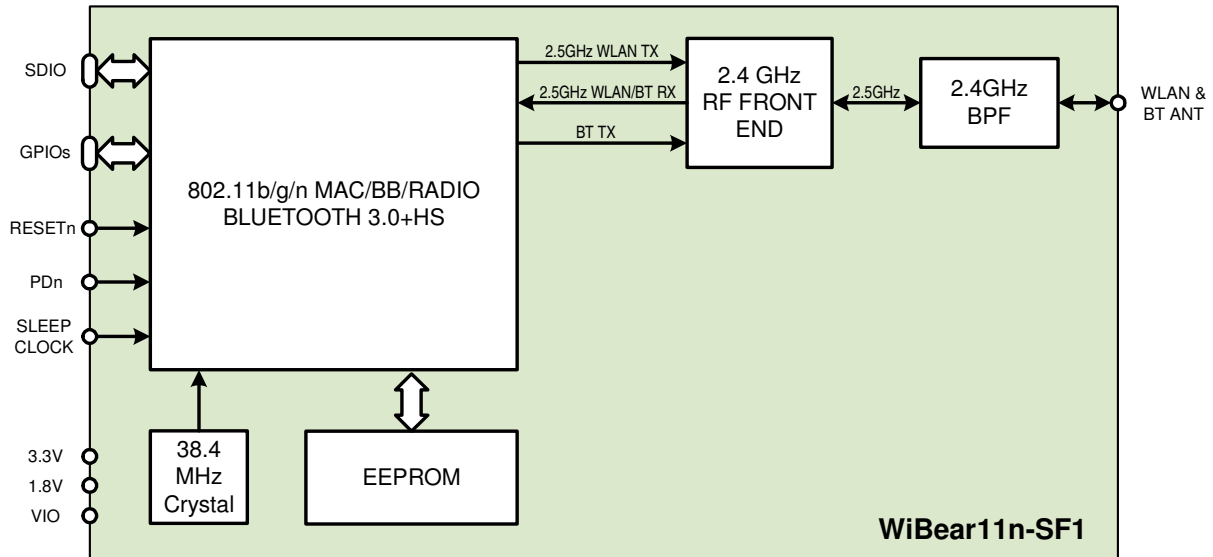


Figure 2: Block diagram of WiBear11n-SF1

### WiBear11n-SF2

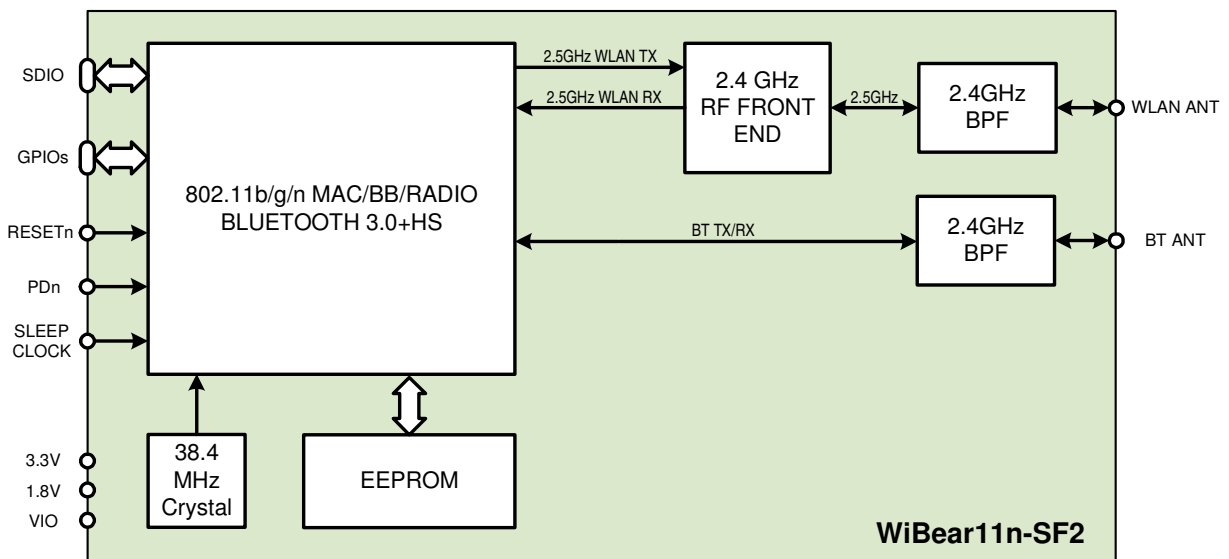
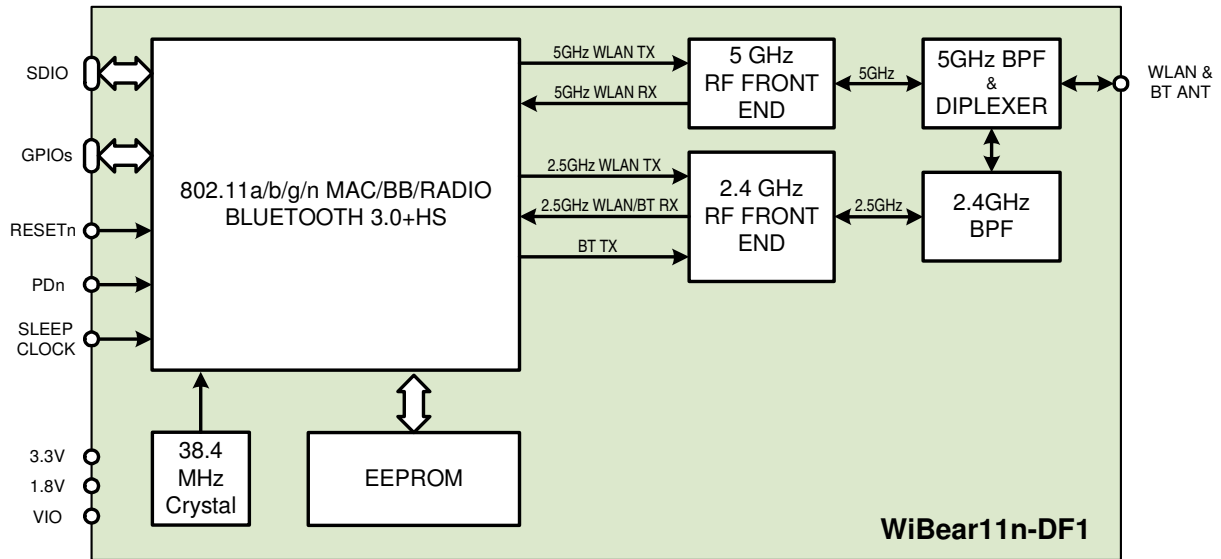


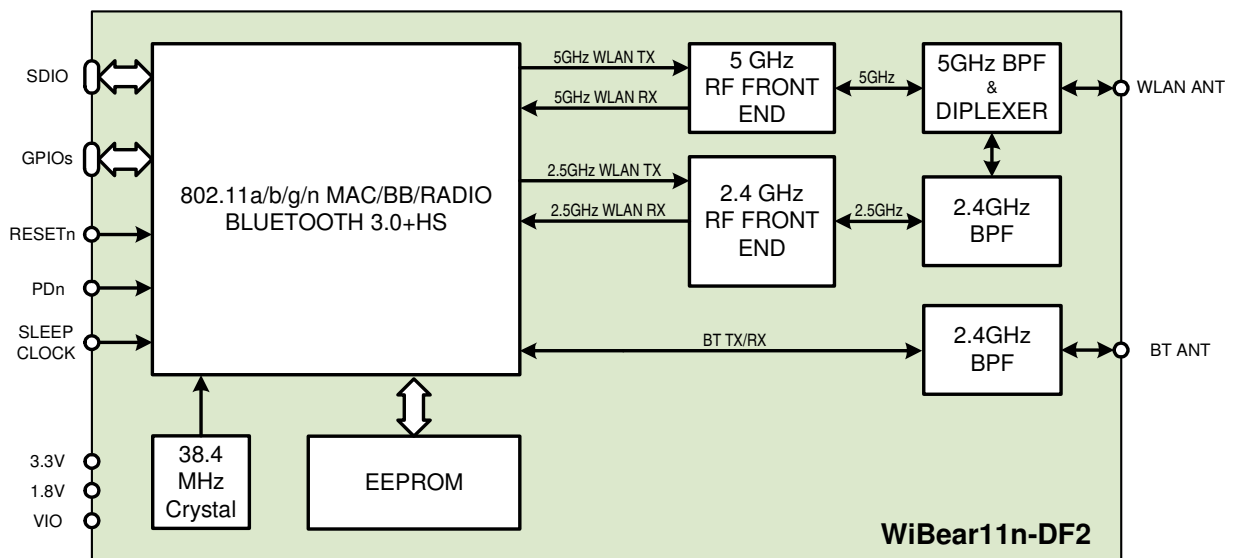
Figure 3: Block diagram of WiBear11n-SF2

**WiBear11n-DF1**



**Figure 4:** Block diagram of WiBear11n-DF1

**WiBear11n-DF2**



**Figure 5:** Block diagram of WiBear11n-DF2

## Pin Description

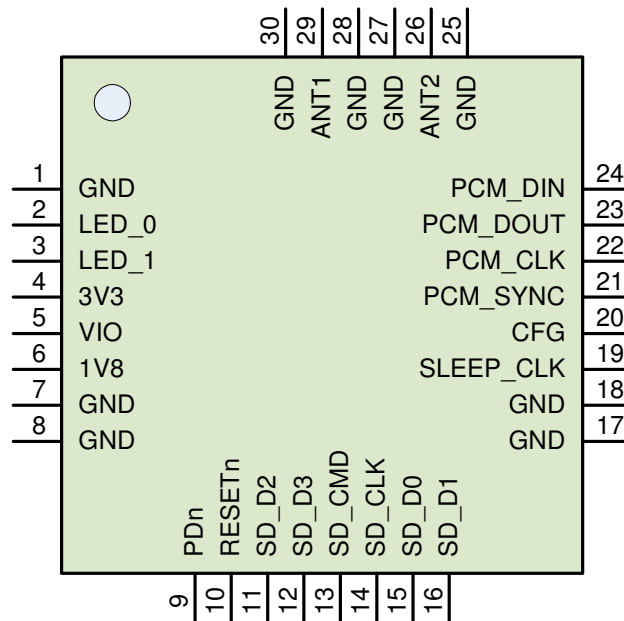


Figure 6: Module pinout

Table 3: Pin description

Pin No.	Pin Name	Pin Type	Description
1	GND	Ground	Ground
2	LED_0	I/O	LED output (GPIO_1 of Radio/Baseband processor), WLAN activity <sup>1</sup>
3	LED_1	I/O	LED output (GPIO_17 of Radio/Baseband processor), Bluetooth activity <sup>1</sup>
4	3V3	Power	3.3V Power supply (3.0V...3.6V)
5	VIO	Power	VIO Supply (1.8V or 3.3V)
6	1V8	Power	1.8V Supply (1.7V...1.9V)
7	GND	Ground	Ground
8	GND	Ground	Ground
9	PDn	I	Full power down (active low), has internal pull-up to VIO pin
10	RESETn	I	Reset (active low), has weak internal pull-up to VIO pin
11	SD_D2	I/O	SDIO Data line bit [2]
12	SD_D3	I/O	SDIO Data line bit [3]
13	SD_CMD	I/O	SDIO Command
14	SD_CLK	I	SDIO Clock input
15	SD_D0	I/O	SDIO Data line bit [0]
16	SD_D1	I/O	SDIO Data line bit [1]
17	GND	Ground	Ground
18	GND	Ground	Ground
19	SLEEP_CLK	I	Clock input for external sleep clock source (32.768kHz) <sup>2</sup>
20	CFG	I/O	Configuration pin <sup>3</sup>
21	PCM_SYNC	I/O	GPIO_14 of Radio/Baseband processor, output if master, input if slave
22	PCM_CLK	I/O	GPIO_13 of Radio/Baseband processor, output if master, input if slave
23	PCM_DOUT	O	GPIO_12 of Radio/Baseband processor, output
24	PCM_DIN	I	GPIO_11 of Radio/Baseband processor, input
25	GND	Ground	Ground

26	ANT2	I/O, RF	Bluetooth antenna for WiBear11n-SF2/-DF2 module, at WiBear-SF1/-DF1 not connected
27	GND	Ground	Ground
28	GND	Ground	Ground
29	ANT1	I/O, RF	WLAN + Bluetooth antenna for WiBear11n-SF1/-DF1 module, WLAN only antenna for WiBear11n-SF2/-DF2 module
30	GND	Ground	Ground

NOTES: <sup>1</sup> Possible to use as a LED output depend on firmware (driver) version. Regardless of the I/O supply (1.8V or 3.3V), the supply to the actual board LED always need to use 3.3V on the other end of the LED and works as open drain circuitry in that case. LED current limiting resistor should be used. Maximum sink to the ground current - 10 mA.

<sup>2</sup> Should be provided from external source in case of power save operation modes necessity. Not required for full power mode and for automotive use (firmware & driver version 14.44). Mandatory for all other releases with sleep mode support. Sleep clock signal requirements: frequency 32.768kHz  $\pm$ 250ppm, low level from 0 to 0.25V, high level from 0.8 to 2.0V, duty cycle 20-80%, slew rate less than 100nS (10-90%).

<sup>3</sup> Leave it unconnected when 32.768KHz Sleep Clock provided, pull down by 47K resistor for Sleep Clock less operation.

## Electrical Specifications

### Absolute Maximum Ratings

**Table 4:** Absolute maximum ratings

Name	Parameter	Min	Max	Units
3V3	Power supply voltage 3.3V	-0.3	3.6	V
1V8	Power supply voltage 1.8V	-0.3	2.0	V
VIO	I/O supply voltage 1.8V/2.6/3.3V	-0.3	3.6	V
T <sub>STORAGE</sub>	Storage temperature	-40	+85	°C

### Operating Conditions

**Table 5:** Operating conditions

Name	Parameter	Min	Typ	Max	Units
3V3	Power supply voltage 3.3V	3.1	3.3	3.6	V
1V8	Power supply voltage 1.8V	1.74	1.8	1.89	V
VIO	I/O supply voltage 1.8V/3.3V	1.62	1.8	1.98	V
		3.0	3.3	3.6	V
T <sub>A</sub>	Ambient operating temperature	-40	-	+85	°C
Ripple Noise	Peak-to-peak voltage ripple on 3V3 and 1V8 supply lines.	-	-	10	mV

### Digital Pad Ratings

**Table 6:** Digital pad ratings

Name	Parameter	Mode <sup>1</sup>	Min	Max	Units
V <sub>IH</sub>	Input high voltage	1.8V	0.8*1V8	1V8+0.3	V
		3.3V	0.7*3V3	3V3+0.3	V
V <sub>IL</sub>	Input low voltage	1.8V	-0.3	0.3*1V8	V
		3.3V	-0.3	0.3*3V3	V
V <sub>HYS</sub>	Input hysteresis	1.8V	150	-	mV
		3.3V	200	-	mV
V <sub>OH</sub>	Output high voltage	1.8V	1V8-0.4	-	V
		3.3V	3V3-0.4	-	V
V <sub>OL</sub>	Output low voltage	1.8V	-	0.4	V
		3.3V	-	0.4	V

Note: <sup>1</sup>IO voltage, see table above for possible IO voltage range.

### Current Consumption

**Table 7:** Current consumption

Operation mode			Current, mA <sup>1</sup>		
			1.8V	VIO <sup>2</sup>	3.3V
RX	2.4GHz		145	10	0.1
	5GHz		150	10	14
TX	2.4GHz	+18dBm	140	10	200
		+15dBm	140	10	170
		+12dBm	140	10	145
		+6dBm	140	10	120
	5GHz	+15dBm	150	10	200
		+12dBm	150	10	170
+6dBm		150	10	150	

Notes: <sup>1</sup> Peak values shown, average current for full operation mode (not a power save mode) strongly depend on RX/TX time ratio and remain in range between peak values of RX and TX.

<sup>2</sup> VIO current shown for 3.3V I/O voltage.



## Radio Specifications

### WLAN

Module supports dual-band 802.11b/g/n and 802.11a/n operation in both 2.4 GHz and 5 GHz radio bands, respectively. Therefore the module is designed to operate in only one frequency band at time.

**Table 8:** WLAN radio specifications

Parameter		Operation mode		Specification					
RF Frequency Range		802.11b/g/n		2.400 – 2.500 GHz					
		802.11a/n		4.900 – 5.825 GHz					
Modulation		802.11b		CCK and DSSS					
		802.11a/g/n		OFDM					
Supported Data Rates		802.11b		1, 2, 5.5, 11 Mbps					
		802.11a/g		6, 9, 12, 18, 24, 36, 48, 54 Mbps					
		802.11n		MCS0 - MCS7					
Supported Bandwidth		802.11n		20, 40 MHz					
Supported Guard Interval		802.11n		400, 800 mS					
Maximum Transmit Power		802.11b		18 dBm ± 1 dB					
		802.11a/g/n		15 dBm ± 1 dB					
Receiver Sensitivity		2.4 GHz		802.11b		1 Mbps	-96 dBm ± 1 dB		
				11 Mbps		-87 dBm ± 1 dB			
				802.11g		6 Mbps	-89 dBm ± 1 dB		
						54 Mbps	-71 dBm ± 1 dB		
		802.11n		20 MHz		MCS0	-88 dBm ± 1 dB		
						MCS7	-69 dBm ± 1 dB		
				40 MHz		MCS0	-85 dBm ± 1 dB		
						MCS7	-66 dBm ± 1 dB		
		5 GHz		802.11a		6 Mbps	-92 dBm ± 1 dB		
						54 Mbps	-75 dBm ± 1 dB		
				802.11n		20 MHz		MCS0	-91 dBm ± 1 dB
								MCS7	-72 dBm ± 1 dB
40 MHz						MCS0	-89 dBm ± 1 dB		
						MCS7	-69 dBm ± 1 dB		

**Table 9:** 2.4 GHz Band Supported Channels, 20MHz bandwidth

Channel	Frequency, GHz	Channel	Frequency, GHz	Channel	Frequency, GHz
1	2.412	6	2.437	11	2.462
2	2.417	7	2.442	12	2.467
3	2.422	8	2.447	13	2.472
4	2.427	9	2.452	14 <sup>1</sup>	2.484
5	2.432	10	2.457		

Note: <sup>1</sup>Channel 14 supported at 802.11b mode only

**Table 10:** 2.4 GHz Band Supported Channels, 40MHz bandwidth

Channel	Frequency, GHz	Channel	Frequency, GHz	Channel	Frequency, GHz	
1	5	2.422	4	8	2.437	
2	6	2.427	5	9	2.442	
3	7	2.432	6	10	2.447	
				7	11	2.452

**Table 11:** 5 GHz Band Supported Channels, 20MHz bandwidth

Channel	Frequency, GHz	Channel	Frequency, GHz	Channel	Frequency, GHz
36	5.180	100	5.500	132	5.660
40	5.200	104	5.520	136	5.680
44	5.220	108	5.540	140	5.700
48	5.240	112	5.560	149	5.745
52	5.260	116	5.580	153	5.765
56	5.280	120	5.600	157	5.785
60	5.300	124	5.620	161	5.805
64	5.320	128	5.640	165	5.825

**Table 12:** 5 GHz Band Supported Channels, 40MHz bandwidth

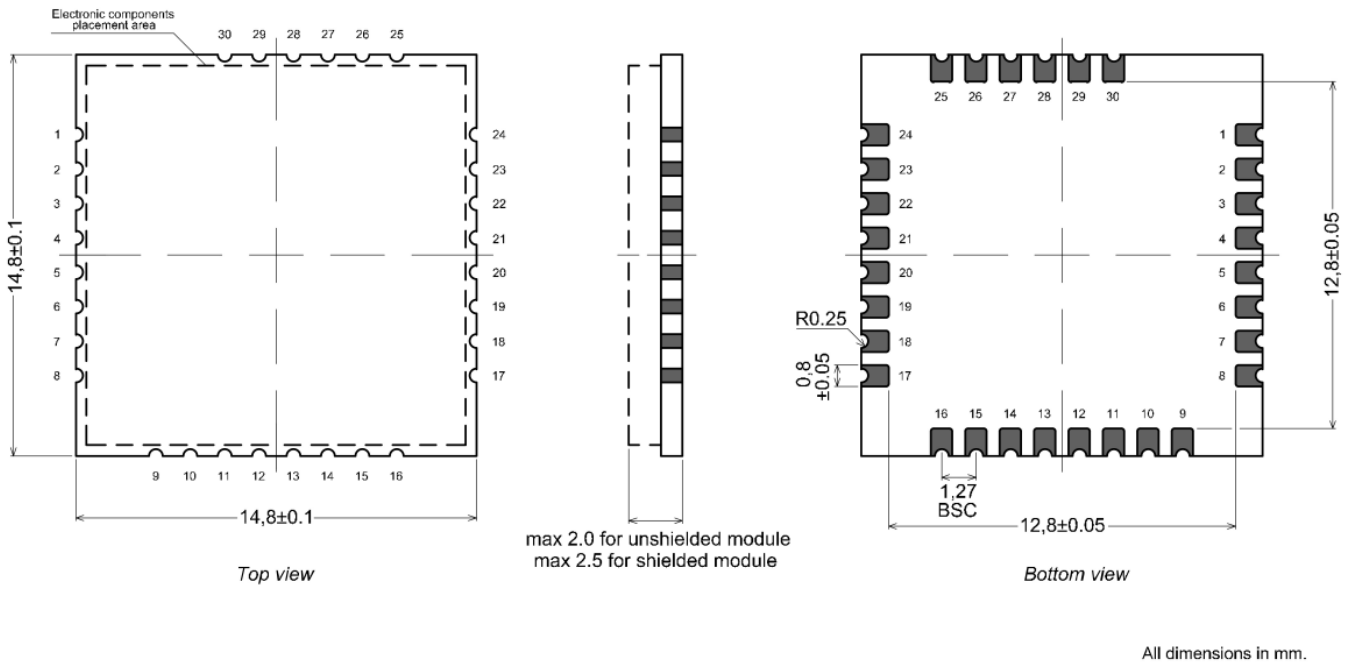
Channel	Frequency, GHz	Channel	Frequency, GHz	Channel	Frequency, GHz	
36	40	5.190	100	104	5.510	
44	48	5.230	108	112	5.550	
52	56	5.270	116	120	5.590	
60	64	5.310	124	128	5.630	
				132	136	5.670
				149	153	5.755
				157	161	5.795

## Bluetooth

**Table 13:** Bluetooth Radio specifications

Parameter	Specification
RF Frequency Range	2.400 – 2.4835 GHz
Supported Modes	BT 2.1 EDR, BT3.0 HS
Number of channels	79
Modulation	1 Mbps: GFSK (BDR) 2 Mbps: $\pi/4$ DQPSK (EDR) 3 Mbps: 8DQPSK (EDR)
Transmit Power	+8 dBm $\pm$ 1.5 dB
Receiver Sensitivity	BDR: -90 dBm $\pm$ 1.5 dB EDR: -87 dBm $\pm$ 1.5 dB

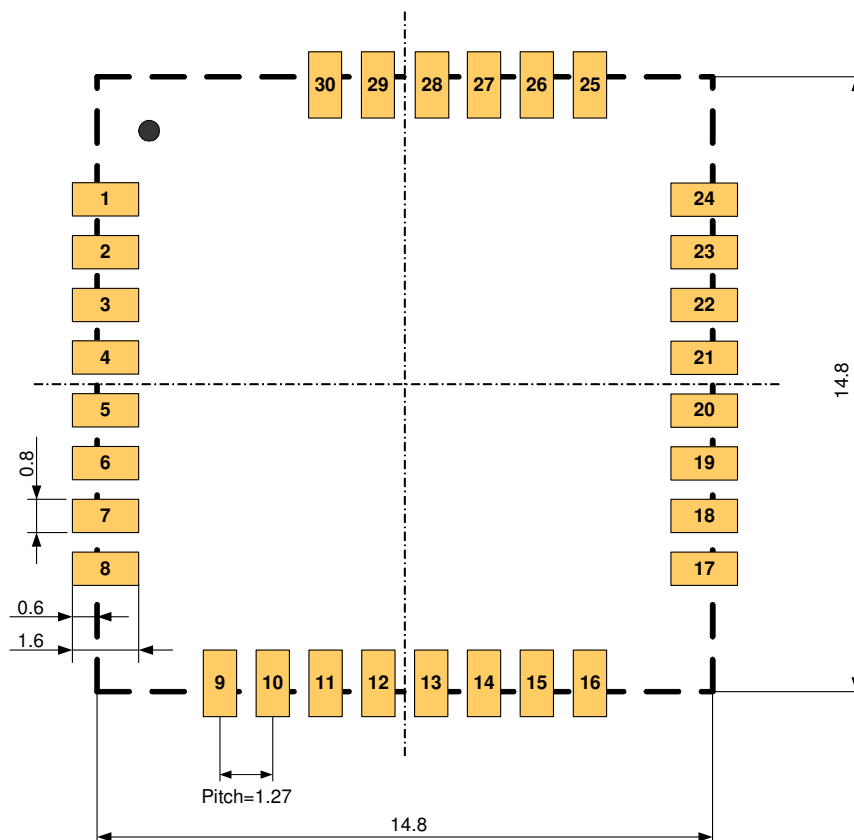
## Physical Dimensions



**Figure 7:** Physical dimensions

**Note:** The tolerances  $\pm 0.1$  mm may be exceeded in the corners of the PCB due to the cutting process. In worst case, the outer dimensions could reach **15.1 mm**.

## Recommended Footprint



**Figure 8:** Recommended footprint

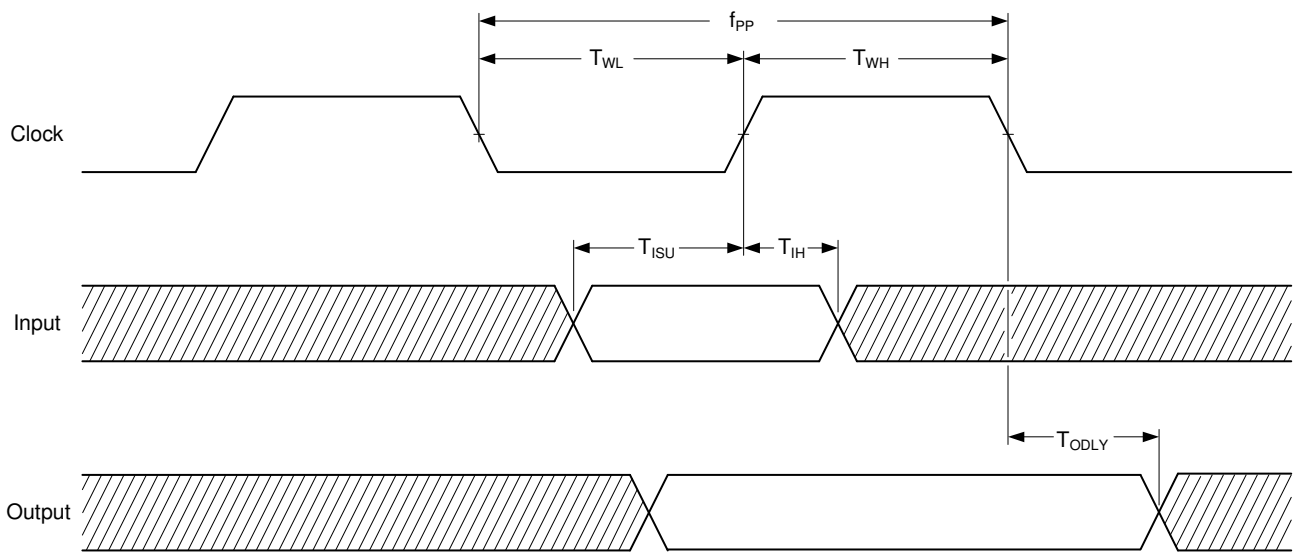
## Host Interfaces

### SDIO Interface

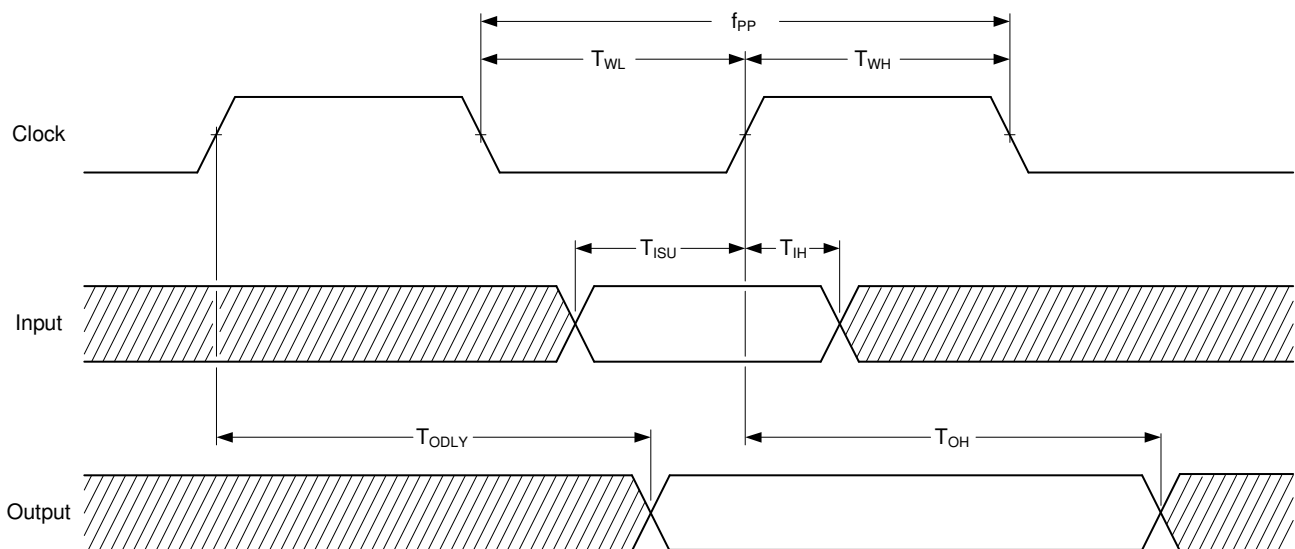
WiBear11n module supports a SDIO device interface that conforms to the industry standard SDIO Full-Speed specification and allows a host controller using the SDIO bus protocol to access the WLAN and Bluetooth functions. The module also supports High Speed mode as defined in the SDIO 1.2 specification.

The module's SDIO host interface pins are powered from the VIO voltage supply.

A module acts as the device on the SDIO bus. The SDIO interface supports SDIO modes at the full clock range of 0 to 50 MHz which allows a maximum throughput of 200Mbps.



**Figure 9:** SDIO Protocol Timing Diagram



**Figure 10:** SDIO Protocol Timing Diagram at High Speed Mode

**Table 14:** SDIO Host Interface Timing Data

Symbol	Parameter	Condition	Min	Typ	Max	Units
f <sub>PP</sub>	Clock Frequency	Normal	0	-	25	MHz
		High Speed	0	-	50	MHz
T <sub>WL</sub>	Clock Low Time	Normal	10	-	-	ns
		High Speed	7	-	-	ns
T <sub>WH</sub>	Clock High Time	Normal	10	-	-	ns
		High Speed	7	-	-	ns
T <sub>ISU</sub>	Input Setup Time	Normal	5	-	-	ns
		High Speed	6	-	-	ns
T <sub>IH</sub>	Input Hold Time	Normal	5	-	-	ns
		High Speed	2	-	-	ns
T <sub>ODLY</sub>	Output Delay Time	Normal	-	-	14	ns
		High Speed	-	-	14	ns
T <sub>OH</sub>	Output Hold Time	High Speed	2.5	-	-	ns

## Reference Design

### Overview

Reference design shows how to connect a WiBear11n module to the host controller. WLAN and Bluetooth (BT3.0 HS + EDR) may be connected to the host simultaneously over the SDIO bus. The layout is equipped with the possibility to either use an onboard antenna or an external antenna connected via coaxial connector by means of setting of jumper R7 or R8. Host interface voltage can also be changed by jumper J6. The ready-made reference design is available as WiBear11n Evaluation Kit from Lesswire AG.

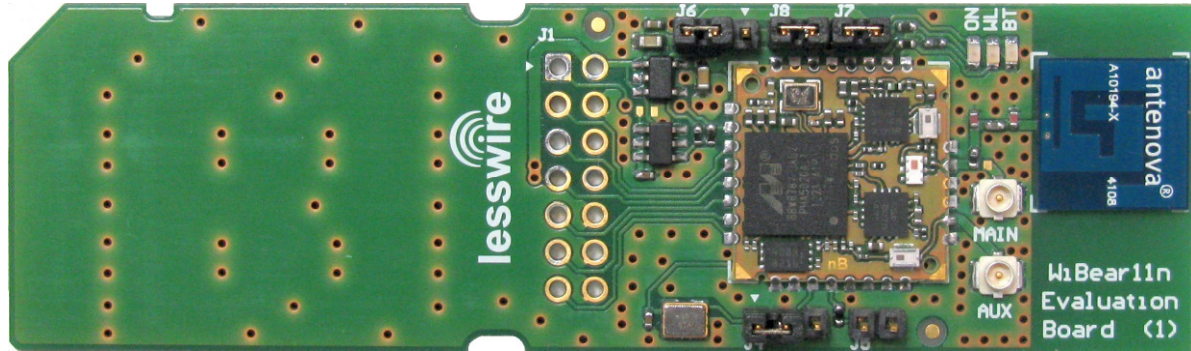


Figure 11: Evaluation Kit outlook

### Schematic Diagram

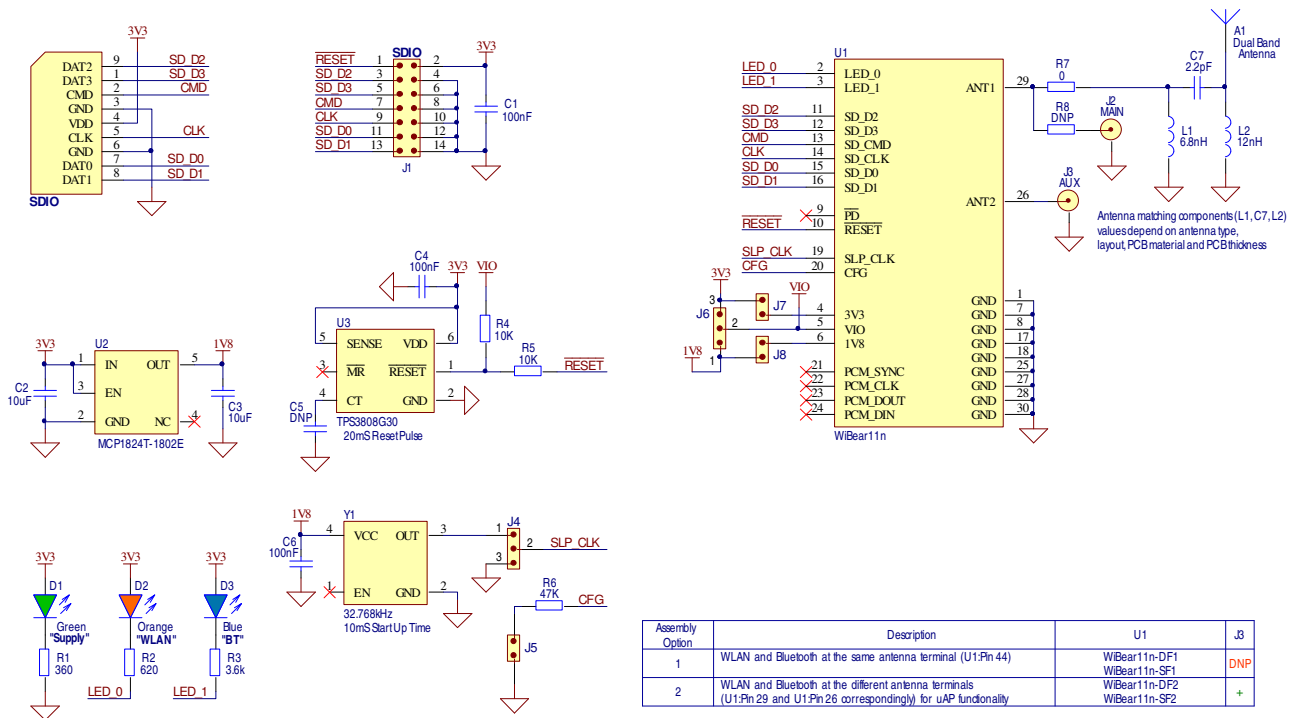


Figure 12: Evaluation kit schematic diagram

## Assembly diagram

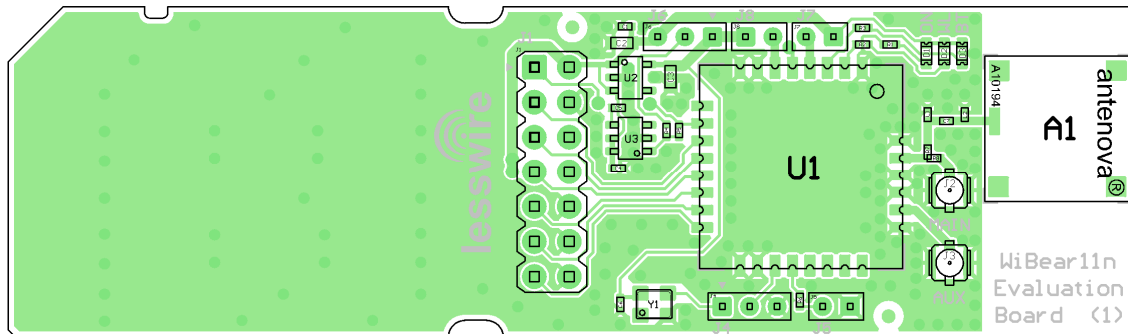


Figure 13: Evaluation kit assembly diagram

## Bill of Materials

Table 15: Bill of materials

Qty	Designator	Part Description	Manufacturer Part Number
1	A1	Antenna CHIP 2.45 & 5 GHz, 10.4x10.4x0.8mm	Antennova: A10194
3	C1, C4, C6	CAP, CER, 100nF, 10%, X7R, 16V, SMD 0402	Generic Components
2	C2, C3	CAP, CER, 10uF, 20%, X5R, 6.3V, SMD 0603	Generic Components
1	C5	DNP	Generic Components
1	C7	CAP, CER, 2.2pF, +/-0.25pF, C0G, 50V, SMD 0402	Generic Components
1	D1	LED, Green, SMD 0603	Avago: HSMG-C190
1	D2	LED, Orange, SMD 0603	Avago: HSMD-C190
1	D3	LED, Blue, SMD 0603	Avago: HSMR-C190
1	J1	Pin Header, Double Row, 2.54mm pitch, Straight, 2x7 Way, Through Hole	Generic Components
2	J2, J3	Coaxial Connector, 0 - 6GHz, SMD	Hirose: U.FL-R-SMT
2	J4, J6	Pin Header, Pitch 2.0mm, 1x3 Way, Through Hole	Samtec: TMM-103-01-G-S
3	J5, J7, J8	Pin Header, Pitch 2.0mm, 1x2 Way, Through Hole	Samtec: TMM-102-01-G-S
1	L1	IND, Multilayer Ceramic, 6.8nH, +/-5%, 300mA, SMD 0402	Generic Components
1	L2	IND, Multilayer Ceramic, 12nH, +/-5%, 300mA, SMD 0402	Generic Components
1	PCB	PCB, Dual side, 82x24x1.5mm, Rev.1A	Lesswire AG: WiBear11n_EK_R1
1	R1	RES, 360 Ohm, 5%, 1/16W, SMD 0402	Generic Components
1	R2	RES, 620 Ohm, 5%, 1/16W, SMD 0402	Generic Components
1	R3	RES, 3.6k, 5%, 1/16W, SMD 0402	Generic Components
2	R4, R5	RES, 10k, 5%, 1/16W, SMD 0402	Generic Components
1	R6	RES, 47K, 5%, 1/16W, SMD 0402	Generic Components
2	R7, R8	RES, 0 Ohm, 1/16W, SMD 0402	Generic Components
1	U1	WLAN 802.11a/b/g/n and Bluetooth Module, 14.8x14.8x2.5mm	Lesswire AG: WiBear11n
1	U2	CMOS LDO Voltage Regulator 1.8V 300mA, SOT23-5	Microchip: MCP1824T-1802E/OT
1	U3	Voltage supervisor, programmable reset time, threshold voltage 2.79V, SOT23-6	Texas Instruments: TPS3808G30
1	Y1	Quartz Oscillator, 32.768kHz, 1.8V, +/-50ppm, -40...+85C, SMD 3.2x2.5x1.0mm	Pericom: KK3270049

## Mounting process

The WiBear11n is a surface mount module supplied on a 6-layer FR4-type PCB with gold plated connection pads and produced in a lead-free process with a lead-free soldering paste. The warpage of the PCB is max. 0,75% according to IPC-A-610E. The thickness of solder resist on the host PCB top side and the WiBear11n bottom side must be considered for the soldering process.

Modules rated at moisture sensitivity level 3. See moisture sensitive warning label on each shipping bag for detailed information. After opening the dry pack, modules must be mounted within 168 hours in factory conditions of maximum 30°C/60%RH or must be stored at less than 10%RH. Modules require baking if the humidity indicator card shows more than 10% when read at 23±5°C or if the conditions mentioned above are not met. Please refer to J-STD-033B standard for bake procedure.

Module is compatible with industrial reflow profile for RoHS/Pb-free solders, Sn96.5/Ag3.0/Cu0.5 solder is a right choice. Use of "No Clean" soldering paste is strongly recommended, cleaning the populated modules is strongly discouraged - residuals under the module cannot be easily removed with any cleaning process. Cleaning with water can lead to capillary effects where water is absorbed into the gap between the host board and module. The combination of soldering flux residuals and encapsulated water could lead to short circuits between neighboring pads.

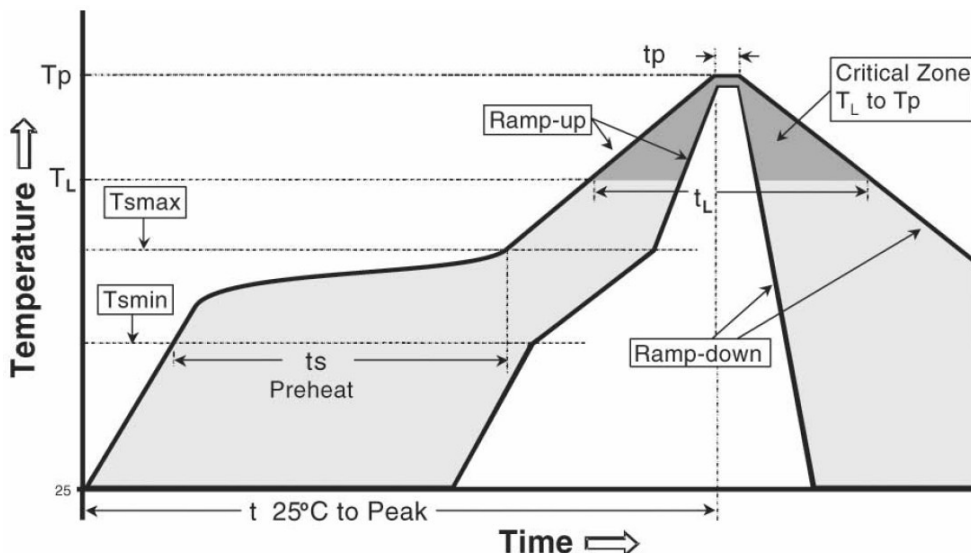
Only a single reflow soldering process is permitted for host boards with WiBear11n modules.

The reflow profile used is dependent on the thermal mass of the entire populated PCB, heat transfer efficiency of the oven and particular type of solder paste used. Since the profile used is process and layout dependent, the optimum profile should be studied case by case. Recommendations below should be taken as a starting point guide. In case of basic information necessity please refer to J-STD-020C standard.

**Table 16:** Recommended reflow profile

Profile feature	Sn-Pb eutectic (Sn63/Pb37)	RoHS/Pb-free (Sn96.5/Ag3.0/Cu0.5)
Ramp up rate ( $T_{SMAX}$ to $T_P$ )	3°C/sec max	3°C/sec max
Minimum soak temperature ( $T_{SMIN}$ )	100°C	150°C
Maximum soak temperature ( $T_{SMAX}$ )	150°C	200°C
Soak time ( $t_s$ )	60 - 120 sec	60 - 180 sec
Liquidus temperature ( $T_L$ )	183°C	217°C
Time above $T_L$ ( $t_L$ )	60 - 150 sec	60 - 150 sec
Peak temperature ( $T_P$ )	215 - 225°C	235 - 245°C
Time within +0 / -5°C of actual $T_P$ ( $t_p$ )	10 - 30 sec	20 - 40 sec
Ramp down rate	6°C/sec max	6°C/sec max
Time from 25°C to $T_P$	6 min max	8 min max

Note: lowest value of  $T_P$  and slower ramp down rate (2 - 3°C/sec) is preferred.



**Figure 14:** Reflow profile



## Installation and Regulatory Information

### General

The purpose of this guide is to explain how to integrate the WiBear11n module into the end product. The module has to be installed and used in accordance with the technical instructions provided by the manufacturer. The module may only be implemented in the configuration that was authorized. Note that any modifications of this equipment not expressly approved by the manufacturer could void the user's authority to operate the equipment.

### European Union Regulatory Compliance

The WiBear11n module has been tested and complies with the regulatory standards EN 300 328 and EN 301 489-1/-17. We declare that the human exposure of this module is below the SAR limits specified in the EU recommendations 1999/519/EC.

**IMPORTANT:** The 'CE' marking must be affixed to a visible location on the OEM product, where this module is installed in, and has to be labeled in accordance to R&TTE Directive 1999/5/EC.

### FCC Compliance

This device complies with Part 15 of the FCC Rules<sup>1</sup>. 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.

Not authorized modification could void authority to use this equipment.

The internal / external antenna(s) used for this module must provide a separation distance of at least 20 cm from all persons and must not be co-located or operating in conjunction with any other antenna or transmitter.

**NOTE:** The outside of final product that contain a WiBear11n module must display in a user accessible area a label referring to the enclosed module. This exterior label can use wording such as the following: "Contains Transmitter Module FCC ID: PV7-WIBEAR11N-SF1"<sup>2</sup> or "Contains FCC ID: PV7-WIBEAR11N-SF1".

**IMPORTANT:** The approval type for the WiBear11n variants is a *limited* modular approval due to the absence of a shielding. This requires any manufacturer of original equipment containing the WiBear11n module to ask for an approval of their design by the manufacturer of the WiBear11n module.

### IC Compliance

This device complies with Industry Canada RSS-210 (Rev. 8). 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.*

The installer of this radio equipment must ensure that the antenna is located or pointed such that it does not emit RF field in excess of Health Canada limits for the general population; consult Safety Code 6, obtainable from Health Canada.

Not authorized modification could void authority to use this equipment.

<sup>1</sup> Limited modular approval has been applied for the module variant WiBear11n-SF1, the certification process for the other module variants is ongoing.

<sup>2</sup> FCC and IC IDs for the WiBear11n module variants are shown in Table 19. Select the applicable ID.

The internal / external antenna(s) used for this module must provide a separation distance of at least 20 cm from all persons and must not be co-located or operating in conjunction with any other antenna or transmitter.

NOTE: The outside of final product that contain a WiBear11n module must display in a user accessible area a label referring to the enclosed module. This exterior label can use wording such as the following: “Contains Transmitter Module IC ID: 7738A-WB11NSF1”<sup>2</sup> or “Contains IC ID: 7738A-WB11NSF1”.

IMPORTANT: The approval type for the WiBear11n variants is a *limited* modular approval due to the absence of a shielding. Due to Industry Canada Modular Approval Requirements (Source: RSS-Gen / Issue 3 / Dec. 2010) any application which includes the WiBear11n module must be approved by the module manufacturer (lesswire AG). The application manufacturer must provide design data for the review procedure.

### Approved Antennas List

For Bluetooth and WLAN operation in the 2.4 GHz band, the module has been tested and approved for use with the antenna listed in the table below.

**Table 17:** Approved antennas list, single-band operation

Model Name	Manufacturer and description	Gain [dBi] (peak)
2450AT45A100	Johanson Technology, chip antenna, 2400 – 2500 MHz	3.0
ANT-2.4-CW-RH	Linx, monopole antenna, 2390 – 2490 MHz	-0.9
ANT-2.4-CW-RCT-RP	Linx, dipole antenna, 2390 – 2510 MHz	2.2
GW26.0151	Taoglas, monopole antenna, 2400 – 2500 MHz	1.8

For Bluetooth, WLAN operation in the 2.4 GHz band, and WLAN operation in the 5 GHz band, the module has been tested and approved for use with the antenna listed in the table below.

**Table 18:** Approved antennas list, dual-band operation

Model Name	Manufacturer and description	Gain [dBi] (peak)
A10194	Antenova, dual-band SMD antenna, 2.4 – 2.5 GHz and 4.9 – 5.9 GHz	1.8 @ 2.4 GHz band 4.1 @ 5 GHz band
ANT-DB1-RAF-RPS	Linx, dual-band dipole antenna, 2400 – 2483 MHz and 5150 – 5825 GHz	2.675 @ 2.4 GHz band 4.599 @ 5 GHz band
GW40.2153	Taoglas, dual-band dipole antenna, 2400 – 2500 MHz and 5150 – 5850 GHz	3.74 @ 2.4 GHz band 2.5 @ 5 GHz band
GW59.3153	Taoglas, dual-band dipole antenna, 2400 – 2500 MHz and 5150 – 5850 GHz	2.37 @ 2.4 GHz band 2.93 @ 5 GHz band

The module may be integrated with other antennas which the OEM installer must authorize with respective regulatory agencies and after approval of the module manufacturer.

### FCC and IC IDs

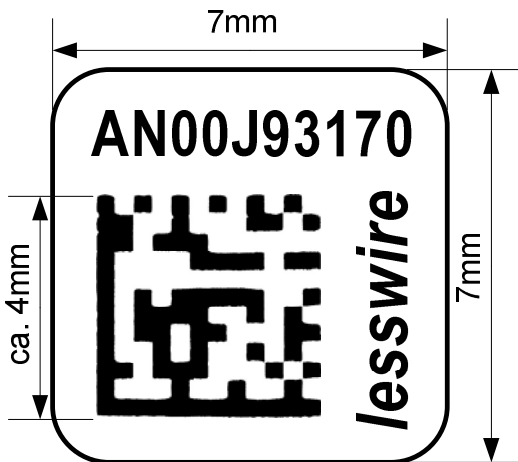
**Table 19:** FCC and IC IDs for WiBear11n module variants

Model	Model number	FCC ID	IC ID
WiBear11n-SF1	AN00J93170	PV7-WIBEAR11N-SF1	7738A-WB11NSF1
WiBear11n-SF2	AN00J93174	PV7-WIBEAR11N-SF2	7738A-WB11NSF2
WiBear11n-DF1	AN00J93172	PV7-WIBEAR11N-DF1	7738A-WB11NDF1
WiBear11n-DF2	AN00J93176	PV7-WIBEAR11N-DF2	7738A-WB11NDF2

### Label

Due to the small module size, the FCC and IC IDs cannot be displayed on the label. The corresponding FCC and IC IDs for the module variants are shown in the table above.

Label drawing:



Label location:



Figure 15: Label and label location

### Bluetooth Qualification

WiBear11n is listed at the Bluetooth SIG (<https://www.bluetooth.org/en-us>) under **QD ID 54755**.

The Product Type is "Controller Subsystem", Specification Name is "3.0+HS".

All four module variants (-SF1, -SF2, -DF1, -DF2) are listed as product variants under the above mentioned QD ID.

## Revision History

**Table 20:** Revision history

Date	Version	Author	Description
20-Jun-2012	1.00	Igor Shevchenko	Preliminary release
22-Jun-2012	1.01	Igor Shevchenko Andras Varadi Andreas Beierer	Some minor mistakes fixed
16-Jul-2012	1.02	Igor Shevchenko	PCM interface description added, Supported channels presented in region independent form.
01-Oct-2012	1.03	Igor Shevchenko	Minor mistakes fixed, Evaluation Kit information added
05-Dec-2012	1.04	Daniel Dietterle	Updated order codes for latest hardware revision C
11-Jan-2013	1.05	Daniel Dietterle	Added installation and regulatory information
16-Jan-2013	1.06	Daniel Dietterle	Added label information and table with FCC/IC IDs
18-Jan-2013	1.07	Igor Shevchenko	Added Wi-Fi Direct mode support
18-Jan-2013	1.08	Igor Shevchenko	Requirements (Note 2) for Sleep Mode updated
22-Jan-2013	1.09	Daniel Dietterle	Added paragraph on IC compliance
06-Feb-2013	1.10	Daniel Dietterle	Added paragraph on IC compliance in French language
22-Feb-2013	1.11	Igor Shevchenko	Dimension drawing improved (tolerances added)
25-Feb-2013	1.12	Daniel Dietterle	FCC ID's and IC ID's with cross-reference to model numbers
28-Mar-2013	1.13	Daniel Dietterle	Added: RoHS compliance; mounting process (warpage); custom tariff numbers; IMDS number
07-May-2013	1.14	Daniel Dietterle	Electrical specification updated: minimum supply voltage and ripple noise, digital pad ratings corrected Physical dimensions: Contour tolerances in corners of the PCB added
14-May-2013	1.15	Daniel Dietterle	Added order information for tape&reel packing
15-May-2013	1.16	Daniel Dietterle	Corrected ordering information for variants DF1 and SF2 (T&R)
21-May-2013	1.17	Daniel Dietterle	Release, no changes.
19-Dec-2013	1.18	Daniel Dietterle	Approved antenna list extended
13-Mar-2014	1.19	Daniel Dietterle	Bluetooth QDID added, corrected several typos on page 3
10-Oct-2014	1.20	Daniel Dietterle	Approved antenna list extended