

SPB800-WiFi 802.11b+g SMD Board

Data Sheet

SPB800

WiFi SMD Board



Revision History

Revision	Revision date	Description
PA1	2010-07-14	First Draft
PA2	2010-10-22	Updated pin and signal list
PA3	2010-11-08	Added evaluation kit information
PA4	2010-11-25	Revised land pattern
PA5	2010-12-10	Land pattern dimensions clarified
PA6	2010-12-13	Land pattern drawing updated
PA7	2010-12-17	FCC ID added
PA8	2010-12-17	Cleaned up pagination

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1 INTRODUCTION

1.1 Overview

SPB800 is a SMD module with the HDG104 WLAN System In Package, SIP module and a micro processor including external flash memory and peripheral components required. It is a complete solution designed to be function as a standalone communication module, serial cable replacement or as an easy to use WLAN addition with a minimal resource need, to an existing system.

SPB800 enables a cost efficient ultra low power, high performance and feature rich client solution. It provides up to 54 Mbit/s data rate when operating in the OFDM mode and up to 11 Mbit/s data rate when operating in the DSSS/CCK mode. The SPB800 offloads the IP-stack and much of the WiFi-handling code from the host to drastically reduce memory footprint and MCU requirements for adding WiFi to a host system.

The SPB800 comes in three versions

- WLAN addition to a system using the pico-oWL API that requires a minimum footprint on the host processor.
- Serial WiFi adapter with UART interface.
- Wireless RS-232 adapter to make any equipment with a serial port accessible on the wireless network



1.2 Key Features

- Integrated IP-stack
- Data Rates: 1, 2, 5.5, 6, 9, 11, 12, 18, 24, 36, 48, and 54Mbps
- Modulation: QPSK, 16QAM, 64QAM DBPSK, DQPSK, CCK, OFDM with BPSK
- WEP and AES hardware encryption accelerator up to 128 bits
- Low power consumption
- Advanced power management for optimum power consumption at varying load.
- Simple configuration and control via (o)WL-pico API.
- Single Supply Voltage 3.3 V
- Small footprint 22 X 34 mm
- RoHS Compliant
- Integrated Chip antenna or U.FL connector versions available
- Evaluation kits available.
- Temperature range -20°C to +70°C or wide range -40°C to +85°C

2 HARDWARE ARCHITECTURE

2.1 Block Diagram

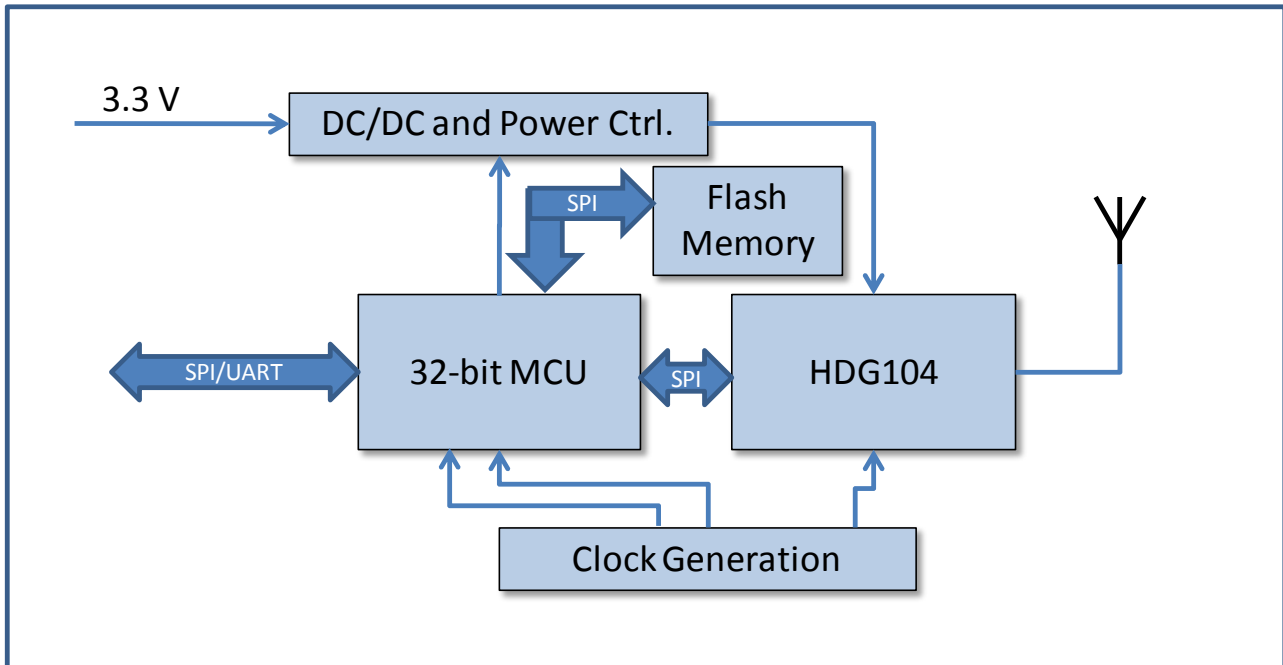


Figure 2-1 Block Diagram:

2.2 Order information

Part No.	Antenna Option	Operating Temp.	Batch size	Shipment package
SPB800-BC-N1	Integrated chip antenna	0 – 70 °C	10/100	Unit in ESD bag
SPB800-BC-N2	Integrated chip antenna	0 – 70 °C	1K/10K/50K	Tape and Reel
SPB800-BM-N1	Integrated chip antenna	-40 – 85 °C	10/100	Unit in ESD bag
SPB800-BM-N2	Integrated chip antenna	-40 – 85 °C	1K/10K/50K	Tape and Reel
SPB800-DC-N1	U.FL. connector	0 – 70 °C	10/100	Unit in ESD bag
SPB800-DC-N2	U.FL. connector	0 – 70 °C	1K/10K/50K	Tape and Reel
SPB800-DM-N1	U.FL. connector	-40 – 85 °C	10/100	Unit in ESD bag
SPB800-DM-N2	U.FL. connector	-40 – 85 °C	1K/10K/50K	Tape and Reel
SPB800E	Integrated chip antenna	0 – 70 °C	1/10/100	Unit in ESD bag.

Table 2-1: Ordering Information

3 ELECTRICAL DATA

3.1 Absolute maximum ratings

Rating	Min	Max	Unit
Supply voltage	0	4	V
Input RF level		10	dBm
Storage temperature	-50	+125	°C

Table 3-1: Absolute maximum ratings. Exceeding any of the maximum ratings, even briefly lead to deterioration in performance or even destruction. Values indicates condition applied one at the time.

3.2 ESD

SPB800 withstands ESD voltages up to 2000 V HBM (Human Body Model) according to JESD22-A114 and up to 300 V MM (Machine Model) according to JESD22-A115.

3.3 Recommended operating conditions

Rating	Min	Typ.	Max	Unit
Supply Voltage VCC	3.0	3.3	3.6	V
Operating temperature SPB800C	-20	+25	+70	°C
Operating temperature SPB800M	-40	+25	+85	°C

Table 3-2: Recommended operating conditions

3.4 Power Consumption

3.4.1 Current Consumption

Mode	Conditions	Parameter	Voltage	Min	Typ.	Max	Unit
All modes		VCC	3.6 V			300	mA
TX [802.11b]	25°C	VCC	3.3 V		180	200	mA
TX [802.11g]	25°C	VCC	3.3 V		180	200	mA
RX [802.11b]	25°C	VCC	3.3 V		74		mA
RX [802.11g]	25°C	VCC	3.3 V		77		mA

Power Save (2s beacons)	25°C	VCC	3.3 V		1.0		mA
System Sleep (only 32 kHz clock running)	25°	VCC	3.3 V		1.0		mA
Shutdown	25°	VCC	3.3 V		24.0		μA

Table 3-3: Current consumption in different modes.

3.4.2 Power Consumption

Conditions: T_{amb}=25°C, VCC=3.3 V

Mode	Output Power	Power Consumption	Comments
TX 802.11b	+17 dBm	758 mW	1, 2, 5.5, 11 Mbit/s, MCU run at 16 MHz
TX 802.11g	+14 dBm	623 mW	6, 9, 12, 18, 24, 36, 48, 54 Mbit/s, MCU run at 16 MHz
RX 802.11b	N/A	253 mW	MCU run at 16 MHz
RX 802.11g	N/A	236 mW	MCU run at 16 MHz
Power Save	N/A	0,4 mW	Receive only, 2s RX beacons, MCU run at 32 kHz
Sleep	N/A	0,2mW	No receive, FW loaded, only LFC Running, MCU run at 32 kHz
Soft Shutdown	N/A	0,15 mW	No receive, No FW loaded, only LFC Running, MCU run at 32 kHz
Shutdown	N/A	0,07 mW	No FW loaded, DVDD OFF, MCU static

Table 3.4: Power consumption in different modes.

3.5 RF Performance

VCC= 2.75 – 3.6V, amb= -20 – +70°C

Parameter	Conditions	Min	Typical	Max	Units
Frequency range		2400		2500	MHz
RF impedance			50		ohm
Transmitter performance					
Output power	QPSK, Calibrated.	+16,5	+17	+17,5	dBm
Output power	OFDM 54Mbit/s, Calibrated.	+13,5	+14	+14,5	dBm
EVM at +15dBm	QPSK		30	35	%
EVM at +11dBm	OFDM 54MBit/s		3.5	5	%
Receiver performance					

Receiver sensitivity	DPSK 1Mbit/s		-96		dBm
Receiver sensitivity	QDPSK 2Mbit/s		-92		dBm
Receiver sensitivity	CCK/DPSK 5.5Mbit/s		-91		dBm
Receiver sensitivity	CCK/BPSK 11Mbit/s		-88		dBm
Receiver sensitivity	OFDM 6Mbit/s		-91		dBm
Receiver sensitivity	OFDM 9Mbit/s		-90		dBm
Receiver sensitivity	OFDM 12Mbit/s		-88		dBm
Receiver sensitivity	OFDM 18Mbit/s		-86		dBm
Receiver sensitivity	OFDM 24Mbit/s		-83		dBm
Receiver sensitivity	OFDM 36Mbit/s		-80		dBm
Receiver sensitivity	OFDM 48Mbit/s		-76		dBm
Receiver sensitivity	OFDM 54Mbit/s		-74		dBm

Table 3.5: RF performance.

4 PIN CONFIGURATIONS

4.1 Pin Configuration

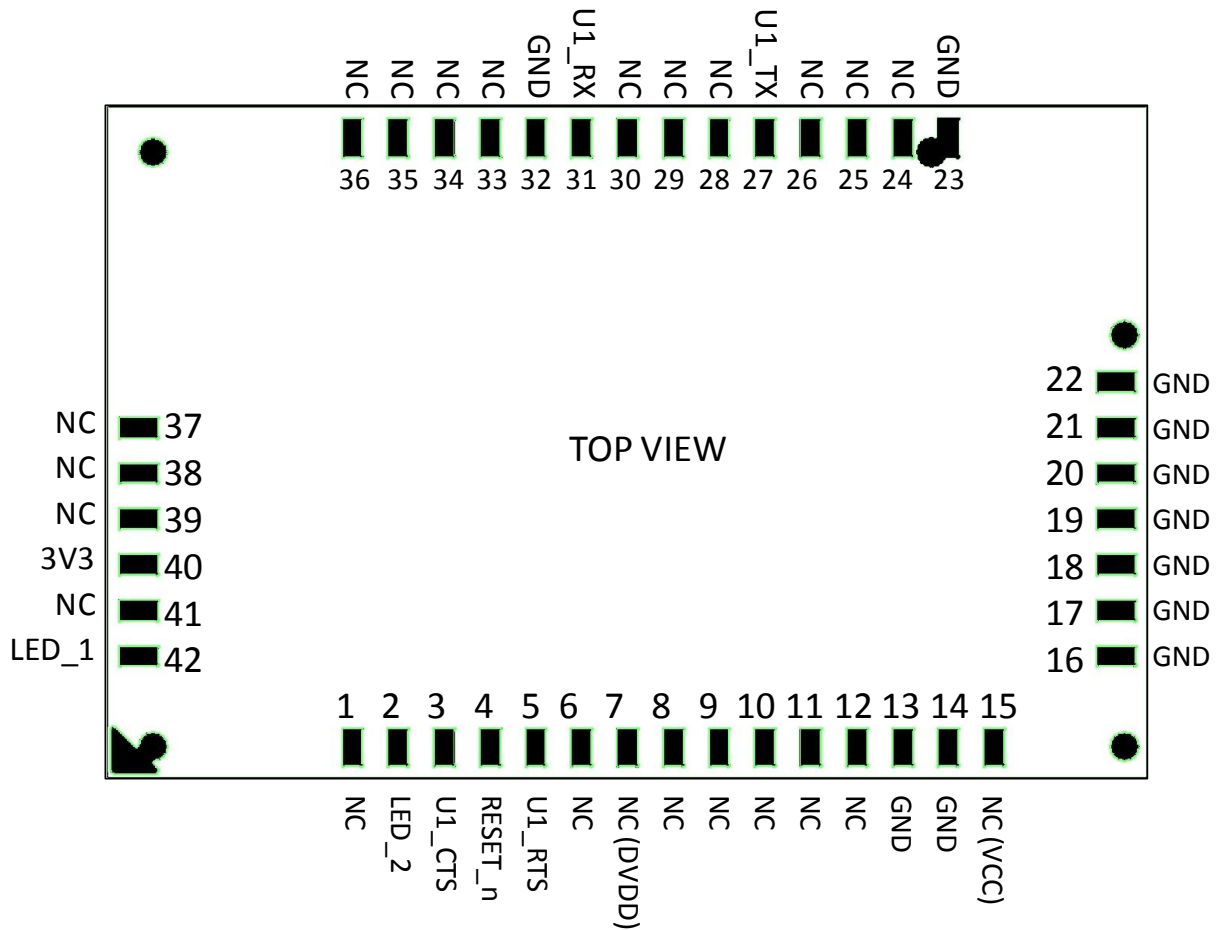


Figure 4-1: Module pads, Top view

4.2 Pin assignments

Pin	Function	Type	Description
1	NO CONNECTION	NC	Do not connect
2	LED_2	-	Indicates WiFi Connection
3	UART_CTS	I	Clear to send (active low)
4	RESET_n	I	Reset
5	UART_RTS	O	Ready to send (active low)

6-12	NO CONNECTION	NC	Do not connect
13	GND	S	Ground
14	GND	S	Ground
15	NO CONNECTION	NC	Do not connect
16-23	GND	S	Ground
24-25	NO CONNECTION	NC	Do not connect
26	UART_TX	O	UART TX
27-30	NO CONNECTION	NC	Do not connect
31	UART_RX	I	UART RX
32	GND	S	Ground
33-39	NO CONNECTION	NC	Do not connect
40	VCC	S	3.3V supply voltage
41	NO CONNECTION	NC	Do not connect
42	LED_1	O	Power on LED

Table 4-1: Pin Description for the module



5 APPLICATION INFORMATION

5.1 Power Supply

SPB800 should be powered by a 3.3V supply.

5.2 Serial interface UART

To communicate with the SPB800 a UART interface is used. The signals "UART_RTS" and "UART_CTS" are only active when hardware flow control is enabled by the host.

5.3 RF interface

The SPB800-B has a high performance chip antenna as the primary RF interface.

The SPB800-D has a U.FL connector as RF interface. Use Hirose U.FL receptacle or comparable for connection.

5.4 General application information

5.4.1 Design directions

The design using the SPB800 must be performed according to good RF design considerations. Keep the area under the antenna free from all metal including signal or ground wires.

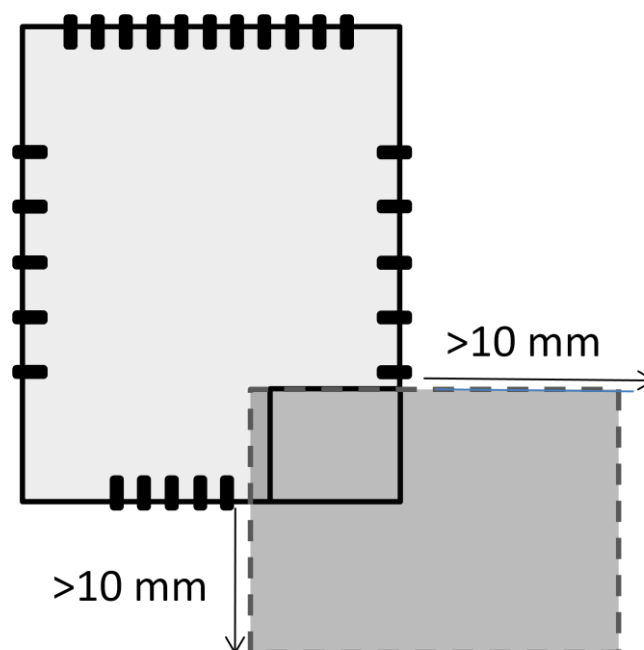


Figure 5-1: Proposed keep out area

5.5 Soldering

The SPB800 is a surface mount PCB module. If the modules has been exposed to air or are delivered in non-hermetically sealed packages it is recommended to bake the modules before soldering. To lower the moister content bake the packages for 192 hours at 40–45°C and <5%RH, or 24 hours at 120–130°C, depending on the maximum temperature rating of the packaging. The recommended solder profile is pictured in [Figure 5.6](#)

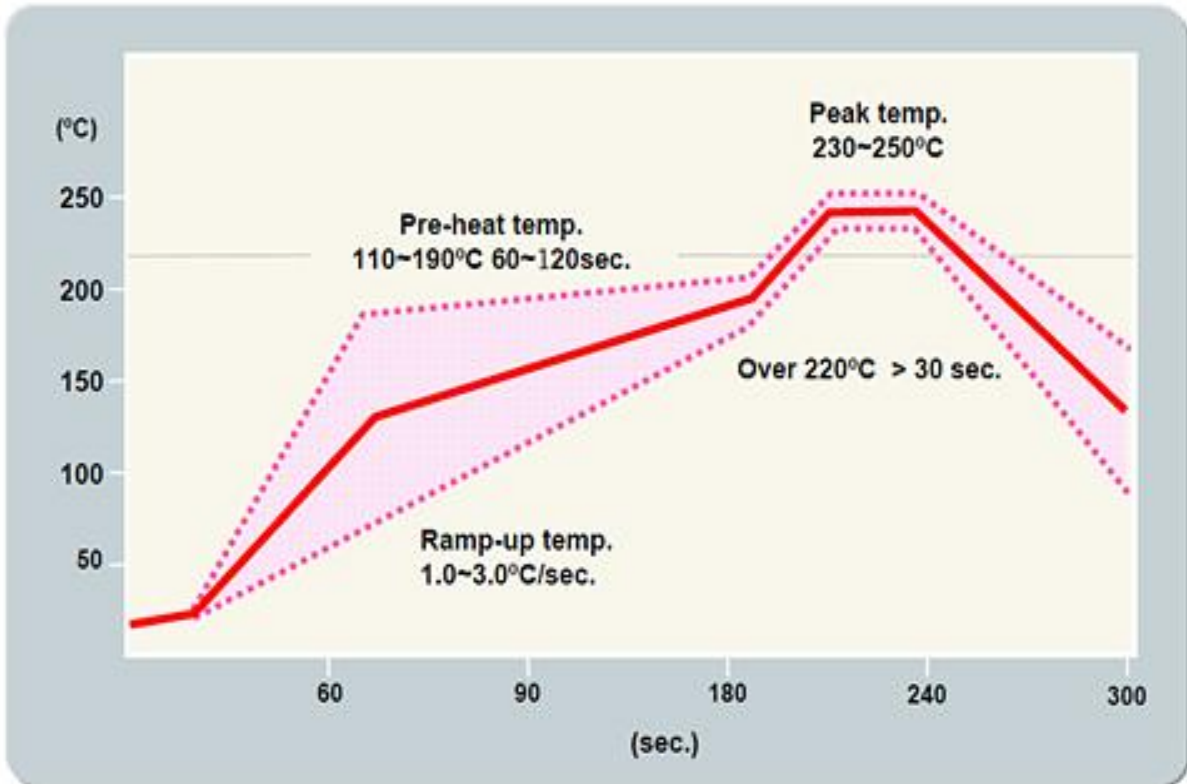


Figure 5.6: Reflow Temperture Profile.

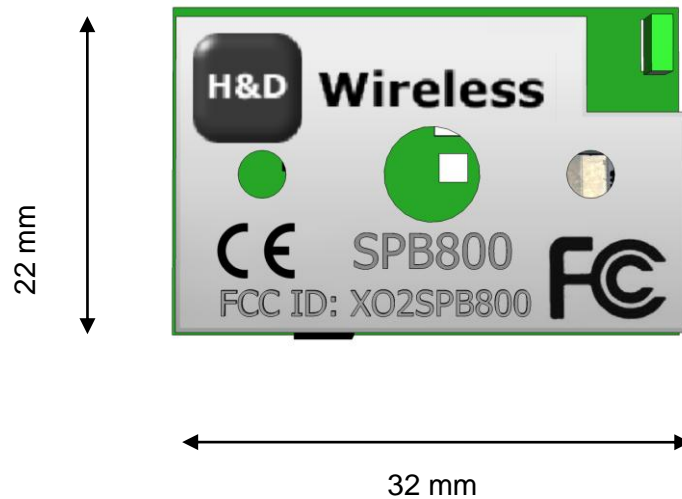
Type	Rising Zone	Preheat Zone	Reflow Zone	Peak Zone	Cooldown Zone	Comment
PSR	125°C-Peak No	110-190°C 60-120 s	>220°C >30 s	230-250°C	Peak-125°C No	

5.5.1 Environmental statement

The SPB800 is designed and manufactured to comply with the RoHS and Green directives.

6 PACKAGE SPECIFICATIONS

6.1 Mechanical outline of the SPB800 circuit board



6.2 Markings on the SPB800

The EMC Shield is imprinted with the FCC ID, part number

6.3 Package dimensions

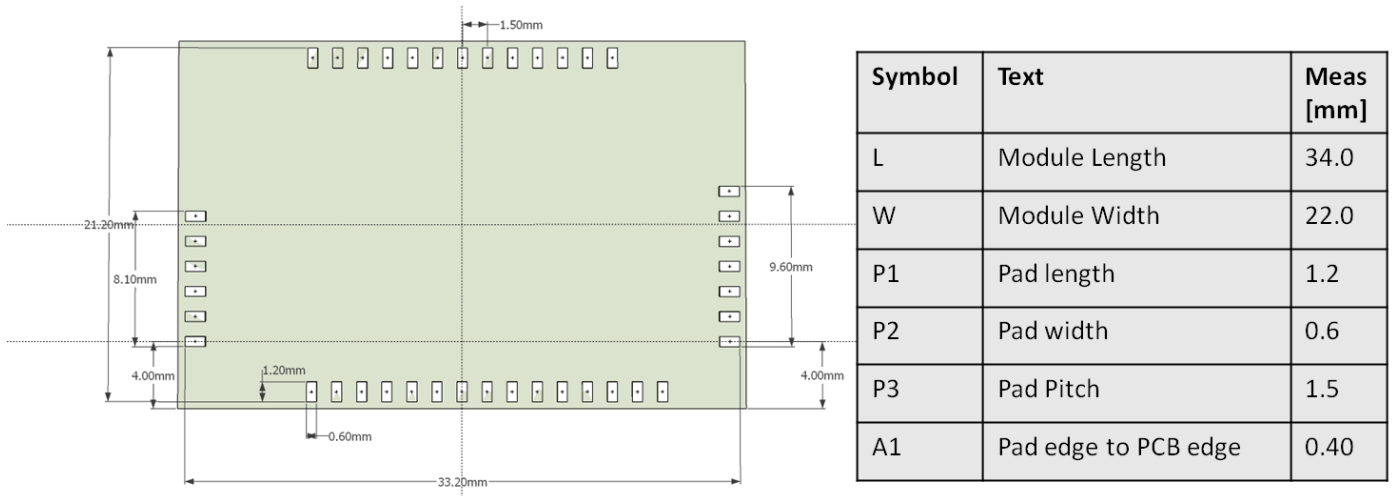


Figure 6-2: SPB800 Top View

6.4 Mounting information

Recommended land pattern on the PCB

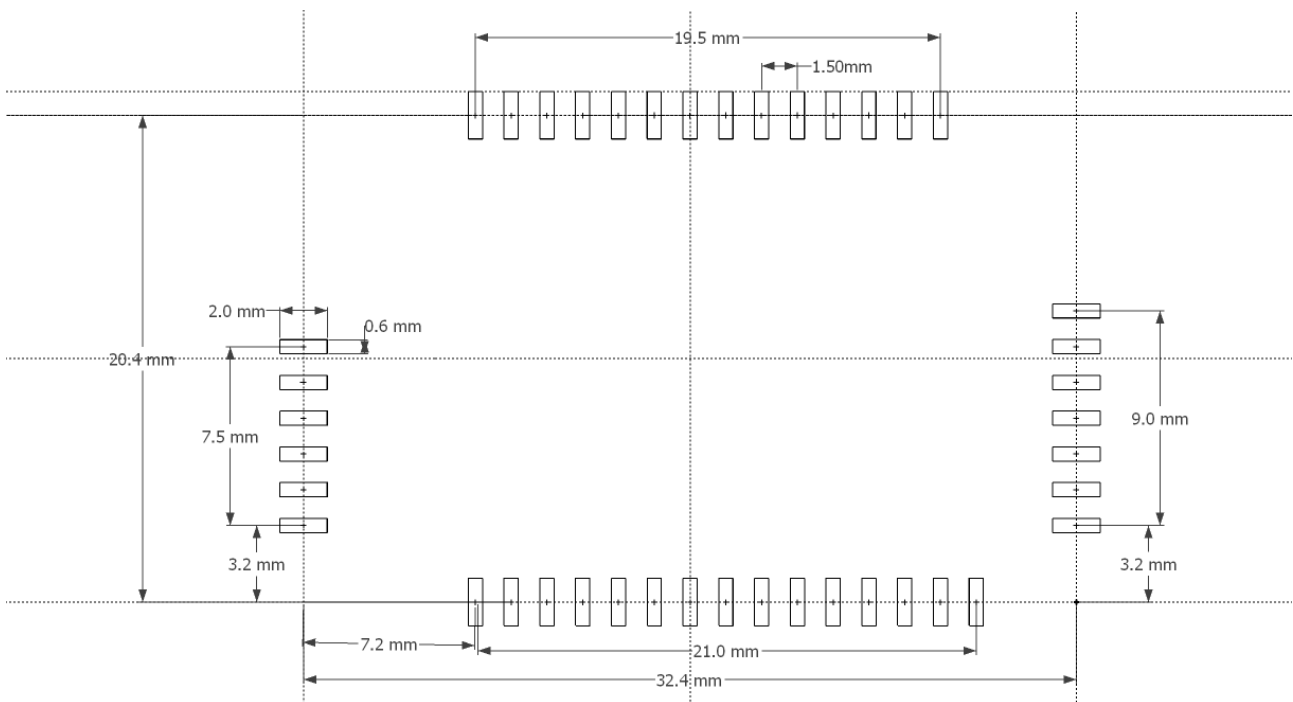
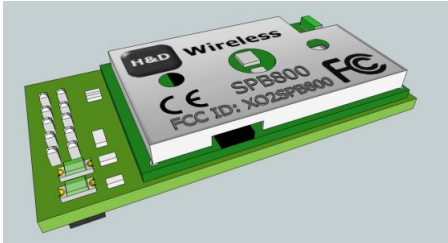


Figure 6-3: Land pattern for the SPB800

7 Evaluation Kit

The Evaluation kit has the SPB800 conveniently mounted on a PCB with a 10 position header socket including both signal and power for the module. Two LEDs indicating power on and that the unit is connected to an access point is situated on the board. The ENb signal is an active low signal that enable to power down the EVK.



7.1 Pin out for the EVK (SPB800E)

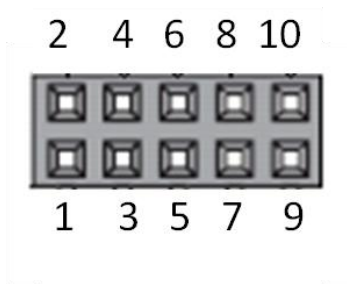


Figure 7-1: SPB800 EVK pins top view

Header Pin	XMEGA Pin	Description	SPB800 Pin
1	PD0	UART_RTS	5
2	PD1	ENb	-
3	PD2	UART_RX	26
4	PD3	UART_TX	25
5	PD4	UART_CTS	3
6	PD5	NC	(6)
7	PD6	NC	(1)
8	PD7	NC	(11)
9	GND	Ground	32
10	V3P3	Supply	40

8 STANDARDS COMPLIANCE

8.1 IEEE/IETF

Standard	Revision	Description
802.11	802.11 R2003	WLAN MAC& PHY
802.11b	802.11 R2003	High rate DSSS (5,5/11Mbit/s)
802.11d	802.11 R2003	Operation in different regulatory domains
802.11e	D9,0 Aug. 2004	QoS enhancements
802.11g	-2003	Extended rate PHY (ERP-PBCC, DSS-OFDM)
802.11i	-2004	Security enhancements
802.11k	Draft 11.0, 2008	Wireless network management
802.11r	Draft 9.0, 2008	Fast BSS transition
802.11h	1997 edition	Bridge tunneling
RFC1023	Inherent	Frame encapsulation
802.15.2		Bluetooth coexistence

Table 7.1: applicable IEEE standards

8.2 WiFi

Specification	Description	Revision
Wi-Fi 802.11b with WPA system inter operability test plan for IEEE 802.11b devices	802.11b devices with WPA	2.1
WiFi 802.11g with WPA system inter operability test plan	802.11g devices with WPA	2.0
UMA (FMCA)	Convergence services over WiFi-GAN	Aug. 2005
WMM (including WMM Power Save)		Ver 1.1

Table 7.2: Applicable WiFi standards

8.3 Regulatory

Country	Approval authority	Regulatory	Frequency band
USA	FCC	FCC ID: X02SPB800	2.4 GHz -2.4835 GHz
Canada	IC	RSS: TBA	2.4 GHz -2.4835 GHz
Europe	National	ETSI	2.4 GHz -2.4835 GHz

Table 7.3: Regulatory standards

8.3.1 FCC (United States of America)

This equipment complies with Part 15 of the FCC rules and regulations.

To fulfill FCC Certification requirements, an OEM manufacturer must comply with the following regulations:

1. The modular transmitter must be labeled with its own FCC ID number, and, if the FCC ID 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:

Example of label required for OEM product containing SPB800 module

Contains FCC ID: XO2SPB800

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

2. To be used with the SPB800 module, the external antennas have been tested and approved which are specified in here below. The SPB800 Module may be integrated with custom design antennas which OEM installer must authorize following the FCC 15.21 requirements.

WARNING: The Original Equipment Manufacturer (OEM) must ensure that the OEM modular transmitter must be labeled with its own FCC ID number. This includes a clearly visible label on the outside of the final product enclosure that displays the contents shown below. If the FCC ID is not visible when the equipment is installed inside another device, then the outside of the device into which the equipment is installed must also display a label referring to the enclosed equipment.

IMPORTANT: This equipment 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 (FCC 15.19).

The internal / external antenna(s) used for this mobile transmitter 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.

Installers must be provided with antenna installation instructions and transmitter operating conditions for satisfying RF exposure compliance. This device is approved as a mobile device with respect to RF exposure compliance, and may only be marketed to OEM installers. Use in portable exposure conditions (FCC 2.1093) requires separate equipment authorization.

IMPORTANT: Modifications not expressly approved by this company could void the user's authority to operate this equipment (FCC section 15.21).

IMPORTANT: This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense (FCC section 15.105).

8.3.2 IC (Canada)

Equipment is subject to certification under the applicable RSSs, shall be permanently labeled on each item, or as an inseparable combination. The label must contain the following information for full compliance:

Certification Number: Manufacturer's Name, Trade Name or Brand Name Model Name:	IC: 8713A-SPB800 H&D Wireless AB SPB800
--	--

IMPORTANT: This equipment for which a certificate has been issued is not considered certified if it is not properly labeled. The information on the Canadian label can be combined with the manufacturer's other labeling requirements

IMPORTANT: 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.

IMPORTANT: To reduce potential radio interference to other users, the antenna type and its gain should be so chosen that the equivalent isotropically radiated power (e.i.r.p.) is not more than that permitted for successful communication.

IMPORTANT: 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's website www.hc-sc.gc.ca/rpb.

8.3.3 ETSI (Europe)

The SPB800 module has been certified for use in European union countries according to ETSI EN 300 328 (Electromagnetic compatibility and Radio spectrum matters for equipment operating in the 2,4 GHz ISM band using spread spectrum modulation techniques). This standard is harmonized within the European Union and covering essential requirements under article 3.2 of the R&TTE-directive.

If the SPB800 module are incorporated into a product, the manufacturer must ensure compliance of the final end-user product to the European harmonized EMC and low voltage/safety standards. A declaration of conformity must be issued for the product including compliance references to these standards. Underlying the declaration of conformity a technical construction file (TCF), including all relevant test reports and technical documentation, must be issued and kept on file as described in Annex II of the R&TTE-directive.

Furthermore, the manufacturer must maintain a copy of the SPB800 module documentation and ensure the final product does not exceed the specified power ratings, antenna specifications, and/or installation requirements as specified in the user manual. If any of these specifications are exceeded in the final product, a complete re-test must be made in order to comply with all relevant standards as basis for CE-marking. A submission to notified body must be used only if deviations from standards have been found or if non-harmonized standards have been used.

9 Related Documents

1543-SPB800 (o)WL-pico Commands, user manual.

10 SALES OFFICES

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