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QRF-0600

ZigBee Module

User Manual

(Preliminary)

Doc. #: AN-QRF-0600-01

<Rev. 0.2>

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QuadRep Electronics [T] Ltd.

16F-1, No. 75, Hsin Tai Wu Rd, Sec.1,

His-Chih, Taipei, Taiwan

TEL: +886-2-26989933

FAX: +886-2-26989911

[http:// www.quadrep.com.tw](http://www.quadrep.com.tw)

[http:// www.quadrep.com.cn](http://www.quadrep.com.cn)



Revision History

Version	Description of Change	Editor	Date
0.1	Initial version	Liwei	2010/12/21
0.2	Add Sleep Power	Liwei	2011/02/01

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1. GENERAL INFORMATION

The QRF-0600 module is a high output power (over 18dBm at antenna output) system that integrates RF IC, PA, LNA antenna, other necessary components such as crystal, switches, resistors and capacitors. The purpose of the QRF-0600 module is to provide our customers a flexible and reliable module for their application development. There are two interfaces for the QRF-0600 module. It's simple and convenient to program for both 802.15.4 and ZIGBEE applications.

UZ2400D, 802.15.4 compliant transceiver, features a maximum 5 MHz serial interface when operating at 20MHz for various control purposes and it is a serial interface slave device. The basic serial interface consists of 4-wired bus: SCLK, SI, SO, and SEN. It provides accesses to various storage units: MAC/BB/RF control/status registers, TXFIFOs, RXFIFO and security key table.



2. PCBA PICTURES AND MECHANICAL DRAWING

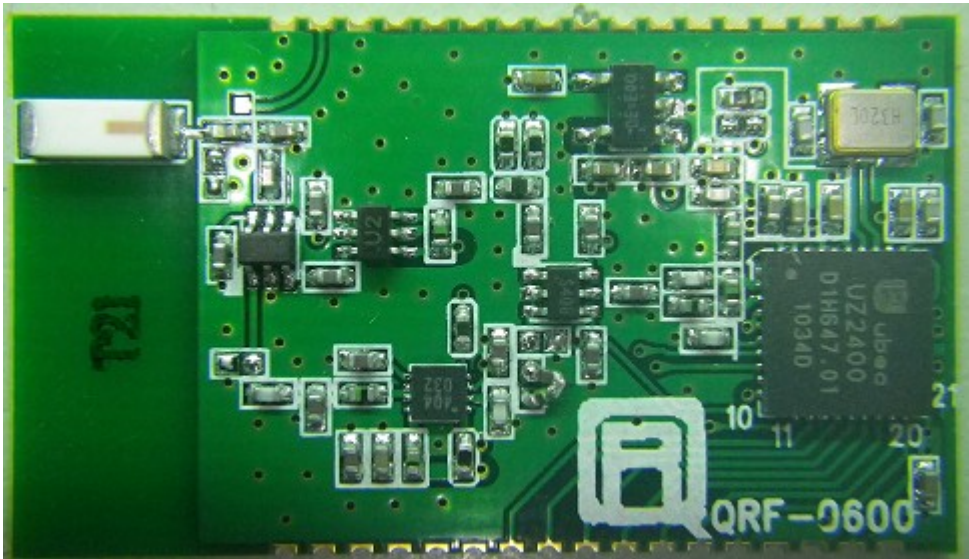


Figure 1 Front view of QRF-0600 Module

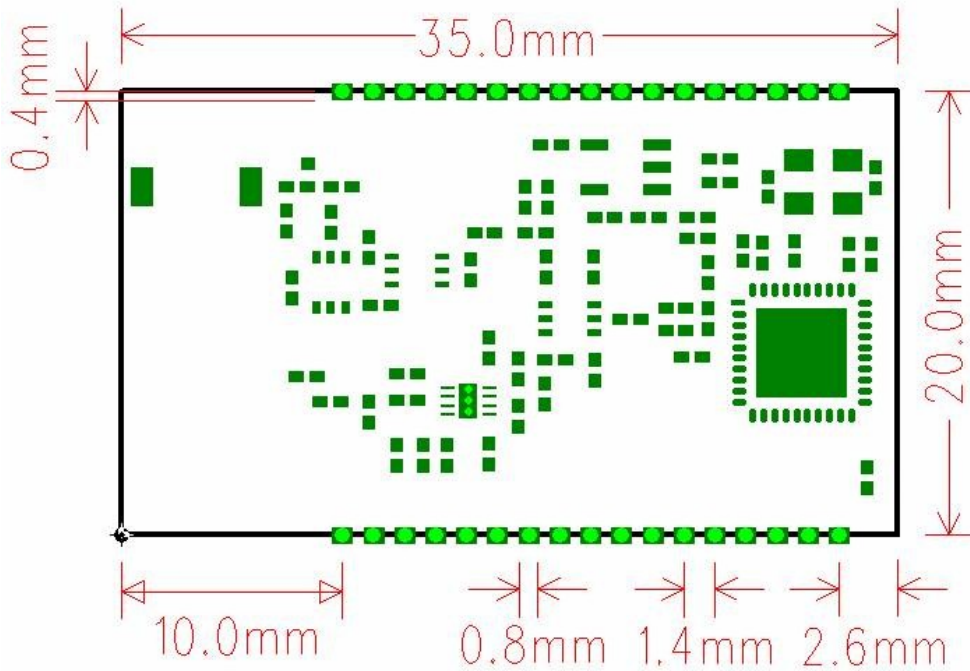


Figure 2 PCB mechanical drawing of QRF-0600 Module (front view)

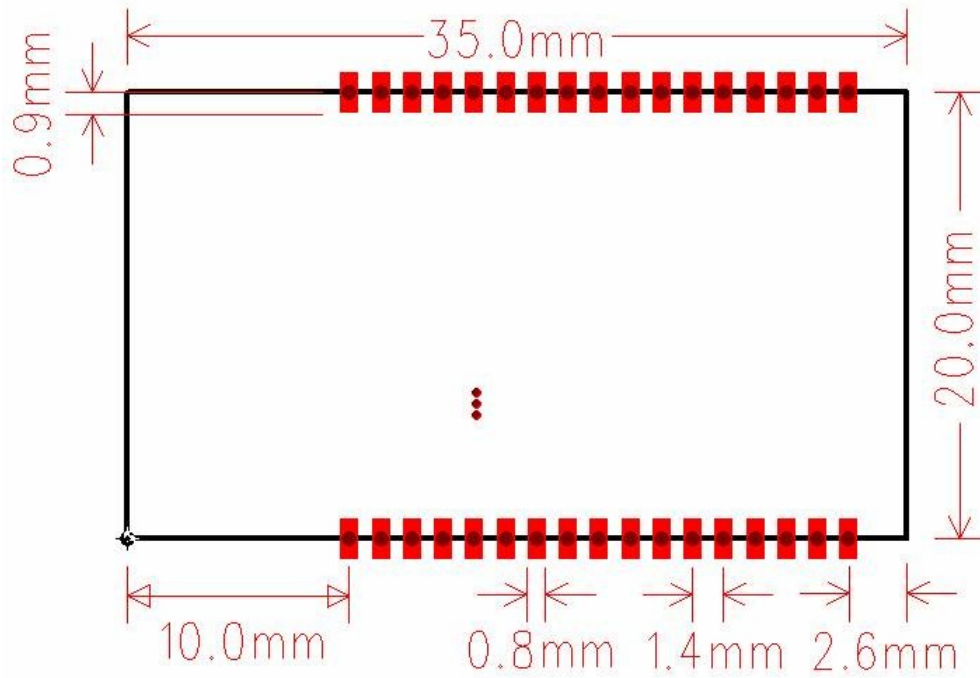


Figure 3 PCB mechanical drawing of QRF-0600 Module (Back view)

Note 1: The PCB size is 35 x 20 (cm²).

Note 2: The PCBA thickness is 2.2 mm (the highest component)

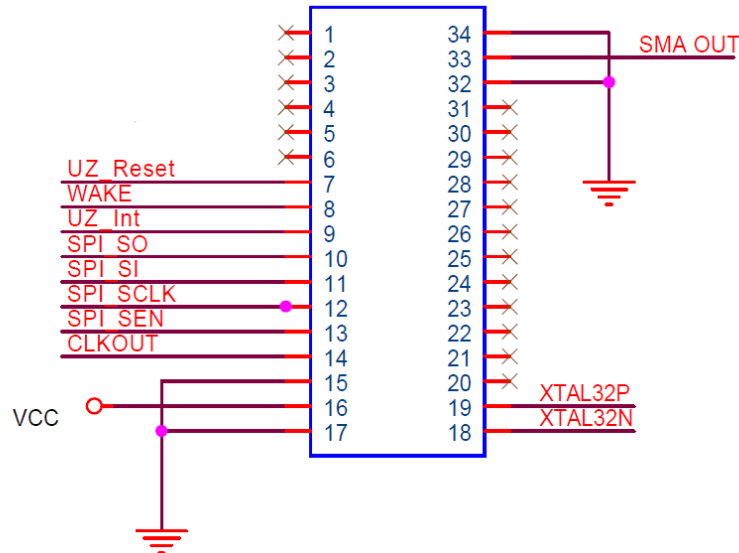


3. ANTENNA

This module adopts chip-antenna for minimizing the PCB size. User owns the flexibility to use an external antenna. When user uses external antenna, please re-solder from internal chip antenna side to external SMA (TP1).

4. POWER SUPPLY

Pad 16 is VCC input on QRF-0600 QuadRep ZigBee module. The voltage range is from 3.0V to 3.3V

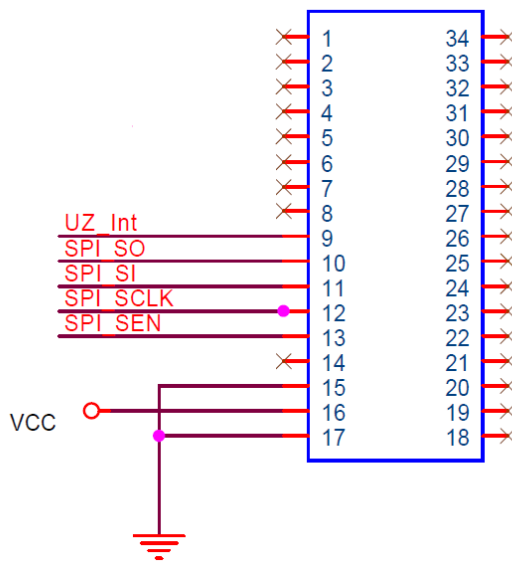
**5. QRF-0600 PAD DEFINITION**

Pad number	Name	Function	Definition
1	None	Don't use	
2	None	Don't use	
3	None	Don't use	
4	None	Don't use	
5	None	Don't use	
6	None	Don't use	
7	UZ-Reset	UZ2400D Reset	UZ2400D PIN 13
8	Wake	UZ2400D Wake	UZ2400D PIN 15
9	UZ-Int	UZ2400D Interrupt	UZ2400D PIN 16
10	SPI_SO	UZ2400D SPI SO	UZ2400D PIN 17
11	SPI_SI	UZ2400D SPI SI	UZ2400D PIN 18
12	SPI_SCLK	UZ2400D SPI CLK	UZ2400D PIN 19
13	SPI_SEN	UZ2400D SPI SEN	UZ2400D PIN 20
14	CLKOUT	UZ2400D Clock out	UZ2400D PIN 26
15	GND	Grand	
16	VCC	Power in	
17	GND	Grand	
18	XTAL32N	UZ2400D Extra Oscillators	UZ2400D PIN 27
19	XTAL32P	UZ2400D Extra Oscillators	UZ2400D PIN 28
20	None	Don't use	
21	None	Don't use	
22	None	Don't use	
23	None	Don't use	
24	None	Don't use	
25	None	Don't use	



26	None	Don't use	
27	None	Don't use	
28	None	Don't use	
29	None	Don't use	
30	None	Don't use	
31	None	Don't use	
32	GND	Grand	
33	SMA OUT	Extra Antenna	SMA connect pad
34	GND	Grand	

At least connect external lines for QRF-0600 module



**6. ELECTRICAL SPECIFICATIONS**

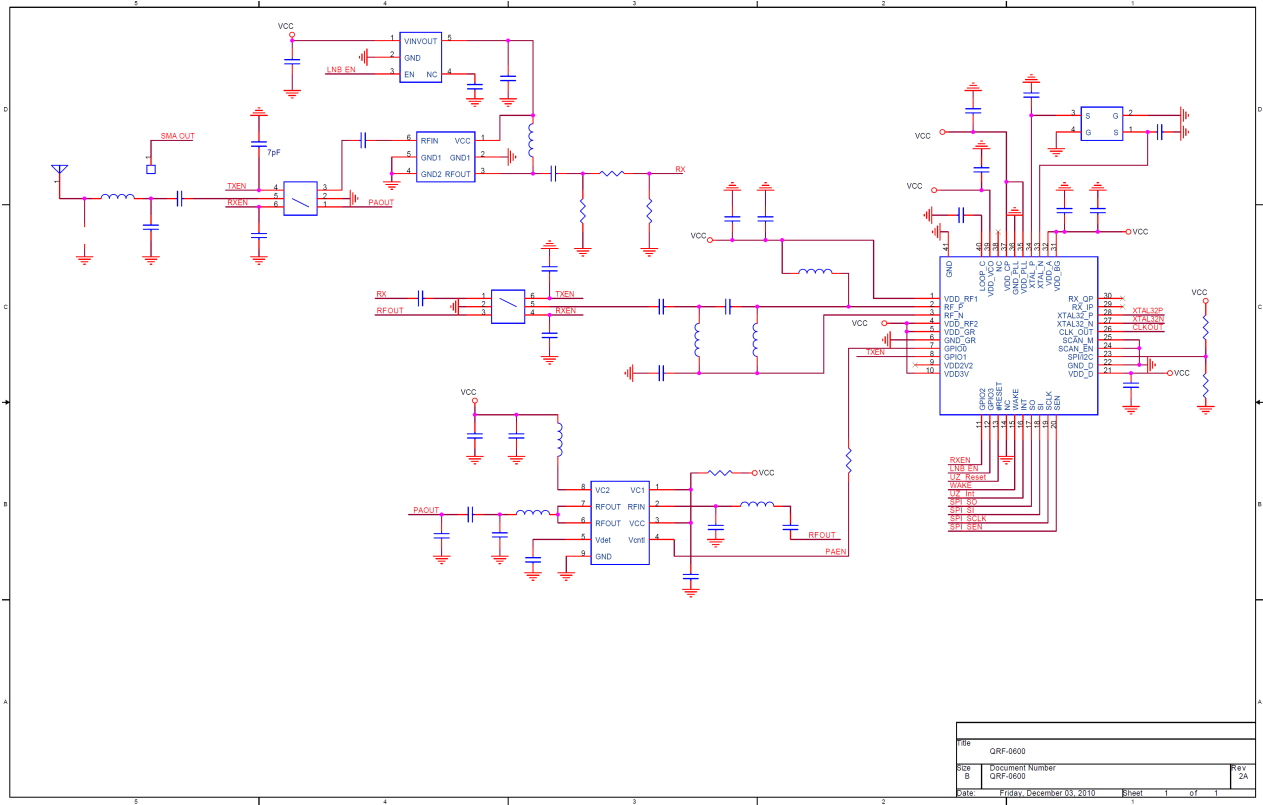
Absolute Maximum Rating	
VCC	3.6V
Storage temperature	-40°C to +120°C
Operating temperature Range	-30°C to +80°C

WARNING: Exceeding any of these ratings will void the warranty and may damage the device

Parameters	Min	Typ	Max	Units
Supply Voltage for RF, analog and digital circuits	3	3.3	3.6	V
Supply Voltage for Digital I/O	3	3.3	3.6	V
Current Consumption				
ACTIVE TX Mode @ 18 dBm		76		mA
ACTIVE RX Mode		40		mA
Sleep Mode		1.8		mA
Output Power		18		dBm
Wireless Receive Sensitivity		-102		dBm
Selectable Channels		16		channel
Frequency Band	2.400		2.835	GHz
Antenna Output Impedance		50		Ohms



7. CIRCUIT DIAGRAM

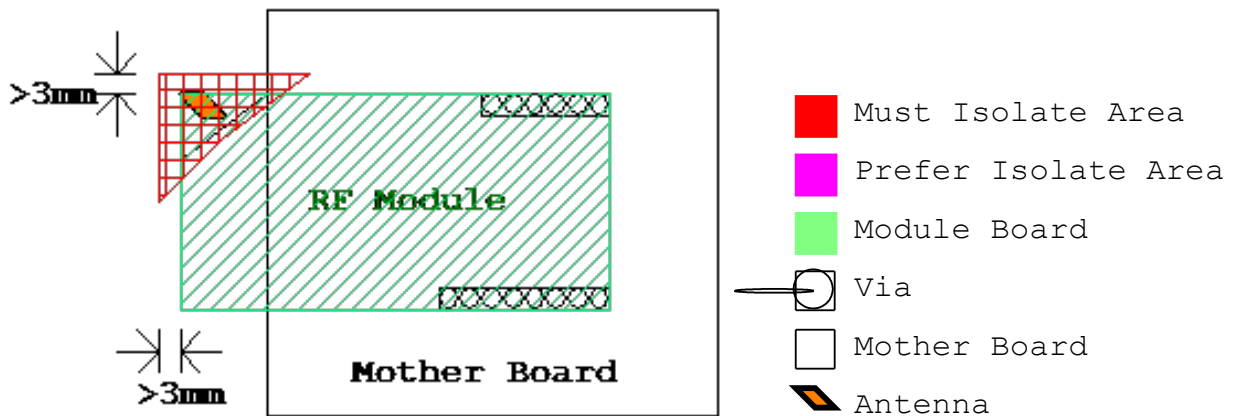




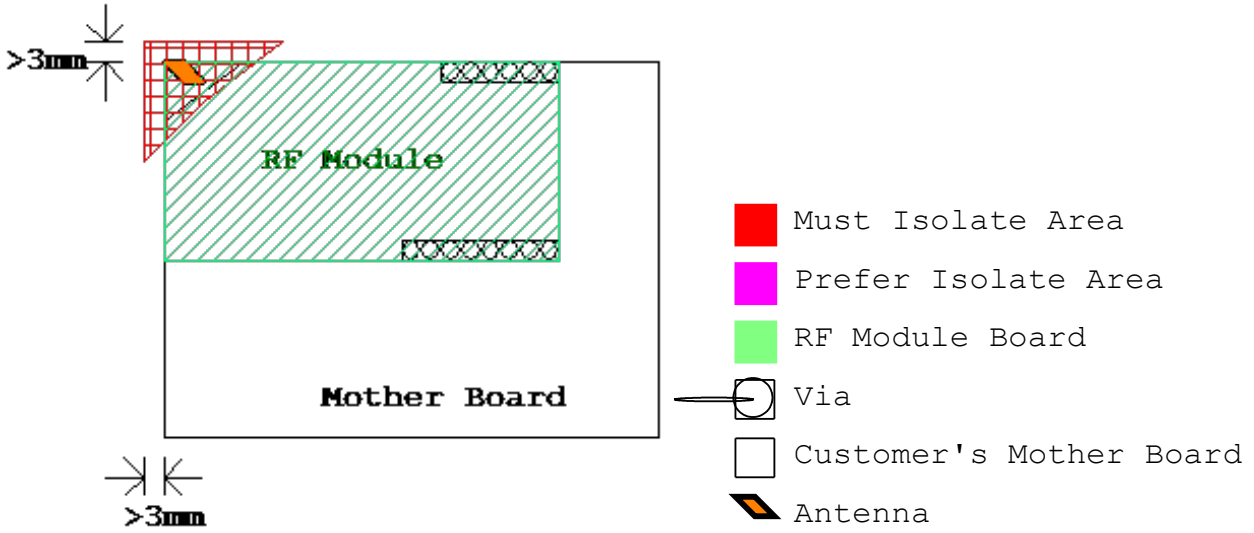
8. DESIGN GUIDE TO AVOID RF INTERFERENCE

When RF module put on an application board (mother board), to minimize the RF signal interference, the best way is to define an isolation area. This area should have no any trace or grounding pad. Here are some layout suggestions for mother board.

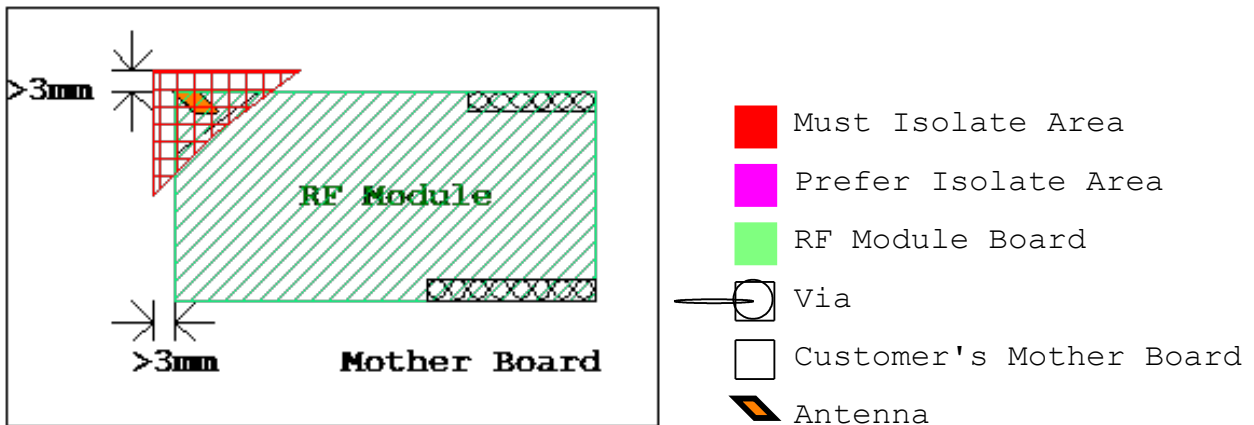
Suggestion 1: Place RF board aside mother board. (Let antenna part outside mother board is better) Make sure no trace and grounding pad under the must isolate area. Please see the drawing as below.



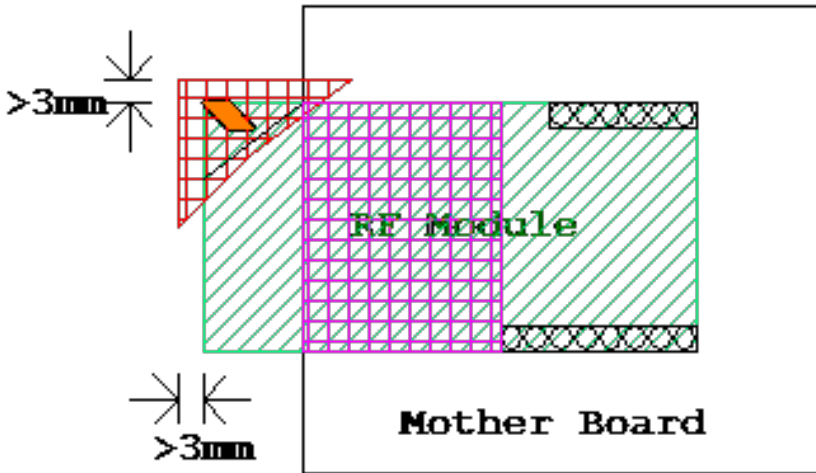
Suggestion 2: Place RF board at the corner of mother board. Make sure no trace and grounding pad under the must isolate area. Please see the drawing as below.









Suggestion 3: If you couldn't put RF board at one side or at the corner of mother board. You must make sure no circuit trace and grounding pad under the must isolate area, and at least reserve extra 3 mm space as safety area. Please see the drawing as below.

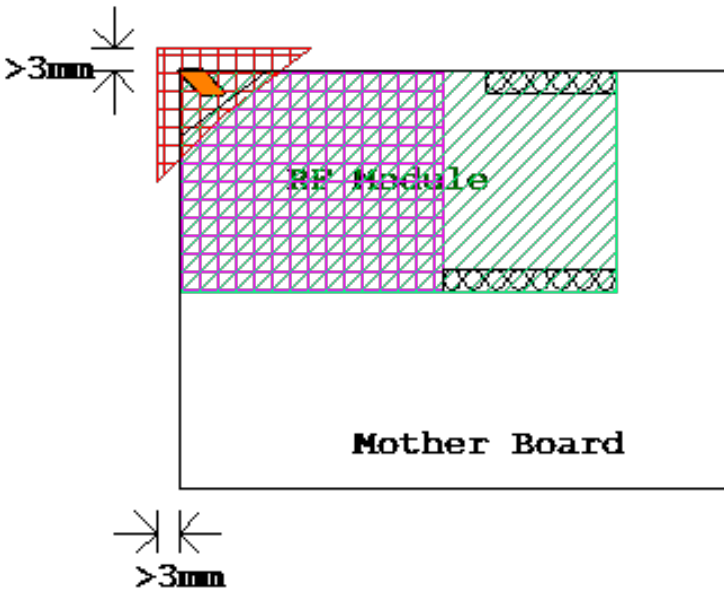


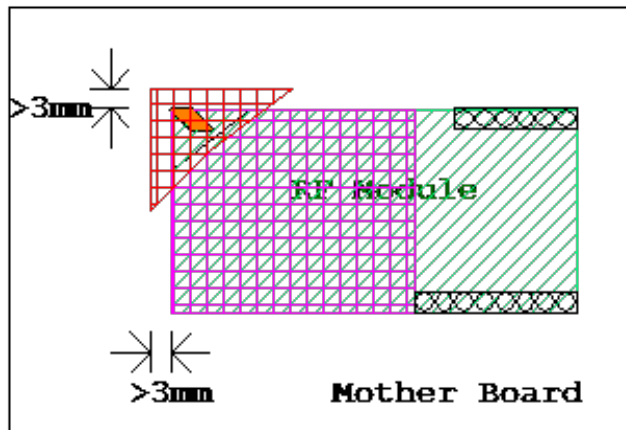
For all of above suggestions, try to extend isolation area from must area to prefer area. Please see the drawing as below. The more isolation area, the better RF performance.




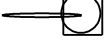




-  Must Isolate Area
-  Prefer Isolate Area
-  RF Module Board

-  Via
-  Customer's Mother Board
-  Antenna





-  Must Isolate Area
-  Prefer Isolate Area
-  RF Module Board
-  Via
-  Customer's Mother Board
-  Antenna



9. MAX RF POWER

The power amplifier is designed for the little single. The default power of UZ2400D (0 dBm) is too big for PA. If sending 0 dBm power into PA, it causes non-linearity gain and EVM become bigger.

For linearity gain and good EVM of PA, the maximum input power of PA is -2 dBm. So you should reduce the output power of UZ2400D 2 dBm.

10. REFERENCE DOCUMENTS

10.1 UBEC UZ2400D datasheet

10.2 ACX AT5020 datasheet

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QuadRep Electronics [T] Ltd.

16F-1, No. 75, Hsin Tai Wu Rd, Sec.1, His-Chih, Taipei, Taiwan

TEL: +886-2-26989933

FAX: +886-2-26989911

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