



# AMPAK

## AP6XXX

### Evaluation Kits

### User manual

Version 1.2

#### Revision History

Date	Revision Content	Revised By	Version
2012/12/26	Initial released	Dora	1.0
2013/03/07	Modify figure1	Dora	1.1
2013/06/06	Modify figure1	Dora	1.2

# 1. AP6XXX Evaluation Board Introduction

AP6XXX Evaluation board (EVB) likes as figure1. That is designed for IEEE802.11 a/b/g/n/ac WLAN with integrated Bluetooth, FM, NFC and GPS application. It is subject to provide a convenient environment for customer’s verification on WiFi or Bluetooth function. There are many controller pins and reserved GPIO on Evaluation board which describes as below.

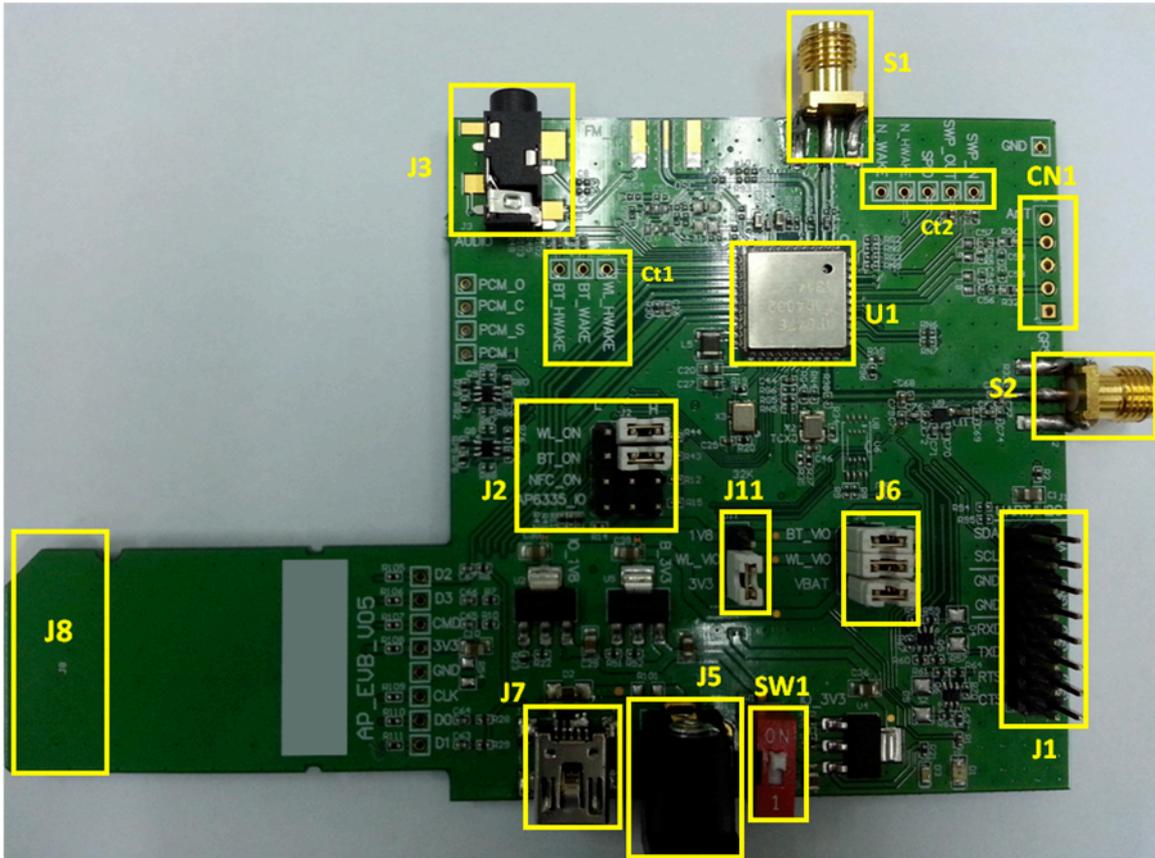


Figure1. Top view of AP6XXX EVB

## Interface highlights:

1. U1: AP6XXX SIP module.
2. J1: UART interface connects with UART transport board for BT and GPS measuring, it also provides I2C (SDA/SCL) for NFC measuring.
3. J2: Enable(H) or disable(L) Bluetooth, WiFi, NFC function and AP6335\_SDIO I/O voltage selection.(H for SDIO 3.3V, L for SDIO 1.8V)
4. J3: FM audio out interface.
5. J5: 5V DC adaptor input connector.
6. J6: VBAT / WL\_VIO / BT\_VIO for main system I/O power path.
7. J7: 5V DC mini USB input connector.
8. J8: Standard SDIO interfaces for Wi-Fi performance measured.

9. J11: WL\_VIO power path for 1V8 or 3V3 selection.
10. SW1: Power on/off switch.
11. CN1: NFC interface connects with NFC antenna.
12. S1: SMA connector let RF signal in/out path, you could connect with RF cable or Dipole antenna.
13. S2: SMA connector let GPS RF signal input, you could connect with GPS antenna.
14. Ct1: WLAN and BT control pins, strongly recommended WL\_HWAKE(IRQ) connected to MCU.
15. Ct2: NFC control pins, strongly recommended N\_WAKE and N\_H\_WAKE connected to MCU.

## 2. WiFi function verification step

WiFi SDIO: Using external pull up resistors depends on the SDIO supply voltage. For 1.8V, the resistance range is 30KΩ~82KΩ. For 3.3V, its range from 21 KΩ~41 KΩ on the four data lines and the CMD line as the following circuitry.

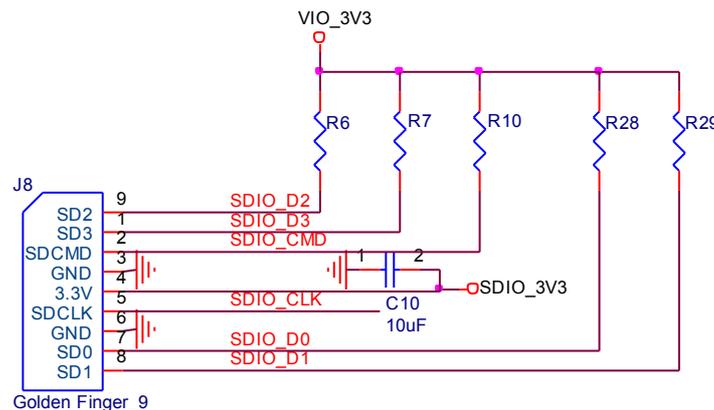


Figure2. WiFi verification connection interface to Host SDIO

### Hardware Setup:

- ❖ Refer to Figure2 SDIO pin definition connects the J8 interface of AP6XXX evaluation board to Host SDIO control interface.
- ❖ Using pull high resistors (R6, R7, R10, R28, R29) that resistance is 30Kohm for 1.8V or 3.3V VDDIO pull up voltage. (Pull high resistors are un-necessary if at verification phase.)
- ❖ Connects an external antenna at SMA connector on the evaluation board.
- ❖ Note to the VDDIO voltage level should be the same with GPIO voltage level of Host CPU. (VDDIO 3.3V or 1.8V selection by jump J11)

### WiFi software setup:

Please follow up software guideline of Ampak official released.

### 3. Bluetooth function verification step

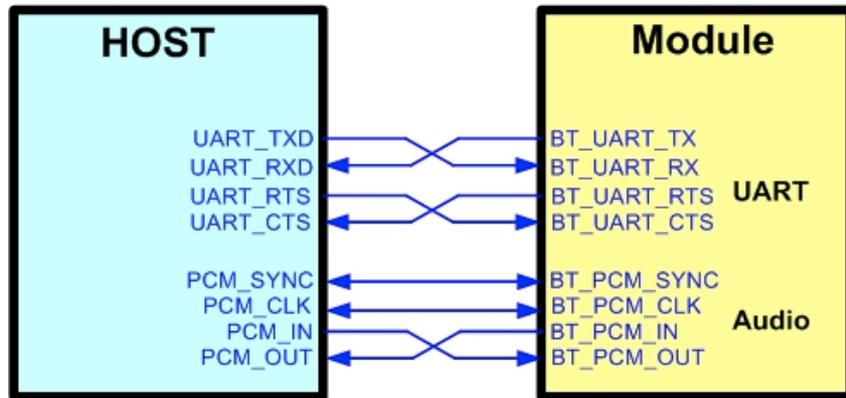


Figure3. Bluetooth verification connection interface to Host UART

#### Hardware Setup:

- ❖ Refer to Figure3 UART pin definition connects the J1 interface of AP6XXX evaluation board to Host UART control interface.
- ❖ Connects an external antenna at SMA connector on the evaluation board.
- ❖ Note to the VDDIO voltage level should be the same as GPIO voltage level of Host CPU.

#### WiFi and Bluetooth software setup:

Please follow up software guideline of Ampak official released.

## **Federal Communications Commission (FCC) Statement**

15.21

You are cautioned that changes or modifications not expressly approved by the part responsible for compliance could void the user's authority to operate the equipment.

15.105(b)

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications.

However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions:

- 1) this device may not cause harmful interference, and
- 2) this device must accept any interference received, including interference that may cause undesired operation of the device.

## **FCC RF Radiation Exposure Statement**

- 1) This Transmitter must not be co-located or operating in conjunction with any other antenna or transmitter.
- 2) This equipment complies with FCC RF radiation exposure limits set forth for an uncontrolled environment. This equipment should be installed and operated with a minimum distance of 20 centimeters between the radiator and your body.

This equipment should be installed.

Note: The end product shall has the words "Contains Transmitter Module

**FCC ID: Z28-AP6256-ZA**

OEM statement

The Original Equipment Manufacturer (OEM) must ensure that the OEM modular transmitter must be labeled with its own FCC ID number. This includes a clearly visible label on the outside of the final product enclosure that displays the contents shown below. If the FCC ID is not visible when the equipment is installed inside another device, then the outside of the device into which the equipment is installed must also display a label referring to the enclosed equipment.

The end product with this module may subject to perform FCC part 15B unintentional emission test requirement and be properly authorized while installation to host(s), and platform, and integrator are obligated to have its manual or instruction with the related compliance warning to end users.

This device is intended for OEM integrator only

The end product with this module may be subject to re-evaluate RF exposure as per 47CFR § 2.1091, and §2.1093 if antenna or usage, including co-located usage of other transmitters, of the subsequent installation are changed.

This radio transmitter has been approved by FCC/Innovation, Science and Economic Development Canada to operate with the antenna types listed below, with the maximum permissible gain indicated. Antenna types not included in this list that Have a gain greater than the maximum gain indicated for any type listed are strictly prohibited for use with this device.



## RF 天線

	Antenna Type	Brand	Model	Peak Gain (dBi)	Frequency Range	Connector Type
1	PIFA	anjil	AJDF1J-B0005	2400~2500MHz :2.46 5150~5350(MHz):4.93 5500~5700(MHz):4.57 5745~5825(MHz):4.66	2.4G&5G	i-pex
2	PIFA	ing 聯慶 科技股份有限公司	T-543-929104 2-1	2400~2500MHz : -1.65 5150~5350(MHz):-1.14 5500~5700(MHz):-1.46 5745~5825(MHz):-1.73	2.4G&5G	i-pex
3	PIFA	ing 聯慶 科技股份有限公司	T-543-929115 2-11	2400~2500MHz :-1.65 5150~5350(MHz):-1.14 5500~5700(MHz):-1.46 5745~5825(MHz):-1.73	2.4G&5G	i-pex
4	PIFA	TSKY CO., LTD.	A8-A006-00541	2400~2500MHz :1.47 5150~5350(MHz):4.83 5500~5700(MHz):4.45 5745~5825(MHz):4.5	2.4G&5G	i-pex
5	PIFA	TSKY CO., LTD.	A8-A006-00509	2400~2500MHz :2.7 5150~5350(MHz):6.63 5500~5700(MHz):5.78 5745~5825(MHz):5.55	2.4G&5G	i-pex
6	PIFA	TSKY CO., LTD.	A8-A006-00543	2400~2500MHz :4.37 5150~5350(MHz):3.26 5500~5700(MHz):4.62 5745~5825(MHz):4.17	2.4G&5G	i-pex
7	PIFA	TSKY CO., LTD	A8-A003-00185	2400~2500MHz :2.33 5150~5350(MHz):4.56 5500~5700(MHz):4.33 5745~5825(MHz):3.18	2.4G&5G	i-pex
8	Dipole	亞驪	RFA-25-T42-U-M70	2400~2500MHz :2.9 5150~5350(MHz):4.5 5500~5700(MHz):4.5 5745~5825(MHz):4.5	2.4G&5G	SMA
9	Dipole	TSKY CO., LTD	A8-A003-00178	2400~2500MHz :4.25 5150~5350(MHz):3.64 5500~5700(MHz):3.91 5745~5825(MHz):2.06	2.4G&5G	SMA
10	Dipole	TSKY CO., LTD	A8-A006-00522	2400~2500MHz :5.56 5150~5350(MHz):4.36 5500~5700(MHz):4.66 5745~5825(MHz):4.36	2.4G&5G	SMA
11	PIFA	anjil	AJDF1J-B0003	2400~2500MHz :2.78 5150~5350(MHz):2.47 5500~5700(MHz):2.18 5745~5825(MHz):1.98	2.4G&5G	i-pex

12	PIFA	ing 聯慶 科技股份 有限公司	T-543- 929104 8-1	2400~2500MHz :-1.16 5150~5350(MHz):-1.37 5500~5700(MHz):-1.04 5745~5825(MHz):-1.68	2.4G&5G	i-pex
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