



RF MEASUREMENT REPORT

FCC ID: XMR2023CC200ALB
Applicant: Quectel Wireless Solutions Co., Ltd
Product: Satellite Communication Module
Model No.: CC200A-LB
Brand Name: Quectel
FCC Rule Part(s): FCC CFR 47 Part 2, FCC CFR 47 Part 25
Result: Complies
Received Date: 2023-08-14
Test Date: 2023-08-30 ~ 2023-10-25

Reviewed By:

Sunny Sun

Sunny Sun

Approved By:

Robin Wu

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
2308RSU050-U2	V01	Initial Report	2023-10-25	Invalid
2308RSU050-U2	V02	Modified the typo	2023-11-14	Valid

CONTENTS

Description	Page
1. General Information	5
1.1. Applicant	5
1.2. Manufacturer	5
1.3. Testing Facility	5
1.4. Product Information.....	6
1.5. Product Specification under Test	6
2. Test Configuration	7
2.1. Test Mode	7
2.2. Test System Connection Diagram.....	7
2.3. Test Software	7
2.4. Applied Standards.....	8
2.5. Test Environment Condition	8
3. Measuring Instrument	9
4. Decision Rules and Measurement Uncertainty	10
4.1. Decision Rules	10
4.2. Measurement Uncertainty	10
5. Test Result.....	11
5.1. Summary	11
5.2. Occupied Bandwidth	12
5.2.1. Test Limit	12
5.2.2. Test Procedure used	12
5.2.3. Test Setting	12
5.2.4. Test Setup	12
5.2.5. Test Result	12
5.3. Power Spectral Density & Output Power	13
5.3.1. Test Limit	13
5.3.2. Test Procedure used	13
5.3.3. Test Setting	14
5.3.4. Test Setup	14
5.3.5. Test Result	14
5.4. Frequency Tolerance	15
5.4.1. Test Limit	15
5.4.2. Test Procedure used	15
5.4.3. Test Setting	15

5.4.4.	Test Setup	16
5.4.5.	Test Result	16
5.5.	Emission Limitations (Conducted Emissions)	17
5.5.1.	Test Limit	17
5.5.2.	Test Procedure used	18
5.5.3.	Test Setting	18
5.5.4.	Test Setup	19
5.5.5.	Test Result	19
5.6.	Emission Limitations (Radiated Emissions)	20
5.6.1.	Test Limit	20
5.6.2.	Test Procedure used	20
5.6.3.	Test Setting	21
5.6.4.	Test Setup	22
5.6.5.	Test Result	23
Appendix A - Test Result.....		24
A.1	Duty Cycle Test Result.....	24
A.2	Occupied Bandwidth Test Result	25
A.3	Power Spectral Density & Output Power Test Result	26
A.4	Frequency Tolerance Test Result.....	28
A.5	Emission Limitations (Conducted Emissions) Test Result	29
A.6	Emission Limitations (Radiated Emissions) Test Result	35
Appendix B - Test Setup Photograph		39
Appendix C - EUT Photograph		40

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 Accreditations A2LA: 3628.01 CNAS: L10551 FCC: CN1166 ISED: CN0001 VCCI: ☐ R-20025 ☐ G-20034 ☐ C-20020 ☐ T-20020 ☐ R-20141 ☐ G-20134 ☐ C-20103 ☐ 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 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: 3261 FCC: 291082, TW3261 ISED: TW3261

1.4. Product Information

Product Name	Satellite Communication Module
Model No.	CC200A-LB
S/N	D1Y23GL1X000030
Satellite Specification	L-Band, 1626.5 ~ 1660.5 MHz
GNSS Specification	GPS L1/ GLONASS L1/ Galileo E1/ BDS B1
Power Supply:	DC 5.5 ~ 6.5 V, typ. 6 V
Note: 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	OQPSK
Antenna Type	Directional Antenna
Antenna Gain	2.29dBi
Authorized Bandwidth	2 kHz

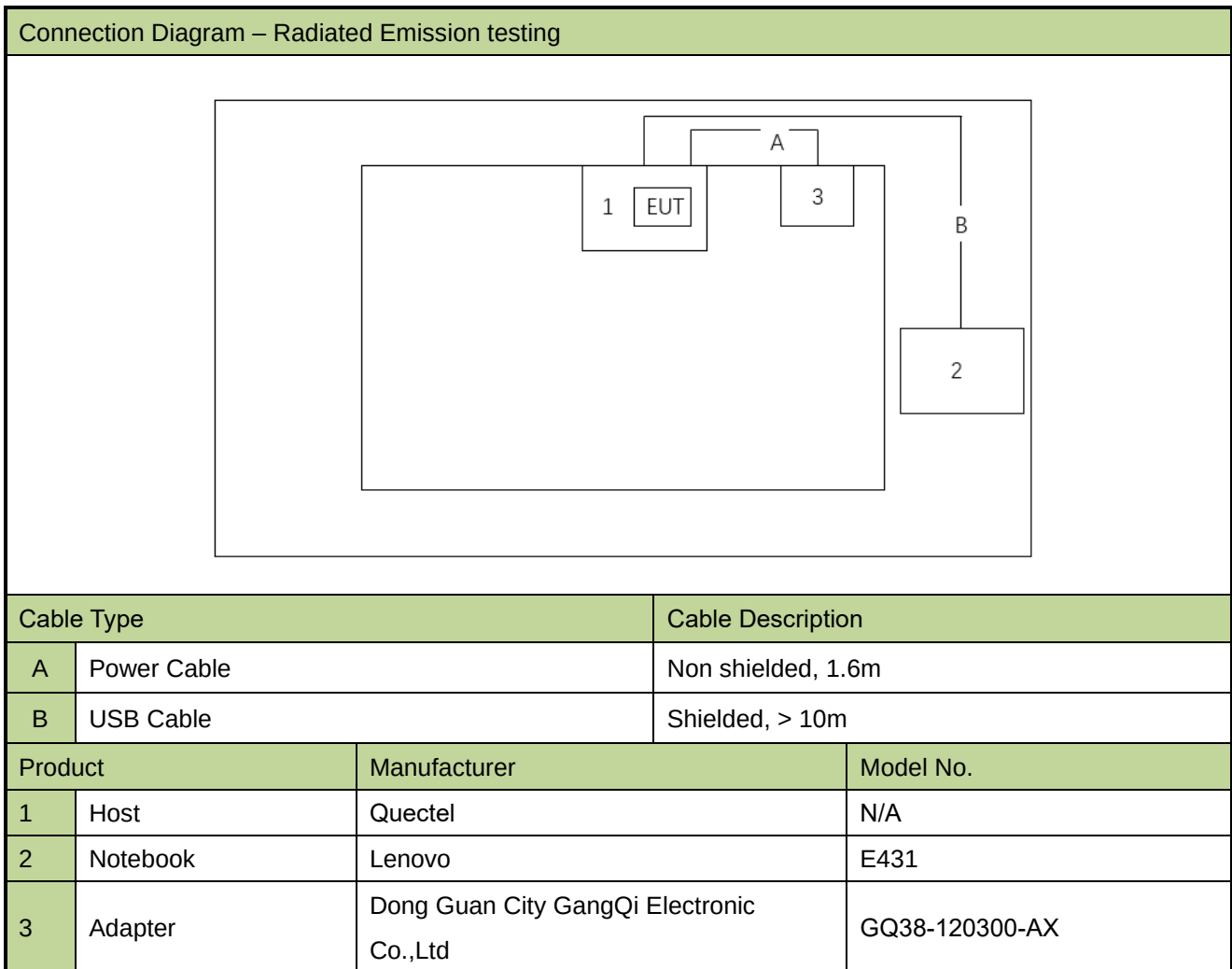
2. Test Configuration

2.1. Test Mode

Mode 1: Transmit at 1626.5MHz
Mode 2: Transmit at 1643.5MHz
Mode 3: Transmit at 1660.5MHz

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.



2.3. Test Software

The test utility software used during testing was “IPOP”, 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
TRILOG Antenna	Schwarzbeck	VULB 9162	MRTSUE06022	1 year	2024-05-15	WZ-AC2
EMI Test Receiver	Agilent	N9038A	MRTSUE06125	1 year	2024-05-23	WZ-AC2
Thermohygrometer	Mingle	ETH529	MRTSUE06170	1 year	2023-11-27	WZ-AC2
Horn Antenna	Schwarzbeck	BBHA 9120D	MRTSUE06171	1 year	2023-10-13	WZ-AC2
Horn Antenna	Schwarzbeck	BBHA 9120D	MRTSUE06171	1 year	2024-10-11	WZ-AC2
Preamplifier	Schwarzbeck	BBV 9718	MRTSUE06176	1 year	2024-05-07	WZ-AC2
Anechoic Chamber	RIKEN	WZ-AC2	MRTSUE06213	1 year	2024-04-20	WZ-AC2
Thermohygrometer	testo	608-H1	MRTSUE11038	1 year	2023-11-01	WZ-AC2
Loop Antenna	Schwarzbeck	FMZB 1519	MRTSUE06025	1 year	2023-09-29	WZ-AC2
Loop Antenna	Schwarzbeck	FMZB 1519	MRTSUE06025	1 year	2024-09-17	WZ-AC2
Shielding Room	HUAMING	WZ-SR5	MRTSUE06442	N/A	N/A	WZ-SR5
Signal Analyzer	Keysight	N9010B	MRTSUE06457	1 year	2024-05-23	WZ-SR5
Thermohygrometer	testo	608-H1	MRTSUE06402	1 year	2024-05-31	WZ-SR5
USB Power Sensor	Keysight	U2021XA	MRTSUE06446	1 year	2024-05-23	WZ-SR5
Temperature Chamber	BAOYT	BYH-150CL	MRTSUE06051	1 year	2023-10-08	WZ-TR3
Thermohygrometer	testo	608-H1	MRTSUE06401	1 year	2024-05-31	WZ-TR3
Attenuator	SHX	SMA10-20dB-18G	MRTSUE06697	1 year	2024-03-01	WZ-TR3/WZ-SR5
EMI Test Receiver	R&S	ESR7	MRTSUE06001	1 year	2023-12-28	WZ-AC1
Horn Antenna	Schwarzbeck	BBHA 9120D	MRTSUE06023	1 year	2024-08-09	WZ-AC1
Preamplifier	Agilent	83017A	MRTSUE06076	1 year	2024-05-07	WZ-AC1
TRILOG Antenna	Schwarzbeck	VULB 9168	MRTSUE06172	1 year	2024-06-09	WZ-AC1
Anechoic Chamber	TDK	WZ-AC1	MRTSUE06212	1 year	2024-04-20	WZ-AC1
Thermohygrometer	testo	608-H1	MRTSUE06403	1 year	2024-05-31	WZ-AC1
Signal Analyzer	Keysight	N9010B	MRTSUE06607	1 year	2023-12-28	WZ-AC1
Thermohygrometer	testo	608-H1	MRTSUE11039	1 year	2023-11-01	WZ-AC1

Software	Version	Function
EMI Software	V3.0.0	EMI Test Software
Controller_MF 7802	1.02	RE Antenna & Turntable
BenchVue Power Meter	2018.1	Power
Controller_MF 7802	2.03C	RE Antenna & Turntable

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: 2.59dB
Coplanar:	9kHz~30MHz: 2.60dB
Horizontal:	30MHz~200MHz: 3.85dB
	200MHz~1GHz: 4.36dB
	1GHz~17GHz: 4.98dB
Vertical:	30MHz~200MHz: 4.06dB
	200MHz~1GHz: 5.28dB
	1GHz~17GHz: 4.91dB
Spurious Emissions, Conducted	
Measuring Uncertainty for a Level of Confidence of 95% ($U=2U_c(y)$):	
2.3dB	
Power Spectrum Density	
Measuring Uncertainty for a Level of Confidence of 95% ($U=2U_c(y)$):	
2.3dB	
Occupied Bandwidth	
Measuring Uncertainty for a Level of Confidence of 95% ($U=2U_c(y)$):	
3.2%	

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.

5.2. Occupied Bandwidth

5.2.1. Test Limit

N/A

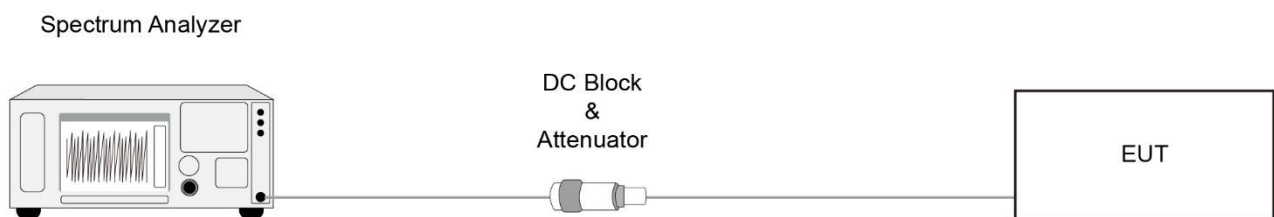
5.2.2. Test Procedure used

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 = 5 kHz herein for measurement)

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

4. Detector = power averaging (RMS)

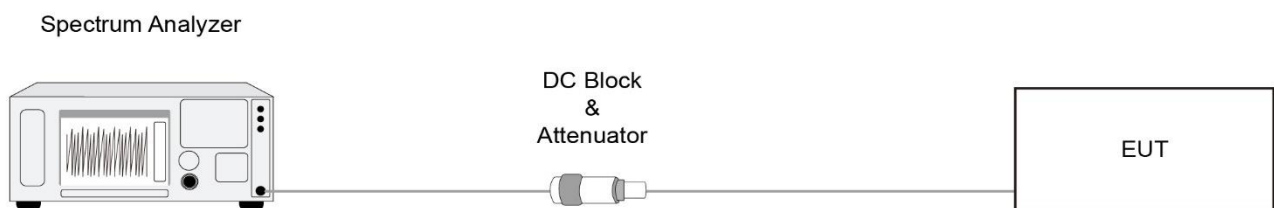
5. Trace mode = Trace average

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.

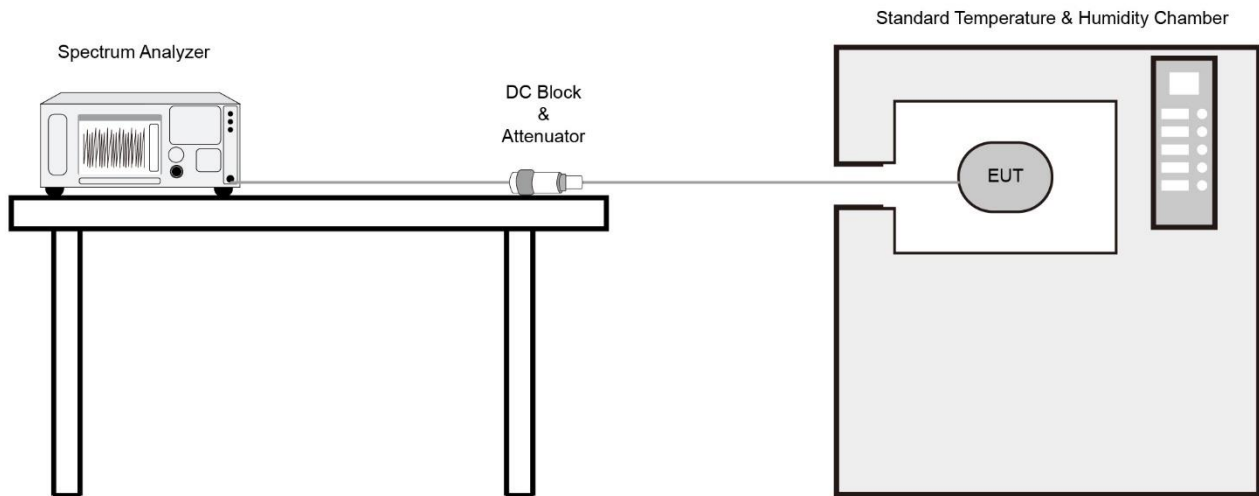
Adjust the temperature and supply voltage follow below:

- 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 millisecond 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 = 30Hz 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
8. $10 \times \log(4\text{kHz}/30\text{Hz}) = 21.2\text{dB}$ was added to the reference offset for in-band mask measurement to correct the result relative to any 4kHz band as per the requirement in 25.202(f)(1)&(2).

Spurious Emission – Out-of-Band Emission Peak Measurement

1. RBW = 100kHz or 10kHz

Set the RBW greater than 4kHz in order to increase the measurement speed
2. $VBW = 3 \times RBW$
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

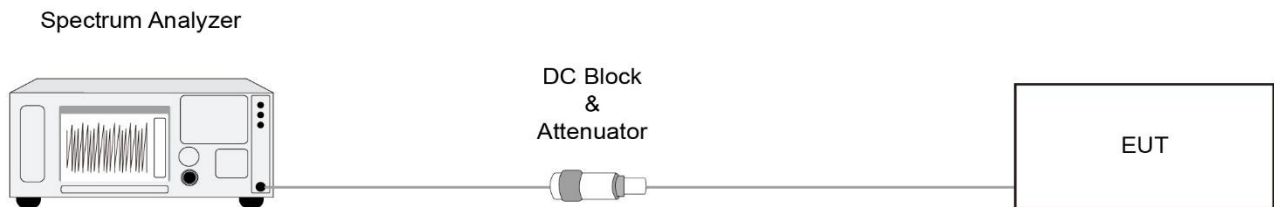
1. RBW = 10Hz
2. $VBW = 3 \times RBW$
3. Detector = Average
4. Sweep time = Auto couple

5. Sweep points $\geq 2 * \text{span} / \text{RBW}$
6. Trace mode = Average
7. Trace was allowed to stabilize
8. Add a $10 * \log(4000/10)$ factor to obtain 4kHz energy.

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) $\times$ (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 millisecond 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

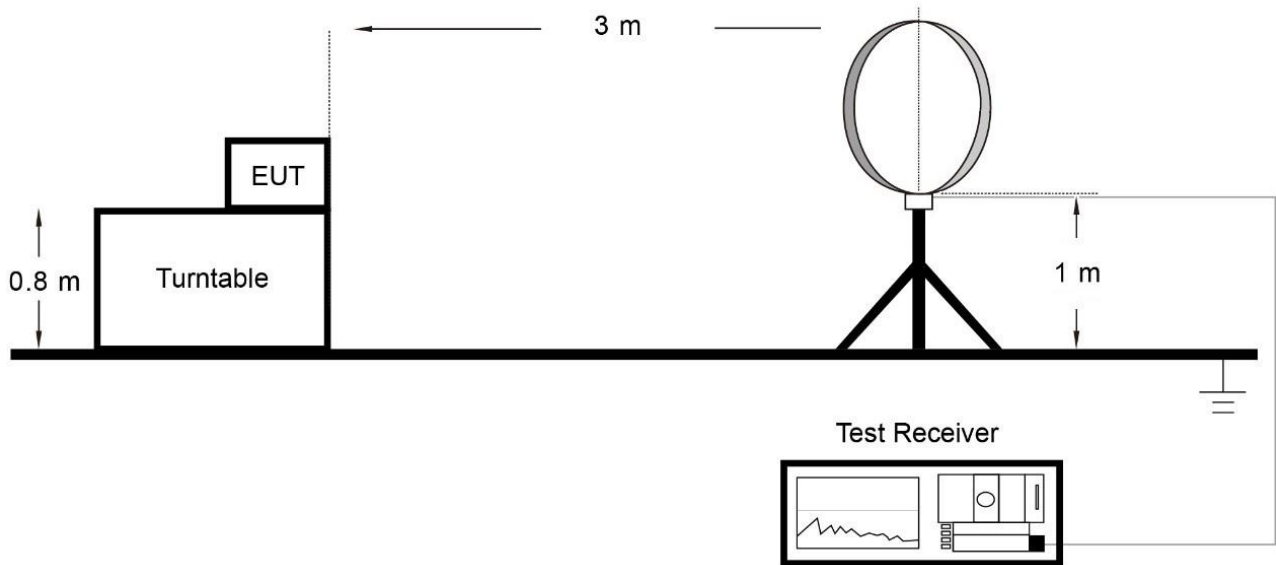
1. RBW = 100kHz for below 1GHz or 1MHz for above 1GHz

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

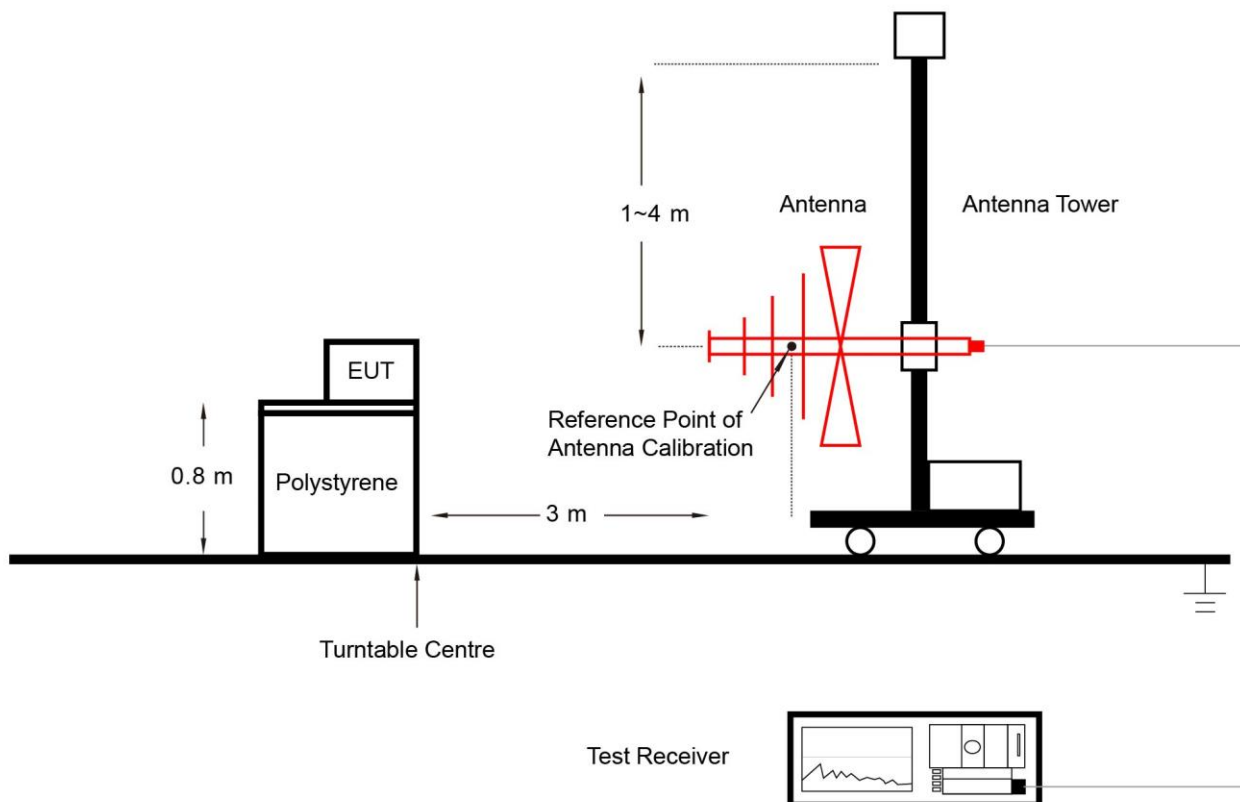
2. VBW = 3 * RBW
3. Detector = Peak
4. Sweep time = Auto couple
5. Trace mode = Max hold
6. Trace was allowed to stabilize

5.6.4. Test Setup

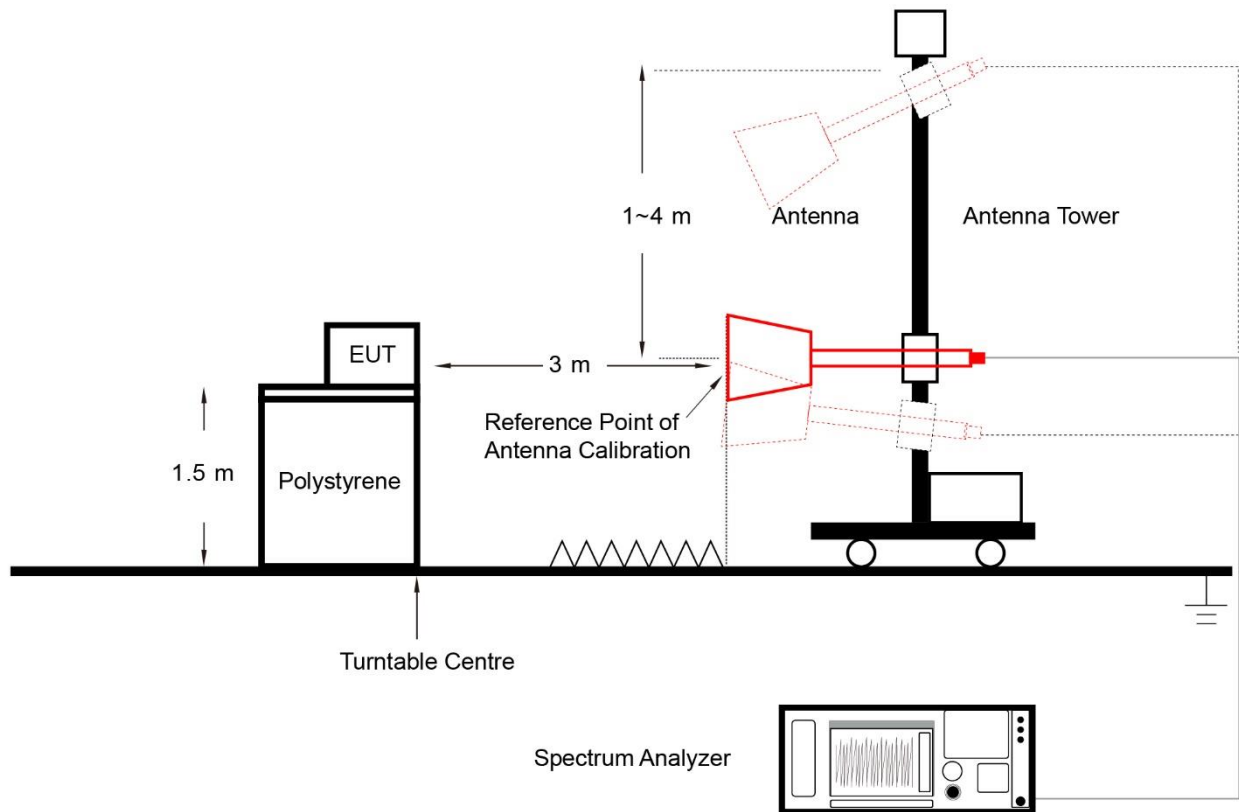
9kHz ~ 30MHz Test Setup



30MHz ~ 1GHz Test Setup



1GHz ~ 17GHz Test Setup



The tests were performed with antenna port terminated.

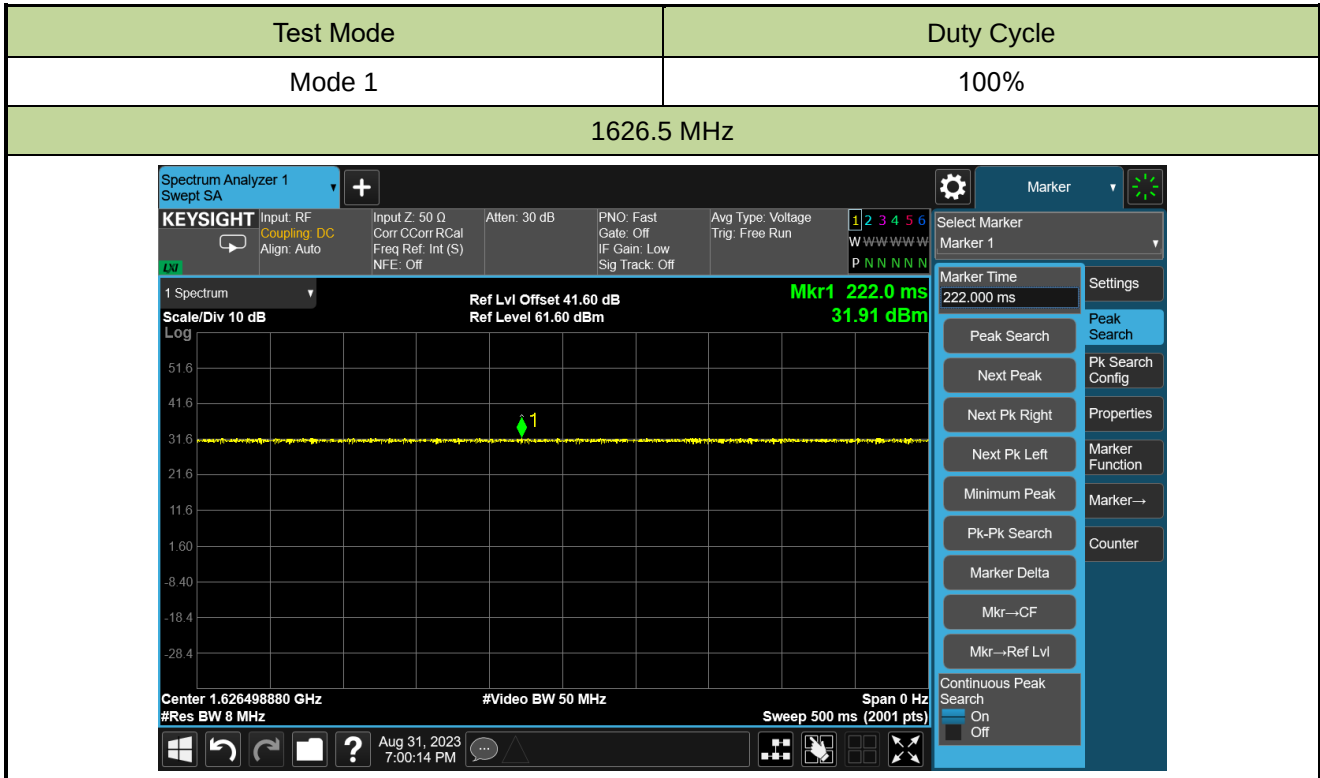
5.6.5. Test Result

Refer to Appendix A.6.

Appendix A - Test Result

A.1 Duty Cycle Test Result

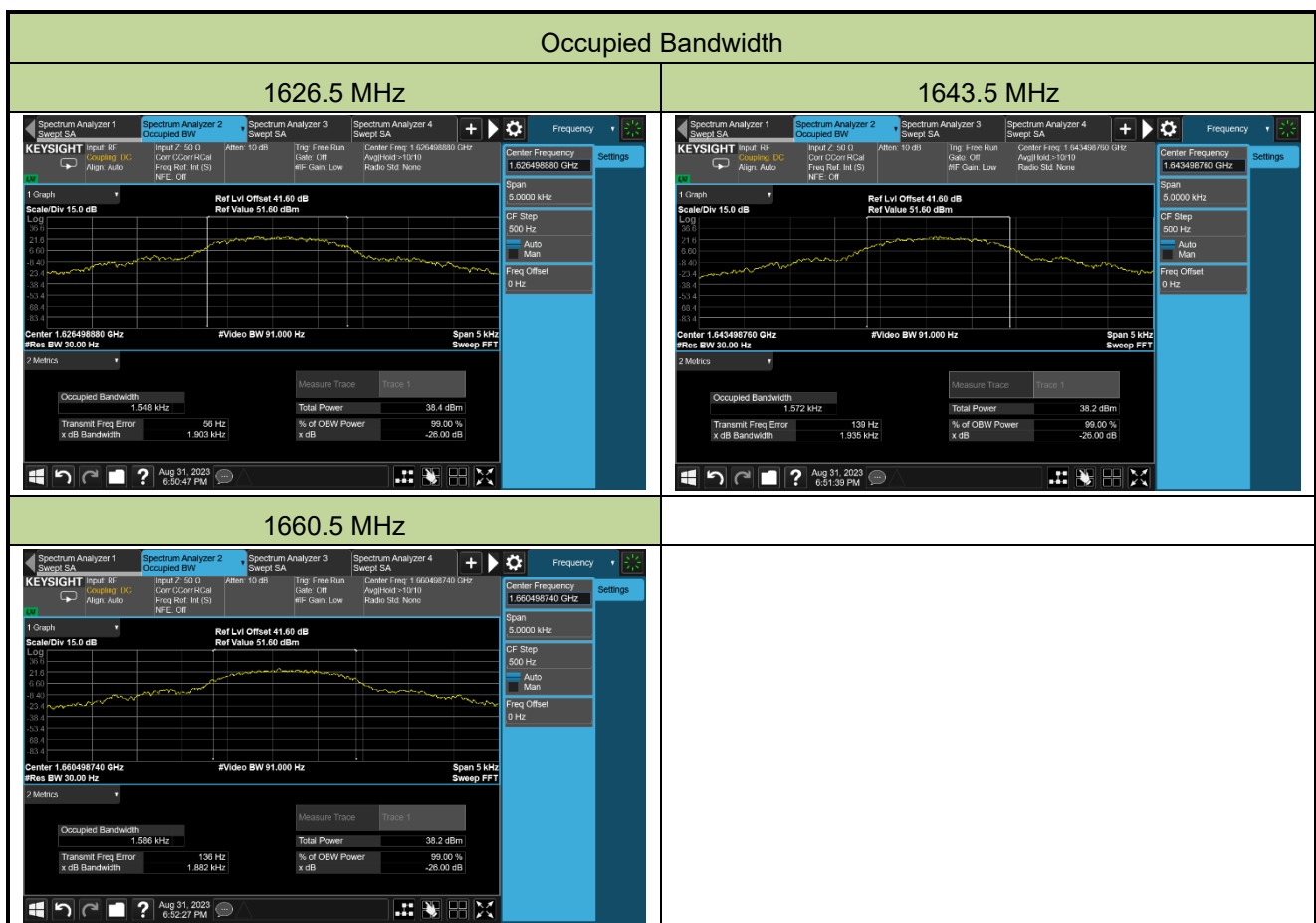
Test Site	WZ-SR5	Test Engineer	Luis Yang
Test Date	2023-08-31		



A.2 Occupied Bandwidth Test Result

Test Site	WZ-SR5	Test Engineer	Luis Yang
Test Date	2023-08-31		

Test Frequency (MHz)	99% Bandwidth (kHz)
1626.5	1.548
1643.5	1.572
1660.5	1.586



A.3 Power Spectral Density & Output Power Test Result

Test Site	WZ-SR5	Test Engineer	Luis Yang
Test Date	2023-08-30 ~ 2023-08-31		
Test Item	Power Spectral Density		

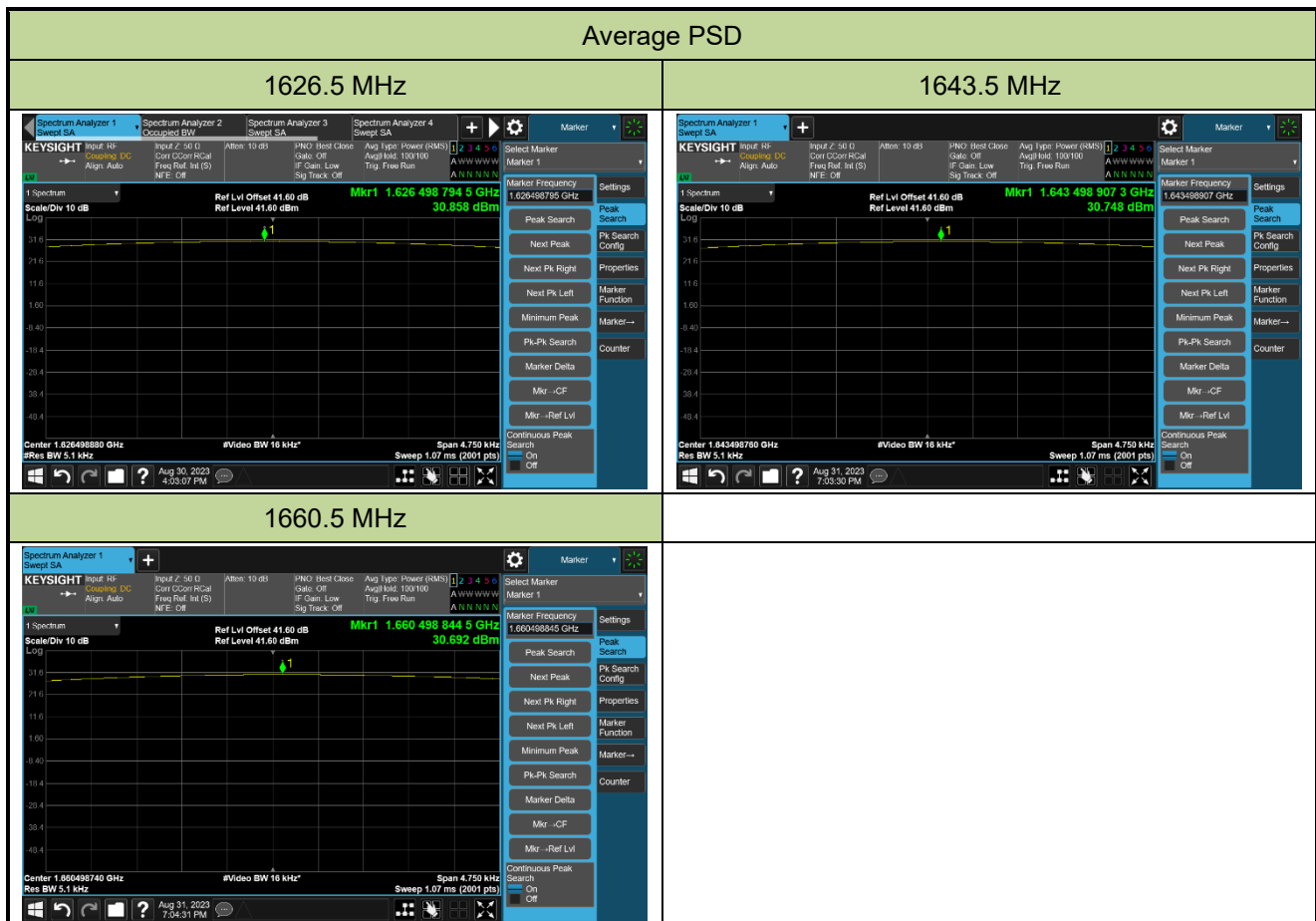
Test Freq. (MHz)	AVPSD (dBm/5.1kHz)	Duty Cycle (%)	Final AVPSD (dBm/5.1kHz)	EIRP PSD (dBW/5.1kHz)	Limit (dBW/4kHz)	Result
1626.5	30.858	100	30.858	3.148	≤ 40	Pass
1643.5	30.748	100	30.748	3.038	≤ 40	Pass
1660.5	30.692	100	30.692	2.982	≤ 40	Pass

Note 1: Final AVPSD (dBm/5.1kHz) = AVPSD (dBm/5.1kHz) + 10*log (1/Duty cycle)

Note 2: EIRP PSD (dBW/5.1kHz) = Final AVPSD (dBm/5.1kHz) + 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 5.1kHz and the measure level is complied with limit of 4kHz.



Test Site	WZ-SR5	Test Engineer	Luis Yang
Test Date	2023-08-31		
Test Item	Output Power (Reported Only)		

Test Freq. (MHz)	Average Power (dBm)	EIRP (dBm)
1626.5	32.13	34.42
1643.5	32.04	34.33
1660.5	32.51	34.80

Note: EIRP (dBm) = Average Power (dBm) + Antenna Gain (dBi).

A.4 Frequency Tolerance Test Result

Test Site	WZ-TR3	Test Engineer	Luis Yang
Test Date	2023-08-31	Temperature	-30 ~ 50 °C

Test Freq. (MHz)	Voltage (V _{DC})	Temp. (°C)	Measured Freq. (MHz)	Freq. Tolerance (ppm)	Limit (ppm)	Result
1626.5	6	-30	1626.498747	-0.77	-10 ~ +10	Pass
		-20	1626.498921	-0.66	-10 ~ +10	Pass
		-10	1626.498761	-0.76	-10 ~ +10	Pass
		0	1626.499134	-0.53	-10 ~ +10	Pass
		+10	1626.499088	-0.56	-10 ~ +10	Pass
		+20	1626.498814	-0.73	-10 ~ +10	Pass
		+30	1626.498755	-0.77	-10 ~ +10	Pass
		+40	1626.498943	-0.65	-10 ~ +10	Pass
		+50	1626.498956	-0.64	-10 ~ +10	Pass
	5.5	+20	1626.500157	0.10	-10 ~ +10	Pass
	6.5	+20	1626.500674	0.41	-10 ~ +10	Pass

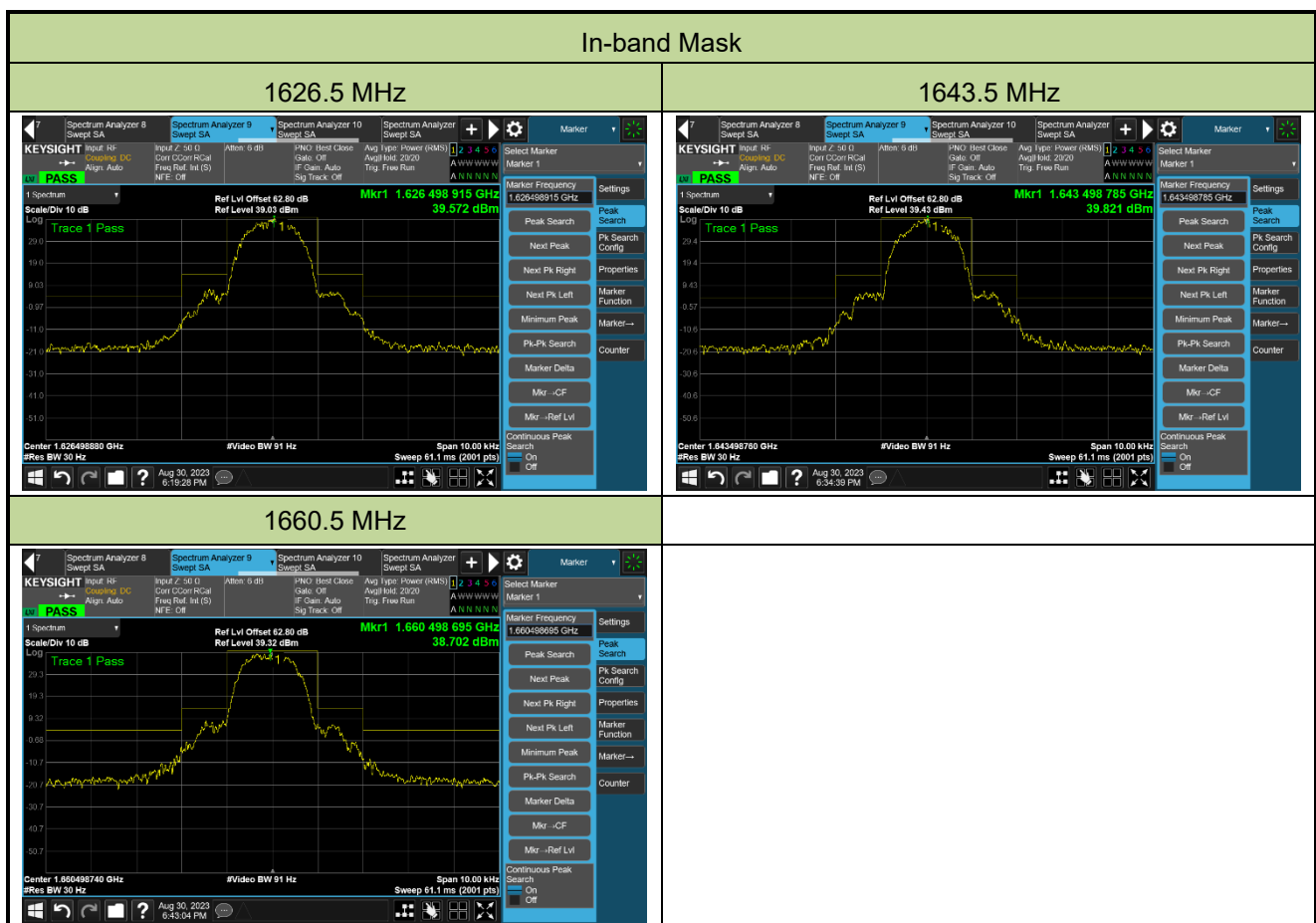
Note: Frequency Tolerance (ppm) = {[Measured Frequency (MHz) - Test Frequency (MHz)] / Test Frequency (MHz)} * 10⁶.

A.5 Emission Limitations (Conducted Emissions) Test Result

Test Site	WZ-SR5	Test Engineer	Luis Yang
Test Date	2023-08-30	Test Item	In-band Mask

Test Frequency (MHz)	Test Result
1626.5	Pass
1643.5	Pass
1660.5	Pass

Authorization Bandwidth = 2kHz

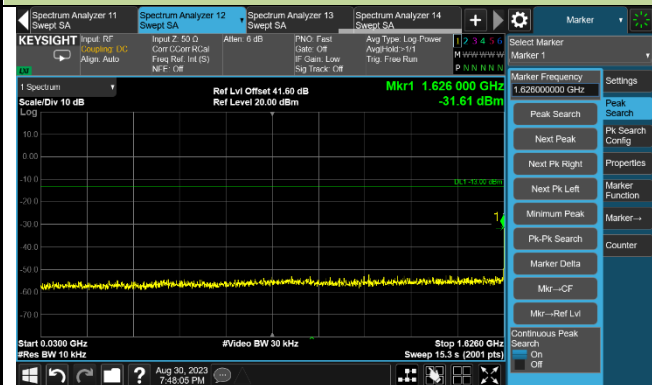


Test Site	WZ-SR5	Test Engineer	Luis Yang
Test Date	2023-08-30 ~ 2023-09-06	Test Item	Out-of-Band Emission

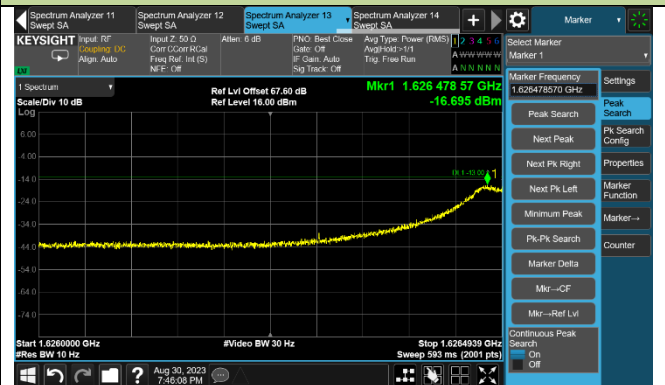
Test Channel	Frequency Range (MHz)	Measured Freq. (MHz)	Max Measurement Level (dBm)	Limit (dBm)	Result
1626.5 MHz	30 ~ 1626	1626.0	-31.61	-13	Pass
	1626 ~ 1626.49388	1626.47857	-16.695	-13	Pass
	1626.50388 ~ 1627	1626.50413	-15.259	-13	Pass
	1627 ~ 1700	1627.0	-32.40	-13	Pass
	1700 ~ 17000	4882.40	-37.39	-13	Pass
1643.5 MHz	30 ~ 1642	1642.0	-40.10	-13	Pass
	1642 ~ 1643.49376	1643.4938	-17.204	-13	Pass
	1643.50376 ~ 1645	1643.5038	-16.368	-13	Pass
	1645 ~ 1700	1645.3025	-41.11	-13	Pass
	1700 ~ 17000	4928.30	-35.86	-13	Pass
1660.5 MHz	30 ~ 1659	1659.0	-40.78	-13	Pass
	1659 ~ 1660.49374	1660.4937	-16.249	-13	Pass
	1660.50374 ~ 1665	1660.5037	-15.854	-13	Pass
	1665 ~ 1700	1667.5025	-39.91	-13	Pass
	1700 ~ 17000	4981.85	-37.10	-13	Pass

1626.5 MHz

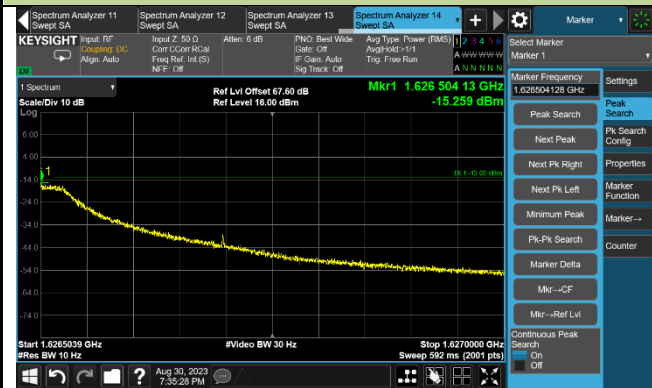
30 ~ 1626 MHz



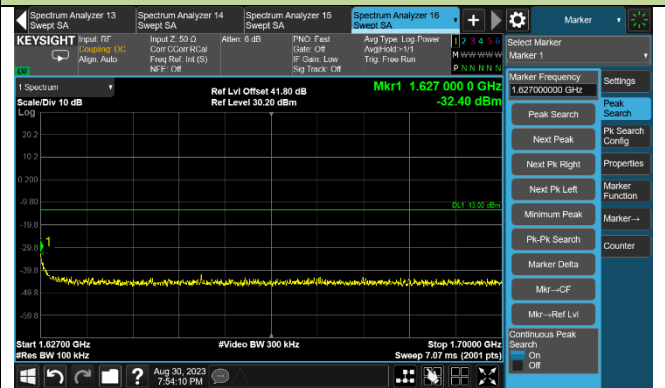
1626 ~ 1626.49388 MHz Note



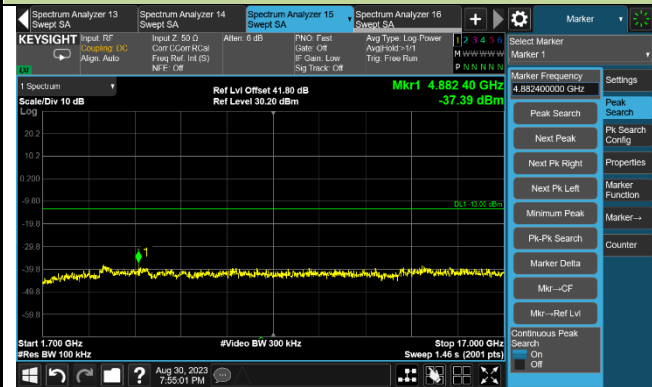
1626.50388 ~ 1627 MHz Note



1627 ~ 1700 MHz

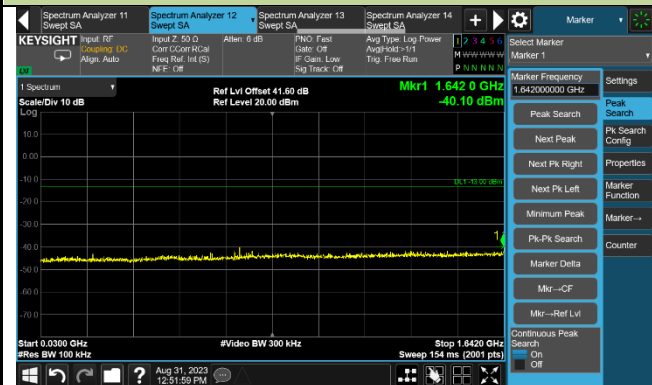


1700 ~ 17000 MHz



1643.5 MHz

30 ~ 1642 MHz



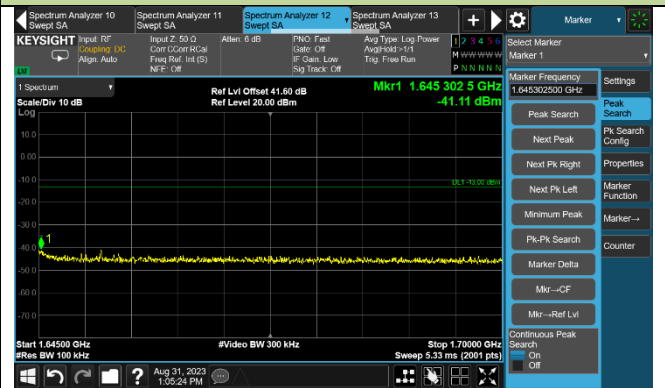
1642 ~ 1643.49376 MHz Note



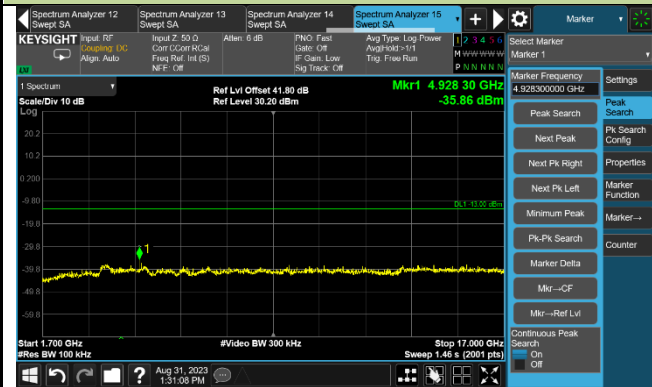
1643.50376 ~ 1645 MHz Note



1645 ~ 1700 MHz

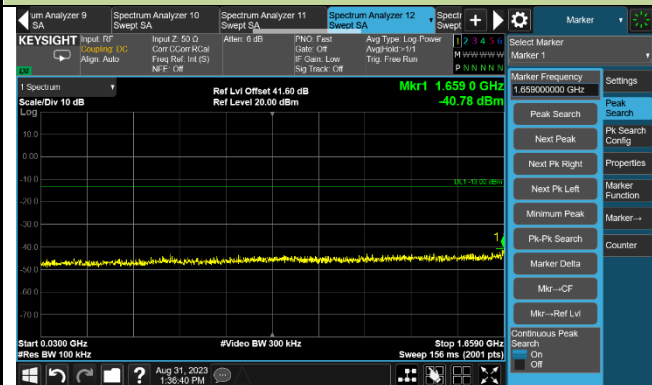


1700 ~ 17000 MHz

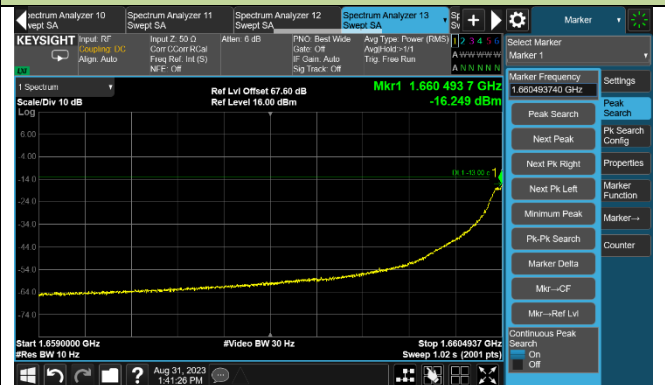


1660.5 MHz

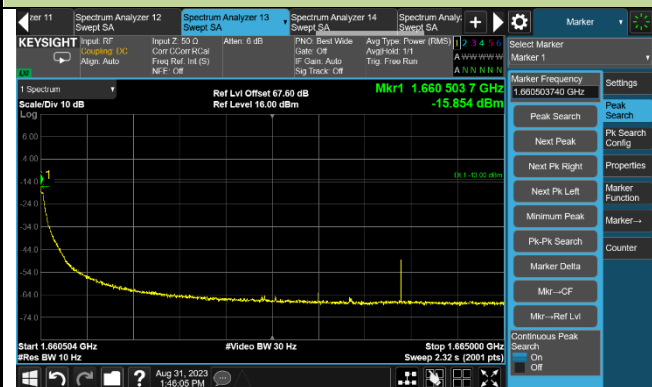
30 ~ 1659 MHz



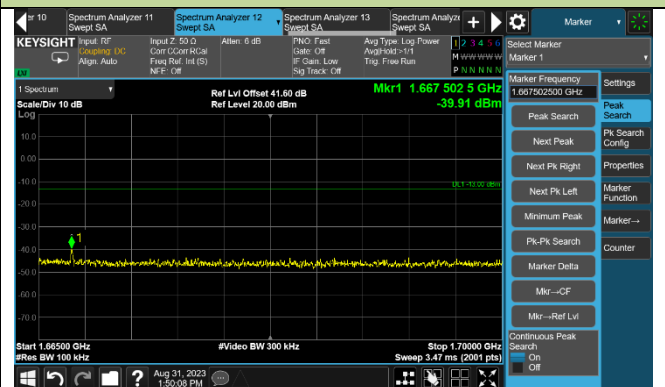
1659 ~ 1660.49374 MHz Note



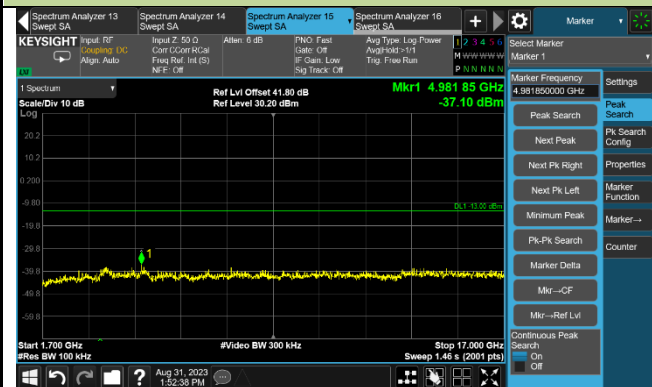
1660.50374 ~ 1665 MHz Note



1665 ~ 1700 MHz



1700 ~ 17000 MHz



Note: The conversion factor $10 \cdot \log(4000/10)$ had compensated to the SA's reference level offset.

Test Site	WZ-SR5	Test Engineer	Luis Yang
Test Date	2023-10-25	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	Frank Xue
Test Date	2023-10-17	Test Channel	1626.5MHz
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
4880.0	44.8	3.2	48.0	82.3	-34.3	Peak	Horizontal
6504.0	41.3	6.2	47.5	82.3	-34.8	Peak	Horizontal
9296.0	36.0	12.2	48.2	82.3	-34.1	Peak	Horizontal
14944.0	36.6	15.4	52.0	82.3	-30.3	Peak	Horizontal
4880.0	51.5	3.2	54.7	82.3	-27.6	Peak	Vertical
6504.0	42.8	6.2	49.0	82.3	-33.3	Peak	Vertical
8968.0	37.1	10.6	47.7	82.3	-34.6	Peak	Vertical
14520.0	35.5	16.0	51.5	82.3	-30.8	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	Frank Xue
Test Date	2023-10-17	Test Channel	1626.5MHz
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.		

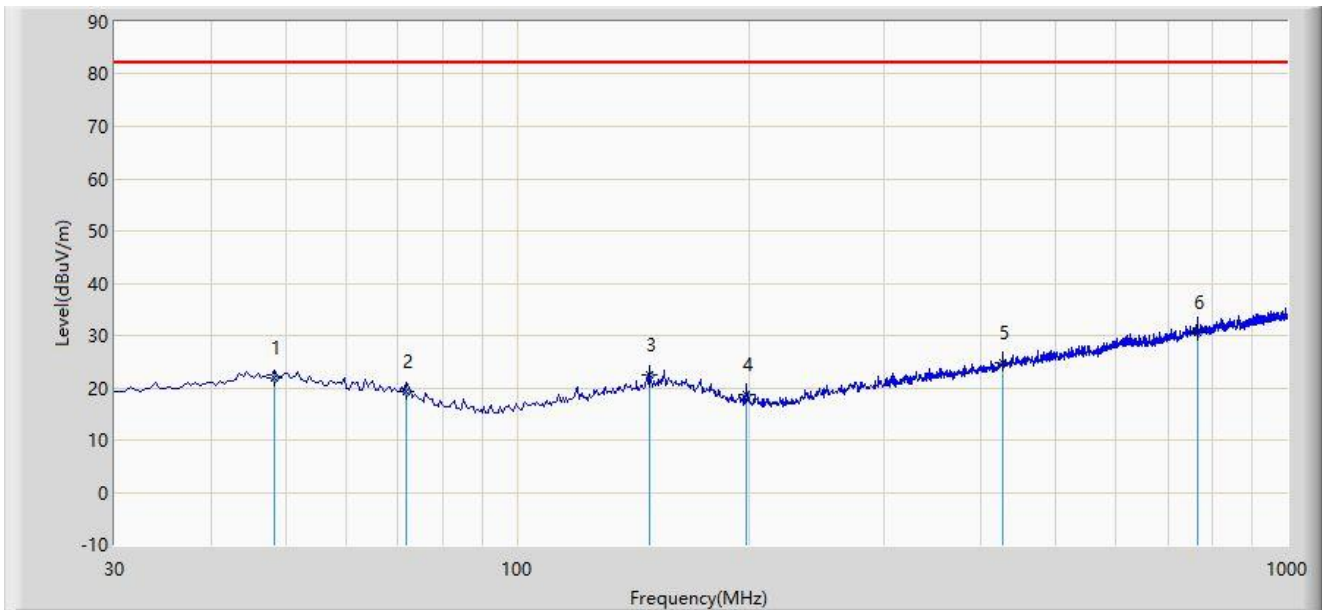
Frequency (MHz)	Reading Level (dBμV)	Factor (dB/m)	Measure Level (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Detector	Polarization
1583.0	39.1	-6.1	33.0	55.2	-22.2	Peak	Horizontal
1593.4	38.5	-6.1	32.4	55.2	-22.8	Peak	Horizontal
1562.9	39.6	-6.2	33.4	55.2	-21.8	Peak	Vertical
1603.2	38.2	-6.2	32.0	55.2	-23.2	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)

Radiated Spurious Emission For below 1GHz:

Site: WZ-AC1	Test Date: 2023-10-17
Limit: FCC_Part 25_RE (3m)	Engineer: Frank Xue
Probe: VULB 9168_25-2000MHz	Polarity: Horizontal
EUT: Satellite Communication Module	Power: AC 120V/60Hz
Test Mode: Transmit at 1626.5MHz	



No	Mark	Frequency (MHz)	Measure Level (dBμV/m)	Reading Level (dBμV)	Margin (dB)	Limit (dBμV/m)	Factor (dB/m)	Type
1		48.430	21.874	3.310	-60.426	82.300	18.564	QP
2		71.710	19.287	3.210	-63.013	82.300	16.077	QP
3		148.340	22.364	4.310	-59.936	82.300	18.055	QP
4		198.780	18.706	3.690	-63.594	82.300	15.016	QP
5		427.700	24.786	3.010	-57.514	82.300	21.776	QP
6	*	765.745	30.500	2.390	-51.800	82.300	28.110	QP

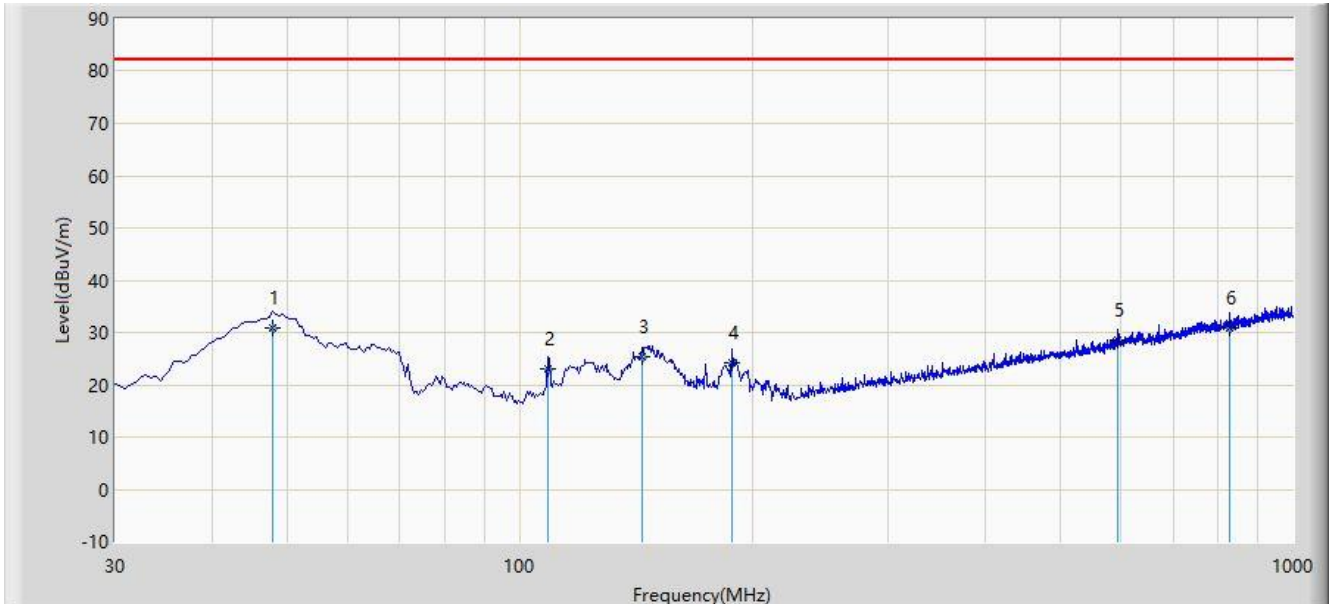
Note 1: " * ", means this data is the worst emission level.

Note 2: Measure Level (dBμV/m) = Reading Level (dBμV) + Factor (dB/m).

Note 3: Factor (dB/m) = Cable Loss (dB) + Antenna Factor (dB/m).

Note 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: 2023-10-17
Limit: FCC_Part 25_RE (3m)	Engineer: Frank Xue
Probe: VULB 9168_25-2000MHz	Polarity: Vertical
EUT: Satellite Communication Module	Power: AC 120V/60Hz
Test Mode: Transmit at 1626.5MHz	



No	Mark	Frequency (MHz)	Measure Level (dBμV/m)	Reading Level (dBμV)	Margin (dB)	Limit (dBμV/m)	Factor (dB/m)	Type
1		47.945	30.890	12.340	-51.410	82.300	18.549	QP
2		109.055	23.152	8.340	-59.148	82.300	14.813	QP
3		143.945	25.294	7.340	-57.006	82.300	17.954	QP
4		188.595	24.079	8.310	-58.221	82.300	15.769	QP
5		594.540	28.487	3.140	-53.813	82.300	25.347	QP
6	*	829.280	30.947	2.140	-51.353	82.300	28.808	QP

Note 1: " * ", means this data is the worst emission level.

Note 2: Measure Level (dBμV/m) = Reading Level (dBμV) + Factor (dB/m).

Note 3: Factor (dB/m) = Cable Loss (dB) + Antenna Factor (dB/m).

Note 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 “2308RSU050-UT” file.

Appendix C - EUT Photograph

Refer to “2308RSU050-UE” file.

The End