

RF EXPOSURE REPORT



Report No.: 16050031-FCC-H-V2

Applicant	Quectel Wireless Solutions Co., Ltd.	
Product Name	WiFi Module	
Model No.	FC20-N	
Serial No.	N/A	
Test Standard	FCC 2.1091: 2016	
Test Date	February 07 to March 01, 2017	
Issue Date	April 18, 2017	
Test Result	☒ Pass ☐ Fail	
Equipment complied with the specification ☒		
Equipment did not comply with the specification ☐		
		
Loren Test Engineer	David Huang Checked By	
This test report may be reproduced in full only Test result presented in this test report is applicable to the tested sample only		

Issued by:

SIEMIC (SHENZHEN-CHINA) LABORATORIES

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Laboratories Introduction

SIEMIC, headquartered in the heart of Silicon Valley, with superior facilities in US and Asia, is one of the leading independent testing and certification facilities providing customers with one-stop shop services for Compliance Testing and Global Certifications.



In addition to testing and certification, SIEMIC provides initial design reviews and compliance management throughout a project. Our extensive experience with China, Asia Pacific, North America, European, and International compliance requirements, assures the fastest, most cost effective way to attain regulatory compliance for the global markets.

Accreditations for Conformity Assessment

Country/Region	Scope
USA	EMC, RF/Wireless, SAR, Telecom
Canada	EMC, RF/Wireless, SAR, Telecom
Taiwan	EMC, RF, Telecom, SAR, Safety
Hong Kong	RF/Wireless, SAR, Telecom
Australia	EMC, RF, Telecom, SAR, Safety
Korea	EMI, EMS, RF, SAR, Telecom, Safety
Japan	EMI, RF/Wireless, SAR, Telecom
Singapore	EMC, RF, SAR, Telecom
Europe	EMC, RF, SAR, Telecom, Safety

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1. Report Revision History

Report No.	Report Version	Description	Issue Date
16050031-FCC-H	NONE	Original	March 02, 2017
16050031-FCC-H-V1	V1	P9 Change 2412(MHz)high frequency into 2412(MHz)low	April 12, 2017
16050031-FCC-H-V2	V2	Changed the antenna type	April 18, 2017

2. Customer information

Applicant Name	Quectel Wireless Solutions Co., Ltd.
Applicant Add	RM501,Building 13,No.99 TianZhou Road,Xuhui District,Shanghai,China
Manufacturer	Quectel Wireless Solutions Co., Ltd.
Manufacturer Add	RM501,Building 13,No.99 TianZhou Road,Xuhui District,Shanghai,China

3. Test site information

Lab performing tests	SIEMIC (Shenzhen-China) LABORATORIES
Lab Address	Zone A, Floor 1, Building 2 Wan Ye Long Technology Park South Side of Zhoushi Road, Bao' an District, Shenzhen, Guangdong China 518108
FCC Test Site No.	718246
IC Test Site No.	4842E-1
Test Software	Labview of SIEMIC version 2.0

4. Equipment under Test (EUT) Information

Description of EUT:	WiFi Module
Main Model:	FC20-N
Serial Model:	N/A
Equipment Category :	DTS
Antenna Gain:	3dBi
Antenna Type:	Fixed external antenna
Input Power:	Main supply voltage: 3.3V, 500mA IO supply voltage: 1.8V
Trade Name :	Quectel
FCC ID:	XMR201703FC20N
Type of Modulation:	802.11b/g/n: DSSS, OFDM
RF Operating Frequency (ies):	WIFI: 802.11b/g/n(20M): 2412-2462 MHz WIFI: 802.11n(40M): 2422-2452 MHz
Number of Channels:	WIFI :802.11b/g/n(20M): 11CH WIFI :802.11n(40M): 7CH
Port:	N/A
Date EUT received:	February 06, 2017
Test Date(s):	February 07 to March 01, 2017

5. FCC §2.1091 - Maximum Permissible exposure (MPE)

5.1 Applicable Standard

According to §1.1307(b)(1), systems operating under the provisions of this section shall be operated in a manner that ensures that the public is not exposed to radio frequency energy level in excess of the Commission' s guidelines.

According to §1.1310 and §2.1091 RF exposure is calculated.

Limits for General Population/Uncontrolled Exposure

Limits for General Population/Uncontrolled Exposure				
Frequency Range (MHz)	Electric Field Strength (V/m)	Magnetic Field Strength (A/m)	Power Density (mW/cm ²)	Averaging Time (minutes)
0.3-1.34	614	1.63	*(100)	30
1.34-30	824/f	2.19/f	*(180/f ²)	30
30-300	27.5	0.073	0.2	30
300-1500	/	/	f/1500	30
1500-100,000	/	/	1.0	30

f = frequency in MHz

* = Plane-wave equivalent power density

5.2 Test Result

Type	Test mode	CH	Freq (MHz)	Conducted Power (dBm)	Tune Up Power (dBm)
Output power	802.11b	Low	2412	15.91	15.5±1
		Mid	2437	15.82	15.5±1
		High	2462	15.74	15.5±1
	802.11g	Low	2412	13.60	14±1
		Mid	2437	13.76	14±1
		High	2462	13.71	14±1
	802.11n (20M)	Low	2412	13.71	14±1
		Mid	2437	13.81	14±1
		High	2462	13.71	14±1
	802.11n (40M)	Low	2422	12.92	13±1
		Mid	2437	12.75	13±1
		High	2452	12.78	13±1

Predication of MPE limit at a given distance

$$S = \frac{PG}{4\pi R^2}$$

Where: S = power density (in appropriate units, e.g. mW/cm²)

P = power input to the antenna (in appropriate units, e.g., mW).

G = power gain of the antenna in the direction of interest relative to an isotropic radiator, the power gain factor, is normally numeric gain.

R = distance to the center of radiation of the antenna (appropriate units, e.g., cm)

For the antenna manufacturer provide only used limited to ERP/EIRP or radiated spurious emission test. The MPE evaluation as below:

Maximum output power at antenna input terminal: 16.5 (dBm)

Maximum output power at antenna input terminal: 79.43(mW)

Prediction distance: >20 (cm)

Predication frequency: 2412 (MHz) Low frequency

Antenna Gain (typical): 3 (dBi)

Antenna Gain (typical): 1.995 (numeric)

The worst case is power density at predication frequency at 20 cm: 0.0177(mW/cm²)

MPE limit for general population exposure at prediction frequency: 1.0 (mW/cm²)

$0.0177(\text{mW}/\text{cm}^2) < 1.0 (\text{mW}/\text{cm}^2)$

Result: Pass