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Product Approval Sheet

Item	Wi-Fi and Bluetooth Combo Module
Customer	EVERLINT
Model	WBT-MSO
Version	1.0
Date	2025. 06. 16

담 당	검 토	승 인

Revision History

Revision	Date	Changes	Written by
Rev1.0	06/16/2025	First Release	Kyungshin Jeong

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REALTEK RTL8822CS-VBS-CG Data sheet

SD specifications Part1 Physical Layer Specification Version 3.01

1. Product description

WBT-MSO is a highly integrated module that supports 2-stream 802.11ac solutions with MU-MIMO with integrated Bluetooth 5.4 controller, SDIO (SDIO 1.1/2.0/3.0) interface, and HS-UART mixed interface.

The module provides IEEE 802.11a/b/g/n/ac and Bluetooth SIG 5.4 mobile connectivity and it is applicable to Soft AP, portable, handheld computers, point-of-sale devices, and other wireless devices.

The purpose of this document is to describe the features and specifications of the module and to provide our OEM partners/customers with the information required to integrate the Wi-Fi5/Bluetooth 5.4 Module into their products.

Application and hardware interface requirements are discussed at a high level only; for more detail, see the following chapter.

A. Overview

- Wi-Fi5 and Bluetooth 5.4 combo module
- Compact size as 17mm X 15mm X 2.5T
- CMOS MAC, Baseband PHY and RF in a single chip for IEEE 802.11a/b/g/n/ac compatible WLAN
- Support 802.11ac 2x2, Wave-2 compliant with MU-MIMO
- Complete 802.11n MIMO solution for 2.4GHz and 5Ghz band
- Compliance Bluetooth 5.4 SIG standard

B. Key Feature

- **Wi-Fi**
 - IEEE 802.11a/b/g/n/ac compatible WLAN
 - Support 802.11ac 2x2, Wave-2 compliant with MU-MIMO
 - Complete 802.11n MIMO solution for 2.4GHz and 5Ghz band
 - Complies with SDIO 1.1/2.0/3.0 for WLAN with clock rate up to 208MHz
 - IEEE 802.11e QoS Enhancement (WMM)
 - Maximum PHY data rate up to 173.3 Mbps using 20MHz bandwidth, 400Mbps using 40MHz bandwidth, and 866.7Mbps using 80MHz bandwidth.
 - Channel management and co-existence
 - IEEE 802.11ac MIMO OFDM
 - IEEE 802.11n MIMO OFDM
 - Two Transmit and Two Receive paths

- Hardware antenna diversity
- **Bluetooth**
 - Support Bluetooth 5.4 system
 - Compatible with Bluetooth v2.1 systems
 - Integrated MCU to execute Bluetooth protocol stack
 - Supports SCO/eSCO link (allows one link for PCM interface and three links for HS-UART)
- **Antenna**
 - Supports three antenna ports as Wi-Fi Primary, Wi-Fi Secondary and Bluetooth
- **Host interface**
 - Supports SDIO1.1/2.0/3.0 for Wi-Fi host interface and high-speed UART for Bluetooth host interface

C. Standard Compliance

- IEEE 802.11 a/b/g/n/ac
- Bluetooth V5.4 SIG conformance

D. Application

- Wi-Fi soft AP, gateway and Mobile router
- Asset management
- IoT applications
- Smart home: Voice assist device, smart printer, home automation gateway and IP camera
- Retail/POS
- Healthcare, medical devices and Smart city

2. Product Specifications

A. Specification Overview

Item		Description
Hardware		
Wi-Fi5 and Bluetooth5.4 SoC		
Wi-Fi5 and Bluetooth5.4 SoC	Realtek RTL8822CS-VBS-CG	Dual-Band MIMO 2x2 Solution (11ac 2x2 MAC/BB/RF + PA) and Integrated Bluetooth Controller Solution CMOS MAC, Baseband PHY and RF in a single chip for IEEE 802.11a/b/g/n/ac compatible WLAN IEEE 802.11i (WPA, WPA2). Open, shared key, and pair-wise key authentication services Bluetooth 5.4 BDR and EDR: 1Mbps, 2Mbps and 3Mbps Bluetooth Low Energy (LE): 1Mbps and 2Mbps
Power supply	DC 3.3V	Support operation with single external 3.3V power supply
Host I/F	Wi-Fi	SDIO 1.1/2.0/3.0
	Bluetooth	High speed UART
Audio I/F	Digital interface	Supports Master and Slave mode Supports 8-bit A-law/ μ -law, and 13/16-bit linear PCM formats Supports padding of Audio Gain to 13-bit samples
Peripheral I/F	GPIOs	For control module power enable or disable For control module/Host wakes up or sleep For sets the module boot configuration
Radio / Baseband Interface		
RF PHY / Front-end	Wi-Fi and Bluetooth	Supports concurrent use 2X2 Wi-Fi and Bluetooth as 3 antenna RF coaxial receptacles that Bluetooth, Wi-Fi primary and Wi-Fi secondary for using 2x2 Wi-Fi5 MU-MIMO. Diplexers bandpass filters PAMs LNAs and SPDT switches are assembled for simultaneous use of Wi-Fi 2.4GHz and 5GHz.
Baseband/MACs	Wi-Fi	Two independent direct conversion Wi-Fi radios to support true simultaneous operation in the 2x2 2.4 GHz and 5 GHz Bands.
	Bluetooth	Supports Bluetooth 5.4 Integrated internal Class 1.5, Class 2, and Class 3 PA Packet types: 1Mbps (GFSK), 2Mbps(pi/4-DQPSK), 3Mbps (8DPSK).

		Fully functional AFH using Packet Error Rate.
	Bluetooth LE	Bluetooth LE 1Mbps and 2Mbps
System interface		
Surface-mount technology (SMT)	Land Grid Array type	40 pins
System environment		
Operating condition	Operating temperature	0°C ~ +70°C
	Storage temperature	-40°C ~ +85°C
	Humidity	10~90% Relative/Non-condensing
Certification	Alliance	TBD
Appearance		
Dimension	Length	17.0mm±0.2mm
	Width	15.0mm±0.2mm
	Height	2.5mm±0.2mm
Package		40Pins Rectangular LGA
Software		
System SW		
OS		Linux, Android
Protocol	Wi-Fi	802.11 a/b/g/n/ac
	Bluetooth	Bluetooth 5.4 Classic / Bluetooth LE
Networking	Wi-Fi	2.4GHz (Max BW 40Mhz) / 5GHz (Max BW 80Mhz) Concurrent Dual Wi-Fi
	Bluetooth	BT Classic- BR, EDR2 and EDR3 BLE - 1Mbps/2Mbps
Encryption	Wi-Fi	AES, TKIP
	Bluetooth	AES
Security	Wi-Fi	WEP, WPA1, WPA2, WAPI
	Bluetooth	Security Mode 4
Management	Wi-Fi	Station mode
	Bluetooth	Bluetooth Classic / Bluetooth LE
OTA		Not supported

B. RF Specification

– Wi-Fi RF performance

Wi-Fi 2.4GHz				
Item	Functional Item		Detailed Specification	Remark
Standard	IEEE802.11		b/g/n	
Band Class	Frequency range		2.400~2.4835GHz	
	Channels		1~11ch(FCC), 13ch	
Channel BW	802.11b/g		20MHz	
	802.11n		20MHz/40MHz	
RF	802.11b	Modulation	DSSS/CCK	
		Rate (Max. TP)	11/5.5/2/1Mbps	Auto fallback
		Rx. Sensitivity	-74dBm	Conducted per chain, 1M
		Output power	CE_20dBm, FCC_18dBm	Conducted per chain, 1M @EVM<35%
	802.11g	Modulation	OFDM	
		Rate (Max. TP)	54/48/36/24/18/12/9/6Mbps	Auto fallback
		Rx. Sensitivity	-74dBm	Conducted per chain, 6M
		Output power	CE_20dBm, FCC_18dBm	Conducted per chain, 6M @EVM<-27dB
	802.11n	Modulation	OFDM	
		Rate (Max. TP)	MCS0 ~ MCS7 (Max 300Mbps)	2SS HT40 MCS0
		Rx. Sensitivity	-74dBm	Conducted per chain, HT20 MCS0
			-74dBm	Conducted per chain, HT40 MCS0
		Output power	CE_20dBm, FCC_18dBm	Conducted per chain, HT20 MCS0 @EVM-28dB

Wi-Fi 5GHz				
Item	Functional Item		Detailed Specification	Remark
Standard	IEEE802.11		a/n/ac	
Band Class	Frequency range		5.150~5.825GHz	Support all DFS bands
	Channels		36~165ch	
Channel BW	802.11a		20MHz	
	802.11n		20MHz/40MHz	

RF	802.11ac		20MHz/40MHz/80MHz	
	802.11a	Modulation	OFDM	
		Rate (Max. TP)	54/48/36/24/18/12/9/6Mbps	
		Rx. Sensitivity	-104.03dBm	
		Output power	CE_23dBm, FCC_21dBm	
	802.11n	Modulation	OFDM	
		Rate (Max. TP)	MCS0 ~ MCS7 (Max 300Mbps)	
		Rx. Sensitivity	-104.03dBm	Conducted per chain, HT20 MCS0
			-104.03dBm	Conducted per chain, HT40 MCS0
		Output power	CE_23dBm, FCC_21dBm	
	802.11ac	Modulation	OFDM	
		Rate (Max. TP)	MCS0 ~ MCS9 (Max. 866.7MHz)	
		Rx. Sensitivity	-104.03dBm	Conducted per chain, VHT20 MCS0
			-104.03dBm	Conducted per chain, VHT40 MCS0
			-104.03dBm	Conducted per chain, VHT80 MCS0
		Output power	CE_23dBm, FCC_21.5dBm	
			Conducted per chain, VHT20 MCS0 @EVM<-32dB	

– **Bluetooth BDR RF performance**

Item	Functional Item	Detailed Specification	Remark
Standard	IEEE802.15.1	Up to Bluetooth 5.4	
Band Class	Frequency range	2.400~2.4835GHz	
	Channels	79ch	
Channel BW	1MHz		
RF	Power class	CE_20dBm, FCC_7dBm	Conducted, Class 1.5, UE tolerance : +/-1dB
	Transmission Rate / Modulation	1Mbps/GFSK	
	Max Rx. Sensitivity	-69.59dBm	BER<0.1%, Conducted, DH3
Data rate		1Mb/s	

– **Bluetooth EDR RF performance**

Item	Functional Item	Detailed Specification	Remark
Standard	IEEE802.15.1	Up to Bluetooth 5.4	
Band Class	Frequency range	2.400~2.4835GHz	
	Channels	79ch	
Channel BW	2MHz, 3MHz		
RF	Power class	CE_20dBm, FCC_6dBm	Conducted, Class 1.5, UE tolerance : +/-1dB
	Transmission Rate / Modulation	2Mbps/pi/4-DQPSK 3Mbps/8 DPSK	
	Max Rx. Sensitivity	-69.59dBm	BER<0.1%, Conducted, 2-DH5
Data rate		2Mb/s, 3Mb/s	

– Bluetooth LE RF performance

Item	Functional Item	Detailed Specification	Remark
Standard	IEEE802.15.1	Up to Bluetooth LE 4.0	
Band Class	Frequency range	2.400~2.4835GHz	
	Channels	40ch	
Channel BW	1MHz, 2MHz		
RF	Power class	CE_20dBm, FCC_8dBm	Conducted, Class 1.5, 1MHz, UE tolerance : +/-1dB
	Transmission Rate / Modulation	1Mbps and 2Mbps/GFSK	
	Max Rx. Sensitivity	-68.86dBm	PER≤30.8%, Conducted, 1MHz
Data rate		1Mb/s, 2Mb/s	

Control Signal Interface

– Host Wakes-up

● UART_WAKE (Bluetooth host wakeup/sleep)

- ✓ The UART_WAKE signals is an Active High signal used to Wake the Host or enable the Host to go into sleep modes. The UART_WAKE can be used as an Out of Band signal to the Host in case the host does not support in-band wake up using an In-Band message.
- ✓ There are potentially many ways to make use of this Out of Band Wake signal and they may be vendor specific.

● SD_WAKE (Wi-Fi host wakeup/sleep in the SDIO)

- ✓ The SD_WAKE signals is an Active High signal used to Wake the Host or enable the Host to go into sleep modes. The SD_WAKE can be used as an Out of Band signal to the Host in case the host does not support in-band wake up using an In-Band message.
- ✓ There are potentially many ways to make use of this Out of Band Wake signal and they may be vendor specific.

– Device Wakes-up

The module provides the GPIOs below for wake up/sleep control. they are currently preserved, but can be used according to customer needs.

● BT_WAKE

- ✓ Bluetooth wake-up: Signal from the host to the module indicating that the host requires attention.
 - Asserted: the module Bluetooth block must wake-up or remain awake
 - Deasserted: the module Bluetooth block may sleep when sleep criteria are met.
- ✓ There are potentially many ways to make use of this Wake signal and they may be vendor specific.

– Device (WLAN/Bluetooth) on/off control

● WL_DIS_L

- ✓ This pin can be defined as the WLAN Radio-off function with host interface remaining connected. When this pin is pulled low, WLAN Radio will be disabled.

● BT_DIS_L

- ✓ This pin can externally shut down the module BT function when BT_DIS_N is pulled Low. When this pin is pulled low, UART interface will be also disabled.
- ✓ This pin can be also defined as the BT Radio-off function with host interface remaining connected.

– SDIO Interface RESET

● SD_RESET

- ✓ This pin can externally shut down the module WLAN function when SD_RESET is pulled low . When this pin is pulled low, SDIO interface will be disabled.

– Test/Debug Mode

● G_WL

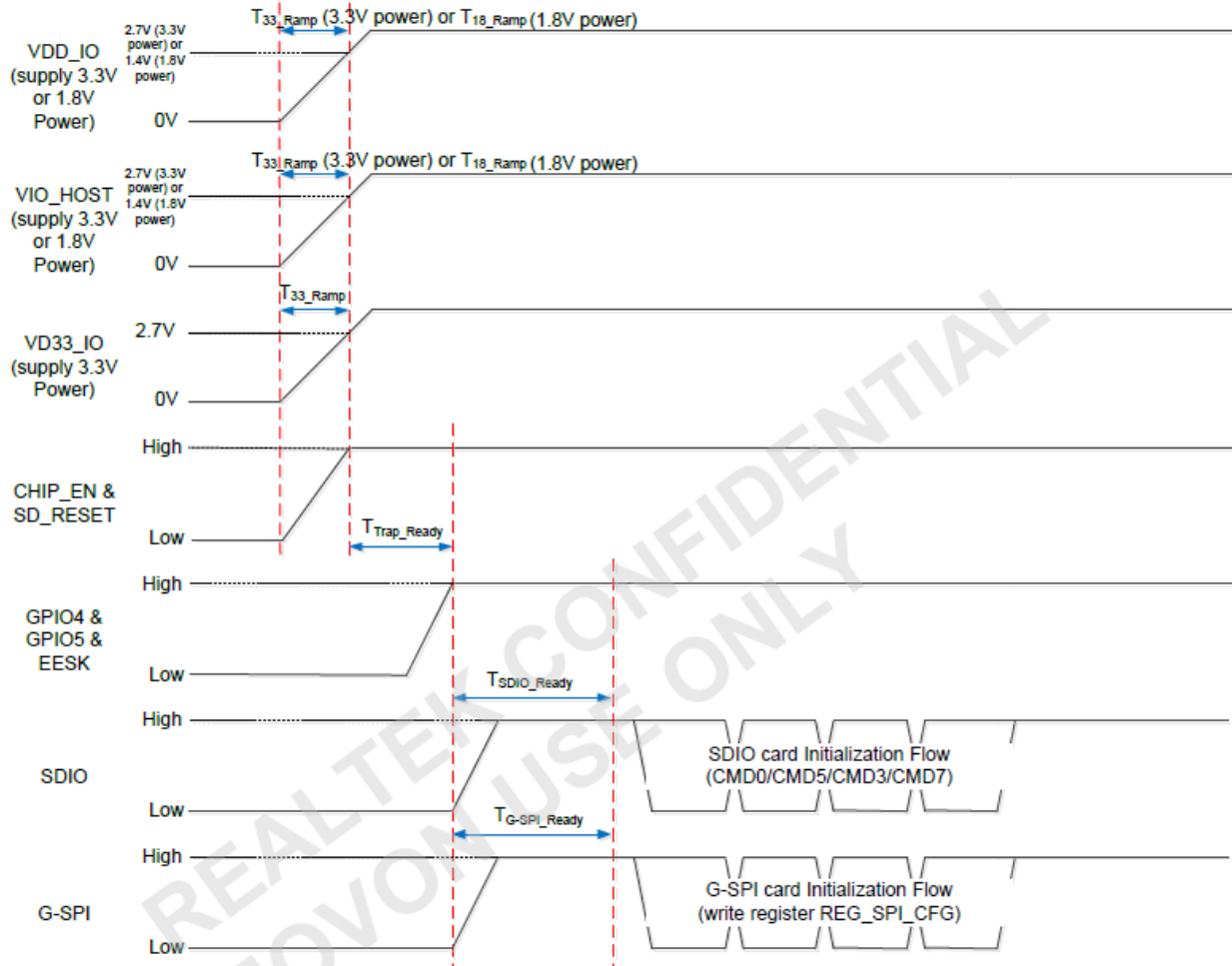
- ✓ The operating mode of the WLAN is determined based on the state of this pin when powered on.
 - HIGH : Test/Debug Mode
 - LOW : Normal Operating Mode

- **G_BT**

- ✓ The operating mode of the Bluetooth is determined based on the state of this pin when powered on.
 - HIGH : Test/Debug Mode
 - LOW : Normal Operating Mode

C. Electrical Specification

– System Power on sequence



	Min	Typical	Max	Unit	Descriptin
T _{18_Ramp}	0.5	1.5	5	ms	The 1.8V power ramp up duration
T _{33_Ramp}	0.5	1.5	5	ms	The 3.3V power ramp up duration
T _{Trap_Ready}	400	500	X	ms	WLAN eFuse autoload. TTrap_Ready = 500ms (Typical)
T _{SDIO_Ready}	10	20	100	ms	SDIO Not Ready Duration. In this state, the RTL8822CS-VBS-CG may respond to commands without the ready bit being set. After the ready bit is set, the host will initiate complete card detection procedure.
T _{G-SPI_Ready}	30	40	180	ms	The duration G-SPI device internal initialization. After TG-SPI_Ready, SPI host can then send command to write REG_SPI_CFG register. REG_SPI_CFG register is to control G-SPI endian and word length.

● SDIO Interface Power On Sequence

After power-on, the SDIO interface is selected by the MD-CRC10 automatically when a valid SDIO command is received. To attain better SDIO host compatibility, the following power-on sequence is recommended.

We recommend that the card detection procedures are divided into two phases: A 3.3V/1.8V power pre-charge phase and a formal power-up phase.

After the 3.3V ramp up and 1.8V ramp up, the power management unit is enabled by the power ready detection circuit. The power management unit enables the SDIO block. eFUSE is then autoloading to SDIO circuits during the T_{SDIO_Ready} duration and then SDIO pins are pulled up. After CMD5/5/3/7 procedures, card detection is executed.

● SD_RESET Power On Sequence

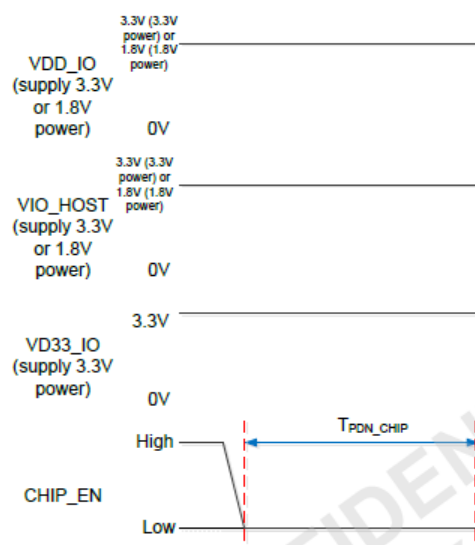
To attain SD_RESET capability, the following power sequence is recommended.

After the 3.3V/1.8V ramp up, the power management unit is enabled by the power ready detection circuit.

The power management unit enables the SD_RESET function. After power management unit being enabled,

SD_RESET needs to keep high for ensuring WLAN and SDIO function being alive.

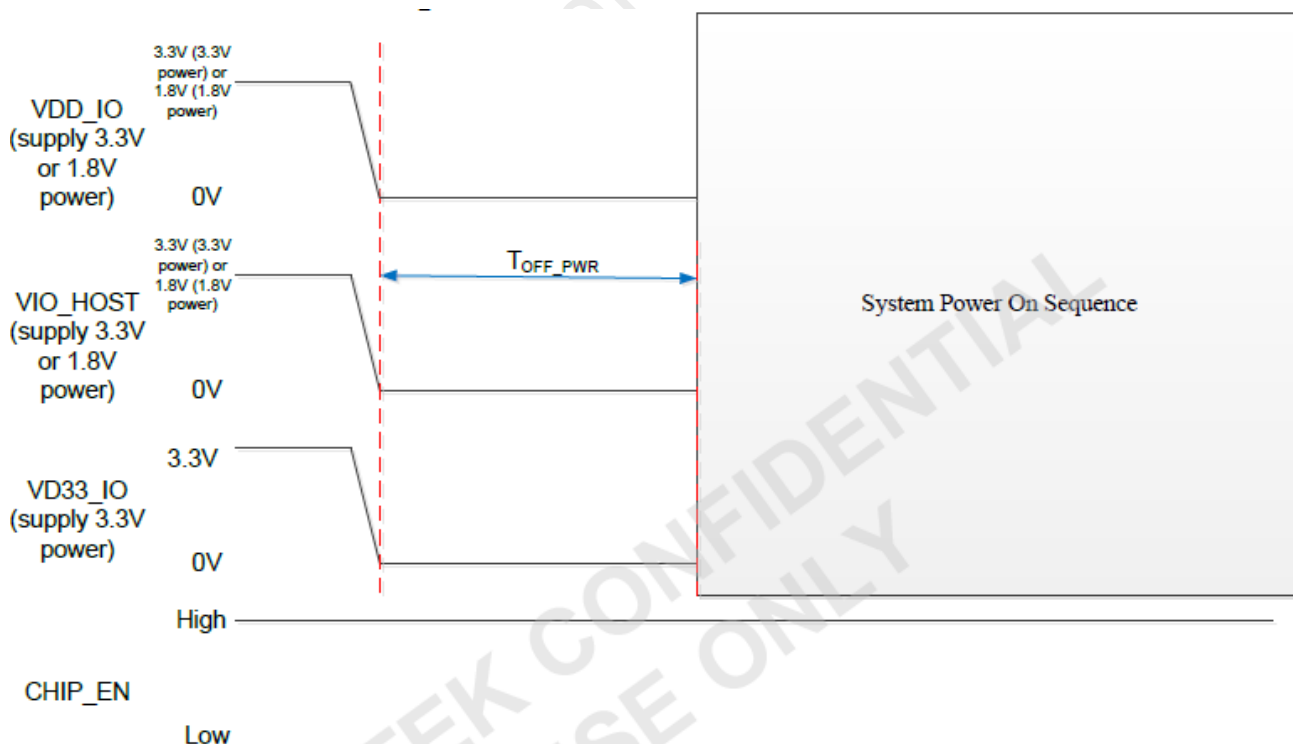
– Power off sequence



	Min	Typical	Max	Unit	Descriptin
T_{PDN_CHIP}	100	100	X	ms	CHIP_EN keep low duration

CHIP_EN can externally shutdown the RTL8822CS-VBS-CG when CHIP_EN is pulled low. The keeping low duration must be more than T_{PDN_CHIP}

– Power Reset Sequence



	Min	Typical	Max	Unit	Descriptin
T _{OFF_PWR}	100	100	X	ms	3.3V/1.8V power keep low duration

The 3.3V/1.8V power should keep low at least T_{OFF_PWR} before calling system power on Sequence.
CHIP_EN should be pulled high during power reset sequence.

DC characteristics

– Power Tree

The module utilizes 3.3V(VDD, VDD_IO) and 1.8V(VDD_IO) power sources. VDD_IO can utilize the same power supply (3.3V) as VDD. Do not exceed minimum or maximum voltage. Module will be permanently damaged above this limit.

– Electrical characteristics

Parameter		Minimum	Typical	Maximum	Unit
External Power supply					
VDD	3.3V Supply Voltage	3.0	3.3	3.6	V
VDD_IO	1.8V or 3.3V I/O Supply Voltage	3.0	3.3	3.6	V
		1.62	1.8	1.98	V
Internal PMU output power					
VD10	1.05V Core Supply Voltage	0.945	1.05	1.155	V
Digital IO Pin DC Charateristics_3.3V GPIO					
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
Digital IO Pin DC Charateristics_318V GPIO					
V _{IH}	Input high voltage	1.7	1.8	3.6	V
V _{IL}	Input low voltage	-	0	0.8	V
V _{OH}	output high voltage	1.62	-	1.8	V
V _{OL}	output low voltage	0	-	0.18	V

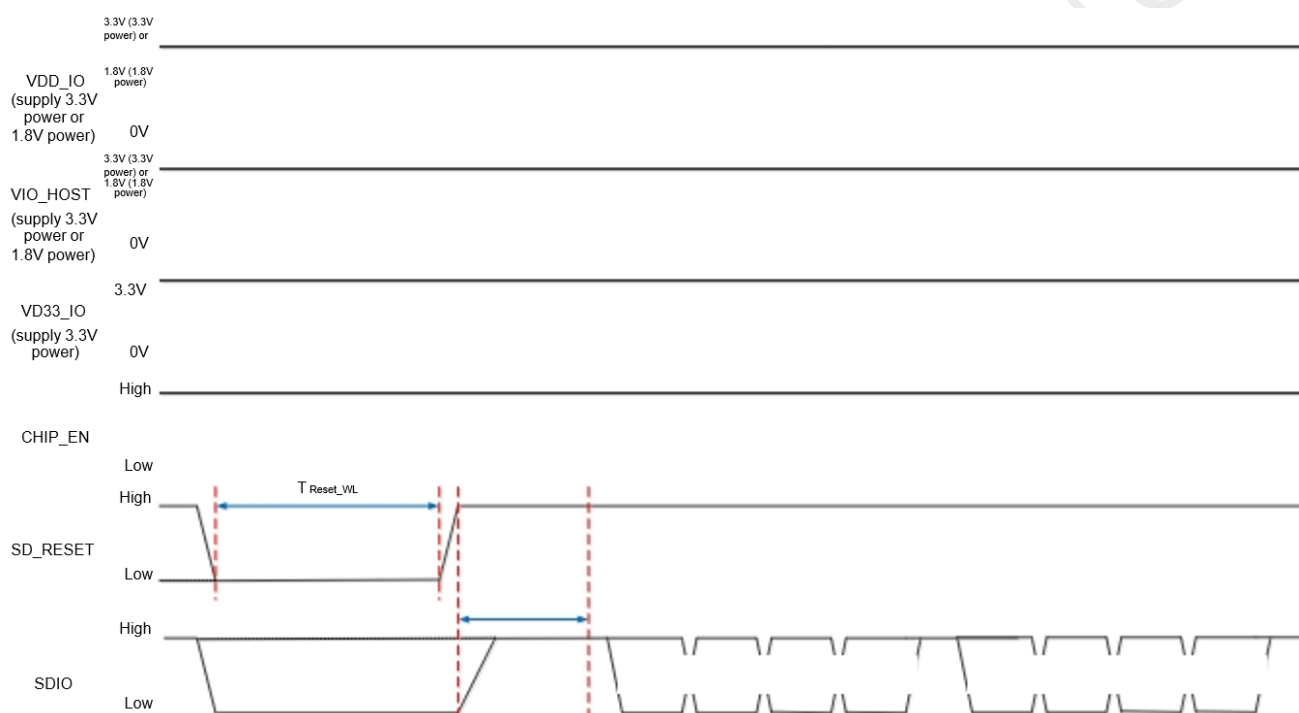
AC characteristics

– SDIO

● Interface Timing

For timing criteria, please check specification in "SD specifications Part1 Physical Layer Specification Version 3.01"

● WLAN and SDIO Reset Sequence



	Min	Typical	Max	Unit	Descriptin
T_{Reset_WL}	100	100	X	ms	SD_RESET keep low duration
T_{SDIO_Ready}	10	20	100100	ms	SDIO Not Ready Duration. In this state, WBT-MSO may respond to commands with out the ready bit being set. After the ready bit is set, the host will initiate complete card detection procedure.

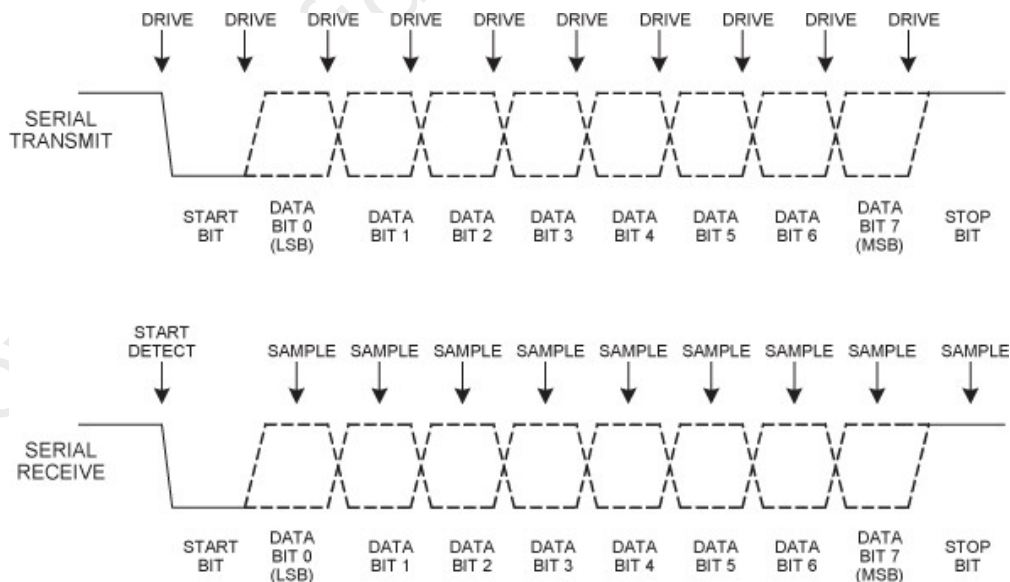
● SDIO Reset Sequence



– UART

WBT-MSO UART interface is a standard 4-wire interface with RX, TX, CTS, and RTS. The interface supports the Bluetooth 2.0 UART HCI H4 and H5 specifications. The default baud rate is 115.2 kbaud. In order to support high and low speed baud rate, the WBT-MSO provides multiple UART clocks.

Desired Baud Rate	Error	Desired Baud Rate	Error
1200	0%	1382400	-0.22%
9600	0%	1444400	-0.20%
14400	0%	1500000	-0.31%
19200	0.01%	1843200	-0.22%
28800	0.01%	2000000	0%
38400	0.04%	2100000	0.25%
57600	0.01%	2500000	0%
76800	0.04%	2764800	-0.22%
115200	-0.08%	3000000	-0.31%
128000	0%	3250000	0.47%
153600	-0.08%	3692300	-0.38%
230400	-0.08%	3710000	0.29%
460800	-0.08%	3750000	0.39%
500000	0%	3800000	0.25%
921600	-0.22%	4000000	0%
1000000	0%		

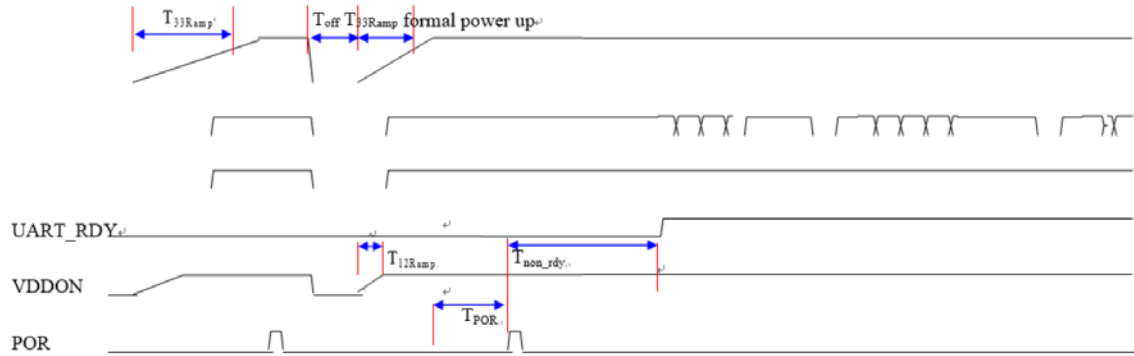


● UART Interface Signal Levels

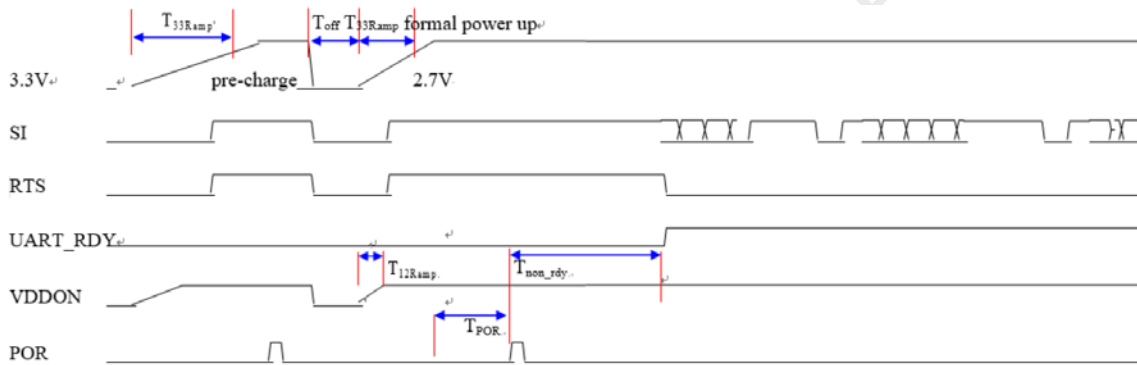
The UART signal level ranges from 1.8V to 3.3V. The host provides the power source with the targeted power level to the WBT-MSO UART interface via the VIO_HOST pin.

● UART Interface Power-On Sequence

The UART interface power-on sequence differs depending on whether or not host flow control is supported.



<UART Power-On Sequence Without Hardware Flow Control>



<UART Power On Sequence With Hardware Flow Control>

Symbol	Description
T_{33ramp}	3.3V Power Pre-Charge Ramp Up Duration Before Formal Power Up. We recommend that a 3.3V power-on and then power-off sequence is executed by the host controller before the formal power on sequence. This procedure can eliminate host card detection issues when power ramp up duration is too long, or when a system warm reboot fails.
T_{off}	The duration 3.3V is cut off before formal power up.
T_{33ramp}	The 3.3V main power ramp up duration.
T_{12ramp}	The internal 1.2V ramp up duration.
T_{POR}	The duration from when the power-on reset releases and the power management unit execute power on tasks. A power on reset will detect both 3.3V and 1.2V power ramp up after a predetermined duration.
T_{non_rdy}	UART Not Ready Duration. In this state, the WBT-MSO will not respond to any commands.

Symbol	Min.	Typ.	Max.	Unit
$T_{33\text{ramp}}$	-	-	No Limit	ms
T_{off}	250	500	1000	ms
$T_{33\text{ramp}}$	0.1	0.5	2.5	ms
$T_{12\text{ramp}}$	0.1	0.5	1.5	ms
T_{por}	2	2	8	ms
$T_{\text{non-rdy}}$	1	2	10	ms

<UART Interface Power On Timing Parameters>

– PCM

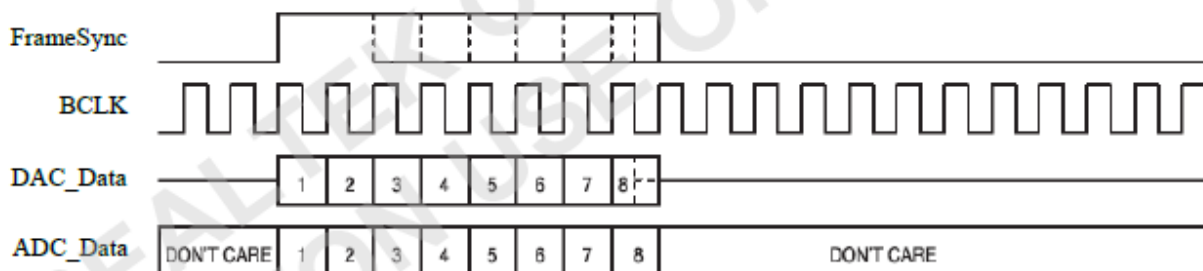
WBT-MSO supports a PCM digital audio interface that is used for transmitting digital audio/voice

data to/from the Audio Codec. Features are supported as below:

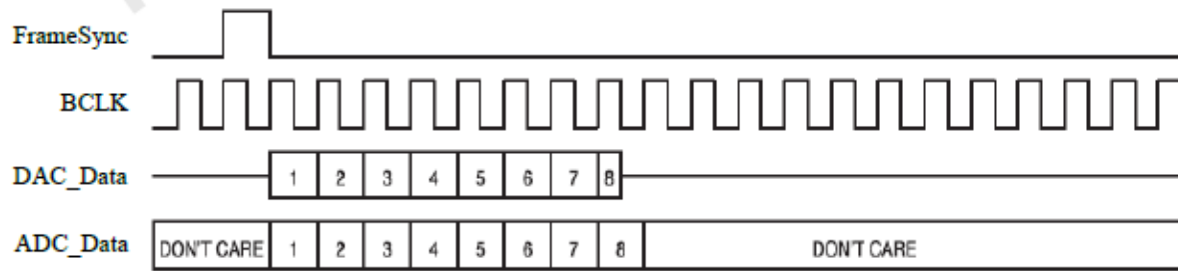
- ✓ Supports Master and Slave mode
- ✓ Programmable long/short Frame Sync
- ✓ Supports 8-bit A-law/ μ -law, and 13/16-bit linear PCM formats
- ✓ Supports sign-extension and zero-padding for 8-bit and 13-bit samples
- ✓ Supports padding of Audio Gain to 13-bit samples
- ✓ PCM Master Clock Output: 64, 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.



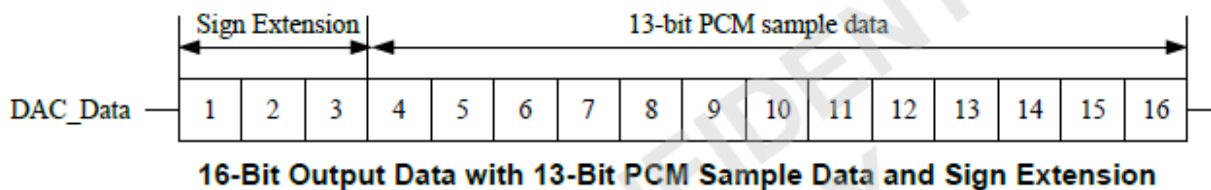
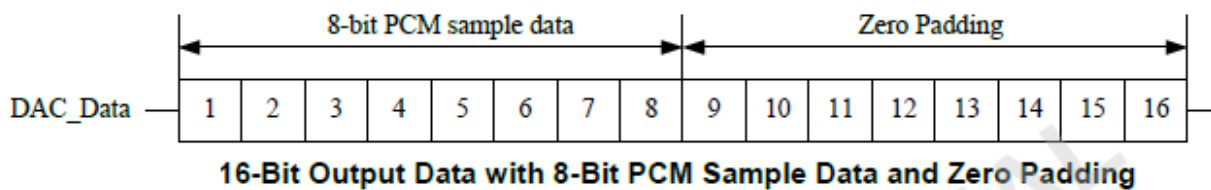
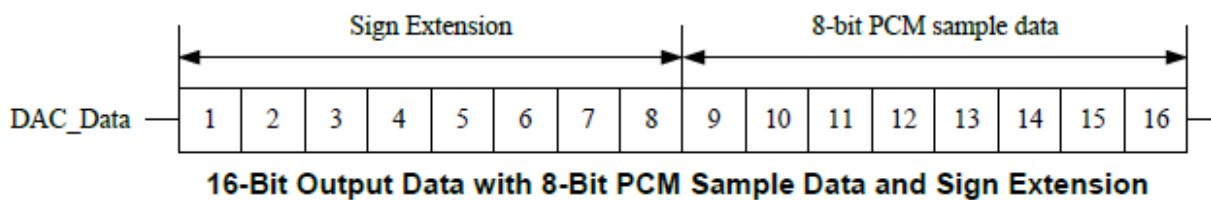
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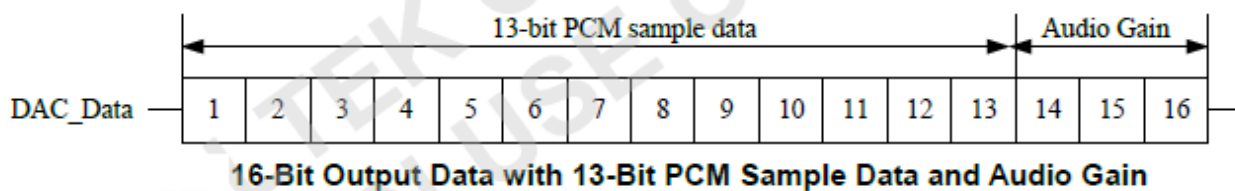
<Short FrameSync>

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

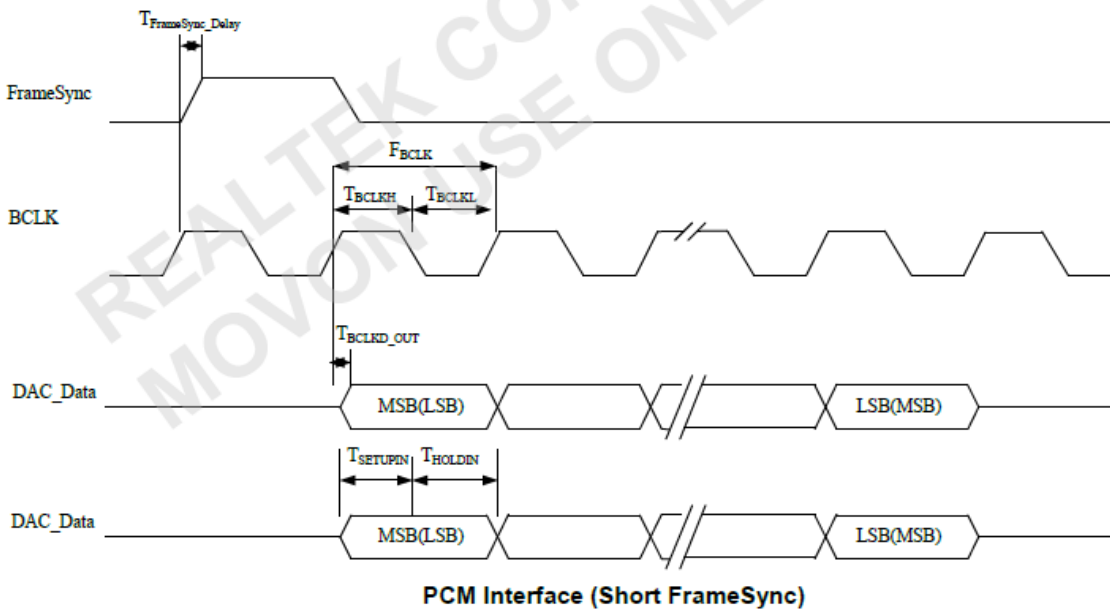
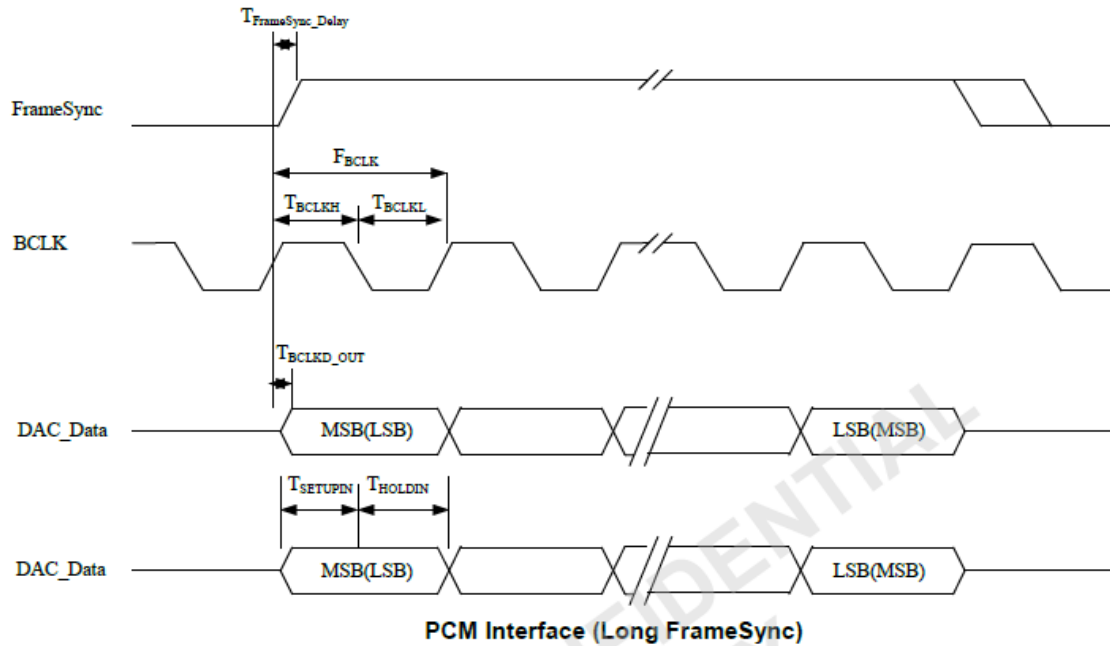
For 16-bit linear PCM output, 3 or 8 unused bits may be sign extended/zero padded.



For 16-bit linear PCM output, 3-bit programmable audio gain value can be padded to 13-bit sample data.



● PCM Interface Timing



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
L	Number of Slots Per Frame	1	1	1	Slots

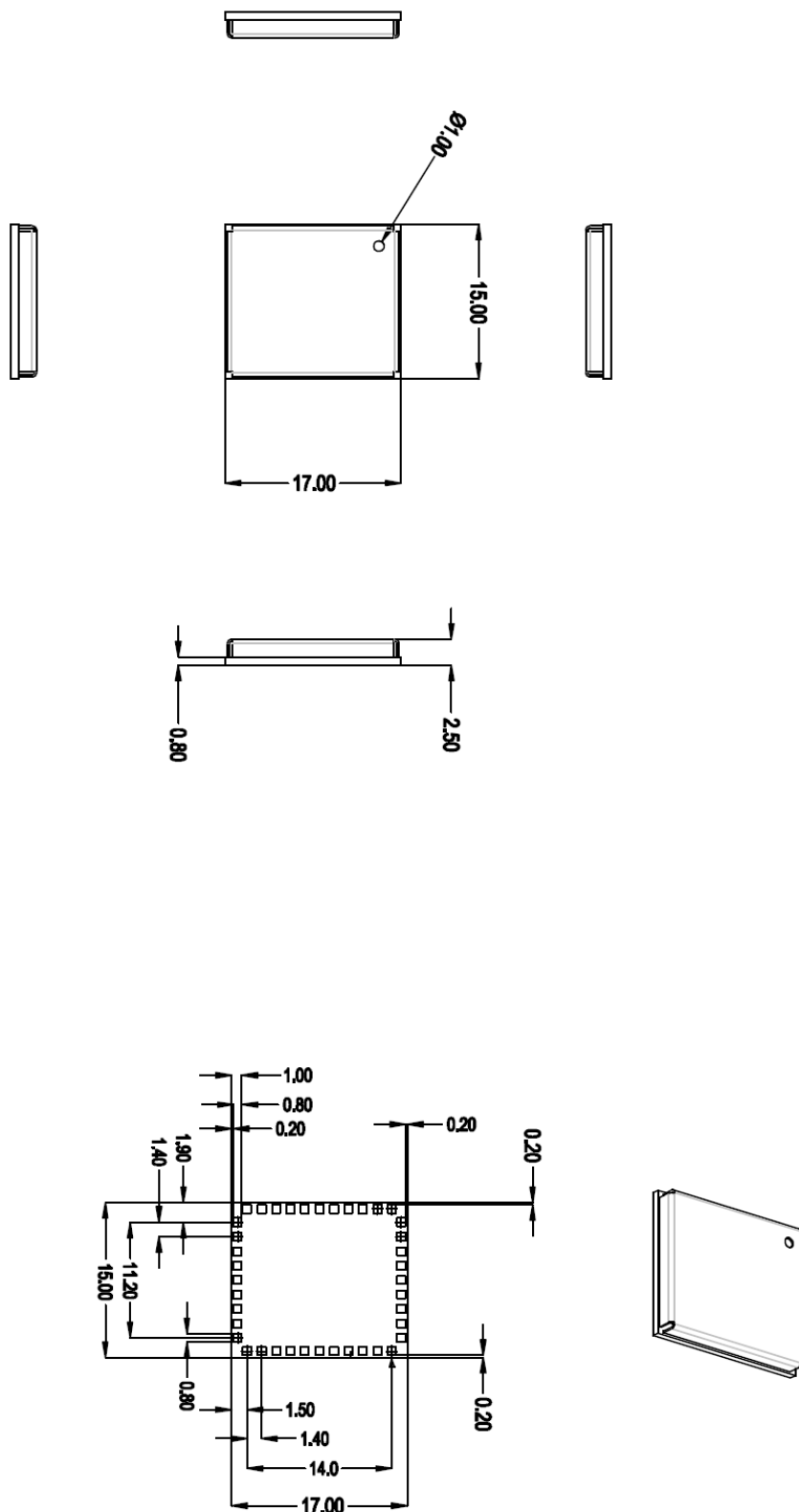
<PCM Interface Clock Specifications>

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 Timing>

Mechanical Specifications

Product Drawing



D. HW Design Guide

Reference schematic

We provide this as a separate document. If necessary, please contact MOVON sales team.

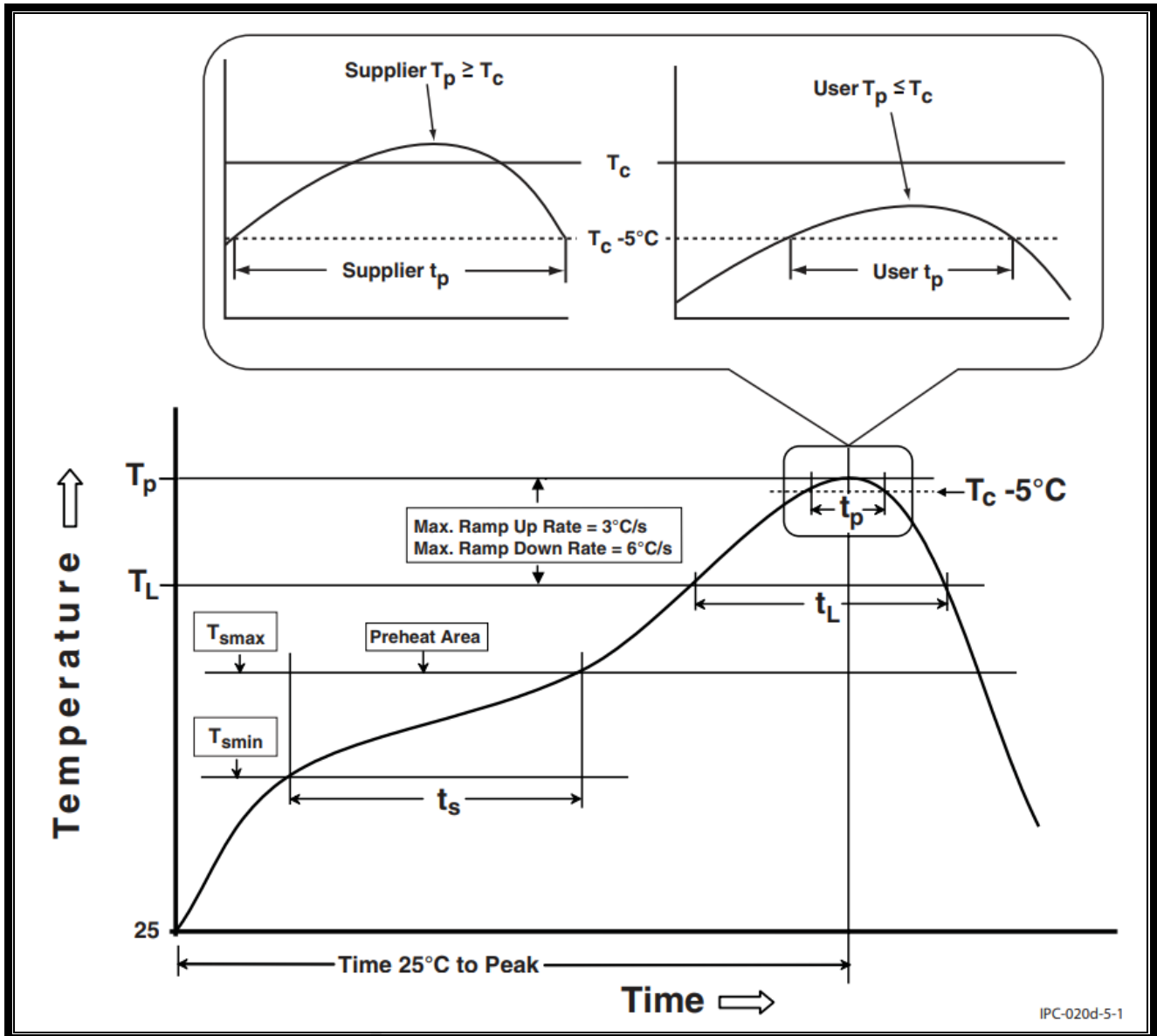
E. Reflow soldering profile

Package thickness	Volume mm2<350	Volume mm2>350
<2.5mm	235 degree C	220 degree C
>=2.5mm	220 degree C	220 degree C

<Table 1. Sn-Pb Eutectic Process – Classification Temperature (Tc)>

Package thickness	Volume mm2<350	Volume mm2 350 ~ 2000	Volume mm2>2000
<1.6mm	260 degree C	260 degree C	260 degree C
1.6mm ~ 2.5mm	260 degree C	250 degree C	245 degree C
>2.5mm	250 degree C	245 degree C	245 degree C

<Table 2. Pb-Free Process – Classification Temperature (Tc)>



<Figure1. Reflow Soldering Profile, Per J-STD-020D>

Profile Feature	Sn-Pb Eutectic Assembly	Pb-Free Assembly
Preheat/Soak		
Temperature Min (T _{smin})	100 degree C	150 degree C
Temperature Man (T _{smax})	150 degree C	200 degree C
Time (t _s) from (T _{smin} to T _{smax})	60 ~ 120 seconds	60 ~ 120 seconds
Ramp-up rate (T _L to T _p)	3 degree C/second max	3 degree C/second max
Liquidous temperature (T _L)	183 degree C	217 degree C
Time (T _L) maintained above T _L	60 ~ 150 seconds	60 ~ 150 seconds
Peak package body temperature (T _p)	For users T _p must not exceed the Classification temperature	For users T _p must not exceed the Classification temperature

	in Table 1	in Table 2
		For suppliers Tp must equal or exceed the Classification temperature in Table 2
Time (Tp)* within 5 degree C of the specified classification temperature (Tc), see Figure 1	20* seconds	30* seconds
Ramp-down rate (Tp to TL)	6 degree C/second max	6 degree C/second max
Time 25 degree C to peak temperature	6 minutes max	8 minutes max
* Tolerance for peak profile temperature (Tp) is defined as a supplier minimum and a user maximum		

Note:

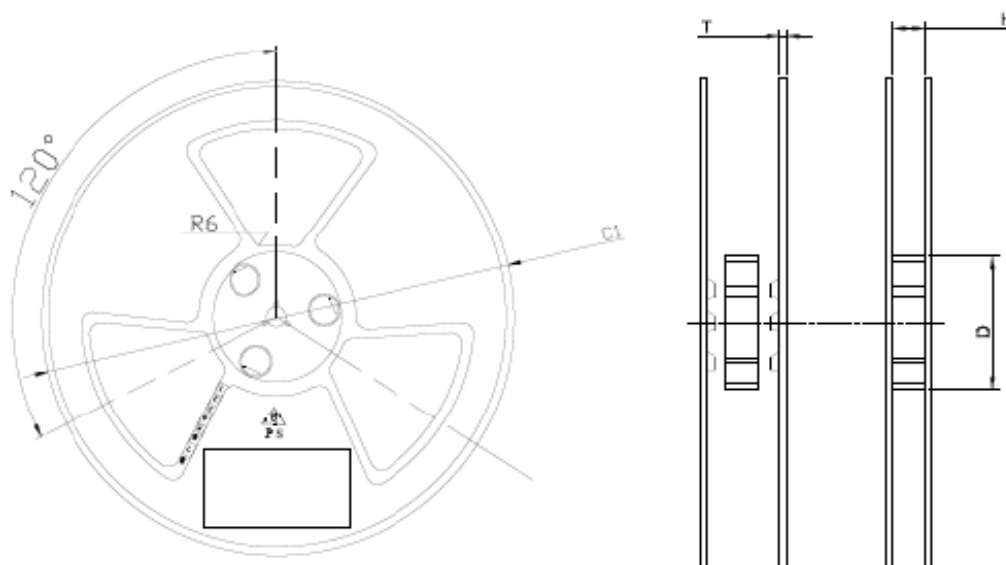
1. Recommend to supply N2 for reflow oven
2. N2 atmosphere during reflow (O2<300ppm)
3. All temperatures refer to the center of the package, measured on the package body surface that is facing up during assembly reflow (e.g., live-bug). If parts are reflowed in other than the normal live-bug assembly reflow orientation (i.e., dead-bug), Tp shall be within $\pm 2^{\circ}\text{C}$ of the live-bug Tp and still meet the Tc requirements, otherwise, the profile shall be adjusted to achieve the latter. To accurately measure actual peak package body temperatures refer to JEP140 for recommended thermocouple use.
4. Reflow profiles in this document are for classification/preconditioning and are not meant to specify board assembly profiles. Actual board assembly profiles should be developed based on specific process needs and board designs and should not exceed the parameters in Table. For example, if Tc is 260°C and time tp is 30 seconds, this means the following for the supplier and the user. For a supplier: The peak temperature must be at least 260°C . The time above 255°C must be at least 30 seconds. For a user: The peak temperature must not exceed 260°C . The time above 255°C must not exceed 30 seconds.
5. All components in the test load shall meet the classification profile requirements.
6. SMD packages classified to a given moisture sensitivity level by using Procedures or Criteria defined within any previous version of J-STD-020, JESD22-A112 (rescinded), IPC-SM-786 (rescinded) do not need to be reclassified to the current revision unless a change in classification level or a higher peak classification temperature is desired. (Source Reference: J-STD-020-D1)

3. Packing Specification

– Reel dimension

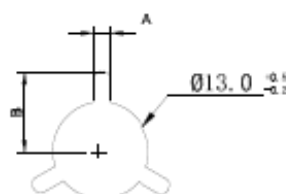
– Unit: mm

Size	C1	A	B	H	T	D
32mm	$330^{+0.2}_{-2.0}$	$2.0^{+0.2}_{-0.2}$	$10.3^{+0.2}_{-0.2}$	$32.5^{+0.3}_{-0.3}$	$2.0^{+0.3}_{-0.3}$	$100.0^{+0.2}_{-0.2}$



注:名称 13"塑胶旋转卷轮
材质 P.S蓝色

单位: mm
未注公差: ± 3



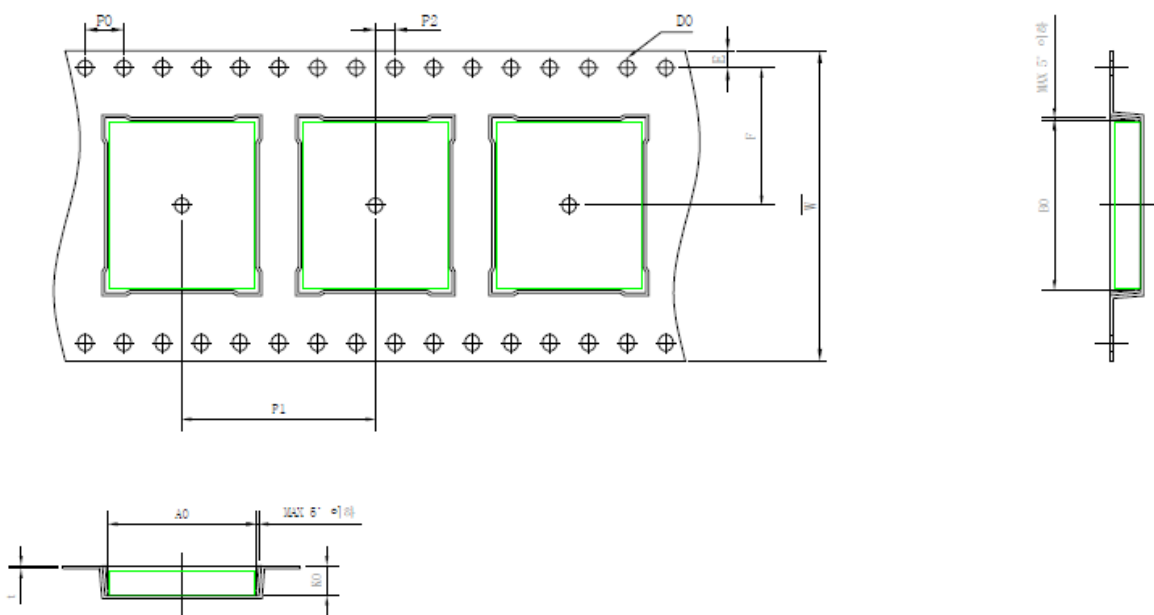
SPEC	12	16	24	32	44	56	72	88
C1 ± 2	330	330	330	330	330	330	330	330
A ± 0.2	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.3
B ± 0.2	10.3	10.3	10.3	10.3	10.3	10.3	10.3	10.3
H ± 0.3	12.5	16.5	24.5	32.5	44.5	56.5	72.5	88.5
T ± 0.3	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
D ± 0.2	$\varnothing 100$	$\varnothing 100$	$\varnothing 100$	$\varnothing 100$	$\varnothing 100$	$\varnothing 100$	$\varnothing 100$	$\varnothing 100$

– Tape dimension

– Unit: mm

A ₀	B ₀	K ₀	E	F	P ₀
15.3 ^{+0.15} _{-0.15}	17.5 ^{+0.15} _{-0.15}	3.10 ^{+0.15} _{-0.15}	1.75 ^{+0.10} _{-0.10}	14.20 ^{+0.15} _{-0.15}	4.00 ^{+0.10} _{-0.10}
P ₁	P ₂	D ₀	T	W	
20.00 ^{+0.10} _{-0.10}	2.00 ^{+0.10} _{-0.10}	1.55 ^{+0.10} _{-0.10}	0.30 ^{+0.05} _{-0.05}	32.0 ^{+0.30} _{-0.30}	

진행방향 →



Weight information

- 1) Module (1PCS): 1.34g
- 2) Reel (1000 PCS): 1.78Kg

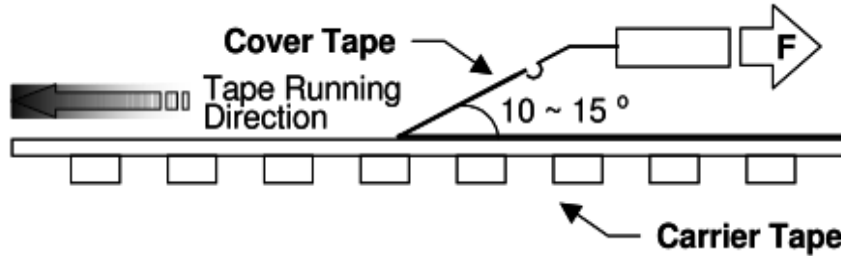
Tape type

- 1) Carrier type: Polystyrene
- 2) Cover type: Polyester

- **Cover tape detachment**

1) Detachment strength: $F = 20g \sim 90g$

2) Detachment speed: 50mm/sec



- **Module label specification**

TBD

- **Reel label specification**

TBD

- **Out carton box specification**

TBD

- **FCC Part 15 Compliance information**

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.

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

The device for operation in the band 5150-5250 MHz is only for indoor use to reduce the potential for harmful interference to co-channel mobile satellite systems.

– **IC approval**

This device contains licence-exempt transmitter(s)/receiver(s) that comply with Innovation, Science and Economic Development Canada's licence-exempt RSS(s). Operation is subject to the following two conditions:

(1) This device may not cause interference.

(2) This device must accept any interference, including interference that may cause undesired operation of the device.

L'émetteur/récepteur exempt de licence contenu dans le présent appareil est conforme aux CNR d'Innovation, Sciences et Développement économique 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;

(2) L'appareil doit accepter tout brouillage radioélectrique subi, même si le brouillage est susceptible d'en compromettre le fonctionnement.

5150-5350MHz indoor use only.

– **CE RED_EU declaration**

This product can be used in which EU members, in accordance with Article 10(10) / or this product can be used in at least one EU country, in accordance with Article 10(2).

Manufacturer: EVERINT Co., Ltd.

Address: 129, Chungjusandan 1-ro, Chungju-si, Chungcheongbuk-do, Republic of Korea

<Regulatory notice to host manufacturer according to KDB 996369 D03 OEM Manual v01>

List of applicable FCC rules

This module has been granted modular approval as below listed FCC rule parts.

-FCC Rule parts 15C (15.247, 15.407)

Summarize the specific operational use conditions

-The OEM integrator should use equivalent antennas which is the same type and equal or less gain than an antenna listed in 2.7 in this instruction manual.

RF exposure considerations

The module has been certified for integration into products only by OEM integrators under the following condition:

-The antenna(s) must be installed such that a minimum separation distance of at least 20 cm is maintained between the radiator (antenna) and all persons at all times.

-The transmitter module must not be co-located or operating in conjunction with any other antenna or transmitter except in accordance with FCC multi-transmitter product procedures.

-Mobile use

As long as the three conditions above are met, further transmitter testing will not be required.

OEM integrators should provide the minimum separation distance to end users in their end-product manuals.

Antennas list

This module is certified with the following integrated antenna.

-Type:

BT/LE : Ceramic chip Antenna

WLAN : Chip Antenna

- Max. peak Antenna gain

Frequency Band	Dual Band Ant1	Dual Band Ant2	BT Ant (2402-2480)
2.4G (2412-2472)	0.27 dBi	0.27 dBi	0.01 dBi
UNII-1 (5180-5240)	0.38 dBi	0.38 dBi	
UNII-2A(5260-5320)	0.2 dBi	0.2 dBi	
UNII-2C(5500-5720) (without 5600-5650)	0.82 dBi	0.82 dBi	
UNII-3 (5745-5825)	1.34 dBi	1.34 dBi	

Any new antenna type, higher gain than listed antenna should be met the requirements of FCC rule 15.203 and 2.1043 as permissive change procedure.

Authentication protocol

This module and antenna incorporate an authentication protocol to ensure that only authorized modules and authorized antennas work together.

This radio transmitter has been approved by Federal Communications Commission to operate with the antenna types listed, with the maximum permissible gain indicated. Antenna types not included in this list that have a gain greater than the maximum gain indicated for any type listed are strictly prohibited for use with this device.

Label and compliance information End Product Labeling

The module is labeled with its own FCC ID and IC Certification Number. If the FCC ID and IC Certification Number are 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. In that case, the final end product must be labeled in a visible area with the following:

"Contains FCC ID: 2AKMF-

WBT-MSO" "Contains IC:

22266-WBTMSO"

Information on test modes and additional testing requirements

-OEM integrator is still responsible for testing their end-product for any additional compliance requirements required with this module installed (for example, digital device emissions, PC peripheral requirements, additional transmitter in the host, etc.).

Additional testing, Part 15 Subpart B disclaimer

-The final host product also requires Part 15 subpart B compliance testing with the modular transmitter installed to be properly authorized for operation as a Part 15 digital device.