



# 正基科技股份有限公司

## SPECIFICATION

**PRODUCT NAME : AP72611**

**REVISION : 00**

**DATE : January 17, 2024**

Customer APPROVED	
Company	
Representative Signature	

PREPARED	REVIEW			APPROVED	DCC ISSUE
	PM	QA	ET		

# 正基科技股份有限公司



## AP72611 Data Sheet

Address:

6F., No. 21, Huanke 1st Rd., Zhubei City, Hsinchu County 302047 , Taiwan (R.O.C.)

<http://www.ampak.com.tw>

## Revision

Revision	Date	Description	Revised By
0.0	2024/01/17	- Initial Released	Ander Lee

# Contents

<b>DCC ISSUE</b> .....	<b>0</b>
<b>Revision</b> .....	<b>1</b>
<b>Contents</b> .....	<b>2</b>
<b>1. Introduction</b> .....	<b>3</b>
1.1 Overview .....	3
1.2 Product Features .....	4
<b>2. General Specification</b> .....	<b>6</b>
2.1 General Specification .....	6
2.2 Recommended Operating Rating .....	6
2.3 Product current consumption .....	6
<b>3. Wi-Fi RF Specification</b> .....	<b>7</b>
3.1 2.4GHz RF Specification .....	7
3.2 5GHz RF Specification .....	9
3.3 6GHz RF Specification .....	13
<b>4. Bluetooth Specification</b> .....	<b>16</b>
4.1 Bluetooth Specification .....	16
<b>5. Pin Definition</b> .....	<b>17</b>
5.1 Pin Outline Diagram .....	17
5.2 Pin Assignment .....	18
5.3 Physical Dimensions .....	27
5.4 Sample Picture .....	29
5.5 Pin position .....	31
5.6 Label Information .....	33
<b>6. Package Information</b> .....	<b>34</b>
6.1 Label A Inner box label .....	34
6.2 Label B Carton box label .....	34
6.3 Package Manner .....	35
<b>7. Note</b> .....	<b>ii</b>



# 1. Introduction

## 1.1 Overview

The Ampak Smart Audio SoM (System on Module) platform is an advanced module specially designed and optimized for mid and high-end sound technology, feature-rich IP phones and terminals that require powerful processing and 3D graphics capabilities. The SoM supports a sophisticated GUI and multi-channel high-quality HD voice. This smart speaker solution is Artificial Intelligence (AI) Engine can be done on GPU and/or CPU, dedicated specifically for low-power, high-performance smart audio applications.

The SoM AP72611 is an advanced application processor designed for voice control and smart audio speaker / smart home applications. It integrates a powerful subsystem with Wi-Fi 6E (2.4/5/6GHz) / Bluetooth 5.3 and advanced multi-format audio DSP is complete audio front end addressing all audio in/out functionality expected from high-end VoIP terminals, providing two high-quality audio DACs and ADCs. The audio DSP has three differential input amplifiers and two differential output amplifiers which can support stereo and mono speakers, headsets, and/or line outputs. It supports digital microphone, hardware-controlled mute, and three individual analog mute inputs that function independently, capable of muting each of the three differential input amplifiers.

### SoM Ampak Model Name : AP72611

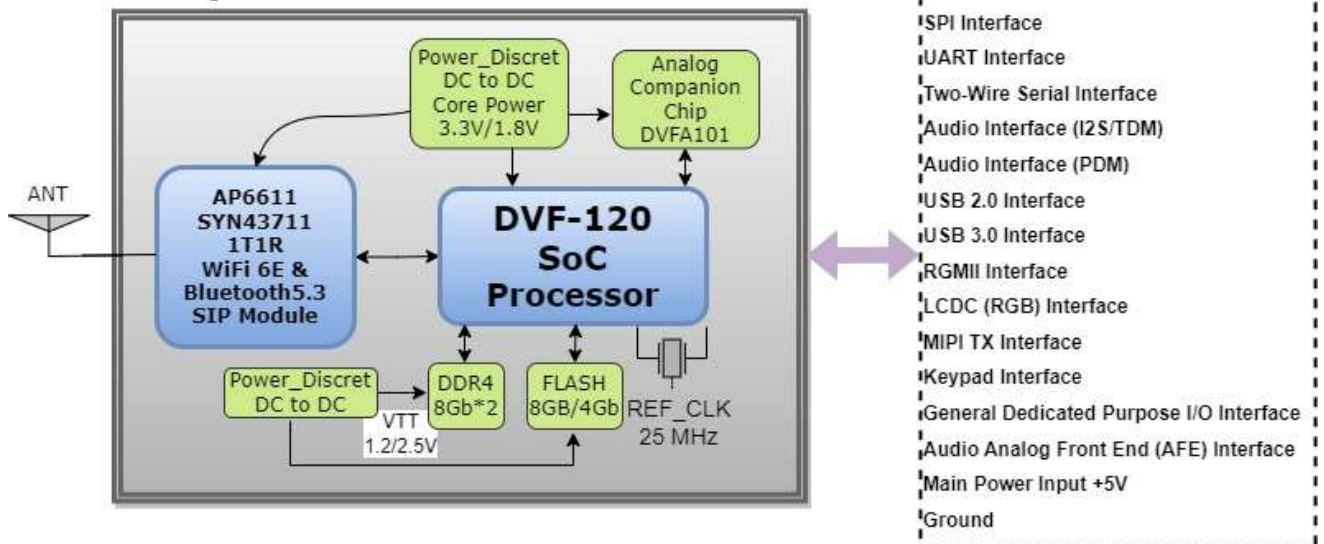


Figure 1-1 Block diagram



## 1.2 Product Features

- Lead Free design which is compliant with ROHS requirements.
- CPU: Quad-core Arm® Cortex®-A55 up to 1.9GHz
- GPU
  - Imagination™ BXE-2-32 / Dual core (2 pixels per clock)
  - Clock frequency up to 800 MHz
  - Supports OpenGL® ES™ 3.2, OpenCL™ 3.0, EGL™ 1.5, Vulkan® 1.3, Android™ NN API through IMGDNN AP
- Security:
  - On-chip 32Kbit anti-fuse OTP
  - True random number generator
  - DRM engine supports
  - AES, DES, 3DES, SHA1/SHA2/MD5, RSA, ECC
- Audio
  - TDM//PDM and DVFA audio
  - 8 to 96/192 kHz and slot size 8/16/24/32 bit
- Memory Interfaces
  - ◆ DRAM 32-bit DDR4- 2666 up to 8 Gb memory space
  - ◆ 4Gb NAND 8 bit Parallel SLC (64 bit ECC per 2KB of data)
- Peripherals
  - One USB 3.0 Host and One USB 2.0 On-The-Go (OTG) interface
  - Four TWSI 2-wire buses (I2C compatible) and Two high speed UART interfaces
  - Two SPI controllers and Up to four slave devices supported on each interface
  - 72-bit pin-shared GPIOs
  - Rectangular Keyboard matrix controller up to 80 keys (8x10)
  - 4 PWMs and On-chip temperature sensor
- Video/Display Interfaces
  - MIPI Display Serial Interface (DSI) up to 1080p60 screen resolution
  - RGB Digital Parallel Interface (DPI) / CPU-type Display Bus Interface (DBI) , RGB 16bpp (565), 18bpp (666) and 24bpp (888) output formats / Up to 1080p30 screen resolution and refresh rate
- Ethernet
  - 802.3 (G)MAC supports RGMII and RMII
  - 802.1 p/q tagging (VLAN) in hardware
  - IEEE 1588 Precision Time Protocol (PTP) with PPS output signal
- IEEE 802.11 Key Features
  - 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 radio, and 20MHz channels for 2.4GHz radio.
  - Client MU-MIMO
- Bluetooth Key Features
  - Complies with Bluetooth Core Specification Version 5.3 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 5.3, including the following support:
  - ◆ Low energy (LE) isochronous channels
  - ◆ LE power controls
  - ◆ LE enhanced connection updates
  - ◆ LE channel classification
  - ◆ LE audio
- Package
  - 69.6x50x5.5mm SO-DIMM 260-pin

## 2. General Specification

### 2.1 General Specification

Model Name	AP72611
Product Description	Smart Audio System on Module support Wi-Fi 6E / Bluetooth 5.3 functionality
Dimension	SO-DIMM 260-pin L x W x H : 69.6(±0.15) x 50(±0.15) mm x 5.50(±0.2)mm
Operating temperature	0°C to 65°C
Storage temperature	-40°C to 85°C
Humidity	Operating Humidity 10% to 95% Non-Condensing Storage Humidity 5% to 95% Non-Condensing

### 2.2 Recommended Operating Rating

	Min.	Typ.	Max.	Unit
Operating Temperature	-10	25	65	deg.C
VDD	4.5	5	5.5	V

### 2.3 Product current consumption

Item	Typ.
work mode: CPU load 80%, TX or RX throughput 20Mbps,	TBD
idle mode: CPU load 0%, keep connection to AP but no wifi stream,	TBD
EUP mode: the lowest power ,can wake up by Wifi and BT.	TBD



## 3. Wi-Fi RF Specification

### 3.1 2.4GHz RF Specification

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

Feature	Description				
<b>WLAN Standard</b>	IEEE 802.11 b/g/n/ax & Wi-Fi compliant				
<b>Frequency Range</b>	2400 MHz ~ 2483.5 MHz (2.4GHz ISM Band)				
<b>Number of Channels</b>	2400 MHz ~ 2483.5 MHz : Ch1 ~ Ch13				
<b>Modulation</b>	802.11b : DQPSK 、 DBPSK 、 CCK 802.11g/n : OFDM /64-QAM 、 16-QAM 、 QPSK 、 BPSK 802.11ax : OFDMA /256-QAM 、 64-QAM 、 16-QAM 、 QPSK 、 BPSK				
<b>Output Power , tolerance <math>\pm 1.5</math> dB</b>					
<b>The transmit EVM quality &amp; spectrum mask are compliant with IEEE 802.11 standard</b>					
802.11b	1Mbps	2Mbps	5.5Mbps	11Mbps	
	19	19	19	19	
802.11g	6 、 9Mbps	12 、 18Mbps	24Mbps	36Mbps	48Mbps
	19	19	18	18	17
	54Mbps				
	17				
802.11n 20MHz	MCS0~2	MCS3	MCS4	MCS5	MCS6
	18.5	18.5	18	17	16
	MCS7				
	16				
802.11ax 20MHz	HE0~2	HE3	HE4	HE5	HE6
	18.5	18.5	18	17	16
	HE7	HE8	HE9		
	16	15.5	15		

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

<b>Sensitivity, tolerance <math>\pm 2</math> dB</b>				
<b>CCK modulation PER <math>\leq 8\%</math> 、 OFDM modulation PER <math>\leq 10\%</math></b>				
802.11b	Data Rate	Spec.(dBm)		
	1Mbps	-96		
	2Mbps	-90		
	5.5Mbps	-88		
	11Mbps	-87		
802.11g	Data Rate	Spec.(dBm)	Data Rate	Spec.(dBm)
	6Mbps	-91	24Mbps	-83
	9Mbps	-88	36Mbps	-80



	12Mbps	-87	48Mbps	-76
	18Mbps	-85	54Mbps	-73
802.11n_20MHz	Data Rate	Spec.(dBm)	Data Rate	Spec.(dBm)
	MCS0	-90	MCS4	-77
	MCS1	-87	MCS5	-75
	MCS2	-84	MCS6	-73
	MCS3	-80	MCS7	-72
802.11ax_20MHz	Data Rate	Spec.(dBm)	Data Rate	Spec.(dBm)
	HE0	-90	HE6	-72
	HE1	-87	HE7	-71
	HE2	-84	HE8	-69
	HE3	-80	HE9	-68
	HE4	-77		
	HE5	-75		
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
<b>WLAN Standard</b>	IEEE 802.11a/n/ac/ax & Wi-Fi compliant
<b>Frequency Range</b>	5150~5350MHz、5470~5725MHz、5725~5850MHz (5GHz UNII Band)
<b>Number of Channels</b>	5150~5350MHz : Ch36 ~ Ch64 5470~5725MHz : Ch100 ~ Ch140 5725~5850MHz : Ch149 ~ Ch165
<b>Modulation</b>	802.11a : OFDM /64-QAM、16-QAM、QPSK、BPSK 802.11n : OFDM /64-QAM、16-QAM、QPSK、BPSK 802.11ac : OFDM /256-QAM、64-QAM、16-QAM、QPSK、BPSK 802.11ax : OFDMA /1024-QAM、256-QAM、64-QAM、16-QAM、QPSK、BPSK

Output Power , tolerance $\pm 2$ 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	
5725~5850	15.5	15.5	15.5	15.5	
802.11n 20MHz	Frequency (MHz)	48Mbps	54Mbps		
	5150~5350	15.5	15		
	5470~5725	15.5	15		
	5725~5850	15.5	15		
	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
5725~5850	15.5	1.5	15.5	15.5	
802.11n 40MHz	Frequency (MHz)	MCS6	MCS7		
	5150~5350	15	14		
	5470~5725	15	14		
	5725~5850	15	14		

802.11n 40MHz	Frequency (MHz)	MCS0~2	MCS3	MCS4	MCS5
	5150~5350	15	15	15	15
	5470~5725	15	15	15	15



	5725~5850	15	15	15	15
	Frequency (MHz)	MCS6	MCS7		
	5150~5350	15	14		
	5470~5725	15	14		
	5725~5850	15	14		
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
	5725~5850	15.5	1.5	15.5	15.5
	Frequency (MHz)	MCS6	MCS7	MCS8	
	5150~5350	15	14.5	12.5	
	5470~5725	15	14.5	12.5	
	5725~5850	15	14.5	12.5	
802.11ac 40MHz	Frequency (MHz)	MCS0~2	MCS3	MCS4	MCS5
	5150~5350	15	15	15	15
	5470~5725	15	15	15	15
	5725~5850	15	15	15	15
	Frequency (MHz)	MCS6	MCS7	MCS8	MCS9
	5150~5350	15	14	12	11
	5470~5725	15	14	12	11
	5725~5850	15	14	12	11
802.11ac 80MHz	Frequency (MHz)	MCS0~2	MCS3	MCS4	MCS5
	5150~5350	15	15	15	15
	5470~5725	15	15	15	15
	5725~5850	15	15	15	15
	Frequency (MHz)	MCS6	MCS7	MCS8	MCS9
	5150~5350	15	13.5	12	11
	5470~5725	15	13.5	12	11
	5725~5850	15	13.5	12	11

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
	5725~5850	15.5	1.5	15.5	15.5
	Frequency (MHz)	HE6	HE7	HE8	HE9
	5150~5350	15	14.5	12.5	12



	5470~5725	15	14.5	12.5	12
	5725~5850	15	14.5	12.5	12
	Frequency (MHz)	HE10	HE11		
	5150~5350	9.5	9.5		
	5470~5725	9.5	9.5		
	5725~5850	9.5	9.5		
802.11ax 40MHz	Frequency (MHz)	HE0~2	HE3	HE4	HE5
	5150~5350	15	15	15	15
	5470~5725	15	15	15	15
	5725~5850	15	15	15	15
	Frequency (MHz)	HE6	HE7	HE8	HE9
	5150~5350	15	14	12	11
	5470~5725	15	14	12	11
	5725~5850	15	14	12	11
	Frequency (MHz)	HE10	HE11		
	5150~5350	9	9		
	5470~5725	9	9		
	5725~5850	9	9		

802.11ax 80MHz	Frequency (MHz)	HE0~2	HE3	HE4	HE5
	5150~5350	15	15	15	15
	5470~5725	15	15	15	15
	5725~5850	15	15	15	15
	Frequency (MHz)	HE6	HE7	HE8	HE9
	5150~5350	15	13.5	12	11
	5470~5725	15	13.5	12	11
	5725~5850	15	13.5	12	11
	Frequency (MHz)	HE10	HE11		
	5150~5350	8	8		
	5470~5725	8	8		
	5725~5850	8	8		

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

Sensitivity, tolerance $\pm 2$ dB				
CCK modulation PER $\leq 8\%$ 、OFDM modulation PER $\leq 10\%$				
	Data Rate	Spec.(dBm)	Data Rate	Spec.(dBm)
802.11a	6Mbps	-90	24Mbps	-83
	9Mbps	-90	36Mbps	-80
	12Mbps	-88	48Mbps	-75

	<b>18Mbps</b>	<b>-86</b>	<b>54Mbps</b>	<b>-73</b>
<b>802.11n_20MHz</b>	<b>Data Rate</b>	<b>Spec.(dBm)</b>	<b>Data Rate</b>	<b>Spec.(dBm)</b>
	MCS0	-90	MCS4	-79
	MCS1	-88	MCS5	-76
	MCS2	-86	MCS6	-73
	MCS3	-83	MCS7	-72
<b>802.11n_40MHz</b>	<b>Data Rate</b>	<b>Spec.(dBm)</b>	<b>Data Rate</b>	<b>Spec.(dBm)</b>
	MCS0	-88	MCS4	-77
	MCS1	-86	MCS5	-72
	MCS2	-83	MCS6	-70
	MCS3	-80	MCS7	-69
<b>802.11ac_20MHz</b>	<b>Data Rate</b>	<b>Spec.(dBm)</b>	<b>Data Rate</b>	<b>Spec.(dBm)</b>
	MCS0	-90	MCS5	-75
	MCS1	-88	MCS6	-73
	MCS2	-86	MCS7	-70
	MCS3	-83	MCS8	-68
	MCS4	-79		
<b>802.11ac_40MHz</b>	<b>Data Rate</b>	<b>Spec.(dBm)</b>	<b>Data Rate</b>	<b>Spec.(dBm)</b>
	MCS0	-88	MCS5	-72
	MCS1	-86	MCS6	-70
	MCS2	-83	MCS7	-69
	MCS3	-80	MCS8	-65
	MCS4	-76	MCS9	-64
<b>802.11ac_80MHz</b>	<b>Data Rate</b>	<b>Spec.(dBm)</b>	<b>Data Rate</b>	<b>Spec.(dBm)</b>
	MCS0	-85	MCS5	-68
	MCS1	-82	MCS6	-67
	MCS2	-79	MCS7	-65
	MCS3	-76	MCS8	-62
	MCS4	-73	MCS9	-61

<b>802.11ax_20MHz</b>	<b>Data Rate</b>	<b>Spec.(dBm)</b>	<b>Data Rate</b>	<b>Spec.(dBm)</b>
	HE0	-90	HE6	-73
	HE1	-88	HE7	-70
	HE2	-86	HE8	-68
	HE3	-83	HE9	-64
	HE4	-79	HE10	-59
	HE5	-75	HE11	-57
<b>802.11ax_40MHz</b>	<b>Data Rate</b>	<b>Spec.(dBm)</b>	<b>Data Rate</b>	<b>Spec.(dBm)</b>
	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	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	-57
	HE5	-68	HE11	-53
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 & Wi-Fi compliant				
Frequency Range	5925~7125MHz (6GHz U-NII5, U-NII6, U-NII-7, U-NII-8 Band)				
Number of Channels	5925~6425MHz : 6G1 ~ 6G93 6425~6525MHz : 6G97 ~ 6G113 6525~6875MHz : 6G117~6G181 6875~7125MHz : 6G185~6G233				
Modulation	802.11ax : OFDMA /1024-QAM、256-QAM、64-QAM、16-QAM、QPSK、BPSK				
<b>Output Power , tolerance <math>\pm 2.5</math> dB</b>					
<b>The transmit EVM quality &amp; spectrum mask are compliant with IEEE 802.11 standard</b>					
802.11ax 20MHz	Frequency (MHz)	HE0~2	HE3	HE4	HE5
	5925~6425	14.5	14	14	14
	6425~6525	14.5	14	14	14
	6525~6875	14	14	14	14
	6875~7125	13.5	13.5	13.5	13.5
	Frequency (MHz)	HE6	HE7	HE8	HE9
	5925~6425	14	13	11.5	10.5
	6425~6525	14	13	11.5	10.5
	6525~6875	14	13	11.5	10.5
	6875~7125	13	11	10.5	9.5
	Frequency (MHz)	HE10	HE11		
	5925~6425	9	9		

	6425~6525	9	9		
	6525~6875	9	9		
	6875~7125	8	8		
802.11ax 40MHz	Frequency (MHz)	HE0~2	HE3	HE4	HE5
	5925~6425	14.5	14	14	14
	6425~6525	14.5	14	14	14
	6525~6875	14	14	14	14
	6875~7125	14	13.5	13.5	13.5
	Frequency (MHz)	HE6	HE7	HE8	HE9
	5925~6425	13.5	12.5	10.5	9
	6425~6525	13.5	12.5	10.5	9.5
	6525~6875	13.5	12.5	10.5	9.5
	6875~7125	13	11.5	9.5	8.5
	Frequency (MHz)	HE10	HE11		
	5925~6425	8	8		
	6425~6525	8.5	8.5		
	6525~6875	8.5	8.5		
	6875~7125	7.5	7.5		
802.11ax 80MHz	Frequency (MHz)	HE0~2	HE3	HE4	HE5
	5925~6425	14.5	14	14	14
	6425~6525	14.5	14	14	14
	6525~6875	14	14	14	14
	6875~7125	14	13.5	13.5	13.5
	Frequency (MHz)	HE6	HE7	HE8	HE9
	5925~6425	13.5	12.5	10.5	9.5
	6425~6525	13.5	12.5	10.5	9.5
	6525~6875	13.5	12.5	10.5	9.5
	6875~7125	13	11.5	9.5	8.5
	Frequency (MHz)	HE10	HE11		
	5925~6425	8.5	8.5		
	6425~6525	8.5	8.5		
	6525~6875	8.5	8.5		
	6875~7125	7.5	7.5		
Note: The specifications of RF output power are subject to change to fulfill the safety regulation and requirements in end-user product.					
<b>Sensitivity, tolerance <math>\pm 2</math> dB, OFDM modulation PER <math>\leq 10\%</math></b>					
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
<b>General Specification</b>	
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, $\pi/4$ -DQPSK, 8DPSK
<b>RF Specification</b>	
<b>Output Power, tolerance <math>\pm 2</math> dB</b>	
	<b>CL1 (dBm)</b>
BDR Output Power	7
EDR Output Power	6
BLE Output Power	7
<b>Sensitivity, tolerance <math>\pm 2</math> dB</b>	
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)	-84 dBm
Sensitivity @ PER=30.8% for LE (1Mbps)	-90 dBm
Sensitivity @ PER=30.8% for 2LE (2Mbps)	-90 dBm
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 Diagram

1	GND	GND	4
3	GND	GND	6
5	GND	GND	8
7	GND	GND	10
11	GND	GND	12
13	GND	GND	14
15	GND	GND	16
17	GND	GND	18
19	GND	GND	20
21	GND	GND	22
23	GND	GND	24
25	GND	GND	26
27	GND	GND	28
29	GND	GND	30
31	GND	GND	32
33	GND	GND	34
35	GND	GND	36
37	GND	GND	38
39	GND	GND	40
41	GND	GND	42
43	GND	GND	44
45	GND	GND	46
47	VDD +5V	VDD +5V	48
49	VDD +5V	VDD +5V	50
51	VDD +5V	VDD +5V	52
53	VDD +5V	VDD +5V	54
55	VDD +5V	VDD +5V	56
57	VDD +5V	VDD +5V	58
59	VDD +5V	VDD +5V	60
61	VDD +5V	VDD +5V	62
63	VDD +5V	VDD +5V	64
65	VDD +5V	VDD +5V	66
67	GND	GND	68
69	GND	GND	70
71	GND	GND	72
73	GND	GND	74
75	GND	GND	76
77	GND	GND	78
79	GND	GND	80
81	GND	GND	82
83	GND	GND	84
85	GND	GND	86
87	GND	GND	88
89	GND	GND	90
91	GND	GND	92
93	DVF120.MPI_DSL_TD0p	GND	94
95	DVF120.MPI_DSL_TD0n	GND	96
97	GND	GND	98
99	DVF120.MPI_DSL_TD1p	GND	100
101	DVF120.MPI_DSL_TD1n	GND	102
103	GND	GND	104
105	DVF120.MPI_DSL_TCKp	GND	106
107	DVF120.MPI_DSL_TCKn	GND	108
109	GND	GND	110
111	DVF120.MPI_DSL_TD2p	GND	112
113	DVF120.MPI_DSL_TD2n	GND	114
115	GND	GND	116
117	DVF120.MPI_DSL_TD3p	GND	118
119	DVF120.MPI_DSL_TD3n	GND	120
121	GND	GND	122
123	DVF120.USB3_TxP	GND	124
125	DVF120.USB3_TxN	GND	126
127	GND	GND	128
129	DVF120.USB3_USB20_Dn	GND	130
131	DVF120.USB3_USB20_Dp	PWR_USB3_VBUS	132
133	GND	GND	134
135	DVF120.USB3_RxP	GND	136
137	DVF120.USB3_RxN	PWR_USB_VBUS	138
139	GND	GND	140
141	DVF120.USB2_DN	DVF120.USB2_IDPIN	142
143	DVF120.USB2_DP	GND	144
	GND	GND	
145	GND	GND	146
147	GND	GND	148
149	LCD_D13	GND	150
151	LCD_D14	GND	152
153	LCD_D15	GND	154
155	LCD_D20	GND	156
157	LCD_D19	GND	158
159	LCD_D23	GND	160
161	LCD_D6	LCD_DE	162
163	LCD_D8/I2S5_DI	LCD_HSYNC	164
165	LCD_D3	LCD_VSYNC	166
167	LCD_D7	LCD_D22	168
169	LCD_D6	LCD_D21	170
171	LCD_PCLK	LCD_D17/I2S5_BCLK	172
173	LCD_D12	LCD_D18	174
175	LCD_D4	LCD_D16/I2S5_LCK	176
177	LCD_D2	GND	178
179	LCD_D8/I2S5_DO	RGMI_RXC	180
181	LCD_D1	RGMI_RXTL	182
183	LCD_D0	RGMI_RXD0	184
185	LCD_D10	RGMI_RXD1	186
187	LCD_D11	RGMI_RXD2	188
189	GND	RGMI_RXD3	190
191	GND	GND	192
193	DVF120.I2S2_BCLK	RGMI_TXC	194
195	DVF120.I2S2_LRCK	RGMI_TXTL	196
197	GND	RGMI_TXD0	198
199	CONN-SPI_BOOT_SRC0	RGMI_TXD1	200
201	CONN-SPI_BOOT_SRC1	RGMI_TXD2	202
203	GND	RGMI_TXD3	204
205	DVF120.PDM_DI[1]	GND	206
207	GND	RGMI_25MHZ_MAIN_CLK_OUT	208
209	DVF120.I2S1_DI	DVF120.RGMI_MIO	210
211	DVF120.I2S2_DI	DVF120.RGMI_MIO	212
213	DVF120.I2S1_BCLK	GND	214
215	DVF120.I2S1_MCLK	DVF120.PWM[3]	216
217	DVF120.I2S1_LRCK	DVF120.PWM[2]	218
219	DVF120.I2S2_DO	DVF120.PWM[0]	220
221	DVF120.I2S1_DO	DVF120.PWM[1]	222
223	GND	GND	224
225	DVF120.PDM_DI[0]	DVF120.TW2_SCL	226
227	DVF120.PDM_CLK/I2S2_MCLK	DVF120.TW2_SDA	228
229	DVF120.PDM_DI[3]	GND	230
231	DVF120.PDM_DI[2]	DVF120.SPI1_SDI	232
233	GND	DVF120.SPI1_SCLK	234
235	DVF120.URT1A_RTS	DVF120.SPI1_SDO	236
237	DVF120.URT1A_CTS	DVF120.SPI1_SSIn	238
239	DVF120.URT1B_TXD	DVF120.SPI1_SSn	240
241	DVF120.URT1B_RXD	GND	242
243	GND	DVF120.JTAG_TDO@PUBoot	244
245	DVF120.SPI2_SCLK	DVF120.RStIn	246
247	DVF120.SPI2_SDO	DVF120.JTAG_TDI@PUBoot	248
249	DVF120.SPI2_SDI	DVF120.JTAG_TMS@PUBoot	250
251	DVF120.SPI2_SSO	DVF120.JTAG_TCK@PDP	252
253	GND	GND	254
255	DVF120.URT0_TXD_CONSOLE	DVF120.TW1_SDA	256
257	DVF120.URT0_RXD_CONSOLE	DVF120.TW1_SCL	258
259	GND	GND	260

AP72611\_SOD1MM260PIN



## 5.2 Pin Assignment

260-Pin SODIMM Front			
Pin #	Pin Name	Pin Type	Description
1	GND	Power	Ground
3	GND	Power	Ground
5	GND	Power	Ground
7	GND	Power	Ground
9	GND	Power	Ground
11	GND	Power	Ground
13	GND	Power	Ground
15	GND	Power	Ground
17	GND	Power	Ground
19	GND	Power	Ground
21	GND	Power	Ground
23	GND	Power	Ground
25	GND	Power	Ground
27	GND	Power	Ground
29	GND	Power	Ground
31	GND	Power	Ground
33	GND	Power	Ground
35	GND	Power	Ground
37	GND	Power	Ground
39	GND	Power	Ground
41	GND	Power	Ground
43	GND	Power	Ground
45	VDD_+5V	Power	Input Main Power DC +5V
47	VDD_+5V	Power	Input Main Power DC +5V
49	VDD_+5V	Power	Input Main Power DC +5V
51	VDD_+5V	Power	Input Main Power DC +5V
53	VDD_+5V	Power	Input Main Power DC +5V
55	VDD_+5V	Power	Input Main Power DC +5V
57	VDD_+5V	Power	Input Main Power DC +5V
59	VDD_+5V	Power	Input Main Power DC +5V
61	VDD_+5V	Power	Input Main Power DC +5V
63	VDD_+5V	Power	Input Main Power DC +5V



65	GND	Power	Ground
67	GND	Power	Ground
69	GND	Power	Ground
71	GND	Power	Ground
73	GND	Power	Ground
75	GND	Power	Ground
77	GND	Power	Ground
79	GND	Power	Ground
81	GND	Power	Ground
83	GND	Power	Ground
85	GND	Power	Ground
87	GND	Power	Ground
89	GND	Power	Ground
91	MIPI_DSI_D0p	CMOS, Output	MIPI TX Data lane 0 +ve line
93	MIPI_DSI_D0n	CMOS, Output	MIPI TX Data lane 0 -ve line
95	GND	Power	Ground
97	MIPI_DSI_D1p	CMOS, Output	MIPI TX Data lane 1 +ve line
99	MIPI_DSI_D1n	CMOS, Output	MIPI TX Data lane 1 -ve line
101	GND	Power	Ground
103	MIPI_DSI_CKp	CMOS, Output	MIPI TX Clock lane +ve line
105	MIPI_DSI_CKn	CMOS, Output	MIPI TX Clock lane -ve line
107	GND	Power	Ground
109	MIPI_DSI_D2p	CMOS, Output	MIPI TX Data lane 2 +ve line
111	MIPI_DSI_D2n	CMOS, Output	MIPI TX Data lane 2 -ve line
113	GND	Power	Ground
115	MIPI_DSI_D3p	CMOS, Output	MIPI TX Data lane 3 +ve line
117	MIPI_DSI_D3n	CMOS, Output	MIPI TX Data lane 3 -ve line
119	GND	Power	Ground
121	USB3_TXp	Analog, Input	USB 3.0 SS Transmit Port Data Positive
123	USB3_TXn	Analog, Input	USB 3.0 SS Transmit Port Data Negative
125	GND	Power	Ground
127	USB3_USB20.Dn	Analog, Input/Output	USB 3.0 Port Data Negative (USB20)
129	USB3_USB20.Dp	Analog, Input/Output	USB 3.0 Port Data Positive (USB20)
131	GND	Power	Ground
133	USB3_RXp	Analog, Input	USB 3.0 SS Receive Port Data Positive
135	USB3_RXn	Analog, Input	USB 3.0 SS Receive Port Data Negative

137	GND	Power	Ground
139	USB2_Dn	Analog, Input/Output	USB 2.0 Port Data Negative
141	USB2_Dp	Analog, Input/Output	USB 2.0 Port Data Positive
143	GND	Power	Ground
145	GND	Power	Ground
147	LCDD13	CMOS, Input/Output	LCDC (RGB) Interface Data 13
149	LCDD14	CMOS, Input/Output	LCDC (RGB) Interface Data 14
151	LCDD15	CMOS, Input/Output	LCDC (RGB) Interface Data 15
153	LCDD20	CMOS, Input/Output	LCDC (RGB) Interface Data 20
155	LCDD19	CMOS, Input/Output	LCDC (RGB) Interface Data 19
157	LCDD23	CMOS, Input/Output	LCDC (RGB) Interface Data 23
159	LCDD6	CMOS, Input/Output	LCDC (RGB) Interface Data 6
161	LCDD9 / I2S5_DI	CMOS, Input/Output	LCDC (RGB) Interface Data 9 / Audio Interface #5 Data in
163	LCDD3	CMOS, Input/Output	LCDC (RGB) Interface Data 3
165	LCDD7	CMOS, Input/Output	LCDC (RGB) Interface Data 7
167	LCDD5	CMOS, Input/Output	LCDC (RGB) Interface Data 5
169	LCD_PCLK	CMOS, Input/Output	LCDC (RGB) Interface Clock Output
171	LCDD12	CMOS, Input/Output	LCDC (RGB) Interface Data 12
173	LCDD4	CMOS, Input/Output	LCDC (RGB) Interface Data 4
175	LCDD2	CMOS, Input/Output	LCDC (RGB) Interface Data 2
177	LCDD8 / I2S5_DO	CMOS, Input/Output	LCDC (RGB) Interface Data 8 / Audio Interface #5 Data out
179	LCDD1	CMOS, Input/Output	LCDC (RGB) Interface Data 1
181	LCDD0	CMOS,	LCDC (RGB) Interface Data 0

		Input/Output	
183	LCDD10	CMOS, Input/Output	LCDC (RGB) Interface Data 10
185	LCDD11	CMOS, Input/Output	LCDC (RGB) Interface Data 11
187	GND	Power	Ground
189	GND	Power	Ground
191	I2S2_BCLK	CMOS, Input/Output	Audio Interface #2 bit clock
193	I2S2_LRCK	CMOS, Input/Output	Audio Interface #2 WS or LR select
195	GND	Power	Ground
197	CONN-SPI.BOOT_SRC 0	CMOS, Input	External SPI Bootloader Control SRC0, Active LOW
199	CONN-SPI.BOOT_SRC 1	CMOS, Input	External SPI Bootloader Control SRC1, Active LOW
201	GND	Power	Ground
203	PDM_DI[1]	CMOS, Input	PDM Data in channel 1
205	GND	Power	Ground
207	I2S1_DI	CMOS, Input	Audio Interface #1 Data in
209	I2S2_DI	CMOS, Input	Audio Interface #2 Data in
211	I2S1_BCLK	CMOS, Input/Output	Audio Interface #1 bit clock
213	I2S1_MCLK	CMOS, Input/Output	Audio Interface #1 Master clock
215	I2S1_LRCK	CMOS, Input/Output	Audio Interface #1 WS or LR select
217	I2S2_DO	CMOS, Output	Audio Interface #2 Data out
219	I2S1_DO	CMOS, Output	Audio Interface #1 Data out
221	GND	Power	Ground
223	PDM_DI[0]	CMOS, Input	PDM Data in channel 0
225	PDM_CLKIO / I2S2_MCLK	CMOS, Output	PDM Clock out / Audio Interface #2 Master clock
227	PDM_DI[3]	CMOS, Input	PDM Data in channel 3
229	PDM_DI[2]	CMOS, Input	PDM Data in channel 2
231	GND	Power	Ground
233	UART1A_RTS	CMOS, Output	UART1 RTS location A
235	UART1A_CTS	CMOS, Input	UART1 CTS location A
237	UART1B_TX	CMOS, Output	UART1 TX location B
239	UART1B_RX	CMOS, Input	UART1 RX location B



241	GND	Power	Ground
243	SPI2_SCLK	CMOS, Output	SPI2 serial clock.
245	SPI2_SDO	CMOS, Input/Output	SPI2 serial data output
247	SPI2_SDI	CMOS, Input	SPI2 serial data input
249	SPI2_SS0n	CMOS, Output	SPI2 Module select 0 For first slave device with handler
251	GND	Power	Ground
253	UART0A_TX	CMOS, Output	UART0 TX location A/URT0_TXD_CONSOLE
255	UART0A_RX	CMOS, Input	UART0 RX location A/URT0_RXD_CONSOLE
257	GND	Power	Ground
259	GND	Power	Ground

260-Pin SODIMM Back			
Pin #	Pin Name	Pin Type	Description
2	GND	Power	Ground
4	GND	Power	Ground
6	GND	Power	Ground
8	GND	Power	Ground
10	GND	Power	Ground
12	GND	Power	Ground
14	GND	Power	Ground
16	GND	Power	Ground
18	GND	Power	Ground
20	GND	Power	Ground
22	GND	Power	Ground
24	GND	Power	Ground
26	GND	Power	Ground
28	GND	Power	Ground
30	GND	Power	Ground
32	GND	Power	Ground
34	GND	Power	Ground
36	GND	Power	Ground
38	GND	Power	Ground
40	GND	Power	Ground
42	GND	Power	Ground



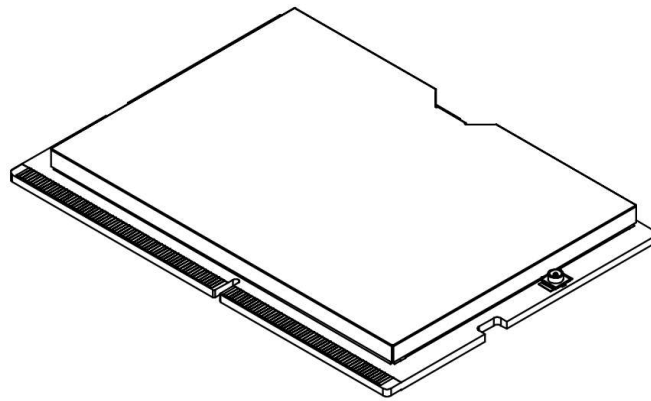
44	GND	Power	Ground
46	VDD_+5V	Power	Input Main Power DC +5V
48	VDD_+5V	Power	Input Main Power DC +5V
50	VDD_+5V	Power	Input Main Power DC +5V
52	VDD_+5V	Power	Input Main Power DC +5V
54	VDD_+5V	Power	Input Main Power DC +5V
56	VDD_+5V	Power	Input Main Power DC +5V
58	VDD_+5V	Power	Input Main Power DC +5V
60	VDD_+5V	Power	Input Main Power DC +5V
62	VDD_+5V	Power	Input Main Power DC +5V
64	VDD_+5V	Power	Input Main Power DC +5V
66	GND	Power	Ground
68	GND	Power	Ground
70	GND	Power	Ground
72	GND	Power	Ground
74	GND	Power	Ground
76	GND	Power	Ground
78	GND	Power	Ground
80	GND	Power	Ground
82	GND	Power	Ground
84	GND	Power	Ground
86	GND	Power	Ground
88	GND	Power	Ground
90	GND	Power	Ground
92	GND	Power	Ground
94	GND	Power	Ground
96	GND	Power	Ground
98	GND	Power	Ground
100	GND	Power	Ground
102	GND	Power	Ground
104	GND	Power	Ground
106	GND	Power	Ground
108	GND	Power	Ground
110	GND	Power	Ground
112	GND	Power	Ground
114	GND	Power	Ground
116	GND	Power	Ground
118	GND	Power	Ground

120	GND	Power	Ground
122	GND	Power	Ground
124	GND	Power	Ground
126	GND	Power	Ground
128	GND	Power	Ground
130	PWR_USB3_VBUS	Analog, Input	This pin is not 5V tolerant and must not connect directly to the 5V VBUS voltage on USB link. This pin must be isolated by an external 30 Kohm $\pm 1\%$ resistor so it could see a lower voltage.
132	GND	Power	Ground
134	GND	Power	Ground
136	PWR_USB_VBUS	Analog, Input	Connect an external 30 Kohm $\pm 1\%$ series resistor to USB 2.0 VBUS
138	GND	Power	Ground
140	USB2_ID	Analog, Input	USB 2.0 OTG ID
142	GND	Power	Ground
144	GND	Power	Ground
146	GND	Power	Ground
148	GND	Power	Ground
150	GND	Power	Ground
152	GND	Power	Ground
154	GND	Power	Ground
156	GND	Power	Ground
158	GND	Power	Ground
160	LCD_DE	CMOS, Input/Output	LCDC (RGB) Interface Data Enable
162	LCD_HSYNC	CMOS, Input/Output	LCDC (RGB) Interface Data Horizontal Synchronization Signal
164	LCD_VSYNC	CMOS, Input/Output	LCDC (RGB) Interface Data Vertical Synchronization Signal
166	LCDD22	CMOS, Input/Output	LCDC (RGB) Interface Data 22
168	LCDD21	CMOS, Input/Output	LCDC (RGB) Interface Data 21
170	LCDD17 / I2S5_BCLK	CMOS, Input/Output	LCDC (RGB) Interface Data 17 / Audio Interface #5 bit clock
172	LCDD18	CMOS, Input/Output	LCDC (RGB) Interface Data 18
174	LCDD16 / I2S5_LRCK	CMOS, Input/Output	LCDC (RGB) Interface Data 16 / Audio Interface #5 WS or LR select

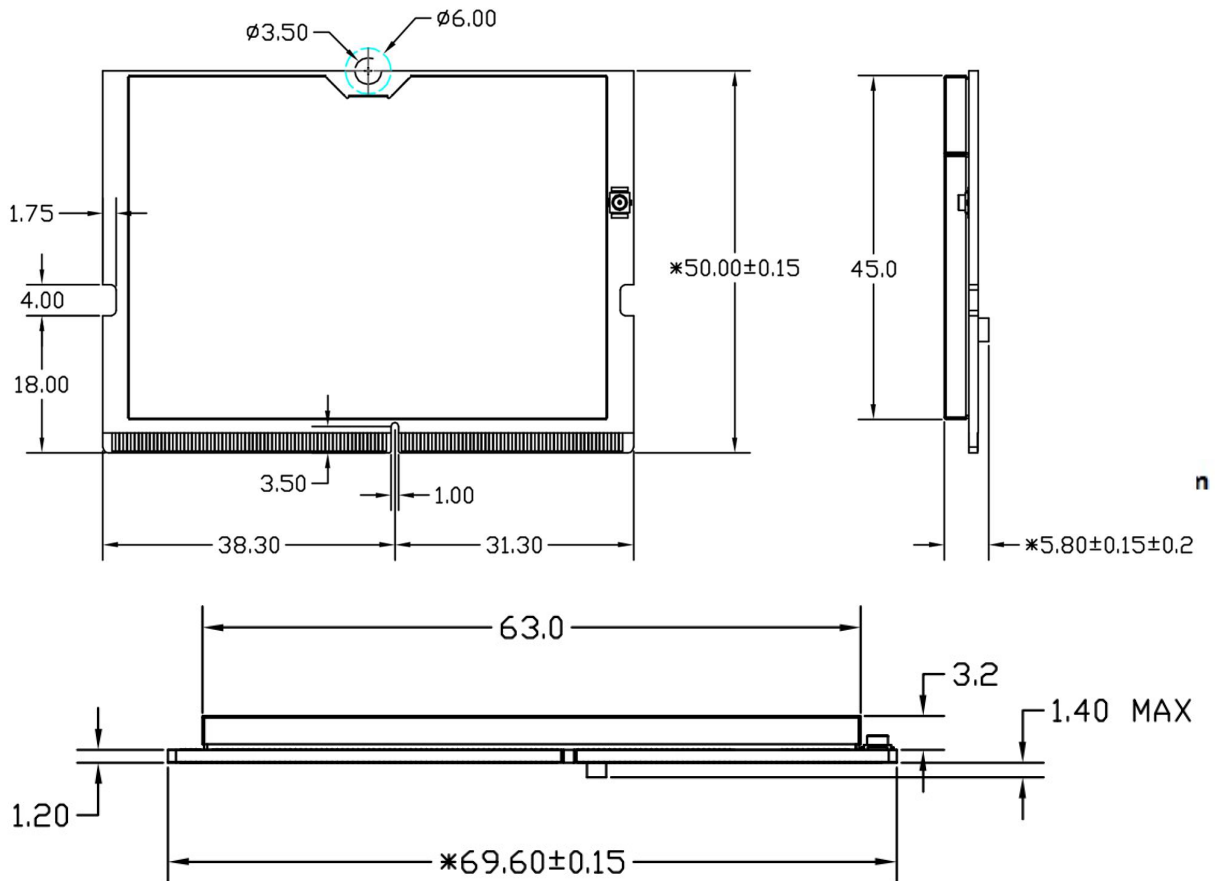
176	GND	Power	Ground
178	RGMIIRXC	CMOS, Input	RGMII Interface RX Clock Input
180	RGMIIRXCTL	CMOS, Input	RGMII Interface RX Control
182	RGMIIRD0	CMOS, Input	RGMII Interface RX Data 0
184	RGMIIRD1	CMOS, Input	RGMII Interface RX Data 1
186	RGMIIRD2	CMOS, Input	RGMII Interface RX Data 2
188	RGMIIRD3	CMOS, Input	RGMII Interface RX Data 3
190	GND	Power	Ground
192	RGMIITXC	CMOS, Output	RGMII Interface TX Clock Output
194	RGMIITXCTL	CMOS, Output	RGMII Interface TX Control
196	RGMIITD0	CMOS, Output	RGMII Interface TX Data 0
198	RGMIITD1	CMOS, Output	RGMII Interface TX Data 1
200	RGMIITD2	CMOS, Output	RGMII Interface TX Data 2
202	RGMIITD3	CMOS, Output	RGMII Interface TX Data 3
204	GND	Power	Ground
206	RGMII_CLK_OUT	CMOS, Output	RGMII PHY Clock Reference Output, 25MHz
208	RGMII_MDC	CMOS, Output	RGMII Management Interface Clock
210	RGMII_MDIO	CMOS, Input/Output	RGMII Management Interface Data
212	GND	Power	Ground
214	PWM[3]	CMOS, Output	Pulse-Width Modulation output data 3
216	PWM[2]	CMOS, Output	Pulse-Width Modulation output data 2
218	PWM[0]	CMOS, Output	Pulse-Width Modulation output data 0
220	PWM[1]	CMOS, Output	Pulse-Width Modulation output data 1
222	GND	Power	Ground
224	TW2_SCL	CMOS, Input/Output	TWSI2 Serial clock
226	TW2_SDA	CMOS, Input/Output	TWSI2 Serial data
228	GND	Power	Ground
230	SPI1_SDI	CMOS, Input	SPI1 serial data input / External SPI Bootloader
232	SPI1_SCLK	CMOS, Output	SPI1 serial clock / External SPI Bootloader
234	SPI1_SDO	CMOS, Input/Output	SPI1 serial data output /External SPI Bootloader
236	SPI1_SS1n	CMOS, Output	SPI1 Module select 1 For second slave device with handler.
238	SPI1_SS0n	CMOS, Output	SPI1 Module select 0 / External SPI Bootloader For first slave device with handler
240	GND	Power	Ground

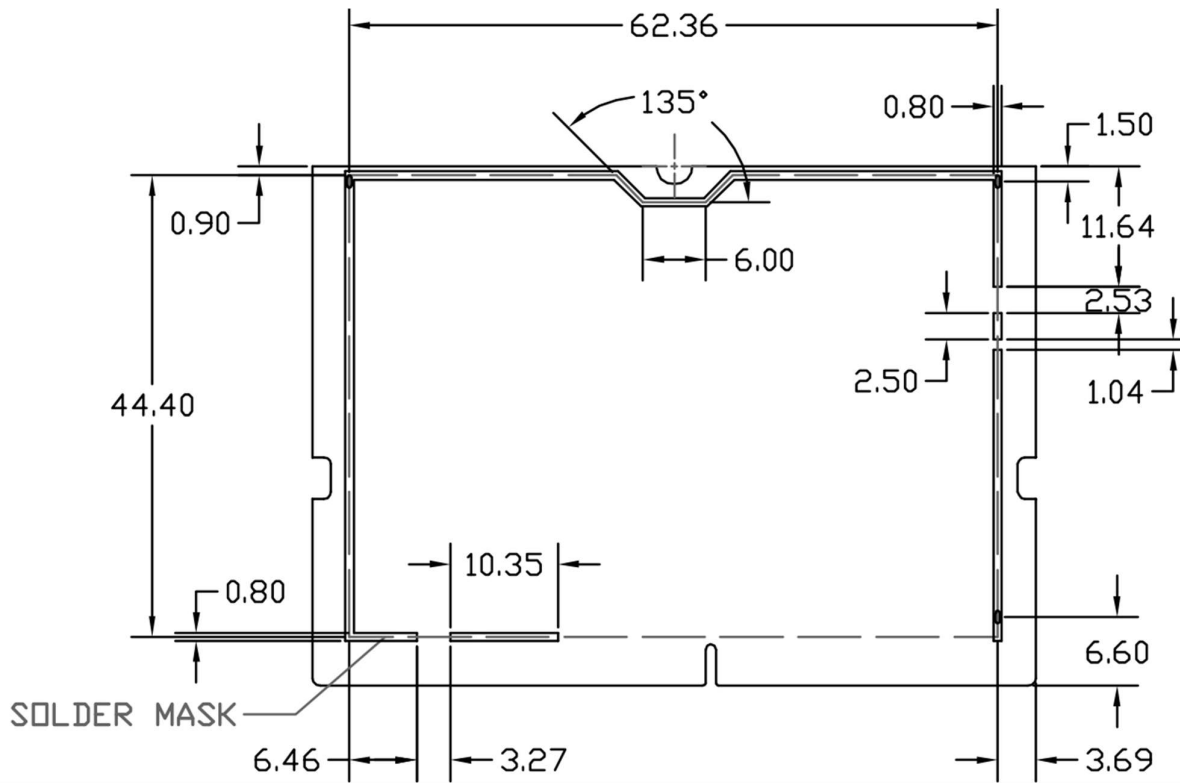
242	JTAG_TDO	CMOS, Output with internal pull-up	JTAG SDATA OUT
244	RSTIn	CMOS, Input with internal pull-up	SoM Active low reset input with internal pullup
246	JTAG_TDI	CMOS, Input with internal pull-up	JTAG SDATA IN.
248	JTAG_TMS	CMOS, Input with internal pull-up	JTAG Mode select signal
250	JTAG_TCK	CMOS, Input with internal pull-down	JTAG Clock.
252	GND	Power	Ground
254	TW1_SDA	CMOS, Input/Output	TWSI1 Serial data
256	TW1_SCL	CMOS, Input/Output	TWSI1 Serial clock
258	GND	Power	Ground
260	GND	Power	Ground

### 5.3 Physical Dimensions



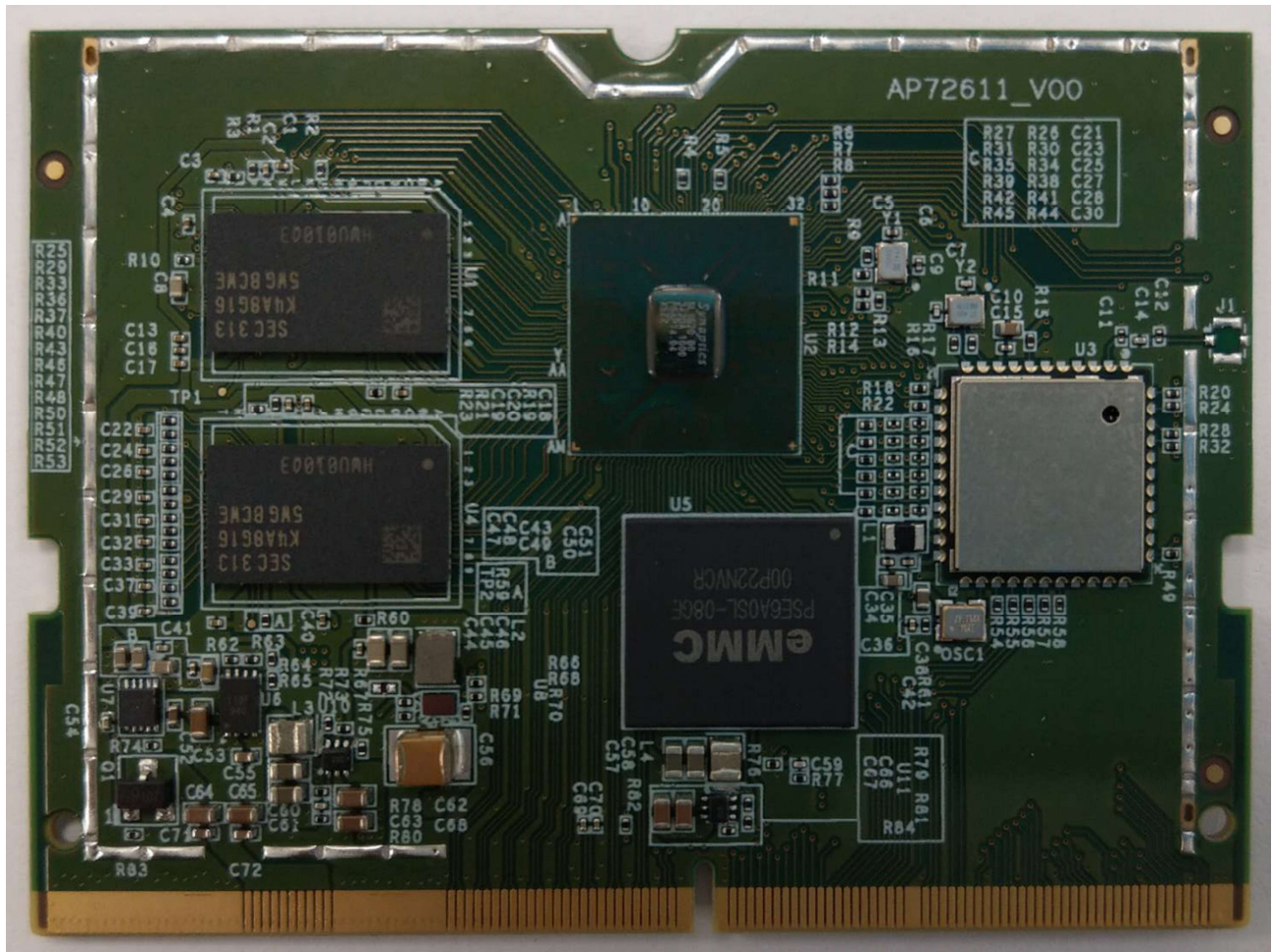
ISOMETRIC VIEW  
SCALE 1:1





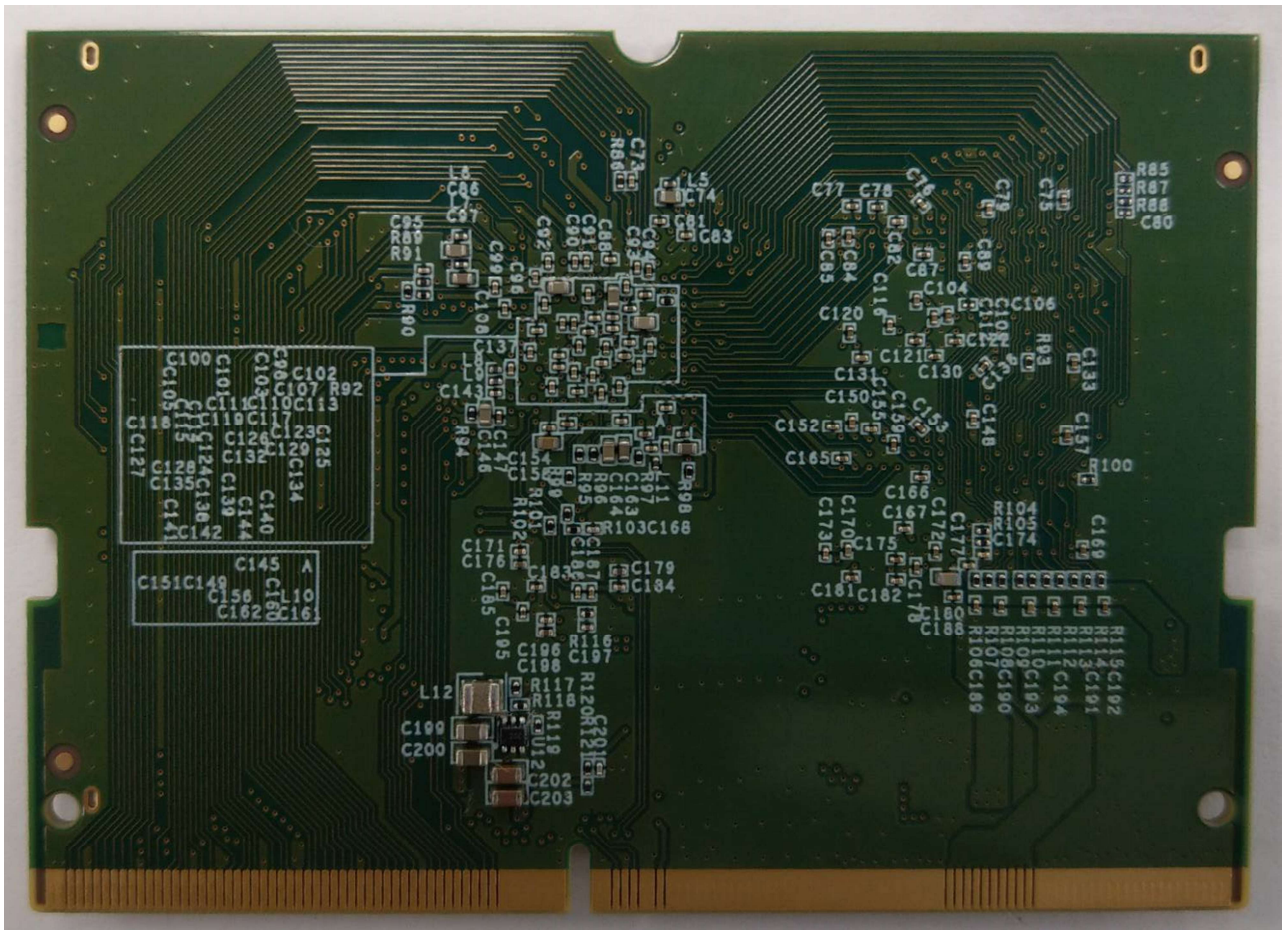
### 5.4 Sample Picture

< TOP VIEW >





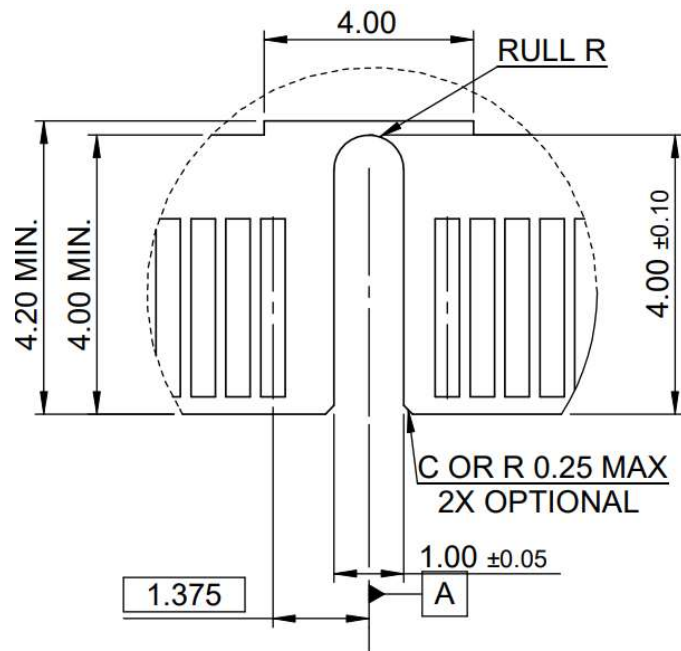
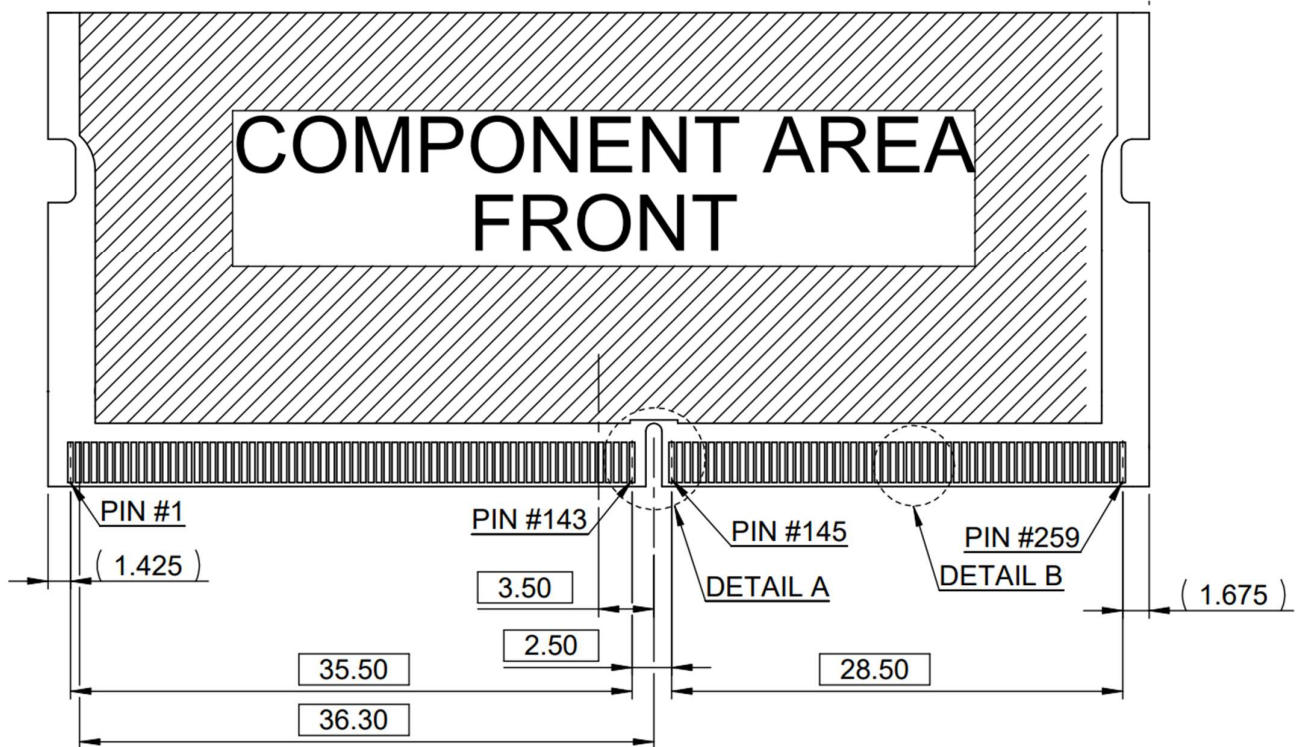
< BOT VIEW >





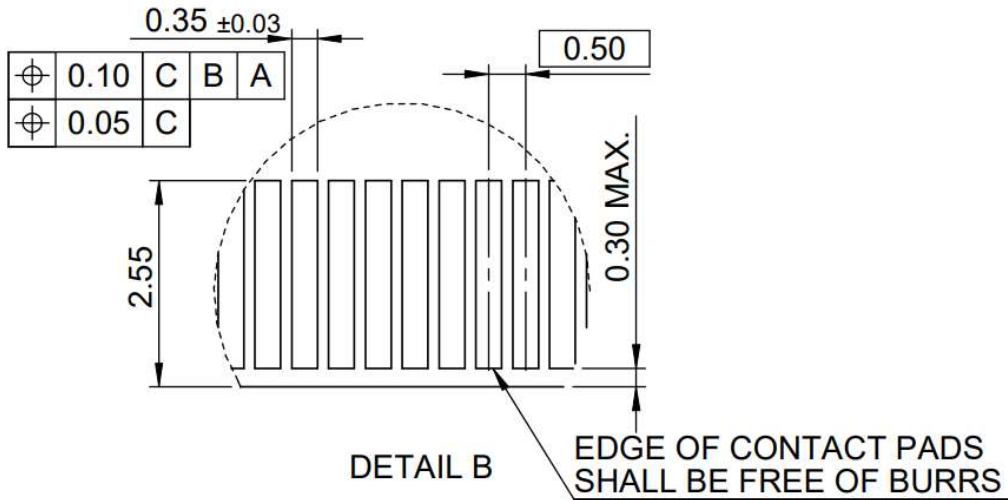
### 5.5 Pin position

< TOP VIEW >

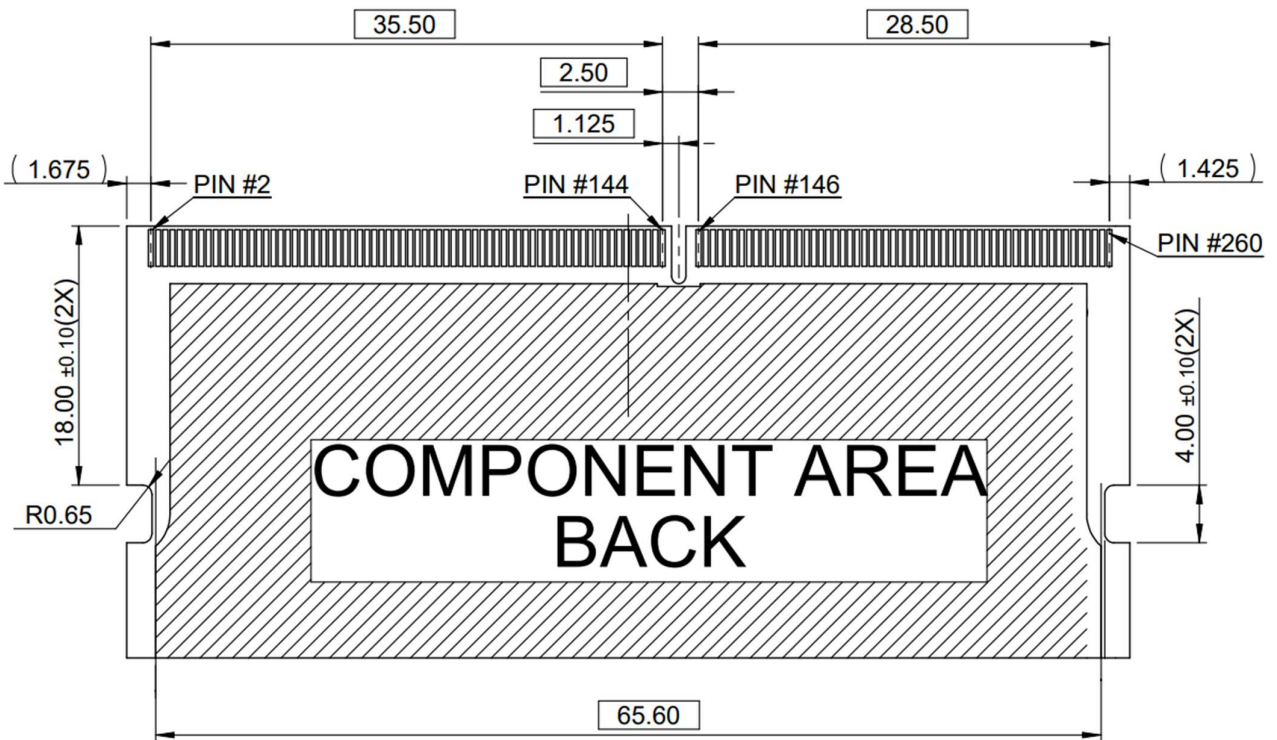


DETAIL A

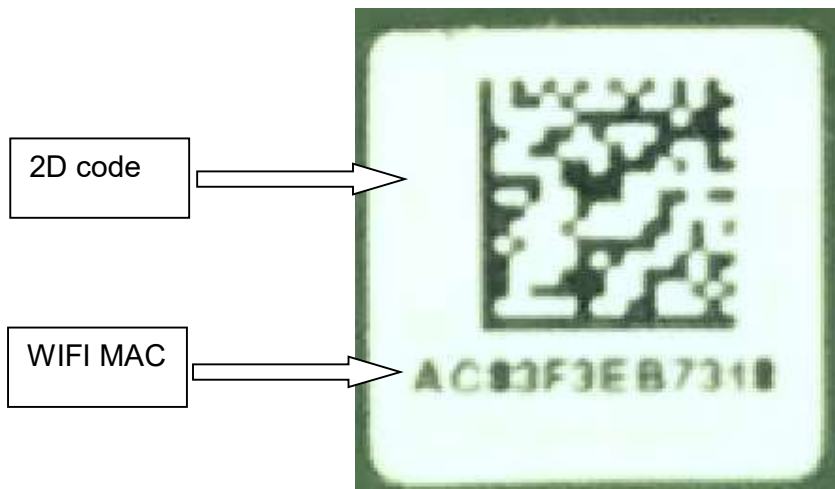




< BOT VIEW >



## 5.6 Label Information



## 6. Package Information

### 6.1 Label A Inner box label

Label Size: 70mmX50mm  
 [依各廠實際Label 使用]  
 (1)Barcode (BC) Symbology: Code128 Auto  
 (2)Human Readable: Arial  
 [字高依Label尺寸微調, 字體不可斷字,  
 條碼不可模糊,需可清晰讀取,辨識]

PKG S/N :	
AMK Device:	
Model:	 AP72598.WL_HN.B (HF)
P/N :	 99P-W02-0510R
Qty :	 50
Date Code :	 1803
Lot Code :	 T2124017

Made in Taiwan

### 6.2 Label B Carton box label

Label Size: 70mm X100 mm  
 [依各廠實際Label 使用]  
 (1)Barcode (BC) Symbology: Code128 Auto  
 (2)Human Readable: Arial  
 [字高依Label尺寸微調, 字體不可斷字,  
 條碼不可模糊,需可清晰讀取,辨識]

<b>AMPAK Technology Inc.</b>	
PO :	
AMK DEVICE:	
Mode Name:	 AP72598.WL_HN.B (HF)
Part No :	 99P-W02-0510R
Quantity:	 250
Lot D/C :	 T211B04A 1801
Manufacture:	 2018/01/01

Made in Taiwan

## 6.3 Package Manner

- 1 防靜電氣泡袋：1 PCS



- 1 BOX : 50 PCS





- 1 外箱 CTN : 5 BOX (不滿五箱，使用空箱填滿)



- Label A 黏貼處



- Label B 黏貼處



## 7. Note