AW-NB114H

IEEE 802.11b/g/n

Wi-Fi with Bluetooth 4.0/3.0 + HS

Combo Half Mini Card

Data sheet

Version 0.6

0B

(Standard Version)

Revision History

Document Release	Date	Modification	Initials	Approved
Version 0.1	2011/12/01	Initial Release (Marketing SPEC)	Carla Chen	Ray Lee
Version 0.2	2012/01/20	Update: 1. Block Diagram 2. Electrical and Thermal Characteristics 3. Mechanical Dimension	Young Fan Kevin Lin	Antonio Chu
Version 0.3	2012/02/03	1. Add FCC Label and Module data	Carla Chen	Ray Lee
Version 0.4	2012/02/09	1. Modify Block Diagram 2. Modify WiFi Output Power	Carla Chen	Ray Lee
Version 0.5	2012/12/03	Update 1. Features 2. General Specifications 3. Power Consumption 4. Connector Pin-out Definitions 5. Add LED Behavior Table 6. Mechanical Dimensions 7. FCC Label	Amos Weiyu Emily	Antonio Louis Ray
Version 0.6	2013/4/2	Add wireless security description	Yvonne Chen	Patrick

1. Introduction

AzureWave Technologies, Inc. introduces the pioneer of the IEEE 802.11b/g/n WiFi with Bluetooth 4.0 / 3.0 + high speed combo half mini card module --- **AW-NB114H.** The AW-NB114H IEEE 802.11 b/g/n PCIE WIFI with Bluetooth 4.0 / 3.0 + HS combo module is a highly integrated wireless local area network (WLAN) solution to let users enjoy the digital content through the latest wireless technology without using the extra cables and cords. AW-NB114H combines with Bluetooth 4.0 / 3.0 + HS and provides a complete 2.4GHz Bluetooth system which is fully compliant to Bluetooth v4.0 / 3.0 + HS that supports EDR of 2Mbps and 3Mbps for data and audio communications. It enables a **high performance, cost effective, low power, compact solution** that easily fits onto one side of the PCI Express and USB Combo half mini Card.

Compliant with the IEEE 802.11b/g/n standard, AW-NB114H uses Direct Sequence Spread Spectrum **(DSSS)**, Orthogonal Frequency Division Multiplexing **(OFDM), BPSK, QPSK, CCK** and **QAM** baseband modulation technologies.

Compare to 802.11g technology, 802.11n standard makes big improvement on speed and range.

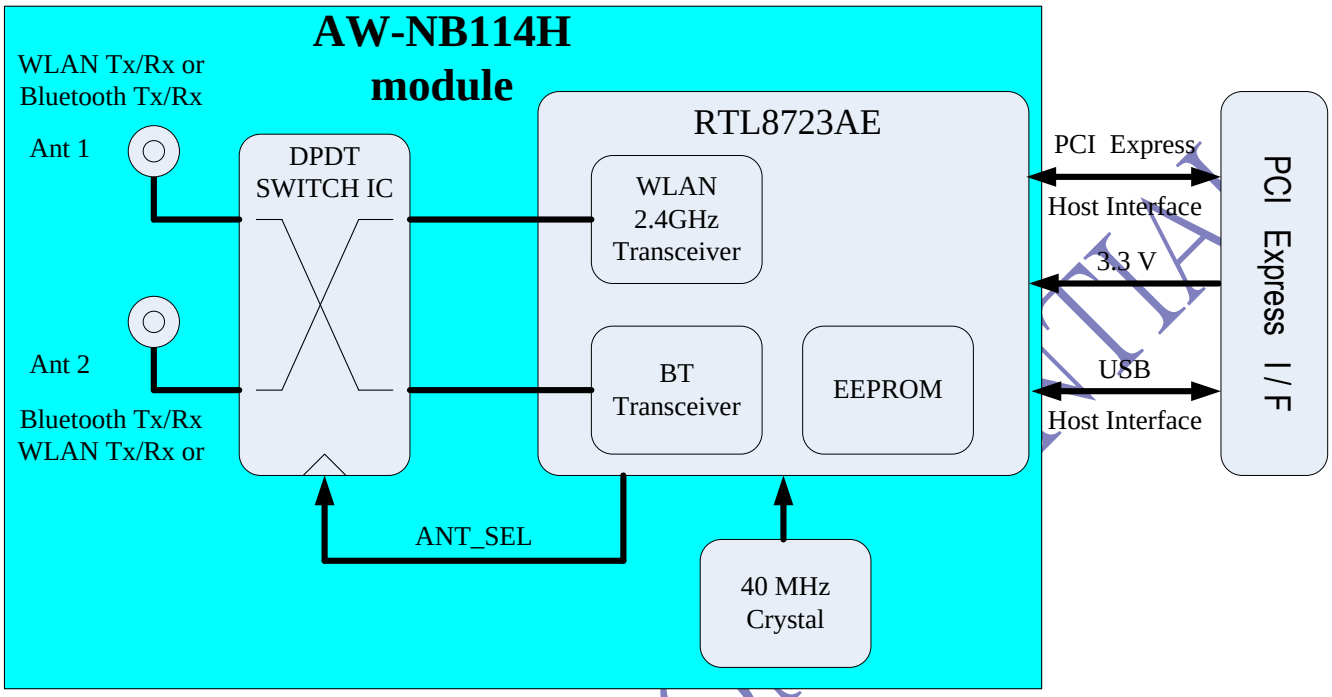
Faster Speed: WLAN up to 150Mbps data rate.

AW-NB114H module adopts Realtek **combo single RTL8723AE-CG** solution. The module design is based on the Realtek **combo single RTL8723AE-CG** solution

2. Features

- High speed wireless connection up to 150 Mbps for Wi-Fi
- 2 antennas to support WLAN 1(Transmit) × 1(Receive) technology and Bluetooth
- Support antenna diversity function
- WCS (Wireless Coexistence System)
- Low power consumption and high performance
- Enhanced wireless security
- Fully qualified Bluetooth v 4.0 / 3.0 + high speed
- Enhanced Data Rate (EDR) compliant for both 2Mbps and 3Mbps supported
- Fully-speed Bluetooth operation with Piconet and Scatternet support
- Electrical compliant to USB 2.0 interface
- Support Mini card PCI-E 1.1 &1.2 standard specification
- Support WOWL
- Enhance wireless security (WEP, WPA2-PSK….etc)

3. Block Diagram



4. General Specifications

Model Name	AW-NB114H
Product Description	IEEE 802.11 b/g/n Wi-Fi with Bluetooth V4.0/3.0HS Combo half size mini card
Bluetooth Standard	IEEE 802.11b/g/n, Wi-Fi compliant / Bluetooth v4.0/3.0+HS Standard
Host Interface	WiFi: PCIE Bluetooth: USB
Chipset	Realtek RTL 8723AE
Wi-Fi PID/VID	8723 / 10EC
Wi-Fi SSID/SVID	2114 / 1A3B
BT PID/VID	3394 / 13D3
Dimension	26.65x29.85x3.05 mm (Tolerance remarked in mechanical drawing)
Weight	3g
Antenna	Standard U.FL Connector 1. Connector of Ant 1 : for WiFi Tx/Rx or BT Tx/Rx 2. Connector of Ant 2 : for BT Tx/Rx or WiFi Tx/Rx
Operating Conditions	
Voltage	3.0V~3.6V
Temperature	0~70 ℃
Storage Temperature	-40~80 ℃
Electrical Specifications	
Frequency Range	Wi-Fi: 2.4 GHz ISM Bands 2.412-2.472 GHz, 2.484 GHz / BT: 2402MHz~2483MHz
Modulation	Wi-Fi: 802.11b: CCK, DQPSK, DBPSK 802.11 g: 64 QAM, 16 QAM, QPSK, BPSK 802.11 n: 64 QAM, 16 QAM, QPSK, BPSK BT: Header GFSK Payload 2M: /4 DQPSK Payload 3M: 8DPSK
Output Power	Wi-Fi: 802.11b (11Mbps): 16 ±1.5dBm 802.11g (6Mbps): 15 ±1.5dBm 802.11g (54Mbps): 14 ±1.5dBm 802.11n (HT20, MCS0): 15 ±1.5dBm 802.11n (HT20, MCS7): 13 ±1.5dBm 802.11n (HT40, MCS0): 13 ±1.5dBm 802.11n (HT40, MCS7): 13 ±1.5dBm

	BT: -6 ≤ Output Power ≤ +10 dBm (Conductive)
Receive Sensitivity	**Wi-Fi: 802.11b: less than 802.11b: less than -76 dBm (11Mbps)** **802.11g: less than -65 dBm (54Mbps)** **802.11n: less than -64 dBm at HT20 MCS7** **less than -61 dBm at HT40 MCS7** **BT: BER < 0.1% (Anritsu 8852B Tx -70 Bm)**
Security	**WEP 64-bit and 128-bit encryption** **WPA (Wi Fi Protected Access)** **WPA2 (Wi Fi Protected Access)**
Regulatory	**Follow Realtek RTL8723AE worldwide regulatory.**

4-1. LED mode behavior for WiFi and Bluetooth

State	Definition	Interpretation
OFF	**The LED is emitting no light.**	**Radio is incapable of transmitting.** This state is indicated when the card is not powered, the W_Disable# signal is asserted to disable the radio, or when the radio is disabled by software.
ON	**The LED is emitting light.**	**Radio is capable of transmitting.** The LED should remain ON even if the radio is bit actually transmitting. For example, the LED remains ON during temporary radio disablements performed by the Mini Card of its own volition to do scanning, switching radios/bands, power-management, etc. If the card is in a state wherein it is possible that radio can begin transmitting without the system user performing any action, this LED should remain ON.

5. Electrical and Thermal Characteristics

5-1. Absolute Maximum Ratings

Symbol	Parameter	Maximum	Unit
V_{dd33}	Maximum I/O supply voltage	3.6	V
RF_{in}	Maximum RF input (reference to 50 Ω)	0 (WiFi) -5 (BT)	dBm
T_{store}	Storage temperature	-40~85	°C

5-2. Recommended Operating Conditions

Symbol	Parameter	Rating	Unit
V_{dd33}	I/O voltage	3.0~3.6	V

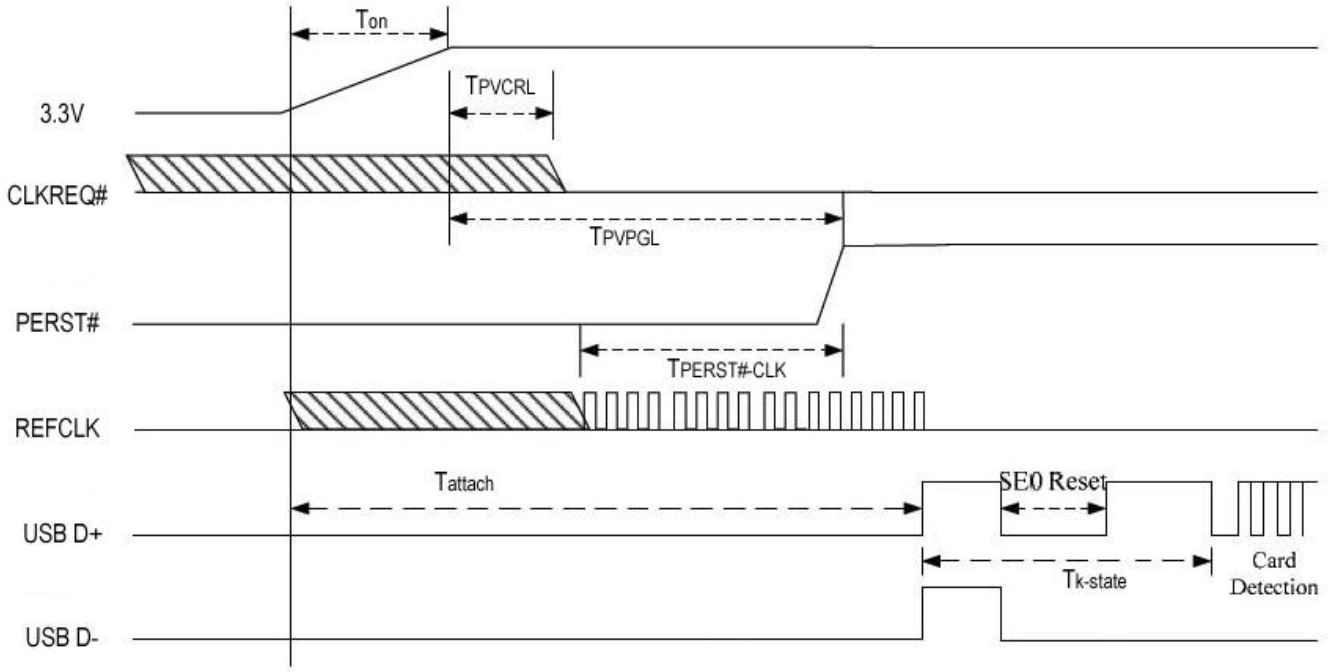
5-3. GPIO DC Characteristics

Symbol	Parameter	Minimum	Typical	Maximum	Unit
V_{IH}	Input high voltage	2.0	3.3	3.6	V
V_{IL}	Input low voltage	--	0	0.9	V
V_{OH}	Output high voltage	2.97	--	3.3	V
V_{OL}	Output low voltage	0	--	0.33	V

5-4. GPIO Interface Characteristics for BT / WLAN

Signal Name	Mini PCI-E Pin	I/O Type	Driver Strength	Pull-up
WLAN_DISABLE	20	Input		100K PU
LED_ WLAN_L	44	Output	12mA	
LED_BT_L	46	Output	12mA	
BT_ DISABLE_L	51	Input		100K PU

5-5. Power On Sequence



T_{on} : The main power ramp up duration
T_{PVCRL} : Power valid to CLKREQ# output active
T_{PVPGL} : Power valid to PERST# input inactive
$T_{PERST\#-CLK}$: Reference clock stable before PERST# inactive
T_{attach} : USB attach state
$T_{k-state}$: The duration from resister attached to USB host starting card detection procedure

Symbol	Unit	Minimum	Typical	Maximum
T_{on}	ms	--	1.5	5
T_{PVCRL}	us	--		100
T_{PVPGL}	ms	1		--
$T_{PERST\#-CLK}$	us	100		--
T_{attach}	ms	2	7	15
$T_{k-state}$	ms	50	250	

5-6. Power Consumption

WIFI

Test Bed		Dell Vostro 3450		
Test OS		Windows 7 Ultimate x64 SP1		
Test AP		D-Link DIR-855		
Driver Version		AZ_RL8723AE_2002.1.1125.2011_BT_7192_20111109_Beta		
Test Voltage		3.3V		
Item		L0 Mode	L1 Mode	NOTE
WLAN Module No Connect AP	MAX	249.48 mA	194.47 mA	
WLAN Module Connect to the AP	MAX	309.07 mA	204.06 mA	
WLAN RF OFF		87.87 mA	20.025 mA	
Transmit Packet Test HT 40*		281.53 mA	219.61 mA	
Receiver Packet Test HT 40*		249.49 mA	199.75 mA	

Note. 1. The power consumption data were measured when NB operated in DC (battery) mode.
2.Bluetooth function is disable.

BT

Test Bed		Dell Vostro 3450-2350	
Test OS		Windows 7 Ultimate x64 SP1	
Driver Version		AZ_RL8723AE_2002.1.1125.2011_BT_7192_20111109_Beta	
Test Voltage		3.3V	
Item		L0 Mode	NOTE
BT Module No Connec BT	MAX	88.71 mA	
BT Module Connect to the BT	MAX	92.42 mA	
BT RF OFF		57.30 mA	
Transmit Packet		129.07 mA	
Receiver Packet		105.86 mA	

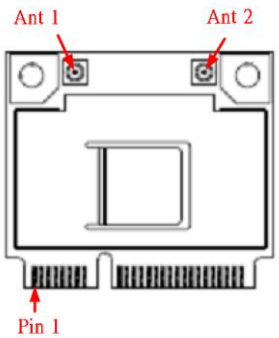
Note: 1. The power consumption data were measured when NB operated in DC (battery) mode.
2.Wifi function is disable.

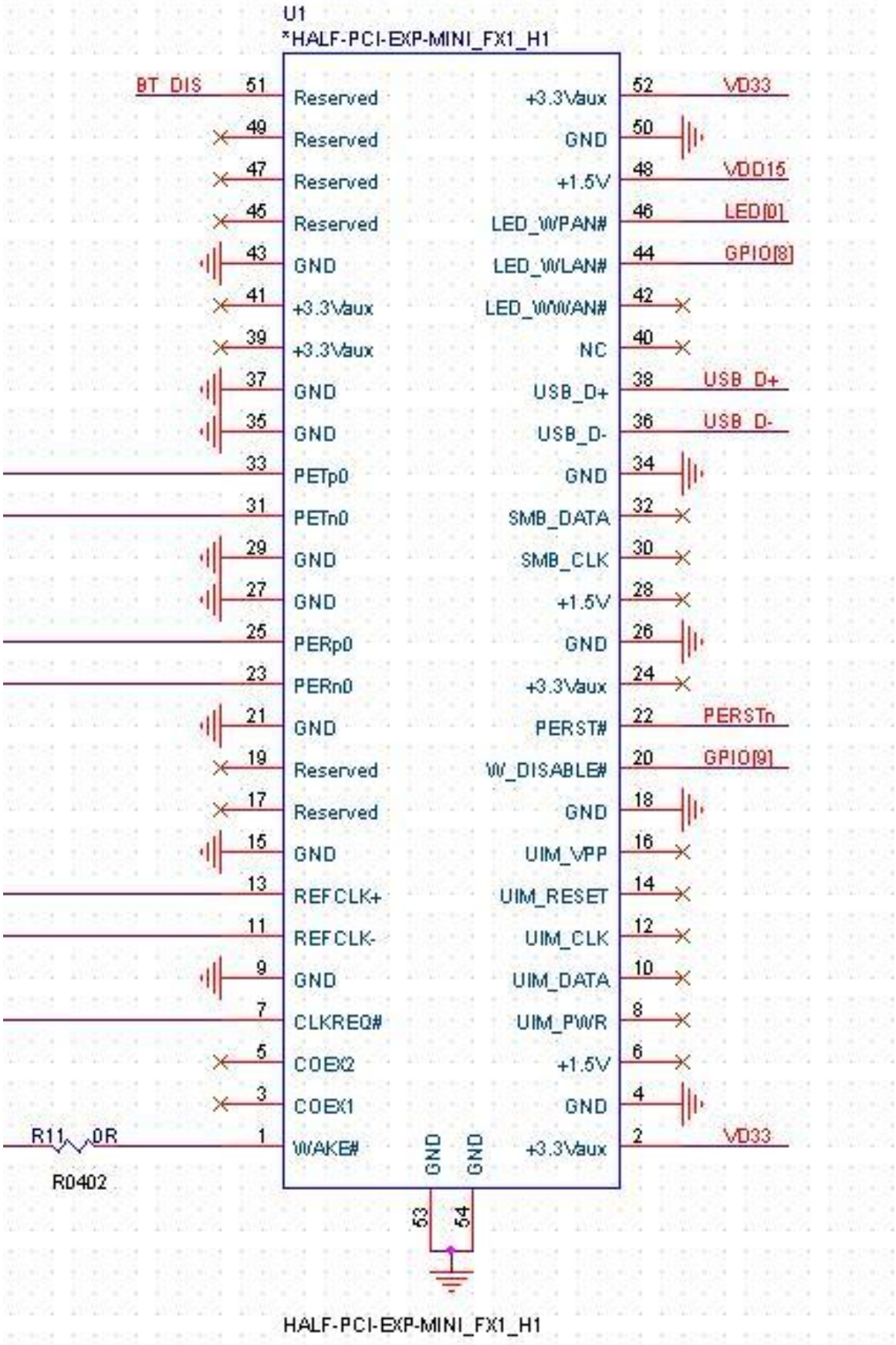
6. Connector Pin-out Definitions

Pin No.	Definition	Description	Type
1	WAKE#	Open Drain active Low signal. This signal is used to request that the system return from a sleep/suspended state to service a function initiated wake event.	Output Open-Drain
2	3.3V/3.3AUX	3.3V/3.3AUX power supply (Use 3.3AUX for WOWL supporting)	VCC
3	NC	Floating Pin, No connect to anything.	Floating
4	GND	Ground	GND
5	NC	Floating Pin, No connect to anything.	Floating
6	NC	Floating Pin, No connect to anything.	Floating
7	CLKREQ_L	Reference clock request.	Output
8	NC	Floating Pin, No connect to anything.	Floating
9	GND	Ground	GND
10	NC	Floating Pin, No connect to anything.	Floating
11	REFCLK-	Differential reference clock	CLK
12	NC	Floating Pin, No connect to anything.	Floating
13	REFCLK+	Differential reference clock	CLK
14	NC	Floating Pin, No connect to anything.	Floating
15	GND	Ground	GND
16	NC	Floating Pin, No connect to anything.	Floating
17	NC	Floating Pin, No connect to anything.	Floating
18	GND	Ground	GND
19	NC	Floating Pin, No connect to anything.	Floating
20	WLAN_DISABLE_L	WLAN disable control. (Module Internal Resister Pull-High)	Input
21	GND	Ground	GND
22	PERST_L	PCI Express Reset Signal: Active low.	Input
23	PERn0	PCI Express differential transmit	Output
24	NC	Floating Pin, No connect to anything.	Floating
25	PERp0	PCI Express differential transmit	Output
26	GND	Ground	GND
27	GND	Ground	GND
28	NC	Floating Pin, No connect to anything.	Floating
29	GND	Ground	GND

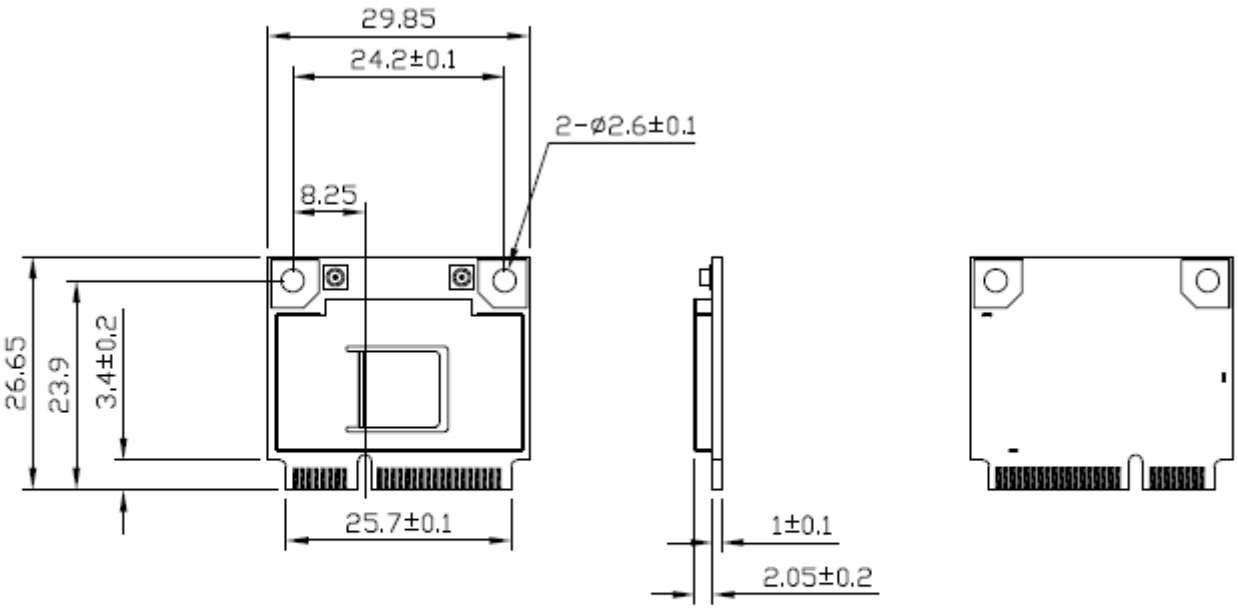
30	NC	Floating Pin, No connect to anything.	Floating
31	PETn0	PCI Express differential receive	Input
32	NC	Floating Pin, No connect to anything.	Floating
33	PETp0	PCI Express differential receive	Input
34	GND	Ground	GND
35	GND	Ground	GND
36	USB_D-	USB Differential signal	Output/Input
37	GND	Ground	GND
38	USB_D+	USB Differential signal	Output/Input
39	NC	Floating Pin, No connect to anything.	Floating
40	NC	Floating Pin, No connect to anything.	Floating
41	NC	Floating Pin, No connect to anything.	Floating
42	NC	Floating Pin, No connect to anything.	Floating
43	GND	Ground	GND
44	LED_WLAN_L	LED Pin: Active low	Output
45	NC	Floating Pin, No connect to anything.	Floating
46	LED_BT_L	LED Pin: Active low	Output
47	NC	Floating Pin, No connect to anything.	Floating
48	NC	Floating Pin, No connect to anything.	Floating
49	NC	Floating Pin, No connect to anything.	Floating
50	GND	Ground	GND
51	BT_DISABLE_L	BT disable control. (Module Internal Resister Pull-High)	Input
52	3.3V/3.3AUX	3.3V/3.3AUX power supply (Use 3.3AUX for WOWL supporting)	VCC

Pin order



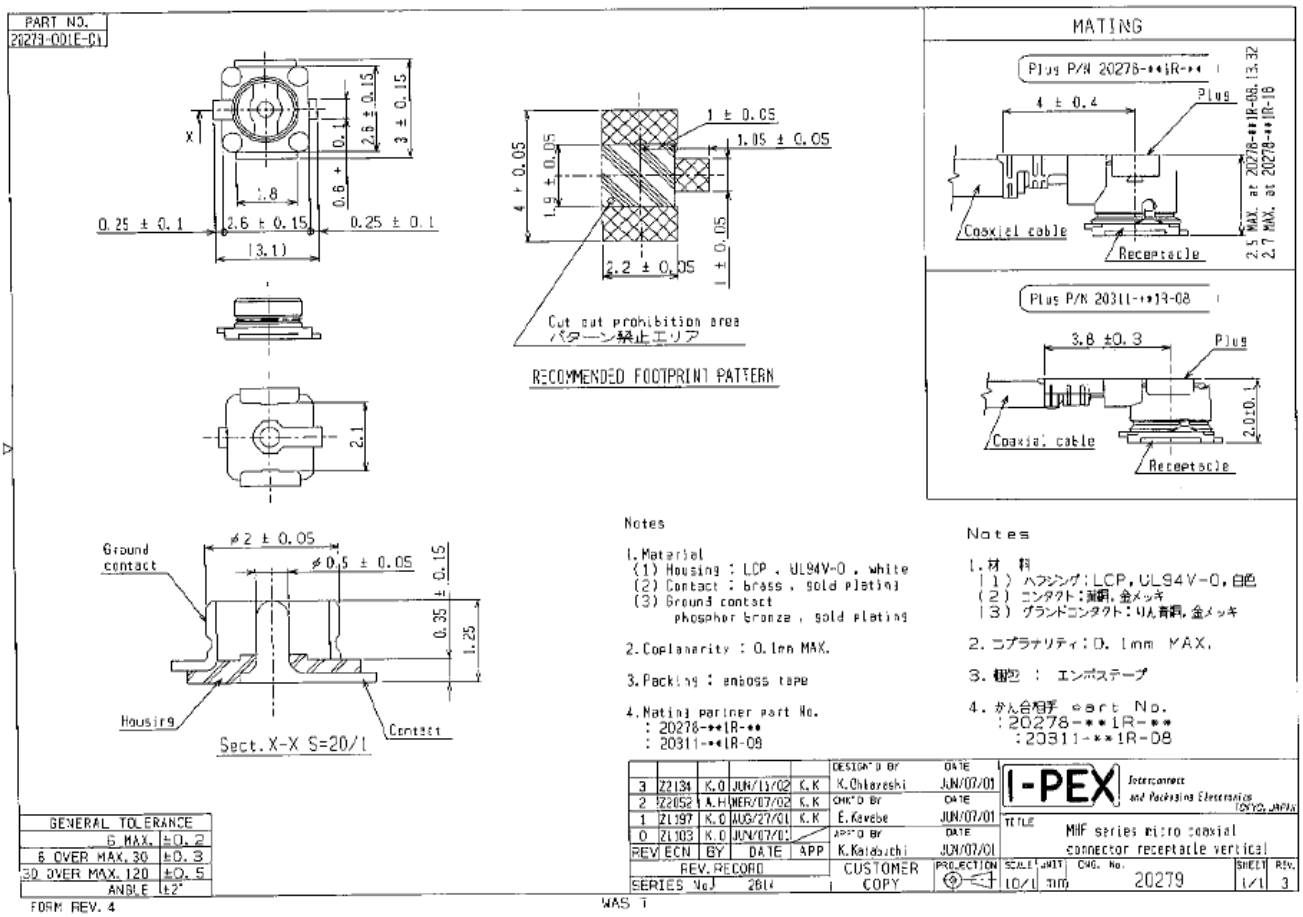


7. Mechanical Dimensions

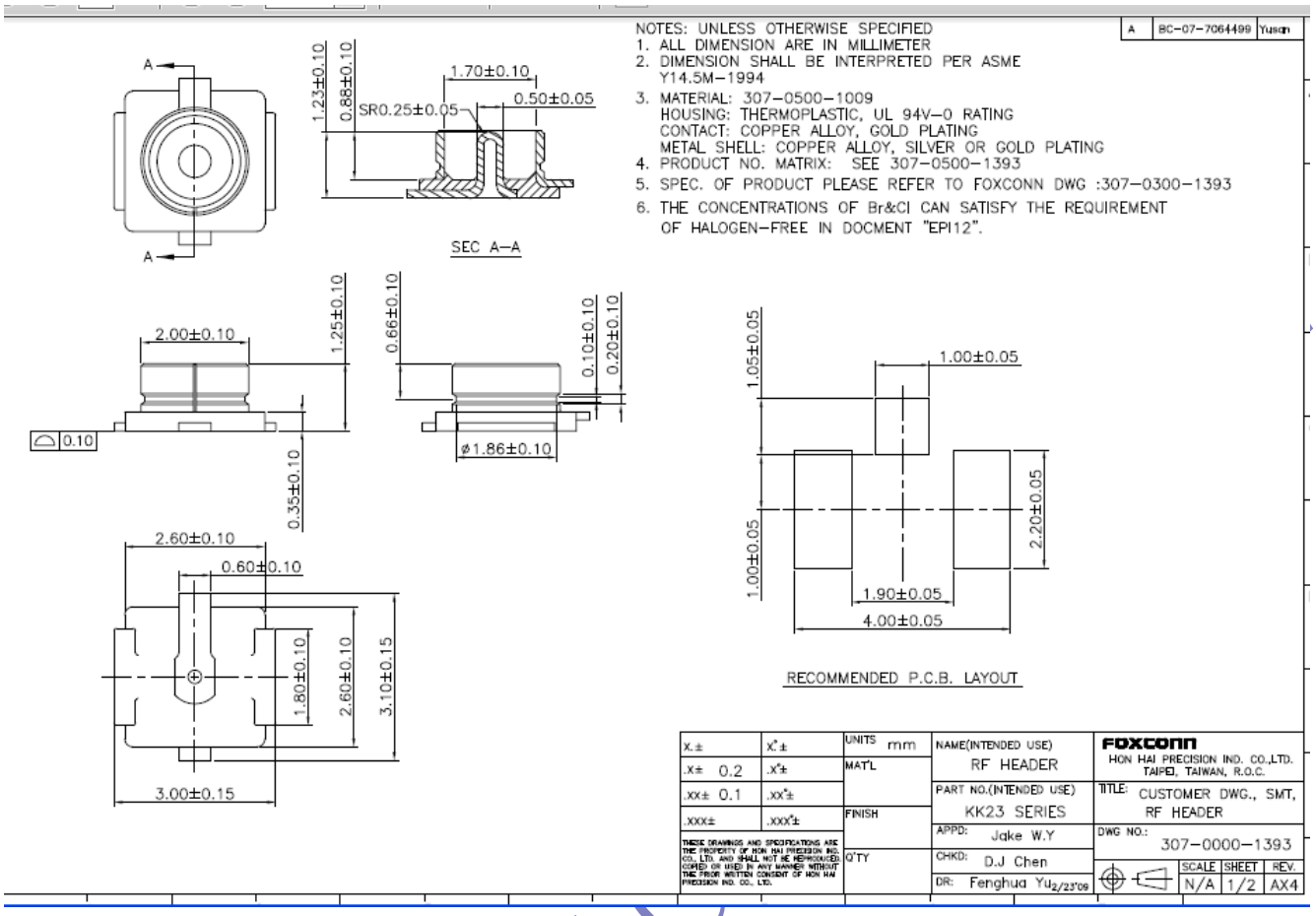


Tolerances unless otherwise specified : ±0.15mm

RF connector -1



RF connector -2



8. Module Photo

FCC Label: