



# **TEST REPORT**

# Applicant: Fibocom Wireless Inc.

Address: 1101, Tower A, Building 6, Shenzhen International Innovation Valley, Dashi 1st Rd, Nanshan, ShenZhen, China

## FCC ID: ZMOSQ808NA

Product Name: LTE Module

## Standard(s): 47 CFR Part 15, Subpart C(15.247) ANSI C63.10-2013 KDB 558074 D01 15.247 Meas Guidance v05r02

The above device has been tested and found compliant with the requirement of the relative standards by China Certification ICT Co., Ltd (Dongguan)

Report Number: CR231167139-00C

Date Of Issue: 2024/3/16

**Reviewed By:** Calvin Chen

Calvin Ohen

Title:RF EngineerApproved By:Sun Zhong

Sun 2hong

Title: Manager

**Test Laboratory:** China Certification ICT Co., Ltd (Dongguan) No. 113, Pingkang Road, Dalang Town, Dongguan, Guangdong, China Tel: +86-769-82016888

#### **Test Facility**

The Test site used by China Certification ICT Co., Ltd (Dongguan) to collect test data is located on the No. 113, Pingkang Road, Dalang Town, Dongguan, Guangdong, China.

The lab has been recognized as the FCC accredited lab under the KDB 974614 D01 and is listed in the FCC Public Access Link (PAL) database, FCC Registration No. : 442868, the FCC Designation No. : CN1314.

#### Declarations

China Certification ICT Co., Ltd (Dongguan) is not responsible for the authenticity of any test data provided by the applicant. Data included from the applicant that may affect test results are marked with a triangle symbol "▲". Customer model name, addresses, names, trademarks etc. are not considered data.

Unless otherwise stated the results shown in this test report refer only to the sample(s) tested.

This report cannot be reproduced except in full, without prior written approval of the Company.

This report is valid only with a valid digital signature. The digital signature may be available only under the Adobe software above version 7.0.

This report may contain data that are not covered by the accreditation scope and shall be marked with an asterisk " $\star$ ".

# CONTENTS

DOCUMENT REVISION HISTORY	5
1. GENERAL INFORMATION	6
1.1 PRODUCT DESCRIPTION FOR EQUIPMENT UNDER TEST (EUT)	6
1.2 DESCRIPTION OF TEST CONFIGURATION	8
<ul> <li>1.2.1 EUT Operation Condition:</li> <li>1.2.2 Support Equipment List and Details</li> <li>1.2.3 Support Cable List and Details</li> <li>1.2.4 Block Diagram of Test Setup</li> <li>1.3 MEASUREMENT UNCERTAINTY</li> </ul>	8 8 9
2. SUMMARY OF TEST RESULTS	.11
3. REQUIREMENTS AND TEST PROCEDURES	.12
3.1 AC LINE CONDUCTED EMISSIONS	12
<ul> <li>3.1.1 Applicable Standard</li></ul>	13 13 14 14
3.2 RADIATION SPURIOUS EMISSIONS	
<ul> <li>3.2.1 Applicable Standard.</li> <li>3.2.2 EUT Setup.</li> <li>3.2.3 EMI Test Receiver &amp; Spectrum Analyzer Setup</li> <li>3.2.4 Test Procedure</li></ul>	15 16 17 17
3.3.1 Applicable Standard	18
3.3.2 EUT Setup	18
3.4.1 EUT Setup	19
3.4.2 Test Procedure	19
<ul> <li>3.5.1 Applicable Standard</li></ul>	20 20
3.6.1 Applicable Standard	21
3.6.2 EUT Setup	21
3.6.3 Test Procedure	
3.7.1 Applicable Standard	
3.7.2 EUT Setup	22
3.7.3 Test Procedure	22

Page 3 of 48

#### Report No.: CR231167139-00C

3.8 DUTY CYCLE	23
3.8.1 EUT Setup	
3.9 ANTENNA REQUIREMENT	23
3.9.1 Applicable Standard	
4. Test DATA AND RESULTS	
4.1 AC LINE CONDUCTED EMISSIONS	24
4.2 RADIATION SPURIOUS EMISSIONS	27
4.3 SPOT CHECK FOR MAXIMUM CONDUCTED OUTPUT POWER	44
4.4 DUTY CYCLE	45
5. EUT PHOTOGRAPHS	
6. TEST SETUP PHOTOGRAPHS	

# **DOCUMENT REVISION HISTORY**

Revision Number	Report Number Description of Revision		Date of Revision
1.0 CR231167139-00C		Class II Permissive Change	2024/3/16
		Report	202 11 51 10

# **1. GENERAL INFORMATION**

#### 1.1 Product Description for Equipment under Test (EUT)

EUT Name:	LTE Module	
EUT Model:	SQ808-NA	
<b>Operation Frequency:</b>	2412-2462MHz(802.11b/g/n ht20)	
Maximum Peak Output Power (Conducted):	1 / 23 (Bm(x)) / 1 / (n)	
Modulation Type:	802.11b:DSSS-DBPSK, DQPSK, CCK 802.11g/n:OFDM-BPSK, QPSK, 16QAM, 64QAM	
Rated Input Voltage:	5Vdc from Adapter or 7.4Vdc from battery	
Serial Number:	2DS1-1 (For RF Conducted Test&Screen 1#) 2DS1-6 (For RE/CE Test&Screen 1#)	
EUT Received Date:	2023/11/17	
EUT Received Status:	Good	
Tart Darman		

#### **Test Purpose:**

This is Class II permissive Change application for FCC ID: ZMOSQ808NA, certified on 08/05/2020. The change was below, which was provided by manufacturer ▲:

1. Build the module into the certified host, host FCC ID: XKB-DX4CL4GWBT.

Per Spot check with the RF output power, the change not affect the RF parameters, so AC line conducted emission and radiated spurious emission were tested in this report.

# **Operation Frequency Detail:**

For 802.11b/g/n ht20:

Channel	Frequency (MHz)	Channel	Frequency (MHz)
1	2412	7	2442
2	2417	8	2447
3	2422	9	2452
4	2427	10	2457
5	2432	11	2462
6	2437	/	/
Per section 15.31(m), the	below frequencies were perform	ned the test as below:	
Test	Channel		quency MHz)
Lo	owest	,	2412
N	liddle	,	2437
H	ighest		2462

#### **Antenna Information Detail**▲:

Antenna Manufacturer	Antenna Type	input impedance (Ohm)	Frequency Range	Antenna Gain	
Fuzhou ZHONGTIANXUN communication technology Co., Ltd	IFA	50	2.4~2.5GHz	3.66 dBi	
The Method of §15.203 Compliance:					

Antenna use a unique type of connector to attach to the EUT.

Unit was professionally installed, and installer shall be responsible for verifying that the correct antenna is employed with the unit.

#### **Host Configuration Detail:**

Configuration	Item	Manufacturer	Model
1#	Screen	GuangDonghongbosheng Optoelectronic Technology Co.,Ltd.	MDT0500L
2#	Screen	GuangDonghongbosheng Optoelectronic Technology Co.,Ltd.	MDT0500M
3#	Screen	Shenzhen Great Prospect Optoelectronics Co.,Ltd.	MDT0500N

#### **Accessory Information:**

Accessory Description	Manufacturer	Model	Parameters		
Adapter 1#	Xiamen Keli Electronics Co.,Ltd.	SW-0983	Input: 100-240V~50/60Hz, 0.5A Output: 5.0V, 2.0A		
Adapter 2#	Jiangxi Jian Aohai Technology Co.,Ltd.	A319-050200U-US2	Input: 100-240V~50/60Hz,0.3A Output: 5.0V, 2.0A		
Adapter 3#	SHENZHEN KEYU POWER SUPPLY TECHNOLOGY CO.,LTD.	KA12C-0502000US	Input: 100-240V~50/60Hz, 0.35A Output: 5.0V, 2000mA		

#### **1.2 Description of Test Configuration 1.2.1 EUT Operation Condition:** For 802.11b/g/n:

EUT Operation Mode:	The system was configured for testing in Engineering Mode, which was provided by the manufacturer. Tests was performed with the Screen 1#+Adapter 1#, because it was the worst which was base on Host test report:CR231167140-00B.
<b>Equipment Modifications:</b>	No
EUT Exercise Software:	QRCT3

The software was provided by manufacturer. The maximum power was configured as below, that was provided by the manufacturer  $\blacktriangle$ :

Test Medes	Data	Power Level Setting			
Test Modes Rate		Lowest Channel	Middle Channel	Highest Channel	
802.11b	1Mbps	14	14	14	
802.11g	6Mbps	6	6	6	
802.11n ht20	MCS0	6	6	6	

The above are the worst-case data rates, which are determined for each mode based upon investigations by measuring the average power and PSD across all data rates, bandwidths, and modulations.

#### **1.2.2 Support Equipment List and Details**

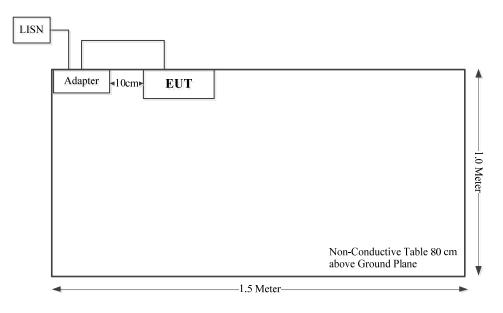
Manufacturer Description		Model	Serial Number
/	/	/	/

#### **1.2.3 Support Cable List and Details**

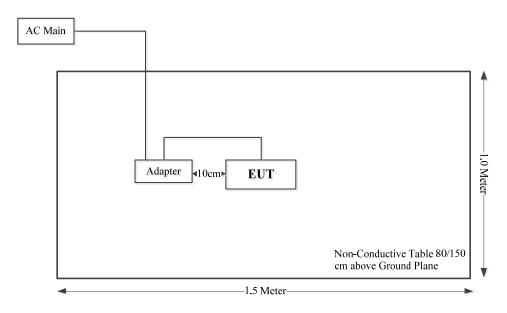
Cable Description	Shielding Type	Ferrite Core	Length (m)	From Port	То
USB Cable	No	No	1.2	Adapter 1#	EUT

#### 1.2.4 Block Diagram of Test Setup

AC line conducted emissions:



Radiated Spurious Emissions:



### **1.3 Measurement Uncertainty**

Otherwise required by the applicant or Product Regulations, Decision Rule in this report did not consider the uncertainty. The extended uncertainty given in this report is obtained by combining the standard uncertainty times the coverage factor K with the 95% confidence interval.

Parameter	Measurement Uncertainty
Occupied Channel Bandwidth	±5 %
RF output power, conducted	±0.61dB
Power Spectral Density, conducted	±0.61 dB
	9kHz~30MHz: 4.12dB,30M~200MHz: 4.15 dB,200M~1GHz: 5.61
Unwanted Emissions, radiated	dB,1G~6GHz: 5.14 dB, 6G~18GHz: 5.93 dB,
	18G~26.5G:5.47 dB,26.5G~40G:5.63 dB
Unwanted Emissions, conducted	±1.26 dB
Temperature	±1℃
Humidity	$\pm 5\%$
DC and low frequency voltages	$\pm 0.4\%$
Duty Cycle	1%
AC Power Lines Conducted Emission	2.8 dB (150 kHz to 30 MHz)

# **2. SUMMARY OF TEST RESULTS**

Standard(s) Section	Test Items	Result	Note
§15.207(a)	AC Line Conducted Emissions	Compliant	/
§15.205, §15.209, §15.247(d)	Spurious Emissions	Compliant	/
§15.247 (a)(2)	Minimum 6 dB Bandwidth	Note*	Original report page 17~27
§15.247(b)(3)	Maximum Conducted Output Power	Compliant	Reporting
§15.247(d)	100 kHz Bandwidth Of Frequency Band Edge	Note*	Original report page 34-38
§15.247(e)	Power Spectral Density	Note*	Original report page 28~33
§15.203	Antenna Requirement	Compliant	/

Note\*: per spot check with the output power, the RF parameters identical with the original module, the result please refer to the original report: ZR/2020/6002802, which was released by SGS-CSTC Standards Technical Services Co., Ltd. Shenzhen Branch

China Certification ICT Co., Ltd (Dongguan) is not responsible for the authenticity of any test data provided in the original report.

# **3. REQUIREMENTS AND TEST PROCEDURES**

#### 3.1 AC Line Conducted Emissions

#### **3.1.1 Applicable Standard**

FCC§15.207(a).

(a) Except as shown in paragraphs (b) and (c) of this section, for an intentional radiator that is designed to be connected to the public utility (AC) power line, the radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies, within the band 150 kHz to 30 MHz, shall not exceed the limits in the following table, as measured using a 50  $\mu$ H/50 ohms line impedance stabilization network (LISN). Compliance with the provisions of this paragraph shall be based on the measurement of the radio frequency voltage between each power line and ground at the power terminal. The lower limit applies at the boundary between the frequency ranges.

	Conducted limit (dBµV)	
Frequency of emission (MHz)	Quasi-peak	Average
0.15-0.5	66 to 56*	56 to 46*
0.5-5	56	46
5-30	60	50

\*Decreases with the logarithm of the frequency.

(b) The limit shown in paragraph (a) of this section shall not apply to carrier current systems operating as intentional radiators on frequencies below 30 MHz. In lieu thereof, these carrier current systems shall be subject to the following standards:

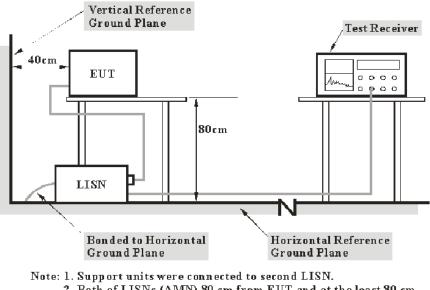
(1) For carrier current system containing their fundamental emission within the frequency band 535-1705 kHz and intended to be received using a standard AM broadcast receiver: no limit on conducted emissions.

(2) For all other carrier current systems: 1000  $\mu V$  within the frequency band 535-1705 kHz, as measured using a 50  $\mu H/50$  ohms LISN.

(3) Carrier current systems operating below 30 MHz are also subject to the radiated emission limits in §15.205, §15.209, §15.221, §15.223, or §15.227, as appropriate.

(c) Measurements to demonstrate compliance with the conducted limits are not required for devices which only employ battery power for operation and which do not operate from the AC power lines or contain provisions for operation while connected to the AC power lines. Devices that include, or make provisions for, the use of battery chargers which permit operating while charging, AC adapters or battery eliminators or that connect to the AC power lines indirectly, obtaining their power through another device which is connected to the AC power lines, shall be tested to demonstrate compliance with the conducted limits.

#### 3.1.2 EUT Setup



2. Both of LISNs (AMN) 80 cm from EUT and at the least 80 cm from other units and other metal planes support units.

The setup of EUT is according with per ANSI C63.10-2013 measurement procedure. The specification used was with the FCC Part 15.207 limits.

The spacing between the peripherals was 10 cm.

The adapter or EUT was connected to the main LISN with a 120 V/60 Hz AC power source.

#### 3.1.3 EMI Test Receiver Setup

The EMI test receiver was set to investigate the spectrum from 150 kHz to 30 MHz.

During the conducted emission test, the EMI test receiver was set with the following configurations:

Frequency Range	IF B/W	
150 kHz – 30 MHz	9 kHz	

#### **3.1.4 Test Procedure**

The frequency and amplitude of the six highest ac power-line conducted emissions relative to the limit, measured over all the current-carrying conductors of the EUT power cords, and the operating frequency or frequency to which the EUT is tuned (if appropriate), should be reported, unless such emissions are more than 20 dB below the limit. AC power-line conducted emissions measurements are to be separately carried out only on each of the phase ("hot") line(s) and (if used) on the neutral line(s), but not on the ground [protective earth] line(s). If less than six emission frequencies are within 20 dB of the limit, then the noise level of the measuring instrument at representative frequencies should be reported. The specific conductor of the power-line cord for each of the reported emissions should be identified. Measure the six highest emissions with respect to the limit on each current-carrying conductor of each power cord associated with the EUT (but not the power cords of associated or peripheral equipment that are part of the test configuration). Then, report the six highest emissions with respect to the limit frequency and specific current-carrying conductor identified with the emission. The six highest emissions should be reported for each of the reported for each of the current-carrying conductor identified with the emission. The six highest emissions should be reported for each of the current-carrying conductor, or the six highest emissions may be reported over all the current-carrying conductors.

#### 3.1.5 Corrected Amplitude & Margin Calculation

The basic equation is as follows:

Result = Reading + Factor Factor = attenuation caused by cable loss + voltage division factor of AMN

The "**Margin**" column of the following data tables indicates the degree of compliance within the applicable limit. The equation for margin calculation is as follows:

Margin = Limit - Result

#### **3.2 Radiation Spurious Emissions**

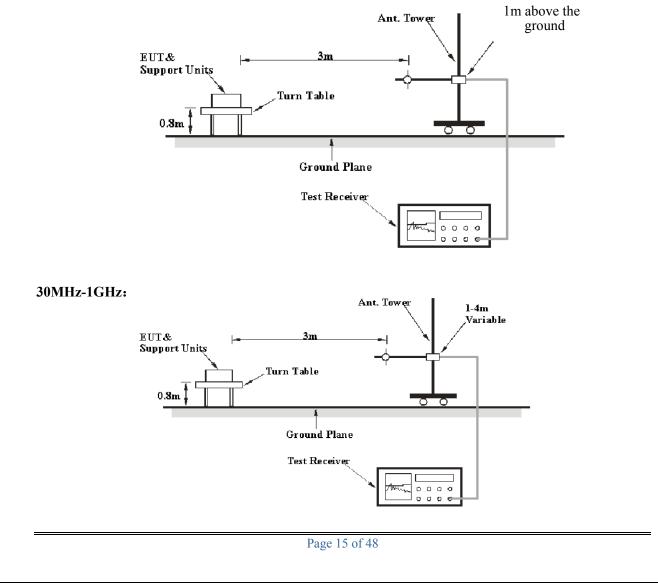
#### **3.2.1 Applicable Standard**

#### FCC §15.247 (d);

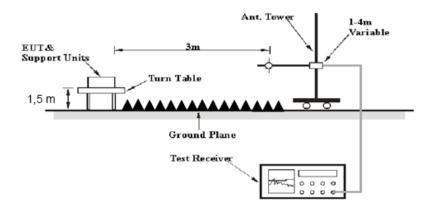
In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under paragraph (b)(3) of this section, the attenuation required under this paragraph shall be 30 dB instead of 20 dB. Attenuation below the general limits specified in §15.209(a) is not required. In addition, radiated emissions which fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emission limits specified in §15.209(a) (see §15.205(c)).

#### 3.2.2 EUT Setup

#### 9kHz~30MHz:



#### Above 1GHz:



The radiated emissions were performed in the 3 meters distance, using the setup accordance with the ANSI C63.10-2013. The specification used was the FCC 15.209, and FCC 15.247 limits.

The external I/O cables were draped along the test table and formed a bundle 30 to 40 cm long in the middle.

The spacing between the peripherals was 10 cm.

For 9kHz-30MHz test, the lowest height of the magnetic antenna shall be 1 m above the ground and three antenna orientations (parallel, perpendicular, and ground-parallel) shall be measured.

#### 3.2.3 EMI Test Receiver & Spectrum Analyzer Setup

The system was investigated from 9 kHz to 25 GHz.

During the radiated emission test, the EMI test receiver & Spectrum Analyzer Setup were set with the following configurations:

Frequency Range	Measurement	RBW	Video B/W	IF B/W
9 kHz – 150 kHz	QP/AV	300 Hz	1 kHz	200 Hz
150 kHz – 30 MHz	QP/AV	9 kHz	30 kHz	9 kHz
20 MIL 1000 MIL	QP	/	/	120 kHz
30 MHz – 1000 MHz	РК	100 kHz	300 kHz	/

1GHz-25GHz:

Measurement	Duty cycle	RBW	Video B/W
PK	Any	1MHz	3 MHz
A	>98%	1MHz	10 Hz
Ave.	<98%	1MHz	≥1/T

Note: T is minimum transmission duration

If the maximized peak measured value complies with under the QP/Average limit more than 6dB, then it is unnecessary to perform an QP/Average measurement.

#### **3.2.4 Test Procedure**

Maximizing procedure was performed on the highest emissions to ensure that the EUT complied with all installation combinations.

Data was recorded in Quasi-peak detection mode for frequency range of 9 kHz-1 GHz except 9 – 90 kHz, 110 – 490 kHz, employing an average detector, peak and Average detection modes for frequencies above 1 GHz.

#### 3.2.5 Corrected Amplitude & Margin Calculation

The basic equation is as follows:

Result = Reading + Factor Factor = Antenna Factor + Cable Loss- Amplifier Gain

The "**Margin**" column of the following data tables indicates the degree of compliance within the applicable limit. The equation for margin calculation is as follows:

Margin = Limit - Result

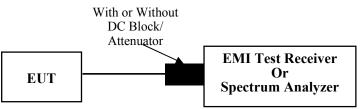
#### 3.3 Minimum 6 dB Emission Bandwidth

#### 3.3.1 Applicable Standard

#### FCC §15.247 (a)(2)

Systems using digital modulation techniques may operate in the 902-928 MHz, 2400-2483.5 MHz, and 5725-5850 MHz bands. The minimum 6 dB bandwidth shall be at least 500 kHz.

#### 3.3.2 EUT Setup



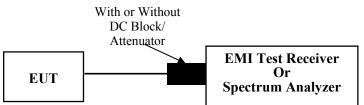
#### **3.3.3 Test Procedure**

According to ANSI C63.10-2013 Section 11.8

- a) Set RBW = 100 kHz.
- b) Set the video bandwidth (VBW)  $\geq 3 \times RBW$ .
- c) Detector = Peak.
- d) Trace mode = max hold.
- e) Sweep = auto couple.
- f) Allow the trace to stabilize.
- g) Measure the maximum width of the emission that is constrained by the frequencies associated with the two outermost amplitude points (upper and lower frequencies) that are attenuated by 6 dB relative to the maximum level measured in the fundamental emission.

#### 3.4 99% Occupied Bandwidth

#### 3.4.1 EUT Setup



#### **3.4.2 Test Procedure**

According to ANSI C63.10-2013 Section 6.9.3

The occupied bandwidth is the frequency bandwidth such that, below its lower and above its upper frequency limits, the mean powers are each equal to 0.5% of the total mean power of the given emission. The following procedure shall be used for measuring 99% power bandwidth:

a) The instrument center frequency is set to the nominal EUT channel center frequency. The frequency span for the spectrum analyzer shall be between 1.5 times and 5.0 times the OBW.

b) The nominal IF filter bandwidth (3 dB RBW) shall be in the range of 1% to 5% of the OBW, and VBW shall be approximately three times the RBW, unless otherwise specified by the applicable requirement. c) Set the reference level of the instrument as required, keeping the signal from exceeding the maximum input mixer level for linear operation. In general, the peak of the spectral envelope shall be more than [10 log (OBW/RBW)] below the reference level. Specific guidance is given in 4.1.5.2.

d) Step a) through step c) might require iteration to adjust within the specified range.

e) Video averaging is not permitted. Where practical, a sample detection and single sweep mode shall be used. Otherwise, peak detection and max hold mode (until the trace stabilizes) shall be used. f) Use the 99% power bandwidth function of the instrument (if available) and report the measured bandwidth.

g) If the instrument does not have a 99% power bandwidth function, then the trace data points are recovered and directly summed in linear power terms. The recovered amplitude data points, beginning at the lowest frequency, are placed in a running sum until 0.5% of the total is reached; that frequency is recorded as the lower frequency. The process is repeated until 99.5% of the total is reached; that frequency is recorded as the upper frequency. The 99% power bandwidth is the difference between these two frequencies.

h) The occupied bandwidth shall be reported by providing plot(s) of the measuring instrument display; the plot axes and the scale units per division shall be clearly labeled. Tabular data may be reported in addition to the plot(s).

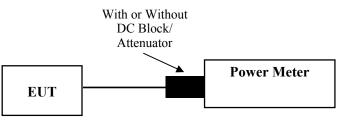
#### **3.5 Maximum Conducted Output Power**

#### **3.5.1 Applicable Standard**

#### FCC §15.247 (b)(3)

For systems using digital modulation in the 902-928 MHz, 2400-2483.5 MHz, and 5725-5850 MHz bands: 1 Watt. As an alternative to a peak power measurement, compliance with the one Watt limit can be based on a measurement of the maximum conducted output power. Maximum Conducted Output Power is defined as the total transmit power delivered to all antennas and antenna elements averaged across all symbols in the signaling alphabet when the transmitter is operating at its maximum power control level. Power must be summed across all antennas and antenna elements. The average must not include any time intervals during which the transmitter is off or is transmitting at a reduced power level. If multiple modes of operation are possible (e.g., alternative modulation methods), the maximum conducted output power is the highest total transmit power occurring in any mode.

#### 3.5.2 EUT Setup



#### **3.5.3 Test Procedure**

According to ANSI C63.10-2013 Section 11.9.2.3.2

Method AVGPM-G is a measurement using a gated RF average power meter.

Alternatively, measurements may be performed using a wideband gated RF power meter provided that the gate parameters are adjusted such that the power is measured only when the EUT is transmitting at its maximum power control level. Because the measurement is made only during the ON time of the transmitter, no duty cycle correction factor is required.

According to ANSI C63.10-2013 Section 11.9.1.3

The maximum peak conducted output power may be measured using a broadband peak RF power meter. The power meter shall have a video bandwidth that is greater than or equal to the DTS bandwidth and shall use a fast-responding diode detector.

a) Set the EUT in transmitting mode.

b) Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to test equipment.

c) Add a correction factor to the display.

d) Set the power meter to test peak output power, record the result.

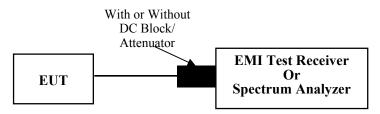
#### 3.6 Maximum Power Spectral Density

#### **3.6.1 Applicable Standard**

#### FCC §15.247 (e)

For digitally modulated systems, the power spectral density conducted from the intentional radiator to the antenna shall not be greater than 8 dBm in any 3 kHz band during any time interval of continuous transmission. This power spectral density shall be determined in accordance with the provisions of paragraph (b) of this section. The same method of determining the conducted output power shall be used to determine the power spectral density.

#### 3.6.2 EUT Setup



#### 3.6.3 Test Procedure

According to ANSI C63.10-2013 Section 11.10.2

a) Set analyzer center frequency to DTS channel center frequency.

b) Set the span to 1.5 times the DTS bandwidth.

c) Set the RBW to 3 kHz  $\leq$  RBW  $\leq$  100 kHz.

d) Set the VBW  $\geq$  [3 × RBW].

e) Detector = peak.

f) Sweep time = auto couple.

g) Trace mode = max hold.

h) Allow trace to fully stabilize.

i) Use the peak marker function to determine the maximum amplitude level within the RBW.

j) If measured value exceeds requirement, then reduce RBW (but no less than 3 kHz) and repeat.

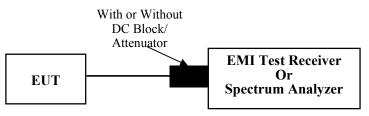
#### 3.7 100 kHz Bandwidth of Frequency Band Edge

#### **3.7.1 Applicable Standard**

#### FCC §15.247 (d);

In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under paragraph (b)(3) of this section, the attenuation required under this paragraph shall be 30 dB instead of 20 dB. Attenuation below the general limits specified in §15.209(a) is not required. In addition, radiated emissions which fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emission limits specified in §15.209(a) (see §15.205(c)).

#### 3.7.2 EUT Setup



#### **3.7.3 Test Procedure**

According to ANSI C63.10-2013 Section 11.11

a) Set the center frequency and span to encompass frequency range to be measured.

b) Set the RBW = 100 kHz.

c) Set the VBW  $\geq$  [3 × RBW].

d) Detector = peak.

e) Sweep time = auto couple.

f) Trace mode = max hold.

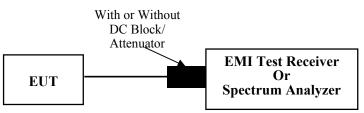
g) Allow trace to fully stabilize.

h) Use the peak marker function to determine the maximum amplitude level.

Ensure that the amplitude of all unwanted emissions outside of the authorized frequency band (excluding restricted frequency bands) is attenuated by at least the minimum requirements specified in 11.11. Report the three highest emissions relative to the limit.

### 3.8 Duty Cycle

#### 3.8.1 EUT Setup



#### **3.8.2 Test Procedure**

According to ANSI C63.10-2013 Section 11.6

The zero-span mode on a spectrum analyzer or EMI receiver if the response time and spacing between bins on the sweep are sufficient to permit accurate measurements of the ON and OFF times of the transmitted signal:

1) Set the center frequency of the instrument to the center frequency of the transmission.

2) Set  $RBW \ge OBW$  if possible; otherwise, set RBW to the largest available value.

3) Set VBW  $\geq$  RBW. Set detector = peak or average.

4) The zero-span measurement method shall not be used unless both RBW and VBW are > 50/T and the number of sweep points across duration T exceeds 100. (For example, if VBW and/or RBW are limited to 3 MHz, then the zero-span method of measuring the duty cycle shall not be used if  $T \le 16.7 \mu s$ .)

#### 3.9 Antenna Requirement

#### **3.9.1 Applicable Standard**

#### FCC §15.203

An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the provisions of this section. The manufacturer may design the unit so that a broken antenna can be replaced by the user, but the use of a standard antenna jack or electrical connector is prohibited. This requirement does not apply to carrier current devices or to devices operated under the provisions of §§15.211, 15.213, 15.217, 15.219, 15.221, or §15.236. Further, this requirement does not apply to intentional radiators that must be professionally installed, such as perimeter protection systems and some field disturbance sensors, or to other intentional radiators which, in accordance with §15.31(d), must be measured at the installation site. However, the installer shall be responsible for ensuring that the proper antenna is employed so that the limits in this part are not exceeded.

#### 3.9.2 Judgment

Compliant. Please refer to the Antenna Information detail in Section 1.

# 4. Test DATA AND RESULTS

#### 4.1 AC Line Conducted Emissions

Serial Number:	2DS1-6	Test Date:	2023/12/11
Test Site:	CE	Test Mode:	Transmitting (maximum output power mode(802.11b Low channel) was tested)
Tester:	David Huang	Test Result:	Pass

#### **Environmental Conditions:**

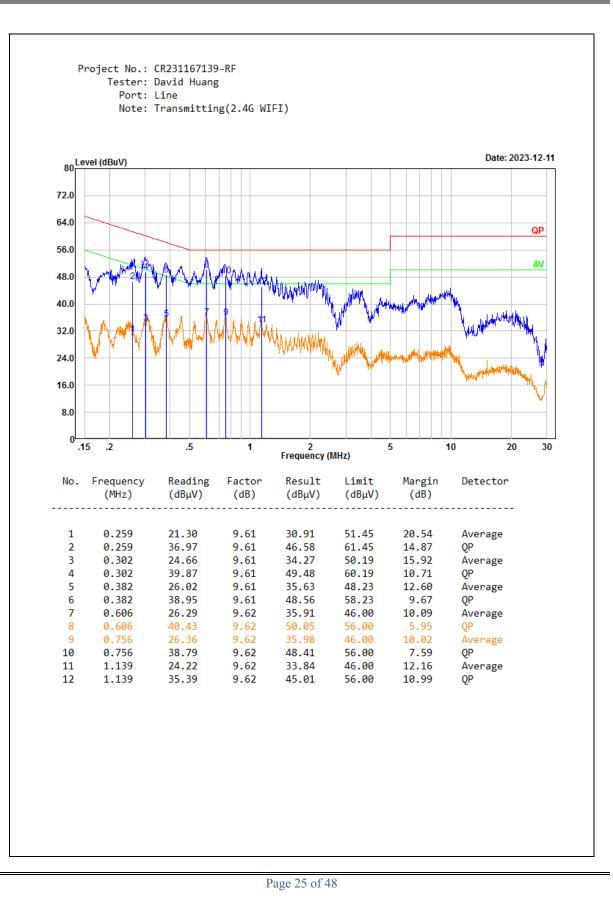
Temperature: (°C)	27.1	Relative Humidity: (%)	52	ATM Pressure: (kPa)	100.9
----------------------	------	------------------------------	----	------------------------	-------

#### **Test Equipment List and Details:**

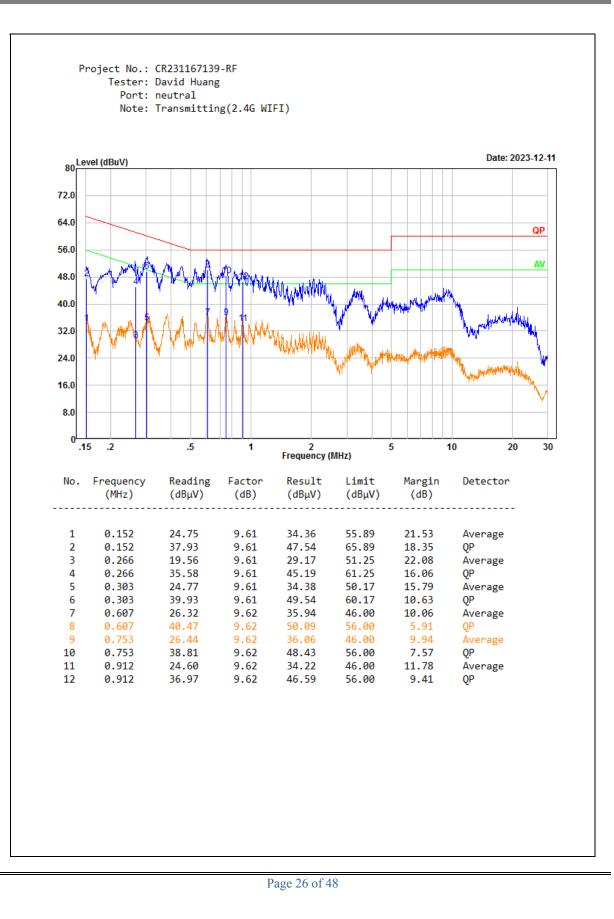
Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
R&S	LISN	ENV216	101134	2023/3/31	2024/3/30
R&S	EMI Test Receiver	ESR3	102726	2023/3/31	2024/3/30
MICRO-COAX	Coaxial Cable	UTIFLEX	C-0200-01	2023/8/6	2024/8/5
Audix	Test Software	E3	190306 (V9)	N/A	N/A

\* Statement of Traceability: China Certification ICT Co., Ltd (Dongguan) attests that all calibrations have been performed, traceable to National Primary Standards and International System of Units (SI).

Report No.: CR231167139-00C



Report No.: CR231167139-00C



#### 4.2 Radiation Spurious Emissions

Serial Number:	2DS1-6	Test Date:	2024/1/4
Test Site:	966-1/966-2	Test Mode:	Transmitting
Tester:	Jeff Luo, Mack Huang	Test Result:	Pass

Environmental Conditions:						
Temperature: (℃)	24.2~25.7	Relative Humidity: (%)	43~59	ATM Pressure: (kPa)	101.5	

#### **Test Equipment List and Details:**

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
Sunol Sciences	Antenna	JB6	A082520-5	2023/12/1	2026/11/30
BACL	Loop Antenna	1313-1P	3092721	2023/10/20	2026/10/19
R&S	EMI Test Receiver	ESR3	102724	2023/3/31	2024/3/30
TIMES MICROWAVE	Coaxial Cable	LMR-600- UltraFlex	C-0470-02	2023/7/16	2024/7/15
TIMES MICROWAVE	Coaxial Cable	LMR-600- UltraFlex	C-0780-01	2023/7/16	2024/7/15
Sonoma	Amplifier	310N	186165	2023/7/16	2024/7/15
Audix	Test Software	E3	201021 (V9)	N/A	N/A
АН	Double Ridge Guide Horn Antenna	SAS-571	1394	2023/2/22	2026/2/21
R&S	Spectrum Analyzer	FSV40	101591	2023/3/31	2024/3/30
MICRO-COAX	Coaxial Cable	UFA210A-1- 1200-70U300	217423-008	2023/8/6	2024/8/5
MICRO-COAX	Coaxial Cable	UFA210A-1- 2362-300300	235780-001	2023/8/6	2024/8/5
Mini	Pre-amplifier	ZVA-183-S+	5969001149	2023/11/8	2024/11/7
PASTERNACK	Horn Antenna	PE9852/2F-20	112002	2021/2/5	2024/2/4
Quinstar	Preamplifier	QLW-18405536- JO	15964001005	2023/9/15	2024/9/14
MICRO-COAX	Coaxial Cable	UFB142A-1-2362- 200200	235772-001	2023/8/6	2024/8/5
E-Microwave	Band Rejection Filter	2400-2483.5MHz	OE01902424	2023/8/6	2024/8/5
Mini Circuits	High Pass Filter	VHF-6010+	31119	2023/8/6	2024/8/5

\* Statement of Traceability: China Certification ICT Co., Ltd (Dongguan) attests that all calibrations have been performed, traceable to National Primary Standards and International System of Units (SI).

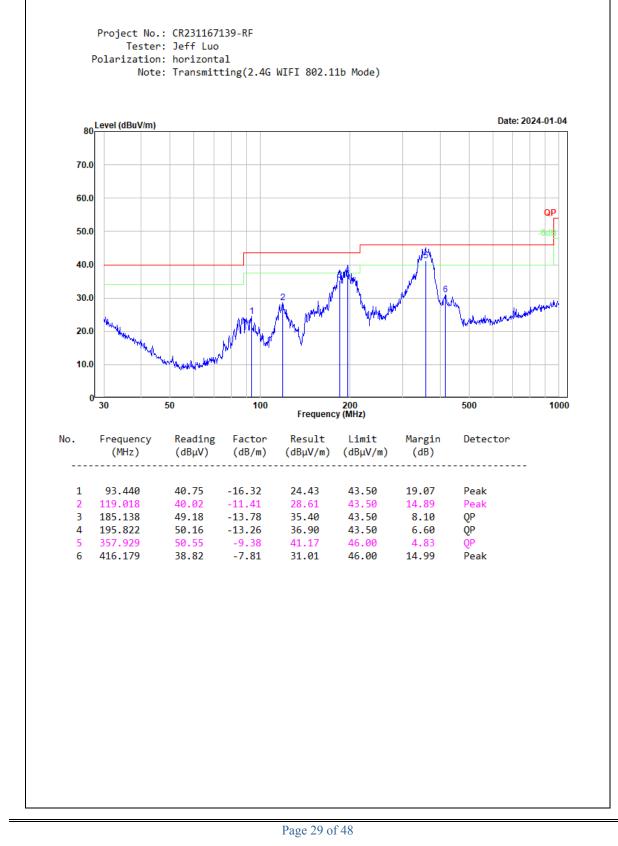
#### Test Data:

Please refer to the below table and plots. After pre-scan in the X, Y and Z axes of orientation, the worst case is below:

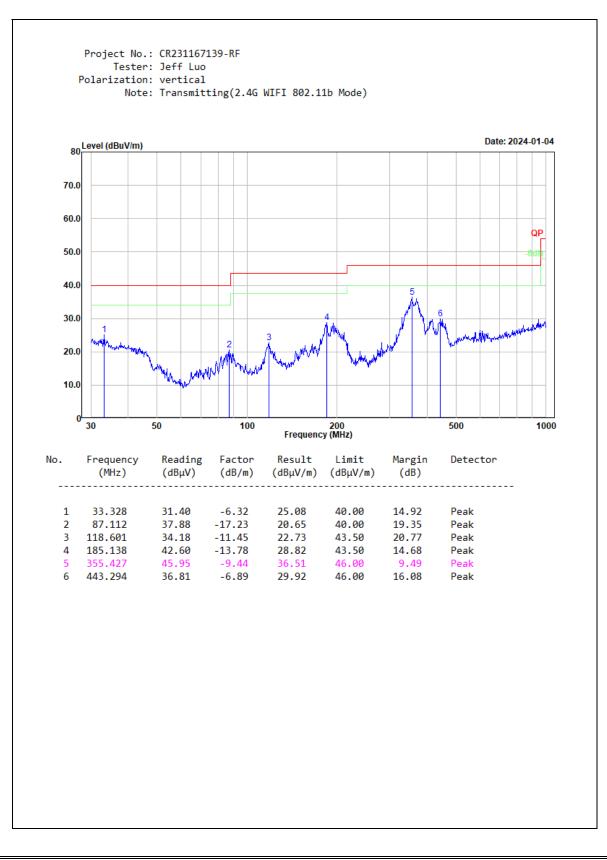
### 1) 9kHz~30MHz

The amplitude of spurious emissions attenuated more than 20 dB below the permissible value is not required to be report.

#### 2) 30MHz-1GHz (maximum output power mode (802.11b) was tested) Low channel:

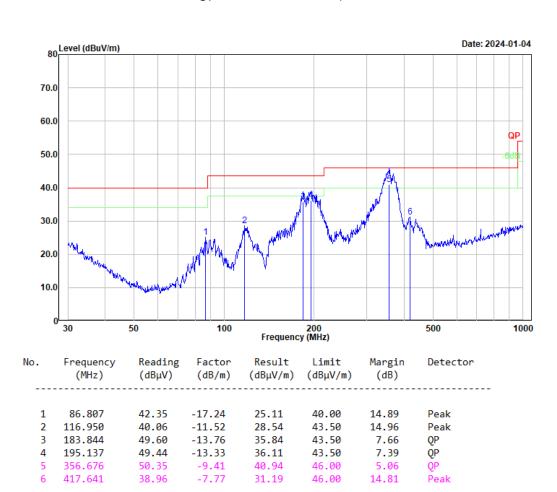


Report No.: CR231167139-00C

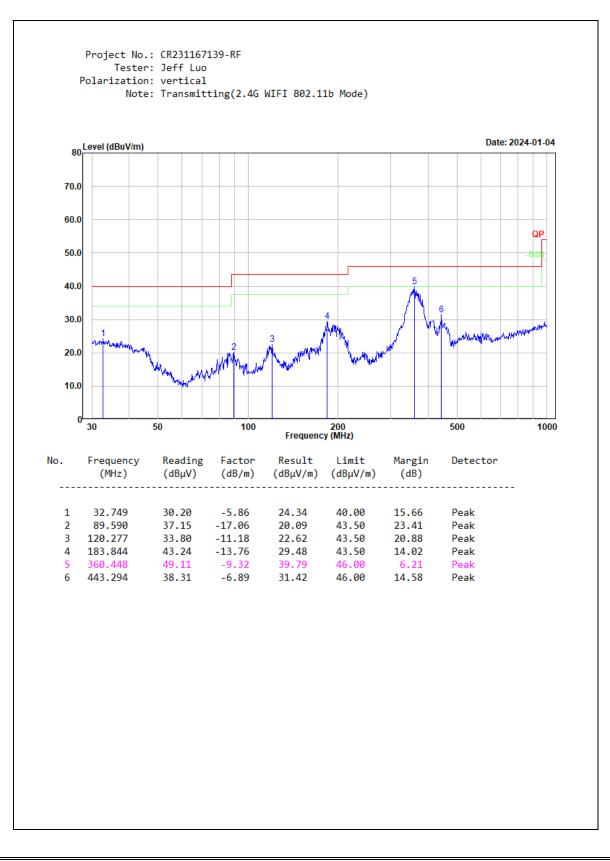


#### Middle channel:

```
Project No.: CR231167139-RF
Tester: Jeff Luo
Polarization: horizontal
Note: Transmitting(2.4G WIFI 802.11b Mode)
```



Report No.: CR231167139-00C



#### High channel:

6

417.641

```
Project No.: CR231167139-RF
Tester: Jeff Luo
Polarization: horizontal
Note: Transmitting(2.4G WIFI 802.11b Mode)
```

-7.77

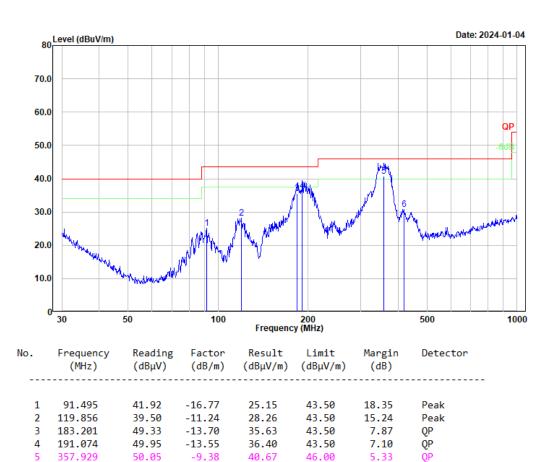
30.80

46.00

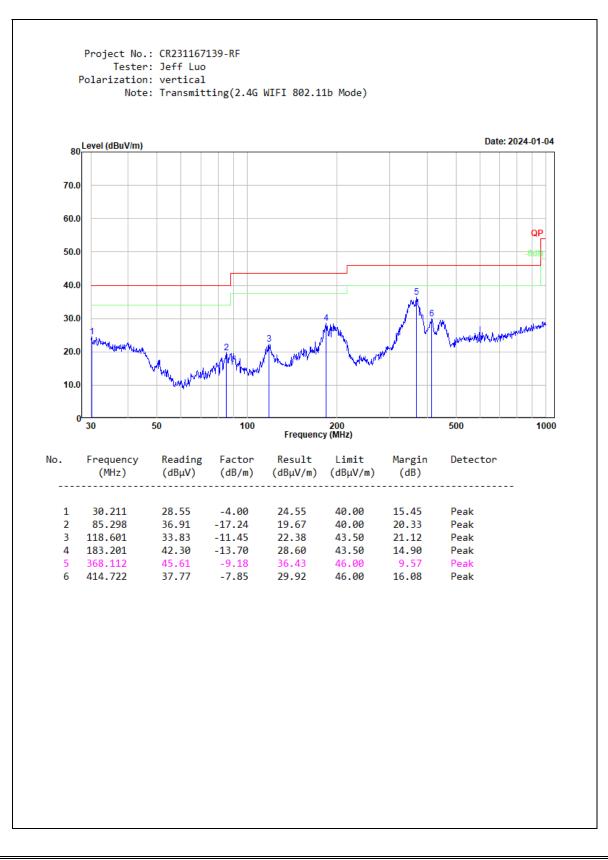
15.20

Peak

38.57



Report No.: CR231167139-00C



Report No.: CR231167139-00C

#### 3) 1-25GHz: 802.11b Mode:

-	Receiver							
Frequency (MHz)	Reading (dBµV)	Detector	Polar (H/V)	Factor (dB/m)	Result (dBµV/m)	Limit (dBµV/m)	Margin (dB)	
Low Channel: 2412 MHz								
2390.000	24.53	PK	Н	31.71	56.24	74.00	17.76	
2390.000	13.76	AV	Н	31.71	45.47	54.00	8.53	
2390.000	26.41	PK	V	31.71	58.12	74.00	15.88	
2390.000	15.15	AV	V	31.71	46.86	54.00	7.14	
4824.000	36.02	PK	Н	11.26	47.28	74.00	26.72	
4824.000	27.71	AV	Н	11.26	38.97	54.00	15.03	
4824.000	35.91	PK	V	11.26	47.17	74.00	26.83	
4824.000	24.19	AV	V	11.26	35.45	54.00	18.55	
7236.000	34.05	PK	Н	15.24	49.29	74.00	24.71	
7236.000	22.69	AV	Н	15.24	37.93	54.00	16.07	
7236.000	36.50	PK	V	15.24	51.74	74.00	22.26	
7236.000	23.93	AV	V	15.24	39.17	54.00	14.83	
	-	]	Middle Cha	annel: 2437 M	Hz	•		
4874.000	34.64	PK	Н	11.45	46.09	74.00	27.91	
4874.000	26.94	AV	Н	11.45	38.39	54.00	15.61	
4874.000	36.38	PK	V	11.45	47.83	74.00	26.17	
4874.000	28.42	AV	V	11.45	39.87	54.00	14.13	
7311.000	35.37	PK	Н	15.58	50.95	74.00	23.05	
7311.000	25.70	AV	Н	15.58	41.28	54.00	12.72	
7311.000	35.06	PK	V	15.58	50.64	74.00	23.36	
7311.000	24.15	AV	V	15.58	39.73	54.00	14.27	
High Channel: 2462MHz								
2483.500	26.89	PK	Н	32.19	59.08	74.00	14.92	
2483.500	16.19	AV	Н	32.19	48.38	54.00	5.62	
2483.500	24.39	PK	V	32.19	56.58	74.00	17.42	
2483.500	14.27	AV	V	32.19	46.46	54.00	7.54	
4924.000	37.83	PK	Н	11.67	49.50	74.00	24.50	
4924.000	30.37	AV	Н	11.67	42.04	54.00	11.96	
4924.000	36.06	PK	V	11.67	47.73	74.00	26.27	
4924.000	27.91	AV	V	11.67	39.58	54.00	14.42	
7386.000	34.75	PK	Н	15.63	50.38	74.00	23.62	
7386.000	24.30	AV	Н	15.63	39.93	54.00	14.07	
7386.000	34.88	PK	V	15.63	50.51	74.00	23.49	
7386.000	23.16	AV	V	15.63	38.79	54.00	15.21	

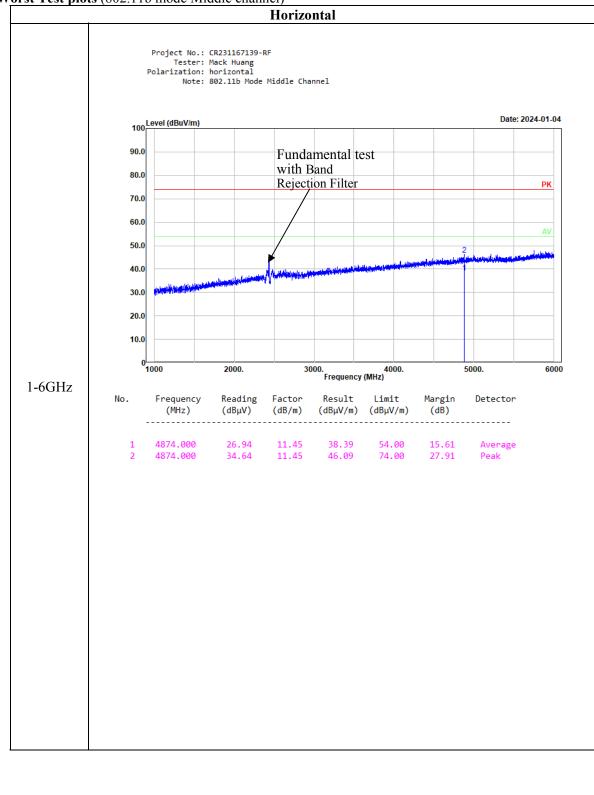
#### 802.11g Mode:

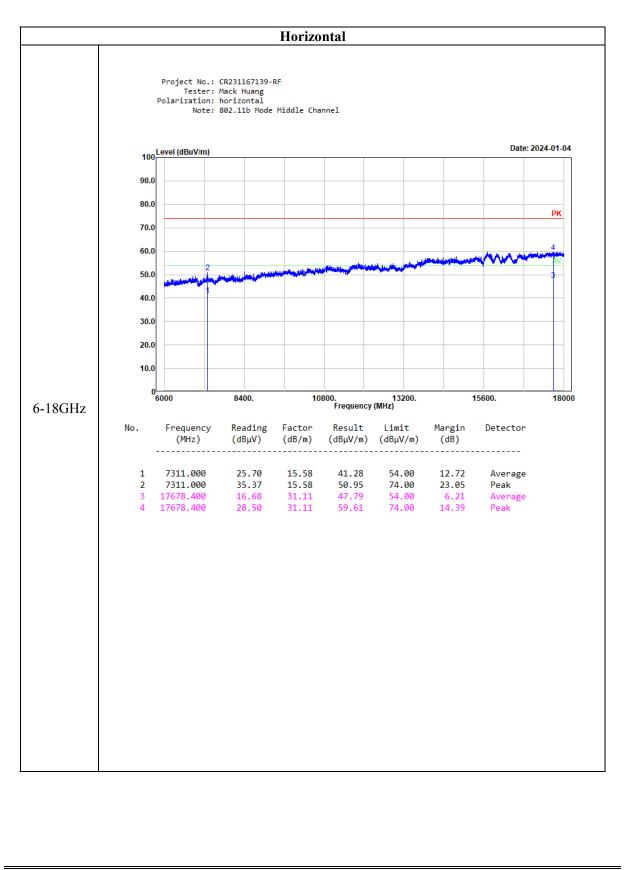
E.	Receiver		D I			<b>.</b>	
Frequency (MHz)	Reading (dBµV)	Detector	Polar (H/V)	Factor (dB/m)	Result (dBµV/m)	Limit (dBµV/m)	Margin (dB)
	(42,414)		Low Char	nnel: 2412 MH	Z		
2390.000	36.07	PK	Н	31.71	67.78	74.00	6.22
2390.000	18.54	AV	Н	31.71	50.25	54.00	3.75
2390.000	32.73	РК	V	31.71	64.44	74.00	9.56
2390.000	17.78	AV	V	31.71	49.49	54.00	4.51
4824.000	34.87	PK	Н	11.26	46.13	74.00	27.87
4824.000	24.05	AV	Н	11.26	35.31	54.00	18.69
4824.000	34.42	PK	V	11.26	45.68	74.00	28.32
4824.000	23.40	AV	V	11.26	34.66	54.00	19.34
7236.000	35.14	РК	Н	15.24	50.38	74.00	23.62
7236.000	23.91	AV	Н	15.24	39.15	54.00	14.85
7236.000	34.66	РК	V	15.24	49.90	74.00	24.10
7236.000	24.25	AV	V	15.24	39.49	54.00	14.51
		]	Middle Cha	annel: 2437 MI	Hz		
4874.000	34.55	РК	Н	11.45	46.00	74.00	28.00
4874.000	24.09	AV	Н	11.45	35.54	54.00	18.46
4874.000	34.02	PK	V	11.45	45.47	74.00	28.53
4874.000	23.25	AV	V	11.45	34.70	54.00	19.30
7311.000	34.66	PK	Н	15.58	50.24	74.00	23.76
7311.000	23.19	AV	Н	15.58	38.77	54.00	15.23
7311.000	34.33	PK	V	15.58	49.91	74.00	24.09
7311.000	22.97	AV	V	15.58	38.55	54.00	15.45
			High Cha	nnel: 2462MH	Z		
2483.500	36.23	PK	Н	32.19	68.42	74.00	5.58
2483.500	18.66	AV	Н	32.19	50.85	54.00	3.15
2483.500	34.70	PK	V	32.19	66.89	74.00	7.11
2483.500	18.41	AV	V	32.19	50.60	54.00	3.40
4924.000	34.30	PK	Н	11.67	45.97	74.00	28.03
4924.000	24.05	AV	Н	11.67	35.72	54.00	18.28
4924.000	34.72	PK	V	11.67	46.39	74.00	27.61
4924.000	23.82	AV	V	11.67	35.49	54.00	18.51
7386.000	34.65	PK	Н	15.63	50.28	74.00	23.72
7386.000	23.98	AV	Н	15.63	39.61	54.00	14.39
7386.000	33.96	PK	V	15.63	49.59	74.00	24.41
7386.000	23.45	AV	V	15.63	39.08	54.00	14.92

## 802.11n ht20 Mode:

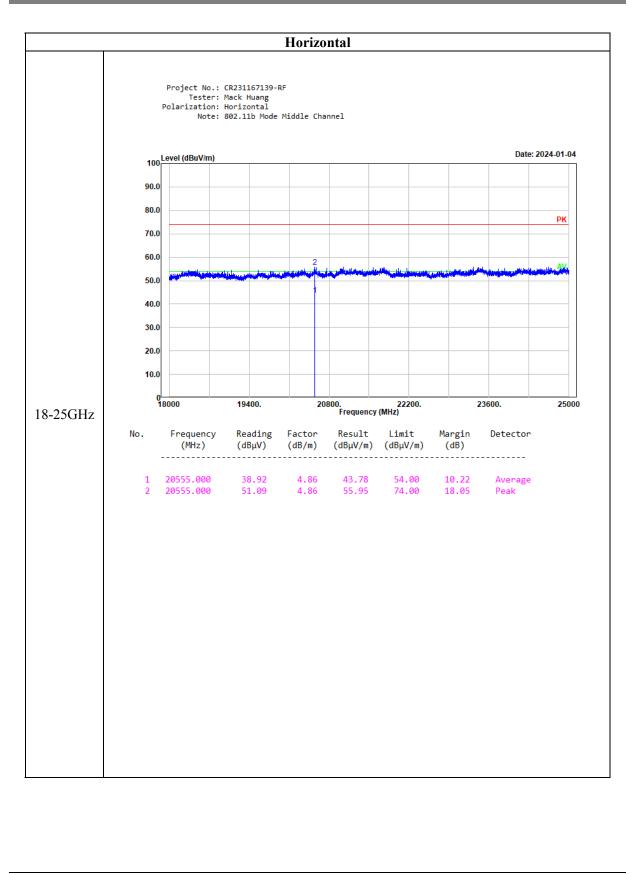
F	Rece	eiver	Dili	<b>F</b> actoria	Derik	<b>T</b> •	Maria
Frequency (MHz)	Reading (dBµV)	Detector	Polar (H/V)	Factor (dB/m)	Result (dBµV/m)	Limit (dBµV/m)	Margin (dB)
	(		Low Chai	nnel: 2412 MH	Z		
2390.000	36.56	PK	Н	31.71	68.27	74.00	5.73
2390.000	19.05	AV	Н	31.71	50.76	54.00	3.24
2390.000	31.43	РК	V	31.71	63.14	74.00	10.86
2390.000	15.30	AV	V	31.71	47.01	54.00	6.99
4824.000	34.80	PK	Н	11.26	46.06	74.00	27.94
4824.000	23.68	AV	Н	11.26	34.94	54.00	19.06
4824.000	35.15	PK	V	11.26	46.41	74.00	27.59
4824.000	23.35	AV	V	11.26	34.61	54.00	19.39
7236.000	34.25	РК	Н	15.24	49.49	74.00	24.51
7236.000	23.17	AV	Н	15.24	38.41	54.00	15.59
7236.000	34.35	РК	V	15.24	49.59	74.00	24.41
7236.000	23.26	AV	V	15.24	38.50	54.00	15.50
		]	Middle Cha	annel: 2437 Ml	Hz		
4874.000	34.87	PK	Н	11.45	46.32	74.00	27.68
4874.000	23.86	AV	Н	11.45	35.31	54.00	18.69
4874.000	34.45	PK	V	11.45	45.90	74.00	28.10
4874.000	23.59	AV	V	11.45	35.04	54.00	18.96
7311.000	33.99	PK	Н	15.58	49.57	74.00	24.43
7311.000	23.16	AV	Н	15.58	38.74	54.00	15.26
7311.000	33.93	PK	V	15.58	49.51	74.00	24.49
7311.000	22.90	AV	V	15.58	38.48	54.00	15.52
			High Cha	nnel: 2462MH	Z		
2483.500	33.92	PK	Н	32.19	66.11	74.00	7.89
2483.500	17.69	AV	Н	32.19	49.88	54.00	4.12
2483.500	28.04	РК	V	32.19	60.23	74.00	13.77
2483.500	15.32	AV	V	32.19	47.51	54.00	6.49
4924.000	34.70	PK	Н	11.67	46.37	74.00	27.63
4924.000	23.92	AV	Н	11.67	35.59	54.00	18.41
4924.000	34.05	PK	V	11.67	45.72	74.00	28.28
4924.000	22.94	AV	V	11.67	34.61	54.00	19.39
7386.000	33.94	PK	Н	15.63	49.57	74.00	24.43
7386.000	23.07	AV	Н	15.63	38.70	54.00	15.30
7386.000	34.06	PK	V	15.63	49.69	74.00	24.31
7386.000	23.15	AV	V	15.63	38.78	54.00	15.22

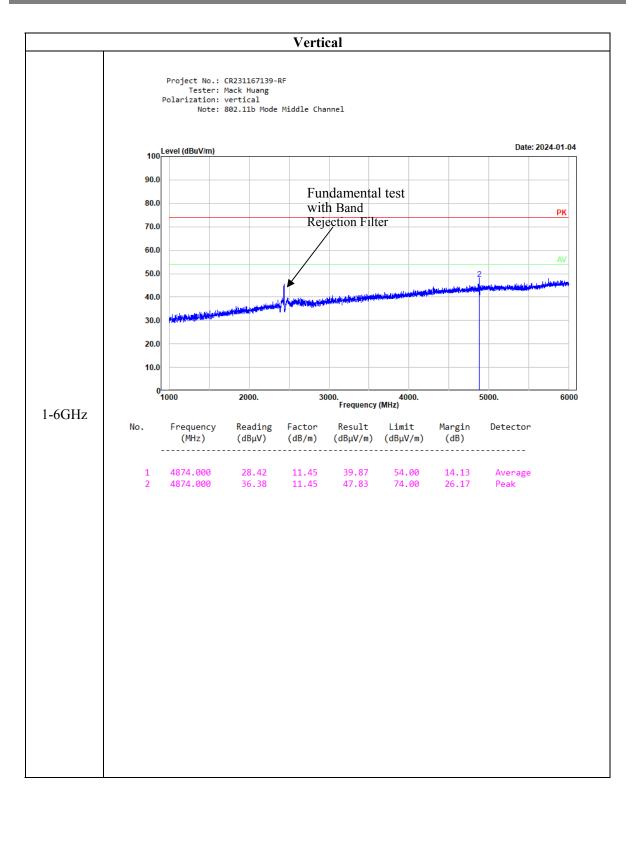




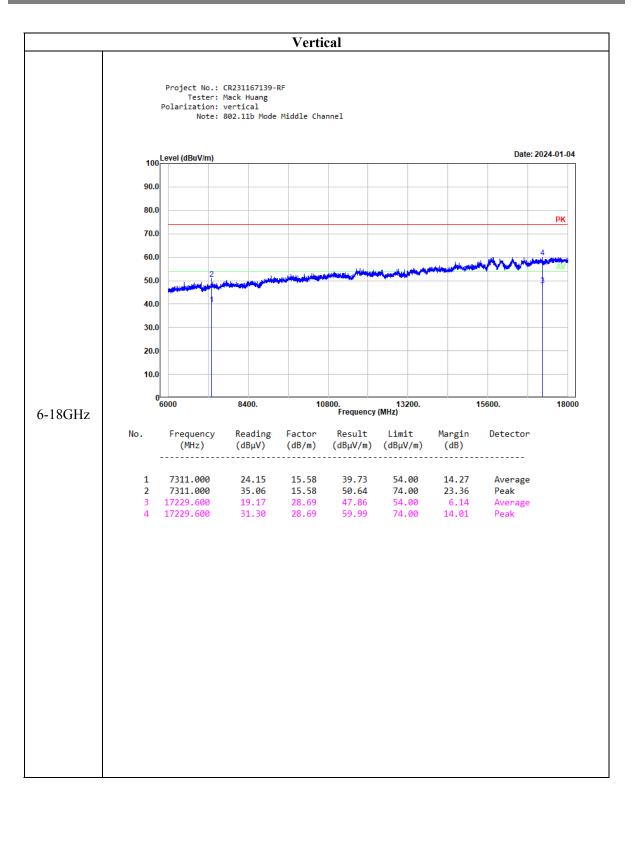


Page 39 of 48

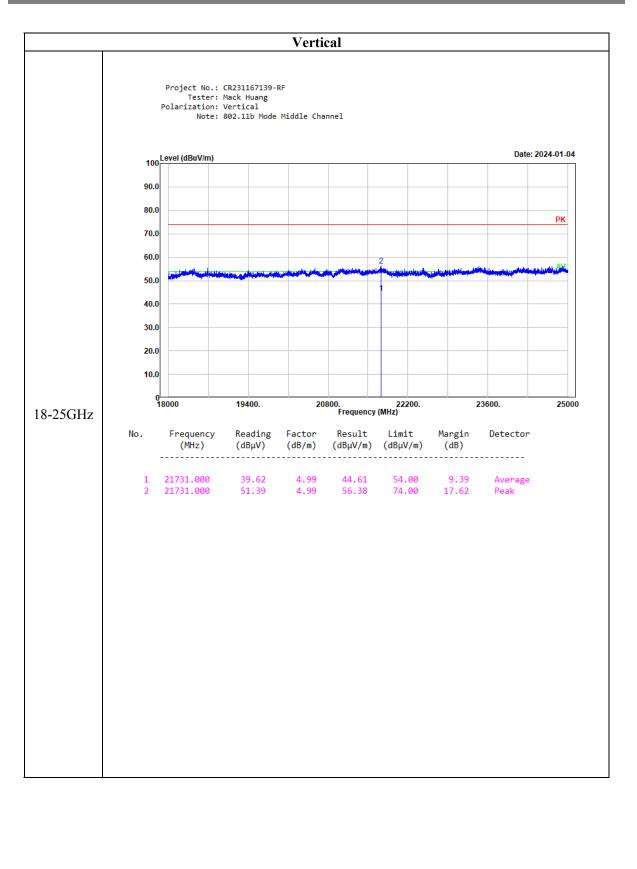




Page 41 of 48



Page 42 of 48



Page 43 of 48

# 4.3 Spot Check for Maximum Conducted Output Power

Serial Number:	2DS1-1	Test Date:	2023/12/2
Test Site:	RF	Test Mode:	Transmitting
Tester:	Jou Zhou	Test Result:	Pass

Environmental	Conditions:				
Temperature: (°C)	25.5	Relative Humidity: (%)	36	ATM Pressure: (kPa)	101.7

# **Test Equipment List and Details:**

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
Anritsu	Power Meter	ML2495A	1106009	2023/08/04	2024/08/03
Anritsu	Pulse Power Sensor	MA2411A	10780	2023/08/04	2024/08/03
zhuoxiang	Coaxial Cable	SMA-178	211001	Each time	N/A
Mini-Circuits	DC Block	BLK-18-S+	1554403	Each time	N/A

\* Statement of Traceability: China Certification ICT Co., Ltd (Dongguan) attests that all calibrations have been performed, traceable to National Primary Standards and International System of Units (SI).

\_\_\_\_

## Test Data:

Test Modes	Test Frequency (MHz)	Maximum Conducted Peak Output Power (dBm)	Maximum Conducted Average Output Power (dBm)	Limit (dBm)
	2412	17.53	13.68	30
802.11b	2437	17.07	13.74	30
	2462	16.47	13.16	30
	2412	14.95	5.83	30
802.11g	2437	14.47	5.45	30
	2462	14.19	5.22	30
	2412	12.83	3.73	30
802.11n ht20	2437	12.77	3.61	30
	2462	12.46	2.97	30

# 4.4 Duty Cycle

Serial Number:	2DS1-1	Test Date:	2024/3/16
Test Site:	RF	Test Mode:	Transmitting
Tester:	Jou Zhou	Test Result:	N/A

Environmental	Conditions:				
Temperature: (°C)	24.9	Relative Humidity: (%)	59	ATM Pressure: (kPa)	100.9

# **Test Equipment List and Details:**

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
R&S	Spectrum Analyzer	FSV40	101943	2023/3/31	2024/3/30
eastsheep	Coaxial Attenuator	2W-SMA-JK-18G	21060301	Each time	N/A
zhuoxiang	Coaxial Cable	SMA-178	211001	Each time	N/A
Mini-Circuits	DC Block	BLK-18-S+	1554403	Each time	N/A

\* Statement of Traceability: China Certification ICT Co., Ltd (Dongguan) attests that all calibrations have been performed, traceable to National Primary Standards and International System of Units (SI).

#### Test Data:

Test Modes	Ton (ms)	Ton+off (ms)	Duty cycle (%)	1/T (Hz)	Duty Factor (dB)	VBW Setting (kHz)
802.11b	6.391	6.478	98.66	/	/	0.01
802.11g	1.061	1.243	85.36	943	0.69	1
802.11n ht20	1	1.183	84.53	1000	0.73	1

# Report No.: CR231167139-00C

	Duty Cycle	
1	Spectrum 2 2 Spectrum 3 2 Spectrum 4 2	
	Ref Level         30.00 dBm         Offset         10.50 dB         RBW         10 MHz           Att         40 dB         SWT         30 ms         VBW         10 MHz	
	SGL IPk Chw	
	20 dBm	-1.12 dB 6.4783 ms
	20 Gen M1[1]	-22.06 dBm 11,9565 ms
	0 dBm	
	-10 dBm	
	-20 dBm	
802.11b	-30 dam	
	-40 dBm	
	-60 dBm	
	CF 2.437 GHz 691 pts	3.0 ms/
	Marker	on Result
	M1 1 11.9565 ms -22.06 d8m D1 M1 1 6.3913 ms 0.19 d8	
	D2 M1 1 6.4783 ms -1.12 dB	4,49
	ProjectNo.:CR231167139 Tester:Jou Shou	
	Date: 16.MAR.2024 11:09:52	
	Spectrum         Spectrum         Spectrum         Spectrum         Spectrum         Spectrum         K         Spectrum         Spec	
	Att 40 dB SWT 6 ms VBW 10 MHz SGL	
	19k Cirw     D2[1]	1.92 dB
	20 d8m M1[1]	1.24348 ms -23.85 dBm 1.35652 mc
	19.000 manual menudeverser persident ware manufactured	1.35652 ms
	0 d8m	
	10 mm	
000.11	-30 dBm	hend
802.11g	-40 dBm	
	-50 dBm	
	-60 dBm-	
	CF 2.437 GHz 691 pts Marker	600.0 µs/
		on Result
	D1         M1         1         1.06087 ms         0.05 dB           D2         M1         1         1.24348 ms         1.92 dB	
		aya
	ProjectNo.:CR231167139 Tester:Jou Ebou Date: 16.MAR.2024 11:11:30	
	Spectrum 2 8 Spectrum 3 8 Spectrum 4 8	
	Ref Level         30.00 dBm         Offset         10.50 dB         RBW         10 MHz           Att         40 dB         SWT         6 ms         VBW         10 MHz	
	SGL 1Pk Clrw	
	D2[1]	0.03 dB 1.18261 ms
	Mi[1]	-22.21 dBm 2.20870 ms
	0 dBm	
	-10 dBm	
	-20 d8m	have
	-30 dBm-	
802.11n ht20		
802.11n ht20	-40 dBm-	
802.11n ht20	-50 d8m	
802.11n ht20	-50 dBm	
802.11n ht20	-50 d8m	600.0 µs/
802.11n ht20	-50 dBm -60 dBm -60 dBm -67 2,437 GHz Marker Type Ref Trc X-value Y-value Function Function M11 1 2,2097 ms -22,21 dBm Function Function	600.0 μs/
802.11n ht20	-50 dBm -60 dBm -70	on Result
802.11n ht20	-50 dBm -60 dBm -60 dBm -65 dBm -66	on Result

Page 46 of 48

# **5. EUT PHOTOGRAPHS**

Please refer to the attachment CR231167139-EXP EUT EXTERNAL PHOTOGRAPHS and CR231167139-INP EUT INTERNAL PHOTOGRAPHS

# 6. TEST SETUP PHOTOGRAPHS

Please refer to the attachment CR231167139-00C-TSP TEST SETUP PHOTOGRAPHS.

**===== END OF REPORT ====**