



正基科技股份有限公司



AP12676_M2P

Evaluation Board User Manual

Address:

6F.-2, No. 23, Huanke 1st Rd., Zhubei City, Hsinchu County 302047,
Taiwan

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



Revision

Revision	Date	Description	Revised By
0.1	2025/ 02 / 25	Initial released	Jason



Contents

1. AP12676_M2P User manual Introduction	2
1.1 Module Block Diagram	2
1.2 Reference Design	3
2. AP12676_M2P EVB	6
3. WiFi Function Verification Step	7
3.1 Hardware Setup	7
3.2 WiFi Software Setup	7
4. Bluetooth Function Verification Step	8
4.1 Hardware Setup	8
4.2 Bluetooth Software Setup	8

1. AP12676_M2P User manual Introduction

This document provides customers with considerations for the hardware design of AP12676_M2P. It includes hardware block diagram, reference design, and PCB stack up, which will be explained in detail below.

1.1 Module Block Diagram

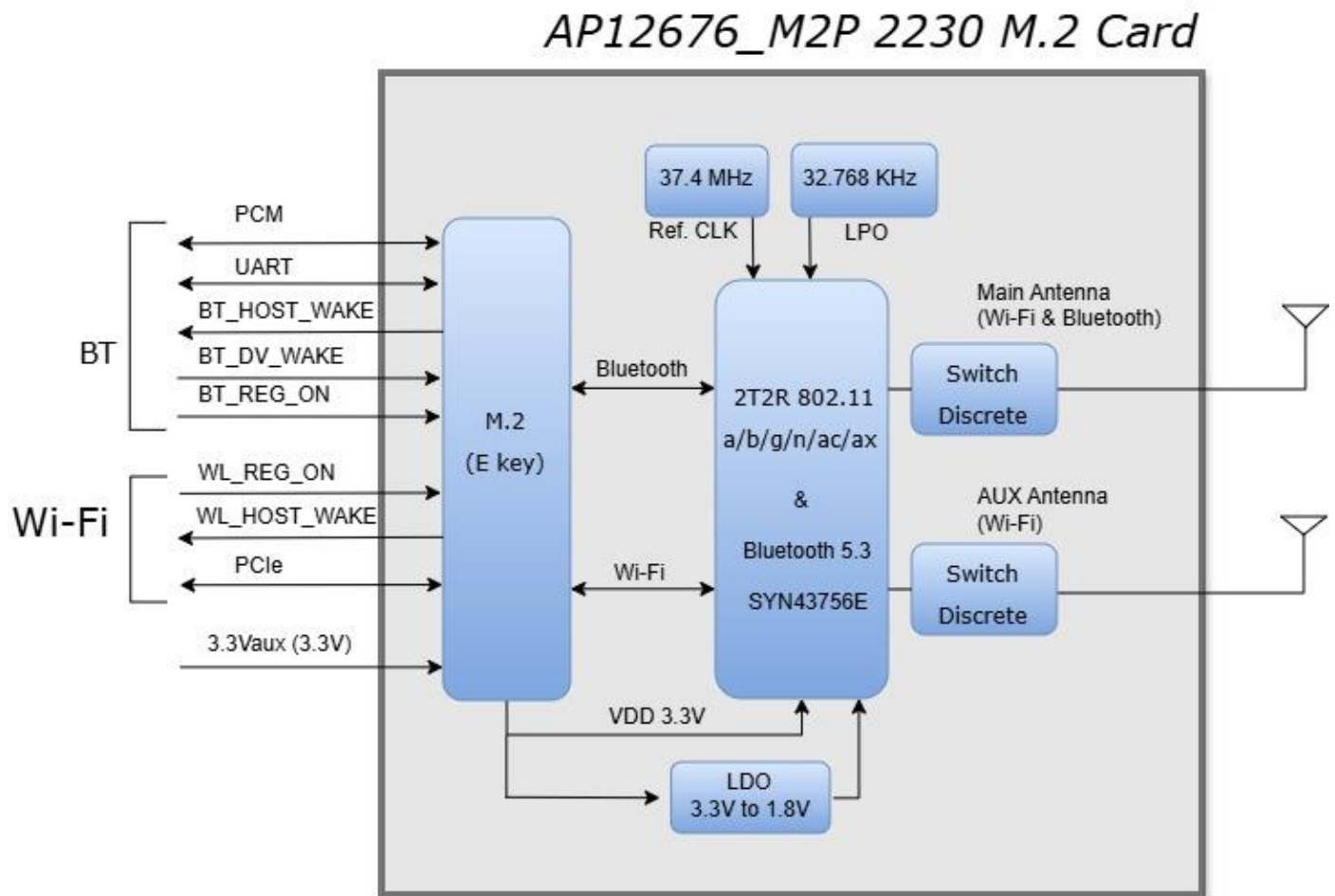


Figure1. AP12676_M2P Module Block Diagram

In Figure 1, The AP12676_M2P is a fully Wi-Fi and Bluetooth functionalities 2230 M.2 card (KEY E) with integrated Bluetooth 5.3. The WLAN host interface is PCIe v3.0 compliant and runs at Gen1 speeds. The Bluetooth host interface is a UART interface and it also supports PCM interface.

Connected to HOST I/O

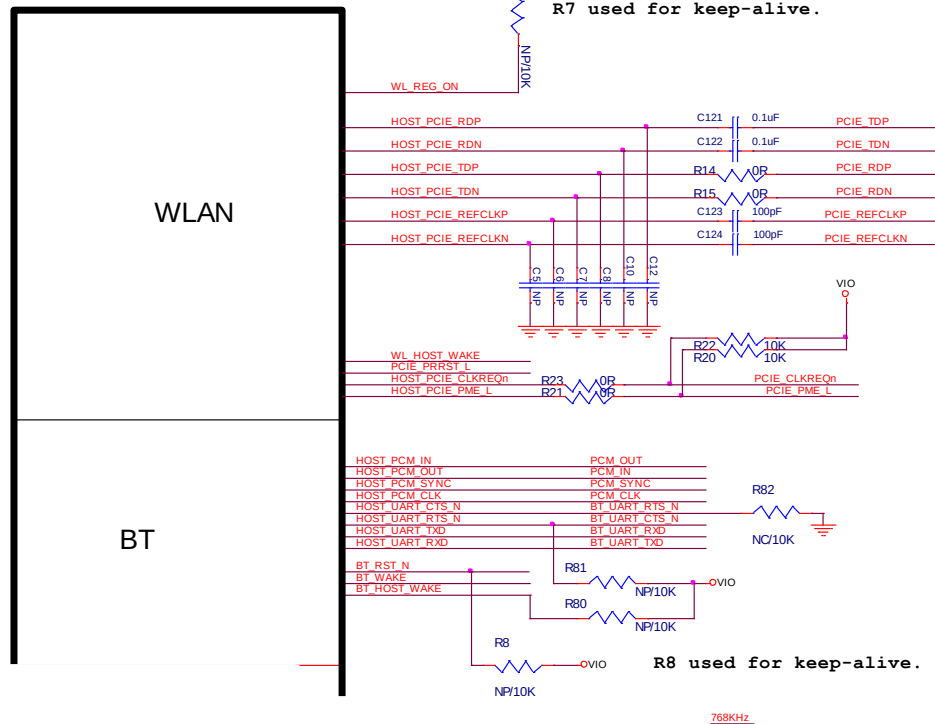


Figure3. Interface pin define reference design

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.

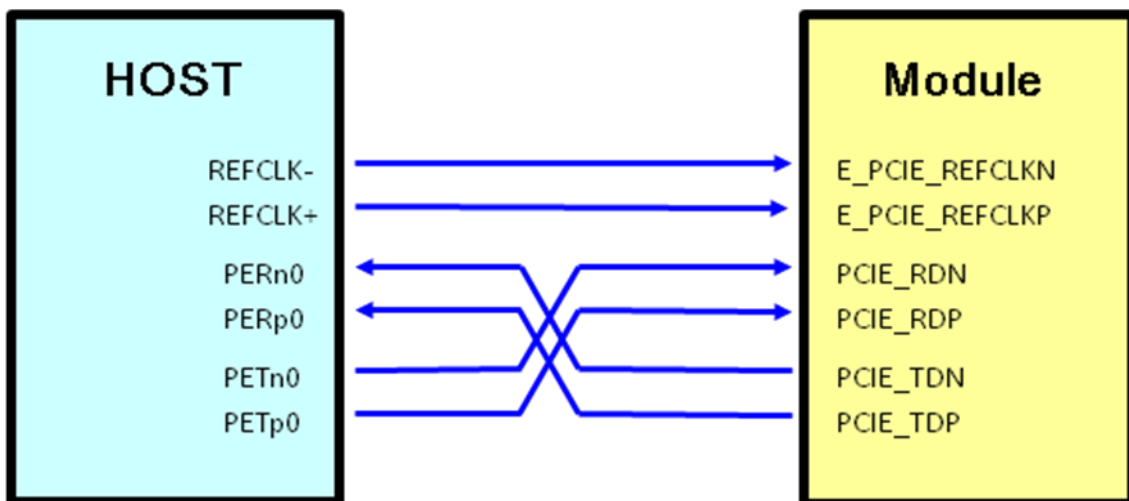


Figure4. PCI-e Interface Connection Diagram

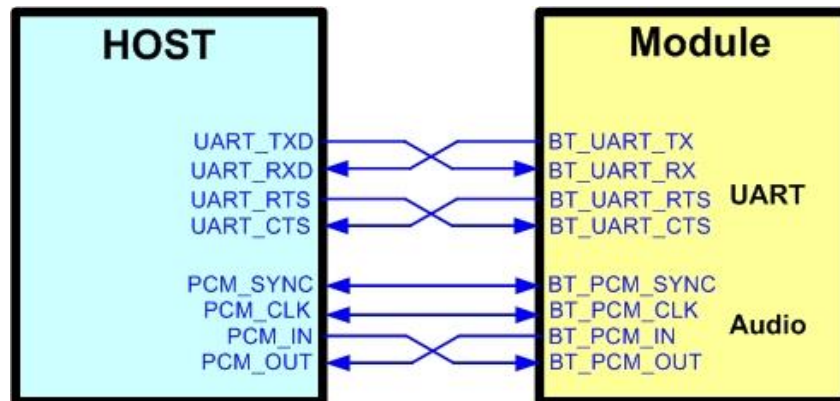


Figure5. UART and PCM Interface Connection Diagram

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, 無	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, 無	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

AP12676_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. AP12676_M2P EVB

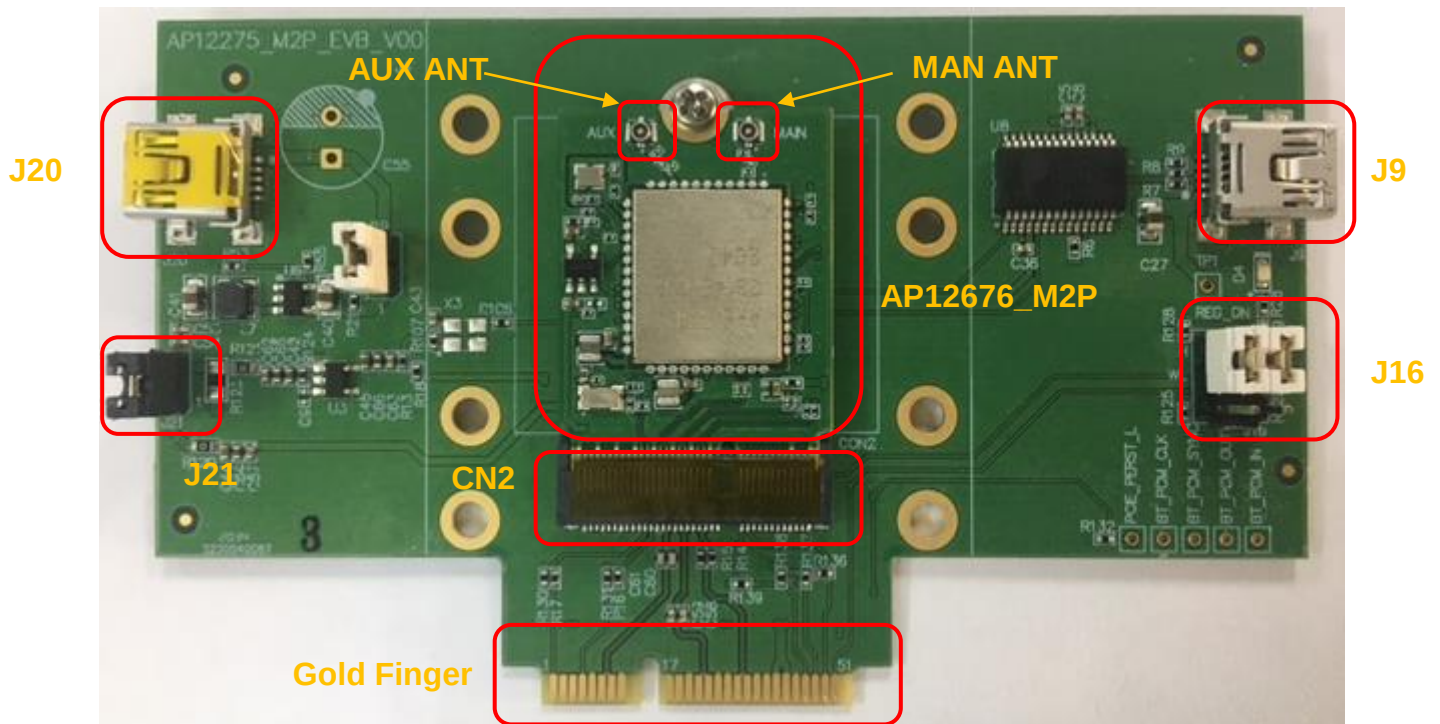
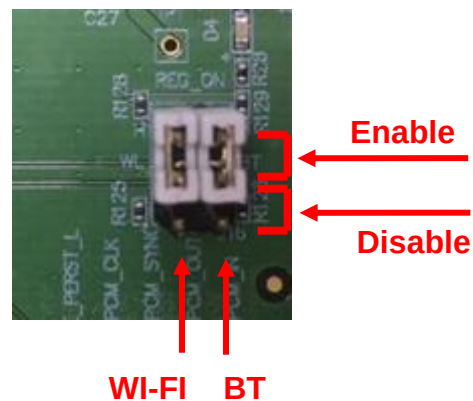


Figure7. Top view of AP12676_M2P EVB

Interface highlights:

1. AP12676_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 AP12676_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 AP12676_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.