

Product Specifications

LM811-045x 11n+ BT WiFi module

Version: 1.6

Manufacturer	CC&C Technologies, Inc.
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Revision History

Version	Issue date	Reason for revision
Preliminary	Aug. 1, 2014	Preliminary release
1.1	Aug. 18, 2014	Modify for Pin-out of module, dimension figure, and added factory options
1.2	Sep. 26, 2014	Add DC power input, power consumption item and operating temperature data
1.3	Jan. 12, 2015	Modify factory optional explanation
1.4	Mar. 3, 2015	Modify PCB pin out and add chip antenna optional
1.5	June 09, 2015	Modify dimension figure (Distance between Pin13 to PCB left)
1.6	Oct. 13, 2015	Add Interface Specification, Modify Pin outs define

Overview

LM811-045X is a WLAN 11n and Bluetooth combo module, provides a single USB interface to host, which fully supports the features and functional compliance of IEEE 802.11b/g/n standards, Bluetooth v2.1, v3.0 and v4.0 standards. It supports up to 150Mbps WLAN network connections and Bluetooth protocol stack (LM, LL and LE), Bluetooth baseband and modem.

It is designed to provide excellent performance with low power consumption and enhance the advantages of robust system and cost-effective.

LM811-045X provides a complete solution for a high throughput performance integrated wireless LAN and Bluetooth module, and is targeted at competitive superior performance, better power management applications.

Features

- Operate at ISM frequency bands (2.4GHz)
- IEEE standards support: IEEE 802.11b/ g/ n/ d/ e/ h/ i
- Fully qualified Bluetooth 2.1 + EDR specification including both 2Mbps and 3Mbps modulation mode
- Fully qualified Bluetooth 3.0
- Fully qualified Bluetooth 4.0 Dual mode
- Full speed Bluetooth operation with Pico net and Scatter net support
- Enterprise level security which can apply WPA/WPA2 certification for WiFi
- WiFi 1T1R, allow data rate supporting up to 150Mbps
- Support sophisticated WiFi/BT coexistence mechanism to enhance collection performance
- Support antenna diversity for WiFi and BT antenna selection
- Support Bluetooth adaptive power management mechanism
- Fully-featured software utility for easy configuration and management
- RoHS compliance
- Low Halogen compliance

General Specification

Model Name	LM811-045x
Product Name	WLAN and Bluetooth combo module, USB interface
Standards	IEEE 802.11b/g/n/d/e/h/i Bluetooth v2.1+EDR/ v3.0/ v3.0+HS/ v4.0
Data Transfer Rate	WLAN: 802.11b: 11, 5.5, 2, 1 Mbps 802.11g: 54, 48, 36, 24, 18, 12, 9, 6 Mbps 802.11n: MCS0 to 7 for HT20MHz, MCS0 to 7 for HT40MHz Bluetooth: Basic rate: 1Mbps Enhanced data rate: 2, 3 Mbps High Speed: 6, 9, 12, 18, 24, 36, 48, 54 Mbps
Modulation Method	WLAN: 802.11b: CCK, DQPSK, DBPSK 802.11g: 64QAM, 16QAM, QPSK, BPSK 802.11n: 64QAM, 16QAM, QPSK, BPSK Bluetooth: 8DPSK, $\pi/4$ DQPSK, GFSKFSK
Operating Channel	WLAN 2.4GHz: 11: (Ch. 1-11) – United States 13: (Ch. 1-13) – Europe 14: (Ch. 1-14) – Japan BT 2.4GHz: Ch. 0 to 78
Frequency Range	2.4GHz ISM band (2.400GHz to 2.4835 GHz)
Spread Spectrum	WLAN IEEE 802.11b: DSSS (Direct Sequence Spread Spectrum) WLAN IEEE 802.11g/n: OFDM (Orthogonal Frequency Division Multiplexing) Bluetooth: FHSS (Frequency Hopping Spread Spectrum)
RF Output Power (tolerance ± 2 dBm)	WLAN: 17dBm – 802.11b@11Mbps 15dBm – 802.11g@6Mbps 14dBm – 802.11g@54Mbps 13dBm – 802.11n@MCS0_HT20 13dBm – 802.11n@MCS7_HT20 13dBm – 802.11n@MCS0_HT40 13dBm – 802.11n@MCS7_HT40 Bluetooth: Max + 8dBm
Network architecture	WLAN: Ad hoc mode (Peer-to-Peer) Infrastructure mode Software AP WiFi Direct BT: Pico Net Scatter Net
Receiver Sensitivity	WLAN: -82dBm – 802.11b@11Mbps -71dBm – 802.11g@54Mbps -67dBm – 802.11n@MCS7_HT20 -64dBm – 802.11n@MCS7_HT40 Bluetooth: -89dBm@1Mbps

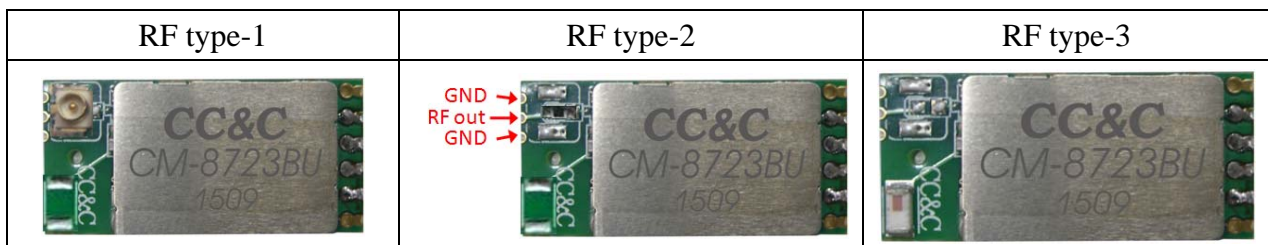
	-90dBm@2Mbps -83dBm@3Mbps
Operation Range	WLAN: Up to 180 meters in open space Bluetooth: Great than 10 meters in open space
OS Support	Windows XP/ Linux/ Android
Security	WLAN: WPA, WPA-PSK, WPA2, WPA2-PSK, WEP 64bit & 128bit, IEEE 802.11x, IEEE 802.11i BT: Simple Paring
Bus interface	USB 2.0
Operating Temperature	0 – 60° C ambient temperature 0 to 95 % (non-condensing)
Storage Temperature	-20 ~ 70°C ambient temperature 0 to 95 % (non-condensing)
Dimension	25 x 12 x 2 mm (LxWxH)

Factory options

- DC power input 3.3V or 5V input and DC range as below table

Module	Minimum	Typical	Maximum	Unit
DC 5V module	4.75	5	5.25	V
DC 3.3V module	3.135	3.3	3.465	V

- RF out can select below: RF connector (type-1), RF output on half-hole pin (type-2), RF out by chip antenna (type-3)



Power Consumption

DC power for 5V		
Description	Performance	
	TYP	UNITS
Off	10	uA
Unassociated idle	40	mA
Associated idle for 2.4GHz band	70	mA
Data transfer for 2.4GHz	103	mA

PS. Data transfer test using the Linux driver: Linux_v4.3.6_11841.20140714

DC power for 3.3V		
Description	Performance	
	TYP	UNITS
Off	16	uA
Unassociated idle	90	mA
Associated idle for 2.4GHz band	141	mA
Data transfer for 2.4GHz	168	mA

PS. Data transfer test using the Linux driver: Linux_v4.3.6_11841.20140714

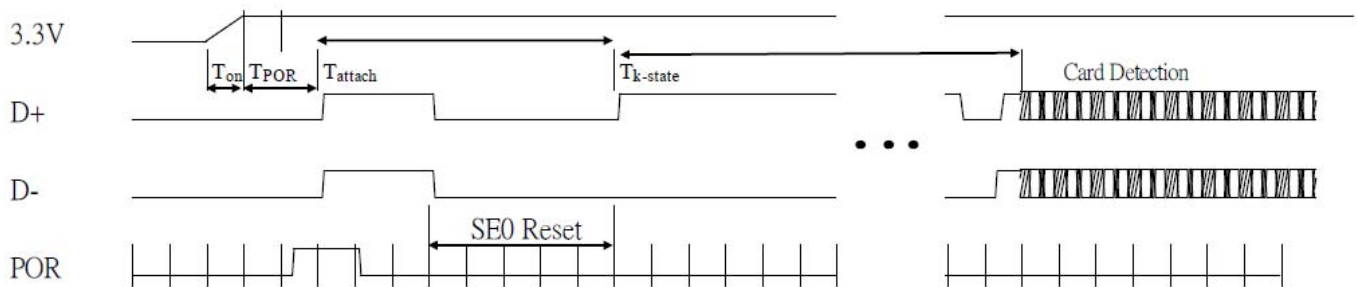
Pin outs define:



Pin	Signal	Input /Output	Description
1	CHIP_WAKE_HOST	Output	Signal from module to wake up host, refer driver source code for details.
2	GND	Power	Ground
3	USB D+	I/O	USB D+ signal
4	USB D-	I/O	USB D- signal
5	VCC	Power	DC 3.3V
6	HOST_WAKE_CHIP	Input	Signal from host to wake up module, refer driver source code for details.
7	GND	Power	Ground
8	ANT	RF	WLAN/BT RF port (if don't using IPEX connector)
9	GND	Power	Ground
10	BT_PCM_IN	Input	PCM data Input. This pin is also shared with GPIO0 and 3DG_SEL_A.
11	BT_PCM_OUT	Output	PCM data Output. This pin is also shared with GPIO1 and 3DG_SYNC_A.
12	BT_PCM_SYNK	I/O	PCM frame Synchronization. This pin is also shared with GPIO2.
13	BT_PCM_CLK	I/O	PCM Clock. This pin is also shared with GPIO3.
14	EXT_XIN	-	NC_ Keep to floating

Interface Timing Specification

USB Bus during Power On Sequence



CM-8723BU USB Bus Power On Sequence

T_{on} : The main power ramp up duration

T_{por} : The power on reset releases and power management unit executes power on tasks

T_{attach} : USB attach state

$T_{k-state}$: the duration from register attached to USB host starting card detection procedure

The power on flow description:

After main 3.3V ramp up, the internal power on reset is released by power ready detection circuit and the power management unit will be enabled. The power management unit enables the internal regulator and clock circuits.

The power management unit also enables the USB circuits.

USB analog circuits attach resistors to indicate the insertion of the USB device.

The typical timing range

	Unit	Min	Typical	Max
T_{on}	ms	--	1.5	5
T_{por}	ms	--	2	10
T_{attach}	ms	2	7	15
$T_{k-state}$	ms	50	250	--

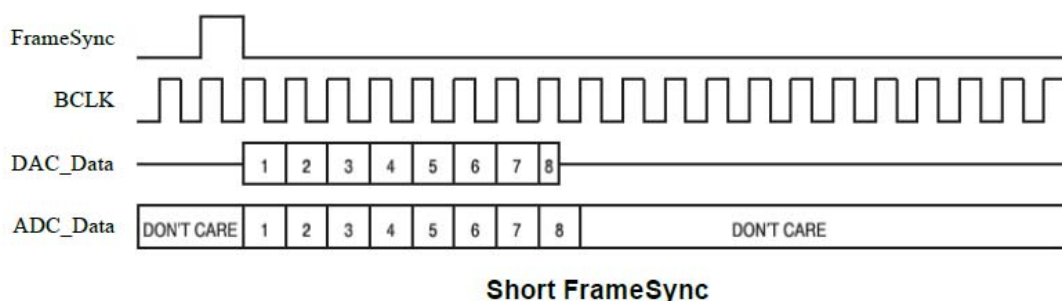
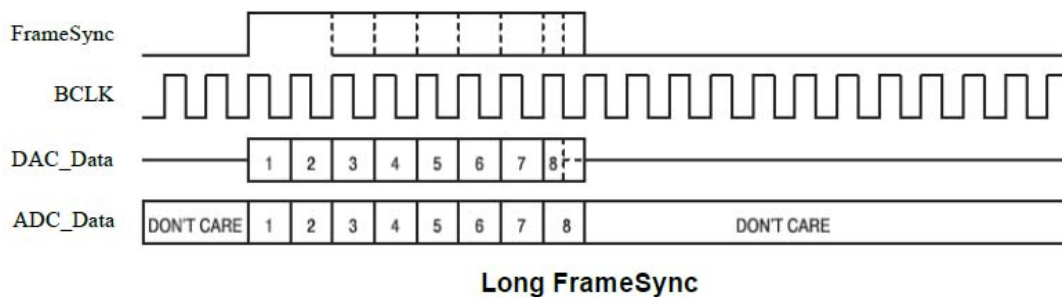
PCM Interface Characteristics

The CM-8723BU supports a PCM digital audio interface that is used for transmitting digital audio/voice data to/from the Audio Codes. Features are supported as below:

- Supports Master and Slave mode
- Programmable long/short Frame Sync
- Supports 8-bit A-law/~~μ~~-law, and 13/16-bit linear PCM formats
- Supports sign-extension and zero-padding for 8-bit and 13-bit samples
- Supports padding of Audio Gain to 13-bit samples
- PCM Master Clock Output: 64, 128, 256, or 512kHz
- Supports SCO/ESCO link

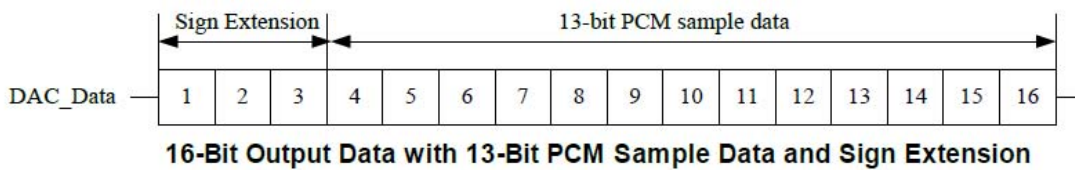
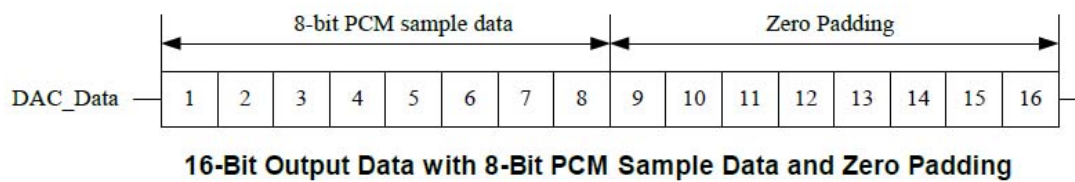
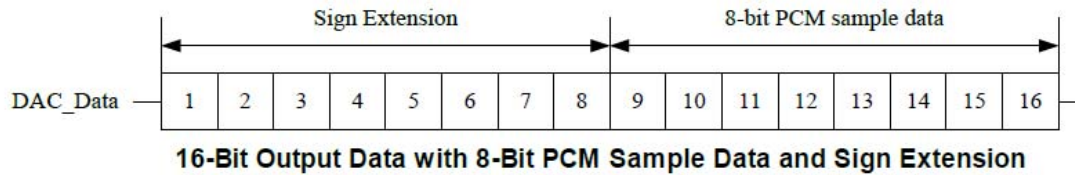
PCM Format

FrameSync is the synchronizing function used to control the transfer of DAC_Data and ADC_Data. A Long FrameSync indicates the start of ADC_Data at the rising edge of FrameSync, and a Short FrameSync indicates the start of ADC_Data at the falling edge of FrameSync.

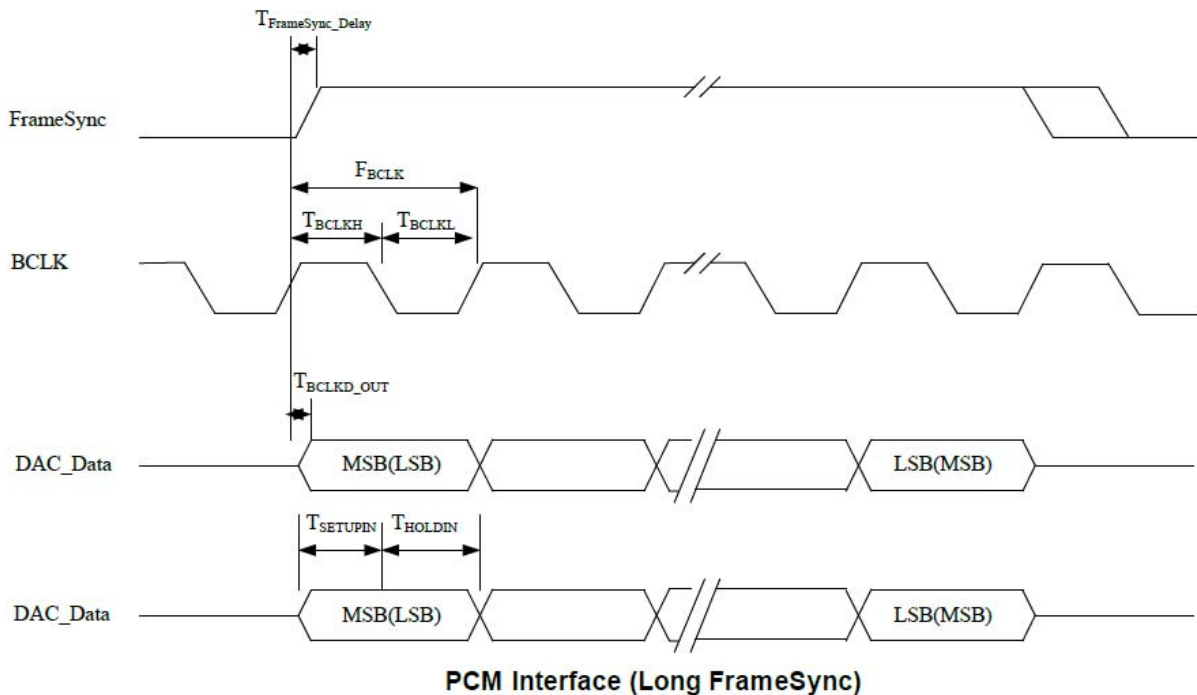


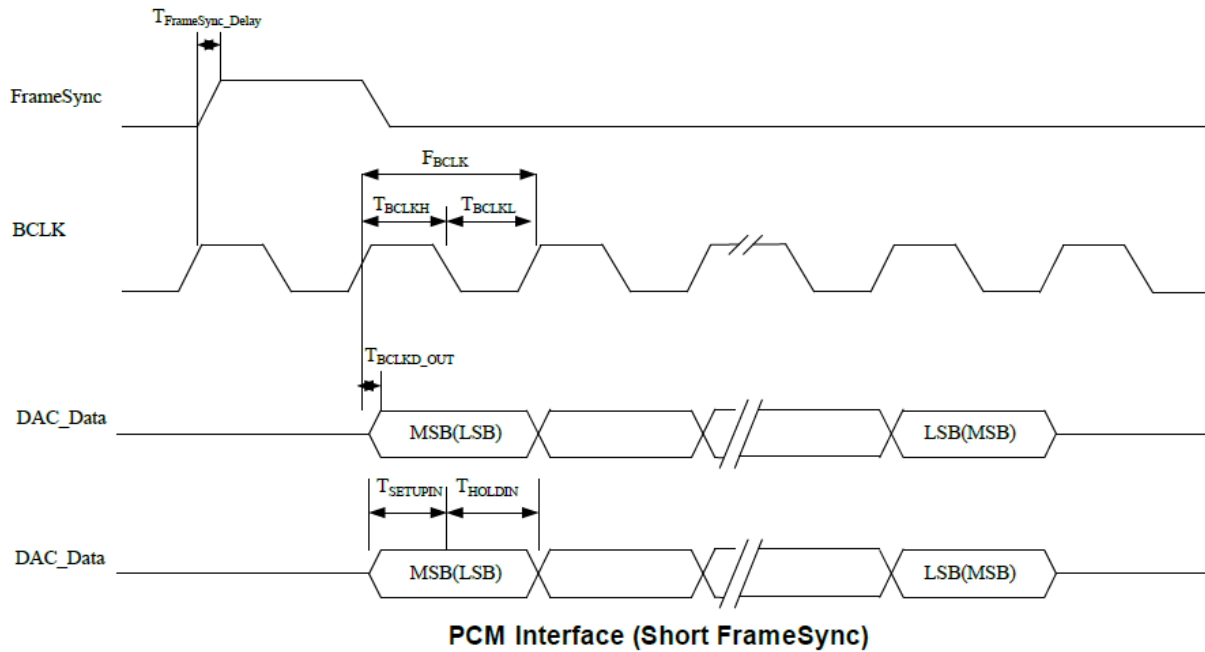
Sign Extension and Zero Padding for 8-Bit and 13-Bit Samples

For 16-bit linear PCM output, 3 or 8 unused bits may be sign extended/zero padded.



PCM Interface Timing





PCM Interface Clock Specifications

Symbol	Description	Min.	Typ.	Max.	Unit
F_{BCLK}	Frequency of BCLK (Master)	64	-	512	kHz
$F_{FrameSync}$	Frequency of Frame Sync (Master)	-	8	-	kHz
F_{BCLK}	Frequency of BCLK (Slave)	64	-	512	kHz
$F_{FrameSync}$	Frequency of Frame Sync (Slave)	-	8	-	kHz
D	Data Size	8	8	16	bits
N	Number of Slots Per Frame	1	1	1	Slots

PCM Interface Timing

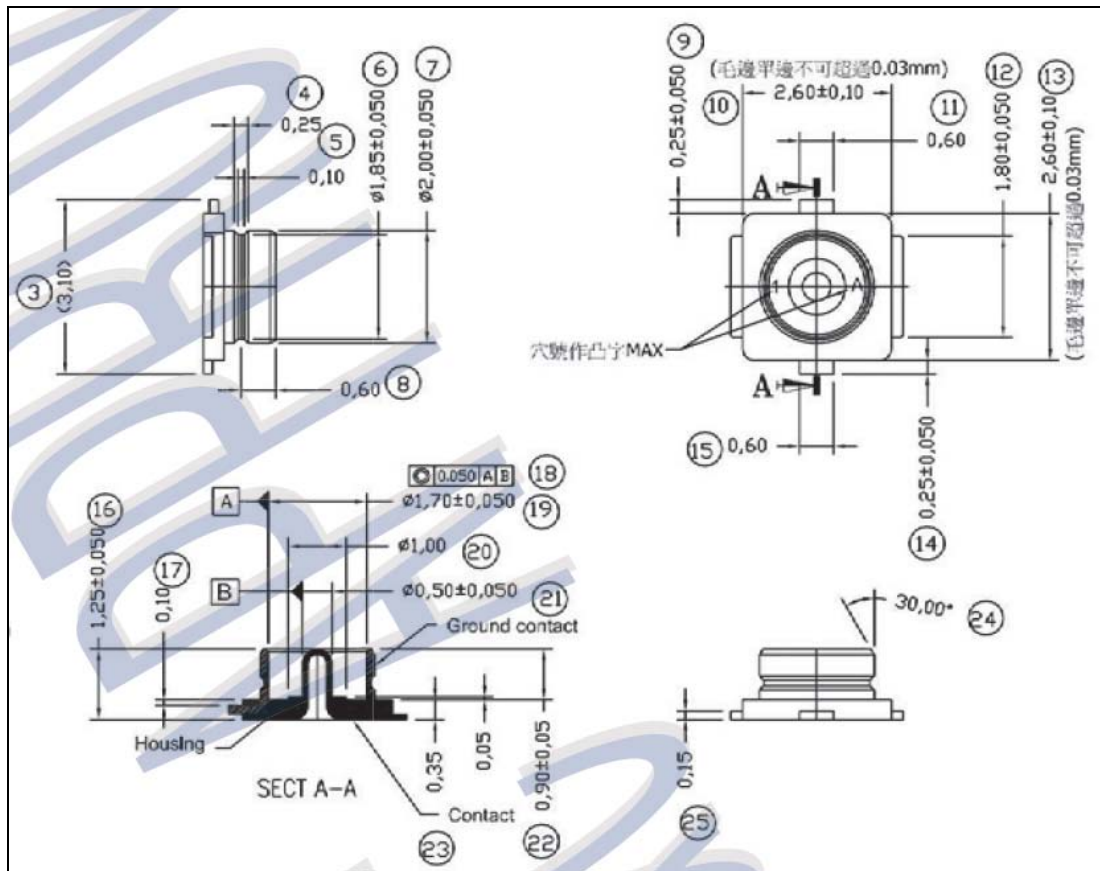
Symbol	Description	Min.	Typ.	Max.	Unit
T_{BCLKH}	High Period of BCLK	980	-	-	ns
T_{BCLKL}	Low Period of BCLK	970	-	-	ns
$T_{FrameSync_Delay}$	Delay Time from BCLK High to Frame Sync High	-	-	75	ns
T_{BCLKD_OUT}	Delay Time from BCLK High to Valid DAC_Data	-	-	125	ns
$T_{SETUPIN}$	Set-Up Time for ADC_Data Valid to BCLK Low	10	-	-	ns
T_{HOLDIN}	Hold Time for BCLK Low to ADC_Data Invalid	125	-	-	ns

PCM Interface Signal Levels

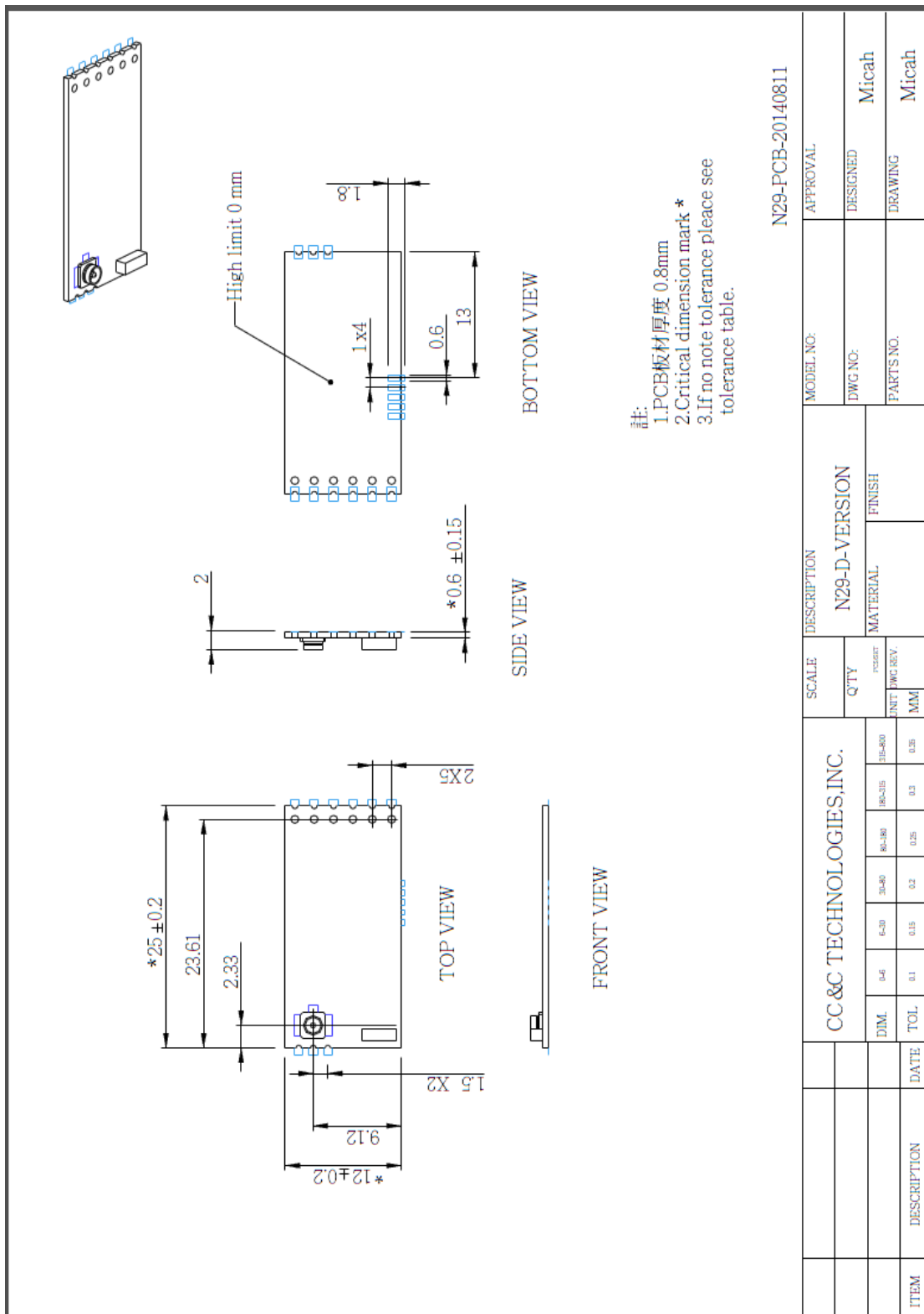
The PCM signal level ranges from 1.8V to 3.3V . The host provides the power source with the targeted power level to the CM-8723BU PCM interface via the VDD33 pin.

The CM-8723BU module WiFi/BT both single path **S0** connection to ANT, and IPEX connector S1 path set to NC.

RF connector dimensions (unit: mm)



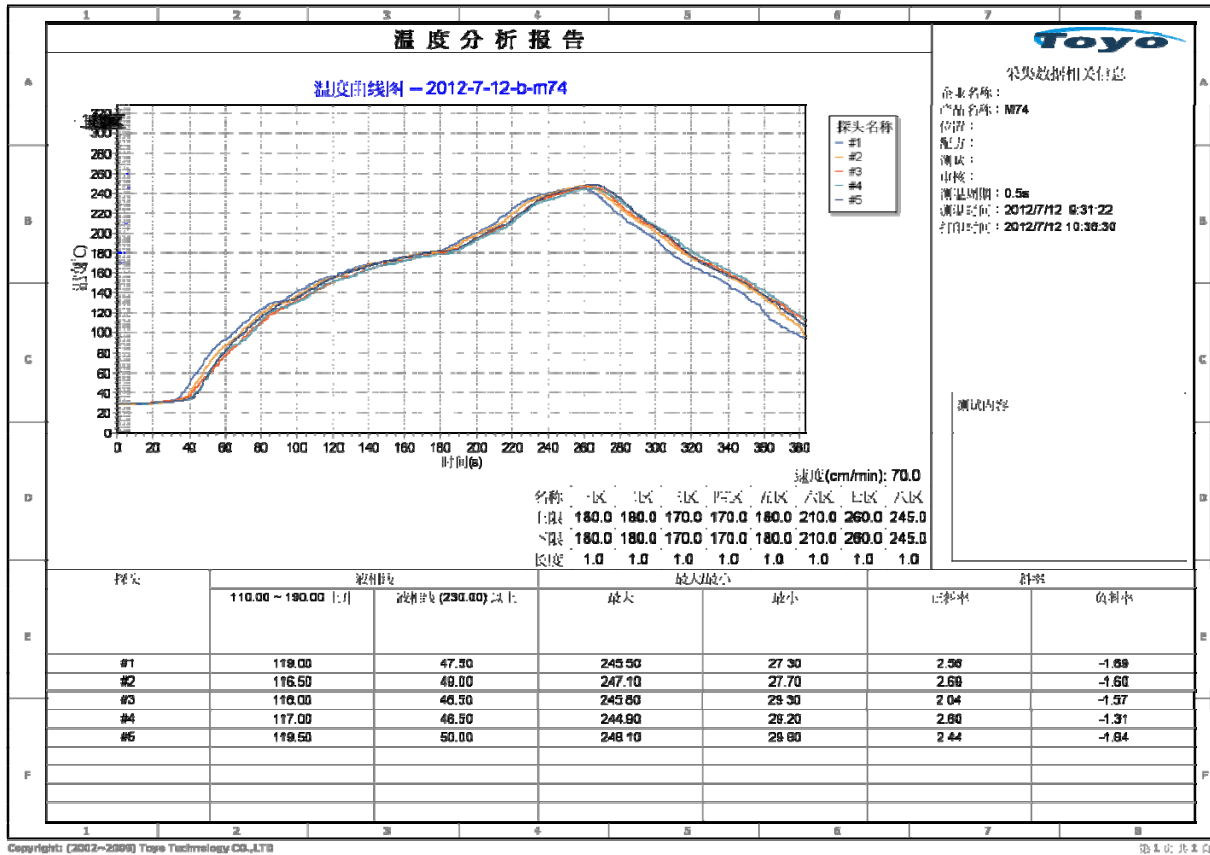
Dimension



Subject to change without notice

PCB Layout footprint

1. The recommended layout pads for CM-8723BU module are shown below. (Module top view)



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This module is surface mount device; please refer below conditions for drying before solder reflow processes. (extracted from IPC/JEDEC J-STD-033B.1)

Bake @ 125 °C		Bake @ 90 °C		Bake @ 40 °C	
Exceeding floor Life By > 72h	Exceeding floor Life By ≤ 72h	Exceeding floor Life By > 72h	Exceeding floor Life By ≤ 72h	Exceeding floor Life By > 72h	Exceeding floor Life By ≤ 72h
9 hours	7 hours	33 hours	23 hours	13 days	9 days

FCC Warning

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.

NOTE 1: This equipment 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 radiate 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.

NOTE 2 : Any changes or modifications to this unit not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

FCC Radiation Exposure Statement:

This equipment complies with FCC radiation exposure limits set forth for an uncontrolled environment. End users must follow the specific operating instructions for satisfying RF exposure compliance.

Note 1: Compliance of this device in all final host configurations is the responsibility of the Grantee.

OEM integrators are responsible to satisfy RF exposure requirements. SAR evaluation is valid for portable, mobile and fixed applications.

The highest reported SAR value for body condition is 0.664W/kg respectively. This device was tested simulation typical 5mm separation distance from the body.

Note 2: Any modifications made to the module will void the Grant of Certification, this module is limited to OEM installation only and must not be sold to end-users, end-user has no manual instructions to remove or install the device, only software or operating procedure shall be placed in the end-user operating manual of final products.

Note 3: The device must not transmit simultaneously with any other antenna or transmitter.

Note 4: To ensure compliance with all non-transmitter functions the host manufacturer is responsible for ensuring compliance with the module(s) installed and fully operational. For example, if a host was previously authorized as an unintentional radiator under the Declaration of Conformity procedure without a transmitter certified module

and a module is added, the host manufacturer is responsible for ensuring that after the module is installed and operational the host continues to be compliant with the Part 15B unintentional radiator requirements. Since this may depend on the details of how the module is integrated with the host, LM Technologies Ltd. shall provide guidance to the host manufacturer for compliance with the Part 15B requirements.

Note 5: FCC ID label on the final system must be labeled with “Contains FCC ID: VVX811-04XX” or “Contains transmitter module FCC ID: VVX811-04XX”.

The transmitter module must be installed and used in strict accordance with the manufacturer's instructions as described in the user documentation that comes with the host product. LM Technologies Ltd. is responsible for the compliance of the module in all final hosts.