正基科技股份有限公司

SPECIFICATION

PRODUCT NAME：AP6276P

REVISION：0.1

DATE：Jan. 11th , 2022

Customer APPROVED	
Company	
Representative Signature	

PREPARED	**REVIEW**			**APPROVED**	**DCC ISSUE**
	PM	**QA**	**ET**		

正基科技股份有限公司

AMPAK Technology Inc.

AP6276P

Data Sheet

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Revision

Revision	Date	Description	Revised By
0.1	2022/01/11	Preliminary Release	Richard

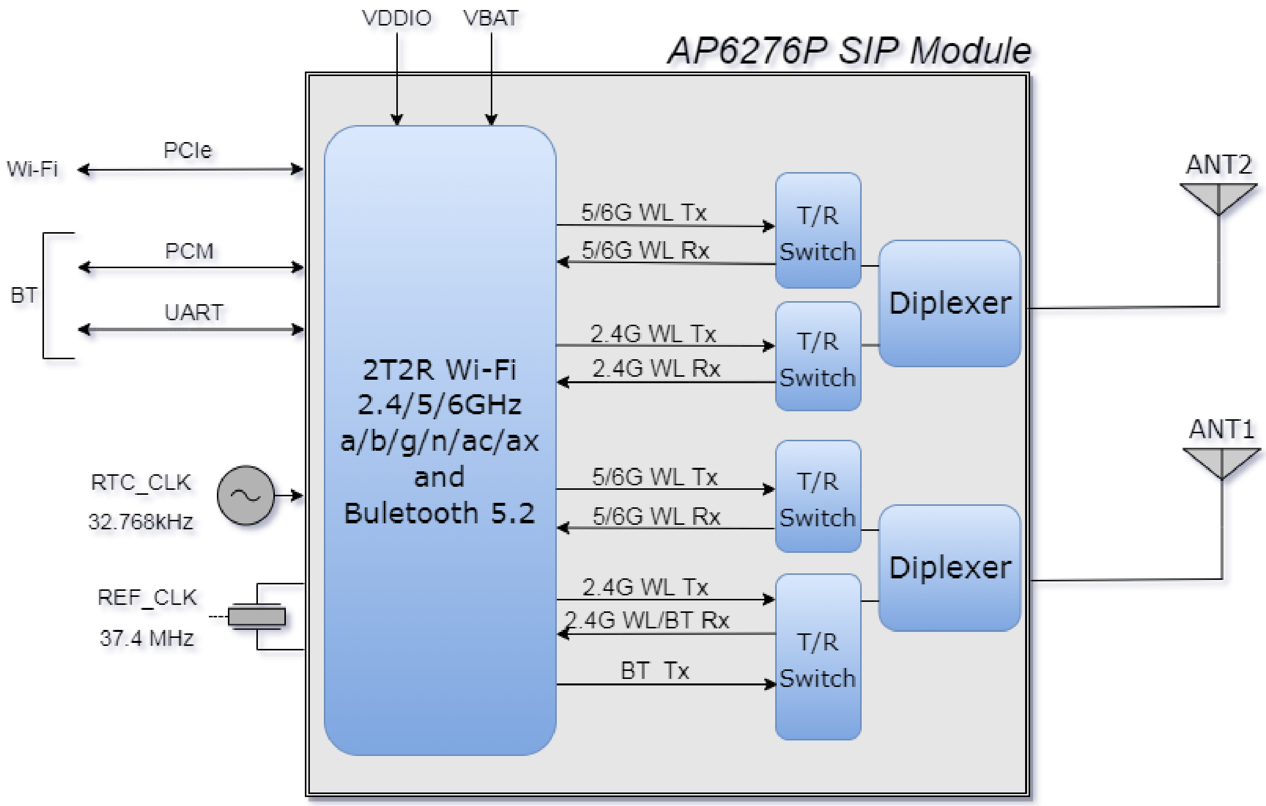
Contents

1. Introduction

1.1 Overview

The AMPAK Technology® AP6276P 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 AP6276P included PCIE interface for Wi-Fi, UART/ PCM interface for Bluetooth.

In addition, this compact module is a total solution for a combination of Wi-Fi + BT 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 and U-NII-6) radio, and 20MHz channels for 2.4GHz radio.
- Client MU-MIMO
- Supports PCI express revision 3.0 and power management running at Gen1 speeds.

Bluetooth Key Features

- BT host digital interface:
  - HCI UART (up to 4 Mbps)
  - PCM for audio data
- Complies with Bluetooth Core Specification Version 5.2 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.
- BT Core Specification Version 5.2, 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	AP6276P
Product Description	2T2R 802.11 a/b/g/n/ac/ax Wi-Fi 6 + BT 5.2 Module
Dimension	L x W : 15 x 13 (typical) mm，H : 1.65 (Maximum) mm
WiFi Interface	Support PCIe v3.0 compliant and runs at Gen1 speeds
BT 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

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	5.0	V
VDDIO	1.68	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 x VDDIO	NA	V
VIL = Input low voltage	NA	0.4 x 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(TBD)

3.1 2.4GHz RF Specification(TBD)

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

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**	
	19.5	19.5	19.5	19.5	
802.11g	**6、9Mbps**	**12、18Mbps**	**24Mbps**	**36Mbps**	**48Mbps**
	18.5	17.5	17.5	17	17
	54Mbps				
	17				
802.11n **20MHz**	**MCS0~2**	**MCS3**	**MCS4**	**MCS5**	**MCS6**
	18.5	17.5	17.5	17	17
	MCS7				
	16				
802.11ax **20MHz**	**HE0~2**	**HE3**	**HE4**	**HE5**	**HE6**
	18.5	17.5	17.5	17	17
	HE7	**HE8**	**HE9**		
	16	15	14		

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 ≦ 8%、OFDM modulation PER ≦ 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	-76
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
	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(TBD)

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、5.725~5.85GHz (5GHz UNII Band)
Number of Channels	5.15~5.35GHz：Ch36 ~ Ch64 5.47~5.725GHz：Ch100 ~ Ch140 5.725~5.85GHz：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

Output Power , tolerance ± 2 dB

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

	Frequency (MHz)	**6~9Mbps**	**12~18Mbps**	**24Mbps**	**36Mbps**
802.11a	**5150~5350**	15.5	15.5	15.5	15.5
	5470~5720	15.5	15.5	15.5	15.5
	5725~5845	15.5	15.5	15.5	15.5
	Frequency (MHz)	**48Mbps**	**54Mbps**		
	5150~5350	15.5	15.5		
	5470~5720	15.5	15.5		
	5725~5845	15.5	15.5		
802.11n 20MHz	**Frequency (MHz)**	**MCS0~2**	**MCS3**	**MCS4**	**MCS5**
	5150~5350	15.5	15.5	15.5	15.5
	5470~5720	15.5	15.5	15.5	15.5
	5725~5845	15.5	15.5	15.5	15.5
	Frequency (MHz)	**MCS6**	**MCS7**		
	5150~5350	15.5	14.5		
	5470~5720	15.5	14.5		
	5725~5845	15.5	14.5		

802.11n 40MHz	**Frequency (MHz)**	**MCS0~2**	**MCS3**	**MCS4**	**MCS5**
	5150~5350	15.5	15.5	15.5	15.5
	5470~5720	15	15	15	15
	5725~5845	15	15	15	15
	Frequency (MHz)	**MCS6**	**MCS7**		
	5150~5350	15	15		
	5470~5720	14.5	14.5		
	5725~5845	14.5	14.5		
802.11ac 20MHz	**Frequency (MHz)**	**MCS0~2**	**MCS3**	**MCS4**	**MCS5**
	5150~5350	15.5	15.5	15.5	15.5
	5470~5720	15.5	15.5	15.5	15.5
	5725~5845	15.5	15.5	15.5	15.5
	Frequency (MHz)	**MCS6**	**MCS7**	**MCS8**	
	5150~5350	15.5	14.5	12.5	
	5470~5720	15.5	14.5	12.5	
	5725~5845	15.5	14.5	12.5	
802.11ac 40MHz	**Frequency (MHz)**	**MCS0~2**	**MCS3**	**MCS4**	**MCS5**
	5150~5350	15.5	15.5	15.5	15.5
	5470~5720	15	15	15	15
	5725~5845	15	15	15	15
	Frequency (MHz)	**MCS6**	**MCS7**	**MCS8**	**MCS9**
	5150~5350	15	15	13.5	11
	5470~5720	14.5	14.5	13	10
	5725~5845	14.5	14.5	13	10
802.11ac 80MHz	**Frequency (MHz)**	**MCS0~2**	**MCS3**	**MCS4**	**MCS5**
	5150~5350	15	15	15	15
	5470~5720	15	15	15	15
	5725~5845	15	15	15	15
	Frequency (MHz)	**MCS6**	**MCS7**	**MCS8**	**MCS9**
	5150~5350	14.5	14.5	11	11
	5470~5720	14.5	14.5	10	10
	5725~5845	14.5	14.5	10	10

	Frequency (MHz)	HE0~2	HE3	HE4	HE5
802.11ax **20MHz**	**5150~5350**	15.5	15.5	15.5	15.5
	5470~5720	15.5	15.5	15.5	15.5
	5725~5845	15.5	15.5	15.5	15.5
	Frequency (MHz)	**HE6**	**HE7**	**HE8**	**HE9**
	5150~5350	15.5	14.5	12.5	12.5
	5470~5720	15.5	14.5	12.5	12.5
	5725~5845	15.5	14.5	12.5	12.5
	Frequency (MHz)	**HE10**	**HE11**		
	5150~5350	10.5	10.5		
	5470~5720	10	10		
	5725~5845	10	10		
802.11ax **40MHz**	**Frequency (MHz)**	**HE0~2**	**HE3**	**HE4**	**HE5**
	5150~5350	15.5	15.5	15.5	15.5
	5470~5720	15	15	15	15
	5725~5845	15	15	15	15
	Frequency (MHz)	**HE6**	**HE7**	**HE8**	**HE9**
	5150~5350	15	15	13.5	11
	5470~5720	14.5	14.5	13	10
	5725~5845	14.5	14.5	13	10
	Frequency (MHz)	**HE10**	**HE11**		
	5150~5350	9	9		
	5470~5720	8	8		
	5725~5845	8	8		
802.11ax **80MHz**	**Frequency (MHz)**	**HE0~2**	**HE3**	**HE4**	**HE5**
	5150~5350	15	15	15	15
	5470~5720	15	15	15	15
	5725~5845	15	15	15	15
	Frequency (MHz)	**HE6**	**HE7**	**HE8**	**HE9**
	5150~5350	14.5	14.5	11	11
	5470~5720	14.5	14.5	10	10
	5725~5845	14.5	14.5	10	10
	Frequency (MHz)	**HE10**	**HE11**		
	5150~5350	9	9		
	5470~5720	9	9		
	5725~5845	9	9		
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 ≦ 10%				
802.11a SISO	**Data Rate**	**Spec.(dBm)**	**Data Rate**	**Spec.(dBm)**
	6Mbps	-90.5	**24Mbps**	-83
	9Mbps	-90	**36Mbps**	-80
	12Mbps	-88	**48Mbps**	-75
	18Mbps	-86	**54Mbps**	-73
802.11a MIMO	**Data Rate**	**Spec.(dBm)**	**Data Rate**	**Spec.(dBm)**
	6Mbps	-92	**24Mbps**	-86
	9Mbps	-91	**36Mbps**	-83
	12Mbps	-90	**48Mbps**	-78
	18Mbps	-89	**54Mbps**	-77
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**	-72
802.11n_20MHz MIMO	**Data Rate**	**Spec.(dBm)**	**Data Rate**	**Spec.(dBm)**
	MCS0	-92	**MCS5**	-78
	MCS1	-91	**MCS6**	-76
	MCS2	-89	**MCS7**	-75
	MCS3	-86	**MCS8**	-90
	MCS4	-82	**MCS15**	-71
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**	-69
802.11n_40MHz MIMO	**Data Rate**	**Spec.(dBm)**	**Data Rate**	**Spec.(dBm)**
	MCS0	-88	**MCS5**	-75
	MCS1	-88	**MCS6**	-73
	MCS2	-86	**MCS7**	-72
	MCS3	-83	**MCS8**	-87
	MCS4	-79	**MCS15**	-68

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**	-75
	MCS2,NSS=1	-88	**MCS8,NSS=1**	-72
	MCS3,NSS=1	-85	**MCS0,NSS=2**	-89
	MCS4,NSS=1	-82	**MCS8,NSS=2**	-67
	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**	-87
	MCS5,NSS=1	-77	**MCS9,NSS=2**	-63
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**	-66
	MCS3,NSS=1	-79	**MCS9,NSS=1**	-63
	MCS4,NSS=1	-76	**MCS0,NSS=2**	-84
	MCS5,NSS=1	-71	**MCS9,NSS=2**	-60
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(TBD)

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

Feature	**Description**
WLAN Standard	IEEE 802.11ax
Frequency Range	5.925~6525GHz (6GHz U-NII5 & U-NII6 Band)
Number of Channels	5935~5425MHz：Ch191 ~ Ch283 6425~6525GHz：Ch287 ~ Ch303
Modulation	802.11ax : OFDMA /1024-QAM、256-QAM、64-QAM、16-QAM、QPSK、BPSK

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	13.5	13.5	13.5	13.5
	6435~6515	13.5	13.5	13.5	13.5
802.11ax 20MHz	**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
	Frequency (MHz)	**HE10**	**HE11**		
	5955~5415	8.5	8.5		
	6435~6515	8.5	8.5		
802.11ax 40MHz	**Frequency (MHz)**	**HE0~2**	**HE3**	**HE4**	**HE5**
	5955~5415	13	13	13	13
	6435~6515	13	13	13	13
	Frequency (MHz)	**HE6**	**HE7**	**HE8**	**HE9**
	5955~5415	12.5	12.5	11	8
	6435~6515	12.5	12.5	11	8
	Frequency (MHz)	**HE10**	**HE11**		
	5955~5415	6	6		
	6435~6515	6	6		

802.11ax 80MHz	**Frequency (MHz)**	**HE0~2**	**HE3**	**HE4**	**HE5**
	5955~5415	13	13	13	13
	6435~6515	13	13	13	13
	Frequency (MHz)	**HE6**	**HE7**	**HE8**	**HE9**
	5955~5415	12.5	12.5	8	8
	6435~6515	12.5	12.5	8	8
	Frequency (MHz)	**HE10**	**HE11**		
	5955~5415	6	6		
	6435~6515	6	6		

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 ≦ 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

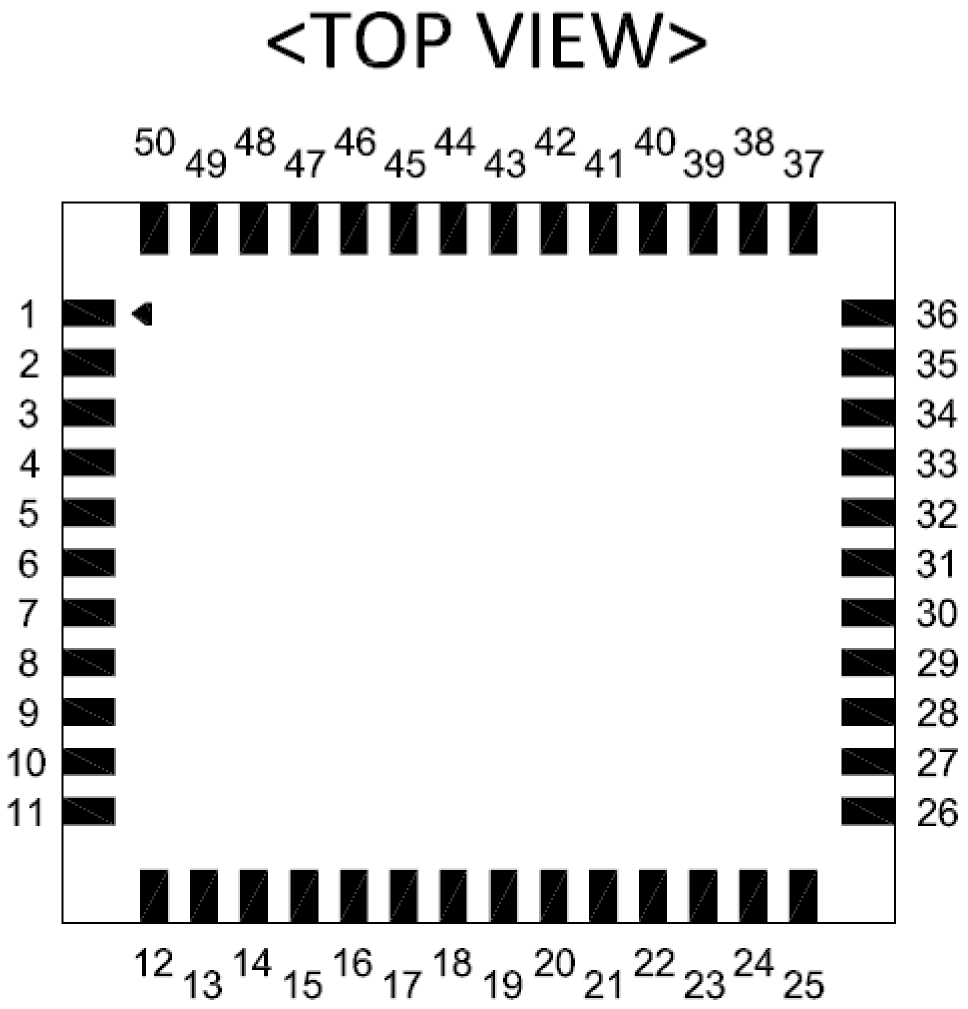
Conditions : VBAT=3.3V ; VDDIO=1.8V ; Temp:25°C

Feature	**Description**
General Specification	
Bluetooth Standard	BDR、EDR(1Mbps & 2Mbps)、LE(1Mbps)、2LE(2Mbps)
Host Interface	UART
Frequency Band	2402 MHz ~ 2480 MHz
Number of Channels	79 channels for classic、40 channels for BLE
Modulation	GFSK, π/4-DQPSK, 8DPSK
RF Specification	
Output Power , tolerance ± 2 dB	
	CL1 (dBm)
BDR Output Power	8
EDR Output Power	6
BLE Output Power	7
Sensitivity, tolerance ± 2 dB	
Sensitivity @ BER=0.1% for GFSK (1Mbps)	-88 dBm
Sensitivity @ BER=0.01% for π/4-DQPSK (2Mbps)	-91 dBm
Sensitivity @ BER=0.01% for 8DPSK (3Mbps)	-85 dBm
Sensitivity @ PER=30.8% for LE (1Mbps)	-90 dBm
Sensitivity @ PER=30.8% for 2LE (2Mbps)	-91dBm
Maximum Input Level	GFSK (1Mbps):-20dBm
	π/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



5.2 Pin Assignment

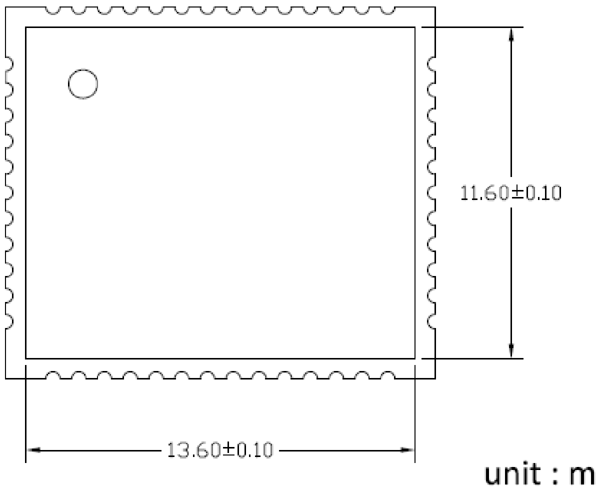
NO	Name	Type	Description
1	GND	—	Ground connections
2	WL_ANT0	I/O	RF I/O port0
3	GND	—	Ground connections
4	GND	—	Ground connections
5	GND	—	Ground connections
6	GND	—	Ground connections
7	GND	—	Ground connections
8	GND	—	Ground connections
9	WL_ANT1	I/O	RF I/O port1
10	GND	—	Ground connections
11	GND	—	Ground connections
12	PCIE_PREST_L	I	PCIe host indication to reset the device
13	XTAL_XOP	I	Xtal oscillator input
14	XTAL_XON	O	Xtal oscillator output
15	WL_REG_ON	I	Low asserting reset for Wi-Fi core
16	WL_HOST_WAKE	O	WLAN to wake-up HOST
17	NC	—	Floating (Don’t connected to ground)
18	NC	—	Floating (Don’t connected to ground)
19	BT_PCM_OUT	O	PCM Data output
20	BT_PCM_IN	I	PCM data input
21	BT_PCM_SYNC	I/O	PCM sync signal
22	BT_PCM_CLK	I	PCM clock
23	GND	—	Ground connections
24	PCIE_PME_L	OD	PCI power management event output
25	CBUCK_0P9	I	Internal Buck voltage generation pin
26	CSR_VLX	O	Internal Buck voltage generation pin
27	GND	—	Ground connections
28	ASR_VLX	O	Internal Analog Buck voltage generation pin
29	ABUCK_1P12	I	Internal Analog Buck voltage generation pin
30	GND	—	Ground connections
31	LPO_IN	I	External Low Power Clock input (32.768KHz)
32	GND	—	Ground connections
33	PCIE_RCLK_N	I	PCI Express differential clock input-Negative
34	VDDIO	P	I/O Voltage supply input

35	PCIE_RCLK_P	I	PCI Express differential clock input-Positive
36	VBAT	P	Main power voltage source input
37	PCIE_CLKREQ_L	OD	PCIe clock request
38	BT_REG_ON	I	Low asserting reset for Bluetooth core
39	GND	—	Ground connections
40	BT_UART_TXD	O	Bluetooth UART serial data output
41	BT_UART_RXD	I	Bluetooth UART serial data input
42	BT_UART_RTS_N	O	Bluetooth UART request to send
43	BT_UART_CTS_N	I	Bluetooth UART clear to send
44	PCIE_RX_N	I	PCI Express receive data-Negative
45	PCIE_RX_P	I	PCI Express receive data-Positive
46	PCIE_TX_N	O	PCI Express transmit data-Negative
47	PCIE_TX_P	O	PCI Express transmit data-Positive
48	NC	—	Floating (Don’t connected to ground)
49	BT_WAKE	I	HOST wake-up Bluetooth device
50	BT_HOST_WAKE	O	Bluetooth device to wake-up HOST

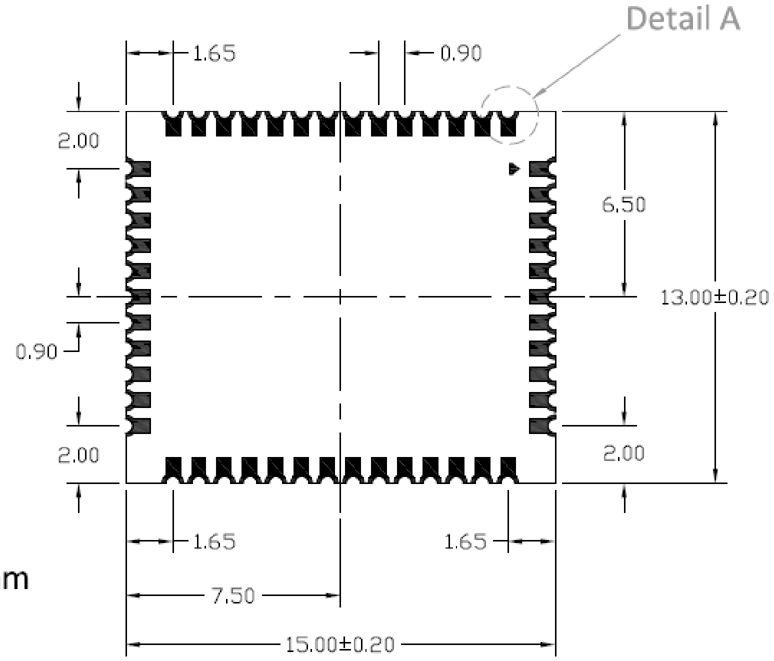
6. Dimensions(TBD)

6.1 Module Dimensions

<TOP VIEW>

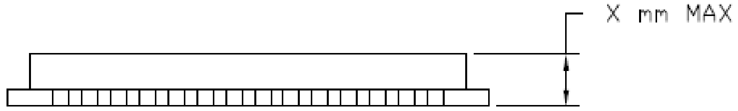


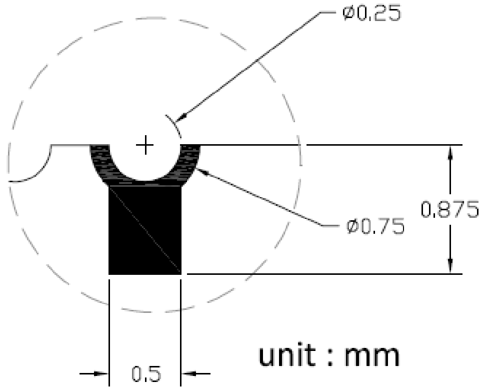
<BOTTOM VIEW>



unit : mm

<SIDE VIEW>



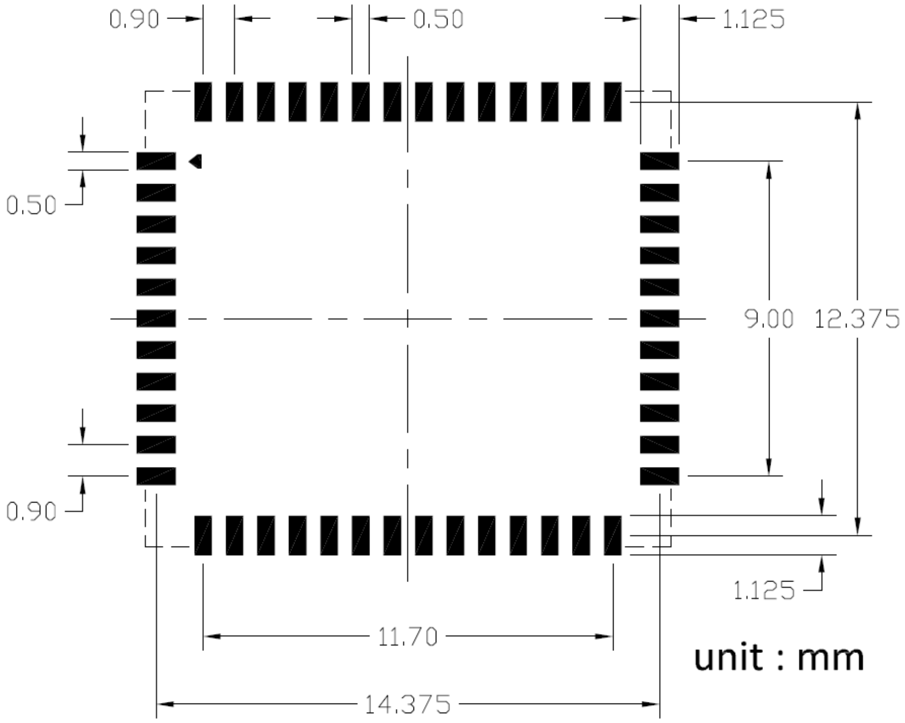


unit : mm

Detail A

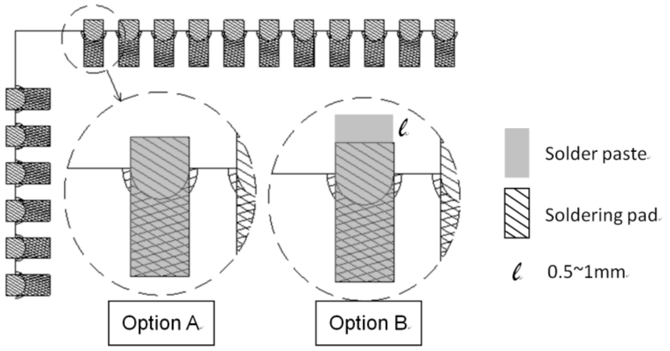
Note, X = 1.65mm

6.2 Recommended footprint



<TOP VIEW>

- Solder paste layer design is generally the same as recommended footprint.
  (錫膏層設計通常建議和焊墊尺寸相同)
- If soldering quality with good wetting on upright side is essential for PQC, how to optimize the aperture design in the stencil to adjust the amount of solder paste would be crucial.
  In addition, a kind of stencil design with stepped thickness in partial area would be considered if the thickness of stencil is about 0.1mm or thinner. Please optimize the stencil design by manufacture engineer or contact AMPAK FAE for assistance.
  (如果模組吃錫品質考量側面爬錫，如何優化鋼網開孔設計以調整適當的錫膏量是非常重要的。尤其鋼網的厚度大約是 0.1mm 或更薄時，可考慮局部加厚鋼網的設計。請諮詢製程工程師以優化鋼網的設計,或是聯絡正基科技技術支持團隊).



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 <5	Ω pF
Clock jitter (integrated over 300Hz – 15KHz)	<1	Hz
Output high voltage	0.7Vio - Vio	V

External 37.4MHz X'TAL characteristics

Parameter	Specification	Units
Nominal frequency - F0	37.4	MHz
Frequency Tolerance - ΔF / F 0 (At 25℃ +/- 3℃)	+/- 10	ppm
Operation Temperature Range - Topr	-30 ~ + 85	℃
Freq. Stability(over operating temperature) - TC Ref. to 25℃	+/- 10	ppm
Load capacitance - CL	18	pF
Equivalent Series Resistance – ESR	Max. 60	Ω
Drive Level - DL	Typ. 50, Max. 100	uW
Insulation resistance – IR At 100Vdc	Min. 500	MΩ

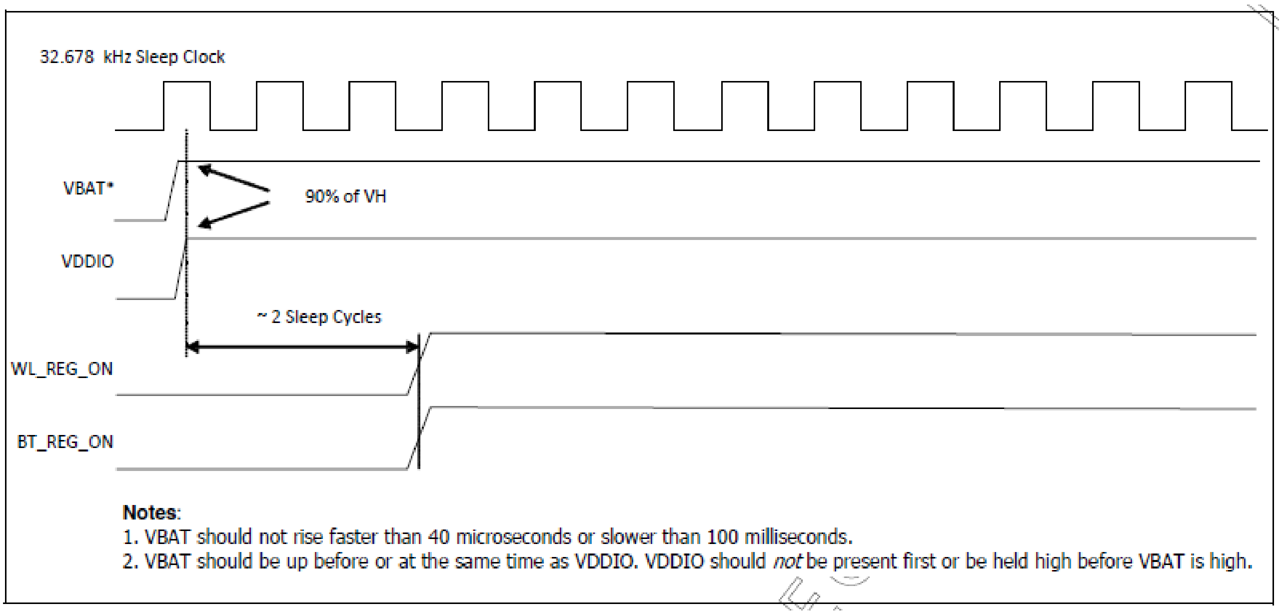
8. Host Interface Timing Diagram

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.

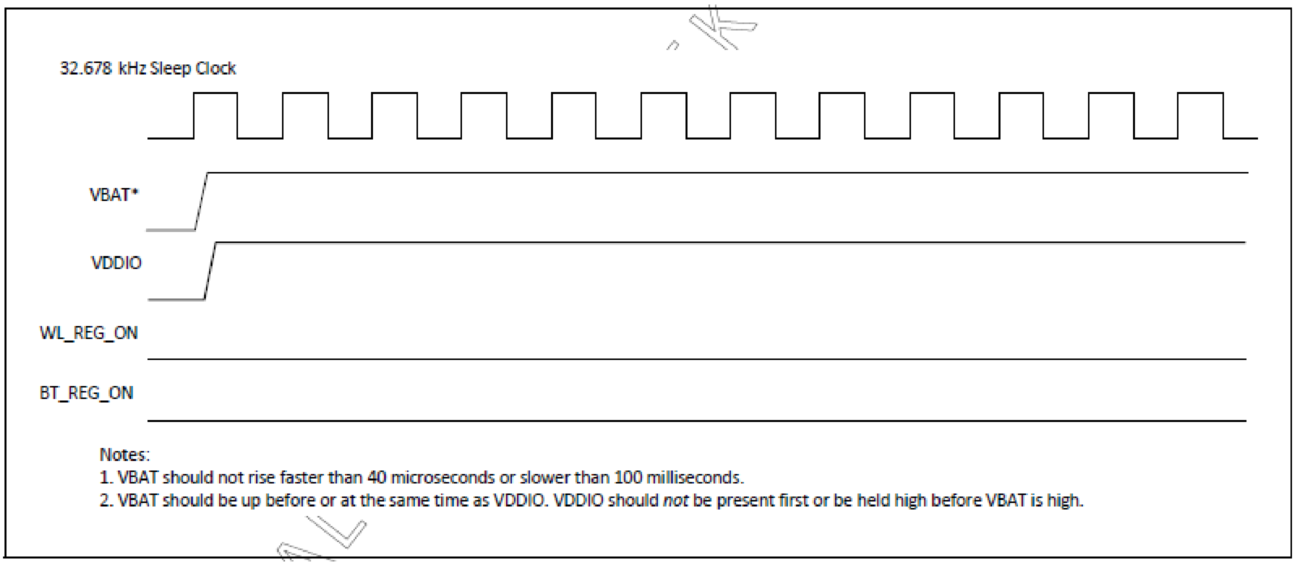
Additionally, diagrams are provided to indicate proper sequencing of the signals for carious operating states. The timing value indicated are minimum required values: longer delays are also acceptable.

- WL_REG_ON: Used by the PMU to power up or power down the internal regulators used by the WLAN section. 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.
- BT_REG_ON: Used by the PMU to power up or power down the internal regulators used by the BT section. Low asserting reset for Bluetooth. This pin has no effect on WLAN and does not control any PMU functions. This pin must be driven high or low (not left floating).



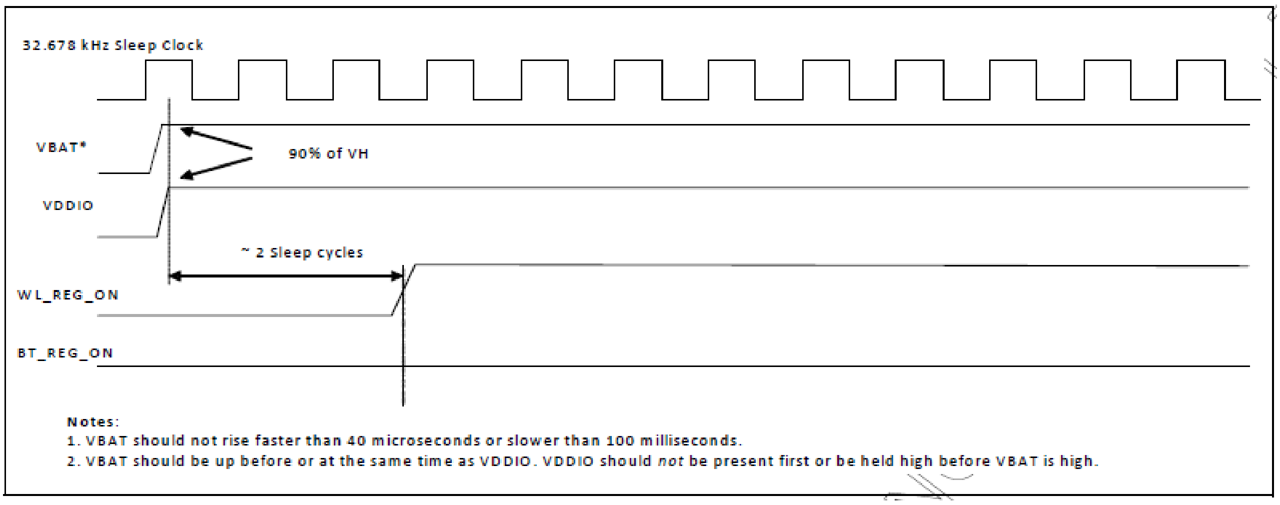
Notes:
1. VBAT should not rise faster than 40 microseconds or slower than 100 milliseconds.
2. VBAT should be up before or at the same time as VDDIO. VDDIO should *not* be present first or be held high before VBAT is high.

WLAN=ON, Bluetooth=ON



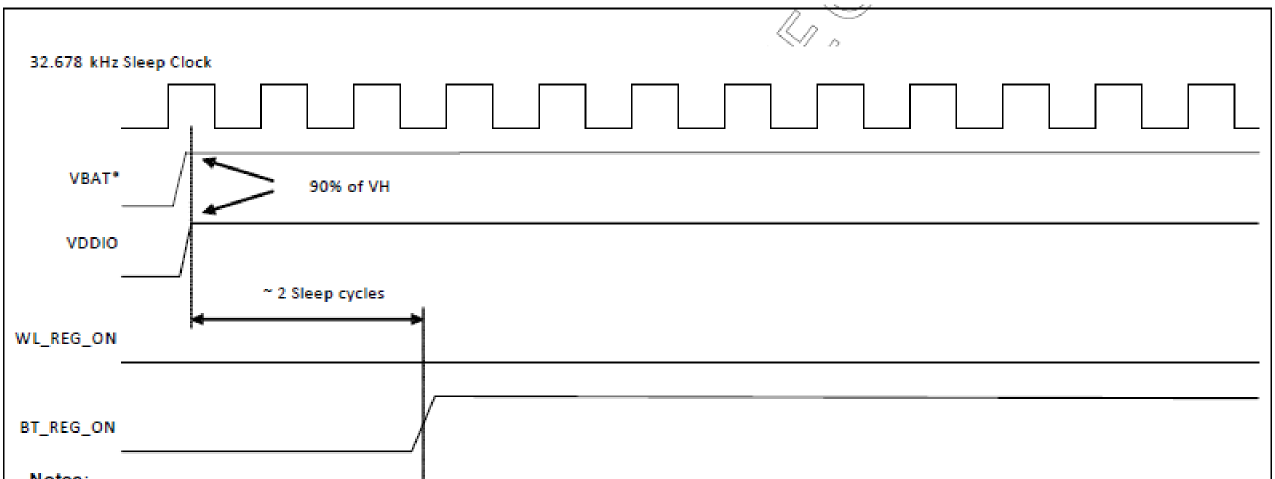
Notes:
1. VBAT should not rise faster than 40 microseconds or slower than 100 milliseconds.
2. VBAT should be up before or at the same time as VDDIO. VDDIO should *not* be present first or be held high before VBAT is high.

WLAN=OFF, Bluetooth=OFF



Notes:
1. VBAT should not rise faster than 40 microseconds or slower than 100 milliseconds.
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

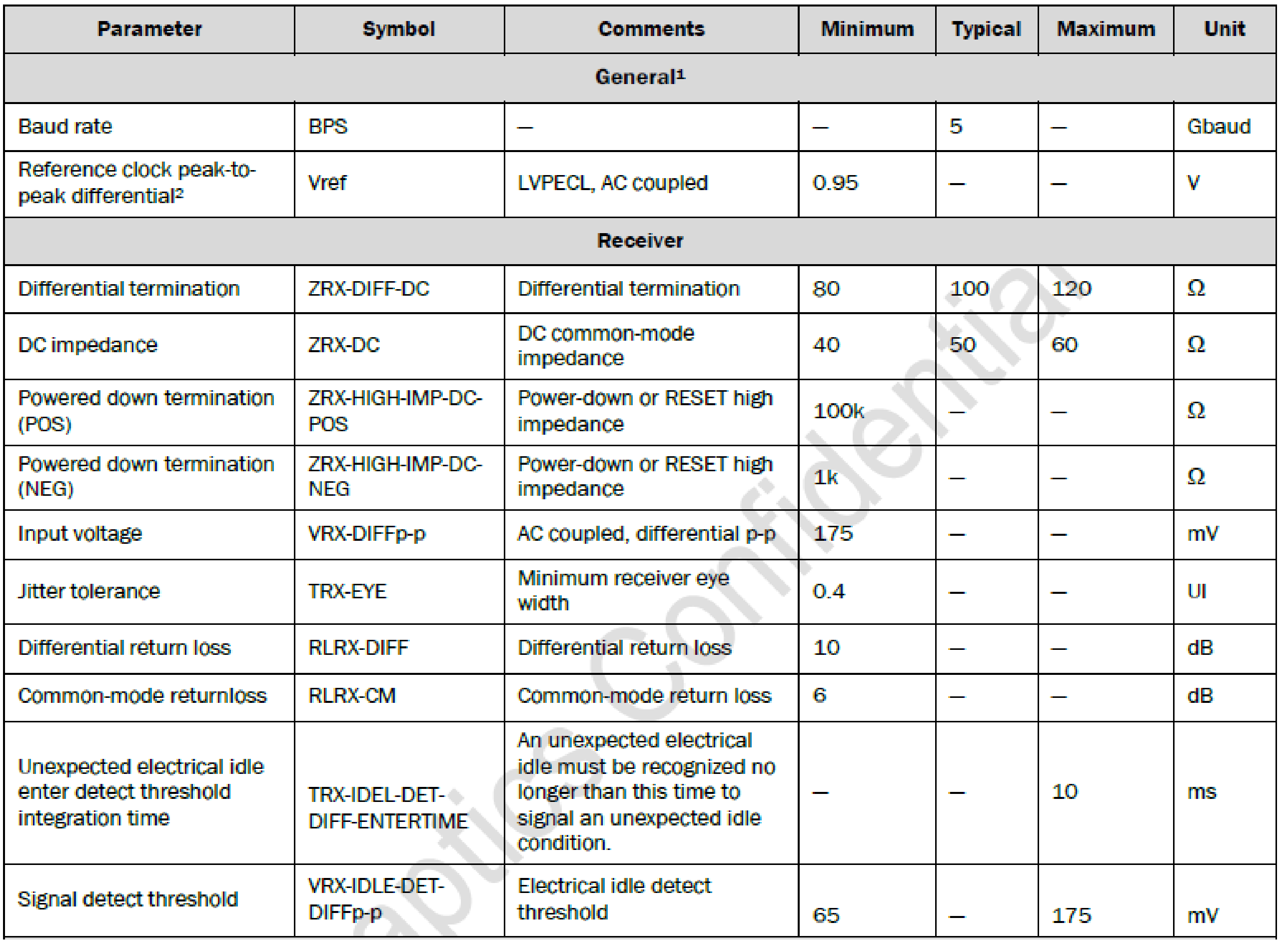


Notes:
1. VBAT should not rise faster than 40 microseconds or slower than 100 milliseconds.
2. VBAT should be up before or at the same time as VDDIO. VDDIO should *not* be present first or be held high before VBAT is high.

WLAN=OFF, Bluetooth=ON

8.2 PCIe Interface Description

The PCI Express(PCIe) core on the AP6276P is a high-performance serial I/O interconnect that is protocol compliant and electrically compatible with the PCI Express Base Specification v3.0 running at Gen1 speeds.



Parameter	Symbol	Comments	Minimum	Typical	Maximum	Unit
General[1]						
Baud rate	BPS	–	–	5	–	Gbaud
Reference clock peak-to-peak differential[2]	Vref	LVPECL, AC coupled	0.95	–	–	V
Receiver						
Differential termination	ZRX-DIFF-DC	Differential termination	80	100	120	Ω
DC impedance	ZRX-DC	DC common-mode impedance	40	50	60	Ω
Powered down termination (POS)	ZRX-HIGH-IMP-DC-POS	Power-down or RESET high impedance	100k	–	–	Ω
Powered down termination (NEG)	ZRX-HIGH-IMP-DC-NEG	Power-down or RESET high impedance	1k	–	–	Ω
Input voltage	VRX-DIFFp-p	AC coupled, differential p-p	175	–	–	mV
Jitter tolerance	TRX-EYE	Minimum receiver eye width	0.4	–	–	UI
Differential return loss	RLRX-DIFF	Differential return loss	10	–	–	dB
Common-mode returnloss	RLRX-CM	Common-mode return loss	6	–	–	dB
Unexpected electrical idle enter detect threshold integration time	TRX-IDEL-DET-DIFF-ENTERTIME	An unexpected electrical idle must be recognized no longer than this time to signal an unexpected idle condition.	–	–	10	ms
Signal detect threshold	VRX-IDLE-DET-DIFFp-p	Electrical idle detect threshold	65	–	175	mV

Transmitter						
Output voltage	VTX-DIFFp-p	Differential p-p, programmable in 16 steps	0.8	–	1200	mV
RX detection voltage swing	VTX-RCV-DETECT	The amount of voltage change allowed during receiver detection.	–	–	600	mV
TX AC peak common- mode voltage (2.5 GT/s)	VTX-CM-AC-P	TX AC common-mode voltage (2.5 GT/s)	–	–	20	mV
Absolute delta of DC common-mode voltage during L0 and electrical idle	VTX-CM-DC-ACTIVE-IDLE-DELTA	Absolute delta of DC common-mode voltage during L0 and electricalidle.	0	–	100	mV
Absolute delta of DC common-mode voltage between D+ and D–	VTX-CM-DC-LINE-DELTA	DC offset between D+ and D–	0	–	25	mV
Electrical idle differential peak output voltage	VTX-IDLE-DIFF-AC-p	Peak-to-peak voltage	0	–	20	mV
Parameter	**Symbol**	**Comments**	**Minimum**	**Typical**	**Maximum**	**Unit**
TX short circuit current	ITX-SHORT	Current limit when TX output is shorted to ground.	–	–	90	mA
DC differential TX termination	ZTX-DIFF-DC	Low impedance defined during signaling (parameter is captured for 5.0 GHz by RLTX-DIFF)	80	–	120	Ω
Differential return loss	RLTX-DIFF	Differentialreturn loss	10 (min) for 0.05: 1.25 GHz	–	–	dB
Common-mode return loss	RLTX-CM	Common-mode return loss	6	–	–	dB
TX eye width	TTX-EYE	Minimum TX eye width	0.75	–	–	UI

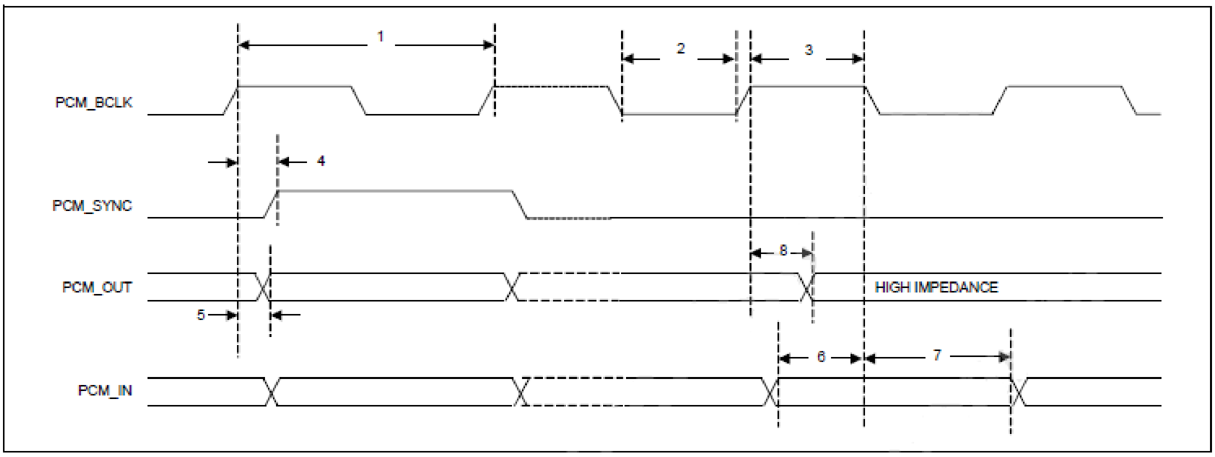
The reference clock inputs comply with the requirements of the PCI Express CEM v2.0 Specification.

8.3 PCM Interface Description

The PCM Interface on the AP6276P can connect to linear PCM Codec devices in master or slave mode. In master mode, the AP6276P 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 AP6276P.The configuration of the PCM interface may be adjusted by the host through the use of vendor-specific HCI commands.

Short Frame Sync, Master Modem

PCM Timing Diagram (Short Frame Sync, Master Mode)

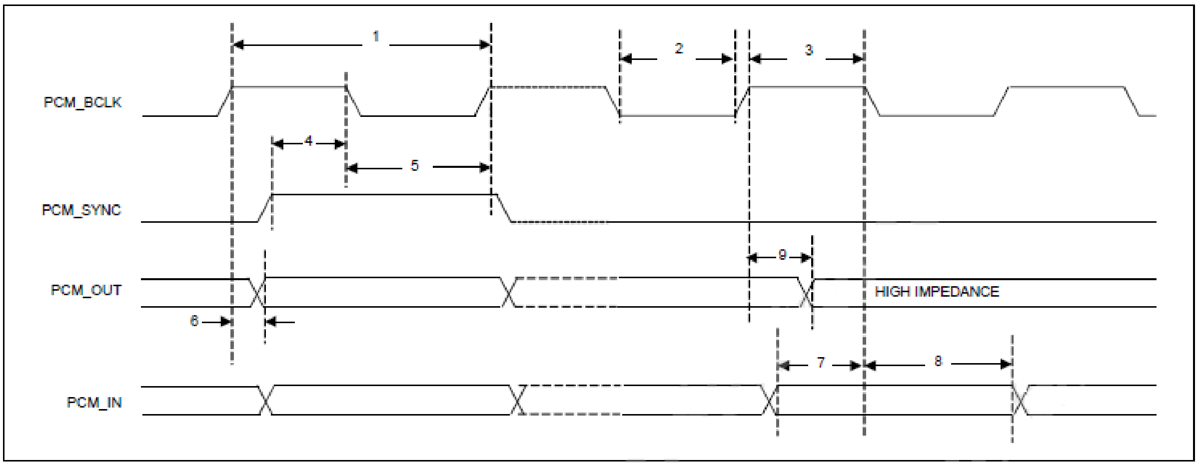


PCM Interface Timing Specifications (Short Frame Sync, Master Mode)

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	PCM_SYNC delay	0	–	25	ns
5	PCM_OUT delay	0	–	25	ns
6	PCM_IN setup	8	–	–	ns
7	PCM_IN hold	8	–	–	ns
8	Delay from rising edge of PCM_BCLK during last bit period to PCM_OUT becoming high impedance	0	–	25	ns

Short Frame Sync, Slave Mode

PCM Timing Diagram (Short Frame Sync, Slave Mode)

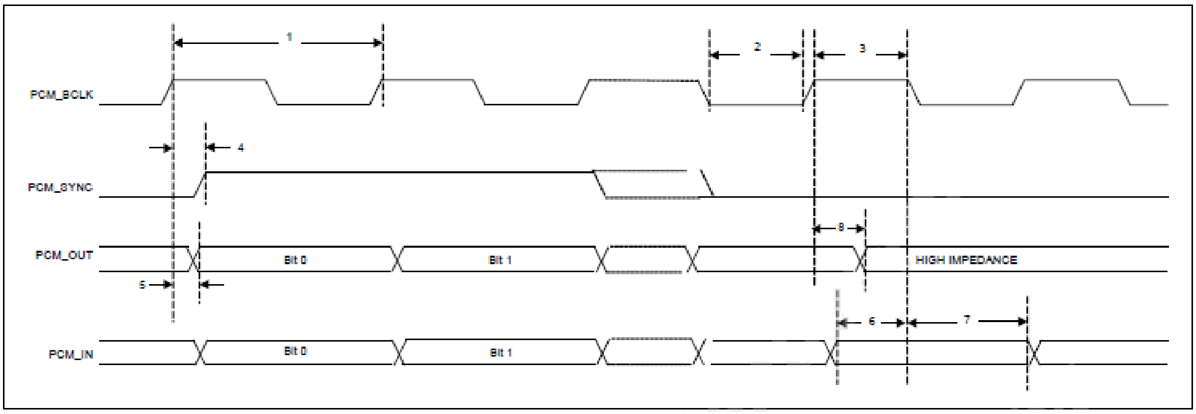


PCM Interface Timing Specifications (Short Frame Sync, Slave Mode)

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	PCM_SYNC setup	8	–	–	ns
5	PCM_SYNC hold	8	–	–	ns
6	PCM_OUT delay	0	–	25	ns
7	PCM_IN setup	8	–	–	ns
8	PCM_IN hold	8	–	–	ns
9	Delay from rising edge of PCM_BCLK during last bit period to PCM_OUT becoming high impedance	0	–	25	ns

Long Frame Sync, Master Mode

PCM Timing Diagram (Long Frame Sync, Master Mode)

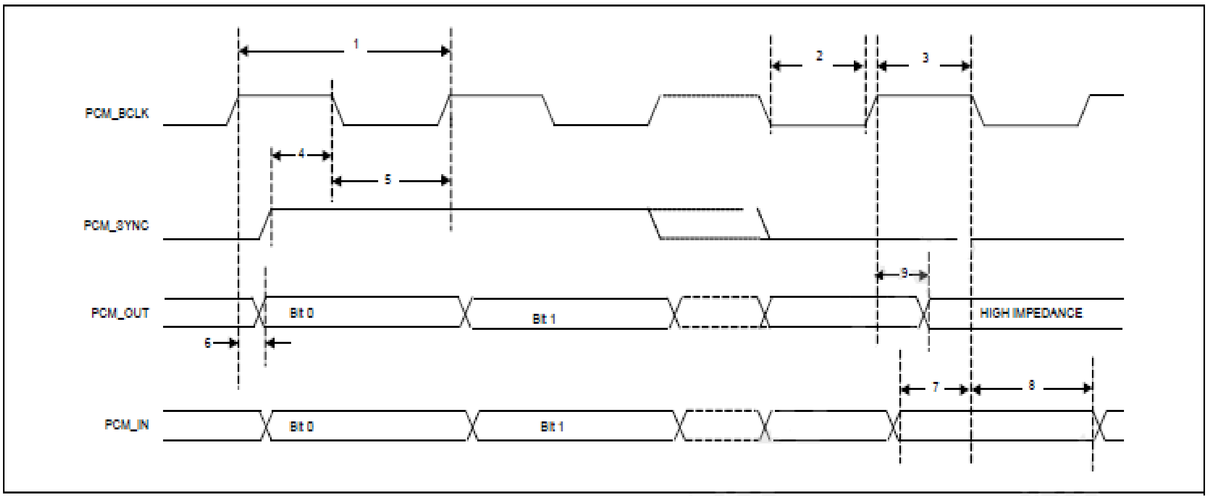


PCM Interface Timing Specifications (Long Frame Sync, Master Mode)

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	PCM_SYNC delay	0	–	25	ns
5	PCM_OUT delay	0	–	25	ns
6	PCM_IN setup	8	–	–	ns
7	PCM_IN hold	8	–	–	ns
8	Delay from rising edge of PCM_BCLK during last bit period to PCM_OUT becoming high impedance	0	–	25	ns

Long Frame Sync, Slave Mode

PCM Timing Diagram (Long Frame Sync, Slave Mode)

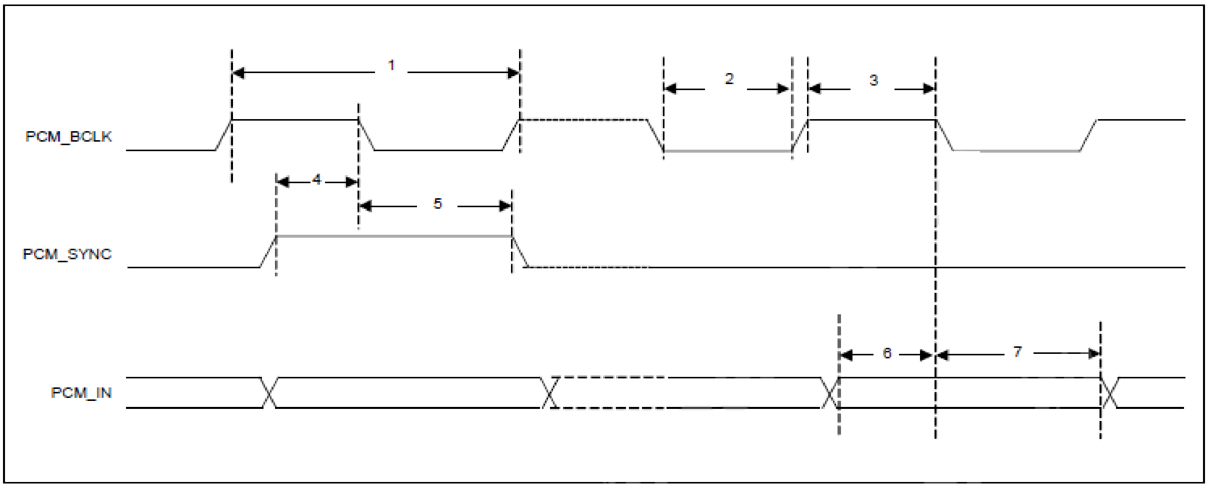


PCM Interface Timing Specifications (Long Frame Sync, Slave Mode)

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	PCM_SYNC setup	8	–	–	ns
5	PCM_SYNC hold	8	–	–	ns
6	PCM_OUT delay	0	–	25	ns
7	PCM_IN setup	8	–	–	ns
8	PCM_IN hold	8	–	–	ns
9	Delay from rising edge of PCM_BCLK during last bit period to PCM_OUT becoming high impedance	0	–	25	ns

Short Frame Sync, Burst Mode

PCM Burst Mode Timing (Receive Only, Short Frame Sync)

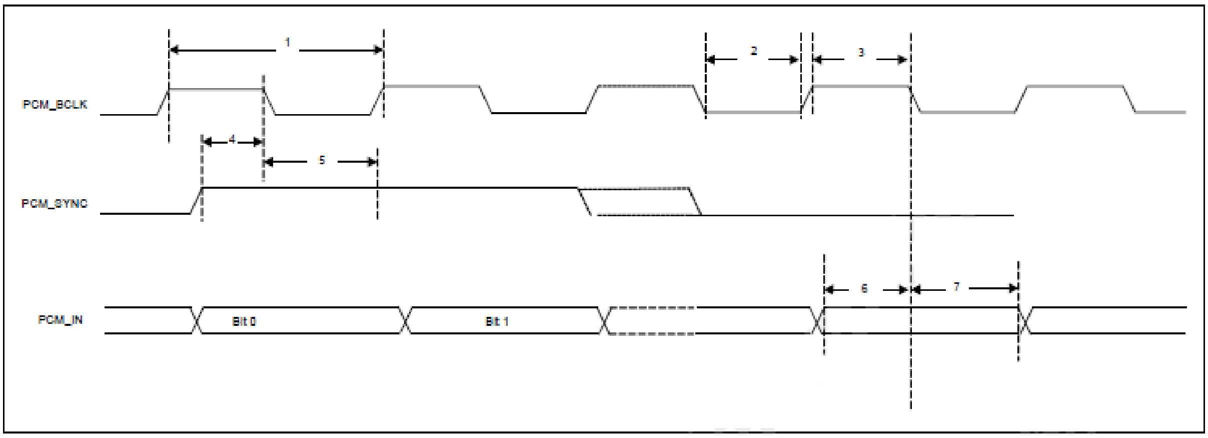


PCM Burst Mode (Receive Only, Short Frame Sync)

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	PCM_SYNC setup	8	–	–	ns
5	PCM_SYNC hold	8	–	–	ns
6	PCM_IN setup	8	–	–	ns
7	PCM_IN hold	8	–	–	ns

Long Frame Sync, Burst Mode

PCM Burst Mode Timing (Receive Only, Long Frame Sync)



PCM Burst Mode (Receive Only, Long 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	PCM_SYNC setup	8	–	–	ns
5	PCM_SYNC hold	8	–	–	ns
6	PCM_IN setup	8	–	–	ns
7	PCM_IN hold	8	–	–	ns

8.4 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 5.0 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.

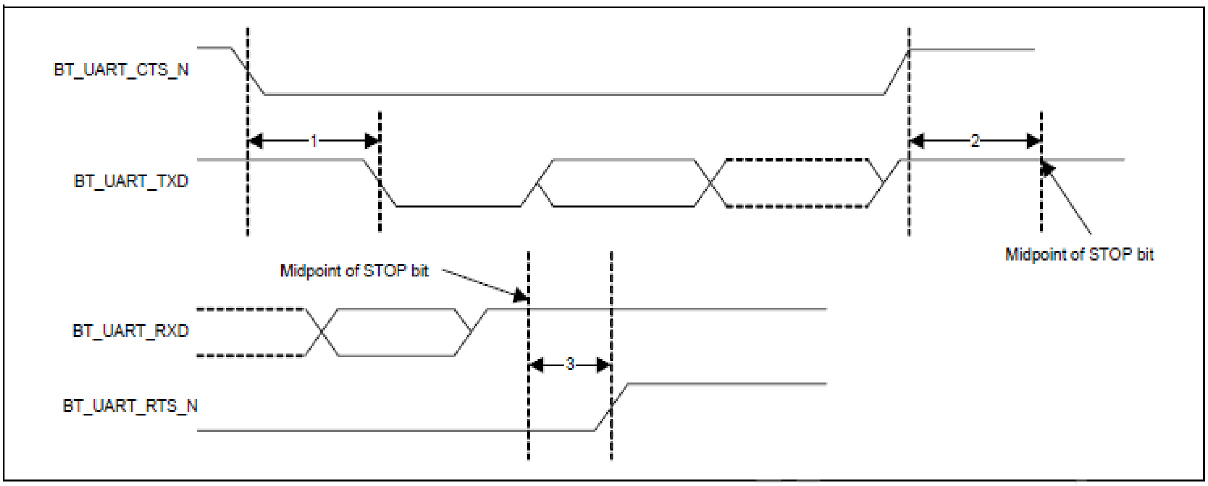
The UART can perform XON/XOFF flow control and includes hardware support for the Serial Line Input Protocol (SLIP). It can also perform wake-on activity. For example, activity on the RX or CTS inputs can wake the chip from a sleep state.

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 ±2%.

Example of Common Baud Rates

Desired Rate	Actual Rate	Error (%)
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

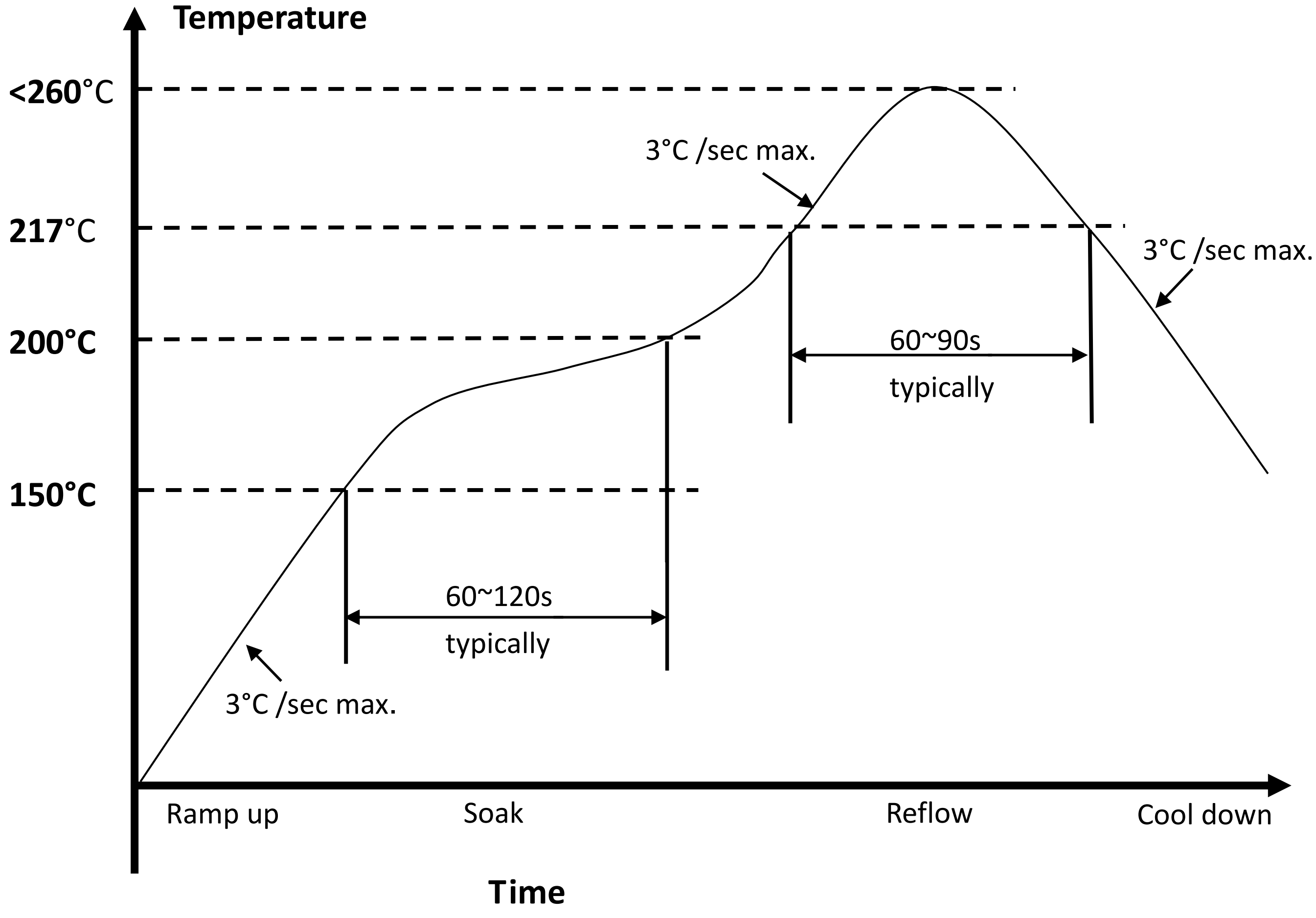
UART Timing



UART Timing Specifications

Ref	Characteristics	Min.	Typ.	Max.	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



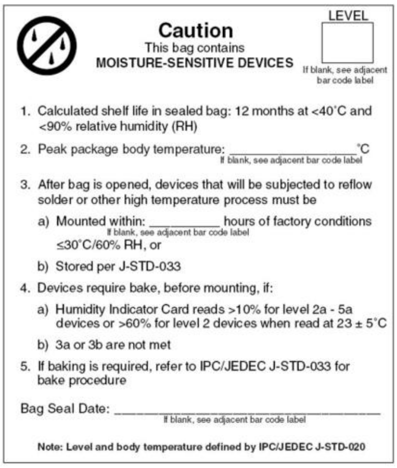
1. Referred to IPC/JEDEC standard
2. Peak Temperature : <260°C(Time within 5°C of actual Peak Temperature 20-40 seconds)
3. Cycle of Reflow : 2 times max.
4. Adding Nitrogen (N2) to implement 2000ppm or less of oxygen concentration during reflow process is recommended.
5. If the shelf time is exceeded,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

10. Package Information

10.1 Label

Label A→ Anti-static and humidity notice

Label B→ MSL caution / Storage Condition



Caution
This bag contains
MOISTURE-SENSITIVE DEVICES

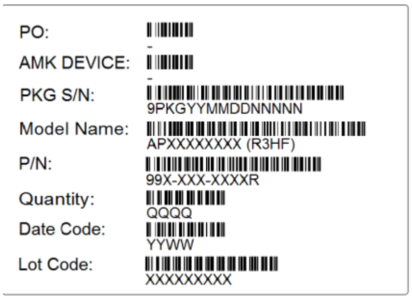
LEVEL ☐
If blank, see adjacent bar code label

1. Calculated shelf life in sealed bag: 12 months at <40°C and <90% relative humidity (RH)
2. Peak package body temperature: ________________°C
   If blank, see adjacent bar code label
3. After bag is opened, devices that will be subjected to reflow solder or other high temperature process must be
   a) Mounted within: __________ hours of factory conditions
   If blank, see adjacent bar code label
   ≤30°C/60% RH, or
   b) Stored per J-STD-033
4. Devices require bake, before mounting, if:
   a) Humidity Indicator Card reads >10% for level 2a - 5a devices or >60% for level 2 devices when read at 23 ± 5°C
   b) 3a or 3b are not met
5. If baking is required, refer to IPC/JEDEC J-STD-033 for bake procedure

Bag Seal Date: ______________________________
If blank, see adjacent bar code label

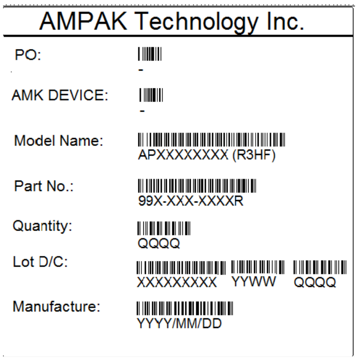
Note: Level and body temperature defined by IPC/JEDEC J-STD-020

Label C→ Inner box label .



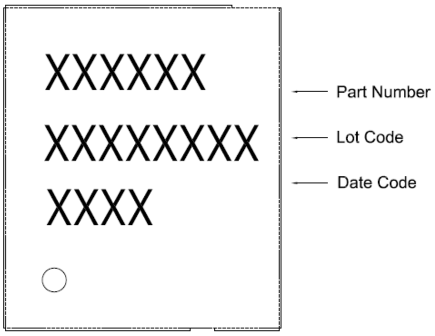
PO: -
AMK DEVICE: -
PKG S/N: 9PKGYYMMDDNNNNN
Model Name: APXXXXXXXX (R3HF)
P/N: 99X-XXX-XXXXR
Quantity: QQQQ
Date Code: YYWW
Lot Code: XXXXXXXXX

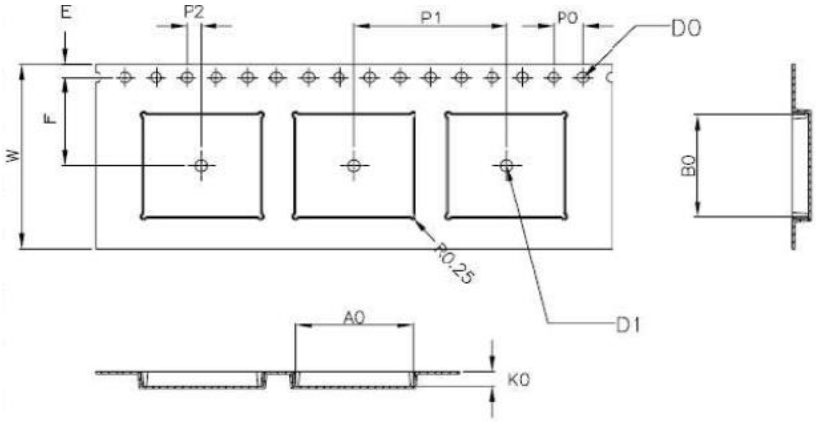
Label D→ Carton box label .

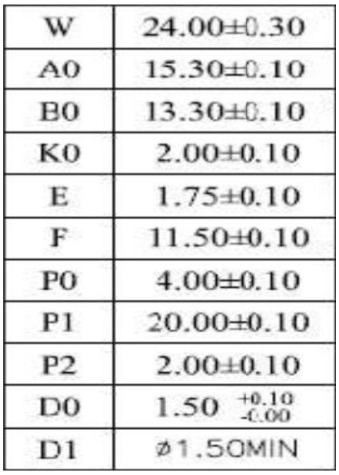


AMPAK Technology Inc.
PO: -
AMK DEVICE: -
Model Name: APXXXXXXXX (R3HF)
Part No.: 99X-XXX-XXXXR
Quantity: QQQQ
Lot D/C: XXXXXXXXX YYWW QQQQ
Manufacture: YYYY/MM/DD

10.2 Dimension

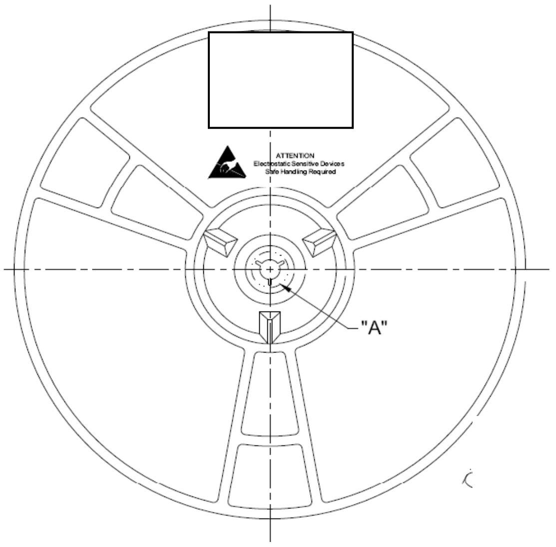


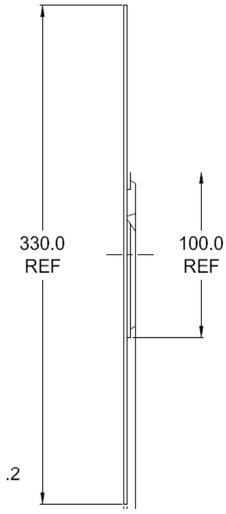


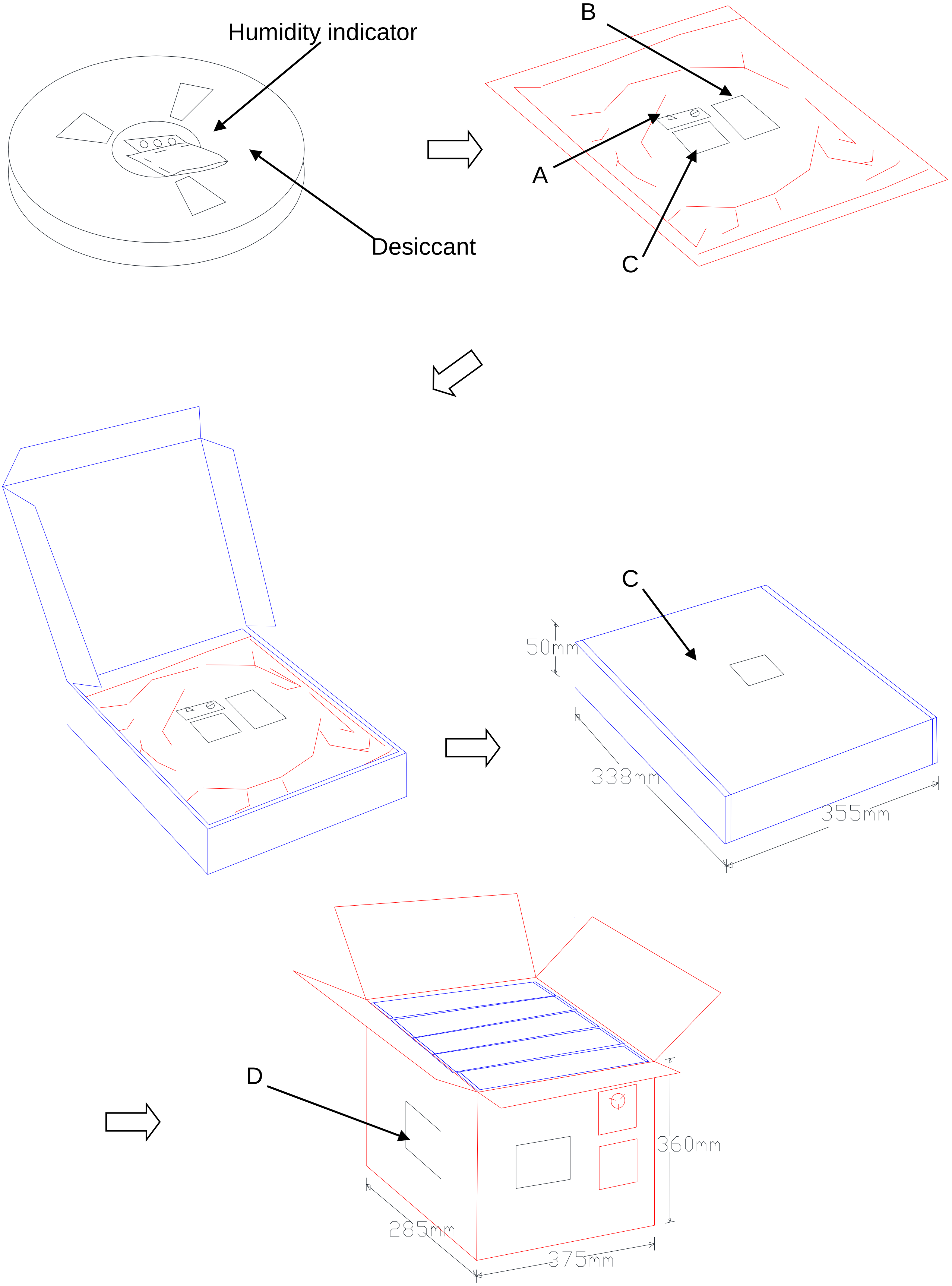


W	24.00±0.30
A0	15.30±0.10
B0	13.30±0.10
K0	2.00±0.10
E	1.75±0.10
F	11.50±0.10
P0	4.00±0.10
P1	20.00±0.10
P2	2.00±0.10
D0	$1.50^{+0.10}_{-0.00}$
D1	ø1.50MIN

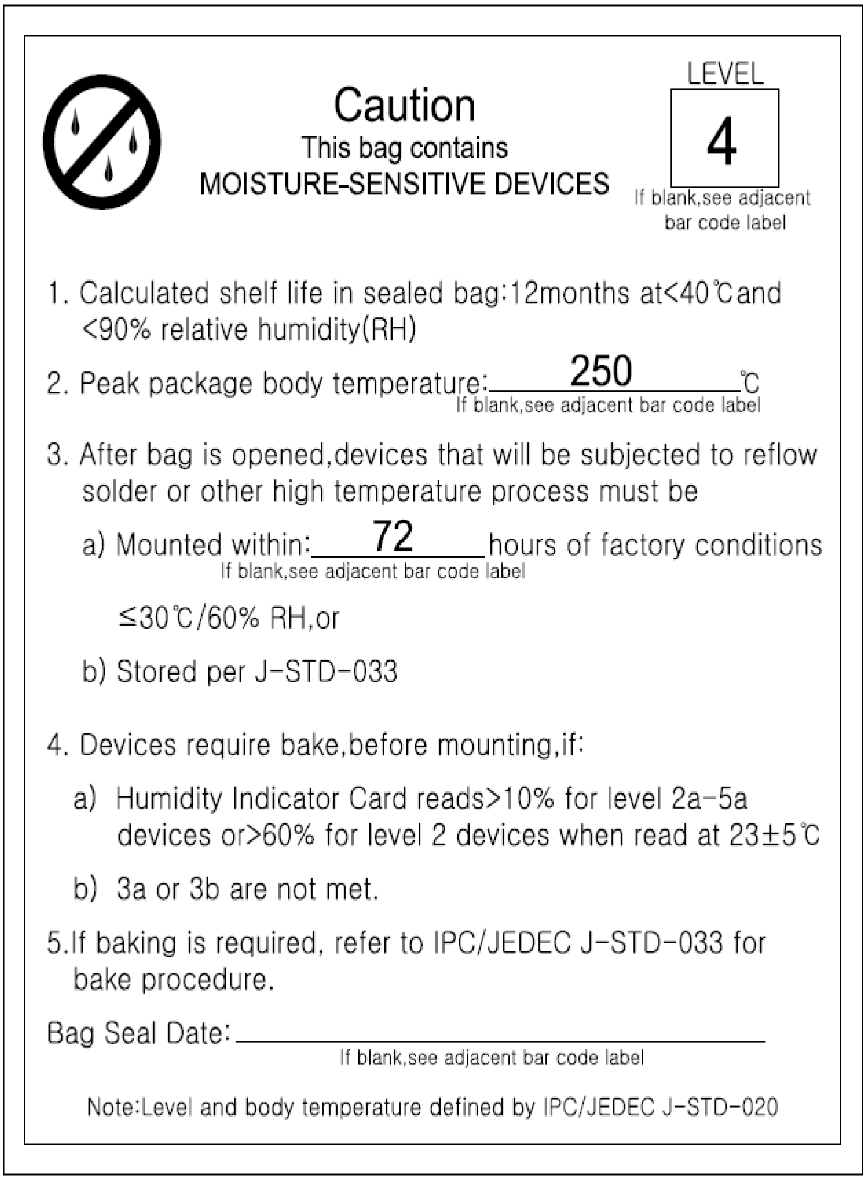
1. 10 sprocket hole pitch cumulative tolerance ±0.20.
2. Carrier camber is within 1 mm in 250 mm.
3. Material : Black Conductive Polystyrene Alloy.
4. All dimensions meet EIA-481-D requirements.
5. Thickness: 0.30±0.05mm.
6. Component load per 13”reel : 1000 pcs






Humidity indicator
Desiccant
B
A
C
C
50mm
338mm
355mm
D
360mm
285mm
375mm

10.3 MSL Level / Storage Condition



LEVEL

4

If blank,see adjacent bar code label

Caution

This bag contains

MOISTURE-SENSITIVE DEVICES

1. Calculated shelf life in sealed bag:12months at<40℃and <90% relative humidity(RH)

2. Peak package body temperature:____250____℃

If blank,see adjacent bar code label

3. After bag is opened,devices that will be subjected to reflow solder or other high temperature process must be

   a) Mounted within:____72____hours of factory conditions

   If blank,see adjacent bar code label

   ≤30℃/60% RH,or

   b) Stored per J-STD-033

4. Devices require bake,before mounting,if:

   a) Humidity Indicator Card reads>10% for level 2a-5a devices or>60% for level 2 devices when read at 23±5℃

   b) 3a or 3b are not met.

5.If baking is required, refer to IPC/JEDEC J-STD-033 for bake procedure.

Bag Seal Date:____________________

If blank,see adjacent bar code label

Note:Level and body temperature defined by IPC/JEDEC J-STD-020