Shenzhen Global Test Service Co.,Ltd.
No.7-101 and 8A-104, Building 7 and 8, DCC Cultural and Creative Garden, No.98, Pingxin North Road, Shangmugu Community, Pinghu Street, Longgang District, Shenzhen, Guangdong

FCC PART 15 SUBPART C TEST REPORT

FCC PART 15.247

Report Reference No.....:	**GTSR18110003-BLE**
FCC ID..... :	**2AQN5 –LPW02**
Compiled by (position+printed name+signature)..:	File administrators Jimmy Wang
Supervised by (position+printed name+signature)..:	Test Engineer Aaron Tan
Approved by (position+printed name+signature)..:	Manager Jason Hu
Date of issue.....:	Nov.19, 2018
Representative Laboratory Name.:	**Shenzhen Global Test Service Co.,Ltd.**
Address.....:	No.7-101 and 8A-104, Building 7 and 8, DCC Cultural and Creative Garden, No.98, Pingxin North Road, Shangmugu Community, Pinghu Street, Longgang District, Shenzhen, Guangdong, China
Applicant's name.....:	**Shenzhen Bencse Electronic Technology Co.,Ltd**
Address .....:	**Plant Building 1, Jinshali Industrial Park, No.374 Xuegang North Road ,Qinghu Community, Longhua Subdistrict, Longhua District, Shenzhen City**
Test specification .....:	
Standard .....:	**FCC Part 15.247**
TRF Originator.....:	Shenzhen Global Test Service Co.,Ltd.
Master TRF.....:	Dated 2014-12

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Test item description .....:	Home Party speaker
Trade Mark .....:	/
Manufacturer .....:	Shenzhen Bencse Electronic Technology Co.,Ltd
Model/Type reference.....:	LPW02
Listed Models .....:	LPB02, LPG02, BENCI-W02, BENCI-B02, BENCI-G02, W02, B02, G02
Modulation Type .....:	GFSK
Difference .....:	All the same except the model number
Operation Frequency.....:	From 2402MHz to 2480MHz
Hardware Version .....:	V9
Software Version .....:	V1.9_0
Rating .....:	DC 16.8V from Battery or DC 19V from adapter
Result.....:	**PASS**

TEST REPORT

Test Report No. :	GTSR18110003-BLE	Nov. 19, 2018 Date of issue

Equipment under Test	:	**Home Party speaker**
Model /Type	:	LPW02
Listed Models	:	LPB02, LPG02, BENCI-W02, BENCI-B02, BENCI-G02, W02, B02, G02
Applicant	:	**Shenzhen Bencse Electronic Technology Co.,Ltd**
Address	:	**Plant Building 1, Jinshali Industrial Park, No.374 Xuegang North Road ,Qinghu Community, Longhua Subdistrict, Longhua District, Shenzhen City, China 518000**
Manufacturer	:	**Shenzhen Bencse Electronic Technology Co.,Ltd**
Address	:	**Plant Building 1, Jinshali Industrial Park, No.374 Xuegang North Road ,Qinghu Community, Longhua Subdistrict, Longhua District, Shenzhen City, China 518000**

Test Result:	**PASS**

The test report merely corresponds to the test sample.
It is not permitted to copy extracts of these test result without the written permission of the test laboratory.

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1. TEST STANDARDS

The tests were performed according to following standards:

FCC Rules Part 15.247: Frequency Hopping, Direct Spread Spectrum and Hybrid Systems that are in operation within the bands of 902-928 MHz, 2400-2483.5 MHz, and 5725-5850 MHz.
ANSI C63.10-2013: American National Standard for Testing Unlicensed Wireless Devices
KDB558074 D01 DTS Meas Guidance v05: Guidance for Performing Compliance Measurements on Digital Transmission Systems (DTS) Operating Under §15.247.

2. SUMMARY

2.1. General Remarks

Date of receipt of test sample	:	Nov. 7, 2018
Testing commenced on	:	Nov. 7, 2018
Testing concluded on	:	Nov. 19, 2018

2.2. Product Description

Product Name:	**Home Party speaker**
Trade Mark:	/
Model/Type reference:	LPW02
Listed Models	LPB02, LPG02, BENCI-W02, BENCI-B02, BENCI-G02, W02, B02, G02
Power Supply	DC 16.8V from Battery or DC 19V from adapter Adapter Information： Model：yczx-19V-2A Input:100-240VAC,0.16-0.36A, 50/60Hz Output: DC19V, 2.0A
BT	
Modulation Type	GFSK
Operation frequency	2402-2480 MHz
Antenna Type:	Internal Antenna
Antenna Gain:	0.83 dBi

2.3. Equipment Under Test

Power supply system utilised

Power supply voltage	:	○	230V / 50 Hz	○	120V / 60Hz
		○	12 V DC	○	24 V DC
		●	Other (specified in blank below)		

16.8V from battery

2.4. Short description of the Equipment under Test (EUT)

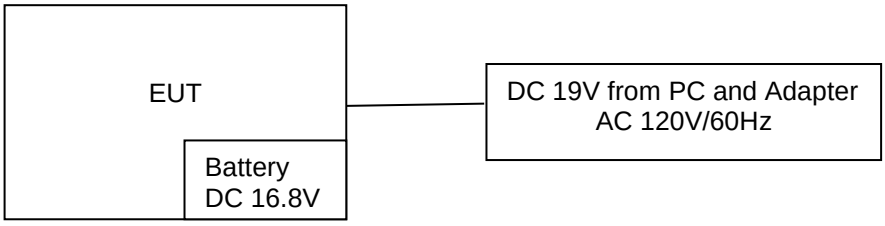
This is a Home Party speaker.

2.5. EUT operation mode

The Applicant provides communication tools software(AppoTech RF Control Kit) to control the EUT for staying in continuous transmitting (Duty Cycle more than 98%) and receiving mode for testing .There are 40 channels provided to the EUT. Channel 00/19/39 was selected to test.

Channel	Frequency(MHz)	Channel	Frequency(MHz)
0	**2402**	20	2442
1	2404	21	2444
2	2406	22	2446
3	2408	23	2448
4	2410	24	2450
5	2412	25	2452
6	2414	26	2454
7	2416	27	2456
8	2418	28	2458
9	2420	29	2460
10	2422	30	2462
11	2424	31	2464
12	2426	32	2466
13	2428	33	2468
14	2430	34	2470
15	2432	35	2472
16	2434	36	2474
17	2436	37	2476
18	2438	38	2478
19	**2440**	**39**	**2480**

2.6. Block Diagram of Test Setup



2.7. Special Accessories

Manufacturer	Description	Model	Serial Number	Certificate
TOSHIBA	Tablet PC	Satellite S40Dt-A	D26T	DOC

2.8. Related Submittal(s) / Grant (s)

This submittal(s) (test report) is intended for **FCC ID: 2AQN5 –LPW02** filing to comply with Section 15.247 of the FCC Part 15, Subpart C Rules.

2.9. Modifications

No modifications were implemented to meet testing criteria.

3. TEST ENVIRONMENT

3.1. Address of the test laboratory

Shenzhen Global Test Service Co.,Ltd.
No.7-101 and 8A-104, Building 7 and 8, DCC Cultural and Creative Garden, No.98, Pingxin North Road, Shangmugu Community, Pinghu Street, Longgang District, Shenzhen, Guangdong

The 3m-Semi anechoic test site fulfils CISPR 16-1-4 according to ANSI C63.4:2014 and CISPR 16-1-4:2010 SVSWR requirement for radiated emission above 1GHz.

3.2. Test Facility

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

FCC-Registration No.: 165725

Shenzhen Global Test Service Co.,Ltd 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 our files.

A2LA-Lab Cert. No.: 4758.01

Shenzhen Global Test Service Co.,Ltd. EMC Laboratory has been accredited by A2LA for technical competence in the field of electrical testing, and proved to be in compliance with ISO/IEC 17025: 2005 General Requirements for the Competence of Testing and Calibration Laboratories and any additional program requirements in the identified field of testing.

CNAS-Lab Code: L8169

Shenzhen Global Test Service Co.,Ltd. has been assessed and proved to be in compliance with CNAS-CL01 Accreditation Criteria for Testing and Calibration Laboratories (identical to ISO/IEC 17025: 2005 General Requirements) for the Competence of Testing and Calibration Laboratories. Date of Registration: Dec. 11, 2015. Valid time is until Dec. 10, 2018.

3.3. Environmental conditions

During the measurement the environmental conditions were within the listed ranges:

Temperature:	15-35 ° C
Humidity:	30-60 %
Atmospheric pressure:	950-1050mbar

3.4. Test Description

The EUT has been tested under operating condition.

This test was performed with EUT in X, Y, Z position and the worst case was found when EUT in X position.

Pre-test AC conducted emission at both voltage AC 120V/60Hz and AC 240V/50Hz, recorded worst case.

Worst-case mode and channel used for 150 kHz-30 MHz power line conducted emissions was the mode and channel with the highest output power, which was determined to be BT LE mode (Middle Channel).

Worst-case mode and channel used for 9kHz-1000 MHz radiated emissions was the mode and channel with the highest output power, that was determined to be BT LE mode(Middle Channel).

Worst-Case data rates were utilized from preliminary testing of the Chipset, worst-case data rates used during the testing are as follows:

BT LE: 1 Mbps, GFSK.

3.5. Statement of the measurement uncertainty

The data and results referenced in this document are true and accurate. The reader is cautioned that there may be errors within the calibration limits of the equipment and facilities. The measurement uncertainty was calculated for all measurements listed in this test report acc. to CISPR 16 - 4 „Specification for radio disturbance and immunity measuring apparatus and methods – Part 4: Uncertainty in EMC Measurements“ and is documented in the Shenzhen Global Test Service Co.,Ltd. quality system acc. to DIN EN ISO/IEC 17025. Furthermore, component and process variability of devices similar to that tested may result in additional deviation. The manufacturer has the sole responsibility of continued compliance of the device.
Hereafter the best measurement capability for Shenzhen GTS laboratory is reported:

Test	Range	Measurement Uncertainty	Notes
Radiated Emission	30~1000MHz	4.10 dB	(1)
Radiated Emission	1~18GHz	4.32 dB	(1)
Radiated Emission	18-40GHz	5.54 dB	(1)
Conducted Disturbance	0.15~30MHz	3.12 dB	(1)

(1) This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=2.

3.6. Equipments Used during the Test

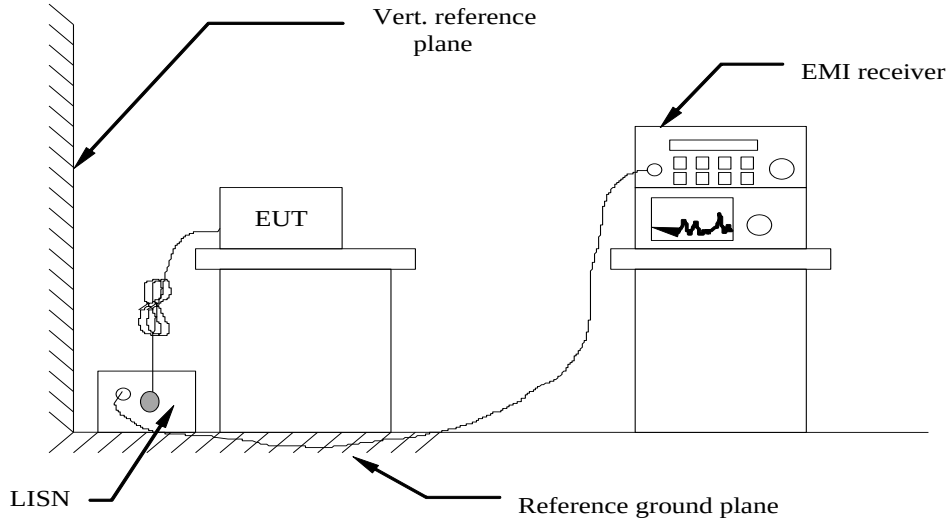
Test Equipment	Manufacturer	Model No.	Serial No.	Calibration Date	Calibration Due Date
LISN	R&S	ENV216	3560.6550.08	2018/09/20	2019/09/19
LISN	R&S	ESH2-Z5	893606/008	2018/09/20	2019/09/19
Bilog Antenna	Schwarzbeck	VULB9163	976	2016/09/20	2019/09/19
EMI Test Receiver	R&S	ESCI7	101102	2018/09/20	2019/09/19
Spectrum Analyzer	Agilent	N9020A	MY48010425	2018/09/20	2019/09/19
Spectrum Analyzer	R&S	FSP40	100019	2018/06/05	2019/06/04
Controller	EM Electronics	Controller EM 1000	N/A	N/A	N/A
Horn Antenna	Schwarzbeck	BBHA 9120D	01622	2016/09/20	2019/09/19
Active Loop Antenna	SCHWARZBECK	FMZB1519	1519-037	2016/09/20	2019/09/19
Broadband Horn Antenna	SCHWARZBECK	BBHA 9170	971	2016/09/20	2019/09/19
Amplifier	Schwarzbeck	BBV 9743	#202	2018/09/20	2019/09/19
Amplifier	EMCI	EMC051845B	980355	2018/09/20	2019/09/19
Temperature/Humidity Meter	Gangxing	CTH-608	02	2018/09/20	2019/09/19
High-Pass Filter	K&L	9SH10-2700/X12750-O/O	KL142031	2018/09/20	2019/09/19
High-Pass Filter	K&L	41H10-1375/U12750-O/O	KL142032	2018/09/20	2019/09/19
RF Cable(below 1GHz)	HUBER+SUHNER	RG214	RE01	2018/09/20	2019/09/19
RF Cable(above 1GHz)	HUBER+SUHNER	RG214	RE02	2018/09/20	2019/09/19
Data acquisition card	Agilent	U2531A	TW53323507	2018/09/20	2019/09/19
Power Sensor	Agilent	U2021XA	MY5365004	2018/09/20	2019/09/19
EMI Test Software	R&S	ES-K1	V1.7.1	2018/09/20	2019/09/19
EMI Test Software	JS Tonscend	JS32-RE	2.0.1.5	2018/09/20	2019/09/19

Note: 1. The Cal.Interval was one year.

4. TEST CONDITIONS AND RESULTS

4.1. AC Power Conducted Emission

TEST CONFIGURATION



TEST PROCEDURE

1 The equipment was set up as per the test configuration to simulate typical actual usage per the user's manual. The EUT is a tabletop system, a wooden table with a height of 0.8 meters is used and is placed on the ground plane as per ANSI C63.10-2013.
2 Support equipment, if needed, was placed as per ANSI C63.10-2013
3 All I/O cables were positioned to simulate typical actual usage as per ANSI C63.10-2013
4 The EUT received DC5V power, the adapter received AC120V/60Hz power through a Line Impedance Stabilization Network (LISN) which supplied power source and was grounded to the ground plane.
5 All support equipments received AC power from a second LISN, if any.
6 The EUT test program was started. Emissions were measured on each current carrying line of the EUT using a spectrum Analyzer / Receiver connected to the LISN powering the EUT. The LISN has two monitoring points: Line 1 (Hot Side) and Line 2 (Neutral Side). Two scans were taken: one with Line 1 connected to Analyzer / Receiver and Line 2 connected to a 50 ohm load; the second scan had Line 1 connected to a 50 ohm load and Line 2 connected to the Analyzer / Receiver.
7 Analyzer / Receiver scanned from 150 KHz to 30MHz for emissions in each of the test modes.
8 During the above scans, the emissions were maximized by cable manipulation.

AC Power Conducted Emission Limit

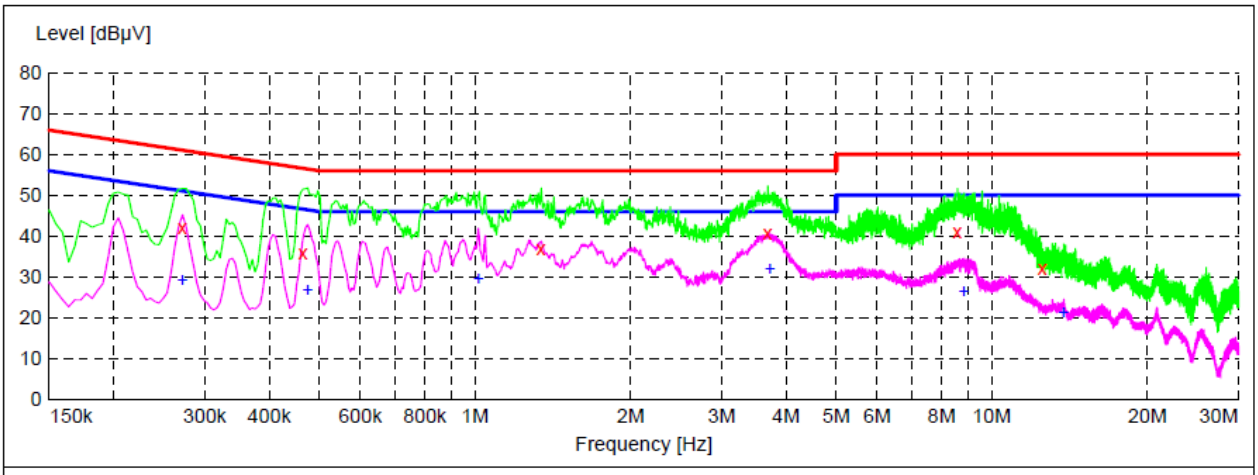
For intentional device, according to § 15.207(a) AC Power Conducted Emission Limits is as following：

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
* Decreases with the logarithm of the frequency.		

TEST RESULTS

Remark: We measured Conducted Emission at all mode in AC 120V/60Hz and AC 240V/50Hz, Pre-test AC conducted emission at power from AC mains mode and at charge from PC mode, recorded worst case..

Power supply:	AC 120V/60Hz(adapter)	Polarization	L



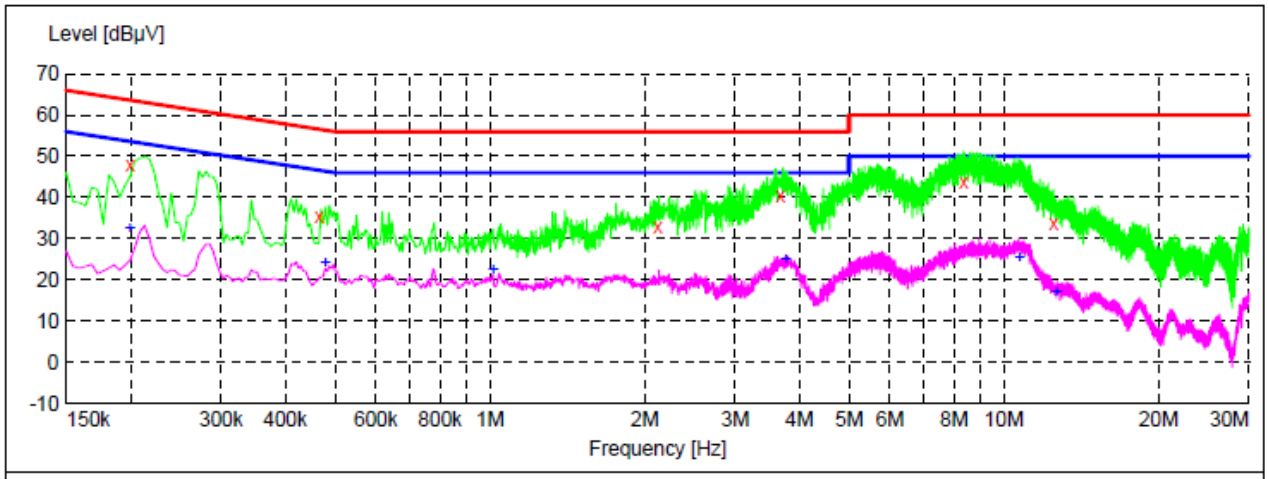
MEASUREMENT RESULT:

Frequency MHz	Level dBµV	Transd dB	Limit dBµV	Margin dB	Detector	Line	PE
0.271500	42.20	9.9	61	18.9	QP	L1	GND
0.465000	36.00	9.8	57	20.6	QP	L1	GND
1.342500	36.80	9.6	56	19.2	QP	L1	GND
3.682500	40.90	9.4	56	15.1	QP	L1	GND
8.583000	41.10	9.0	60	18.9	QP	L1	GND
12.507000	32.20	8.5	60	27.8	QP	L1	GND

MEASUREMENT RESULT:

Frequency MHz	Level dBµV	Transd dB	Limit dBµV	Margin dB	Detector	Line	PE
0.271500	29.30	9.9	51	21.8	AV	L1	GND
0.474000	27.10	9.8	46	19.3	AV	L1	GND
1.014000	29.70	9.6	46	16.3	AV	L1	GND
3.723000	32.10	9.4	46	13.9	AV	L1	GND
8.812500	26.70	9.0	50	23.3	AV	L1	GND
13.744500	21.30	8.3	50	28.7	AV	L1	GND

Power supply:	AC 120V/60Hz(adapter)	Polarization	N



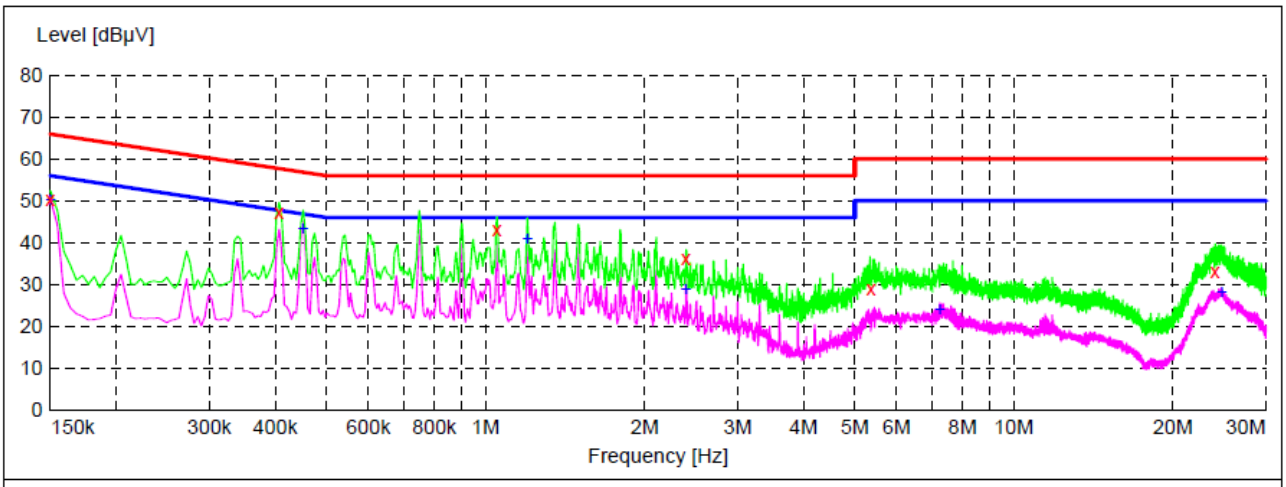
MEASUREMENT RESULT:

Frequency MHz	Level dBµV	Transd dB	Limit dBµV	Margin dB	Detector	Line	PE
0.199500	47.90	10.0	64	15.7	QP	N	GND
0.465000	35.60	9.8	57	21.0	QP	N	GND
2.121000	33.00	9.5	56	23.0	QP	N	GND
3.678000	40.50	9.4	56	15.5	QP	N	GND
8.362500	43.70	9.0	60	16.3	QP	N	GND
12.511500	33.70	8.5	60	26.3	QP	N	GND

MEASUREMENT RESULT:

Frequency MHz	Level dBµV	Transd dB	Limit dBµV	Margin dB	Detector	Line	PE
0.199500	32.30	10.0	54	21.3	AV	N	GND
0.478500	24.20	9.8	46	22.2	AV	N	GND
1.014000	22.50	9.6	46	23.5	AV	N	GND
3.768000	24.90	9.4	46	21.1	AV	N	GND
10.720500	25.50	8.8	50	24.5	AV	N	GND
12.642000	17.10	8.5	50	32.9	AV	N	GND

Power supply:	AC 240V/50Hz(adapter)	Polarization	L



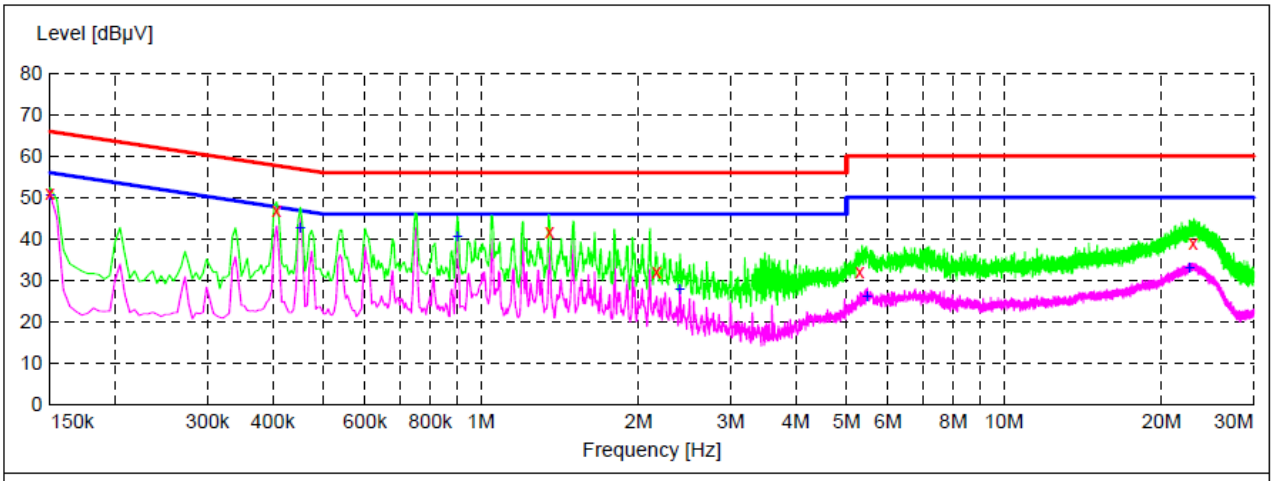
MEASUREMENT RESULT:

Frequency MHz	Level dBµV	Transd dB	Limit dBµV	Margin dB	Detector	Line	PE
0.150000	50.60	10.1	66	15.4	QP	L1	GND
0.406500	47.20	9.8	58	10.5	QP	L1	GND
1.050000	43.10	9.6	56	12.9	QP	L1	GND
2.395500	36.40	9.5	56	19.6	QP	L1	GND
5.365500	29.10	9.3	60	30.9	QP	L1	GND
24.022500	33.20	7.0	60	26.8	QP	L1	GND

MEASUREMENT RESULT:

Frequency MHz	Level dBµV	Transd dB	Limit dBµV	Margin dB	Detector	Line	PE
0.150000	50.30	10.1	56	5.7	AV	L1	GND
0.451500	43.70	9.8	47	3.1	AV	L1	GND
1.198500	41.10	9.6	46	4.9	AV	L1	GND
2.395500	28.90	9.5	46	17.1	AV	L1	GND
7.237500	24.30	9.1	50	25.7	AV	L1	GND
24.747000	28.20	7.0	50	21.8	AV	L1	GND

Power supply:	AC 240V/50Hz(adapter)	Polarization	N



MEASUREMENT RESULT:

Frequency MHz	Level dBµV	Transd dB	Limit dBµV	Margin dB	Detector	Line	PE
0.150000	51.20	10.1	66	14.8	QP	N	GND
0.406500	47.00	9.8	58	10.7	QP	N	GND
1.351500	41.90	9.6	56	14.1	QP	N	GND
2.166000	32.20	9.5	56	23.8	QP	N	GND
5.302500	32.30	9.3	60	27.7	QP	N	GND
23.023500	39.20	7.0	60	20.8	QP	N	GND

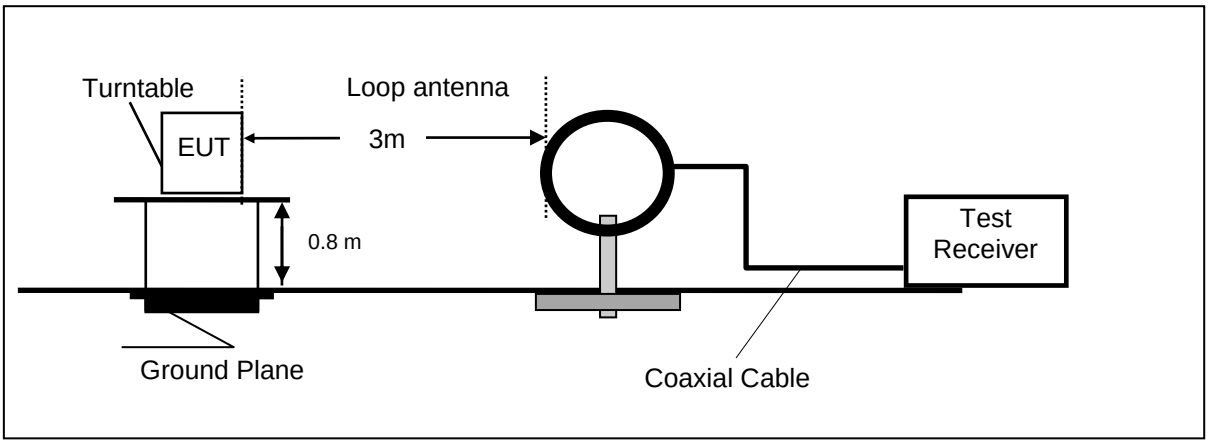
MEASUREMENT RESULT:

Frequency MHz	Level dBµV	Transd dB	Limit dBµV	Margin dB	Detector	Line	PE
0.150000	50.80	10.1	56	5.2	AV	N	GND
0.451500	42.70	9.8	47	4.1	AV	N	GND
0.901500	40.80	9.6	46	5.2	AV	N	GND
2.400000	28.10	9.5	46	17.9	AV	N	GND
5.464500	26.40	9.3	50	23.6	AV	N	GND
22.605000	33.10	7.0	50	16.9	AV	N	GND

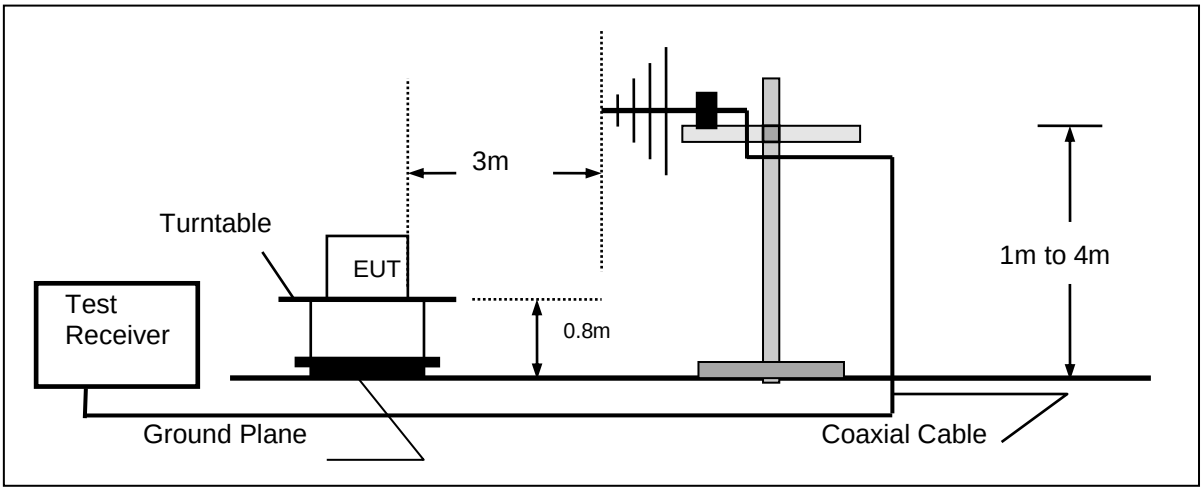
4.2. Radiated Emission

TEST CONFIGURATION

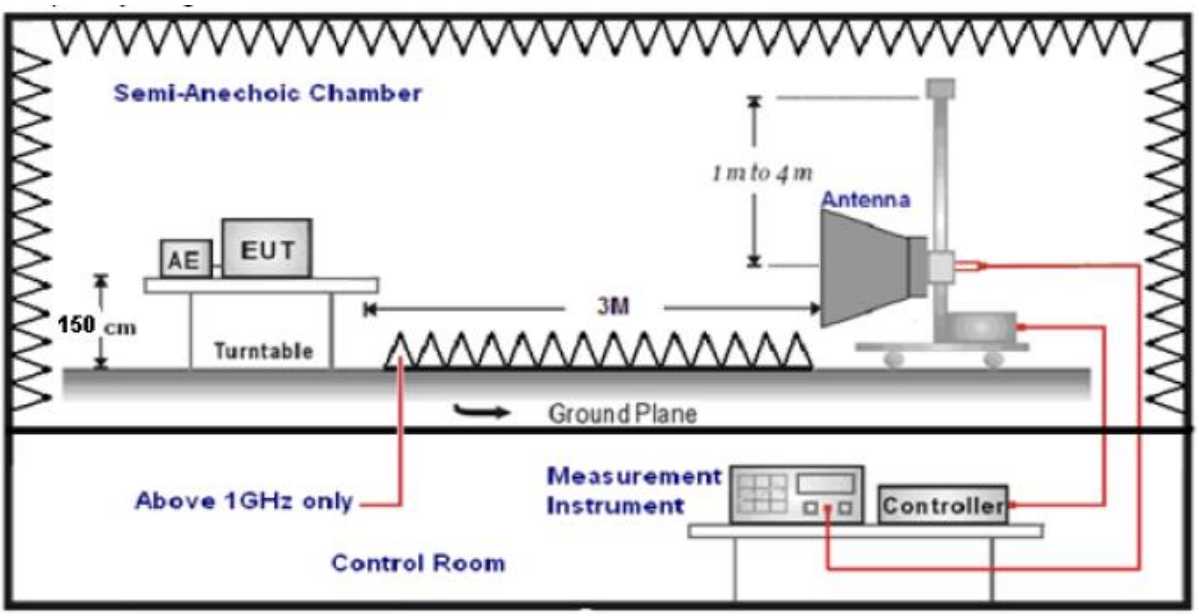
Frequency range 9 KHz – 30MHz



Frequency range 30MHz – 1000MHz



Frequency range above 1GHz-25GHz



TEST PROCEDURE

1. The EUT was placed on a turn table which is 0.8m above ground plane when testing frequency range 9 KHz –1GHz;the EUT was placed on a turn table which is 1.5m above ground plane when testing frequency range 1GHz – 25GHz.
2. Maximum procedure was performed by raising the receiving antenna from 1m to 4m and rotating the turn table from 0℃ to 360℃ to acquire the highest emissions from EUT.
3. And also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical.
4. Repeat above procedures until all frequency measurements have been completed.
5. The EUT minimum operation frequency was 32.768KHz and maximum operation frequency was 2480MHz.so radiated emission test frequency band from 9KHz to 25GHz.
6. The distance between test antenna and EUT as following table states:

Test Frequency range	Test Antenna Type	Test Distance
9KHz-30MHz	Active Loop Antenna	3
30MHz-1GHz	Ultra-Broadband Antenna	3
1GHz-18GHz	Double Ridged Horn Antenna	3
18GHz-25GHz	Horn Anternna	1

7. Setting test receiver/spectrum as following table states:

Test Frequency range	Test Receiver/Spectrum Setting	Detector
9KHz-150KHz	RBW=200Hz/VBW=3KHz,Sweep time=Auto	QP
150KHz-30MHz	RBW=9KHz/VBW=100KHz,Sweep time=Auto	QP
30MHz-1GHz	RBW=120KHz/VBW=1000KHz,Sweep time=Auto	QP
1GHz-40GHz	Peak Value: RBW=1MHz/VBW=3MHz, Sweep time=Auto Average Value: RBW=1MHz/VBW=10Hz, Sweep time=Auto	Peak

Field Strength Calculation

The field strength is calculated by adding the Antenna Factor and Cable Factor and subtracting the Amplifier Gain and Duty Cycle Correction Factor(if any) from the measured reading. The basic equation with a sample calculation is as follows:

FS = RA + AF + CL - AG

Where FS = Field Strength	CL = Cable Attenuation Factor (Cable Loss)
RA = Reading Amplitude	AG = Amplifier Gain
AF = Antenna Factor	

Transd=AF +CL-AG

RADIATION LIMIT

For intentional device, according to § 15.209(a), the general requirement of field strength of radiated emission from intentional radiators at a distance of 3 meters shall not exceed the following table. According to § 15.247(d), in any 100kHz bandwidth outside the frequency band in which the EUT is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20dB below that in the100kHz bandwidth within the band that contains the highest level of desired power.

The pre-test have done for the EUT in three axes and found the worst emission at position shown in test setup photos.

Frequency (MHz)	Distance (Meters)	Radiated (dBμV/m)	Radiated (μV/m)
0.009-0.49	3	20log(2400/F(KHz))+40log(300/3)	2400/F(KHz)
0.49-1.705	3	20log(24000/F(KHz))+ 40log(30/3)	24000/F(KHz)
1.705-30	3	20log(30)+ 40log(30/3)	30
30-88	3	40.0	100
88-216	3	43.5	150
216-960	3	46.0	200
Above 960	3	54.0	500

TEST RESULTS

For 9KHz to 30MHz

Freq.	Reading	Limit	Margin	State
(MHz)	(dBuV/m)	(dBuV/m)	(dB)	P/F
--	--	--	--	P
--	--	--	--	P

Note:

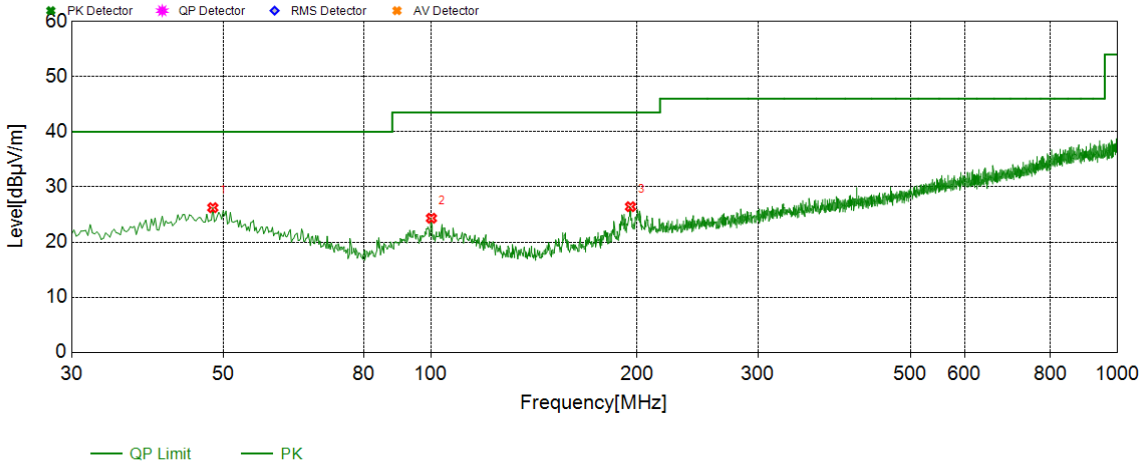
The amplitude of spurious emissions which are attenuated by more than 20dB below the permissible value has no need to be reported.

Distance extrapolation factor =40 log (specific distance/test distance)(dB);

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

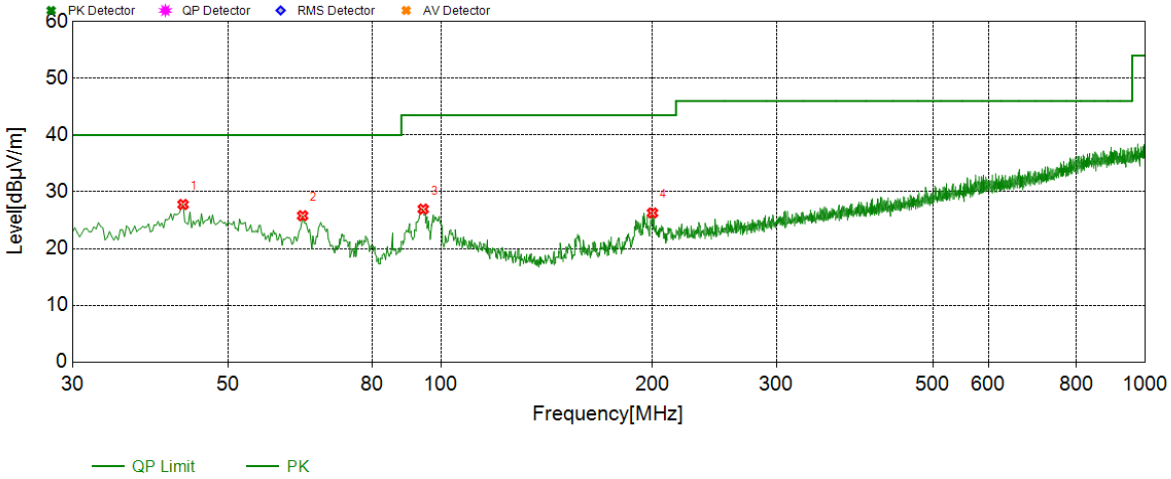
For 30MHz to 1000MHz

Horizontal



NO.	Freq. [MHz]	Reading [dBµV/m]	Result Level [dBµV/m]	Factor [dB]	Limit [dBµV/m]	Margin [dB]	Height [cm]	Angle[°]	Polarity
1	48.188	40.27	26.23	-14.04	40.00	13.77	100	185	Horizontal
2	100.325	41.33	24.32	-17.01	43.50	19.18	100	146	Horizontal
3	195.628	43.35	26.41	-16.94	43.50	17.09	100	249	Horizontal

Vertical



NO.	Freq. [MHz]	Reading [dBµV/m]	Result Level [dBµV/m]	Factor [dB]	Limit [dBµV/m]	Margin [dB]	Height [cm]	Angle[°]	Polarity
1	43.095	42.06	27.76	-14.30	40.00	12.24	100	187	Vertical
2	63.708	43.24	25.78	-17.46	40.00	14.22	100	183	Vertical
3	94.505	44.76	26.95	-17.81	43.50	16.55	100	357	Vertical
4	199.993	42.77	26.27	-16.50	43.50	17.23	100	218	Vertical

Note:

1. Pre-scan all modes and recorded the worst case results in this report (BT LE (Middle Channel))
2. Emission level (dBuV/m) = Meter Reading+ antenna Factor+ cable loss- preamp factor
3. Margin value = Emission level-Limits

For 1GHz to 25GHz

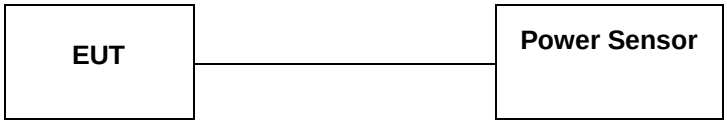
Polar (H/V)	Frequency (MHz)	Meter Reading (dBuV)	antenna Factor (dB)	cable loss (dB)	preamp factor (dB)	Emission Level (dBuV/m)	Limits (dBuV/m)	Margin (dB)	Detector Type
2402									
Vertical	4804	42.19	30.26	6.98	26.63	52.8	74	-21.2	Pk
Horizonta	4804	43.62	30.26	6.98	26.63	54.23	74	-19.77	PK
Vertical	7206	36.95	36.55	8.87	27.02	55.35	74	-18.65	Pk
Horizontal	7206	35.48	36.55	8.87	27.02	53.88	74	-20.12	PK
2440									
Vertical	4880	40.54	30.34	7.58	26.67	51.79	74	-22.21	Pk
Horizonta	4880	41.59	30.34	7.58	26.67	52.84	74	-21.16	PK
Vertical	7320	35.26	36.69	8.56	27.18	53.33	74	-20.67	Pk
Horizontal	7320	35.69	36.69	8.56	27.18	53.76	74	-20.24	PK
2480									
Vertical	4960	42.19	30.58	7.81	26.73	53.85	74	-20.15	Pk
Horizonta	4960	42.01	30.58	7.81	26.73	53.67	74	-20.33	PK
Vertical	7440	35.26	37.31	8.72	27.23	54.06	74	-19.94	Pk
Horizontal	7440	34.85	37.31	8.72	27.23	53.65	74	-20.35	PK

REMARKS:

4. Emission level (dBuV/m) = Meter Reading+ antenna Factor+ cable loss- preamp factor
5. Margin value = Emission level-Limits
6. -- Mean the PK detector measured value is below average limit.
7. The other emission levels were very low against the limit.
8. If the PK measured levels comply with average limit, then the average level were deemed to comply with average limit.

4.3. Maximum Peak Output Power

TEST CONFIGURATION



TEST PROCEDURE

According to KDB558074 D01 DTS Measurement Guidance Section 9.1 Maximum peak conducted output power,9.1.2.
The maximum peak conducted output power may be measured using a broadband peak RF power meter. The power meter shall have a video bandwidth that is greater than or equal to the DTS bandwidth and shall utilize a fast-responding diode detector.

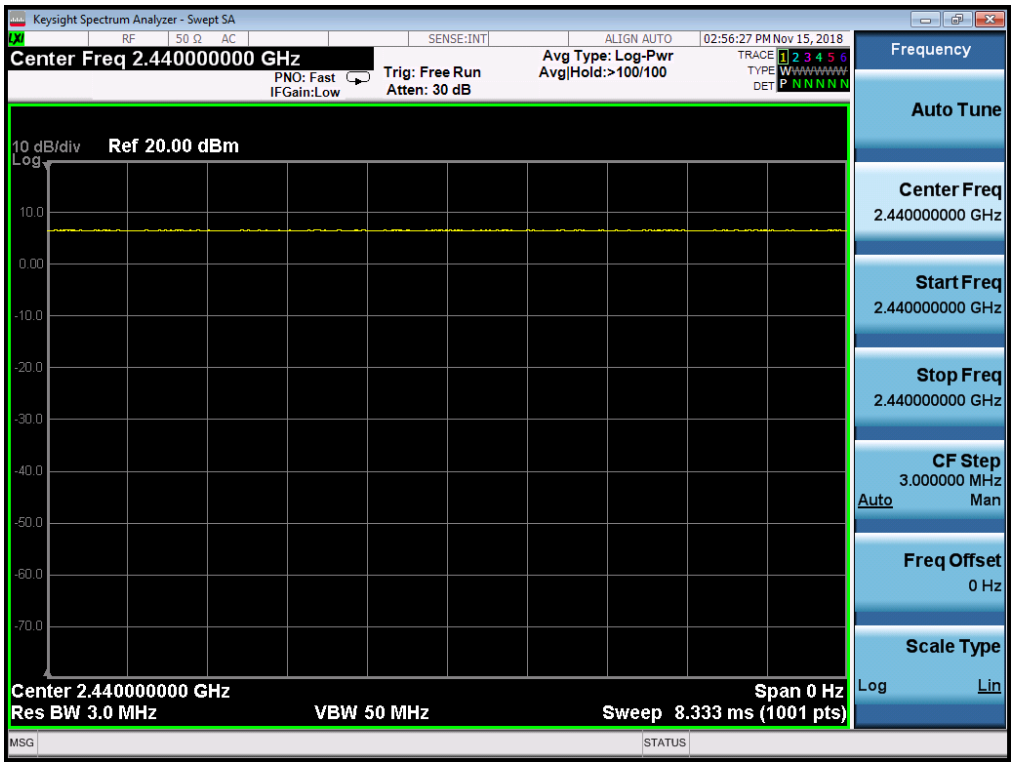
LIMIT

The Maximum Peak Output Power Measurement is 30dBm.

TEST RESULTS

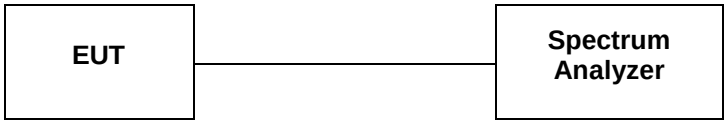
Type	Channel	Peak Output power (dBm)	Limit (dBm)	Result
GFSK	0	5.48	30	Pass
	19	6.67		
	39	5.52		

Note: 1.The test results including the cable lose.



4.4. Power Spectral Density

TEST CONFIGURATION



TEST PROCEDURE

1.Use this procedure when the maximum peak conducted output power in the fundamental emission is used to demonstrate compliance.
2.Set the RBW =3 kHz.
3.Set the VBW =10 KHz.
4.Set the span to 1.5 times the DTS channel bandwidth.
5.Detector = peak.
6.Sweep time = auto couple.
7.Trace mode = max hold.
8.Allow trace to fully stabilize.
9.Use the peak marker function to determine the maximum power level.
10.If measured value exceeds limit,reduce RBW(no less than 3 kHz)and repeat.
11.The resulting peak PSD level must be 8 dBm.

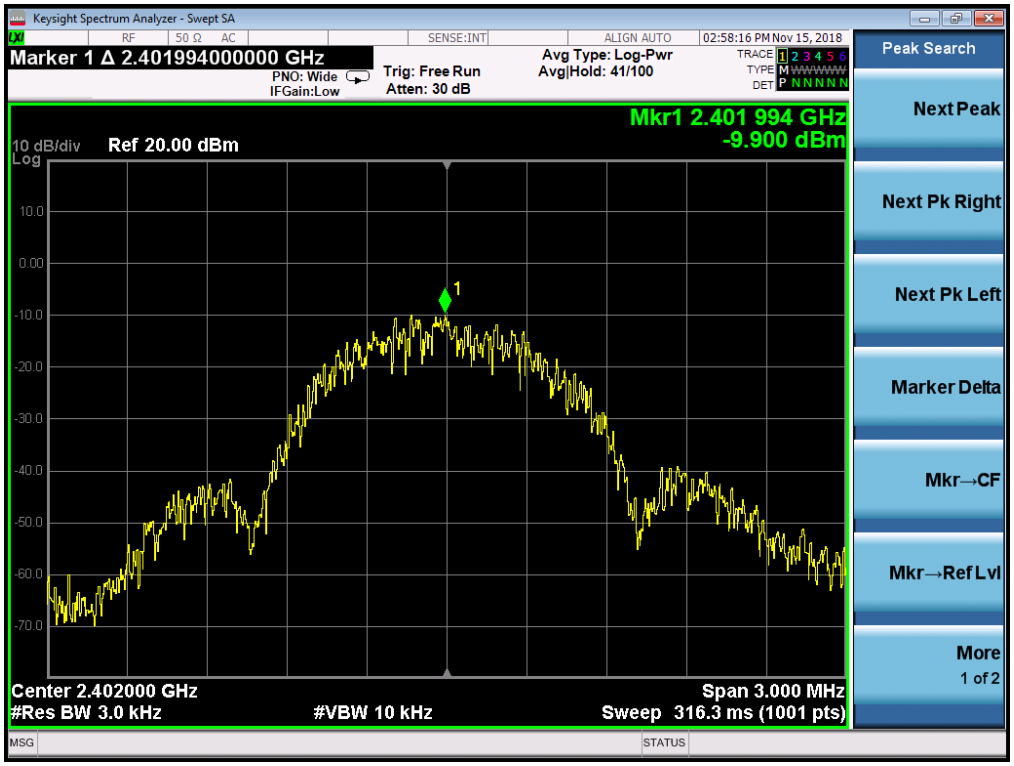
LIMIT

For digitally modulated systems, the power spectral density conducted from the intentional radiator to the antenna shall not be greater than 8 dBm in any 3 kHz band during any time interval of continuous transmission.

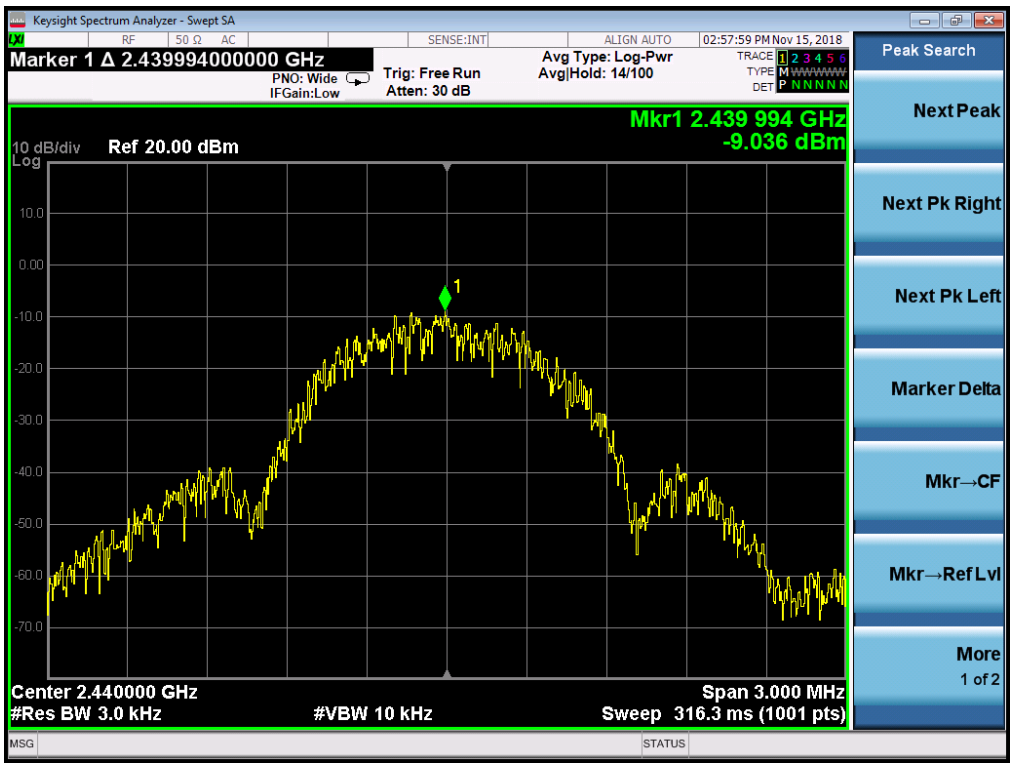
TEST RESULTS

Type	Channel	Power Spectral Density	Limit (dBm/3KHz)	Result
GFSK	0	-9.900	8.00	Pass
	19	-9.036		
	39	-9.743		

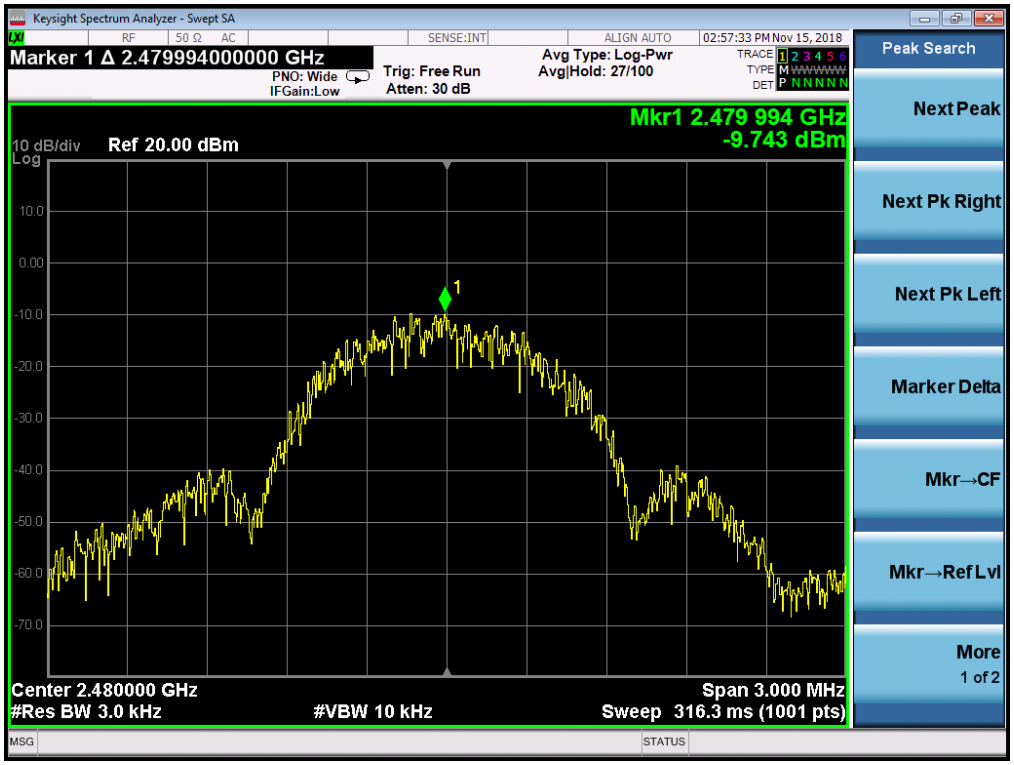
CH00


Keysight Spectrum Analyzer - Swept SA
Marker 1 Δ 2.401994000000 GHz
PNO: Wide
IFGain:Low
Trig: Free Run
Atten: 30 dB
Avg Type: Log-Pwr
Avg|Hold: 41/100
02:58:16 PM Nov 15, 2018
Mkr1 2.401 994 GHz
-9.900 dBm
10 dB/div
Log
Ref 20.00 dBm
Center 2.402000 GHz
#Res BW 3.0 kHz
#VBW 10 kHz
Span 3.000 MHz
Sweep 316.3 ms (1001 pts)
Peak Search
Next Peak
Next Pk Right
Next Pk Left
Marker Delta
Mkr→CF
Mkr→Ref Lvl
More
1 of 2

CH19

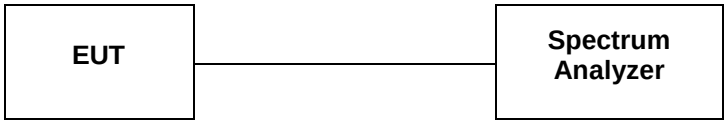

Keysight Spectrum Analyzer - Swept SA
Marker 1 Δ 2.439994000000 GHz
PNO: Wide
IFGain:Low
Trig: Free Run
Atten: 30 dB
Avg Type: Log-Pwr
Avg|Hold: 14/100
02:57:59 PM Nov 15, 2018
Mkr1 2.439 994 GHz
-9.036 dBm
10 dB/div
Log
Ref 20.00 dBm
Center 2.440000 GHz
#Res BW 3.0 kHz
#VBW 10 kHz
Span 3.000 MHz
Sweep 316.3 ms (1001 pts)
Peak Search
Next Peak
Next Pk Right
Next Pk Left
Marker Delta
Mkr→CF
Mkr→Ref Lvl
More
1 of 2

CH39


Keysight Spectrum Analyzer - Swept SA
RF 50 Ω AC
SENSE:INT
ALIGN AUTO
02:57:33 PM Nov 15, 2018
Marker 1 Δ 2.479994000000 GHz
PNO: Wide
IFGain:Low
Trig: Free Run
Atten: 30 dB
Avg Type: Log-Pwr
Avg|Hold: 27/100
TRACE 1 2 3 4 5 6
TYPE M WWWWWW
DET P N N N N N
Mkr1 2.479 994 GHz
-9.743 dBm
10 dB/div
Log
Ref 20.00 dBm
10.0
0.00
-10.0
-20.0
-30.0
-40.0
-50.0
-60.0
-70.0
1
Center 2.480000 GHz
#Res BW 3.0 kHz
#VBW 10 kHz
Span 3.000 MHz
Sweep 316.3 ms (1001 pts)
Peak Search
Next Peak
Next Pk Right
Next Pk Left
Marker Delta
Mkr→CF
Mkr→Ref Lvl
More
1 of 2
MSG
STATUS

4.5. 6dB Bandwidth

TEST CONFIGURATION



TEST PROCEDURE

The transmitter output was connected to the spectrum analyzer through an attenuator. The bandwidth of the fundamental frequency was measured by spectrum analyzer with RBW=100 KHz and VBW=300KHz.
The 6dB bandwidth is defined as the total spectrum the power of which is higher than peak power minus 6dB.
According to KDB558074 D01 V03 for one of the following procedures may be used to determine the modulated DTS device signal bandwidth.
1. Set RBW = 100 kHz.
2. Set the video bandwidth (VBW) ≥ 3 RBW.
3. Detector = Peak.
4. Trace mode = max hold.
5. Sweep = auto couple.
6. Allow the trace to stabilize.
7. Measure the maximum width of the emission that is constrained by the frequencies associated with the two outermost amplitude points (upper and lower frequencies) that are attenuated by 6 dB relative to the maximum level measured in the fundamental emission.

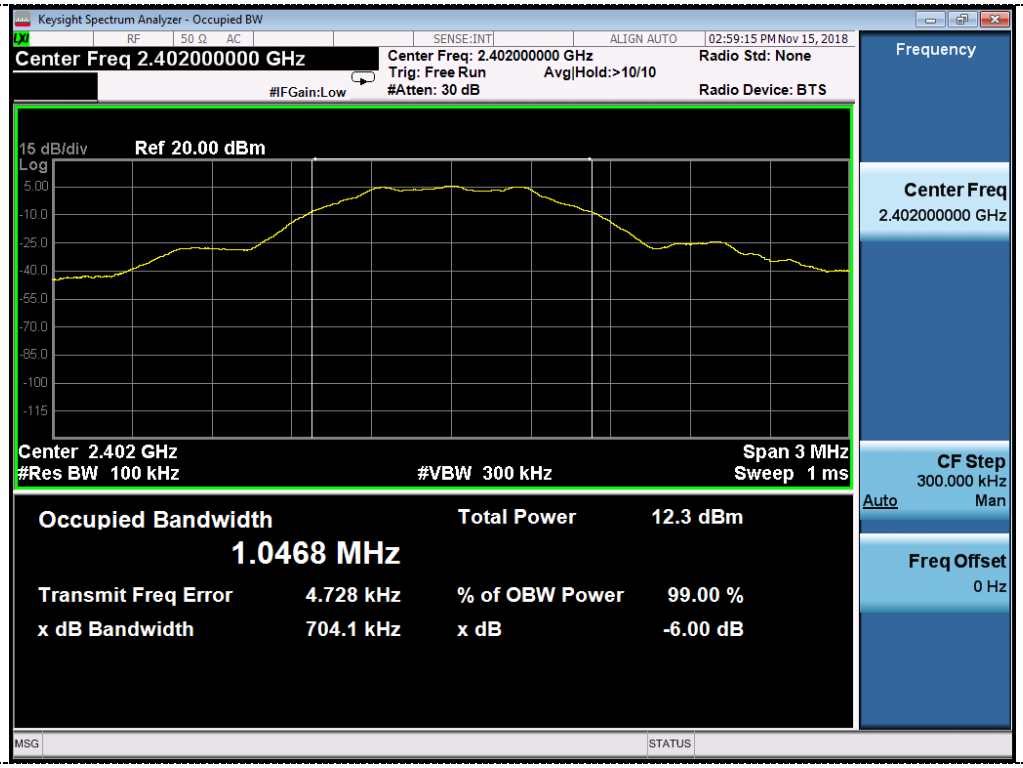
LIMIT

For digital modulation systems, the minimum 6 dB bandwidth shall be at least 500 kHz

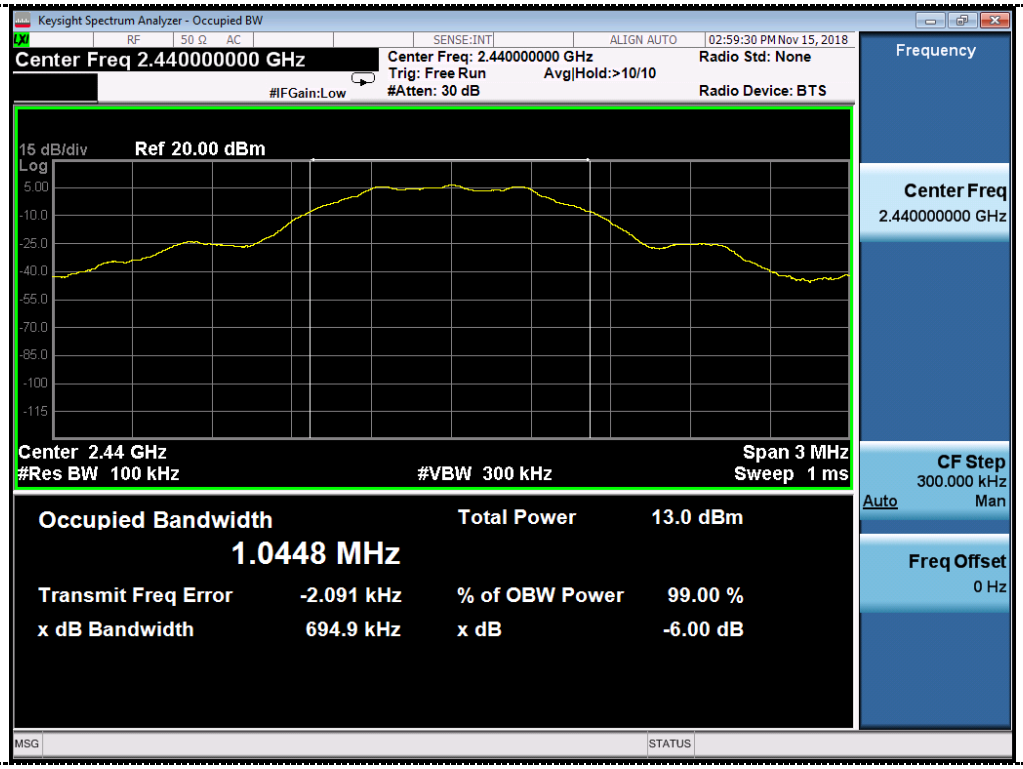
TEST RESULTS

Type	Channel	6dB Bandwidth (KHz)	Limit (KHz)	Result
GFSK	0	704.1	≥500	Pass
	19	694.9		
	39	698.8		

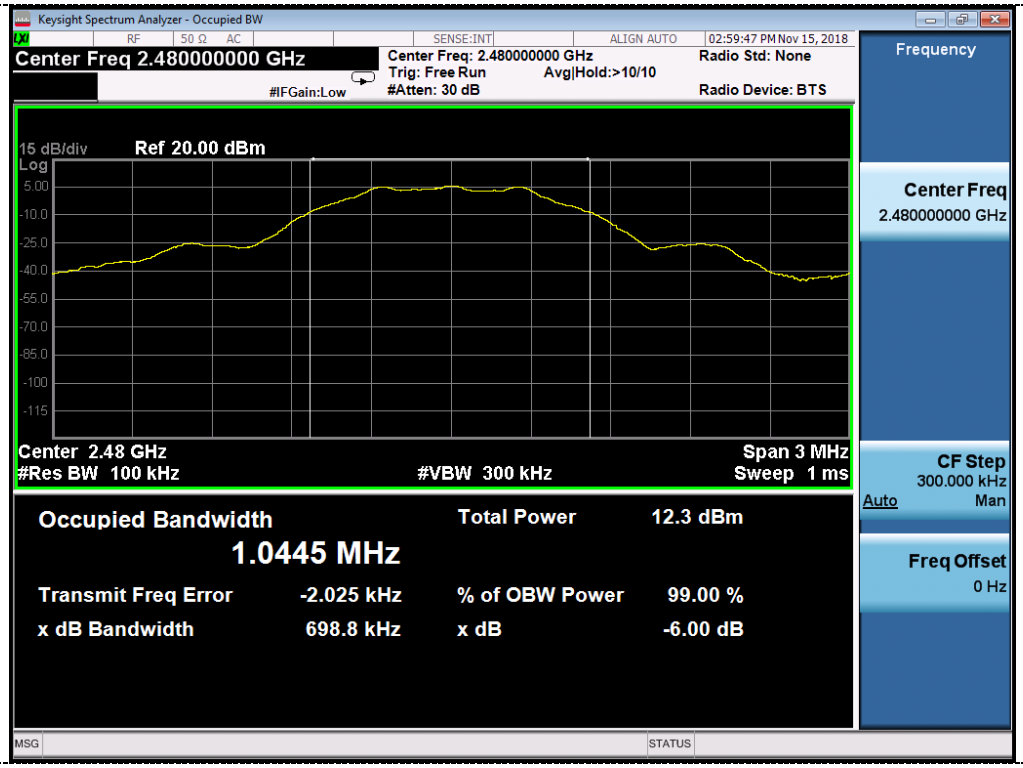
CH00


Keysight Spectrum Analyzer - Occupied BW
RF 50 Ω AC
SENSE:INT
ALIGN AUTO
02:59:15 PM Nov 15, 2018
Center Freq 2.402000000 GHz
#IFGain:Low
Center Freq: 2.402000000 GHz
Trig: Free Run
Avg|Hold:>10/10
#Atten: 30 dB
Radio Std: None
Radio Device: BTS
Frequency
15 dB/div
Ref 20.00 dBm
Log
5.00
-10.0
-25.0
-40.0
-55.0
-70.0
-85.0
-100
-115
Center Freq
2.402000000 GHz
Center 2.402 GHz
#Res BW 100 kHz
#VBW 300 kHz
Span 3 MHz
Sweep 1 ms
CF Step
300.000 kHz
Auto
Man
Occupied Bandwidth
1.0468 MHz
Total Power 12.3 dBm
Transmit Freq Error 4.728 kHz
% of OBW Power 99.00 %
x dB Bandwidth 704.1 kHz
x dB -6.00 dB
Freq Offset
0 Hz
MSG
STATUS

CH19


Keysight Spectrum Analyzer - Occupied BW
RF 50 Ω AC
SENSE:INT
ALIGN AUTO
02:59:30 PM Nov 15, 2018
Center Freq 2.440000000 GHz
#IFGain:Low
Center Freq: 2.440000000 GHz
Trig: Free Run
Avg|Hold:>10/10
#Atten: 30 dB
Radio Std: None
Radio Device: BTS
Frequency
15 dB/div
Ref 20.00 dBm
Log
5.00
-10.0
-25.0
-40.0
-55.0
-70.0
-85.0
-100
-115
Center Freq
2.440000000 GHz
Center 2.44 GHz
#Res BW 100 kHz
#VBW 300 kHz
Span 3 MHz
Sweep 1 ms
CF Step
300.000 kHz
Auto
Man
Occupied Bandwidth
1.0448 MHz
Total Power 13.0 dBm
Transmit Freq Error -2.091 kHz
% of OBW Power 99.00 %
x dB Bandwidth 694.9 kHz
x dB -6.00 dB
Freq Offset
0 Hz
MSG
STATUS

CH39

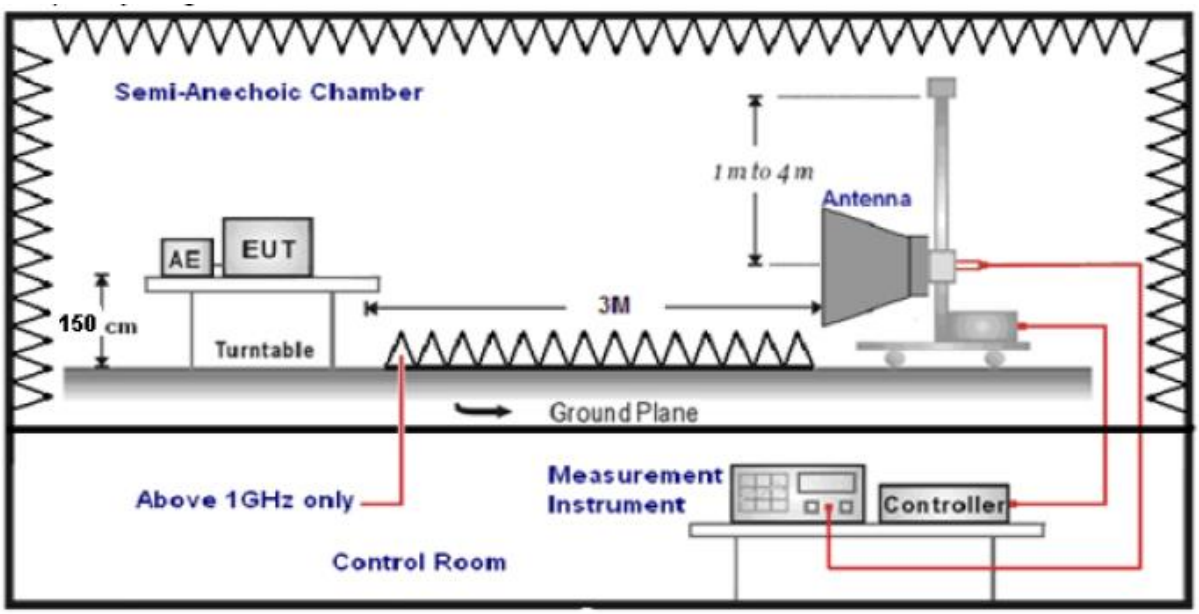

Keysight Spectrum Analyzer - Occupied BW
RF 50 Ω AC
SENSE:INT
ALIGN AUTO
02:59:47 PM Nov 15, 2018
Center Freq 2.480000000 GHz
Center Freq: 2.480000000 GHz
Trig: Free Run
Avg|Hold:>10/10
#Atten: 30 dB
#IFGain:Low
Radio Std: None
Radio Device: BTS
Frequency
15 dB/div
Log
Ref 20.00 dBm
5.00
-10.0
-25.0
-40.0
-55.0
-70.0
-85.0
-100
-115
Center 2.48 GHz
#Res BW 100 kHz
#VBW 300 kHz
Span 3 MHz
Sweep 1 ms
Center Freq
2.480000000 GHz
CF Step
300.000 kHz
Auto
Man
Freq Offset
0 Hz
Occupied Bandwidth
1.0445 MHz
Total Power 12.3 dBm
Transmit Freq Error -2.025 kHz
% of OBW Power 99.00 %
x dB Bandwidth 698.8 kHz
x dB -6.00 dB
MSG
STATUS

4.6. Band Edge Compliance of RF Emission

TEST REQUIREMENT

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 CONFIGURATION



TEST PROCEDURE

1. The EUT was placed on a turn table which is 1.5m above ground plane.
2. Maximum procedure was performed by raising the receiving antenna from 1m to 4m and rotating the turn table from 0℃ to 360℃ to acquire the highest emissions from EUT.
3. And also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical.
4. Repeat above procedures until all frequency measurements have been completed..
5. The distance between test antenna and EUT was 3 meter:
6. Setting test receiver/spectrum as following table states:

Test Frequency range	Test Receiver/Spectrum Setting	Detector
1GHz-40GHz	Peak Value: RBW=1MHz/VBW=3MHz, Sweep time=Auto Average Value: RBW=1MHz/VBW=10Hz, Sweep time=Auto	Peak

LIMIT

Below -20dB of the highest emission level in operating band.
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)

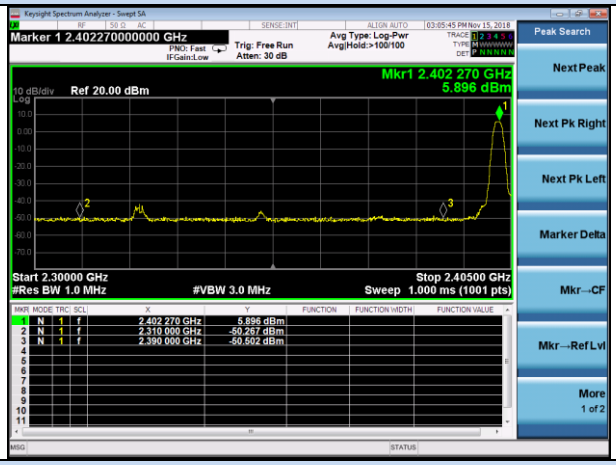
TEST RESULTS

4.6.1 For Radiated Bandedge Measurement

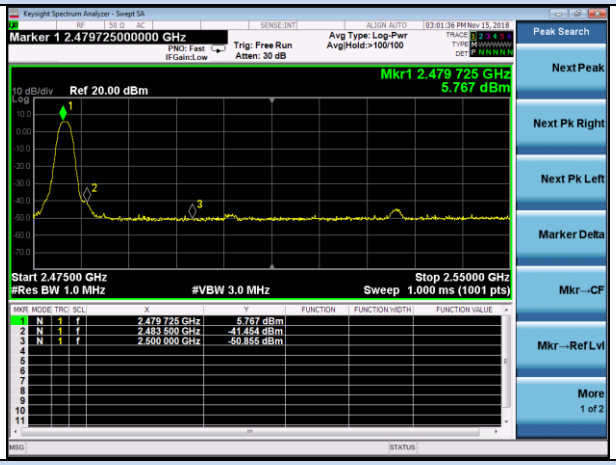
GFSK								
Frequency (MHz)	Conducted Power (dBm)	Antenna Gain (dBi)	Ground Reflection Factor (dB)	Covert Radiated E Level At 3m (dBuV/m)	Detector	Limit (dBuV/m)	Over limit dB	Verdict
2310	-50.267	0.83	0	45.793	Peak	74	-28.207	PASS
2310	-62.775	0.83	0	33.285	AV	54	-20.715	PASS
2390	-50.502	0.83	0	45.558	Peak	74	-28.442	PASS
2390	-62.589	0.83	0	33.471	AV	54	-20.529	PASS
2483.5	-41.454	0.83	0	54.606	Peak	74	-19.394	PASS
2483.5	-57.103	0.83	0	38.957	AV	54	-15.043	PASS
2500	-50.855	0.83	0	45.205	Peak	74	-28.795	PASS
2500	-62.712	0.83	0	33.348	AV	54	-20.652	PASS

Band-edge measurements for radiated emissions

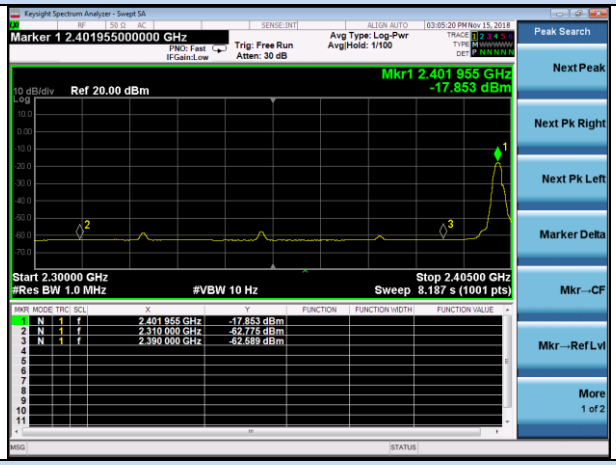
Antenna 1



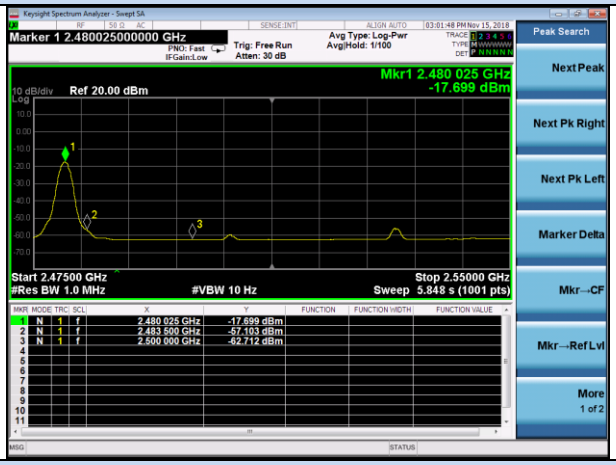
2402 MHz – Peak



2480 MHz – Peak



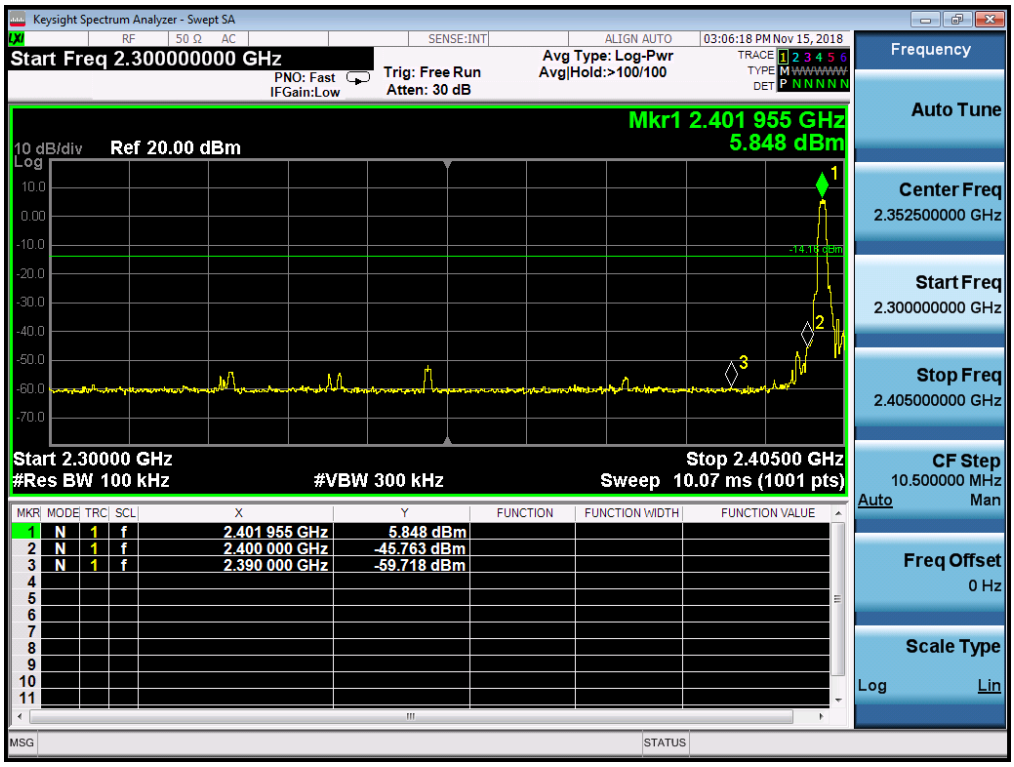
2402 MHz – Average

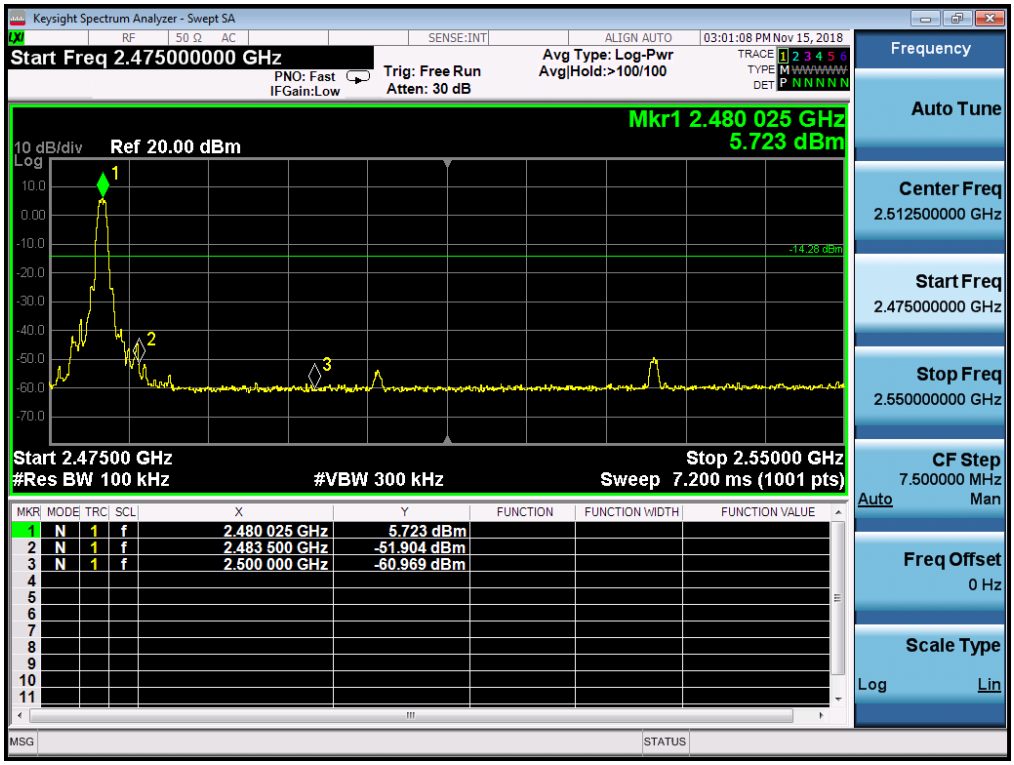


2480MHz –Average

4.6.2 For Conducted Bandedge Measurement

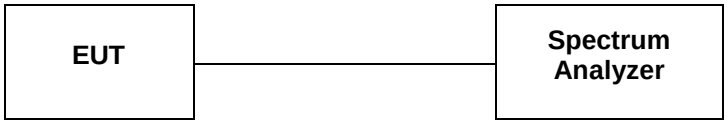
Frequency Band	Delta Peak to band emission(dBc)	＞Limit (dBc)	Result
Left-band	51.611	20	Pass
Right-band	57.627	20	Pass





4.7. Spurious RF Conducted Emission

TEST CONFIGURATION



TEST PROCEDURE

The Spurious RF conducted emissions compliance of RF radiated emission should be measured by following the guidance in ANSI C63.10-2013 with respect to maximizing the emission by rotating the EUT, measuring the emission while the EUT is situated in three orthogonal planes (if appropriate), adjusting the measurement antenna height and polarization etc. Set RBW=100kHz and VBW= 300KHz to measure the peak field strength , and mwasure frequeny range from 9KHz to 25GHz.

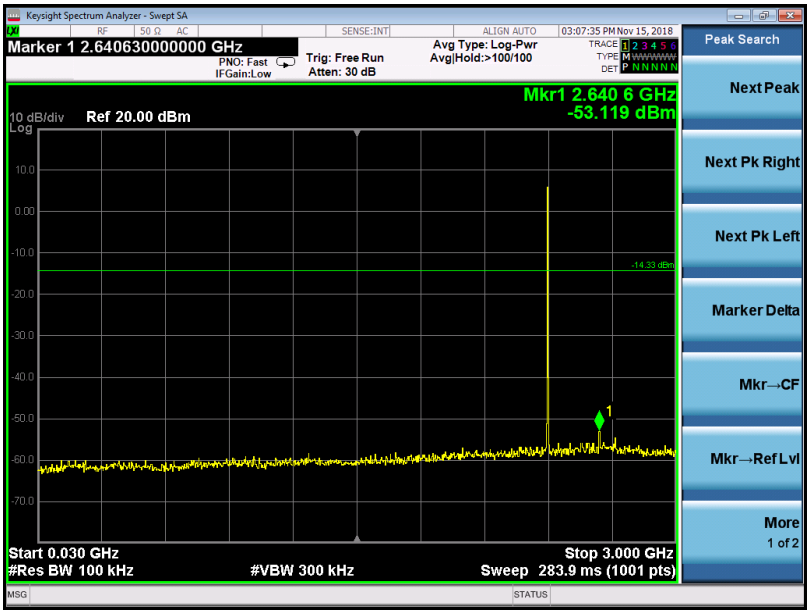
LIMIT

1. Below -20dB of the highest emission level in operating band.
2. Fall in the restricted bands listed in section 15.205. The maximum permitted average field strength is listed in section 15.209.

TEST RESULTS

Test Mode:	GFSK	Test channel :	00

Channel 0

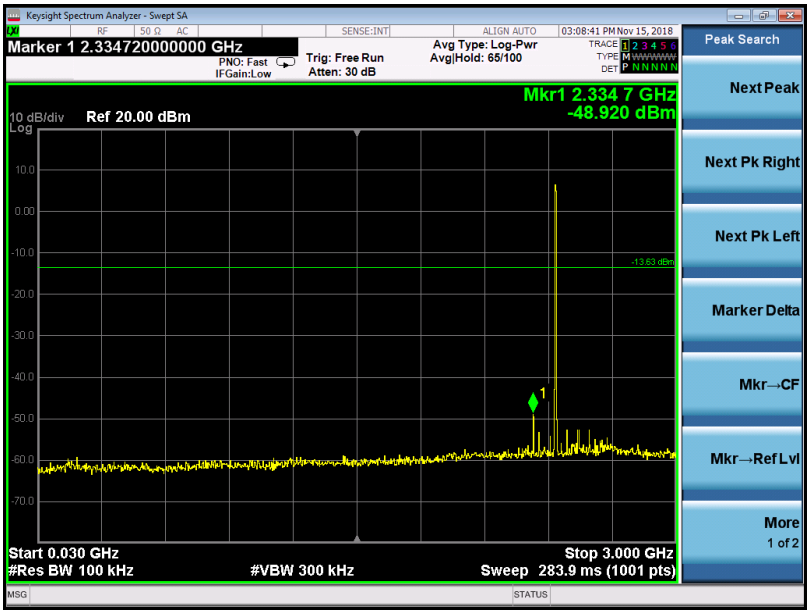


30MHz~3GHz

3GHz ~25GHz

Test Mode:	GFSK	Test channel :	19

Channel 19

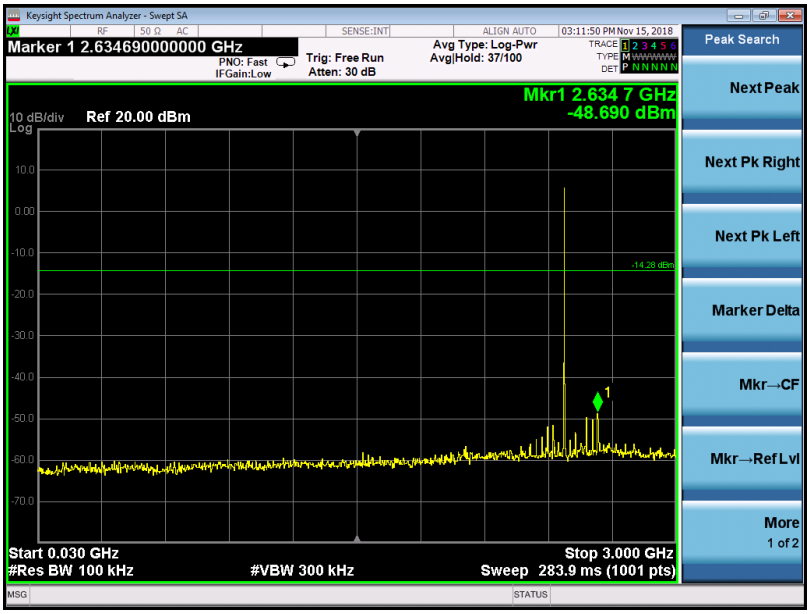


30MHz~3GHz

3GHz ~25GHz

Test Mode:	GFSK	Test channel :	39

Channel 39



30MHz~3GHz

3GHz ~25GHz

4.8. Antenna Requirement

Standard Applicable

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.

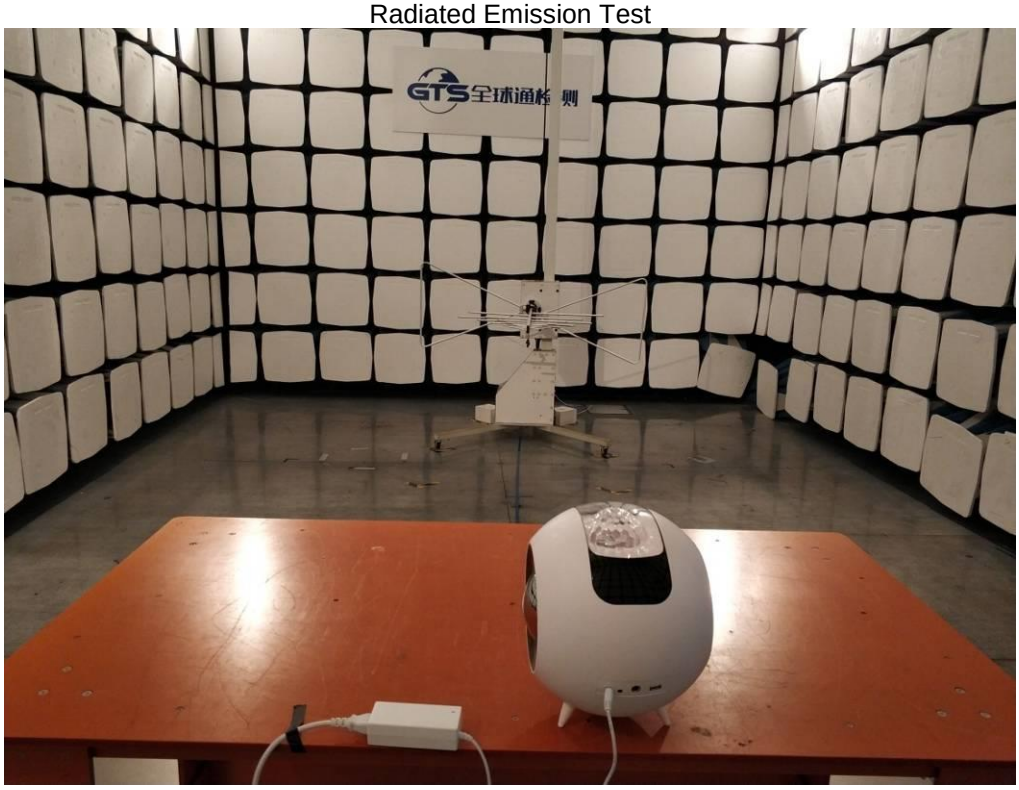
And according to FCC 47 CFR Section 15.247 (c), if transmitting antennas of directional gain greater than 6dBi are used, the power shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6dBi.

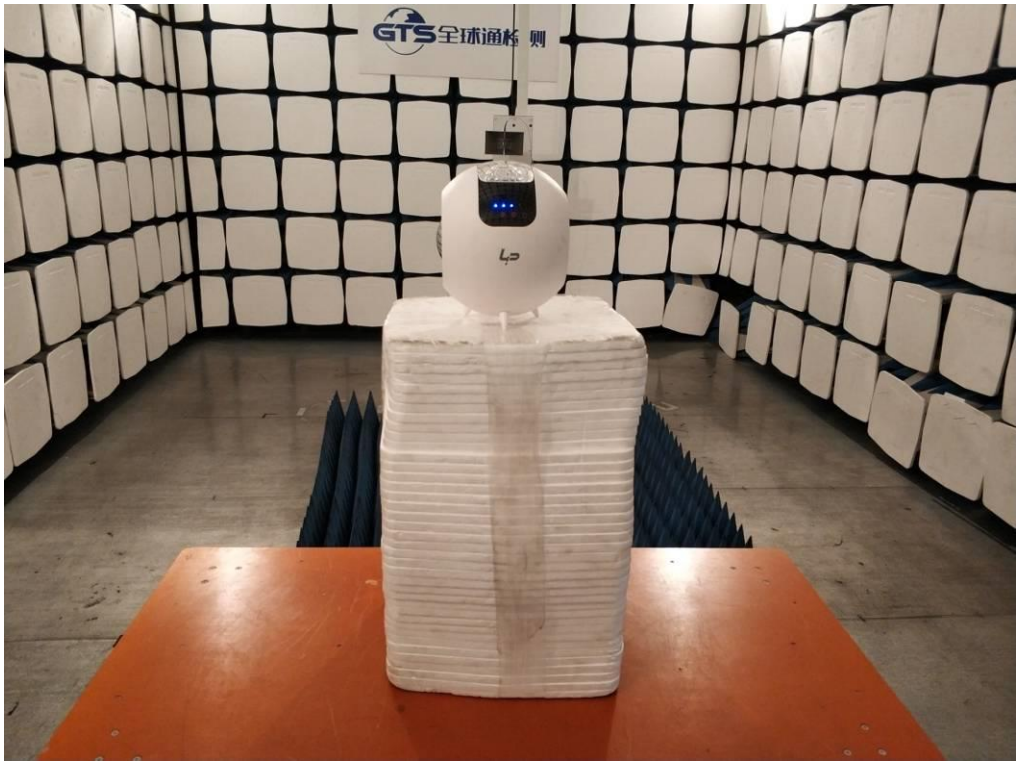
Test Result

The antenna used for this product is Internal Antenna and that no antenna other than that furnished by the responsible party shall be used with the device, the maximum peak gain of the transmit antenna is only 0.83dBi.

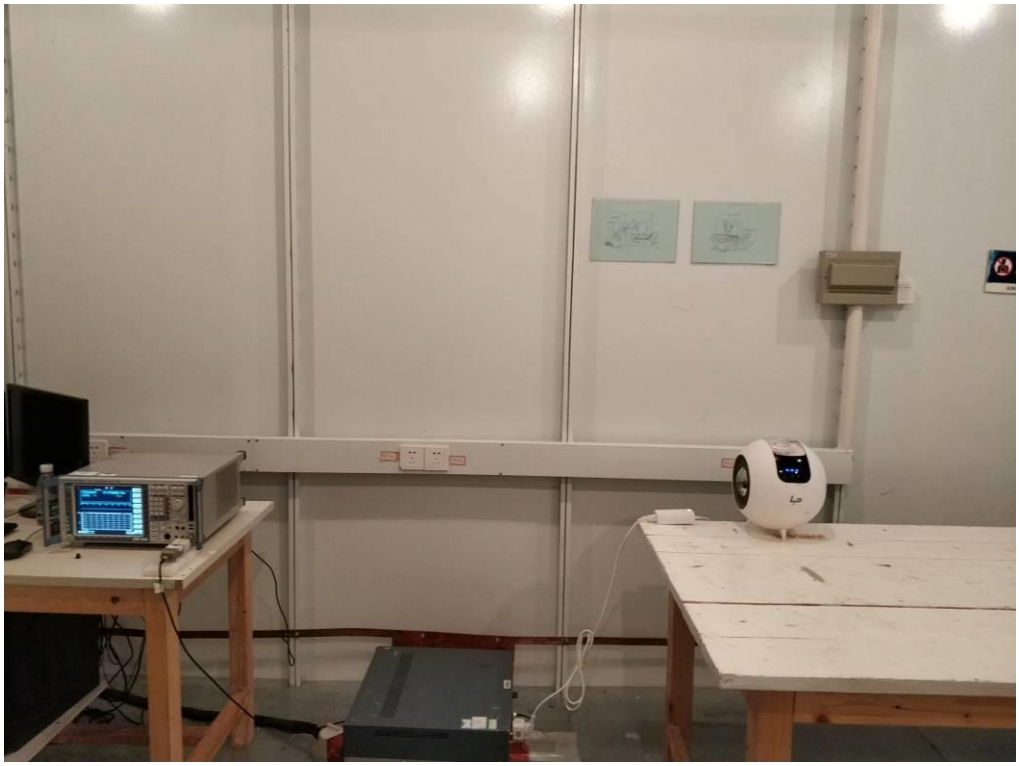
5. Test Setup Photos of the EUT

Radiated Emission Test

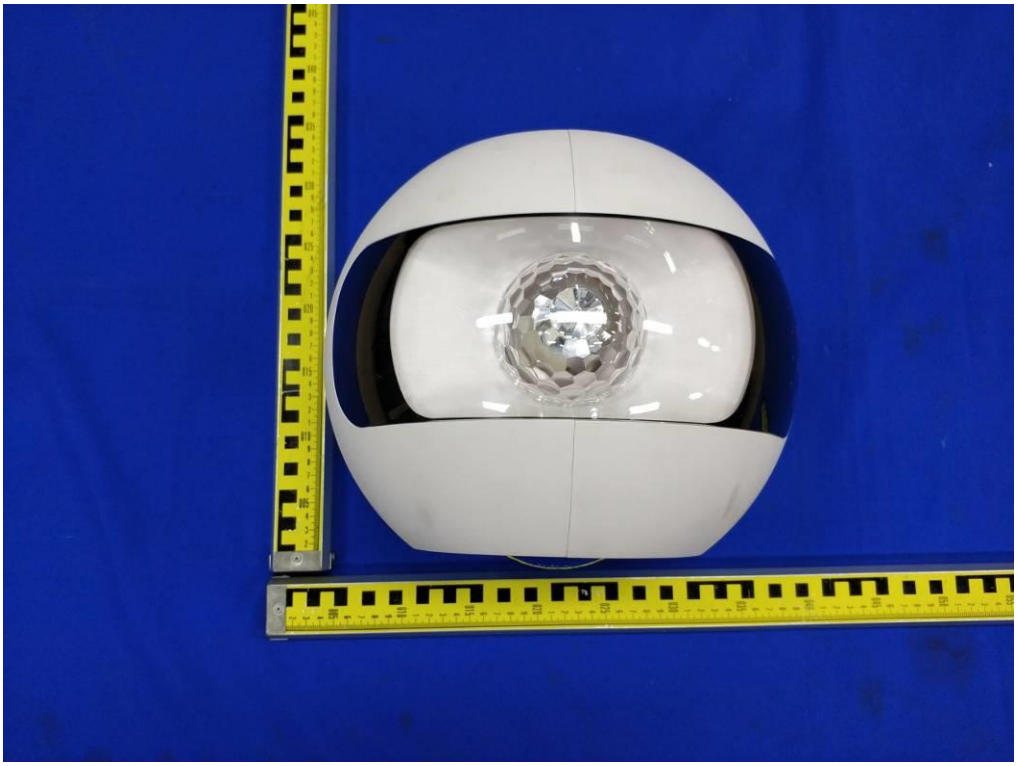


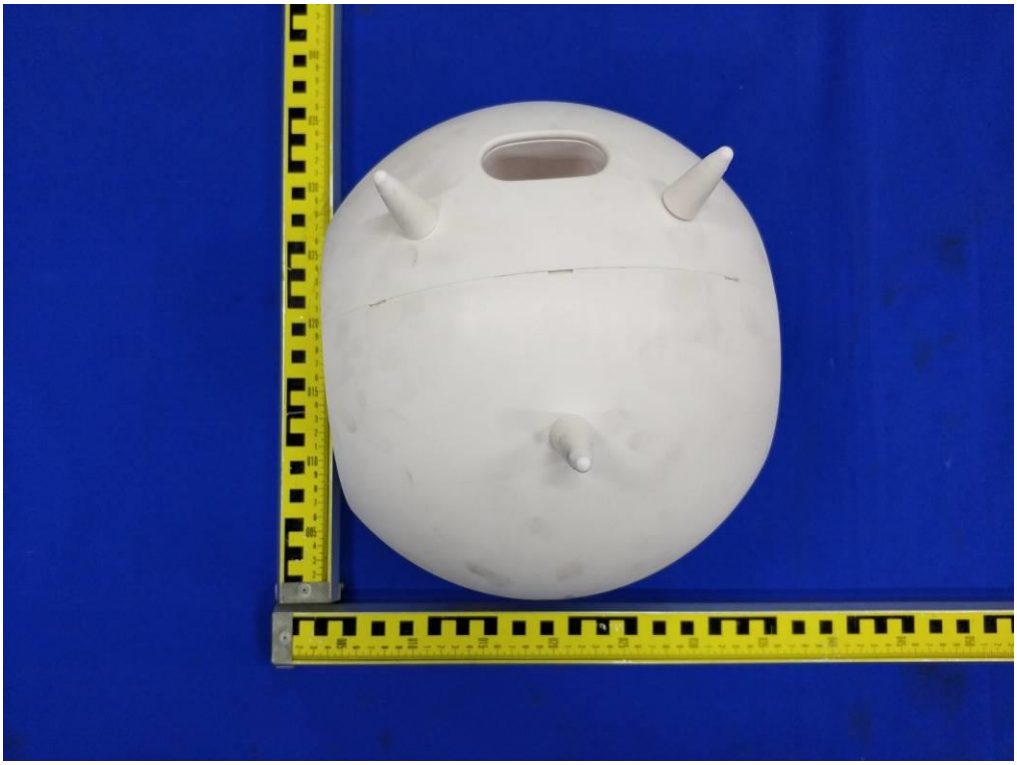


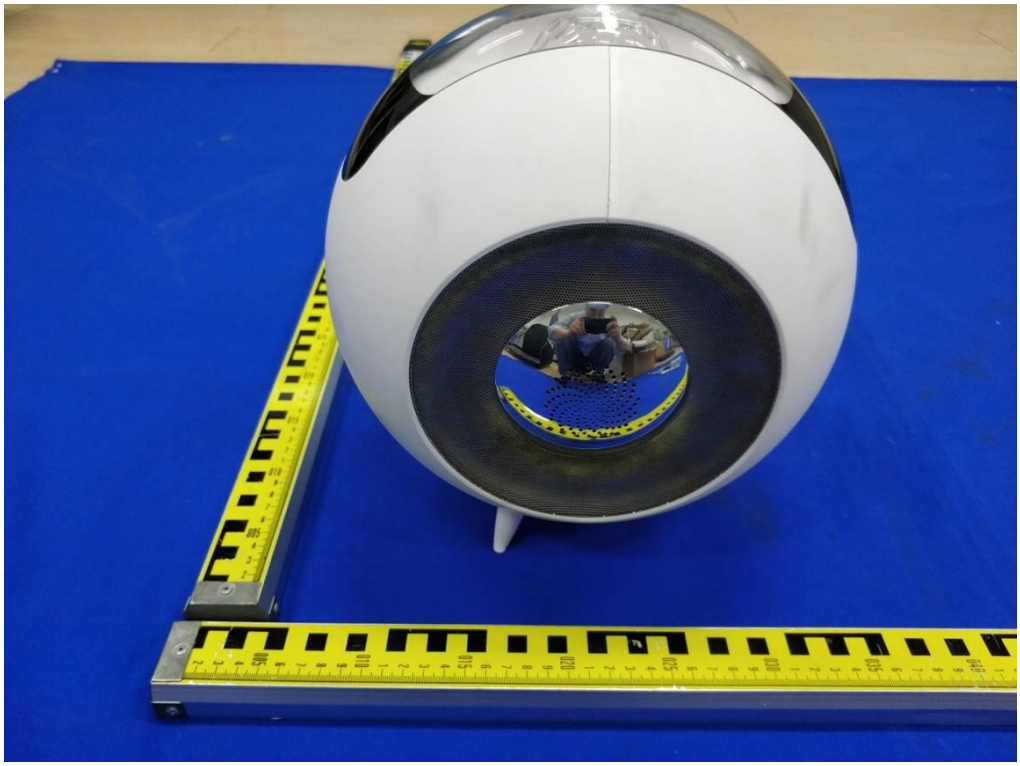
Conducted Emission

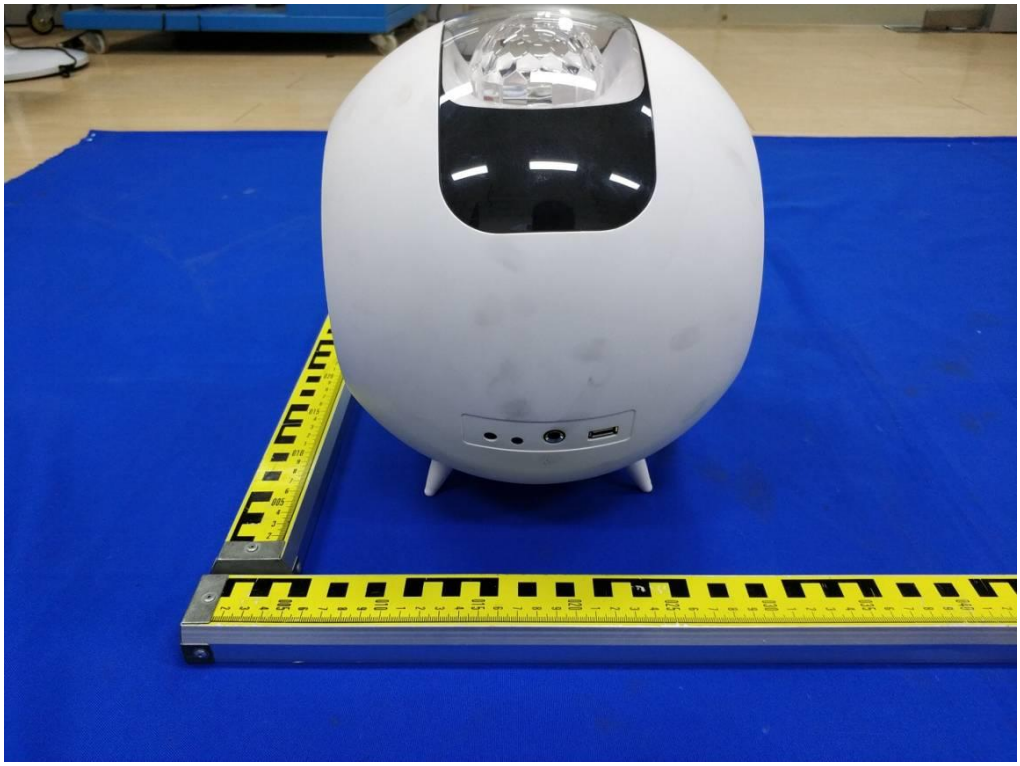


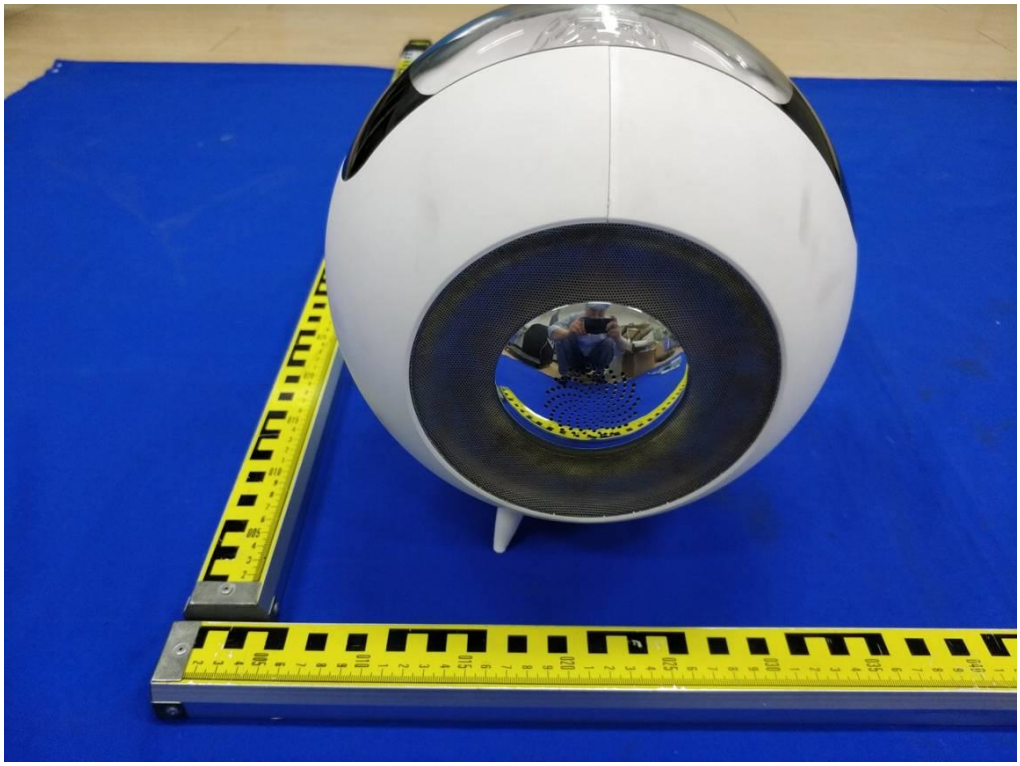
6. External and Internal Photos of the EUT

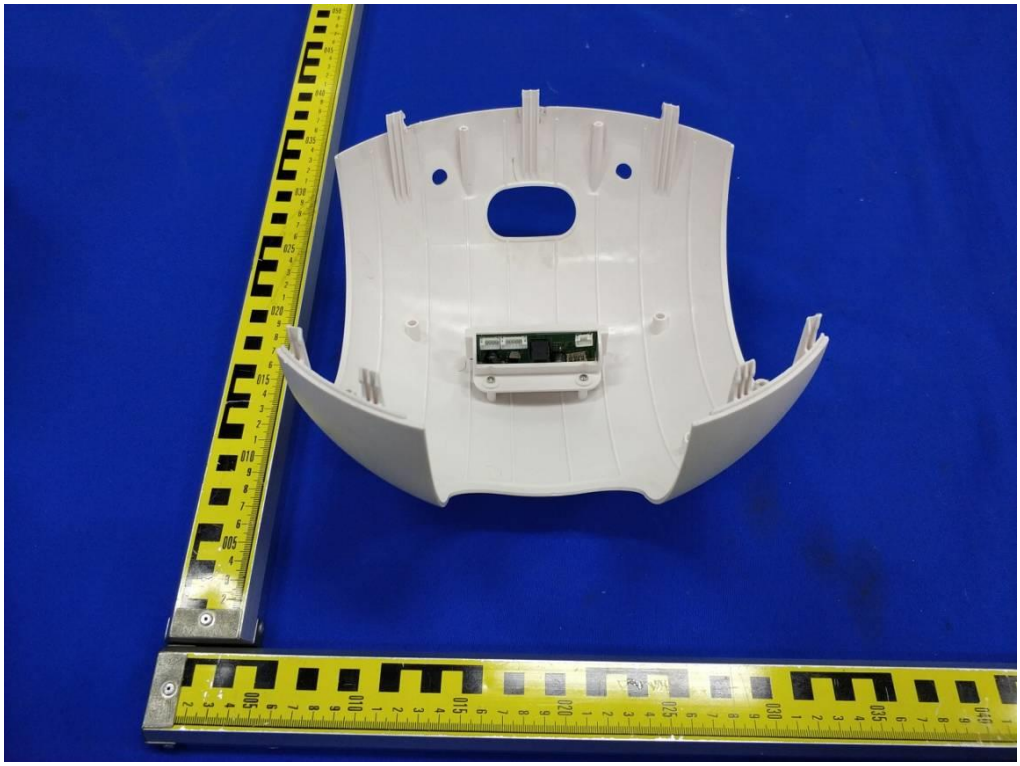


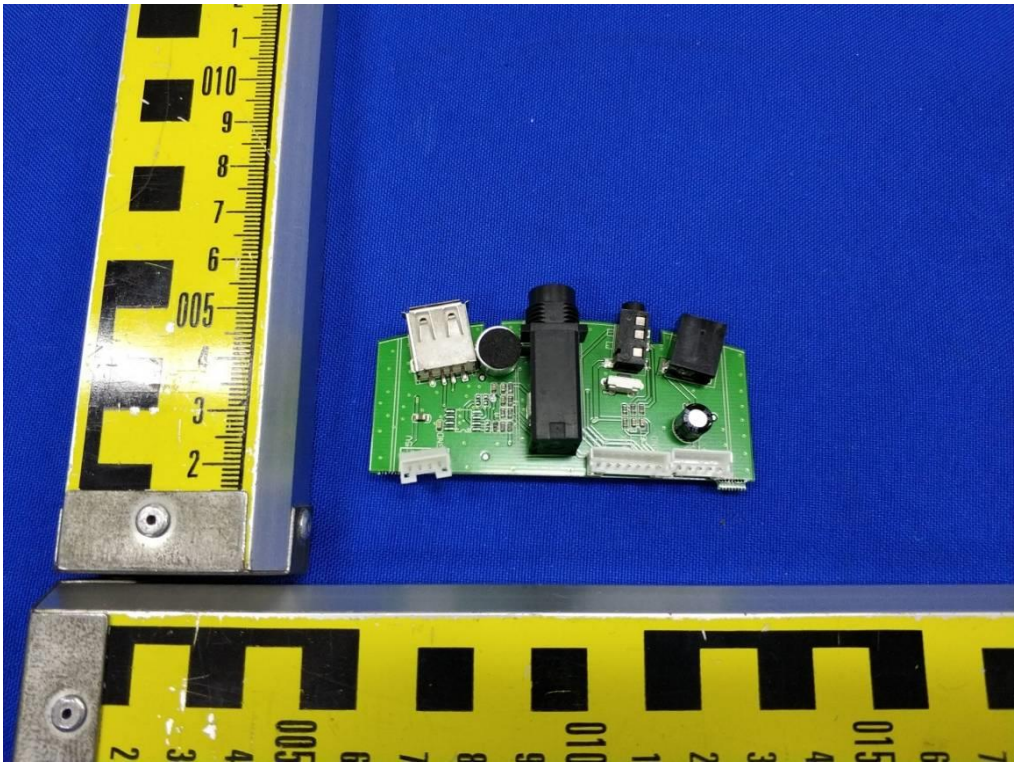


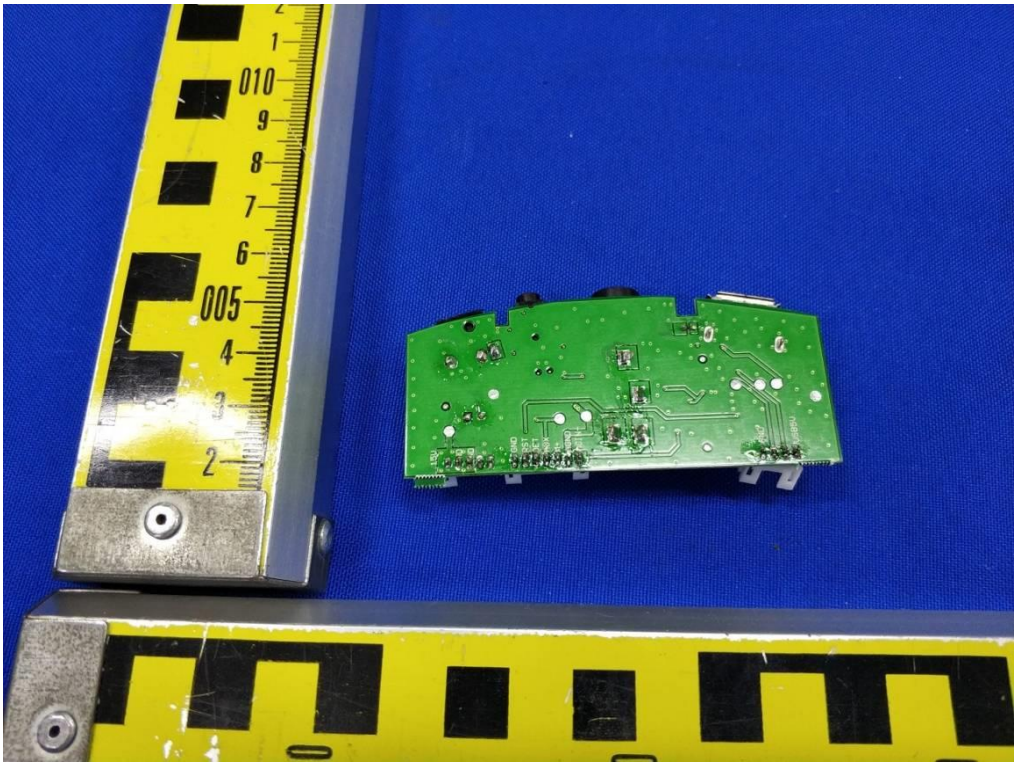


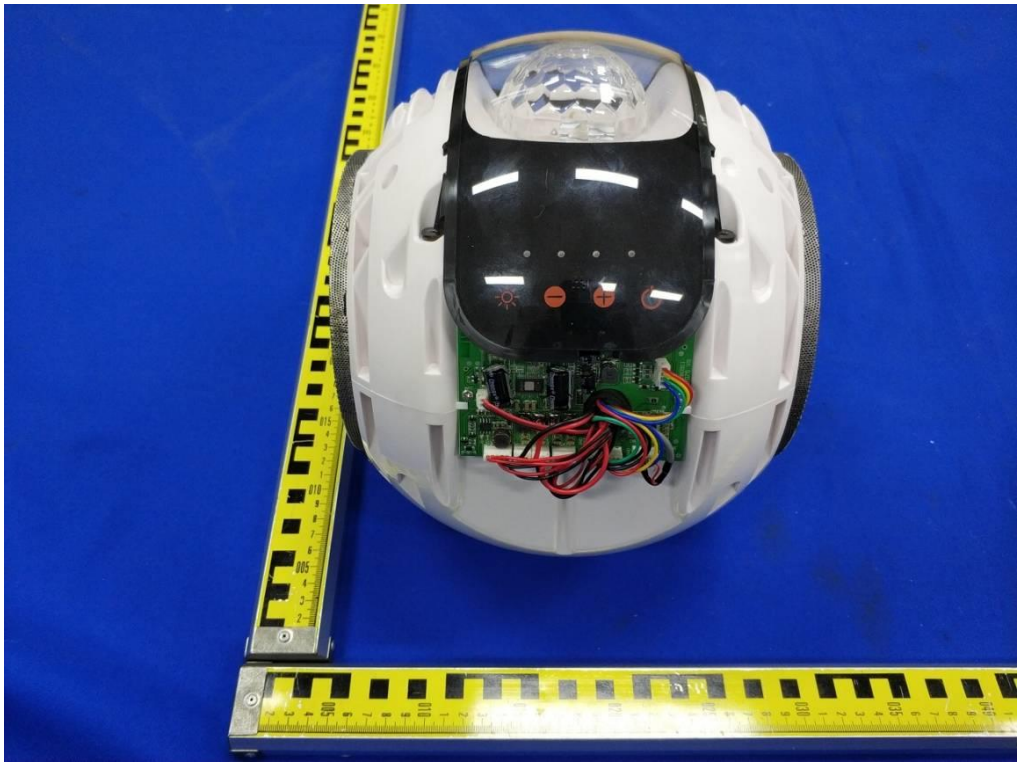


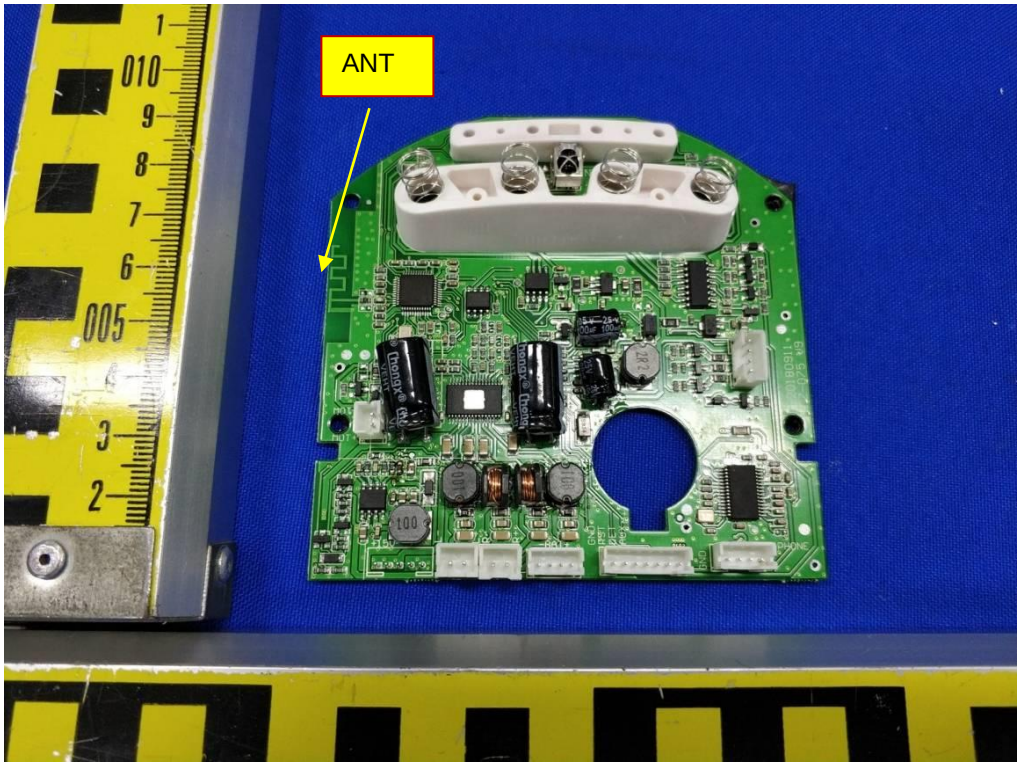








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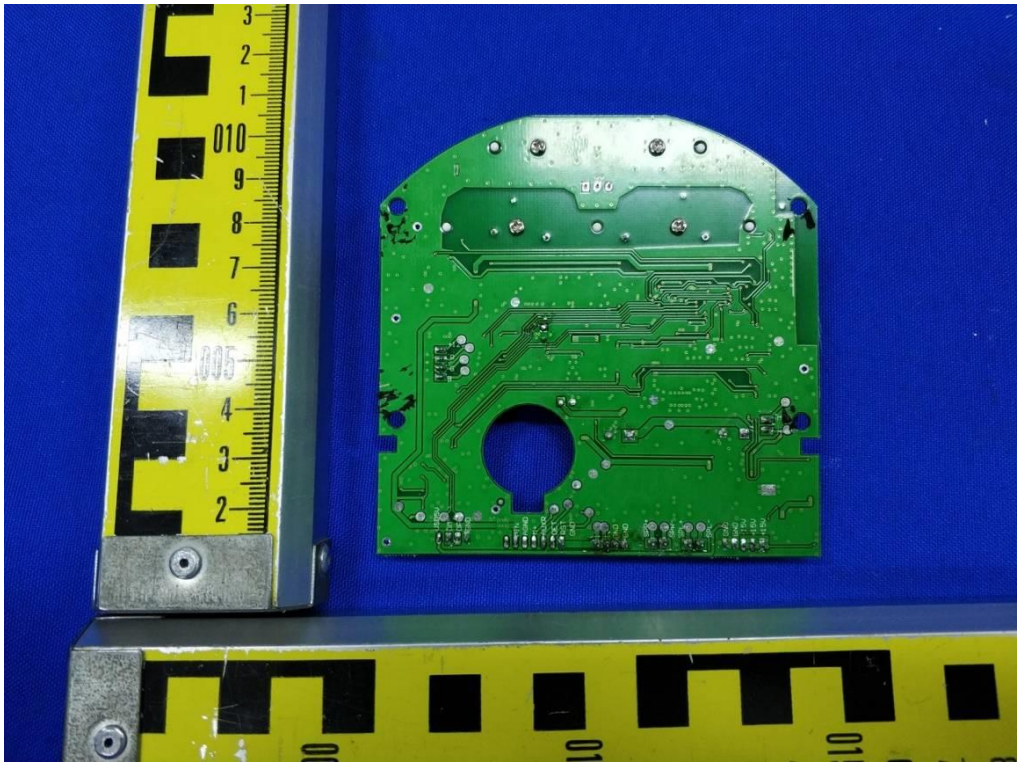

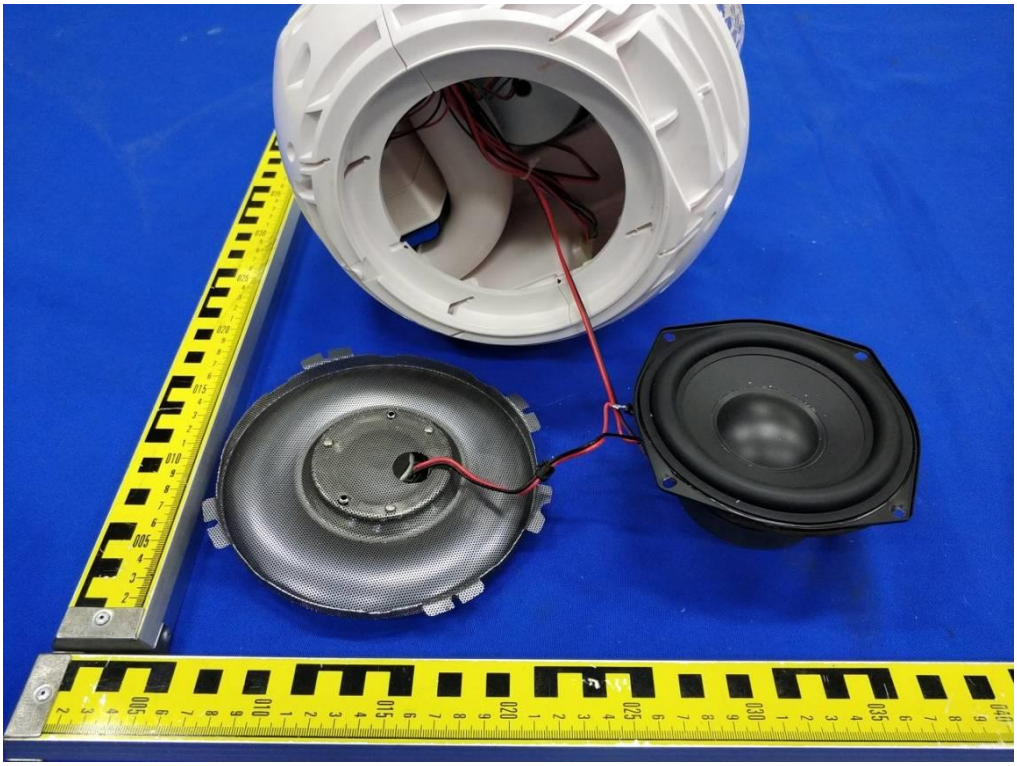

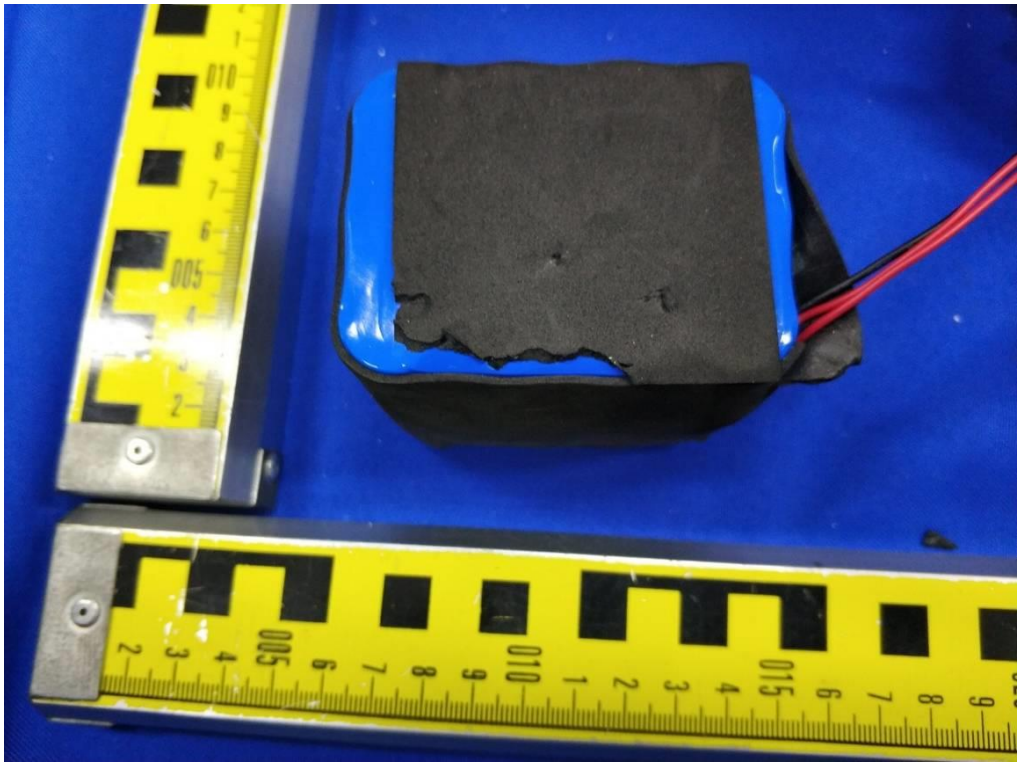

.....End of Report.....