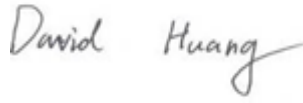


RF TEST REPORT



Report No.: 17070353-FCC-R

Supersede Report No.: N/A

Applicant	Lexibook Limited	
Product Name	VR headset with Controller	
Model No.	VR100Z	
Serial No.	N/A	
Test Standard	FCC Part 15.247: 2016, ANSI C63.10: 2013	
Test Date	May 20 to June 01, 2017	
Issue Date	June 02, 2017	
Test Result	☒ Pass ☐ Fail	
Equipment complied with the specification	☒	
Equipment did not comply with the specification	☐	
		
Loren Luo Test Engineer	David Huang Checked By	
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 (SHENZHEN-CHINA) LABORATORIES

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

South Side of Zhoushi Road, Bao' an District, Shenzhen, Guangdong China 518108

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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

Test Report	17070353-FCC-R
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1. Report Revision History

Report No.	Report Version	Description	Issue Date
17070353-FCC-R	NONE	Original	June 02, 2017

2. Customer information

Applicant Name	Lexibook Limited
Applicant Add	8th Floor , 17 Wang Chiu Road , Kowloon Bay,Kowloon,Hong Kong.
Manufacturer	Lexibook Limited
Manufacturer Add	8th Floor , 17 Wang Chiu Road , Kowloon Bay,Kowloon,Hong Kong.

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: VR headset with Controller

Main Model: VR100Z

Serial Model: N/A

Date EUT received: May 19, 2017

Test Date(s): May 20 to June 01, 2017

Equipment Category : DSS

Antenna Gain: 0.5dBi

Antenna Type: PCB antenna

Type of Modulation: GFSK

RF Operating Frequency (ies): 2402-2480 MHz

Max. Output Power: -0.177dBm

Number of Channels: 79CH

Port: USB Port

Input Power: Battery:
Spec: 3.7V,180mAH
USB:5V

Trade Name : Lexibook

FCC ID: 2AMAM-VR100Z

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)(1)	Channel Separation	Compliance
§15.247(a)(1)	20 dB Bandwidth	Compliance
§15.247(b)(1)	Peak Output Power	Compliance
§15.247(a)(1)(iii)	Number of Hopping Channel	Compliance
§15.247(a)(1)(iii)	Time of Occupancy (Dwell Time)	Compliance
§15.247(d)	Band Edge& Restricted Band	Compliance
§15.207(a)	AC Line Conducted Emissions	Compliance
§15.205, §15.209, §15.247(d)	Radiated Emissions& Restricted Band	Compliance

Measurement Uncertainty

Emissions		
Test Item	Description	Uncertainty
Band Edge& Restricted Band and Radiated Emissions& Restricted Band	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 PCB antenna for Bluetooth, the gain is 0.5dBi for Bluetooth.

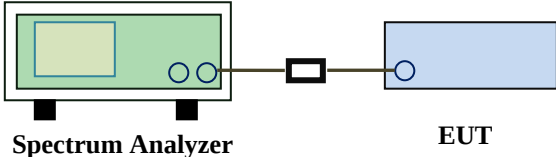
The antenna meets up with the ANTENNA REQUIREMENT.

Result: Compliance.

6.2 Channel Separation

Temperature	23 °C
Relative Humidity	59%
Atmospheric Pressure	1026mbar
Test date :	May 26, 2017
Tested By :	Loren Luo

Requirement(s):

Spec	Item	Requirement	Applicable
§ 15.247(a)(1)	a)	Channel Separation < 20dB BW and 20dB BW < 25KHz ; Channel Separation Limit=25KHz Chanel Separation < 20dB BW and 20dB BW > 25kHz ; Channel Separation Limit=2/3 20dB BW	
Test Setup	 Spectrum Analyzer EUT		
Test Procedure	The test follows FCC Public Notice DA 00-705 Measurement Guidelines. Use the following spectrum analyzer settings: - The EUT must have its hopping function enabled - Span = wide enough to capture the peaks of two adjacent channels - Resolution (or IF) Bandwidth (RBW) ≥ 1% of the span - Video (or Average) Bandwidth (VBW) ≥ RBW - Sweep = auto - Detector function = peak - Trace = max hold - Allow the trace to stabilize. Use the marker-delta function to determine the separation between the peaks of the adjacent channels. The limit is specified in one of the subparagraphs of this Section. Submit this plot.		

Remark	
Result	☒ Pass ☐ Fail

Test Data ☒ Yes ☐ N/A

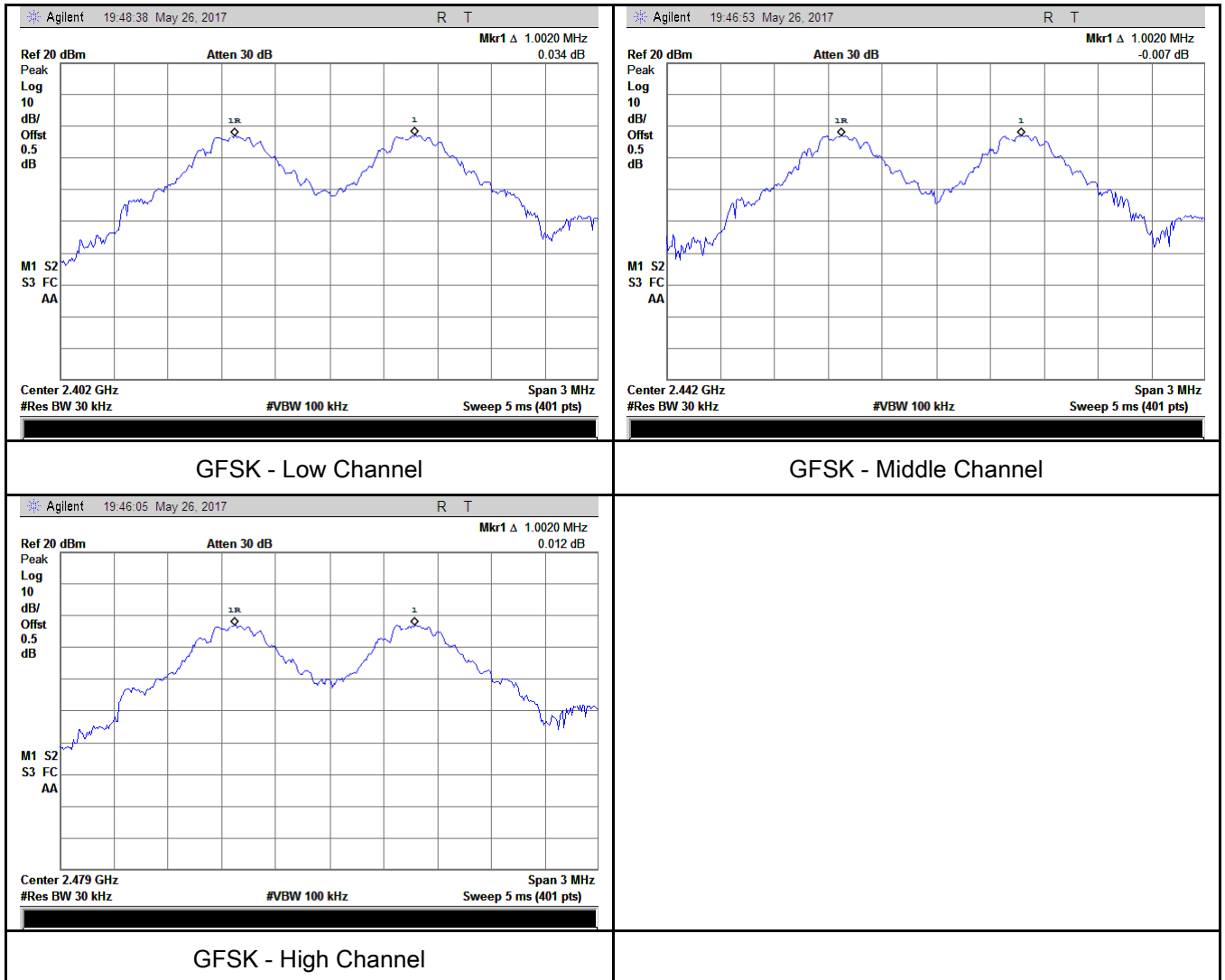
Test Plot ☒ Yes (See below) ☐ N/A

Channel Separation measurement result

Type/ Modulation	CH	CH Frequency (MHz)	CH Separation (MHz)	Limit (MHz)	Result
CH Separation GFSK	Low Channel	2402	1.002	0.693	Pass
	Adjacency Channel	2403			
	Mid Channel	2440	1.002	0.679	Pass
	Adjacency Channel	2441			
	High Channel	2480	1.002	0.693	Pass
	Adjacency Channel	2479			
	Adjacency Channel	2479			

Test Plots

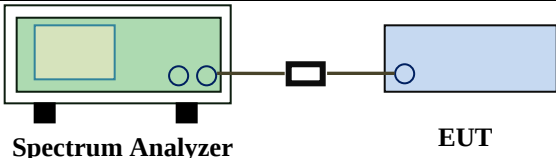
Channel Separation measurement result



6.3 20dB Bandwidth

Temperature	23 °C
Relative Humidity	59%
Atmospheric Pressure	1026mbar
Test date :	May 26, 2017
Tested By :	Loren Luo

Requirement(s):

Spec	Item	Requirement	Applicable
§15.247(a) (1)	a)	Frequency hopping systems shall have hopping channel carrier frequencies separated by a minimum of 25 kHz or the 20 dB bandwidth of the hopping channel, whichever is greater.	
Test Setup	 Spectrum Analyzer EUT		
Test Procedure	The test follows FCC Public Notice DA 00-705 Measurement Guidelines. Use the following spectrum analyzer settings: - Span = approximately 2 to 3 times the 20 dB bandwidth, centered on a hopping channel - RBW $\geq$ 1% of the 20 dB bandwidth - VBW $\geq$ RBW - Sweep = auto - Detector function = peak - Trace = max hold. - The EUT should be transmitting at its maximum data rate. Allow the trace to stabilize. Use the marker-to-peak function to set the marker to the peak of the emission. Use the marker-delta function to measure 20 dB down one side of the emission. Reset the marker-delta function, and move the marker to the other side of the emission, until it is (as close as possible to) even with the reference		

	marker level. The marker-delta reading at this point is the 20 dB bandwidth of the emission. If this value varies with different modes of operation (e.g., data rate, modulation format, etc.), repeat this test for each variation. The limit is specified in one of the subparagraphs of this Section. Submit this plot(s).
Remark	
Result	☒ Pass ☐ Fail

Test Data ☒ Yes ☐ N/A

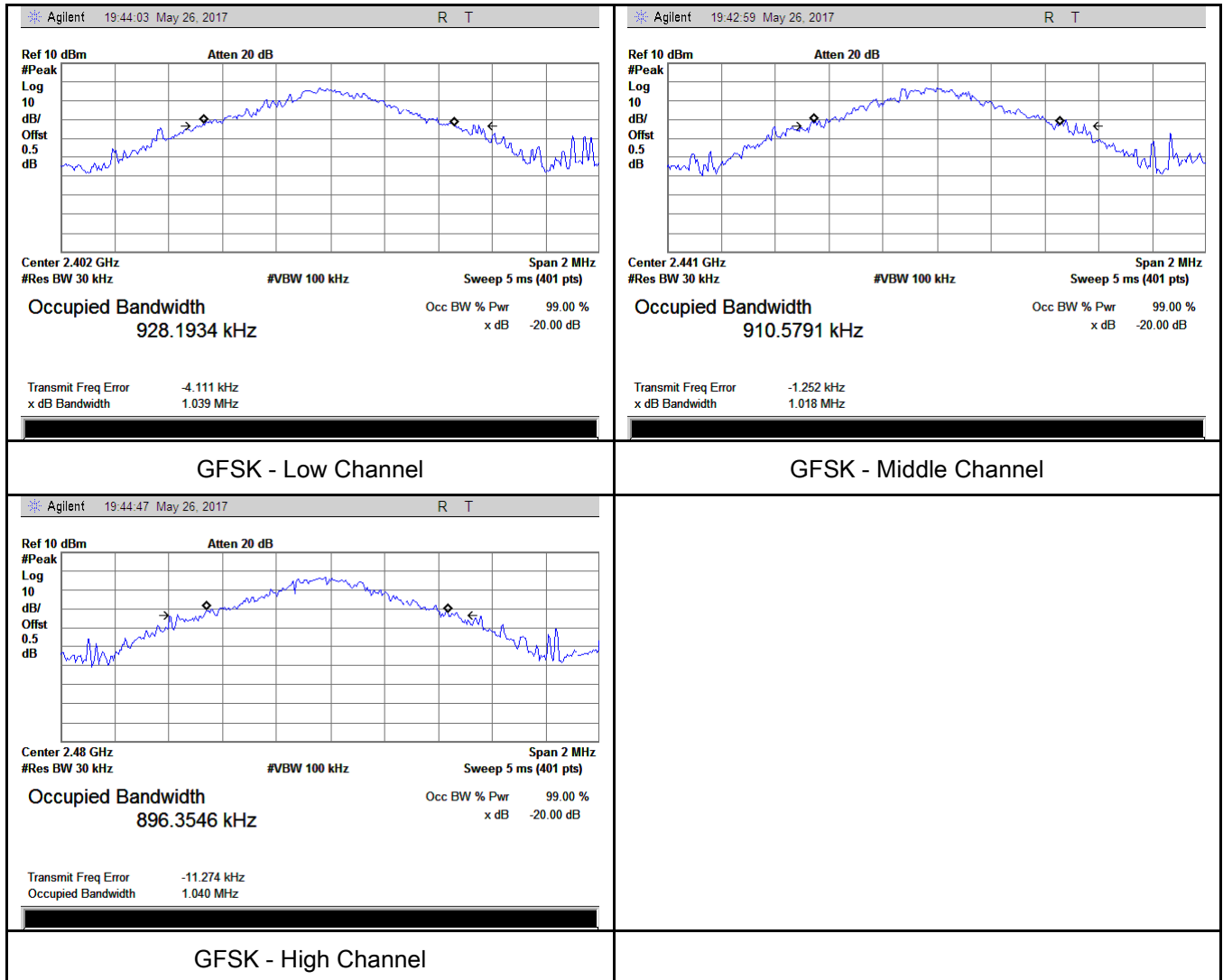
Test Plot ☒ Yes (See below) ☐ N/A

Measurement result

Modulation	CH	CH Frequency (MHz)	20dB Bandwidth (MHz)	99% Occupied Bandwidth (MHz)
GFSK	Low	2402	1.039	0.9282
	Mid	2441	1.018	0.9106
	High	2480	1.040	0.8964

Test Plots

20dB Bandwidth measurement result

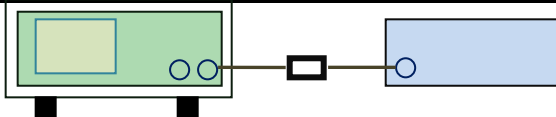


6.4 Peak Output Power

Temperature	23 °C
Relative Humidity	59%
Atmospheric Pressure	1026mbar
Test date :	May 26, 2017
Tested By :	Loren Luo

Requirement(s):

Spec	Item	Requirement	Applicable
§15.247(b) (3)	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	 Spectrum Analyzer EUT
------------	--

Test Procedure	The test follows FCC Public Notice DA 00-705 Measurement Guidelines. Use the following spectrum analyzer settings: - Span = approximately 5 times the 20 dB bandwidth, centered on a hopping channel - RBW $>$ the 20 dB bandwidth of the emission being measured - VBW $\geq$ RBW - Sweep = auto - Detector function = peak - Trace = max hold - Allow the trace to stabilize.
----------------	---

	- Use the marker-to-peak function to set the marker to the peak of the emission. The indicated level is the peak output power (see the note above regarding external attenuation and cable loss). The limit is specified in one of the subparagraphs of this Section. Submit this plot. A peak responding power meter may be used instead of a spectrum analyzer.
Remark	
Result	☒ Pass ☐ Fail

Test Data ☒ Yes ☐ N/A

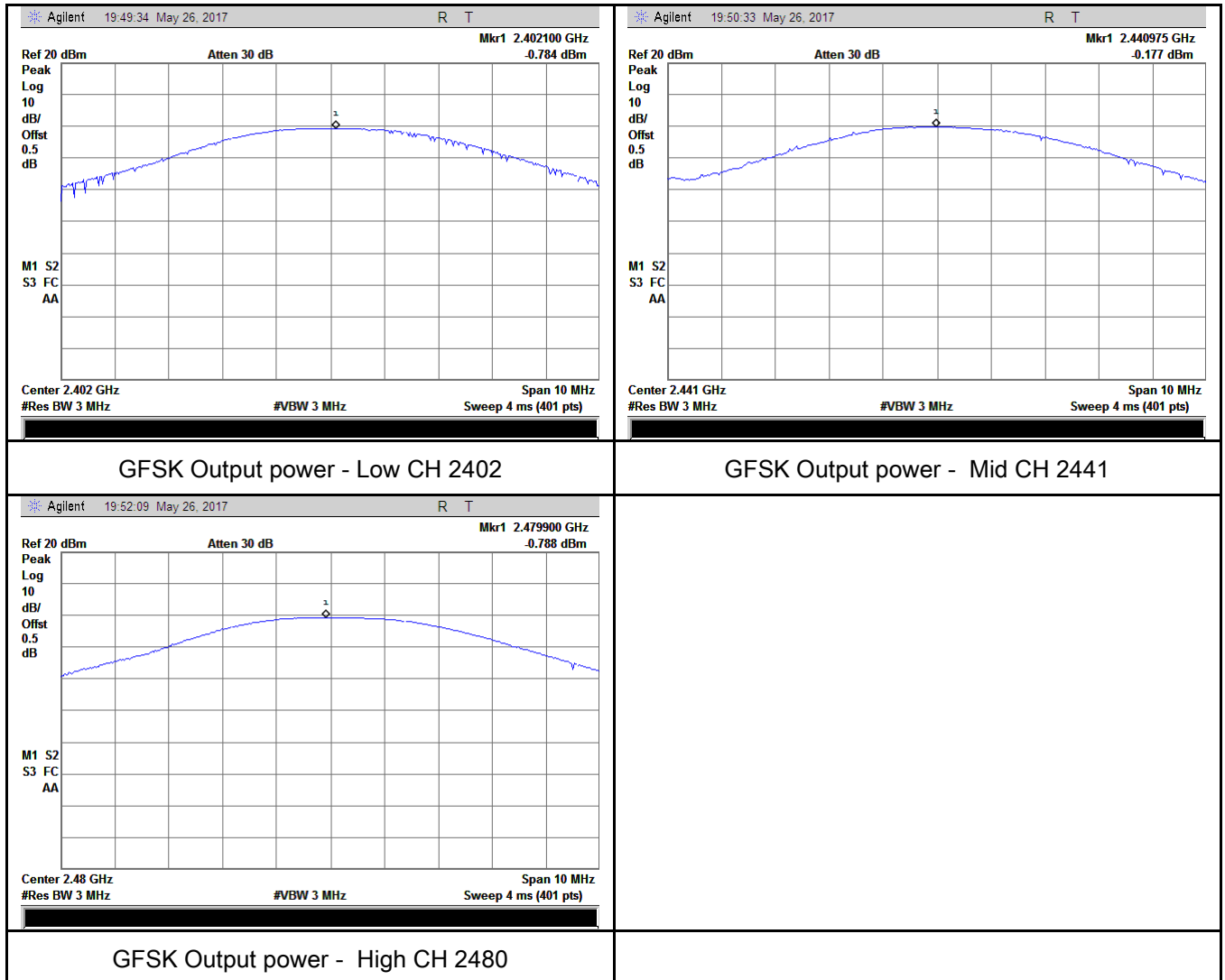
Test Plot ☒ Yes (See below) ☐ N/A

Peak Output Power measurement result

Type	Modulation	CH	Frequency (MHz)	Conducted Power (dBm)	Limit (mW)	Result
Output power	GFSK	Low	2402	-0.784	125	Pass
		Mid	2441	-0.177	125	Pass
		High	2480	-0.788	125	Pass

Test Plots

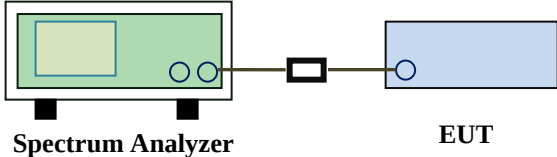
Output Power measurement result



6.5 Number of Hopping Channel

Temperature	23 °C
Relative Humidity	59%
Atmospheric Pressure	1026mbar
Test date :	May 26, 2017
Tested By :	Loren Luo

Requirement(s):

Spec	Item	Requirement	Applicable
§15.247(a) (1)(iii)	a)	FHSS in 2400-2483.5MHz $\geq$ 15 channels	☒
Test Setup	 Spectrum Analyzer EUT		
Test Procedure	The test follows FCC Public Notice DA 00-705 Measurement Guidelines. <u>Use the following spectrum analyzer settings:</u> The EUT must have its hopping function enabled. - Span = the frequency band of operation - RBW $\geq$ 1% of the span - VBW $\geq$ RBW - Sweep = auto - Detector function = peak - Trace = max hold - Allow trace to fully stabilize. - It may prove necessary to break the span up to sections, in order to clearly show all of the hopping frequencies. The limit is specified in one of the subparagraphs of this Section. Submit this plot(s).		
Remark			
Result	☒ Pass ☐ Fail		

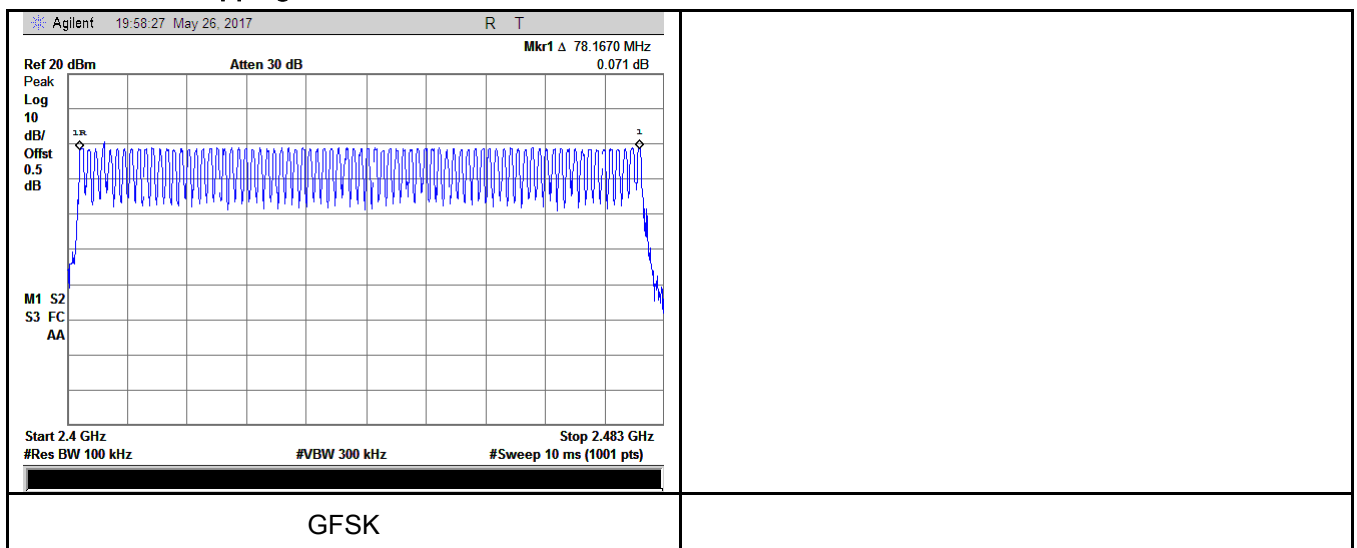
Test Data ☒ Yes ☐ N/A
 Test Plot ☒ Yes (See below) ☐ N/A

Number of Hopping Channel measurement result

Type	Modulation	Frequency Range	Number of Hopping Channel	Limit
Number of Hopping Channel	GFSK	2400-2483.5	79	15

Test Plots

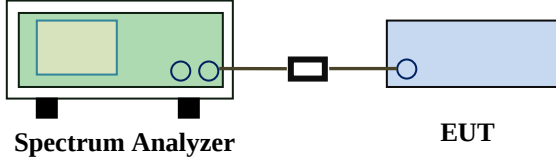
Number of Hopping Channels measurement result



6.6 Time of Occupancy (Dwell Time)

Temperature	23 °C
Relative Humidity	59%
Atmospheric Pressure	1026mbar
Test date :	May 26, 2017
Tested By :	Loren Luo

Requirement(s):

Spec	Item	Requirement	Applicable
§15.247(a) (1)(iii)	a)	Dwell Time < 0.4s	☒
Test Setup	 Spectrum Analyzer EUT		
Test Procedure	The test follows FCC Public Notice DA 00-705 Measurement Guidelines. <u>Use the following spectrum analyzer</u> - Span = zero span, centered on a hopping channel - RBW = 1 MHz - VBW ≥ RBW - Sweep = as necessary to capture the entire dwell time per hopping channel - Detector function = peak - Trace = max hold - use the marker-delta function to determine the dwell time		
Remark			
Result	☒ Pass ☐ Fail		

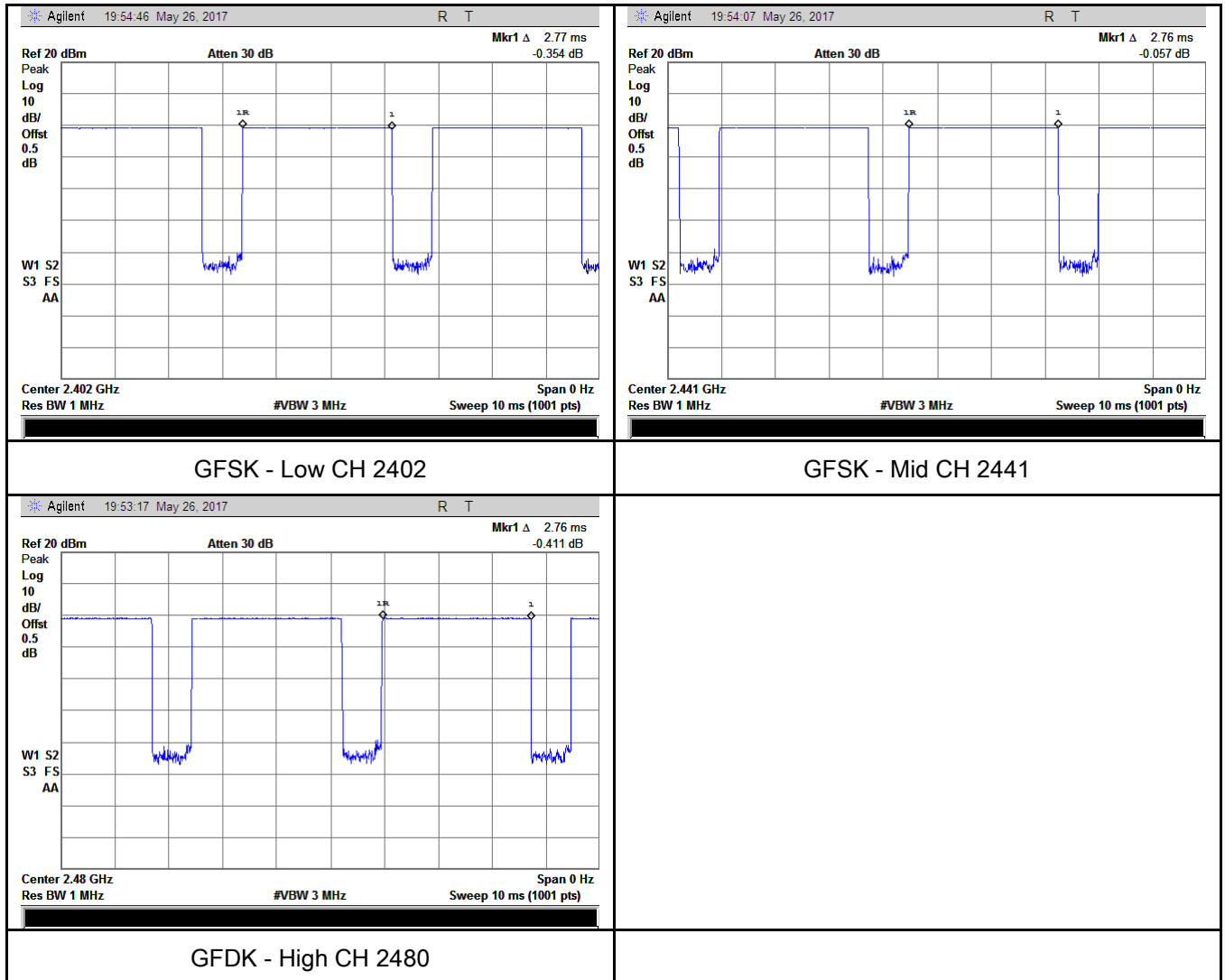
Test Data ☒ Yes ☐ N/A

Test Plot ☒ Yes (See below) ☐ N/A

Type	Modulation	CH	Pulse Width (ms)	Dwell Time (ms)	Limit (ms)	Result
Dwell Time	GFSK	Low	2.77	295.467	400	Pass
		Mid	2.76	294.400	400	Pass
		High	2.76	294.400	400	Pass
Note: Dwell time=Pulse Time (ms) × (1600 ÷ 6 ÷ 79) ×31.6						

Test Plots

Dwell Time measurement result

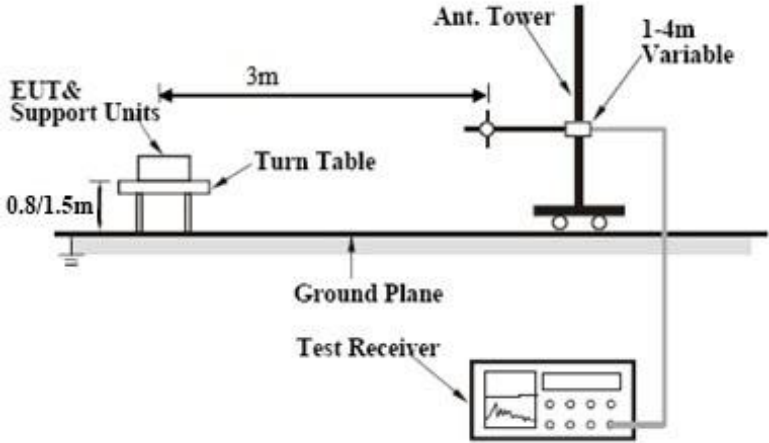


6.7 Band Edge & Restricted Band

Temperature	25 °C
Relative Humidity	54%
Atmospheric Pressure	1002mbar
Test date :	June 02, 2017
Tested By :	Loren Luo

Requirement(s):

Spec	Item	Requirement	Applicable
§15.247(a) (1)(iii)	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	
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Test Procedure	The test follows FCC Public Notice DA 00-705 Measurement Guidelines. 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,
----------------	--

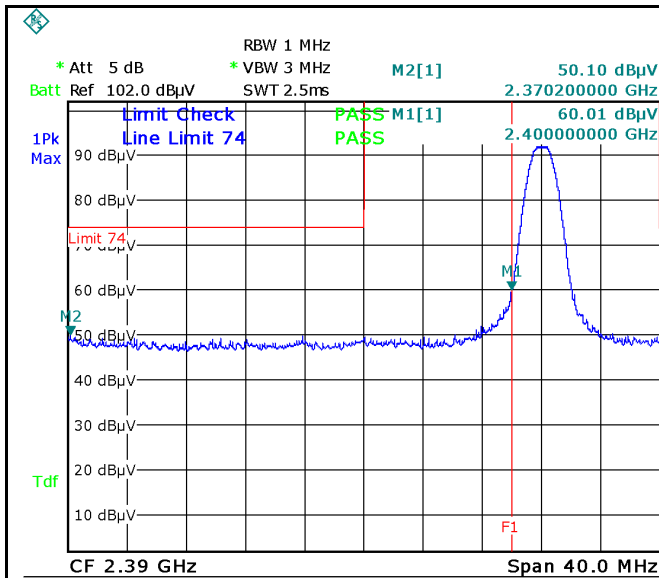
	and make sure the instrument is operated in its linear range. - 3. First, set both RBW and VBW of spectrum analyzer to 100 kHz with a convenient frequency span including 100kHz bandwidth from band edge, check the emission of EUT, if pass then set Spectrum Analyzer as below: a. The resolution bandwidth 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

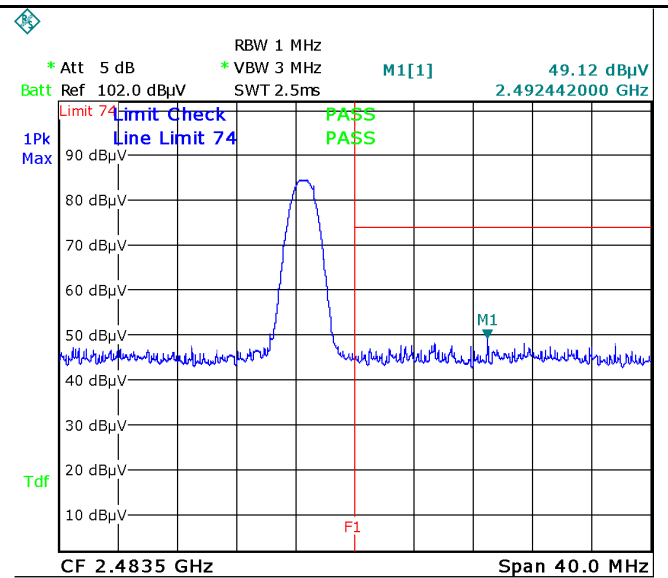
Test Plots

GFSK Mode:





Date: 2.JUN.2017 17:44:24



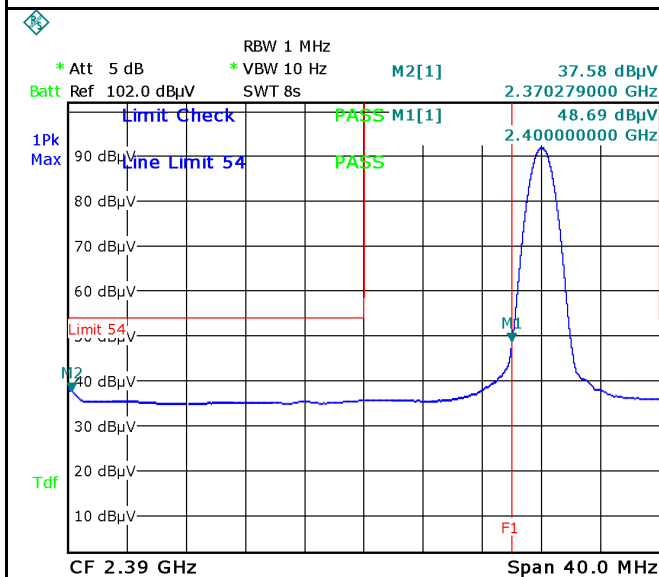
Date: 2.JUN.2017 18:02:28

GFSK-Left Side-PK

Note: F1 is frequency 2400MHz

GFSK-Right Side-PK

Note: F1 is frequency 2483.5MHz



Date: 2.JUN.2017 17:43:06

Note: (no need if PK value less than the AV limit)

GFSK-Left Side-AV

GFSK-Right Side-AV

6.8 AC Power Line Conducted Emissions

Temperature	24 °C
Relative Humidity	51%
Atmospheric Pressure	1027mbar
Test date :	May 27, 2017
Tested By :	Loren Luo

Requirement(s):

Spec	Item	Requirement	Applicable		
47CFR§15.207, RSS210 (A8.1)	a)	For Low-power radio-frequency devices that is designed to be connected to the public utility (AC) power line, the radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies, within the band 150 kHz to 30 MHz, shall not exceed the limits in the following table, as measured using a 50 [mu]H/50 ohms line impedance stabilization network (LISN). The lower limit applies at the boundary between the frequencies ranges.	☒		
		Frequency ranges (MHz)		Limit (dBµV)	
				QP	Average
		0.15 ~ 0.5		66 – 56	56 – 46
		0.5 ~ 5		56	46
5 ~ 30	60	50			

Test Setup	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.
------------	--

Procedure	- 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. - The power supply for the EUT was fed through a 50W/50mH EUT LISN, connected to filtered mains. - The RF OUT of the EUT LISN was connected to the EMI test receiver via a low-loss
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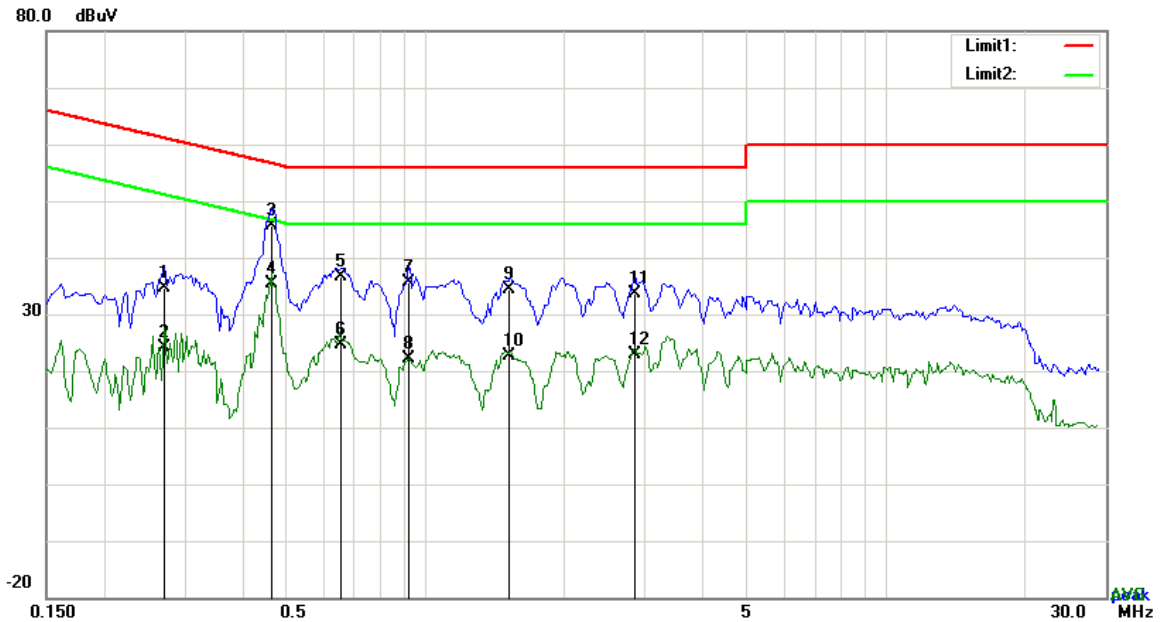
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	coaxial cable. 4. All other supporting equipment were powered separately from another main supply. 5. The EUT was switched on and allowed to warm up to its normal operating condition. 6. A scan was made on the NEUTRAL line (for AC mains) or Earth 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: Bluetooth Mode

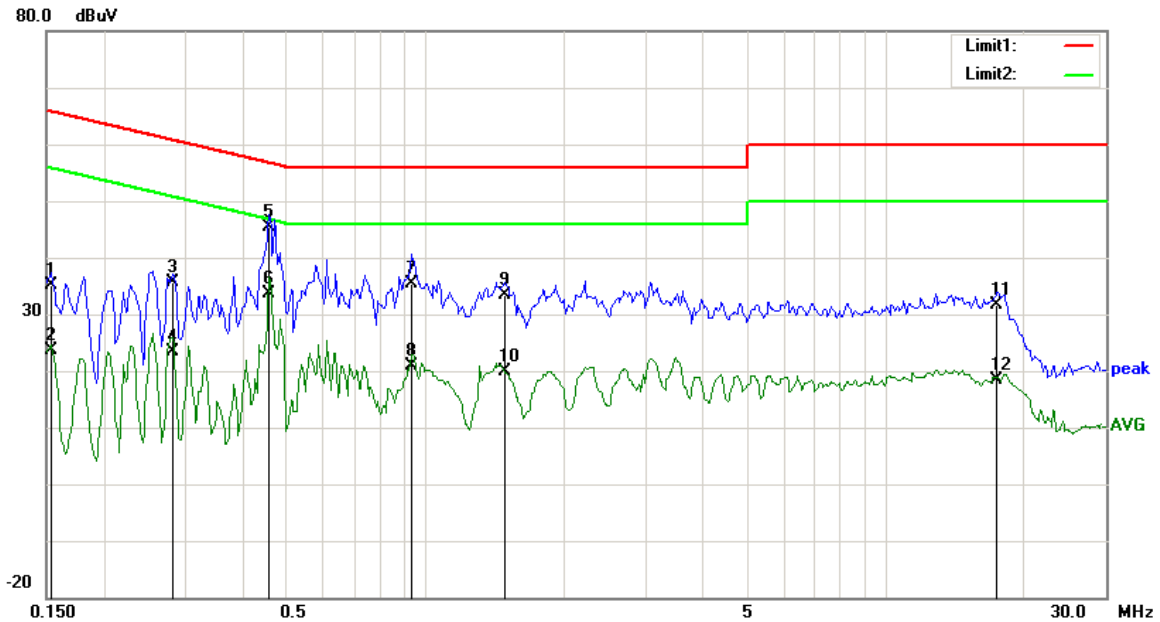


Test Data

Phase Line Plot at 120Vac, 60Hz

No.	P/L	Frequency	Reading	Detector	Corrected	Result	Limit	Margin
		(MHz)	(dBuV)		(dB)	(dBuV)	(dBuV)	(dB)
1	L1	0.2709	24.71	QP	10.03	34.74	61.09	-26.35
2	L1	0.2709	14.06	AVG	10.03	24.09	51.09	-27.00
3	L1	0.4620	35.70	QP	10.03	45.73	56.66	-10.93
4	L1	0.4620	25.39	AVG	10.03	35.42	46.66	-11.24
5	L1	0.6570	26.53	QP	10.03	36.56	56.00	-19.44
6	L1	0.6570	14.64	AVG	10.03	24.67	46.00	-21.33
7	L1	0.9222	25.59	QP	10.03	35.62	56.00	-20.38
8	L1	0.9222	12.16	AVG	10.03	22.19	46.00	-23.81
9	L1	1.5267	24.33	QP	10.04	34.37	56.00	-21.63
10	L1	1.5267	12.69	AVG	10.04	22.73	46.00	-23.27
11	L1	2.8488	23.58	QP	10.05	33.63	56.00	-22.37
12	L1	2.8488	12.95	AVG	10.05	23.00	46.00	-23.00

Test Mode: Bluetooth Mode

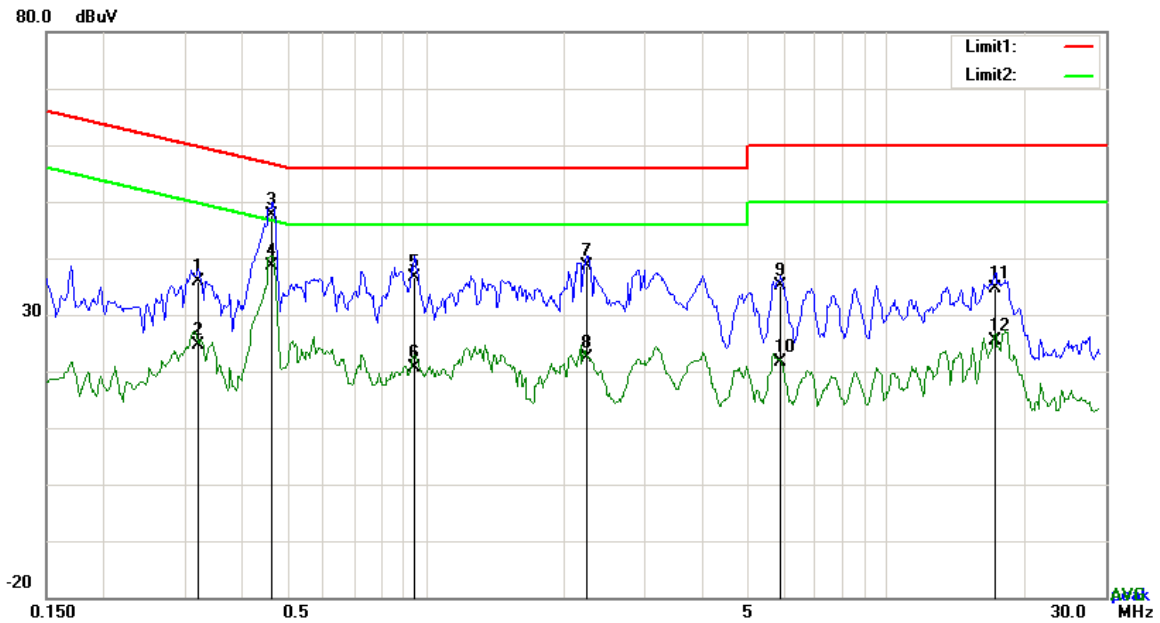


Test Data

Phase Neutral Plot at 120Vac, 60Hz

No.	P/L	Frequency	Reading	Detector	Corrected	Result	Limit	Margin
		(MHz)	(dBuV)		(dB}	(dBuV)	(dBuV)	(dB)
1	N	0.1539	25.00	QP	10.02	35.02	65.79	-30.77
2	N	0.1539	13.66	AVG	10.02	23.68	55.79	-32.11
3	N	0.2826	25.54	QP	10.02	35.56	60.74	-25.18
4	N	0.2826	13.29	AVG	10.02	23.31	50.74	-27.43
5	N	0.4581	35.47	QP	10.02	45.49	56.73	-11.24
6	N	0.4581	23.62	AVG	10.02	33.64	46.73	-13.09
7	N	0.9300	25.36	QP	10.03	35.39	56.00	-20.61
8	N	0.9300	10.83	AVG	10.03	20.86	46.00	-25.14
9	N	1.4838	23.45	QP	10.03	33.48	56.00	-22.52
10	N	1.4838	9.91	AVG	10.03	19.94	46.00	-26.06
11	N	17.4651	21.30	QP	10.23	31.53	60.00	-28.47
12	N	17.4651	8.16	AVG	10.23	18.39	50.00	-31.61

Test Mode: Bluetooth Mode

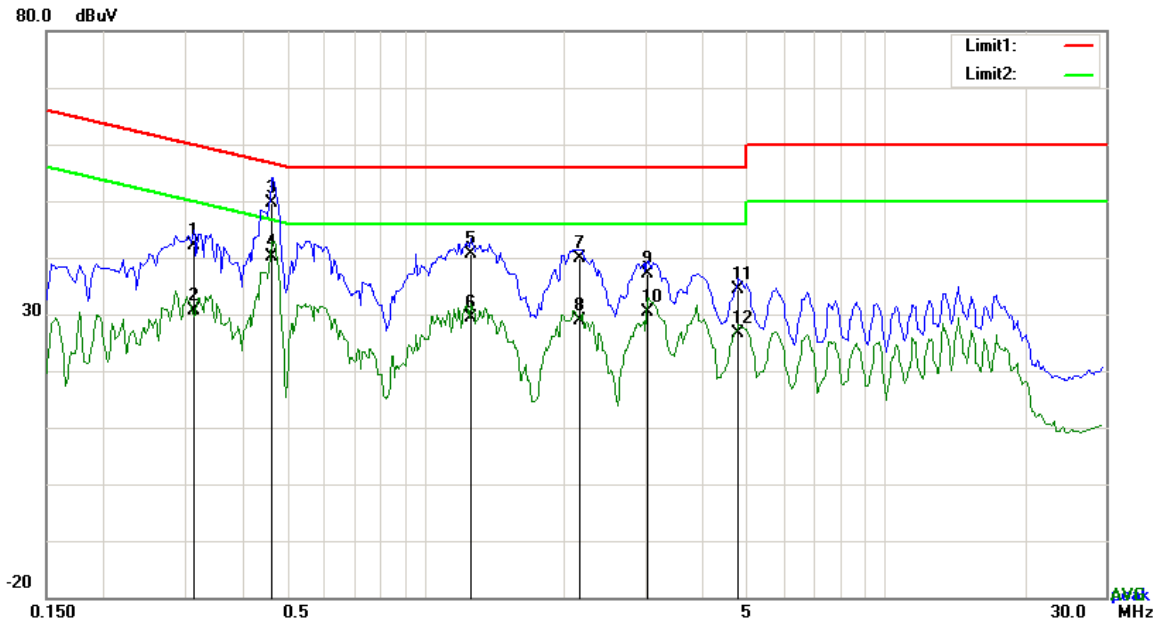


Test Data

Phase Line Plot at 240Vac, 60Hz

No.	P/L	Frequency	Reading	Detector	Corrected	Result	Limit	Margin
		(MHz)	(dBuV)		(dB)	(dBuV)	(dBuV)	(dB)
1	L1	0.3216	25.77	QP	10.03	35.80	59.67	-23.87
2	L1	0.3216	14.53	AVG	10.03	24.56	49.67	-25.11
3	L1	0.4659	37.57	QP	10.03	47.60	56.59	-8.99
4	L1	0.4659	28.48	AVG	10.03	38.51	46.59	-8.08
5	L1	0.9456	26.53	QP	10.03	36.56	56.00	-19.44
6	L1	0.9456	10.53	AVG	10.03	20.56	46.00	-25.44
7	L1	2.2443	28.48	QP	10.05	38.53	56.00	-17.47
8	L1	2.2443	12.41	AVG	10.05	22.46	46.00	-23.54
9	L1	5.9250	25.00	QP	10.09	35.09	60.00	-24.91
10	L1	5.9250	11.42	AVG	10.09	21.51	50.00	-28.49
11	L1	17.2857	24.26	QP	10.26	34.52	60.00	-25.48
12	L1	17.2857	15.01	AVG	10.26	25.27	50.00	-24.73

Test Mode: Bluetooth Mode



Test Data

Phase Neutral Plot at 240Vac, 60Hz

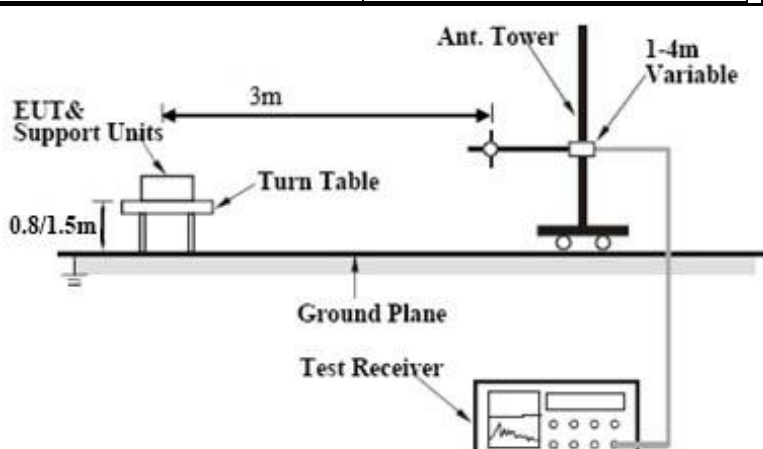
No.	P/L	Frequency	Reading	Detector	Corrected	Result	Limit	Margin
		(MHz)	(dBuV)		(dB)	(dBuV)	(dBuV)	(dB)
1	N	0.3138	32.22	QP	10.02	42.24	59.87	-17.63
2	N	0.3138	20.49	AVG	10.02	30.51	49.87	-19.36
3	N	0.4659	39.73	QP	10.02	49.75	56.59	-6.84
4	N	0.4659	30.21	AVG	10.02	40.23	46.59	-6.36
5	N	1.2537	30.52	QP	10.03	40.55	56.00	-15.45
6	N	1.2537	19.43	AVG	10.03	29.46	46.00	-16.54
7	N	2.1663	29.90	QP	10.04	39.94	56.00	-16.06
8	N	2.1663	18.83	AVG	10.04	28.87	46.00	-17.13
9	N	3.0351	27.18	QP	10.05	37.23	56.00	-18.77
10	N	3.0351	20.37	AVG	10.05	30.42	46.00	-15.58
11	N	4.7784	24.39	QP	10.07	34.46	56.00	-21.54
12	N	4.7784	16.48	AVG	10.07	26.55	46.00	-19.45

6.9 Radiated Emissions & Restricted Band

Temperature	24 °C
Relative Humidity	51%
Atmospheric Pressure	1027mbar
Test date :	May 27, 2017
Tested By :	Loren Luo

Requirement(s):

Spec	Item	Requirement	Applicable										
47CFR§15.205, §15.209, §15.247(d)	a)	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>		Frequency range (MHz)	Field Strength (µV/m)	30 – 88	100	88 – 216	150	216 - 960	200	Above 960	500
		Frequency range (MHz)		Field Strength (µV/m)									
		30 – 88		100									
		88 – 216		150									
		216 - 960		200									
Above 960	500												

Test Setup	
------------	--

Procedure	- The EUT was switched on and allowed to warm up to its normal operating condition. - 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:
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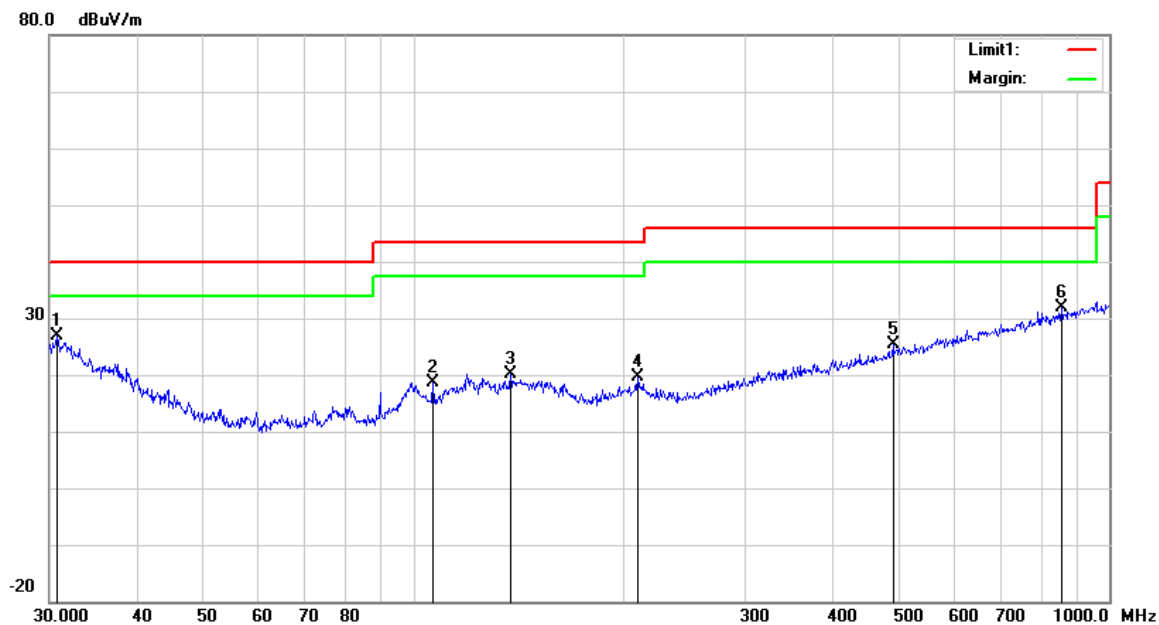
	a. Vertical or horizontal polarization (whichever gave the higher emission level over a full rotation of the EUT) was chosen. b. The EUT was then rotated to the direction that gave the maximum emission. c. Finally, the antenna height was adjusted to the height that gave the maximum emission. 3. The resolution 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	
Result	☒ Pass ☐ Fail

Test Data ☒ Yes ☐ N/A

Test Plot ☒ Yes (See below) ☐ N/A

Test Mode: Bluetooth Mode

Below 1GHz

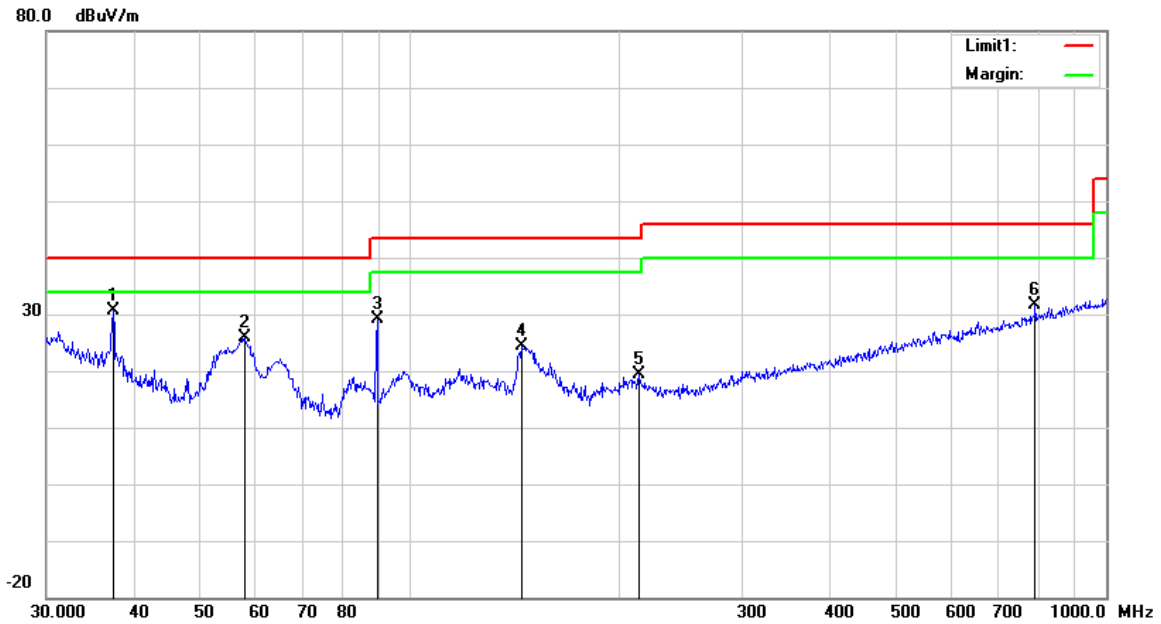


Test Data

Horizontal Polarity Plot @3m

No.	P/L	Frequency	Reading	Detect or	Ant_F	PA_G	Cab_L	Result	Limit	Margin	Height	Degr ee
		(MHz)	(dBuV/m)		(dB/m)	(dB)	(dB)	(dBuV/m)	(dBuV/m)	(dB)	(cm)	(°)
1	H	30.7455	27.65	peak	20.83	22.28	0.64	26.84	40.00	-13.16	100	146
2	H	106.7587	28.19	peak	11.58	22.33	1.15	18.59	43.50	-24.91	100	211
3	H	137.9029	28.43	peak	12.74	22.40	1.26	20.03	43.50	-23.47	100	154
4	H	210.0482	28.53	peak	11.96	22.36	1.57	19.70	43.50	-23.80	100	338
5	H	489.0269	27.47	peak	17.48	21.83	2.36	25.48	46.00	-20.52	100	31
6	H	854.0247	27.89	peak	21.99	21.00	2.89	31.77	46.00	-14.23	100	309

Below 1GHz



Test Data

Vertical Polarity Plot @3m

No.	P/L	Frequency	Reading	Detect or	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	V	37.4165	36.26	peak	15.79	22.26	0.77	30.56	40.00	-9.44	100	16
2	V	57.7962	40.04	peak	7.54	22.40	0.76	25.94	40.00	-14.06	100	272
3	V	89.5900	42.48	peak	7.98	22.32	0.96	29.10	43.50	-14.40	200	337
4	V	144.3348	32.76	peak	12.60	22.38	1.30	24.28	43.50	-19.22	100	51
5	V	213.0151	28.29	peak	11.92	22.36	1.58	19.43	43.50	-24.07	100	129
6	V	790.6188	28.60	peak	21.29	21.17	2.94	31.66	46.00	-14.34	100	291

Above 1GHz

Test Mode:	Transmitting Mode
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Low Channel: GFSK Mode (Worst Case) (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	39.67	AV	V	33.67	6.86	32.66	47.54	54	-6.46
4804	39.3	AV	H	33.67	6.86	32.66	47.17	54	-6.83
4804	48.98	PK	V	33.67	6.86	32.66	56.85	74	-17.15
4804	45.38	PK	H	33.67	6.86	32.66	53.25	74	-20.75
17802	24.59	AV	V	45.03	11.21	32.38	48.45	54	-5.55
17802	24.92	AV	H	45.03	11.21	32.38	48.78	54	-5.22
17802	39.81	PK	V	45.03	11.21	32.38	63.67	74	-10.33
17802	42.13	PK	H	45.03	11.21	32.38	65.99	74	-8.01

Middle Channel: GFSK Mode (Worst Case) (2441 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)
4882	39.53	AV	V	33.71	6.95	32.74	47.45	54	-6.55
4882	38.78	AV	H	33.71	6.95	32.74	46.7	54	-7.3
4882	48.36	PK	V	33.71	6.95	32.74	56.28	74	-17.72
4882	46.76	PK	H	33.71	6.95	32.74	54.68	74	-19.32
17813	24.49	AV	V	45.15	11.18	32.41	48.41	54	-5.59
17813	23.77	AV	H	45.15	11.18	32.41	47.69	54	-6.31
17813	41.15	PK	V	45.15	11.18	32.41	65.07	74	-8.93
17813	41.51	PK	H	45.15	11.18	32.41	65.43	74	-8.57

High Channel: GFSK Mode (Worst Case) (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	38.42	AV	V	33.9	6.76	32.74	46.34	54	-7.66
4960	38.36	AV	H	33.9	6.76	32.74	46.28	54	-7.72
4960	48.32	PK	V	33.9	6.76	32.74	56.24	74	-17.76
4960	47.37	PK	H	33.9	6.76	32.74	55.29	74	-18.71
17817	23.71	AV	V	45.22	11.35	32.38	47.9	54	-6.1
17817	24.45	AV	H	45.22	11.35	32.38	48.64	54	-5.36
17817	41.89	PK	V	45.22	11.35	32.38	66.08	74	-7.92
17817	40.74	PK	H	45.22	11.35	32.38	64.93	74	-9.07

Note:

1, The testing has been conformed to $10 \times 2480 \text{ MHz} = 24,800 \text{ MHz}$

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	03/23/2017	03/22/2018	☒
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

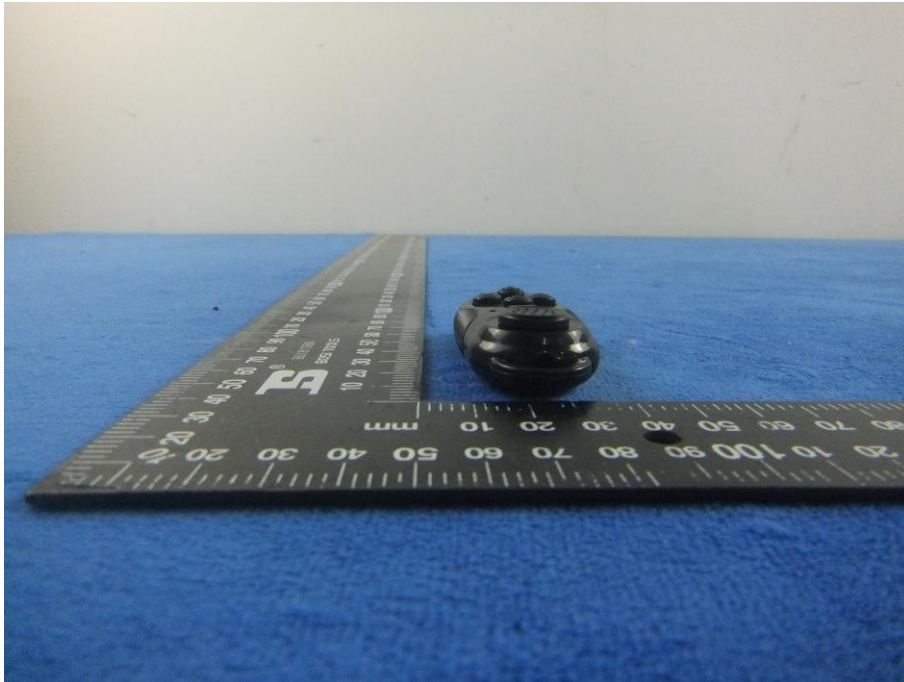
EUT - Front View



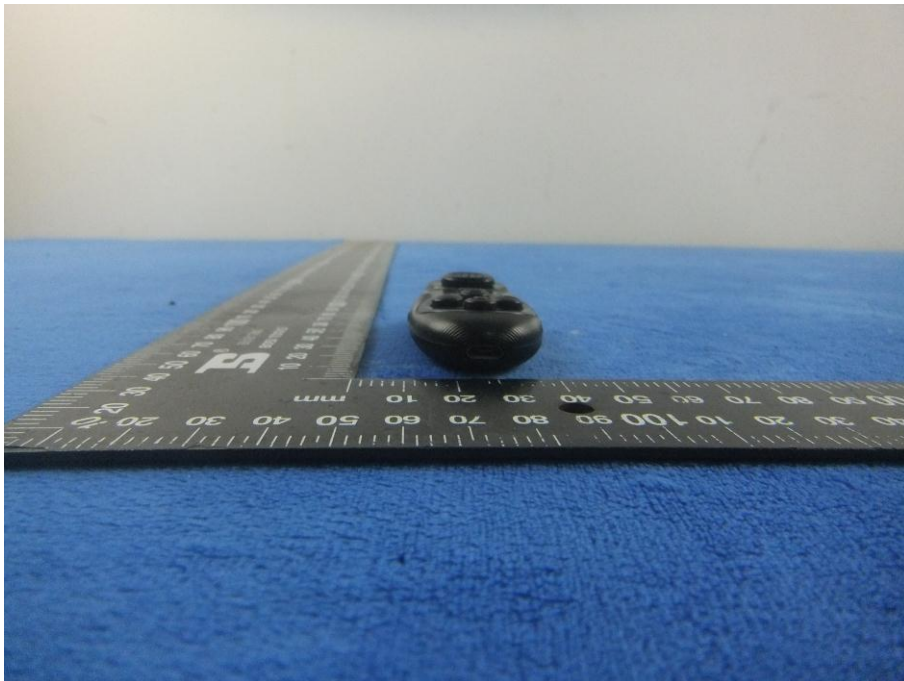
EUT - Rear View



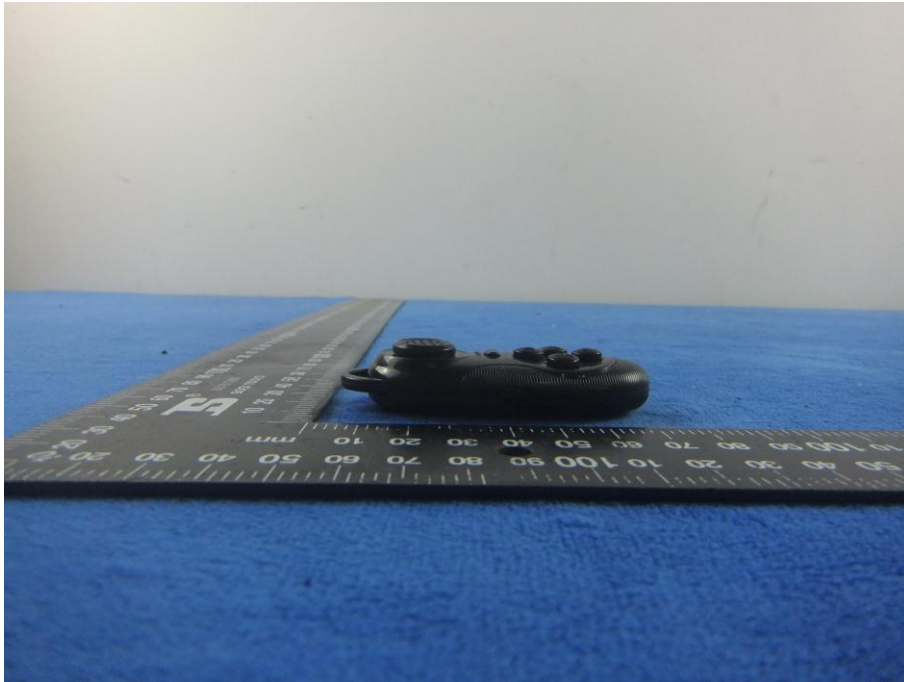
EUT - Top View



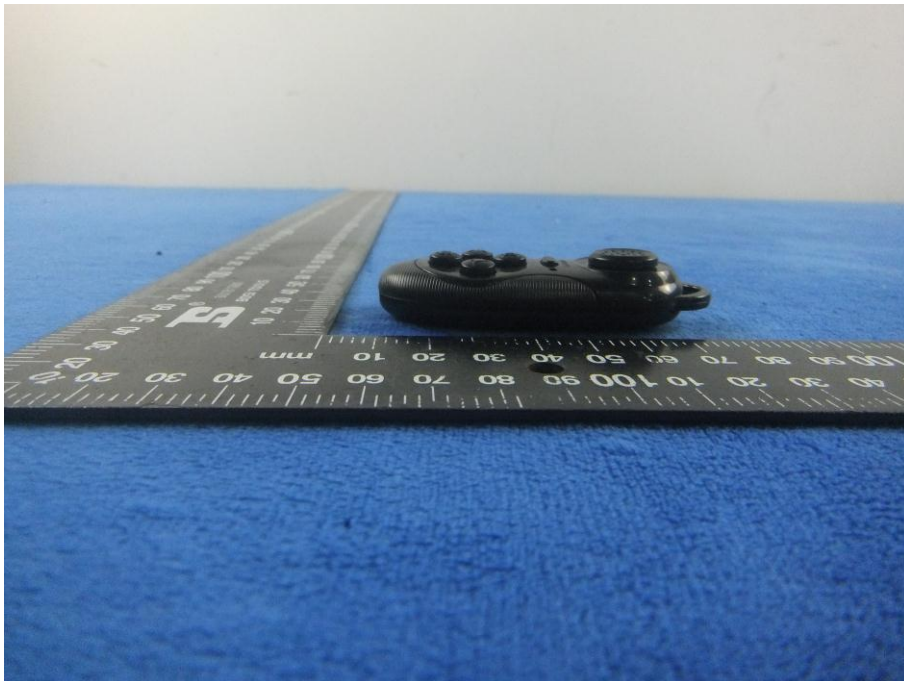
EUT - Bottom View



EUT - Left View

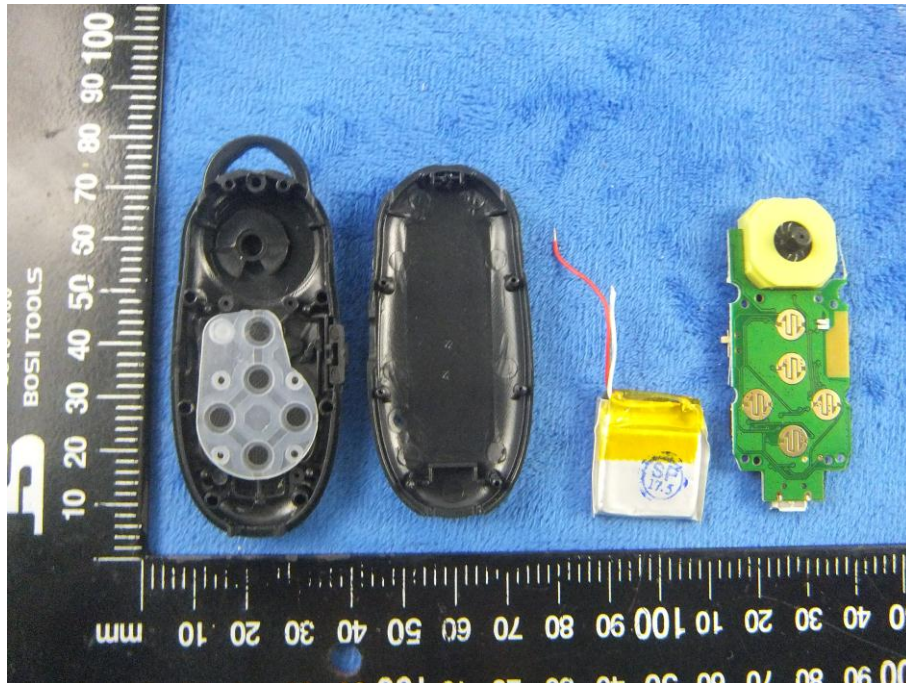


EUT - Right View

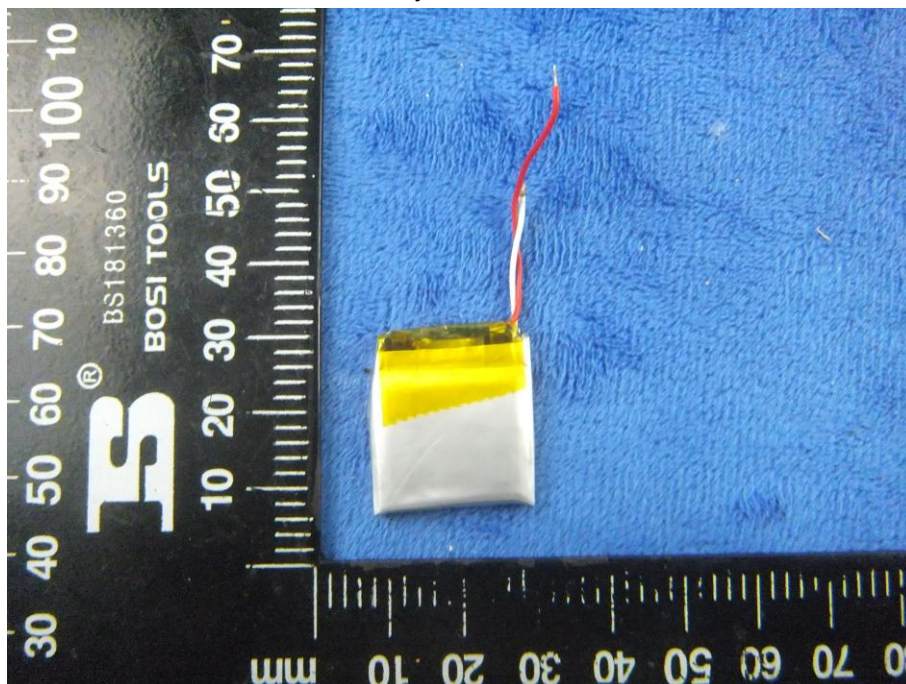


Annex B.ii. Photograph: EUT Internal Photo

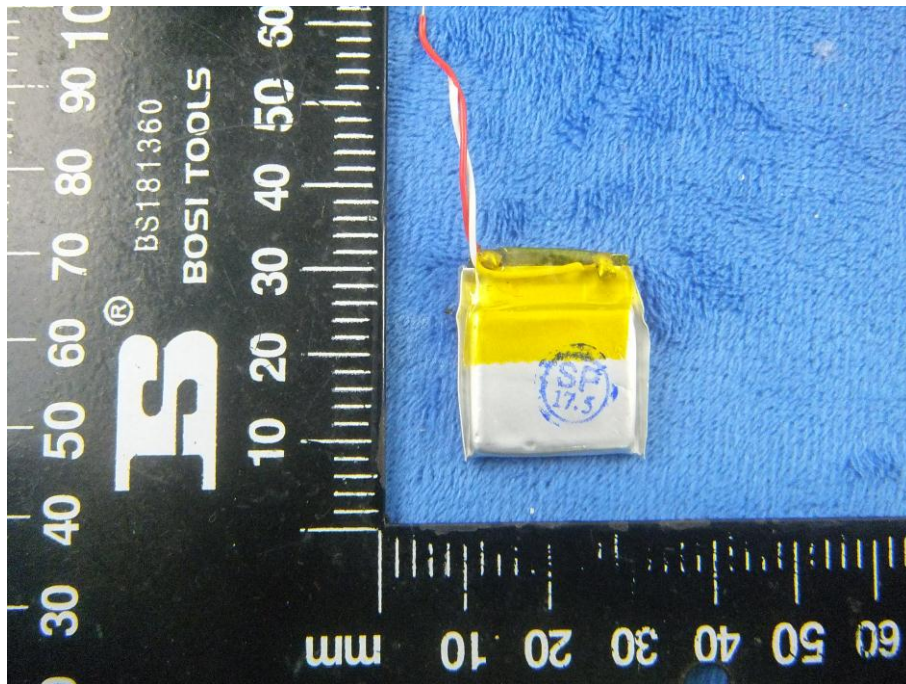
Cover Off - Top View



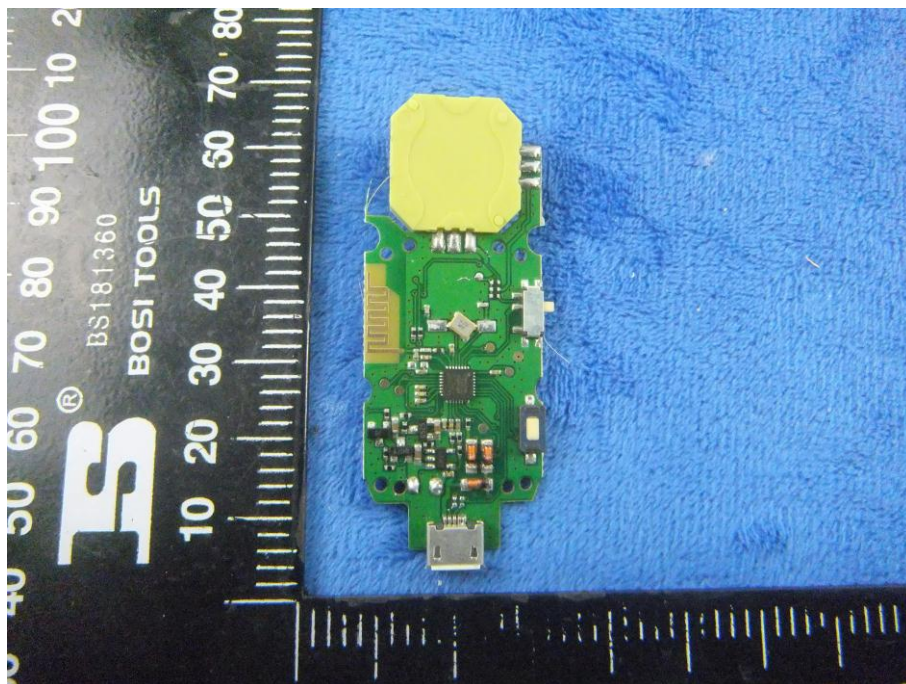
Battery - Front View



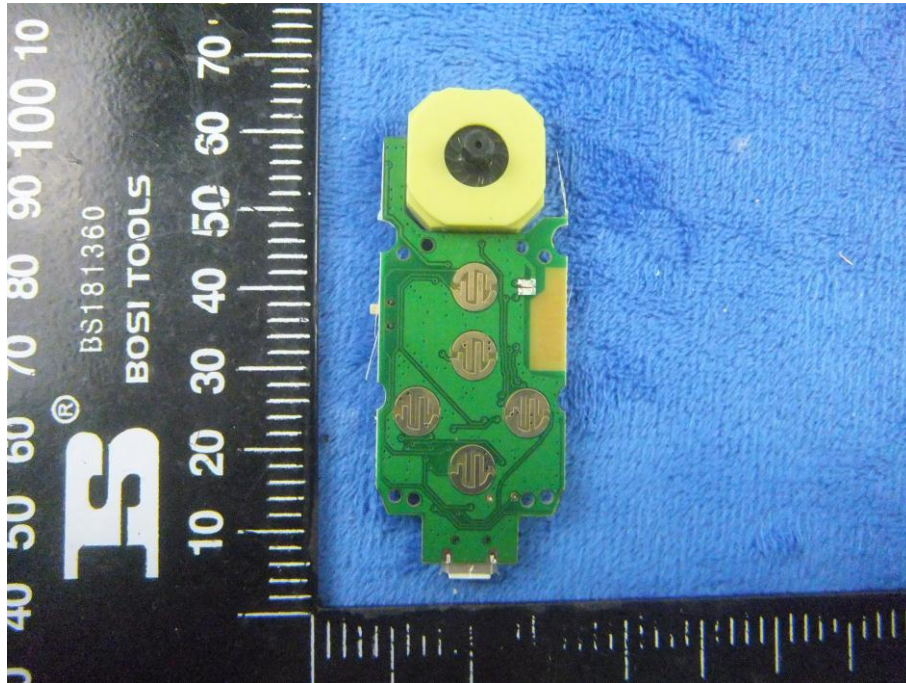
Battery - Rear View



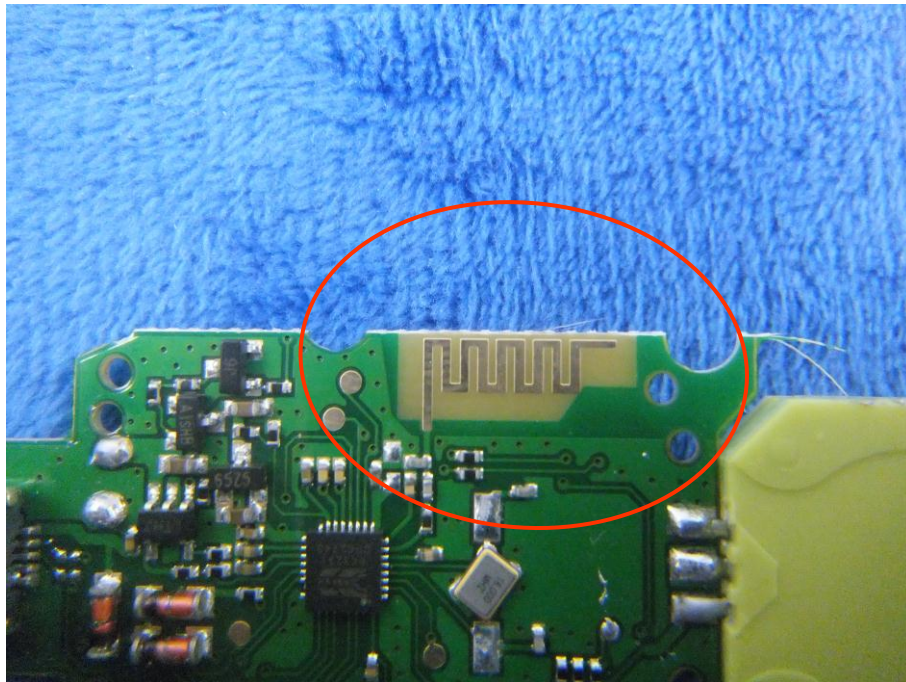
Mainboard - Front View



Mainboard - Rear View



BT - Antenna View



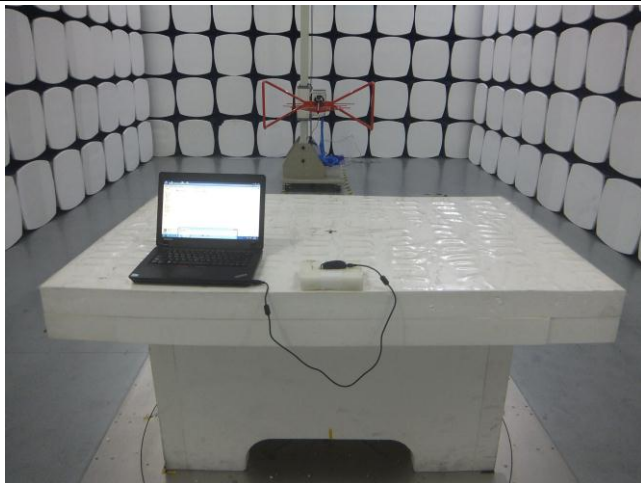
Annex B.iii. Photograph: Test Setup Photo



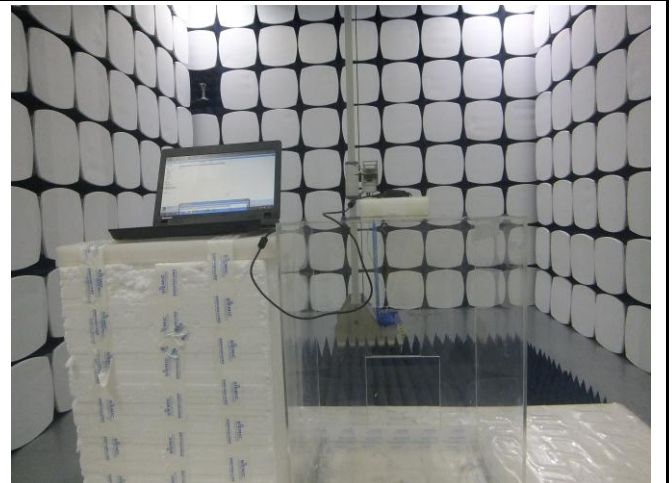
Conducted Emissions Test Setup Front View



Conducted Emissions Test Setup Side View



Radiated Spurious Emissions Test Setup Below 1GHz

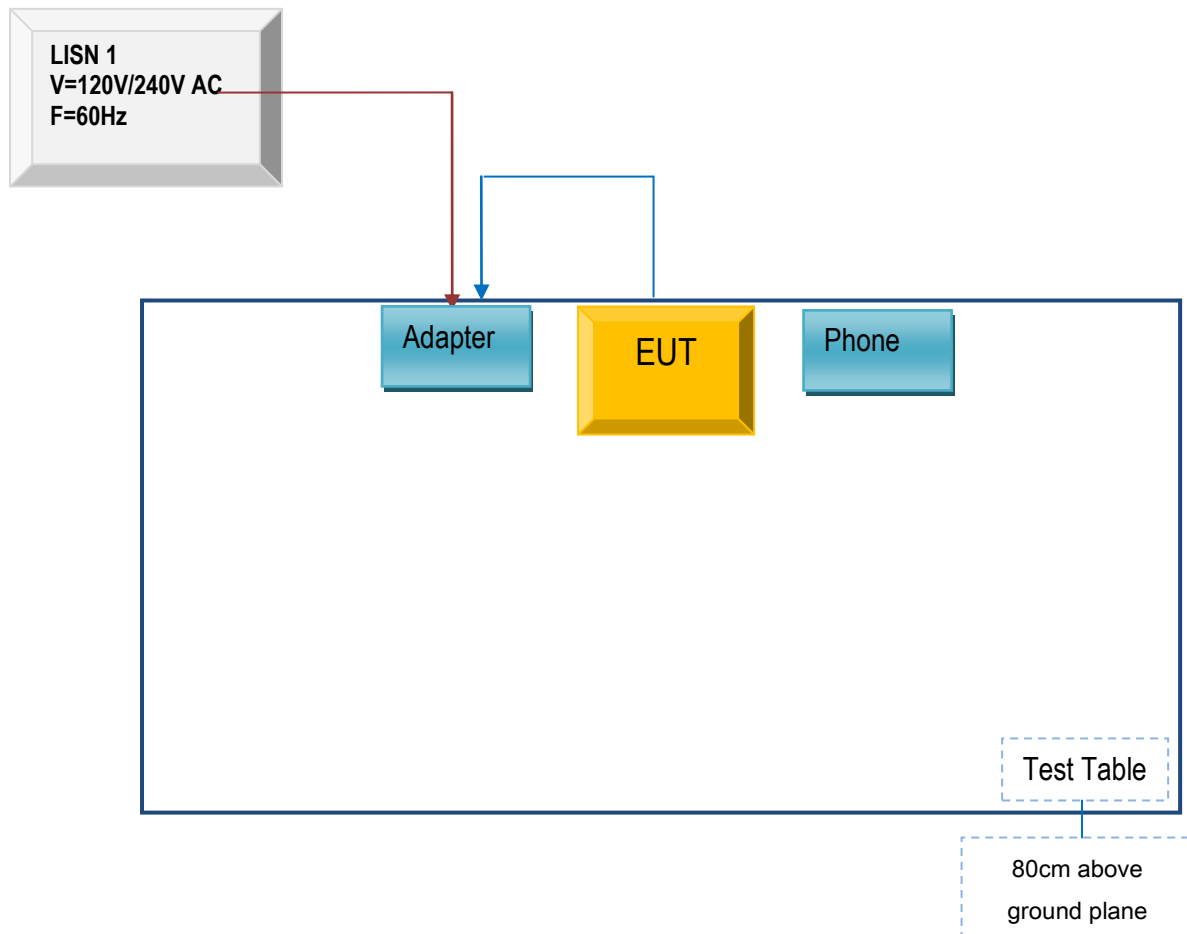


Radiated Spurious Emissions Test Setup Above
1GHz

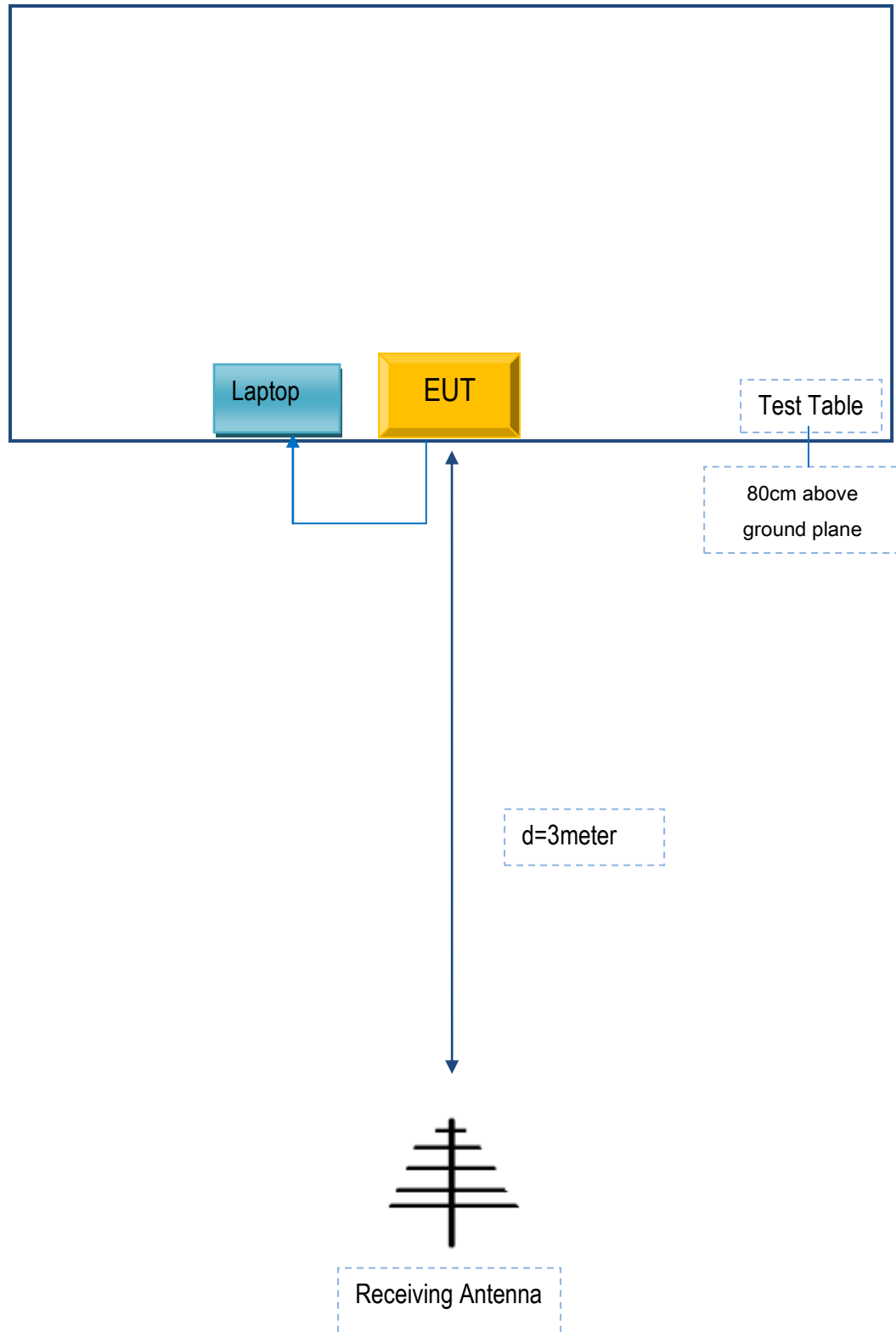
Annex C. TEST SETUP AND SUPPORTING EQUIPMENT

Annex C.ii. TEST SET UP BLOCK

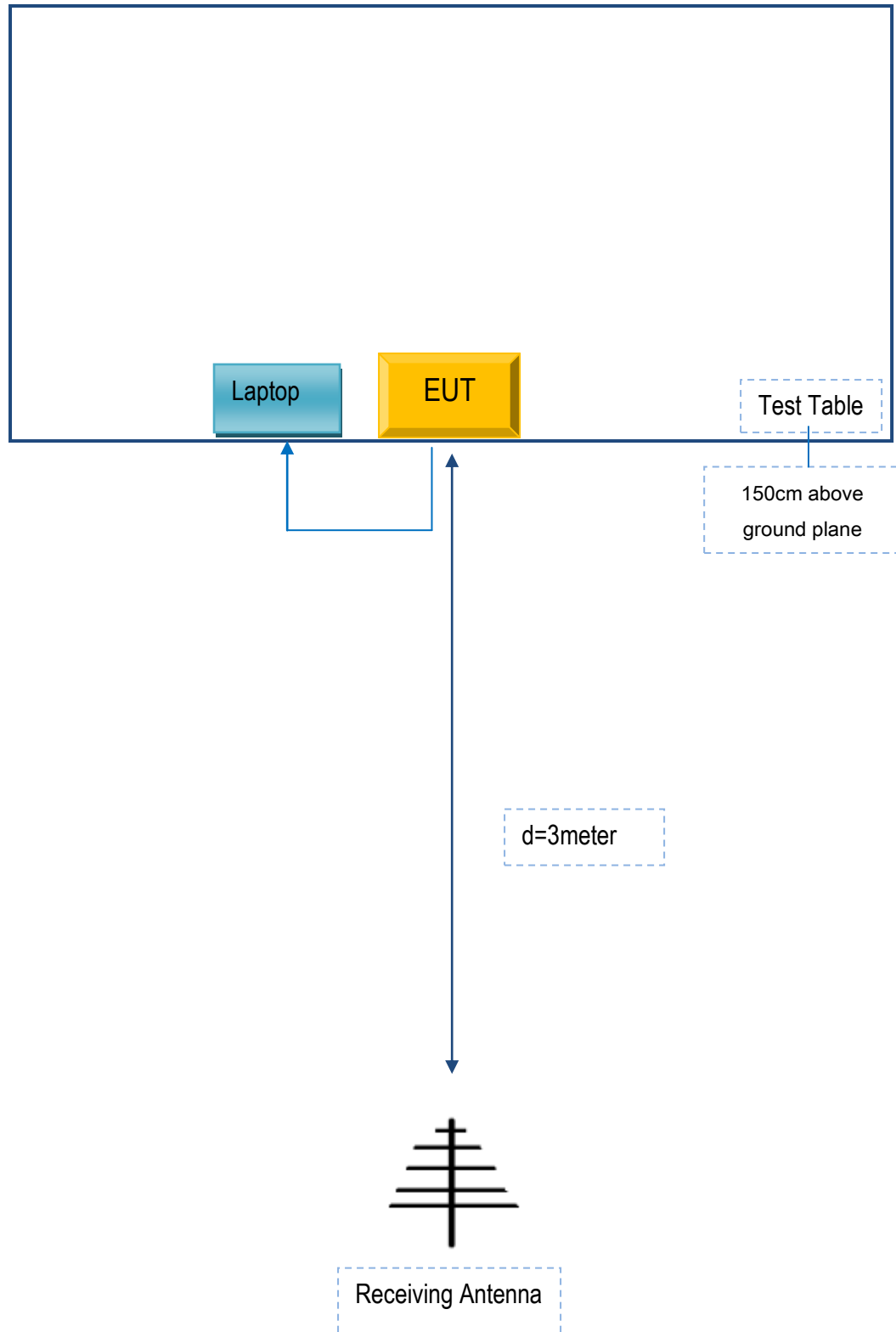
Block Configuration Diagram for AC Line Conducted Emissions



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
TECNO MOBILE LIMITED	Adapter	P6200	SE503
TECNO MOBILE LIMITED	Laptop	E40	LR-1EHRX
TECNO MOBILE LIMITED	Phone	A8000	AE560

Supporting Cable:

Cable type	Shield Type	Ferrite Core	Length	Serial No
USB Cable	Un-shielding	No	0.8m	SE503

Test Report	17070353-FCC-R
Page	51 of 52

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

Please see the attachment

Annex E. DECLARATION OF SIMILARITY

N/A