
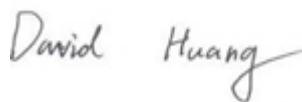



RF TEST REPORT



Report No.: 17070297-FCC-R-V2

Supersede Report No.: N/A

Applicant	Remote Solution co.,Ltd	
Product Name	REMOTE CONTROL UNIT	
Model No.	CRB36	
Serial No.	N/A	
Test Standard	FCC Part 15.247: 2016, ANSI C63.10: 2013	
Test Date	June 07 to June 23 & 29, 2017	
Issue Date	June 30, 2017	
Test Result	<input checked="" type="checkbox"/> Pass <input type="checkbox"/> Fail	
Equipment complied with the specification	<input checked="" type="checkbox"/>	
Equipment did not comply with the specification	<input type="checkbox"/>	
		
Leen Yang 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

Phone: +86 0755 2601 4629801 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

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1. Report Revision History

Report No.	Report Version	Description	Issue Date
17070297-FCC-R	NONE	Original	June 23, 2017
17070297-FCC-R-V1	V1	Changed the Applicant address and Added the Radiated Emission test data (9kHz-30MHz)	June 29, 2017
17070297-FCC-R-V2	V2	Changed the FCC ID	June 30, 2017

2. Customer information

Applicant Name	Remote Solution co.,Ltd
Applicant Add	92, Chogokri,Nammyun,Kimchon City, Kyungbuk,South Korea
Manufacturer	Remote Solution HK Ltd
Manufacturer Add	No.7,6 Road, Gaoli Industrial Zone, Tangxia Town, Dong guan City, China

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:	REMOTE CONTROL UNIT
Main Model:	CRB36
Serial Model:	N/A
Date EUT received:	June 06, 2017
Test Date(s):	June 07 to June 23 & 29, 2017
Equipment Category :	DTS
Antenna Gain:	0 dBi
Antenna Type:	PCB antenna
Type of Modulation:	QPSK
RF Operating Frequency (ies):	2425-2475 MHz
Max. Output Power:	3.438dBm
Number of Channels:	25CH
Port:	N/A
Trade Name :	N/A
Input Power:	DC: 3V
FCC ID:	TX4CRB36C

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	N/A
§15.205, §15.209, §15.247(d)	Radiated Emissions & Unwanted Emissions into Restricted Frequency Bands	Compliance

Measurement Uncertainty

Emissions		
Test Item	Description	Uncertainty
Band-Edge & Unwanted Emissions into Restricted Frequency Bands and Radiated Emissions & Unwanted Emissions into Restricted Frequency Bands	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 4 antennas:

Four permanently attached PCB antenna for ZigBee, the gain of each antenna is 0dBi.

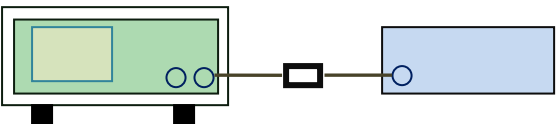
The total gain of the 4 antenna is 6 dBi.

The antenna meets up with the ANTENNA REQUIREMENT.

Result: Compliance.

6.2 DTS (6 dB) Channel Bandwidth

Temperature	23 °C
Relative Humidity	56%
Atmospheric Pressure	1014mbar
Test date :	June 14 & 20, 2017
Tested By :	Leen Yang

Spec	Item	Requirement	Applicable
§ 15.247(a)(2)	a)	6dB BW ≥ 500kHz;	<input checked="" type="checkbox"/>
RSS Gen(4.6.1)	b)	99% BW: For FCC reference only; required by IC.	<input checked="" type="checkbox"/>
Test Setup	 <p style="text-align: center;">Spectrum Analyzer EUT</p>		
Test Procedure	<p>558074 D01 DTS MEAS Guidance v03r03, 8.1 DTS bandwidth <u>6dB Emission bandwidth measurement procedure</u></p> <ul style="list-style-type: none"> - 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. <p>Measure the maximum width of the emission that is constrained by the frequencies associated with the two outermost amplitude points (upper and lower frequencies) that are attenuated by 6 dB relative to the maximum level measured in the fundamental emission.</p>		
Remark			
Result	<input checked="" type="checkbox"/> Pass <input type="checkbox"/> Fail		

Test Data Yes N/A

Test Plot Yes (See below) N/A

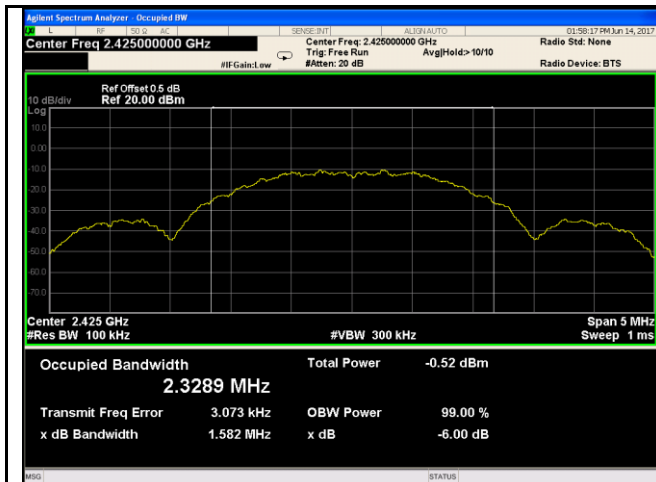
Antenna 1:

6dB Bandwidth measurement result

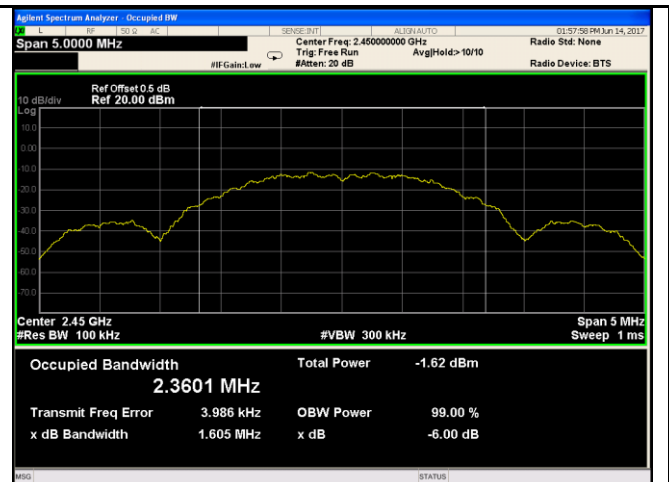
Test Data

CH	Frequency (MHz)	6dB Bandwidth (kHz)	99% Occupied Bandwidth (MHz)
Low	2425	1.582	2.3289
Mid	2450	1.605	2.3601
High	2475	1.576	2.3320

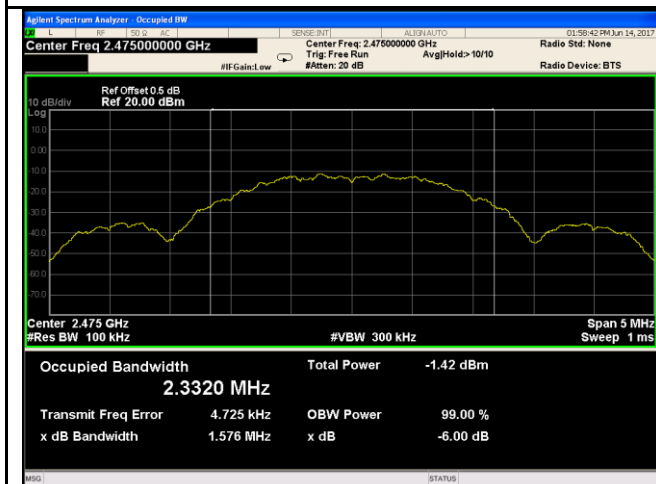
Test Plots



6dB Bandwidth - Low CH 2425



6dB Bandwidth - Mid CH 2450

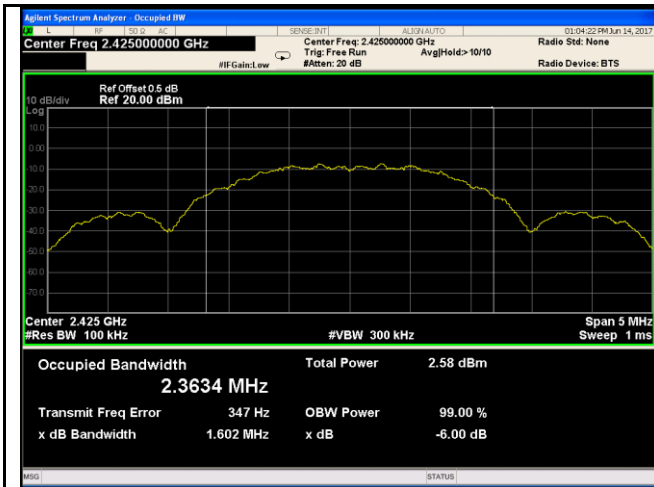


6dB Bandwidth - High CH 2475

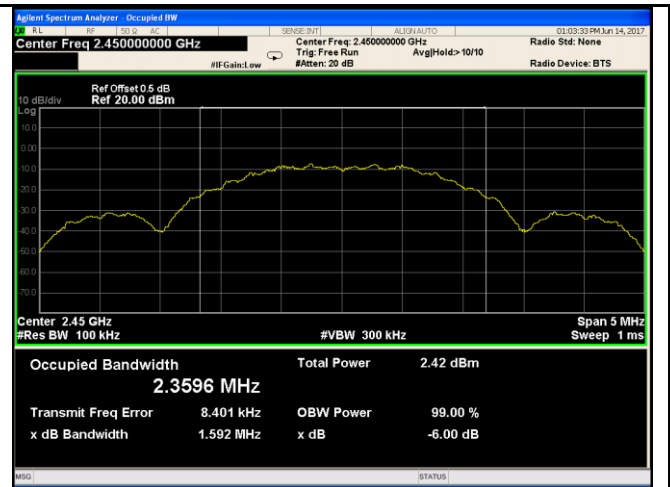
Antenna 2:
6dB Bandwidth measurement result
Test Data

CH	Frequency (MHz)	6dB Bandwidth (kHz)	99% Occupied Bandwidth (MHz)
Low	2425	1.602	2.3634
Mid	2450	1.592	2.3596
High	2475	1.602	2.3506

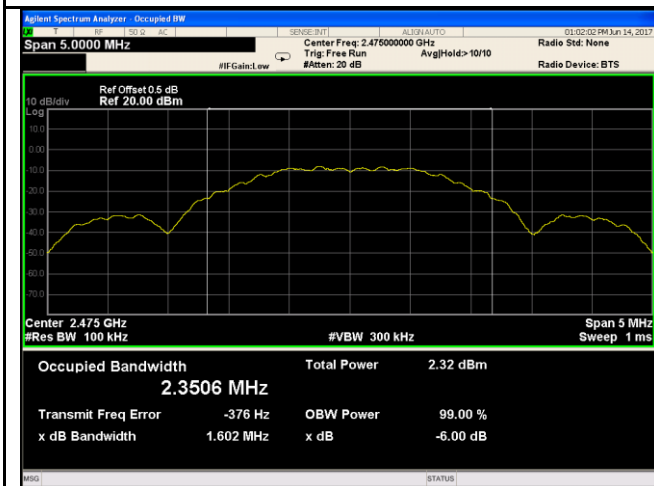
Test Plots



6dB Bandwidth - Low CH 2425



6dB Bandwidth - Mid CH 2450



6dB Bandwidth - High CH 2475

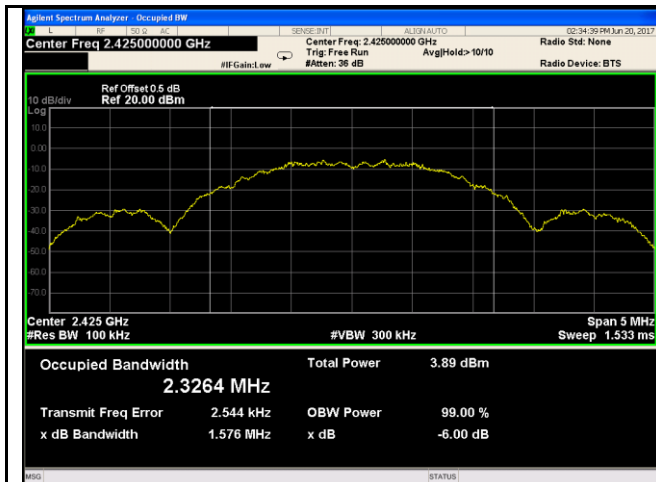
Antenna 3:

6dB Bandwidth measurement result

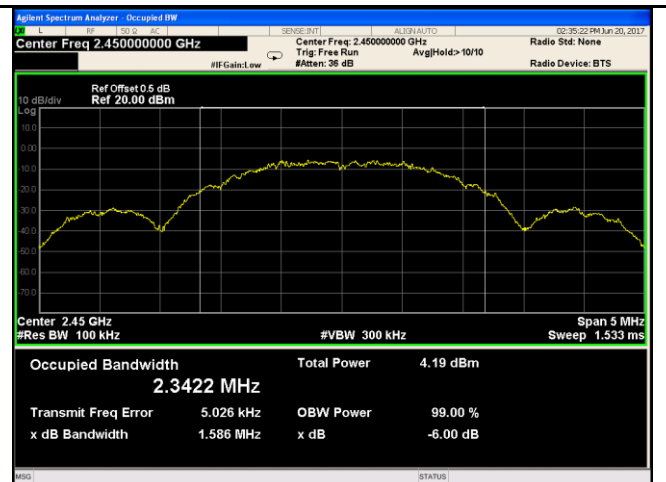
Test Data

CH	Frequency (MHz)	6dB Bandwidth (kHz)	99% Occupied Bandwidth (MHz)
Low	2425	1.576	2.3264
Mid	2450	1.586	2.3422
High	2475	1.546	2.3170

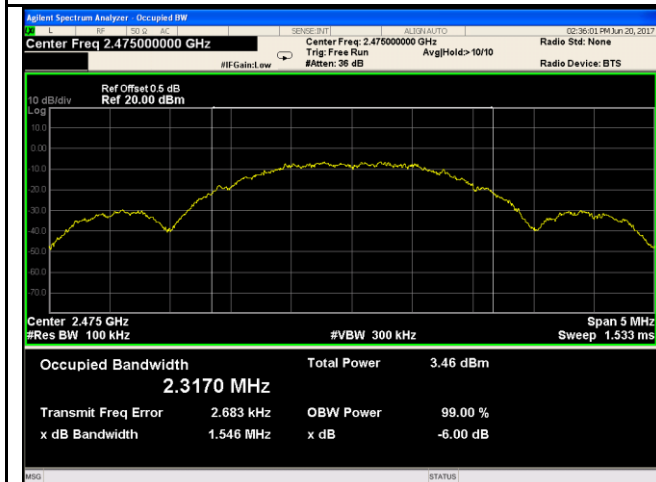
Test Plots



6dB Bandwidth - Low CH 2425



6dB Bandwidth - Mid CH 2450



6dB Bandwidth - High CH 2475

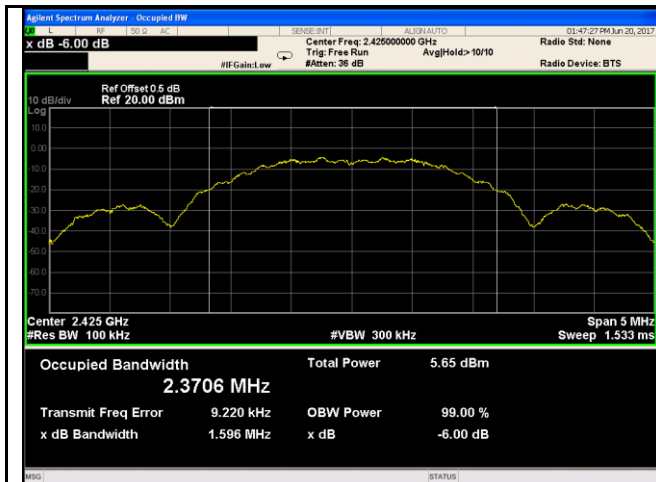
Antenna 4:

6dB Bandwidth measurement result

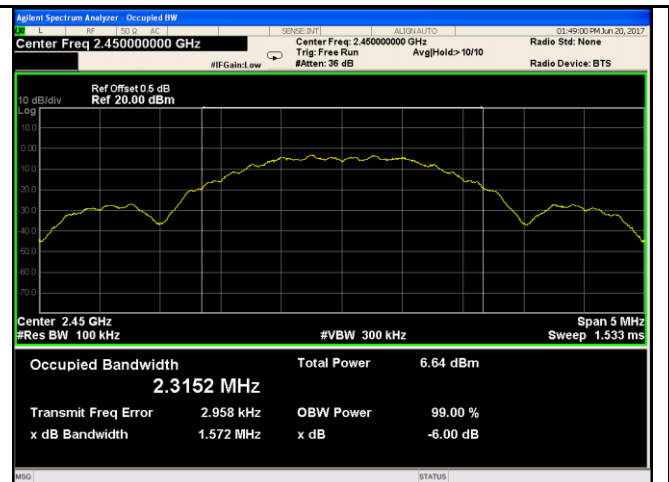
Test Data

CH	Frequency (MHz)	6dB Bandwidth (kHz)	99% Occupied Bandwidth (MHz)
Low	2425	1.596	2.3706
Mid	2450	1.572	2.3152
High	2475	1.593	2.3264

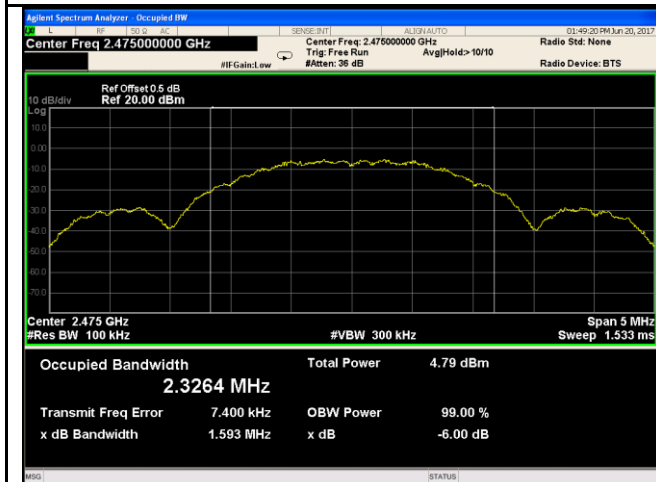
Test Plots



6dB Bandwidth - Low CH 2425



6dB Bandwidth - Mid CH 2450

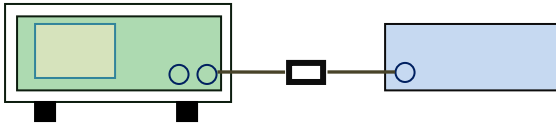


6dB Bandwidth - High CH 2475

6.3 Maximum Output Power

Temperature	23 °C
Relative Humidity	56%
Atmospheric Pressure	1014mbar
Test date :	June 14 & 20, 2017
Tested By :	Leen Yang

Requirement(s):

Spec	Item	Requirement	Applicable
§15.247(b) (3),RSS210 (A8.4)	a)	FHSS in 2400-2483.5MHz with ≥ 75 channels: ≤ 1 Watt	<input type="checkbox"/>
	b)	FHSS in 5725-5850MHz: ≤ 1 Watt	<input type="checkbox"/>
	c)	For all other FHSS in the 2400-2483.5MHz band: ≤ 0.125 Watt.	<input type="checkbox"/>
	d)	FHSS in 902-928MHz with ≥ 50 channels: ≤ 1 Watt	<input type="checkbox"/>
	e)	FHSS in 902-928MHz with ≥ 25 & < 50 channels: ≤ 0.25 Watt	<input type="checkbox"/>
	f)	DTS in 902-928MHz, 2400-2483.5MHz: ≤ 1 Watt	<input checked="" type="checkbox"/>
Test Setup	 <p style="text-align: center;">Spectrum Analyzer EUT</p>		
Test Procedure	558074 D01 DTS MEAS Guidance v03r03, 9.1.2 Integrated band power method Maximum output power measurement procedure a) Set the RBW \geq DTS bandwidth. b) Set VBW $\geq 3 \times$ RBW. c) Set span $\geq 3 \times$ 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	<input checked="" type="checkbox"/> Pass <input type="checkbox"/> Fail		

Test Data Yes N/A

Test Plot Yes (See below) N/A

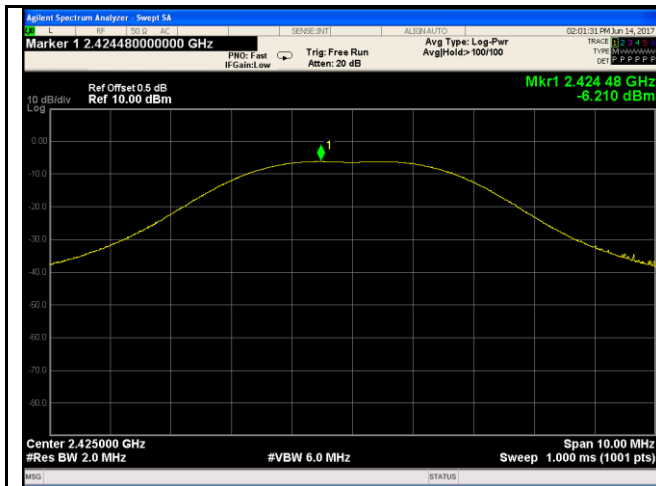
Output Power measurement result

Test Data

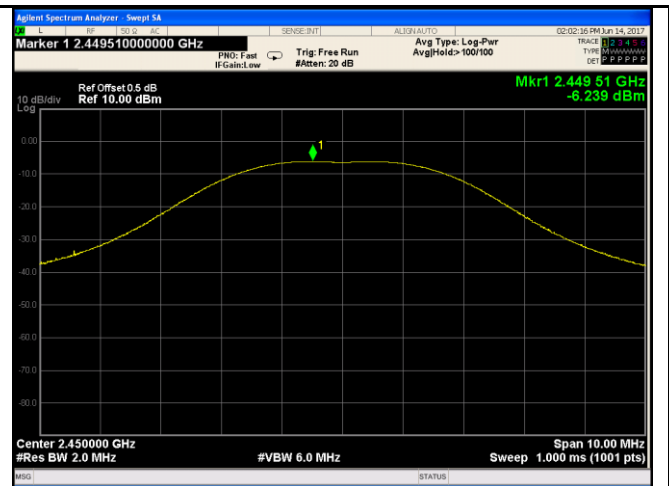
Type	CH	Frequency (MHz)	Conducted Power (dBm)				Total Max Power (dBm)	Limit (dBm)	Result
			Antenna 1	Antenna 2	Antenna 3	Antenna 4			
Output power	Low	2425	-6.210	-4.443	-1.395	-0.872	3.308	30	Pass
	Mid	2450	-6.239	-4.426	-1.816	-0.225	3.438	30	Pass
	High	2475	-6.171	-5.035	-2.489	-1.615	2.572	30	Pass

Antenna 1:

Test Plots

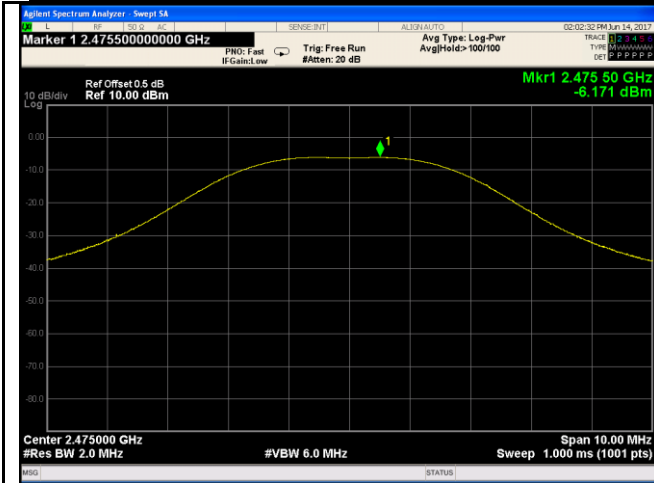


AV Output power - Low CH 2425



AV Output power - Mid CH 2450

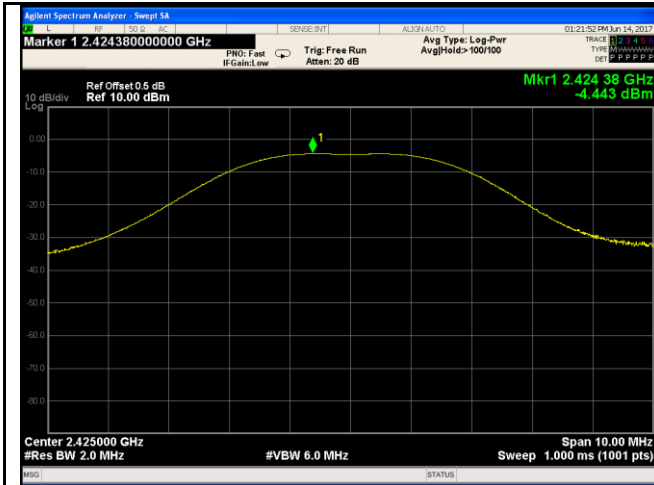
Test Report No.	17070297-FCC-R-V2
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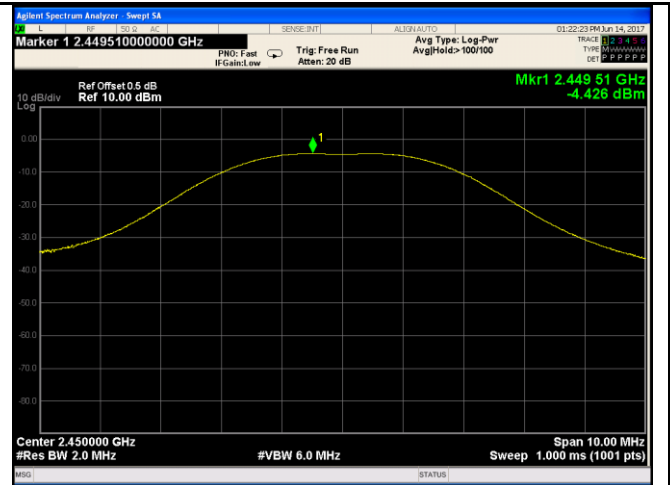
AV Output power - High CH 2475

Antenna 2:

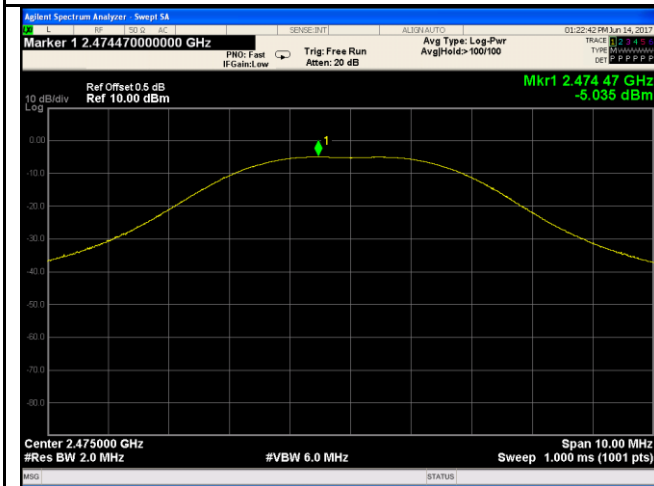
Test Plots



AV Output power - Low CH 2425



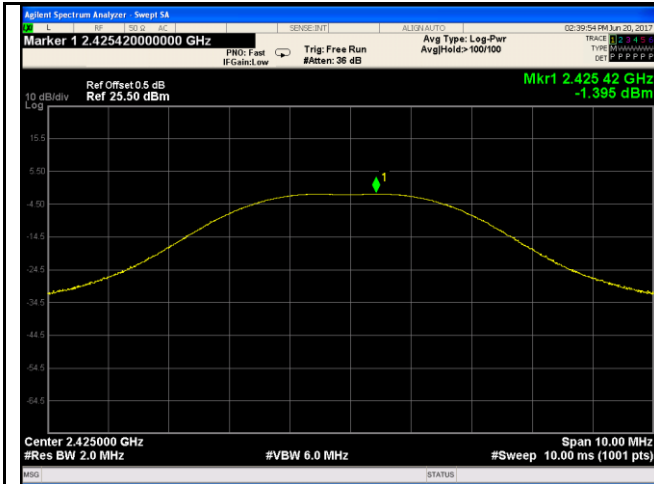
AV Output power - Mid CH 2450



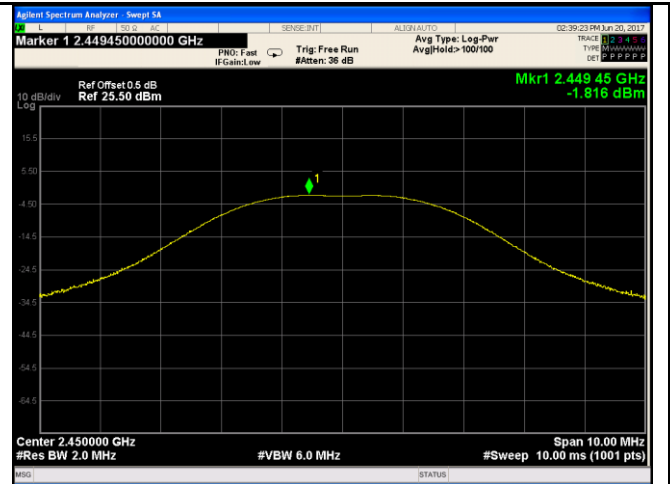
AV Output power - High CH 2475

Antenna 3:

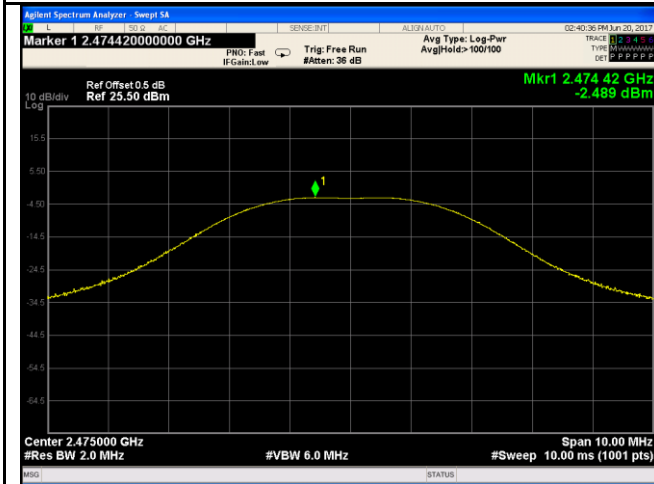
Test Plots



AV Output power - Low CH 2425



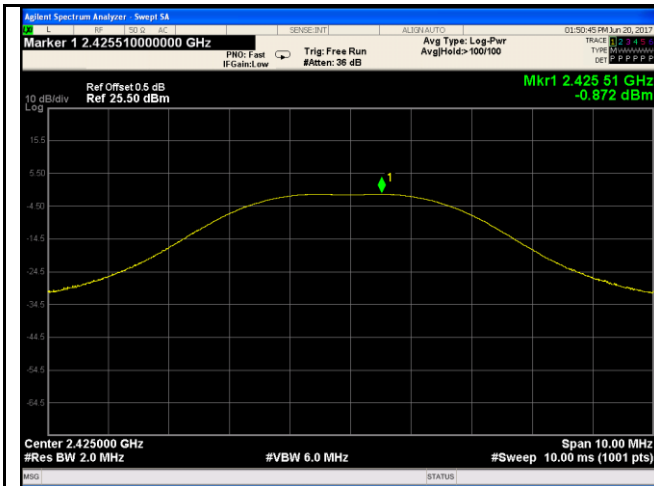
AV Output power - Mid CH 2450



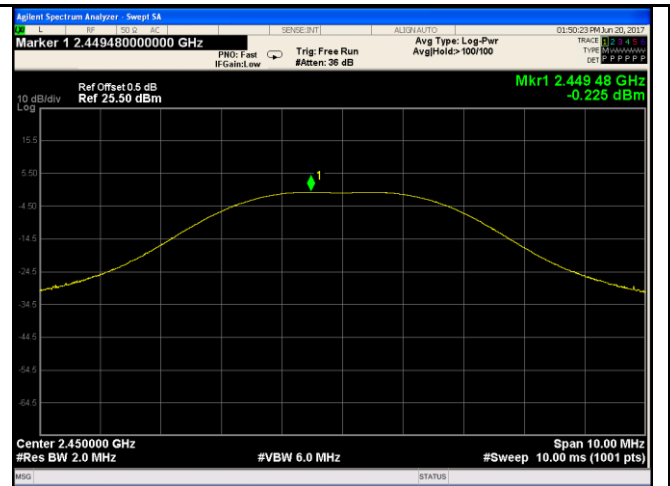
AV Output power - High CH 2475

Antenna 4:

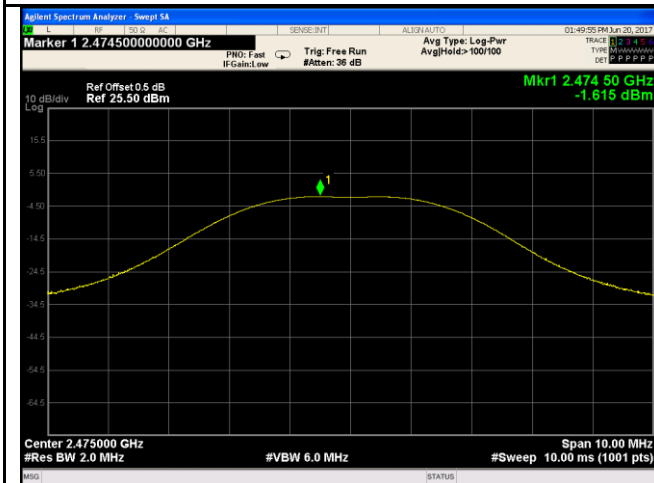
Test Plots



AV Output power - Low CH 2425



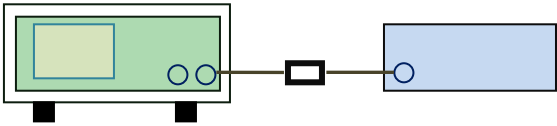
AV Output power - Mid CH 2450



AV Output power - High CH 2475

6.4 Power Spectral Density

Temperature	23 °C
Relative Humidity	56%
Atmospheric Pressure	1014mbar
Test date :	June 14 & 20, 2017
Tested By :	Leen Yang

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.	<input checked="" type="checkbox"/>
Test Setup	 <p style="text-align: center;">Spectrum Analyzer EUT</p>		
Test Procedure	<p>558074 D01 DTS MEAS Guidance v03r03, 10.2 power spectral density method power spectral density measurement procedure</p> <ul style="list-style-type: none"> - 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: $3 \text{ kHz} \leq \text{RBW} \leq 100 \text{ kHz}$. - d) Set the VBW $\geq 3 \times \text{RBW}$. - 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	<input checked="" type="checkbox"/> Pass <input type="checkbox"/> Fail		

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

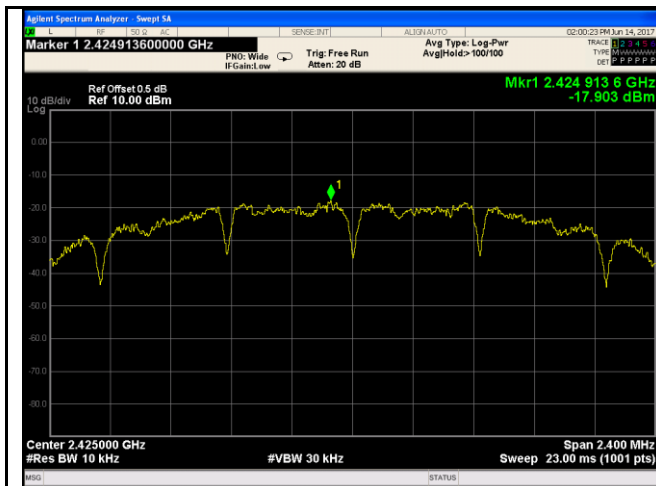
Power Spectral Density measurement result

Test Data

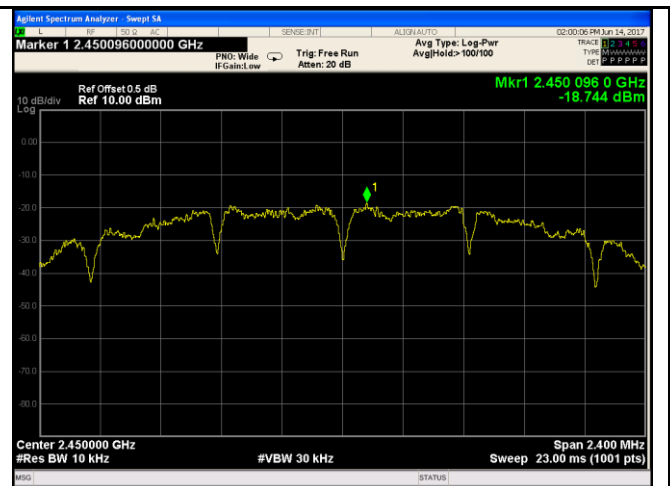
Type	CH	Freq (MHz)	PSD (dBm)				Total Max PSD (dB m)	Factor	Result (dBm)	Limit (dBm)	Result
			Antenna 1	Antenna 2	Antenna 3	Antenna 4					
PSD	Low	2425	-18.744	-15.506	-12.184	-10.744	-7.328	-5.23	-12.558	8	Pass
	Mid	2450	-19.145	-15.053	-11.889	-9.687	-6.676	-5.23	-11.906	8	Pass
	High	2475	-17.903	-15.010	-13.001	-11.150	-7.569	-5.23	-12.799	8	Pass

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

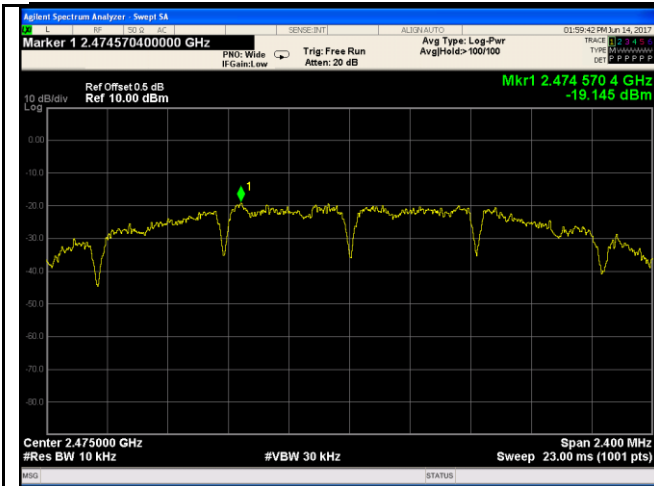
Antenna 1: Test Plots



PSD - Low CH 2425



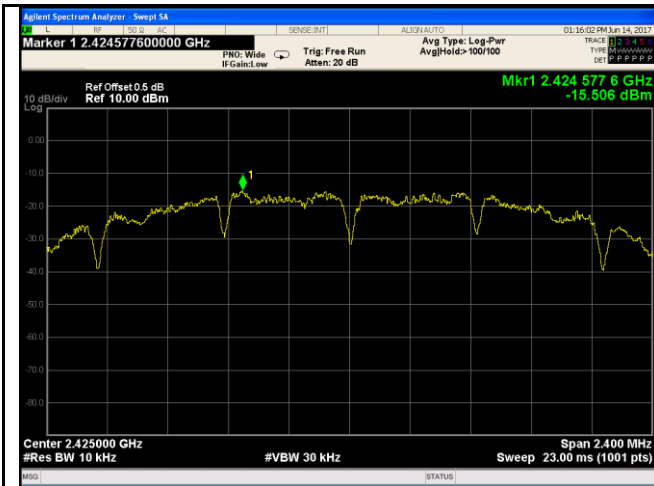
PSD - Mid CH 2450



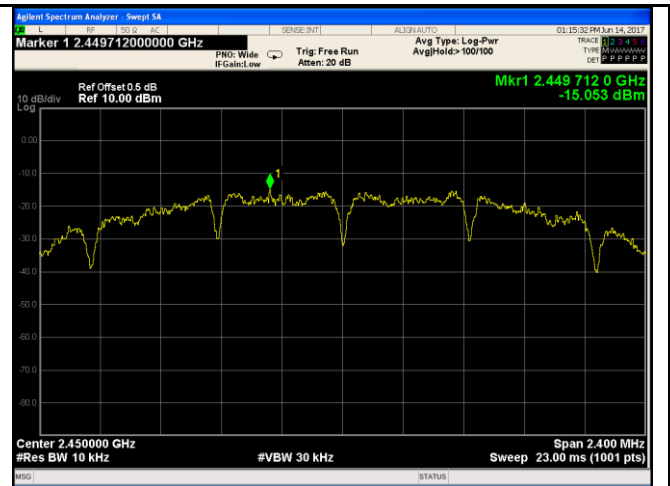
PSD - High CH 2475

Antenna 2:

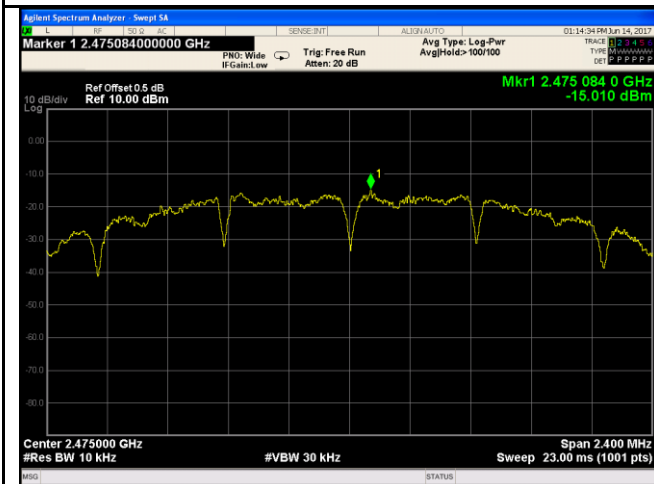
Test Plots



PSD - Low CH 2425



PSD - Mid CH 2450

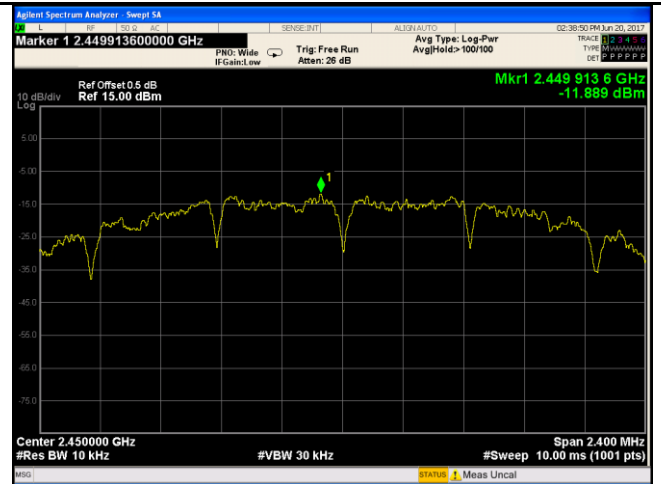


PSD - High CH 2475

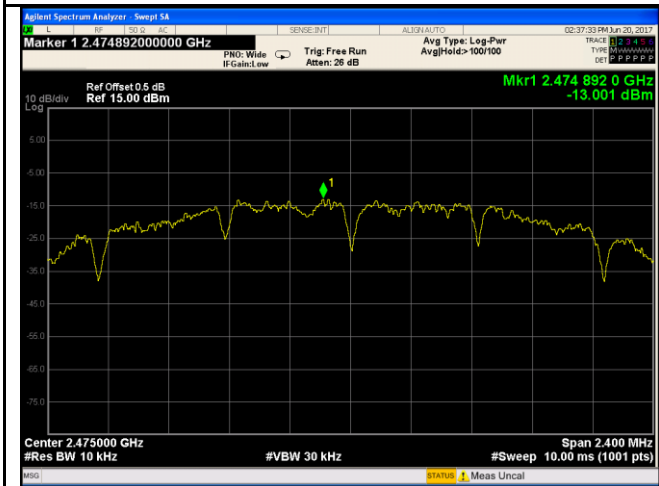
Antenna 3:
Test Plots



PSD - Low CH 2425



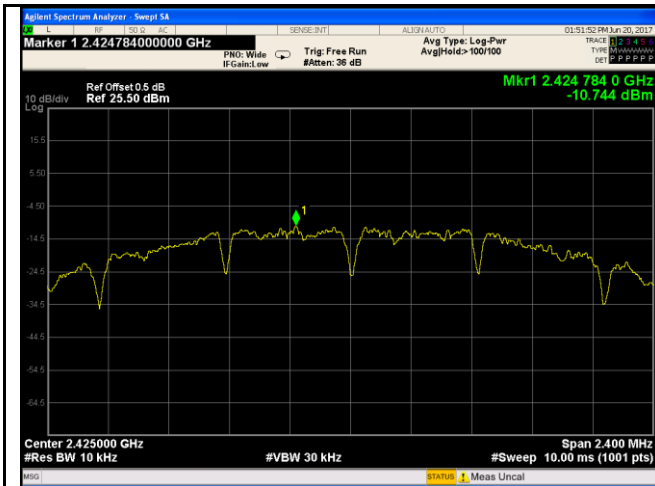
PSD - Mid CH 2450



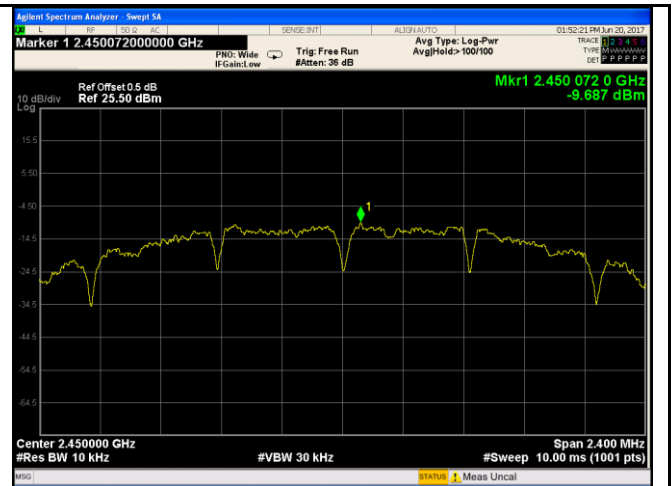
PSD - High CH 2475

Antenna 4:

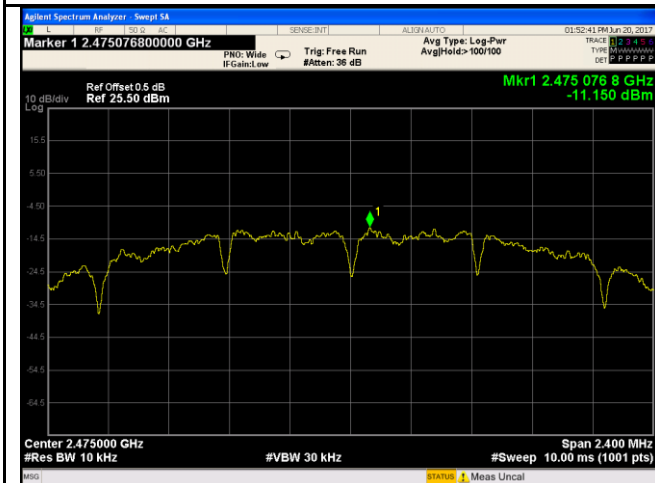
Test Plots



PSD - Low CH 2425



PSD - Mid CH 2450

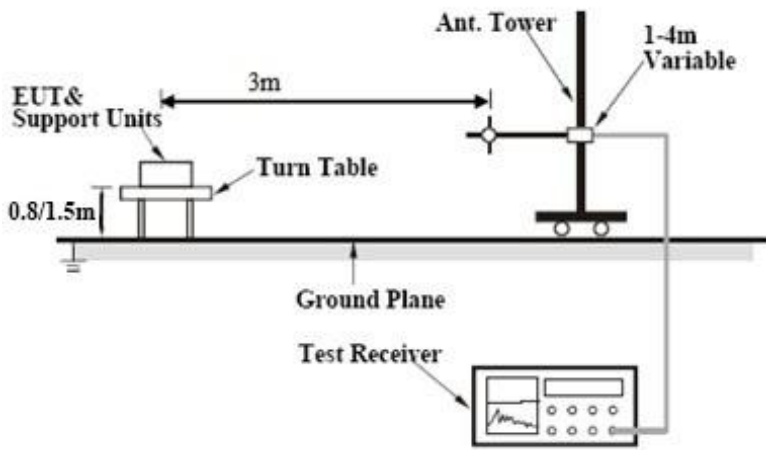


PSD - High CH 2475

6.5 Band-Edge & Unwanted Emissions into Restricted Frequency Bands

Temperature	24 °C
Relative Humidity	56%
Atmospheric Pressure	1023mbar
Test date :	June 23, 2017
Tested By :	Leen Yang

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.	<input checked="" type="checkbox"/>
Test Setup			
Test Procedure	<p>Radiated Method Only</p> <ul style="list-style-type: none"> - 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 		

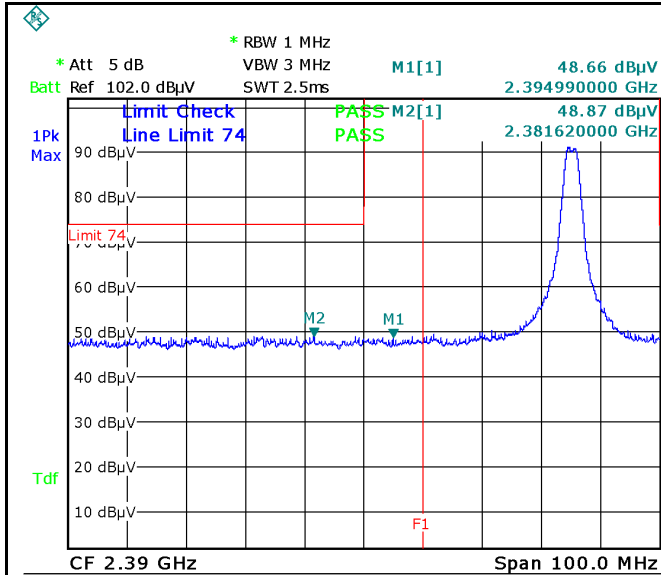
Test Report No.	17070297-FCC-R-V2
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	<p>convenient frequency span including 100kHz bandwidth from band edge, check the emission of EUT, if pass then set Spectrum Analyzer as below:</p> <p>a. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120 kHz for Quasiy Peak detection at frequency below 1GHz.</p> <p>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.</p> <p>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.</p> <ul style="list-style-type: none"> - 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	<input checked="" type="checkbox"/> Pass <input type="checkbox"/> Fail

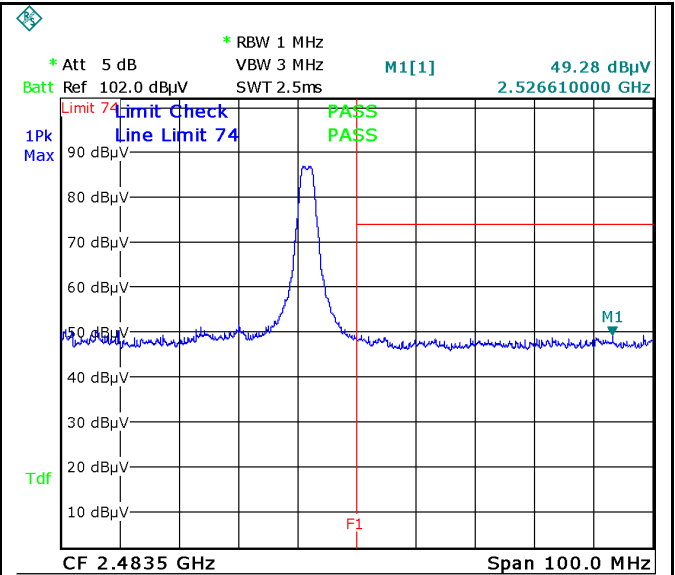
Test Data Yes N/A
Test Plot Yes (See below) N/A

Test Plots

Band Edge measurement result



Date: 23.JUN.2017 15:13:18



Date: 23.JUN.2017 15:17:00

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

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

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


Band Edge, Left Side-AV

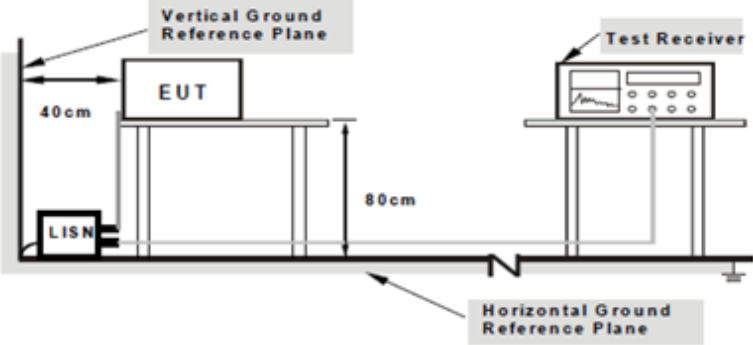
Band Edge, Right Side-AV

6.6 AC Power Line Conducted Emissions

Temperature	25 °C
Relative Humidity	57%
Atmospheric Pressure	1024mbar
Test date :	-----
Tested By :	-----

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.															
		<table border="1"> <thead> <tr> <th rowspan="2">Frequency ranges (MHz)</th> <th colspan="2">Limit (dBµV)</th> </tr> <tr> <th>QP</th> <th>Average</th> </tr> </thead> <tbody> <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> </tbody> </table>		Frequency ranges (MHz)	Limit (dBµV)		QP	Average	0.15 ~ 0.5	66 – 56	56 – 46	0.5 ~ 5	56	46	5 ~ 30	60	50
		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	 <p style="text-align: center;"> Note: 1. Support units were connected to second LISN. 2. Both of LISNs (AMN) are 80cm from EUT and at least 80cm from other units and other metal planes support units. </p>
------------	---

Procedure	<ol style="list-style-type: none"> 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
-----------	---

	<p>coaxial cable.</p> <ol style="list-style-type: none"> 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	<input type="checkbox"/> Pass <input type="checkbox"/> Fail <input checked="" type="checkbox"/> N/A

Test Data Yes N/A

Test Plot Yes (See below) N/A

6.7 Radiated Emissions & Restricted Band

Temperature	22 °C
Relative Humidity	55%
Atmospheric Pressure	1013mbar
Test date :	June 13 & 29, 2017
Tested By :	Leen Yang

Requirement(s):

Spec	Item	Requirement	Applicable																
47CFR§15.247(d), RSS210 (A8.5)	a)	<p>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</p> <table border="1"> <thead> <tr> <th>Frequency range (MHz)</th> <th>Field Strength (µV/m)</th> </tr> </thead> <tbody> <tr> <td>0.009~0.490</td> <td>2400/F(KHz)</td> </tr> <tr> <td>0.490~1.705</td> <td>24000/F(KHz)</td> </tr> <tr> <td>1.705~30.0</td> <td>30</td> </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> </tbody> </table>	Frequency range (MHz)	Field Strength (µV/m)	0.009~0.490	2400/F(KHz)	0.490~1.705	24000/F(KHz)	1.705~30.0	30	30 – 88	100	88 – 216	150	216 960	200	Above 960	500	<input checked="" type="checkbox"/>
	Frequency range (MHz)	Field Strength (µV/m)																	
	0.009~0.490	2400/F(KHz)																	
0.490~1.705	24000/F(KHz)																		
1.705~30.0	30																		
30 – 88	100																		
88 – 216	150																		
216 960	200																		
Above 960	500																		
b)	<p>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</p> <p><input checked="" type="checkbox"/> 20 dB down <input type="checkbox"/> 30 dB down</p>	<input checked="" type="checkbox"/>																	
c)	<p>or restricted band, emission must also comply with the radiated emission limits specified in 15.209</p>	<input checked="" type="checkbox"/>																	

<p>Test Setup</p>	<p>The top diagram shows an EUT (Equipment Under Test) on a stand that is 0.8m high. A Loop Antenna is positioned 3 meters away from the EUT. The antenna is connected to an RF Test Receiver. The entire setup is on a Ground Plane.</p> <p>The bottom diagram shows EUT & Support Units on a Turn Table that is 0.8/1.5m high. An Ant. Tower (1-4m Variable) is positioned 3 meters away from the EUT. The antenna is connected to a Test Receiver. The entire setup is on a Ground Plane.</p>
<p>Procedure</p>	<ol style="list-style-type: none"> 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: <ol style="list-style-type: none"> 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.

	<p>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.</p> <p>5. Steps 2 and 3 were repeated for the next frequency point, until all selected frequency points were measured.</p>
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	<input checked="" type="checkbox"/> Pass <input type="checkbox"/> Fail

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

Test Result:

Test Mode:	Transmitting Mode
------------	-------------------

Frequency range: 9KHz - 30MHz

Freq. (MHz)	Detection value	Factor (dB/m)	Reading (dBuV/m)	Result (dBuV/m)	Limit@3m (dBuV/m)	Margin (dB)
--	--	--	--	--	--	>20
--	--	--	--	--	--	>20

Note:

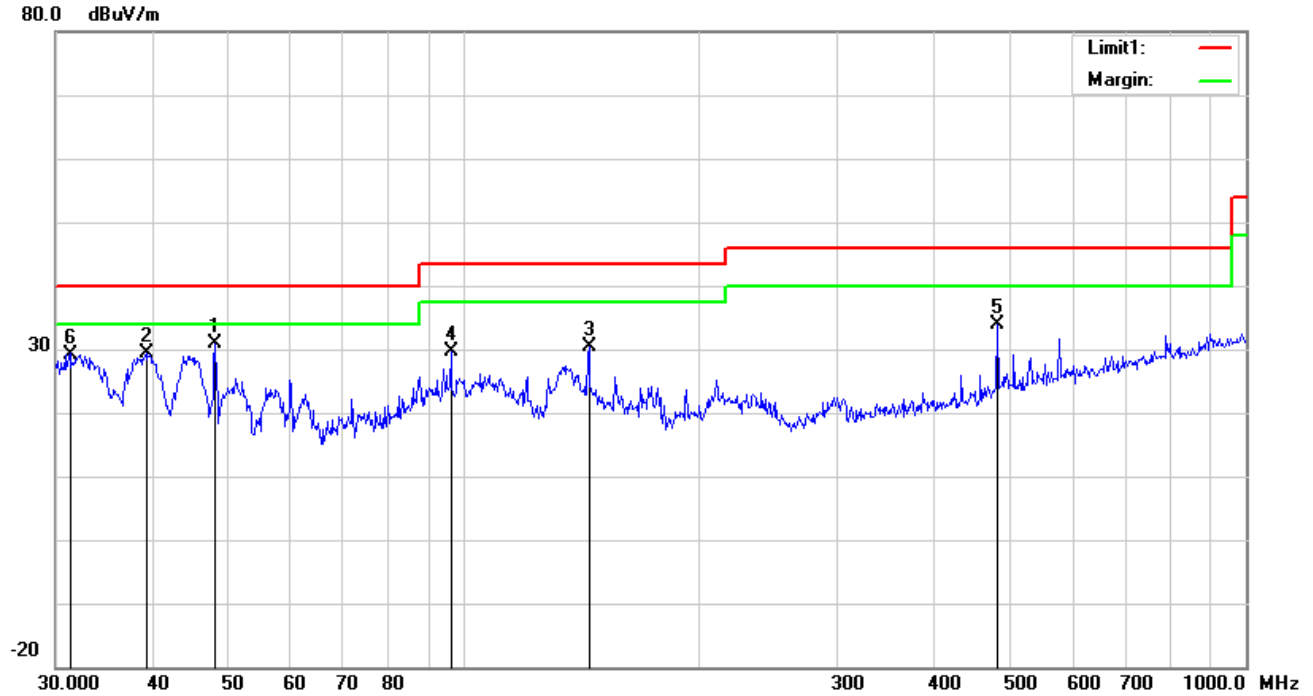
The amplitude of spurious emissions which are attenuated by more than 20dB below the permissible value has no need to be reported.

Distance extrapolation factor = $40 \log(\text{specific distance}/\text{test distance})$ (dB);

Limit line = specific limits(dBuV) + distance extrapolation factor.

Test Mode:	Transmitting Mode
-------------------	--------------------------

30MHz -1GHz

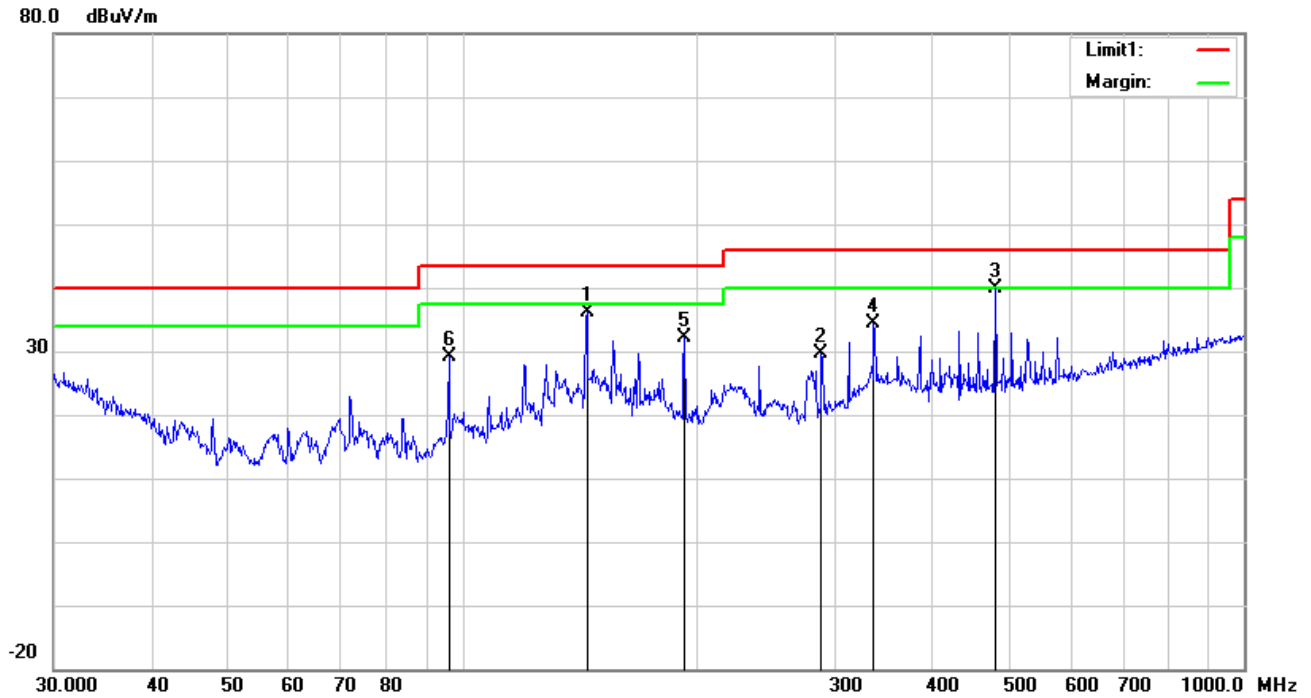


Test Data

Vertical 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	V	47.9940	43.10	peak	9.28	22.34	0.78	30.82	40.00	-9.18	100	197
2	V	39.2991	36.48	peak	14.41	22.28	0.79	29.40	40.00	-10.60	100	293
3	V	144.3348	38.79	peak	12.60	22.38	1.30	30.31	43.50	-13.19	200	9
4	V	96.0986	41.54	peak	9.46	22.32	1.02	29.70	43.50	-13.80	100	241
5	V	480.5276	36.02	peak	17.31	21.85	2.31	33.79	46.00	-12.21	100	289
6	V	31.2893	30.45	peak	20.41	22.27	0.66	29.25	40.00	-10.75	100	54

30MHz -1GHz



Test Data

Horizontal Polarity Plot @3m

No.	P/L	Frequency (MHz)	Reading (dBuV/m)	Detect or	Ant_F (dB/m)	PA_G (dB)	Cab_L (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Height (cm)	Degr ee ()
1	H	144.3348	44.63	peak	12.60	22.38	1.30	36.15	43.50	-7.35	100	332
2	H	287.9904	37.08	peak	13.07	22.29	1.77	29.63	46.00	-16.37	100	150
3	H	480.5276	42.03	peak	17.31	21.85	2.31	39.80	46.00	-6.20	100	188
4	H	336.0352	40.31	peak	14.36	22.19	1.97	34.45	46.00	-11.55	100	30
5	H	192.4186	41.24	peak	11.68	22.33	1.54	32.13	43.50	-11.37	100	172
6	H	96.0986	41.04	peak	9.46	22.32	1.02	29.20	43.50	-14.30	100	8

Above 1GHz

Test Mode:	Transmitting Mode
-------------------	--------------------------

Low Channel (2425 MHz)

Frequency (MHz)	S.A. Reading (dB μ V)	Detector (PK/AV)	Polarity (H/V)	Ant. Factor (dB/m)	Cable Loss (dB)	Pre-Amp. Gain (dB)	Cord. Amp. (dB μ V/m)	Limit (dB μ V/m)	Margin (dB)
4850	40.01	AV	V	33.67	6.86	32.66	47.88	54	-6.12
4850	39.66	AV	H	33.67	6.86	32.66	47.53	54	-6.47
4850	48.44	PK	V	33.67	6.86	32.66	56.31	74	-17.69
4850	46.07	PK	H	33.67	6.86	32.66	53.94	74	-20.06
17905	24.29	AV	V	45.03	11.21	32.38	48.15	54	-5.85
17905	24.97	AV	H	45.03	11.21	32.38	48.83	54	-5.17
17905	40.51	PK	V	45.03	11.21	32.38	64.37	74	-9.63
17905	41.93	PK	H	45.03	11.21	32.38	65.79	74	-8.21

Middle Channel (2450 MHz)

Frequency (MHz)	S.A. Reading (dB μ V)	Detector (PK/AV)	Polarity (H/V)	Ant. Factor (dB/m)	Cable Loss (dB)	Pre-Amp. Gain (dB)	Cord. Amp. (dB μ V/m)	Limit (dB μ V/m)	Margin (dB)
4900	39.68	AV	V	33.71	6.95	32.74	47.6	54	-6.4
4900	39.1	AV	H	33.71	6.95	32.74	47.02	54	-6.98
4900	49.07	PK	V	33.71	6.95	32.74	56.99	74	-17.01
4900	46.94	PK	H	33.71	6.95	32.74	54.86	74	-19.14
17813	24.6	AV	V	45.15	11.18	32.41	48.52	54	-5.48
17813	23.53	AV	H	45.15	11.18	32.41	47.45	54	-6.55
17813	41.13	PK	V	45.15	11.18	32.41	65.05	74	-8.95
17813	40.7	PK	H	45.15	11.18	32.41	64.62	74	-9.38

High Channel (2475 MHz)

Frequency (MHz)	S.A. Reading (dB μ V)	Detector (PK/AV)	Polarity (H/V)	Ant. Factor (dB/m)	Cable Loss (dB)	Pre-Amp. Gain (dB)	Cord. Amp. (dB μ V/m)	Limit (dB μ V/m)	Margin (dB)
4950	38.86	AV	V	33.9	6.76	32.74	46.78	54	-7.22
4950	39.69	AV	H	33.9	6.76	32.74	47.61	54	-6.39
4950	49.19	PK	V	33.9	6.76	32.74	57.11	74	-16.89
4950	48.9	PK	H	33.9	6.76	32.74	56.82	74	-17.18
17822	24.91	AV	V	45.22	11.35	32.38	49.1	54	-4.9
17822	25.75	AV	H	45.22	11.35	32.38	49.94	54	-4.06
17822	42.48	PK	V	45.22	11.35	32.38	66.67	74	-7.33
17822	41.23	PK	H	45.22	11.35	32.38	65.42	74	-8.58

Note:

- 1, The testing has been conformed to $10 \times 2475 \text{ MHz} = 24,750 \text{ MHz}$
- 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	<input checked="" type="checkbox"/>
Line Impedance	LI-125A	191106	09/24/2016	09/23/2017	<input checked="" type="checkbox"/>
Line Impedance	LI-125A	191107	09/24/2016	09/23/2017	<input checked="" type="checkbox"/>
ISN	ISN T800	34373	09/24/2016	09/23/2017	<input type="checkbox"/>
Double Ridge Horn Antenna (1 ~18GHz)	AH-118	71283	09/23/2016	09/22/2017	<input checked="" type="checkbox"/>
Transient Limiter	LIT-153	531118	08/31/2016	08/30/2017	<input checked="" type="checkbox"/>
RF conducted test					
Agilent ESA-E SERIES	E4407B	MY45108319	09/16/2016	09/15/2017	<input checked="" type="checkbox"/>
Power Splitter	1#	1#	08/31/2016	08/30/2017	<input checked="" type="checkbox"/>
DC Power Supply	E3640A	MY40004013	09/16/2016	09/15/2017	<input checked="" type="checkbox"/>
Radiated Emissions					
EMI test receiver	ESL6	100262	09/16/2016	09/15/2017	<input checked="" type="checkbox"/>
Positioning Controller	UC3000	MF780208282	11/18/2016	11/17/2017	<input checked="" type="checkbox"/>
OPT 010 AMPLIFIER (0.1-1300MHz)	8447E	2727A02430	08/31/2016	08/30/2017	<input checked="" type="checkbox"/>
Microwave Preamplifier (1 ~ 26.5GHz)	8449B	3008A02402	03/23/2017	03/22/2018	<input checked="" type="checkbox"/>
Active Antenna (9kHz-30MHz)	AL-130	121031	10/13/2016	10/12/2017	<input checked="" type="checkbox"/>
Bilog Antenna (30MHz~6GHz)	JB6	A110712	09/20/2016	09/19/2017	<input checked="" type="checkbox"/>
Double Ridge Horn Antenna (1 ~18GHz)	AH-118	71283	09/23/2016	09/22/2017	<input checked="" type="checkbox"/>
Universal Radio Communication Tester	CMU200	121393	09/24/2016	09/23/2017	<input checked="" type="checkbox"/>

Annex B. EUT And Test Setup Photographs

Annex B.i. Photograph: EUT External Photo

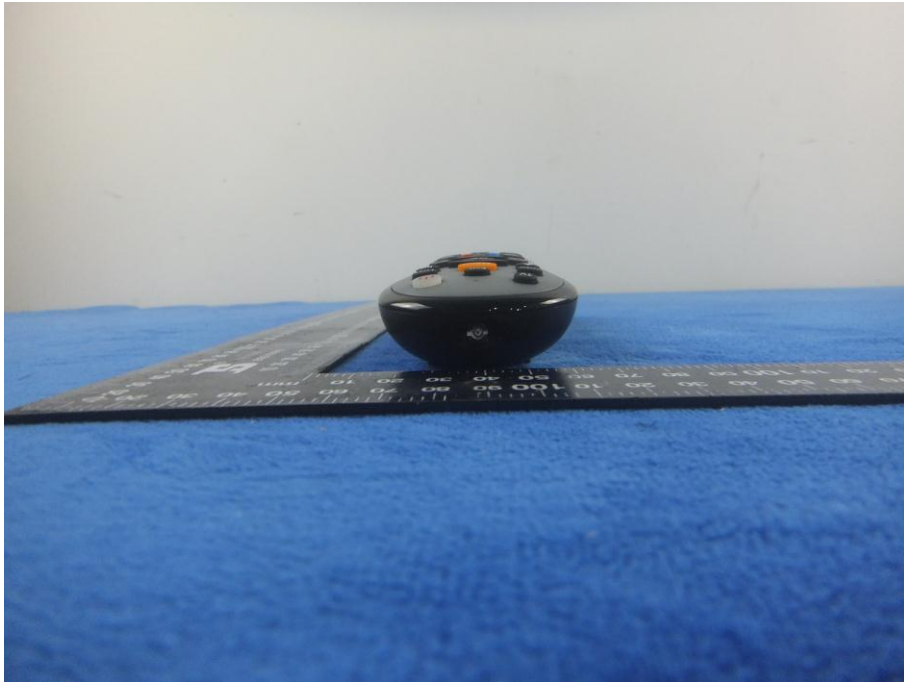
EUT - Front View



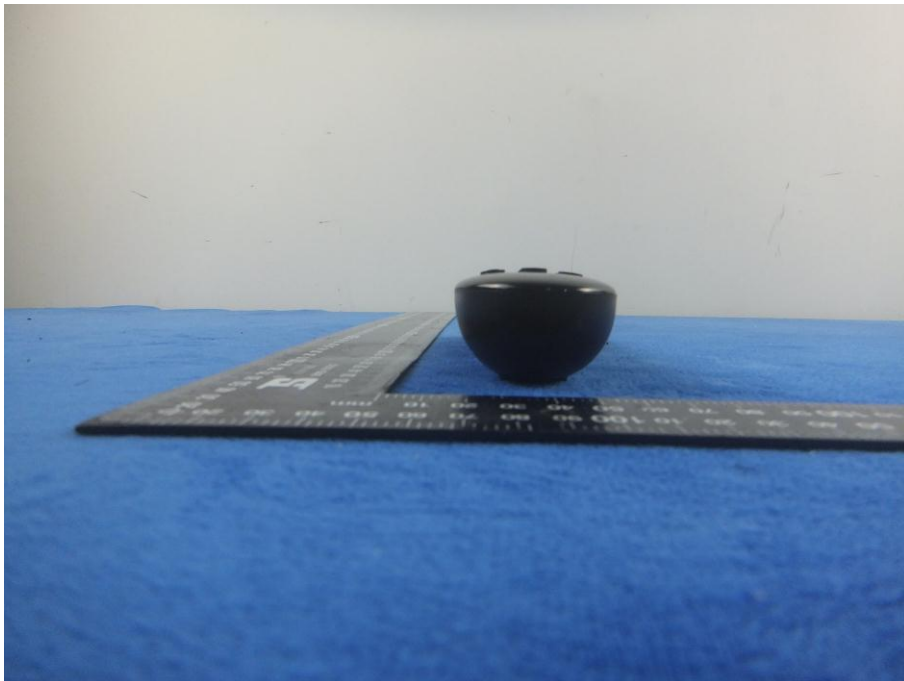
EUT - Rear View



EUT - Top View



EUT - Bottom View



EUT - Left View



EUT - Right View



Annex B.ii. Photograph: EUT Internal Photo

Cover Off - Top View



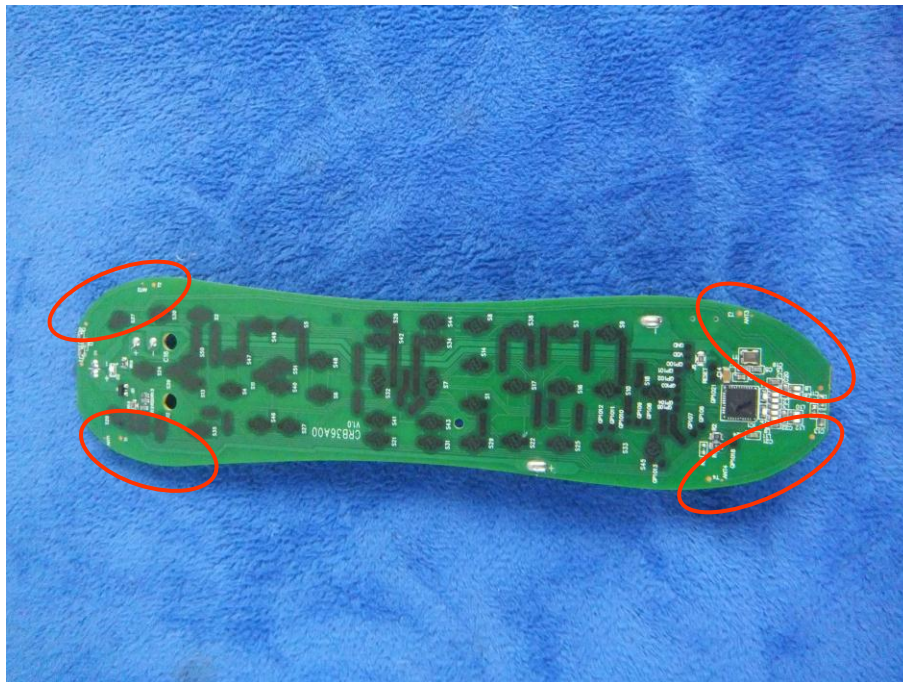
Mainboard – Front View



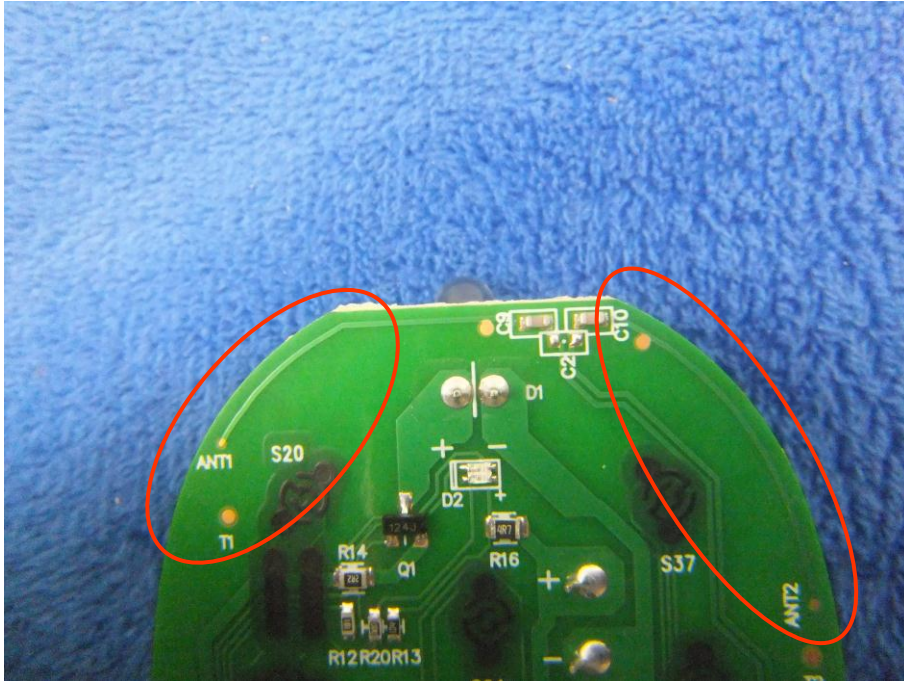
Mainboard – Rear View



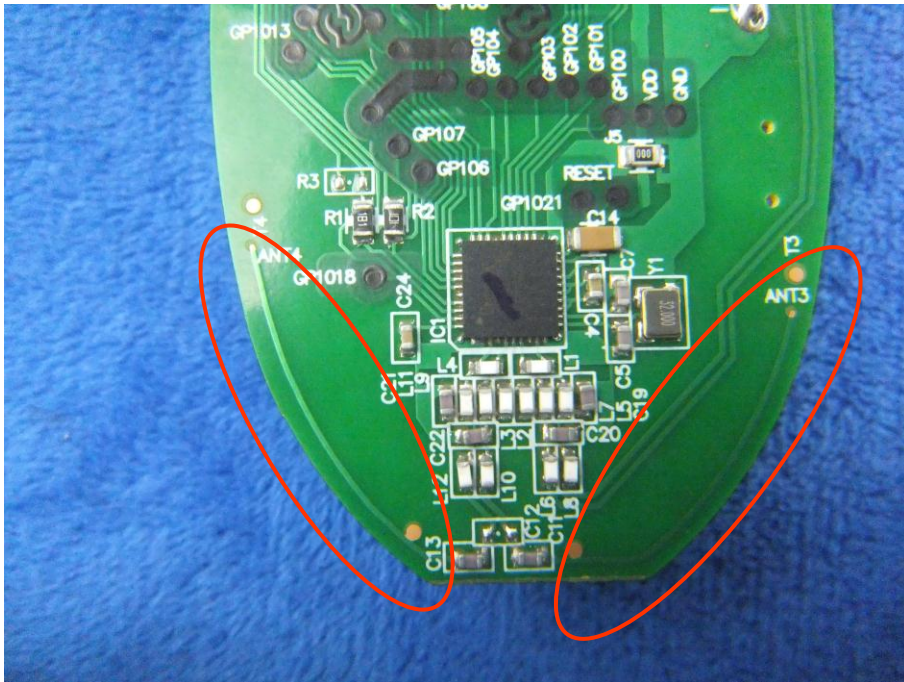
BT – Antenna 1 - 4 View



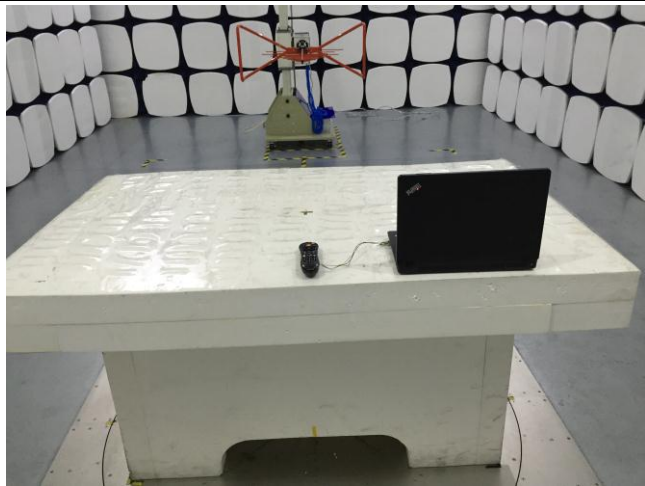
BT – Antenna 1 & 2 View



BT – Antenna 3 & 4 View



Annex B.iii. Photograph: Test Setup Photo



Radiated Spurious Emissions Test Setup Below 1GHz



Radiated Spurious Emissions Test Setup Above
1GHz

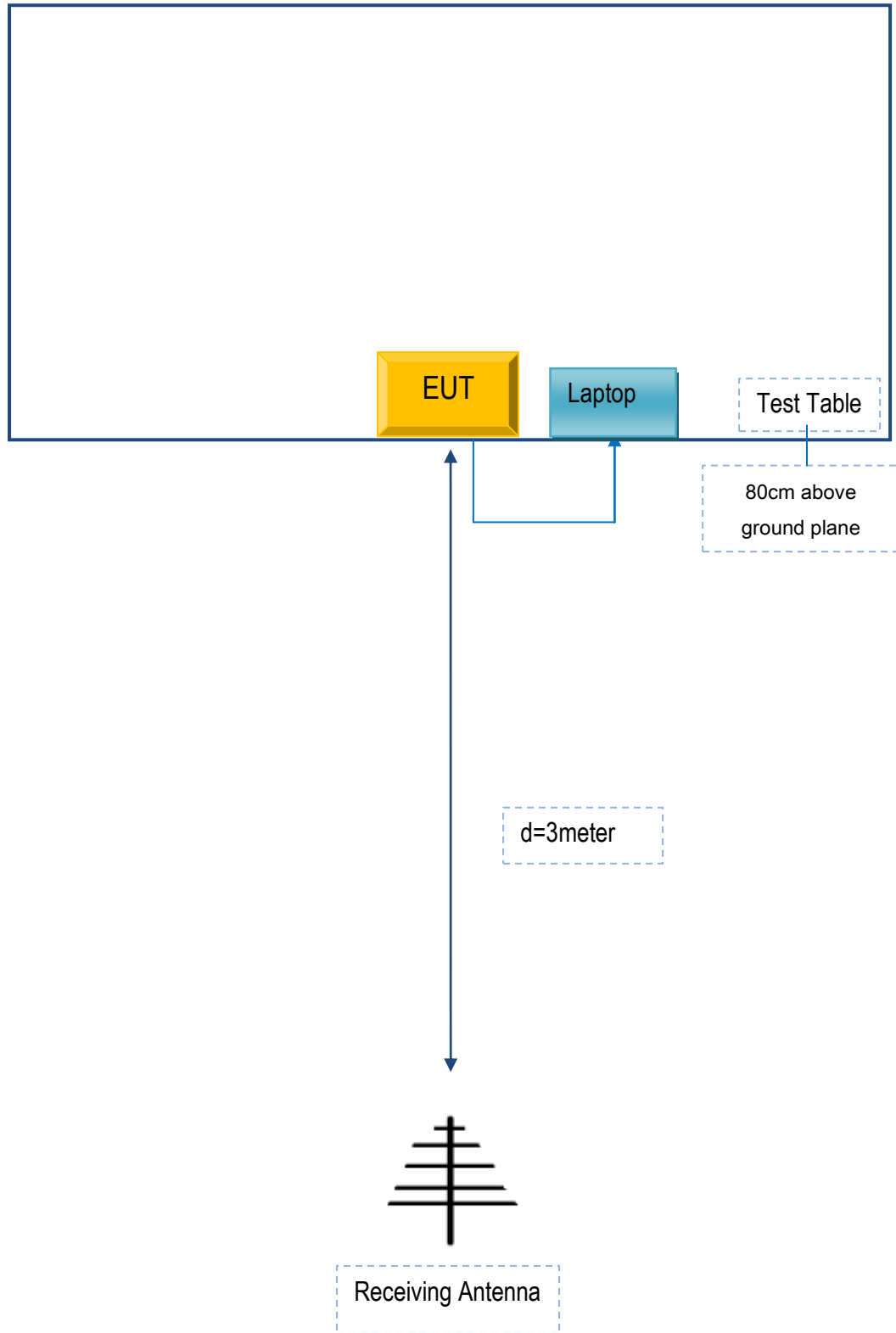
Annex C. TEST SETUP AND SUPPORTING EQUIPMENT

Annex C.ii. TEST SET UP BLOCK

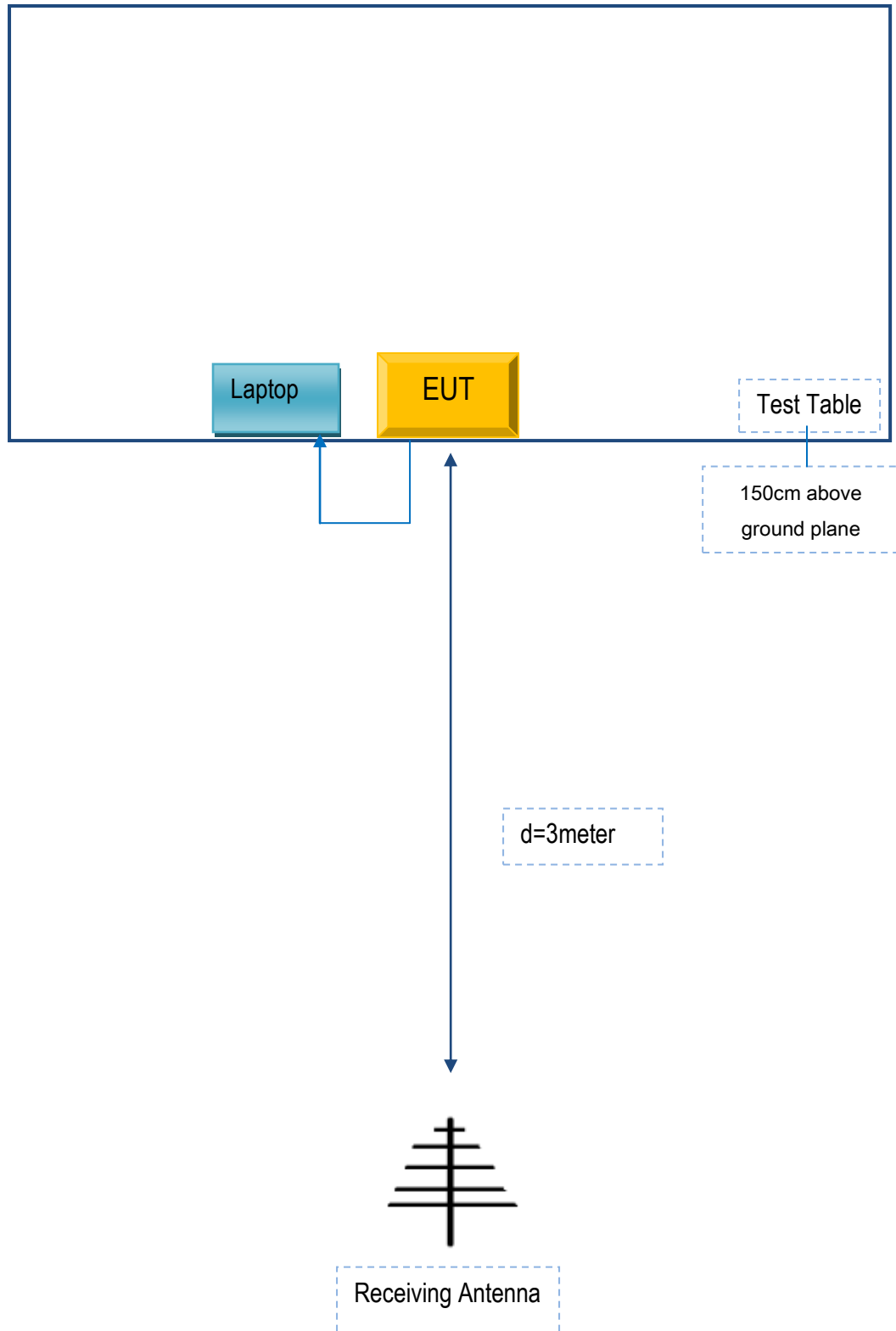
Block Configuration Diagram for AC Line Conducted Emissions

N/A

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
Remote Solution co.,Ltd	Laptop	E40	LR-1EHRX

Supporting Cable:

Cable type	Shield Type	Ferrite Core	Length	Serial No
USB Cable	Un-shielding	No	0.8m	LR-1EHRX

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

Please see the attachment

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Annex E. DECLARATION OF SIMILARITY

N/A