

Report No.: GZEM200901485401

Page: 1 of 30

FCC ID: 2AXIY1507-12126-20

**TEST REPORT****Application No.:**

GZEM2009014854CR

**Applicant:**

Wenzhou Yeeka Lock Technology Co., Ltd

**Address of Applicant:**

No.49, Fuyang North Road, Sanxi Industrial Park Ouhai district, Wenzhou, China

**Manufacturer:**

Wenzhou Yeeka Lock Technology Co., Ltd

**Address of Manufacturer:**

No.49, Fuyang North Road, Sanxi Industrial Park Ouhai district, Wenzhou, China

**Factory:**

Wenzhou Yeeka Lock Technology Co., Ltd

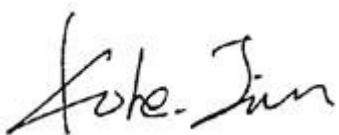
**Address of Factory:**

No.49, Fuyang North Road, Sanxi Industrial Park Ouhai district, Wenzhou, China

**Equipment Under Test (EUT):****FCC ID: 2AXIY1507-12126-20****EUT Name:** 1507 IoT lock**Model No.:** 1507-12126-20**Trade Mark:** yeeka**Standard(s):** 47 CFR Part 15, Subpart C 15.225**Date of Receipt:** 2020-09-04**Date of Test:** 2020-09-10 to 2020-11-14**Date of Issue:** 2020-12-22

<b>Test Result:</b>	<b>Pass*</b>
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\* In the configuration tested, the EUT complied with the standards specified above.



Kobe Jian

EMC Laboratory Manager

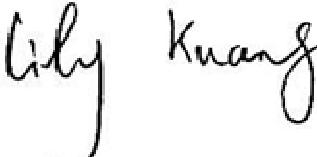


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Revision Record				
Version	Chapter	Date	Modifier	Remark
01		2020-12-22		Original

Authorized for issue by:			
Tested By	 Lily Kuang	2020-09-10 to 2020-11-14	
	Lily_Kuang /Project Engineer	Date	
Checked By	 Ricky Liu	2020-11-17	
	Ricky_Liu /Reviewer	Date	



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## 2 Test Summary

Radio Spectrum Technical Requirement				
Item	Standard	Method	Requirement	Result
Antenna Requirement	47 CFR Part 15, Subpart C 15.225	N/A	47 CFR Part 15, Subpart C 15.203	Pass

Radio Spectrum Matter Part				
Item	Standard	Method	Requirement	Result
Conducted Emissions at AC Power Line (150kHz-30MHz)	47 CFR Part 15, Subpart C 15.225	ANSI C63.10 (2013) Section 6.2	47 CFR Part 15, Subpart C 15.207	Pass
20dB Bandwidth	47 CFR Part 15, Subpart C 15.225	ANSI C63.10 (2013) Section 6.9	47 CFR Part 15, Subpart C 15.215	Pass
Emission Mask	47 CFR Part 15, Subpart C 15.225	ANSI C63.10 (2013) Section 6.4	47 CFR Part 15, Subpart C 15.225(a)&(b)&(C )	Pass
Frequency tolerance	47 CFR Part 15, Subpart C 15.225	ANSI C63.10 (2013) Section 6.8	47 CFR Part 15, Subpart C 15.225(e)	Pass
Radiated Emissions(9kHz-30MHz)	47 CFR Part 15, Subpart C 15.225	ANSI C63.10 (2013) Section 6.4&6.5	47 CFR Part 15, Subpart C 15.225(d) & 15.209	Pass
Radiated Emissions(30MHz-1GHz)	47 CFR Part 15, Subpart C 15.225	ANSI C63.10 (2013) Section 6.4&6.5	47 CFR Part 15, Subpart C 15.225(d) & 15.209	Pass**

\*\*: The EUT passed Radiated Emissions (30MHz-1GHz) tests after modification.

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## 4 General Information

### 4.1 Details of E.U.T.

Power Supply:	DC 12V for transmitting mode
Test Voltage:	AC 120V, 60Hz with AC/DC adapter refer to section 4.2
Modulation Type	ASK declared by applicant
Operation Frequency:	13.56MHz
Internal Source:	<108MHz
Antenna Gain:	0 dBi
Antenna Type:	Integrated antenna
Cable:	AC mains (unshielded, 0.5m)
Hardware Version:	N/A
Firmware Version:	V1.14
S/N:	1507-1220
Power setting level	Default and can not be changed by user

### 4.2 Description of Support Units

Description	Manufacturer	Model No.	Serial No.
AC/DC Adapter	SGS	DC 12V	REF. No.SEA0500
RFID Card	Offered by client	none	none

### 4.3 Measurement Uncertainty

No.	Item	Measurement Uncertainty
1	Conducted Disturbance Voltage at Mains Terminals	3.63dB (9kHz to 150kHz)
		3.22dB (150kHz to 30MHz)
2	Disturbance Power	3.78dB
3	Radiated Emissions	5.0dB (30MHz-1GHz)
		5.0dB (1GHz-6GHz)
4	Radiated Immunity	2.18dB(80MHz-3GHz)
5	Conducted Immunity	3.5dB(150kHz-230MHz)
6	Electrostatic Discharge	±6 %
7	EFT (Electrical Fast Transients)	±4 %
8	Surge Immunity	±6%
9	Voltage Dips and Interruptions	±4 %
10	CISPR 20 Immunity	1.5dB
11	Temperature	±0.4°C
12	Humidity	±1.3%
13	DC power	±0.5 %

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#### 4.4 Test Location

All tests were performed at:

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No tests were sub-contracted.

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## 4.5 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-CL01:2018 accreditation criteria for testing laboratories (identical to

ISO/IEC 17025:2017 General Requirements) for the Competence of Testing Laboratories.

● **FCC Recognized 2.948 Listed Test Firm(Registration No.: 282399)**

SGS-CSTC Standards Technical Services Co., Ltd., EMC Laboratory has been registered and fully described in a report filed with the (FCC) Federal Communications Commission. The acceptance letter from the FCC is maintained in our files. Registration 282399, May 31, 2002.

● **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, CAB identifier: CN0052)**

SGS-CSTC Standards Technical Services Co., Ltd., has been registered by Innovation Science and Economic Development Canada for Wireless Device Testing laboratories to test to Canadian radio equipment requirements. Registration No. 4620B, CAB identifier: CN0052.

● **VCCI (Registration No.: R-12460, C-12584, G-10449 and T-11179)**

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-12460, C-12584, G-10449 and T-11179 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.

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#### 4.6 Deviation from Standards

None

#### 4.7 Abnormalities from Standard Conditions

None



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## 5 Equipment List

Conducted Emissions at AC Power Line (150kHz-30MHz)					
Equipment	Manufacturer	Model No	Inventory No	Cal Date	Cal Due Date
Shielding Room	ChangZhou ZhongYu	8m x 3m x 3.8m	EMC0306	N/A	N/A
Two-Line V-Network	Rohde & Schwarz	ENV216	EMC0118	2020-01-10	2021-01-09
LISN	Rohde & Schwarz	ENV216	EMC2135	2020-09-25	2021-09-24
EMI Test Receiver	Rohde & Schwarz	ESCS30	EMC0506	2020-11-13	2021-11-12
Coaxial Cable	HangTianXing	2m	EMC0107	2020-09-09	2022-09-08
Test Software E3c	Audix	Ver. 5.4.1221b	GZE100-62	N/A	N/A

20dB Bandwidth					
Equipment	Manufacturer	Model No	Inventory No	Cal Date	Cal Due Date
MXA Signal Analyzer	AgilentTechnologies	N9020A	SEM004-10	2020-03-02	2021-03-01
6dB Attenuator	HP	8491A	EMC2062	2020-04-15	2022-04-14
Test Software JS1120-3	HangTianXing	V2.6	GZE100-69	N/A	N/A
MI CABLE	SGS-EMC	0.8M	EMC2136	2019-11-02	2021-11-01

Frequency tolerance					
Equipment	Manufacturer	Model No	Inventory No	Cal Date	Cal Due Date
MXA Signal Analyzer	AgilentTechnologies	N9020A	SEM004-10	2020-03-02	2021-03-01
6dB Attenuator	HP	8491A	EMC2062	2020-04-15	2022-04-14
Test Software JS1120-3	HangTianXing	V2.6	GZE100-69	N/A	N/A
MI CABLE	SGS-EMC	0.8M	EMC2136	2019-11-02	2021-11-01
Temperature Chamber	GZ GongWen Co.Ltd.	GDJW-100	EMC0039	2020-07-01	2021-06-30

Emission Mask & Radiated Spurious Emissions					
Equipment	Manufacturer	Model No	Inventory No	Cal Date	Cal Due Date
EMI Test Receiver	Rohde & Schwarz	ESIB26	EMC0522	2020-01-10	2021-01-09
Chamber cable	HangTianXing	N/A	EMC0542	2019-06-28	2021-06-27
Trilog Broadband Antenna 30MHz-1GHz	SCHWARZBECKMESS-ELEKTRONIK	VULB 9168	SEM003-18	2019-02-22	2022-02-22
Amplifier	HP	8447F	EMC2065	2020-05-26	2021-05-25
Pre-Amplifier MH648A	ANRITSU CORP	MH648A	EMC2086	2020-11-18	2021-11-17
Active Loop Antenna	ETS-Lindgren	6502	EMC2190	2019-12-27	2021-12-26
10m Semi-Anechoic Chamber	ETS	N/A	EMC0530	2019-10-20	2022-10-19
Test Software E3	Audix	Ver.6.120110a	GZE100-61	N/A	N/A

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<b>General used equipment</b>						
<b>Equipment</b>	<b>Manufacturer</b>	<b>Model No</b>	<b>Inventory No</b>	<b>Cal Date</b>	<b>Cal Due Date</b>	
DMM	Fluke	73	EMC0006	2020-07-09	2021-07-08	
DMM	Fluke	73	EMC0007	2020-07-09	2021-07-08	

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## 6 Radio Spectrum Technical Requirement

### 6.1 Antenna Requirement

#### 6.1.1 Test Requirement:

47 CFR Part 15, Subpart C 15.203

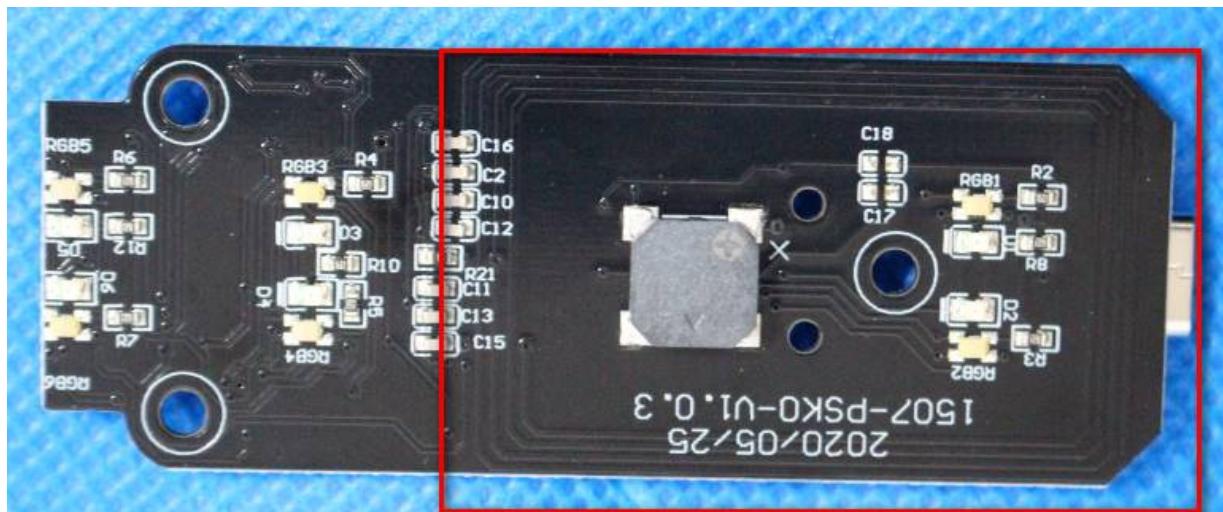
#### 6.1.2 Conclusion

Standard Requirement:

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 antenna that uses a unique coupling to the intentional radiator, the manufacturer may design the unit permanently attached antenna or of an so that a broken antenna can be replaced by the user, but the use of a standard antenna jack or electrical connector is prohibited.

EUT Antenna:

The antenna is integrated on the main PCB and no consideration of replacement. The best case gain of the antenna is 0dBi.



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## 7 Radio Spectrum Matter Test Results

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

Test Requirement 47 CFR Part 15, Subpart C 15.207

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

Limit:

Frequency range (MHz)	Limit (dBuV)	
	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.

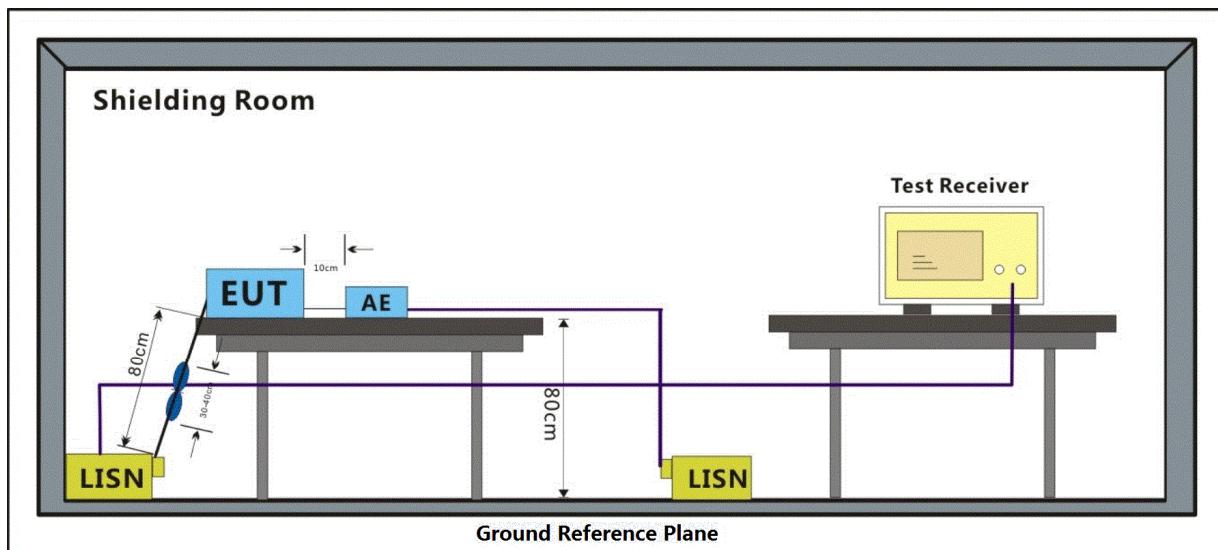
#### 7.1.1 E.U.T. Operation

Operating Environment:

Temperature: 22.6 °C Humidity: 52 % RH Atmospheric Pressure: 1020 mbar

Test Mode: a:TX mode\_Keep the EUT in transmitting with modulation mode.

#### 7.1.2 Test Setup Diagram



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### 7.1.3 Measurement Procedure and 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.

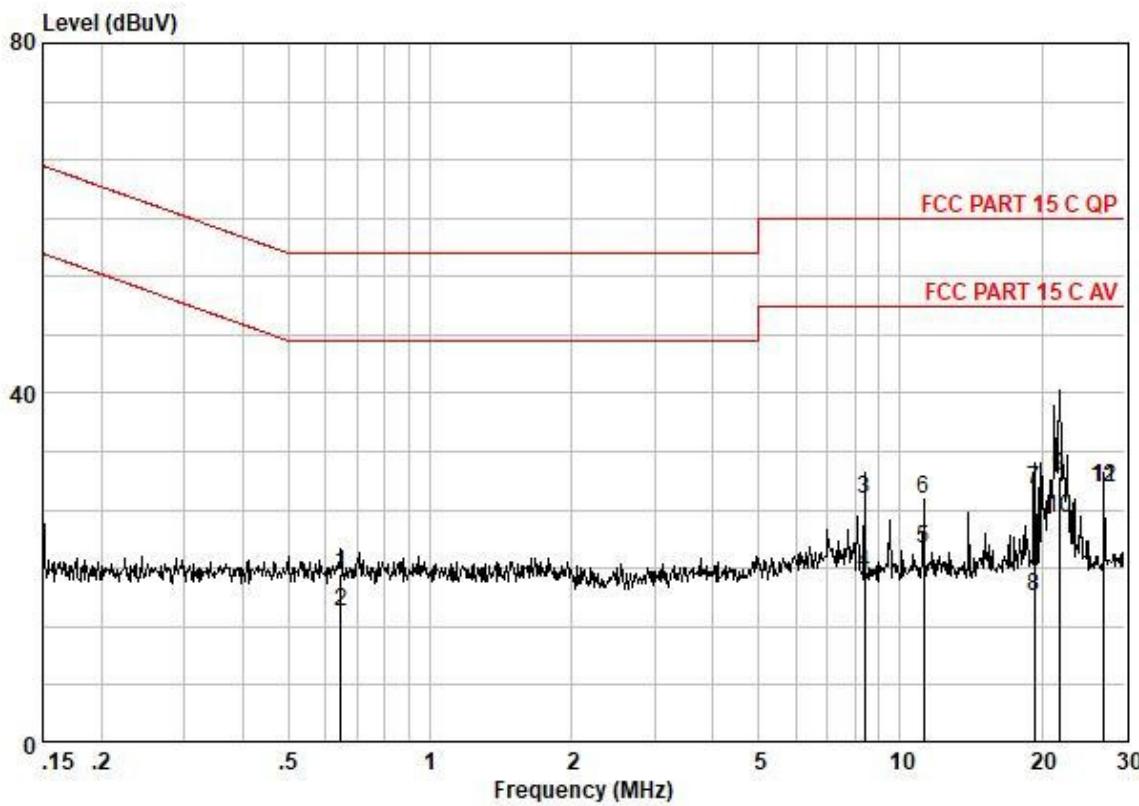
Remark: LISN=Read Level+ Cable Loss+ LISN Factor



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Mode:a; Line:Live Line



Pol :LIVE  
Mode :  
Model :

Frequency MHz	read level dBuV	Cable Loss dB	LISN Factor dB	Measured level dBuV	Limit Line dBuV	Over limit dB	Remark
0.65	9.72	0.10	9.65	19.47	56.00	-36.53	QP
0.65	5.24	0.10	9.65	14.99	46.00	-31.01	AVERAGE
8.41	17.76	0.30	9.92	27.98	60.00	-32.03	QP
8.41	9.18	0.30	9.92	19.40	50.00	-30.61	AVERAGE
11.20	11.87	0.30	10.00	22.17	50.00	-27.83	AVERAGE
11.20	17.58	0.30	10.00	27.88	60.00	-32.12	QP
19.33	18.37	0.40	10.12	28.89	60.00	-31.11	QP
19.33	6.32	0.40	10.12	16.84	50.00	-33.16	AVERAGE
21.83	20.07	0.40	10.13	30.60	60.00	-29.40	QP
21.83	15.24	0.40	10.13	25.77	50.00	-24.23	AVERAGE
27.13	18.61	0.40	10.17	29.18	50.00	-20.82	AVERAGE
27.13	18.65	0.40	10.17	29.22	60.00	-30.78	QP

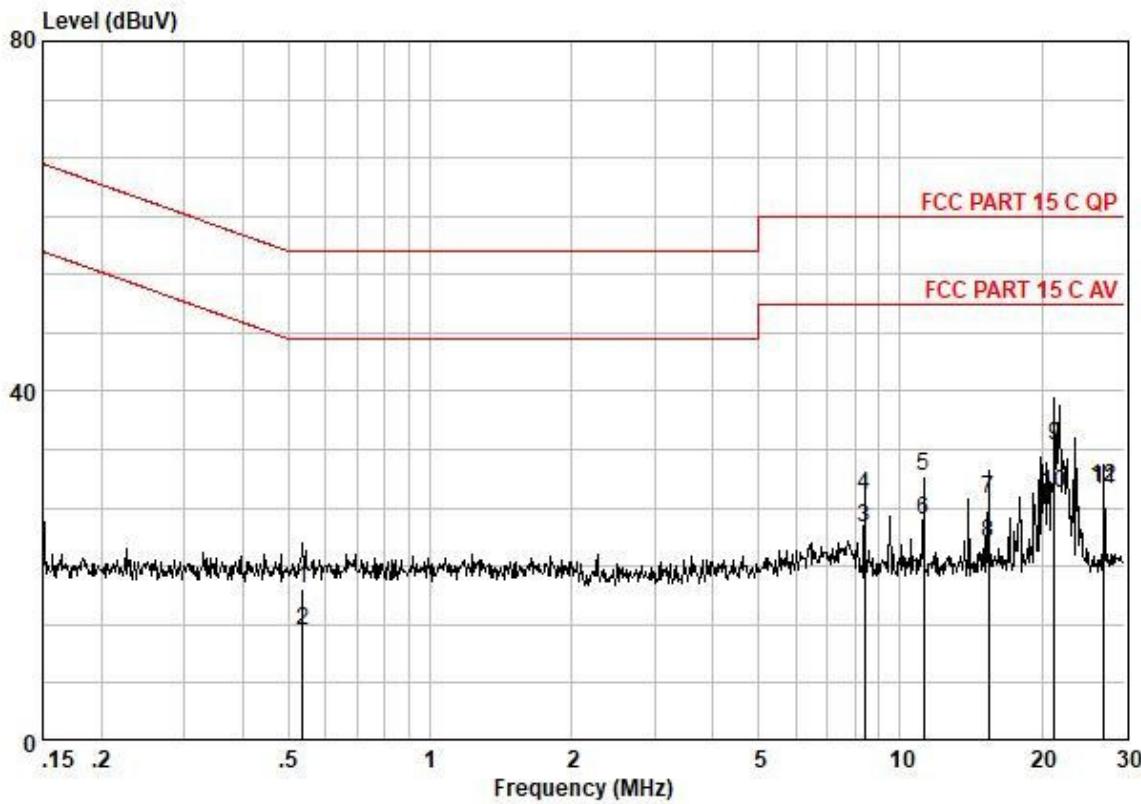
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Mode:a; Line:Neutral Line



Pol :NEUTRAL  
Mode :  
Model :

Frequency MHz	read level dBuV	Cable Loss dB	LISN Factor dB	Measured level dBuV	Limit Line dBuV	Over limit dB	Remark
0.53	7.68	0.10	9.64	17.42	56.00	-38.58	QP
0.53	2.99	0.10	9.64	12.73	46.00	-33.27	AVERAGE
8.41	14.11	0.30	9.92	24.33	50.00	-25.68	AVERAGE
8.41	18.00	0.30	9.92	28.22	60.00	-31.79	QP
11.20	20.01	0.30	10.00	30.31	60.00	-29.69	QP
11.20	15.01	0.30	10.00	25.31	50.00	-24.69	AVERAGE
15.39	17.09	0.40	10.12	27.61	60.00	-32.39	QP
15.39	12.05	0.40	10.12	22.57	50.00	-27.43	AVERAGE
21.26	23.23	0.40	10.13	33.76	60.00	-26.24	QP
21.26	17.91	0.40	10.13	28.44	50.00	-21.56	AVERAGE
27.13	18.26	0.40	10.17	28.83	50.00	-21.17	AVERAGE
27.13	18.38	0.40	10.17	28.95	60.00	-31.05	QP

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## 7.2 20dB Bandwidth

Test Requirement 47 CFR Part 15, Subpart C 15.215

Test Method: ANSI C63.10 (2013) Section 6.9

Limit: N/A

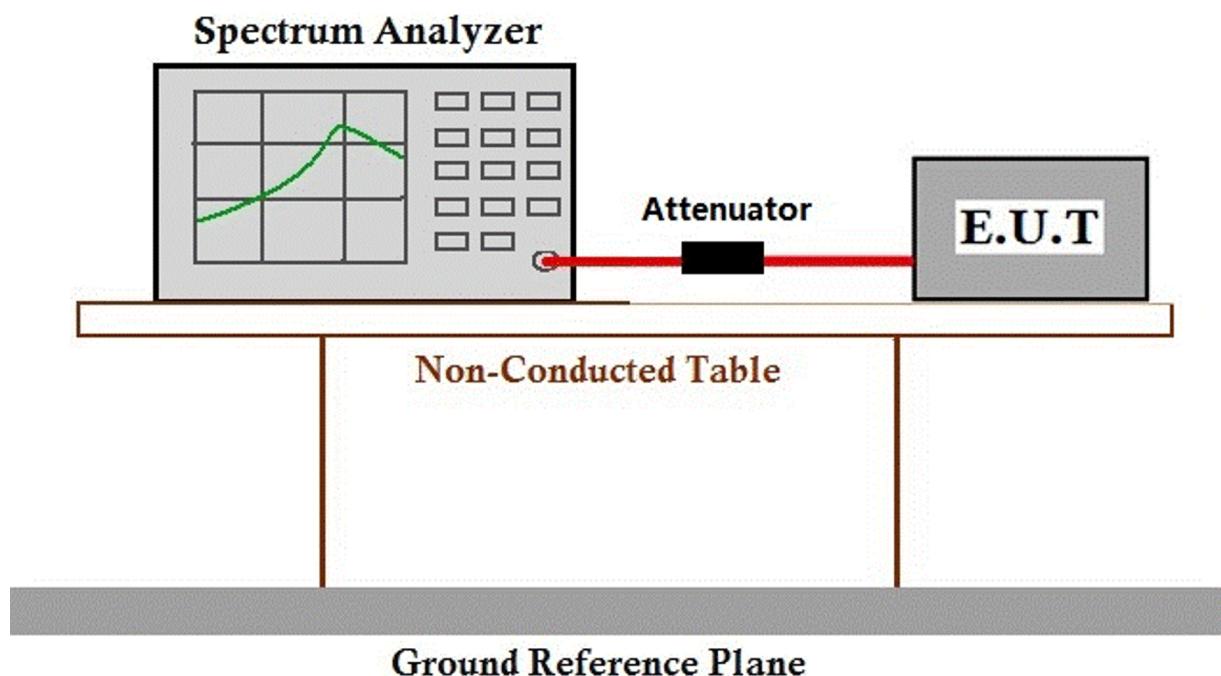
### 7.2.1 E.U.T. Operation

Operating Environment:

Temperature: 25.4 °C Humidity: 61.7 % RH Atmospheric Pressure: 1020 mbar

Test Mode: a:TX mode\_Keep the EUT in transmitting with modulation mode.

### 7.2.2 Test Setup Diagram



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## 7.2.3 Measurement Procedure and Data

**Cable Loss= 0.9dB**

Remark: The setting of RBW was the minimum for the spectrum.

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### 7.3 Emission Mask

Test Requirement 47 CFR Part 15, Subpart C 15.225(a)&(b)&(C )

Test Method: ANSI C63.10 (2013) Section 6.4

Limit:

The field strength of any emission shall not exceed the following limits:

- (a) 15848 millivolts/m (84 dB  $\mu$  V/m) at 30 m, within the band 13.553-13.567 MHz.
- (b) 334 microvolts/m (50.5 dB  $\mu$  V/m) at 30 m, within the bands 13.410-13.553 MHz and 13.567-13.710 MHz.
- (c) 106 microvolts/m (40.5 dB  $\mu$  V/m) at 30 m, within the bands 13.110-13.410 MHz and 13.710-14.010 MHz.
- (d) 30 microvolts/m (29.5 dB  $\mu$  V/m) at 30 m, outside the band 13.110-14.010 MHz.

According to ANSI C63.10 Section 6.4, the test data shall convert by below formula:

If both the single point and the limit distance are equal to or closer to the EUT than  $\lambda/2\pi$ , then extrapolation to the limit distance shall be calculated using Equation (4):

$$FS_{\text{limit}} = FS_{\text{max}} - 40 \log \left( \frac{d_{\text{limit}}}{d_{\text{measure}}} \right) \quad (4)$$

where

$FS_{\text{limit}}$	is the calculation of field strength at the limit distance, expressed in dB $\mu$ V/m
$FS_{\text{max}}$	is the measured field strength, expressed in dB $\mu$ V/m
$d_{\text{near field}}$	is the $\lambda/2\pi$ distance
$d_{\text{measure}}$	is the distance of the measurement point from the EUT
$d_{\text{limit}}$	is the reference distance or the distance of the $\lambda/2\pi$ point

**Table 5—Relationship of frequency and wavelength (informative)**

Frequency (MHz)	$\lambda$ (m)	$0.625\lambda$ (m)	$\lambda/2\pi$
0.009	33333.3	20833.3	5305.2
0.1	3000.0	1875.0	477.5
0.3	1000.0	625.0	159.2
1	300.0	187.5	47.7
4.76	63.0	39.4	10.0
16	18.8	11.7	3.0
30	10.0	6.3	1.6

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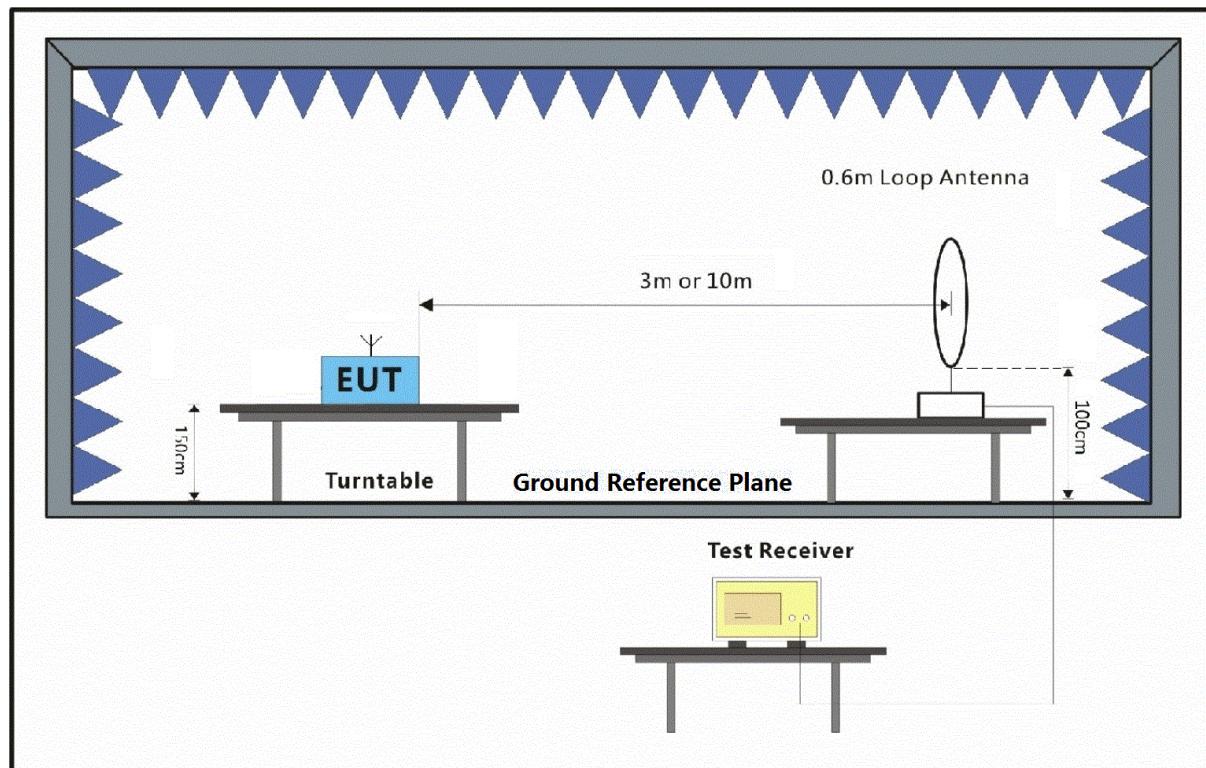
### 7.3.1 E.U.T. Operation

Operating Environment:

Temperature: 25.4 °C      Humidity: 61.7 % RH      Atmospheric Pressure: 1020 mbar

Test Mode: a:TX mode\_Keep the EUT in transmitting with modulation mode.

### 7.3.2 Test Setup Diagram



### 7.3.3 Measurement Procedure and Data

For testing performed with the loop antenna, the center of the loop was positioned 1 m above the ground and positioned with its plane vertical at the specified distance from the EUT. During testing the loop was rotated about its vertical axis for maximum response at each azimuth and also investigated with the loop positioned in the horizontal plane.

The radiation measurements are performed in X, Y, Z axis positioning. And found the X axis positioning which is worse case, only the test worst case mode is recorded in the report.

Measured Level I=Read Level + Antenna Factor + Cable Loss - Preamp Factor

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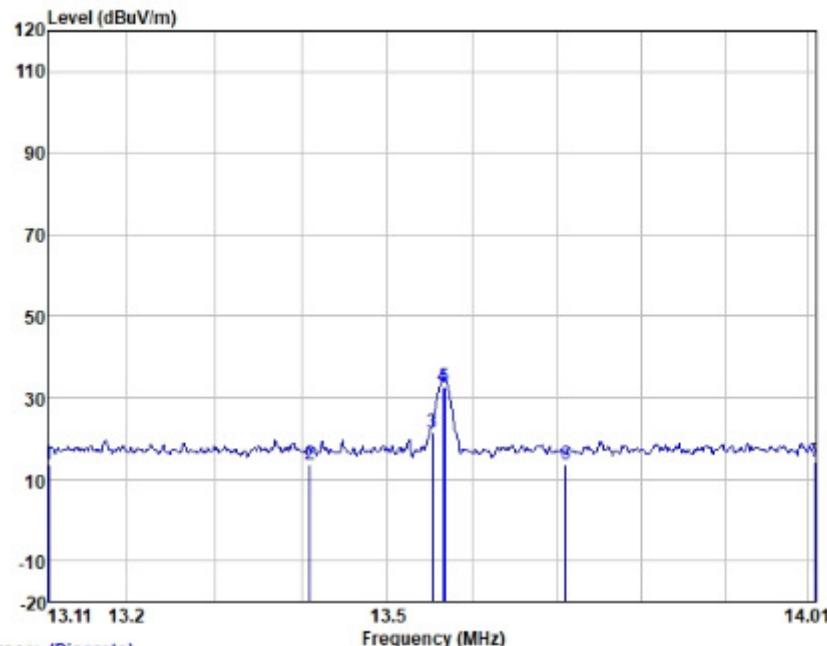
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Mode:a; Polarization:X



Freq	ReadAntenna	Cable	Preamp	Limit	Over	
	Level	Loss	Factor			
Hz	dBuV	dB/m	dB	dBuV/m	dBuV/m	dB
1	13.110	33.27	9.07	0.40	29.25	13.49 -----
2	13.410	33.35	8.99	0.40	29.25	13.49 -----
3	13.553	41.38	8.96	0.40	29.25	21.49 -----
4	13.565	52.38	8.96	0.40	29.25	32.49 -----
5	13.567	52.30	8.96	0.40	29.25	32.41 -----
6	13.710	33.41	8.93	0.40	29.25	13.49 -----
7	14.010	34.47	8.87	0.40	29.25	14.49 -----

Frequency (MHz)	Level (dBuV/m) @10m	Convert Factor (dB)	Level (dBuV/m) @ 30m	Limit (dBuV/m) @30m	Over limit (dB)
13.110	13.49	19.08	-5.59	29.54	-35.13
13.410	13.49	19.08	-5.59	40.51	-46.1
13.553	21.49	19.08	2.41	50.47	-48.06
**13.565	32.49	19.08	13.41	84.00	-70.59
13.567	32.41	19.08	13.33	50.47	-37.14
13.710	13.49	19.08	-5.59	40.51	-46.1
14.010	14.49	19.08	-4.59	29.54	-34.13

\*\*Remark: This is the main operating frequency of the EUT.



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## 7.4 Frequency tolerance

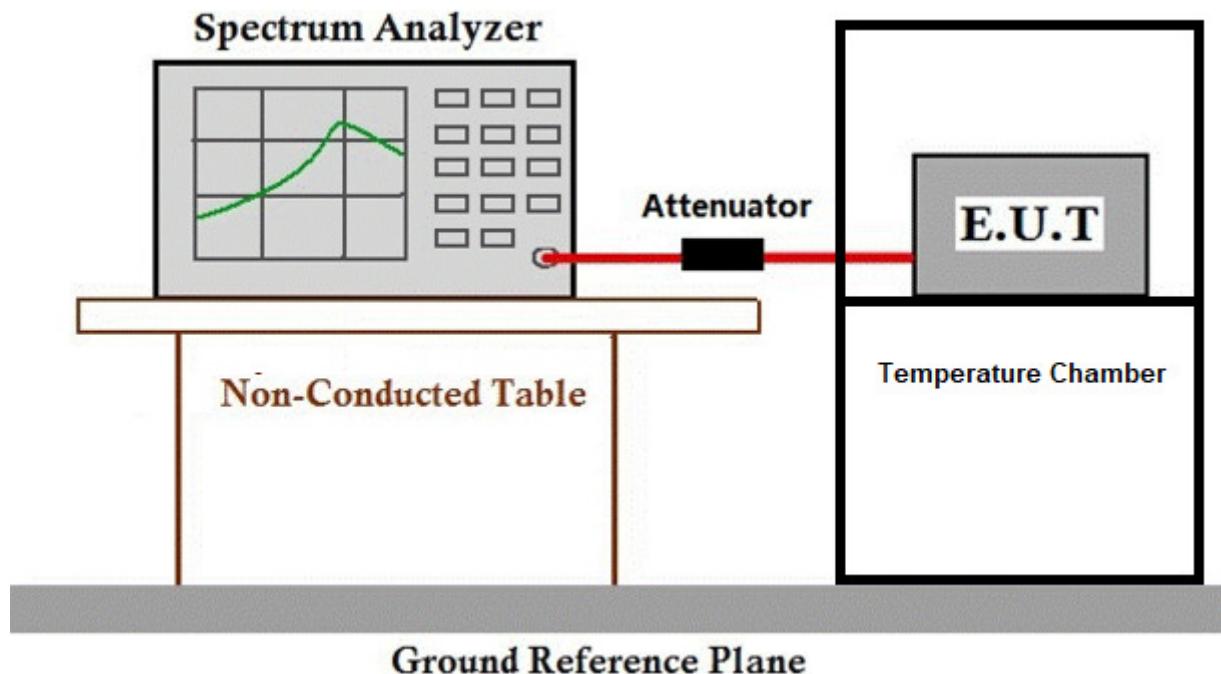
Test Requirement 47 CFR Part 15, Subpart C 15.225(e)  
Test Method: ANSI C63.10 (2013) Section 6.8  
Limit:  $\pm 0.01\%$  (100ppm)

### 7.4.1 E.U.T. Operation

Operating Environment:

Temperature: 25.4 °C Humidity: 61.7 % RH Atmospheric Pressure: 1020 mbar  
Test Mode: a:TX mode\_Keep the EUT in transmitting with modulation mode.

### 7.4.2 Test Setup Diagram



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## 7.4.3 Measurement Procedure and Data

At startup:

Measurement Conditions		Limit: ±100ppm		Verdict
Voltage (V DC)	Temperature (°C)	Frequency Measured (MHz)	Test data (ppm)	
V <sub>norm</sub> : 12	-20	13.565660	-4.6	PASS
	-10	13.565690	-2.4	PASS
	0	13.565712	-0.81	PASS
	+10	13.565720	-0.22	PASS
	T <sub>normal</sub> : +20	13.565723	Ref	PASS
	+30	13.565722	-0.074	PASS
	+40	13.565721	-0.15	PASS
	+50	13.565720	-0.22	PASS
	V <sub>max</sub> : 13.2	13.565719	-0.30	PASS
V <sub>min</sub> : 10.8	T <sub>normal</sub> : +20	13.565720	-0.22	PASS

At 2 minutes later:

Measurement Conditions		Limit: ±100ppm		Verdict
Voltage (V DC)	Temperature (°C)	Frequency Measured (MHz)	Test data (ppm)	
V <sub>norm</sub> : 12	-20	13.565663	-4.4	PASS
	-10	13.565687	-2.7	PASS
	0	13.565715	-0.59	PASS
	+10	13.565719	-0.29	PASS
	T <sub>normal</sub> : +20	13.565723	Ref	PASS
	+30	13.565721	-0.15	PASS
	+40	13.565720	-0.22	PASS
	+50	13.565719	-0.30	PASS
	V <sub>max</sub> : 13.2	13.565718	-0.37	PASS
V <sub>min</sub> : 10.8	T <sub>normal</sub> : +20	13.565721	-0.15	PASS

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At 5 minutes later:

Measurement Conditions		Limit: ±100ppm		Verdict
Voltage (V DC)	Temperature (°C)	Frequency Measured (MHz)	Test data (ppm)	
V <sub>norm</sub> : 12	-20	13.565665	-4.3	PASS
	-10	13.565688	-2.6	PASS
	0	13.565716	-0.52	PASS
	+10	13.565718	-0.37	PASS
	T <sub>normal</sub> : +20	13.565723	Ref	PASS
	+30	13.565720	-0.22	PASS
	+40	13.565718	-0.37	PASS
	+50	13.565717	-0.44	PASS
V <sub>max</sub> : 13.2	T <sub>normal</sub> : +20	13.565719	-0.29	PASS
V <sub>min</sub> : 10.8		13.565720	-0.22	PASS

At 10 minutes later:

Measurement Conditions		Limit: ±100ppm		Verdict
Voltage (V DC)	Temperature (°C)	Frequency Measured (MHz)	Test data (ppm)	
V <sub>norm</sub> : 12	-20	13.565662	-4.5	PASS
	-10	13.565689	-2.5	PASS
	0	13.565717	-0.44	PASS
	+10	13.565715	-0.59	PASS
	T <sub>normal</sub> : +20	13.565723	Ref	PASS
	+30	13.565719	-0.30	PASS
	+40	13.565720	-0.22	PASS
	+50	13.565718	-0.37	PASS
V <sub>max</sub> : 13.2	T <sub>normal</sub> : +20	13.565720	-0.22	PASS
V <sub>min</sub> : 10.8		13.565718	-0.37	PASS

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## 7.5 Radiated Emissions(9kHz-30MHz)

Test Requirement 47 CFR Part 15, Subpart C 15.225(d) &amp; 15.209

Test Method: ANSI C63.10 (2013) Section 6.4&amp;6.5

Measurement Distance: 10m

Limit:

Frequency(MHz)	Field strength (microvolts/meter)	Limit (dBuV/m)	Detector	Measurement Distance (meters)
0.009-0.490	2400/F(kHz)	-	-	300
0.490-1.705	24000/F(kHz)	-	-	30
1.705-30	30	-	-	30
30-88	100	40.0	QP	3
88-216	150	43.5	QP	3
216-960	200	46.0	QP	3
960-1000	500	54.0	QP	3
Above 1000	500	54.0	AV	3

According to ANSI C63.10 Section 6.4, the test data shall convert by below formula:

If both the single point and the limit distance are equal to or closer to the EUT than  $\lambda/2\pi$ , then extrapolation to the limit distance shall be calculated using Equation (4):

$$FS_{\text{limit}} = FS_{\text{max}} - 40 \log \left( \frac{d_{\text{limit}}}{d_{\text{measure}}} \right) \quad (4)$$

where

$FS_{\text{limit}}$  is the calculation of field strength at the limit distance, expressed in dB $\mu$ V/m  
 $FS_{\text{max}}$  is the measured field strength, expressed in dB $\mu$ V/m  
 $d_{\text{near field}}$  is the  $\lambda/2\pi$  distance  
 $d_{\text{measure}}$  is the distance of the measurement point from the EUT  
 $d_{\text{limit}}$  is the reference distance or the distance of the  $\lambda/2\pi$  point

Table 5—Relationship of frequency and wavelength (informative)

Frequency (MHz)	$\lambda$ (m)	$0.625\lambda$ (m)	$\lambda/2\pi$
0.009	33333.3	20833.3	5305.2
0.1	3000.0	1875.0	477.5
0.3	1000.0	625.0	159.2
1	300.0	187.5	47.7
4.76	63.0	39.4	10.0
16	18.8	11.7	3.0
30	10.0	6.3	1.6

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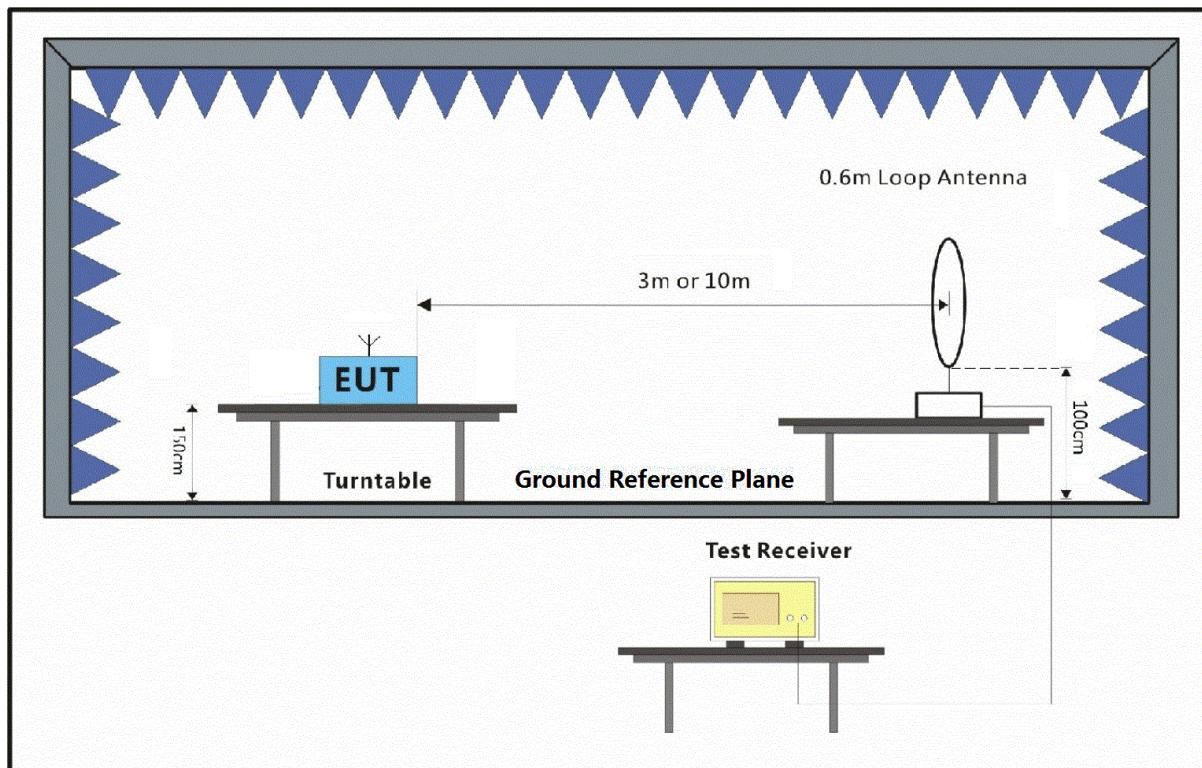
### 7.5.1 E.U.T. Operation

#### Operating Environment:

Temperature: 22 °C      Humidity: 52 % RH      Atmospheric Pressure: 1020 mbar

Test Mode: a:TX mode\_Keep the EUT in transmitting with modulation mode.

### 7.5.2 Test Setup Diagram



### 7.5.3 Measurement Procedure and Data

For testing performed with the loop antenna, the center of the loop was positioned 1 m above the ground and positioned with its plane vertical at the specified distance from the EUT. During testing the loop was rotated about its vertical axis for maximum response at each azimuth and also investigated with the loop positioned in the horizontal plane.

The radiation measurements are performed in X, Y, Z axis positioning. And found the X axis positioning which it is worse case, only the test worst case mode is recorded in the report.

Measured Level I=Read Level + Antenna Factor + Cable Loss - Preamp Factor

Mode:a; Polarization:X

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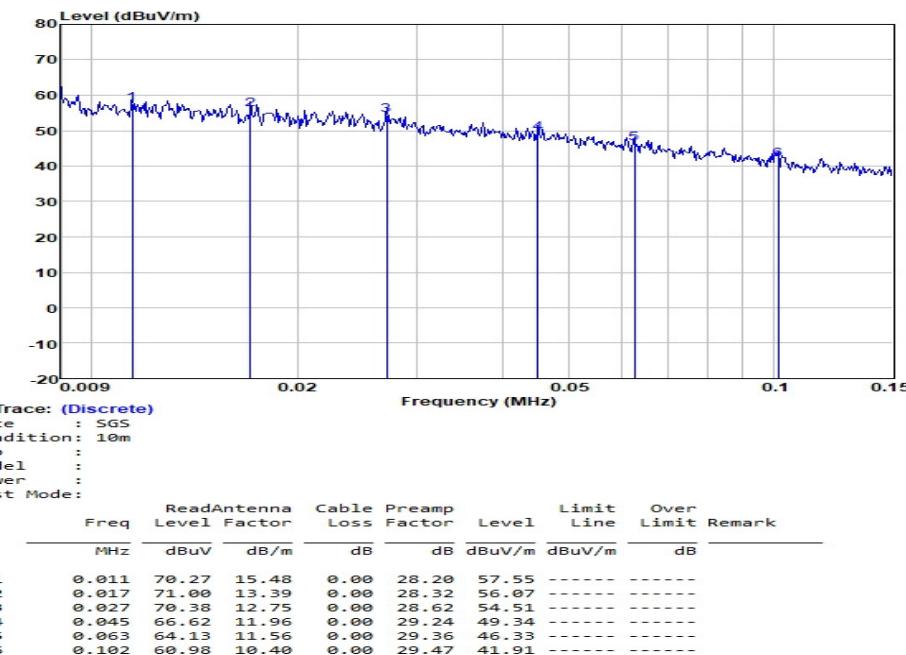


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All the test data below the background of emissions in the frequency band. So, no measurement data was shown.

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## 7.6 Radiated Emissions(30MHz-1GHz)

Test Requirement 47 CFR Part 15, Subpart C 15.225(d) & 15.209

Test Method: ANSI C63.10 (2013) Section 6.4&6.5

Measurement Distance: 3m

Limit:

Frequency	Field strength (microvolt/meter)	Limit (dBuV/m)	Remark	Measurement distance (m)
30MHz-88MHz	100	40.0	Quasi-peak	3
88MHz-216MHz	150	43.5	Quasi-peak	3
216MHz-960MHz	200	46.0	Quasi-peak	3
960MHz-1GHz	500	54.0	Quasi-peak	3

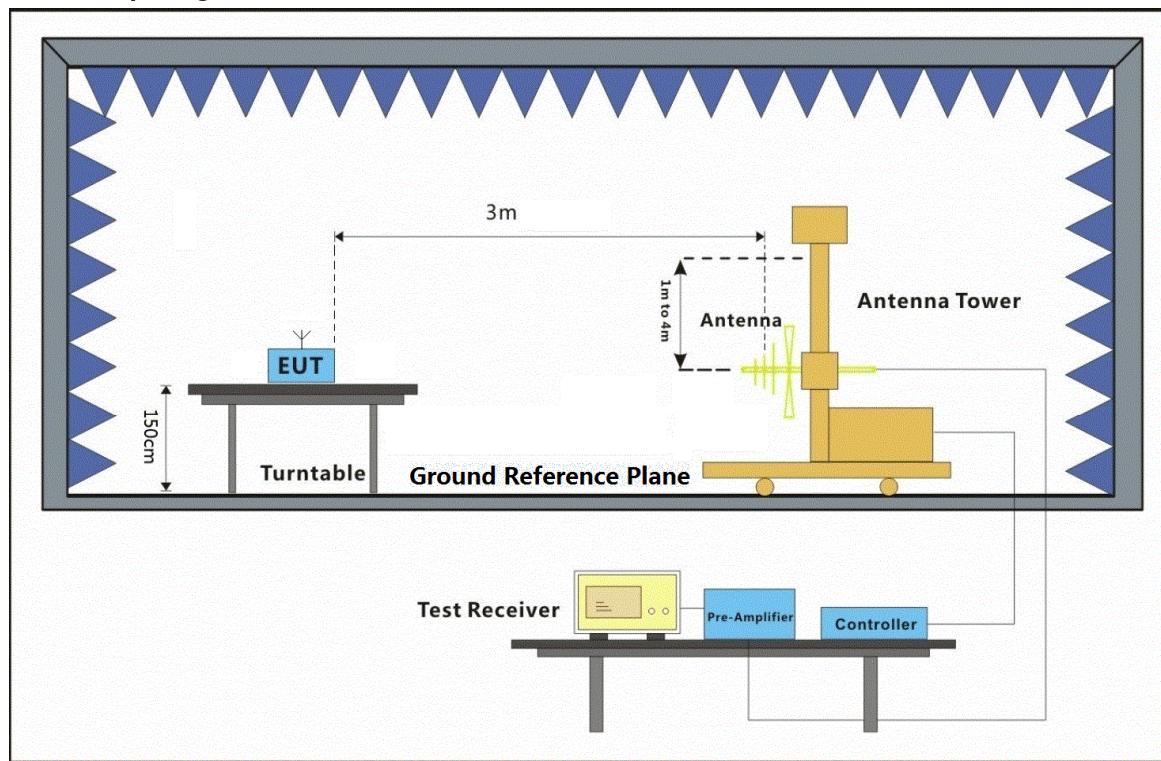
### 7.6.1 E.U.T. Operation

Operating Environment:

Temperature: 22 °C Humidity: 52 % RH Atmospheric Pressure: 1020 mbar

Test Mode: a:TX mode\_Keep the EUT in transmitting with modulation mode.

### 7.6.2 Test Setup Diagram



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### 7.6.3 Measurement Procedure and Data

- a. The EUT was placed on the top of a rotating table 0.8 meters above the ground for below 1GHz at a 3 meter semi-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation.
- b. The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.
- c. 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.
- d. 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.
- e. The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.
- f. 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.
- g. The radiation measurements are performed in X, Y, Z axis positioning. And found the X axis positioning which it is worse case, only the test worst case mode is recorded in the report.

Remark: Level= Read Level+ Cable Loss+ Antenna Factor- Preamp Factor

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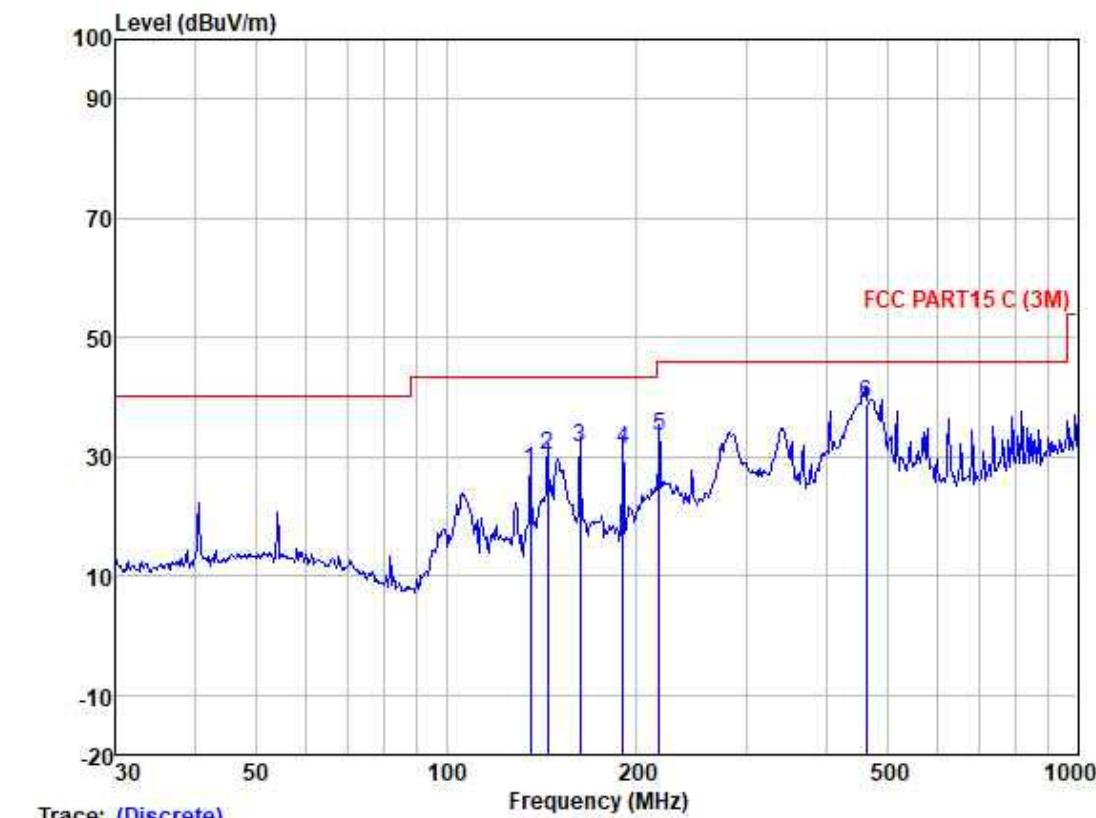
SGS-CSTC Standards Technical Services Co., Ltd.  
Guangzhou Branch Testing Center for EEC Laboratory

No.198 Kezhu Road, Scientech Park, Guangzhou Economic & Technology Development District, Guangzhou, China 510663

中国·广州·经济技术开发区科学城科珠路198号

邮编: 510663 t (86-20) 82155555 f (86-20) 82075058 sgs.china@sgs.com

Mode:a; Polarization:Horizontal



Freq	ReadAntenna	Cable	Preamp	Limit	Over	Remark			
	Level	Factor	Loss						
	MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB	
1	135.982	39.81	12.80	1.91	26.96	27.56	43.50	-15.94	HORIZONTAL QP
2	144.842	41.47	13.65	2.02	26.87	30.27	43.50	-13.23	HORIZONTAL QP
3	163.182	42.52	13.53	2.17	26.79	31.43	43.50	-12.07	HORIZONTAL QP
4	190.405	44.67	10.97	2.44	26.74	31.34	43.50	-12.16	HORIZONTAL QP
5	217.544	47.65	9.80	2.60	26.71	33.34	46.00	-12.66	HORIZONTAL QP
6	462.346	44.90	17.47	4.16	27.81	38.72	46.00	-7.28	HORIZONTAL QP

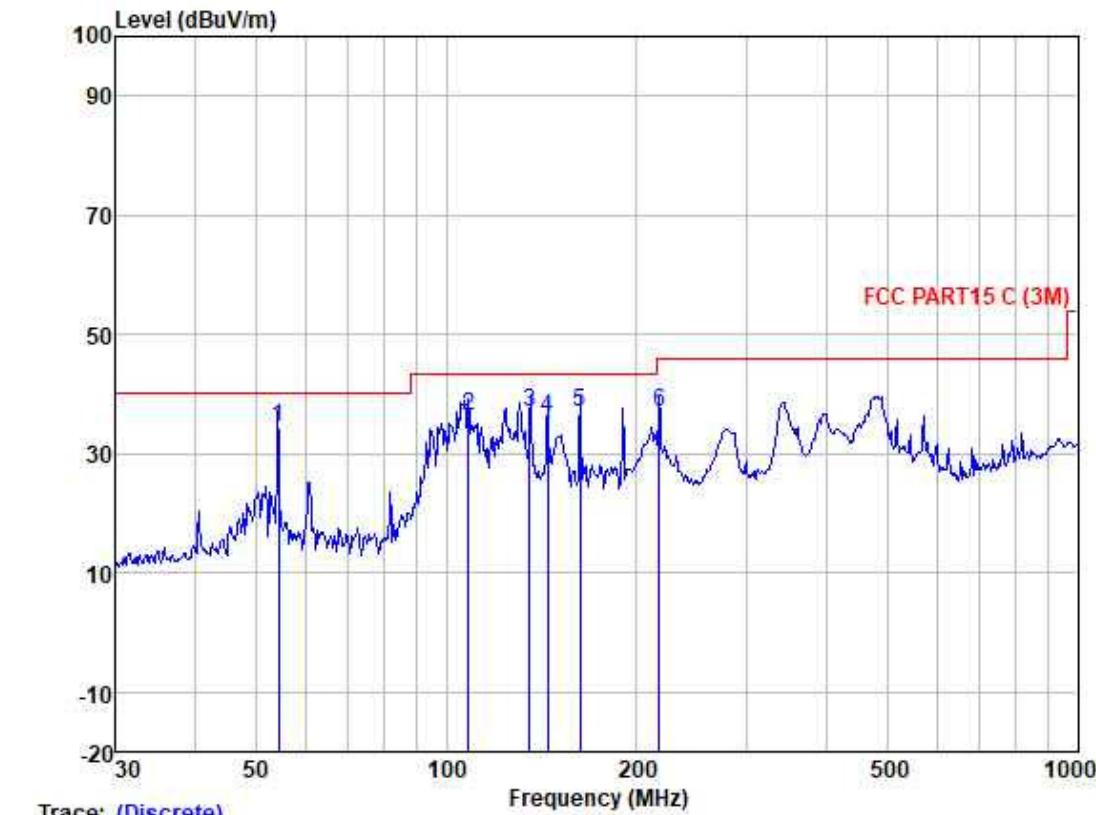
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Guangzhou Branch Inspection & Testing Services for EEC Laboratory  
No.198 Kezhu Road, Scientech Park, Guangzhou Economic & Technology Development District, Guangzhou, China 510663 t (86-20) 82155555 f (86-20) 82075058 www.sgsgroup.com.cn  
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Mode:a; Polarization:Vertical



Trace: (Discrete)  
 Site : SGS  
 Condition: FCC PART15 C (3M) 3m VERTICAL  
 Job : F  
 Model :  
 Power :  
 Test Mode: RT

Freq	ReadAntenna	Cable	Preamp	Limit	Over	Over	Remark	
	Level	Factor	Loss					
	MHz	dBuV	dB/m	dB	dB	dBuV/m	dB	
1	54.262	46.43	13.79	1.26	27.17	34.31	40.00	-5.69 VERTICAL QP
2	108.647	51.20	10.33	1.70	27.06	36.17	43.50	-7.33 VERTICAL QP
3	135.632	49.27	12.73	1.91	26.96	36.95	43.50	-6.55 VERTICAL QP
4	144.842	47.21	13.65	2.02	26.87	36.01	43.50	-7.49 VERTICAL QP
5	163.182	47.94	13.53	2.17	26.79	36.85	43.50	-6.65 VERTICAL QP
6	217.544	51.20	9.80	2.60	26.71	36.89	46.00	-9.11 VERTICAL QP

--End of Report--

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