SGS-CSTC Standards Technical Services Co., Ltd.
Guangzhou Branch

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TEST REPORT

Application No.:	GZEM1801000520CR (SHEM1712012958CR)
FCC ID:	2AORCA102
Applicant:	XI'AN FENGYU INFORMATION TECHNOLOGIES CO., LTD.
Address of Applicant:	No.10, Zhangba 5th road, Yanta, Xi'an, Shanxi,China
Manufacturer:	XI'AN FENGYU INFORMATION TECHNOLOGIES CO., LTD.
Address of Manufacturer:	No.10, Zhangba 5th road, Yanta, Xi'an, Shanxi,China
Equipment Under Test (EUT):	
EUT Name:	Mi Walkie-Talkie
Model No.:	A102
Standards:	47 CFR Part 15, Subpart C 15.247
Date of Receipt:	2017-12-05
Date of Test:	2017-12-13 to 2017-12-22
Date of Issue:	2018-01-29
Test Result :	**Pass***

* In the configuration tested, the EUT complied with the standards specified above.

Kobe Jian
Manager

The manufacturer should ensure that all products in series production are in conformity with the product sample detailed in this report. If the product in this report is used in any configuration other than that detailed in the report, the manufacturer must ensure the new system complies with all relevant standards. Any mention of SGS International Electrical Approvals or testing done by SGS International Electrical Approvals in connection with, distribution or use of the product described in this report must be approved by SGS International Electrical Approvals in writing.

Revision Record				
Version	**Chapter**	**Date**	**Modifier**	**Remark**
00	/	2018-01-02	/	Original

Authorized for issue by:				
		Vico.Cui **Vico_Cui /Project Engineer**		
		Ricky Liu **Ricky_Liu /Reviewer**		

2 Test Summary

Radio Spectrum Technical Requirement				
Item	**Standard**	**Method**	**Requirement**	**Result**
Antenna Requirement	47 CFR Part 15, Subpart C 15.247	N/A	47 CFR Part 15, Subpart C 15.203 & 15.247(c)	Pass

Radio Spectrum Matter Part				
Item	**Standard**	**Method**	**Requirement**	**Result**
Conducted Emissions at AC Power Line (150kHz-30MHz)	47 CFR Part 15, Subpart C 15.247	ANSI C63.10 (2013) Section 6.2	47 CFR Part 15, Subpart C 15.207	Pass
Minimum 6dB Bandwidth	47 CFR Part 15, Subpart C 15.247	ANSI C63.10 (2013) Section 11.8.1	47 CFR Part 15, Subpart C 15.247a(2)	Pass
Conducted Peak Output Power	47 CFR Part 15, Subpart C 15.247	ANSI C63.10 (2013) Section 11.9.1	47 CFR Part 15, Subpart C 15.247(b)(3)	Pass
Power Spectrum Density	47 CFR Part 15, Subpart C 15.247	ANSI C63.10 (2013) Section 11.10.2	47 CFR Part 15, Subpart C 15.247(e)	Pass
Conducted Band Edges Measurement	47 CFR Part 15, Subpart C 15.247	ANSI C63.10 (2013) Section 11.13.3.2	47 CFR Part 15, Subpart C 15.247(d)	Pass
Conducted Spurious Emissions	47 CFR Part 15, Subpart C 15.247	ANSI C63.10 (2013) Section 11.11	47 CFR Part 15, Subpart C 15.247(d)	Pass
Radiated Emissions which fall in the restricted bands	47 CFR Part 15, Subpart C 15.247	ANSI C63.10 (2013) Section 6.10.5	47 CFR Part 15, Subpart C 15.205 & 15.209	Pass
Radiated Spurious Emissions	47 CFR Part 15, Subpart C 15.247	ANSI C63.10 (2013) Section 6.4,6.5,6.6	47 CFR Part 15, Subpart C 15.205 & 15.209	Pass

3 Contents

4 General Information

4.1 Details of E.U.T.

Power supply:	DC 3.7V by Lithium ion batteries (2600mAh)
Test voltage:	DC 3.7V
Product Description:	Portable product with BT function

4.2 Technical Specifications

Operation Frequency:	2402MHz-2480MHz
BT Version	BLE mode
Modulation Type:	GFSK
Number of Channel:	40
Antenna Type	PIFA Antenna
Antenna Gain	-1.5 dBi

4.3 Description of Support Units

The EUT has been tested with associated equipment below.

Description	Manufacturer	Model No.	Supplied by
Laptop	Lenovo	ThinkPad X100e	SGS

4.4 Test Environment

Environment Parameter	Selected Values During Tests	
Relative Humidity	Ambient	
Value	Temperature(°C)	Voltage(V)
TNVN	25	DC 36

Note:

VN:Normal Voltage	VL:Low Extreme Test Voltage	VH:High Extreme Test Voltage
TN:Normal Temperature	TL:Low Extreme Test Temperature	TH:High Extreme Test Temperature

Operation Frequency each of channel							
Channel	Frequency	Channel	Frequency	Channel	Frequency	Channel	Frequency
1	2402MHz	11	2422MHz	21	2442MHz	31	2462MHz
2	2404MHz	12	2424MHz	22	2444MHz	32	2464MHz
3	2406MHz	13	2426MHz	23	2446MHz	33	2466MHz
4	2408MHz	14	2428MHz	24	2448MHz	34	2468MHz
5	2410MHz	15	2430MHz	25	2450MHz	35	2470MHz
6	2412MHz	16	2432MHz	26	2452MHz	36	2472MHz
7	2414MHz	17	2434MHz	27	2454MHz	37	2474MHz
8	2416MHz	18	2436MHz	28	2456MHz	38	2476MHz
9	2418MHz	19	2438MHz	29	2458MHz	39	2478MHz
10	2420MHz	20	2440MHz	30	2460MHz	40	2480MHz

Using test software was control EUT work in continuous transmitter mode. And select test channel as below:

Channel	Frequency
The lowest channel (CH1)	2402MHz
The middle channel (CH20)	2440MHz
The highest channel (CH40)	2480MHz

4.5 Details of Test Mode

Test Mode	Description of Test Mode
Engineering mode	Using test software to control EUT working in continuous transmitting and receiving, and select channel and modulation type

4.6 Measurement Uncertainty

No.	Item	Measurement Uncertainty
1	Radio Frequency	7.25 x 10-8
2	Timeout	2s
3	Duty cycle	0.37%
4	Occupied Bandwidth	3%
5	RF conducted power	0.75dB
6	RF power density	2.84dB
7	Conducted Spurious emissions	0.75dB
8	RF Radiated power	4.5dB (below 1GHz)
		4.8dB (above 1GHz)
9	Radiated Spurious emission test	4.2dB (Below 30MHz)
		4.4dB (30MHz-1GHz)
		4.6dB (1GHz-18GHz)
10	Temperature test	1°C
11	Humidity test	3%
12	Supply voltages	1.5%
13	Time	3%

4.7 Test Location

All tests were performed at:
SGS-CSTC Standards Technical Services Co., Ltd., Guangzhou Branch EMC Laboratory,
198 Kezhu Road, Scientech Park, Guangzhou Economic & Technology Development District,
Guangzhou, China 510663
Tel: +86 20 82155555 Fax: +86 20 82075059

No tests were sub-contracted.

4.8 Test Facility

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

- **NVLAP (Lab Code: 200611-0)**

  SGS-CSTC Standards Technical Services Co., Ltd., Guangzhou EMC Laboratory is accredited by the National Voluntary Laboratory Accreditation Program (NVLAP/NIST). NVLAP Code: 200611-0.

  The report must not be used by the client to claim product certification, approval, or endorsement by NVLAP, NIST, or any agency of the Federal Government.

- **ACMA**

  SGS-CSTC Standards Technical Services Co., Ltd., EMC Laboratory can also perform testing for the Australian C-Tick mark as a result of our NVLAP accreditation.

- **SGS UK(Certificate No.: 32), SGS-TUV SAARLAND and SGS-FIMKO**

  Have approved SGS-CSTC Standards Technical Services Co., Ltd., EMC Laboratory as a supplier of EMC TESTING SERVICES and SAFETY TESTING SERVICES.

- **CNAS (Lab Code: L0167)**

  SGS-CSTC Standards Technical Services Co., Ltd., EMC Laboratory has been assessed and in compliance with CNAS-CL01:2006 accreditation criteria for testing laboratories (identical to ISO/IEC 17025:2005 General Requirements) for the Competence of Testing Laboratories.

- **FCC Recognized Accredited Test Firm(Registration No.: 486818)**

  SGS-CSTC Standards Technical Services Co., Ltd., EMC Laboratory has been accredited and fully described in a report filed with the (FCC) Federal Communications Commission. The acceptance letter from the FCC is maintained in our files. Designation Number: CN5016, Test Firm Registration Number: 486818, Jul 13, 2017.

- **Industry Canada (Registration No.: 4620B-1)**

  The 3m/10m Alternate Semi-anechoic chamber of SGS-CSTC Standards Technical Services Co., Ltd., has been registered by Certification and Engineering of Industry Canada for radio equipment testing with Registration No. 4620B-1.

- **VCCI (Registration No.: R-2460, C-2584, G-449 and T-1179)**

  The 10m Semi-anechoic chamber and Shielded Room of SGS-CSTC Standards Technical Services Co. Ltd. have been registered in accordance with the Regulations for Voluntary Control Measures with Registration No.: R-2460, C-2584，G-449 and T-1179 respectively.

- **CBTL (Lab Code: TL129)**

  SGS-CSTC Standards Technical Services Co., Ltd., E&E Laboratory has been assessed and fully comply with the requirements of ISO/IEC 17025:2005, the Basic Rules, IECEE 01 and Rules of procedure IECEE 02, and the relevant IECEE CB-Scheme Operational documents.

4.9 Deviation from Standards

None

4.10 Abnormalities from Standard Conditions

None

5 Equipment List

FCC & IC equipment						
No.	Test Equipment	Manufacturer	Model No.	Serial No.	Cal. date (YYYY-MM-DD)	Cal.Due date (YYYY-MM-DD)
EMC0525	Compact Semi-Anechoic Chamber	ChangZhou ZhongYu	N/A	N/A	2016-12-04	2019-12-03
EMC0522	EMI Test Receiver	Rohde & Schwarz	ESIB26	100283	2017-01-20	2018-01-19
EMC0056	EMI Test Receiver	Rohde & Schwarz	ESCI	100236	2017-01-20	2018-01-19
EMC0528	RI High frequency Cable	SGS	20 m	N/A	2016-04-19	2018-04-18
EMC2025	Trilog Broadband Antenna 30-1000MHz	SCHWARZBECK MESS-ELEKTRONIK	VULB 9160	9160-3372	2016-09-08	2019-09-07
SEM003-18	Trilog Broadband Antenna 25-2000MHz	SCHWARZBECK MESS-ELEKTRONIK	VULB 9168	665	2016-06-29	2019-06-28
EMC0524	Bi-log Type Antenna	Schaffner -Chase	CBL6112B	2966	2016-09-08	2019-09-07
EMC0519	Bilog Type Antenna	Schaffner -Chase	CBL6143	5070	2017-05-04	2020-05-03
EMC2026	Horn Antenna 1-18GHz	SCHWARZBECK MESS-ELEKTRONIK	BBHA 9120D	9120D-841	2016-09-09	2019-09-08
EMC0521	1-26.5 GHz Pre-Amplifier	Agilent	8449B	3008A01649	2017-01-20	2018-01-19
EMC2065	Amplifier	HP	8447F	N/A	2017-06-19	2018-06-18
EMC0523	Active Loop Antenna	EMCO	6502	42963	2016-02-27	2018-02-26
EMC2041	Broad-Band Horn Antenna (14)15-26.5(40)GHz	SCHWARZBECK MESS-ELEKTRONI	BBHA 9170	9170-375	2017-05-23	2020-05-22
EMC2079	High Pass Filter(915MHz)	FSY MICROWAVE	HM1465-9SS	009	2017-01-20	2018-01-19
EMC2069	2.4GHz Filter	Micro-Tronics	BRM 50702	149	2017-01-20	2018-01-19
EMC0530	10m Semi-Anechoic Chamber	ETS	N/A	N/A	2016-04-30	2018-04-29
EMC2136	MI Cable	SGS	0.8m	N/A	2017-11-02	2018-11-01
EMC2137	MI Cable	SGS	0.8m	N/A	2017-11-02	2018-11-01
EMC2138	EXA Signal Analyzer	KEYSIGHT	N9010A	MY57120105	2017-11-15	2018-11-14
EMC0069	Signal Analyzer(20Hz ~ 26.5Ghz	R&S	FSIQ26	100312	2017-11-20	2018-11-19

Conducted Emission						
No.	Test Equipment	Manufacturer	Model No.	Serial No.	Cal. date (YYYY-MM-DD)	Cal.Due date (YYYY-MM-DD)
EMC0306	Shielding Room	Zhong Yu	8 x 3 x 3.8 m^3	N/A	2016-12-27	2019-12-26
EMC0118	Two-line v-netwok	R&S	ENV216	100359	2017-01-20	2018-01-19
EMC0102	LISN	SCHAFFNER CHASE	MN2050D/1	1421	2017-09-20	2018-09-19
EMC0506	EMI Test Receiver	Rohde & Schwarz	ESCS30	100085	2017-11-27	2018-11-26
EMC0107	Coaxial Cable	SGS	2m	N/A	2016-07-24	2018-07-23
EMC0106	Voltage Probe	SGS	N/A	N/A	2016-04-05	2018-04-04
EMC2123	8 Line ISN Cat 6	SCHWARZBECK MESS-ELEKTRONIK	NTFM 8158	NTFM 8158 0151	2017-06-23	2018-06-22
EMC2124	8 Line ISN Cat 5	SCHWARZBECK MESS-ELEKTRONIK	CAT5 8158	CAT5 8158-188	2017-06-23	2018-06-22
EMC2126	8 Line ISN Cat 3	SCHWARZBECK MESS-ELEKTRONIK	CAT3 8158	CAT38158-0081	2017-06-23	2018-06-22
EMC2122	ISN S8	SCHWARZBECK MESS-ELEKTRONIK	ISN S8	57	2017-06-23	2018-06-22
EMC2121	ISN S1	SCHWARZBECK MESS-ELEKTRONIK	ISN S1	10	2017-06-23	2018-06-22
EMC2125	2 wires ISN	SCHWARZBECK MESS-ELEKTRONIK	NTFM 8131	8131-198	2017-06-23	2018-06-22
EMC2047	CDN	Elektronik-Feinmechanik	L-801:AF2	2793	2015-09-19	2018-09-18
EMC2048	CDN	Elektronik-Feinmechanik	L-801:M2/M3	2738	2015-09-25	2018-09-24
EMC2062	6dB Attenuator	HP	8491A	24487	2016-04-05	2018-04-04
EMC0167	Conical metal housing	SGS-EMC	N/A	N/A	2016-04-19	2018-04-18

General used equipment						
No.	Test Equipment	Manufacturer	Model No.	Serial No.	Cal. date (YYYY-MM-DD)	Cal.Due date (YYYY-MM-DD)
EMC0006	DMM	Fluke	73	70681569	2017-07-26	2018-07-25
EMC0007	DMM	Fluke	73	70671122	2017-07-26	2018-07-25

6 Radio Spectrum Technical Requirement

6.1 Antenna Requirement

6.1.1 Test Requirement:

47 CFR Part 15, Subpart C 15.247

6.1.2 Conclusion

Standard Requirment:

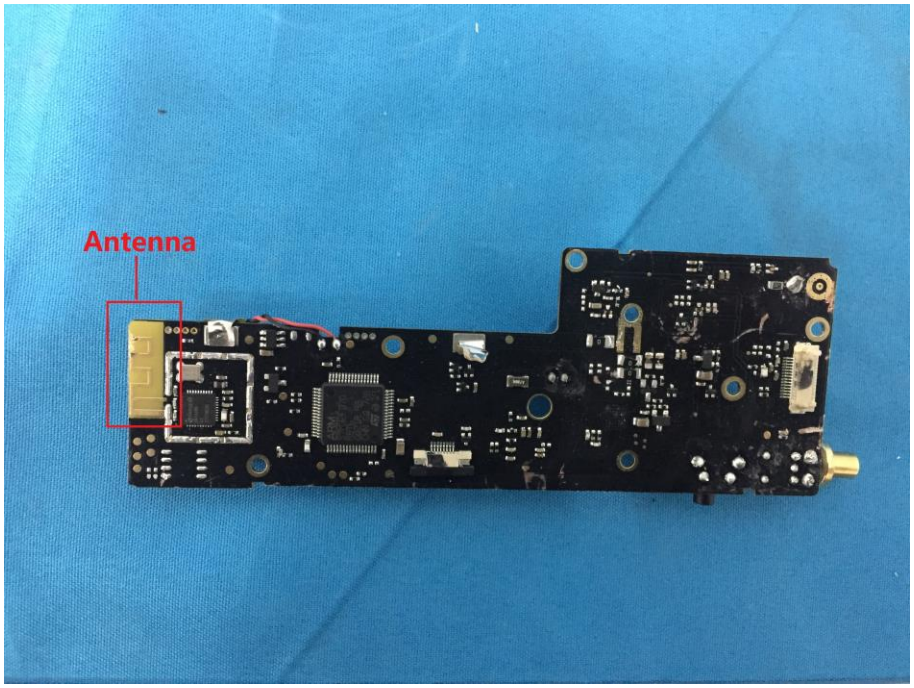
An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator, the manufacturer may design the unit so that a broken antenna can be replaced by the user, but the use of a standard antenna jack or electrical connector is prohibited.

15.247(b) (4) requirement:

The conducted output power limit specified in paragraph (b) of this section is based on the use of antennas with directional gains that do not exceed 6 dBi. Except as shown in paragraph (c) of this section, if transmitting antennas of directional gain greater than 6 dBi are used, the conducted output power from the intentional radiator shall be reduced below the stated values in paragraphs (b)(1), (b)(2), and (b)(3) of this section, as appropriate, by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

EUT Antenna:

The antenna is PIFA Antenna and no consideration of replacement. The best case gain of the antenna is -1.5dBi.



7 Radio Spectrum Matter Test Results

7.1 Conducted Emissions at AC Power Line (150kHz-30MHz)

Test Requirement: 47 CFR Part 15, Subpart C 15.247

Test Method: ANSI C63.10 (2013) Section 6.2

Limit:

Frequency of emission(MHz)	Conducted limit(dBμV)	
	Quasi-peak	Average
0.15-0.5	66 to 56*	56 to 46*
0.5-5	56	46
5-30	60	50
*Decreases with the logarithm of the frequency.		

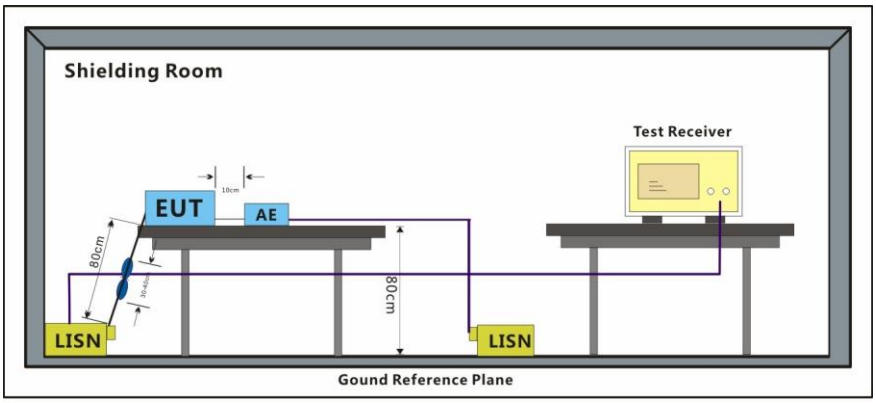
7.1.1 E.U.T. Operation

Operating Environment:

Temperature: 22 °C Humidity: 50 % RH Atmospheric Pressure: 1010 mbar

Test mode TX mode_Keep the EUT continuously transmitting mode with GFSK modulation.

7.1.2 Test Setup Diagram



7.1.3 Measurement Data

1) The mains terminal disturbance voltage test was conducted in a shielded room.

2) The EUT was connected to AC power source through a LISN 1 (Line Impedance Stabilization Network) which provides a 50ohm/50μH + 5ohm linear impedance. The power cables of all other units of the EUT were connected to a second LISN 2, which was bonded to the ground reference plane in the same way as the LISN 1 for the unit being measured. A multiple socket outlet strip was used to connect multiple power cables to a single LISN provided the rating of the LISN was not exceeded.

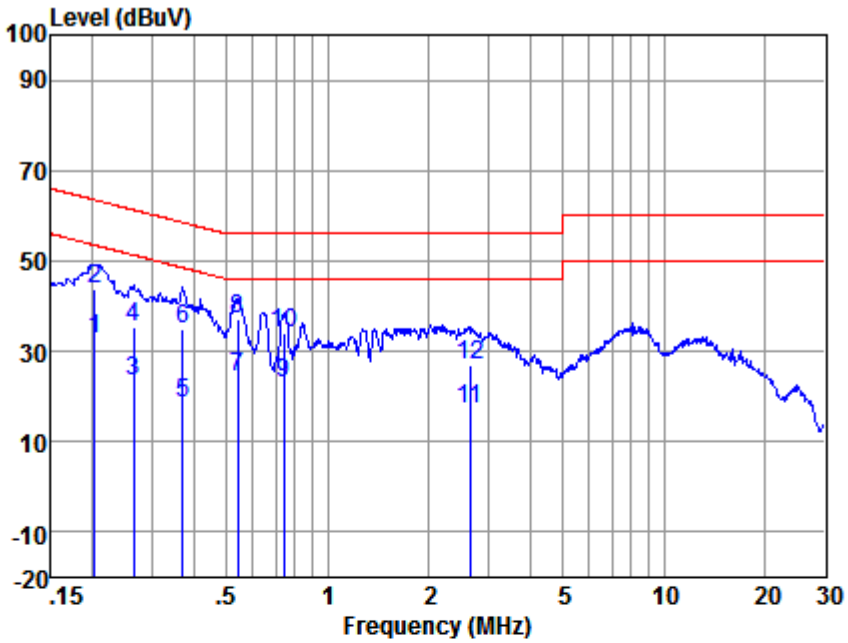
3) The tabletop EUT was placed upon a non-metallic table 0.8m above the ground reference plane. And for floor-standing arrangement, the EUT was placed on the horizontal ground reference plane,

4) The test was performed with a vertical ground reference plane. The rear of the EUT shall be 0.4 m from the vertical ground reference plane. The vertical ground reference plane was bonded to the horizontal ground reference plane. The LISN 1 was placed 0.8 m from the boundary of the unit under test and bonded to a ground reference plane for LISNs mounted on top of the ground reference plane. This distance was between the closest points of the LISN 1 and the EUT. All other units of the EUT and associated equipment was at least 0.8 m from the LISN 2.

5) In order to find the maximum emission, the relative positions of equipment and all of the interface cables must be changed according to ANSI C63.10 on conducted measurement.

Notes: Emission Level=Read Level + LISN Factor + Cable Loss

Line:Live Line

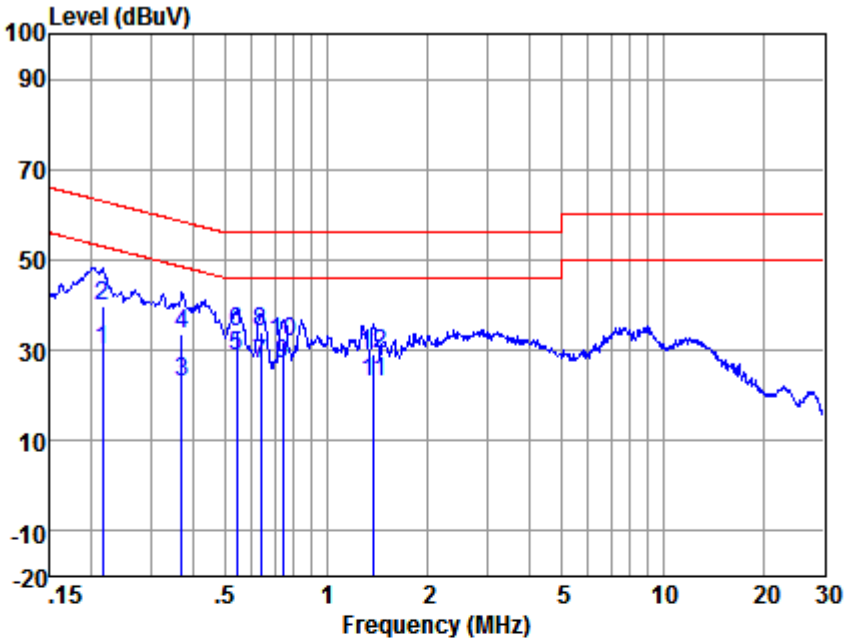


Site : chamber
Condition : LISN-L-2017

Test mode : a

	Freq	Read Level	LISN Factor	Cable Loss	Level	Limit Line	Over Limit	Remark
	MHz	dBuV	dB	dB	dBuV	dBuV	dB	
1	0.202	22.96	0.11	9.81	32.88	53.54	-20.66	Average
2	0.202	33.89	0.11	9.81	43.81	63.54	-19.73	QP
3	0.264	13.55	0.11	9.81	23.47	51.29	-27.82	Average
4	0.264	25.46	0.11	9.81	35.38	61.29	-25.91	QP
5	0.369	8.65	0.11	9.81	18.57	48.52	-29.95	Average
6	0.369	24.83	0.11	9.81	34.75	58.52	-23.77	QP
7	0.541	14.24	0.11	9.82	24.17	46.00	-21.83	Average
8	0.541	26.97	0.11	9.82	36.90	56.00	-19.10	QP
9	0.739	13.11	0.11	9.83	23.05	46.00	-22.95	Average
10	0.739	23.95	0.11	9.83	33.89	56.00	-22.11	QP
11	2.650	7.28	0.12	9.85	17.25	46.00	-28.75	Average
12	2.650	17.08	0.12	9.85	27.05	56.00	-28.95	QP

Line:Neutral Line



Site : chamber
Condition : LISN-N-2017

Test mode : a

	Freq	Read Level	LISN Factor	Cable Loss	Level	Limit Line	Over Limit	Remark
	MHz	dBuV	dB	dB	dBuV	dBuV	dB	
1	0.215	20.13	0.11	9.81	30.05	53.01	-22.96	Average
2	0.215	29.71	0.11	9.81	39.63	63.01	-23.38	QP
3	0.371	12.85	0.11	9.81	22.77	48.47	-25.70	Average
4	0.371	23.71	0.11	9.81	33.63	58.47	-24.84	QP
5	0.541	18.57	0.11	9.82	28.50	46.00	-17.50	Average
6	0.541	23.88	0.11	9.82	33.81	56.00	-22.19	QP
7	0.637	16.89	0.11	9.82	26.82	46.00	-19.18	Average
8	0.637	23.94	0.11	9.82	33.87	56.00	-22.13	QP
9	0.739	16.93	0.11	9.83	26.87	46.00	-19.13	Average
10	0.739	21.75	0.11	9.83	31.69	56.00	-24.31	QP
11	1.381	13.00	0.12	9.84	22.96	46.00	-23.04	Average
12	1.381	19.10	0.12	9.84	29.06	56.00	-26.94	QP

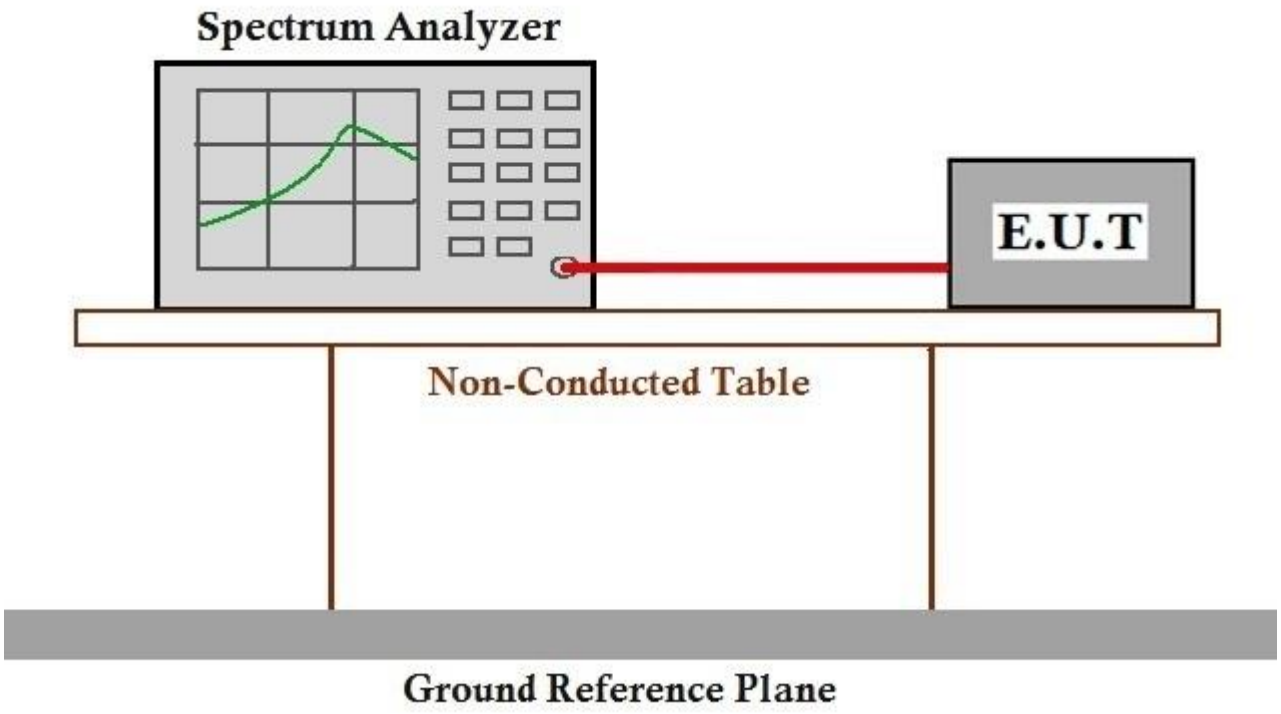
7.2 Minimum 6dB Bandwidth

Test Requirement: 47 CFR Part 15, Subpart C 15.247
Test Method: ANSI C63.10 (2013) Section 11.8.1
Limit: ⩾500 kHz

7.2.1 E.U.T. Operation

Operating Environment:
Temperature: 21.2 °C Humidity: 56.1 % RH Atmospheric Pressure: 1020 mbar
Test mode TX mode_Keep the EUT continuously transmitting mode with GFSK modulation.

7.2.2 Test Setup Diagram



7.2.3 Measurement Data

The detailed test data see: Appendix A for GZEM180100052002

7.3 Conducted Peak Output Power

Test Requirement: 47 CFR Part 15, Subpart C 15.247

Test Method: ANSI C63.10 (2013) Section 11.9.1

Limit:

Frequency range(MHz)	Output power of the intentional radiator(watt)
902-928	1 for ≥50 hopping channels
	0.25 for <50 hopping channels
	1 for digital modulation
2400-2483.5	1 for ≥75 non-overlapping hopping channels
	0.125 for all other frequency hopping systems
	1 for digital modulation
5725-5850	1 for frequency hopping systems and digital modulation

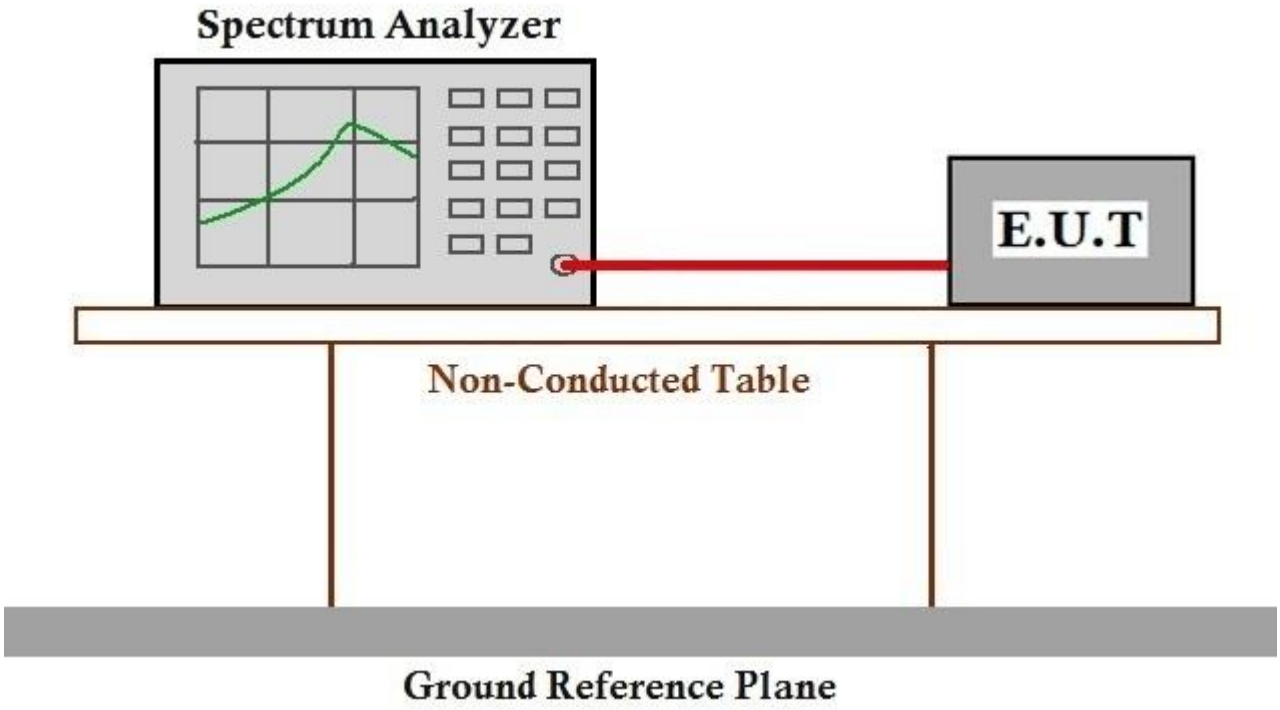
7.3.1 E.U.T. Operation

Operating Environment:

Temperature: 21.2 °C Humidity: 56.1 % RH Atmospheric Pressure: 1020 mbar

Test mode TX mode_Keep the EUT continuously transmitting mode with GFSK modulation.

7.3.2 Test Setup Diagram



7.3.3 Measurement Data

The detailed test data see: Appendix A for GZEM180100052002

7.4 Power Spectrum Density

Test Requirement:	47 CFR Part 15, Subpart C 15.247
Test Method:	ANSI C63.10 (2013) Section 11.10.2
Limit:	≤8dBm in any 3 kHz band during any time interval of continuous transmission

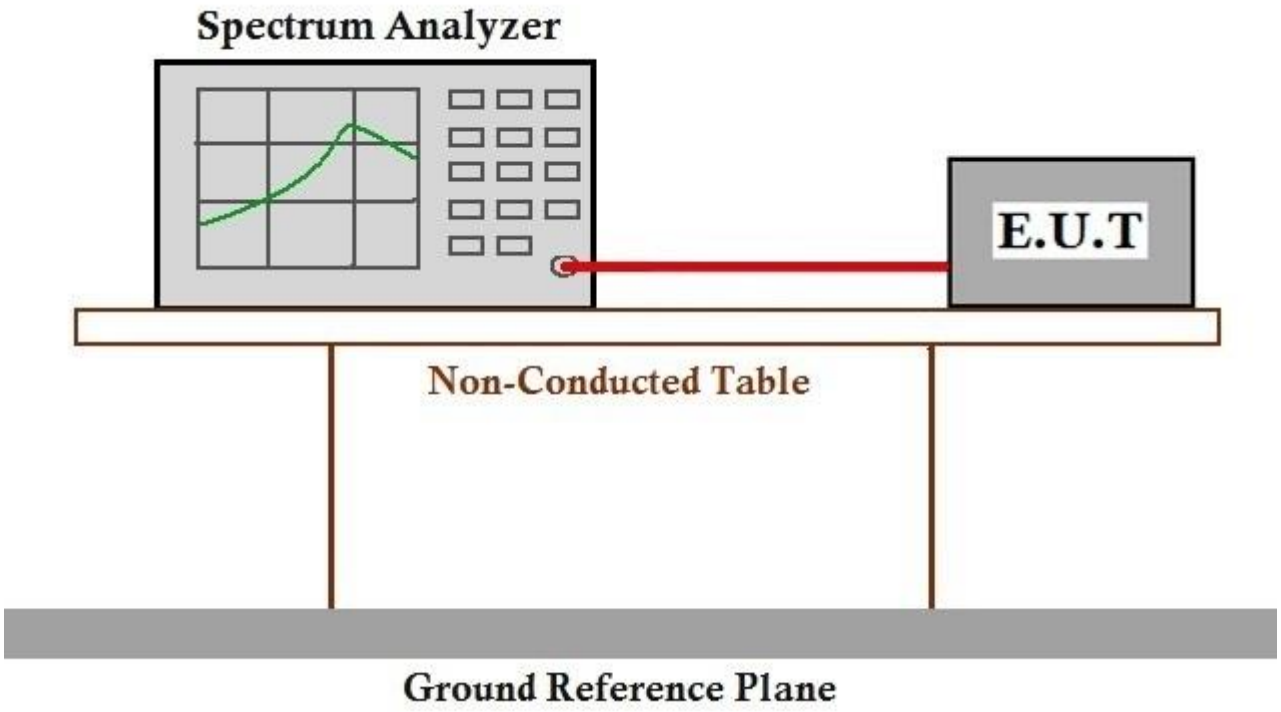
7.4.1 E.U.T. Operation

Operating Environment:

Temperature: 21.2 °C Humidity: 56.1 % RH Atmospheric Pressure: 1020 mbar

Test mode TX mode_Keep the EUT continuously transmitting mode with GFSK modulation.

7.4.2 Test Setup Diagram



7.4.3 Measurement Data

The detailed test data see: Appendix A for GZEM180100052002

7.5 Conducted Band Edges Measurement

Test Requirement:	47 CFR Part 15, Subpart C 15.247
Test Method:	ANSI C63.10 (2013) Section 11.13.3.2
Limit:	In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits. If the transmi

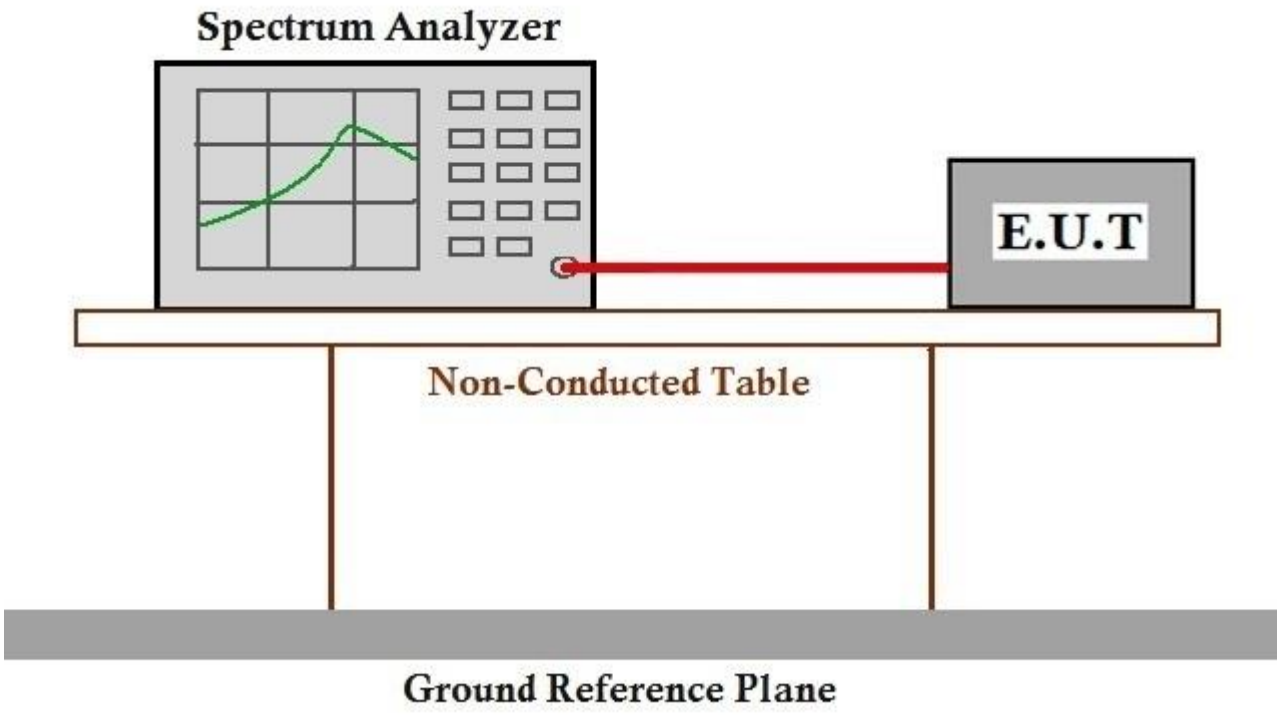
7.5.1 E.U.T. Operation

Operating Environment:

Temperature: 21.2 °C Humidity: 56 % RH Atmospheric Pressure: 1020 mbar

Test mode TX mode_Keep the EUT continuously transmitting mode with GFSK modulation.

7.5.2 Test Setup Diagram



7.5.3 Measurement Data

The detailed test data see: Appendix A for GZEM180100052002

7.6 Conducted Spurious Emissions

Test Requirement:	47 CFR Part 15, Subpart C 15.247
Test Method:	ANSI C63.10 (2013) Section 11.11
Limit:	In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits. If the transmi

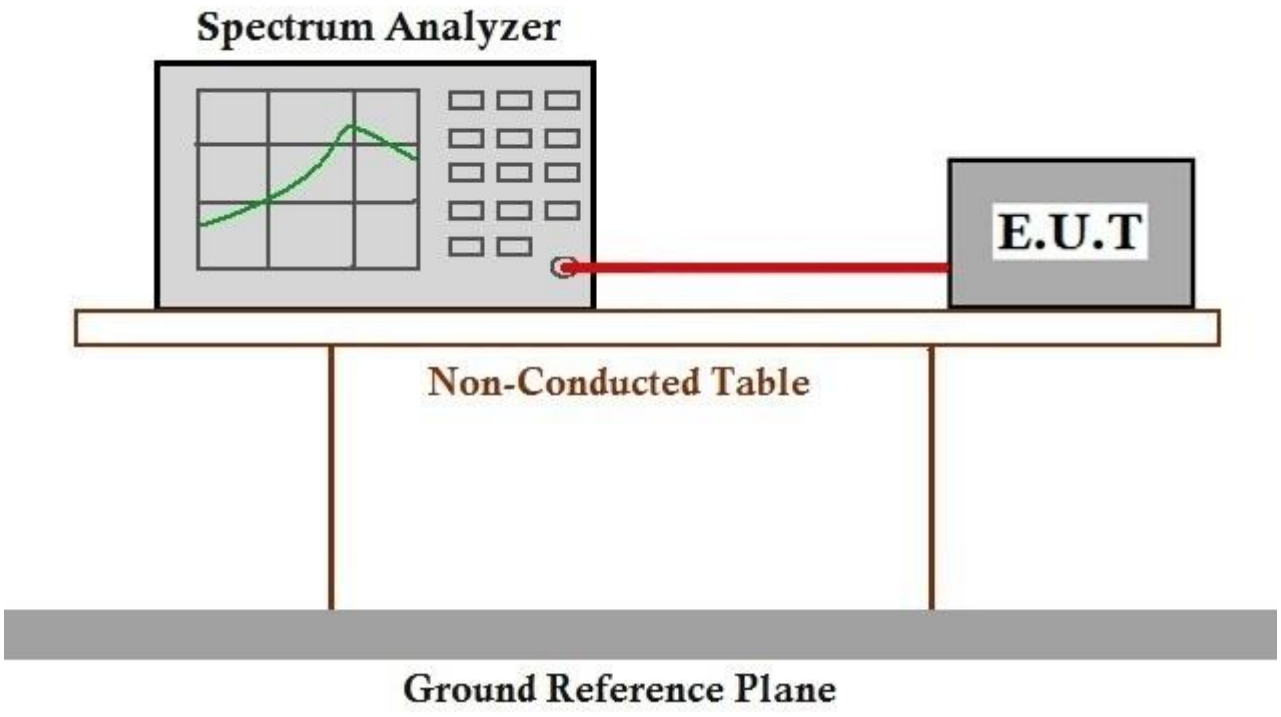
7.6.1 E.U.T. Operation

Operating Environment:

Temperature: 21.2 °C Humidity: 56.1 % RH Atmospheric Pressure: 1020 mbar

Test mode TX mode_Keep the EUT continuously transmitting mode with GFSK modulation.

7.6.2 Test Setup Diagram



7.6.3 Measurement Data

The detailed test data see: Appendix A for GZEM180100052002

7.7 Radiated Emissions which fall in the restricted bands

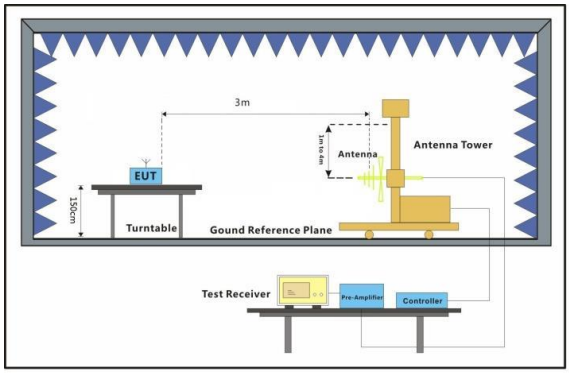
Test Requirement: 47 CFR Part 15, Subpart C 15.247
Test Method: ANSI C63.10 (2013) Section 6.10.5
Measurement Distance: 3m
Limit:

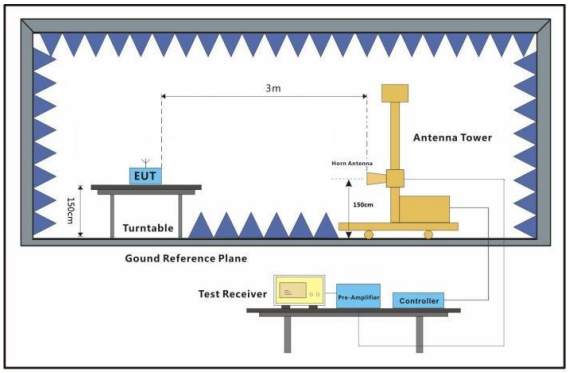
Frequency(MHz)	Field strength(microvolts/meter)	Measurement distance(meters)
0.009-0.490	2400/F(kHz)	300
0.490-1.705	24000/F(kHz)	30
1.705-30.0	30	30
30-88	100	3
88-216	150	3
216-960	200	3
Above 960	500	3
Remark: The emission limits shown in the above table are based on measurements employing a CISPR quasi-peak detector except for the frequency bands 9-90kHz, 110-490kHz and above 1000 MHz. Radiated emission limits in these three bands are based on measurements employing an average detector, the peak field strength of any emission shall not exceed the maximum permitted average limits specified above by more than 20 dB under any condition of modulation.		

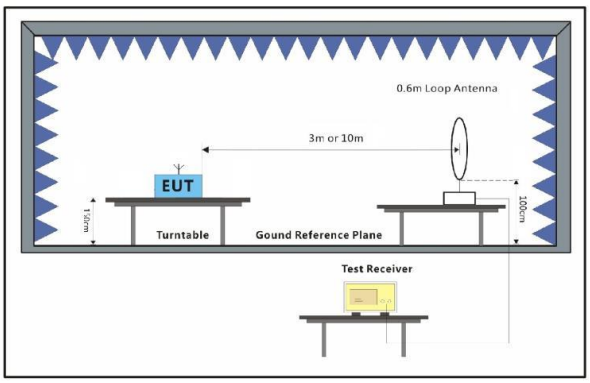
7.7.1 E.U.T. Operation

Operating Environment:
Temperature: 20 °C Humidity: 52.9 % RH Atmospheric Pressure: 1020 mbar
Test mode TX mode_Keep the EUT continuously transmitting mode with GFSK modulation.

7.7.2 Test Setup Diagram







7.7.3 Measurement Data

a. For below 1GHz, the EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 or 10 meter semi-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation.

b. For above 1GHz, the EUT was placed on the top of a rotating table 1.5 meters above the ground at a 3 meter fully-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation.

c. The EUT was set 3 or 10 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.

d. The antenna height is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.

e. For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters (for the test frequency of below 30MHz, the antenna was tuned to heights 1 meter) and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading.

f. The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.

g. If the emission level of the EUT in peak mode was 10dB lower than the limit specified, then testing could be stopped and the peak values of the EUT would be reported. Otherwise the emissions that did not have 10dB margin would be re-tested one by one using peak, quasi-peak or average method as specified and then reported in a data sheet.

h. Test the EUT in the lowest channel,the middle channel,the Highest channel.

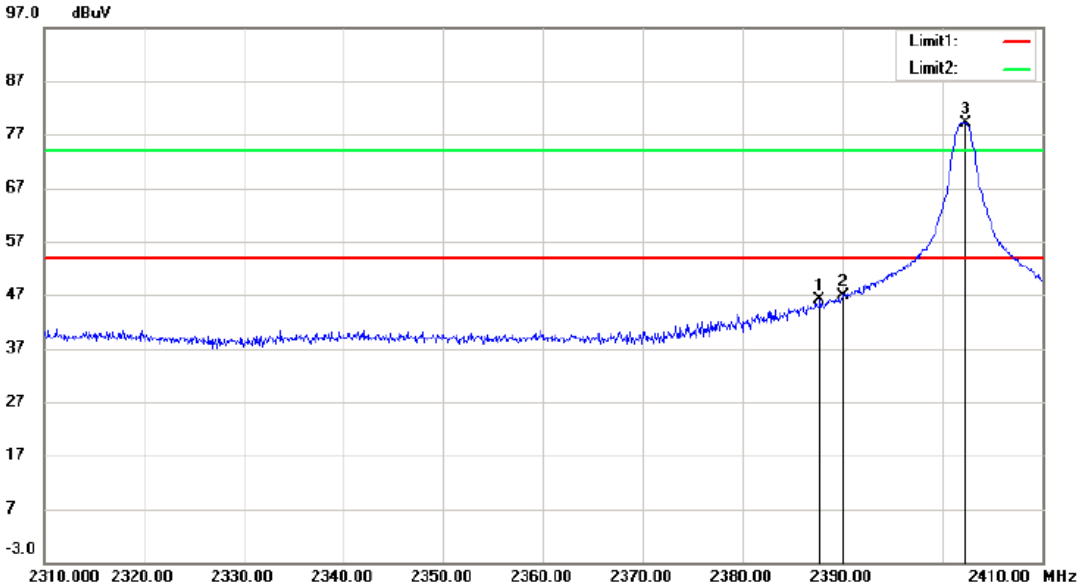
i. The radiation measurements are performed in X, Y, Z axis positioning for Transmitting mode, and found the X axis positioning which it is the worst case.

j. Repeat above procedures until all frequencies measured was complete.

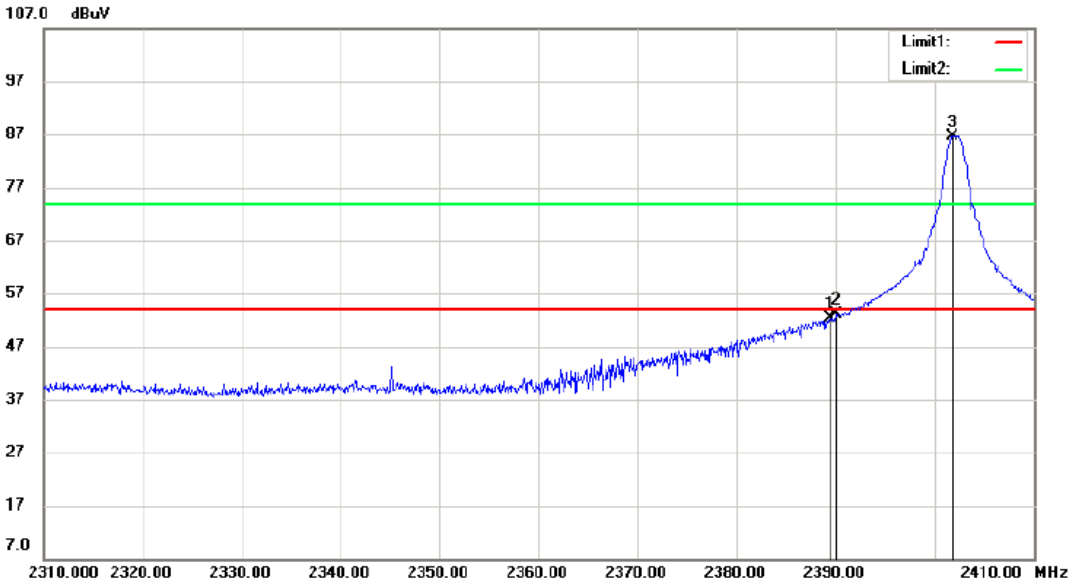
Lowest Channel (2402MHz)

MK.	Frequency (MHz)	Reading (dBuV/m)	Corrected factor(dB)	Result (dBuV/m)	Limit (dBuV/m)	Over Limit (dB)	Detector	Polarization
1	2387.7	50.02	-3.88	46.14	54	-7.86	Peak	Horizontal
2	2390	50.75	-3.89	46.86	54	-7.14	Peak	Horizontal
3	2402.3	83.04	-3.92	79.12	54	25.12	Peak	Horizontal
1	2389.4	56.19	-3.88	52.31	54	-1.69	Peak	Vertical
2	2390	56.9	-3.89	53.01	54	-0.99	Peak	Vertical
3	2401.8	90.48	-3.91	86.57	54	32.57	Peak	Vertical

Horizontal:



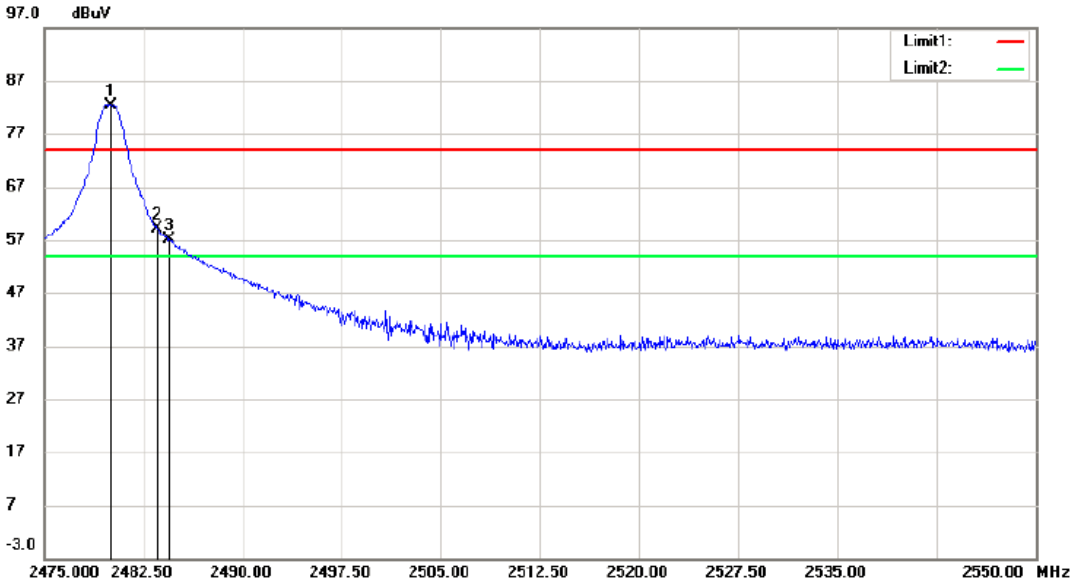
Vertical:



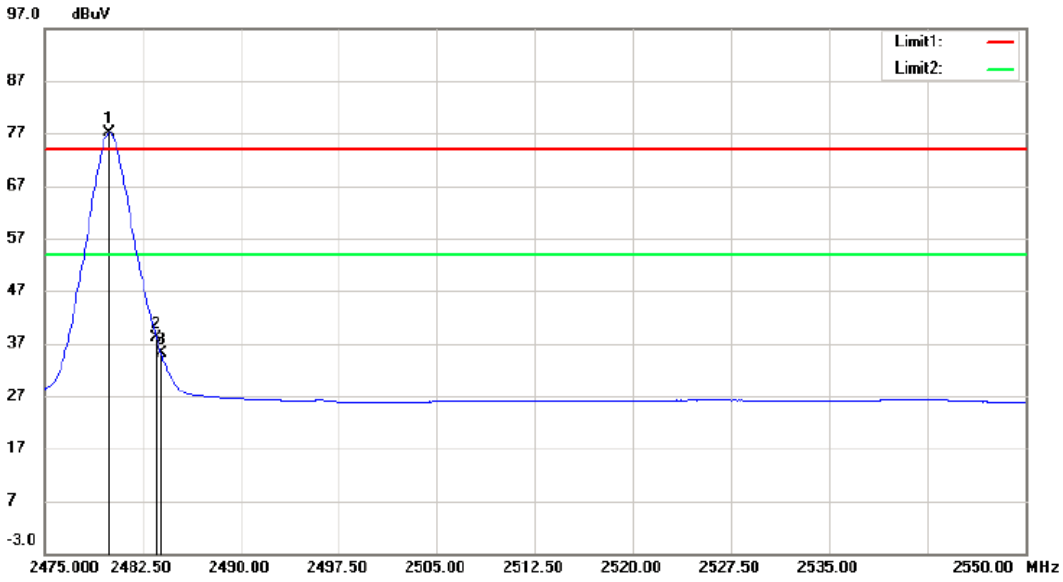
Highest Channel (2480MHz)

MK.	Frequency (MHz)	Reading (dBuV/m)	Corrected factor(dB)	Result (dBuV/m)	Limit (dBuV/m)	Over Limit (dB)	Detector	Polarization
1	2480.025	86.33	-4	82.33	74	8.33	Peak	Horizontal
2	2483.5	63.11	-4.01	59.1	74	-14.9	Peak	Horizontal
3	2484.45	61.25	-4.02	57.23	74	-16.77	Peak	Horizontal
1	2479.95	81.03	-4	77.03	54	23.03	Average	Horizontal
2	2483.5	42.18	-4.01	38.17	54	-15.83	Average	Horizontal
3	2483.925	39.16	-4.02	35.14	54	-18.86	Average	Horizontal

Peak



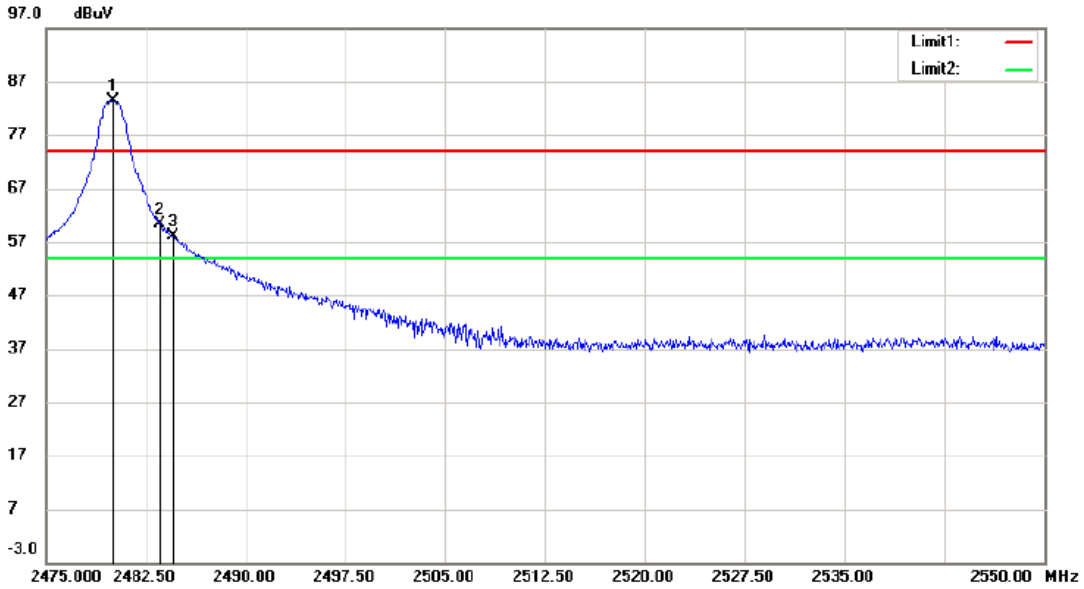
Average



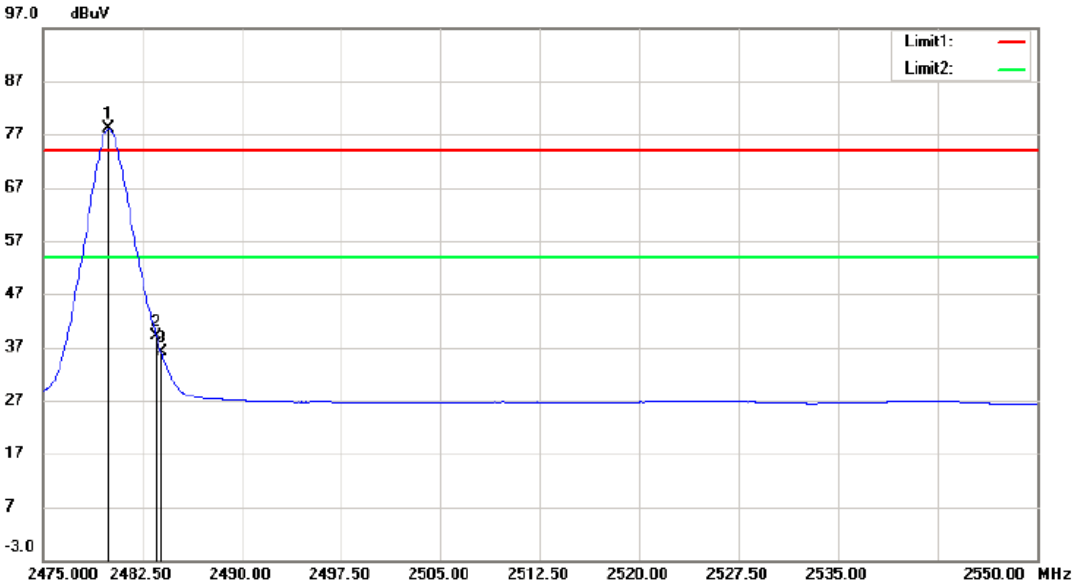
Highest Channel (2480MHz)

MK.	Frequency (MHz)	Reading (dBuV/m)	Corrected factor(dB)	Result (dBuV/m)	Limit (dBuV/m)	Over Limit (dB)	Detector	Polarization
1	2480.025	87.31	-4	83.31	74	9.31	Peak	Vertical
2	2483.5	64.31	-4.01	60.3	74	-13.7	Peak	Vertical
3	2484.525	62.1	-4.01	58.09	74	-15.91	Peak	Vertical
1	2479.95	82.07	-4	78.07	54	24.07	Average	Vertical
2	2483.5	43.22	-4.01	39.21	54	-14.79	Average	Vertical
3	2483.925	40.17	-4.02	36.15	54	-17.85	Average	Vertical

Peak



Average



7.8 Radiated Spurious Emissions

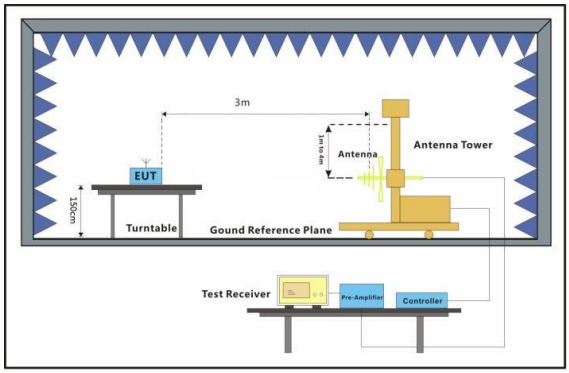
Test Requirement: 47 CFR Part 15, Subpart C 15.247
Test Method: ANSI C63.10 (2013) Section 6.4,6.5,6.6
Measurement Distance: 3m
Limit:

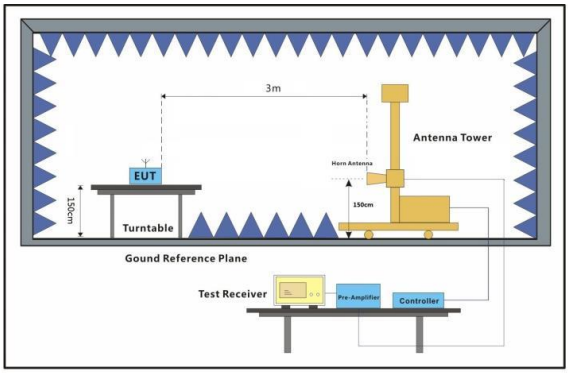
Frequency(MHz)	Field strength(microvolts/meter)	Measurement distance(meters)
0.009-0.490	2400/F(kHz)	300
0.490-1.705	24000/F(kHz)	30
1.705-30.0	30	30
30-88	100	3
88-216	150	3
216-960	200	3
Above 960	500	3
Remark: The emission limits shown in the above table are based on measurements employing a CISPR quasi-peak detector except for the frequency bands 9-90kHz, 110-490kHz and above 1000 MHz. Radiated emission limits in these three bands are based on measurements employing an average detector, the peak field strength of any emission shall not exceed the maximum permitted average limits specified above by more than 20 dB under any condition of modulation.		

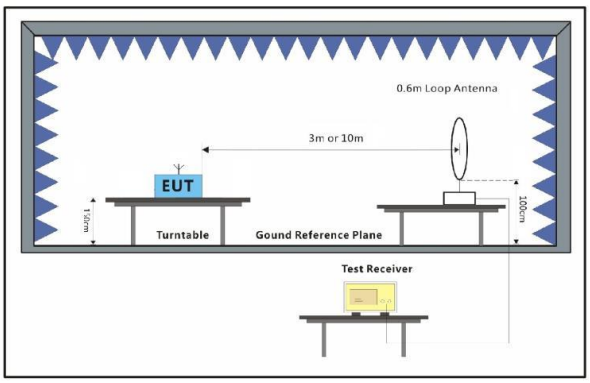
7.8.1 E.U.T. Operation

Operating Environment:
Temperature: 20 °C Humidity: 52.9 % RH Atmospheric Pressure: 1020 mbar
Test mode TX mode_Keep the EUT continuously transmitting mode with GFSK modulation.

7.8.2 Test Setup Diagram







7.8.3 Measurement Data

a. For below 1GHz, the EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 or 10 meter semi-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation.

b. For above 1GHz, the EUT was placed on the top of a rotating table 1.5 meters above the ground at a 3 meter fully-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation.

c. The EUT was set 3 or 10 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.

d. The antenna height is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.

e. For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters (for the test frequency of below 30MHz, the antenna was tuned to heights 1 meter) and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading.

f. The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.

g. If the emission level of the EUT in peak mode was 10dB lower than the limit specified, then testing could be stopped and the peak values of the EUT would be reported. Otherwise the emissions that did not have 10dB margin would be re-tested one by one using peak, quasi-peak or average method as specified and then reported in a data sheet.

h. Test the EUT in the lowest channel,the middle channel,the Highest channel.

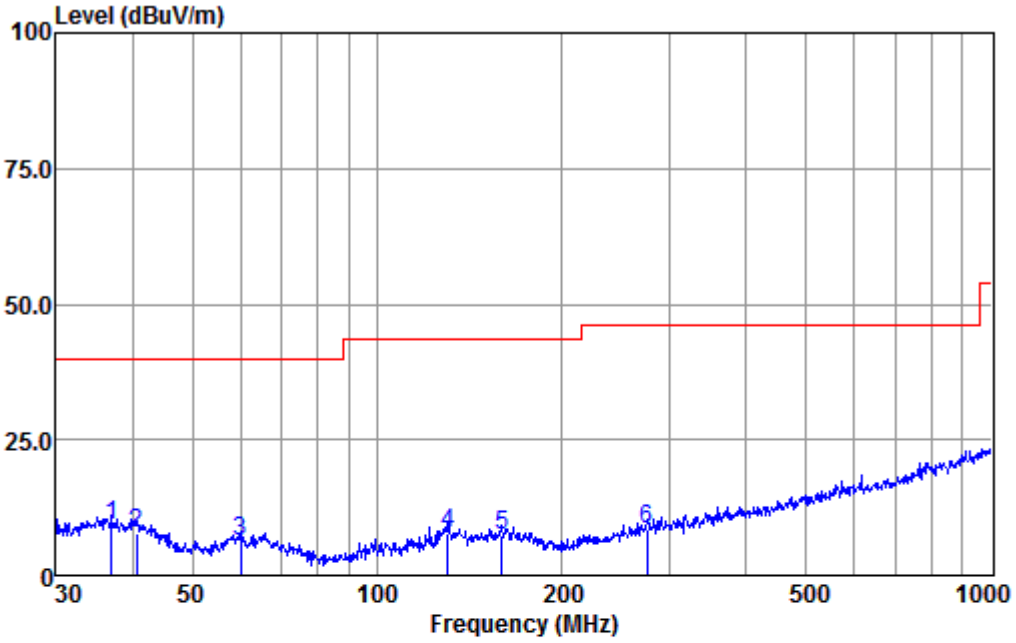
i. The radiation measurements are performed in X, Y, Z axis positioning for Transmitting mode, and found the X axis positioning which it is the worst case.

j. Repeat above procedures until all frequencies measured was complete.

Note: No spurious emissions were detected within 20dB of limit below 30MHz

30MHz-1GHz:

Mode:b; Polarization:Horizontal

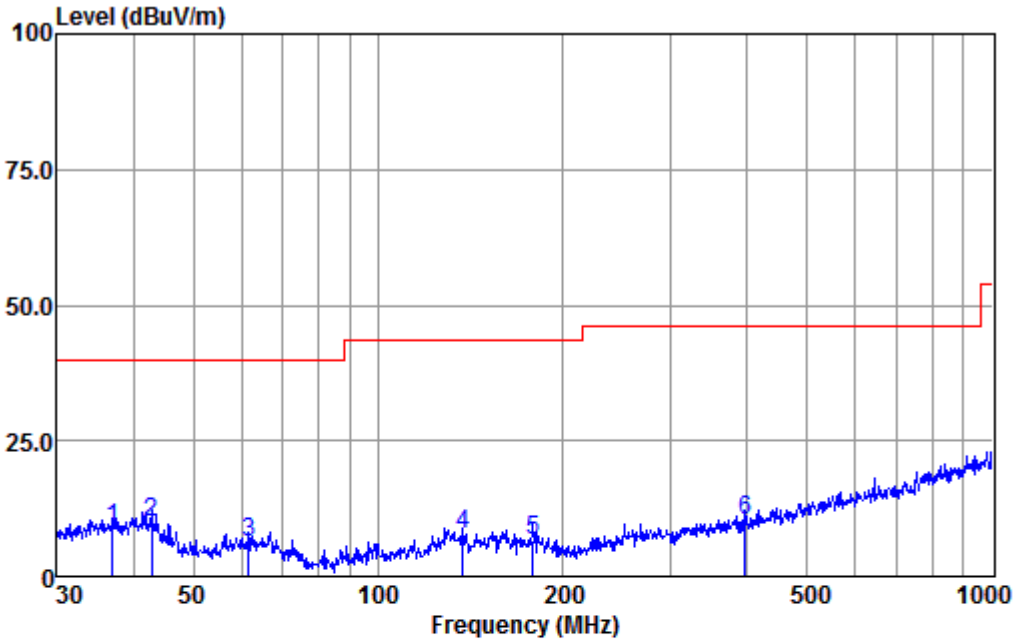


Condition : HORIZONTAL

Test Mode : b

	Freq	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Level	Limit Line	Over Limit	Remark
	MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB	
1 q	36.90	35.53	16.02	0.21	42.62	9.14	40.00	-30.86	QP
2	40.56	34.39	15.94	0.22	42.62	7.93	40.00	-32.07	QP
3	60.07	35.95	12.60	0.30	42.65	6.20	40.00	-33.80	QP
4	130.38	37.08	12.73	0.58	42.65	7.74	43.50	-35.76	QP
5	159.78	36.26	13.10	0.63	42.59	7.40	43.50	-36.10	QP
6	275.16	37.71	12.38	0.81	42.43	8.47	46.00	-37.53	QP

Mode:b; Polarization:Vertical



Condition : VERTICAL

Test Mode : b

	Freq	ReadLevel	Antenna Factor	Cable Loss	Preamp Factor	Level	Limit Line	Over Limit	Remark
	MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB	
1	36.90	35.08	16.02	0.21	42.62	8.69	40.00	-31.31	QP
2 q	42.75	37.87	14.61	0.23	42.63	10.08	40.00	-29.92	QP
3	61.56	36.16	12.41	0.30	42.65	6.22	40.00	-33.78	QP
4	137.42	38.22	11.66	0.60	42.64	7.84	43.50	-35.66	QP
5	178.76	36.74	11.86	0.66	42.56	6.70	43.50	-36.80	QP
6	396.24	36.29	15.03	0.99	42.11	10.20	46.00	-35.80	QP

Above 1GHz:

Lowest Channel(2402MHz)

Mark	Frequency (MHz)	Reading (dBuV)	Factor (dB)	Emission (dBuV/m)	Limit (dBuV/m)	Over Limit (dB)	Detector	polarization
1	4804	37.09	6.18	43.27	54	-10.73	peak	Horizontal
2	7206	35.63	10.63	46.26	54	-7.74	peak	Horizontal
3	9608	35.88	14.38	50.26	54	-3.74	peak	Horizontal
4	4804	38.25	6.18	44.43	54	-9.57	peak	Vertical
5	7206	37.69	10.63	48.32	54	-5.68	peak	Vertical
6	9608	38.03	14.38	52.41	54	-1.59	peak	Vertical

Middle Channel(2440MHz)

Mark	Frequency (MHz)	Reading (dBuV)	Factor (dB)	Emission (dBuV/m)	Limit (dBuV/m)	Over Limit (dB)	Detector	polarization
1	4880	38.9	6.97	45.87	54	-8.13	peak	Horizontal
2	7320	35.78	11.12	46.9	54	-7.1	peak	Horizontal
3	9760	32.05	14.35	46.4	54	-7.6	peak	Horizontal
4	4880	38.39	6.97	45.36	54	-8.64	peak	Vertical
5	7320	36.05	11.12	47.17	54	-6.83	peak	Vertical
6	9760	36.89	14.35	51.24	54	-2.76	peak	Vertical

Highest Channel(2480MHz)

Mark	Frequency (MHz)	Reading (dBuV)	Factor (dB)	Emission (dBuV/m)	Limit (dBuV/m)	Over Limit (dB)	Detector	polarization
1	4960	40.72	7.49	48.21	54	-5.79	peak	Horizontal
2	7440	35.07	11.65	46.72	54	-7.28	peak	Horizontal
3	9920	34.55	14.4	48.95	54	-5.05	peak	Horizontal
4	4960	34.38	7.49	41.87	54	-12.13	peak	Vertical
5	7440	38.51	11.65	50.16	54	-3.84	peak	Vertical
6	9920	32.49	14.4	46.89	54	-7.11	peak	Vertical

Remark: 1) Emission = Receiver Reading + Factor

2) Factor = Antenna Factor + Cable Loss + Pre-amplifier Factor.

3) If the Peak value below the AV Limit, the AV test doesn't perform for this submission.

8 Test Setup Photographs

Refer to the <Test Setup photos-for BLE>.

9 EUT Constructional Details

Refer to the < External Photos > & < Internal Photos >.

--End of the Report--