Audix Technology Corp.
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FCC 15.247 & RSS-247
(Class II Permissive Change)
2.4 GHz Test Report

for

Powertech Industrial Co Ltd

10F, No. 407, Sec. 2, Chung-Shan Road,
Chung-Ho City, Taipei Hsien 235 Taiwan

Product Name	**:**	**WiFi-MCU Module**
Model Name	**:**	**WSDB-750GN_A**
FCC ID	**:**	**NHS-WSDB750GN**
IC	**:**	**3653A-WSDB750GN**

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

Testing Laboratory
1724

TESTING
NVLAP LAB CODE 200077-0

The statement is based on a single evaluation of one sample of the above-mentioned products. It does not imply an assessment of the whole production and does not permit the use of the test lab logo.
The report must not be used by the client to claim product certification, approval, or endorsement by NVLAP, NIST, TAF or any government agencies.

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TEST REPORT CERTIFICATION
(Class II Permissive Change)

Applicant	:	Powertech Industrial Co Ltd
Factory	:	Ampak Technology Inc.
EUT Description		
(1) Product	:	WiFi-MCU Module
(2) Model	:	WSDB-750GN_A
(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: 2018. 04. 02

Reviewed by: (Annie Yu/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	2018. 04. 02	Original Report	EM-F180144

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2. SUMMARY OF TEST RESULTS

Rule		Description	Results
FCC	IC		
15.207	RSS-Gen §8.8	Conducted Emission	**N/A, Note**
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	**N/A, Note**
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	**N/A, Note**
15.247 (e)	RSS-247 §5.2(2)	Peak Power Spectral Density	**N/A, Note**
15.203	RSS-Gen §8.3	Antenna Requirement	**Compliance**
Note: The Class II Change Permissive is not influence on this test.			

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3. GENERAL INFORMATION

3.1. Description of Application

Applicant	Powertech Industrial Co Ltd 10F, No. 407, Sec. 2, Chung-Shan Road, Chung-Ho City, Taipei Hsien 235 Taiwan
Factory	Ampak Technology Inc. No1. Jan Ai Road, Hulou, Hsinchu, Taiwan, 30352
Product	WiFi-MCU Module
Model	WSDB-750GN_A

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3.2. Description of EUT

Test Model	WSDB-750GN_A
Serial Number	N/A
Power Rating	DC 3.3V
RF Features	802.11/b/g/n
Transmit Type	802.11b: 1T1R 802.11g: 1T1R 802.11n-HT20: 2T2R
Sample Status	Production
Date of Receipt	2018. 02. 13
Date of Test	2018. 03. 29 ~ 30
Interface Ports of EUT	• None
Accessories Supplied	• None
Information for Class II Change Permissive	The EUT is an addition version with original FCC ID: NHS-WSDB750GN, IC: 3653A-WSDB750GN. The difference with original report are as follow: 1. To updating RSS standard for RSS-247 Issue1 to RSS-247 Issue 2. 2. To add an external antenna different from original antenna type. The detail information refers to the following list (the blue word is for this time).

- Information for Permissive Change
  (the blue word is for this time)

Item	Antenna				
1	To add an external antenna different from original antenna type.				
	Antenna Part Number	Manufacture	Antenna Type	Frequency	Max Gain (dBi)
	Original antenna				
	WSDB-733GN	Gemtek Technology Co., Ltd.	Printed Antenna	2400-2500MHz	2.0
	Note: This antenna is with components C33=10pF, R14=0 ohm, R12=NC.				
	External antenna				
	RFA-02-AP599-70-78	**ARISTOTLE ENTERPRISES INC**	**Dipole**	**2400**	**3.96**
				2450	**4.07**
				2500	**2.88**
	Note: This antenna is with components C33=2.4nH, R14=NC, R12=0 ohm.				

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3.3. Antenna Information

No.	Antenna Part Number	Manufacture	Antenna Type	Frequency (MHz)	Max Gain (dBi)
1	RFA-02-AP599-70-78	ARISTOTLE ENTERPRISES INC	Dipole	2400	3.96
				2450	4.07
				2500	2.88

3.4. EUT Specifications Assessed in Current Report

Mode	Fundamental Range (MHz)	Channel Number	Modulation	Data Rate (Mbps)
802.11b	2412-2462	11	DSSS (DBPSK/DQPSK/CCK)	Up to 11
802.11g		11	OFDM (BPSK/QPSK/16QAM/64QAM)	Up to 54
802.11n-HT20				Up to 72.2

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

3.5. Descriptions of Key Components

None

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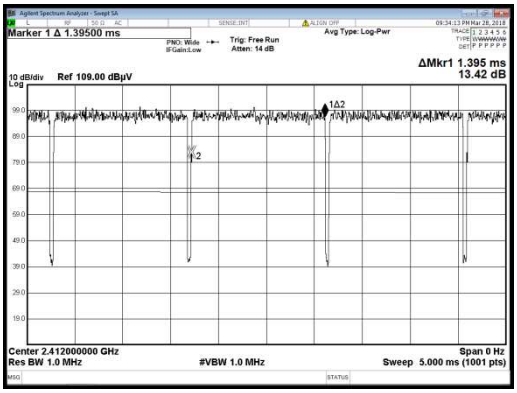
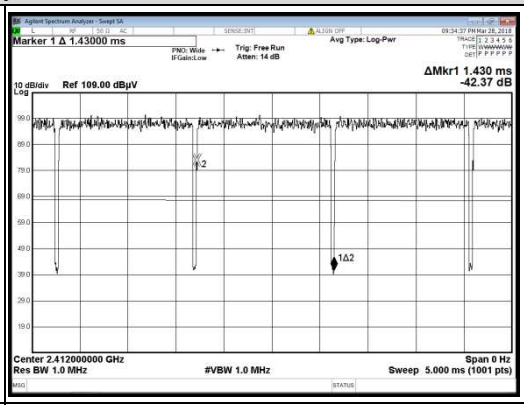
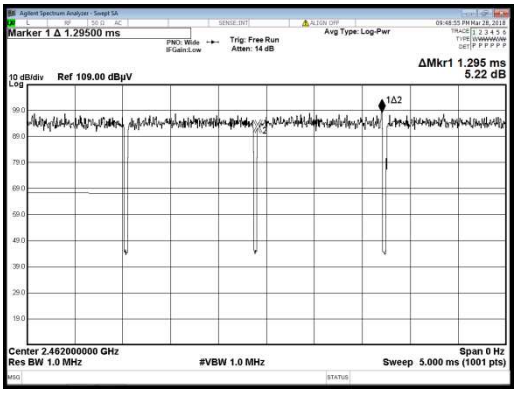
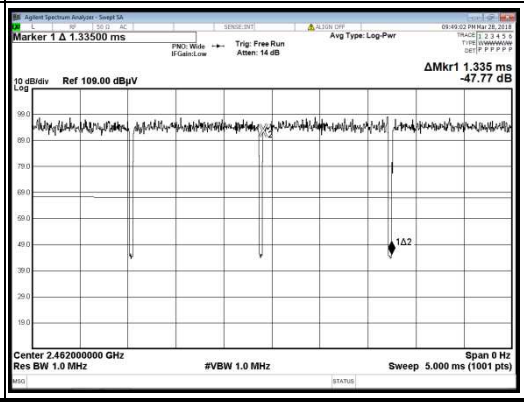
3.6. Test Configuration

Mode	Duty Cycle (x)	T (ms)	Duty Cycle Factor (dB)
802.11b	1.00	---	---
802.11g	0.975524476	1.395	1.430
802.11n-HT20	0.970037453	1.295	1.335

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)	
802.11g		
802.11n-HT20		

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Item		Mode	Data Rate	Test Channel
Radiated Test Case	Radiated Band Edge Note1	802.11b	1Mbps	1/11
		802.11g	6Mbps	1/11
		802.11n-HT20	MCS0	1/11
	Radiated Spurious Emission Note1 & 2	802.11b	1Mbps	6
		802.11g	6Mbps	11
		802.11n-HT20	MCS0	11
Conducted Test Case	Peak Output Power	802.11b	1Mbps	1/6/11
		802.11g	6Mbps	1/6/11
		802.11n-HT20	MCS0	1/6/11

Note 1:□Mobile Device
■Portable Device, and 3 axis were assessed. The worst scenario for Radiated Spurious Emission as follow: ■ Lie □ Side□ Stand

Note 2: Low, mid, and high channels were measured, only the worst channel of each modulation was presented in this report.

3.7. Tested Supporting System List

3.7.1. Support Peripheral Unit

No.	Product	Brand	Model No.	Serial No.	Approval
1.	Notebook PC	acer	N16Q2	N/A	Contains FCC ID: PPD-QCNFA435 Contains IC: 4104A-QCNFA435
2.	Test JIG	N/A	N/A	N/A	N/A

3.7.2. Cable Lists

No.	Cable Description Of The Above Support Units
1.	USB Cable: Non-Shielded, Detachable, 1.2m Adapter: Chicony, M/N A11-065N1A DC Cord：Shielded, Undetachable, 1.8m, Bonded a ferrite core AC Power Cord：Unshielded, Detachable, 1.0m
2.	NA

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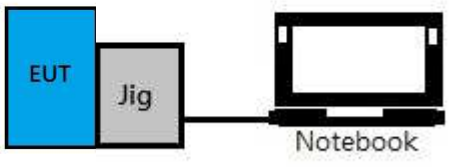
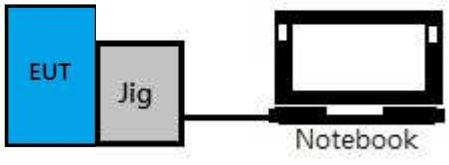
3.8. Setup Configuration

3.8.1. EUT Configuration for Power Line & Radiated Emission



3.8.2. EUT Configuration for RF Conducted Test Items



3.9. Operating Condition of EUT

Test program “cmd” is used for enabling EUT WLAN function under continues transmitting and choosing data rate/ channel.

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3.10.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: attemc_report@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. TW1724
Test Facilities	(1) Semi-Anechoic Chamber (IC Test Site Registration No.: 5183B-1) (2) Fully Anechoic Chamber (IC Test Site Registration No.: 5183B-4)

3.11.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. Radiated Emission Measurement

Item	Type	Manufacturer	Model No.	Serial No.	Cal. Date	Cal. Interval
1.	Spectrum Analyzer	Agilent	N9030A-526	MY53310269	2018. 01. 04	1 Year
2.	Test Receiver	R & S	ESCS30	100338	2017. 06. 19	1 Year
3.	Amplifier	HP	8447D	2944A06305	2018. 01. 30	1 Year
4.	Amplifier	Sonoma	310N	187161	2017. 06. 08	1 Year
5.	Bilog Antenna	CHASE	CBL6112D	33821	2018. 01. 21	1 Year
6.	Loop Antenna	R&S	HFH2-Z2	891847/27	2017. 12. 18	1 Year
7.	Double-Ridged Waveguide Horn	ETS-Lindgren	3117	00135902	2018. 03. 08	1 Year
8.	Horn Antenna	COM-POWER	AH-840	101092	2017. 05. 04	1 Year
9.	2.4GHz Notch Filter	K&L	7NSL10-2441.5E130.5-00	1	2017. 07. 26	1 Year
10.	3GHz Notch Filter	Microwave	H3G018G1	484798	2017. 08. 25	1 Year
11.	Digital Thermo-Hygro Meter	iMax	HTC-1	No.1 3m A/C	2017. 04. 21	1 Year
12.	Digital Thermo-Hygro Meter	EVERY DAY	E-512	RF-02	2017. 04. 21	1 Year
13.	Test Software	Audix	e3	V.6.110601	N.C.R.	N.C.R.

4.2. RF Conducted Measurement

Item	Type	Manufacturer	Model No.	Serial No.	Cal. Date	Cal. Interval
1.	Power Meter	Anritsu	ML2495A	1145008	2017. 11. 03	1 Year
2.	Power Sensor	Anritsu	MA2411B	1126096	2017. 11. 03	1 Year
3.	Digital Thermo-Hygro Meter	Shenzhen Datronn Electronics	KT-905	RF	2017. 04. 21	1 Year

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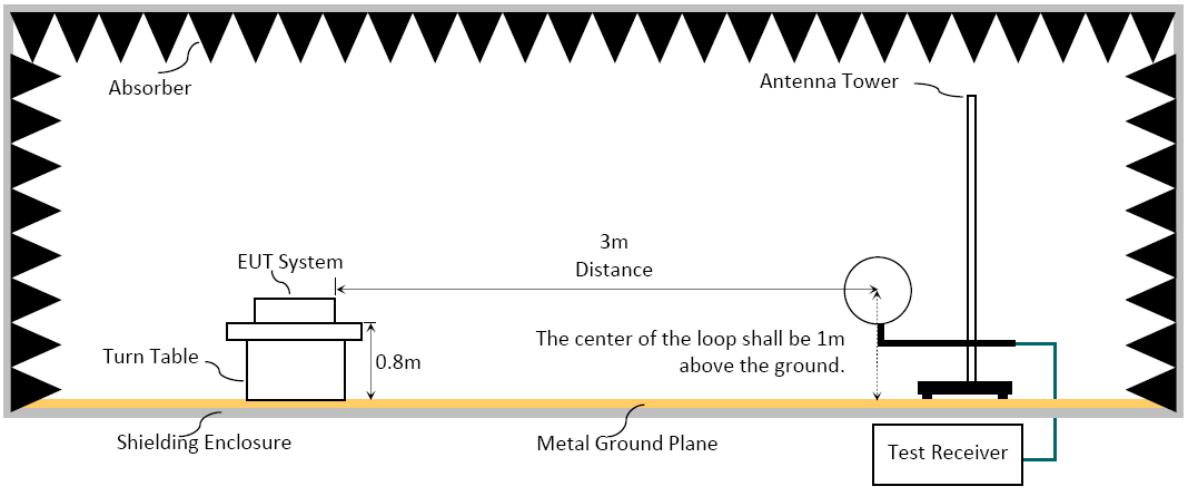
5. RADIATED EMISSION

5.1. Block Diagram of Test Setup

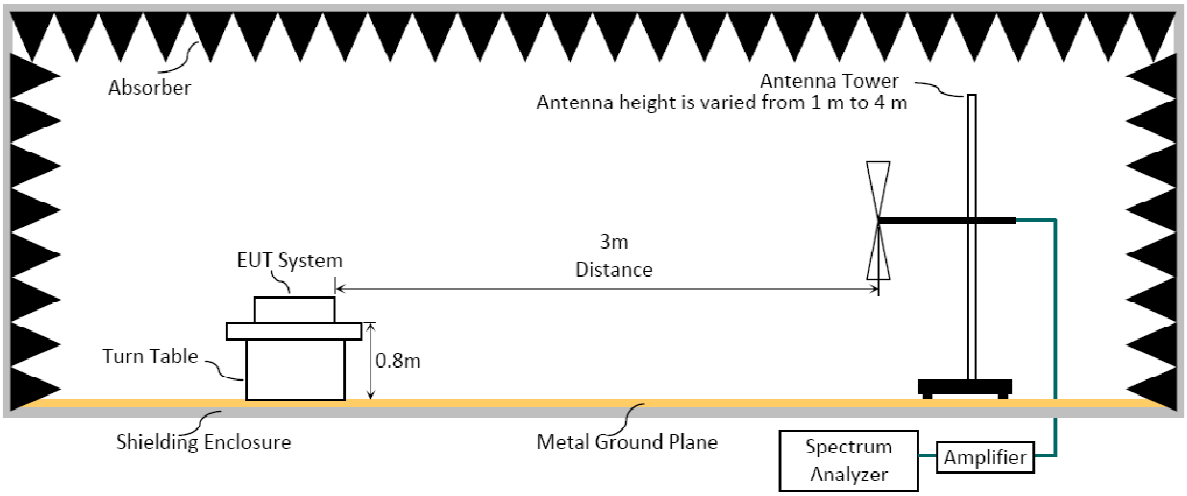
5.1.1. Block Diagram of EUT

Indicated as section 3.9

5.1.2. Setup Diagram for 9kHz-30MHz



5.1.3. Setup Diagram for 30-1000 MHz



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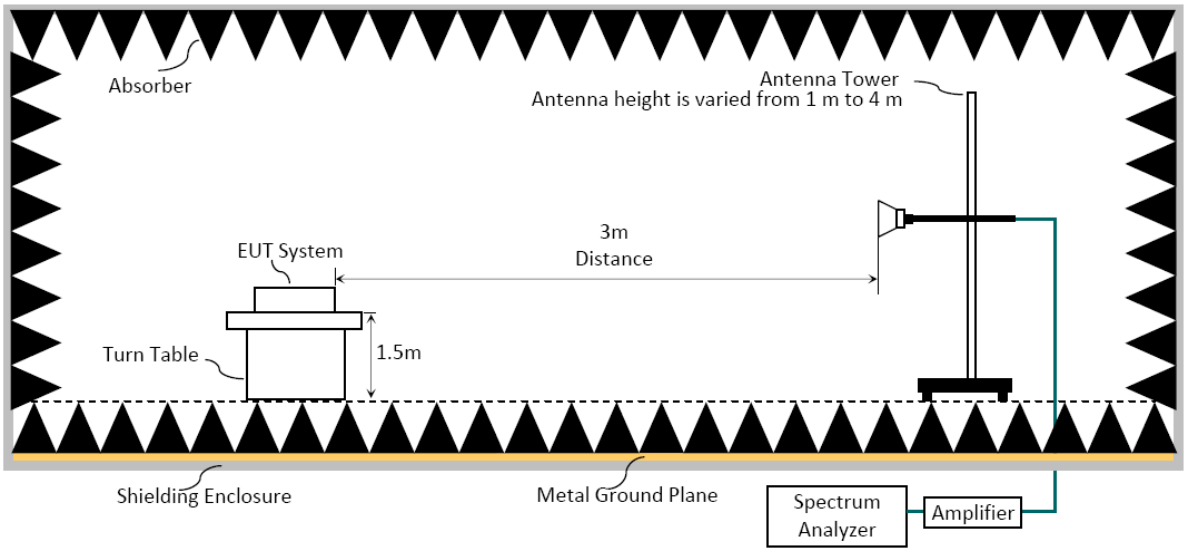
5.1.4. Setup Diagram for above 1GHz



5.2. 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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5.3. 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 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 final 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 final 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)
802.11b	---	---	10Hz
802.11g	1.395	0.716846	750Hz
802.11n-HT20	1.295	0.772201	750Hz

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.

5.4. 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

5.5. Test Results

Please refer to Appendix A.

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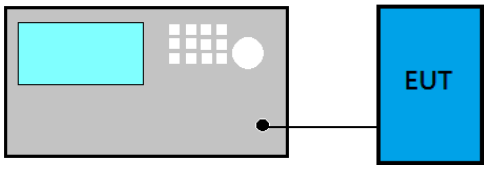
6. MAXIMUM PEAK OUTPUT POWER

6.1. Block Diagram of Test Setup

- For WLAN Function

- For BLE Function



6.2. 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)

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6.3. 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.

□Maximum peak conducted output power method:

(1) Set the RBW ≥ DTS bandwidth
(2) Set VBW ≥ 3 × RBW
(3) Set span ≥ 3 × RBW.
(4) Sweep time = auto couple
(5) Detector = peak.
(6) Trace mode = max hold.
(7) Allow trace to fully stabilize.
(8) Use peak marker function to determine the peak amplitude level.

□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%.

6.4. Test Results

Please refer to Appendix A

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7. DEVIATION TO TEST SPECIFICATIONS

【NONE】

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APPDNDIX A

TEST DATA AND PLOTS

(Model: WSDB-750GN_A)

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A.1 RADIATED EMISSION

Test Date	2018/03/30	Temp./Hum.	24℃/51%
Test Voltage	DC 3.3V (Via test jig)		

A.1.1 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

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
60.07	12.54	1.73	11.41	25.68	40.00	14.32	Peak
120.21	18.80	2.51	4.83	26.14	43.50	17.36	Peak
159.98	16.36	2.93	7.88	27.17	43.50	16.33	Peak
240.49	18.57	3.73	6.28	28.58	46.00	17.42	Peak
296.75	19.47	4.28	7.86	31.61	46.00	14.39	Peak
533.43	23.69	6.54	8.93	39.16	46.00	6.84	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
60.07	12.54	1.73	10.13	24.40	40.00	15.60	Peak
167.74	15.98	3.01	11.51	30.50	43.50	13.00	Peak
193.93	15.65	3.28	12.40	31.33	43.50	12.17	Peak
263.77	19.26	3.95	14.17	37.38	46.00	8.62	Peak
359.80	21.09	5.09	12.96	39.14	46.00	6.86	Peak
480.08	22.95	6.27	9.05	38.27	46.00	7.73	Peak

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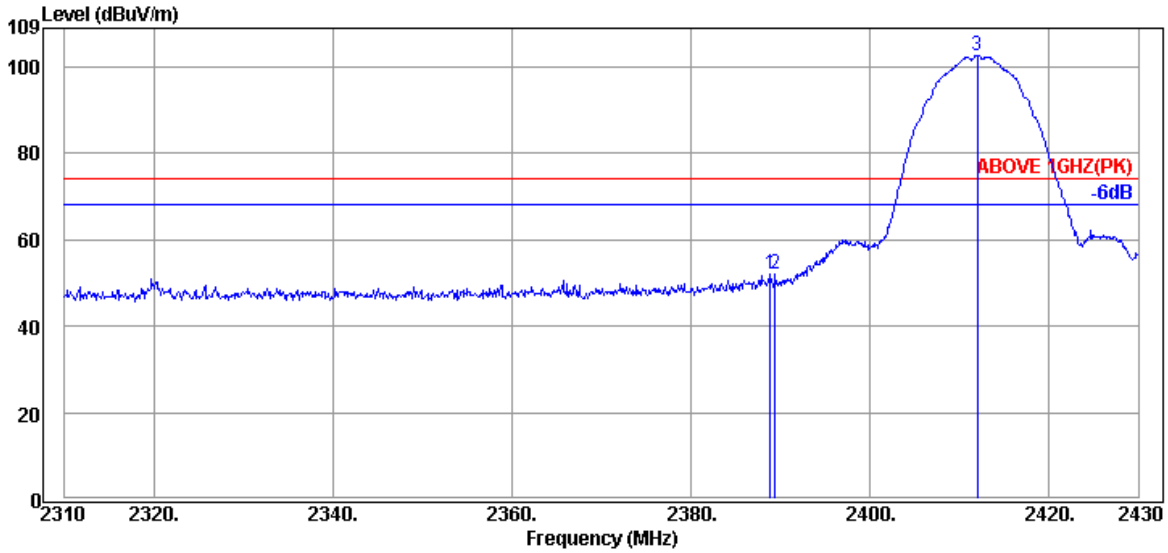
A.2.1.3 Frequency Above 1 GHz to 10th harmonics

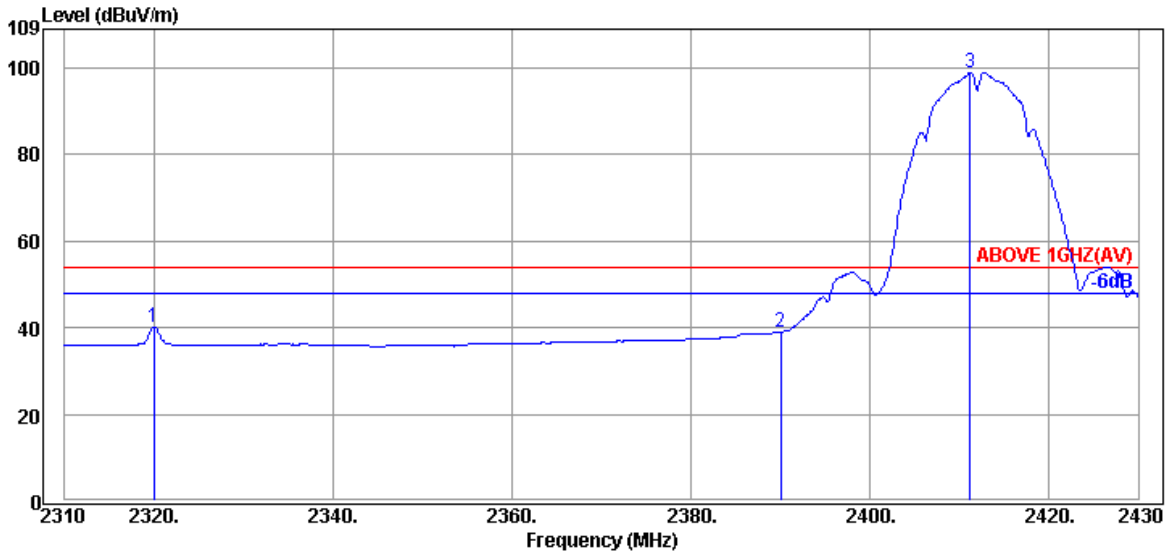
Band Edge:

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
2388.84	32.16	6.57	13.28	52.01	74.00	21.99	Peak
2389.44	32.16	6.57	13.30	52.03	74.00	21.97	Peak
2412.00	32.18	6.59	64.03	102.80	---	---	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
2319.96	32.06	6.49	1.57	40.12	54.00	13.88	Average
2390.04	32.16	6.57	0.39	39.12	54.00	14.88	Average
2411.16	32.18	6.59	60.23	99.00	---	---	Average

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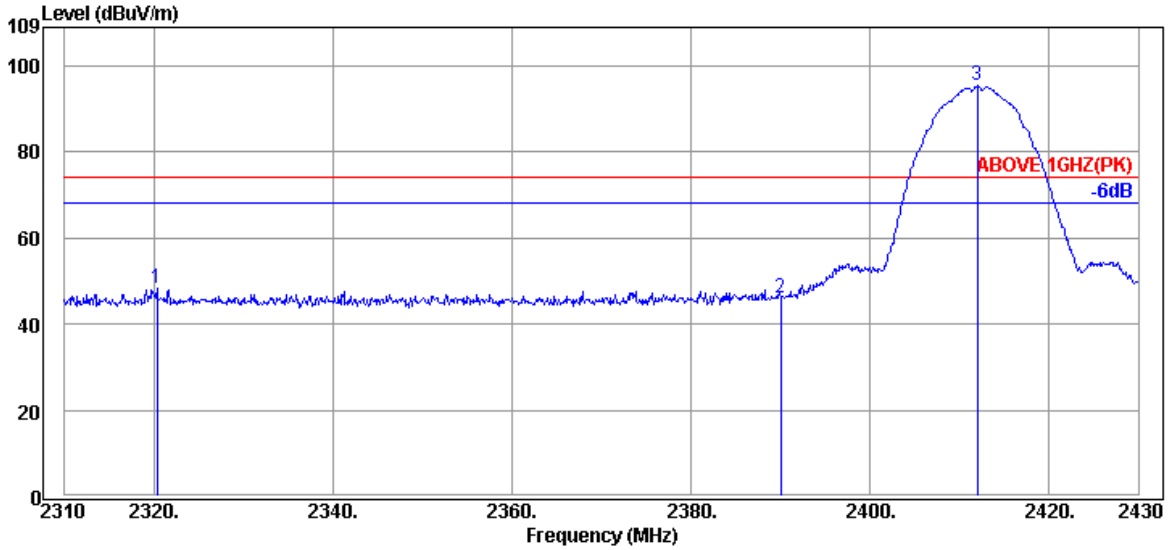
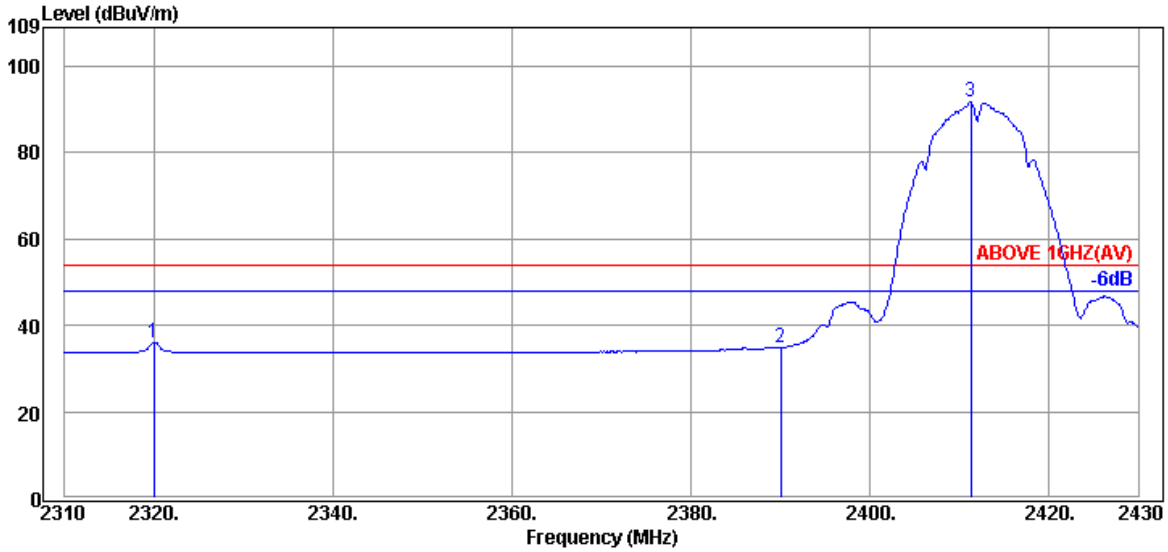
Mode	802.11b	Frequency	TX 2412MHz



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
2320.32	32.06	6.49	9.68	48.23	74.00	25.77	Peak
2390.04	32.16	6.57	7.39	46.12	74.00	27.88	Peak
2412.00	32.18	6.59	56.60	95.37	---	---	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
2319.96	32.06	6.49	-2.57	35.98	54.00	18.02	Average
2390.04	32.16	6.57	-3.95	34.78	54.00	19.22	Average
2411.28	32.18	6.59	52.85	91.62	---	---	Average

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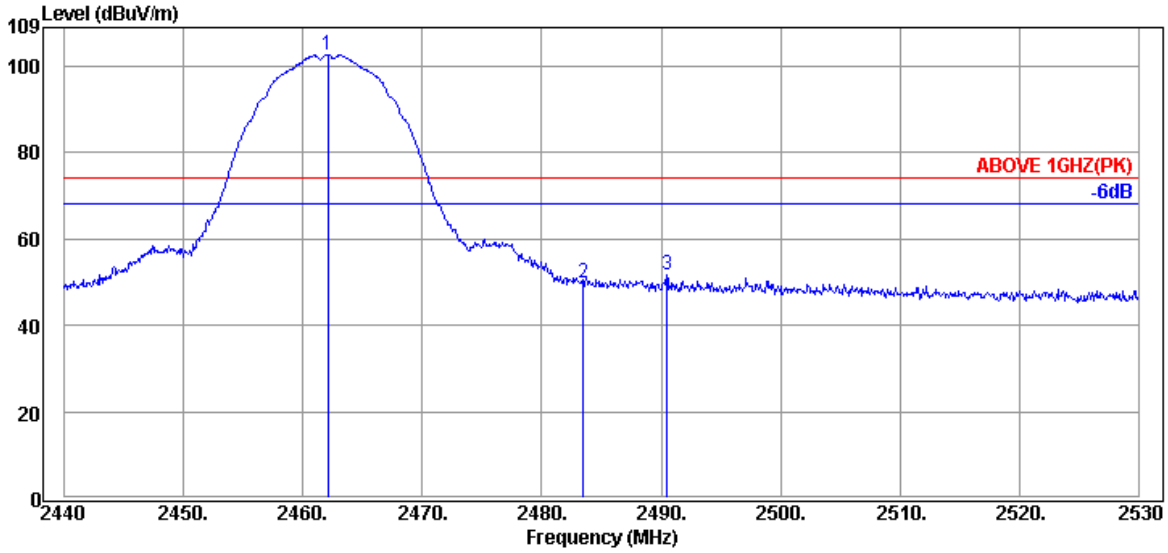
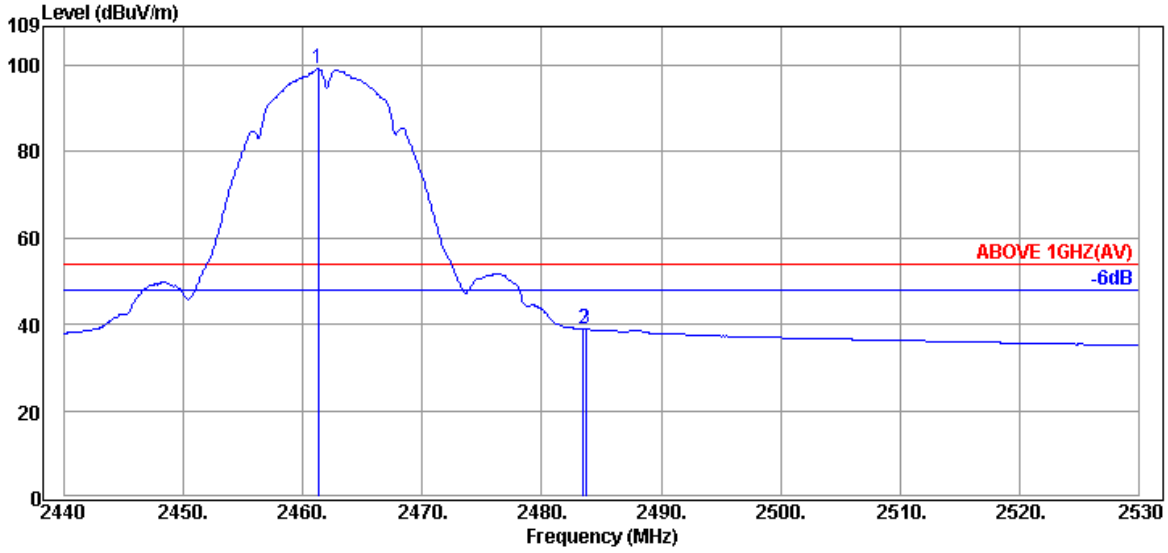
Mode	802.11b	Frequency	TX 2462MHz



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
2462.05	32.25	6.65	63.92	102.82	---	---	Peak
2483.47	32.28	6.67	10.81	49.76	74.00	24.24	Peak
2490.49	32.30	6.69	12.67	51.66	74.00	22.34	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
2461.24	32.25	6.65	60.35	99.25	---	---	Average
2483.47	32.28	6.67	-0.04	38.91	54.00	15.09	Average
2483.65	32.28	6.67	-0.09	38.86	54.00	15.14	Average

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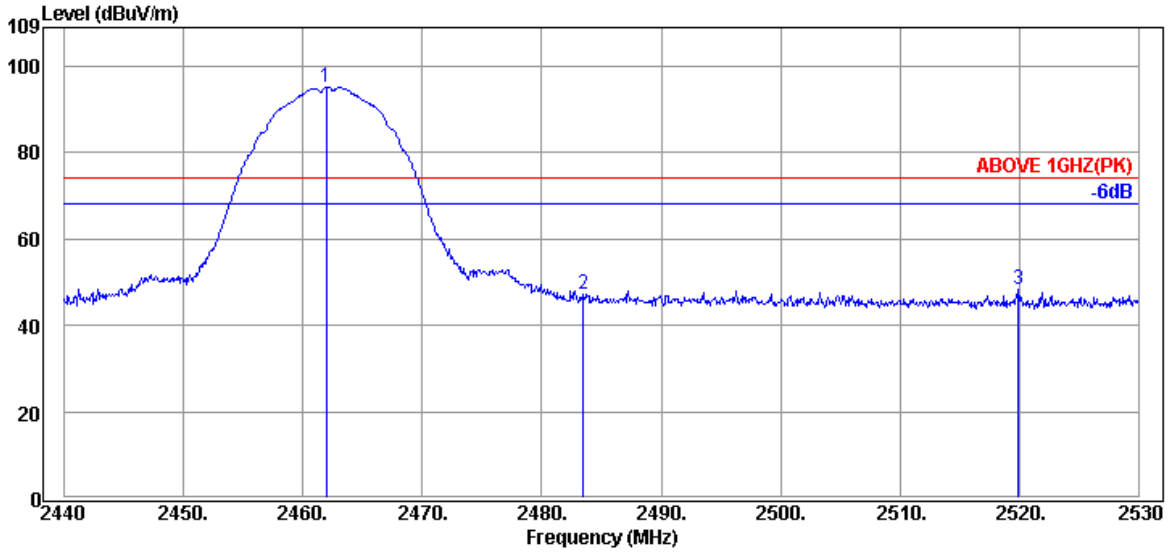
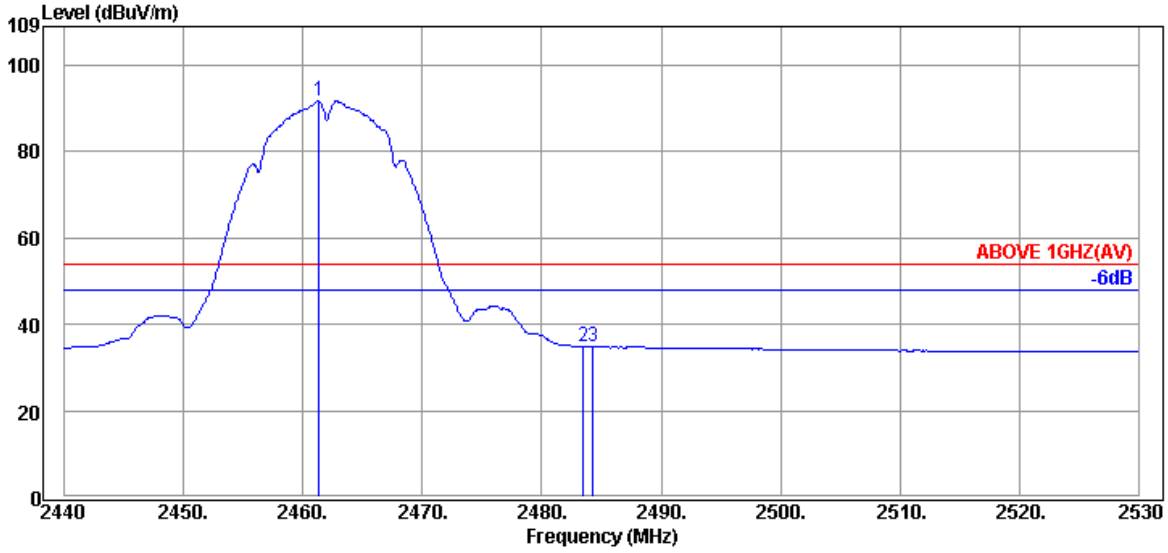
Mode	802.11b	Frequency	TX 2462MHz



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
2461.96	32.25	6.65	56.41	95.31	---	---	Peak
2483.47	32.28	6.67	8.10	47.05	74.00	26.95	Peak
2519.92	32.32	6.72	9.22	48.26	74.00	25.74	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
2461.33	32.25	6.65	52.82	91.72	---	---	Average
2483.47	32.28	6.67	-4.07	34.88	54.00	19.12	Average
2484.28	32.28	6.67	-4.12	34.83	54.00	19.17	Average

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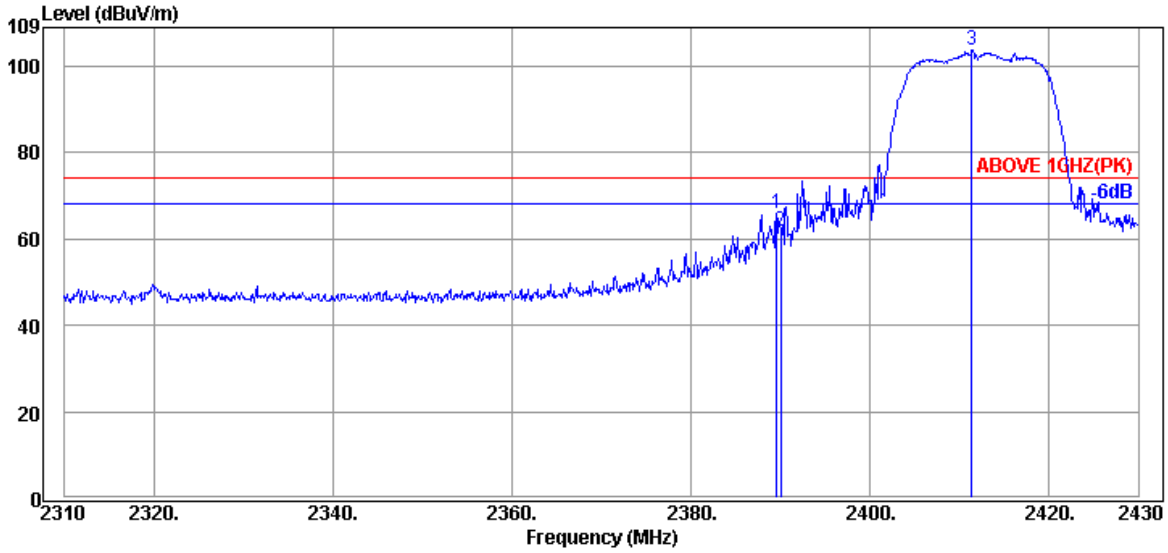
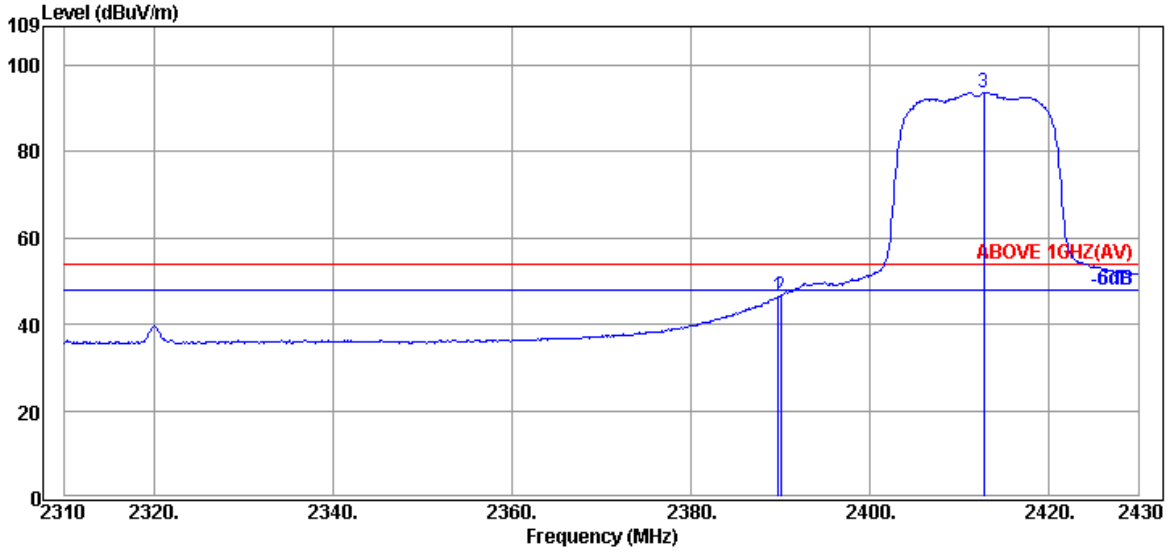
Mode	802.11g	Frequency	TX 2412MHz



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
2389.56	32.16	6.57	27.38	66.11	74.00	7.89	Peak
2390.04	32.16	6.57	22.92	61.65	74.00	12.35	Peak
2411.40	32.18	6.59	65.04	103.81	---	---	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
2389.80	32.16	6.57	7.78	46.51	54.00	7.49	Average
2390.04	32.16	6.57	7.83	46.56	54.00	7.44	Average
2412.72	32.18	6.59	54.98	93.75	---	---	Average

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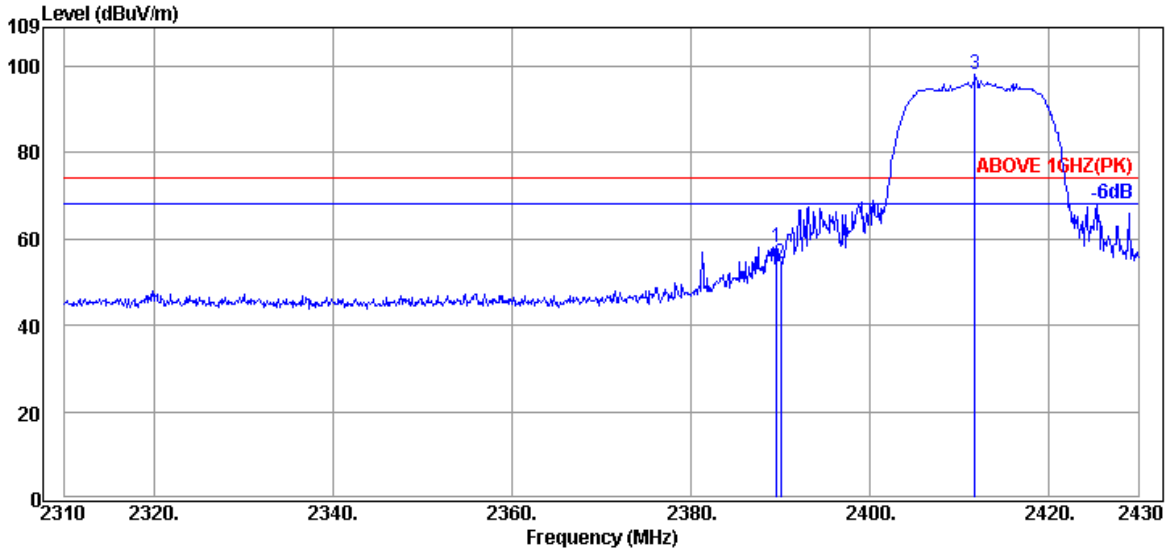
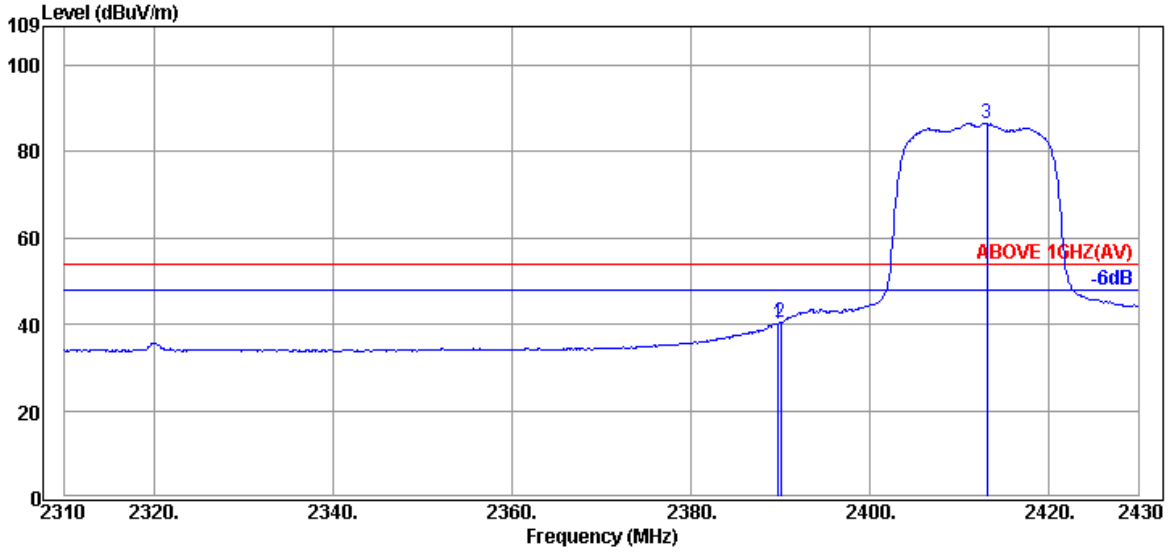
Mode	802.11g	Frequency	TX 2412MHz



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	19.43	58.16	74.00	15.84	Peak
2390.04	32.16	6.57	15.65	54.38	74.00	19.62	Peak
2411.76	32.18	6.59	59.19	97.96	---	---	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
2389.80	32.16	6.57	1.45	40.18	54.00	13.82	Average
2390.04	32.16	6.57	1.75	40.48	54.00	13.52	Average
2413.08	32.18	6.59	47.77	86.54	---	---	Average

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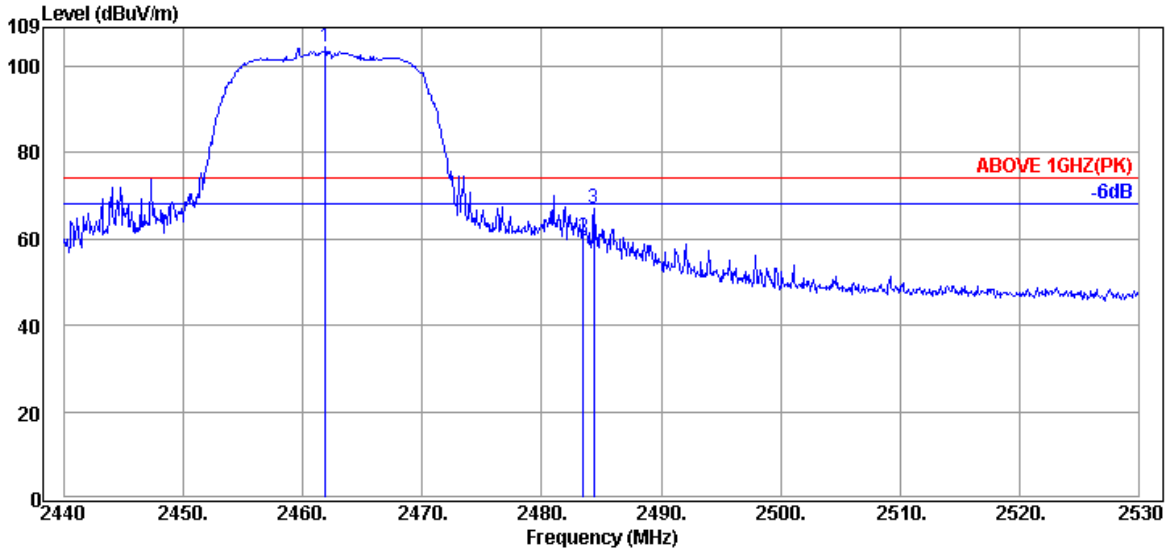
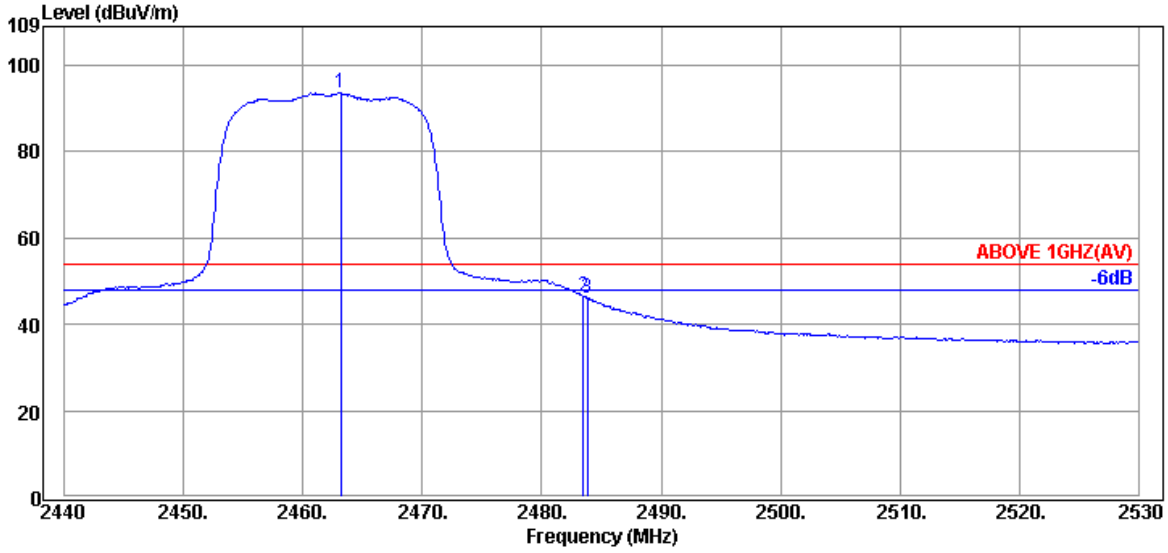
Mode	802.11g	Frequency	TX 2462MHz



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
2461.87	32.25	6.65	65.57	104.47	---	---	Peak
2483.47	32.28	6.67	21.21	60.16	74.00	13.84	Peak
2484.37	32.28	6.67	27.98	66.93	74.00	7.07	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
2463.13	32.25	6.65	54.78	93.68	---	---	Average
2483.47	32.28	6.67	7.61	46.56	54.00	7.44	Average
2483.83	32.28	6.67	7.24	46.19	54.00	7.81	Average

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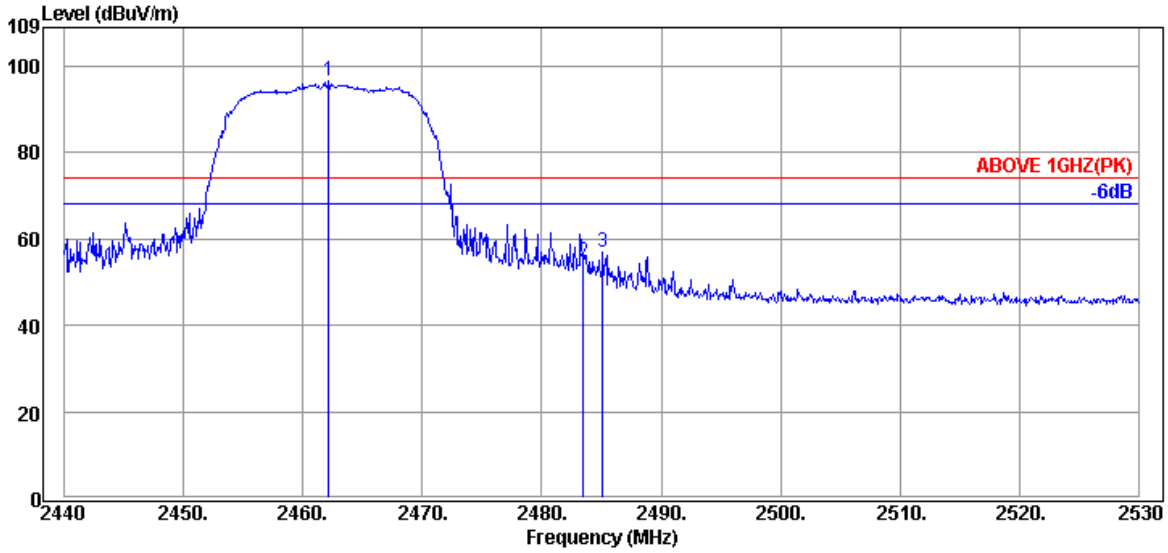
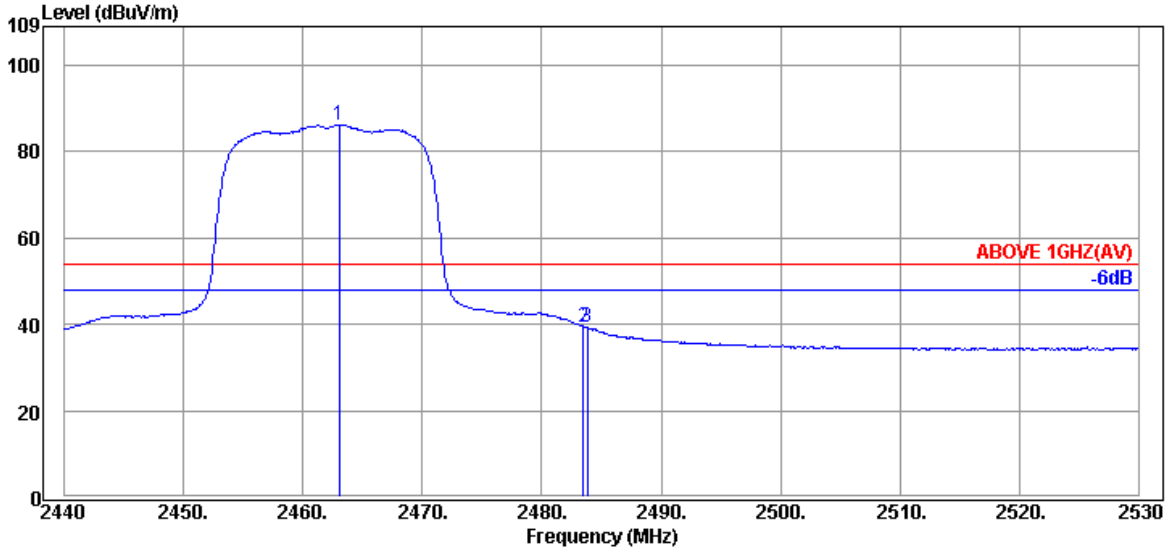
Mode	802.11g	Frequency	TX 2462MHz



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
2462.14	32.25	6.65	57.82	96.72	---	---	Peak
2483.47	32.28	6.67	15.92	54.87	74.00	19.13	Peak
2485.09	32.28	6.67	18.15	57.10	74.00	16.90	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
2463.04	32.25	6.65	47.35	86.25	---	---	Average
2483.47	32.28	6.67	0.51	39.46	54.00	14.54	Average
2483.83	32.28	6.67	0.53	39.48	54.00	14.52	Average

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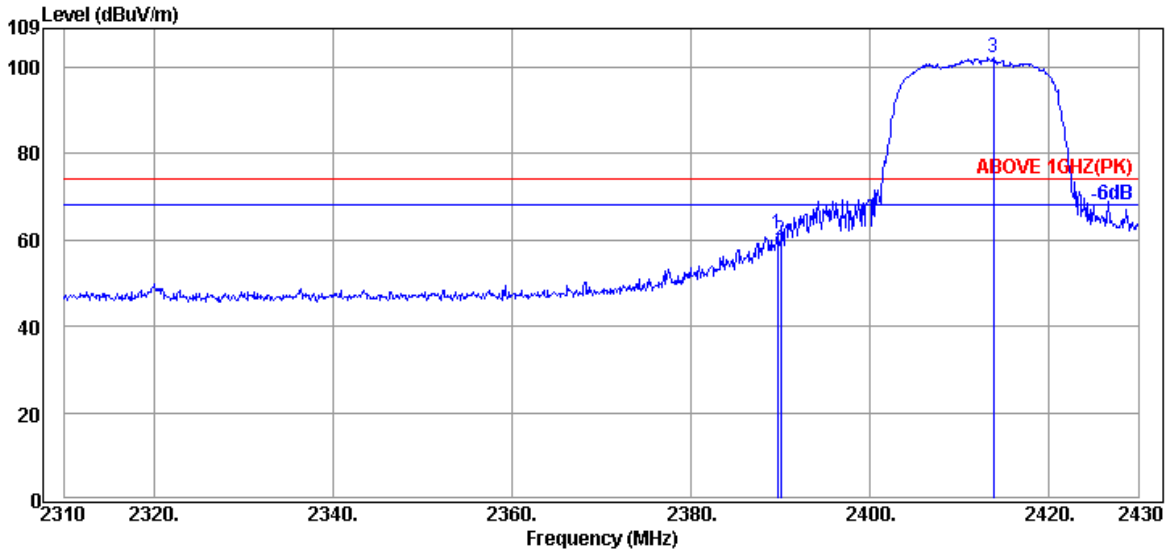
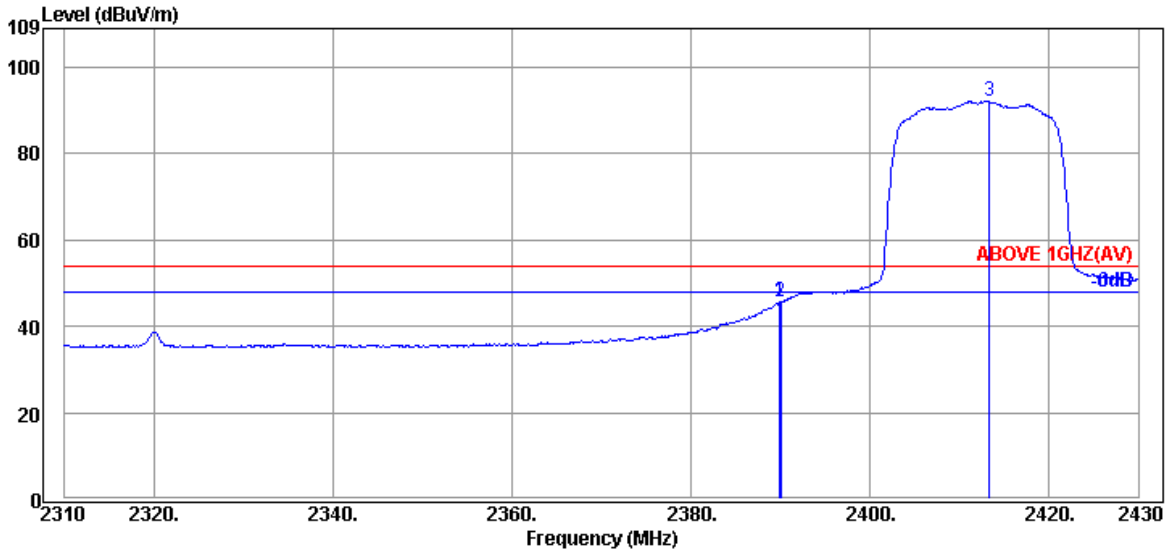
Mode	802.11n-HT20	Frequency	TX 2412MHz



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
2389.68	32.16	6.57	22.66	61.39	74.00	12.61	Peak
2390.04	32.16	6.57	21.23	59.96	74.00	14.04	Peak
2413.80	32.18	6.59	63.60	102.37	---	---	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
2389.92	32.16	6.57	6.85	45.58	54.00	8.42	Average
2390.04	32.16	6.57	6.85	45.58	54.00	8.42	Average
2413.32	32.18	6.59	53.49	92.26	---	---	Average

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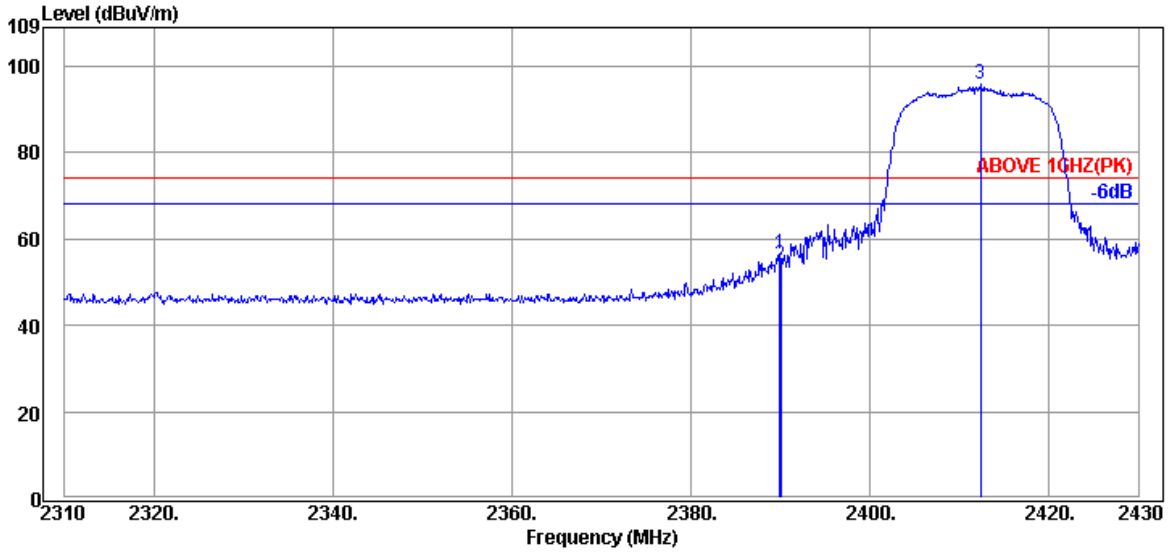
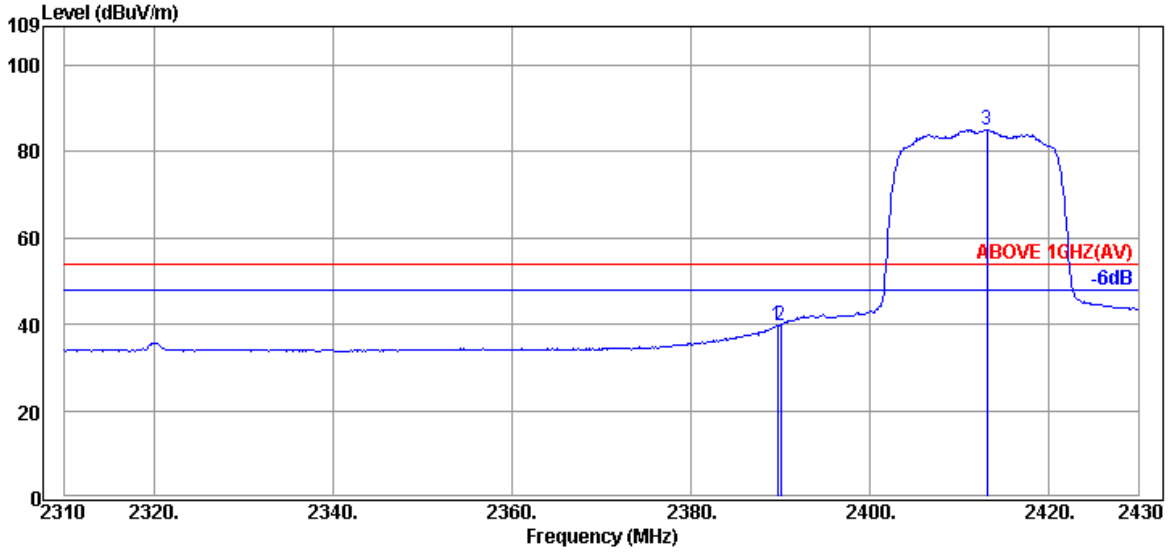
Mode	802.11n-HT20	Frequency	TX 2412MHz



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
2389.92	32.16	6.57	17.85	56.58	74.00	17.42	Peak
2390.04	32.16	6.57	15.26	53.99	74.00	20.01	Peak
2412.36	32.18	6.59	57.09	95.86	---	---	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
2389.68	32.16	6.57	0.93	39.66	54.00	14.34	Average
2390.04	32.16	6.57	1.12	39.85	54.00	14.15	Average
2413.08	32.18	6.59	46.28	85.05	---	---	Average

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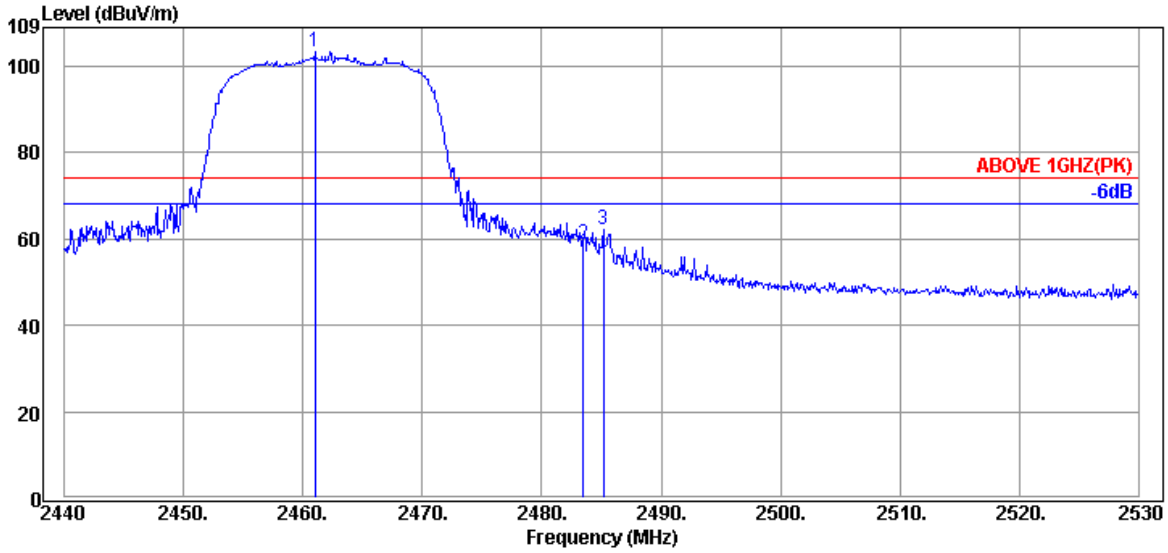
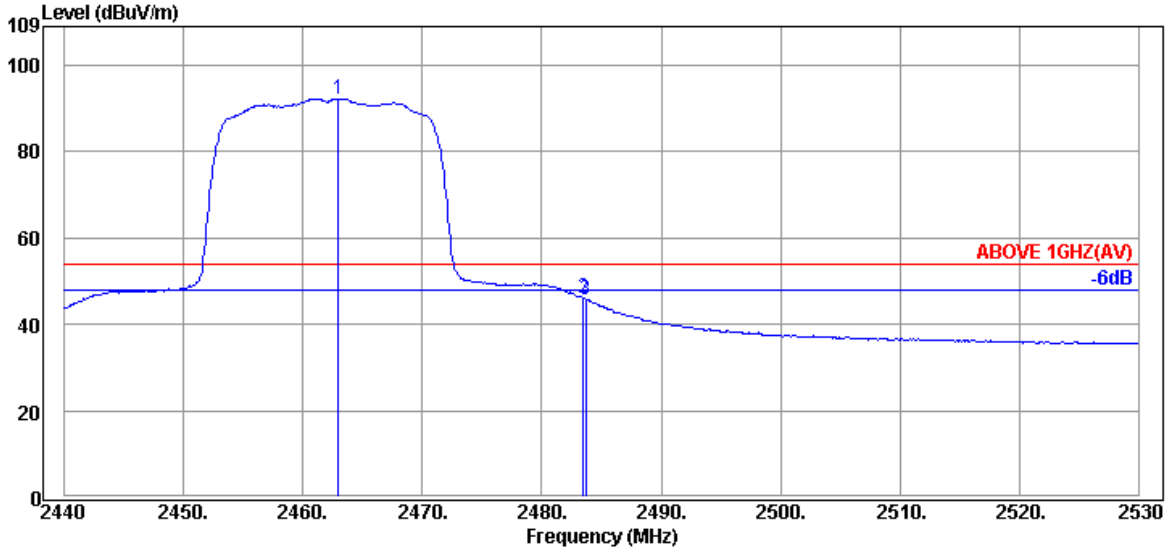
Mode	802.11n-HT20	Frequency	TX 2462MHz



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
2460.97	32.25	6.65	64.37	103.27	---	---	Peak
2483.47	32.28	6.67	19.70	58.65	74.00	15.35	Peak
2485.18	32.28	6.67	23.09	62.04	74.00	11.96	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
2462.95	32.25	6.65	53.43	92.33	---	---	Average
2483.47	32.28	6.67	7.12	46.07	54.00	7.93	Average
2483.65	32.28	6.67	6.89	45.84	54.00	8.16	Average

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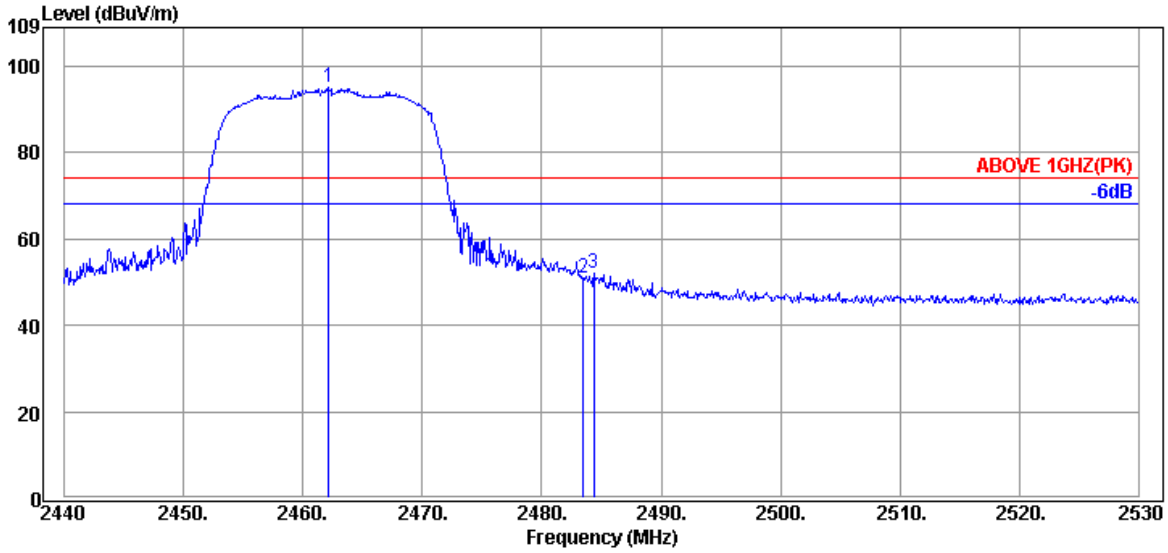
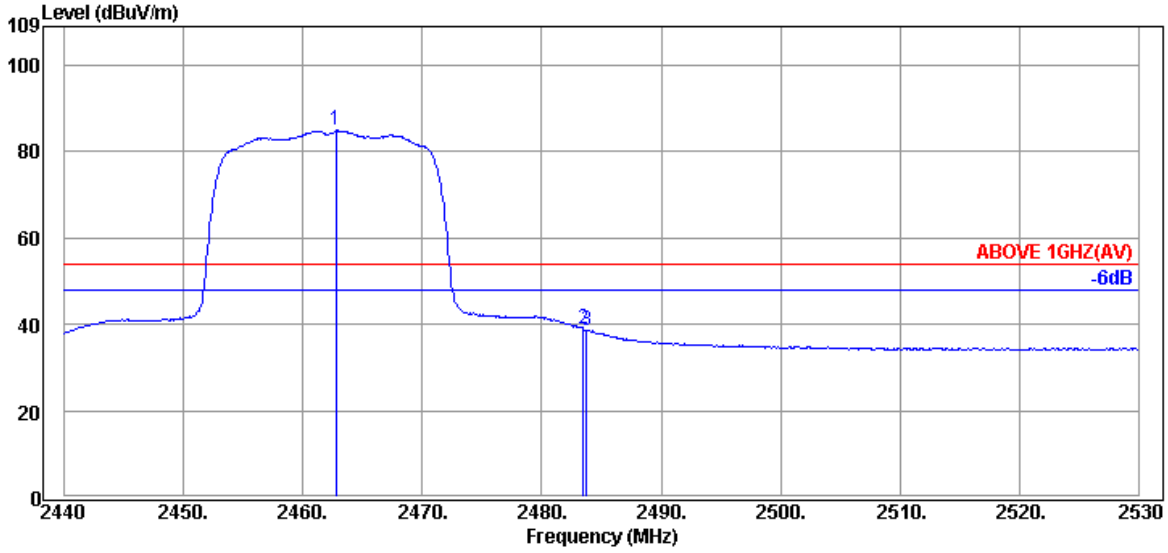


Antenna at Vertical Polarization

Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Meter Reading (dBµV)	Emission Level (dBµV/m)	Limits (dBµV/m)	Margin (dB)	Detector
2462.14	32.25	6.65	56.23	95.13	---	---	Peak
2483.47	32.28	6.67	12.16	51.11	74.00	22.89	Peak
2484.37	32.28	6.67	13.09	52.04	74.00	21.96	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
2462.77	32.25	6.65	46.01	84.91	---	---	Average
2483.47	32.28	6.67	-0.01	38.94	54.00	15.06	Average
2483.74	32.28	6.67	-0.34	38.61	54.00	15.39	Average

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A.1.2 Emissions outside the frequency band:

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

Mode	802.11b	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
3655.00	32.96	8.35	10.65	51.96	54.00	2.04	Peak
4875.00	34.25	9.56	-0.19	43.62	54.00	10.38	Peak
7310.00	35.80	11.90	-2.25	45.45	54.00	8.55	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
4875.00	34.25	9.56	-1.51	42.30	54.00	11.70	Peak
7310.00	35.80	11.90	-3.15	44.55	54.00	9.45	Peak

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
3695.00	33.01	8.41	9.47	50.89	54.00	3.11	Peak
4925.00	34.27	9.58	-2.37	41.48	54.00	12.52	Peak
7385.00	35.80	11.99	-3.26	44.53	54.00	9.47	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
4925.00	34.27	9.58	-2.85	41.00	54.00	13.00	Peak
7385.00	35.80	11.99	-2.41	45.38	54.00	8.62	Peak

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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
3695.00	33.01	8.41	8.42	49.84	54.00	4.16	Peak
4925.00	34.27	9.58	-2.59	41.26	54.00	12.74	Peak
7385.00	35.80	11.99	-2.86	44.93	54.00	9.07	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
4925.00	34.27	9.58	-3.03	40.82	54.00	13.18	Peak
7385.00	35.80	11.99	-2.26	45.53	54.00	8.47	Peak

A.1.3 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.2 MAXIMUM PEAK OUTPUT POWER

Test Date	2018/03/29	Temp./Hum.	20℃/43%
Cable Loss	---	Test Voltage	DC 3.3V (Via test jig)

A.2.1 Peak Output Power

Modulation Type	Centre Frequency (MHz)	Max. Peak Output Power		Antenna Gain (dBi)	Output Power (E.I.R.P.)		Limit
		(dBm)	(W)		(dBm)	(W)	
802.11b	2412	17.76	0.05970	4.07	21.83	0.15241	< 30dBm (1W) (Maximum Peak Output Power) < 36dBm (4W) (E.I.R.P)
	2437	17.81	0.06039		21.88	0.15417	
	2462	17.70	0.05888		21.77	0.15031	
802.11g	2412	20.14	0.10328		24.21	0.26363	
	2437	20.26	0.10617		24.33	0.27102	
	2462	20.46	0.11117		24.53	0.28379	
802.11n-HT20	2412	19.68	0.09290		23.75	0.23714	
	2437	19.76	0.09462		23.83	0.24155	
	2462	19.81	0.09572		23.88	0.24434	

Note: The results have been included cable loss.

A.2.2 Average Output Power (Reporting only)

Modulation Type	Centre Frequency (MHz)	Output Power(dBm)	10log (1/X)	Max. Average Output Power		Antenna Gain (dBi)	Total Average Output Power (E.I.R.P.)		Limit
				(dBm)	(W)		(dBm)	(W)	
802.11b	2412	14.98	0	14.98	0.03148	4.07	19.05	0.08035	< 30dBm (1W) (Maximum Peak Output Power) < 36dBm (4W) (E.I.R.P)
	2437	14.97		14.97	0.03141		19.04	0.08017	
	2462	14.86		14.86	0.03062		18.93	0.07816	
802.11g	2412	12.88	0.11	12.99	0.01991		17.06	0.05082	
	2437	12.97		13.08	0.02032		17.15	0.05188	
	2462	13.06		13.17	0.02075		17.24	0.05297	
802.11n-HT20	2412	11.96	0.13	12.09	0.01618		16.16	0.04130	
	2437	11.92		12.05	0.01603		16.12	0.04093	
	2462	12.05		12.18	0.01652		16.25	0.04217	

Note: The results have been included cable loss.

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APPDNDIX B

TEST PHOTOGRAPHS

(Model: WSDB-750GN_A)