



RF MEASUREMENT REPORT

FCC ID: XMR024BG770ASN
Applicant: Quectel Wireless Solutions Co., Ltd.
Product: LTE NTN Module
Model No.: BG770A-SN
Brand Name: Quectel
FCC Rule Part(s): FCC CFR 47 Part 2, FCC CFR 47 Part 25
Result: Complies
Received Date: 2024-06-14
Test Date: 2024-09-08 ~ 2024-10-17

Reviewed By:

Sunny Sun

Approved By:

Robin Wu



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.

The test report shall not be reproduced except in full without the written approval of MRT Technology (Suzhou) Co., Ltd.

Revision History

Report No.	Version	Description	Issue Date	Note
2406RSU025-U5	V01	Initial Report	2024-11-27	Valid

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1. General Information

1.1. Applicant

Quectel Wireless Solutions Co., Ltd.

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

1.2. Manufacturer

Quectel Wireless Solutions Co., Ltd.

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 Location (Suzhou - Wujiang)			
	Building 1, No.1 Xingdong Road, Wujiang, Suzhou, Jiangsu, People’s Republic of China			
☒	Laboratory Accreditations			
	A2LA: 3628.01		CNAS: L10551	
	FCC: CN1166		ISED: CN0001	
	VCCI:	☐ R-20025	☐ G-20034	☐ C-20020
		☐ R-20141	☐ G-20134	☐ C-20103
			☐ T-20020	☐ T-20104
☐	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	
☐	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: 3261		FCC: 291082, TW3261	
			ISED: TW3261	

1.4. Product Information

Product Name	LTE NTN Module
Model No.	BG770A-SN
S/N	D1C24C22B000039
3GPP Specification	L-Band 255 LTE Cat M1 Band 2/4/5/12/13/25/26/66 LTE Cat NB Band 2/4/5/12/13/17/25/66
GNSS Specification	GPS, GLONASS
Operating Temp.	-35 ~ 75°C
Operating Voltage	DC 3.1V ~ 4.2Vdc, typical 3.3V
Antenna Specification	Refer to Section 1.6
Equipment Category	MESs
Remark: The information of EUT was provided by the manufacturer, and the accuracy of the information shall be the responsibility of the manufacturer.	

1.5. Product Specification under Test

Frequency Range	1626.5 ~ 1660.5 MHz
Type of Modulation	BPSK, QPSK
Authorized Bandwidth	200 kHz

1.6. Antenna Details

Frequency Range (MHz)	Antenna Type	Max Peak Gain (dBi)
1520 ~ 2200	Fixed External Antenna	3.7

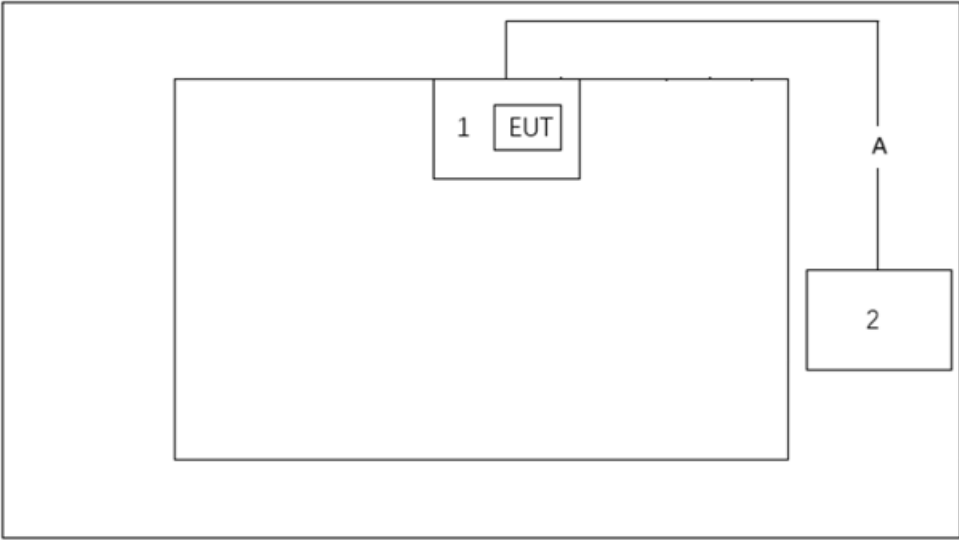
2. Test Configuration

2.1. Test Mode

Mode 1: Transmit by BPSK Modulation at 1626.6 MHz
Mode 2: Transmit by BPSK Modulation at 1643.5 MHz
Mode 3: Transmit by BPSK Modulation at 1660.4MHz
Mode 4: Transmit by QPSK Modulation at 1626.6 MHz
Mode 5: Transmit by QPSK Modulation at 1643.5 MHz
Mode 6: Transmit by QPSK Modulation at 1660.4MHz
Note: 3.75k spacing_1 tone@0/1/46/47, 15k spacing_1 tone@0/1/10/11, 15k spacing_3 tone@0/9 and 15k spacing_6 tone are forbidden to use as declared by manufacturer.

2.2. Test System Connection Diagram

The device was tested per the guidance ANSI C63.26: 2015 was used to reference the appropriate EUT setup for radiated emissions testing.

Connection Diagram – Radiated Emission testing			
			
Cable Type		Cable Description	Length
A	USB Cable	Shielded	> 10m
Product		Manufacturer	Model No.
1	EVB Test Fixture	Quectel	N/A
2	Notebook	Lenovo	E431

2.3. Test Software

The test utility software used during testing was “QCOM_V1.6”, and the commands were provided by manufacturer.

2.4. Applied Standards

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

- FCC Part 25
- ANSI C63.26-2015

2.5. Test Environment Condition

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

3. Measuring Instrument

Instrument Name	Manufacturer	Model No.	Asset No.	Cali. Interval	Cal. Due Date	Test Site
EMI Test Receiver	R&S	ESR7	MRTSUE06001	1 year	2024-12-17	WZ-AC1
Horn Antenna	Schwarzbeck	BBHA 9120D	MRTSUE06023	1 year	2025-07-26	WZ-AC1
Preamplifier	Agilent	83017A	MRTSUE06076	1 year	2024-11-09	WZ-AC1
TRILOG Antenna	Schwarzbeck	VULB 9168	MRTSUE06172	1 year	2025-05-15	WZ-AC1
Anechoic Chamber	TDK	WZ-AC1	MRTSUE06212	1 year	2025-04-19	WZ-AC1
Signal Analyzer	Keysight	N9010B	MRTSUE06607	1 year	2024-10-23	WZ-AC1
Thermohygrometer	testo	608-H1	MRTSUE11039	1 year	2024-10-25	WZ-AC1
Active Loop Antenna	Schwarzbeck	FMZB 1519-60 D	MRTSUE07076	1 year	2024-12-04	WZ-AC1
Thermohygrometer	testo	608-H1	MRTSUE06402	1 year	2025-05-12	WZ-SR5
Shielding Room	HUAMING	WZ-SR5	MRTSUE06442	N/A	N/A	WZ-SR5
Signal Analyzer	Keysight	N9010B	MRTSUE06457	1 year	2025-05-08	WZ-SR5/WZ-TR3
USB Power Sensor	Keysight	U2021XA	MRTSUE06446	1 year	2025-05-08	WZ-SR5
Directional Coupler	narda	4226-10	MRTSUE06563	1 year	2024-10-26	WZ-SR5
Attenuator	MVE	MVE2213	MRTSUE11083	1 year	2025-06-05	WZ-SR5
5G Wireless Test Platform	Keysight	E7515B	MRTSUE06942	1 year	2025-02-03	WZ-AC1/WZ-SR5/WZ-TR3
Temperature Chamber	BAOYT	BYH-150CL	MRTSUE06051	1 year	2025-09-02	WZ-TR3
Thermohygrometer	testo	608-H1	MRTSUE11268	1 year	2024-12-14	WZ-TR3

Software	Version	Function
e3	230711	RE & CE
Controller_MF 7802	2.03C	RE Antenna & Turntable
BenchVue Power Meter	2018.1	Power

4. Decision Rules and Measurement Uncertainty

4.1. Decision Rules

The Decision Rule is based on Simple Acceptance in accordance with ISO Guide 98-4: 2012 Clause 8.2.
(Measurement uncertainty is not taken into account when stating conformity with a specified requirement.)

4.2. 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 Emission Measurement	
The maximum measurement uncertainty is evaluated as:	
Coaxial:	9kHz~30MHz: 2.61dB
Coplanar:	9kHz~30MHz: 2.62dB
Horizontal:	30MHz~200MHz: 3.79dB
	200MHz~1GHz: 3.91dB
	1GHz~17GHz: 4.99dB
Vertical:	30MHz~200MHz: 4.06dB
	200MHz~1GHz: 5.21dB
	1GHz~17GHz: 4.90dB
Spurious Emissions, Conducted	
Measuring Uncertainty for a Level of Confidence of 95% ($U=2Uc(y)$):	
2.2dB	
Output Power	
Measuring Uncertainty for a Level of Confidence of 95% ($U=2Uc(y)$):	
1.4dB	
Power Spectrum Density	
Measuring Uncertainty for a Level of Confidence of 95% ($U=2Uc(y)$):	
2.2dB	
Occupied Bandwidth	
Measuring Uncertainty for a Level of Confidence of 95% ($U=2Uc(y)$):	
2.7%	

5. Test Result

5.1. Summary

FCC Section(s)	Test Description	Test Condition	Verdict
2.1049	Occupied Bandwidth	Conducted	Pass
2.1046(a), 25.204(a)	Power Spectral Density & Output Power		Pass
2.1055, 25.202(d)	Frequency Tolerance		Pass
2.1051, 25.202(f) 25.216 (c) & (f)	Emission Limitations (Conducted Emissions)		Pass
2.1053, 25.202(f) 25.216 (c) & (f)	Emission Limitations (Radiated Emissions)	Radiated	Pass

Remark:

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 of the system to connect the EUT to the analyzer at all frequencies of interest.
2. For radiated emission tests, every axis (X, Y, Z) was also verified. The test results shown in the following sections represent the worst-case emissions.
3. The 15kHz Sub-Carrier Spacing_ Full tone has wider bandwidth, so "Occupied Bandwidth" was performed with the configuration.
4. The 3.75kHz Sub-Carrier Spacing_1tone has higher output power, so "Emission Limitations in OOBE domain" was performed with the configuration.
5. The 3.75kHz Sub-Carrier Spacing_1tone has higher output power and 15kHz Sub-Carrier Spacing_ Full tones has wider bandwidth, so "Emission Limitations in In-band domain" was performed with the two configurations.

5.2. Occupied Bandwidth

5.2.1. Test Limit

N/A

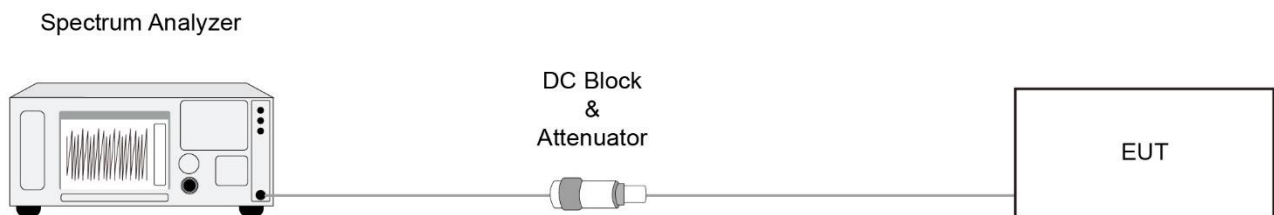
5.2.2. Test Procedure used

ANSI C63.26-2015 - Section 5.4.4

5.2.3. Test Setting

1. The spectrum analyzer center frequency is set to the nominal EUT channel center frequency. The frequency span for the spectrum analyzer shall be set wide enough to capture all modulation products including the emission skirts (typically a span of $1.5 \times \text{OBW}$ is sufficient)
2. Set RBW = 1% to 5% of the OBW
3. VBW $\geq 3 \times \text{RBW}$
4. Detector = Peak
5. Trace mode = Max hold
6. Sweep = Auto couple
7. Allow the trace was allowed to stabilize

5.2.4. Test Setup



5.2.5. Test Result

Refer to Appendix A.2.

5.3. Power Spectral Density & Output Power

5.3.1. Test Limit

In bands shared coequally with terrestrial radio communication services, the equivalent isotropically radiated power transmitted in any direction towards the horizon by an earth station, other than an ESV, operating in frequency bands between 1 and 15GHz, shall not exceed the following limits except as provided for in paragraph(c) of this section:

+ 40 dBW in any 4 kHz band for $\theta \leq 0^\circ$

+ 40 + 3 θ dBW in any 4 kHz band for $0^\circ < \theta \leq 5^\circ$

where θ is the angle of elevation of the horizon viewed from the center of radiation of the antenna of the earth station and measured in degrees as positive above the horizontal plane and negative below it.

5.3.2. Test Procedure used

ANSI C63.26-2015 - Section 5.2.4.5 & 5.2.4.4.1

ANSI C63.26-2015 - Section 5.2.4.2

5.3.3. Test Setting

Power Spectral Density Measurement using spectrum analyzer

1. Set span to 2 to 3 times the OBW

2. Set RBW = 1% to 5% of the OBW

(RBW shall set to the reference bandwidth specified by the applicable regulatory requirement, so set

RBW = 4.3 kHz herein for measurement)

3. Set VBW $\geq 3 \times$ RBW

4. Detector = power averaging (RMS)

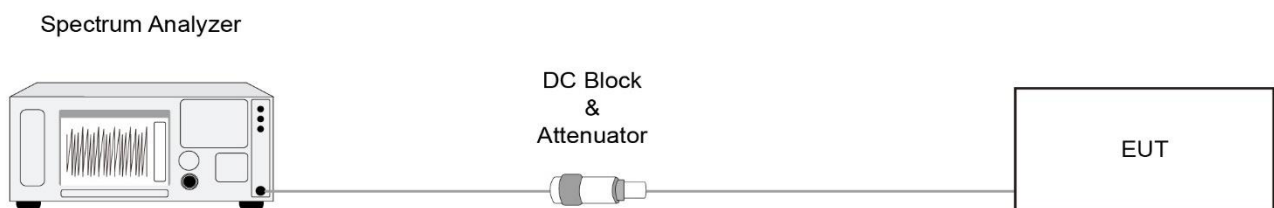
5. Trace mode = Trace average

6. Trace was allowed to stabilize

Average Power Measurement

Average power measurements were performed only when the EUT was transmitting at its maximum power control level using a broadband power meter with a pulse sensor. The power meter implemented triggering and gating capabilities which were set up such that power measurements were recorded only during the ON time of the transmitter.

5.3.4. Test Setup



5.3.5. Test Result

Refer to Appendix A.3.

5.4. Frequency Tolerance

5.4.1. Test Limit

The carrier frequency of each earth station transmitter authorized in these services shall be maintained within 0.001 percent of the reference frequency.

5.4.2. Test Procedure used

ANSI C63.26-2015 - Section 5.6.3 & 5.6.4 & 5.6.5

5.4.3. Test Setting

The EUT was set to transmit a modulated carrier. The EUT was connected to a spectrum analyzer via a cable and attenuator.

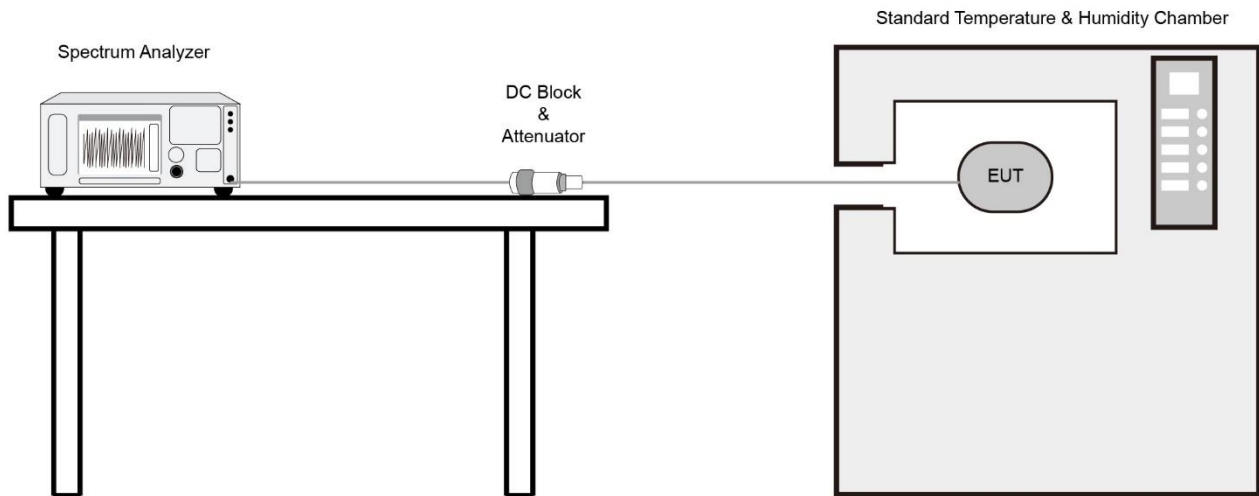
Adjust the temperature and supply voltage follow below:

- a) At 10°C intervals of temperatures between -30°C and +50°C at the manufacturer's rated supply voltage, and
- b) At +20°C temperature and $\pm 15\%$ supply voltage variations. If a product is specified to operate over a range of input voltage then the -15% variation is applied to the lowermost voltage and the +15% is applied to the uppermost voltage.

Adjust the detector bandwidth and span settings to achieve a resolution capable of accurate frequency measurements over the applicable frequency stability limits. Mark the highest point and record it.

If an unmodulated carrier is not available, the mean frequency of a modulated carrier can be obtained by using a frequency counter with gating time set to an appropriately large multiple of bit periods (gating time depending on the required accuracy).

5.4.4. Test Setup



5.4.5. Test Result

Refer to Appendix A.4.

5.5. Emission Limitations (Conducted Emissions)

5.5.1. Test Limit

The mean power of emissions shall be attenuated below the mean output power of the transmitter in accordance with the schedule:

- (1) In any 4kHz band, the center frequency of which is removed from the assigned frequency by more than 50 percent up to and including 100 percent of the authorized bandwidth: 25dB;
- (2) In any 4kHz band, the center frequency of which is removed from the assigned frequency by more than 100 percent up to and including 250 percent of the authorized bandwidth: 35dB;
- (3) In any 4kHz band, the center frequency of which is removed from the assigned frequency by more than 250 percent of the authorized bandwidth: An amount equal to 43dB plus 10 times the logarithm (to the base 10) of the transmitter power in watts.

Limits on emissions from mobile earth stations for protection of aeronautical radionavigation-satellite service

The e.i.r.p. density of emissions from mobile earth stations placed in service after July 21, 2002 with assigned uplink frequencies between 1610 MHz and 1660.5 MHz shall not exceed –70 dBW/MHz, averaged over any 2 millisecond active transmission interval, in the band 1559–1605 MHz. The e.i.r.p. of discrete emissions of less than 700 Hz bandwidth from such stations shall not exceed –80 dBW, averaged over any 2 milliseconds active transmission interval, in the 1559–1605 MHz band.

Mobile earth stations placed in service after July 21, 2002 with assigned uplink frequencies in the 1610 – 1660.5 MHz band shall suppress the power density of emissions in the 1605–1610 MHz band to an extent determined by linear interpolation from –70 dBW/MHz at 1605 MHz to –10 dBW/MHz at 1610 MHz.

$$\text{EIRP (dBm)} = \text{EIRP (dBW)} + 30.$$

5.5.2. Test Procedure used

ANSI C63.26-2015 - Section 5.7

5.5.3. Test Setting

Spurious Emission – In-Band Emission

1. Analyzer center frequency was set to the frequency of the radiated spurious emission of interest
2. RBW = 4.3kHz for in-band mask
3. $VBW \geq 3 \times RBW$
4. Detect = power averaging (RMS)
5. sweep time > (number of points in sweep) $\times$ (transmitter period) (i.e., the transmit on-time + the off-time).
6. Trace mode = Trace average
7. Trace was allowed to stabilize

Spurious Emission – Out-of-Band Emission Peak Measurement

1. RBW = 100kHz

Set the RBW greater than 4kHz in order to increase the measurement speed

2. $VBW = 3 * RBW$
3. Detector = Peak
4. Sweep time = Auto couple
5. Trace mode = Max hold
6. Trace was allowed to stabilize

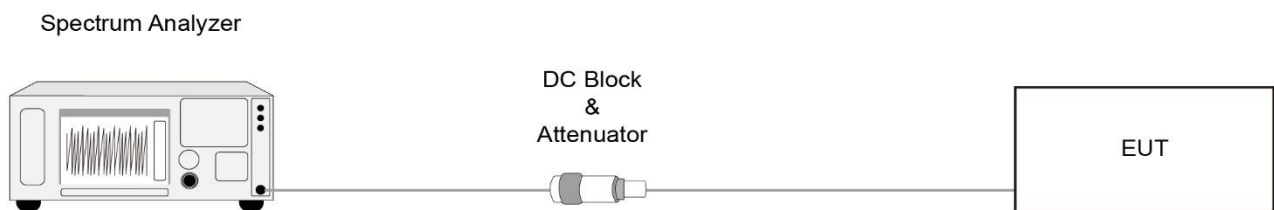
Spurious Emission – Out-of-Band Emission Average Measurement

1. RBW = 100kHz
2. $VBW = 3 * RBW$
3. Detector = Average
4. Sweep time = Auto couple
5. Sweep points $\geq 2 * \text{span} / RBW$
6. Trace mode = Average

7. Trace was allowed to stabilize

Spurious Emission – Part 25.216 (c) & (f)

1. RBW = 1MHz
2. VBW = 3 * RBW
3. Detector = power averaging (RMS)
4. Sweep time > (number of points in sweep) × (transmitter period) (i.e., the transmit on-time + the off-time).
5. Trace mode = Trace average
6. Trace was allowed to stabilize

5.5.4. Test Setup**5.5.5. Test Result**

Refer to Appendix A.5.

5.6. Emission Limitations (Radiated Emissions)

5.6.1. Test Limit

In any 4kHz band, the center frequency of which is removed from the assigned frequency by more than 250 percent of the authorized bandwidth: An amount equal to 43dB plus 10 times the logarithm (to the base 10) of the transmitter power in watts.

For Out-Of-Band Emission, The emission limit equal to 82.3dB μ V/m.

$E \text{ (dB}\mu\text{V/m)} = \text{EIRP (dBm)} - 20 \log D + 104.8$; where D is the measurement distance in meters.

Limits on emissions from mobile earth stations for protection of aeronautical radionavigation-satellite service

The e.i.r.p. density of emissions from mobile earth stations placed in service after July 21, 2002 with assigned uplink frequencies between 1610 MHz and 1660.5 MHz shall not exceed -70 dBW/MHz, averaged over any 2 millisecond active transmission interval, in the band 1559–1605 MHz. The e.i.r.p. of discrete emissions of less than 700 Hz bandwidth from such stations shall not exceed -80 dBW, averaged over any 2 milliseconds active transmission interval, in the 1559–1605 MHz band.

Mobile earth stations placed in service after July 21, 2002 with assigned uplink frequencies in the 1610 – 1660.5 MHz band shall suppress the power density of emissions in the 1605–1610 MHz band to an extent determined by linear interpolation from -70 dBW/MHz at 1605 MHz to -10 dBW/MHz at 1610 MHz.

$\text{EIRP (dBm)} = \text{EIRP (dBW)} + 30$.

$E \text{ (dB}\mu\text{V/m)} = \text{EIRP (dBm)} - 20 \log D + 104.8$; where D is the measurement distance of 3m in this report.

For example, $E = 55.2 \text{ dB}\mu\text{V/m}$ if EIRP is -70 dBW.

5.6.2. Test Procedure used

ANSI C63.26-2015 - Section 5.2.7 & 5.5

5.6.3. Test Setting

Spurious Emission – Out-of-Band Emission

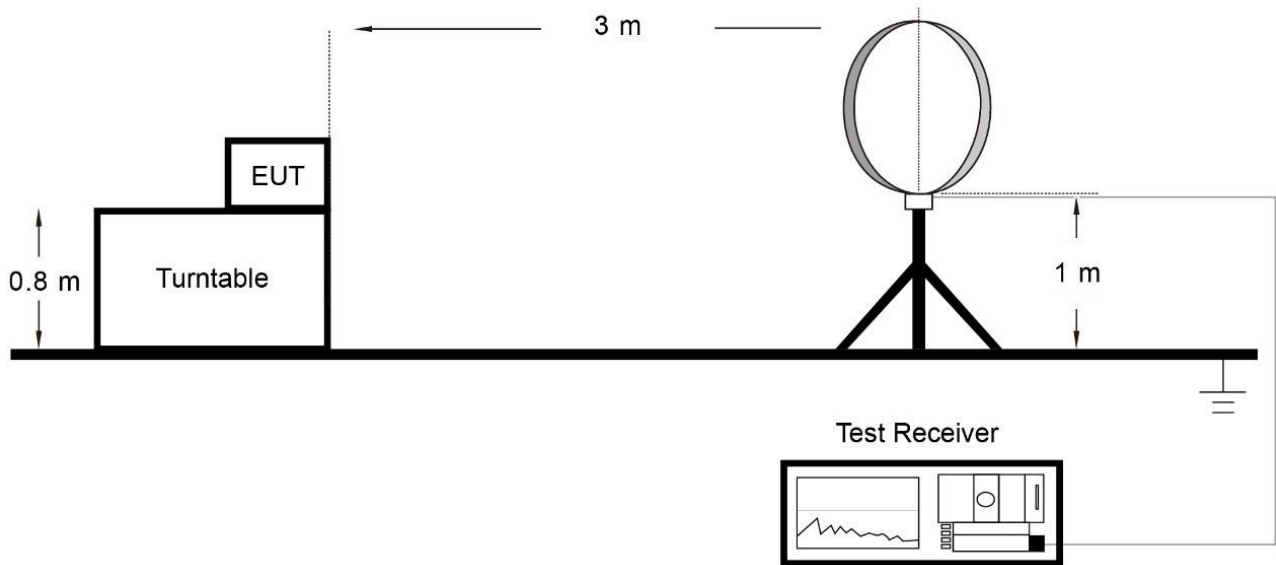
1. RBW = 100kHz

Set the RBW greater than 4kHz in order to increase the measurement speed

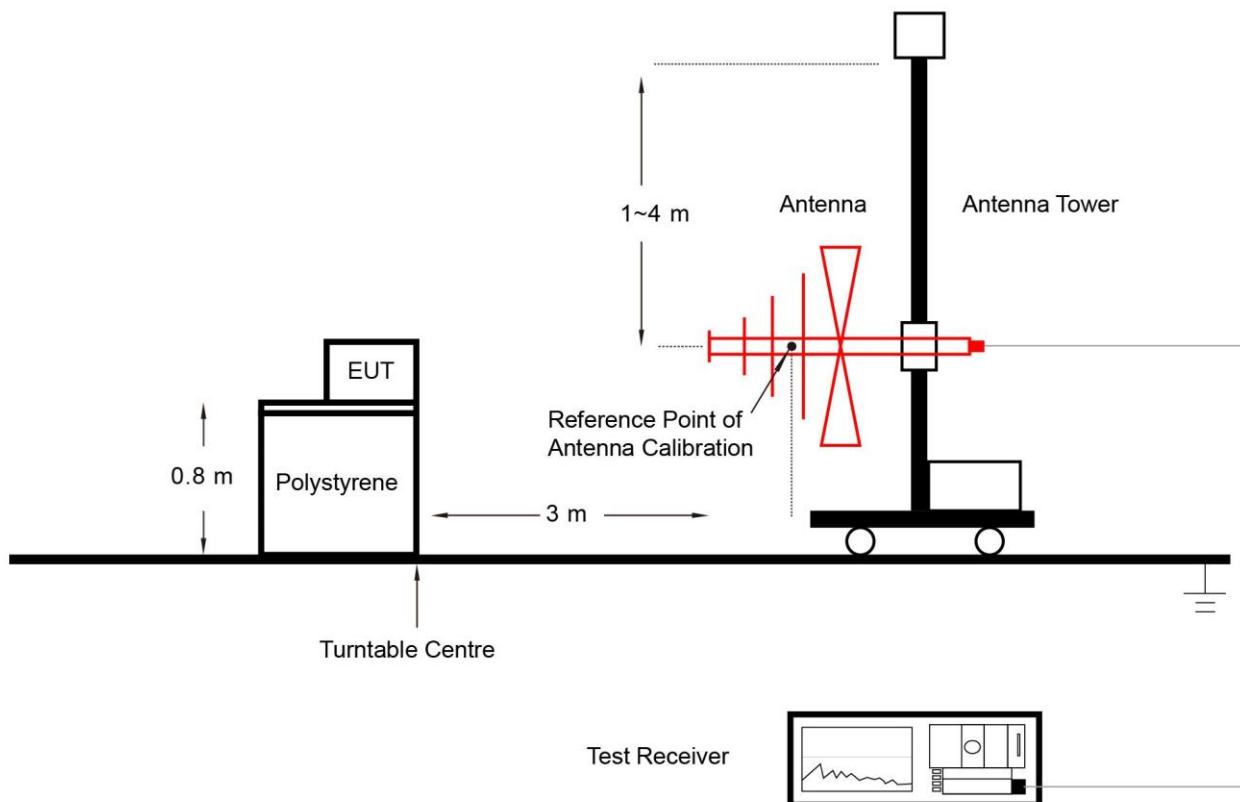
2. VBW = 3 * RBW
3. Detector = Peak
4. Sweep time = Auto couple
5. Trace mode = Max hold
6. Trace was allowed to stabilize

5.6.4. Test Setup

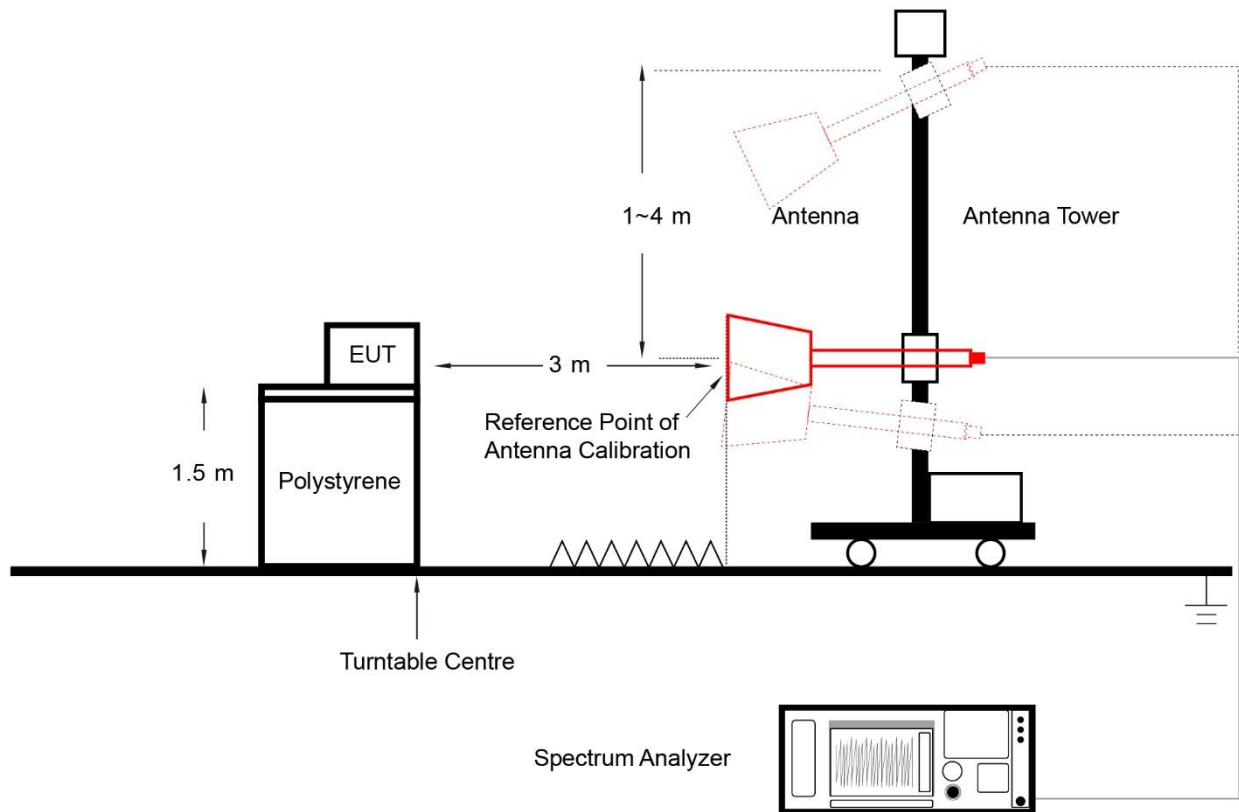
9kHz ~ 30MHz Test Setup



30MHz ~ 1GHz Test Setup



1GHz ~ 17GHz Test Setup



The test was performed with antenna port terminated.

5.6.5. Test Result

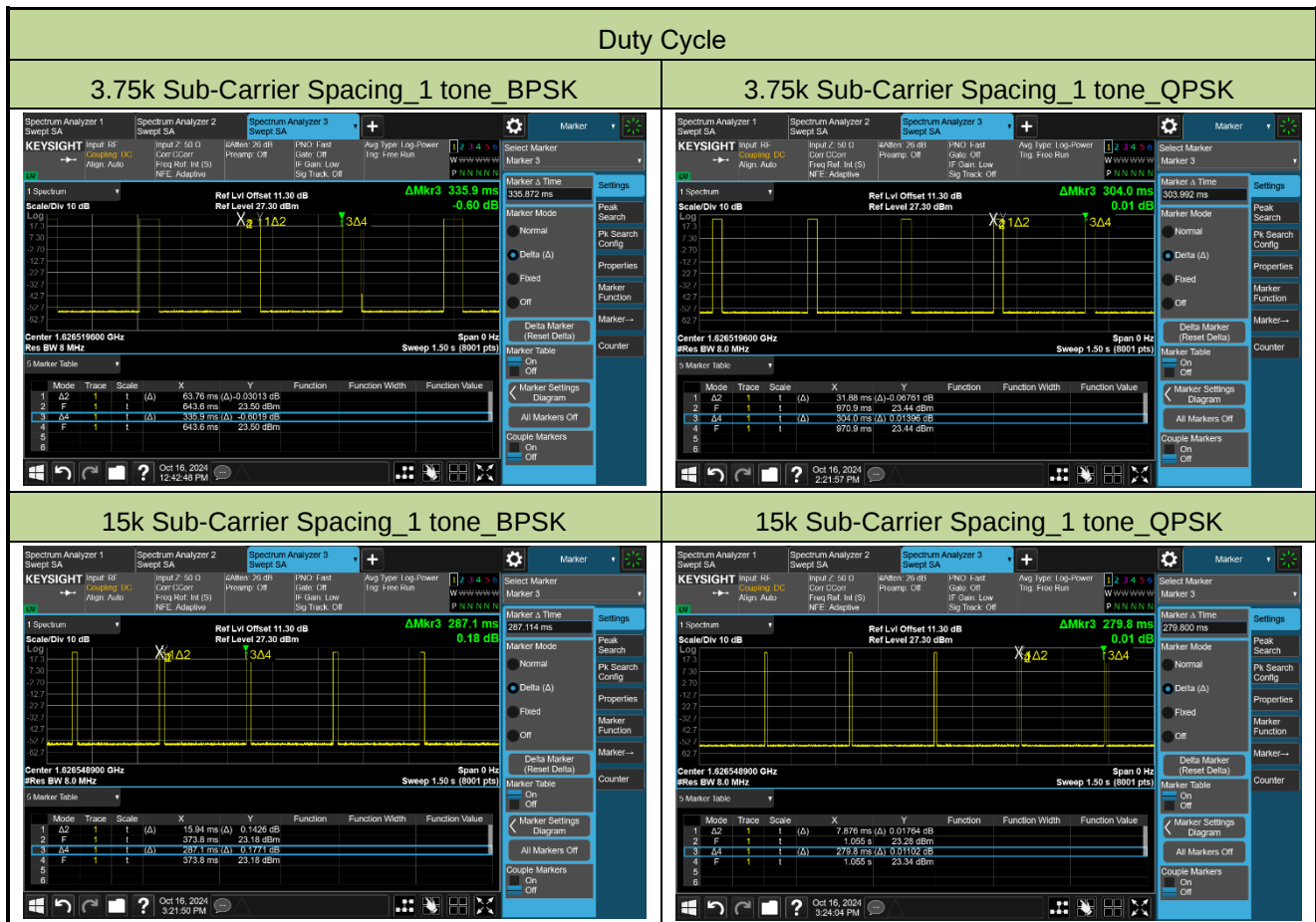
Refer to Appendix A.6.

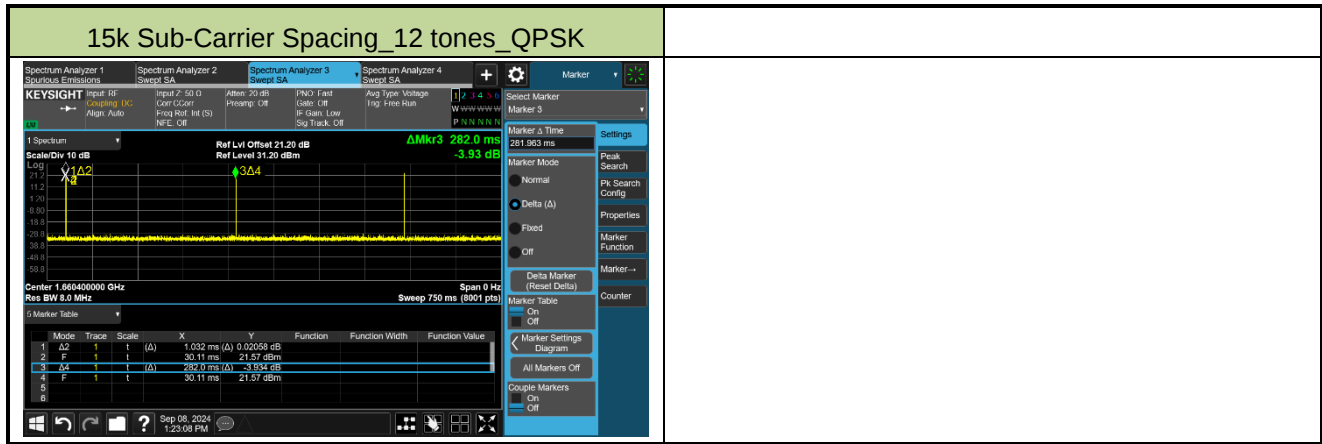
Appendix A - Test Result

A.1 Duty Cycle Test Result

Test Site	WZ-SR5	Test Engineer	Amy Zhang
Test Date	2024-09-08 ~ 2024-10-16		

Test Configuration	Duty Cycle
3.75k Sub-Carrier Spacing_1 tone_BPSK	18.98%
3.75k Sub-Carrier Spacing_1 tone_QPSK	10.49%
15k Sub-Carrier Spacing_1 tone_BPSK	5.55%
15k Sub-Carrier Spacing_1 tone_QPSK	2.81%
15k Sub-Carrier Spacing_12 tones_QPSK	0.37%

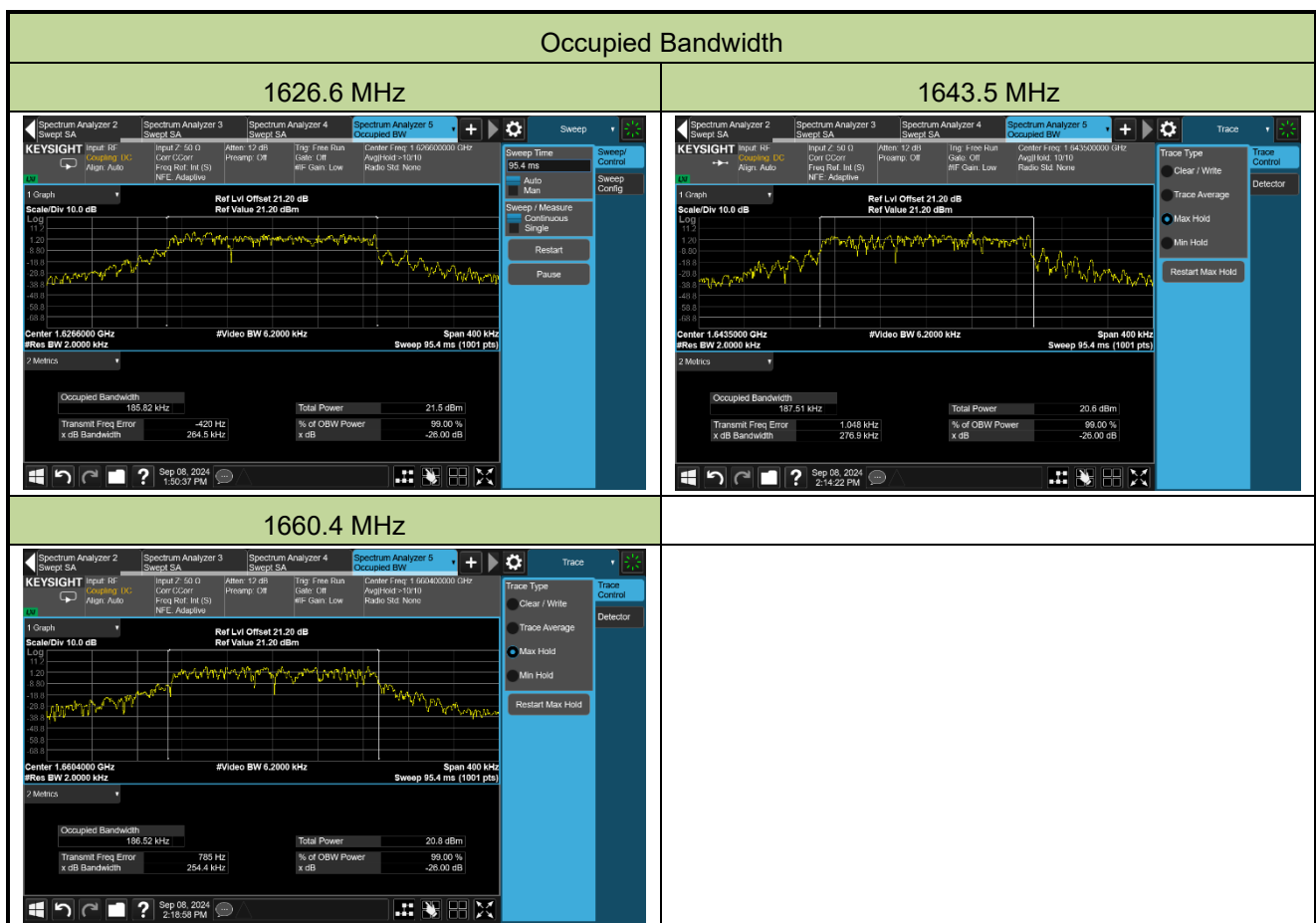




A.2 Occupied Bandwidth Test Result

Test Site	WZ-SR5	Test Engineer	Amy Zhang
Test Date	2024-09-08		

Test Frequency (MHz)	99% Bandwidth (kHz)
1626.6	185.82
1643.5	187.51
1660.4	186.52



A.3 Power Spectral Density & Output Power Test Result

Test Site	WZ-SR5	Test Engineer	Amy Zhang
Test Date	2024-09-08 ~ 2024-10-16		
Test Item	Output Power (Report Only)		

Modulation	Sub-Carrier Spacing (kHz)	Freq. (MHz)	N _{tones}	Output Power (dBm)
BPSK	3.75	1626.6	1@2	22.76
			1@45	22.78
		1643.5	1@2	22.77
			1@45	22.78
		1660.4	1@2	22.79
			1@45	22.78
	15	1626.6	1@2	22.46
			1@9	22.51
		1643.5	1@2	22.55
			1@9	22.63
		1660.4	1@2	22.56
			1@9	22.67
QPSK	3.75	1626.6	1@2	22.77
			1@45	22.79
		1643.5	1@2	22.78
			1@45	22.79
		1660.4	1@2	22.78
			1@45	22.77
	15	1626.6	1@2	22.43
			1@9	22.44
		1643.5	1@2	22.52
			1@9	22.53
		1660.4	1@2	22.61
			1@9	22.64
	15	1626.6	Full	20.98
		1643.5	Full	21.11
		1660.4	Full	21.08

Test Site	WZ-SR5	Test Engineer	Amy Zhang
Test Date	2024-10-16 ~ 2024-10-17		
Test Item	Power Spectral Density		

Modulation	Sub-Carrier Spacing (kHz)	Freq. (MHz)	N _{tones}	AVPSD (dBm/4.3kHz)	Duty Cycle (%)	Final AVPSD (dBm/4.3kHz)	EIRP PSD (dBW/4.3kHz)	Limit (dBW/4kHz)
BPSK	3.75	1626.6	1@2	14.602	18.98	21.82	-4.48	≤ 40
			1@45	14.760	18.98	21.98	-4.32	≤ 40
		1643.5	1@2	14.867	18.98	22.08	-4.22	≤ 40
			1@45	14.845	18.98	22.06	-4.24	≤ 40
		1660.4	1@2	14.691	18.98	21.91	-4.39	≤ 40
			1@45	14.758	18.98	21.98	-4.32	≤ 40
	15	1626.6	1@2	5.890	5.55	18.45	-7.85	≤ 40
			1@9	5.854	5.55	18.41	-7.89	≤ 40
		1643.5	1@2	6.060	5.55	18.62	-7.68	≤ 40
			1@9	6.121	5.55	18.68	-7.62	≤ 40
		1660.4	1@2	5.701	5.55	18.26	-8.04	≤ 40
			1@9	5.667	5.55	18.22	-8.08	≤ 40
QPSK	3.75	1626.6	1@2	12.036	10.49	21.83	-4.47	≤ 40
			1@45	12.163	10.49	21.96	-4.34	≤ 40
		1643.5	1@2	12.371	10.49	22.16	-4.14	≤ 40
			1@45	12.438	10.49	22.23	-4.07	≤ 40
		1660.4	1@2	12.109	10.49	21.90	-4.40	≤ 40
			1@45	12.146	10.49	21.94	-4.36	≤ 40
	15	1626.6	1@2	3.505	2.81	19.02	-7.28	≤ 40
			1@9	2.960	2.81	18.47	-7.83	≤ 40
		1643.5	1@2	2.980	2.81	18.49	-7.81	≤ 40
			1@9	3.071	2.81	18.58	-7.72	≤ 40
		1660.4	1@2	2.907	2.81	18.42	-7.88	≤ 40
			1@9	2.978	2.81	18.49	-7.81	≤ 40
	15	1626.6	Full	-16.526	0.37	7.79	-18.51	≤ 40
		1643.5	Full	-16.179	0.37	8.14	-18.16	≤ 40
		1660.4	Full	-16.191	0.37	8.13	-18.17	≤ 40

Note 1: Final AVPSD (dBm/4.3kHz) = AVPSD (dBm/4.3kHz) + 10*log (1/Duty cycle)

Note 2: EIRP PSD (dBW/4.3kHz) = Final AVPSD (dBm/4.3kHz) + Antenna Gain (dBi) - 30.

Note 3: The max EIRP PSD is less than the limit for $\theta \leq 0^\circ$ which limit is lower, so the requirement is complied.

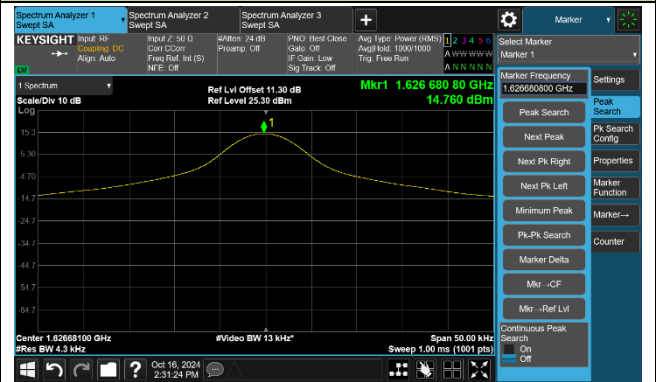
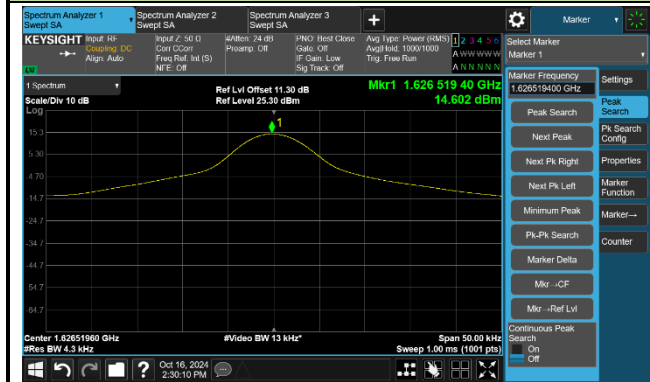
Note 4: The RBW used for testing is 4.3kHz and the measure level is complied with limit of 4kHz.

BPSK - 3.75kHz Sub-Carrier Spacing

1626.6MHz

1@2

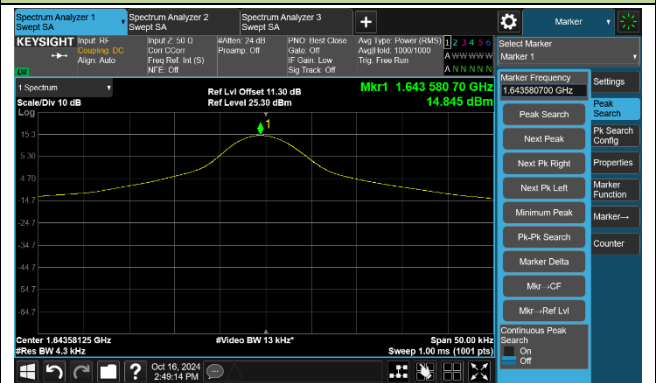
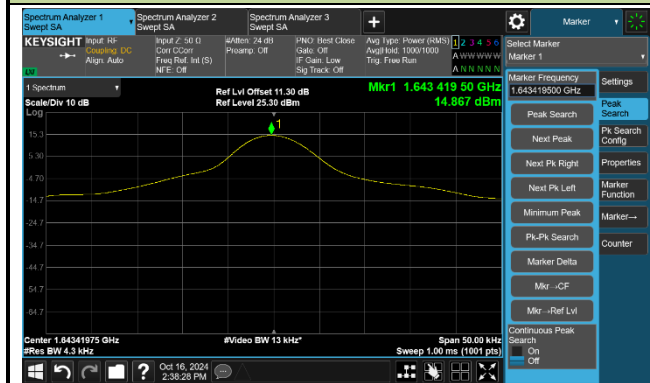
1@45



1643.5MHz

1@2

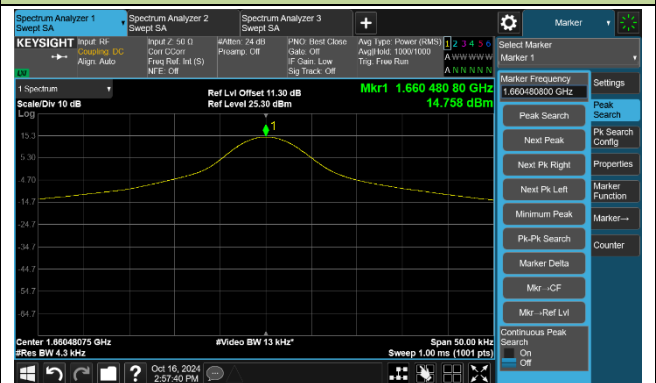
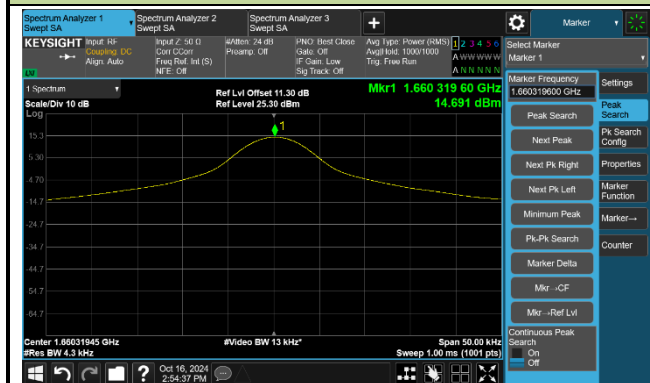
1@45



1660.4MHz

1@2

1@45

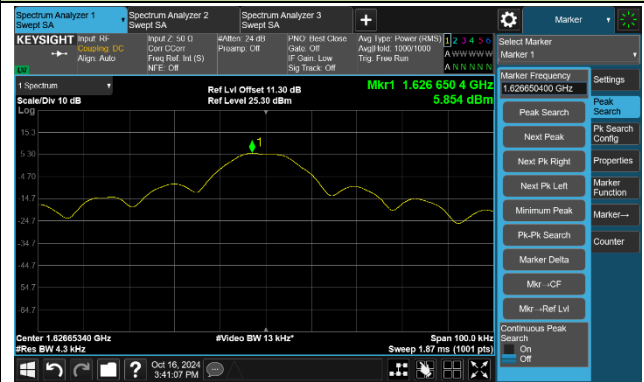
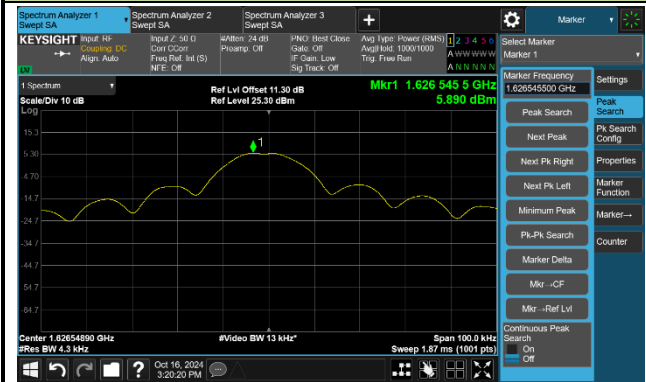


BPSK - 15kHz Sub-Carrier Spacing

1626.6MHz

1@2

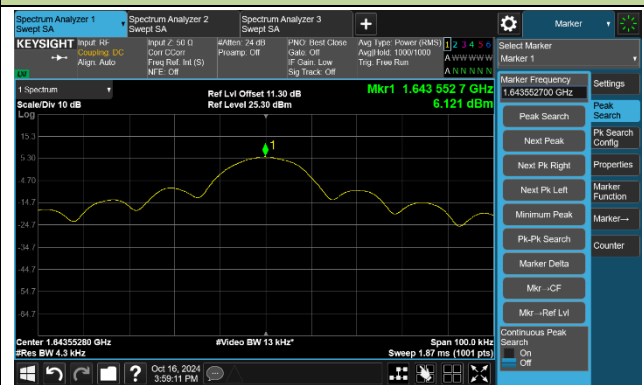
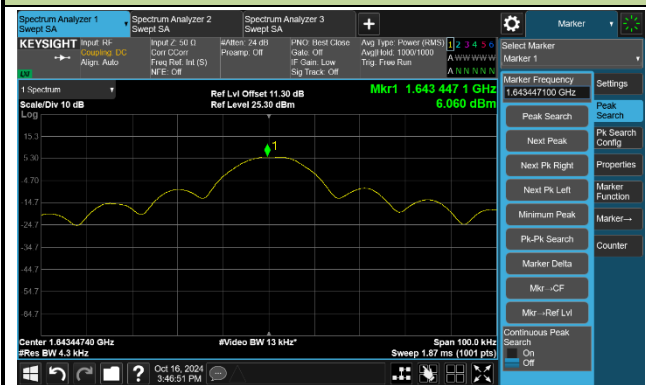
1@9



1643.5MHz

1@2

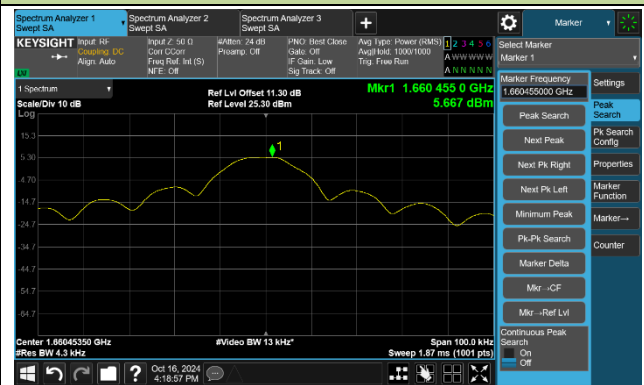
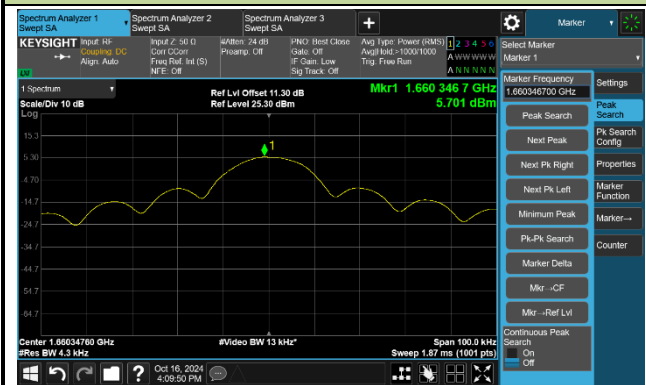
1@9



1660.4MHz

1@2

1@9

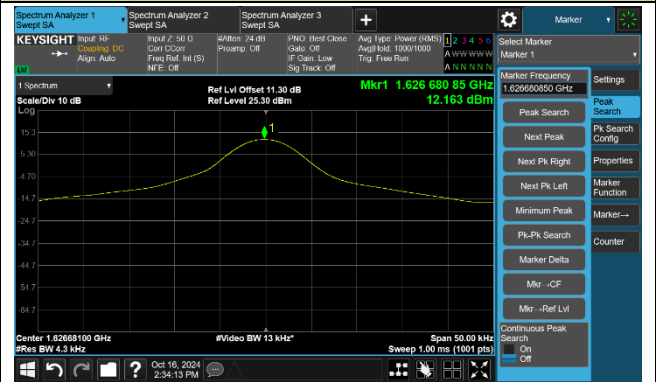
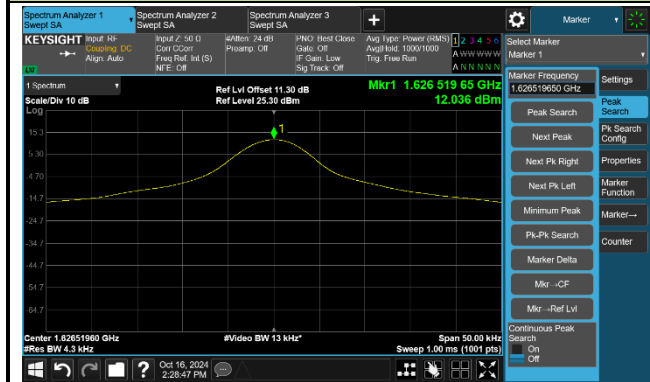


QPSK - 3.75kHz Sub-Carrier Spacing

1626.6MHz

1@2

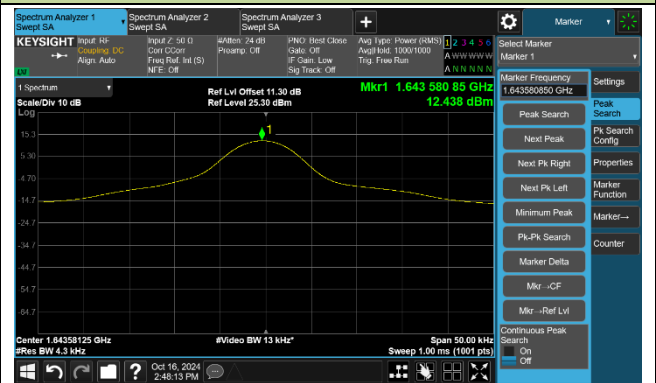
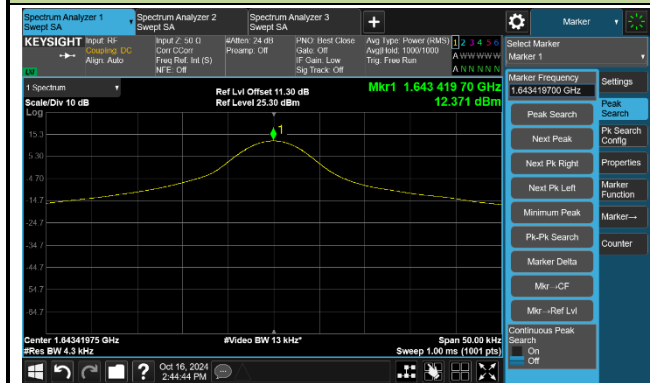
1@45



1643.5MHz

1@2

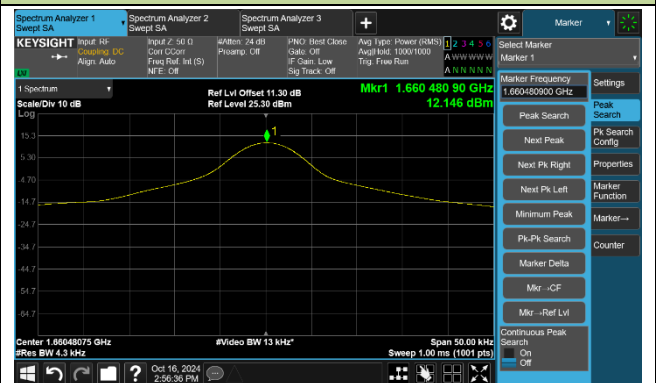
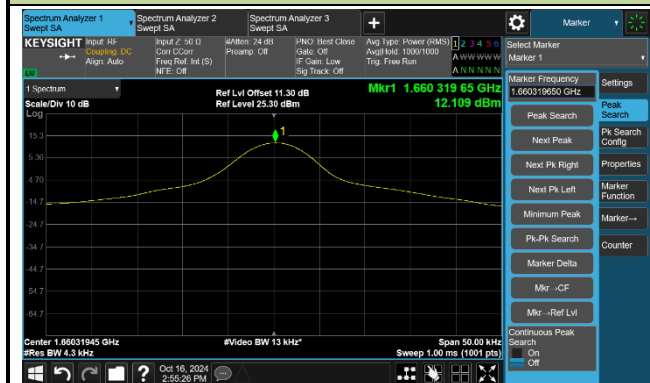
1@45



1660.4MHz

1@2

1@45

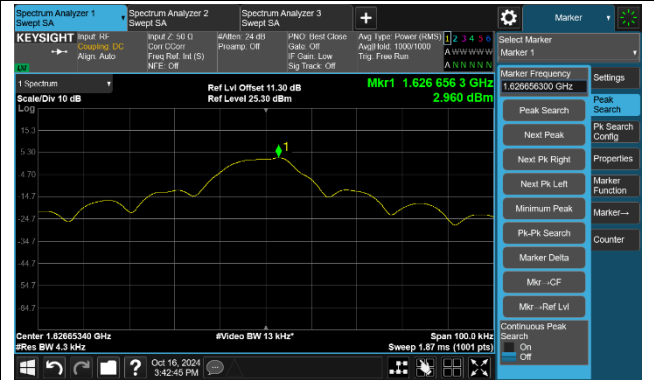
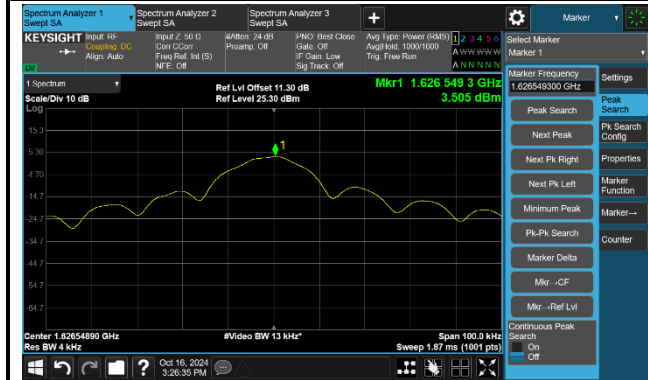


QPSK - 15kHz Sub-Carrier Spacing

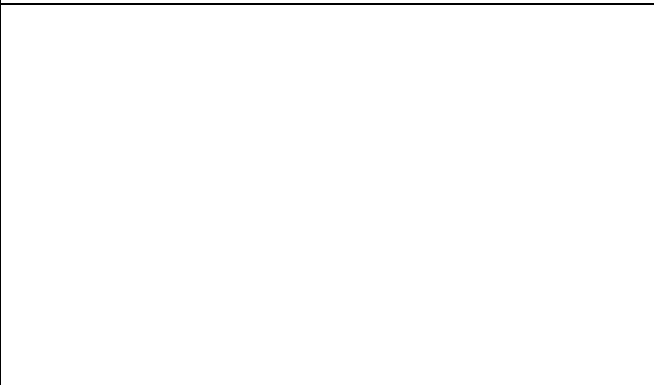
1626.6MHz

1@2

1@9



Full tones







A.4 Frequency Tolerance Test Result

Test Site	WZ-TR3	Test Engineer	Amy Zhang
Test Date	2024-09-10	Temperature	-30 ~ 50 °C

Test Freq. (MHz)	Voltage	Temp. (°C)	Freq. Error (Hz)	Freq. Tolerance (ppm)	Limit (ppm)	Result
1626.6	Normal	+50	26.72	0.016	-10 ~ +10	Pass
		+40	26.71	0.016	-10 ~ +10	Pass
		+30	25.26	0.016	-10 ~ +10	Pass
		+20	27.86	0.017	-10 ~ +10	Pass
		+10	25.59	0.016	-10 ~ +10	Pass
		0	29.52	0.018	-10 ~ +10	Pass
		-10	20.76	0.013	-10 ~ +10	Pass
		-20	24.46	0.015	-10 ~ +10	Pass
		-30	25.69	0.016	-10 ~ +10	Pass
	-15%	+20	24.36	0.015	-10 ~ +10	Pass
	15%	+20	24.73	0.015	-10 ~ +10	Pass

Note: Frequency Tolerance (ppm) = [Freq. Error (MHz) / Test Frequency (MHz)] * 10⁶.

A.5 Emission Limitations (Conducted Emissions) Test Result

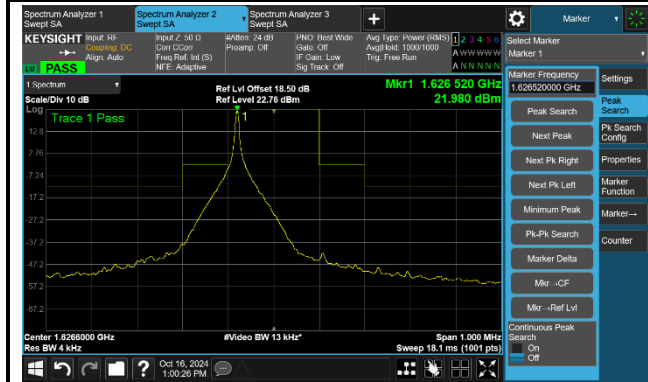
Test Site	WZ-SR5	Test Engineer	Amy Zhang
Test Date	2024-10-16	Test Item	In-band Mask

Modulation	Sub-Carrier Spacing (kHz)	Freq. (MHz)	N _{tones}	Test Result
BPSK	3.75	1626.6	1@2	Pass
		1643.5	1@2	Pass
		1660.4	1@45	Pass
QPSK	3.75	1626.6	1@2	Pass
		1643.5	1@2	Pass
		1660.4	1@45	Pass
	15	1626.6	Full tones	Pass
		1643.5	Full tones	Pass
		1660.4	Full tones	Pass

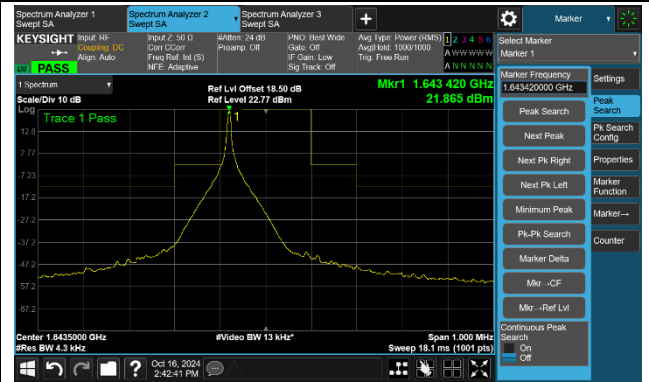
Authorization Bandwidth = 200kHz

BPSK - 3.75kHz Sub-Carrier Spacing

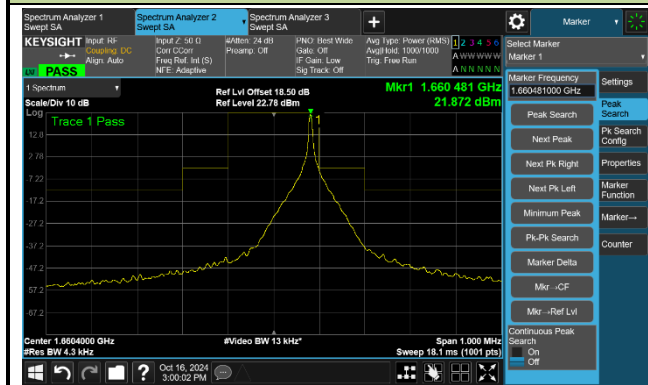
1626.6MHz 1@2



1643.5MHz 1@2

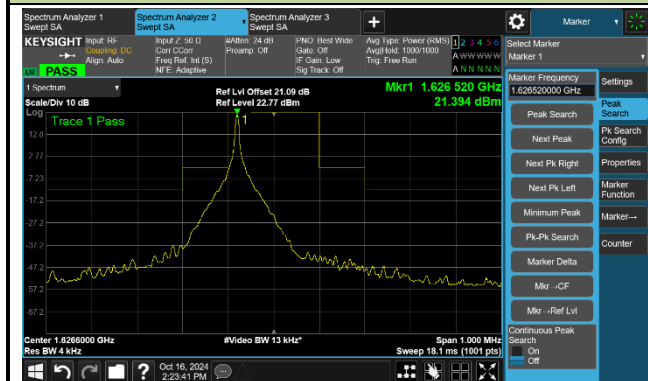


1660.4MHz 1@2

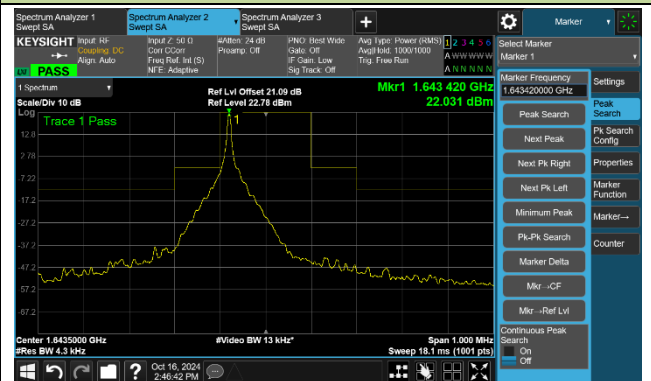


QPSK - 3.75kHz Sub-Carrier Spacing

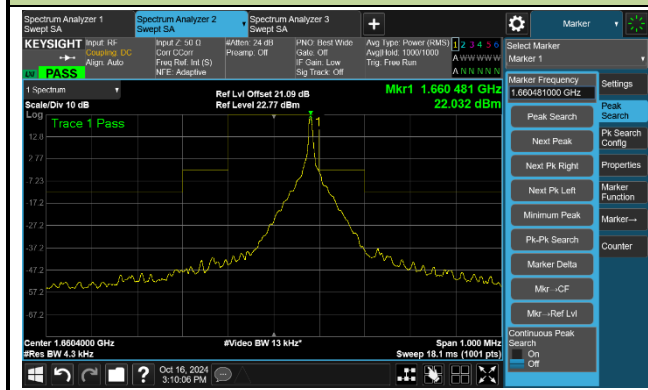
1626.6MHz 1@2



1643.5MHz 1@2



1660.4MHz 1@2



QPSK - 15kHz Sub-Carrier Spacing

1626.6MHz_Full tones



1643.5MHz_Full tones



1660.4MHz_Full tones



Test Site	WZ-SR5	Test Engineer	Amy Zhang
Test Date	2024-09-08	Test Item	Out-of-Band Emission

Modulation	Sub-Carrier Spacing (kHz)	Freq. (MHz)	Test Result
BPSK	3.75	1626.6	Pass
		1643.5	Pass
		1660.4	Pass



Test Site	WZ-SR5	Test Engineer	Amy Zhang
Test Date	2024-09-12	Test Item	Additional Unwanted Emission – 1559 ~ 1610MHz
Frequency Range	1559 ~ 1610MHz		



A.6 Emission Limitations (Radiated Emissions) Test Result

Test Site	WZ-AC1	Test Engineer	Amy Zhang
Test Date	2024-09-09	Test Channel	1660.4MHz
Test Mode	Out-of-Band Emission – 1G ~ 17G		
Remark	1. Average measurement was not performed if peak level lower than average limit. 2. Other frequency was 20dB below limit line within 1GHz to 17GHz, there is not show in the report.		

Frequency (MHz)	Reading Level (dBμV)	Factor (dB/m)	Measure Level (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Detector	Polarization
3320.0	46.8	-0.7	46.1	82.2	-36.1	Peak	Horizontal
10532.8	35.5	14.9	50.4	82.2	-31.8	Peak	Horizontal
14348.8	35.9	15.8	51.7	82.2	-30.5	Peak	Horizontal
3321.6	51.3	-0.7	50.6	82.2	-31.6	Peak	Vertical
7972.8	38.7	9.9	48.6	82.2	-33.6	Peak	Vertical
11220.8	36.9	14.2	51.1	82.2	-31.1	Peak	Vertical

Note: Measure Level (dBμV/m) = Reading Level (dBμV) + Factor (dB/m).

Factor (dB/m) = Cable Loss (dB) + Antenna Factor (dB/m) - Pre_Amplifier Gain (dB)

Test Site	WZ-AC1	Test Engineer	Amy Zhang
Test Date	2023-10-17	Test Channel	1660.4MHz
Test Mode	Additional Unwanted Emission – 1559 ~ 1610MHz		
Remark	1. Average measurement was not performed if peak level lower than average limit. 2. Other frequency was 20dB below limit line within 1GHz to 17GHz, there is not show in the report.		

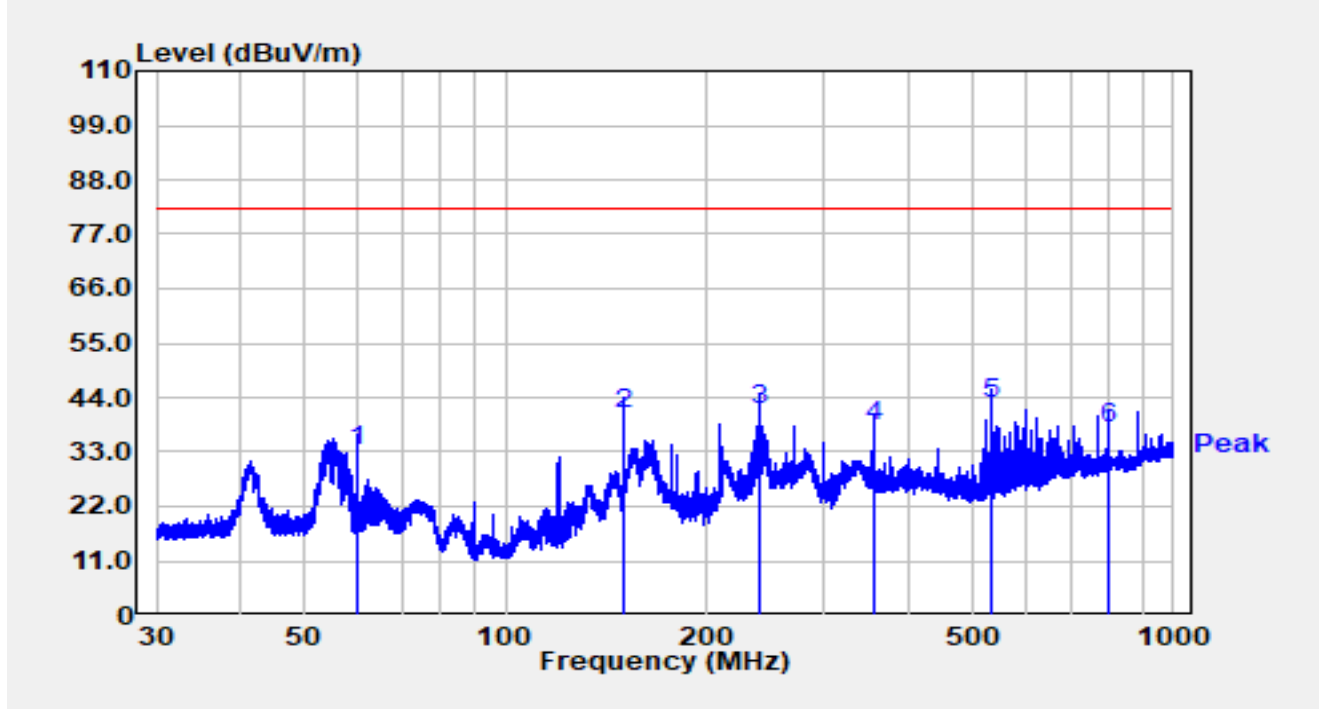
Frequency (MHz)	Reading Level (dBμV)	Factor (dB/m)	Measure Level (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Detector	Polarization
1559.0	16.1	28.9	45.0	55.2	-10.2	Average	Horizontal
1584.3	13.7	28.9	42.6	55.2	-12.6	Average	Horizontal
1600.3	13.9	28.9	42.8	55.2	-12.4	Average	Horizontal
1559.2	15.7	28.9	44.6	55.2	-10.6	Average	Vertical
1573.9	13.8	29.0	42.8	55.2	-12.4	Average	Vertical
1580.1	13.8	29.0	42.8	55.2	-12.4	Average	Vertical

Note: Measure Level (dBμV/m) = Reading Level (dBμV) + Factor (dB/m).

Factor (dB/m) = Cable Loss (dB) + Antenna Factor (dB/m) - Pre_Amplifier Gain (dB)

Radiated Spurious Emission For below 1GHz:

Site	WZ-AC1	Test Date	2024-09-09
Test Engineer	Amy Zhang	Temp./Humidity	24.5°C / 55.4%
Factor	VULB 9168_25-1000MHz	Polarity	Horizontal
EUT	LTE NTN Module	Test Voltage	DC 3.3V
Test Mode	Transmit at 1660.4MHz		

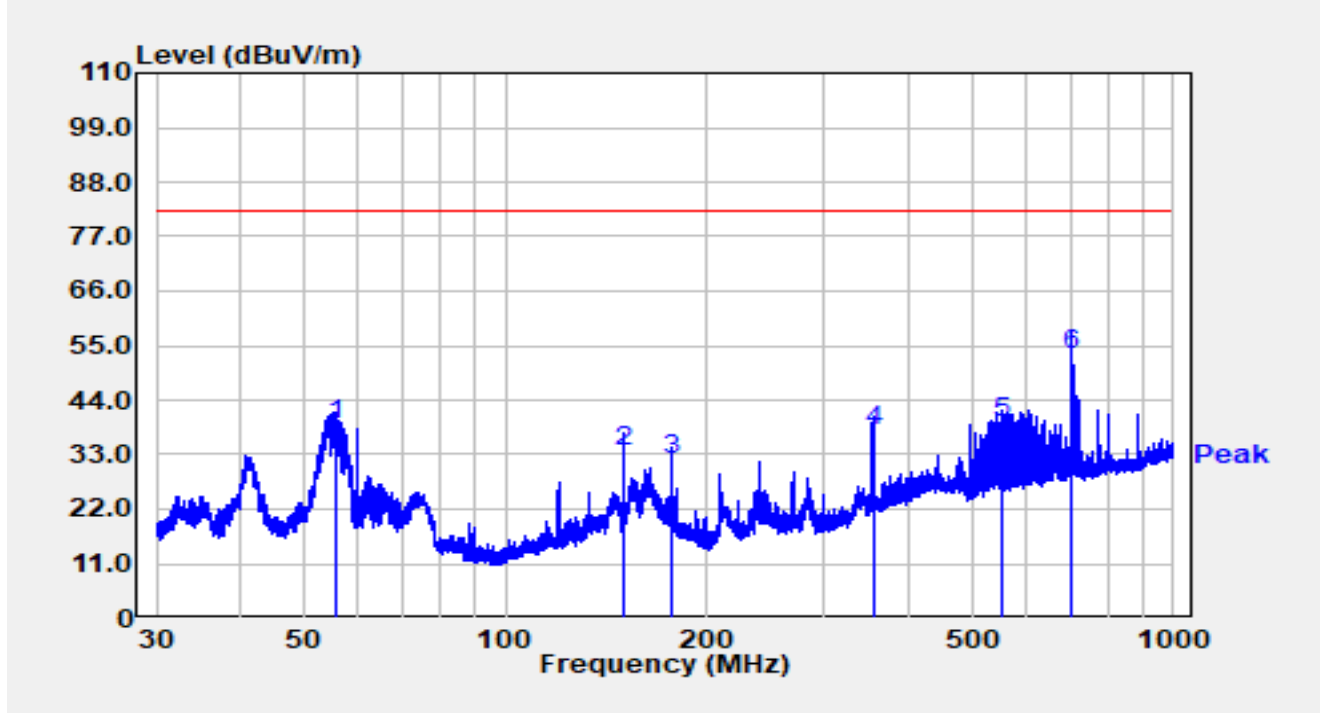


No	Mark	Frequency (MHz)	Reading (dBμV)	C.F (dB/m)	Measurement (dBμV/m)	Margin (dB)	Limit (dBμV/m)	Detector
1		60.006	15.12	18.18	33.30	-48.90	82.20	QP
2		150.011	22.64	18.22	40.86	-41.34	82.20	QP
3		240.072	25.12	16.49	41.61	-40.59	82.20	QP
4		355.303	18.21	20.08	38.29	-43.91	82.20	QP
5	*	532.710	18.64	24.31	42.95	-39.25	82.20	QP
6		798.420	8.64	29.30	37.94	-44.26	82.20	QP

Notes:

1. " * ", means this data is the worst emission level.
2. C.F (dB/m) = Antenna Factor (dB/m) + Cable Loss (dB).
3. Measurement(dBμV/m) = Reading(dBμV) + C.F (dB/m).
4. The amplitude of radiated emissions (frequency range from 9kHz to 30MHz) is that proximity to ambient noise, which also are attenuated more than 20 dB below the permissible value. Therefore, the data is not presented in the report.

Site	WZ-AC1	Test Date	2024-09-09
Test Engineer	Amy Zhang	Temp./Humidity	24.5°C / 55.4%
Factor	VULB 9168_25-1000MHz	Polarity	Vertical
EUT	LTE NTN Module	Test Voltage	DC 3.3V
Test Mode	Transmit at 1660.4MHz		



No	Mark	Frequency (MHz)	Reading (dBμV)	C.F (dB/m)	Measurement (dBμV/m)	Margin (dB)	Limit (dBμV/m)	Detector
1		55.609	20.61	18.50	39.11	-43.09	82.20	QP
2		150.011	15.21	18.22	33.43	-48.77	82.20	QP
3		177.477	14.21	17.56	31.77	-50.43	82.20	QP
4		355.054	17.64	20.08	37.72	-44.48	82.20	QP
5		554.242	15.12	24.38	39.50	-42.70	82.20	QP
6	*	705.957	25.64	27.67	53.31	-28.89	82.20	QP

Notes:

1. " *", means this data is the worst emission level.
2. C.F (dB/m) = Antenna Factor (dB/m) + Cable Loss (dB).
3. Measurement(dBμV/m) = Reading(dBμV) + C.F (dB/m).
4. The amplitude of radiated emissions (frequency range from 9kHz to 30MHz) is that proximity to ambient noise, which also are attenuated more than 20 dB below the permissible value. Therefore, the data is not presented in the report.

Appendix B - Test Setup Photograph

Refer to “2406RSU025-UT” file.

Appendix C - EUT Photograph

Refer to “2406RSU025-UE” file.

The End