Test Report

FCC ID : W9R-NX1

Date of issue: May 17, 2016

Sample Description:	Visual Controller For Garage Door Opener
Model(s):	NX1
Applicant:	ExaDigm Inc.
Address:	2861 Pullman Street, Santa Ana, CA 92705 United State
Date of Test:	May 06, 2016 to May 11, 2016

Shenzhen Microtest Co., Ltd.
http://www.mtitest.com

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Tel:(86-755)88850135 Fax: (86-755) 88850136 http://www.mtitest.com E-mail: mti@51mti.com
Address: No.102A & 302A, East Block, Hengfang Industrial Park, Xingye Road, Xixiang, Bao'an District, Shenzhen, Guangdong, China

TABALE OF CONTENTS

TEST RESULT CERTIFICATION	
Applicant's name:	ExaDigm Inc.
Address:	2861 Pullman Street, Santa Ana, CA 92705 United State
Manufacture's Name:	ExaDigm Inc.
Address:	2861 Pullman Street, Santa Ana, CA 92705 United State
Product description	
Product name:	Visual Controller For Garage Door Opener
Trademark:	**NEXBANG**
Model name:	NX1
Serial Model:	/
Standards:	FCC Part 15.247
Test Procedure:	ANSI C63.4-2009; ANSI C63.10-2009 558074 D01 DTS Meas Guidance v03r05

This EUT has been tested by Shenzhen Toby Technology Co., Ltd. and the test results show that the equipment under test (EUT) is in compliance with the FCC requirements. And it is applicable only to the tested sample identified in the report.

Tested by: David Chen

David Chen May 17, 2016

Reviewed by: Leon Chen

Leon Chen May 17, 2016

Approved by: Ares Liu

Ares Liu May 17, 2016

SUMMARY OF TEST RESULT

Item	FCC Part No.	Description of Test	Result
1	15.203	Antenna requirement	Pass
2	15.207	AC power line conducted emission	Pass
3	15.247(b)(3)	Maximum peak output power	Pass
4	15.247(a)(2)	6dB emission bandwidth	Pass
5	15.247(e)	Power spectral density (PSD)	Pass
8	15.247(d)	Band edge spurious emission	Pass
9	15.247(d), 15.209	Radiated emission	Pass

1 General description

1.1 Feature of equipment under test (EUT)

Product name:	Visual Controller For Garage Door Opener
Model name:	NX1
Serial model name:	/
Tx/Rx frequency range:	Tx/Rx: 2412MHz~2462MHz for 802.11b/g/n20 Tx/Rx: 2422MHz~2452MHz for 802.11n40
WIFI feature:	☒802.11b ☒802.11g ☒802.11n20 ☒802.11n40
Modulation type:	DSSS, OFDM
Power source:	DC 5V from adapter
Adapter information:	Model: ADS-6MA-06 05050EPCU Input: 100-240VAC 50/60Hz Max. 0.3A Output: 5VDC 1.0A
Antenna designation:	PIFA antenna (Antenna Gain: 2.34dBi)

1.2 operation channel list

Channel	Frequency	Channel	Frequency	Channel	Frequency
1	2412MHz	6	2437MHz	11	2462MHz
2	2417MHz	7	2442MHz	--	--
3	2422MHz	8	2447MHz	--	--
4	2427MHz	9	2452MHz	---	---
5	2432MHz	10	2457MHz	---	---

2 Test Configuration of EUT

2.1 Test frequency channel

Channel	802.11b/g/n20	802.11n40
Low	2412MHz	2422MHz
Middle	2437MHz	2437MHz
High	2462MHz	2452MHz

2.2 EUT operation mode

During testing, RF test program provided by the manufacture to control the Tx operation followed the test requirement. (duty cycle>98%)

2.3 Test conditions

During the measurement the environmental conditions were within the listed ranges:

- Temperature: 20ºC~30ºC
- Humidity: 30%~70%
- Atmospheric pressure: 98kPa~101kPa

2.4 Testing site

Test Site	Shenzhen Toby Technology Co., Ltd.
Test Site Location	1 A/F., Bldg.6, Yusheng Industrial Zone The National Road No.107 Xixiang Section 467 Shenzhen Guangdong China
FCC Registration No.:	811562
CNAS Registration No.:	CNAS L5813

2.5 Ancillary equipment list

Equipment	Model	S/N	Manufacturer
/	/	/	/

2.6 Measurement uncertainty

Measurement Uncertainty for a Level of Confidence of 95 %, U=2xUc(y)

RF frequency	1 x 10-7
RF power, conducted	± 1 dB
Conducted emission(150kHz~30MHz)	± 2.5 dB
Radiated emission(30MHz~1GHz)	± 4.2 dB
Radiated emission (above 1GHz)	± 4.3 dB
Temperature	±1 degree
Humidity	± 5 %

3 List of test equipment

For AC power line conducted emission:

Equipment	Manufacturer	Model	Serial No.	Calibration Due
LISN	R&S	ENV216	101313	2016.12.06
LISN	SCHWARZBECK	NNLK 8129	8129245	2016.12.25
Pulse Limiter	SCHWARZBECK	VTSD 9561F	9716	2016.12.25
Test Cable	N/A	N/A	C01	2016.12.06
EMI Test Receiver	R&S	ESCI	101160	2016.12.06

For Radiated emission:

Equipment	Manufacturer	Model	Serial No.	Calibration Due
Log-Bicon Antenna	MESS-ELEKTRONIK	VULB 9160	3058	2016.12.11
Horn Antenna	Schwarzbeck	BBHA 9120D	631	2016.12.05
Horn Antenna	Schwarzbeck	BBHA 9170	373	2016.12.05
Test Cable	United Microwave	57793	1m	2016.12.05
Test Cable	United Microwave	A30A30-5006	10m	2016.12.05
Microwave Pre_amplifier	Agilent	8449B	3008A01714	2016.12.05
Pre-Amplifier	Anritsu	MH648A	M09961	2016.12.05
EMI Test Receiver	R&S	ESCI-7	101318	2016.12.05
Spctrum analyzer	Agient	E4470B	MY41441082	2016.06.01

For RF conducted emission:

Equipment	Manufacturer	Model	Serial No.	Calibration Due
Spctrum analyzer	Agient	E4470B	MY41441082	2016.06.01
Power meter	Anritsu	ML2495A	1005002	2016.09.11
Power Senor	Anritsu	MA2411B	0917070	2016.09.11

Note: the calibration interval of the above test instruments is 12 months and the calibrations are traceable to international system unit (SI).

4 Test Result

4.1 Conducted emission

4.1.1. Limit

Frequency (MHz)	Limit	
	Quasi-peak	Average
0.15-0.5	66 to 56	56 to 46
0.5-5	56	46
5-30	60	50

Note: Decreases with the logarithm of the frequency from 0.15MHz to 0.5MHz.

4.1.2. Test method

1. The EUT was placed 0.8 meters from the horizontal ground plane with EUT being connected to the power mains through a line impedance stabilization network (LISN). All other support equipment powered from additional LISN(s). The LISN provide 50 Ohm/50uH of coupling impedance for the measuring instrument.

2. Interconnecting cables that hang closer than 40 cm to the ground plane shall be folded back and forth in the center forming a bundle 30 to 40 cm long.

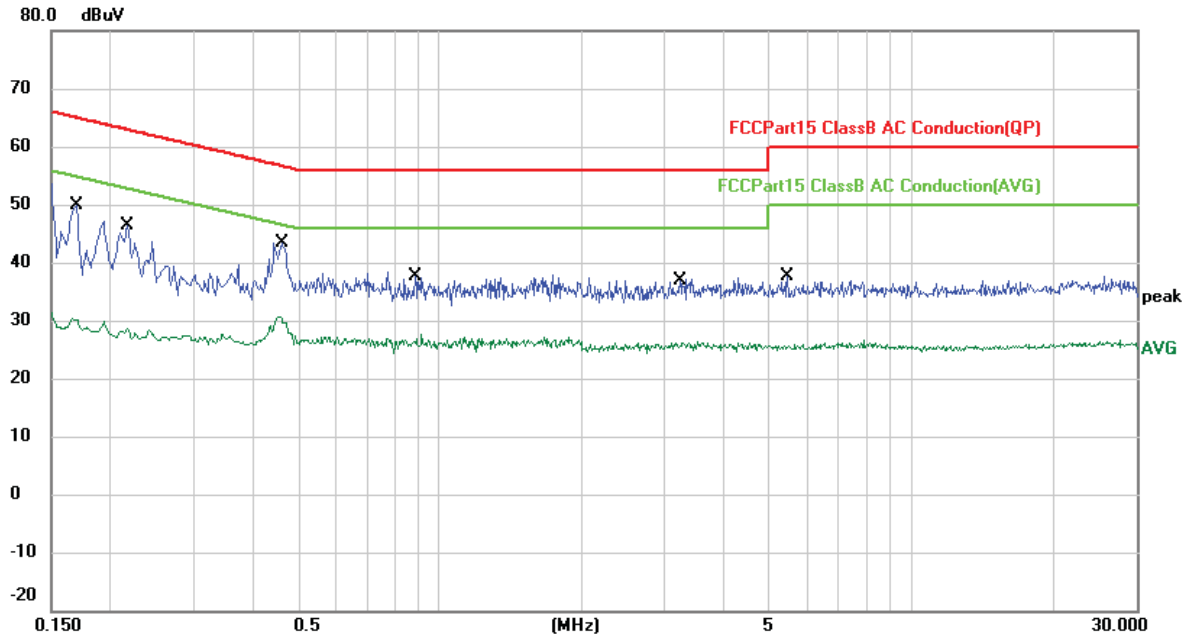
3. I/O cables that are not connected to a peripheral shall be bundled in the center. The end of the cable may be terminated, if required, using the correct terminating impedance. The overall length shall not exceed 1 m.

4. LISN at least 80 cm from nearest part of EUT chassis.

5. The resolution bandwidth of EMI test receiver is set at 9kHz.

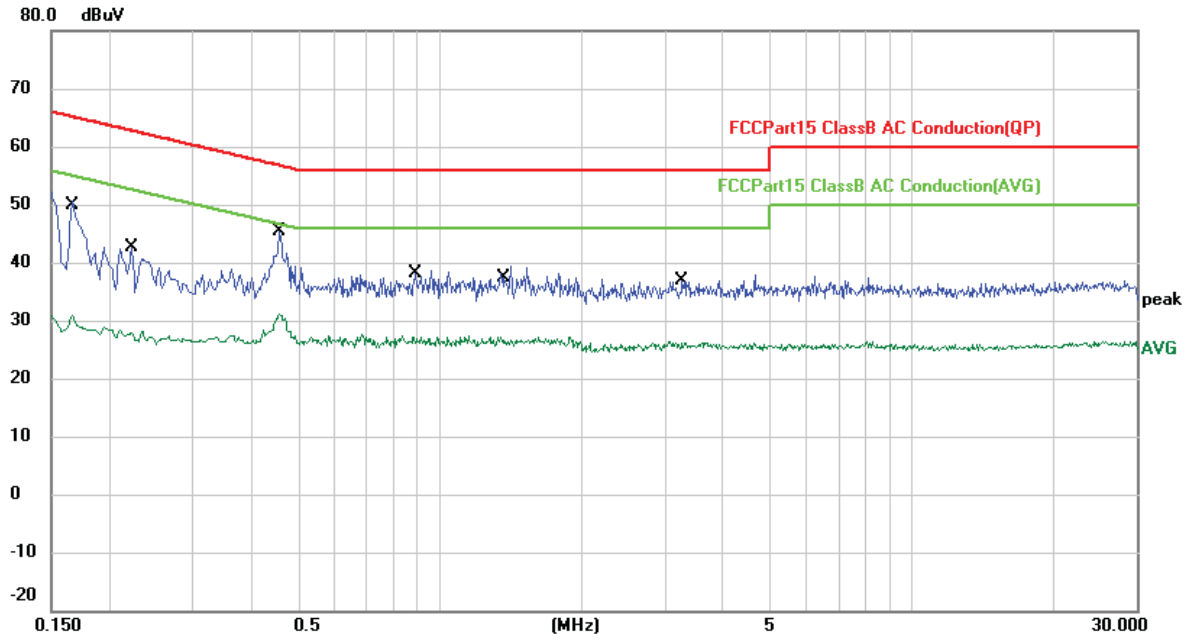
4.1.3. Test Result

Temperature:	25℃	Relative Humidity:	59%
Pressure:	101kPa	Polarization:	L
Test voltage:	AC 120V/60Hz	Test mode:	Transmitting



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over		
		MHz	dBuV	dB	dBuV	dBuV	dB	Detector	Comment
1		0.1678	14.33	30.02	44.35	65.06	-20.71	QP	
2		0.1678	-0.54	30.02	29.48	55.06	-25.58	AVG	
3		0.2179	6.96	30.02	36.98	62.89	-25.91	QP	
4		0.2179	-2.53	30.02	27.49	52.89	-25.40	AVG	
5		0.4633	6.02	30.02	36.04	56.63	-20.59	QP	
6	*	0.4633	-0.20	30.02	29.82	46.63	-16.81	AVG	
7		0.8845	-0.15	30.02	29.87	56.00	-26.13	QP	
8		0.8845	-3.89	30.02	26.13	46.00	-19.87	AVG	
9		3.1886	-0.16	30.04	29.88	56.00	-26.12	QP	
10		3.1886	-4.89	30.04	25.15	46.00	-20.85	AVG	
11		5.4987	-0.43	30.05	29.62	60.00	-30.38	QP	
12		5.4987	-5.25	30.05	24.80	50.00	-25.20	AVG	

Temperature:	25℃	Relative Humidity:	59%
Pressure:	101kPa	Polarization:	N
Test voltage:	AC 120V/60Hz	Test mode:	Transmitting



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over		
		MHz	dBuV	dB	dBuV	dBuV	dB	Detector	Comment
1		0.1685	13.21	30.02	43.23	65.03	-21.80	QP	
2		0.1685	-0.73	30.02	29.29	55.03	-25.74	AVG	
3		0.2189	6.10	30.02	36.12	62.86	-26.74	QP	
4		0.2189	-2.67	30.02	27.35	52.86	-25.51	AVG	
5		0.4588	7.26	30.02	37.28	56.71	-19.43	QP	
6	*	0.4588	0.49	30.02	30.51	46.71	-16.20	AVG	
7		0.8931	0.15	30.02	30.17	56.00	-25.83	QP	
8		0.8931	-3.71	30.02	26.31	46.00	-19.69	AVG	
9		1.3672	-0.53	30.02	29.49	56.00	-26.51	QP	
10		1.3672	-3.89	30.02	26.13	46.00	-19.87	AVG	
11		3.2619	-0.11	30.04	29.93	56.00	-26.07	QP	
12		3.2619	-4.86	30.04	25.18	46.00	-20.82	AVG	

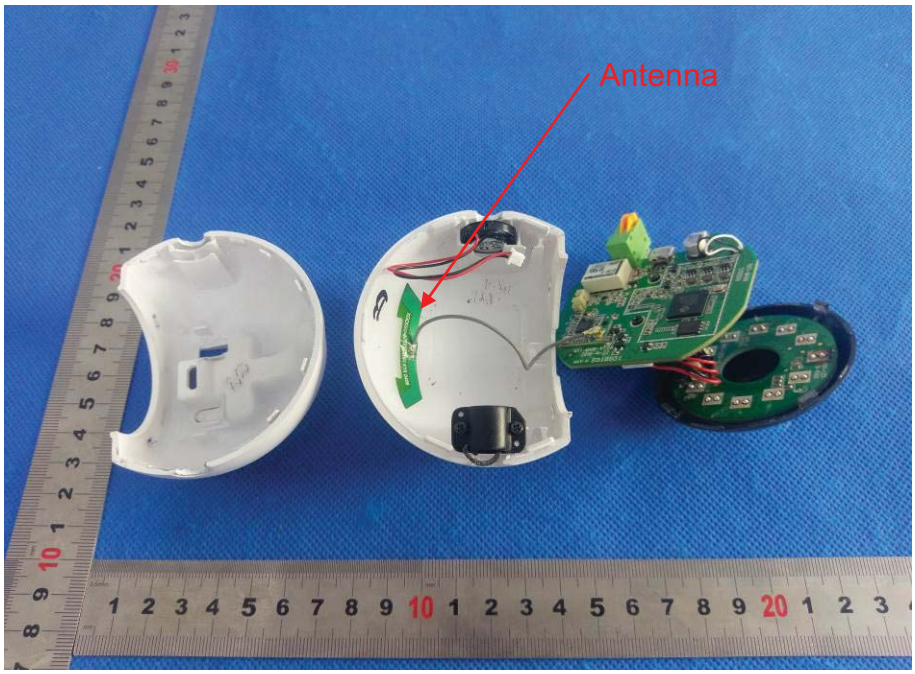
4.2 Antenna requirement

4.2.1. Requirement defined in FCC 15.203

An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the provisions of this section. The manufacturer may design the unit so that a broken antenna can be replaced by the user, but the use of a standard antenna jack or electrical connector is prohibited. This requirement does not apply to carrier current devices or to devices operated under the provisions of §15.211, §15.213, §15.217, §15.219, or §15.221. Further, this requirement does not apply to intentional radiators that must be professionally installed, such as perimeter protection systems and some field disturbance sensors, or to other intentional radiators which, in accordance with §15.31(d), must be measured at the installation site. However, the installer shall be responsible for ensuring that the proper antenna is employed so that the limits in this part are not exceeded.

4.2.2. EUT antenna description

The WIFI antenna of EUT is an internal permanently attached antenna, the maximum gain of the antenna is 2.34dBi. So the antenna meets the requirement of this part.



4.3 Maximum peak output power

4.3.1. Limits

Conducted peak output power limit is 1W (30dBm).

4.3.2. Test Method

The maximum peak conducted output power may be measured using a broadband peak RF power meter. The power meter shall have a video bandwidth that is greater than or equal to the DTS bandwidth and shall utilize a fast-responding diode detector.

4.3.3. Test Result

Frequency (MHz)	Peak output power (dBm)	Limit (dBm)
802.11b		
2412	17.53	30
2437	17.73	30
2462	17.72	30
802.11g		
2412	15.22	30
2437	15.15	30
2462	15.2	30
802.11n20		
2412	15.3	30
2437	15.16	30
2462	15.52	30
802.11n40		
2422	13.57	30
2437	13.96	30
2452	13.36	30

4.4 6dB emission bandwidth

4.4.1. Limits

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

4.4.2. Test method

Use the following spectrum analyzer settings:

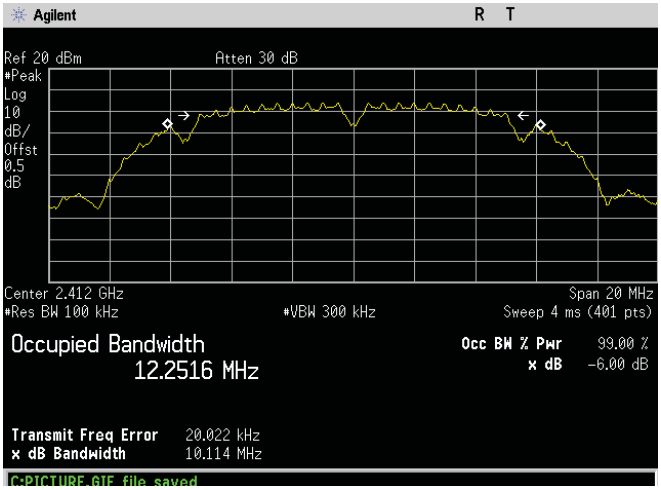
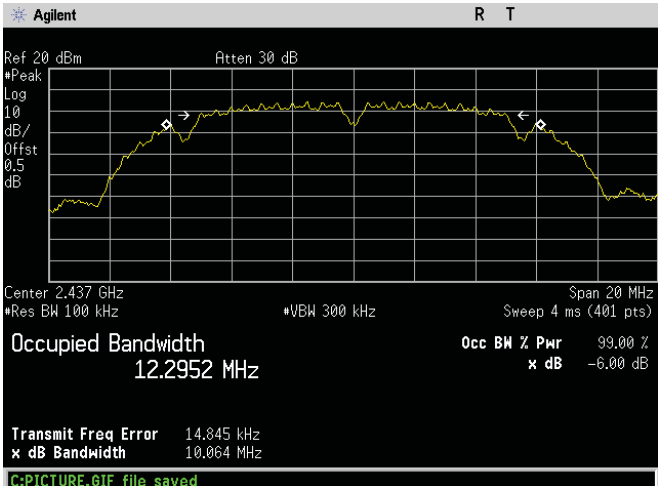
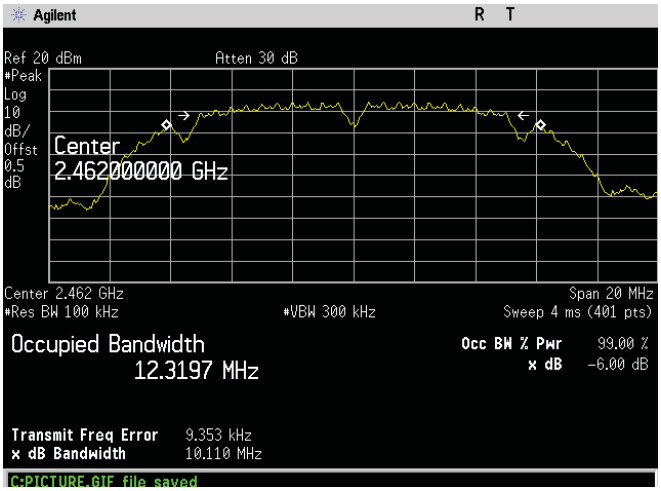
RBW = 100kHz
VBW ≥ 3RBW
Detector = peak
Trace mode = max hold
Sweep time = auto couple
Allow the trace to stabilize, measure the maximum width of the emission that is constrained by the frequencies associated with the two outermost amplitude points (upper and lower frequencies) that are attenuated by 6 dB relative to the maximum level measured in the fundamental emission.

4.4.3. Test result

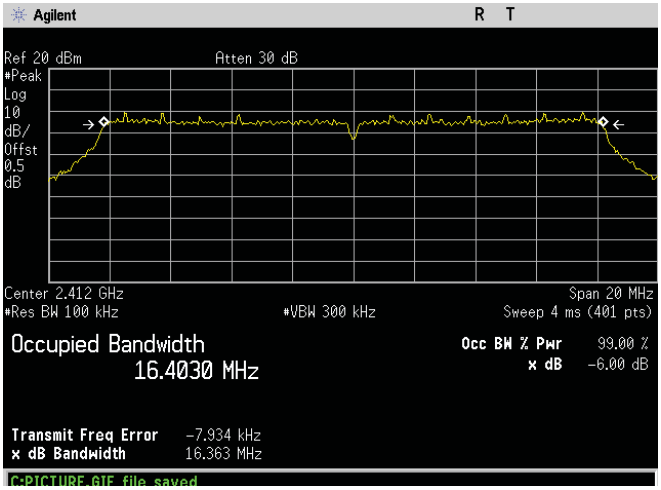
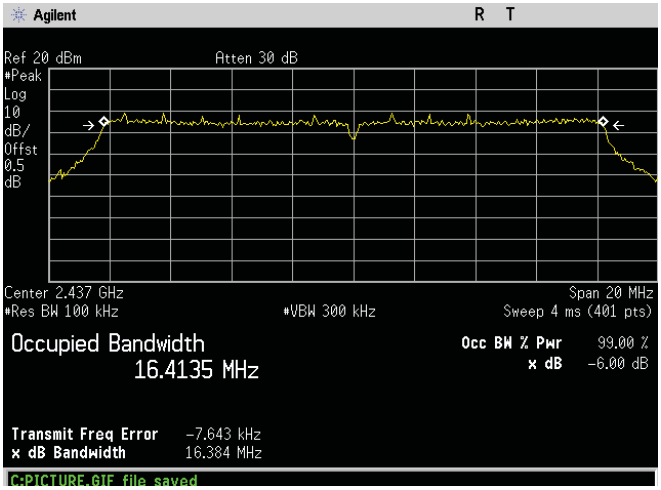
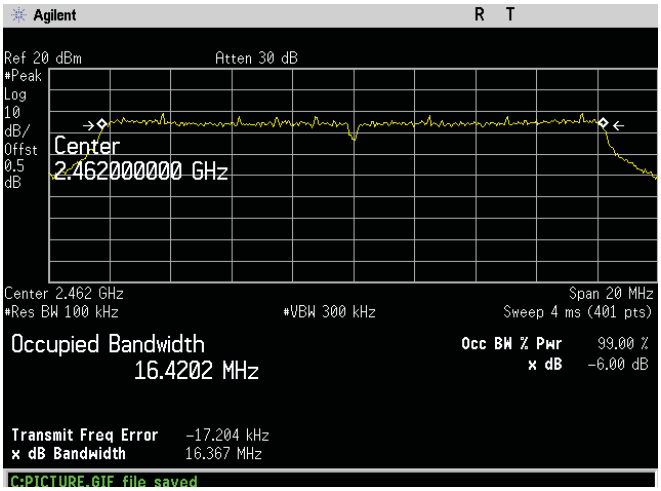
Frequency (MHz)	6dB emission bandwidth (MHz)	Limit
802.11b		
2412	10.114	500kHz
2437	10.064	
2462	10.11	
802.11g		
2412	16.363	500kHz
2437	16.4135	
2462	16.367	
802.11n20		
2412	17.107	500kHz
2437	17.109	
2462	17.074	
802.11n40		
2422	35.489	500kHz
2437	35.171	
2452	35.546	

Test plots as below:

802.11b mode

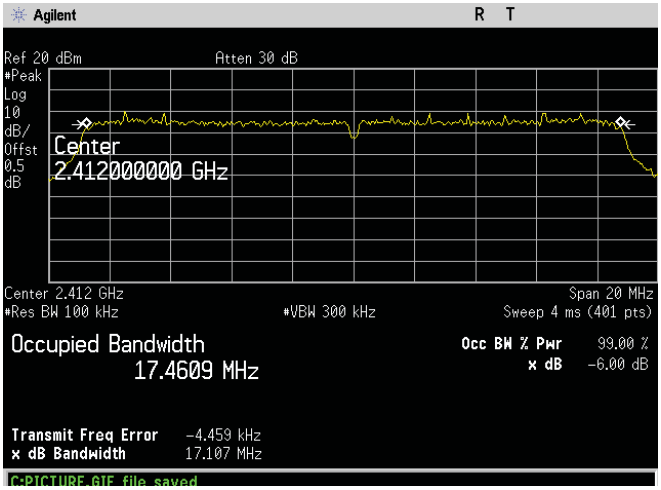
2412MHz

2437MHz

2462MHz


802.11g mode

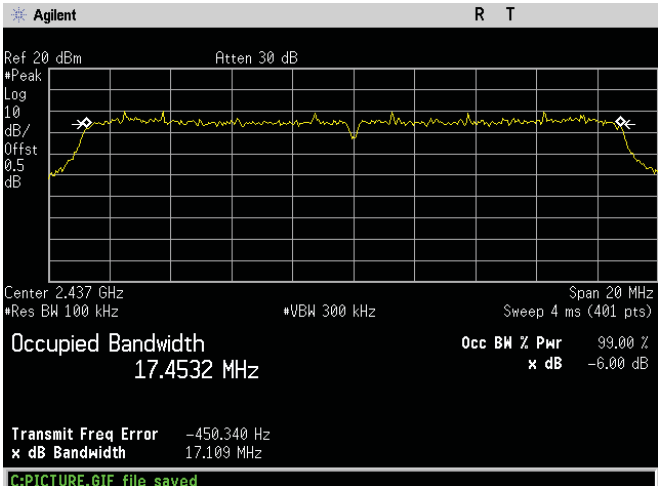
2412MHz

2437MHz

2462MHz


802.11n20 mode

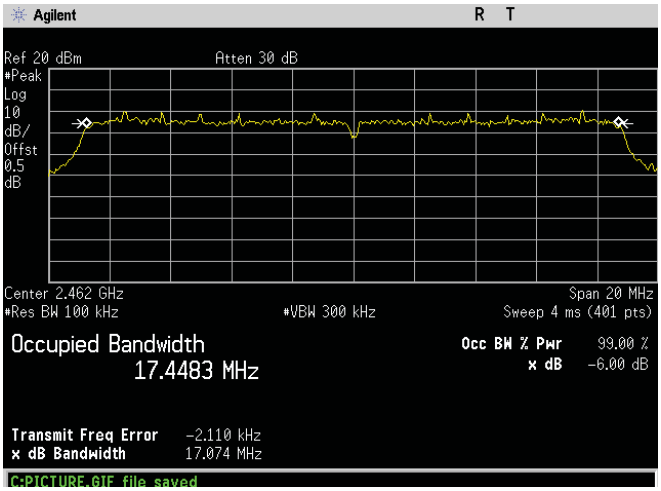
2412MHz



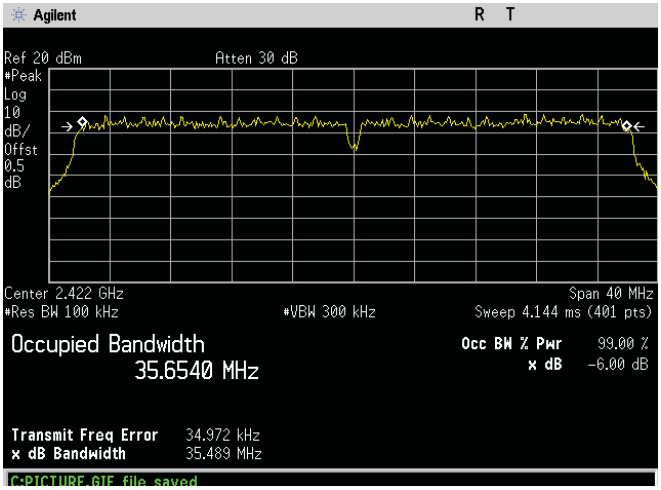
2437MHz



2462MHz



802.11n40 mode

2422MHz

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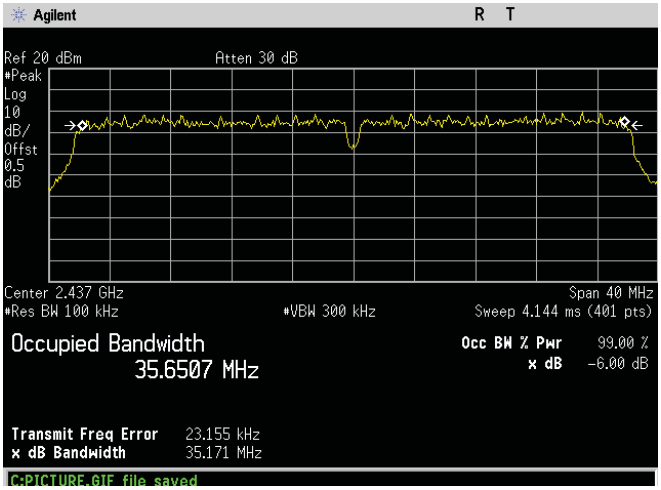
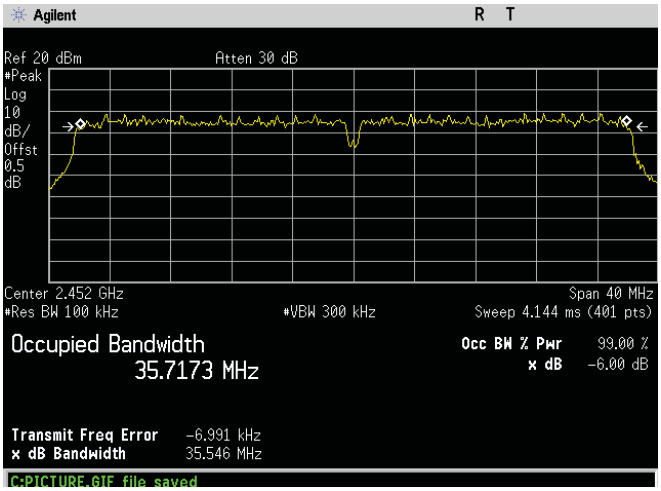

2452MHz


4.5 Power spectral density

4.5.1. Limits

The power spectral density conducted from the intentional radiator to the antenna shall not be greater than 8dBm in any 3kHz band during any time interval of continuous transmission.

4.5.2. Test method

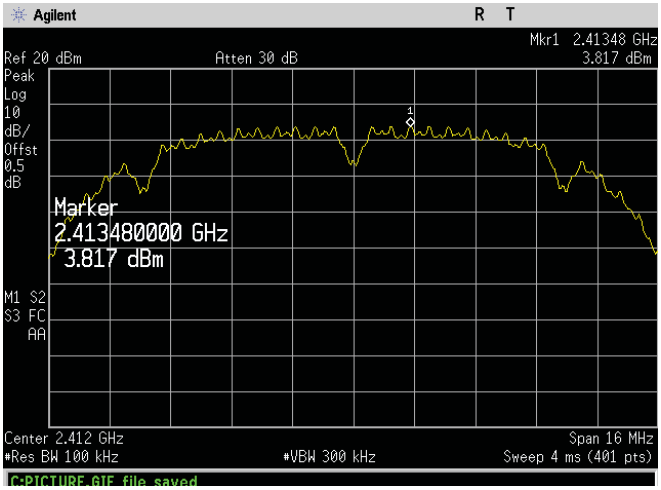
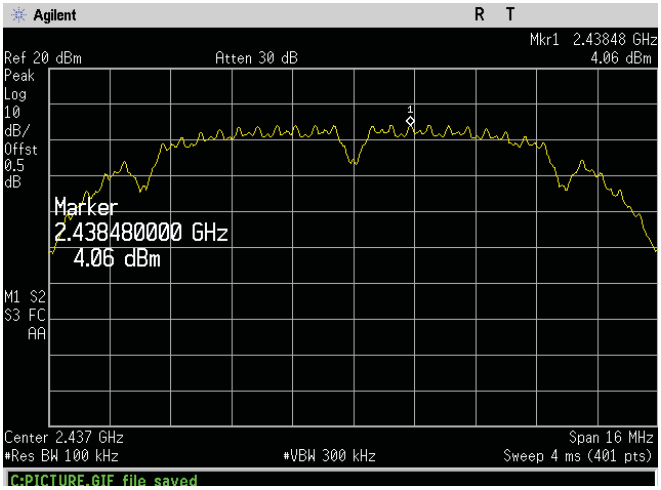
Span = 1.5 times DTS bandwidth (6dB emission bandwidth, see section 4.4)
RBW = 3kHz to 100kHz
VBW ≥ 3RBW
Detector = peak
Sweep time = auto
Trace mode = max hold
Allow the trace to stabilize. Use the peak marker function to determine the maximum amplitude level within the RBW.

4.5.3. Test result

Frequency (MHz)	PSD (dBm/100kHz)	Limit (dBm/3kHz)
802.11b		
2412	3.817	8
2437	4.06	
2462	4.14	
802.11g		
2412	-0.198	8
2437	-0.255	
2462	-0.92	
802.11n20		
2412	0.259	8
2437	0.709	
2462	-0.135	
802.11n40		
2422	-1.144	8
2437	-0.863	
2462	-0.864	

Test plots as below:

802.11b mode

2412MHz

2437MHz

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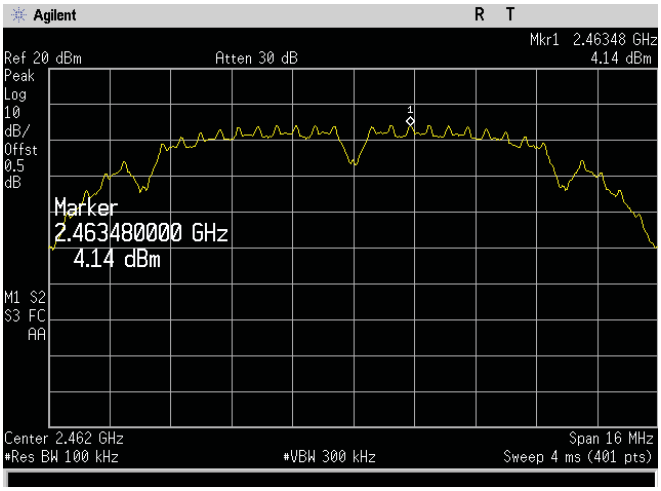

802.11g mode

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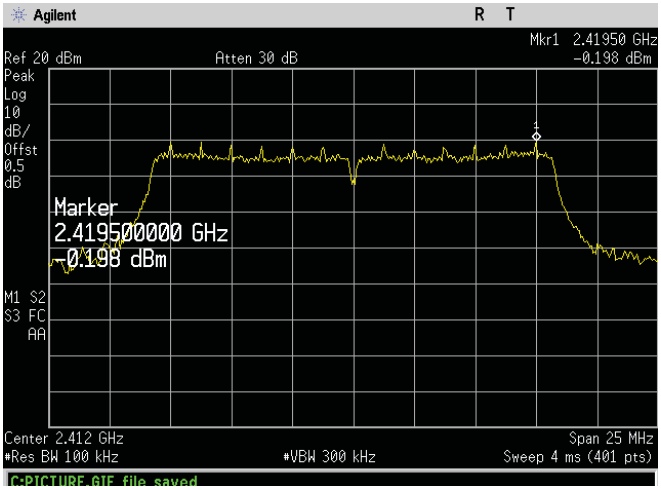
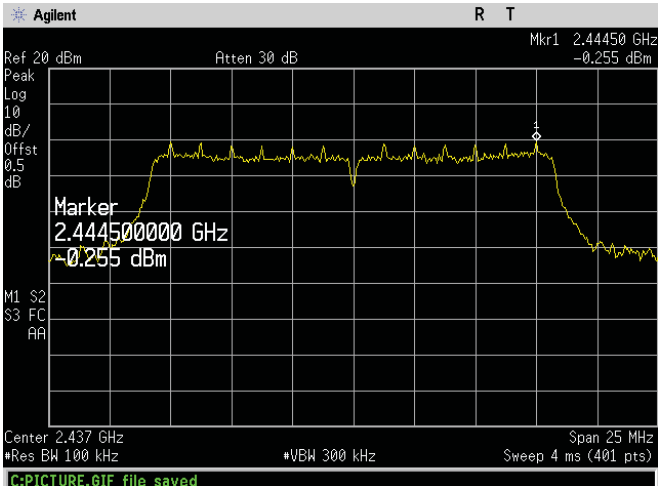

2437MHz

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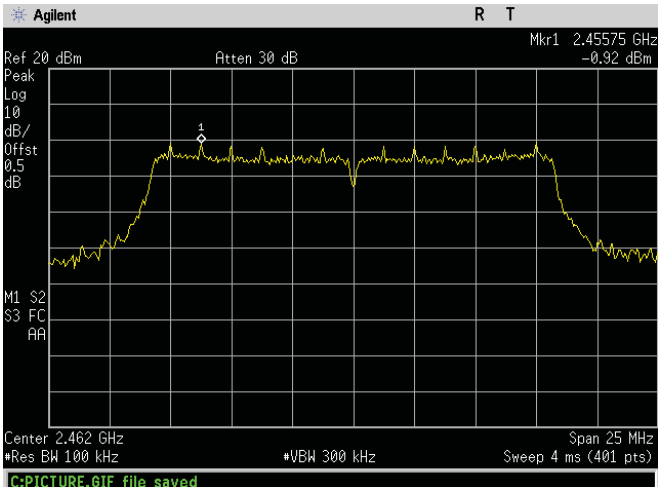
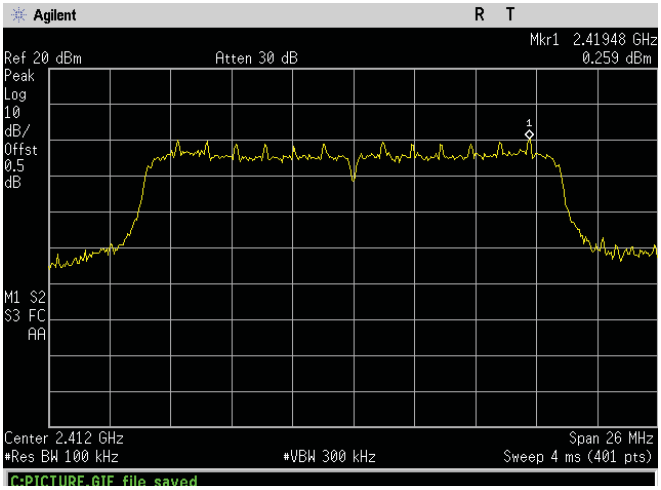


802.11n20 mode

2412MHz

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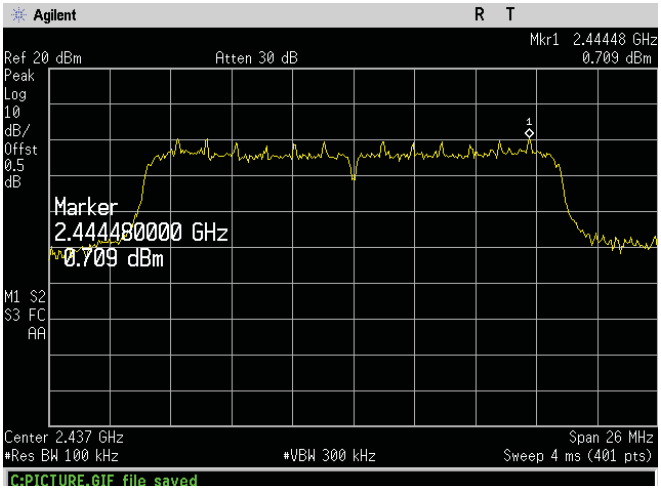
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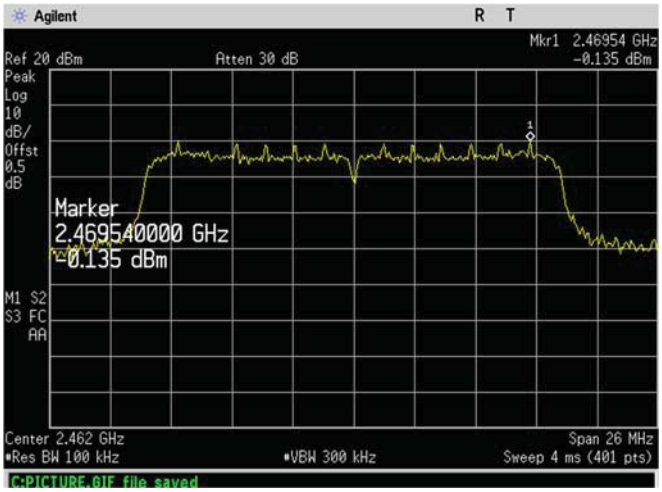

802.11n40 mode

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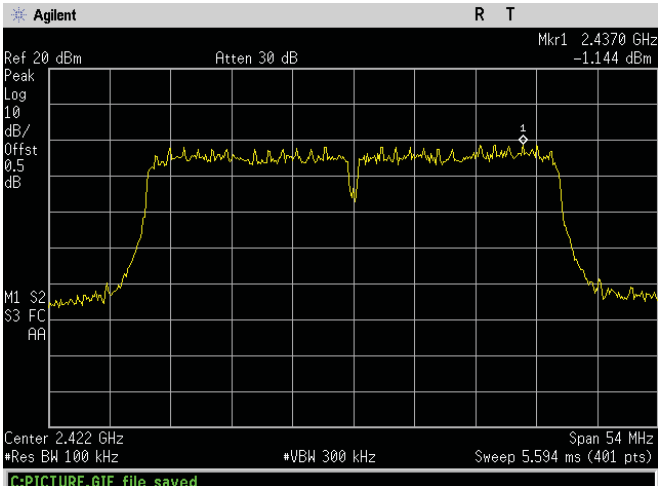
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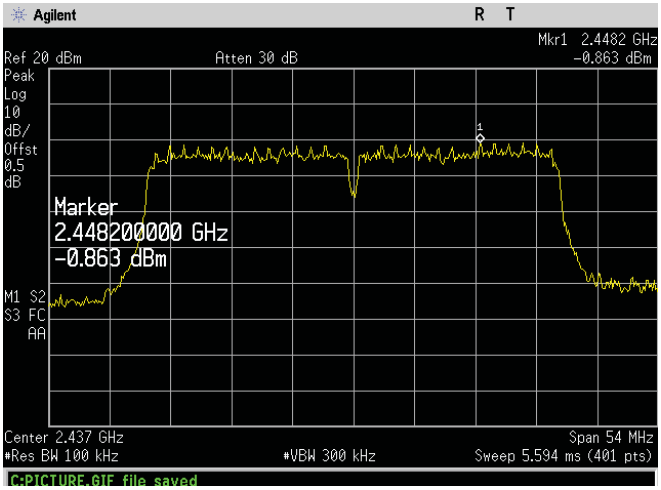
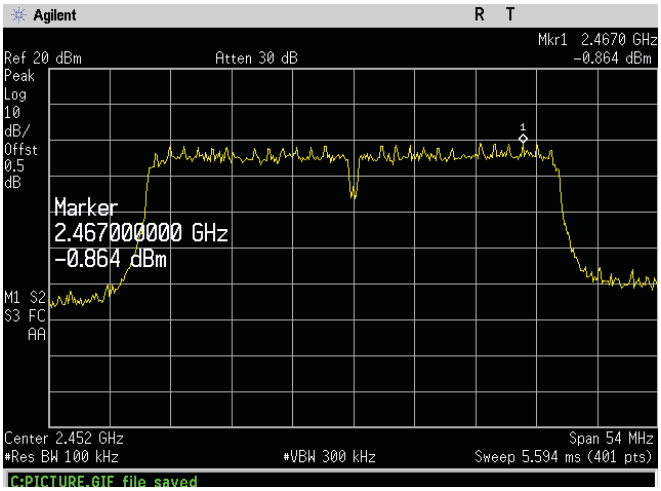

2452MHz


4.6 Band edge spurious emission

4.6.1. Limit

In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits.

4.6.2. Test method

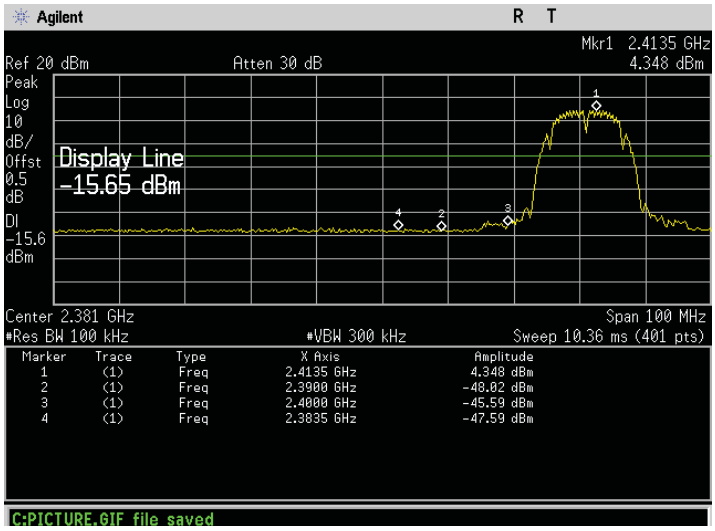
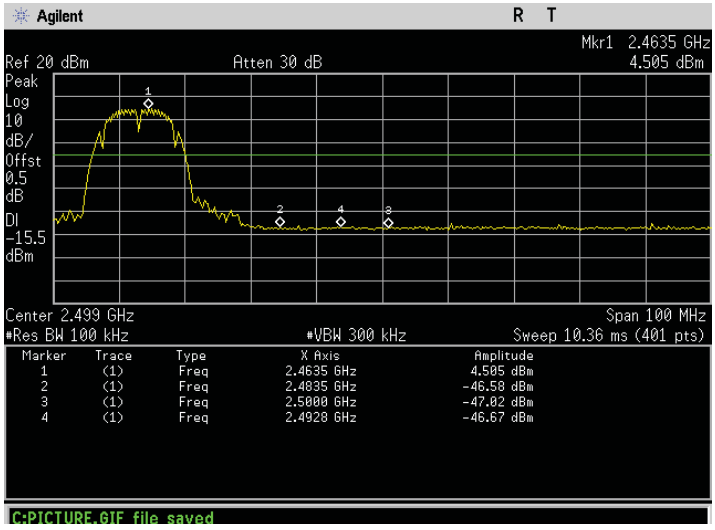
Use the following spectrum analyzer settings:

Set RBW = 100 kHz. VBW ≥ 3RBW. Detector = peak, Sweep time = auto couple, Trace mode = max hold.

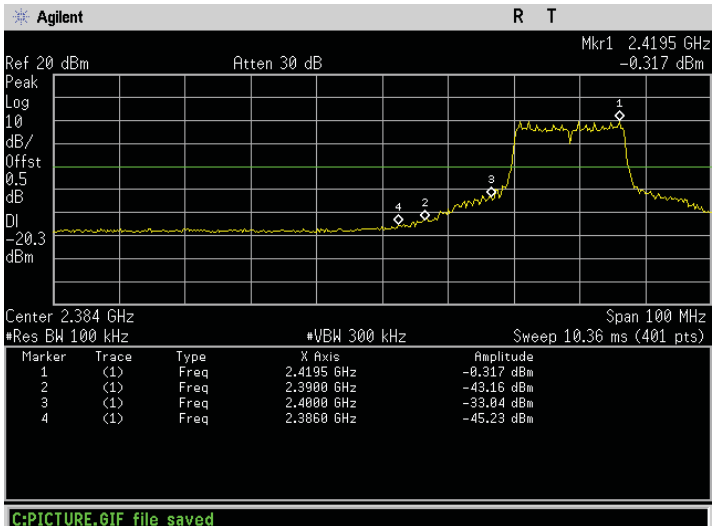
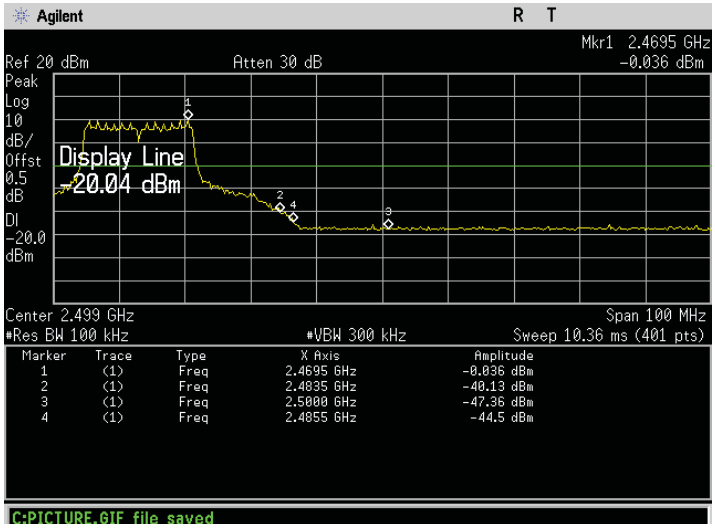
4.6.3. Test Result

Test plots as below:

802.11b mode, Band edge

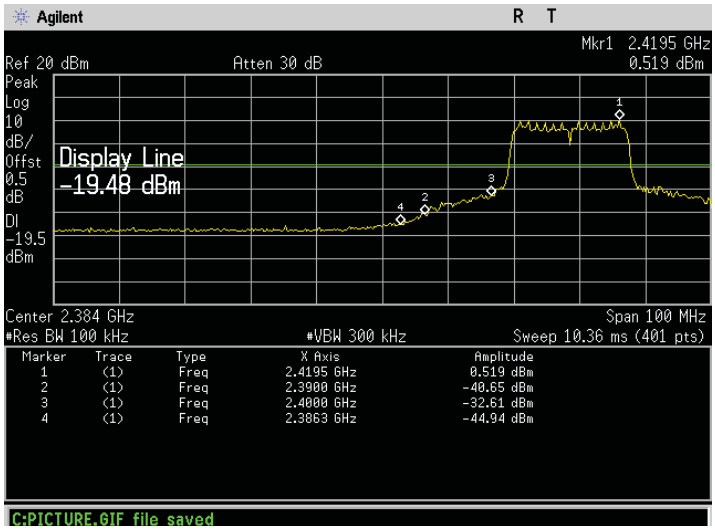
Low edge

Up edge


802.11g mode, Band edge

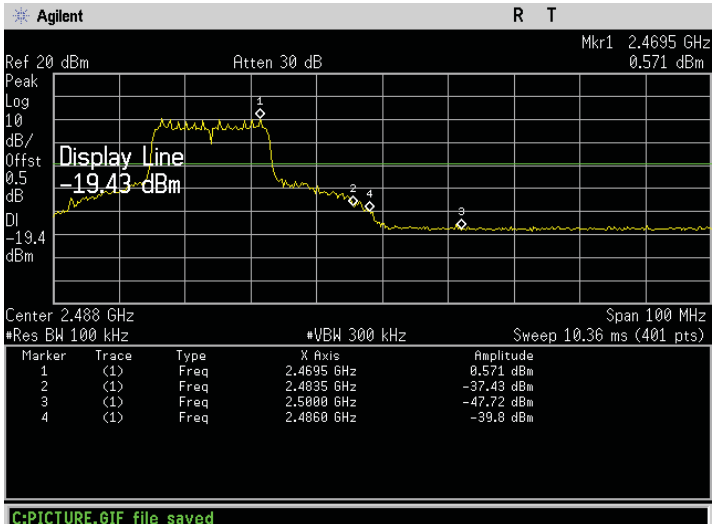
Low edge

Up edge


802.11n20 mode, Band edge

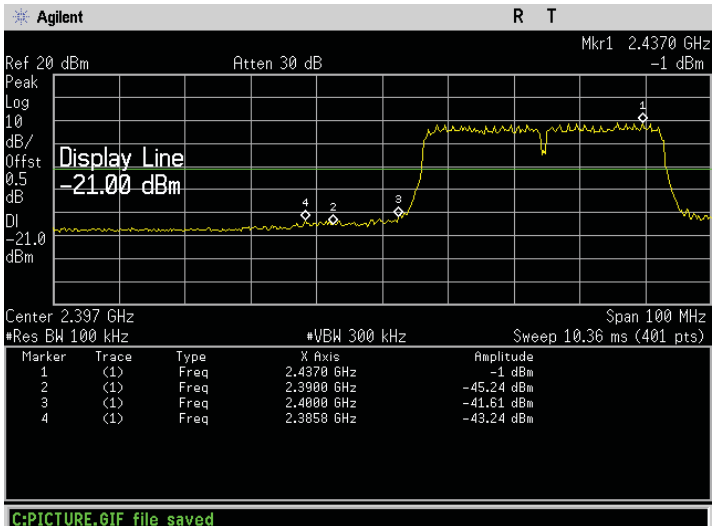
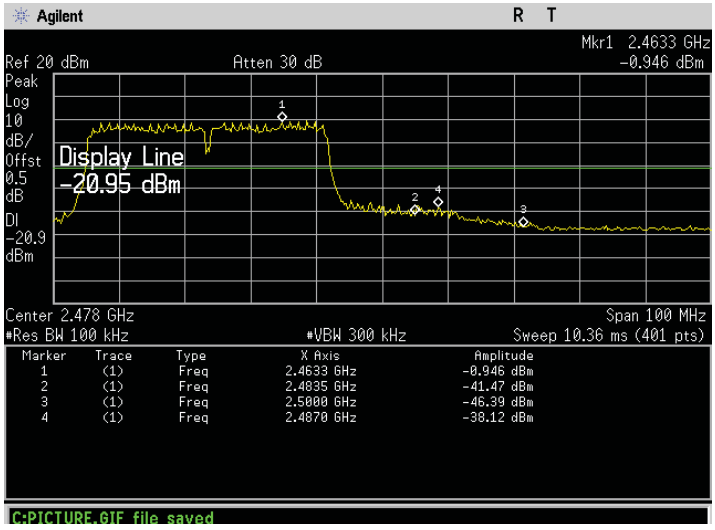
Low edge



Up edge



802.11n40 mode, Band edge

Low edge

Up edge


4.7 Radiated emission

4.7.1. Limit

In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits. Attenuation below the general limits specified in §15.209(a) is not required. In addition, radiated emissions which fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emission limits specified in §15.209(a).

Frequency (MHz)	Field strength μV/m	Field strength dBμV/m	Detector	Measurement distance
30-88	100	40	QP	3m
88-216	150	43.5	QP	
216-960	200	46	QP	
960-1000	500	46	QP	
Above 1000	500	54	AV	
Above 1000	5000	74	PK	

4.7.2. Test method

1. The EUT is placed on a turntable, which is 0.8m above ground plane.

2. EUT is set 3m away from the receiving antenna, which is varied from 1m to 4m to find out the highest emissions.

3. Use the following spectrum analyzer settings:

Span = wide enough to fully capture the emission being measured, RBW = 1 MHz for f ≥ 1GHz, 100 kHz for f < 1 GHz, VBW ≥ RBW, Sweep = auto, Detector function = peak, Trace = max hold

4. Follow the guidelines in ANSI C63.4-2009 with respect to maximizing the emission by rotating the EUT, adjusting the measurement antenna height and polarization, etc. The peak reading of the emission, after being corrected by the antenna factor, cable loss, pre-amp gain, etc., is the peak field strength, submit this data. Each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical.

5. Set the VBW to 10 Hz, while maintaining all of the other instrument settings. This peak level, once corrected, must comply with the limit specified in Section 15.209. If the duty cycle per channel of the hopping signal is less than 100ms, then the reading obtained with the 10 Hz VBW may be further adjusted by a “duty cycle correction factor”, derived from 20log(duty cycle/100ms), in an effort to demonstrate compliance with the 15.209 limit. Submit this data.

4.7.3. Test Result

Remark:
If the PK measured values lower than average mode limit, the EUT shall be deemed to meet average limits and then no additional average mode measurement performed.

802.11b: 2412MHz					
Frequency	Ant. Polarization	Emission level	Limits	Detector	Result
(MHz)	H / V	dBμV/m	dBμV/m		
501.18	V	36.8	46	QP	Pass
501.18	H	37.9	46	QP	
2390	V	45.13	74	PK	
2390	H	47.32	74	PK	
4824	H	56.86	74	PK	
4824	H	45.58	54	AVG	
4824	V	52.91	74	PK	
7236	V	50.28	74	PK	
7236	H	50.16	74	PK	
802.11b: 2437MHz					
Frequency	Ant. Polarization	Emission level	Limits	Detector	Result
(MHz)	H / V	dBμV/m	dBμV/m		
501.18	V	36.3	46	QP	Pass
501.18	H	38.3	46	QP	
4874	V	51.74	74	PK	
4874	H	57.64	74	PK	
4874	H	50.13	54	AVG	
7311	V	50.26	74	PK	
7311	H	50.35	74	PK	
802.11b: 2462MHz					
Frequency	Ant. Polarization	Emission level	Limits	Detector	Result
(MHz)	H / V	dBμV/m	dBμV/m		
501.18	V	37.5	46	QP	Result
501.18	H	38.1	46	QP	
2483.5	V	45.69	74	PK	
2483.5	H	45.48	54	AVG	
4924	V	52.67	74	PK	
4924	H	60.33	74	PK	
4924	H	48.81	54	AVG	
7386	V	50.31	74	PK	
7386	H	50.24	74	PK	

802.11g: 2412MHz					
Frequency	Ant. Polarization	Emission level	Limits	Detector	Result
(MHz)	H / V	dBμV/m	dBμV/m		
501.18	V	37	46	QP	Pass
501.18	H	38.1	46	QP	
2390	V	45.73	74	PK	
2390	H	49.76	74	PK	
4824	H	54.78	74	PK	
4824	H	41.83	54	AVG	
4824	V	51.06	74	PK	
7236	V	50.56	74	PK	
7236	H	51.06	74	PK	
802.11g: 2437MHz					
Frequency	Ant. Polarization	Emission level	Limits	Detector	Result
(MHz)	H / V	dBμV/m	dBμV/m		
501.18	V	36.4	46	QP	Pass
501.18	H	38	46	QP	
4874	V	50.07	74	PK	
4874	H	55.07	74	PK	
4874	H	41.88	54	AVG	
7311	V	49.79	74	PK	
7311	H	49.62	74	PK	
802.11g: 2462MHz					
Frequency	Ant. Polarization	Emission level	Limits	Detector	Result
(MHz)	H / V	dBμV/m	dBμV/m		
501.18	V	37.2	46	QP	Result
501.18	H	38.3	46	QP	
2483.5	V	46.38	74	PK	
2483.5	H	46.61	54	AVG	
4924	V	51.29	74	PK	
4924	H	56.37	74	PK	
4924	H	41.98	54	AVG	
7386	V	50.22	74	PK	
7386	H	49.22	74	PK	

802.11n20: 2412MHz					
Frequency	Ant. Polarization	Emission level	Limits	Detector	Result
(MHz)	H / V	dBμV/m	dBμV/m		
501.18	V	37.5	46	QP	Pass
501.18	H	37.1	46	QP	
2390	V	44.27	74	PK	
2390	H	49.28	74	PK	
4824	H	53.27	74	PK	
4824	H	40.46	54	AVG	
4824	V	50.75	74	PK	
7236	V	50.56	74	PK	
7236	H	50.87	74	PK	
802.11n20: 2437MHz					
Frequency	Ant. Polarization	Emission level	Limits	Detector	Result
(MHz)	H / V	dBμV/m	dBμV/m		
501.18	V	36.8	46	QP	Pass
501.18	H	37.5	46	QP	
4874	V	50.26	74	PK	
4874	H	54.08	74	PK	
4874	H	41.58	54	AVG	
7311	V	50.14	74	PK	
7311	H	51.14	74	PK	
802.11n20: 2462MHz					
Frequency	Ant. Polarization	Emission level	Limits	Detector	Result
(MHz)	H / V	dBμV/m	dBμV/m		
501.18	V	36.6	46	QP	Result
501.18	H	37.6	46	QP	
2483.5	V	45.17	74	PK	
2483.5	H	44.53	54	AVG	
4924	V	49.8	74	PK	
4924	H	54.75	74	PK	
4924	H	43.28	54	AVG	
7386	V	50.18	74	PK	
7386	H	49.77	74	PK	

802.11n20: 2422MHz					
Frequency	Ant. Polarization	Emission level	Limits	Detector	Result
(MHz)	H / V	dBμV/m	dBμV/m		
501.18	V	**36.6**	46	QP	
501.18	H	**37.6**	46	QP	
2390	V	50.18	74	PK	
2390	H	52.11	74	PK	
4844	V	50.24	74	PK	
4844	H	50.18	74	PK	
7266	V	49.94	74	PK	
7266	H	49.89	74	PK	
802.11n20: 2437MHz					
Frequency	Ant. Polarization	Emission level	Limits	Detector	Result
(MHz)	H / V	dBμV/m	dBμV/m		
501.18	V	36.3	46	QP	
501.18	H	38.3	46	QP	
4874	V	50.39	74	PK	
4874	H	49.75	74	PK	
7311	V	49.98	74	PK	
7311	H	51.04	74	PK	
802.1120: 2452MHz					
Frequency	Ant. Polarization	Emission level	Limits	Detector	Result
(MHz)	H / V	dBμV/m	dBμV/m		
501.18	V	37.3	46	QP	
501.18	H	38.1	46	QP	
2483.5	V	47.36	74	PK	
2483.5	H	48.19	74	PK	
4904	V	50.16	74	PK	
4904	H	50.27	74	PK	
7356	V	49.54	74	PK	
7356	H	50.66	74	PK	

----END OF REPORT----