

**Shenzhen Global Test Service Co.,Ltd.**

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FCC PART 15 SUBPART C TEST REPORT**FCC PART 15.247****Report Reference No.....: GTSR18110079-BLE****FCC ID.....: 2AIRJ-NARMONY**

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Date of issue.....: Nov.12, 2018

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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 Jilongchang Electronics Co.,Ltd

Address: No.134 Gangzai Street, Furong Industrial Park, Shajing of Baoan District, Shenzhen City, Guangdong Province, CHINA

Test specificationStandard: **FCC Part 15.247**

TRF Originator: Shenzhen Global Test Service Co.,Ltd.

Master TRF.....: Dated 2014-12

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Test item description MY AUDIO PET SPLASH BLUETOOTH SPEAKER

Trade Mark: /

Manufacturer: Shenzhen Jilongchang Electronics Co.,Ltd

Model/Type reference.....: Narmony

Listed Models: Rocktopod, AuROARa BEARealis

Modulation Type: GFSK

Difference: All the same except the model number

Operation Frequency.....: From 2402MHz to 2480MHz

Hardware Version: V1.3

Software Version: V1.02

Rating: DC 3.7V from Battery or DC 5V from adapter

Result.....: **PASS**

TEST REPORT

Test Report No. : GTSR18110079-BLE	Nov. 12, 2018
	Date of issue

Equipment under Test : **MY AUDIO PET SPLASH BLUETOOTH SPEAKER**

Model /Type : **Narmony**

Listed Models : **Rocktopod, AuROARa BEARealis**

Applicant : **Shenzhen Jilongchang Electronics Co.,Ltd**

Address : **No.134 Gangzai Street, Furong Industrial Park, Shajing of
Baoan District, Shenzhen City, Guangdong Province, CHINA**

Manufacturer : **Shenzhen Jilongchang Electronics Co.,Ltd**

Address : **No.134 Gangzai Street, Furong Industrial Park, Shajing of
Baoan District, Shenzhen City, Guangdong Province, CHINA**

Test Result:	PASS
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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. 12, 2018

2.2. Product Description

Product Name:	MY AUDIO PET SPLASH BLUETOOTH SPEAKER
Trade Mark:	/
Model/Type reference:	Narmony
Listed Models	Rocktopod, AuROARa BEARealis
Power Supply	DC 3.7V from Battery or DC 5V from adapter
BT	
Modulation Type	GFSK
Operation frequency	2402-2480 MHz
Antenna Type:	Internal Antenna
Antenna Gain:	0 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)	

3.7V from battery

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

This is a **BLUETOOTH SPEAKER**.

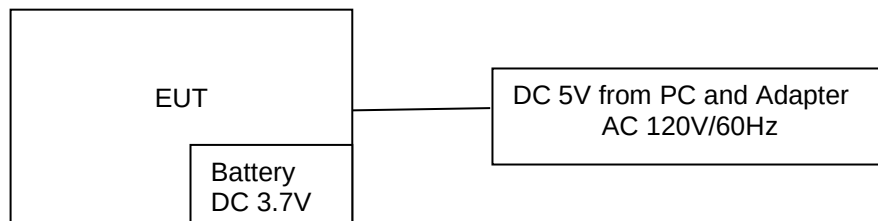
2.5. EUT operation mode

The Applicant provides communication tools software(Realtek MPtool) 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: 2AIRJ-NARMONY** 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

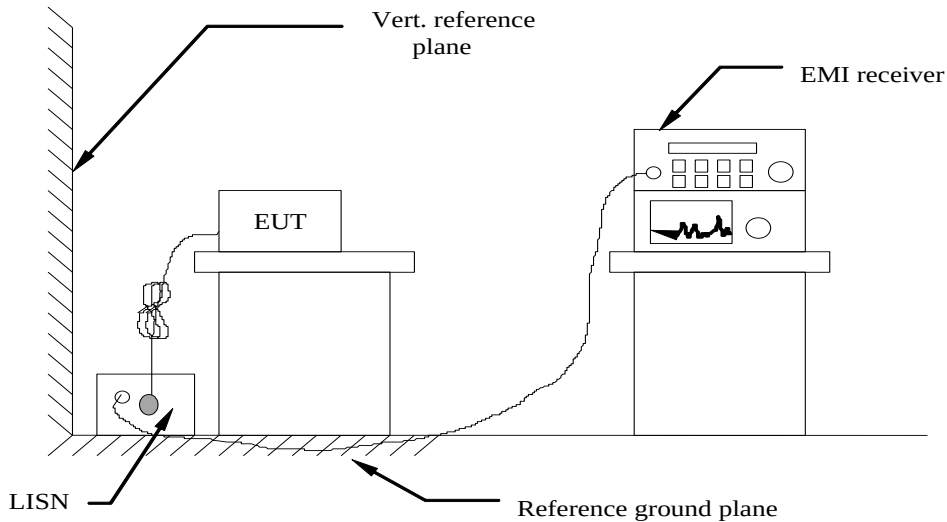
Test Equipment	Manufacturer	Model No.	Serial No.	Calibration Date	Calibration Due Date
LISN	R&S	ENV216	3560.6550.08	2018/09/20	2019/09/19
LISN	R&S	ESH2-Z5	893606/008	2018/09/20	2019/09/19
Bilog Antenna	Schwarzbeck	VULB9163	976	2016/09/20	2019/09/19
EMI Test Receiver	R&S	ESCI7	101102	2018/09/20	2019/09/19
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	SCHWARZBEC K	FMZB1519	1519-037	2016/09/20	2019/09/19
Broadband Horn Antenna	SCHWARZBEC K	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

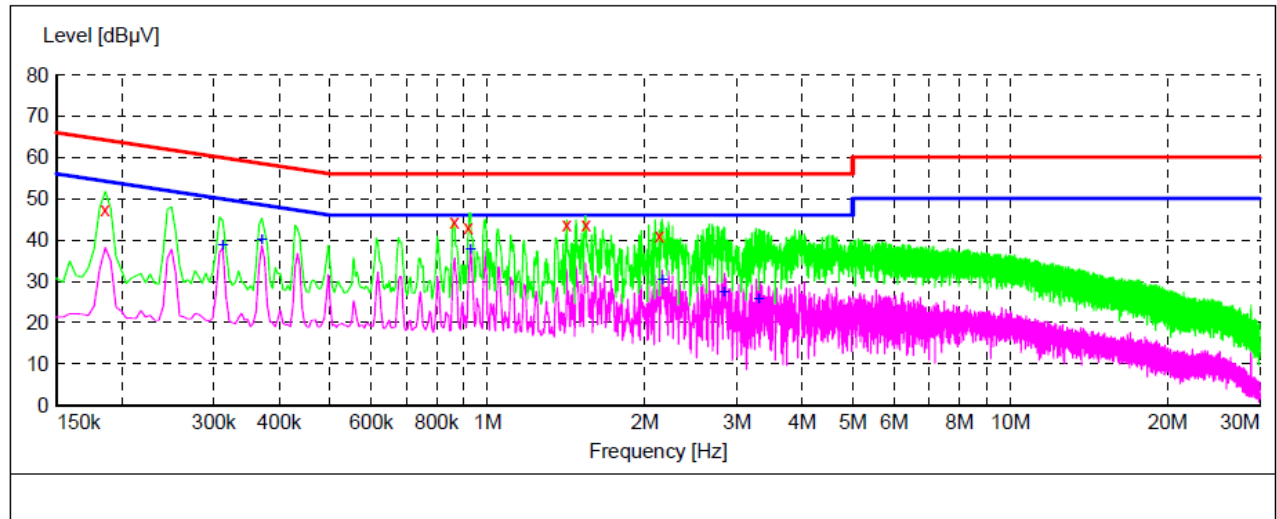
Remark: We measured Conducted Emission at all mode in AC 120V/60Hz and AC 240V/50Hz, Pre-test AC conducted emission at power from AC mains mode and at charge from PC mode, recorded worst case..

Power supply:

AC 120V/60Hz(adapter)

Polarization

L

**MEASUREMENT RESULT:**

Frequency MHz	Level dBμV	Transd dB	Limit dBμV	Margin dB	Detector	Line	PE
0.186000	47.50	10.0	64	16.7	QP	L1	GND
0.865500	44.40	9.6	56	11.6	QP	L1	GND
0.919500	43.10	9.6	56	12.9	QP	L1	GND
1.419000	43.60	9.6	56	12.4	QP	L1	GND
1.545000	43.80	9.5	56	12.2	QP	L1	GND
2.134500	40.90	9.5	56	15.1	QP	L1	GND

MEASUREMENT RESULT:

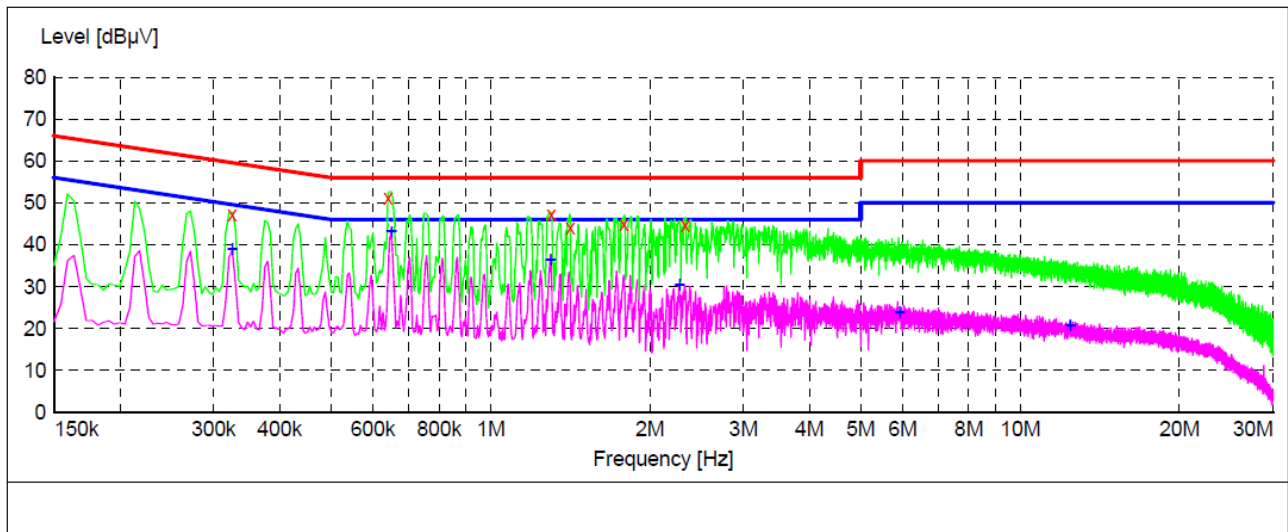
Frequency MHz	Level dBμV	Transd dB	Limit dBμV	Margin dB	Detector	Line	PE
0.312000	38.70	9.9	50	11.2	AV	L1	GND
0.370500	40.10	9.9	49	8.4	AV	L1	GND
0.928500	37.80	9.6	46	8.2	AV	L1	GND
2.161500	30.40	9.5	46	15.6	AV	L1	GND
2.832000	27.30	9.5	46	18.7	AV	L1	GND
3.300000	25.70	9.4	46	20.3	AV	L1	GND

Power supply:

AC 120V/60Hz(adapter)

Polarization

N

**MEASUREMENT RESULT:**

Frequency MHz	Level dBμV	Transd dB	Limit dBμV	Margin dB	Detector	Line	PE
0.325500	47.20	9.9	60	12.4	QP	N	GND
0.640500	51.20	9.7	56	4.8	QP	N	GND
1.302000	47.30	9.6	56	8.7	QP	N	GND
1.414500	44.10	9.6	56	11.9	QP	N	GND
1.788000	44.90	9.5	56	11.1	QP	N	GND
2.332500	44.60	9.5	56	11.4	QP	N	GND

MEASUREMENT RESULT:

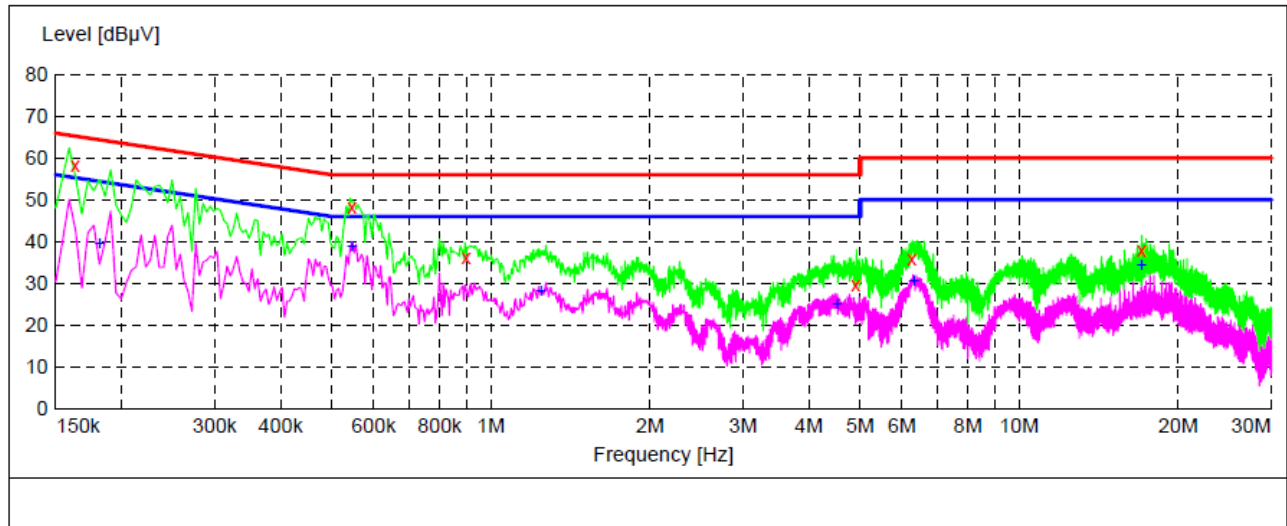
Frequency MHz	Level dBμV	Transd dB	Limit dBμV	Margin dB	Detector	Line	PE
0.325500	39.00	9.9	50	10.6	AV	N	GND
0.649500	42.10	9.7	46	3.9	AV	N	GND
1.297500	36.40	9.6	46	9.6	AV	N	GND
2.274000	30.50	9.5	46	15.5	AV	N	GND
5.914500	23.80	9.2	50	26.2	AV	N	GND
12.421500	20.70	8.5	50	29.3	AV	N	GND

Power supply:

AC 240V/50Hz(adapter)

Polarization

L

**MEASUREMENT RESULT:**

Frequency MHz	Level dBμV	Transd dB	Limit dBμV	Margin dB	Detector	Line	PE
0.163500	58.30	10.0	65	7.0	QP	L1	GND
0.546000	48.50	9.8	56	7.5	QP	L1	GND
0.897000	36.40	9.6	56	19.6	QP	L1	GND
4.906500	29.70	9.3	56	26.3	QP	L1	GND
6.265500	35.90	9.2	60	24.1	QP	L1	GND
17.052000	38.00	8.6	60	22.0	QP	L1	GND

MEASUREMENT RESULT:

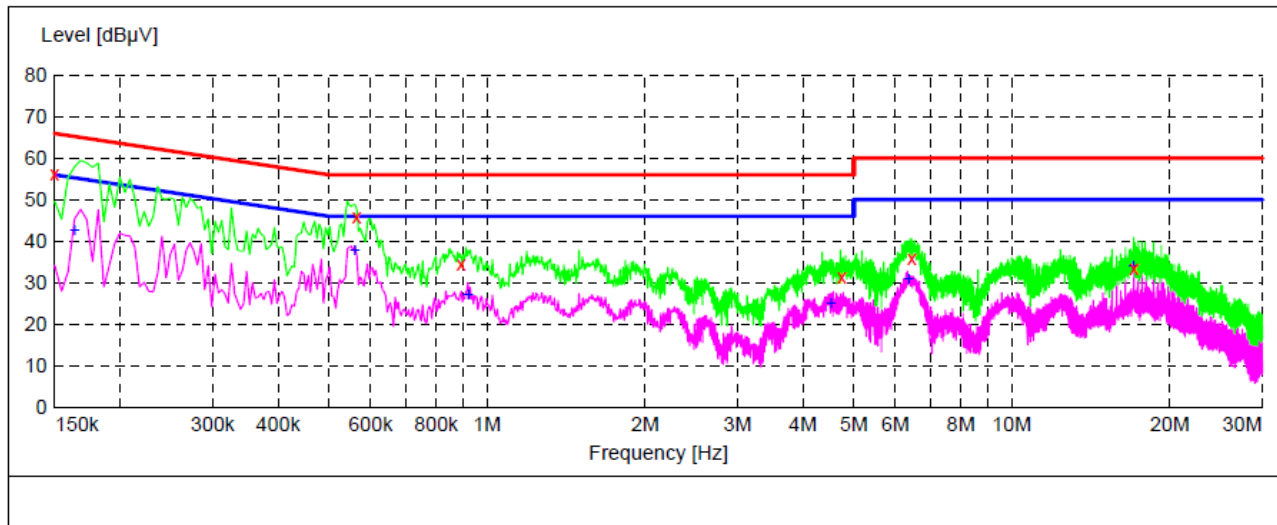
Frequency MHz	Level dBμV	Transd dB	Limit dBμV	Margin dB	Detector	Line	PE
0.181500	39.70	10.0	54	14.7	AV	L1	GND
0.546000	39.20	9.8	46	6.8	AV	L1	GND
1.243500	28.20	9.6	46	17.8	AV	L1	GND
4.515000	25.20	9.3	46	20.8	AV	L1	GND
6.315000	30.60	9.2	50	19.4	AV	L1	GND
17.052000	34.60	8.6	50	15.4	AV	L1	GND

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	56.20	10.1	66	9.8	QP	N	GND
0.564000	46.10	9.7	56	9.9	QP	N	GND
0.892500	34.60	9.6	56	21.4	QP	N	GND
4.744500	31.30	9.3	56	24.7	QP	N	GND
6.450000	35.90	9.2	60	24.1	QP	N	GND
17.083500	33.50	8.6	60	26.5	QP	N	GND

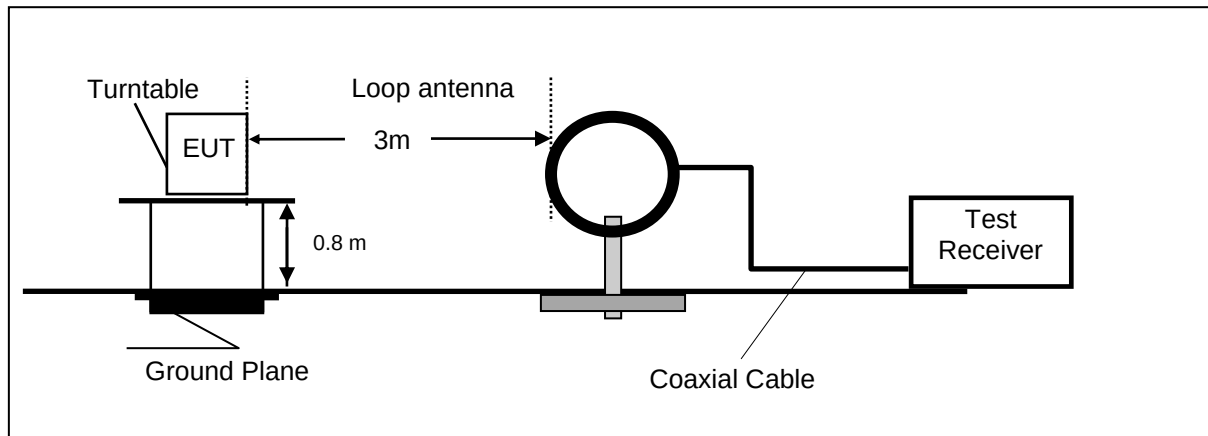
MEASUREMENT RESULT:

Frequency MHz	Level dBμV	Transd dB	Limit dBμV	Margin dB	Detector	Line	PE
0.163500	42.70	10.0	55	12.6	AV	N	GND
0.559500	38.00	9.7	46	8.0	AV	N	GND
0.919500	27.40	9.6	46	18.6	AV	N	GND
4.524000	25.30	9.3	46	20.7	AV	N	GND
6.351000	31.00	9.2	50	19.0	AV	N	GND
17.061000	34.30	8.6	50	15.7	AV	N	GND

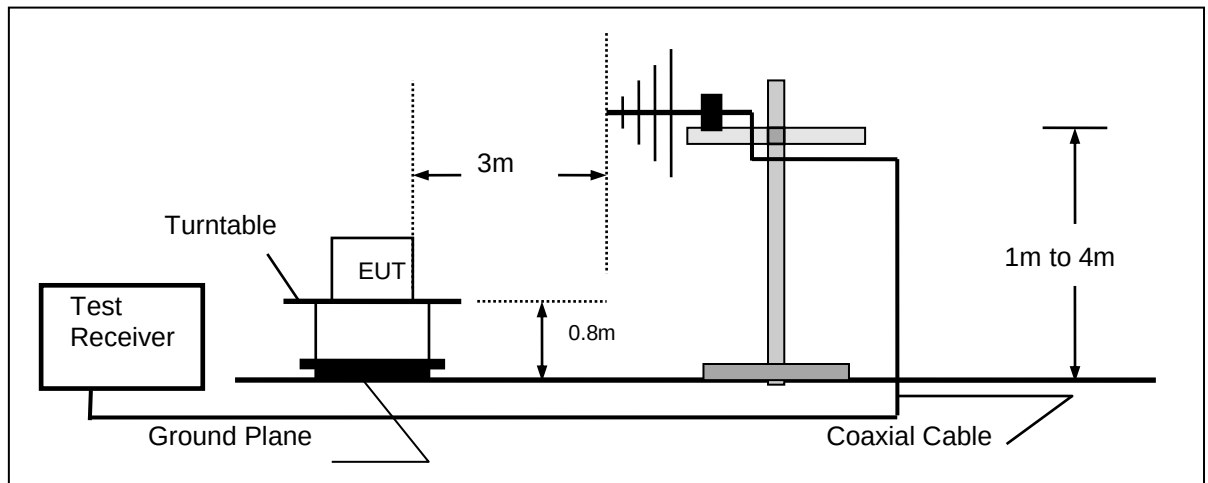
4.2. Radiated Emission

TEST CONFIGURATION

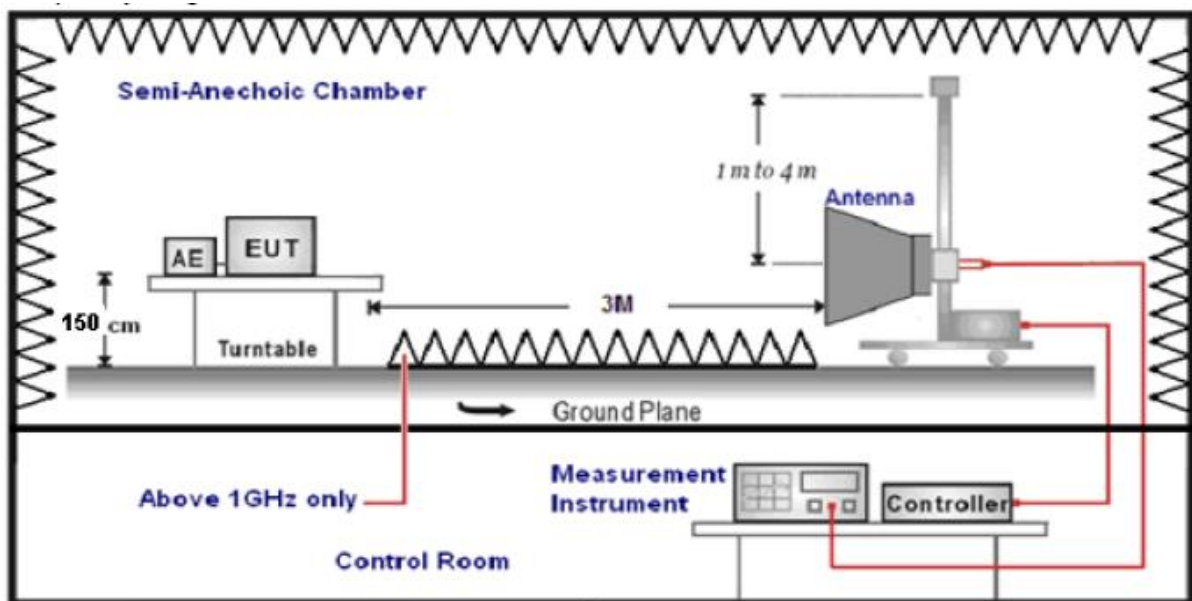
Frequency range 9 KHz – 30MHz



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°C to 360°C 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 Antenna	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	

$$\text{Transd}=AF +CL-AG$$

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	$20\log(2400/F(\text{KHz}))+40\log(300/3)$	$2400/F(\text{KHz})$
0.49-1.705	3	$20\log(24000/F(\text{KHz}))+ 40\log(30/3)$	$24000/F(\text{KHz})$
1.705-30	3	$20\log(30)+ 40\log(30/3)$	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:

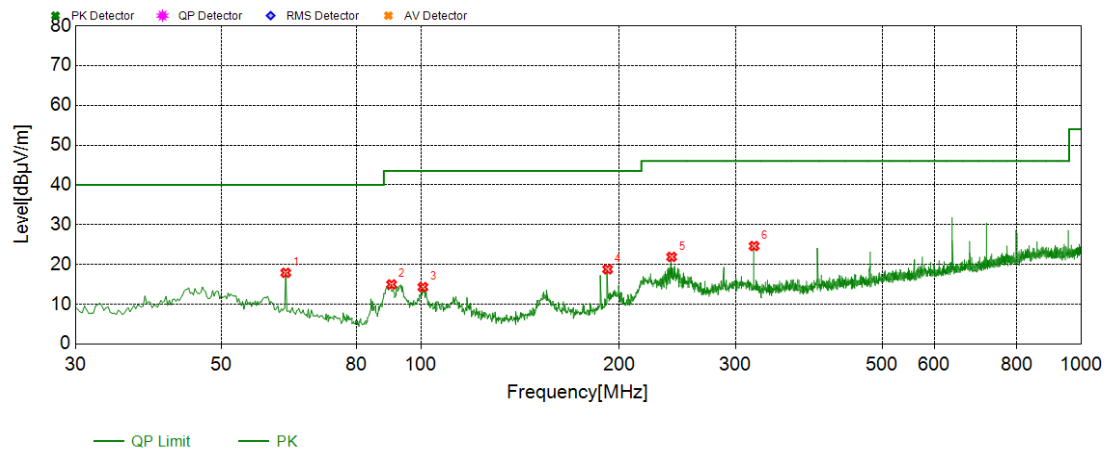
The amplitude of spurious emissions which are attenuated by more than 20dB below the permissible value has no need to be reported.

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

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

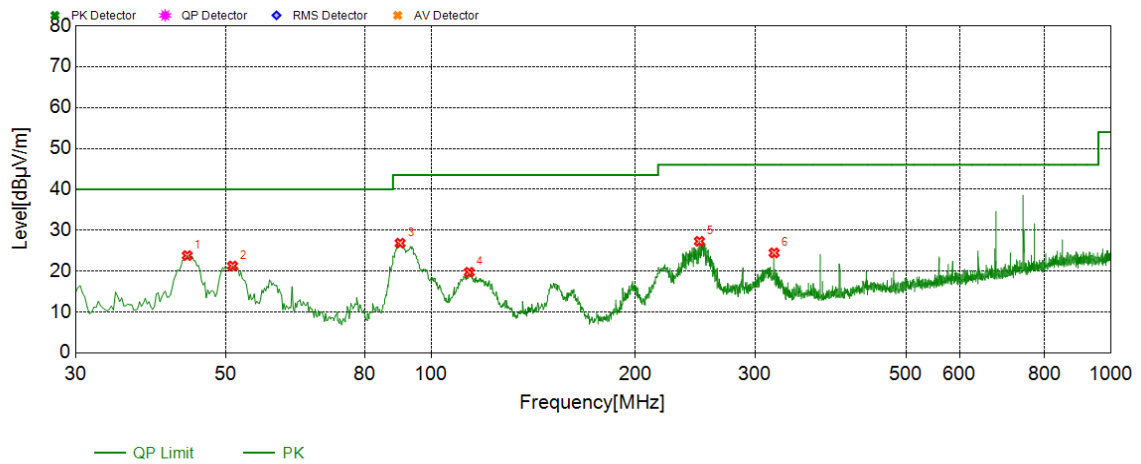
For 30MHz to 1000MHz

Horizontal



NO.	Freq. [MHz]	Reading [dBμV/m]	Result Level [dBμV/m]	Factor [dB]	Limit [dBμV/m]	Margin [dB]	Height [cm]	Angle[°]	Polarity
1	62.495	35.70	17.89	-17.81	40.00	22.11	100	193	Horizontal
2	90.383	33.45	14.97	-18.48	43.50	28.53	100	239	Horizontal
3	100.810	31.24	14.29	-16.95	43.50	29.21	100	42	Horizontal
4	191.990	36.11	18.78	-17.33	43.50	24.72	100	173	Horizontal
5	240.005	37.20	21.89	-15.31	46.00	24.11	100	200	Horizontal
6	320.030	38.30	24.62	-13.68	46.00	21.38	100	101	Horizontal

Vertical



NO.	Freq. [MHz]	Reading [dBμV/m]	Result Level [dBμV/m]	Factor [dB]	Limit [dBμV/m]	Margin [dB]	Height [cm]	Angle[°]	Polarity
1	43.823	38.84	23.8	-15.04	40.00	16.20	100	180	Vertical
2	51.098	36.33	21.26	-15.07	40.00	18.74	100	207	Vertical
3	90.140	45.37	26.84	-18.53	43.50	16.66	100	0	Vertical
4	113.905	37.33	19.72	-17.61	43.50	23.78	100	266	Vertical
5	248.493	42.44	27.29	-15.15	46.00	18.71	100	101	Vertical
6	320.030	38.15	24.47	-13.68	46.00	21.53	100	0	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

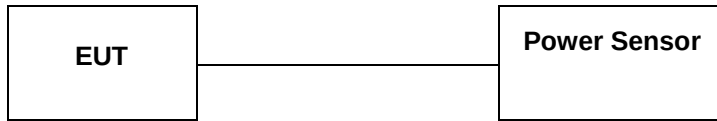
Polar (H/V)	Frequency (MHz)	Meter Reading (dBuV)	antenna Factor (dB)	cable loss (dB)	preamp factor (dB)	Emission Level (dBuV/m)	Limits (dBuV/m)	Margin (dB)	Detector Type
2402									
Vertical	4804	40.53	30.26	6.98	26.63	51.14	74	-22.96	Pk
Horizontal	4804	41.68	30.26	6.98	26.63	52.29	74	-22.16	PK
Vertical	7206	35.96	36.55	8.87	27.02	54.36	74	-20.48	Pk
Horizontal	7206	35.47	36.55	8.87	27.02	53.87	74	-21.38	PK
2440									
Vertical	4880	40.12	30.34	7.58	26.67	51.37	74	-23.52	Pk
Horizontal	4880	41.55	30.34	7.58	26.67	52.8	74	-23.29	PK
Vertical	7320	35.14	36.69	8.56	27.18	53.21	74	-20.65	Pk
Horizontal	7320	34.81	36.69	8.56	27.18	52.88	74	-21.12	PK
2480									
Vertical	4960	38.28	30.58	7.81	26.73	49.94	74	-24.11	Pk
Horizontal	4960	41.52	30.58	7.81	26.73	53.18	74	-22.88	PK
Vertical	7440	34.41	37.31	8.72	27.23	53.21	74	-20.92	Pk
Horizontal	7440	35.16	37.31	8.72	27.23	53.96	74	-21.55	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.

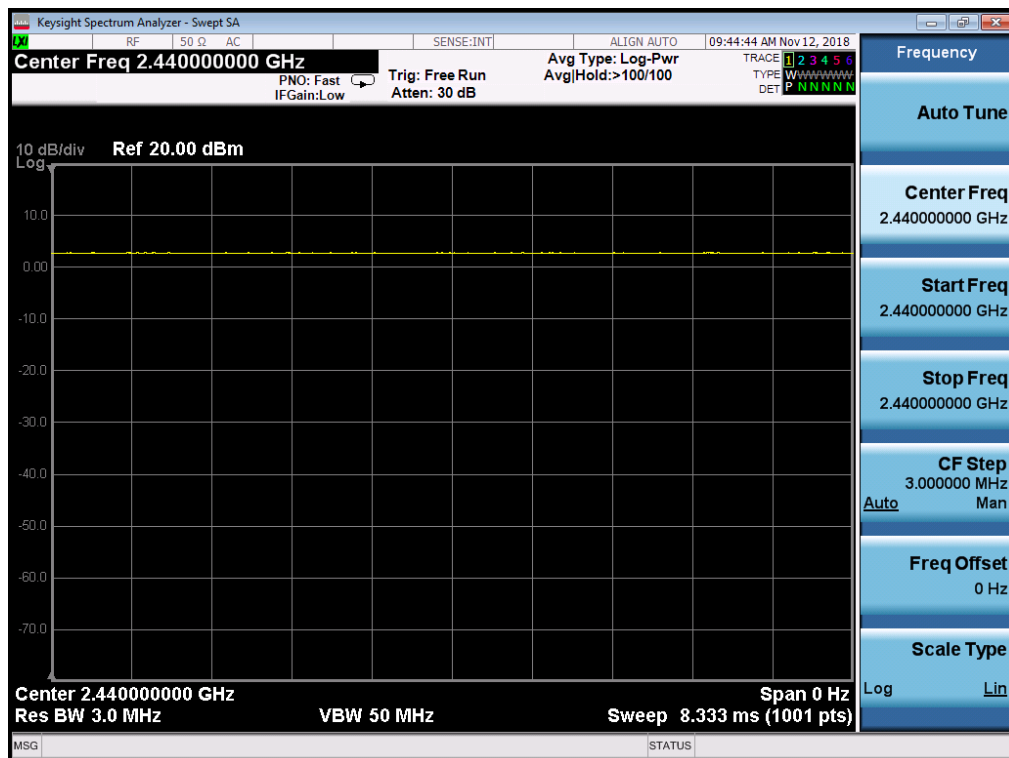
LIMIT

The Maximum Peak Output Power Measurement is 30dBm.

TEST RESULTS

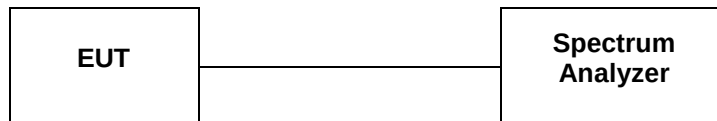
Type	Channel	Peak Output power (dBm)	Limit (dBm)	Result
GFSK	0	2.48	30	Pass
	19	2.67		
	39	2.37		

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



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.

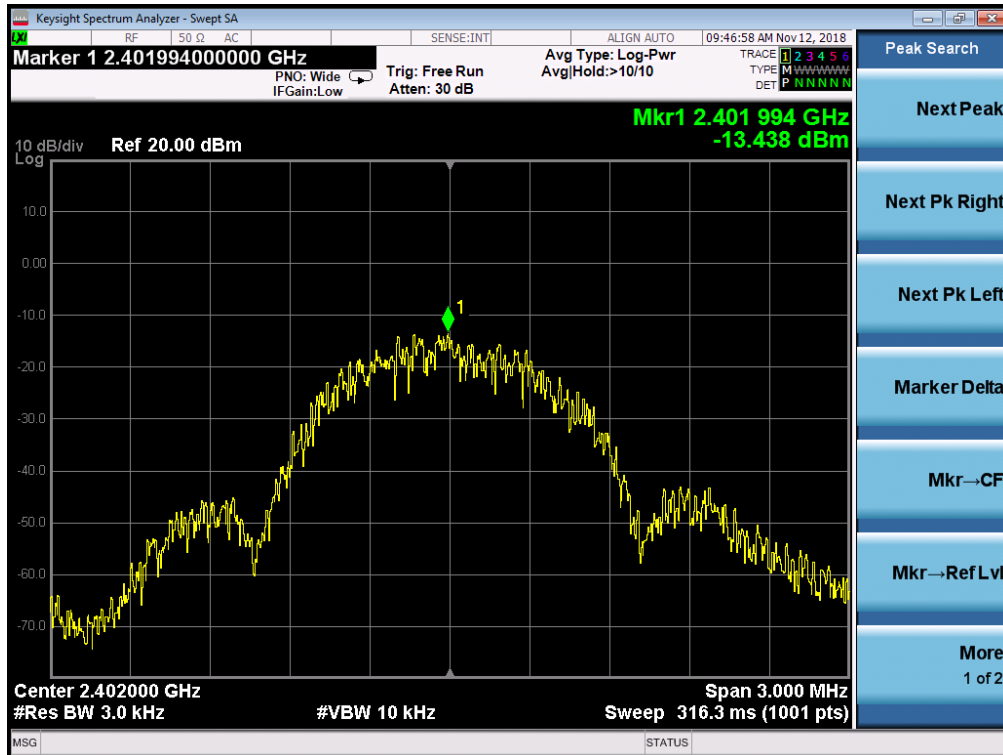
LIMIT

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.

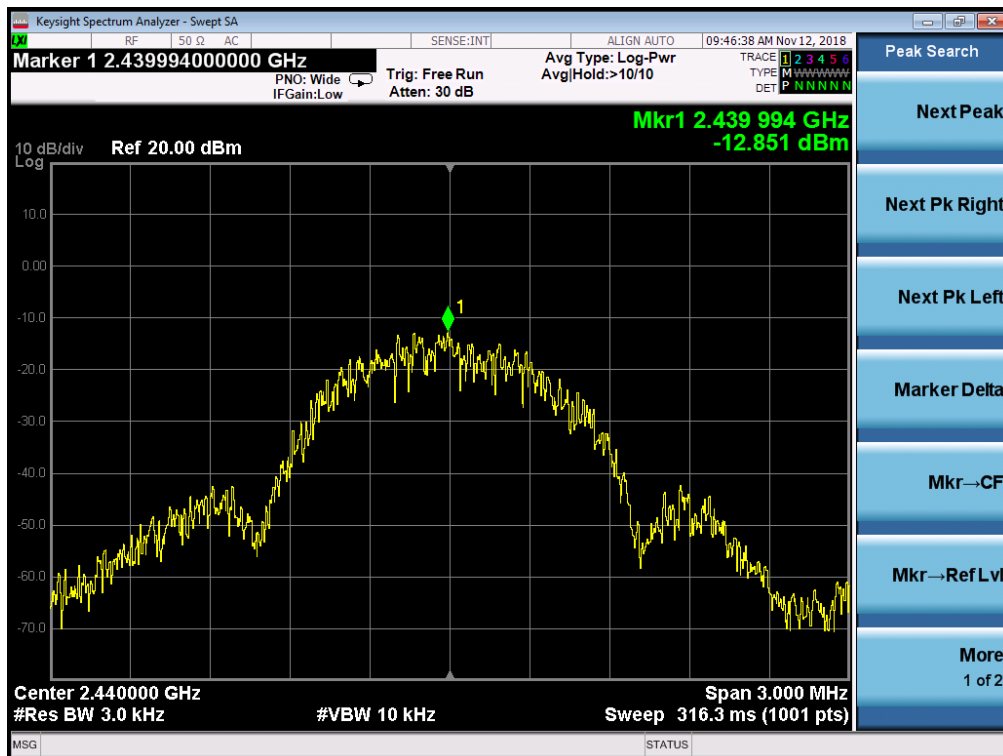
TEST RESULTS

Type	Channel	Power Spectral Density	Limit (dBm/3KHz)	Result
GFSK	0	-13.438	8.00	Pass
	19	-12.851		
	39	-13.358		

CH00



CH19

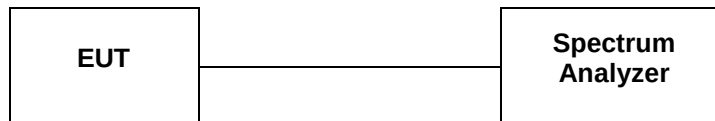


CH39



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.

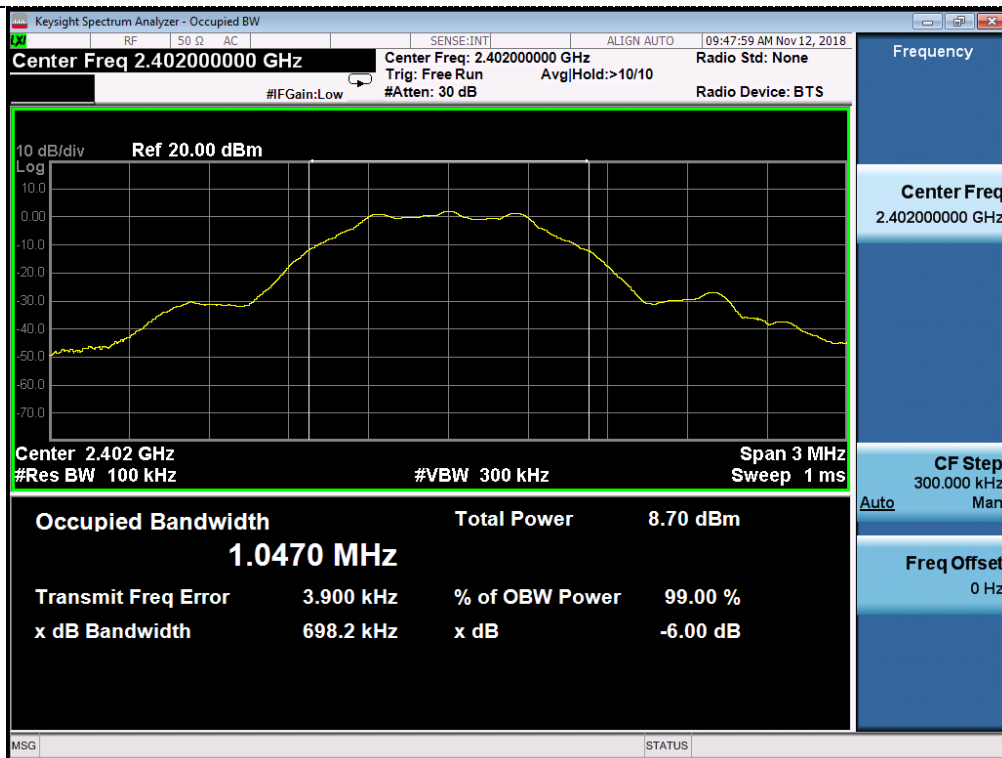
LIMIT

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

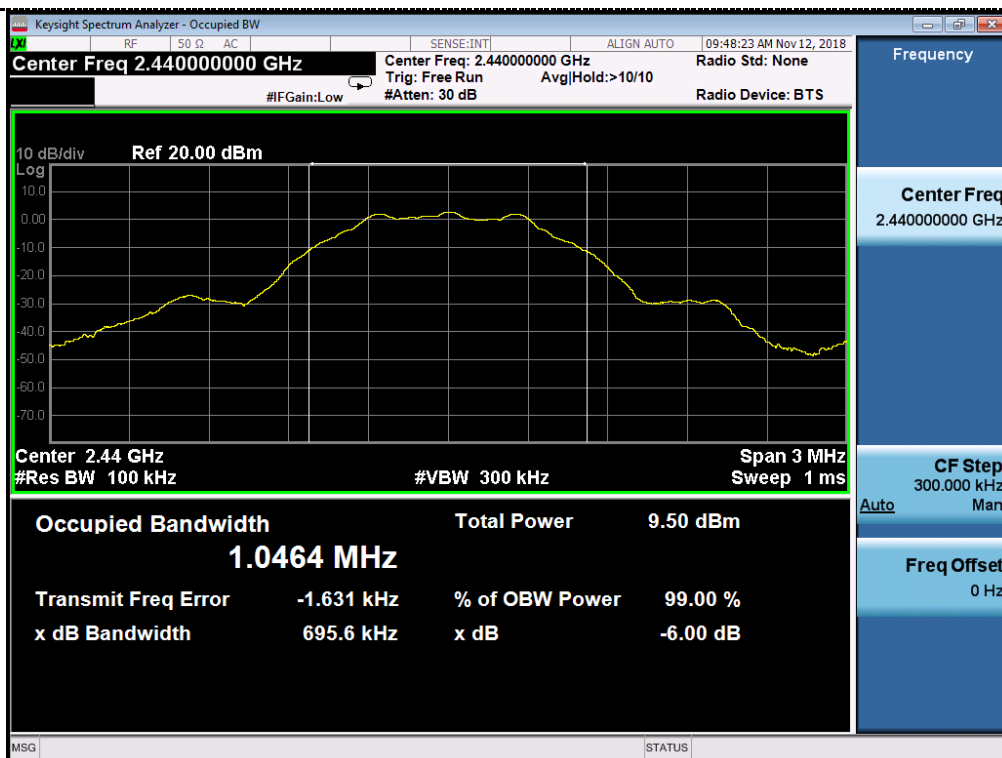
TEST RESULTS

Type	Channel	6dB Bandwidth (KHz)	Limit (KHz)	Result
GFSK	0	698.2	≥ 500	Pass
	19	695.6		
	39	696.9		

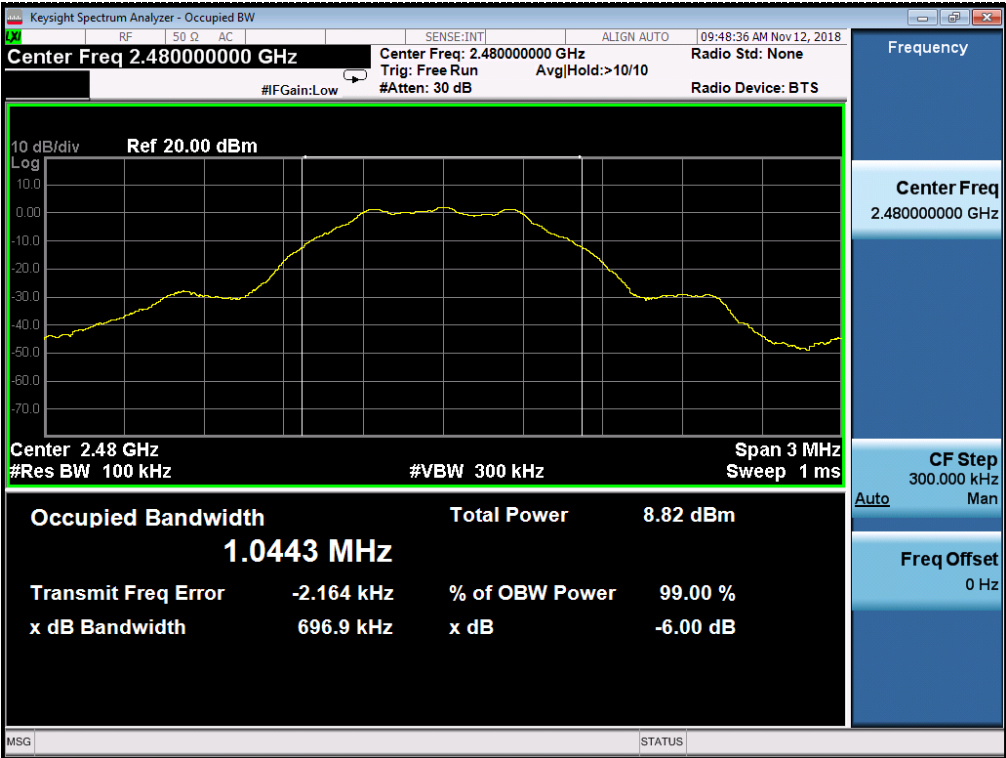
CH00



CH19



CH39

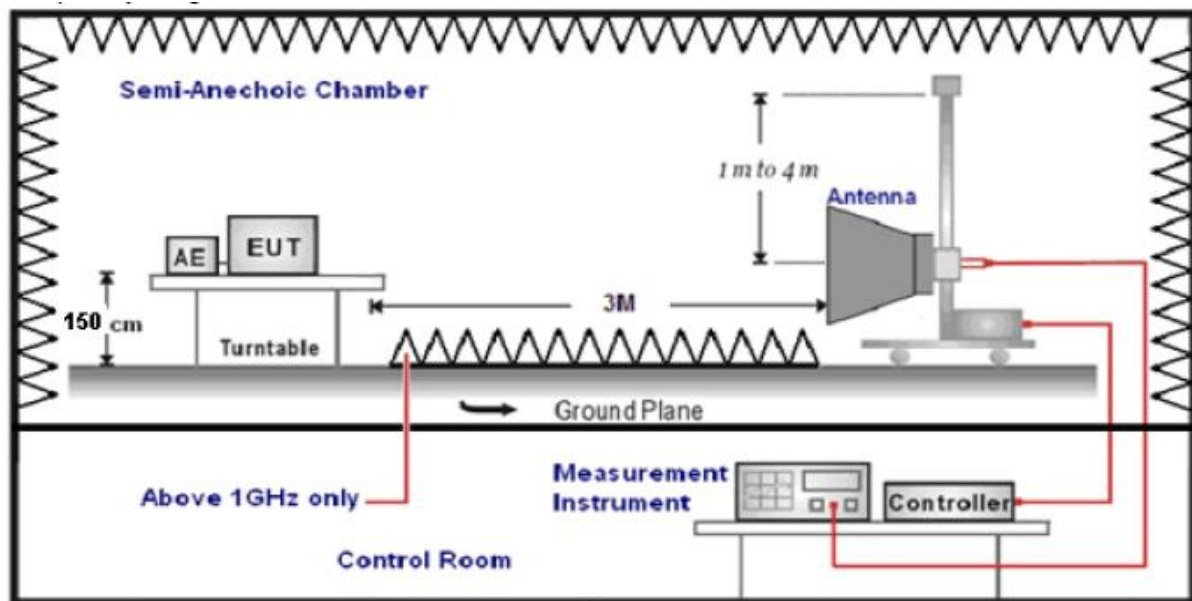


4.6. Band Edge Compliance of RF Emission

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°C to 360°C 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

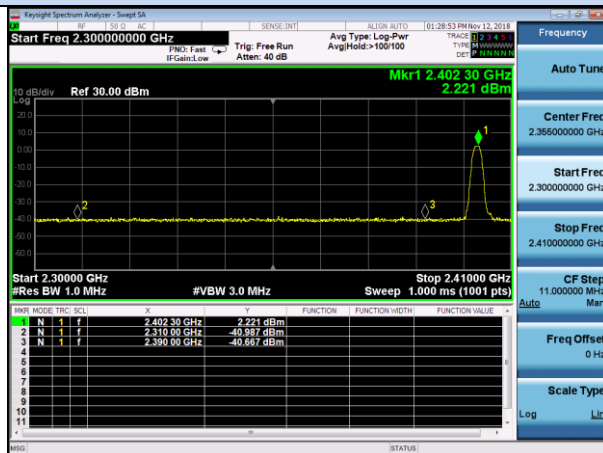
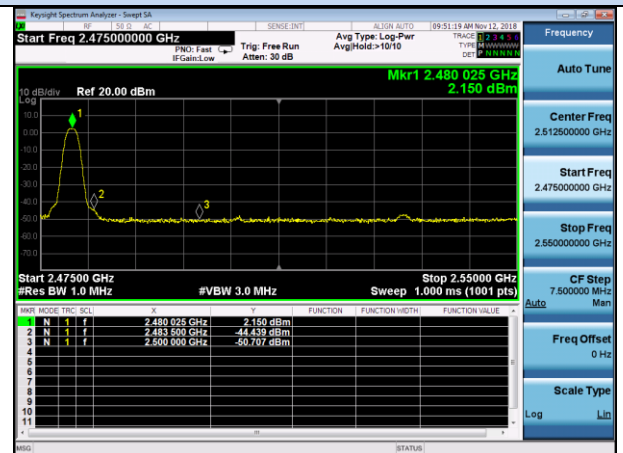
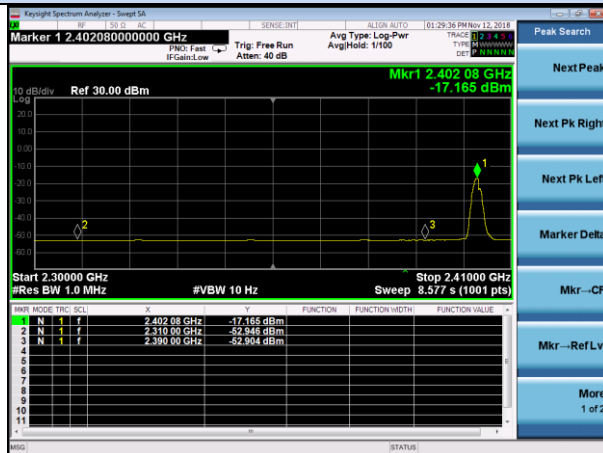
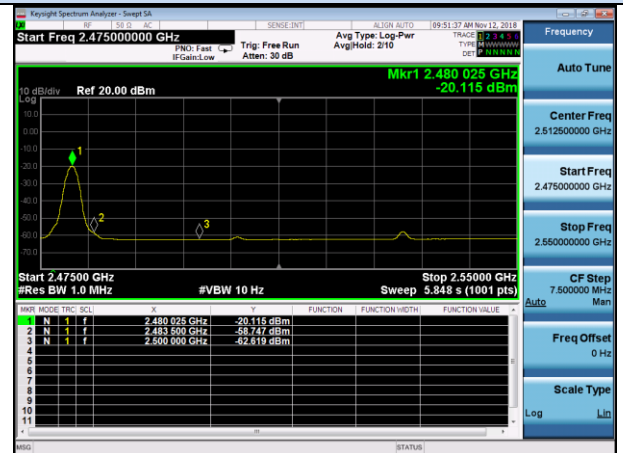
LIMIT

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)

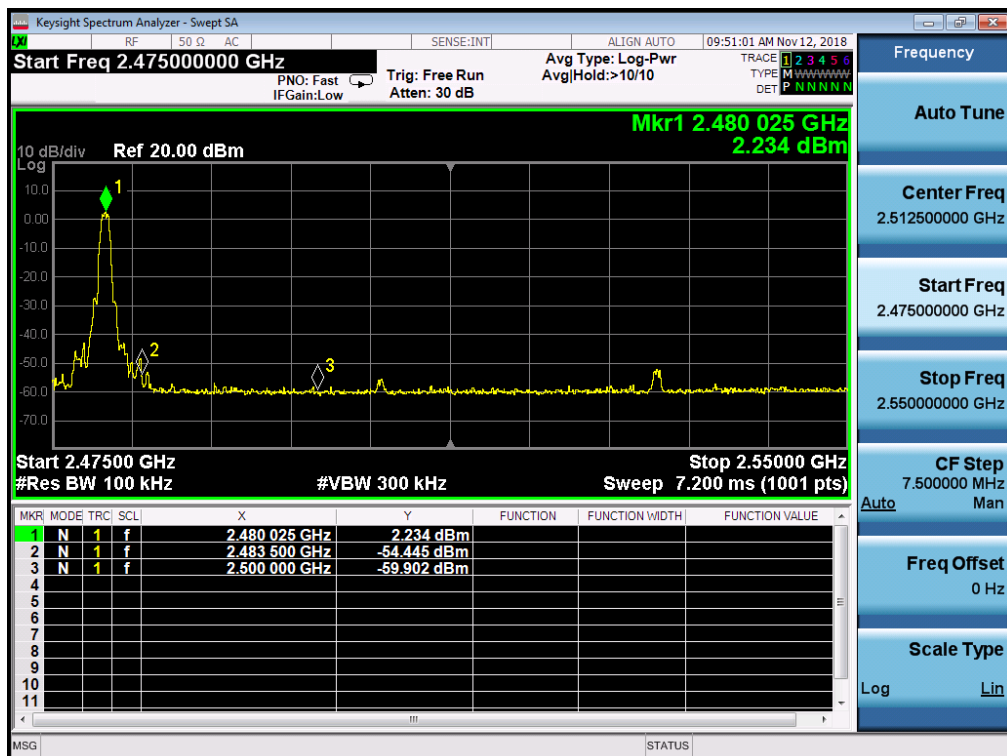
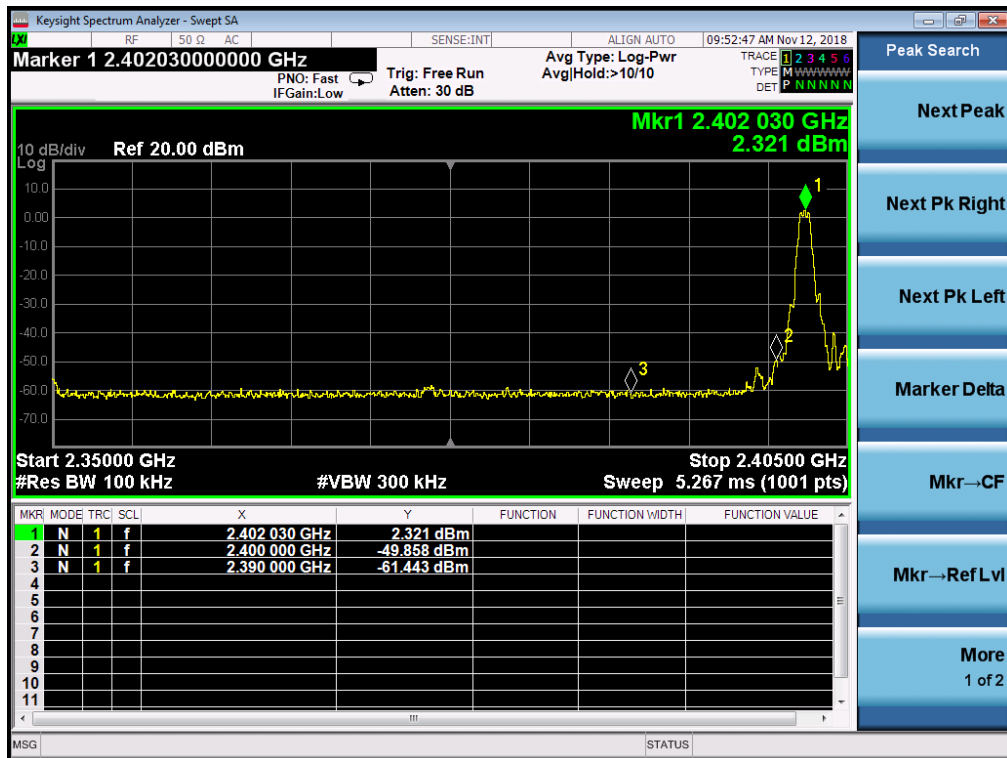
TEST RESULTS**4.6.1 For Radiated Bandedge Measurement**

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	-40.987	0	0	54.243	Peak	74	-19.757	PASS
2310	-52.946	0	0	42.284	AV	54	-11.716	PASS
2390	-40.667	0	0	54.563	Peak	74	-19.437	PASS
2390	-52.904	0	0	42.326	AV	54	-11.674	PASS
2483.5	-44.439	0	0	50.791	Peak	74	-23.209	PASS
2483.5	-58.747	0	0	36.483	AV	54	-17.517	PASS
2500	-50.707	0	0	44.523	Peak	74	-29.477	PASS
2500	-62.619	0	0	32.611	AV	54	-21.389	PASS

Band-edge measurements for radiated emissions**Antenna 1****2402 MHz – Peak****2480 MHz – Peak****2402 MHz – Average****2480MHz –Average**

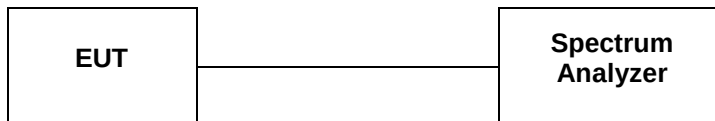
4.6.2 For Conducted Bandedge Measurement

Frequency Band	Delta Peak to band emission(dBc)	>Limit (dBc)	Result
Left-band	52.179	20	Pass
Right-band	56.679	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 measure frequency 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

Keysight Spectrum Analyzer - Swept SA

Center Freq 2.402000000 GHz

10 dB/div

Ref 20.00 dBm

Mkr1 2.402 006 GHz

2.174 dBm

Center 2.402000 GHz

#Res BW 100 kHz

#VBW 300 kHz

Span 3.000 MHz

Sweep 1.000 ms (1001 pts)

Frequency

Auto Tune

Center Freq
2.402000000 GHz

Start Freq
2.400500000 GHz

Stop Freq
2.403500000 GHz

CF Step
300.000 kHz

Auto

Freq Offset
0 Hz

Scale Type
Log

Lin

Channel 0

Keysight Spectrum Analyzer - Swept SA

Marker 1 2.506980000000000 GHz

10 dB/div

Ref 20.00 dBm

Mkr1 2.507 0 GHz

-47.312 dBm

Start 0.030 GHz

#Res BW 100 kHz

#VBW 300 kHz

Stop 3.000 GHz

Sweep 283.9 ms (1001 pts)

Peak Search

Next Peak

Next Pk Right

Next Pk Left

Marker Delta

Mkr→CF

Mkr→Ref Lvl

More
1 of 2

30MHz~3GHz

Keysight Spectrum Analyzer - Swept SA

Marker 1 21.348000000000000 GHz

10 dB/div

Ref 20.00 dBm

Mkr1 21.348 GHz

-47.929 dBm

Start 3.00 GHz

#Res BW 100 kHz

#VBW 300 kHz

Stop 25.00 GHz

Sweep 2.103 s (1001 pts)

Peak Search

Next Peak

Next Pk Right

Next Pk Left

Marker Delta

Mkr→CF

Mkr→Ref Lvl

More
1 of 2

3GHz ~25GHz

Test Mode:

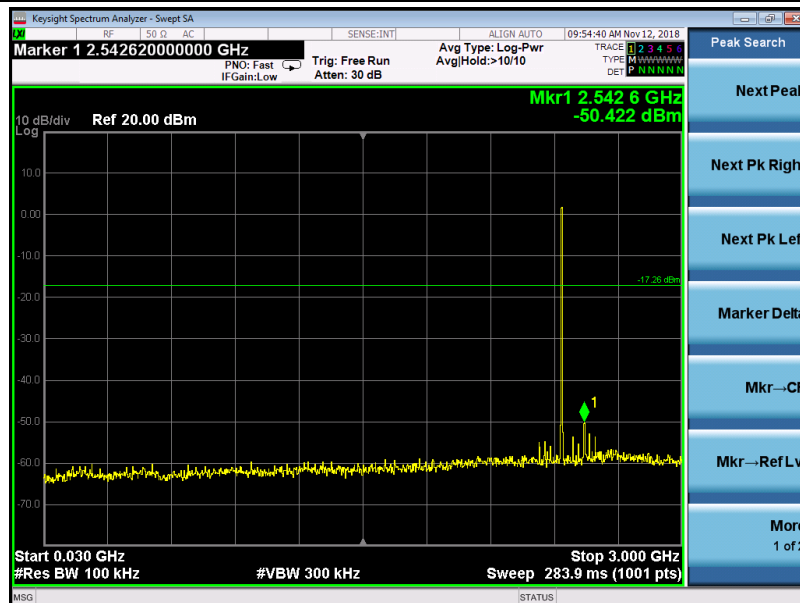
GFSK

Test channel :

19



Channel 19



30MHz~3GHz



3GHz ~25GHz

Test Mode:

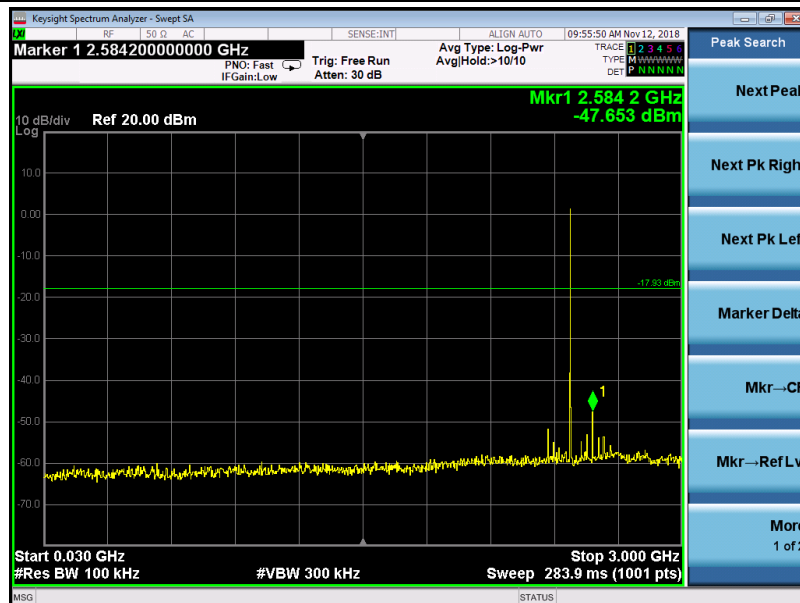
GFSK

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.

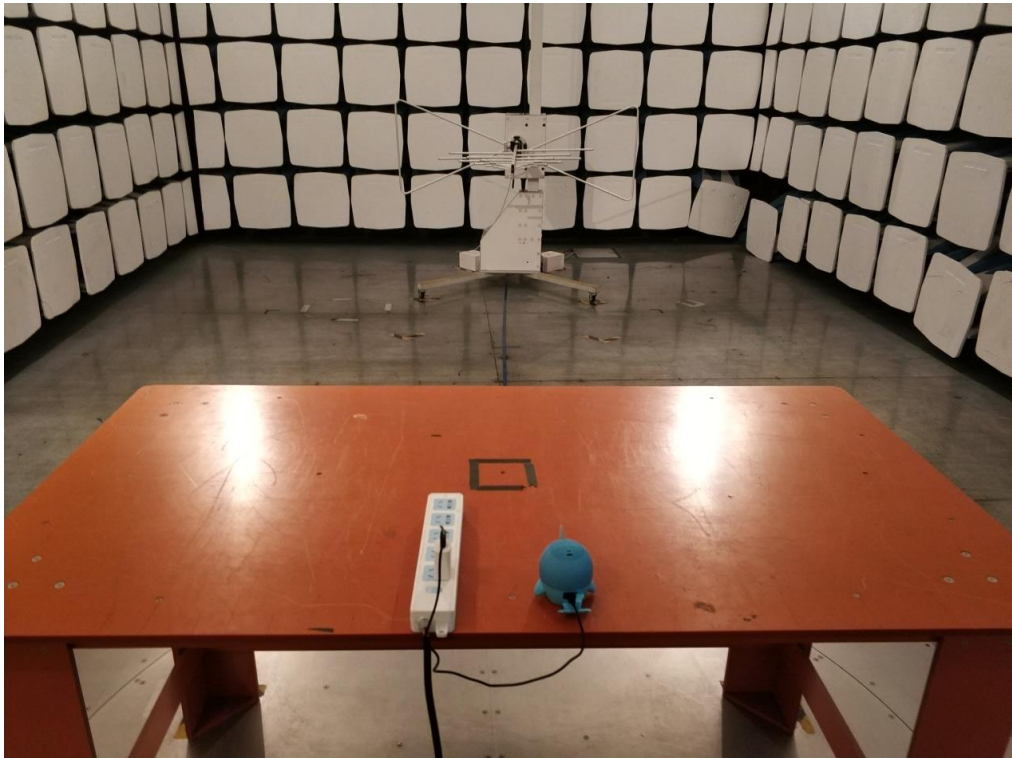
And according to FCC 47 CFR Section 15.247 (c), if transmitting antennas of directional gain greater than 6dBi are used, the power shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6dBi.

Test Result

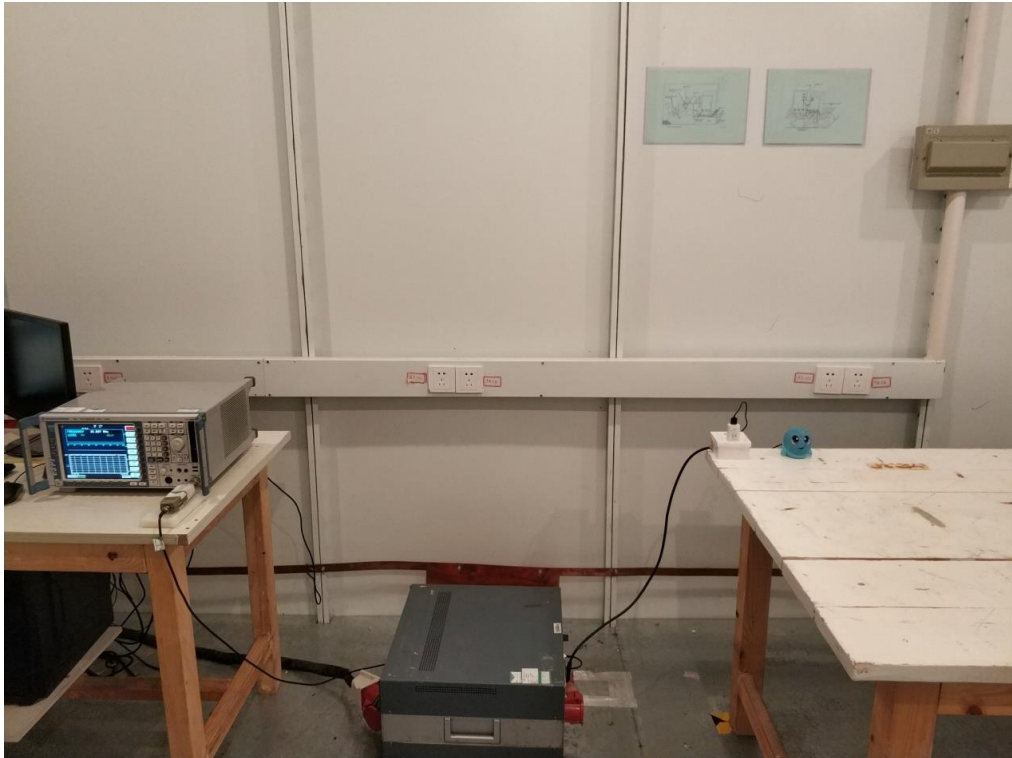
The antenna used for this product is Internal Antenna and that no antenna other than that furnished by the responsible party shall be used with the device, the maximum peak gain of the transmit antenna is only 0dBi.

5. Test Setup Photos of the EUT

Radiated Emission Test



Conducted Emission



6. External and Internal Photos of the EUT

Please refer to separated files for Photos of the EUT.

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