TCT 通测检测
TESTING CENTRE TECHNOLOGY

TEST REPORT

FCC ID: 2AFVN-AR117A2BLA

Product: WATCH SPEAKER BLACK

Model No.: AR117A2BLA

Trade Mark: Brookstone

Report No.: TCT171120E006

Issued Date: Nov. 14, 2017

Issued for:

Brookstone Purchasing, Inc.
One Innovation Way, Merrimack, New Hampshire, 03054, United States

Issued By:

Shenzhen Tongce Testing Lab.
1B/F., Building 1, Yibaolai Industrial Park, Qiaotou, Fuyong, Baoan District, Shenzhen, Guangdong, China
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1. Test Certification

Product:	WATCH SPEAKER BLACK
Model No.:	AR117A2BLA
Trade Mark:	Brookstone
Applicant:	Brookstone Purchasing, Inc.
Address:	One Innovation Way, Merrimack, New Hampshire, 03054, United States
Manufacturer/ Factory:	ShenZhen MoTu Technologies Co.,Ltd
Address:	2 / f, huahui building, hubin central road, 37 district, baoan district, shenzhen, China
Date of Test:	Nov. 08 - Nov. 13, 2017
Applicable Standards:	FCC CFR Title 47 Part 15 Subpart C Section 15.249

The above equipment has been tested by Shenzhen Tongce Testing Lab. and found compliance with the requirements set forth in the technical standards mentioned above. The results of testing in this report apply only to the product/system, which was tested. Other similar equipment will not necessarily produce the same results due to production tolerance and measurement uncertainties.

Tested By: Brews Xu **Date:** ***Nov. 13, 2017***

Brews Xu

Reviewed By: Joe Zhou **Date:** ***Nov. 14, 2017***

Joe Zhou

Approved By: Tomsin **Date:** ***Nov. 14, 2017***

Tomsin

SHENZHEN TONGCE TESTING LAB TCT

2. Test Result Summary

Requirement	CFR 47 Section	Result
Antenna Requirement	§15.203	PASS
AC Power Line Conducted Emission	§15.207	PASS
Field Strength of Fundamental	§15.249 (a)	PASS
Spurious Emissions	§2.1053 §15.249 (a) (d)/ §15.209	PASS
Band Edge	§2.1053 §15.249 (d)/ §15.205	PASS
20dB Occupied Bandwidth	§2.1049 §15.215 (c)	PASS

Note:

1. Pass: Test item meets the requirement.

2. Fail: Test item does not meet the requirement.

3. N/A: Test case does not apply to the test object.

4. The test result judgment is decided by the limit of test standard.

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3. EUT Description

Product:	WATCH SPEAKER BLACK
Model No.:	AR117A2BLA
Trade Mark:	Brookstone
Operation Frequency:	2402MHz - 2480MHz
Number of Channel:	79
Modulation Technology:	GFSK, Pi/4QPSK, 8DPSK
Antenna Type:	PCB antenna
Antenna Gain:	1.2dBi
Power Supply:	Battery: DC 3.7V, 400mAh, 1.48Wh Or DC 5V USB Charger

Operation Frequency each of channel for GFSK, π/4-DQPSK, 8DPSK

Channel	Frequency	Channel	Frequency	Channel	Frequency	Channel	Frequency
0	2402MHz	20	2422MHz	40	2442MHz	60	2462MHz
1	2403MHz	21	2423MHz	41	2443MHz	61	2463MHz
…	…	…	…	…	…	…	…
10	2412MHz	30	2432MHz	50	2452MHz	70	2472MHz
11	2413MHz	31	2433MHz	51	2453MHz	71	2473MHz
…	…	…	…	…	…	…	…
18	2420MHz	38	2440MHz	58	2460MHz	78	2480MHz
19	2421MHz	39	2441MHz	59	2461MHz	-	
Remark: Channel 0, 39 &78 have been tested for GFSK, π/4-DQPSK, 8DPSK modulation mode.							

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	2402MHz
The middle channel	2441MHz
The Highest channel	2480MHz

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4. Genera Information

4.1. Test Environment and Mode

Operating Environment:	
Temperature:	25.0 °C
Humidity:	54 % RH
Atmospheric Pressure:	1010 mbar
Test Mode:	
Engineering mode:	Keep the EUT in continuous transmitting by select channel

The sample was placed (0.8m below 1GHz, 1.5m above 1GHz) above the ground plane of 3m chamber. Measurements in both horizontal and vertical polarities were performed. During the test, each emission was maximized by: having the EUT continuously working, investigated all operating modes, rotated about all 3 axis (X, Y & Z) and considered typical configuration to obtain worst position, manipulating interconnecting cables, rotating the turntable, varying antenna height from 1m to 4m in both horizontal and vertical polarizations. The emissions worst-case are shown in Test Results of the following pages.

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)	94.17	95.58	93.20

Final Test Mode:

The EUT was tested in GFSK, π/4QPSK, 8DPSK modulation, and found the GFSK modulation is the worst case.

According to ANSI C63.4 standards, the test results are both the “worst case” and “worst setup”:

Y axis (see the test setup photo)

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4.2.Description of Support Units

The EUT has been tested as an independent unit together with other necessary accessories or support units. The following support units or accessories were used to form a representative test configuration during the tests.

Equipment	Model No.	Serial No.	FCC ID	Trade Name
USB Charger	A1399	/	/	APPLE

Note:

1. All the equipment/cables were placed in the worst-case configuration to maximize the emission during the test.

2. Grounding was established in accordance with the manufacturer's requirements and conditions for the intended use.

5. Facilities and Accreditations

5.1. Facilities

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

- FCC - Registration No.: 645098
  Shenzhen Tongce Testing Lab
  The 3m Semi-anechoic chamber has been registered and fully described in a report with the (FCC) Federal Communications Commission. The acceptance letter from the FCC is maintained in our files.
- IC - Registration No.: 10668A-1
  The 3m Semi-anechoic chamber of Shenzhen TCT Testing Technology Co., Ltd. has been registered by Certification and Engineering Bureau of Industry Canada for radio equipment testing

5.2. Location

Shenzhen Tongce Testing Lab
Address: 1B/F., Building 1, Yibaolai Industrial Park, Qiaotou, Fuyong, Baoan District, Shenzhen, Guangdong, China
TEL: +86-755-27673339

5.3. Measurement Uncertainty

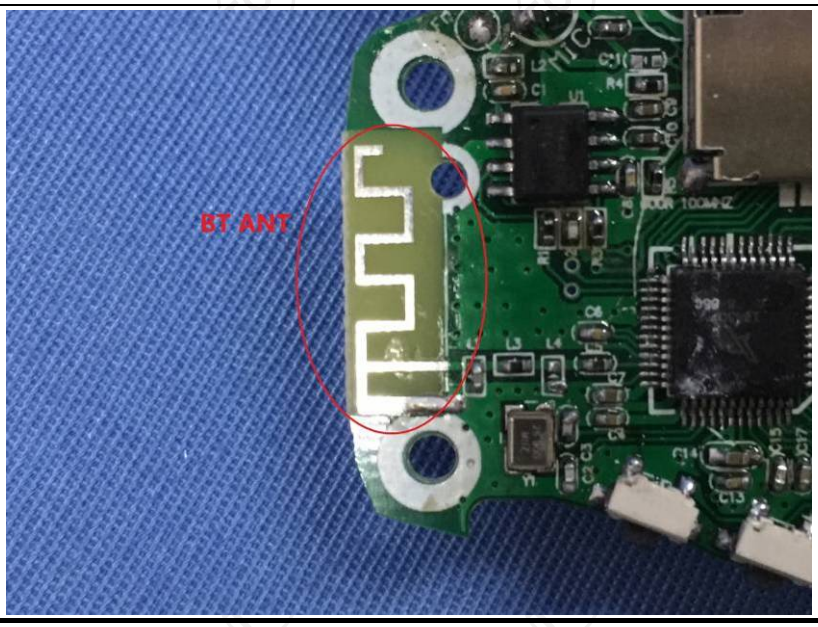
The reported uncertainty of measurement y ± U, where expended uncertainty U is based on a standard uncertainty multiplied by a coverage factor of k=2, providing a level of confidence of approximately 95 %.

No.	Item	MU
1	Conducted Emission	±2.56dB
2	RF power, conducted	±0.12dB
3	Spurious emissions, conducted	±0.11dB
4	All emissions, radiated(<1GHz)	±3.92dB
5	All emissions, radiated(>1GHz)	±4.28dB
6	Temperature	±0.1°C
7	Humidity	±1.0%

6. Test Results and Measurement Data

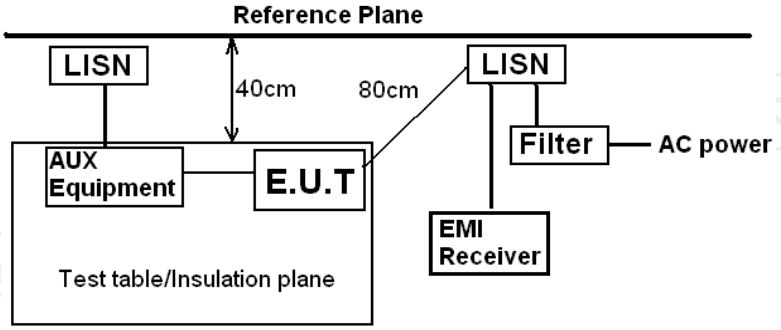
6.1. Antenna Requirement

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.	
E.U.T Antenna:	
The EUT PCB antenna is integral antenna which permanently attached, and the best case gain of the antenna is 1.2dBi.	



6.2.Conducted Emission

6.2.1. Test Specification

<table>
<tr><td>Test Requirement:</td><td>FCC Part15 C Section 15.207</td></tr>
<tr><td>Test Method:</td><td>ANSI C63.10:2013</td></tr>
<tr><td>Frequency Range:</td><td>150 kHz to 30 MHz</td></tr>
<tr><td>Receiver setup:</td><td>RBW=9 kHz, VBW=30 kHz, Sweep time=auto</td></tr>
<tr><td>Limits:</td><td>
<table>
<tr><td rowspan="2">Frequency range (MHz)</td><td colspan="2">Limit (dBuV)</td></tr>
<tr><td>Quasi-peak</td><td>Average</td></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>
</td></tr>
<tr><td>Test Setup:</td><td>


Remark:
E.U.T: Equipment Under Test
LISN: Line Impedence Stabilization Network
Test table height=0.8m
</td></tr>
<tr><td>Test Mode:</td><td>Transmitting mode with modulation</td></tr>
<tr><td>Test Procedure:</td><td>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.</td></tr>
<tr><td>Test Result:</td><td>Pass</td></tr>
</table>

6.2.2. Test Instruments

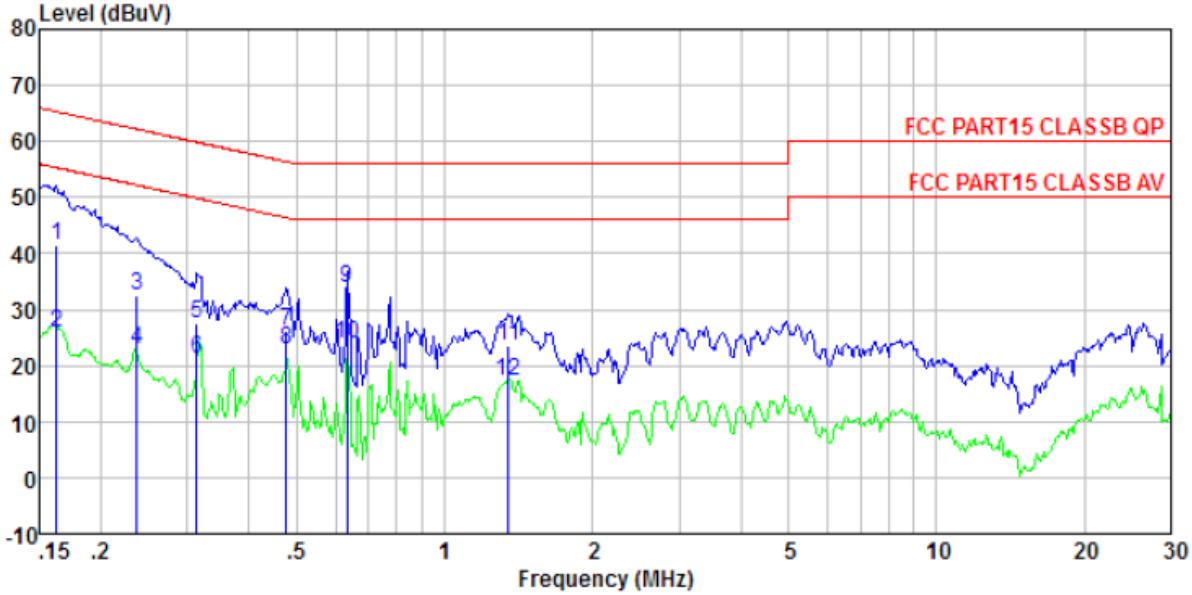
Conducted Emission Shielding Room Test Site (843)				
Equipment	**Manufacturer**	**Model**	**Serial Number**	**Calibration Due**
Test Receiver	R&S	ESPI	101401	Jun. 12, 2018
LISN	Schwarzbeck	NSLK 8126	8126453	Sep. 27, 2018
Coax cable (9KHz-30MHz)	TCT	CE-05	N/A	Sep. 27, 2018
EMI Test Software	Shurple Technology	EZ-EMC	N/A	N/A

Note: *The calibration interval of the above test instruments is 12 months and the calibrations are traceable to international system unit (SI).*

6.2.3. Test data

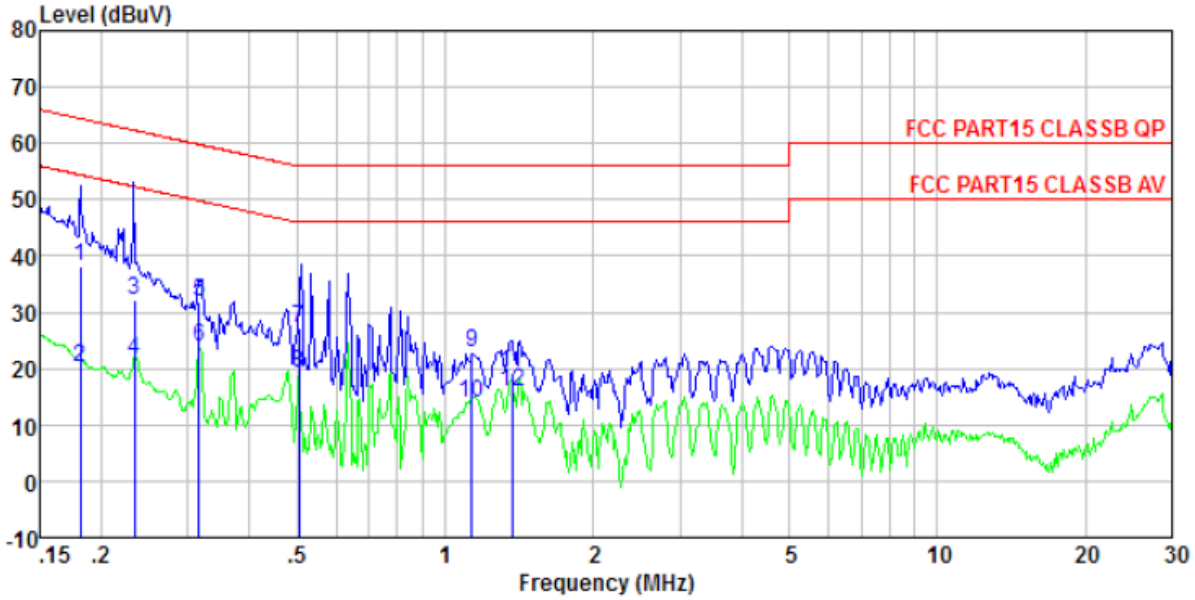
Please refer to following diagram for individual

Conducted Emission on Line Terminal of the power line (150 kHz to 30MHz)



Freq MHz	Reading level dBuV	lISN/ISN factor dB	Cable loss dB	level dBuV	Limit level dBuV	Over limit dB	Remark
0.162	40.82	0.42	0.12	41.36	65.34	-23.98	QP
0.162	25.35	0.42	0.12	25.89	55.34	-29.45	Average
0.237	32.08	0.44	0.12	32.64	62.22	-29.58	QP
0.237	22.40	0.44	0.12	22.96	52.22	-29.26	Average
0.313	26.97	0.44	0.10	27.51	59.88	-32.37	QP
0.313	20.58	0.44	0.10	21.12	49.88	-28.76	Average
0.476	25.72	0.39	0.11	26.22	56.41	-30.19	QP
0.476	22.31	0.39	0.11	22.81	46.41	-23.60	Average
0.634	33.26	0.30	0.13	33.69	56.00	-22.31	QP
0.634	23.30	0.30	0.13	23.73	46.00	-22.27	Average
1.352	23.21	0.23	0.13	23.57	56.00	-32.43	QP
1.352	16.99	0.23	0.13	17.35	46.00	-28.65	Average

Conducted Emission on Neutral Terminal of the power line (150 kHz to 30MHz)



Freq MHz	Reading level dBuV	lISN/ISN factor dB	Cable loss dB	level dBuV	Limit level dBuV	Over limit dB	Remark
0.182	37.49	0.41	0.13	38.03	64.42	-26.39	QP
0.182	19.82	0.41	0.13	20.36	54.42	-34.06	Average
0.234	31.75	0.42	0.12	32.29	62.30	-30.01	QP
0.234	21.13	0.42	0.12	21.67	52.30	-30.63	Average
0.317	31.35	0.42	0.10	31.87	59.80	-27.93	QP
0.317	23.52	0.42	0.10	24.04	49.80	-25.76	Average
0.505	26.68	0.35	0.11	27.14	56.00	-28.86	QP
0.505	18.64	0.35	0.11	19.10	46.00	-26.90	Average
1.135	22.54	0.21	0.13	22.88	56.00	-33.12	QP
1.135	13.51	0.21	0.13	13.85	46.00	-32.15	Average
1.367	18.74	0.21	0.13	19.08	56.00	-36.92	QP
1.367	15.59	0.21	0.13	15.93	46.00	-30.07	Average

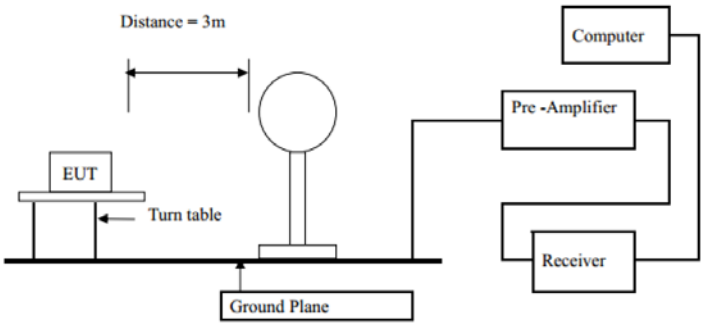
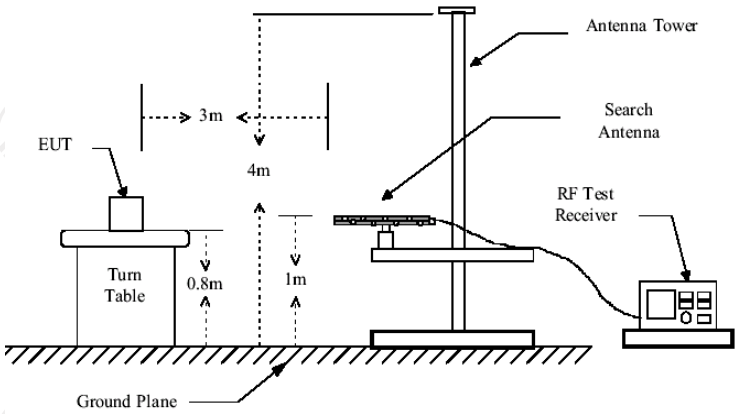
Notes:

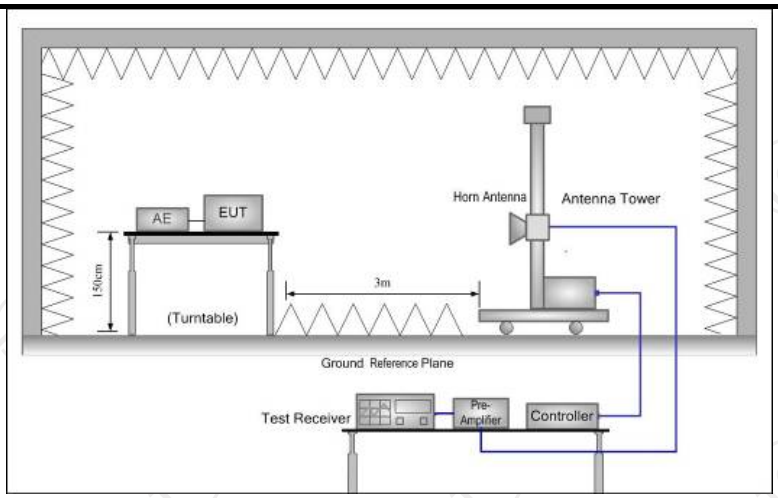
1. *An initial pre-scan was performed on the line and neutral lines with peak detector.*
2. *Quasi-Peak and Average measurement were performed at the frequencies with maximized peak emission.*
3. *Final Level =Receiver Read level + LISN Factor + Cable Loss*
4. *If the average limit is met when using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

6.3.Radiated Emission Measurement

6.3.1. Test Specification

<table>
<tr><td>Test Requirement:</td><td>FCC Part15 C Section 15.209/ Part 2 J Section 2.1053</td></tr>
<tr><td>Test Method:</td><td>ANSI C63.10:2013</td></tr>
<tr><td>Frequency Range:</td><td>9 kHz to 25 GHz</td></tr>
<tr><td>Measurement Distance:</td><td>3 m</td></tr>
<tr><td>Antenna Polarization:</td><td>Horizontal & Vertical</td></tr>
<tr><td>Receiver Setup:</td><td><table>
<tr><td>Frequency</td><td>Detector</td><td>RBW</td><td>VBW</td><td>Remark</td></tr>
<tr><td>9kHz- 150kHz</td><td>Quasi-peak</td><td>200Hz</td><td>1kHz</td><td>Quasi-peak Value</td></tr>
<tr><td>150kHz-30MHz</td><td>Quasi-peak</td><td>9kHz</td><td>30kHz</td><td>Quasi-peak Value</td></tr>
<tr><td>30MHz-1GHz</td><td>Quasi-peak</td><td>120kHz</td><td>300kHz</td><td>Quasi-peak Value</td></tr>
<tr><td rowspan="2">Above 1GHz</td><td>Peak</td><td>1MHz</td><td>3MHz</td><td>Peak Value</td></tr>
<tr><td>Peak</td><td>1MHz</td><td>10Hz</td><td>Average Value</td></tr>
</table></td></tr>
<tr><td>Limit(Field strength of the fundamental signal):</td><td><table>
<tr><td>Frequency</td><td>Limit (dBuV/m @3m)</td><td>Remark</td></tr>
<tr><td rowspan="2">2400MHz-2483.5MHz</td><td>94.00</td><td>Average Value</td></tr>
<tr><td>114.00</td><td>Peak Value</td></tr>
</table></td></tr>
<tr><td>Limit(Spurious Emissions):</td><td><table>
<tr><td>Frequency</td><td>Limit (dBuV/m @3m)</td><td>Remark</td></tr>
<tr><td>0.009-0.490</td><td>2400/F(KHz)</td><td>Quasi-peak Value</td></tr>
<tr><td>0.490-1.705</td><td>24000/F(KHz)</td><td>Quasi-peak Value</td></tr>
<tr><td>1.705-30</td><td>30</td><td>Quasi-peak Value</td></tr>
<tr><td>30MHz-88MHz</td><td>40.0</td><td>Quasi-peak Value</td></tr>
<tr><td>88MHz-216MHz</td><td>43.5</td><td>Quasi-peak Value</td></tr>
<tr><td>216MHz-960MHz</td><td>46.0</td><td>Quasi-peak Value</td></tr>
<tr><td>960MHz-1GHz</td><td>54.0</td><td>Quasi-peak Value</td></tr>
<tr><td rowspan="2">Above 1GHz</td><td>54.0</td><td>Average Value</td></tr>
<tr><td>74.0</td><td>Peak Value</td></tr>
</table></td></tr>
<tr><td>Limit (band edge) :</td><td>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.</td></tr>
<tr><td>Test Procedure:</td><td>1. The EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 meter chamber in below 1GHz, 1.5m above the ground in above 1GHz. 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</td></tr>
</table>

	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 rotatable 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 setup:	For radiated emissions below 30MHz  30MHz to 1GHz  Above 1GHz (The diagram below shows the test setup that is utilized to make the measurements for emission from 1GHz to the tenth harmonic of the highest fundamental frequency or to 40GHz emissions, whichever is lower.)

	
Test results:	PASS

6.3.2. Test Instruments

Radiated Emission Test Site (966)				
Name of Equipment	**Manufacturer**	**Model**	**Serial Number**	**Calibration Due**
Test Receiver	ROHDE&SCHWARZ	ESVD	100008	Sep. 27, 2018
Spectrum Analyzer	ROHDE&SCHWARZ	FSQ	200061	Sep. 27, 2018
Pre-amplifier	EM Electronics Corporation CO.,LTD	EM30265	07032613	Sep. 27, 2018
Pre-amplifier	HP	8447D	2727A05017	Sep. 27, 2018
Loop antenna	ZHINAN	ZN30900A	12024	Sep. 27, 2018
Broadband Antenna	Schwarzbeck	VULB9163	340	Sep. 27, 2018
Horn Antenna	Schwarzbeck	BBHA 9120D	631	Sep. 27, 2018
Horn Antenna	Schwarzbeck	BBH 9170	582	Jun. 07, 2018
Antenna Mast	Keleto	CC-A-4M	N/A	N/A
Coax cable (9KHz-1GHz)	TCT	RE-low-01	N/A	Sep. 27, 2018
Coax cable (9KHz-40GHz)	TCT	RE-high-02	N/A	Sep. 27, 2018
Coax cable (9KHz-1GHz)	TCT	RE-low-03	N/A	Sep. 27, 2018
Coax cable (9KHz-40GHz)	TCT	RE-high-04	N/A	Sep. 27, 2018
EMI Test Software	Shurple Technology	EZ-EMC	N/A	N/A

Note: *The calibration interval of the above test instruments is 12 months and the calibrations are traceable to international system unit (SI).*

6.3.3. Test Data

Field Strength of Fundamental

Peak value:

Frequency (MHz)	Emission PK/AV (dBuV/m)	Horizontal /Vertical	Limits PK/AV (dBuV/m)	Margin (dB)
2402	94.21 (PK)	V	114	-19.79
2402	91.73 (PK)	H	114	-22.27
2441	92.71 (PK)	V	114	-21.29
2441	90.88 (PK)	H	114	-23.13
2480	95.58 (PK)	V	114	-18.42
2480	92.50 (PK)	H	114	-21.50
Average value:				
2402	82.46 (AV)	V	94	-11.54
2402	80.18 (AV)	H	94	-13.82
2441	80.87 (AV)	V	94	-13.13
2441	78.02 (AV)	H	94	-15.98
2480	83.79 (AV)	V	94	-10.21
2480	80.84 (AV)	H	94	-13.16

Spurious Emissions

Frequency Range (9 kHz-30MHz)

Frequency (MHz)	Level@3m (dBμV/m)	Limit@3m (dBμV/m)
--	--	--
--	--	--
--	--	--
--	--	--

Note: *1. Emission Level=Reading+ Cable loss-Antenna factor-Amp factor*

2. The emission levels are 20 dB below the limit value, which are not reported. It is deemed to comply with the requirement

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Frequency Range (30MHz-1GHz)

Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	polarization
36.13	37.47	14.63	0.62	30.06	22.66	40.00	-17.34	Vertical
49.53	37.05	15.28	0.77	30.00	23.10	40.00	-16.90	Vertical
83.23	42.59	11.72	1.06	29.78	25.59	40.00	-14.41	Vertical
99.88	34.84	15.16	1.19	29.70	21.49	43.50	-22.01	Vertical
131.76	42.90	10.82	1.45	29.50	25.67	43.50	-17.83	Vertical
207.85	41.38	12.80	1.89	29.28	26.79	43.50	-16.71	Vertical
84.70	40.99	12.16	1.07	29.77	24.45	40.00	-15.55	Horizontal
113.32	42.32	13.63	1.31	29.61	27.65	43.50	-15.85	Horizontal
136.46	43.30	10.45	1.48	29.48	25.75	43.50	-17.75	Horizontal
175.65	41.68	11.36	1.72	29.30	25.46	43.50	-18.04	Horizontal
212.27	42.68	12.93	1.91	29.32	28.20	43.50	-15.30	Horizontal
251.18	33.78	14.07	2.13	29.65	20.33	46.00	-25.67	Horizontal

Band Edge Requirement

Test channel:	Lowest channel

Peak value:

Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Polarization
2390.00	41.33	27.59	5.38	30.18	44.12	74.00	-29.88	Horizontal
2400.00	57.89	27.58	5.39	30.18	60.68	74.00	-13.32	Horizontal
2390.00	41.73	27.59	5.38	30.18	44.52	74.00	-29.48	Vertical
2400.00	59.76	27.58	5.39	30.18	62.55	74.00	-11.45	Vertical

Average value:

Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Polarization
2390.00	32.23	27.59	5.38	30.18	35.02	54.00	-18.98	Horizontal
2400.00	43.37	27.58	5.39	30.18	46.16	54.00	-7.84	Horizontal
2390.00	32.06	27.59	5.38	30.18	34.85	54.00	-19.15	Vertical
2400.00	44.87	27.58	5.39	30.18	47.66	54.00	-6.34	Vertical

Test channel:	Highest channel

Peak value:

Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Polarization
2483.50	43.25	27.53	5.47	29.93	46.32	74.00	-27.68	Horizontal
2500.00	42.71	27.55	5.49	29.93	45.82	74.00	-28.18	Horizontal
2483.50	43.83	27.53	5.47	29.93	46.90	74.00	-27.10	Vertical
2500.00	43.57	27.55	5.49	29.93	46.68	74.00	-27.32	Vertical

Average value:

Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Polarization
2483.50	35.04	27.53	5.47	29.93	38.11	54.00	-15.89	Horizontal
2500.00	33.26	27.55	5.49	29.93	36.37	54.00	-17.63	Horizontal
2483.50	36.12	27.53	5.47	29.93	39.19	54.00	-14.81	Vertical
2500.00	33.05	27.55	5.49	29.93	36.16	54.00	-17.84	Vertical

Note:

1. *Emission Level=Peak Reading + Correction Factor; Correction Factor= Antenna Factor + Cable loss – Pre-amplifier*
2. *Margin (dB) = Emission Level (dBμV/m)- limit (dBμV/m)*

Above 1GHz

Test channel:	Lowest channel

Peak value:

Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	polarization
4804.00	40.02	31.78	8.60	32.09	48.31	74.00	-25.69	Vertical
7206.00	33.63	36.15	11.65	32.00	49.43	74.00	-24.57	Vertical
9608.00	33.07	37.95	14.14	31.62	53.54	74.00	-20.46	Vertical
12010.00	*					74.00		Vertical
14412.00	*					74.00		Vertical
4804.00	44.85	31.78	8.60	32.09	53.14	74.00	-20.86	Horizontal
7206.00	35.62	36.15	11.65	32.00	51.42	74.00	-22.58	Horizontal
9608.00	32.75	37.95	14.14	31.62	53.22	74.00	-20.78	Horizontal
12010.00	*					74.00		Horizontal
14412.00	*					74.00		Horizontal

Average value:

Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	polarization
4804.00	28.32	31.78	8.60	32.09	36.61	54.00	-17.39	Vertical
7206.00	22.01	36.15	11.65	32.00	37.81	54.00	-16.19	Vertical
9608.00	20.92	37.95	14.14	31.62	41.39	54.00	-12.61	Vertical
12010.00	*					54.00		Vertical
14412.00	*					54.00		Vertical
4804.00	32.84	31.78	8.60	32.09	41.13	54.00	-12.87	Horizontal
7206.00	24.36	36.15	11.65	32.00	40.16	54.00	-13.84	Horizontal
9608.00	20.87	37.95	14.14	31.62	41.34	54.00	-12.66	Horizontal
12010.00	*					54.00		Horizontal
14412.00	*					54.00		Horizontal

Note:

1. *Emission Level=Peak Reading + Correction Factor; Correction Factor= Antenna Factor + Cable loss – Pre-amplifier*
2. *Margin (dB) = Emission Level (dBµV/m)- limit (dBµV/m)*
3. *The emission levels of other frequencies are very lower than the limit and not show in test report.*
4. *Measurements were conducted from 1 GHz to the 10th harmonic of highest fundamental frequency.*
5. *Data of measurement shown " * "in the above table mean that the reading of emissions is attenuated more than 20 dB below the limits or the field strength is too small to be measured.*

Test channel:	Middle channel

Peak value:

Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	polarization
4882.00	41.61	31.85	8.67	32.12	50.01	74.00	-23.99	Vertical
7323.00	34.69	36.37	11.72	31.89	50.89	74.00	-23.11	Vertical
9764.00	34.01	38.35	14.25	31.62	54.99	74.00	-19.01	Vertical
12205.00	*					74.00		Vertical
14646.00	*					74.00		Vertical
4882.00	46.78	31.85	8.67	32.12	55.18	74.00	-18.82	Horizontal
7323.00	36.82	36.37	11.72	31.89	53.02	74.00	-20.98	Horizontal
9764.00	33.84	38.35	14.25	31.62	54.82	74.00	-19.18	Horizontal
12205.00	*					74.00		Horizontal
14646.00	*					74.00		Horizontal

Average value:

Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	polarization
4882.00	29.64	31.85	8.67	32.12	38.04	54.00	-15.96	Vertical
7323.00	22.91	36.37	11.72	31.89	39.11	54.00	-14.89	Vertical
9764.00	21.72	38.35	14.25	31.62	42.70	54.00	-11.30	Vertical
12205.00	*					54.00		Vertical
14646.00	*					54.00		Vertical
4882.00	34.35	31.85	8.67	32.12	42.75	54.00	-11.25	Horizontal
7323.00	25.37	36.37	11.72	31.89	41.57	54.00	-12.43	Horizontal
9764.00	21.80	38.35	14.25	31.62	42.78	54.00	-11.22	Horizontal
12205.00	*					54.00		Horizontal
14646.00	*					54.00		Horizontal

Note:

1. *Emission Level=Peak Reading + Correction Factor; Correction Factor= Antenna Factor + Cable loss – Pre-amplifier*
2. *Margin (dB) = Emission Level (dBµV/m)- limit (dBµV/m)*
3. *The emission levels of other frequencies are very lower than the limit and not show in test report.*
4. *Measurements were conducted from 1 GHz to the 10th harmonic of highest fundamental frequency.*
5. *Data of measurement shown " * "in the above table mean that the reading of emissions is attenuated more than 20 dB below the limits or the field strength is too small to be measured.*

Test channel:	Highest channel

Peak value:

Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	polarization
4960.00	41.46	31.93	8.73	32.16	49.96	74.00	-24.04	Vertical
7440.00	34.59	36.59	11.79	31.78	51.19	74.00	-22.81	Vertical
9920.00	33.92	38.81	14.38	31.88	55.23	74.00	-18.77	Vertical
12400.00	*					74.00		Vertical
14880.00	*					74.00		Vertical
4960.00	46.60	31.93	8.73	32.16	55.10	74.00	-18.90	Horizontal
7440.00	36.71	36.59	11.79	31.78	53.31	74.00	-20.69	Horizontal
9920.00	33.74	38.81	14.38	31.88	55.05	74.00	-18.95	Horizontal
12400.00	*					74.00		Horizontal
14880.00	*					74.00		Horizontal

Average value:

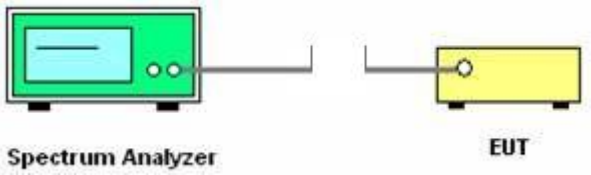
Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	polarization
4960.00	29.71	31.93	8.73	32.16	38.21	54.00	-15.79	Vertical
7440.00	22.95	36.59	11.79	31.78	39.55	54.00	-14.45	Vertical
9920.00	21.75	38.81	14.38	31.88	43.06	54.00	-10.94	Vertical
12400.00	*					54.00		Vertical
14880.00	*					54.00		Vertical
4960.00	34.43	31.93	8.73	32.16	42.93	54.00	-11.07	Horizontal
7440.00	25.42	36.59	11.79	31.78	42.02	54.00	-11.98	Horizontal
9920.00	21.85	38.81	14.38	31.88	43.16	54.00	-10.84	Horizontal
12400.00	*					54.00		Horizontal
14880.00	*					54.00		Horizontal

Note:

1. *Emission Level=Peak Reading + Correction Factor; Correction Factor= Antenna Factor + Cable loss – Pre-amplifier*
2. *Margin (dB) = Emission Level (dBµV/m)- limit (dBµV/m)*
3. *The emission levels of other frequencies are very lower than the limit and not show in test report.*
4. *Measurements were conducted from 1 GHz to the 10th harmonic of highest fundamental frequency.*
5. *Data of measurement shown " * "in the above table mean that the reading of emissions is attenuated more than 20 dB below the limits or the field strength is too small to be measured.*

6.4.20dB Occupied Bandwidth

6.4.1. Test Specification

Test Requirement:	FCC Part15 C Section 15.215(c)/ Part 2 J Section 2.1049
Test Method:	ANSI C63.10: 2013
Limit:	N/A
	1. According to the follow Test-setup, keep the relative position between the artificial antenna and the EUT. 2. Set to the maximum power setting and enable the EUT transmit continuously. 3. Use the following spectrum analyzer settings for 20dB Bandwidth measurement. Span = approximately 2 to 3 times the 20 dB bandwidth, centered on a hopping channel; RBW≥1% of the 20 dB bandwidth; VBW≥RBW; Sweep = auto; Detector function = peak; Trace = max hold. 4. Measure and record the results in the test report.
Test setup:	
Test Mode:	Transmitting mode with modulation
Test results:	PASS

6.4.2. Test Instruments

RF Test Room				
Equipment	**Manufacturer**	**Model**	**Serial Number**	**Calibration Due**
Spectrum Analyzer	Agilent	N9020A	MY49100060	Sep. 27, 2018

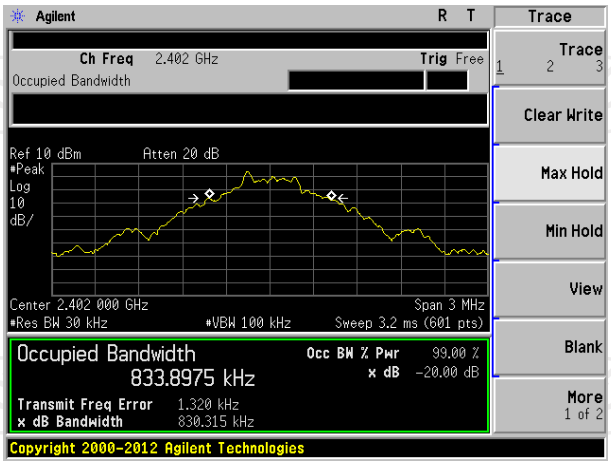
Note: *The calibration interval of the above test instruments is 12 months and the calibrations are traceable to international system unit (SI).*

6.4.3. Test data

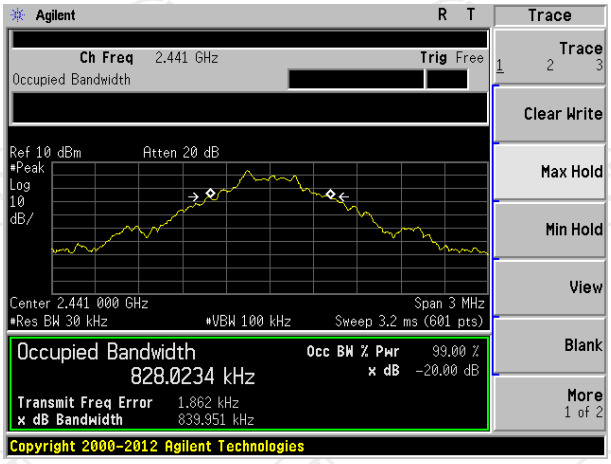
Test Channel	20dB Occupy Bandwidth (MHz)	Limit	Conclusion
Lowest	0.830	---	PASS
Middle	0.840	---	PASS
Highest	0.845	---	PASS

Test plots as follows:

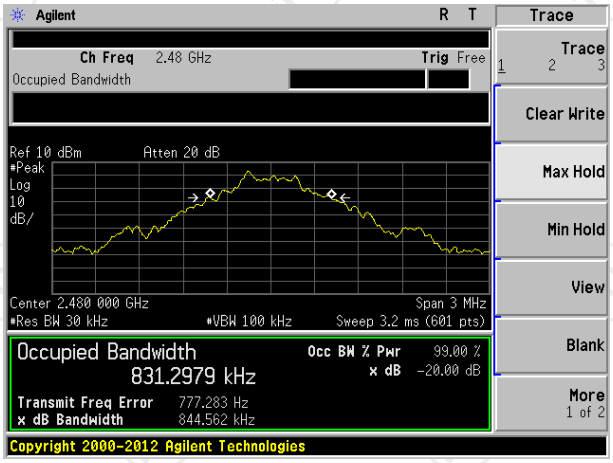
Lowest channel



Middle channel

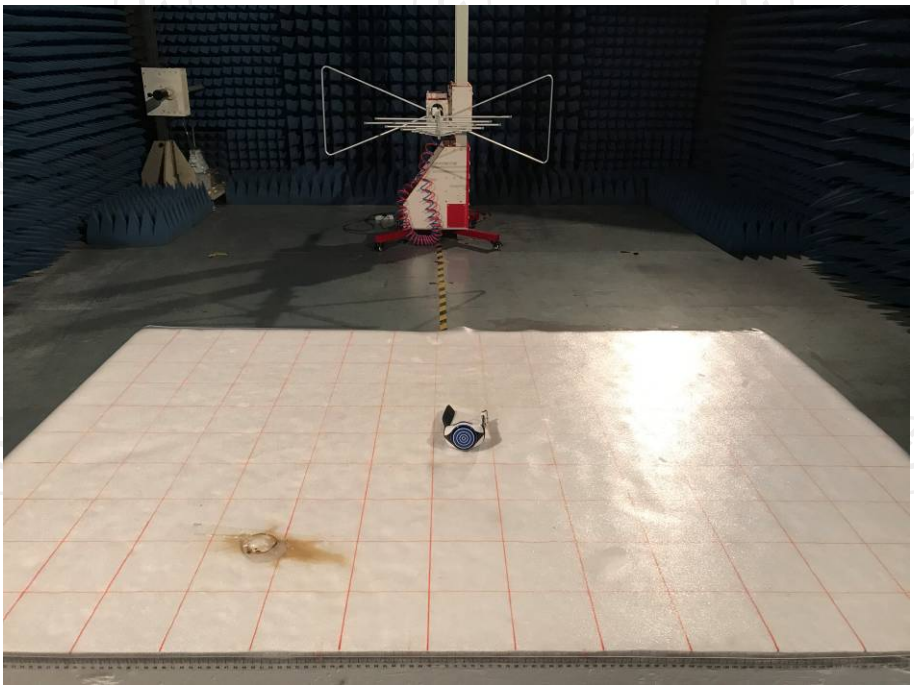


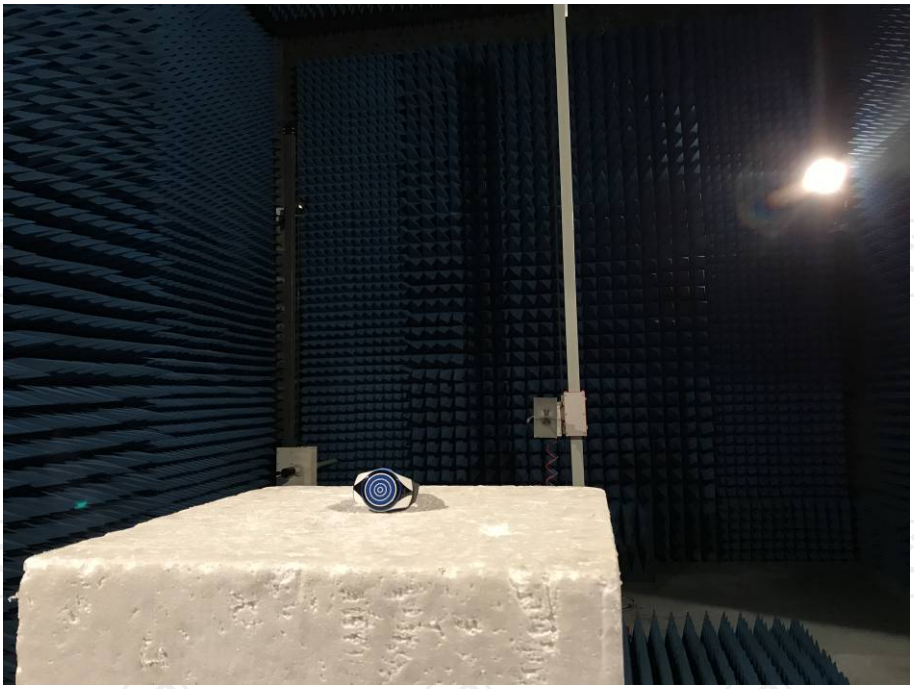
Highest channel



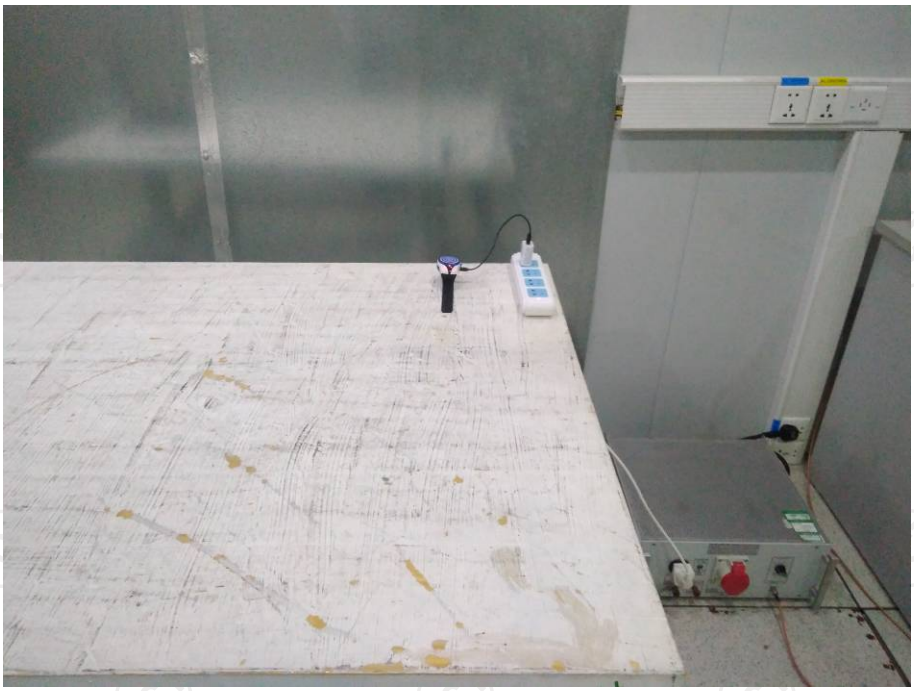
Appendix A: Photographs of Test Setup

Product: WATCH SPEAKER BLACK
Model: AR117A2BLA
Radiated Emission





Conducted Emission

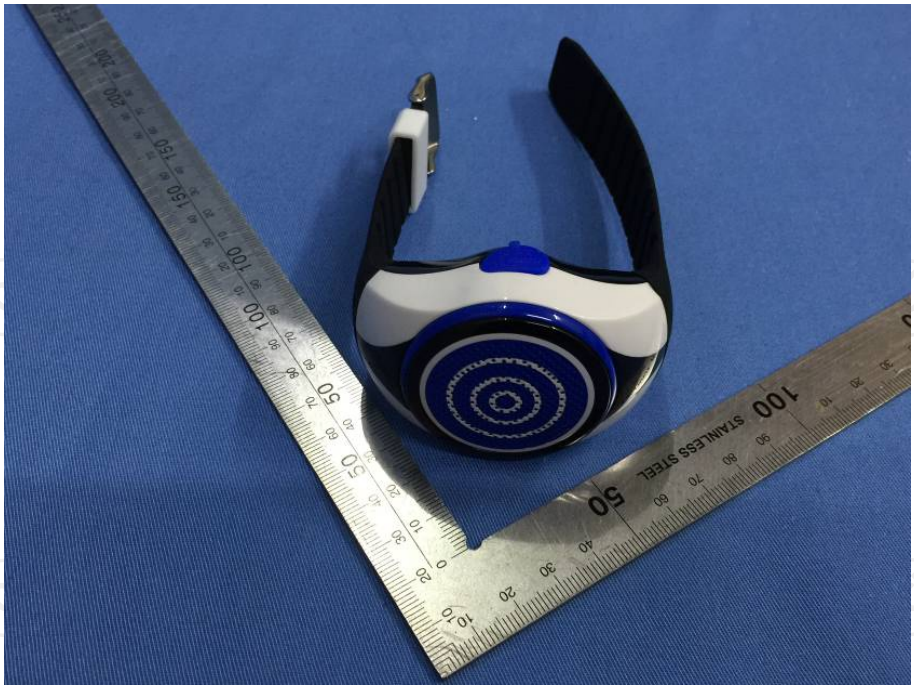


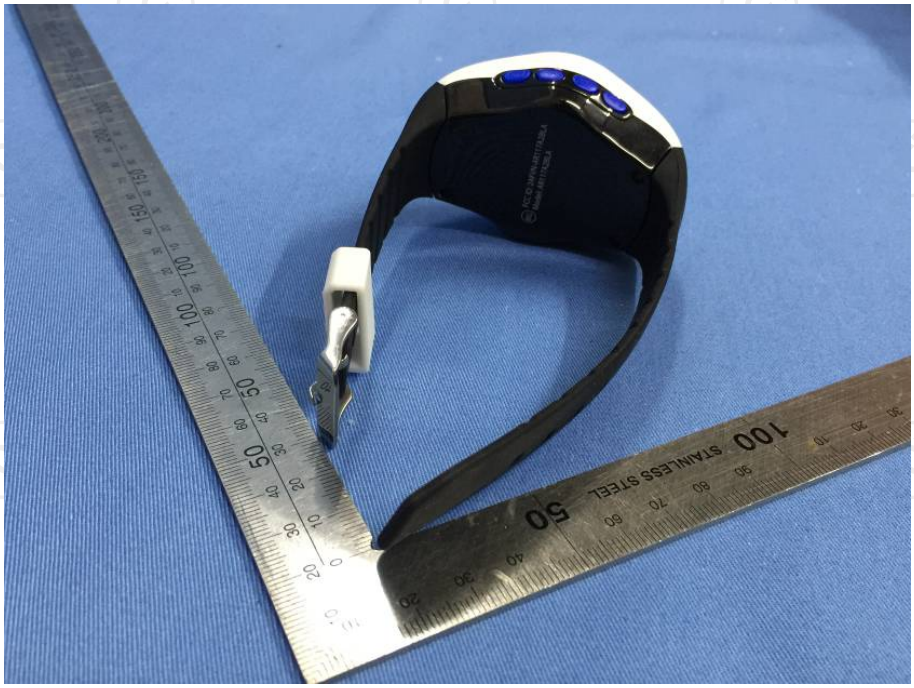
Appendix B: Photographs of EUT

Product: WATCH SPEAKER BLACK

Model: AR117A2BLA

External Photos

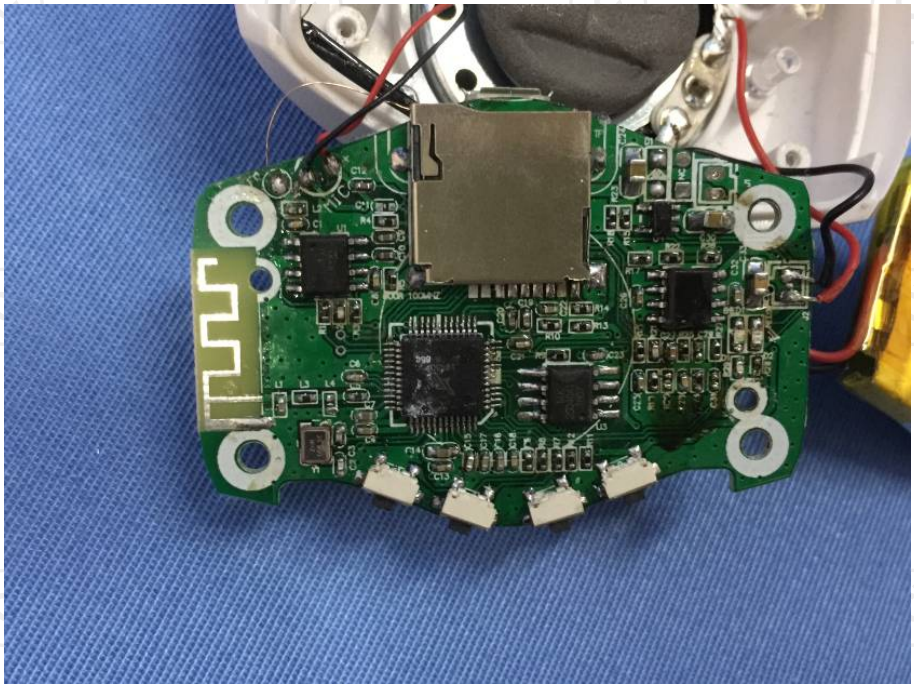

STAINLESS STEEL

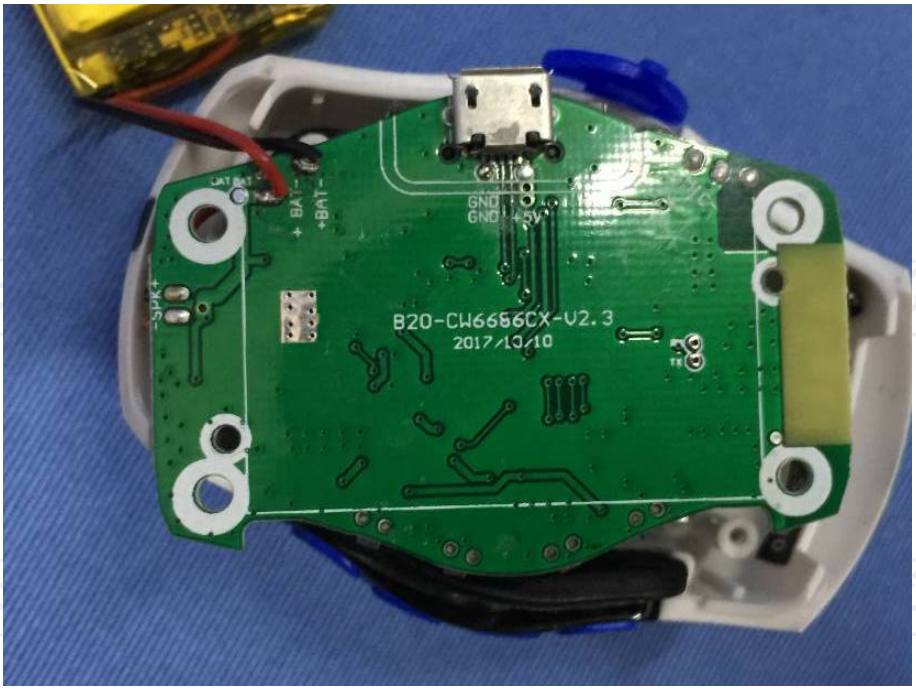

STAINLESS STEEL

STAINLESS STEEL

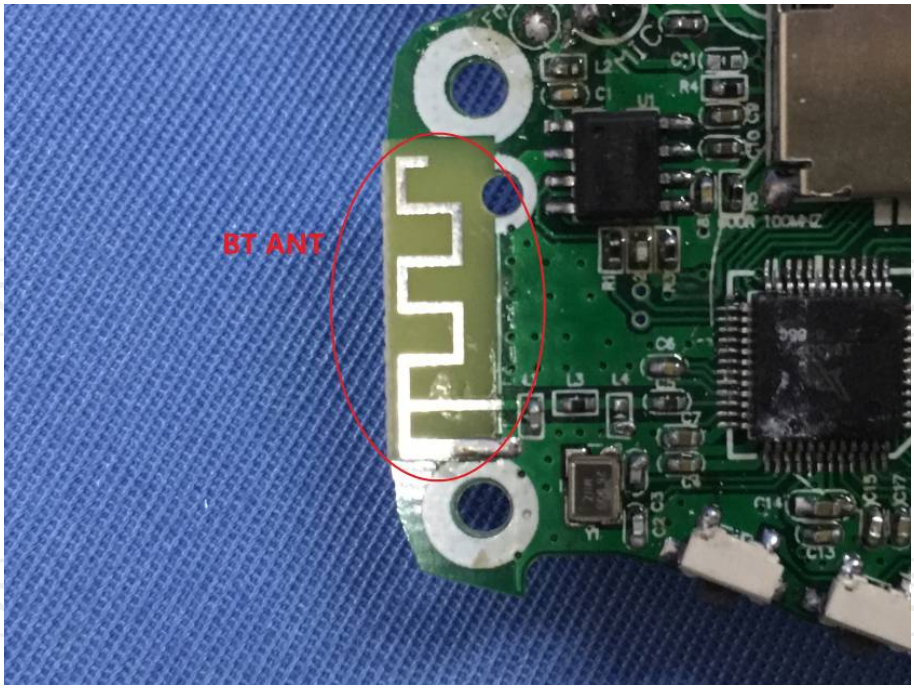
Appendix B: Photographs of EUT

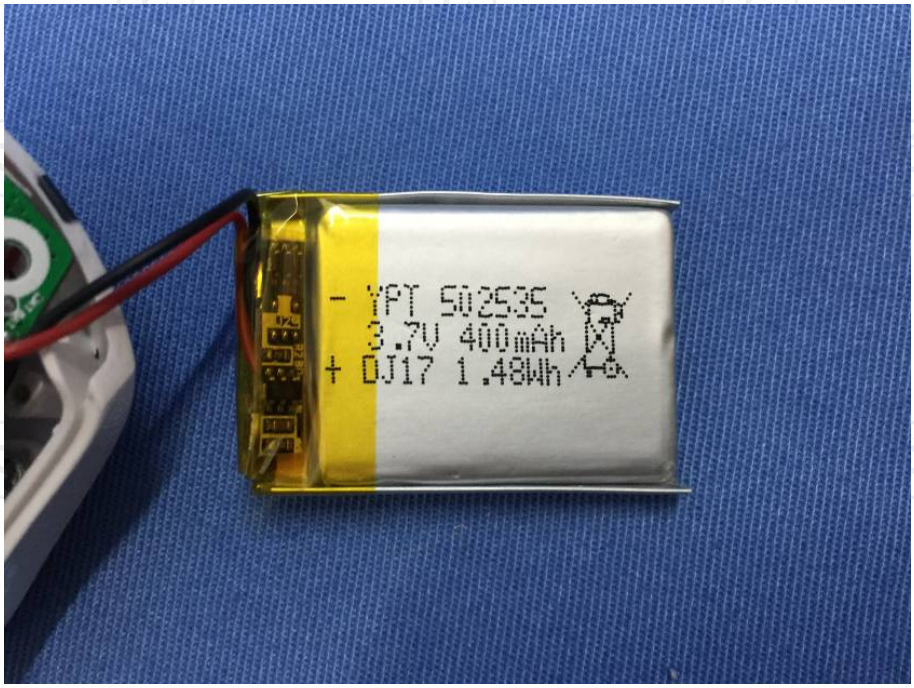
Product: WATCH SPEAKER BLACK
Model: AR117A2BLA
Internal Photos




B20-CW6656CX-V2.3
2017/10/10

FM_ANT_SG890





*******END OF REPORT*******