

MRT Technology (Suzhou) Co., Ltd Phone: +86-512-66308358 Web: www.mrt-cert.com Report No.: 2404RSU035-U5 Report Version: V01 Issue Date: 2024-06-07

# **RF MEASUREMENT REPORT**

- FCC ID: 2BEY3LCUR57WWDB
- Applicant: NETPRISMA INC.
- Product: LTE-A Cat 16 M.2 Module
- Model No.: LCUR57-WWD
- Brand Name: Vrileg
- FCC Rule(s): Part 27 Subpart D
- Result: Complies
- **Received Date:** 2024-04-22
- **Test Date:** 2024-05-05 ~ 2024-05-27

**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
2404RSU035-U5	V01	Initial Report	2024-06-07	Valid



# CONTENTS

Genne	ral Information	5
1.1.	Applicant	5
1.2.	Manufacturer	5
1.3.	Testing Facility	5
1.4.	Product Information	6
1.5.	Radio Specification under Test	6
1.6.	Description of Available Antennas	7
1.7.	Test Methodology	7
Test C	onfiguration	8
2.1.	Test System Connection Diagram	8
2.2.	Test Environment Condition	8
Measu	ring Instrument	9
Decisi	on Rules and Measurement Uncertainty	11
4.1.	Decision Rules	11
4.2.	Measurement Uncertainty	11
Test R	esult	12
5.1.	Summary	12
5.2.	Occupied Bandwidth Measurement	13
5.2.1.	Test Limit	13
5.2.2.	Test Procedure	13
5.2.3.	Test Setting	13
5.2.4.	Test Setup	13
5.2.5.	Test Result	13
5.3.	Frequency Stability Measurement	14
5.3.1.	Test Limit	14
5.3.2.	Test Procedure	14
5.3.3.	Test Setting	14
5.3.4.	Test Setup	15
5.3.5.	Test Result	15
5.4.	Transmitter Output Power Measurement	16
5.4.1.	Test Limit	16
5.4.2.	Test Procedure	16
5.4.3.	Test Setting	16
5.4.4.	Test Setup	17
	<ol> <li>1.1.</li> <li>1.2.</li> <li>1.3.</li> <li>1.4.</li> <li>1.5.</li> <li>1.6.</li> <li>1.7.</li> <li>Test C</li> <li>2.1.</li> <li>2.2.</li> <li>Measu</li> <li>4.1.</li> <li>4.2.</li> <li>Test R</li> <li>5.1.</li> <li>5.2.1.</li> <li>5.2.3.</li> <li>5.2.4.</li> <li>5.2.5.</li> <li>5.3.1.</li> <li>5.2.4.</li> <li>5.3.2.</li> <li>5.3.1.</li> <li>5.3.2.</li> <li>5.3.4.</li> <li>5.3.4.</li> <li>5.4.1.</li> <li>5.4.2.</li> <li>5.4.3.</li> </ol>	12.       Manufacturer         13.       Testing Facility         14.       Product Information         15.       Radio Specification under Test         16.       Description of Available Antennas         17.       Test Methodology         Test Configuration



	5.4.5.	Test Result	.17
	5.5.	Transmitter unwanted emissions (band-edge) Measurement	.18
	5.5.1.	Test Limit	.18
	5.5.2.	Test Procedure	.18
	5.5.3.	Test Setting	.18
	5.5.4.	Test Setup	.19
	5.5.5.	Test Result	.19
	5.6.	Transmitter unwanted emissions (spurious) Measurement	.20
	5.6.1.	Test Limit	.20
	5.6.2.	Test Procedure	.20
	5.6.3.	Test Setting	.20
	5.6.4.	Test Setup	.21
	5.6.5.	Test Result	.21
	5.7.	Radiated Spurious Emissions Measurement	.22
	5.7.1.	Test Limit	.22
	5.7.2.	Test Procedure	.22
	5.7.3.	Test Setting	.22
	5.7.4.	Test Setup	.23
	5.7.5.	Test Result	.23
Арр	endix A -	Test Result	.24
	A.1	Occupied Bandwidth Test Result	.24
	A.2	Frequency Stability Test Result	.28
	A.3	Transmitter Output Power Test Result	.29
	A.4	Transmitter unwanted emissions (band-edge) Test Result	.32
	A.5	Transmitter unwanted emissions (spurious) Test Result	.38
	A.6	Radiated Spurious Emissions Test Result	.41
Арр	endix B -	Test Setup Photograph	.43
Арр	endix C -	EUT Photograph	.44



### 1. Genneral Information

#### 1.1. Applicant

NETPRISMA INC.

1301 6TH AVE, SEATTLE, WA, 98101-2304, UNITED STATES

#### 1.2. Manufacturer

NETPRISMA INC.

1301 6TH AVE, SEATTLE, WA, 98101-2304, UNITED STATES

#### 1.3. Testing Facility

$\boxtimes$	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, Lianc	lo U Valley, No.200	Xingpu Rd., Shengpu	ı Town, Suzhou Indu	strial Park, China		
	Laboratory Accre	editations					
	A2LA: 3628.01		CNAS	: L10551			
	FCC: CN1166		ISED:	CN0001			
	NCOL	□R-20025	□G-20034	C-20020	□T-20020		
	VCCI:	□R-20141	□G-20134	C-20103	□T-20104		
	Test Site – MRT Shenzhen Laboratory						
	Laboratory Loca	tion (Shenzhen)					
	1G, Building A, Junxiangda Building, Zhongshanyuan Road West, Nanshan District, Shenzhen, China						
	Laboratory Accre	editations					
	A2LA: 3628.02	28.02 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	LTE-A Cat 16 M.2 Module
Model No. LCUR57-WWD	
Brand Name	Vrileg
Serial No.	D1C24CG1D000013 (Conducted)
	D1C24CG1D000108 (Radiated)
	WCDMA Band II/IV/V
3GPP Specification	LTE Band 2, 4, 5, 7, 12, 13, 14, 25, 26, 30, 38, 41, 42, 43, 48, 66
Operating Temperature Range	-25 ~ 75 °C
Supply Voltage Rating	3.135 – 4.4Vdc, typical 3.7Vdc
Antenna Specification	Refer to Section 1.6
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. Radio Specification under Test

E-UTRA Specification		
TX Frequency Range	Band 30: 2305 ~ 2315 MHz	
RX Frequency Range	Band 30: 2350 ~ 2360 MHz	
Support Bandwidth	5MHz, 10MHz	
Support Power Class	PC3	
Modulation	UL up to 64QAM & DL up to 256QAM	



#### 1.6. Description of Available Antennas

Technology	Frequency Range (MHz)	Antenna Type	MaxPeak Gain (dBi)		
LTE Band 30	2305 ~ 2315	2305 ~ 2315 PIFA			
Note 1: All antenna information (Antenna type and Peak Gain) is provided by the manufacturer.					
Note 2: The typical antennas used to calculate the ERP (EIRP).					

### 1.7. Test Methodology

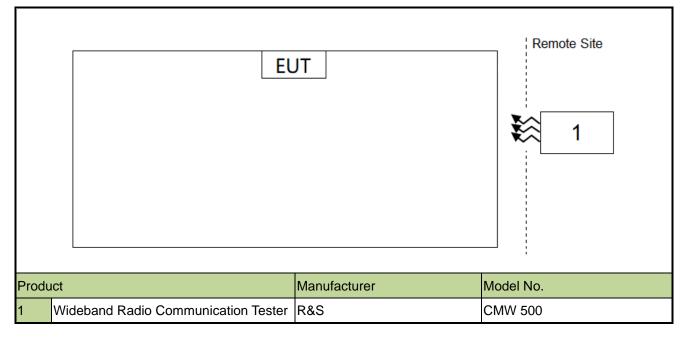
According to the specifications of the manufacturer, the EUT must comply with the requirements of the following standards:

- 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



# 2. Test Configuration

### 2.1. Test System Connection Diagram



#### 2.2. Test Environment Condition

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



# 3. Measuring Instrument

Instrument	Manufacturer	Model No.	Asset No.	Cali. Interval	Cali. Due Date	Test Site
Communication Tester	R&S	CMW500	MRTSUE06243	1 year	2024-09-27	SIP-SR1
Thermohygrometer	testo	622	MRTSUE06629	1 year	2024-12-21	SIP-SR1
				1 year	2024-05-09	SIP-SR1
Communication Tester	R&S	CMW500	MRTSUE06881	1 year	2025-05-08	SIP-SR1
Temperature Chamber	BAOYT	BYG-80CL	MRTSUE06932	1 year	2025-02-03	SIP-SR1
Shielding Room	MIX-BEP	SIP-SR1	MRTSUE06948	N/A	N/A	SIP-SR1
Directional Coupler	MVE	MVE4912-10	MRTSUE07052	1 year	2024-08-24	SIP
Attenuator	MVE	MVE2213	MRTSUE11111	1 year	2024-08-02	SIP
Signal Analyzer	Keysight	N9010B	MRTSUE07028	1 year	2024-10-23	SIP-SR1
Directional Coupler	MVE	MVE4912-10	MRTSUE07052	1 year	2024-08-24	SIP
Communication Tester	R&S	CMW500	MRTSUE06108	1 year	2024-10-23	WZ-SR6
Thermohygrometer	testo	608-H1	MRTSUE06362	1 year	2025-02-04	WZ-SR6
Shielding Room	HUAMING	WZ-SR6	MRTSUE06443	N/A	N/A	WZ-SR6
Radio Communication Analyzer	Anritsu	MT8821C	MRTSUE06960	1 year	2024-07-06	WZ-SR6
Temperature Chamber	BAOYT	BYH-150CL	MRTSUE06051	1 year	2024-09-27	WZ-TR3
Thermohygrometer	testo	608-H1	MRTSUE11268	1 year	2024-12-14	WZ-TR3
Thermohygrometer	testo	608-H1	MRTSUE06362	1 year	2025-02-04	WZ-SR6
Shielding Room	HUAMING	WZ-SR6	MRTSUE06443	N/A	N/A	WZ-SR6
Signal Analyzer	Keysight	N9020B	MRTSUE06583	1 year	2024-09-27	WZ-SR6
USB Power Sensor	Keysight	U8488A	MRTSUE06958	5 years	2026-07-08	SIP-SR3
Thermohygrometer	testo	608-H1	MRTSUE06616	1 year	2024-10-28	SIP-AC1
Horn Antenna	R&S	HF907	MRTSUE06610	1 year	2024-06-17	SIP-AC1
EMI Test Receiver	R&S	ESR3	MRTSUE06185	1 year	2024-12-17	SIP-AC1
Anechoic Chamber	RIKEN	SIP-AC1	MRTSUE06554	1 year	2024-12-21	SIP-AC1
				1 year	2024-05-09	SIP-AC1
Signal Analyzer	Keysight	N9010B	MRTSUE06559	1 year	2025-05-08	SIP-AC1
Horn Antenna	Schwarzbeck	BBHA 9170	MRTSUE06599	1 year	2024-09-24	SIP-AC1
Preamplifier	EMCI	EMC184045SE	MRTSUE06602	1 year	2024-10-09	SIP-AC1
Loop Antenna	Schwarzbeck	FMZB 1519 B	MRTSUE06937	1 year	2025-01-27	SIP-AC1
Signal Analyzer	Keysight	N9010B	MRTSUE07028	1 year	2024-10-23	SIP-AC1
Active Loop Antenna	Schwarzbeck	FMZB 1519-60 D	MRTSUE07075	1 year	2024-12-04	SIP-AC1
Cable	HUBER+SUHNER	SF106	MRTSUE06594	1 year	2024-12-21	SIP-AC1
Cable	HUBER+SUHNER	SF106	MRTSUE06874	1 year	2024-12-21	SIP-AC1



Software	Version	Function
EMI Software	V3.0.0	EMI Test Software
Controller_MF 7802BS	1.02	RE Antenna & Turntable
CMWrun	V 1.9.10.20	license 2G & 3G & 4G
UCTS	V 6.23.217.99	license 3G & 4G & 5G
Agilent Power Analyzer/Agilent Power Panel	V R03.09.00	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 Spurious Emissions					
Measureme	Measurement Uncertainty for a Level of Confidence of 95% (U=2Uc(y)):				
Coaxial:	9kHz~30MHz: 2.61dB				
Coplanar:	9kHz~30MHz: 2.62dB				
Horizontal:	30MHz~200MHz: 3.79dB				
	200MHz~1GHz: 3.91dB				
	1GHz~40GHz: 4.99dB				
Vertical:	30MHz~200MHz: 4.06dB				
	200MHz~1GHz: 5.21dB				
	1GHz~40GHz: 4.90dB				
Conducted Spur	ious Emissions				
Measuring	Uncertainty for a Level of Confidence of 95% (U=2Uc(y)):				
1.47dB	1.47dB				
Output Power					
Measuring Uncertainty for a Level of Confidence of 95% (U=2Uc(y)):					
0.66dB					
Occupied Bandw	vidth				
Measuring	Uncertainty for a Level of Confidence of 95% (U=2Uc(y)):				
69.28kHz	69.28kHz				
Frequency Stability					
Measuring	Measuring Uncertainty for a Level of Confidence of 95% (U=2Uc(y)):				
8.04Hz					



### 5. Test Result

### 5.1. Summary

FCC Part Section(s)	Test Description	Test Condition	Test Result
2.1049	Occupied Bandwidth		Pass
2.1055, 27.54	Frequency Stability		Pass
27.50(a)(3)	Transmitter Output Power		Pass
	Transmitter unwanted emissions	Conducted	
2.1051, 27.53(a)(4)	(band-edge)		Pass
2.4054, 27.52(a)(4)	Transmitter unwanted emissions		Pass
2.1051, 27.53(a)(4)	(spurious)		
2.1053, 27.53(a)(4)	Transmitter Spurious Emission	Radiated	Pass

#### Notes:

- 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.
- All supported modulation types were evaluated. The worst-case emission of modulation was selected. Therefore, the Frequency Stability, Transmitter unwanted emissions (band-edge), Transmitter unwanted emissions (spurious), Radiated Spurious Emission were presented worst-case in the test report.
- 3) 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.
- 4) This report is based on MRT Original "2404RSU035-U5" Report, FCC ID: 2BEY3LCUR57WWDA to copying report and updating the FCC ID.



#### 5.2. Occupied Bandwidth Measurement

#### 5.2.1. 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.

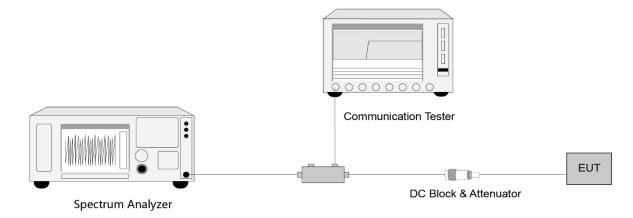
#### 5.2.2. Test Procedure

ANSI C63.26-2015 - Section 5.4.4

#### 5.2.3. 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  $\geq$  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.

#### 5.2.4. Test Setup



#### 5.2.5. Test Result

Refer to Appendix A.1.



#### 5.3. Frequency Stability Measurement

#### 5.3.1. Test Limit

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

#### 5.3.2. Test Procedure

ANSI C63.26-2015 - Section 5.6

#### 5.3.3. Test Setting

- A reference point shall be established at the applicable unwanted emissions limit using a RBW equal to the RBW required by the unwanted emissions specification of the applicable regulatory standard. These reference points measured using the lowest and highest channel of operation shall be identified as f<sub>L</sub> and f<sub>H</sub> respectively.
- 2. Use the frequency error function of the instrument and record the frequency error.
- 3. Change the temperature of equipment and repeat Steps 2.
- 4. Change the Voltage of equipment and repeat Steps 2.
- 5. The frequency error offset determined in the above methods shall be added or subtracted from the values of  $f_L$  and  $f_H$  and the resulting frequencies must remain within the band

#### 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.

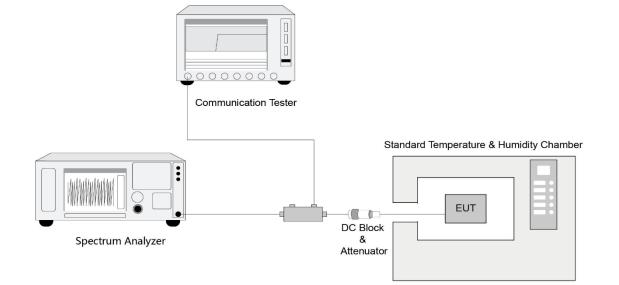
#### Frequency Stability Under Voltage Variations:

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, record the maximum frequency change.



### 5.3.4. Test Setup



#### 5.3.5. Test Result

Refer to Appendix A.2.



#### 5.4. Transmitter Output Power Measurement

#### 5.4.1. 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 LTE 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.

#### 5.4.2. Test Procedure

ANSI C63.26-2015 - Section 5.2.4.2 & 5.2.4.4

#### 5.4.3. Test Setting

#### 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.

#### Average Power Spectral Density Measurement

- 1. Set span to  $2 \times to 3 \times the OBW$ ;
- 2. Set RBW = 1% to 5% of the OBW;
- 3. Set VBW  $\geq$  3 × RBW;
- 4. Set number of measurement points in sweep  $\geq 2 \times \text{span} / \text{RBW}$ ;
- 5. Sweep time set to auto;
- 6. Detector = power averaging (rms);
- 7. If the EUT can be configured to transmit continuously, then set the trigger to free run;
- 8. If the EUT cannot be configured to transmit continuously, then use a sweep trigger with the level set to enable triggering only on full power bursts and configure the EUT to transmit at full power for the entire duration of each sweep.
- 9. 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 multiple symbols, 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.

10. Compute power by integrating the spectrum across the specified bandwidth of the signal using the instrument's band or channel power measurement function with band/channel limits set equal to the specified bandwidth band edges. If the instrument does not have a band or channel power function, sum the spectrum levels (in linear power units) at intervals equal to the RBW extending across the entire specified bandwidth of the spectrum.

#### ERP & EIRP Measurement

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

$$ERP \text{ or } EIRP = P_{Meas} + G_{T}$$
(1)

where

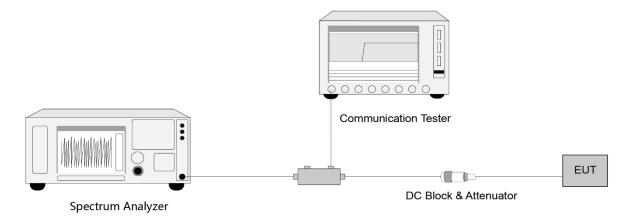
ERP or EIRP effective radiated power or equivalent isotropically radiated power, respectively (expressed in the same units as P<sub>Meas</sub>, e.g., dBm or dBW)

P<sub>Meas</sub> measured transmitter output power or PSD, in dBm or dBW

G<sub>T</sub> 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.

#### 5.4.4. Test Setup



#### 5.4.5. Test Result

Refer to Appendix A.3.



### 5.5. Transmitter unwanted emissions (band-edge) Measurement

#### 5.5.1. 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.

#### 5.5.2. Test Procedure

ANSI C63.26-2015 - Section5.7

#### 5.5.3. Test Setting

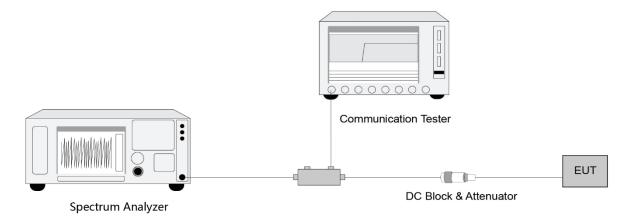
- 1. Set the analyzer frequency to Low or High channel
- 2. RBW = specified resolution bandwidth, for improvement of the accuracy in the measurement of the average power of a noise-like emission, a RBW narrower than the specified reference bandwidth can be used (generally limited to no less than 1% of the frequency block group, 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. If the EUT can be configured to transmit continuously, then set the trigger to free run
- 7. If the EUT cannot be configured to transmit continuously, then use a sweep trigger with the level set to enable triggering only on full power bursts and configure the EUT to transmit at full power for the entire



duration of each sweep. Verify that the sweep time is less than or equal to the transmission burst duration. Time gating can also be used under similar constraints

- 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.
- 9. Compute the power by integrating the spectrum across the specified resolution bandwidth using the instrument's band or channel power measurement function, with the band/channel limits set equal to the specified resolution bandwidth, when using a measurement bandwidth smaller than the specified bandwidth. Otherwise, Use the peak marker function to determine the maximum amplitude level.

#### 5.5.4. Test Setup



#### 5.5.5. Test Result

Refer to Appendix A.4.



#### 5.6. Transmitter unwanted emissions (spurious) Measurement

#### 5.6.1. 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 10<sup>th</sup>harmonic. 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) by a factor of at least 70 + 10 log (P) dB.

#### 5.6.2. Test Procedure

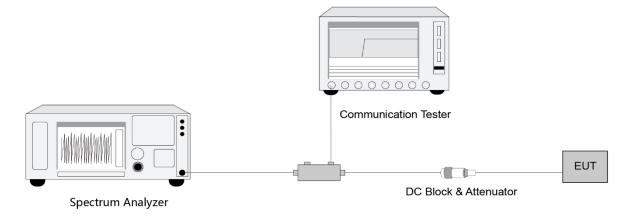
ANSI C63.26-2015 - Section 5.7

#### 5.6.3. Test Setting

- 1. Set the analyzer frequency to low, Mid or high channel.
- 2. RBW = specified resolution bandwidth
- 3. VBW ≥ 3\*RBW
- 4. Sweep time = auto
- 5. Detector = power averaging (rms)
- 6. If the EUT can be configured to transmit continuously, then set the trigger to free run
- 7. If the EUT cannot be configured to transmit continuously, then use a sweep trigger with the level set to enable triggering only on full power bursts and configure the EUT to transmit at full power for the entire duration of each sweep. Verify that the sweep time is less than or equal to the transmission burst duration. Time gating can also be used under similar constraints
- 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.
- 9. Use the peak marker function to determine the maximum amplitude level.



### 5.6.4. Test Setup



#### 5.6.5. Test Result

Refer to Appendix A.5.



#### 5.7. Radiated Spurious Emissions Measurement

#### 5.7.1. 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 (dB $\mu$ V/m) = EIRP (dBm) - 20 log D + 104.8; where D is the measurement distance in meters. The emission limit equal to 55.3dB $\mu$ V/m.

#### 5.7.2. Test Procedure

ANSI C63.26-2015 - Section 5.2.7 & 5.5

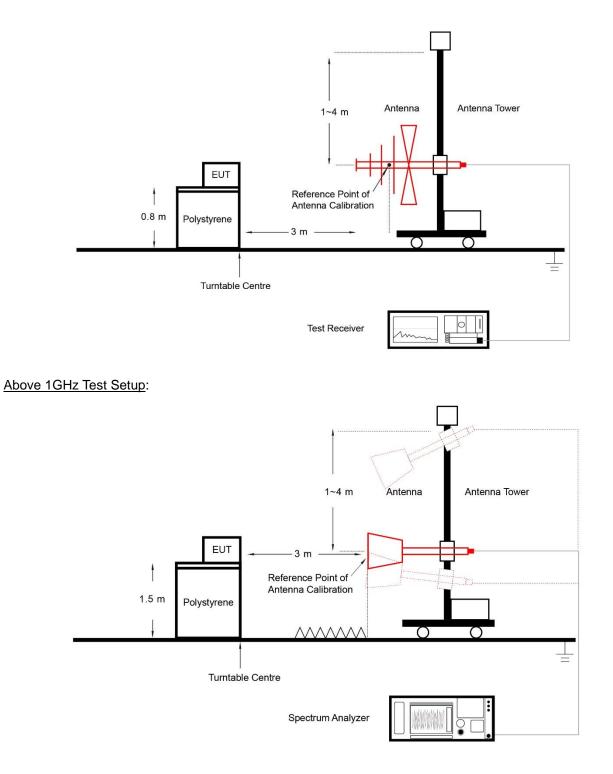
#### 5.7.3. Test Setting

- 1. RBW = 120kHz or 1MHz
- 2. VBW ≥ 3\*RBW
- 3. Sweep time  $\ge$  10 × (number of points in sweep) × (transmission symbol period)
- 4. Detector = CISPR quasi-peak / average detector (Below 1 GHz, compliance with the limits shall be demonstrated using a CISPR quasi-peak detector and the related measurement bandwidth. Above 1 GHz, compliance with the limits shall be demonstrated using a linear average detector with a minimum resolution bandwidth of 1 MHz.)
- 5. The trace was allowed to stabilize



### 5.7.4. Test Setup

Below 1GHz Test Setup:



#### 5.7.5. Test Result

Refer to Appendix A.6.



# Appendix A - Test Result

# A.1 Occupied Bandwidth Test Result

Test Site	SIP-SR1	Test Engineer	Yoniter Yang
Test Date	2024-05-05	Test Band	Band 30

Bandwidth (MHz)	Frequency (MHz)	99% Bandwidth (MHz)					
QPSK							
	2307.5	4.46					
5	2310.0	4.46					
	2312.5	4.48					
10	2310.0	8.93					
16QAM							
	2307.5	4.46					
5	2310.0	4.47					
	2312.5	4.47					
10	2310.0	8.93					
64QAM	64QAM						
	2307.5	4.46					
5	2310.0	4.46					
	2312.5	4.46					
10	2310.0	8.92					



99% Bandwidth – 5M	Hz Bandwidth QPSK	
Low Channel Bandwidth	Middle Channel Bandwidth	
Content and a second seco	Construct Analyzer         Processing Analyzer	
2 Marks         Measure Trace         Trace 1           Occupied Banavidth         4.400 Met         Total Power         30.3 dBm           Transmit Reg Bandwidth         4.871 Metz         % dB Wower         -90.0 %i           x dB Bandwidth         4.871 Metz         % dB         -26.00 dB           Image: Charles and the state of the	2 Metrics         Measure Trace         Trace 1           Coccupied Banchedm         4.450 MHz         Total Power         30.2 dbm           Tasimer Flow         30.2 dbm         30.2 dbm	
High Channel Bandwidth		
KEVSIGHT more the Conceptod Addition of the stores Name of the stores Name of the stores Name of the stores Sectores Sectores Name of the stores Sectores Name of the stores Name of the stores		
99% Bandwidth – 10N	/Hz Bandwidth QPSK	
Middle Channel Bandwidth         Series       Processor       Series         Colspan="2">Series       Colspan="2">Series       Colspan="2">Series         Series       Colspan="2">Series       Colspan="2">Series         Colspan="2">Series       Colspan="2">Series       Colspan="2">Series         Series       Colspan="2">Series       Colspan="2">Series         Series       Colspan="2">Series         Series       Series         Series       Series       Series         Series       Series <th colspa<="" td=""><td></td></th>	<td></td>	



99% Bandwidth – 5M	Hz Bandwidth 16QAM
Low Channel Bandwidth	Middle Channel Bandwidth
Epochtum Analyzor 1 Concepted Bandwidth Case Dir v 0 of all       People 2 0210 People 2000 dBm       Concepted Bandwidth Red S Dat No.00 dBm       Concepted Bandwidth Case Dir v 0 of all       People 2 0210 dBm       Concepted Bandwidth Red S Dat No.00 dBm       Concepted Bandwidth Red S Dat No.00 dBm       Concepted Bandwidth Case Dir v 0 of all       Percent Dir v 0 of all	Signadrum Analyzer 1     Image 2 / 210     Allew 10 / db     Tig free hum     Center Free 2 / 21000000 CH2     Center Free 2 / 210000000 CH2     Center Free 2 / 21000000 CH2     Center Free 2 / 2100000 CH2     Center Free 2 / 210000 CH2
High Channel Bandwidth	
Center Availaber 1 Competend Realistics Figure 2.61 (2) (2) (2) (2) (2) (2) (2) (2) (2) (2)	Hz Bandwidth 16QAM
Low Channel Bandwidth	
Control double       Processor       Processor<	



99% Bandwidth – 5M	Hz Bandwidth 64QAM
Low Channel Bandwidth	Middle Channel Bandwidth
Control Markingson 1     Control Bark     Control Park 2: 00 0	Spectrum Analyzer 1 Compared WW KEYSIGHT Groups J. Revent Volume 40.00 dBm 1 Gets ScaterDiv 10.0 dB Compared BankWeft 2 Judicis Compared BankWeft 4.4620 Mar. 2 Compared BankWeft 4.4620 Mar. 2 Compared BankWeft 4.4620 Mar. 2 Total Prevent Stater Compared BankWeft 4.4620 Mar. 2 Total Prevent Stater Total Prevent Stater Compared BankWeft 4.4620 Mar. 2 Total Prevent Stater Compared BankWeft Compared Bank
Transmit Free Brow         -200 Hz         Install Protect         2/3 dom           Transmit Free Brow         -200 Hz         Not Of DV Protect         9 do 00 h           x dB Bandwidth         -4.66 M4z         Not Of DV Protect         -260 0 db           Image: Solution of the state o	Transmit Fried Error         4.106 MHz         100 ar prover         2.02 Statin           Transmit Fried Error         4.000 MHz         % of 60 MP Power         -0.000 MB           Transmit Fried Error         4.800 MHz         % of 60 MP Power         -0.000 MB           Transmit Fried Error         6.800 MHz         % of 60 MP Power         -0.000 MB
High Channel Bandwidth	
Production Markador 1 Compared Production Compared Productination Compared Production	Hz Bandwidth 64QAM
Low Channel Bandwidth	



### A.2 Frequency Stability Test Result

Test Site	WZ-TR3	Test Engineer	Jone Zhang
Test Date	2024-05-23 ~ 2024-05-27	Test Band	Band 30

Voltage Temp (°C)		Frequency F	Frequency Range (MHz)		Frequency	Within
	Temp (°C)	2305.0	2315.0	Delta (Hz)	stability	Authorized
		f∟	fн		(ppm)	Frequency Block
	+ 20 (Ref)	2305.1950	2314.8050	0.00	0.0000	Pass
	+ 50	2305.1950	2314.8050	10.00	0.0043	Pass
	+ 40	2305.1950	2314.8050	11.10	0.0048	Pass
	+ 30	2305.1950	2314.8050	-10.90	-0.0047	Pass
Normal	+ 10	2305.1950	2314.8050	14.20	0.0061	Pass
	0	2305.1950	2314.8050	-10.20	-0.0044	Pass
	- 10	2305.1950	2314.8050	-8.80	-0.0038	Pass
	- 20	2305.1950	2314.8050	10.10	0.0044	Pass
	- 30	2305.1950	2314.8050	11.40	0.0049	Pass
15%	+ 20	2305.1950	2314.8050	9.60	0.0042	Pass
-15%	+ 20	2305.1950	2314.8050	13.20	0.0057	Pass



#### A.3 Transmitter Output Power Test Result

Test Site	SIP-SR1	Test Engineer	Yoniter Yang
Test Date	2024-05-09	Test Band	Band 30

Frequency	Channel	RB	RB	Power Spectral	EIRP Spectral	Limit
(MHz)	Bandwidth	Size	Offset	Density	Density	(dBm
	(MHz)			(dBm/5MHz)	(dBm/5MHz)	/5MHz)
QPSK						
2307.5				22.23	23.21	< 23.98
2310.0	5	1	0	22.23	23.21	< 23.98
2312.5				22.27	23.25	< 23.98
2307.5				22.28	23.26	< 23.98
2310.0	5	1	12	22.24	23.22	< 23.98
2312.5				22.23	23.21	< 23.98
2307.5				22.22	23.20	< 23.98
2310.0	5	1	24	22.18	23.16	< 23.98
2312.5				22.15	23.13	< 23.98
2307.5				21.30	22.28	< 23.98
2310.0	5	25	0	21.31	22.29	< 23.98
2312.5				21.39	22.37	< 23.98
2310.0			0	22.16	23.14	< 23.98
2310.0	10	1	24	22.24	23.22	< 23.98
2310.0	10		49	22.45	23.43	< 23.98
2310.0		50	0	19.09	20.07	< 23.98
Note: The EIRP	Spectral Density	/ (dBm/5MHz	:) = Power Sp	ectral Density (dBr	n/5MHz) + Antenna	a Gain (dBi)



Frequency	Channel	RB	RB	Power Spectral	EIRP Spectral	Limit
(MHz)	Bandwidth	Size	Offset	Density	Density	(dBm
	(MHz)			(dBm/5MHz)	(dBm/5MHz)	/5MHz)
16QAM	-					
2307.5				21.26	22.24	< 23.98
2310.0	5	1	0	21.35	22.33	< 23.98
2312.5				21.38	22.36	< 23.98
2307.5				21.62	22.60	< 23.98
2310.0	5	1	12	21.40	22.38	< 23.98
2312.5				21.75	22.73	< 23.98
2307.5				21.30	22.28	< 23.98
2310.0	5	1	24	21.15	22.13	< 23.98
2312.5				21.56	22.54	< 23.98
2307.5				20.24	21.22	< 23.98
2310.0	5	25	0	20.37	21.35	< 23.98
2312.5				20.39	21.37	< 23.98
2310.0			0	21.56	22.54	< 23.98
2310.0	10	1	24	21.65	22.63	< 23.98
2310.0	10		49	21.52	22.50	< 23.98
2310.0		50	0	17.93	18.91	< 23.98
Note: The EIRP	Spectral Density	/ (dBm/5MHz	) = Power Sp	ectral Density (dBr	n/5MHz) + Antenna	a Gain (dBi)

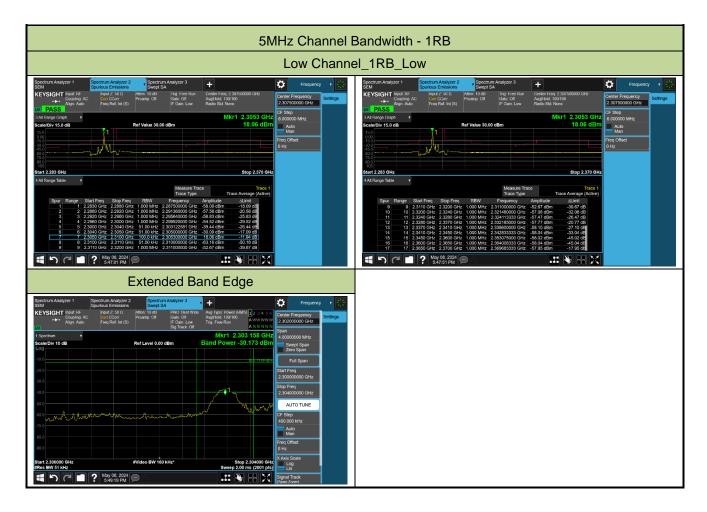


Frequency (MHz)	Channel Bandwidth (MHz)	RB Size	RB Offset	Power Spectral Density (dBm/5MHz)	EIRP Spectral Density (dBm/5MHz)	Limit (dBm /5MHz)
64QAM	. ,			· · · /	· · · · · · · · · · · · · · · · · · ·	,
2307.5				19.63	20.61	< 23.98
2310.0	5	1	0	20.68	21.66	< 23.98
2312.5				20.50	21.48	< 23.98
2307.5				20.43	21.41	< 23.98
2310.0	5	1	12	20.86	21.84	< 23.98
2312.5				20.25	21.23	< 23.98
2307.5				20.34	21.32	< 23.98
2310.0	5	1	24	20.37	21.35	< 23.98
2312.5				20.37	21.35	< 23.98
2307.5				19.22	20.20	< 23.98
2310.0	5	25	0	19.39	20.37	< 23.98
2312.5				19.40	20.38	< 23.98
2310.0			0	19.85	20.83	< 23.98
2310.0	40	1	24	20.35	21.33	< 23.98
2310.0	10		49	20.47	21.45	< 23.98
2310.0		50	0	16.89	17.87	< 23.98
Note: The EIRP	Spectral Density	/ (dBm/5MHz	z) = Power Sp	ectral Density (dBr	n/5MHz) + Antenna	a Gain (dBi)

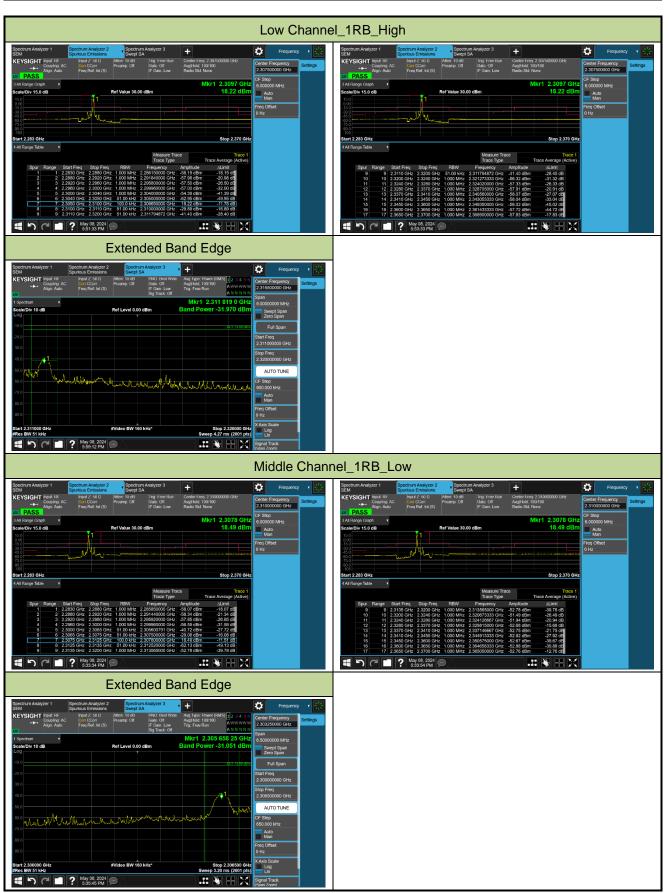


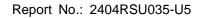
### A.4 Transmitter unwanted emissions (band-edge) Test Result

Test Site	SIP-SR1	Test Engineer	Yoniter Yang
Test Date	2024-05-08	Test Band	Band 30











	nel_1RB_High
Bigetti mikaritari         Bigetti mikaritari         Bigetti mikaritari         Centre Free 2 Microscol (Figure 100)         Centre Free 7 Microscol (	Bit Control Analyzer 1 Bit Ministry 1 Bit Ministr
Extended Band Edge	
Spectrum Analyzer 1 Berlin Country Analyzer 2 Spectrum Analyzer 2 Spectrum Analyzer 3 Spectrum Analyzer 3 Spectrum Analyzer 4 Spectrum	
High Channe	el_1RB_Low
Image: Status Hanger 1       Scheder Hanger 2	Bit         Sportum Analyzer 1 Stati         Sportum Analyzer 3 Provide Units (0)         Provide Units (0
Spectrum Analyzer 1 Spectrum Analyzer 2 Spectrum Analyzer 3	
BLM         Special Emissions         Swept 4.5         Applications         Control of the second	



High Channe	el_1RB_High
Security Analyses 1 Security	Storm Analyzer 1       Sporting Analyzer 3       Sporting Analyzer 3       Provide A
Byechtum Analyzer 1     Spechtum Analyzer 2     Spechtum Analyzer 2     Spechtum Analyzer 3     S	
Lt 1744 Bit C 1940 C	



10MHz Channel	Bandwidth - 1RB
Middle Chanr	nel_1RB_Low
Spectrum Analyzer 1 Statut         Spectrum Analyzer 3 Swept 2A         Spectrum Analyzer 3 Swept 2A         Frequency         Spectrum Analyzer 3 Swept 2A           KEVSIGHT Brezit in Ange And Ange	Spectrum Analyzer 1 SkL         Spectrum Analyzer 2 Supprise Lenson         Spectrum Analyzer 3 wept 2A         Spectrum Analyzer 3 wept 2A
Extended Band Edge	
Bjechtun Analyzer 1 Stell Stell KEVSICHT Nerd Str. Depender Aus Depender Aus Dep	
	nel_1RB_High
Spectrum Analyzer 1 Stern Stern Stern Stern Stern Age Ata de Program Age Ata de Ata de	Bitcher         <







### A.5 Transmitter unwanted emissions (spurious) Test Result

Test Site	SIP-SR1	Test Engineer	Yoniter Yang
Test Date	2024-05-11 ~ 2024-05-13	Test Band	Band 30, 1RB, QPSK

Channel Bandwidth (MHz)	Frequency (MHz)	Frequency Range (MHz)	Max Spurious Emissions (dBm)	Limit (dBm)	Result	
	0007 5	30 ~ 1000	-44.81	≤ -40.00	Pass	
	2307.5	1000 ~ 24000	-41.74	≤ -40.00	Pass	
	0010.0	30 ~ 1000	-45.70	≤ -40.00	Pass	
5	2310.0	1000 ~ 24000	-41.75	≤ -40.00	Pass	
		30 ~ 1000	-45.23	≤ -40.00	Pass	
	2312.5	1000 ~ 24000	-41.73	≤ -40.00	Pass	
40	0010.0	30 ~ 1000	-44.99	≤ -40.00	Pass	
10	10 2310.0		-41.62	≤ -40.00	Pass	
Note: The amplitude of Conducted Spurious 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.



5MHz Channel Bandwidth					
Low Channel 30 ~ 1000MHz	Low Channel 1000 ~ 24000MHz				
Control Markators	Control Analyzer         Control 2:95:00         Product 2:95:00         Control 2:95:000000 GHL         Control 2:95:000000 GHL         Control 2:95:000000 GHL         Control 2:95:00000 GHL         Control 2:95:000000 GHL         Control 2:95:00000 GHL <th< th=""></th<>				
4 Al Range Table     Stop Freq     RBW     Frequency     Amplitude     All initi       1     1     S0.000 MHz     1.000 MHz     1.000 MHz     4.313 dB	I All Range Table         I           Spar         Range         Start Freq.         Stop Freq.         RBW         Frequency:         Arrestructe         Allmit.           1         1         10007 Grid.         2.28190 Grid.         1000 MHz.         2.28190 Grid.         16.39 Grid.           2         2         2.5170 Grid.         24000 Grid.         1000 MHz.         251.77612890 Grid.         -17.87 GRid.           4         Children         P.         May 111, 2024         Physical Start Freq.         -17.87 GRid.         -17.87 GRid.				
Middle Channel 30 ~ 1000MHz	Middle Channel 1000 ~ 24000MHz				
Spechal Endpand       Impact 2 of U       Impact 2 of	Spectra Response for the second secon				
High Channel 30 ~ 1000MHz	High Channel 1000 ~ 24000MHz				
Spectrum Analyzer 1         Image 2.012         Image 2.012 <td>Specifican Analyzer 1 Specifican Analyzer 1 OPC 2010         Implification Processory         Implification Processory         Allow 10 dB         Implification Processory         Settings           VEXVSIGHT Processory         Processory         Processory         Settings           VICE PASS Processory         Processory         Processory         Processory         Processory           VICE PASS Processory         Processory         Processory</td>	Specifican Analyzer 1 Specifican Analyzer 1 OPC 2010         Implification Processory         Implification Processory         Allow 10 dB         Implification Processory         Settings           VEXVSIGHT Processory         Processory         Processory         Settings           VICE PASS Processory         Processory         Processory         Processory         Processory           VICE PASS Processory         Processory				



Middle Channel 30 ~ 1000	ИНz	Middle Channel 1000 ~ 24000	)MHz
And Advanced Total State Free     Stop Free     RBW     Free press     Amplitude     Amplitude       Stop Free     RBW     Free press     Amplitude     Amplitude     Amplitude	Ceffer frequency 2.3100000 ofter GF Step Auto 0 ta Prec Offset 0 ta	Specific manufacture         Image: State         Image: State         Mark 12:30:00         Tops Free Net         Called of the Net 2:30:000000 GHz         Called of the Net 2:30:00000 GHz         Called of the Net 2:30:000000 GHz         Called of the Net 2:30:000000 GHz         Called of the Net 2:30:0000000 GHz         Called of the Net 2:30:0000000000000000000000000000000000	Bm Ann



#### A.6 Radiated Spurious Emissions Test Result

Test Site	SIP-AC1	Test Engineer	Fusco Pan
Test Date	2024-05-06 ~ 2024-05-10	Test Band	Band 30, 1RB, QPSK

Frequency	Reading Level	Factor	Measure Level	Limit	Margin	Detector	Polarization
(MHz)	(dBµV)	(dB/m)	(dBµV/m)	(dBµV/m)	(dB)		
Low Channel							
465.0	3.9	22.3	26.2	55.3	-29.1	Quasi-Peak	Horizontal
891.8	-1.0	29.4	28.4	55.3	-26.9	Quasi-Peak	Horizontal
54.3	15.4	17.9	33.3	55.3	-22.0	Quasi-Peak	Vertical
462.6	3.4	22.4	25.8	55.3	-29.5	Quasi-Peak	Vertical
4451.0	38.7	3.7	42.4	55.3	-12.9	Peak	Horizontal
10936.5	35.7	13.1	48.8	55.3	-6.5	Peak	Horizontal
3813.5	39.8	2.6	42.4	55.3	-12.9	Peak	Vertical
9729.5	36.9	10.5	47.4	55.3	-7.9	Peak	Vertical
Middle Channel							
37.8	18.2	17.1	35.3	55.3	-20.0	Quasi-Peak	Horizontal
464.1	4.1	22.3	26.4	55.3	-28.9	Quasi-Peak	Horizontal
44.6	16.4	18.0	34.4	55.3	-20.9	Quasi-Peak	Vertical
463.6	4.3	22.4	26.7	55.3	-28.6	Quasi-Peak	Vertical
4111.0	39.4	3.3	42.7	55.3	-12.6	Peak	Horizontal
8845.5	36.9	9.9	46.8	55.3	-8.5	Peak	Horizontal
5335.0	36.8	5.9	42.7	55.3	-12.6	Peak	Vertical
11523.0	34.7	13.6	48.3	55.3	-7.0	Peak	Vertical
High Channel							
232.7	16.2	15.4	31.6	55.3	-23.7	Quasi-Peak	Horizontal
469.4	4.4	22.3	26.7	55.3	-28.6	Quasi-Peak	Horizontal
42.1	8.6	17.8	26.4	55.3	-28.9	Quasi-Peak	Vertical
935.5	-1.6	29.7	28.1	55.3	-27.2	Quasi-Peak	Vertical
4706.0	38.2	4.3	42.5	55.3	-12.8	Peak	Horizontal
8786.0	36.9	9.9	46.8	55.3	-8.5	Peak	Horizontal
6491.0	35.4	7.4	42.8	55.3	-12.5	Peak	Vertical
10715.5	34.8	12.9	47.7	55.3	-7.6	Peak	Vertical

Note1: Measure Level (dBµV/m) = Reading Level (dBµV) + Factor (dB/m)

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

Note2: The peak-detection value will always be equal to or greater than average-detection value. In a result, the peak-detection value measured by spectrum analyzer shall represent the worst-case results.



Note 3: The amplitude of Radiated transmitter spurious emissions (Frequency range from 9kHz to 30MHz and above 18GHz) 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 "2404RSU035-UT" file.



# Appendix C - EUT Photograph

Refer to "2404RSU035-UE" file.

The End