FCC RADIO TEST REPORT

FCC ID: 2BC32ESK-180-4G

Sample： Solar camera

Trade Name： EMENEC

Main Model： ESK-180 (4G)

Additional Model： ESK-200 (4G)

Report No.： 23102007ER-62

Prepared for

EMENEC LLC

74 E Glenwood Ave # 217, Smyrna, Delaware, 19977, United States

Prepared by

Global United Technology Services Co. Ltd.

No. 123-128, Tower A, Jinyuan Business Building, No.2, Laodong Industrial Zone, Xixiang Road, Baoan District, Shenzhen, Guangdong, China 518102

TEST RESULT CERTIFICATION

Applicant	:	EMENEC LLC
Address	:	74 E Glenwood Ave # 217, Smyrna, Delaware, 19977, United States
Manufacturer	:	Shenzhen Fuvision Electronics Co., Limited
Address	:	RM 235, 2/F, Block B, Huafeng Headquarters economic Building, No.288, Xixiang Ave., Bao'an District, Shenzhen, Guangdong, China 518102

Product description

Product	:	Solar camera
Trade Name	:	EMENEC
Model Name	:	ESK-180 (4G), ESK-200 (4G)
Test Methods	:	FCC Part 2 Rules FCC Part 22 Rules FCC Part 24 Rules FCC Part 27 Rules

This device described above has been tested by Global United Technology Services Co. Ltd., and the test results show that the equipment under test (EUT) is in compliance with the FCC requirements. And it is applicable only to the tested sample identified in the report.
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Date of Test

Date (s) of performance of tests	:	Oct. 23, 2023 ~ Dec. 08, 2023
Date of Issue	:	Dec. 11, 2023
Test Result	:	Pass

Prepared By:  ***Date:*** *2023-12-11*

Project Engineer

Check By:  ***Date:*** *2023-12-11*

Reviewer

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1 TEST SUMMARY

1.1 TEST PROCEDURES AND RESULTS

The tests were performed according to following standards:

FCC Part 22 Public Mobile Services.

FCC Part 24 Personal Communications Services.

FCC Part 27 Miscellaneous Wireless Communications Services.

FCC Part 2 Frequency allocations and radio treaty matters, general rules and regulations.

TIA/EIA 603 E: March 2016 Land Mobile FM or PM Communications Equipment Measurement and Performance Standards.

ANSI-C63.26:2015 American National Standard for Compliance Testing of Transmitters Used in Licensed Radio Services

KDB971168 D01 v03r01 Measurement Guidance For Certification Of Licensed Digital Transmitters

DESCRIPTION OF TEST	STANDARD	RESULT
Occupied Bandwidth	§2.1049	Pass
Band Edge / Spurious and Harmonic Emissions at Antenna Terminal	§2.1051, §22.917(a),§22.917(a), §27.53(g), §27.53(c), §27.53(h), §24.238(a)	Pass
On all frequencies between 763-775 MHz and 793-805 MHz	§27.53(c)(4)	Pass*
Conducted Output Power	§2.1046	Pass
Frequency stability / variation of ambient temperature	§2.1055, §22.355, §27.54, §24.235	Pass
Peak- to- Average Ratio	§27.50(d)(5), §24.232(d)	Pass
Effective Radiated Power Equivalent Isotropic Radiated Power	§22.913(a)(5), §27.50(c)(10), §27.50(b), §27.50(d)(4), §24.232(c)	Pass
Radiated Spurious and Harmonic Emissions	§2.1053, §22.917(a), §27.53(g) §27.53(c), §27.53(h), §24.238(a)	Pass
Undesirable Emissions in the 1559-1610 MHz band	§2.1053, §27.53(f)	Pass

Note:*Since it was not possible to set the resolution bandwidth to 6.25 kHz with the available equipment, a bandwidth of 10kHz was used instead to show compliance.

1.2 TEST FACILITY

Test Firm : Global United Technology Services Co. Ltd.

Address : No. 123-128, Tower A, Jinyuan Business Building, No.2, Laodong Industrial Zone, Xixiang Road, Baoan District, Shenzhen, Guangdong, China 518102

The test facility is recognized, certified, or accredited by the following organizations:

● **FCC—Registration No.: 381383**

Designation Number: CN5029

Global United Technology Services Co., Ltd., Shenzhen 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 files.

● **IC —Registration No.: 9079A**

CAB identifier: CN0091

The 3m Semi-anechoic chamber of Global United Technology Services Co., Ltd. has been registered by Certification and Engineering Bureau of Industry Canada for radio equipment testing

● **NVLAP (LAB CODE:600179-0)**

Global United Technology Services Co., Ltd., is accredited by the National Voluntary Laboratory Accreditation Program (NVLAP).

1.3 MEASUREMENT UNCERTAINTY

The reported uncertainty of measurement y ± U, where expended uncertainty U is based on a standard uncertainty multiplied by a coverage factor of k=2, providing a level of confidence of approximately 95 %.

A. Conducted Measurement:

Test Site	Method	Measurement Frequency Range	U, (dB)
UNI	ANSI	9kHz ~ 150kHz	2.96
		150kHz ~ 30MHz	2.44

B. Radiated Measurement:

Test Site	Method	Measurement Frequency Range	U, (dB)
UNI	ANSI	9kHz ~ 30MHz	2.50
		30MHz ~ 1000MHz	4.80
		Above 1000MHz	4.13

C. RF Conducted Method:

Item	**Measurement Uncertainty**
Uncertainty of total RF power, conducted	U_c = ±0.8 dB
Uncertainty of RF power density, conducted	U_c = ±2.6 dB
Uncertainty of spurious emissions, conducted	U_c = ±2 %
Uncertainty of Occupied Channel Bandwidth	U_c = ±2 %

1.4 ENVIRONMENTAL CONDITIONS

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

Temperature:	15~35 °C
Relative Humidity:	30~60 %
Air Pressure:	950~1050 hPa

2 GENERAL INFORMATION

2.1 GENERAL DESCRIPTION OF EUT

Product	Solar camera		
Trade Name	EMENEC		
Main Model	ESK-180 (4G)		
Additional Model	ESK-200 (4G)		
Model Difference	All model's the function, software and electric circuit are the same, only with a product color and model named different. Test sample model: ESK-180 (4G).		
FCC ID	2BC32ESK-180-4G		
Antenna Type	External Antenna		
Frequency Bands	☒FDD Band 2 ☒FDD Band 4 ☒FDD Band 5 ☒FDD Band 12 ☒FDD Band 13 ☒FDD Band 17 ☒TDD Band 66 ☒FDD Band 71		
Transmission Frequency Range	**LTE-Band 2**	1850.7 MHz – 1909.3 MHz---(1.4MHz)	
		1851.5 MHz – 1908.5 MHz---(3.0MHz)	
		1852.5 MHz – 1907.5 MHz---(5.0MHz)	
		1855.0 MHz – 1905.0 MHz---(10.0MHz)	
		1857.5 MHz – 1902.5 MHz---(15.0MHz)	
		1860.0 MHz – 1900.0 MHz---(20.0MHz)	
	LTE-Band 4	1710.7 MHz – 1754.3 MHz---(1.4MHz)	
		1711.5 MHz – 1753.5 MHz---(3.0MHz)	
		1712.5 MHz – 1752.5 MHz---(5.0MHz)	
		1715.0 MHz – 1750.0 MHz---(10.0MHz)	
		1717.5 MHz – 1747.5 MHz---(15.0MHz)	
		1720.0 MHz – 1745.0 MHz---(20.0MHz)	
	LTE-Band 5	824.7 MHz – 848.3 MHz---(1.4MHz)	
		825.5 MHz – 847.7 MHz---(3.0MHz)	
		826.5 MHz – 846.5 MHz---(5.0MHz)	
		829.0 MHz – 844.0 MHz---(10.0MHz)	
	LTE-Band 12	699.7 MHz – 715.3 MHz---(1.4MHz)	
		700.5 MHz – 714.5 MHz---(3.0MHz)	
		701.5 MHz – 713.5 MHz---(5.0MHz)	
		704.0 MHz – 711.0 MHz---(10.0MHz)	
	LTE-Band 13	779.5 MHz – 784.5 MHz---(5.0MHz)	
		782.0 MHz – 782.0 MHz---(10.0MHz)	
	LTE-Band 17	706.5 MHz – 713.5 MHz ---(5.0MHz)	
		709.0 MHz – 711.0 MHz ---(10.0MHz)	
	LTE-Band 66	1710.7 MHz – 1779.3 MHz---(1.4MHz)	
		1711.5 MHz – 1778.5 MHz---(3.0MHz)	
		1712.5 MHz – 1777.5 MHz---(5.0MHz)	

		1715.0 MHz – 1775.0 MHz---(10.0MHz)
		1717.5 MHz – 1772.5 MHz---(15.0MHz)
		1720.0 MHz – 1770.0 MHz---(20.0MHz)
	LTE-Band 71	665.5 MHz – 695.5 MHz---(5.0MHz)
		668.0 MHz – 693.0 MHz---(10.0MHz)
		670.5 MHz – 690.5 MHz---(15.0MHz)
		673.0 MHz – 688.0 MHz---(20.0MHz)
Type of Modulation	☒QPSK ☒16QAM	
Antenna gain	Band 2: 2.67dBi; Band 4: 2.67dBi; Band 5: 3dBi; Band 12: 0.76dBi; Band 13: 3dBi; Band 17: 3dBi; Band 66: 2.67dBi; Band 71: 0.76dBi	
Single Card	WCDMA/LTE Card Slot	
Power Class	3	
Battery	DC 3.7V	
Power Source	DC 3.7V by battery or DC 5V by adapter	
Adapter	N/A	

2.2 DESCRIPTION OF TEST MODES AND TEST FREQUENCY

The EUT has been tested under typical operating condition. The CMW500 used to control the EUT staying in continuous transmitting and receiving mode for testing.

Test Frequency:

Band 2			
Test channel	**Bandwidth(MHz)**	**N_{UL}**	**Frequency of Uplink (MHz)**
Low Range	1.4	18607	1850.70
	3	18615	1851.50
	5	18625	1852.50
	10	18650	1855.00
	15	18675	1857.50
	20	18700	1860.00
Mid Range	1.4/3/5/10/15/20	18900	1880.00
High Range	1.4	19193	1909.30
	3	19185	1908.50
	5	19175	1907.50
	10	19150	1905.00
	15	19125	1902.50
	20	19100	1900.00

Band 4			
Test channel	**Bandwidth(MHz)**	**N_{UL}**	**Frequency of Uplink (MHz)**
Low Range	1.4	19957	1710.70
	3	19965	1711.50
	5	19975	1712.50
	10	20000	1715.00
	15	20025	1717.50
	20	20050	1720.00
Mid Range	1.4/3/5/10/15/20	20175	1732.50
High Range	1.4	20393	1754.30
	3	20385	1753.50
	5	20375	1752.50
	10	20350	1750.00
	15	20325	1747.50
	20	20300	1745.00

Band 5			
Test channel	**Bandwidth(MHz)**	**N_{UL}**	**Frequency of Uplink (MHz)**
Low Range	1.4	20407	824.70
	3	20415	825.50
	5	20425	826.50
	10	20450	829.00
Mid Range	1.4/3/5/10	20525	836.50
High Range	1.4	20643	848.30
	3	20635	847.50
	5	20625	846.50
	10	20600	844.00

Band 12			
Test channel	**Bandwidth(MHz)**	**N_{UL}**	**Frequency of Uplink (MHz)**
Low Range	1.4	23017	699.70
	3	23025	700.50
	5	23035	701.50
	10	23060	704.00
Mid Range	1.4/3/5/10	23095	707.50
High Range	1.4	23173	715.30
	3	23165	714.50
	5	23155	713.50
	10	23130	711.00

Band 13			
Test channel	**Bandwidth(MHz)**	**N_{UL}**	**Frequency of Uplink (MHz)**
Low Range	5	23205	779.50
	10	23230	782.00
Mid Range	5/10	23230	782.00
High Range	5	23255	784.50
	10	23230	782.00

Band 17			
Test channel	**Bandwidth(MHz)**	**N_{UL}**	**Frequency of Uplink (MHz)**
Low Range	5	23755	706.50
	10	23780	709.00
Mid Range	5/10	23790	710.00
High Range	5	23825	713.50
	10	23800	711.00

Band 66			
Test channel	**Bandwidth(MHz)**	**N_{UL}**	**Frequency of Uplink (MHz)**
Low Range	1.4	131979	1710.7
	3	131987	1711.5
	5	131997	1712.5
	10	132022	1715
	15	132047	1717.5
	20	132072	1720
Mid Range Tx[1]	1.4/3/5/10/15/20	132322	1745
Mid Range	1.4/3/5/10/15/20	132422	1755
Paired High Range2	1.4	132665	1779.3
	3	132657	1778.5
	5	132647	1777.5
	10	132622	1775
	15	132597	1772.5
	20	132572	1770
High Range[3]	1.4	NA	NA
	3	NA	NA
	5	NA	NA
	10	NA	NA
	15	NA	NA
	20	NA	NA
Note 1: Applicable for transmitter testing. Note 2: Applicable if UL is configured on the CC. Note 3: Applicable if no UL is configured on the CC.			

Band 71			
Test channel	**Bandwidth(MHz)**	**N_{UL}**	**Frequency of Uplink (MHz)**
Low Range	5	133147	665.5
	10	133172	668
	15	133197	670.5
	20	133222	673
Mid Range	5/10/15	133297	680.5
	20	133322	683
High Range	5	133447	695.5
	10	133422	693
	15	133397	690.5
	20	133372	688

2.3 DESCRIPTION OF THE TEST MODES

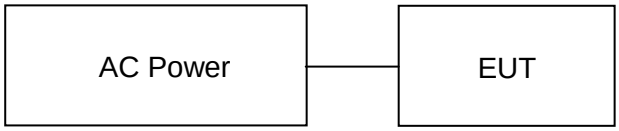
During the measurement the environmental conditions were within the listed ranges:

Voltage	Normal Voltage	DC 3.7V
	High Voltage	DC 4.07V
	Low Voltage	DC 3.33V
Other	Normal Temperature	24°C
	Relative Humidity	55 %
	Air Pressure	989 hPa

Note: All modes were test at Normal Voltage, High Voltage, and Low Voltage, only the worst results of Normal Voltage was reported in the test report.

2.4 TEST SETUP

Operation of EUT during Conducted and Radiation testing:



2.5 DESCRIPTION TEST PERIPHERAL AND EUT PERIPHERAL

The EUT has been tested as an independent unit together with other necessary accessories or support units. The following support units or accessories were used to form a representative test configuration during the tests.

Item	Equipment	Model/Type No.	Cable Length(m)	Note
1	Solar camera	ESK-180 (4G)	--	EUT
2				AE

Note:

1. The support equipment was authorized by Declaration of Confirmation.
2. All the above equipment/cables were placed in worse case positions to maximize emission signals during emission test.

2.6 MEASUREMENT INSTRUMENTS LIST

Radiated Emission:						
Item	**Test Equipment**	**Manufacturer**	**Model No.**	**Inventory No.**	**Cal.Date (mm-dd-yy)**	**Cal.Due date (mm-dd-yy)**
1	3m Semi- Anechoic Chamber	ZhongYu Electron	9.2(L)*6.2(W)* 6.4(H)	GTS250	June 23, 2021	June 22, 2024
2	Control Room	ZhongYu Electron	6.2(L)*2.5(W)* 2.4(H)	GTS251	N/A	N/A
3	EMI Test Receiver	Rohde & Schwarz	ESU26	GTS203	April 14, 2023	April 13, 2024
4	BiConiLog Antenna	SCHWARZBECK MESS-ELEKTRONIK	VULB9168	GTS640	March 19, 2023	March 18, 2025
5	Double -ridged waveguide horn	SCHWARZBECK MESS-ELEKTRONIK	BBHA 9120 D	GTS208	April 17, 2023	April 16, 2025
6	EMI Test Software	AUDIX	E3	N/A	N/A	N/A
7	Wideband Radio Communication Tester	Rohde & Schwarz	CMW500	GTS575	April 14, 2023	April 13, 2024
8	Loop Antenna	ZHINAN	ZN30900A	GTS534	Nov. 29, 2022	Nov. 28, 2024
9	Broadband Preamplifier	SCHWARZBECK	BBV9718	GTS535	April 14, 2023	April 13, 2024
10	Amplifier(1GHz-26.5GHz)	HP	8449B	GTS601	April 14, 2023	April 13, 2024
11	Horn Antenna (18-26.5GHz)	/	UG-598A/U	GTS664	Oct. 29, 2023	Oct. 28, 2024
12	Horn Antenna (26.5-40GHz)	A.H Systems	SAS-573	GTS665	Oct. 29, 2023	Oct. 28, 2024
13	FSV·Signal Analyzer (10Hz-40GHz)	Keysight	FSV-40-N	GTS666	March 13, 2023	March 12, 2024
14	Amplifier	/	LNA-1000-30S	GTS650	April 14, 2023	April 13, 2024
15	CDNE M2+M3-16A	HCT	30MHz-300MHz	GTS668	Dec. 20, 2022	Dec.19, 2024
16	Wideband Amplifier	/	WDA-01004000-15P35	GTS602	April 14, 2023	April 13, 2024
17	Thermo meter	JINCHUANG	GSP-8A	GTS643	April 19, 2023	April 18, 2024
18	RE cable 1	GTS	N/A	GTS675	July 31. 2023	July 30. 2024
19	RE cable 2	GTS	N/A	GTS676	July 31. 2023	July 30. 2024
20	RE cable 3	GTS	N/A	GTS677	July 31. 2023	July 30. 2024
21	RE cable 4	GTS	N/A	GTS678	July 31. 2023	July 30. 2024
22	RE cable 5	GTS	N/A	GTS679	July 31. 2023	July 30. 2024
23	RE cable 6	GTS	N/A	GTS680	July 31. 2023	July 30. 2024
24	RE cable 7	GTS	N/A	GTS681	July 31. 2023	July 30. 2024
25	RE cable 8	GTS	N/A	GTS682	July 31. 2023	July 30. 2024

Conducted Emission						
Item	**Test Equipment**	**Manufacturer**	**Model No.**	**Inventory No.**	**Cal.Date (mm-dd-yy)**	**Cal.Due date (mm-dd-yy)**
1	Shielding Room	ZhongYu Electron	7.3(L)x3.1(W)x2.9(H)	GTS252	July 12, 2022	July 11, 2027
2	EMI Test Receiver	R&S	ESCI 7	GTS552	April 14, 2023	April 13, 2024
3	LISN	ROHDE & SCHWARZ	ENV216	GTS226	April 14, 2023	April 13, 2024
4	Coaxial Cable	GTS	N/A	GTS227	N/A	N/A
5	EMI Test Software	AUDIX	E3	N/A	N/A	N/A
6	Thermo meter	JINCHUANG	GSP-8A	GTS642	April 19, 2023	April 18, 2024
7	Absorbing clamp	Elektronik-Feinmechanik	MDS21	GTS229	April 14, 2023	April 13, 2024
8	ISN	SCHWARZBECK	NTFM 8158	GTS565	April 14, 2023	April 13, 2024
9	High voltage probe	SCHWARZBECK	TK9420	GTS537	April 14, 2023	April 13, 2024
10	Antenna end assembly	Weinschel	1870A	GTS560	April 14, 2023	April 13, 2024

RF Conducted Test:						
Item	**Test Equipment**	**Manufacturer**	**Model No.**	**Serial No.**	**Cal.Date (mm-dd-yy)**	**Cal.Due date (mm-dd-yy)**
1	MXA Signal Analyzer	Agilent	N9020A	GTS566	April 14, 2023	April 13, 2024
2	EMI Test Receiver	R&S	ESCI 7	GTS552	April 14, 2023	April 13, 2024
3	PSA Series Spectrum Analyzer	Agilent	E4440A	GTS536	April 14, 2023	April 13, 2024
4	MXG vector Signal Generator	Agilent	N5182A	GTS567	April 14, 2023	April 13, 2024
5	ESG Analog Signal Generator	Agilent	E4428C	GTS568	April 14, 2023	April 13, 2024
6	USB RF Power Sensor	DARE	RPR3006W	GTS569	April 14, 2023	April 13, 2024
7	RF Switch Box	Shongyi	RFSW3003328	GTS571	April 14, 2023	April 13, 2024
8	Programmable Constant Temp & Humi Test Chamber	WEWON	WHTH-150L-40-880	GTS572	April 14, 2023	April 13, 2024
9	Thermo meter	JINCHUANG	GSP-8A	GTS641	April 19, 2023	April 18, 2024

3 ERP AND EIRP

3.1 LIMIT

The radiation test is carried out in a semi-anechoic chamber.

According to the test, put the device under test on a non-conductive platform 3 meters away from the receiving antenna (ANSI/TIA-603-E-2016 Article 2.2.17).

The following rules are for the maximum radiated power limit requirements of the product:

LTE FDD Band 2: 2W(33dBm) ERP

LTE FDD Band 4: 1W(30dBm) ERP

LTE FDD Band 5: 7W(38.45dBm) ERP

LTE FDD Band 12: 3W(34.77dBm) ERP

LTE FDD Band 13: 3W(34.77dBm) ERP

LTE FDD Band 17: 3W(34.77dBm) ERP

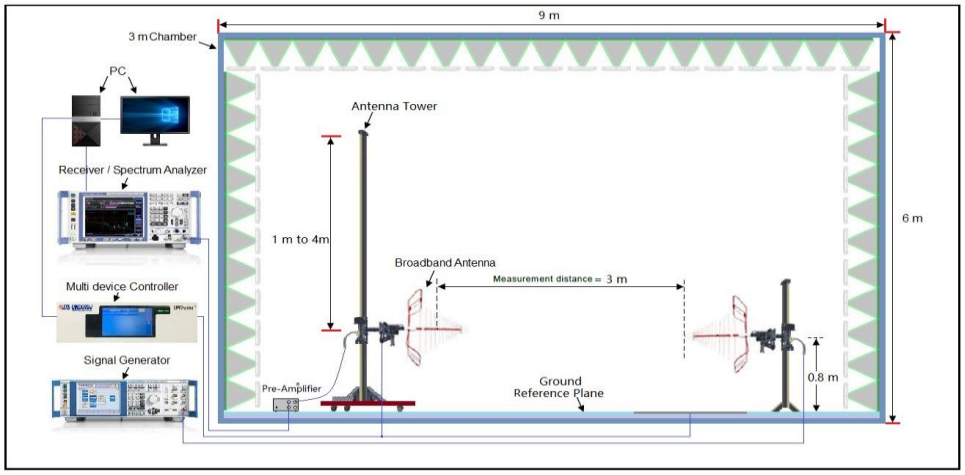
LTE FDD Band 66: 1W(30dBm) ERP

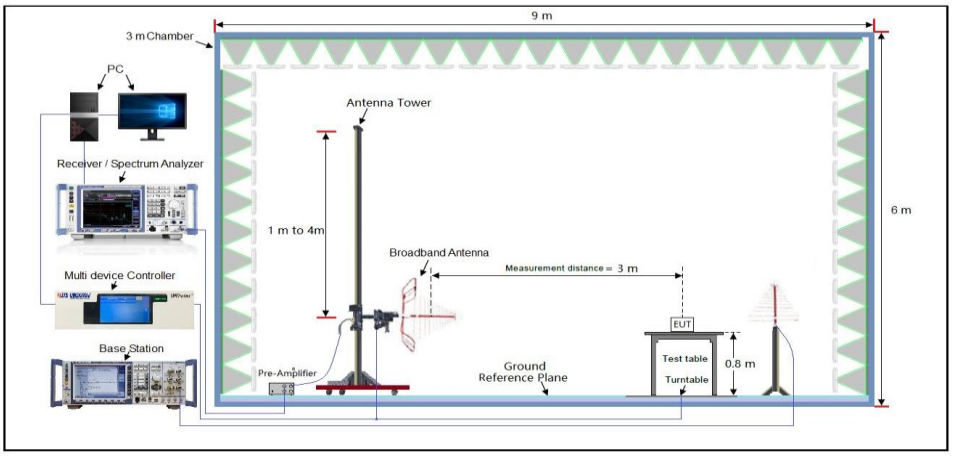
LTE FDD Band 66: 3W(34.77dBm) ERP

FCC: §2.1046, §22.913, §24.232, §27.50, §90.635, §90.541, and §96.41

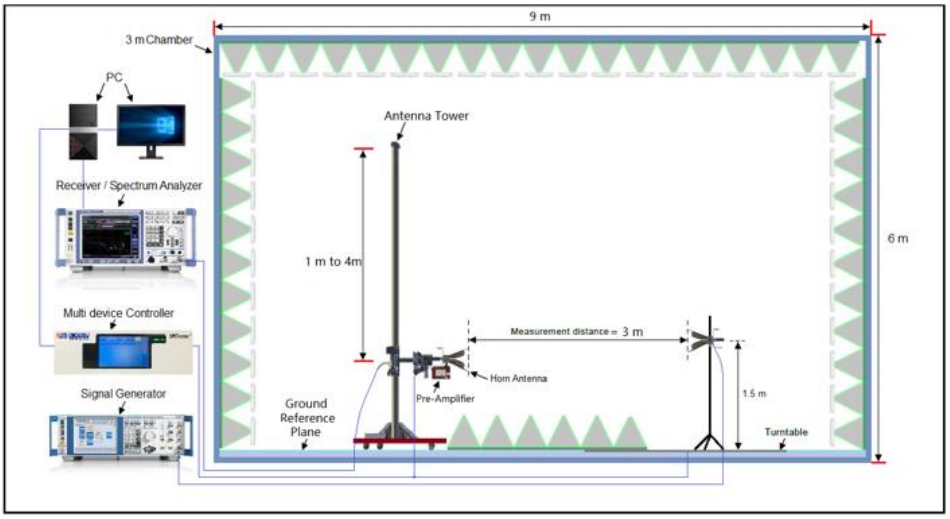
3.2 TEST CONFIGURATION

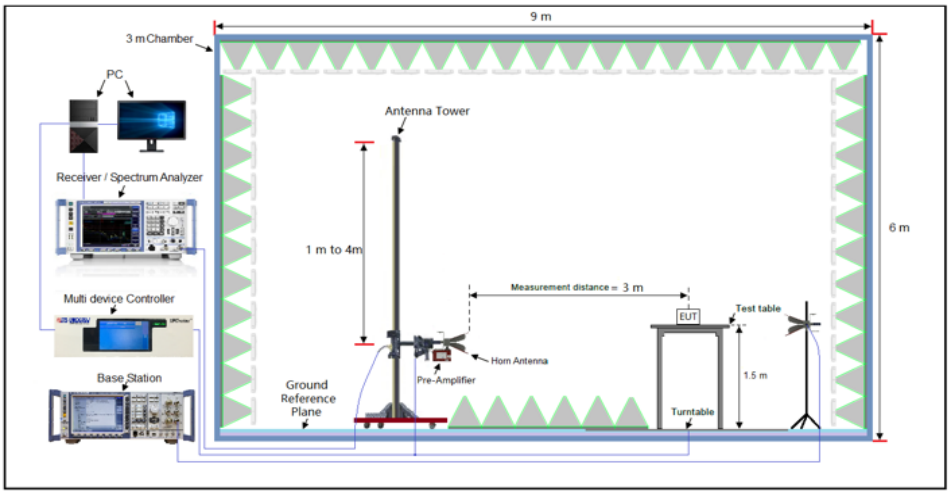
Radiated Power 30MHz to 1GHz Test setup





Radiated Power Above 1GHz Test setup





Conducted Power Test setup

3.3 TEST PROCEDURE

Radiated Test:

1. Place the EUT in the center of the turntable.
   a) For radiated emissions measurements performed at frequencies less than or equal to 1 GHz, the EUT shall be placed on a RF-transparent table at a nominal height of 80 cm above the reference ground plane
   b) For radiated measurements performed at frequencies above 1 GHz, the EUT shall be placed on an RF transparent table at a nominal height of 1.5 m above the ground plane.
2. Unless the EUT uses an integral antenna, the EUT shall be terminated with a non-radiating transmitter load. In cases where the EUT uses an adjustable antenna, the antenna shall be adjusted through typical positions and lengths to maximize emissions levels.
3. The EUT shall be tested while operating on the frequency per manufacturer specification. Set the transmitter to operate in continuous transmit mode.
4. Receiver or Spectrum set as follow:
   Below 1GHz, RBW=100kHz, VBW=300kHz, Detector=Peak, Sweep time=Auto
   Above 1GHz, RBW=1MHz, VBW=3MHz, Detector=Peck, Sweep time=Auto
5. Each emission under consideration shall be evaluated:
   a) Raise and lower the measurement antenna from 1 m to 4 m, as necessary to enable detection of the maximum emission amplitude relative to measurement antenna height.
   b) Rotate the EUT through 360° to determine the maximum emission level relative to the axial position.
   c) Return the turntable to the azimuth where the highest emission amplitude level was observed.
   d) Vary the measurement antenna height again through 1 m to 4 m again to find the height associated with the maximum emission amplitude.
   e) Record the measured emission amplitude level and frequency

8. Maintain the previous measurement instrument settings and test set-up, with the exception that the EUT is removed and replaced by the substitution antenna.
9. Connect a signal generator to the substitution antenna; locate the signal generator so as to minimize any potential influences on the measurement results. Set the signal generator to the frequency where emissions are detected, and set an output power level such that the radiated signal can be detected by the measurement instrument, with sufficient dynamic range relative to the noise floor.
10. For each emission that was detected and measured in the initial test
    a) Vary the measurement antenna height between 1 m to 4 m to maximize the received (measured) signal amplitude.

b) Adjust the signal generator output power level until the amplitude detected by the measurement instrument equals the amplitude level of the emission previously measured directly in step 5 and step 6.

c) Record the output power level of the signal generator when equivalence is achieved in step b).

11. Repeat step 8 through step 10 with the measurement antenna oriented in the opposite polarization.

12. Calculate the emission power in dBm referenced to a half-wave dipole using the following equation:

Pe = Ps(dBm) − cable loss (dB) + antenna gain (dBd)

where

Pe = equivalent emission power in dBm

Ps = source (signal generator) power in dBm

NOTE—dBd refers to the measured antenna gain in decibels relative to a half-wave dipole.

13. Correct the antenna gain of the substitution antenna if necessary to reference the emission power to a half-wave dipole. When using measurement antennas with the gain specified in dBi, the equivalent dipole-referenced gain can be determined from:

gain (dBd) = gain (dBi) − 2.15 dB.

If necessary, the antenna gain can be calculated from calibrated antenna factor information

14.Provide the complete measurement results as a part of the test report.

Conducted Test:

The EUT is coupled to the SS with attenuator through power splitter; the RF load attached to EUT antenna terminal is 50ohm, the path loss as the factor is calibrated to correct the reading. A system simulator was used to establish communication with the EUT , Its parameters were set to force the EUT transmitting at maximum output power. The measured power in the radio frequency on the transmitter output terminals shall be reported. The measurements were performed on all modes at 3 typical channels(the Top Channel, the Middle Channel and the Bottom Channel) for each band.

3.4 TEST RESULT

Please refer to Appendix.

4 PEAK-TO-AVERAGE POWER RATIO

4.1 PROVISIONS APPLICABLE

① CCDF Procedure for PAPR :

1. Set resolution/measurement bandwidth ≥ signal's occupied bandwidth;
2. Set the number of counts to a value that stabilizes the measured CCDF curve;
3. Set the measurement interval as follows:

-for continuous transmissions, set to 1 ms,

-or burst transmissions, employ an external trigger that is synchronized with the EUT burst timing sequence, or use the internal burst trigger with a trigger level that allows the burst to stabilize and set the measurement interval to a time
that is less than or equal to the burst duration.

4. Record the maximum PAPR level associated with a probability of 0.1%.

② Alternate Procedure for PAPR:

Use one of the procedures presented in 5.2(ANSI C63.26-2015) to measure the total peak power and record as PPk. Use one of the applicable procedures presented 5.2(ANSI C63.26-2015) to measure the total average power and recordas PAvg. Determine the P.A.R. from:

P.A.R(dB) = PPk (dBm) – PAvg (dBm) (PAvg = Average Power + Duty cycle Factor)

4.2 MEASUREMENT METHOD

Test Settings(Peak Power):

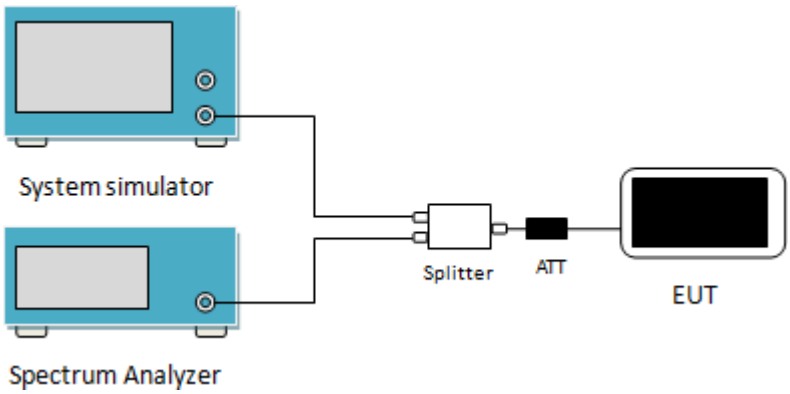
The measurement instrument must have a RBW that is greater than or equal to the OBW of the signal to be measured and a VBW ≥ 3 × RBW.

1. Set the RBW ≥ OBW.
2. Set VBW ≥ 3 × RBW.
3. Set span ≥ 2 × OBW.
4. Sweep time ≥ 10 × (number of points in sweep) × (transmission symbol period).
5. Detector = peak.
6. Trace mode = max hold.
7. Allow trace to fully stabilize.
8. Use the peak marker function to determine the peak amplitude level.

Test Settings(Average Power)

1. Set span to 2 × to 3 × the OBW.
2. Set RBW ≥ OBW.
3. Set VBW ≥ 3 × RBW.
4. Set number of measurement points in sweep ≥ 2 × span / RBW.
5. Sweep time: Set ≥ [10 × (number of points in sweep) × (transmission period)] for single sweep (automation-compatible) measurement. The transmission period is the (on + off) time.
6. Detector = power averaging (rms).
7. Set sweep trigger to “free run.”
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 period 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.
10. Add [10 log (1/duty cycle)] to the measured maximum power level to compute the average power during continuous transmission. For example, add [10 log (1/0.25)] = 6 dB if the duty cycle is a constant 25%.

4.3 MEASUREMENT SETUP



4.4 TEST RESULT

Please refer to Appendix

5 OCCUPY BANDWIDTH

5.1 PROVISIONS APPLICABLE

The width of a frequency band such that, below the lower and above the upper frequency limits, the mean powers emitted are each equal to a specified percentage 0.5 % of the total mean power of a given emission.

The EUT makes a call to the communication simulator.

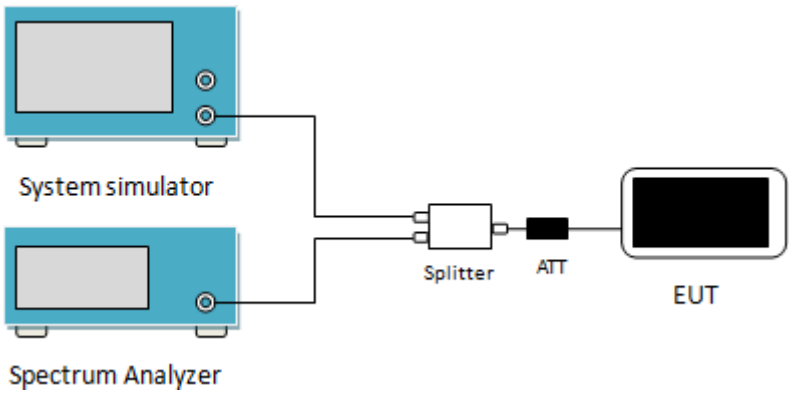
The conducted occupied bandwidth used the power splitter via EUT RF power connector between simulation base station and spectrum analyzer.

The communication simulator station system controlled a EUT to export maximum output power under transmission mode and specific channel frequency. Use OBW measurement function of Spectrum analyzer to measure 99 % occupied bandwidth

5.2 MEASUREMENT METHOD

1. The signal analyzer's automatic bandwidth measurement capability was used to perform the 99% occupied bandwidth and the 26dB bandwidth. The bandwidth measurement was not influenced by any intermediate power nulls in the fundamental emission.
2. RBW = 1 – 5% of the expected OBW
3. VBW ≥ 3 x RBW
4. Detector = Peak
5. Trace mode = max hold
6. Sweep = auto couple
7. The trace was allowed to stabilize
8. If necessary, steps 2 – 7 were repeated after changing the RBW such that it would be within 1-5% of the 99% occupied bandwidth observed in Step 7

5.3 MEASUREMENT SETUP



5.4 TEST RESULT

Please refer to Appendix

6 MODULATION CHARACTERISTIC

According to FCC § 2.1047(d), Part 22H & 24E there is no specific requirement for digital modulation, therefore modulation characteristic is not presented.

7 OUT OF BAND EMISSION AT ANTENNA TERMINALS

7.1 PROVISIONS APPLICABLE

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 10th 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.

7.2 MEASUREMENT METHOD

For Band 2/Band 4/Band 5/Band 12/Band 13/Band 14/Band 17/Band 25/Band 26/Band 66/Band 71:
The minimum permissible attenuation level of any spurious emission is 43 + log10(P[Watts]), where P is the transmitter power in Watts.
For Band 7:
(i) 40 + 10 log10 p from the channel edges to 5 MHz away
(ii) 43 + 10 log10 p between 5 MHz and X MHz from the channel edges, and
(iii) 55 + 10 log10 p at X MHz and beyond from the channel edges
For Band 14:
On all frequencies between 769-775 MHz and 799-805 MHz:< 65 + 10log10 (P[Watts])

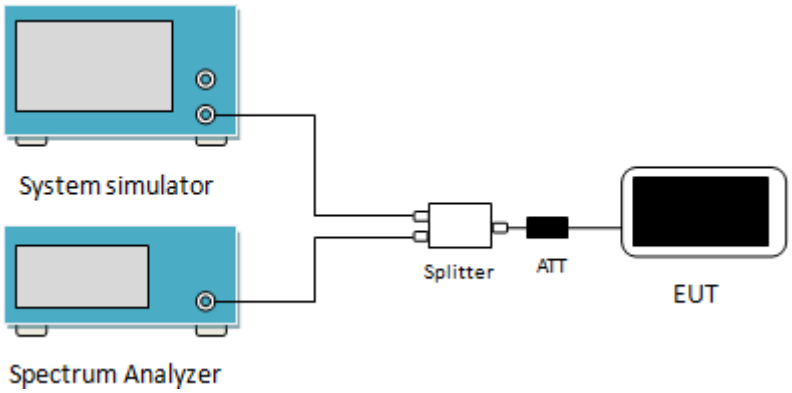
Test Settings

1. Start frequency was set to 30MHz and stop frequency was set to at least 10 * the fundamental frequency (separated into at least two plots per channel)
1. RBW = 1 MHz
2. VBW ≥ 3 MHz
3. Detector = RMS
4. Trace Mode = Average
5. Sweep time = auto
6. Number of points in sweep ≥ 2 * Span / RBW

Test Note

Compliance with the applicable limits is based on the use of measurement instrumentation employing a resolution bandwidth of 100 kHz or greater for frequencies less than 1 GHz and 1 MHz or greater for frequencies greater than 1 GHz. However, in the 1 MHz bands immediately outside and adjacent to the frequency block a resolution bandwidth of at least one percent of the emission bandwidth of the fundamental emission of the transmitter may be employed. The emission bandwidth is defined as the width of the signal between two points, one below the carrier center frequency and one above the carrier center frequency, outside of which all emission are attenuated at least 26 dB below the transmitter power.

7.3 MEASUREMENT SETUP



7.4 TEST RESULT

Please refer to Appendix

Note: 1. No transmission signal is found in standby or receiving mode, and the default value is lower than the limit of 20dB, which is not recorded in this report.

2. Pre-scan all RB Size and offset, and found the RB Size and offset of worst case, so the report shows only the worst case test data.

8 FIELD STRENGTH OF SPURIOUS RADIATION MEASUREMENT

8.1 PROVISIONS APPLICABLE

(A) On any frequency outside a licensee's frequency block (e.g. A, D, B, etc.) within the USPCS spectrum, the power of any emission shall be attenuated below the transmitter power (P, in Watts) by at least 43+10Log(P) dB. The specification that emissions shall be attenuated below the transmitter power (P) by at least 43 + 10 log (P) dB, translates in the relevant power range (1 to 0.001 W) to -13 dBm.

At 1 W the specified minimum attenuation becomes 43 dB and relative to a 30 dBm (1 W) carrier becomes a limit of -13 dBm. At 0.001 W (0 dBm) the minimum attenuation is 13 dB, which again yields a limit of -13 dBm. In this way a translation of the specification from relative to absolute terms is carried out.

(B) For specific criteria, please refer to the description in section 9.2 of the report for corresponding evaluation.

8.2 MEASUREMENT PROCEDURE

1. The EUT was placed on the top of the turntable 0.8 or 1.5 meter above ground. The phase center of the receiving antenna mounted on the top of a height-variable antenna tower was placed 3 meters far away from the turntable.
2. Power on the EUT and all the supporting units. The turntable was rotated by 360 degrees to determine the position of the highest radiation.
3. The height of the broadband receiving antenna was varied between one meter and four meters above ground to find the maximum emissions field strength of both horizontal and vertical polarization.
4. For each suspected emissions, the antenna tower was scan (from 1 M to 4 M) and then the turntable was rotated (from 0 degree to 360 degrees) to find the maximum reading.
5. Set the test-receiver system to Peak or CISPR quasi-peak Detect Function with specified bandwidth under Maximum Hold Mode.
6. For emissions above 1GHz, use 1MHz VBW and RBW for peak reading. Then 1MHz RBW and 10Hz VBW for average reading in spectrum analyzer. Place the measurement antenna away from each area of the EUT determined to be a source of emissions at the specified measurement distance, while keeping the measurement antenna aimed at the source of emissions at each frequency of significant emissions, with polarization oriented for maximum response. The measurement antenna may have to be higher or lower than the EUT, depending on the radiation pattern of the emission and staying aimed at the emission source for receiving the maximum signal. The final measurement antenna elevation shall be that which maximizes the emissions. The measurement antenna elevation for maximum emissions shall be restricted to a range of heights of from 1 m to 4 m above the ground or reference ground plane.
7. When the radiated emissions limits are expressed in terms of the average value of the emissions, and pulsed operation is employed, the measurement field strength shall be determined by averaging over one complete pulse train, including blanking intervals, as long as the pulse train does not exceed 0.1 seconds. As an alternative (provided the transmitter operates for longer than 0.1 seconds) or in cases where the pulse train exceeds 0.1 seconds, the measured field strength shall be determined from the average absolute voltage during a 0.1 second interval during which the field strength is at its maximum values.

8.If the emissions level of the EUT in peak mode was 3 dB lower than the average limit specified, then testing will be stopped and peak values of EUT will be reported, otherwise, the emissions which do not have 3 dB margin will be repeated one by one using the quasi-peak method for below 1GHz.

9. For testing above 1GHz, the emissions level of the EUT in peak mode was lower than average limit (that means the emissions level in peak mode also complies with the limit in average mode), then testing will be stopped and peak values of EUT will be reported, otherwise, the emissions will be measured in average mode again and reported.

10. In case the emission is lower than 30MHz, loop antenna has to be used for measurement and the recorded data should be QP measured by receiver. High - Low scan is not required in this case.

11. For spurious emissions above 1GHz, a horn antenna is substituted in place of the EUT. The substitute antenna is driven by a signal generator and the previously recorded signal was duplicated.

The spurious emissions is calculated by the following formula;

Result(dBm) = Pg(dBm) +Factor(dB)

Factor(dB) = Ant Gain(dB)-Cable Loss(dB) + Power Splitter(dB) (Above 1GHz)

Factor(dB) = Ant Gain(dB)-Cable Loss(dB) (Below 1GHz)

Where: Pgis the generator output power into the substitution antenna.

If the fundalmatal frequency is below 1GHz, RF output power has been converted to EIRP.

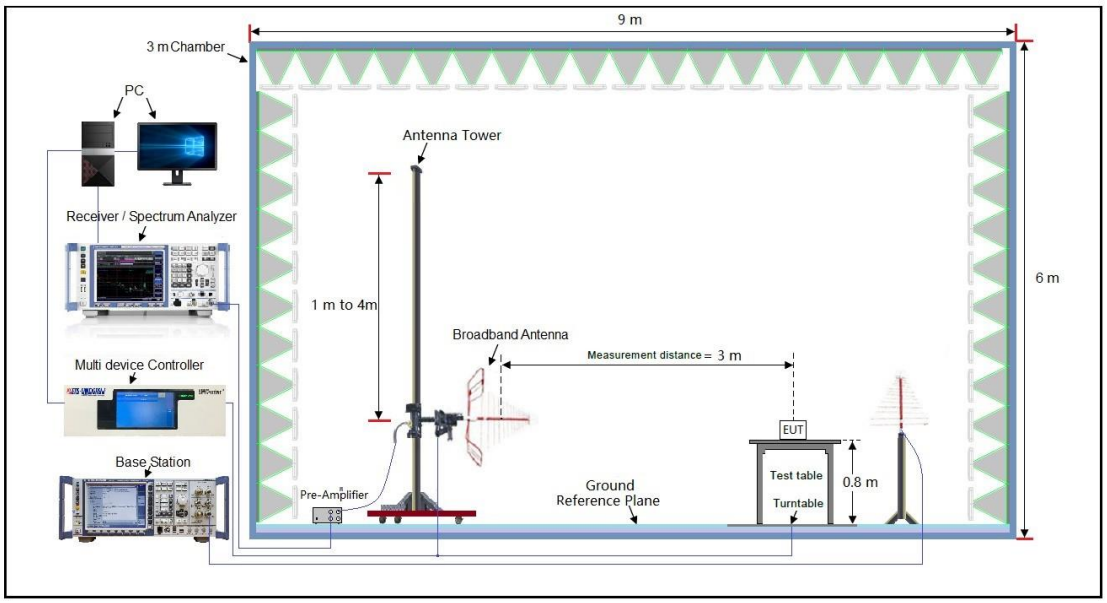
EIRP(dBm) = ERP(dBm) + 2.15

12. Examples of Factor parameters for testing radiation spurious:

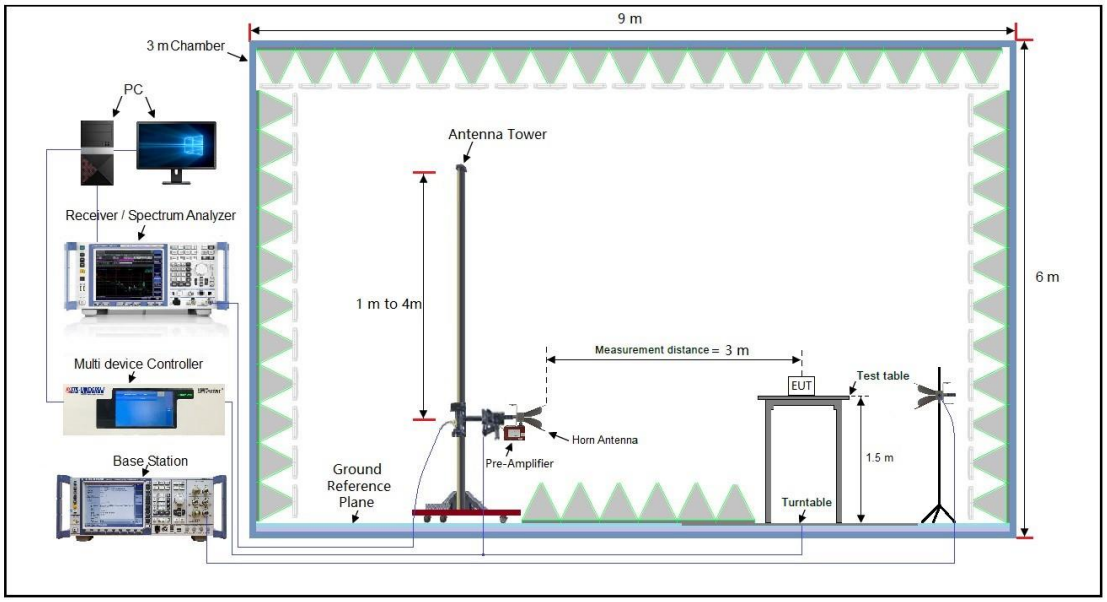
Frequency Range(MHz)	Factor(dB)
30-500	6.18
500-1000	9.37
1000-1500	27.56
1500-2000	28.27
2000-3000	29.45
3000-5000	30.15
5000-10000	31.26
10000-15000	32.78
15000-20000	33.99
Above 20GHz	35.04

8.3 MEASUREMENT SETUP

Radiated Emissions 30MHz to 1GHz Test setup



Radiated Emissions Above 1GHz Test setup



8.4 TEST RESULT

All the modulations and bandwidths were tested and only record the worst result for Band 2(QPSK, 10MHz), Band 4(QPSK, 20MHz), Band 5(QPSK, 1.4MHz) , Band 12(QPSK, 1.4MHz) , Band 13(QPSK, 10MHz) , Band 17(QPSK, 10MHz) , Band 66(QPSK, 20MHz) , Band 71(QPSK, 20MHz).

LTE Band 2
Low channel

Frequency (MHz)	Polarity (H/V)	Emission Level (dBm)	Limit (dBm)	Margin (dB)
5580	V	-43.57	-13	-30.57
3720	V	-42.58	-13	-29.58
703.3	V	-49.68	-13	-36.68
419.9	V	-51.76	-13	-38.76
5580	H	-41.82	-13	-28.82
3720	H	-43.13	-13	-30.13
703.3	H	-50.43	-13	-37.43
419.9	H	-51.91	-13	-38.91

Middle channel

Frequency (MHz)	Polarity (H/V)	Emission Level (dBm)	Limit (dBm)	Margin (dB)
5640	V	-43.27	-13	-30.27
3760	V	-41.93	-13	-28.93
889.3	V	-50.01	-13	-37.01
621.4	V	-51.02	-13	-38.02
5640	H	-51.19	-13	-38.19
3760	H	-43.92	-13	-30.92
889.3	H	-47.15	-13	-34.15
621.4	H	-50.74	-13	-37.74

High channel

Frequency (MHz)	Polarity (H/V)	Emission Level (dBm)	Limit (dBm)	Margin (dB)
5700	V	-43.4	-13	-30.4
3800	V	-43.9	-13	-30.9
669.3	V	-49.19	-13	-36.19
547.6	V	-48.61	-13	-35.61
5700	H	-41.54	-13	-28.54
3800	H	-41.25	-13	-28.25
669.3	H	-50.01	-13	-37.01
547.6	H	-50.16	-13	-37.16

LTE Band 4
Low channel

Frequency (MHz)	Polarity (H/V)	Emission Level (dBm)	Limit (dBm)	Margin (dB)
5160	V	-41.46	-13	-28.46
3440	V	-41.66	-13	-28.66
783.6	V	-46.83	-13	-33.83
547.3	V	-49.56	-13	-36.56
5160	H	-41.58	-13	-28.58
3440	H	-42.05	-13	-29.05
783.6	H	-49.05	-13	-36.05
547.3	H	-45.88	-13	-32.88

Middle channel

Frequency (MHz)	Polarity (H/V)	Emission Level (dBm)	Limit (dBm)	Margin (dB)
5197.5	V	-38.5	-13	-25.5
3465	V	-38.63	-13	-25.63
742.3	V	-45.47	-13	-32.47
615.7	V	-47.47	-13	-34.47
5197.5	H	-38.93	-13	-25.93
3465	H	-39.45	-13	-26.45
742.3	H	-46.14	-13	-33.14
615.7	H	-45.73	-13	-32.73

High channel

Frequency (MHz)	Polarity (H/V)	Emission Level (dBm)	Limit (dBm)	Margin (dB)
5235	V	-38.51	-13	-25.51
3490	V	-39.51	-13	-26.51
711.1	V	-47.46	-13	-34.46
528.7	V	-46.65	-13	-33.65
5235	H	-38.32	-13	-25.32
3490	H	-38.24	-13	-25.24
612.5	H	-45.3	-13	-32.3
553.9	H	-45.07	-13	-32.07

LTE Band 5

Low channel

Frequency (MHz)	Polarity (H/V)	Emission Level (dBm)	Limit (dBm)	Margin (dB)
2487	V	-40.76	-13	-27.76
1658	V	-42.03	-13	-29.03
512.2	V	-45.93	-13	-32.93
365.5	V	-46.2	-13	-33.2
2487	H	-39.71	-13	-26.71
1658	H	-39.88	-13	-26.88
521.1	H	-44.2	-13	-31.2
336.5	H	-44.28	-13	-31.28

Middle channel

Frequency (MHz)	Polarity (H/V)	Emission Level (dBm)	Limit (dBm)	Margin (dB)
2509.5	V	-42.44	-13	-29.44
1673	V	-42.31	-13	-29.31
725.8	V	-46.21	-13	-33.21
616.6	V	-45.95	-13	-32.95
2509.5	H	-40.83	-13	-27.83
1673	H	-41.69	-13	-28.69
705.5	H	-45.25	-13	-32.25
558.9	H	-44.93	-13	-31.93

High channel

Frequency (MHz)	Polarity (H/V)	Emission Level (dBm)	Limit (dBm)	Margin (dB)
2532	V	-39.83	-13	-26.83
1688	V	-39.76	-13	-26.76
648.3	V	-45.75	-13	-32.75
482.7	V	-45.74	-13	-32.74
2532	H	-40.21	-13	-27.21
1688	H	-40.4	-13	-27.4
785.6	H	-45.48	-13	-32.48
615.7	H	-47.39	-13	-34.39

LTE Band 12
Low channel

Frequency (MHz)	Polarity (H/V)	Emission Level (dBm)	Limit (dBm)	Margin (dB)
2112.0	V	-42.5	-13	-29.5
1408	V	-41.1	-13	-28.1
658.1	V	-49.76	-13	-36.76
516.9	V	-49.18	-13	-36.18
2112	H	-41.4	-13	-28.4
1408	H	-41.3	-13	-28.3
714.4	H	-48.12	-13	-35.12
669.5	H	-48.43	-13	-35.43

Middle channel

Frequency (MHz)	Polarity (H/V)	Emission Level (dBm)	Limit (dBm)	Margin (dB)
2122.5	V	-43.88	-13	-30.88
1415	V	-43.4	-13	-30.4
651.5	V	-47.55	-13	-34.55
512.7	V	-49.72	-13	-36.72
2122.5	H	-43.04	-13	-30.04
1415	H	-42.87	-13	-29.87
525.4	H	-48.61	-13	-35.61
498.7	H	-49.47	-13	-36.47

High channel

Frequency (MHz)	Polarity (H/V)	Emission Level (dBm)	Limit (dBm)	Margin (dB)
2133	V	-43.85	-13	-30.85
1422	V	-43.21	-13	-30.21
653.3	V	-47	-13	-34
592.7	V	-47.87	-13	-34.87
2133	H	-44.1	-13	-31.1
1422	H	-43.62	-13	-30.62
641.5	H	-50.84	-13	-37.84
558.3	H	-48.95	-13	-35.95

LTE Band 13
Low channel

Frequency (MHz)	Polarity (H/V)	Emission Level (dBm)	Limit (dBm)	Margin (dB)
2338.5	V	-47.16	-13	-34.16
1559	V	-44.68	-13	-31.68
678.2	V	-47.82	-13	-34.82
423.6	V	-51.53	-13	-38.53
2338.5	H	-44.92	-13	-31.92
1559	H	-43.99	-13	-30.99
577.3	H	-52.27	-13	-39.27
345.9	H	-48.64	-13	-35.64

Middle channel

Frequency (MHz)	Polarity (H/V)	Emission Level (dBm)	Limit (dBm)	Margin (dB)
2346	V	-44.87	-13	-31.87
1564	V	-45.57	-13	-32.57
611.7	V	-50.8	-13	-37.8
444,8	V	-51.78	-13	-38.78
2346	H	-43.93	-13	-30.93
1564	H	-45.49	-13	-32.49
692.8	H	-47.5	-13	-34.5
439.4	H	-51.83	-13	-38.83

High channel

Frequency (MHz)	Polarity (H/V)	Emission Level (dBm)	Limit (dBm)	Margin (dB)
2353.5	V	-44.76	-13	-31.76
1569	V	-44.22	-13	-31.22
572.8	V	-48.26	-13	-35.26
309.9	V	-50.87	-13	-37.87
2353.5	H	-43.62	-13	-30.62
1569	H	-43.19	-13	-30.19
602.7	H	-49.5	-13	-36.5
413.6	H	-49.38	-13	-36.38

LTE Band 17
Low channel

Frequency (MHz)	Polarity (H/V)	Emission Level (dBm)	Limit (dBm)	Margin (dB)
2127	V	-39.77	-13	-26.77
1418	V	-42.62	-13	-29.62
880.36	V	-36.95	-13	-23.95
650.93	V	-44.10	-13	-31.10
2127	H	-39.32	-13	-26.32
1418	H	-42.37	-13	-29.37
840.77	H	-36.70	-13	-23.70
666.78	H	-43.70	-13	-30.70

Middle channel

Frequency (MHz)	Polarity (H/V)	Emission Level (dBm)	Limit (dBc)	Margin (dB)
2130	V	-38.74	-13	-25.74
1420	V	-42.04	-13	-29.04
925.75	V	-36.47	-13	-23.47
636.94	V	-42.94	-13	-29.94
2130	H	-31.99	-13	-18.99
1420	H	-38.46	-13	-25.46
886.06	H	-41.74	-13	-28.74
560.36	H	-36.21	-13	-23.21

High channel

Frequency (MHz)	Polarity (H/V)	Emission Level (dBm)	Limit (dBm)	Margin (dB)
2133	V	-37.55	-13	-24.55
1422	V	-38.79	-13	-25.79
677.77	V	-28.70	-13	-15.70
416.01	V	-38.78	-13	-25.78
2133	H	-37.19	-13	-24.19
1422	H	-38.43	-13	-25.43
740.46	H	-28.39	-13	-15.39
594.04	H	-38.30	-13	-25.30

LTE Band 13 (1559 MHz ~ 1610 MHz Wideband Band)

Operating Frequency (MHz)	Measured Frequency (MHz)	Polarity (H/V)	Emission Level (dBm)	Limit (dBm/MHz)	Margin (dB)
779.5	1559	V	-42.02	-40	-2.02
782.0	1564	V	-42.91	-40	-2.91
784.5	1569	V	-41.56	-40	-1.56
779.5	1559	H	-41.33	-40	-1.33
782.0	1564	H	-42.83	-40	-2.83
784.5	1569	H	-40.53	-40	-0.53

Note:

1. The spurious emissions found in the frequency band 1559-1610MHz meet the stricter Wideband limits.

2. The emission levels of below 1 GHz are very lower than the limit above10dB and not show in test report.

LTE Band 66
Low channel

Frequency (MHz)	Polarity (H/V)	Emission Level (dBm)	Limit (dBm)	Margin (dB)
5132.1	V	-43.34	-13	-30.34
3421.4	V	-41.92	-13	-28.92
698.3	V	-46.64	-13	-33.64
417.5	V	-48.44	-13	-35.44
5132.1	H	-42.46	-13	-29.46
3421.4	H	-43.01	-13	-30.01
504.9	H	-50.19	-13	-37.19
431.9	H	-47.54	-13	-34.54

Middle channel

Frequency (MHz)	Polarity (H/V)	Emission Level (dBm)	Limit (dBm)	Margin (dB)
5235	V	-42.93	-13	-29.93
3490	V	-42.3	-13	-29.3
578.2	V	-48.35	-13	-35.35
345.7	V	-49.21	-13	-36.21
5235	H	-42.5	-13	-29.5
3490	H	-42.18	-13	-29.18
634.8	H	-46.5	-13	-33.5
412.9	H	-50.22	-13	-37.22

High channel

Frequency (MHz)	Polarity (H/V)	Emission Level (dBm)	Limit (dBm)	Margin (dB)
5337.9	V	-41.91	-13	-28.91
3558.6	V	-40.83	-13	-27.83
752.6	V	-46.27	-13	-33.27
546.1	V	-48.83	-13	-35.83
5337.9	H	-41.85	-13	-28.85
3558.6	H	-41.43	-13	-28.43
687.3	H	-47.9	-13	-34.9
436.6	H	-46.96	-13	-33.96

LTE Band 71
Low channel

Frequency (MHz)	Polarity (H/V)	Emission Level (dBm)	Limit (dBm)	Margin (dB)
1996.5	V	-41.91	-13	-28.91
1331	V	-42.9	-13	-29.9
511.2	V	-45.33	-13	-32.33
375.4	V	-48.45	-13	-35.45
1996.5	H	-42.03	-13	-29.03
1331	H	-43.12	-13	-30.12
577.1	H	-50.86	-13	-37.86
309.6	H	-47.51	-13	-34.51

Middle channel

Frequency (MHz)	Polarity (H/V)	Emission Level (dBm)	Limit (dBm)	Margin (dB)
2041.5	V	-42.4	-13	-29.4
1361	V	-43.44	-13	-30.44
515.1	V	-48.62	-13	-35.62
345.7	V	-50.24	-13	-37.24
2041.5	H	-43.01	-13	-30.01
1361	H	-42.17	-13	-29.17
564.5	H	-46.27	-13	-33.27
315.9	H	-51.06	-13	-38.06

High channel

Frequency (MHz)	Polarity (H/V)	Emission Level (dBm)	Limit (dBm)	Margin (dB)
2086.5	V	-41.45	-13	-28.45
1391	V	-41.03	-13	-28.03
546.6	V	-47.2	-13	-34.2
345.1	V	-49.37	-13	-36.37
2086.5	H	-41.41	-13	-28.41
1391	H	-41.02	-13	-28.02
534.2	H	-48.23	-13	-35.23
322.9	H	-47.16	-13	-34.16

Note: 1. Margin (dB) = Emission Level(dBm) -Limit(dBm)
Emission Level(dBm)= Measurement Reading(dBm)+Factor(dB)
Factor(dB) = ANT Gain -Cable Loss + Power Splitter

2. The test refers to the value of Factor, please refer to the results listed in the test method in this section of the report.
3. Radiated Spurious Emissions was Tested QPSK Modulation, Resource Block Size 1 and Resource Block Offset 0.
4. Below 30MHz, no spurious emission was found, and only the worst mode data above 30MHz is recorded in the report.

9 FREQUENCY STABILITY V.S. TEMPERATURE MEASUREMENT

9.1 PROVISIONS APPLICABLE

9.1.1 For Hand carried battery powered equipment

Frequency stability testing is performed in accordance with the guidelines of ANSI/TIA-603-E-2016.

The frequency stability of the transmitter is measured by:

a.) Temperature: The temperature is varied from -10°C to +40°C in 10°C increments using an environmental chamber.

b.) Primary Supply Voltage: The primary supply voltage is varied from 85% to 115% of the nominal value for non hand-carried battery and AC powered equipment. For hand-carried,battery-powered equipment, primary supply voltage is reduced to the battery operating end point which shall be specified by the manufacturer.

For Part 22, the frequency stability of the transmitter shall be maintained within ±0.00025% (±2.5 ppm) of the center frequency. For Part 24 and Part 27, the frequency stability shall be sufficient to ensure that the fundamental emission stays within the authorized frequency block.

9.1.2 For equipment powered by primary supply voltage

1. The carrier frequency of the transmitter is measured at room temperature (20°C to provide a reference).
2. The equipment is turned on in a “standby” condition for fifteen minutes before applying power to the transmitter. Measurement of the carrier frequency of the transmitter is made within one minute after applying power to the transmitter.
3. Frequency measurements are made at 10°C intervals ranging from -10°C to +40°C. A period of at least one half-hour is provided to allow stabilization of the equipment at each temperature level.

9.2 MEASUREMENT METHOD

In order to measure the carrier frequency under the condition of AFC lock, it is necessary to make measurements with the EUT in a “call mode”. This is accomplished with the use of R&S CMW500 DIGITAL RADIO COMMUNICATION TESTER.

1.Measure the carrier frequency at room temperature.

2.Subject the EUT to overnight soak at -10℃. With the EUT, powered via nominal voltage, connected to the CMW500 and in a simulated call on channel 20175 for LTE band 4 measure the carrier frequency. These measurements should be made within 2 minutes of Powering up the EUT, to prevent significant self-warming.

3.Repeat the above measurements at 10℃ increments from -10℃ to +40℃. Allow at least 1 1/2 hours at each temperature, unpowered, before making measurements.

4.Re-measure carrier frequency at room temperature with nominal voltage. Vary supply voltage from minimum voltage to maximum voltage, in 0.1Volt increments re-measuring carrier frequency at each voltage. Pause at nominal voltage for 1 1/2 hours unpowered, to allow any self-heating to stabilize, before continuing.

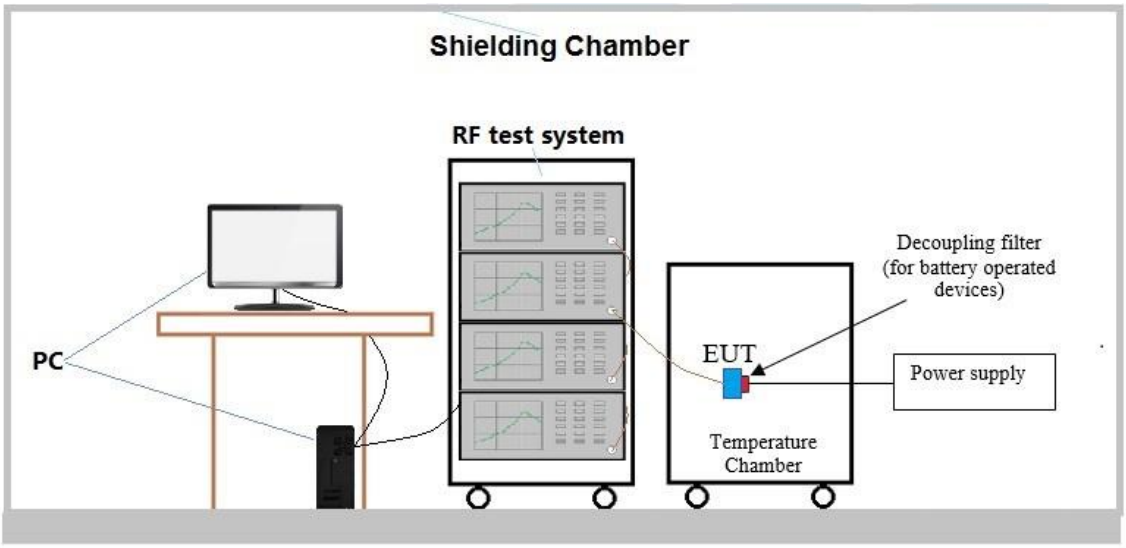
5.Subject the EUT to overnight soak at +50℃.

6.With the EUT, powered via nominal voltage, connected to the CMW500 and in a simulated call on the centre channel, measure the carrier frequency. These measurements should be made within 2 minutes of Powering up the EUT, to prevent significant self-warming.

7.Repeat the above measurements at 10℃ increments from +50℃ to -20℃. Allow at least 1 1/2 hours at each temperature, unpowered, before making measurements.

8.At all temperature levels hold the temperature to +/- 0.5℃ during the measurement procedure.

9.3 MEASUREMENT SETUP



9.4 TEST RESULT

Please refer to Appendix test data

10 FREQUENCY STABILITY V.S. VOLTAGE MEASUREMENT

10.1 MEASUREMENT SETUP

Refer to 9.3

10.2 TEST PROCEDURE

1. Set chamber temperature to 25℃. Use a variable DC power source to power the EUT and set the voltage to rated voltage.
2. Set the spectrum analyzer RBW low enough to obtain the desired frequency resolution and recorded the frequency. Reduce the input voltage to specify extreme voltage variation (+/- 15%) and endpoint, record the maximum frequency change.

10.3 TEST RESULT

Refer to 9.4

11 BAND EDGE

11.1 MEASUREMENT OVERVIEW

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.

11.2 MEASUREMENT METHOD

1. Start and stop frequency were set such that the band edge would be placed in the center of the plot
2. Span was set large enough so as to capture all out of band emissions near the band edge
3. RBW > 1% of the emission bandwidth
4. VBW > 3 x RBW
5. Detector = RMS
6. Number of sweep points ≥ 2 x Span/RBW
7. Trace mode = trace average
8. Sweep time = auto couple
9. The trace was allowed to stabilize

TEST NOTE

§90.543(e)

1. On all frequencies between 769-775 MHz and 799-805 MHz, by a factor not less than 76 + 10 log (P) dB in a 6.25 kHz band segment, for base and fixed stations.

2. On all frequencies between 769-775 MHz and 799-805 MHz, by a factor not less than 65 + 10 log (P) dB in a 6.25 kHz band segment, for mobile and portable stations.

3. On any frequency between 775-788 MHz, above 805 MHz, and below 758 MHz, by at least 43 + 10 log (P) dB.

4. Compliance with the provisions of paragraphs (e)(1) and (2) of this section is based on the use of m easurement instrumentation such that the reading taken with any resolution bandwidth setting should be adjusted to indicate spectral energy in a 6.25 kHz segment.

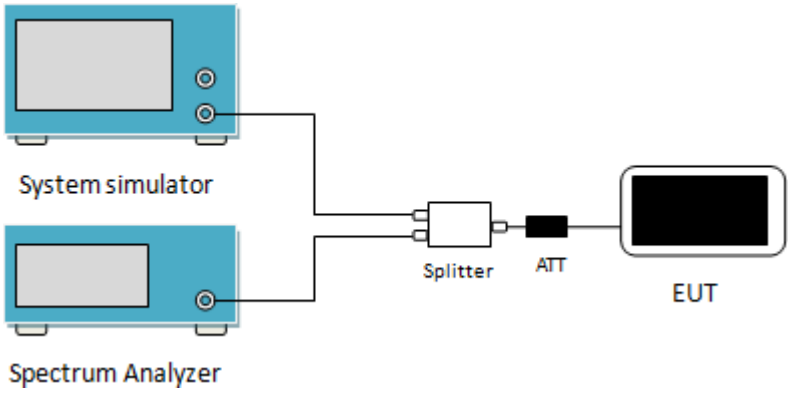
5. Compliance with the provisions of paragraph (e)(3) of this section is based on the use of measurem ent instrumentation employing a resolution bandwidth of 100 kHz or greater.

However, in the 100 kHz bands immediately outside and adjacent to the frequency block, a resolution bandwidth of 30kHz may be employed.

According to FCC 22.917, 24.238, 27.53 specified that power of any emission outside of The authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least 43 + 10 log(P) dB.In the 1 MHz bands immediately outside and adjacent to the frequency block a resolution bandwidth of at least one percent of the emission bandwidth of the

fundamental emission of the transmitter may be employed. All measurements were done at 2 channels(low and high operational frequency range.)
The band edge measurement used the power splitter via EUT RF power connector between simulation base station and spectrum analyzer.

11.3 MEASUREMENT METHOD

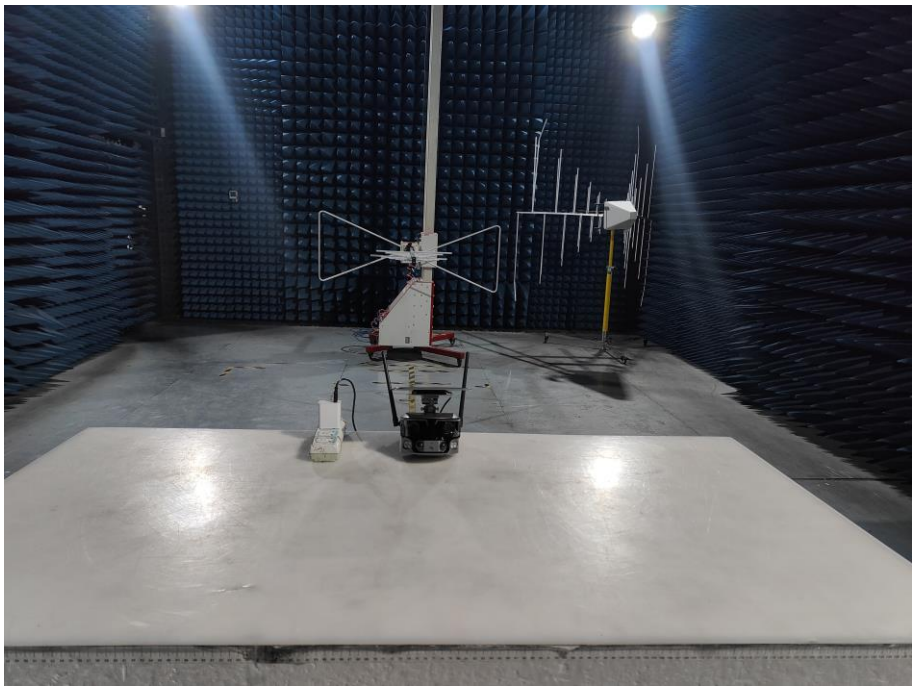


11.4 TEST RESULT

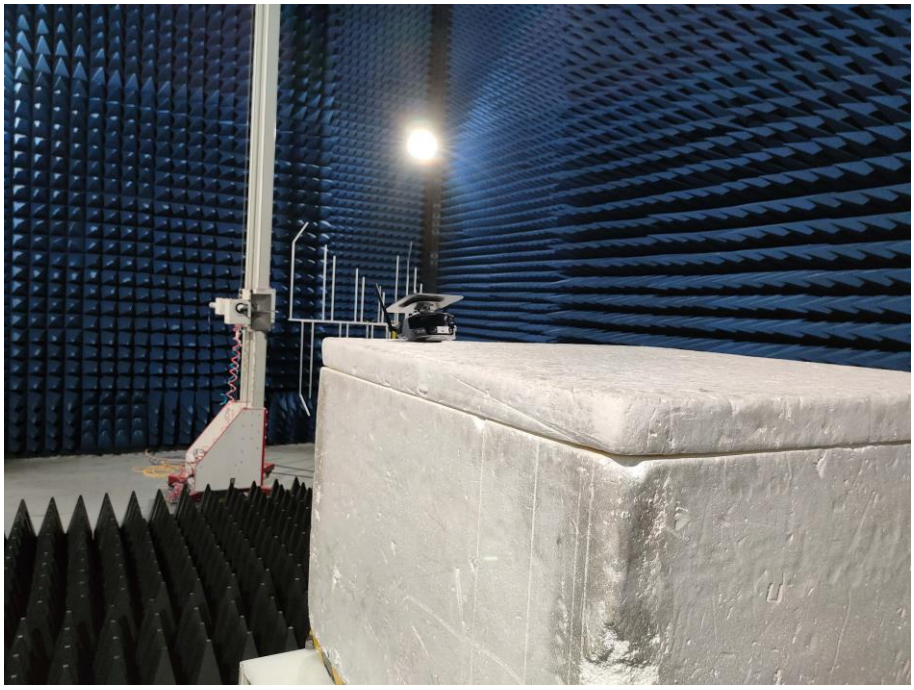
Please refer to Appendix

12 PHOTO OF TEST

RADIATED EMISSION



30MHz-1000MHz



Above 1GHz

RF Conducted

End of Report