FCC Test Report

Product Name	Wireless Receiver
Model No.	ENY-P1U02W
FCC ID.	2AJ8N-ENY-P1U02W

Applicant	Quantum Inc.
Address	1-13-10 Shibaura, Minato-ku, Tokyo 105-0023, Japan

Date of Receipt	May 17, 2017
Issued Date	July 04, 2017
Report No.	1750427R-RFUSP23V00
Report Version	V1.0

Testing Laboratory
3023

Test Report

Issued Date: July 04, 2017
Report No.: 1750427R-RFUSP23V00

Product Name	Wireless Receiver
Applicant	Quantum Inc.
Address	1-13-10 Shibaura, Minato-ku, Tokyo 105-0023, Japan
Manufacturer	Panasonic Corporation
Model No.	ENY-P1U02W
FCC ID.	2AJ8N-ENY-P1U02W
EUT Rated Voltage	DC 5V (Power by USB)
EUT Test Voltage	DC 5V (Power by USB)
Trade Name	Quantum
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

Documented By : Genie Chang

(Senior Adm. Specialist / Genie Chang)

Tested By : Nick Chen

(Engineer / Nick Chen)

Approved By :

(Director / Vincent Lin)

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1. GENERAL INFORMATION

1.1. EUT Description

Product Name	Wireless Receiver
Trade Name	Quantum
Model No.	ENY-P1U02W
FCC ID.	2AJ8N-ENY-P1U02W
Frequency Range	2402-2478MHz
Channel Number	2
Type of Modulation	GFSK
Antenna Type	inverted F
Channel Control	Auto
Antenna Gain	Refer to the table “Antenna List”

Antenna List

No.	Manufacturer	Part No.	Antenna Type	Peak Gain
1	Taiyo Yuden	AH083F245001-T	inverted F	1.8dBi for 2.4 GHz

Note: The antenna of EUT is conforming to FCC 15.203.

Center Frequency of Each Channel

Channel	Frequency	Channel	Frequency
Channel 01:	2402 MHz	Channel 02:	2478 MHz

Note:

1. The EUT is a Wireless Receiver with a built-in 2.4GHz wireless transceiver.
2. These tests were conducted on a sample for the purpose of demonstrating compliance of 2.4GHz transmitter with Part 15 Subpart C Paragraph 15.247 for spread spectrum devices.
3. The radiation measurements are performed in X, Y, Z axis positioning. Only the worst case is shown in the report.
4. The EUT has two sets of independent chip and antenna. The antenna 0 is transmit and Receive function and the antenna 1 is only Receive function. The antenna 0 is shown in the report.

Test Mode	Mode 1: Transmit

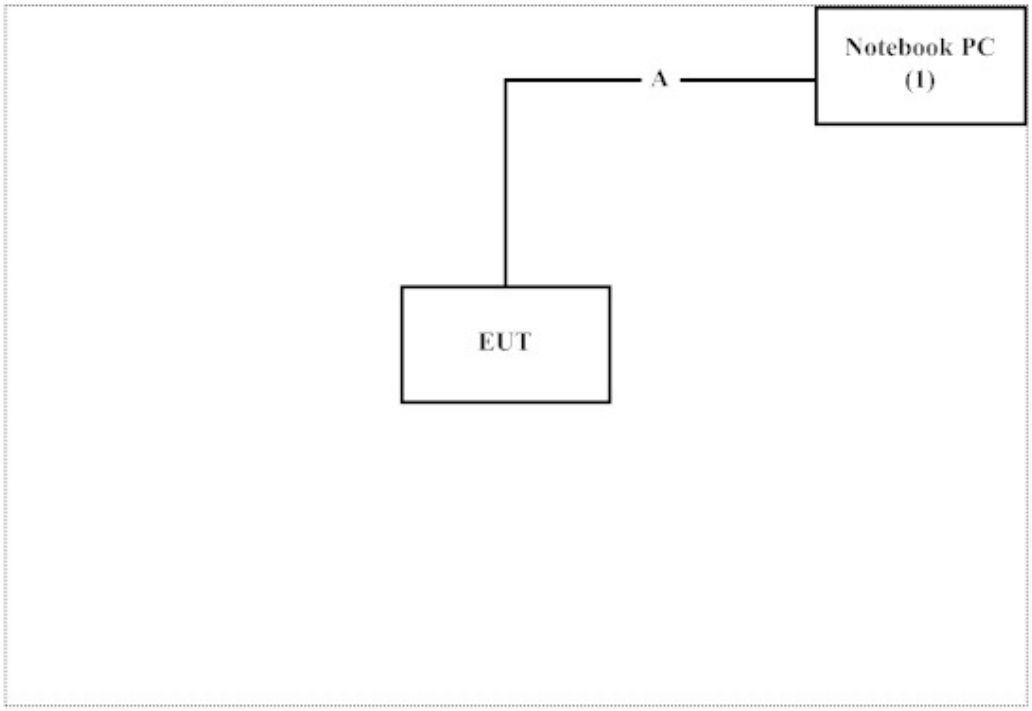
1.3. Tested System Details

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	Notebook PC	DELL	P62G	416FJC2	N/A

Signal Cable Type		Signal cable Description
A	USB Cable	Shielded, 1.8m

1.4. Configuration of Tested System



1.5. EUT Exercise Software

(1) Setup the EUT as shown in Section 1.4.

(2) Execute software “ttempro (ver 4.7.3)” on the Notebook.

(3) Configure the test mode, the test channel, and the data rate.

(4) Press “OK” to start the continuous Transmit.

(5) 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

The related certificate for our laboratories about the test site and management system can be downloaded from DEKRA Testing and Certification Co., Ltd. Web Site:
http://www.dekra.com.tw/english/about/certificates.aspx?bval=5
The address and introduction of DEKRA Testing and Certification Co., Ltd. laboratories can be founded in our Web site: http://www.dekra.com.tw/index_en

Site Description: Accredited by TAF
Accredited Number: 3023

Site Name: DEKRA Testing and Certification Co., Ltd.
Site Address: No.159, Sec. 2, Wenhua 1st Rd., Linkou Dist.,
New Taipei City 24457, Taiwan.
TEL: 886-2-2602-7968 / FAX : 866-2-2602-3286
E-Mail : info.tw@dekra.com

FCC Accreditation Number: TW1014

1.7. List of Test Equipment

For Conduction measurements /ASR1

	Equipment	Manufacturer	Model No.	Serial No.	Cali. Data	Due. Data
X	EMI Test Receiver	R&S	ESR7	161601	2017.01.06	2018.01.05
X	LISN	R&S	ENV216	101306	2017.02.16	2018.02.15
X	LISN	R&S	ENV216	101307	2017.03.17	2018.03.16
X	Coaxial Cable	Quietek	RG400_BNC	RF001	2017.05.24	2018.05.23

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

For Conducted measurements /ASR4

	Equipment	Manufacturer	Model No.	Serial No.	Cali. Data	Due. Data
X	Spectrum Analyzer	R&S	FSV30	103464	2017.01.07	2018.01.08
X	Power Meter	Anritsu	ML2496A	1548003	2016.12.15	2017.12.14
X	Power Sensor	Anritsu	MA2411B	1531024	2016.12.15	2017.12.14
X	Power Sensor	Anritsu	MA2411B	1531025	2016.12.15	2017.12.14
	Bluetooth Tester	R&S	CBT	101238	2017.01.01	2018.01.02

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 Conduction Test System V8.0.110

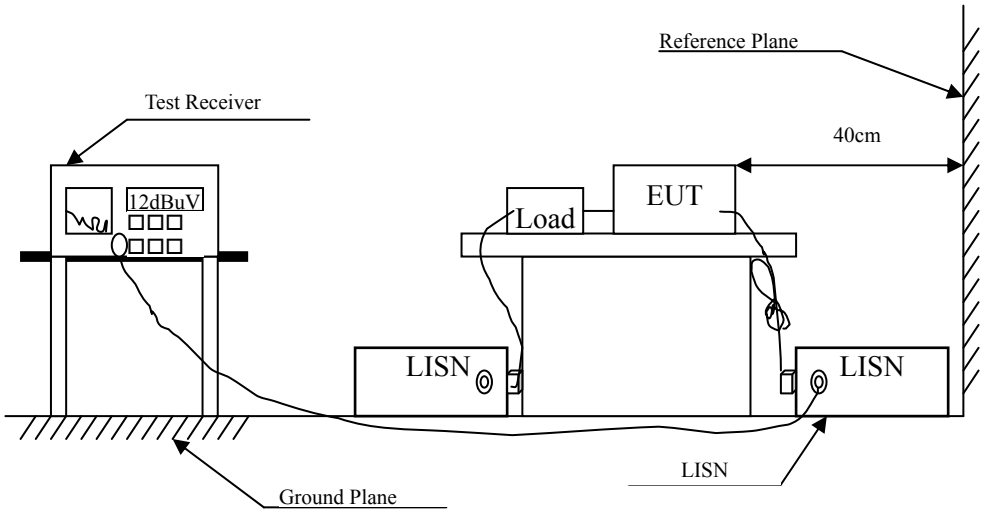
For Radiated measurements /ACB1

	Equipment	Manufacturer	Model No.	Serial No.	Cali. Data	Due. Data
X	Loop Antenna	A.H.	SAS-562B	272	2016.07.21	2017.07.20
X	Bi-Log Antenna	SCHWARZBECK	VULB9168	9168-674	2017.02.09	2018.02.08
X	Horn Antenna	ETS-Lindgren	3117	00203800	2016.10.13	2017.10.12
X	Horn Antenna	Com-Power	AH-840	101087	2017.05.24	2018.05.23
X	Pre-Amplifier	EMCI	EMC001330	980316	2017.05.14	2018.05.13
X	Pre-Amplifier	EMCI	EMC051835SE	980311	2017.05.15	2018.05.14
X	Pre-Amplifier	EMCI	EMC05820SE	980310	2017.05.15	2018.05.14
X	Pre-Amplifier	EMCI	EMC184045SE	980314	2017.05.17	2018.05.16
X	Filter	MICRO TRONICS	BRM50702	G251	2016.08.11	2017.08.10
	Filter	MICRO TRONICS	BRM50716	G188	2016.08.11	2017.08.10
X	EMI Test Receiver	R&S	ESR7	101602	2016.12.15	2017.12.14
X	Spectrum Analyzer	R&S	FSV40	101148	2017.01.24	2018.01.23
X	Coaxial Cable	SUHNER	SUCOFLEX 106	RF002	2017.05.25	2018.05.24
X	Mircoflex Cable	HUBER SUHNER	SUCOFLEX 102	MY3381/2	2016.08.11	2017.08.10

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	AV
0.15 - 0.50	66-56	56-46
0.50-5.0	56	46
5.0 - 30	60	50

Remarks: In the above table, the tighter limit applies at the band edges.

2.3. Test Procedure

The EUT and Peripherals 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 refer 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 the interface cables must be changed according to ANSI C63.4: 2014 on conducted measurement.

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

The EUT was setup to ANSI C63.4, 2014; tested to DTS test procedure of FCC KDB-558074 for compliance to FCC 47CFR Subpart C requirements.

2.4. Uncertainty

±2.35dB

2.5. Test Result of Conducted Emission

Product : Wireless Receiver
Test Item : Conducted Emission Test
Power Line : Line 1
Test Date : 2017/05/19
Test Mode : Mode 1: Transmit (2402MHz)

Frequency	Correct Factor	Reading Level	Measurement Level	Margin	Limit
MHz	dB	dBµV	dBµV	dB	dBµV
LINE 1					
Quasi-Peak					
0.159	9.560	35.352	44.912	-20.831	65.743
0.505	9.580	25.941	35.521	-20.479	56.000
3.631	9.596	18.219	27.815	-28.185	56.000
4.979	9.610	15.606	25.216	-30.784	56.000
10.194	9.651	17.645	27.296	-32.704	60.000
24.576	9.690	20.414	30.104	-29.896	60.000
Average					
0.159	9.560	20.180	29.740	-26.003	55.743
0.505	9.580	16.963	26.543	-19.457	46.000
3.631	9.596	9.049	18.645	-27.355	46.000
4.979	9.610	10.489	20.099	-25.901	46.000
10.194	9.651	13.301	22.952	-27.048	50.000
24.576	9.690	19.781	29.471	-20.529	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 : Wireless Receiver
Test Item : Conducted Emission Test
Power Line : Line 2
Test Date : 2017/05/19
Test Mode : Mode 1: Transmit (2402MHz)

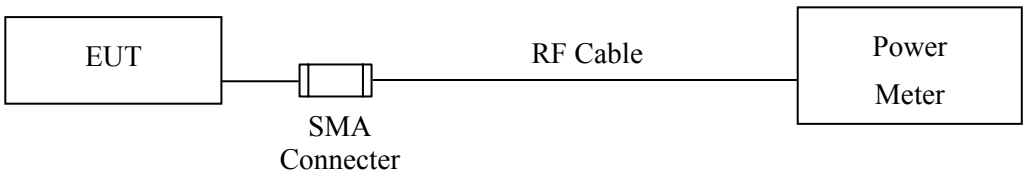
Frequency	Correct Factor	Reading Level	Measurement Level	Margin	Limit
MHz	dB	dBμV	dBμV	dB	dBμV
LINE 2					
Quasi-Peak					
0.152	9.552	36.061	45.613	-20.330	65.943
0.514	9.571	21.294	30.865	-25.135	56.000
3.633	9.596	20.038	29.634	-26.366	56.000
4.983	9.610	16.210	25.820	-30.180	56.000
10.383	9.654	13.835	23.489	-36.511	60.000
24.576	9.730	20.405	30.135	-29.865	60.000
Average					
0.152	9.552	20.100	29.652	-26.291	55.943
0.514	9.571	16.142	25.713	-20.287	46.000
3.633	9.596	9.100	18.696	-27.304	46.000
4.983	9.610	10.180	19.790	-26.210	46.000
10.383	9.654	9.675	19.329	-30.671	50.000
24.576	9.730	19.438	29.168	-20.832	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



3.2. Limit

The maximum peak power shall be less 1Watt.

3.3. Test Procedure

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 section 9.1.3 PKPM1 Peak power meter method.

3.4. Uncertainty

±0.86 dB

3.5. Test Result of Peak Power Output

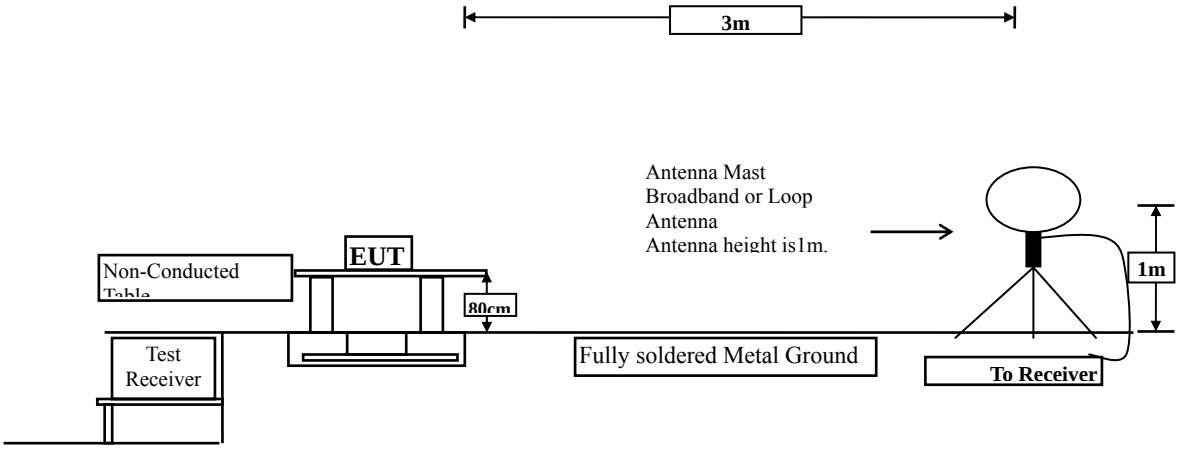
Product : Wireless Receiver
Test Item : Peak Power Output
Test Mode : Mode 1: Transmit
Test Date : 2017/07/03

Channel No.	Frequency (MHz)	Measurement (dBm)	Required Limit	Result
Channel 01	2402.00	5.91	1 Watt= 30 dBm	Pass
Channel 02	2478.00	5.82	1 Watt= 30 dBm	Pass

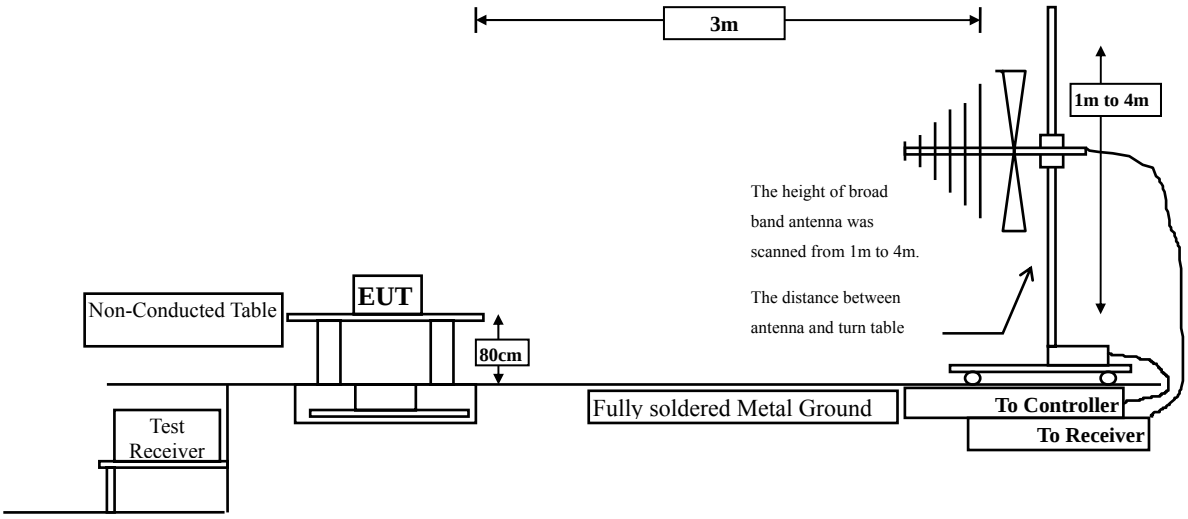
4. Radiated Emission

4.1. Test Setup

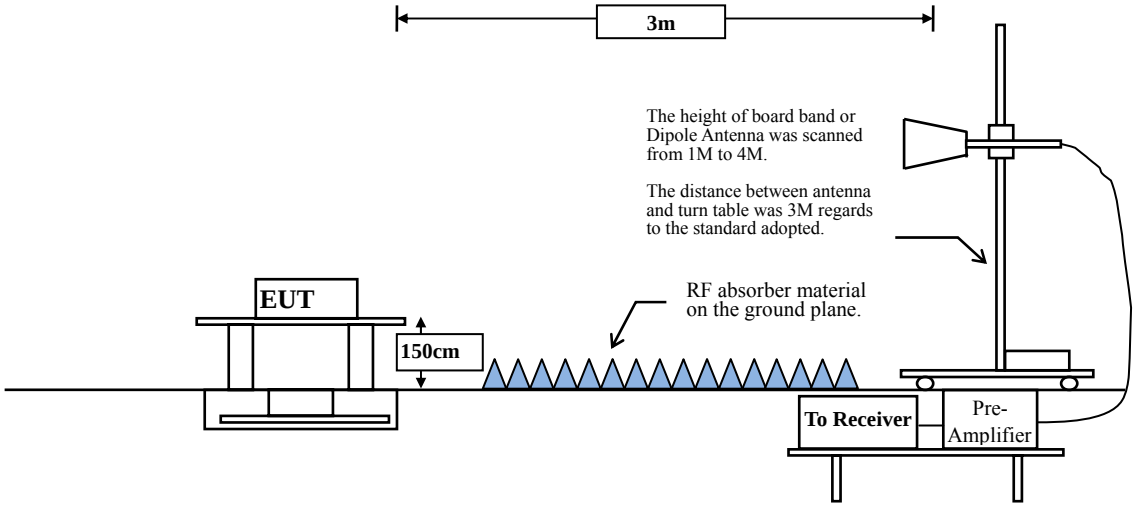
Radiated Emission Under 30MHz



Radiated Emission Below 1GHz



Radiated Emission Above 1GHz



4.2. Limits

➢ **General Radiated Emission 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 Limits		
Frequency MHz	Field strength (microvolts/meter)	Measurement distance (meter)
0.009-0.490	2400/F(kHz)	300
0.490-1.705	24000/F(kHz)	30
1.705-30	30	30
30-88	100	3
88-216	150	3
216-960	200	3
Above 960	500	3

Remarks: 1. RF Voltage (dBuV) = 20 log RF Voltage (uV)
2. In the Above Table, the tighter limit applies at the band edges.
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.

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

4.4. Uncertainty

Horizontal polarization：

30-300MHz: ±4.08dB；300M-1GHz: ±3.86dB；1-18GHz: ±3.77dB；18-40GHz: ±3.98dB

Vertical polarization：

30-300MHz: ±4.81dB；300M-1GHz: ±3.87dB；1-18GHz : ±3.83dB；18-40GHz: ±3.98dB

4.5. Test Result of Radiated Emission

Product : Wireless Receiver
Test Item : Harmonic Radiated Emission Data
Test Date : 2017/06/27
Test Mode : Mode 1: Transmit (2402MHz)

Frequency	Correct Factor	Reading Level	Measurement Level	Margin	Limit
MHz	dB	dBμV	dBμV /m	dB	dBμV /m
Horizontal					
Peak Detector:					
4804.000	-3.773	65.650	61.877	-12.123	74.000
7206.000	-0.784	65.430	64.645	-9.355	74.000
9608.000	1.052	67.060	68.113	-5.887	74.000
Average Detector:					
4804.000	-3.773	52.230	48.457	-5.543	54.000
7206.000	-0.784	49.850	49.065	-4.935	54.000
9608.000	1.052	47.710	48.763	-5.237	54.000
Vertical					
Peak Detector:					
4804.000	-3.773	63.600	59.827	-14.173	74.000
7206.000	-0.784	68.140	67.355	-6.645	74.000
9608.000	1.052	71.120	72.173	-1.827	74.000
Average Detector:					
4804.000	-3.773	51.020	47.247	-6.753	54.000
7206.000	-0.784	52.170	51.385	-2.615	54.000
9608.000	1.052	50.970	52.023	-1.977	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 : Wireless Receiver
Test Item : Harmonic Radiated Emission Data
Test Date : 2017/06/27
Test Mode : Mode 1: Transmit (2478MHz)

Frequency MHz	Correct Factor dB	Reading Level dBμV	Measurement Level dBμV /m	Margin dB	Peak Limit dBμV /m
Horizontal Peak Detector:					
4956.000	-3.738	53.880	50.142	-23.858	74.000
7434.000	-0.652	49.560	48.909	-25.091	74.000
9912.000	1.662	49.130	50.792	-23.208	74.000
Average Detector					
--					54.000
Vertical Peak Detector:					
4956.000	-3.738	52.030	48.292	-25.708	74.000
7434.000	-0.652	47.840	47.189	-26.811	74.000
9912.000	1.662	52.060	53.722	-20.278	74.000
Average Detector					
--					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 : Wireless Receiver
Test Item : General Radiated Emission Data
Test Date : 2017/06/27
Test Mode : Mode 1: Transmit (2402MHz)

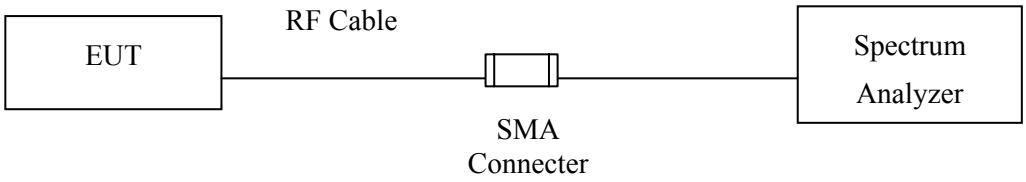
Frequency	Correct Factor	Reading Level	Measurement Level	Margin	Limit
MHz	dB	dBμV	dBμV /m	dB	dBμV /m
Horizontal					
82.014	-15.780	47.014	31.233	-8.767	40.000
191.667	-13.540	46.997	33.458	-10.042	43.500
408.159	-7.393	39.484	32.091	-13.909	46.000
589.507	-3.578	33.255	29.677	-16.323	46.000
724.464	-1.589	34.110	32.520	-13.480	46.000
984.536	1.605	33.058	34.663	-19.337	54.000
Vertical					
90.449	-17.245	51.808	34.563	-8.937	43.500
184.638	-12.916	40.453	27.536	-15.964	43.500
329.435	-9.431	36.501	27.070	-18.930	46.000
562.797	-4.225	33.602	29.377	-16.623	46.000
730.087	-1.510	33.186	31.675	-14.325	46.000
977.507	1.498	32.537	34.036	-19.964	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.
8. No emission found between lowest internal used/generated frequency to 30MHz.

5. RF Antenna Conducted Test

5.1. Test Setup



5.2. Limits

According to FCC Section 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 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, the attenuation required under this paragraph shall be 30 dB instead of 20 dB.

5.3. Test Procedure

The EUT was tested according to DTS test procedure of KDB558074 for compliance to FCC 47CFR 15.247 requirements.
Set RBW = 100 kHz, Set VBW> RBW, scan up through 10th harmonic.

5.4. Uncertainty

±1.23dB

5.5. Test Result of RF Antenna Conducted Test

Product : Wireless Receiver
Test Item : RF Antenna Conducted Test
Test Mode : Mode 1: Transmit
Test Date : 2017/07/03

Figure Channel 01:

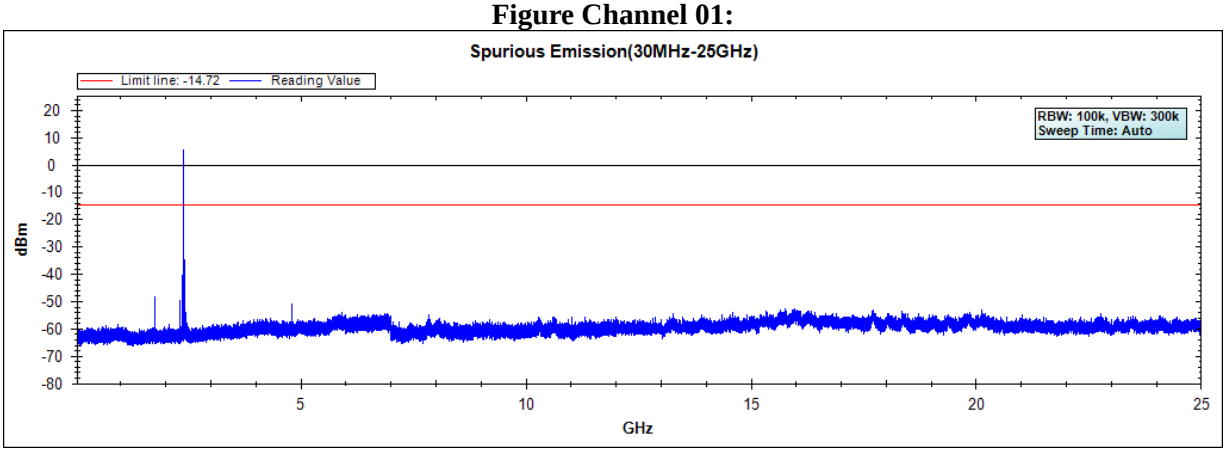
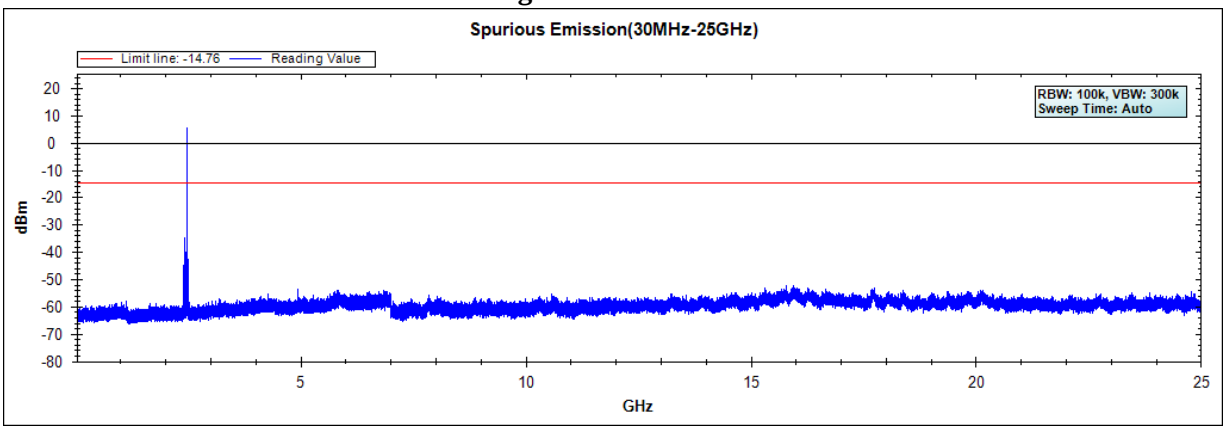


Figure Channel 02:

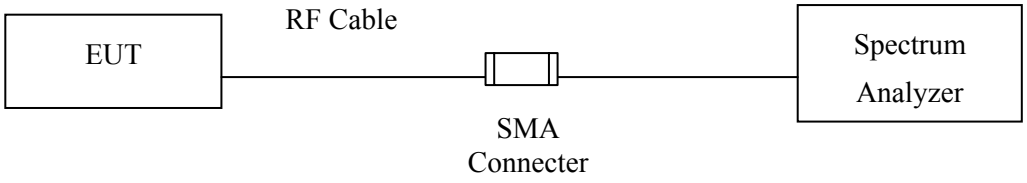


Note: The above test pattern is synthesized by multiple of the frequency range.

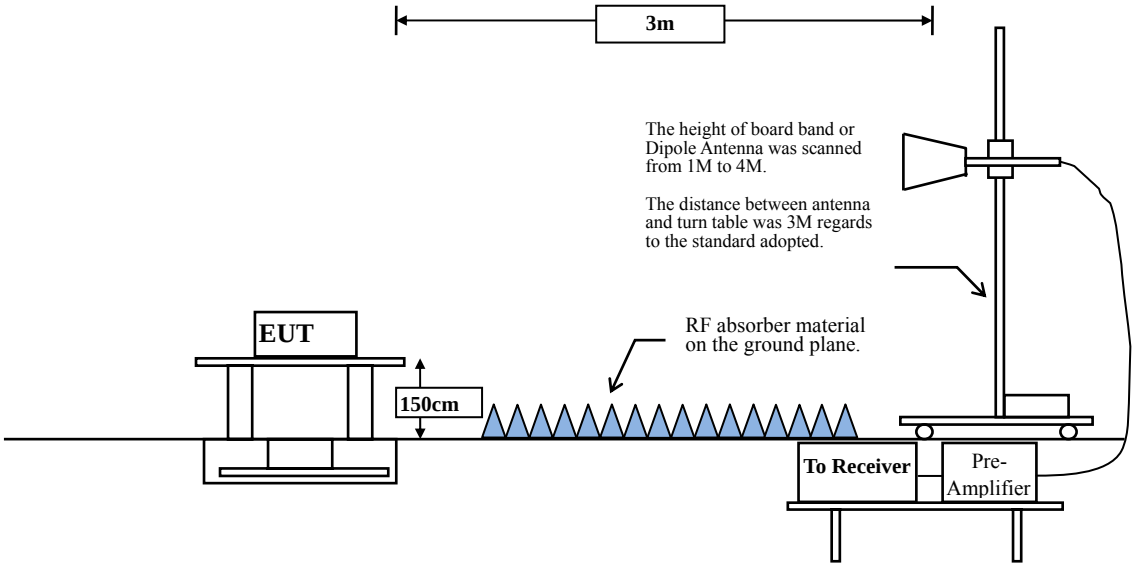
6. Band Edge

6.1. Test Setup

RF Conducted Measurement



RF Radiated Measurement:



6.2. Limit

According to FCC Section 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 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, the attenuation required under this paragraph shall be 30 dB instead of 20 dB. 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)).

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

Conducted: ±1.23dB
Radiated:
Horizontal polarization：1-18GHz: ±3.77dB
Vertical polarization：1-18GHz : ±3.83dB

6.5. Test Result of Band Edge

Product : Wireless Receiver
Test Item : Band Edge Data
Test Date : 2017/06/27
Test Mode : Mode 1: Transmit (2402MHz)

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
1 (Peak)	2390.000	11.556	61.889	73.445	74.00	54.00	Pass
1 (Peak)	2401.739	11.582	96.889	108.472	--	--	--
1 (Average)	2385.942	11.546	28.451	39.997	74.00	54.00	Pass
1 (Average)	2390.000	11.556	22.224	33.780	74.00	54.00	Pass
1 (Average)	2402.029	11.584	75.584	87.168	--	--	--

Figure Channel 1: Horizontal (Peak)

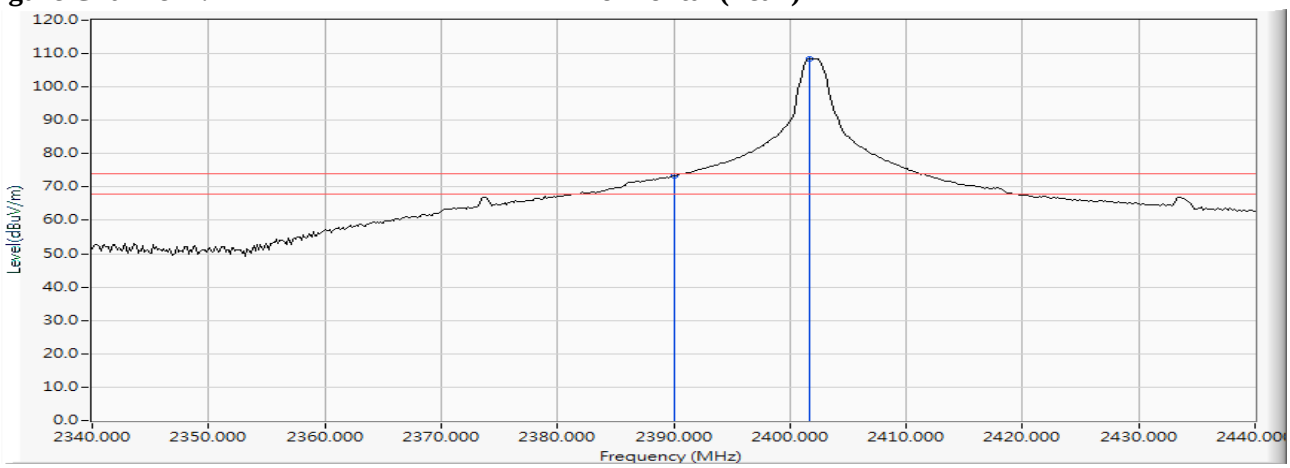
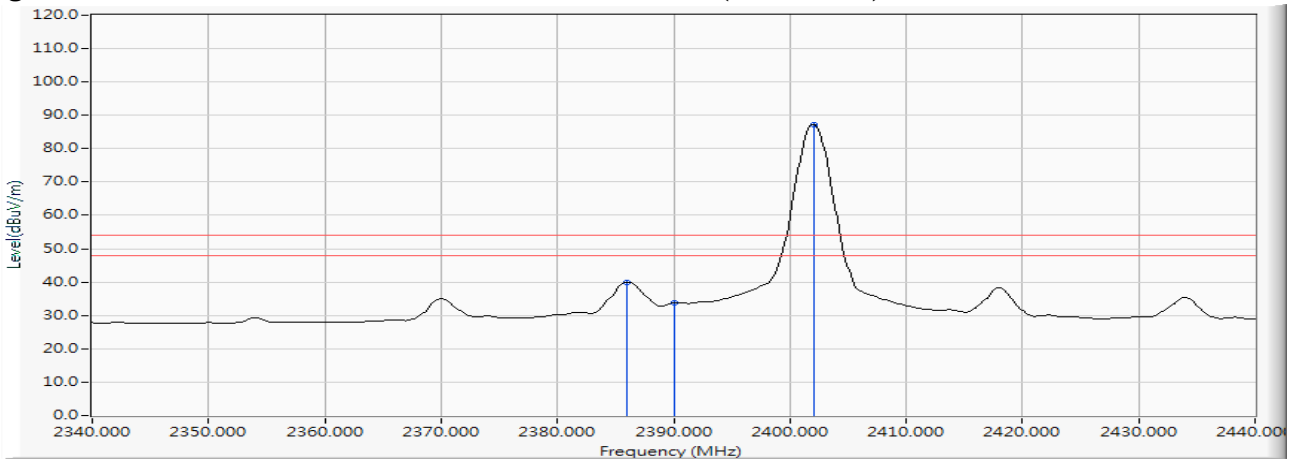


Figure Channel 1: Horizontal (AVERAGE)



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.

Product : Wireless Receiver
Test Item : Band Edge Data
Test Date : 2017/06/27
Test Mode : Mode 1: Transmit (2402MHz)

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
1 (Peak)	2390.000	11.556	59.804	71.360	74.00	54.00	Pass
1 (Peak)	2401.739	11.582	94.996	106.579	--	--	--
1 (Average)	2385.942	11.546	26.814	38.360	74.00	54.00	Pass
1 (Average)	2390.000	11.556	20.918	32.474	74.00	54.00	Pass
1 (Average)	2402.029	11.584	73.920	85.504	--	--	--

Figure Channel 1: Vertical (Peak)

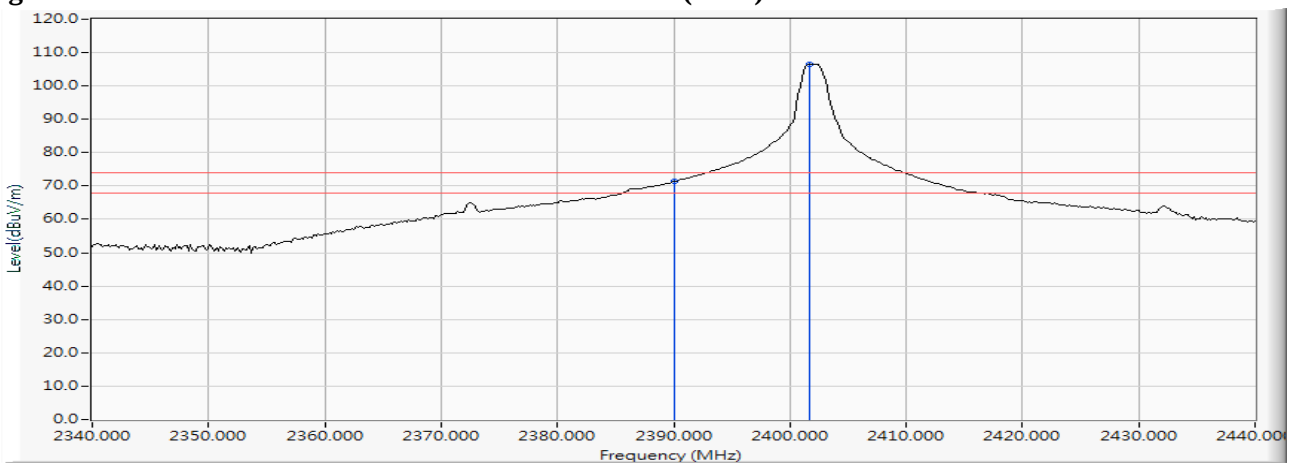
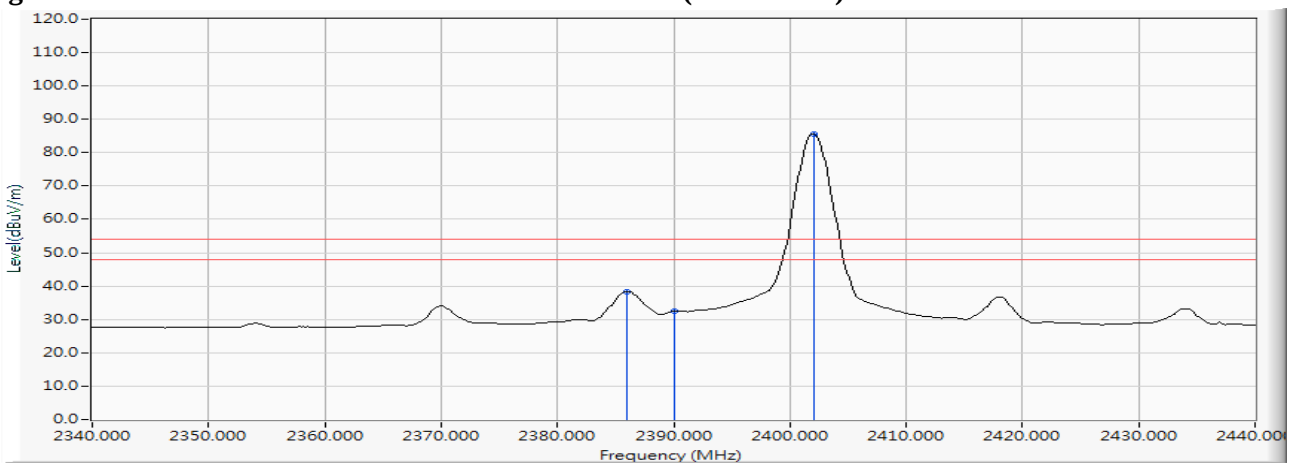


Figure Channel 1: Vertical (AVERAGE)



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.

Product : Wireless Receiver
Test Item : Band Edge Data
Test Date : 2017/06/27
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
2 (Peak)	2477.703	11.785	90.556	102.342	--	--	--
2 (Peak)	2483.500	11.800	61.063	72.863	74.00	54.00	Pass
2 (Average)	2477.993	11.787	69.869	81.655	--	--	--
2 (Average)	2483.500	11.800	21.457	33.257	74.00	54.00	Pass
2 (Average)	2494.080	11.824	24.163	35.987	74.00	54.00	Pass

Figure Channel 2: Horizontal (Peak)

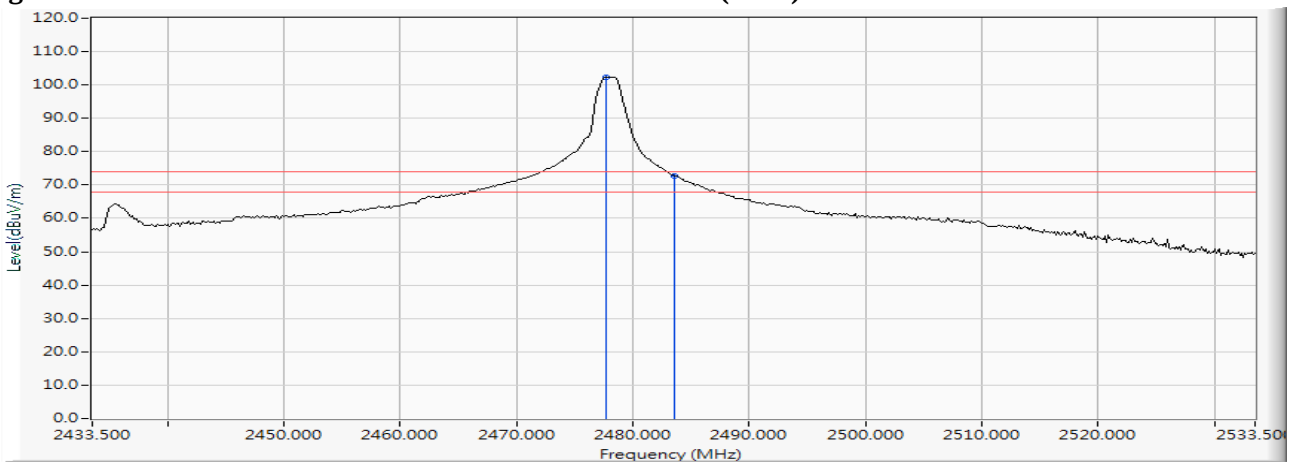
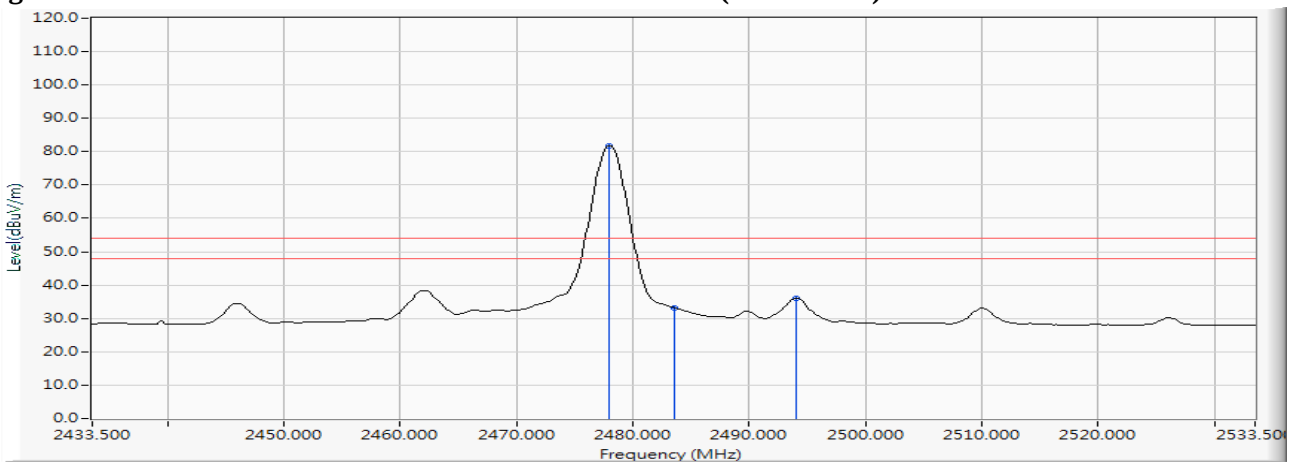


Figure Channel 2: Horizontal (AVERAGE)



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.

Product : Wireless Receiver
Test Item : Band Edge Data
Test Date : 2017/06/27
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
2 (Peak)	2477.703	11.785	87.438	99.224	--	--	--
2 (Peak)	2483.500	11.800	57.789	69.589	74.00	54.00	Pass
2 (Average)	2477.993	11.787	67.494	79.280	--	--	--
2 (Average)	2483.500	11.800	19.675	31.475	74.00	54.00	Pass
2 (Average)	2494.080	11.824	22.934	34.758	74.00	54.00	Pass

Figure Channel 2: Vertical (Peak)

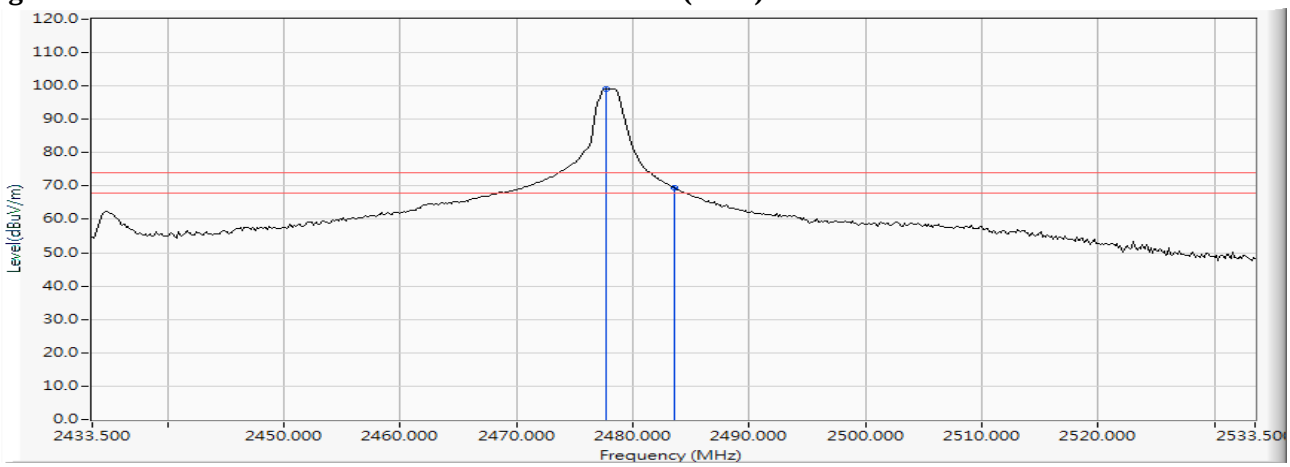
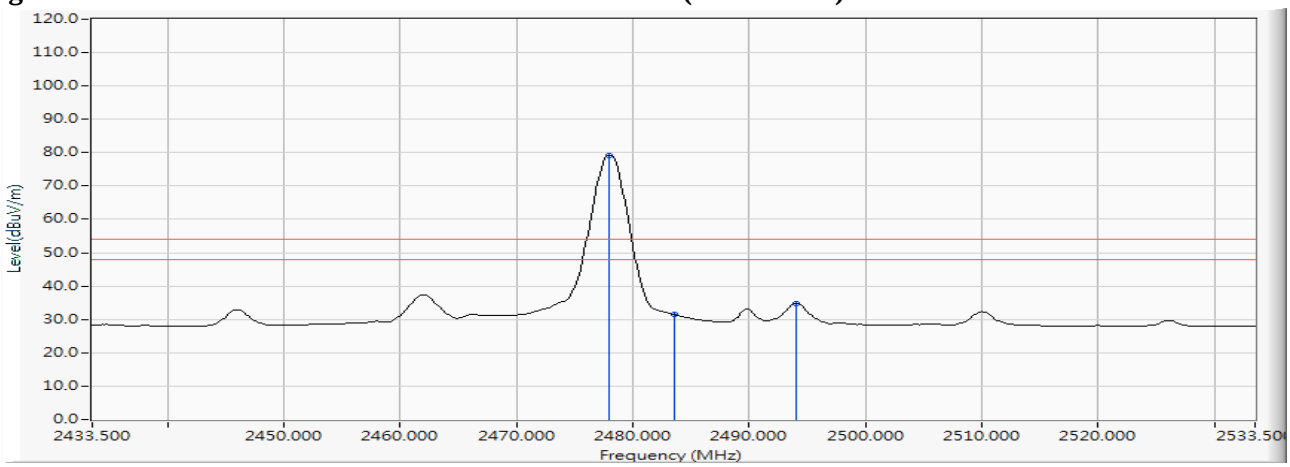


Figure Channel 2: Vertical (AVERAGE)

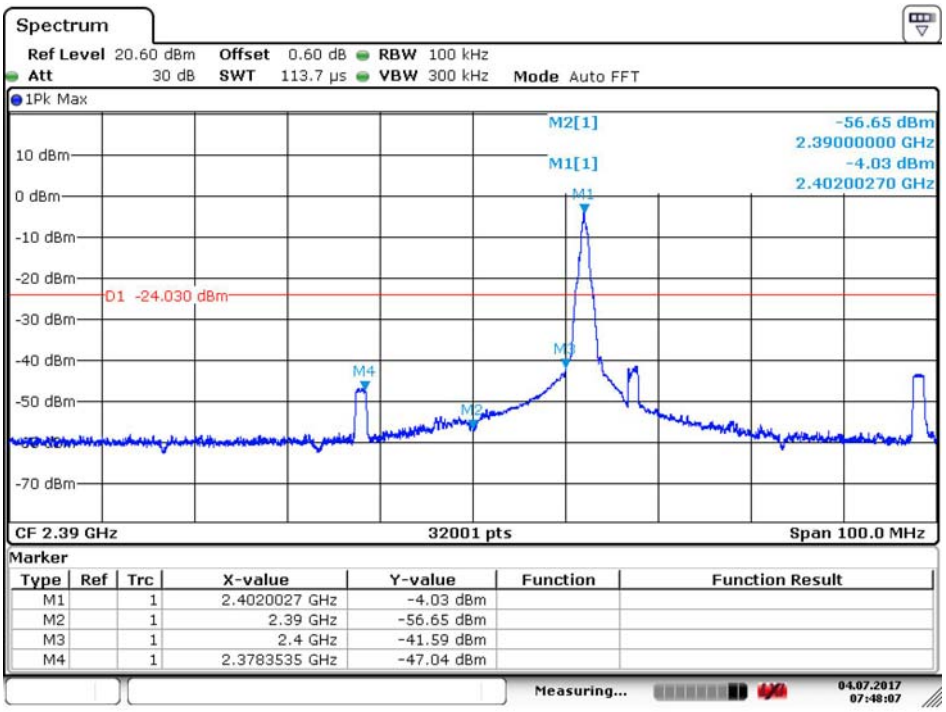


Note:

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.

Product : Wireless Receiver
Test Item : Band Edge Data
Test Date : 2017/07/04
Test Mode : Mode 1: Transmit (2402MHz)

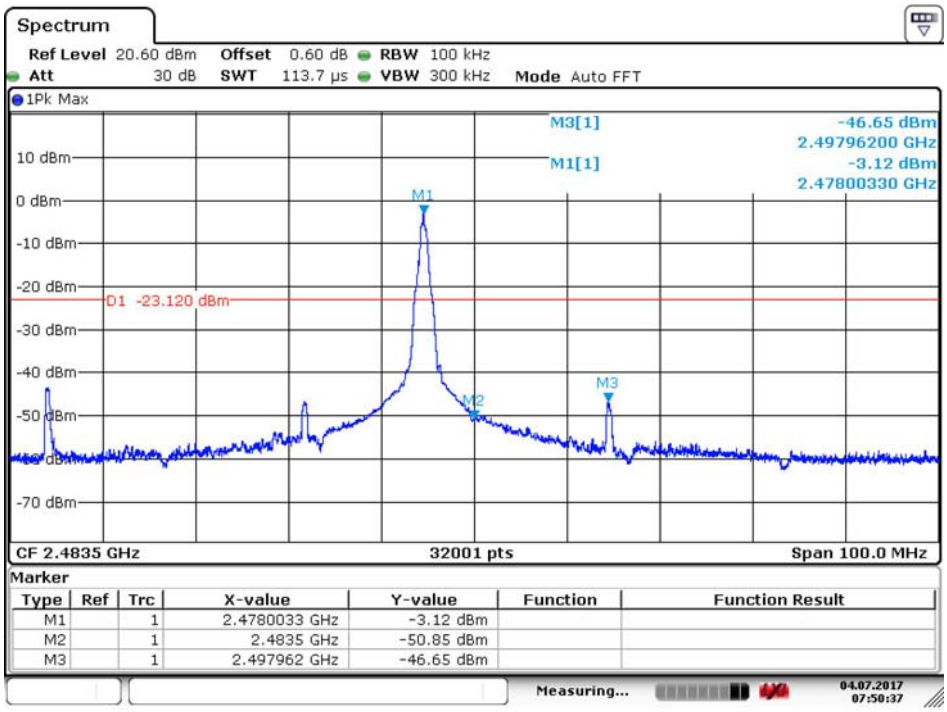
Measurement Level Δ (dB)	Result
> 20	PASS



Date: 4.JUL.2017 07:48:07

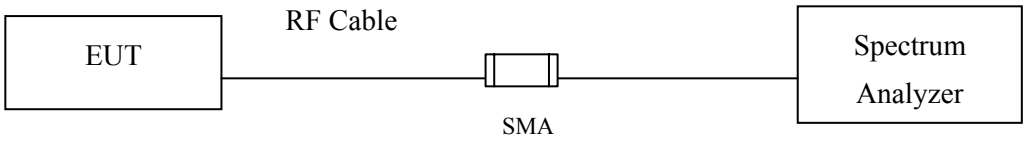
Product : Wireless Receiver
Test Item : Band Edge Data
Test Date : 2017/07/04
Test Mode : Mode 1: Transmit (2478MHz)

Measurement Level Δ (dB)	Result
> 20	PASS



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 C63.10 2013; tested according to DTS test procedure of KDB558074 for compliance to FCC 47CFR 15.247 requirements.
Set RBW = 1-5% of the emission bandwidth, VBW≥3*RBW

7.4. Uncertainty

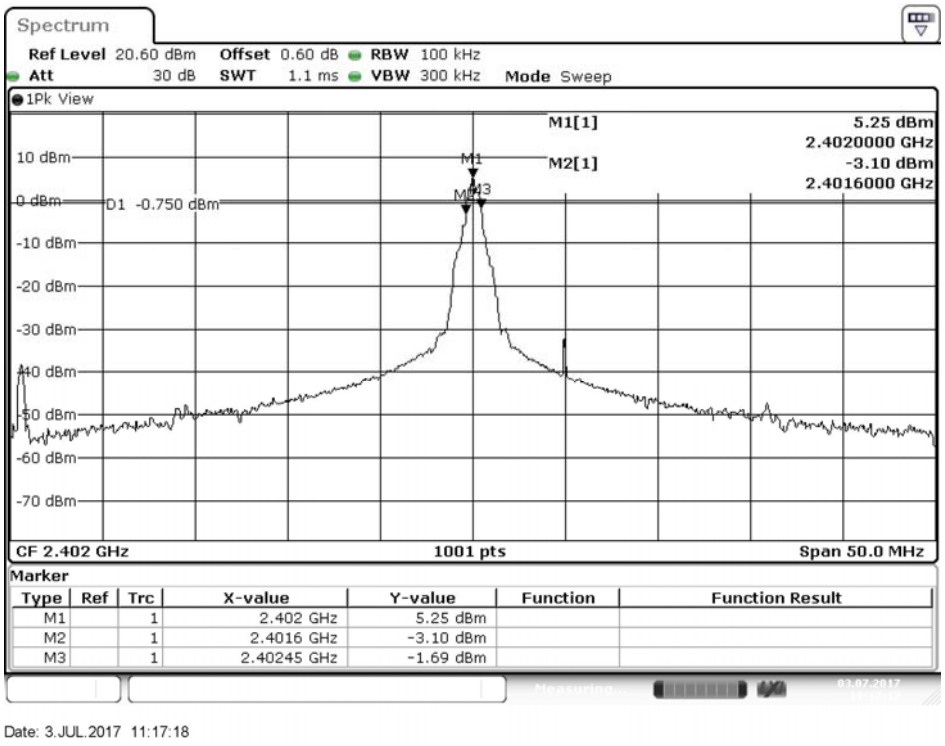
±279.2Hz

7.5. Test Result of 6dB Bandwidth

Product : Wireless Receiver
Test Item : 6dB Bandwidth Data
Test Mode : Mode 1: Transmit (2402MHz)
Test Date : 2017/07/03

Channel No.	Frequency (MHz)	Measurement Level (kHz)	Required Limit (kHz)	Result
01	2402	850	>500	Pass

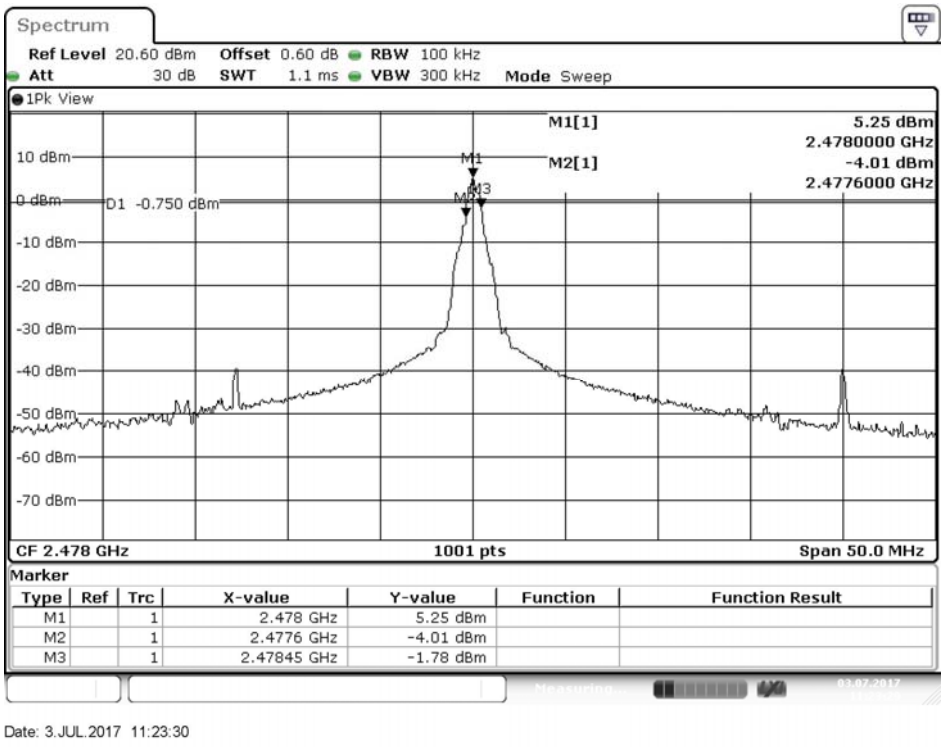
Figure Channel 01:



Product : Wireless Receiver
Test Item : 6dB Bandwidth Data
Test Mode : Mode 1: Transmit (2478MHz)
Test Date : 2017/07/03

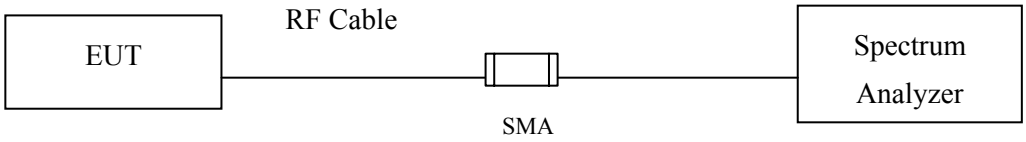
Channel No.	Frequency (MHz)	Measurement Level (kHz)	Required Limit (kHz)	Result
02	2478	850	>500	Pass

Figure Channel 02:



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

8.4. Uncertainty

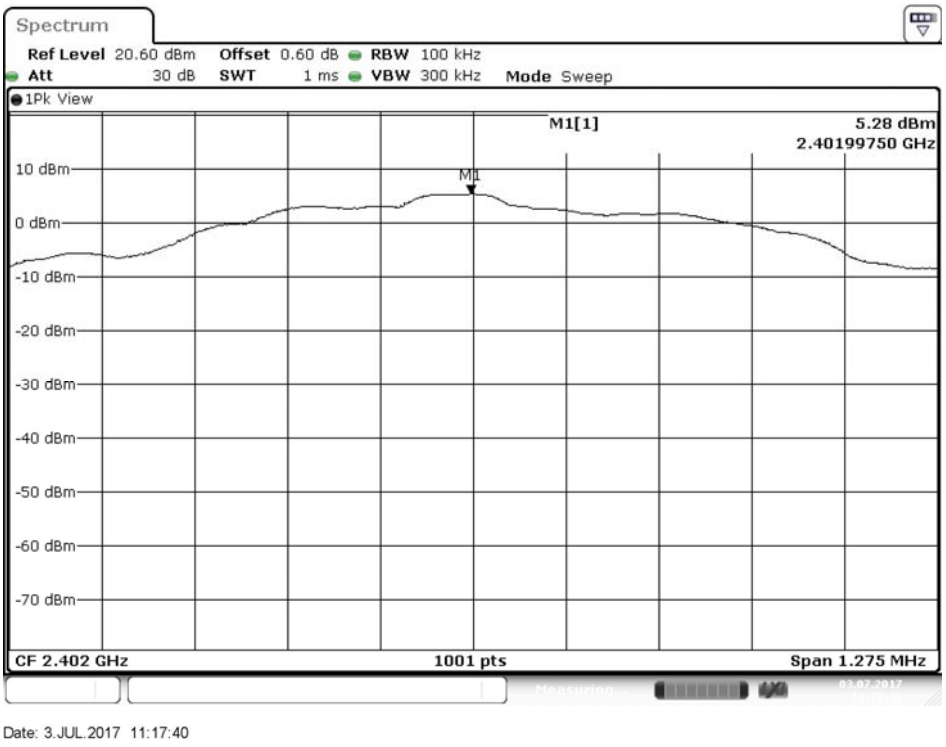
±1.23dB

8.5. Test Result of Power Density

Product : Wireless Receiver
Test Item : Power Density Data
Test Mode : Mode 1: Transmit (2402MHz)
Test Date : 2017/07/03

Channel No.	Frequency (MHz)	Measure Level (dBm)	Limit (dBm)	Result
01	2402	5.28	≦8dBm	Pass

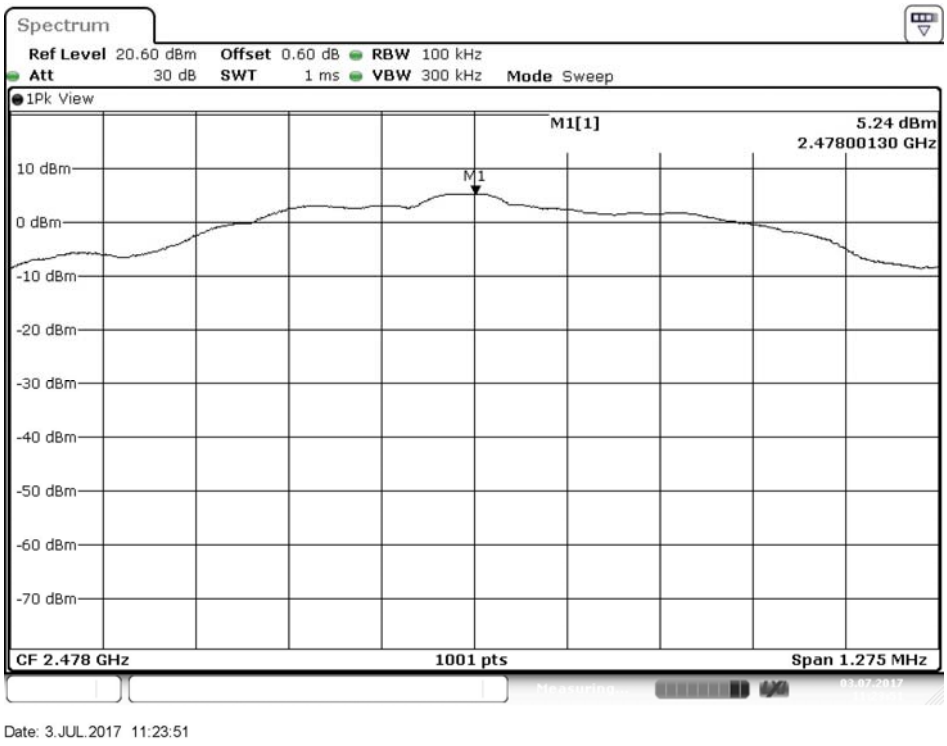
Figure Channel 01:



Product : Wireless Receiver
Test Item : Power Density Data
Test Mode : Mode 1: Transmit (2478MHz)
Test Date : 2017/07/03

Channel No.	Frequency (MHz)	Measurement Level (dBm)	Required Limit (dBm)	Result
02	2478	5.24	≦8dBm	Pass

Figure Channel 02:



9. EMI Reduction Method During Compliance Testing

No modification was made during testing.

Attachment 1: EUT Test Photographs

Attachment 2: EUT Detailed Photographs