RF TEST REPORT

Report No.: 16071382-FCC-R-V2

Supersede Report No.: N/A

Applicant	Medtrum Technologies Inc.
Product Name	USB Dongle
Model No.	MD-LQ-002
Serial No.	N/A
Test Standard	FCC Part 15.247: 2016, ANSI C63.10: 2013
Test Date	December 24, 2016 to February 06, 2017
Issue Date	March 10, 2017
Test Result	☑ Pass ☐ Fail
Equipment complied with the specification	☑
Equipment did not comply with the specification	☐

Loren Luo	David Huang	
Loren Luo Test Engineer	David Huang Checked By	

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Test result presented in this test report is applicable to the tested sample only

Issued by:

SIEMIC (SHENZHEN-CHINA) LABORATORIES

Zone A, Floor 1, Building 2 Wan Ye Long Technology Park

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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

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1. Report Revision History

Report No.	Report Version	Description	Issue Date
16071382-FCC-R	NONE	Original	February 07, 2017
16071382-FCC-R-V1	V1	Change product name	February 28, 2017
16071382-FCC-R-V2	V2	Changed the P8 antenna type	March 10, 2017

2. Customer information

Applicant Name	Medtrum Technologies Inc.
Applicant Add	7F，Building 8，No.200 Niudun Road, Shanghai 201203
Manufacturer	Medtrum Technologies Inc
Manufacturer Add	7F，Building 8，No.200 Niudun Road, Shanghai 201203

3. Test site information

Lab performing tests	SIEMIC (Shenzhen-China) LABORATORIES
Lab Address	Zone A, Floor 1, Building 2 Wan Ye Long Technology Park South Side of Zhoushi Road, Bao’ an District, Shenzhen, Guangdong China 518108
FCC Test Site No.	718246
IC Test Site No.	4842E-1
Test Software	Radiated Emission Program-To Shenzhen v2.0

4. Equipment under Test (EUT) Information

Description of EUT:	USB Dongle
Main Model:	MD-LQ-002
Serial Model:	N/A
Date EUT received:	December 23, 2016
Test Date(s):	December 24, 2016 to February 06, 2017
Equipment Category：	DTS
Antenna Gain:	0dBi
Antenna Type:	Ceramic chip antenna
Type of Modulation:	GFSK
RF Operating Frequency (ies):	2402-2480 MHz (TX/RX)
Max. Output Power:	0.930dBm
Number of Channels:	40CH
Port:	USB Port
Trade Name :	Medtrum
Input Power:	USB: DC 5V
FCC ID:	2AARU-LQ002

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
§15.247 (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 Restricted Frequency Bands	Compliance
§15.207 (a),	AC Power Line Conducted Emissions	Compliance
§15.205, §15.209, §15.247(d)	Radiated Spurious Emissions & Unwanted Emissions into Restricted Frequency Bands	Compliance

Measurement Uncertainty

Emissions		
Test Item	**Description**	**Uncertainty**
Band Edge and 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)	+5.6dB/-4.5dB
-	-	-

6. Measurements, Examination And Derived Results

6.1 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

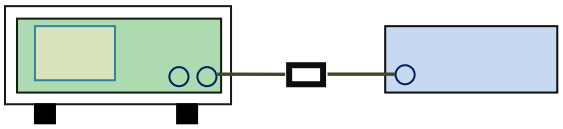
The EUT has 1 antenna:
A permanently attached Ceramic chip antenna for BLE the gain is 0dBi for BLE.

The antenna meets up with the ANTENNA REQUIREMENT.

Result: Compliance.

6.2 DTS (6 dB) Channel Bandwidth

Temperature	25℃
Relative Humidity	55%
Atmospheric Pressure	1023mbar
Test date :	December 29, 2016
Tested By :	Loren Luo

Spec	Item	Requirement	Applicable
§ 15.247(a)(2)	a)	6dB BW≥ 500kHz;	☑
RSS Gen(4.6.1)	b)	99% BW: For FCC reference only; required by IC.	☑
Test Setup			
Test Procedure	558074 D01 DTS MEAS Guidance v03r03, 8.1 DTS bandwidth 6dB Emission bandwidth measurement procedure - Set RBW = 100 kHz. - Set the video bandwidth (VBW) ≥ 3 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

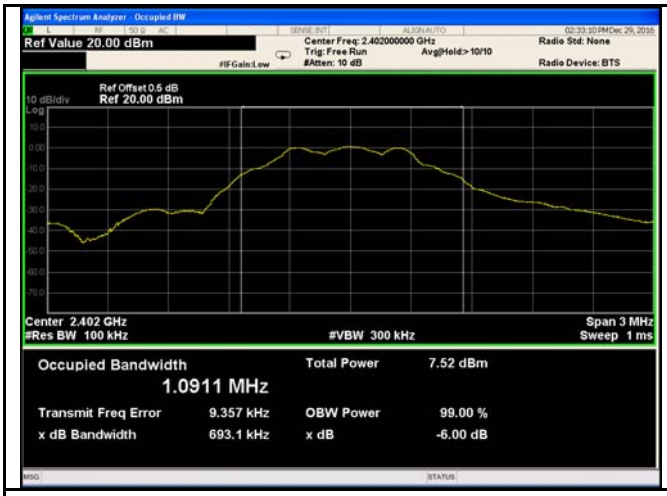
Test Plot ☑ Yes (See below) ☐ N/A

6dB Bandwidth measurement result

Test Data

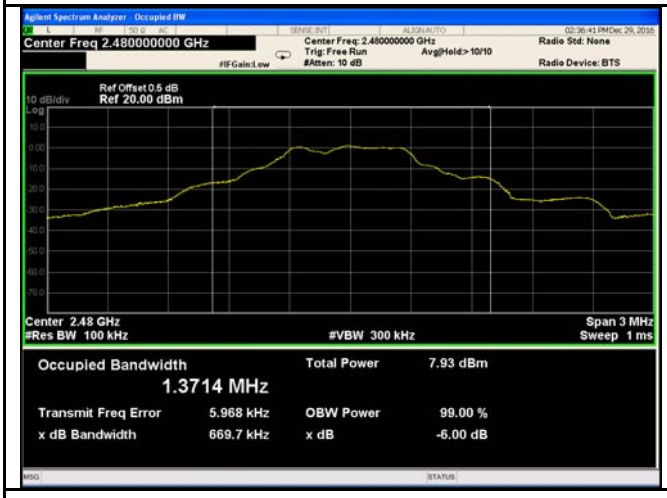
CH	Frequency (MHz)	6dB Bandwidth (kHz)	99% Occupied Bandwidth (MHz)
Low	2402	693.1	1.0911
Mid	2440	683.4	1.1558
High	2480	669.7	1.3714

Test Plots



6dB Bandwidth - Low CH 2402

6dB Bandwidth - Mid CH 2440

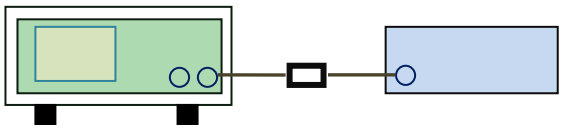


6dB Bandwidth - High CH 2480

6.3 Maximum Output Power

Temperature	25℃
Relative Humidity	55%
Atmospheric Pressure	1023mbar
Test date :	December 29, 2016
Tested By :	Loren Luo

Requirement(s):

Spec	Item	Requirement	Applicable
§15.247(b)(3),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)	DTS in 902-928MHz, 2400-2483.5MHz: ≤ 1 Watt	☑
Test Setup			
Test Procedure	558074 D01 DTS MEAS Guidance v03r03, 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

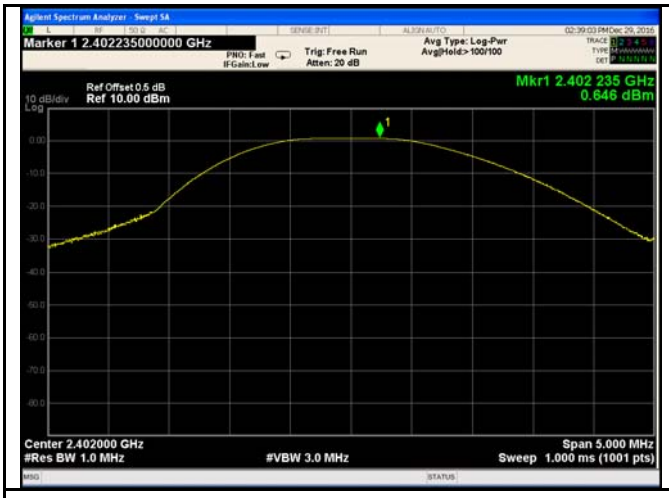
Test Plot ☑ Yes (See below) ☐ N/A

Output Power measurement result

Test Data

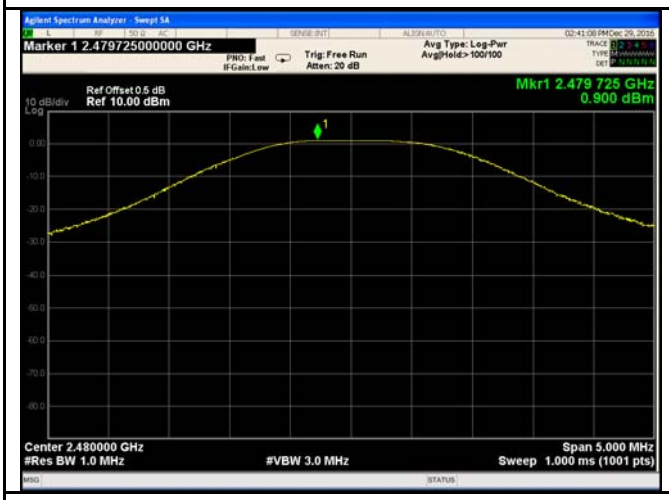
Type	CH	Frequency (MHz)	Conducted Power (dBm)	Limit (dBm)	Result
Output power	Low	2402	0.646	30	Pass
	Mid	2440	**0.930**	30	Pass
	High	2480	0.900	30	Pass

Test Plots



AV Output power - Low CH 2402

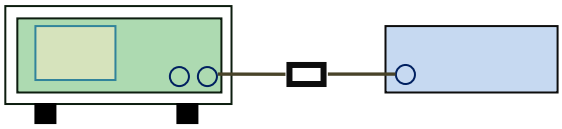
AV Output power - Mid CH 2440



AV Output power - High CH 2480

6.4 Power Spectral Density

Temperature	25℃
Relative Humidity	55%
Atmospheric Pressure	1023mbar
Test date :	December 29, 2016
Tested By :	Loren Luo

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 v03r03, 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		

Test Data ☑ Yes ☐ N/A

Test Plot ☑ Yes (See below) ☐ N/A

Power Spectral Density measurement result

Test Data

Type	CH	Freq (MHz)	Reading (dBm)	Factor (dB)	Result (dBm)	Limit (dBm)	Result
PSD	Low	2402	-4.746	-5.23	-9.976	8	Pass
	Mid	2440	-4.457	-5.23	-9.687	8	Pass
	High	2480	-5.990	-5.23	-11.22	8	Pass

Note: factor=10log(3/10)=-5.23

Test Plots

PSD - Low CH 2402

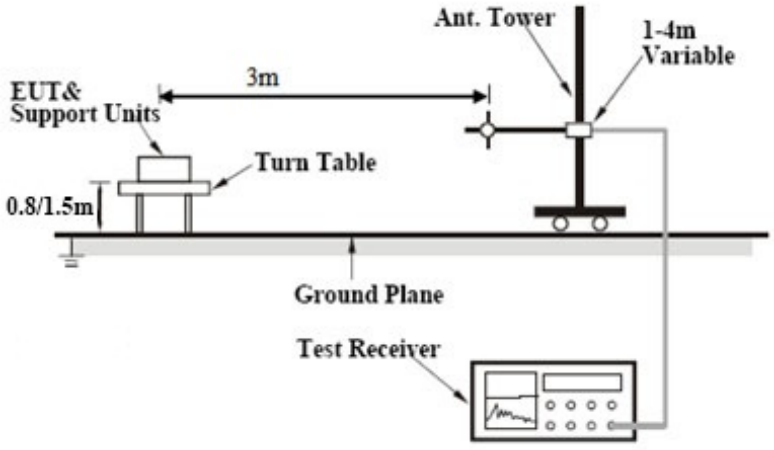
PSD - Mid CH 2440

PSD - High CH 2480

6.5 Band-Edge & Unwanted Emissions into Restricted Frequency Bands

Temperature	25℃
Relative Humidity	55%
Atmospheric Pressure	1012mbar
Test date :	January 11, 2017
Tested By :	Loren Luo

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.		

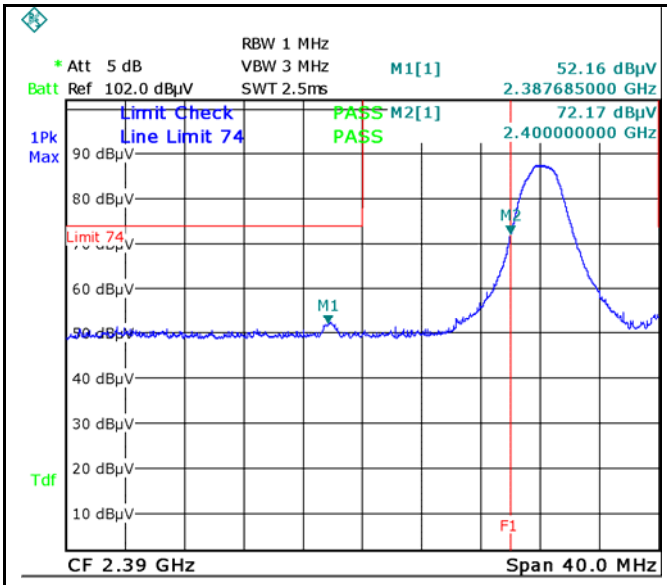
	- 3. First, set both RBW and VBW of spectrum analyzer to 100 kHz with a convenient frequency span including 100kHz bandwidth from band edge, check the emission of EUT, if pass then set Spectrum Analyzer as below: a. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120 kHz for Quasiy Peak detection at frequency below 1GHz. b. 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. c. The resolution bandwidth of test receiver/spectrum analyzer is 1MHz and the video bandwidth is 10Hz with Peak detection for Average Measurement as below at frequency above 1GHz. - 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

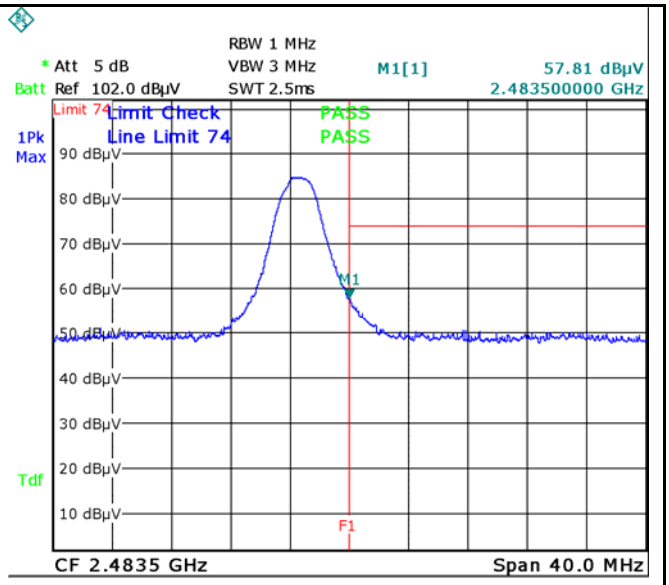
Test Plots

Band Edge measurement result



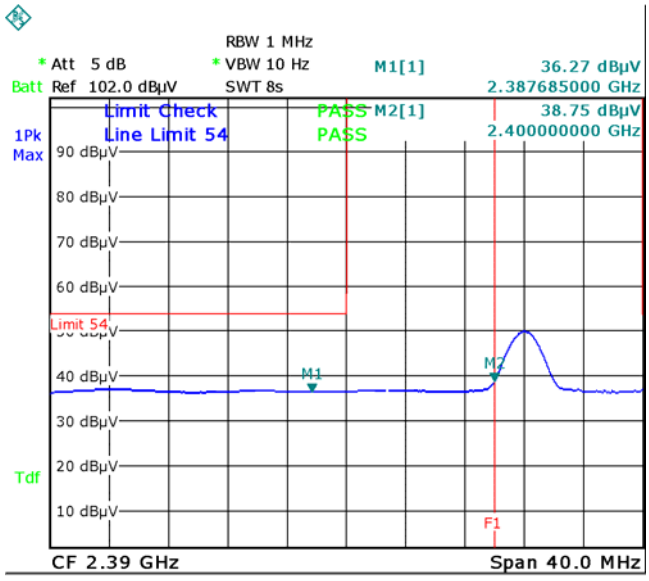
Band Edge, Left Side (Peak)

Note: F1 is frequency 2390MHz; F2 is frequency 2400MHz

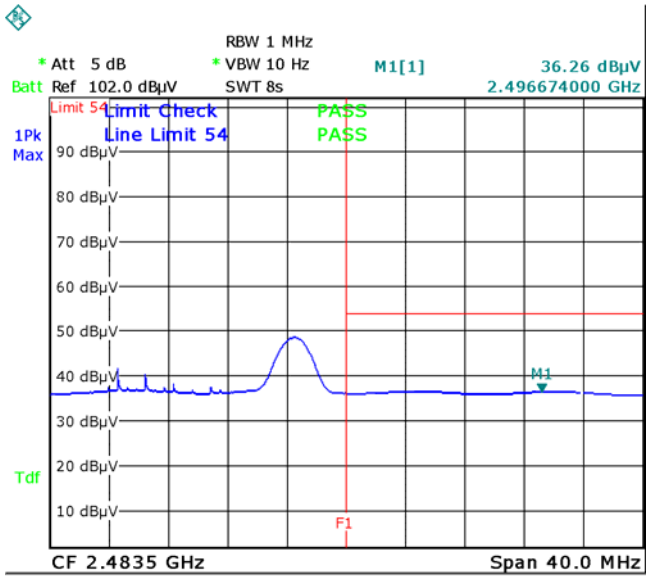


Band Edge, Right Side (Peak)

Note: F1 is frequency 2483.5MHz



Band Edge, Left Side-AV

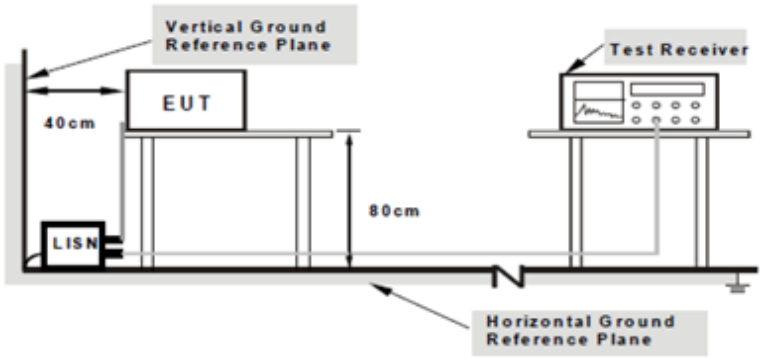


Band Edge, Right Side-AV

6.6 AC Power Line Conducted Emissions

Temperature	25℃
Relative Humidity	55%
Atmospheric Pressure	1012mbar
Test date :	January 11, 2017
Tested By :	Loren Luo

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.
<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"> 

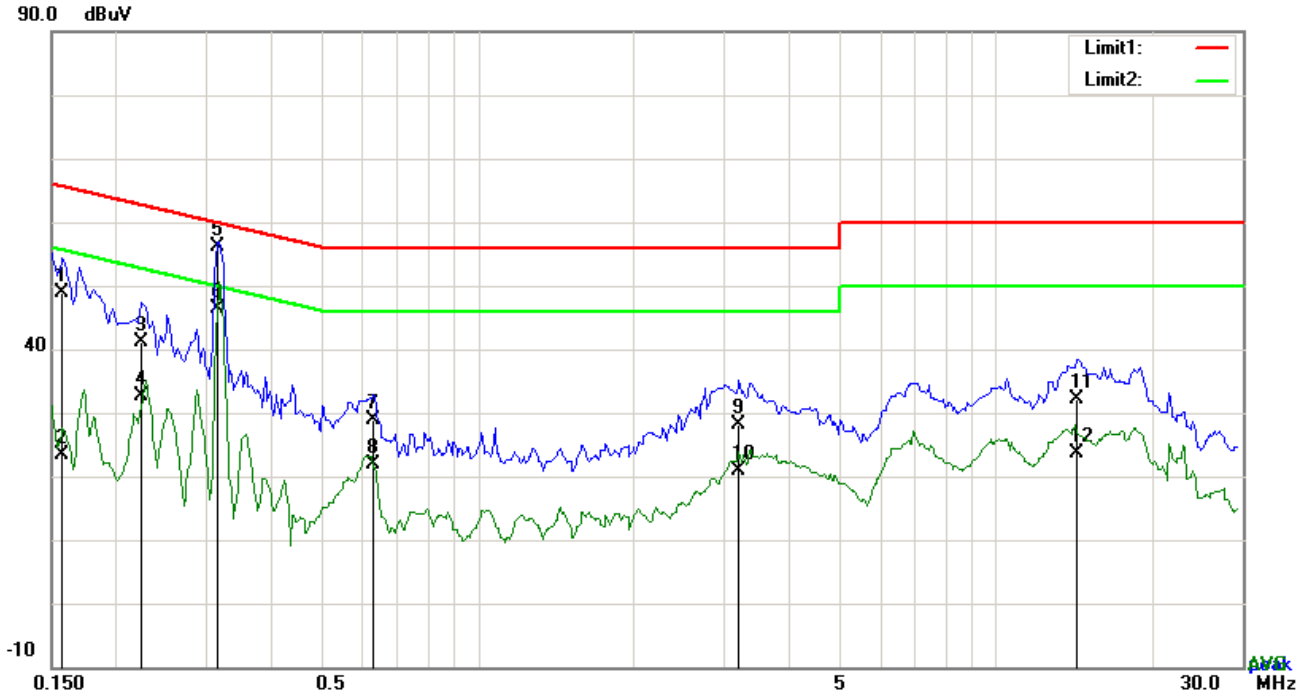
Note: 1.Support units were connected to second LISN.
2.Both of LISNs (AMN) are 80cm from EUT and at least 80cm from other units and other metal planes support units.</td></tr>
<tr><td>Procedure</td><td colspan="3">1. The EUT and supporting equipment were set up in accordance with the requirements of 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</td></tr>
</table>

	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).
Remark	
Result	☑ Pass ☐ Fail

Test Data ☑ Yes ☐ N/A

Test Plot ☑ Yes (See below) ☐ N/A

Test Mode:	Transmitting Mode

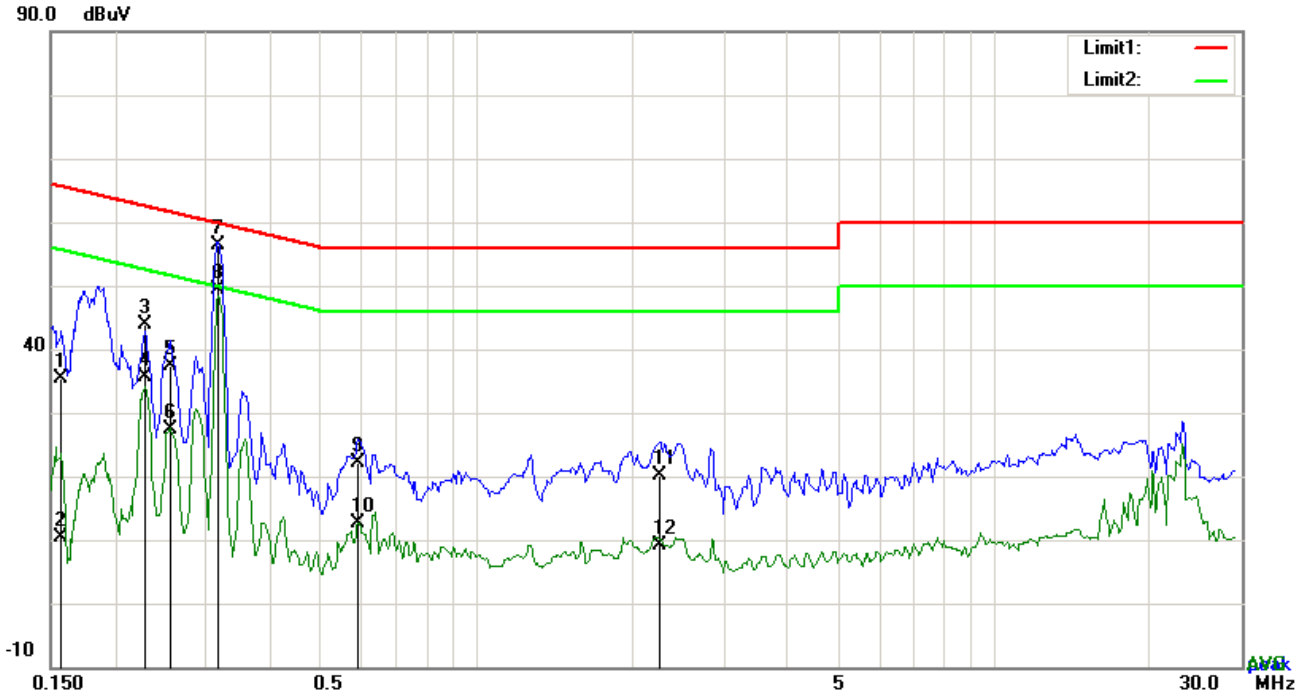


Test Data

Phase Line Plot at 120Vac, 60Hz

No.	P/L	Frequency (MHz)	Reading (dBµV)	Detector	Corrected (dB)	Result (dBµV)	Limit (dBµV)	Margin (dB)
1	L1	0.1578	38.87	QP	10.03	48.90	65.58	-16.68
2	L1	0.1578	13.40	AVG	10.03	23.43	55.58	-32.15
3	L1	0.2241	31.17	QP	10.03	41.20	62.67	-21.47
4	L1	0.2241	22.56	AVG	10.03	32.59	52.67	-20.08
5	L1	0.3138	46.22	QP	10.03	56.25	59.87	-3.62
6	L1	0.3138	36.34	AVG	10.03	46.37	49.87	-3.50
7	L1	0.6297	18.86	QP	10.03	28.89	56.00	-27.11
8	L1	0.6297	11.89	AVG	10.03	21.92	46.00	-24.08
9	L1	3.1950	18.01	QP	10.06	28.07	56.00	-27.93
10	L1	3.1950	10.90	AVG	10.06	20.96	46.00	-25.04
11	L1	14.3139	21.86	QP	10.21	32.07	60.00	-27.93
12	L1	14.3139	13.54	AVG	10.21	23.75	50.00	-26.25

Test Mode:	Transmitting Mode

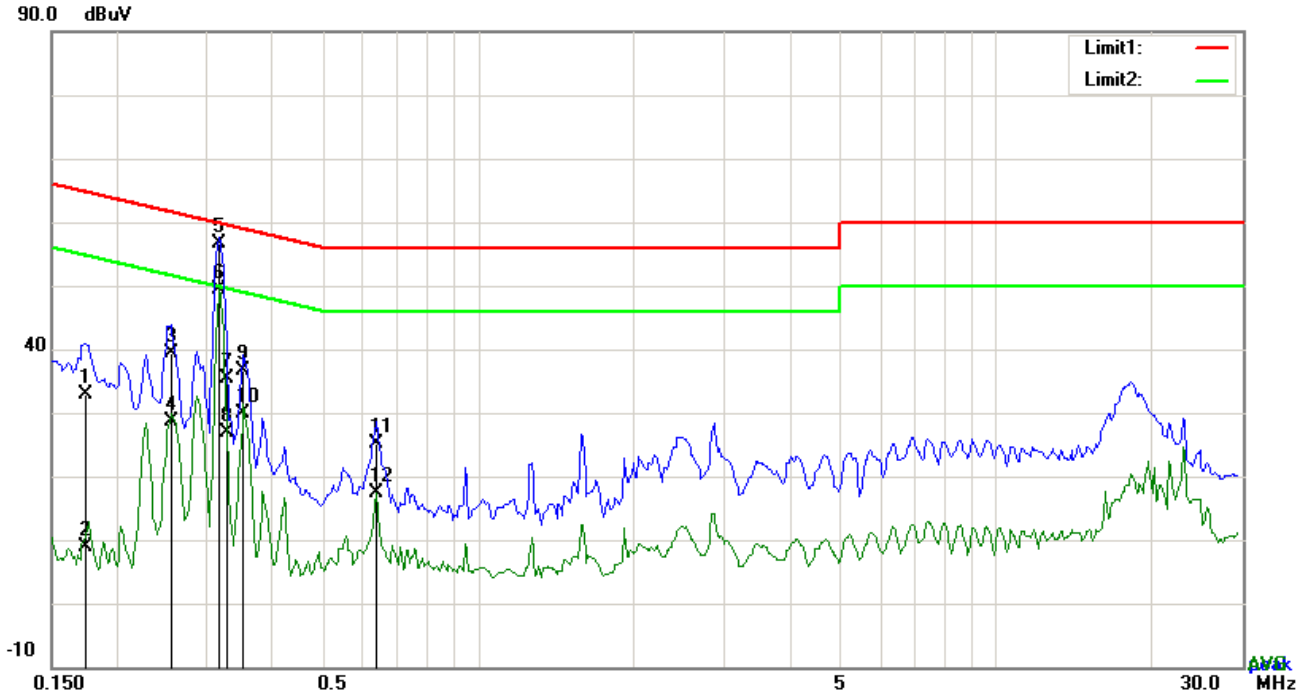


Test Data

Phase Neutral Plot at 120Vac, 60Hz

No.	P/L	Frequency (MHz)	Reading (dBµV)	Detector	Corrected (dB)	Result (dBµV)	Limit (dBµV)	Margin (dB)
1	N	0.1578	25.28	QP	10.03	35.31	65.58	-30.27
2	N	0.1578	0.39	AVG	10.03	10.42	55.58	-45.16
3	N	0.2280	33.74	QP	10.03	43.77	62.52	-18.75
4	N	0.2280	25.71	AVG	10.03	35.74	52.52	-16.78
5	N	0.2553	27.27	QP	10.03	37.30	61.58	-24.28
6	N	0.2553	17.32	AVG	10.03	27.35	51.58	-24.23
7	N	0.3177	46.42	QP	10.03	56.45	59.77	-3.32
8	N	0.3177	39.42	AVG	10.03	49.45	49.77	-0.32
9	N	0.5907	12.07	QP	10.03	22.10	56.00	-33.90
10	N	0.5907	2.49	AVG	10.03	12.52	46.00	-33.48
11	N	2.2560	10.15	QP	10.05	20.20	56.00	-35.80
12	N	2.2560	-0.96	AVG	10.05	9.09	46.00	-36.91

Test Mode:	Transmitting Mode

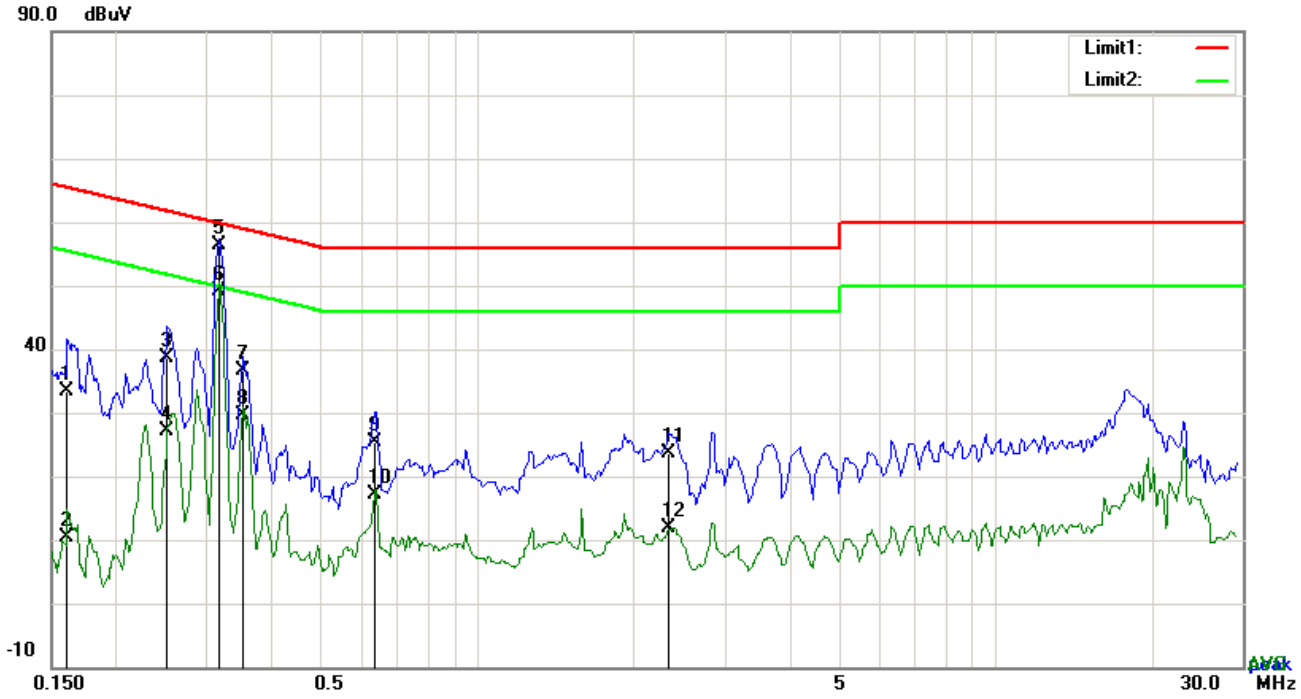


Test Data

Phase Line Plot at 240Vac, 60Hz

No.	P/L	Frequency (MHz)	Reading (dBµV)	Detector	Corrected (dB)	Result (dBµV)	Limit (dBµV)	Margin (dB)
1	L1	0.1749	22.92	QP	10.03	32.95	64.72	-31.77
2	L1	0.1749	-1.24	AVG	10.03	8.79	54.72	-45.93
3	L1	0.2553	29.31	QP	10.03	39.34	61.58	-22.24
4	L1	0.2553	18.50	AVG	10.03	28.53	51.58	-23.05
5	L1	0.3177	46.71	QP	10.03	56.74	59.77	-3.03
6	L1	0.3177	39.28	AVG	10.03	49.31	49.77	-0.46
7	L1	0.3268	25.33	QP	10.03	35.36	59.53	-24.17
8	L1	0.3268	16.88	AVG	10.03	26.91	49.53	-22.62
9	L1	0.3528	26.63	QP	10.03	36.66	58.90	-22.24
10	L1	0.3528	19.87	AVG	10.03	29.90	48.90	-19.00
11	L1	0.6375	15.14	QP	10.03	25.17	56.00	-30.83
12	L1	0.6375	7.38	AVG	10.03	17.41	46.00	-28.59

Test Mode:	Transmitting Mode



Test Data

Phase Neutral Plot at 240Vac, 60Hz

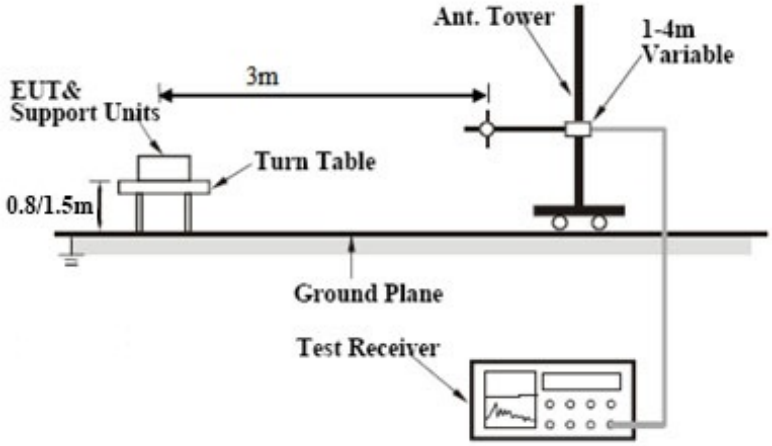
No.	P/L	Frequency (MHz)	Reading (dBµV)	Detector	Corrected (dB)	Result (dBµV)	Limit (dBµV)	Margin (dB)
1	N	0.1607	23.43	QP	10.03	33.46	65.43	-31.97
2	N	0.1607	0.32	AVG	10.03	10.35	55.43	-45.08
3	N	0.2514	28.70	QP	10.03	38.73	61.71	-22.98
4	N	0.2514	17.02	AVG	10.03	27.05	51.71	-24.66
5	N	0.3177	46.42	QP	10.03	56.45	59.77	-3.32
6	N	0.3177	38.98	AVG	10.03	49.01	49.77	-0.76
7	N	0.3528	26.51	QP	10.03	36.54	58.90	-22.36
8	N	0.3528	19.64	AVG	10.03	29.67	48.90	-19.23
9	N	0.6336	15.32	QP	10.03	25.35	56.00	-30.65
10	N	0.6336	7.00	AVG	10.03	17.03	46.00	-28.97
11	N	2.3340	13.56	QP	10.05	23.61	56.00	-32.39
12	N	2.3340	1.83	AVG	10.05	11.88	46.00	-34.12

6.7 Radiated Spurious Emissions & Restricted Band

Temperature	25℃
Relative Humidity	55%
Atmospheric Pressure	1012mbar
Test date :	January 11, 2017
Tested By :	Loren Luo

Requirement(s):

<table>
<tr><th>Spec</th><th>Item</th><th>Requirement</th><th>Applicable</th></tr>
<tr><td rowspan="3">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
<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>b)</td><td>For non-restricted band, 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 or 30dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, determined by the measurement method on output power to be used. Attenuation below the general limits specified in § 15.209(a) is not required
☒ 20 dB down ☐ 30 dB down</td><td>☑</td></tr>
<tr><td>c)</td><td>or restricted band, emission must also comply with the radiated emission limits specified in 15.209</td><td>☑</td></tr>
</table>

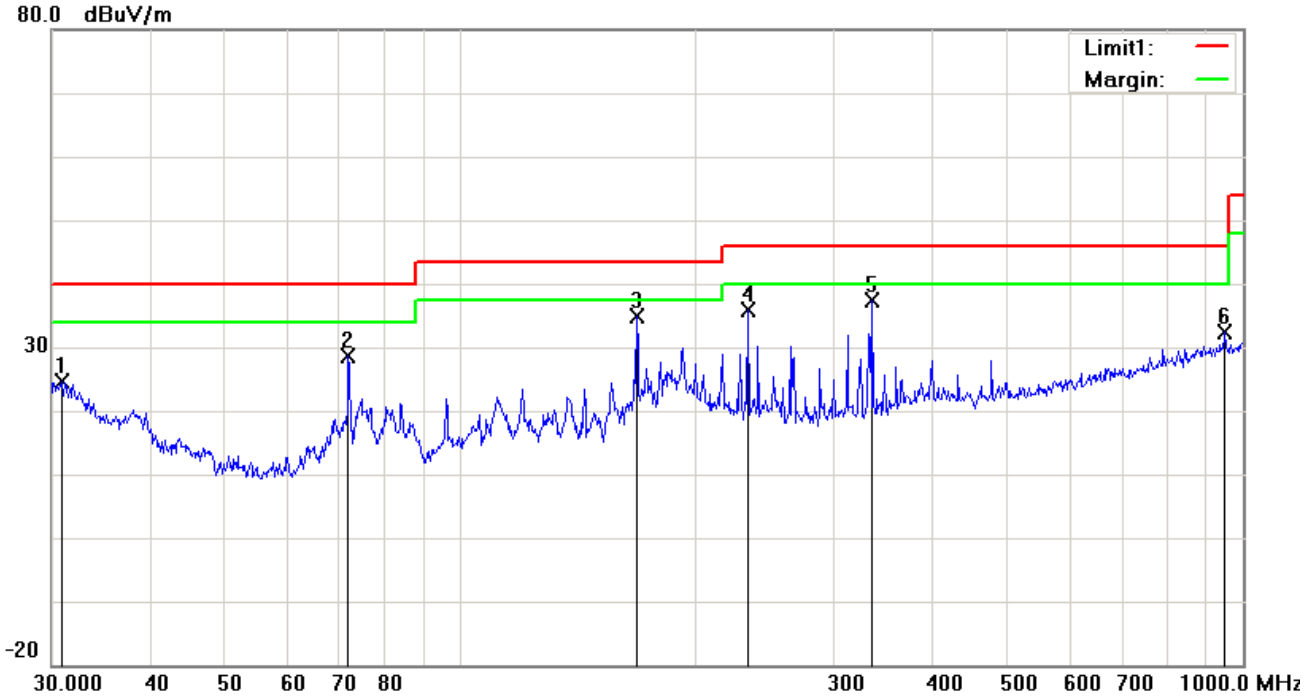
Test Setup	
Procedure	1. The EUT was switched on and allowed to warm up to its normal operating condition. 2. The test was carried out at the selected frequency points obtained from the EUT characterization. Maximization of the emissions, was carried out by rotating the EUT, changing the antenna polarization, 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 is 10Hz with Peak detection for Average Measurement as below at frequency above 1GHz. 5. Steps 2 and 3 were repeated for the next frequency point, until all selected frequency points were measured.
Remark	Different RF configuration has been evaluated but not much difference was found. The data presented here is the worst case data with EUT under 802.11n – HT20-2437MHz mode.
Result	☑ Pass ☐ Fail

Test Data ☑ Yes ☐ N/A

Test Plot ☑ Yes (See below) ☐ N/A

Test Mode:	Transmitting Mode

Below 1GHz

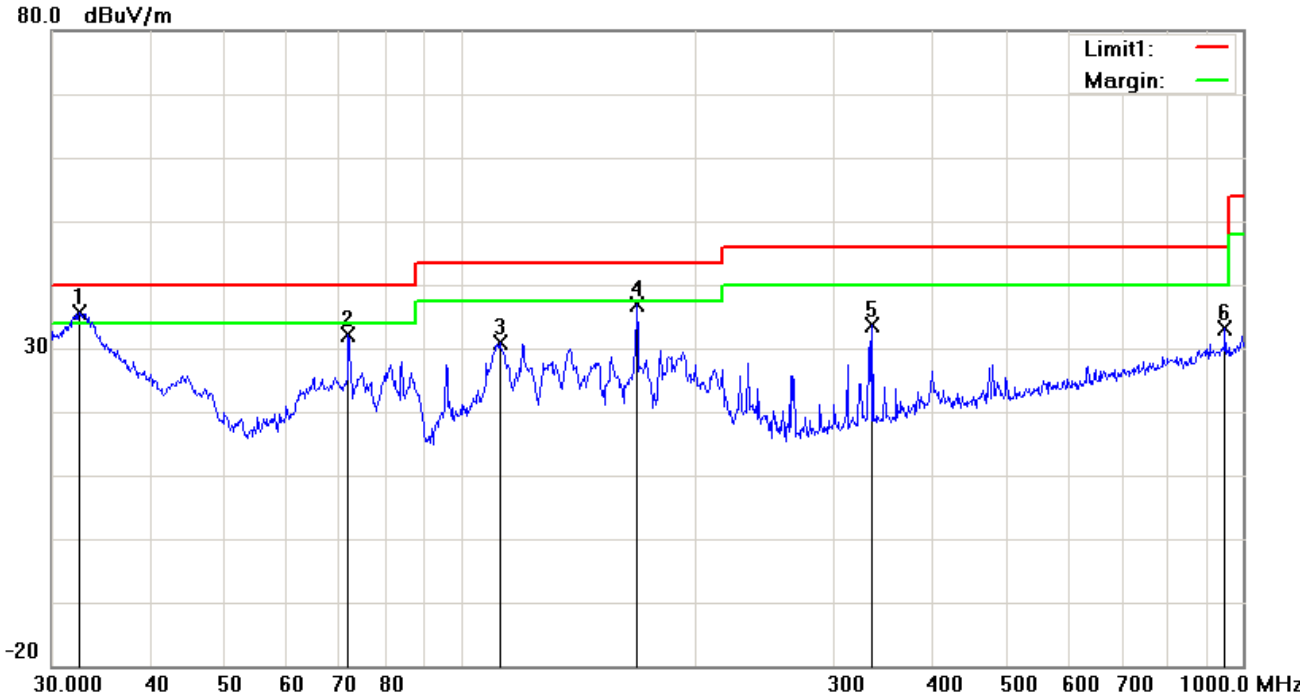


Test Data

Vertical Polarity Plot @3m

No	P/L	Frequency (MHz)	Reading (dBµV)	Detector	Corrected (dB)	Result (dBµV)	Limit (dBµV)	Margin (dB)	Height	Degree
1	H	30.9619	25.50	peak	-0.96	24.54	40.00	-15.46	100	115
2	H	71.8320	42.35	peak	-13.66	28.69	40.00	-11.31	200	248
3	H	167.8243	43.89	peak	-8.92	34.97	43.50	-8.53	100	43
4	H	233.3487	45.02	peak	-9.04	35.98	46.00	-10.02	300	159
5	H	336.0352	43.33	peak	-5.86	37.47	46.00	-8.53	100	343
6	H	948.7610	27.27	peak	5.12	32.39	46.00	-13.61	100	188

Below 1GHz



Test Data

Horizontal Polarity Plot @3m

No	P/L	Frequency (MHz)	Reading (dBµV)	Detector	Corrected (dB)	Result (dBµV)	Limit (dBµV)	Margin (dB)	Height	Degree
1	V	32.5198	37.80	QP	-2.11	35.69	40.00	-4.31	100	175
2	V	71.8320	45.88	peak	-13.66	32.22	40.00	-7.78	100	221
3	V	112.1305	39.53	peak	-8.65	30.88	43.50	-12.62	100	64
4	V	167.8243	45.69	peak	-8.92	36.77	43.50	-6.73	100	314
5	V	336.0352	39.55	peak	-5.86	33.69	46.00	-12.31	200	197
6	V	948.7610	27.90	peak	5.12	33.02	46.00	-12.98	100	112

Above 1GHz

Test Mode:	Transmitting Mode

Low Channel (2402 MHz)

Frequency (MHz)	S.A. Reading (dBμV)	Detector (PK/AV)	Polarity (H/V)	Ant. Factor (dB/m)	Cable Loss (dB)	Pre-Amp. Gain (dB)	Cord. Amp. (dBμV/m)	Limit (dBμV/m)	Margin (dB)
4804	38.53	AV	V	33.83	6.86	31.72	47.5	54	-6.5
4804	38.14	AV	H	33.83	6.86	31.72	47.11	54	-6.89
4804	48.92	PK	V	33.83	6.86	31.72	57.89	74	-16.11
4804	48.36	PK	H	33.83	6.86	31.72	57.33	74	-16.67
17797	24.77	AV	V	45.03	11.21	32.38	48.63	54	-5.37
17797	24.51	AV	H	45.03	11.21	32.38	48.37	54	-5.63
17797	41.66	PK	V	45.03	11.21	32.38	65.52	74	-8.48
17797	40.98	PK	H	45.03	11.21	32.38	64.84	74	-9.16

Middle Channel (2440 MHz)

Frequency (MHz)	S.A. Reading (dBμV)	Detector (PK/AV)	Polarity (H/V)	Ant. Factor (dB/m)	Cable Loss (dB)	Pre-Amp. Gain (dB)	Cord. Amp. (dBμV/m)	Limit (dBμV/m)	Margin (dB)
4880	38.67	AV	V	33.86	6.82	31.82	47.53	54	-6.47
4880	38.42	AV	H	33.86	6.82	31.82	47.28	54	-6.72
4880	48.75	PK	V	33.86	6.82	31.82	57.61	74	-16.39
4880	48.02	PK	H	33.86	6.82	31.82	56.88	74	-17.12
17809	24.49	AV	V	45.15	11.18	32.41	48.41	54	-5.59
17809	24.17	AV	H	45.15	11.18	32.41	48.09	54	-5.91
17809	41.36	PK	V	45.15	11.18	32.41	65.28	74	-8.72
17809	41.08	PK	H	45.15	11.18	32.41	65	74	-9

High Channel (2480 MHz)

Frequency (MHz)	S.A. Reading (dBμV)	Detector (PK/AV)	Polarity (H/V)	Ant. Factor (dB/m)	Cable Loss (dB)	Pre-Amp. Gain (dB)	Cord. Amp. (dBμV/m)	Limit (dBμV/m)	Margin (dB)
4960	38.53	AV	V	33.9	6.76	31.92	47.27	54	-6.73
4960	38.16	AV	H	33.9	6.76	31.92	46.90	54	-7.10
4960	48.79	PK	V	33.9	6.76	31.92	57.53	74	-16.47
4960	48.11	PK	H	33.9	6.76	31.92	56.85	74	-17.15
17799	24.63	AV	V	45.22	11.35	32.38	48.82	54	-5.18
17799	24.37	AV	H	45.22	11.35	32.38	48.56	54	-5.44
17799	41.58	PK	V	45.22	11.35	32.38	65.77	74	-8.23
17799	40.96	PK	H	45.22	11.35	32.38	65.15	74	-8.85

Note:

*1, The testing has been conformed to 10*2480MHz=24,800MHz*
2, All other emissions more than 30 dB below the limit
3, X-Axis, Y-Axis and Z-Axis were investigated. The results above show only the worst case.

Annex A. TEST INSTRUMENT

Instrument	Model	Serial #	Cal Date	Cal Due	In use
AC Line Conducted					
EMI test receiver	ESCS30	8471241027	09/16/2016	09/15/2017	☑
Line Impedance	LI-125A	191106	09/24/2016	09/23/2017	☑
Line Impedance	LI-125A	191107	09/24/2016	09/23/2017	☑
LISN	ISN T800	34373	09/24/2016	09/23/2017	☑
Double Ridge Horn Antenna (1 ~18GHz)	AH-118	71283	09/23/2016	09/22/2017	☑
Transient Limiter	LIT-153	531118	08/31/2016	08/30/2017	☑
RF conducted test					
Agilent ESA-E SERIES	E4407B	MY45108319	09/16/2016	09/15/2017	☑
Power Splitter	1#	1#	08/31/2016	08/30/2017	☑
DC Power Supply	E3640A	MY40004013	09/16/2016	09/15/2017	☑
Radiated Emissions					
EMI test receiver	ESL6	100262	09/16/2016	09/15/2017	☑
Positioning Controller	UC3000	MF780208282	11/18/2016	11/17/2017	☑
OPT 010 AMPLIFIER (0.1-1300MHz)	8447E	2727A02430	08/31/2016	08/30/2017	☑
Microwave Preamplifier (1 ~ 26.5GHz)	8449B	3008A02402	03/24/2016	03/23/2017	☑
Bilog Antenna (30MHz~6GHz)	JB6	A110712	09/20/2016	09/19/2017	☑
Double Ridge Horn Antenna (1 ~18GHz)	AH-118	71283	09/23/2016	09/22/2017	☑
Universal Radio Communication Tester	CMU200	121393	09/24/2016	09/23/2017	☑

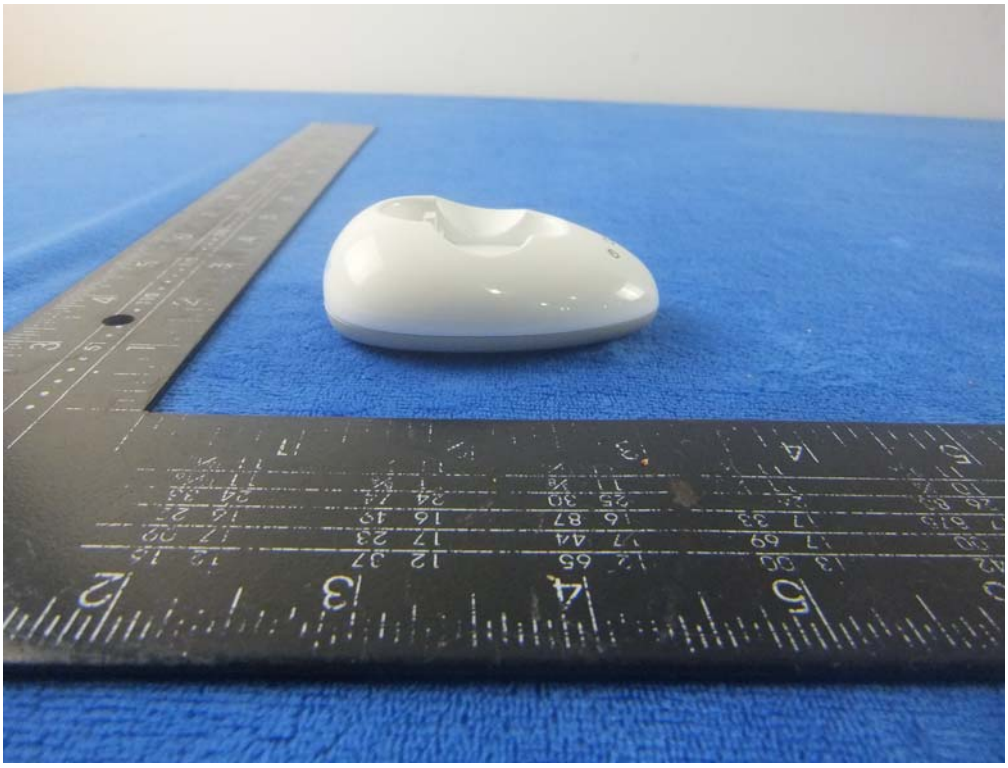
Annex B. EUT And Test Setup Photographs

Annex B.i. Photograph: EUT External Photo

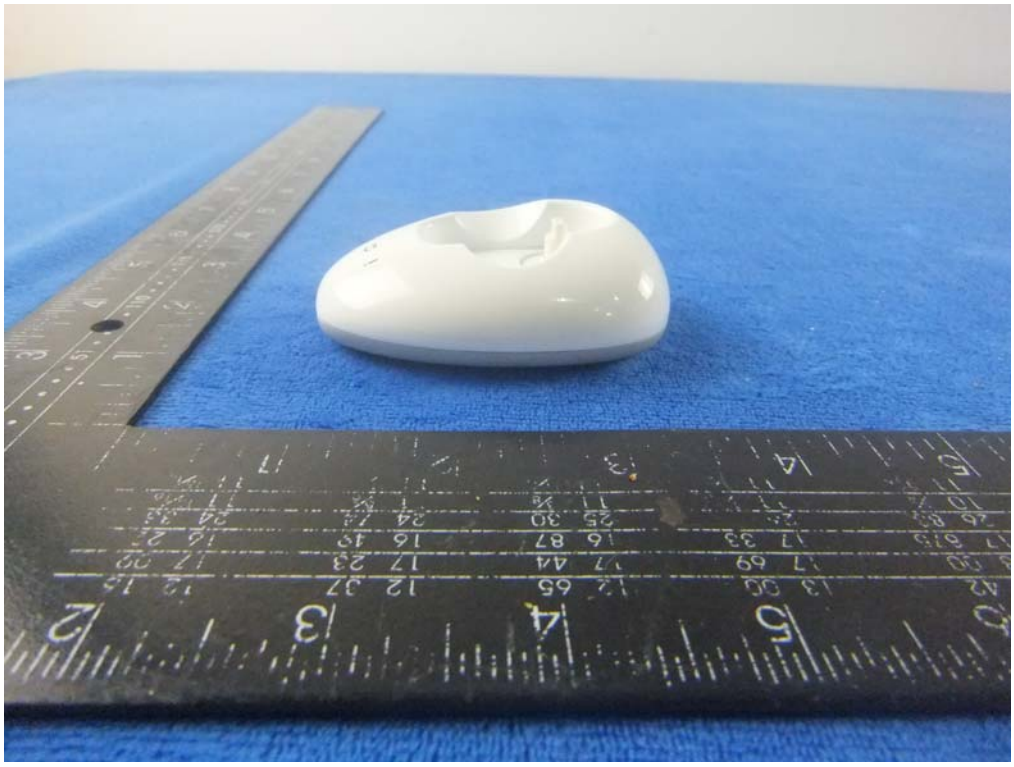
Whole Package View

EUT - Front View

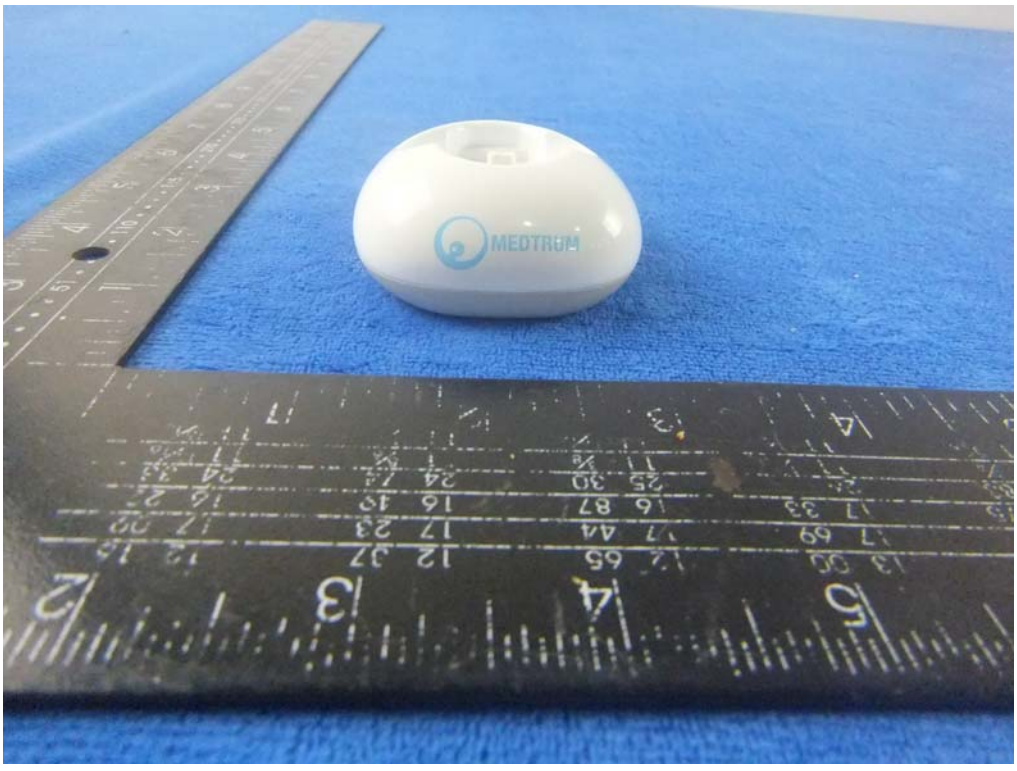
EUT – Rear View



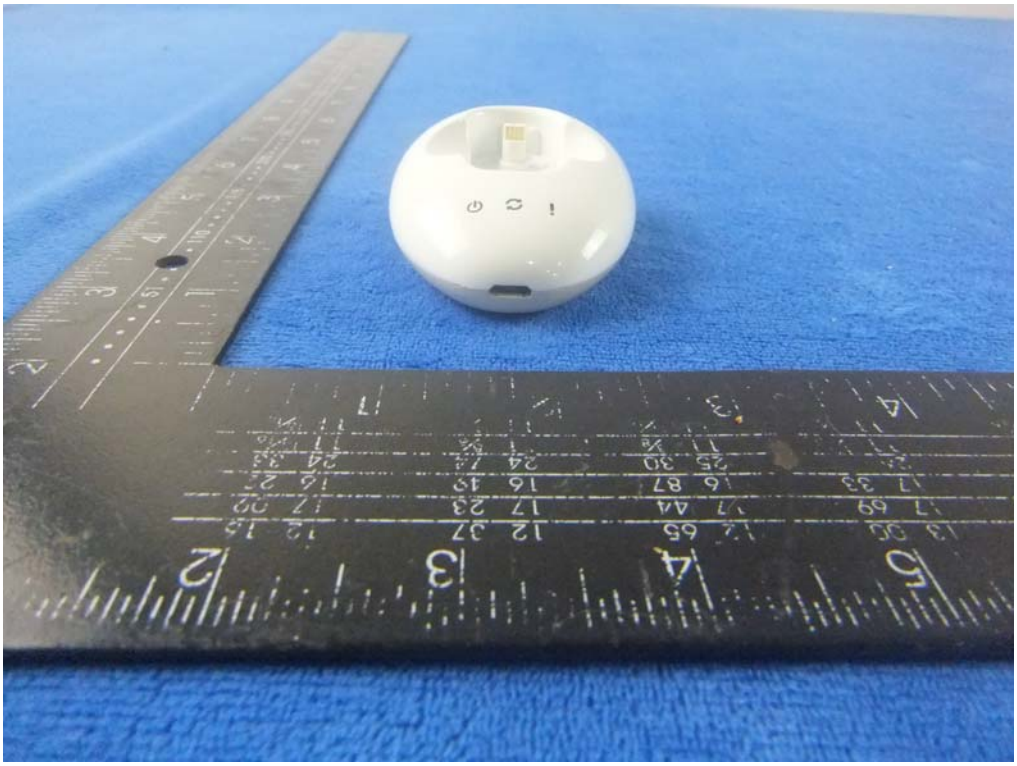
EUT - Left View



EUT – Right View

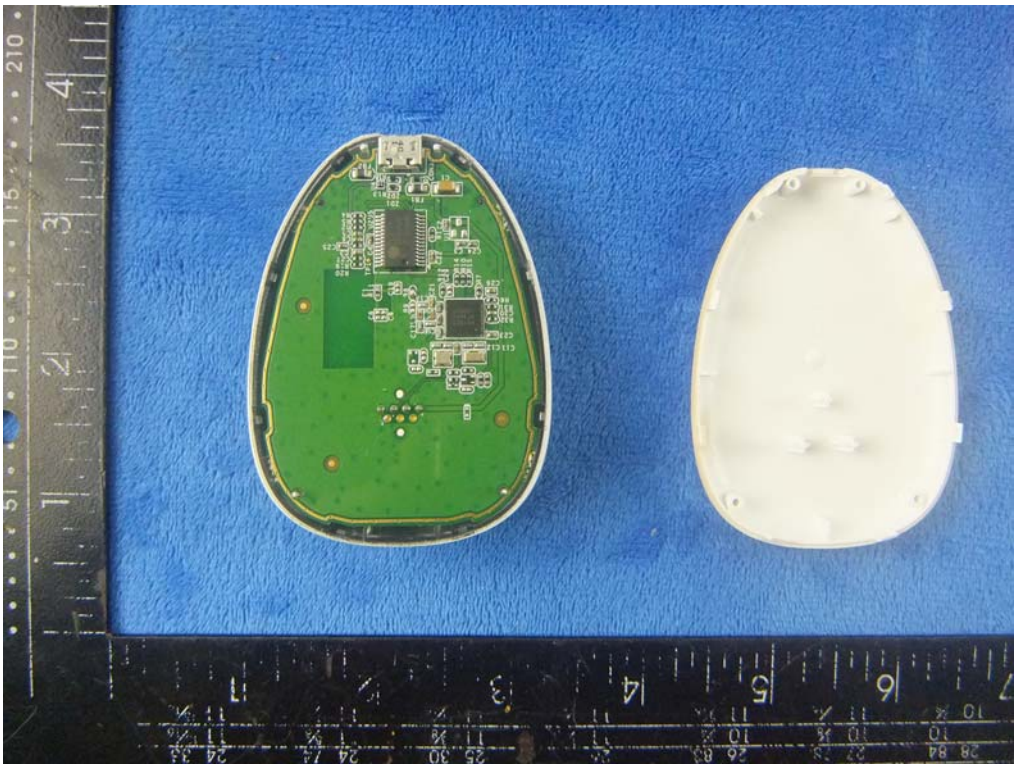


EUT - Top View



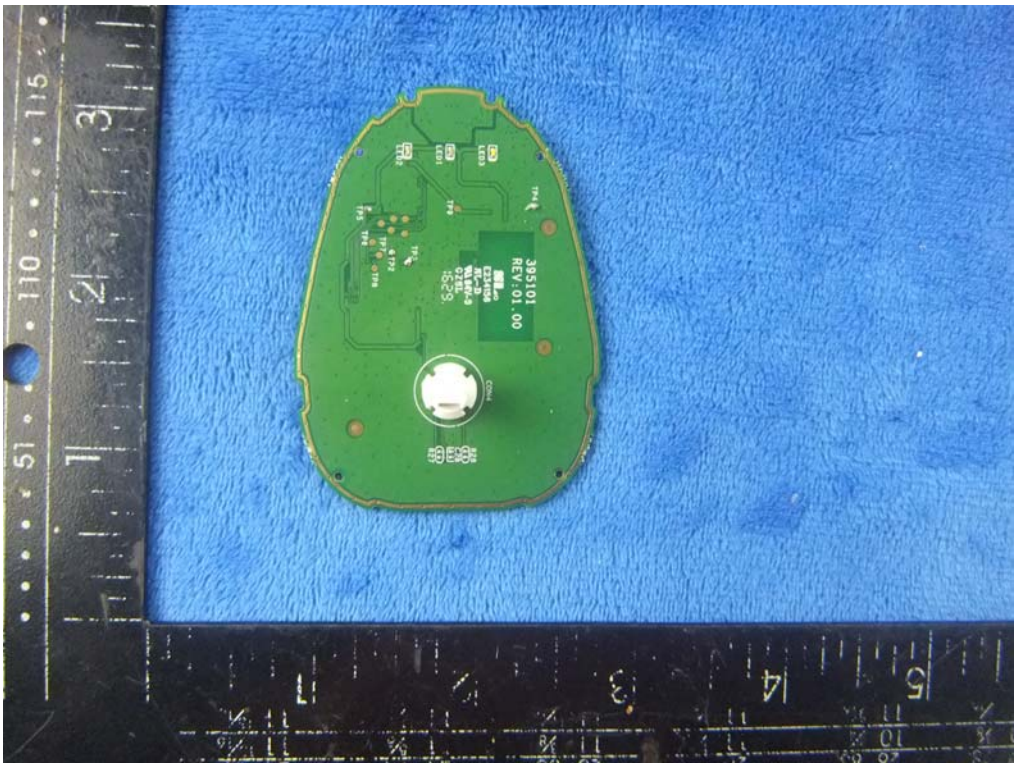
EUT – Bottom View

Annex B.ii. Photograph: EUT Internal Photo

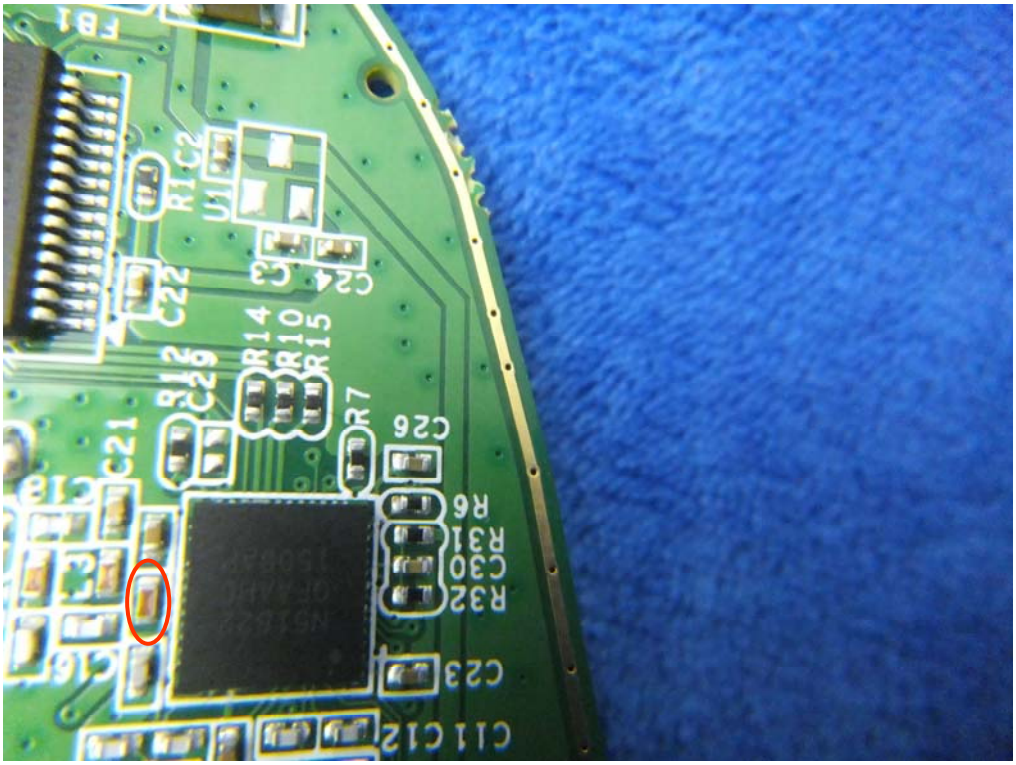


Cover Off - Top View

Mainborad - Front View

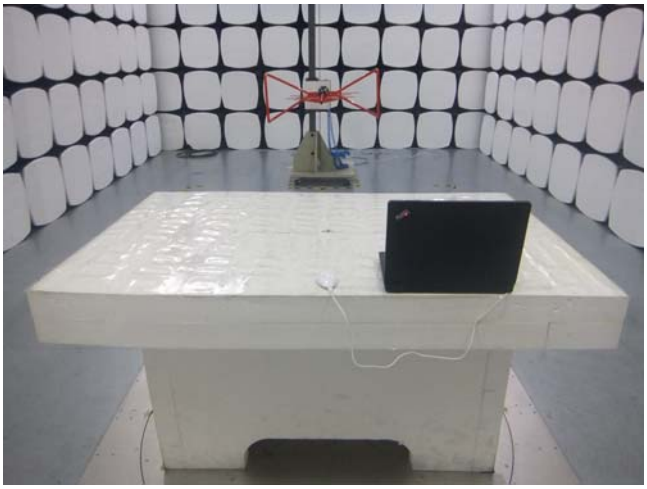
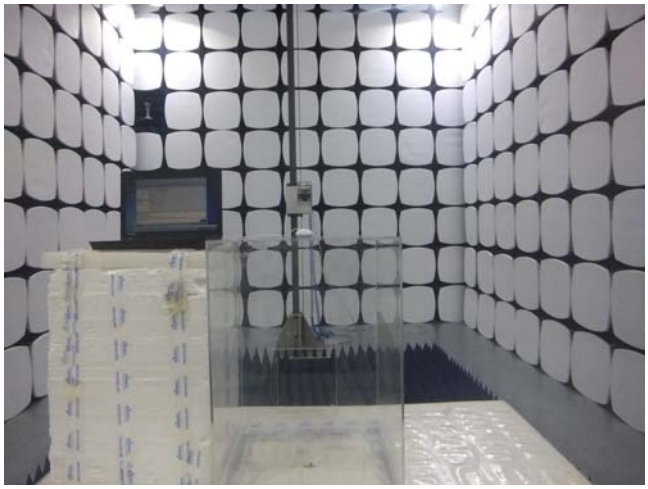


Mainborad - Rear View



BT- Antenna View

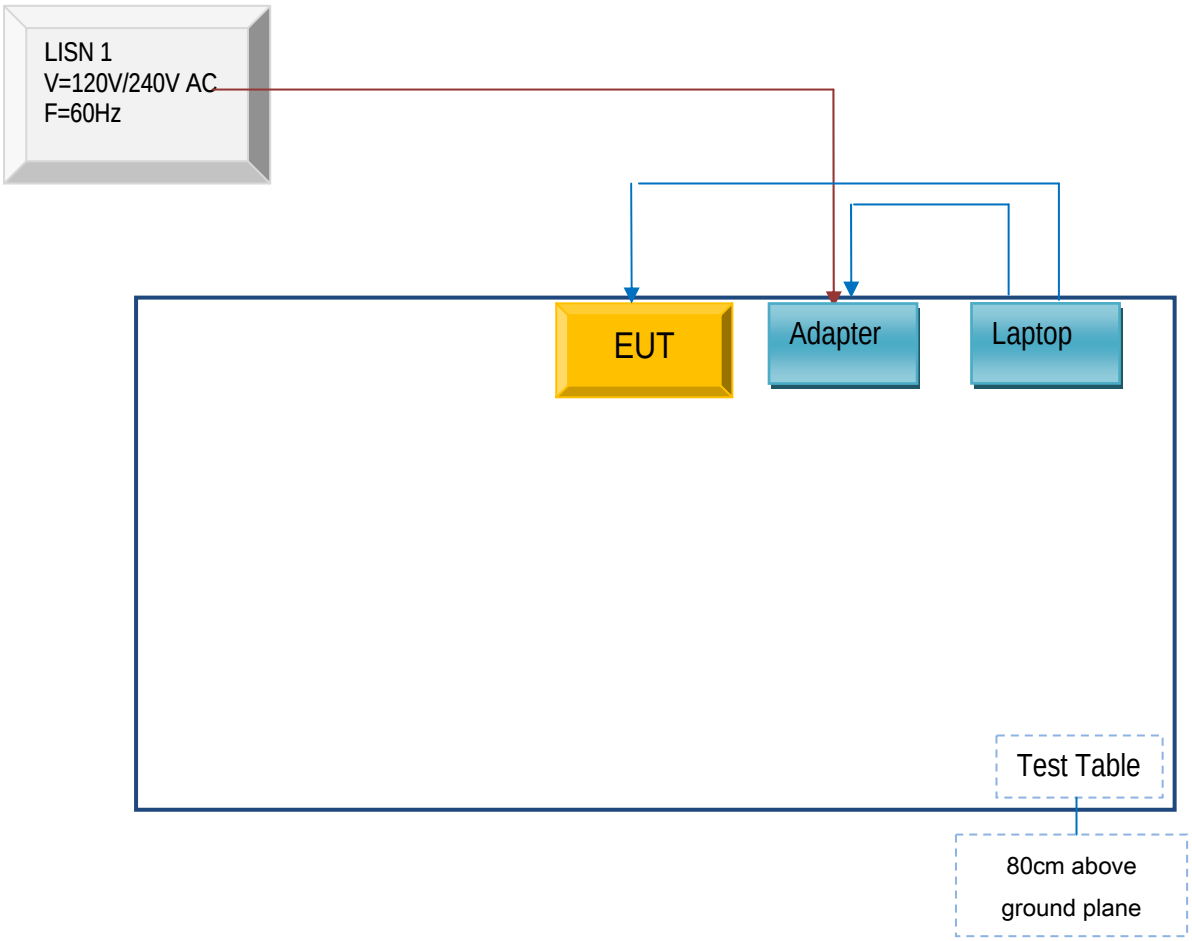
Annex B.iii. Photograph: Test Setup Photo

<table>
<tr><td>  </td><td>  </td></tr>
<tr><td>Conducted Emissions Test Setup Front View</td><td>Conducted Emissions Test Setup Side View</td></tr>
<tr><td>  </td><td>  </td></tr>
<tr><td>Radiated Spurious Emissions Test Setup Below 1GHz</td><td>Radiated Spurious Emissions Test Setup Above 1GHz</td></tr>
</table>

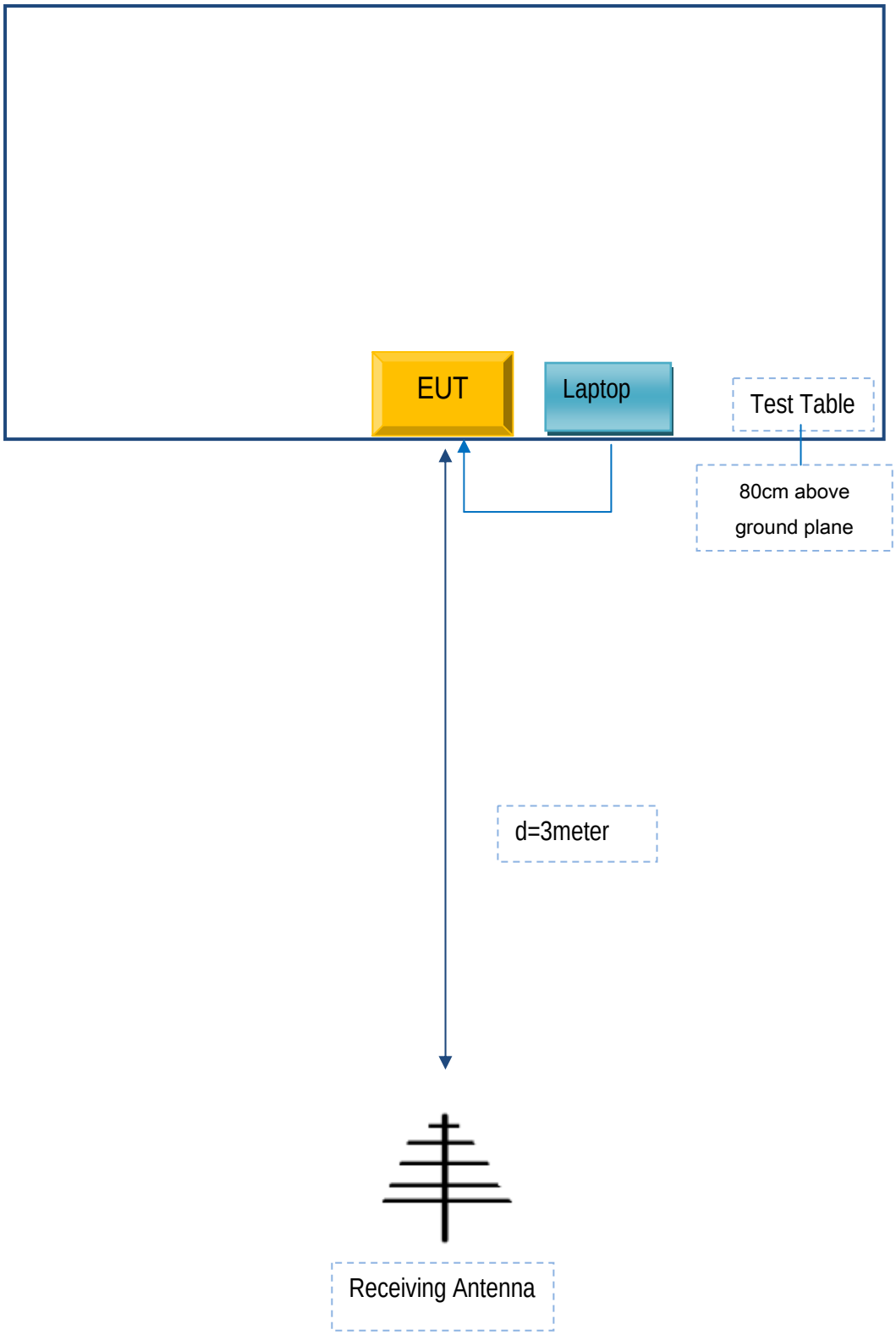
Annex C. TEST SETUP AND SUPPORTING EQUIPMENT

Annex C.ii. TEST SET UP BLOCK

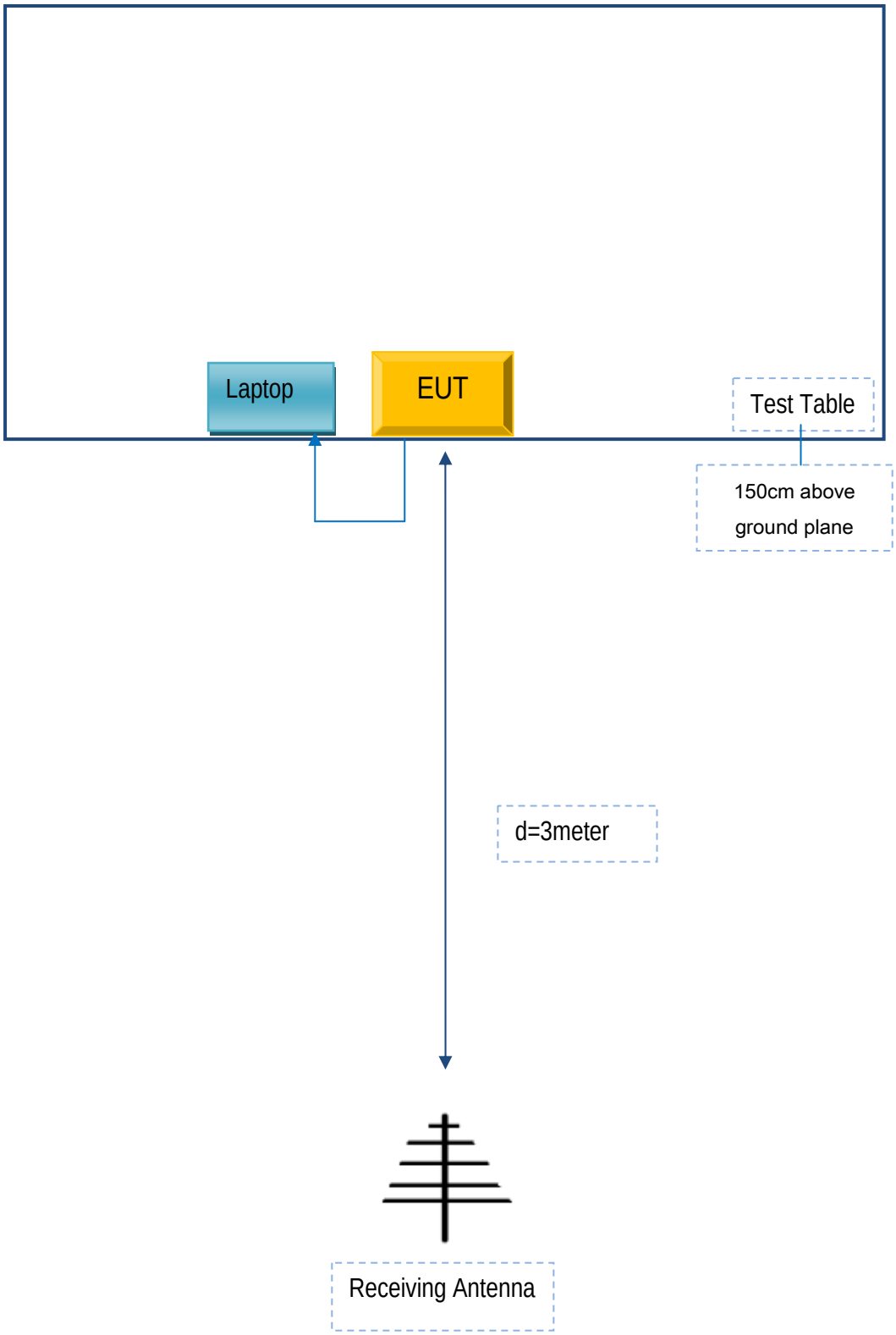
Block Configuration Diagram for AC Line Conducted Emissions



Block Configuration Diagram for Radiated Emissions （Below 1GHz）.



Block Configuration Diagram for Radiated Emissions （Above 1GHz）.



Annex C. iI. SUPPORTING EQUIPMENT DESCRIPTION

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

Supporting Equipment:

Manufacturer	Equipment Description	Model	Serial No
Lenovo	Laptop	E40	LR-1EHRX
DCA	Adaptor	E2164A	V356328X

Supporting Cable:

Cable type	Shield Type	Ferrite Core	Length	Serial No
USB Cable	Un-shielding	No	0.8m	E157263
Power Cable	Un-shielding	No	0.5m	XC003152

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

Please see the attachment

Annex E. DECLARATION OF SIMILARITY

N/A