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**BCM4330 WLAN+BT Combo Module  
(Foxconn T77H389.00)  
Product Specification  
Rev 3.0**

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**Index**



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<b>1. REVISION HISTORY .....</b>	<b>3</b>
<b>2. INTRODUCTION .....</b>	<b>4</b>
2.1 SCOPE .....	4
2.2 FUNCTION .....	4
<b>3. PRODUCT SPECIFICATION .....</b>	<b>5</b>
3.1 HARDWARE CHARACTERISTIC .....	5
3.2 HARDWARE ARCHITECTURE .....	5
3.3 ELECTRICAL SPECIFICATION .....	5
3.4 WLAN RF CHARACTERISTICS .....	6
<b>3.4.1 IEEE802.11b</b> .....	6
<b>3.4.2 IEEE802.11g</b> .....	7
<b>3.4.3 IEEE802.11n HT20(2.4GHz)</b> .....	8
<b>3.4.5 IEEE802.11a</b> .....	9
<b>3.4.6 IEEE802.11n HT20 (5GHz)</b> .....	10
3.5 BLUETOOTH STANDARD SPECIFICATIONS .....	11
3.6 LGA PIN DEFINITION .....	11
<b>4. SOFTWARE REQUIREMENT .....</b>	<b>13</b>
<b>5. REGULATORY .....</b>	<b>13</b>
<b>6. ENVIRONMENTAL REQUIREMENTS AND SPECIFICATIONS .....</b>	<b>13</b>
6.1 TEMPERATURE .....	13
6.2 PCB BENDING .....	13
6.3 HANDLING ENVIRONMENT .....	14
6.4 STORAGE CONDITION .....	14
6.5 BAKING CONDITION .....	14
6.6 SOLDERING AND REFLOW CONDITION .....	14



## 1. Revision History

Date	Change Note	REV Note
2011-12-26	Initial release	1.0
2012-04-16	1. Update block diagram in 3.2. 2. Update Electrical Specification in 3.3. 3. Update WLAN RF Characteristics in 3.4. 4. Update Bluetooth Standard Specifications in 3.5. 5. Change LGA G6 pin definition in 3.6. 6. Update mechanical drawing.	2.0
2012-06-18	1. Update WLAN RF characteristics in 3.4. 2. Update Bluetooth standard specifications in 3.5. 3. Update schematic.	3.0



## 2. Introduction

### Project Name: 802.11abgn (1X1) + BT4.0 combo module

This documentation describes the product specification of the WLAN+BT combo Module. WLAN is Compliant with IEEE Std. 802.11b-1999, IEEE Std. 802.11g-2003 and IEEE Std. 802.11n-2009, Bluetooth is compliant with Bluetooth 4.0+HS. It is a confidential document of Foxconn.

\* For b/g/n and a/b/g/n module, Foxconn HW/FW are the same, platform use different firmware and driver to enable or disable 5GHz

### 2.1 Scope

This combo Module combines WLAN, Bluetooth in one module, the WLAN is available in the 2.4GHz and 5GHz band, it is compatible with the IEEE 802.11 a/b/g standard and the 802.11n standard. It allow user to switch to different vendors' Access Points through the wireless networks and to prevent from eavesdropping. The 802.11 a/g data rate provides for 54, 48, 36, 24, 18, 12, 9, 6Mbps, 802.11b data rate provides for 11, 5.5, 2, 1 Mbps, it can also support 11n high data rate up to MCS7(HT20) with PHY data rate to 72Mbps. Bluetooth is compliant to Core Specification version 4.0.

### 2.2 Function

- Single stream 802.11n support for 20MHz channels provide PHY layer rates up to 72Mbps.
- Bluetooth supports Class 1 and Class 2 output power.
- Provides a small form factor solution and ultra low power consumption to support low cost requirement.
- Host interface supports:
  - WLAN: SDIO;
  - BT data: UART
  - BT digital audio: PCM



### 3. Product Specification

#### 3.1 Hardware Characteristic

Form factor	14.5mmx14.5mm LGA
Host Interface	WLAN: SDIO BT: UART for data, PCM for Audio
PCB	6-layer HDI design
RF connector	Two MHF RF connector on module

#### 3.2 Hardware Architecture

The WLAN+BT combo module is designed base on BROADCOM BCM4330 chip, the Broadcom BCM4330 is a highly integrated single chip solution for single stream dual-band WLAN and BT4.0, use two RF connector with one for antenna diversity, a 26MHz crystal is used for reference clock generation, see the block diagram as below:

#### 3.3 Electrical Specification

##### Absolute Maximum Ratings

These specification indicate levels where permanent damage to the device can occur. Functional operation is not guaranteed under these conditions. Operation at absolute maximum conditions for extended can adversely affect long-term reliability of the device.

Rating	Symbol	Value	Unit
DC supply voltage for the device	VBAT_3.3V	-0.3 to 3.6	V
VDDIO	VIO	-0.5 to 2.98	V

##### Recommended Operating Condition

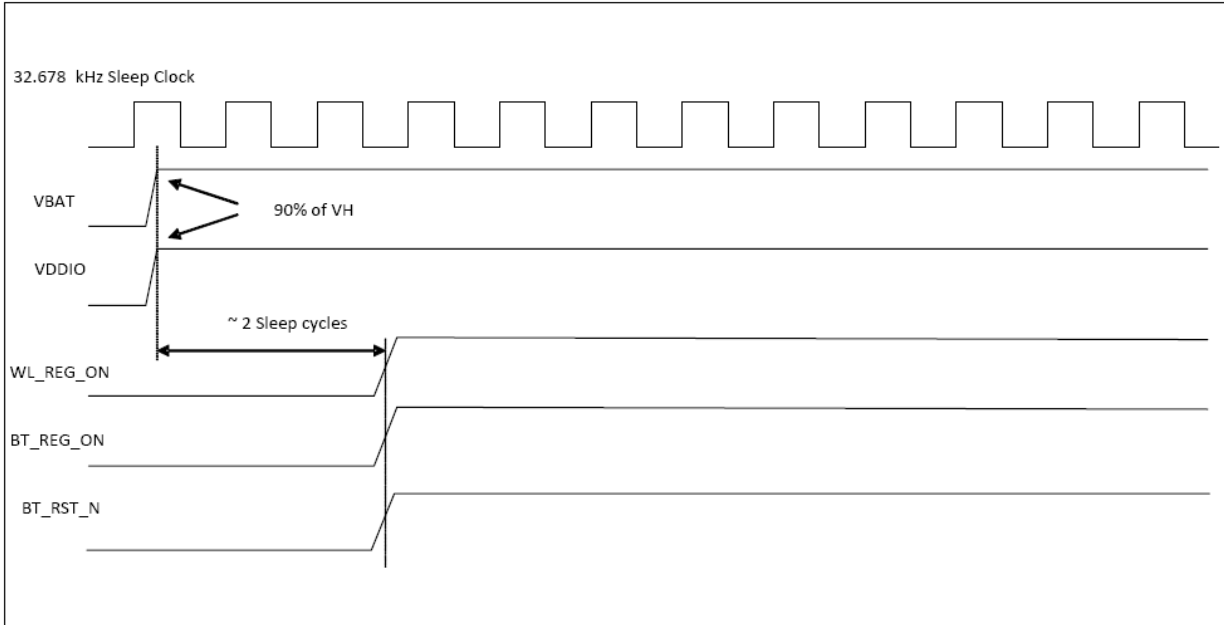
Element	Symbol	Value			Unit
		Minimum	Typical	Maximum	
DC supply voltage for the device	VBAT_3.3V	3.0	3.3	3.6	V
VDDIO for WL_VDDIO and BT_VDDIO	VIO_1.8V	1.2	1.8	2.9	V

Function operation is not guaranteed outside this limit, and operation outside this limit for extended periods can adversely affect long-term reliability of the device.

Remark:

VBAT\_3.3V range is restricted by FEM SE5007BT.

### Power-Up Sequence Timing



WLAN = ON, Bluetooth = ON

### Current Consumption

TBD

\* Will be updated after EDVT testing.

### Product ID Definition

Vendor ID: 0x14e4

Device ID: 0x4360

### 3.4 WLAN RF Characteristics

#### 3.4.1 IEEE802.11b

Items	Contents			
Specification	IEEE802.11b			
Mode	DSSS / CCK			
Channel	CH1 to CH13,CH14			
Data rate	1, 2, 5.5, 11Mbps			
<b>-TX Characteristics-</b>	Min.	Typ.	Max.	Unit
<b>1. Power Levels</b>				
1) Target Power@1Mbps	13	15	17	dBm
2) Target Power@2Mbps	13	15	17	dBm
3) Target Power@5.5Mbps	13	15	17	dBm
4) Target Power@11Mbps	13	15	17	dBm
<b>2. Spectrum Mask @18dBm</b>				
1) $f_c - 33\text{MHz} < f < f_c - 22\text{MHz}$	-	-	-50	dBr
2) $f_c - 22\text{MHz} < f < f_c - 11\text{MHz}$	-	-	-30	dBr
3) $f_c + 11\text{MHz} < f < f_c + 22\text{MHz}$	-	-	-30	dBr
4) $f_c + 22\text{MHz} < f < f_c + 33\text{MHz}$	-	-	-50	dBr
<b>3. Frequency Error</b>	-15	-	+15	ppm



<b>4.Modulation Accuracy(EVM)@18dBm</b>				
1) 1Mbps	-	-	-9.1	dB
2) 2Mbps	-	-	-9.1	dB
3) 5.5Mbps	-	-	-9.1	dB
4) 11Mbps	-	-	-9.1	dB
<b>-RX Characteristics-</b>	<b>Min.</b>	<b>Typ.</b>	<b>Max.</b>	<b>Unit</b>
<b>5. Minimum Input Level Sensitivity</b>				
1) 1Mbps (FER ≤8%)	-	-91	-	dBm
2) 2Mbps (FER ≤8%)	-	-90	-	dBm
3) 5.5Mbps (FER ≤8%)	-	-87	-	dBm
4) 11Mbps (FER ≤8%)	-	-85	-	dBm
<b>6. Maximum Input Level</b>	-10	-7	-	dBm
<b>-Spurious Emission-</b>	<b>Min.</b>	<b>Typ.</b>	<b>Max.</b>	<b>Unit</b>
FCC(30MHz- 1GHz)	-	-	-41.3	dBm
FCC Average(1GHz – 12.75GHz)	-	-	-41.3	dBm

**3.4.2 IEEE802.11g**

<b>Items</b>	<b>Contents</b>			
<b>Specification</b>	IEEE802.11g			
<b>Mode</b>	OFDM			
<b>Channel</b>	CH1 to CH13			
<b>Data rate</b>	6, 9, 12, 18, 24, 36, 48, 54Mbps			
<b>- TX Characteristics -</b>	<b>Min.</b>	<b>Typ.</b>	<b>Max.</b>	<b>Unit</b>
<b>1. Power Levels</b>				
1) Target Power@6Mbps	11	13	15	dBm
2) Target Power@9Mbps	11	13	15	dBm
3) Target Power@12Mbps	11	13	15	dBm
4) Target Power@18Mbps	11	13	15	dBm
5) Target Power@24Mbps	11	13	15	dBm
6) Target Power@36Mbps	11	13	15	dBm
7) Target Power@48Mbps	11	13	15	dBm
8) Target Power@54Mbps	11	13	15	dBm
<b>2. Spectrum Mask @16dBm</b>				
1) at fc +/- 11MHz	-	-	-20	dBr
2) at fc +/- 20MHz	-	-	-28	dBr
3) at fc > +/-30MHz	-	-	-40	dBr
<b>3. Frequency Error</b>	-15	-	+15	ppm
<b>4. Constellation Error(EVM)@16dBm</b>				
1) 6Mbps	-	-	-5	dB
2) 9Mbps	-	-	-8	dB
3) 12Mbps	-	-	-10	dB
4) 18Mbps	-	-	-13	dB
5) 24Mbps	-	-	-16	dB
6) 36Mbps	-	-	-19	dB
7) 48Mbps	-	-	-22	dB
8) 54Mbps	-	-	-25	dB
<b>- RX Characteristics -</b>	<b>Min.</b>	<b>Typ.</b>	<b>Max.</b>	<b>Unit</b>
<b>5. Minimum Input Level Sensitivity</b>				
1) 6Mbps (PER < 10%)	-	-88	-	dBm
2) 9Mbps (PER < 10%)	-	-86	-	dBm
3) 12Mbps (PER < 10%)	-	-85	-	dBm
4) 18Mbps (PER < 10%)	-	-84	-	dBm
5) 24Mbps (PER < 10%)	-	-82	-	dBm
6) 36Mbps (PER < 10%)	-	-78	-	dBm
7) 48Mbps (PER < 10%)	-	-74	-	dBm
8) 54Mbps (PER < 10%)	-	-72	-	dBm



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<b>6. Maximum Input Level (PER &lt; 10%)</b>	-20	-7	-	dBm
<b>-Spurious Emission-</b>	Min.	Typ.	Max.	Unit
FCC(30MHz- 1GHz)	-	-	-41.3	dBm
FCC Average(1GHz – 12.75GHz)	-	-	-41.3	dBm

### 3.4.3 IEEE802.11n HT20(2.4GHz)

Items	Contents			
<b>Specification</b>	IEEE802.11n HT20			
<b>Mode</b>	OFDM			
<b>Channel</b>	CH1 to CH13			
<b>Data rate (MCS index)</b>	MCS0~MCS7			
<b>- TX Characteristics -</b>	Min.	Typ.	Max.	Unit
<b>1. PowerLevels</b>				
1) Target Power@MCS0	10	12	14	dBm
2) Target Power@ MCS1	10	12	14	dBm
3) Target Power@ MCS2	10	12	14	dBm
4) Target Power@ MCS3	10	12	14	dBm
5) Target Power@ MCS4	10	12	14	dBm
6) Target Power@ MCS5	10	12	14	dBm
7) Target Power@ MCS6	10	12	14	dBm
8) Target Power@ MCS7	10	12	14	dBm
<b>2. Spectrum Mask @15dBm</b>				
1) at fc +/- 11MHz	-	-	-20	dBr
2) at fc +/- 20MHz	-	-	-28	dBr
3) at fc > +/-30MHz	-	-	-45	dBr
<b>3. Frequency Error</b>	-15	-	+15	ppm
<b>4. Constellation Error(EVM)@15dBm</b>				
1) MCS0	-	-	-5	dB
2) MCS1	-	-	-10	dB
3) MCS2	-	-	-13	dB
4) MCS3	-	-	-16	dB
5) MCS4	-	-	-19	dB
6) MCS5	-	-	-22	dB
7) MCS6	-	-	-25	dB
8) MCS7	-	-	-28	dB
<b>- RX Characteristics -</b>	Min.	Typ.	Max.	Unit
<b>5. Minimum Input Level Sensitivity</b>				
1) MCS0 (PER < 10%)	-	-85	-	dBm
2) MCS1 (PER < 10%)	-	-84	-	dBm
3) MCS2 (PER < 10%)	-	-82	-	dBm
4) MCS3 (PER < 10%)	-	-80	-	dBm
5) MCS4 (PER < 10%)	-	-77	-	dBm
6) MCS5 (PER < 10%)	-	-73	-	dBm
7) MCS6 (PER < 10%)	-	-71	-	dBm
8) MCS7 (PER < 10%)	-	-69	-	dBm
<b>6. Maximum Input Level (PER &lt; 10%)</b>	-20	-7	-	dBm
<b>-Spurious Emission-</b>	Min.	Typ.	Max.	Unit
FCC(30MHz- 1GHz)	-	-	-41.3	dBm
FCC Average(1GHz – 12.75GHz)	-	-	-41.3	dBm



3.4.5 IEEE802.11a

Items	Contents			
<b>Specification</b>	IEEE802.11a			
<b>Mode</b>	OFDM			
<b>Channel</b>	lower band:5.15GHz~5.25GHz middle band:5.25GHz~5.35GHz upper band:5.745GHz~5.805GHz			
<b>Data rate</b>	6, 9, 12, 18, 24, 36, 48, 54Mbps			
<b>- TX Characteristics -</b>	Min.	Typ.	Max.	Unit
<b>1. Power Levels</b>				
Low Band	12.5	14	15.5	dBm
Middle Band	12.5	14	15.5	dBm
Upper Band	12.5	14	15.5	dBm
<b>2. Spectrum Mask @ Type power</b>				
1) at fc +/- 11MHz	-	-	-20	dBr
2) at fc +/- 20MHz	-	-	-28	dBr
3) at fc > +/-30MHz	-	-	-40	dBr
<b>3. Frequency Error</b>	-15	-	+15	ppm
<b>4. Constellation Error(EVM)@ Type power</b>				
1) 6Mbps	-	-	-5	dB
2) 9Mbps	-	-	-8	dB
3) 12Mbps	-	-	-10	dB
4) 18Mbps	-	-	-13	dB
5) 24Mbps	-	-	-16	dB
6) 36Mbps	-	-	-19	dB
7) 48Mbps	-	-	-22	dB
8) 54Mbps	-	-	-25	dB
<b>- RX Characteristics -</b>	Min.	Typ.	Max.	Unit
<b>5. Minimum Input Level Sensitivity</b>				
1) 6Mbps (PER < 10%)	-	-90	-	dBm
2) 9Mbps (PER < 10%)	-	-89	-	dBm
3) 12Mbps (PER < 10%)	-	-88	-	dBm
4) 18Mbps (PER < 10%)	-	-86	-	dBm
5) 24Mbps (PER < 10%)	-	-84	-	dBm
6) 36Mbps (PER < 10%)	-	-81	-	dBm
7) 48Mbps (PER < 10%)	-	-77	-	dBm
8) 54Mbps (PER < 10%)	-	-75	-	dBm
<b>6. Maximum Input Level (PER &lt; 10%)</b>	-30	-24	-	dBm
<b>-Spurious Emission-</b>	Min.	Typ.	Max.	Unit
FCC(30MHz- 1GHz)	-	-	-41.3	dBm
FCC Average(1GHz – 12.75GHz)	-	-	-41.3	dBm

3.4.6 IEEE802.11n HT20 (5GHz)

Items	Contents			
Specification	IEEE802.11n HT20			
Mode	OFDM			
Channel	low band:5.15GHz~5.25GHz middle band:5.25GHz~5.35GHz upper band:5.5GHz~5.825GHz			
Data rate (MCS index)	MCS0~MCS7			
- TX Characteristics -	Min.	Typ.	Max.	Unit
<b>1. Power Levels</b>				
Low Band	11.5	13	14.5	dBm
Middle Band	11.5	13	14.5	dBm
Upper Band	11.5	13	14.5	dBm
<b>2. Spectrum Mask @Type power</b>				
1) at fc +/- 11MHz	-	-	-20	dBr
2) at fc +/- 20MHz	-	-	-28	dBr
3) at fc > +/-30MHz	-	-	-45	dBr
<b>3. Frequency Error</b>	-15	-	+15	ppm
<b>4. Constellation Error(EVM)@Type power</b>				
1) MCS0	-	-	-5	dB
2) MCS1	-	-	-10	dB
3) MCS2	-	-	-13	dB
4) MCS3	-	-	-16	dB
5) MCS4	-	-	-19	dB
6) MCS5	-	-	-22	dB
7) MCS6	-	-	-25	dB
8) MCS7	-	-	-28	dB
- RX Characteristics -	Min.	Typ.	Max.	Unit
<b>5. Minimum Input Level Sensitivity</b>				
1) MCS0 (PER < 10%)	-	-89	-	dBm
2) MCS1 (PER < 10%)	-	-87	-	dBm
3) MCS2 (PER < 10%)	-	-85	-	dBm
4) MCS3 (PER < 10%)	-	-83	-	dBm
5) MCS4 (PER < 10%)	-	-79	-	dBm
6) MCS5 (PER < 10%)	-	-75	-	dBm
7) MCS6 (PER < 10%)	-	-73	-	dBm
8) MCS7 (PER < 10%)	-	-72	-	dBm
<b>6. Maximum Input Level (PER &lt; 10%)</b>	-30	-	-	dBm
- RX Characteristics -	Min.	Typ.	Max.	Unit
FCC(30MHz- 1GHz)	-	-	-41.3	dBm
FCC Average(1GHz – 12.75GHz)	-	-	-41.3	dBm

\* The performance will be updated after EDVT testing.



### 3.5 Bluetooth Standard Specifications

Bluetooth Core Specification version 4.0:  
 Host interface: UART, baud rates up to 4Mbps  
 Support all Bluetooth 4.0+HS packet types.  
 Operating frequency range: 2400MHz ~2483.5MHz  
 Modulation type:  
 Basic rate 1Mbps: GFSK,  
 Enhanced data rate 2Mbps: DQPSK  
 Enhanced data rate 3Mbps: 8DPSK

Items	Contents			
Specification	BT4.0+EDR			
Frequency range	2.4G~2.4835G			
Data rate	1Mbps, 2Mbps, 3Mbps			
- TX Characteristics -	Min.	Typ.	Max.	Unit
<b>1. Power Levels</b>				
BT Output Power	0	2	4	dBm
<b>2. Minimum Input Level Sensitivity</b>				
GFSK (1Mbps)	-	-88	-	dBm
DQPSK (2Mbps)	-	-91	-	dBm
8DPSK (3Mbps)	-	-85	-	dBm

Remark: BT power level can be changed according to customer's request by modifying hcd file.

### 3.6 LGA Pin Definition

#### Bottom View

	1	2	3	4	5	6	7	8	9	10
A		GND	GND	GND	GND	GND	GND	GND	GND	GND
B	GND	GND	GND	GND	GND	GND	GND	GND	GND	GND
C	GND	GND	GND	GND	GND	GND	GND	GND	GND	ANT_MAIN_LGA
D	GND	GND	GND	GND	GND	GND	GND	GND	GND	GND
E	GND	GND	GND	UART_CTS_N	UART_RTS_N	UART_RXD	UART_TXD	GND	GND	GND
F	GND	GND	VBAT_3.3V_L	GND	GND	GND	GND	BT_GPIO1_HOSTWAKE	GND	ANT_AUX_LGA
G	GND	GND	GND	GND	GND	WLAN_LED	SDIO_SPI_SEL	BT_GPIO0_BTWAKE	BT_RST_N	GND
H	GND	GND	GND	GND	GPIO0_WL_HOST_WAKE	GND	GND	LPO	BT_CLK_REQ_OUT	GND
J	GND	GND	GND	BT_PCM_IN	BT_PCM_OUT	GND	SDIO_DATA3	BT_REG_ON	VBAT_3.3V_R	WL_REG_NO
K	GND	GND	BT_PCM_CLK	BT_PCM_SYNC	VIO_1.8V	SDIO_DATA2	SDIO_DATA0	SDIO_CMD	SDIO_CLK	SDIO_DATA1

Pin No.	Pin Name	Type	Description
C10	ANT_MAIN_LGA	I/O	Reserved LGA pin for connecting main antenna on mother board
F10	ANT_AUX_LGA	I/O	Reserved LGA pin for connecting aux antenna on mother board
E4	UART_CTS_N	I	UART clear to Send, active low (for BT data)
E5	UART_RTS_N	O	UART request to Send, active low (for BT data)
E6	UART_RXD	I	UART signal input
E7	UART_TXD	O	UART signal output
F3	VBAT_3.3V_L	I	Main power supply for the module, (3.3V+/-10%, together with pin J9 to supply the module ), reserve 500mA current consumption for this pin, need external 10uF decoupling cap
F8	BT_GPIO1_HOSTWAKE	O	Signal from module to host to require Host wake up



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G9	BT_RST_N	I	External reset for BT, active low, please pull-up on host side (not left floating)
G7	SDIO_SPI_SEL	I	Host interface mode selection, internal pull down, work with SDIO_DATA_1 and SDIO_DATA_2 together to set SDIO interface, if use SDIO, then simply pull this pin low via a 10Kohm.
G6	WLAN LED	O	Reserve for wireless status indicator connect to WL_GPIO_1 of BCM4330

G8	BT_GPIO0_BTWAKE	I	BT wake up, signal from the host to module to require BT device wake-up or remain awake
H9	BT_CLK_REQ_OUT	O	BT/WLAN reference clock request out, active high, need an external 100kohm pull-down resistor to ensure the signal is deasserted when BCM43330 powers up
H5	GPIO0_WL_HOST_WAKE	O	Signal from WLAN device to awake the host.
H8	LPO	I	32.768kHz LPO clock, need for device auto frequency detection
J4	BT_PCM_IN	I	PCM data input
J5	BT_PCM_OUT	O	PCM data output
J7	SDIO_DATA3	I/O	SDIO data line 3
J8	BT_REG_ON	I	Power up or power down BCM4330 internal regulators used for BT, Logic high level: 1.08V~3.6V Need pull-up via a 10Kohm resistor or less (inertnal 200K pull-down)
J9	VBAT_3.3V_R	I	Main power supply for the module, (3.3V+/-10%, together with pin F3 to supply the module ), please consider reserve for 500mA current consumption, external 10uF decoupling cap.
J10	WL_REG_ON	I	Power up or power down BCM4330 internal regulators used for WLAN, this pin is also a low active reset for WLAN only (not for BT) Logic high level: 1.08V~3.6V Need pull-up via a 10Kohm resistor or less (inertnal 200K pull-down)
K3	BT_PCM_CLK	I	PCM Clock
K4	BT_PCM_SYNC	I/O	PCM sync signal
K5	VIO_1.8V	I	VDDIO for BCM4330 I/O supply, range from 1.2V~2.9V, select 1.8V here, please consider reserve for 200mA current consumption
K6	SDIO_DATA2	I/O	SDIO data line 2
K7	SDIO_DATA0	I/O	SDIO data line 0
K8	SDIO_CMD	I/O	SDIO command
K9	SDIO_CLK	I	SDIO clock



K10	SDIO_DATA1	I/O	SDIO data line 1
A2,A3,A4, A5,A6,A7, A8,A9,A1 0,B1,B2,B 3,B4,B5,B 6,B7,B8,B 9,B10,C1, C2,C3,C4, C5,C6,C7, C8,C9,D1, D2,D3,D4, D5,D6,D7, D8,D9,D1 0,E1,E2,E 3,E8,E9,E 10,F1,F2,F 4,F5,F6,F7 ,F9,G1,G2 ,G3,G4,G5 ,G10,H1,H 2,H3,H4,H 6,H7,H10, J1,J2,J3,J6 ,K1,K2,	GND		Ground

#### 4. Software Requirement

- Nvram file for RF parameters configuration.
- If use dual-band WLAN, platform need to load dual-band firmware and install dual-band driver.
- If use single-band WLAN, platform need to load single-band firmware and install single-band driver.

#### 5. Regulatory

TBD

#### 6. Environmental Requirements and Specifications

##### 6.1 Temperature

###### 9.1.1 Operating Temperature Conditions

The product shall be capable of continuous reliable operation when operating in ambient temperature of 0 °C to +70°C.

###### 9.1.2 Non-Operating Temperature Conditions

Neither subassemblies shall be damaged nor shall the operational performance be degraded when restored to the operating temperature when exposed to storage temperature in the range of -10°C to +85°C.

##### 6.2 PCB bending

The PCB bending spec shall be keep planeness under 0.1mm for both Foxconn and end assembly customer.



### 6.3 Handling environment

#### 6.3.1. ESD

The product ESD immunity is HBM $\geq$  +/- 450 (V), MM  $\geq$  +/- 100 (V). Please handle it under ESD protection environment.

Note: HBM: Human Body Model/MM: Mechanical Model

#### 6.3.2. Terminals

The product is mounted with motherboard through Land Grid Array. In order to prevent poor soldering, please do not touch LGA portion by hand.

#### 6.3.3. Falling

It will cause damage on the mounted components when the product is falling or receiving drop shock. It may cause the product mal-function.

### 6.4 Storage Condition

#### 6.4.1 Moisture barrier bag before opened

Moisture barrier bag must be stored under 30 degree C, humidity under 85% RH. The calculated shelf life for the dry packed product shall be a 12 months from the bag seal date.

#### 6.4.2. Moisture barrier bag open

Humidity indicator cards must be blue, <30%.

### 6.5 Baking Condition

Products require baking before mounting if

- a) humidity indicator cards reads >30%
- b) temp <30 degree C, humidity < 70% RH, over 96 hours

Baking condition: 90 degree C, 12-22 hours

Baking times: 1 time

### 6.6 Soldering and reflow condition

#### 1) Heating method

Conventional Convection or IR/convection

#### 2) Temperature measurement

Thermocouple d=0.1mm ~ 0.2mm CA (K) or CC (T) at soldering portion or equivalent method.

#### 3) Solder paste composition

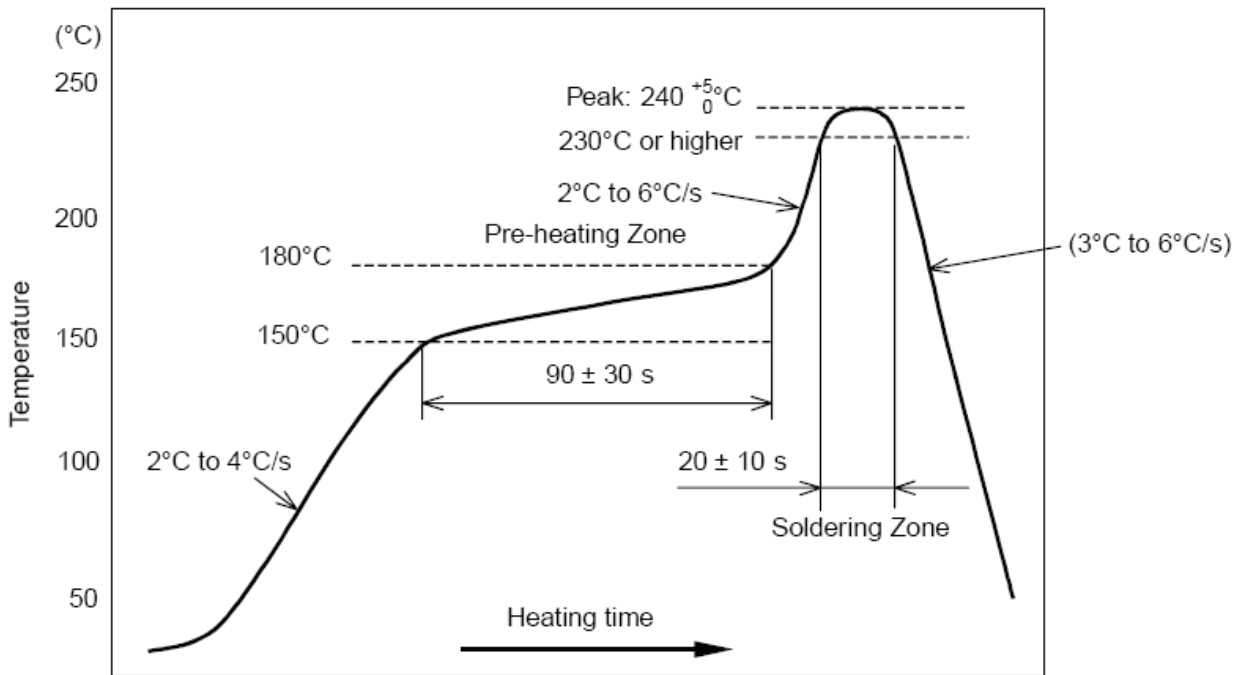
Sn/3.0Ag/0.5Cu

#### 4) Allowable reflow soldering times: 2 times based on the below reflow soldering profile

#### 5) Temperature profile

Reflow soldering shall be done according to the below temperature profile.

#### 6) Peak temp: 245 degree C



**Temperature profile for evaluation of solder heat resistance of a component (at solder joint)**



## **FCC Regulations:**

● 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 device 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 radiated 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 or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- 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 or an experienced radio/TV technician for help.

Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

Operation on the 5.15-5.25GHz frequency band is restricted to indoor use only.

The device marketed to the US/Canada is firmware limited to operate only on channel 1~11.

## **▶ RF Exposure Information**

This Modular Approval is limited to OEM installation for mobile and fixed applications only. The antenna installation and operating configurations of this transmitter, including any applicable source-based time-averaging duty factor, antenna gain and cable loss must satisfy MPE categorical Exclusion Requirements of §2.1091.

The antenna(s) used for this transmitter must be installed to provide a separation distance of at least 20 cm from all persons, must not be collocated or operating in conjunction with any other antenna or transmitter, except in accordance with FCC multi-transmitter product procedures.

The end user has no manual instructions to remove or install the device and a separate approval is required for all other operating configurations, including portable configurations with respect to 2.1093 and different antenna configurations.

Maximum antenna gain allowed for use with this device is 2.5 dBi for 2.4GHz, 2.48dBi for 5GHz. When the module is installed in the host device, the FCC ID label must be visible through a window on the final device or it must be visible when an access panel, door or cover is easily re-moved. If not, a second label must be placed on the outside of the final device that contains the following text: "Contains FCC ID: HLZ-T77H389".





## **IC Regulations:**

This device complies with Industry Canada license-exempt RSS standard(s). 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."

This Class B digital apparatus complies with Canadian ICES-003.

Cet appareil numérique de la classe B est conforme à la norme NMB-003 du Canada.

To reduce potential radio interference to other users, the antenna type and its gain should be so chosen that the equivalent isotropically radiated power (EIRP) is not more than that required for successful communication. This device has been designed to operate with an antenna having a maximum gain of 2.5 dBi for 2.4GHz, 2.48dBi for 5GHz.. When the module is installed in the host device, the IC label must be visible through a window on the final device or it must be visible when an access panel, door or cover is easily re-moved. If not, a second label must be placed on the outside of the final device that contains the following text: "Contains IC: 1754F-T77H389".

Antenna having a higher gain is strictly prohibited per regulations of Industry Canada. The required antenna impedance is 50 ohms.

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.

This device and its antenna(s) must not be co-located or operating in conjunction with any other antenna or transmitter.

The County Code Selection feature is disabled for products marketed in the US/Canada

The device for the band 5150-5250 MHz is only for indoor usage to reduce potential for harmful interference to co-channel mobile satellite systems; the maximum antenna gain permitted (for devices in the bands 5250-5350 MHz and 5470-5725 MHz) to comply with the e.i.r.p. limit; and The maximum antenna gain permitted (for devices in the band 5725-5850 MHz) to comply with the e.i.r.p. limits specified for point-to-point and non point-to-point operation as appropriate, as stated in section A9.2(3). In addition, High-power radars are allocated as primary users (meaning they have priority) of the band 5250-5350 MHz and this radar could cause interference and/or damage to LE-LAN devices.

## **IMPORTANT NOTE:**

### **IC Radiation Exposure Statement:**

This equipment complies with IC RSS-102 radiation exposure limits set forth for an uncontrolled environment. This equipment should be installed and operated with minimum distance 20cm between the radiator & your body.



### R&TTE Regulation:

In all cases assessment of the final product must be mass against the Essential requirements of the R&TTE Directive Articles 3.1(a) and (b), safety and EMC respectively, as well as any relevant Article 3.3 requirements.

The maximum antenna gain is 2.5 dBi for 2.4GHz, 2.48dBi for 5GHz. and the antenna separation distance is 20cm.

The maximum ambient temperature for operating will not be higher than 70 °C.

CE 0700 ⓘ

This equipment may be operated in:							
AT	BE	BG	CH	CY	CZ	DE	DK
EE	ES	FI	FR	GB	GR	HU	IE
IT	IS	LI	LT	LU	LV	MT	NL
NO	PL	PT	RO	SE	SI	SK	TR