

# RF TEST REPORT



Report No.: 16020762-FCC-R1  
Supersede Report No.: N/A

Applicant	Shanghai Smarfid Security Equipment Co.,Ltd.	
Product Name	Magic MINI DesFire Reader	
Main Model	MD382-8N	
Serial Model	N/A	
Test Standard	FCC Part 15.225: 2016, ANSI C63.10: 2013	
Test Date	September 19 to September 27, 2017	
Issue Date	September 27, 2017	
Test Result	<input checked="" type="checkbox"/> Pass <input type="checkbox"/> Fail	
Equipment complied with the specification	<input checked="" type="checkbox"/>	
Equipment did not comply with the specification	<input type="checkbox"/>	
<i>Trety Lu</i>	<i>Deon Dai</i>	
Trety Lu Test Engineer	Deon Dai Engineer Reviewer	
This test report may be reproduced in full only Test result presented in this test report is applicable to the tested sample only		

Issued by:  
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## Laboratories Introduction

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### Accreditations for Conformity Assessment

Country/Region	Scope
USA	EMC, RF/Wireless, SAR, Telecom
Canada	EMC, RF/Wireless, SAR, Telecom
Taiwan	EMC, RF, Telecom, SAR, Safety
Hong Kong	RF/Wireless, SAR, Telecom
Australia	EMC, RF, Telecom, SAR, Safety
Korea	EMI, EMS, RF, SAR, Telecom, Safety
Japan	EMI, RF/Wireless, SAR, Telecom
Singapore	EMC, RF, SAR, Telecom
Europe	EMC, RF, SAR, Telecom, Safety

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## 1. Report Revision History

Report No.	Report Version	Description	Issue Date
16020762-FCC-R1	NONE	Original	September 27, 2017

## 2. Customer information

Applicant Name	Shanghai Smarfid Security Equipment Co.,Ltd.
Applicant Address	No. 88, Lane 600, XinLi Road, Minhang District, Shanghai, China
Manufacturer Name	Shanghai Smarfid Security Equipment Co.,Ltd.
Manufacturer Address	No. 88, Lane 600, XinLi Road, Minhang District, Shanghai, China

## 3. Test site information

Lab performing tests	SIEMIC (Nanjing-China) Laboratories
Lab Address	2-1 Longcang Avenue Yuhua Economic and Technology Development Park, Nanjing, China
FCC Test Site No.	694825
IC Test Site No.	4842B-1
Test Software	EZ EMC

#### 4. Equipment Under Test (EUT) Information

Description of EUT:	Magic MINI DesFire Reader
Main Model:	MD382-8N
Serial Model:	N/A
Date EUT received:	September 15, 2017
Test Date(s):	September 19 to September 27, 2017
Antenna Gain:	13.56MHz: 6dBi
Type of Modulation:	ASK
RF Operating Frequency (ies):	13.56MHz
Number of Channels:	1 CH
Input Power:	9-15V
Trade Name :	N/A
FCC ID:	X3A-MD3828N

## 5. Test Summary

The product was tested in accordance with the following specifications.  
All testing has been performed according to below product classification:

FCC Rules	Description of Test	Result
§15.203	Antenna Requirement	Compliance
§15.207(a)	Conducted Emissions Voltage	Compliance
§15.225(a)	Fundamental Field Strength	Compliance
§15.225(b)	Fundamental Field Strength	Compliance
§15.225(c)	Fundamental Field Strength	Compliance
§15.225(d), 15.209	Radiated Emissions	Compliance
§15.225(e)	Frequency Stability	Compliance
§15.215(c)	Occupied Bandwidth	Compliance

### Measurement Uncertainty

Emissions		
Test Item	Description	Uncertainty
Conducted Emissions & Radiated Spurious Emissions	Confidence level of approximately 95% (in the case where distributions are normal), with a coverage factor of 2 (for EUTs < 0.5m X 0.5m X 0.5m)	1.634dB / 3.952dB

## 6. Measurements, Examination And Derived Results

### 6.1 Antenna Requirement

#### Applicable Standard

Requirement(s): 47 CFR §15.203

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.

Antenna requirement must meet at least one of the following:

- a) Antenna must be permanently attached to the device.
- b) Antenna must use a unique type of connector to attach to the device.
- c) Device must be professionally installed. Installer shall be responsible for ensuring that the correct antenna is employed with the device.

The antenna is permanently attached to the device which meets the requirement.

Result: Compliance.

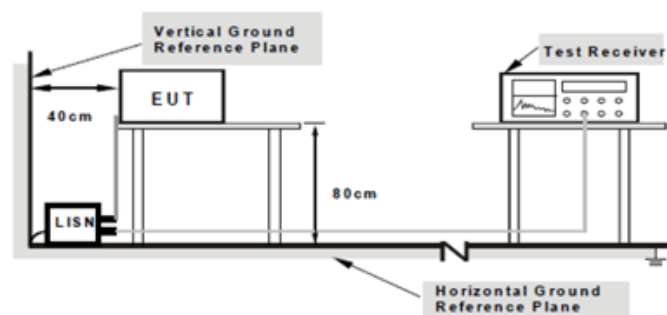


## 6.2 Conducted Emissions Voltage

Temperature	25°C
Relative Humidity	50%
Atmospheric Pressure	1019mbar
Test date :	September 19, 2017
Tested By :	Trety Lu

### Conducted Emission Limit

Frequency ranges (MHz)	Limit (dB $\mu$ V)	
	QP	Average
0.15 ~ 0.5	66 – 56	56 – 46
0.5 ~ 5	56	46
5 ~ 30	60	50

Spec	Item	Requirement	Applicable
47CFR§15.207	a)	For Low-power radio-frequency devices that is designed to be connected to the public utility (AC) power line, the radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies, within the band 150 kHz to 30 MHz, shall not exceed the limits in the following table, as measured using a 50 [mu]H/50 ohms line impedance stabilization network (LISN). The lower limit applies at the boundary between the frequency ranges.	<input checked="" type="checkbox"/>
Test Setup	 <p>Note: 1.Support units were connected to second LISN. 2.Both of LISNs (AMN) are 80cm from EUT and at least 80cm from other units and other metal planes support units.</p>		
Procedure	<ul style="list-style-type: none"> <li>- The EUT and supporting equipment were set up in accordance with the requirements of the standard on top of a 1.5m x 1m x 0.8m high, non-metallic table, as shown in Annex B.</li> <li>- The power supply for the EUT was fed through a 50W/50mH EUT LISN, connected to filtered mains.</li> <li>- The RF OUT of the EUT LISN was connected to the EMI test receiver via a low-loss coaxial cable.</li> <li>- All other supporting equipment were powered separately from another main supply.</li> </ul>		
Remark			
Result	<input checked="" type="checkbox"/> Pass <input type="checkbox"/> Fail		

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Test Data  Yes  N/A

Test Plot  Yes (See below)  N/A

**Data sample**

**Data sample**

No.	Frequency (MHz)	Reading (dBμV)	Detector	Lisn/Isn (dB)	Ps_Lmt (dB)	Cab_L (dB)	Result (dBμV)	Limit (dBμV)	Margin (dB)
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Frequency (MHz) = Emission frequency in MHz

Reading (dBμV) = Receiver Reading Value

Detector=Quasi Peak Detector or Average Detector

Lisn/Isn= Insertion loss of LISN

Ps\_Lmt= Insertion loss of transient limiter (The transient limiter included 10dB attenuation)

Cab\_L= cable loss

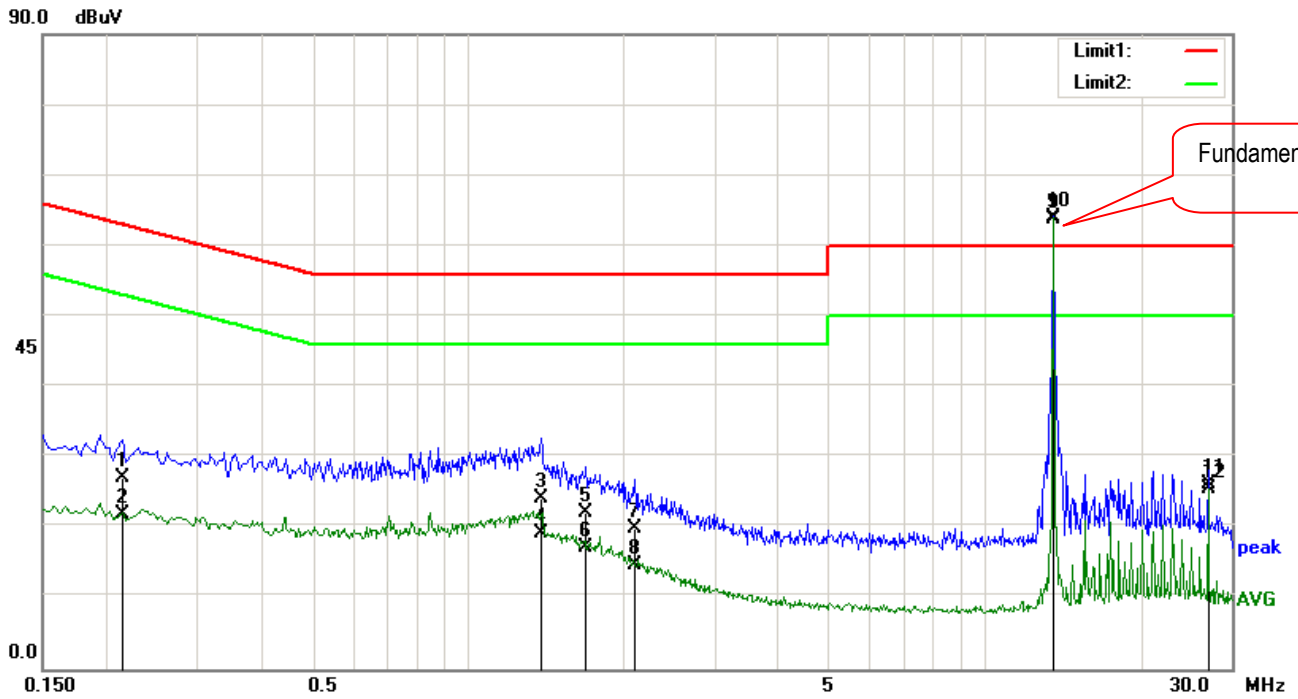
Result (dBμV) = Reading Value + Corrected Value

Limit (dBμV) = Limit stated in standard

**Calculation Formula:**

Margin (dB) = Result (dBμV) – limit (dBμV)

Test Mode:	Transmitting Mode
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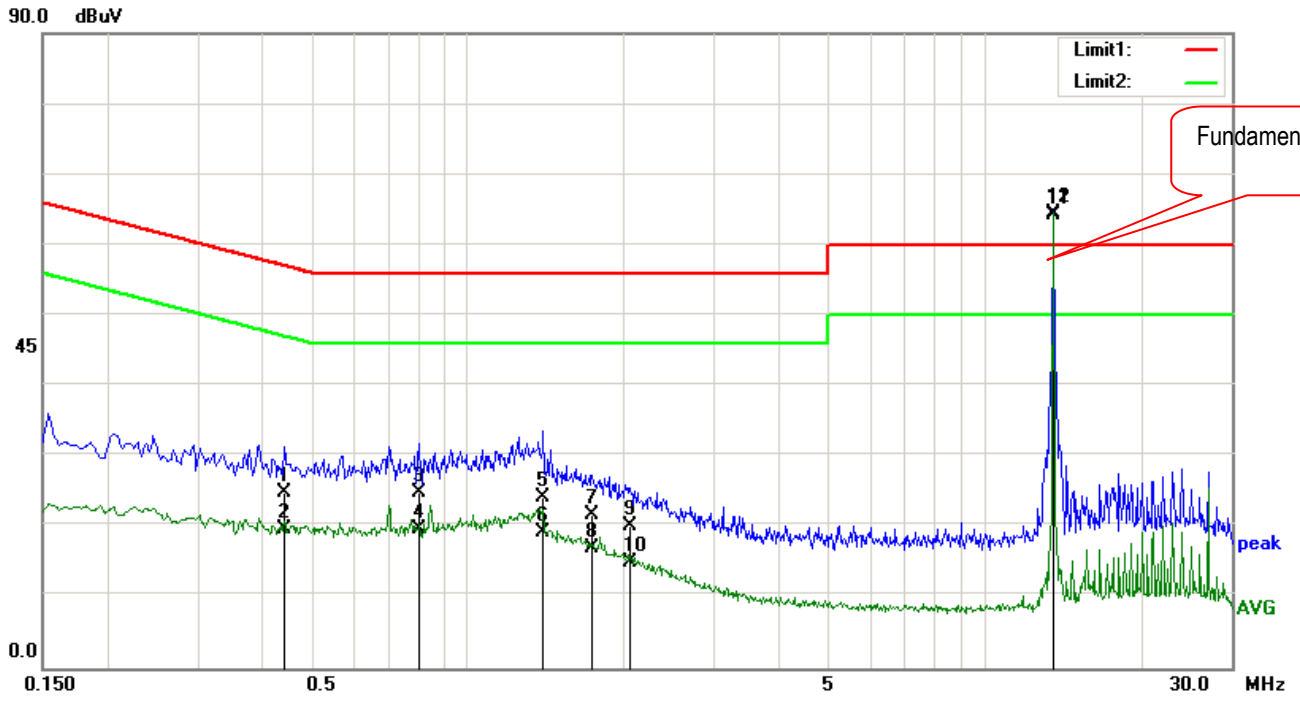


Test Data

Phase Line Plot at 120Vac, 60Hz

No.	Frequency (MHz)	Reading (dBμV)	Detector	Lisn/Isn (dB)	Ps_Lmt (dB)	Cab_L (dB)	Result (dBμV)	Limit (dBμV)	Margin (dB)
1	0.2140	16.74	QP	0.10	-10.00	0.26	27.10	63.05	-35.95
2	0.2140	11.54	AVG	0.10	-10.00	0.26	21.90	53.05	-31.15
3	1.3860	13.81	QP	0.15	-10.00	0.20	24.16	56.00	-31.84
4	1.3860	8.79	AVG	0.15	-10.00	0.20	19.14	46.00	-26.86
5	1.6980	11.80	QP	0.15	-10.00	0.21	22.16	56.00	-33.84
6	1.6980	6.92	AVG	0.15	-10.00	0.21	17.28	46.00	-28.72
7	2.1060	9.57	QP	0.16	-10.00	0.20	19.93	56.00	-36.07
8	2.1060	4.27	AVG	0.16	-10.00	0.20	14.63	46.00	-31.37
9	13.5620	52.60	QP	0.75	-10.00	0.48	63.83	60.00	3.83
10	13.5620	52.77	AVG	0.75	-10.00	0.48	64.00	50.00	14.00
11	27.1220	14.38	QP	1.26	-10.00	0.67	26.31	60.00	-33.69
12	27.1220	13.62	AVG	1.26	-10.00	0.67	25.55	50.00	-24.45

Test Mode:	Transmitting Mode
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Test Data

Phase Neutral Plot at 120Vac, 60Hz

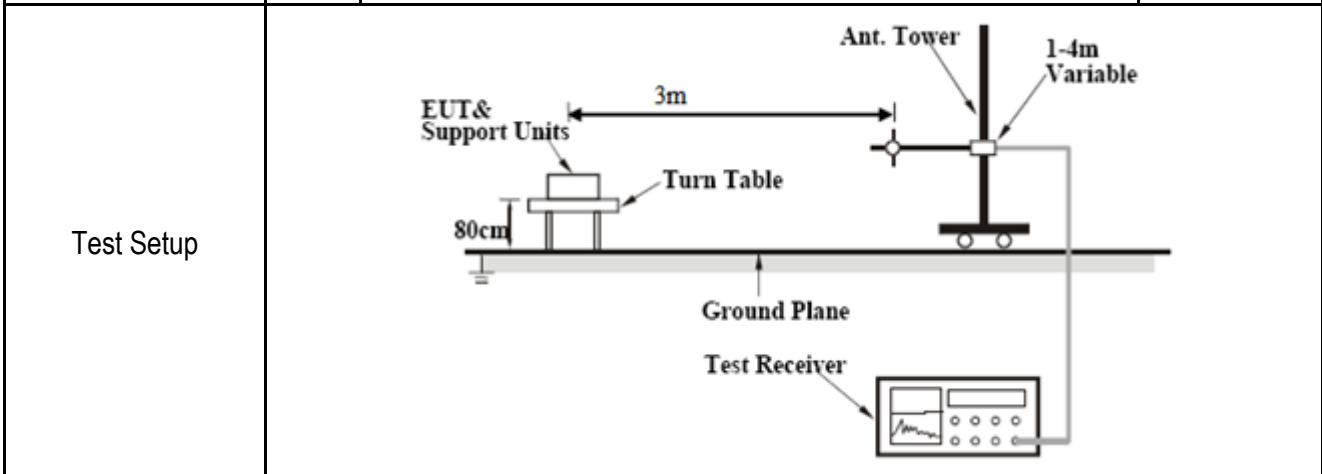
No.	Frequency (MHz)	Reading (dBμV)	Detector	Lisn/Isn (dB)	Ps_Lmt (dB)	Cab_L (dB)	Result (dBμV)	Limit (dBμV)	Margin (dB)
1	0.4420	14.52	QP	0.11	-10.00	0.21	24.84	57.02	-32.18
2	0.4420	9.44	AVG	0.11	-10.00	0.21	19.76	47.02	-27.26
3	0.8020	14.49	QP	0.12	-10.00	0.20	24.81	56.00	-31.19
4	0.8020	9.44	AVG	0.12	-10.00	0.20	19.76	46.00	-26.24
5	1.3980	13.85	QP	0.15	-10.00	0.20	24.20	56.00	-31.80
6	1.3980	8.79	AVG	0.15	-10.00	0.20	19.14	46.00	-26.86
7	1.7420	11.44	QP	0.16	-10.00	0.21	21.81	56.00	-34.19
8	1.7420	6.57	AVG	0.16	-10.00	0.21	16.94	46.00	-29.06
9	2.0580	9.82	QP	0.17	-10.00	0.19	20.18	56.00	-35.82
10	2.0580	4.53	AVG	0.17	-10.00	0.19	14.89	46.00	-31.11
11	13.5620	52.88	QP	0.83	-10.00	0.48	64.19	60.00	4.19
12	13.5620	53.05	AVG	0.83	-10.00	0.48	64.36	50.00	14.36

### 6.3 Fundamental Field Strength Test Result

Temperature	25°C
Relative Humidity	50%
Atmospheric Pressure	1019mbar
Test date :	September 21, 2017
Tested By :	Trety Lu

Requirement(s):

Spec	Item	Requirement	Applicable
§15.225(a) §15.225(b) §15.225(c)	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.	<input checked="" type="checkbox"/>
	b)	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.	<input type="checkbox"/>
	c)	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.	<input type="checkbox"/>



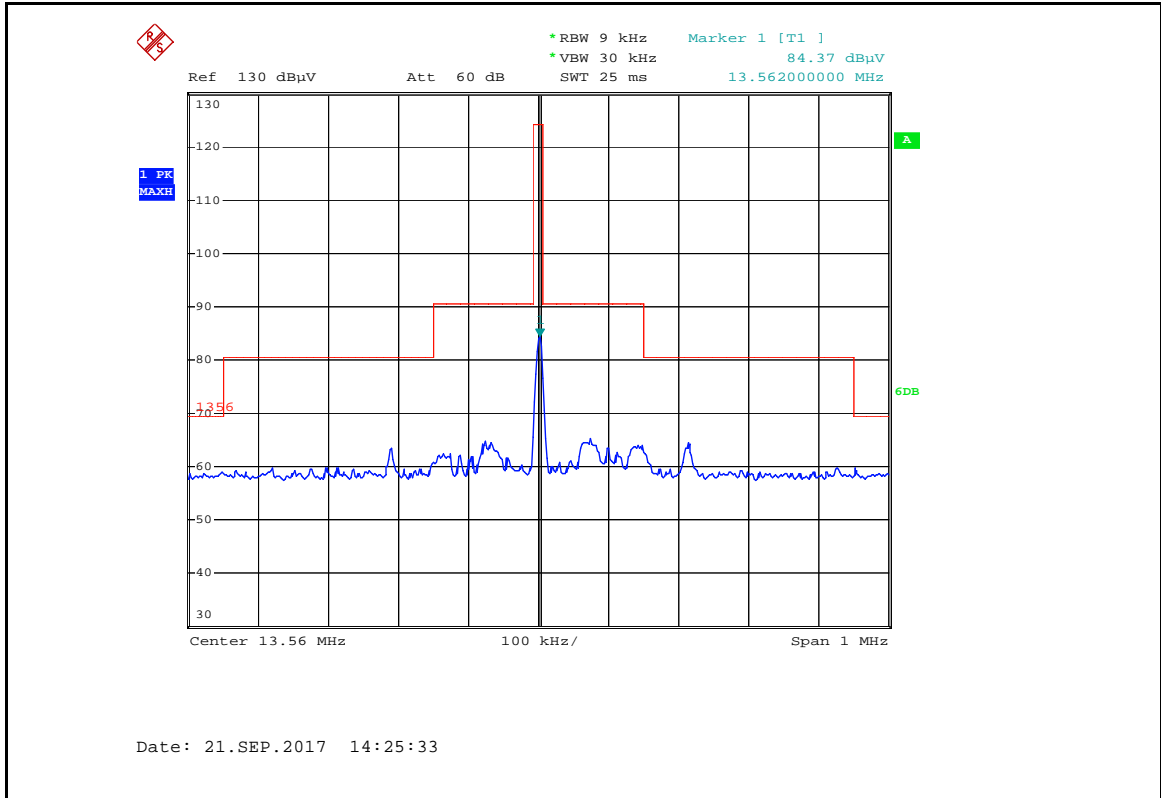
Test Procedure	<ol style="list-style-type: none"> <li>1. The EUT was switched on and allowed to warm up to its normal operating condition.</li> <li>2. The test was carried out at the selected frequency points obtained from the EUT characterisation. Maximization of the emissions, was carried out by rotating the EUT, changing the antenna polarization, and adjusting the antenna height in the following manner:             <ol style="list-style-type: none"> <li>a. Vertical or horizontal polarisation (whichever gave the higher emission level over a full rotation of the EUT) was chosen.</li> <li>b. The EUT was then rotated to the direction that gave the maximum emission.</li> <li>c. Finally, the antenna height was adjusted to the height that gave the maximum emission.</li> </ol> </li> <li>3. A peak measurement was then made for that frequency point.</li> <li>4. Steps 2 and 3 were repeated for the next frequency point, until all selected frequency points were measured.</li> </ol>
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Remark	
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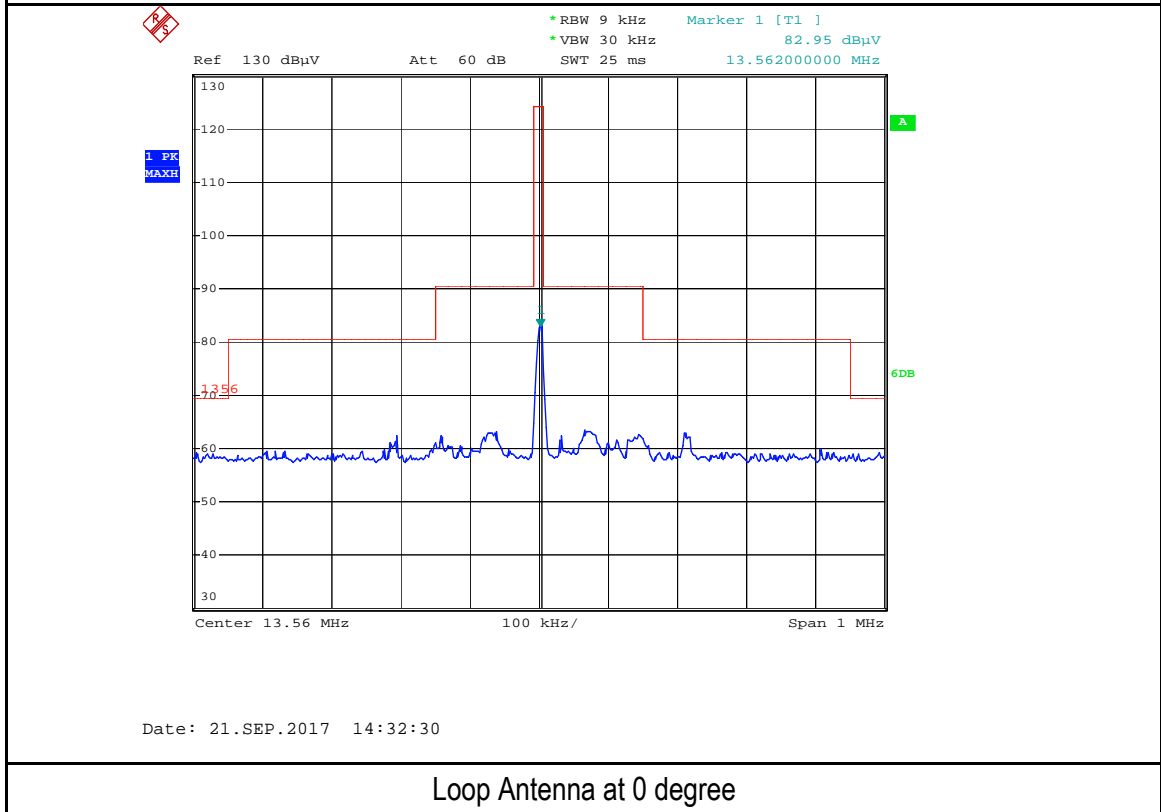
Result	<input checked="" type="checkbox"/> Pass <input type="checkbox"/> Fail
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Test Data    Yes                      N/A  
 Test Plot    Yes                      N/A

Test Plots  
Fundamental Field Strength Measurement Result:



Loop Antenna at 90 degree



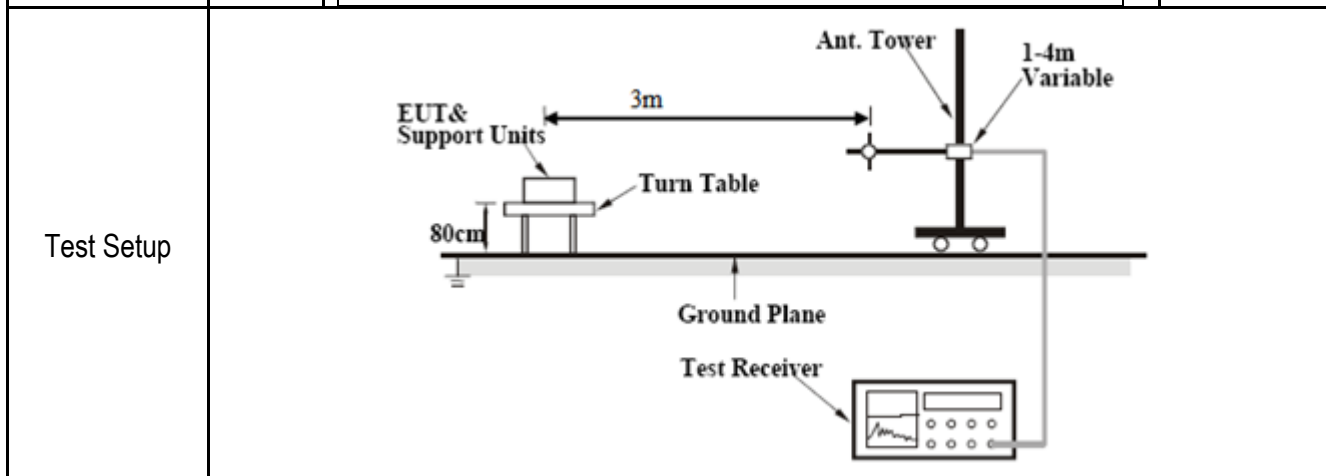
Loop Antenna at 0 degree

## 6.4 Radiated Spurious Emissions

Temperature	25°C
Relative Humidity	50%
Atmospheric Pressure	1019mbar
Test date :	September 25, 2017
Tested By :	Trety Lu

### Requirement(s):

Spec	Item	Requirement	Applicable																								
§15.225(d) , 15.209	a)	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.	<input checked="" type="checkbox"/>																								
		<table border="1"> <thead> <tr> <th>Fundamental frequency (MHz)</th> <th>Field strength (microvolts/meter)</th> <th>Measurement distance (meters)</th> </tr> </thead> <tbody> <tr> <td>0.009-0.490</td> <td>2400/F(kHz)</td> <td>300</td> </tr> <tr> <td>0.490-1.705</td> <td>24000/F(kHz)</td> <td>30</td> </tr> <tr> <td>1.705-30.0</td> <td>30</td> <td>30</td> </tr> <tr> <td>30-88</td> <td>100**</td> <td>3</td> </tr> <tr> <td>88-246</td> <td>150**</td> <td>3</td> </tr> <tr> <td>216-960</td> <td>200**</td> <td>3</td> </tr> <tr> <td>Above 960</td> <td>500</td> <td>3</td> </tr> </tbody> </table>		Fundamental 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	88-246	150**	3	216-960	200**	3	Above 960	500	3
		Fundamental 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																						
		88-246		150**	3																						
216-960	200**	3																									
Above 960	500	3																									



Procedure	Requirement
1.	The EUT was switched on and allowed to warm up to its normal operating condition.
2.	The test was carried out at the selected frequency points obtained from the EUT characterisation. Maximization of the emissions, was carried out by rotating the EUT, changing the antenna polarization, and adjusting the antenna height in the following manner: <ul style="list-style-type: none"> <li>a. Vertical or horizontal polarisation (whichever gave the higher emission level over a full rotation of the EUT) was chosen.</li> <li>b. The EUT was then rotated to the direction that gave the maximum emission.</li> <li>c. Finally, the antenna height was adjusted to the height that gave the maximum emission.</li> </ul>
3.	A Quasi-peak measurement was then made for that frequency point.
4.	Steps 2 and 3 were repeated for the next frequency point, until all selected frequency points were measured.

Remark	
Result	<input checked="" type="checkbox"/> Pass <input type="checkbox"/> Fail

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Test Data  Yes  N/A

Test Plot  Yes  N/A

**Data sample**

No.	Frequency (MHz)	Reading (dB $\mu$ V/m)	Detector	Ant_F (dB/m)	PA_G (dB)	Cab_L (dB)	Result (dB $\mu$ V/m)	Limit (dB $\mu$ V/m)	Margin (dB)	Height (cm)	Degree ( $^{\circ}$ )
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Frequency (MHz) = Emission frequency in MHz

Reading (dB $\mu$ V/m) = Receiver Reading Value

Detector= Peak Detector or Quasi Peak Detector

Ant\_F=Antenna Factor

PA\_G=Pre-Amplifier Gain

Cab\_L=Cable Loss

Result (dB $\mu$ V/m) = Reading Value + Corrected Value

Limit (dB $\mu$ V/m) = Limit stated in standard

Height (cm) = Height of Receiver antenna

Degree = Turn table degree

**Calculation Formula:**

Margin (dB) = Result (dB $\mu$ V/m) – limit (dB $\mu$ V/m)



<b>Test Mode:</b>	Transmitting
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Below 30MHz Loop Antenna at 0 degree:

@ 3M

Frequency	Peak ( Corrected )	Factor	Height	Azimuth	Limits @ 3m	Margin
(MHz)	(dB $\mu$ V/m)	(dB)	(cm)	(deg)	(dB $\mu$ V/m)	(dB)
14.39	51.38	38.7	190	277	69.54	-18.16
4.39	52.83	46.3	150	139	69.54	-16.71
13.99	51.79	39.1	180	110	80.50	-28.71

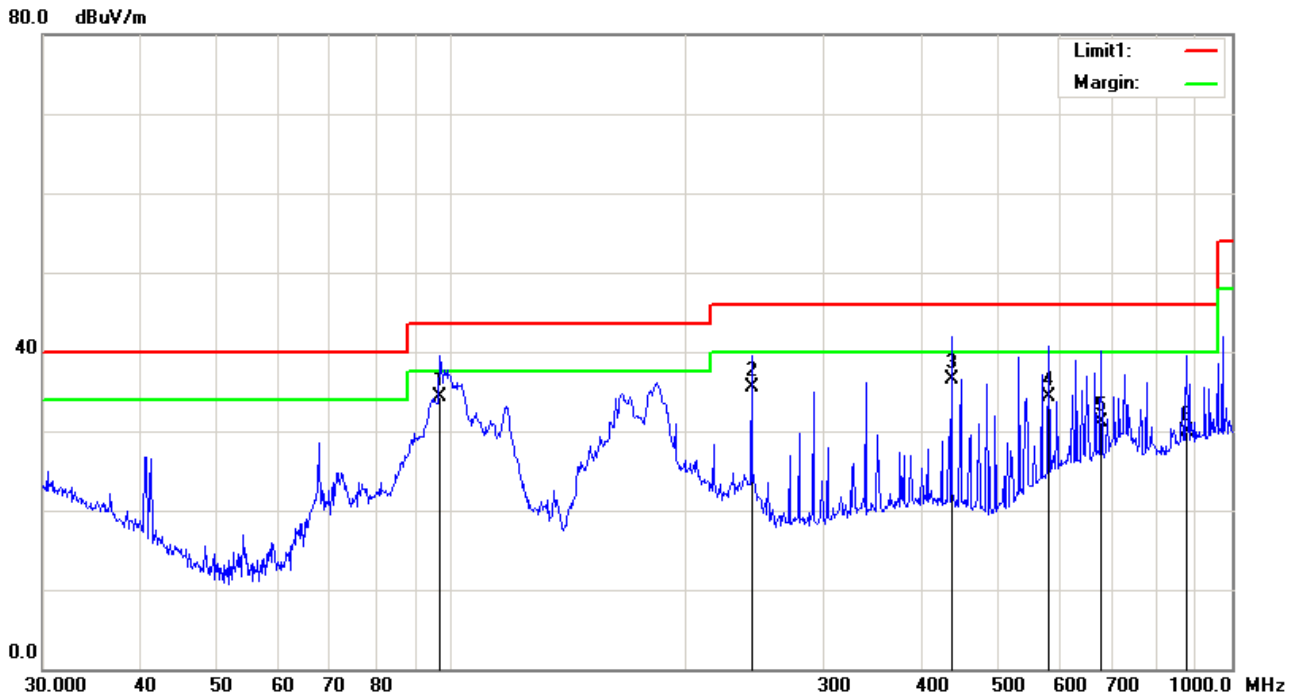
Below 30MHz Loop Antenna at 90 degree:

@ 3M

Frequency	Peak ( Corrected )	Factor	Height	Azimuth	Limits @ 3m	Margin
(MHz)	(dB $\mu$ V/m)	(dB)	(cm)	(deg)	(dB $\mu$ V/m)	(dB)
4.88	52.65	46.2	100	224	69.54	-16.89
14.39	50.43	38.7	200	210	69.54	-19.11
13.99	53.80	39.1	150	165	80.50	-26.70

Test Mode:	Transmitting Mode
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Below (30MHz-1GHz)



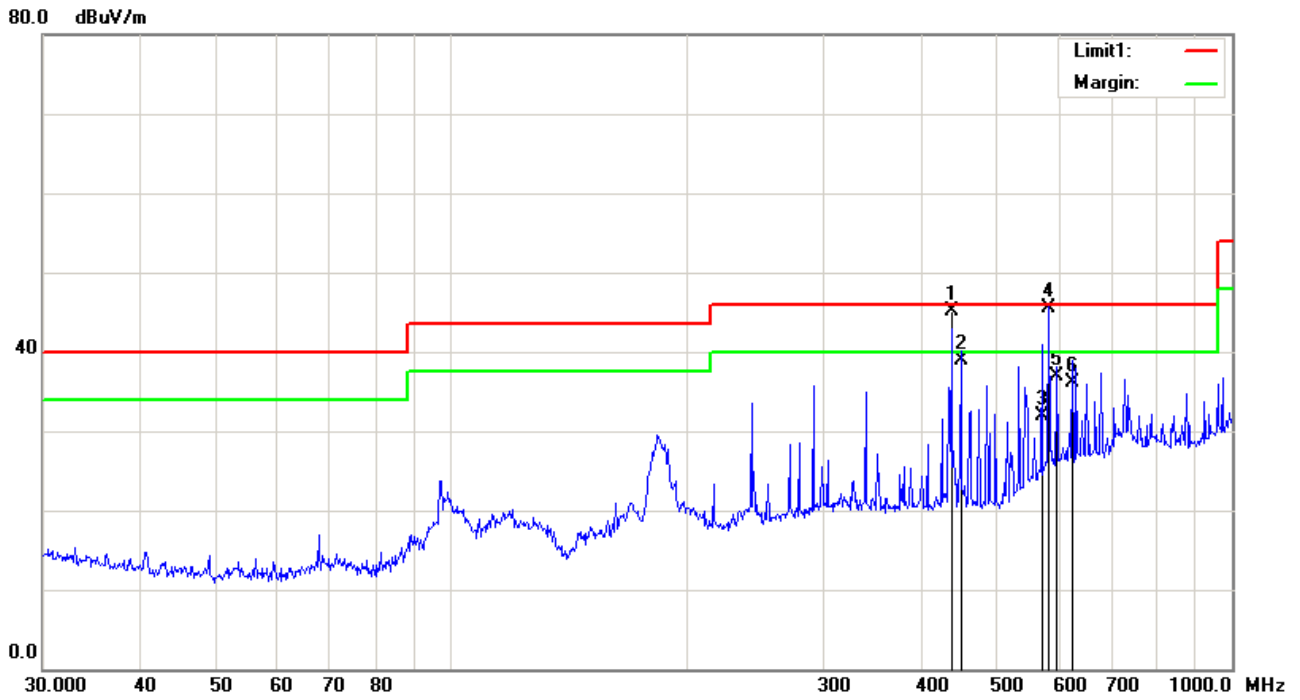
Test Data

Vertical Polarity Plot at 3m

No.	Frequency (MHz)	Reading (dBµV/m)	Detector	Ant_F (dB/m)	PA_G (dB)	Cab_L (dB)	Result (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Degree (°)
1	96.7749	69.03	QP	10.43	46.64	1.58	34.40	43.50	-9.10	100	306
2	242.5253	65.66	QP	14.89	47.43	2.48	35.60	46.00	-10.40	100	359
3	437.1199	65.92	QP	16.38	49.15	3.35	36.50	46.00	-9.50	100	222
4	582.7425	59.67	QP	19.41	48.65	3.87	34.30	46.00	-11.70	200	203
5	679.9600	51.75	QP	22.12	46.86	4.19	31.20	46.00	-14.80	100	21
6	875.2470	47.97	QP	23.15	46.00	4.78	29.90	46.00	-16.10	100	324

Test Mode:	Transmitting Mode
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*Below 1GHz*



Horizontal Polarity Plot at 3m

No.	Frequency (MHz)	Reading (dBuV/m)	Detector	Ant_F (dB/m)	PA_G (dB)	Cab_L (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Height (cm)	Degree (°)
1	437.1199	75.00	QP	16.00	49.15	3.35	45.20	46.00	-0.80	200	259
2	449.5558	68.71	QP	16.00	49.16	3.39	38.94	46.00	-7.06	200	251
3	570.6100	56.80	QP	19.71	48.43	3.82	31.90	46.00	-14.10	200	123
4	582.7425	69.95	QP	20.35	48.65	3.87	45.52	46.00	-0.48	200	93
5	597.2234	60.56	QP	21.11	48.69	3.92	36.90	46.00	-9.10	200	96
6	625.0780	57.61	QP	21.55	46.97	4.01	36.20	46.00	-9.80	200	288

Note: The highest frequency of the internal sources of the EUT is less than 108MHz, so the measurement shall only be made up to 1GHz.

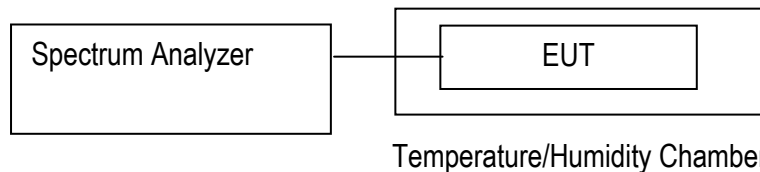
## 6.5 Frequency Stability

Temperature	25°C
Relative Humidity	50%
Atmospheric Pressure	1019mbar
Test date :	September 21, 2017
Tested By :	Trety Lu

### Requirement(s):

Spec	Item	Requirement	Applicable
§15.225(e)	a)	The Frequency tolerance of the carrier signal shall be maintained within $\pm 0.01\%$ of the operating frequency over a temperature variation of $-20^{\circ}\text{C}$ to $+50^{\circ}\text{C}$ at normal supply voltage.	<input checked="" type="checkbox"/>
	b)	The frequency of the transmitter was measured at 85% and at 115% of the rated power supply voltage at $20^{\circ}\text{C}$ environmental temperature.	<input checked="" type="checkbox"/>

### Test Setup



### Test Procedure

- 1> Place the de-energized EUT in an environmental temperature test chamber. Supply the EUT with nominal ac voltage, or install a new or fully charged battery in the EUT. An antenna should be connected to the antenna output connector of the EUT if possible. Use of a dummy load could affect the output frequency of the EUT. If the EUT is equipped with or uses an adjustable-length antenna, it should be fully extended.
- 2> Turn the EUT on, and couple its output to a frequency counter or other frequency-measuring device of sufficient accuracy, considering the frequency tolerance with which the EUT shall comply.
- 3> Turn the EUT off, and place it inside an environmental chamber set to the highest temperature specified by the procuring or regulatory agency. For devices that are normally operated continuously, the EUT may be energized while inside the test chamber. For devices that have oscillator heaters, energize only the heater circuit while the EUT is inside the chamber.
- 4> Allow sufficient time (approximately 30 minutes) for the temperature of the chamber to stabilize. While maintaining a constant temperature inside the environmental chamber, turn the EUT on and measure the EUT operating frequency at startup, and two, five, and ten minutes after startup. Four measurements in total are made.
- 5> If 13.1.1 requires measurements on only one operating frequency, proceed to step f); otherwise, successively tune the EUT to each of the additional operating frequencies specified in 13.1.1 and repeat step d).
- 6> Repeat step d) and step e) with the temperature chamber set to the lowest temperature specified by the procuring or regulatory agency. Be sure to allow the environmental chamber temperature to stabilize before performing these measurements.

Remark	
Result	<input checked="" type="checkbox"/> Pass <input type="checkbox"/> Fail

Test Data    Yes                      N/A

Test Plot    Yes                      N/A

Carrier Frequency: 13.56MHz at -20°C to +50°C, DC12V

Temperature (oC)	Measured Freq. (MHz)	Freq. Drift (Hz)	Freq. Deviation (Limit: 0.01%)	Pass/Fail
50	13.55940	600	< 0.01	Pass
40	13.55950	500	< 0.01	Pass
30	13.55960	400	< 0.01	Pass
20	Reference			
10	13.55970	300	< 0.01	Pass
0	13.55980	200	< 0.01	Pass
-10	13.55960	400	< 0.01	Pass
-20	13.55970	300	< 0.01	Pass

Carrier Frequency: 13.56MHz at 20°C at DC12V

Measured Voltage ±15% of nominal	Measured Freq. (MHz)	Freq. Drift (Hz)	Freq. Deviation (Limit: 0.01%)	Pass/Fail
10.2	13.55970	300	<0.01	Pass
13.8	13.55980	200	<0.01	Pass

## 6.6 20dB Occupied Bandwidth

Temperature	25°C
Relative Humidity	50%
Atmospheric Pressure	1019mbar
Test date :	September 27, 2017
Tested By :	Trety Lu

### Requirement(s):

Spec	Item	Requirement	Applicable
§15.215(c)	a)	Intentional radiators operating under the alternative provisions to the general emission limits, as contained in §§ 15.217 through 15.257 and in Subpart E of this part, must be designed to ensure that the 20 dB bandwidth of the emission, or whatever bandwidth may otherwise be specified in the specific rule section under which the equipment operates, is contained within the frequency band designated in the rule section under which the equipment is operated. The requirement to contain the designated bandwidth of the emission within the specified frequency band includes the effects from frequency sweeping, frequency hopping and other modulation techniques that may be employed as well as the frequency stability of the transmitter over expected variations in temperature and supply voltage. If a frequency stability is not specified in the regulations, it is recommended that the fundamental emission be kept within at least the central 80% of the permitted band in order to minimize the possibility of out-of-band operation.	<input checked="" type="checkbox"/>
Test Setup	<div style="display: flex; align-items: center; justify-content: center;"> <div style="border: 1px solid black; padding: 5px; margin-right: 10px;">Spectrum Analyzer</div> <div style="margin-right: 10px;">—</div> <div style="border: 1px solid black; padding: 5px; margin-left: 10px;">EUT</div> </div>		
Test Procedure	<u>20dB Emission bandwidth measurement procedure</u> <ul style="list-style-type: none"> <li>- Set RBW = 300 Hz.</li> <li>- Set the video bandwidth (VBW) ≥ 3 ´ RBW.</li> <li>- Detector = Peak.</li> <li>- Trace mode = max hold.</li> <li>- Sweep = auto couple.</li> <li>- Allow the trace to stabilize.</li> </ul> <p>Measure the maximum width of the emission that is constrained by the frequencies associated with the two outermost amplitude points (upper and lower frequencies) that are attenuated by 20 dB relative to the maximum level measured in the fundamental emission.</p>		
Remark			
Result	<input checked="" type="checkbox"/> Pass <input type="checkbox"/> Fail		

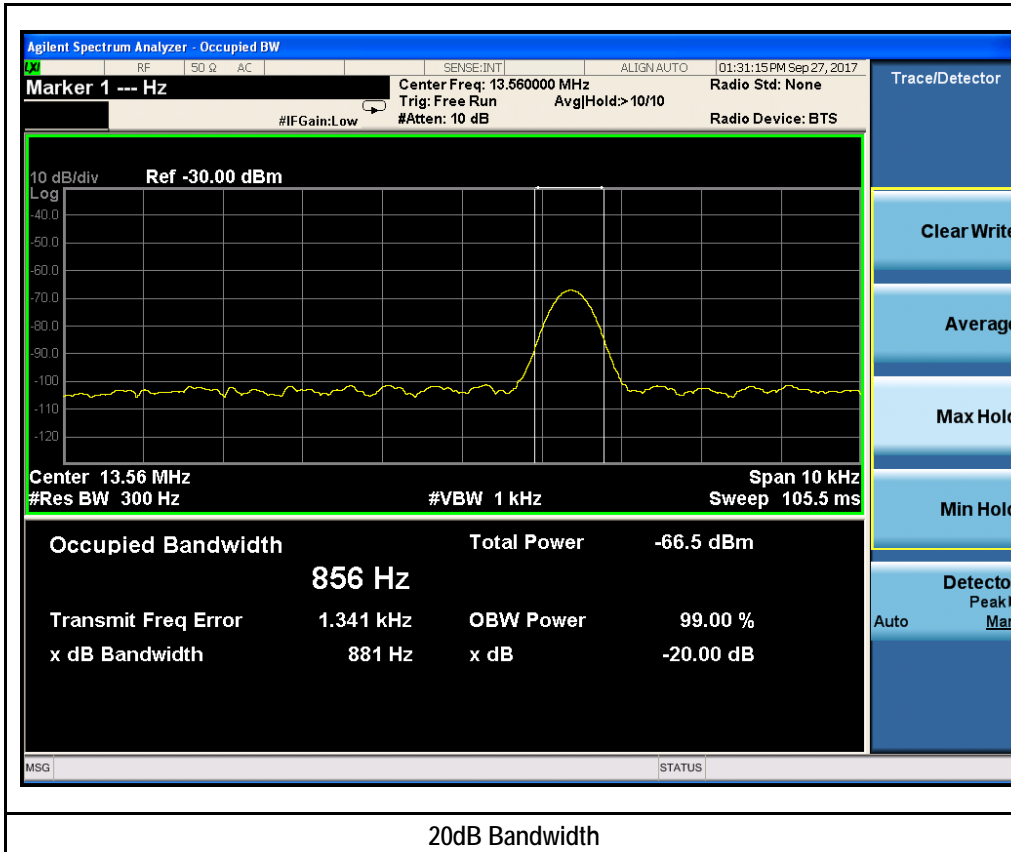
Test Data    Yes                      N/A  
 Test Plot    Yes                      N/A

### 20dB Bandwidth measurement result

Frequency (MHz)	20dB BW (kHz)	Test Result
13.56	0.881	PASS

### Test Plots

#### 20dB Bandwidth measurement result



## Annex A. TEST INSTRUMENT

Instrument	Model	Serial #	Cal Date	Cal Due	In use
<b>Conducted Emissions</b>					
R&S EMI Receiver	ESPI3	101216	05/03/2017	05/02/2018	<input checked="" type="checkbox"/>
Power Splitter	1#	1#	02/02/2017	02/01/2018	<input checked="" type="checkbox"/>
Temperature/Humidity Chamber	1007H	N/A	01/07/2017	01/06/2018	<input checked="" type="checkbox"/>
SIEMIC EZ EMC Conducted Emissions software	Ver.ICP-03A1	N/A	N/A	N/A	<input checked="" type="checkbox"/>
<b>Radiated Emissions</b>					
R&S EMI Receiver	ESPI3	101216	05/03/2017	05/02/2018	<input checked="" type="checkbox"/>
Antenna (30MHz~6GHz)	JB6	A121411	10/31/2016	10/31/2017	<input checked="" type="checkbox"/>
EMCO Passive Loop Antenna	6509	9909-1469	10/09/2016	10/08/2017	<input checked="" type="checkbox"/>
Hp Agilent Pre-Amplifier	8447F	1937A01160	10/27/2016	10/26/2017	<input checked="" type="checkbox"/>
SIEMIC EZ EMC Radiated Emissions software	Ver.ICP-03A1	N/A	N/A	N/A	<input checked="" type="checkbox"/>



**Annex B. EUT And Test Setup Photographs**

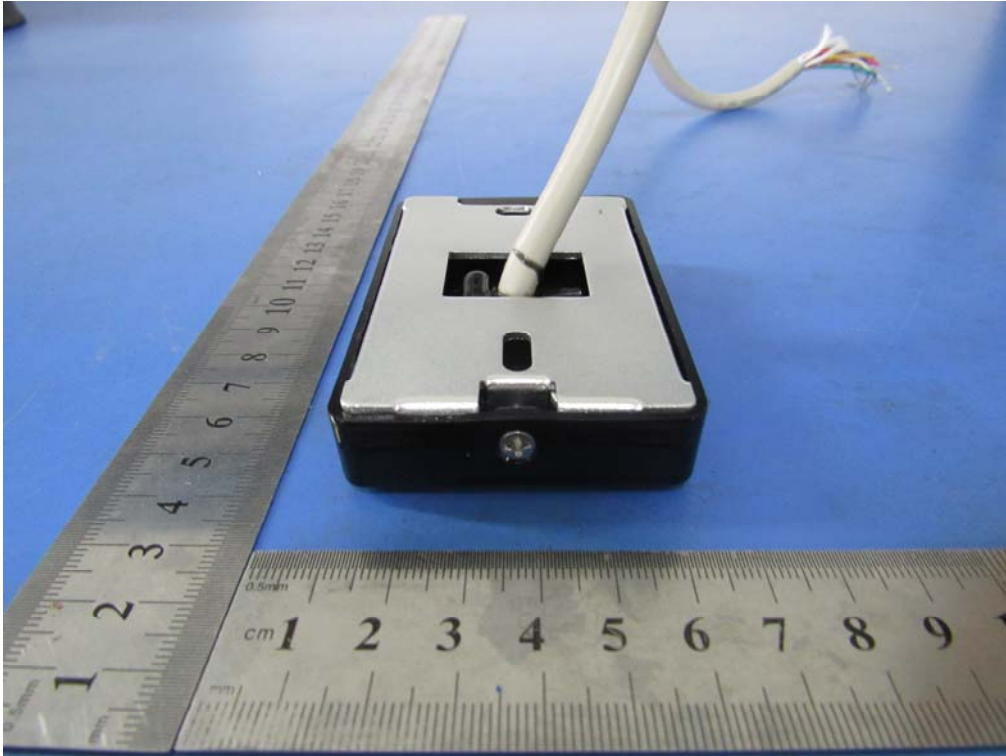
Annex B.i. Photograph EUT External Photo



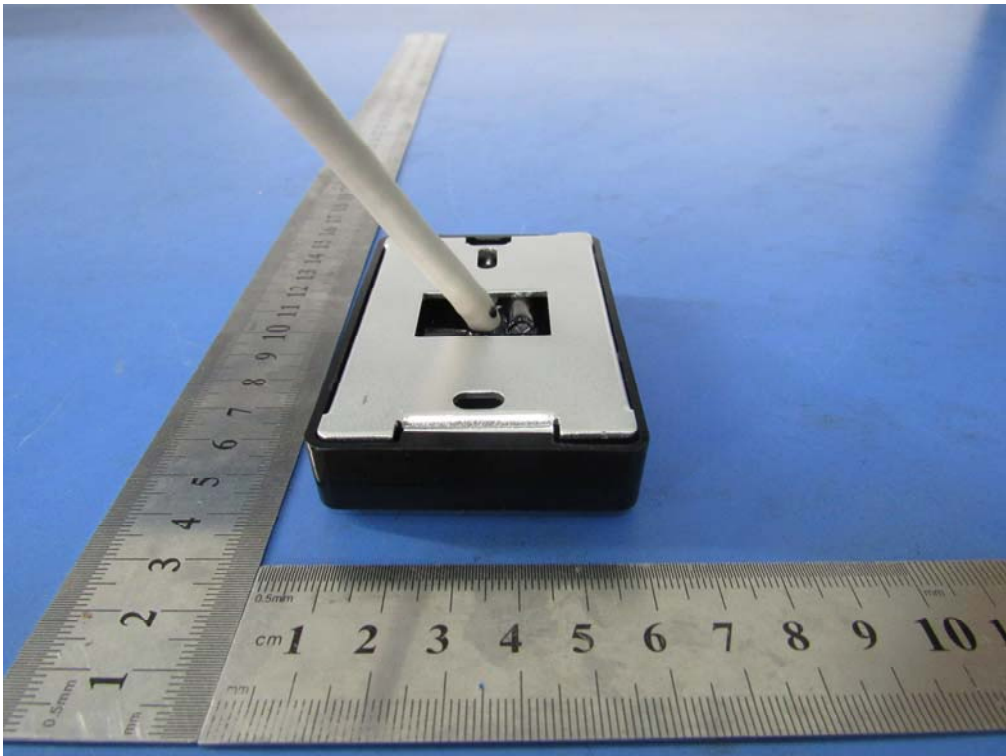
Front View of EUT



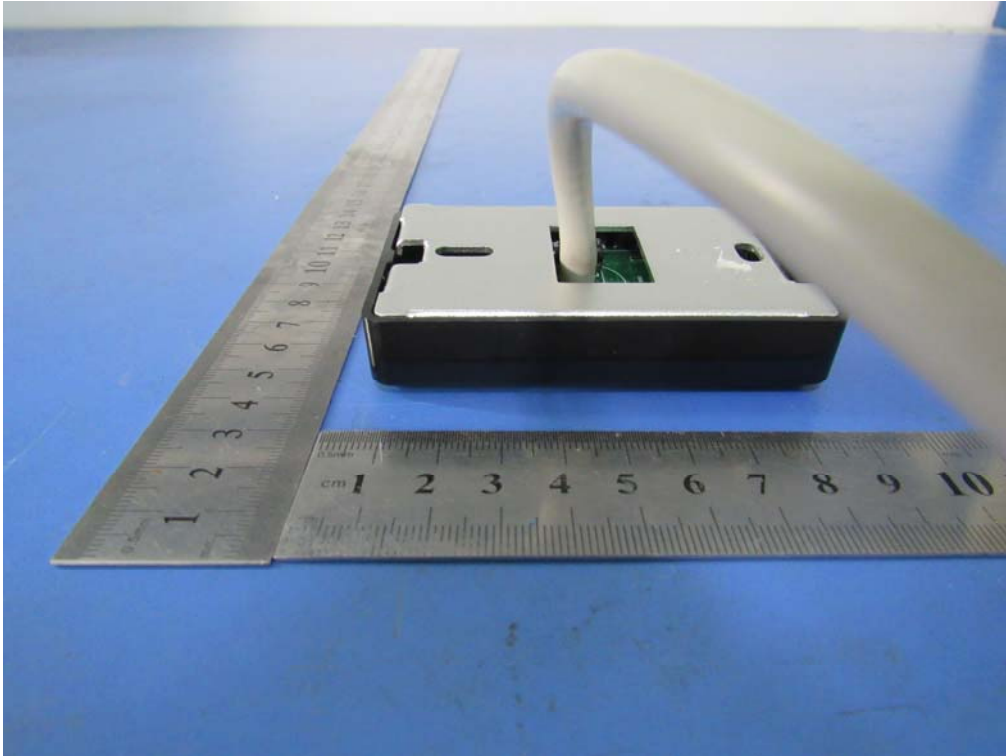
Rear View of EUT



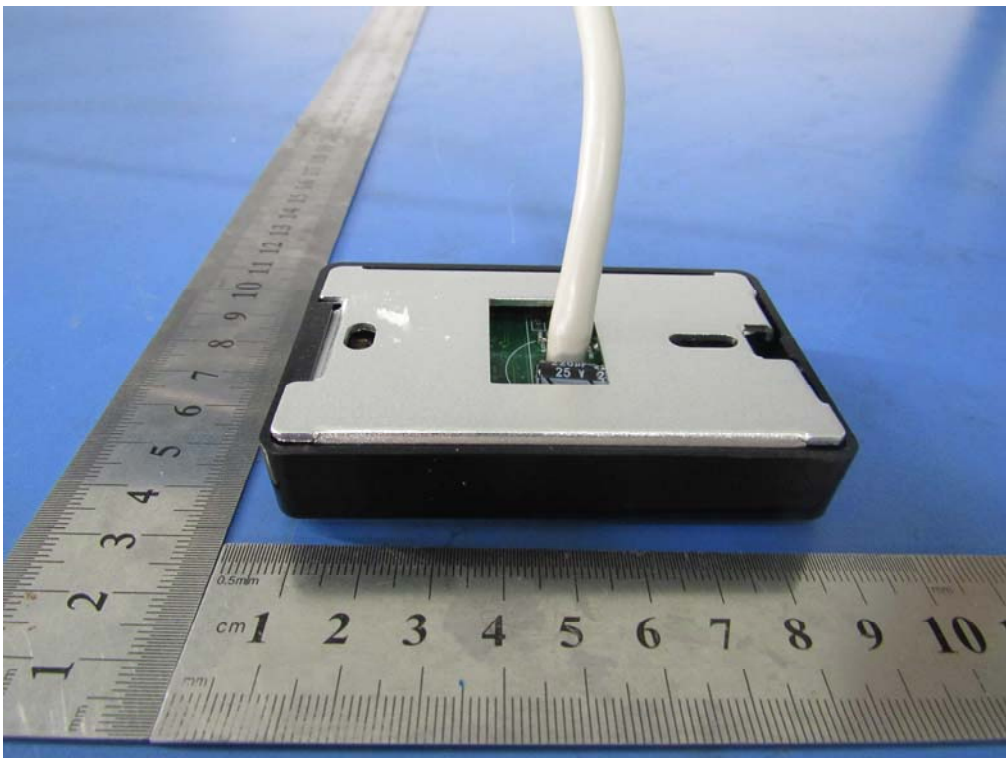
Top View of EUT



Bottom View of EUT



Left View of EUT

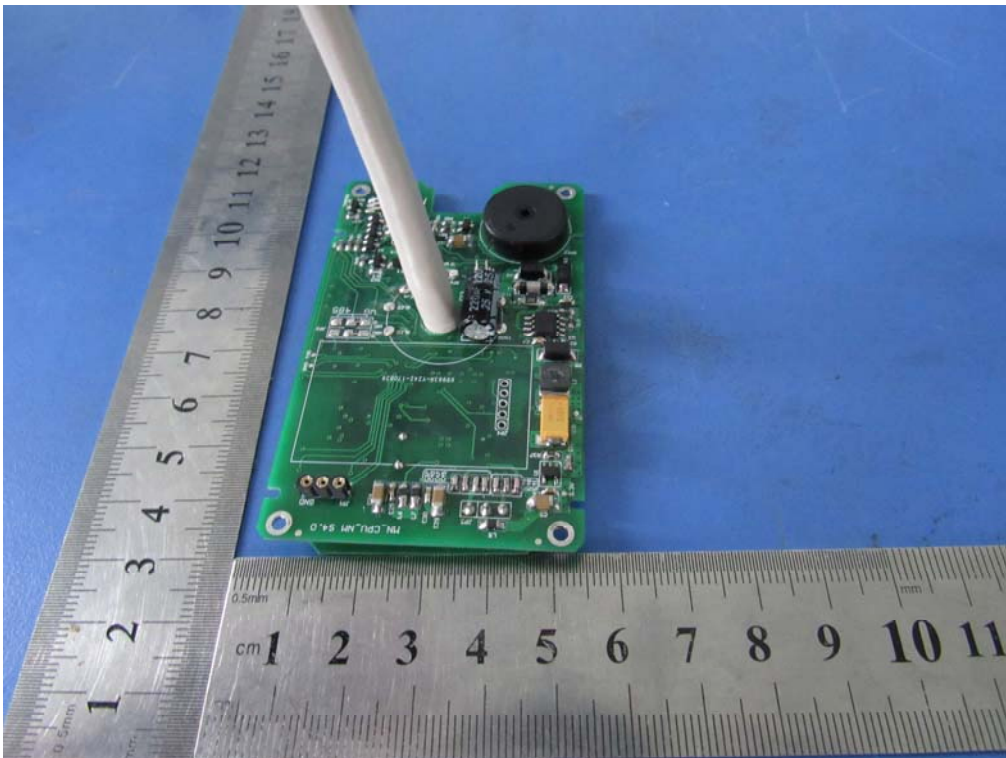


Right View of EUT

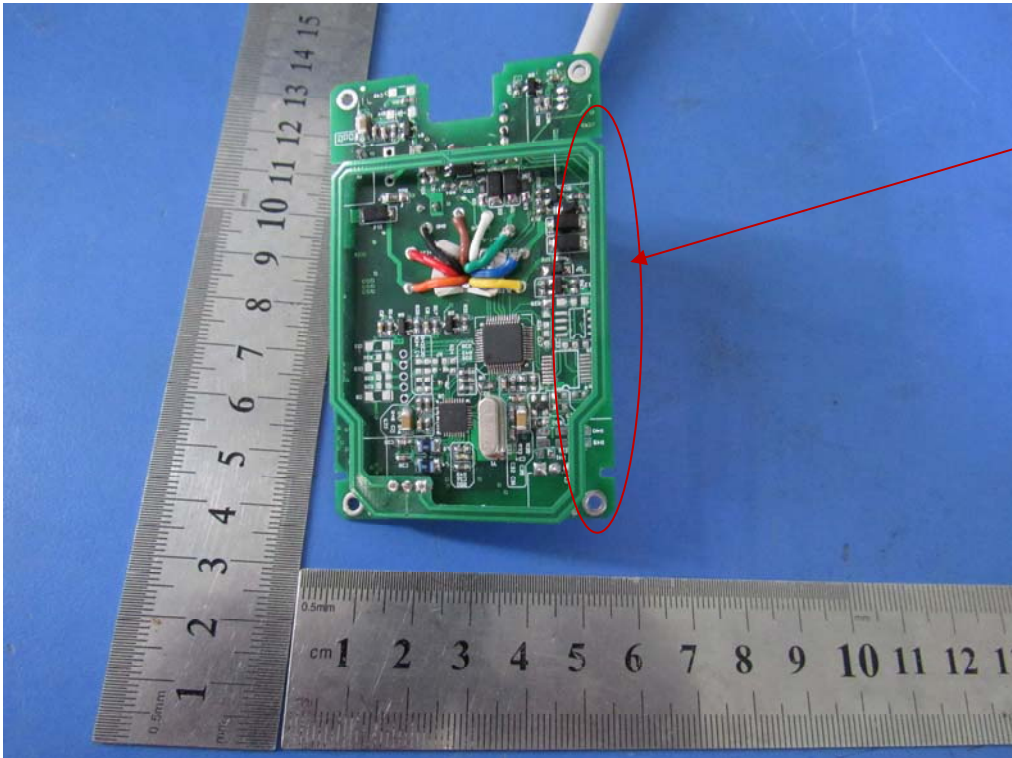
**Annex B.ii. Photograph EUT Internal Photo**



Uncover- Front View

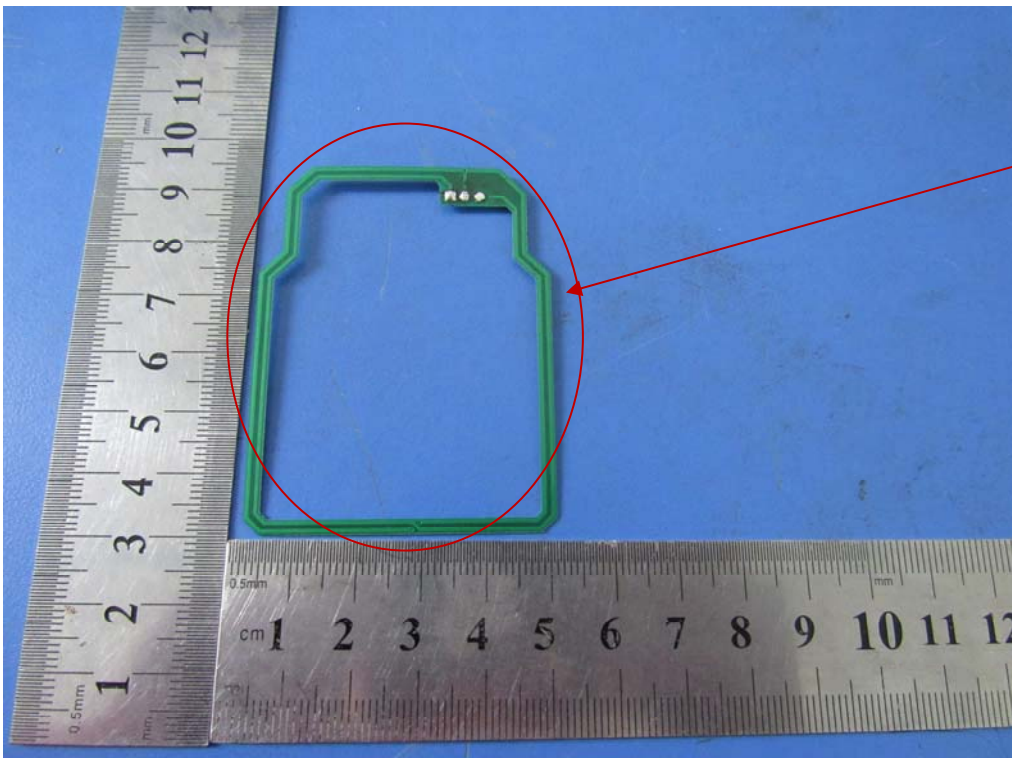


EUT PCBA – Front View



Antenna

EUT PCBA – Rear View



Antenna

Antenna – Front View(13.56MHz)

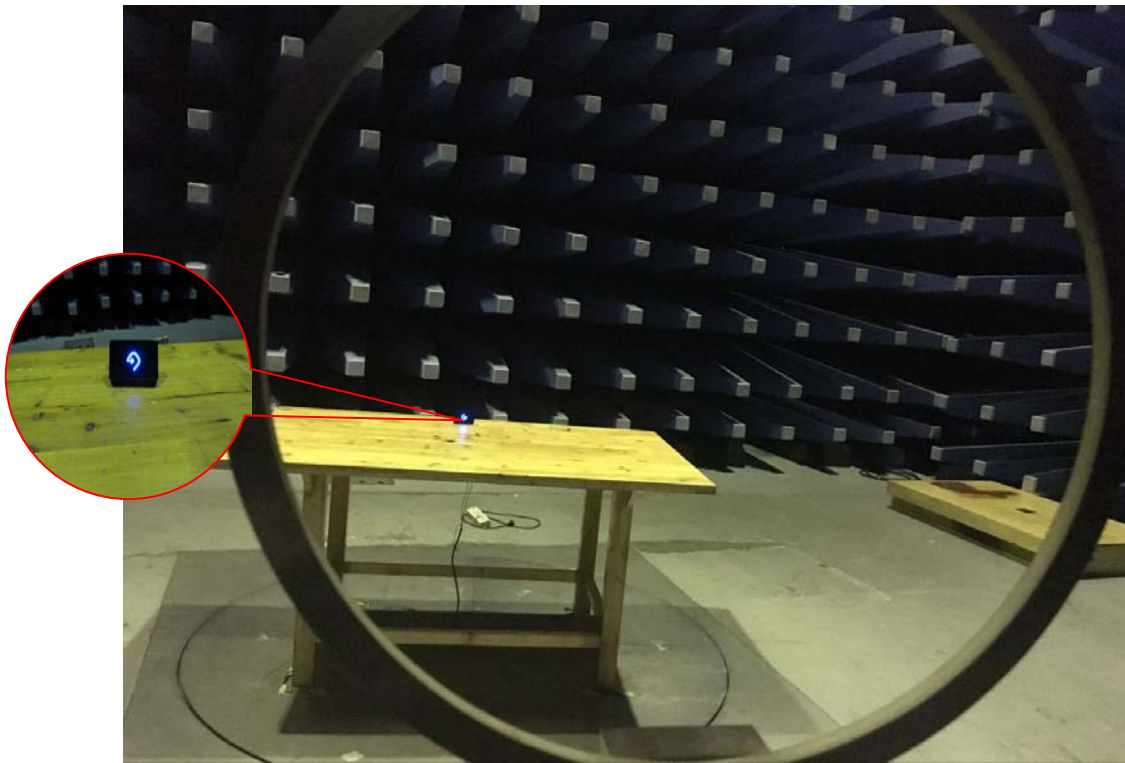
**Annex B.iii. Photograph Test Setup Photo**



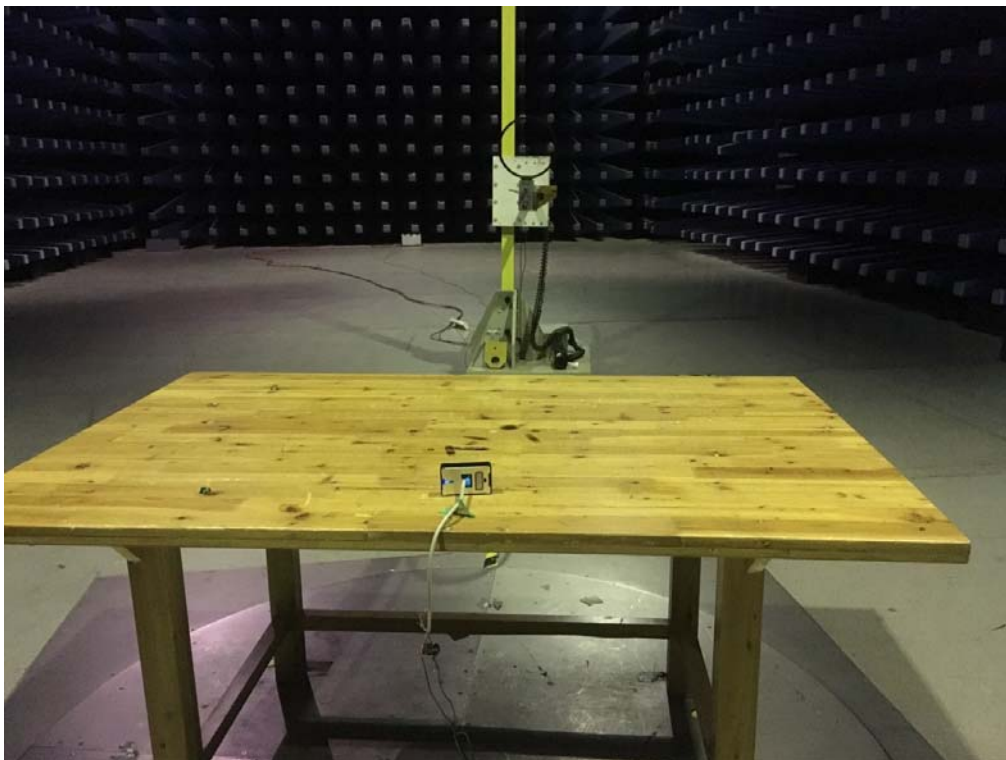
Conducted Emissions Setup Front View



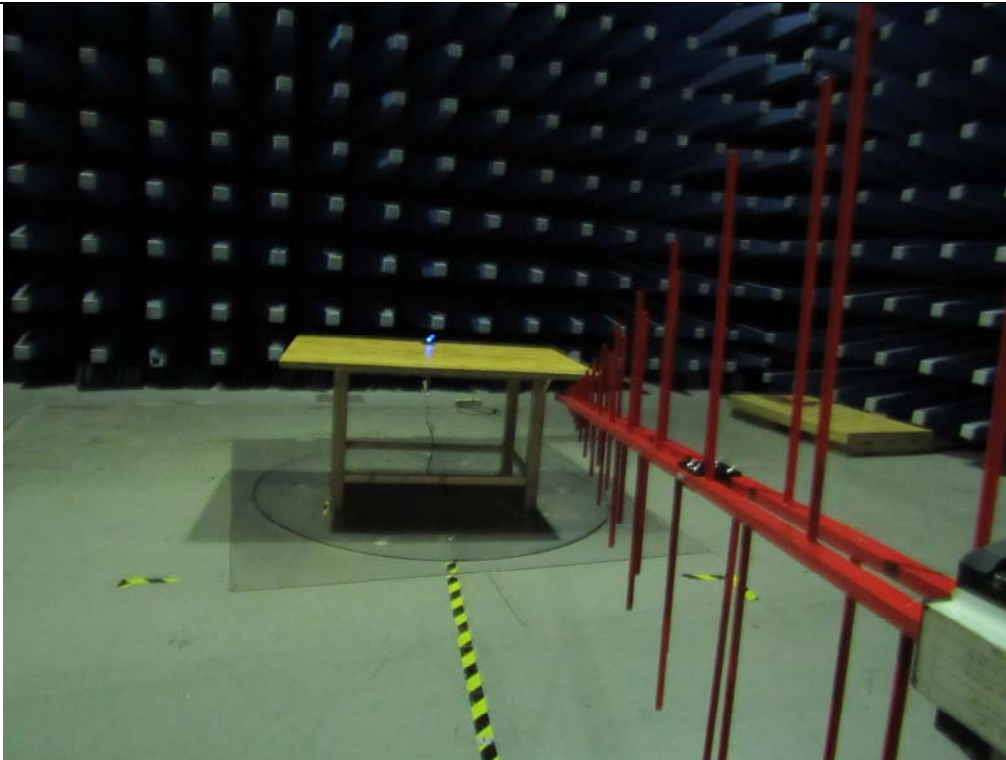
Conducted Emissions Setup Side View



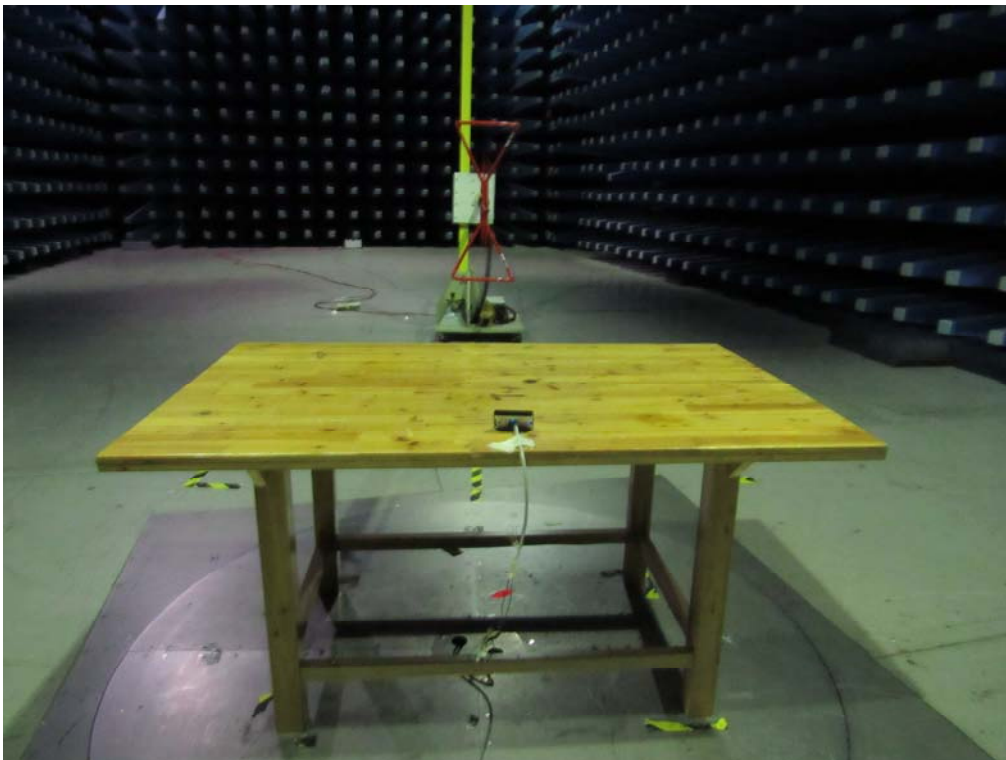
Front View of Radiated Emissions Test Setup below 30MHz



Rear View of Radiated Emissions Test Setup below 30MHz



Front View of Radiated Emissions Test Setup (30MHz-1GHz)

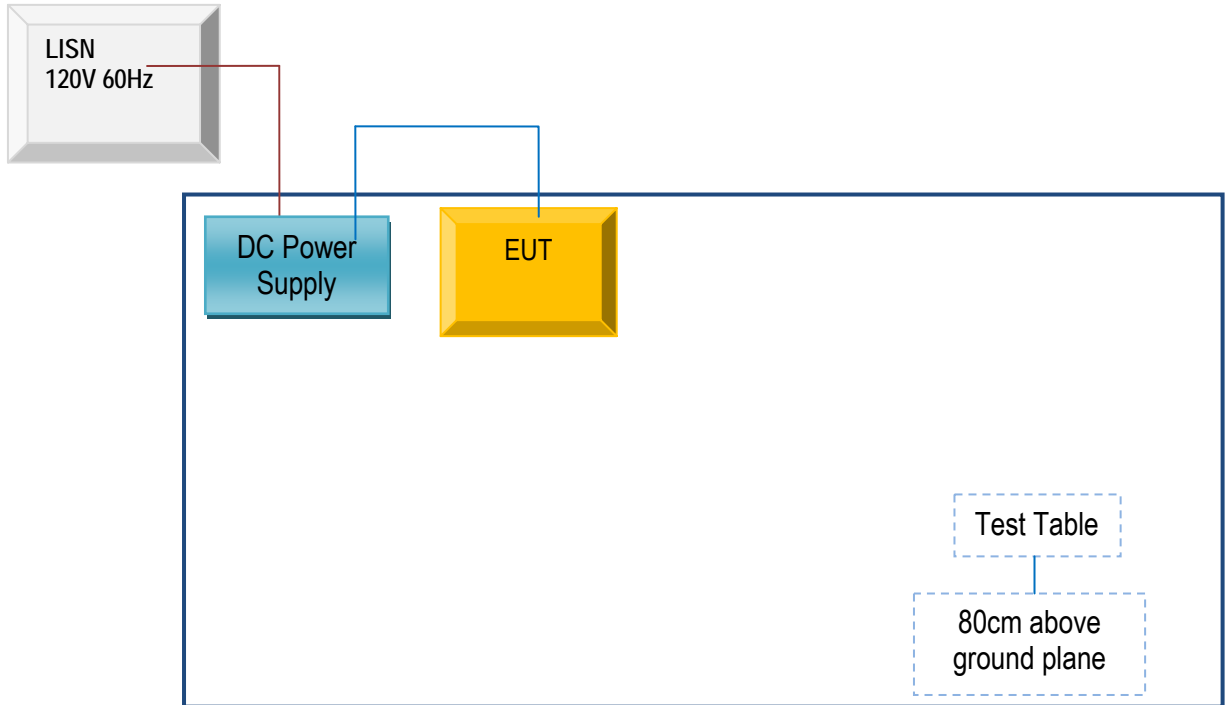


Rear View of Radiated Emissions Test Setup (30MHz-1GHz)

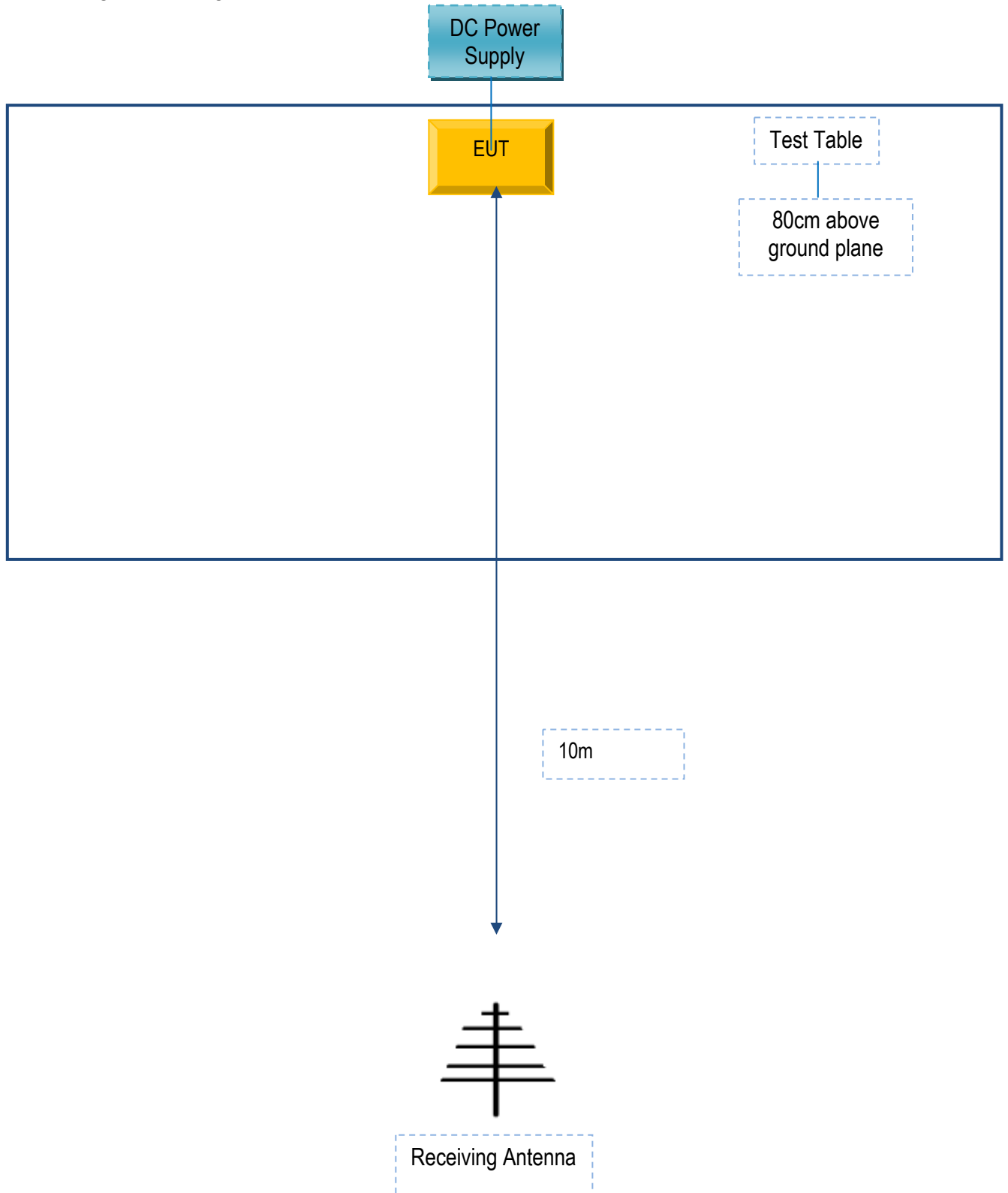


**Annex C. TEST SETUP AND SUPPORTING EQUIPMENT**

**Annex C.i. TEST SET UP BLOCK**



**Block Configuration Diagram for Radiated Emissions**



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**Annex C. ii. SUPPORTING EQUIPMENT DESCRIPTION**

The following is a description of supporting equipment and details of cables used with the EUT.

Manufacturer	Equipment Description	Model
BK PRECISION	DC Power Supply	IT1786B

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## Annex D. User Manual / Block Diagram / Schematics / Partlist

Please see attachment

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## Annex E. DECLARATION OF SIMILARITY

N/A