FCC Test Report

Product Name	Intelligent Robot
Model No	Zenbo
FCC ID.	MSQ-ZENBO

Applicant	ASUSTeK COMPUTER INC.
Address	4F, No. 150, Li-Te Rd., Peitou, Taipei, Taiwan

Date of Receipt	Aug. 15, 2016
Issue Date	Jul. 20, 2017
Report No.	1740337R-RFUSP02V00
Report Version	V1.0

Testing Laboratory
3023

Test Report

Issue Date: Jul. 20, 2017
Report No.: 1740337R-RFUSP02V00

Product Name	Intelligent Robot
Applicant	ASUSTeK COMPUTER INC.
Address	4F, No. 150, Li-Te Rd., Peitou, Taipei, Taiwan
Manufacturer	ASUSTeK COMPUTER INC.
Model No.	Zenbo
FCC ID.	MSQ-ZENBO
EUT Rated Voltage	DC 14.4V (Power by Battery)
EUT Test Voltage	AC 120V/60Hz
Trade Name	ASUS
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 : Yulin Chen

(Engineer / Yulin Chen)

Approved By :

(Director / Vincent Lin)

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1. GENERAL INFORMATION

1.1. EUT Description

Product Name	Intelligent Robot
Trade Name	ASUS
Model No.	Zenbo
FCC ID.	MSQ-ZENBO
Frequency Range	2412-2462MHz for 802.11b/g/n-20BW
Number of Channels	802.11b/g/n-20MHz: 11
Data Speed	802.11b: 1-11Mbps, 802.11g: 6-54Mbps, 802.11n: up to 72.2Mbps
Type of Modulation	802.11b:DSSS (DBPSK, DQPSK, CCK) 802.11g/n:OFDM (BPSK, QPSK, 16QAM, 64QAM)
Antenna Type	PIFA Antenna
Antenna Gain	Refer to the table “Antenna List”
Channel Control	Auto
Power Adapter	MFR: ASUS, M/N: ADP-45BW B Input: AC 100-240V, 50-60Hz, 1.2A Output: DC 19V, 2.37A Cable Out: Non-shielded, 2.3m

Antenna List

No.	Manufacturer	Part No.	ASUS Part No.	Antenna Type	Peak Gain
1	ASUS	290-70109	14008-02060000	PIFA Antenna	0.59dBi for 2.4 GHz

Note:

1. The antenna of EUT conforms to FCC 15.203.

2. Only the higher gain antenna was tested and recorded in this report

802.11b/g/n-20MHz Center Frequency of Each Channel:

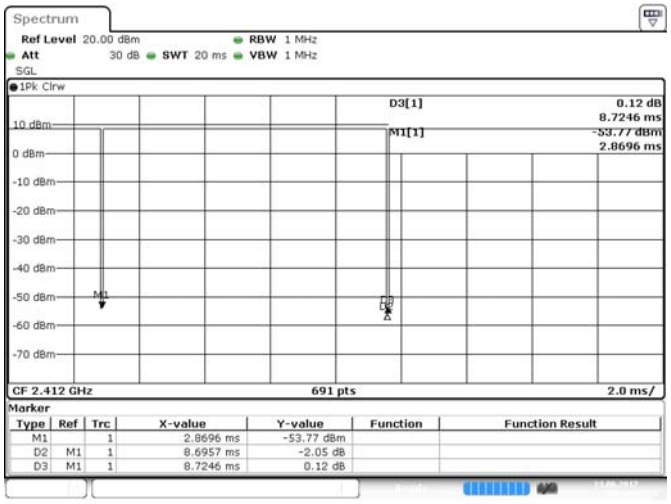
Channel	Frequency	Channel	Frequency	Channel	Frequency	Channel	Frequency
Channel 01:	2412 MHz	Channel 02:	2417 MHz	Channel 03:	2422 MHz	Channel 04:	2427 MHz
Channel 05:	2432 MHz	Channel 06:	2437 MHz	Channel 07:	2442 MHz	Channel 08:	2447 MHz
Channel 09:	2452 MHz	Channel 10:	2457 MHz	Channel 11:	2462 MHz		

Duty Cycle:

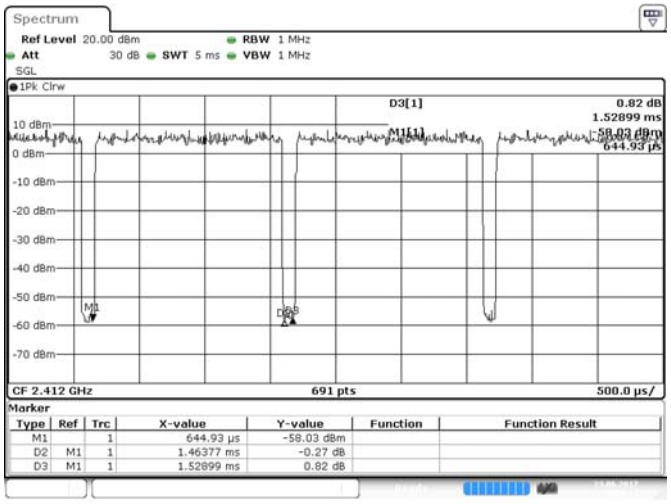
802.11b	0.996
802.11g	0.957
802.11n-20	0.939

*Duty cycle = Ton / (Ton + Toff)

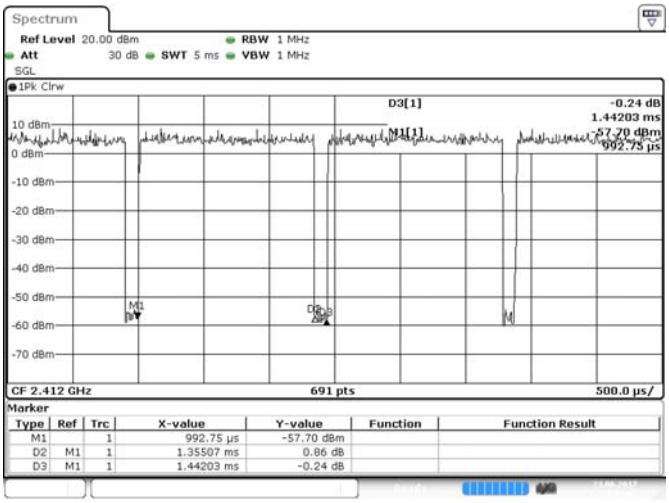
802.11b:



802.11g:



802.11n20:



Note:

1. The EUT is an Intelligent Robot with a built-in WLAN and Bluetooth transceiver, this report for WLAN.
2. Regarding to the operation frequency, the lowest, middle and highest frequency are selected to perform the test.
3. At result of pretests, module supports dual-channel transmission, only the worst case is shown in the report.
4. Lowest and highest data rates are tested in each mode. Only worst case is shown in the report. (802.11b is 1Mbps、802.11g is 6Mbps、802.11n(20M-BW) is 7.2Mbps)
5. These tests are conducted on a sample for the purpose of demonstrating compliance of 802.11b/g/n transmitter with Part 15 Subpart C Paragraph 15.247 of spread spectrum devices.

Test Mode:	Mode 1: Transmit (802.11b 1Mbps)
	Mode 2: Transmit (802.11g 6Mbps)
	Mode 3: Transmit (802.11n MCS0 7.2Mbps 20M-BW)

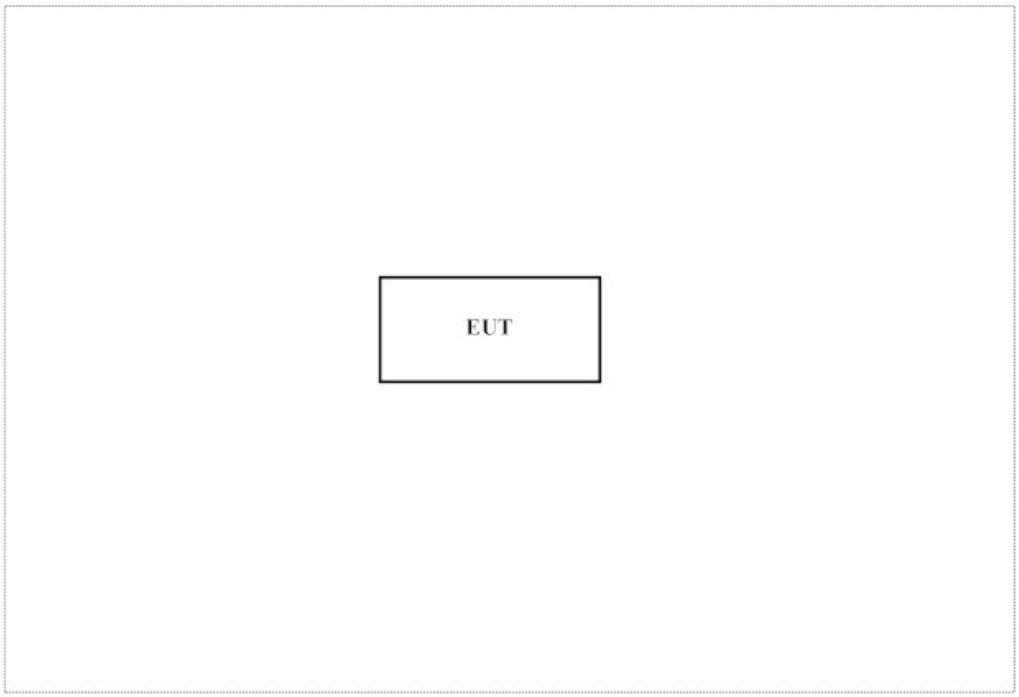
1.3. Tested System Details

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
N/A				

Signal Cable Type	Signal cable Description
N/A	

1.4. Configuration of Tested System



1.5. EUT Exercise Software

1. Setup the EUT as shown in Section 1.4.
2. Execute software “Raltek MP Tool” on the EUT.
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 Item and 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	Two-Line V-Network	R&S	ENV216	101306	2017.02.16	2018.02.15
X	Two-Line V-Network	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	2017.01.09	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	2017.01.03	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

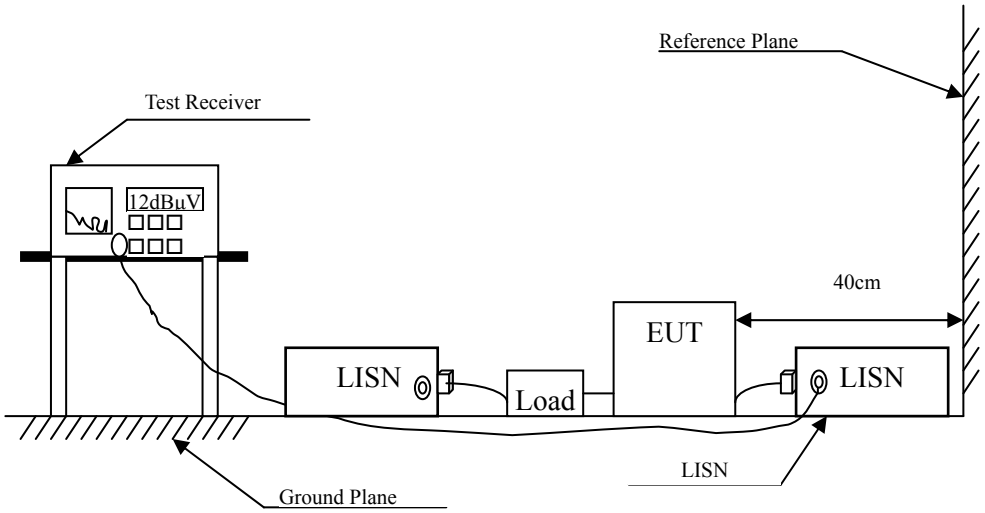
For Radiated measurements /ACB1

	Equipment	Manufacturer	Model No.	Serial No.	Cali. Data	Due. Data
X	Loop Antenna	A.H.	SAS-562B	272	2016.03.18	2018.03.17
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	101149	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 (dBµV) 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 invested over the frequency range from 0.15MHz to 30MHz using a receiver bandwidth of 9kHz.

2.4. Uncertainty

± 2.35 dB

2.5. Test Result of Conducted Emission

Product : Intelligent Robot
Test Item : Conducted Emission Test
Power Line : Line 1
Test Mode : Mode 3: Transmit (802.11n MCS0 7.2Mbps 20M-BW) (2437MHz)
Test Date : 2017/07/12

Frequency	Correct Factor	Reading Level	Measurement Level	Margin	Limit
MHz	dB	dBµV	dBµV	dB	dBµV
Line 1					
Quasi-Peak					
0.152	9.707	41.057	50.765	-15.178	65.943
0.443	9.726	31.136	40.862	-16.767	57.629
2.224	9.805	19.461	29.266	-26.734	56.000
13.880	10.057	15.885	25.942	-34.058	60.000
24.576	10.172	24.755	34.927	-25.073	60.000
26.178	10.169	0.236	10.405	-49.595	60.000
Average					
0.152	9.707	22.779	32.486	-23.457	55.943
0.443	9.726	22.504	32.230	-15.399	47.629
2.224	9.805	13.558	23.363	-22.637	46.000
13.880	10.057	10.617	20.674	-29.326	50.000
24.576	10.172	23.890	34.062	-15.938	50.000
26.178	10.169	-2.556	7.614	-42.386	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 : Intelligent Robot
Test Item : Conducted Emission Test
Power Line : Line 2
Test Mode : Mode 3: Transmit (802.11n MCS0 7.2Mbps 20M-BW) (2437MHz)
Test Date : 2017/07/12

Frequency	Correct Factor	Reading Level	Measurement Level	Margin	Limit
MHz	dB	dBµV	dBµV	dB	dBµV
Line 2					
Quasi-Peak					
0.159	10.002	39.495	49.497	-16.246	65.743
0.443	10.010	34.097	44.108	-13.521	57.629
2.227	9.936	20.304	30.240	-25.760	56.000
2.681	9.935	19.226	29.161	-26.839	56.000
13.180	10.097	16.837	26.934	-33.066	60.000
24.576	10.270	24.179	34.449	-25.551	60.000
Average					
0.159	10.002	26.125	36.127	-19.616	55.743
0.443	10.010	25.172	35.182	-12.447	47.629
2.227	9.936	13.932	23.867	-22.133	46.000
2.681	9.935	14.251	24.186	-21.814	46.000
13.180	10.097	11.473	21.570	-28.430	50.000
24.576	10.270	23.700	33.970	-16.030	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. Limits

The maximum peak power shall be less 1 Watt.

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 : Intelligent Robot
Test Item : Peak Power Output Data
Test Mode : Mode 1: Transmit (802.11b 1Mbps)
Test Date : 2016/09/21

Channel No	Frequency (MHz)	Average Power For different Data Rate (Mbps)				Peak Power	Required Limit	Result
		1	2	5.5	11	1		
		Measurement Level (dBm)						
01	2412	15.61	--	--	--	18.98	<30dBm	Pass
06	2437	16.15	16.04	15.97	15.83	19.54	<30dBm	Pass
11	2462	16.32	--	--	--	19.65	<30dBm	Pass

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

Product : Intelligent Robot
Test Item : Peak Power Output Data
Test Mode : Mode 2: Transmit (802.11g 6Mbps)
Test Date : 2016/09/21

Channel No	Frequency (MHz)	Average Power For different Data Rate (Mbps)								Peak Power	Required Limit	Result
		6	9	12	18	24	36	48	54	6		
		Measurement Level (dBm)										
01	2412	15.46	--	--	--	--	--	--	--	22.42	<30dBm	Pass
06	2437	15.57	15.44	15.35	15.23	15.12	15.01	14.90	14.79	22.43	<30dBm	Pass
11	2462	15.75	--	--	--	--	--	--	--	22.60	<30dBm	Pass

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

Product : Intelligent Robot
Test Item : Peak Power Output Data
Test Mode : Mode 3: Transmit (802.11n MCS0 7.2Mbps 20M-BW)
Test Date : 2016/09/21

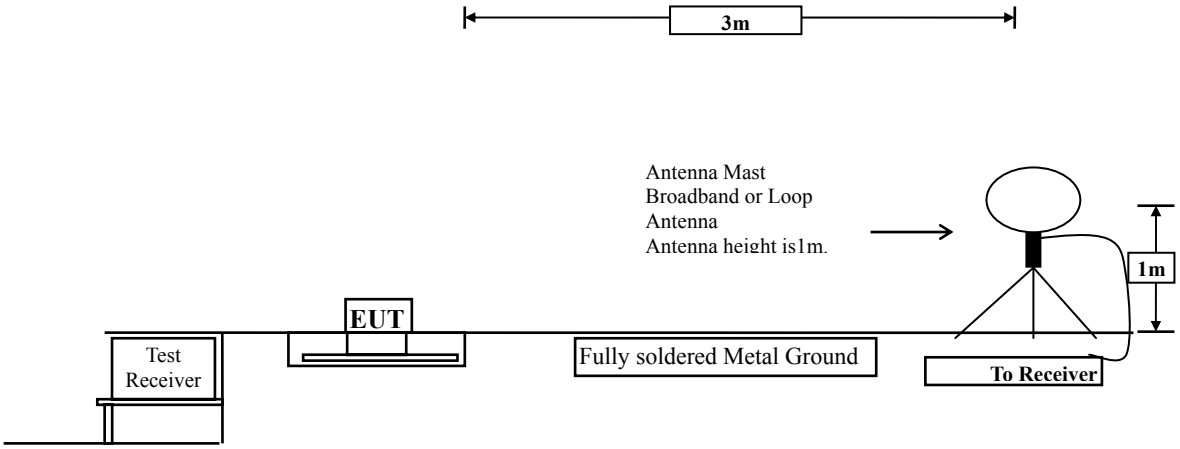
Channel No	Frequency (MHz)	Average Power For different Data Rate (Mbps)								Peak Power	Required Limit	Result
		7.2	14.4	21.7	28.9	43.3	57.8	65	72.2	7.2		
		Measurement Level (dBm)										
01	2412	15.43	--	--	--	--	--	--	--	22.56	<30dBm	Pass
06	2437	15.32	15.21	15.06	14.94	14.81	14.68	14.55	14.42	22.51	<30dBm	Pass
11	2462	15.52	--	--	--	--	--	--	--	22.61	<30dBm	Pass

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

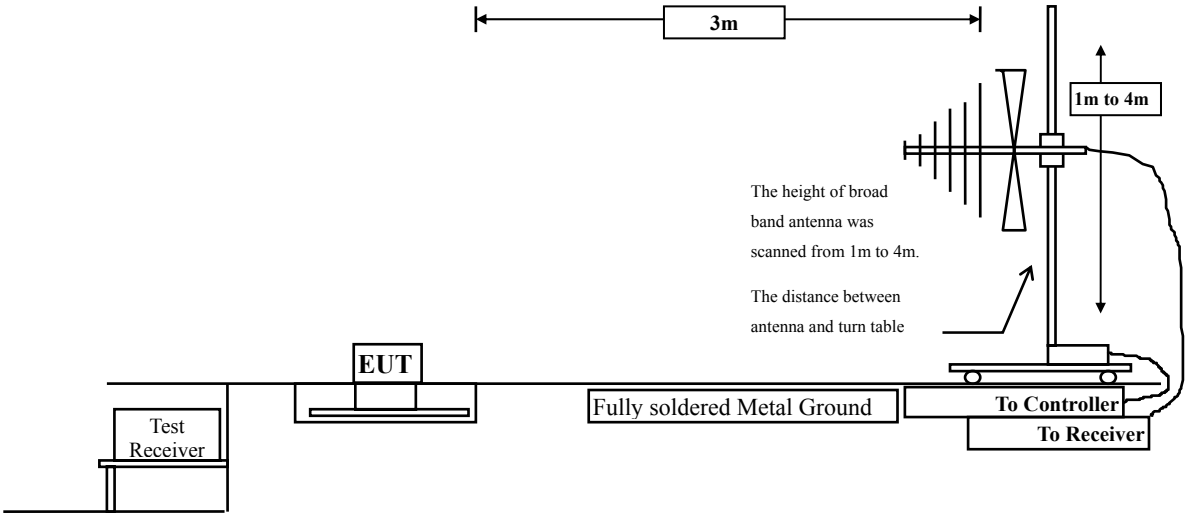
4. Radiated Emission

4.1. Test Setup

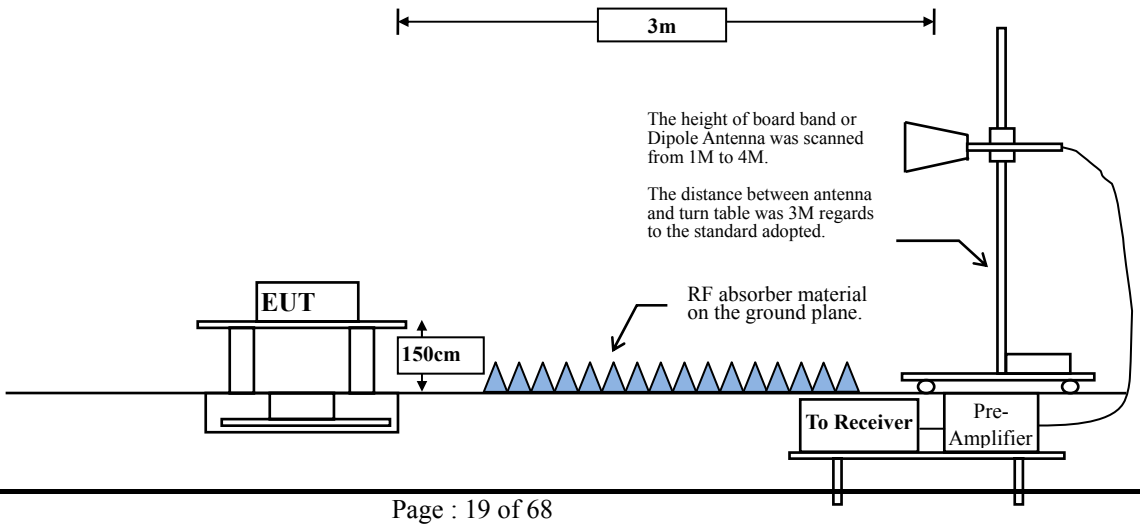
Radiated Emission Under 30MHz



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	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: E field strength (dBμV/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 C63.4: 2014 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.

The average measurement tested according to KDB 558074 section 12.2.5.3. Reduced VBW averaging across on- and off-times of the EUT transmissions with max hold.

VBW ≥ 1/T:

Mode	Duty Cycle	T	1/T	VBW Setting
802.11b	0.996	--	--	10 Hz
802.11g	0.957	1.4637 ms	683 Hz	1 KHz
802.11n20	0.939	1.3550 ms	738 Hz	1 KHz

4.4. Uncertainty

Horizontal：
30-300MHz: ±4.08dB；300M-1GHz: ±3.86dB；1-18GHz: ±3.77dB；18-40GHz: ±3.98dB。
Vertical：
30-300MHz: ±4.81dB；300M-1GHz: ±3.87dB；1-18GHz: ±3.83dB；18-40GHz: ±3.98dB。

4.5. Test Result of Radiated Emission

Product : Intelligent Robot
Test Item : Harmonic Radiated Emission Data
Test Mode : Mode 1: Transmit (802.11b 1Mbps) (2412MHz)
Test Date : 2016/09/09

Frequency	Correct Factor	Reading Level	Measurement Level	Margin	Limit
MHz	dB	dBμV	dBμV/m	dB	dBμV/m
Horizontal					
Peak Detector:					
4824.000	-4.612	55.680	51.068	-22.932	74.000
7236.000	-1.027	45.830	44.803	-29.197	74.000
9648.000	1.529	43.730	45.259	-28.741	74.000
Average Detector:					
--	--	--	--	--	54.000
Vertical					
Peak Detector:					
4824.000	-4.612	50.440	45.828	-28.172	74.000
7236.000	-1.027	45.840	44.813	-29.187	74.000
9648.000	1.529	43.620	45.149	-28.851	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 : Intelligent Robot
Test Item : Harmonic Radiated Emission Data
Test Mode : Mode 1: Transmit (802.11b 1Mbps) (2437 MHz)
Test Date : 2016/09/09

Frequency	Correct Factor	Reading Level	Measurement Level	Margin	Limit
MHz	dB	dBμV	dBμV/m	dB	dBμV/m
Horizontal					
Peak Detector:					
4874.000	-4.550	49.740	45.190	-28.810	74.000
7311.000	-0.952	45.350	44.398	-29.602	74.000
9748.000	1.634	44.200	45.834	-28.166	74.000
Average Detector:					
--	--	--	--	--	54.000
Vertical					
Peak Detector:					
4874.000	-4.550	47.970	43.420	-30.580	74.000
7311.000	-0.952	45.320	44.368	-29.632	74.000
9748.000	1.634	44.130	45.764	-28.236	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 : Intelligent Robot
Test Item : Harmonic Radiated Emission Data
Test Mode : Mode 1: Transmit (802.11b 1Mbps) (2462 MHz)
Test Date : 2016/09/09

Frequency	Correct Factor	Reading Level	Measurement Level	Margin	Limit
MHz	dB	dBμV	dBμV/m	dB	dBμV/m
Horizontal					
Peak Detector:					
4924.000	-4.477	48.020	43.543	-30.457	74.000
7386.000	-0.888	44.960	44.072	-29.928	74.000
9848.000	1.766	43.550	45.316	-28.684	74.000
Average Detector:					
--	--	--	--	--	54.000
Vertical					
Peak Detector:					
4924.000	-4.477	47.100	42.623	-31.377	74.000
7386.000	-0.888	45.100	44.212	-29.788	74.000
9848.000	1.766	43.460	45.226	-28.774	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 : Intelligent Robot
Test Item : Harmonic Radiated Emission Data
Test Mode : Mode 2: Transmit (802.11g 6Mbps) (2412MHz)
Test Date : 2016/09/09

Frequency	Correct Factor	Reading Level	Measurement Level	Margin	Limit
MHz	dB	dBμV	dBμV/m	dB	dBμV/m
Horizontal					
Peak Detector:					
4824.000	-4.612	52.450	47.838	-26.162	74.000
7236.000	-1.027	45.420	44.393	-29.607	74.000
9648.000	1.529	43.830	45.359	-28.641	74.000
Average Detector:					
--	--	--	--	--	54.000
Vertical					
Peak Detector:					
4824.000	-4.612	48.900	44.288	-29.712	74.000
7236.000	-1.027	45.140	44.113	-29.887	74.000
9648.000	1.529	43.310	44.839	-29.161	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 = 1kHz, 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 : Intelligent Robot
Test Item : Harmonic Radiated Emission Data
Test Mode : Mode 2: Transmit (802.11g 6Mbps) (2437 MHz)
Test Date : 2016/09/09

Frequency	Correct Factor	Reading Level	Measurement Level	Margin	Limit
MHz	dB	dBμV	dBμV/m	dB	dBμV/m
Horizontal					
Peak Detector:					
4874.000	-4.550	51.890	47.340	-26.660	74.000
7311.000	-0.952	45.240	44.288	-29.712	74.000
9748.000	1.634	44.020	45.654	-28.346	74.000
Average Detector:					
--	--	--	--	--	54.000
Vertical					
Peak Detector:					
4874.000	-4.550	48.840	44.290	-29.710	74.000
7311.000	-0.952	45.250	44.298	-29.702	74.000
9748.000	1.634	44.370	46.004	-27.996	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 = 1kHz, 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 : Intelligent Robot
Test Item : Harmonic Radiated Emission Data
Test Mode : Mode 2: Transmit (802.11g 6Mbps) (2462 MHz)
Test Date : 2016/09/09

Frequency	Correct Factor	Reading Level	Measurement Level	Margin	Limit
MHz	dB	dBµV	dBµV/m	dB	dBµV/m
Horizontal					
Peak Detector:					
4924.000	-4.477	52.850	48.373	-25.627	74.000
7386.000	-0.888	45.120	44.232	-29.768	74.000
9848.000	1.766	43.570	45.336	-28.664	74.000
Average Detector:					
--	--	--	--	--	54.000
Vertical					
Peak Detector:					
4924.000	-4.477	49.170	44.693	-29.307	74.000
7386.000	-0.888	45.210	44.322	-29.678	74.000
9848.000	1.766	43.790	45.556	-28.444	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 = 1kHz, 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 : Intelligent Robot
Test Item : Harmonic Radiated Emission Data
Test Mode : Mode 3: Transmit (802.11n MCS0 7.2Mbps 20M-BW)(2412MHz)
Test Date : 2016/09/09

Frequency	Correct Factor	Reading Level	Measurement Level	Margin	Limit
MHz	dB	dBμV	dBμV/m	dB	dBμV/m
Horizontal					
Peak Detector:					
4824.000	-4.612	51.890	47.278	-26.722	74.000
7236.000	-1.027	45.240	44.213	-29.787	74.000
9648.000	1.529	43.270	44.799	-29.201	74.000
Average Detector:					
--	--	--	--	--	54.000
Vertical					
Peak Detector:					
4824.000	-4.612	48.160	43.548	-30.452	74.000
7236.000	-1.027	46.290	45.263	-28.737	74.000
9648.000	1.529	43.510	45.039	-28.961	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 = 1kHz, 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 : Intelligent Robot
Test Item : Harmonic Radiated Emission Data
Test Mode : Mode 3: Transmit (802.11n MCS0 7.2Mbps 20M-BW) (2437 MHz)
Test Date : 2016/09/09

Frequency	Correct Factor	Reading Level	Measurement Level	Margin	Limit
MHz	dB	dBμV	dBμV/m	dB	dBμV/m
Horizontal					
Peak Detector:					
4874.000	-4.550	50.320	45.770	-28.230	74.000
7311.000	-0.952	45.760	44.808	-29.192	74.000
9748.000	1.634	44.340	45.974	-28.026	74.000
Average Detector:					
--	--	--	--	--	54.000
Vertical					
Peak Detector:					
4874.000	-4.550	47.960	43.410	-30.590	74.000
7311.000	-0.952	45.020	44.068	-29.932	74.000
9748.000	1.634	44.210	45.844	-28.156	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 = 1kHz, 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 : Intelligent Robot
Test Item : Harmonic Radiated Emission Data
Test Mode : Mode 3: Transmit (802.11n MCS0 7.2Mbps 20M-BW) (2462 MHz)
Test Date : 2016/09/09

Frequency	Correct Factor	Reading Level	Measurement Level	Margin	Limit
MHz	dB	dBμV	dBμV/m	dB	dBμV/m
Horizontal					
Peak Detector:					
4924.000	-4.477	51.090	46.613	-27.387	74.000
7386.000	-0.888	44.770	43.882	-30.118	74.000
9848.000	1.766	44.290	46.056	-27.944	74.000
Average Detector:					
--	--	--	--	--	54.000
Vertical					
Peak Detector:					
4924.000	-4.477	48.150	43.673	-30.327	74.000
7386.000	-0.888	45.450	44.562	-29.438	74.000
9848.000	1.766	43.600	45.366	-28.634	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 = 1kHz, 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 : Intelligent Robot
Test Item : General Radiated Emission Data
Test Mode : Mode 1: Transmit (802.11b 1Mbps)(2437 MHz)
Test Date : 2017/07/12

Frequency	Correct Factor	Reading Level	Measurement Level	Margin	Limit
MHz	dB	dBμV	dBμV/m	dB	dBμV/m
Horizontal					
149.493	-8.756	35.797	27.042	-16.458	43.500
270.391	-9.024	35.922	26.897	-19.103	46.000
347.710	-7.027	36.200	29.173	-16.827	46.000
396.913	-5.668	35.446	29.778	-16.222	46.000
491.101	-3.701	35.068	31.367	-14.633	46.000
582.478	-1.748	35.377	33.629	-12.371	46.000
Vertical					
145.275	-8.906	35.966	27.060	-16.440	43.500
254.928	-9.699	32.964	23.266	-22.734	46.000
329.435	-7.431	35.728	28.297	-17.703	46.000
394.101	-5.745	34.827	29.082	-16.918	46.000
495.319	-3.627	34.157	30.529	-15.471	46.000
609.188	-1.262	35.396	34.135	-11.865	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 = 1kHz, 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.

Product : Intelligent Robot
Test Item : General Radiated Emission Data
Test Mode : Mode 2: Transmit (802.11g 6Mbps)(2437 MHz)
Test Date : 2017/07/12

Frequency	Correct Factor	Reading Level	Measurement Level	Margin	Limit
MHz	dB	dBμV	dBμV/m	dB	dBμV/m
Horizontal					
167.768	-8.930	35.503	26.572	-16.928	43.500
309.754	-7.862	35.889	28.026	-17.974	46.000
419.406	-5.131	34.375	29.244	-16.756	46.000
503.754	-3.470	35.786	32.316	-13.684	46.000
581.072	-1.783	36.009	34.226	-11.774	46.000
633.087	-1.067	34.902	33.835	-12.165	46.000
Vertical					
152.304	-8.700	35.571	26.871	-16.629	43.500
298.507	-8.106	36.388	28.282	-17.718	46.000
378.638	-6.177	35.324	29.146	-16.854	46.000
451.739	-4.387	34.953	30.566	-15.434	46.000
503.754	-3.470	35.427	31.957	-14.043	46.000
609.188	-1.262	35.691	34.430	-11.570	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 = 1kHz, 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.

Product : Intelligent Robot
Test Item : General Radiated Emission Data
Test Mode : Mode 3: Transmit (802.11n MCS0 7.2Mbps 20M-BW)(2437 MHz)
Test Date : 2017/07/12

Frequency	Correct Factor	Reading Level	Measurement Level	Margin	Limit
MHz	dB	dBμV	dBμV/m	dB	dBμV/m
Horizontal					
143.870	-8.956	35.297	26.340	-17.160	43.500
276.014	-8.729	34.315	25.586	-20.414	46.000
344.899	-7.089	36.026	28.937	-17.063	46.000
439.087	-4.672	33.965	29.292	-16.708	46.000
540.304	-2.732	34.847	32.115	-13.885	46.000
755.391	0.820	35.642	36.462	-9.538	46.000
Vertical					
142.464	-9.007	34.377	25.370	-18.130	43.500
268.986	-9.099	35.330	26.231	-19.769	46.000
384.261	-6.019	35.240	29.221	-16.779	46.000
457.362	-4.287	35.304	31.017	-14.983	46.000
526.246	-3.015	35.332	32.317	-13.683	46.000
661.203	-0.701	36.962	36.261	-9.739	46.000

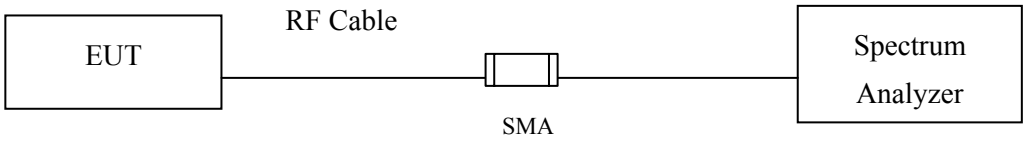
Note:

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 = 1kHz, 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

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 KDB558074 for compliance to FCC 47CFR 15.247 requirements.
Set RBW = 100 kHz, Set VBW> RBW, scan up through 10th harmonic.

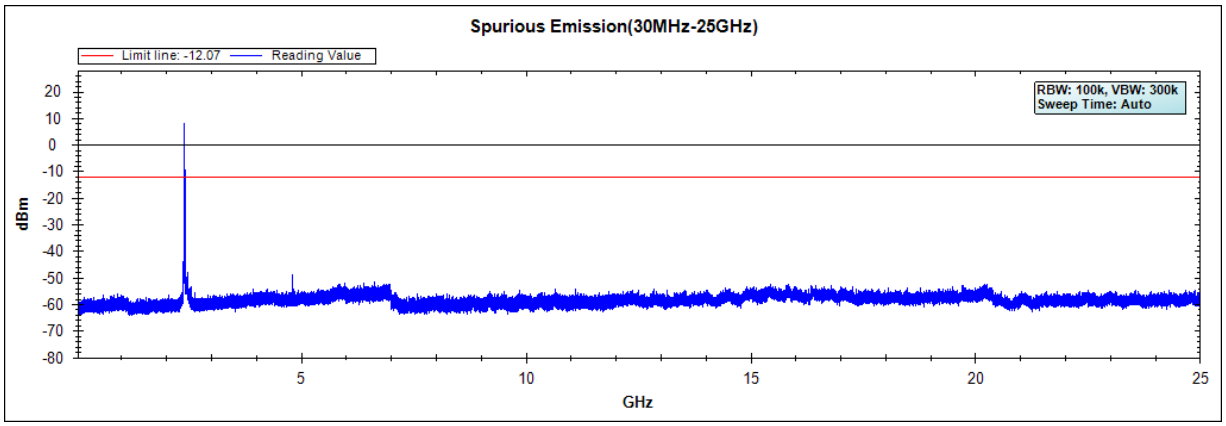
5.4. Uncertainty

±1.23dB

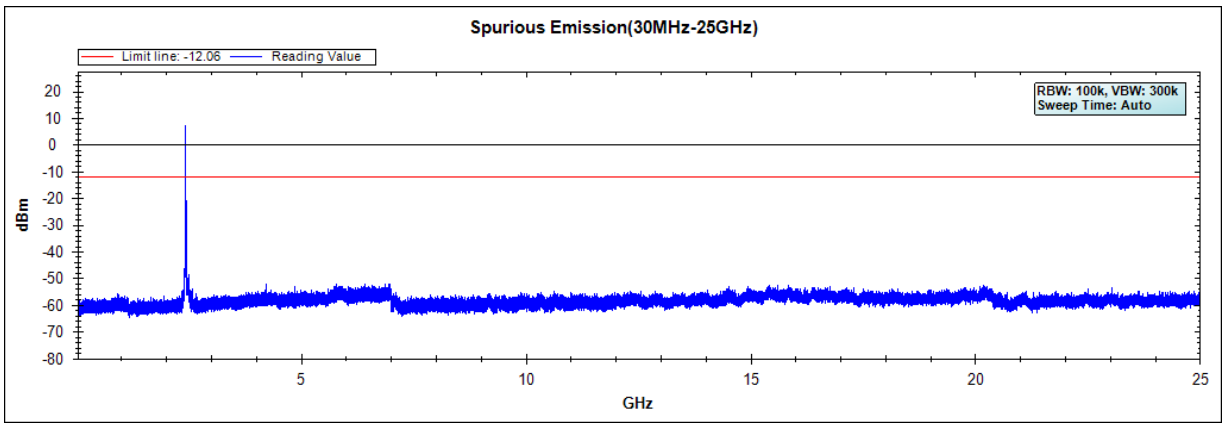
5.5. Test Result of RF antenna conducted test

Product	:	Intelligent Robot
Test Item	:	RF antenna conducted test
Test Mode	:	Mode 1: Transmit (802.11b 1Mbps)
Test Date	:	2016/09/05

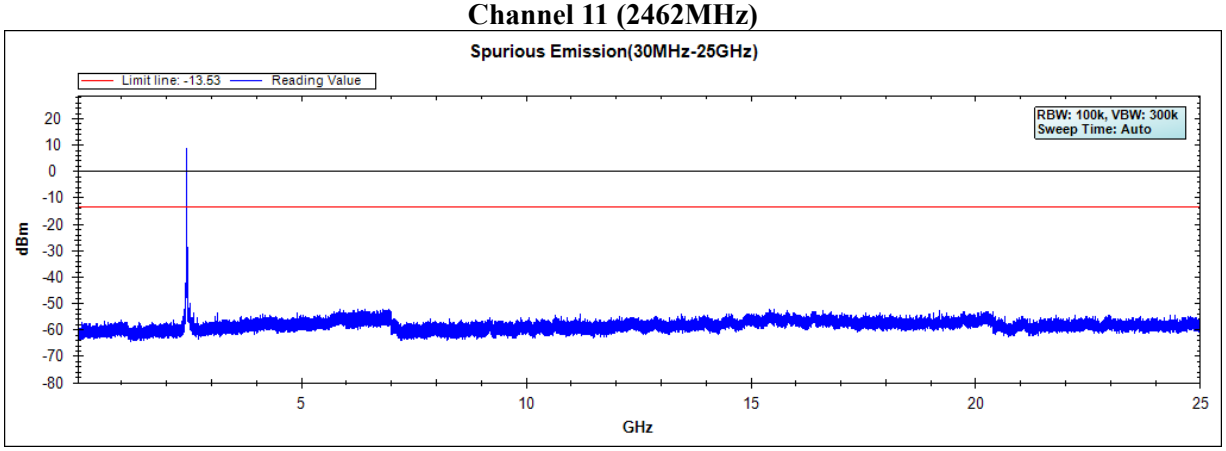
Channel 01 (2412MHz)



Channel 06 (2437MHz)



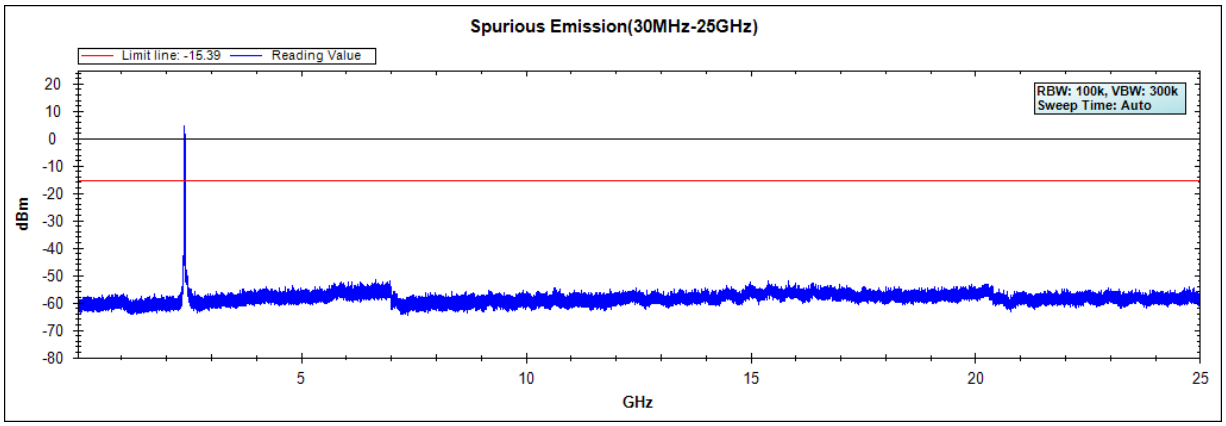
Channel 11 (2462MHz)



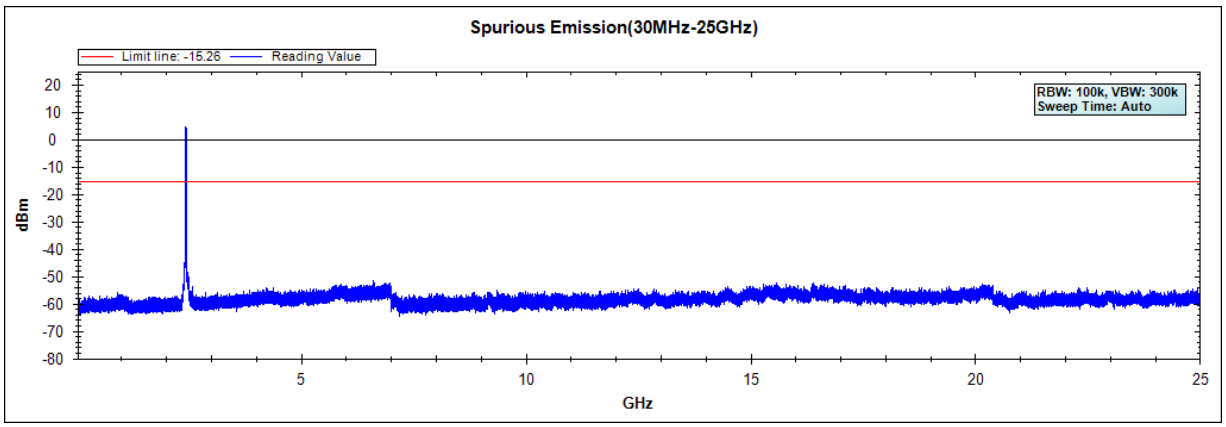
Note: The above test pattern is synthesized by multiple of the frequency range.

Product	:	Intelligent Robot
Test Item	:	RF Antenna Conducted Spurious
Test Mode	:	Mode 2: Transmit (802.11g 6Mbps)
Test Date	:	2016/09/05

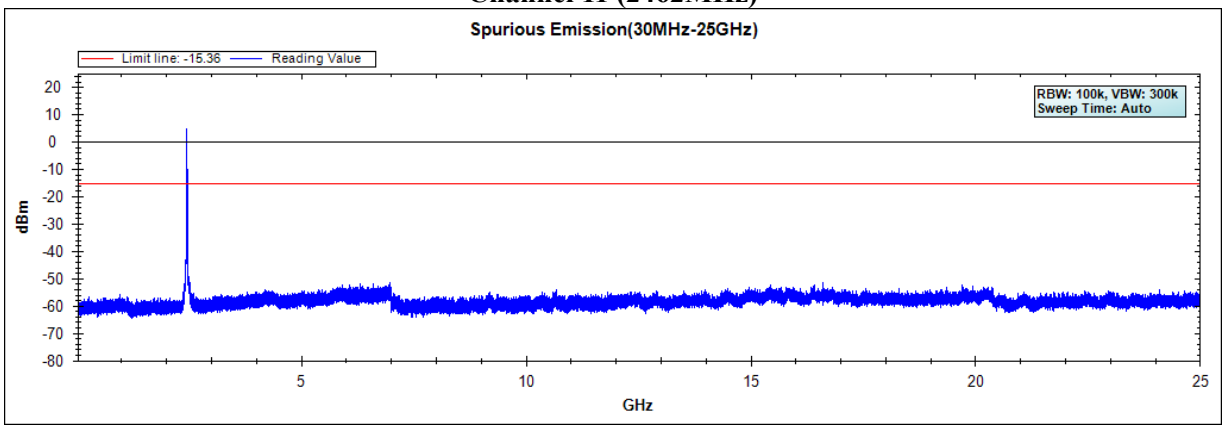
Channel 01 (2412MHz)



Channel 06 (2437MHz)



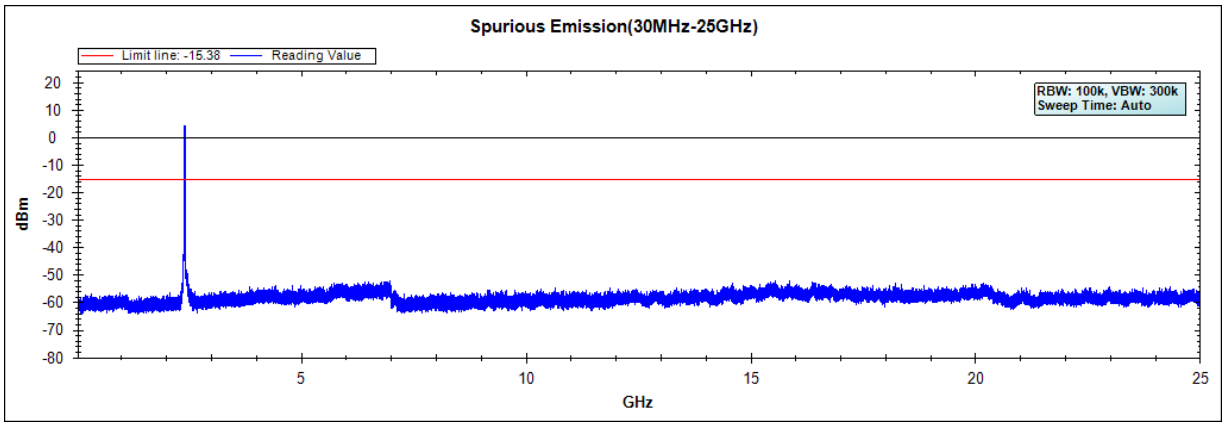
Channel 11 (2462MHz)



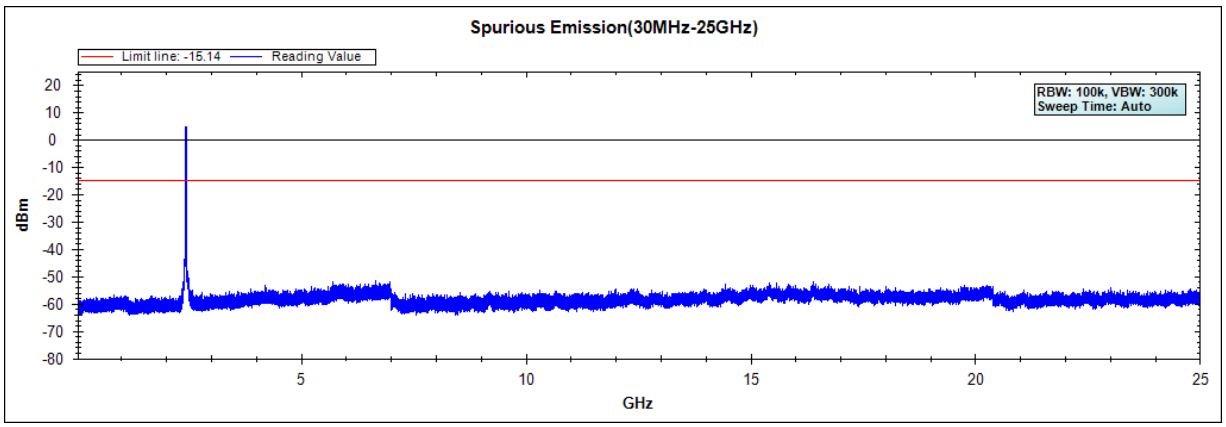
Note: The above test pattern is synthesized by multiple of the frequency range.

Product	:	Intelligent Robot
Test Item	:	RF Antenna Conducted Spurious
Test Mode	:	Mode 3: Transmit (802.11n MCS0 7.2Mbps 20M-BW)
Test Date	:	2016/09/05

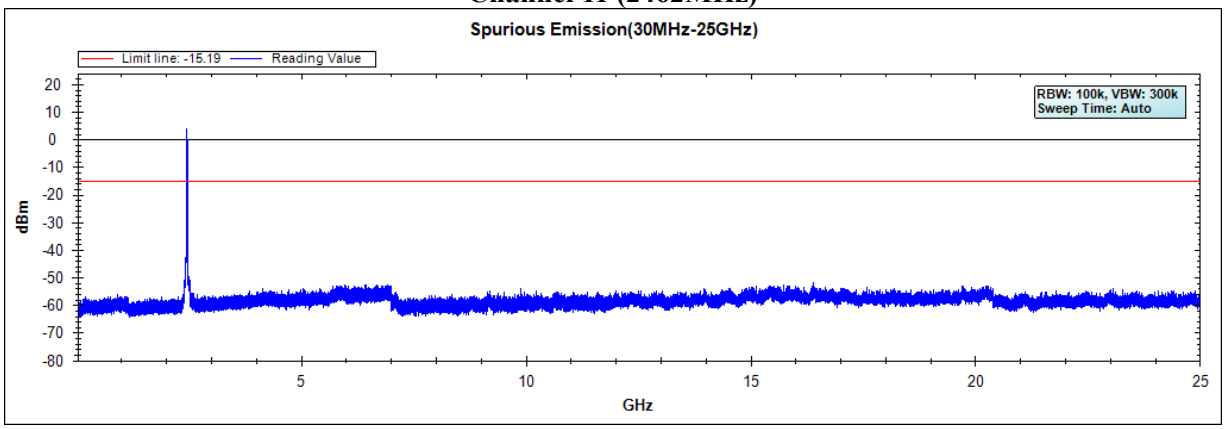
Channel 01 (2412MHz)



Channel 06 (2437MHz)



Channel 11 (2462MHz)

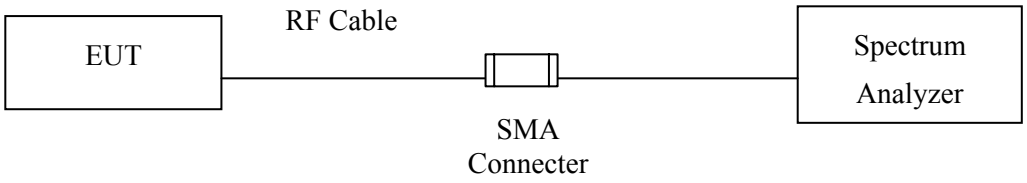


Note: The above test pattern is synthesized by multiple of the frequency range.

6. Band Edge

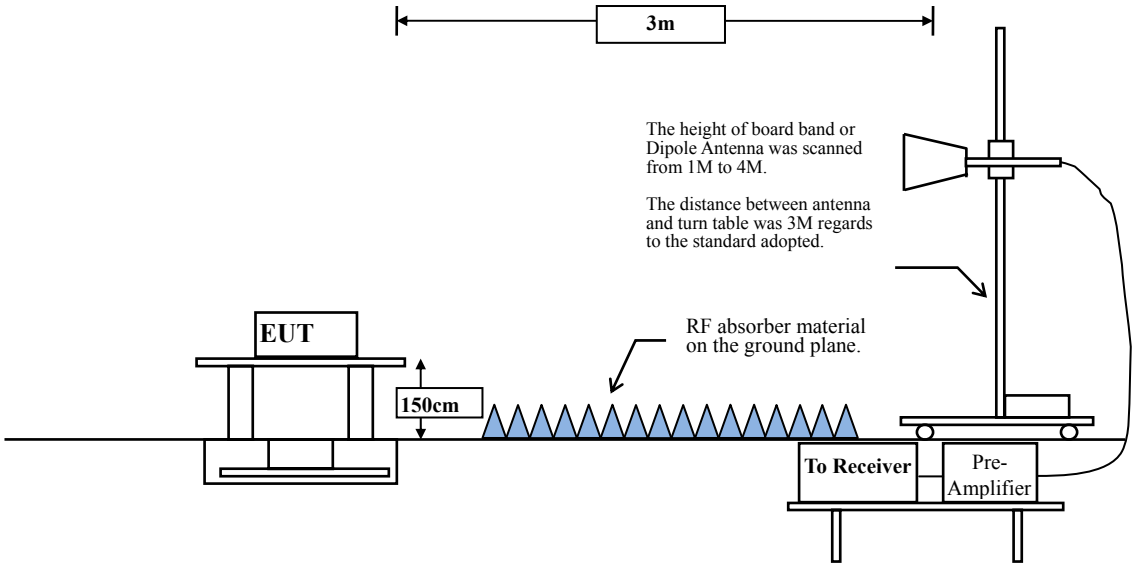
6.1. Test Setup

RF Conducted Measurement



RF Radiated Measurement:

Above 1GHz



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 C63.4:2014 on radiated measurement.
The average measurement tested according to KDB 558074 section 12.2.5.3. Reduced VBW averaging across on- and off-times of the EUT transmissions with max hold.

VBW ≥ 1/T:

Mode	Duty Cycle	T	1/T	VBW Setting
802.11b	0.996	--	--	10 Hz
802.11g	0.957	1.4637 ms	683 Hz	1 KHz
802.11n20	0.939	1.3550 ms	738 Hz	1 KHz

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 : Intelligent Robot
Test Item : Band Edge Data
Test Mode : Mode 1: Transmit (802.11b 1Mbps) (2412MHz)
Test Date : 2016/09/08

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
01 (Peak)	2388.986	11.893	41.059	52.952	74.00	54.00	Pass
01 (Peak)	2390.000	11.897	40.997	52.894	74.00	54.00	Pass
01 (Peak)	2396.957	11.923	49.842	61.765	--	--	--
01 (Peak)	2400.000	11.935	47.483	59.418	--	--	--
01 (Peak)	2413.043	11.985	93.277	105.262	--	--	--
01 (Average)	2390.000	11.897	30.725	42.622	74.00	54.00	Pass
01 (Average)	2396.667	11.923	43.949	55.871	--	--	--
01 (Average)	2400.000	11.935	39.589	51.524	--	--	--
01 (Average)	2412.754	11.984	89.704	101.688	--	--	--

Figure Channel 01: Horizontal (Peak)

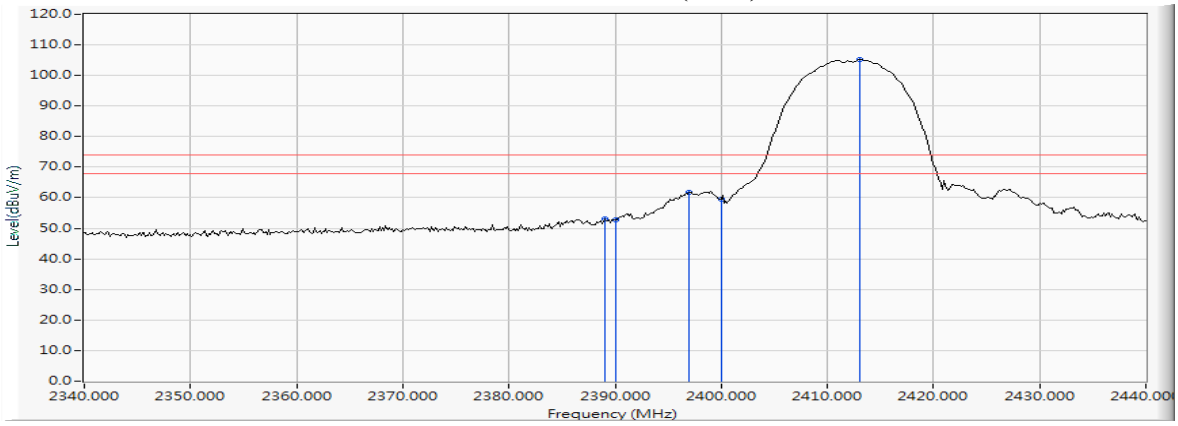
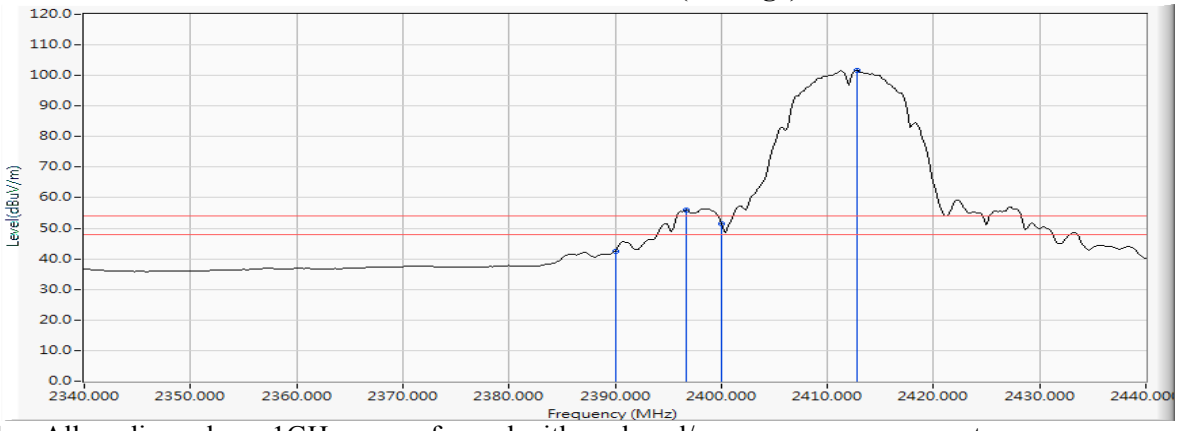


Figure Channel 01: Horizontal (Average)



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 : Intelligent Robot
Test Item : Band Edge Data
Test Mode : Mode 1: Transmit (802.11b 1Mbps) (2412MHz)
Test Date : 2016/09/08

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
01 (Peak)	2383.913	11.874	44.967	56.841	74.00	54.00	Pass
01 (Peak)	2390.000	11.897	41.139	53.036	74.00	54.00	Pass
01 (Peak)	2398.696	11.929	51.202	63.132	--	--	--
01 (Peak)	2400.000	11.935	49.306	61.241	--	--	--
01 (Peak)	2413.043	11.985	92.807	104.792	--	--	--
01 (Average)	2390.000	11.897	30.305	42.202	74.00	54.00	Pass
01 (Average)	2398.551	11.929	44.885	56.814	--	--	--
01 (Average)	2400.000	11.935	39.788	51.723	--	--	--
01 (Average)	2411.304	11.978	89.080	101.058	--	--	--

Figure Channel 01: VERTICAL (Peak)

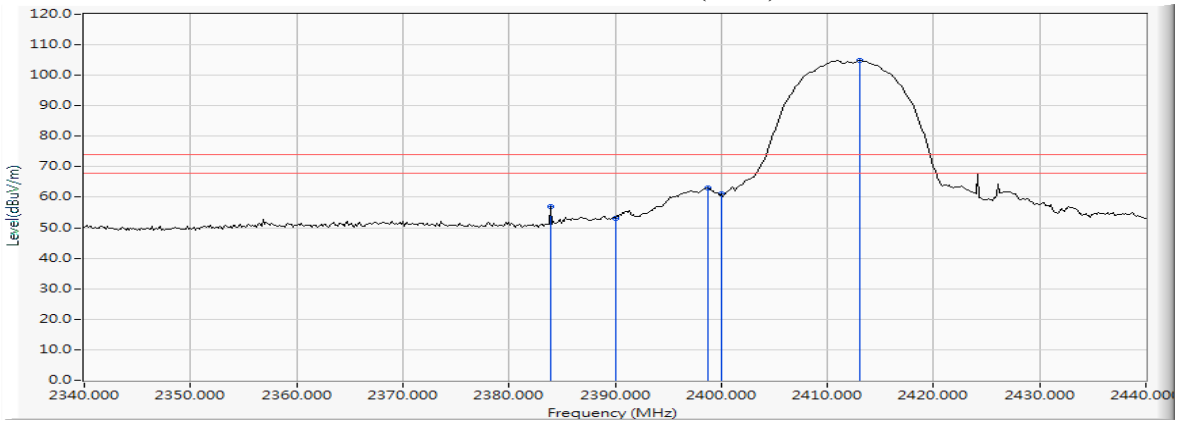
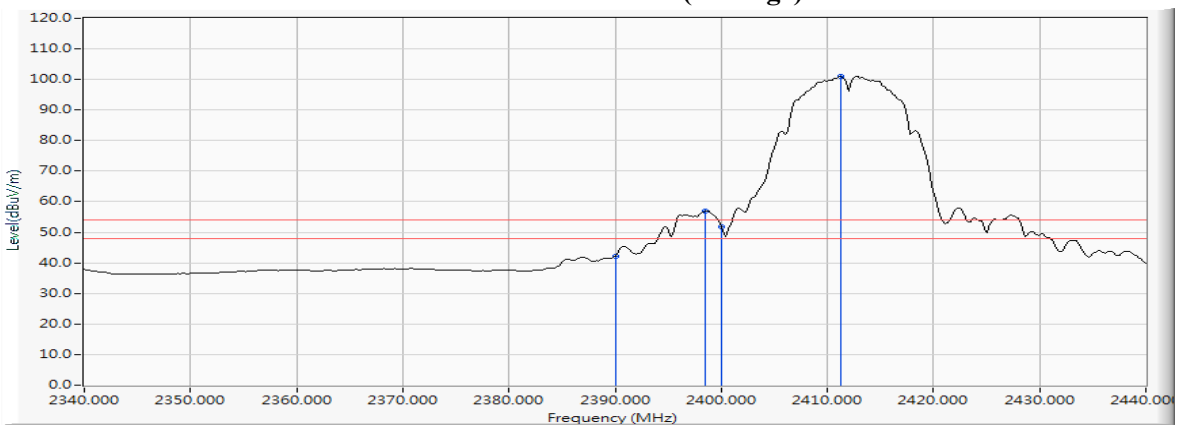


Figure Channel 01: VERTICAL (Average)



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 : Intelligent Robot
Test Item : Band Edge Data
Test Mode : Mode 1: Transmit (802.11b 1Mbps) (2462MHz)
Test Date : 2016/09/08

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
11 (Peak)	2462.920	12.189	94.388	106.576	--	--	--
11 (Peak)	2483.500	12.272	43.028	55.300	74.00	54.00	Pass
11 (Peak)	2486.254	12.282	43.773	56.056	74.00	54.00	Pass
11 (Average)	2461.181	12.181	90.899	103.079	--	--	--
11 (Average)	2483.500	12.272	36.185	48.457	74.00	54.00	Pass

Figure Channel 11: Horizontal (Peak)

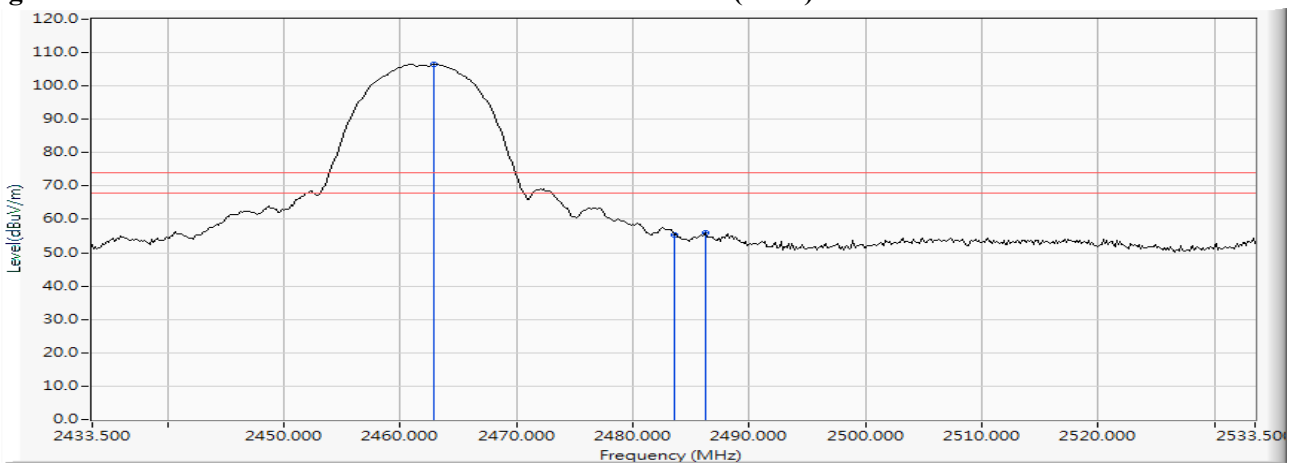
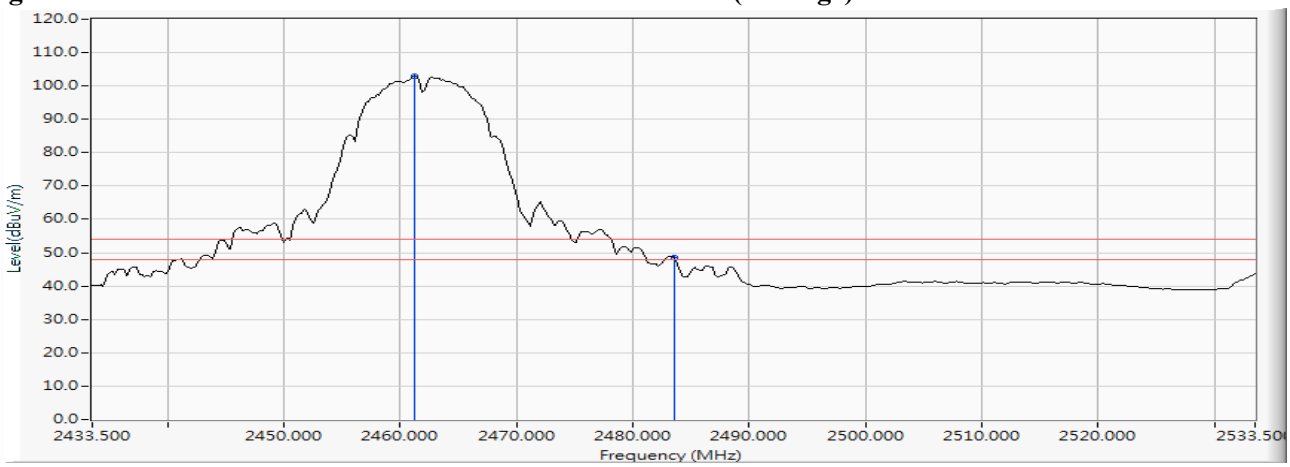


Figure Channel 11: Horizontal (Average)



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 : Intelligent Robot
Test Item : Band Edge Data
Test Mode : Mode 1: Transmit (802.11b 1Mbps) (2462MHz)
Test Date : 2016/09/08

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
11 (Peak)	2460.891	12.179	94.208	106.387	--	--	--
11 (Peak)	2483.500	12.272	42.532	54.804	74.00	54.00	Pass
11 (Average)	2461.181	12.181	90.750	102.930	--	--	--
11 (Average)	2483.500	12.272	34.689	46.961	74.00	54.00	Pass

Figure Channel 11: VERTICAL (Peak)

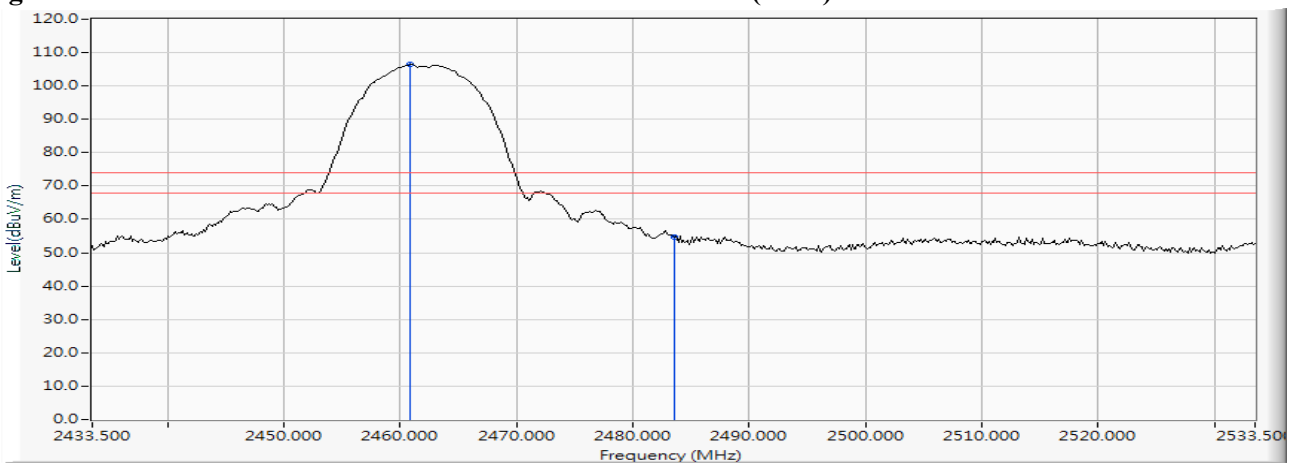


Figure Channel 11: VERTICAL (Average)

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 : Intelligent Robot
Test Item : Band Edge Data
Test Mode : Mode 2: Transmit (802.11g 6Mbps) (2412MHz)
Test Date : 2017/06/29

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
01 (Peak)	2390.000	13.556	51.395	64.951	74.00	54.00	Pass
01 (Peak)	2400.000	13.579	63.420	76.999	--	--	--
01 (Peak)	2410.290	13.604	95.919	109.523	--	--	--
01 (Average)	2390.000	13.556	37.806	51.362	74.00	54.00	Pass
01 (Average)	2400.000	13.579	50.258	63.837	--	--	--
01 (Average)	2414.493	13.614	87.928	101.542	--	--	--

Figure Channel 01: Horizontal (Peak)

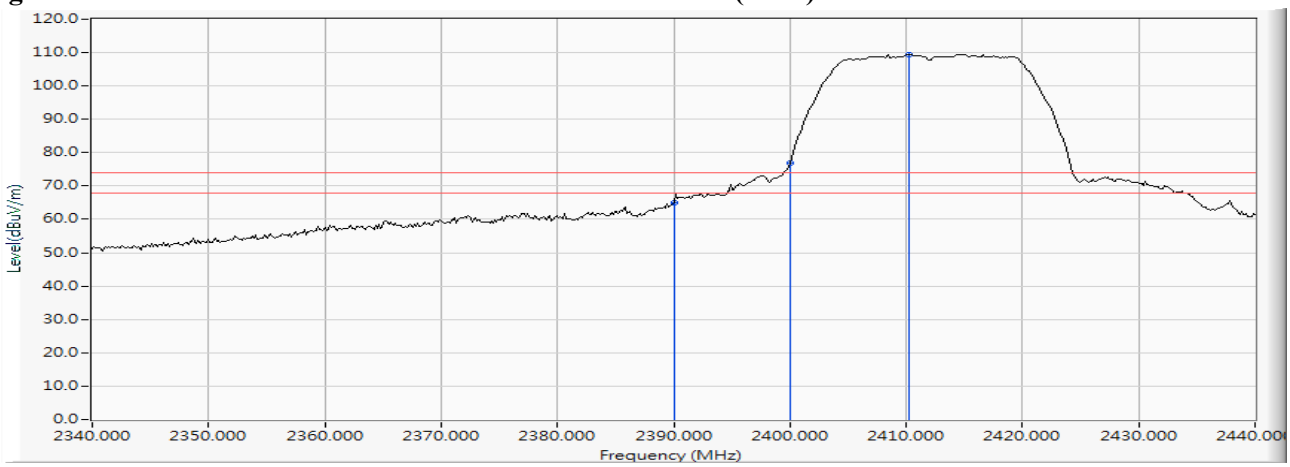
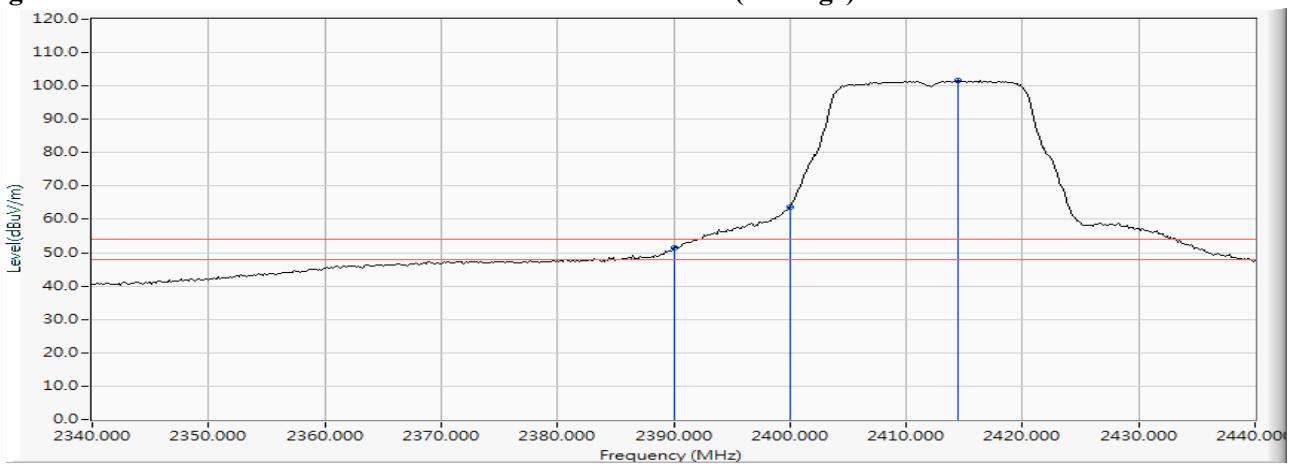


Figure Channel 01: Horizontal (Average)



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 = 1kHz, 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 : Intelligent Robot
Test Item : Band Edge Data
Test Mode : Mode 2: Transmit (802.11g 6Mbps) (2412MHz)
Test Date : 2017/06/29

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
01 (Peak)	2389.565	13.555	53.184	66.739	74.00	54.00	Pass
01 (Peak)	2390.000	13.556	52.286	65.842	74.00	54.00	Pass
01 (Peak)	2400.000	13.579	64.436	78.015	--	--	--
01 (Peak)	2410.290	13.604	96.758	110.362	--	--	--
01 (Average)	2390.000	13.556	40.137	53.693	74.00	54.00	Pass
01 (Average)	2400.000	13.579	52.197	65.776	--	--	--
01 (Average)	2414.348	13.614	88.920	102.533	--	--	--

Figure Channel 01: VERTICAL (Peak)

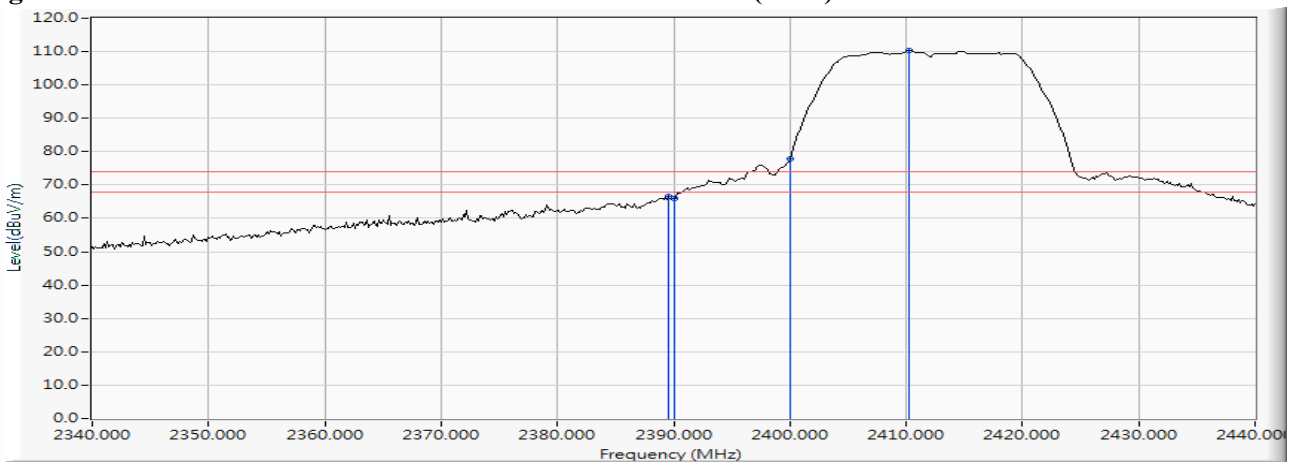
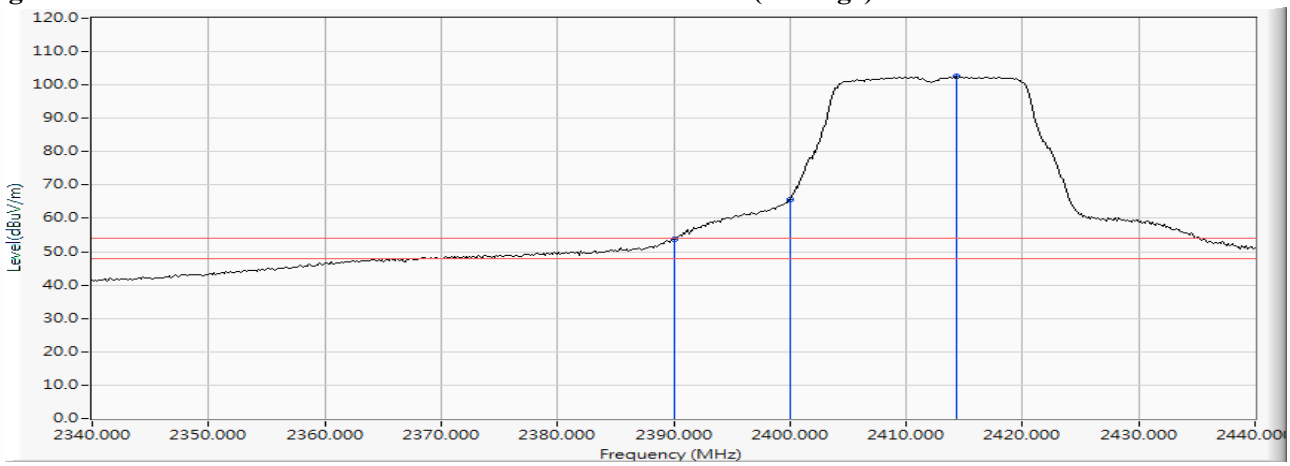


Figure Channel 01: VERTICAL (Average)



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 = 1kHz, 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 : Intelligent Robot
Test Item : Band Edge Data
Test Mode : Mode 2: Transmit (802.11g 6Mbps) (2462MHz)
Test Date : 2017/07/06

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
11 (Peak)	2460.167	13.736	94.567	108.304	--	--	--
11 (Peak)	2483.500	13.800	51.998	65.798	74.00	54.00	Pass
11 (Peak)	2483.790	13.800	52.538	66.338	74.00	54.00	Pass
11 (Average)	2459.732	13.736	86.601	100.337	--	--	--
11 (Average)	2483.500	13.800	38.599	52.399	74.00	54.00	Pass
11 (Average)	2483.645	13.800	39.147	52.947	74.00	54.00	Pass

Figure Channel 11: Horizontal (Peak)

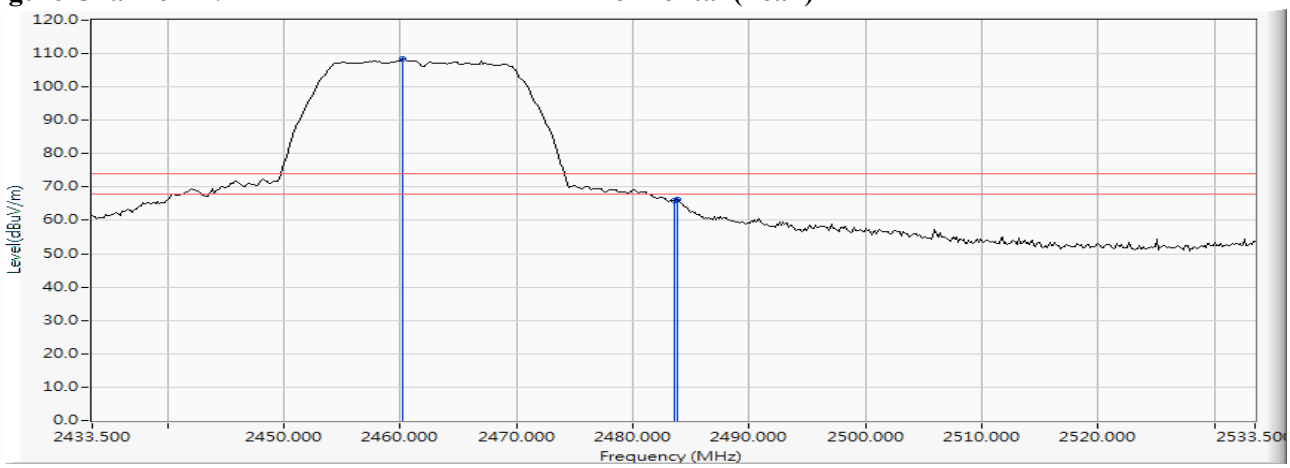
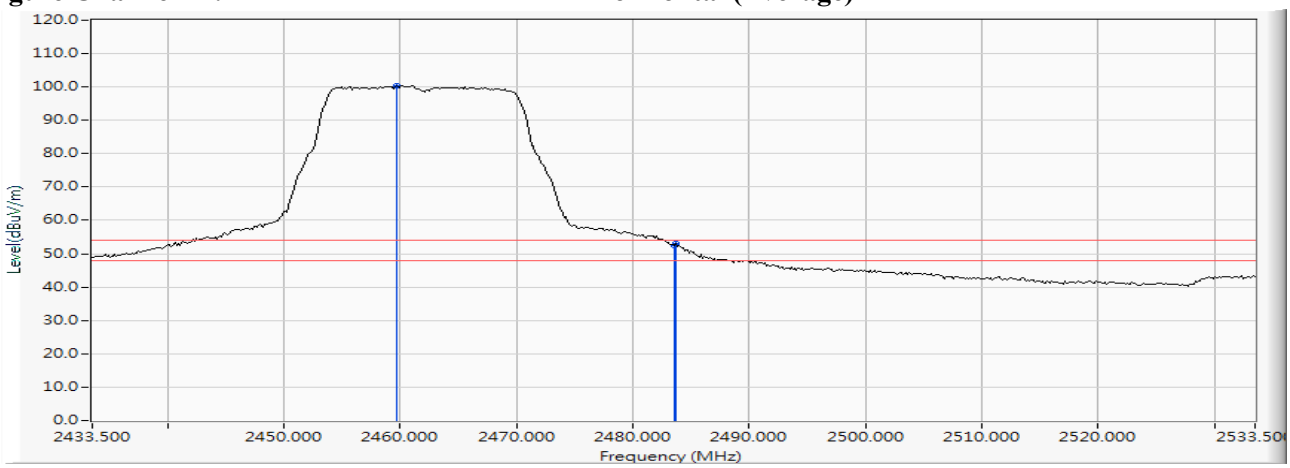


Figure Channel 11: Horizontal (Average)



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 = 1kHz, 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 : Intelligent Robot
Test Item : Band Edge Data
Test Mode : Mode 2: Transmit (802.11g 6Mbps) (2462MHz)
Test Date : 2017/07/06

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
11 (Peak)	2460.167	13.736	93.596	107.333	--	--	--
11 (Peak)	2483.500	13.800	50.249	64.049	74.00	54.00	Pass
11 (Average)	2460.022	13.736	85.530	99.267	--	--	--
11 (Average)	2483.500	13.800	37.146	50.946	74.00	54.00	Pass

Figure Channel 11: VERTICAL (Peak)

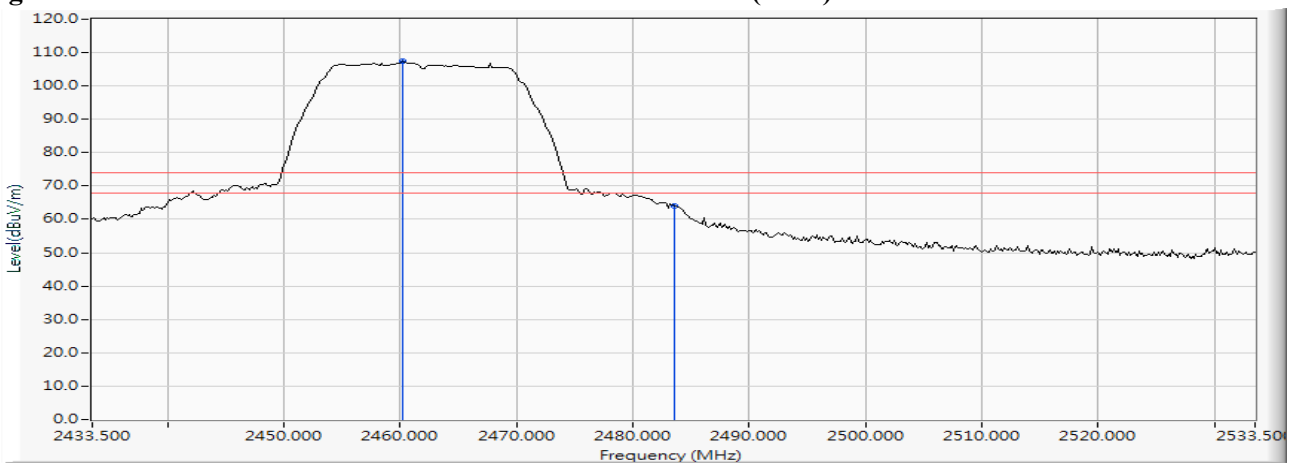
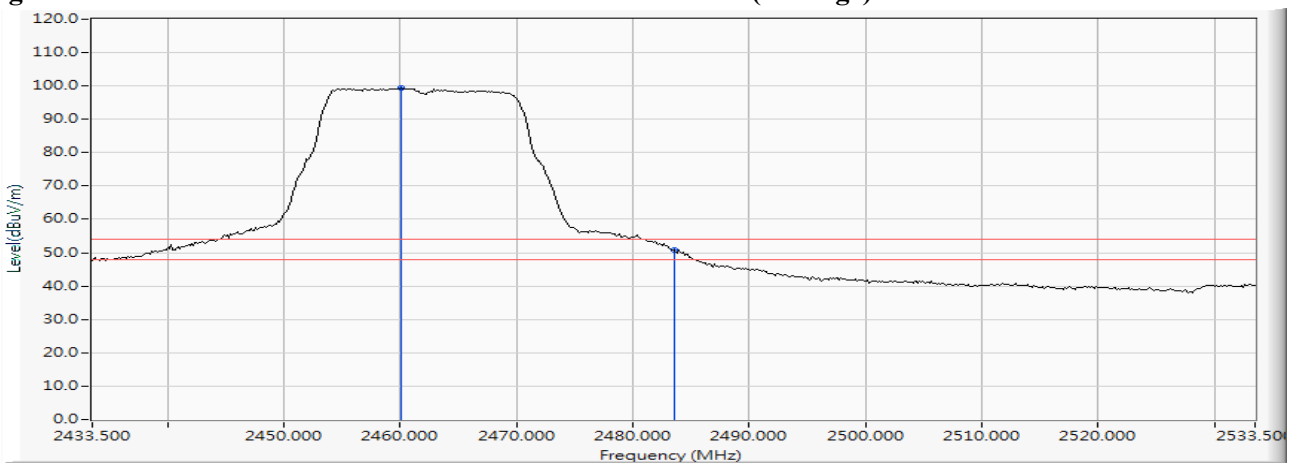


Figure Channel 11: VERTICAL (Average)



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 = 1kHz, 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 : Intelligent Robot
Test Item : Band Edge Data
Test Mode : Mode 3: Transmit (802.11n MCS0 7.2Mbps 20M-BW) (2412MHz)
Test Date : 2017/07/06

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
01 (Peak)	2390.000	13.556	48.999	62.555	74.00	54.00	Pass
01 (Peak)	2400.000	13.579	61.950	75.529	--	--	--
01 (Peak)	2416.087	13.617	94.931	108.549	--	--	--
01 (Average)	2390.000	13.556	33.936	47.492	74.00	54.00	Pass
01 (Average)	2400.000	13.579	45.705	59.284	--	--	--
01 (Average)	2416.522	13.618	86.031	99.650	--	--	--

Figure Channel 01: Horizontal (Peak)

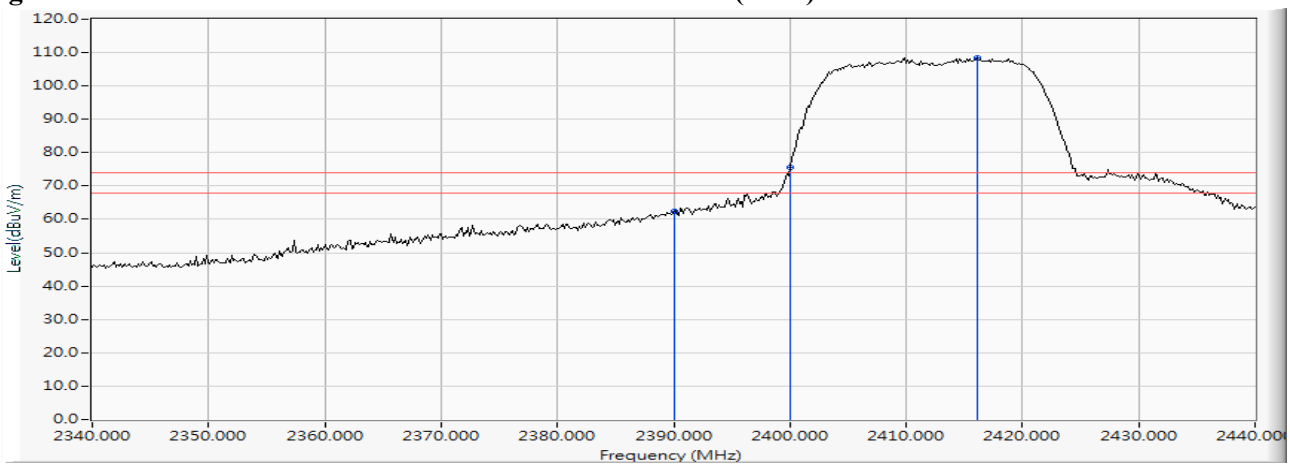
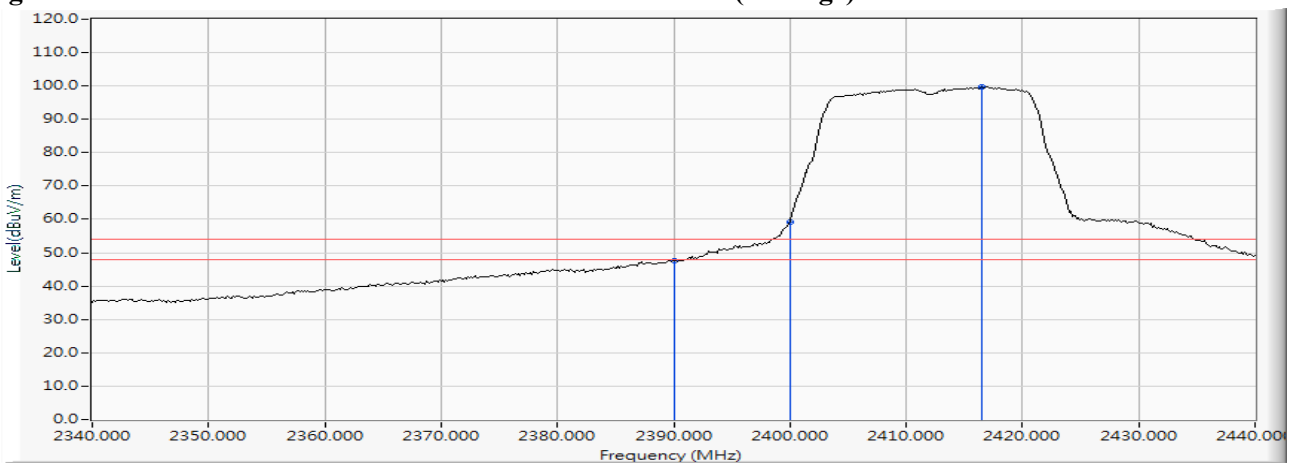


Figure Channel 01: Horizontal (Average)



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 = 1kHz, 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 : Intelligent Robot
Test Item : Band Edge Data
Test Mode : Mode 3: Transmit (802.11n MCS0 7.2Mbps 20M-BW) (2412MHz)
Test Date : 2017/07/06

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
01 (Peak)	2389.420	13.554	47.385	60.939	74.00	54.00	Pass
01 (Peak)	2390.000	13.556	45.455	59.011	74.00	54.00	Pass
01 (Peak)	2400.000	13.579	60.999	74.578	--	--	--
01 (Peak)	2416.812	13.619	93.951	107.570	--	--	--
01 (Average)	2390.000	13.556	32.089	45.645	74.00	54.00	Pass
01 (Average)	2400.000	13.579	44.804	58.383	--	--	--
01 (Average)	2417.391	13.621	84.858	98.479	--	--	--

Figure Channel 01: VERTICAL (Peak)

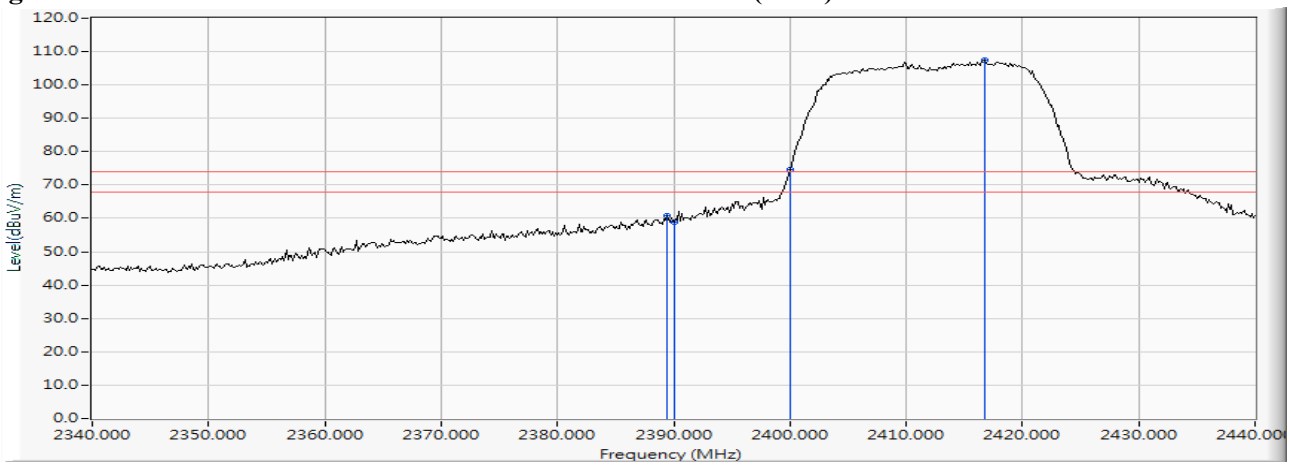
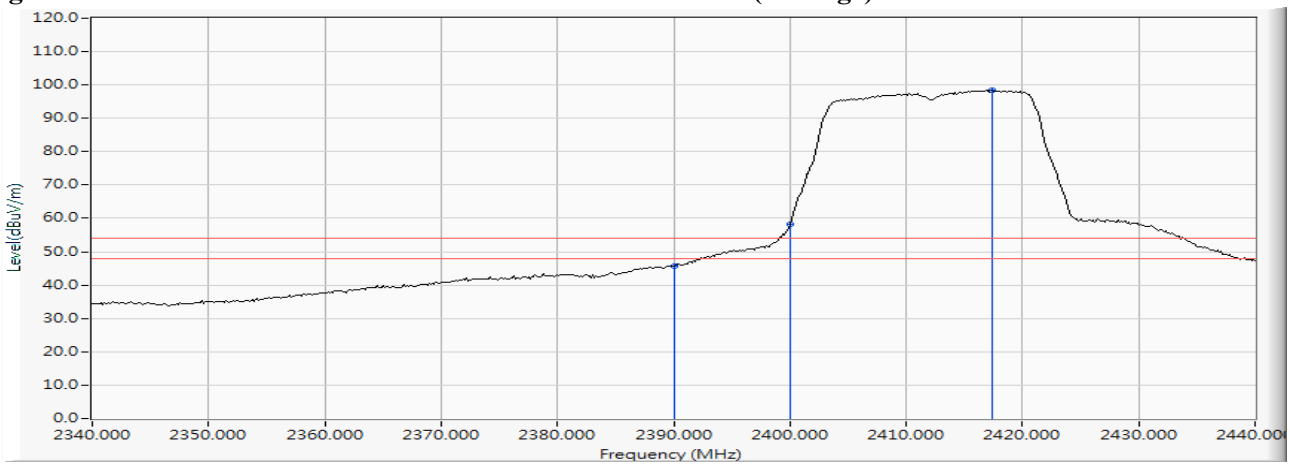


Figure Channel 01: VERTICAL (Average)



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 = 1kHz, 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 : Intelligent Robot
Test Item : Band Edge Data
Test Mode : Mode 3: Transmit (802.11n MCS0 7.2Mbps 20M-BW) (2462MHz)
Test Date : 2017/07/06

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
11 (Peak)	2459.877	13.736	95.444	109.180	--	--	--
11 (Peak)	2483.500	13.800	53.316	67.116	74.00	54.00	Pass
11 (Peak)	2483.935	13.801	53.746	67.547	74.00	54.00	Pass
11 (Average)	2460.457	13.739	85.974	99.712	--	--	--
11 (Average)	2483.500	13.800	39.304	53.104	74.00	54.00	Pass

Figure Channel 11: Horizontal (Peak)

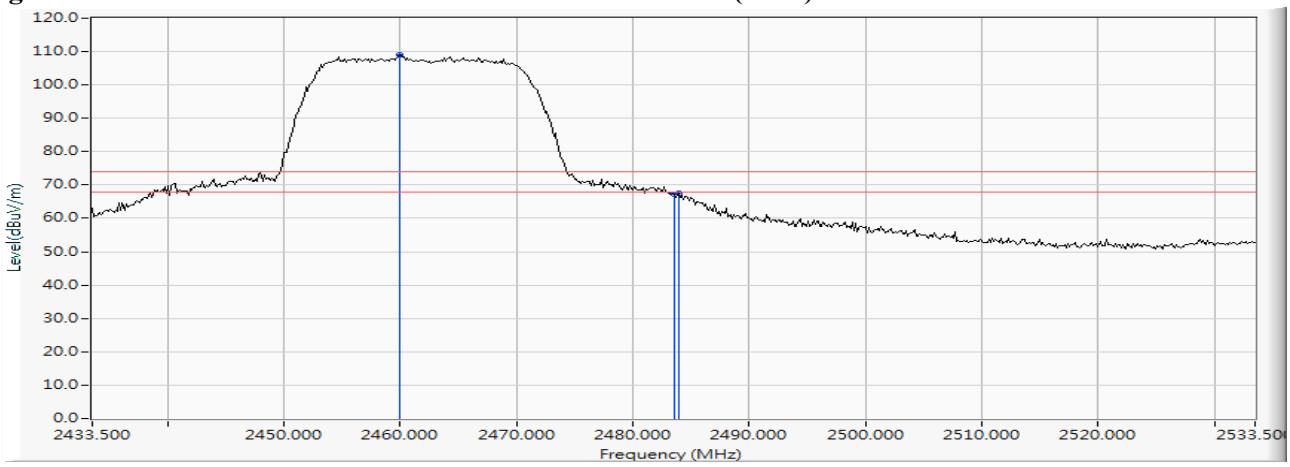
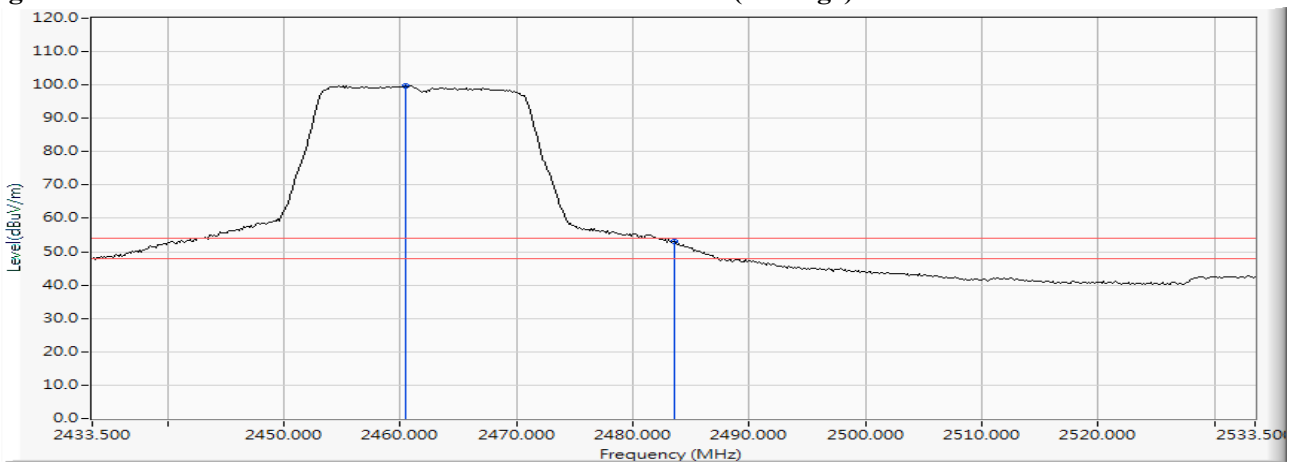


Figure Channel 11: Horizontal (Average)



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 = 1kHz, 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 : Intelligent Robot
Test Item : Band Edge Data
Test Mode : Mode 3: Transmit (802.11n MCS0 7.2Mbps 20M-BW) (2462MHz)
Test Date : 2017/07/06

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
11 (Peak)	2460.312	13.739	93.882	107.620	--	--	--
11 (Peak)	2483.500	13.800	51.654	65.454	74.00	54.00	Pass
11 (Peak)	2484.514	13.801	51.736	65.538	74.00	54.00	Pass
11 (Average)	2458.572	13.733	85.163	98.895	--	--	--
11 (Average)	2483.500	13.800	37.730	51.530	74.00	54.00	Pass

Figure Channel 11: VERTICAL (Peak)

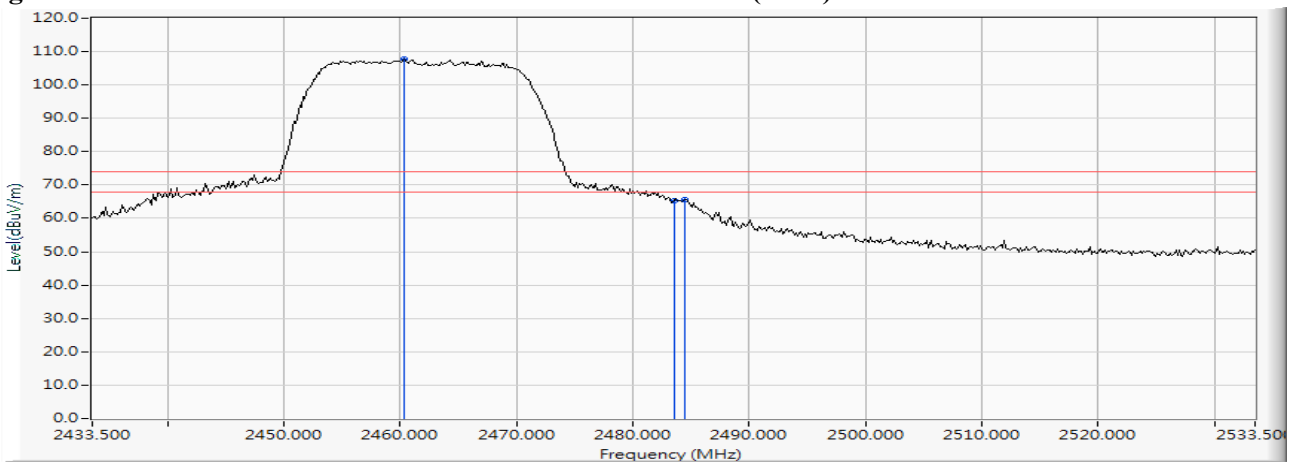
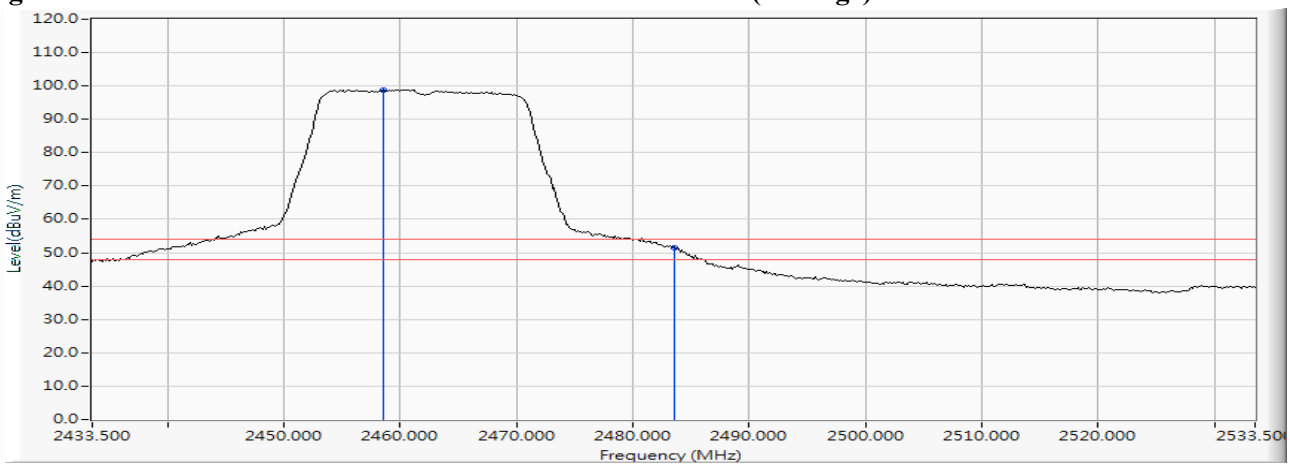


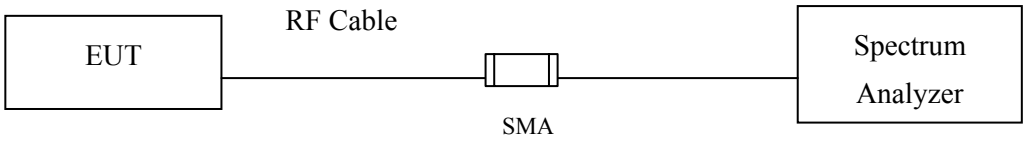
Figure Channel 11: VERTICAL (Average)



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 = 1kHz, 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 C63.10: 2013; tested according to DTS test procedure of Jan KDB558074 for compliance to FCC 47CFR 15.247 requirements.

7.4. Uncertainty

± 279.2Hz

7.5. Test Result of 6dB Bandwidth

Product : Intelligent Robot
Test Item : 6dB Bandwidth Data
Test Mode : Mode 1: Transmit (802.11b 1Mbps)
Test Date : 2016/09/05

Channel No.	Frequency (MHz)	Measurement Level (kHz)	Required Limit (kHz)	Result
01	2412	8150	>500	Pass
06	2437	8100	>500	Pass
11	2462	8150	>500	Pass

Figure Channel 01:

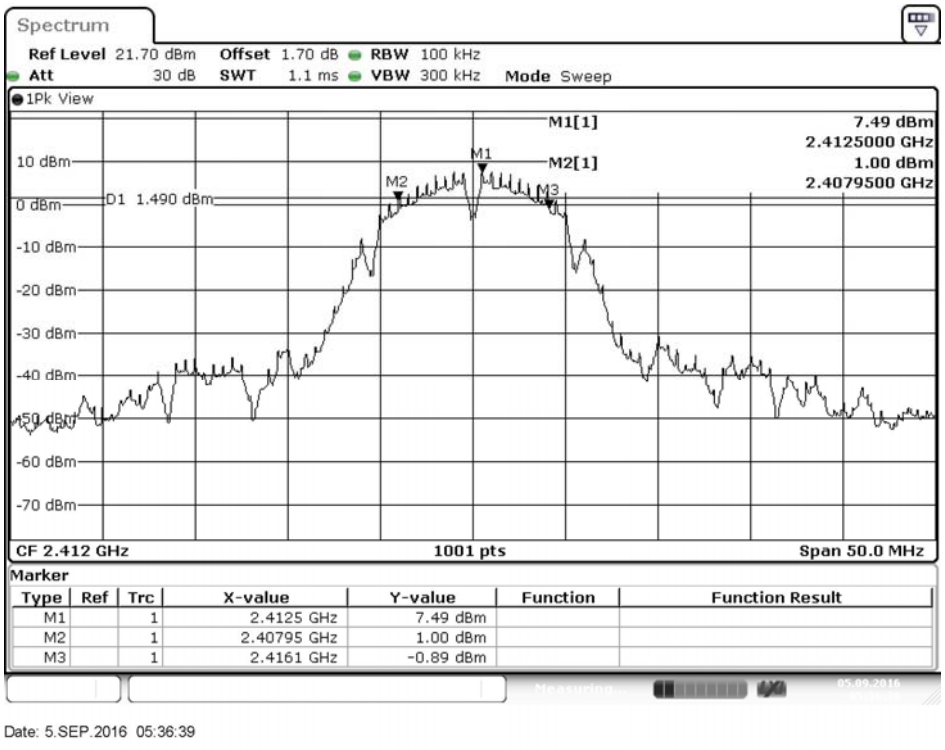
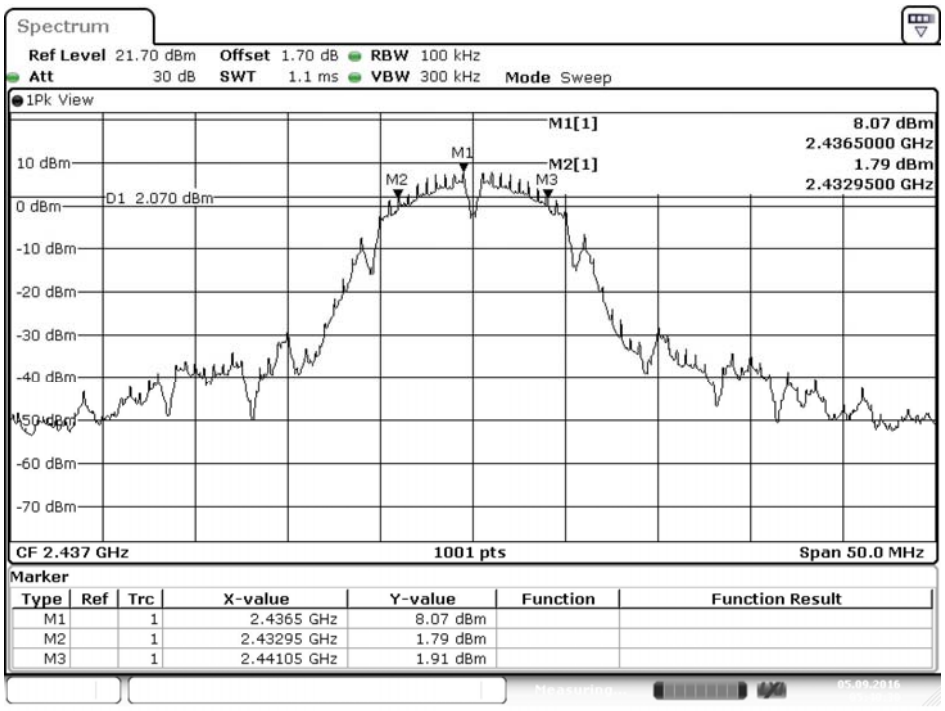
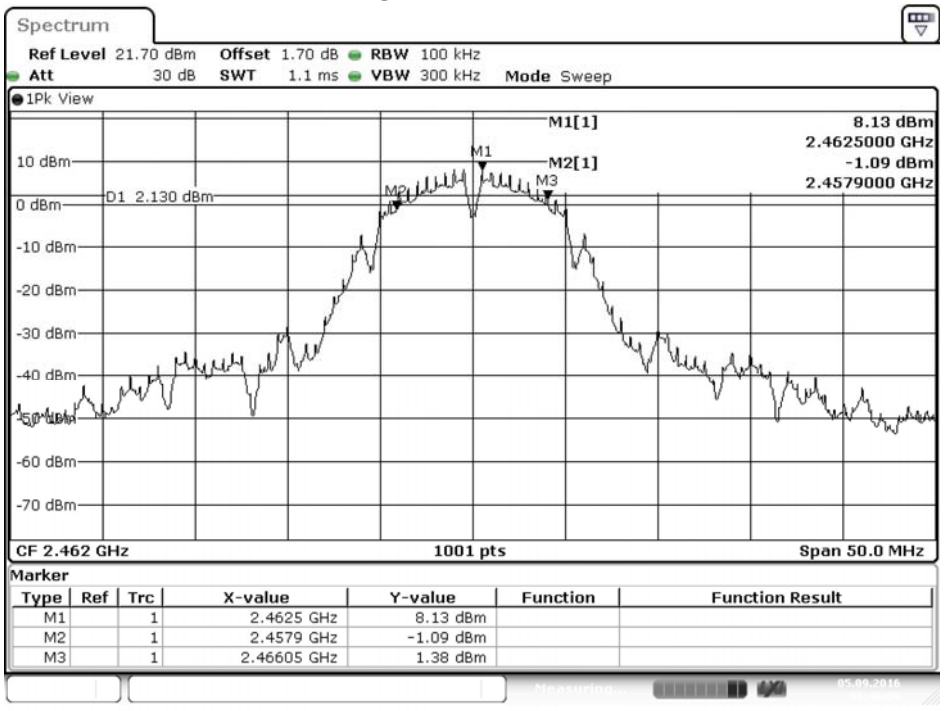


Figure Channel 06:



Date: 5.SEP.2016 05:40:30

Figure Channel 11:



Date: 5.SEP.2016 05:46:58

Product : Intelligent Robot
Test Item : 6dB Bandwidth Data
Test Mode : Mode 2: Transmit (802.11g 6Mbps) (2412MHz)
Test Date : 2016/09/05

Channel No.	Frequency (MHz)	Measurement Level (kHz)	Required Limit (kHz)	Result
01	2412	16400	>500	Pass
06	2437	16400	>500	Pass
11	2462	16400	>500	Pass

Figure Channel 01:

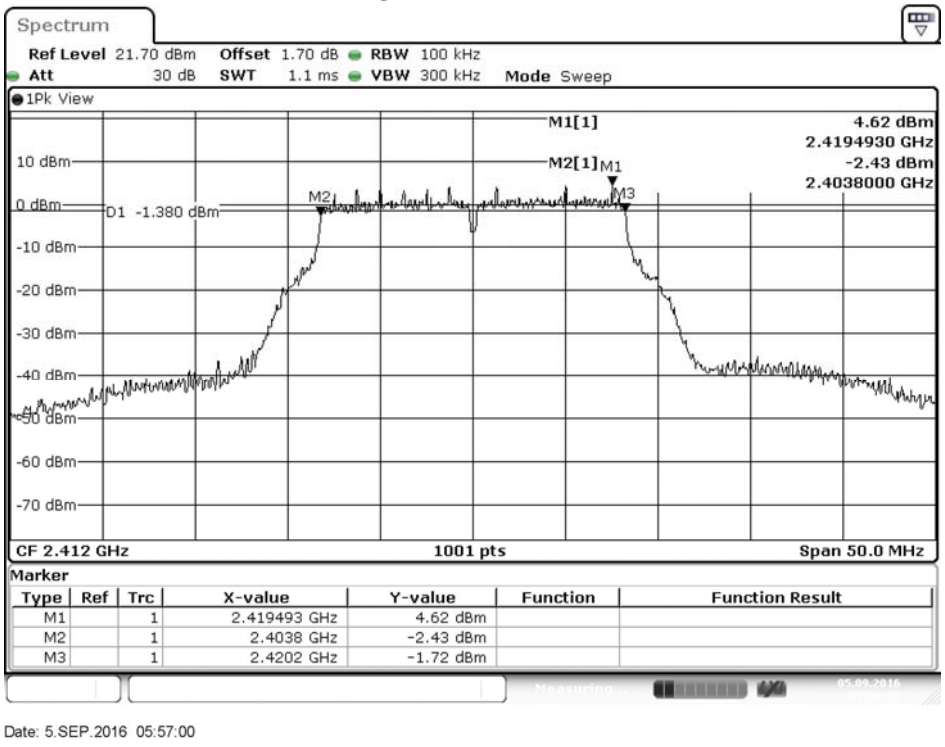
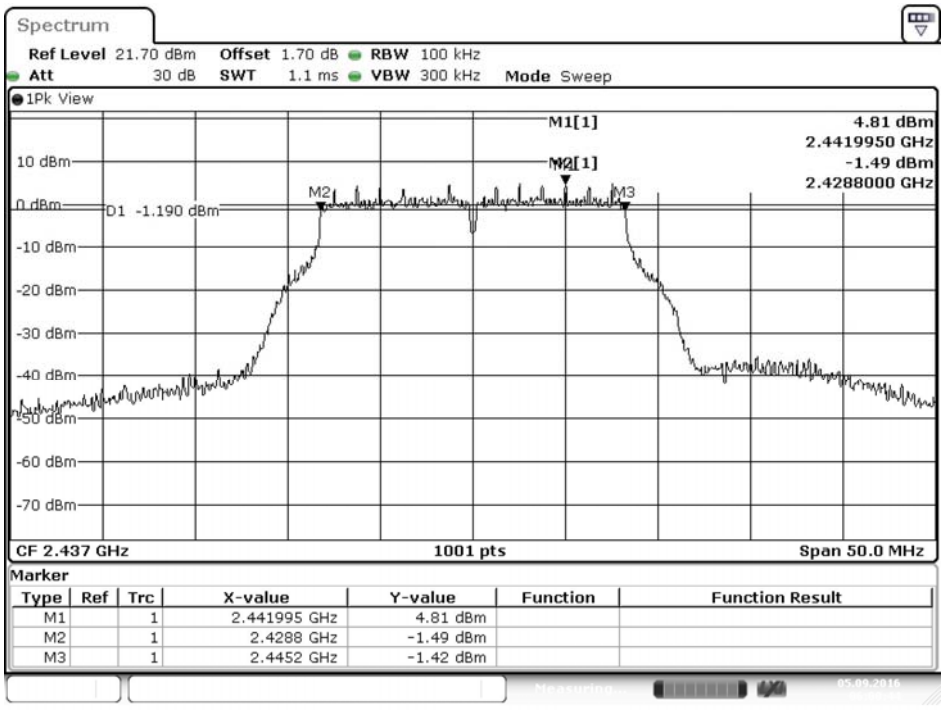
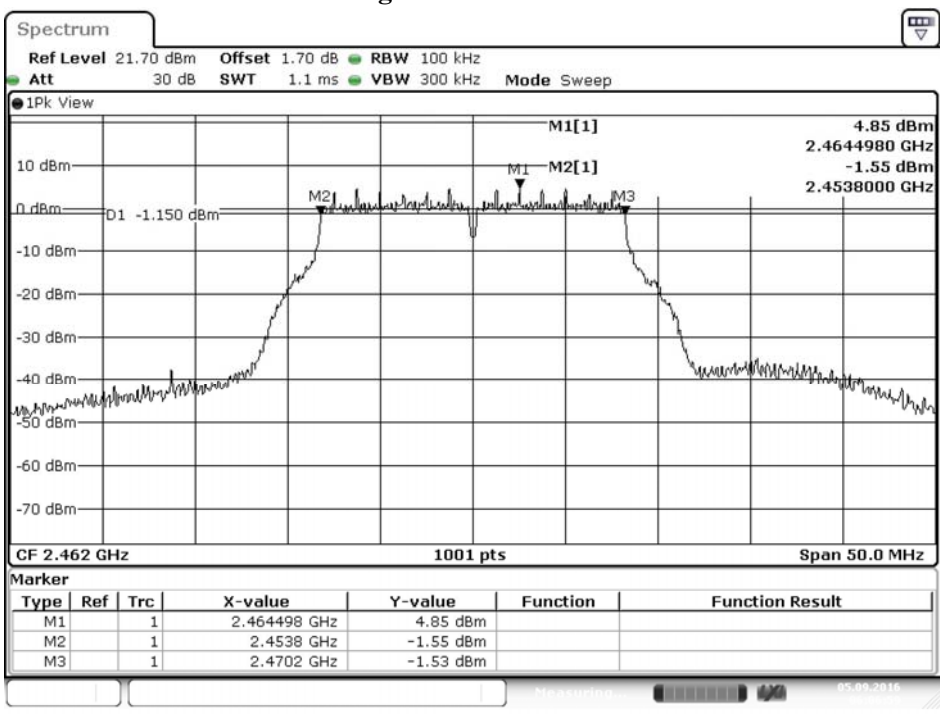


Figure Channel 06:



Date: 5.SEP.2016 06:00:45

Figure Channel 11:



Date: 5.SEP.2016 06:06:59

Product : Intelligent Robot
Test Item : 6dB Bandwidth Data
Test Mode : Mode 3: Transmit (802.11n MCS0 7.2Mbps 20M-BW)
Test Date : 2016/09/05

Channel No.	Frequency (MHz)	Measurement Level (kHz)	Required Limit (kHz)	Result
01	2412	17650	>500	Pass
06	2437	17700	>500	Pass
11	2462	17700	>500	Pass

Figure Channel 01:

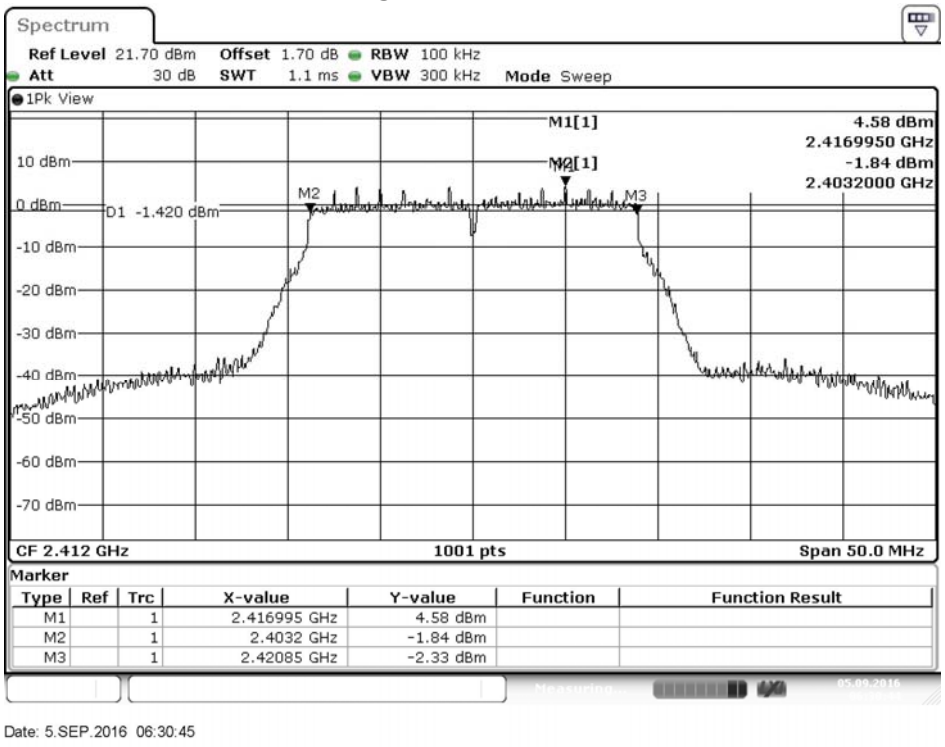
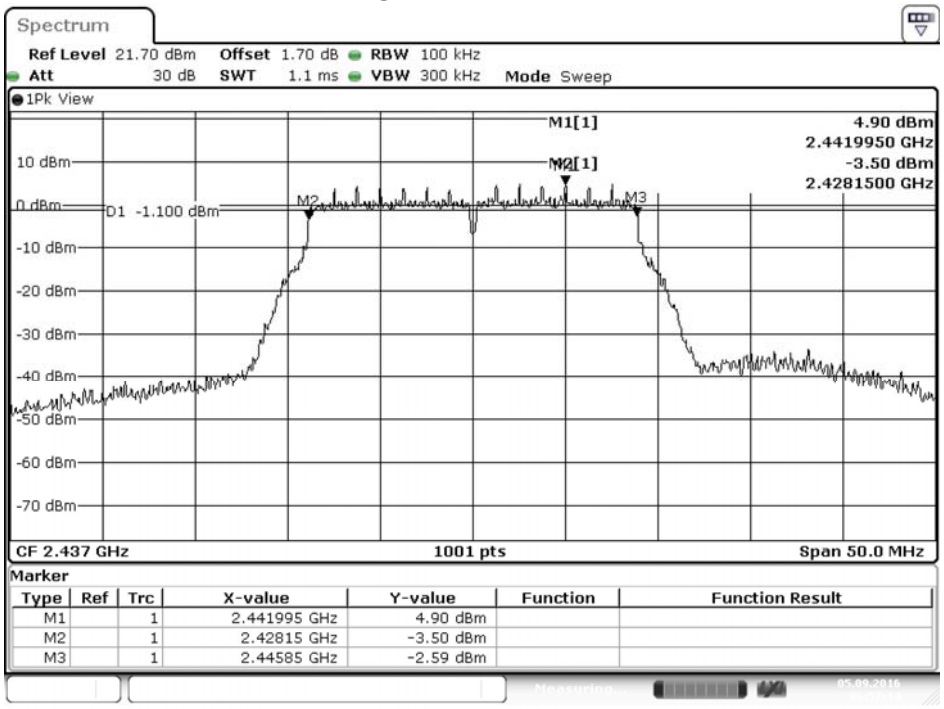
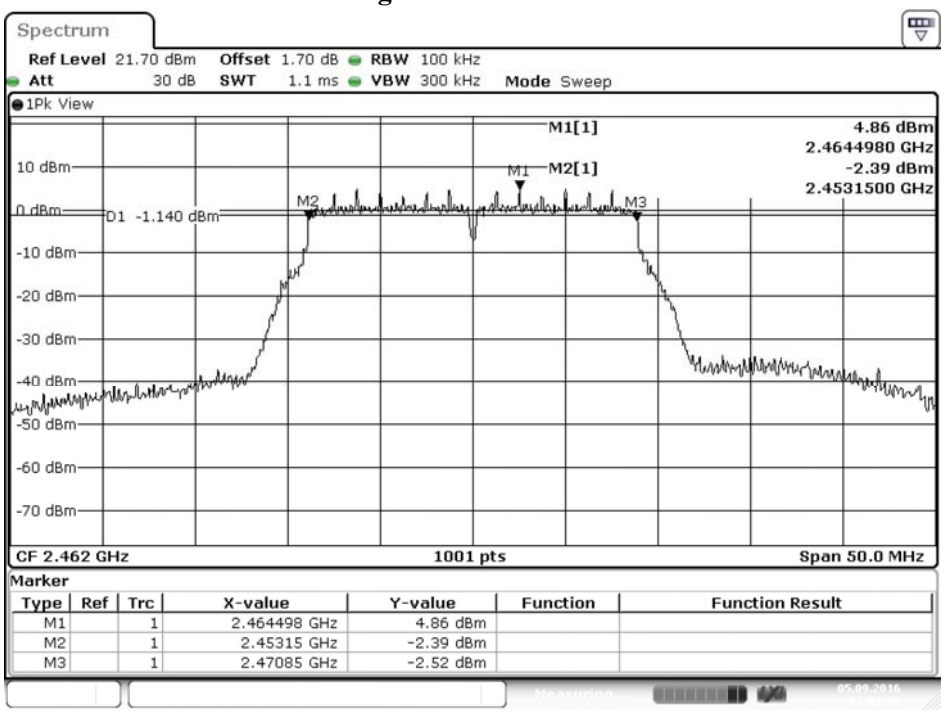


Figure Channel 06:



Date: 5.SEP.2016 06:57:15

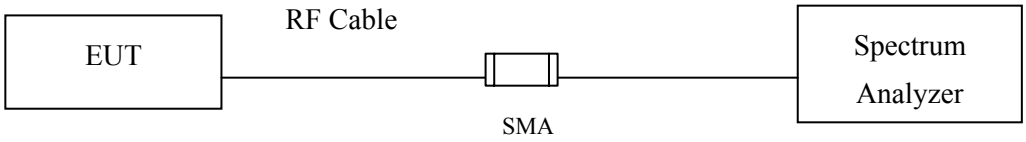
Figure Channel 11:



Date: 5.SEP.2016 07:02:56

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

± 1.23 dB

8.5. Test Result of Power Density

Product : Intelligent Robot
Test Item : Power Density Data
Test Mode : Mode 1: Transmit (802.11b 1Mbps)
Test Date : 2016/09/05

Channel No.	Frequency (MHz)	Measure Level (dBm)	Limit (dBm)	Result
01	2412	7.93	≦8dBm	Pass
06	2437	7.94	≦8dBm	Pass
11	2462	6.47	≦8dBm	Pass

Figure Channel 01:

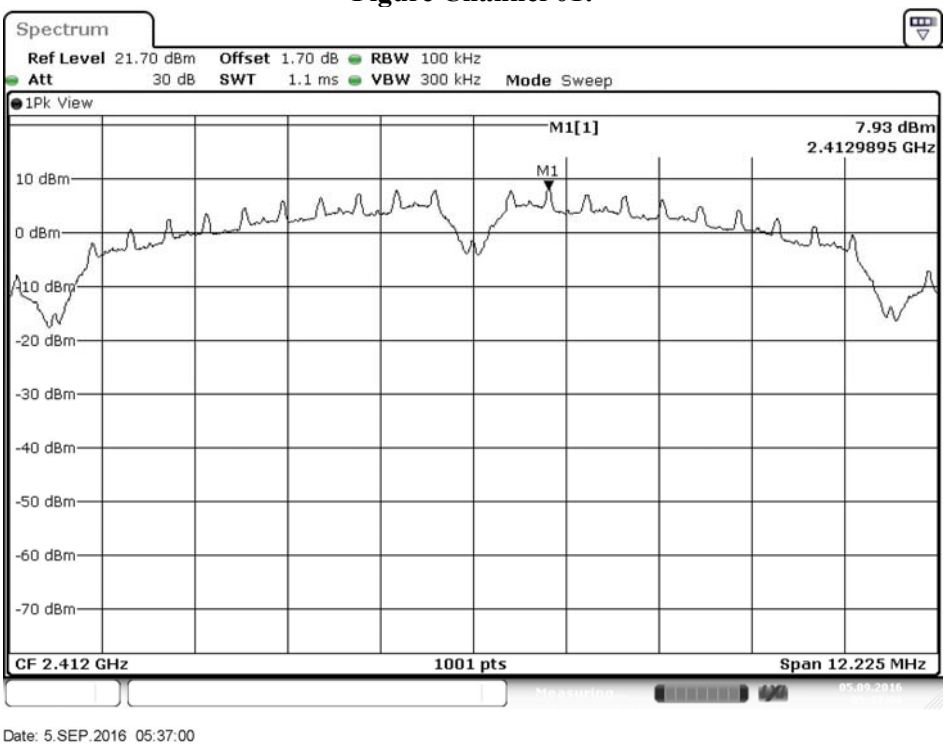
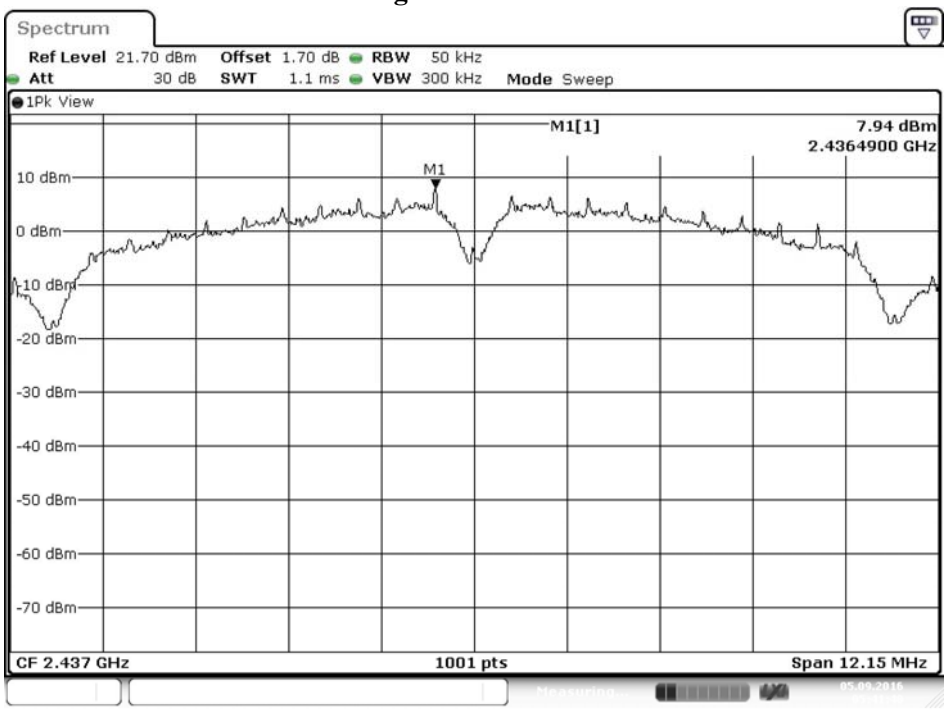
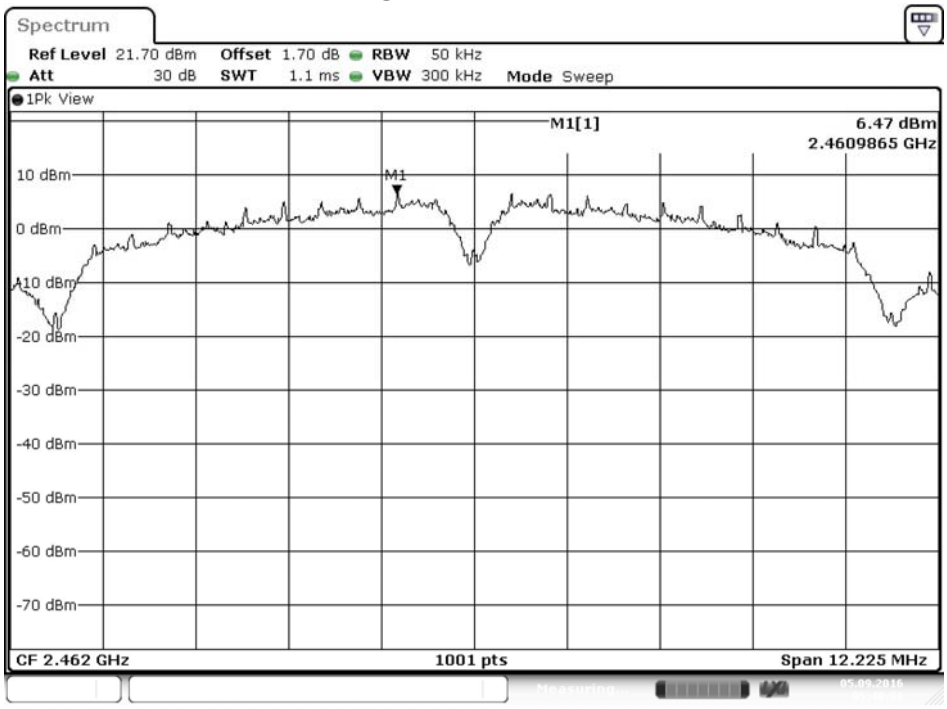


Figure Channel 06:



Date: 5.SEP.2016 05:41:40

Figure Channel 11:



Date: 5.SEP.2016 05:48:08

Product : Intelligent Robot
Test Item : Power Density Data
Test Mode : Mode 2: Transmit (802.11g 6Mbps)
Test Date : 2016/09/05

Channel No.	Frequency (MHz)	Measure Level (dBm)	Limit (dBm)	Result
01	2412	4.61	≦8dBm	Pass
06	2437	4.74	≦8dBm	Pass
11	2462	4.64	≦8dBm	Pass

Figure Channel 01:

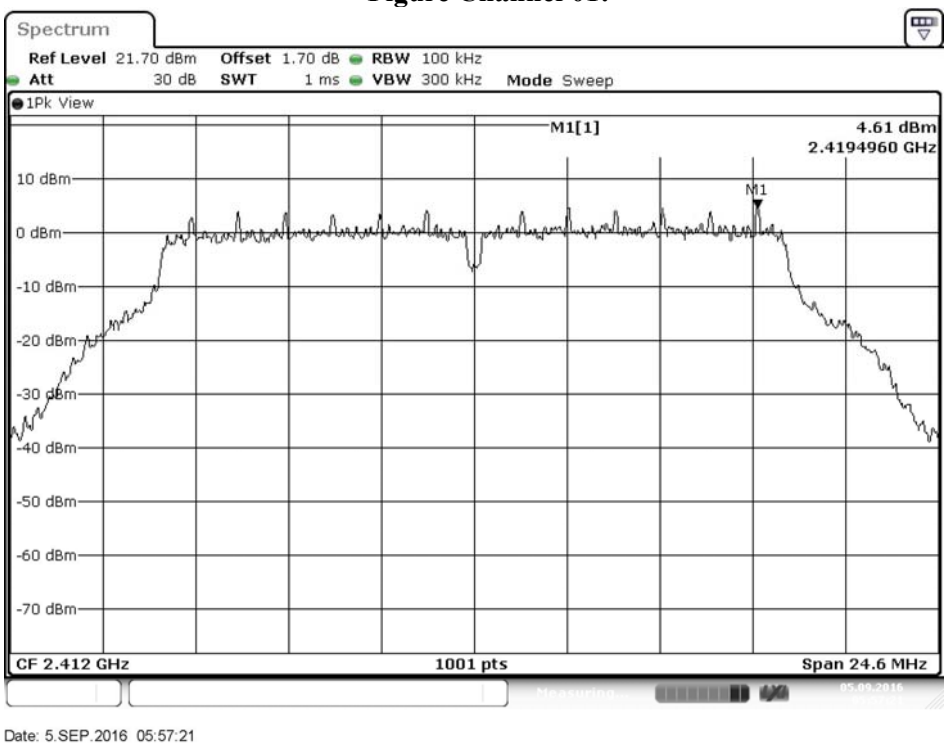
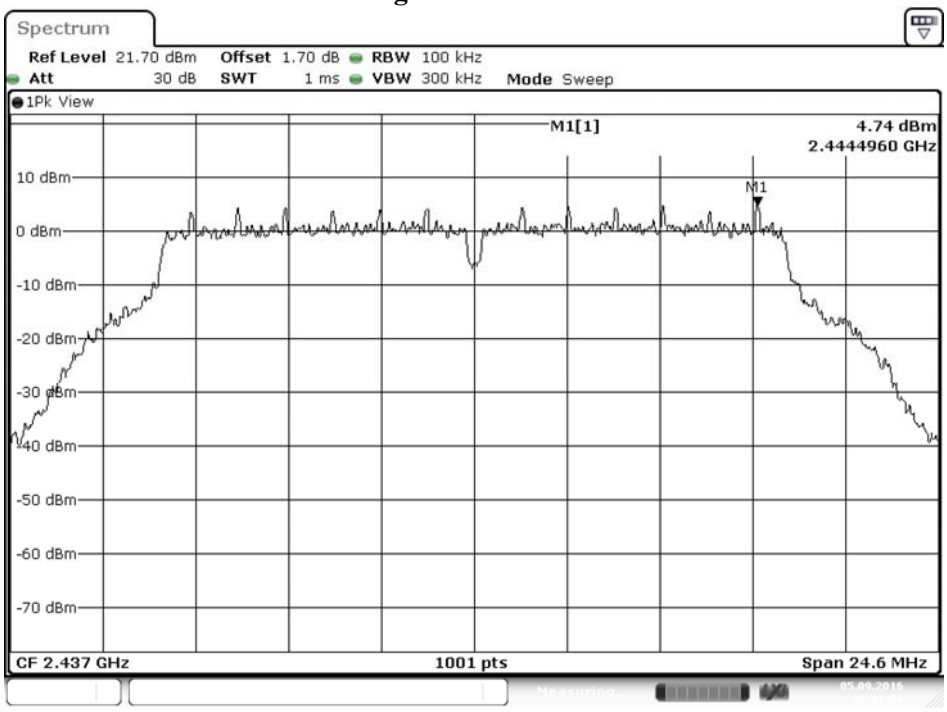
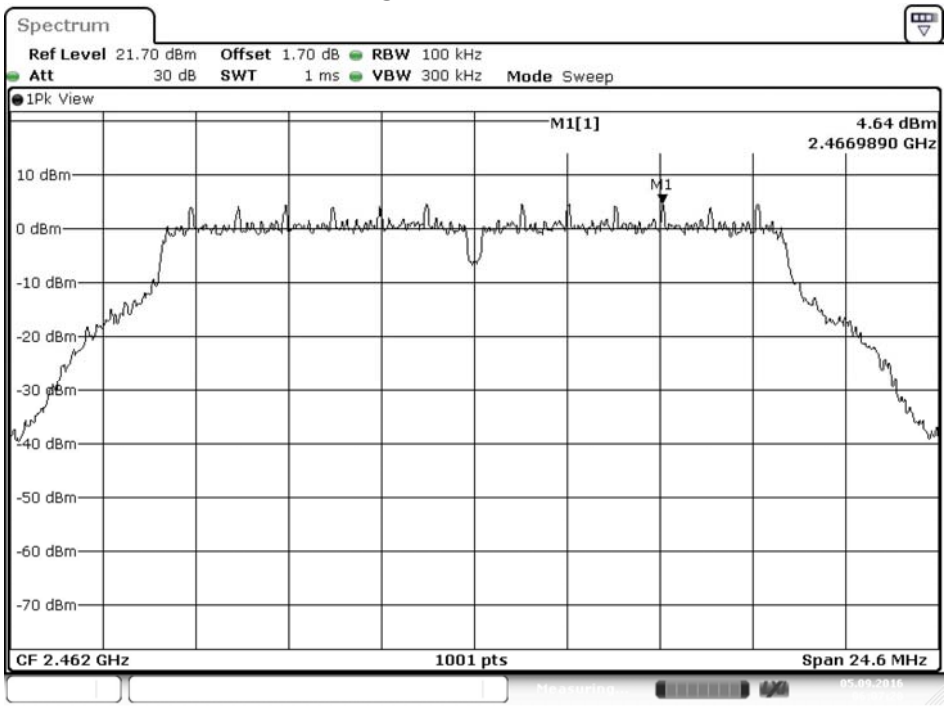


Figure Channel 06:



Date: 5.SEP.2016 06:01:06

Figure Channel 11:



Date: 5.SEP.2016 06:07:20

Product : Intelligent Robot
Test Item : Power Density Data
Test Mode : Mode 3: Transmit (802.11n MCS0 7.2Mbps 20M-BW)
Test Date : 2016/09/05

Channel No.	Frequency (MHz)	Measure Level (dBm)	Limit (dBm)	Result
01	2412	4.62	≦8dBm	Pass
06	2437	4.86	≦8dBm	Pass
11	2462	4.81	≦8dBm	Pass

Figure Channel 01:

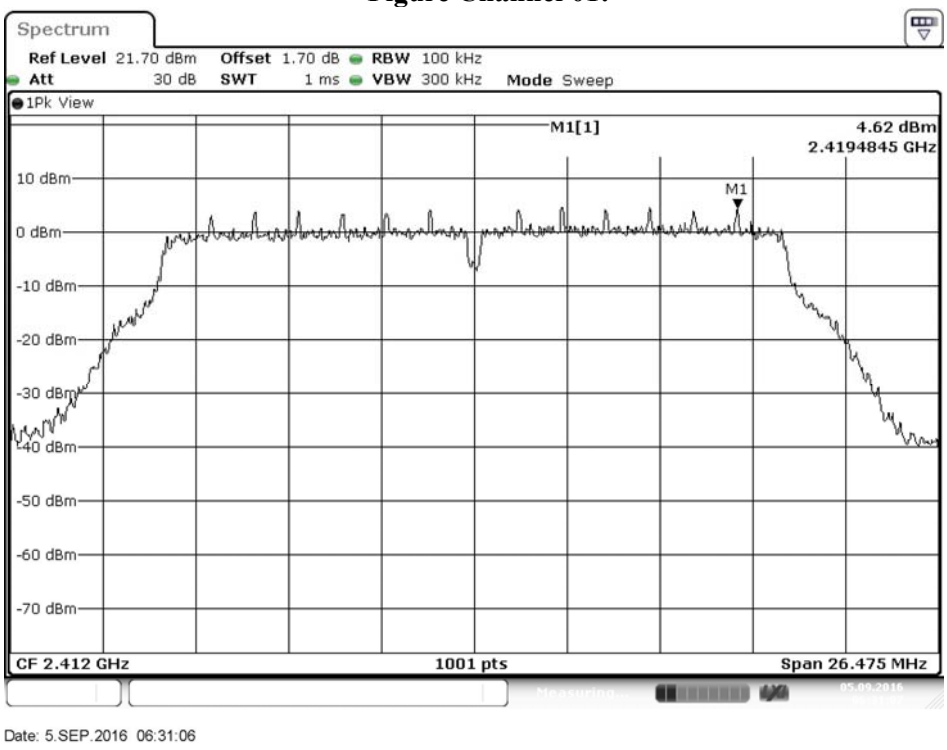
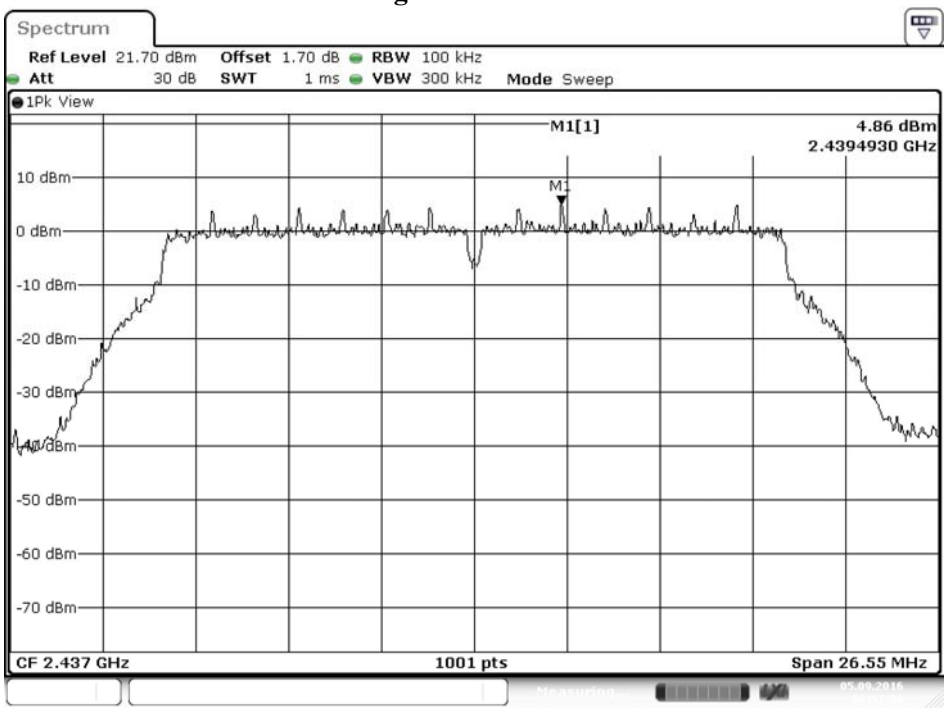
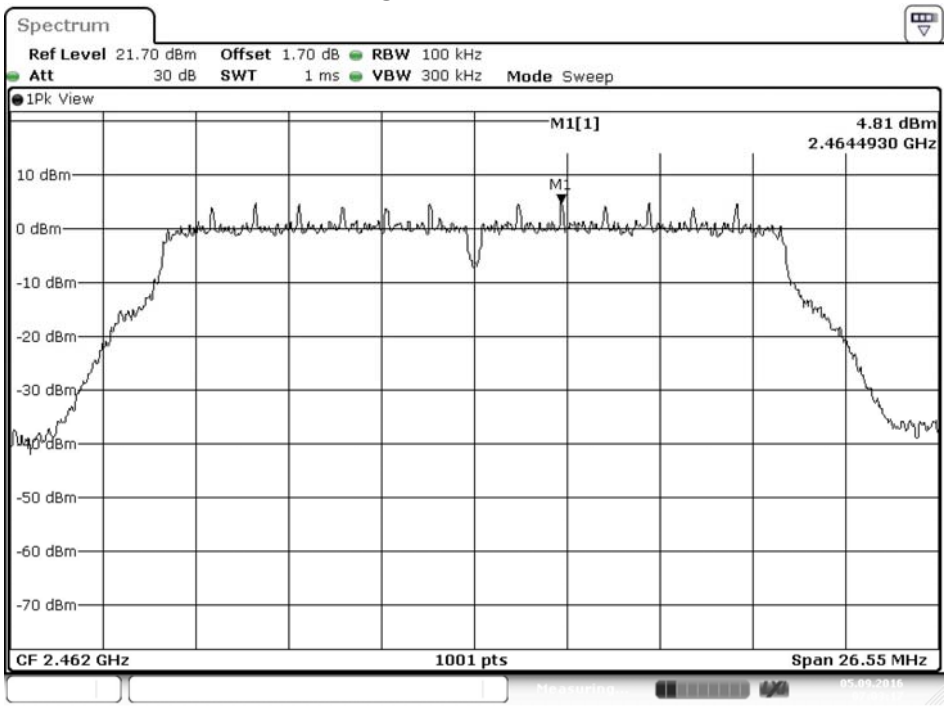


Figure Channel 06:



Date: 5.SEP.2016 06:57:36

Figure Channel 11:



Date: 5.SEP.2016 07:03:18

9. EMI Reduction Method During Compliance Testing

No modification was made during testing.

Attachment 1: EUT Test Photographs

Attachment 2: EUT Detailed Photographs