

FCC REPORT

Applicant: Shenzhen Umido Technology Co.,Ltd

Address of Applicant: Room 301-302, Bld. 7, F518 Idea Land, Baoyuan Road, Bao'an District, Shenzhen, Guangdong, P.R.China

Equipment Under Test (EUT)

Product Name: Joystic X1

Model No.: X1

FCC ID: 2AHWV-X1

Applicable standards: FCC CFR Title 47 Part 15 Subpart C Section 15.249:2015

Date of sample receipt: March 21, 2016

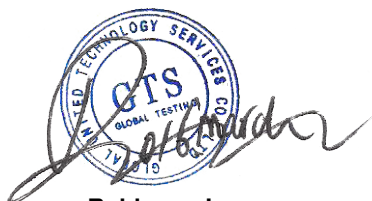
Date of Test: March 22-29, 2016

Date of report issued: March 30, 2016

Test Result : PASS *

* In the configuration tested, the EUT complied with the standards specified above.

Authorized Signature:



Robinson Lo

Laboratory Manager

This report details the results of the testing carried out on one sample. The results contained in this test report do not relate to other samples of the same product and does not permit the use of the GTS product certification mark. The manufacturer should ensure that all products in series production are in conformity with the product sample detailed in this report.

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2 Version

Version No.	Date	Description
00	March 30, 2016	Original

Prepared By:

Yang. Liu

Date:

March 30, 2016

Project Engineer

Check By:

hank. yan

Date:

March 30, 2016

Reviewer

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4 Test Summary

Test Item	Section in CFR 47	Result
Antenna requirement	15.203	Pass
AC Power Line Conducted Emission	15.207	Pass
Field strength of the fundamental signal	15.249 (a)	Pass
Spurious emissions	15.249 (a) (d)/15.209	Pass
Band edge	15.249 (d)/15.205	Pass
20dB Occupied Bandwidth	15.215 (c)	Pass

Pass: The EUT complies with the essential requirements in the standard.

Remark: Test according to ANSI C63.10 2013.

4.1 Measurement Uncertainty

Test Item	Frequency Range	Measurement Uncertainty	Notes
Radiated Emission	9kHz ~ 30MHz	$\pm 4.34\text{dB}$	(1)
Radiated Emission	30MHz ~ 1000MHz	$\pm 4.24\text{dB}$	(1)
Radiated Emission	1GHz ~ 26.5GHz	$\pm 4.68\text{dB}$	(1)
AC Power Line Conducted Emission	0.15MHz ~ 30MHz	$\pm 3.45\text{dB}$	(1)

Note (1): The measurement uncertainty is for coverage factor of $k=2$ and a level of confidence of 95%.

5 General Information

5.1 Client Information

Applicant:	Shenzhen Umido Technology Co.,Ltd
Address of Applicant:	Room 301-302, Bld. 7, F518 Idea Land, Baoyuan Road, Bao'an District, Shenzhen, Guangdong, P.R.China
Manufacturer/ Factory:	Shenzhen Umido Technology Co.,Ltd
Address of Manufacturer/ Factory:	Room 301-302, Bld. 7, F518 Idea Land, Baoyuan Road, Bao'an District, Shenzhen, Guangdong, P.R.China

5.2 General Description of EUT

Product Name:	Joystic X1
Model No.:	X1
2.4G radio:	
Operation Frequency:	2420MHz~2476MHz
Channel numbers:	20
Modulation type:	GFSK
Antenna Type:	PCB antenna
Antenna gain:	0dBi (declare by Applicant)
Bluetooth:	
Operation Frequency:	2402MHz~2480MHz
Channel numbers:	79
Channel separation:	1MHz
Modulation type:	GFSK
Antenna Type:	PCB antenna
Antenna gain:	0dBi (declare by Applicant)
Power supply:	DC 3.7V 1000mAh Li-ion Battery Or DC 5V by PC

Operation Frequency each of channel							
Channel	Frequency	Channel	Frequency	Channel	Frequency	Channel	Frequency
1	2420MHz	6	2435MHz	11	2450MHz	16	2465MHz
2	2423MHz	7	2438MHz	12	2453MHz	17	2468MHz
⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮
5	2432MHz	10	2448MHz	15	2462MHz	20	2476MHz

Note:

In section 15.31(m), regards to the operating frequency range over 10 MHz, the Lowest frequency, the middle frequency, and the highest frequency of channel were selected to perform the test, and the selected channel see below:

Channel	Frequency
The lowest channel	2420MHz
The middle channel	2448MHz
The Highest channel	2476MHz

5.3 Test mode

Transmitting mode	Keep the EUT in continuously transmitting mode
<i>Remark: During the test, the test voltage was tuned from 85% to 115% of the nominal rated supply voltage, and found that the worst case was under the nominal rated supply condition. So the report just shows that condition's data.</i>	

Per-test mode.

We have verified the construction and function in typical operation, The EUT was placed on three different polar directions; i.e. X axis, Y axis, Z axis. which was shown in this test report and defined as follows:

Axis	X	Y	Z
Field Strength(dBuV/m)	83.77	84.48	83.12

5.4 Description of Support Units

Manufacturer	Description	Model	Serial Number	FCC Approval
Apple	PC	A1278	C1MN99ERDTY3	DoC
DELTA	ADAPTER	ADP-60ADT	N/A	VoC

5.5 Test Facility

The test facility is recognized, certified, or accredited by the following organizations:

- **FCC —Registration No.: 600491**

Global United Technology Services Co., Ltd., Shenzhen EMC Laboratory has been registered and fully described in a report filed with the (FCC) Federal Communications Commission. The acceptance letter from the FCC is maintained in files. Registration 600491, June 28, 2013.

- **Industry Canada (IC) —Registration No.: 9079A-2**

The 3m Semi-anechoic chamber of Global United Technology Services Co., Ltd. has been registered by Certification and Engineering Bureau of Industry Canada for radio equipment testing with Registration No.: 9079A-2, June 26, 2013.

5.6 Test Location

All tests were performed at:

Global United Technology Services Co., Ltd.

Address: No. 301-309, 3/F., Jinyuan Business Building, No.2, Laodong Industrial Zone, Xixiang Road, Baoan District, Shenzhen, Guangdong, China 518102

Tel: 0755-27798480

Fax: 0755-27798960

5.7 Other Information Requested by the Customer

None.

6 Test Instruments list

Radiated Emission:						
Item	Test Equipment	Manufacturer	Model No.	Inventory No.	Cal.Date (mm-dd-yy)	Cal.Due date (mm-dd-yy)
1	3m Semi- Anechoic Chamber	ZhongYu Electron	9.0(L)*6.0(W)* 6.0(H)	GTS250	July. 03 2015	July. 02 2020
2	Control Room	ZhongYu Electron	6.2(L)*2.5(W)* 2.4(H)	GTS251	N/A	N/A
3	Spectrum Analyzer	Agilent	E4440A	GTS533	Jun. 30 2015	Jun. 29 2016
4	EMI Test Receiver	Rohde & Schwarz	ESU26	GTS203	Jun. 30 2015	Jun. 29 2016
5	BiConiLog Antenna	SCHWARZBECK MESS-ELEKTRONIK	VULB9163	GTS214	Jun. 30 2015	Jun. 29 2016
6	Double -ridged waveguide horn	SCHWARZBECK MESS-ELEKTRONIK	9120D-829	GTS208	Jun. 26 2015	Jun. 25 2016
7	Horn Antenna	ETS-LINDGREN	3160	GTS217	Mar. 26 2016	Mar. 25 2017
8	EMI Test Software	AUDIX	E3	N/A	N/A	N/A
9	Coaxial Cable	GTS	N/A	GTS213	Mar. 26 2016	Mar. 25 2017
10	Coaxial Cable	GTS	N/A	GTS211	Mar. 26 2016	Mar. 25 2017
11	Coaxial cable	GTS	N/A	GTS210	Mar. 26 2016	Mar. 25 2017
12	Coaxial Cable	GTS	N/A	GTS212	Mar. 26 2016	Mar. 25 2017
13	Amplifier(100kHz-3GHz)	HP	8347A	GTS204	Jun. 30 2015	Jun. 29 2016
14	Amplifier(2GHz-20GHz)	HP	8349B	GTS206	Jun. 30 2015	Jun. 29 2016
15	Amplifier (18-26GHz)	Rohde & Schwarz	AFS33-18002 650-30-8P-44	GTS218	Jun. 26 2015	Jun. 25 2016
16	Band filter	Amindeon	82346	GTS219	Mar. 26 2016	Mar. 25 2017

Conducted Emission:						
Item	Test Equipment	Manufacturer	Model No.	Inventory No.	Cal.Date (mm-dd-yy)	Cal.Due date (mm-dd-yy)
1	Shielding Room	ZhongYu Electron	7.0(L)x3.0(W)x3.0(H)	GTS264	Jun. 30 2015	Jun. 29 2016
2	EMI Test Receiver	Rohde & Schwarz	ESCS30	GTS223	Jun. 30 2015	Jun. 29 2016
3	10dB Pulse Limita	Rohde & Schwarz	N/A	GTS224	Jun. 30 2015	Jun. 29 2016
4	Coaxial Switch	ANRITSU CORP	MP59B	GTS225	Jun. 30 2015	Jun. 29 2016
5	LISN	SCHWARZBECK MESS-ELEKTRONIK	NSLK 8127	GTS226	Jun. 30 2015	Jun. 29 2016
6	Coaxial Cable	GTS	N/A	GTS227	Jun. 30 2015	Jun. 29 2016
7	EMI Test Software	AUDIX	E3	N/A	N/A	N/A

General used equipment:						
Item	Test Equipment	Manufacturer	Model No.	Inventory No.	Cal.Date (mm-dd-yy)	Cal.Due date (mm-dd-yy)
1	Barometer	ChangChun	DYM3	GTS257	July 07 2015	July 06 2016

7 Test results and Measurement Data

7.1 Antenna requirement

Standard requirement:	FCC Part15 C Section 15.203
15.203 requirement: 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, the manufacturer may design the unit so that a broken antenna can be replaced by the user, but the use of a standard antenna jack or electrical connector is prohibited.	
EUT Antenna:	
<i>The antenna is PCB antenna, the best case gain of the antenna is 0dBi</i> 	

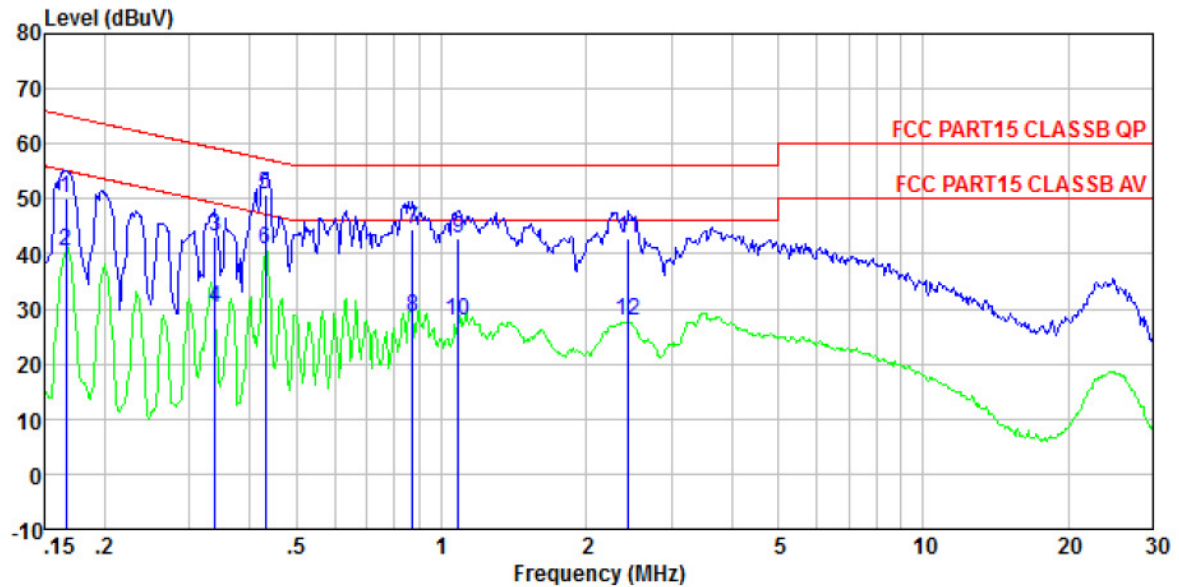
7.2 Conducted Emissions

Test Requirement:	FCC Part15 C Section 15.207																
Test Method:	ANSI C63.10:2013																
Test Frequency Range:	150KHz to 30MHz																
Class / Severity:	Class B																
Receiver setup:	RBW=9KHz, VBW=30KHz, Sweep time=auto																
Limit:	<table><tr><th rowspan="2">Frequency range (MHz)</th><th colspan="2">Limit (dBuV)</th></tr><tr><th>Quasi-peak</th><th>Average</th></tr><tr><td>0.15-0.5</td><td>66 to 56*</td><td>56 to 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> * Decreases with the logarithm of the frequency.			Frequency range (MHz)	Limit (dBuV)		Quasi-peak	Average	0.15-0.5	66 to 56*	56 to 46*	0.5-5	56	46	5-30	60	50
Frequency range (MHz)	Limit (dBuV)																
	Quasi-peak	Average															
0.15-0.5	66 to 56*	56 to 46*															
0.5-5	56	46															
5-30	60	50															
Test setup:	Reference Plane Test table/Insulation plane <i>Remark: E.U.T: Equipment Under Test LISN: Line Impedance Stabilization Network Test table height=0.8m</i>																
Test procedure:	1. The E.U.T and simulators are connected to the main power through a line impedance stabilization network (L.I.S.N.). This provides a 50ohm/50uH coupling impedance for the measuring equipment. 2. The peripheral devices are also connected to the main power through a LISN that provides a 50ohm/50uH coupling impedance with 50ohm termination. (Please refer to the block diagram of the test setup and photographs). 3. Both sides of A.C. line are checked for maximum conducted interference. In order to find the maximum emission, the relative positions of equipment and all of the interface cables must be changed according to ANSI C63.10:2013 on conducted measurement.																
Test Instruments:	Refer to section 6.0 for details																
Test mode:	Refer to section 5.3 for details																
Test results:	Pass																

Measurement data:

Test Voltage: AC 120V/60Hz

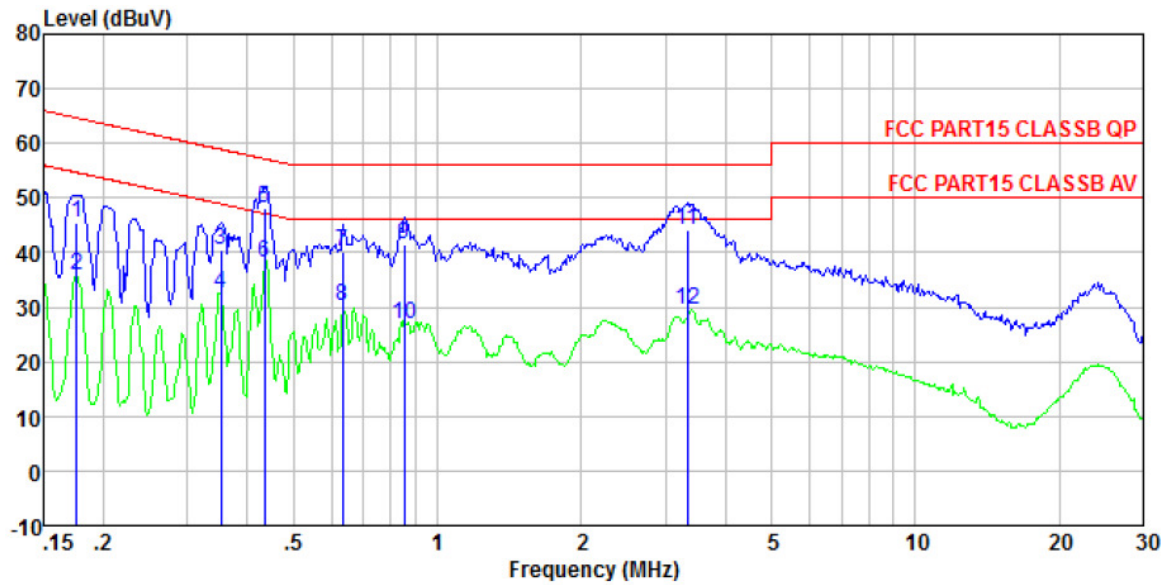
Line:



Condition : FCC PART15 CLASSB QP LISN-2013 LINE
 Job No. : 0220
 Test mode : 2.4G mode
 Test Engineer: Arslan

	Freq	Read Level	LISN Factor	Cable Loss	Level	Limit Line	Over Limit	Remark
	MHz	dBuV	dB	dB	dBuV	dBuV	dB	
1	0.166	49.78	0.15	0.12	50.05	65.16	-15.11	QP
2	0.166	40.05	0.15	0.12	40.32	55.16	-14.84	Average
3	0.339	42.90	0.11	0.10	43.11	59.22	-16.11	QP
4	0.339	30.11	0.11	0.10	30.32	49.22	-18.90	Average
5	0.431	50.48	0.12	0.11	50.71	57.24	-6.53	QP
6	0.431	40.71	0.12	0.11	40.94	47.24	-6.30	Average
7	0.871	44.15	0.14	0.13	44.42	56.00	-11.58	QP
8	0.871	28.42	0.14	0.13	28.69	46.00	-17.31	Average
9	1.082	42.45	0.13	0.13	42.71	56.00	-13.29	QP
10	1.082	27.72	0.13	0.13	27.98	46.00	-18.02	Average
11	2.448	42.37	0.13	0.15	42.65	56.00	-13.35	QP
12	2.448	27.65	0.13	0.15	27.93	46.00	-18.07	Average

Neutral:

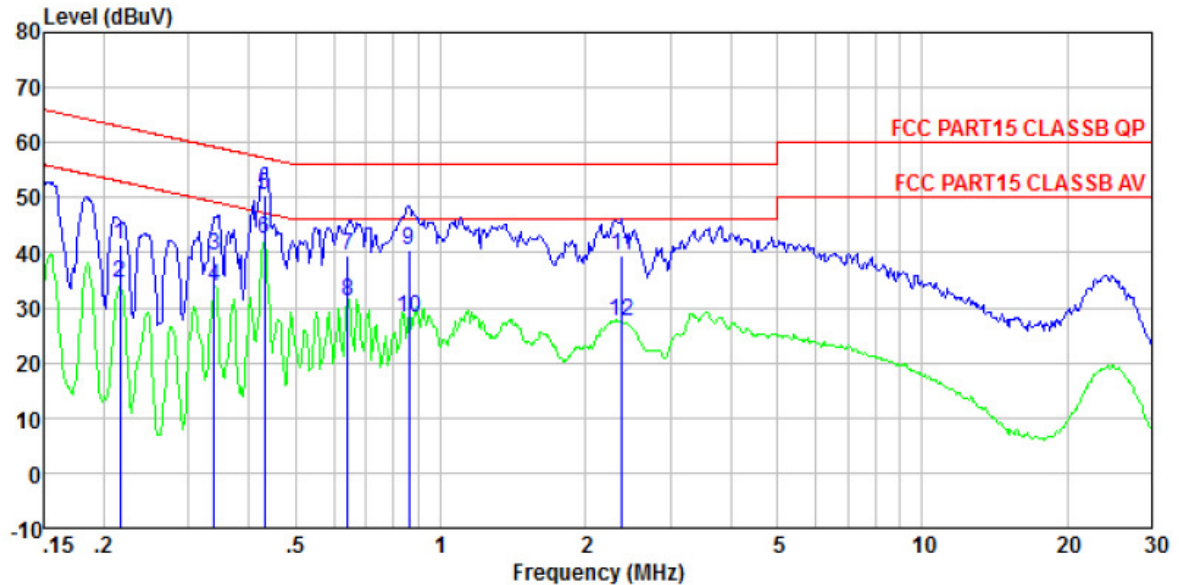


Condition : FCC PART15 CLASSB QP LISN-2013 NEUTRAL
 Job No. : 0220
 Test mode : 2.4G mode
 Test Engineer: Arslan

	Freq	Read Level	LISN Factor	Cable Loss	Level	Limit Line	Over Limit	Remark
	MHz	dBuV	dB	dB	dBuV	dBuV	dB	
1	0.176	45.40	0.07	0.13	45.60	64.68	-19.08	QP
2	0.176	35.59	0.07	0.13	35.79	54.68	-18.89	Average
3	0.352	40.33	0.06	0.10	40.49	58.91	-18.42	QP
4	0.352	32.50	0.06	0.10	32.66	48.91	-16.25	Average
5	0.435	47.92	0.06	0.11	48.09	57.15	-9.06	QP
6	0.435	38.09	0.06	0.11	38.26	47.15	-8.89	Average
7	0.634	39.93	0.07	0.13	40.13	56.00	-15.87	QP
8	0.634	30.13	0.07	0.13	30.33	46.00	-15.67	Average
9	0.853	41.34	0.07	0.13	41.54	56.00	-14.46	QP
10	0.853	26.54	0.07	0.13	26.74	46.00	-19.26	Average
11	3.328	43.91	0.13	0.15	44.19	56.00	-11.81	QP
12	3.328	29.19	0.13	0.15	29.47	46.00	-16.53	Average

Test Voltage: AC 240V/50Hz

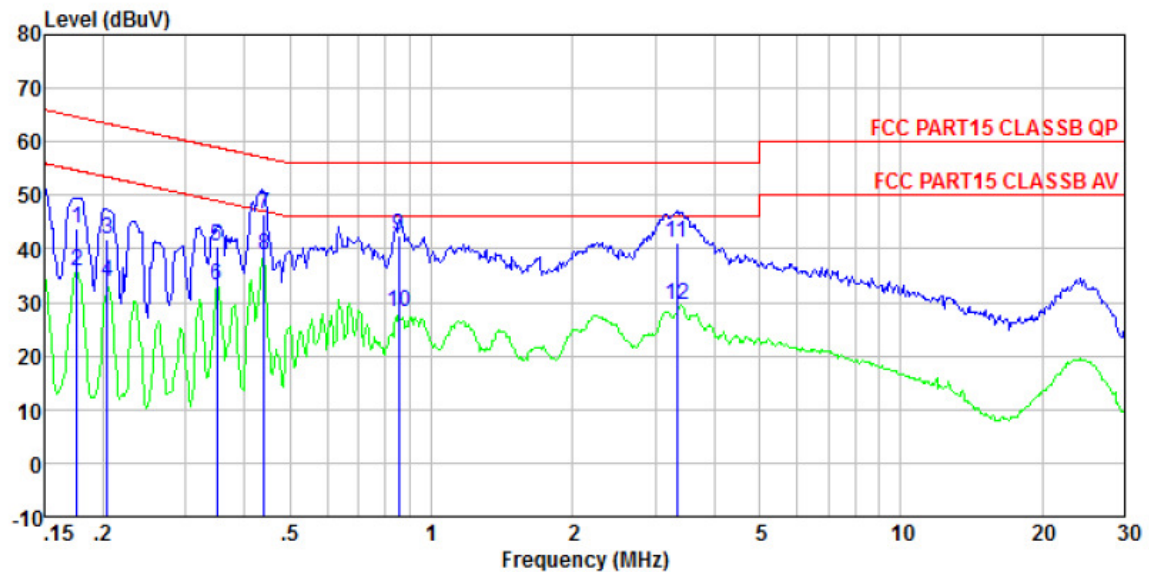
Line:



Site : Shielded room
Condition : FCC PART15 CLASSB QP LISN-2013 LINE
Job No. : 0220
Test mode : 2.4G mode
Test Engineer: Arslan

	Freq	Read Level	Level	Cable Loss	LISN Factor	Limit Line	Over Limit	Remark
	MHz	dBuV	dBuV	dB	dB	dBuV	dB	
1	0.216	41.10	41.36	0.13	0.13	62.96	-21.60	QP
2	0.216	34.12	34.38	0.13	0.13	52.96	-18.58	Average
3	0.339	39.20	39.41	0.10	0.11	59.22	-19.81	QP
4	0.339	33.61	33.82	0.10	0.11	49.22	-15.40	Average
5	0.431	50.24	50.47	0.11	0.12	57.24	-6.77	QP
6	0.431	42.37	42.60	0.11	0.12	47.24	-4.64	Average
7	0.641	39.34	39.60	0.13	0.13	56.00	-16.40	QP
8	0.641	30.82	31.08	0.13	0.13	46.00	-14.92	Average
9	0.862	40.28	40.55	0.13	0.14	56.00	-15.45	QP
10	0.862	27.84	28.11	0.13	0.14	46.00	-17.89	Average
11	2.384	39.17	39.45	0.15	0.13	56.00	-16.55	QP
12	2.384	27.10	27.38	0.15	0.13	46.00	-18.62	Average

Neutral:



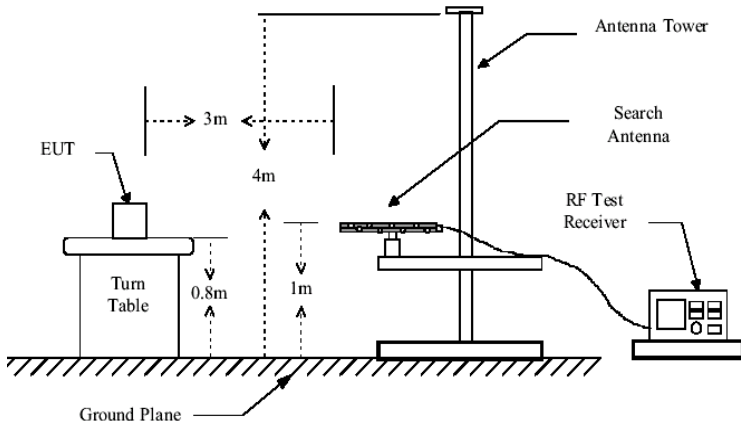
Site : Shielded room
Condition : FCC PART15 CLASSB QP LISN-2013 NEUTRAL
Job No. : 0220
Test mode : 2.4G mode
Test Engineer: Arslan

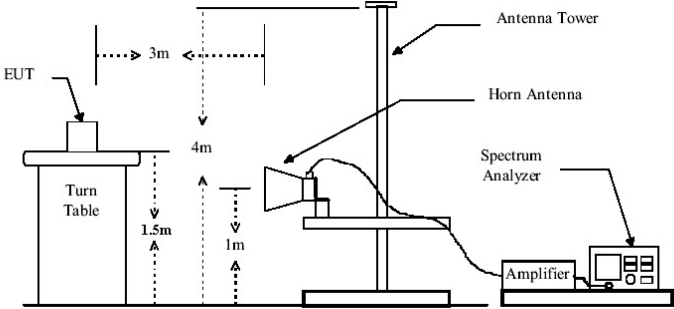
	Read		Cable	LISN	Limit	Over	
Freq	Level	Level	Loss	Factor	Line	Limit	Remark
MHz	dBuV	dBuV	dB	dB	dBuV	dB	
1	0.176	43.56	43.76	0.13	0.07	64.68	-20.92 QP
2	0.176	35.62	35.82	0.13	0.07	54.68	-18.86 Average
3	0.204	41.74	41.94	0.13	0.07	63.45	-21.51 QP
4	0.204	33.70	33.90	0.13	0.07	53.45	-19.55 Average
5	0.350	40.37	40.53	0.10	0.06	58.96	-18.43 QP
6	0.350	33.05	33.21	0.10	0.06	48.96	-15.75 Average
7	0.440	46.42	46.59	0.11	0.06	57.07	-10.48 QP
8	0.440	38.50	38.67	0.11	0.06	47.07	-8.40 Average
9	0.853	42.11	42.31	0.13	0.07	56.00	-13.69 QP
10	0.853	27.88	28.08	0.13	0.07	46.00	-17.92 Average
11	3.328	40.76	41.04	0.15	0.13	56.00	-14.96 QP
12	3.328	29.10	29.38	0.15	0.13	46.00	-16.62 Average

Notes:

1. An initial pre-scan was performed on the line and neutral lines with peak detector.
2. Quasi-Peak and Average measurement were performed at the frequencies with maximized peak emission.
3. Final Level = Receiver Read level + LISN Factor + Cable Loss
4. If the average limit is met when using a quasi-peak detector receiver, the EUT shall be deemed to meet both limits and measurement with the average detector receiver is unnecessary.

7.3 Radiated Emission Method

Test Requirement:	FCC Part15 C Section 15.209				
Test Method:	ANSI C63.10:2013				
Test Frequency Range:	30MHz to 25GHz				
Test site:	Measurement Distance: 3m				
Receiver setup:	Frequency	Detector	RBW	VBW	Remark
	30MHz-1GHz	Quasi-peak	120KHz	300KHz	Quasi-peak Value
	Above 1GHz	Peak	1MHz	3MHz	Peak Value
		Peak	1MHz	10Hz	Average Value
Limit: (Field strength of the fundamental signal)	Frequency		Limit (dBuV/m @3m)		Remark
	2400MHz-2483.5MHz		94.00		Average Value
			114.00		Peak Value
Limit: (Spurious Emissions)	Frequency		Limit (dBuV/m @3m)		Remark
	30MHz-88MHz		40.00		Quasi-peak Value
	88MHz-216MHz		43.50		Quasi-peak Value
	216MHz-960MHz		46.00		Quasi-peak Value
	960MHz-1GHz		54.00		Quasi-peak Value
	Above 1GHz		54.00		Average Value
			74.00		Peak Value
Limit: (band edge)	Emissions radiated outside of the specified frequency bands, except for harmonics, shall be attenuated by at least 50 dB below the level of the fundamental or to the general radiated emission limits in Section 15.209, whichever is the lesser attenuation.				
Test setup:	Below 1GHz				
					
	Above 1GHz				

	
Test Procedure:	1. The EUT was placed on the top of a rotating table (0.8m for below 1GHz and 1.5 meters for above 1GHz) above the ground at a 3 meter camber. The table was rotated 360 degrees to determine the position of the highest radiation. 2. The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower. 3. The antenna height is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement. 4. For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters and the rota table was turned from 0 degrees to 360 degrees to find the maximum reading. 5. The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode. 6. If the emission level of the EUT in peak mode was 10dB lower than the limit specified, then testing could be stopped and the peak values of the EUT would be reported. Otherwise the emissions that did not have 10dB margin would be re-tested one by one using peak, quasi-peak or average method as specified and then reported in a data sheet.
Test Instruments:	Refer to section 6.0 for details
Test mode:	Refer to section 5.3 for details
Test results:	Pass

Measurement data:

7.3.1 Field Strength of The Fundamental Signal

Peak value:

Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamplifier Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	polarization
2420.00	80.48	27.58	5.39	30.18	83.27	114.00	-30.73	Vertical
2420.00	81.36	27.58	5.39	30.18	84.15	114.00	-29.85	Horizontal
2448.00	77.59	27.55	5.43	30.06	80.51	114.00	-33.49	Vertical
2448.00	78.98	27.55	5.43	30.06	81.90	114.00	-32.10	Horizontal
2476.00	80.36	27.52	5.47	29.93	83.42	114.00	-30.58	Vertical
2476.00	81.42	27.52	5.47	29.93	84.48	114.00	-29.52	Horizontal

Average value:

Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamplifier Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	polarization
2420.00	69.78	27.58	5.39	30.18	72.57	94.00	-21.43	Vertical
2420.00	71.32	27.58	5.39	30.18	74.11	94.00	-19.89	Horizontal
2448.00	67.59	27.55	5.43	30.06	70.51	94.00	-23.49	Vertical
2448.00	68.08	27.55	5.43	30.06	71.00	94.00	-23.00	Horizontal
2476.00	70.64	27.52	5.47	29.93	73.70	94.00	-20.30	Vertical
2476.00	69.31	27.52	5.47	29.93	72.37	94.00	-21.63	Horizontal

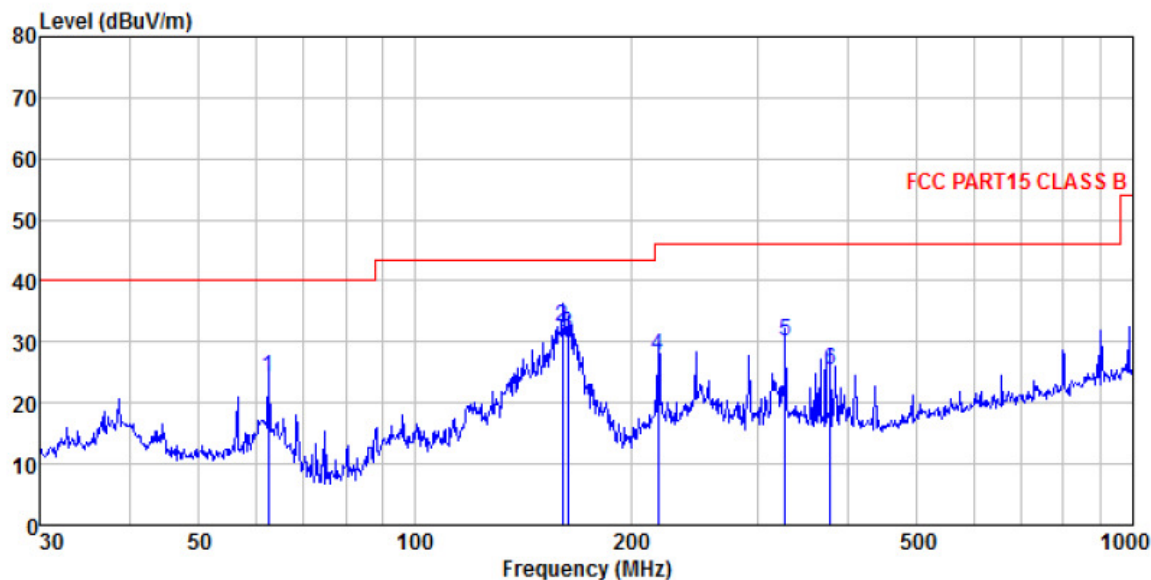
Remark: RBW 3MHz VBW 3MHz peak detector is for PK Value, RMS detector is for AV value

7.3.2 Spurious emissions

■ Below 1GHz

Test Voltage: AC 120V/60Hz

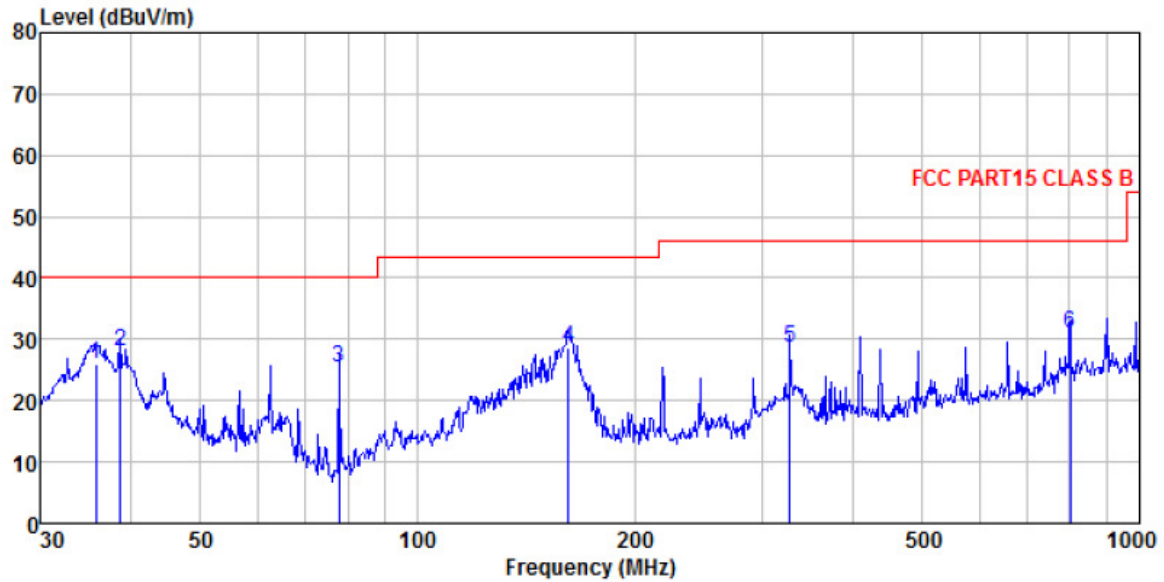
Horizontal:



Condition : FCC PART15 CLASS B VULB9163-2013M HORIZONTAL
 Job No. : 0220
 Test Mode : 2.4G mode
 Test Engineer: Chen

	Freq	ReadAntenna	Cable Preamp		Limit	Over	
	Level Factor	Loss Factor	Level	Line	Limit	Remark	
	MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m
1	62.431	39.35	13.77	0.88	29.90	24.10	40.00 -15.90 QP
2	160.346	49.49	10.67	1.63	29.36	32.43	43.50 -11.07 QP
3	163.182	48.27	10.77	1.65	29.34	31.35	43.50 -12.15 QP
4	218.309	42.13	13.13	1.95	29.38	27.83	46.00 -18.17 QP
5	327.887	41.92	15.66	2.51	29.84	30.25	46.00 -15.75 QP
6	378.584	35.77	16.57	2.76	29.60	25.50	46.00 -20.50 QP

Vertical:

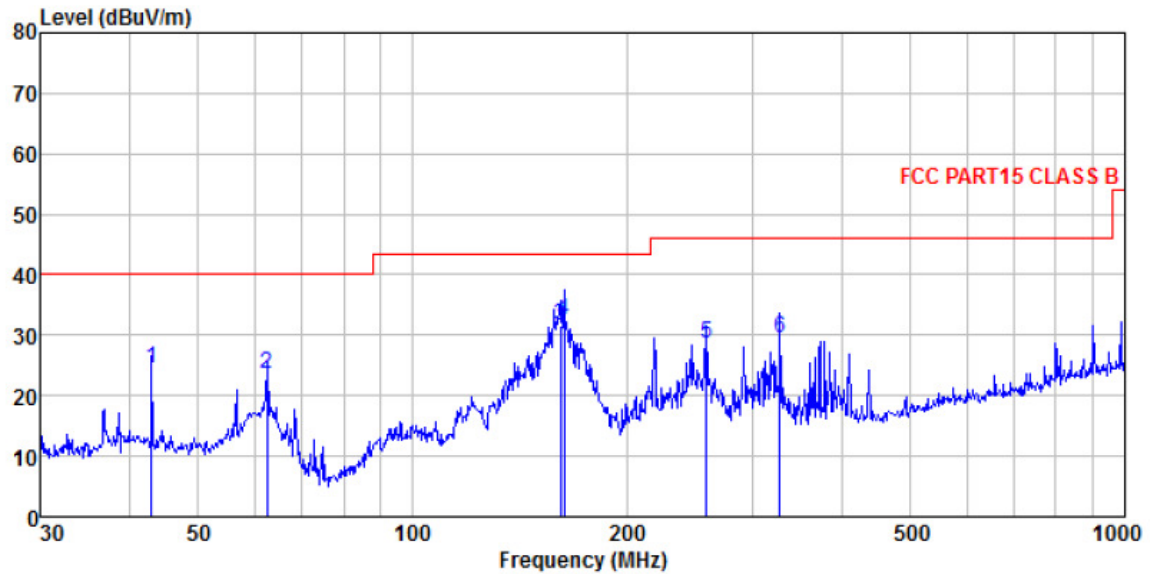


Condition : FCC PART15 CLASS B VULB9163-2013M VERTICAL
 Job No. : 0220
 Test Mode : 2.4G mode
 Test Engineer: Chen

	Freq	ReadAntenna Level	Antenna Factor	Cable Loss	Preamp Factor	Level	Limit Line	Over Limit	Remark
	MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB	
1	35.875	41.01	14.54	0.62	30.07	26.10	40.00	-13.90	QP
2	38.752	42.15	15.25	0.65	30.05	28.00	40.00	-12.00	QP
3	77.865	44.04	10.26	1.01	29.81	25.50	40.00	-14.50	QP
4	162.041	45.70	10.72	1.64	29.35	28.71	43.50	-14.79	QP
5	327.887	40.31	15.66	2.51	29.84	28.64	46.00	-17.36	QP
6	801.786	33.60	22.06	4.46	29.20	30.92	46.00	-15.08	QP

Test Voltage: AC 240V/50Hz

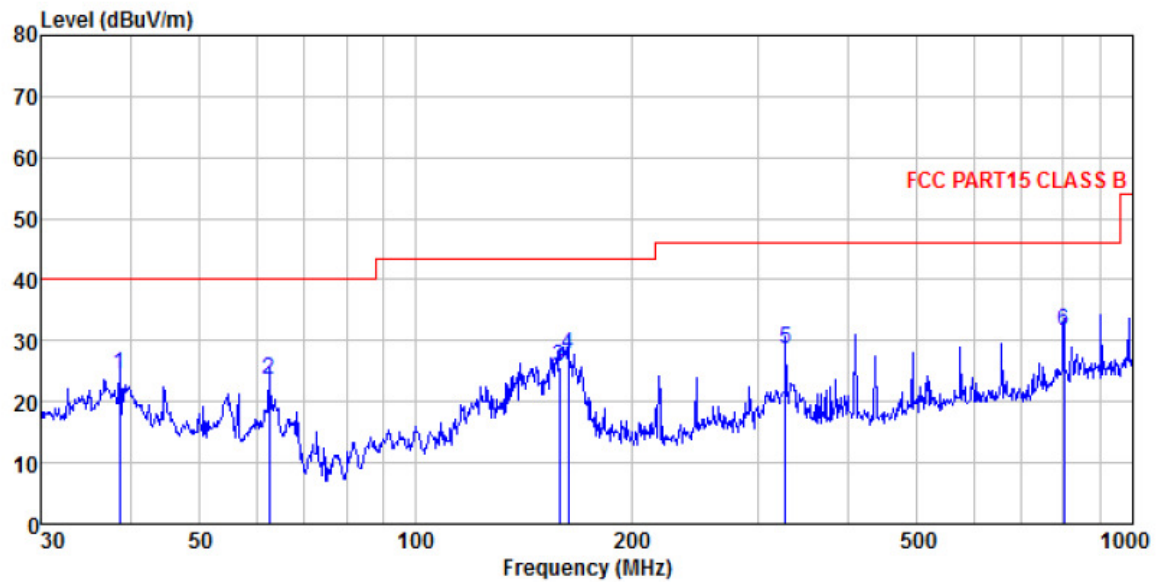
Horizontal:



Condition : FCC PART15 CLASS B VULB9163-2013M HORIZONTAL
 Job No. : 0220
 Test Mode : 2.4G mode
 Test Engineer: Chen

	Freq	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Level	Limit	Over Limit	Remark
	MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB	
1	43.050	38.25	15.56	0.70	30.03	24.48	40.00	-15.52	QP
2	62.431	38.91	13.77	0.88	29.90	23.66	40.00	-16.34	QP
3	161.474	48.65	10.72	1.64	29.35	31.66	43.50	-11.84	QP
4	163.182	49.31	10.77	1.65	29.34	32.39	43.50	-11.11	QP
5	258.326	42.10	14.05	2.16	29.71	28.60	46.00	-17.40	QP
6	327.887	41.32	15.66	2.51	29.84	29.65	46.00	-16.35	QP

Vertical:



Condition : FCC PART15 CLASS B VULB9163-2013M VERTICAL
 Job No. : 0220
 Test Mode : 2.4G mode
 Test Engineer: Chen

	Freq	ReadAntenna Level	Antenna Factor	Cable Loss	Preamp Factor	Level	Limit	Over Limit	Remark
	MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB	
1	38.616	38.73	15.25	0.65	30.05	24.58	40.00	-15.42	QP
2	62.431	38.97	13.77	0.88	29.90	23.72	40.00	-16.28	QP
3	158.668	42.90	10.61	1.62	29.37	25.76	43.50	-17.74	QP
4	163.182	44.65	10.77	1.65	29.34	27.73	43.50	-15.77	QP
5	327.887	40.23	15.66	2.51	29.84	28.56	46.00	-17.44	QP
6	801.786	34.26	22.06	4.46	29.20	31.58	46.00	-14.42	QP

■ Above 1GHz

Test channel:	Lowest channel
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Peak value:

Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamplifier Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	polarization
4840.00	49.57	31.78	8.60	32.09	57.86	74.00	-16.14	Vertical
7260.00	30.80	36.15	11.65	32.00	46.60	74.00	-27.40	Vertical
9680.00	30.55	37.95	14.14	31.62	51.02	74.00	-22.98	Vertical
12100.00	*					74.00		Vertical
14520.00	*					74.00		Vertical
4840.00	48.05	31.78	8.60	32.09	56.34	74.00	-17.66	Horizontal
7260.00	32.42	36.15	11.65	32.00	48.22	74.00	-25.78	Horizontal
9680.00	29.82	37.95	14.14	31.62	50.29	74.00	-23.71	Horizontal
12100.00	*					74.00		Horizontal
14520.00	*					74.00		Horizontal

Average value:

Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamplifier Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	polarization
4840.00	37.24	31.78	8.60	32.09	45.53	54.00	-8.47	Vertical
7260.00	19.66	36.15	11.65	32.00	35.46	54.00	-18.54	Vertical
9680.00	18.83	37.95	14.14	31.62	39.30	54.00	-14.70	Vertical
12100.00	*					54.00		Vertical
14520.00	*					54.00		Vertical
4840.00	35.58	31.78	8.60	32.09	43.87	54.00	-10.13	Horizontal
7260.00	21.73	36.15	11.65	32.00	37.53	54.00	-16.47	Horizontal
9680.00	18.43	37.95	14.14	31.62	38.90	54.00	-15.10	Horizontal
12100.00	*					54.00		Horizontal
14520.00	*					54.00		Horizontal

Remark:

1. Final Level = Receiver Read level + Antenna Factor + Cable Loss – Preamplifier Factor
2. The emission levels of other frequencies are very lower than the limit and not show in test report.
3. “*”, means this data is the too weak instrument of signal is unable to test.

Test channel:	Middle channel
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Peak value:

Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamplifier Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	polarization
4896.00	49.85	31.85	8.67	32.12	58.25	74.00	-15.75	Vertical
7344.00	30.98	36.37	11.72	31.89	47.18	74.00	-26.82	Vertical
9792.00	30.71	38.35	14.25	31.62	51.69	74.00	-22.31	Vertical
12240.00	*					74.00		Vertical
14688.00	*					74.00		Vertical
4896.00	48.38	31.85	8.67	32.12	56.78	74.00	-17.22	Horizontal
7344.00	32.63	36.37	11.72	31.89	48.83	74.00	-25.17	Horizontal
9792.00	30.02	38.35	14.25	31.62	51.00	74.00	-23.00	Horizontal
12240.00	*					74.00		Horizontal
14688.00	*					74.00		Horizontal

Average value:

Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamplifier Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	polarization
4896.00	37.47	31.85	8.67	32.12	45.87	54.00	-8.13	Vertical
7344.00	19.82	36.37	11.72	31.89	36.02	54.00	-17.98	Vertical
9792.00	18.97	38.35	14.25	31.62	39.95	54.00	-14.05	Vertical
12240.00	*					54.00		Vertical
14688.00	*					54.00		Vertical
4896.00	35.85	31.85	8.67	32.12	44.25	54.00	-9.75	Horizontal
7344.00	21.91	36.37	11.72	31.89	38.11	54.00	-15.89	Horizontal
9792.00	18.60	38.35	14.25	31.62	39.58	54.00	-14.42	Horizontal
12240.00	*					54.00		Horizontal
14688.00	*					54.00		Horizontal

Remark:

1. Final Level = Receiver Read level + Antenna Factor + Cable Loss – Preamplifier Factor
2. The emission levels of other frequencies are very lower than the limit and not show in test report.
3. “*”, means this data is the too weak instrument of signal is unable to test.

Test channel:	Highest channel
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Peak value:

Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamplifier Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	polarization
4952.00	49.80	31.93	8.73	32.16	58.30	74.00	-15.70	Vertical
7428.00	30.95	36.59	11.79	31.78	47.55	74.00	-26.45	Vertical
9904.00	30.69	38.81	14.38	31.88	52.00	74.00	-22.00	Vertical
12380.00	*					74.00		Vertical
14856.00	*					74.00		Vertical
4952.00	48.33	31.93	8.73	32.16	56.83	74.00	-17.17	Horizontal
7428.00	32.59	36.59	11.79	31.78	49.19	74.00	-24.81	Horizontal
9904.00	29.98	38.81	14.38	31.88	51.29	74.00	-22.71	Horizontal
12380.00	*					74.00		Horizontal
14856.00	*					74.00		Horizontal

Average value:

Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamplifier Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	polarization
4952.00	37.47	31.93	8.73	32.16	45.97	54.00	-8.03	Vertical
7428.00	19.82	36.59	11.79	31.78	36.42	54.00	-17.58	Vertical
9904.00	18.98	38.81	14.38	31.88	40.29	54.00	-13.71	Vertical
12380.00	*					54.00		Vertical
14856.00	*					54.00		Vertical
4952.00	35.85	31.93	8.73	32.16	44.35	54.00	-9.65	Horizontal
7428.00	21.91	36.59	11.79	31.78	38.51	54.00	-15.49	Horizontal
9904.00	18.60	38.81	14.38	31.88	39.91	54.00	-14.09	Horizontal
12380.00	*					54.00		Horizontal
14856.00	*					54.00		Horizontal

Remark:

1. Final Level = Receiver Read level + Antenna Factor + Cable Loss – Preamplifier Factor
2. The emission levels of other frequencies are very lower than the limit and not show in test report.
3. “*”, means this data is the too weak instrument of signal is unable to test.

7.3.3 Bandedge emissions

All of the restriction bands were tested, and only the data of worst case was exhibited.

Test channel:	Lowest channel
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Peak value:

Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamplifier Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Polarization
2390.00	46.02	27.59	5.38	30.18	48.81	74.00	-25.19	Horizontal
2400.00	48.26	27.58	5.39	30.18	51.05	74.00	-22.95	Horizontal
2390.00	46.87	27.59	5.38	30.18	49.66	74.00	-24.34	Vertical
2400.00	47.63	27.58	5.39	30.18	50.42	74.00	-23.58	Vertical

Average value:

Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamplifier Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Polarization
2390.00	35.86	27.59	5.38	30.18	38.65	54.00	-15.35	Horizontal
2400.00	37.29	27.58	5.39	30.18	40.08	54.00	-13.92	Horizontal
2390.00	36.03	27.59	5.38	30.18	38.82	54.00	-15.18	Vertical
2400.00	38.23	27.58	5.39	30.18	41.02	54.00	-12.98	Vertical

Test channel:	Highest channel
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Peak value:

Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamplifier Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Polarization
2483.50	48.50	27.53	5.47	29.93	51.57	74.00	-22.43	Horizontal
2500.00	47.07	27.55	5.49	29.93	50.18	74.00	-23.82	Horizontal
2483.50	49.87	27.53	5.47	29.93	52.94	74.00	-21.06	Vertical
2500.00	48.37	27.55	5.49	29.93	51.48	74.00	-22.52	Vertical

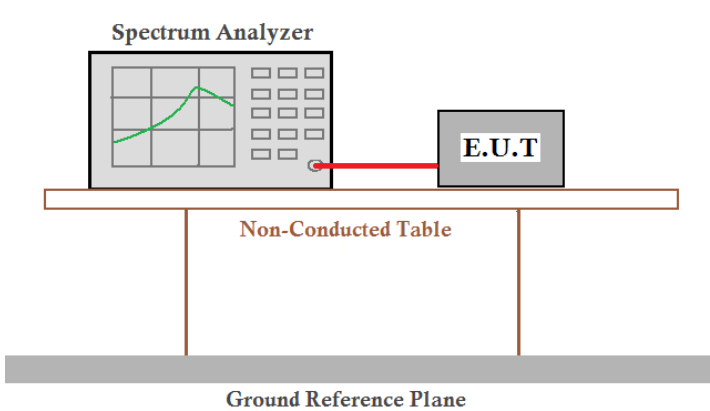
Average value:

Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamplifier Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Polarization
2483.50	38.73	27.53	5.47	29.93	41.80	54.00	-12.20	Horizontal
2500.00	36.28	27.55	5.49	29.93	39.39	54.00	-14.61	Horizontal
2483.50	40.20	27.53	5.47	29.93	43.27	54.00	-10.73	Vertical
2500.00	36.46	27.55	5.49	29.93	39.57	54.00	-14.43	Vertical

Remark:

1. Final Level = Receiver Read level + Antenna Factor + Cable Loss – Preamplifier Factor

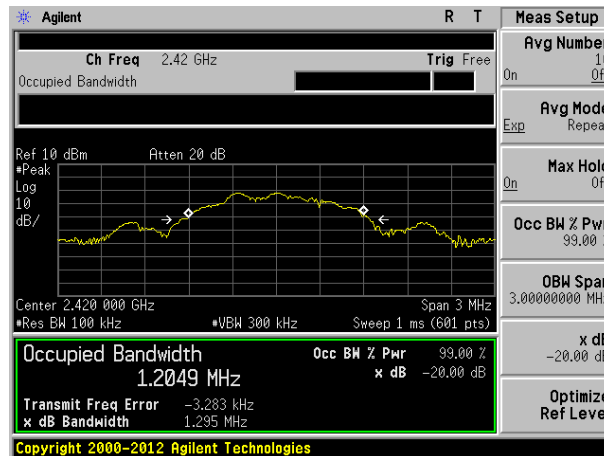
7.4 20dB Occupy Bandwidth

Test Requirement:	FCC Part15 C Section 15.249/15.215
Test Method:	ANSI C63.10:2013
Limit:	Operation Frequency range 2400MHz~2483.5MHz
Test setup:	 The diagram illustrates the test setup. A Spectrum Analyzer is connected to an E.U.T. (Equipment Under Test) via a red cable. Both the Spectrum Analyzer and the E.U.T. are placed on a Non-Conducted Table. The table is supported by a Ground Reference Plane.
Test Instruments:	Refer to section 6.0 for details
Test mode:	Refer to section 5.3 for details
Test results:	Pass

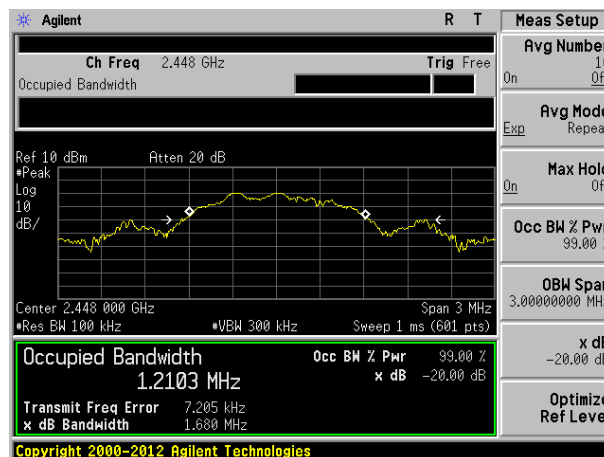
Measurement Data

Test channel	20dB bandwidth(MHz)	Result
Lowest	1.295	Pass
Middle	1.680	Pass
Highest	1.666	Pass

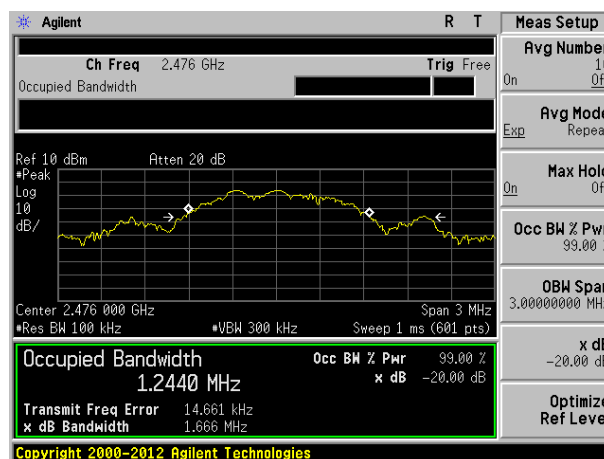
Test plot as follows:



Lowest channel



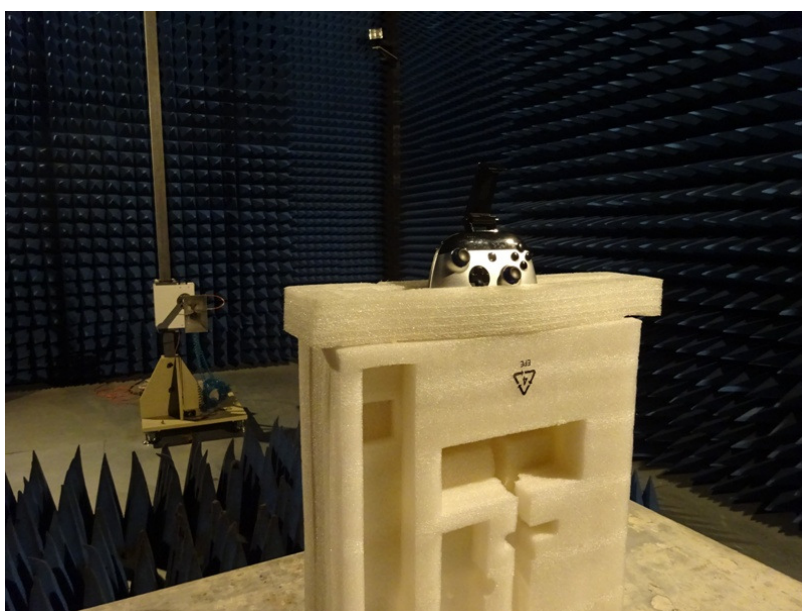
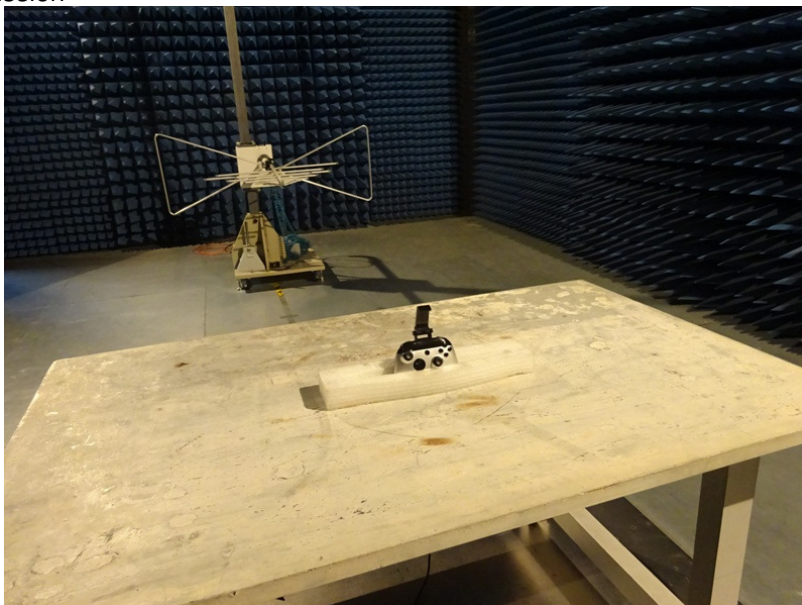
Middle channel



Highest channel

8 Test Setup Photo

Radiated Emission



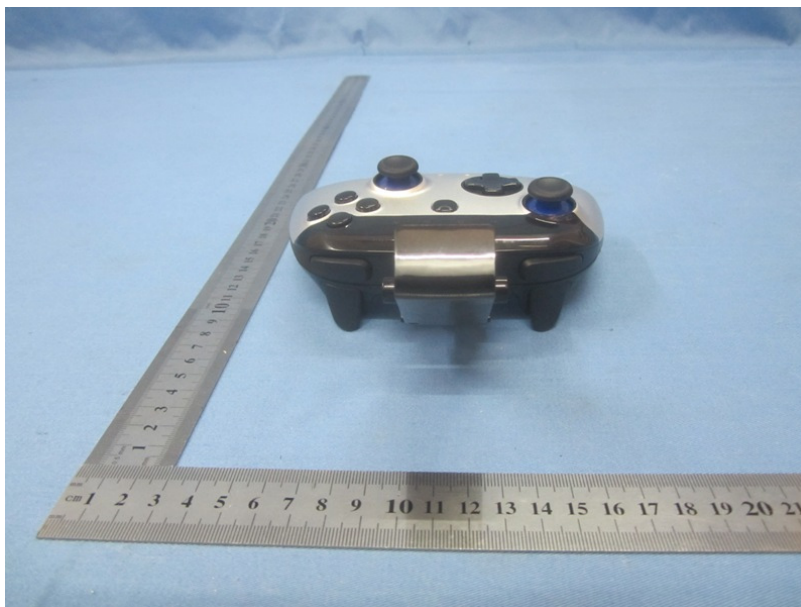
Conducted Emission



9 EUT Constructional Details

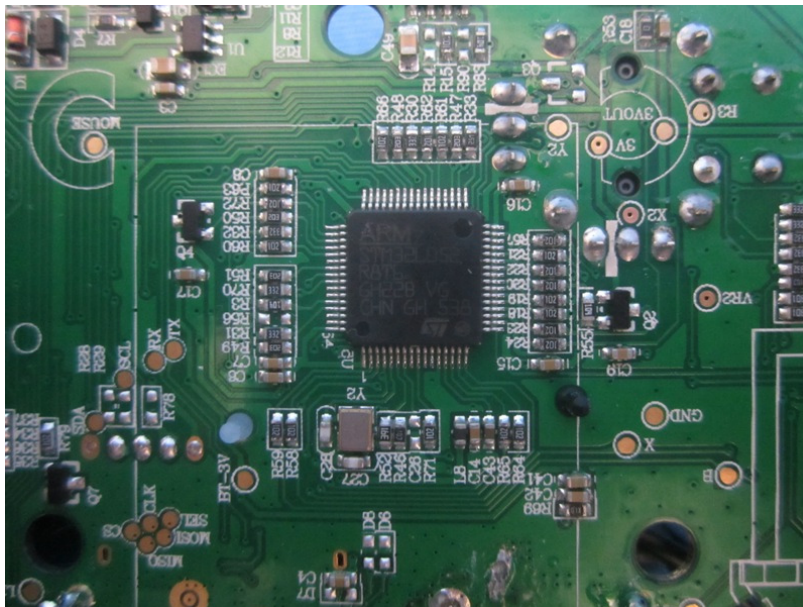
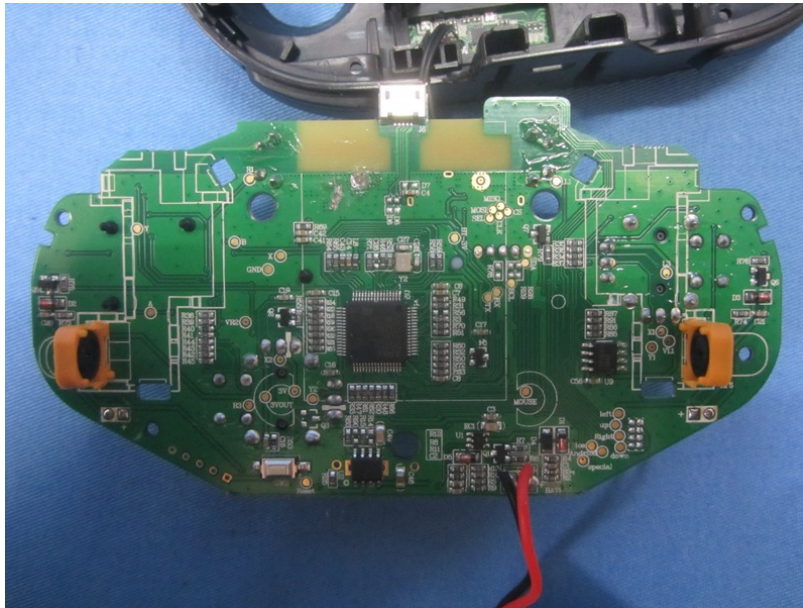


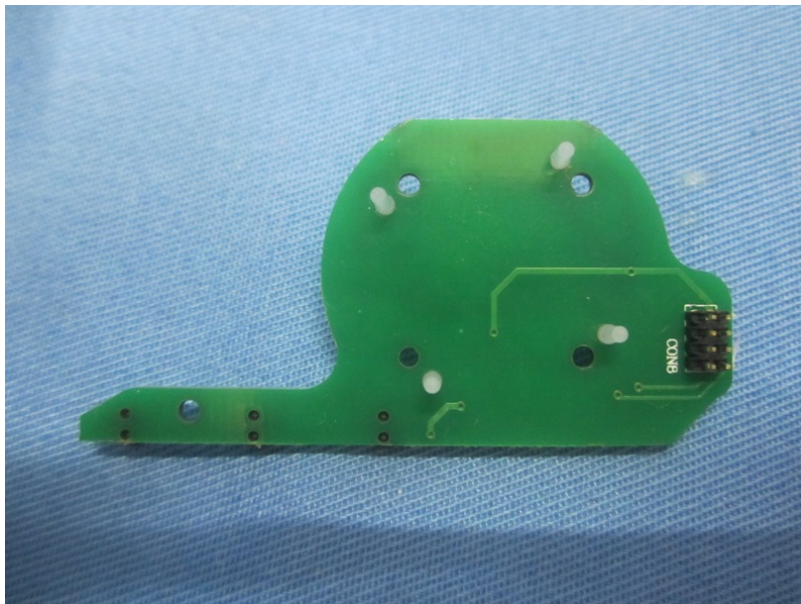
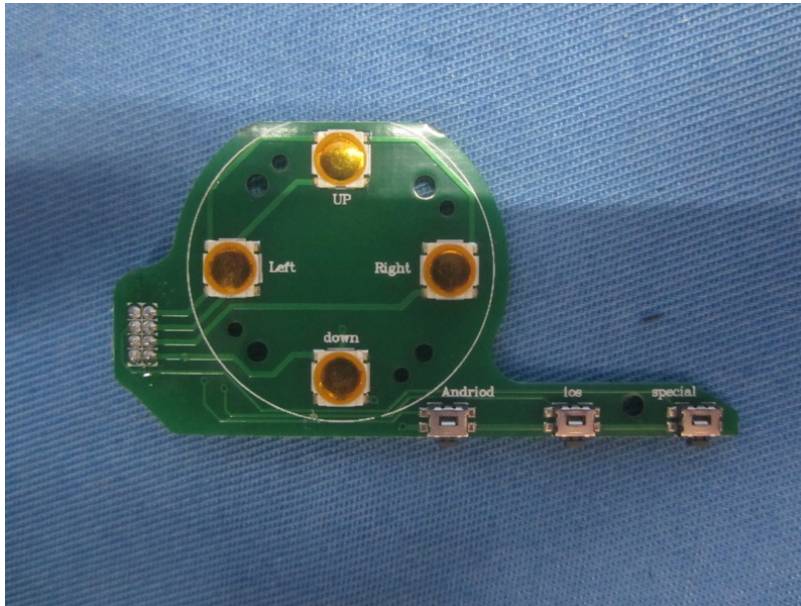


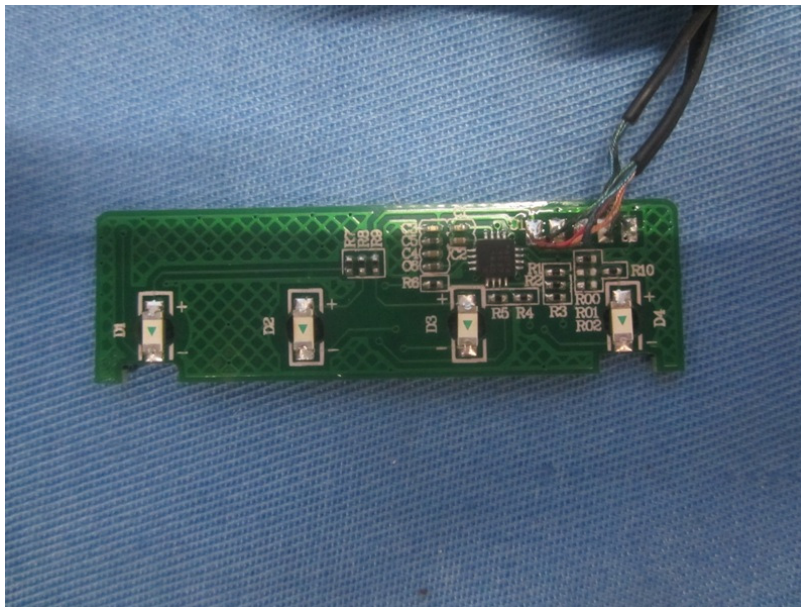
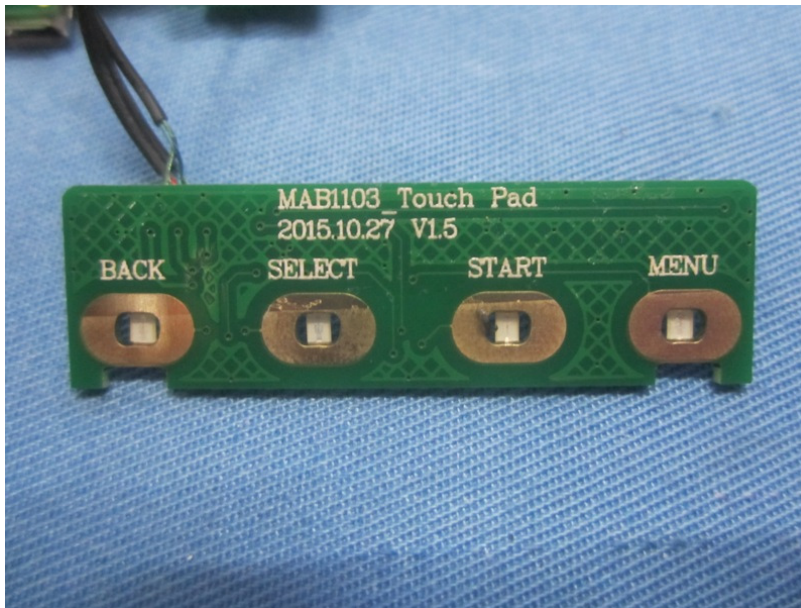














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