FCC RADIO TEST REPORT

FCC ID: 2BAA8-GB213HKXV

Sample : LTE Security Camera System

Trade Name : GENBOLT

Main Model : GB-213H/K/X/V

Additional Model : Additional model please refer to the page 7

Report No. : UNIA23021713ER-61

Prepared for

ShenZhenShi KuShi KeJi YouXianGongSi

A583, Block A, B, #1019 NanHai Ave, YanShan Community, ZhaoShang Street, NanShan, ShenZhen, China

Prepared by

Shenzhen United Testing Technology Co., Ltd.

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TEST RESULT CERTIFICATION

Applicant	:	ShenZhenShi KuShi KeJi YouXianGongSi
Address	:	A583, Block A, B, #1019 NanHai Ave, YanShan Community, ZhaoShang Street, NanShan, ShenZhen, China
Manufacturer	:	ShenZhenShi KuShi KeJi YouXianGongSi
Address	:	A583, Block A, B, #1019 NanHai Ave, YanShan Community, ZhaoShang Street, NanShan, ShenZhen, China

Product description

Product	:	LTE Security Camera System
Trade Name	:	GENBOLT
Model Name	:	GB-213H/K/X/V, Additional model please refer to the page 7
Test Methods	:	FCC CFR Title 47 Part 2 FCC CFR Title 47 Part 22 Subpart H FCC CFR Title 47 Part 24 Subpart E FCC CFR Title 47 Part 27 Subpart L FCC CFR Title 47 Part 27 Subpart H

This device described above has been tested by Shenzhen United Testing Technology 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	:	Feb. 17, 2023 ~ Feb. 27, 2023
Date of Issue	:	Feb. 28, 2023
Test Result	:	Pass

Prepared by: kahn.yang

Kahn yang/Supervisor

Reviewer: kelly cheng

Kelly Cheng/Supervisor

Approved & Authorized Signer: liuze

Liuze/Manager

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1 TEST SUMMARY

1.1 TEST PROCEDURES AND RESULTS

DESCRIPTION OF TEST	STANDARD	RESULT
RF Output Power	Part 2.1046 Part 22.913 (a)(5) Part 24.232 (c) Part 27.50 (c)(10) Part 27.50 (d)(4)	COMPLIANT
Peak-to-Average Power Ratio	Part 24.232 (d) Part 22.913 (d) Part 27.50(d)(5)	COMPLIANT
Modulation Characteristics	Part 2.1047	COMPLIANT
99% & -26 dB Occupied Bandwidth	Part 2.1049 Part 22.917(b) Part 24.238(b) Part 27.53(g) Part 27.53(h) Part 27.53(m)	COMPLIANT
Out of band emission at antenna terminals	Part 2.1053 Part 22.917(a) Part 24.238 (a) Part 27.53 (g) Part 27.53 (h)	COMPLIANT
Field strength of spurious radiation	Part 22.917(a) Part 24.238 (a) Part 27.53 (g) Part 27.53 (h)	COMPLIANT
Frequency stability vs. temperature	Part 22.355 Part 24.235 Part 27.54 Part 2.1055(a)(1)(b)	COMPLIANT
Frequency stability vs. voltage	Part 22.355 Part 24.235 Part 27.54 Part 2.1055(d)(2)	COMPLIANT

1.2 TEST FACILITY

Test Firm : Shenzhen United Testing Technology Co., Ltd.

Address : 2F, Annex Bldg, Jiahuangyuan Tech Park, #365 Baotian 1 Rd, Tiegang Community, Xixiang Str, Bao'an District, Shenzhen, China

The testing quality ability of our laboratory meet with "Quality Law of People's Republic of China" Clause 19.The testing quality system of our laboratory meets with ISO/IEC-17025 requirements. This approval result is accepted by MRA of APLAC.

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

A2LA Certificate Number: 4747.01

The EMC Laboratory has been accredited by A2LA, and in compliance with ISO/IEC 17025:2017 General Requirements for testing Laboratories.

FCC Registration Number: 0027159896

The EMC Laboratory has been registered and fully described in a report filed with the (FCC) Federal Communications commission.

IC Registration Number: 21947

The EMC Laboratory has been registered and fully described in a report filed with the (IC) Industry Canada.

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	LTE Security Camera System
Trade Name	GENBOLT
Main Model	GB-213H/K/X/V
Additional Model	GB-106H/K/X/V, GB-107H/K/X/V, GB-108H/K/X/V, GB-109H/K/X/V, GB-200H/K/X/V, GB-201H/K/X/V, GB-202H/K/X/V, GB-203H/K/X/V, GB-206H/K/X/V, GB-209H/K/X/V, GB-210H/K/X/V, GB-211H/K/X/V, GB-212H/K/X/V, GB-216H/K/X/V, GB-217H/K/X/V, GB-219H/K/X/V, GB-222H/K/X/V, GB-223H/K/X/V, GB-224H/K/X/V
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: GB-213H/K/X/V.
FCC ID	2BAA8-GB213HKXV
Antenna Type	IPEX Antenna
Antenna Gain	LTE Band 2: 2.22dBi, LTE Band 4: -3.52dBi, LTE Band 5: 0.59dBi, LTE Band 12: -0.8dBi, LTE Band 13: -0.8dBi, LTE Band 17: -0.8dBi, LTE Band 66: -3.52dBi
Frequency Range	Band 2: UL: 1850.7MHz~1909.3MHz, DL: 1930.7MHz~1989.3MHz Band 4: UL: 1710.7MHz~1754.3MHz, DL: 2110.7MHz~2154.3MHz Band 5: UL: 824.7MHz~848.3MHz, DL: 869.7MHz~893.3MHz Band 12: UL: 699.7MHz~715.3MHz, DL: 729.7MHz~745.3MHz Band 13: UL: 779.5MHz~784.5MHz, DL: 748.5MHz~753.5MHz Band 17: UL: 706.5MHz~713.5MHz, DL: 736.5MHz~743.5MHz Band 66: UL: 1710.7MHz~1779.3MHz, DL: 2110.7MHz~2179.3MHz
Frequency Band	BAND2/4/5/12/13/17/66
Modulation Type	☒QPSK ☒16QAM
Battery	N/A
Power Source	DC 12V from adapter
Adapter	Model: XED-NVR2010WC2-J Input: 100-240V~, 50/60Hz, 0.7A Output: DC 12V, 2A

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.			

2.3 DESCRIPTION OF THE TEST MODES

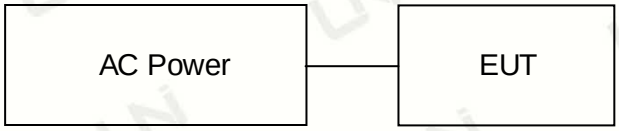
During the measurement the environmental conditions were within the listed ranges:

Voltage	Normal Voltage	AC 120V
	High Voltage	AC 132V
	Low Voltage	AC 108V
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 No.	Trademark	Cable Length(cm)	Remark
1	LTE Security Camera System	GB-213H/K/X/V	GENBOLT	3m	EUT

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

Item	Equipment	Manufacturer	Model No.	Serial No.	Calibrated until
Conduction Emissions Measurement					
1	Conducted Emission Test Software	EZ-EMC	Ver.CCS-3A1-CE	N/A	N/A
2	AMN	Schwarzbeck	NNLK8121	8121370	2023.09.22
3	AAN	TESEQ	T8-Cat6	38888	2023.09.22
4	Pulse Limiter	CYBRTEK	EM5010	E115010056	2023.05.30
5	EMI Test Receiver	Rohde&Schwarz	ESCI	101210	2023.09.22
Radiated Emissions Measurement					
1	Radiated Emission Test Software	EZ-EMC	Ver.CCS-03A1	N/A	N/A
2	Horn Antenna	Sunol	DRH-118	A101415	2023.09.27
3	Broadband Hybrid Antenna	Sunol	JB1	A090215	2024.02.26
4	PREAMP	HP	8449B	3008A00160	2023.09.22
5	PREAMP	HP	8447D	2944A07999	2023.05.30
6	EMI TEST RECEIVER	Rohde&Schwarz	ESR3	101891	2023.09.22
7	VECTOR Signal Generator	Rohde&Schwarz	SMU200A	101521	2023.09.22
8	Signal Generator	Agilent	E4421B	MY4335105	2023.09.22
9	MXA Signal Analyzer	Agilent	N9020A	MY50510140	2023.09.22
10	MXA Signal Analyzer	Keysight	N9020A	MY51110104	2023.09.22
11	RF Power sensor	DARE	RPR3006W	15I00041SNO88	2023.05.30
12	RF Power sensor	DARE	RPR3006W	15I00041SNO89	2023.05.30
13	RF power divider	Anritsu	K241B	992289	2023.09.22
14	Wideband radio communication tester	Rohde&Schwarz	CMW500	154987	2023.09.22
15	Active Loop Antenna	Com-Power	AL-130R	10160009	2023.05.30
16	Broadband Hybrid Antennas	Schwarzbeck	VULB9163	VULB9163#958	2023.09.22
17	Horn Antenna	Schwarzbeck	BBHA9120D	9120D-1680	2023.05.30
18	Horn Antenna	A-INFOMW	LB-180400-KF	J211060660	2023.09.27
19	Microwave Broadband Preamplifier	Schwarzbeck	BBV 9721	100472	2023.09.22
20	Signal Generator	Agilent	N5183A	MY47420153	2023.09.22
21	Spctrum Analyzer	Rohde&Schwarz	FSP 40	100501	2023.09.22
22	Power Meter	KEYSIGHT	N1911A	MY50520168	2023.09.22
23	Frequency Meter	VICTOR	VC2000	997406086	2023.09.22
24	DC Power Source	HYELEC	HY5020E	055161818	2023.09.22

3 ERP AND EIRP

3.1 LIMIT

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

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

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

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

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

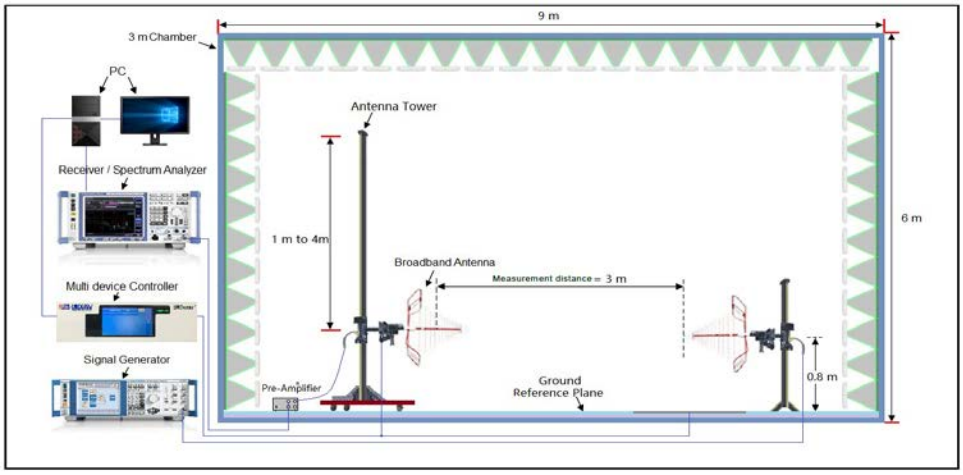
LTE FDD Band 17: 3W(34.77dBm) ERP

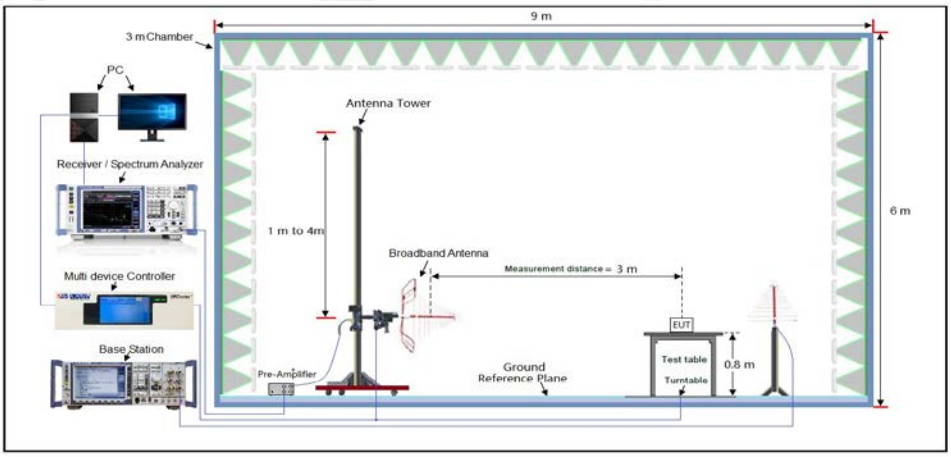
LTE FDD Band 66: 1W(30dBm) EIRP

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

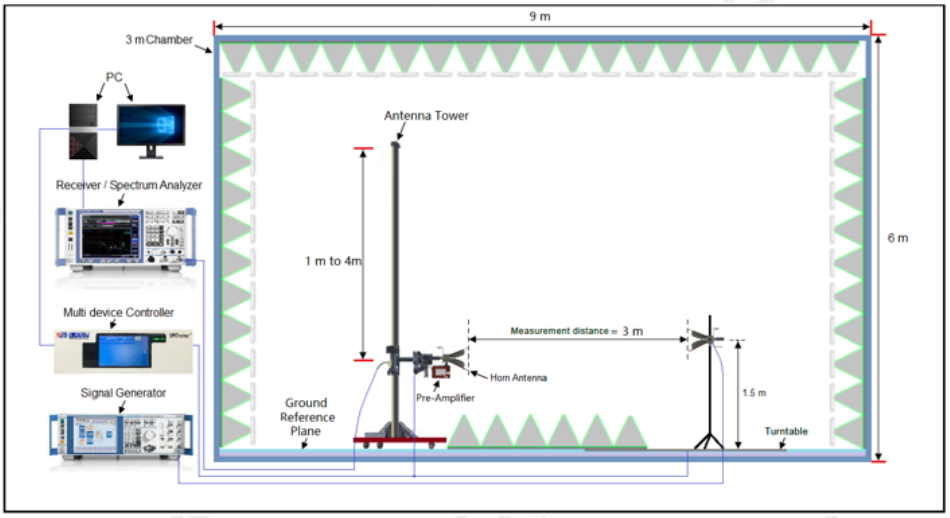
3.2 TEST CONFIGURATION

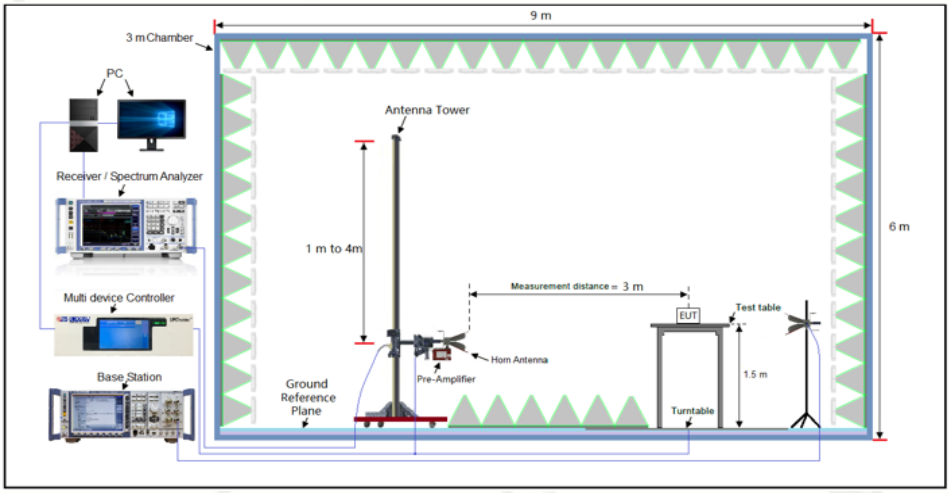
Radiated Power 30MHz to 1GHz Test setup





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.

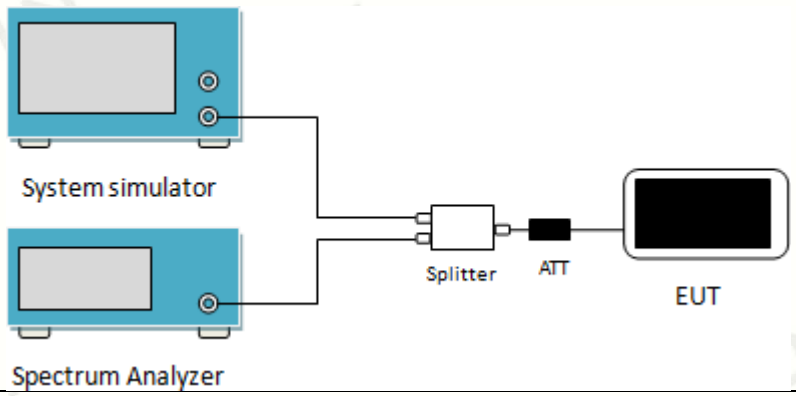
Conducted Test:

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 test data.

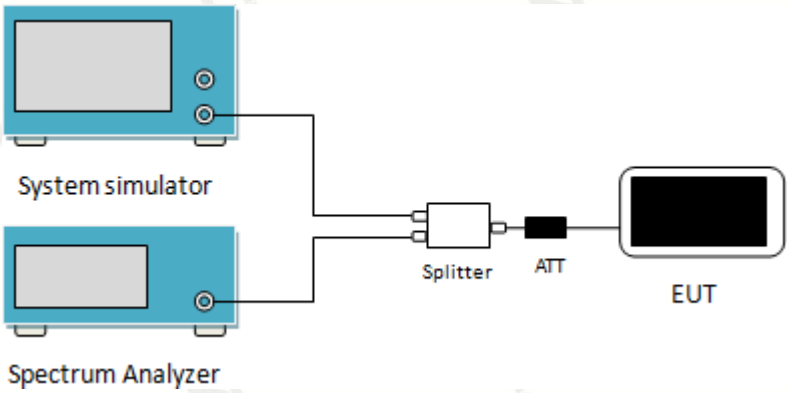
4 PEAK-TO-AVERAGE POWER RATIO

Test Requirement:	Part 24.232 (d), Part 27.50(d)(5)
Limit:	The peak-to-average ratio (PAR) of the transmission may not exceed 13 dB.
Test setup:	
Test Procedure:	1 The RF output of the transceiver was connected to a spectrum analyzer through appropriate attenuation. 2 Set the CCDF option in spectrum analyzer, RBW ≥OBW, 3 Set the EUT working in highest power level, measured and recorded the 0.1% as PAPR level. 4 Repeat step 1~3 at other frequency and modulations.
Test Instruments:	Refer to section 2.5 for details
Test mode:	Refer to section 2.3 for details
Test results:	Passed

4.1 TEST RESULT

Please refer to Appendix test data

5 OCCUPY BANDWIDTH

Test Requirement:	Part 22.917(b), Part 24.238(b), Part 27.53(g), Part 27.53(h)
Test Setup:	
Test Procedure:	1. The EUT's output RF connector was connected with a short cable to the spectrum analyzer 2. RBW was set to about 1% ~ 5% of emission BW, VBW= 3 times RBW. 3. -26dBc display line was placed on the screen (or 99%bandwidth), the occupied bandwidth is the delta frequency between the two points where the display line intersects the signal trace.
Test Instruments:	Refer to section 2.5 for details
Test mode:	Refer to section 2.3 for details
Test results:	Passed

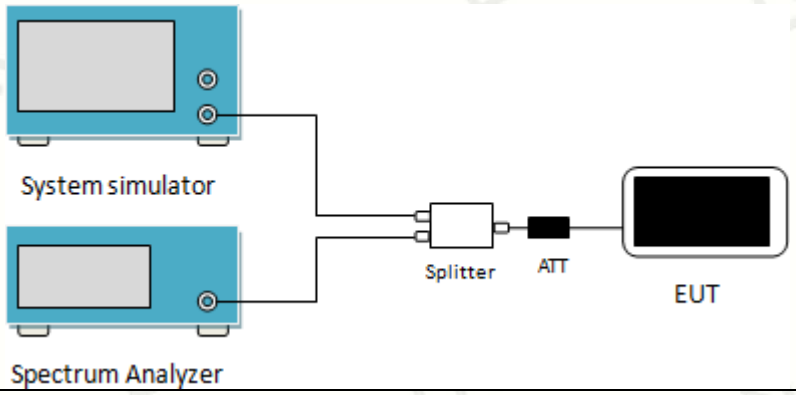
5.1 Test Result

Please refer to Appendix test data

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

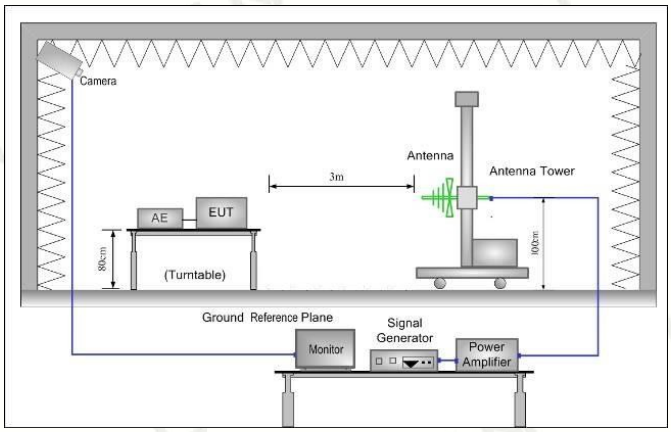
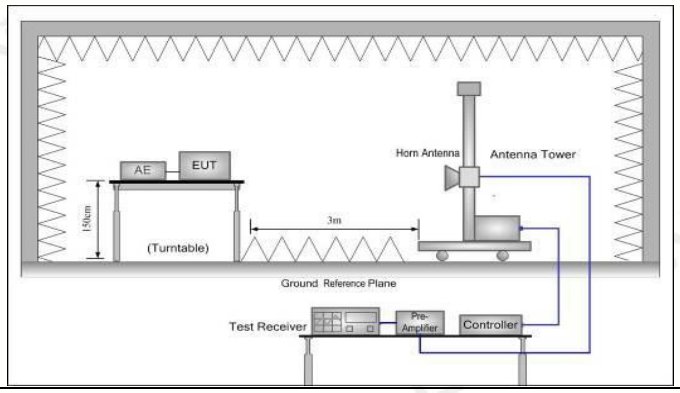
Test Requirement:	Part 22.917(a), Part 24.238 (a), part 27.53(g), part 27.53(h),
Limit:	§22.917, §24.238, §27.53 (c), (g), (h), §90.691, §90.543 (Band 14) The minimum permissible attenuation level of any spurious emissions is 43 + 10 log (P) dB where transmitting power (P) in Watts. §27.53 (a) (Band 30, 40) The minimum permissible attenuation level of any spurious emissions is 70 + 10 log (P) dB where transmitting power (P) in Watts. §27.53 (m) (Band 7, 41) The minimum permissible attenuation level of any spurious emissions is 55 + 10 log (P) dB where transmitting power (P) in Watts. §96.41 (e) 3.5 GHz Emissions and Interference Limits— (2) Additional protection levels. Notwithstanding paragraph (d)(1) of this section, the conducted power of any emissions below 3530 MHz or above 3720 MHz shall not exceed −40dBm/MHz.
Test setup:	
Test Procedure:	1 The RF output of the transceiver was connected to a spectrum analyzer through appropriateattenuation. 2 For the out of band: For Band 5 & 12 & 17 set the RBW=100 kHz, VBW=300 kHz and for Band 2 & 4 & 7 set the RBW=1 MHz, VBW=3 MHz when below 1 GHz, RBW =1 MHz, VBW=3 MHz when above 1 GHz, Start=30MHz, Stop= 10thharmonic. 3 Band Edge Requirements: In the 1 MHz bands immediately outside and adjacent to the frequency block, a resolution bandwidth of at least 1 percent of the emission bandwidth of the fundamental emission of the transmitter may be employed to measure the out of band Emissions.
Test Instruments:	Refer to section 2.5 for details
Test mode:	Refer to section 2.3 for details
Test results:	Passed
Remark:	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.

7.1 TEST RESULT

Please refer to Appendix test data

8 FIELD STRENGTH OF SPURIOUS RADIATION MEASUREMENT

Test Requirement:	Part 22.917(a), Part 24.238 (a), Part 27.53(g), Part 27.53(m), Part 27.53(h)
Limit:	§22.917(a), §24.238(a), §27.53 (g), (h), §90.691 The 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. §27.53 (Band 13) (c) The 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. (f) Emissions in the band 1559-1610 MHz shall be limited to −70 dBW/MHz equivalent isotropically radiated power (EIRP) for wideband signals. (-70 dBW/MHz = -40dBm/MHz). §27.53 (m) (Band 7) At least 55 + 10 log (P) dB on all frequencies more than X megahertz from the channel edge, where X is the greater of 6 megahertz or the actual emission bandwidth as defined in paragraph (m)(6) of this section.

Test setup:	Below1GHz  Above1GHz 
Test Procedure:	1. The EUT was placed on the top of a rotating table 0.8m(below 1GHz)/1.5m(above 1GHz) above the ground at a 3 meter camber. The radiated emission at the fundamental frequency was measured at 3 m with a test antenna and EMI spectrum analyzer. 2. During the tests, the antenna height and the EUT azimuth were varied in order to identify the maximum level of emissions from the EUT. This maximization process was repeated with the EUT positioned in each of its three orthogonal orientations. 3. The frequency range up to tenth harmonic was investigated for each of three fundamental frequency (low, middle and high channels). Once spurious emission was identified, the power of the emission was determined using the substitution method.

Test Procedure:	4. The spurious emissions attenuation was calculated as the difference between radiated power at the fundamental frequency and the spurious emissions frequency. ERP / EIRP = S.G. output (dBm) + Antenna Gain(dB/dBi) – Cable Loss (dB)
Test Instruments:	Refer to section 2.5 for details
Test mode:	Refer to section 2.3 for details
Test results:	Passed

8.1 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).

LTE Band 2 part:

Low channel

Frequency (MHz)	Polarity (H/V)	Emission Level (dBm)	Limit (dBm)	Margin (dB)
5580	V	-41.58	-13	-28.58
3720	V	-40.67	-13	-27.67
694.6	V	-49.27	-13	-36.27
423.5	V	-50.90	-13	-37.90
5580	H	-40.07	-13	-27.07
3720	H	-42.80	-13	-29.80
665.3	H	-49.38	-13	-36.38
436.1	H	-49.82	-13	-36.82

Middle channel

Frequency (MHz)	Polarity (H/V)	Emission Level (dBm)	Limit (dBm)	Margin (dB)
5640	V	-41.59	-13	-28.59
3760	V	-40.20	-13	-27.20
879.3	V	-49.46	-13	-36.46
614.5	V	-50.18	-13	-37.18
5640	H	-49.31	-13	-36.31
3760	H	-43.37	-13	-30.37
852.6	H	-46.41	-13	-33.41
743.1	H	-48.74	-13	-35.74

High channel

Frequency (MHz)	Polarity (H/V)	Emission Level (dBm)	Limit (dBm)	Margin (dB)
5700	V	-41.50	-13	-28.50
3800	V	-42.49	-13	-29.49
658.9	V	-48.63	-13	-35.63
514.3	V	-47.46	-13	-34.46
5700	H	-39.77	-13	-26.77
3800	H	-40.39	-13	-27.39
674.5	H	-49.60	-13	-36.60
563.9	H	-48.46	-13	-35.46

LTE Band 4 part:

Low channel

Frequency (MHz)	Polarity (H/V)	Emission Level (dBm)	Limit (dBm)	Margin (dB)
5160	V	-39.52	-13	-26.52
3440	V	-39.84	-13	-26.84
737.5	V	-46.01	-13	-33.01
524.2	V	-48.76	-13	-35.76
5160	H	-39.82	-13	-26.82
3440	H	-41.62	-13	-28.62
519.4	H	-48.08	-13	-35.08
396.3	H	-44.54	-13	-31.54

Middle channel

Frequency (MHz)	Polarity (H/V)	Emission Level (dBm)	Limit (dBm)	Margin (dB)
5197.5	V	-39.42	-13	-26.42
3465	V	-39.15	-13	-26.15
670.3	V	-47.61	-13	-34.61
522.1	V	-49.64	-13	-36.64
5197.5	H	-39.36	-13	-26.36
3465	H	-40.81	-13	-27.81
558.1	H	-48.31	-13	-35.31
463.2	H	-46.67	-13	-33.67

High channel

Frequency (MHz)	Polarity (H/V)	Emission Level (dBm)	Limit (dBm)	Margin (dB)
5235	V	-40.39	-13	-27.39
3490	V	-41.96	-13	-28.96
732.5	V	-51.43	-13	-38.43
514.2	V	-50.69	-13	-37.69
5235	H	-40.61	-13	-27.61
3490	H	-40.87	-13	-27.87
606.7	H	-48.88	-13	-35.88
545.3	H	-48.03	-13	-35.03

LTE Band 5 part:

Low channel

Frequency (MHz)	Polarity (H/V)	Emission Level (dBm)	Limit (dBm)	Margin (dB)
2487	V	-41.45	-13	-28.45
1658	V	-42.54	-13	-29.54
521.6	V	-48.19	-13	-35.19
358.9	V	-48.19	-13	-35.19
2487	H	-40.72	-13	-27.72
1658	H	-41.60	-13	-28.60
524.5	H	-46.01	-13	-33.01
339.3	H	-44.99	-13	-31.99

Middle channel

Frequency (MHz)	Polarity (H/V)	Emission Level (dBm)	Limit (dBm)	Margin (dB)
2509.5	V	-43.06	-13	-30.06
1673	V	-43.48	-13	-30.48
726.2	V	-47.83	-13	-34.83
617.9	V	-48.39	-13	-35.39
2509.5	H	-41.64	-13	-28.64
1673	H	-43.50	-13	-30.50
724.5	H	-47.23	-13	-34.23
559.6	H	-45.82	-13	-32.82

High channel

Frequency (MHz)	Polarity (H/V)	Emission Level (dBm)	Limit (dBm)	Margin (dB)
2532	V	-40.51	-13	-27.51
1688	V	-40.44	-13	-27.44
645.2	V	-47.72	-13	-34.72
484.1	V	-47.84	-13	-34.84
2532	H	-41.13	-13	-28.13
1688	H	-42.19	-13	-29.19
783.8	H	-47.48	-13	-34.48
623.5	H	-48.88	-13	-35.88

LTE Band 12 part:

Low channel

Frequency (MHz)	Polarity (H/V)	Emission Level (dBm)	Limit (dBm)	Margin (dB)
2122	V	-36.84	-13	-23.84
1408	V	-38.01	-13	-25.01
828.5	V	-28.13	-13	-15.13
563.4	V	-38.00	-13	-25.00
2122	H	-36.45	-13	-23.45
1408	H	-37.66	-13	-24.66
669.3	H	-27.82	-13	-14.82
414.2	H	-37.54	-13	-24.54

Middle channel

Frequency (MHz)	Polarity (H/V)	Emission Level (dBm)	Limit (dBc)	Margin (dB)
2122.5	V	-36.01	-13	-23.01
1415	V	-37.07	-13	-24.07
893.5	V	-27.24	-13	-14.24
542.1	V	-37.18	-13	-24.18
2122.5	H	-38.46	-13	-25.46
1415	H	-39.72	-13	-26.72
868.7	H	-29.72	-13	-16.72
493.5	H	-39.63	-13	-26.63

High channel

Frequency (MHz)	Polarity (H/V)	Emission Level (dBm)	Limit (dBm)	Margin (dB)
2133	V	-37.91	-13	-24.91
1422	V	-39.15	-13	-26.15
768.4	V	-29.24	-13	-16.24
549.5	V	-38.89	-13	-25.89
2133	H	-37.21	-13	-24.21
1422	H	-38.22	-13	-25.22
697.3	H	-28.30	-13	-15.30
482.1	H	-39.04	-13	-26.04

LTE Band 13 part:

Low channel

Frequency (MHz)	Polarity (H/V)	Emission Level (dBm)	Limit (dBm)	Margin (dB)
2338.5	V	-44.91	-13	-31.91
1559	V	-47.89	-13	-34.89
889.36	V	-41.97	-13	-28.97
659.93	V	-49.43	-13	-36.43
2338.5	H	-44.44	-13	-31.44
1559	H	-47.62	-13	-34.62
849.77	H	-41.72	-13	-28.72
675.78	H	-49.01	-13	-36.01

Middle channel

Frequency (MHz)	Polarity (H/V)	Emission Level (dBm)	Limit (dBc)	Margin (dB)
2346	V	-43.84	-13	-30.84
1564	V	-47.28	-13	-34.28
934.75	V	-41.47	-13	-28.47
645.94	V	-48.22	-13	-35.22
2346	H	-36.80	-13	-23.80
1564	H	-43.55	-13	-30.55
895.06	H	-46.97	-13	-33.97
569.36	H	-41.21	-13	-28.21

High channel

Frequency (MHz)	Polarity (H/V)	Emission Level (dBm)	Limit (dBm)	Margin (dB)
2353.5	V	-42.60	-13	-29.60
1569	V	-43.89	-13	-30.89
686.77	V	-33.38	-13	-20.38
425.01	V	-43.88	-13	-30.88
2353.5	H	-42.23	-13	-29.23
1569	H	-43.51	-13	-30.51
749.46	H	-33.05	-13	-20.05
603.04	H	-43.38	-13	-30.38

LTE Band 17 part:

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 66 part:

Low channel

Frequency (MHz)	Polarity (H/V)	Emission Level (dBm)	Limit (dBm)	Margin (dB)
5160	V	-40.38	-13	-27.38
3440	V	-43.28	-13	-30.28
673.37	V	-37.52	-13	-24.52
557.93	V	-44.79	-13	-31.79
5160	H	-39.93	-13	-26.93
3440	H	-43.03	-13	-30.03
851.40	H	-37.27	-13	-24.27
573.78	H	-44.38	-13	-31.38

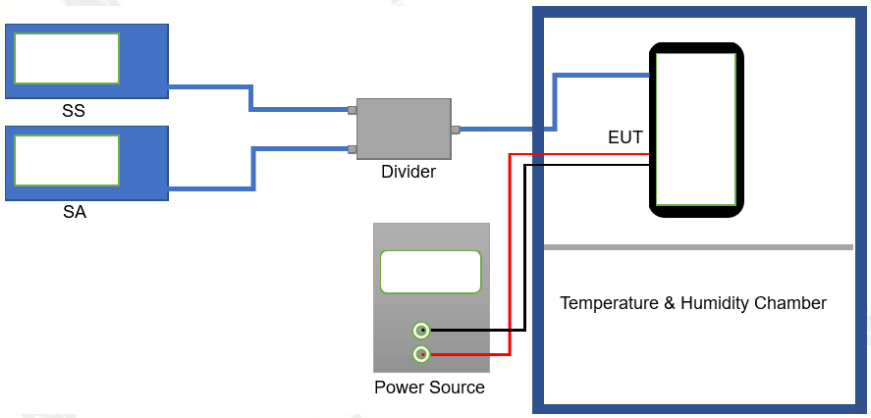
Middle channel

Frequency (MHz)	Polarity (H/V)	Emission Level (dBm)	Limit (dBc)	Margin (dB)
5235	V	-39.35	-13	-26.35
3490	V	-42.69	-13	-29.69
832.75	V	-37.04	-13	-24.04
543.94	V	-43.61	-13	-30.61
5235	H	-32.49	-13	-19.49
3490	H	-39.06	-13	-26.06
793.06	H	-42.39	-13	-29.39
467.36	H	-36.78	-13	-23.78

High channel

Frequency (MHz)	Polarity (H/V)	Emission Level (dBm)	Limit (dBm)	Margin (dB)
5310	V	-38.13	-13	-25.13
3540	V	-39.39	-13	-26.39
584.77	V	-29.15	-13	-16.15
323.01	V	-39.38	-13	-26.38
5310	H	-37.77	-13	-24.77
3540	H	-39.03	-13	-26.03
647.46	H	-28.83	-13	-15.83
501.04	H	-38.89	-13	-25.89

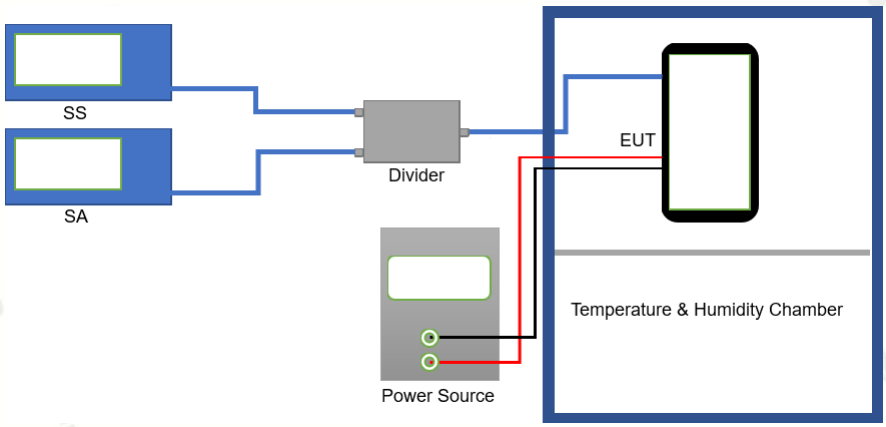
9 FREQUENCY STABILITY V.S. TEMPERATURE MEASUREMENT

Test Requirement:	Part 22.355, Part 24.235, Part 27.54, Part 2.1055(a)(1)(b)
Limit:	Cellular Band: ±2.5ppm PCS Band: Within the authorized frequency block
Test setup:	
Test procedure:	1. The equipment under test was connected to an external DC power supply and input rated voltage. 2. RF output was connected to a frequency counter or spectrum analyzer via feed through attenuators. 3. The EUT was placed inside the temperature chamber. 4. Set the spectrum analyzer RBW low enough to obtain the desired frequency resolution and measure EUT 25℃ operating frequency as reference frequency. 5. Turn EUT off and set the chamber temperature to –30℃. After the temperature stabilized for approximately 30 minutes recorded the frequency. 6. Repeat step measure with 10℃ increased per stage until the highest temperature of +50℃reached
Test Instruments:	Refer to section 2.5 for details
Test mode:	Refer to section 2.3 for details
Test results:	Passed

9.1 TEST RESULT

Please refer to Appendix test data

10 FREQUENCY STABILITY V.S. VOLTAGE MEASUREMENT

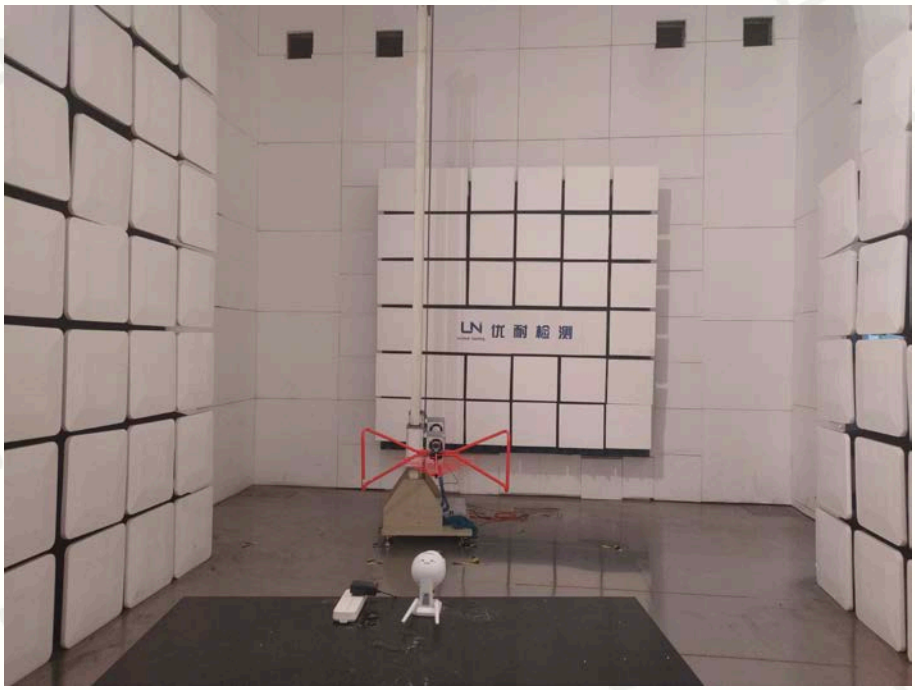
Test Requirement:	Part 22.355, Part 24.235, Part 27.54, Part 2.1055(d)(2)
Limit:	Cellular Band: ±2.5ppm PCS Band: Within the authorized frequency block
Test setup:	
Test procedure:	1. Set chamber temperature to 25℃. Use a variable DC power source to power the EUT and set the voltage to rated voltage. 2. Set the spectrum analyzer RBW low enough to obtain the desired frequency resolution and recorded the frequency. 3. Reduce the input voltage to specify extreme voltage variation (+/- 15%) and endpoint, record the maximum frequency change.
Test Instruments:	Refer to section 2.5 for details
Test mode:	Refer to section 2.3 for details
Test results:	Passed

10.1 TEST RESULT

Please refer to Appendix test data

11 PHOTO OF TEST

11.1 RADIATED EMISSION



End of Report