TEST REPORT

Reference No.	:	WTS18S12133988W
FCC ID	:	2AKSESB
Applicant	:	Smart iBlue Technology Limited
Address	:	Unit 12,10/F.,Hong Man Industrial Centre,2 Hong Man Street, Chai Wan,Hong Kong
Manufacturer	:	Dongguan Kentle Electronics Technology Ltd.
Address	:	Tiantou 2nd Indusrtial Area, Hengli Town, Dongguan City, Guangdong, China
Product	:	Smart Bulb
Model(s)	:	SBR-600, SBW-1000
Standards	:	FCC CFR47 Part 15 C Section 15.247:2018
Date of Receipt sample	:	2018-12-26
Date of Test	:	2018-12-27 to2019-01-09
Date of Issue	:	2019-01-15
Test Result	:	**Pass**

Remarks:
The results shown in this test report refer only to the sample(s) tested, this test report cannot be reproduced, except in full, without prior written permission of the company.
The report would be invalid without specific stamp of test institute and the signatures of compiler and approver.

Prepared By:
Waltek Services (Shenzhen) Co., Ltd.
Address: 1/F., Fukangtai Building, West Baima Road, Songgang Street, Baoan District, Shenzhen, Guangdong, China
Test Site/Test Location:
Waltek Services (Shenzhen) Co., Ltd.
Address: 1/F., Fukangtai Building, West Baima Road, Songgang Street, Baoan District, Shenzhen, Guangdong, China
Tel :+86-755-83551033
Fax:+86-755-83552400

Compiled by: Approved by:

Robin Zhou / Test Engineer

Philo Zhong / Manager

1 Laboratories Introduction

Waltek Services (Shenzhen) Co., Ltd is a professional third-party testing and certification laboratory with multi-year product testing and certification experience, established strictly in accordance with ISO/IEC 17025 requirements, and accredited by ILAC (International Laboratory Accreditation Cooperation) member. A2LA (American Association for Laboratory Accreditation, the certification number is 4243.01) of USA, CNAS (China National Accreditation Service for Conformity Assessment, the registration number is L3110) of China. Meanwhile, Waltek has got recognition as registration and accreditation laboratory from EMSD (Electrical and Mechanical Services Department), and American Energy star, FCC (The Federal Communications Commission), CEC (California energy efficiency), ISED Canada (Innovation, Science and Economic Development Canada). It's the strategic partner and data recognition laboratory of international authoritative organizations, such as Intertek (ETL-SEMKO), TÜV Rheinland, TÜV SÜD, etc.

Waltek Services (Shenzhen) Co., Ltd is one of the largest and the most comprehensive third party testing laboratory in China. Our test capability covered four large fields: safety test. Electro Magnetic Compatibility (EMC), and energy performance, wireless radio. As a professional, comprehensive, justice international test organization, we still keep the scientific and rigorous work attitude to help each client satisfy the international standards and assist their product enter into globe market smoothly.

1.1 Test Facility

A. Accreditations for Conformity Assessment (International)

Country/Region	Scope Covered By	Scope	Note
USA	ISO/IEC 17025	FCC ID \ SDoC(VOC/DOC)	1
Canada		IC ID \ VOC	2
Japan		MIC-T \ MIC-R	-
Europe		EMCD \ RED	-
Taiwan		NCC	-
Hong Kong		OFCA	-
Australia		RCM	-
India		WPC	-
Thailand		NTC	-
Singapore		IDA	-

Note:

1. FCC Designation No.: CN1201. Test Firm Registration No.: 523476.
2. ISED CAB identifier: CN0013

B.TCBs and Notify Bodies Recognized Testing Laboratory.

Recognized Testing Laboratory of …	Notify body number
TUV Rheinland	Optional.
Intertek	
TUV SUD	
SGS	
Phoenix Testlab GmbH	0700
Element Materials Technology Warwick Ltd.	0891
Timco Engineering, Inc.	1177
Eurofins Product Service GmbH	0681

2 Contents

Page

3 Report Revision History

Test report No.	Date of Receipt sample	Date of Test	Date of Issue	Purpose	Comment	Approved
WTS18S12133988W	2018-12-26	2018-12-27 to 2019-01-09	2019-01-15	Original	-	Valid

4 General Information

4.1 General Description of E.U.T.

Product:	Smart Bulb
Model(s):	SBR-600, SBW-1000
Model Difference:	Above models the main board are the same in PCB circuit, PCB Layout, and internal structure, only the LED board, the output power and model names are different.

4.2 Details of E.U.T.

Operation Frequency:	2402-2480MHz
Antenna installation:	Ceramic Antenna
Antenna Gain:	0 dBi
Type of modulation:	GFSK
Ratings:	Input: AC 100V-130V, 50/60Hz Output: 7W for SBR-600, 12W for SBW-1000.

4.3 Channel List

Channel No.	Frequency (MHz)	Channel No.	Frequency (MHz)	Channel No.	Frequency (MHz)	Channel No.	Frequency (MHz)
0	2402	1	2404	2	2406	3	2408
4	2410	5	2412	6	2414	7	2416
8	2418	9	2420	10	2422	11	2424
12	2426	13	2428	14	2430	15	2432
16	2434	17	2436	18	2438	19	2440
20	2442	21	2444	22	2446	23	2448
24	2450	25	2452	26	2454	27	2456
28	2458	29	2460	30	2462	31	2464
32	2466	33	2468	34	2470	35	2472
36	2474	37	2476	38	2478	39	2480

4.4 Test Mode

All test mode(s) and condition(s) mentioned were considered and evaluated respectively by performing full tests, the worst data were recorded and reported.

Test Items	Mode	Data Rate	Channel	TX/RX
Maximum Peak Output Power	BLE	1 Mbps	0/19/39	TX
Power Spectral Density	BLE	1 Mbps	0/19/39	TX
Frequency Range	BLE	1 Mbps	0/19/39	TX
Transmitter Spurious Emissions	BLE	1 Mbps	0/19/39	TX

Note The EUT has been tested under its typical operating condition. Pre-defined engineering program for regulatory testing used to control the EUT for staying in continuous transmitting.
Only the worst case data were reported.

5 Equipment Used during Test

5.1 Equipment's List

Conducted Emissions						
Item	**Equipment**	**Manufacturer**	**Model No.**	**Serial No.**	**Last Calibration Date**	**Calibration Due Date**
1.	EMI Test Receiver	R&S	ESCI	101155	2018-09-15	2019-09-14
2.	LISN	SCHWARZBECK	NSLK 8128	8128-289	2018-09-15	2019-09-14
3.	Limiter	York	MTS-IMP-136	261115-001-0024	2018-09-15	2019-09-14
4.	Cable	LARGE	RF300	-	2018-07-18	2019-07-17
3m Semi-anechoic Chamber for Radiation Emissions						
Item	**Equipment**	**Manufacturer**	**Model No.**	**Serial No.**	**Last Calibration Date**	**Calibration Due Date**
1	Spectrum Analyzer	R&S	FSP30	100091	2018-04-20	2019-04-19
2	Broad-band Horn Antenna(1-18GHz)	SCHWARZBECK	BBHA 9120 D	667	2018-05-18	2019-05-17
3	Broadband Preamplifier	COMPLIANCE DIRECTION	PAP-1G18	2004	2018-04-07	2019-04-06
4	Coaxial Cable (above 1GHz)	Top	1GHz-18GHz	EW02014-7	2018-04-07	2019-04-06
5	Spectrum Analyzer	R&S	FSP40	100501	2018-11-13	2019-11-12
6	Broad-band Horn Antenna(18-40GHz)	SCHWARZBECK	BBHA 9170	BBHA9170651	2018-10-25	2019-10-24
7	Microwave Broadband Preamplifier (18-40GHz)	SCHWARZBECK	BBV 9721	100472	2018-10-25	2019-10-24
8	Cable	Top	18-40GHz	-	2018-10-25	2019-10-24
3m Semi-anechoic Chamber for Radiation Emissions						
Item	**Equipment**	**Manufacturer**	**Model No.**	**Serial No**	**Last Calibration Date**	**Calibration Due Date**
1	Test Receiver	R&S	ESCI	101296	2018-04-20	2019-04-19
2	Trilog Broadband Antenna	SCHWARZBECK	VULB9160	9160-3325	2018-04-19	2019-04-18
3	Active Loop Antenna	Com-power	AL-130R	10160007	2018-04-17	2019-04-16
4	Amplifier	ANRITSU	MH648A	M43381	2018-04-20	2019-04-19
5	Cable	HUBER+SUHNER	CBL2	525178	2018-04-20	2019-04-19
6	Coaxial Cable (below 1GHz)	Top	TYPE16 (13M)	-	2018-04-20	2019-04-19

RF Conducted Testing						
Item	**Equipment**	**Manufacturer**	**Model No.**	**Serial No.**	**Last Calibration Date**	**Calibration Due Date**
1.	Spectrum Analyzer	R&S	FSL6	100959	2018-11-18	2019-11-17
2	Coaxial Cable	Top	10Hz-30GHz	-	2018-11-18	2019-11-17
3	Antenna Connector*	Realacc	45RSm	-	2018-11-18	2019-11-17
4	DC Block	Gwave	GDCB-3G-N-SMA	140307001	2018-11-18	2019-11-17
"*": The temporary antenna connector is soldered on the PCB board in order to perform conducted tests and this temporary antenna connector is listed in the equipment list.						

5.2 Measurement Uncertainty

Parameter	**Uncertainty**
Radio Frequency	± 1 x 10^{-6}
RF Power	± 1.0 dB
RF Power Density	± 2.2 dB
Radiated Spurious Emissions test	± 5.03 dB (30M~1000MHz)
	± 5.47 dB (1000M~25000MHz)
Conducted Emissions test	± 3.64 dB (AC mains 150KHz~30MHz)
Confidence interval：95%. Confidence factor:k=2	

5.3 Subcontracted

Whether parts of tests for the product have been subcontracted to other labs:

☐ Yes ☒ No

If Yes, list the related test items and lab information:

Test Lab: N/A

Lab address: N/A

Test items: N/A

6 Test Summary

Test Items	Test Requirement	Result
Radiated Spurious Emissions	15.247(d) 15.205(a) 15.209(a)	Pass
Conducted Emissions	15.207(a)	Pass
Bandwidth	15.247(a)(2)	Pass
Maximum conducted peak output power	15.247(b)(3),(4)	Pass
Power Spectral Density	15.247(e)	Pass
Band Edge	15.247(d)	Pass
Antenna Requirement	15.203	Pass
RF Exposure	1.1307(b)(1)	Pass
Note: Pass=Compliance; NC=Not Compliance; NT=Not Tested; N/A=Not Applicable.		

7 Conducted Emission

Test Requirement: FCC CFR 47 Part 15 Section 15.207

Test Method: ANSI C63.10:2013

Test Result: PASS

Frequency Range: 150kHz to 30MHz

Class/Severity: Class B

Limit:

Frequency (MHz)	Limit (dBμV)	
	Quasi-peak	Average
0.15 to 0.5	66 to 56	56 to 46
0.5 to 5	56	46
5 to 30	60	50

7.1 E.U.T. Operation

Operating Environment **:**

Temperature: 21.5 °C

Humidity: 51.9 % RH

Atmospheric Pressure: 101.2kPa

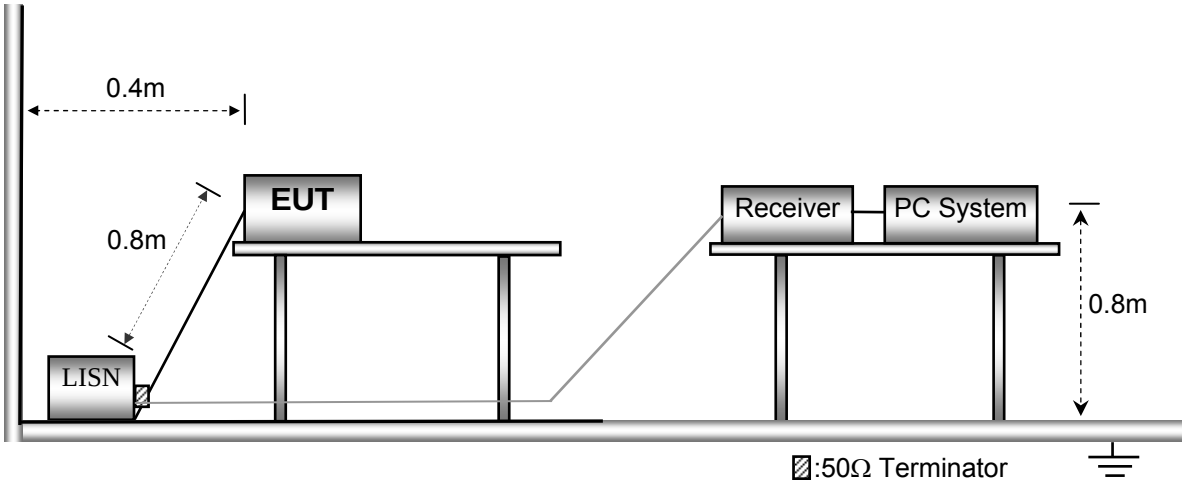
Test Voltage: AC 120V/60Hz

EUT Operation **:**

The test was performed in Transmitting mode, the worst data (low channel) were shown in the report.

7.2 EUT Setup

The conducted emission tests were performed using the setup accordance with the ANSI C63.10:2013.



7.3 Measurement Description

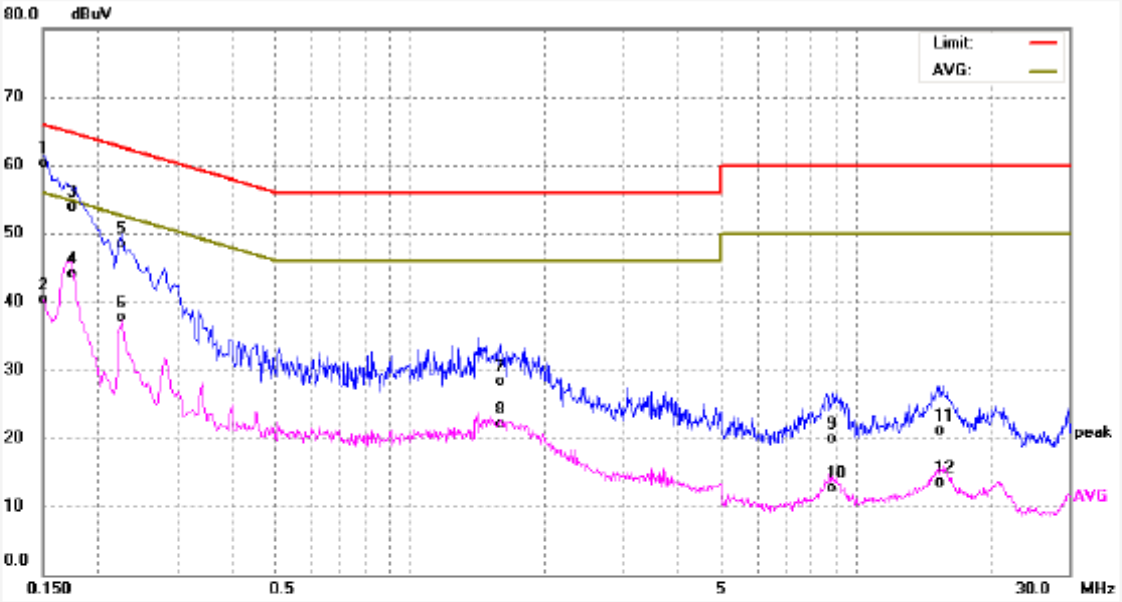
The maximised peak emissions from the EUT was scanned and measured for both the Live and Neutral Lines. Quasi-peak & average measurements were performed if peak emissions were within 6dB of the average limit line.

7.4 Conducted Emission Test Result

An initial pre-scan was performed on the live and neutral lines.

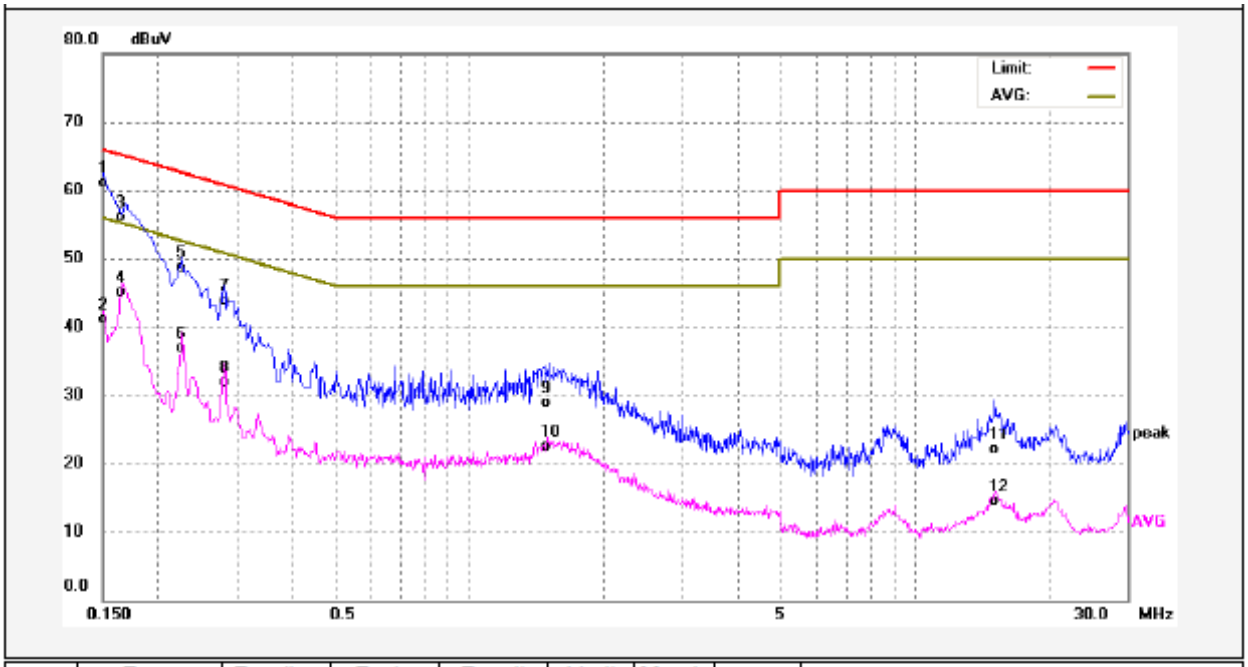
Model: SBW-1000

Live line:



No.	Freq. (MHz)	Reading (dBuV)	Factor (dB)	Result (dBuV)	Limit dBuV	Margin (dB)	Detector	Remark
1	0.1500	50.06	10.26	60.32	65.99	-5.67	QP	
2	0.1500	29.97	10.26	40.23	55.99	-15.76	AVG	
3	0.1740	43.71	10.29	54.00	64.76	-10.76	QP	
4	0.1740	33.77	10.29	44.06	54.76	-10.70	AVG	
5	0.2260	38.24	10.36	48.60	62.59	-13.99	QP	
6	0.2260	27.35	10.36	37.71	52.59	-14.88	AVG	
7	1.5940	17.80	10.50	28.30	56.00	-27.70	QP	
8	1.5940	11.59	10.50	22.09	46.00	-23.91	AVG	
9	8.8700	8.69	11.15	19.84	60.00	-40.16	QP	
10	8.8700	1.46	11.15	12.61	50.00	-37.39	AVG	
11	15.4260	10.23	10.87	21.10	60.00	-38.90	QP	
12	15.4260	2.73	10.87	13.60	50.00	-36.40	AVG	

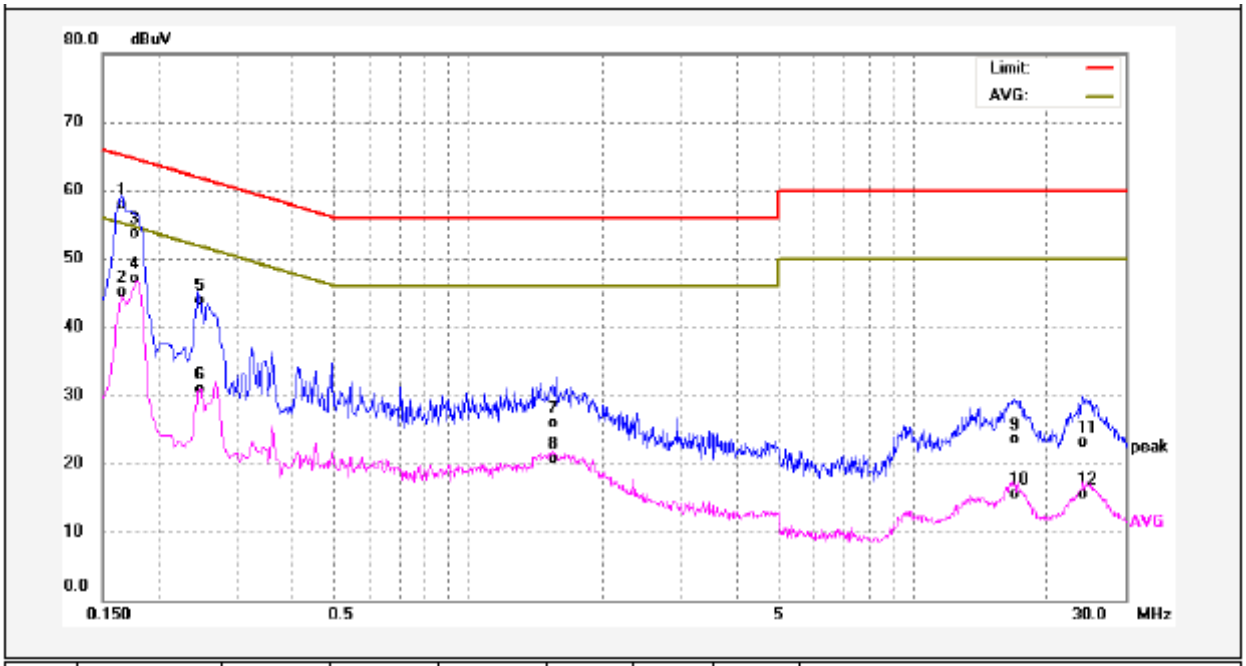
Neutral line:



No.	Freq. (MHz)	Reading (dBuV)	Factor (dB)	Result (dBuV)	Limit dBuV	Margin (dB)	Detector	Remark
1	0.1500	50.81	10.26	61.07	65.99	-4.92	QP	
2	0.1500	30.76	10.26	41.02	55.99	-14.97	AVG	
3	0.1660	45.74	10.28	56.02	65.15	-9.13	QP	
4	0.1660	34.92	10.28	45.20	55.15	-9.95	AVG	
5	0.2260	38.36	10.36	48.72	62.59	-13.87	QP	
6	0.2260	26.47	10.36	36.83	52.59	-15.76	AVG	
7	0.2819	33.59	10.40	43.99	60.76	-16.77	QP	
8	0.2819	21.51	10.40	31.91	50.76	-18.85	AVG	
9	1.4980	18.50	10.48	28.98	56.00	-27.02	QP	
10	1.4980	11.93	10.48	22.41	46.00	-23.59	AVG	
11	15.1780	11.13	10.88	22.01	60.00	-37.99	QP	
12	15.1780	3.59	10.88	14.47	50.00	-35.53	AVG	

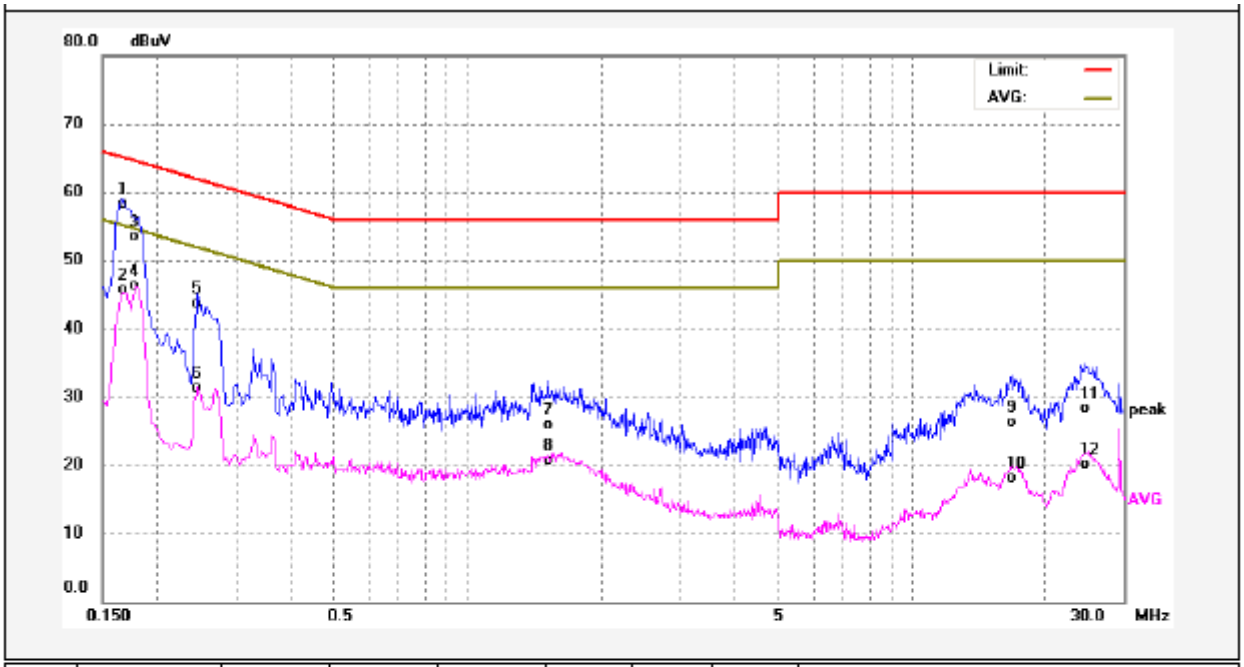
Model: SBR-600

Live line:



No.	Freq. (MHz)	Reading (dBuV)	Factor (dB)	Result (dBuV)	Limit dBuV	Margin (dB)	Detector	Remark
1	0.1660	47.66	10.28	57.94	65.15	-7.21	QP	
2	0.1660	34.76	10.28	45.04	55.15	-10.11	AVG	
3	0.1780	43.50	10.30	53.80	64.57	-10.77	QP	
4	0.1780	36.75	10.30	47.05	54.57	-7.52	AVG	
5	0.2460	33.55	10.38	43.93	61.89	-17.96	QP	
6	0.2460	20.46	10.38	30.84	51.89	-21.05	AVG	
7	1.5740	15.36	10.49	25.85	56.00	-30.15	QP	
8	1.5740	10.20	10.49	20.69	46.00	-25.31	AVG	
9	16.8700	12.62	10.83	23.45	60.00	-36.55	QP	
10	16.8700	4.65	10.83	15.48	50.00	-34.52	AVG	
11	24.1299	12.56	10.55	23.11	60.00	-36.89	QP	
12	24.1299	4.95	10.55	15.50	50.00	-34.50	AVG	

Neutral line:



No.	Freq. (MHz)	Reading (dBuV)	Factor (dB)	Result (dBuV)	Limit dBuV	Margin (dB)	Detector	Remark
1	0.1660	47.95	10.28	58.23	65.15	-6.92	QP	
2	0.1660	35.42	10.28	45.70	55.15	-9.45	AVG	
3	0.1780	43.23	10.30	53.53	64.57	-11.04	QP	
4	0.1780	36.02	10.30	46.32	54.57	-8.25	AVG	
5	0.2460	33.30	10.38	43.68	61.89	-18.21	QP	
6	0.2460	20.93	10.38	31.31	51.89	-20.58	AVG	
7	1.5180	15.52	10.48	26.00	56.00	-30.00	QP	
8	1.5180	10.23	10.48	20.71	46.00	-25.29	AVG	
9	16.7820	15.53	10.83	26.36	60.00	-33.64	QP	
10	16.7820	7.27	10.83	18.10	50.00	-31.90	AVG	
11	24.5940	17.87	10.53	28.40	60.00	-31.60	QP	
12	24.5940	9.52	10.53	20.05	50.00	-29.95	AVG	

8 Radiated Spurious Emissions

Test Requirement: FCC CFR47 Part 15 Section 15.209 & 15.247

Test Method: ANSI C63.10:2013

Test Result: PASS

Measurement Distance: 3m

Limit:

Frequency (MHz)	Field Strength		Field Strength Limit at 3m Measurement Dist	
	uV/m	Distance (m)	uV/m	dBuV/m
0.009 ~ 0.490	2400/F(kHz)	300	10000 * 2400/F(kHz)	$20\log^{(2400/F(kHz))} + 80$
0.490 ~ 1.705	24000/F(kHz)	30	100 * 24000/F(kHz)	$20\log^{(24000/F(kHz))} + 40$
1.705 ~ 30	30	30	100 * 30	$20\log^{(30)} + 40$
30 ~ 88	100	3	100	$20\log^{(100)}$
88 ~ 216	150	3	150	$20\log^{(150)}$
216 ~ 960	200	3	200	$20\log^{(200)}$
Above 960	500	3	500	$20\log^{(500)}$

8.1 EUT Operation

Operating Environment **:**

Temperature: 23.5 °C

Humidity: 52.1 % RH

Atmospheric Pressure: 101.2kPa

Test Voltage: AC 120V/60Hz

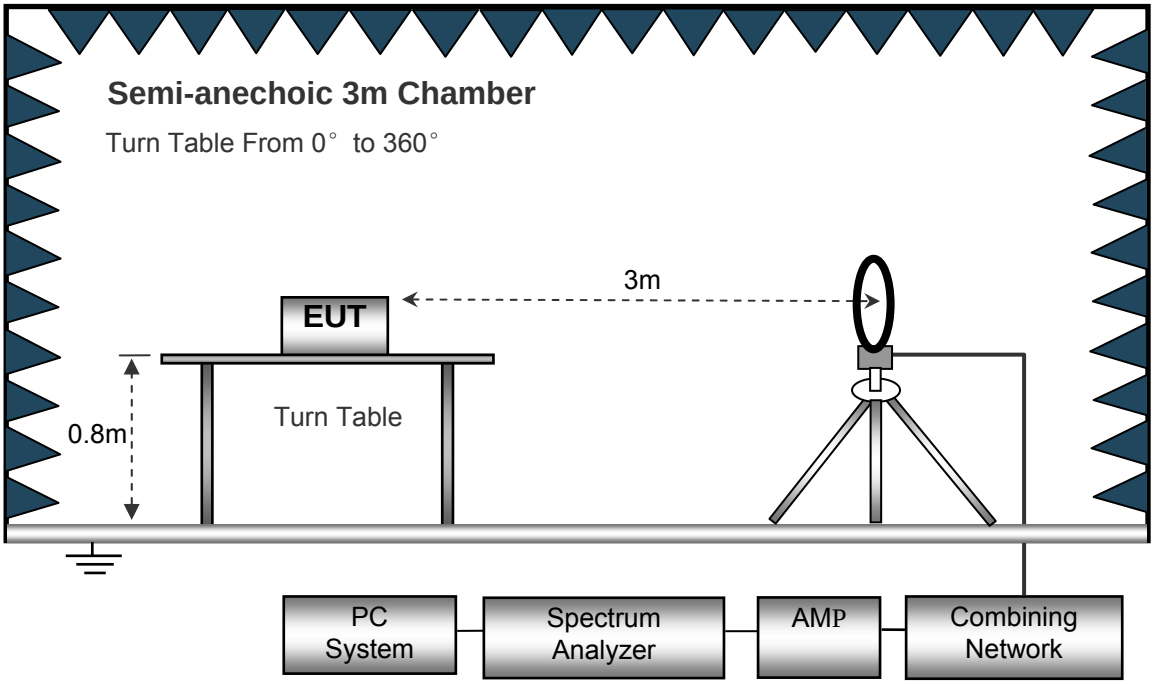
EUT Operation :

The test was performed in Transmitting mode. the test data were shown in the report.

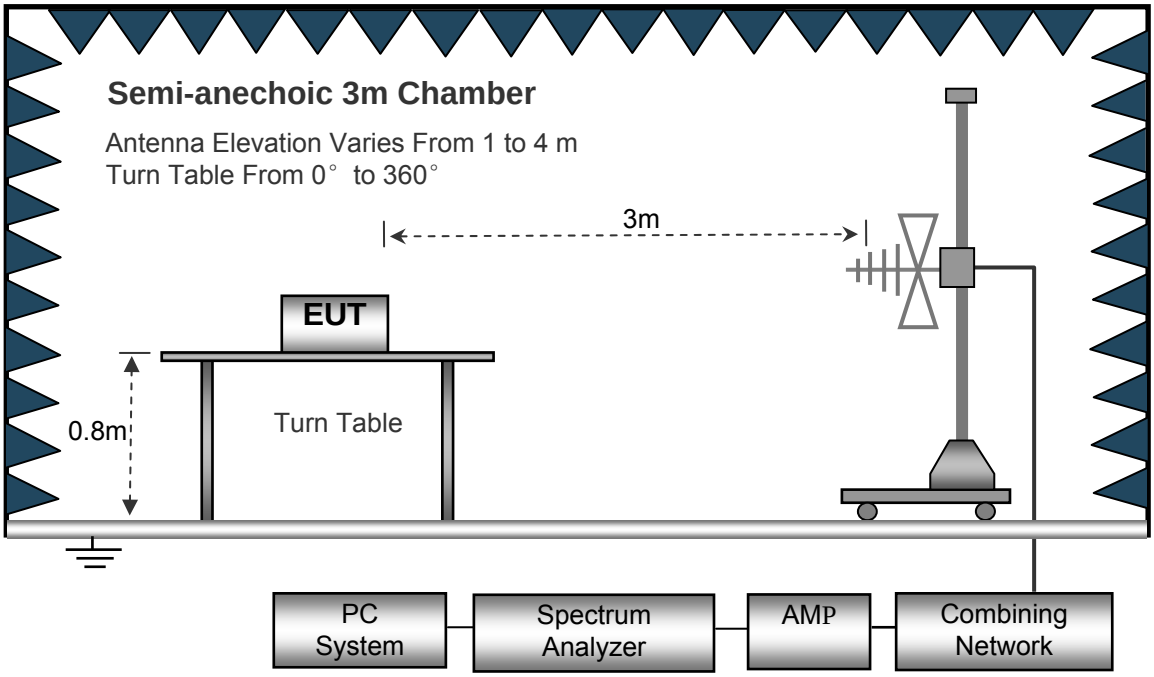
8.2 Test Setup

The radiated emission tests were performed in the 3m Semi- Anechoic Chamber test site, using the setup accordance with the ANSI C63.10:2013.

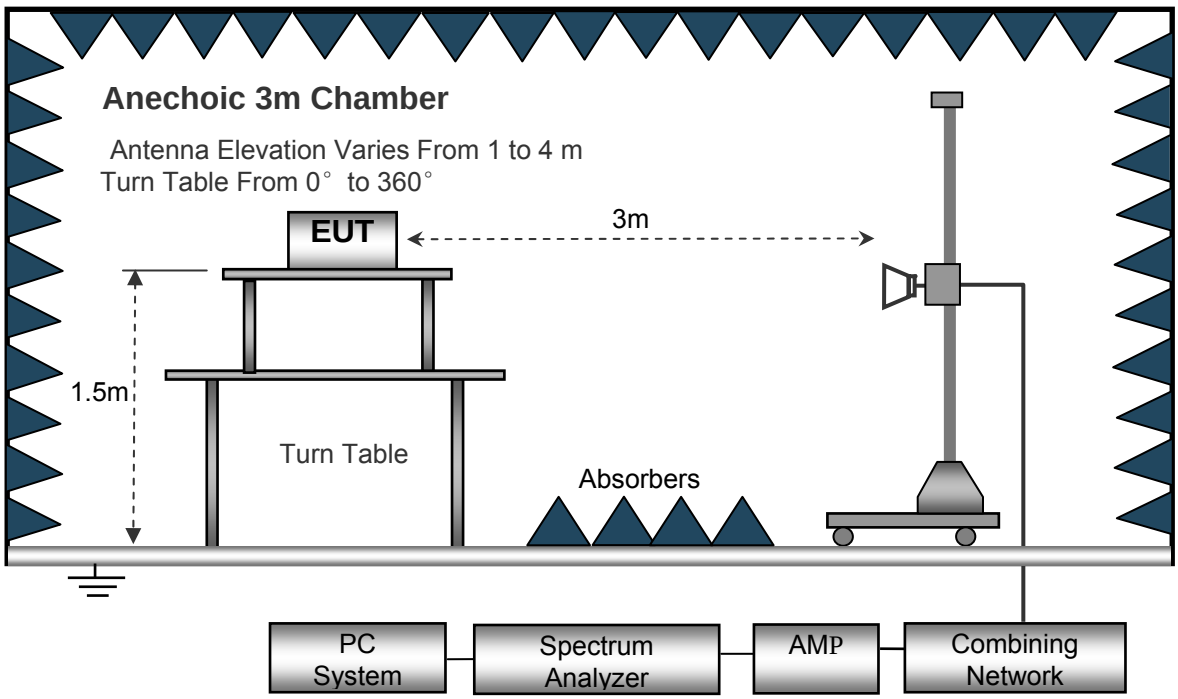
The test setup for emission measurement below 30MHz.



The test setup for emission measurement from 30 MHz to 1 GHz.



The test setup for emission measurement above 1 GHz.



8.3 Spectrum Analyzer Setup

Below 30MHz

Sweep Speed ..... Auto
IF Bandwidth..... 10kHz
Video Bandwidth..... 10kHz
Resolution Bandwidth..... 10kHz

30MHz ~ 1GHz

Sweep Speed ..... Auto
Detector ..... PK
Resolution Bandwidth..... 100kHz
Video Bandwidth..... 300kHz

Above 1GHz

Sweep Speed ..... Auto
Detector ..... PK
Resolution Bandwidth..... 1MHz
Video Bandwidth..... 3MHz
Detector ..... Ave.
Resolution Bandwidth..... 1MHz
Video Bandwidth..... 10Hz

8.4 Test Procedure

1. The EUT is placed on a turntable. For below 1GHz, the EUT is 0.8m above ground plane; For above1GHz, the EUT is 1.5m above ground plane.
2. The turntable shall be rotated for 360 degrees to determine the position of maximum emission level.
3. EUT is set 3m away from the receiving antenna, which is moved from 1m to 4m to find out the maximum emissions.
4. Maximum procedure was performed on the six highest emissions to ensure EUT compliance.
5. And also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical.
6. Repeat above procedures until the measurements for all frequencies are complete.
7. The radiation measurements are performed in X,Y and Z axis positioning(X denotes lying on the table, Y denotes side stand and Z denotes vertical stand),the worst condition was tested putting the eut in X axis,so the worst data were shown as follow.
8. 2.4GHz high –pass filter is used druing radiated emissions above 1GHz measurement.

8.5 Corrected Amplitude & Margin Calculation

The Corrected Amplitude is calculated by adding the Antenna Factor and Cable Factor, and subtracting the Amplifier Gain from the Amplitude reading. The basic equation is as follows:

Corr. Ampl. = Indicated Reading + Antenna Factor + Cable Factor - Amplifier Gain

The “Margin” column of the following data tables indicates the degree of compliance with the applicable limit. For example, a margin of -7dB means the emission is 7dB below the maximum limit for Class B. The equation for margin calculation is as follows:

Margin = Corr. Ampl. – Limit

8.6 Summary of Test Results

Test Frequency : 9 kHz to 30 MHz

The measurements were more than 20 dB below the limit and not reported.

Test Frequency : 30 MHz ~ 18 GHz

Model: SBW-1000

Frequency	Receiver Reading	Detector	Turn table Angle	RX Antenna		Corrected Factor	Corrected Amplitude	FCC Part 15.247/209/205	
				Height	Polar			Limit	Margin
(MHz)	(dBμV)	(PK/QP/Ave)	Degree	(m)	(H/V)	(dB)	(dBμV/m)	(dBμV/m)	(dB)
GFSK Low Channel 2402MHz									
37.42	36.92	QP	212	1.1	H	-16.75	20.17	40.00	-19.83
37.42	53.18	QP	165	1.0	V	-16.75	36.43	40.00	-3.57
4804.00	44.75	PK	84	1.6	V	-1.06	43.69	74.00	-30.31
4804.00	35.13	Ave	84	1.6	V	-1.06	34.07	54.00	-19.93
7206.00	45.27	PK	323	1.7	H	1.33	46.60	74.00	-27.40
7206.00	32.94	Ave	323	1.7	H	1.33	34.27	54.00	-19.73
2335.70	45.14	PK	314	1.0	V	-13.19	31.95	74.00	-42.05
2335.70	35.12	Ave	314	1.0	V	-13.19	21.93	54.00	-32.07
2387.43	42.19	PK	229	1.5	H	-13.14	29.05	74.00	-44.95
2387.43	34.17	Ave	229	1.5	H	-13.14	21.03	54.00	-32.97
2486.53	43.38	PK	199	1.7	V	-13.08	30.30	74.00	-43.70
2486.53	33.39	Ave	199	1.7	V	-13.08	20.31	54.00	-33.69

Frequency	Receiver Reading	Detector	Turn table Angle	RX Antenna		Corrected Factor	Corrected Amplitude	FCC Part 15.247/209/205	
				Height	Polar			Limit	Margin
(MHz)	(dBμV)	(PK/QP/Ave)	Degree	(m)	(H/V)	(dB)	(dBμV/m)	(dBμV/m)	(dB)
GFSK Middle Channel 2440MHz									
37.42	36.06	QP	326	1.3	H	-16.75	19.31	40.00	-20.69
37.42	52.19	QP	269	1.4	V	-16.75	35.44	40.00	-4.56
4880.00	44.11	PK	257	1.5	V	-0.62	43.49	74.00	-30.51
4880.00	35.30	Ave	257	1.5	V	-0.62	34.68	54.00	-19.32
7320.00	46.06	PK	147	1.7	H	2.21	48.27	74.00	-25.73
7320.00	32.92	Ave	147	1.7	H	2.21	35.13	54.00	-18.87
2348.30	45.06	PK	86	1.1	V	-13.19	31.87	74.00	-42.13
2348.30	33.71	Ave	86	1.1	V	-13.19	20.52	54.00	-33.48
2374.03	42.61	PK	169	1.0	H	-13.14	29.47	74.00	-44.53
2374.03	33.14	Ave	169	1.0	H	-13.14	20.00	54.00	-34.00
2493.23	42.67	PK	296	1.4	V	-13.08	29.59	74.00	-44.41
2493.23	34.27	Ave	296	1.4	V	-13.08	21.19	54.00	-32.81

Frequency	Receiver Reading	Detector	Turn table Angle	RX Antenna		Corrected Factor	Corrected Amplitude	FCC Part 15.247/209/205	
				Height	Polar			Limit	Margin
(MHz)	(dBμV)	(PK/QP/Ave)	Degree	(m)	(H/V)	(dB)	(dBμV/m)	(dBμV/m)	(dB)
GFSK High Channel 2480MHz									
37.42	35.31	QP	357	1.4	H	-16.75	18.56	40.00	-21.44
37.42	52.54	QP	49	1.7	V	-16.75	35.79	40.00	-4.21
4960.00	44.21	PK	142	1.3	V	-0.24	43.97	74.00	-30.03
4960.00	35.11	Ave	142	1.3	V	-0.24	34.87	54.00	-19.13
7440.00	45.76	PK	2	1.4	H	2.84	48.60	74.00	-25.40
7440.00	34.12	Ave	2	1.4	H	2.84	36.96	54.00	-17.04
2310.15	45.32	PK	275	1.6	V	-13.19	32.13	74.00	-41.87
2310.15	33.55	Ave	275	1.6	V	-13.19	20.36	54.00	-33.64
2387.47	42.23	PK	146	1.7	H	-13.14	29.09	74.00	-44.91
2387.47	33.09	Ave	146	1.7	H	-13.14	19.95	54.00	-34.05
2499.67	43.05	PK	119	1.1	V	-13.08	29.97	74.00	-44.03
2499.67	33.83	Ave	119	1.1	V	-13.08	20.75	54.00	-33.25

Model: SBR-600

Frequency	Receiver Reading	Detector	Turn table Angle	RX Antenna		Corrected Factor	Corrected Amplitude	FCC Part 15.247/209/205	
				Height	Polar			Limit	Margin
(MHz)	(dBμV)	(PK/QP/Ave)	Degree	(m)	(H/V)	(dB)	(dBμV/m)	(dBμV/m)	(dB)
GFSK Low Channel 2402MHz									
234.17	47.11	QP	104	1.9	H	-15.87	31.24	46.00	-14.76
234.17	54.20	QP	84	1.2	V	-15.87	38.33	46.00	-7.67
4804.00	44.50	PK	300	1.4	V	-1.06	43.44	74.00	-30.56
4804.00	35.74	Ave	300	1.4	V	-1.06	34.68	54.00	-19.32
7206.00	43.25	PK	85	1.2	H	1.33	44.58	74.00	-29.42
7206.00	34.40	Ave	85	1.2	H	1.33	35.73	54.00	-18.27
2327.05	46.52	PK	266	1.4	V	-13.19	33.33	74.00	-40.67
2327.05	33.77	Ave	266	1.4	V	-13.19	20.58	54.00	-33.42
2354.61	43.72	PK	169	2.0	H	-13.14	30.58	74.00	-43.42
2354.61	33.25	Ave	169	2.0	H	-13.14	20.11	54.00	-33.89
2484.12	42.52	PK	163	1.1	V	-13.08	29.44	74.00	-44.56
2484.12	33.40	Ave	163	1.1	V	-13.08	20.32	54.00	-33.68

Frequency	Receiver Reading	Detector	Turn table Angle	RX Antenna		Corrected Factor	Corrected Amplitude	FCC Part 15.247/209/205	
				Height	Polar			Limit	Margin
(MHz)	(dBμV)	(PK/QP/Ave)	Degree	(m)	(H/V)	(dB)	(dBμV/m)	(dBμV/m)	(dB)
GFSK Middle Channel 2440MHz									
234.17	47.27	QP	138	1.2	H	-15.87	31.40	46.00	-14.60
234.17	53.37	QP	188	1.8	V	-15.87	37.50	46.00	-8.50
4880.00	43.46	PK	137	1.7	V	-0.62	42.84	74.00	-31.16
4880.00	36.91	Ave	137	1.7	V	-0.62	36.29	54.00	-17.71
7320.00	42.81	PK	86	1.0	H	2.21	45.02	74.00	-28.98
7320.00	32.93	Ave	86	1.0	H	2.21	35.14	54.00	-18.86
2316.35	45.54	PK	93	1.7	V	-13.19	32.35	74.00	-41.65
2316.35	33.37	Ave	93	1.7	V	-13.19	20.18	54.00	-33.82
2388.56	42.66	PK	31	1.5	H	-13.14	29.52	74.00	-44.48
2388.56	34.42	Ave	31	1.5	H	-13.14	21.28	54.00	-32.72
2483.79	44.80	PK	232	2.0	V	-13.08	31.72	74.00	-42.28
2483.79	33.79	Ave	232	2.0	V	-13.08	20.71	54.00	-33.29

Frequency	Receiver Reading	Detector	Turn table Angle	RX Antenna		Corrected Factor	Corrected Amplitude	FCC Part 15.247/209/205	
				Height	Polar			Limit	Margin
(MHz)	(dBμV)	(PK/QP/Ave)	Degree	(m)	(H/V)	(dB)	(dBμV/m)	(dBμV/m)	(dB)
GFSK High Channel 2480MHz									
234.17	47.48	QP	304	1.4	H	-15.87	31.61	46.00	-14.39
234.17	52.79	QP	277	1.9	V	-15.87	36.92	46.00	-9.08
4960.00	42.82	PK	236	1.9	V	-0.24	42.58	74.00	-31.42
4960.00	36.99	Ave	236	1.9	V	-0.24	36.75	54.00	-17.25
7440.00	43.15	PK	167	1.3	H	2.84	45.99	74.00	-28.01
7440.00	33.50	Ave	167	1.3	H	2.84	36.34	54.00	-17.66
2318.84	46.00	PK	14	1.1	V	-13.19	32.81	74.00	-41.19
2318.84	35.56	Ave	14	1.1	V	-13.19	22.37	54.00	-31.63
2361.62	42.02	PK	223	1.9	H	-13.14	28.88	74.00	-45.12
2361.62	34.81	Ave	223	1.9	H	-13.14	21.67	54.00	-32.33
2487.88	44.70	PK	20	1.6	V	-13.08	31.62	74.00	-42.38
2487.88	34.67	Ave	20	1.6	V	-13.08	21.59	54.00	-32.41

Test Frequency : Above 18GHz

The measurements were more than 20 dB below the limit and not reported.

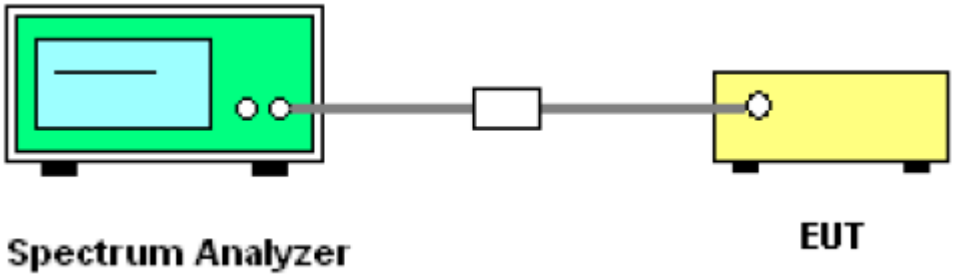
9 Band Edge Measurement

Test Requirement:	FCC CFR47 Part 15 Section 15.247
Test Method:	558074 D01 15.247 Meas Guidance v05 August 24, 2018
Test Limit:	Regulation 15.247 (d),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. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under paragraph (b)(3) of this section, the attenuation required under this paragraph shall be 30 dB instead of 20 dB. Attenuation below the general limits specified in §15.209(a) is not required. In addition, radiated emissions which fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emission limits specified in §15.209(a) (see §15.205(c)).
Test Mode:	Transmitting

9.1 Test Produce

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. Turn on the EUT and connect its antenna terminal to measurement instrument via a low loss cable. Then set it to any one measured frequency within its operating range, and make sure the instrument is operated in its linear range.
3. Set RBW to 100 kHz and VBW of spectrum analyzer to 300 kHz with a convenient frequency span including 100 kHz bandwidth from band edge.
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.

9.2 Test Setup

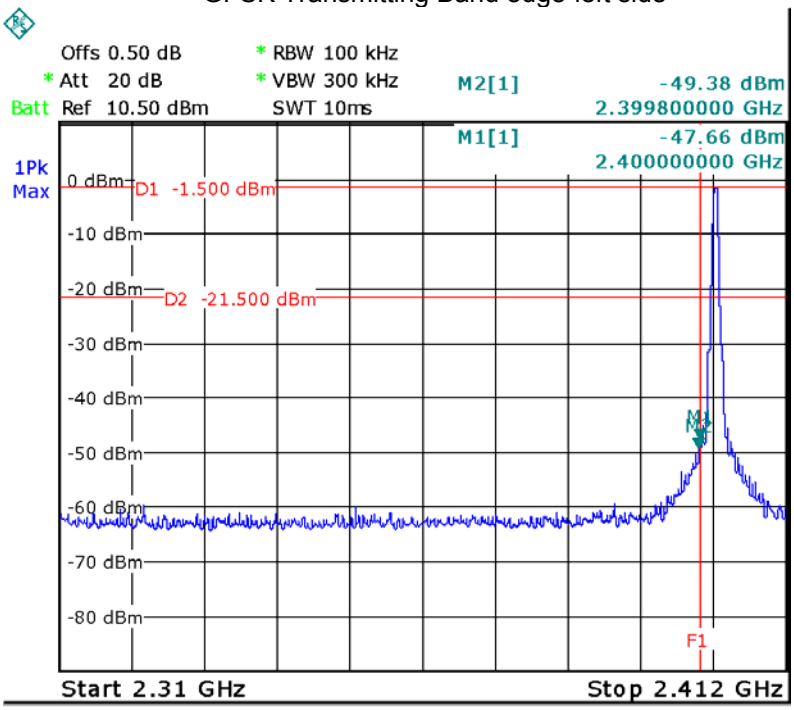


9.3 Test Result

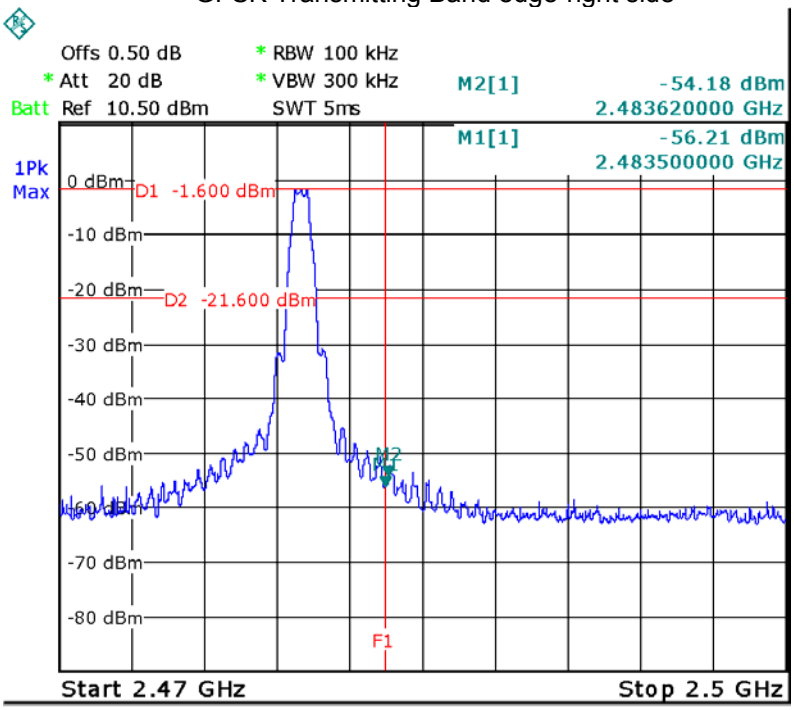
Test result plots shown as follows:

Test plots

GFSK Transmitting Band edge-left side



GFSK Transmitting Band edge-right side



10 Bandwidth Measurement

Test Requirement: FCC CFR47 Part 15 Section 15.247

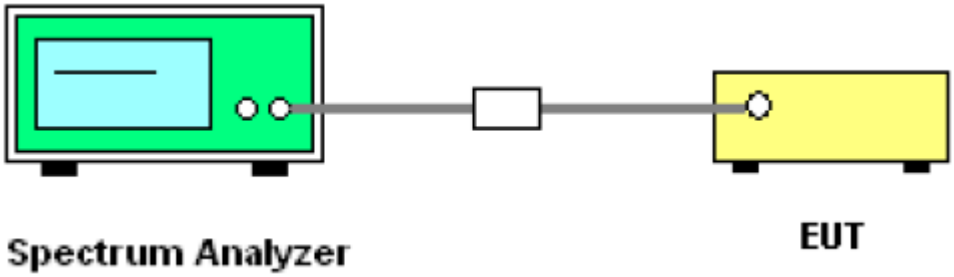
Test Method: 558074 D01 15.247 Meas Guidance v05 August 24, 2018

10.1 Test Procedure:

1. Remove the antenna from the EUT and then connect a low RF cable from the antenna port to the spectrum;

2. Set the spectrum analyzer: RBW = 100kHz, VBW = 300kHz

10.2 Test Setup



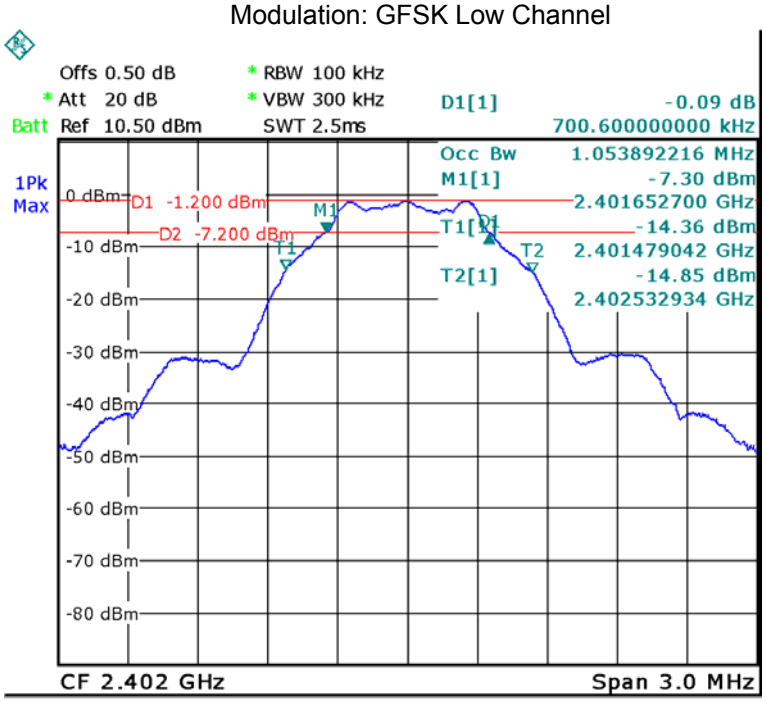
10.3 Test Result:

6dB Bandwidth (MHz)			99% Bandwidth (MHz)		
Low	Middle	High	Low	Middle	High
0.701	0.701	0.701	1.054	1.054	1.054

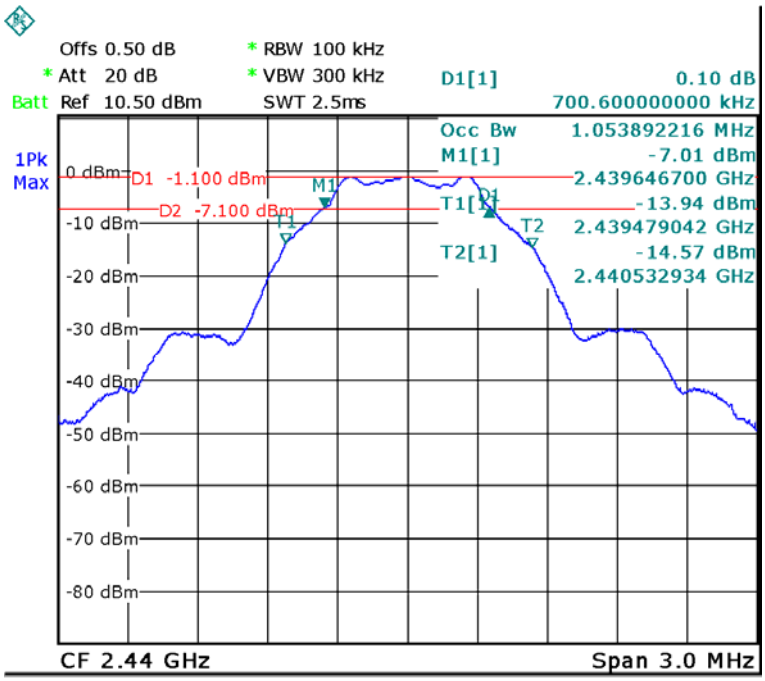
Test result plot as follows:

Test Plot

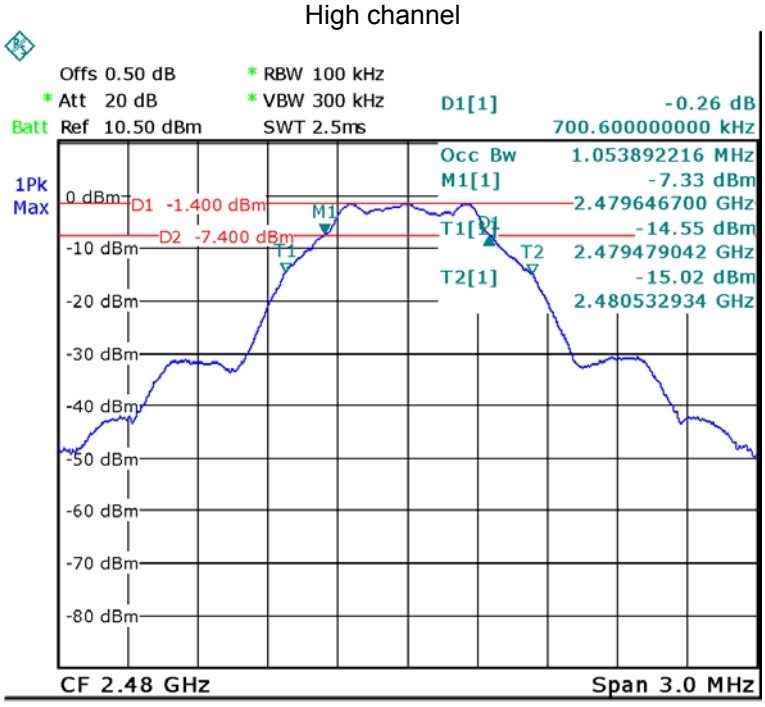
Modulation: GFSK Low Channel



Middle channel



High channel



11 Maximum conducted peak Output Power

Test Requirement: FCC CFR47 Part 15 Section 15.247

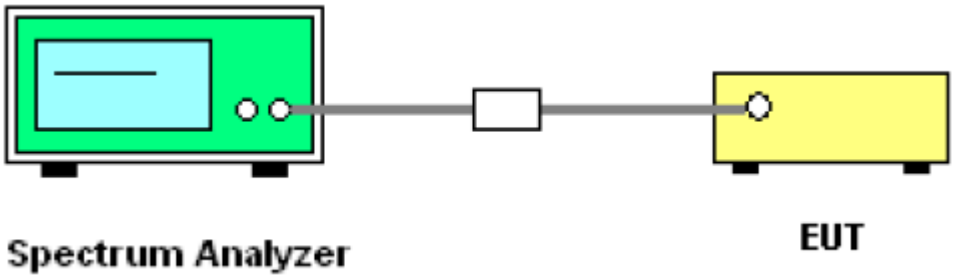
Test Method: 558074 D01 15.247 Meas Guidance v05 August 24, 2018

11.1 Test Procedure:

558074 D01 15.247 Meas Guidance v05 August 24, 2018

1. Remove the antenna from the EUT and then connect a low RF cable from the antenna port to the spectrum.
2. Set the spectrum analyzer: RBW = 1 MHz. VBW = 3 MHz. Sweep = auto; Detector Function = Peak, Set the span to fully encompass the DTS bandwidth.
3. Keep the EUT in transmitting at lowest, medium and highest channel individually. Record the max value.

11.2 Test Setup



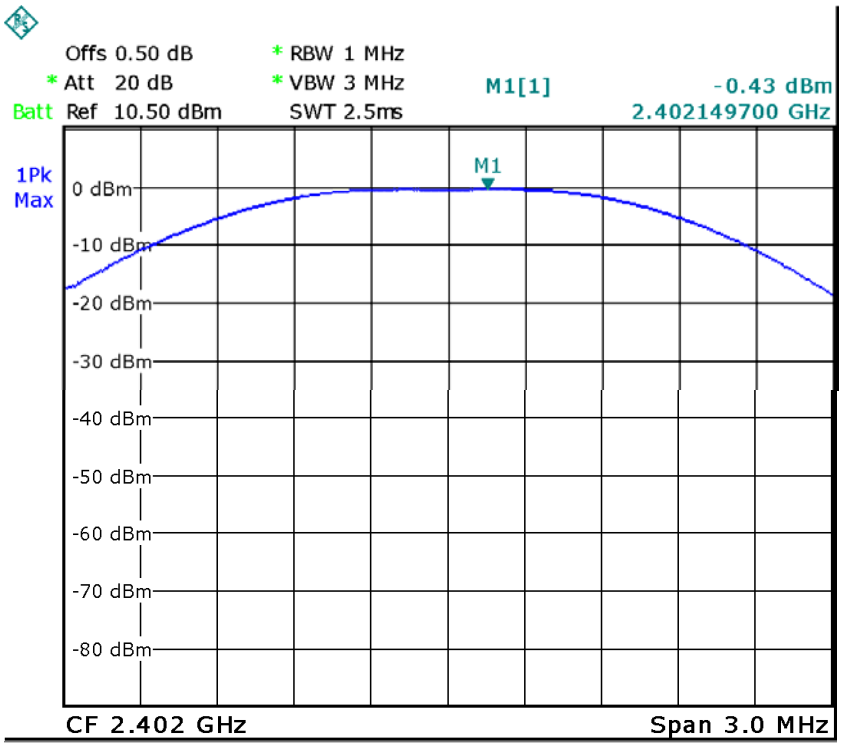
11.3 Test Result:

Maximum conducted Peak Output Power (dBm)		
Low	Middle	High
-0.43	**-0.18**	-0.62
Limit: 1W/30dBm		

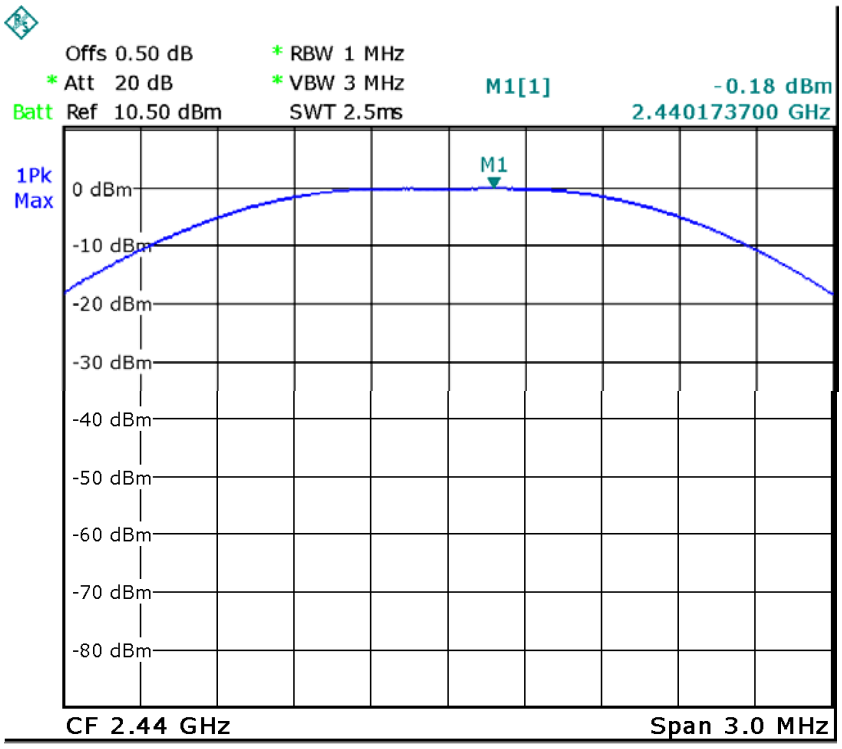
Test result plot as follows:

Modulation: GFSK

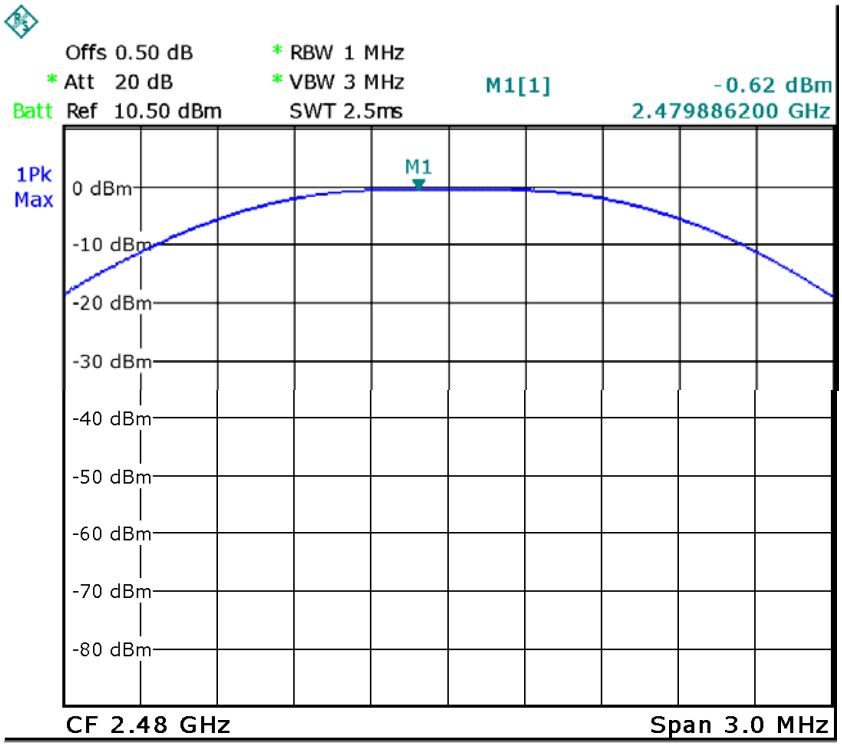
Low Channel



Middle channel



High channel



12 Power Spectral density

Test Requirement: FCC CFR47 Part 15 Section 15.247

Test Method: 558074 D01 15.247 Meas Guidance v05 August 24, 2018

12.1 Test Procedure:

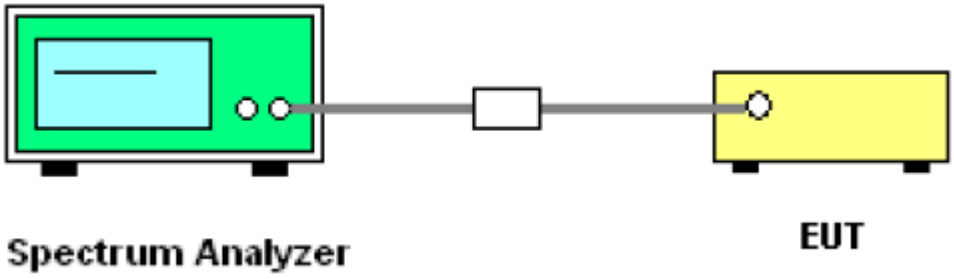
558074 D01 15.247 Meas Guidance v05 August 24, 2018

1. Remove the antenna from the EUT and then connect a low RF cable from the antenna port to the spectrum.

2. Set the spectrum analyzer: RBW = 3kHz. VBW = 10kHz , Span = 1.5 times the DTS channel bandwidth(6 dB bandwidth). Sweep = auto; Detector Function = Peak. Trace = Max hold.

3. Allow the trace to stabilize. Use the marker-delta function to determine the separation between the peaks of the adjacent channels. The limit is specified in one of the subparagraphs of this Section Submit this plot.

12.2 Test Setup

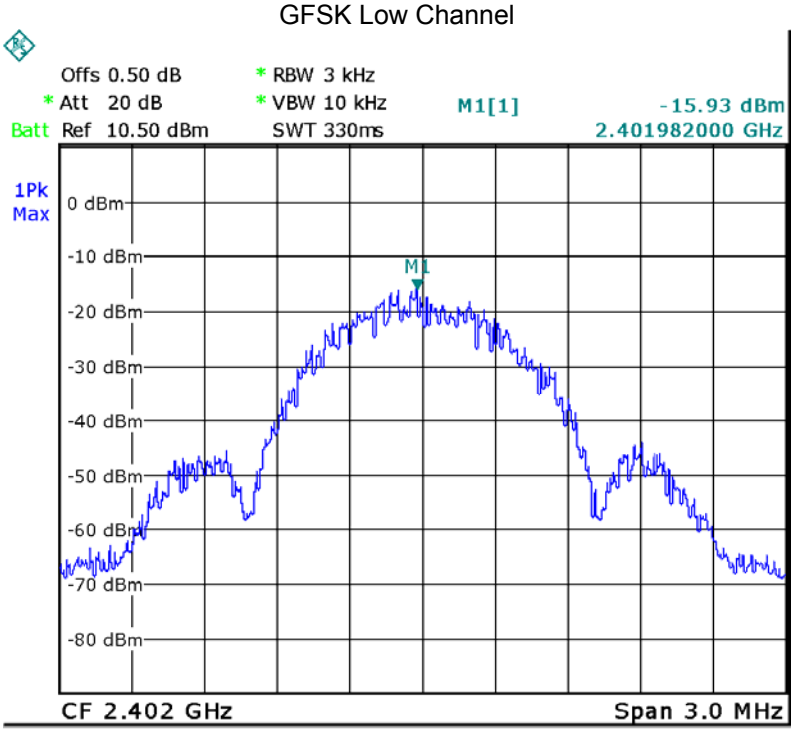


12.3 Test Result:

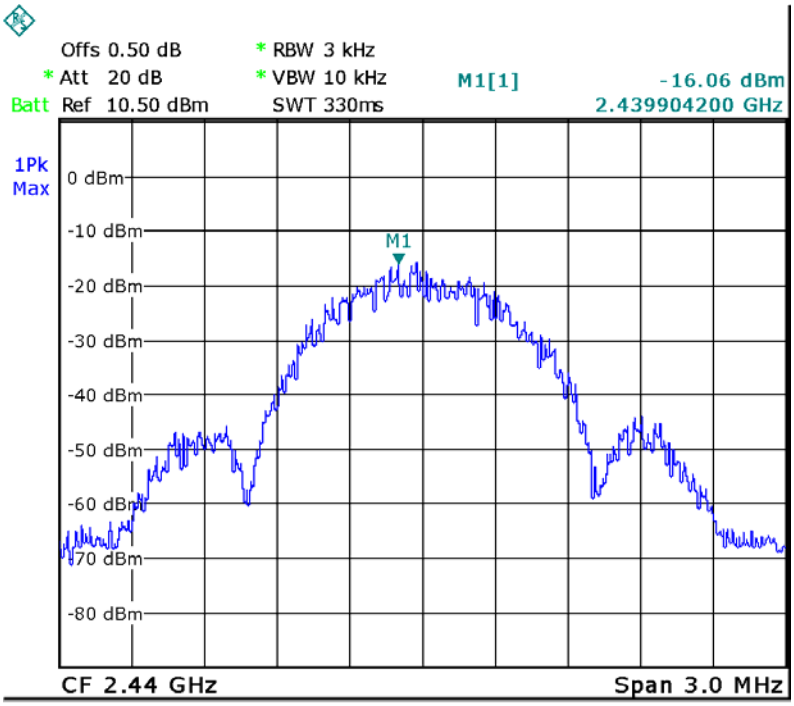
Power Spectral (dBm per 3kHz)		
Low	Middle	High
-15.93	-16.06	-16.46
Limit: 8dBm per 3kHz		

Test Plot

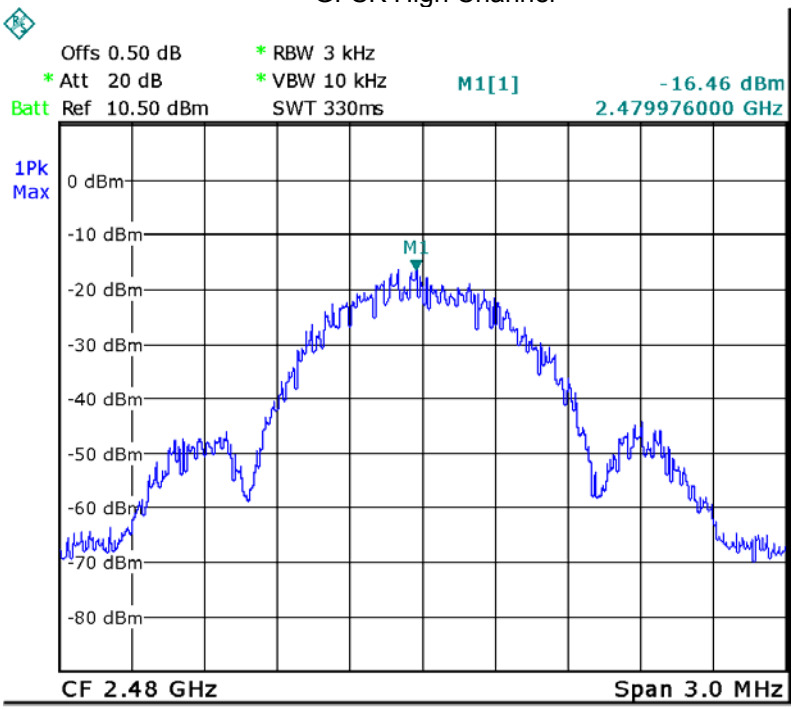
GFSK Low Channel



GFSK Middle Channel



GFSK High Channel



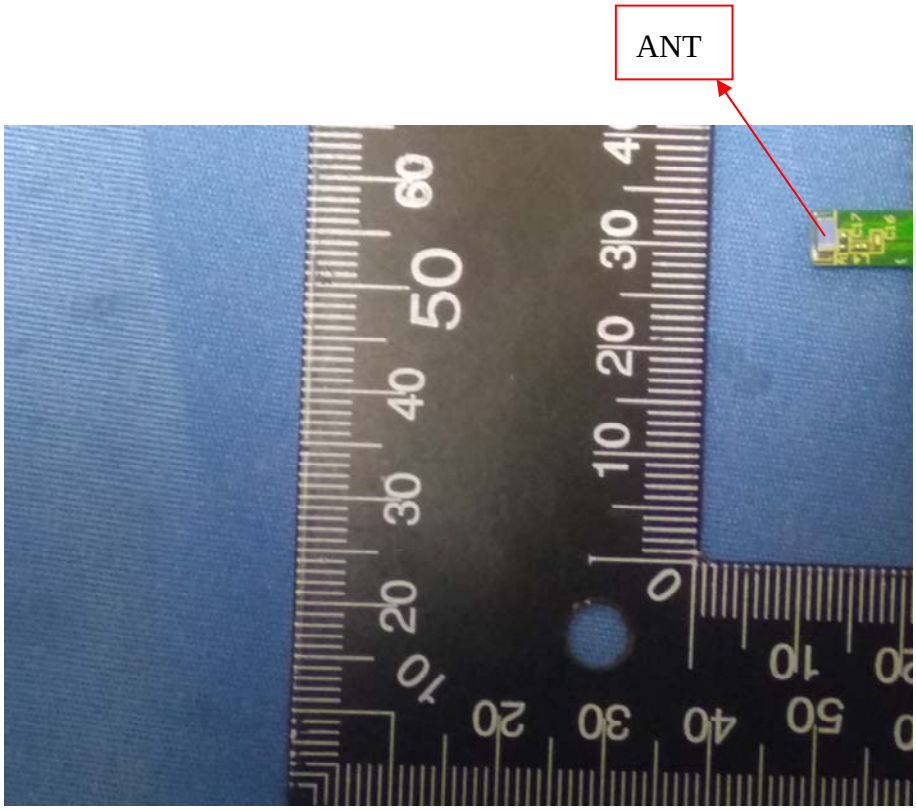
13 Antenna Requirement

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 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 use of a standard antenna jack or electrical connector is prohibited. This requirement does not apply to carrier current devices or to devices operated under the provisions of §15.211, §15.213, §15.217, §15.219, or §15.221. Further, this requirement does not apply to intentional radiators that must be professionally installed, such as perimeter protection systems and some field disturbance sensors, or to other intentional radiators which, in accordance with §15.31(d), must be measured at the installation site. However, the installer shall be responsible for ensuring that the proper antenna is employed so that the limits in this part are not exceeded.

For intentional device, according to FCC 47 CFR Section 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.

Result:

The EUT has one Ceramic Antenna, the gain is 0dBi. meets the requirements of FCC 15.203.



14 FCC ID: 2AKSESB RF Exposure Report

Test Requirement: FCC Part 1.1307

Evaluation Method: FCC Part 2.1091 & KDB 447498 D01 General RF Exposure Guidance v06

14.1 Requirements

Systems operating under the provisions of this section shall be operated in a manner that ensures that the public is not exposed to radio frequency energy levels in excess limit for maximum permissible exposure. In accordance with 47 CFR FCC Part 2 Subpart J, section 2.1091 this device has been defined as a mobile device whereby a distance of 0.2 m normally can be maintained between the user and the device.

14.2 The procedures / limit

(A) Limits for Occupational / Controlled Exposure

Frequency Range (MHz)	Electric Field Strength (E) (V/m)	Magnetic Field Strength (H) (A/m)	Power Density (S) (mW/ cm^2)	Averaging Time $\|E\|^2$,$\|H\|^2$or S (minutes)
0.3-3.0	614	1.63	(100)*	6
3.0-30	1842 / f	4.89 / f	(900 / f)*	6
30-300	61.4	0.163	1.0	6
300-1500			F/300	6
1500-100,000			5	6

(B) Limits for General Population / Uncontrolled Exposure

Frequency Range (MHz)	Electric Field Strength (E) (V/m)	Magnetic Field Strength (H) (A/m)	Power Density (S) (mW/ cm^2)	Averaging Time $\|E\|^2$,$\|H\|^2$ or S (minutes)
0.3-1.34	614	1.63	(100)*	30
1.34-30	824/f	2.19/f	(180/f)*	30
30-300	27.5	0.073	0.2	30
300-1500			F/1500	30
1500-100,000			1.0	30

Note: f = frequency in MHz; *Plane-wave equivalent power density

14.3 MPE Calculation Method

$$S = \frac{P \times G}{4 \times \pi \times R^2}$$

S = power density (in appropriate units, e.g. mW/cm^2)
P = output power to the antenna (in appropriate units, e.g., mW).
G = power gain of the antenna in the direction of interest relative to an isotropic radiator, the power gain factor, is normally numeric gain.
R = distance to the center of radiation of the antenna (appropriate units, e.g., cm)

From the peak EUT RF output power, the minimum mobile separation distance, R=20cm, as well as the gain of the used antenna, the RF power density can be obtained

Antenna Gain (dBi)	Antenna Gain (numeric)	Max. conducted Output Power (dBm)	Max. conducted Output Power (mW)	Power Density (mW/cm2)	Limit of Power Density (mW/cm2)	Reult
0	1.000	-0.18	0.96	0.00019	1	Compliance

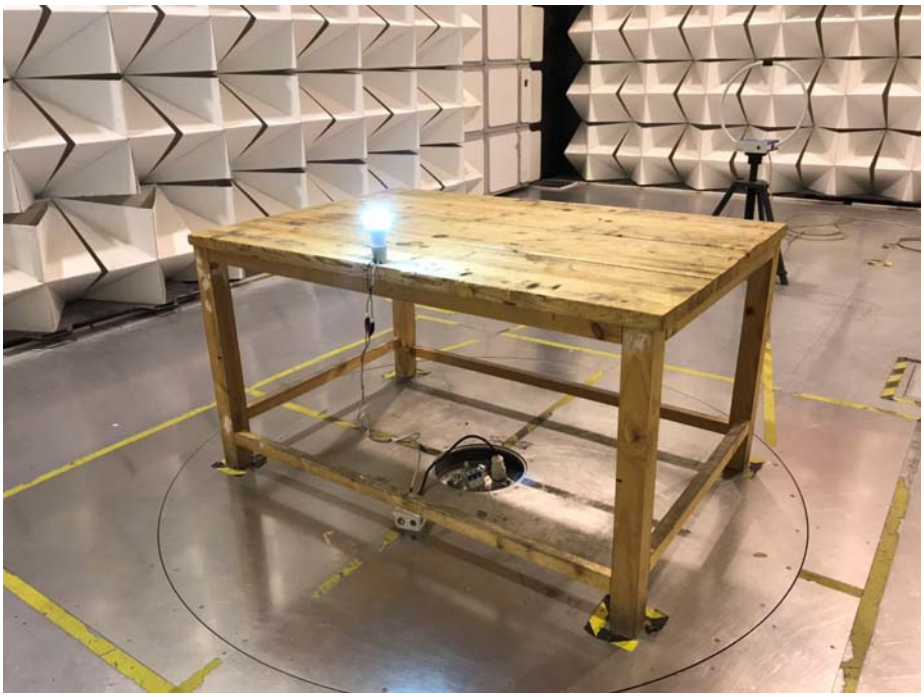
14.4 Result: Compliance

No SAR measurement is required.

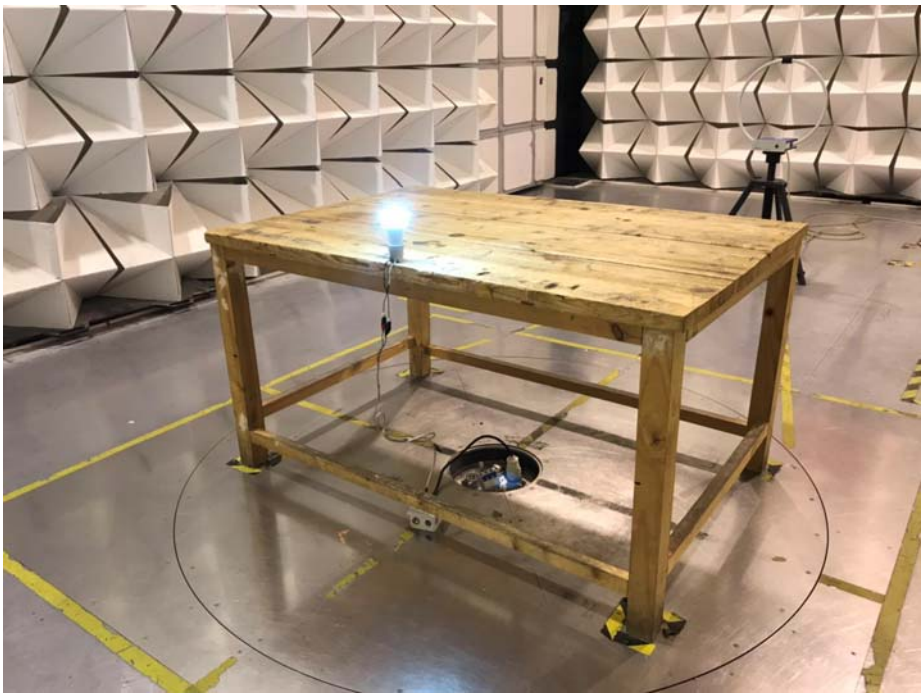
15 Photographs–EUT Test Setup Photos

15.1 Radiated Spurious Emissions

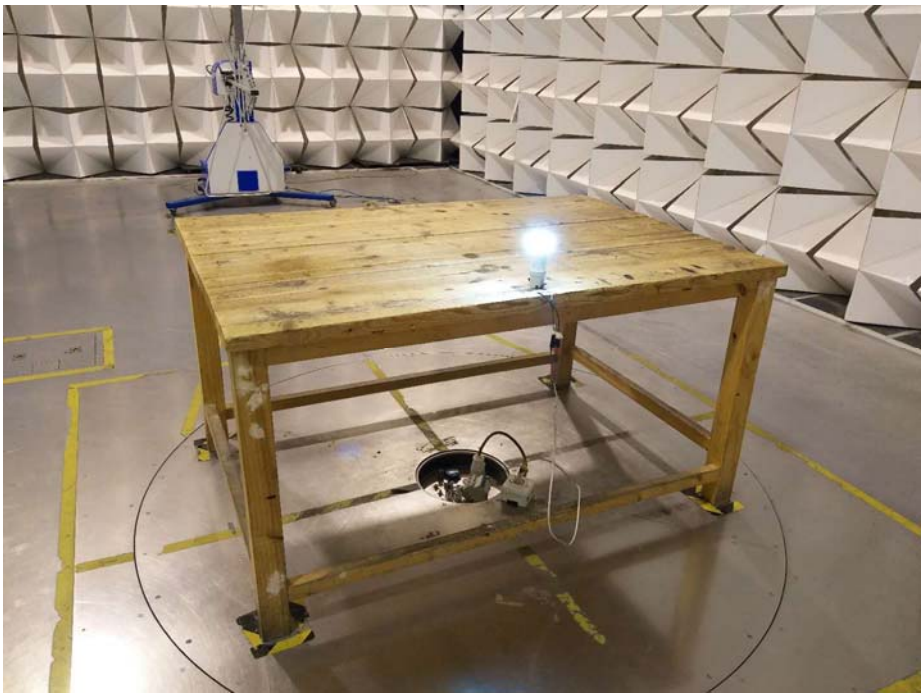
Test frequency Below 30MHz
Model: SBW-1000



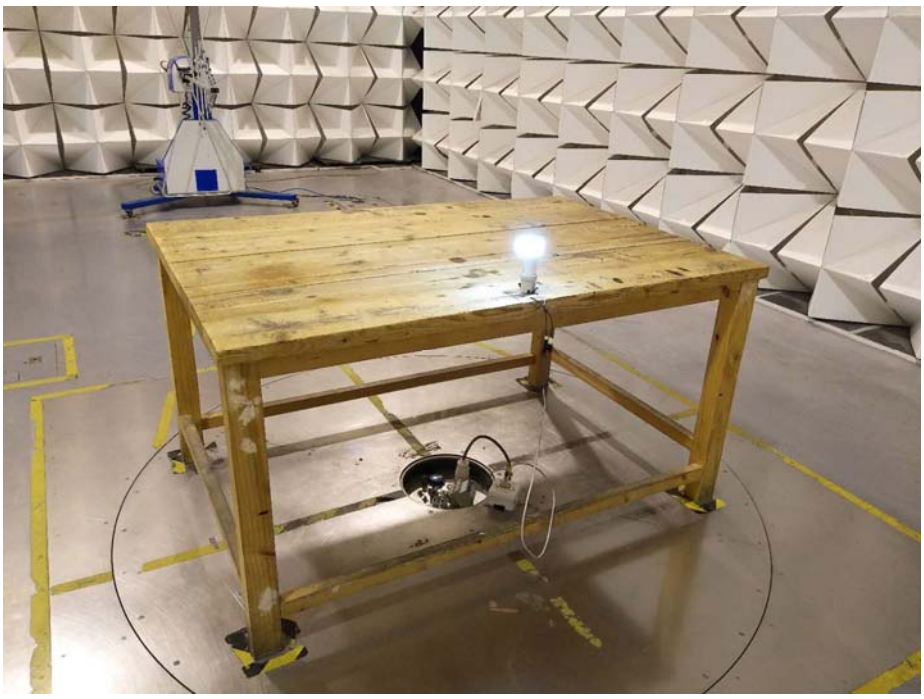
Model: SBR-600



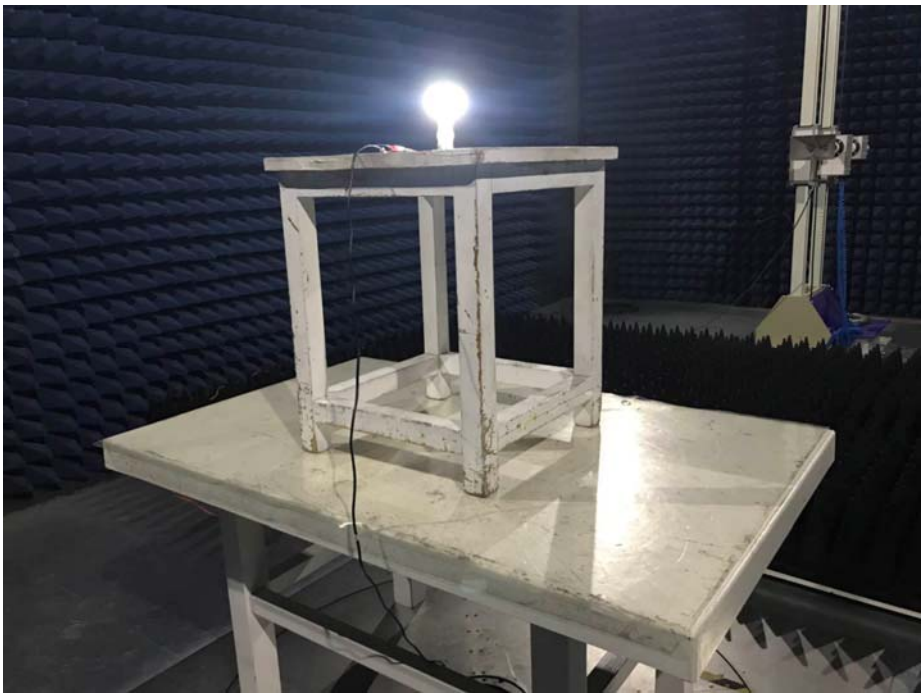
Test frequency from 30MHz to 1GHz
Model: SBW-1000



Model: SBR-600



Test frequency above 1GHz
Model: SBW-1000



Model: SBR-600

15.2 Conducted Emission

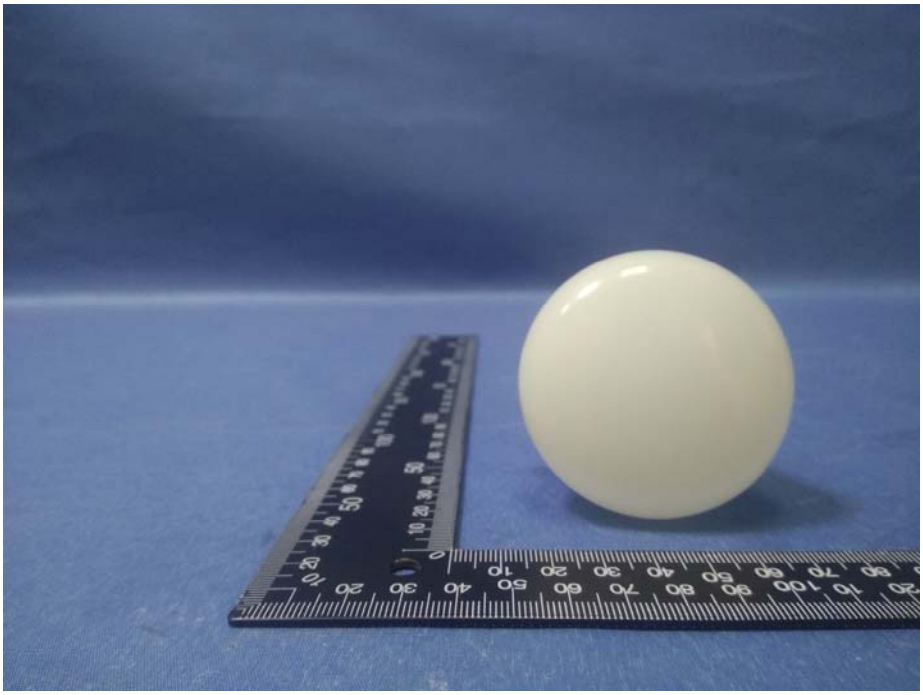
Model: SBW-1000

Model: SBR-600

16 Photographs - Constructional Details

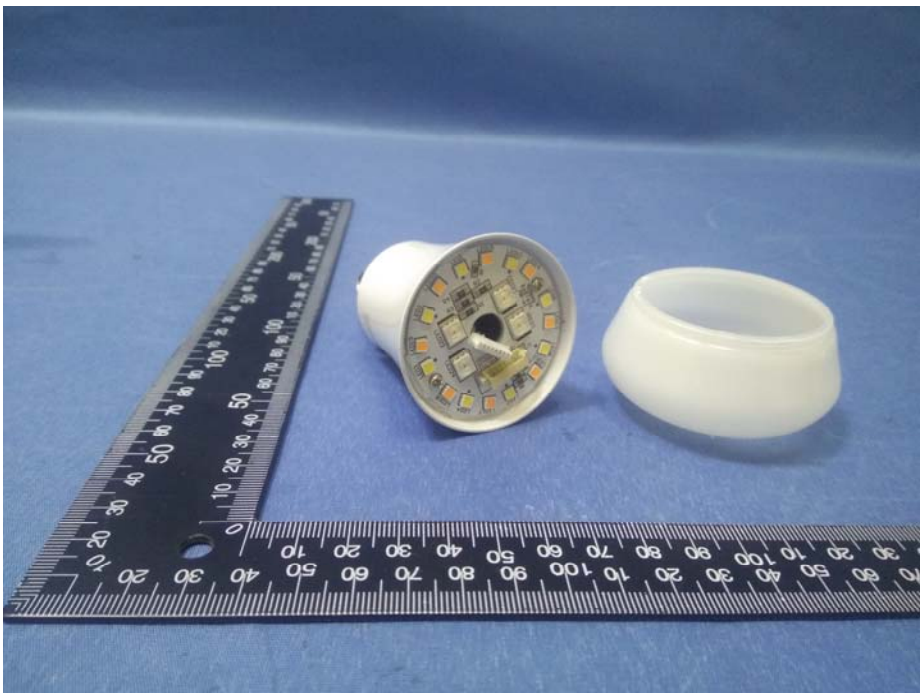
16.1 EUT- External Photos

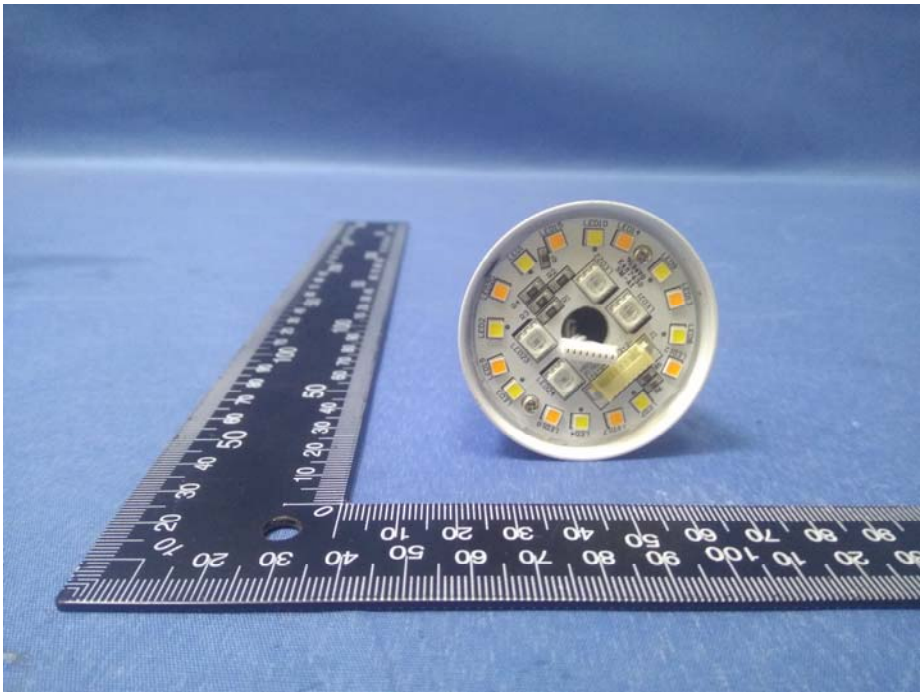
Model SBW-1000 & SBR-600

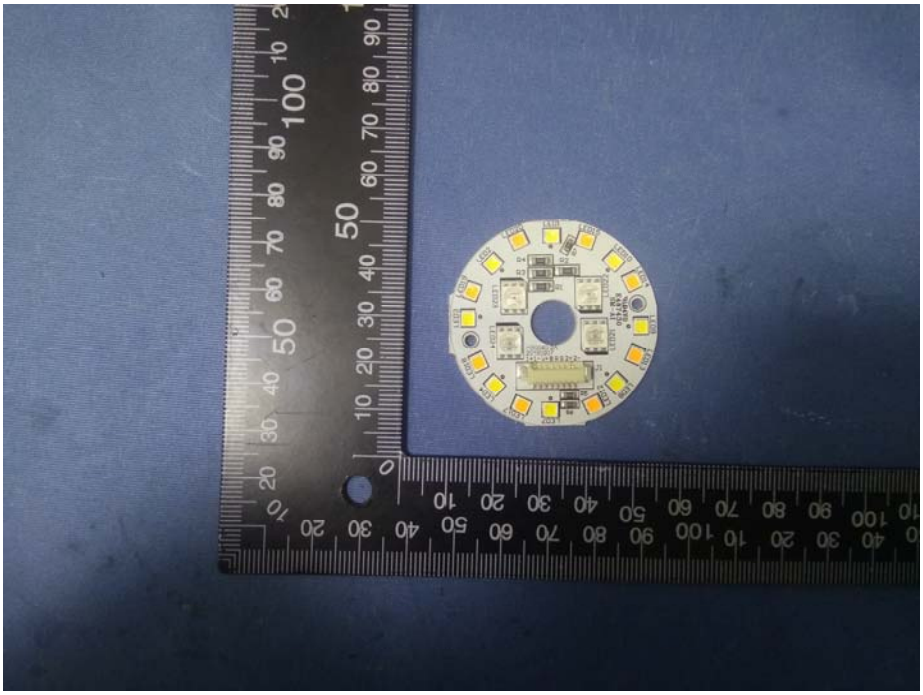


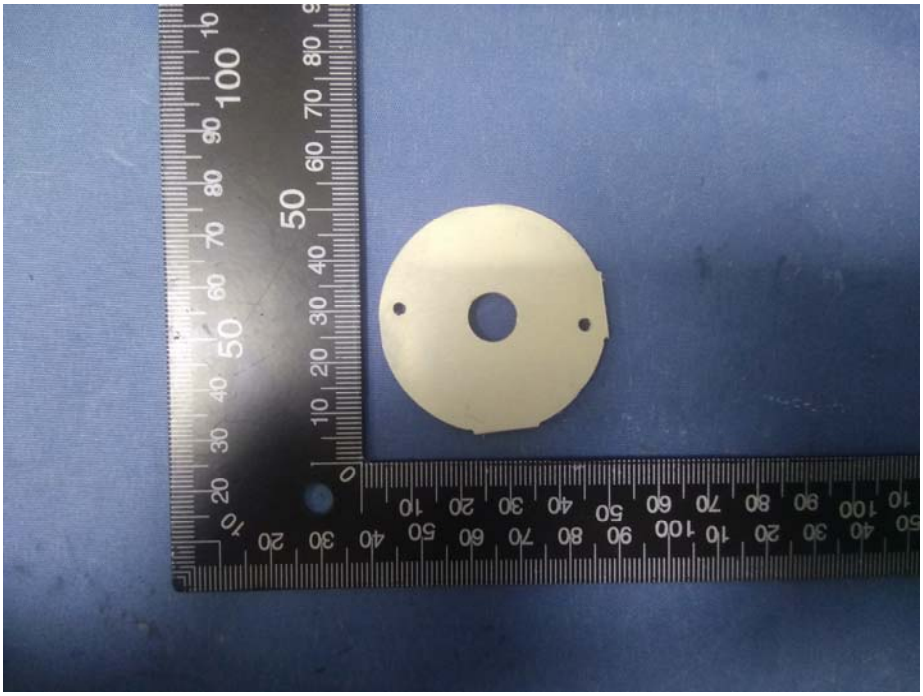
16.2 EUT- Internal Photos

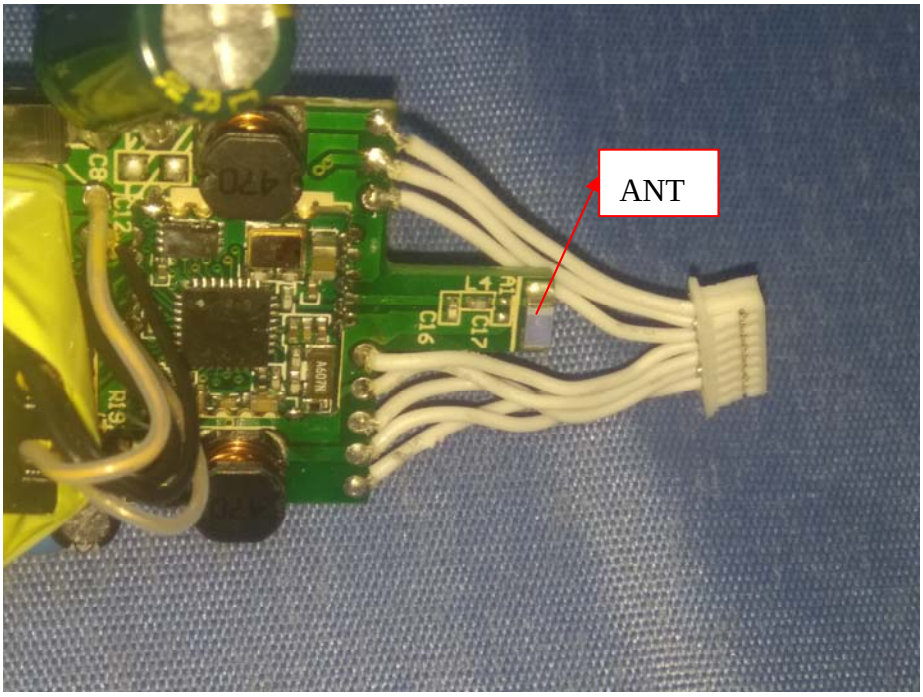
model SBR-600

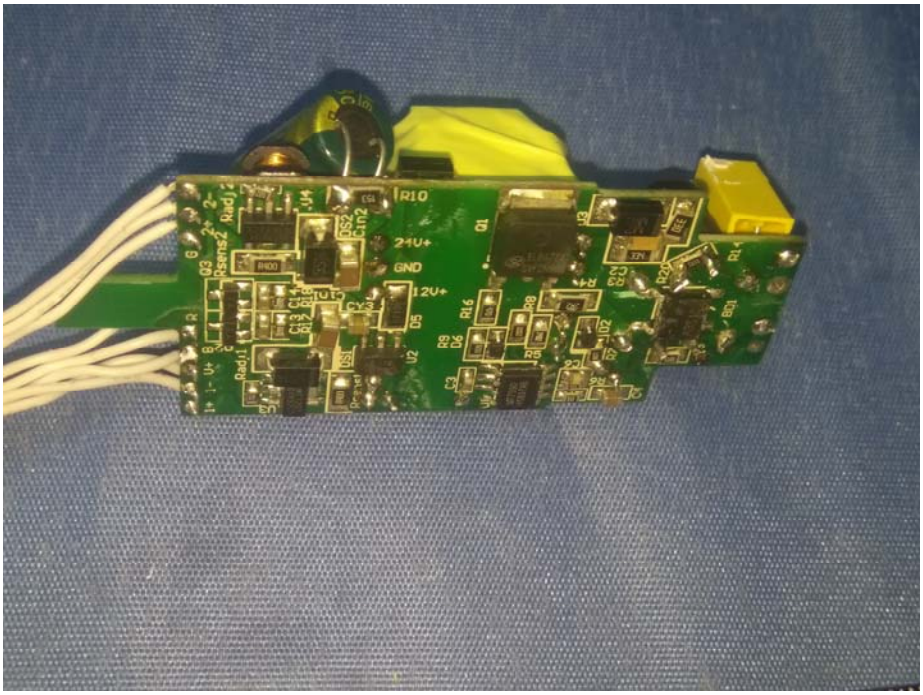




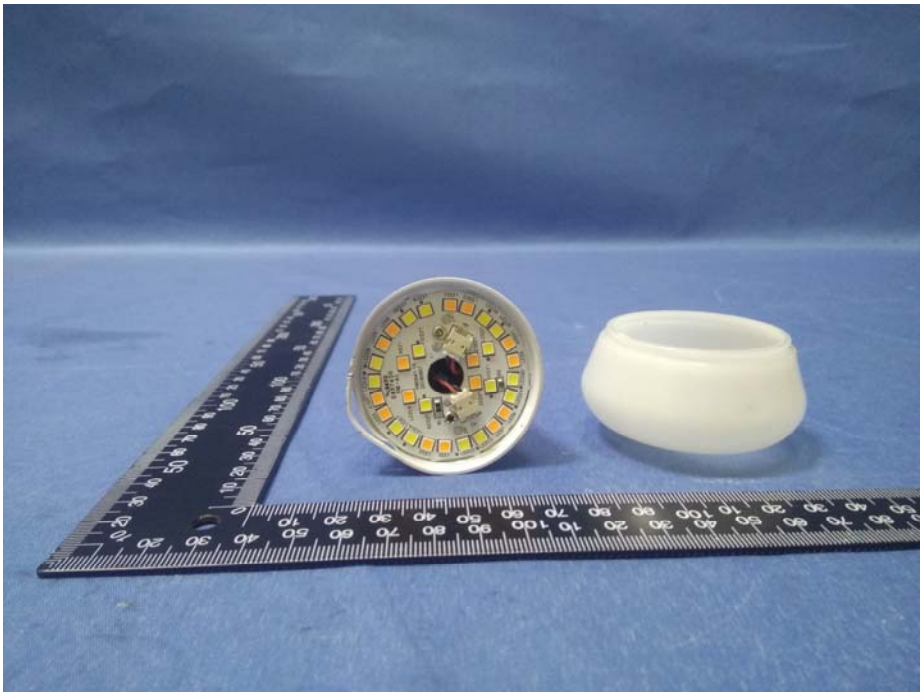


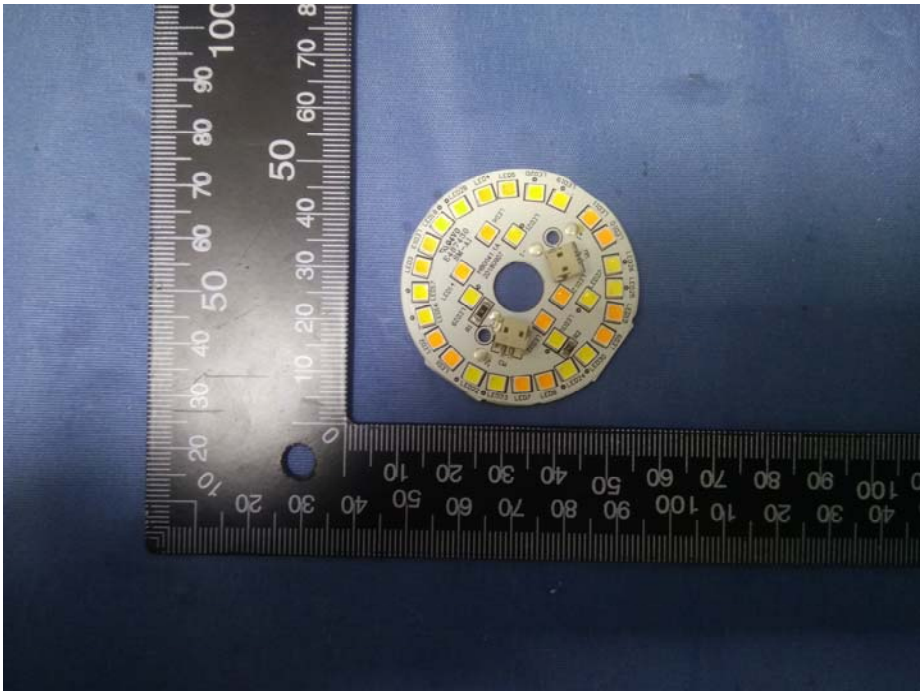


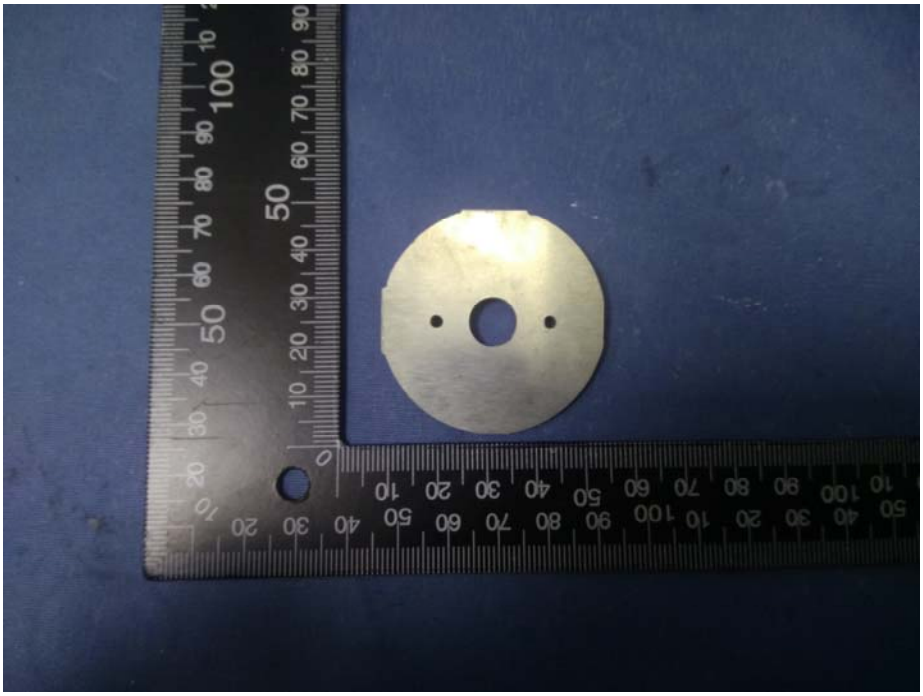

ANT

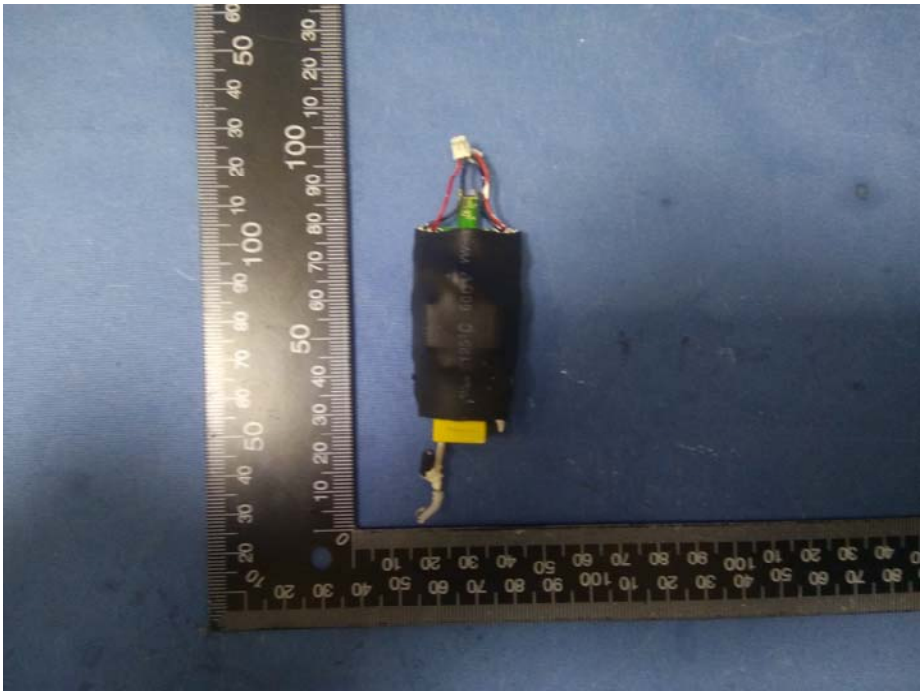

R10
24V+
GND
12V+

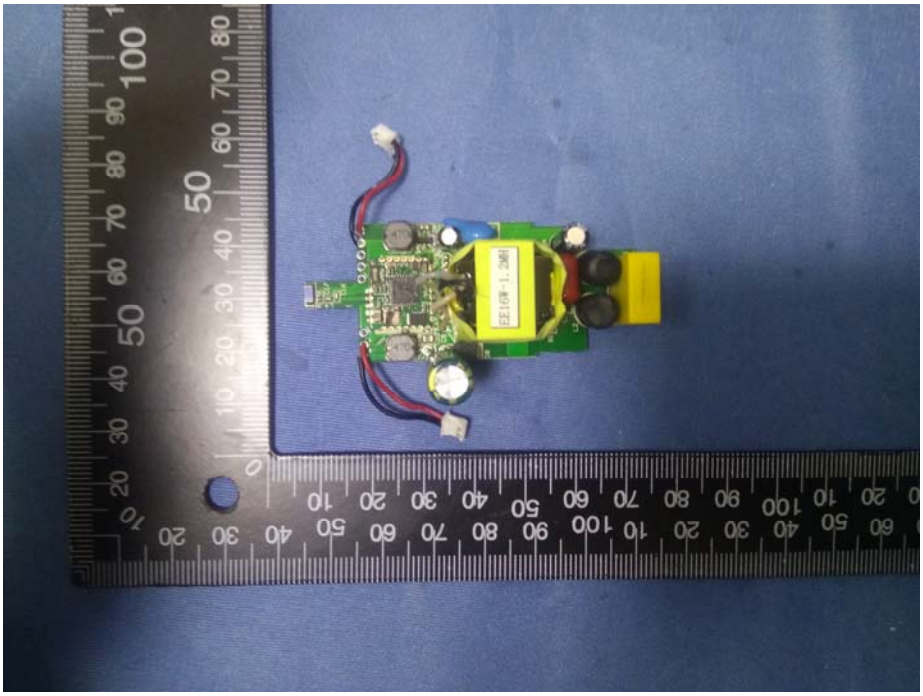
model SBW-1000

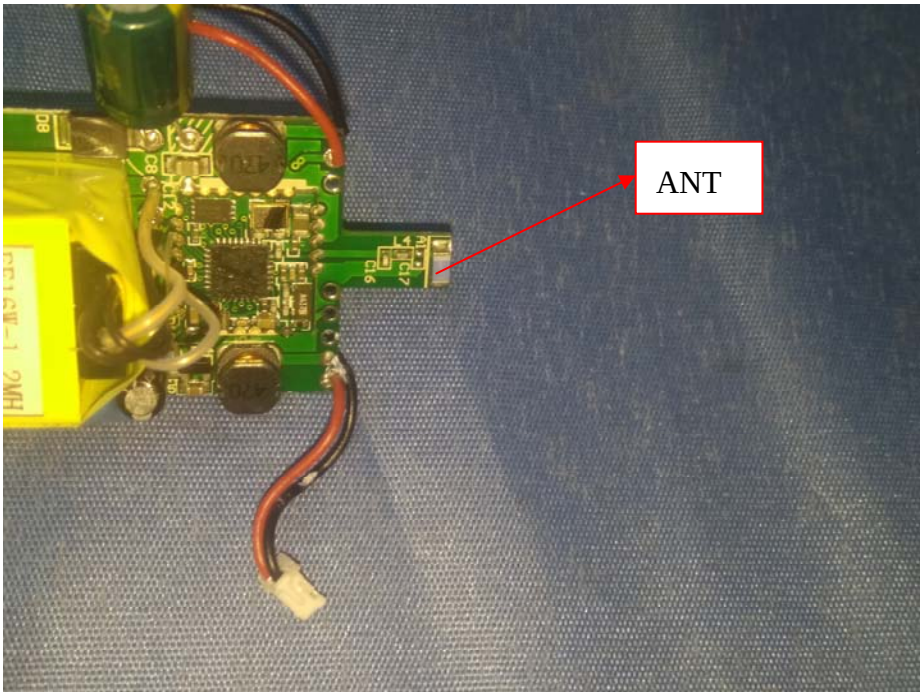


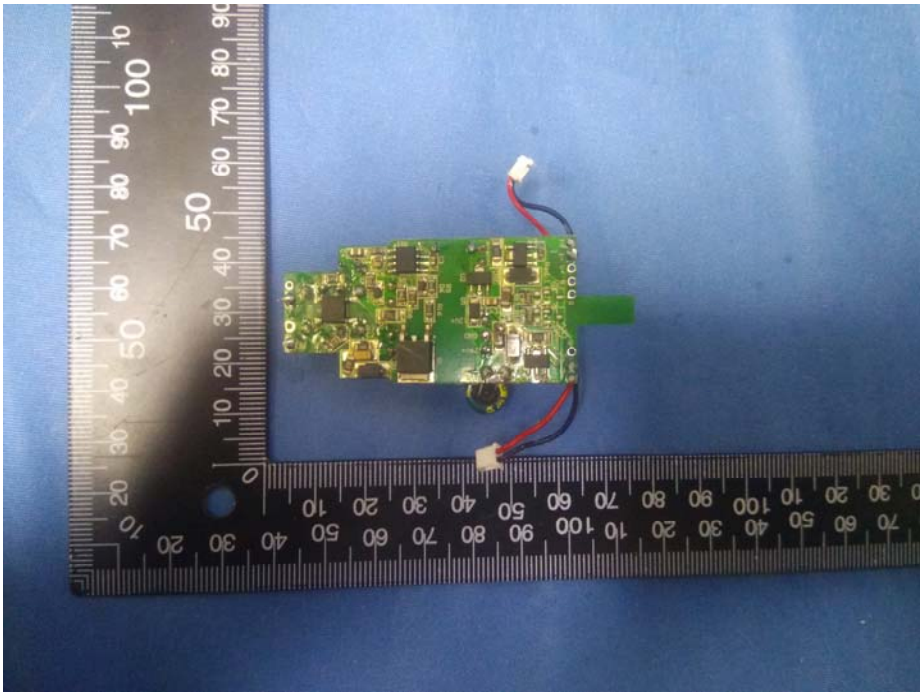


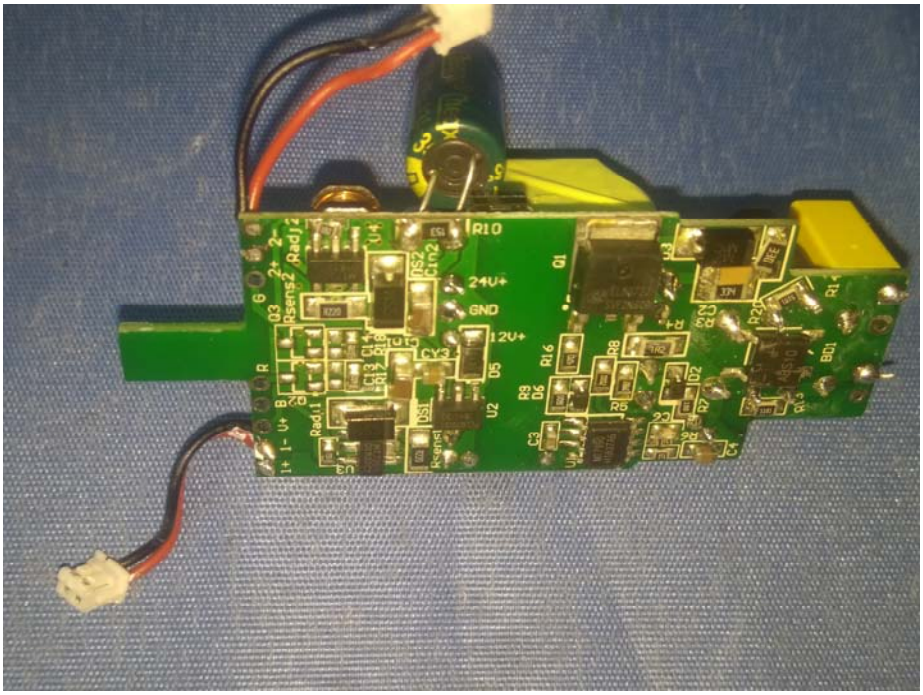







ANT





======End of Report======