

TEST REPORT**On behalf of****Hisense Electric Co., Ltd.****Product Name: TV Remote Control****Model No.: ERF3A69, ERF3B69, EFR3C69, ERF3*69****FCC ID: W9HBRCB0006**

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Date of Report : 2018.01.09

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 : Hisense Electric Co., Ltd.
EUT Description : TV Remote Control
(A) Model No. : Refer to Sec.2.1
(B) Power Supply : DC 3V
(C) Test Voltage : DC 3V

Test Procedure Used:

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

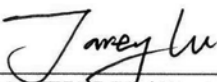
The device described above is tested by Audix Technology (Shanghai) Co., Ltd. to determine the maximum emission levels emanating from the device. The maximum emission levels are compared to the FCC Part 15 Subpart C limits.

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 (M/N: Refer to Sec2.1), which was tested on 2018.01.03 - 2018.01.04 is technically compliance with the FCC limits.

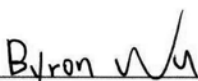
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Date of Test : 2018.01.03 - 2018.01.04 Date of Report : 2018.01.09

Producer :

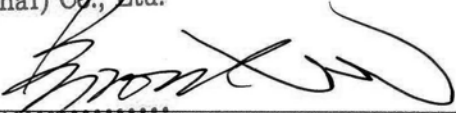

JAREY LU / Test Engineer

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
EMISSION			
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 : TV Remote Control

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

Model Number : ERF3A69, ERF3B69, EFR3C69, ERF3*69

Note : The modified histories of report are as follows:

M/N	Difference	
ERF3A69	--	different printed word of keys
ERF3B69	--	
ERF3C69	--	
ERF3 *69	“*” represents “D” ~ “Z”, for different sales area and customer.	

Test Model : ERF3A69

Radio Tech : Bluetooth v4.2 BLE

Channel Freq. : 2402MHz-2480MHz

Tested Freq. : 2402MHz, 2442MHz, 2480MHz

Modulation : GFSK

Antenna Gain : 3.23 dBi

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

Applicant : Hisense Electric Co., Ltd.
No.218 Qianwangang Road, Economy & Technology
Development Zone, Qingdao, China

2.2 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

2.3 Measurement Uncertainty

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 = 6×10^{-8} MHz

Maximum Peak Output Power Expanded Uncertainty : U = 0.84 dB

Power Spectral Density Expanded Uncertainty : U = 0.38 dB

3 RADIATED EMISSION TEST

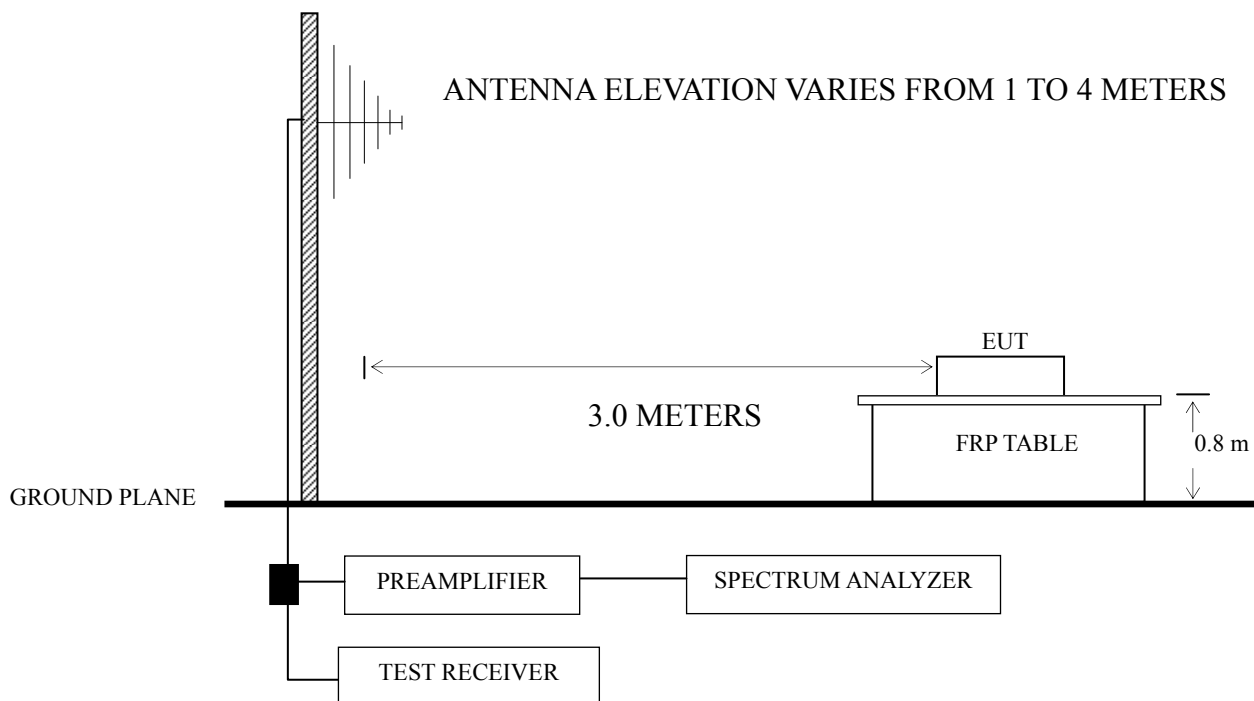
3.1 Test Equipment

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, 2017	Apr 26, 2018
2.	Preamplifier	HP	8449B	3008A00864	Mar 20, 2017	Mar 19, 2018
3.	Spectrum Analyzer	Agilent	N9010A	MY52221182	Jun 12, 2017	Jun 11, 2018
4.	Test Receiver	R&S	ESCI	101303	May 07, 2017	May 06, 2018
5.	Bi-log Antenna	Schwarz beck	VULB 9168	708	Jul 20, 2017	Jul 19, 2018
6.	Horn Antenna	EMCO	3115	9607-4878	Jun 02, 2017	Jun 01, 2018
7.	Horn Antenna	EMCO	3116	00062643	Sep 08, 2017	Sep 08, 2019
8.	50Ω Coaxial Switch	Anritsu	MP59B	6200426390	Sep 17, 2017	Mar 17, 2018
9.	Software	Audix	E3	SET00200 9912M295-2	--	--

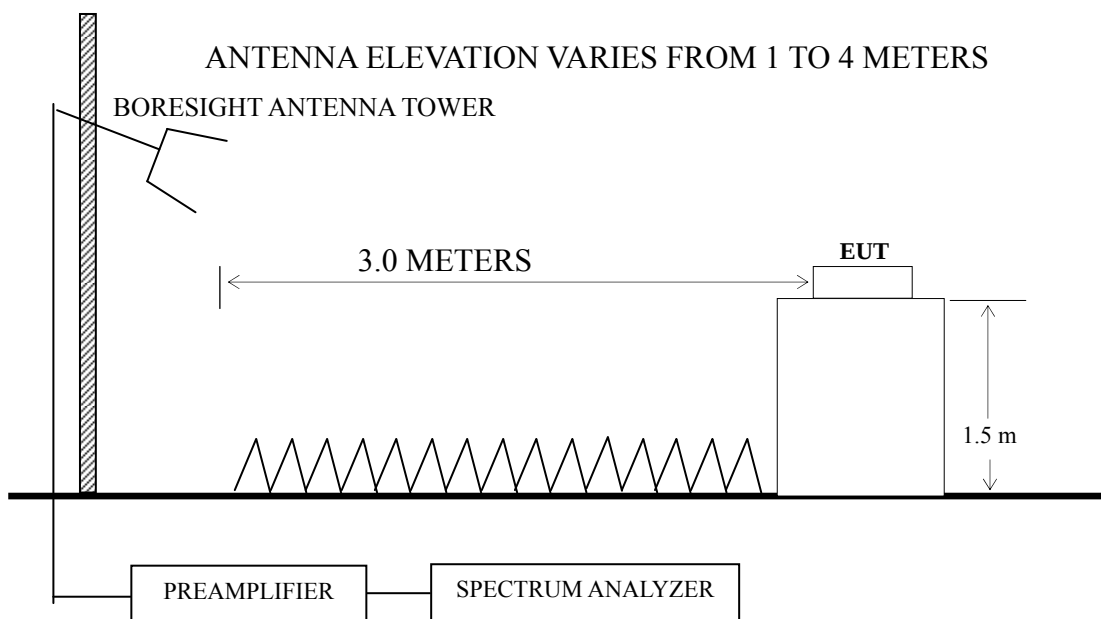
3.2 Block Diagram of Test Setup

3.2.1 Below 1GHz



■ : 50 ohm Coaxial Switch

3.2.2 Above 1GHz



3.3 Radiated Emission Limit [FCC Part 15 Subpart C 15.209]

Frequency (MHz)	Distance (m)	Field strength limits ($\mu\text{V/m}$)	
		($\mu\text{V/m}$)	dB($\mu\text{V/m}$)
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 ($\mu\text{V/m}$) = 20 log Emission Level ($\mu\text{V/m}$)

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

3.4 Test Configuration

The EUT (listed in Sec.2.1) and the simulators (listed in Sec.2.2) were installed as shown on Sec.3.2 to meet FCC requirements and operating in a manner that tends to maximize its emission level in a normal application.

3.5 Operating Condition of EUT

3.5.1 Setup the EUT as shown in Sec. 3.2.

3.5.2 Turn on the power of all equipment.

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

3.6 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 10th harmonics from fundamental frequency) was checked.

All the test results are listed in Sec.3.7.

3.7 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.

No.	Operation	Channel	Frequency	Data Page	
1.	Transmitting	Worst case emission < 1GHz		P12	
2.		00	2402 MHz	P13-14	
3.		20	2442 MHz		
4.		39	2480 MHz		
5.	Receiving	--		P15	
6.	Transmitting	Cabinet Emission		P16	
7.		00	2402 MHz	Restricted Frequency bands	P18
8.		39	2480 MHz		P19

NOTE 1 – Level = Read Level + Antenna Factor + Cable Loss (<1GHz)

NOTE 2 – Level = Read Level + Antenna Factor + Cable Loss - Preamp Factor (>1GHz)

NOTE 3 – 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.

Worst case emission < 1GHzEUT : TV Remote Control Temperature : 22°CModel No. : ERF3A69 Humidity : 51%RHTest Mode : Transmitting Date of Test : 2018.01.03

Polarization	Frequency (MHz)	Meter Reading dB (μV)	Antenna Factor (dB/m)	Cable Loss (dB)	Emission Level dB (μV/m)	Limits dB (μV/m)	Margin (dB)	Remark
Horizontal	35.749	8.35	19.32	0.61	28.28	40	11.72	QP
	49.014	2.98	19.4	0.72	23.1	40	16.9	
	67.438	2.77	18.15	0.81	21.73	43.5	18.27	
	144.335	3.09	18.61	1.25	22.95	46	20.55	
	550.948	3.48	24.72	2.41	30.61	46	15.39	
	906.482	3.93	29.37	3.05	36.35	46	9.65	
Vertical	35.749	9.12	19.32	0.61	29.05	40	10.95	QP
	46.995	2.87	19.6	0.7	23.17	40	16.83	
	63.313	2.77	18.72	0.79	22.28	40	17.72	
	162.041	3.34	19.39	1.33	24.06	43.5	19.44	
	537.589	3.59	24.47	2.38	30.44	46	15.56	
	830.4	3.52	28.69	2.92	35.13	46	10.87	

TEST ENGINEER: Jarey

Radiated Emission > 1GHz

EUT : TV Remote Control Temperature : 22°C

Model No. : ERF3A69 Humidity : 51%RH

Test Mode : Transmitting Date of Test : 2018.01.03

CH00 (2402MHz)

Polarization	Frequency (MHz)	Meter Reading dB (μV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Emission Level dB (μV/m)	Limits dB (μV/m)	Margin (dB)	Remark
Horizontal	1192.811	44.46	24.32	3.57	36.12	36.23	74	37.77	Peak
	1798.127	42.86	27.1	4.4	35.47	38.89	74	35.11	Peak
	2339.107	41.84	28.5	5.04	35.26	40.12	74	33.88	Peak
	4004.339	39.32	32.7	6.72	34.2	44.54	74	29.46	Peak
	6322.136	37.86	35.84	8.64	34.57	47.77	74	26.23	Peak
	11076.1	38.42	39.23	11.39	35.61	53.43	74	20.57	Peak
Vertical	1032.305	44.68	23.32	3.27	36.35	34.92	74	39.08	Peak
	1422.798	43.11	25.54	3.92	35.84	36.73	74	37.27	Peak
	1944.073	40.56	27.61	4.58	35.35	37.4	74	36.6	Peak
	3196.094	39.28	31	5.95	34.97	41.26	74	32.74	Peak
	5881.418	37.3	35.11	8.38	34.17	46.62	74	27.38	Peak
	11044.13	37.63	39.21	11.25	35.6	52.49	74	21.51	Peak

CH20 (2442MHz)

Polarization	Frequency (MHz)	Meter Reading dB (μV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Emission Level dB (μV/m)	Limits dB (μV/m)	Margin (dB)	Remark
Horizontal	1068.738	46.06	23.56	3.33	36.3	36.65	74	37.35	Peak
	1653.55	42.64	26.55	4.22	35.61	37.8	74	36.2	Peak
	2252.846	42.43	28.33	4.96	35.27	40.45	74	33.55	Peak
	4329.354	38.1	33.44	7.12	34.09	44.57	74	29.43	Peak
	7519.349	38.13	37.84	9.34	35.62	49.69	74	24.31	Peak
	12149.42	37.79	39	12.17	35.54	53.42	74	20.58	Peak
Vertical	1068.738	44.33	23.56	3.33	36.3	34.92	74	39.08	Peak
	1402.384	43.24	25.44	3.9	35.87	36.71	74	37.29	Peak
	2126.308	42.08	28.07	4.8	35.29	39.66	74	34.34	Peak
	3801.333	38.39	32.32	6.57	34.38	42.9	74	31.1	Peak
	6507.536	37.82	36.2	8.75	34.79	47.98	74	26.02	Peak
	12255.22	37.75	39	12.28	35.42	53.61	74	20.39	Peak

CH39 (2480MHz)

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	1122.563	44.41	23.9	3.45	36.22	35.54	74	38.46	Peak
	1620.431	43.03	26.41	4.19	35.64	37.99	74	36.01	Peak
	2163.504	41.96	28.15	4.84	35.28	39.67	74	34.33	Peak
	4341.886	37.44	33.47	7.12	34.09	43.94	74	30.06	Peak
	7368.741	39.46	37.62	9.21	35.52	50.77	74	23.23	Peak
	12651.13	37.59	39.4	12.5	35.06	54.43	74	19.57	Peak
Vertical	1096.904	43.35	23.74	3.39	36.25	34.23	74	39.77	Peak
	1394.3	42.96	25.4	3.9	35.88	36.38	74	37.62	Peak
	1731.816	42.09	26.85	4.34	35.53	37.75	74	36.25	Peak
	2641.019	40.99	29.31	5.39	35.23	40.46	74	33.54	Peak
	5209.075	37.81	34.45	7.95	33.97	46.24	74	27.76	Peak
	12433.62	37.83	39	12.39	35.26	53.96	74	20.04	Peak

TEST ENGINEER: Jarey

EUT : TV Remote Control Temperature : 22°C

Model No. : ERF3A69 Humidity : 51%RH

Test Mode : Receiving Date of Test : 2018.01.03

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	36.127	8.88	19.32	0.61	--	28.81	40	11.19	QP
	51.843	2.32	19.28	0.73	--	22.33	40	17.67	
	63.313	2.77	18.72	0.79	--	22.28	43.5	17.72	
	154.821	2.72	19.29	1.3	--	23.31	46	20.19	
	524.554	4.3	24.26	2.34	--	30.9	46	15.1	
	818.834	3.74	28.4	2.89	--	35.03	46	10.97	
	1263.796	44.09	24.72	3.69	36.03	36.47	74	37.53	PK
	1731.816	43.87	26.85	4.34	35.53	39.53	74	34.47	
	2507.129	41.14	28.83	5.23	35.24	39.96	74	34.04	
	4547.396	37.99	33.84	7.32	34.03	45.12	74	28.88	
	6874.906	37.16	36.88	8.96	35.16	47.84	74	26.16	
	11701.38	37.58	39.24	11.79	35.67	52.94	74	21.06	
Vertical	36.509	8.31	19.33	0.62	--	28.26	40	11.74	QP
	48.332	2.85	19.47	0.71	--	23.03	43.5	16.97	
	69.114	3.39	17.93	0.82	--	22.14	43.5	17.86	
	152.13	4.56	19.12	1.29	--	24.97	46	18.53	
	444.851	3.39	23.04	2.17	--	28.6	46	17.4	
	771.449	4.12	28.07	2.82	--	35.01	46	10.99	
	1050.364	45.61	23.44	3.3	36.32	36.03	74	37.97	PK
	1477.276	43.01	25.8	4.01	35.78	37.04	74	36.96	
	2024.354	42.04	27.85	4.64	35.3	39.23	74	34.77	
	2947.623	40.42	30.34	5.67	35.2	41.23	74	32.77	
	5567.137	36.68	34.85	8.16	34.08	45.61	74	28.39	
	11735.25	37.76	39.21	11.93	35.67	53.23	74	20.77	

TEST ENGINEER: Jarey

Emissions in restricted frequency bands

Using Antenna-port conducted measurements:

According to the ANSI C63.10-2013 Sec. 11.12.2, antenna-port conducted measurements is also be permitted as an alternative to radiated measurements in the restricted frequency bands.

The transmitter output was connected to the Test Receiver. The EUT was set to transmit continuously ($\geq 98\%$ duty cycle).

The test procedure is defined in ANSI C63.10-2013
(11.12.2.4 Peak power measurement procedure & the 11.12.2.5 Average power measurement procedures (11.12.2.5.1 Trace averaging with continuous EUT transmission at full power)):

Note1 – The additional radiated test was performed to prove that the cabinet emissions (transmit antenna be replaced with a termination matching the impedance of the antenna) also comply with the applicable limits.

Cabinet Emission (Radiated with antenna terminated):

Polarization	Frequency (MHz)	Meter Reading dB (μ V)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamplifier Factor (dB)	Emission Level dB (μ V/m)	Limits dB (μ V/m)	Margin (dB)	Remark
Horizontal	2312.219	41.89	28.45	5.04	35.26	40.12	74	33.88	Peak
	2312.219	24.86	28.45	5.04	35.26	23.09	54	30.91	Average
	2390	44.15	28.59	5.12	35.26	42.6	74	31.4	Peak
	2390	26.47	28.59	5.12	35.26	24.92	54	29.08	Average
	2483.5	46.53	28.77	5.19	35.25	45.24	74	28.76	Peak
	2483.5	28.01	28.77	5.19	35.25	26.72	54	27.28	Average
	2492.677	42.89	28.79	5.23	35.25	41.66	74	32.34	Peak
	2492.677	23.32	28.79	5.23	35.25	22.09	54	31.91	Average
Vertical	2312.219	42.03	28.45	5.04	35.26	40.26	74	33.74	Peak
	2312.219	24.51	28.45	5.04	35.26	22.74	54	31.26	Average
	2390	44.05	28.59	5.12	35.26	42.5	74	31.5	Peak
	2390	28.16	28.59	5.12	35.26	26.61	54	27.39	Average
	2483.5	48.63	28.77	5.19	35.35	47.24	74	26.76	Peak
	2483.5	30.04	28.77	5.19	35.35	28.65	54	25.35	Average
	2499.893	40.79	28.8	5.23	35.24	39.58	74	34.42	Peak
	2499.893	25.33	28.8	5.23	35.24	24.12	54	29.88	Average

The frequency range 2310-2390MHz & 2483.5-2500MHz were tested, and the maximum emission frequency was recorded above.

Note2 – The antenna gain (3.23dBi) and cable loss (0.5dB) were set as offset (3dB) in the spectrum.

(According to ANSI C63.10-2013 Sec. 11.12.2.6, when determining the EIRP from the measured conducted power, the upper bound on antenna gain for a device with a signal RF output shall be selected as the maximum in-band gain of the antenna across all operating bands, or 2 dBi, whichever is greater.)

Note3 – $EIRP = E + 20\log D - 104.8$

Where: EIRP = equivalent isotropic radiated power in dBm,

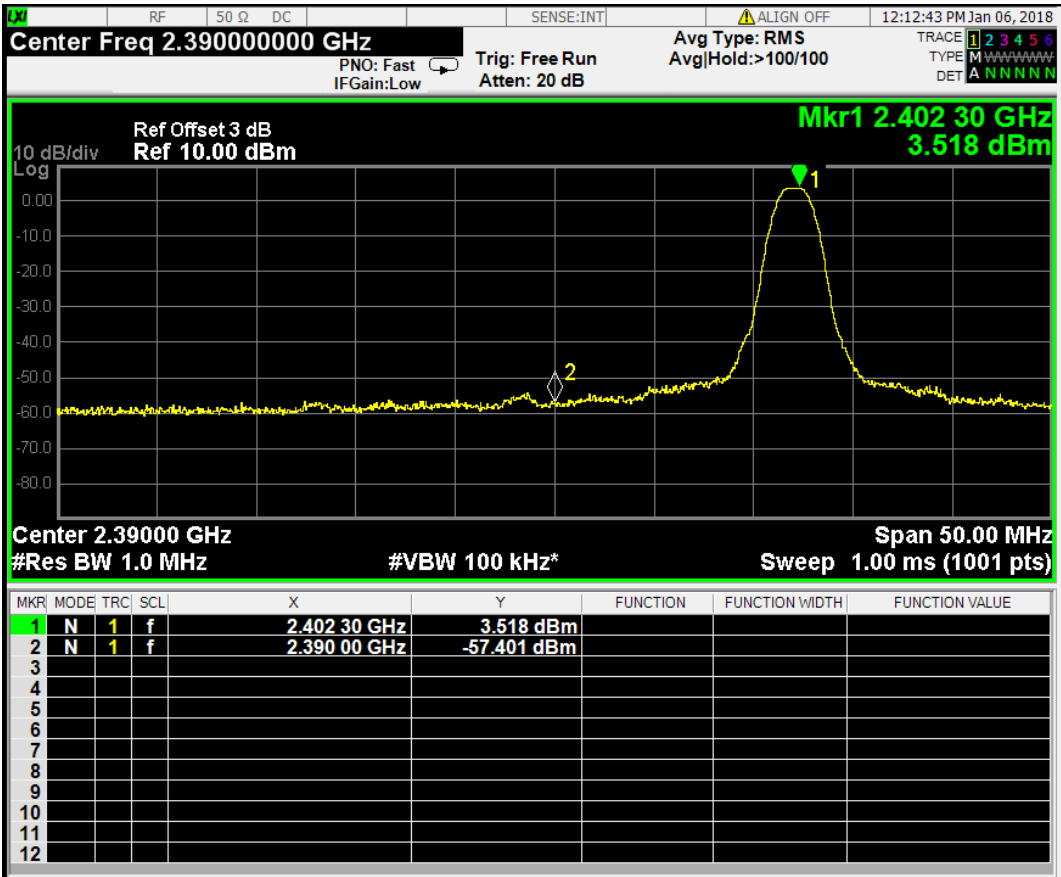
E = electric field strength in dB μ V/m,

D = specified measurement distance in meters.

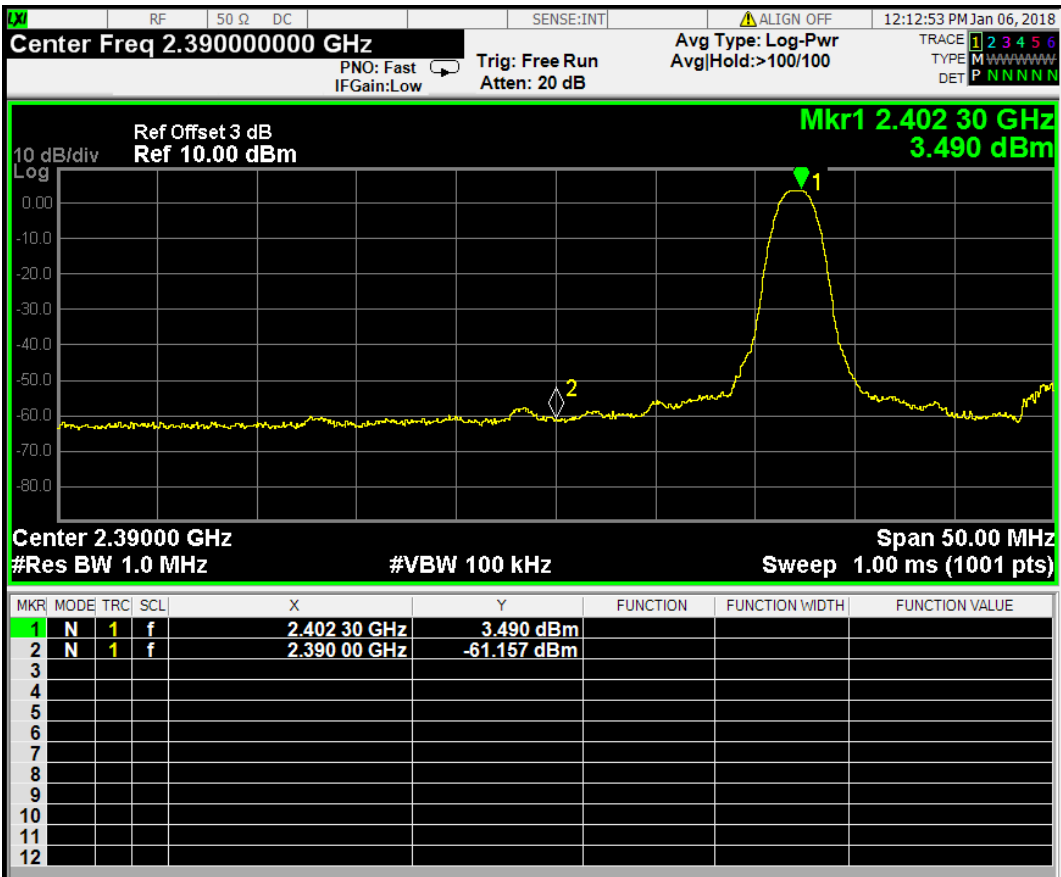
The Average Power limit = -41.2 dBm

The Peak Power limit = -21.2 dBm

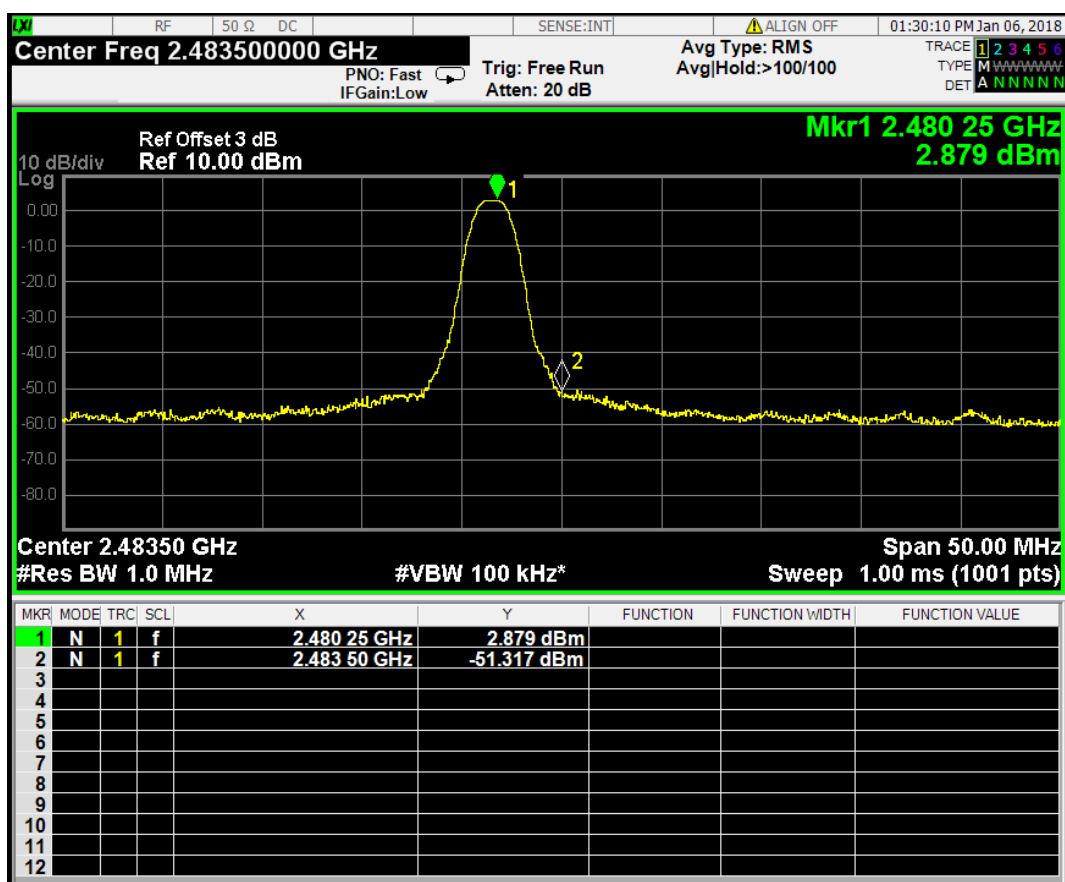
AV Result on CH00



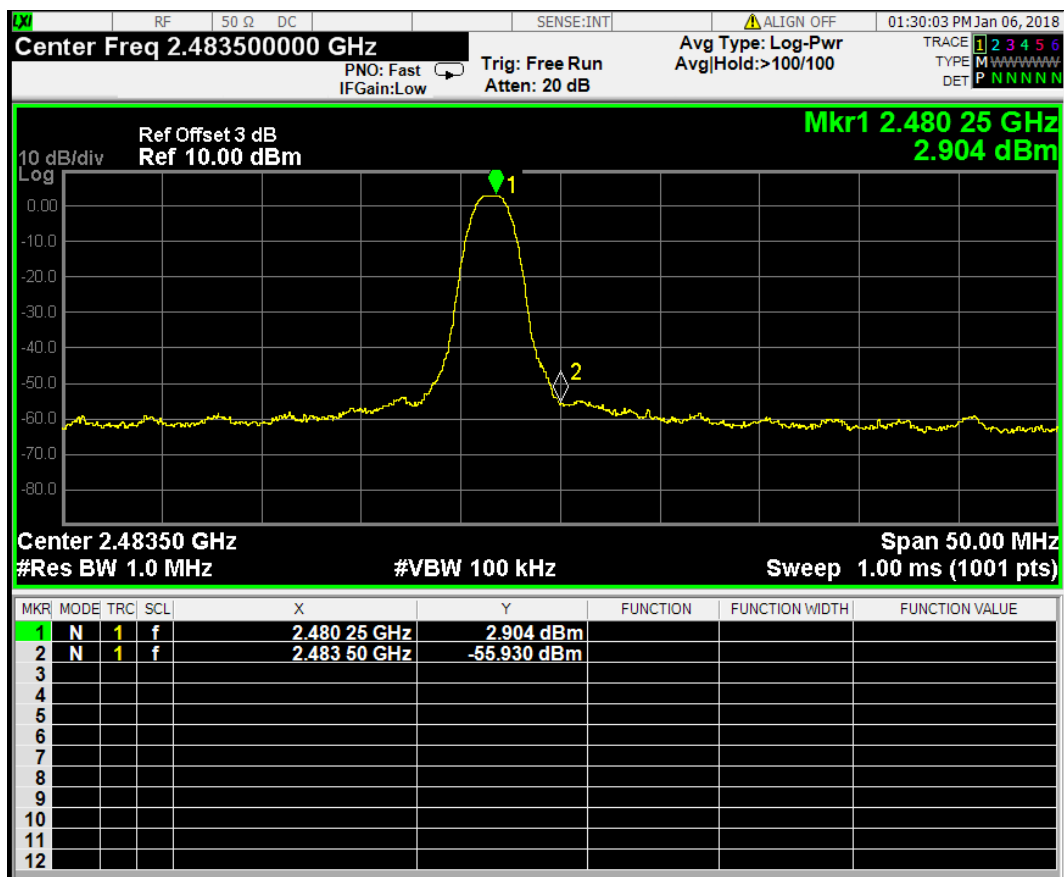
PK Result on CH00



AV Result on CH39



PK Result on CH39



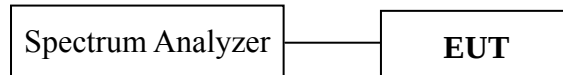
4 6 dB BANDWIDTH MEASUREMENT

4.1 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	N9010A	MY52221182	Jun 12, 2017	Jun 11, 2018

4.2 Block Diagram of Test Setup



4.3 Specification Limits (§15.247(a)(2))

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

4.4 Operating Condition of EUT

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

4.5 Test Procedure

The transmitter output was connected to the spectrum analyzer. The bandwidth of the fundamental frequency was measure by spectrum analyzer with 100 kHz RBW / 300 kHz VBW.

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

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

4.6 Test Results

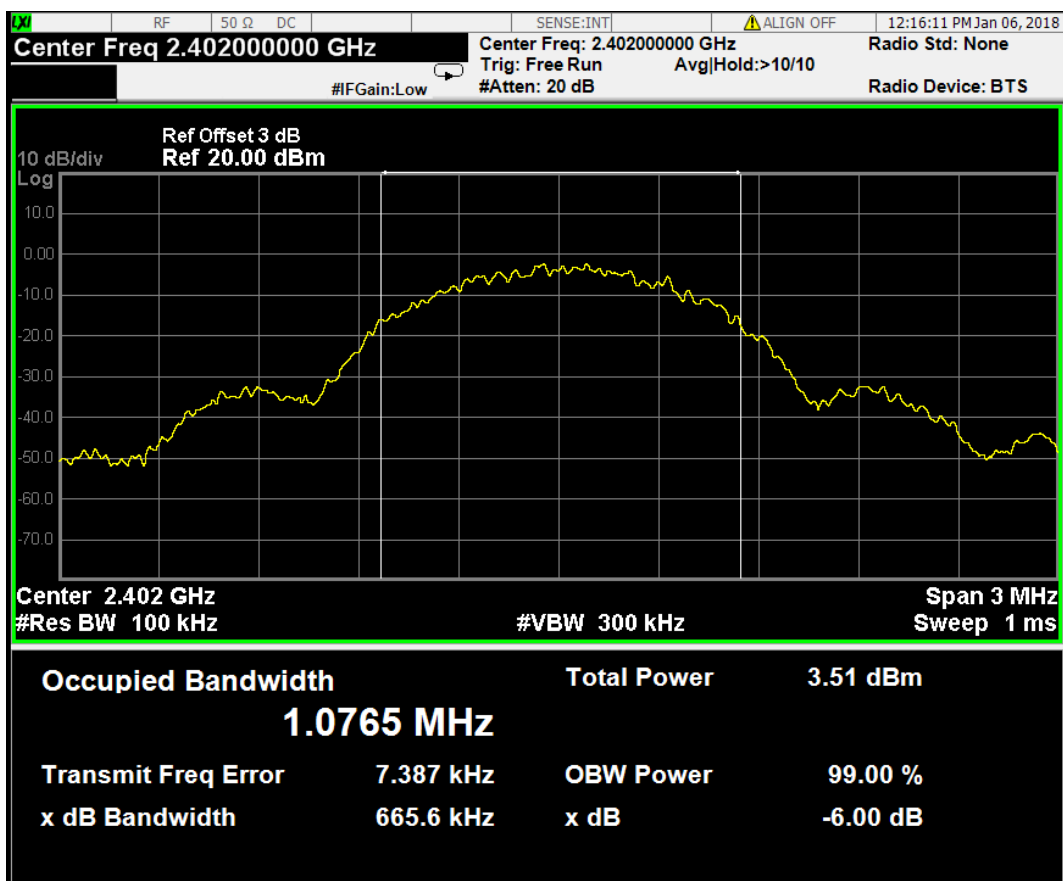
PASSED.

All the test results are attached in next pages.

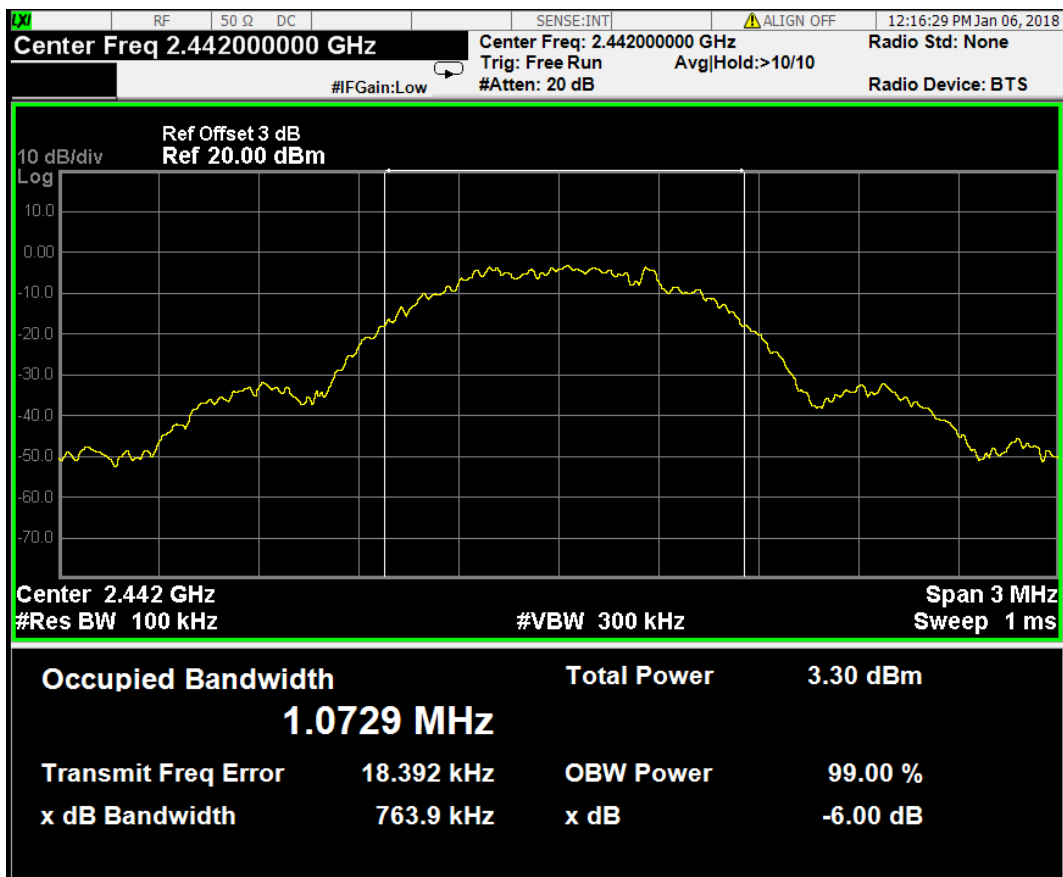
(Test Date: 2018.01.04 Temperature: 23℃ Humidity: 51 %)

Channel	Frequency	6dB Bandwidth
00	2402 MHz	665.6 kHz
20	2442 MHz	763.9 kHz
39	2480 MHz	705.3 kHz

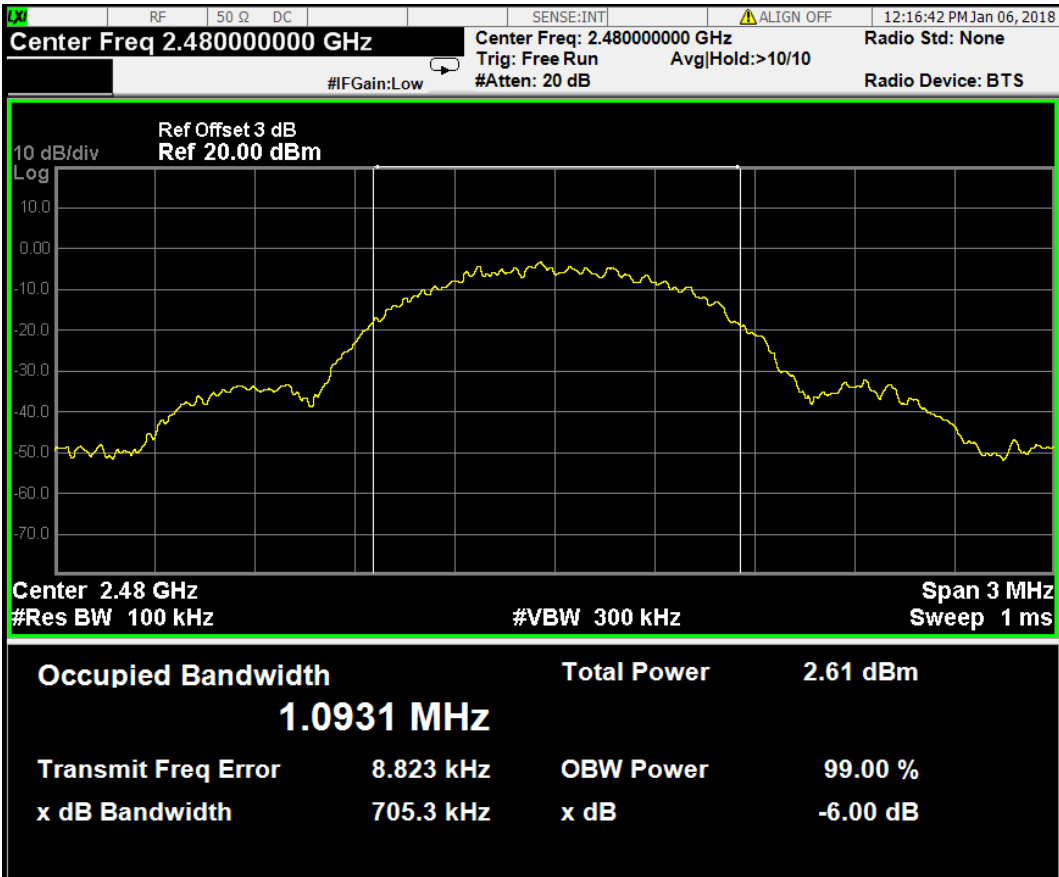
CH00 (2402 MHz)



CH20 (2442 MHz)



CH39 (2480 MHz)



5 MAXIMUM PEAK OUTPUT POWER MEASUREMENT

5.1 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	N9010A	MY52221182	Jun 12, 2017	Jun 11, 2018

5.2 Block Diagram of Test Setup

The Same as Section. 4.2.

5.3 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)

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 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).

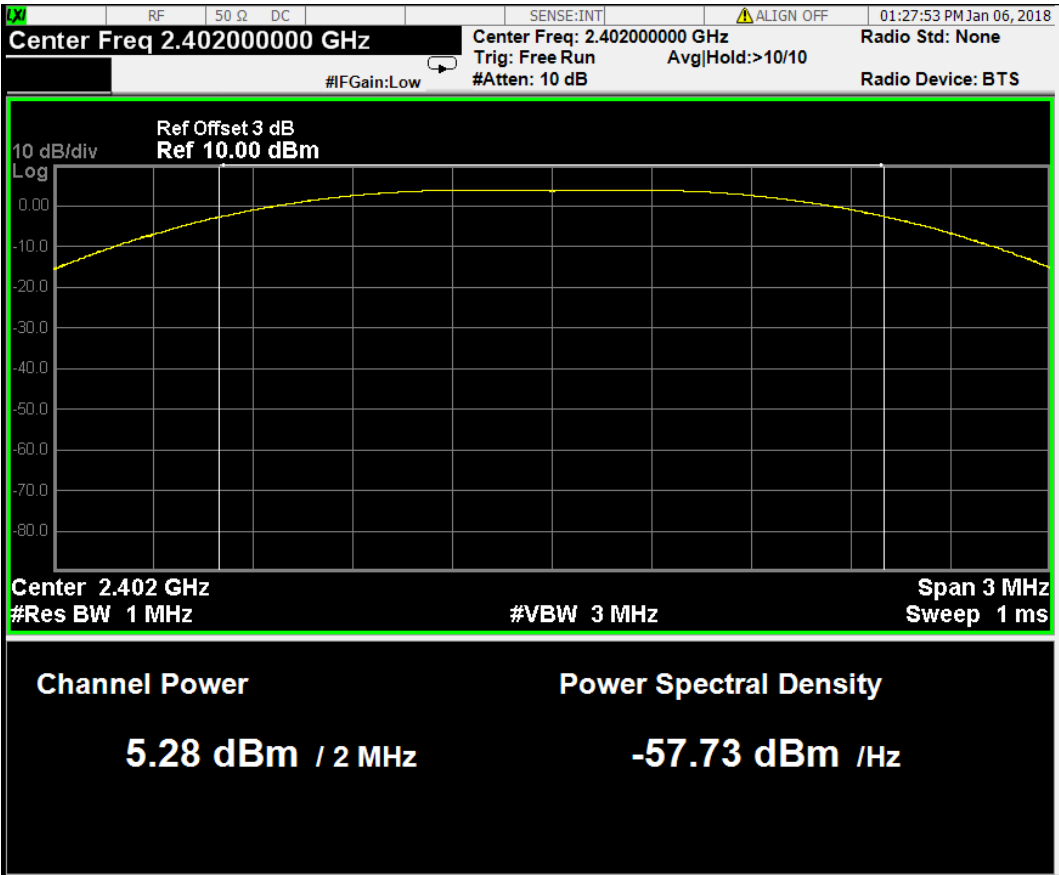
5.6 Test Results

PASSED. All the test results are listed below.

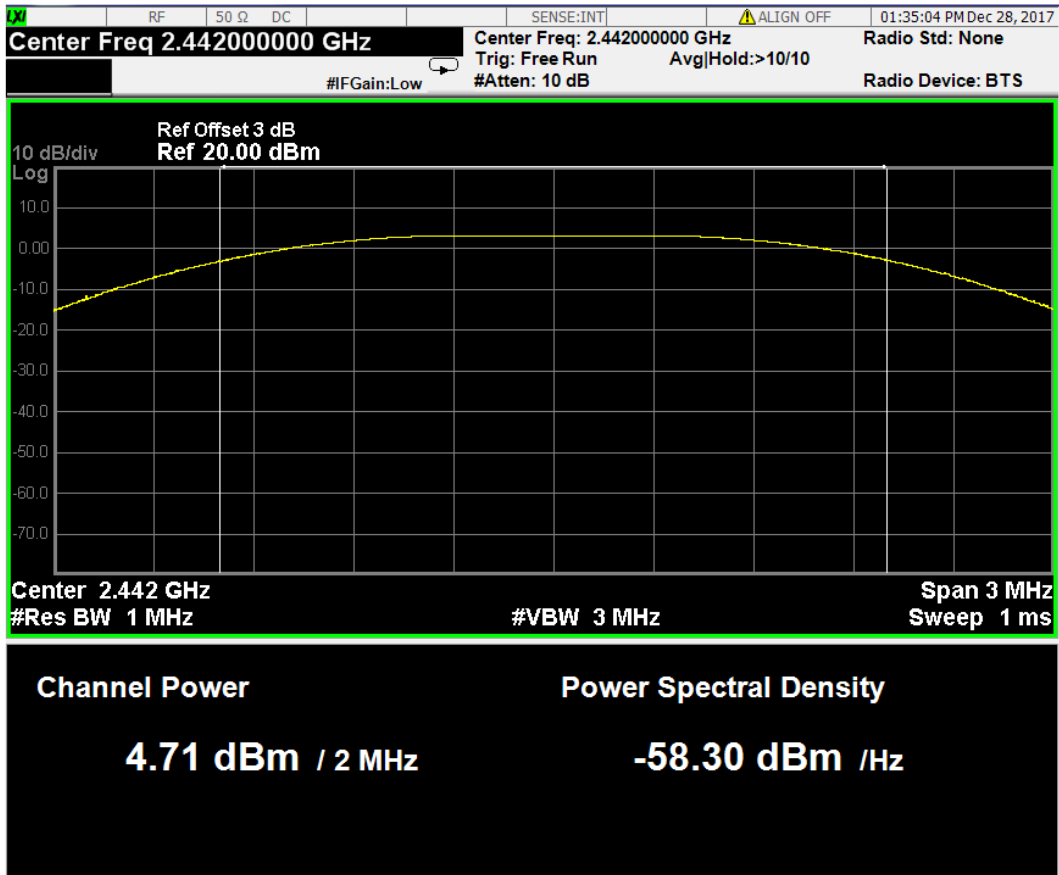
(Test Date: 2018.01.04 Temperature: 23°C Humidity: 51 %)

Channel	Frequency	Peak Output Power	Limit
00	2402 MHz	5.28 dBm	30 dBm
20	2442 MHz	4.71 dBm	30 dBm
39	2480 MHz	4.55 dBm	30 dBm

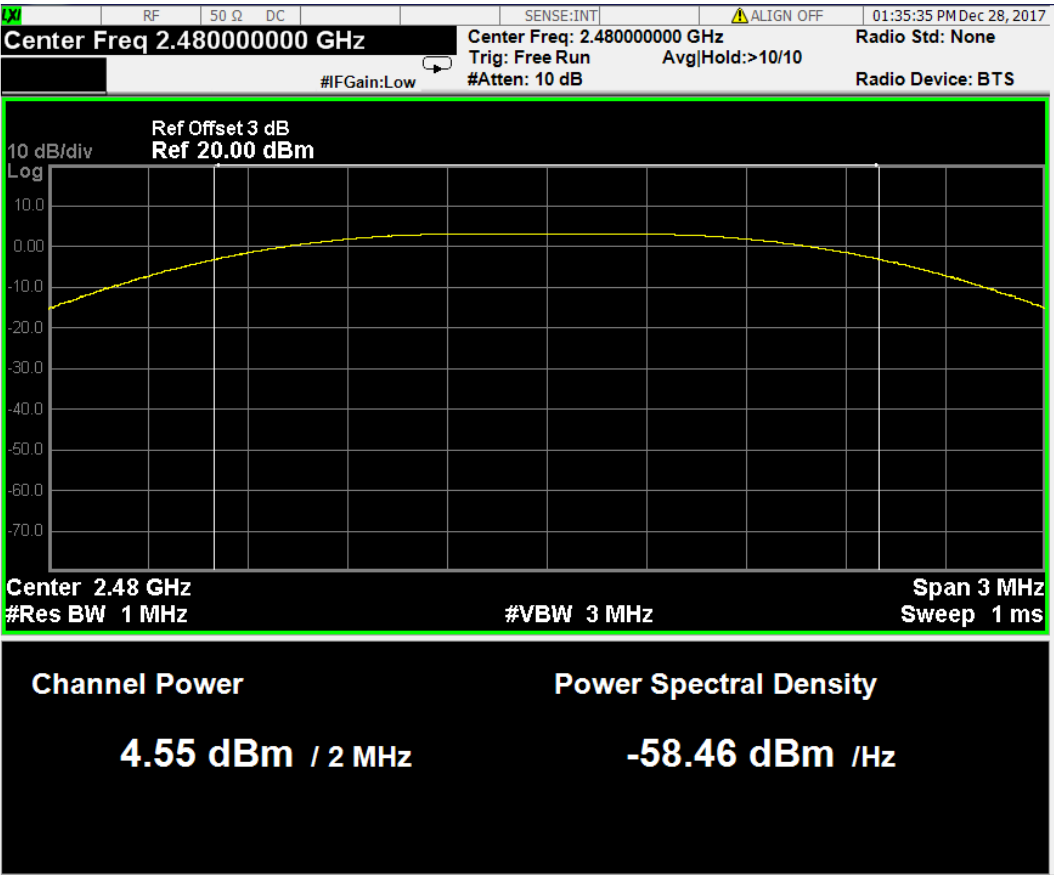
CH00 (2402 MHz)



CH20 (2442 MHz)



CH39 (2480 MHz)



6 EMISSION LIMITATIONS MEASUREMENT

6.1 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	N9010A	MY52221182	Jun 12, 2017	Jun 11, 2018

6.2 Block Diagram of Test Setup

The Same as Section. 4.2.

6.3 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. 4.7)

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 Test Receiver. Set RBW = 100 kHz, VBW $\geq$ 300 kHz, scan up through 10th harmonic. All harmonics/spurs must be at least 20 dB down from the highest emission level within the authorized band as measured with a 100 kHz RBW.

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).

6.6 Test Results

PASSED.

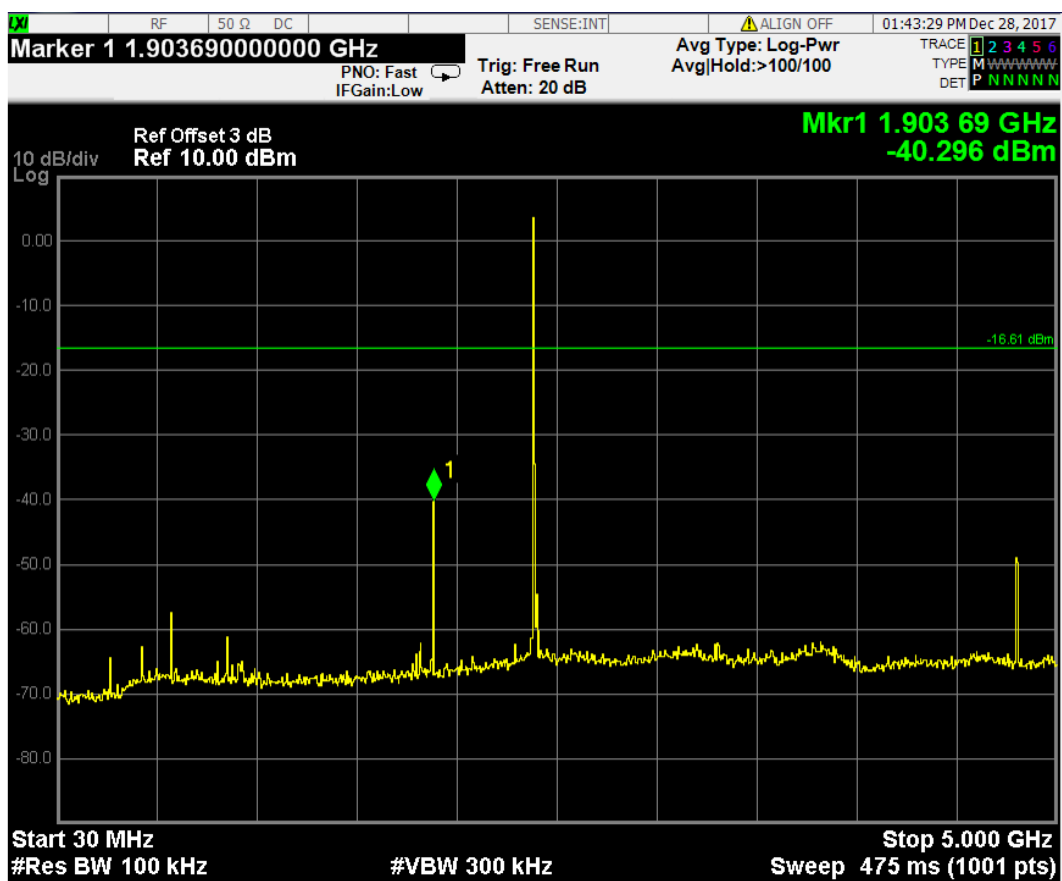
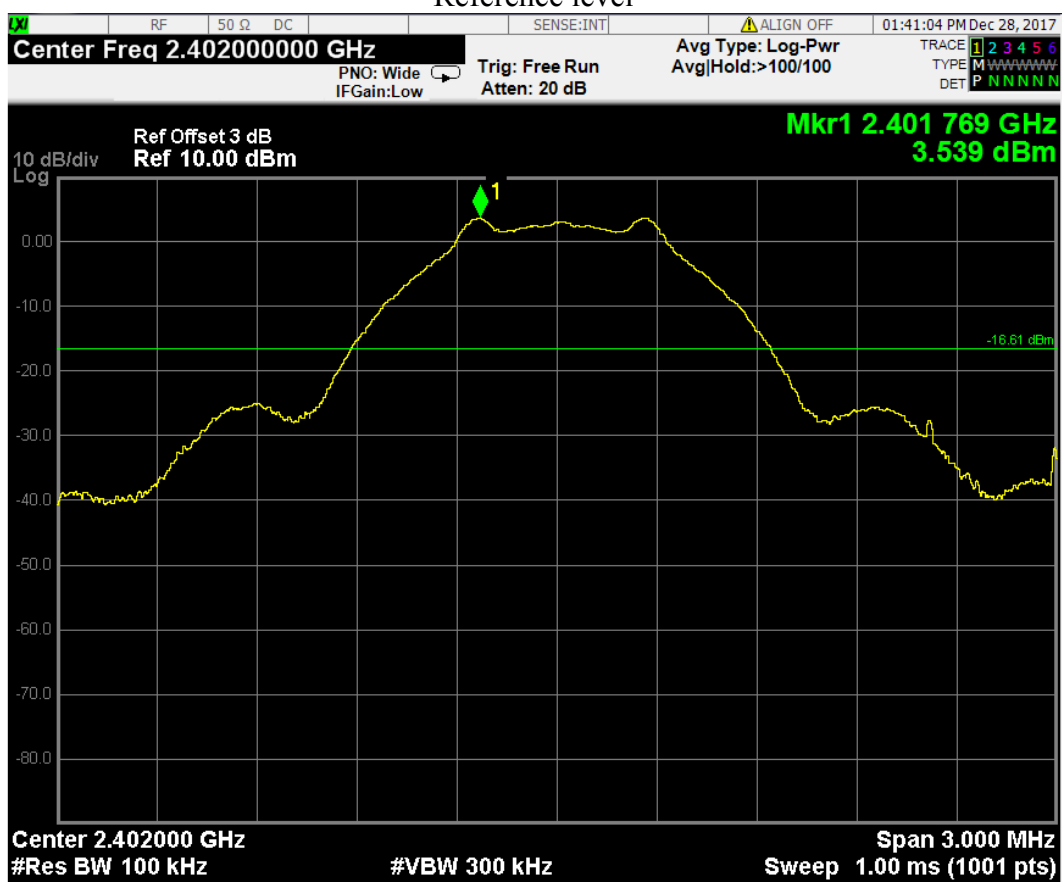
The test data was attached in the next pages.

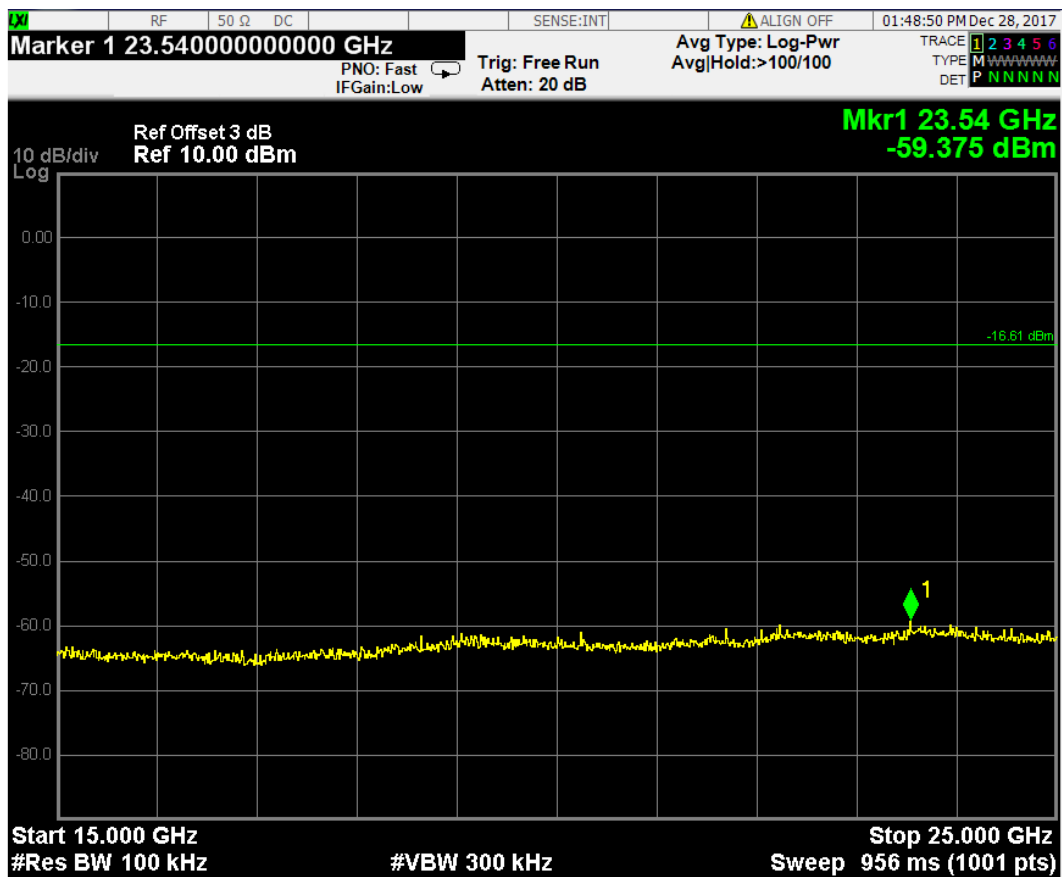
(Test Date: 2018.01.04 Temperature: 23℃ Humidity: 51 %)

Channel	Data Page
00	P27-28
20	P29-30
39	P31-32

CH00 (2402 MHz)

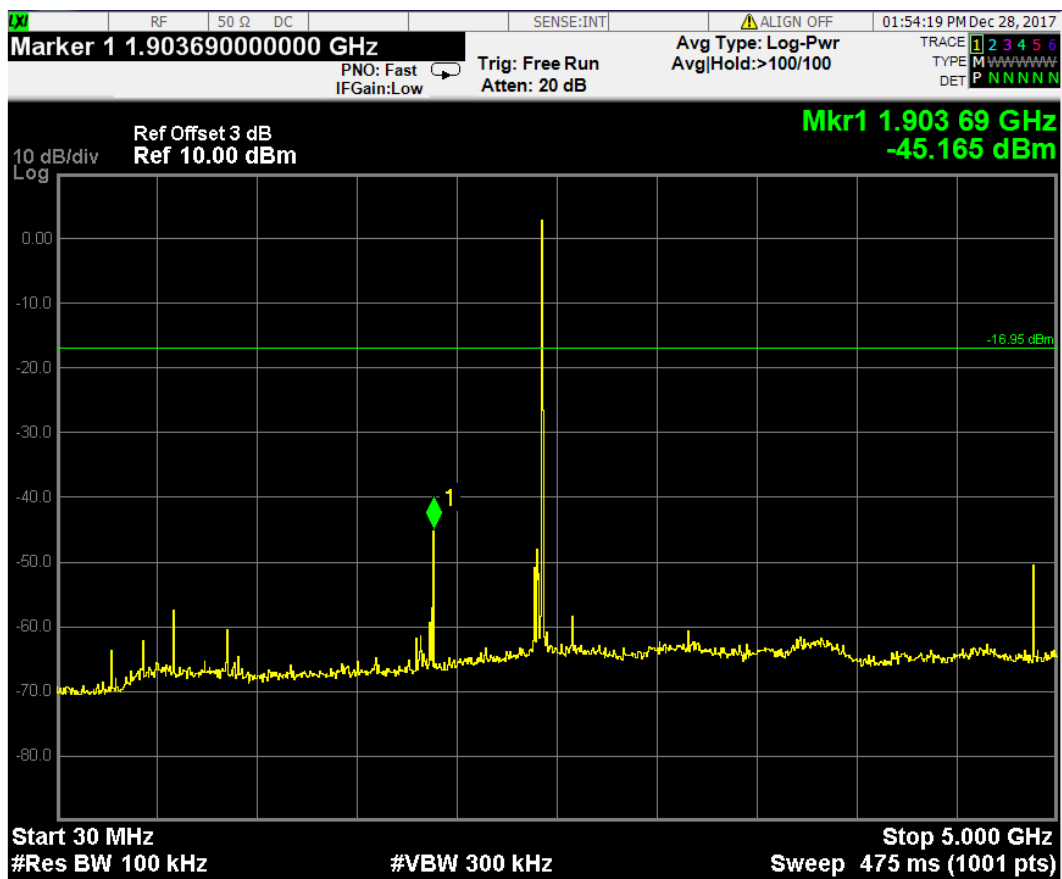
Reference level

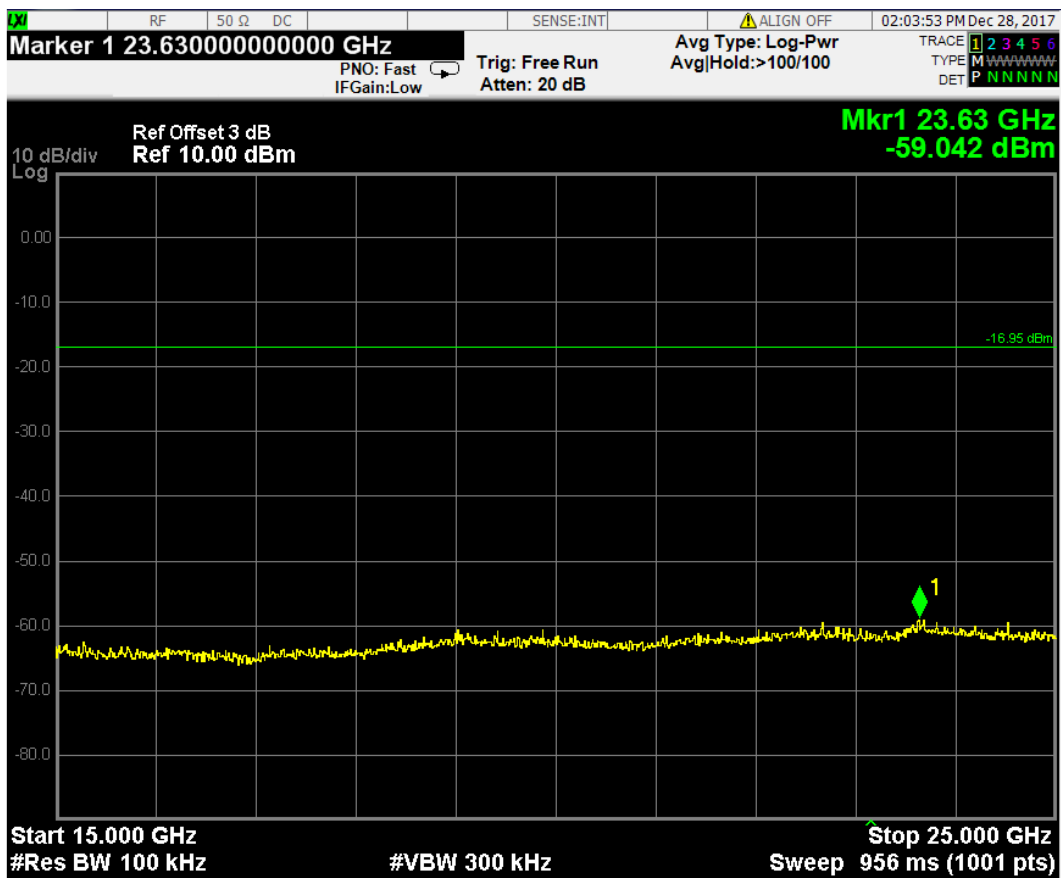
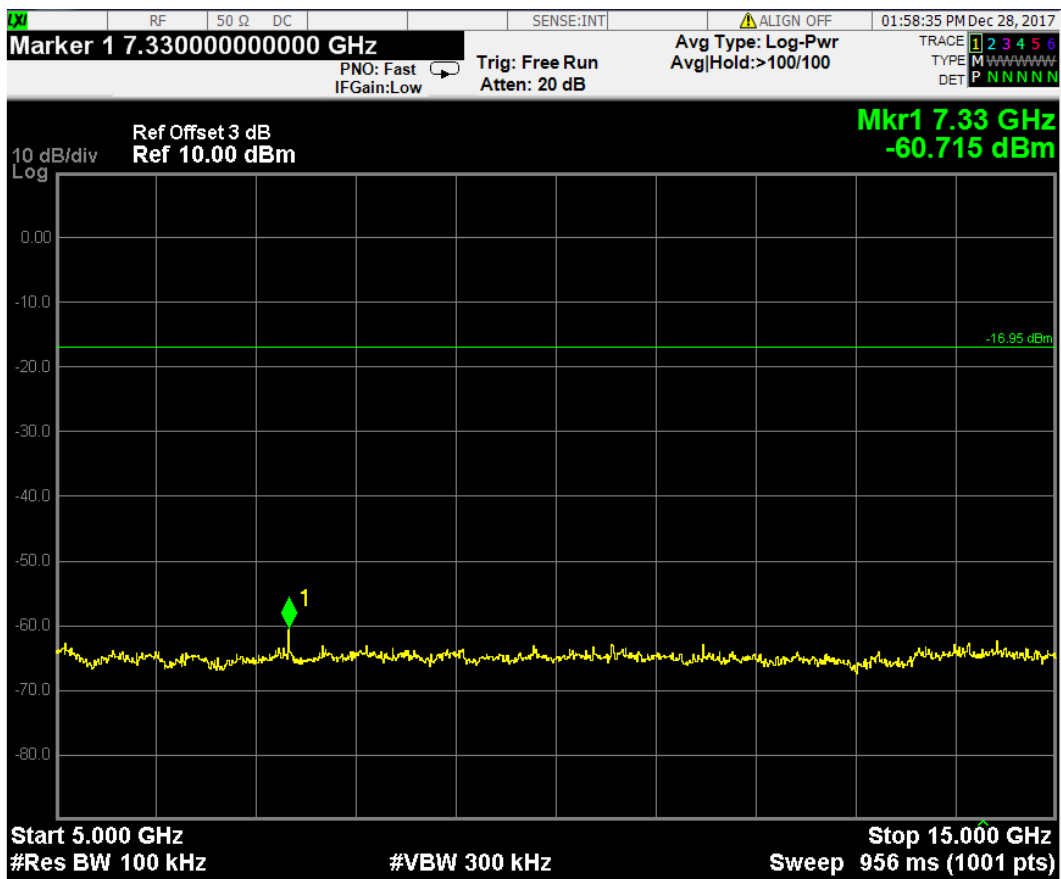




CH20 (2442 MHz)

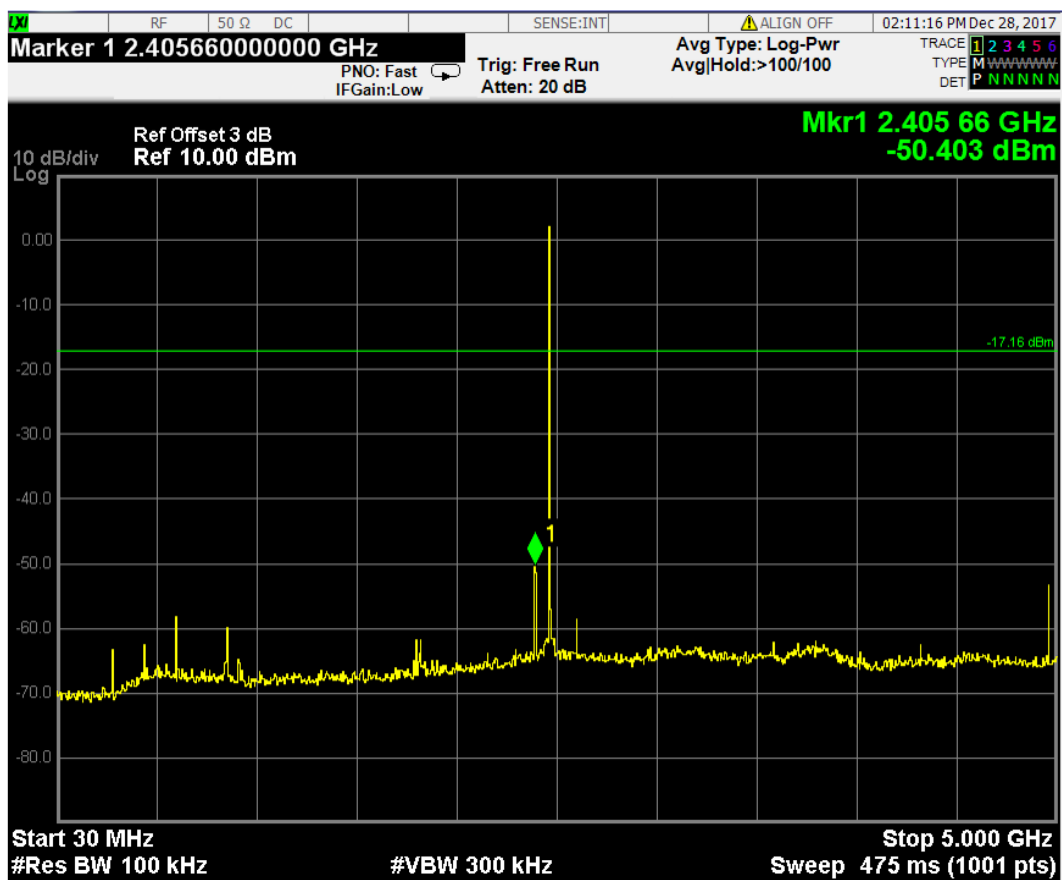
Reference level

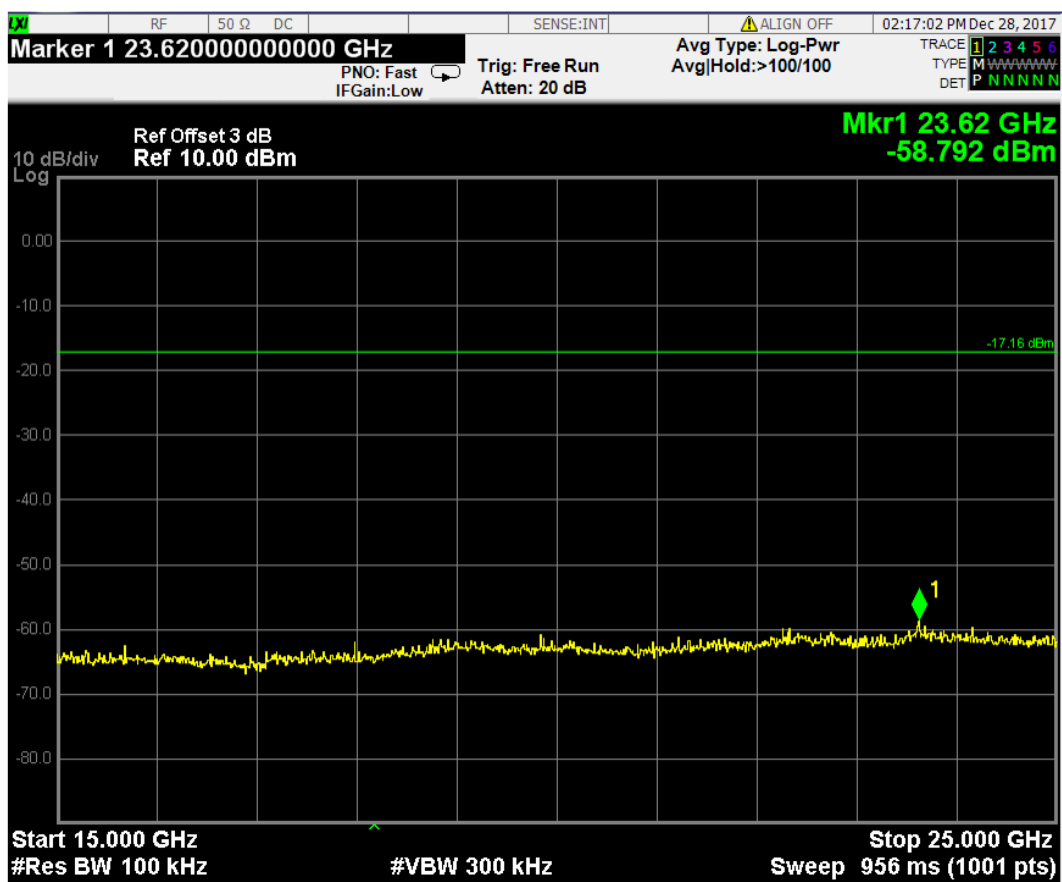
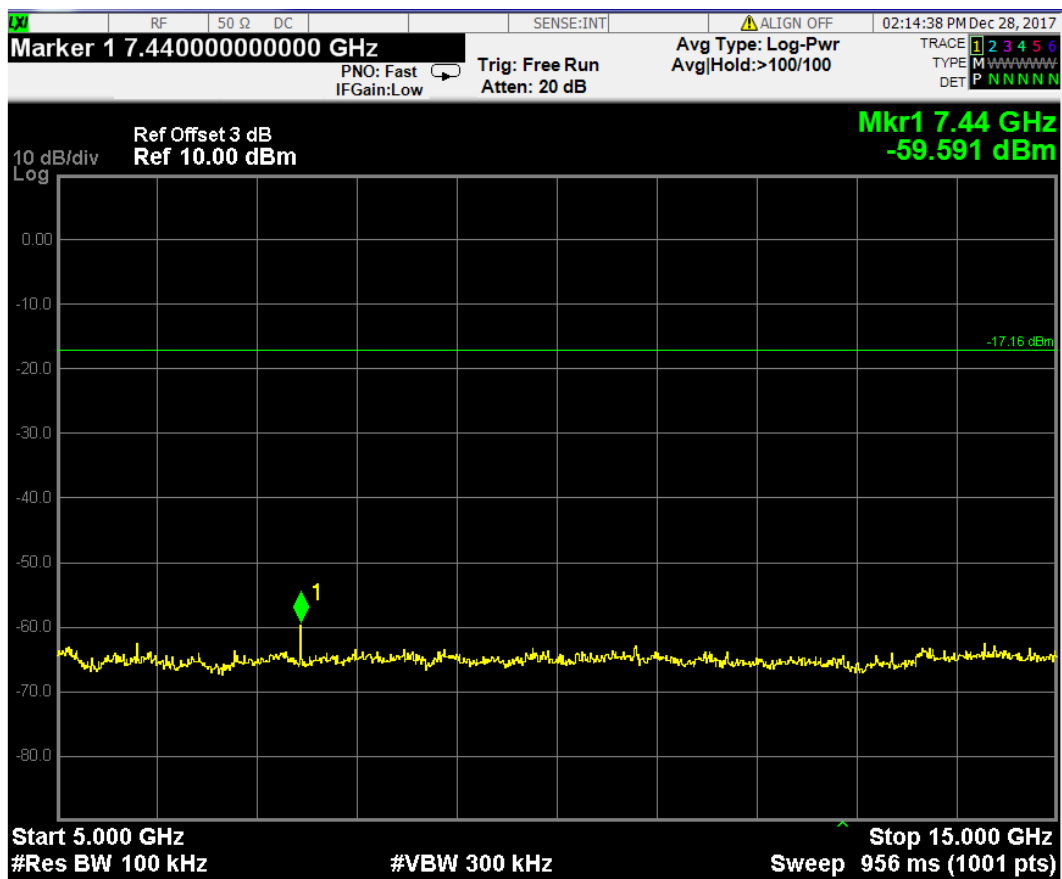




CH39 (2480 MHz)

Reference level





7 BAND EDGES MEASUREMENT

7.1 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	N9010A	MY52221182	Jun 12, 2017	Jun 11, 2018

7.2 Block Diagram of Test Setup

The Same as section.4.2.

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, provided the transmitter demonstrates compliance with the peak conducted power limits.

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 Test Receiver. 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).

7.6 Test Results

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

(Test Date: 2018.01.04 Temperature: 23℃ Humidity: 51 %)

Location	Channel	Frequency	Delta Marker	Result
Below Band Edge	00	2402 MHz	65.647 dB	More than 20 dB below the highest level of the desired power
Upper Band Edge	39	2480 MHz	58.834 dB	

[illegible][illegible]

8 POWER SPECTRAL DENSITY MEASUREMENT

8.1 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	N9010A	MY52221182	Jun 12, 2017	Jun 11, 2018

8.2 Block Diagram of Test Setup

The Same as section 4.2.

8.3 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.

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 Test Receiver. 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).

8.6 Test Results

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

(Test Date: 2018.01.04 Temperature: 23°C Humidity: 51 %)

Channel	Frequency	Power Spectral Density	Limit
00	2402 MHz	3.539 dBm	8 dBm
20	2442 MHz	3.055 dBm	8 dBm
39	2480 MHz	2.839 dBm	8 dBm

RF 50 Ω DC SENSE:INT ALIGN OFF 01:41:04 PM Dec 28, 2017

Center Freq 2.40200000 GHz PNO: Wide IFGain:Low Trig: Free Run Atten: 20 dB Avg Type: Log-Pwr Avg|Hold:>100/100

TRACE 1 2 3 4 5 6 TYPE M W W W W W W W DET P N N N N N N

Ref Offset 3 dB Ref 10.00 dBm

Mkr1 2.401 769 GHz 3.539 dBm

10 dB/div Log

-16.61 dBm

Center 2.402000 GHz #Res BW 100 kHz #VBW 300 kHz Span 3.000 MHz Sweep 1.00 ms (1001 pts)

Center Freq 2.44200000 GHz

PNO: Wide IFGain:Low Trig: Free Run Atten: 20 dB

Avg Type: Log-Pwr AvgHold:>100/100

TRACE 1 2 3 4 5 6
TYPE M W W W W W W W
DET P N N N N N N

Ref Offset 3 dB Ref 10.00 dBm

Mkr1 2.441 760 GHz 3.055 dBm

10 dB/div Log

-16.95 dBm

Center 2.442000 GHz #Res BW 100 kHz #VBW 300 kHz Span 3.000 MHz Sweep 1.00 ms (1001 pts)

CH39 2480 MHz



9 DEVIATION TO TEST SPECIFICATIONS

None.