

FCC Test Report

Product Name	Transmitter box
Model No	B8-T
FCC ID.	APIREVELB8SUB

Applicant	Harman International Industries, Inc
Address	8500 Balboa Blvd, Northridge, CA 91329, UNITED STATES.

Date of Receipt	June 13, 2017
Issue Date	July 17, 2017
Report No.	1760330R-RFUSP01V00-A
Report Version	V1.0



The test results relate only to the samples tested.

The test results shown in the test report are traceable to the national/international standard through the calibration report of the equipment and evaluated measurement uncertainty herein.

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Applicant	Harman International Industries, Inc
Address	8500 Balboa Blvd, Northridge, CA 91329, UNITED STATES.
Manufacturer	Harman International Industries, Inc
Model No.	B8-T
EUT Rated Voltage	AC 100-240V, 50-60Hz
EUT Test Voltage	AC 120V / 60Hz
Trade Name	REVEL
Applicable Standard	FCC CFR Title 47 Part 15 Subpart C: 2016 ANSI C63.4: 2014, ANSI C63.10: 2013 KDB 558074 D01 DTS Meas Guidance v04
Test Result	Complied

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1. GENERAL INFORMATION

1.1. EUT Description

Product Name	Transmitter box
Trade Name	REVEL
Model No.	B8-T
FCC ID.	APIREVELB8SUB
Frequency Range	2403-2478MHz
Number of Channels	26CH
Type of Modulation	FSK
Antenna Type	Dipole Antenna
Channel Control	Auto
Antenna Gain	Refer to the table "Antenna List"
Signal Cable	Non-Shielded, 2.1m
Subwoofer (Receiver)	1 set
Power Adapter	MFR: GPE, M/N: GPE051A-050100-D Input: AC 100-240V~50-60Hz 0.5A Output: 5V $\overline{\text{---}}$ 1000mA, 5W Cable out: Shielded, 1.8m.

Antenna List

No.	Manufacturer	Part No.	Antenna Type	Peak Gain
1	Meiloon	188-ASDWLAN30-E	Dipole Antenna	1.53dBi for 2.4 GHz

Note: The antenna of EUT conforms to FCC 15.203.

Center Frequency of Each Channel:

Channel	Frequency	Channel	Frequency	Channel	Frequency	Channel	Frequency
Channel 00:	2403 MHz	Channel 01:	2406 MHz	Channel 02:	2409 MHz	Channel 03:	2412 MHz
Channel 04:	2415 MHz	Channel 05:	2418 MHz	Channel 06:	2421 MHz	Channel 07:	2424 MHz
Channel 08:	2427 MHz	Channel 09:	2430 MHz	Channel 10:	2433 MHz	Channel 11:	2436 MHz
Channel 12:	2439 MHz	Channel 13:	2442 MHz	Channel 14:	2445 MHz	Channel 15:	2448 MHz
Channel 16:	2451 MHz	Channel 17:	2454 MHz	Channel 18:	2457 MHz	Channel 19:	2460 MHz
Channel 20:	2463 MHz	Channel 21:	2466 MHz	Channel 22:	2469 MHz	Channel 23:	2472 MHz
Channel 24:	2475 MHz	Channel 25:	2478 MHz				

Note:

1. The EUT is a Transmitter box. with a built-in 2.4GHz Transmit & Receiver, this report for Transmit.
2. Regarding to the operation frequency, the lowest, middle and highest frequency are selected to perform the test.
3. These tests are conducted on a sample for the purpose of demonstrating compliance of 2.4GHz transmitter with Part 15 Subpart C Paragraph 15.247 of spread spectrum devices
4. The radiation measurements are performed in X, Y, Z axis positioning. Only the worst case is shown in the report.

Test Mode:	Mode 1: Transmit
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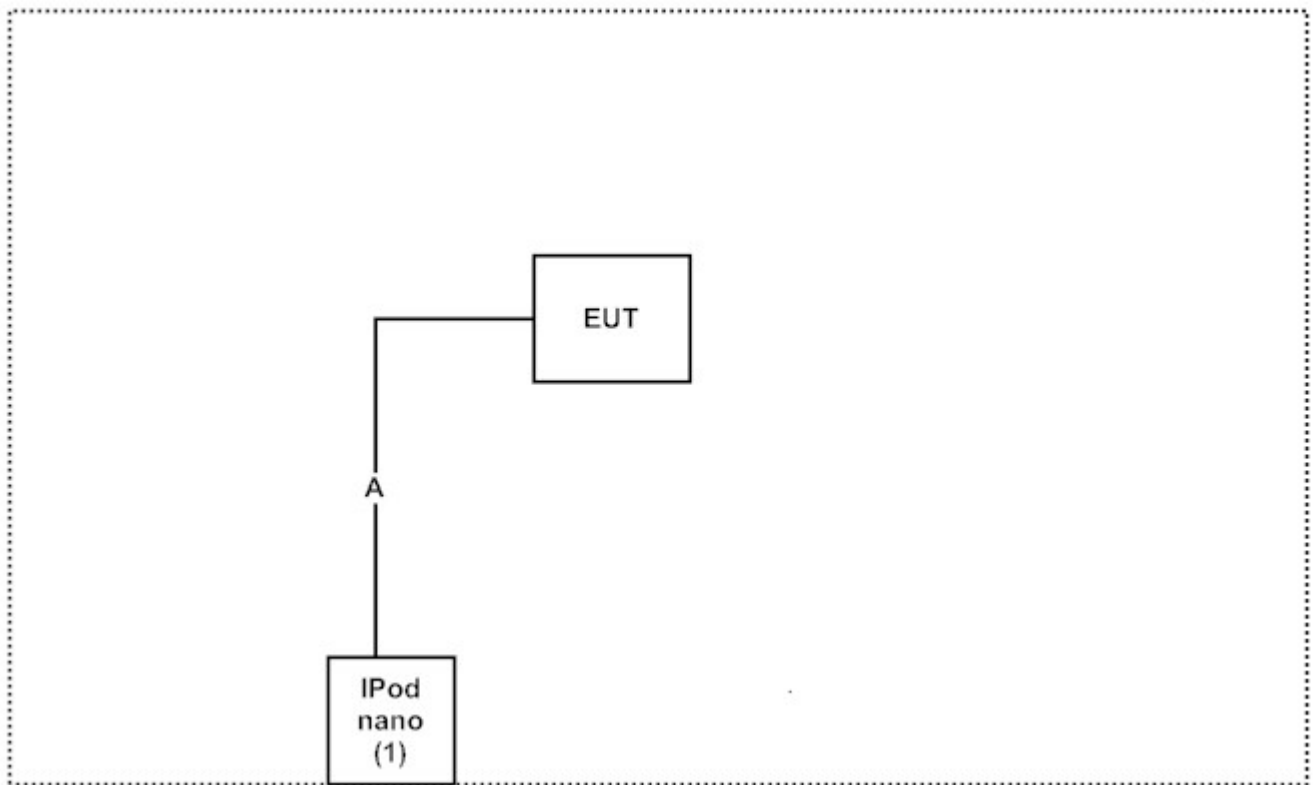
1.3. Tested System Details

The types for all equipment, plus descriptions of all cables used in the tested system (including inserted cards) are:

	Product	Manufacturer	Model No.	Serial No.	Power Cord
1	iPod nano	Apple	A1199	YM733325VQ5	N/A

	Signal Cable Type	Signal cable Description
A	Signal Cable	Non-Shielded, 0.6m

1.4. Configuration of Tested System



1.5. EUT Exercise Software

- (1) Setup the EUT as shown in section 1.4.
- (2) Provide the Power on transmitting
- (3) Start transmits continually.
- (4) Verify that the EUT works properly.

1.6. Test Facility

Ambient conditions in the laboratory:

Items	Required (IEC 68-1)	Actual
Temperature (°C)	15-35	20-35
Humidity (%RH)	25-75	50-65
Barometric pressure (mbar)	860-1060	950-1000

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FCC Accreditation Number: TW1014

1.7. List of Test Equipment

For Conducted measurements /CB3/SR8

	Equipment	Manufacturer	Model No.	Serial No.	Cali. Date	Due. Date
	Temperature Chamber	WIT GROUP	TH-1S-B	EQ-201-00146	2016/11/28	2017/11/27
X	Spectrum Analyzer	Agilent	N9010A	MY48030495	2016/7/22	2017/7/21
X	Power Meter	Anritsu	ML2495A	6K00003357	2017/6/23	2018/6/22
X	Pulse power sensor	Anritsu	MA2411B	0846193	2017/6/23	2018/6/22
X	EMI Test Receiver	R&S	ESCS 30	100369	2016/10/13	2017/10/12
X	LISN	R&S	ESH3-Z5	836679/017	2017/1/7	2018/1/6
X	LISN	R&S	ENV216	100097	2017/1/7	2018/1/6
X	Coaxial Cable	QTK(Arnist)	RG 400	LC018-RG	2017/6/25	2018/6/24

For Radiated measurements /Site3/CB8

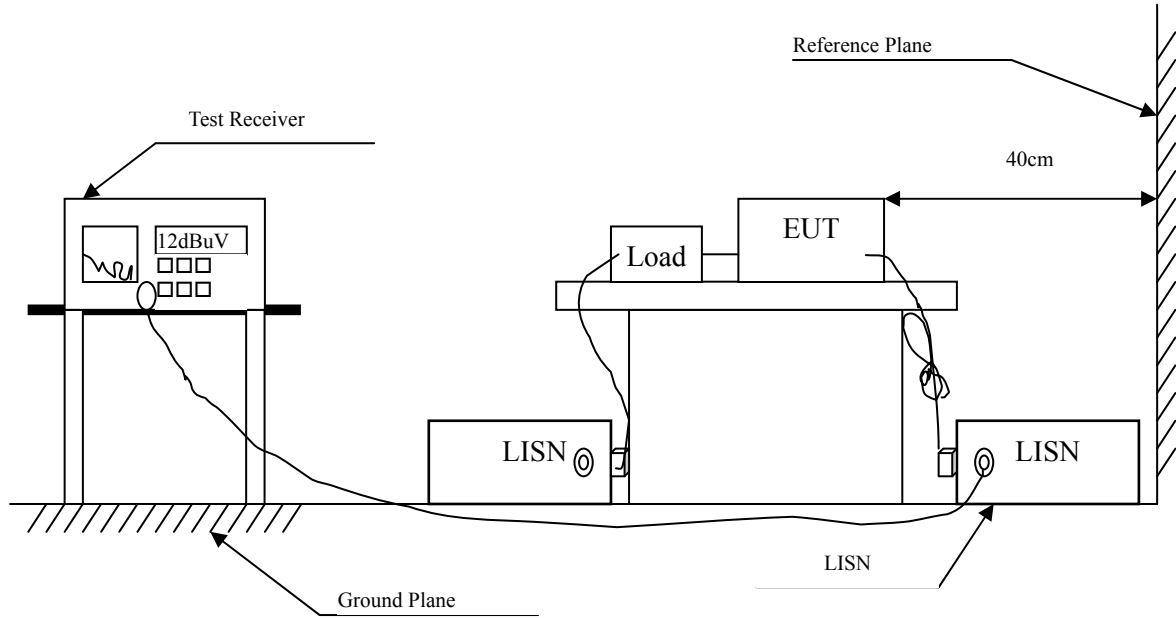
	Equipment	Manufacturer	Model No.	Serial No.	Cali. Date	Due. Date
X	Spectrum Analyzer	R&S	FSP40	100170	2017/1/5	2018/1/4
	Loop Antenna	Teseq	HLA6121	37133	2017/3/18	2018/3/17
X	Bi-Log Antenna	Schaffner Chase	CBL6112B	2707	2017/6/11	2018/6/10
X	<u>Horn Antenna</u>	ETS-Lindgren	3117	00135205	2017/4/6	2017/4/5
	<u>Horn Antenna</u>	Schwarzbeck	BBHA9170	9170430	2017/1/11	2017/1/10
X	<u>Pre-Amplifier</u>	QTK	AP/0100A	CHM/0901069	2017/6/23	2018/6/22
X	<u>Pre-Amplifier</u>	EMCI	EMC012630SE	980210	2017/1/26	2017/1/24
X	<u>Pre-Amplifier</u>	NARDA WE	DBL-1840N506	013	2016/9/30	2017/9/29
X	Filter	MicroTRON	BRM50701	019	2016/11/2	2017/11/1
	Filter	Microwave Circuits	N0257881	36681	2016/12/7	2017/12/6
X	EMI Test Receiver	R&S	ESR26	101385	2016/9/29	2017/9/28
X	Coaxial Cable	QTK(Arnist)	SUCOFLEX 106	L1606-015C	2017/6/23	2018/6/22
X	EMI Test Receiver	R&S	ESCS 30	838251/001	2016/7/21	2017/7/20
X	Coaxial Cable	QTK(Arnist)	RG 214	LC003-RG	2017/6/16	2018/6/15
X	Coaxial signal switch	Anritsu	MP59B	6201415889	2017/6/16	2018/6/15

Note:

1. All equipments are calibrated every one year.
2. The test instruments marked with "X" are used to measure the final test results.
3. Test Software version :QuieTek EMI 2.0 V2.1.113.

2. Conducted Emission

2.1. Test Setup



2.2. Limits

FCC Part 15 Subpart C Paragraph 15.207 (dBuV) Limit		
Frequency MHz	Limits	
	QP	AVG
0.15 - 0.50	66-56	56-46
0.50-5.0	56	46
5.0 - 30	60	50

2.3. Test Procedure

The EUT and simulators are connected to the main power through a line impedance stabilization network (L.I.S.N.). This provides a 50 ohm /50uH coupling impedance for the measuring equipment. The peripheral devices are also connected to the main power through a LISN that provides a 50ohm /50uH coupling impedance with 50ohm termination. (Please refers to the block diagram of the test setup and photographs.)

Both sides of A.C. line are checked for maximum conducted interference. In order to find the maximum emission, the relative positions of equipment and all of the interface cables must be changed according to ANSI C63.4: 2014 on conducted measurement.

Conducted emissions were investigated over the frequency range from 0.15MHz to 30MHz using a receiver bandwidth of 9kHz.

2.4. Uncertainty

± 2.26 dB

2.5. Test Result of Conducted Emission

Product : Transmitter box
 Test Item : Conducted Emission Test
 Power Line : Line (+)
 Test Date : 2017/06/30
 Test Mode : Mode 1: Transmit

Frequency MHz	Correct Factor dB	Reading Level dBuV	Measurement Level dBuV	Margin dB	Limit dBuV
Line (+)					
Quasi-Peak					
0.380	9.740	31.430	41.170	-18.259	59.429
0.545	9.744	16.960	26.704	-29.296	56.000
0.740	9.757	16.800	26.557	-29.443	56.000
1.396	9.748	15.660	25.408	-30.592	56.000
5.224	9.931	9.020	18.951	-41.049	60.000
25.228	10.089	16.700	26.789	-33.211	60.000
Average					
0.380	9.740	8.490	18.230	-31.199	49.429
0.545	9.744	-1.880	7.864	-38.136	46.000
0.740	9.757	-1.980	7.777	-38.223	46.000
1.396	9.748	-2.560	7.188	-38.812	46.000
5.224	9.931	-4.360	5.571	-44.429	50.000
25.228	10.089	15.220	25.309	-24.691	50.000

Note:

1. All Reading Levels are Quasi-Peak and average value.
2. "■" means the worst emission level.
3. Measurement Level = Reading Level + Correct Factor

Product : Transmitter box
 Test Item : Conducted Emission Test
 Power Line : Line (-)
 Test Date : 2017/06/30
 Test Mode : Mode 1: Transmit

Frequency MHz	Correct Factor dB	Reading Level dBuV	Measurement Level dBuV	Margin dB	Limit dBuV
Line (-)					
Quasi-Peak					
0.377	9.763	23.630	33.393	-26.121	59.514
0.814	9.851	9.770	19.621	-36.379	56.000
1.560	9.839	4.330	14.169	-41.831	56.000
1.744	9.822	8.340	18.162	-37.838	56.000
5.775	9.999	7.380	17.379	-42.621	60.000
25.228	10.269	15.750	26.019	-33.981	60.000
Average					
0.377	9.763	3.710	13.473	-36.041	49.514
0.814	9.851	-3.820	6.031	-39.969	46.000
1.560	9.839	-5.700	4.139	-41.861	46.000
1.744	9.822	-4.670	5.152	-40.848	46.000
5.775	9.999	-3.970	6.029	-43.971	50.000
25.228	10.269	14.430	24.699	-25.301	50.000

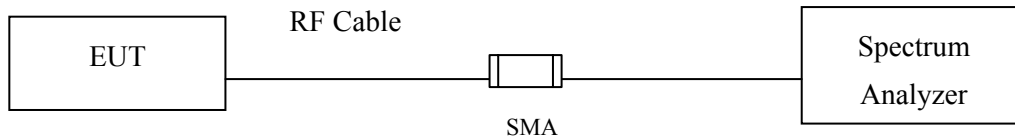
Note:

1. All Reading Levels are Quasi-Peak and average value.
2. "█" means the worst emission level.
3. Measurement Level = Reading Level + Correct Factor

3. Peak Power Output

3.1. Test Setup

Conducted Measurement



3.2. Limits

The maximum peak power shall be less 1 Watt.

3.3. Test Procedure

The EUT was tested according to DTS test procedure of KDB 558074 for compliance to FCC 47CFR 15.247 requirements. The maximum peak conducted output power using KDB 558074 D01 DTS Meas Guidance v04 section 9.1.3 PKPM1 Peak power meter method.

3.4. Uncertainty

± 1.19 dB

3.5. Test Result of Peak Power Output

Product : Transmitter box
Test Item : Peak Power Output Data
Test Site : No.3 OATS
Test Date : 2017/06/30
Test Mode : Mode 1: Transmit

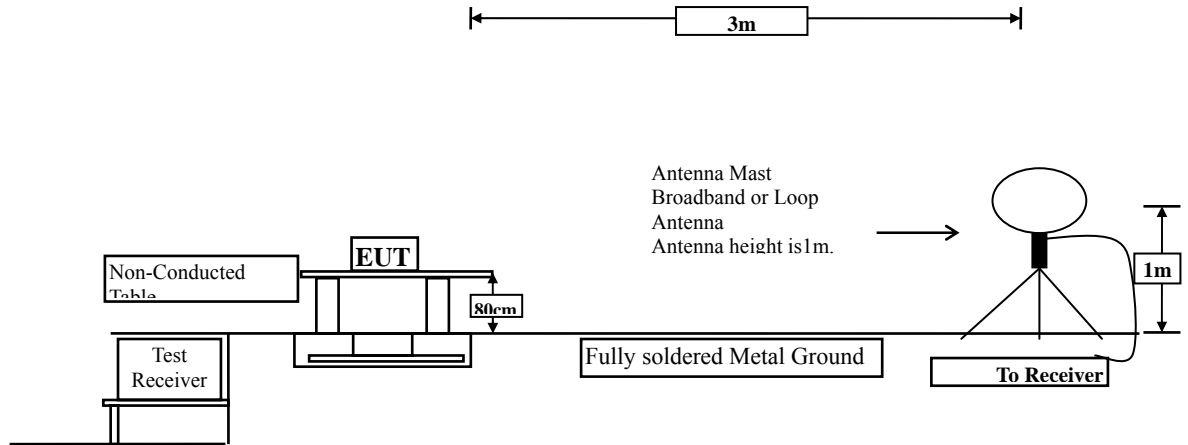
Channel No.	Frequency (MHz)	Measurement Level (dBm)	Required Limit (dBm)	Result
00	2403	10.98	<30dBm	Pass
12	2439	10.98	<30dBm	Pass
25	2478	10.89	<30dBm	Pass

Note: Peak Power Output Value = Reading value on power meter + cable loss

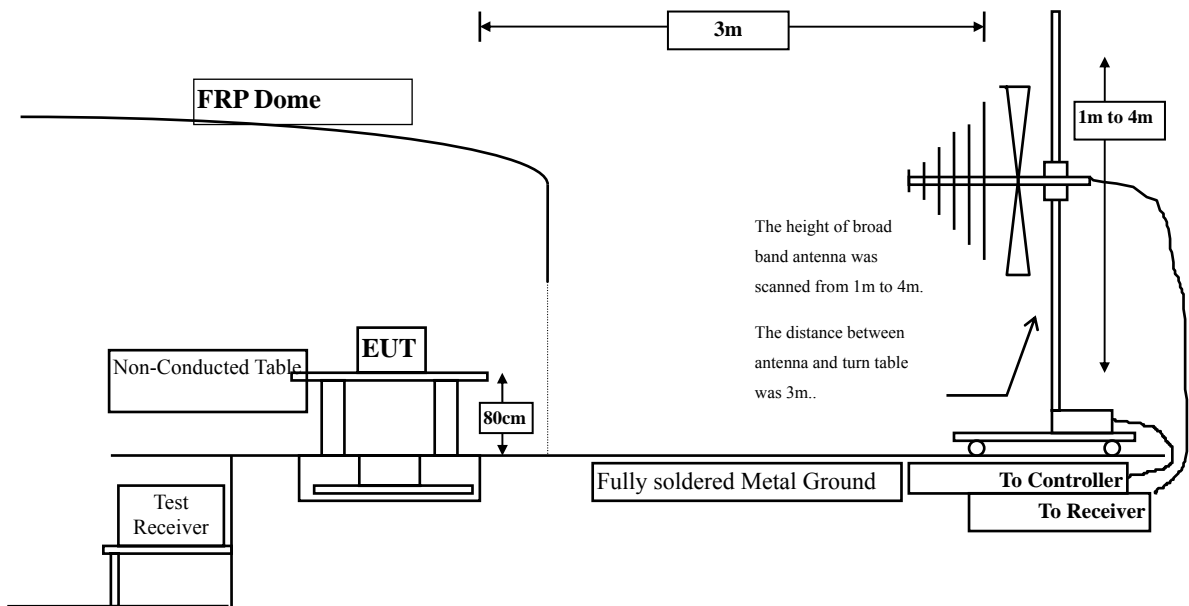
4. Radiated Emission

4.1. Test Setup

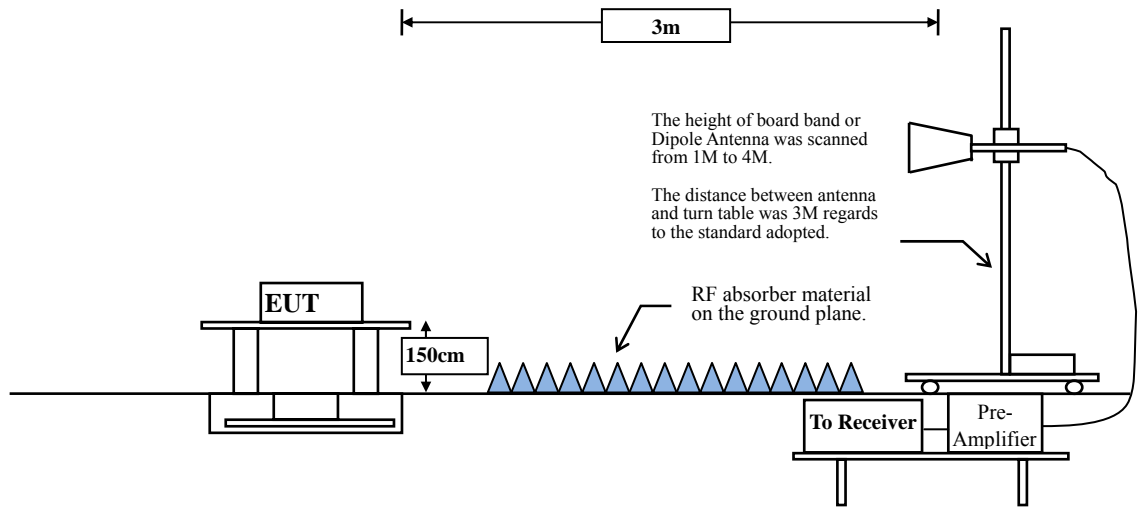
Radiated Emission Under 30MHz



Radiated Emission Below 1GHz



Radiated Emission Above 1GHz



4.2. Limits

Emissions radiated outside of the specified frequency bands, except for harmonics, shall be attenuated by at least 20dB below the level of the fundamental or to the general radiated emission limits in paragraph 15.209, whichever is the lesser attenuation.

FCC Part 15 Subpart C Paragraph 15.209(a) Limits		
Frequency MHz	uV/m @3m	dBuV/m@3m
30-88	100	40
88-216	150	43.5
216-960	200	46
Above 960	500	54

Remarks: E field strength (dBuV/m) = 20 log E field strength (uV/m)

4.3. Test Procedure

The EUT was setup according to ANSI C63.10: 2013 and tested according to DTS test procedure of KDB558074 for compliance to FCC 47CFR 15.247 requirements.

Measuring the frequency range below 1GHz, the EUT is placed on a turn table which is 0.8 meter above ground, when measuring the frequency range above 1GHz, the EUT is placed on a turn table which is 1.5 meter above ground.

The turn table is rotated 360 degrees to determine the position of the maximum emission level.

The EUT was positioned such that the distance from antenna to the EUT was 3 meters.

The antenna is scanned between 1 meter and 4 meters to find out the maximum emission level. This is repeated for both horizontal and vertical polarization of the antenna. In order to find the maximum emission, all of the interface cables were manipulated according to ANSI C63.10: 2013 on radiated measurement.

The resolution bandwidth below 30MHz setting on the field strength meter is 9kHz and 30MHz~1GHz is 120kHz and above 1GHz is 1MHz.

Radiated emission measurements below 30MHz are made using Loop Antenna and 30MHz~1GHz are made using broadband Bilog antenna and above 1GHz are made using Horn Antennas.

The measurement is divided into the Preliminary Measurement and the Final Measurement.

The suspected frequencies are searched for in Preliminary Measurement with the measurement antenna kept pointed at the source of the emission both in azimuth and elevation, with the polarization of the antenna oriented for maximum response. The antenna is pointed at an angle towards the source of the emission, and the EUT is rotated in both height and polarization to maximize the measured emission. The emission is kept within the illumination area of the 3 dB bandwidth of the antenna.

The worst radiated emission is measured in the Open Area Test Site on the Final Measurement.

The measurement frequency range from 9kHz - 10th Harmonic of fundamental was investigated.

4.4. Uncertainty

± 4.08 dB above 1GHz

± 4.22 dB below 1GHz

4.5. Test Result of Radiated Emission

Product : Transmitter box
 Test Item : Harmonic Radiated Emission Data
 Test Site : No.3 OATS
 Test Date : 2017/06/29
 Test Mode : Mode 1: Transmit (2403MHz)

Frequency MHz	Correct Factor dB	Reading Level dBuV	Measurement Level dBuV/m	Margin dB	Limit dBuV/m
Horizontal					
Peak Detector:					
4806.000	2.528	54.790	57.318	-16.682	74.000
7209.000	9.477	46.470	55.948	-18.052	74.000
9612.000	10.357	38.970	49.327	-24.673	74.000
Average Detector:					
4806.000	2.528	42.290	44.818	-9.182	54.000
7209.000	9.477	25.940	35.418	-18.582	54.000
Vertical					
Peak Detector:					
4806.000	2.931	54.890	57.821	-16.179	74.000
7209.000	9.957	45.360	55.317	-18.683	74.000
9612.000	10.818	39.620	50.438	-23.562	74.000
Average Detector:					
4806.000	2.931	44.570	47.501	-6.499	54.000
7209.000	9.957	32.730	42.687	-11.313	54.000

Note:

- All Readings below 1GHz are Quasi-Peak, above 1GHz are performed with peak and/or average measurements as necessary.
- Peak measurements: RBW = 1MHz, VBW = 3 MHz, Sweep: Auto.
- Average measurements: RBW = 1MHz, VBW = 10 Hz, Sweep: Auto.
- Measurement Level = Reading Level + Correct Factor.
- Correct Factor = Antenna factor + Cable loss – Amplifier gain.
- The average measurement was not performed when the peak measured data under the limit of average detection.
- The emission levels of other frequencies are very lower than the limit and not show in test report.

Product : Transmitter box
 Test Item : Harmonic Radiated Emission Data
 Test Site : No.3 OATS
 Test Date : 2017/06/29
 Test Mode : Mode 1: Transmit (2439MHz)

Frequency MHz	Correct Factor dB	Reading Level dBuV	Measurement Level dBuV/m	Margin dB	Limit dBuV/m
Horizontal					
Peak Detector:					
4878.000	2.052	54.300	56.351	-17.649	74.000
7317.000	9.637	46.160	55.797	-18.203	74.000
9756.000	9.649	38.260	47.909	-26.091	74.000
Average Detector:					
4878.000	2.052	44.340	46.391	-7.609	54.000
7317.000	9.637	34.730	44.367	-9.633	54.000
Vertical					
Peak Detector:					
4878.000	2.511	54.050	56.560	-17.440	74.000
7317.000	10.232	49.070	59.302	-14.698	74.000
9756.000	10.285	40.320	50.604	-23.396	74.000
Average Detector:					
4878.000	2.511	43.660	46.170	-7.830	54.000
7317.000	10.232	34.370	44.602	-9.398	54.000

Note:

1. All Readings below 1GHz are Quasi-Peak, above 1GHz are performed with peak and/or average measurements as necessary.
2. Peak measurements: RBW = 1MHz, VBW = 3 MHz, Sweep: Auto.
3. Average measurements: RBW = 1MHz, VBW = 10 Hz, Sweep: Auto.
4. Measurement Level = Reading Level + Correct Factor.
5. Correct Factor = Antenna factor + Cable loss – Amplifier gain.
6. The average measurement was not performed when the peak measured data under the limit of average detection.
7. The emission levels of other frequencies are very lower than the limit and not show in test report.

Product : Transmitter box
 Test Item : Harmonic Radiated Emission Data
 Test Site : No.3 OATS
 Test Date : 2017/06/29
 Test Mode : Mode 1: Transmit (2478MHz)

Frequency MHz	Correct Factor dB	Reading Level dBuV	Measurement Level dBuV/m	Margin dB	Limit dBuV/m
Horizontal					
Peak Detector:					
4956.000	2.542	53.610	56.153	-17.847	74.000
7434.000	10.531	43.610	54.142	-19.858	74.000
9912.000	42.011	38.780	48.973	-25.027	74.000
Average Detector:					
4956.000	2.542	42.620	45.163	-8.837	54.000
7434.000	10.531	30.750	41.282	-12.718	54.000
Vertical					
Peak Detector:					
4956.000	3.336	53.510	56.847	-17.153	74.000
7434.000	11.219	43.560	54.779	-19.221	74.000
9912.000	11.241	40.850	52.091	-21.909	74.000
Average Detector:					
4956.000	3.336	43.120	46.457	-7.543	54.000
7434.000	11.219	35.030	46.249	-7.751	54.000

Note:

1. All Readings below 1GHz are Quasi-Peak, above 1GHz are performed with peak and/or average measurements as necessary.
2. Peak measurements: RBW = 1MHz, VBW = 3 MHz, Sweep: Auto.
3. Average measurements: RBW = 1MHz, VBW = 10 Hz, Sweep: Auto.
4. Measurement Level = Reading Level + Correct Factor.
5. Correct Factor = Antenna factor + Cable loss – Amplifier gain.
6. The average measurement was not performed when the peak measured data under the limit of average detection.
7. The emission levels of other frequencies are very lower than the limit and not show in test report.

Product : Transmitter box
 Test Item : General Radiated Emission Data
 Test Site : No.3 OATS
 Test Date : 2017/06/29
 Test Mode : Mode 1: Transmit (2441MHz)

Frequency MHz	Correct Factor dB	Reading Level dBuV	Measurement Level dBuV/m	Margin dB	Limit dBuV/m
Horizontal					
94.667	4.355	29.340	33.694	-9.806	43.500
215.565	4.724	28.214	32.937	-10.563	43.500
287.261	4.985	29.048	34.033	-11.967	46.000
384.261	5.255	28.346	33.601	-12.399	46.000
503.754	5.602	26.364	31.966	-14.034	46.000
810.217	6.534	29.715	36.249	-9.751	46.000
Vertical					
115.754	6.241	29.805	36.046	-7.454	43.500
326.623	6.969	27.457	34.426	-11.574	46.000
408.159	7.182	28.407	35.589	-10.411	46.000
467.203	7.367	27.570	34.937	-11.063	46.000
720.246	8.062	27.361	35.423	-10.577	46.000
810.217	8.395	28.904	37.299	-8.701	46.000

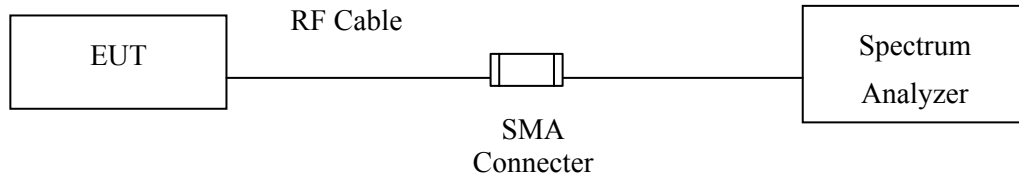
Note:

1. All Readings below 1GHz are Quasi-Peak, above 1GHz are performed with peak and/or average measurements as necessary.
2. Peak measurements: RBW = 1MHz, VBW = 3 MHz, Sweep: Auto.
3. Average measurements: RBW = 1MHz, VBW = 10 Hz, Sweep: Auto.
4. Measurement Level = Reading Level + Correct Factor.
5. Correct Factor = Antenna factor + Cable loss – Amplifier gain.
6. The average measurement was not performed when the peak measured data under the limit of average detection.
7. The emission levels of other frequencies are very lower than the limit and not show in test report.

5. RF antenna conducted test

5.1. Test Setup

RF antenna Conducted Measurement:



5.2. Limits

In any 100 kHz bandwidth outside the frequency band in which the spread spectrum 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 the 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)).

5.3. Test Procedure

The EUT was tested according to DTS test procedure of Jan. 2012 KDB558074 for compliance to FCC 47CFR 15.247 requirements.

Set RBW = 100 kHz, Set VBW > RBW, scan up through 10th harmonic.

5.4. Uncertainty

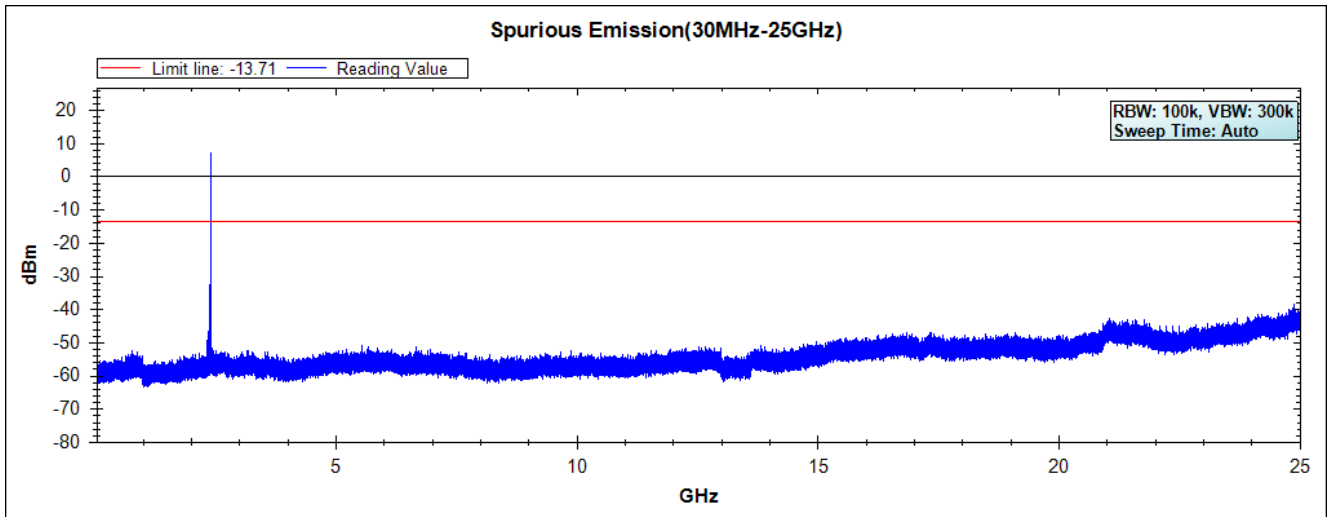
The measurement uncertainty

Conducted is defined as $\pm 1.20\text{dB}$

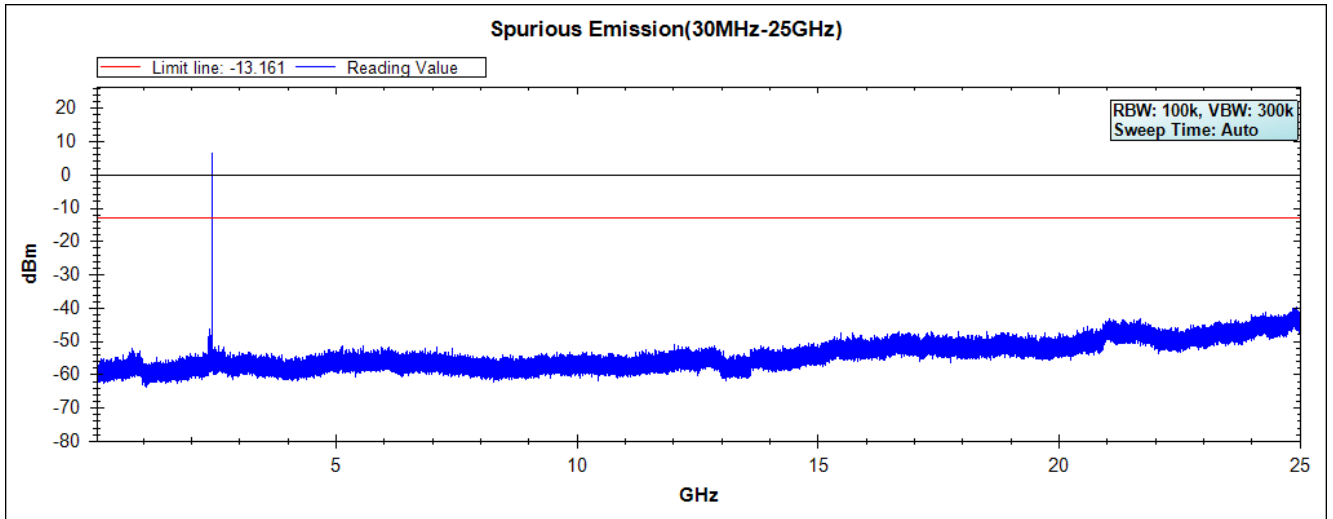
5.5. Test Result of RF antenna conducted test

Product : Transmitter box
Test Item : RF antenna conducted test
Test Site : No.3 OATS
Test Date : 2017/06/29
Test Mode : Mode 1: Transmit

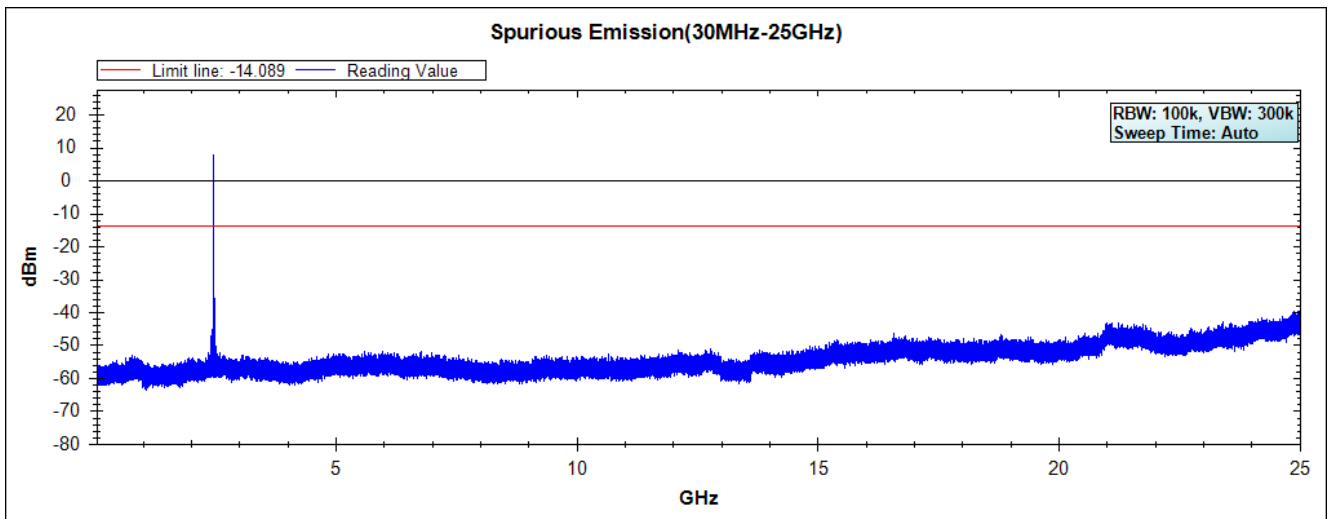
Channel 00 (2403MHz) 30M-25GHz



Channel 12 (2439MHz) 30M-25GHz



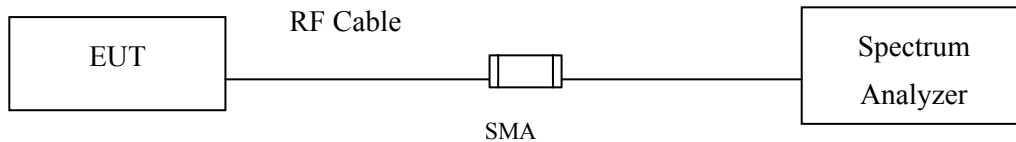
Channel 25 (2478MHz) 30M-25GHz



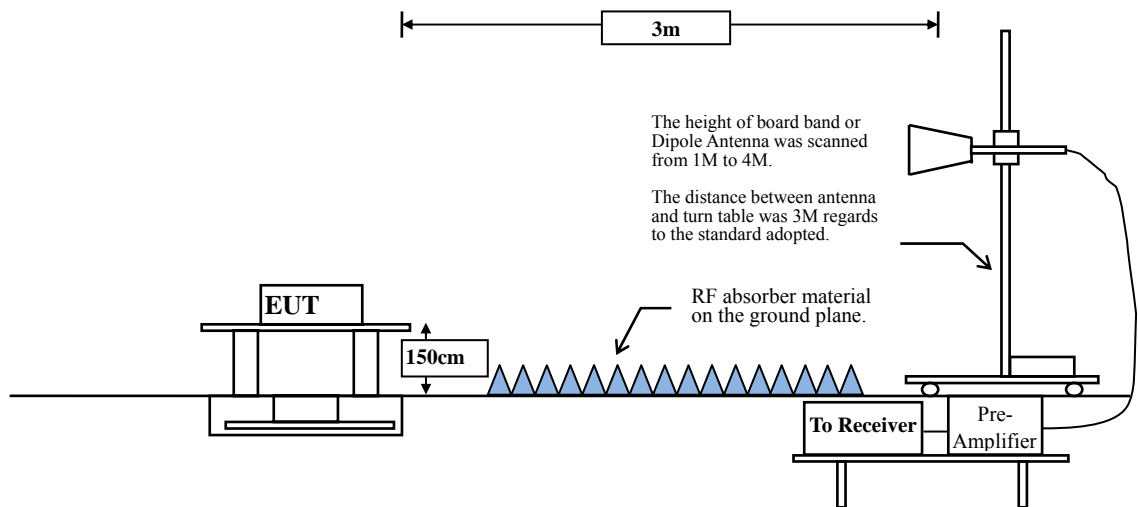
6. Band Edge

6.1. Test Setup

RF Conducted Measurement



RF Radiated Measurement:



6.2. Limits

Emissions radiated outside of the specified frequency bands, except for harmonics, shall be attenuated by at least 20dB below the level of the fundamental or to the general radiated emission limits in paragraph 15.209, whichever is the lesser attenuation.

6.3. Test Procedure

The EUT was setup according to ANSI C63.10, 2013 and tested according to DTS test procedure of KDB558074 for compliance to FCC 47CFR 15.247 requirements.

The EUT is placed on a turn table which is 1.5 meter above ground. The turn table is rotated 360 degrees to determine the position of the maximum emission level. The EUT was positioned such that the distance from antenna to the EUT was 3 meters.

The antenna is scanned from 1 meter to 4 meters to find out the maximum emission level. This is repeated for both horizontal and vertical polarization of the antenna. In order to find the maximum emission, all of the interface cables were manipulated according to ANSI C63.10:2013 on radiated measurement.

6.4. Uncertainty

± 4.08 dB above 1GHz

± 4.22 dB below 1GHz

6.5. Test Result of Band Edge

Product : Transmitter box
 Test Item : Band Edge Data
 Test Site : No.3 OATS
 Test Date : 2017/06/29
 Test Mode : Mode 1: Transmit (2403MHz)

RF Radiated Measurement (Horizontal):

Channel No.	Frequency (MHz)	Correct Factor (dB)	Reading Level (dBμV)	Emission Level (dBμV/m)	Peak Limit (dBμV/m)	Average Limit (dBμV/m)	Result
00 (Peak)	2390.000	-2.687	55.523	52.836	74.00	54.00	Pass
00 (Peak)	2400.000	-2.660	76.651	73.991	--	--	--
00 (Peak)	2402.464	-2.657	96.993	94.336	--	--	--
00 (Average)	2355.072	-2.824	34.213	31.389	74.00	54.00	Pass
00 (Average)	2379.130	-2.735	31.176	28.441	74.00	54.00	Pass
00 (Average)	2390.000	-2.687	27.252	24.565	74.00	54.00	Pass
00 (Average)	2400.000	-2.660	44.563	41.903	--	--	--
00 (Average)	2403.043	-2.655	79.041	76.385	--	--	--

Figure Channel 00: Horizontal (Peak)

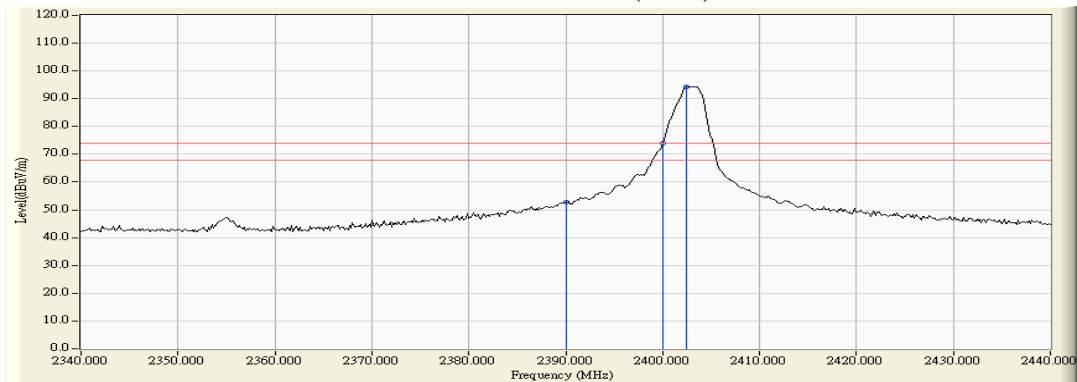
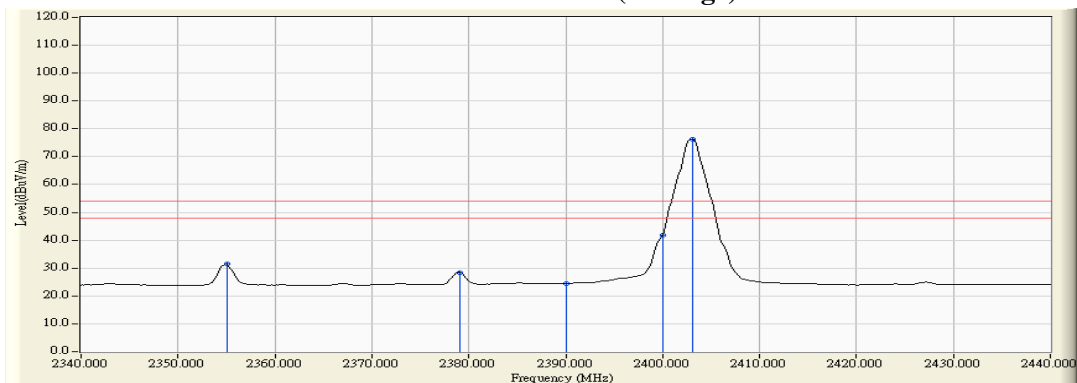


Figure Channel 00: Horizontal (Average)



Note:

1. All readings above 1GHz are performed with peak and/or average measurements as necessary.
2. Peak measurements: RBW = 1MHz, VBW = 3 MHz, Sweep: Auto.
3. Average measurements: RBW = 1MHz, VBW = 10 Hz, Sweep: Auto.
4. “ * ”, means this data is the worst emission level.
5. Measurement Level = Reading Level + Correct Factor.
6. The average measurement was not performed when the peak measured data under the limit of average detection.

Product : Transmitter box
 Test Item : Band Edge Data
 Test Site : No.3 OATS
 Test Date : 2017/06/29
 Test Mode : Mode 1: Transmit (2403MHz)

RF Radiated Measurement (Vertical):

Channel No.	Frequency (MHz)	Correct Factor (dB)	Reading Level (dBμV)	Emission Level (dBμV/m)	Peak Limit (dBμV/m)	Average Limit (dBμV/m)	Result
00 (Peak)	2389.565	-4.157	54.912	50.755	74.00	54.00	Pass
00 (Peak)	2390.000	-4.159	54.604	50.445	74.00	54.00	Pass
00 (Peak)	2400.000	-4.171	76.982	72.811	--	--	--
00 (Peak)	2403.478	-4.170	97.584	93.414	--	--	--
00 (Average)	2354.638	-4.020	33.332	29.312	74.00	54.00	Pass
00 (Average)	2378.841	-4.122	30.638	26.516	74.00	54.00	Pass
00 (Average)	2390.000	-4.159	27.122	22.963	74.00	54.00	Pass
00 (Average)	2400.000	-4.171	44.828	40.657	--	--	--
00 (Average)	2403.043	-4.170	79.577	75.406	--	--	--

Figure Channel 00: Vertical (Peak)

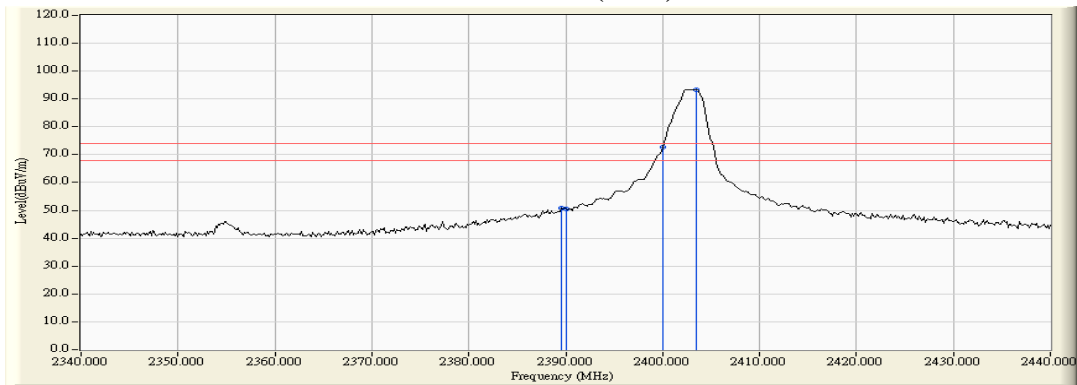
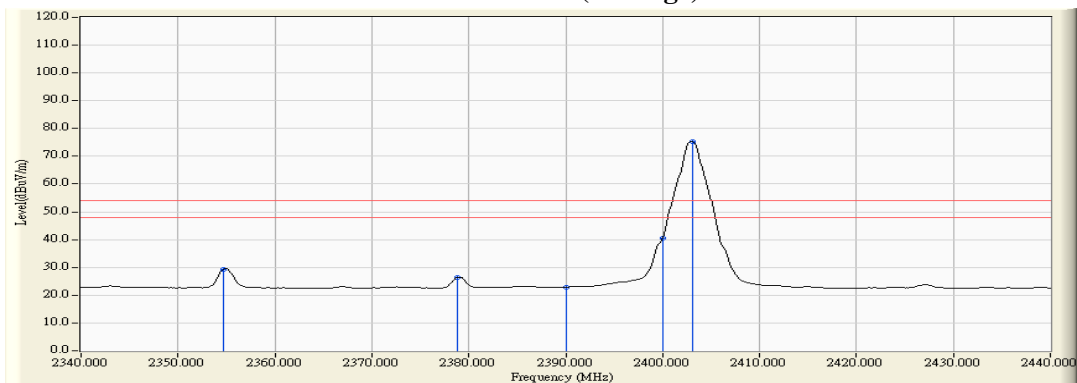


Figure Channel 00: Vertical (Average)



Note:

1. All readings above 1GHz are performed with peak and/or average measurements as necessary.
2. Peak measurements: RBW = 1MHz, VBW = 3 MHz, Sweep: Auto.
3. Average measurements: RBW = 1MHz, VBW = 10 Hz, Sweep: Auto.
4. “ * ”, means this data is the worst emission level.
5. Measurement Level = Reading Level + Correct Factor.
6. The average measurement was not performed when the peak measured data under the limit of average detection.

Product : Transmitter box
 Test Item : Band Edge Data
 Test Site : No.3 OATS
 Test Date : 2017/06/29
 Test Mode : Mode 1: Transmit (2478MHz)

RF Radiated Measurement (Horizontal):

Channel No.	Frequency (MHz)	Correct Factor (dB)	Reading Level (dBμV)	Emission Level (dBμV/m)	Peak Limit (dBμV/m)	Average Limit (dBμV/m)	Result
25 (Peak)	2477.558	-2.608	99.419	96.812	--	--	--
25 (Peak)	2483.500	-2.601	65.356	62.754	74.00	54.00	Pass
25 (Average)	2477.993	-2.607	81.279	78.672	--	--	--
25 (Average)	2483.500	-2.601	29.996	27.394	74.00	54.00	Pass

Figure Channel 25: Horizontal (Peak)

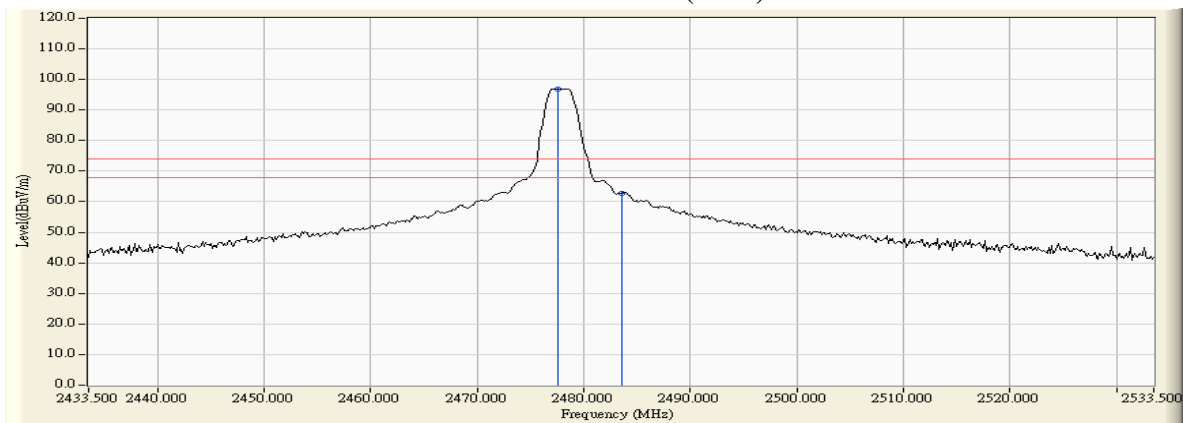
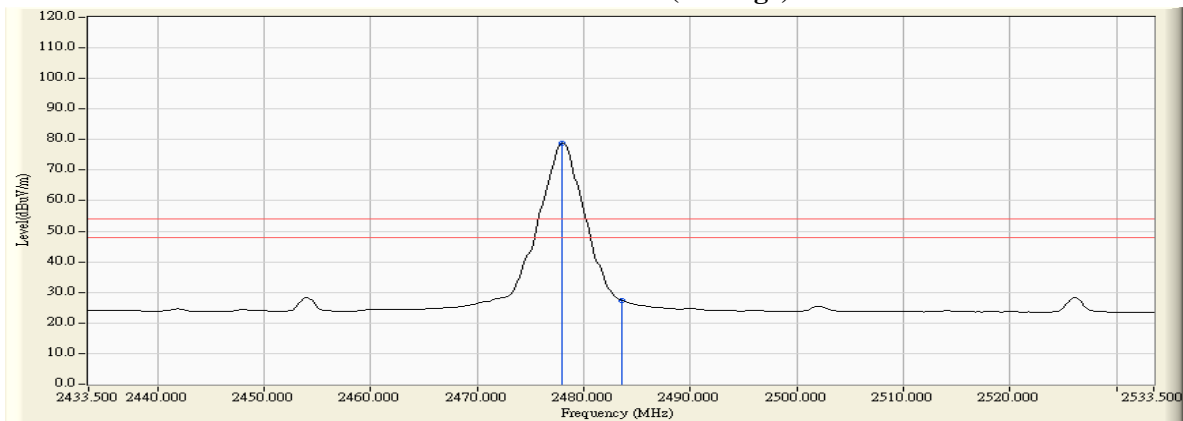


Figure Channel 25: Horizontal (Average)



Note:

1. All readings above 1GHz are performed with peak and/or average measurements as necessary.
2. Peak measurements: RBW = 1MHz, VBW = 3 MHz, Sweep: Auto.
3. Average measurements: RBW = 1MHz, VBW = 10 Hz, Sweep: Auto.
4. “ * ”, means this data is the worst emission level.
5. Measurement Level = Reading Level + Correct Factor.
6. The average measurement was not performed when the peak measured data under the limit of average detection.

Product : Transmitter box
 Test Item : Band Edge Data
 Test Site : No.3 OATS
 Test Date : 2017/06/29
 Test Mode : Mode 1: Transmit (2478MHz)

RF Radiated Measurement (Vertical):

Channel No.	Frequency (MHz)	Correct Factor (dB)	Reading Level (dBμV)	Emission Level (dBμV/m)	Peak Limit (dBμV/m)	Average Limit (dBμV/m)	Result
25 (Peak)	2478.427	-3.983	100.036	96.053	--	--	--
25 (Peak)	2483.500	-3.966	66.424	62.457	74.00	54.00	Pass
25 (Average)	2477.993	-3.984	81.772	77.788	--	--	--
25 (Average)	2483.500	-3.966	30.454	26.487	74.00	54.00	Pass

Figure Channel 25: Vertical (Peak)

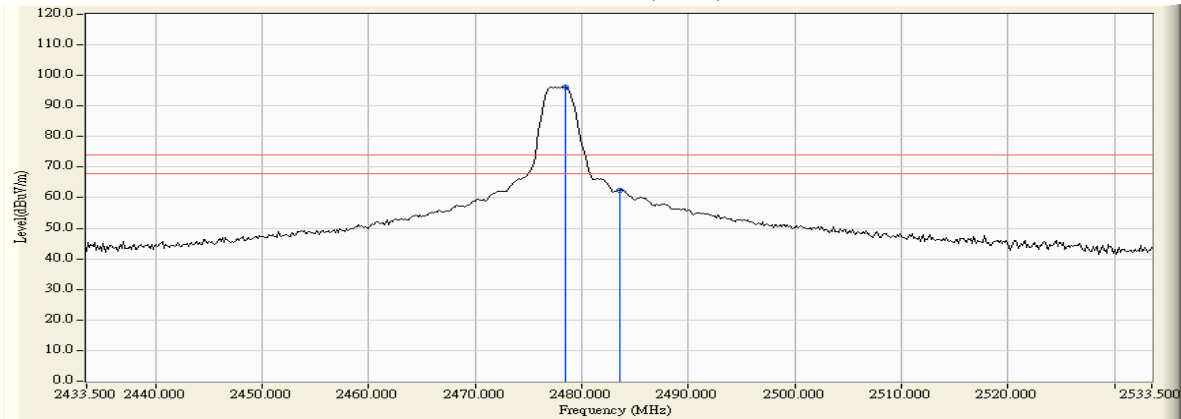
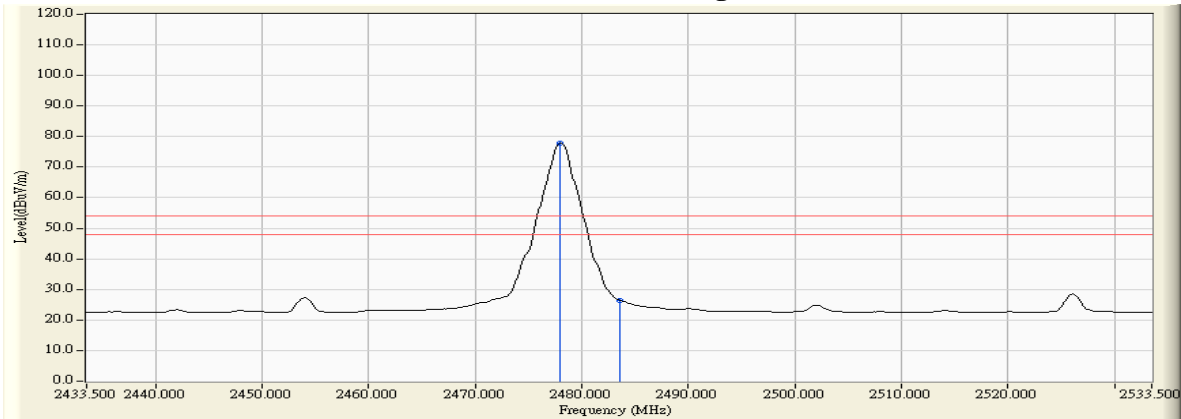


Figure Channel 25: Vertical (Average)

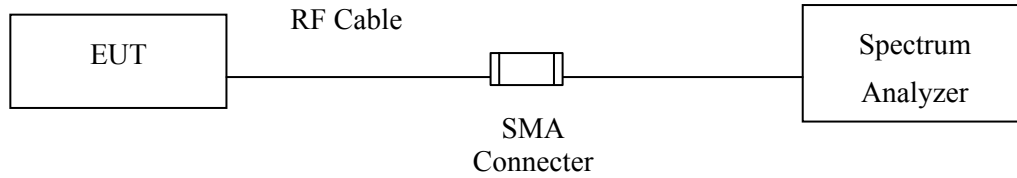


Note:

1. All readings above 1GHz are performed with peak and/or average measurements as necessary.
2. Peak measurements: RBW = 1MHz, VBW = 3 MHz, Sweep: Auto.
3. Average measurements: RBW = 1MHz, VBW = 10 Hz, Sweep: Auto.
4. “ * ”, means this data is the worst emission level.
5. Measurement Level = Reading Level + Correct Factor.
6. The average measurement was not performed when the peak measured data under the limit of average detection.

7. 6dB Bandwidth

7.1. Test Setup



7.2. Limits

The minimum bandwidth shall be at least 500 kHz.

7.3. Test Procedure

The EUT was setup according to ANSI C63.4, 2014; tested according to DTS test procedure of KDB558074 for compliance to FCC 47CFR 15.247 requirements.

7.4. Uncertainty

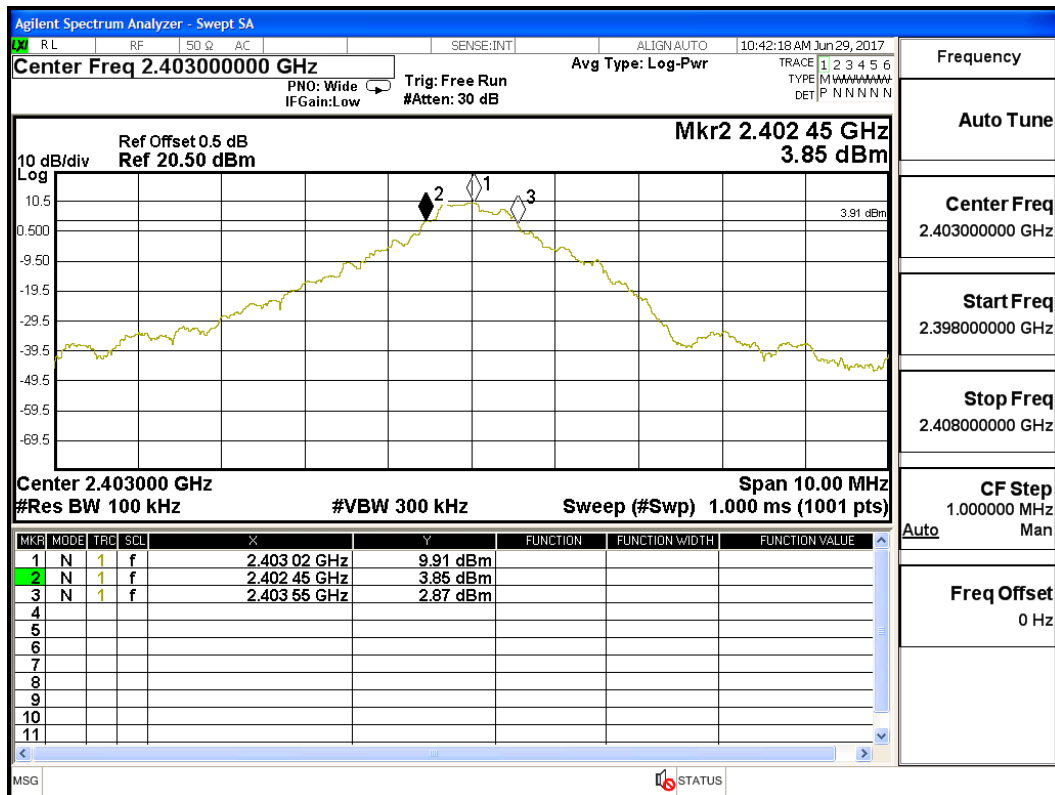
$\pm 283\text{Hz}$

7.5. Test Result of 6dB Bandwidth

Product : Transmitter box
 Test Item : 6dB Bandwidth Data
 Test Site : No.3 OATS
 Test Date : 2017/06/29
 Test Mode : Mode 1: Transmit (2403MHz)

Channel No.	Frequency (MHz)	Measurement Level (kHz)	Required Limit (kHz)	Result
00	2403.00	1100	>500	Pass

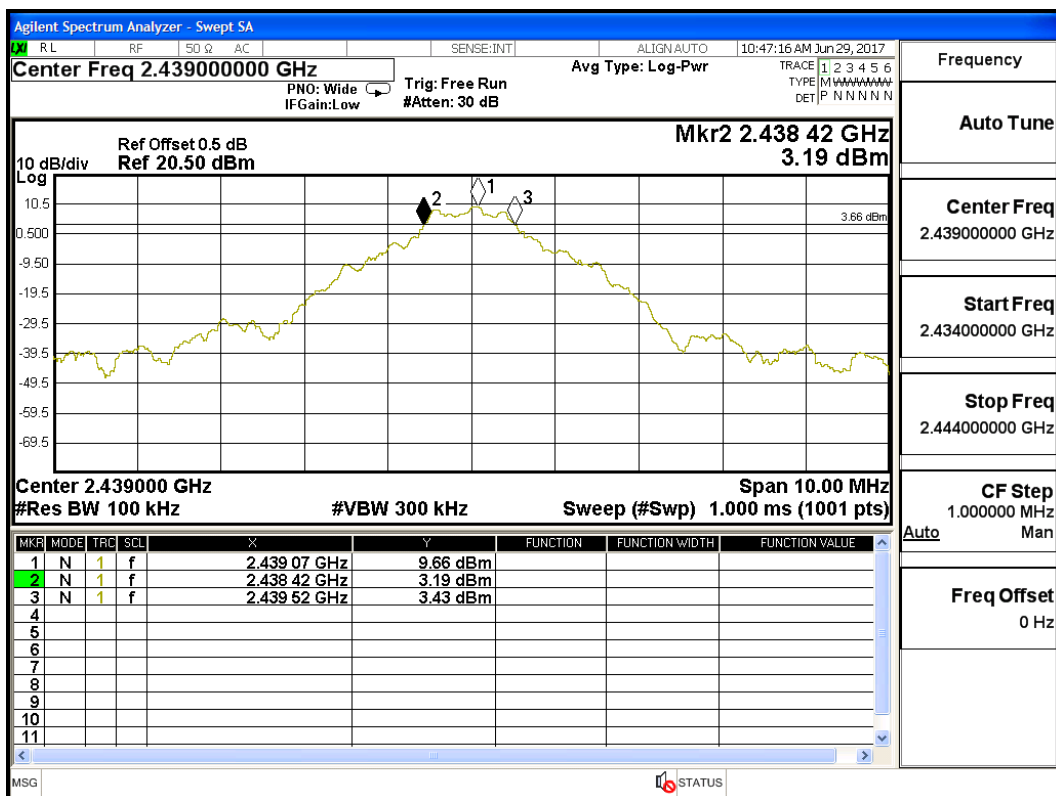
Figure Channel 00:



Product : Transmitter box
 Test Item : 6dB Bandwidth Data
 Test Site : No.3 OATS
 Test Date : 2017/06/29
 Test Mode : Mode 1: Transmit (2439MHz)

Channel No.	Frequency (MHz)	Measurement Level (kHz)	Required Limit (kHz)	Result
12	2439.00	1100	>500	Pass

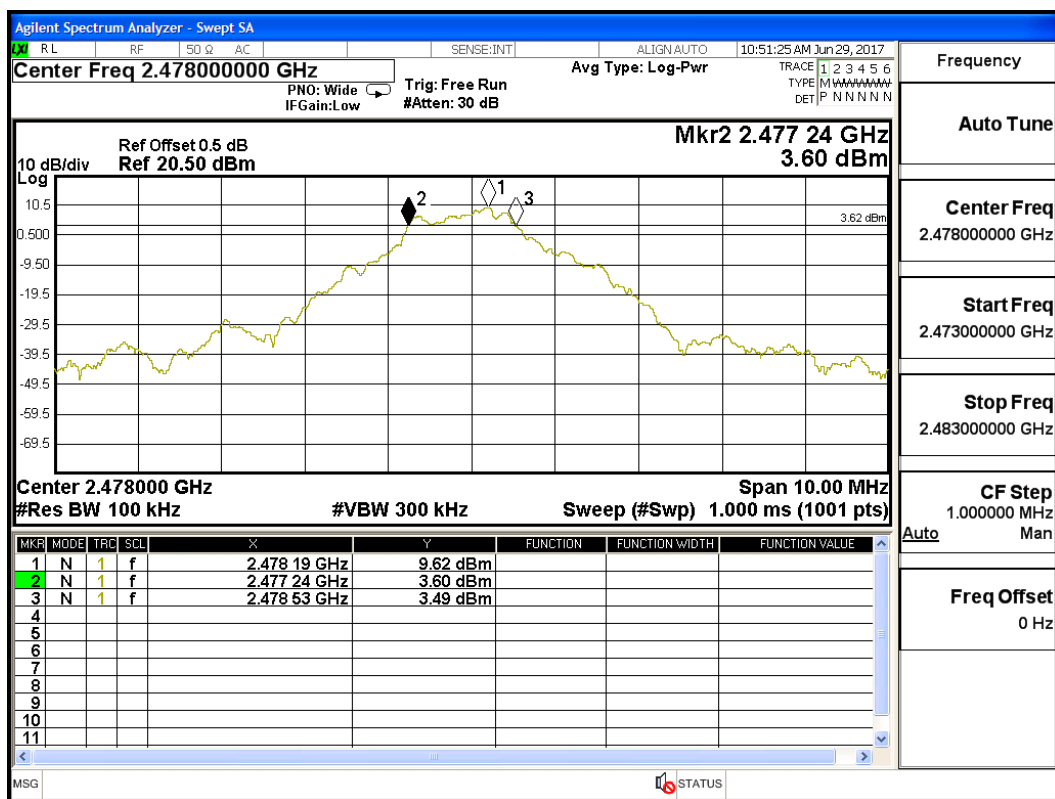
Figure Channel 12:



Product : Transmitter box
 Test Item : 6dB Bandwidth Data
 Test Site : No.3 OATS
 Test Mode : Mode 1: Transmit (2478MHz)

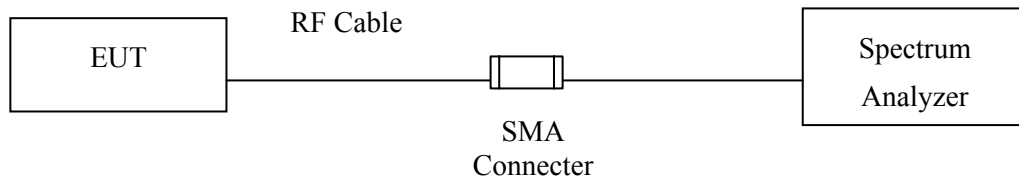
Channel No.	Frequency (MHz)	Measurement Level (kHz)	Required Limit (kHz)	Result
25	2478.00	1290	>500	Pass

Figure Channel 25:



8. Power Density

8.1. Test Setup



8.2. Limits

The transmitted power density averaged over any 1 second interval shall not be greater +8dBm in any 3kHz bandwidth.

8.3. Test Procedure

The EUT was setup according to ANSI C63.10, 2013; tested according to DTS test procedure of KDB 558074 for compliance to FCC 47CFR 15.247 requirements.

The maximum power spectral density using KDB 558074 section 10.2 PKPSD (peak PSD) method.

8.4. Uncertainty

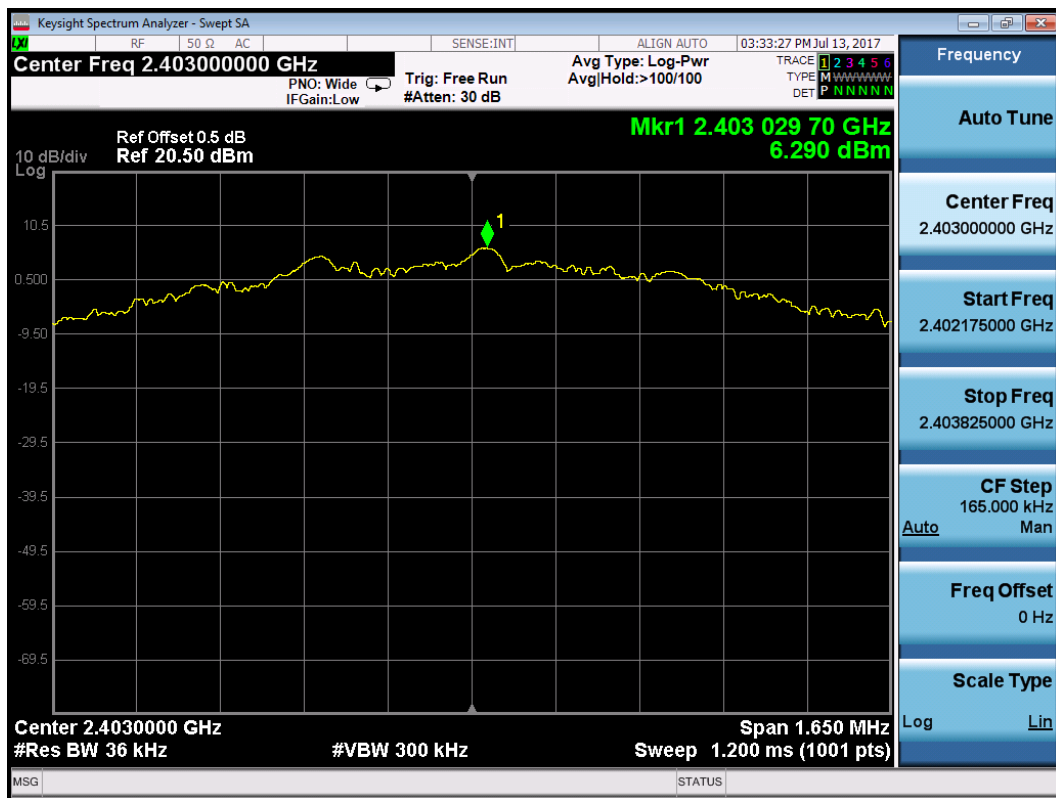
± 1.20 dB

8.5. Test Result of Power Density

Product : Transmitter box
 Test Item : Power Density Data
 Test Site : No.3 OATS
 Test Date : 2017/06/29
 Test Mode : Mode 1: Transmit(2403MHz)

Channel No.	Frequency (MHz)	Measure Level (dBm)	Limit (dBm)	Result
00	2403.00	6.290	≤ 8dBm	Pass

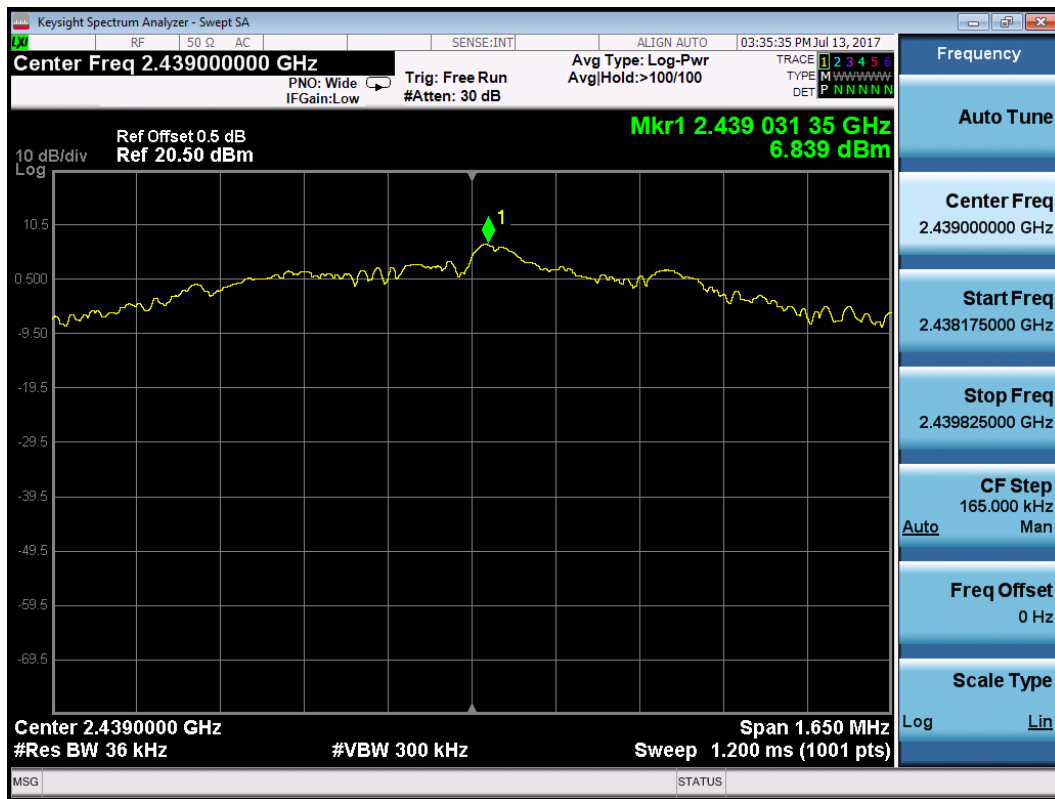
Figure Channel 00:



Product : Transmitter box
 Test Item : Power Density Data
 Test Site : No.3OATS
 Test Date : 2017/06/29
 Test Mode : Mode 1: Transmit (2439MHz)

Channel No.	Frequency (MHz)	Measurement Level (dBm)	Required Limit (dBm)	Result
12	2439	6.839	≤ 8dBm	Pass

Figure Channel 12:



Product : Transmitter box
 Test Item : Power Density Data
 Test Site : No.3 OATS
 Test Date : 2017/06/29
 Test Mode : Mode 1: Transmit (2478MHz)

Channel No.	Frequency (MHz)	Measurement Level (dBm)	Required Limit (dBm)	Result
25	2478.00	5.911	≤ 8dBm	Pass

Figure Channel 25:



9. EMI Reduction Method During Compliance Testing

No modification was made during testing.

Attachment 1: EUT Test Photographs

Attachment 2: EUT Detailed Photographs