RF TEST REPORT

Report No.: 20250117G00948X-W7

Product Name: SOLIS Hero

Model No. : SolHero24

FCC ID: 2A9UP-25HERO

IC: 31476-25HERO

Applicant: SIMO Holdings Inc.

Address: P.O.Box 309, Ugland House, GrandCayman, KY1-1104, Cayman Islands

Dates of Testing: 01/14/2025 - 03/07/2025

Issued by: CCIC Southern Testing Co., Ltd.

Lab Location: Electronic Testing Building, No.43, Shahe Road, Xili Street, Nanshan District, Shenzhen, Guangdong, China.

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Test Report

Product.....:	SOLIS Hero
Trade Name .....:	SIMO
Applicant.....:	SIMO Holdings Inc.
Applicant Address.....:	PO.Box 309, Ugland House, GrandCayman, KY1-1104, Cayman Islands
Manufacturer.....:	SIMO Holdings Inc.
Manufacturer Address.....:	PO.Box 309, Ugland House, GrandCayman, KY1-1104, Cayman Islands
Test Standards.....:	47 CFR Part 2/22/24/27 RSS-Gen, Issue 5: Feb 2021 RSS-132, Issue 4: Jan 2023 RSS-133, Issue 7: Jul 2024 RSS-139-Issue 4: Sep 2022
Test Result.....:	Pass
Tested by .....:	Chuiwang Zhang 2025.03.07 Chuiwang Zhang, Test Engineer
Reviewed by.....:	Sun Jiaohui 2025.03.07 Sun Jiaohui, Senior Engineer
Approved by.....:	Chris You 2025.03.07 Chris You, Manager

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Change History		
Issue	Date	Reason for change
1.0	2025.03.07	First edition

1. GENERAL INFORMATION

1.1. EUT Description

Product Name	SOLIS Hero	
Hardware Version	Y6601-V1.2	
Software Version	2.104.5.91(0312)	
EUT supports Radios application	WCDMA/HSPA	
Frequency Range	WCDMA 850:	Tx: 826.4 - 846.6MHz (at intervals of 200kHz) Rx: 871.4 - 891.6MHz (at intervals of 200kHz)
	WCDMA 1700:	Tx: 1712.4 - 1752.6MHz (at intervals of 200kHz) Rx: 2112.4 - 2152.6MHz (at intervals of 200kHz)
	WCDMA 1900:	Tx: 1852.4 - 1907.6MHz (at intervals of 200kHz) Rx: 1932.4 - 1987.6MHz (at intervals of 200kHz)
Maximum Output Power to Antenna	WCDMA 850: 23.84dBm WCDMA 1700: 21.48dBm WCDMA 1900: 18.29dBm	
Type of Modulation	WCDMA: QPSK(Uplink) HSDPA: QPSK(Uplink) HSUPA: QPSK(Uplink)	
Antenna Type	Internal Antenna	
Antenna gain	WCDMA 850: -0.94dBi WCDMA 1700: 0.71dBi WCDMA 1900: 1.09dBi	
Power supply	Rechargeable Li-ion Battery DC3.8V/5250mAh	

Note 1: The information of antenna gain and cable loss is provided by the manufacturer and our lab is not responsible for the accuracy of the antenna gain and cable loss information.

1.2. Maximum ERP/EIRP, Frequency Tolerance and Emission Designator

LTE Bands	Type of Modulation	Emission Designator	Frequency Tolerance (ppm)	Maximum ERP(W)
WCDMA 850	QPSK	4M18F9W	-0.013459	0.121

LTE Bands	Type of Modulation	Emission Designator	Frequency Tolerance (ppm)	Maximum EIRP(W)
WCDMA 1900	QPSK	4M17F9W	-0.007218	0.090
WCDMA 1700	QPSK	4M19F9W	-0.009067	0.169

1.3. Test Standards and Results

The purpose of the report is to conduct testing according to the following FCC/IC certification standards:

No.	Identity	Document Title
1	47 CFR Part 2	Frequency Allocations and Radio Treaty Matters; General Rules and Regulations
2	47 CFR Part 22	Public Mobile Services
3	47 CFR Part 24	Personal Communications Services
4	47 CFR Part 27	Miscellaneous Wireless Communications Services
5	RSS-Gen-Issue 5: Feb 2021	General Requirements for Compliance of Radio Apparatus
6	RSS-132-Issue 4: Jan 2023	Cellular Telephone Systems Operating in the Bands 824-849 MHz and 869-894 MHz
7	RSS-133-Issue 7: Jul 2024	2 GHz Personal Communications Services
8	RSS-139-Issue 4: Sep 2022	Advanced Wireless Services Equipment Operating in the Bands 1710-1780 MHz and 2110-2200 MHz
9	KDB 971168 D01 Power Meas License Digital Systems v03r01	Measurement Guidance For Certification of Licensed Digital Transmitters
12	KDB 412172 D01 Determining ERP and EIRP v01r01	Guidelines for Determining the Effective Radiated Power (ERP) and Equivalent Isotropic Radiated Power (EIRP) of an RF Transmitting Systems
13	ANSI/TIA-603-E-2016	Land Mobile FM or PM Communications Equipment Measurement and Performance Standards
14	ANSI C63.26-2015	American National Standard for Compliance Testing of Transmitters Used in Licensed Radio Services

Test detailed items/section required by FCC/IC rules and results are as below:

No.	FCC Rule	IC Rule	Description	Limit	Result
1	2.1046	RSS-GEN, 6.12	Conducted Output Power	Reporting Only	PASS
2	22.913(a)(5)	RSS-132,5.4	Effective Radiated Power (GSM850/W850)	ERP < 7Watts	PASS
	24.232 (c)	RSS-133,6.4	Equivalent Isotropic Radiated Power	EIRP < 2Watts	PASS
	27.50(d)(4)	RSS-139,6.5	Equivalent Isotropic Radiated Power	EIRP < 1Watts	PASS
3	22.913(d) 24.232(d) 27.50(d)(5)	RSS-132,5.4 RSS-133,6.4 RSS-139,6.5	Peak to Average Radio	< 13dBm	PASS
4	2.1049	RSS-GEN,6.7	Occupied Bandwidth	Reporting Only	PASS
5	2.1055 22.355 24.235 27.54	RSS-GEN, 6.11 RSS-132, 5.3 RSS-133, 6.3 RSS-139, 6.4	Frequency Stability (FCC GSM850/W850, IC PCS1900/W1900)	< ±2.5ppm	PASS
			Frequency Stability (FCC PCS1900/W1900, IC GSM850/W850, W1700)	Within the Authorized Band	PASS
6	2.1051 22.917 24.238 27.53	RSS-GEN,6.13 RSS-132,5.5 RSS-133,6.5 RSS-139,6.6	Conducted Spurious Emission and Conducted Band Edge	< $43+10\log_{10}$ (P[Watts])	PASS
7	2.1053 22.917 24.238 27.53	RSS-GEN,6.13 RSS-132,5.5 RSS-133,6.5 RSS-139,6.6	Radiated Spurious Emissions	< $43+10\log_{10}$ (P[Watts])	PASS

Remark:

1. All test items were verified and recorded according to the standards and without any deviation during the test.

2. This EUT has also been tested and complied with the requirements of FCC Part 15, Subpart B and ICES-003 Issue 7 October 2020, recorded in a separate test report.

1.4. Test Configuration of Equipment Under Test

Antenna port conducted and radiated test items listed below are performed according to KDB 971168 D01 Power Meas License Digital Systems v03r01 with maximum output power.

Radiated measurements are performed by rotating the EUT in three different orthogonal test planes to find the maximum emission.

Radiated emissions were investigated as following frequency range:

1. 30 MHz to 9000 MHz for WCDMA Band V.
2. 30 MHz to 20000 MHz for WCDMA Band II.
3. 30 MHz to 18000 MHz for WCDMA Band IV.

All modes and data rates and positions were investigated.
Test modes are chosen to be reported as the worst case configuration below:

Test Modes		
Band	Radiated TCs	Conducted TCs
WCDMA Band V	RMC 12.2kbps Link	RMC 12.2kbps Link
WCDMA Band II	RMC 12.2kbps Link	RMC 12.2kbps Link
WCDMA Band IV	RMC 12.2kbps Link	RMC 12.2kbps Link

Note: The maximum power levels are chosen to test as the worst case configuration as follows:

RMC 12.2kbps mode for WCDMA band V,

RMC 12.2kbps mode for WCDMA band II,

RMC 12.2kbps mode for WCDMA band IV, only these modes were used for all tests.

1.5. Test Environment Conditions

During the measurement, the environmental conditions were within the listed ranges:

Temperature (°C):	15℃- 35℃
Relative Humidity (%):	30% -60%
Atmospheric Pressure (kPa):	86kPa-106kPa

1.6. Laboratory Facilities and Accreditation Certificate

☒ **CCIC-SET Lab 1**

Address: Electronic Testing Building, No.43, Shahe Road, Xili Street, Nanshan District, Shenzhen, Guangdong, China

FCC-Registration No.: CN1283

CCIC Southern Testing Co., Ltd EMC Laboratory has been registered and fully described in a report filed with the FCC (Federal Communications Commission). The acceptance letter from the FCC is maintained in our files. Designation Number: CN1283, valid time is until Jun. 30th, 2025.

ISED Registration: 11185A, CAB number: CN0064

CCIC Southern Testing Co., Ltd. EMC Laboratory has been registered by Certification and Engineering Bureau of Industry Canada for the performance of radiated measurements with Registration No. 11185A on Aug. 04, 2016, valid time is until Jun. 30th, 2025.

A2LA Code: 5721.01

CCIC-SET is a third party testing organization accredited by A2LA according to ISO/IEC 17025. The accreditation certificate number is 5721.01.

CNAS L1659

CCIC Southern Testing Co., Ltd. CCIC is a third party testing organization accredited by China National Accreditation Service for Conformity Assessment (CNAS) according to ISO/IEC 17025. The accreditation certificate number is L1659.

☐ **CCIC-SET Lab 4**

Address: No.125, Hongmei Section, Wangsha Road, Hongmei Town, Dongguan City, Guangdong Province, China

CNAS L1659

CCIC Southern Testing Co., Ltd. CCIC is a third party testing organization accredited by China National Accreditation Service for Conformity Assessment (CNAS) according to ISO/IEC 17025. The accreditation certificate number is L1659.

2. 47 CFR Part 2 Requirements

2.1. Conducted Output Power and ERP/EIRP

2.1.1. Requirement

According to FCC section 2.1046(a), for transmitters other than single sideband, independent sideband and controlled carrier radiotelephone, power output shall be measured at the RF output terminals when the transmitter is adjusted in accordance with the tune-up procedure to give the values of current and voltage on the circuit elements specified in FCC section 2.1033(c)(8).

The EIRP of mobile transmitters must not exceed 2 Watts for W1900.

The EIRP of mobile transmitters must not exceed 1 Watts for W1700.

The ERP of mobile transmitters must not exceed 7 Watts for W850.

According to KDB 412172 D01 Determining ERP and EIRP v01r01.

EIRP = $P_T + {}_{GT} - L_C$, ERP = EIRP - 2.15, where

P_T = transmitter output power in dBm;

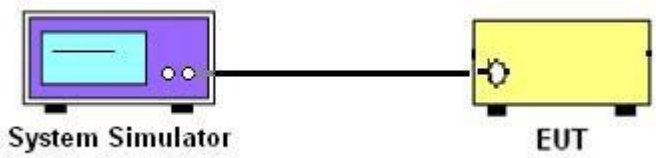
G_T = gain of the transmitting antenna in dBi;

L_C = signal attenuation in the connecting cable between the transmitter and antenna in dB.

2.1.2. Measuring Instruments

The measuring equipment is listed in the section 3 of this test report.

2.1.3. Test Setup



2.1.4. Test Procedures

1. The transmitter output port was connected to the system simulator.

2. Set EUT at maximum power through system simulator.

3. Select lowest, middle, and highest channels for each band and different modulation.

4. Measure and record the power level from the system simulator.

2.1.5. Test Results of Conducted Output Power and ERP/EIRP

WCDMA 850							
EUT Mode		Average power (dBm)			Ant. Gain (dBi)	Max. ERP (dBm)	ERP Limit (dBm)
		4132	4183	4233			
		826.4MHz	836.6MHz	846.6MHz			
RMC	12.2 kbps	23.65	23.84	23.75	-0.97	20.82	38.45
HSDPA	Subtest 1	22.69	22.86	22.76			
	Subtest 2	22.13	22.28	22.23			
	Subtest 3	22.17	22.34	22.24			
	Subtest 4	22.08	22.29	22.20			
HSUPA	Subtest 1	20.66	20.84	20.70			
	Subtest 2	20.67	20.80	20.72			
	Subtest 3	21.62	21.78	21.72			
	Subtest 4	20.15	20.33	20.24			
	Subtest 5	21.62	21.83	21.75			

WCDMA 1700							
EUT Mode		Average power (dBm)			Ant. Gain (dBi)	Max. EIRP (dBm)	EIRP Limit (dBm)
		1312	1413	1513			
		1712.4MHz	1732.6MHz	1752.6MHz			
RMC	12.2 kbps	21.48	21.43	21.35	0.71	22.19	30.00
HSDPA	Subtest 1	20.58	20.48	20.51			
	Subtest 2	20.01	19.96	19.84			
	Subtest 3	20.01	20.01	19.82			
	Subtest 4	20.14	20.01	19.80			
HSUPA	Subtest 1	18.53	18.48	18.51			
	Subtest 2	18.66	18.49	18.53			
	Subtest 3	19.57	19.50	19.47			
	Subtest 4	18.09	18.09	18.01			
	Subtest 5	19.60	19.48	19.43			

WCDMA 1900							
EUT Mode		Average power (dBm)			Ant. Gain (dBi)	Max. EIRP (dBm)	EIRP Limit (dBm)
		9262	9400	9538			
		1852.4MHz	1880.0MHz	1907.6MHz			
RMC	12.2 kbps	18.29	18.22	18.24	1.09	19.38	33
HSDPA	Subtest 1	17.25	17.38	17.15			
	Subtest 2	16.73	16.69	16.59			
	Subtest 3	16.35	16.77	16.76			
	Subtest 4	16.75	16.76	16.72			
HSUPA	Subtest 1	15.24	15.30	15.21			
	Subtest 2	15.28	15.31	15.25			
	Subtest 3	16.27	16.29	16.37			
	Subtest 4	14.92	15.00	14.80			
	Subtest 5	16.40	16.34	16.35			

2.2. Peak-to-average power ratio (PAPR)

2.2.1. Requirement

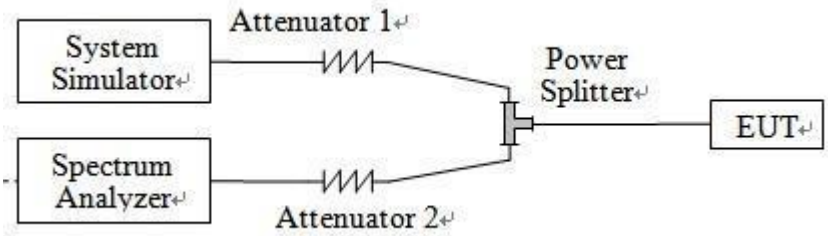
Power Complementary Cumulative Distribution Function (CCDF) curves provide a means for characterizing the power peaks of a digitally modulated signal on a statistical basis. A CCDF curve depicts the probability of the peak signal amplitude exceeding the average power level. Most contemporary measurement instrumentation include the capability to produce CCDF curves for an input signal provided that the instrument's resolution bandwidth can be set wide enough to accommodate the entire input signal bandwidth.

In measuring transmissions in this band using an average power technique, the Peak-to-average power ratio (PAPR) of the transmission may not exceed 13 dB.

2.2.2. Measuring Instruments

The measuring equipment is listed in the section 3 of this test report.

2.2.3. Test Description



2.2.4. Test Procedures

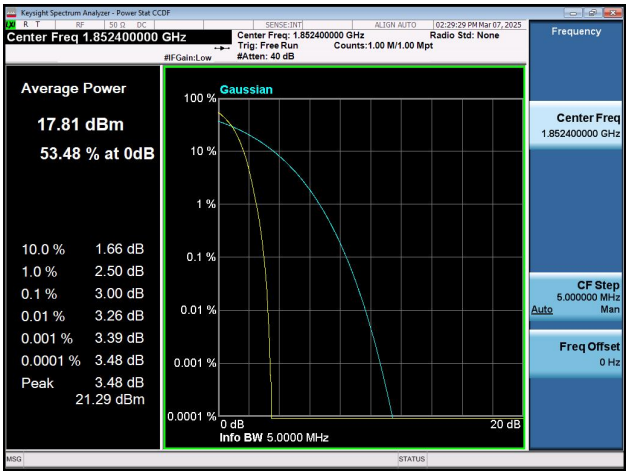
1. The testing follows the of KDB 971168 D01 v03r01 Section 5.7.2 and ANSI C63.26-2015 Section 5.2.3.4.
2. The EUT was connected to spectrum analyzer and system simulator via a power divider, Path loss compensation is then performed on the spectrum analyzer and the system simulator respectively.
3. Set the CCDF (Complementary Cumulative Distribution Function) option in spectrum analyzer.
4. Set resolution/measurement bandwidth ≥ OBW or specified reference bandwidth.
5. Set the number of counts to a value that stabilizes the measured CCDF curve.
6. Set the EUT working in highest power level, measured and recorded the 0.1% as PAPR level.
7. Repeat step 3~6 at other frequency and modulations.

2.2.5. Test Results of Peak-to-average power ratio (PAPR)

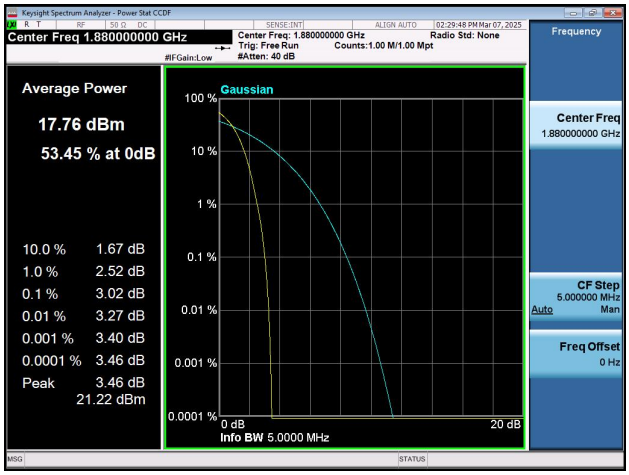
Band	Channel	Peak-to-Average Ratio(dB)	Limit(dB)	Verdict
Band2	9262	3.0	13	PASS
Band2	9400	3.02	13	PASS
Band2	9538	3.05	13	PASS
Band4	1312	2.85	13	PASS
Band4	1413	2.9	13	PASS
Band4	1513	2.9	13	PASS
Band5	4132	2.64	13	PASS
Band5	4183	2.94	13	PASS
Band5	4233	2.81	13	PASS

Test Graphs

Band2-9262-PASS

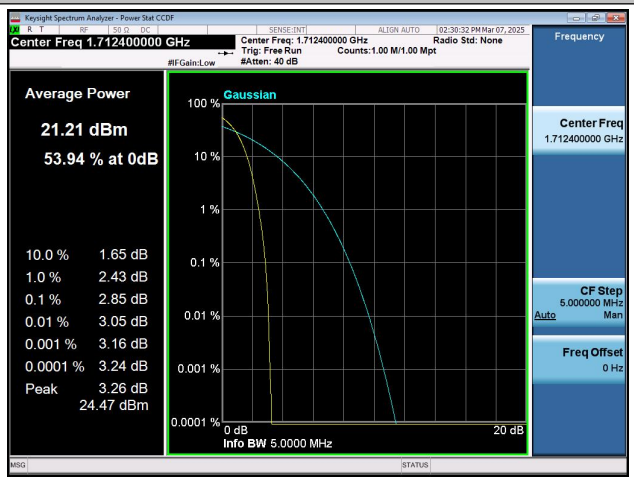


Band2-9400-PASS

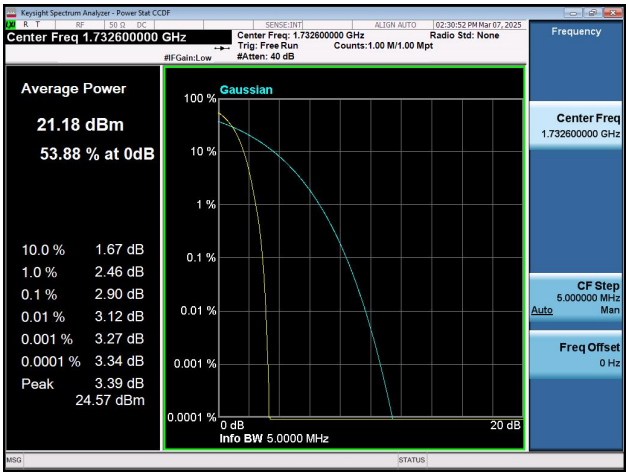


Band2-9538-PASS

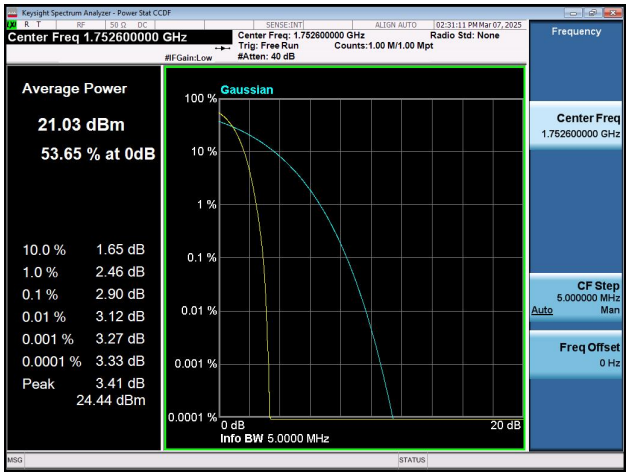
Band4-1312-PASS

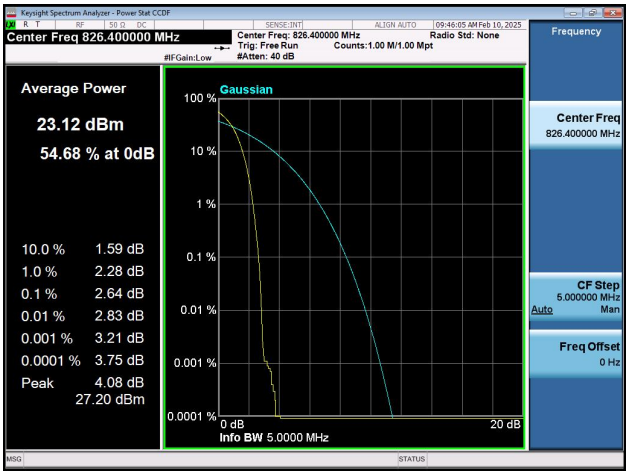
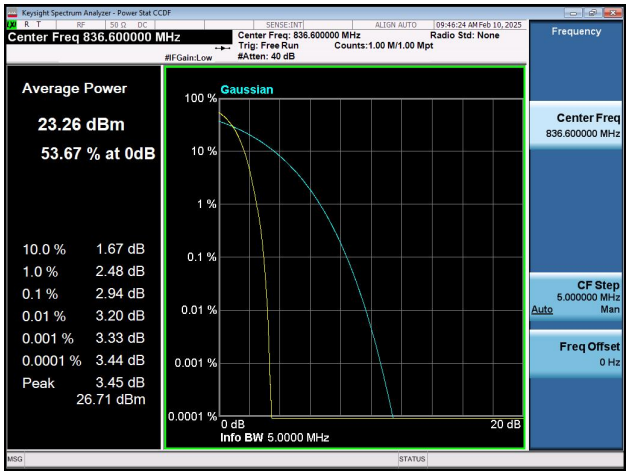


Band4-1413-PASS



Band4-1513-PASS



Band5-4132-PASS	Band5-4183-PASS
	
Band5-4233-PASS	

2.3. 99% Occupied Bandwidth and 26dB Emission Bandwidth

2.3.1. Requirement

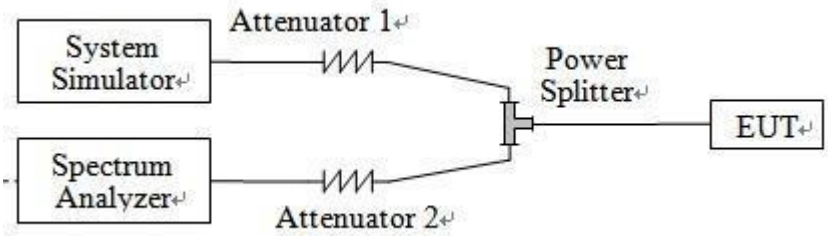
The Occupied Bandwidth is the frequency bandwidth such that, below its lower and above its upper frequency limits, the mean powers are each equal to 0.5% of the total mean power of the given emission.

The 26 dB emission bandwidth is defined as the frequency range between two points, one above and one below the carrier frequency, at which the spectral density of the emission is attenuated 26 dB below the maximum in-band spectral density of the modulated signal Spectral density (power per unit bandwidth) is to be measured with a detector of resolution bandwidth equal to approximately 1.0% of the emission bandwidth.

2.3.2. Measuring Instruments

The measuring equipment is listed in the section 3 of this test report.

2.3.3. Test Setup



2.3.4. Test Procedures

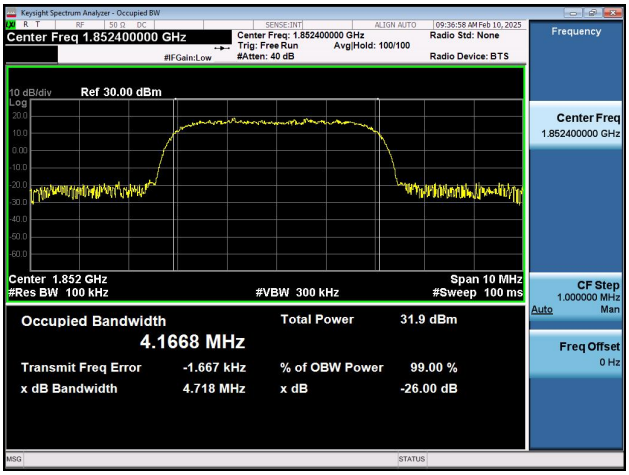
1. The testing follows the of KDB 971168 D01 v03r01 Section 4 and ANSI C63.26-2015 Section 5.4.
2. The EUT was connected to spectrum analyzer and system simulator via a power divider, Path loss compensation is then performed on the spectrum analyzer and the system simulator respectively.
3. The spectrum analyzer center frequency is set to the nominal EUT channel center frequency.
4. Set span to be approximately 1.5 to 5 times the OBW.
5. The nominal RBW shall be in the range of 1% to 5% of the anticipated OBW.
6. Set VBW ≥ 3 × RBW.
7. Set Detection mode = peak.
8. Set Trace mode = max hold.
9. Allow trace to stabilize.
10. Repeat step 3~9 at other frequency and modulations.

2.3.5. Test Result of 99% Occupied Bandwidth and 26dB Emission Bandwidth

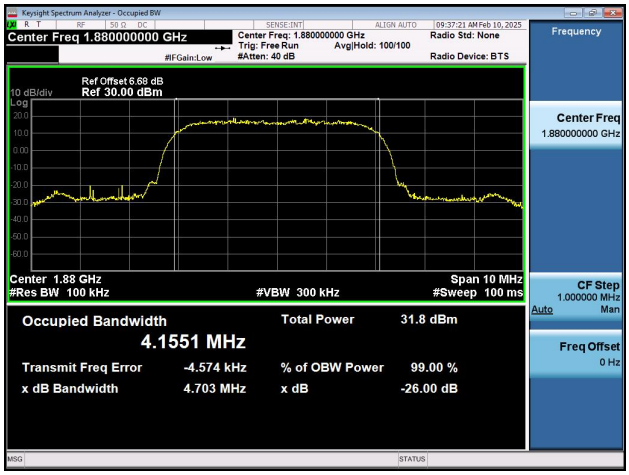
Band	Channel	26dB EBW(MHz)	99% OBW(MHz)	Limit(MHz)	Verdict
Band2	9262	4.718	4.1668	---	PASS
Band2	9400	4.703	4.1551	---	PASS
Band2	9538	4.695	4.1565	---	PASS
Band4	1312	4.762	4.1910	---	PASS
Band4	1413	4.739	4.1754	---	PASS
Band4	1513	4.729	4.1811	---	PASS
Band5	4132	4.734	4.1747	---	PASS
Band5	4183	4.704	4.1666	---	PASS
Band5	4233	4.717	4.1775	---	PASS

Test Graphs

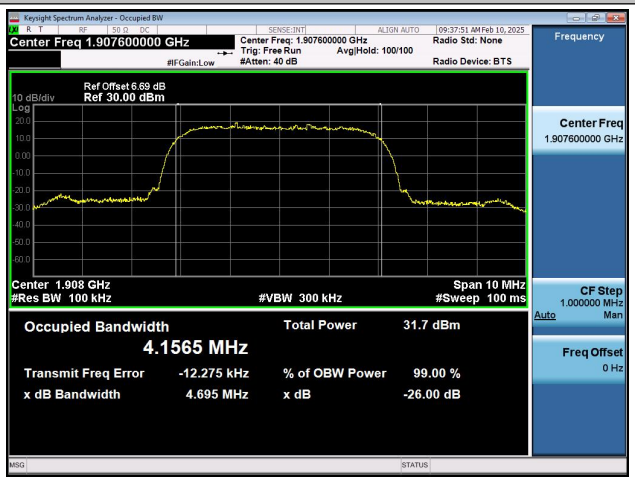
Band2-9262-PASS



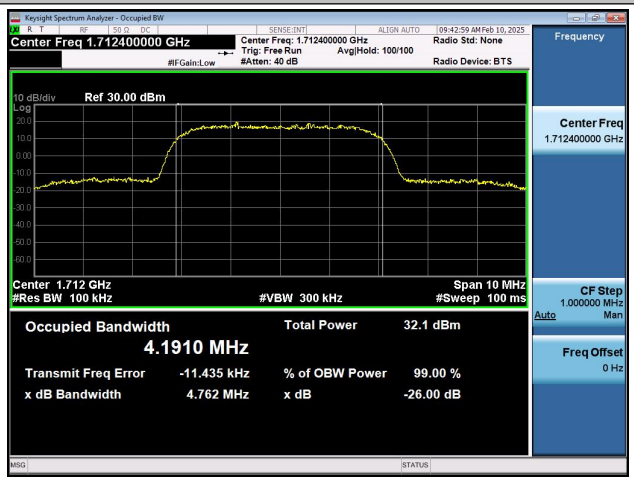
Band2-9400-PASS



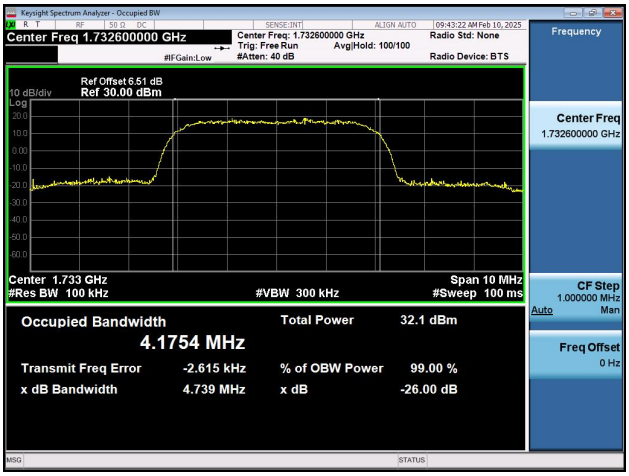
Band2-9538-PASS



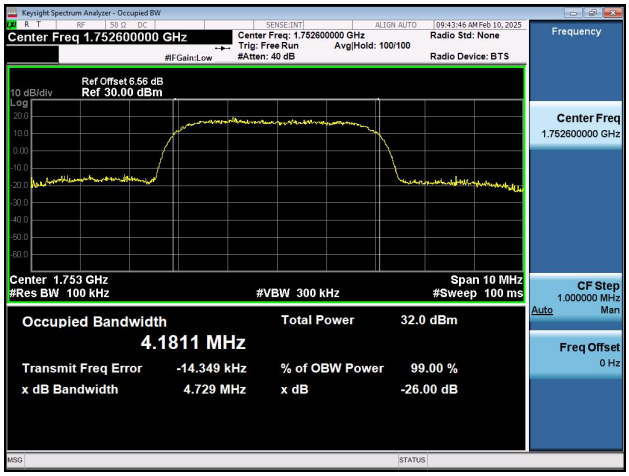
Band4-1312-PASS

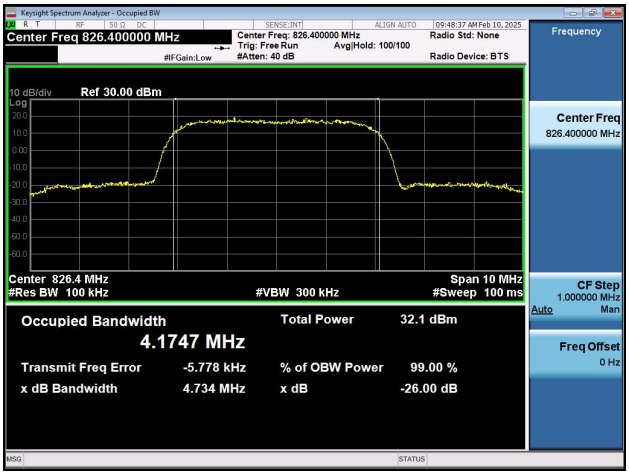
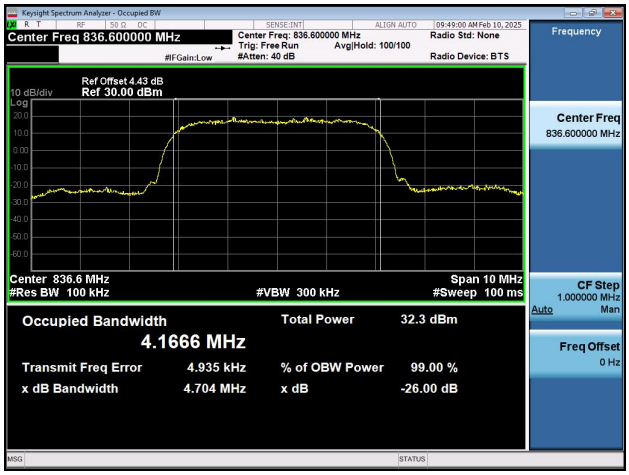
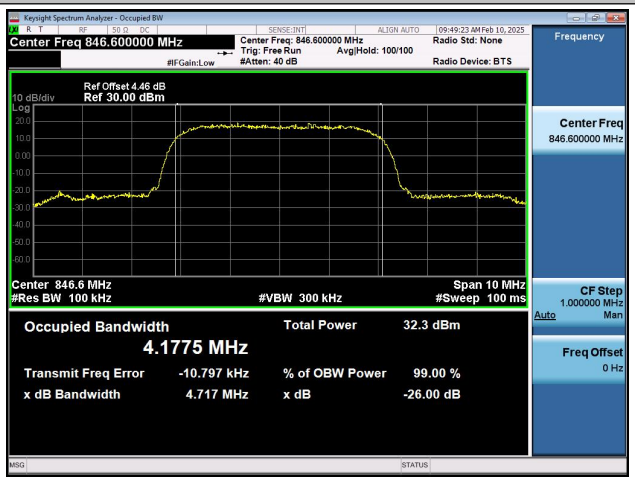


Band4-1413-PASS



Band4-1513-PASS



Band5-4132-PASS	Band5-4183-PASS
	
Band5-4233-PASS	
	

2.4. Conducted Band Edge

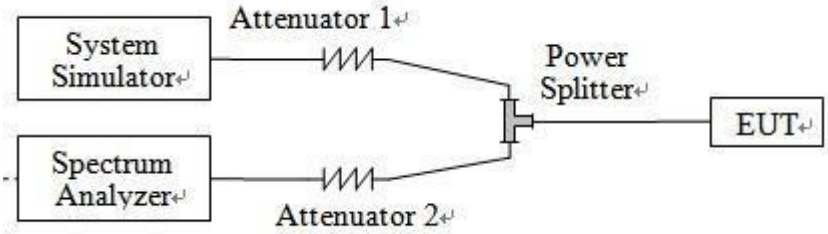
2.4.1. Requirement

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 43 + 10 log (P) dB.

2.4.2. Measuring Instruments

The measuring equipment is listed in the section 3 of this test report.

2.4.3. Test Setup



2.4.4. Test Procedures

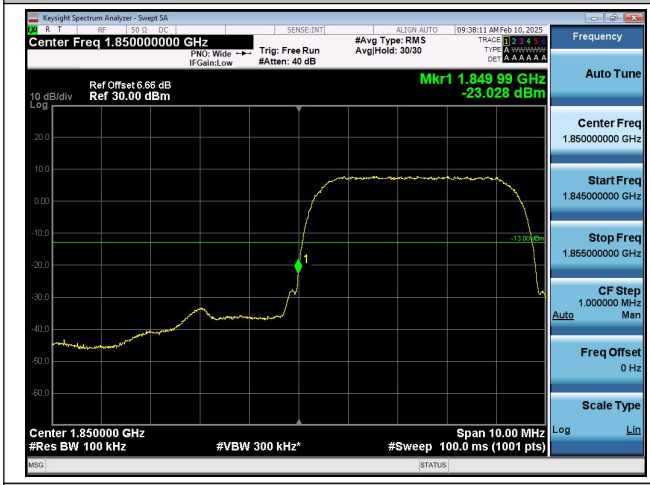
1. The testing follows the of KDB 971168 D01 v03r01 Section 6 and ANSI C63.26-2015 Section 5.7.
2. The EUT was connected to spectrum analyzer and system simulator via a power divider, Path loss compensation is then performed on the spectrum analyzer and the system simulator respectively.
3. Span was set large enough so as to capture all out of band emissions near the Channel Edge.
4. Use RBW ≥ 1% EBW in the 1 megahertz bands immediately outside and adjacent to the licensee's authorized frequency channel, and use RBW = 1 MHz outside 1 MHz of the authorized frequency channel.
5. Set VBW ≥ 3 × RBW
6. Set Detector = power averaging (rms).
7. Set the number of points in sweep ≥ 2 × span / RBW.
8. Set sweep trigger to “free run.”
9. Set the Sweep time > (number of points in sweep) × (transmitter period) (i.e., the transmit on-time + the off-time).
10. Perform a trace average of at least 100 traces.
11. Repeat step 3~10 at other frequency and modulations.

2.4.5. Test Result of Conducted Band Edge

Band	Channel	Frequency (MHz)	Result (dBm)	Limit(dBm)	Verdict
Band2	9262	1849.99	-23.03	-13	PASS
Band2	9538	1910.01	-23.47	-13	PASS
Band4	1312	1709.99	-17.55	-13	PASS
Band4	1513	1755.01	-19.96	-13	PASS
Band5	4132	823.99	-20.69	-13	PASS
Band5	4233	849.01	-22.55	-13	PASS

Test Graphs

Band2-9262-PASS



Band2-9538-PASS

Band4-1312-PASS

Band4-1513-PASS

Band5-4132-PASS

Band5-4233-PASS

2.5. Conducted Spurious Emission

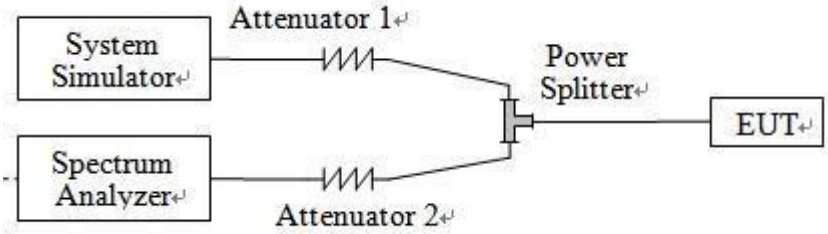
2.5.1. Requirement

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 43 + 10 log (P) dB.

2.5.2. Measuring Instruments

The measuring equipment is listed in the section 3 of this test report.

2.5.3. Test Setup



2.5.4. Test Procedures

1. The testing follows the of KDB 971168 D01 v03r01 Section 6 and ANSI C63.26-2015 Section 5.7.
2. The EUT was connected to spectrum analyzer and system simulator via a power divider, Path loss compensation is then performed on the spectrum analyzer and the system simulator respectively.
3. Set the spectrum analyzer start frequency to 9kHz and stop frequency to the tenth harmonic of the highest fundamental frequency.
4. Set RBW = 1MHz, VBW ≥ 3 × RBW
5. Set Detector = peak.
6. Set Trace mode = max hold.
7. Set Sweep time = auto-couple.
8. Identify and measure the highest spurious emission levels in each frequency range.
9. Compare the results with the corresponding limit in the applicable regulation.
10. Repeat step 3~9 at other frequency and modulations.

Note: For 9 kHz to 30MHz: the amplitude of spurious emissions is attenuated by more than 20dB below the permissible value, so we not provide the test result here.

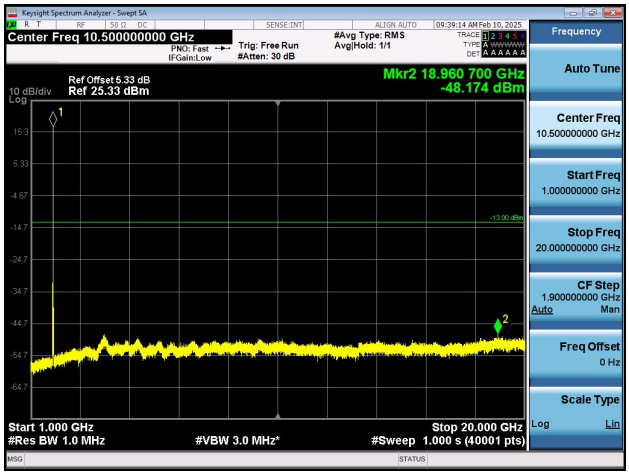
2.5.5. Test Result of Conducted Spurious Emission

Band	Channel	Frequency Range(MHz)	Frequency (dBm)	Result (dBm)	Limit(dBm)	Verdict
Band2	9262	30~1000MHz	889.42	-60.74	-13	PASS
Band2	9262	1000~20000MHz	18960.7	-48.17	-13	PASS
Band2	9400	30~1000MHz	873.42	-60.79	-13	PASS
Band2	9400	1000~20000MHz	3793	-48.55	-13	PASS
Band2	9538	30~1000MHz	905.43	-60.81	-13	PASS
Band2	9538	1000~20000MHz	3856.65	-48.68	-13	PASS
Band4	1312	30~1000MHz	893.79	-60.81	-13	PASS
Band4	1312	1000~20000MHz	18890.88	-48.4	-13	PASS
Band4	1413	30~1000MHz	868.57	-60.8	-13	PASS
Band4	1413	1000~20000MHz	5108.28	-48.59	-13	PASS
Band4	1513	30~1000MHz	882.63	-60.88	-13	PASS
Band4	1513	1000~20000MHz	19859.4	-48.58	-13	PASS
Band5	4132	30~1000MHz	932.1	-70.02	-13	PASS
Band5	4132	1000~10000MHz	1650.7	-48.39	-13	PASS
Band5	4183	30~1000MHz	969.45	-69.91	-13	PASS
Band5	4183	1000~10000MHz	1674.55	-48.57	-13	PASS
Band5	4233	30~1000MHz	970.9	-70.46	-13	PASS
Band5	4233	1000~10000MHz	1691.65	-48.86	-13	PASS

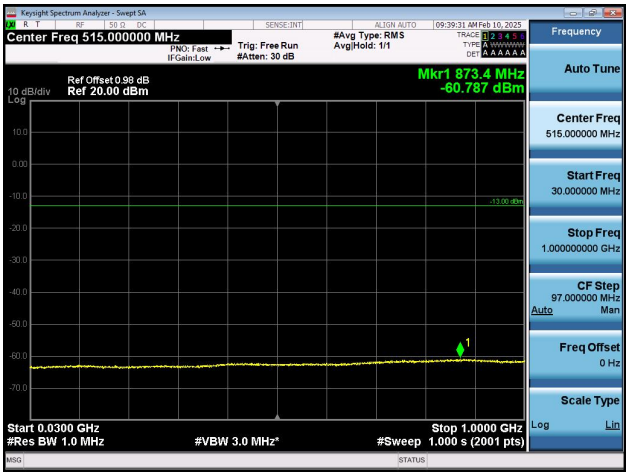
Test Graphs

Band2-9262-30~1000MHz-PASS

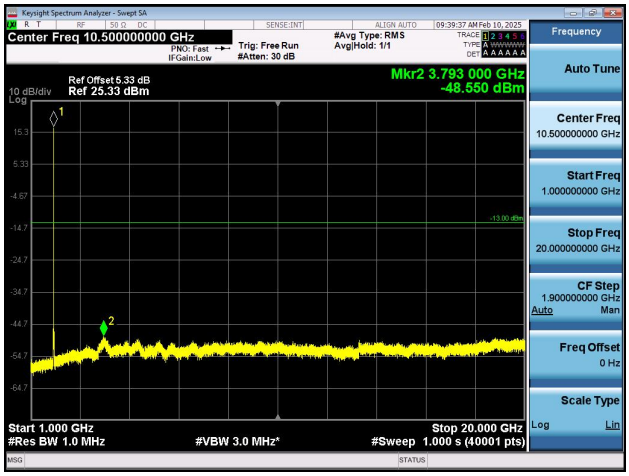
Band2-9262-1000~20000MHz-PASS



Band2-9400-30~1000MHz-PASS

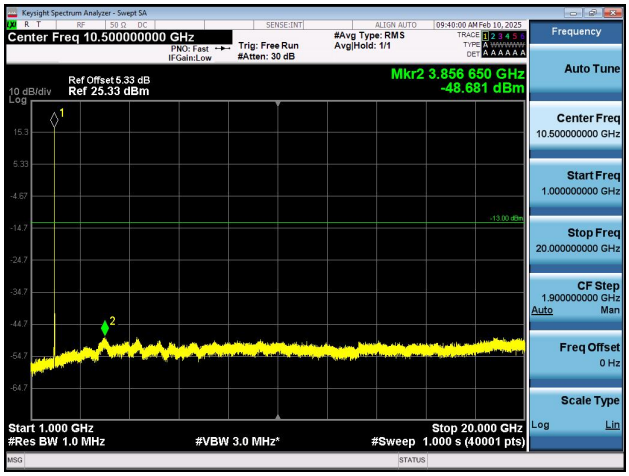


Band2-9400-1000~20000MHz-PASS



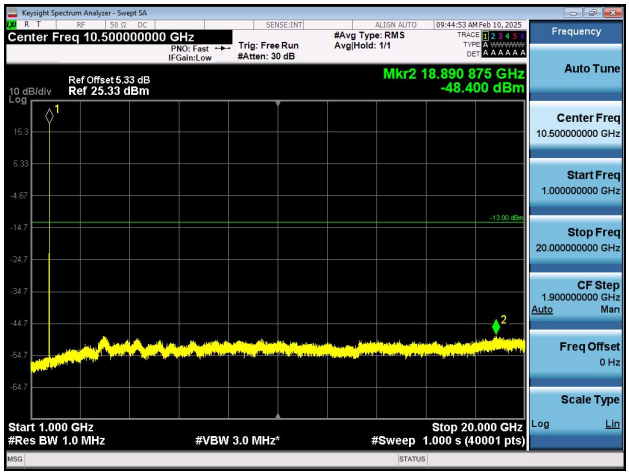
Band2-9538-30~1000MHz-PASS

Band2-9538-1000~20000MHz-PASS

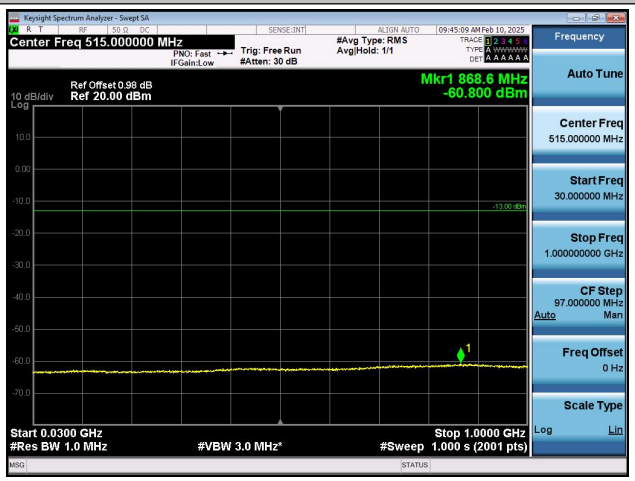


Band4-1312-30~1000MHz-PASS

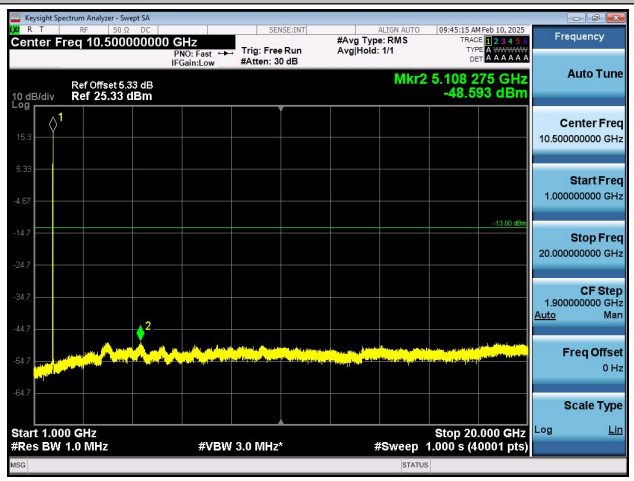
Band4-1312-1000~20000MHz-PASS



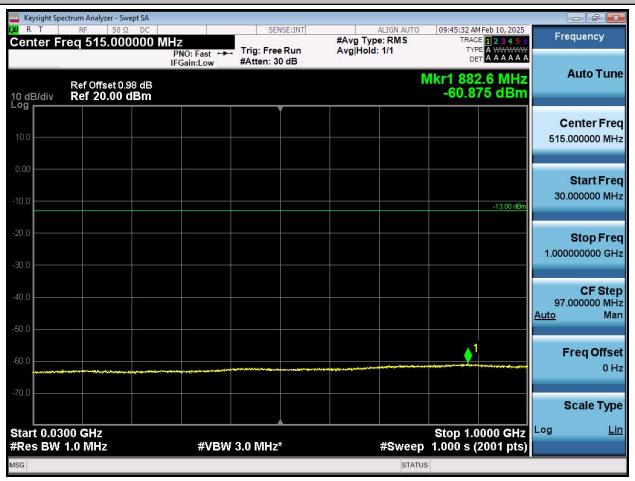
Band4-1413-30~1000MHz-PASS



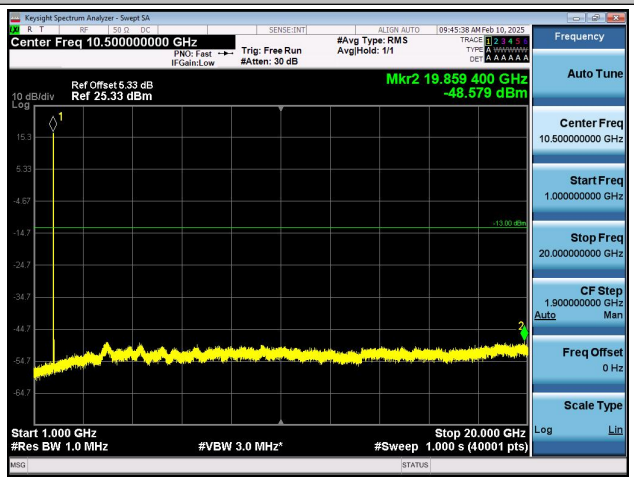
Band4-1413-1000~20000MHz-PASS



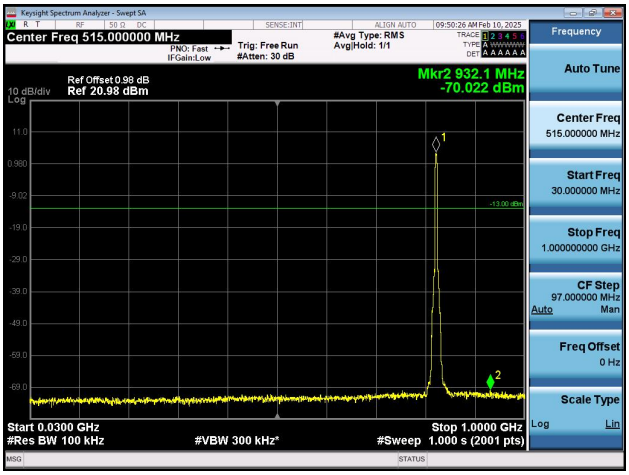
Band4-1513-30~1000MHz-PASS



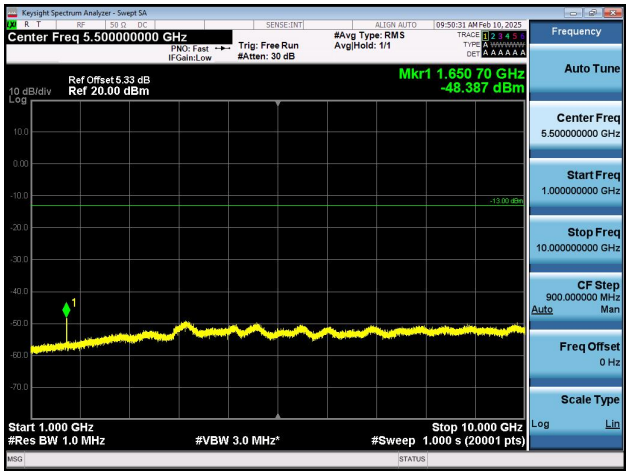
Band4-1513-1000~20000MHz-PASS



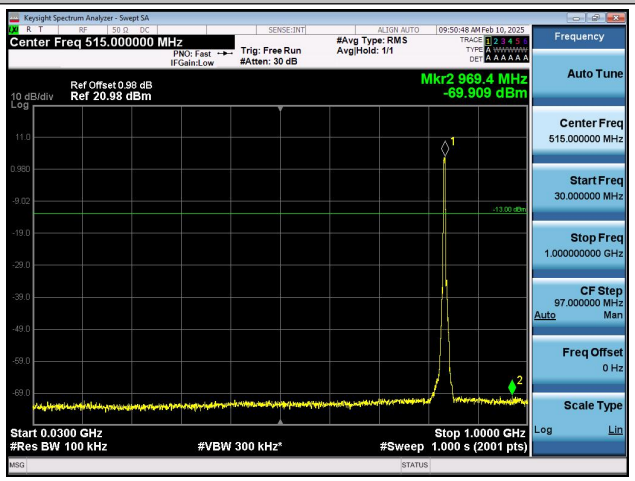
Band5-4132-30~1000MHz-PASS



Band5-4132-1000~10000MHz-PASS

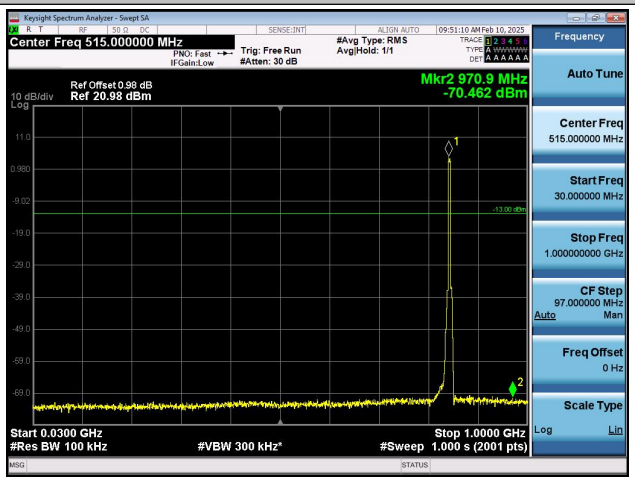


Band5-4183-30~1000MHz-PASS



Band5-4183-1000~10000MHz-PASS

Band5-4233-30~1000MHz-PASS



Band5-4233-1000~10000MHz-PASS

2.6. Radiated Spurious Emission

2.6.1. Requirement

The radiated spurious emission was measured by substitution method according to ANSI/TIA-603-E-2016.

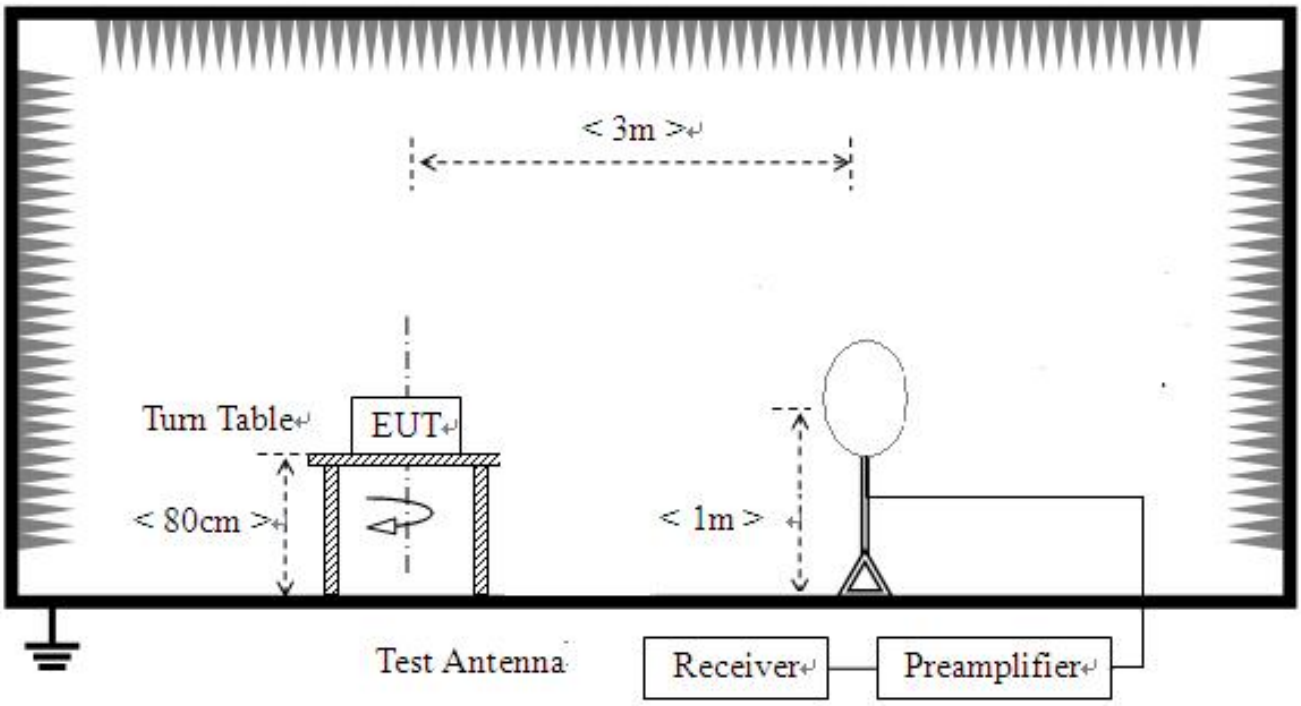
The power of any emission outside of the authorized operating frequency ranges must be lower than the transmitter power (P) by a factor of at least 43 + 10 log (P) dB.

2.6.2. Measuring Instruments

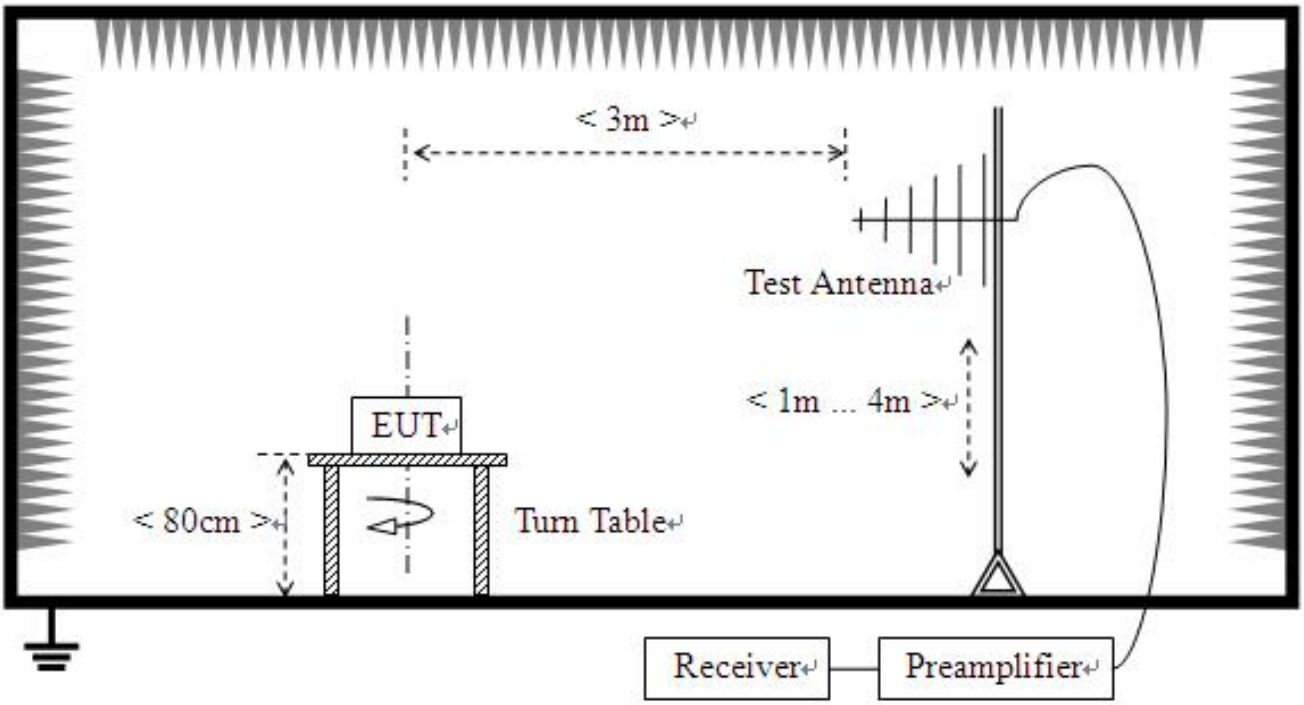
The measuring equipment is listed in the section 3 of this test report.

2.6.3. Test Setup

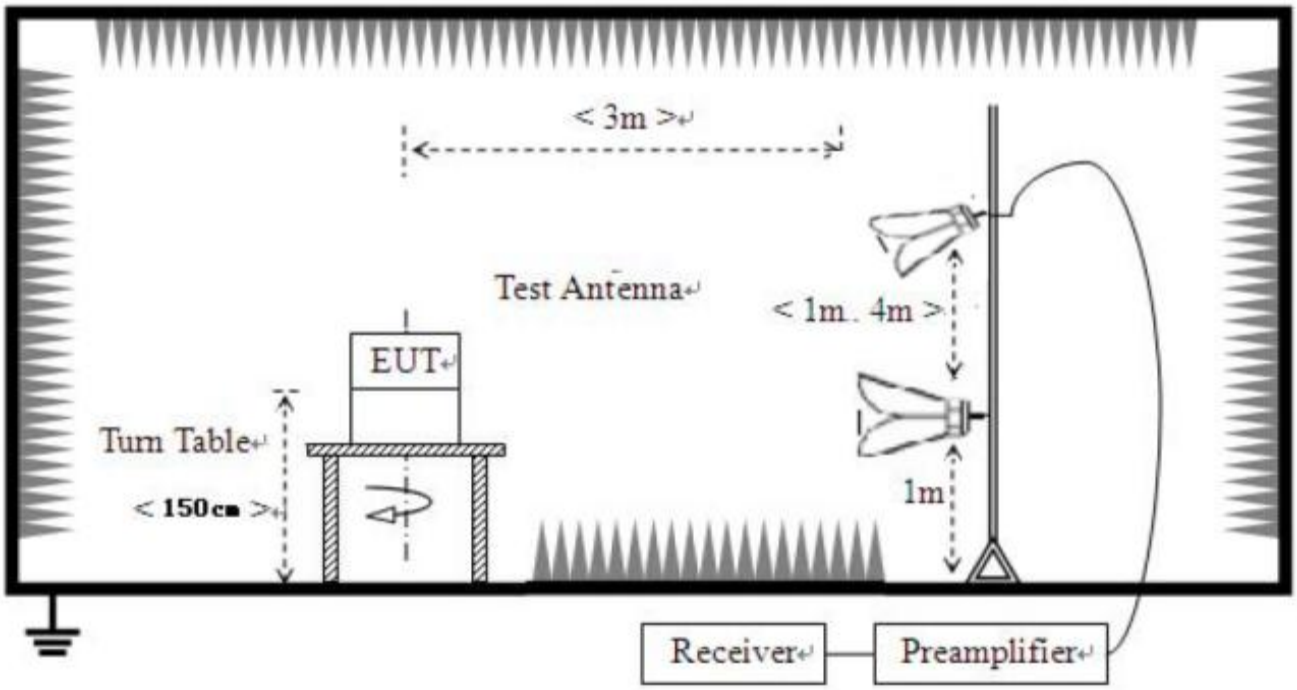
For radiated emissions from 9kHz to 30MHz



For radiated emissions from 30MHz to 1GHz



For radiated emissions above 1GHz



2.6.4. Test Procedures

1. The EUT was placed on a rotatable wooden table with 0.8 meter (for below 1GHz) / 1.5 meters (for above 1GHz) above ground.
2. The EUT was set 3 meters from the receiving antenna, which was mounted on the antenna tower.
3. The table was rotated 360 degrees to determine the position of the highest spurious emission.
4. The height of the receiving antenna is varied between one meter and four meters to search the maximum spurious emission for both horizontal and vertical polarizations.
5. Make the measurement with the spectrum analyzer's RBW = 1MHz, VBW = 3MHz, taking the record of maximum spurious emission.
6. A horn antenna was substituted in place of the EUT and was driven by a signal generator.
7. Tune the output power of signal generator to the same emission level with EUT maximum spurious emission.
8. Taking the record of output power at antenna port.
9. Repeat step 7 to step 8 for another polarization.
10. The RF fundamental frequency should be excluded against the limit line in the operating frequency band.
11. This device employs GMSK and 8PSK technology with GSM, GPRS and EGPRS capabilities. All configurations were investigated and the worst case emissions were found in GSM mode.
12. This device employs UMTS technology with WCDMA (AMR/RMC), HSDPA, HSUPA capabilities. All configurations were investigated and the worst case UMTS emissions were found in RMC WCDMA mode at 12.2Kbps.
13. All Spurious Emission tests were performed in X, Y, Z axis direction and low, middle, high channel. And only the worst axis test condition was recorded in this test report.
13. The spectrum is measured from 9 kHz to the 10th harmonic of the fundamental frequency of the transmitter using CISPR quasi peak detector below 1GHz. The worst case emissions are reported however emissions whose levels were not within 20dB of the respective limits were not reported.

2.6.5. Test Result of Radiated Spurious Emission

Note: 1. The emission levels of above 18GHz are lower than the limit 20dB and not show in test report.

Note: 2. Absolute Level = Reading Level + Factor.

Note: 3. Worst-Case test data provide as below.

WCDMA 850 Middle Channel							
NO.	Freq. [MHz]	Reading [dBm]	Level [dBm]	Limit [dBm]	Margin [dB]	Factor [dB]	Polarity
1	68.33	-95.15	-75.80	-13.00	62.80	19.35	Horizontal
2	327.45	-106.03	-78.38	-13.00	65.38	27.65	Horizontal
3	681.68	-105.24	-70.65	-13.00	57.65	34.59	Horizontal
4	3112.01	-57.55	-50.36	-13.00	37.36	7.19	Horizontal
5	11905.8	-63.47	-39.73	-13.00	26.73	23.74	Horizontal
6	17404.2	-66.33	-37.04	-13.00	24.04	29.29	Horizontal
NO.	Freq. [MHz]	Reading [dBm]	Level [dBm]	Limit [dBm]	Margin [dB]	Factor [dB]	Polarity
1	36.79	-90.48	-69.89	-13.00	56.89	20.59	Vertical
2	71.25	-91.20	-69.88	-13.00	56.88	21.32	Vertical
3	422.56	-106.25	-77.61	-13.00	64.61	28.64	Vertical
4	2175.26	-57.54	-55.35	-13.00	42.35	2.19	Vertical
5	5062.65	-58.34	-43.89	-13.00	30.89	14.45	Vertical
6	17361.7	-65.78	-36.63	-13.00	23.63	29.15	Vertical

WCDMA 1900 Middle Channel							
NO.	Freq. [MHz]	Reading [dBm]	Level [dBm]	Limit [dBm]	Margin [dB]	Factor [dB]	Polarity
1	66.39	-89.55	-70.20	-13.00	57.20	19.35	Horizontal
2	319.69	-104.22	-77.08	-13.00	64.08	27.14	Horizontal
3	658.87	-106.95	-72.12	-13.00	59.12	34.83	Horizontal
4	1610.73	-58.27	-59.43	-13.00	46.43	-1.16	Horizontal
5	5110.61	-58.59	-44.01	-13.00	31.01	14.58	Horizontal
6	17234.6	-64.31	-35.87	-13.00	22.87	28.44	Horizontal
NO.	Freq. [MHz]	Reading [dBm]	Level [dBm]	Limit [dBm]	Margin [dB]	Factor [dB]	Polarity
1	41.65	-97.85	-77.92	-13.00	64.92	19.93	Vertical
2	123.65	-99.03	-76.73	-13.00	63.73	22.30	Vertical
3	587.54	-105.19	-72.54	-13.00	59.54	32.65	Vertical
4	1661.13	-57.69	-58.55	-13.00	45.55	-0.86	Vertical
5	7482.15	-59.48	-39.81	-13.00	26.81	19.67	Vertical
6	17467.5	-64.54	-36.25	-13.00	23.25	28.29	Vertical

WCDMA 1700 Middle Channel							
NO.	Freq. [MHz]	Reading [dBm]	Level [dBm]	Limit [dBm]	Margin [dB]	Factor [dB]	Polarity
1	33.40	-100.39	-77.21	-13.00	64.21	23.18	Horizontal
2	123.65	-99.35	-79.26	-13.00	66.26	20.09	Horizontal
3	508.45	-105.12	-72.52	-13.00	59.52	32.60	Horizontal
4	3179.21	-57.54	-50.29	-13.00	37.29	7.25	Horizontal
5	4889.04	-58.51	-43.76	-13.00	30.76	14.75	Horizontal
6	17398.5	-65.70	-36.34	-13.00	23.34	29.36	Horizontal
NO.	Freq. [MHz]	Reading [dBm]	Level [dBm]	Limit [dBm]	Margin [dB]	Factor [dB]	Polarity
1	39.70	-98.11	-77.92	-13.00	64.92	20.19	Vertical
2	123.65	-99.97	-77.67	-13.00	64.67	22.30	Vertical
3	888.88	-105.53	-68.60	-13.00	55.60	36.93	Vertical
4	1149.11	-56.87	-59.04	-13.00	46.04	-2.17	Vertical
5	4864.89	-58.00	-43.26	-13.00	30.26	14.74	Vertical
6	17354.2	-65.53	-36.43	-13.00	23.43	29.10	Vertical

2.7. Frequency Stability

2.7.1. Requirement

Frequency stability is a measure of frequency drift due to temperature and supply voltage variations, with reference to the frequency measured at an appropriate reference temperature and the rated supply voltage.

For licensed devices, the following measurement conditions apply:

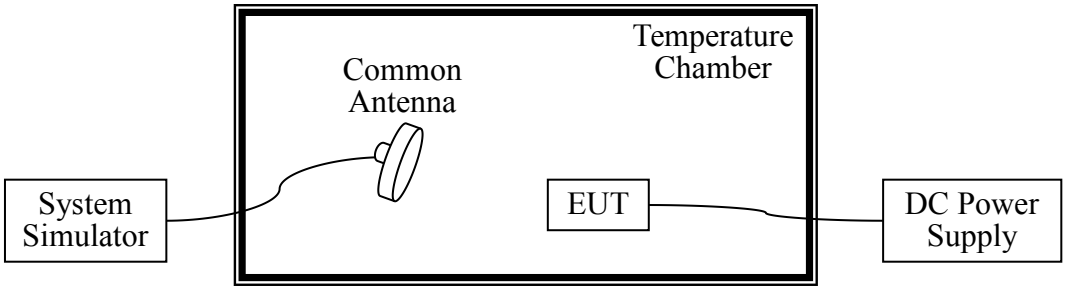
a. at the temperatures of -30°C (-22°F), +20°C (+68°F) and +50°C (+122°F), and at the manufacturer's rated supply voltage.

b. at the temperature of +20°C (+68°F) and at ±15% of the manufacturer's rated supply voltage.

2.7.2. Measuring Instruments

The measuring equipment is listed in the section 3 of this test report.

2.7.3. Test Setup



2.7.4. Test Procedures

1. The EUT was set up in the thermal chamber and connected with the system simulator.
2. With power OFF, the temperature was decreased to -30°C and the EUT was stabilized before testing. Power was applied and the maximum change in frequency was recorded within one minute.
3. With power OFF, the temperature was raised in 10°C step up to 50°C. The EUT was stabilized at each step for at least half an hour. Power was applied and the maximum frequency change was recorded within one minute.
4. The nominal, highest and lowest extreme voltages were tested, which are specified by the applicant; the normal temperature here used is 20°C.
5. The variation in frequency was measured for the worst case.

2.7.5. Test Result of Frequency Stability

WCDMA Band 2__Mid Channe					
Voltage [Vdc]	Temperature (℃)	Deviation (Hz)	Deviation (ppm)	Limit (ppm)	Verdict
NV	NT	-13.57	-0.007218	Within authorized band for Band 2	PASS
LV	NT	-12.32	-0.006553		PASS
HV	NT	-12.20	-0.006489		PASS
NV	-30	-12.08	-0.006426		PASS
NV	-20	-12.04	-0.006404		PASS
NV	-10	-10.17	-0.005410		PASS
NV	0	-10.44	-0.005553		PASS
NV	10	-11.84	-0.006298		PASS
NV	20	-11.97	-0.006367		PASS
NV	30	-9.33	-0.004963		PASS
NV	40	-12.82	-0.006819		PASS
NV	50	-9.88	-0.005255		PASS

WCDMA Band 4__Mid Channe					
Voltage [Vdc]	Temperature (℃)	Deviation (Hz)	Deviation (ppm)	Limit (ppm)	Verdict
NV	NT	-15.71	-0.009067	Within authorized band for Band 4	PASS
LV	NT	-14.81	-0.008548		PASS
HV	NT	-12.58	-0.007261		PASS
NV	-30	-14.58	-0.008415		PASS
NV	-20	-13.05	-0.007532		PASS
NV	-10	-14.63	-0.008444		PASS
NV	0	-8.17	-0.004715		PASS
NV	10	-11.60	-0.006695		PASS
NV	20	-7.23	-0.004173		PASS
NV	30	-11.67	-0.006736		PASS
NV	40	-14.49	-0.008363		PASS
NV	50	-12.14	-0.007007		PASS

WCDMA Band 5__Mid Channe					
Voltage [Vdc]	Temperature (℃)	Deviation (Hz)	Deviation (ppm)	Limit (ppm)	Verdict
NV	NT	-5.71	-0.006825	±2.5	PASS
LV	NT	-6.42	-0.007674		PASS
HV	NT	-10.85	-0.012969		PASS
NV	-30	-7.23	-0.008642		PASS
NV	-20	-5.59	-0.006682		PASS
NV	-10	-9.90	-0.011834		PASS
NV	0	-5.73	-0.006849		PASS
NV	10	-9.18	-0.010973		PASS
NV	20	-9.22	-0.011021		PASS
NV	30	-11.26	-0.013459		PASS
NV	40	-11.06	-0.013220		PASS
NV	50	-8.43	-0.010077		PASS

Note 1: Normal Voltage = 3.8V, Low Voltage = 3.42V, High Voltage = 4.37V, Normal Temperature = 20℃.

3. List of measuring equipment

Item	Test Equipment	Manufacturer	Model No.	Serial No.	Cal Date	Due Date
1	EMI Test Receiver	ROHDE&SCHWARZ	ESW26	A180502935	2024.05.23	2025.05.22
2	5M Anechoic Chamber	Albatross	SAC-5MAC 12.8x6.8x6.4m	A0304210	2022.06.09	2026.06.08
3	Loop Antenna	Schwarz beck	HFH2-Z2	A0304220	2022.05.02	2025.05.01
4	Broadband antenna (30MHz~1GHz)	R&S	HL562	A0304224	2023.06.08	2026.06.07
5	EMI Horn Ant. (1-18G)	ETC	MCTD-1209	A150402241	2023.05.16	2026.05.15
6	Horn antenna (18GHz~26.5GHz)	AR	AT4510	A0804450	2023.06.01	2026.05.31
7	Amplifier 30M~1GHz	MILMEGA	80RF1000-1000	A140101634	2024.09.05	2025.09.04
8	Amplifier 1G~18GHz	MILMEGA	AS0104R-800/400	A160302517	2024.05.25	2025.05.24
9	Spectrum Analyzer	KEYSIGHT	N9030A	A160702554	2024.12.31	2025.12.30
10	Test Receiver	R&S	ESIB7	A0501375	2024.02.28	2025.02.27
11	Broadband Ant.	ETC	MCTD 2786	A150402240	2023.05.22	2026.05.21
12	3M Anechoic Chamber	Albatross	SAC-3MAC 9*6*6m	A0412375	2024.02.27	2027.02.26
13	Constant Temperature Humidity Chamber	ESPEC	SU-642	A150802409	2025.01.03	2026.01.02
14	Wideband Radio Communication tester	R&S	CMW500	A130101034	2024.06.18	2025.06.17
15	Wideband Radio Communication tester	R&S	CMW500	A150802214	2024.03.27	2025.03.26
16	Power Supply	R&S	WYJ-60100	A141102031	2023.07.12	2026.07.11
17	Cable(9kHz~30MHz)	/	/	C230800587	2023.08.21	2026.08.20
18	Cable(30MHz~18GHz)	/	XSMJA750-SMNM(RA)-12M	C230800588	2023.08.21	2026.08.20
19	Cable(18GHz~40GHz)	/	SUCOFLEX102	C230800590	2023.08.21	2026.08.20

4. Uncertainty of Evaluation

The measurement uncertainties shown below were calculated in accordance with the requirements of ANSI C63.10-2013. All the measurement uncertainty value were shown with a coverage K=2 to indicate 95% level of confidence . The measurement data show herein meets or exceeds the CISPR measurement uncertainty values specified in CISPR 16-4-2 and can be compared directly to specified limit to determine compliance.

Uncertainty of Conducted Emission Measurement (150kHz~30MHz)

Measuring Uncertainty for a level of confidence of 95%(U=2Uc(y))	2.8dB

Uncertainty of Radiated Emission Measurement (9kHz~30MHz)

Measuring Uncertainty for a level of confidence of 95%(U=2Uc(y))	3.5dB

Uncertainty of Radiated Emission Measurement (30MHz~1GHz)

Measuring Uncertainty for a level of confidence of 95%(U=2Uc(y))	3.91dB

Uncertainty of Radiated Emission Measurement (1GHz~18GHz)

Measuring Uncertainty for a level of confidence of 95%(U=2Uc(y))	4.5dB

Uncertainty of Radiated Emission Measurement (18GHz~40GHz)

Measuring Uncertainty for a level of confidence of 95%(U=2Uc(y))	4.9dB

Uncertainty of RF Conducted Measurement (9kHz~40GHz)

Measuring Uncertainty for a level of confidence of 95%(U=2Uc(y))	1.2dB

** END OF REPORT **