RADIO TEST REPORT
FCC ID:2AWGT-G1C

Product Designation	:	GPS tracker
Trade Name	:	GOSAFE
Model Name	:	G1C
Applicant	:	GOSAFE(GUANGZHOU)INC
Date of Issue	:	May. 15, 2020
Standard(s)	:	FCC Part 24:PERSONAL COMMUNICATIONS SERVICES FCC Part 27:MISCELLANEOUS WIRELESS COMMUNICATIONS SERVICES
Report No	:	DGE200413002D03

Prepared for

GOSAFE(GUANGZHOU)INC

RM 1105, the Innovation Building C1 No. 182 Kexue Avenue, Science City, Guangzhou.China

Prepared by

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REPORT REVISE RECORD

Report No	Revise Time	Issued Date	Valid Version	Notes
DGE200413002D03	/	May 15, 2020	Invalid	Initial release

Note: The original test report Ref.No. ZR/2019/8003201 dated Dec. 11, 2019, was modified on May. 15, 2020 to include the following changes:

- Change the EUT Left headset photo;
- RADIATED OUTPUT POWER.
- RADIATED SPURIOUS EMISSION;

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1. TEST REPORT CERTIFICATION

Applicant's name..... : GOSAFE(GUANGZHOU)INC

Address..... : RM 1105, the Innovation Building C1 No. 182 Kexue Avenue, Science City, Guangzhou.China

Manufacturer's Name..... : Huizhou Bo Shi Jie Technology Co., Ltd.

Address..... : Bo Shi Jie Industrial Park, No .1 Huifeng West Third Road, Zhongkai，Huizhou City, Guangzhou.China

Product description

Product name..... : GPS tracker

Trademark ..... : GOSAFE

Model and/or type reference ....: G1C

Difference..... : N/A

Standards..... : FCC Part 24: PERSONAL COMMUNICATIONS SERVICES
FCC Part 27:MISCELLANEOUS WIRELESS COMMUNICATIONS SERVICES

Date of Test.....

Date (s) of performance of tests..... : 10 Apr. 2020 ~15 May. 2020

Date of Issue..... : 15 May. 2020

Test Result..... : **Pass**

Testing Engineer : Eileen Liu.
(Eileen Liu)

Technical Manager : Jason chen
(Jason Chen)

Authorized Signatory : Sam . Chen
(Sam Chen)

2. GENERAL INFORMATION

2.1 PRODUCT DESCRIPTION

A major technical description of EUT is described as following:

Product Designation:	GPS tracker
Frequency Bands:	☒ LTE CatM1 Band 2 ☒ LTE CatM1 Band 4
Test Modulation	QPSK,16QAM
Hardware Version	V1.0
Software Version	V1.0
Antenna Type	PIFA Antenna
Antenna gain	LTE CatM1 Band 2: 0.9dBi; LTE CatM1 Band 4: 1.6dBi;
Power Supply:	DC 3.3V to 4.07V (Normal: DC 3.7V);DC 6V~90V by external power supply
Singel Card:	GSM /LTE Card Slot
Extreme Temp. Tolerance	-20℃ to +75℃
*** Note: 1. The High Voltage DC 4.07V and Low Voltage DC 3.3V were declared by manufacturer 2. The EUT couldn't be operating normally with higher or lower voltage.	

2.2 Technical Specification

Characteristics	Description		
Supported Frequency Range	Band	Tx	Rx
	GSM 850	824 to 849 MHz	869 to 894 MHz
	GSM 1900	1850 to 1910 MHz	1930 to 1990 MHz
	LTE NB1 Band 2	1850 to 1910 MHz	1930 to 1990 MHz
	LTE NB1 Band 4	1710 to 1755 MHz	2110 to 2155 MHz
	LTE NB1 Band 12	699 to 716 MHz	729 to 746 MHz
	LTE NB1 Band13	777 to 787 MHz	746 to 756 MHz
	LTE CatM1 Band 2	1850 to 1910 MHz	1930 to 1990 MHz
	LTE CatM1 Band 4	1710 to 1755 MHz	2110 to 2155 MHz
	LTE CatM1 Band 12	699 to 716 MHz	729 to 746 MHz
	LTE CatM1 Band 13	777 to 787 MHz	746 to 756 MHz

Supported Channel Bandwidth	GSM	200KHz
	LTE NB1 Band 2	180KHz
	LTE NB1 Band 4	180KHz
	LTE NB1 Band 12	180KHz
	LTE NB1 Band13	180KHz
	LTE CatM1 Band 2	☒ 1.4MHz ☒ 3MHz ☒ 5MHz ☒ 10MHz ☒ 15MHz ☒ 20MHz
	LTE CatM1 Band 4	☒ 1.4MHz ☒ 3MHz ☒ 5MHz ☒ 10MHz ☒ 15MHz ☒ 20MHz
	LTE CatM1 Band 12	☒ 1.4MHz ☒ 3MHz ☒ 5MHz ☒ 10MHz
	LTE CatM1 Band 13	☒ 5MHz ☒ 10MHz

2.3 Test Frequencies

Test Mode	Bandwidth	TX / RX	RF Channel		
			Low (L)	Middle (M)	High (H)
LTE CatM1 Band 2	1.4MHz	TX	Channel 18607	Channel 18900	Channel 19193
			1850.7 MHz	1880 MHz	1909.3 MHz
		RX	Channel 607	Channel 900	Channel 1193
			1930.7 MHz	1960 MHz	1989.3 MHz
	3MHz	TX	Channel 18615	Channel 18900	Channel 19185
			1851.5 MHz	1880 MHz	1908.5 MHz
		RX	Channel 615	Channel 900	Channel 1185
			1931.5 MHz	1960 MHz	1988.5 MHz
	5MHz	TX	Channel 18625	Channel 18900	Channel 19175
			1852.5 MHz	1880 MHz	1907.5 MHz
		RX	Channel 625	Channel 900	Channel1175
			1932.5 MHz	1960 MHz	1987.5 MHz
	10MHz	TX	Channel 18650	Channel 18900	Channel 19150
			1855 MHz	1880 MHz	1905 MHz
		RX	Channel 650	Channel 900	Channel 1150
			1935 MHz	1960 MHz	1985 MHz
	15MHz	TX	Channel 18675	Channel 18900	Channel 19125
			1857.5 MHz	1880 MHz	1902.5 MHz
		RX	Channel 675	Channel 900	Channel 1125
			1937.5 MHz	1960 MHz	1982.5 MHz
	20MHz	TX	Channel 18700	Channel 18900	Channel 19100
			1860 MHz	1880 MHz	1900 MHz
		RX	Channel 700	Channel 900	Channel 1100
			1940 MHz	1960 MHz	1980 MHz

Test Mode	**Bandwidth**	**TX/RX**	**RF Channel**		
			Low	**Middle**	**High**
LTE CatM1 Band 4	1.4MHz	TX	Channel 19957	Channel 20175	Channel 20393
			1710.7 MHz	1732.5 MHz	1754.3 MHz
		RX	Channel 1975	Channel 2175	Channel 2375
			2112.5 MHz	2132.5MHz	2152.5 MHz

	3MHz	TX	Channel 19965	Channel 20175	Channel 20385
			1711.5 MHz	1732.5 MHz	1753.5 MHz
		RX	Channel 2000	Channel 2175	Channel 2350
			2115MHz	2132.5MHz	2150MHz
	5MHz	TX	Channel 19975	Channel 20175	Channel 20375
			1712.5 MHz	1732.5 MHz	1752.5 MHz
		RX	Channel 1975	Channel 2175	Channel 2375
			2112.5 MHz	2132.5MHz	2152.5 MHz
	10MHz	TX	Channel 20000	Channel 20175	Channel 20350
			1715 MHz	1732.5 MHz	1750 MHz
		RX	Channel 20000	Channel 20175	Channel 20350
			2115 MHz	2132.5MHz	2150 MHz
	15MHz	TX	Channel 20025	Channel 20175	Channel 20325
			1717.5 MHz	1732.5 MHz	1747.5 MHz
		RX	Channel 20025	Channel 20175	Channel 20325
			2117.5 MHz	2132.5MHz	2147.5 MHz
	20MHz	TX	Channel 20050	Channel 20175	Channel 20300
			1720 MHz	1732.5 MHz	1745 MHz
		RX	Channel 20050	Channel 20175	Channel 20300
			2120 MHz	2132.5MHz	2145 MHz

2.4 Test Methodology

The radiated emission testing was performed according to the procedures of ANSI/TIA-603-E-2016, and KDB 971168 D01 Power Means License Digital Systems V03R01.

2.5 TEST FACILITY

Site	Shenzhen NTEK Testing Technology Co., Ltd.
Location	1/F, Building E, Fenda Science Park, Sanwei Community, Xixiang Street, Bao'an District, Shenzhen P.R. China
Designation Number	FCC Registered No.: 238937 IC Registered No.:9270A-1 CNAS Registration No.:L5516

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 %.

No.	Item	Uncertainty
1	Conducted Emission Test	±3.6dB
2	RF power,conducted	±0.16dB
3	Spurious emissions,conducted	±0.21dB
4	All emissions,radiated(<1G)	±4. 8dB
5	All emissions,radiated(>1G)	±5.0dB
6	Temperature	±0.5°C
7	Humidity	±2%

ALL TEST EQUIPMENT LIST

No.	Type	Manufacturer	S/N	Cal. Date	Cal. Due
1	H & T Chamber ETH225-40A	Test EQ	WIT-05121302	Feb.13,2020	Feb.12,2021
2	CMW500	R&S	1100.008.02	Feb.27,2020	Feb.26,2021
3	Wireless communication test set 8960	Agilent	GB46200384	July 16,2019	July 15,2020
4	Power Splitter 11636A	Agilent	34	Sep.21,2019	Sep.20,2020
5	Attenuator	JFW	50FHC-006-50	Jun 20, 2019	June 19, 2020
6	Vector Signal Generator SMU200A	R&S	104332	Sep.21,2019	Sep.20,2020
7	VECTOR ANALYZER E4440A	Agilent	MY44303916	Jun 29, 2019	June 28, 2020
8	MXG Vector Signal Generator N5182A	AGILENT	MY50140530	Sep. 21, 2019	Sep. 20, 2020
9	PSG Analog Signal Generator E8257D	AGILENT	MY45141029	Sep. 21, 2019	Sep. 20, 2020

No.	Type	Manufacturer	S/N	Cal. Date	Cal. Due
10	MXA Signal Analyzer N9020A	AGILENT	W1312-60196	Feb.27,2020	Feb.26,2021
11	Universal Switch Control Unit	JS TONSCEND	N/A	---	---
12	RF SHIELD BOX	R&S	1204.7008K02-102590-EE	Feb.27,2020	Feb.26,2021
13	Programmable Power Supply PPT-1830	GW INSTEK	EM907629	Aug.24,2019	Aug.23,2020
14	Vibration Source SCU-200	SUSHI	3000-40-07	Feb.23,2020	Feb.22,2021
15	Attenuator	JFW	50FHC-006-50	Jun 20, 2019	Jun 19, 2020
16	EMI Test Receiver ESCI	R&S	100694	Feb.27,2020	Feb.26,2021
17	Horn Antenna	EM	EM-AH-10180	Mar.01,2020	Feb.28,2021
18	Horn Ant	Schwarzbeck	BBHA 9170	Mar.12,2020	Mar.11,2021
19	Loop antenna	ARA	PLA-1030/B	Mar.01,2020	Feb.28,2021
20	Bilog Antenna	TESEQ	CBL6111D	Apr.11,2020	Apr.10,2021
21	Pre-Amplifier	EMC	EMC051835SE	Mar.01,2016	Feb.28,2021
22	High pass filter unit	Tonscend	JS0806-F	Mar.09,2019	Mar.08,2022
23	Coupling Ant	EMC	0059611	Mar.18,2019	Mar.17,2022

2.6 SPECIAL ACCESSORIES

The battery wassupplied by the applicant were used as accessories and being tested with EUT intended for FCC grant together.

2.7 EQUIPMENT MODIFICATIONS

Not available for this EUT intended for grant.

3. SYSTEM TEST CONFIGURATION

3.1 EUT CONFIGURATION

The EUTconfiguration for testing is installed on RF field strength measurement to meet the Commission’s requirement and operating in a manner which intends to maximize its emission characteristics in a continuous normal application.

3.2 EUT EXERCISE

The Transmitter was operated in the maximum output power mode through Communication Tester. The TX frequency was fixed which was for the purpose of the measurements.

3.3 CONFIGURATION OF EUT SYSTEM

Fig. 2-1 Configuration of EUT System

Table 2-1 Equipment Used in EUT System

Item	Equipment	Model No.	ID or Specification	Remark
1	GPS tracker	G1C	2AWGT-G1C	EUT
2	Antenna	N/A	N/A	AE

***Note: All the accessories have been used during the test. The following “EUT” in setup diagram means EUT system.

4. SUMMARY OF TEST RESULTS

Item Number	Item Description		FCC Rules	Result
1	Output Power	Conducted Output Power	2.1046	Pass
		Radiated Output Power	24.232 (c)/ 27.50(d)(4)	
2	Peak-to-Average Ratio	Peak-to-Average Ratio	24.232(d) / 27.50(d)	Pass
3	Spurious Emission	Conducted Spurious Emission	2.1051/24.238(a)/ 27.53(h)	Pass
		Radiated Spurious Emission		
4	Frequency Stability		2.1053/24.238(a)/27.53(h)	Pass
5	Occupied Bandwidth		2.1049	Pass
6	Band Edge		2.1051/24.238(a)/ 27.53(h)	Pass

5. DESCRIPTION OF TEST MODES

During the testing, the EUT was controlled via Rhode & Schwarz Digital Radio Communication Tester (CMW 500)to ensure max power transmission and proper modulation. Three channels (The top channel, the middle channel and the bottom channel) were chosen for testing on both GSMand PCS frequency band.

***Note:** LTE, mode have been tested during the test.

The worst condition was recorded in the test report if no other modes test data.

6. OUTPUT POWER

6.1 CONDUCTED OUTPUT POWER

Please refer to the original report .: ZR/2019/8003201-Appendix B , FCC ID: ZMOMA510GL

6.2 RADIATED OUTPUT POWER

6.2.1 MEASUREMENT METHOD

The measurements procedures specified in ANSI/TIA-603-E-2016 were applied.

1. Effective Radiated Power (ERP) and Equivalent Isotropic Radiated Power (EIRP) measurements are performed using the substitution method described in ANSI/TIA-603-E-2016 with the EUT transmitting into an integral antenna. Measurements on signal operating below 1GHz are performed using dipole antennas. Measurements on signals operating above 1GHz are performed using broadband horn antennas. All measurements are performed as RMS average measurements while the EUT operating at its maximum duty cycle, at maximum power, and at the approximate frequencies.
2. In an anechoic antenna test chamber, a half-wave dipole antenna for the frequency band of interest is placed at the reference centre of the chamber. An RF Signal source for the frequency band of interest is connected to the dipole with a cable that has been constructed to not interfere with the radiation pattern of the antenna. A known (measured) power (Pin) is applied to the input of the dipole, and the power received (Pr) at the chamber's probe antenna is recorded.
3. The substitution method is used. Substitution values at each frequency are measured before and saved to the test software. A "reference path loss" is established as ARpl=Pin + 2.15 - Pr. TheARpl is the attenuation of “reference path loss”, and including the gain of receive antenna, the cable loss and the air loss. The measurement results are obtained as described below: Power=PMea+ARpl
4. The EUT is substituted for the dipole at the reference centre of the chamber and a scan is performed to obtain the radiation pattern.
5. From the radiation pattern, the co-ordinates where the maximum antenna gain occurs are identified.
6. The EUT is then put into continuously transmitting mode at its maximum power level.
7. Power mode measurements are performed with the receiving antenna placed at the coordinates determined in Step 3 to determine the output power as defined in Rule 24.232 (b) and (c) and Rule 27.50(d)(4). The "reference path loss" from Step1 is added to this result.
8. This value is EIRP since the measurement is calibrated using a half-wave dipole antenna of known gain (2.15 dBi) and known input power (Pin).
9. ERP can be calculated from EIRP by subtracting the gain of the dipole, **ERP = EIRP -2.15dBi.**..

SG Level= Signal generator output
Pcl= cable loss
Ga= Antenna Gain
Peak EIRP(dBm)= SGLevel -Pcl +Ga
ERP(dBm)=EIRP-2.15

6.2.2 PROVISIONS APPLICABLE

Mode	FCC Part Section(s)	Nominal Peak Power
LTE CatM1 Band 2	24.229(b)	<=33dBm (2W)
LTE CatM1 Band 4	27.5(h)	<=30dBm (1W)

6.2.3 MEASUREMENT RESULT

LTE CatM1 Band 2

Test Band	Test Mode	Test Bandwidth	Test channel	Test RB	Conducted Power (dBm)	EIRP (dBm)	limit (dBm)	Verdict
CatM1 Band 2	QPSK	1.4M	LCH	1RB#0	21.15	22.05	33.00	PASS
CatM1 Band 2	QPSK	1.4M	LCH	5RB#0	20.08	20.98	33.00	PASS
CatM1 Band 2	QPSK	1.4M	LCH	6RB#0	19.06	19.96	33.00	PASS
CatM1 Band 2	QPSK	1.4M	MCH	1RB#0	21.06	21.96	33.00	PASS
CatM1 Band 2	QPSK	1.4M	MCH	5RB#0	20.01	20.91	33.00	PASS
CatM1 Band 2	QPSK	1.4M	MCH	6RB#0	19.02	19.92	33.00	PASS
CatM1 Band 2	QPSK	1.4M	HCH	1RB#0	21.15	22.05	33.00	PASS
CatM1 Band 2	QPSK	1.4M	HCH	5RB#0	19.96	20.86	33.00	PASS
CatM1 Band 2	QPSK	1.4M	HCH	6RB#0	19.05	19.95	33.00	PASS
CatM1 Band 2	16QAM	1.4M	LCH	1RB#0	20.19	21.09	33.00	PASS
CatM1 Band 2	16QAM	1.4M	LCH	5RB#0	19.18	20.08	33.00	PASS
CatM1 Band 2	16QAM	1.4M	MCH	1RB#0	19.87	20.77	33.00	PASS
CatM1 Band 2	16QAM	1.4M	MCH	5RB#0	19.04	19.94	33.00	PASS
CatM1 Band 2	16QAM	1.4M	HCH	1RB#0	19.94	20.84	33.00	PASS
CatM1 Band 2	16QAM	1.4M	HCH	5RB#0	19.04	19.94	33.00	PASS
CatM1 Band 2	QPSK	3M	LCH	1RB#0	21.18	22.08	33.00	PASS
CatM1 Band 2	QPSK	3M	LCH	5RB#0	19.99	20.89	33.00	PASS
CatM1 Band 2	QPSK	3M	LCH	6RB#0	19.08	19.98	33.00	PASS
CatM1 Band 2	QPSK	3M	MCH	1RB#0	21.14	22.04	33.00	PASS
CatM1 Band 2	QPSK	3M	MCH	5RB#0	19.96	20.86	33.00	PASS
CatM1 Band 2	QPSK	3M	MCH	6RB#0	18.96	19.86	33.00	PASS
CatM1 Band 2	QPSK	3M	HCH	1RB#0	21.12	22.02	33.00	PASS
CatM1 Band 2	QPSK	3M	HCH	5RB#0	19.99	20.89	33.00	PASS
CatM1 Band 2	QPSK	3M	HCH	6RB#0	18.89	19.79	33.00	PASS
CatM1 Band 2	16QAM	3M	LCH	1RB#0	19.93	20.83	33.00	PASS
CatM1 Band 2	16QAM	3M	LCH	5RB#0	19.09	19.99	33.00	PASS
CatM1 Band 2	16QAM	3M	MCH	1RB#0	19.87	20.77	33.00	PASS
CatM1 Band 2	16QAM	3M	MCH	5RB#0	18.88	19.78	33.00	PASS
CatM1 Band 2	16QAM	3M	HCH	1RB#0	19.7	20.60	33.00	PASS
CatM1 Band 2	16QAM	3M	HCH	5RB#0	18.97	19.87	33.00	PASS
CatM1 Band 2	QPSK	5M	LCH	1RB#0	21.13	22.03	33.00	PASS
CatM1 Band 2	QPSK	5M	LCH	5RB#0	20.1	21.00	33.00	PASS
CatM1 Band 2	QPSK	5M	LCH	6RB#0	20.15	21.05	33.00	PASS
CatM1 Band 2	QPSK	5M	MCH	1RB#0	20.95	21.85	33.00	PASS
CatM1 Band 2	QPSK	5M	MCH	5RB#0	19.84	20.74	33.00	PASS
CatM1 Band 2	QPSK	5M	MCH	6RB#0	19.91	20.81	33.00	PASS
CatM1 Band 2	QPSK	5M	HCH	1RB#0	21.12	22.02	33.00	PASS
CatM1 Band 2	QPSK	5M	HCH	5RB#0	19.89	20.79	33.00	PASS
CatM1 Band 2	QPSK	5M	HCH	6RB#0	19.94	20.84	33.00	PASS

CatM1 Band 2	16QAM	5M	LCH	1RB#0	20.84	21.74	33.00	PASS
CatM1 Band 2	16QAM	5M	LCH	5RB#0	20.08	20.98	33.00	PASS
CatM1 Band 2	16QAM	5M	MCH	1RB#0	20.81	21.71	33.00	PASS
CatM1 Band 2	16QAM	5M	MCH	5RB#0	19.83	20.73	33.00	PASS
CatM1 Band 2	16QAM	5M	HCH	1RB#0	20.72	21.62	33.00	PASS
CatM1 Band 2	16QAM	5M	HCH	5RB#0	19.91	20.81	33.00	PASS
CatM1 Band 2	QPSK	10M	LCH	1RB#0	21.21	22.11	33.00	PASS
CatM1 Band 2	QPSK	10M	LCH	5RB#0	21.2	22.10	33.00	PASS
CatM1 Band 2	QPSK	10M	LCH	6RB#0	20.09	20.99	33.00	PASS
CatM1 Band 2	QPSK	10M	MCH	1RB#0	20.93	21.83	33.00	PASS
CatM1 Band 2	QPSK	10M	MCH	5RB#0	20.89	21.79	33.00	PASS
CatM1 Band 2	QPSK	10M	MCH	6RB#0	19.88	20.78	33.00	PASS
CatM1 Band 2	QPSK	10M	HCH	1RB#0	21.12	22.02	33.00	PASS
CatM1 Band 2	QPSK	10M	HCH	5RB#0	21.04	21.94	33.00	PASS
CatM1 Band 2	QPSK	10M	HCH	6RB#0	19.93	20.83	33.00	PASS
CatM1 Band 2	16QAM	10M	LCH	1RB#0	20.87	21.77	33.00	PASS
CatM1 Band 2	16QAM	10M	LCH	5RB#0	20.79	21.69	33.00	PASS
CatM1 Band 2	16QAM	10M	MCH	1RB#0	20.71	21.61	33.00	PASS
CatM1 Band 2	16QAM	10M	MCH	5RB#0	20.61	21.51	33.00	PASS
CatM1 Band 2	16QAM	10M	HCH	1RB#0	20.78	21.68	33.00	PASS
CatM1 Band 2	16QAM	10M	HCH	5RB#0	20.93	21.83	33.00	PASS
CatM1 Band 2	QPSK	15M	LCH	1RB#0	21.18	22.08	33.00	PASS
CatM1 Band 2	QPSK	15M	LCH	5RB#0	21.2	22.10	33.00	PASS
CatM1 Band 2	QPSK	15M	LCH	6RB#0	21.16	22.06	33.00	PASS
CatM1 Band 2	QPSK	15M	MCH	1RB#0	20.99	21.89	33.00	PASS
CatM1 Band 2	QPSK	15M	MCH	5RB#0	21.01	21.91	33.00	PASS
CatM1 Band 2	QPSK	15M	MCH	6RB#0	20.97	21.87	33.00	PASS
CatM1 Band 2	QPSK	15M	HCH	1RB#0	21.08	21.98	33.00	PASS
CatM1 Band 2	QPSK	15M	HCH	5RB#0	21.05	21.95	33.00	PASS
CatM1 Band 2	QPSK	15M	HCH	6RB#0	20.99	21.89	33.00	PASS
CatM1 Band 2	16QAM	15M	LCH	1RB#0	20.88	21.78	33.00	PASS
CatM1 Band 2	16QAM	15M	LCH	5RB#0	21.2	22.10	33.00	PASS
CatM1 Band 2	16QAM	15M	MCH	1RB#0	20.79	21.69	33.00	PASS
CatM1 Band 2	16QAM	15M	MCH	5RB#0	21.07	21.97	33.00	PASS
CatM1 Band 2	16QAM	15M	HCH	1RB#0	20.66	21.56	33.00	PASS
CatM1 Band 2	16QAM	15M	HCH	5RB#0	20.98	21.88	33.00	PASS
CatM1 Band 2	QPSK	20M	LCH	1RB#0	21.12	22.02	33.00	PASS
CatM1 Band 2	QPSK	20M	LCH	5RB#0	21.07	21.97	33.00	PASS
CatM1 Band 2	QPSK	20M	LCH	6RB#0	21.23	22.13	33.00	PASS
CatM1 Band 2	QPSK	20M	MCH	1RB#0	21.02	21.92	33.00	PASS
CatM1 Band 2	QPSK	20M	MCH	5RB#0	20.98	21.88	33.00	PASS
CatM1 Band 2	QPSK	20M	MCH	6RB#0	21.16	22.06	33.00	PASS
CatM1 Band 2	QPSK	20M	HCH	1RB#0	20.97	21.87	33.00	PASS
CatM1 Band 2	QPSK	20M	HCH	5RB#0	21.11	22.01	33.00	PASS
CatM1 Band 2	QPSK	20M	HCH	6RB#0	21.06	21.96	33.00	PASS
CatM1 Band 2	16QAM	20M	LCH	1RB#0	20.83	21.73	33.00	PASS
CatM1 Band 2	16QAM	20M	LCH	5RB#0	21.16	22.06	33.00	PASS

LTE CatM1 Band 4

Test Band	Test Mode	Test Bandwidth	Test channel	Test RB	Conducted Power (dBm)	EIRP (dBm)	limit (dBm)	Verdict
CatM1 Band 4	QPSK	1.4M	LCH	1RB#0	20.75	22.35	33.00	PASS
CatM1 Band 4	QPSK	1.4M	LCH	5RB#0	19.67	21.27	33.00	PASS
CatM1 Band 4	QPSK	1.4M	LCH	6RB#0	18.64	20.24	33.00	PASS
CatM1 Band 4	QPSK	1.4M	MCH	1RB#0	20.85	22.45	33.00	PASS
CatM1 Band 4	QPSK	1.4M	MCH	5RB#0	19.76	21.36	33.00	PASS
CatM1 Band 4	QPSK	1.4M	MCH	6RB#0	18.74	20.34	33.00	PASS
CatM1 Band 4	QPSK	1.4M	HCH	1RB#0	20.81	22.41	33.00	PASS
CatM1 Band 4	QPSK	1.4M	HCH	5RB#0	19.69	21.29	33.00	PASS
CatM1 Band 4	QPSK	1.4M	HCH	6RB#0	18.66	20.26	33.00	PASS
CatM1 Band 4	16QAM	1.4M	LCH	1RB#0	19.51	21.11	33.00	PASS
CatM1 Band 4	16QAM	1.4M	LCH	5RB#0	18.74	20.34	33.00	PASS
CatM1 Band 4	16QAM	1.4M	MCH	1RB#0	19.98	21.58	33.00	PASS
CatM1 Band 4	16QAM	1.4M	MCH	5RB#0	18.77	20.37	33.00	PASS
CatM1 Band 4	16QAM	1.4M	HCH	1RB#0	19.79	21.39	33.00	PASS
CatM1 Band 4	16QAM	1.4M	HCH	5RB#0	18.82	20.42	33.00	PASS
CatM1 Band 4	QPSK	3M	LCH	1RB#0	20.82	22.42	33.00	PASS
CatM1 Band 4	QPSK	3M	LCH	5RB#0	19.65	21.25	33.00	PASS
CatM1 Band 4	QPSK	3M	LCH	6RB#0	18.80	20.40	33.00	PASS
CatM1 Band 4	QPSK	3M	MCH	1RB#0	20.85	22.45	33.00	PASS
CatM1 Band 4	QPSK	3M	MCH	5RB#0	19.73	21.33	33.00	PASS
CatM1 Band 4	QPSK	3M	MCH	6RB#0	18.82	20.42	33.00	PASS
CatM1 Band 4	QPSK	3M	HCH	1RB#0	20.83	22.43	33.00	PASS
CatM1 Band 4	QPSK	3M	HCH	5RB#0	19.67	21.27	33.00	PASS
CatM1 Band 4	QPSK	3M	HCH	6RB#0	18.85	20.45	33.00	PASS
CatM1 Band 4	16QAM	3M	LCH	1RB#0	19.49	21.09	33.00	PASS
CatM1 Band 4	16QAM	3M	LCH	5RB#0	18.94	20.54	33.00	PASS
CatM1 Band 4	16QAM	3M	MCH	1RB#0	19.59	21.19	33.00	PASS
CatM1 Band 4	16QAM	3M	MCH	5RB#0	18.39	19.99	33.00	PASS
CatM1 Band 4	16QAM	3M	HCH	1RB#0	19.61	21.21	33.00	PASS
CatM1 Band 4	16QAM	3M	HCH	5RB#0	18.66	20.26	33.00	PASS
CatM1 Band 4	QPSK	5M	LCH	1RB#0	20.81	22.41	33.00	PASS
CatM1 Band 4	QPSK	5M	LCH	5RB#0	19.69	21.29	33.00	PASS
CatM1 Band 4	QPSK	5M	LCH	6RB#0	19.77	21.37	33.00	PASS
CatM1 Band 4	QPSK	5M	MCH	1RB#0	20.86	22.46	33.00	PASS
CatM1 Band 4	QPSK	5M	MCH	5RB#0	19.74	21.34	33.00	PASS
CatM1 Band 4	QPSK	5M	MCH	6RB#0	19.89	21.49	33.00	PASS
CatM1 Band 4	QPSK	5M	HCH	1RB#0	20.86	22.46	33.00	PASS
CatM1 Band 4	QPSK	5M	HCH	5RB#0	19.77	21.37	33.00	PASS
CatM1 Band 4	QPSK	5M	HCH	6RB#0	19.96	21.56	33.00	PASS

CatM1 Band 4	16QAM	5M	LCH	1RB#0	20.46	22.06	33.00	PASS
CatM1 Band 4	16QAM	5M	LCH	5RB#0	19.73	21.33	33.00	PASS
CatM1 Band 4	16QAM	5M	MCH	1RB#0	20.57	22.17	33.00	PASS
CatM1 Band 4	16QAM	5M	MCH	5RB#0	19.75	21.35	33.00	PASS
CatM1 Band 4	16QAM	5M	HCH	1RB#0	20.58	22.18	33.00	PASS
CatM1 Band 4	16QAM	5M	HCH	5RB#0	19.88	21.48	33.00	PASS
CatM1 Band 4	QPSK	10M	LCH	1RB#0	20.88	22.48	33.00	PASS
CatM1 Band 4	QPSK	10M	LCH	5RB#0	20.75	22.35	33.00	PASS
CatM1 Band 4	QPSK	10M	LCH	6RB#0	19.81	21.41	33.00	PASS
CatM1 Band 4	QPSK	10M	MCH	1RB#0	20.88	22.48	33.00	PASS
CatM1 Band 4	QPSK	10M	MCH	5RB#0	20.77	22.37	33.00	PASS
CatM1 Band 4	QPSK	10M	MCH	6RB#0	19.75	21.35	33.00	PASS
CatM1 Band 4	QPSK	10M	HCH	1RB#0	20.90	22.50	33.00	PASS
CatM1 Band 4	QPSK	10M	HCH	5RB#0	20.79	22.39	33.00	PASS
CatM1 Band 4	QPSK	10M	HCH	6RB#0	19.83	21.43	33.00	PASS
CatM1 Band 4	16QAM	10M	LCH	1RB#0	20.55	22.15	33.00	PASS
CatM1 Band 4	16QAM	10M	LCH	5RB#0	20.86	22.46	33.00	PASS
CatM1 Band 4	16QAM	10M	MCH	1RB#0	20.57	22.17	33.00	PASS
CatM1 Band 4	16QAM	10M	MCH	5RB#0	20.47	22.07	33.00	PASS
CatM1 Band 4	16QAM	10M	HCH	1RB#0	20.60	22.20	33.00	PASS
CatM1 Band 4	16QAM	10M	HCH	5RB#0	20.63	22.23	33.00	PASS
CatM1 Band 4	QPSK	15M	LCH	1RB#0	20.91	22.51	33.00	PASS
CatM1 Band 4	QPSK	15M	LCH	5RB#0	20.79	22.39	33.00	PASS
CatM1 Band 4	QPSK	15M	LCH	6RB#0	20.69	22.29	33.00	PASS
CatM1 Band 4	QPSK	15M	MCH	1RB#0	20.92	22.52	33.00	PASS
CatM1 Band 4	QPSK	15M	MCH	5RB#0	20.81	22.41	33.00	PASS
CatM1 Band 4	QPSK	15M	MCH	6RB#0	20.78	22.38	33.00	PASS
CatM1 Band 4	QPSK	15M	HCH	1RB#0	20.92	22.52	33.00	PASS
CatM1 Band 4	QPSK	15M	HCH	5RB#0	20.77	22.37	33.00	PASS
CatM1 Band 4	QPSK	15M	HCH	6RB#0	20.76	22.36	33.00	PASS
CatM1 Band 4	16QAM	15M	LCH	1RB#0	20.47	22.07	33.00	PASS
CatM1 Band 4	16QAM	15M	LCH	5RB#0	20.71	22.31	33.00	PASS
CatM1 Band 4	16QAM	15M	MCH	1RB#0	20.53	22.13	33.00	PASS
CatM1 Band 4	16QAM	15M	MCH	5RB#0	20.68	22.28	33.00	PASS
CatM1 Band 4	16QAM	15M	HCH	1RB#0	20.56	22.16	33.00	PASS
CatM1 Band 4	16QAM	15M	HCH	5RB#0	20.77	22.37	33.00	PASS

CatM1 Band 4	QPSK	20M	LCH	1RB#0	20.95	22.55	33.00	PASS
CatM1 Band 4	QPSK	20M	LCH	5RB#0	20.85	22.45	33.00	PASS
CatM1 Band 4	QPSK	20M	LCH	6RB#0	20.77	22.37	33.00	PASS
CatM1 Band 4	QPSK	20M	MCH	1RB#0	20.97	22.57	33.00	PASS
CatM1 Band 4	QPSK	20M	MCH	5RB#0	20.81	22.41	33.00	PASS
CatM1 Band 4	QPSK	20M	MCH	6RB#0	20.79	22.39	33.00	PASS
CatM1 Band 4	QPSK	20M	HCH	1RB#0	20.96	22.56	33.00	PASS
CatM1 Band 4	QPSK	20M	HCH	5RB#0	20.91	22.51	33.00	PASS
CatM1 Band 4	QPSK	20M	HCH	6RB#0	20.87	22.47	33.00	PASS
CatM1 Band 4	16QAM	20M	LCH	1RB#0	20.56	22.16	33.00	PASS
CatM1 Band 4	16QAM	20M	LCH	5RB#0	20.31	21.91	33.00	PASS
CatM1 Band 4	16QAM	20M	MCH	1RB#0	20.57	22.17	33.00	PASS
CatM1 Band 4	16QAM	20M	MCH	5RB#0	20.20	21.80	33.00	PASS
CatM1 Band 4	16QAM	20M	HCH	1RB#0	20.53	22.13	33.00	PASS
CatM1 Band 4	16QAM	20M	HCH	5RB#0	20.78	22.38	33.00	PASS

Note:

a: For getting the EIRP (Efficient Isotropic Radiated Power) in substitution method, the following formula should be taken to calculate it,

EIRP [dBm] = Conducted Power [dBm] + Gain [dBi]

ERP [dBm] = Conducted Power [dBm] + Gain [dBi] -2.15

6.3. PEAK-TO-AVERAGE RATIO

Please refer to the original report .: ZR/2019/8003201-Appendix B , FCC ID: ZMOMA510GL

7. OCCUPIED BANDWIDTH

Please refer to the original report .: ZR/2019/8003201-Appendix B , FCC ID: ZMOMA510GL

8. BAND EDGE

Please refer to the original report .: ZR/2019/8003201-Appendix B , FCC ID: ZMOMA510GL

9. SPURIOUS EMISSION

9.1 CONDUCTED SPURIOUS EMISSION

Please refer to the original report .: ZR/2019/8003201-Appendix B , FCC ID: ZMOMA510GL

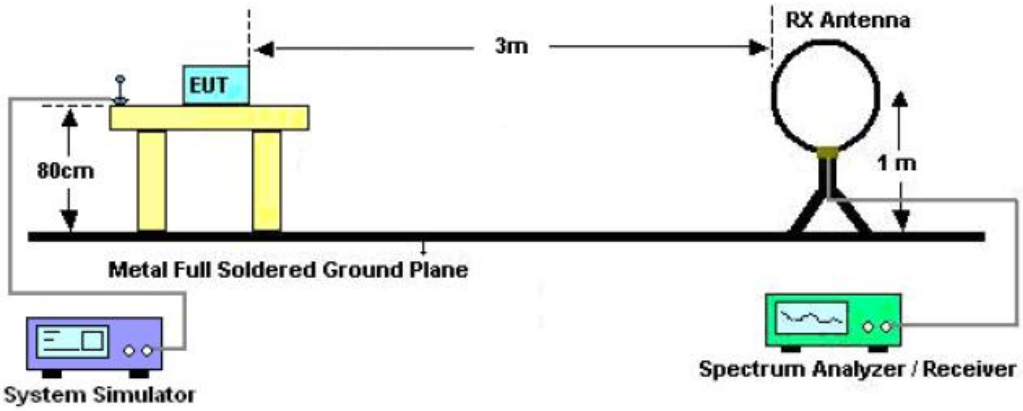
9.2 RADIATED SPURIOUS EMISSION

9.2.1MEASUREMENT METHOD

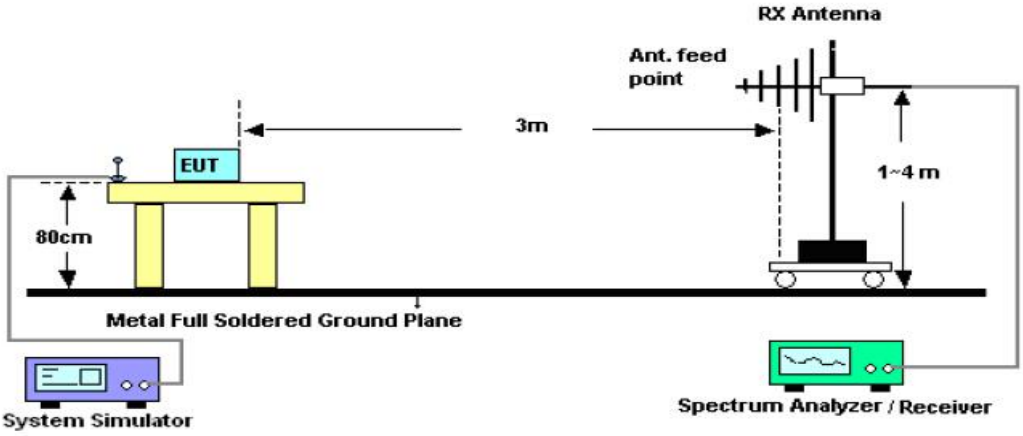
1. The EUT was placed on the top of the turntable 0.8 or 1.5 meter above ground. The phase center of the receiving antenna mounted on the top of a height-variable antenna tower was placed 3 meters far away from the turntable.
2. Power on the EUT and all the supporting units. The turntable was rotated 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.

9.2.2 TEST SETUP

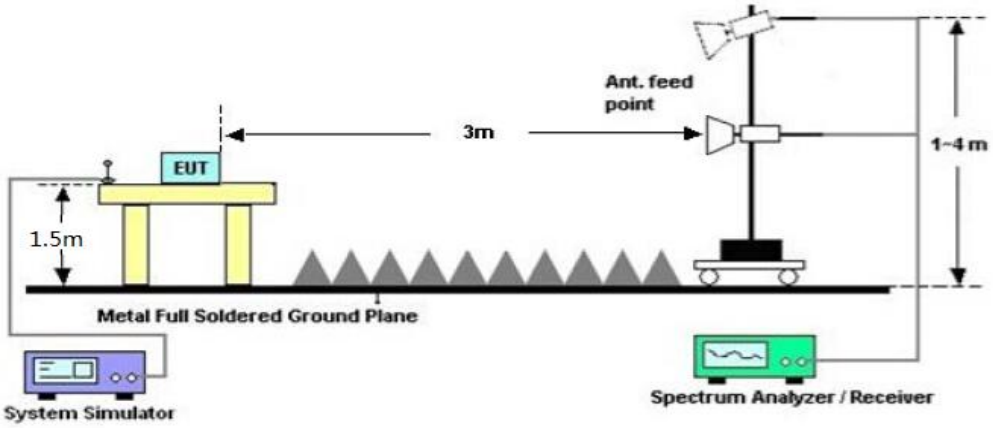
Radiated Emission Test-Setup Frequency Below 30MHz



RADIATED EMISSION TEST SETUP 30MHz-1000MHz



RADIATED EMISSION TEST SETUP ABOVE 1000MHz



9.2.3 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.

Note: only result the worst condition of each test mode:

9.2.4 MEASUREMENT RESULT

LTE CatM1 Band 2:

Test Results for Low Channel					
Frequency (MHz)	Emission Level (dBm)	Factor (dBm)	Limits (dBm)	Margin (dB)	Comment
3703.28	-51.62	2.00	-13	-38.62	Horizontal
5554.57	-53.56	1.74	-13	-40.56	Horizontal
14812.06	-51.03	2.62	-13	-38.03	Horizontal
3703.10	-53.92	2.80	-13	-40.92	Vertical
5554.90	-50.35	1.17	-13	-37.35	Vertical
14812.18	-55.77	2.57	-13	-42.77	Vertical
Test Results for Middle Channel					
Frequency (MHz)	Emission Level (dBm)	Factor (dBm)	Limits (dBm)	Margin (dB)	Comment
3760.45	-51.59	2.97	-13	-38.59	Horizontal
5640.02	-53.49	1.93	-13	-40.49	Horizontal
15040.18	-50.78	2.55	-13	-37.78	Horizontal
3760.45	-53.98	2.45	-13	-40.98	Vertical
5640.29	-50.54	2.20	-13	-37.54	Vertical
15040.02	-55.97	1.32	-13	-42.97	Vertical
Test Results for High Channel					
Frequency (MHz)	Emission Level (dBm)	Factor (dBm)	Limits (dBm)	Margin (dB)	Comment
3818.95	-51.70	1.87	-13	-38.70	Horizontal
5728.34	-53.37	2.79	-13	-40.37	Horizontal

15274.81	-51.07	1.72	-13	-38.07	Horizontal
3818.75	-54.17	1.95	-13	-41.17	Vertical
5728.12	-50.53	1.77	-13	-37.53	Vertical
15274.87	-56.06	1.96	-13	-43.06	Vertical

LTE CatM1 Band 4:

Test Results for Low Channel					
Frequency (MHz)	Emission Level (dBm)	Factor (dBm)	Limits (dBm)	Margin (dB)	Comment
3421.58	-51.49	2.92	-13	-38.49	Horizontal
5132.10	-53.28	2.11	-13	-40.28	Horizontal
13685.65	-50.77	2.05	-13	-37.77	Horizontal
3421.62	-53.69	2.22	-13	-40.69	Vertical
5132.22	-50.65	2.50	-13	-37.65	Vertical
13685.89	-55.64	1.63	-13	-42.64	Vertical
Test Results for Middle Channel					
Frequency (MHz)	Emission Level (dBm)	Factor (dBm)	Limits (dBm)	Margin (dB)	Comment
3465.40	-51.89	2.78	-13	-38.89	Horizontal
5197.93	-53.61	1.46	-13	-40.61	Horizontal
13860.42	-50.86	2.42	-13	-37.86	Horizontal
3465.42	-54.09	2.64	-13	-41.09	Vertical
5197.90	-50.20	1.68	-13	-37.20	Vertical
13860.09	-55.74	2.23	-13	-42.74	Vertical
Test Results for High Channel					
Frequency (MHz)	Emission Level (dBm)	Factor (dBm)	Limits (dBm)	(dB)	Comment
3509.00	-51.79	2.78	-13	-38.79	Horizontal
5263.19	-53.61	1.33	-13	-40.61	Horizontal
14034.78	-51.14	1.58	-13	-38.14	Horizontal
3508.94	-53.69	1.15	-13	-40.69	Vertical
5263.33	-50.54	2.33	-13	-37.54	Vertical
14034.76	-55.72	1.16	-13	-42.72	Vertical

RESULT: PASS

Note:

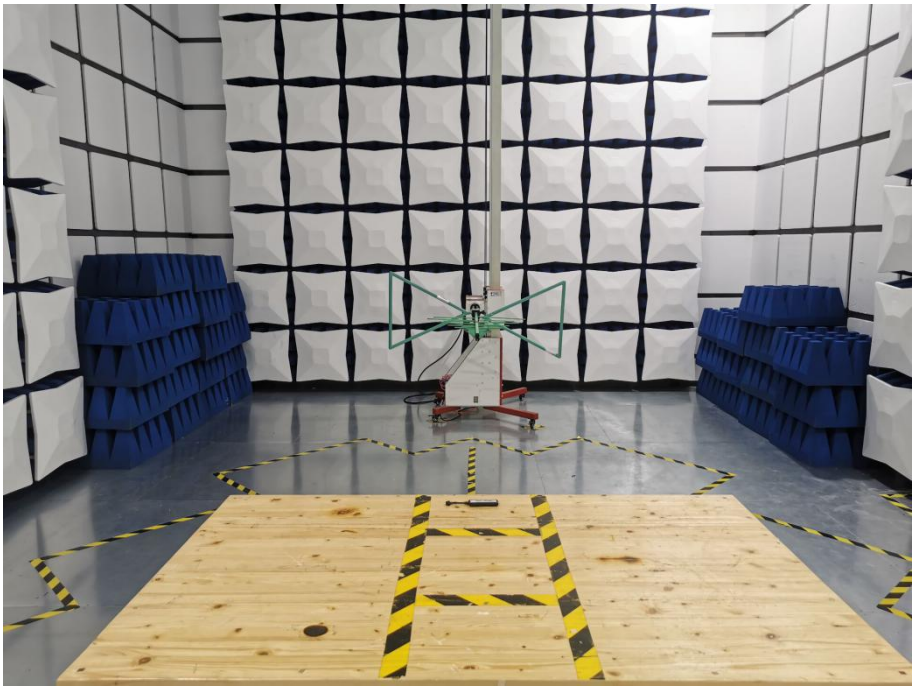
1. Margin = Emission Level -Limit
2. Below 30MHZ no Spurious found and Above is the worst mode data
3. Factor = Antenna Factor + Cable Loss

10. FREQUENCY STABILITY

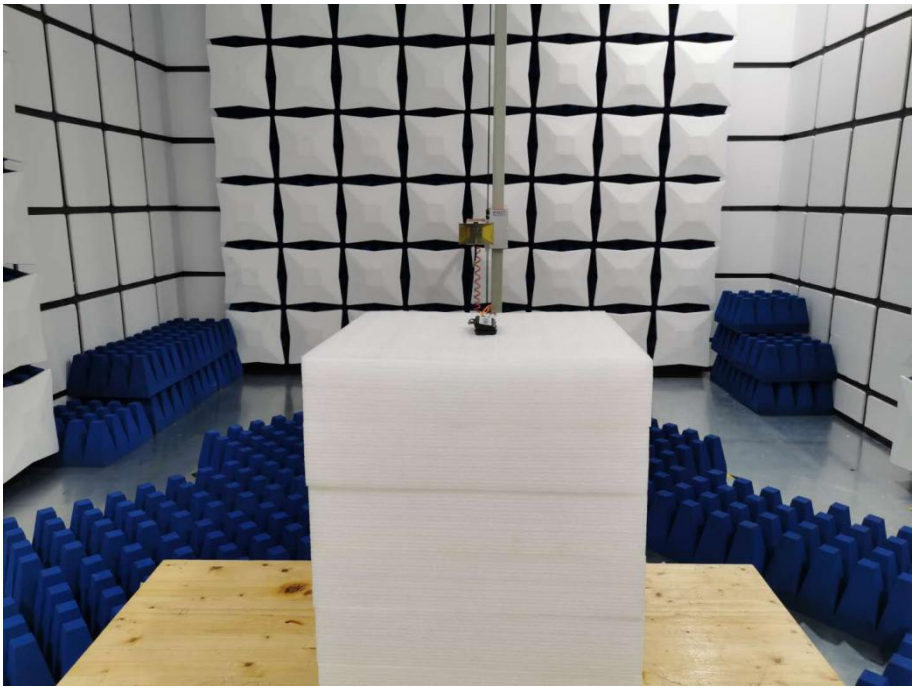
Please refer to the original report .:ZR/2019/8003201-Appendix B , FCC ID: ZMOMA510GL

APPENDIX A: PHOTOGRAPHS OF TEST SETUP

RADIATED SPURIOUS EMISSION



RADIATED SPURIOUS ABOVE 1G EMISSION



----END OF REPORT----