



# **M882E2**

## User Reference Guide



**BUILD REVISION**

Version	Modified	Modifier	Approver	Date	Department
V1.0.0	Initial Version	刘双霖	Robo	2021-02-08	Hardware Department

# 1. PRODUCT INTRODUCTION

## 1.1 OVERVIEW



M882E2 is a WIFI dedicated mini-PCie module based on QUALCOMM QCA9882. It complies with IEEE802.11a/b/g/n/ac wireless network protocol, adopts 2x2 MIMO (Multiple Input Multiple Output) Multi-Channel wireless signal transceiver, making the transmission rate up to 866Mbps.

### RockeeTech mini-PCie Product Series:

Model Number	Chipset	Description
<b>M886E0</b>	QCA9886	5.8G 2x2 Mini PCie Card High Power
<b>M886E1</b>	QCA9886	5.8G 2x2 Mini PCie Card Normal Power
<b>M882E2</b>	QCA9882	2.4G 2x2 5.8G 2x2 Mini PCie Card Normal Power
<b>M892E2</b>	QCA9892	2.4G 2x2 5.8G 2x2 Mini PCie Card Normal Power

## 1.2 PRODUCT SPECIFICATION

CPU Model	QCA9882
Interface	Mini PCI Express 1.2
Antenna Port	Ipex Connector
Operating Frequency	2412 MHz ~2472MHz 5180 MHz ~5825MHz
Modulation Techniques	IEEE802.11 a/b/g/n/ac
Power Consumption	≤3W
Power Supply	3.3V Power Supply
Operating Temperature	-20°C ~ +80°C
Storage Temperature	-40°C ~ +90°C
Operating Humidity	5%-95% ( Non-Condensing )
Dimensions	30*51*3.2mm



### 1.3 PRODUCT PURCHASING INFORMATION

Product Name	Model	Packaging
M882E2	M882E2	MIMO 2x2

## 2. RF PARAMETERS

M882E2 supports all modulation modes and rates under 802.11a/n/ac mode. The transmission parameters and the receiver sensitivity parameters table are shown below.

Transmission Power

Modulation	Data Rate	Single-Chain TX Power (dbm)	2-Chains TX Power (dbm)
2.4GHz 802.11b	1Mbps	23	26
	5.5Mbps	22	25
	11Mbps	21	24
2.4GHz 802.11g	6Mbps	23	26
	9Mbps	23	26
	12Mbps	23	26
	18Mbps	23	26
	24Mbps	23	26
	36Mbps	22	25
	48Mbps	21	24
	54Mbps	20	23
2.4GHz 802.11n (20MHz)	MCS0	23	26
	MCS1	22	25
	MCS2	22	25
	MCS3	21	24
	MCS4	21	24
	MCS5	20	23
	MCS6	19	22
	MCS7	17	20
2.4GHz 802.11n (40MHz)	MCS0	23	26
	MCS1	22	25
	MCS2	22	25
	MCS3	21	24
	MCS4	21	24
	MCS5	20	23
	MCS6	19	22
	MCS7	17	20

## 2. RF PARAMETERS

M882E2 supports all modulation modes and rates under 802.11a/n/ac mode. The transmission parameters and the receiver sensitivity parameters table are shown below.

### Transmission Power

Modulation	Data Rate	Single-Chain TX Power (dbm)	2-Chains TX Power (dbm)
5GHz 802.11a	6Mbps	23	26
	9Mbps	23	26
	12Mbps	23	26
	18Mbps	23	26
	24Mbps	23	26
	36Mbps	21	24
	48Mbps	19	22
	54Mbps	18	21
5GHz 802.11n VHT20	MCS0	23	26
	MCS1	22	25
	MCS2	22	25
	MCS3	20	23
	MCS4	20	23
	MCS5	18	21
	MCS6	17	20
	MCS7	16	19
	MCS8	15	18

## Transmission Power

Modulation	Data Rate	Single-Chain TX Power (dbm)	2-Chains TX Power (dbm)
5GHz 802.11n/ac VHT40	MCS0	23	26
	MCS1	22	25
	MCS2	22	25
	MCS3	20	23
	MCS4	20	23
	MCS5	18	21
	MCS6	17	20
	MCS7	16	19
	MCS8	15	18
	MCS9	14	17
5GHz 802.11n/ac VHT80	MCS0	23	26
	MCS1	22	25
	MCS2	22	25
	MCS3	21	24
	MCS4	20	23
	MCS5	18	21
	MCS6	17	20
	MCS7	16	19
	MCS8	15	18
	MCS9	14	17



## Receiver Sensitivity

Modulation	Data Rate	Receiver Sensitivity (dbm)
2.4GHz 802.11b	1Mbps	-94
	5.5Mbps	-93
	11Mbps	-90
2.4GHz 802.11g	6Mbps	-94
	9Mbps	-93
	12Mbps	-93
	18Mbps	-91
	24Mbps	-89
	36Mbps	-84
	48Mbps	-80
	54Mbps	-78
2.4GHz 802.11n (20MHz)	MCS0	-94
	MCS1	-92
	MCS2	-90
	MCS3	-87
	MCS4	-84
	MCS5	-79
	MCS6	-79
	MCS7	-75
2.4GHz 802.11n (40MHz)	MCS0	-90
	MCS1	-86
	MCS2	-84
	MCS3	-83
	MCS4	-80
	MCS5	-76
	MCS6	-73
	MCS7	-72

### Receiver Sensitivity

Modulation	Data Rate	Receiver Sensitivity (dbm)
5GHz 802.11a	6Mbps	-94
	9Mbps	-94
	12Mbps	-92
	18Mbps	-91
	24Mbps	-90
	36Mbps	-82
	48Mbps	-78
	54Mbps	-78
5GHz 802.11n HT20	MCS0	-93
	MCS1	-90
	MCS2	-87
	MCS3	-83
	MCS4	-80
	MCS5	-77
	MCS6	-74
	MCS7	-73
5GHz 802.11n/ac VHT40	MCS8	-70
	MCS0	-90
	MCS1	-88
	MCS2	-85
	MCS3	-82
	MCS4	-80
	MCS5	-75
	MCS6	-73
	MCS7	-73
	MCS8	-70
5GHz 802.11n/ac VHT80	MCS9	-68
	MCS0	-89
	MCS1	-87
	MCS2	-85
	MCS3	-82
	MCS4	-78
	MCS5	-74
	MCS6	-73
	MCS7	-71
	MCS8	-67
	MCS9	-65

## 2. RF PARAMETERS

PIN	PCI定义	信号定义	I/O	描述	备注
1	WAKE#	PCIE_WAKE_N	DO	PCIE唤醒信号	
2	3.3V	+3V3	PI	3.3V电源	
3	Reserved	NC			
4	GND	GND	PI	地	
5	Reserved	NC			
6	1.5V	NC			
7	CLKREQ#	PCIE_CLKREQ_N	DO	PCIE时钟请求	
8	Reserved	NC			
9	GND	GND	PI	地	
10	Reserved	NC			
11	REFCLK-	PCIE_CLK_N	PI	PCIE参考时钟-	
12	Reserved	NC			
13	REFCLK+	PCIE_CLK_P	PI	PCIE参考时钟+	
14	Reserved	NC			
15	GND	GND	PI	地	
16	Reserved	NC			
17	Reserved	NC			
18	GND	GND	PI	地	
19	Reserved	NC		内部悬空	
20	Reserved	W_DISABLE	DI	WLAN关闭信号	
21	GND	GND	PI	地	
22	PERST#	PCIE_RST_N	DI	PCIE复位信号	
23	PERn0	PCIE_RX_P	DO	PCIE数据发送+	
24	+3.3Vaux	+3V3	PI	3.3V电源	
25	PERp0	PCIE_RX_N	DO	PCIE数据发送+	
26	GND	GND	PI	地	
27	GND	GND	PI	地	
28	+1.5V	NC			
29	GND	GND	PI	地	
30	SMB_CLK	NC			
31	PETn0	PCIE_TX_N	DI	PCIE数据接收-	
32	SMB_DATA	NC			
33	PETp0	PCIE_TX_P	DI	PCIE数据接收+	
34	GND	GND	PI	地	
35	GND	GND	PI	地	

PIN	PCI定义	信号定义	I/O	描述	备注
36	USB_D-	NC			
37	Reserved	GND	PI	地	
38	USB_D+	NC			
39	Reserved	+3V3	PI	3.3V电源	
40	GND	GND	PI	地	
41	Reserved	+3V3	PI	3.3V电源	
42	LED_WWAN#	NC			
43	Reserved	GND	PI	地	
44	LED_WLAN#	LED_WLAN	DO	WIFI工作指示	
45	Reserved	NC			
46	LED_WPAN#	NC			
47	Reserved	NC			
48	+1.5V	NC			
49	Reserved	NC			
50	GND	GND	PI	地	
51	Reserved	NC			
52	+3.3V	+3V3	PI	3.3V电源	

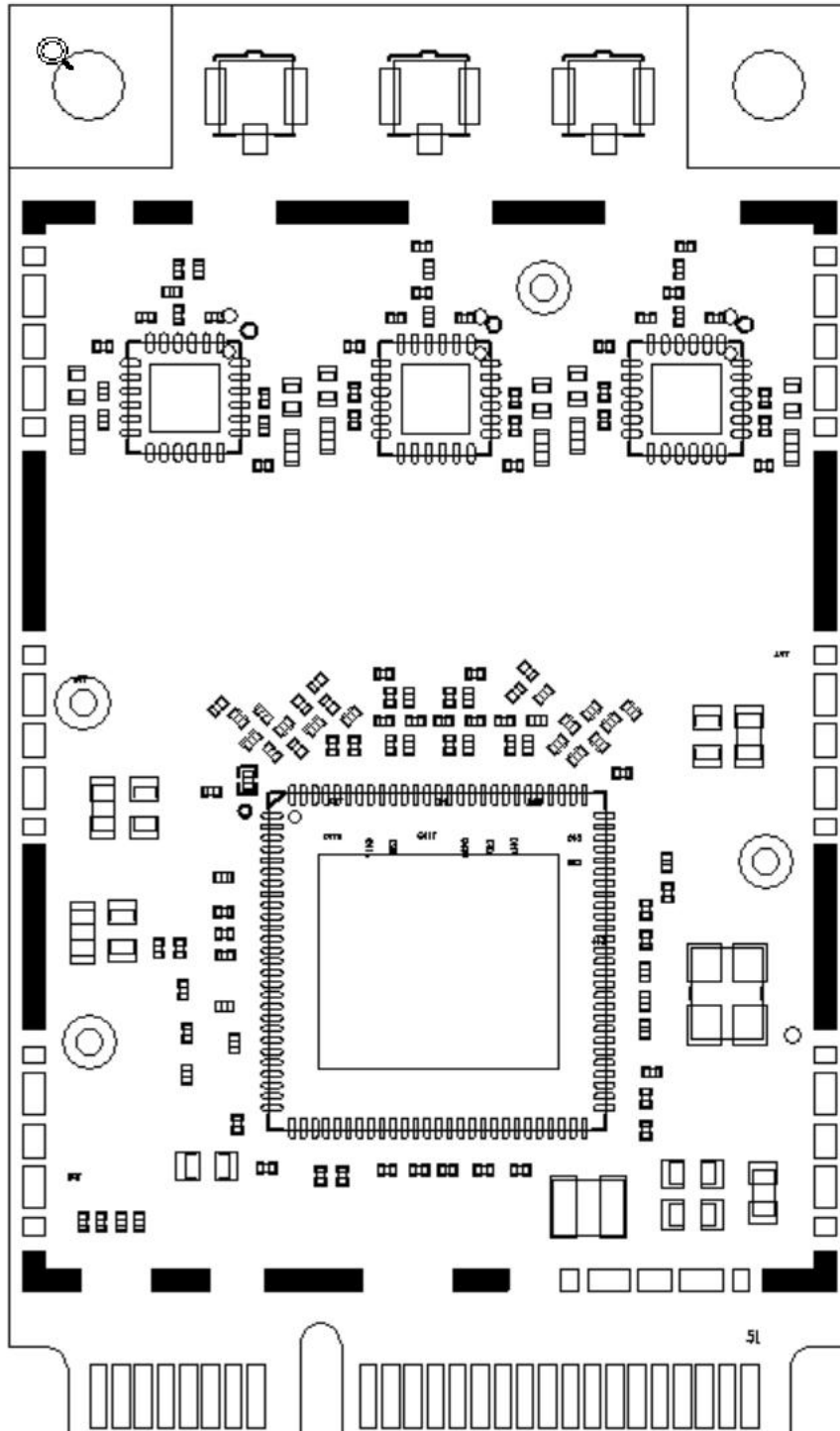
#### 说明1:

P——电源引脚  
D——数字引脚  
I——输入引脚  
O——输出引脚

#### 说明2:

- PCIE\_TX\_P/N可以根据走线做极性翻转
- PCIE\_RX\_P/N可以根据走线做极性翻转

### 3. PCB DIMENSIONS



## 2.2 List of applicable FCC rules

FCC Part15 Subpart C, Section 15.247, FCC Part15 Subpart E, Paragraph 15.407

## 2.3 Specific operational use conditions

### Sufficient Power Supply

Wi-Fi Module is a mini-PCIe module and would be attached to the mini-PCIe interface of the main device. As the transmitter power would require adequate power supply to the module for good performance, it is important to have at least 3.3V and 1A supplying to the module.

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### FCC regulatory information

This device complies with Part 15 of the FCC Rules. Operation is subjected 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.

Warning: Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

### End Device Labelling

Please notice that if the FCC identification number is not visible when the module is installed inside another device, then the outside of the device into which the module is installed must also display a label referring to the enclosed module. This exterior label can use wording such as the following: "Contains FCC ID: 2AS2S-M882E2" or any similar wording that expresses the same meaning may be used.

### RF Exposure Compliance

This equipment complies with FCC radiation exposure limits set forth for an uncontrolled environment. This equipment should be installed and operated with a minimum distance of

20cm between the radiator & your body. This transmitter must not be co-located or operating in conjunction with any other antenna or transmitter.

#### Installation Notice

The module is limited to OEM installation ONLY. The OEM integrator responsible for ensuring that the end-user has no manual instruction to remove or install module.

#### FCC Part 15B Compliance of End Device

The OEM integrator is responsible to ensure that if they need to be compliant with FCC Part 15B Compliance of End Device. If OEM integrator is required to comply with FCC Part 15B Compliance of End Device, they are responsible for ensuring that the host product which is installed and operating with the module is in compliant with Part 15B unintentional Radiator requirements. Please note that for a Class B digital device or peripheral, the instructions furnished the user manual of the end-user product shall include the following or similar statement, placed in a prominent location in the text of the manual:

Note: 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.

## 2.4 Limited Module Procedures

This module is an unrestricted module.

## 2.5 Trace Antenna Designs

Not Applicable.

There is no trace antenna on our Wi-Fi module.

## 2.6 RF Exposure Considerations

This equipment complies with FCC radiation exposure limits set forth for an uncontrolled environment. This equipment should be installed and operated with minimum distance 20cm between the radiator & your body.

FCC INFORMATION (additional)

OEM INTEGRATION INSTRUCTIONS:

This device is intended only for OEM integrators under the following conditions: The module must be installed in the host equipment such that 20 cm is maintained between the antenna and users, and the transmitter module may not be co-located with any other transmitter or antenna. The module shall be only used with the internal antenna(s) that has been originally tested and certified with this module. As long as 3 conditions above are met, further transmitter test will not be required. However, the OEM integrator is still responsible for testing their end-product for any additional compliance requirements required with this module installed (for example, digital device emissions, PC peripheral requirements, etc.).

Validity of using the module certification:

In the event that these conditions cannot be met (for example certain laptop configurations or co-location with another transmitter), then the FCC authorization for this module in combination with the host equipment is no longer considered valid and the FCC ID of the module cannot be used on the final product. In these circumstances, the OEM integrator will be responsible for re-evaluating the end product (including the transmitter) and obtaining a separate FCC authorization.

## 2.7 Antennas

Antenna Used:

1.5dBi Dipole Dual Band (2.4GHz and 5GHz) Antenna.





## 2.8 Label and compliance information

FCC ID: 2AS2S-M882E2

The final end product must be labeled in a visible area with the following: “Contains FCC ID: 2AS2S-M882E2”. Information that must be placed in the end user manual:

The OEM integrator has to be aware not to provide information to the end user regarding how to install or remove this RF module in the user's manual of the end product which integrates this module. The end user manual shall include all required regulatory information/warning as shown in this manual.

The module is not applicable for Limited module procedures. The module is a Single module and complies with the requirement of FCC Part 15.247

Warning: Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

NOTE: This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to 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

## 2.9 Information on test modes and additional testing requirements

To investigate the maximum EMI emission characteristics generated from EUT, the test system was prescanning tested based on the consideration of following EUT operation mode or test configuration mode which possibly have effect on EMI emission level. Each of these EUT operation mode(s) or test configuration mode(s) mentioned above was evaluated respectively.

### RADIATED EMISSION TEST (BELOW 1GHz):

Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, data rates, XYZ axis and antenna ports (if EUT with antenna diversity architecture).

For the test results, only the worst case was shown in test report.

### RADIATED EMISSION TEST (ABOVE 1GHz):

Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, data rates, XYZ axis and antenna ports (if EUT with antenna diversity architecture).

## 2.10 Additional testing Part 15 Subpart B disclaimer

The grantee should include a statement that the modular transmitter is **only** FCC authorized for the specific rule parts (i.e., FCC transmitter rules) listed on the grant, and that the host product manufacturer is responsible for compliance to any other FCC rules that apply to the host not covered by the modular transmitter grant of certification. If the grantee markets their product as being Part 15 Subpart B compliant (when it also contains unintentional-radiator digital circuitry), then the grantee shall provide a notice stating that the final host product still requires Part 15 Subpart B compliance testing with the modular transmitter installed.