Shenzhen CTA Testing Technology Co., Ltd.

Room 106, Building 1, Yibaolai Industrial Park, Qiaotou Community, Fuhai Street, Bao'an District, Shenzhen, China

TEST REPORT
FCC CFR Title 47 Part 2,FCC CFR Title 47 Part 22
FCC CFR Title 47 Part 24,FCC CFR Title 47 Part 27

Report Reference No. ..... :	**CTA22012500603**
FCC ID. ..... :	**2A3YA-N21**
Compiled by (position+printed name+signature) . :	File administrators Kevin Liu
Supervised by (position+printed name+signature) . :	Project Engineer Kevin Liu
Approved by (position+printed name+signature) . :	RF Manager Eric Wang
Date of issue ..... :	Feb. 10, 2022
Testing Laboratory Name ..... :	**Shenzhen CTA Testing Technology Co., Ltd.**
Address ..... :	Room 106, Building 1, Yibaolai Industrial Park, Qiaotou Community, Fuhai Street, Bao'an District, Shenzhen, China
Applicant's name ..... :	**Naviter d.o.o.**
Address ..... :	PLANINA 3 KRANJ Slovenia
Test specification ..... :	
Standard ..... :	**FCC CFR Title 47 Part 2,FCC CFR Title 47 Part 22** **FCC CFR Title 47 Part 24,FCC CFR Title 47 Part 27**

Test item description ..... :	**GPS Navigator**
Trade Mark ..... :	Naviter
Manufacturer ..... :	Naviter d.o.o.
Model/Type reference ..... :	N21
Listed Models ..... :	N23, N24, N31, N32, M71, M72
Rating ..... :	DC 3.70V From Battery and DC 5V From external circuit
Result ..... :	**PASS**

T E S T R E P O R T

Equipment under Test	:	GPS Navigator
Model /Type	:	N21
Series Model No.		N23, N24, N31, N32, M71, M72
Applicant	:	Naviter d.o.o.
Address	:	PLANINA 3 KRANJ Slovenia
Manufacturer	:	Naviter d.o.o.
Address	:	PLANINA 3 KRANJ Slovenia

Test Result:	**PASS**

The test report merely corresponds to the test sample.
It is not permitted to copy extracts of these test result without the written permission of the test laboratory.

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1. SUMMARY

1.1. Test Standards

FCC Rules Part 2: FREQUENCY ALLOCA-TIONS AND RADIO TREATY MAT-TERS; GENERAL RULES AND REG-ULATIONS
FCC Rules Part 22: PRIVATE LAND MOBILE RADIO SERVICES.
FCC Rules Part 24: PUBLIC MOBILE SERVICES
FCC Rules Part 27: MISCELLANEOUS WIRDELESS COMMUNICATIONS SERVICES
ANSI C63.26: 2015: American National Standard for Compliance Testing of Transmitters Used in Licensed Radio Services
KDB 971168 D01 Power Meas License Digital Systems v03: MEASUREMENT GUIDANCE FOR CERTIFICATION OF LICENSED DIGITAL TRANSMITTERS

1.2. Test Description

Test Item	Section in CFR 47	Result	Test Engineer
Conducted Output Power	Part 2.1046 Part 22.913(a) Part 24.232(c) Part 27.50	Pass	Kevin Liu
Peak-to-Average Ratio	Part 24.232 Part 27.50	Pass	Kevin Liu
99% Occupied Bandwidth & 26 dB Bandwidth	Part 2.1049 Part 22.917(b) Part 24.238(b) Part 27.53	Pass	Kevin Liu
Band Edge	Part 2.1051 Part 22.917 Part 24.238 Part 27.53	Pass	Kevin Liu
Conducted Spurious Emissions	Part 2.1051 Part 22.917 Part 24.238 Part 27.53	Pass	Kevin Liu
Frequency stability VS Temperature	Part 2.1055(a)(1)(b) Part 22.355 Part 24.235 Part 27.54	Pass	Kevin Liu
Frequency stability VS Voltage	Part 2.1055(d)(1)(2) Part 22.355 Part 24.235 Part 27.54	Pass	Kevin Liu
ERP and EIRP	Part 22.913(a) Part 24.232(b) Part 27.50	Pass	Kevin Liu
Radiated Spurious Emissions	Part 2.1053 Part 22.917 Part 24.238 Part 27.53	Pass	Kevin Liu

Note:
1.The measurement uncertainty is not included in the test result.
2.This is a single SIM card

1.3. Test Facility

1.3.1 Address of the test laboratory

Shenzhen CTA Testing Technology Co., Ltd.

Room 106, Building 1, Yibaolai Industrial Park, Qiaotou Community,Fuhai Street, Bao ′an District, Shenzhen, China

1.3.2 Test Facility

The test facility is recognized, certified, or accredited by the following organizations:
FCC-Registration No.: 517856 Designation Number: CN1318

Shenzhen CTA Testing Technology Co., Ltd. has been listed on the US Federal Communications Commission list of test facilities recognized to perform electromagnetic emissions measurements.

A2LA-Lab Cert. No.: 6534.01

Shenzhen CTA Testing Technology Co., Ltd. has been listed by American Association for Laboratory Accreditation to perform electromagnetic emission measurement.

The 3m-Semi anechoic test site fulfils CISPR 16-1-4 according to ANSI C63.10 and CISPR 16-1-4:2010.

1.4. Measurement Uncertainty

The data and results referenced in this document are true and accurate. The reader is cautioned that there may be errors within the calibration limits of the equipment and facilities. The measurement uncertainty was calculated for all measurements listed in this test report acc. to TR-100028-01" Electromagnetic compatibility and Radio spectrum Matters (ERM);Uncertainties in the measurement of mobile radio equipment characteristics; Part 1" and TR-100028-02 "Electromagnetic compatibility and Radio spectrum Matters (ERM);Uncertainties in the measurement of mobile radio equipment characteristics; Part 2 " and is documented in the Shenzhen CTA Testing Technology Co., Ltd.quality system acc. to DIN EN ISO/IEC 17025. Furthermore, component and process variability of devices similar to that tested may result in additional deviation. The manufacturer has the sole responsibility of continued compliance of the device.

Hereafter the best measurement capability for Shenzhen CTA Testing Technology Co., Ltd.:

Test	Measurement Uncertainty	Notes
Radiated Emission 30~1000MHz	4.06 dB	(1)
Radiated Emission 1~18GHz	5.14 dB	(1)
Radiated Emission 18-40GHz	5.38 dB	(1)
Conducted Output Power	0.48 dB	(1)
Peak-to-Average Ratio	3.16 dB	(1)
Occupy Bandwidth	2.80 dB	(1)
Out of band emission at antenna terminals	1.75 dB	(1)
Band Edge compliance	1.60 dB	(1)
Radiated Power Measurement	4.5dB (below 1GHz) 4.8dB (above 1GHz)	(1)
Frequency stability	1.38 dB	(1)

(1) This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=2.

1.5. Environmental conditions

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

Normal Temperature:	25°C
Relative Humidity:	55 %
Air Pressure:	101 kPa

2. GENERAL INFORMATION

2.1. Client Information

Applicant:	Naviter d.o.o.
Address:	PLANINA 3 KRANJ Slovenia
Manufacturer:	Naviter d.o.o.
Address:	PLANINA 3 KRANJ Slovenia

2.2. 2.2.General Description of EUT

Test Sample Number:	1-1-1(Normal Sample),1-1-2(Engineering Sample)
Product Name:	GPS Navigator
Model/Type reference:	Naviter
Trademark:	N21
Listed Model(s):	N22, N23, N24, N31, N32, M71, M72
Model difference:	All models have the same circuit and RF module, except for the different appearance shape.
Power supply(Battery):	5V⎓2A
Power Supply(Adapter):	DC 3.7V, 16000mAh, 59.2Wh
Hardware version:	V1.0
Software version:	V1.0.0
LTE	
Operation Band:	Band 2: UL: 1850.7MHz~1909.3MHz, DL: 1930.7MHz~1989.3MHz Band 5: UL: 824.7MHz~848.3MHz, DL: 869.7MHz~893.3MHz Band 7: UL: 2502.5MHz~2567.5MHz, DL: 2622.5MHz~2687.5MHz
Modulation Type:	QPSK, 16QAM
Target TX Output Power:	Band 2: 21.87 dBm Band 5: 19.97 dBm Band 7: 21.68 dBm
Antenna type:	FPC Antenna
Antenna Gain:	FDD Band 2: 1.0dBi FDD Band 5: 0.5dBi FDD Band 7: 1.0dBi

2.3. 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 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 7			
Test channel	**Bandwidth(MHz)**	**N_{UL}**	**Frequency of Uplink (MHz)**
Low Range	5	20775	2502.50
	10	20800	2505.00
	15	20825	2507.50
	20	20850	2510.00
Mid Range	5/10/15/20	21100	2535.00
High Range	5	21425	2567.50
	10	21400	2565.00
	15	21375	2562.50
	20	21350	2560.00

2.4. Measurement Instruments List

Test Equipment	Manufacturer	Model No.	Equipment No.	Calibration Date	Calibration Due Date
LISN	R&S	ENV216	CTA-308	2021/08/06	2022/08/05
LISN	R&S	ENV216	CTA-314	2021/08/06	2022/08/05
EMI Test Receiver	R&S	ESPI	CTA-307	2021/08/06	2022/08/05
EMI Test Receiver	R&S	ESCI	CTA-306	2021/08/06	2022/08/05
Spectrum Analyzer	Agilent	N9020A	CTA-301	2021/08/06	2022/08/05
Spectrum Analyzer	R&S	FSP	CTA-337	2021/08/06	2022/08/05
Vector Signal generator	Agilent	N5182A	CTA-305	2021/08/06	2022/08/05
Analog Signal Generator	R&S	SML03	CTA-304	2021/08/06	2022/08/05
Universal Radio Communication	CMW500	R&S	CTA-302	2021/08/06	2022/08/05
Temperature and humidity meter	Chigo	ZG-7020	CTA-326	2021/08/06	2022/08/05
Ultra-Broadband Antenna	Schwarzbeck	VULB9163	CTA-310	2021/08/07	2022/08/06
Horn Antenna	Schwarzbeck	BBHA 9120D	CTA-309	2021/08/07	2022/08/06
Loop Antenna	Zhinan	ZN30900C	CTA-311	2021/08/07	2022/08/06
Horn Antenna	Beijing Hangwei Dayang	OBH100400	CTA-336	2021/08/06	2022/08/05
Amplifier	Schwarzbeck	BBV 9745	CTA-312	2021/08/06	2022/08/05
Amplifier	Taiwan chengyi	EMC051845B	CTA-313	2021/08/06	2022/08/05
Directional coupler	NARDA	4226-10	CTA-303	2021/08/06	2022/08/05
High-Pass Filter	XingBo	XBLBQ-GTA18	CTA-402	2021/08/06	2022/08/05
High-Pass Filter	XingBo	XBLBQ-GTA27	CTA-403	2021/08/06	2022/08/05
Automated filter bank	Tonscend	JS0806-F	CTA-404	2021/08/06	2022/08/05
Power Sensor	Agilent	U2021XA	CTA-405	2021/08/06	2022/08/05
Amplifier	Schwarzbeck	BBV9719	CTA-406	2021/08/06	2022/08/05
Spectrum Analyzer	R&S	FSV40-N	CTA-407	2021/08/06	2022/08/05
Pre-Amplifier	Schwarzbeck	BBV-9721	CTA-408	2021/08/06	2022/08/05
Horn Antenna	Schwarzbeck	BBHA 9170	CTA-409	2021/08/06	2022/08/05

Note:
1)The Cal. Interval was one year.
2)The cable loss has calculated in test result which connection between each test instruments.

3. TEST ITEM AND RESULTS

3.1. Conducted Output Power

LIMIT

Conducted Output Power: N/A

TEST CONFIGURATION

- For Conducted output Power

Note: Measurement setup for testing on Antenna connector

TEST PROCEDURE

- For Conducted output Power

1. The transmitter output port was connected to base station.
2. The RF output of EUT was connected to the power meter by RF cable and attenuator, the path loss was compensated to the results for each measurement.
3. Set EUT at maximum power through base station.
4. Select lowest, middle, and highest channels for each band and different modulation.
5. Measure the maximum PK burst power and maximum Avg. burst power.

TEST RESULTS

Please see the Appendix for every tested Band.

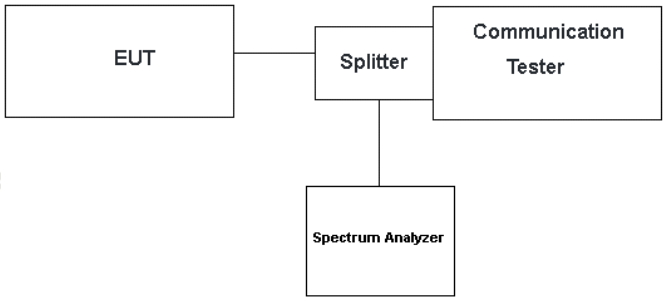
3.2. Peak-to-Average Ratio

LIMIT:

The Peak-to-Average Ratio (PAR) of the transmission may not exceed 13dB.

TEST CONFIGURATION

- For Peak-to-Average Ratio



TEST PROCEDURE

- For Peak-to-Average Ratio

1. The testing follows FCC KDB 971168 v02r02 Section 5.7.1.
2. The EUT was connected to spectrum and communication tester via a splitter
3. Set the CCDF (Complementary Cumulative Distribution Function) option in spectrum analyzer.
4. The highest RF powers were measured and recorded the maximum PAPR level associated with a probability of 0.1 %.
5. Record the deviation as Peak to Average Ratio.

TEST RESULTS

LTE Band 2

Test Band: 2 _ 1.4MHz Bandwidth							
Test Mode	RB Allocation		Test result (dB)			Limit (dB)	Verdict
	Size	Offset	LCH	MCH	HCH		
QPSK	6	0	8.46	5.13	4.41	13	PASS
16QAM	6	0	5.19	5.94	5.30	13	PASS
Test Band: 2 _ 3MHz Bandwidth							
Test Mode	RB Allocation		Test result (dB)			Limit (dB)	Verdict
	Size	Offset	LCH	MCH	HCH		
QPSK	15	0	4.49	5.07	4.55	13	PASS
16QAM	15	0	5.33	5.94	5.42	13	PASS
Test Band: 2 _ 5MHz Bandwidth							
Test Mode	RB Allocation		Test result (dB)			Limit (dB)	Verdict
	Size	Offset	LCH	MCH	HCH		
QPSK	25	0	4.61	5.19	4.72	13	PASS
16QAM	25	0	5.39	5.91	5.57	13	PASS
Test Band: 2 _ 10MHz Bandwidth							
Test Mode	RB Allocation		Test result (dB)			Limit (dB)	Verdict
	Size	Offset	LCH	MCH	HCH		
QPSK	50	0	4.61	4.99	4.70	13	PASS
16QAM	50	0	5.51	5.86	5.62	13	PASS
Test Band: 2 _ 15MHz Bandwidth							
Test Mode	RB Allocation		Test result (dB)			Limit (dB)	Verdict
	Size	Offset	LCH	MCH	HCH		
QPSK	75	0	4.58	4.75	4.49	13	PASS
16QAM	75	0	5.54	5.74	5.62	13	PASS
Test Band: 2 _ 20MHz Bandwidth							
Test Mode	RB Allocation		Test result (dB)			Limit (dB)	Verdict
	Size	Offset	LCH	MCH	HCH		
QPSK	100	0	3.97	4.00	3.94	13	PASS
16QAM	100	0	5.57	5.62	5.59	13	PASS

LTE Band 5

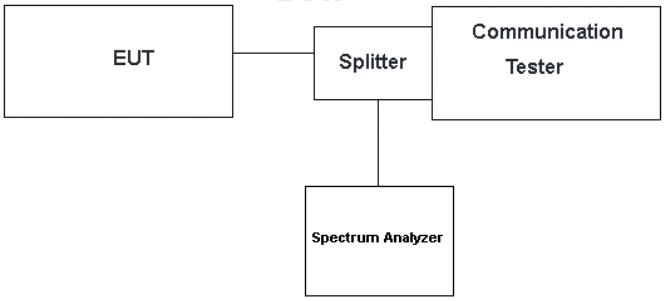
Test Band: 5 _ 1.4MHz Bandwidth							
Test Mode	RB Allocation		Test result (dB)			Limit (dB)	Verdict
	Size	Offset	LCH	MCH	HCH		
QPSK	6	0	6.61	6.67	6.64	13	PASS
16QAM	6	0	7.54	7.36	6.96	13	PASS
Test Band: 5 _ 3MHz Bandwidth							
Test Mode	RB Allocation		Test result (dB)			Limit (dB)	Verdict
	Size	Offset	LCH	MCH	HCH		
QPSK	15	0	6.67	6.64	6.20	13	PASS
16QAM	15	0	7.45	7.48	6.96	13	PASS
Test Band: 5 _ 5MHz Bandwidth							
Test Mode	RB Allocation		Test result (dB)			Limit (dB)	Verdict
	Size	Offset	LCH	MCH	HCH		
QPSK	25	0	6.38	6.72	6.20	13	PASS
16QAM	25	0	7.10	7.45	6.84	13	PASS
Test Band: 5 _ 10MHz Bandwidth							
Test Mode	RB Allocation		Test result (dB)			Limit (dB)	Verdict
	Size	Offset	LCH	MCH	HCH		
QPSK	50	0	5.57	6.38	5.97	13	PASS
16QAM	50	0	6.52	7.25	6.87	13	PASS

LTE Band 7

Test Band: 7 _ 5MHz Bandwidth							
Test Mode	RB Allocation		Test result (dB)			Limit (dB)	Verdict
	Size	Offset	LCH	MCH	HCH		
QPSK	25	0	5.13	5.45	5.51	13	PASS
16QAM	25	0	5.86	6.17	6.29	13	PASS
Test Band: 7 _ 10MHz Bandwidth							
Test Mode	RB Allocation		Test result (dB)			Limit (dB)	Verdict
	Size	Offset	LCH	MCH	HCH		
QPSK	50	0	5.07	5.25	5.42	13	PASS
16QAM	50	0	6.00	6.12	6.35	13	PASS
Test Band: 7 _ 15MHz Bandwidth							
Test Mode	RB Allocation		Test result (dB)			Limit (dB)	Verdict
	Size	Offset	LCH	MCH	HCH		
QPSK	75	0	4.93	5.07	5.28	13	PASS
16QAM	75	0	5.94	5.97	6.32	13	PASS
Test Band: 7 _ 20MHz Bandwidth							
Test Mode	RB Allocation		Test result (dB)			Limit (dB)	Verdict
	Size	Offset	LCH	MCH	HCH		
QPSK	100	0	4.26	4.26	4.43	13	PASS
16QAM	100	0	5.88	5.86	6.14	13	PASS

3.3. Occupy Bandwidth

TEST CONFIGURATION



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% 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 RESULTS

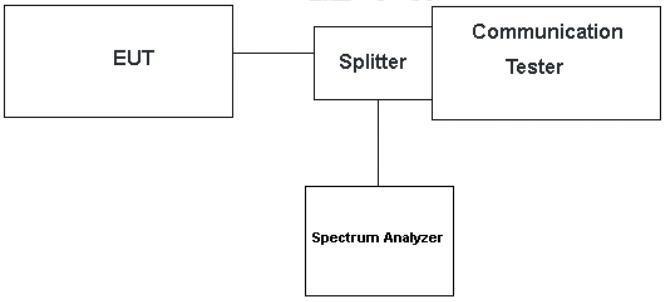
Please see the Appendix for every tested Band.

3.4. Out of band emission at antenna terminals

LIMIT

FDD Band 2: 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.
FDD Band 5: 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.
FDD Band 7: For mobile digital stations, the attenuation factor shall be not less than 40 + 10 log (P) dB on all frequencies between the channel edge and 5 megahertz from the channel edge, 43 + 10 log (P) dB on all frequencies between 5 megahertz and X megahertz from the channel edge, and 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. In addition, the attenuation factor shall not be less that 43 + 10 log (P) dB on all frequencies between 2490.5 MHz and 2496 MHz and 55 + 10 log (P) dB at or below 2490.5 MHz.

TEST CONFIGURATION



TEST PROCEDURE

1. The RF output of the transceiver was connected to a spectrum analyzer through appropriate attenuation.
2. The resolution bandwidth of the spectrum analyzer was set at 1MHz; sufficient scans were taken to show the out of band Emissions if any up to 10th harmonic.
3. For the out of band: Set the RBW = 1MHz VBW⩾3 times RBW, Start=30MHz, Stop= 10th harmonic.

TEST RESULTS

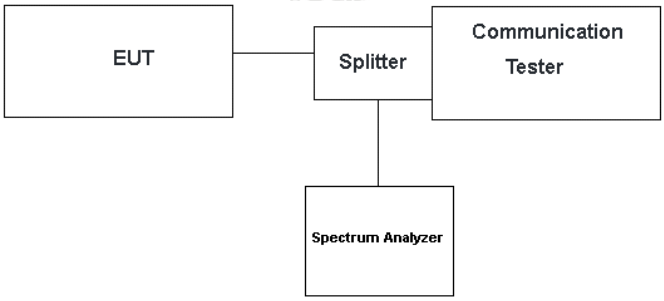
Please see the Appendix for every tested Band.

3.5. Band Edge compliance

LIMIT

FDD Band 2: 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.
FDD Band 5: 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.
FDD Band 7: For mobile digital stations, the attenuation factor shall be not less than 40 + 10 log (P) dB on all frequencies between the channel edge and 5 megahertz from the channel edge, 43 + 10 log (P) dB on all frequencies between 5 megahertz and X megahertz from the channel edge, and 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. In addition, the attenuation factor shall not be less that 43 + 10 log (P) dB on all frequencies between 2490.5 MHz and 2496 MHz and 55 + 10 log (P) dB at or below 2490.5 MHz.

TEST CONFIGURATION



TEST PROCEDURE

1. The RF output of the transceiver was connected to a spectrum analyzer through appropriate attenuation.
2. RBW was set to about 1% of emission BW, VBW≥3 times RBW.

TEST RESULTS

Please see the Appendix for every tested Band.

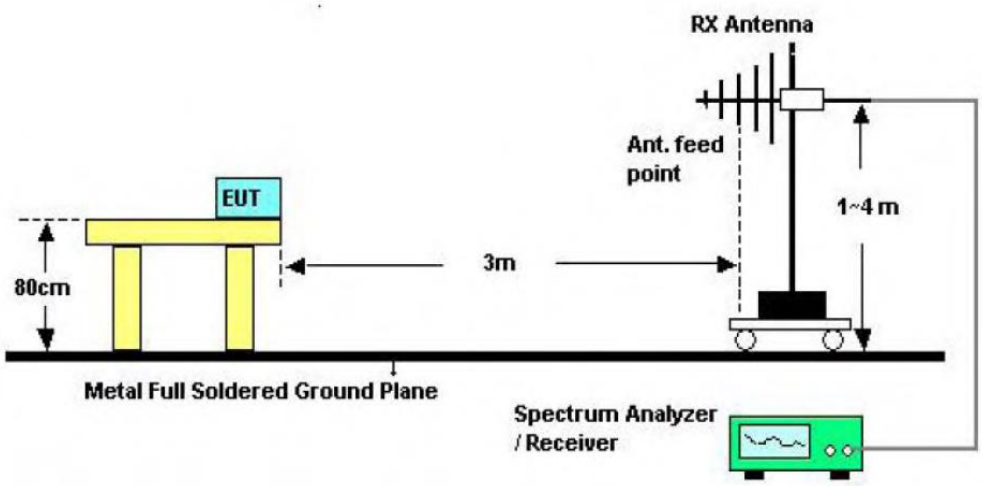
3.6. Radiated Power Measurement

LIMIT

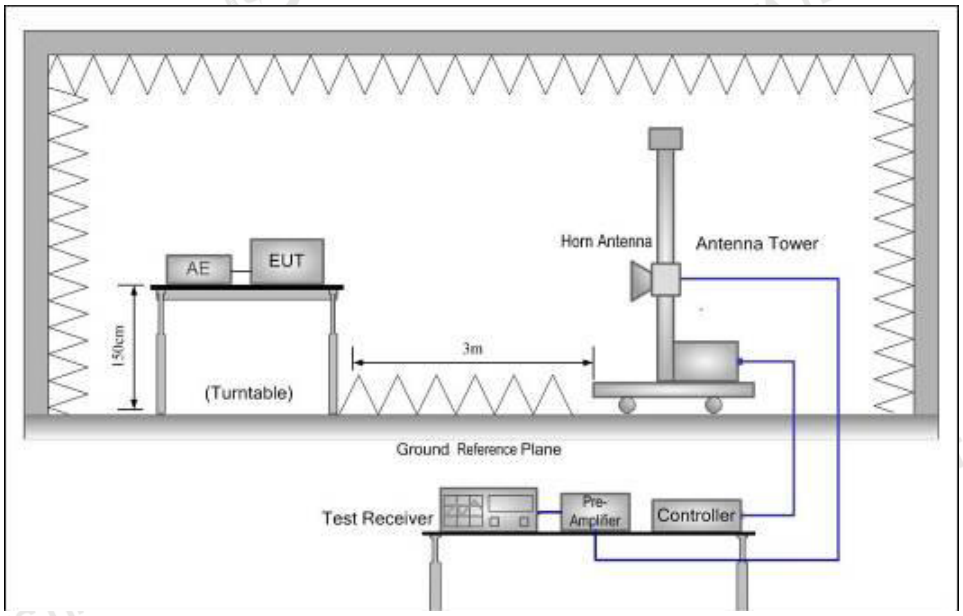
LTE FDD Band 2: 2W(33dBm) EIPR
LTE FDD Band 5: 7W(38.45dBm) ERP
LTE FDD Band 7: 2W(33dBm) EIRP

TEST CONFIGURATION

For the actual test configuration, please refer to the related Item – EUT Test Photos.



Below 1GHz



Above 1GHz

TEST PROCEDURE

1. EUT was placed on a 1.50 meter high non-conductive stand at a 3 meter test distance from the receive antenna. A receiving antenna was placed on the antenna mast 3 meters from the EUT for emission measurements. The height of receiving antenna is 1.50m. Detected emissions were maximized at each frequency by rotating the EUT through 360° and adjusting the receiving antenna polarization. The radiated emission measurements of all transmit frequencies in three channels (High, Middle, Low) were measured with peak detector.
2. A log-periodic antenna or double-ridged waveguide horn antenna shall be substituted in place of the EUT. The log-periodic antenna will be driven by a signal generator and the level will be adjusted till the same power value on the spectrum analyzer or receiver. The level of the spurious emissions can be calculated through the level of the signal generator, cable loss, the gain of the substitution antenna and the reading of the spectrum analyzer or receiver.
3. The EUT is then put into continuously transmitting mode at its maximum power level during the test. Set Test Receiver or Spectrum RBW=1MHz, VBW=3MHz, and the maximum value of the receiver should be recorded as (Pr).
4. The EUT shall be replaced by a substitution antenna. In the chamber, an substitution antenna for the frequency band of interest is placed at the reference point of the chamber. An RF Signal source for the frequency band of interest is connected to the substitution antenna with a cable that has been constructed to not interfere with the radiation pattern of the antenna. A power (PMea) is applied to the input of the substitution antenna, and adjusts the level of the signal generator output until the value of the receiver reach the previously recorded (Pr). The power of signal source (PMea) is recorded. The test should be performed by rotating the test item and adjusting the receiving antenna polarization.
5. An amplifier should be connected to the Signal Source output port. And the cable should be connecting between the Amplifier and the Substitution Antenna. The cable loss (Pcl), the Substitution Antenna Gain (Ga) and the Amplifier Gain (PAg) should be recorded after test.
6. The measurement results are obtained as described below:
7. Power(EIRP)=PMea- PAg - Pcl + Ga
8. We used N5182A microwave signal generator which signal level can up to 33dBm,so we not used power Amplifier for substitution test; The measurement results are amend as described below:
9. Power(EIRP)=PMea- Pcl + Ga
10. This value is EIRP since the measurement is calibrated using an antenna of known gain (2.15 dBi) and known input power.
11. ERP can be calculated from EIRP by subtracting the gain of the dipole, ERP = EIRP-2.15dBi.

TEST RESULTS

Remark:

1. By preliminary testing and verifying three axis (X, Y and Z) position of EUT transmitted status, it was found that “Z axis” position was the worst, and test data recorded in this report.

LTE Band 2 - 1.4MHz									
Mode	Channel	Antenna Pol.	SG Level	Ca Antenna Gain	Cable Loss (dBm)	ERP(dBm)	ERP(W)	Limit (dBm)	Result
QPSK	Low	V	0.36	17.72	2.76	20.09	0.1021	≤33	Pass
		H	-0.01	17.48	2.81	20.32	0.1076		
	Mid	V	-0.34	16.54	3.38	20.11	0.1026		
		H	-0.28	17.07	2.82	20.15	0.1035		
	High	V	0.37	17.20	3.42	20.34	0.1081		
		H	0.09	17.32	3.02	20.25	0.1059		
16QAM	Low	V	0.32	16.34	3.40	19.27	0.0845		
		H	-0.42	17.42	2.99	20.87	0.1222		
	Mid	V	0.14	17.83	3.31	20.96	0.1247		
		H	-0.14	17.69	3.07	20.87	0.1222		
	High	V	-0.45	17.53	2.96	21.11	0.1291		
		H	0.30	17.95	3.45	21.13	0.1297		

LTE Band 2 - 3MHz									
Mode	Channel	Antenna Pol.	SG Level	Ca Antenna Gain	Cable Loss (dBm)	ERP(dBm)	ERP(W)	Limit (dBm)	Result
QPSK	Low	V	0.05	17.83	3.00	20.23	0.1054	≤33	Pass
		H	0.02	17.55	2.73	20.37	0.1089		
	Mid	V	0.05	16.43	3.44	20.15	0.1035		
		H	0.13	17.21	2.56	20.31	0.1074		
	High	V	-0.13	17.17	3.22	20.22	0.1052		
		H	-0.04	17.29	3.01	20.22	0.1052		
16QAM	Low	V	-0.33	16.33	3.28	19.41	0.0873		
		H	0.21	17.47	2.86	20.88	0.1225		
	Mid	V	-0.11	17.89	2.69	21.06	0.1276		
		H	0.21	17.68	2.97	20.89	0.1227		
	High	V	-0.10	17.62	3.11	21.03	0.1268		
		H	0.37	17.81	3.15	20.96	0.1247		

LTE Band 2 - 5MHz									
Mode	Channel	Antenna Pol.	SG Level	Ca Antenna Gain	Cable Loss (dBm)	ERP(dBm)	ERP(W)	Limit (dBm)	Result
QPSK	Low	V	-0.37	17.84	2.93	20.24	0.1057	≤33	Pass
		H	-0.19	17.53	2.63	20.35	0.1084		
	Mid	V	-0.24	16.50	3.12	20.22	0.1052		
		H	-0.42	17.12	3.41	20.22	0.1052		
	High	V	-0.06	17.28	2.65	20.33	0.1079		
		H	-0.14	17.35	3.04	20.28	0.1067		
16QAM	Low	V	-0.37	16.19	3.09	19.27	0.0845		
		H	0.43	17.50	3.22	20.91	0.1233		
	Mid	V	0.08	17.87	2.98	21.04	0.1271		
		H	0.41	17.64	3.04	20.85	0.1216		
	High	V	0.35	17.66	3.02	21.07	0.1279		
		H	0.24	17.93	2.58	21.08	0.1282		

LTE Band 2 - 10MHz									
Mode	Channel	Antenna Pol.	SG Level	Ca Antenna Gain	Cable Loss (dBm)	ERP(dBm)	ERP(W)	Limit (dBm)	Result
QPSK	Low	V	0.09	17.80	3.14	20.20	0.1047	≤33	Pass
		H	0.42	17.51	2.82	20.33	0.1079		
	Mid	V	0.49	16.47	3.19	20.19	0.1045		
		H	0.27	17.19	3.35	20.29	0.1069		
	High	V	0.24	17.22	2.87	20.27	0.1064		
		H	0.49	17.26	3.25	20.19	0.1045		
16QAM	Low	V	0.23	16.28	2.98	19.36	0.0863		
		H	0.10	17.56	2.81	20.97	0.1250		
	Mid	V	-0.15	17.73	3.21	20.90	0.1230		
		H	-0.02	17.75	3.43	20.96	0.1247		
	High	V	0.35	17.65	2.66	21.06	0.1276		
		H	-0.29	17.81	2.62	20.96	0.1247		

LTE Band 2 - 10MHz									
Mode	Channel	Antenna Pol.	SG Level	Ca Antenna Gain	Cable Loss (dBm)	ERP(dBm)	ERP(W)	Limit (dBm)	Result
QPSK	Low	V	0.34	17.76	2.69	20.16	0.1038	≤33	Pass
		H	0.27	17.47	2.96	20.29	0.1069		
	Mid	V	0.23	16.46	3.03	20.18	0.1042		
		H	0.44	17.12	2.90	20.22	0.1052		
	High	V	-0.25	17.18	3.33	20.23	0.1054		
		H	0.05	17.30	3.09	20.23	0.1054		
16QAM	Low	V	-0.13	16.17	2.76	19.25	0.0841		
		H	-0.49	17.61	3.35	21.02	0.1265		
	Mid	V	0.30	17.75	2.53	20.92	0.1236		
		H	-0.17	17.69	2.52	20.90	0.1230		
	High	V	0.34	17.62	3.42	21.03	0.1268		
		H	0.34	17.88	2.69	21.03	0.1268		

LTE Band 2 - 20MHz									
Mode	Channel	Antenna Pol.	SG Level	Ca Antenna Gain	Cable Loss (dBm)	ERP(dBm)	ERP(W)	Limit (dBm)	Result
QPSK	Low	V	-0.42	17.74	3.46	20.14	0.1033	≤33	Pass
		H	0.04	17.52	2.80	20.34	0.1081		
	Mid	V	-0.03	16.39	3.30	20.11	0.1026		
		H	-0.27	17.08	2.87	20.18	0.1042		
	High	V	0.13	17.18	3.20	20.23	0.1054		
		H	-0.06	17.17	3.26	20.10	0.1023		
16QAM	Low	V	0.04	16.19	2.96	19.27	0.0845		
		H	0.08	17.50	3.46	20.91	0.1233		
	Mid	V	-0.43	17.86	3.02	21.03	0.1268		
		H	0.43	17.68	2.87	20.89	0.1227		
	High	V	-0.45	17.54	3.35	20.95	0.1245		
		H	0.44	17.86	3.04	21.01	0.1262		

LTE Band 5 - 1.4MHz									
Mode	Channel	Antenna Pol.	SG Level	Ca Antenna Gain	Cable Loss (dBm)	ERP(dBm)	ERP(W)	Limit (dBm)	Result
QPSK	Low	V	-0.03	18.30	3.06	20.70	0.1175	≤38.45	Pass
		H	-0.28	18.27	2.94	21.09	0.1285		
	Mid	V	0.11	17.44	3.12	21.16	0.1306		
		H	-0.09	18.06	2.82	21.16	0.1306		
	High	V	-0.27	17.82	3.28	20.87	0.1222		
		H	0.34	17.76	3.26	20.69	0.1172		
16QAM	Low	V	0.32	17.67	3.01	20.75	0.1189		
		H	-0.43	17.66	2.70	21.07	0.1279		
	Mid	V	-0.14	17.47	3.18	20.64	0.1159		
		H	0.22	17.48	3.06	20.69	0.1172		
	High	V	0.35	17.16	2.80	20.57	0.1140		
		H	-0.14	18.35	2.62	21.50	0.1413		

LTE Band 5 - 3MHz									
Mode	Channel	Antenna Pol.	SG Level	Ca Antenna Gain	Cable Loss (dBm)	ERP(dBm)	ERP(W)	Limit (dBm)	Result
QPSK	Low	V	-0.28	17.88	3.17	20.28	0.1067	≤38.45	Pass
		H	-0.34	17.44	2.75	20.26	0.1062		
	Mid	V	-0.37	16.50	3.22	20.22	0.1052		
		H	-0.47	17.21	2.77	20.31	0.1074		
	High	V	-0.06	17.24	3.09	20.29	0.1069		
		H	-0.22	17.22	2.82	20.15	0.1035		
16QAM	Low	V	-0.23	16.24	2.71	19.32	0.0855		
		H	-0.43	17.48	2.58	20.89	0.1227		
	Mid	V	0.35	17.89	2.90	21.06	0.1276		
		H	-0.19	17.74	2.56	20.95	0.1245		
	High	V	-0.05	17.68	2.91	21.09	0.1285		
		H	0.01	17.94	2.65	21.09	0.1285		

LTE Band 5 - 5MHz									
Mode	Channel	Antenna Pol.	SG Level	Ca Antenna Gain	Cable Loss (dBm)	ERP(dBm)	ERP(W)	Limit (dBm)	Result
QPSK	Low	V	-0.33	18.17	2.72	20.57	0.1140	≤38.45	Pass
		H	0.07	18.32	2.78	21.14	0.1300		
	Mid	V	0.27	17.44	2.59	21.16	0.1306		
		H	0.29	18.08	2.98	21.18	0.1312		
	High	V	-0.07	17.87	2.77	20.92	0.1236		
		H	0.41	17.61	2.90	20.54	0.1132		
16QAM	Low	V	-0.16	17.58	3.05	20.66	0.1164		
		H	-0.04	17.65	2.85	21.06	0.1276		
	Mid	V	0.28	17.53	2.90	20.70	0.1175		
		H	-0.28	17.36	3.47	20.57	0.1140		
	High	V	0.28	17.30	3.22	20.71	0.1178		
		H	0.36	18.21	3.37	21.36	0.1368		

LTE Band 5 - 10MHz									
Mode	Channel	Antenna Pol.	SG Level	Ca Antenna Gain	Cable Loss (dBm)	ERP(dBm)	ERP(W)	Limit (dBm)	Result
QPSK	Low	V	0.11	18.17	2.79	20.57	0.1140	≤38.45	Pass
		H	0.33	18.33	2.69	21.15	0.1303		
	Mid	V	0.29	17.45	2.70	21.17	0.1309		
		H	-0.49	17.96	2.66	21.06	0.1276		
	High	V	0.04	17.75	3.25	20.80	0.1202		
		H	-0.46	17.60	3.47	20.53	0.1130		
16QAM	Low	V	-0.02	17.66	2.65	20.74	0.1186		
		H	0.48	17.56	2.89	20.97	0.1250		
	Mid	V	0.40	17.58	2.71	20.75	0.1189		
		H	0.29	17.51	2.67	20.72	0.1180		
	High	V	-0.18	17.29	3.27	20.70	0.1175		
		H	-0.16	18.29	3.46	21.44	0.1393		

LTE Band 7 - 5MHz									
Mode	Channel	Antenna Pol.	SG Level	Ca Antenna Gain	Cable Loss (dBm)	ERP(dBm)	ERP(W)	Limit (dBm)	Result
QPSK	Low	V	-0.11	18.21	3.01	20.61	0.1151	≤33	Pass
		H	-0.39	18.21	2.70	21.03	0.1268		
	Mid	V	0.18	17.39	2.73	21.11	0.1291		
		H	-0.16	18.12	3.37	21.22	0.1324		
	High	V	-0.33	17.93	2.75	20.98	0.1253		
		H	-0.23	17.66	2.68	20.59	0.1146		
16QAM	Low	V	-0.10	17.64	2.87	20.72	0.1180		
		H	-0.03	17.56	2.76	20.97	0.1250		
	Mid	V	-0.33	17.51	2.93	20.68	0.1169		
		H	0.35	17.33	3.01	20.54	0.1132		
	High	V	0.13	17.19	3.26	20.60	0.1148		
		H	-0.32	18.20	3.34	21.35	0.1365		

LTE Band 7 - 10MHz									
Mode	Channel	Antenna Pol.	SG Level	Ca Antenna Gain	Cable Loss (dBm)	ERP(dBm)	ERP(W)	Limit (dBm)	Result
QPSK	Low	V	-0.39	18.24	3.32	20.64	0.1159	≤33	Pass
		H	-0.46	18.21	3.45	21.03	0.1268		
	Mid	V	0.17	17.42	3.26	21.14	0.1300		
		H	0.14	17.96	3.23	21.06	0.1276		
	High	V	0.40	17.75	3.29	20.80	0.1202		
		H	-0.15	17.62	2.72	20.55	0.1135		
16QAM	Low	V	0.13	17.52	2.86	20.60	0.1148		
		H	-0.03	17.61	3.29	21.02	0.1265		
	Mid	V	-0.13	17.54	2.90	20.71	0.1178		
		H	-0.24	17.42	2.61	20.63	0.1156		
	High	V	0.03	17.26	2.64	20.67	0.1167		
		H	0.34	18.24	3.49	21.39	0.1377		

LTE Band 7 - 15MHz									
Mode	Channel	Antenna Pol.	SG Level	Ca Antenna Gain	Cable Loss (dBm)	ERP(dBm)	ERP(W)	Limit (dBm)	Result
QPSK	Low	V	0.49	18.33	2.79	18.35	0.0684	≤33	Pass
		H	-0.24	18.20	2.89	18.47	0.0703		
	Mid	V	0.20	17.38	2.81	17.69	0.0587		
		H	-0.11	18.08	3.16	18.15	0.0653		
	High	V	-0.02	17.91	3.12	18.01	0.0632		
		H	0.42	17.67	3.23	17.08	0.0511		
16QAM	Low	V	-0.32	17.51	3.22	17.74	0.0594		
		H	-0.20	17.72	2.64	18.54	0.0714		
	Mid	V	0.31	17.48	3.45	17.49	0.0561		
		H	-0.35	17.50	3.46	16.82	0.0481		
	High	V	-0.47	17.28	3.46	13.82	0.0241		
		H	0.05	18.33	2.78	15.55	0.0359		

LTE Band 7 - 20MHz									
Mode	Channel	Antenna Pol.	SG Level	Ca Antenna Gain	Cable Loss (dBm)	ERP(dBm)	ERP(W)	Limit (dBm)	Result
QPSK	Low	V	-0.25	18.25	2.52	20.65	0.1161	≤33	Pass
		H	-0.14	18.36	2.68	21.18	0.1312		
	Mid	V	0.41	17.45	3.00	21.17	0.1309		
		H	0.46	18.11	3.31	21.21	0.1321		
	High	V	0.01	17.89	3.35	20.94	0.1242		
		H	-0.14	17.64	3.32	20.57	0.1140		
16QAM	Low	V	-0.09	17.58	2.63	20.66	0.1164		
		H	0.01	17.70	2.99	21.11	0.1291		
	Mid	V	0.22	17.41	2.64	20.58	0.1143		
		H	0.43	17.40	2.85	20.61	0.1151		
	High	V	0.39	17.26	2.96	20.67	0.1167		
		H	-0.37	18.23	2.83	21.38	0.1374		

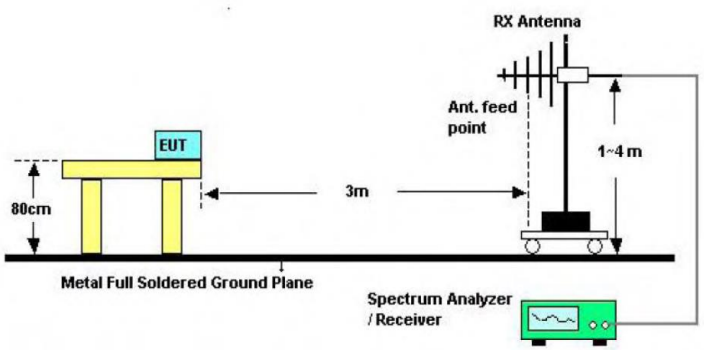
3.7. Radiated Spurious Emission

LIMIT

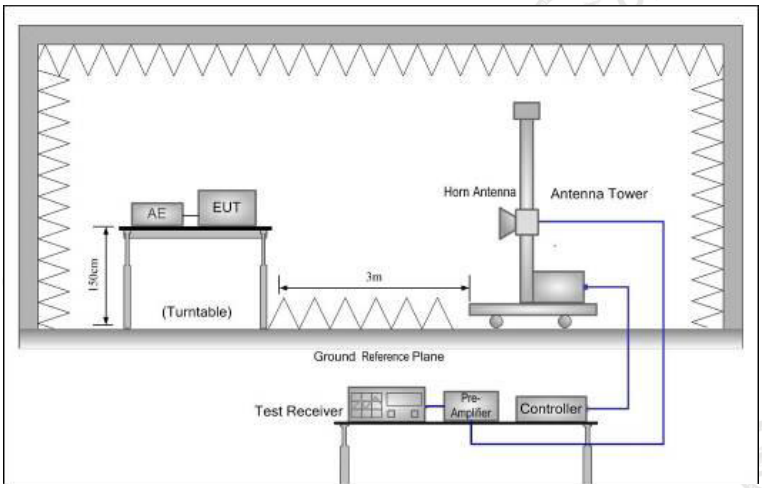
FDD Band 2: The power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least 43 + 10 log(P) dB.
FDD Band 5: The power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least 43 + 10 log(P) dB.
FDD Band 7: For mobile digital stations, the attenuation factor shall be not less than 40 + 10 log (P) dB on all frequencies between the channel edge and 5 megahertz from the channel edge, 43 + 10 log (P) dB on all frequencies between 5 megahertz and X megahertz from the channel edge, and 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. In addition, the attenuation factor shall not be less that 43 + 10 log (P) dB on all frequencies between 2490.5 MHz and 2496 MHz and 55 + 10 log (P) dB at or below 2490.5 MHz.

TEST CONFIGURATION

For the actual test configuration, please refer to the related Item – EUT Test Photos.



Below 1GHz



Above 1GHz

TEST PROCEDURE

1. EUT was placed on a 1.50 meter high non-conductive stand at a 3 meter test distance from the receive antenna. A receiving antenna was placed on the antenna mast 3 meters from the EUT for emission measurements. The height of receiving antenna is 1.50m. Detected emissions were maximized at each frequency by rotating the EUT through 360° and adjusting the receiving antenna polarization. The radiated emission measurements of all transmit frequencies in three channels (High, Middle, Low) were measured with peak detector.
2. A log-periodic antenna or double-ridged waveguide horn antenna shall be substituted in place of the EUT. The log-periodic antenna will be driven by a signal generator and the level will be adjusted till the same power value on the spectrum analyzer or receiver. The level of the spurious emissions can be calculated through the level of the signal generator, cable loss, the gain of the substitution antenna and the reading of the spectrum analyzer or receiver.
3. The EUT is then put into continuously transmitting mode at its maximum power level during the test. Set Test Receiver or Spectrum RBW=1MHz, VBW=3MHz, and the maximum value of the receiver should be recorded as (Pr).
4. The EUT shall be replaced by a substitution antenna. In the chamber, an substitution antenna for the frequency band of interest is placed at the reference point of the chamber. An RF Signal source for the frequency band of interest is connected to the substitution antenna with a cable that has been constructed to not interfere with the radiation pattern of the antenna. A power (PMea) is applied to the input of the substitution antenna, and adjusts the level of the signal generator output until the value of the receiver reach the previously recorded (Pr). The power of signal source (PMea) is recorded. The test should be performed by rotating the test item and adjusting the receiving antenna polarization.
5. An amplifier should be connected to the Signal Source output port. And the cable should be connecting between the Amplifier and the Substitution Antenna. The cable loss (Pcl) ,the Substitution Antenna Gain (Ga) and the Amplifier Gain (PAg) should be recorded after test.
6. The measurement results are obtained as described below:
7. Power(EIRP)=PMea- PAg - Pcl + Ga
8. We used SMF100A microwave signal generator which signal level can up to 33dBm,so we not used power Amplifier for substitution test; The measurement results are amend as described below:
9. Power(EIRP)=PMea- Pcl + Ga
10. This value is EIRP since the measurement is calibrated using an antenna of known gain (2.15 dBi) and known input power.
11. ERP can be calculated from EIRP by subtracting the gain of the dipole, ERP = EIRP-2.15dBi.
12. Test frequency range should extend to 10^{th} harmonic of highest fundamental frequency.

TEST RESULTS

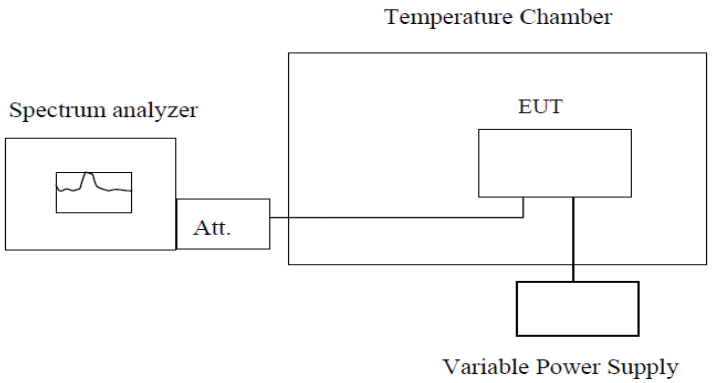
Please Refer to Appendix for Details.

3.8. Frequency stability

LIMIT

Cellular Band: ±2.5ppm PCS Band: Within the authorized frequency block

TEST CONFIGURATION



Note : Measurement setup for testing on Antenna connector

TEST PROCEDURE

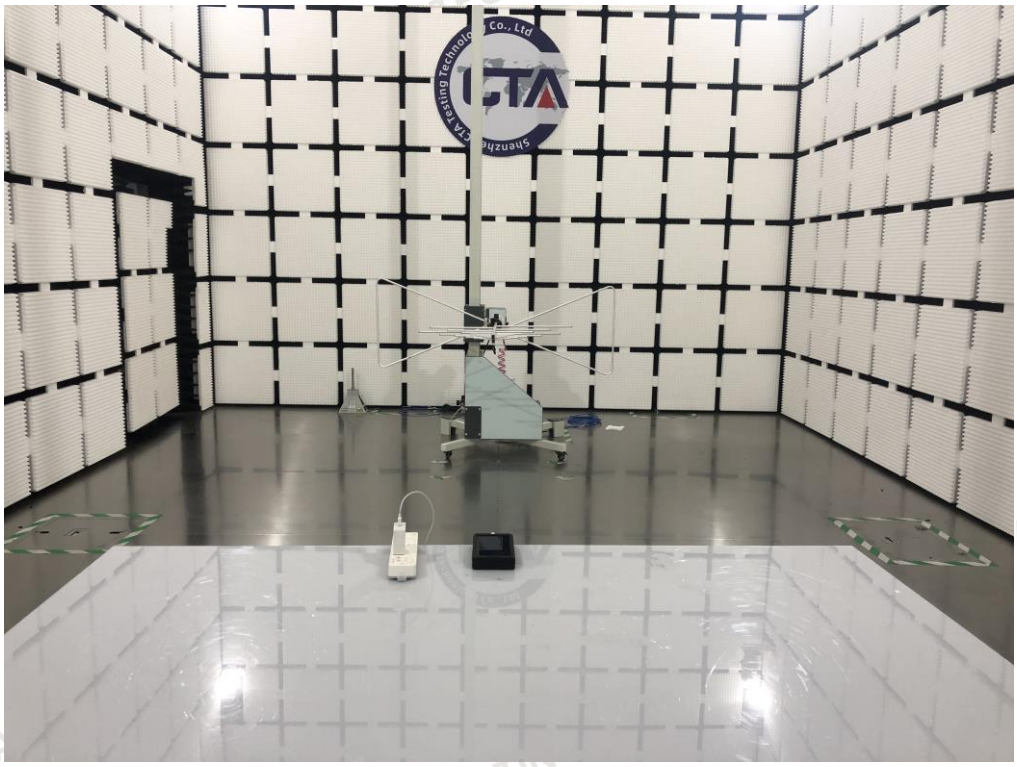
1. The equipment under test was connected to an external DC power supply and input rated voltage.
2. RF output was connected to a frequency counter or spectrum analyzer via feed through attenuators.
3. The EUT was placed inside the temperature chamber.
4. Set the spectrum analyzer RBW low enough to obtain 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 +55℃ reached.
7. Reduce the input voltage to specified extreme voltage variation (+/- 15%) and endpoint, record the maximum frequency change.

TEST RESULTS

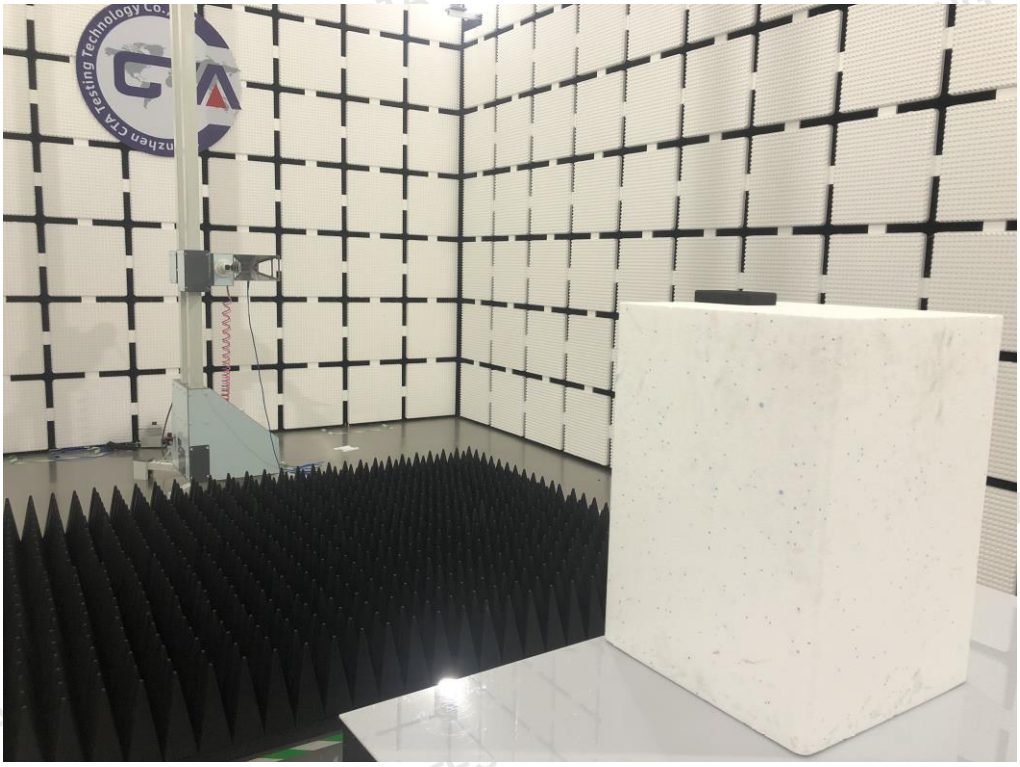
Please see the Appendix for every tested Band.

4. EUT TEST PHOTOS

Radiated Measurement (Below 1GHz)



Radiated Measurement (Above 1GHz)



5. PHOTOGRAPHS OF EUT CONSTRUCTIONAL

Please refer to the report Report No.: CTA22012500601

--THE END--