RF TEST REPORT

SIEMIC
A Bureau Veritas Group Company

Report No.: 17021528-FCC-R1
Supersede Report No.: N/A

Applicant	**Zhejiang VALUE Mechanical & Electrical Products CO.,LTD**
Product Name	**Handheld device**
Main Model	**H2**
Serial Model	**H50, H1, H100, H3, H120**
Test Standard	**FCC Part 15.247: 2017, ANSI C63.10: 2013**
Test Date	**November 08 to November 13, 2017**
Issue Date	**November 15, 2017**
Test Result	**☒ Pass ☐ Fail**
Equipment complied with the specification	☒
Equipment did not comply with the specification	☐

Trety Lu	Deon Dai	
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:
SIEMIC (Nanjing-China) Laboratories
2-1 Longcang Avenue Yuhua Economic and
Technology Development Park, Nanjing, China
Tel:+86(25)86730128/86730129 Fax:+86(25)86730127 Email: China@siemic.com.cn

Laboratories Introduction

SIEMIC, headquartered in the heart of Silicon Valley, with superior facilities in US and Asia, is one of the leading independent testing and certification facilities providing customers with one-stop shop services for Compliance Testing and Global Certifications.

In addition to testing and certification, SIEMIC provides initial design reviews and compliance management throughout a project. Our extensive experience with China, Asia Pacific, North America, European, and International compliance requirements, assures the fastest, most cost effective way to attain regulatory compliance for the global markets.

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

This page has been left blank intentionally.

CONTENTS

1. Report Revision History

Report No.	Report Version	Description	Issue Date
17021528-FCC-R1	NONE	Original	November 15, 2017

2. Customer information

Applicant Name	Zhejiang VALUE Mechanical & Electrical Products CO.,LTD
Applicant Add	jiulong Avenue,Western Industrial District,Wenling,Zhejiang,China
Manufacturer	Zhejiang VALUE Mechanical & Electrical Products CO.,LTD
Manufacturer Add	jiulong Avenue,Western Industrial District,Wenling,Zhejiang,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:	Handheld device
Main Model:	H2
Serial Model:	H50, H1, H100, H3, H120
Date EUT received:	November 06, 2017
Test Date(s):	November 08 to November 13, 2017
Output Max power	BLE: -0.702dBm
Antenna Gain:	BLE:0.5 dBi
Type of Modulation:	BLE: GFSK
RF Operating Frequency (ies):	BLE: 2402-2480 MHz
Number of Channels:	BLE: 40CH
Port:	N/A
Input Power:	4*AAA(4*1.5V)
Trade Name :	N/A
FCC ID:	2ANTN0002

Operating channel list

Channel	Frequency(MHz)	Channel	Frequency(MHz)	Channel	Frequency(MHz)
00	2402	14	2430	28	2458
01	2404	15	2432	29	2460
02	2406	16	2434	30	2462
03	2408	17	2436	31	2464
04	2410	18	2438	32	2466
05	2412	19	2440	33	2468
06	2414	20	2442	34	2470
07	2416	21	2444	35	2472
08	2418	22	2446	36	2474
09	2420	23	2448	37	2476
10	2422	24	2450	38	2478
11	2424	25	2452	39	2480
12	2426	26	2454		
13	2428	27	2456		

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
§15.247 (i), §2.1091	RF Exposure	Compliance
§15.203	Antenna Requirement	Compliance
§15.247 (a)(2)	DTS (6 dB) CHANNEL BANDWIDTH	Compliance
§15.247(b)(3)	Conducted Maximum Output Power	Compliance
§15.247(e)	Power Spectral Density	Compliance
§15.247(d)	Band-Edge & Unwanted Emissions into Non-Restricted Frequency Bands	Compliance
§15.207 (a),	Power Line Conducted Emissions	N/A
§15.205, §15.209, §15.247(d)	Radiated Spurious Emissions & Unwanted Emissions into Restricted Frequency Bands	Compliance

Measurement Uncertainty

Test Item	Description	Uncertainty
Radiated 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)	3.952dB

6. Measurements, Examination And Derived Results

6.1 RF Exposure

The EUT is a portable device, thus requires RF exposure evaluation;
Please refer to SIEMIC RF Exposure Report: 17021528-FCC-H1.

6.2 Antenna Requirement

Applicable Standard

According to § 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. 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 user of a standard antenna jack or electrical connector is prohibited. The structure and application of the EUT were analyzed to determine compliance with section §15.203 of the rules. §15.203 state that the subject device must meet the following criteria:

a. Antenna must be permanently attached to the unit.
b. Antenna must use a unique type of connector to attach to the EUT.

Unit must be professionally installed, and installer shall be responsible for verifying that the correct antenna is employed with the unit. And according to FCC 47 CFR section 15.247 (b), if the transmitting antennas of directional gain greater than 6dBi are used, the power shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

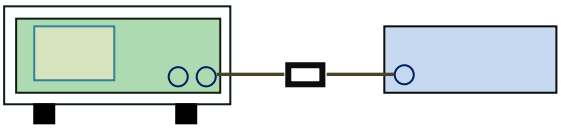
Antenna Connector Construction

Antenna must be permanently attached to the unit, it meets up with the ANTENNA REQUIREMENT.

Result: Compliant.

6.3 DTS (6 dB) Channel Bandwidth

Temperature	20°C
Relative Humidity	50%
Atmospheric Pressure	1019mbar
Test date :	November 08, 2017
Tested By :	Trety Lu

Spec	Item	Requirement	Applicable
§ 15.247(a)(2) RSS Gen (4.6.1)	a)	6dB BW≥500kHz;	☒
	b)	20dB BW: For FCC reference only; required by IC.	☐
Test Setup			
Test Procedure	558074 D01 DTS Meas Guidance V04, 8.1 DTS bandwidth 6dB Emission bandwidth measurement procedure - Set RBW = 100 kHz. - Set the video bandwidth (VBW) ≥ 3 x RBW. - Detector = Peak. - Trace mode = max hold. - Sweep = auto couple. - Allow the trace to stabilize. 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 6 dB relative to the maximum level measured in the fundamental emission.		
Remark			
Result	☒Pass	☐Fail	
Test Data	☒Yes	☐N/A	
Test Plot	☒Yes (See below)	☐N/A	

6dB Bandwidth measurement result

Type	Test mode	CH	Freq (MHz)	Result (MHz)	Limit (MHz)	Result
6dB BW	BLE	Low	2402	0.7067	≥0.5	Pass
		Mid	2440	0.7193	≥0.5	Pass
		High	2480	0.7116	≥0.5	Pass

Test Plots

6dB Bandwidth measurement result

6dB Bandwidth - Low CH 2402

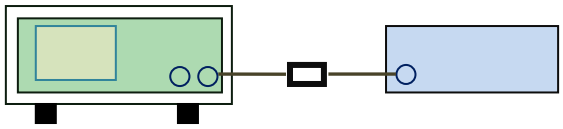
6dB Bandwidth - Mid CH 2440

6dB Bandwidth - High CH 2480

6.4 Maximum Output Power

Temperature	20°C
Relative Humidity	50%
Atmospheric Pressure	1019mbar
Test date :	November 08, 2017
Tested By :	Trety Lu

Requirement(s):

Spec	Item	Requirement	Applicable
§15.247(b)(2),RSS210 (A8.4)	a)	FHSS in 2400-2483.5MHz with ≥ 75 channels: ≤1 Watt	☐
	b)	FHSS in 5725-5850MHz: ≤1 Watt	☐
	c)	For all other FHSS in the 2400-2483.5MHz band: ≤0.125 Watt.	☐
	d)	FHSS in 902-928MHz with ≥ 50 channels: ≤1 Watt	☐
	e)	FHSS in 902-928MHz with ≥ 25 & <50 channels: ≤0.25 Watt	☐
	f)	DSSS in 902-928MHz, 2400-2483.5MHz, 5725-5850MHz: ≤1 Watt	☒
Test Setup			
Test Procedure	558074 D01 DTS Meas Guidance V04, 9.1.2 Integrated band power method Maximum output power measurement procedure a) Set the RBW ≥ DTS bandwidth. b) Set VBW ≥ 3 × RBW. c) Set span ≥ 3 x RBW d) Sweep time = auto couple. e) Detector = peak. f) Trace mode = max hold. g) Allow trace to fully stabilize. h) Use peak marker function to determine the peak amplitude level.		
Remark			
Result	☒Pass	☐Fail	
Test Data	☒Yes	☐N/A	
Test Plot	☒Yes (See below)	☐N/A	

Output Power measurement result

Type	Test mode	CH	Freq (MHz)	Conducted Power (dBm)	Limit (dBm)	Result
Output power	BLE	Low	2402	-4.877	30	Pass
		Mid	2440	-2.560	30	Pass
		High	2480	-0.702	30	Pass

Test Plots

Output Power measurement result

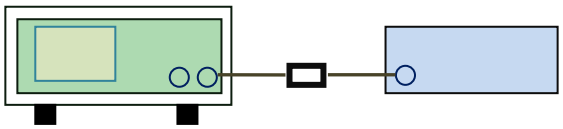
Output power - Low CH 2402

Output power - Mid CH 2440

Output power - High CH 2480

6.5 Power Spectral Density

Temperature	20°C
Relative Humidity	50%
Atmospheric Pressure	1019mbar
Test date :	November 08, 2017
Tested By :	Trety Lu

Spec	Item	Requirement	Applicable
§15.247(e)	a)	The power spectral density conducted from the intentional radiator to the antenna shall not be greater than 8 dBm in any 3 kHz band during any time interval of continuous transmission.	☒
Test Setup			
Test Procedure	558074 D01 DTS MEAS Guidance V04 10.2 power spectral density method power spectral density measurement procedure a) Set analyzer center frequency to DTS channel center frequency. b) Set the span to 1.5 times the DTS bandwidth. c) Set the RBW to: 3 kHz ≤ RBW ≤ 100 kHz. d) Set the VBW ≥ 3 × RBW. e) Detector = peak. f) Sweep time = auto couple. g) Trace mode = max hold. h) Allow trace to fully stabilize. i) Use the peak marker function to determine the maximum amplitude level within the RBW. j) If measured value exceeds limit, reduce RBW (no less than 3 kHz) and repeat.		
Remark			
Result	☒ Pass ☐ Fail		
Result	☒ Pass ☐ Fail		
Test Data	☒ Yes ☐ N/A		

Power Spectral Density measurement result

Type	Test mode	CH	Freq (MHz)	PSD (dBm)	Limit (dBm)	Result
PSD	BLE	Low	2402	-5.510	8	Pass
		Mid	2440	-3.268	8	Pass
		High	2480	-1.380	8	Pass

Test Plots

Power Spectral Density measurement result

PSD - Low CH 2402

PSD - Mid CH 2440

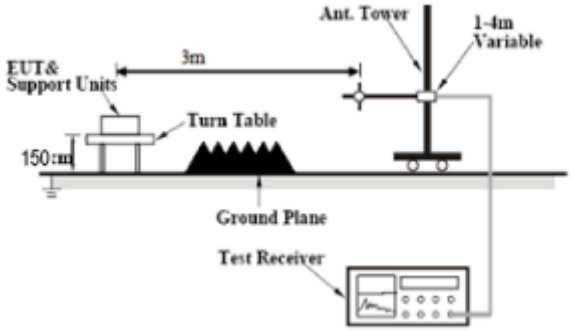
PSD - High CH 2480

6.6 Band-Edge & Unwanted Emissions into Non-Restricted Frequency Bands

Temperature	20°C
Relative Humidity	50%
Atmospheric Pressure	1019mbar
Test date :	November 13, 2017
Tested By :	Trety Lu

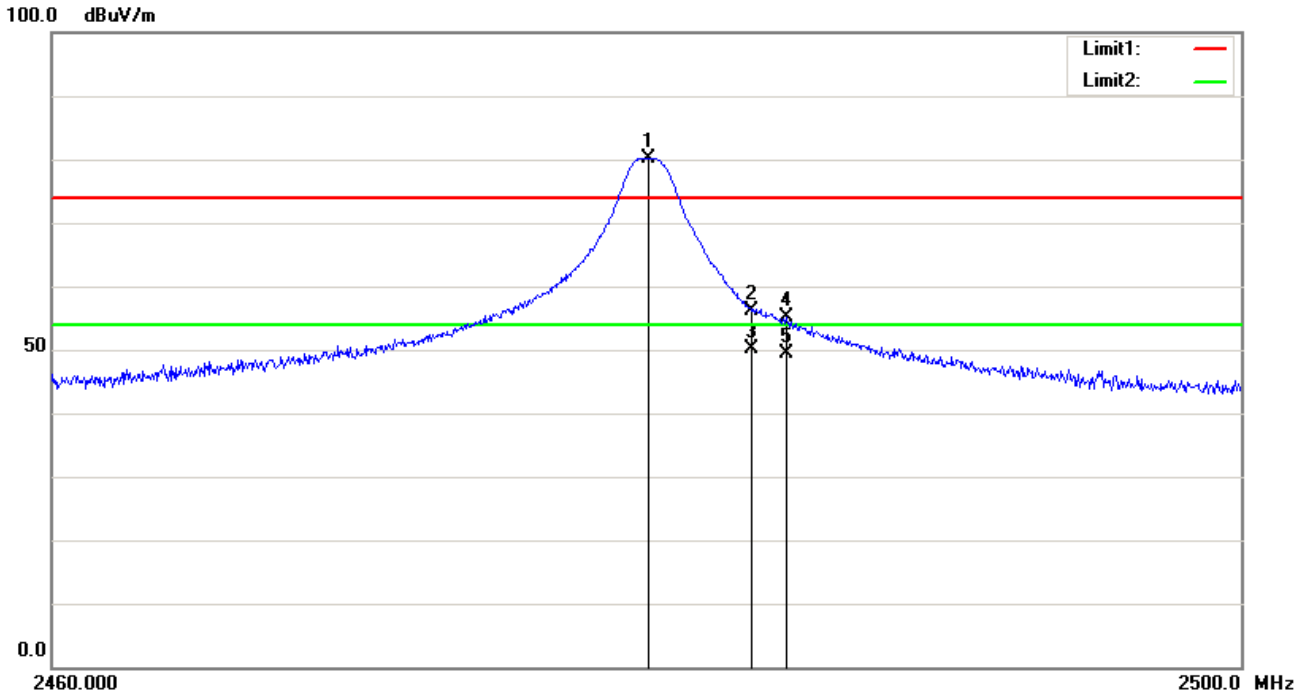
Requirement(s):

Spec	Item	Requirement	Applicable
§15.247(d)	a)	In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits.	☒

Test Setup	
Test Procedure	Radiated Method Only - 1. Check the calibration of the measuring instrument using either an internal calibrator or a known signal from an external generator. - 2. Position the EUT without connection to measurement instrument. Put it on the Rotated table and turn on the EUT and make it operate in transmitting mode. Then set it to Low Channel and High Channel within its operating range, and make sure the instrument is operated in its linear range. - 3. First, set both RBW and VBW of spectrum analyzer to 100 kHz with a convenient frequency span including 100kHz bandwidth from band edge, check the emission of EUT, if pass then set Spectrum Analyzer as below: a. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120 kHz for Quasi Peak detection at frequency below 1GHz. b. The resolution bandwidth of test receiver/spectrum analyzer is 1MHz and video bandwidth is 3MHz for Peak detection at frequency above 1GHz. c. The resolution bandwidth of test receiver/spectrum analyzer is 1MHz and the video bandwidth for Average detection (AV) as below at frequency above 1GHz. ■ 1/T kHz (Duty cycle < 98%) □ 10 Hz (Duty cycle > 98%) - 4. Measure the highest amplitude appearing on spectral display and set it as a reference level. Plot the graph with marking the highest point and edge frequency. - 5. Repeat above procedures until all measured frequencies were complete.
Remark	
Result	☒ Pass ☐ Fail
Test Data	☒ Yes ☐ N/A
Test Plot	☒ Yes (See below) ☐ N/A

Test Plots
Band Edge measurement result

Test Mode:	Transmitting BLE Mode

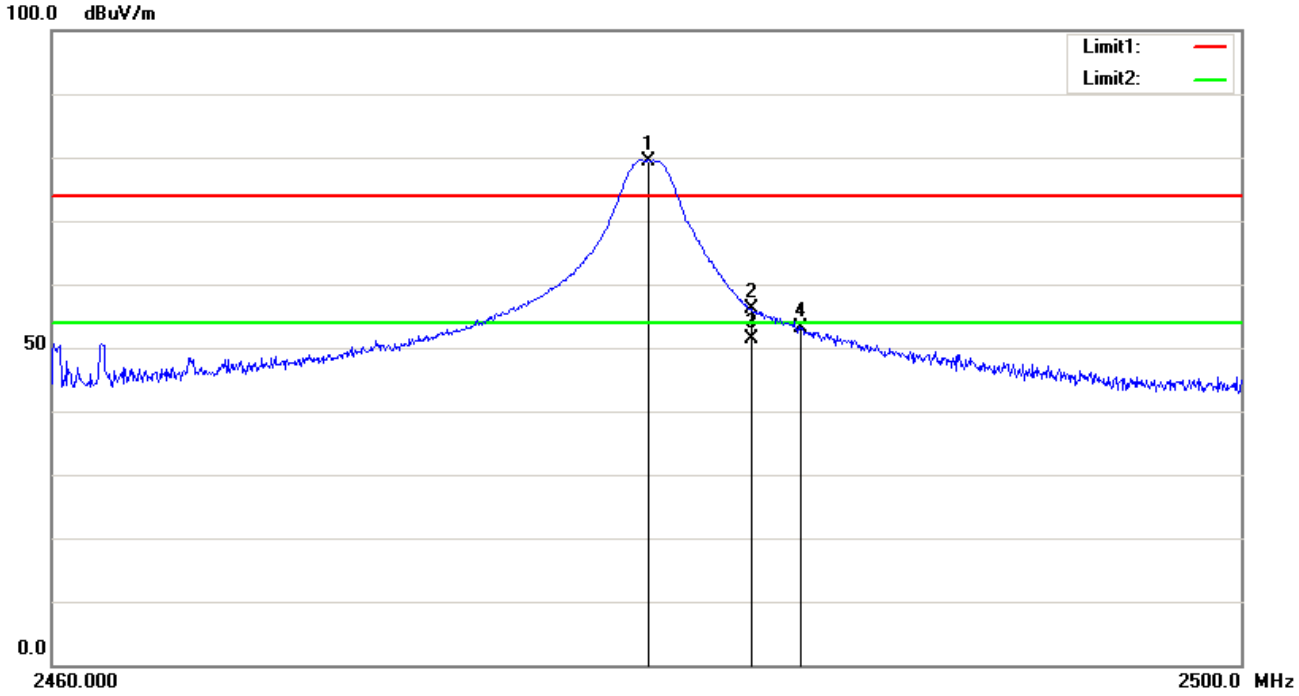


Test Data

GFSK-Right Side-V

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	2480.000	97.09	peak	31.59	52.62	4.06	80.12	74.00	6.12	100	308
2	2483.500	73.17	peak	31.59	52.63	4.06	56.19	74.00	-17.81	100	271
3	2483.500	67.10	AVG	31.59	52.63	4.06	50.12	54.00	-3.88	100	271
4	2484.680	72.08	peak	31.59	52.63	4.06	55.10	74.00	-18.90	200	271
5	2484.680	66.31	AVG	31.59	52.63	4.06	49.33	54.00	-4.67	200	271

Test Mode:	Transmitting BLE Mode

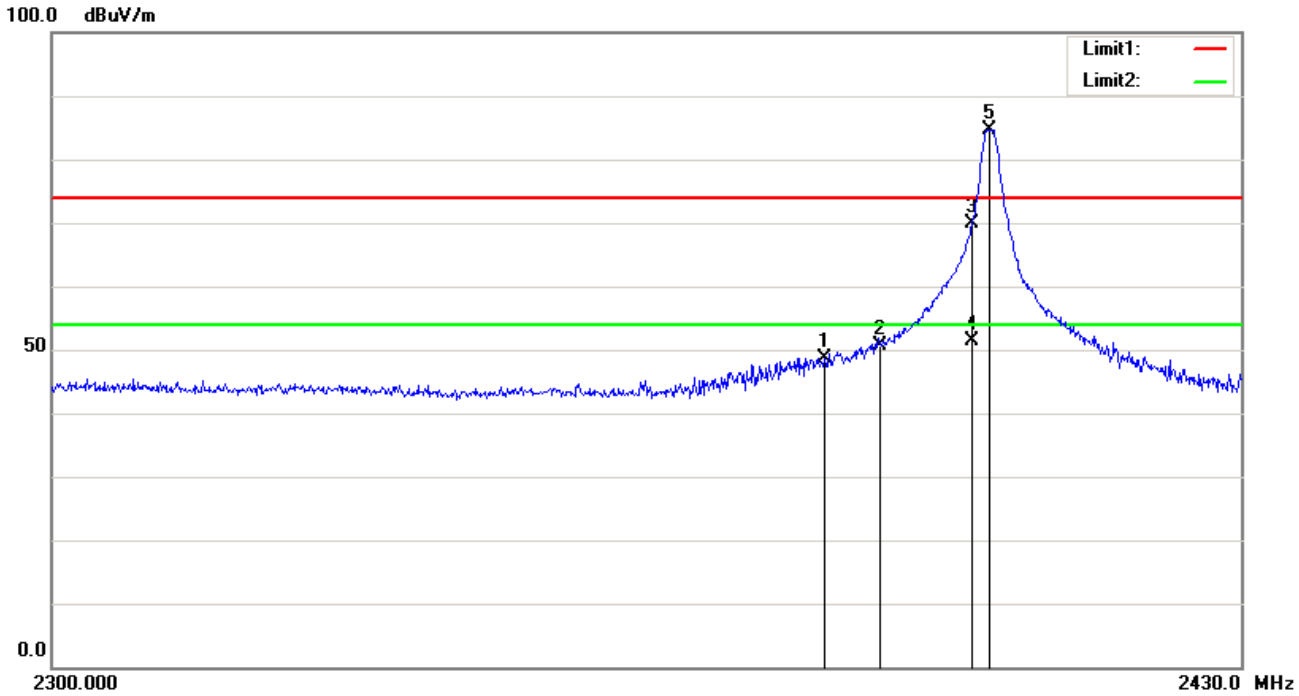


Test Data

GFSK-Right Side-H

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	2480.000	96.47	peak	31.59	52.62	4.06	79.50	74.00	5.50	100	333
2	2483.500	73.06	peak	31.59	52.63	4.06	56.08	74.00	-17.92	100	333
3	2483.500	68.36	AVG	31.59	52.63	4.06	51.38	54.00	-2.62	100	333
4	2485.160	70.15	peak	31.59	52.63	4.06	53.17	74.00	-20.83	100	321

Test Mode:	Transmitting BLE Mode

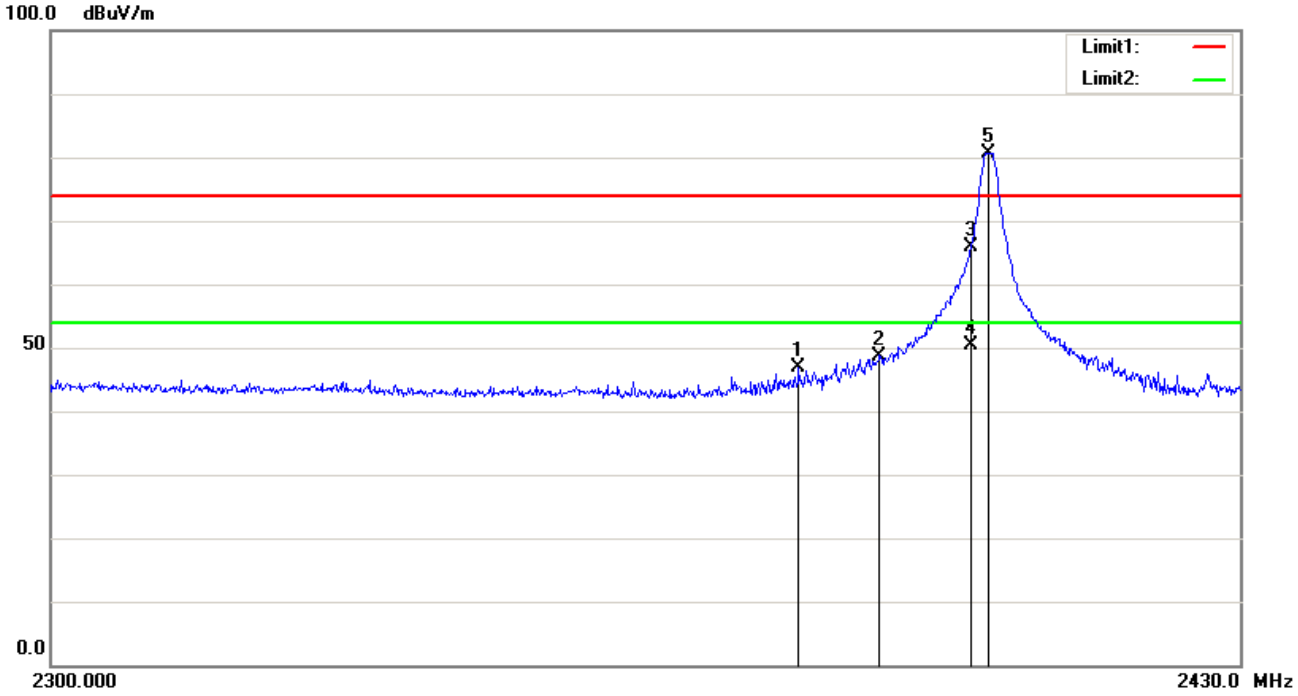


Test Data

GFSK-Left Side-V

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	2383.720	65.69	peak	31.53	52.55	4.03	48.70	74.00	-25.30	200	316
2	2390.000	67.61	peak	31.53	52.55	4.02	50.61	74.00	-23.39	200	317
3	2400.000	86.81	peak	31.54	52.56	4.01	69.80	74.00	-4.20	100	317
4	2400.000	68.34	AVG	31.54	52.56	4.01	51.33	54.00	-2.67	100	317
5	2402.000	101.64	peak	31.54	52.56	4.01	84.63	74.00	10.63	200	317

Test Mode:	Transmitting BLE Mode



Test Data

GFSK-Left Side-H

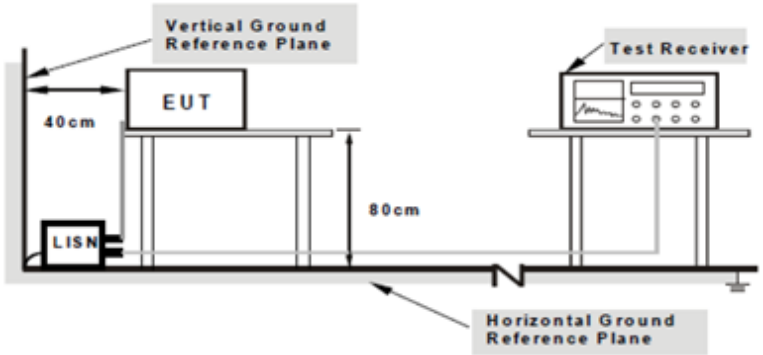
No.	Frequency (MHz)	Reading (dBµV/m)	Detector	Ant_F (dB/m)	PA_G (dB)	Cab_L (dB)	Result (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Degree (°)
1	2380.990	63.83	peak	31.53	52.54	4.03	46.85	74.00	-27.15	200	324
2	2390.000	65.64	peak	31.53	52.55	4.02	48.64	74.00	-25.36	100	325
3	2400.000	82.78	peak	31.54	52.56	4.01	65.77	74.00	-8.23	100	329
4	2400.000	67.30	AVG	31.54	52.56	4.01	50.29	54.00	-3.71	100	329
5	2402.000	97.60	peak	31.54	52.56	4.01	80.59	74.00	6.59	100	310

6.7 Power Line Conducted Emissions

Temperature	---
Relative Humidity	---
Atmospheric Pressure	---
Test date :	---
Tested By :	---

Requirement(s):

<table>
<tr><th>Spec</th><th>Item</th><th>Requirement</th><th>Applicable</th></tr>
<tr><td>47CFR§15.207, RSS210 (A8.1)</td><td>a)</td><td>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 frequencies ranges.

Class A Limit
<table>
<tr><th rowspan="2">Frequency ranges (MHz)</th><th colspan="2">Limit (dBμV)</th></tr>
<tr><th>QP</th><th>Average</th></tr>
<tr><td>0.15 ~ 0.5</td><td>79</td><td>66</td></tr>
<tr><td>0.5 ~ 30</td><td>73</td><td>60</td></tr>
</table>
Class B Limit
<table>
<tr><th rowspan="2">Frequency ranges (MHz)</th><th colspan="2">Limit (dBμV)</th></tr>
<tr><th>QP</th><th>Average</th></tr>
<tr><td>0.15 ~ 0.5</td><td>66 – 56</td><td>56 – 46</td></tr>
<tr><td>0.5 ~ 5</td><td>56</td><td>46</td></tr>
<tr><td>5 ~ 30</td><td>60</td><td>50</td></tr>
</table></td><td>☐</td></tr>
<tr><td>Test Setup</td><td colspan="3"> 

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.</td></tr>
<tr><td>Procedure</td><td colspan="3">1. 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.
2. The power supply for the EUT was fed through a 50W/50mH EUT LISN, connected to filtered mains.
3. The RF OUT of the EUT LISN was connected to the EMI test receiver via a low-loss coaxial cable.
4. All other supporting equipment were powered separately from another main supply.
5. The EUT was switched on and allowed to warm up to its normal operating condition.
6. A scan was made on the NEUTRAL line (for AC mains) or Earth line (for DC power) over the required frequency range using an EMI test receiver.
7. High peaks, relative to the limit line, The EMI test receiver was then tuned to the selected frequencies and the necessary measurements made with a receiver bandwidth setting of 10 kHz.
8. Step 7 was then repeated for the LIVE line (for AC mains) or DC line (for DC power).</td></tr>
<tr><td>Remark</td><td colspan="3">Power supply by battery</td></tr>
<tr><td>Result</td><td colspan="3">☐Pass ☐Fail ☒N/A</td></tr>
</table>

Test Data	☐Yes ☒N/A
Test Plot	☐Yes (See below) ☒N/A

Data sample

No.	Frequency	Reading	Detector	Lisn/Isn	Ps_Lmt	Cab_L	Result	Limit	Margin
	(MHz)	(dBμV)		(dB}	(dB)	(dB)	(dBμV)	(dBμV)	(dB)

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

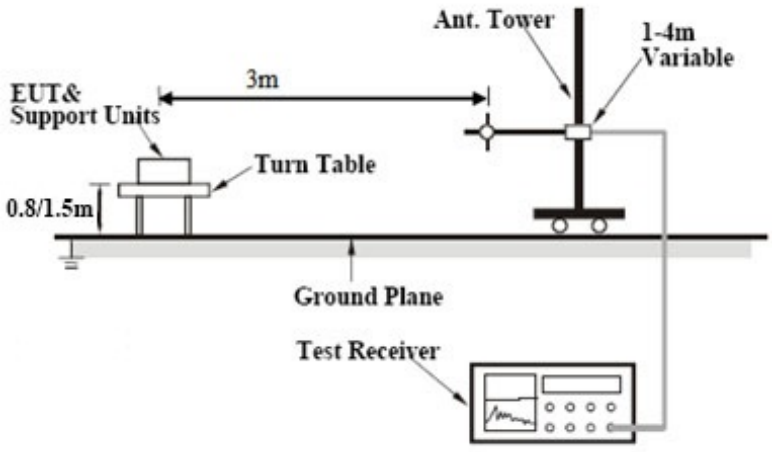
Calculation Formula:

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

6.8 Radiated Emissions

Temperature	20°C
Relative Humidity	50%
Atmospheric Pressure	1019mbar
Test date :	November 10, 2017
Tested By :	Trety Lu

Requirement(s):

<table>
<tr><th>Spec</th><th>Item</th><th>Requirement</th><th>Applicable</th></tr>
<tr><td>47CFR§15.247(d), RSS210 (A8.5)</td><td>a)</td><td>Except higher limit as specified elsewhere in other section, the emissions from the low-power radio-frequency devices shall not exceed the field strength levels specified in the following table and the level of any unwanted emissions shall not exceed the level of the fundamental emission. The tighter limit applies at the band edges
Class A Limit
<table>
<tr><th>Frequency range (MHz)</th><th>Field Strength (μV/m)</th></tr>
<tr><td>30 – 88</td><td>90</td></tr>
<tr><td>88 – 216</td><td>150</td></tr>
<tr><td>216 – 960</td><td>210</td></tr>
<tr><td>Above 960</td><td>300</td></tr>
</table>
Class B Limit
<table>
<tr><th>Frequency range (MHz)</th><th>Field Strength (μV/m)</th></tr>
<tr><td>30 – 88</td><td>100</td></tr>
<tr><td>88 – 216</td><td>150</td></tr>
<tr><td>216 – 960</td><td>200</td></tr>
<tr><td>Above 960</td><td>500</td></tr>
</table></td><td>☒</td></tr>
<tr><td>Test Setup</td><td colspan="3"> 
</td></tr>
<tr><td>Procedure</td><td colspan="3">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 characterization. Maximization of the emissions, was carried out by rotating the EUT, changing the antenna polarization, and adjusting the antenna height in the following manner:
a. Vertical or horizontal polarization (whichever gave the higher emission level over a full rotation of the EUT) was chosen.
b. The EUT was then rotated to the direction that gave the maximum emission.
c. Finally, the antenna height was adjusted to the height that gave the maximum emission.
3. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120 kHz for Quasiy Peak detection at frequency below 1GHz.
4. The resolution bandwidth of test receiver/spectrum analyzer is 1MHz and video bandwidth is 3MHz with Peak detection for Peak measurement at frequency above 1GHz.
The resolution bandwidth of test receiver/spectrum analyzer is 1MHz and the video bandwidth with Peak</td></tr>
</table>

	detection for Average Measurement as below at frequency above 1GHz. ■ 1/T kHz (Duty cycle < 98%) □ 10 Hz (Duty cycle > 98%) 5. Steps 2 and 3 were repeated for the next frequency point, until all selected frequency points were measured.
Remark	
Result	☒Pass ☐Fail
Test Data	☒Yes ☐N/A
Test Plot	☒Yes (See below) ☐N/A

Data sample

No.	Frequency	Reading	Detector	Ant_F	PA_G	Cab_L	Result	Limit	Margin	Height	Degree
	(MHz)	(dBμV/m)		(dB/m)	(dB)	(dB)	(dBμV/m)	(dBμV/m)	(dB)	(cm)	(°)

Frequency (MHz) = Emission frequency in MHz

Reading (dBμV/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 (dBμV/m) = Read ing Value + Corrected Value

Limit (dBμV/m) = Limit stated in standard

Height (cm) = Height of Receiver antenna

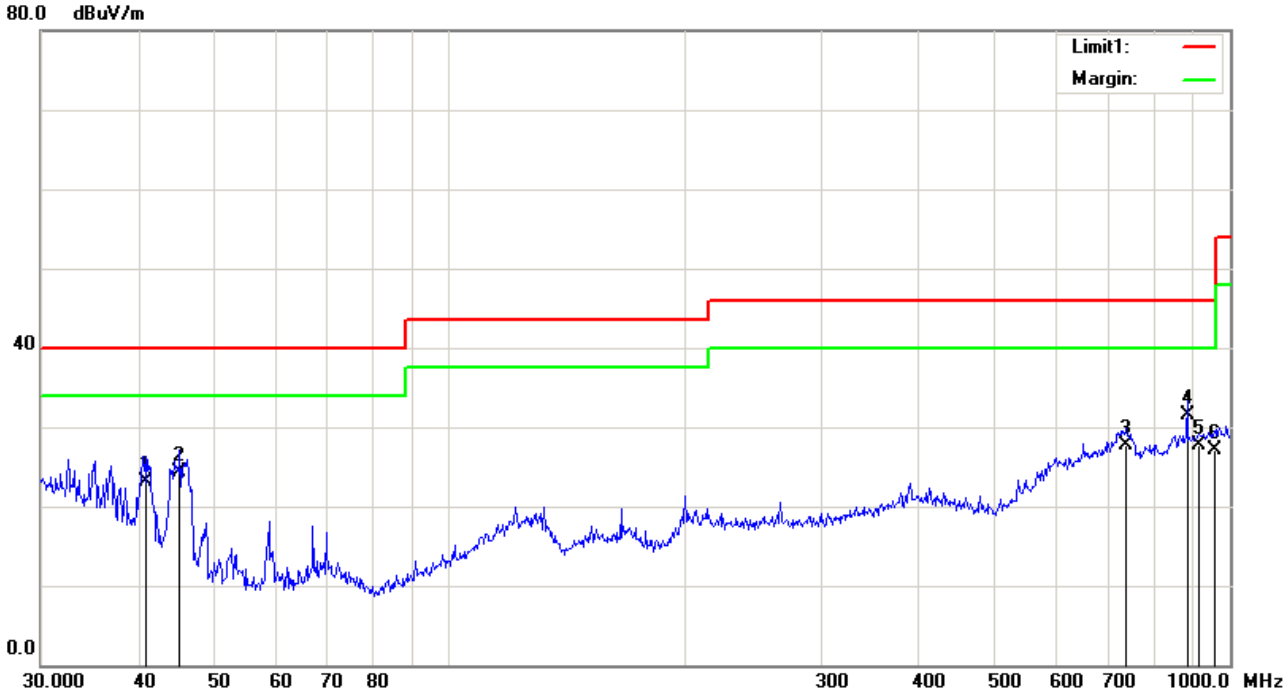
Degree = Turn table degree

Calculation Formula:

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

Test Mode:	Transmitting BLE Mode-Low Channel

Below 1GHz



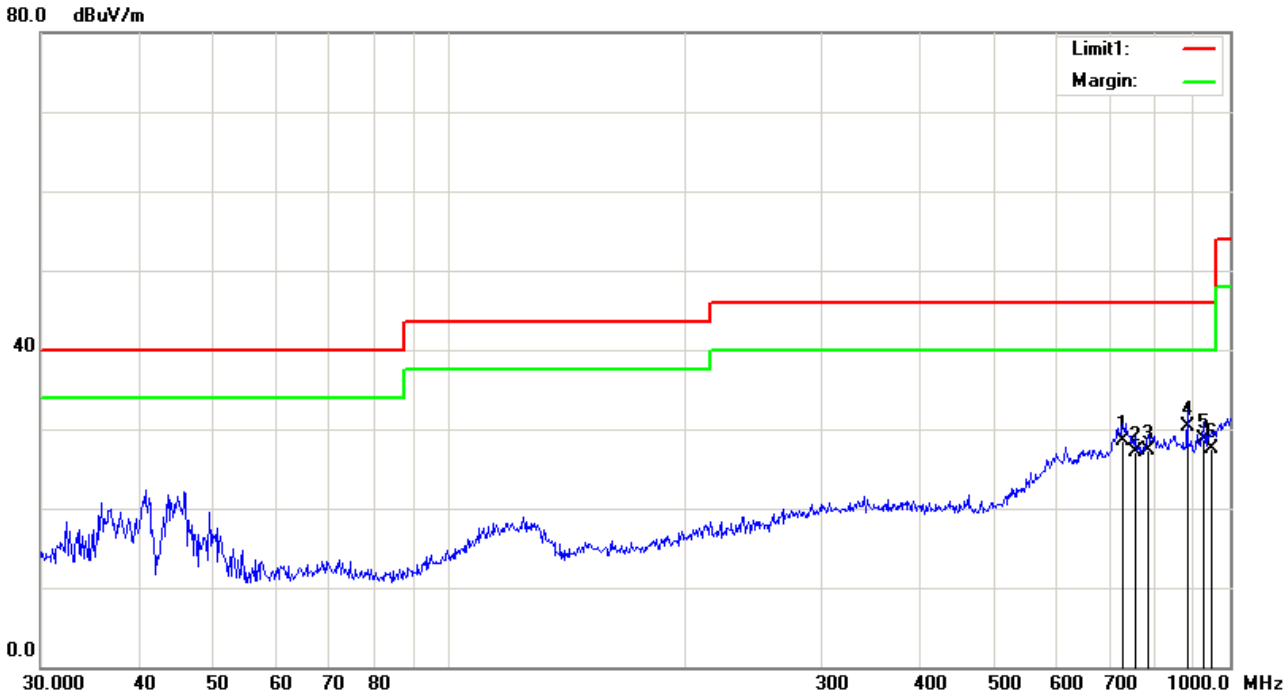
Test Data

Vertical Polarity Plot @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	40.8446	52.61	QP	15.21	45.75	1.07	23.14	40.00	-16.86	100	162
2	45.2166	56.94	QP	12.27	46.03	1.15	24.33	40.00	-15.67	200	152
3	737.0714	46.33	QP	22.20	45.21	4.36	27.68	46.00	-18.32	100	82
4	881.4067	49.33	QP	23.28	45.95	4.80	31.46	46.00	-14.54	200	225
5	912.8620	45.77	QP	23.66	46.63	4.89	27.69	46.00	-18.31	300	350
6	955.4381	44.74	QP	23.64	46.16	4.97	27.19	46.00	-18.81	200	27

Test Mode:	Transmitting BLE Mode-Low Channel

Below 1GHz

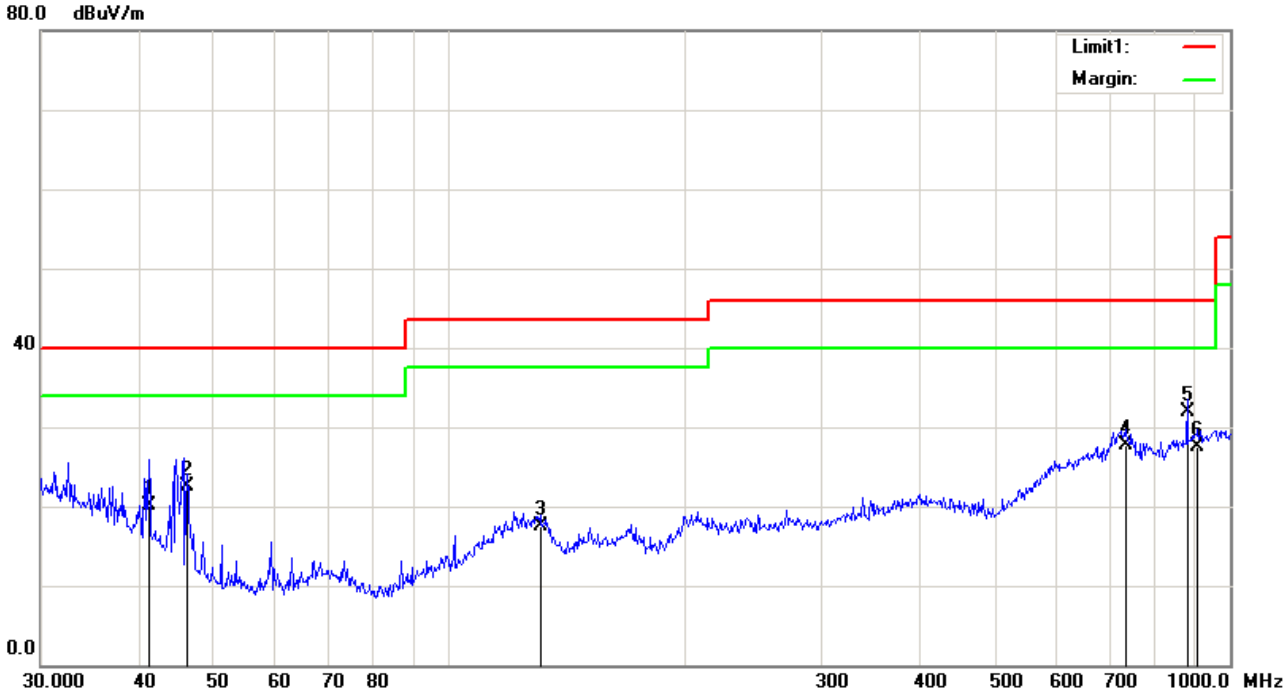


Horizontal Polarity Plot @3m

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	729.3583	47.00	QP	22.58	45.46	4.34	28.46	46.00	-17.54	200	212
2	755.3873	45.03	QP	22.73	44.98	4.41	27.19	46.00	-18.81	300	137
3	785.0935	46.11	QP	22.91	46.19	4.50	27.33	46.00	-18.67	300	271
4	881.4067	48.60	QP	22.76	45.95	4.80	30.21	46.00	-15.79	200	357
5	925.7563	46.84	QP	23.32	46.40	4.91	28.67	46.00	-17.33	100	215
6	948.7610	44.64	QP	23.87	46.02	4.96	27.45	46.00	-18.55	200	246

Test Mode:	Transmitting BLE Mode-Middle Channel

Below 1GHz



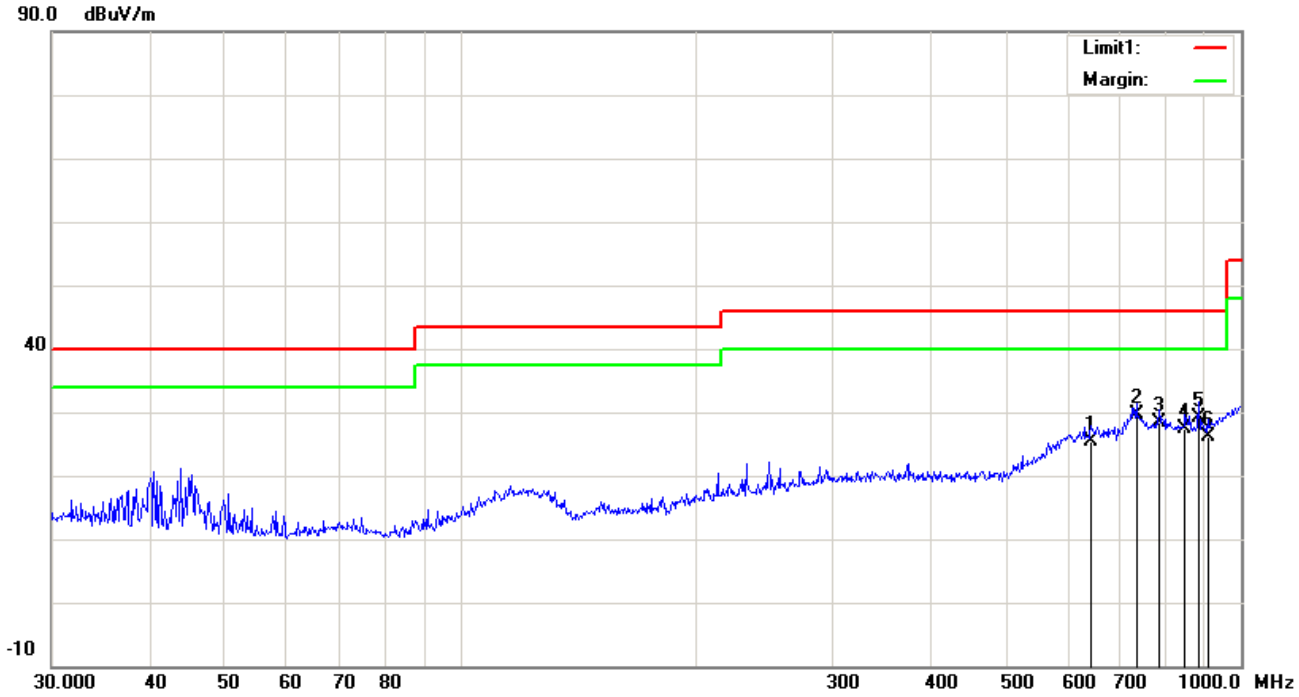
Test Data

Vertical Polarity Plot @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	41.2765	49.97	QP	14.92	45.78	1.08	20.19	40.00	-19.81	100	129
2	46.1780	55.80	QP	11.62	46.11	1.17	22.48	40.00	-17.52	200	225
3	130.8369	46.99	QP	16.04	47.36	1.87	17.54	43.50	-25.96	200	49
4	734.4913	46.35	QP	22.23	45.29	4.35	27.64	46.00	-18.36	300	148
5	881.4067	49.81	QP	23.28	45.95	4.80	31.94	46.00	-14.06	100	108
6	909.6667	45.51	QP	23.67	46.63	4.88	27.43	46.00	-18.57	200	154

Test Mode:	Transmitting BLE Mode-Middle Channel

Below 1GHz

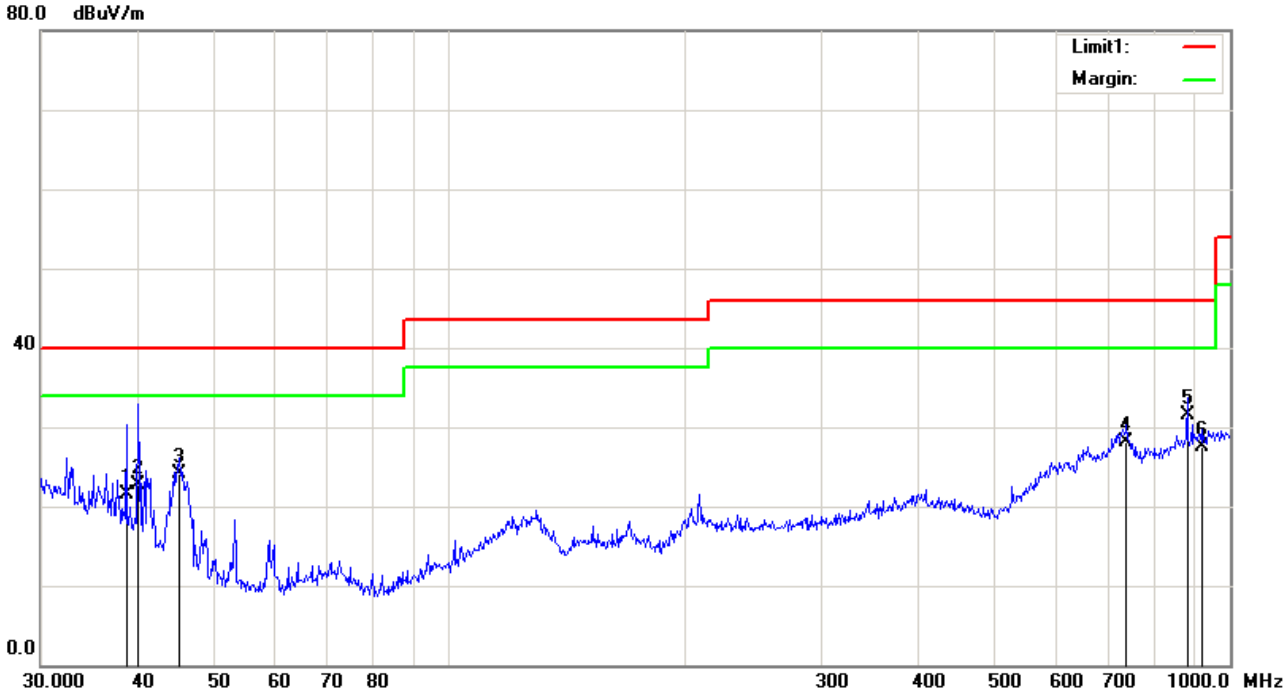


Horizontal Polarity Plot @3m

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	642.8613	46.91	QP	21.75	47.25	4.07	25.48	46.00	-20.52	200	49
2	734.4913	47.98	QP	22.61	45.29	4.35	29.65	46.00	-16.35	100	89
3	785.0935	47.22	QP	22.91	46.19	4.50	28.44	46.00	-17.56	300	349
4	848.0563	46.09	QP	22.86	46.23	4.69	27.41	46.00	-18.59	200	154
5	881.4067	47.58	QP	22.76	45.95	4.80	29.19	46.00	-16.81	300	83
6	906.4824	45.07	QP	22.86	46.63	4.87	26.17	46.00	-19.83	100	189

Test Mode:	Transmitting BLE Mode-High Channel

Below 1GHz



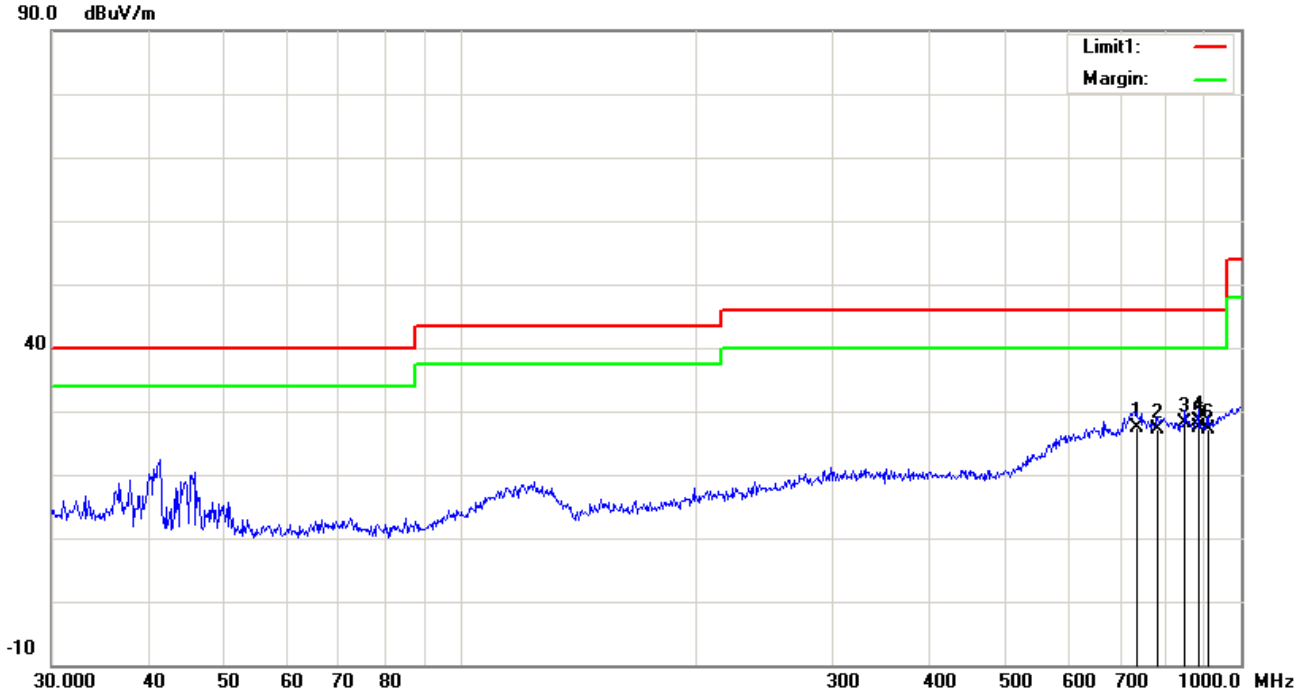
Test Data

Vertical Polarity Plot @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	38.6161	49.55	QP	16.59	45.68	1.03	21.49	40.00	-18.51	100	46
2	39.9942	51.62	QP	15.78	45.70	1.05	22.75	40.00	-17.25	200	137
3	45.2166	56.79	QP	12.27	46.03	1.15	24.18	40.00	-15.82	300	333
4	737.0714	46.84	QP	22.20	45.21	4.36	28.19	46.00	-17.81	200	303
5	881.4067	49.33	QP	23.28	45.95	4.80	31.46	46.00	-14.54	100	320
6	919.2866	45.61	QP	23.66	46.62	4.90	27.55	46.00	-18.45	200	140

Test Mode:	Transmitting BLE Mode-High Channel

Below 1GHz



Horizontal Polarity Plot @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	734.4913	45.81	QP	22.61	45.29	4.35	27.48	46.00	-18.52	200	117
2	782.3453	45.88	QP	22.89	46.15	4.49	27.11	46.00	-18.89	300	161
3	848.0563	46.83	QP	22.86	46.23	4.69	28.15	46.00	-17.85	100	9
4	881.4067	46.79	QP	22.76	45.95	4.80	28.40	46.00	-17.60	200	142
5	881.4067	45.73	QP	22.76	45.95	4.80	27.34	46.00	-18.66	300	273
6	906.4824	46.09	QP	22.86	46.63	4.87	27.19	46.00	-18.81	200	232

Test Mode:	Transmitting BLE Mode-Low Channel

Above 1GHz

Vertical

No.	Frequency	Reading	Detector	Ant_F	PA_G	Cab_L	Result	Limit	Margin	Height	Degree
	(MHz)	(dBµV/m)		(dB/m)	(dB)	(dB)	(dBµV/m)	(dBµV/m)	(dB)	(cm)	(°)
1	1901.000	68.15	peak	30.73	51.77	3.98	51.09	74.00	-22.91	100	267
2	2139.000	63.76	peak	31.38	52.35	4.13	46.92	74.00	-27.08	200	245
3	4315.000	57.43	peak	32.09	52.35	5.93	43.10	74.00	-30.90	200	64
4	6440.000	55.22	peak	34.10	52.64	5.84	42.52	74.00	-31.48	100	73
5	8752.000	55.99	peak	34.96	54.27	8.20	44.88	74.00	-29.12	100	315
6	10588.000	55.30	peak	38.56	53.07	9.38	50.17	74.00	-23.83	200	143

Horizontal

No.	Frequency	Reading	Detector	Ant_F	PA_G	Cab_L	Result	Limit	Margin	Height	Degree
	(MHz)	(dBµV/m)		(dB/m)	(dB)	(dB)	(dBµV/m)	(dBµV/m)	(dB)	(cm)	(°)
1	1867.000	65.47	peak	30.53	51.61	3.99	48.38	74.00	-25.62	100	246
2	2139.000	63.34	peak	31.38	52.35	4.13	46.50	74.00	-27.50	200	200
3	4519.000	57.17	peak	32.54	52.06	5.90	43.55	74.00	-30.45	100	98
4	5947.000	55.37	peak	33.41	51.52	5.91	43.17	74.00	-30.83	300	229
5	8089.000	56.25	peak	36.16	54.56	7.95	45.80	74.00	-28.20	200	72
6	10163.000	55.69	peak	38.67	53.75	9.28	49.89	74.00	-24.11	100	92

Note: The AV measurement performed, more than 20dB below limit so AV test data was not presented.

Test Mode:	Transmitting BLE Mode-Middle Channel

Above 1GHz

Vertical

No.	Frequency	Reading	Detector	Ant_F	PA_G	Cab_L	Result	Limit	Margin	Height	Degree
	(MHz)	(dBuV/m)		(dB/m)	(dB)	(dB)	(dBuV/m)	(dBuV/m)	(dB)	(cm)	(°)
1	1903	68.27	peak	30.73	51.77	3.98	51.21	74.00	-22.79	100	265
2	2140	63.48	peak	31.38	52.35	4.13	46.64	74.00	-27.36	200	246
3	4316	57.95	peak	32.09	52.35	5.93	43.62	74.00	-30.38	100	65
4	6445	55.66	peak	34.1	52.64	5.84	42.96	74.00	-31.04	300	70
5	8751	55.41	peak	34.96	54.27	8.2	44.3	74.00	-29.7	200	316
6	10590	55.29	peak	38.56	53.07	9.38	50.16	74.00	-23.84	200	142

Horizontal

No.	Frequency	Reading	Detector	Ant_F	PA_G	Cab_L	Result	Limit	Margin	Height	Degree
	(MHz)	(dBuV/m)		(dB/m)	(dB)	(dB)	(dBuV/m)	(dBuV/m)	(dB)	(cm)	(°)
1	1866	65.68	peak	30.53	51.61	3.99	48.59	74.00	-25.41	100	245
2	2138	63.67	peak	31.38	52.35	4.13	46.83	74.00	-27.17	200	205
3	4517	57.46	peak	32.54	52.06	5.9	43.84	74.00	-30.16	200	100
4	5949	55.14	peak	33.41	51.52	5.91	42.94	74.00	-31.06	300	234
5	8090	56.87	peak	36.16	54.56	7.95	46.42	74.00	-27.58	100	78
6	10165	55.43	peak	38.67	53.75	9.28	49.63	74.00	-24.37	100	94

Note: The AV measurement performed, more than 20dB below limit so AV test data was not presented.

Test Mode:	Transmitting BLE Mode-High Channel

Above 1GHz

Vertical

No.	Frequency	Reading	Detector	Ant_F	PA_G	Cab_L	Result	Limit	Margin	Height	Degree
	(MHz)	(dBuV/m)		(dB/m)	(dB)	(dB)	(dBuV/m)	(dBuV/m)	(dB)	(cm)	(°)
1	1910	68.54	peak	30.73	51.77	3.98	51.48	74.00	-22.52	200	260
2	2145	63.67	peak	31.38	52.35	4.13	46.83	74.00	-27.17	200	243
3	4314	57.84	peak	32.09	52.35	5.93	43.51	74.00	-30.49	100	68
4	6442	55.95	peak	34.1	52.64	5.84	43.25	74.00	-30.75	300	74
5	8755	55.27	peak	34.96	54.27	8.2	44.16	74.00	-29.84	200	312
6	10594	55.97	peak	38.56	53.07	9.38	50.84	74.00	-23.16	200	145

Horizontal

No.	Frequency	Reading	Detector	Ant_F	PA_G	Cab_L	Result	Limit	Margin	Height	Degree
	(MHz)	(dBuV/m)		(dB/m)	(dB)	(dB)	(dBuV/m)	(dBuV/m)	(dB)	(cm)	(°)
1	1868	65.18	peak	30.53	51.61	3.99	48.09	74.00	-25.91	100	247
2	2140	63.24	peak	31.38	52.35	4.13	46.4	74.00	-27.6	200	208
3	4520	57.87	peak	32.54	52.06	5.9	44.25	74.00	-29.75	200	105
4	5951	55.77	peak	33.41	51.52	5.91	43.57	74.00	-30.43	300	231
5	8095	56.46	peak	36.16	54.56	7.95	46.01	74.00	-27.99	100	79
6	10169	55.58	peak	38.67	53.75	9.28	49.78	74.00	-24.22	100	97

Note: The AV measurement performed, more than 20dB below limit so AV test data was not presented.

Annex A. TEST INSTRUMENT

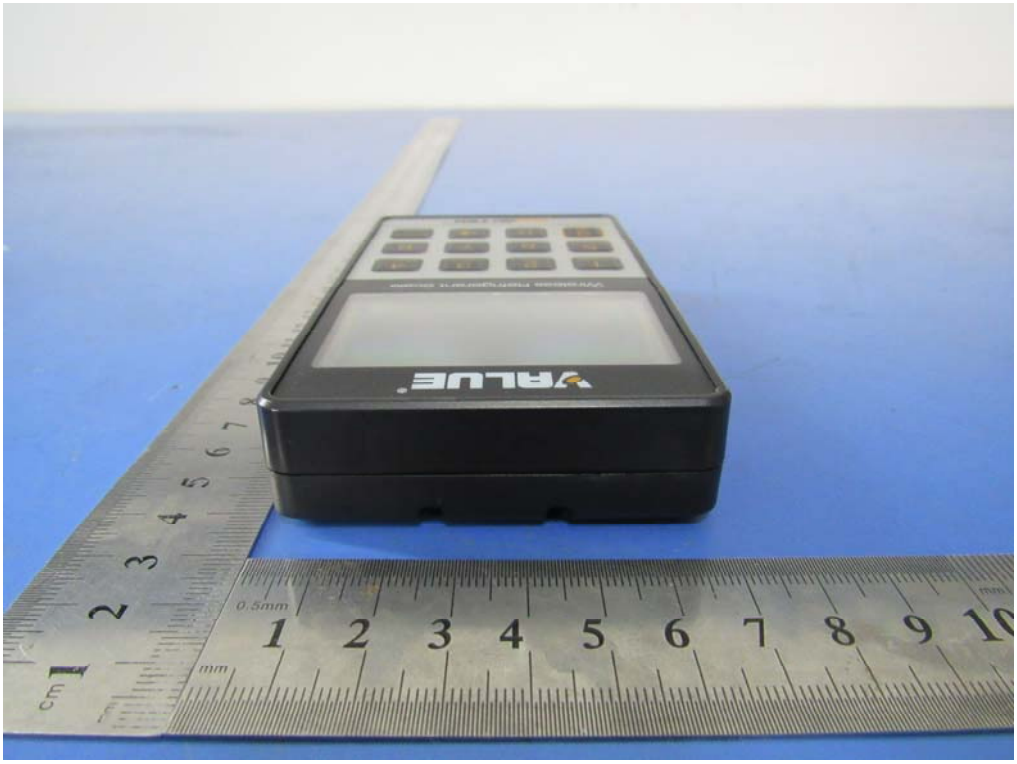
Instrument	Model	Serial #	Cal Date	Cal Due	In use
AC Line Conducted Emissions					
R&S EMI Test Receiver	ESPI3	101216	05/03/2017	05/02/2018	☐
Transient Limiter	LIT-153	531021	10/30/2017	10/29/2018	☐
V-LISN	ESH3-Z5	838979/005	05/15/2017	05/14/2018	☐
SIEMIC EZ_EMC Conducted Emissions software	Ver.ICP-03A1	N/A	N/A	N/A	☐
RF conducted test					
Spectrum Analyzer	N9010A	MY47191130	05/03/2017	05/02/2018	☒
Radiated Emissions					
Spectrum Analyzer	N9010A	MY47191130	05/03/2017	05/02/2018	☒
R&S EMI Receiver	ESPI3	101216	05/03/2017	05/02/2018	☒
Antenna (30MHz~6GHz)	JB6	A121411	10/31/2017	10/31/2018	☒
EMCO Horn Antenna (1 ~18GHz)	3115	N/A	11/15/2016	11/14/2018	☒
Hp Pre-Amplifier	8447F	1937A01160	10/31/2017	10/30/2018	☒
Agilent Pre-Amplifier	8449B	N/A	10/31/2017	10/30/2018	☒
SIEMIC EZ_EMC Radiated Emissions software	Ver.ICP-03A1	N/A	N/A	N/A	☒

Annex B. EUT And Test Setup Photographs

Annex B.i. Photograph: EUT External Photos

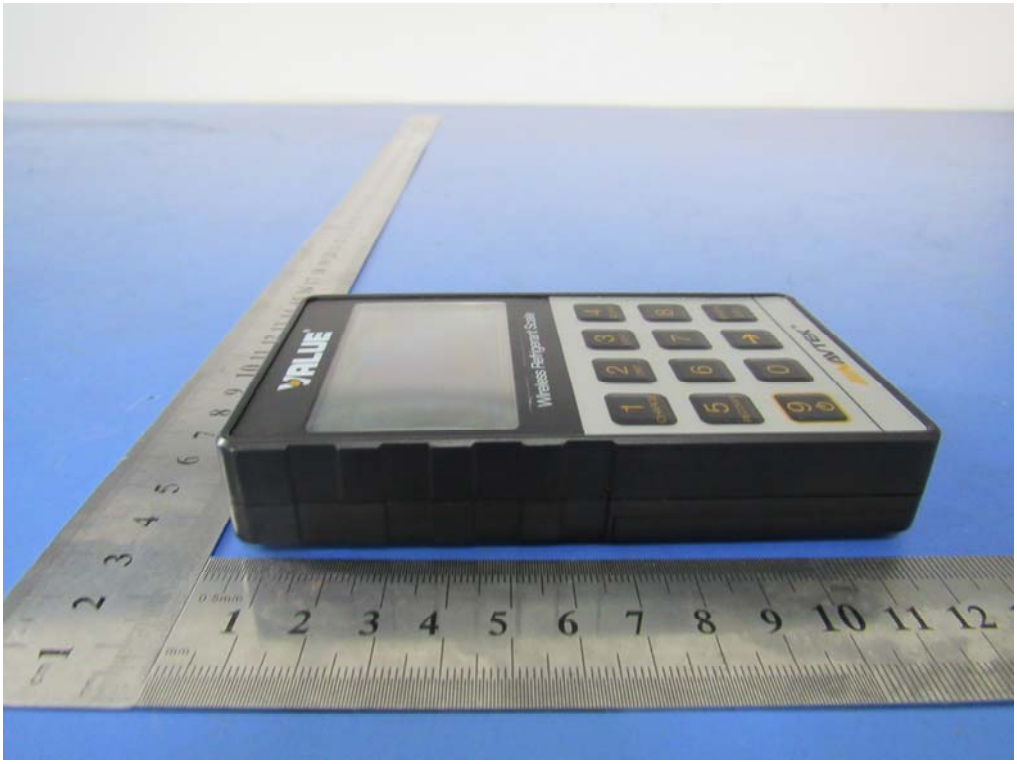
EUT - Front View

EUT - Rear View



EUT - Top View

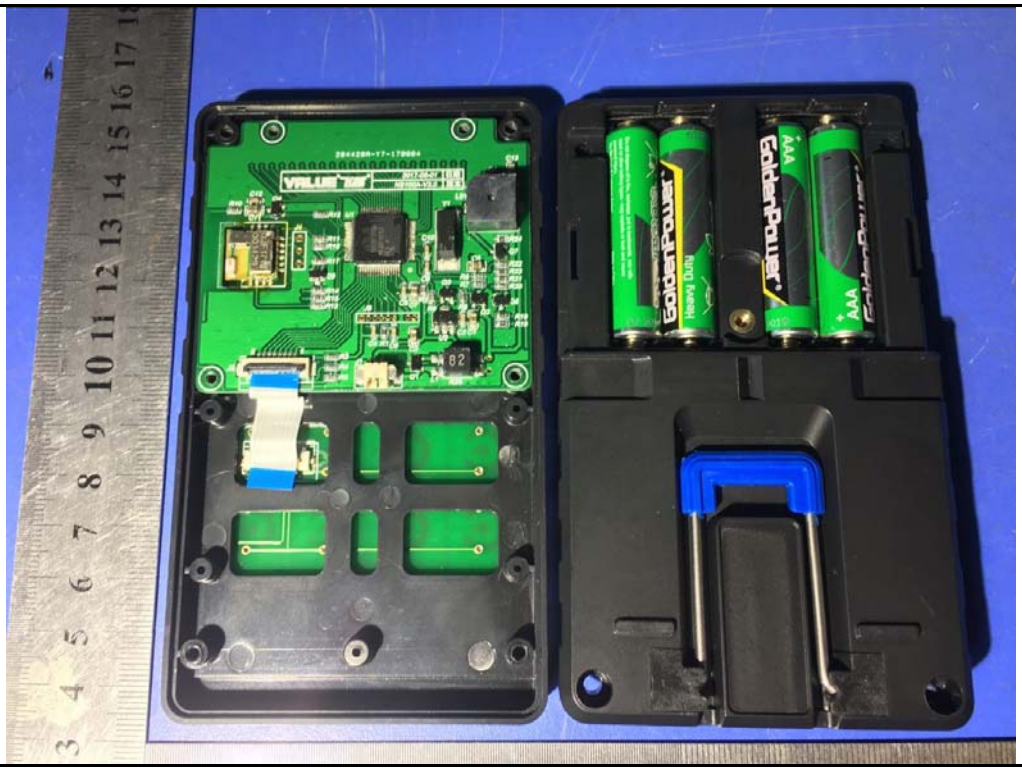
EUT - Bottom View



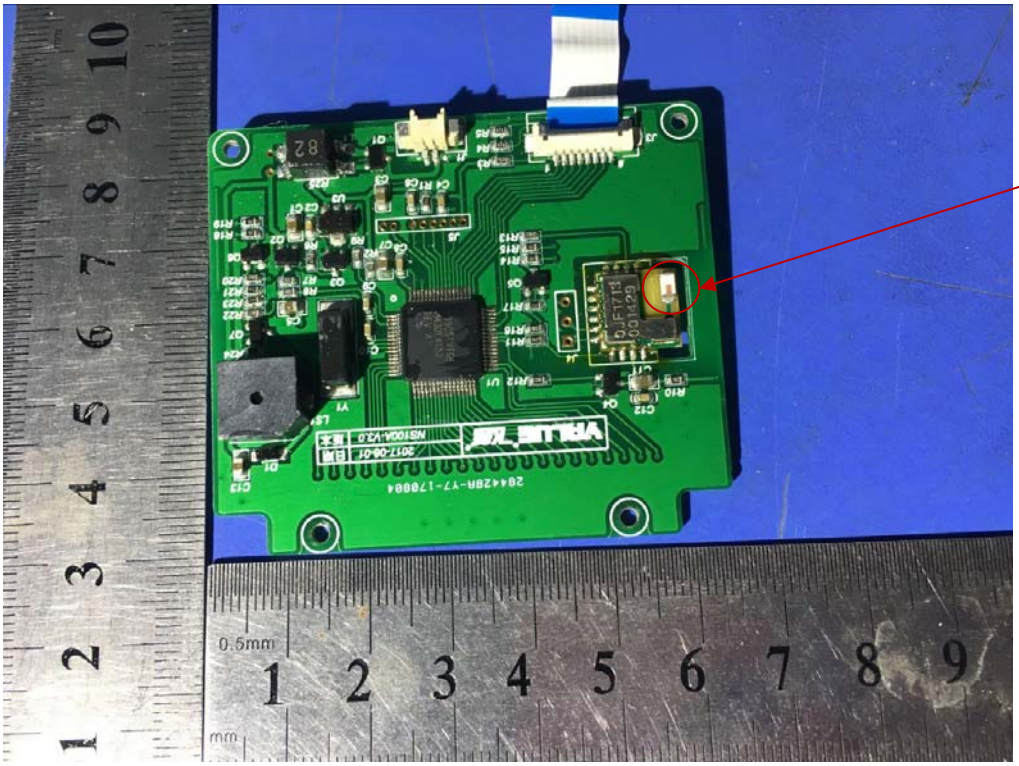
EUT - Left View

EUT - Right View

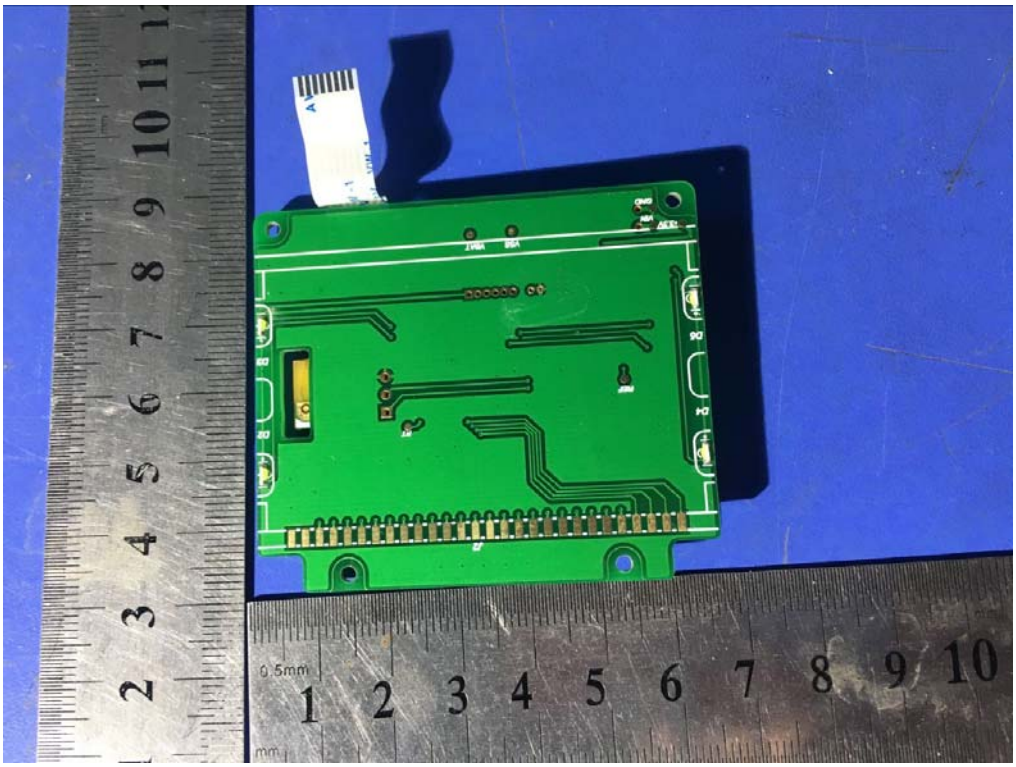
Annex B.ii. Photograph: EUT Internal Photos



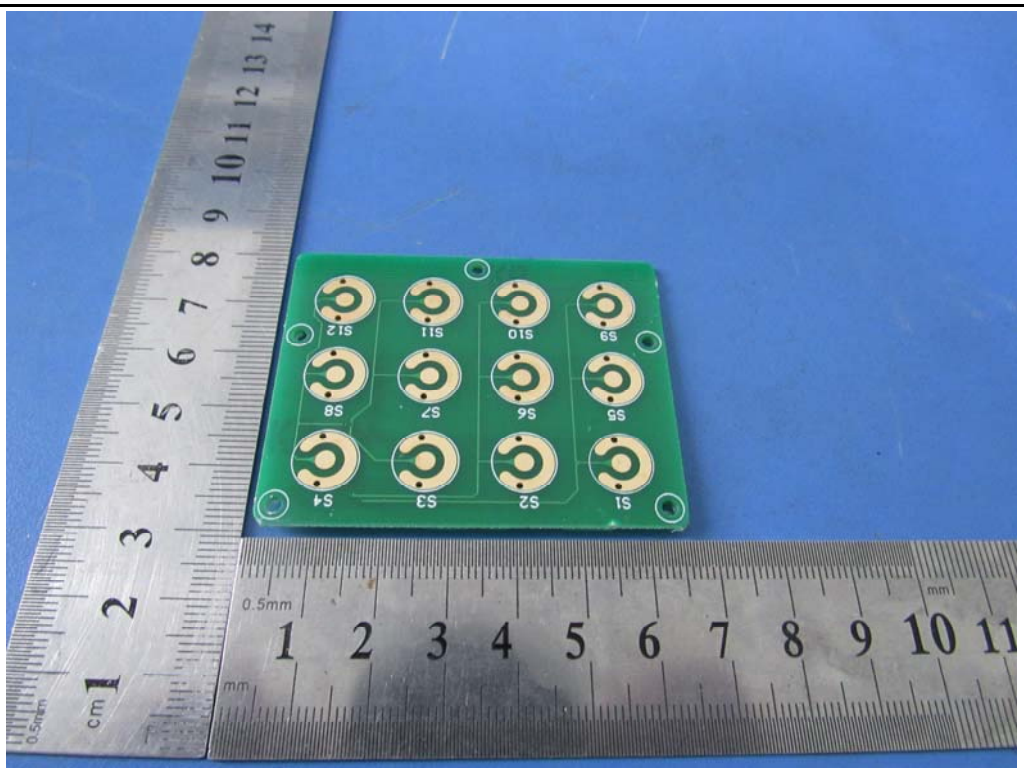
EUT – Uncover Front View



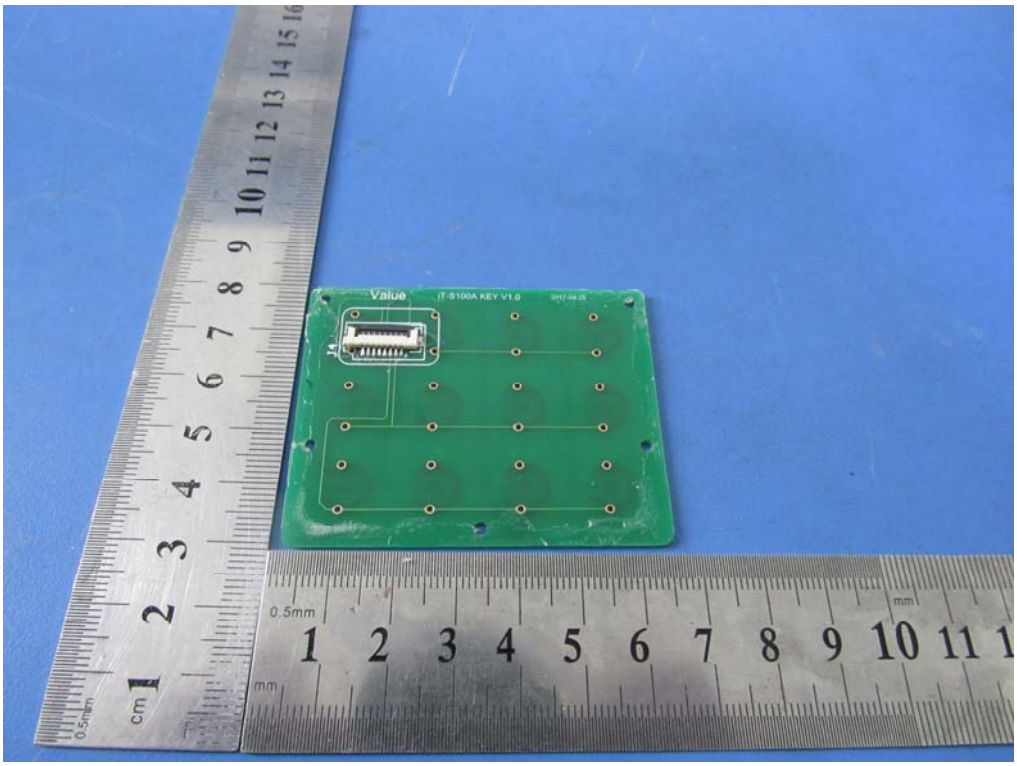
EUT – PCBA 1 Front View



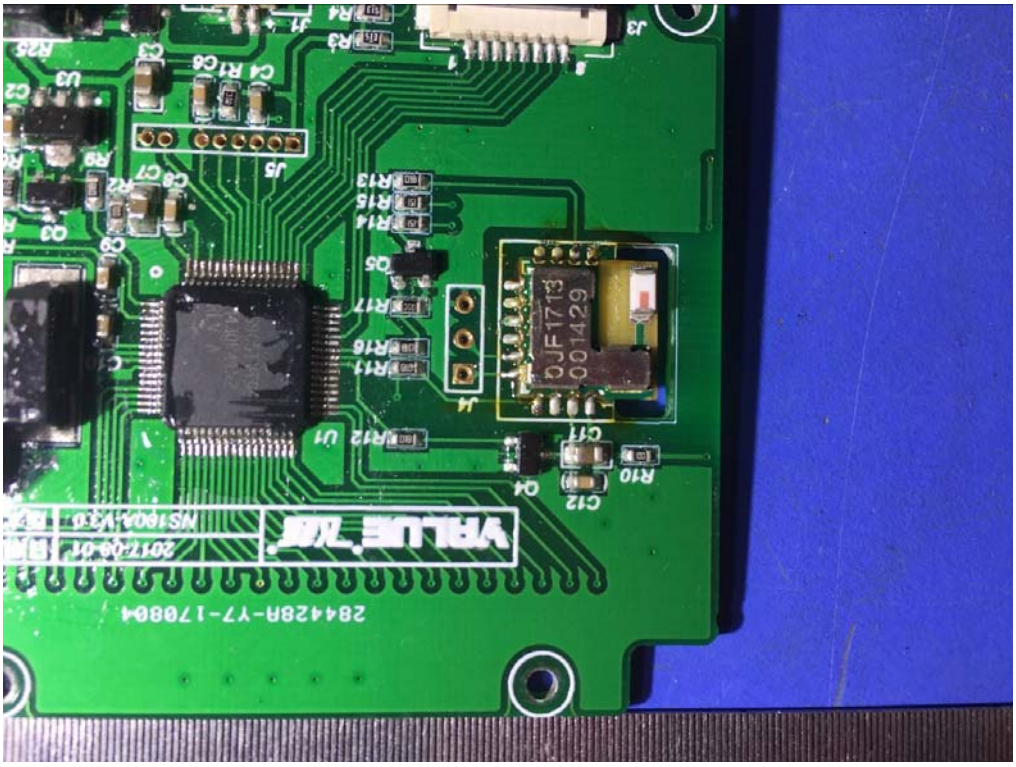
EUT - PCBA 1 Rear View



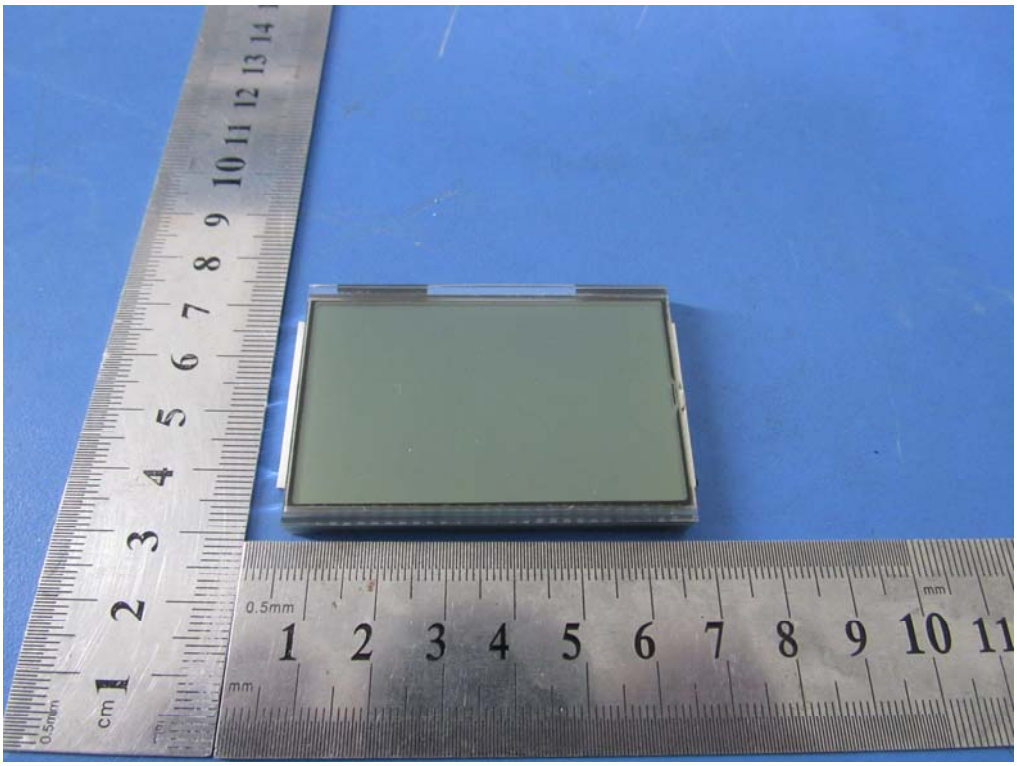
EUT – PCBA 2 Front View



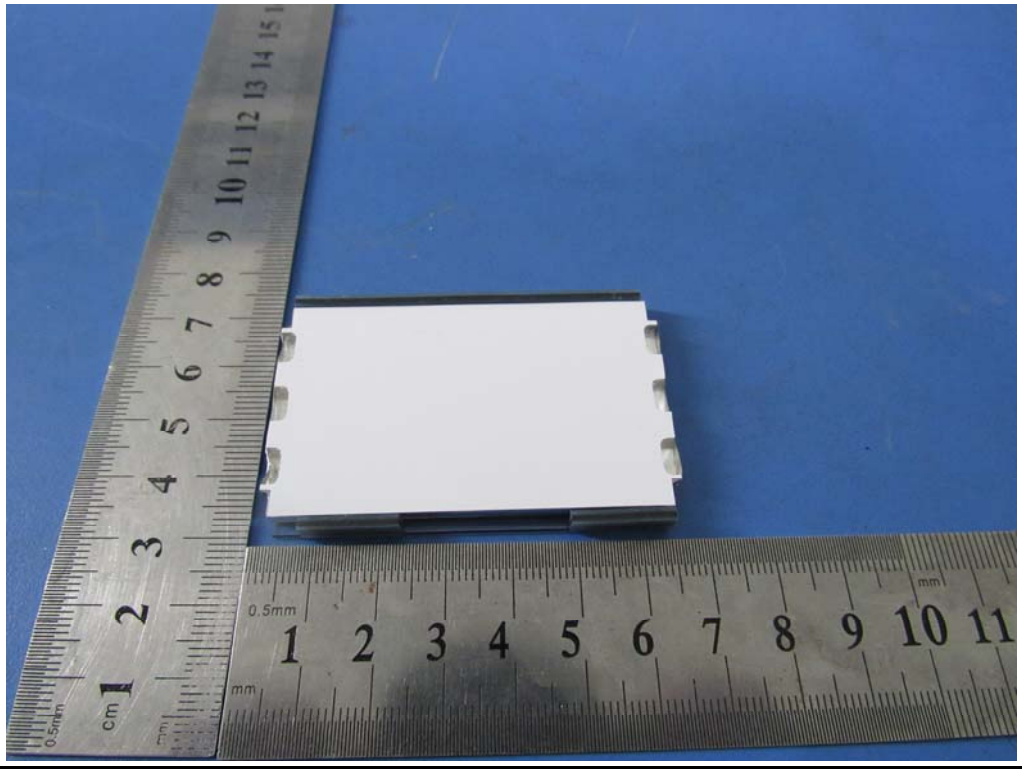
EUT - PCBA 2 Rear View



RF Radio Module – Front View

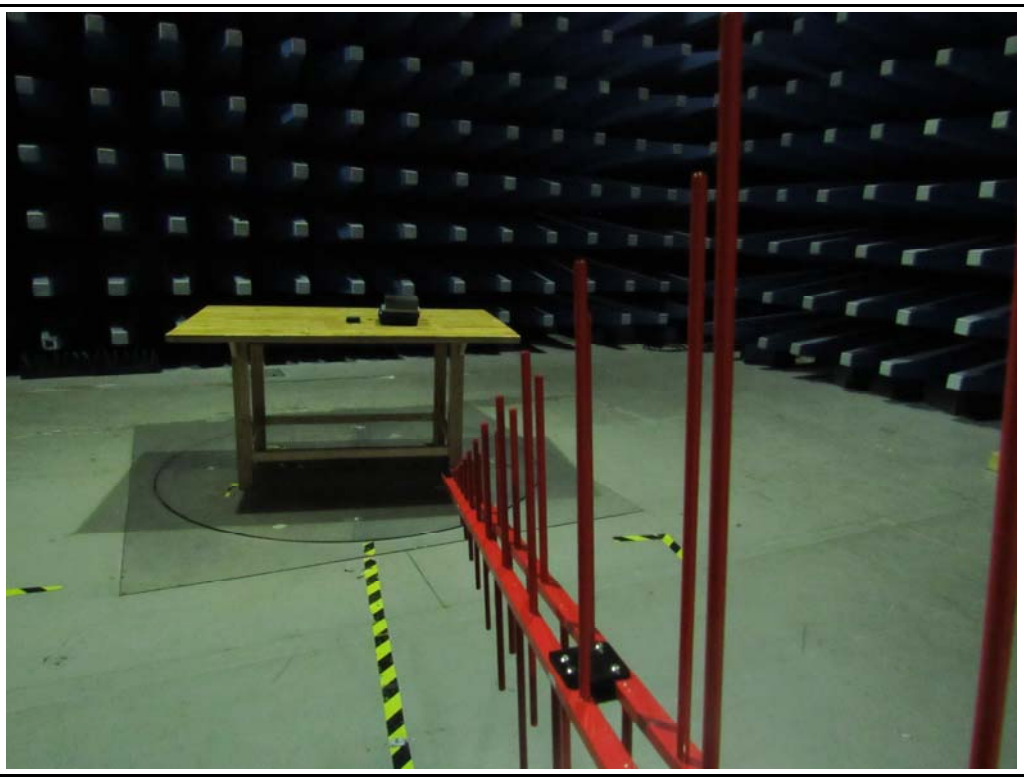


EUT – LCD Front View

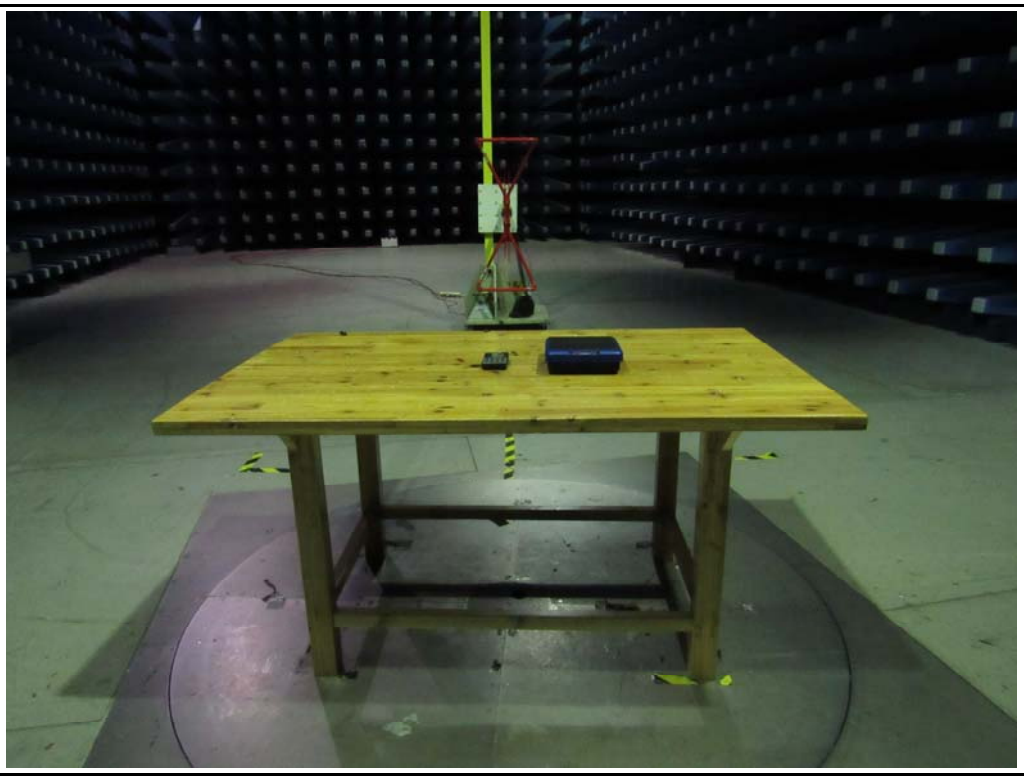


EUT - LCD Rear View

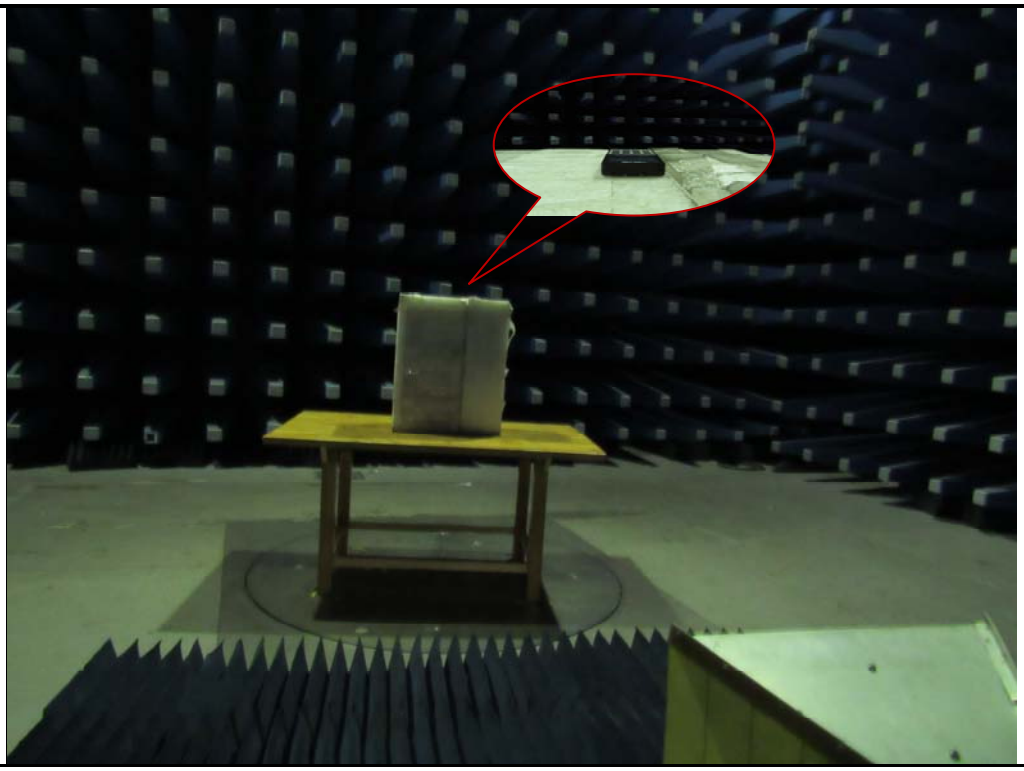
Annex B.iii. Photograph: Test Setup Photo



Radiated Spurious Emissions Test Setup Below 1GHz Front View



Radiated Spurious Emissions Test Setup Below 1GHz Rear View

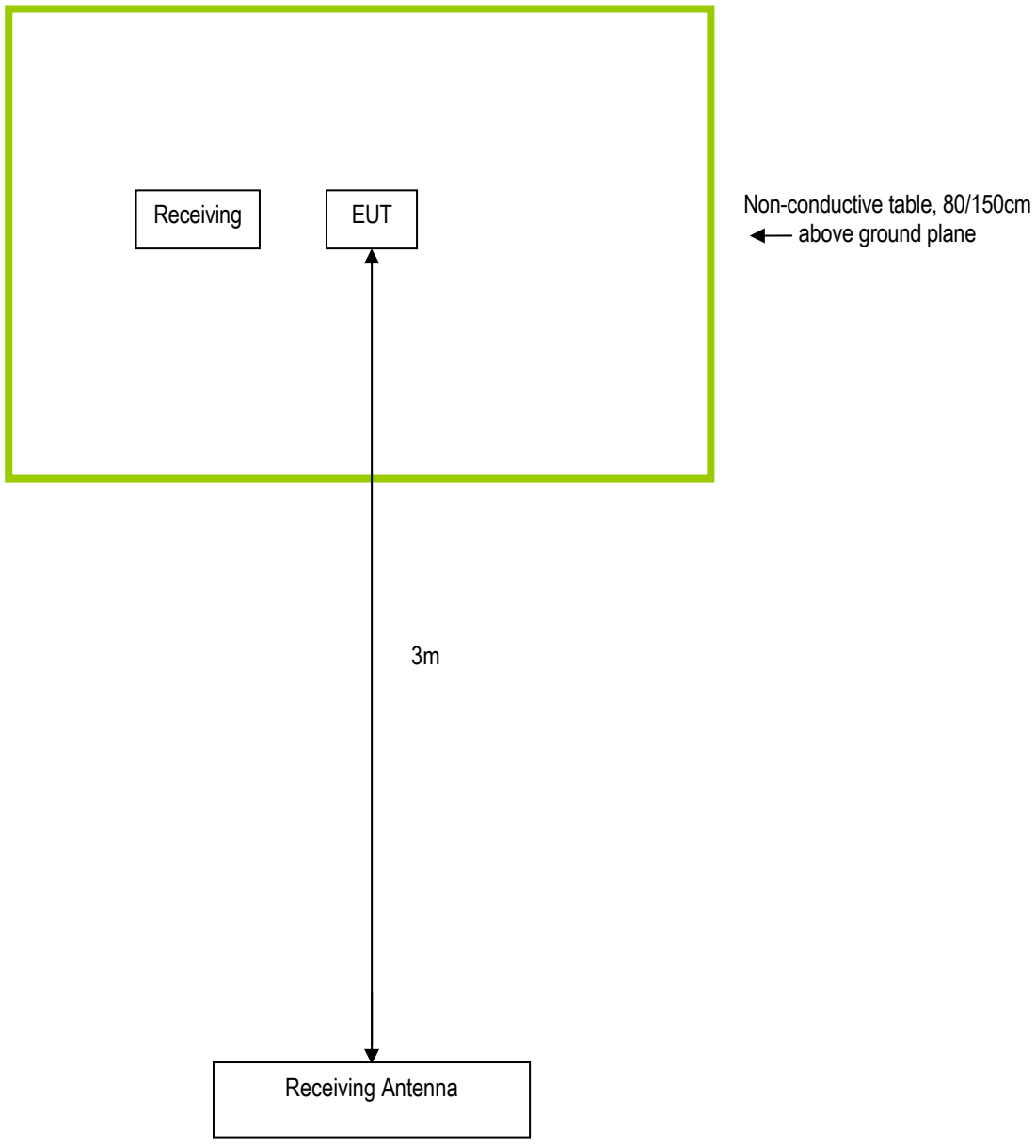


Radiated Spurious Emissions Test Setup Above 1GHz

Annex C. TEST SETUP AND SUPPORTING EQUIPMENT

Annex C.i. TEST SET UP BLOCK

Block Configuration Diagram for Radiated Emissions



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
Zhejiang VALUE Mechanical & Electrical Products CO.,LTD	Wireless Refrigerant Scale	VRS-100i-01

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

Please see attachment

Annex E. DECLARATION OF SIMILARITY