



**SGS-CSTC Standards Technical Services Co., Ltd.  
Shenzhen Branch**

No. 1 Workshop, M-10, Middle section, Science & Technology Park,  
Shenzhen, Guangdong, China 518057

Telephone: +86 (0) 755 2601 2053  
Fax: +86 (0) 755 2671 0594  
Email: ee.shenzhen@sgs.com

Report No.: SZEM171201286902  
Page: 1 of 34

## **TEST REPORT**

**Application No.:** SZEM1712012869CR  
**Applicant:** XIAMEN LEELEN TECHNOLOGY CO., LTD  
**Address of Applicant:** 65 Sunban South Road, Jimei Industrial Zone, Xiamen, China  
**Manufacturer:** XIAMEN LEELEN TECHNOLOGY CO., LTD  
**Address of Manufacturer:** 65 Sunban South Road, Jimei Industrial Zone, Xiamen, China  
**Factory:** XIAMEN LEELEN TECHNOLOGY CO., LTD  
**Address of Factory:** 65 Sunban South Road, Jimei Industrial Zone, Xiamen, China  
**Equipment Under Test (EUT):**  
**EUT Name:** Digital IC Card Register  
**Model No.:** EH-MD-R11-EN1  
**FCC ID:** 2AFVB-EH-MD-R11  
**Trade mark:** LEELEN  
**Standard(s) :** 47 CFR Part 15, Subpart C 15.225  
**Date of Receipt:** 2017-12-26  
**Date of Test:** 2018-01-04 to 2018-01-10  
**Date of Issue:** 2018-01-18

<b>Test Result:</b>	<b>Pass*</b>
---------------------	--------------

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




Keny Xu  
EMC Laboratory 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.

This document is issued by the Company subject to its General Conditions of Service printed overleaf, available on request or accessible at <http://www.sgs.com/en/Terms-and-Conditions.aspx> and, for electronic format documents, subject to Terms and Conditions for Electronic Documents at <http://www.sgs.com/en/Terms-and-Conditions/Terms-e-Document.aspx>. Attention is drawn to the limitation of liability, indemnification and jurisdiction issues defined therein. Any holder of this document is advised that information contained hereon reflects the Company's findings at the time of its intervention only and within the limits of Client's instructions, if any. The Company's sole responsibility is to its Client and this document does not exonerate parties to a transaction from exercising all their rights and obligations under the transaction documents. This document cannot be reproduced except in full, without prior written approval of the Company. Any unauthorized alteration, forgery or falsification of the content or appearance of this document is unlawful and offenders may be prosecuted to the fullest extent of the law. Unless otherwise stated the results shown in this test report refer only to the sample(s) tested and such sample(s) are retained for 30 days only.



<i>Revision Record</i>				
<i>Version</i>	<i>Chapter</i>	<i>Date</i>	<i>Modifier</i>	<i>Remark</i>
01		2018-01-18		Original

<b>Authorized for issue by:</b>				
				
		<hr/>		
		<b>Leo Lai /Project Engineer</b>		
				
		<hr/>		
		<b>Eric Fu /Reviewer</b>		



## 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



### 3 Contents

	Page
<b>1 COVER PAGE</b> .....	<b>1</b>
<b>2 TEST SUMMARY</b> .....	<b>3</b>
<b>3 CONTENTS</b> .....	<b>4</b>
<b>4 GENERAL INFORMATION</b> .....	<b>6</b>
4.1 DETAILS OF E.U.T. ....	6
4.2 DESCRIPTION OF SUPPORT UNITS .....	6
4.3 MEASUREMENT UNCERTAINTY .....	6
4.4 TEST LOCATION.....	7
4.5 TEST FACILITY.....	7
4.6 DEVIATION FROM STANDARDS.....	7
4.7 ABNORMALITIES FROM STANDARD CONDITIONS .....	7
<b>5 EQUIPMENT LIST</b> .....	<b>8</b>
<b>6 RADIO SPECTRUM TECHNICAL REQUIREMENT</b> .....	<b>10</b>
6.1 ANTENNA REQUIREMENT .....	10
6.1.1 <i>Test Requirement:</i> .....	10
6.1.2 <i>Conclusion</i> .....	10
<b>7 RADIO SPECTRUM MATTER TEST RESULTS</b> .....	<b>11</b>
7.1 CONDUCTED EMISSIONS AT AC POWER LINE (150KHZ-30MHZ).....	11
7.1.1 <i>E.U.T. Operation</i> .....	12
7.1.2 <i>Test Setup Diagram</i> .....	12
7.1.3 <i>Measurement Procedure and Data</i> .....	12
7.2 20DB BANDWIDTH .....	15
7.2.1 <i>E.U.T. Operation</i> .....	15
7.2.2 <i>Test Setup Diagram</i> .....	15
7.2.3 <i>Measurement Procedure and Data</i> .....	15
7.3 EMISSION MASK .....	17
7.3.1 <i>E.U.T. Operation</i> .....	18
7.3.2 <i>Test Setup Diagram</i> .....	18
7.3.3 <i>Measurement Procedure and Data</i> .....	18
7.4 FREQUENCY TOLERANCE .....	21
7.4.1 <i>E.U.T. Operation</i> .....	21
7.4.2 <i>Test Setup Diagram</i> .....	21
7.4.3 <i>Measurement Procedure and Data</i> .....	21
7.5 RADIATED EMISSIONS(9KHZ-30MHZ) .....	23
7.5.1 <i>E.U.T. Operation</i> .....	24
7.5.2 <i>Test Setup Diagram</i> .....	24
7.5.3 <i>Measurement Procedure and Data</i> .....	24
7.6 RADIATED EMISSIONS(30MHZ-1GHZ).....	28
7.6.1 <i>E.U.T. Operation</i> .....	29
7.6.2 <i>Test Setup Diagram</i> .....	29
7.6.3 <i>Measurement Procedure and Data</i> .....	30
<b>8 PHOTOGRAPHS</b> .....	<b>33</b>
8.1 CONDUCTED EMISSIONS AT AC POWER LINE (150KHZ-30MHZ) TEST SETUP .....	33
8.2 RADIATED EMISSIONS(9KHZ-30MHZ) TEST SETUP .....	34



8.3 RADIATED EMISSIONS(30MHZ-1GHZ) TEST SETUP .....34

## 4 General Information

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

Power supply:	DC 5V
Operation Frequency:	13.56MHz
Modulated Type:	ASK

### 4.2 Description of Support Units

Description	Manufacturer	Model No.	Serial No.
Laptop	Lenovo	T430u	REF. No.SEA1800
Network Cable	SGS	N/A	REF. No.SEA1100
Mouse	Lenovo	MO28UOA	N/A
Router	NETGEAR	DGN2200	REF. No.SEA2200

### 4.3 Measurement Uncertainty

No.	Item	Measurement Uncertainty
1	Radio Frequency	$7.25 \times 10^{-8}$
2	Duty cycle	0.37%
3	Occupied Bandwidth	3%
4	RF conducted power	0.75dB
5	RF power density	2.84dB
6	Conducted Spurious emissions	0.75dB
7	RF Radiated power	4.5dB (below 1GHz)
		4.8dB (above 1GHz)
8	Radiated Spurious emission test	4.5dB (Below 1GHz)
		4.8dB (Above 1GHz)
9	Temperature test	1°C
10	Humidity test	3%
11	Supply voltages	1.5%
12	Time	3%



#### **4.4 Test Location**

All tests were performed at:

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

No. 1 Workshop, M-10, Middle Section, Science & Technology Park, Shenzhen, Guangdong, China.  
518057.

Tel: +86 755 2601 2053 Fax: +86 755 2671 0594

No tests were sub-contracted.

#### **4.5 Test Facility**

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

- **CNAS (No. CNAS L2929)**

CNAS has accredited SGS-CSTC Standards Technical Services Co., Ltd. Shenzhen Branch EMC Lab to ISO/IEC 17025:2005 General Requirements for the Competence of Testing and Calibration Laboratories (CNAS-CL01 Accreditation Criteria for the Competence of Testing and Calibration Laboratories) for the competence in the field of testing.

- **A2LA (Certificate No. 3816.01)**

SGS-CSTC Standards Technical Services Co., Ltd., Shenzhen EMC Laboratory is accredited by the American Association for Laboratory Accreditation(A2LA). Certificate No. 3816.01.

- **VCCI**

The 3m Fully-anechoic chamber for above 1GHz, 10m Semi-anechoic chamber for below 1GHz, Shielded Room for Mains Port Conducted Interference Measurement and Telecommunication Port Conducted Interference Measurement of SGS-CSTC Standards Technical Services Co., Ltd. have been registered in accordance with the Regulations for Voluntary Control Measures with Registration No.: G-20026, R-14188, C-12383 and T-11153 respectively.

- **FCC –Designation Number: CN1178**

SGS-CSTC Standards Technical Services Co., Ltd., Shenzhen EMC Laboratory has been recognized as an accredited testing laboratory.

Designation Number: CN1178. Test Firm Registration Number: 406779.

- **Industry Canada (IC)**

Two 3m Semi-anechoic chambers and the 10m Semi-anechoic chamber of SGS-CSTC Standards Technical Services Co., Ltd. Shenzhen Branch EMC Lab have been registered by Certification and Engineering Bureau of Industry Canada for radio equipment testing with Registration No.: 4620C-1, 4620C-2, 4620C-3.

#### **4.6 Deviation from Standards**

None

#### **4.7 Abnormalities from Standard Conditions**

None



## 5 Equipment List

RF conducted test					
Equipment	Manufacturer	Model No	Inventory No	Cal Date	Cal Due Date
DC Power Supply	ZhaoXin	PS-3005D	SEM011-05	2017-09-27	2018-09-26
Spectrum Analyzer (20Hz-43GHz)	Rohde & Schwarz	FSU43	SEM004-08	2017-04-14	2018-04-13
Signal Generator (9kHz-40GHz)	KEYSIGHT	N5173B	SEM006-05	2017-09-27	2018-09-26
Measurement Software	JS Tonscend	JS1120-2 BT/WIFI V2.6	N/A	N/A	N/A
Coaxial Cable	SGS	N/A	SEM031-01	2017-07-13	2018-07-12
Attenuator	Weinschel Associates	WA41	SEM021-09	N/A	N/A
Humidity/ Temperature Indicator	Anymetre	TH101B	SEM002-11	2017-07-23	2018-07-23

Conducted Emissions at AC Power Line (150kHz-30MHz)					
Equipment	Manufacturer	Model No	Inventory No	Cal Date	Cal Due Date
Shielding Room	ZhongYu Electron	GB-88	SEM001-06	2017-05-10	2018-05-09
Measurement Software	AUDIX	e3 V5.4.1221d	N/A	N/A	N/A
Coaxial Cable	SGS	N/A	SEM024-01	2017-07-13	2018-07-12
LISN	Rohde & Schwarz	ENV216	SEM007-01	2017-09-27	2018-09-26
LISN	ETS-LINDGREN	3816/2	SEM007-02	2017-04-14	2018-04-13
EMI Test Receiver	Rohde & Schwarz	ESCI	SEM004-02	2017-04-14	2018-04-13

Radiated Emissions(9kHz-30MHz)					
Equipment	Manufacturer	Model No	Inventory No	Cal Date	Cal Due Date
10m Semi-Anechoic Chamber	SAEMC	FSAC1018	SEM001-03	2017-05-10	2018-05-09
Measurement Software	AUDIX	e3 V8.2014-6-27	N/A	N/A	N/A
Coaxial Cable	SGS	N/A	SEM029-01	2017-07-13	2018-07-12
EMI Test Receiver (9kHz-3GHz)	Rohde & Schwarz	ESR	SEM004-03	2017-04-14	2018-04-13
Trilog-Broadband Antenna (30MHz-1GHz)	Schwarzbeck	VULB9168	SEM003-18	2016-01-26	2019-01-25
Pre-amplifier	Sonoma Instrument Co	310N	SEM005-03	2017-06-05	2018-06-04
Active Loop Antenna	ETS-Lindgren	6502	SEM003-08	2017-08-22	2020-08-21





<b>Radiated Emissions(30MHz-1GHz)</b>					
<b>Equipment</b>	<b>Manufacturer</b>	<b>Model No</b>	<b>Inventory No</b>	<b>Cal Date</b>	<b>Cal Due Date</b>
10m Semi-Anechoic Chamber	SAEMC	FSAC1018	SEM001-03	2017-05-10	2018-05-09
Measurement Software	AUDIX	e3 V8.2014-6-27	N/A	N/A	N/A
Coaxial Cable	SGS	N/A	SEM029-01	2017-07-13	2018-07-12
EMI Test Receiver (9kHz-3GHz)	Rohde & Schwarz	ESR	SEM004-03	2017-04-14	2018-04-13
Trilog-Broadband Antenna (30MHz-1GHz)	Schwarzbeck	VULB9168	SEM003-18	2016-01-26	2019-01-25
Pre-amplifier	Sonoma Instrument Co	310N	SEM005-03	2017-06-05	2018-06-04
Active Loop Antenna	ETS-Lindgren	6502	SEM003-08	2017-08-22	2020-08-21

<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>
Humidity/ Temperature Indicator	Shanghai Meteorological Industry Factory	ZJ1-2B	SEM002-03	2017-09-29	2018-09-28
Humidity/ Temperature Indicator	Shanghai Meteorological Industry Factory	ZJ1-2B	SEM002-04	2017-09-29	2018-09-28
Humidity/ Temperature Indicator	Mingle	N/A	SEM002-08	2017-09-29	2018-09-28
Barometer	Changchun Meteorological Industry Factory	DYM3	SEM002-01	2017-04-18	2018-04-17

## 6 Radio Spectrum Technical Requirement

### 6.1 Antenna Requirement

#### 6.1.1 Test Requirement:

47 CFR Part 15, Subpart C 15.203

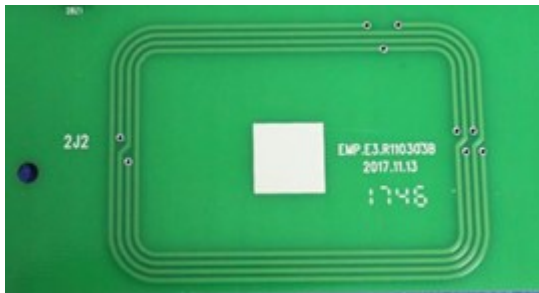
#### 6.1.2 Conclusion

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 permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the provisions of this section. 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.

EUT Antenna:

The antenna is a loop antenna and no consideration of replacement.





## 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.

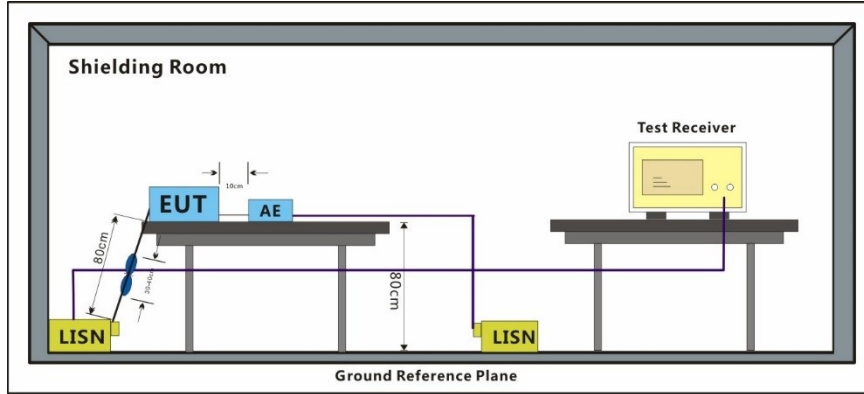
**7.1.1 E.U.T. Operation**

Operating Environment:

Temperature: 20.2 °C Humidity: 34.1 % RH Atmospheric Pressure: 1020 mbar

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

**7.1.2 Test Setup Diagram**

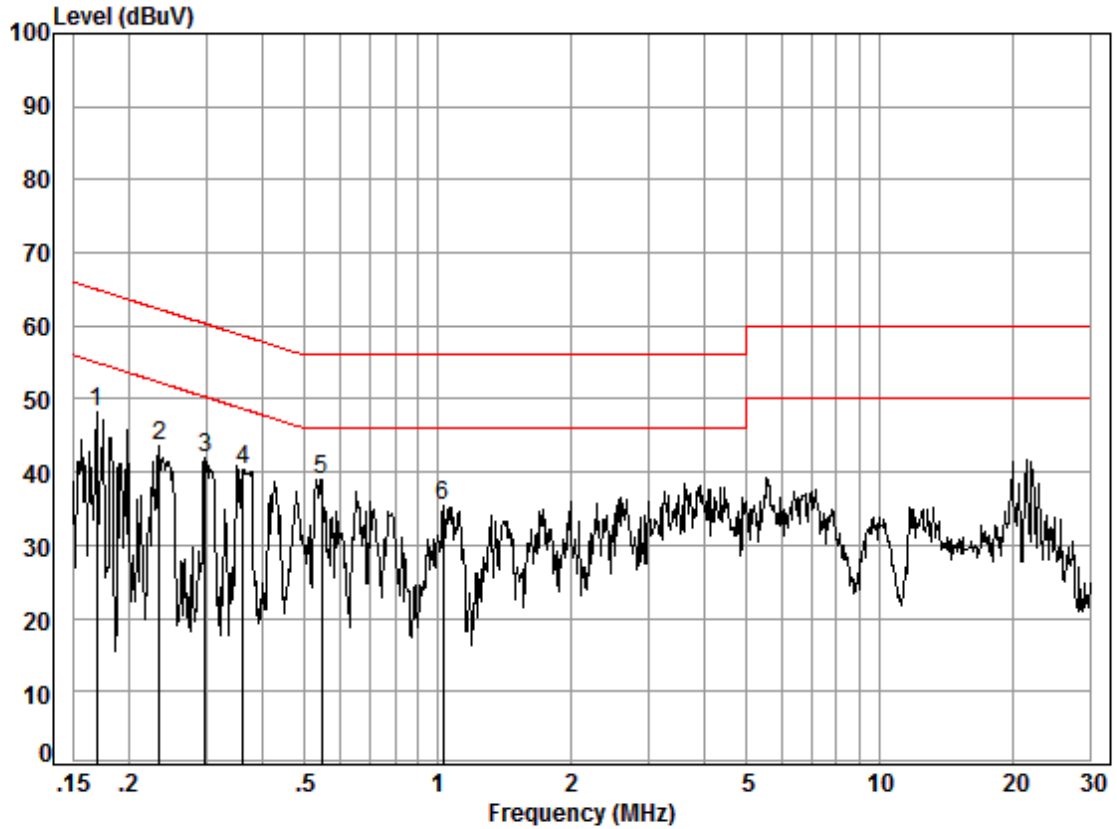


**7.1.3 Measurement Procedure and Data**

- 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

Mode:b; Line:Live Line

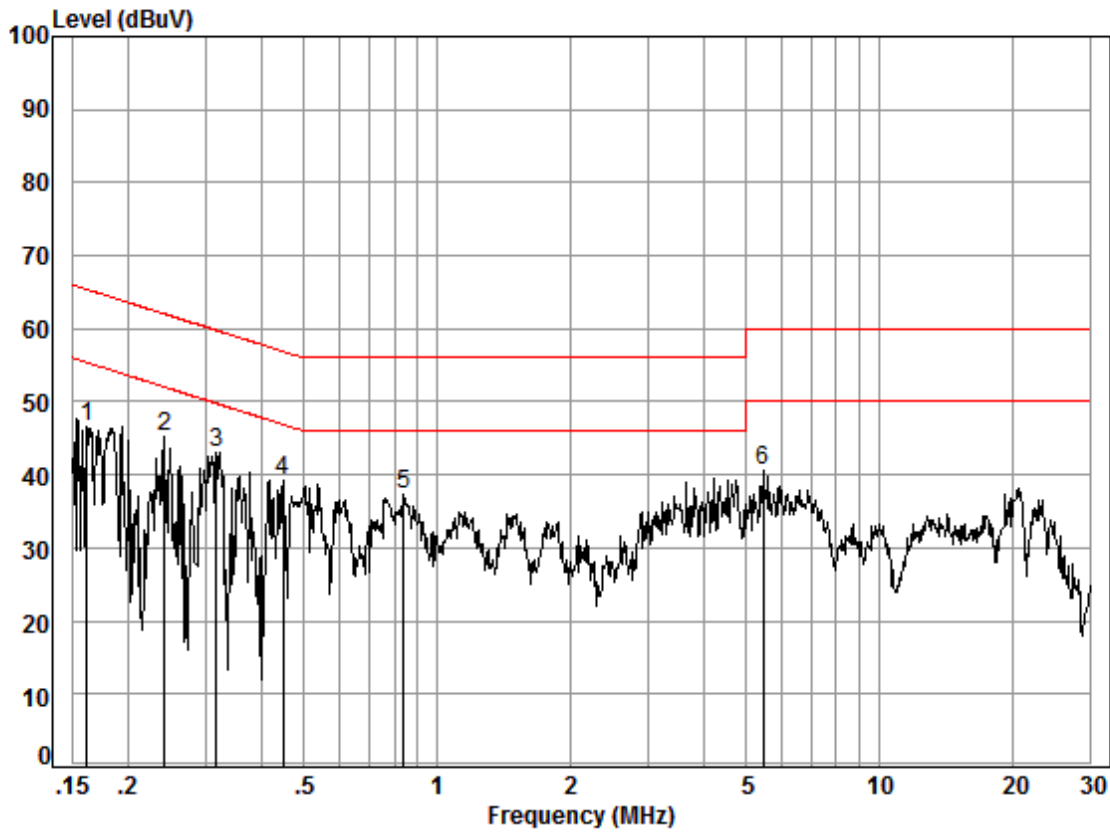


Site : Shielding Room  
 Condition: Line  
 Job No. : 12869CR  
 Test mode: b

	Freq	Cable Loss	LISN Factor	Read Level	Level	Limit Line	Over Limit	Remark
	MHz	dB	dB	dBuV	dBuV	dBuV	dB	
1	0.17	0.02	9.52	38.68	48.22	54.99	-6.77	Peak
2	0.23	0.01	9.51	34.13	43.65	52.30	-8.65	Peak
3	0.30	0.01	9.51	32.33	41.85	50.32	-8.47	Peak
4	0.36	0.01	9.50	30.80	40.31	48.65	-8.34	Peak
5	0.55	0.01	9.51	29.57	39.09	46.00	-6.91	Peak
6	1.03	0.02	9.50	25.94	35.46	46.00	-10.54	Peak



Mode:b; Line:Neutral Line



Site : Shielding Room  
Condition: Neutral  
Job No. : 12869CR  
Test mode: b

	Freq	Cable Loss	LISN Factor	Read Level	Level	Limit Line	Over Limit	Remark
	MHz	dB	dB	dBuV	dBuV	dBuV	dB	
1	0.16	0.02	9.59	36.98	46.59	55.38	-8.79	Peak
2	0.24	0.01	9.58	35.71	45.30	52.04	-6.74	Peak
3	0.32	0.01	9.58	33.50	43.09	49.80	-6.71	Peak
4	0.45	0.01	9.60	29.69	39.30	46.89	-7.59	Peak
5	0.84	0.02	9.61	27.67	37.30	46.00	-8.70	Peak
6	5.48	0.01	9.70	31.01	40.72	50.00	-9.28	Peak

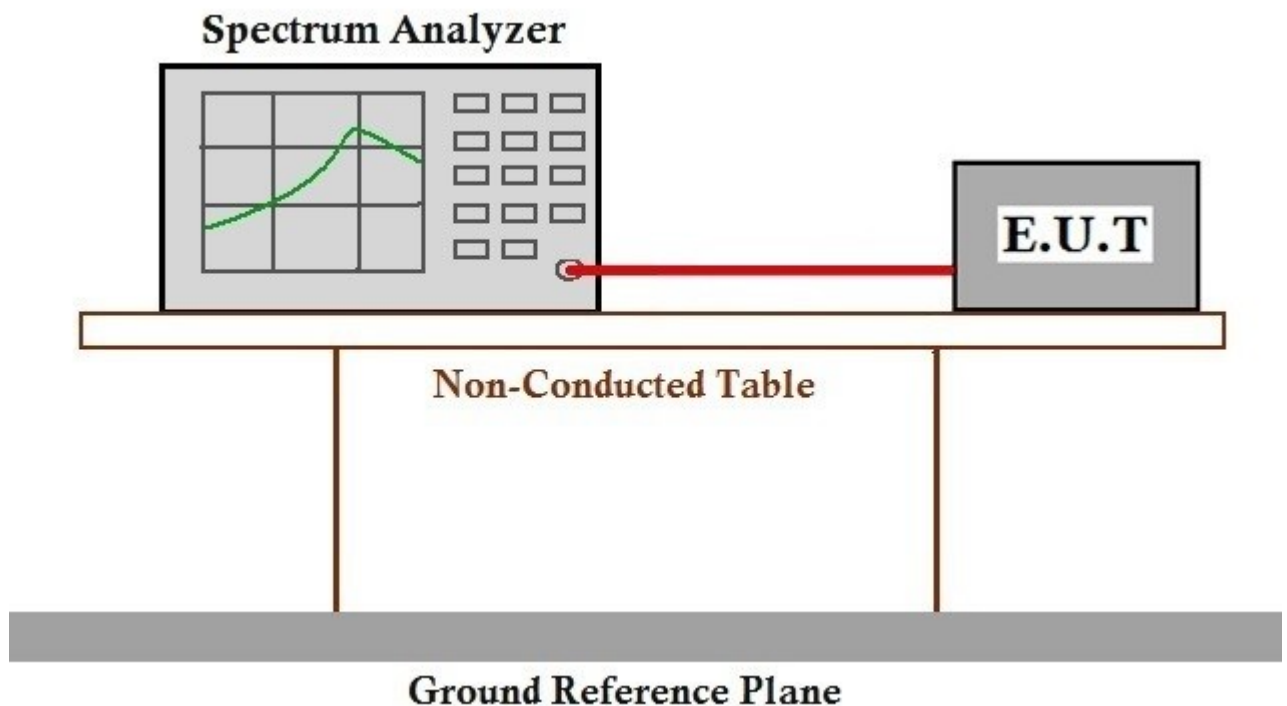
**7.2 20dB Bandwidth**

Test Requirement 47 CFR Part 15, Subpart C 15.215  
 Test Method: ANSI C63.10 (2013) Section 6.9  
 Measurement Distance: 10m  
 Limit: N/A

**7.2.1 E.U.T. Operation**

Operating Environment:  
 Temperature: 23 °C Humidity: 53 % RH Atmospheric Pressure: 1020 mbar  
 Test mode a:TX mode\_Keep the EUT in transmitting with modulation mode.

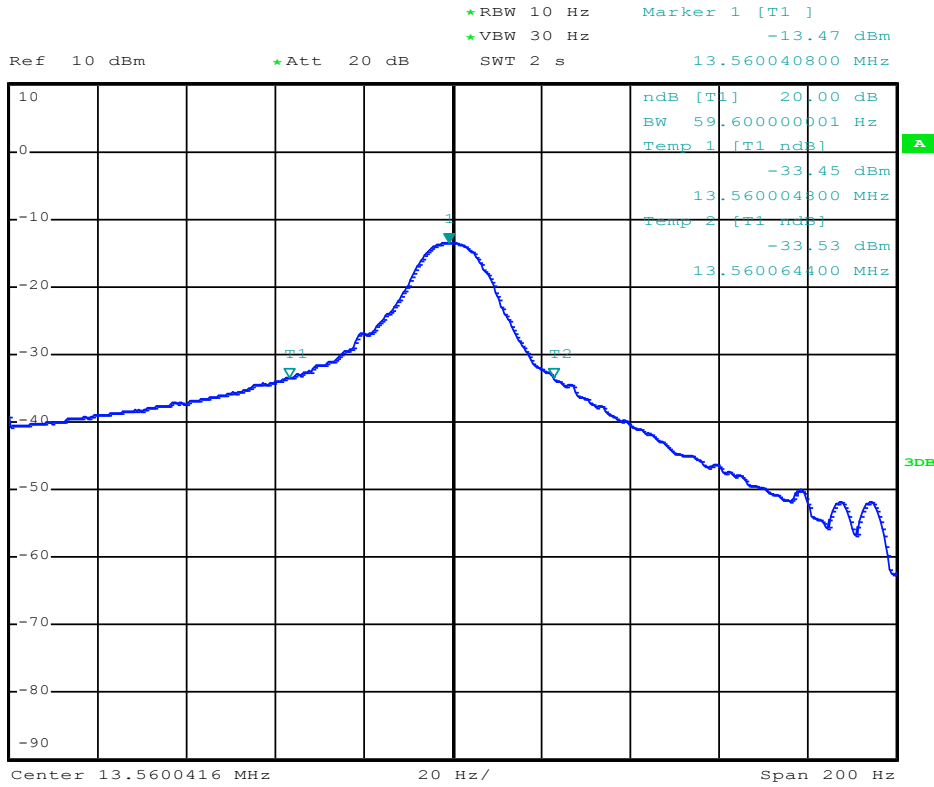
**7.2.2 Test Setup Diagram**



**7.2.3 Measurement Procedure and Data**



1 PR  
VIEW







### **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

Measurement Distance: 10m

Limit:

- (a) The field strength of any emissions within the band 13.553-13.567 MHz shall not exceed 15.848 microvolts/meter at 30 meters.
- (b) Within the bands 13.410-13.553 MHz and 13.567-13.710 MHz, the field strength of any emissions shall not exceed 334 microvolts/meter at 30 meters.
- (c) Within the bands 13.110-13.410 MHz and 13.710-14.010 MHz the field strength of any emissions shall not exceed 106 microvolts/meter at 30 meters.
- (d) The field strength of any emissions appearing outside of the 13.110-14.010 MHz band shall not exceed the general radiated emission limits in § 15.209.

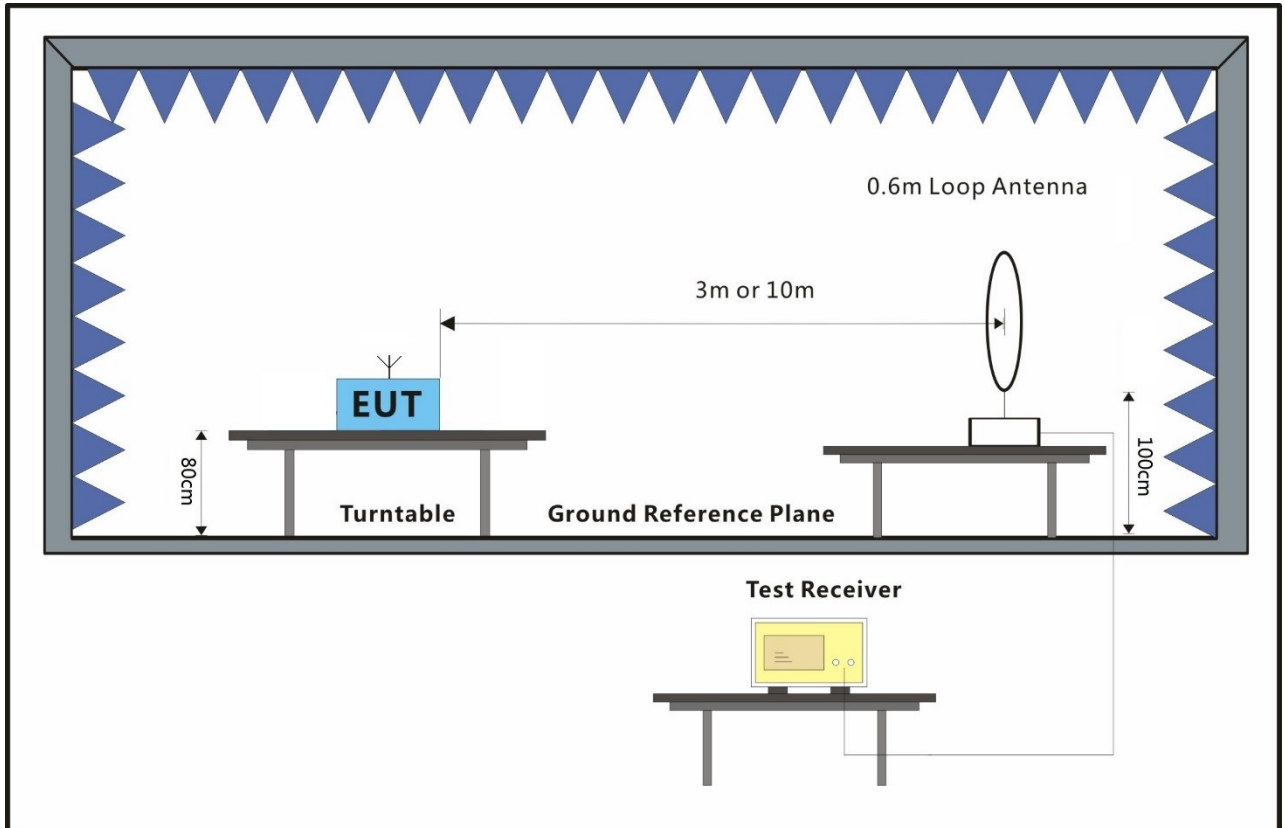
**7.3.1 E.U.T. Operation**

Operating Environment:

Temperature: 24 °C Humidity: 53 % RH Atmospheric Pressure: 1020 mbar

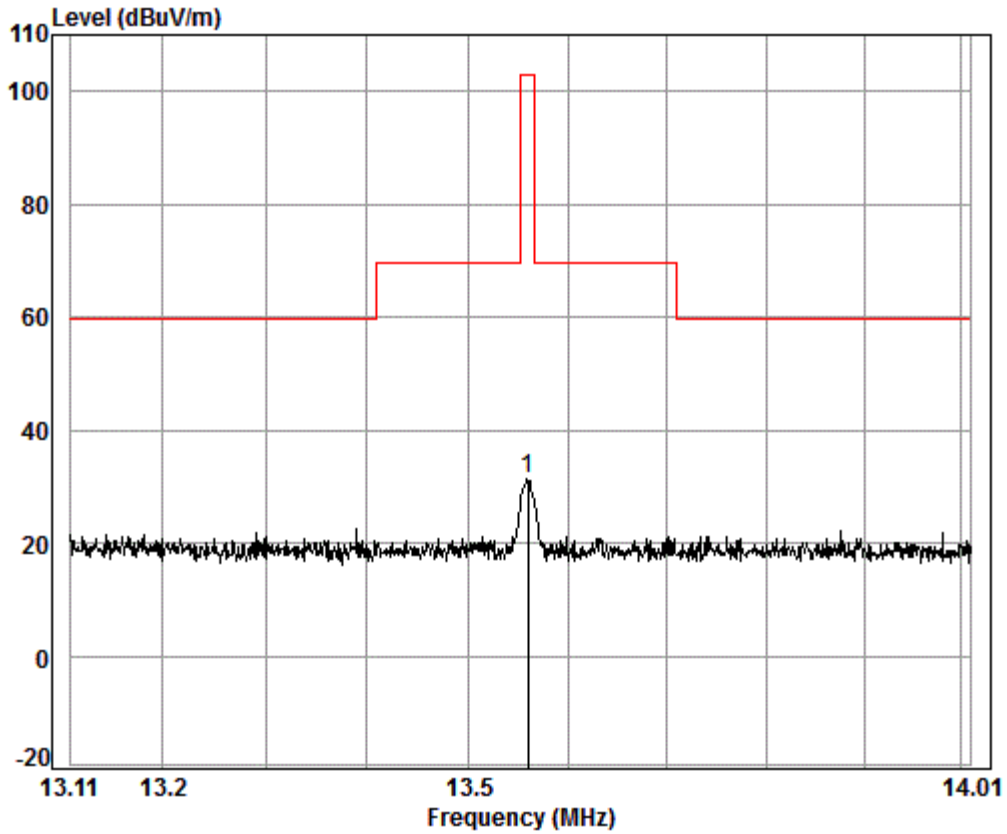
Test mode a:TX mode\_Keep the EUT in transmitting with modulation mode.

**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. Only the worst position of vertical was shown in the report.



Condition: 10m  
Job No. : 12869CR  
Test Mode: b

	Freq	Cable Loss	Ant Factor	Preamp Factor	Read Level	Level	Limit Line	Over Limit
	MHz	dB	dB/m	dB	dBuV	dBuV/m	dBuV/m	dB
1 pp	13.56	0.57	10.47	0.00	20.21	31.25	103.08	-71.83



**Below 30MHz**

The test was performed at a 10m test site.

The level at 30m test distance is below:

The factor calculated by the following equation:

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

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
- $d_{\text{measure}}$  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

Frequency (MHz)	Cable loss (dB)	ANT Factor (dB)	Read Level @ 10m (dB $\mu$ V/m)	Level @ 10m (dB $\mu$ V/m)	Level @ 30m (dB $\mu$ V/m)	Limit @ 30m (dB $\mu$ V/m)	Margin (dB)
13.56	0.57	10.47	20.21	31.25	12.17	84.00	-71.83

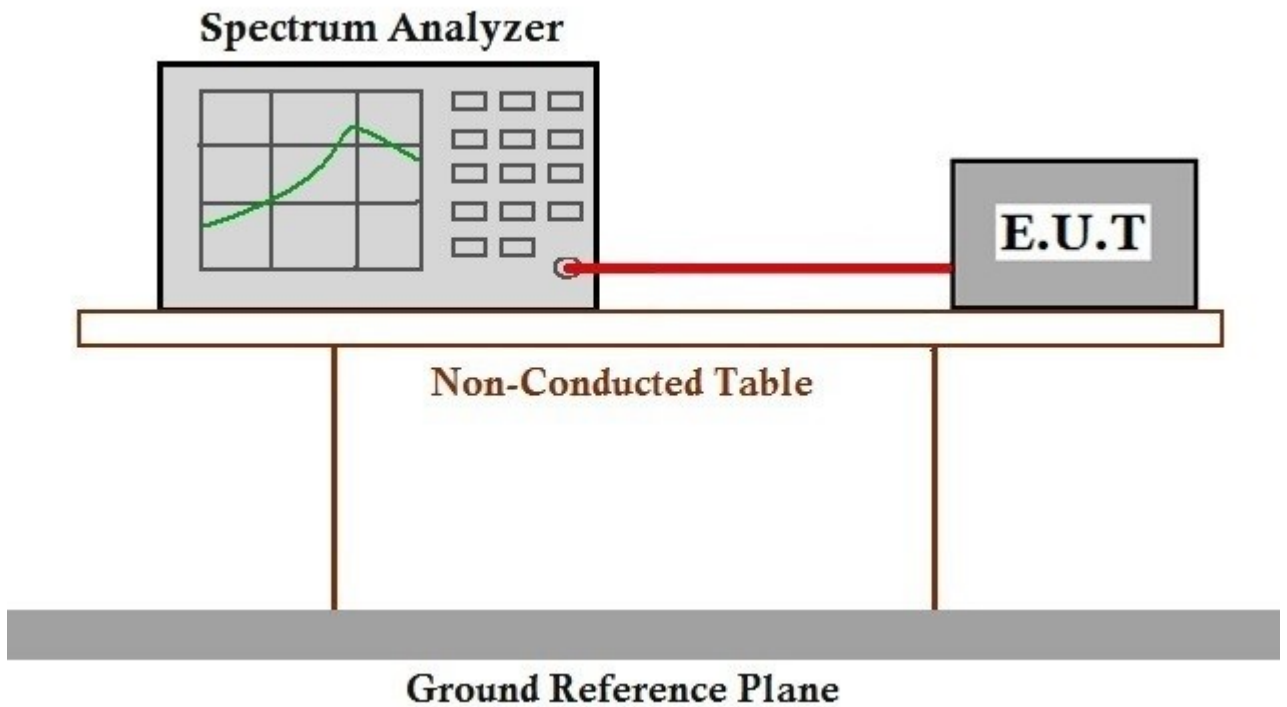
**7.4 Frequency tolerance**

Test Requirement 47 CFR Part 15, Subpart C 15.225(e)  
 Test Method: ANSI C63.10 (2013) Section 6.8  
 Measurement Distance: 10m  
 Limit: 1.356kHz

**7.4.1 E.U.T. Operation**

Operating Environment:  
 Temperature: 24 °C Humidity: 54 % RH Atmospheric Pressure: 1020 mbar  
 Test mode a:TX mode\_Keep the EUT in transmitting with modulation mode.

**7.4.2 Test Setup Diagram**



**7.4.3 Measurement Procedure and Data**



Declared Frequency (MHz)	13.560032MHz
--------------------------	--------------

Temperature (°C)	Voltage(VDC)	Measurement Frequency(MHz)	Frequency Tolerance (%)	Limit (%)	Result
50	5	13.560080	0.00035	±0.01	Pass
40		13.560079	0.00035		Pass
30		13.560036	0.00003		Pass
20		13.560032	0.00000		Pass
10		13.559987	-0.00033		Pass
0		13.559966	-0.00049		Pass
-10		13.560027	-0.00004		Pass
-20		13.559930	-0.00075		Pass
20		5.75	13.560085		0.00039
	4.25	13.560031	-0.00001	Pass	



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

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: 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

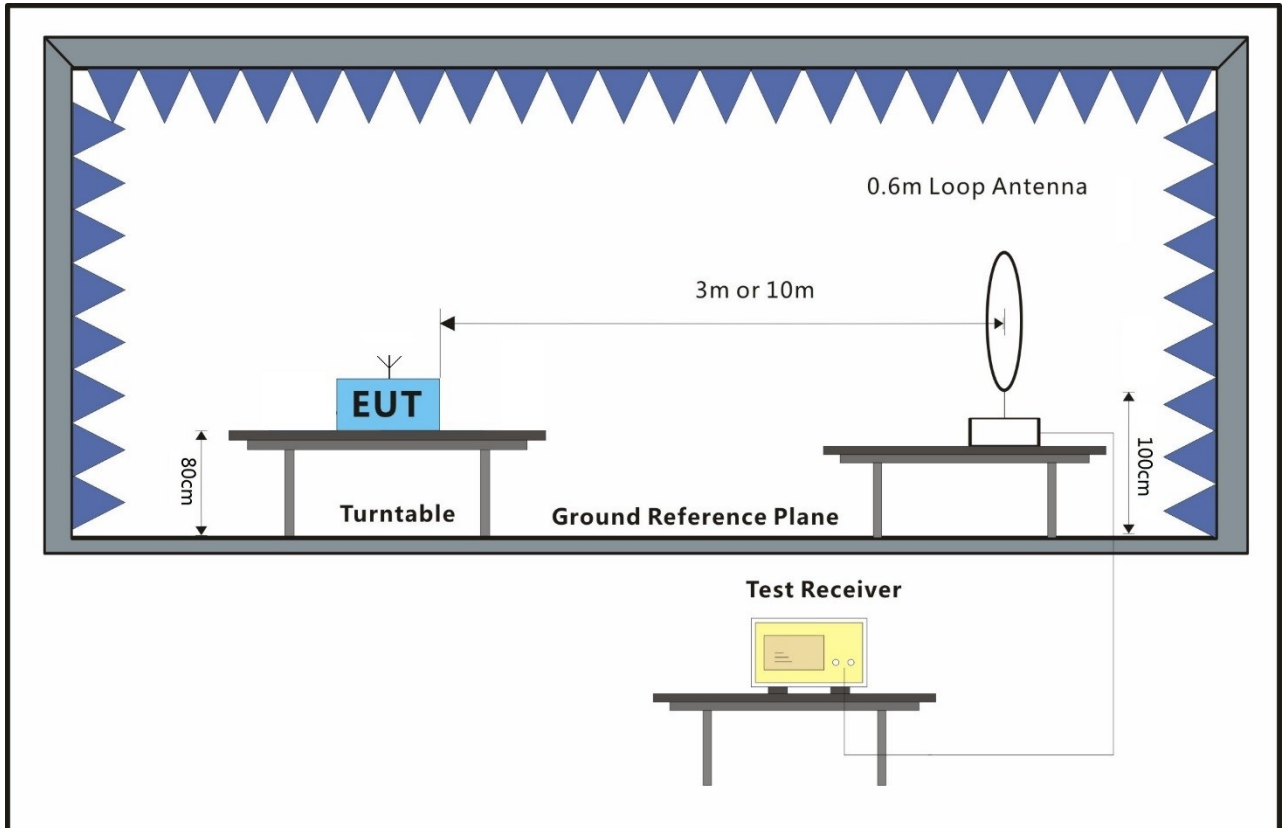
**7.5.1 E.U.T. Operation**

Operating Environment:

Temperature: 23 °C Humidity: 53 % RH Atmospheric Pressure: 1020 mbar

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

**7.5.2 Test Setup Diagram**



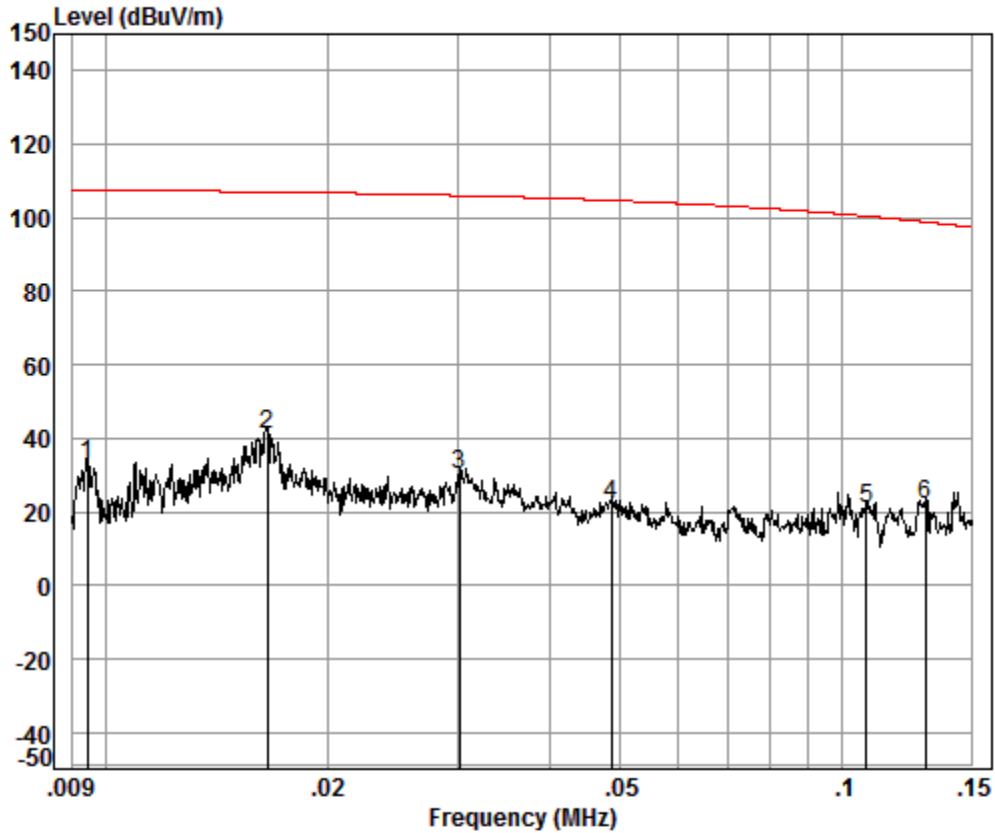
**7.5.3 Measurement Procedure and Data**

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. Only the worst position of vertical was shown in the report.





Mode:b;

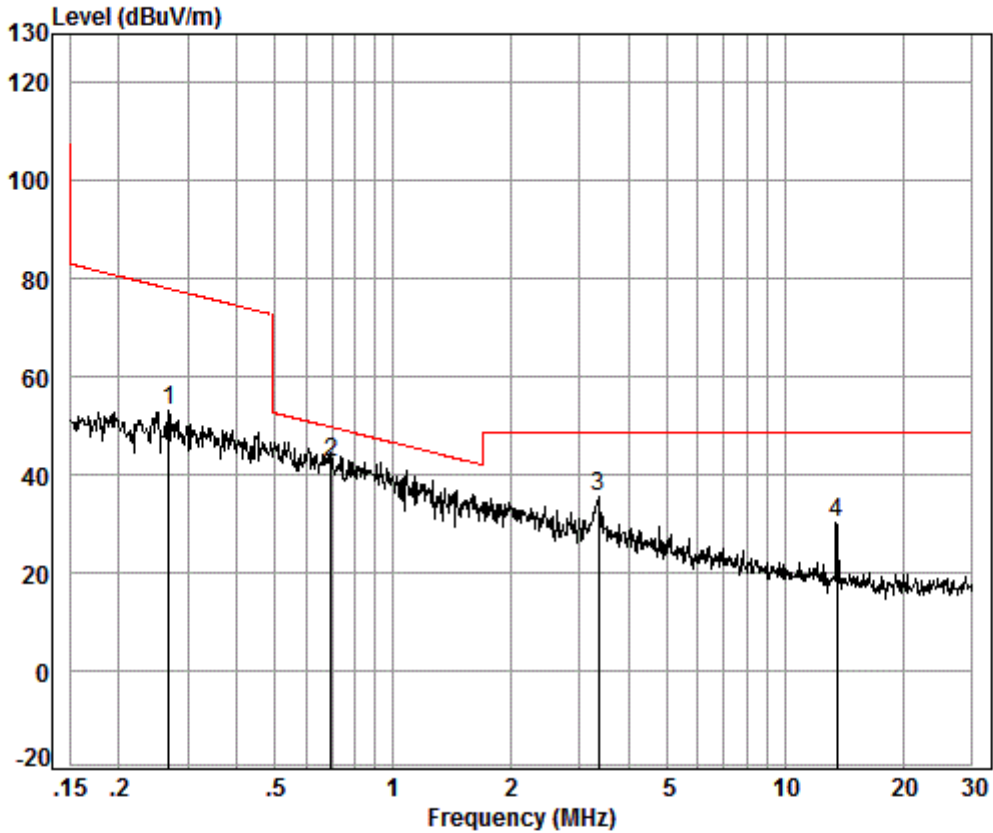


Condition: 10m  
Job No. : 12869CR  
Test Mode: b

	Freq	Cable Loss	Ant Factor	Preamp Factor	Read Level	Limit Level	Over Limit
	MHz	dB	dB/m	dB	dBuV	dBuV/m	dB
1	0.01	0.30	19.68	32.26	44.89	107.57	-74.96
2	0.02	0.24	16.17	32.49	57.34	107.06	-65.80
3	0.03	0.17	13.83	32.50	48.47	106.08	-76.11
4	0.05	0.13	12.48	32.51	41.78	104.75	-82.87
5	0.11	0.05	11.94	32.52	41.45	100.46	-79.54
6	0.13	0.06	11.81	32.51	42.36	98.90	-77.18



Mode:b;



Condition: 10m  
Job No. : 12869CR  
Test Mode: b

	Freq	Cable Loss	Ant Factor	Preamp Factor	Read Level	Limit Level	Over Limit
	MHz	dB	dB/m	dB	dBuV	dBuV/m	dB
1	0.27	0.09	11.97	0.00	41.03	53.09	-24.97
2 pp	0.70	0.17	11.95	0.00	30.58	42.70	-7.04
3	3.35	0.39	12.16	0.00	23.03	48.50	-12.92
4	13.56	0.57	10.47	0.00	19.11	48.50	-18.35



Remark:

1) The field strength is calculated by adding the Antenna Factor, Cable Factor & Preamplifier. The basic equation with a sample calculation is as follows:

$$\text{Final Test Level} = \text{Receiver Reading} + \text{Antenna Factor} + \text{Cable Factor} - \text{Preamplifier Factor}$$

Frequency (MHz)	Level @ 10m (dBuV/m)	Limit @ 300m (dBuV/m)	Limit @ 30m (dBuV/m)	Factor (dB)	Level @ 300m (dBuV/m)	Level @ 30m (dBuV/m)	Margin (dB)
0.01	44.89	47.60	-	59.08	-14.19	-	-61.80
0.02	57.34	41.58	-	59.08	-1.74	-	-43.33
0.03	48.47	38.06	-	59.08	-10.61	-	-48.68
0.05	41.78	33.62	-	59.08	-17.30	-	-50.93
0.11	41.45	26.78	-	59.08	-17.63	-	-44.41
0.13	42.36	25.33	-	59.08	-16.72	-	-42.05
0.27	53.09	18.98	-	59.08	-5.99	-	-24.97
0.70	42.70		30.70	19.08	-	23.62	-7.09
3.35	35.58		29.54	19.08	-	16.50	-13.05



## 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: 10m

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

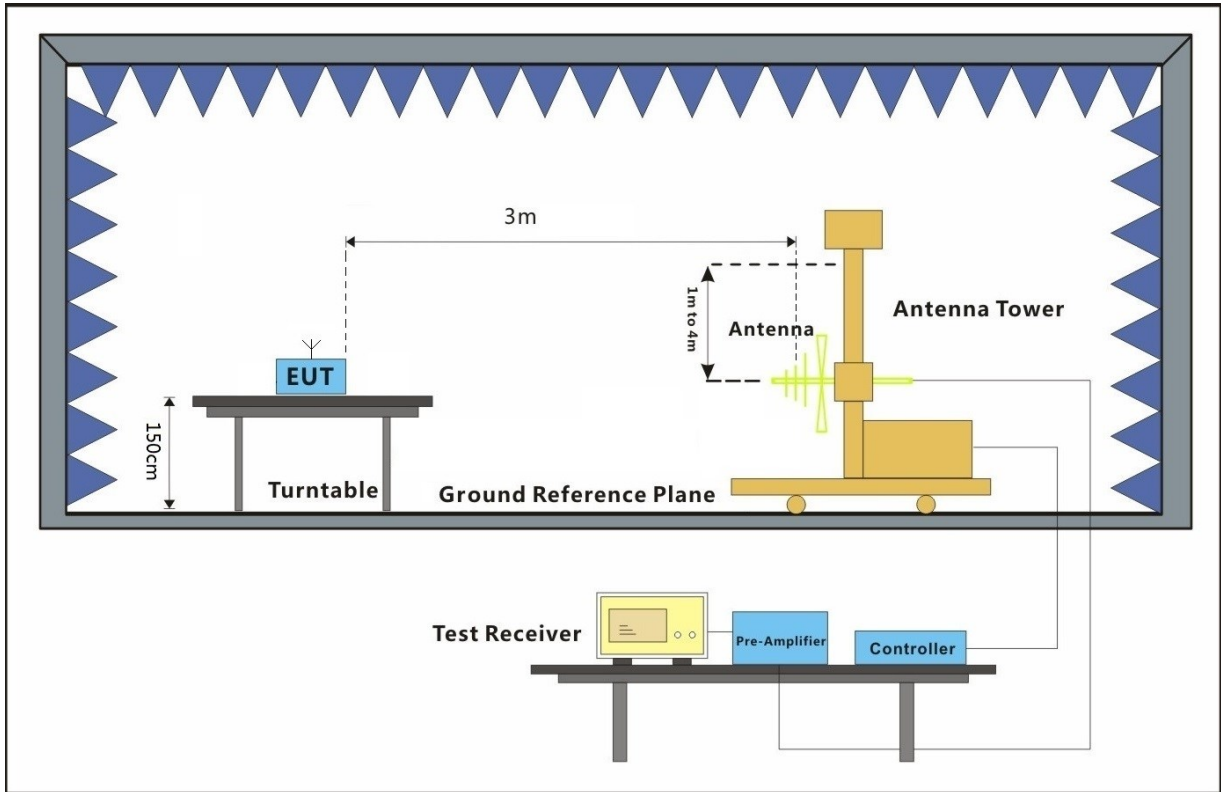
**7.6.1 E.U.T. Operation**

Operating Environment:

Temperature: 24 °C Humidity: 54 % RH Atmospheric Pressure: 1020 mbar

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

**7.6.2 Test Setup Diagram**



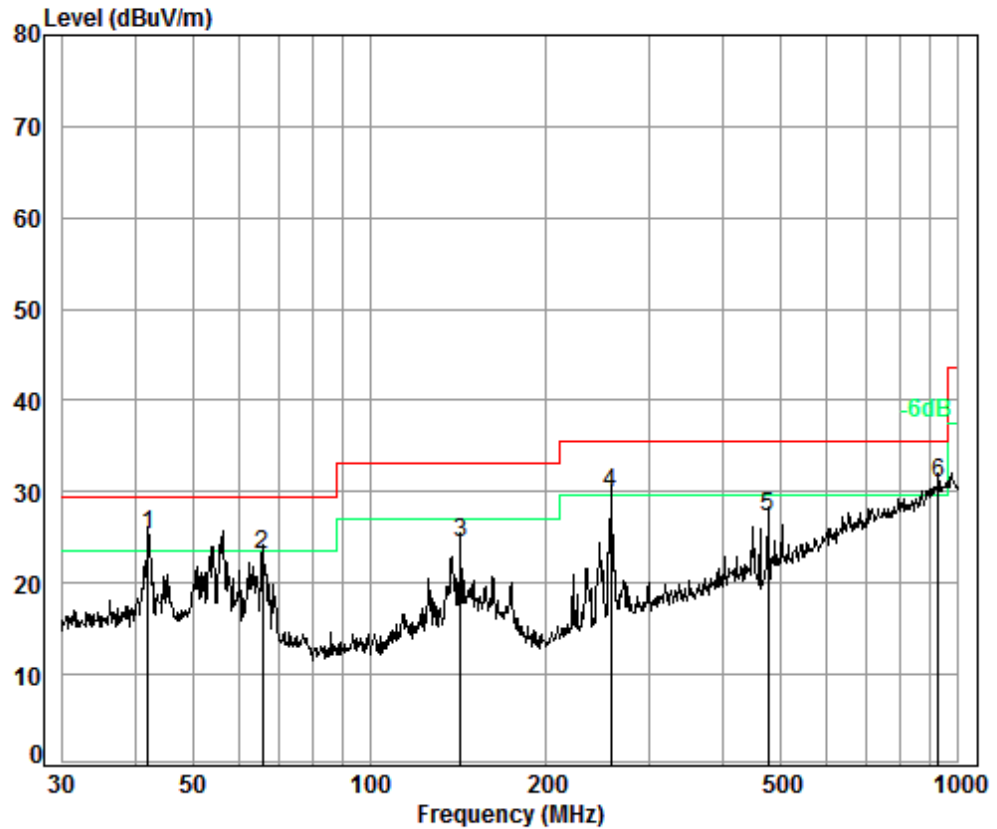


### **7.6.3 Measurement Procedure and Data**

- 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

Mode:b; Polarization:Horizontal

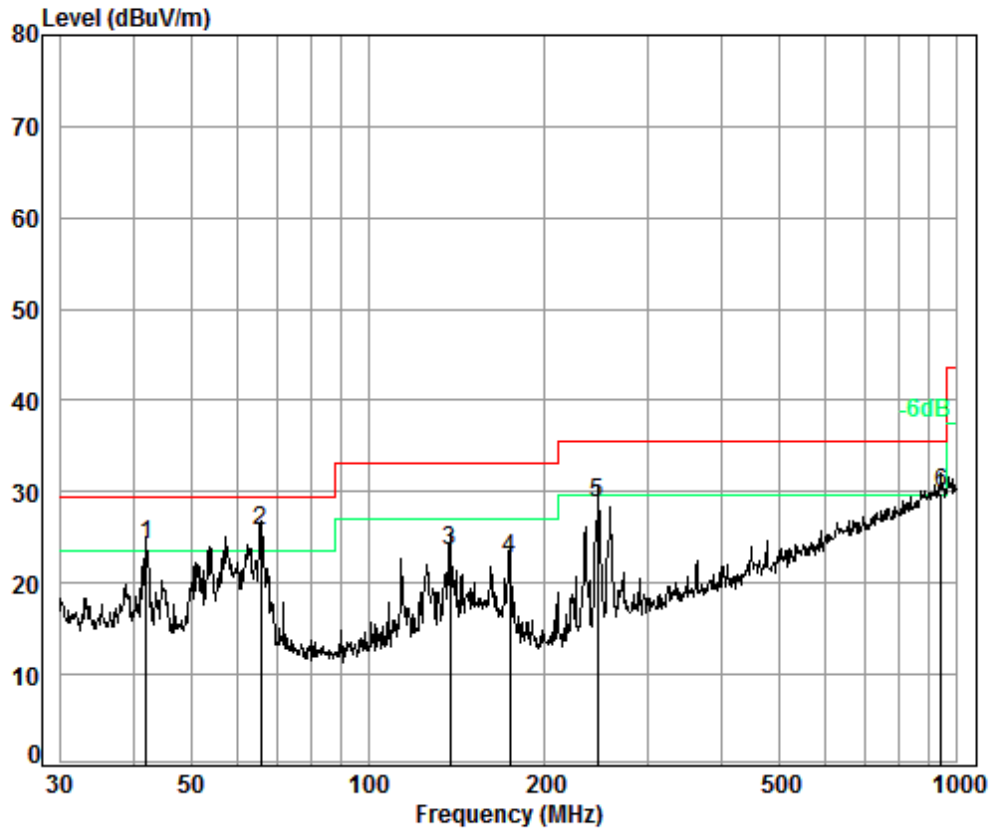


Condition: 10m HORIZONTAL  
 EUT : 12869CR  
 Test Mode: b

Frequency (MHz)	Cable Loss(dB)	Ant Factor (dB/m)	Preamp Factor (dB)	Read Level (dBUV/m)	Read Level @ 10m (dBUV/m)	Level @ 3m (dBUV/m)	Limit Line (dBUV/m)	Margin (dB)
42.01	6.80	13.15	32.45	37.70	25.20	35.66	40	-4.34
65.80	6.98	10.84	32.46	37.79	23.15	33.61	40	-6.39
142.82	7.41	12.95	32.44	36.53	24.45	34.91	43.5	-8.59
257.42	7.89	11.42	32.41	42.90	29.80	40.26	46	-5.74
475.50	8.49	16.46	32.30	34.65	27.30	37.76	46	-8.24
925.76	9.51	22.57	31.19	30.06	30.95	41.41	46	-4.59



Mode:b; Polarization:Vertical



Condition: 10m VERTICAL  
EUT : 12869CR  
Test Mode: b

Frequency (MHz)	Cable Loss(dB)	Ant Factor (dB/m)	Preamp Factor (dB)	Read Level (dBUV/m)	Read Level @ 10m (dBUV/m)	Level @ 3m (dBUV/m)	Limit Line (dBUV/m)	Margin (dB)
42.01	6.80	13.15	32.45	36.62	24.12	34.58	40	-5.42
65.80	6.98	10.84	32.46	40.37	25.73	36.19	40	-3.81
137.90	7.39	12.61	32.45	35.94	23.49	33.95	43.5	-9.55
174.42	7.83	11.17	32.42	42.20	28.78	39.24	43.5	-4.26
245.95	9.56	22.68	31.06	28.78	29.96	40.42	46	-5.58



Remark:

1) The field strength is calculated by adding the Antenna Factor, Cable Factor & Preamplifier. The basic equation with a sample calculation is as follows:

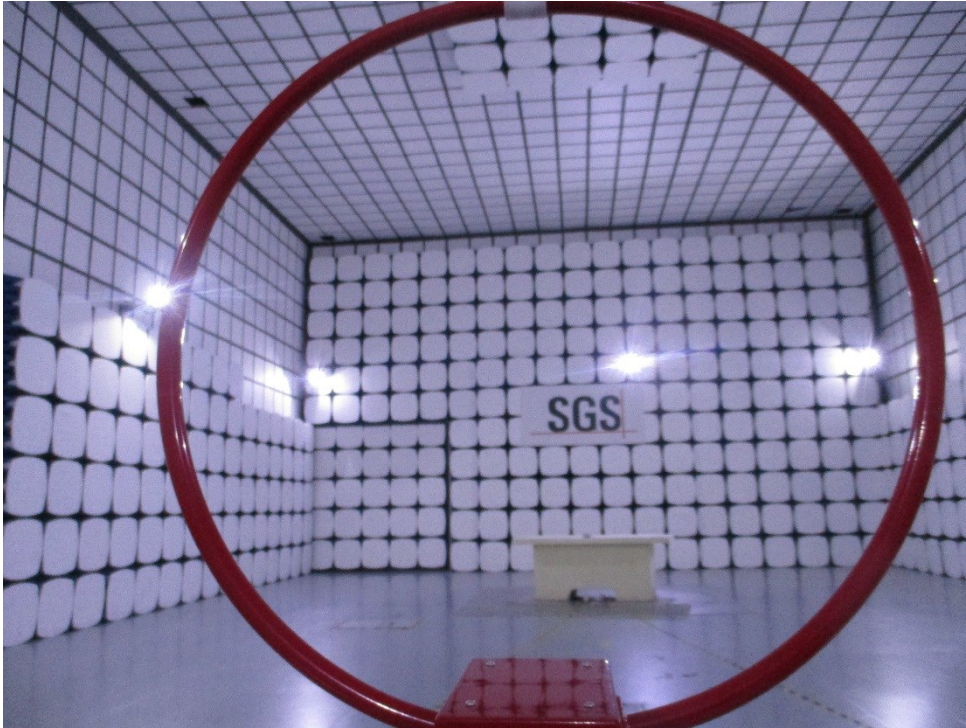
Final Test Level = Receiver Reading + Antenna Factor + Cable Factor – Preamplifier Factor

## 8 Photographs

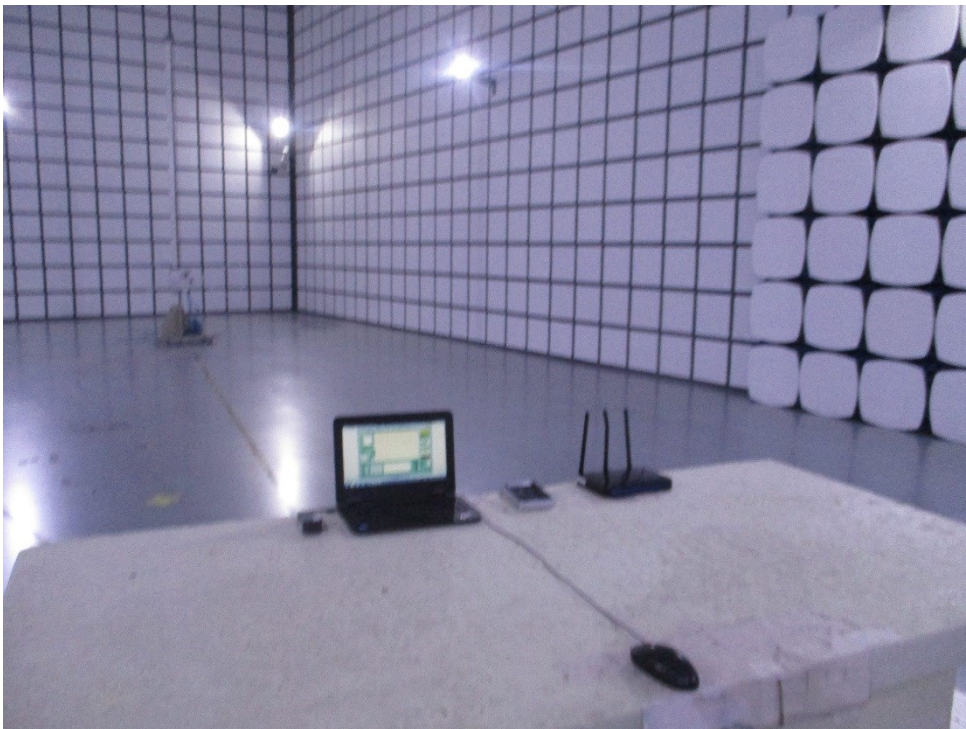
### 8.1 Conducted Emissions at AC Power Line (150kHz-30MHz) Test Setup



## 8.2 Radiated Emissions(9kHz-30MHz) Test Setup



## 8.3 Radiated Emissions(30MHz-1GHz) Test Setup



- End of the Report -