Audix Technology Corp.
No. 53-11, Dingfu, Linkou, Dist.,
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FCC 15.247 & RSS-247
2.4 GHz Test Report

for

Datalogic S.r.l.

Via S. Vitalino 13 Calderara di Reno Italy 40012

Product Name	**:**	**802.11abgn M.2 module w/SDIO interface**
Model Name	**:**	**M2SD50NBT**
FCC ID	**:**	**U4G-RHINOIIWEC7**
IC	**:**	**3862E-RHINOIIWEC7**

Prepared by: **:** **AUDIX Technology Corporation, EMC Department**

Testing Laboratory
1724

TESTING
NVLAP LAB CODE 200077-0

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TABLE OF CONTENTS

Description Page

TEST REPORT CERTIFICATION 4
1. REVISION RECORD OF TEST REPORT 5
2. SUMMARY OF TEST RESULTS 6
3. GENERAL INFORMATION 7
3.1. Description of Application 7
3.2. Description of EUT 8
3.3. Antenna Information 9
3.4. EUT Specifications Assessed in Current Report 9
3.5. Descriptions of Key Components 11
3.6. Data Rate Relative to Output Power 11
3.7. Test Configuration 13
3.8. Tested Supporting System List 17
3.9. Setup Configuration 17
3.10. Operating Condition of EUT 17
3.11. Description of Test Facility 18
3.12. Measurement Uncertainty 18
4. MEASUREMENT EQUIPMENT LIST 19
4.1. Conducted Emission Measurement 19
4.2. Radiated Emission Measurement 19
4.3. RF Conducted Measurement 19
5. CONDUCTED EMISSION 20
5.1. Block Diagram of Test Setup 20
5.2. Conducted Emission Limit 20
5.3. Test Procedure 21
5.4. Test Results 21
6. RADIATED EMISSION 22
6.1. Block Diagram of Test Setup 22
6.2. Radiated Emission Limits 23
6.3. Test Procedure 24
6.4. Measurement Result Explanation 25
6.5. Test Results 25
7. 6dB BANDWIDTH 26
7.1. Block Diagram of Test Setup 26
7.2. Specification Limits 26
7.3. Test Procedure 26
7.4. Test Results 26
8. MAXIMUM PEAK OUTPUT POWER 27
8.1. Block Diagram of Test Setup 27
8.2. Specification Limits 27
8.3. Test Procedure 27
8.4. Test Results 27
9. EMISSION LIMITATIONS 28
9.1. Block Diagram of Test Setup 28

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9.2. Specification Limits 28
9.3. Test Procedure 28
9.4. Test Results 29
10. POWER SPECTRAL DENSITY 30
10.1. Block Diagram of Test Setup 30
10.2. Specification Limits 30
10.3. Test Procedure 30
10.4. Test Results 30
11. DEVIATION TO TEST SPECIFICATIONS 31

APPENDIX A TEST DATA AND PLOTS
APPENDIX B TEST PHOTOGRAPHS

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TEST REPORT CERTIFICATION

Applicant	:	Datalogic S.r.l.
Manufacturer	:	LAIRD TECHNOLOGIES
EUT Description		
(1) Product	:	802.11abgn M.2 module w/SDIO interface
(2) Model	:	M2SD50NBT
(3) Power Supply	:	DC 3.3V

Applicable Standards:

47 CFR FCC Part 15 Subpart C
RSS-Gen (Issue 4), November 2014
RSS-247 (Issue 2), February 2017
ANSI C63.10:2013
KDB 558074 D01 DTS Meas Guidance v04

Audix Technology Corp. tested the equipment mentioned in accordance with the requirements set forth in the above standards. Test results indicate that the equipment tested is capable of demonstrating compliance with the requirements as documented within this report.
Audix Technology Corp. does not assume responsibility for any conclusions and generalizations drawn from the test results with regard to other specimens and samples.

Date of Report: 2017. 10. 27

Reviewed by: (Tina Huang/Administrator)

Approved by: (Ben Cheng/Manager)

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1. REVISION RECORD OF TEST REPORT

Edition No	Issued Data	Revision Summary	Report Number
0	2017. 10. 27	Original Report	EM-F170641

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2. SUMMARY OF TEST RESULTS

Rule		Description	Results
FCC	IC		
15.207	RSS-Gen §8.8	Conducted Emission	**PASS**
15.247(d)/ 15.205	RSS-Gen §8.9 RSS-247 §5.5	Radiated Band Edge and Radiated Spurious Emission	**PASS**
15.247(a)(2)	RSS-247 §5.2(1)	6dB Bandwidth	**PASS**
15.247(b)(3)	RSS-247 §5.4(4)	Maximum Peak Output	**PASS**
15.247(d)	RSS-247 §5.5	Conducted Band Edges and Conducted Spurious Emission	**PASS**
15.247 (e)	RSS-247 §5.2(2)	Peak Power Spectral Density	**PASS**
15.203	RSS-Gen §8.3	Antenna Requirement	**Compliance**

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3. GENERAL INFORMATION

3.1. Description of Application

Applicant	Datalogic S.r.l. Via S. Vitalino 13 Calderara di Reno Italy 40012
Manufacturer	LAIRD TECHNOLOGIES W66N220 Commerce Court Cedarburg WI 53012 United States Of America
Product	802.11abgn M.2 module w/SDIO interface
Model	M2SD50NBT

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3.2. Description of EUT

<table>
<tr><td>Test Model</td><td>M2SD50NBT</td></tr>
<tr><td>Serial Number</td><td>N/A</td></tr>
<tr><td>Power Rating</td><td>DC 3.3V</td></tr>
<tr><td>RF Features</td><td>WLAN:802.11a/b/g/n/
Bluetooth: BT and BLE</td></tr>
<tr><td>Transmit Type</td><td>
<table>
<tr><th colspan="2">2.4 GHz with PCB antenna</th></tr>
<tr><td>802.11b</td><td>2T2R</td></tr>
<tr><td>802.11g</td><td>2T2R</td></tr>
<tr><td>802.11n-HT20</td><td>2T2R</td></tr>
<tr><td>BT/BLE (Chain 0)</td><td>1T1R</td></tr>
</table>
<table>
<tr><th colspan="2">2.4 GHz with omni-s antenna</th></tr>
<tr><td>802.11b</td><td>1T1R</td></tr>
<tr><td>802.11g</td><td>1T1R</td></tr>
<tr><td>802.11n-HT20</td><td>1T1R</td></tr>
<tr><td>BT/BLE (Chain 0)</td><td>1T1R</td></tr>
</table>
<table>
<tr><th colspan="2">UNII Bands with PCB antenna</th></tr>
<tr><td>802.11a</td><td>2T2R</td></tr>
<tr><td>802.11n-HT20</td><td>2T2R</td></tr>
<tr><td>802.11n-HT40</td><td>2T2R</td></tr>
</table>
<table>
<tr><th colspan="2">UNII Bands with omni-s antenna</th></tr>
<tr><td>802.11a</td><td>1T1R</td></tr>
<tr><td>802.11n-HT20</td><td>1T1R</td></tr>
<tr><td>802.11n-HT40</td><td>1T1R</td></tr>
</table>
</td></tr>
<tr><td>Sample Status</td><td>Production</td></tr>
<tr><td>Date of Receipt</td><td>2017. 08. 17</td></tr>
<tr><td>Date of Test</td><td>2017. 09. 27 ~ 10. 26</td></tr>
<tr><td>I/O Ports List</td><td>N/A</td></tr>
<tr><td>Accessories Supplied</td><td>N/A</td></tr>
</table>

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3.3. Antenna Information

2.4G Antenna					
No.	**Antenna Part Number**	**Manufacture**	**Antenna Type**	**Frequency (MHz)**	**Max Gain (dBi)**
1	1399.99.0124 (Tx1 Antenna)	HUBER+SUHNER	PCB	2400 to 2500	1
2	1399.99.0124 (Tx2 Antenna)		PCB	2400 to 2500	1
3	1399.17.0106	HUBER+SUHNER	Omni-S	2400 to 2500	6
				2500 to 2700	6

5G Antenna					
No.	**Antenna Part Number**	**Manufacture**	**Antenna Type**	**Frequency (MHz)**	**Max Gain (dBi)**
1	1399.99.0124 (Tx1 Antenna)	HUBER+SUHNER	PCB	5150 to 5875	1
2	1399.99.0124 (Tx2 Antenna)		PCB	5150 to 5875	1
3	1399.17.0106	HUBER+SUHNER	Omni-S	4900 to 5470	8
				5470 to 5935	8

Note: The two type antennas can't simultaneous use. They will be setup done by software before market. The output power depends on antenna type accordingly.

3.4. EUT Specifications Assessed in Current Report

Mode	Fundamental Range (MHz)	Channel Number
802.11b	2412-2462	11
802.11g		11
802.11n-HT20		11
BLE	2402-2480	40

Mode	Modulation	Data Rate (Mbps)
802.11b	DSSS (DBPSK/DQPSK/CCK)	Up to 11
802.11g	OFDM (BPSK/QPSK/16QAM/64QAM)	Up to 54
802.11n-HT20		Up to 144.4
802.11n-HT40		Up to 300
BLE	GFSK	1

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Channel List (802.11 b/g/n-HT20)	
Channel Number	Frequency (MHz)
1	2412
2	2417
3	2422
4	2427
5	2432
6	2437
7	2442
8	2447
9	2452
10	2457
11	2462

Channel List (BLE)			
Channel Number	Frequency (MHz)	Channel Number	Frequency (MHz)
37	2402	18	2442
00	2404	19	2444
01	2406	20	2446
02	2408	21	2448
03	2410	22	2450
04	2412	23	2452
05	2414	24	2454
06	2416	25	2456
07	2418	26	2458
08	2420	27	2460
09	2422	28	2462
10	2424	29	2464
38	2426	30	2466
11	2428	31	2468
12	2430	32	2470
13	2432	33	2472
14	2434	34	2474
15	2436	35	2476
16	2438	36	2478
17	2440	39	2480

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RMS Output Power (dBm)			
Channel	802.11b	802.11g	802.11n-HT20
1	16.09	15.57	16.21
2	16.08	16.01	16.17
3	16.13	16.13	16.05
4	16.07	16.04	16.08
5	16.14	16.19	16.02
6	16.41	16.23	16.20
7	16.01	16.11	16.19
8	16.06	16.24	16.24
9	15.91	16.38	16.26
10	15.98	16.44	16.37
11	15.79	16.53	16.64

3.5. Descriptions of Key Components

None

3.6. Data Rate Relative to Output Power

802.11b (with PCB antenna)				802.11b (with omni-s antenna)				
Channel	Modulation	Date Rate	Power (dBm)	Channel	Modulation	Date Rate	Power(dBm)	
							Chain 0	Chain 1
1	DBPSK	1	15.98	1	DBPSK	1	15.03	16.2
1	DQPSK	2	15.85	1	DQPSK	2	14.94	15.89
1	CCK	5.5	15.03	1	CCK	5.5	14.53	15.58
1	CCK	11	14.24	1	CCK	11	14.22	15.30

802.11g (with PCB antenna)				802.11g (with omni-s antenna)				
Channel	Modulation	Date Rate	Power (dBm)	Channel	Modulation	Date Rate	Power(dBm)	
							Chain 0	Chain 1
1	BPSK	6	15.57	1	BPSK	6	15.24	15.75
1	BPSK	9	15.27	1	BPSK	9	14.92	15.44
1	QPSK	12	15.10	1	QPSK	12	14.41	15.18
1	QPSK	18	14.89	1	QPSK	18	14.35	14.96
1	16-QAM	24	14.53	1	16-QAM	24	14.08	14.84
1	16-QAM	36	14.41	1	16-QAM	36	13.98	14.41
1	64-QAM	48	14.14	1	64-QAM	48	13.72	14.38
1	64-QAM	54	13.92	1	64-QAM	54	13.46	14.09

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802.11n-HT20 (with PCB antenna)				802.11n-HT20 (with omni-s antenna)			
Channel	Modulation	Date Rate	Power (dBm)	Channel	Modulation	Date Rate	Power (dBm)
1	BPSK	MCS8	15.98	1	BPSK	MCS0	16.37
1	QPSK	MCS9	15.85	1	QPSK	MCS1	16.14
1	QPSK	MCS10	15.03	1	QPSK	MCS2	16.11
1	16-QAM	MCS11	14.24	1	16-QAM	MCS3	16.03
1	16-QAM	MCS12	14.09	1	16-QAM	MCS4	15.97
1	64-QAM	MCS13	13.32	1	64-QAM	MCS5	15.82
1	64-QAM	MCS14	13.07	1	64-QAM	MCS6	15.07
1	64-QAM	MCS15	12.62	1	64-QAM	MCS7	14.11

Note: 1. Above results are assessed in peak power.

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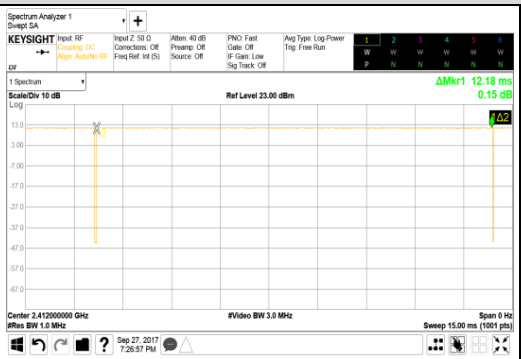
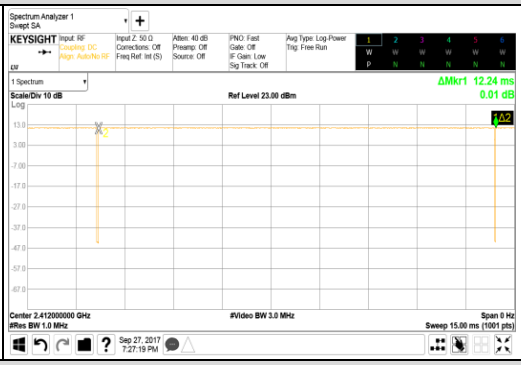
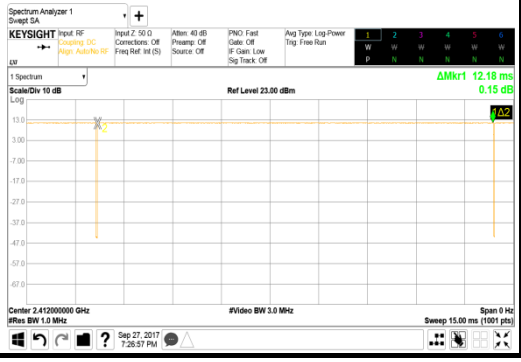
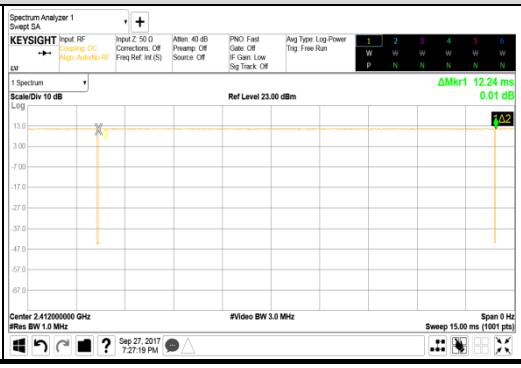
3.7. Test Configuration

Mode	Duty Cycle (x)		T (ms)		Duty Cycle Factor (dB)	
	PCB antenna	Omni-s antenna	PCB antenna	Omni-s antenna	PCB antenna	Omni-s antenna
802.11b	1.00	1.00	12.18	12.18	0	0
802.11g	0.97	0.97	2.015	2.015	0.13	0.13
802.11n-HT20	0.97	0.93	1.878	0.962	0.13	0.32
BLE (Chin 0)	0.63		0.387		2.00	

Note: When duty cycle is less than 98% (0.98) that duty cycle factor 10log(1/x) is needed to add in conducted test items measured in average detector.

Mode	Duty Cycle (x)
	PCB antenna
802.11b	 
	Omni-s antenna
	 

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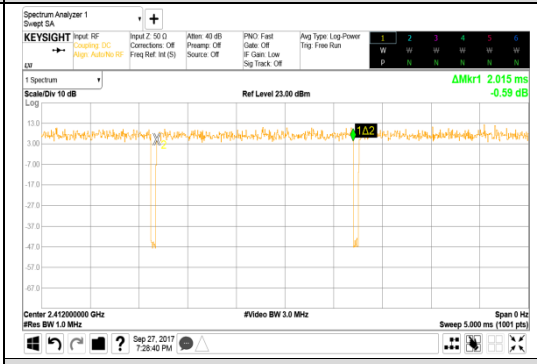
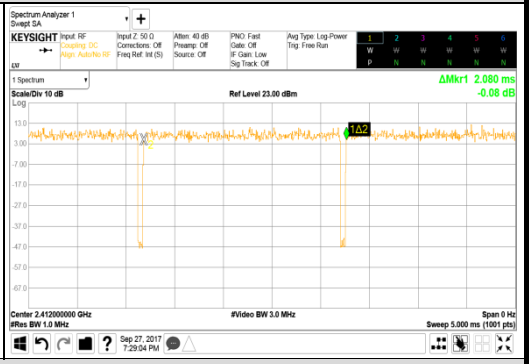
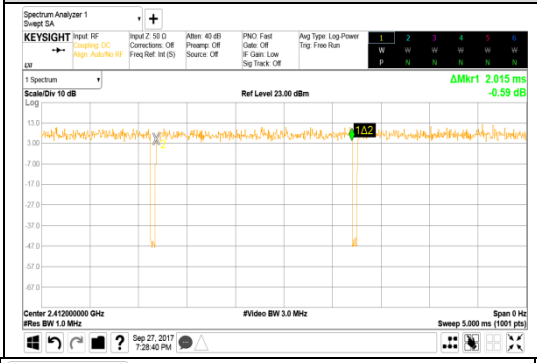
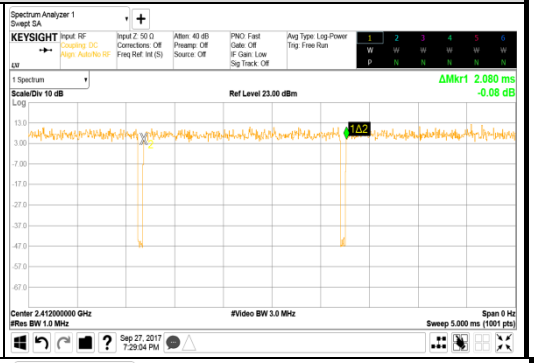
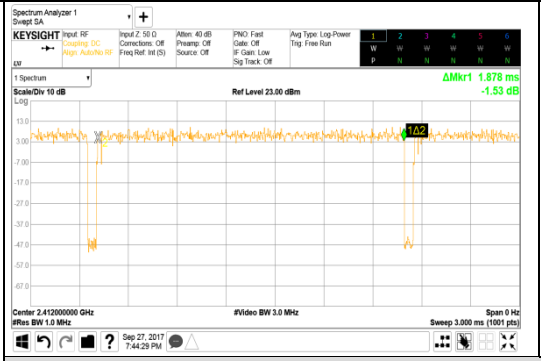
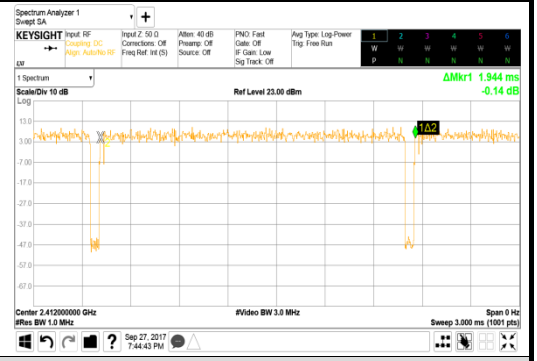
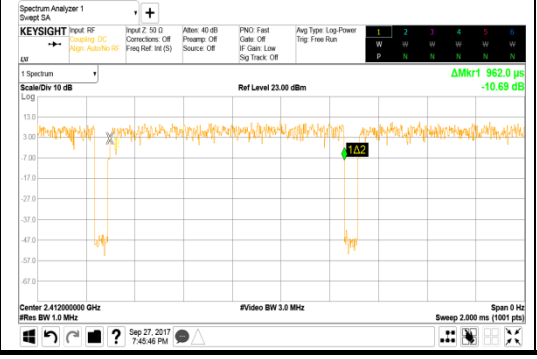
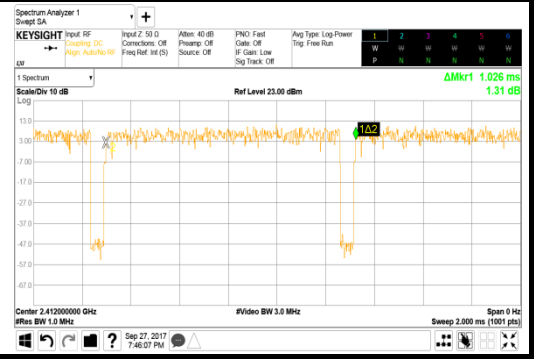
Mode	Duty Cycle (x)
	PCB antenna
802.11g	 
	Omni-s antenna
	 
802.11n-HT20	 
	Omni-s antenna
	 

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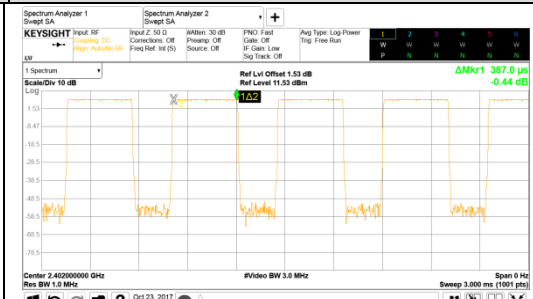
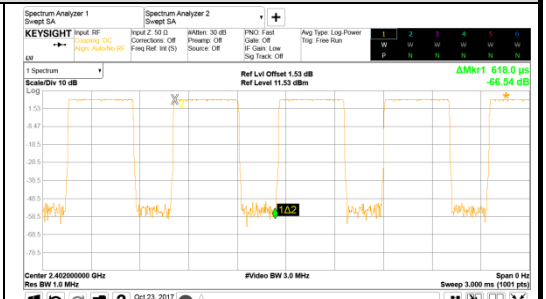
Mode	Duty Cycle (x)	
	PCB antenna	
BLE (Chin 0)		

AC Conduction		
Test Case	with PCB antenna	Normal operation

Item			Mode	Data Rate	Test Channel
Radiated Test Case	Radiated Band Edge Note1	with PCB antenna	802.11b	1Mbps	1/11
			802.11g	6Mbps	1/11
			802.11n-HT20	MCS8	111
			BLE	1Mbps	37/39
		with omni-s antenna	802.11b	1Mbps	1/11
			802.11g	6Mbps	1/11
			802.11n-HT20	MCS0	111
			BLE	1Mbps	37/39
	Radiated Spurious Emission Note1 & 2	with PCB antenna	802.11b	1 Mbps	11
			802.11g	6Mbps	6
			802.11n-HT20	MCS8	1
			BLE	1Mbps	37/17/39
		with omni-s antenna	BLE	1Mbps	37/17/39

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Item			Mode	Data Rate	Test Channel
Conducted Test Case	6dB Bandwidth		802.11b	1Mbps	1/6/11
			802.11g	6Mbps	1/6/11
			802.11n-HT20	MCS8	1/6/11
			BLE	1Mbps	37/17/39
	Peak Output Power	Chain 0	BLE	1Mbps	37/17/39
		with PCB antenna	802.11b	1Mbps	1/6/11
			802.11g	6Mbps	1/6/11
			802.11n-HT20	MCS8	1/6/11
		with omni-s antenna	802.11b	1Mbps	1/6/11
			802.11g	6Mbps	1/6/11
			802.11n-HT20	MCS8	1/6/11
	Spurious Emission	Chain 0	BLE	1Mbps	37/17/39
		with PCB antenna	802.11b	1Mbps	1/6/11
			802.11g	6Mbps	1/6/11
			802.11n-HT20	MCS8	1/6/11
		with omni-s antenna	802.11b	1Mbps	1/6/11
			802.11g	6Mbps	1/6/11
			802.11n-HT20	MCS8	1/6/11
	Band Edge	Chain 0	BLE	1Mbps	37/39
		with PCB antenna	802.11b	1Mbps	1/11
			802.11g	6Mbps	1/11
			802.11n-HT20	MCS8	1/11
		with omni-s antenna	802.11b	1Mbps	1/11
			802.11g	6Mbps	1/11
			802.11n-HT20	MCS8	1/11
	Peak Power Spectral Density	Chain 0	BLE	1Mbps	37/17/39
		with PCB antenna	802.11b	1Mbps	1/6/11
			802.11g	6Mbps	1/6/11
			802.11n-HT20	MCS8	1/6/11
		with omni-s antenna	802.11b	1Mbps	1/6/11
			802.11g	6Mbps	1/6/11
			802.11n-HT20	MCS8	1/6/11

Note 1:
☐Mobile Device.
■Portable Device, and 3 axis were assessed.
☐ Lie
☐ Side
■ Stand
Note 2: Low, mid, and high channels with PCB and Omni-s antennas were measured, only the worst channel of each modulation was presented in this report.

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3.8. Tested Supporting System List

3.8.1. Support Peripheral Unit

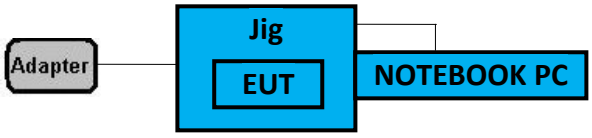
No.	Product	Brand	Model No.	Serial No.	FCC ID
1.	Notebook PC	COMPAQ	Presario B1200	CNU807035Q	N/A
2.	Jig	N/A	N/A	N/A	N/A
3.	AC Adapter	COMPAQ	BS-2005	N/A	N/A

3.8.2. Cable Lists

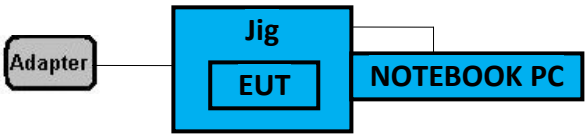
No.	Cable Description Of The Above Support Units
1.	RS232 Cable: Shielded, Detachable, 1.0m AC Adapter: hp, M/N PA-1650-02HC DC Power Cord: Unshielded, Detachable, 1.8m AC Power Cord: Unshielded, Detachable, 1.1m

3.9. Setup Configuration

3.9.1. EUT Configuration for Power Line & Radiated Emission



3.9.2. EUT Configuration for RF Conducted Test Items



3.10. Operating Condition of EUT

Test program “CSR” (for BLE) and “artgui.exe” (for WLAN)” is used for enabling EUT BT or WLAN function under continues transmitting and choosing data rate/ channel.

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3.11.Description of Test Facility

Name of Test Firm	Audix Technology Corporation / EMC Department No. 53-11, Dingfu, Linkou Dist., New Taipei City 244, Taiwan Tel: +886-2-26092133 Fax: +886-2-26099303 Website : www.audixtech.com Contact e-mail: sales@audixtech.com
Accreditations	The laboratory is accredited by following organizations under ISO/IEC 17025:2005 (1) NVLAP(USA) NVLAP Lab Code 200077-0 (2) TAF(Taiwan) No. 1724 (3) FCC OET Designation No. TW1004 & TW1090 & TW1724
Test Facilities	(1) No. 7 Shielding Room (2) Semi-Anechoic Chamber (IC Test Site Registration No.: 5183B-1) (3) Fully Anechoic Chamber (IC Test Site Registration No.: 5183B-4)

3.12.Measurement Uncertainty

Test Item	Frequency Range	Uncertainty
Conduction Test	150kHz~30MHz	±3.50dB
Radiation Test (Distance: 3m)	30MHz~1000MHz	± 3.68dB
	Above 1GHz	± 5.82dB

Remark：Uncertainty = $ku_c(y)$

Test Item	Uncertainty
6dB Bandwidth	± 0.05kHz
Maximum peak output power	± 0.33dB
Power spectral density	± 0.13dB
Conducted Emission Limitations	± 0.13dB

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4. MEASUREMENT EQUIPMENT LIST

4.1. Conducted Emission Measurement

Item	Type	Manufacturer	Model No.	Serial No.	Cal. Date	Cal. Interval
1.	Test Receiver	R&S	ESCI	101276	2017. 03. 23	1 Year
2.	A.M.N.	R&S	ESH2-Z5	100366	2017. 07. 20	1 Year
3.	L.I.S.N.	Kyoritsu	KNW-407	8-881-13	2016. 12. 28	1 Year
4.	Pulse Limiter	R&S	ESH3-Z2	101495	2017. 01. 16	1 Year
5.	Test Software	Audix	e3	V.120619C	N.C.R.	N.C.R.

4.2. Radiated Emission Measurement

Item	Type	Manufacturer	Model No.	Serial No.	Cal. Date	Cal. Interval
1.	Spectrum Analyzer	Agilent	N9010A-526	MY53400071	2017. 09. 13	1 Year
2.	Spectrum Analyzer	Agilent	N9010A-526	MY52220368	2016. 12. 01	1 Year
3.	Test Receiver	R & S	ESCS30	100338	2017. 06. 19	1 Year
4.	Amplifier	HP	8447D	2944A06305	2017. 02. 16	1 Year
5.	Amplifier	Sonoma	310N	187161	2017. 06. 08	1 Year
6.	Bilog Antenna	CHASE	CBL6112D	33821	2017. 01. 21	1 Year
7.	Loop Antenna	R&S	HFH2-Z2	891847/27	2016. 12. 23	1 Year
8.	Double-Ridged Waveguide Horn	ETS-Lindgren	3117	00135902	2017. 03. 08	1 Year
9.	2.4GHz Notch Filter	K&L	7NSL10-244 1.5E130.5-00	1	2017. 07. 26	1 Year
10.	3GHz Notch Filter	Microwave	H3G018G1	484798	2017. 08. 25	1 Year
11.	Test Software	Audix	e3	V.6.110601	N.C.R.	N.C.R.

4.3. RF Conducted Measurement

Item	Type	Manufacturer	Model No.	Serial No.	Cal. Date	Cal. Due
1.	Spectrum Analyzer	Keysight	N9010B-544	MY55460198	2017. 04. 18	1 Year
2.	Power Meter	Anritsu	ML2495A	1145008	2016. 10. 27	1 Year
3.	Power Sensor	Anritsu	MA2411B	1126096	2016. 10. 27	1 Year

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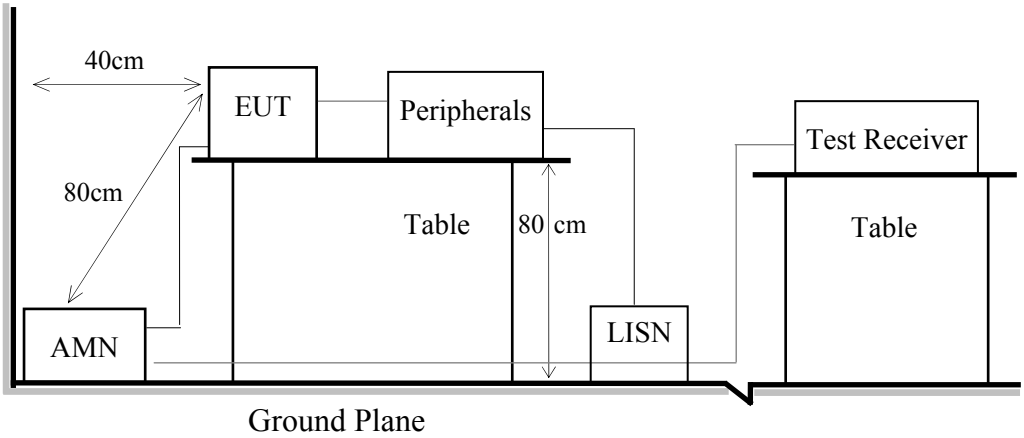
5. CONDUCTED EMISSION

5.1. Block Diagram of Test Setup

5.1.1. Block Diagram of EUT

Indicated as section 3.9

5.1.2. Shielded Room Setup Diagram



5.2. Conducted Emission Limit

Frequency	Conducted Limit	
	Quasi-Peak Level	Average Level
150kHz ~ 500kHz	66 ~ 56 dBμV	56 ~ 46 dBμV
500kHz ~ 5MHz	56 dBμV	46 dBμV
5MHz ~ 30MHz	60 dBμV	50 dBμV

Remark 1.: If the average limit is met when using a Quasi-Peak detector, the measurement using the average detector is not required.
2.: The lower limit applies to the band edges.

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5.3. Test Procedure

5.3.1. To set up the EUT as indicated in ANSI C 63.10. The EUT was placed on the table which has 80 cm height to the ground and 40 cm distance to the conducting wall.

5.3.2. Power supplier of the EUT was connected to the AC mains through an Artificial Mains Network (A.M.N.).

5.3.3. The AC power supplies to all peripheral devices must be provided through line impedance stabilization network (L.I.S.N.)

5.3.4. Checking frequency range from 150 kHz to 30 MHz and record the emission which does not have 20 dB below limit.

5.4. Test Results

Please refer to Appendix A.

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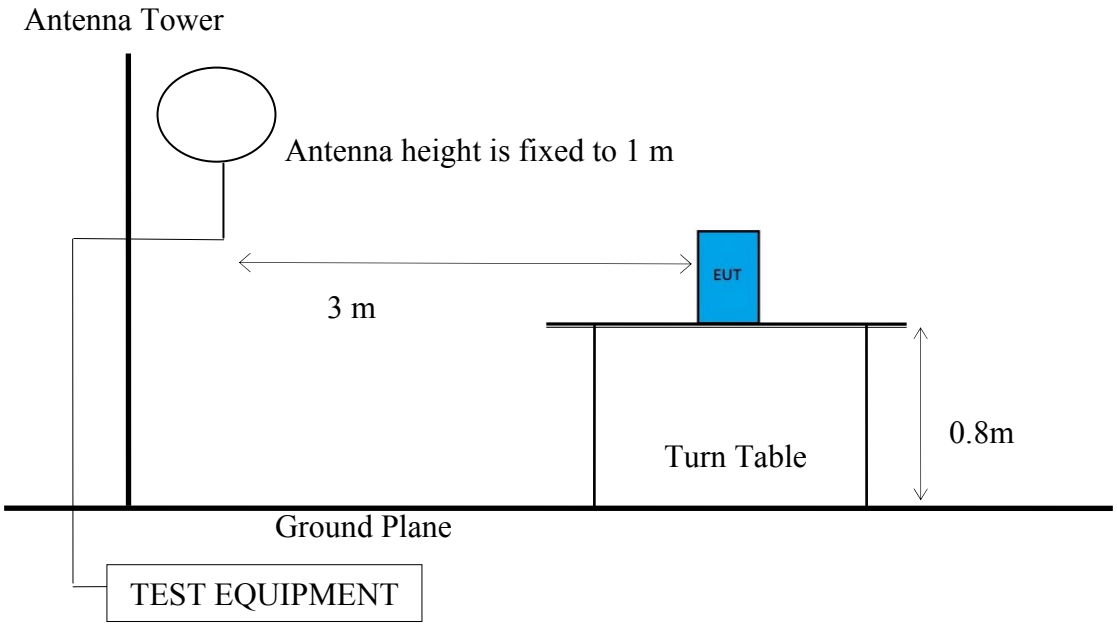
6. RADIATED EMISSION

6.1. Block Diagram of Test Setup

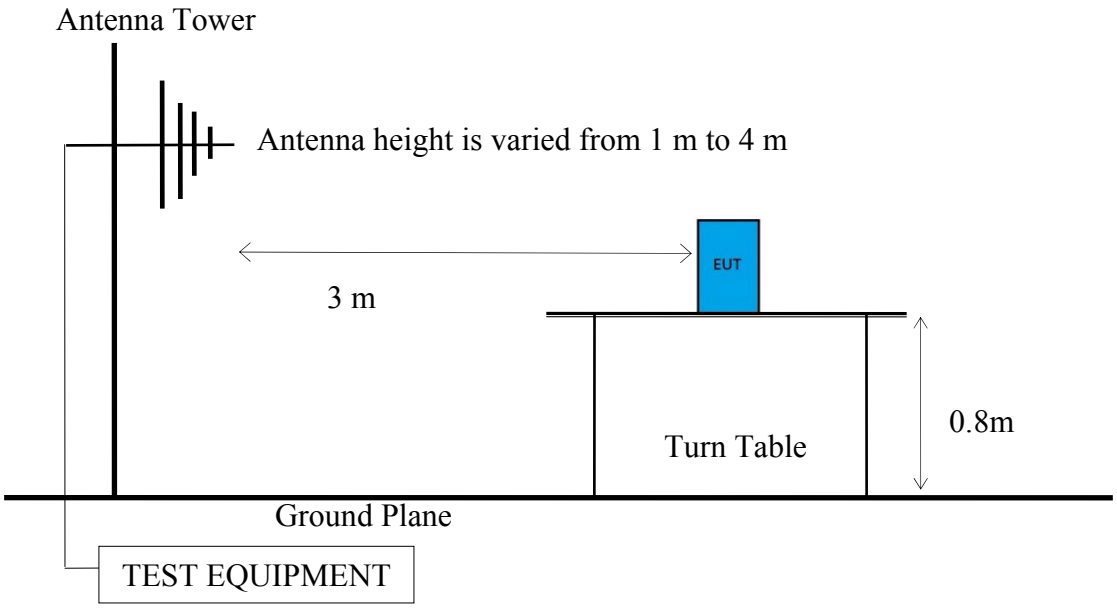
6.1.1. Block Diagram of EUT

Indicated as section 3.9

6.1.2. Setup Diagram for 9kHz-30MHz



6.1.3. Setup Diagram for 30-1000 MHz



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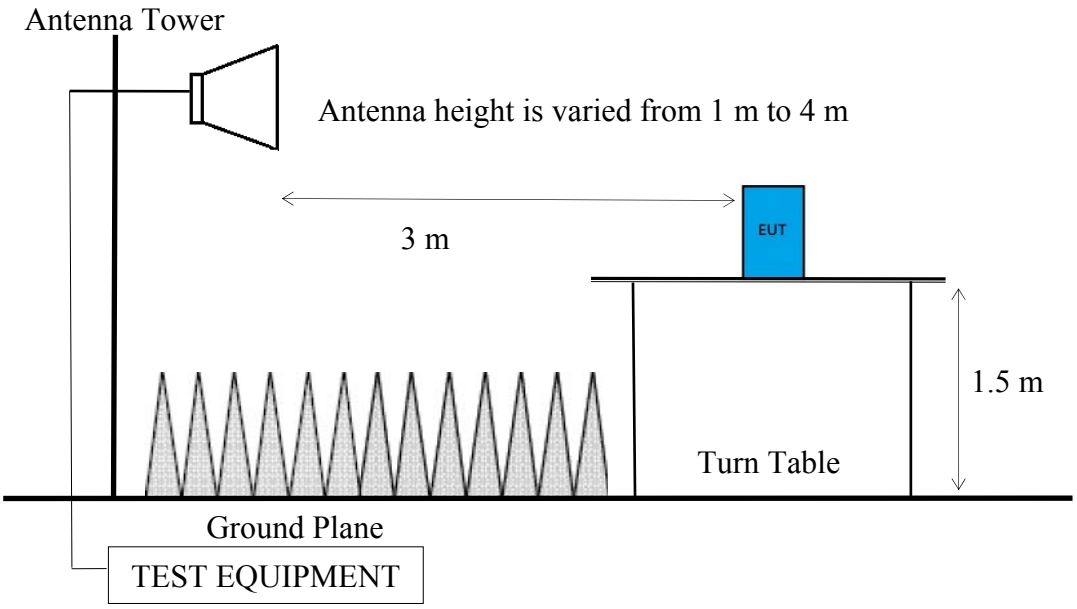
6.1.4. Setup Diagram for above 1GHz



6.2. Radiated Emission Limits

In any 100kHz bandwidth outside the frequency band, the radio frequency power produced by the intentional radiator shall be at least 20dB below that in the 100kHz bandwidth within the band that contains the highest level. In addition, radiated emissions which fall in restricted bands, as defined in Section 15.205/RSS-Gen Section 8.10 table 6, must also comply with the radiated emission limits specified as below.

Frequency (MHz)	Distance (m)	Limits	
		dBμV/m	μV/m
0.009 - 0.490	300	67.6	2400/kHz
0.490 - 1.705	30	87.6	24000/kHz
1.705 - 30	30	29.5	30
30 - 88	3	40.0	100
88- 216	3	43.5	150
216- 960	3	46.0	200
Above 960	3	54.0	500
Above 1000	3	74.0 dBμV/m (Peak) 54.0 dBμV/m (Average)	

Remark：(1) dBμV/m = 20 log (μV/m)
(2) The tighter limit applies to the edge between two frequency bands.
(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) Fundamental and emission fall within operation band are exempted from this section.
(5) Pursuant to ANSI C63.10: 6.6.4.3, if the maximized peak measured value complies with the average limit, then it is unnecessary to perform an average measurement.

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6.3. Test Procedure

Frequency Range 9kHz~30MHz:
The EUT setup on the turn table which has 0.8 m height to the ground. The turn table rotated 360 degrees and antenna fixed to 1 m to find the maximum emission level.
In order to find the maximum emission, all of the interface cables were manipulated according to ANSI C63.10-2013 regulation.

(1) RBW = 9kHz with peak and average detector.
(2) Detector: average and peak (9kHz-490kHz)
Q.P. (490kHz-30MHz)

Frequency Range 30MHz ~ 25GHz:
The EUT setup on the turn find table which has 80 cm (for 30-1000 MHz) and 1.5m (for above 1GHz) height to the ground. The turn table rotated 360 degrees and antenna varied from 1 m to 4 m to find the maximum emission level. Both horizontal and vertical polarization are required. In order to find the maximum emission, all of the interface cables were manipulated according to ANSI C63.10-2013 regulation.

Frequency below 1 GHz:
Spectrum Analyzer is used for pre-testing with following setting:
(1)RBW = 120KHz
(2)VBW ≥ 3 x RBW.
(3)Detector = Peak.
(4)Sweep time = auto.
(5)Trace mode = max hold.
(6)Allow sweeps to continue until the trace stabilizes.
(7)When peak-detected value is lower than limit that the measurement using the Q.P. detector is not required. Otherwise using Q.P. for finally measurement.

Frequency above 1GHz to 10th harmonic (up to 25 GHz):
Peak Detector:
(1)RBW = 1MHz
(2)VBW ≥ 3 x RBW.
(3)Detector = Peak.
(4)Sweep time = auto.
(5)Trace mode = max hold.
(6)Allow sweeps to continue until the trace stabilizes.
(7)When peak-detected value is lower than limit that the measurement using the average detector is not required. Otherwise using average detector for finally measurement.

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Average Detector:

■Option 1:

(1)RBW = 1MHz
(2)VBW ≥ 1/ T.

Modulation Type	T (ms)	1/ T (kHz)	VBW Setting (kHz)
BLE	0.387	2.584	2.7kHz
PCB antenna			
802.11b	12.18	0.082	10kHz
802.11g	2.015	0.496	10kHz
802.11n-HT20	0.962	1.040	10kHz
Omni-s antenna			
802.11b	12.18	0.082	10kHz
802.11g	2.015	0.496	10kHz
802.11n-HT20	1.878	0.532	10kHz

N/A: 1/ T is not implemented when duty cycle presented in section 3.7 is ≥98 %.
(1)Detector = Peak.
(2)Sweep time = auto.
(3)Trace mode = max hold.
(4)Allow sweeps to continue until the trace stabilizes.

□Option 2:

Average Emission Level= Peak Emission Level+ D.C.C.F.

6.4. Measurement Result Explanation

■Peak Emission Level=Antenna Factor + Cable Loss + Meter Reading
■Average Emission Level l=Antenna Factor + Cable Loss + Meter Reading
□Average Emission Level= Peak Emission Level+ DCCF
Duty Cycle Correction Factor (DCCF)= 20log (TX_{on}/TX_{on+off}) presented in section 3.7
□ERP= Peak Emission Level-95.2dB-2.14dB

6.5. Test Results

Please refer to Appendix A.

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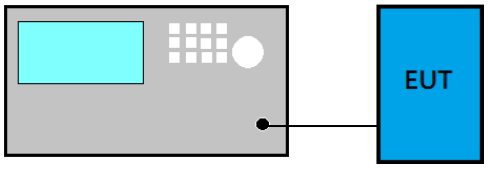
7. 6dB BANDWIDTH

7.1. Block Diagram of Test Setup



7.2. Specification Limits

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

7.3. Test Procedure

Following measurement procedure is reference to KDB 558074 D01 DTS Meas Guidance v04:

(1) Set RBW = 100 kHz.
(2) Set the video bandwidth (VBW) ≥ 3 × RBW.
(3) Detector = Peak.
(4) Trace mode = max hold.
(5) Sweep = auto couple.
(6) Allow the trace to stabilize.
(7) Setting channel bandwidth function x dB to -6 dB to record the final bandwidth.

7.4. Test Results

Please refer to Appendix A

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8. MAXIMUM PEAK OUTPUT POWER

8.1. Block Diagram of Test Setup

8.2. Specification Limits

The Limits of maximum Peak Output Power for digital modulation in 2400-2483.5MHz is : 1Watt. (30dBm), and E.I.R.P.: 4Watt (36dBm)

8.3. Test Procedure

Following measurement procedure is reference to KDB 558074 D01 DTS Meas Guidance v04:

■PKPM1 Peak power meter method:

EUT is connected to power sensor and record the maximum output power.

□Method AVGPM (Measurement using an RF average power meter):

EUT is connected to power sensor and record the maximum average output power and duty cycle factor is added when duty cycle presented in section 3.7 is < 98%.

□Method AVGSA-2 (Spectrum channel power)

(1) Set span to at least 1.5 times the OBW
(2) Set RBW = 1 -5% of OBW
(3) Set the video bandwidth (VBW) ≥ 3 × RBW.
(4) Detector = RMS.
(5) Trace mode = trace average at least 100 traces
(6) Sweep = auto couple.
(7) Compute power by integrating the spectrum across the OBW of the signal using the instrument's band power measurement function with band limits set equal to the OBW band edges.
(8) Duty cycle factor is added when duty cycle presented in section 3.7 is < 98%.

8.4. Test Results

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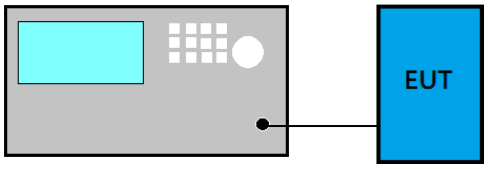
9. EMISSION LIMITATIONS

9.1. Block Diagram of Test Setup



9.2. Specification Limits

In any 100kHz 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 20dB below that in the 100kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, that the required attenuation shall be 30 dB instead of 20 dB.

Attenuation below the general limits specified in Section 15.209(a)/RSS-Gen Section 8.9 table 4 is not required. In addition, radiated emissions which fall in restricted bands, as defined in Section 15.205(a)/RSS-Gen Section 8.10 table 6, must also comply with the radiated emission limits specified in Section 15.209(a)/RSS-Gen Section 8.9 table 4 (See Section 15.205(c)).

9.3. Test Procedure

Following measurement procedure is reference to KDB 558074 D01 DTS Meas Guidance v04:

■Reference Level

(1) Set analyzer center frequency to DTS channel center frequency.
(2) Set the span to 1.5 times the DTS bandwidth.
(3) Set the RBW to: 100 kHz.
(4) Set the VBW ≥ 3 × RBW.
(5) Detector = peak.
(6) Sweep time = auto couple.
(7) Trace mode = max hold.
(8) Allow trace to fully stabilize to find the max PSD as reference level.

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■Emission Level Measurement

(1) Set analyzer center frequency to DTS channel center frequency.
(2) Set the span to 1.5 times the DTS bandwidth.
(3) Set the RBW to: 100 kHz.
(4) Set the VBW ≥ 3 × RBW.
(5) Detector = peak.
(6) Sweep time = auto couple.
(7) Trace mode = max hold.
(8) Allow trace to fully stabilize to find the max level.

9.4. Test Results

Please refer to Appendix A

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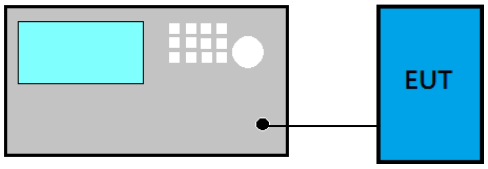
10. POWER SPECTRAL DENSITY

10.1. Block Diagram of Test Setup



10.2. Specification Limits

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

10.3. Test Procedure

Following measurement procedure is reference to KDB 558074 D01 DTS Meas Guidance v04:

■Method PKPSD (peak PSD)

(1) Set analyzer center frequency to DTS channel center frequency.
(2) Set the span to 1.5 times the DTS bandwidth.
(3) Set the RBW to: 3 kHz ≤ RBW ≤ 100 kHz.
(4) Set the VBW ≥ 3 × RBW.
(5) Detector = peak.
(6) Sweep time = auto couple.
(7) Trace mode = max hold.
(8) Allow trace to fully stabilize.
(9) Use the peak marker function to determine the maximum amplitude level.
(10) If measured value exceeds limit, reduce RBW (no less than 3 kHz) and repeat.

□Method AVGPSD-2

(1) Using peak PSD procedure step 1 to step 4.
(2) Detector= RMS detector
(3) Sweep time = auto couple
(4) Trace mode = trace averaging over a minimum of 100 traces
(5) Use the peak marker function to determine the maximum amplitude level.
(6) Duty cycle factor is added when duty cycle presented in section 3.7 < 98%.
(7) If measured value exceeds limit, reduce RBW (no less than 3 kHz) and repeat.

10.4. Test Results

Please refer to Appendix A

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11. DEVIATION TO TEST SPECIFICATIONS

【NONE】

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APPDNDIX A

TEST DATA AND PLOTS

(Model: M2SD50NBT)

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APPDNDIX B

TEST PHOTOGRAPHS

(Model: M2SD50NBT)

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TABLE OF CONTENTS

A.1 CONDUCTED EMISSION 2
A.2 RADIATED EMISSION 4
A.2.1 Emissions within Restricted Frequency Bands 4
A.2.2 Emissions outside the frequency band: 40
A.2.3 Emissions in Non-restricted Frequency Bands: 44
A.3 6dB BANDWIDTH 45
A.3.1 6dB Bandwidth Result 45
A.3.2 Measurement Plots 46
A.4 MAXIMUM PEAK OUTPUT POWER 48
A.4.1 Peak Output Power 48
A.4.2 Average Output Power (Reporting only) 50
A.5 EMISSION LIMITATIONS 51
A.6 POWER SPECTRAL DENSITY 72
A.6.1 Power Spectral Density Result 72
A.6.2 Measurement Plots 73

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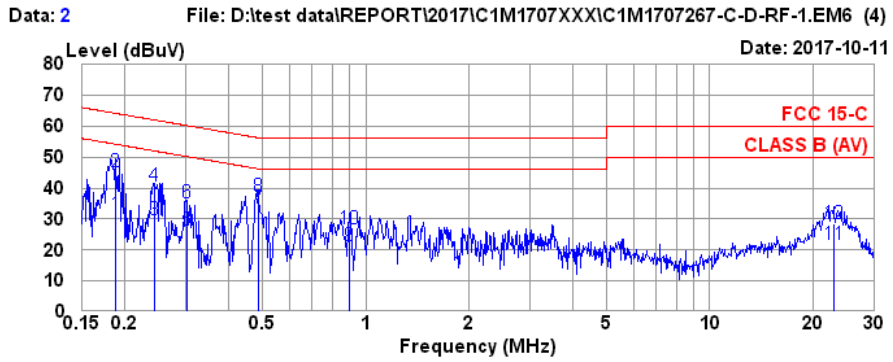
A.1 CONDUCTED EMISSION

Test Date	2017/10/11	Temp./Hum.	27℃/58%
Test Voltage	DC 3.3V (though Jig via Notebook PC)		
Antenna	PCB Antenna		




```
Site no.      : No.7 Shielded Room          Data no.   : 2
Condition     : ESH2-Z5 366(ADAPTER)        Phase      : NEUTRAL
Limit         : FCC 15-C
Env. / Ins.   : 27*C / 58% ESCI(1276)       Engineer   : Nick Du
EUT           : M2SD50NBT
Power Rating  : DC 3.3V
Test Mode     : Operaing
```

	Freq. (MHz)	AMN Factor (dB)	Cable Loss (dB)	Pulse Att. (dB)	Reading (dBµV)	Emission Level (dBµV)	Limits (dBµV)	Margin (dB)	Remark
1	0.187	0.17	0.04	9.86	21.36	31.43	54.15	22.72	Average
2	0.187	0.17	0.04	9.86	35.05	45.12	64.15	19.03	QP
3	0.243	0.18	0.04	9.86	19.75	29.83	52.00	22.17	Average
4	0.243	0.18	0.04	9.86	30.65	40.73	62.00	21.27	QP
5	0.303	0.18	0.04	9.86	16.36	26.44	50.15	23.71	Average
6	0.303	0.18	0.04	9.86	25.17	35.25	60.15	24.90	QP
7	0.486	0.20	0.04	9.86	23.55	33.65	46.23	12.58	Average
8	0.486	0.20	0.04	9.86	27.34	37.44	56.23	18.79	QP
9	0.899	0.22	0.05	9.86	11.20	21.33	46.00	24.67	Average
10	0.899	0.22	0.05	9.86	16.76	26.89	56.00	29.11	QP
11	22.896	0.96	0.32	9.96	10.42	21.66	50.00	28.34	Average
12	22.896	0.96	0.32	9.96	17.22	28.46	60.00	31.54	QP

Remarks: 1. Emission Level= AMN Factor + Cable Loss + Pulse Att. + Reading.
2. If the average limit is met when useing a quasi-peak detector, the EUT shall be deemed to meet both limits and measurement with average detector is unnecessary.

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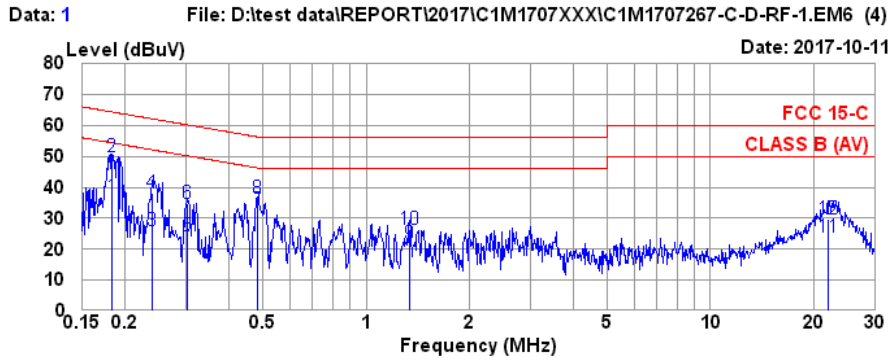
Test Date	2017/10/11	Temp./Hum.	27℃/58%
Test Voltage	DC 3.3V (though Jig via Notebook PC)		
Antenna	PCB Antenna		




```
Site no.      : No.7 Shielded Room          Data no.   : 1
Condition     : ESH2-Z5 366(ADAPTER)        Phase      : LINE
Limit         : FCC 15-C
Env. / Ins.   : 27*C / 58% ESCI(1276)       Engineer   : Nick Du
EUT           : M2SD50NBT
Power Rating  : 120Vac/60Hz
Test Mode     : Operaing
```

	Freq. (MHz)	AMN Factor (dB)	Cable Loss (dB)	Pulse Att. (dB)	Reading (dBµV)	Emission Level (dBµV)	Limits (dBµV)	Margin (dB)	Remark
1	0.182	0.17	0.04	9.86	26.99	37.06	54.37	17.31	Average
2	0.182	0.17	0.04	9.86	39.59	49.66	64.37	14.71	QP
3	0.239	0.17	0.04	9.86	15.88	25.95	52.13	26.18	Average
4	0.239	0.17	0.04	9.86	28.14	38.21	62.13	23.92	QP
5	0.303	0.17	0.04	9.86	14.28	24.35	50.15	25.80	Average
6	0.303	0.17	0.04	9.86	24.65	34.72	60.15	25.43	QP
7	0.484	0.19	0.04	9.86	22.71	32.80	46.27	13.47	Average
8	0.484	0.19	0.04	9.86	26.24	36.33	56.27	19.94	QP
9	1.338	0.23	0.06	9.86	11.71	21.86	46.00	24.14	Average
10	1.338	0.23	0.06	9.86	16.41	26.56	56.00	29.44	QP
11	21.946	1.16	0.31	9.96	12.40	23.83	50.00	26.17	Average
12	21.946	1.16	0.31	9.96	18.32	29.75	60.00	30.25	QP

Remarks: 1. Emission Level= AMN Factor + Cable Loss + Pulse Att. + Reading.
2. If the average limit is met when useing a quasi-peak detector, the EUT shall be deemed to meet both limits and measurement with average detector is unnecessary.

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A.2 RADIATED EMISSION

Test Date	2017/09/27	Temp./Hum.	23℃/48%
Test Voltage	DC 3.3V (through jig via Notebook PC)		

A.2.1 Emissions within Restricted Frequency Bands

A.2.1.1 Frequency 9kHz~30MHz

The emissions (9kHz~30MHz) not reported for there is no emission be found.

A.2.1.2 Frequency Below 1 GHz

- **Antenna: PCB Antenna**

Mode	802.11n-HT20	Frequency	TX 2412MHz

Antenna at Horizontal Polarization

Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Meter Reading (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector
42.61	18.17	1.44	6.00	25.61	40.00	14.39	Peak
191.02	15.61	3.25	17.57	36.43	43.50	7.07	Peak
278.32	19.35	4.10	20.86	44.31	46.00	1.69	Peak
375.32	21.50	5.29	10.42	37.21	46.00	8.79	Peak
497.54	23.12	6.41	6.52	36.05	46.00	9.95	Peak
996.12	27.80	8.81	1.22	37.83	54.00	16.17	Peak

Antenna at Vertical Polarization

Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Meter Reading (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector
42.61	18.17	1.44	18.65	38.26	40.00	1.74	Peak
168.71	15.92	3.02	11.03	29.97	43.50	13.53	Peak
281.23	19.37	4.13	11.59	35.09	46.00	10.91	Peak
499.48	23.14	6.42	6.06	35.62	46.00	10.38	Peak
689.60	24.85	7.05	2.26	34.16	46.00	11.84	Peak
995.15	27.80	8.81	1.01	37.62	54.00	16.38	Peak

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Mode	BLE	Frequency	TX 2440MHz

Antenna at Horizontal Polarization

Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Meter Reading (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector
42.61	18.17	1.44	5.90	25.51	40.00	14.49	Peak
101.78	17.60	2.29	7.11	27.00	43.50	16.50	Peak
281.23	19.37	4.13	19.30	42.80	46.00	3.20	Peak
499.48	23.14	6.42	6.61	36.17	46.00	9.83	Peak
837.04	26.25	7.82	2.66	36.73	46.00	9.27	Peak
993.21	27.76	8.79	0.85	37.40	54.00	16.60	Peak

Antenna at Vertical Polarization

Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Meter Reading (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector
42.61	18.17	1.44	18.90	38.51	40.00	1.49	Peak
126.03	18.50	2.57	11.51	32.58	43.50	10.92	Peak
279.29	19.36	4.11	10.60	34.07	46.00	11.93	Peak
497.54	23.12	6.41	6.13	35.66	46.00	10.34	Peak
689.60	24.85	7.05	3.51	35.41	46.00	10.59	Peak
991.27	27.73	8.76	1.75	38.24	54.00	15.76	Peak

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- **Antenna: Omni-S Antenna**

Mode	802.11n-HT20	Frequency	TX 2412MHz

Antenna at Horizontal Polarization

Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Meter Reading (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector
42.61	18.17	1.44	6.00	25.61	40.00	14.39	Peak
191.02	15.61	3.25	17.57	36.43	43.50	7.07	Peak
278.32	19.35	4.10	20.86	44.31	46.00	1.69	Peak
375.32	21.50	5.29	10.42	37.21	46.00	8.79	Peak
497.54	23.12	6.41	6.52	36.05	46.00	9.95	Peak
996.12	27.80	8.81	1.22	37.83	54.00	16.17	Peak

Antenna at Vertical Polarization

Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Meter Reading (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector
42.61	18.17	1.44	18.65	38.26	40.00	1.74	Peak
168.71	15.92	3.02	11.03	29.97	43.50	13.53	Peak
281.23	19.37	4.13	11.59	35.09	46.00	10.91	Peak
499.48	23.14	6.42	6.06	35.62	46.00	10.38	Peak
689.60	24.85	7.05	2.26	34.16	46.00	11.84	Peak
995.15	27.80	8.81	1.01	37.62	54.00	16.38	Peak

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Mode	BLE	Frequency	TX 2440MHz

Antenna at Horizontal Polarization

Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Meter Reading (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector
42.61	18.17	1.44	5.09	24.70	40.00	15.30	Peak
101.78	17.60	2.29	7.68	27.57	43.50	15.93	Peak
279.29	19.36	4.11	19.54	43.01	46.00	2.99	Peak
499.48	23.14	6.42	5.85	35.41	46.00	10.59	Peak
888.45	26.70	8.10	2.95	37.75	46.00	8.25	Peak
986.42	27.69	8.74	0.75	37.18	54.00	16.82	Peak

Antenna at Vertical Polarization

Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Meter Reading (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector
42.61	18.17	1.44	18.10	37.71	40.00	2.29	Peak
166.77	16.03	3.00	10.61	29.64	43.50	13.86	Peak
277.35	19.34	4.09	11.41	34.84	46.00	11.16	Peak
499.48	23.14	6.42	5.69	35.25	46.00	10.75	Peak
884.57	26.68	8.09	1.82	36.59	46.00	9.41	Peak
993.21	27.76	8.79	1.08	37.63	54.00	16.37	Peak

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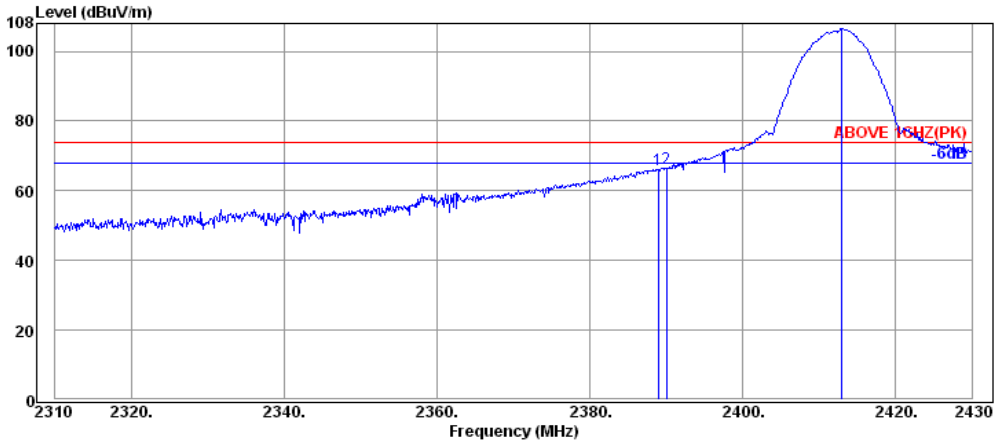
A.2.1.3 Frequency Above 1 GHz to 10th harmonics

Band Edge:

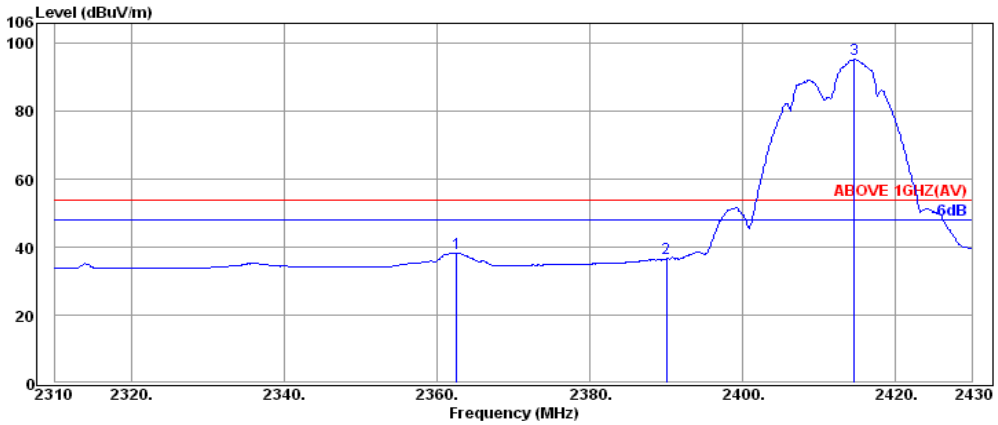
- **Antenna: PCB Antenna**

Mode	802.11b	Frequency	TX 2412MHz



Antenna at Horizontal Polarization

Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Meter Reading (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector
2388.96	32.16	6.57	27.32	66.05	74.00	7.95	Peak
2390.04	32.16	6.57	27.73	66.46	74.00	7.54	Peak
2412.96	32.18	6.59	67.83	106.60	---	---	Peak



Antenna at Horizontal Polarization

Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Meter Reading (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector
2362.56	32.11	6.53	-0.23	38.41	54.00	15.59	Average
2390.04	32.16	6.57	-2.05	36.68	54.00	17.32	Average
2414.64	32.18	6.59	56.57	95.34	---	---	Average

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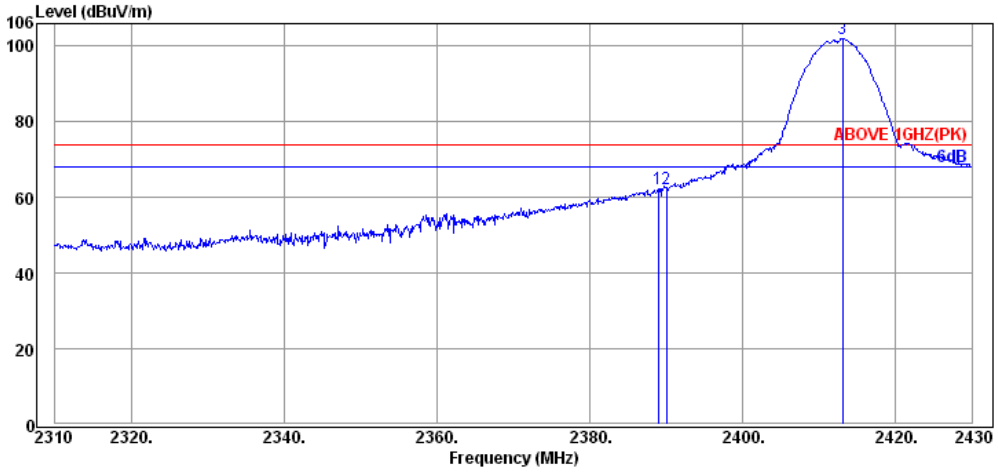
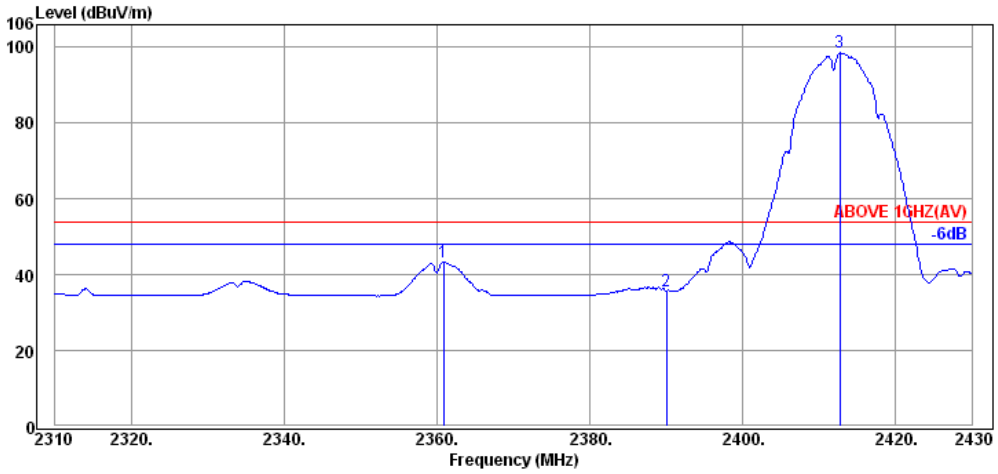
Mode	802.11b	Frequency	TX 2412MHz



Antenna at Vertical Polarization

Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Meter Reading (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector
2388.96	32.16	6.57	23.60	62.33	74.00	11.67	Peak
2390.04	32.16	6.57	23.74	62.47	74.00	11.53	Peak
2413.08	32.18	6.59	63.36	102.13	---	---	Peak



Antenna at Vertical Polarization

Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Meter Reading (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector
2360.88	32.11	6.53	4.73	43.37	54.00	10.63	Average
2390.04	32.16	6.57	-3.03	35.70	54.00	18.30	Average
2412.72	32.18	6.59	59.80	98.57	---	---	Average

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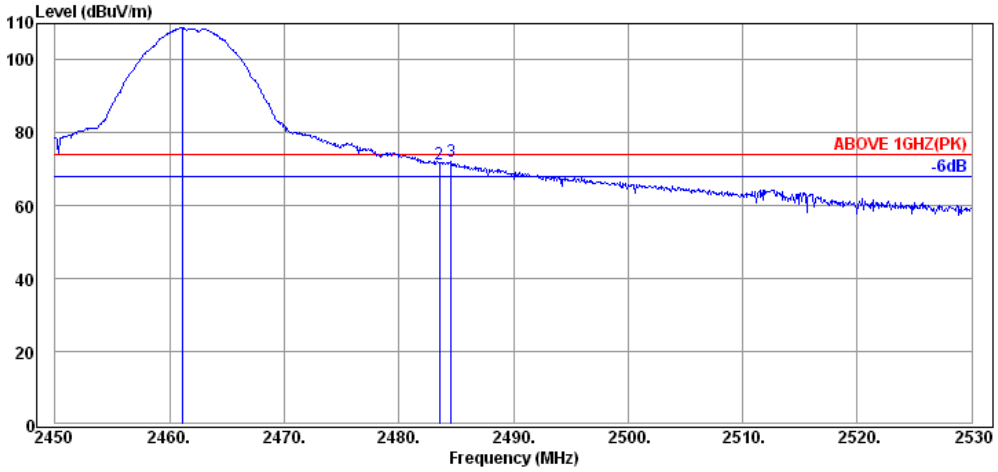
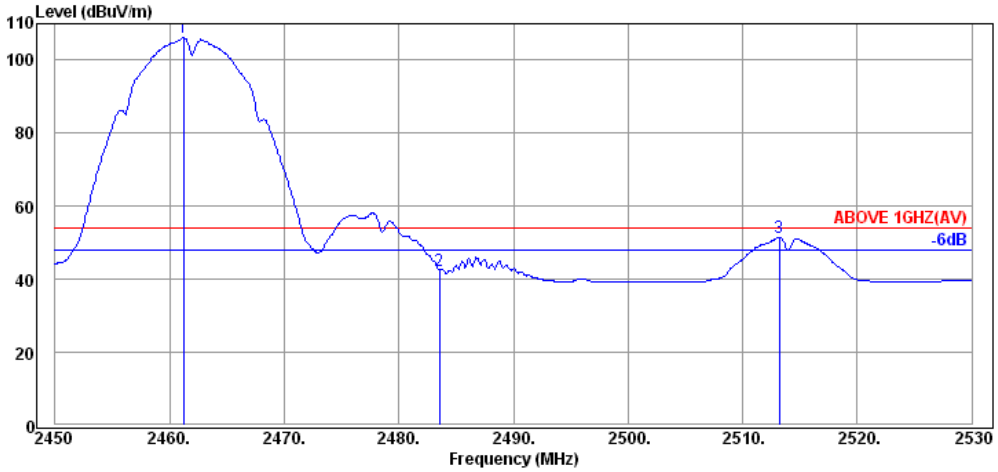
Mode	802.11b	Frequency	TX 2462MHz



Antenna at Horizontal Polarization

Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Meter Reading (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector
2461.12	32.25	6.65	69.94	108.84	---	---	Peak
2483.52	32.28	6.67	32.55	71.50	74.00	2.50	Peak
2484.56	32.28	6.67	33.09	72.04	74.00	1.96	Peak



Antenna at Horizontal Polarization

Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Meter Reading (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector
2461.20	32.25	6.65	67.21	106.11	---	---	Average
2483.52	32.28	6.67	3.55	42.50	54.00	11.50	Average
2513.20	32.32	6.72	12.52	51.56	54.00	2.44	Average

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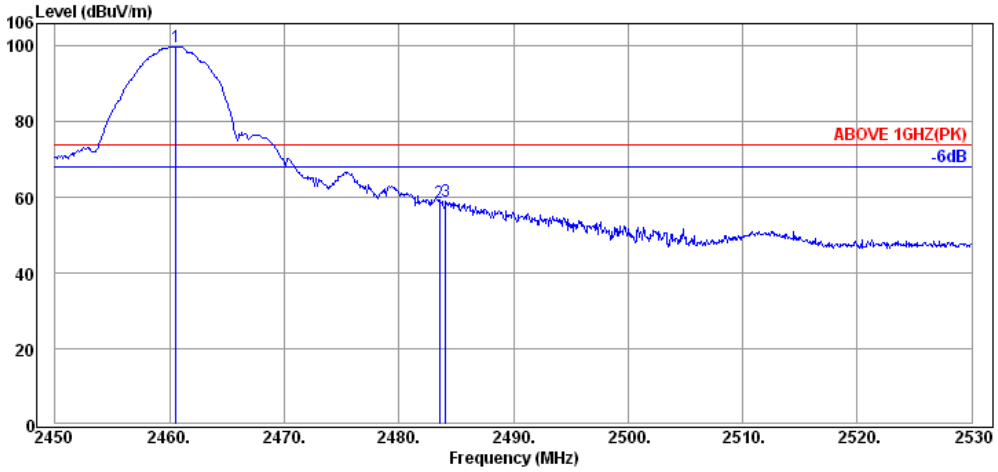
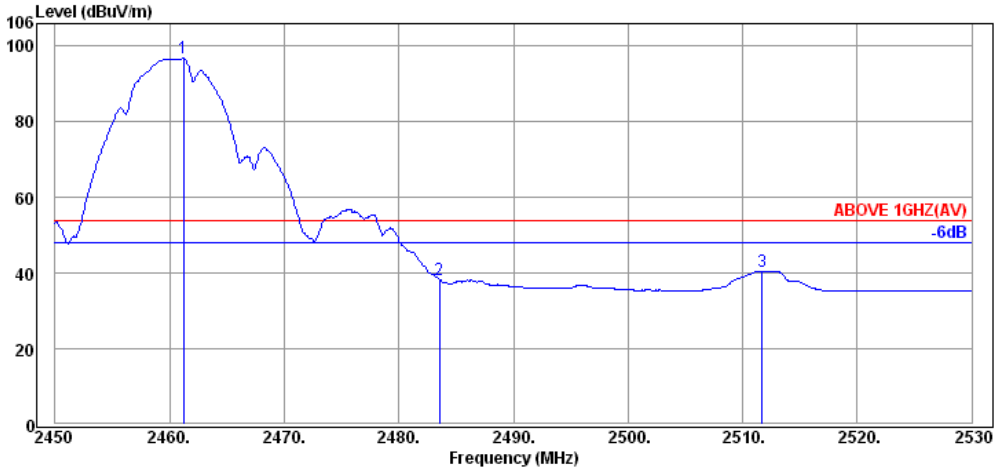
Mode	802.11b	Frequency	TX 2462MHz



Antenna at Vertical Polarization

Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Meter Reading (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector
2460.56	32.25	6.65	60.98	99.88	---	---	Peak
2483.52	32.28	6.67	19.83	58.78	74.00	15.22	Peak
2484.08	32.28	6.67	20.15	59.10	74.00	14.90	Peak



Antenna at Vertical Polarization

Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Meter Reading (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector
2461.20	32.25	6.65	57.88	96.78	---	---	Average
2483.52	32.28	6.67	-0.61	38.34	54.00	15.66	Average
2511.68	32.32	6.72	1.53	40.57	54.00	13.43	Average

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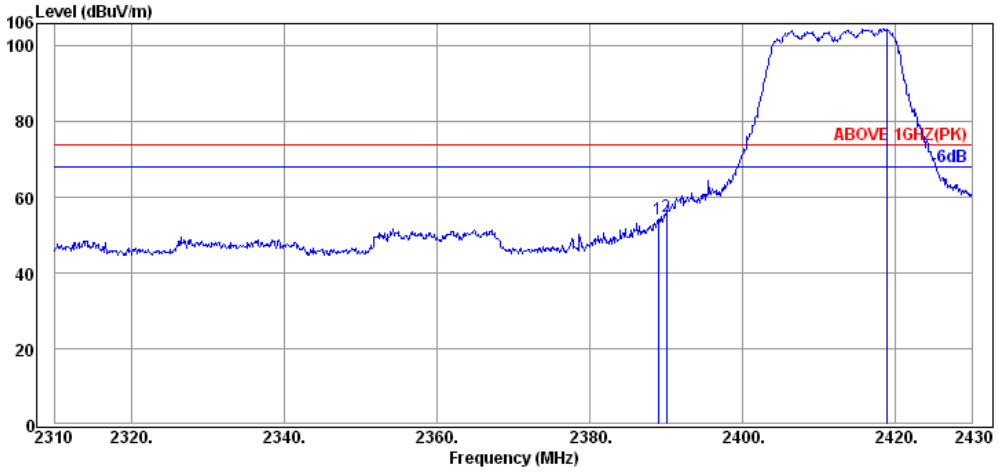
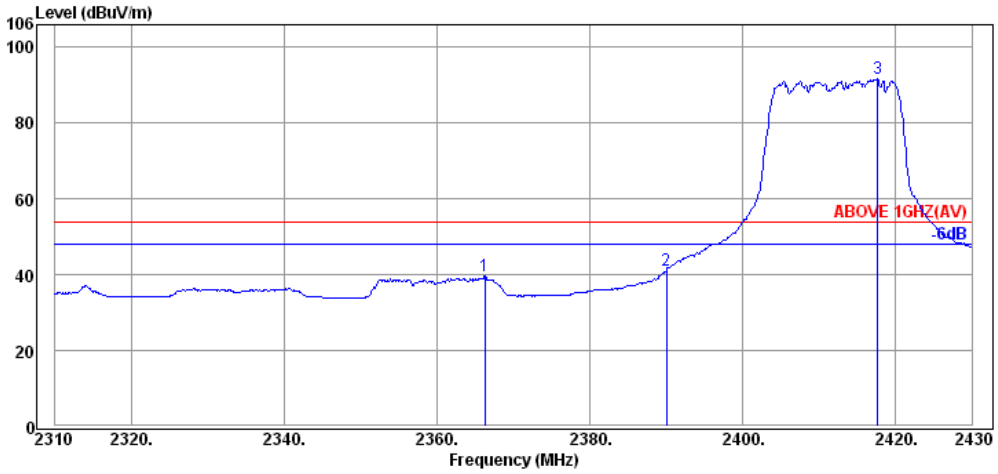
Mode	802.11g	Frequency	TX 2412MHz



Antenna at Horizontal Polarization

Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Meter Reading (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector
2388.96	32.16	6.57	15.52	54.25	74.00	19.75	Peak
2390.04	32.16	6.57	16.36	55.09	74.00	18.91	Peak
2418.84	32.18	6.59	65.92	104.69	---	---	Peak



Antenna at Horizontal Polarization

Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Meter Reading (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector
2366.28	32.11	6.53	0.93	39.57	54.00	14.43	Average
2390.04	32.16	6.57	2.58	41.31	54.00	12.69	Average
2417.64	32.18	6.59	52.97	91.74	---	---	Average

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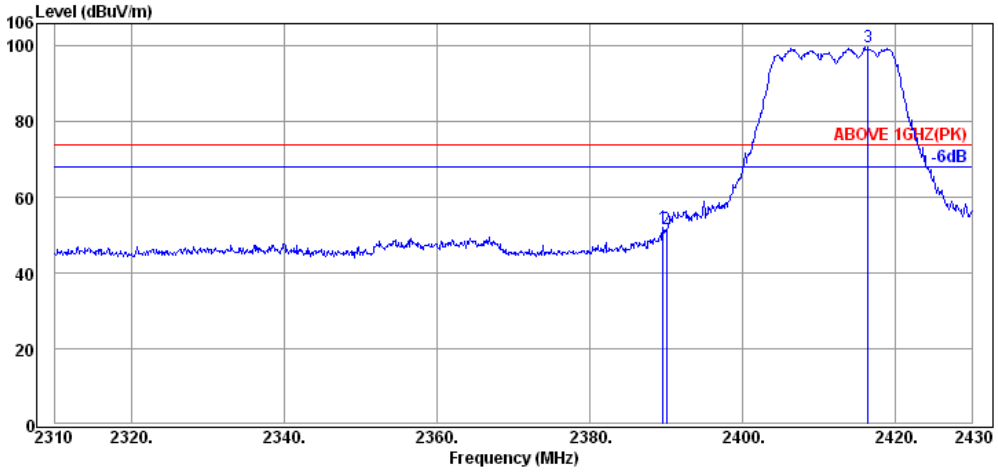
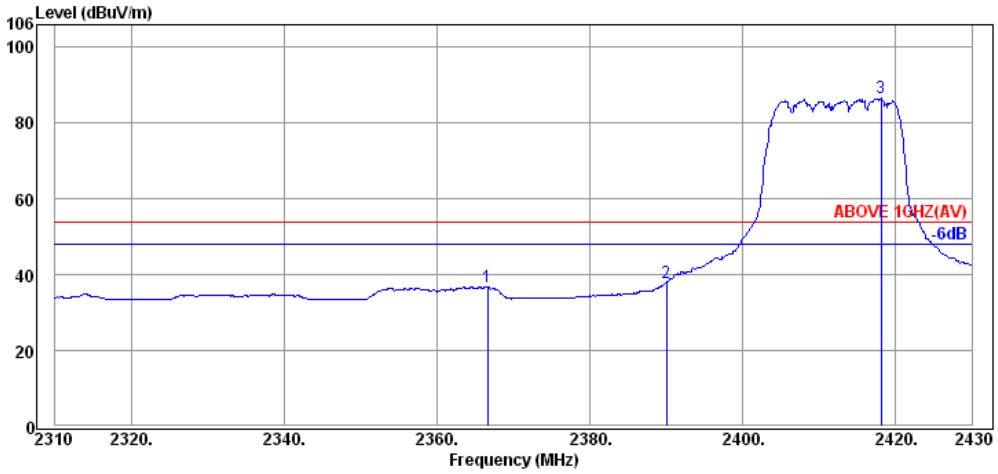
Mode	802.11g	Frequency	TX 2412MHz



Antenna at Vertical Polarization

Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Meter Reading (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector
2389.56	32.16	6.57	13.19	51.92	74.00	22.08	Peak
2390.04	32.16	6.57	12.82	51.55	74.00	22.45	Peak
2416.44	32.18	6.59	61.15	99.92	---	---	Peak



Antenna at Vertical Polarization

Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Meter Reading (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector
2366.64	32.11	6.53	-1.73	36.91	54.00	17.09	Average
2390.04	32.16	6.57	-0.70	38.03	54.00	15.97	Average
2418.12	32.18	6.59	48.03	86.80	---	---	Average

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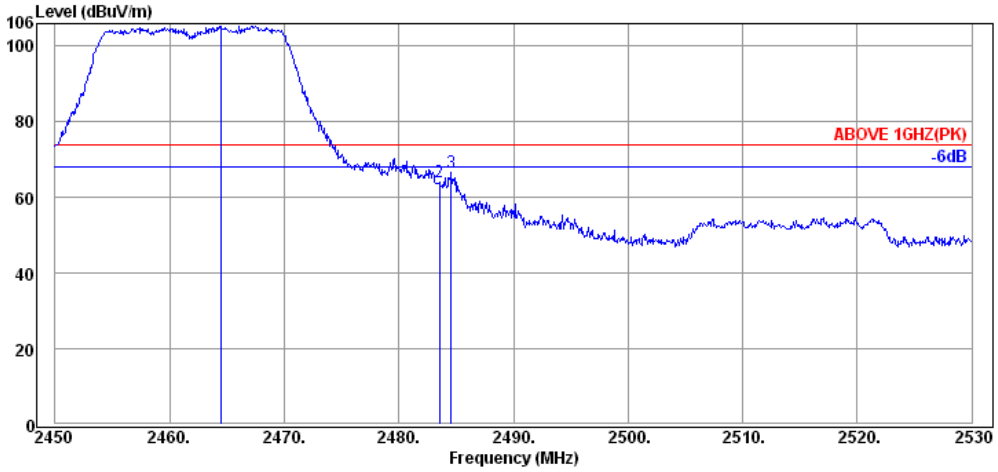
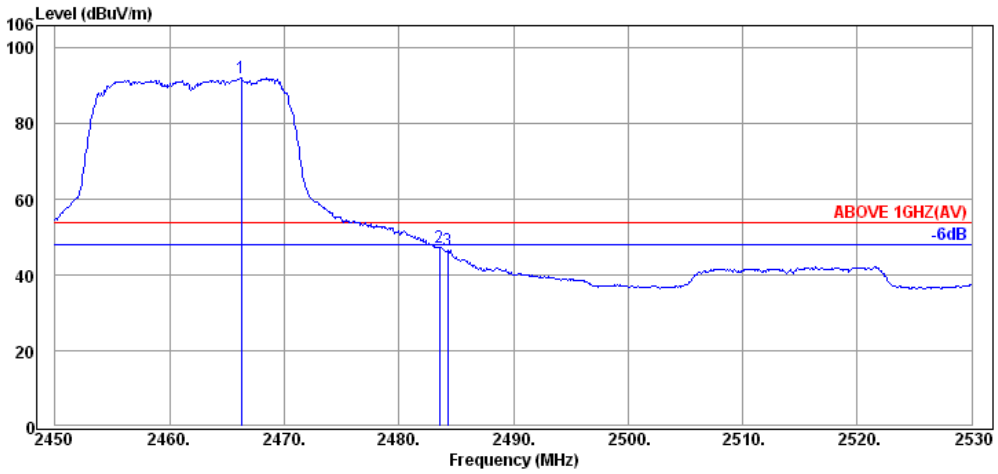
Mode	802.11g	Frequency	TX 2462MHz



Antenna at Horizontal Polarization

Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Meter Reading (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector
2464.48	32.25	6.65	66.53	105.43	---	---	Peak
2483.52	32.28	6.67	25.06	64.01	74.00	9.99	Peak
2484.56	32.28	6.67	27.84	66.79	74.00	7.21	Peak



Antenna at Horizontal Polarization

Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Meter Reading (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector
2466.24	32.25	6.65	53.38	92.28	---	---	Average
2483.52	32.28	6.67	8.23	47.18	54.00	6.82	Average
2484.24	32.28	6.67	7.69	46.64	54.00	7.36	Average

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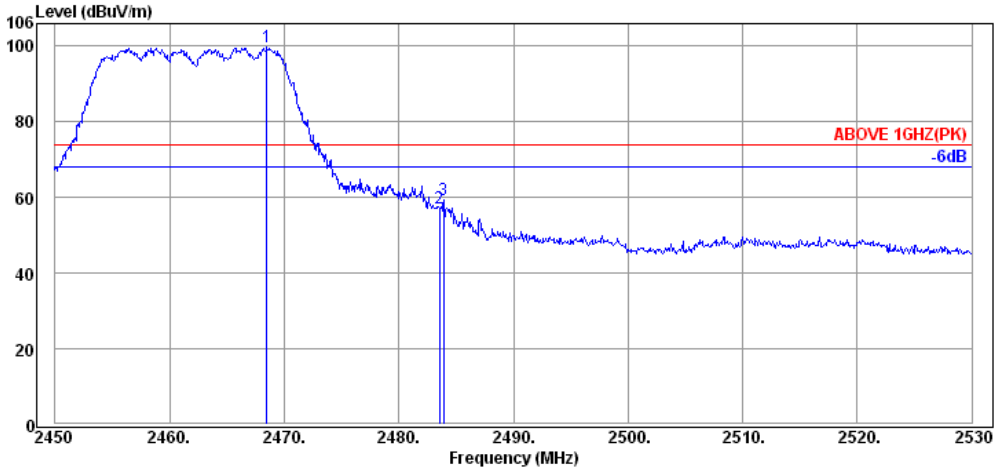
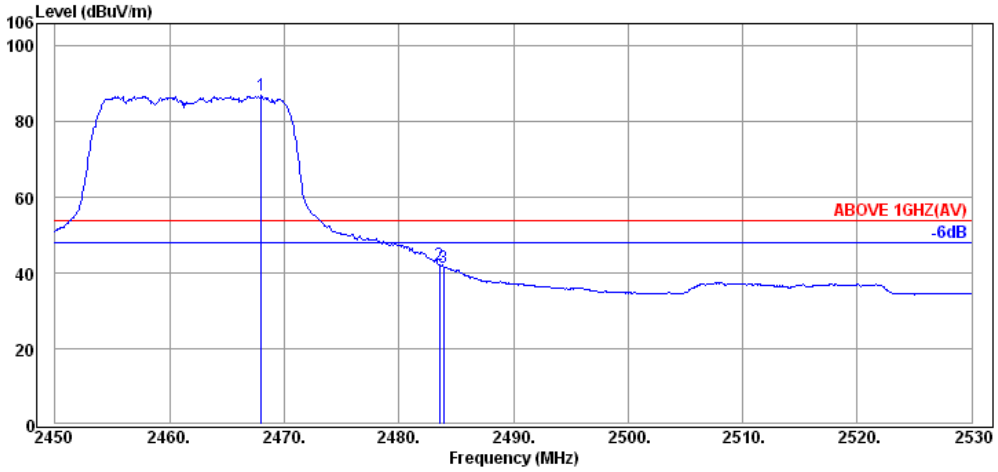
Mode	802.11g	Frequency	TX 2462MHz



Antenna at Vertical Polarization

Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Meter Reading (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector
2468.48	32.25	6.65	61.00	99.90	---	---	Peak
2483.52	32.28	6.67	18.08	57.03	74.00	16.97	Peak
2483.92	32.28	6.67	20.51	59.46	74.00	14.54	Peak



Antenna at Vertical Polarization

Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Meter Reading (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector
2468.00	32.25	6.65	48.06	86.96	---	---	Average
2483.52	32.28	6.67	3.20	42.15	54.00	11.85	Average
2483.92	32.28	6.67	2.67	41.62	54.00	12.38	Average

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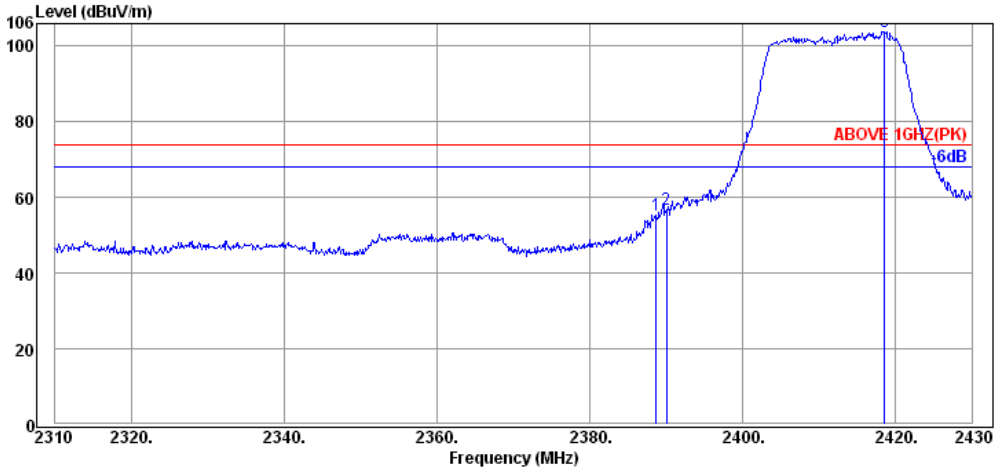
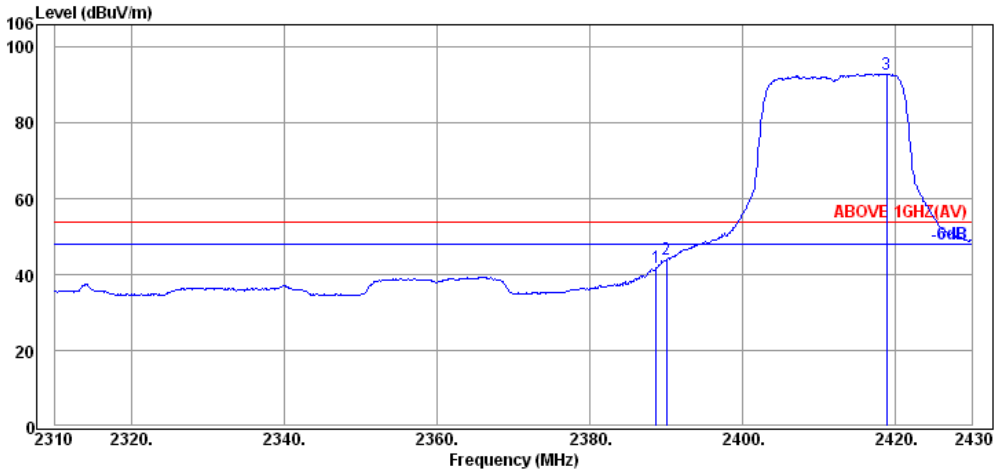
Mode	802.11n-HT20	Frequency	TX 2412MHz



Antenna at Horizontal Polarization

Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Meter Reading (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector
2388.72	32.16	6.57	16.78	55.51	74.00	18.49	Peak
2390.04	32.16	6.57	17.96	56.69	74.00	17.31	Peak
2418.60	32.18	6.59	65.21	103.98	---	---	Peak



Antenna at Horizontal Polarization

Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Meter Reading (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector
2388.72	32.16	6.57	3.08	41.81	54.00	12.19	Average
2390.04	32.16	6.57	5.17	43.90	54.00	10.10	Average
2418.84	32.18	6.59	54.29	93.06	---	---	Average

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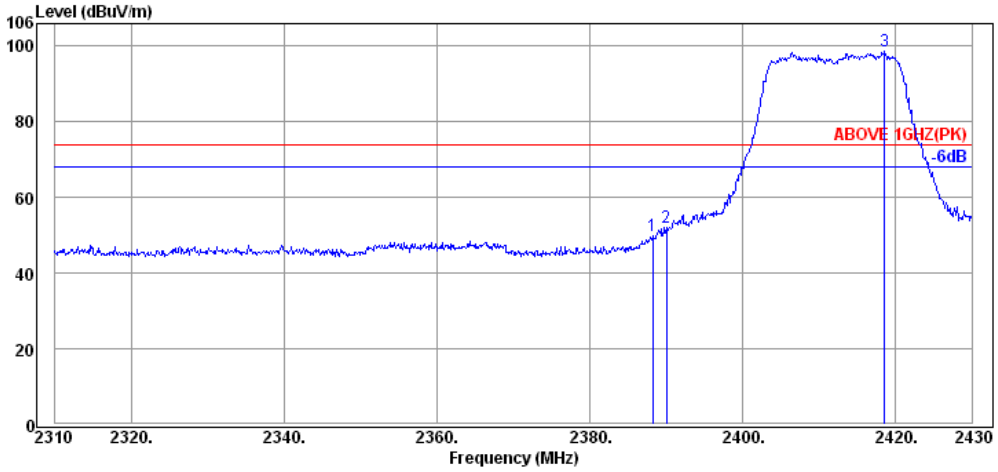
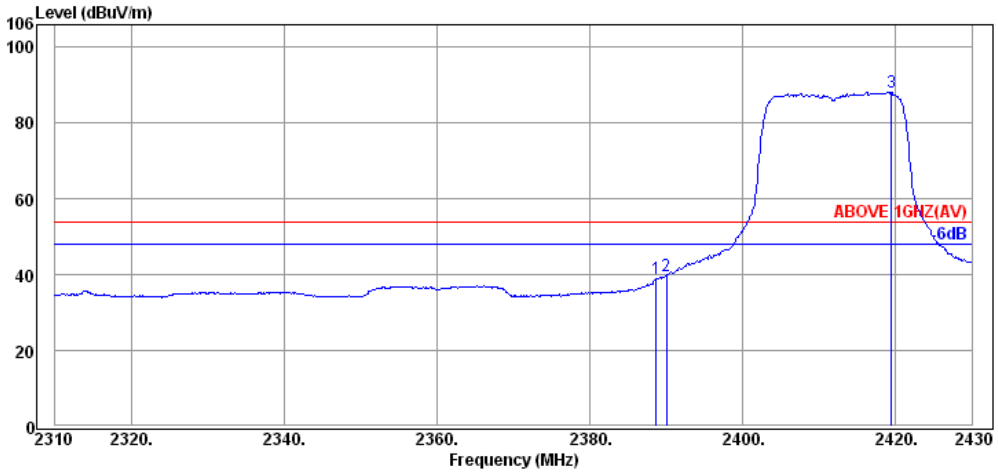
Mode	802.11n-HT20	Frequency	TX 2412MHz



Antenna at Vertical Polarization

Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Meter Reading (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector
2388.24	32.16	6.57	11.21	49.94	74.00	24.06	Peak
2390.04	32.16	6.57	13.41	52.14	74.00	21.86	Peak
2418.60	32.18	6.59	59.87	98.64	---	---	Peak



Antenna at Vertical Polarization

Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Meter Reading (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector
2388.72	32.16	6.57	0.11	38.84	54.00	15.16	Average
2390.04	32.16	6.57	1.02	39.75	54.00	14.25	Average
2419.44	32.18	6.59	49.47	88.24	---	---	Average

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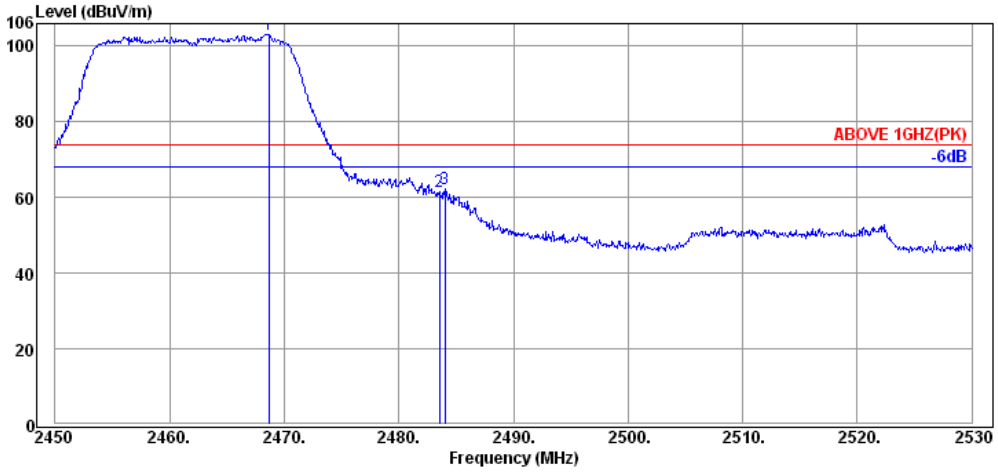
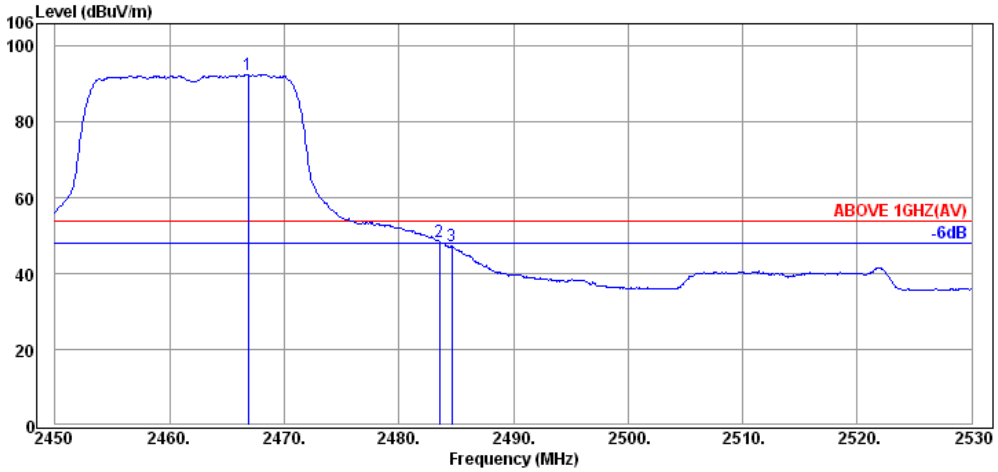
Mode	802.11n-HT20	Frequency	TX 2462MHz



Antenna at Horizontal Polarization

Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Meter Reading (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector
2468.64	32.25	6.65	64.25	103.15	---	---	Peak
2483.52	32.28	6.67	22.61	61.56	74.00	12.44	Peak
2484.00	32.28	6.67	23.52	62.47	74.00	11.53	Peak



Antenna at Horizontal Polarization

Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Meter Reading (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector
2466.88	32.25	6.65	53.60	92.50	---	---	Average
2483.52	32.28	6.67	9.54	48.49	54.00	5.51	Average
2484.64	32.28	6.67	8.28	47.23	54.00	6.77	Average

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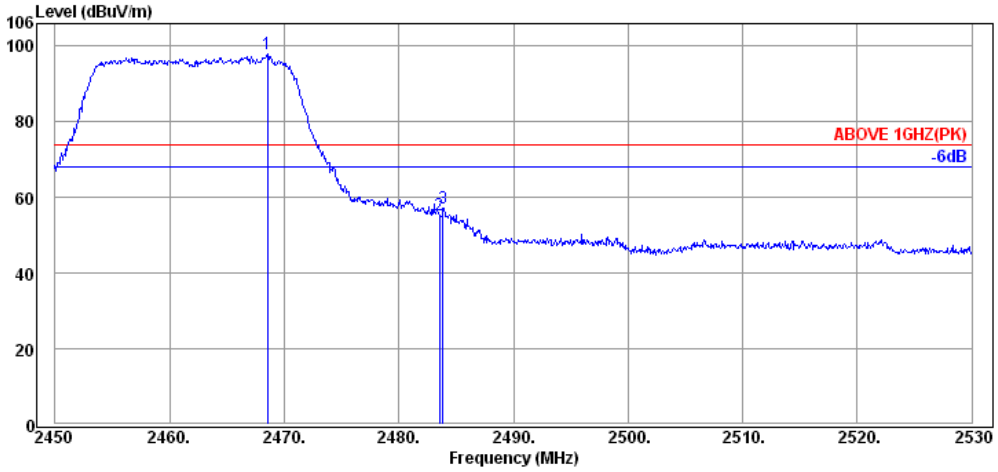
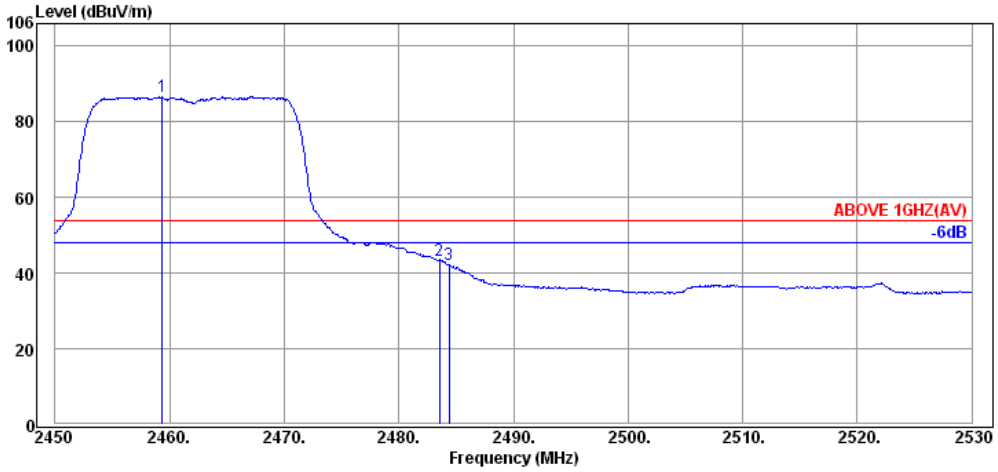
Mode	802.11n-HT20	Frequency	TX 2462MHz



Antenna at Vertical Polarization

Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Meter Reading (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector
2468.56	32.25	6.65	58.96	97.86	---	---	Peak
2483.52	32.28	6.67	16.34	55.29	74.00	18.71	Peak
2483.84	32.28	6.67	18.17	57.12	74.00	16.88	Peak



Antenna at Vertical Polarization

Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Meter Reading (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector
2459.36	32.25	6.65	47.65	86.55	---	---	Average
2483.52	32.28	6.67	4.29	43.24	54.00	10.76	Average
2484.40	32.28	6.67	3.16	42.11	54.00	11.89	Average

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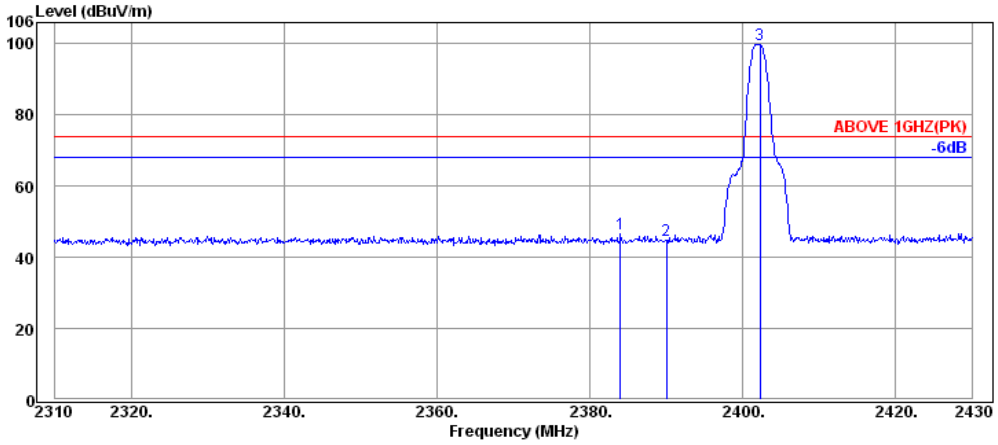
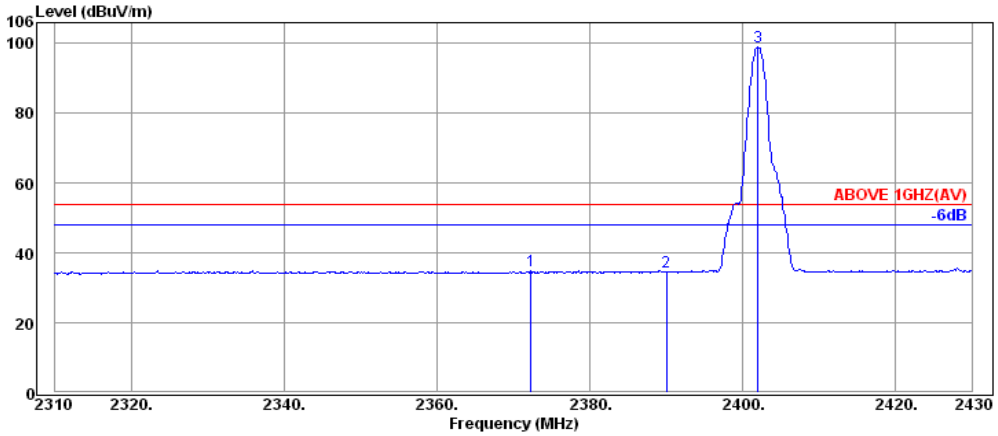
Mode	BLE	Frequency	TX 2402MHz



Antenna at Horizontal Polarization

Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Meter Reading (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector
2384.04	32.13	6.55	7.93	46.61	74.00	27.39	Peak
2390.04	32.16	6.57	6.03	44.76	74.00	29.24	Peak
2402.28	32.16	6.57	61.08	99.81	---	---	Peak



Antenna at Horizontal Polarization

Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Meter Reading (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector
2372.28	32.13	6.55	-3.81	34.87	54.00	19.13	Average
2390.04	32.16	6.57	-4.15	34.58	54.00	19.42	Average
2402.04	32.16	6.57	60.26	98.99	---	---	Average

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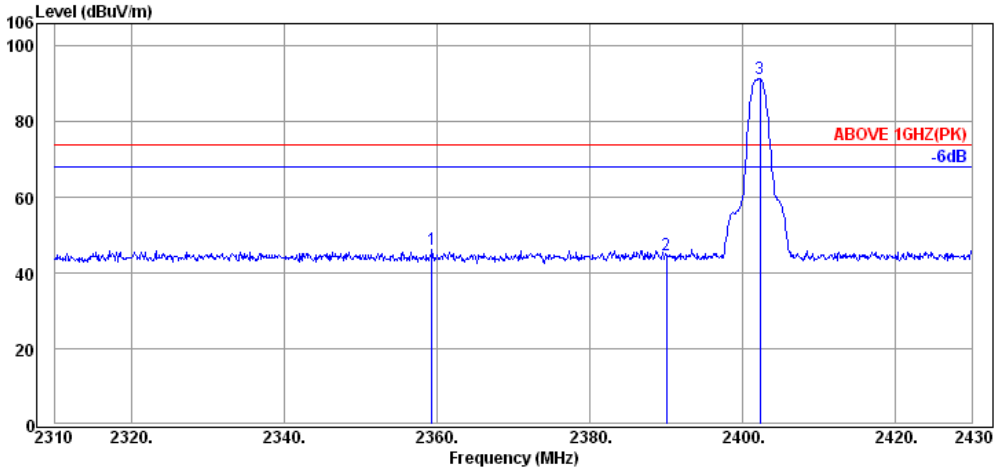
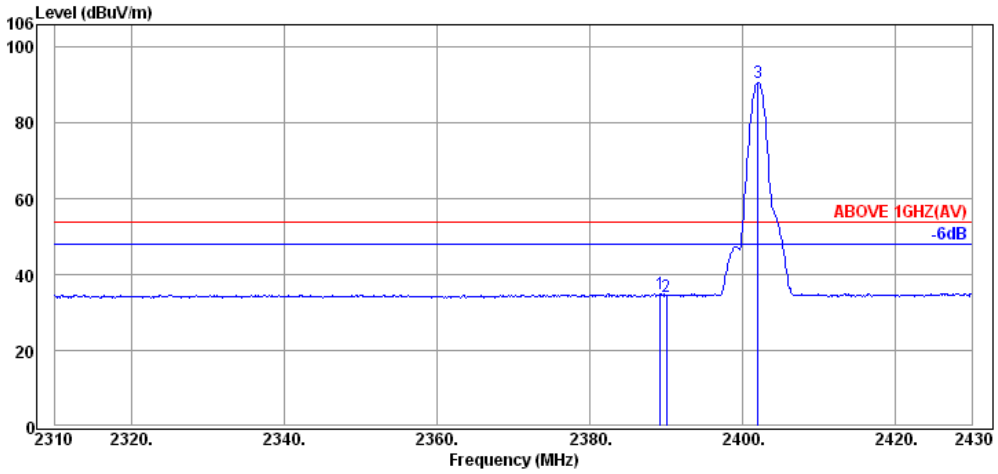
Mode	BLE	Frequency	TX 2402MHz



Antenna at Vertical Polarization

Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Meter Reading (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector
2359.32	32.11	6.53	7.47	46.11	74.00	27.89	Peak
2390.04	32.16	6.57	6.02	44.75	74.00	29.25	Peak
2402.28	32.16	6.57	52.61	91.34	---	---	Peak



Antenna at Vertical Polarization

Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Meter Reading (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector
2389.20	32.16	6.57	-3.83	34.90	54.00	19.10	Average
2390.04	32.16	6.57	-4.33	34.40	54.00	19.60	Average
2402.04	32.16	6.57	51.95	90.68	---	---	Average

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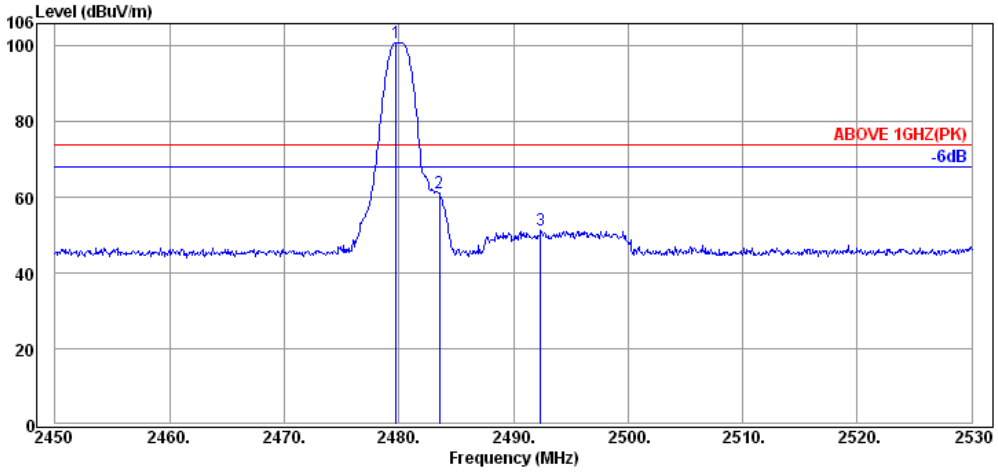
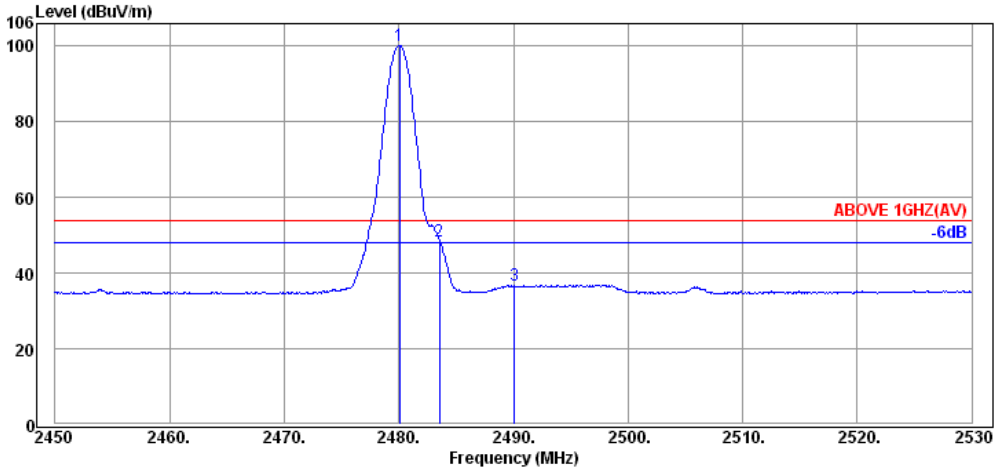
Mode	BLE	Frequency	TX 2480MHz



Antenna at Horizontal Polarization

Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Meter Reading (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector
2479.76	32.28	6.67	61.97	100.92	---	---	Peak
2483.52	32.28	6.67	22.11	61.06	74.00	12.94	Peak
2492.40	32.30	6.69	12.32	51.31	74.00	22.69	Peak



Antenna at Horizontal Polarization

Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Meter Reading (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector
2480.08	32.28	6.67	61.21	100.16	---	---	Average
2483.52	32.28	6.67	9.65	48.60	54.00	5.40	Average
2490.08	32.30	6.69	-2.08	36.91	54.00	17.09	Average

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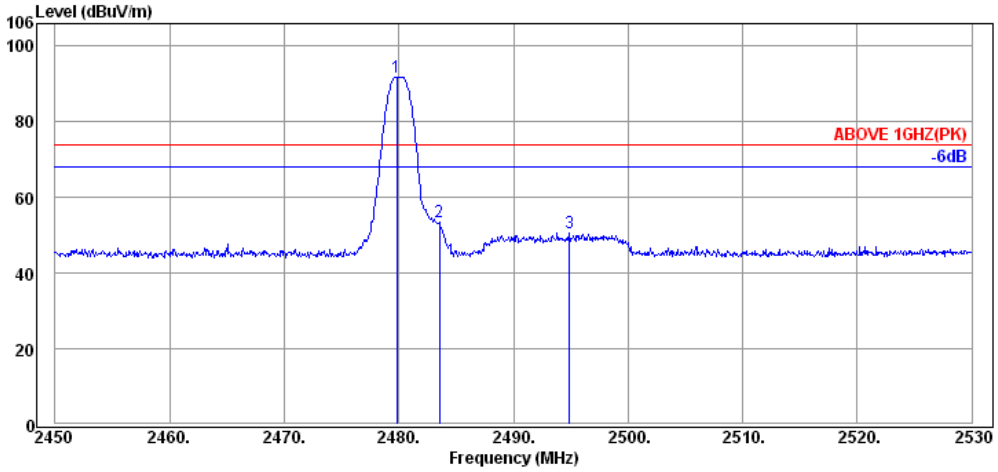
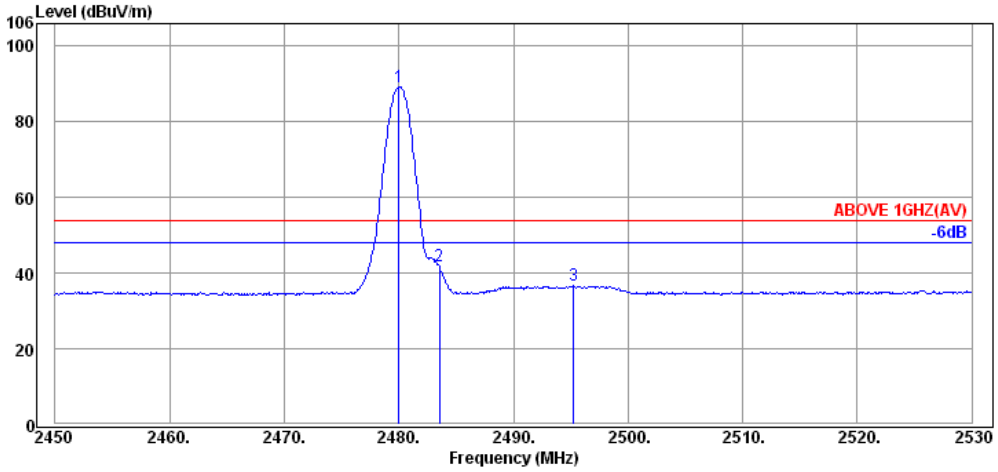
Mode	BLE	Frequency	TX 2480MHz



Antenna at Vertical Polarization

Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Meter Reading (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector
2479.84	32.28	6.67	52.87	91.82	---	---	Peak
2483.52	32.28	6.67	14.46	53.41	74.00	20.59	Peak
2494.88	32.30	6.69	11.61	50.60	74.00	23.40	Peak



Antenna at Vertical Polarization

Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Meter Reading (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector
2480.00	32.28	6.67	50.37	89.32	---	---	Average
2483.52	32.28	6.67	2.89	41.84	54.00	12.16	Average
2495.28	32.30	6.69	-2.35	36.64	54.00	17.36	Average

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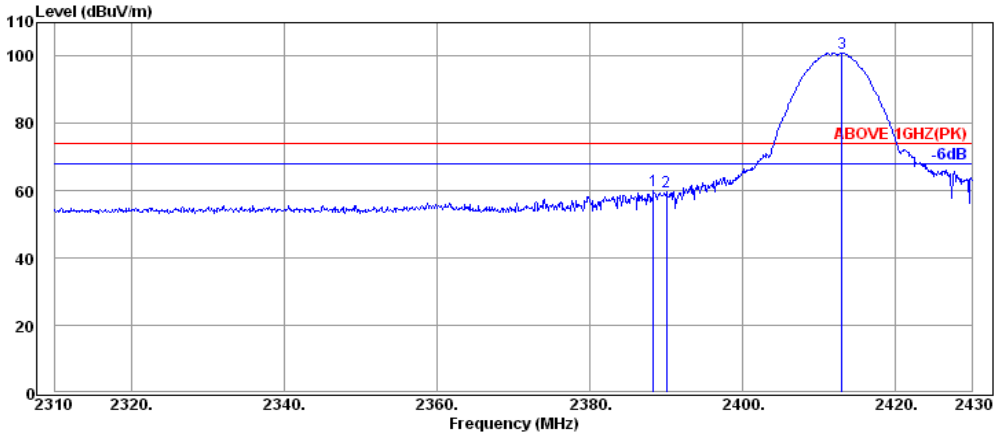
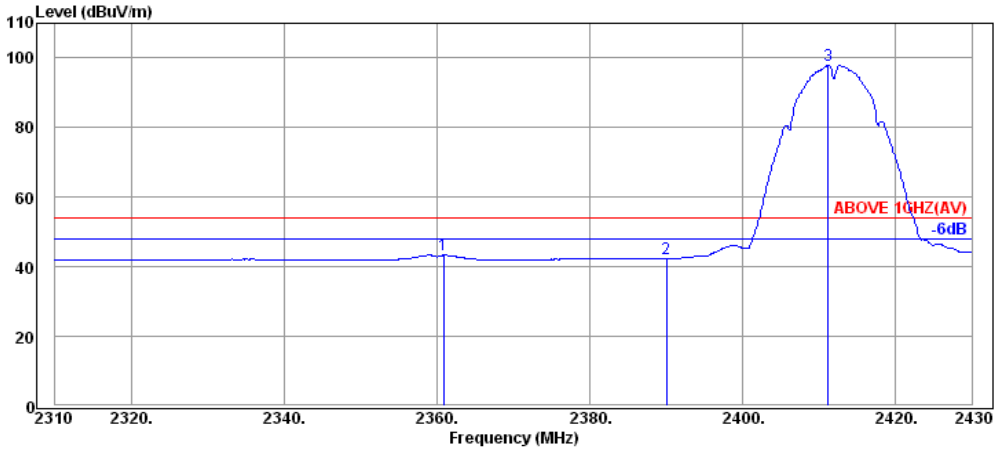
- **Antenna: Omni-s Antenna**

Mode	802.11b	Frequency	TX 2412MHz



Antenna at Horizontal Polarization

Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Meter Reading (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector
2388.36	32.16	6.57	21.42	60.15	74.00	13.85	Peak
2390.04	32.16	6.57	20.86	59.59	74.00	14.41	Peak
2412.96	32.18	6.59	62.34	101.11	---	---	Peak



Antenna at Horizontal Polarization

Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Meter Reading (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector
2360.88	32.11	6.53	4.70	43.34	54.00	10.66	Average
2390.04	32.16	6.57	3.61	42.34	54.00	11.66	Average
2411.16	32.18	6.59	59.27	98.04	---	---	Average

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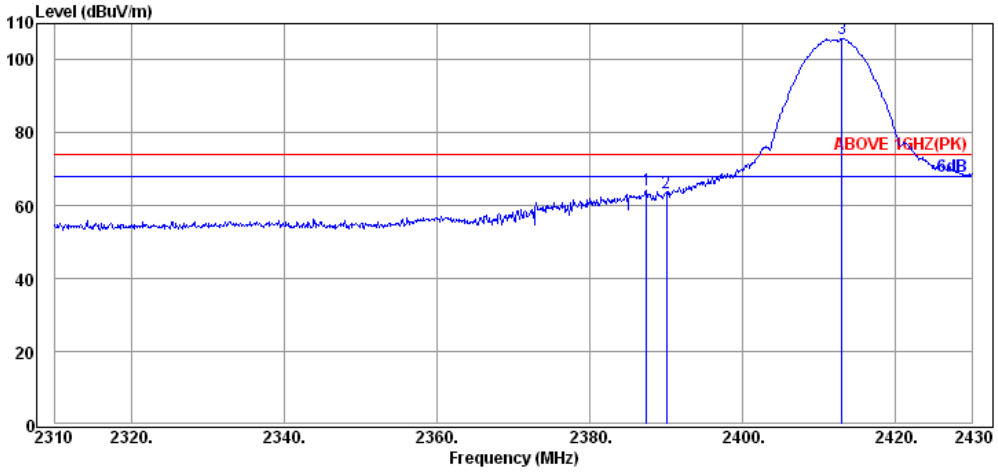
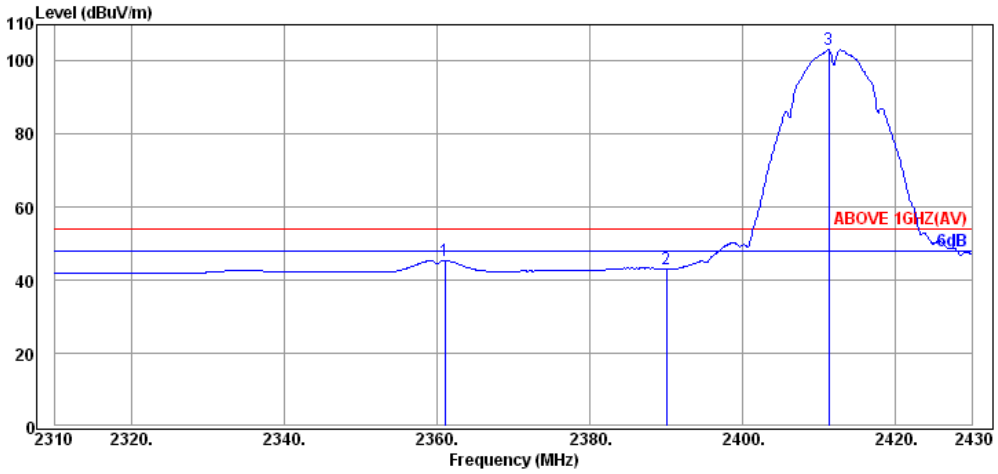
Mode	802.11b	Frequency	TX 2412MHz



Antenna at Vertical Polarization

Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Meter Reading (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector
2387.40	32.16	6.57	25.53	64.26	74.00	9.74	Peak
2390.04	32.16	6.57	24.61	63.34	74.00	10.66	Peak
2412.96	32.18	6.59	67.19	105.96	---	---	Peak



Antenna at Vertical Polarization

Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Meter Reading (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector
2361.00	32.11	6.53	6.81	45.45	54.00	8.55	Average
2390.04	32.16	6.57	4.23	42.96	54.00	11.04	Average
2411.28	32.18	6.59	64.39	103.16	---	---	Average

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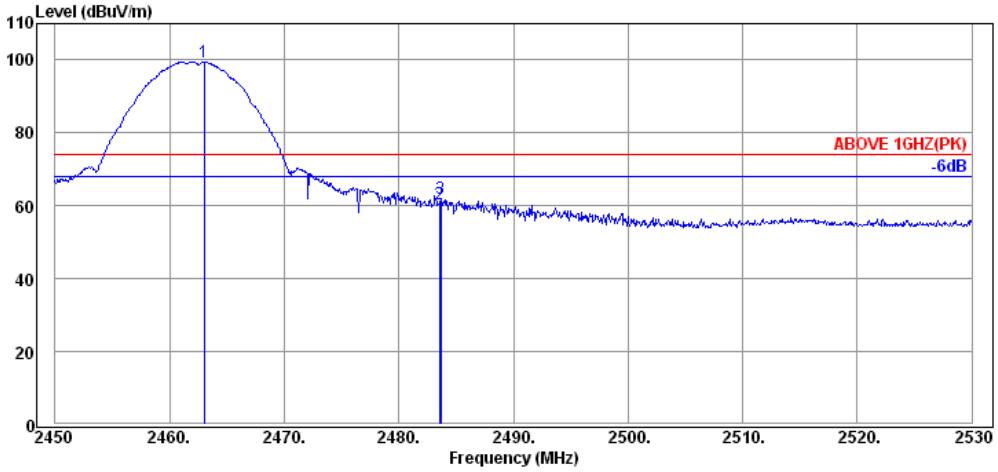
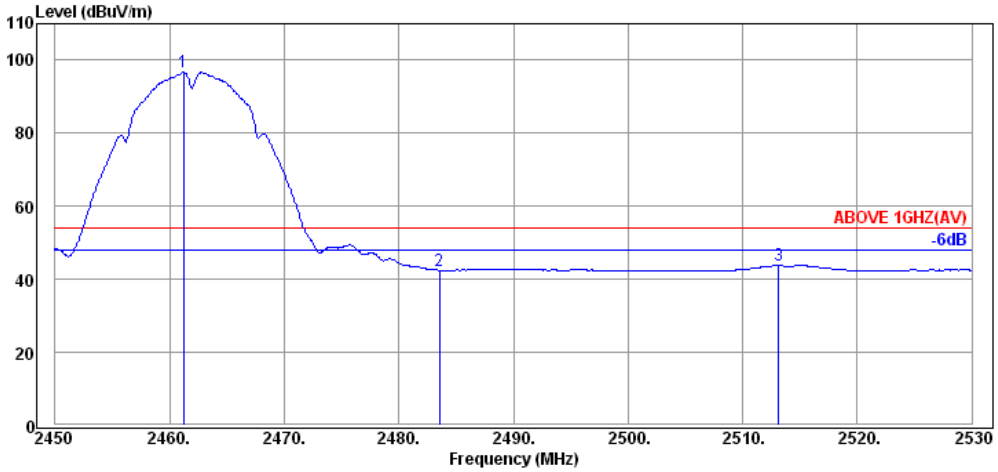
Mode	802.11b	Frequency	TX 2462MHz



Antenna at Horizontal Polarization

Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Meter Reading (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector
2463.04	32.25	6.65	60.67	99.57	---	---	Peak
2483.52	32.28	6.67	21.45	60.40	74.00	13.60	Peak
2483.68	32.28	6.67	22.92	61.87	74.00	12.13	Peak



Antenna at Horizontal Polarization

Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Meter Reading (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector
2461.20	32.25	6.65	57.81	96.71	---	---	Average
2483.52	32.28	6.67	3.50	42.45	54.00	11.55	Average
2513.12	32.32	6.72	4.80	43.84	54.00	10.16	Average

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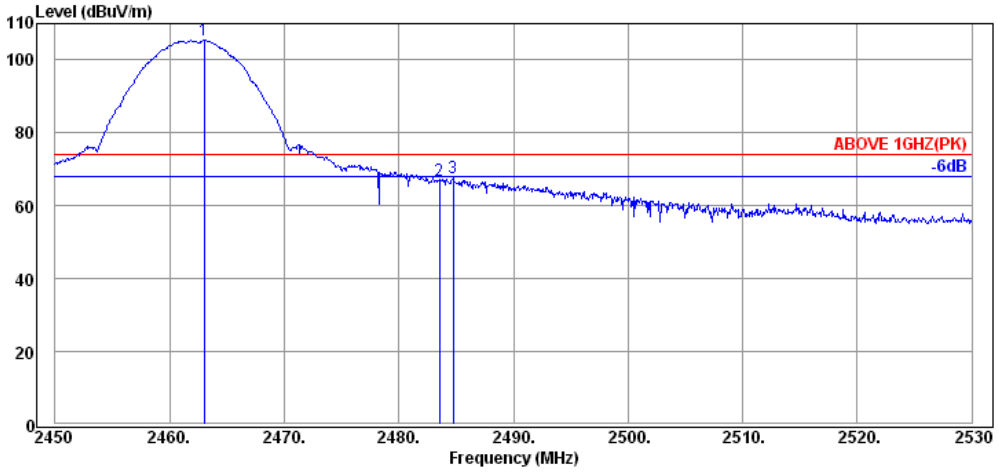
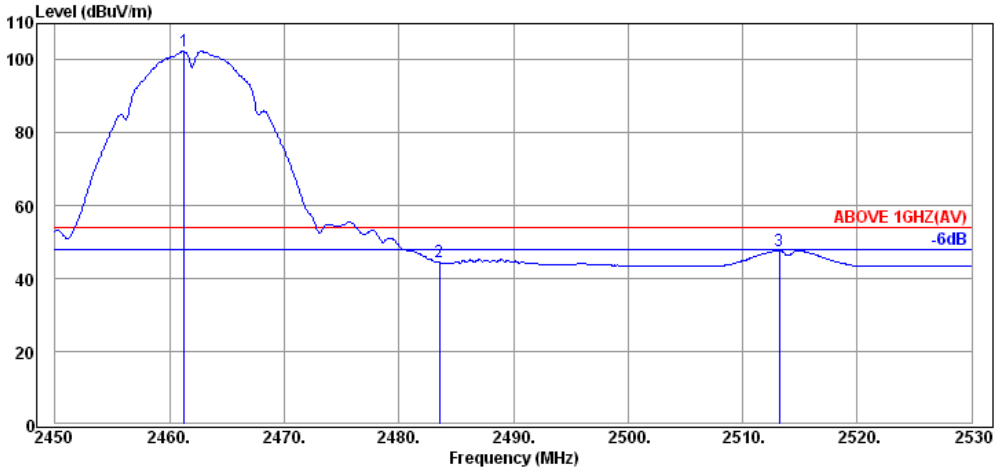
Mode	802.11b	Frequency	TX 2462MHz



Antenna at Vertical Polarization

Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Meter Reading (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector
2463.04	32.25	6.65	66.58	105.48	---	---	Peak
2483.52	32.28	6.67	27.84	66.79	74.00	7.21	Peak
2484.72	32.28	6.67	28.71	67.66	74.00	6.34	Peak



Antenna at Vertical Polarization

Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Meter Reading (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector
2461.28	32.25	6.65	63.54	102.44	---	---	Average
2483.52	32.28	6.67	5.51	44.46	54.00	9.54	Average
2513.20	32.32	6.72	8.74	47.78	54.00	6.22	Average

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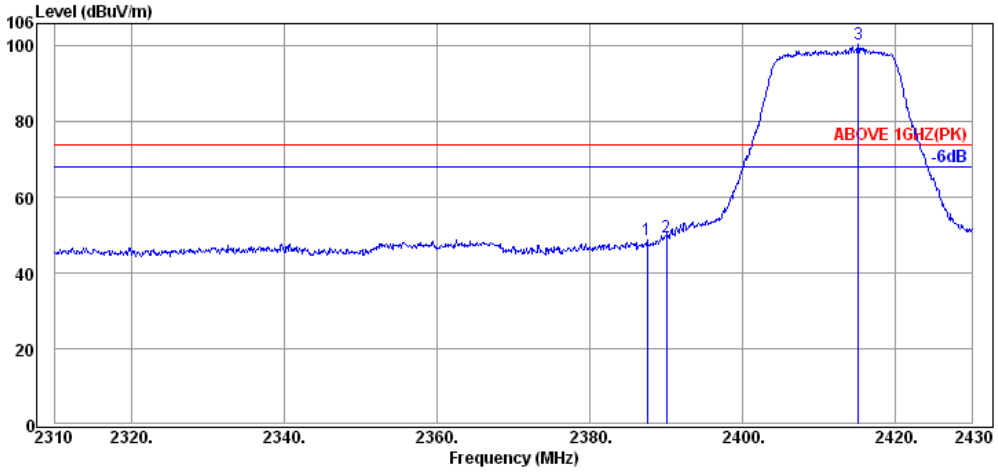
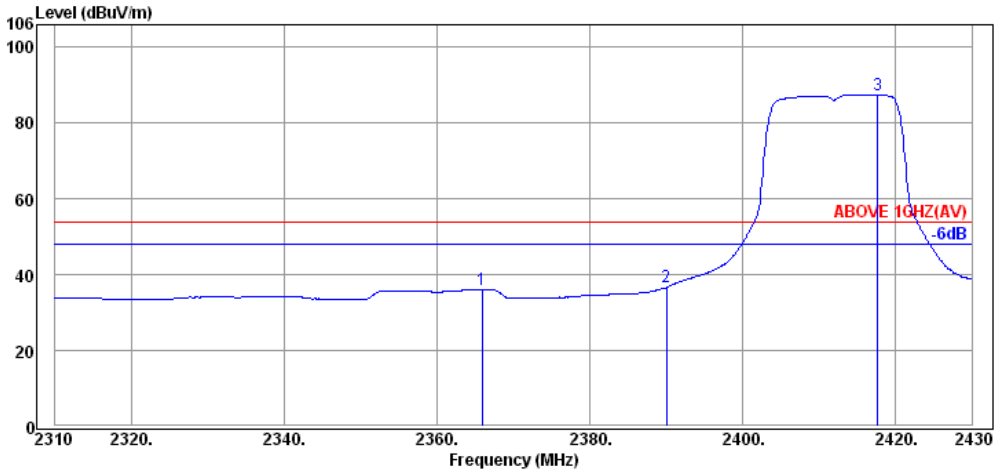
Mode	802.11g	Frequency	TX 2412MHz



Antenna at Horizontal Polarization

Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Meter Reading (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector
2387.52	32.16	6.57	10.04	48.77	74.00	25.23	Peak
2390.04	32.16	6.57	10.72	49.45	74.00	24.55	Peak
2415.12	32.18	6.59	61.61	100.38	---	---	Peak



Antenna at Horizontal Polarization

Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Meter Reading (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector
2365.92	32.11	6.53	-2.49	36.15	54.00	17.85	Average
2390.04	32.16	6.57	-2.03	36.70	54.00	17.30	Average
2417.64	32.18	6.59	48.81	87.58	---	---	Average

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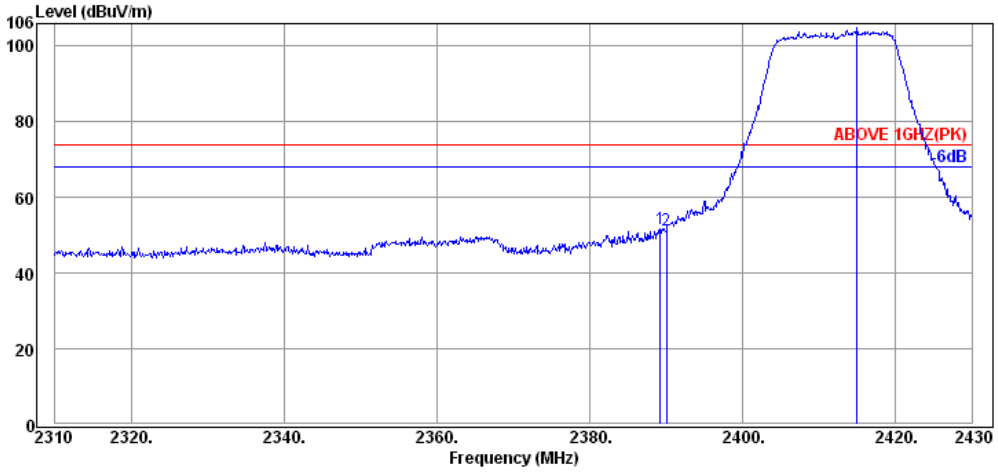
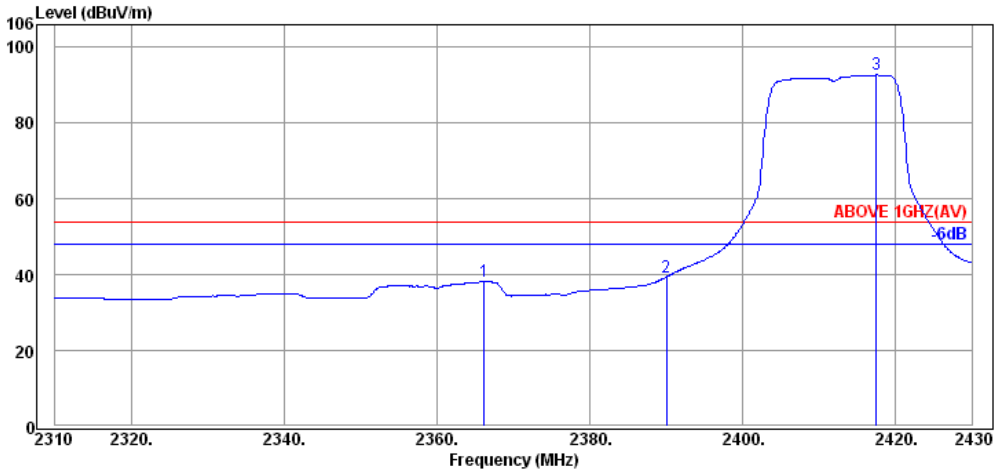
Mode	802.11g	Frequency	TX 2412MHz



Antenna at Vertical Polarization

Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Meter Reading (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector
2389.20	32.16	6.57	13.12	51.85	74.00	22.15	Peak
2390.04	32.16	6.57	12.69	51.42	74.00	22.58	Peak
2415.00	32.18	6.59	66.26	105.03	---	---	Peak



Antenna at Vertical Polarization

Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Meter Reading (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector
2366.16	32.11	6.53	-0.44	38.20	54.00	15.80	Average
2390.04	32.16	6.57	0.70	39.43	54.00	14.57	Average
2417.52	32.18	6.59	53.97	92.74	---	---	Average

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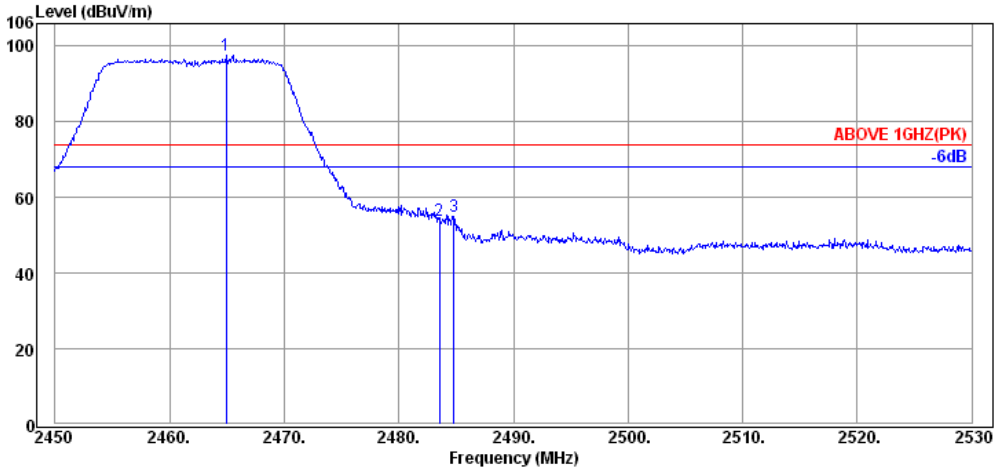
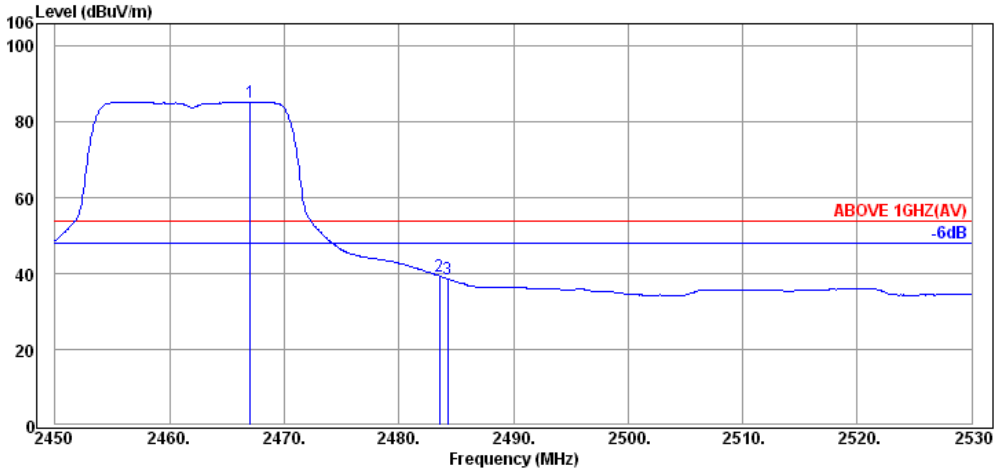
Mode	802.11g	Frequency	TX 2462MHz



Antenna at Horizontal Polarization

Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Meter Reading (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector
2464.96	32.25	6.65	58.62	97.52	---	---	Peak
2483.52	32.28	6.67	14.85	53.80	74.00	20.20	Peak
2484.80	32.28	6.67	16.15	55.10	74.00	18.90	Peak



Antenna at Horizontal Polarization

Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Meter Reading (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector
2467.04	32.25	6.65	46.41	85.31	---	---	Average
2483.52	32.28	6.67	0.47	39.42	54.00	14.58	Average
2484.24	32.28	6.67	-0.17	38.78	54.00	15.22	Average

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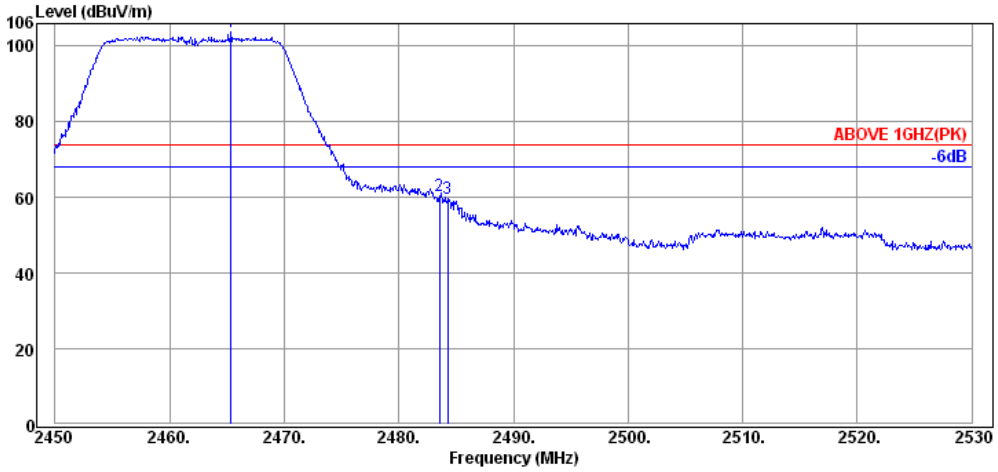
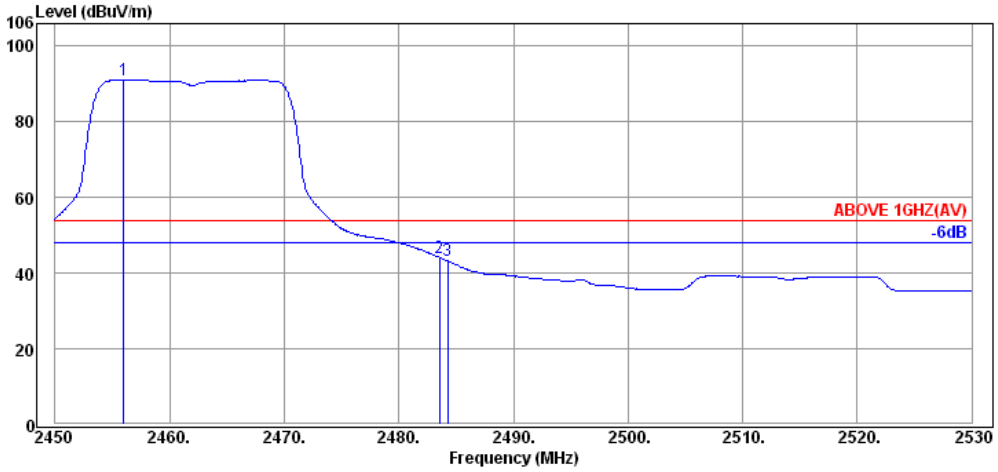
Mode	802.11g	Frequency	TX 2462MHz



Antenna at Vertical Polarization

Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Meter Reading (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector
2465.36	32.25	6.65	64.73	103.63	---	---	Peak
2483.52	32.28	6.67	21.34	60.29	74.00	13.71	Peak
2484.24	32.28	6.67	20.73	59.68	74.00	14.32	Peak



Antenna at Vertical Polarization

Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Meter Reading (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector
2456.00	32.25	6.65	52.22	91.12	---	---	Average
2483.52	32.28	6.67	5.27	44.22	54.00	9.78	Average
2484.24	32.28	6.67	4.24	43.19	54.00	10.81	Average

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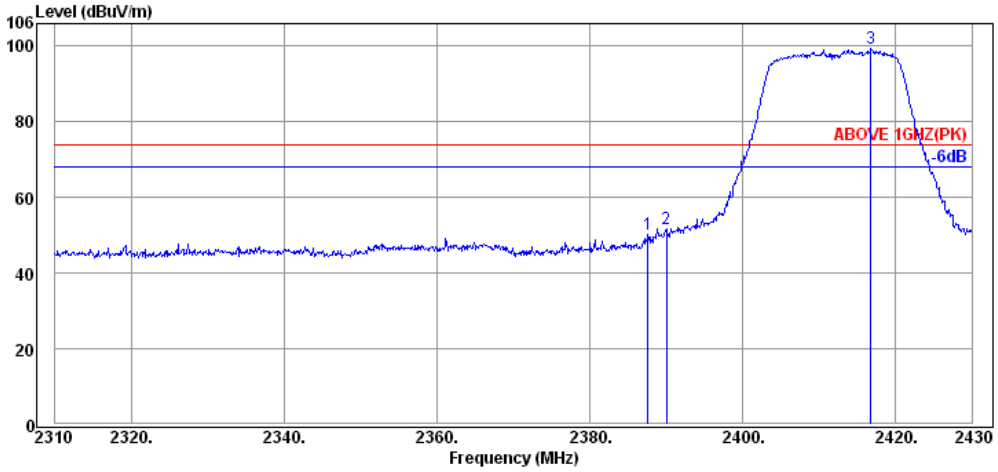
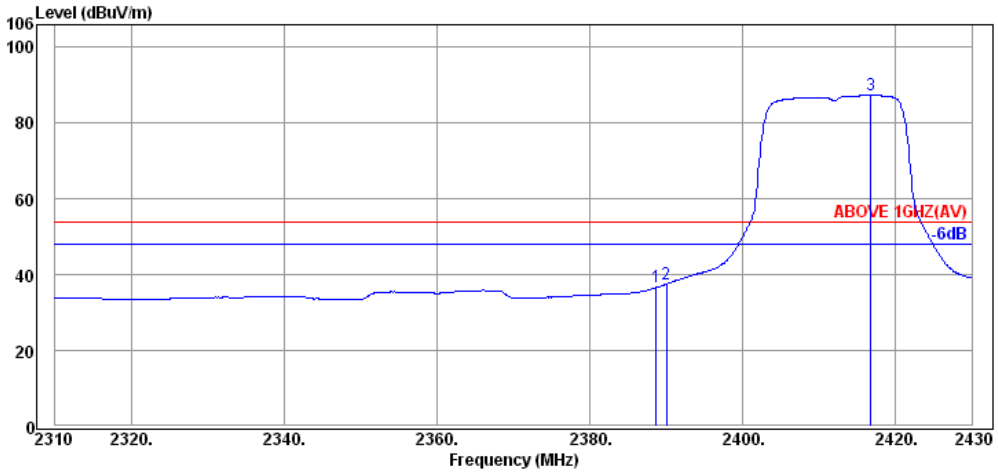
Mode	802.11n-HT20	Frequency	TX 2412MHz



Antenna at Horizontal Polarization

Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Meter Reading (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector
2387.64	32.16	6.57	11.64	50.37	74.00	23.63	Peak
2390.04	32.16	6.57	13.02	51.75	74.00	22.25	Peak
2416.80	32.18	6.59	60.72	99.49	---	---	Peak



Antenna at Horizontal Polarization

Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Meter Reading (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector
2388.72	32.16	6.57	-2.07	36.66	54.00	17.34	Average
2390.04	32.16	6.57	-1.13	37.60	54.00	16.40	Average
2416.80	32.18	6.59	48.58	87.35	---	---	Average

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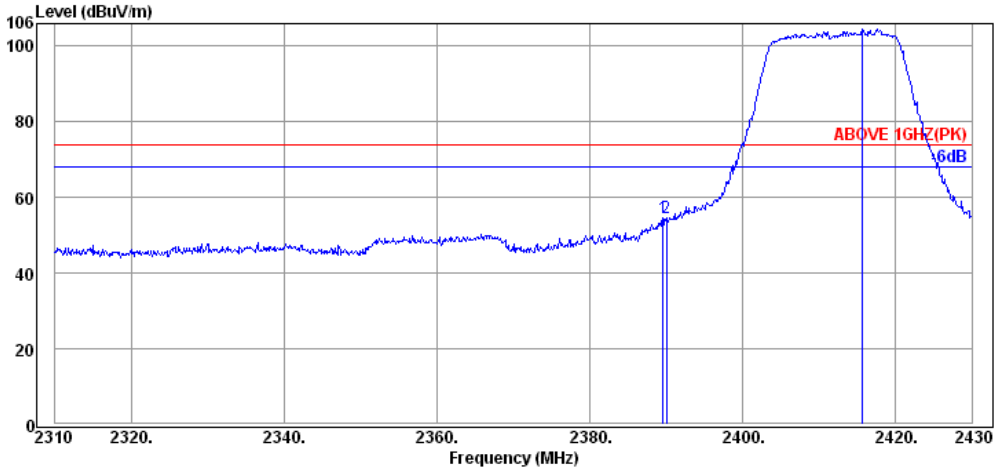
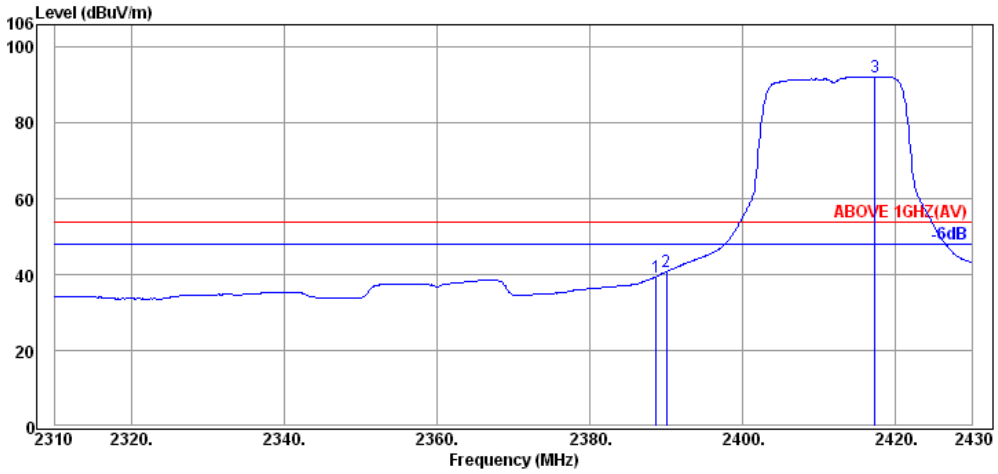
Mode	802.11n-HT20	Frequency	TX 2412MHz



Antenna at Vertical Polarization

Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Meter Reading (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector
2389.56	32.16	6.57	15.86	54.59	74.00	19.41	Peak
2390.04	32.16	6.57	15.79	54.52	74.00	19.48	Peak
2415.60	32.18	6.59	65.78	104.55	---	---	Peak



Antenna at Vertical Polarization

Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Meter Reading (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector
2388.72	32.16	6.57	0.79	39.52	54.00	14.48	Average
2390.04	32.16	6.57	2.07	40.80	54.00	13.20	Average
2417.28	32.18	6.59	53.55	92.32	---	---	Average

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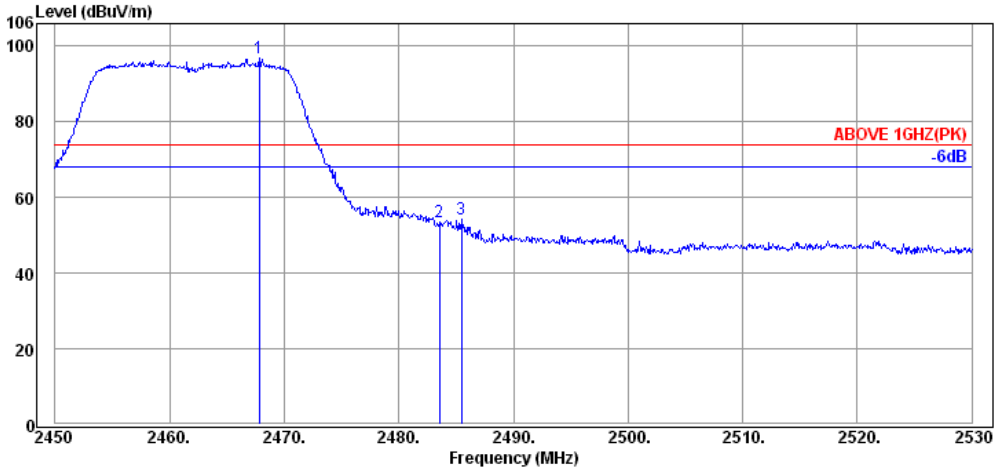
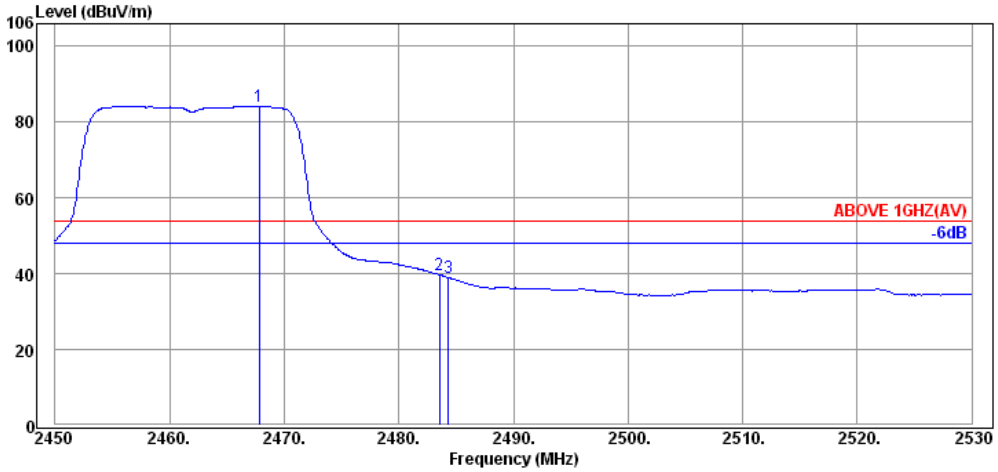
Mode	802.11n-HT20	Frequency	TX 2462MHz



Antenna at Horizontal Polarization

Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Meter Reading (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector
2467.84	32.25	6.65	57.93	96.83	---	---	Peak
2483.52	32.28	6.67	14.75	53.70	74.00	20.30	Peak
2485.44	32.28	6.67	15.23	54.18	74.00	19.82	Peak



Antenna at Horizontal Polarization

Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Meter Reading (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector
2467.84	32.25	6.65	45.34	84.24	---	---	Average
2483.52	32.28	6.67	0.83	39.78	54.00	14.22	Average
2484.32	32.28	6.67	0.05	39.00	54.00	15.00	Average

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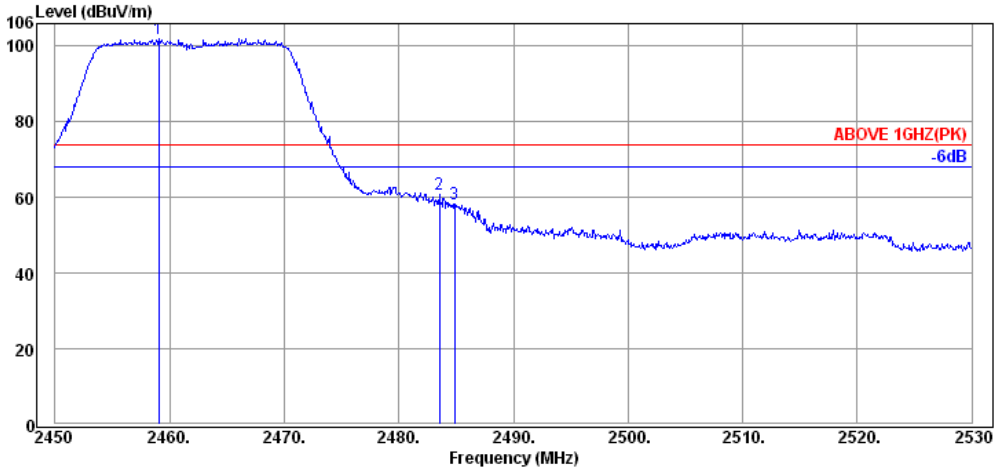
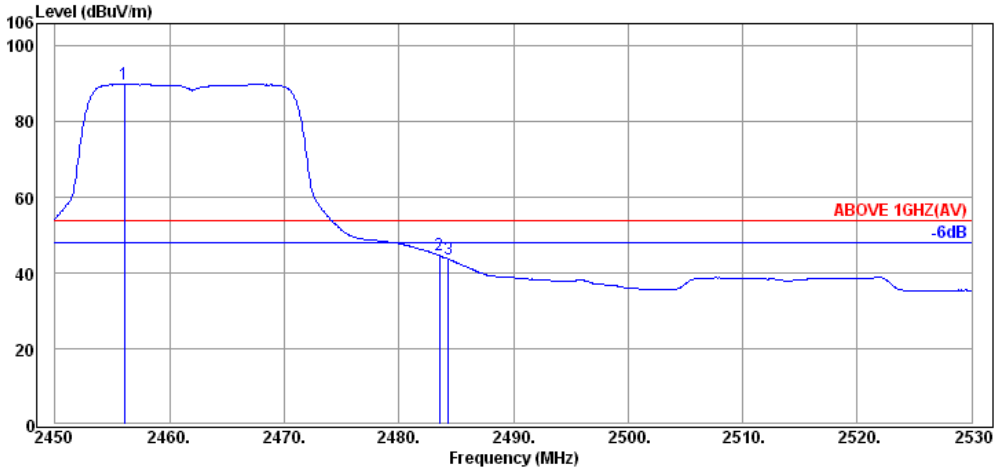
Mode	802.11n-HT20	Frequency	TX 2462MHz



Antenna at Vertical Polarization

Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Meter Reading (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector
2459.04	32.25	6.65	63.12	102.02	---	---	Peak
2483.52	32.28	6.67	22.02	60.97	74.00	13.03	Peak
2484.88	32.28	6.67	19.43	58.38	74.00	15.62	Peak



Antenna at Vertical Polarization

Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Meter Reading (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector
2456.08	32.25	6.65	51.10	90.00	---	---	Average
2483.52	32.28	6.67	5.70	44.65	54.00	9.35	Average
2484.32	32.28	6.67	4.76	43.71	54.00	10.29	Average

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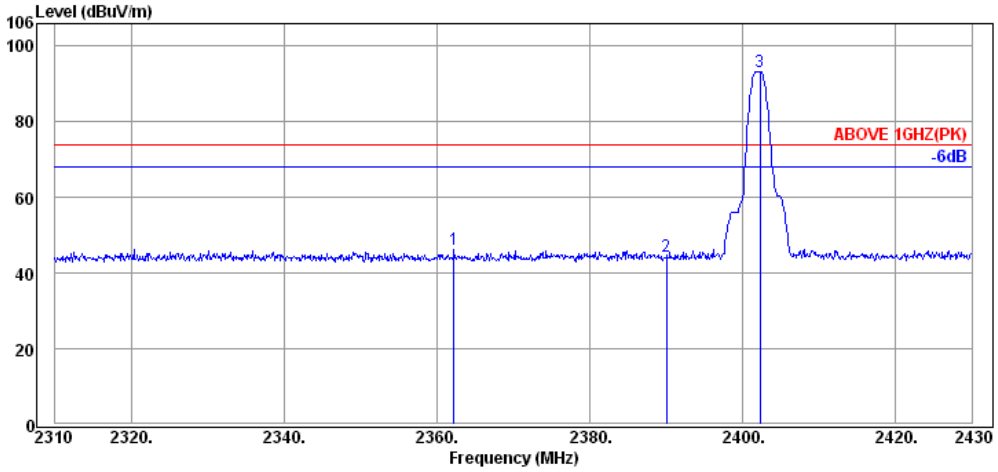
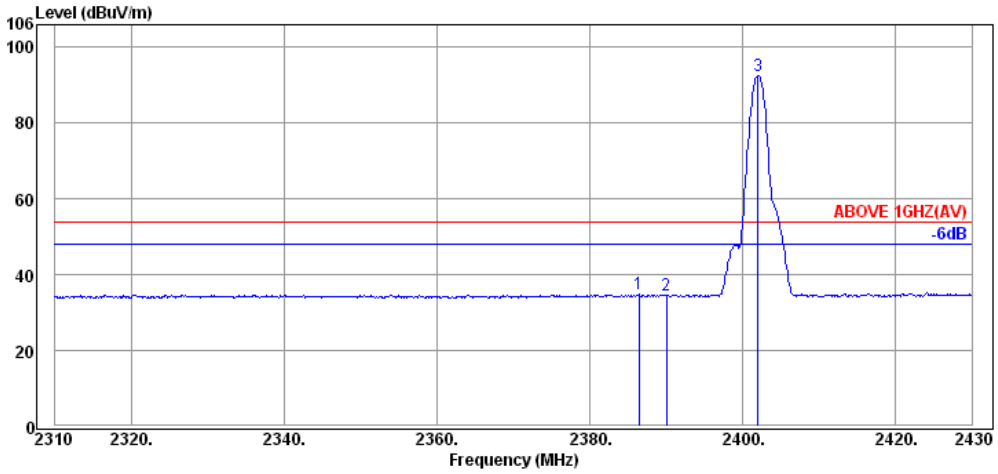
Mode	BLE	Frequency	TX 2402MHz



Antenna at Horizontal Polarization

Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Meter Reading (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector
2362.20	32.11	6.53	7.78	46.42	74.00	27.58	Peak
2390.04	32.16	6.57	5.76	44.49	74.00	29.51	Peak
2402.28	32.16	6.57	54.64	93.37	---	---	Peak



Antenna at Horizontal Polarization

Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Meter Reading (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector
2386.44	32.16	6.57	-3.94	34.79	54.00	19.21	Average
2390.04	32.16	6.57	-4.24	34.49	54.00	19.51	Average
2402.04	32.16	6.57	53.93	92.66	---	---	Average

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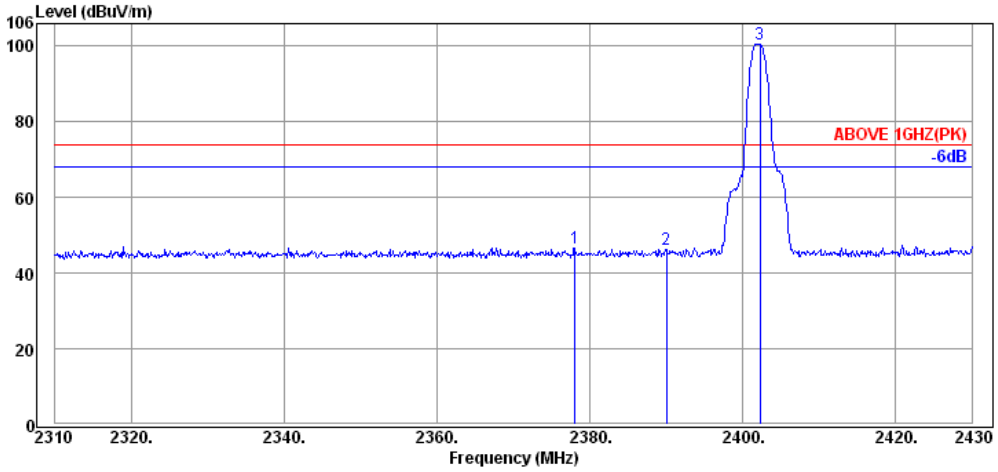
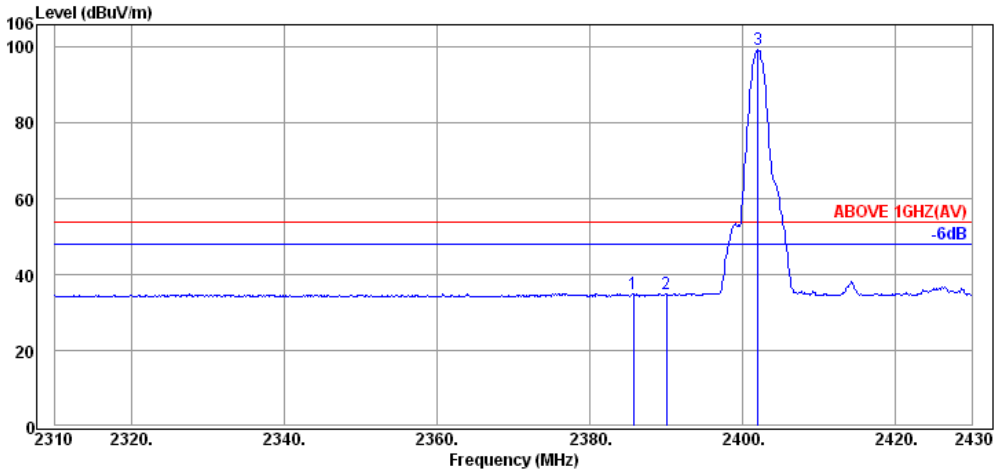
Mode	BLE	Frequency	TX 2402MHz



Antenna at Vertical Polarization

Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Meter Reading (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector
2378.04	32.13	6.55	8.10	46.78	74.00	27.22	Peak
2390.04	32.16	6.57	7.54	46.27	74.00	27.73	Peak
2402.28	32.16	6.57	61.88	100.61	---	---	Peak



Antenna at Vertical Polarization

Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Meter Reading (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector
2385.72	32.16	6.57	-3.59	35.14	54.00	18.86	Average
2390.04	32.16	6.57	-3.80	34.93	54.00	19.07	Average
2402.04	32.16	6.57	60.70	99.43	---	---	Average

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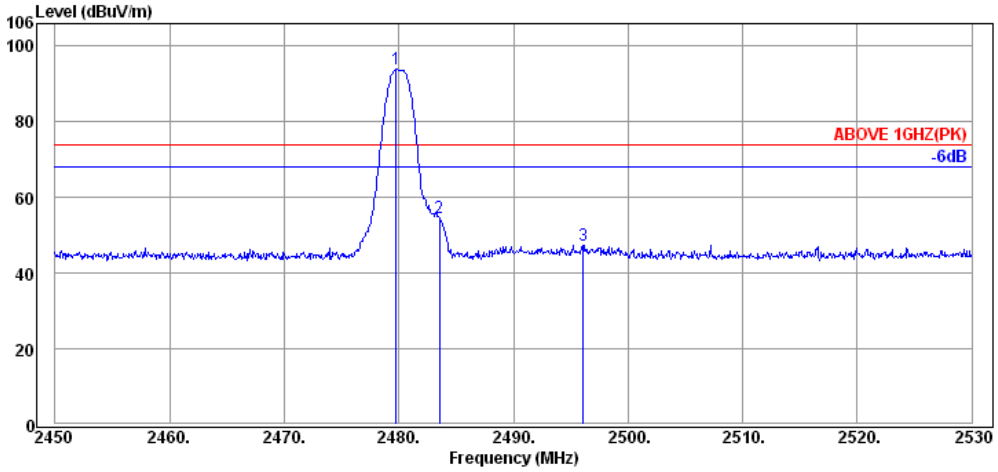
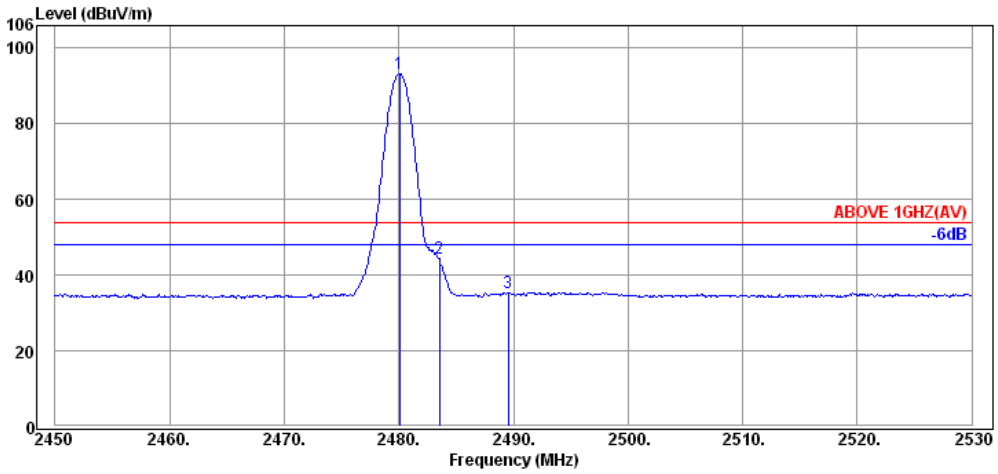
Mode	BLE	Frequency	TX 2480MHz



Antenna at Horizontal Polarization

Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Meter Reading (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector
2479.76	32.28	6.67	54.88	93.83	---	---	Peak
2483.52	32.28	6.67	15.62	54.57	74.00	19.43	Peak
2496.08	32.30	6.69	8.44	47.43	74.00	26.57	Peak



Antenna at Horizontal Polarization

Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Meter Reading (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector
2480.08	32.28	6.67	54.22	93.17	---	---	Average
2483.52	32.28	6.67	5.33	44.28	54.00	9.72	Average
2489.52	32.30	6.69	-3.50	35.49	54.00	18.51	Average

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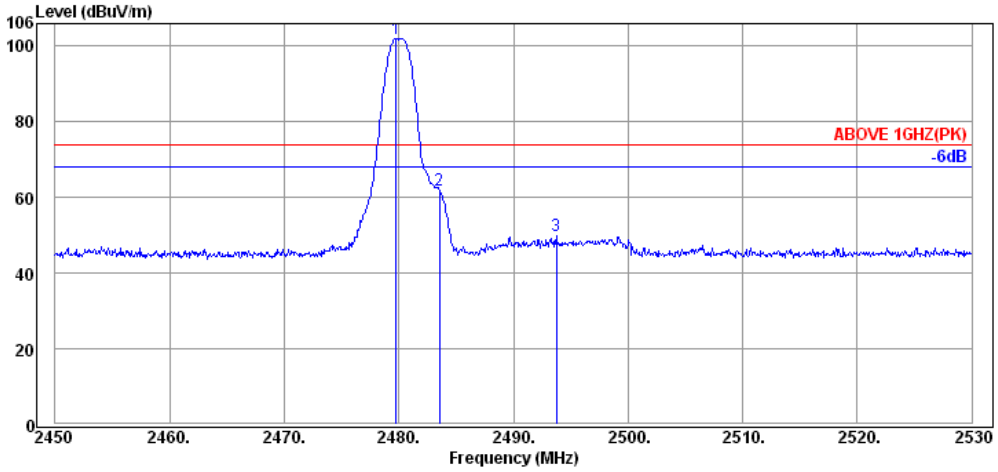
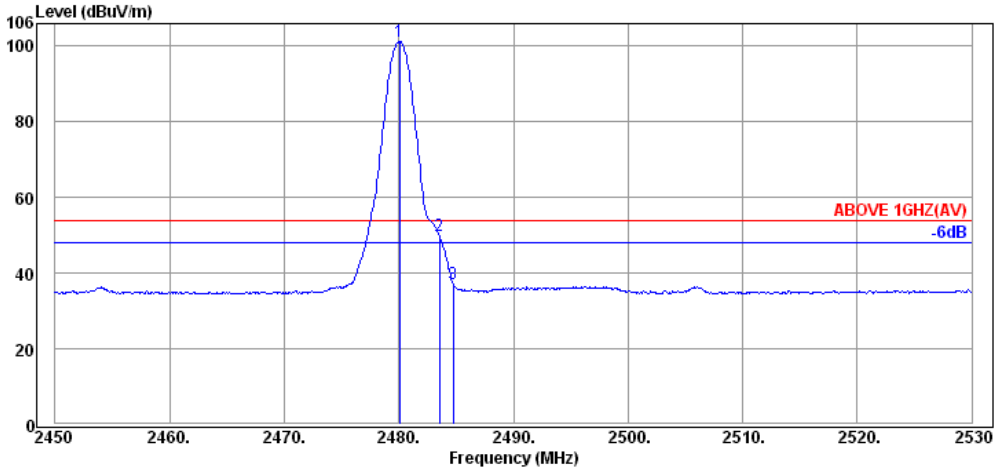
Mode	BLE	Frequency	TX 2480MHz



Antenna at Vertical Polarization

Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Meter Reading (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector
2479.76	32.28	6.67	63.09	102.04	---	---	Peak
2483.52	32.28	6.67	23.09	62.04	74.00	11.96	Peak
2493.76	32.30	6.69	11.03	50.02	74.00	23.98	Peak



Antenna at Vertical Polarization

Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Meter Reading (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector
2480.08	32.28	6.67	62.21	101.16	---	---	Average
2483.52	32.28	6.67	11.12	50.07	54.00	3.93	Average
2484.72	32.28	6.67	-1.64	37.31	54.00	16.69	Average

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A.2.2 Emissions outside the frequency band:

The emissions (up to 25GHz) not reported for there is no emission be found.

- **Antenna: PCB Antenna**

Mode	802.11b	Frequency	TX 2462MHz

Antenna at Horizontal Polarization

Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Meter Reading (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector
3215.00	32.86	7.76	6.49	47.11	54.00	6.89	Peak
4825.00	34.23	9.54	1.75	45.52	54.00	8.48	Peak

Antenna at Vertical Polarization

Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Meter Reading (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector
3215.00	32.86	7.76	1.78	42.40	54.00	11.60	Peak
4825.00	34.23	9.54	2.49	46.26	54.00	7.74	Peak

Mode	802.11g	Frequency	TX 2437MHz

Antenna at Horizontal Polarization

Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Meter Reading (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector
3250.00	32.85	7.81	6.76	47.42	54.00	6.58	Peak

Antenna at Vertical Polarization

Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Meter Reading (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector
3250.00	32.85	7.81	2.76	43.42	54.00	10.58	Peak

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Mode	802.11n-HT20	Frequency	TX 2412MHz

Antenna at Horizontal Polarization

Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Meter Reading (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector
3215.00	32.86	7.76	4.97	45.59	54.00	8.41	Peak

Antenna at Vertical Polarization

Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Meter Reading (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector
3215.00	32.86	7.76	1.69	42.31	54.00	11.69	Peak

Mode	BLE	Frequency	TX 2402MHz

Antenna at Horizontal Polarization

Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Meter Reading (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector
3215.00	32.86	7.76	6.81	47.43	54.00	6.57	Peak
4805.00	34.22	9.54	9.12	52.88	54.00	1.12	Peak

Antenna at Vertical Polarization

Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Meter Reading (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector
4805.00	34.22	9.54	1.54	45.30	54.00	8.70	Peak

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Mode	BLE	Frequency	TX 2440MHz

Antenna at Horizontal Polarization

Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Meter Reading (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector
3215.00	32.86	7.76	7.29	47.91	54.00	6.09	Peak
4880.00	34.25	9.56	5.85	49.66	54.00	4.34	Peak

Antenna at Vertical Polarization

Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Meter Reading (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector
4880.00	34.25	9.56	5.33	49.14	54.00	4.86	Peak

Mode	BLE	Frequency	TX 2480MHz

Antenna at Horizontal Polarization

Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Meter Reading (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector
3215.00	32.86	7.76	7.32	47.94	54.00	6.06	Peak

Antenna at Vertical Polarization

Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Meter Reading (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector
3215.00	32.86	7.76	2.44	43.06	54.00	10.94	Peak

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- **Antenna: Omni-S Antenna**

Mode	BLE	Frequency	TX 2402MHz

Antenna at Horizontal Polarization

Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Meter Reading (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector
1048.00	28.09	4.39	15.14	47.62	54.00	6.38	Peak
1150.00	28.07	4.61	15.31	47.99	54.00	6.01	Peak
1246.00	28.05	4.73	12.43	45.21	54.00	8.79	Peak
4805.00	34.22	9.54	2.08	45.84	54.00	8.16	Peak

Antenna at Vertical Polarization

Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Meter Reading (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector
1046.00	28.09	4.39	11.52	44.00	54.00	10.00	Peak
1150.00	28.07	4.61	14.16	46.84	54.00	7.16	Peak
1246.00	28.05	4.73	10.60	43.38	54.00	10.62	Peak
4805.00	34.22	9.54	3.07	46.83	54.00	7.17	Peak

Mode	BLE	Frequency	TX 2440MHz

Antenna at Horizontal Polarization

Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Meter Reading (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector
1050.00	28.09	4.39	13.99	46.47	54.00	7.53	Peak
1146.00	28.07	4.61	12.78	45.46	54.00	8.54	Peak
1250.00	28.05	4.75	10.16	42.96	54.00	11.04	Peak
4880.00	34.25	9.56	0.89	44.70	54.00	9.30	Peak

Antenna at Vertical Polarization

Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Meter Reading (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector
1050.00	28.09	4.39	11.42	43.90	54.00	10.10	Peak
1148.00	28.07	4.61	12.75	45.43	54.00	8.57	Peak
1248.00	28.05	4.75	10.50	43.30	54.00	10.70	Peak
4880.00	34.25	9.56	3.76	47.57	54.00	6.43	Peak

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Mode	BLE	Frequency	TX 2480MHz

Antenna at Horizontal Polarization

Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Meter Reading (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector
1046.00	28.09	4.39	15.01	47.49	54.00	6.51	Peak
1150.00	28.07	4.61	15.21	47.89	54.00	6.11	Peak
1248.00	28.05	4.75	12.25	45.05	54.00	8.95	Peak
4960.00	34.29	9.60	2.33	46.22	54.00	7.78	Peak

Antenna at Vertical Polarization

Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Meter Reading (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector
1046.00	28.09	4.39	9.17	41.65	54.00	12.35	Peak
1150.00	28.07	4.61	10.84	43.52	54.00	10.48	Peak
1246.00	28.05	4.73	10.30	43.08	54.00	10.92	Peak
4960.00	34.29	9.60	3.09	46.98	54.00	7.02	Peak

A.2.3 Emissions in Non-restricted Frequency Bands:

Pursuant to KDB 558074 D01 DTS Meas Guidance v04 that emission levels below the 15.209 general radiated emissions limits is not required.

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A.3 6dB BANDWIDTH

Test Date	2017/09/27~10/06	Temp./Hum.	23~24℃/55~56%
Cable Loss	---	Test Voltage	DC 3.3V (through jig via Notebook PC)

A.3.1 6dB Bandwidth Result

Mode	Centre Frequency (MHz)	6 dB Bandwidth (MHz)	Limit
802.11b	2412	6.632	>500kHz
	2437	7.094	
	2462	7.034	
802.11g	2412	16.40	
	2437	16.41	
	2462	16.43	
802.11n-HT20	2412	17.65	
	2437	17.65	
	2462	17.65	
BLE	2402	0.7031	
	2440	0.6989	
	2480	0.6967	

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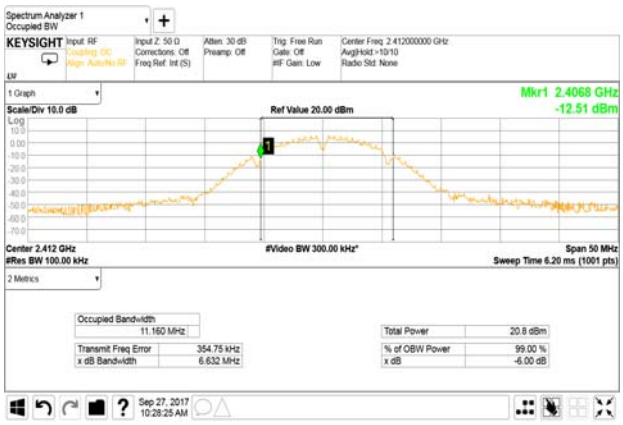
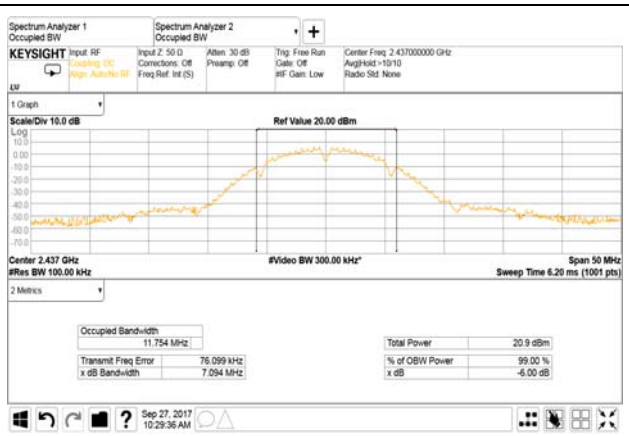
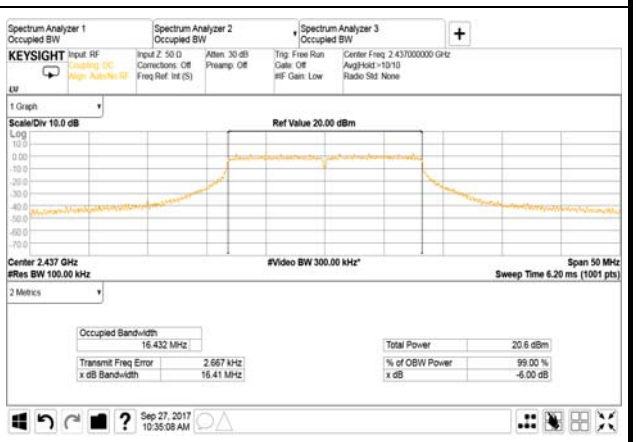
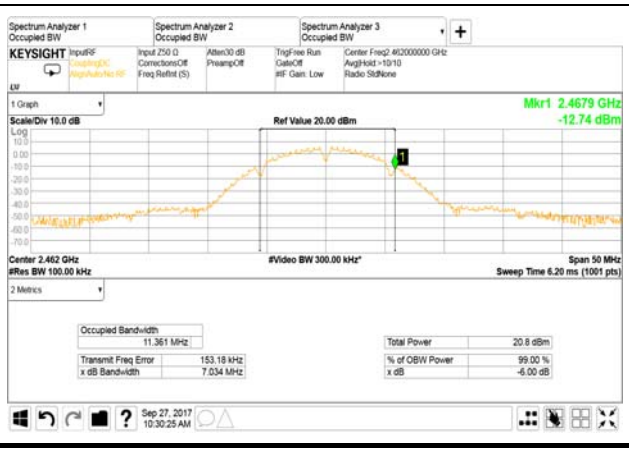
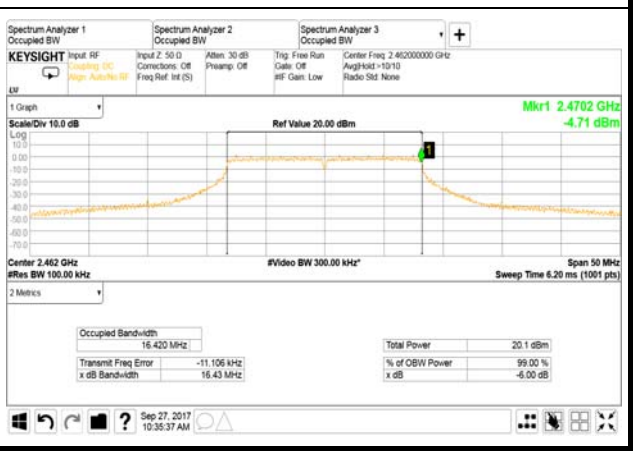
A.3.2 Measurement Plots

802.11b	802.11g
	
	
	

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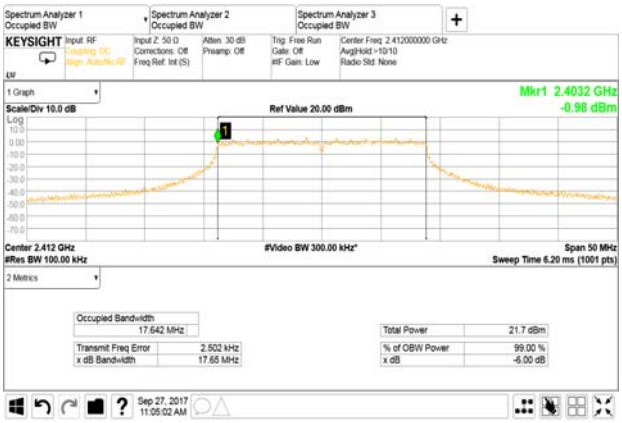
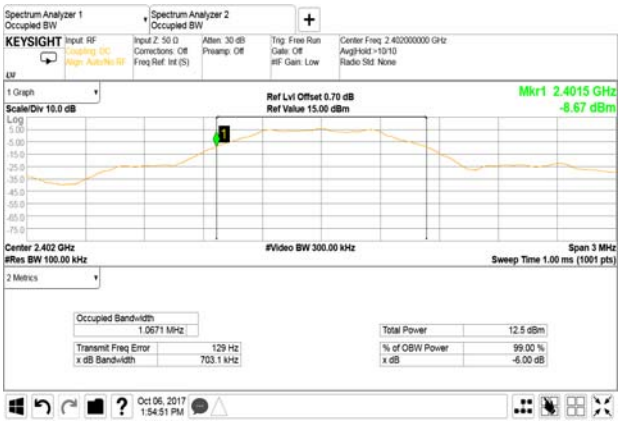
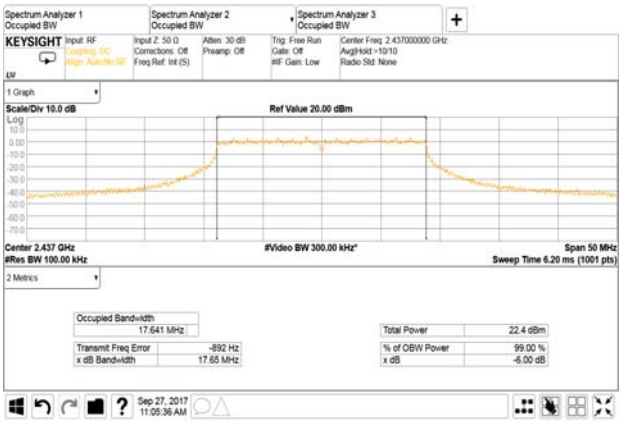
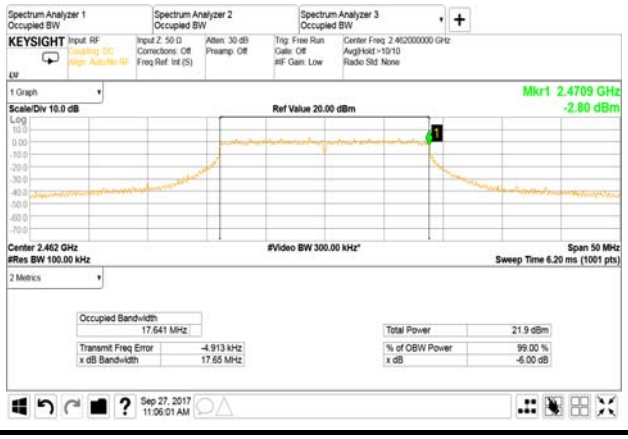
802.11n-HT20	BLE
	
	
	

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A.4 MAXIMUM PEAK OUTPUT POWER

Test Date	2017/10/11	Temp./Hum.	23℃/55%
Cable Loss	0.7dB	Test Voltage	DC 3.3V (through jig via Notebook PC)

A.4.1 Peak Output Power

Mode	Centre Frequency (MHz)	Output Power Chain 0 (dBm)	Output Power Chain 0 (W)	Limit
BLE	2402	0.56	0.001138	< 30dBm (1W)
	2440	0.58	0.001143	
	2480	0.63	0.001156	

Antenna: PCB Antenna

Mode	Centre Frequency (MHz)	Peak Output Power (dBm) Chain 0	Peak Output Power (dBm) Chain 1	Total Peak Output Power (dBm)	Total Peak Output Power (W)	Antenna Gain (dBi)	Output Power (E.I.R.P.) (dBm)	Output Power (E.I.R.P.) (W)	Limit
802.11b	2412	18.62	19.04	21.85	0.153109	1	22.85	0.192752	< 30dBm (1W) (Maximum Peak Output Power) < 36dBm (4W) (E.I.R.P)
	2437	19.08	19.26	22.18	0.165196		23.18	0.207970	
	2462	18.05	19.36	21.76	0.149968		22.76	0.188799	
802.11g	2412	21.41	22.01	24.73	0.297167		25.73	0.374111	
	2437	21.80	22.28	25.06	0.320627		26.06	0.403645	
	2462	21.76	22.33	25.06	0.320627		26.06	0.403645	
802.11n-HT20	2412	21.83	22.48	25.18	0.329610		26.18	0.414954	
	2437	22.07	22.26	25.18	0.329610		26.18	0.414954	
	2462	21.89	22.46	25.19	0.330370		26.19	0.415911	

Note: The results have been included cable loss.

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Antenna: Omni-S Antenna

Mode	Centre Frequency (MHz)	Peak Output Power				Antenna Gain (dBi)	Output Power (E.I.R.P.)			
		Chain 0		Chain 1			Chain 0		Chain 1	
		(dBm)	(W)	(dBm)	(W)		(dBm)	(W)	(dBm)	(W)
802.11b	2412	18.62	0.072778	19.04	0.080168	6	24.62	0.289734	25.04	0.319154
	2437	19.08	0.080910	19.26	0.084333		25.08	0.322107	25.26	0.335738
	2462	18.05	0.063826	19.36	0.086298		24.05	0.254097	25.36	0.343558
802.11g	2412	21.41	0.138357	22.01	0.158855		27.41	0.550808	28.01	0.632412
	2437	21.80	0.151356	22.28	0.169044		27.80	0.602560	28.28	0.672977
	2462	21.76	0.149968	22.33	0.171002		27.76	0.597035	28.33	0.680769
802.11n-HT20	2412	21.83	0.152405	22.48	0.177011		27.83	0.606736	28.48	0.704693
	2437	22.07	0.161065	22.26	0.168267		28.07	0.641210	28.26	0.669885
	2462	21.89	0.154525	22.46	0.176198		27.89	0.615177	28.46	0.701455

Limit: < 30dBm (1W) (Maximum Peak Output Power) ; < 36dBm (4W) (E.I.R.P)

Note: The results have been included cable loss.

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A.4.2 Average Output Power (Reporting only)

Antenna: PCB Antenna

Mode	Centre Frequency (MHz)	Average Output Power (dBm)		10log (1/X)	Total Average Output Power		Antenna Gain (dBi)	Total Average Output Power (E.I.R.P.)		Limit
		Chain 0	Chain 1		(dBm)	(W)		(dBm)	(W)	
802.11b	2412	15.30	16.02	0	18.69	0.073961	1	19.69	0.093111	< 30dBm (1W) (Maximum Average Output Power) < 36dBm (4W) (E.I.R.P)
	2437	15.81	16.00		18.92	0.077983		19.92	0.098175	
	2462	14.84	15.97		18.45	0.069984		19.45	0.088105	
802.11g	2412	15.24	15.75	0.13	18.65	0.073282		19.65	0.092257	
	2437	15.57	16.08		18.98	0.079068		19.98	0.099541	
	2462	15.65	16.35		19.16	0.082414		20.16	0.103753	
802.11n-HT20	2412	15.56	16.12	0.13	18.99	0.079250		19.99	0.099770	
	2437	15.58	16.00		18.94	0.078343		19.94	0.098628	
	2462	15.43	16.45		19.11	0.081470		20.11	0.102565	

Note: The results have been included cable loss.

Antenna: Omni-S Antenna

Mode	Centre Frequency (MHz)	Average Output Power (dBm)		10log (1/X)	Average Output Power (dBm)		Antenna Gain (dBi)	Average Output Power (E.I.R.P.)			
								Chain 0		Chain 1	
		Chain 0	Chain 1		Chain 0	Chain 1		(dBm)	(W)	(dBm)	(W)
802.11b	2412	15.30	16.02	0	15.30	16.02	6	21.30	0.134896	22.02	0.159221
	2437	15.81	16.00		15.81	16.00		21.81	0.151705	22.00	0.158489
	2462	14.84	15.97		14.84	15.97		20.84	0.121339	21.97	0.157398
802.11g	2412	15.24	15.75	0.13	15.37	15.88		21.37	0.137088	21.88	0.154170
	2437	15.57	16.08		15.70	16.21		21.70	0.147911	22.21	0.166341
	2462	15.65	16.35		15.78	16.48		21.78	0.150661	22.48	0.177011
802.11n-HT20	2412	15.56	16.12	0.32	15.88	16.44		21.88	0.154170	22.44	0.175388
	2437	15.58	16.00		15.90	16.32		21.90	0.154882	22.32	0.170608
	2462	15.43	16.45		15.75	16.77		21.75	0.149624	22.77	0.189234

Limit: < 30dBm (1W) (Maximum Peak Output Power) ; < 36dBm (4W) (E.I.R.P)

Note: The results have been included cable loss.

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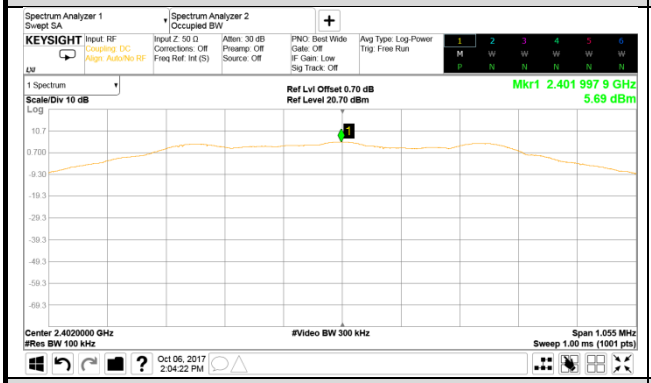
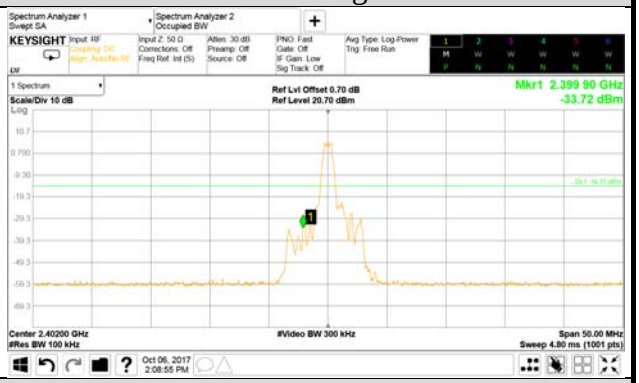
A.5 EMISSION LIMITATIONS

Test Date	2017/10/06	Temp./Hum.	24℃/56%
Cable Loss	0.7dB	Test Voltage	DC 3.3V (through jig via Notebook PC)
Mode	BLE	Frequency	TX 2402MHz
Simultaneous Factor10 log(n) (Note: “n” is antenna number)			0

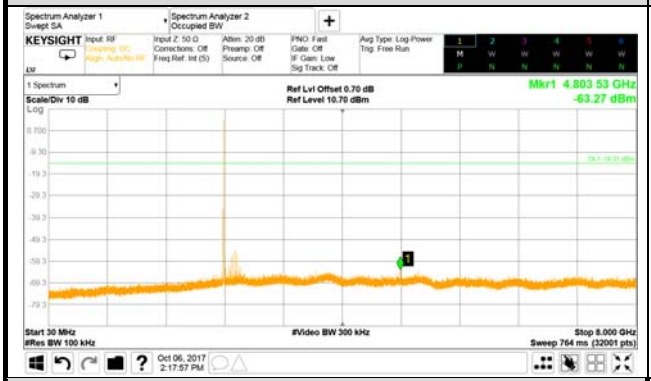
Reference Level



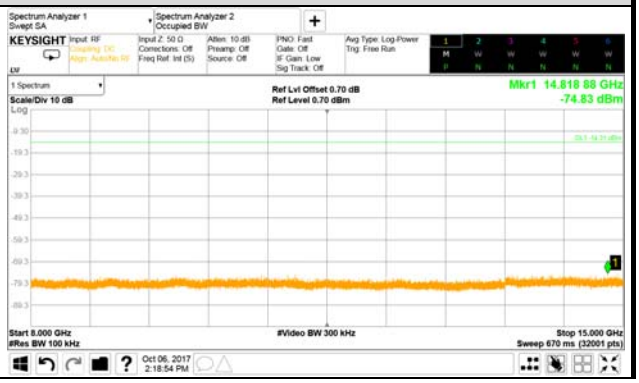
Band Edge



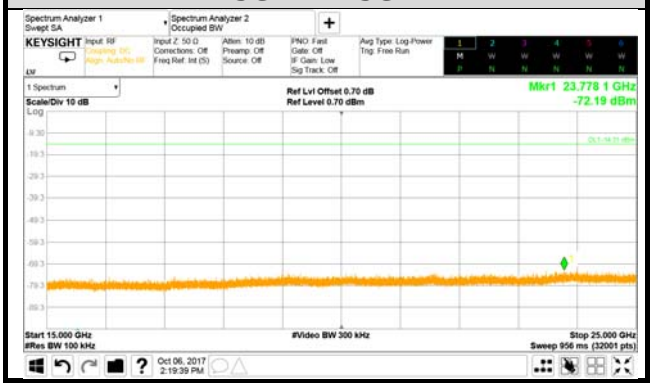
30MHz – 8GHz



8GHz – 15GHz



15GHz – 25GHz



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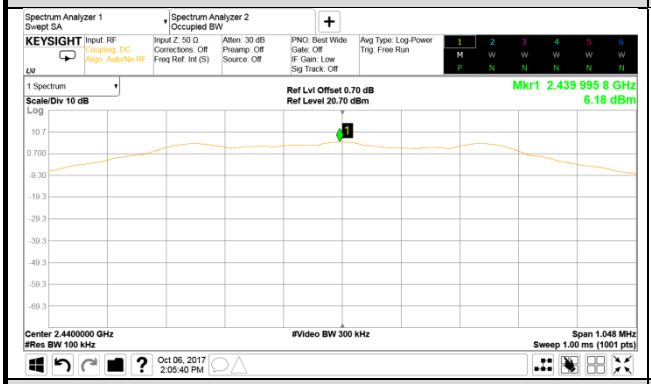
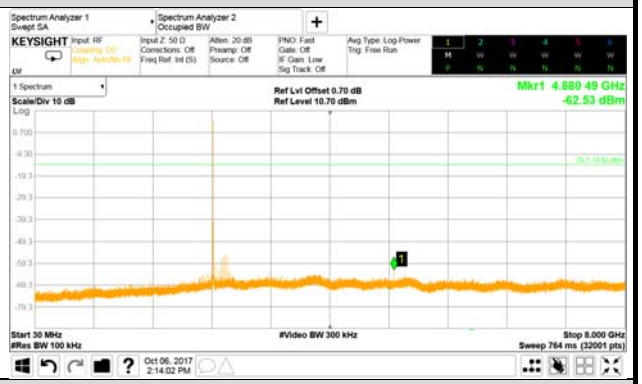
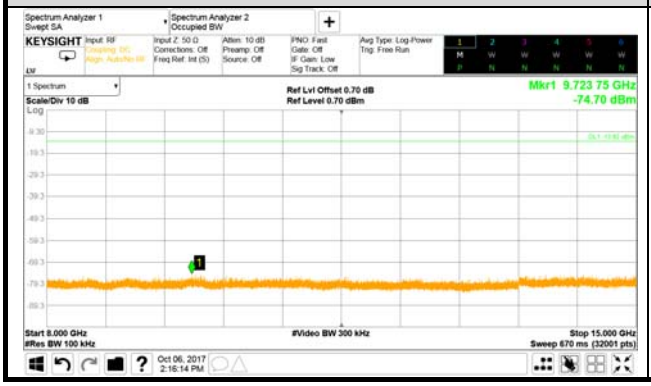
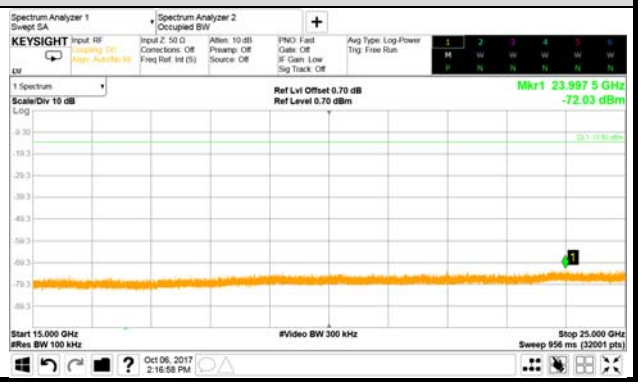
Test Date	2017/10/06	Temp./Hum.	24℃/56%
Cable Loss	0.7dB	Test Voltage	DC 3.3V (through jig via Notebook PC)
Mode	BLE	Frequency	TX 2440MHz
Simultaneous Factor10 log(n) (Note: “n” is antenna number)			0

Reference Level	30MHz – 8GHz
	
8GHz – 15GHz	**15GHz – 25GHz**
	

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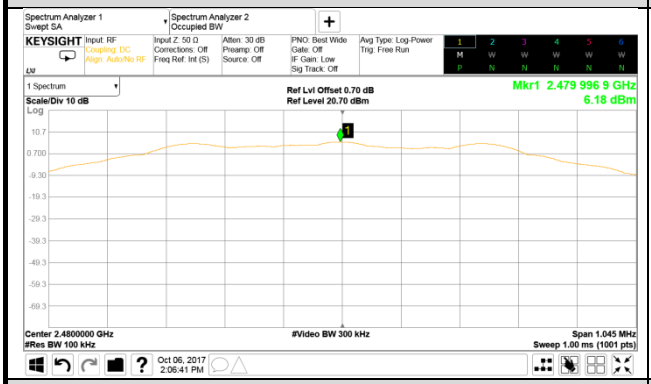
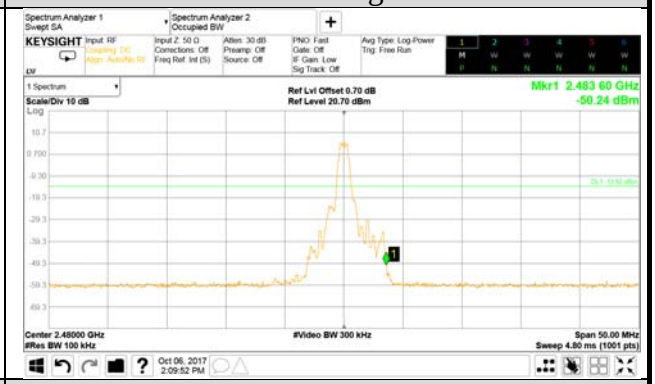
Test Date	2017/10/06	Temp./Hum.	24℃/56%
Cable Loss	0.7dB	Test Voltage	DC 3.3V (through jig via Notebook PC)
Mode	BLE	Frequency	TX 2480MHz
Simultaneous Factor10 log(n) (Note: “n” is antenna number)			0

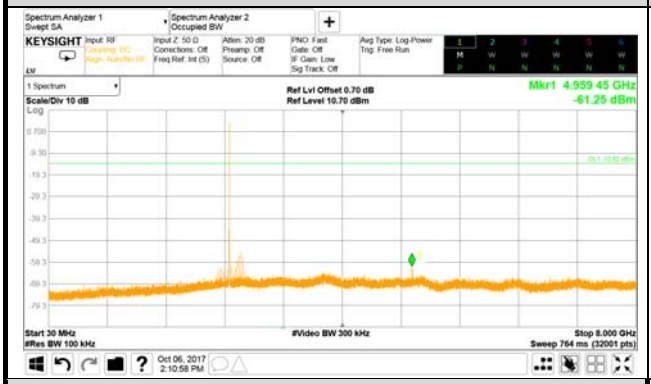
Reference Level



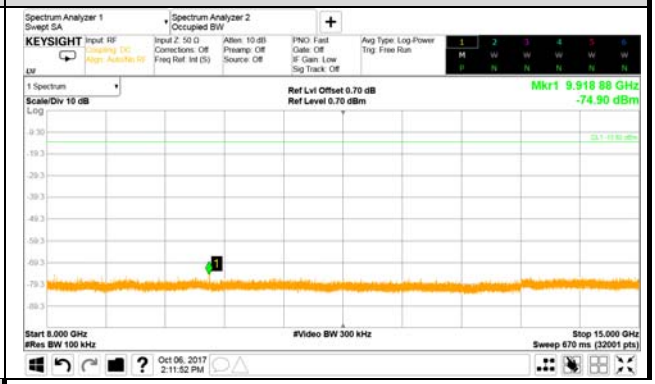
Band Edge



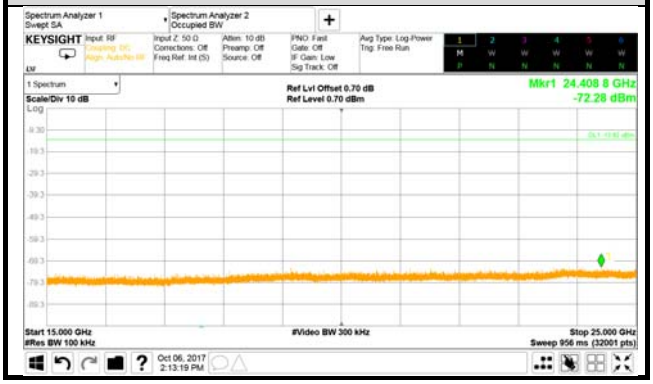
30MHz – 8GHz



8GHz – 15GHz



15GHz – 25GHz



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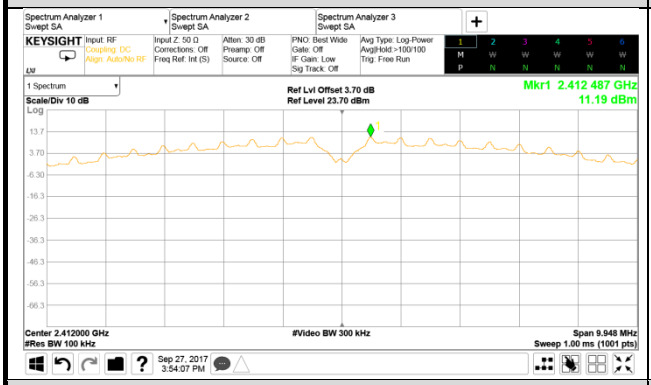
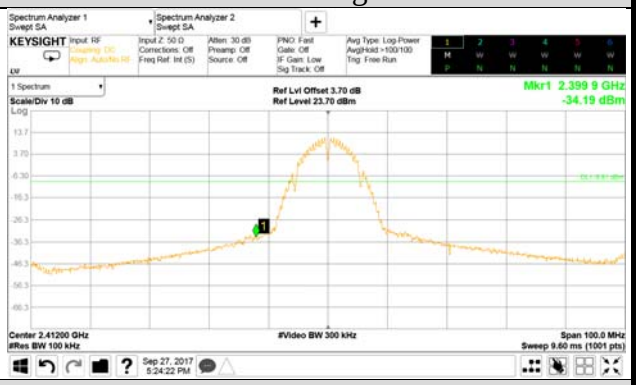
- **Antenna: PCB Antenna**

Test Date	2017/09/27	Temp./Hum.	23℃/55%
Cable Loss	0.7dB	Test Voltage	DC 3.3V (through jig via Notebook PC)
Mode	802.11b	Frequency	TX 2412MHz
Simultaneous Factor10 log(n) (Note: “n” is antenna number)			3

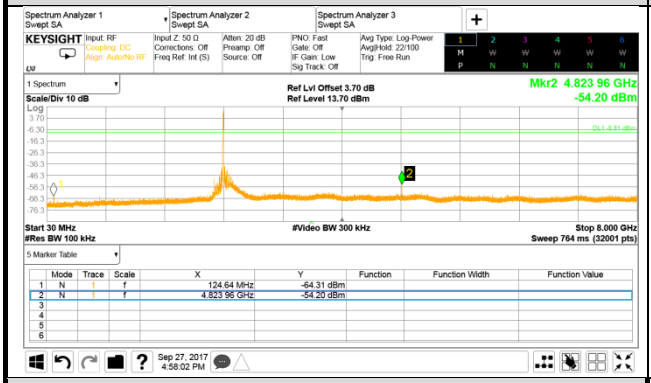
Reference Level



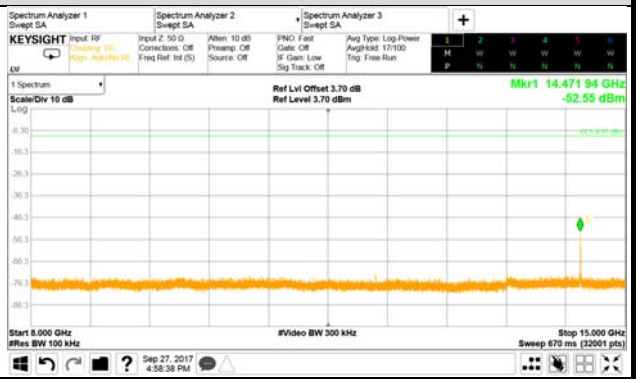
Band Edge



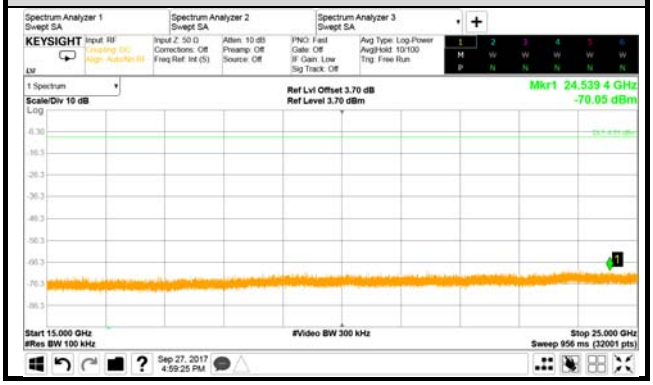
30MHz – 8GHz



8GHz – 15GHz



15GHz – 25GHz



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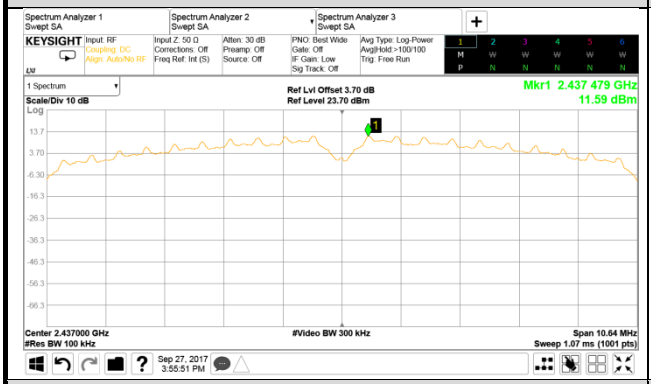
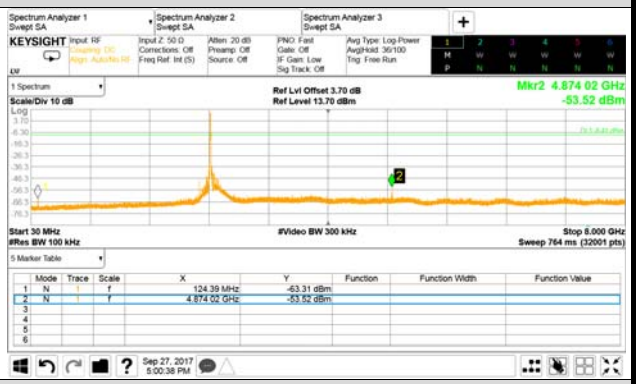
Test Date	2017/09/27	Temp./Hum.	23℃/55%
Cable Loss	0.7dB	Test Voltage	DC 3.3V (through jig via Notebook PC)
Mode	802.11b	Frequency	TX 2437MHz
Simultaneous Factor10 log(n) (Note: “n” is antenna number)			3

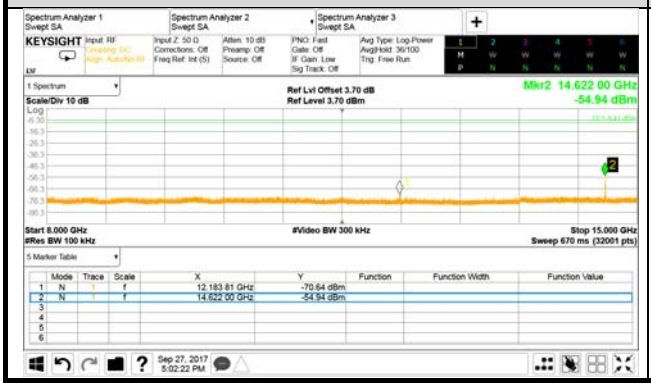
Reference Level



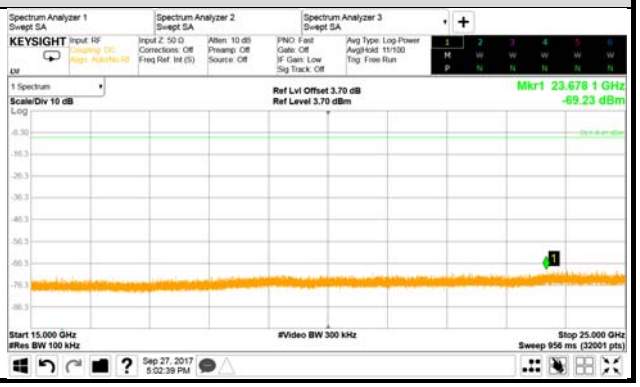
30MHz – 8GHz



8GHz – 15GHz



15GHz – 25GHz



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Audix Technology Corp.
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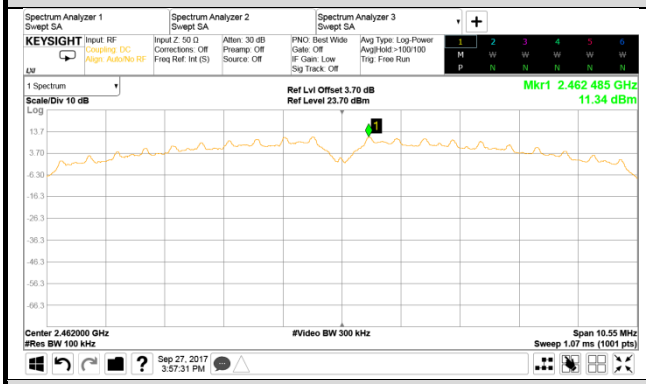
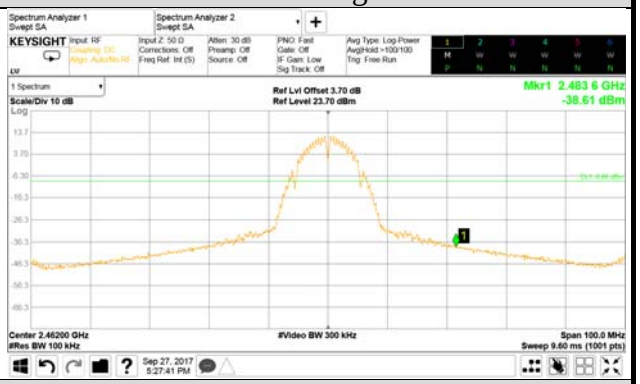
Test Date	2017/09/27	Temp./Hum.	23℃/55%
Cable Loss	0.7dB	Test Voltage	DC 3.3V (through jig via Notebook PC)
Mode	802.11b	Frequency	TX 2462MHz
Simultaneous Factor10 log(n) (Note: “n” is antenna number)			3

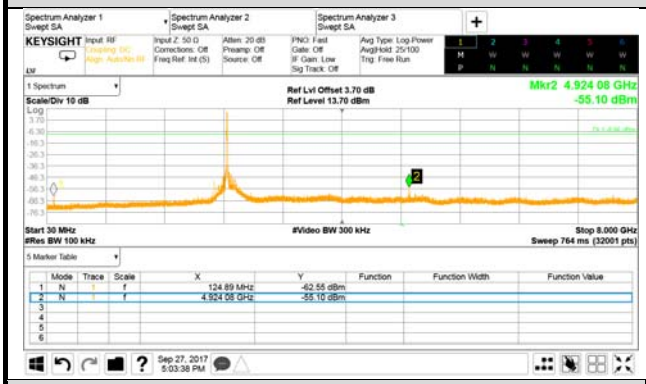
Reference Level



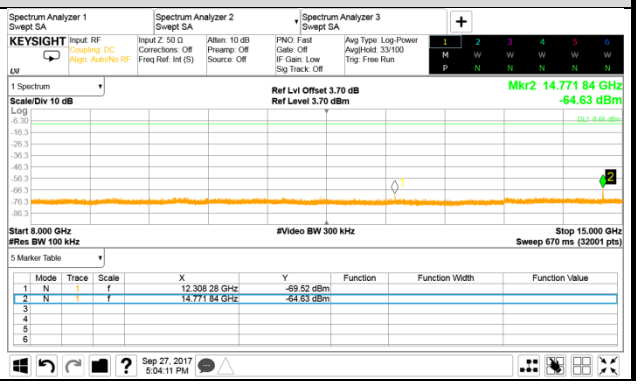
Band Edge



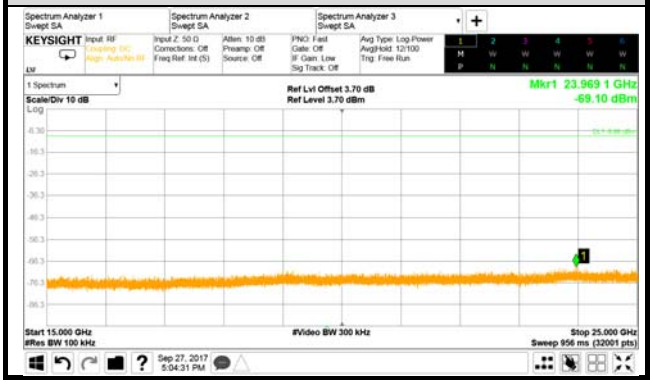
30MHz – 8GHz



8GHz – 15GHz



15GHz – 25GHz



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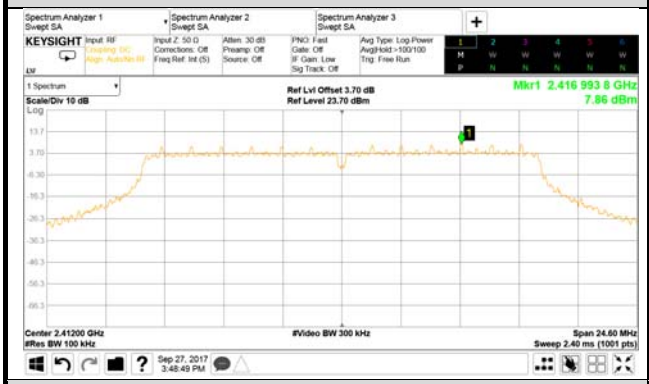
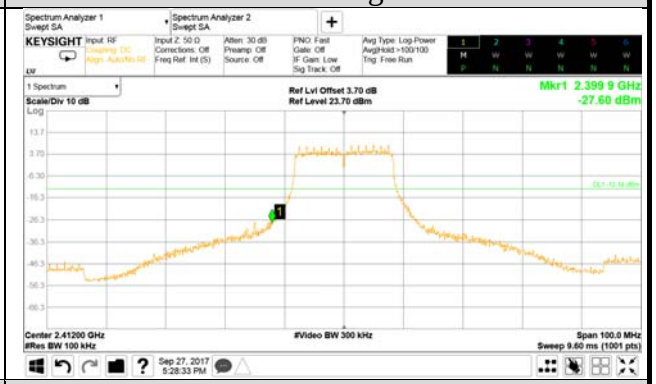
Test Date	2017/09/27	Temp./Hum.	23℃/55%
Cable Loss	0.7dB	Test Voltage	DC 3.3V (through jig via Notebook PC)
Mode	802.11g	Frequency	TX 2412MHz
Simultaneous Factor10 log(n) (Note: “n” is antenna number)			3

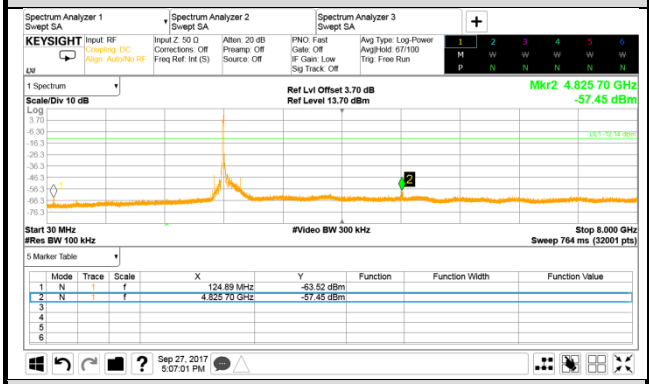
Reference Level



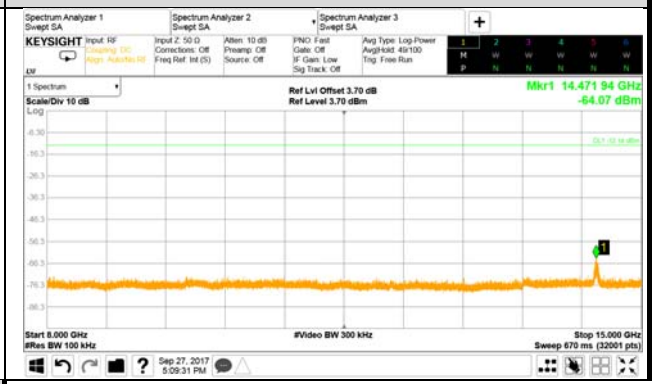
Band Edge



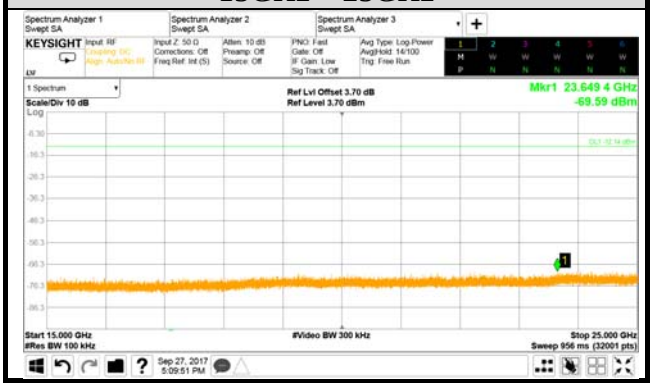
30MHz – 8GHz



8GHz – 15GHz



15GHz – 25GHz



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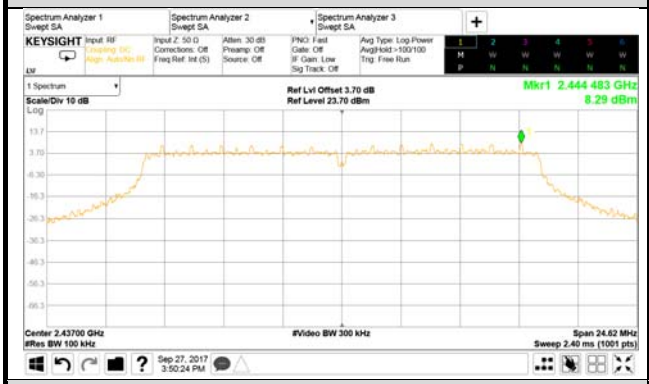
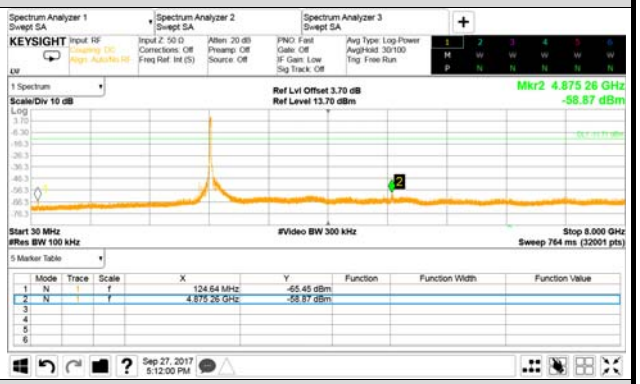
Test Date	2017/09/27	Temp./Hum.	23℃/55%
Cable Loss	0.7dB	Test Voltage	DC 3.3V (through jig via Notebook PC)
Mode	802.11g	Frequency	TX 2437MHz
Simultaneous Factor10 log(n) (Note: “n” is antenna number)			3

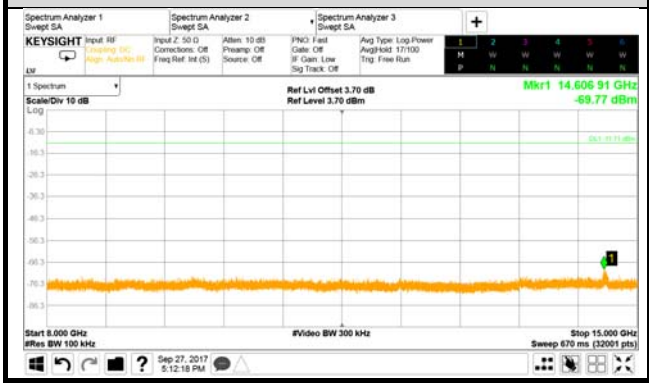
Reference Level



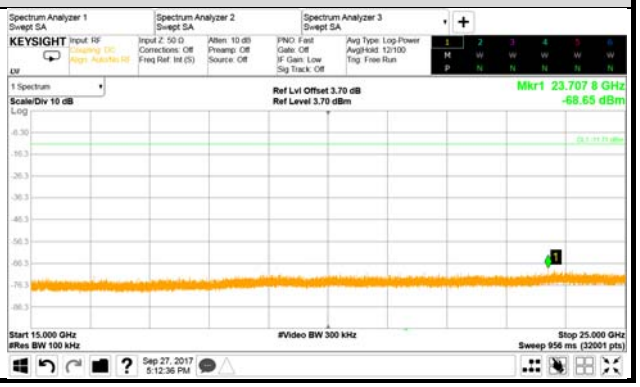
30MHz – 8GHz



8GHz – 15GHz



15GHz – 25GHz



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