



# 正基科技股份有限公司



## AP12275\_M2P

### Evaluation Board User Manual

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# Revision

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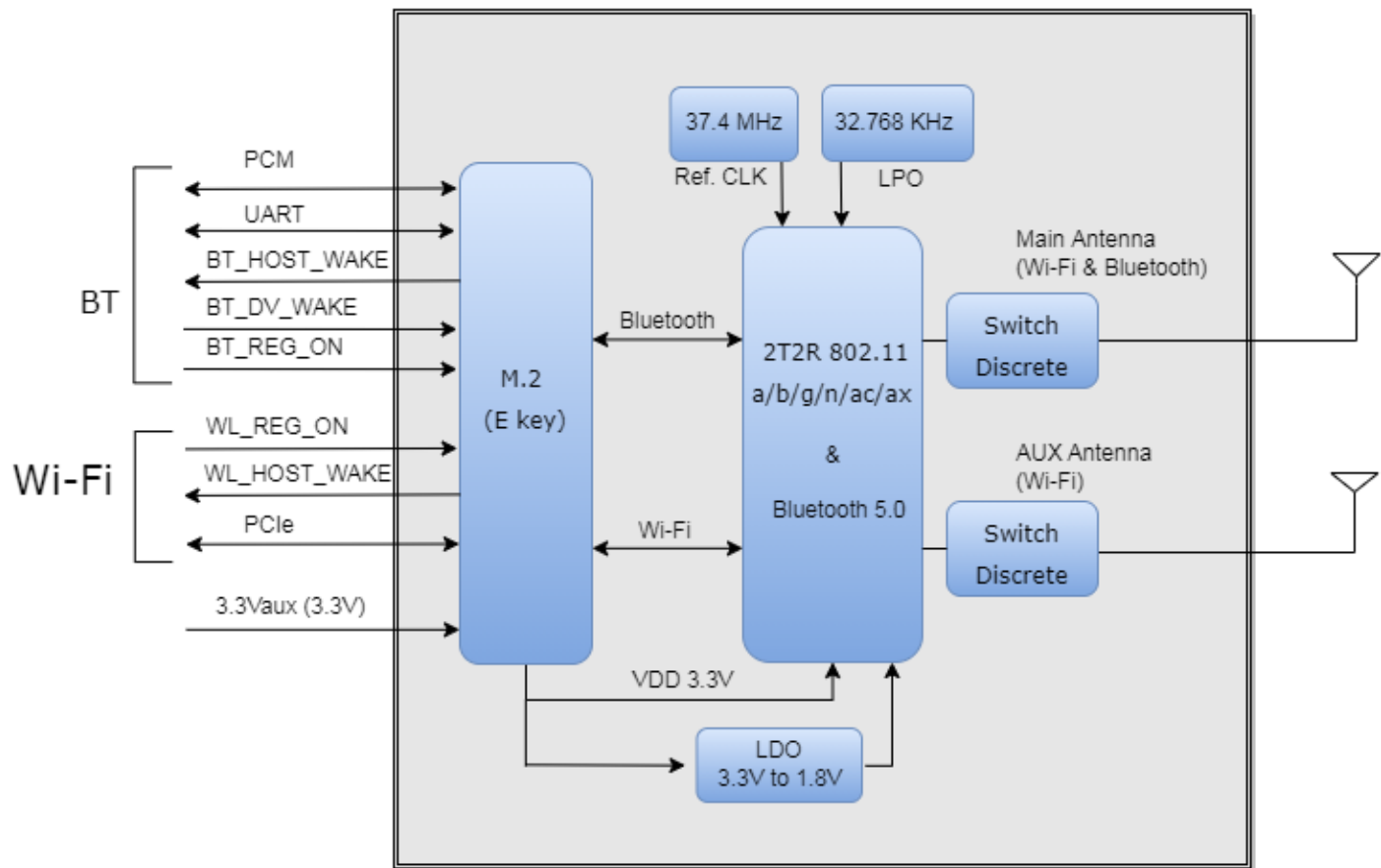


# 1. AP12275\_M2P User manual Introduction

This document provides customers with considerations for the hardware design of AP12275\_M2P. It includes hardware block diagram, reference design, and PCB stack up, which will be explained in detail below.

## 1.1 Module Block Diagram

*AP12275\_M2P 2230 M.2 Card*



**Figure1. AP12275\_M2P Module Block Diagram**

In Figure 1, The AP12275\_M2P is a fully Wi-Fi and Bluetooth functionalities 2230 M.2 card (KEY E) with integrated Bluetooth 5.0. The WLAN host interface is PCIe v3.0 compliant and runs at Gen2 speeds. The Bluetooth host interface is a UART interface and it also supports PCM interface.



## Connected to HOST I/O

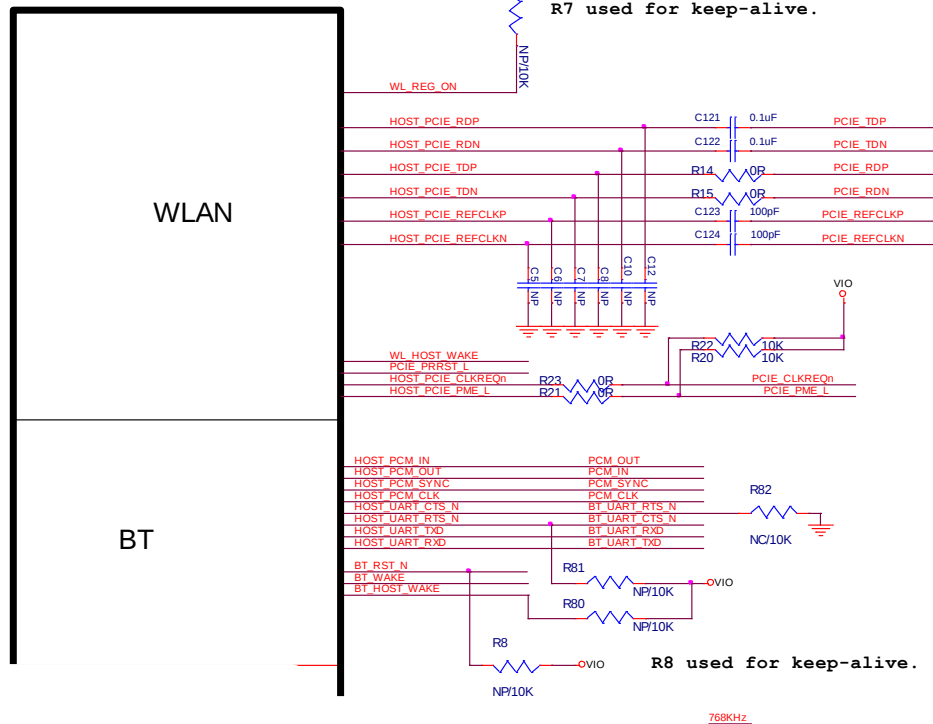


Figure3. Interface pin define reference design

The recommended schematic configuration for all of the interfaces and GPIOs are shown as figure 4. The connection block diagram of the PCI-e interface is shown in figure 5. However, the connection block diagram of UART and PCN interfaces is shown in figure 6. The PCI-e differential pair signals impedance target is 100 ohms impedance. The length difference of each pair of differential signals does not exceed 10 mil, and the integrity of a ground plane should be maintained, as far as possible.

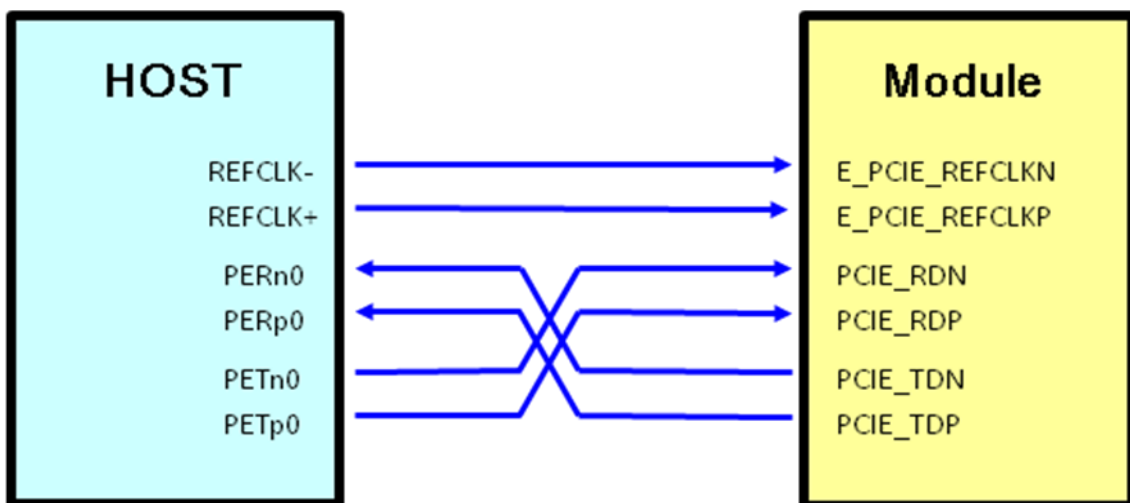


Figure4. PCI-e Interface Connection Diagram

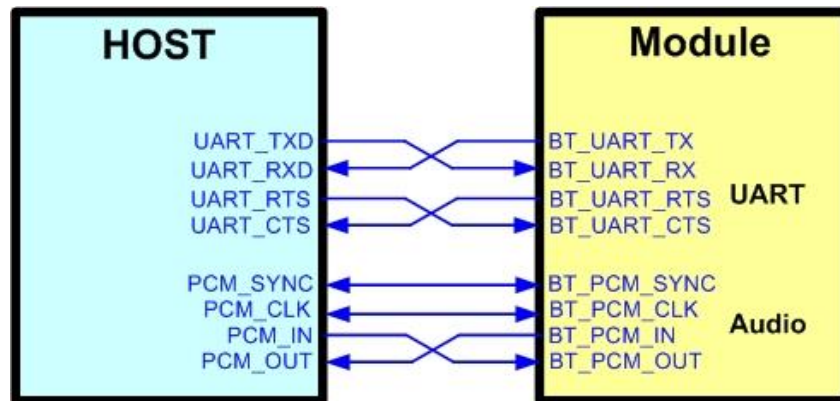


Figure5. UART and PCM Interface Connection Diagram

| 一般四層版 (單位=mm)     |        | 成品銅厚=oz   | 單位=mm |
|-------------------|--------|-----------|-------|
| 成品板厚              | 31.496 |           | 0.800 |
| 上層防焊厚度 min        | 0.400  | ← 有金手指, 翹 | 0.010 |
| TOP~min           | 1.300  | 0.93      | 0.033 |
| PP                | 3.700  |           | 0.094 |
| L2                | 1.200  | 0.86      | 0.030 |
| CORE              | 18.296 |           | 0.465 |
| L3                | 1.200  | 0.86      | 0.030 |
| PP                | 3.700  | ← 有金手指, 翹 | 0.094 |
| BOT~min           | 1.300  | 0.93      | 0.033 |
| 下層防焊厚度 min        | 0.400  |           | 0.010 |
| 1 層 Core / 2 層 PP |        |           |       |

Figure6. PCB Layout Cross-section

AP12275\_M2P Evaluation board (EVB) likes as figure1. That is designed for IEEE802.11 a/b/g/n/ac/ax WLAN with integrated Bluetooth 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.

## 2. AP12275\_M2P EVB

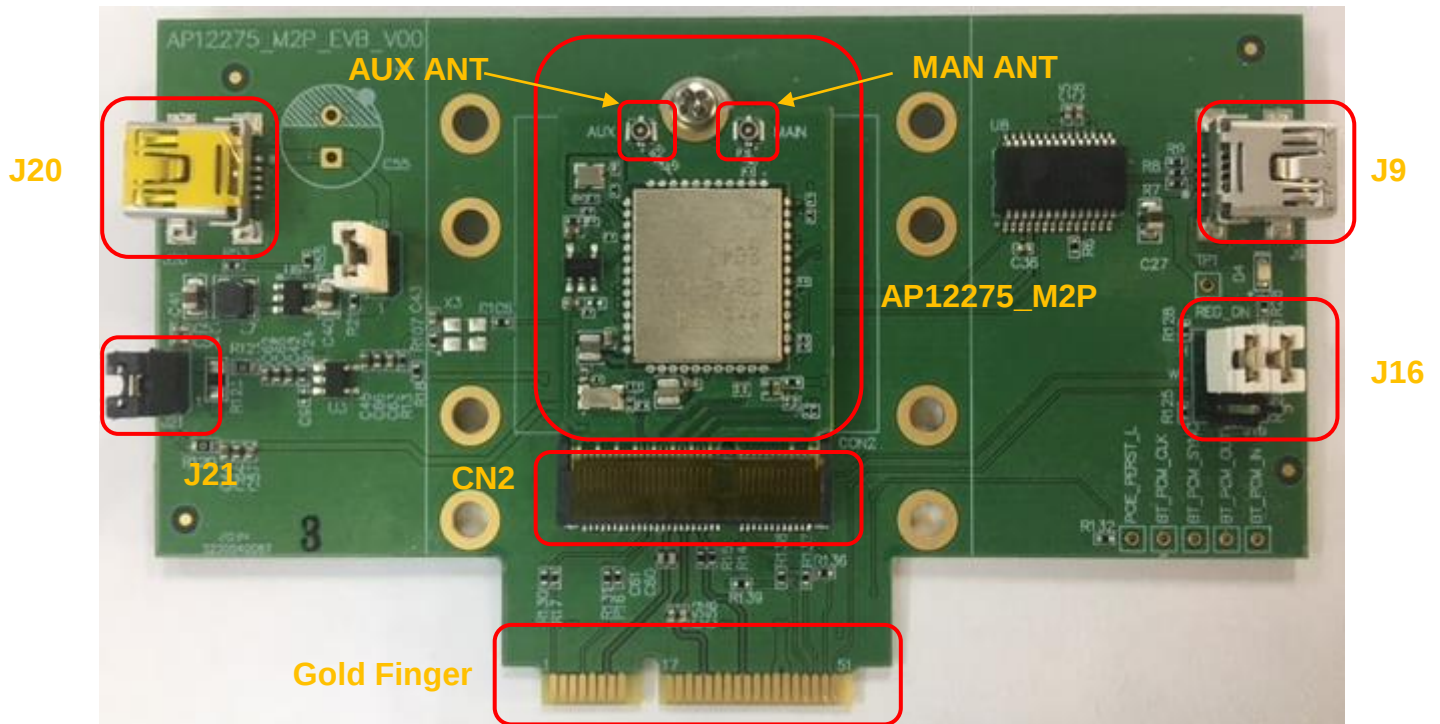
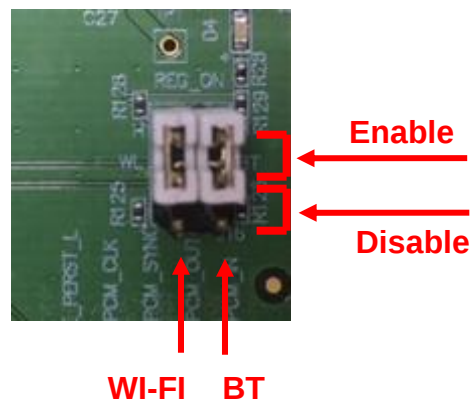


Figure7. Top view of AP12275\_M2P EVB

### Interface highlights:

1. AP12275\_M2P: Fully Wi-Fi and Bluetooth functionalities 2230 M.2 card.
2. J9: Mini USB interface connector for Bluetooth function control and measuring.
3. J16: Enable(H) or disable(L) Bluetooth, WiFi function.



4. J21: 3.3V for M.2 card main system power path.
5. J20: Main Power 5V/2A DC mini USB input connector.
6. Gold Finger: Half-min PCI-e interface for Wi-Fi function control and measuring.
7. MAN ANT: RF Coaxial cable connector compatible to IPEX MHF4, WiFi and Bluetooth share antenna.
8. AUX ANT: RF Coaxial cable connector compatible to IPEX MHF4, WiFi only antenna.
9. CN2: M.2 (NGFF) CONNECTOR E Key.

## 3. WiFi Function Verification Step

### 3.1 Hardware Setup

- ❖ Refer to Figure7 PCIe pin definition connects the Half-min PCI-e interface of AP12275\_M2P evaluation board to Host PCIe control interface.
- ❖ Connects an external antenna at IPEX connector on the evaluation board.
- ❖ Note to the VDDIO voltage level should be the same with GPIO voltage level of Host CPU.

### 3.2 WiFi Software Setup

- ❖ Please follow up software guideline of Ampak official released.

## 4. Bluetooth Function Verification Step

### 4.1 Hardware Setup

- ❖ Refer to Figure7 UART pin definition connects the J9 interface of AP12275\_M2P evaluation board to Host USB 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.

### 4.2 Bluetooth Software Setup

- ❖ Please follow up software guideline of Ampak official released.