EMC TEST REPORT

SIEMIC
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Report No.: 16071382-FCC-E-V1

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 Subpart B Class B:2016, ANSI C63.4: 2014
Test Date	December 24, 2016 to February 06, 2017
Issue Date	February 28, 2017
Test Result	☑ Pass ☐ Fail
Equipment complied with the specification	☑
Equipment did not comply with the specification	☐

Evans He	David Huang	
Evans He 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-E	NONE	Original	February 07, 2017
16071382-FCC-E-V1	V1	Change product name	February 28, 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 of Radiated Emission	Radiated Emission Program-To Shenzhen v2.0
Test Software of Conducted Emission	EZ-EMC(ver.lcp-03A1)

4. Equipment under Test (EUT) Information

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

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
§15.107; ANSI C63.4: 2014	AC Power Line Conducted Emissions	Compliance
§15.109; ANSI C63.4: 2014	Radiated Emissions	Compliance

Measurement Uncertainty

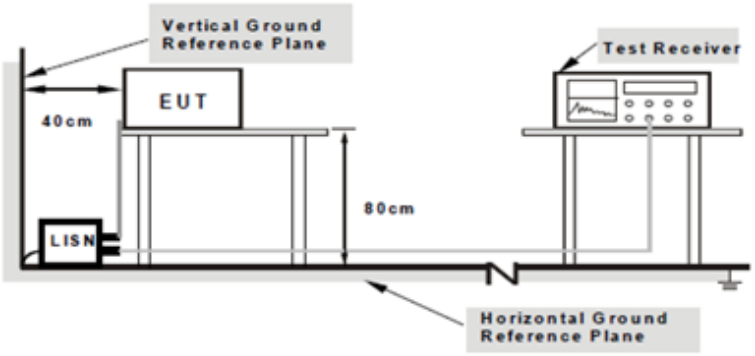
Emissions		
Test Item	**Description**	**Uncertainty**
Band Edge and Radiated Spurious Emissions	Confidence level of approximately 95% (in the case where distributions are normal), with a coverage factor of 2 (for EUTs < 0.5m X 0.5m X 0.5m)	+5.6dB/-4.5dB
-	-	-

6. Measurements, Examination And Derived Results

6.1 AC Power Line Conducted Emissions

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

Requirement(s):

<table>
<tr><th>Spec</th><th>Item</th><th>Requirement</th><th>Applicable</th></tr>
<tr><td>47CFR§15.107</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"> 

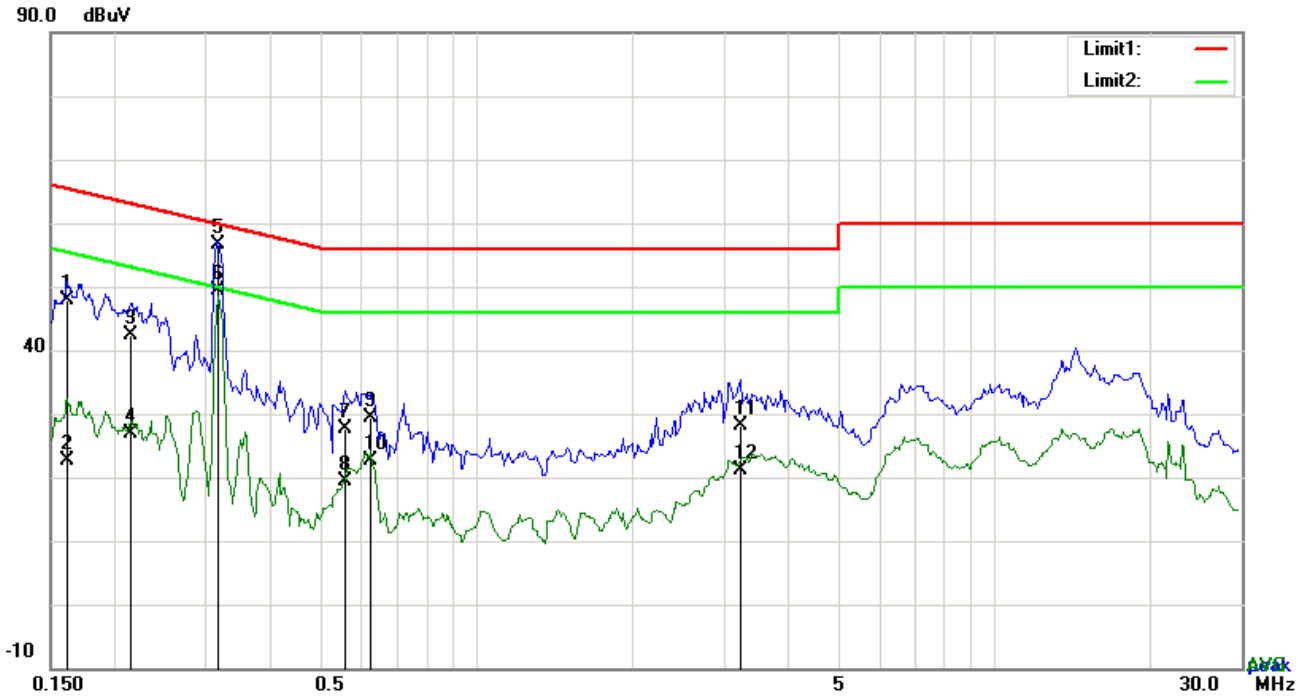
Note: 1.Support units were connected to second LISN.
2.Both of LISNs (AMN) are 80cm from EUT and at least 80cm from other units and other metal planes support units.</td></tr>
<tr><td>Procedure</td><td colspan="3">1. The EUT and supporting equipment were set up in accordance with the requirements of 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 50Ω /50mH EUT LISN, connected to filtered mains.</td></tr>
</table>

	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).
Remark	
Result	☑ Pass ☐ Fail

Test Data ☑ Yes ☐ N/A

Test Plot ☑ Yes (See below) ☐ N/A

Test Mode :	USB Mode

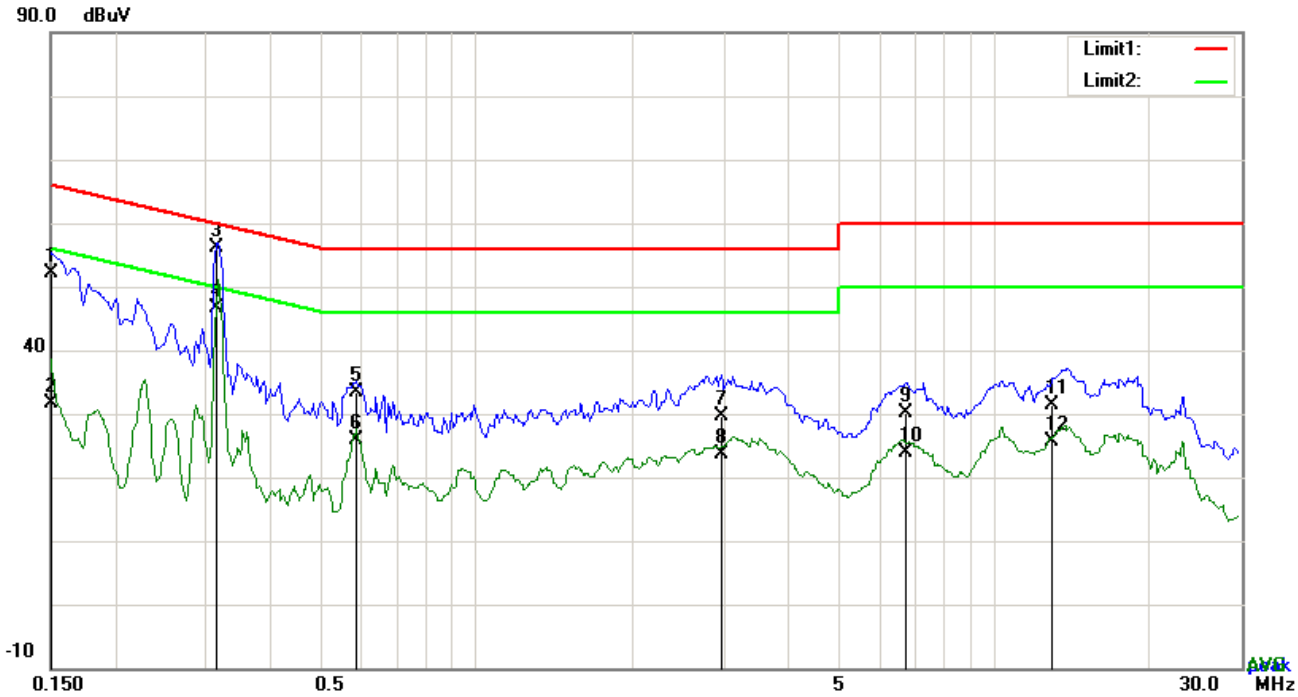


Test Data

Phase Line Plot at 120Vac, 60Hz

No.	P/L	Frequency	Reading	Detector	Corrected	Result	Limit	Margin
		(MHz)	(dBuV)		(dB}	(dBuV)	(dBuV)	(dB)
1	L1	0.1615	37.76	QP	10.03	47.79	65.39	-17.60
2	L1	0.1615	12.58	AVG	10.03	22.61	55.39	-32.78
3	L1	0.2139	32.26	QP	10.03	42.29	63.05	-20.76
4	L1	0.2139	16.73	AVG	10.03	26.76	53.05	-26.29
5	L1	0.3177	46.54	QP	10.03	56.57	59.77	-3.20
6	L1	0.3177	39.38	AVG	10.03	49.41	49.77	-0.36
7	L1	0.5556	17.66	QP	10.03	27.69	56.00	-28.31
8	L1	0.5556	9.28	AVG	10.03	19.31	46.00	-26.69
9	L1	0.6258	19.27	QP	10.03	29.30	56.00	-26.70
10	L1	0.6258	12.51	AVG	10.03	22.54	46.00	-23.46
11	L1	3.2340	18.07	QP	10.06	28.13	56.00	-27.87
12	L1	3.2340	10.96	AVG	10.06	21.02	46.00	-24.98

Test Mode :	USB Mode

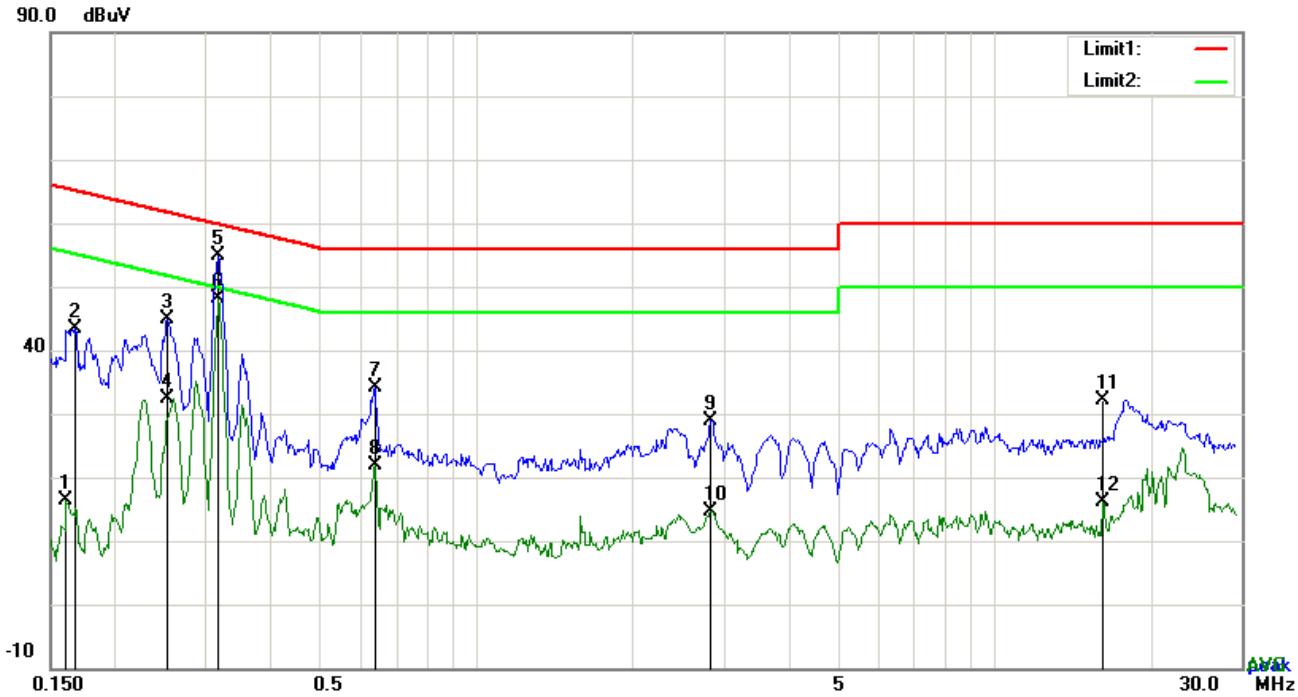


Test Data

Phase Neutral Plot at 120Vac, 60Hz

No.	P/L	Frequency	Reading	Detector	Corrected	Result	Limit	Margin
		(MHz)	(dBuV)		(dB}	(dBuV)	(dBuV)	(dB)
1	N	0.1500	42.21	QP	10.02	52.23	66.00	-13.77
2	N	0.1500	21.62	AVG	10.02	31.64	56.00	-24.36
3	N	0.3138	46.19	QP	10.02	56.21	59.87	-3.66
4	N	0.3138	36.55	AVG	10.02	46.57	49.87	-3.30
5	N	0.5868	23.27	QP	10.02	33.29	56.00	-22.71
6	N	0.5868	15.75	AVG	10.02	25.77	46.00	-20.23
7	N	2.9619	19.57	QP	10.05	29.62	56.00	-26.38
8	N	2.9619	13.55	AVG	10.05	23.60	46.00	-22.40
9	N	6.7674	19.92	QP	10.09	30.01	60.00	-29.99
10	N	6.7674	13.85	AVG	10.09	23.94	50.00	-26.06
11	N	12.9879	21.25	QP	10.18	31.43	60.00	-28.57
12	N	12.9879	15.39	AVG	10.18	25.57	50.00	-24.43

Test Mode :	USB Mode

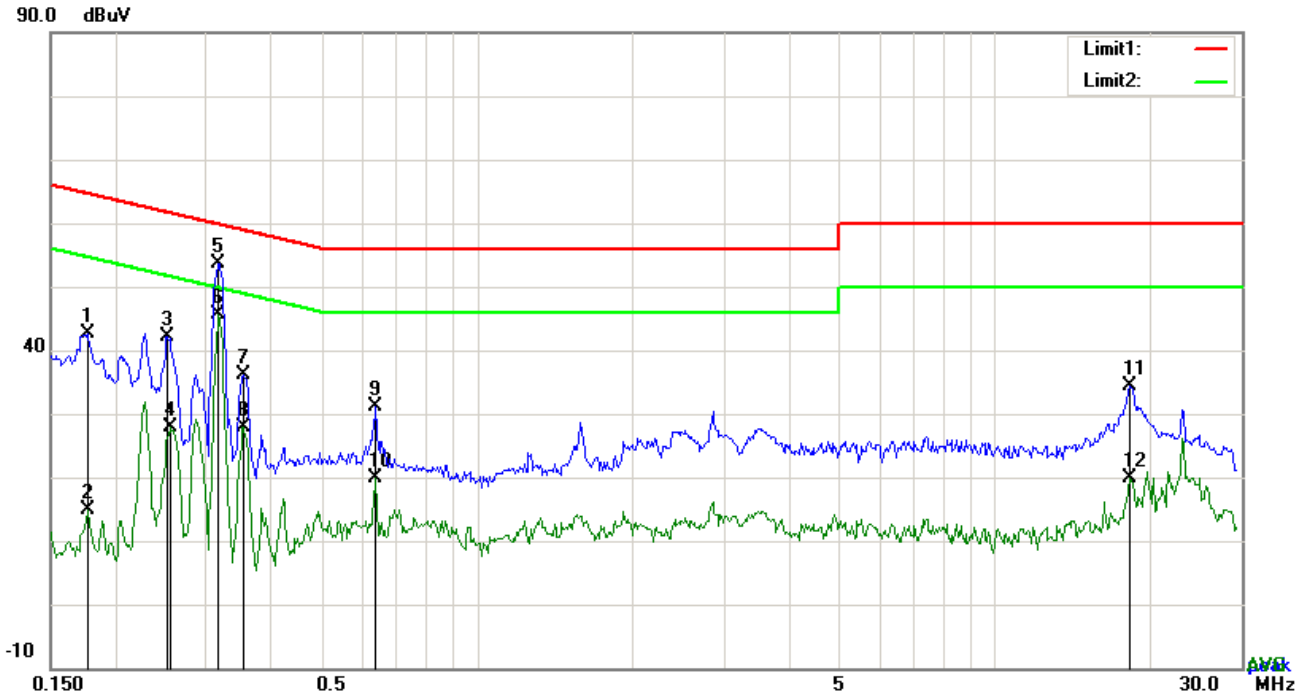


Test Data

Phase Line Plot at 240Vac, 60Hz

No.	P/L	Frequency	Reading	Detector	Corrected	Result	Limit	Margin
		(MHz)	(dBuV)		(dB}	(dBuV)	(dBuV)	(dB)
1	L1	0.1607	6.28	AVG	10.03	16.31	55.43	-39.12
2	L1	0.1607	33.34	QP	10.03	43.37	65.07	-21.70
3	L1	0.2521	34.94	QP	10.03	44.97	61.69	-16.72
4	L1	0.2521	22.27	AVG	10.03	32.30	51.69	-19.39
5	L1	0.3177	44.85	QP	10.03	54.88	59.77	-4.89
6	L1	0.3177	38.01	AVG	10.03	48.04	49.77	-1.73
7	L1	0.6338	24.01	QP	10.03	34.04	56.00	-21.96
8	L1	0.6338	11.73	AVG	10.03	21.76	46.00	-24.24
9	L1	2.8371	18.91	QP	10.05	28.96	56.00	-27.04
10	L1	2.8371	4.54	AVG	10.05	14.59	46.00	-31.41
11	L1	16.1820	21.80	QP	10.24	32.04	60.00	-27.96
12	L1	16.1820	5.93	AVG	10.24	16.17	50.00	-33.83

Test Mode :	USB Mode



Test Data

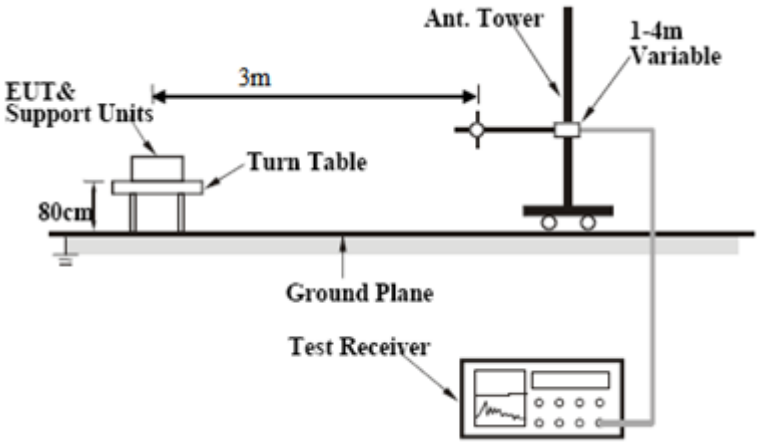
Phase Neutral Plot at 240Vac, 60Hz

No.	P/L	Frequency	Reading	Detector	Corrected	Result	Limit	Margin
		(MHz)	(dBuV)		(dB}	(dBuV)	(dBuV)	(dB)
1	N	0.1768	32.65	QP	10.03	42.68	64.63	-21.95
2	N	0.1768	4.79	AVG	10.03	14.82	54.63	-39.81
3	N	0.2521	32.08	QP	10.03	42.11	61.69	-19.58
4	N	0.2521	17.77	AVG	10.03	27.80	51.60	-23.80
5	N	0.3166	43.68	QP	10.03	53.71	59.80	-6.09
6	N	0.3166	35.53	AVG	10.03	45.56	49.80	-4.24
7	N	0.3539	26.04	QP	10.03	36.07	58.87	-22.80
8	N	0.3539	17.82	AVG	10.03	27.85	48.87	-21.02
9	N	0.6372	21.09	QP	10.03	31.12	56.00	-24.88
10	N	0.6372	9.90	AVG	10.03	19.93	46.00	-26.07
11	N	18.2316	24.00	QP	10.27	34.27	60.00	-25.73
12	N	18.2316	9.54	AVG	10.27	19.81	50.00	-30.19

6.2 Radiated Emissions

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

Requirement(s):

<table>
<tr><th>Spec</th><th>Item</th><th>Requirement</th><th>Applicable</th></tr>
<tr><td>47CFR§15.109(d)</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>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</td></tr>
</table>

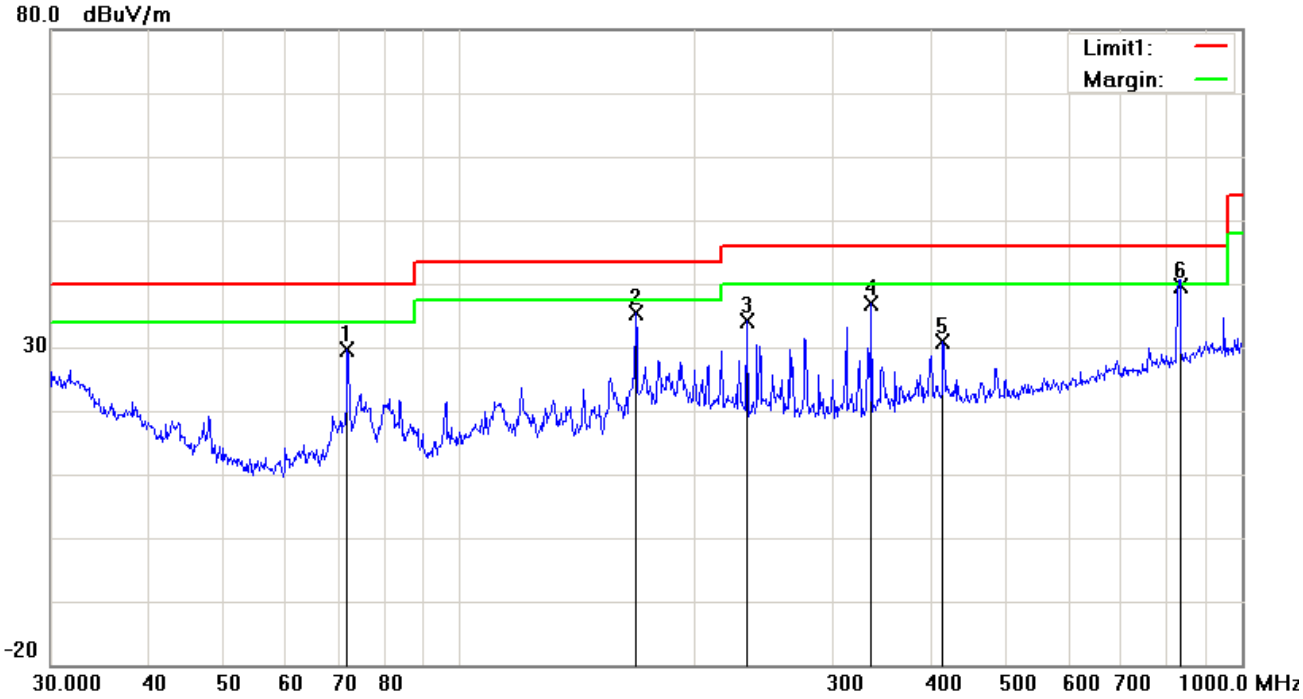
	over a full rotation of the EUT) was chosen. b. The EUT was then rotated to the direction that gave the maximum emission. c. Finally, the antenna height was adjusted to the height that gave the maximum emission. 3. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120 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 detection for Average Measurement as below at frequency above 1GHz. ■ 1 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

Test Mode :	USB Mode

Below 1GHz

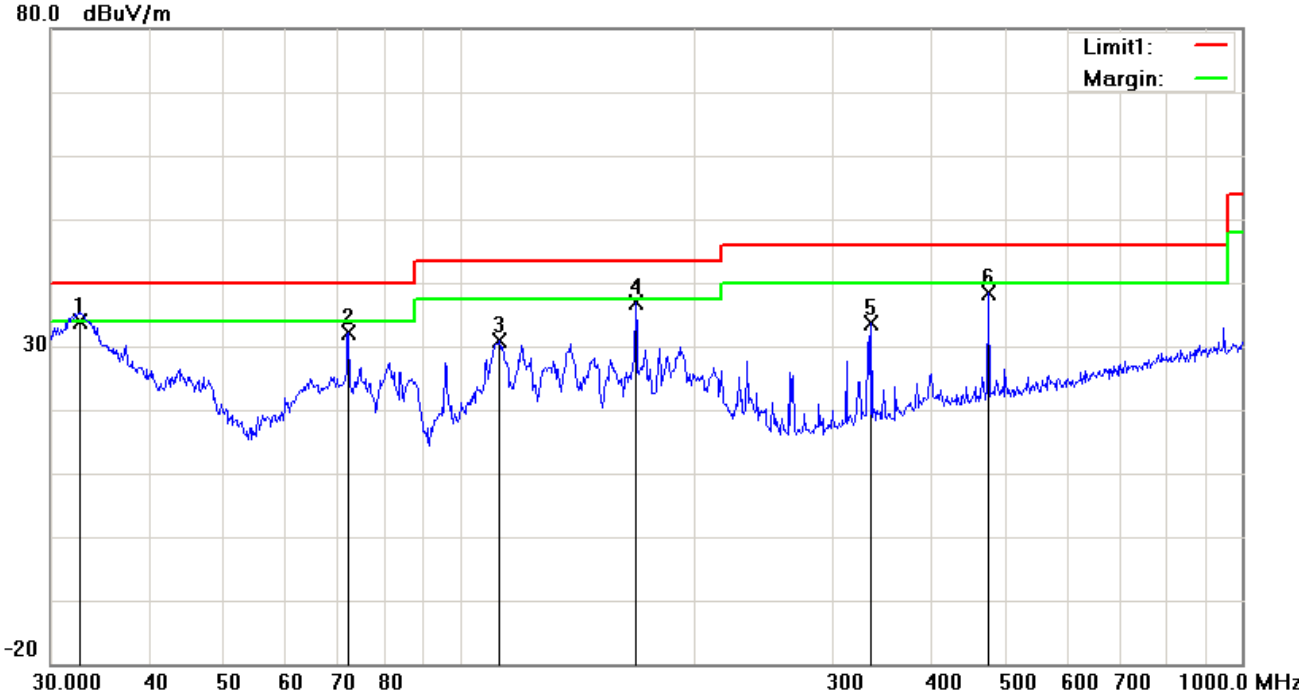


Test Data

Horizontal Polarity Plot @3m

No.	P/L	Frequency	Reading	Detector	Corrected	Result	Limit	Margin	Height	Degree
		(MHz)	(dBuV/m)		(dB/m)	(dBuV/m)	(dBuV/m)	(dB)	(cm)	(°)
1	H	71.8320	43.17	peak	-13.66	29.51	40.00	-10.49	100	167
2	H	167.8243	44.38	peak	-8.92	35.46	43.50	-8.04	100	223
3	H	232.5318	43.18	peak	-9.04	34.14	46.00	-11.86	100	95
4	H	336.0352	42.86	peak	-5.86	37.00	46.00	-9.00	200	182
5	H	414.7223	34.71	peak	-3.94	30.77	46.00	-15.23	200	336
6	H	833.3171	35.91	QP	3.61	39.52	46.00	-6.48	100	196

Below 1GHz



Test Data

Vertical Polarity Plot @3m

No.	P/L	Frequency	Reading	Detector	Corrected	Result	Limit	Margin	Height	Degree
		(MHz)	(dBuV/m)		(dB/m)	(dBuV/m)	(dBuV/m)	(dB)	(cm)	(°)
1	V	32.6340	36.19	QP	-2.20	33.99	40.00	-6.01	200	167
2	V	72.0843	45.83	peak	-13.66	32.17	40.00	-7.83	100	28
3	V	112.5244	39.55	peak	-8.59	30.96	43.50	-12.54	100	194
4	V	167.8243	45.85	peak	-8.92	36.93	43.50	-6.57	200	316
5	V	336.0352	39.50	peak	-5.86	33.64	46.00	-12.36	100	244
6	V	473.8347	40.75	peak	-2.41	38.34	46.00	-7.66	100	151

Above 1GHz

Frequency (MHz)	Amplitude (dBμV/m)	Azimuth	Height (cm)	Polarity (H/V)	Factors (dB)	Limit (dBμV/m)	Margin (dB)	Detector (PK/AV)
1187.35	50.73	53	140	V	-20.35	74	-23.27	PK
1769.91	53.42	134	100	V	-21.26	74	-20.58	PK
2051.48	51.94	92	200	V	-19.98	74	-22.06	PK
1657.69	51.06	71	200	H	-19.79	74	-22.94	PK
2277.16	53.89	111	100	H	-20.87	74	-20.11	PK
1923.72	51.22	144	200	H	-19.94	74	-22.78	PK

*Note1: The highest frequency of the EUT is 2480 MHz, so the testing has been conformed to 5*2480MHz=12,400MHz.*

Note2: The frequency that above 3GHz is mainly from the environment noise.

Note3: 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					
EMI test receiver	ESCS30	8471241027	09/16/2016	09/15/2017	☑
Line Impedance Stabilization Network	LI-125A	191106	09/24/2016	09/23/2017	☑
Line Impedance Stabilization Network	LI-125A	191107	09/24/2016	09/23/2017	☑
LISN	ISN T800	34373	09/24/2016	09/23/2017	☑
Transient Limiter	LIT-153	531118	08/31/2016	08/30/2017	☑
Radiated Emissions					
EMI test receiver	ESL6	100262	09/16/2016	09/15/2017	☑
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	AH-118	71259	09/23/2016	09/22/2017	☑

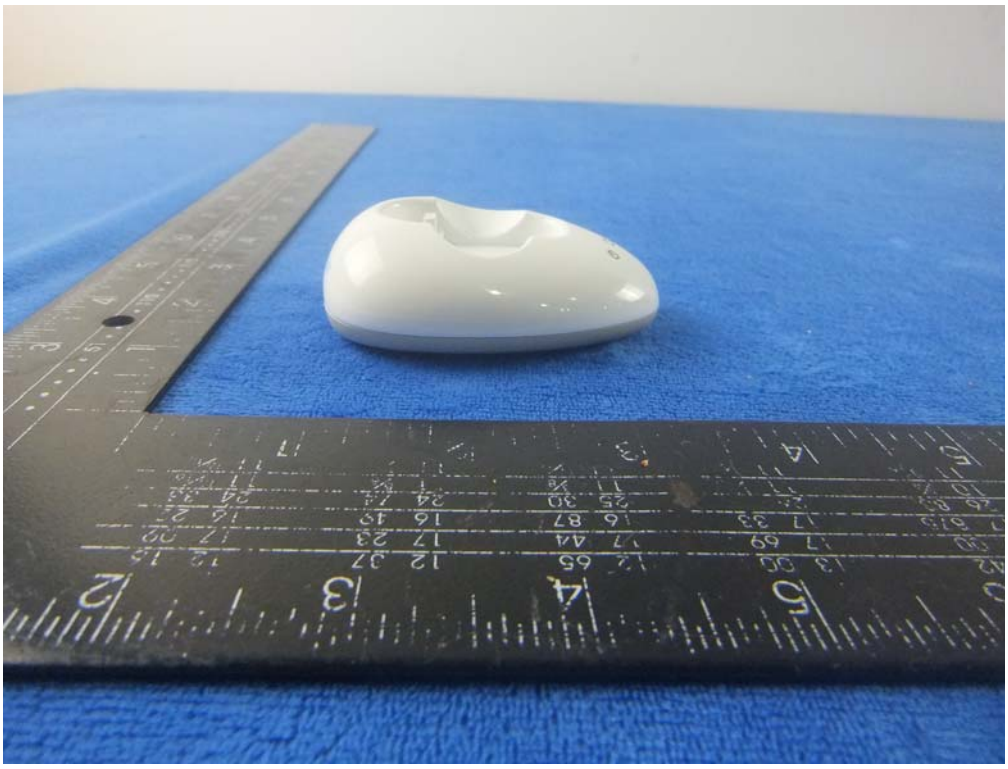
Annex B. EUT And Test Setup Photographs

Annex B.i. Photograph: EUT External Photo

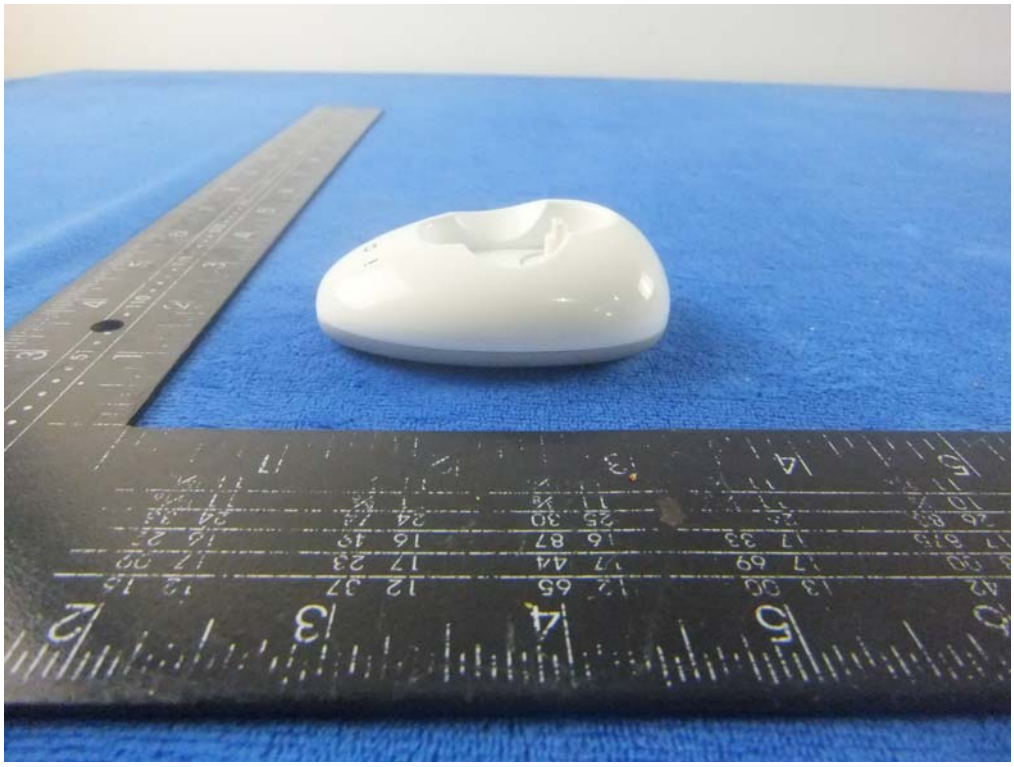
Whole Package View

EUT - Front View

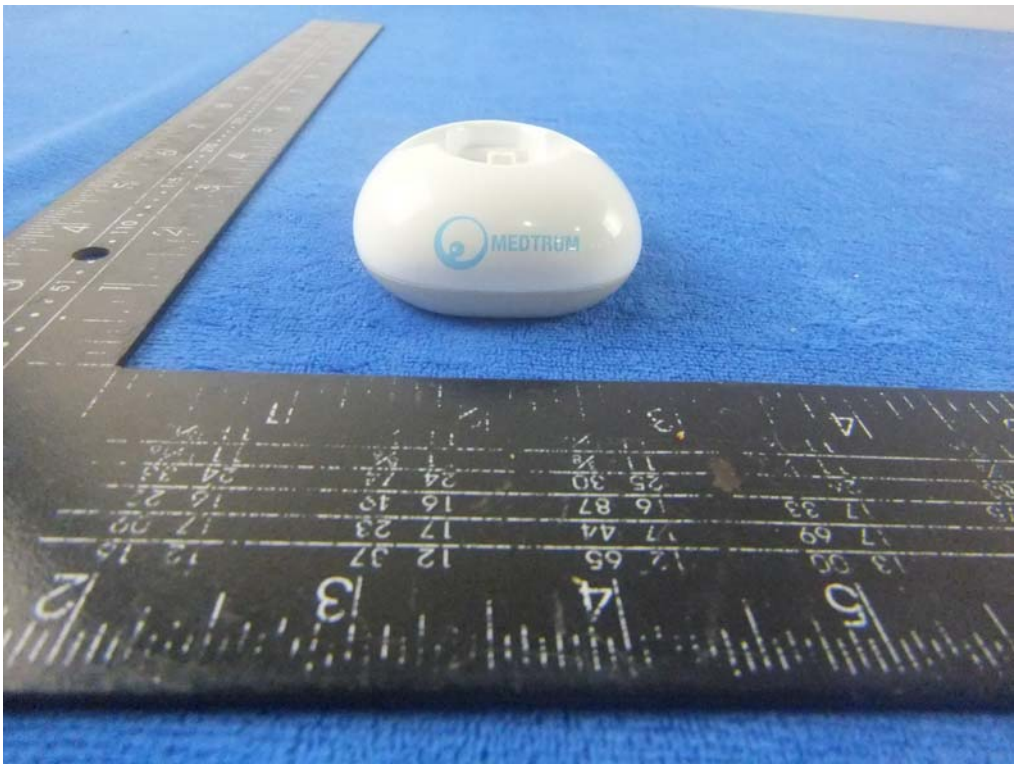
EUT – Rear View



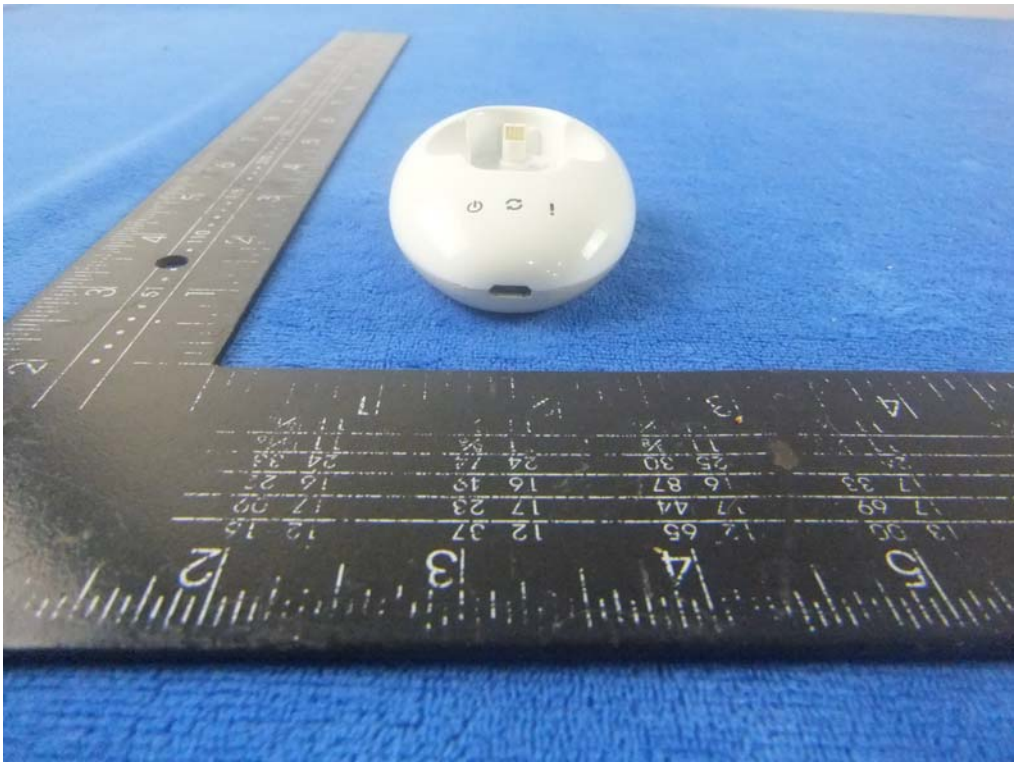
EUT - Left View



EUT – Right View

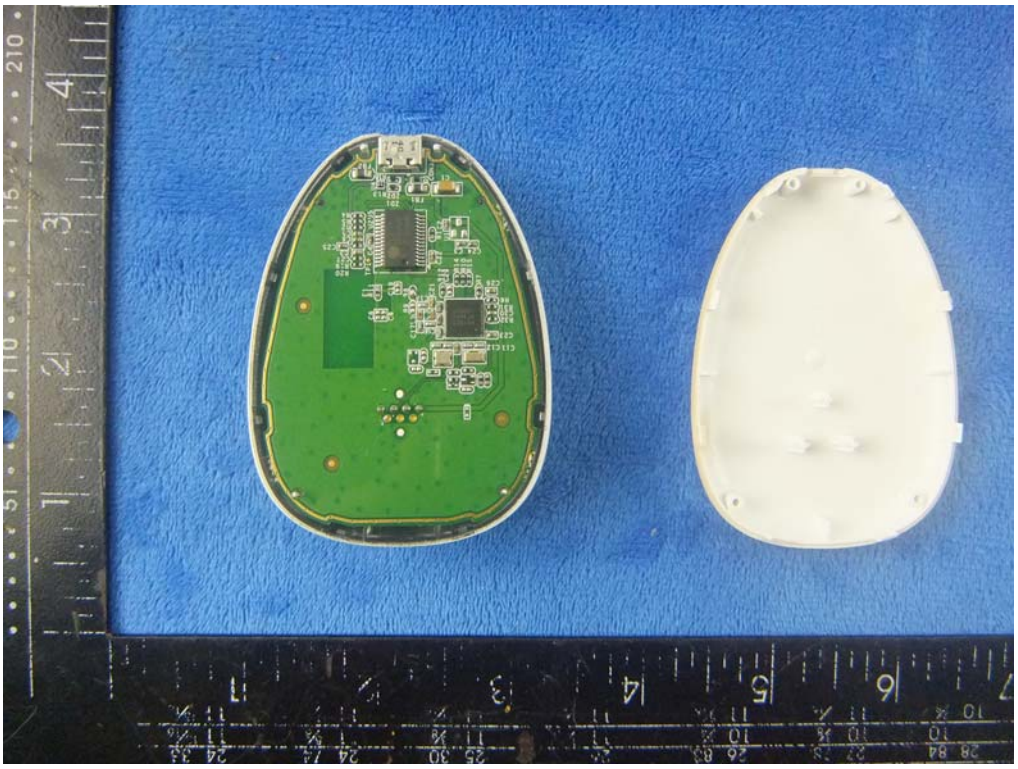


EUT - Top View



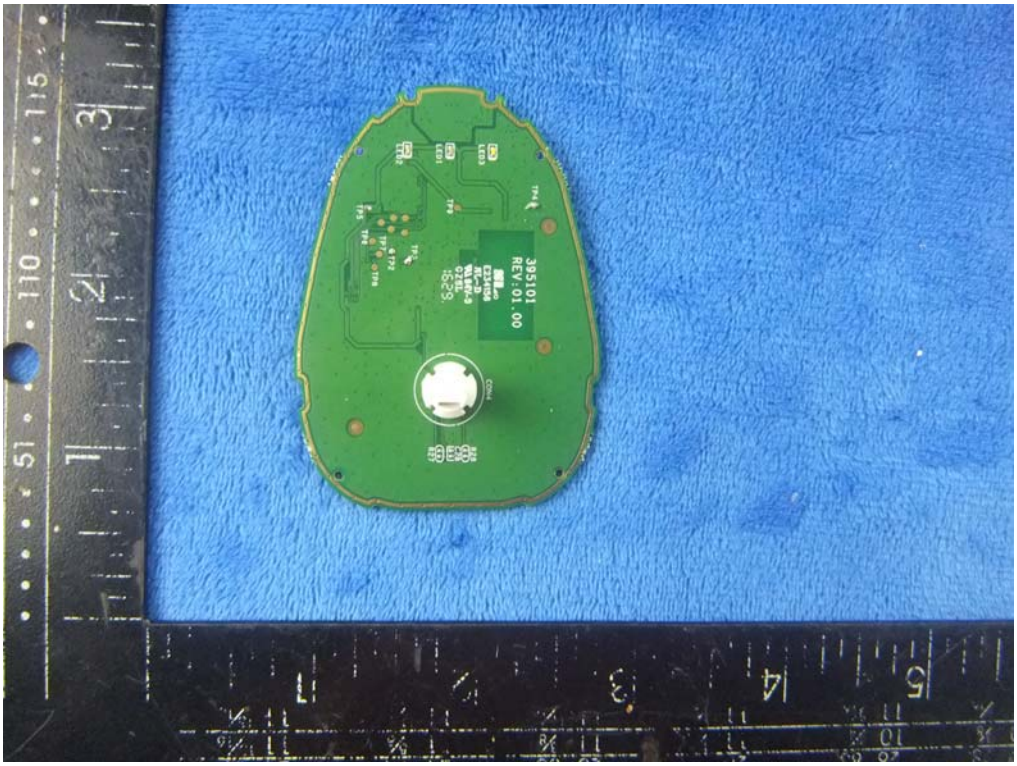
EUT – Bottom View

Annex B.ii. Photograph: EUT Internal Photo

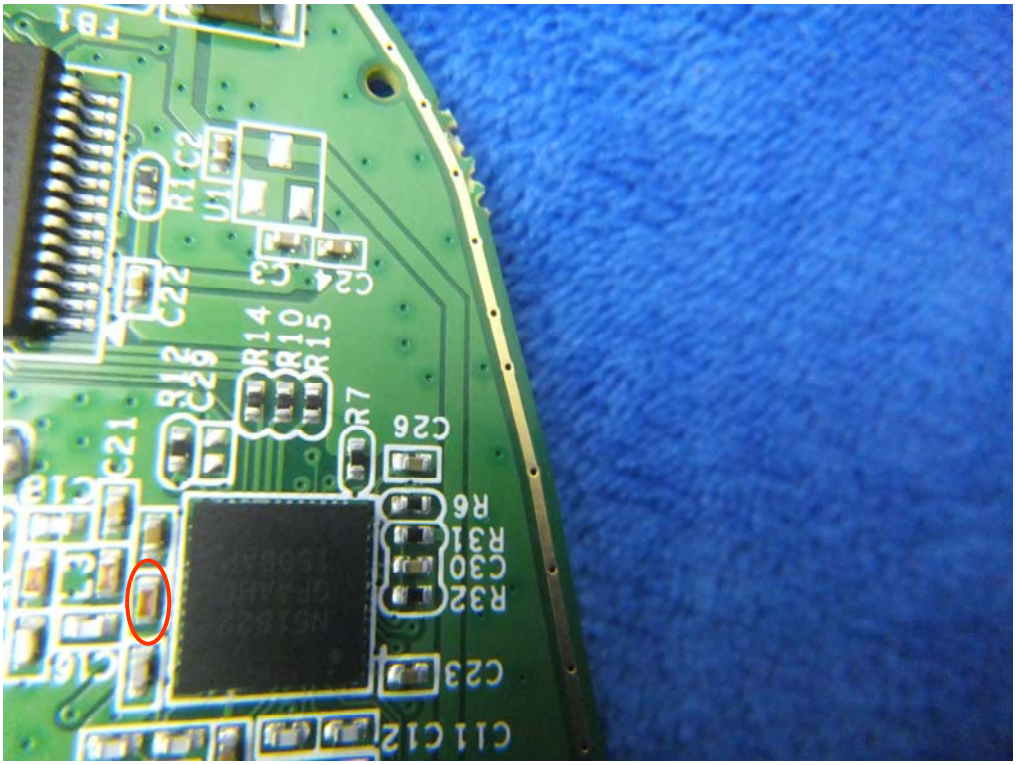


Cover Off - Top View

Mainborad - Front View



Mainborad - Rear View

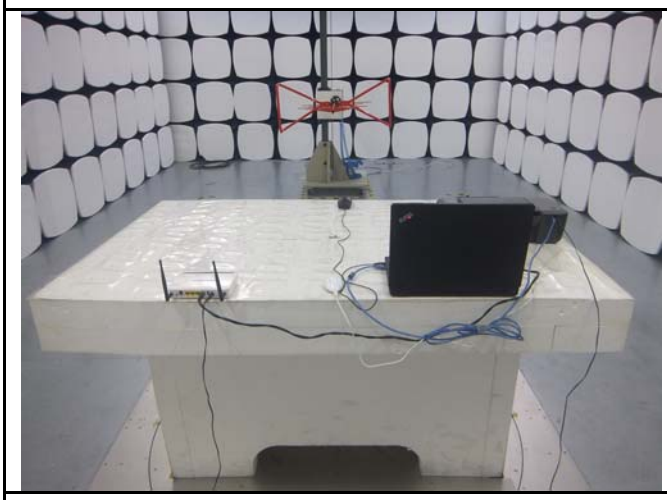


BT- Antenna View

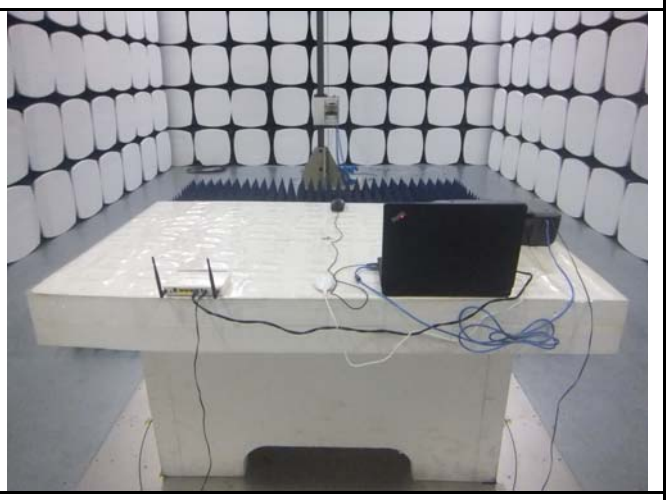
Annex B.iii. Photograph: Test Setup Photo

Conducted Emissions Test Setup – Front View

Conducted Emissions Test Setup – Side View



Radiated Emissions Test Setup Below 1GHz

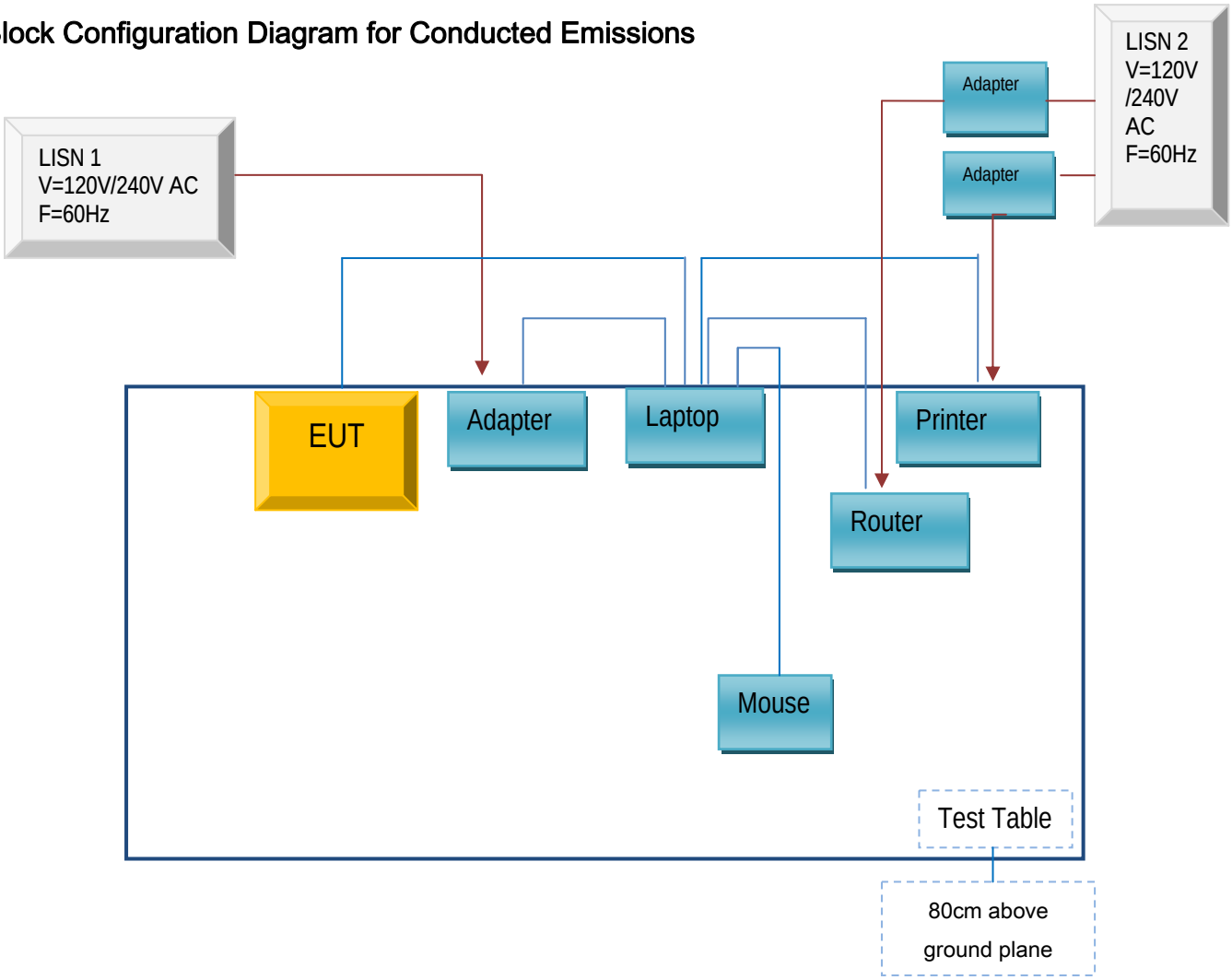


Radiated Emissions Test Setup Above 1GHz

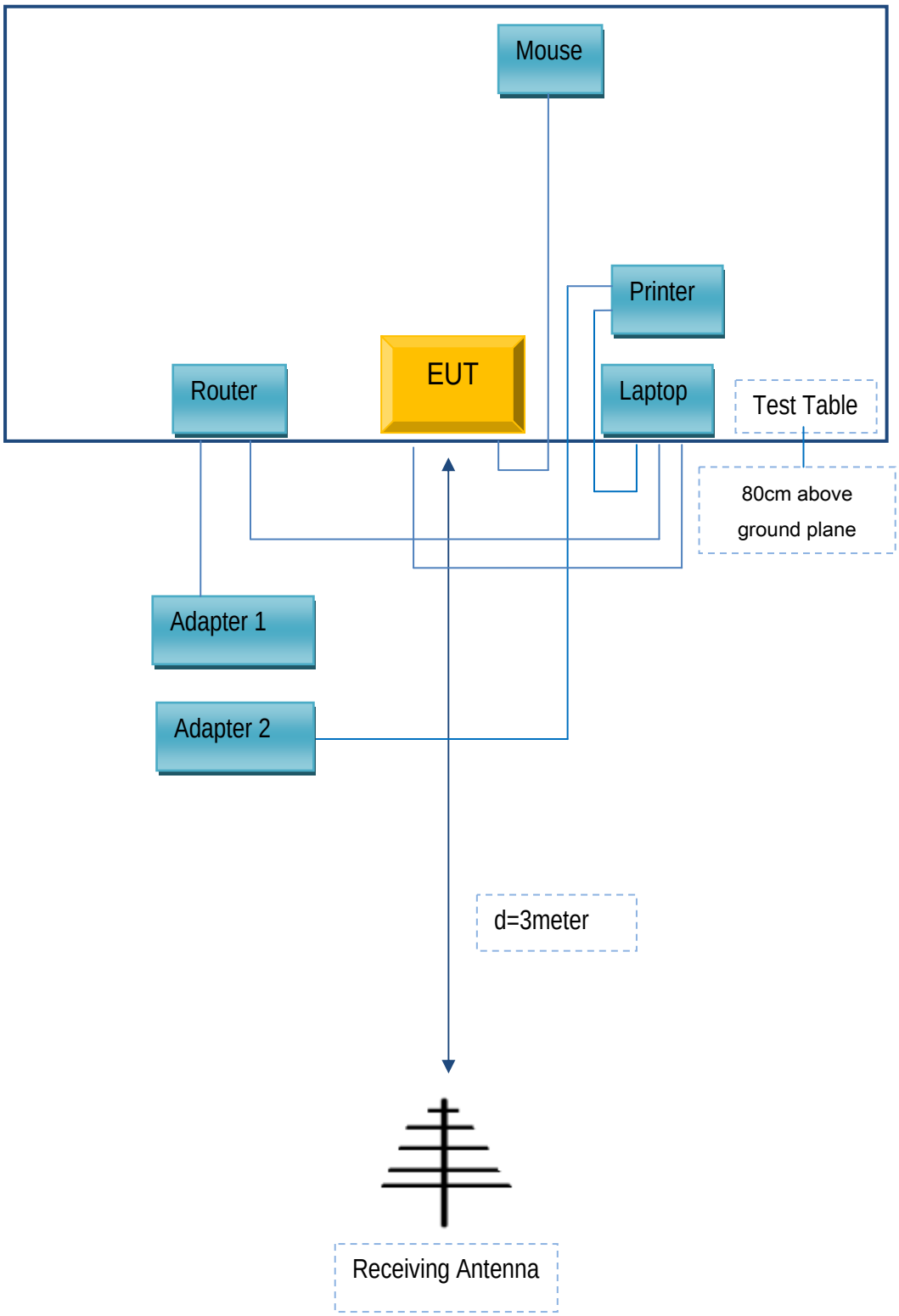
Annex C. TEST SETUP AND SUPPORTING EQUIPMENT

Annex C.ii. TEST SET UP BLOCK

Block Configuration Diagram for Conducted Emissions



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.

Supporting Equipment:

Manufacturer	Equipment Description	Model	Serial No
Lenovo	Laptop	E40	LR-1EHRX
GOLDWEB	Router	R102	1202032094
Lenovo	AC Adapter	42T4416	21D9JU
HP	Printer	VCVRA-1003	CN36M19JWX
DELL	Mouse	E100	912NMTUT41481
BULL	Socket	GN-403	GN201203

Supporting Cable:

Cable type	Shield Type	Ferrite Core	Length	Serial No
USB Cable	Un-shielding	No	2m	JX120051274
USB Cable	Un-shielding	No	2m	CBA3000AH0C1
RJ45 Cable	Un-shielding	No	2m	KX156327541
Router Power cable	Un-shielding	No	2m	13274630Z
Printer Power cable	Un-shielding	No	2m	127581031
Power Cable	Un-shielding	No	0.8m	GT211032

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

Please see the attachment

Annex E. DECLARATION OF SIMILARITY

N/A