MEASUREMENT REPORT

FCC PART 27

FCC ID:	XMR2021RM502QGL
Application:	Quectel Wireless Solutions Company Limited

Application Type:	Certification
Product:	5G Sub-6 GHz M.2 Module
Model No.:	RM502Q-GL
Brand Name:	Quectel
FCC Rule Part(s):	Part 27 Subpart D
Test Procedure(s):	ANSI C63.26: 2015
Test Date:	January 31 ~ April 30, 2021

Reviewed By: Sunny Sun

Approved By: Robin Wu

ACCREDITED
TESTING LABORATORY
CERTIFICATE #3628.01

The test results relate only to the samples tested.

This equipment has been shown to be capable of compliance with the applicable technical standards as indicated in the measurement report and was tested in accordance with the measurement procedures specified in ANSI C63.26-2015. Test results reported herein relate only to the item(s) tested.

Revision History

Report No.	Version	Description	Issue Date	Note
2101RSU049-U5	Rev. 01	Initial Report	05-19-2021	Valid

CONTENTS

Description Page

1. GENERAL INFORMATION

1.1. Applicant

Quectel Wireless Solutions Company Limited
Building 5, Shanghai Business Park Phase III (Area B), No.1016 Tianlin Road, Minhang District, Shanghai, China 200233

1.2. Manufacturer

Quectel Wireless Solutions Company Limited
Building 5, Shanghai Business Park Phase III (Area B), No.1016 Tianlin Road, Minhang District, Shanghai, China 200233

1.3. Testing Facility

☒	**Test Site - MRT Suzhou Laboratory**	
	Laboratory Location (Suzhou - Wuzhong)	
	D8 Building, No.2 Tian'edang Rd., Wuzhong Economic Development Zone, Suzhou, China	
	Laboratory Location (Suzhou - SIP)	
	4b Building, Liando U Valley, No.200 Xingpu Rd., Shengpu Town, Suzhou Industrial Park, China	
	Laboratory Accreditations	
	A2LA: 3628.01	CNAS: L10551
	FCC: CN1166	ISED: CN0001
	VCCI: R-20025, G-20034, C-20020, T-20020	
☐	**Test Site - MRT Shenzhen Laboratory**	
	Laboratory Location (Shenzhen)	
	1G, Building A, Junxiangda Building, Zhongshanyuan Road West, Nanshan District, Shenzhen, China	
	Laboratory Accreditations	
	A2LA: 3628.02	CNAS: L10551
	FCC: CN1284	ISED: CN0105
☐	**Test Site - MRT Taiwan Laboratory**	
	Laboratory Location (Taiwan)	
	No. 38, Fuxing 2nd Rd., Guishan Dist., Taoyuan City 333, Taiwan (R.O.C.)	
	Laboratory Accreditations	
	TAF: L3261-190725	
	FCC: 291082, TW3261	ISED: TW3261

1.4. Product Information

Product Name	5G Sub-6 GHz M.2 Module
Model No.	RM502Q-GL
Brand Name	Quectel
IMEI	Conducted Measurement: 355878110939501 Radiated Measurement: 865776040001173
Operating Temperature	-30 ~ 70 °C
Power Type	3.135 ~ 4.4Vdc, typical 3.7Vdc
UMTS Specification	
Single Band	Band 2, 4, 5
Modulation	Uplink up to 16QAM, Downlink up to 64QAM
E-UTRA Specification	
Single Band	Band 2, 4, 5, 7, 12, 13, 14, 17, 25, 26, 30, 38, 41, 48, 66, 71
Intra-Band	CA_2C, CA_5B, CA_7C, CA_38C, CA_41C, CA_48C, CA_66C
HPUE Band	Band 41
Modulation	UL & DL up to 256QAM
5G NR Specification	
SA Band	n2, n7, n5, n12, n25, n41, n66, n71, n77
SA UL MIMO Band	n41, n77
EN-DC Band	DC_25A_n41A, DC_26A_n41A, DC_2A_n41A, DC_66A_n41A DC_4A_n41A, DC_2A_n77A, DC_7A_n77A, DC_12A_n77A, DC_41A_n77A, DC_66A_n77A
HPUE Band	n41, n77 (SA & UL MIMO)
SCS for NR cell	FDD Band: 15kHz; TDD Band: 30kHz
Modulation	UL & DL up to 256QAM

1.5. Radio Specification under Test

FDD T_XFrequency Range	Band 30: 2305 ~ 2315 MHz
FDD R_XFrequency Range	Band 30: 2350 ~ 2360 MHz

Note 1: For other features of this EUT, test report will be issued separately.

Note 2: The declared of product specification for EUT presented in the report are provided by the manufacturer, and the manufacturer takes all the responsibilities for the accuracy of product specification.

1.6. Description of Available Antennas

Technology	Frequency Range (MHz)	Antenna Type	Max Peak Gain (dBi)
LTE Band 2	1850 ~ 1910	Dipole	0.25
LTE Band 4	1710 ~ 1755		1.47
LTE Band 5	824 ~ 849		2.68
LTE Band 7	2500 ~ 2570		0.78
LTE Band 12	699 ~ 716		-0.20
LTE Band 13	777 ~ 787		1.54
LTE Band 14	788 ~ 798		2.42
LTE Band 17	704 ~ 716		-0.20
LTE Band 25	1850 ~ 1915		0.25
LTE Band 26	814 ~ 849		2.68
LTE Band 30	2305 ~ 2315		-3.06
LTE Band 38	2570 ~ 2620		0.78
LTE Band 41	2500 ~ 2690		0.78
LTE Band 48	3550 ~ 3700		-4.29
LTE Band 66	1710 ~ 1780		1.47
LTE Band 71	663 ~ 698		1.22

Note: All antenna information (Antenna type and Peak Gain) is provided by the manufacturer.

1.7. Test Methodology

According to the specifications of the manufacturer, the EUT must comply with the requirements of the following standards:

- ANSI C63.26:2015
- FCC CFR 47 Part 27
- FCC KDB 971168 D01 v03r01: Power Meas License Digital Systems
- FCC KDB 971168 D02 v02r01: Misc Rev Approv License Devices
- FCC KDB 412172 D01 v01r01: Determining ERP and EIRP

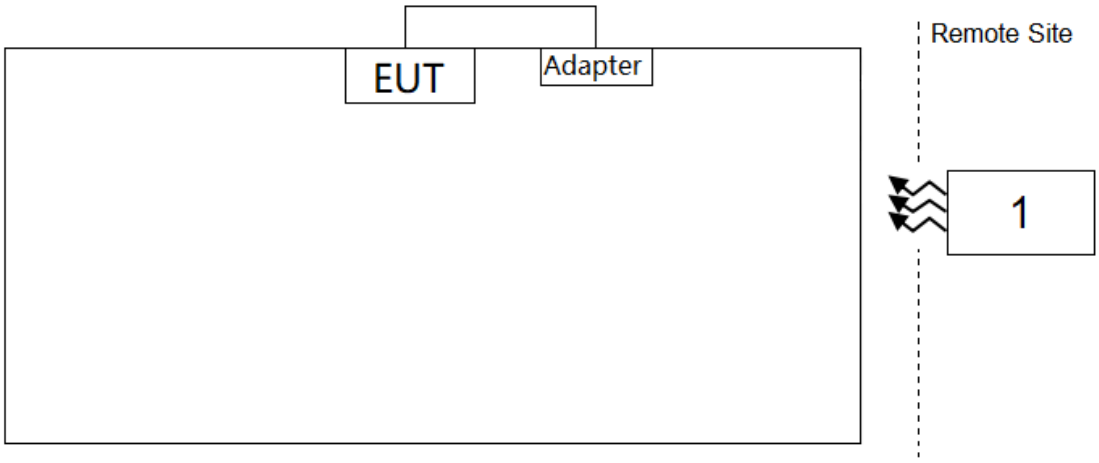
1.8. EMI Suppression Device(s)/Modifications

No EMI suppression device(s) were added and/or no modifications were made during testing.

1.9. Maximum Power, Frequency Tolerance, and Emission Designator

LTE Band 30		QPSK			16QAM		
BW (MHz)	Feq. (MHz)	Designator	Tolerance (ppm)	Max Power (W)	Designator	Tolerance (ppm)	Max Power (W)
5	2305 ~ 2315	4M47G7D	-	0.1774	4M46W7D	-	0.1531
10	2310	8M93G7D	0.0111	0.1754	8M95W7D	-	0.1469
LTE Band 30		64QAM			256QAM		
BW (MHz)	Feq. (MHz)	Designator	Tolerance (ppm)	Max Power (W)	Designator	Tolerance (ppm)	Max Power (W)
5	2305 ~ 2315	4M46W7D	-	0.1422	4M47W7D	-	0.0681
10	2310	8M94W7D	-	0.1452	8M93W7D	-	0.0752

1.10. Configuration of Tested System



Product		Manufacturer	Model No.
1	Wideband Radio Communication Tester	R&S	CMW 500

1.11. Test Environment Condition

Ambient Temperature	15 ~ 35°C
Relative Humidity	20% ~ 75%RH

2. TEST EQUIPMENT CALIBRATION DATE

Radiated Emission (WZ-AC1)

Instrument	Manufacturer	Type No.	Asset No.	Cali. Interval	Cali. Due Date
EMI Test Receiver	R&S	ESR7	MRTSUE06001	1 year	2021/08/01
Wideband Radio Communication Tester	R&S	CMW 500	MRTSUE06243	1 year	2021/11/07
PXA Signal Analyzer	Keysight	9030B	MRTSUE06395	1 year	2021/09/03
Loop Antenna	Schwarzbeck	FMZB 1519	MRTSUE06025	1 year	2021/11/10
Bilog Period Antenna	Schwarzbeck	VULB 9168	MRTSUE06172	1 year	2022/03/30
Broad Band Horn Antenna	Schwarzbeck	BBHA 9120D	MRTSUE06023	1 year	2021/10/13
Broad Band Horn Antenna	Schwarzbeck	BBHA 9170	MRTSUE06597	1 year	2022/02/22
Microwave System Amplifier	Agilent	83017A	MRTSUE06076	1 year	2021/11/15
Preamplifier	Schwarzbeck	BBV 9721	MRTSUE06121	1 year	2021/06/11
Thermohygrometer	Testo	608-H1	MRTSUE06403	1 year	2021/08/08
Anechoic Chamber	TDK	Chamber-AC1	MRTSUE06212	1 year	2022/04/29

Radiated Emission (WZ-AC2)

Instrument	Manufacturer	Type No.	Asset No.	Cali. Interval	Cali. Due Date
Spectrum Analyzer	Keysight	N9038A	MRTSUE06125	1 year	2021/08/01
Wideband Radio Communication Tester	R&S	CMW 500	MRTSUE06243	1 year	2021/11/07
Loop Antenna	Schwarzbeck	FMZB 1519	MRTSUE06025	1 year	2021/11/10
Bilog Period Antenna	Schwarzbeck	VULB 9162	MRTSUE06022	1 year	2021/10/13
Horn Antenna	Schwarzbeck	BBHA9120D	MRTSUE06171	1 year	2021/10/27
Broad Band Horn Antenna	Schwarzbeck	BBHA 9170	MRTSUE06597	1 year	2022/02/22
Broad Band Coaxial Preamplifier	Schwarzbeck	BBV 9718	MRTSUE06176	1 year	2021/11/15
Preamplifier	Schwarzbeck	BBV 9721	MRTSUE06121	1 year	2021/06/11
Temperature/Humidity Meter	Minggao	ETH529	MRTSUE06170	1 year	2021/12/14
Anechoic Chamber	RIKEN	Chamber-AC2	MRTSUE06213	1 year	2022/04/29

Conducted Test Equipment (WZ-SR6, WZ-TR3)

Instrument	Manufacturer	Type No.	Asset No.	Cali. Interval	Cali. Due Date
EXA Signal Analyzer	Agilent	N9020A	MRTSUE06106	1 year	2022/04/14
EXA Signal Analyzer	Keysight	N9010B	MRTSUE06452	1 year	2021/07/11
Signal Analyzer	R&S	FSV40	MRTSUE06218	1 year	2022/04/14
Wideband Radio Communication Tester	R&S	CMW 500	MRTSUE06243	1 year	2021/11/07
Power Meter	Agilent	U2021XA	MRTSUE06030	1 year	2021/11/17
DC Power Supply	GWINSTEK	DPS-3303C	MRTSUE06064	N/A	N/A
True RMS Clamp Meter	Fluke	319	MRTSUE06080	1 year	2022/05/05
Directional Coupler	Agilent	87301D	MRTSUE06082	1 year	2022/03/24
Dual Directional Coupler	Agilent	7778D	MRTSUE06083	1 year	2022/03/24
Attenuator	MVE	6dB	MRTSUE06534	1 year	2021/12/11
Attenuator	MVE	10dB	MRTSUE06543	1 year	2021/12/11
Temperature & Humidity Chamber	BAOYT	BYH-150CL	MRTSUE06051	1 year	2021/11/07
Thermohygrometer	testo	608-H1	MRTSUE06401	1 year	2021/08/08

Software	Version	Function
EMI Software	V3	EMI Test Software

3. MEASUREMENT UNCERTAINTY

Where relevant, the following test uncertainty levels have been estimated for tests performed on the EUT as specified in CISPR 16-4-2. This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k = 2.

Radiated Spurious Emissions
Measurement Uncertainty for a Level of Confidence of 95% (U=2Uc(y)): Horizontal: 9kHz ~ 300MHz: 5.04dB 300MHz ~ 1GHz: 4.95dB 1GHz ~ 40GHz: 6.40dB Vertical: 9kHz ~ 300MHz: 5.24dB 300MHz ~ 1GHz: 6.03dB 1GHz ~ 40GHz: 6.40dB
Conducted Spurious Emissions
Measuring Uncertainty for a Level of Confidence of 95% (U=2Uc(y)): 0.78dB
Output Power
Measuring Uncertainty for a Level of Confidence of 95% (U=2Uc(y)): 1.13dB
Occupied Bandwidth
Measuring Uncertainty for a Level of Confidence of 95% (U=2Uc(y)): 0.28%
Frequency Stability
Measuring Uncertainty for a Level of Confidence of 95% (U=2Uc(y)): 76.2Hz

4. TEST RESULT

4.1. Summary

FCC Part Section(s)	Test Description	Test Limit	Test Condition	Test Result	Reference
2.1049	Occupied Bandwidth	N/A	Conducted	Pass	Section 5.2
2.1055, 27.54	Frequency Stability	Within the band		Pass	Section 5.3
27.50(a)(3)	Equivalent Radiated Power	< 250mW/5MHz		Pass	Section 5.4
2.1051, 27.53(a)(4)	Band Edge	Refer to section 5.5		Pass	Section 5.5
2.1051, 27.53(a)(4)	Spurious Emission	<70 + 10log10 (P[$_{Watts}$])		Pass	Section 5.6
2.1053, 27.53(a)(4)	Spurious Emission	<70 + 10log10 (P[$_{Watts}$])	Radiated	Pass	Section 5.7

Notes:

1) The analyzer plots shown in this section were all taken with a correction table loaded into the analyzer. The correction table was used to account for the losses of the cables and attenuators used as part ofthe system to connect the EUT to the analyzer at all frequencies of interest.

2) All supported modulation types were evaluated. The worst-case emission of modulation was selected. Therefore, the Frequency Stability, Occupied Bandwidth, Channel Band Edge, Radiated & Conducted Spurious Emission were presented worst-case in the test report.

4.2. Occupied Bandwidth Measurement

4.2.1.Test Limit

The occupied bandwidth, that is the frequency bandwidth such that, below its lower and above its upper frequency limits, the mean powers radiated are each equal to 0.5 percent of the total mean power radiated by a given emission shall be measured.

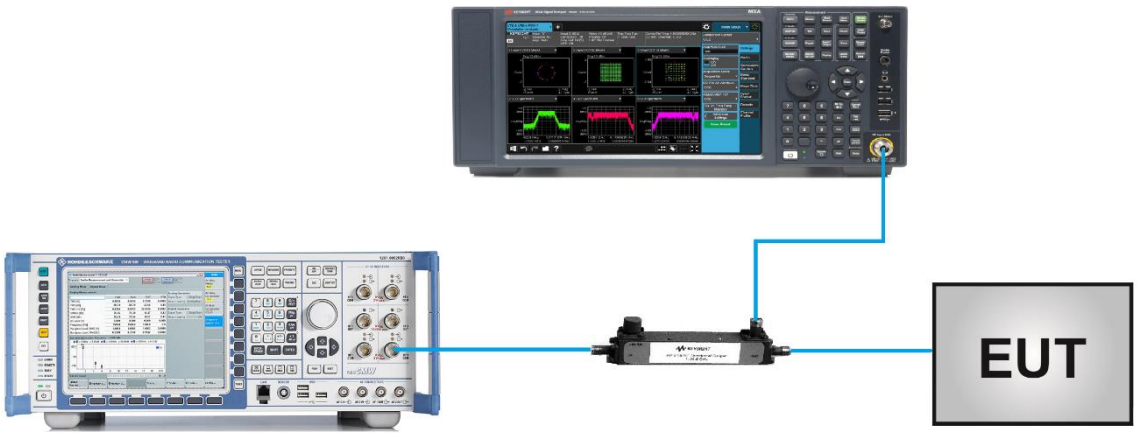
4.2.2.Test Procedure

ANSI C63.26-2015 - Section 5.4

4.2.3.Test Setting

1. Set center frequency to the nominal EUT channel center frequency
2. RBW = The nominal RBW shall be in the range of 1% to 5% of the anticipated OBW
3. VBW ≥ 3 × RBW
4. Detector = Peak
5. Trace mode = max hold
6. Sweep = auto couple
7. Allow the trace to stabilize
8. Use the 99% power bandwidth function of the instrument and report the measured bandwidth.

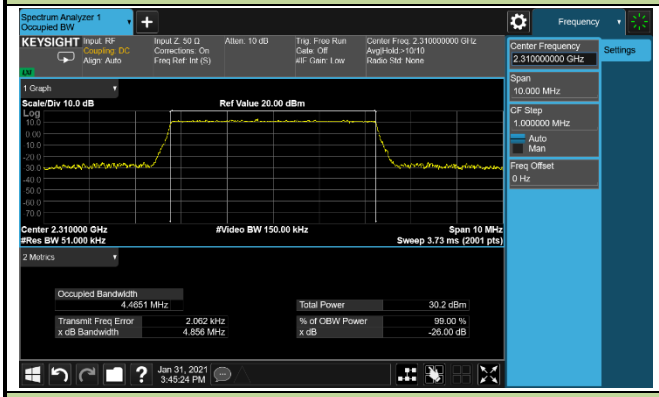
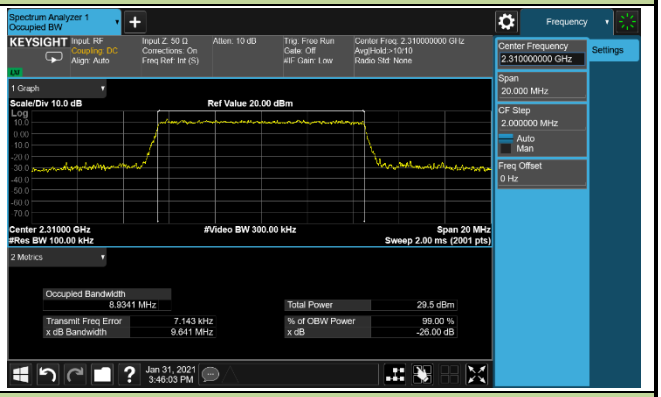
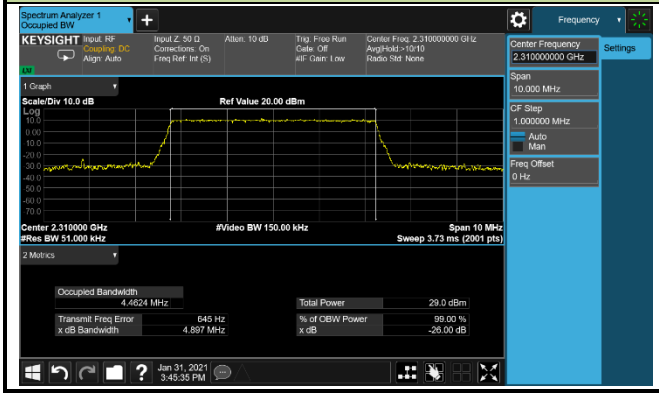
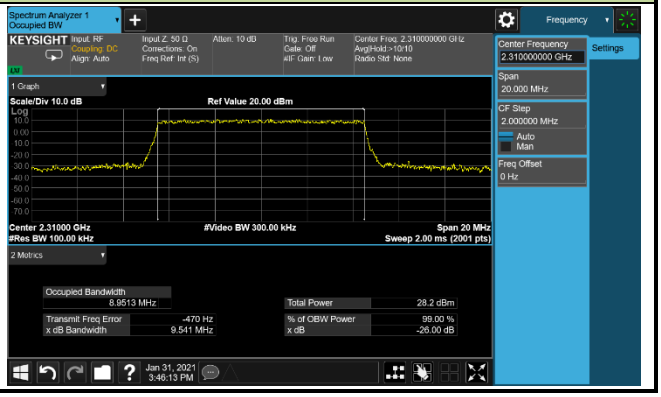
4.2.4.Test Setup

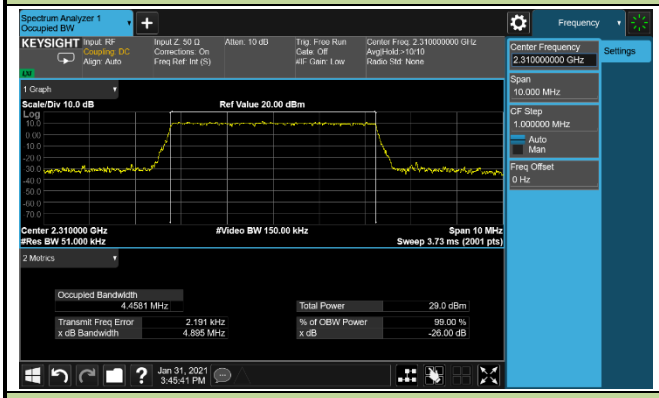
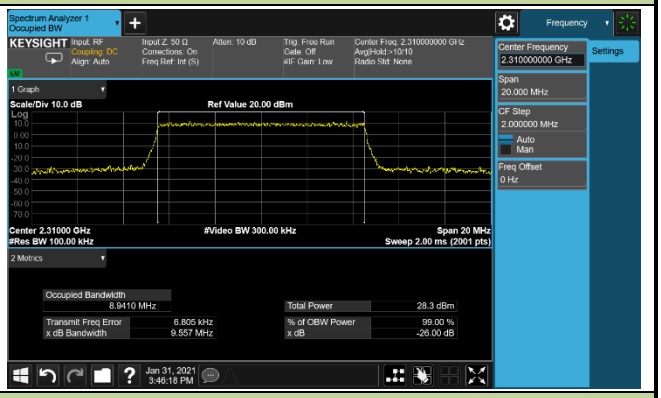
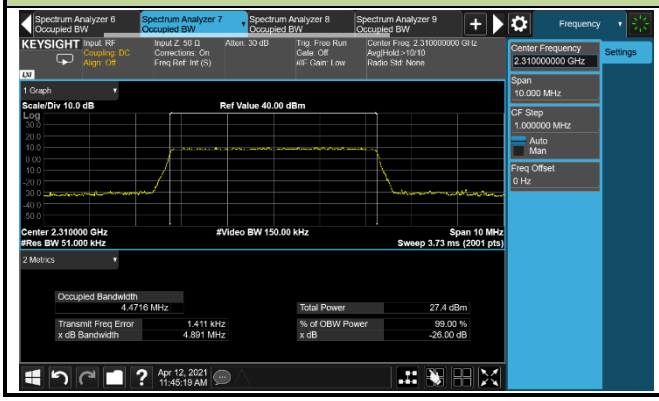
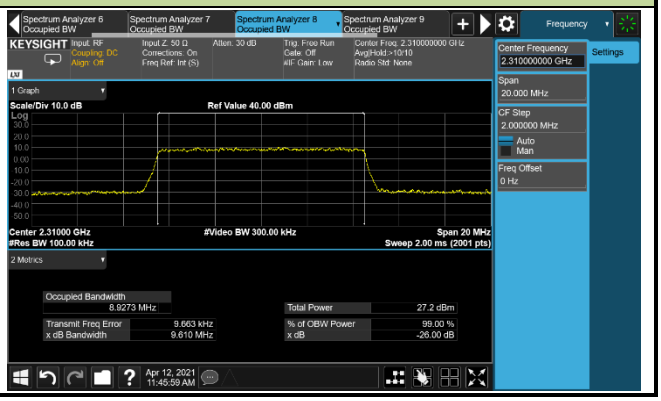


4.2.5.Test Result

Product	5G Sub-6 GHz M.2 Module	Test Site	SIP-SR5
Test Engineer	Candy Luo	Test Date	2021/01/31
Test Band	LTE Band 30		

Modulation	Frequency (MHz)	Bandwidth (MHz)	99% Bandwidth (MHz)
QPSK	2310	5	4.47
		10	8.93
16QAM	2310	5	4.46
		10	8.95
64QAM	2310	5	4.46
		10	8.94
256QAM	2310	5	4.47
		10	8.93

99% Bandwidth - QPSK	
5MHz Channel Bandwidth	10MHz Channel Bandwidth
	
99% Bandwidth - 16QAM	
5MHz Channel Bandwidth	10MHz Channel Bandwidth
	

99% Bandwidth - 64QAM	
5MHz Channel Bandwidth	10MHz Channel Bandwidth
	
99% Bandwidth - 256QAM	
5MHz Channel Bandwidth	10MHz Channel Bandwidth
	

4.3. Frequency Stability Measurement

4.3.1.Test Limit

The frequency stability shall be sufficient to ensure that the fundamental emissions stay within the authorized bands of operation.

4.3.2.Test Procedure

ANSI C63.26-2015 - Section 5.6

4.3.3.Test Setting

Frequency Stability Under Temperature Variations:

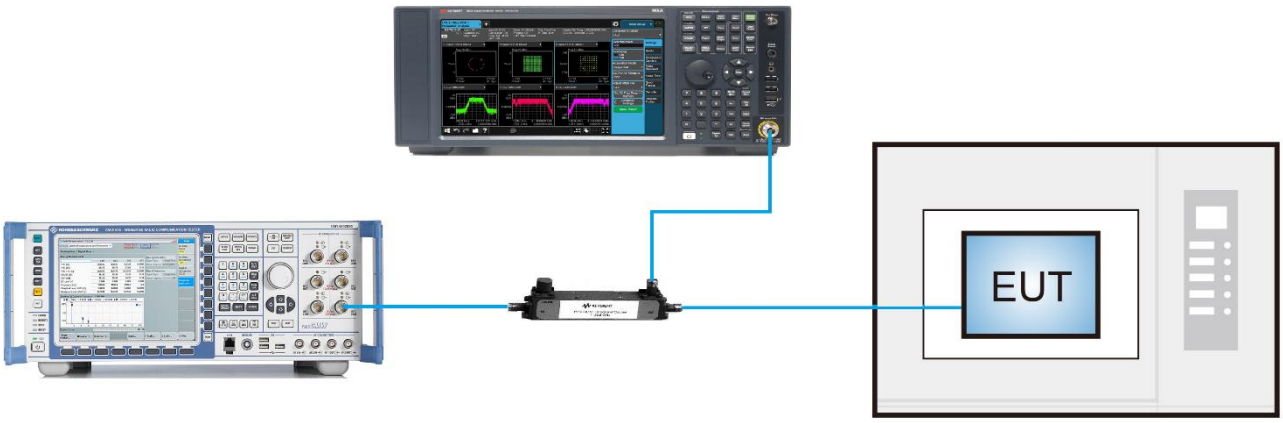
The equipment under test was connected to an external AC or DC power supply and input rated voltage. RF output was connected to a frequency counter or spectrum analyzer via feed through attenuators. The EUT was placed inside the temperature chamber. Set the spectrum analyzer RBW low enough to obtain the desired frequency resolution and measure EUT 20°C operating frequency as reference frequency. Turn EUT off and set the chamber temperature to highest. After the temperature stabilized for approximately 30 minutes recorded the frequency. Repeat step measure with 10°C decreased per stage until the lowest temperature reached.

Frequency Stability Under Voltage Variations:

Set chamber temperature to 20°C. Use a variable AC power supply / DC power source to power the EUT and set the voltage to rated voltage. Set the spectrum analyzer RBW low enough to obtain the desired frequency resolution and recorded the frequency.

Reduce the inputvoltage to specify extreme voltage variation (±15%) and endpoint, recordthe maximum frequency change.

4.3.4.Test Setup



4.3.5.Test Result

Product	5G Sub-6 GHz M.2 Module	Test Site	SIP-TR1
Test Engineer	Candy Luo	Test Date	2021/01/31
Test Band	LTE Band 30		

Power (Vdc)	Temp. (°C)	Frequency Tolerance (ppm)
3.7	- 30	-0.0004
	- 20	0.0029
	- 10	-0.0048
	0	0.0015
	+ 10	0.0007
	+ 20	0.0082
	+ 30	0.0035
	+ 40	0.0111
	+ 50	0.0073
4.4	+ 20	-0.0046
3.135	+ 20	0.0027

4.4. Equivalent Isotropically Radiated Power Measurement

4.4.1.Test Limit

For mobile and portable stations transmitting in the 2305-2315 MHz band or the 2350-2360 MHz band, the average EIRP must not exceed 50milliwatts within any 1 megahertz of authorized bandwidth, except that for mobile and portable stations compliant with 3GPP L TE standards or another advanced mobile broadband protocol that avoids concentrating energy at the edge of the operating band the average EIRP must not exceed 250 milliwatts within any 5 megahertz of authorized bandwidth but may exceed 50 milliwatts within any 1 megahertz of authorized bandwidth

4.4.2.Test Procedure

ANSI C63.26-2015 - Section 5.2.4.4.2 & 5.2.5.5

4.4.3.Test Setting

When the fundamental condition for average power measurements cannot be realized (i.e., the EUT can not be configured to transmit at full-power on a continuous basis (i.e., duty cycle < 98%) and the instrumentation cannot be configured to measure only during active full-power transmissions), then the following procedure can be used if the EUT duty cycle is constant (i.e., duty cycle variations are less thanor equal to ±2%).

a) Set span to 2 × to 3 × the OBW.

b) Set RBW = 1% to 5% of the OBW.

c) Set VBW ≥ 3 × RBW.

d) Set number of measurement points in sweep ≥ 2 × span / RBW.

e) Sweep time:

1) Set = auto-couple, or

2) Set ≥ [10 × (number of points in sweep) × (transmission symbol period)] for single sweep (automation-compatible) measurement.

f) Detector = power averaging (rms).

g) Set sweep trigger to “free run.”

h) Trace average at least 100 traces in power averaging (rms) mode if sweep is set to auto-couple. To accurately determine the average power over the on and off time of the transmitter, it can be necessary to increase the number of traces to be averaged above 100, or if using a manually configured sweep time, increase the sweep time.

i) Using the marker function to identify the maximum PSD.

j) Add 10 log (1/duty cycle) to the measured power level to compute the average power during continuous transmission. For example, add [10 log (1/0.25)] = 6 dB if the duty cycle is a constant 25%.

The relevant equation for determining the maximum ERP or EIRP from the measured RF output power is given in Equation (1) as follows:

$$ERP \text{ or } EIRP = P_{Meas} + G_T \quad (1)$$

where

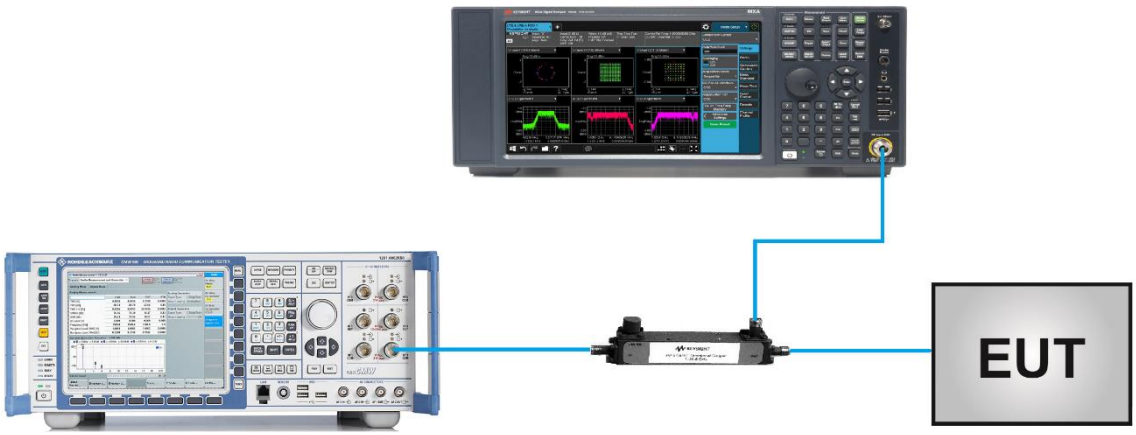
ERP or EIRP effective radiated power or equivalent isotropically radiated power, respectively (expressed in the same units as P_{Meas}, e.g., dBm or dBW)

P_{Meas} measured transmitter output power or PSD, in dBm or dBW

G_T gain of the transmitting antenna, in dBd (ERP) or dBi (EIRP)

For devices utilizing multiple antennas, see 6.4 for guidance with respect to determining the effective array transmit antenna gain term to be used in the above equation.

4.4.4.Test Setup



4.4.5.Test Result

Product	5G Sub-6 GHz M.2 Module	Test Site	SIP-SR5
Test Engineer	Candy Luo	Test Date	2021/01/31

Channel No.	Frequency (MHz)	Channel Bandwidth (MHz)	RB Size	RB Offset	Power Density (dBm/5MHz)	EIRP Density (dBm/5MHz)	Limit (dBm /5MHz)
QPSK							
27685	2307.5	5	1	0	22.21	19.15	< 23.98
27710	2310.0				22.26	19.20	< 23.98
27735	2312.5				22.36	19.30	< 23.98
27685	2307.5	5	1	12	22.36	19.30	< 23.98
27710	2310.0				22.35	19.29	< 23.98
27735	2312.5				22.49	19.43	< 23.98
27685	2307.5	5	1	24	22.31	19.25	< 23.98
27710	2310.0				22.37	19.31	< 23.98
27735	2312.5				22.35	19.29	< 23.98
27685	2307.5	5	25	0	21.42	18.36	< 23.98
27710	2310.0				21.42	18.36	< 23.98
27735	2312.5				21.31	18.25	< 23.98
27710	2310.0	10	1	0	22.44	19.38	< 23.98
			1	24	22.43	19.37	< 23.98
			1	49	22.44	19.38	< 23.98
			50	0	21.35	18.29	< 23.98
Note: The EIRP Density (dBm/5MHz) = Power Density (dBm/5MHz) + Antenna Gain (dBi)							

Channel No.	Frequency (MHz)	Channel Bandwidth (MHz)	RB Size	RB Offset	Power Density (dBm/5MHz)	EIRP Density (dBm/5MHz)	Limit (dBm /5MHz)
16QAM							
27685	2307.5	5	1	0	21.47	18.41	< 23.98
27710	2310.0				21.36	18.30	< 23.98
27735	2312.5				21.61	18.55	< 23.98
27685	2307.5	5	1	12	21.46	18.40	< 23.98
27710	2310.0				21.47	18.41	< 23.98
27735	2312.5				21.85	18.79	< 23.98
27685	2307.5	5	1	24	21.50	18.44	< 23.98
27710	2310.0				21.50	18.44	< 23.98
27735	2312.5				21.51	18.45	< 23.98
27685	2307.5	5	25	0	20.49	17.43	< 23.98
27710	2310.0				20.47	17.41	< 23.98
27735	2312.5				20.42	17.36	< 23.98
27710	2310.0	10	1	0	21.67	18.61	< 23.98
			1	24	21.08	18.02	< 23.98
			1	49	21.53	18.47	< 23.98
			50	0	20.42	17.36	< 23.98
Note: The EIRP Density (dBm/5MHz) = Power Density (dBm/5MHz) + Antenna Gain (dBi)							

Channel No.	Frequency (MHz)	Channel Bandwidth (MHz)	RB Size	RB Offset	Power Density (dBm/5MHz)	EIRP Density (dBm/5MHz)	Limit (dBm /5MHz)
64QAM							
27685	2307.5	5	1	0	21.36	18.30	< 23.98
27710	2310.0				21.25	18.19	< 23.98
27735	2312.5				21.34	18.28	< 23.98
27685	2307.5	5	1	12	21.53	18.47	< 23.98
27710	2310.0				21.36	18.30	< 23.98
27735	2312.5				21.29	18.23	< 23.98
27685	2307.5	5	1	24	21.34	18.28	< 23.98
27710	2310.0				21.33	18.27	< 23.98
27735	2312.5				21.15	18.09	< 23.98
27685	2307.5	5	25	0	20.15	17.09	< 23.98
27710	2310.0				20.07	17.01	< 23.98
27735	2312.5				20.12	17.06	< 23.98
27710	2310.0	10	1	0	21.62	18.56	< 23.98
			1	24	21.32	18.26	< 23.98
			1	49	21.21	18.15	< 23.98
			50	0	20.07	17.01	< 23.98
Note: The EIRP Density (dBm/5MHz) = Power Density (dBm/5MHz) + Antenna Gain (dBi)							

Channel No.	Frequency (MHz)	Channel Bandwidth (MHz)	RB Size	RB Offset	Power Density (dBm/5MHz)	EIRP Density (dBm/5MHz)	Limit (dBm /5MHz)
256QAM							
27685	2307.5	5	1	0	18.26	15.20	< 23.98
27710	2310.0				18.04	14.98	< 23.98
27735	2312.5				18.25	15.19	< 23.98
27685	2307.5	5	1	12	18.33	15.27	< 23.98
27710	2310.0				18.16	15.10	< 23.98
27735	2312.5				18.29	15.23	< 23.98
27685	2307.5	5	1	24	18.24	15.18	< 23.98
27710	2310.0				18.12	15.06	< 23.98
27735	2312.5				18.17	15.11	< 23.98
27685	2307.5	5	25	0	18.12	15.06	< 23.98
27710	2310.0				18.11	15.05	< 23.98
27735	2312.5				18.12	15.06	< 23.98
27710	2310.0	10	1	0	18.76	15.70	< 23.98
			1	24	18.51	15.45	< 23.98
			1	49	18.51	15.45	< 23.98
			50	0	18.14	15.08	< 23.98
Note: The EIRP Density (dBm/5MHz) = Power Density (dBm/5MHz) + Antenna Gain (dBi)							

4.5. Band Edge Measurement

4.5.1.Test Limit

For mobile and portable stations operating in the 2305-2315 MHz and 2350-2360MHz bands:

(1) By a factor of not less than: 43 + 10 log (P) dB on all frequencies between 2305 and2320 MHz and on all frequencies between 2345 and 2360 MHz that are outside the licensed band(s) of operation, not less than 55 + 10 log (P) dB on all frequencies between 2320 and 2324 MHz and on all frequencies between 2341 and 2345 MHz, not less than 61 + 10 log (P) dB on all frequencies between 2324 and 2328 MHz and on all frequencies between 2337 and 2341 MHz, and not less than 67 + 10 log (P) dB on all frequencies between 2328 and 2337 MHz;

(2) By a factor of not less than 43 + 10 log (P) dB on all frequencies between 2300 and 2305 MHz, 55 + 10 log (P) dB on all frequencies between 2296 and 2300 MHz, 61 + 10 log (P) dB on all frequencies between 2292 and 2296 MHz, 67 + 10 log (P) dB on all frequencies between 2288 and 2292 MHz, and 70 + 10 log (P) dB below 2288 MHz;

(3) By a factor of not less than 43 + 10 log (P) dB on all frequencies between 2360 and 2365 MHz, and not less than 70 + 10 log (P) dB above 2365 MHz.

4.5.2.Test Procedure

ANSI C63.26-2015 - Section5.7

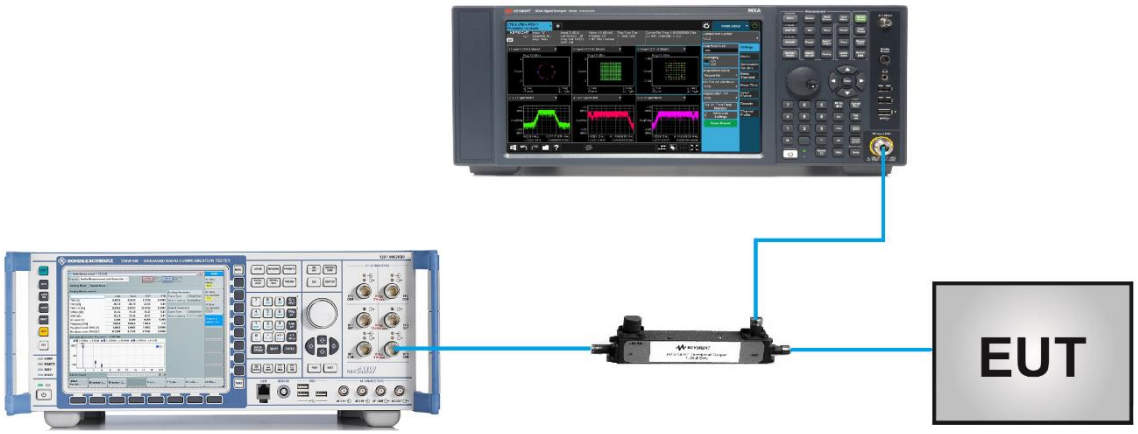
4.5.3.Test Setting

1. Set the analyzer frequency to low or high channel
2. RBW ≥ The nominal RBW shall be in the range of 1% of the anticipated OBW (in the 1MHz band immediately outside and adjacent to the band edge). For improvement of the accuracy in the measurement of the average power of a noise-like emission, a RBW narrower than the specified reference bandwidth can be used (generally limited to no less than 1% of the OBW), provided that a subsequent integration is performed over the full required measurement bandwidth. This integration should be performed using the spectrum analyzer’s band power functions.
3. VBW ≥ 3*RBW
4. Sweep time = auto
5. Detector = power averaging (rms)
6. Set sweep trigger to “free run.”
7. User gate triggered such that the analyzer only sweeps when the device is transmitting at full

power

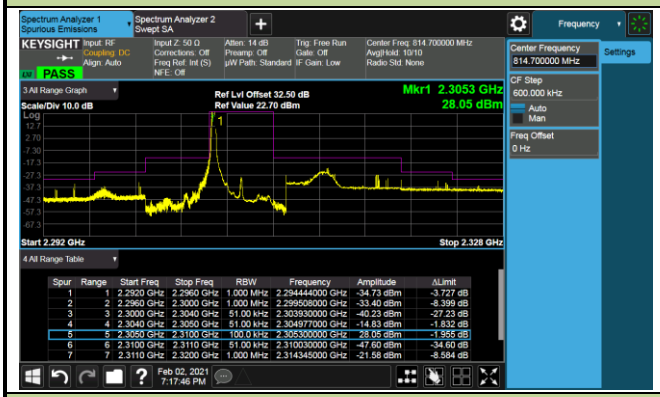
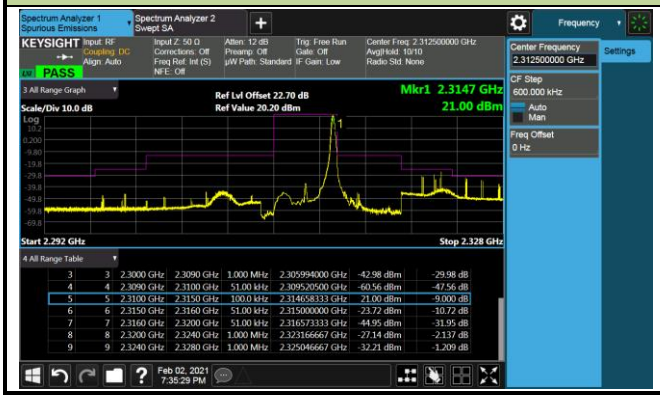
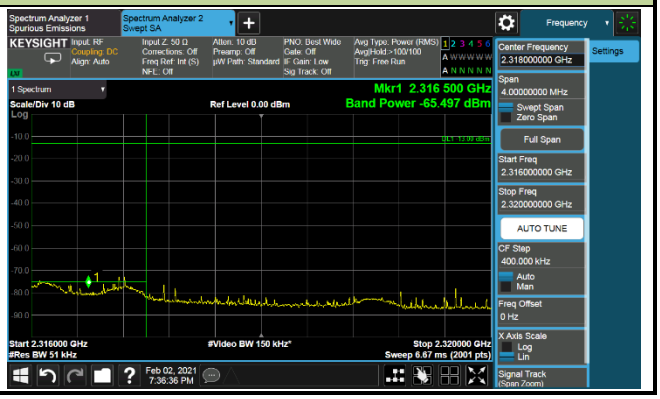
8. Trace average at least 100 traces in power averaging (rms) mode if sweep is set to auto-couple. To accurately determine the average power over the on and off time of the transmitter, it can be necessary to increase the number of traces to be averaged above 100, or if using a manually configured sweep time, increase the sweep time.

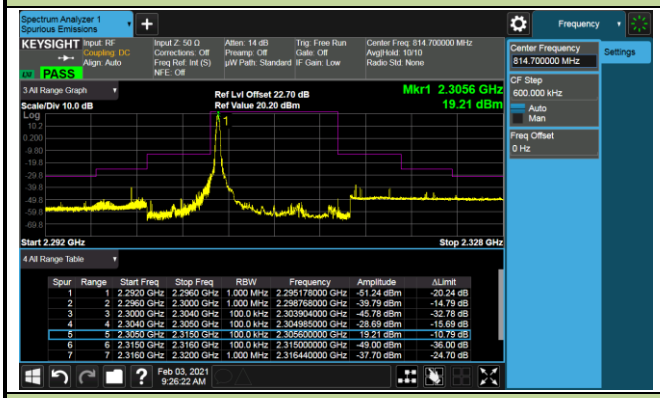
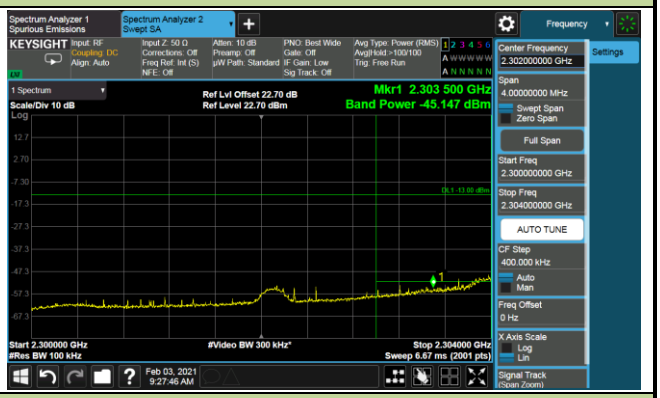
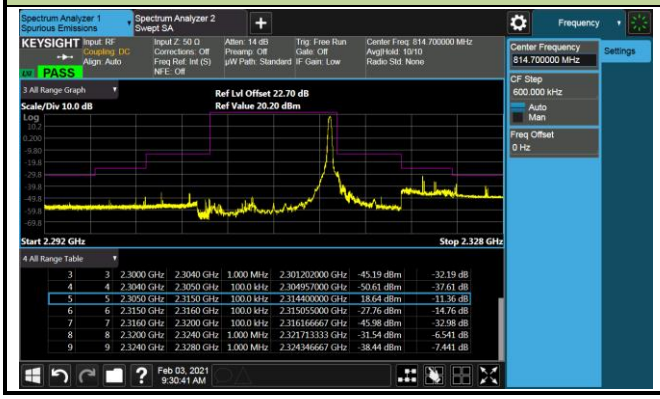
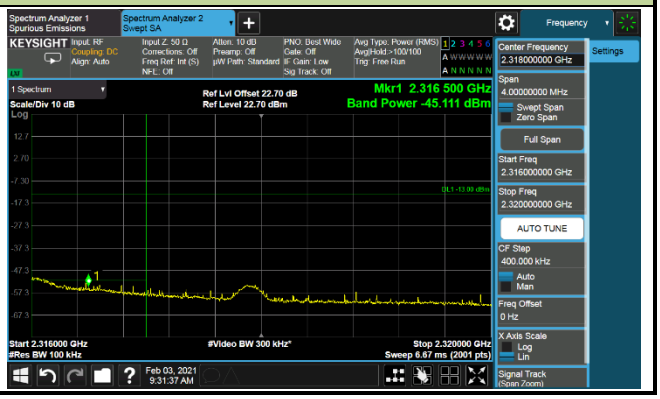
4.5.4.Test Setup



4.5.5.Test Result

Product	5G Sub-6 GHz M.2 Module	Test Site	SIP-SR5
Test Engineer	Candy Luo	Test Date	2021/02/02
Test Band	LTE Band 30_QPSK		

5MHz Channel Bandwidth 1RB	
Lower ACP	Lower Extended Band Edge
	
Upper ACP	Upper Extended Band Edge
	

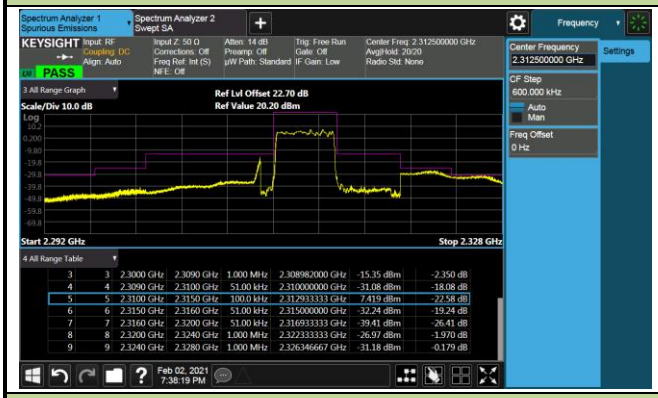
10MHz Channel Bandwidth 1RB	
Lower ACP	Lower Extended Band Edge
	
Upper ACP	Upper Extended Band Edge
	

5MHz Channel Bandwidth Full RB

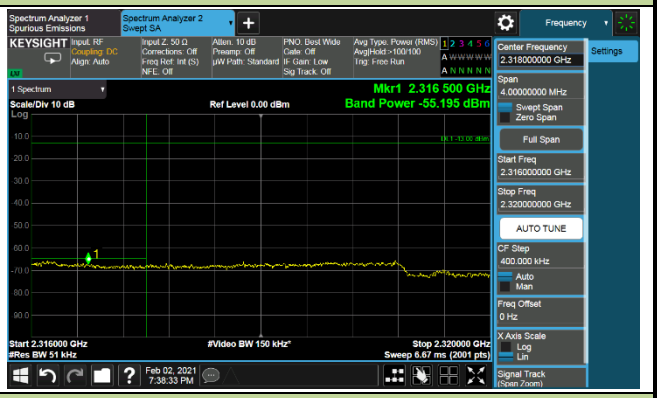
Lower ACP

Lower Extended Band Edge

Upper ACP

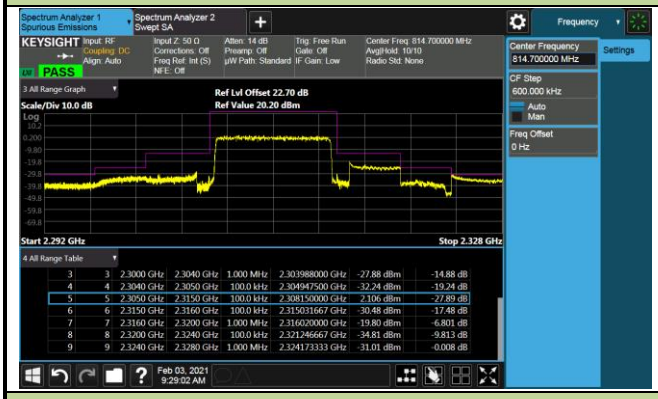


Upper Extended Band Edge



10MHz Channel Bandwidth Full RB

Lower ACP



Lower Extended Band Edge

Upper ACP

Upper Extended Band Edge

4.6. Conducted Spurious Emission Measurement

4.6.1.Test Limit

The level of the carrier and the various conducted spurious and harmonic frequencies is measured by means of a calibrated spectrum analyzer. The spectrum is scanned from the lowest frequency generated in the equipment up to a frequency including its 10thharmonic. All out of band emissions are measured with a spectrum analyzer connected to the antenna terminal of the EUT while the EUT is operating at its maximum duty cycle, at maximum power, and at the appropriate frequencies. All data rates were investigated to determine the worst-case configuration. All modes of operation were investigated and the worst-case configuration results are reported in this section.

The power of any emission outside of the authorized operating frequency ranges must be lower than the transmitter power (P) bya factor of at least 70 + 10 log (P) dB.

4.6.2.Test Procedure

ANSI C63.26-2015 - Section 5.7

4.6.3.Test Setting

1. Set the analyzer frequency to low, mid, high channel.
2. RBW = 1MHz
3. VBW ≥ 3*RBW
4. Sweep time = auto
5. Detector = power averaging (rms)
6. Set sweep trigger to “free run.”
7. User gate triggered such that the analyzer only sweeps when the device is transmitting at full power.
8. Trace average at least 100 traces in power averaging (rms) mode if sweep is set to auto-couple. To accurately determine the average power over the on and off time of the transmitter, it can be necessary to increase the number of traces to be averaged above 100, or if using a manually configured sweep time, increase the sweep time.

4.6.4.Test Setup

4.6.5.Test Result

Product	5G Sub-6 GHz M.2 Module	Test Site	SIP-SR5
Test Engineer	Candy Luo	Test Date	2021/02/01
Test Band	LTE Band 30_QPSK		

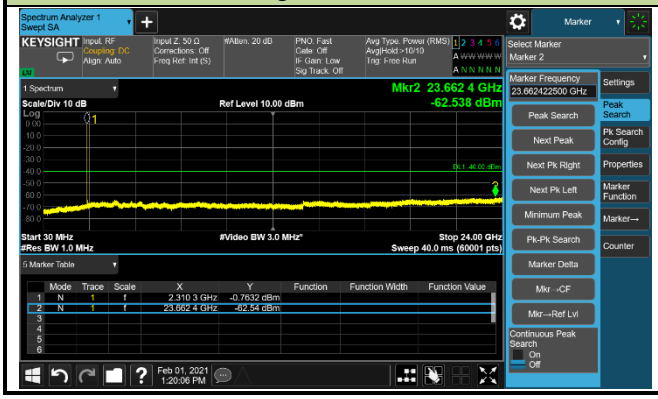
Channel	Frequency (MHz)	Channel Bandwidth (MHz)	Frequency Range (MHz)	Max Spurious Emissions (dBm)	Limit (dBm)	Result
27685	2307.5	5	30 ~ 25000	-62.54	≤ -40.00	Pass
27710	2310.0	5	30 ~ 25000	-64.61	≤ -40.00	Pass
27735	2312.5	5	30 ~ 25000	-62.54	≤ -40.00	Pass
27710	2310.0	10	30 ~ 25000	-65.22	≤ -40.00	Pass

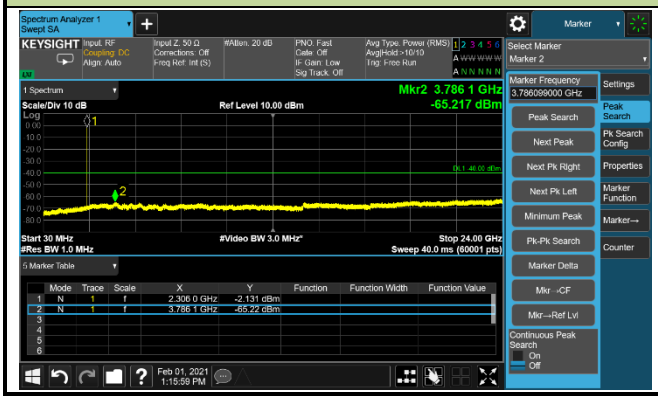
5MHz Channel Bandwidth

Low Channel

Middle Channel

High Channel



10MHz Channel Bandwidth	
Middle Channel	
	

4.7. Radiated Spurious Emission Measurement

4.7.1.Test Limit

Out of band emissions: The power of any emission outside of the authorized operating frequency ranges must be lower than the transmitter power (P) by a factor of at least 70 + 10 log (P) dB.

E (dBμV/m) = EIRP (dBm) - 20 log D + 104.8; where D is the measurement distance in meters. The emission limit equal to 55.3dBμV/m.

4.7.2.Test Procedure

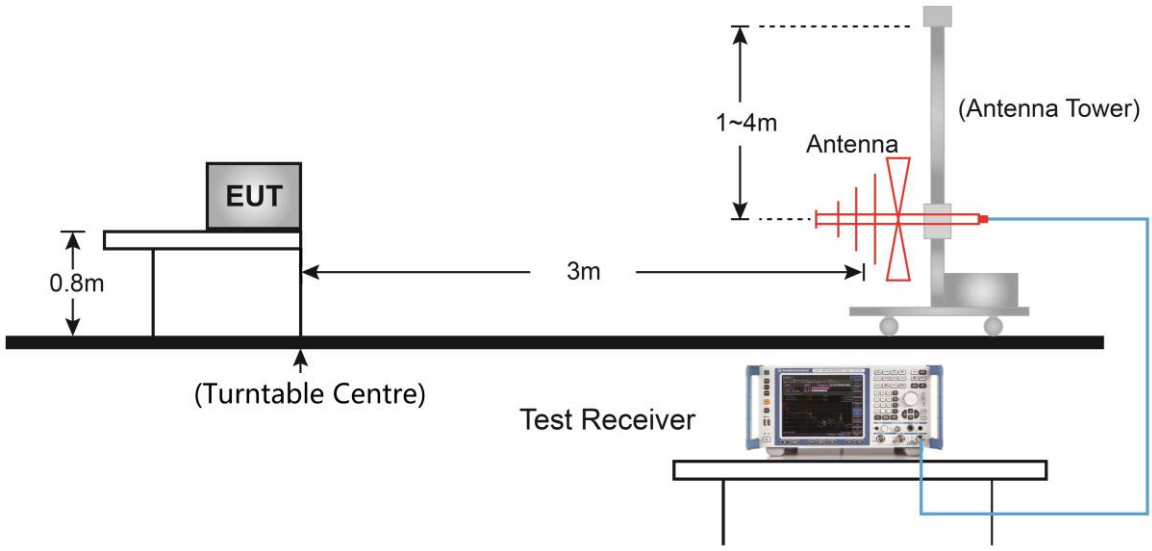
ANSI C63.26-2015 - Section 5.2.7 & 5.5

4.7.3.Test Setting

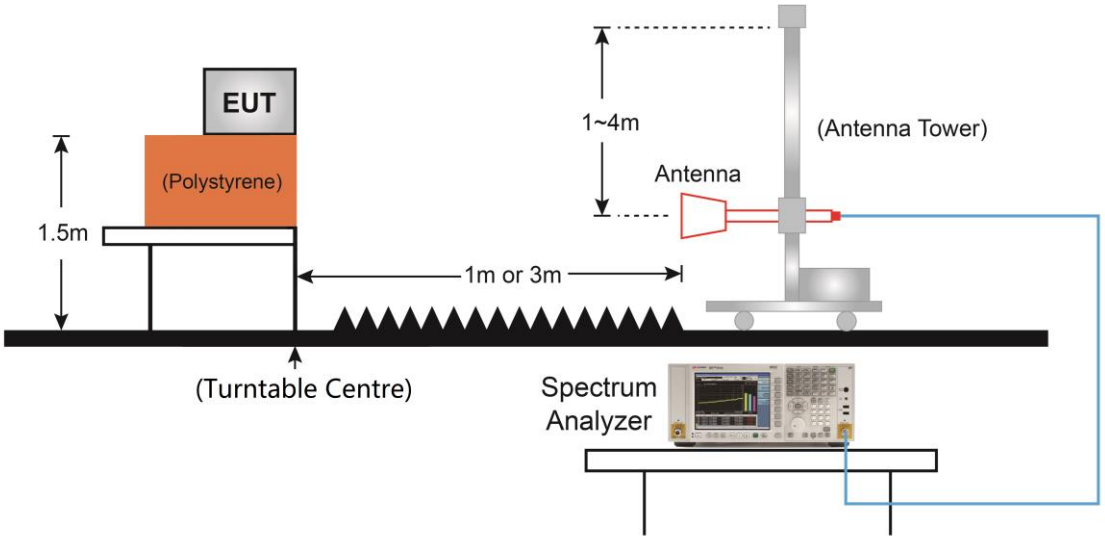
1. RBW = 1MHz
2. VBW ≥ 3*RBW
3. Sweep time ≥ 10 × (number of points in sweep) × (transmission symbol period)
4. Detector = Peak
5. Trace mode = max hold
6. The trace was allowed to stabilize

4.7.4.Test Setup

Below 1GHz Test Setup:



Above 1GHz Test Setup:



4.7.5.Test Result

Product	5G Sub-6 GHz M.2 Module	Test Site	WZ-AC1
Test Engineer	Buter Shi	Test Date	2021/02/02
Test Band	LTE Band 30_5MHz_1RB_QPSK		

Frequency (MHz)	Reading Level (dBμV)	Factor (dB)	Measure Level(dBμV/m)	Limit (dBμV/m)	Margin (dB)	Detector	Polarization
Low Channel							
8097.5	37.7	10.5	48.2	55.3	-7.1	Peak	Horizontal
8726.5	37.8	11.3	49.1	55.3	-6.2	Peak	Horizontal
7188.0	39.0	9.4	48.4	55.3	-6.9	Peak	Vertical
8531.0	38.4	10.5	48.9	55.3	-6.4	Peak	Vertical
Middle Channel							
8021.0	38.9	10.1	49.0	55.3	-6.3	Peak	Horizontal
9075.0	38.5	12.1	50.6	55.3	-4.7	Peak	Horizontal
8616.0	36.2	11.1	47.3	55.3	-8.0	Peak	Vertical
10596.5	37.2	14.7	51.9	55.3	-3.4	Peak	Vertical
High Channel							
8531.0	38.4	10.5	48.9	55.3	-6.4	Peak	Horizontal
9483.0	38.4	12.9	51.3	55.3	-4.0	Peak	Horizontal
7613.0	39.5	9.4	48.9	55.3	-6.4	Peak	Vertical
9075.0	38.5	12.1	50.6	55.3	-4.7	Peak	Vertical
Note: Measure Level (dBμV/m) = Reading Level (dBμV) + Factor (dB).							

5. CONCLUSION

The data collected relate only the item(s) tested and show that unitis compliance with FCC Rules.

The End

Appendix A - Test Setup Photograph

Refer to “2101RSU049-UT” file.

Appendix B - EUT Photograph

Refer to “2101RSU049-UE” file.