



正基科技股份有限公司

## SPECIFICATION

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DATE : 10.01.2014

PRODUCT NAME : AP6269LV

	APPROVED	CHECKED	PREPARED	DCC ISSUE
NAME				

AMPAK

AP6269LV

2x2 11ac WiFi + Bluetooth4.0  
Module Spec Sheet

# Revision History

Date	Revision Content	Revised By	Version
2014/07/18	-Preliminary	Brian	1.0
2014/09/01	-Reference Design Modified	Brian	1.1
2014/10/01	-Reference Design Modified	Brian	1.2

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# 1. Introduction

AMPAK Technology would like to announce a low-cost and low-power consumption module which has all of the WiFi and Bluetooth functionalities. The highly integrated module makes the possibilities of web browsing, VoIP, Bluetooth headsets functional applications and other applications. With seamless roaming capabilities and advanced security, also could interact with different vendors' 802.11a/b/g/n/ac 2x2 Access Points in the wireless LAN.

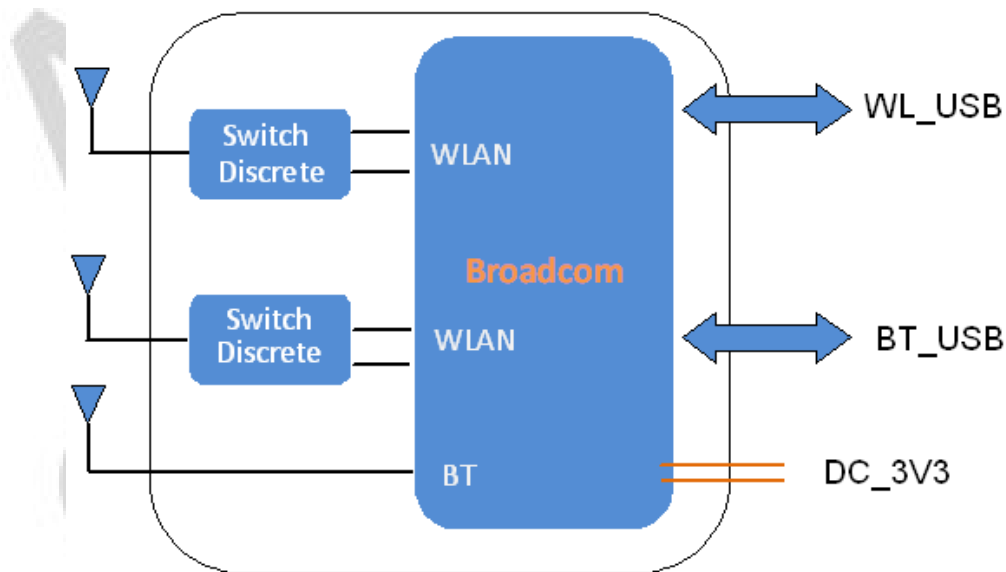
The wireless module complies with IEEE 802.11 a/b/g/n/ac 2x2 standard and it can achieve up to a speed of 867Mbps with dual stream in 802.11n to connect the wireless LAN. The integrated module provides USB interface for WiFi and Bluetooth.

This compact module is a total solution for a combination of WiFi + BT technologies. The module is specifically developed for Smart TV and OTT Box application.

## 2. Features

- Lead Free design which is compliant with ROHS requirements.
- 802.11a/b/g/n/ac dual-band radio with virtual-simultaneous dual-band operation
- Dual-stream spatial multiplexing up to 867 Mbps data rate.
- Supports 20, 40, 80 MHz channels with optional SGI(256 QAM modulation)
- Supports IEEE 802.11 ac/n beam forming.
- Supports IEEE 802.15.2 external coexistence interface to optimize bandwidth utilization with other co-located wireless technologies such as LTE, GPS, or WiMAX.
  - Supports standard USB2.0/ USB3.0
- BT host digital interface: USB2.0
- 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 below.



## 3. Deliverables

### 3.1 Deliverables

The following products and software will be part of the product.

- Module with packaging
- Evaluation Kits
- Software utility for integration, performance test.
- Product Datasheet.
- Agency certified pre-tested report with the adapter board.

### 3.2 Regulatory certifications

The product delivery is a pre-tested module, without the module level certification. For module approval, the platform's antennas are required for the certification.

## 4. General Specification

### 4.1 General Specification

Model Name	AP6269LV
Product Description	Support WiFi/Bluetooth
Dimension	L x W : 27 x 18 (typical) mm
WiFi Interface	Support USB3.0/USB2.0
BT Interface	USB2.0
Operating temperature	0°C to 70°C
Storage temperature	-40°C to 85°C
Humidity	Operating Humidity 10% to 95% Non-Condensing

### 4.2 Voltages

#### 4.2.1 Recommended Operating Rating

	Min.	Typ.	Max.	Unit
Operating Temperature	0	25	70	deg.C
VDD33	3.2	3.3	3.6	V

## 5. WiFi RF Specification

### 5.1 2.4GHz RF Specification

Conditions : VDD=3.3V ; Temp:25°C

Feature	Description
WLAN Standard	IEEE 802.11a/b/g/n/ac WiFi compliant
Frequency Range	2.400 GHz ~ 2.497 GHz (2.4 GHz ISM Band)
Number of Channels	2.4GHz : Ch1 ~ Ch14
Modulation	802.11b : DQPSK, DBPSK, CCK 802.11 g/n : OFDM /64-QAM,16-QAM, QPSK, BPSK
Output Power	802.11b /11Mbps : 16 dBm ± 1.5 dB @ EVM ≤ -9dB
	802.11g /54Mbps : 15 dBm ± 1.5 dB @ EVM ≤ -25dB
	802.11n /MCS7 : 14 dBm ± 1.5 dB @ EVM ≤ -28dB
	802.11ac/256-QAM(R=3/4) : 13 dBm ± 1.5 dB @ EVM ≤ -30dB
	802.11ac/256-QAM(R=5/6) : 11 dBm ± 1.5 dB @ EVM ≤ -32dB
SISO Receive Sensitivity (11b,20MHz) @8% PER	- 1Mbps PER @ -94 dBm, typical
	- 2Mbps PER @ -92 dBm, typical
	- 5.5Mbps PER @ -89 dBm, typical
	- 11Mbps PER @ -86 dBm, typical
SISO Receive Sensitivity (11g,20MHz) @10% PER	- 6Mbps PER @ -91 dBm, typical
	- 9Mbps PER @ -90 dBm, typical
	- 12Mbps PER @ -89 dBm, typical
	- 18Mbps PER @ -86 dBm, typical
	- 24Mbps PER @ -83 dBm, typical
	- 36Mbps PER @ -80 dBm, typical
	- 48Mbps PER @ -75 dBm, typical
- 54Mbps PER @ -72 dBm, typical	
MIMO Receive Sensitivity (11g,20MHz) @10% PER	- 6Mbps PER @ -92 dBm, typical
	- 9Mbps PER @ -92 dBm, typical
	- 12Mbps PER @ -91 dBm, typical
	- 18Mbps PER @ -89 dBm, typical
	- 24Mbps PER @ -85 dBm, typical
	- 36Mbps PER @ -81 dBm, typical
	- 48Mbps PER @ -77 dBm, typical
- 54Mbps PER @ -74 dBm, typical	
SISO Receive	- MCS=0 PER @ -91 dBm, typical

Sensitivity (11n,20MHz) @10% PER	- MCS=1	PER @ -88 dBm, typical
	- MCS=2	PER @ -86 dBm, typical
	- MCS=3	PER @ -82 dBm, typical
	- MCS=4	PER @ -79 dBm, typical
	- MCS=5	PER @ -74 dBm, typical
	- MCS=6	PER @ -72 dBm, typical
	- MCS=7	PER @ -70 dBm, typical
MIMO Receive Sensitivity (11n,20MHz) @10% PER	- MCS=0	PER @ -92 dBm, typical
	- MCS=1	PER @ -91 dBm, typical
	- MCS=2	PER @ -89 dBm, typical
	- MCS=3	PER @ -86 dBm, typical
	- MCS=4	PER @ -82 dBm, typical
	- MCS=5	PER @ -77 dBm, typical
	- MCS=6	PER @ -75 dBm, typical
	- MCS=7	PER @ -72 dBm, typical
	- MCS=8	PER @ -85 dBm, typical
	- MCS=15	PER @ -68 dBm, typical
SISO Receive Sensitivity (11n,40MHz) @10% PER	- MCS=0	PER @ -88 dBm, typical
	- MCS=1	PER @ -85 dBm, typical
	- MCS=2	PER @ -83 dBm, typical
	- MCS=3	PER @ -80 dBm, typical
	- MCS=4	PER @ -76 dBm, typical
	- MCS=5	PER @ -72 dBm, typical
	- MCS=6	PER @ -69 dBm, typical
	- MCS=7	PER @ -67 dBm, typical
MIMO Receive Sensitivity (11n,40MHz) @10% PER	- MCS=0	PER @ -90 dBm, typical
	- MCS=1	PER @ -88 dBm, typical
	- MCS=2	PER @ -86 dBm, typical
	- MCS=3	PER @ -83 dBm, typical
	- MCS=4	PER @ -79 dBm, typical
	- MCS=5	PER @ -75 dBm, typical
	- MCS=6	PER @ -73 dBm, typical
	- MCS=7	PER @ -71 dBm, typical
	- MCS=8	PER @ -86 dBm, typical
	- MCS=15	PER @ -68 dBm, typical
SISO Receive Sensitivity	- MCS=0, NSS1	PER @ -90 dBm, typical
	- MCS=1, NSS1	PER @ -87 dBm, typical

(11ac,20MHz) @10% PER	- MCS=2, NSS1 PER @ -86 dBm, typical
	- MCS=3, NSS1 PER @ -82 dBm, typical
	- MCS=4, NSS1 PER @ -79 dBm, typical
	- MCS=5, NSS1 PER @ -74 dBm, typical
	- MCS=6, NSS1 PER @ -72 dBm, typical
	- MCS=7, NSS1 PER @ -70 dBm, typical
	- MCS=8, NSS1 PER @ -67 dBm, typical
MIMO Receive Sensitivity (11ac,20MHz) @10% PER	- MCS=0, NSS1 PER @ -90 dBm, typical
	- MCS=1, NSS1 PER @ -89 dBm, typical
	- MCS=2, NSS1 PER @ -88 dBm, typical
	- MCS=3, NSS1 PER @ -85 dBm, typical
	- MCS=4, NSS1 PER @ -82 dBm, typical
	- MCS=5, NSS1 PER @ -77 dBm, typical
	- MCS=6, NSS1 PER @ -75 dBm, typical
	- MCS=7, NSS1 PER @ -73 dBm, typical
	- MCS=8, NSS1 PER @ -69 dBm, typical
	- MCS=0, NSS2 PER @ -90 dBm, typical
	- MCS=8, NSS2 PER @ -65 dBm, typical
SISO Receive Sensitivity (11ac,40MHz) @10% PER	- MCS=0, NSS1 PER @ -87 dBm, typical
	- MCS=1, NSS1 PER @ -85 dBm, typical
	- MCS=2, NSS1 PER @ -83 dBm, typical
	- MCS=3, NSS1 PER @ -80 dBm, typical
	- MCS=4, NSS1 PER @ -76 dBm, typical
	- MCS=5, NSS1 PER @ -72 dBm, typical
	- MCS=6, NSS1 PER @ -70 dBm, typical
	- MCS=7, NSS1 PER @ -67 dBm, typical
	- MCS=8, NSS1 PER @ -63 dBm, typical
- MCS=9, NSS1 PER @ -62 dBm, typical	
MIMO Receive Sensitivity (11ac,40MHz) @10% PER	- MCS=0, NSS1 PER @ -89 dBm, typical
	- MCS=1, NSS1 PER @ -88 dBm, typical
	- MCS=2, NSS1 PER @ -86 dBm, typical
	- MCS=3, NSS1 PER @ -83 dBm, typical
	- MCS=4, NSS1 PER @ -78 dBm, typical
	- MCS=5, NSS1 PER @ -75 dBm, typical
	- MCS=6, NSS1 PER @ -73 dBm, typical
	- MCS=7, NSS1 PER @ -71 dBm, typical
- MCS=8, NSS1 PER @ -67 dBm, typical	

	- MCS=9, NSS1 PER @ -65 dBm, typical
	- MCS=0, NSS2 PER @ -87 dBm, typical
	- MCS=9, NSS2 PER @ -61 dBm, typical
Maximum Input Level	802.11b : -10 dBm
	802.11g/n : -20 dBm
Antenna Reference	Small antennas with 0~2 dBi peak gain

## 5.2 5GHz RF Specification

Conditions : VDD=3.3V ; Temp:25°C

Feature	Description
WLAN Standard	IEEE 802.11a/n 2x2, WiFi compliant
Frequency Range	4.900 GHz ~ 5.845 GHz (5.0 GHz ISM Band)
Number of Channels	5.0GHz : Please see the table <sup>1</sup>
Modulation	802.11a : OFDM /64-QAM, 16-QAM, QPSK, BPSK 802.11n : OFDM /64-QAM, 16-QAM, QPSK, BPSK 802.11ac : OFDM /256-QAM
Output Power	802.11a /54Mbps : 13 dBm ± 1.5 dB @ EVM ≤ -25dB
	802.11n /MCS7 : 12 dBm ± 1.5 dB @ EVM ≤ -28dB
	802.11ac /MCS9 : 10 dBm ± 1.5 dB @ EVM ≤ -32dB
SISO Receive Sensitivity (11a,20MHz) @10% PER	- 6Mbps PER @ -90 dBm, typical
	- 9Mbps PER @ -89 dBm, typical
	- 12Mbps PER @ -88 dBm, typical
	- 18Mbps PER @ -85 dBm, typical
	- 24Mbps PER @ -82 dBm, typical
	- 36Mbps PER @ -79 dBm, typical
	- 48Mbps PER @ -73 dBm, typical
- 54Mbps PER @ -71 dBm, typical	
MIMO Receive Sensitivity (11a,20MHz) @10% PER	- 6Mbps PER @ -91 dBm, typical
	- 9Mbps PER @ -91 dBm, typical
	- 12Mbps PER @ -90 dBm, typical
	- 18Mbps PER @ -88 dBm, typical
	- 24Mbps PER @ -85 dBm, typical
- 36Mbps PER @ -81 dBm, typical	

	- 48Mbps PER @ -75 dBm, typical
	- 54Mbps PER @ -71 dBm, typical
SISO Receive Sensitivity (11n,20MHz) @10% PER	- MCS=0 PER @ -90 dBm, typical
	- MCS=1 PER @ -87 dBm, typical
	- MCS=2 PER @ -85 dBm, typical
	- MCS=3 PER @ -82 dBm, typical
	- MCS=4 PER @ -77 dBm, typical
	- MCS=5 PER @ -72 dBm, typical
	- MCS=6 PER @ -70 dBm, typical
	- MCS=7 PER @ -68 dBm, typical
MIMO Receive Sensitivity (11n,20MHz) @10% PER	- MCS=0 PER @ -91 dBm, typical
	- MCS=1 PER @ -90 dBm, typical
	- MCS=2 PER @ -88 dBm, typical
	- MCS=3 PER @ -85 dBm, typical
	- MCS=4 PER @ -81 dBm, typical
	- MCS=5 PER @ -76 dBm, typical
	- MCS=6 PER @ -75 dBm, typical
	- MCS=7 PER @ -71 dBm, typical
	- MCS=8 PER @ -88 dBm, typical
	- MCS=15 PER @ -68 dBm, typical
SISO Receive Sensitivity (11n,40MHz) @10% PER	- MCS=0 PER @ -87 dBm, typical
	- MCS=1 PER @ -84 dBm, typical
	- MCS=2 PER @ -82 dBm, typical
	- MCS=3 PER @ -79 dBm, typical
	- MCS=4 PER @ -75 dBm, typical
	- MCS=5 PER @ -71 dBm, typical
	- MCS=6 PER @ -68 dBm, typical
	- MCS=7 PER @ -66 dBm, typical
MIMO Receive Sensitivity (11n,40MHz) @10% PER	- MCS=0 PER @ -89 dBm, typical
	- MCS=1 PER @ -87 dBm, typical
	- MCS=2 PER @ -85 dBm, typical
	- MCS=3 PER @ -82 dBm, typical
	- MCS=4 PER @ -78 dBm, typical
	- MCS=5 PER @ -74 dBm, typical
	- MCS=6 PER @ -72 dBm, typical
	- MCS=7 PER @ -70 dBm, typical
	- MCS=8 PER @ -85 dBm, typical

	- MCS=15 PER @ -66 dBm, typical
SISO Receive Sensitivity (11ac,20MHz) @10% PER	- MCS=0, NSS1 PER @ -88 dBm, typical
	- MCS=1, NSS1 PER @ -86 dBm, typical
	- MCS=2, NSS1 PER @ -84 dBm, typical
	- MCS=3, NSS1 PER @ -81 dBm, typical
	- MCS=4, NSS1 PER @ -77 dBm, typical
	- MCS=5, NSS1 PER @ -72 dBm, typical
	- MCS=6, NSS1 PER @ -71 dBm, typical
	- MCS=7, NSS1 PER @ -68 dBm, typical
	- MCS=8, NSS1 PER @ -64 dBm, typical
MIMO Receive Sensitivity (11ac,20MHz) @10% PER	- MCS=0, NSS1 PER @ -90 dBm, typical
	- MCS=1, NSS1 PER @ -89 dBm, typical
	- MCS=2, NSS1 PER @ -87 dBm, typical
	- MCS=3, NSS1 PER @ -84 dBm, typical
	- MCS=4, NSS1 PER @ -80 dBm, typical
	- MCS=5, NSS1 PER @ -75 dBm, typical
	- MCS=6, NSS1 PER @ -74 dBm, typical
	- MCS=7, NSS1 PER @ -71 dBm, typical
	- MCS=8, NSS1 PER @ -67 dBm, typical
	- MCS=0, NSS2 PER @ -87 dBm, typical
	- MCS=8, NSS2 PER @ -63 dBm, typical
SISO Receive Sensitivity (11ac,40MHz) @10% PER	- MCS=0, NSS1 PER @ -86 dBm, typical
	- MCS=1, NSS1 PER @ -83 dBm, typical
	- MCS=2, NSS1 PER @ -81 dBm, typical
	- MCS=3, NSS1 PER @ -78 dBm, typical
	- MCS=4, NSS1 PER @ -75 dBm, typical
	- MCS=5, NSS1 PER @ -70 dBm, typical
	- MCS=6, NSS1 PER @ -69 dBm, typical
	- MCS=7, NSS1 PER @ -67 dBm, typical
	- MCS=8, NSS1 PER @ -61 dBm, typical
	- MCS=9, NSS1 PER @ -60 dBm, typical
MIMO Receive Sensitivity (11ac,40MHz) @10% PER	- MCS=0, NSS1 PER @ -88 dBm, typical
	- MCS=1, NSS1 PER @ -86 dBm, typical
	- MCS=2, NSS1 PER @ -84 dBm, typical
	- MCS=3, NSS1 PER @ -81 dBm, typical
	- MCS=4, NSS1 PER @ -78 dBm, typical
	- MCS=5, NSS1 PER @ -73 dBm, typical

	- MCS=6, NSS1 PER @ -72 dBm, typical
	- MCS=7, NSS1 PER @ -70 dBm, typical
	- MCS=8, NSS1 PER @ -64 dBm, typical
	- MCS=9, NSS1 PER @ -63 dBm, typical
	- MCS=0, NSS2 PER @ -85 dBm, typical
	- MCS=9, NSS2 PER @ -60 dBm, typical
SISO Receive Sensitivity (11ac,80MHz) @10% PER	- MCS=0, NSS1 PER @ -83 dBm, typical
	- MCS=1, NSS1 PER @ -80 dBm, typical
	- MCS=2, NSS1 PER @ -78 dBm, typical
	- MCS=3, NSS1 PER @ -74 dBm, typical
	- MCS=4, NSS1 PER @ -71 dBm, typical
	- MCS=5, NSS1 PER @ -68 dBm, typical
	- MCS=6, NSS1 PER @ -66 dBm, typical
	- MCS=7, NSS1 PER @ -62 dBm, typical
	- MCS=8, NSS1 PER @ -59 dBm, typical
MIMO Receive Sensitivity (11ac,80MHz) @10% PER	- MCS=9, NSS1 PER @ -56 dBm, typical
	- MCS=0, NSS1 PER @ -84 dBm, typical
	- MCS=1, NSS1 PER @ -83 dBm, typical
	- MCS=2, NSS1 PER @ -81 dBm, typical
	- MCS=3, NSS1 PER @ -77 dBm, typical
	- MCS=4, NSS1 PER @ -74 dBm, typical
	- MCS=5, NSS1 PER @ -71 dBm, typical
	- MCS=6, NSS1 PER @ -69 dBm, typical
	- MCS=7, NSS1 PER @ -66 dBm, typical
	- MCS=8, NSS1 PER @ -61 dBm, typical
- MCS=9, NSS1 PER @ -60 dBm, typical	
	- MCS=0, NSS2 PER @ -82 dBm, typical
	- MCS=9, NSS2 PER @ -55 dBm, typical
Maximum Input Level	802.11a/n : -30 dBm
Antenna Reference	Small antennas with 0~2 dBi peak gain

<sup>1</sup>5GHz(20MHz) Channel table

Band (GHz)	Operating Channel Numbers	Channel center frequencies(MHz)
5.15GHz~5.25GHz	36	5180
	40	5200
	44	5220
	48	5240
5.25GHz~5.35GHz	52	5260
	56	5280
	60	5300
	64	5320
5.5GHz~5.7GHz	100	5500
	104	5520
	108	5540
	112	5560
	116	5580
	120	5600
	124	5620
	128	5640
	132	5660
	136	5680
5.725GHz~5.825GHz	149	5745
	153	5765
	157	5785
	161	5805

## 6. Bluetooth Specification

### 6.1 Bluetooth Specification

Conditions : VDD=3.3V ; Temp:25°C

Feature	Description		
<b>General Specification</b>			
Bluetooth Standard	Bluetooth V4.0 of 1, 2 and 3 Mbps.		
Host Interface	USB		
Antenna Reference	Small antennas with 0~2 dBi peak gain		
Frequency Band	2402 MHz ~ 2480 MHz		
Number of Channels	79 channels		
Modulation	FHSS, GFSK, DPSK, DQPSK		
<b>RF Specification</b>			
	<b>Min.</b>	<b>Typical.</b>	<b>Max.</b>
Output Power (Class 1.5)		8 dBm	
Output Power (Class 2)		2 dBm	
Sensitivity @ BER=0.1% for GFSK (1Mbps)		-86 dBm	
Sensitivity @ BER=0.01% for $\pi/4$ -DQPSK (2Mbps)		-86 dBm	
Sensitivity @ BER=0.01% for 8DPSK (3Mbps)		-80 dBm	
Maximum Input Level	GFSK (1Mbps):-20dBm		
	$\pi/4$ -DQPSK (2Mbps) :-20dBm		
	8DPSK (3Mbps) :-20dBm		

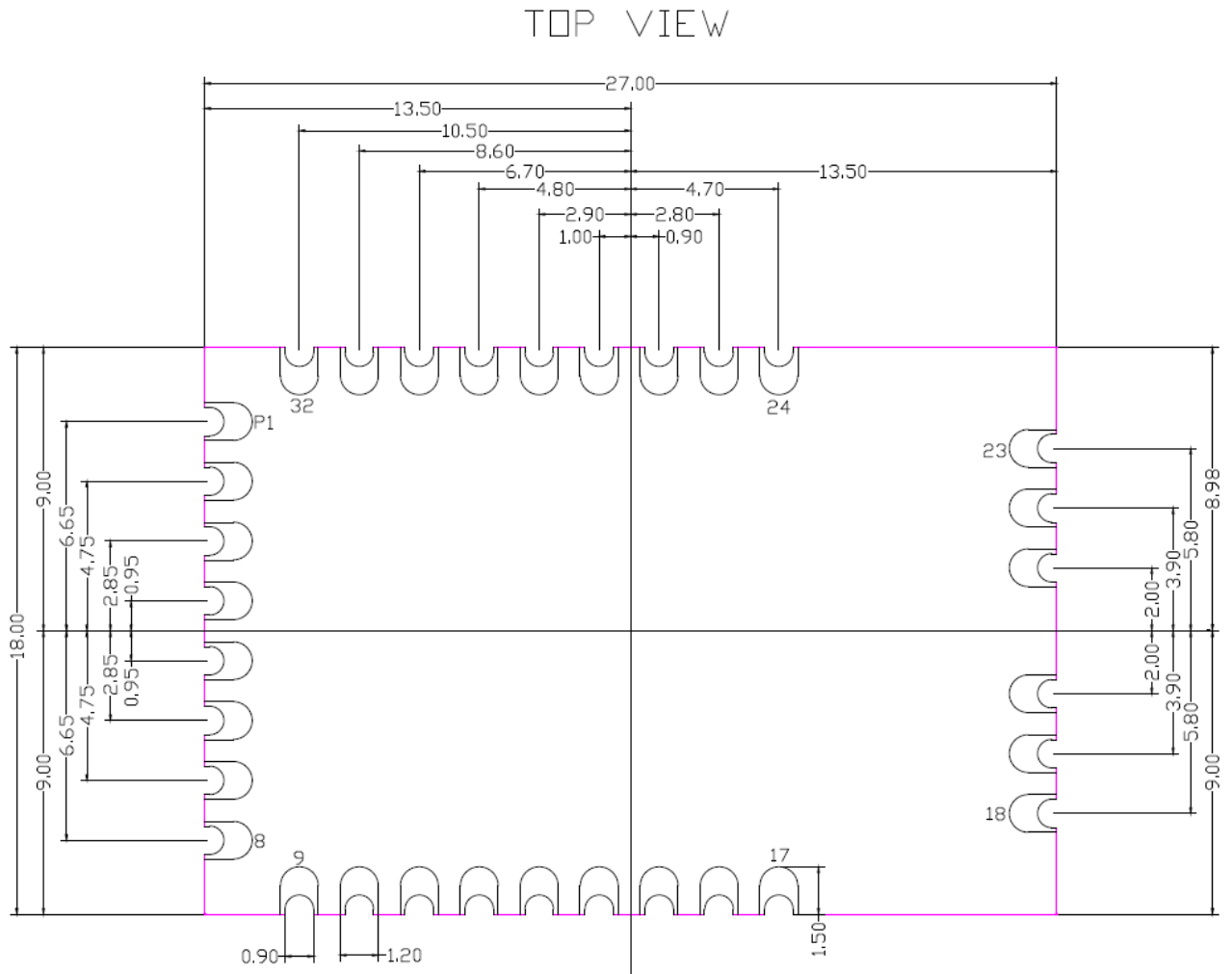
## 7. Pin Assignments

### 7.1 Pin Out

NO	Name	Type	Description
1	USB3_TXN	I/O	WLAN USB3.0 TX data-
2	USB3_TXP	I/O	WLAN USB3.0 TX data+
3	USB3_RXN	I/O	WLAN USB3.0 RX data-
4	USB3_RXP	I/O	WLAN USB3.0 RX data+
5	GND	—	Ground connections
6	WL_USB_DP	I/O	WLAN USB data+ (USB2.0/3.0)
7	WL_USB_DM	I/O	WLAN USB data- (USB2.0/3.0)
8	GND	—	Ground connections
9	BT_USB_DM	I/O	BT USB data-
10	BT_USB_DP	I/O	BT USB data+
11	GND	—	Ground connections
12	BT_RF	I/O	BT RF port
13	GND	—	Ground connections
14	BT_WAKE_HOST	O	BT wake up HOST
15	BT_WAKE	I	Wake up BT
16	BT_VSYN_OUT	O	BT sync from Module to Host
17	BT_VSYN_IN	I	BT sync from Host to Module (BT_GPIO5)
18	GND	—	Ground connections
19	WL_RF0	I/O	WIFI RF port0
20	GND	—	Ground connections
21	GND	—	Ground connections
22	WL_RF1	I/O	WIFI RF port1
23	GND	—	Ground connections
24	GND	—	Ground connections
25	GND	—	Ground connections
26	WL_WAKE_HOST		WLAN wake up HOST
27	BT_REG_ON	I	GPIO Control BT device enabled
28	WL_REG_ON	I	GPIO Control WIFI device enabled
29	GND	—	Ground connections
30	VDD33	I	3.3V Voltage input
31	NC	—	No connection (Floating)
32	GND	—	Ground connections

# 8. Dimensions

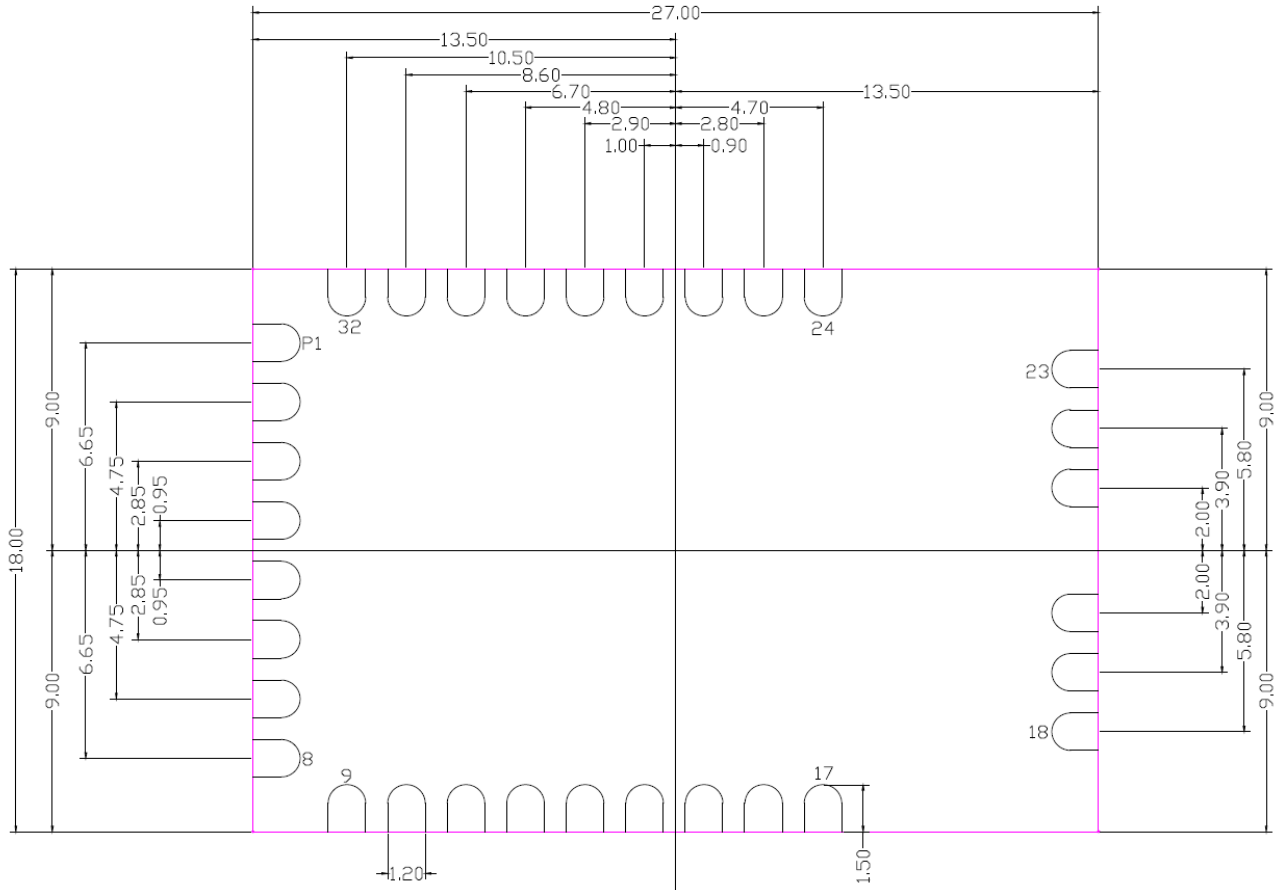
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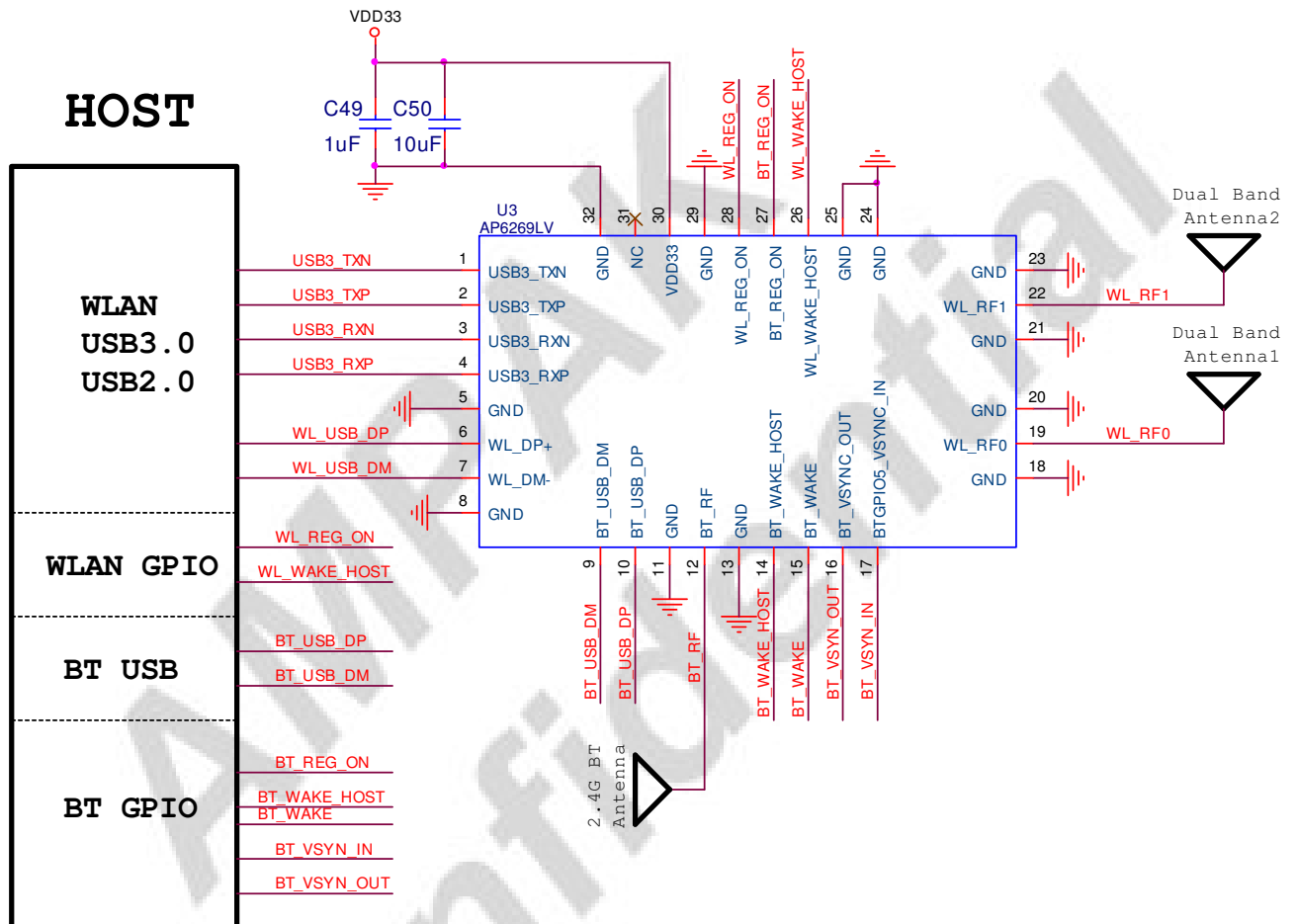
# 9. Layout Recommend

UNIT: mm

TOP VIEW



# 10. Reference Design



Note1: USB D+/D- layout trace must be matched 90ohm impedance.

Note2: RF layout trace must be matched 50ohm impedance.

# 11. Recommended Reflow Profile

Referred to IPC/JEDEC standard.

Peak Temperature : <math>< 250^{\circ}\text{C}</math>

Number of Times :  $\leq 2$  times

