

正基科技股份有限公司

SPECIFICATIN

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Customer APPROVED	
Company	
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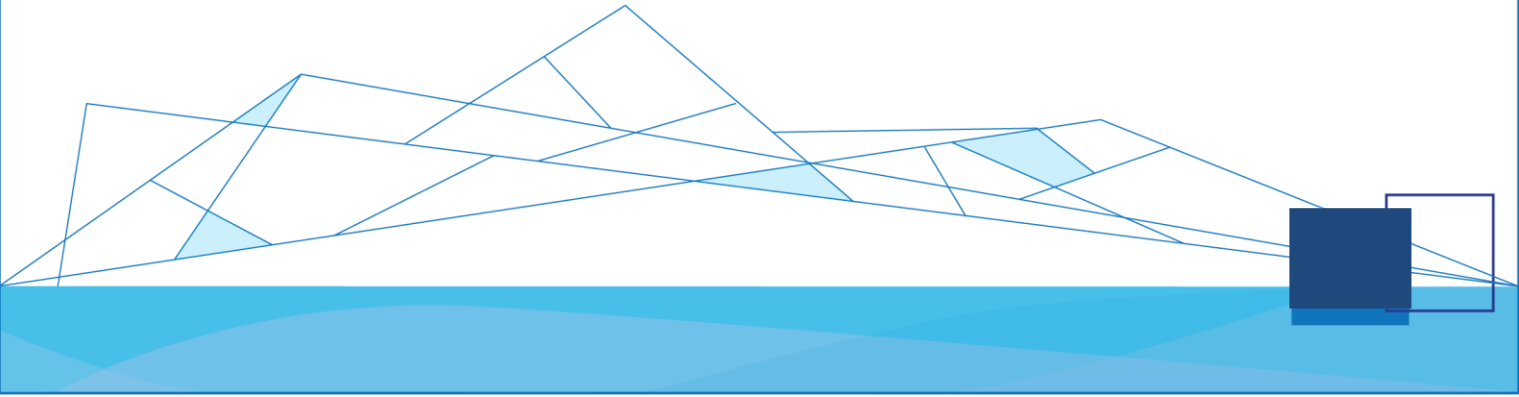


AP5876ES Data Sheet

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Revision

Revision	Date	Description	Revised By
0.1	2025/07/01	--Preliminary Release	Gary
0.2	2025/10/17	--Update Dimension and Package	Gary
0.3	2026/02/11	--Update Dimension	Gary
0.4	2026/05/20	--Delete 802.11a MIMO RX	Sam
0.5	2026/06/10	--Update Product Feature	Gary



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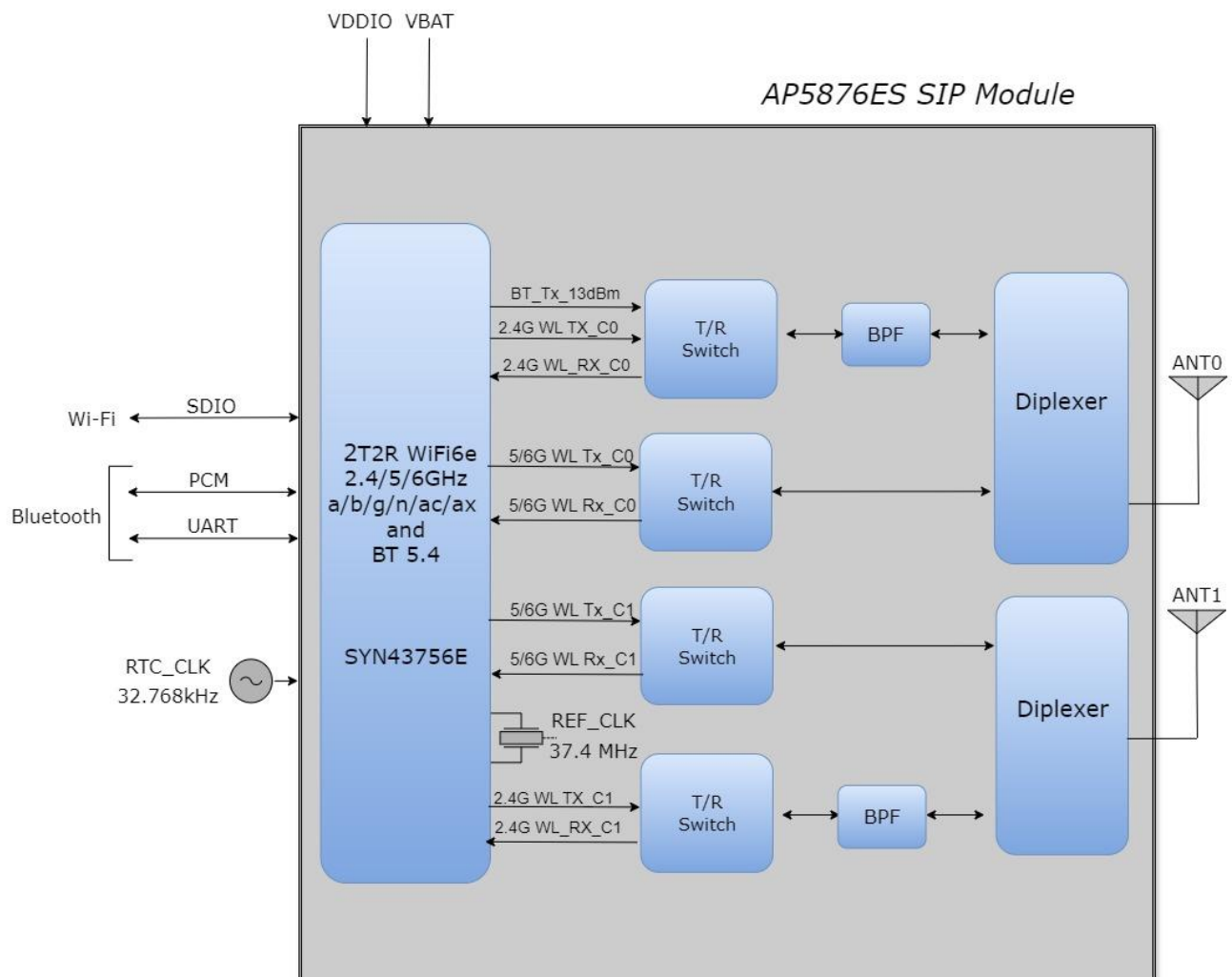
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1. Introduction

1.1 Overview

The AMPAK Technology® AP5876ES is a fully Wi-Fi 6E(2.4/5/6GHz) and Bluetooth functionalities module with seamless roaming capabilities and advance security, also it could interact with different vendors' 802.11a/b/g/n/ac/ax 2x2 Access Points with MIMO standard and can accomplish up to speed of 1200Mbps with dual stream in 802.11ax to connect the wireless LAN. Furthermore AP5876ES included SDIO interface for Wi-Fi, UART/ PCM interface for Bluetooth.

In addition, this compact module is a total solution for a combination of Wi-Fi + Bluetooth technologies. The module is specifically developed for tablet, OTT box and portable devices.



1.2 Product Features

IEEE 802.11 Key Features

- Lead Free design which is compliant with ROHS requirements.
- TX and RX low-density parity check (LDPC) support for improved range and power efficiency.
- Dual-stream spatial multiplexing up to 1200 Mbps data rate.
- 20/40/80 MHz channels for 5GHz and 6GHz (U-NII-5, U-NII-6, U-NII-7 and U-NII-8) radio, and 20MHz channels for 2.4GHz radio.
- Client MU-MIMO
- Supports standard SDIO v3.0 and compatible with SDIO v2.0 HOST interfaces.
- Supported Partial RU(Resource Unit) in 802.11ax.
- Supported non-HT(802.11a) preamble in 6GHz.

Bluetooth Key Features

- Bluetooth host digital interface:
 - HCI UART (up to 4 Mbps)
 - PCM for audio data
- Complies with Bluetooth Core Specification Version 5.4 with provisions for supporting future specifications. With Bluetooth Class 1 or Class2 transmitter operation.
- Supports extended synchronous connections (eSCO), for enhanced voice quality by allowing for retransmission of dropped packets.
- Adaptive frequency hopping (AFH) for reducing radio frequency interference.
A simplified block diagram of the module is depicted in the figure above.
- Bluetooth Core Specification Version 5.4, including the following support:
 - Low energy (LE) isochronous channels
 - LE power control
 - LE enhanced connection update
 - LE channel classification
 - LE audio

2. General Specification

2.1 General Specification

Model Name	AP5876ES
Product Description	2T2R 802.11 a/b/g/n/ac/ax Wi-Fi 6E + Bluetooth 5.4
Dimension	L x W : 10 x 10 (typical) mm , H : 1.25(Maximum) mm
WiFi Interface	Support SDIO V3.0/ 2.0
Bluetooth Interface	UART / PCM
Operating temperature	-30°C to 85°C
Storage temperature	-40°C to 125°C
Humidity	Operating Humidity 10% to 95% Non-Condensing

Note: The optimal RF performance specified in the data sheet, however, is guaranteed only -10 °C to +55 °C and 3.2V < VBAT < 4.8V without derating performance.

2.2 DC Characteristics

2.2.1 Absolute Maximum Ratings

Symbol	Description	Min.	Max.	Unit
VBAT	Input supply Voltage	-0.5	5.25	V
VDDIO	Digital/Bluetooth/ I/O Voltage	-0.5	2.07	V

Extreme caution must be exercised to prevent electrostatic discharge (ESD) damage.

Symbol	Condition	ESD Rating	Unit
ESD_HAND_HBM	Human body model contact discharge per JEDEC EID/JESD22-A114	1.5	kV
ESD_HAND_CDM	Charged device model contact discharge per JEDEC EIA/JESD22-C101	250	V

2.2.2 Recommended Operating Rating

The module requires two power supplies: VBAT and VDDIO.

Voltage rails	Min.	Typ.	Max.	Unit
VBAT	3.0	3.3	4.2	V
VDDIO	1.6	1.8	1.98	V

VBAT current consumption 1200mA (Peak), when VBAT = 3.3V

The module requires two power supplies: other Digital I/O Pins.

For VDDIO=1.8V	Min.	Max.	Unit
VIH = Input high voltage	$0.65 \times VDDIO$	NA	V
VIL = Input low voltage	NA	$0.4 \times VDDIO$	V
VOH = Output high voltage @ 2mA	$VDDIO - 0.4$	NA	V
VOL = Output low voltage @ 2mA	NA	0.4	V

Programmable 2mA to 16mA drive strength. Default is 10mA.

3. Wi-Fi RF Specification

3.1 2.4GHz RF Specification

Conditions : VBAT=3.3V ; VDDIO=1.8V ; Temp:25°C

Feature		Description										
WLAN Standard		IEEE 802.11b/g/n/ax & Wi-Fi compliant										
Frequency Range		2.400 GHz ~ 2.4835 GHz (2.4GHz ISM Band)										
Number of Channels		2.4GHz : Ch1 ~ Ch13										
Modulation		802.11b : DQPSK 、DBPSK 、CCK 802.11 g/n : OFDM /64-QAM 、16-QAM 、QPSK 、BPSK 802.11ax : OFDM /256-QAM 、64-QAM 、16-QAM 、QPSK 、BPSK										
Resource Unit		Partial RU : BW20MHz : 26T 、52T 、106T 、242T										
Output Power , tolerance ± 1.5 dB												
The transmit EVM quality & spectrum mask are compliant with IEEE 802.11 standard												
802.11b	1Mbps		2Mbps		5.5Mbps		11Mbps					
	19		19		19		19					
802.11g	6 、9Mbps		12 、18Mbps		24Mbps		36Mbps		48Mbps			
	18		17		17		17		17			
	54Mbps											
	16.5											
802.11n 20MHz	MCS0~2		MCS3		MCS4		MCS5		MCS6			
	18		17.5		17.5		17		16.5			
	MCS7											
	15.5											
802.11ax 20MHz	HE0~2		HE3		HE4		HE5		HE6			
	18		17.5		17.5		17		16.5			
	HE7		HE8		HE9							
	15.5		14.5		14							
802.11ax_20MHz SISO_OFDMA	HE4		26		17.5		HE9		26		14	
			52		17.5				52		14	

		106	17.5		106	14
		242	17.5		242	14
	HE5	26	17			
		52	17			
		106	17			

Note: The specifications of RF output power are subject to change to fulfill the safety regulation and requirements in end-user product.

Sensitivity, tolerance ± 2 dB
CCK modulation PER $\leq 8\%$ 、OFDM modulation PER $\leq 10\%$

802.11b	Data Rate	Spec.(dBm)		
	1Mbps	-98		
	2Mbps	-93		
	5.5Mbps	-91		
	11Mbps	-89		
802.11g SISO	Data Rate	Spec.(dBm)	Data Rate	Spec.(dBm)
	6Mbps	-93	24Mbps	-85
	9Mbps	-92	36Mbps	-82
	12Mbps	-91	48Mbps	-78
	18Mbps	-88	54Mbps	-76
802.11g MIMO	Data Rate	Spec.(dBm)	Data Rate	Spec.(dBm)
	6Mbps	-95	24Mbps	-87
	9Mbps	-94	36Mbps	-84
	12Mbps	-93	48Mbps	-81
	18Mbps	-90	54Mbps	-78
802.11n_20MHz SISO	Data Rate	Spec.(dBm)	Data Rate	Spec.(dBm)
	MCS0	-93	MCS4	-81
	MCS1	-89	MCS5	-79
	MCS2	-87	MCS6	-76
	MCS3	-84	MCS7	-74
802.11n_20MHz MIMO	Data Rate	Spec.(dBm)	Data Rate	Spec.(dBm)
	MCS0	-93	MCS5	-80
	MCS1	-92	MCS6	-78
	MCS2	-90	MCS7	-76
	MCS3	-87	MCS8	-92
	MCS4	-83	MCS15	-75
802.11ax_20MHz SISO	Data Rate	Spec.(dBm)	Data Rate	Spec.(dBm)
	HE0	-92	HE6	-75

	HE1	-88	HE7	-74
	HE2	-86	HE8	-71
	HE3	-83	HE9	-69
	HE4	-80		
	HE5	-77		
802.11ax_20MHz MIMO	Data Rate	Spec.(dBm)	Data Rate	Spec.(dBm)
	HE0	-91	HE6	-74

802.11ax_20MHz MIMO	HE1	-87	HE7	-73
	HE2	-85	HE8	-70
	HE3	-82	HE9	-68
	HE4	-79		
	HE5	-76		
Maximum Input Level	802.11b : -10 dBm			
	802.11g/n/ax : -20 dBm			



3.2 5GHz RF Specification

Conditions : VBAT=3.3V ; VDDIO=1.8V ; Temp:25°C

Feature	Description
WLAN Standard	IEEE 802.11a/n/ac/ax & Wi-Fi compliant
Frequency Range	5.15~5.35GHz 、 5.47~5.725GHz 、 5.745~5.85GHz (5GHz UNII Band)
Number of Channels	5.15~5.35GHz : Ch36 ~ Ch64 5.47~5.725GHz : Ch100 ~ Ch144 5.745~5.85GHz : Ch149 ~ Ch165
Modulation	802.11a : OFDM /64-QAM 、 16-QAM 、 QPSK 、 BPSK 802.11n : OFDM /64-QAM 、 16-QAM 、 QPSK 、 BPSK 802.11ac : OFDM /256-QAM 、 OFDM /64-QAM 、 16-QAM 、 QPSK 、 BPSK 802.11ax : OFDM/ 1024-QAM 、 OFDM /256-QAM 、 OFDM /64-QAM 、 16-QAM 、 QPSK 、 BPSK
Resource Unit	Partial RU : BW20MHz : 26T 、 52T 、 106T 、 242T BW40MHz : 26T 、 52T 、 106T 、 242T 、 484T BW80MHz : 26T 、 52T 、 106T 、 242T 、 484T 、 996T

Output Power , tolerance ± 2 dB

The transmit EVM quality & spectrum mask are compliant with IEEE 802.11 standard

802.11a	Frequency (MHz)	6~9Mbps	12~18Mbps	24Mbps	36Mbps
	5150~5350	15.5	15.5	15.5	15.5
	5470~5725	15.5	15.5	15.5	15.5
	5745~5845	15.5	15.5	15.5	15.5
	Frequency (MHz)	48Mbps	54Mbps		
	5150~5350	15.5	15.5		
	5470~5725	15.5	15.5		
	5745~5845	15.5	15.5		
802.11n 20MHz	Frequency (MHz)	MCS0~2	MCS3	MCS4	MCS5
	5150~5350	15.5	15.5	15.5	15.5
	5470~5725	15.5	15.5	15.5	15.5
	5745~5845	15.5	15.5	15.5	15.5
	Frequency (MHz)	MCS6	MCS7		
	5150~5350	15.5	14.5		
	5470~5725	15.5	14.5		
	5745~5845	15.5	14.5		



802.11n 40MHz	Frequency (MHz)	MCS0~2	MCS3	MCS4	MCS5
	5150~5350	15.5	15.5	15	15
	5470~5725	15.5	15.5	15	15
	5745~5845	15.5	15.5	15	15
	Frequency (MHz)	MCS6	MCS7		
	5150~5350	14.5	14.5		
	5470~5725	14.5	14.5		
	5745~5845	14.5	14.5		
802.11ac 20MHz	Frequency (MHz)	MCS0~2	MCS3	MCS4	MCS5
	5150~5350	15.5	15.5	15.5	15.5
	5470~5725	15.5	15.5	15.5	15.5
	5745~5845	15.5	15.5	15.5	15.5
	Frequency (MHz)	MCS6	MCS7	MCS8	
	5150~5350	15.5	14.5	12	
	5470~5725	15.5	14.5	12	
	5745~5845	15.5	14.5	12	
802.11ac 40MHz	Frequency (MHz)	MCS0~2	MCS3	MCS4	MCS5
	5150~5350	15.5	15.5	15	15
	5470~5725	15.5	15.5	15	15
	5745~5845	15.5	15.5	15	15
	Frequency (MHz)	MCS6	MCS7	MCS8	MCS9
	5150~5350	14.5	14.5	12	10
	5470~5725	14.5	14.5	12	10
	5745~5845	14.5	14.5	12	10
802.11ac 80MHz	Frequency (MHz)	MCS0~2	MCS3	MCS4	MCS5
	5150~5350	15	15	14.5	14.5
	5470~5725	15	15	14.5	14.5
	5745~5845	15	15	14.5	14.5
	Frequency (MHz)	MCS6	MCS7	MCS8	MCS9
	5150~5350	14	14	10	10
	5470~5725	14	14	10	10
	5745~5845	14	14	10	10

802.11ax 20MHz	Frequency (MHz)	HE0~2	HE3	HE4	HE5
	5150~5350	15.5	15.5	15.5	15.5
	5470~5725	15.5	15.5	15.5	15.5
	5745~5845	15.5	15.5	15.5	15.5
	Frequency (MHz)	HE6	HE7	HE8	HE9
	5150~5350	14.5	14.5	12	12
	5470~5725	14.5	14.5	12	12
	5745~5845	14.5	14.5	12	12
	Frequency (MHz)	HE10	HE11		
	5150~5350	10	10		
	5470~5725	10	10		
	5745~5845	10	10		
802.11ax 40MHz	Frequency (MHz)	HE0~2	HE3	HE4	HE5
	5150~5350	15.5	15.5	15	15
	5470~5725	15.5	15.5	15	15
	5745~5845	15.5	15.5	15	15
	Frequency (MHz)	HE6	HE7	HE8	HE9
	5150~5350	14.5	14.5	12	10
	5470~5725	14.5	14.5	12	10
	5745~5845	14.5	14.5	12	10
	Frequency (MHz)	HE10	HE11		
	5150~5350	8	8		
	5470~5725	8	8		
	5745~5845	8	8		
802.11ax 80MHz	Frequency (MHz)	HE0~2	HE3	HE4	HE5
	5150~5350	15	15	14.5	14.5
	5470~5725	15	15	14.5	14.5
	5745~5845	15	15	14.5	14.5
	Frequency (MHz)	HE6	HE7	HE8	HE9
	5150~5350	14	14	10	10
	5470~5725	14	14	10	10
	5745~5845	14	14	10	10
	Frequency (MHz)	HE10	HE11		

	5150~5350	8	8		
	5470~5725	8	8		
	5745~5845	8	8		

Note: The specifications of RF output power are subject to change to fulfill the safety regulation and requirements in end-user product.

802.11ax_20M Hz SISO_OFDMA	Dara rate	Tones	Frequency	Spec.(dBm)
	HE0	26	5150~5350	15.5
			5470~5725	15.5
			5745~5845	15.5
		52	5150~5350	15.5
			5470~5725	15.5
			5745~5845	15.5
		106	5150~5350	15.5
			5470~5725	15.5
			5745~5845	15.5
		242	5150~5350	14.5
			5470~5725	14
			5745~5845	14
	HE1~2	26	5150~5350	15.5
			5470~5725	15.5
			5745~5845	15.5
		52	5150~5350	15.5
			5470~5725	15.5
			5745~5845	15.5
		106	5150~5350	15.5
			5470~5725	15.5
			5745~5845	15.5
		242	5150~5350	14.5
			5470~5725	14
			5745~5845	14
	HE3~4	26	5150~5350	15.5
			5470~5725	15.5
			5745~5845	15.5
		52	5150~5350	15.5
			5470~5725	15.5
			5745~5845	15.5
		106	5150~5350	15.5
			5470~5725	15.5
			5745~5845	15.5

		242	5745~5845	15.5
			5150~5350	14.5
			5470~5725	14
			5745~5845	14
	HE5~7	26	5150~5350	14.5

802.11ax_20M Hz SISO_OFDMA	HE5~7		5470~5725	14.5
			5745~5845	14.5
		52	5150~5350	14.5
			5470~5725	14.5
			5745~5845	14.5
		106	5150~5350	14.5
			5470~5725	14.5
			5745~5845	14.5
		242	5150~5350	14.5
			5470~5725	14
			5745~5845	14
	HE8~9	26	5150~5350	12
			5470~5725	12
			5745~5845	12
		52	5150~5350	12
			5470~5725	12
			5745~5845	12
		106	5150~5350	12
			5470~5725	12
			5745~5845	12
		242	5150~5350	12
			5470~5725	12
			5745~5845	12
	HE10~11	242	5150~5350	10
			5470~5725	9.5
			5745~5845	9.5

802.11ax_40MHz SISO_OFDMA	Dara rate	Tones	Frequency	Spec.(dBm)
	HE0	26	5150~5350	15.5
			5470~5725	15
			5745~5845	15
		52	5150~5350	15.5
			5470~5725	15
			5745~5845	15
		106	5150~5350	15.5
			5470~5725	15
			5745~5845	15
		242	5150~5350	15.5
			5470~5725	15
			5745~5845	15
		484	5150~5350	14.5
			5470~5725	14.5
			5745~5845	14.5
	HE1~2	26	5150~5350	15.5
			5470~5725	15
			5745~5845	15
		52	5150~5350	15.5
			5470~5725	15
			5745~5845	15
		106	5150~5350	15.5
			5470~5725	15
			5745~5845	15
		242	5150~5350	15.5
			5470~5725	15
			5745~5845	15
		484	5150~5350	14.5
			5470~5725	14.5
			5745~5845	14.5

802.11ax_40MHz SISO_OFDMA	HE3~4	26	5150~5350	15.5
			5470~5725	15
			5745~5845	15
		52	5150~5350	15.5
			5470~5725	15
			5745~5845	15
		106	5150~5350	15.5
			5470~5725	15
			5745~5845	15
		242	5150~5350	15.5
			5470~5725	15
			5745~5845	15
		484	5150~5350	14.5
			5470~5725	14.5
			5745~5845	14.5
	HE5~7	26	5150~5350	14.5
			5470~5725	14.5
			5745~5845	14.5
		52	5150~5350	14.5
			5470~5725	14.5
			5745~5845	14.5
		106	5150~5350	14.5
			5470~5725	14.5
			5745~5845	14.5
		242	5150~5350	14.5
			5470~5725	14.5
			5745~5845	14.5
		484	5150~5350	14.5
			5470~5725	14.5
			5745~5845	14.5
	HE8~9	26	5150~5350	12
			5470~5725	12
			5745~5845	12
		52	5150~5350	12
			5470~5725	12
			5745~5845	12
		106	5150~5350	10

802.11ax_40MHz SISO_OFDMA	HE8~9	106	5470~5725	10
			5745~5845	10
		242	5150~5350	10
			5470~5725	10
			5745~5845	10
		484	5150~5350	10
			5470~5725	10
			5745~5845	10
	HE10~11	242	5150~5350	8
			5470~5725	8
			5745~5845	8
		484	5150~5350	8
			5470~5725	8
			5745~5845	8

	Dara rate	Tones	Frequency	Spec.(dBm)
802.11ax_80MHz SISO_OFDMA	HE0	26	5150~5350	15.5
			5470~5725	15
			5745~5845	15
		52	5150~5350	15.5
			5470~5725	15
			5745~5845	15
		106	5150~5350	15.5
			5470~5725	15
			5745~5845	15
		242	5150~5350	15.5
			5470~5725	15
			5745~5845	15
		484	5150~5350	15.5
			5470~5725	15
			5745~5845	15
		996	5150~5350	15.5
			5470~5725	15
			5745~5845	15
	HE1~2	26	5150~5350	15.5
			5470~5725	15
			5745~5845	15
		52	5150~5350	15.5
			5470~5725	15
			5745~5845	15
		106	5150~5350	15.5
			5470~5725	15
			5745~5845	15
		242	5150~5350	15.5
			5470~5725	15
			5745~5845	15
		484	5150~5350	15.5
			5470~5725	15
			5745~5845	15
		996	5150~5350	15.5
			5470~5725	15
			5745~5845	15

802.11ax_80MHz SISO_OFDMA	HE3~4	26	5150~5350	15.5
			5470~5725	15
			5745~5845	15
		52	5150~5350	15.5
			5470~5725	15
			5745~5845	15
		106	5150~5350	15.5
			5470~5725	15
			5745~5845	15
		242	5150~5350	15.5
			5470~5725	15
			5745~5845	15
		484	5150~5350	15.5
			5470~5725	15
			5745~5845	15
		996	5150~5350	15.5
			5470~5725	15
			5745~5845	15
	HE5~7	26	5150~5350	14.5
			5470~5725	14.5
			5745~5845	14.5
		52	5150~5350	14.5
			5470~5725	14.5
			5745~5845	14.5
		106	5150~5350	14.5
			5470~5725	14.5
			5745~5845	14.5
		242	5150~5350	14.5
			5470~5725	14.5
			5745~5845	14.5
		484	5150~5350	14.5
			5470~5725	14
			5745~5845	14
		996	5150~5350	14
			5470~5725	14
			5745~5845	14

802.11ax_80MHz SISO_OFDMA	HE8~9	26	5150~5350	10
			5470~5725	10
			5745~5845	10
		52	5150~5350	10
			5470~5725	10
			5745~5845	10
		106	5150~5350	10
			5470~5725	10
			5745~5845	10
		242	5150~5350	10
			5470~5725	10
			5745~5845	10
		484	5150~5350	10
			5470~5725	10
			5745~5845	10
		996	5150~5350	10
			5470~5725	10
			5745~5845	10
	HE10~11	242	5150~5350	8
			5470~5725	8
			5745~5845	8
		484	5150~5350	8
			5470~5725	8
			5745~5845	8
		996	5150~5350	8
			5470~5725	8
			5745~5845	8

Sensitivity, tolerance ± 2 dB , OFDM modulation PER $\leq 10\%$				
802.11a SISO	Data Rate	Spec.(dBm)	Data Rate	Spec.(dBm)
	6Mbps	-90	24Mbps	-83
	9Mbps	-89	36Mbps	-80
	12Mbps	-88	48Mbps	-75
	18Mbps	-86	54Mbps	-73
802.11n_20MHz SISO	Data Rate	Spec.(dBm)	Data Rate	Spec.(dBm)
	MCS0	-90	MCS4	-79
	MCS1	-88	MCS5	-76
	MCS2	-86	MCS6	-73
	MCS3	-83	MCS7	-71
802.11n_20MHz MIMO	Data Rate	Spec.(dBm)	Data Rate	Spec.(dBm)
	MCS0	-92	MCS5	-78
	MCS1	-91	MCS6	-76
	MCS2	-89	MCS7	-74
	MCS3	-86	MCS8	-90
	MCS4	-82	MCS15	-70
802.11n_40MHz SISO	Data Rate	Spec.(dBm)	Data Rate	Spec.(dBm)
	MCS0	-88	MCS4	-77
	MCS1	-86	MCS5	-72
	MCS2	-83	MCS6	-70
	MCS3	-80	MCS7	-68
802.11n_40MHz MIMO	Data Rate	Spec.(dBm)	Data Rate	Spec.(dBm)
	MCS0	-90	MCS5	-75
	MCS1	-88	MCS6	-73
	MCS2	-86	MCS7	-71
	MCS3	-83	MCS8	-87
	MCS4	-79	MCS15	-67

802.11ac_20MHz SISO	Data Rate	Spec.(dBm)	Data Rate	Spec.(dBm)
	MCS0	-90	MCS5	-75
	MCS1	-88	MCS6	-73
	MCS2	-86	MCS7	-70
	MCS3	-83	MCS8	-68
	MCS4	-79		
802.11ac_20MHz MIMO	Data Rate	Spec.(dBm)	Data Rate	Spec.(dBm)
	MCS0, NSS=1	-92	MCS6, NSS=1	-76
	MCS1, NSS=1	-91	MCS7, NSS=1	-73
	MCS2, NSS=1	-88	MCS8, NSS=1	-71
	MCS3, NSS=1	-85	MCS0, NSS=2	-89
	MCS4, NSS=1	-82	MCS8, NSS=2	-65
	MCS5, NSS=1	-77		
802.11ac_40MHz SISO	Data Rate	Spec.(dBm)	Data Rate	Spec.(dBm)
	MCS0	-88	MCS5	-72
	MCS1	-86	MCS6	-70
	MCS2	-83	MCS7	-69
	MCS3	-80	MCS8	-65
	MCS4	-76	MCS9	-64
802.11ac_40MHz MIMO	Data Rate	Spec.(dBm)	Data Rate	Spec.(dBm)
	MCS0, NSS=1	-90	MCS6, NSS=1	-73
	MCS1, NSS=1	-88	MCS7, NSS=1	-72
	MCS2, NSS=1	-86	MCS8, NSS=1	-68
	MCS3, NSS=1	-82	MCS9, NSS=1	-66
	MCS4, NSS=1	-79	MCS0, NSS=2	-86
	MCS5, NSS=1	-75	MCS9, NSS=2	-62
802.11ac_80MHz SISO	Data Rate	Spec.(dBm)	Data Rate	Spec.(dBm)
	MCS0	-85	MCS5	-68
	MCS1	-82	MCS6	-67
	MCS2	-79	MCS7	-65
	MCS3	-76	MCS8	-62
	MCS4	-73	MCS9	-61

802.11ac_80MHz MIMO	Data Rate	Spec.(dBm)	Data Rate	Spec.(dBm)
	MCS0, NSS=1	-87	MCS6, NSS=1	-70
	MCS1, NSS=1	-85	MCS7, NSS=1	-68
	MCS2, NSS=1	-82	MCS8, NSS=1	-65
	MCS3, NSS=1	-79	MCS9, NSS=1	-63
	MCS4, NSS=1	-76	MCS0, NSS=2	-83
	MCS5, NSS=1	-71	MCS9, NSS=2	-58
802.11ax_20MHz SISO	Data Rate	Spec.(dBm)	Data Rate	Spec.(dBm)
	HE0	-90	HE6	-73
	HE1	-88	HE7	-70
	HE2	-86	HE8	-68
	HE3	-83	HE9	-64
	HE4	-79	HE10	-59
	HE5	-75	HE11	-57
802.11ax_40MHz SISO	Data Rate	Spec.(dBm)	Data Rate	Spec.(dBm)
	HE0	-88	HE6	-70
	HE1	-86	HE7	-69
	HE2	-83	HE8	-65
	HE3	-80	HE9	-64
	HE4	-76	HE10	-60
	HE5	-72	HE11	-55
802.11ax_80MHz SISO	Data Rate	Spec.(dBm)	Data Rate	Spec.(dBm)
	HE0	-85	HE6	-67
	HE1	-82	HE7	-65
	HE2	-79	HE8	-62
	HE3	-76	HE9	-61
	HE4	-73	HE10	-55
	HE5	-68	HE11	-51
Maximum Input Level	802.11a/n/ac/ax : -30 dBm			



3.3 6GHz RF Specification

Conditions : VBAT=3.3V ; VDDIO=1.8V ; Temp:25°C

Feature	Description
WLAN Standard	IEEE 802.11ax Non-HT(802.11a) preamble for ack/beacon
Frequency Range	5.925 ~ 7.125GHz (6GHz U-NII5/6/7/8 Band)
Number of Channels	5955~5415MHz : 6G1 ~ 6G93、6435~6515MHz : 6G97 ~ 6G113 6535~6855MHz : 6G117 ~ 6G181、6875~7115MHz : 6G185 ~ 6G233
Modulation	802.11ax : OFDMA /1024-QAM、256-QAM、64-QAM、16-QAM、QPSK、BPSK
Resource Unit	Partial RU : BW20MHz : 26T、52T、106T、242T BW40MHz : 26T、52T、106T、242T、484T BW80MHz : 26T、52T、106T、242T、484T、996T

Output Power(dBm) , tolerance ± 2 dB

The transmit EVM quality & spectrum mask are compliant with IEEE 802.11 standard

802.11ax 20MHz	Frequency (MHz)	HE0~2	HE3	HE4	HE5
	5955~5415	14.5	14	13.5	13.5
	6435~6515	14.5	14	13.5	13.5
	6535~6855	14.5	14	13.5	13.5
	6875~7115	14.5	14	13.5	13.5
	Frequency (MHz)	HE6	HE7	HE8	HE9
	5955~5415	13.5	12.5	10.5	10.5
	6435~6515	13.5	12.5	10.5	10.5
	6535~6855	13.5	12.5	10.5	10.5
	6875~7115	13.5	12.5	10.5	10.5
	Frequency (MHz)	HE10	HE11		
	5955~5415	8.5	8.5		
	6435~6515	8.5	8.5		
	6535~6855	8.5	8.5		
	6875~7115	8.5	8.5		
802.11ax 40MHz	Frequency (MHz)	HE0~2	HE3	HE4	HE5
	5955~5415	14.5	14	13	13
	6435~6515	14.5	14	13	13
	6535~6855	14.5	14	13	13
	6875~7115	14.5	14	13	13
	Frequency (MHz)	HE6	HE7	HE8	HE9

	5955~5415	12.5	12.5	11	8
	6435~6515	12.5	12.5	11	8
	6535~6855	12.5	12.5	11	8
	6875~7115	12.5	12.5	11	8
	Frequency (MHz)	HE10	HE11		
	5955~5415	7	7		
	6435~6515	7	7		
	6535~6855	7	7		
	6875~7115	7	7		
802.11ax 80MHz	Frequency (MHz)	HE0~2	HE3	HE4	HE5
	5955~5415	14.5	14	13	13
	6435~6515	14.5	14	13	13
	6535~6855	14.5	14	13	13
	6875~7115	14.5	14	13	13
	Frequency (MHz)	HE6	HE7	HE8	HE9
	5955~5415	12.5	12.5	8	8
	6435~6515	12.5	12.5	8	8
	6535~6855	12.5	12.5	8	8
	6875~7115	12.5	12.5	8	8
	Frequency (MHz)	HE10	HE11		
	5955~5415	7	7		
	6435~6515	7	7		
	6535~6855	7	7		
	6875~7115	7	7		

Note: The specifications of RF output power are subject to change to fulfill the safety regulation and requirements in end-user product.

Sensitivity, tolerance ± 2 dB, OFDM modulation PER $\leq 10\%$

802.11ax_20MHz SISO	Data Rate	Spec.(dBm)	Data Rate	Spec.(dBm)
	HE0	-88	HE6	-71
	HE1	-86	HE7	-68
	HE2	-84	HE8	-66
	HE3	-83	HE9	-62
	HE4	-77	HE10	-57
	HE5	-73	HE11	-55
802.11ax_20MHz MIMO	Data Rate	Spec.(dBm)	Data Rate	Spec.(dBm)
	HE0	-88	HE6	-71
	HE1	-86	HE7	-68

	HE2	-84	HE8	-66
	HE3	-81	HE9	-62
	HE4	-77	HE10	-57
	HE5	-73	HE11	-54
802.11ax_40MHz SISO	Data Rate	Spec.(dBm)	Data Rate	Spec.(dBm)
	HE0	-86	HE6	-68
	HE1	-84	HE7	-67
	HE2	-81	HE8	-63
	HE3	-78	HE9	-62
	HE4	-74	HE10	-68
	HE5	-70	HE11	-53
802.11ax_40MHz MIMO	Data Rate	Spec.(dBm)	Data Rate	Spec.(dBm)
	HE0	-85	HE6	-68
	HE1	-84	HE7	-67
	HE2	-81	HE8	-63
	HE3	-78	HE9	-62
	HE4	-74	HE10	-58
	HE5	-70	HE11	-53
802.11ax_80MHz SISO	Data Rate	Spec.(dBm)	Data Rate	Spec.(dBm)
	HE0	-83	HE6	-65
	HE1	-80	HE7	-63
	HE2	-77	HE8	-60
	HE3	-74	HE9	-59
	HE4	-71	HE10	-55
	HE5	-66	HE11	-51
802.11ax_80MHz MIMO	Data Rate	Spec.(dBm)	Data Rate	Spec.(dBm)
	HE0	-82	HE6	-65
	HE1	-80	HE7	-63
	HE2	-77	HE8	-60
	HE3	-74	HE9	-59
	HE4	-71	HE10	-55
	HE5	-66	HE11	-50
Maximum Input Level	802.11ax : -30dBm			

4. Bluetooth Specification

4.1 Bluetooth Specification

Conditions : VBAT=3.3V ; VDDIO=1.8V ; Temp:25°C

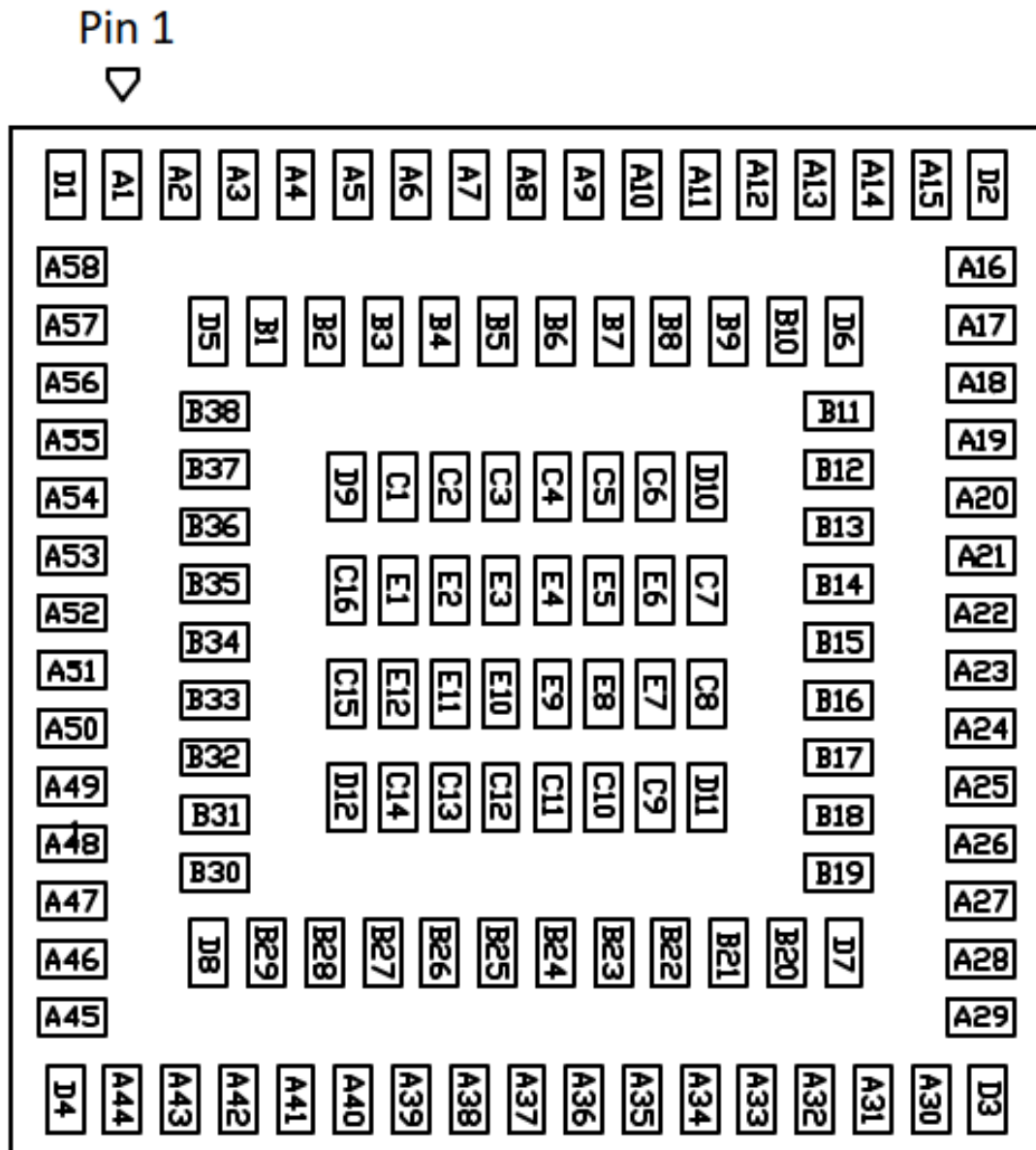
Feature	Description
General Specification	
Bluetooth Standard	BDR、EDR(2Mbps & 3Mbps)、LE(1/2Mbps)、LELR(128/512Kbps)
Host Interface	UART
Frequency Band	2402 MHz ~ 2480 MHz
Number of Channels	79 channels for classic、40 channels for BLE
Modulation	GFSK, $\pi/4$ -DQPSK, 8DPSK
RF Specification	
Output Power, tolerance ± 2 dB	
	CL1 (dBm)
BDR Output Power	14
EDR Output Power	11.5
BLE Output Power	14
Sensitivity, tolerance ± 2 dB	
Sensitivity @ BER=0.1% for GFSK (1Mbps)	-87 dBm
Sensitivity @ BER=0.01% for $\pi/4$ -DQPSK (2Mbps)	-89 dBm
Sensitivity @ BER=0.01% for 8DPSK (3Mbps)	-83 dBm
Sensitivity @ PER=30.8% for LE (1Mbps)	-90.5 dBm
Sensitivity @ PER=30.8% for 2LE (2Mbps)	-87.5dBm
Maximum Input Level	GFSK (1Mbps):-20dBm
	$\pi/4$ -DQPSK (2Mbps) :-20dBm
	8DPSK (3Mbps) :-20dBm

Note* : The Bluetooth BDR output power is able to be configured by firmware (hcd file).

5. Pin Definition

5.1 Pin Outline

<TOP VIEW>



5.2 Pin Assignment

NO	Name	Type	Description
A54	WL_ANT0	I/O	RF I/O port0
A44	WL_ANT1	I/O	RF I/O port1
B12	SDIO_DATA_CMD	I/O	SDIO command line
B13	SDIO_DATA_3	I/O	SDIO data line 3
B14	SDIO_DATA_2	I/O	SDIO data line 2
B15	SDIO_DATA_1	I/O	SDIO data line 1
B16	SDIO_DATA_0	I/O	SDIO data line 0
B18	SDIO_DATA_CLK	I/O	SDIO clock line
A21	NC	⌀	Floating (Don't connect to ground)
A22	NC	⌀	Floating (Don't connect to ground)
A24	NC	⌀	Floating (Don't connect to ground)
A23	NC	⌀	Floating (Don't connect to ground)
A20	NC	⌀	Floating (Don't connect to ground)
A19	NC	⌀	Floating (Don't connect to ground)
D6	NC	⌀	Floating (Don't connect to ground)
B10	NC	⌀	Floating (Don't connect to ground)
B9	NC	⌀	Floating (Don't connect to ground)
A5	BT_UART_TXD	O	Bluetooth UART serial data output
A6	BT_UART_CTS_N	I	Bluetooth UART clear to send
A7	BT_UART_RTS_N	O	Bluetooth UART request to send
A8	BT_UART_RXD	I	Bluetooth UART serial data input
A1	BT_PCM_OUT	O	PCM data output
A2	BT_PCM_SYNC	I/O	PCM sync signal
A3	BT_PCM_CLK	I	PCM clock
A4	BT_PCM_IN	I	PCM data input
A9	BT_I2S_DO	I/O	I2S data output
A10	BT_I2S_WS	I/O	I2S word select
A11	BT_I2S_CLK	I/O	I2S clock
A12	BT_I2S_DI	I/O	I2S data input
C10	LPO_IN	I	External Low Power Clock input (32.768KHz)
B21	WL_HOST_WAKE	O	WLAN to wake-up HOST
B20	WL_WAKE	I	Host wake-up WLAN
B8	DAP_SEL	O	This pin can be programmed to be a GPIO, the DAP

			_SEL signal, UART_DBG_TX or the GCI external coexistence interface. Debug access port select (DAP_SEL) 0: Not selected 1: Selected
B24	LTECOEX_UART_TX/WL_UART_TX	O	This pin can be programmed to be a GPIO, SPI_DATA_OUT signal, UART_TX or the GCI external coexistence interface.
B25	SH_WLAN_WAKE/WL_UART_RX	O	This pin can be programmed to be a GPIO, SPI_DATA_IN signal, UART_RX or the GCI external coexistence interface.
B26	DBG_UART_TX/WL_UART_RTS	I/O	This pin can be programmed to be a GPIO, SPI_DATA_CLK signal, UART_RTS or the GCI external coexistence interface.
B27	DBG_UART_RX/WL_UART_CTS	I/O	This pin can be programmed to be a GPIO, SPI_DATA_CS signal, UART_CTS or the GCI external coexistence interface.
A58	WL_GPIO_12	I/O	This pin can be programmed to be a GPIO, DBG_UART_RX or the GCI external coexistence interface.
A57	WL_GPIO_13	I/O	This pin can be programmed to be a GPIO, DBG_UART_TX or the GCI external coexistence interface.
A56	WL_GPIO_14	I/O	This pin can be programmed to be a GPIO or the GCI external coexistence interface.
B7	WL_GPIO_15	I/O	This pin pull high for SDIO interface, pull low for PCIE interface.
D5	BT_GPIO_2	I/O	Bluetooth general-purpose I/O
B1	BT_GPIO_3	I/O	Bluetooth general-purpose I/O or can be programmed to be
B2	GPIR_TX	I/O	Bluetooth general-purpose I/O or can be programmed to be Bluetooth IR transmit.
B3	GPIR_RX	I/O	Bluetooth general-purpose I/O or can be programmed to be Bluetooth IR learning.
B5	BT_HOST_WAKE	O	Bluetooth device to wake-up HOST
B6	BT_WAKE	I	HOST wake-up Bluetooth device
B22	BT_REG_ON	I	Low asserting reset for Bluetooth core
B23	WL_REG_ON	I	Low asserting reset for Wi-Fi core

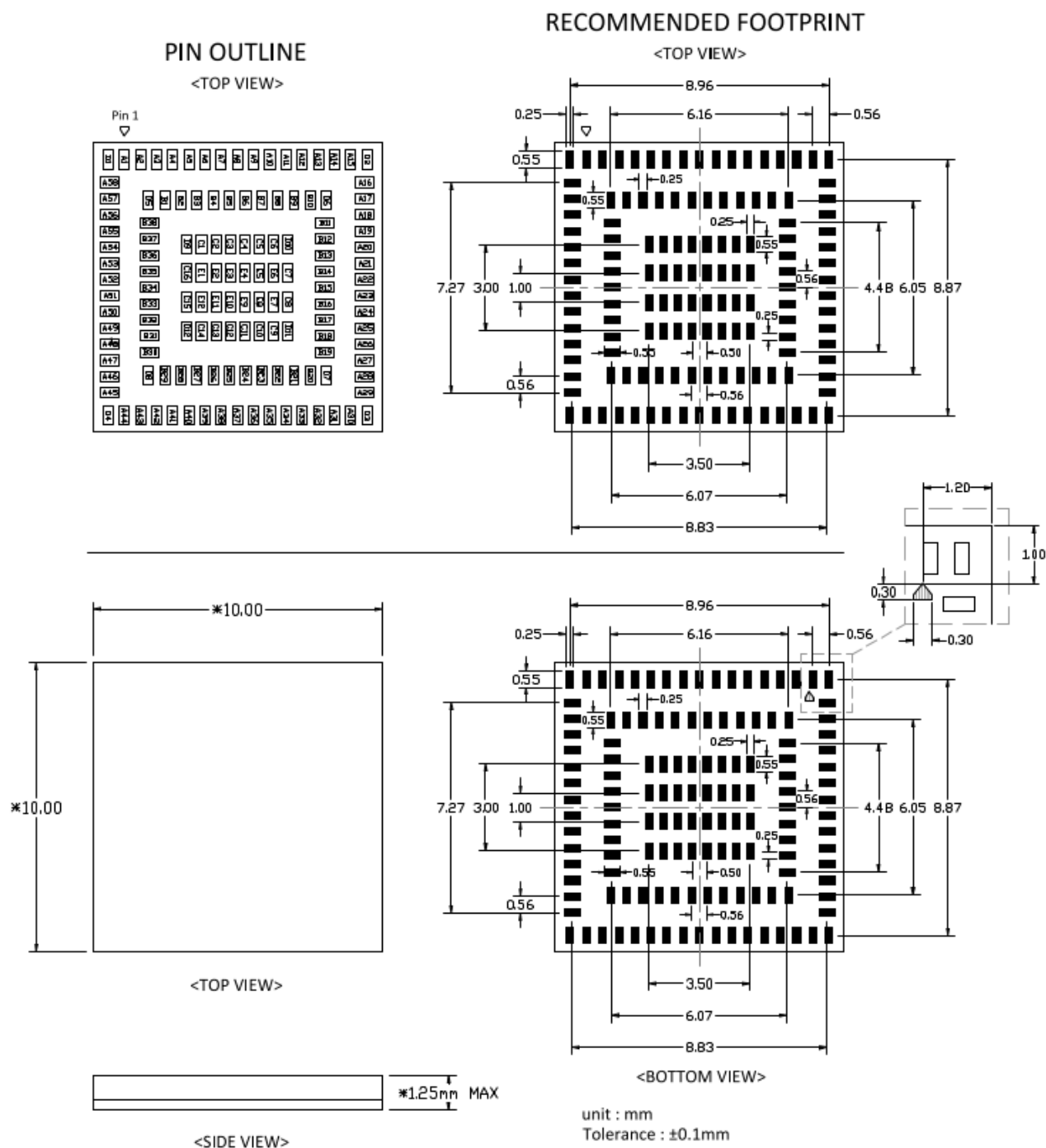
A13	WL_JTAG_TRST	I/O	This pin can be programmed to be a GPIO, the JTAG TRST signal, DBG_UART_RX or the GCI external coexistence interface.
A14	SH_UART_TX/WL_JTAG_TMS	I/O	This pin can be programmed to be a GPIO, the JTAG TMS signal, UART_TX or the GCI external coexistence interface.
A15	SH_WAKE/WL_JTAG_TDO	I/O	This pin can be programmed to be a GPIO, the JTAG TDO signal, UART_RTS or the GCI external coexistence interface.
A16	SH_UART_RX/WL_JTAG_TCK	I/O	This pin can be programmed to be a GPIO, the JTAG TCK signal, UART_RX or the GCI external coexistence interface.
A17	LTECOEX_UART_RX/WL_JTAG_TDI	I/O	This pin can be programmed to be a GPIO, the JTAG TDI signal, UART_CTS or the GCI external coexistence interface.
C12	JTAG_SEL	I/O	This pin must be connected to ground if the JTAG interface is not used.
A33	VBAT	P	Main power voltage source input
A34	VBAT	P	Main power voltage source input
A39	VDDIO	P	Main power voltage source input
A40	VDDIO	P	I/O Voltage supply input
A29	CSR_VLX	O	Internal Buck voltage generation pin
A27	CBUCK_0P9	I	Internal Buck voltage generation pin
A30	ASR_VLX	O	Internal Analog Buck voltage generation pin
A31	ASR_VLX	O	Internal Analog Buck voltage generation pin
A36	ABUCK_1P12	I	Internal Analog Buck voltage generation pin
A37	ABUCK_1P12	I	Internal Analog Buck voltage generation pin
A18	GND	—	Ground connections
A25	GND	—	Ground connections
A26	GND	—	Ground connections
A28	GND	—	Ground connections
A32	GND	—	Ground connections
A35	GND	—	Ground connections
A38	GND	—	Ground connections
A41	GND	—	Ground connections
A42	GND	—	Ground connections
A43	GND	—	Ground connections
A45	GND	—	Ground connections

A46	GND	—	Ground connections
A47	GND	—	Ground connections
A48	GND	—	Ground connections
A49	GND	—	Ground connections
A50	GND	—	Ground connections
A51	GND	—	Ground connections
A52	GND	—	Ground connections
A53	GND	—	Ground connections
A55	GND	—	Ground connections
B4	GND	—	Ground connections
B11	GND	—	Ground connections
B17	GND	—	Ground connections
B19	GND	—	Ground connections
B28	GND	—	Ground connections
B29	GND	—	Ground connections
B30	GND	—	Ground connections
B31	GND	—	Ground connections
B32	GND	—	Ground connections
B33	GND	—	Ground connections
B34	GND	—	Ground connections
B35	GND	—	Ground connections
B36	GND	—	Ground connections
B37	GND	—	Ground connections
B38	GND	—	Ground connections
C1	GND	—	Ground connections
C2	GND	—	Ground connections
C3	GND	—	Ground connections
C4	GND	—	Ground connections
C5	GND	—	Ground connections
C6	GND	—	Ground connections
C7	GND	—	Ground connections
C8	GND	—	Ground connections
C9	GND	—	Ground connections
C11	GND	—	Ground connections
C13	GND	—	Ground connections
C14	GND	—	Ground connections
C15	GND	—	Ground connections

C16	GND	—	Ground connections
D1	GND	—	Ground connections
D2	GND	—	Ground connections
D3	GND	—	Ground connections
D4	GND	—	Ground connections
D7	GND	—	Ground connections
D8	GND	—	Ground connections
D9	GND	—	Ground connections
D10	GND	—	Ground connections
D11	GND	—	Ground connections
D12	GND	—	Ground connections
E1	GND	—	Ground connections
E2	GND	—	Ground connections
E3	GND	—	Ground connections
E4	GND	—	Ground connections
E5	GND	—	Ground connections
E6	GND	—	Ground connections
E7	GND	—	Ground connections
E8	GND	—	Ground connections
E9	GND	—	Ground connections
E10	GND	—	Ground connections
E11	GND	—	Ground connections
E12	GND	—	Ground connections

6. Dimensions

6.1 Module Dimensions



7. External clock reference

External LPO signal characteristics

Parameter	Specification	Units
Nominal input frequency	32.768	kHz
Frequency accuracy	+/-25	ppm
Duty cycle	30 - 70	%
Input signal amplitude	1.8±0.09	V
Signal type	Square-wave or sine-wave	-
Input impedance	>100k	Ω
	<5	pF
Clock jitter (integrated over 300Hz – 15KHz)	<1	Hz
Output high voltage	0.7V _{io} - V _{io}	V

8. Host Interface Timing Diagram

8.1 Power-up Sequence Timing Diagram

The module has signals that allow the host to control power consumption by enabling or disabling the Bluetooth, WLAN and internal regulator blocks. These signals are described below.

Additionally, diagrams are provided to indicate proper sequencing of the signals for various operating states. The timing value indicated are minimum required values: longer delays are also acceptable.

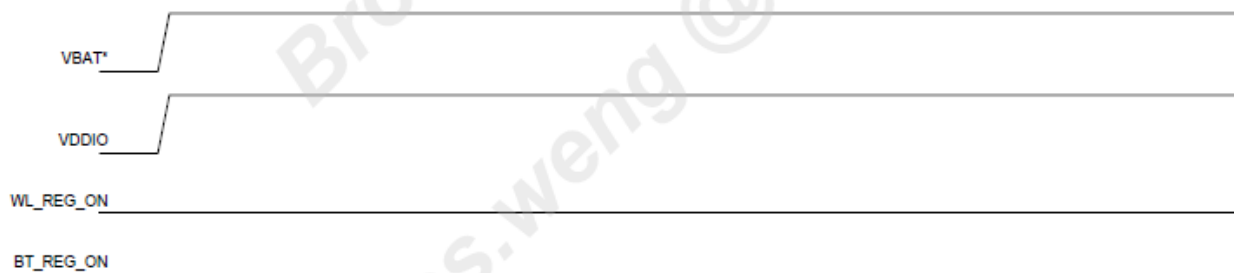
- **WL_REG_ON:** This signal is used by the PMU to power up the WLAN section. It is also OR-gated with the BT_REG_ON input to control the internal regulators. When this pin is high, the regulators are enabled and the WLAN section is out of reset. When this pin is low, the WLAN section is in reset. If BT_REG_ON and WL_REG_ON are both low, the regulators are disabled.
- **BT_REG_ON:** This signal is used by the PMU to decide whether or not to power down the internal regulators. If BT_REG_ON and WL_REG_ON are low, the regulators will be disabled.
- It suggests customers connect WL_REG_ON and BT_REG_ON to GPIOs for control, otherwise unexpected errors may occur when boot-up the device.
- In the figure, The VDDIO power supply has been included in the module. When VBAT is power-up, VDDIO will rise to high level after 15 ms.
- The module main chip has an internal power-on reset (POR) circuit. The device will be held in reset for a maximum of 110 ms after VDDC and VDDIO have both passed the POR threshold. Wait at least 150 ms after VDDC and VDDIO are available before initiating SDIO accesses.



***Notes:**

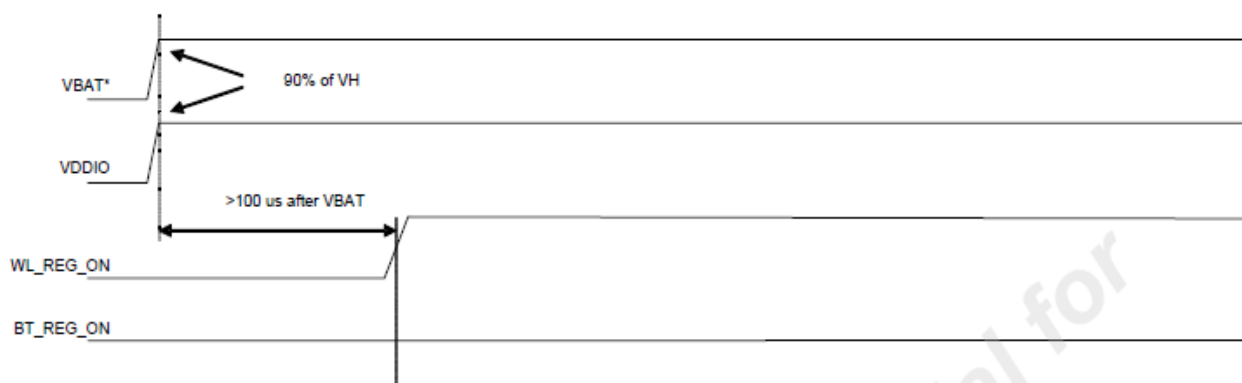
1. The VBAT and VDDIO 10%–90% rise-time slopes must be greater than 50 microseconds/V.
2. VBAT should be up before or at the same time as VDDIO. VDDIO should NOT be present first or be held high before VBAT is high.

WLAN=ON, Bluetooth=ON

***Notes:**

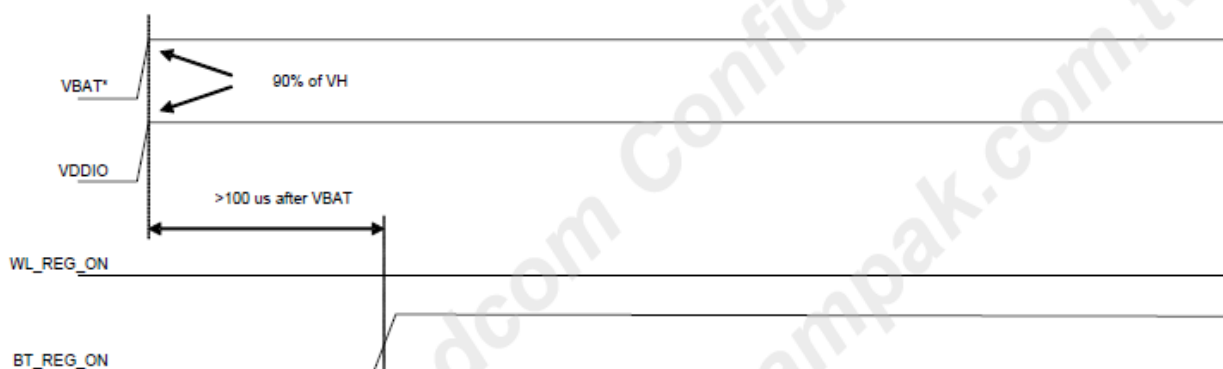
1. The VBAT and VDDIO 10%–90% rise-time slopes must be greater than 50 microseconds/V.
2. VBAT should be up before or at the same time as VDDIO. VDDIO should NOT be present first or be held high before VBAT is high.

WLAN=OFF, Bluetooth=OFF

***Notes:**

1. The VBAT and VDDIO 10%–90% rise-time slopes must be greater than 50 microseconds/V.
2. VBAT should be up before or at the same time as VDDIO. VDDIO should NOT be present first or be held high before VBAT is high.

WLAN=ON, Bluetooth=OFF

***Notes:**

1. The VBAT and VDDIO 10%–90% rise-time slopes must be greater than 50 microseconds/V.
2. VBAT should be up before or at the same time as VDDIO. VDDIO should NOT be present first or be held high before VBAT is high.

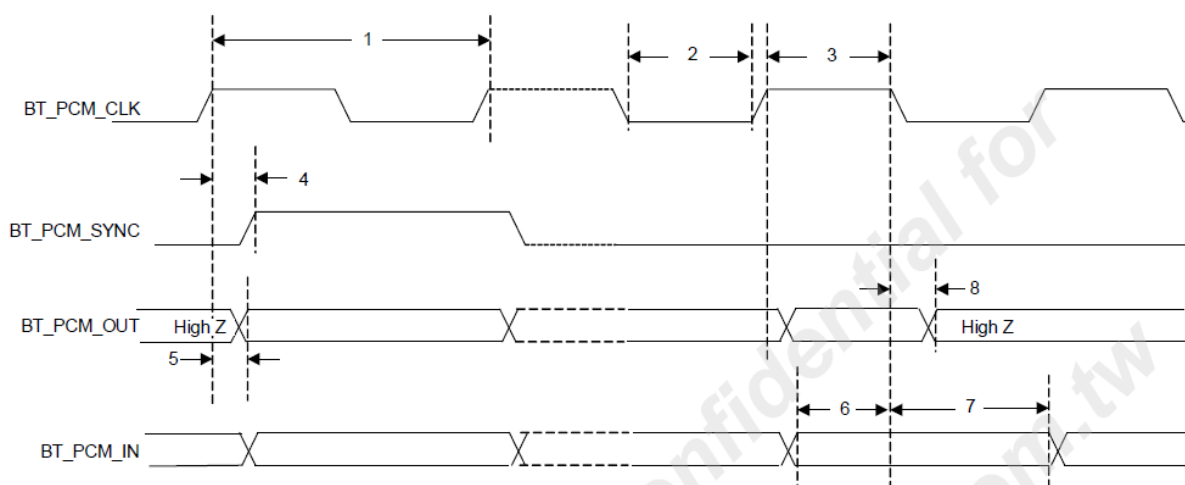
WLAN=OFF, Bluetooth=ON

8.2 PCM Interface Description

The PCM Interface on the AP5876ES can connect to linear PCM Codec devices in master or slave mode. In master mode, the AP5876ES generates the PCM_CLK and PCM_SYNC signals, and in slave mode, these signals are provided by another master on the PCM interface and are inputs to the AP5876ES. The configuration of the PCM interface may be adjusted by the host through the use of vendor-specific HCI commands.

PCM Timing

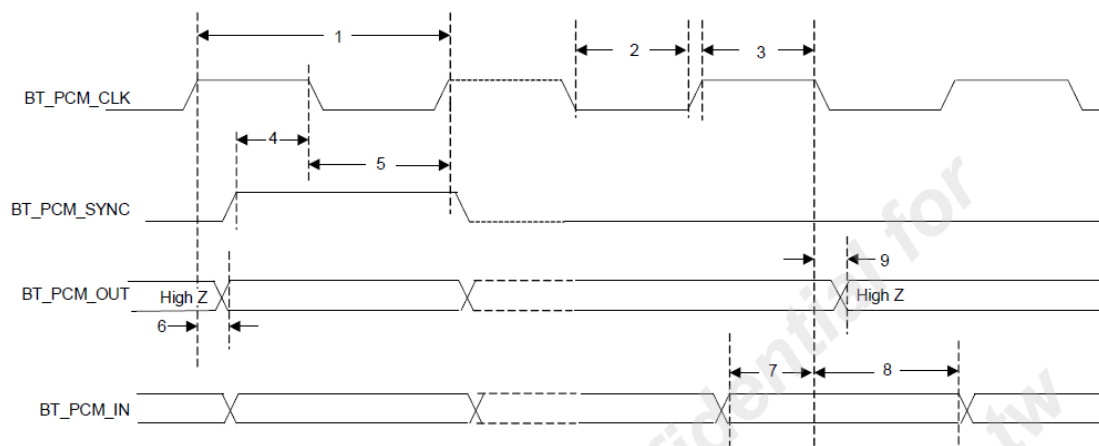
Short Frame Sync, Master Mode



PCM interfcd timing spec(short frame sync, master mode)

Reference	Characteristics	Minimum	Typical	Maximum	Unit
1	PCM bit clock frequency	—	—	12	MHz
2	PCM bit clock low	41	—	—	ns
3	PCM bit clock high	41	—	—	ns
4	BT_PCM_SYNC delay	0	—	25	ns
5	BT_PCM_OUT delay	0	—	25	ns
6	BT_PCM_IN setup	8	—	—	ns
7	BT_PCM_IN hold	8	—	—	ns
8	Delay from falling edge of BT_PCM_CLK during the last bit period to BT_PCM_OUT becoming high impedance.	0	—	25	ns

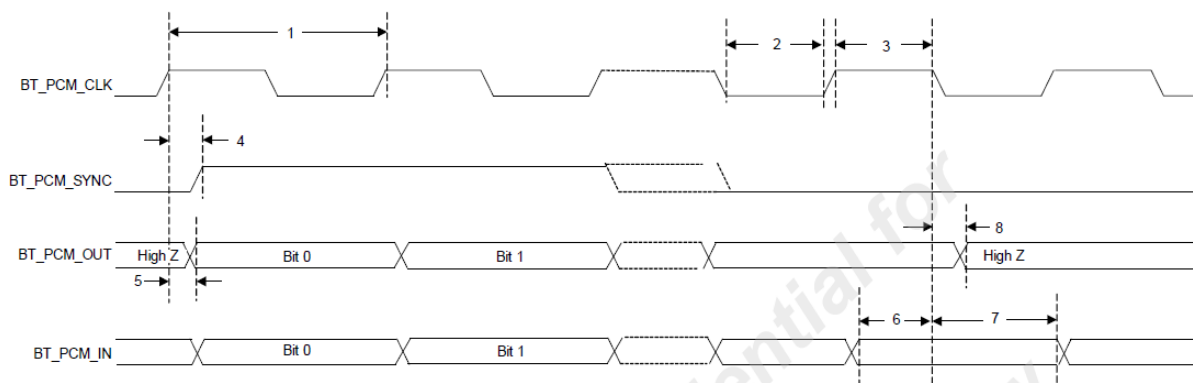
Short Frame Sync, Slave Mode



PCM interface timing spec (short frame sync, slave mode)

Reference	Characteristics	Minimum	Typical	Maximum	Unit
1	PCM bit clock frequency	—	—	12	MHz
2	PCM bit clock low	41	—	—	ns
3	PCM bit clock high	41	—	—	ns
4	BT_PCM_SYNC setup	8	—	—	ns
5	BT_PCM_SYNC hold	8	—	—	ns
6	BT_PCM_OUT delay	0	—	25	ns
7	BT_PCM_IN setup	8	—	—	ns
8	BT_PCM_IN hold	8	—	—	ns
9	Delay from falling edge of BT_PCM_CLK during the last bit period to BT_PCM_OUT becoming high impedance.	0	—	25	ns

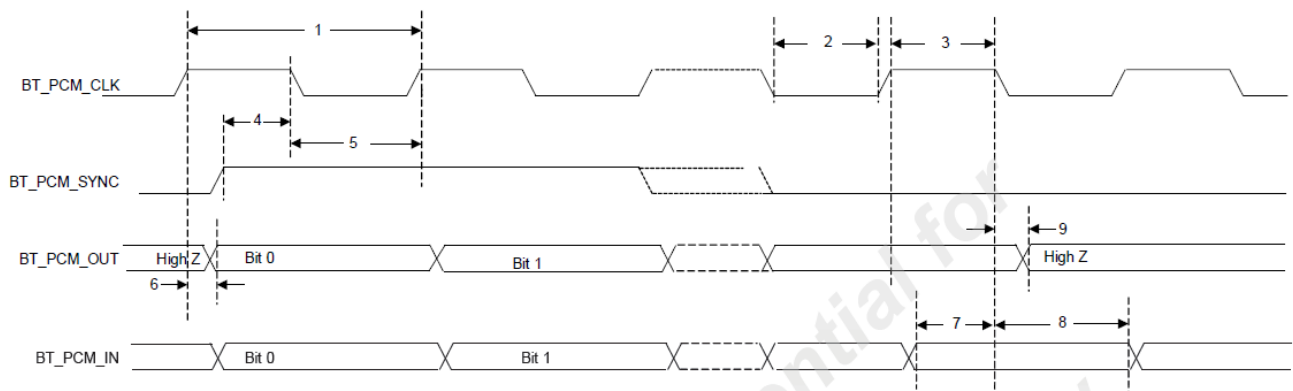
Long Frame Sync, Master Mode



PCM interface timing spec (long frame sync, master mode)

Reference	Characteristics	Minimum	Typical	Maximum	Unit
1	PCM bit clock frequency	—	—	12	MHz
2	PCM bit clock low	41	—	—	ns
3	PCM bit clock high	41	—	—	ns
4	BT_PCM_SYNC delay	0	—	25	ns
5	BT_PCM_OUT delay	0	—	25	ns
6	BT_PCM_IN setup	8	—	—	ns
7	BT_PCM_IN hold	8	—	—	ns
8	Delay from falling edge of BT_PCM_CLK during the last bit period to BT_PCM_OUT becoming high impedance.	0	—	25	ns

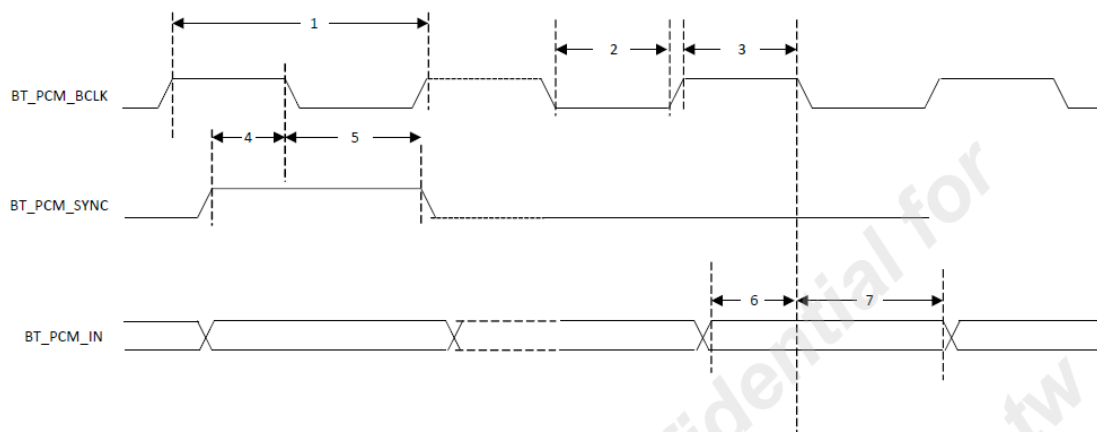
Long Frame Sync, Slave Mode



PCM interface timing spec (long frame sync, slave mode)

Reference	Characteristics	Minimum	Typical	Maximum	Unit
1	PCM bit clock frequency	—	—	12	MHz
2	PCM bit clock low	41	—	—	ns
3	PCM bit clock high	41	—	—	ns
4	BT_PCM_SYNC setup	8	—	—	ns
5	BT_PCM_SYNC hold	8	—	—	ns
6	BT_PCM_OUT delay	0	—	25	ns
7	BT_PCM_IN setup	8	—	—	ns
8	BT_PCM_IN hold	8	—	—	ns
9	Delay from falling edge of BT_PCM_CLK during the last bit period to BT_PCM_OUT becoming high impedance.	0	—	25	ns

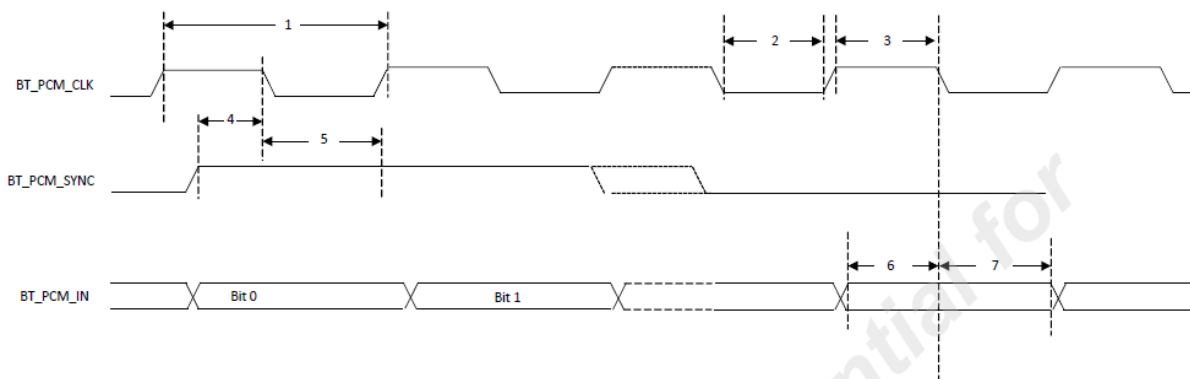
Short Frame Sync, Burst Mod



PCM burst mode (receive only, short frame sync)

Reference	Characteristics	Minimum	Typical	Maximum	Unit
1	PCM bit clock frequency	—	—	24	MHz
2	PCM bit clock low	20.8	—	—	ns
3	PCM bit clock high	20.8	—	—	ns
4	BT_PCM_SYNC setup	8	—	—	ns
5	BT_PCM_SYNC hold	8	—	—	ns
6	BT_PCM_IN setup	8	—	—	ns
7	BT_PCM_IN hold	8	—	—	ns

Long Frame Sync, Burst Mode



PCM burst mode (receive only, long frams sync)

Reference	Characteristics	Minimum	Typical	Maximum	Unit
1	PCM bit clock frequency	—	—	24	MHz
2	PCM bit clock low	20.8	—	—	ns
3	PCM bit clock high	20.8	—	—	ns
4	BT_PCM_SYNC setup	8	—	—	ns
5	BT_PCM_SYNC hold	8	—	—	ns
6	BT_PCM_IN setup	8	—	—	ns
7	BT_PCM_IN hold	8	—	—	ns

8.3 UART Interface Description

The UART is a standard 4-wire interface (RX, TX, RTS, and CTS) with adjustable baud rates from 9600 bps to 4.0 Mbps. The interface features an automatic baud rate detection capability that returns a baud rate selection. Alternatively, the baud rate may be selected through a vendor-specific UART HCI command.

UART has a 1040-byte receive FIFO and a 1040-byte transmit FIFO to support EDR. Access to the FIFOs is conducted through the AHB interface through either DMA or the CPU. The UART supports the Bluetooth UART HCI specification: H4, a custom Extended H4, and H5. The default baud rate is 115.2 Kbaud.

The UART supports the 3-wire H5 UART transport, as described in the Bluetooth specification (Three-wire UART Transport Layer). Compared to H4, the H5 UART transport reduces the number of signal lines required by eliminating the CTS and RTS signals.

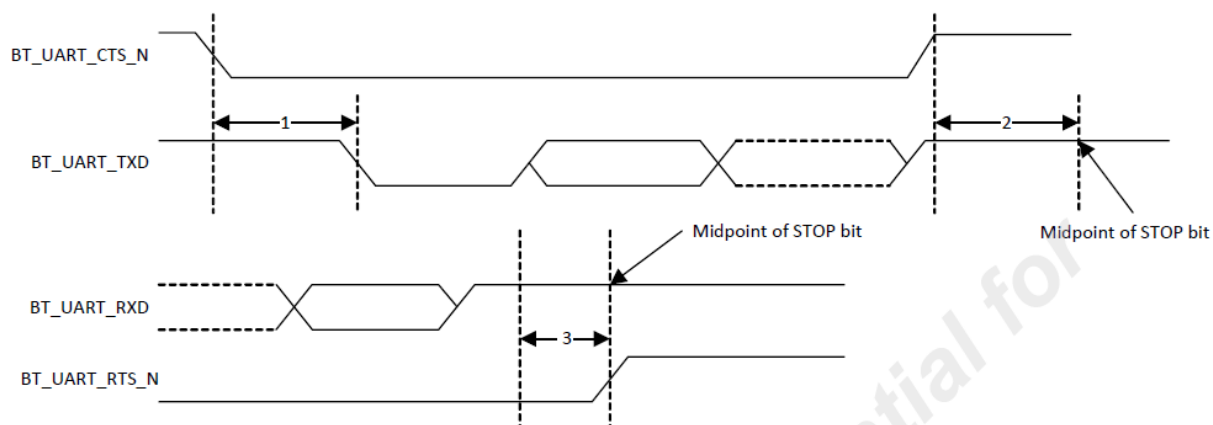
The UART can perform XON/XOFF flow control and includes hardware support for the Serial Line Input Protocol (SLIP). It can also perform wake-on activity. For example, activity on the RX or CTS inputs can wake the chip from a sleep state.

Normally, the UART baud rate is set by a configuration record downloaded after device reset, or by automatic baud rate detection, and the host does not need to adjust the baud rate. Support for changing the baud rate during normal HCI UART operation is included through a vendor-specific command that allows the host to adjust the contents of the baud rate registers. The UARTs operate correctly with the host UART as long as the combined baud rate error of the two devices is within $\pm 2\%$.

Example of Common Baud Rates

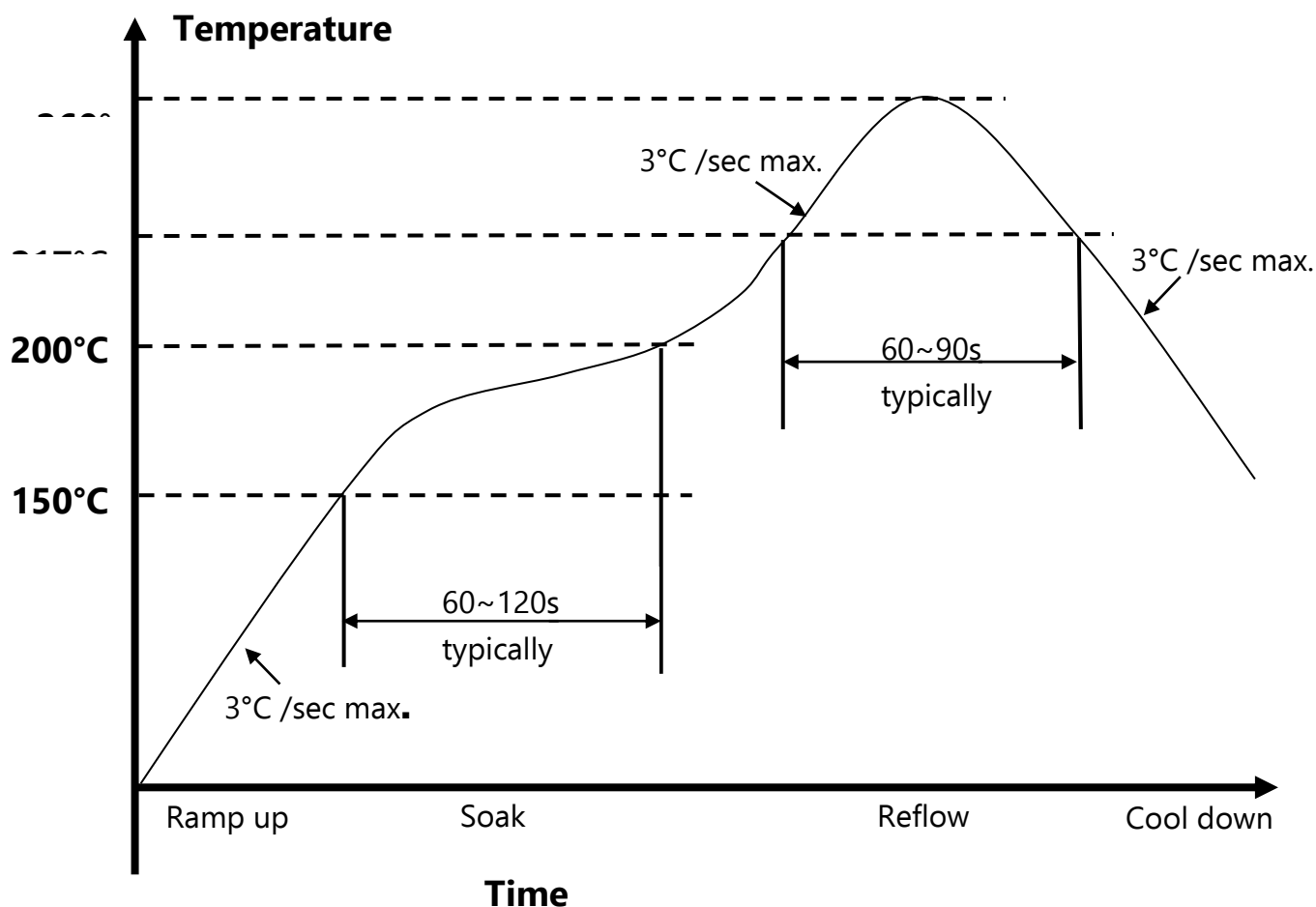
<i>Desired Rate</i>	<i>Actual Rate</i>	<i>Error (%)</i>
4000000	4000000	0.00
3692000	3692308	0.01
3000000	3000000	0.00
2000000	2000000	0.00
1500000	1500000	0.00
1444444	1454544	0.70
921600	923077	0.16
460800	461538	0.16
230400	230796	0.17
115200	115385	0.16
57600	57692	0.16
38400	38400	0.00
28800	28846	0.16
19200	19200	0.00
14400	14423	0.16
9600	9600	0.00

UART Timing



Reference	Characteristics	Minimum	Typical	Maximum	Unit
1	Delay time, BT_UART_CTS_N low to BT_UART_TXD valid	—	—	1.5	Bit periods
2	Setup time, BT_UART_CTS_N high before midpoint of stop bit	—	—	0.5	Bit periods
3	Delay time, midpoint of stop bit to BT_UART_RTS_N high	—	—	0.5	Bit periods

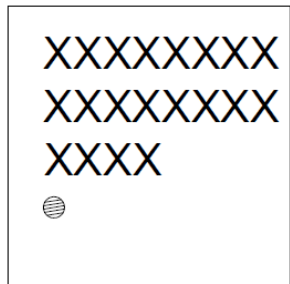
9. Recommended Reflow Profile



1. Referred to IPC/JEDEC standard
2. Peak Temperature : <260°C (Time within 5°C of actual Peak Temperature 20-40 seconds)
3. Cycle of Reflow : 2 times max.
4. Adding Nitrogen (N₂) to implement 2000ppm or less of oxygen concentration during reflow process is recommended.
5. If the shelf time is exceeded, be sure baking to remove the moisture from the component

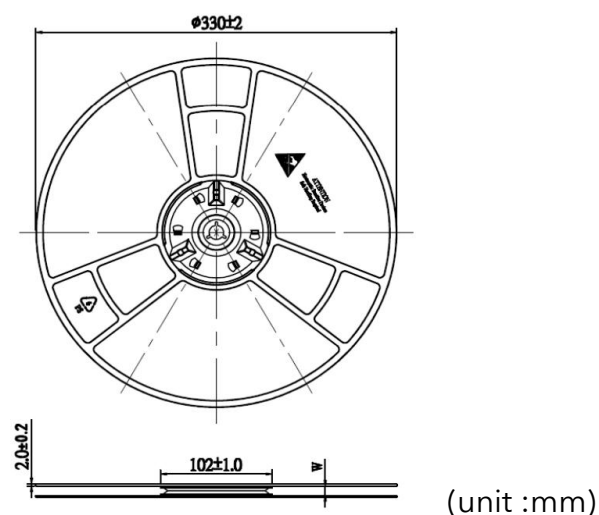
10. Package Information

10.1 Marking

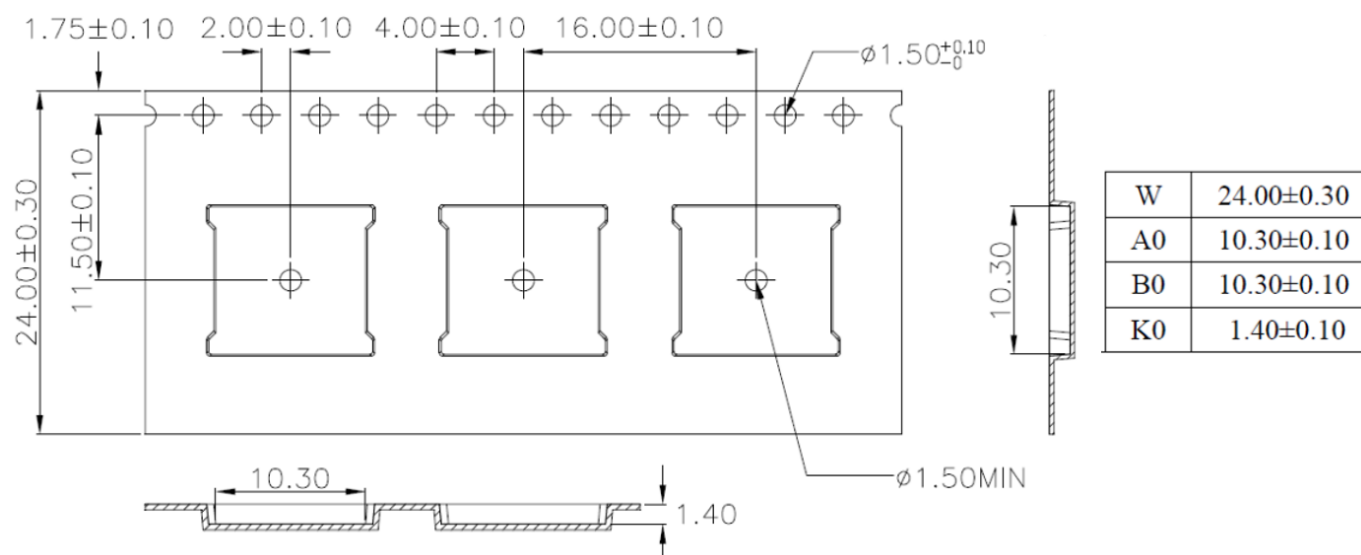
	Rows	Content	Note
	Row 1	XXXXXXXX	Model Name
	Row 2	XXXXXXXX or XXXXXXXXXX (8 digitals or 9 digitals)	Lot Code
	Row 3	YYWW	Date Code
	Row 4	Pin 1 a circular point	Pin 1 indicator

10.2 Tape & Reel Data

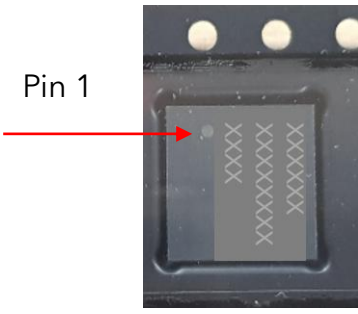
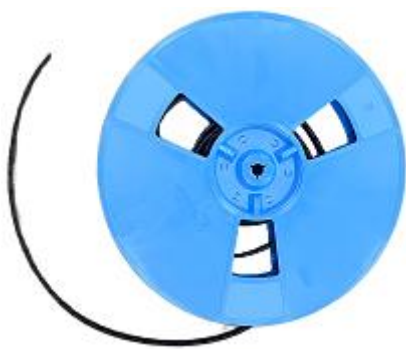
Reel



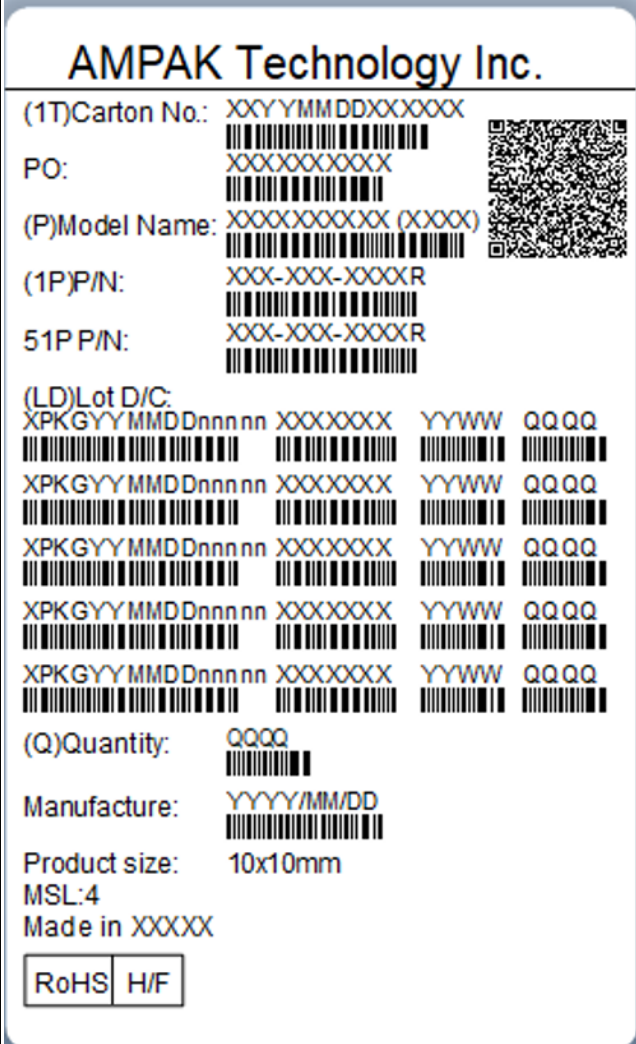
Carrier tape



10.3 Tape & Reel Packing

Items	Photo	Description
1		Pin 1 indicator in carrier tape
2		13" W24.0mm Reel
3		Humidity Indicator Card & Desiccant inside
4		MSL Caution label on top side of Al bag
5		Anti-static and humidity notice on top side of Al bag

A photograph of a closed, rectangular cardboard box. The box is light brown or tan in color. A white shipping label is affixed to the front-left side of the box. The label contains text, including a tracking number and a barcode. The box is shown from a slightly elevated, front-left perspective.

9		5 inner boxes per outer box (Carton) Quantity: 7500pcs/outer box (Carton)
10		Outer box (Carton) Quantity: 7500pcs/outer box (Carton)
11		Outer box (Carton) label The label content includes barcode and QR CODE

