

## TEST REPORT

On behalf of

GE Lighting

Product Name: GE linkable 2.4G model

Model No.: OBM1000CTSD01

FCC ID: PUU-LINKABLE-OB01

Prepared For: GE Lighting  
1975 Noble Road, Cleveland, OH 44077, USA

Prepared By: Audix Technology (Shanghai) Co., Ltd.  
3F and 4F, 34Bldg, 680 Guiping Rd., Caohejing Hi-Tech  
Park, Shanghai 200233, China

Tel: +86-21-64955500  
Fax: +86-21-64955491



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Report No. : ACI-F18354  
Date of Test : 2018.11.02-08  
Date of Report : 2018.11.09

The statement is based on a single evaluation of one sample of the above-mentioned products. It does not imply an assessment of the whole production and does not permit the use of the test lab logo. The report must not be used by the client to claim product certification, approval, or endorsement by NVLAP, NIST, or any agency of the Federal Government.

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## TEST REPORT

Applicant : GE Lighting  
EUT Description : GE linkable 2.4G model  
(A) Model No. : Refer to Sec.2.1  
(B) Power Supply : DC 3.3V  
(C) Test Voltage : DC 3.3V

### Test Procedure Used:

*FCC RULES AND REGULATIONS PART 15 SUBPART C  
AND ANSI C63.10-2013*


The device described above is tested by Audix Technology (Shanghai) Co., Ltd. to determine the maximum emission levels emanating from the device. The maximum emission levels are compared to the FCC Part 15 Subpart C limits.

The test results are contained in this test report and Audix Technology (Shanghai) Co., Ltd. is assumed full responsibility for the accuracy and completeness of these measurements. This report also shows that the EUT to be technically compliance with the FCC limits.

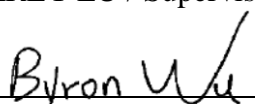
This report applies to above tested Sample only. This report shall not be reproduced in part without written approval of Audix Technology (Shanghai) Co., Ltd.


Date of Test : 2018.11.02-08 Date of Report : 2018.11.09

Producer :

  
JAREY LU / Supervisor

Reviewer :

  
BYRON WU / Deputy Assistant Manager

 For and on behalf of  
Audix Technology (Shanghai) Co., Ltd.

Signatory :

  
Authorized Signature(s) BYRON KWO/Assistant General Manager

# 1 SUMMARY OF STANDARDS AND RESULTS

## 1.1 Description of Standards and Results

The EUT have been tested according to the applicable standards as referenced below:

Description / Test Item	Test Standard	Results	Meets Limit
<b>EMISSION</b>			
Conducted Emission	FCC Rules And Regulations Part 15 Subpart C And ANSI C63.10:2013	N/A	15.207
Radiated Emission	FCC Rules And Regulations Part 15 Subpart C And ANSI C63.10:2013	Pass	15.209(a) 15.205(a)(c)
6 dB Bandwidth Measurement	FCC Rules And Regulations Part 15 Subpart C And ANSI C63.10:2013	Pass	15.247(a)(2)
Maximum Peak Output Power Measurement	FCC Rules And Regulations Part 15 Subpart C And ANSI C63.10:2013	Pass	15.247(b)(3)
Emission Limitations Measurement	FCC Rules And Regulations Part 15 Subpart C And ANSI C63.10:2013	Pass	15.247(d)
Band Edge Measurement	FCC Rules And Regulations Part 15 Subpart C And ANSI C63.10:2013	Pass	15.247(d)
Power Spectral Density Measurement	FCC Rules And Regulations Part 15 Subpart C And ANSI C63.10:2013	Pass	15.247(e)
N/A is an abbreviation for Not Applicable.			

## 2 GENERAL INFORMATION

### 2.1 Description of Equipment Under Test

Description : GE linkable 2.4G model

Type of EUT : ☒ Production ☐ Pre-product ☐ Pro-type

Model Number : OBM1000CTSD01

Test Model : OBM1000CTSD01

Radio Tech. : 2.4G

Channel Freq. : 2425MHz

Test Freq. : 2425MHz

Modulation : GFSK

Antenna : Antenna Type: PCB Antenna  
Antenna Gain: 2 dBi  
The Antenna is an permanently attached antenna that is comply with the 15.203 requirement.

Test Mode : The EUT was set at continuous TX with duty cycle 100% during all the test in the report

Applicant : GE Lighting  
1975 Noble Road, Cleveland, OH 44077, USA

Manufacturer : same as Applicant

Factory : Guangzhou Zhongyan Electronic Co., Ltd.

### 2.2 Tested Supporting System Details

#### 2.2.1 PC

Manufacturer : Acer  
Model Number : P238

### 2.3 Description of Test Facility

Name of Firm : Audix Technology (Shanghai) Co., Ltd.

Site Location : 3F and 4F, 34Bldg, 680 Guiping Rd.,  
Caohejing Hi-Tech Park,  
Shanghai 200233, China.

Accredited by NVLAP, Lab Code : 200371-0

FCC Designation Number : CN5027

Test Firm Registration Number : 954668

## 2.4 Measurement Uncertainty

Conducted Disturbance Expanded Uncertainty (0.15-30MHz):

U = 3.4dB

Radiated Emission Expanded Uncertainty (30-1000MHz):

U = 3.99dB

Radiated Emission Expanded Uncertainty (1000M-26.5GHz):

U = 4.98dB

6 dB Bandwidth Expanded Uncertainty : U =  $6 \times 10^{-8}$  MHz

Maximum Peak Output Power Expanded Uncertainty : U = 0.84 dB

Power Spectral Density Expanded Uncertainty : U = 0.38 dB

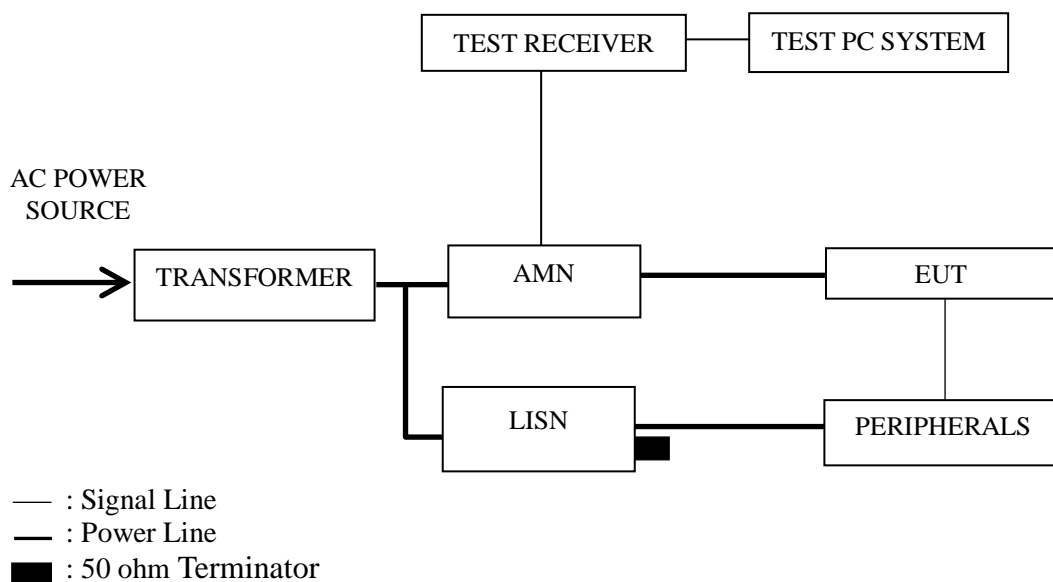
### 3 CONDUCTED EMISSION

#### 3.1 Test Equipment

The following test equipment are used during the conducted emission test in a shielded room.

Item	Type	Manufacturer	Model No.	Serial No.	Last Cal.	Next Cal.
1.	Test Receiver	R&S	ESCI	101302	Apr 27, 2018	Apr 26, 2019
2.	Artificial Mains Network (AMN)	R&S	ENV4200	100125	Jun 24, 2018	Jun 23, 2019
3.	Software	Audix	E3	6.2009-1-15	--	--

#### 3.2 Block Diagram of Test Setup



#### 3.3 Conducted Emission Limits (§15.207)

Frequency (MHz)	Field strength limits (μV/m)	
	(μV/m)	dB(μV/m)
0.15 ~ 0.5	66 to 56 *	56 to 46 *
0.5 ~ 5	56	46
5 ~ 30	60	50

NOTE 1 - \*Decreases with the logarithm of the frequency.  
 NOTE 2 - Emission Level dB (μV/m) = 20 log Emission Level (μV/m)  
 NOTE 3 - The tighter limit applies at the band edges.

### 3.4 Operating Condition of EUT

3.4.1 Setup the EUT as shown in Sec. 3.2.

3.4.2 Turn on the power of all equipment.

3.4.3 Turn the EUT on the test mode, and then test.

### 3.5 Test Procedures

The EUT was placed upon a non-metallic table, which is 0.8 m above the horizontal conducting ground plane and 0.4 m from a vertical reference plane. The EUT was connected to the power mains through an Artificial Mains Network (AMN) to provide a 50  $\Omega$  coupling impedance for the measuring equipment. Both sides of AC line (Line & Neutral) were checked to find out the maximum conducted emission according to FCC Part 15 Subpart C and ANSI C63.10: 2013 requirements during conducted disturbance test.

The I.F. bandwidth of Test Receiver ESCI was set at 9 kHz.

The frequency range from 150 kHz to 30 MHz was checked.

Test with a dummy load in lieu of the antenna to determine compliance with Section 15.207 limits within the transmitter's fundamental emission band. (According to KDB 174176 D01 Line Conducted FAQ)

### 3.6 Test Results

<PASS>

The frequency and amplitude of the highest radiated emission relative the limit is reported. All the emissions not reported below are too low against the FCC limit.

Worst case emission:

No.	Operation	Modulation	Channel	Frequency	Data Page
1.	Transmitting	GFSK	--	2525MHz	P10

NOTE 1 – Level = Read Level + AMN Factor + Cable Loss

NOTE 2 – “QP” means “Quasi-Peak” values

NOTE 3 – The emission levels which not reported are too low against the official limit.

**Worst case emission**

EUT : GE linkable 2.4G model Temperature : 22°C

Model No. : OBM1000CTSD01 Humidity : 51%RH

Test Mode : Transmitting Date of Test : 2018.12.05

Polarization	Frequency (MHz)	Meter Reading dB (μV)	AMN Factor (dB/m)	Cable Loss (dB)	Emission Level dB (μV/m)	Limits dB (μV/m)	Margin (dB)	Remark
Line	0.171	41.6	10.53	0.04	52.17	64.91	12.74	QP
	0.171	26.7	10.53	0.04	37.27	54.91	17.64	Average
	0.2097	35.2	10.48	0.05	45.73	63.22	17.49	QP
	0.2097	20.1	10.48	0.05	30.63	53.22	22.59	Average
	0.3916	27.3	10.36	0.05	37.71	58.03	20.32	QP
	0.3916	15.1	10.36	0.05	25.51	48.03	22.52	Average
	2.246	18.7	10.32	0.1	29.12	56	26.88	QP
	2.246	11.4	10.32	0.1	21.82	46	24.18	Average
	4.164	19.2	10.33	0.12	29.65	56	26.35	QP
	4.164	11.1	10.33	0.12	21.55	46	24.45	Average
	5.658	21.2	10.33	0.14	31.67	60	28.33	QP
	5.658	11.4	10.33	0.14	21.87	50	28.13	Average
Neutral	0.1687	41.2	10.47	0.04	51.71	65.02	13.31	QP
	0.1687	27.2	10.47	0.04	37.71	55.02	17.31	Average
	0.2132	34.5	10.43	0.05	44.98	63.08	18.1	QP
	0.2132	19.5	10.43	0.05	29.98	53.08	23.1	Average
	0.4173	26.4	10.34	0.05	36.79	57.5	20.71	QP
	0.4173	17.2	10.34	0.05	27.59	47.5	19.91	Average
	4.073	15.6	10.34	0.12	26.06	56	29.94	QP
	4.073	5.6	10.34	0.12	16.06	46	29.94	Average
	5.998	19.8	10.34	0.15	30.29	60	29.71	QP
	5.998	9.2	10.34	0.15	19.69	50	30.31	Average
	11.84	22.5	10.29	0.21	33	60	27	QP
	11.84	16.7	10.29	0.21	27.2	50	22.8	Average

TEST ENGINEER: Jarey

## 4 RADIATED EMISSION TEST

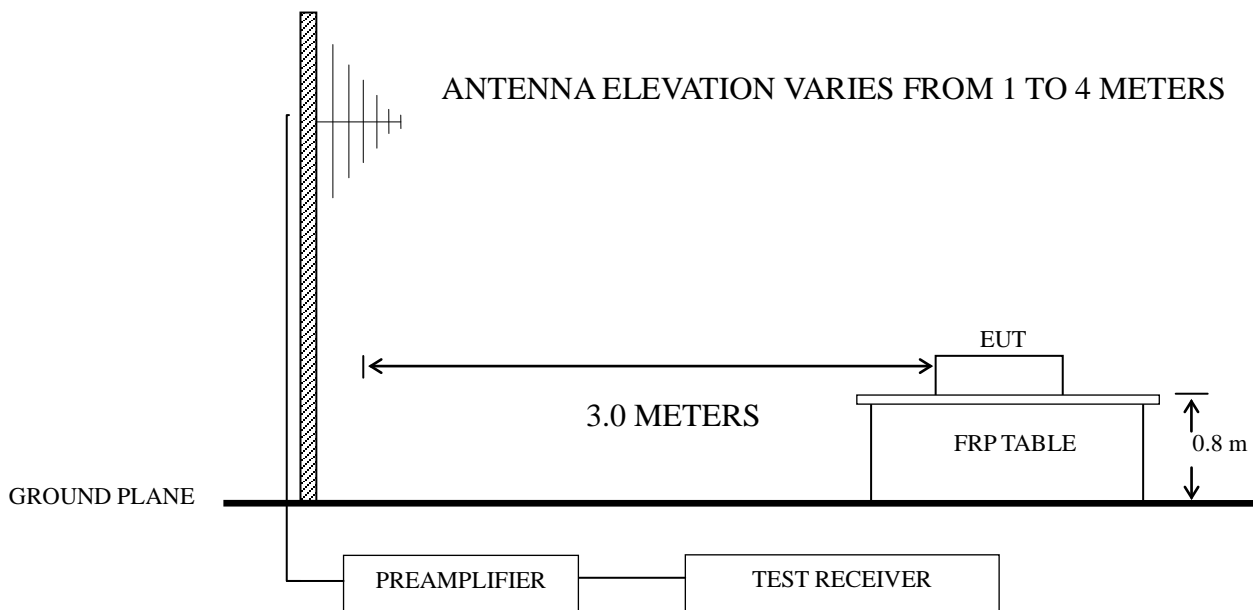
### 4.1 Test Equipment

The following test equipment are used during the radiated emission test in a semi-anechoic chamber:

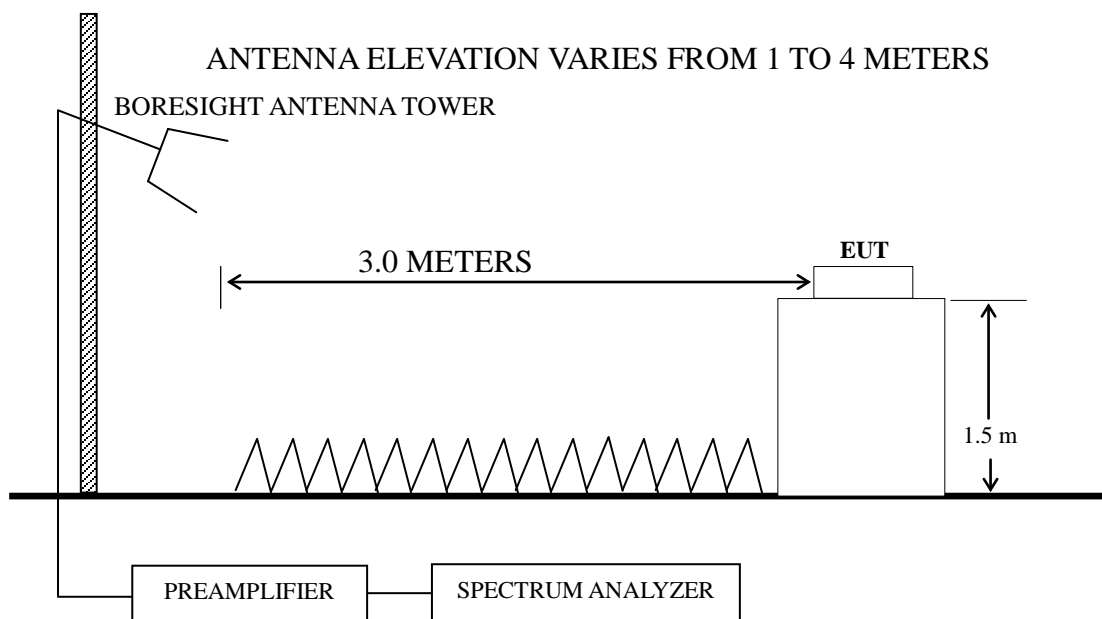
Item	Type	Manufacturer	Model No.	Serial No.	Last Cal.	Next Cal.
1.	Preamplifier	Agilent	8447D	2944A06664	Apr 27, 2018	Apr 26, 2019
2.	Preamplifier	HP	8449B	3008A00864	Mar 8, 2018	Mar 7, 2019
3.	Spectrum Analyzer	Agilent	N9030A	MY53120367	Jun 23, 2018	Jun 22, 2019
4.	Test Receiver	R&S	ESCI	101303	Apr 26, 2018	Apr 25, 2019
5.	Bi-log Antenna	Schwarz beck	VULB 9168	708	Jul 20, 2018	Jul 19, 2019
6.	Horn Antenna	EMCO	3115	9607-4878	Jun 02, 2018	Jun 01, 2019
7.	Horn Antenna	EMCO	3116	00062643	Sep 08, 2018	Sep 08, 2019
8.	Software	Audix	E3	SET00200 9912M295-2	--	--

### 4.2 Block Diagram of Test Setup

#### 4.2.1 Below 1GHz



#### 4.2.2 Above 1GHz



#### 4.3 Radiated Emission Limit (§15.209)

Frequency (MHz)	Distance (m)	Field strength limits (μV/m)	
		(μV/m)	dB(μV/m)
30 ~ 88	3	100	40.0
88 ~ 216	3	150	43.5
216 ~ 960	3	200	46.0
Above 960	3	500	54.0

NOTE 1 - Emission Level dB (μV/m) = 20 log Emission Level (μV/m)  
 NOTE 2 - The tighter limit applies at the band edges.  
 NOTE 3 - Distance refers to the distance in meters between the measuring instrument antenna and the closed point of any part of the device or system.  
 NOTE 4 - The limits shown are based on Quasi-peak value detector below or equal to 1GHz and Average value detector above 1GHz.  
 NOTE 5 - Above 1 GHz, the limit on peak emission is 20 dB above the maximum permitted average emission limit applicable to the EUT

#### 4.4 Test Configuration

The EUT (listed in Sec.2.1) and the simulators (listed in Sec.2.2) were installed as shown on Sec.4.2 to meet FCC requirements and operating in a manner that tends to maximize its emission level in a normal application.

## 4.5 Operating Condition of EUT

4.5.1 Setup the EUT as shown in Sec. 4.2.

4.5.2 Turn on the power of all equipment.

4.5.3 Turn the EUT on the test mode, and then test.

## 4.6 Test Procedures

Radiated emission test applies to harmonics/spurs that fall in the restricted bands listed in Section 15.205. The maximum permitted average field strength is listed in Section 15.209. A pre-amp is necessary for this measurement. For measurement above 1 GHz, set RBW = 1MHz, VBW = 10 Hz, Sweep: Auto. If the emission is pulsed, modify the unit for continuous operation; use the settings shown above, then correct the reading by subtracting the peak-average correction factor, derived from the appropriate duty cycle calculation.

The EUT was placed on a turntable. Below 1 GHz, the table height is 80 cm above the reference ground plane. Above 1 GHz, the table height is 1.5 m. The turntable rotated 360 degrees to determine the position of the maximum emission level. The EUT was set 3 meters away from the receiving antenna, which was mounted on an antenna tower. The antenna moved up and down between 1 meter and 4 meters to find out the maximum emission level. Broadband antenna (Calibrated Bilog Antenna) or Horn antenna was used as receiving antenna. Both horizontal and vertical polarizations of the antenna were set on measurement. In order to find the maximum emission, all of the interference cables were manipulated according to ANSI C63.10: 2013 requirements during radiated emission test.

The bandwidth of Test Receiver R&S ESCI was set at 120 kHz from 30MHz to 1000MHz.

The bandwidth of the VBW was set at 1MHz and RBW was set at 1MHz for peak emission measurement above 1GHz and 1MHz RBW, 10Hz VBW for average emission above 1GHz for Spectrum Agilent N9010A.

The frequency range from 30 MHz to 25 GHz (Up to 10<sup>th</sup> harmonics from fundamental frequency) was checked.

## 4.7 Test Results

**<PASS>**

The frequency and amplitude of the highest radiated emission relative the limit is reported. All the emissions not reported below are too low against the FCC limit.

## Frequency range: below 1GHz (Worst case emission)

No.	Operation	Modulation	Channel	Frequency	Data Page
1.	Transmitting	GFSK	--	2425 MHz	P15

## Frequency range: above 1GHz

No.	Operation	Modulation	Channel	Frequency	Data Page
1.	Transmitting	GFSK	--	2425 MHz	P16

## Restricted bands:

No.	Operation	Modulation	Channel	Frequency	Data Page
1.	Transmitting	GFSK	Cabinet Emission		P17

NOTE 1 – Level = Read Level + Antenna Factor + Cable Loss - Preamp Factor

NOTE 2 – “QP” means “Quasi-Peak” values

NOTE 3 – 0° was the table front facing the antenna. Degree is calculated from 0° clockwise facing the antenna.

NOTE 4 – The emission levels which not reported are too low against the official limit.

NOTE 5 – The emission levels recorded below is data of EUT configured in Lying direction, for Lying direction was the maximum emission direction during the test. The data of Side & Standing direction are too low against the official limit to be reported.

NOTE 6 – All reading are Quasi-Peak values below or equal to 1GHz, Peak and Average values above 1GHz.

For above 1GHz test, if the peak measured value complies with the average limit, it is unnecessary to perform an average measurement.

NOTE 7 – The frequency range 2310-2390MHz & 2483.5-2500MHz were tested for Restricted bands.

**Worst case emission < 1GHz**

EUT : GE linkable 2.4G model Temperature : 22°C

Model No. : OBM1000CTSD01 Humidity : 51%RH

Test Mode : Transmitting Date of Test : 2018.11.02

Polarization	Frequency (MHz)	Meter Reading dB (μV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamplifier Factor (dB)	Emission Level dB (μV/m)	Limits dB (μV/m)	Margin (dB)	Remark
Horizontal	43.506	27.62	19	0.72	28.15	19.19	40	20.81	QP
	53.693	27.21	19.64	0.79	28.13	19.51	40	20.49	QP
	133.151	27.04	18.63	1.27	27.7	19.24	43.5	24.26	QP
	157.007	26.3	20.09	1.39	27.56	20.22	43.5	23.28	QP
	595.133	27.36	25.42	2.65	27.76	27.67	46	18.33	QP
	804.603	26.91	28.13	3.07	27.34	30.77	46	15.23	QP
Vertical	50.409	27.24	19.16	0.77	28.14	19.03	40	20.97	QP
	62.431	26.68	18.65	0.85	28.1	18.08	40	21.92	QP
	145.351	26.35	20.02	1.34	27.63	20.08	43.5	23.42	QP
	154.279	28.34	20.02	1.38	27.58	22.16	43.5	21.34	QP
	633.907	26.77	26.18	2.73	27.67	28.01	46	17.99	QP
	827.493	26.21	28.17	3.12	27.25	30.25	46	15.75	QP

TEST ENGINEER: Jarey

**Radiated Emission > 1GHz**

EUT : GE linkable 2.4G model Temperature : 22°C

Model No. : OBM1000CTSD01 Humidity : 51%RH

Test Mode : Transmitting Date of Test : 2018.11.02

**CH2425 MHz:**

Polarization	Frequency (MHz)	Meter Reading dB (μV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamplifier Factor (dB)	Emission Level dB (μV/m)	Limits dB (μV/m)	Margin (dB)	Remark
Horizontal	1675.358	48.16	27.07	4.37	37.43	42.17	74	31.83	Peak
	1965.002	48.51	28.26	4.66	36.94	44.49	74	29.51	Peak
	3009.976	47.77	30.6	5.85	36.73	47.49	74	26.51	Peak
	3646.072	48.93	31.85	6.53	36.11	51.2	74	22.8	Peak
	4253.498	47.69	32.75	7.11	35.93	51.62	74	22.38	Peak
	4835	45.5	33.93	7.53	36.3	50.66	74	23.34	Peak
Vertical	1548.349	48.86	26.51	4.24	37.6	42.01	74	31.99	Peak
	1902.639	49.42	27.98	4.61	37.06	44.95	74	29.05	Peak
	2924.911	49.58	30.35	5.77	36.77	48.93	74	25.07	Peak
	3659.161	47.88	31.85	6.53	36.11	50.15	74	23.85	Peak
	4238.283	47.67	32.73	7.05	35.91	51.54	74	22.46	Peak
	4988.864	45.54	34.3	7.69	36.4	51.13	74	22.87	Peak

TEST ENGINEER: Jarey

**Emissions in restricted frequency bands:**

EUT : GE linkable 2.4G model Temperature : 22°C

Model No. : OBM1000CTSD01 Humidity : 51%RH

Test Mode : Transmitting Date of Test : 2018.11.02

**CH2425 MHz:**

Polarization	Frequency (MHz)	Meter Reading dB (μV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamplifier Factor (dB)	Emission Level dB (μV/m)	Limits dB (μV/m)	Margin (dB)	Remark
Horizontal	2320.805	49.49	28.46	5.04	35.26	47.73	74	26.27	Peak
	2320.805	37.16	28.46	5.04	35.26	35.4	54	18.6	Average
	2358.456	50.55	28.54	5.08	35.26	48.91	74	25.09	Peak
	2358.456	37.22	28.54	5.08	35.26	35.58	54	18.42	Average
	2488.354	50.2	28.77	5.23	35.25	48.95	74	25.05	Peak
	2488.354	37.44	28.77	5.23	35.25	36.19	54	17.81	Average
	2497.292	50.86	28.8	5.23	35.25	49.64	74	24.36	Peak
Vertical	2497.292	37.23	28.8	5.23	35.25	36.01	54	17.99	Average
	2328.753	50.06	28.48	5.04	35.26	48.32	74	25.68	Peak
	2328.753	37.2	28.48	5.04	35.26	35.46	54	18.54	Average
	2361.604	49.8	28.54	5.08	35.26	48.16	74	25.84	Peak
	2361.604	36.28	28.54	5.08	35.26	34.64	54	19.36	Average
	2486.073	50.03	28.77	5.23	35.25	48.78	74	25.22	Peak
	2486.073	38.41	28.77	5.23	35.25	37.16	54	16.84	Average
	2498.541	50.51	28.8	5.23	35.25	49.29	74	24.71	Peak
	2498.541	37.16	28.8	5.23	35.25	35.94	54	18.06	Average

TEST ENGINEER: Jarey

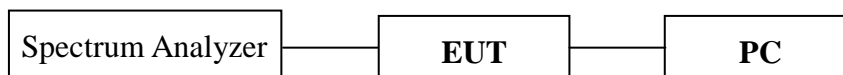
## 5 6 dB BANDWIDTH MEASUREMENT

### 5.1 Test Equipment

The following test equipment was used during the Emission Bandwidth measurement:

Item	Type	Manufacturer	Model No.	Serial No.	Last Cal.	Next Cal.
1.	Spectrum Analyzer	Agilent	N9030A	MY53120367	Jun 23, 2018	Jun 22, 2019

### 5.2 Block Diagram of Test Setup



### 5.3 Specification Limits (§15.247(a)(2))

The minimum 6 dB bandwidth shall be at least 500 kHz.

For DTS devices this bandwidth is referred to as the *DTS bandwidth*.

### 5.4 Operating Condition of EUT

The switch ON/OFF was used to enable the EUT to change the channel one by one.

### 5.5 Test Procedure

The transmitter output was connected to the spectrum analyzer. The bandwidth of the fundamental frequency was measure by spectrum analyzer with settings: RBW = 100kHz, VBW  $\geq 3 \times$  RBW.

The 6 dB bandwidth is defined as the total spectrum the power of which is lower than peak power minus 6 dB .

The test procedure is defined in ANSI C63.10-2013 (the 11.8.2 Measurement Procedure “DTS bandwidth - Option 2” was used).

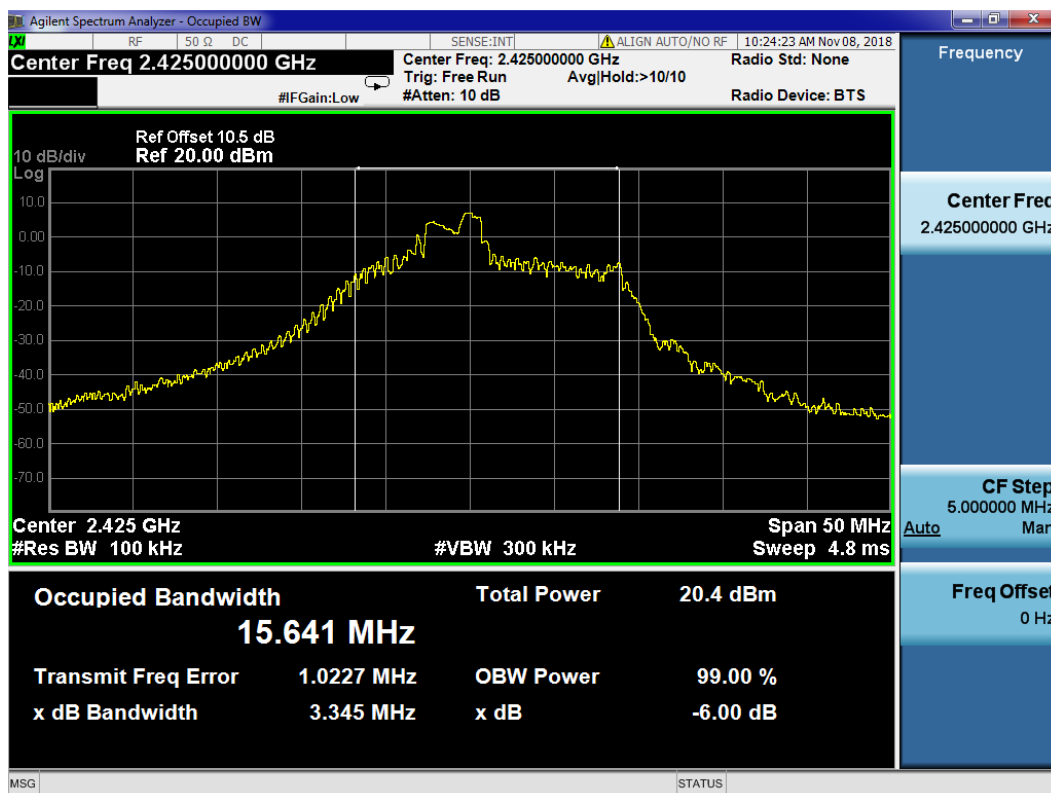
## 5.6 Test Results

### PASSED.

All the test results are attached in next pages.

(Test Date: 2018.11.08 Temperature: 23°C Humidity: 51 %)

Modulation	Channel	Frequency (MHz)	6dB Bandwidth (MHz)	Limit
GFSK	--	2425	3.345	500 kHz



## 6 MAXIMUM PEAK OUTPUT POWER MEASUREMENT

### 6.1 Test Equipment

The following test equipment was used during the maximum peak output power measurement:

Item	Type	Manufacturer	Model No.	Serial No.	Last Cal.	Next Cal.
1.	Spectrum Analyzer	Agilent	N9030A	MY53120367	Jun 23, 2018	Jun 22, 2019

### 6.2 Block Diagram of Test Setup

The Same as Section. 5.2.

### 6.3 Specification Limits ((§15.247(b)(3))

The Limits of maximum Peak Output Power for digital modulation in 2400-2483.5 MHz is: 1 Watt. (30 dBm)

### 6.4 Operating Condition of EUT

The switch ON/OFF was used to enable the EUT to change the channel one by one.

### 6.5 Test Procedure

The transmitter output was connected to the spectrum analyzer.

The following procedure shall be used when an instrument with a resolution bandwidth that is greater than the DTS bandwidth is available to perform the measurement:

- Set the RBW  $\geq$  DTS bandwidth.
- Set VBW  $\geq [3 \times \text{RBW}]$ .
- Set span  $\geq [3 \times \text{RBW}]$ .
- Sweep time = auto couple.
- Detector = peak.
- Trace mode = max hold.
- Allow trace to fully stabilize.
- Use peak marker function to determine the peak amplitude level.

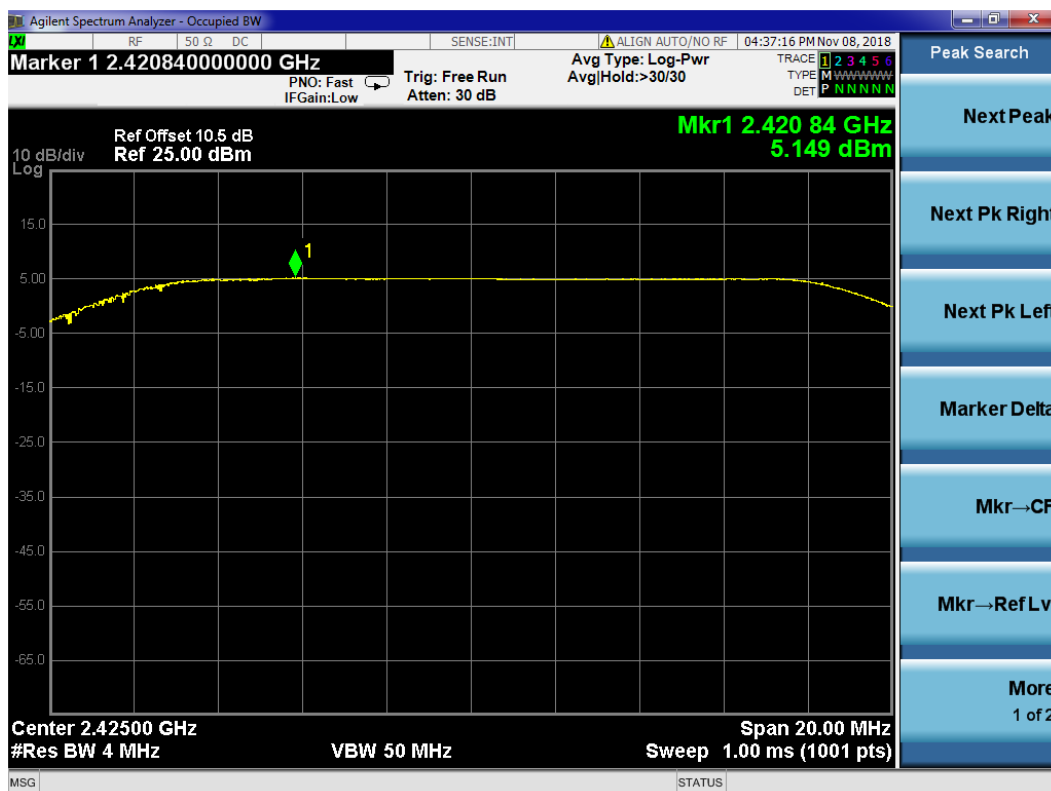
The test procedure is defined in ANSI C63.10-2013 ( 11.9.1.1 Measurement Procedure “ RBW  $\geq$  DTS bandwidth” was used).

## 6.6 Test Results

**PASSED.** All the test results are listed below.

(Test Date: 2018.11.08 Temperature: 23°C Humidity: 51 %)

Modulation	Channel	Frequency (MHz)	Peak Output Power (dBm)	Limit
GFSK	--	2425	<b>5.149</b>	30 dBm



## 7 EMISSION LIMITATIONS MEASUREMENT

### 7.1 Test Equipment

The following test equipment was used during the emission limitations test :

Item	Type	Manufacturer	Model No.	Serial No.	Last Cal.	Next Cal.
1.	Spectrum Analyzer	Agilent	N9030A	MY53120367	Jun 23, 2018	Jun 22, 2019

### 7.2 Block Diagram of Test Setup

The Same as Section. 5.2.

### 7.3 Specification Limits (§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. Attenuation below the general limits specified in Section 15.209(a) is not required.

In addition, radiated emissions which fall in restricted bands, as defined in Section 15.205(a), must also comply with the radiated emission limits specified in Section 15.209(a) (See Section 15.205(c)).(※This test result attaching to Section. 3.7)

### 7.4 Operating Condition of EUT

The switch ON/OFF was used to enable the EUT to change the channel one by one.

### 7.5 Test Procedure

The transmitter output was connected to the spectrum analyzer. Set RBW = 100 kHz, VBW  $\geq$  300 kHz, scan up through 10<sup>th</sup> harmonic.

When maximum conducted (average) output power was used to determine compliance as described in 11.9.2, then the peak power in any 100 kHz bandwidth outside of the authorized frequency band shall be attenuated by at least 30 dB relative to the maximum in-band peak PSD level in 100 kHz.

The test procedure is defined in ANSI C63.10-2013 (11.11.2 Reference level measurement and 11.11.3 Emission level measurement was used).

## 7.6 Test Results

### **PASSED.**

The test data was attached in the next pages.

(Test Date: 2018.11.06 Temperature: 23°C Humidity: 51 %)

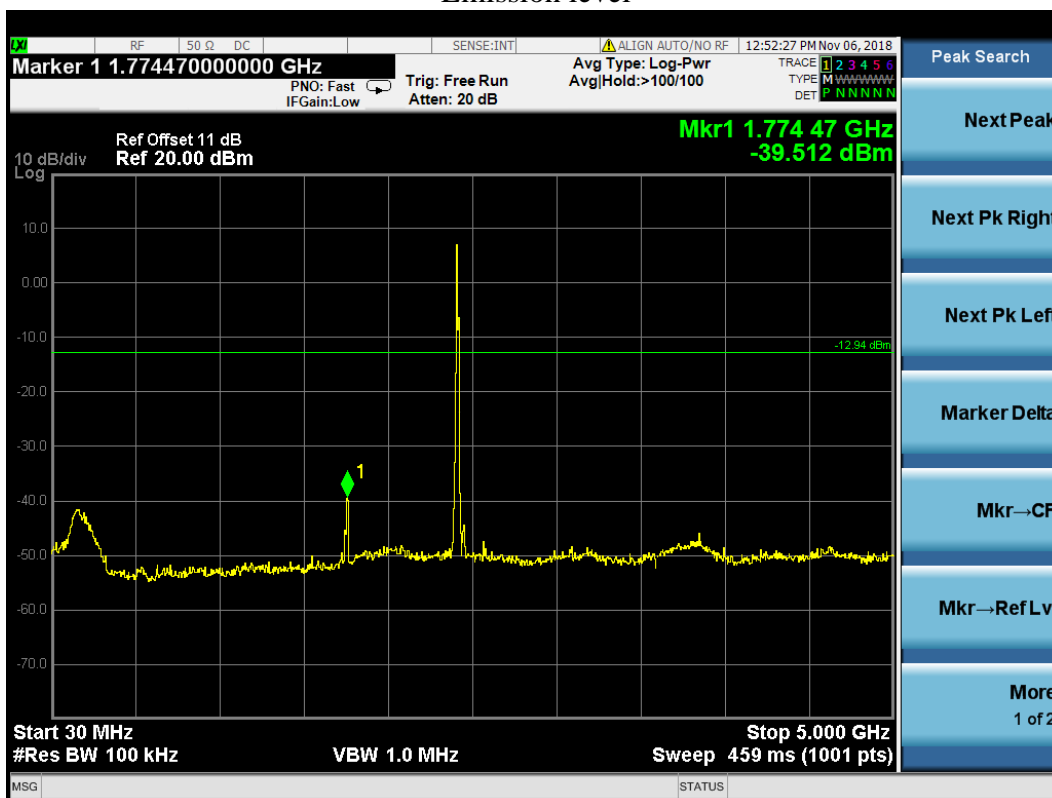
Modulation	Channel	Frequency (MHz)	Data Page
GFSK	--	2425	P24-25

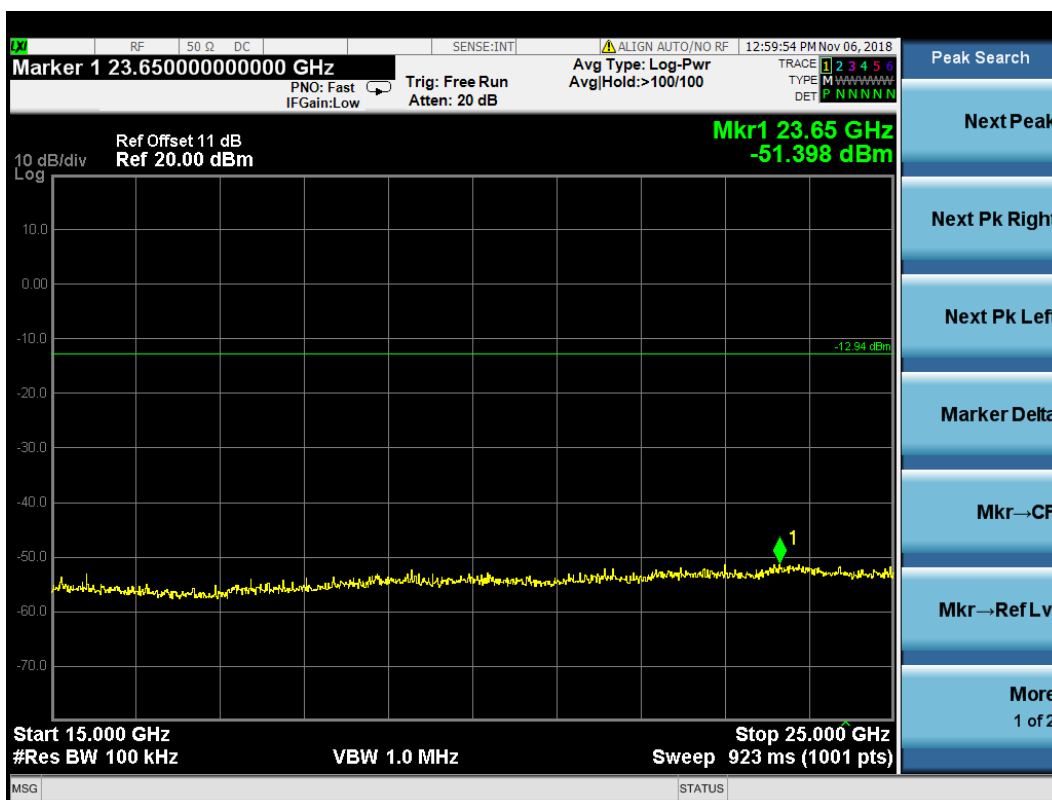
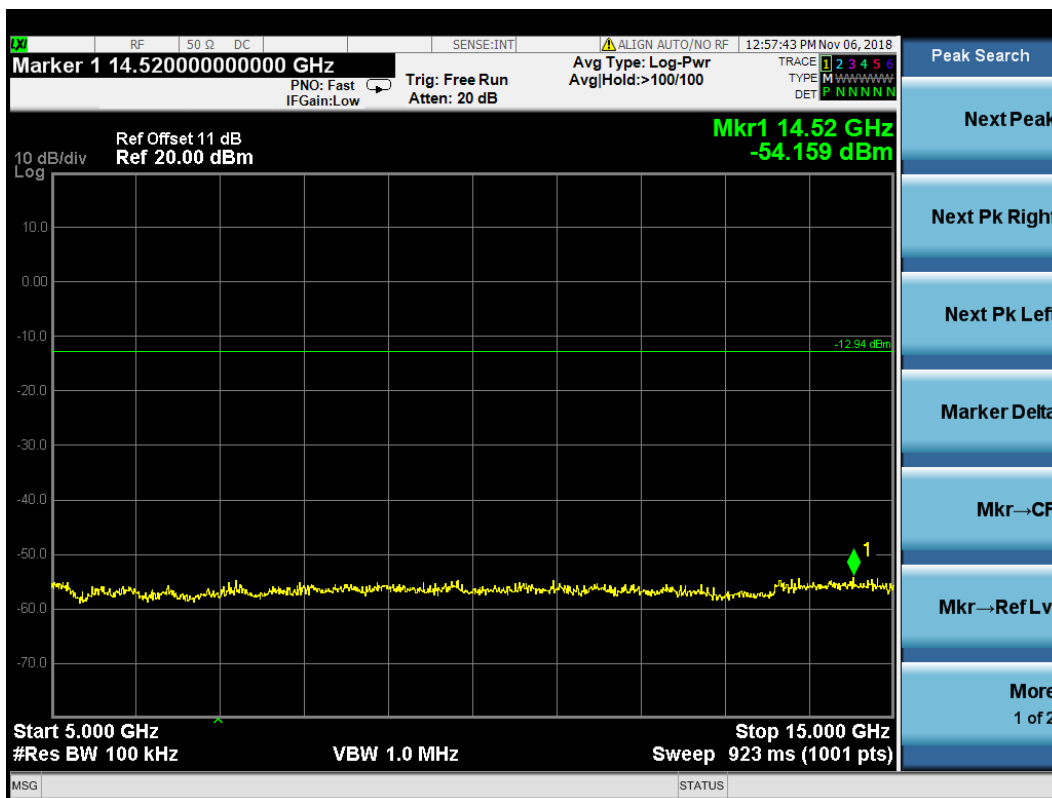
## CH2425 MHz

## Reference level



## Emission level





## 8 BAND EDGES MEASUREMENT

### 8.1 Test Equipment

The following test equipment was used during the band edges measurement:

Item	Type	Manufacturer	Model No.	Serial No.	Last Cal.	Next Cal.
1.	Spectrum Analyzer	Agilent	N9030A	MY53120367	Jun 23, 2018	Jun 22, 2019

### 8.2 Block Diagram of Test Setup

The Same as section.5.2.

### 8.3 Specification Limits (§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.

### 8.4 Operating Condition of EUT

The switch ON/OFF was used to enable the EUT to change the channel one by one.

### 8.5 Test Procedure

The transmitter output was connected to the spectrum analyzer. Set RBW of Test Receiver to 100kHz and VBW to 300kHz with suitable frequency span including 100kHz bandwidth from band edge.

The test procedure is defined in ANSI C63.10-2013 (11.11.3 Emission level measurement was used).

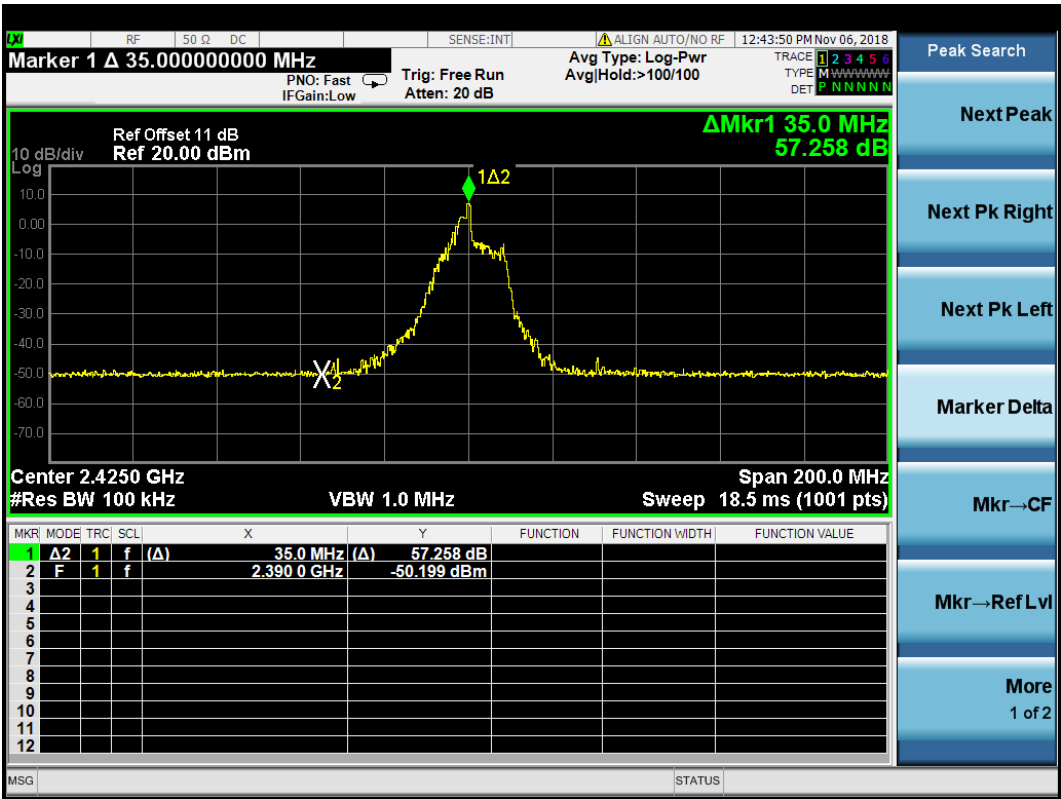
## 8.6 Test Results

**PASSED.** All the test results are attached in next pages.

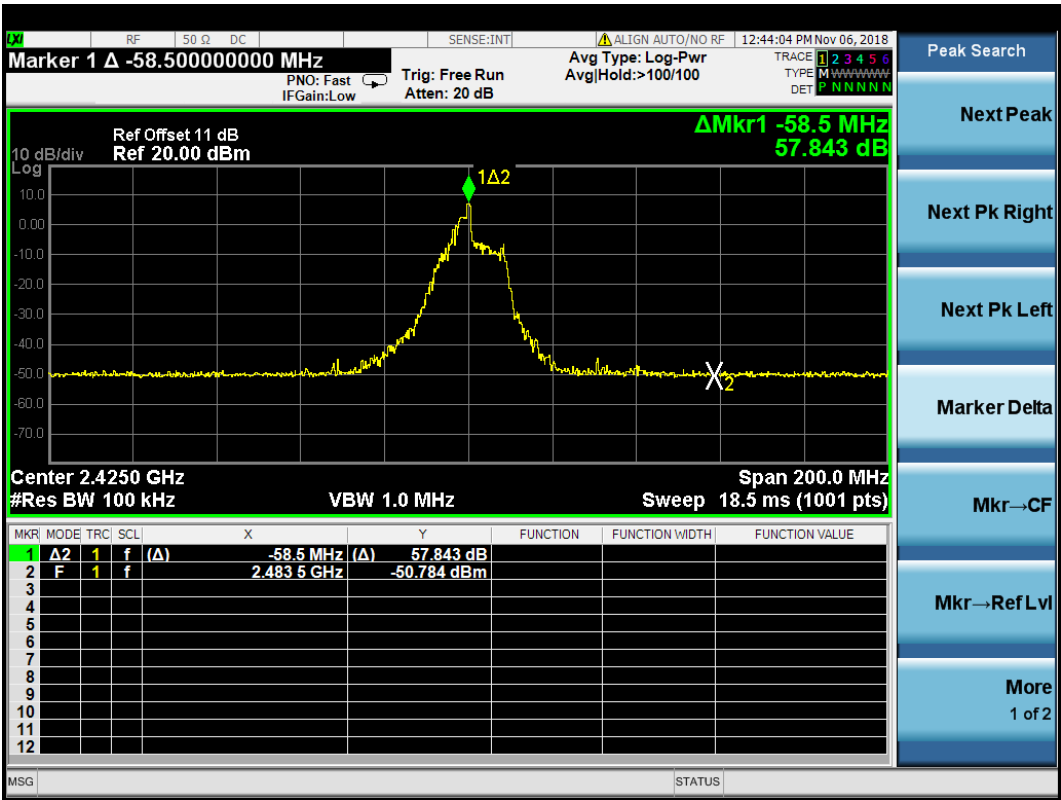
(Test Date: 2018.11.06 Temperature: 23°C Humidity: 51 %)

Modulation	Location	Channel	Frequency (MHz)	Delta Marker (dB)	Result
GFSK	Below Band Edge	--	2425	<b>57.258</b>	More than <b>20 dB</b> below the highest level of the desired power
	Upper Band Edge	--	2425	<b>57.843</b>	

CH2425MHz (Below Edge 2390 MHz)



CH2425MHz (Upper Edge 2483.5 MHz)



## 9 POWER SPECTRAL DENSITY MEASUREMENT

### 9.1 Test Equipment

The following test equipment was used during the power spectral density measurement:

Item	Type	Manufacturer	Model No.	Serial No.	Last Cal.	Next Cal.
1.	Spectrum Analyzer	Agilent	N9030A	MY53120367	Jun 23, 2018	Jun 22, 2019

### 9.2 Block Diagram of Test Setup

The Same as section 5.2.

### 9.3 Specification Limits (§15.247(e))

The peak power spectral density conducted from the intentional radiator to the antenna shall not be greater than 8 dBm in any 3 kHz band.

### 9.4 Operating Condition of EUT

The switch ON/OFF was used to enable the EUT to change the channel one by one.

### 9.5 Test Procedure

The transmitter output was connected to the spectrum analyzer. The Test Receiver was set as  $3\text{kHz} \leq \text{RBW} \leq 100\text{kHz}$ ,  $\text{VBW} \geq 3 \times \text{RBW}$ , span = 1.5 times the DTS channel bandwidth.

The test procedure is defined in ANSI C63.10-2013 ( 11.10.2 Measurement Procedure “Method PKPSD (peak PSD)” was used).

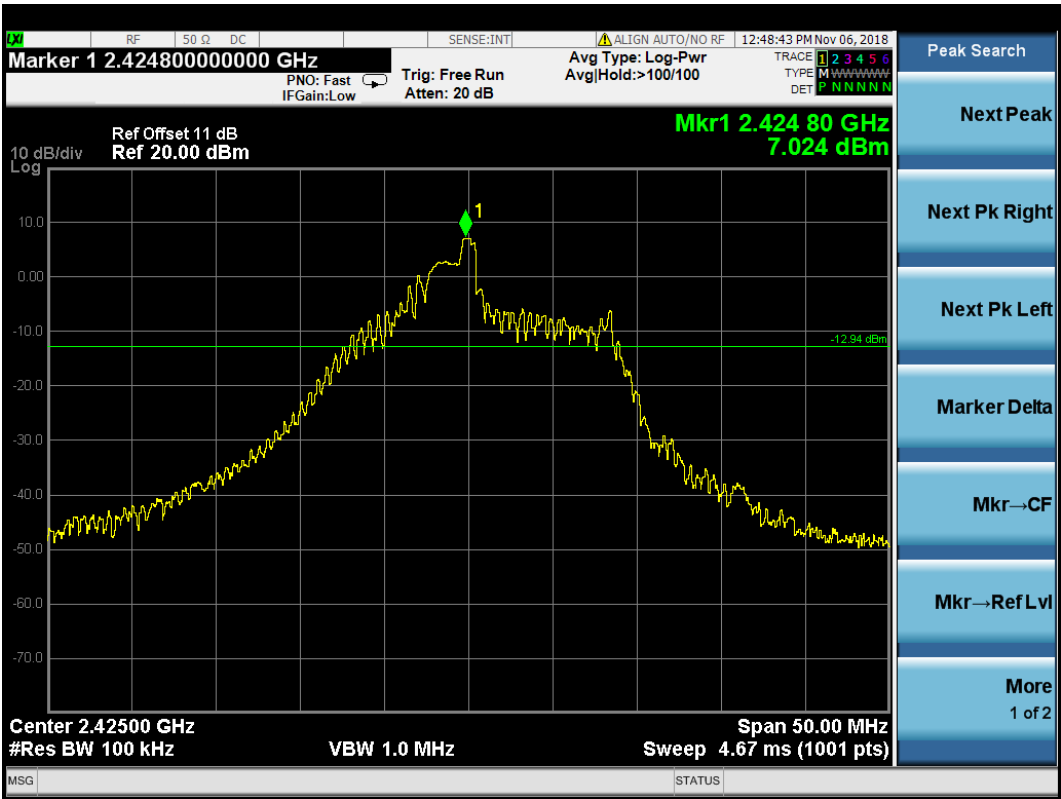
### 9.6 Test Results

**PASSED.** All the test results are attached in next pages.

(Test Date: 2018.11.06 Temperature: 23°C Humidity: 51 %)

Modulation	Channel	Frequency (MHz)	Power Spectral Density (dBm)	Limit
GFSK	--	2425	<b>7.024</b>	8 dBm

CH2425 MHz



## **10 DEVIATION TO TEST SPECIFICATIONS**

None.