SGS-CSTC Standards Technical Services Co., Ltd.

198 Kezhu Road, Scientech Park, Guangzhou Economic & Technological Development District, Guangzhou, China 510663
Telephone: +86 (0) 20 82155555
Fax: +86 (0) 20 82075059
Email: ee.guangzhou@sgs.com

TEST REPORT

Application No.:	GZEM1208003622RF
Applicant:	Shenzhen Ogemray Technology Co., Ltd.
FCC ID:	YWTWF3070M04B
Product Name:	IEEE 802.11 b/g/n WiFi Module
Product Description:	IEEE 802.11 b/g/n WiFi Module
Model No.:	GWF-3M04B
Standards:	47 CFR PART 15 Subpart C: 2011 section 15.247
Date of Receipt:	2012-09-07
Date of Test:	2012-09-08 to 2012-09-26
Date of Issue:	2012-10-11
Test Result :	**Pass***

* In the configuration tested, the EUT detailed in this report complied with the standards specified above. Please refer to section 3 of this report for further detail.

Authorized Signature:

Strong Yao
Manager

2 Version

Revision Record				
Version	**Chapter**	**Date**	**Modifier**	**Remark**
00		2012-10-11		Original

Authorized for issue by:				
Tested By		Storm Shu **(Storm Shu) / Project Engineer**		2012-09-08 to 2012-09-26 **Date**
Prepared By		Storm Shu **(Storm Shu)/ Project Engineer**		2012-09-29 **Date**
Checked By		Strong Yao **(Strong Yao) / Reviewer**		2012-10-11 **Date**

3 Test Summary

Test	Test Requirement	Test method	Result
Antenna Requirement	FCC PART 15 C section 15.247 (c) and Section 15.203	FCC PART 15 C section 15.247 (c) and Section 15.203	PASS
6 dB Bandwidth	FCC PART 15 C section 15.247 (a)(2)	ANSI C63.10: Clause 6.9.1	PASS
Maximum Peak Output Power	FCC PART 15 C section 15.247(b)(3)	ANSI C63.10: Clause 6. 10. 3. 1	PASS
Peak Power Spectral Density	FCC PART 15 C section 15.247(e)	ANSI C63.10: Clause 6. 11. 2. 4	PASS
Conducted Spurious Emission (30MHz to 25GHz)	FCC PART 15 C section 15.209 &15.247(d)	ANSI C63.10: Clause 6.7	PASS
Radiated Spurious Emission 30 MHz to 25 GHz)	FCC PART 15 C section 15.209 &15.247(d)	ANSI C63.10: Clause 6.4, 6.5 and 6.6	PASS
Band Edges Measurement	FCC PART 15 C section 15.247 (d) &15.205	ANSI C63.10: Clause 6.9.2	PASS
Conducted Emissions at Mains Terminals	FCC PART 15 C section 15.207	ANSI C63.10: Clause 6.2	PASS

Remark:

N/A: not applicable. Refer to the relative section for the details.
EUT: In this whole report EUT means Equipment Under Test.
Tx: In this whole report Tx (or tx) means Transmitter.
Rx: In this whole report Rx (or rx) means Receiver.
RF: In this whole report RF means Radio Frequency.
ANSI C63.10: the detail version is ANSI C63.10:2009 in the whole report.

4 Contents

5 General Information

5.1 Client Information

Applicant:	Shenzhen Ogemray Technology Co., Ltd.
Address of Applicant:	3/F, No.9 Bldg, Minxing Industrial Park, Minkang Rd., Mingzhi St., Longhua, Baoan District Shenzhen, China

5.2 General Description of E.U.T.

Product Name:	IEEE 802.11 b/g/n WiFi Module
Model No.:	GWF-3M04B

5.3 Details of E.U.T.

Operating Frequency	2412 MHz to 2462 MHz for 802.11b/g/n(HT20) 2422 MHz to 2452 MHz for 802.11n(HT40)
Type of Modulation:	802.11b: DSSS(CCK/QPSK/BPSK) 802.11g: OFDM(BPSK/QPSK/16QAM/64QAM) 802.11n: MIMO OFDM (BPSK/QPSK/16QAM/64QAM)
Transmit Data Rate:	802.11b :1/2/5.5/11 Mbps 802.11g :6/9/12/18/24/36/48/54 Mbps 802.11n(HT20): 13/19.5/26/39/52/58.5/65 Mbps 802.11n(HT40): 13/26/39/52/78/104/117/130 Mbps
Number of Channels	11 Channels for 802.11b/g/n(HT20) 7 Channels for 802.11n(HT40)
Channel Separation:	5 MHz
Antenna Type	Integral
Antenna gain:	3.3 dBi
Power Supply:	DC 5.0 V for USB supply
Power cord:	N/A

5.4 Description of Support Units

The EUT has been tested with corresponding accessories as below:

Supplied by SGS:

Description	Manufacturer	Model No.	SN/Certificate NO
NoteBook	IBM	T40	99-FBAF9 03/09
Mouse	DELL	MOC5UO	G1B02ZP5

5.5 Deviation from Standards

Biconical and log periodic antennas were used instead of dipole antennas.

5.6 Abnormalities from Standard Conditions

None.

5.7 Other Information Requested by the Customer

None.

5.8 Test Location

All tests were performed at:

SGS-CSTC Standards Technical Services Co., Ltd., Guangzhou EMC Laboratory,
198 Kezhu Road, Scientech Park, Guangzhou Economic & Technology Development District,
Guangzhou, China 510663
Tel: +86 20 82155555 Fax: +86 20 82075059

No tests were sub-contracted.

5.9 Test Facility

The test facility is recognized, certified, or accredited by the following organizations:

- **NVLAP (Lab Code: 200611-0)**

  SGS-CSTC Standards Technical Services Co., Ltd., Guangzhou EMC Laboratory is recognized under the National Voluntary Laboratory Accreditation Program (NVLAP/NIST). NVLAP Code: 200611-0.

- **ACMA**

  SGS-CSTC Standards Technical Services Co., Ltd., EMC Laboratory can also perform testing for the Australian C-Tick mark as a result of our NVLAP accreditation.

- **SGS UK(Certificate No.: 32), SGS-TUV SAARLAND and SGS-FIMKO**

  Have approved SGS-CSTC Standards Technical Services Co., Ltd., EMC Laboratory as a supplier of EMC TESTING SERVICES and SAFETY TESTING SERVICES.

- **CNAS (Lab Code: L0167)**

  SGS-CSTC Standards Technical Services Co., Ltd., EMC Laboratory has been assessed and in compliance with CNAS-CL01:2006 accreditation criteria for testing laboratories (identical to ISO/IEC 17025:2005 General Requirements) for the Competence of Testing Laboratories.

- **FCC (Registration No.: 282399)**

  SGS-CSTC Standards Technical Services Co., Ltd., EMC Laboratory has been registered and fully described in a report filed with the (FCC) Federal Communications Commission. The acceptance letter from the FCC is maintained in our files. Registration 282399, May 31, 2002.

- **Industry Canada (Registration No.: 4620B-1)**

  The 3m/10m Alternate Semi-anechoic chamber of SGS-CSTC Standards Technical Services Co., Ltd. has been registered by Certification and Engineering of Industry Canada for radio equipment testing with Registration No. 4620B-1.

- **VCCI (Registration No.: R-2460, C-2584, G-449 and T-1179)**

  The 10m Semi-anechoic chamber and Shielded Room of SGS-CSTC Standards Technical Services Co., Ltd. have been registered in accordance with the Regulations for Voluntary Control Measures with Registration No.: R-2460, C-2584，G-449 and T-1179 respectively.

- **CBTL (Lab Code: TL129)**

  SGS-CSTC Standards Technical Services Co., Ltd., E&E Laboratory has been assessed and fully comply with the requirements of ISO/IEC 17025:2005, the Basic Rules, IECEE 01:2006-10 and Rules of procedure IECEE 02:2006-10, and the relevant IECEE CB-Scheme Operational documents.

6 Equipment Used during Test

RE in Chamber						
No.	Test Equipment	Manufacturer	Model No.	Serial No.	Cal.Due date (YYYY-MM-DD)	Calibration Interval
EMC0525	Compact Semi-Anechoic Chamber	ChangZhou ZhongYu	N/A	N/A	2014-08-30	2Y
EMC0522	EMI Test Receiver	Rohde & Schwarz	ESIB26	100283	2012-11-11	1Y
EMC0056	EMI Test Receiver	Rohde & Schwarz	ESCI	100236	2013-03-12	1Y
EMC0528	RI High frequency Cable	SGS	20 m	N/A	2013-06-01	1Y
EMC2025	Trilog Broadband Antenna 30-3000MHz	SCHWARZBECK MESS-ELEKTRONIK	VULB 9163	9163-450	2013-12-17	2Y
EMC0524	Bi-log Type Antenna	Schaffner -Chase	CBL6112B	2966	2012-11-28	1Y
EMC0519	Bilog Type Antenna	Schaffner -Chase	CBL6143	5070	2012-11-28	1Y
EMC2026	Horn Antenna 1-18GHz	R&S	BBHA 9120D	9120D-841	2013-11-28	2Y
EMC0518	Horn Antenna	Rohde & Schwarz	HF906	100096	2014-07-01	2Y
EMC0521	1-26.5 GHz Pre-Amplifier	Agilent	8449B	3008A01649	2013-03-12	1Y
EMC0049	Amplifier	Agilent	8447D	2944A10862	2013-03-12	1Y
EMC0075	310N Amplifier	Sonama	310N	272683	2013-03-12	1Y
EMC0523	Active Loop Antenna	EMCO	6502	42963	2012-11-17	1Y
EMC2041	Broad-Band Horn Antenna (14)15-26.5(40)GHz	SCHWARZBECK MESS-ELEKTRONI	BBHA 9170	9170-375	2014-06-01	3Y
EMC0530	10m Semi-Anechoic Chamber	ETS	N/A	N/A	2014-04-27	2Y

General used equipment						
No.	Test Equipment	Manufacturer	Model No.	Serial No.	Cal.Due date (YYYY-MM-DD)	Calibration Interval
EMC0006	DMM	Fluke	73	70681569	2012-11-14	1Y
EMC0007	DMM	Fluke	73	70671122	2012-11-14	1Y

7 Test Results

7.1 E.U.T. test conditions

Test Voltage:	DC 5V
Temperature:	20.0 -25.0 °C
Humidity:	38-50 % RH
Atmospheric Pressure:	1000 -1010 mbar
Requirements:	**15.31(e):** For intentional radiators, measurements of the variation of the input power or the radiated signal level of the fundamental frequency component of the emission, as appropriate, shall be performed with the supply voltage varied between 85% and 115% of the nominal rated supply voltage. For battery operated equipment, the equipment tests shall be performed using a new battery. **15.32:** Power supplies and CPU boards used with personal computers and for which separate authorizations are required to be obtained shall be tested as follows: Testing shall be in accordance with the procedures specified in Section 15.31 of this part.
Test frequencies and frequency range:	According to the 15.31(m) Measurements on intentional radiators or receivers, other than TV broadcast receivers, shall be performed and, if required, reported for each band in which the device can be operated with the device operating at the number of frequencies in each band specified in the following table: According to the 15.33 (a) For an intentional radiator, the spectrum shall be investigated from the lowest radio frequency signal generated in the device, without going below 9 kHz, up to at least the frequency shown in the following table:

Number of fundamental frequencies to be tested in EUT transmit band

Frequency range in which device operates	Number of frequencies	Location in frequency range of operation
1 MHz or less	1	Middle
1 MHz to 10 MHz	2	1 near top and 1 near bottom
More than 10 MHz	3	1 near top, 1 near middle and 1 near bottom

Frequency range of radiated emission measurements

Lowest frequency generated in the device	Upper frequency range of measurement
9 kHz to below 10 GHz	10th harmonic of highest fundamental frequency or to 40 GHz, whichever is lower
At or above 10 GHz to below 30 GHz	5th harmonic of highest fundamental frequency or to 100 GHz, whichever is lower
At or above 30 GHz	5th harmonic of highest fundamental frequency or to 200 GHz, whichever is lower, unless otherwise specified

EUT channels and frequencies list:

1. Test frequencies are lowest channel: 2412 MHz, middle channel: 2437 MHz and highest channel: 2462 MHz for 802.11b/g/n(HT20)

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

2. Test frequencies are lowest channel: 2422 MHz, middle channel: 2437 MHz and highest channel: 2452 MHz for 802.11n(HT40)

Channel	Frequency (MHz)
3	2422
4	2427
5	2432
6	2437
7	2442
8	2447
9	2452

7.2 Antenna Requirement

Standard requirement

15.203 requirement:

For intentional device. According to 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.

15.247(c) (1)(i) requirement:

(i) Systems operating in the 2400-2483.5 MHz bands that are used exclusively for fixed.
Point-to-point operations may employ transmitting antennas with directional gain greater than 6 dBi provided the maximum conducted output power of the intentional radiator is reduced by 1 dB for every 3 dB that the directional gain of the antenna exceeds 6 dBi.

EUT Antenna

The antenna is an integral and no consideration of replacement. The best case gain of the antenna is 3.3 dBi.

Test result: The unit does meet the FCC requirements.

7.3 6 dB Bandwidth

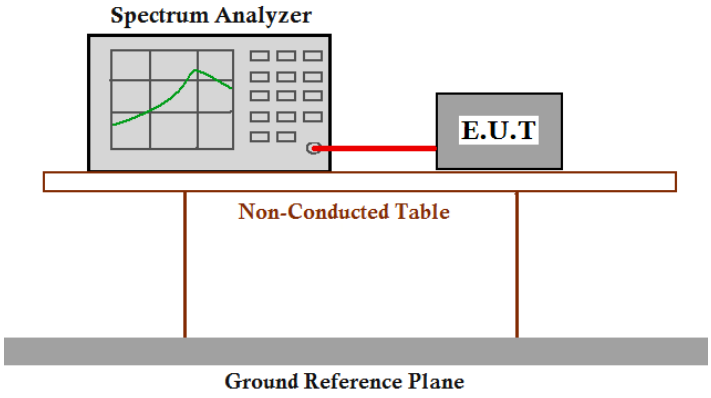
Test Requirement: FCC Part 15 C section 15.247

(a)(2)Systems using digital modulation techniques may operate in the 902-928 MHz, 2400-2483.5MHz, and 5725-5850 MHz bands. The minimum 6 dB bandwidth shall be at least 500 kHz.

Test Method: ANSI C63.10: Clause 6.9.1

Test Status: Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, data rates and antenna ports (if EUT with antenna diversity architecture). Following channel(s) was (were) selected for the final test as listed below.

Test Configuration:



Test Procedure:

1. Remove the antenna from the EUT and then connect a low attention attenuation RF cable (cable loss =1.5dB) from the antenna port to the spectrum.
2. Set the spectrum analyzer:

   Sweep = auto; Detector Function = Peak; ace = Max Hold

   RBW: 1%~5% OBW; VBW: ≥3*RBW

   Span: two times and five times the OBW.
3. Mark the peak power frequency and -6dB (upper and lower) power frequency.
4. Repeat until all the test status is investigated.
5. Report the worse case.

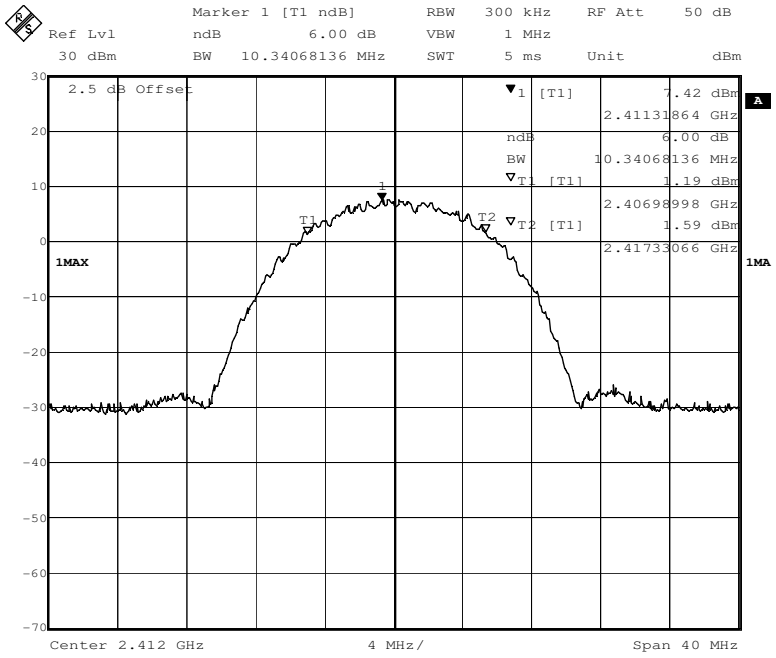
Channel No.	Frequency (MHz)	Mode	Data Rate	Measured 6dB bandwidth (MHz)	Limit	Result
1	2412	802.11b	11 Mbps	10.341	≥500KHz	Pass
6	2437		11 Mbps	9.860		Pass
11	2462		11 Mbps	10.501		Pass
1	2412	802.11g	54 Mbps	16.593	≥500KHz	Pass
6	2437		54 Mbps	16.683		Pass
11	2462		54 Mbps	16.603		Pass
1	2412	802.11n (HT20)	65 Mbps	17.796	≥500KHz	Pass
6	2437		65 Mbps	17.886		Pass
11	2462		65 Mbps	17.976		Pass
3	2422	802.11n (HT40)	150 Mbps	36.285	≥500KHz	Pass
6	2437		150 Mbps	36.605		Pass
9	2452		150 Mbps	36.713		Pass

Test result: The unit does meet the FCC requirements.

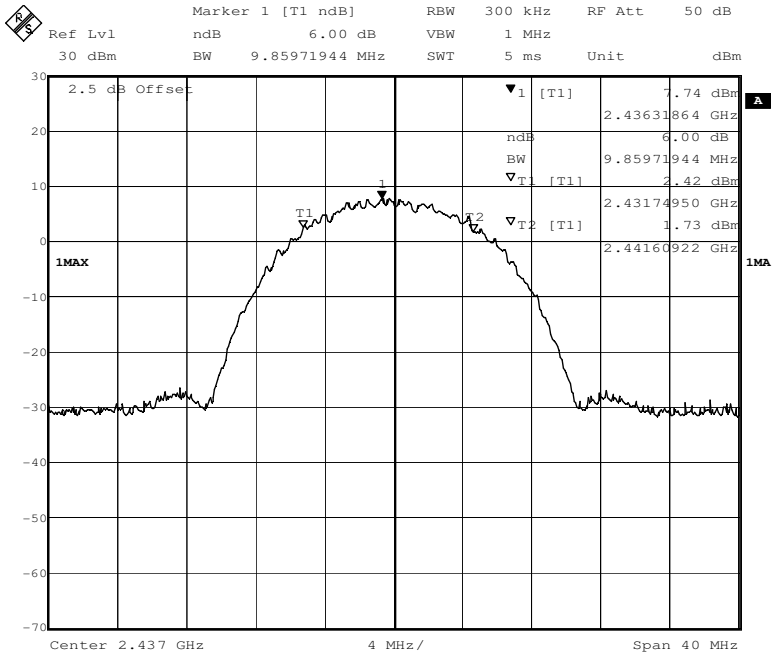
Result plot as follows:

802.11b mode with 11Mbps data rate

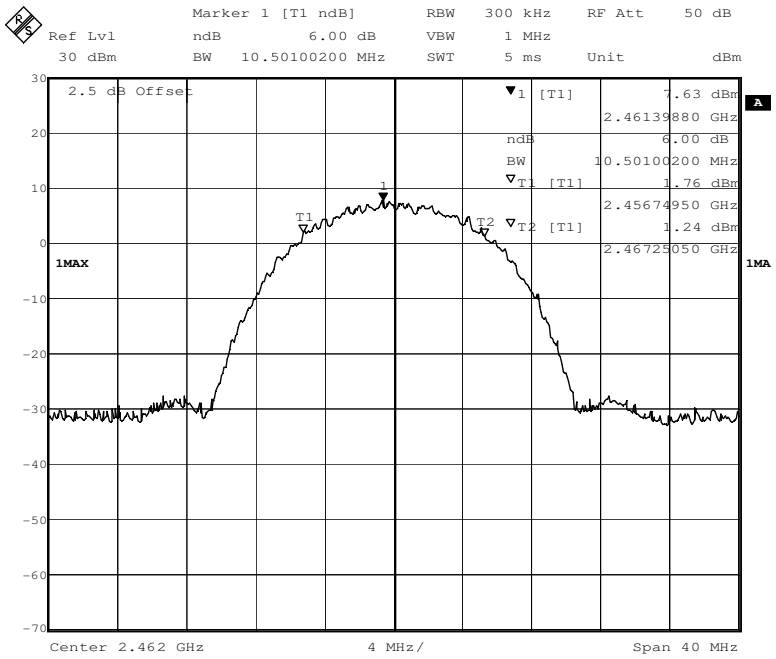
Channel 1: 2.412GHz:



Channel 6: 2.437GHz:

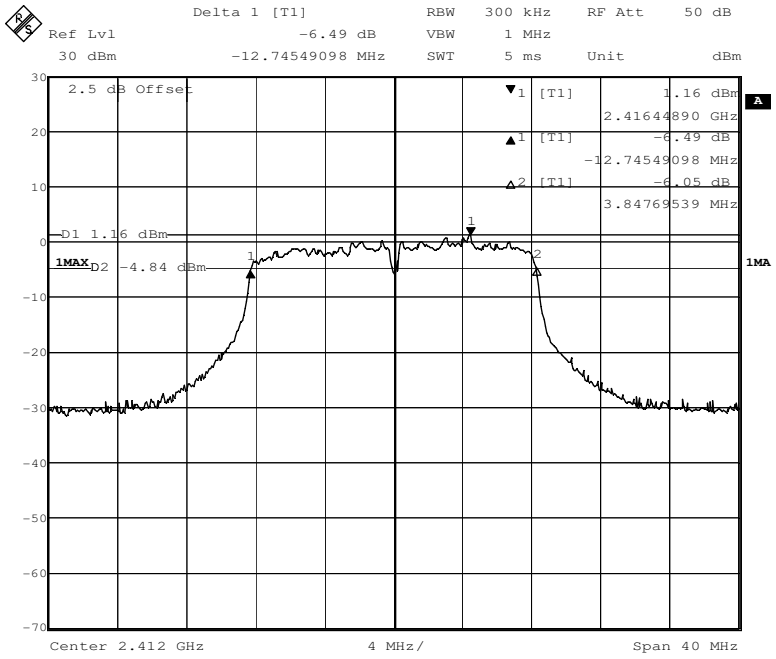


Channel 11: 2.462GHz:

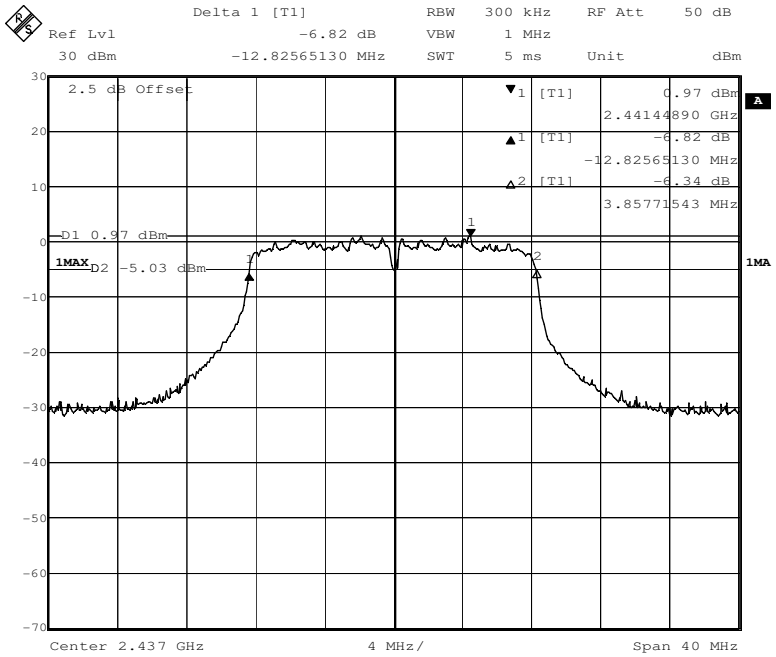


802.11g mode with 54Mbps data rate

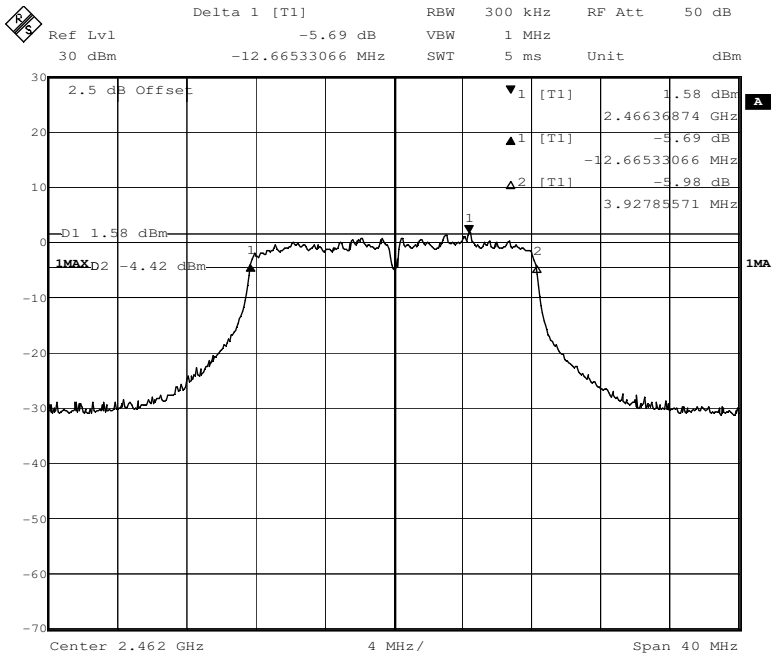
Channel 1: 2.412GHz:



Channel 6: 2.437GHz:

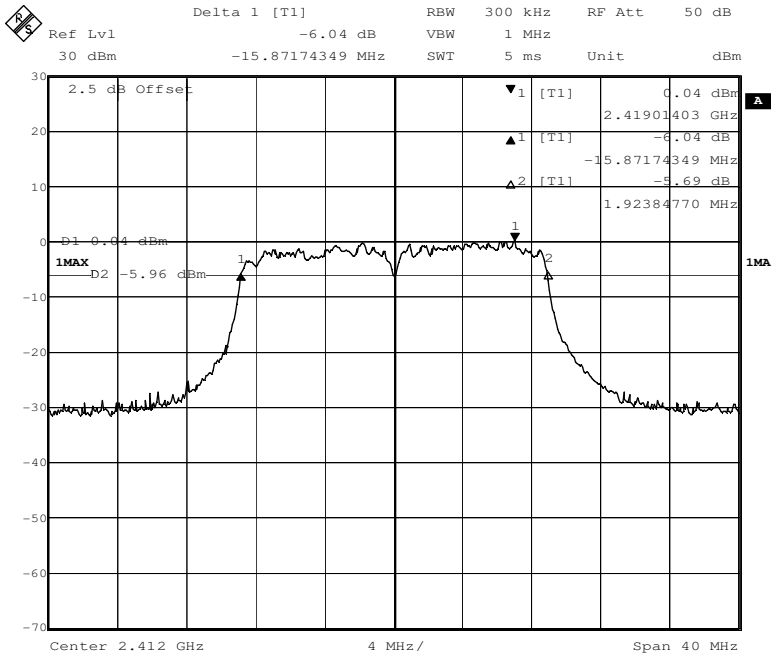


Channel 11: 2.462GHz:

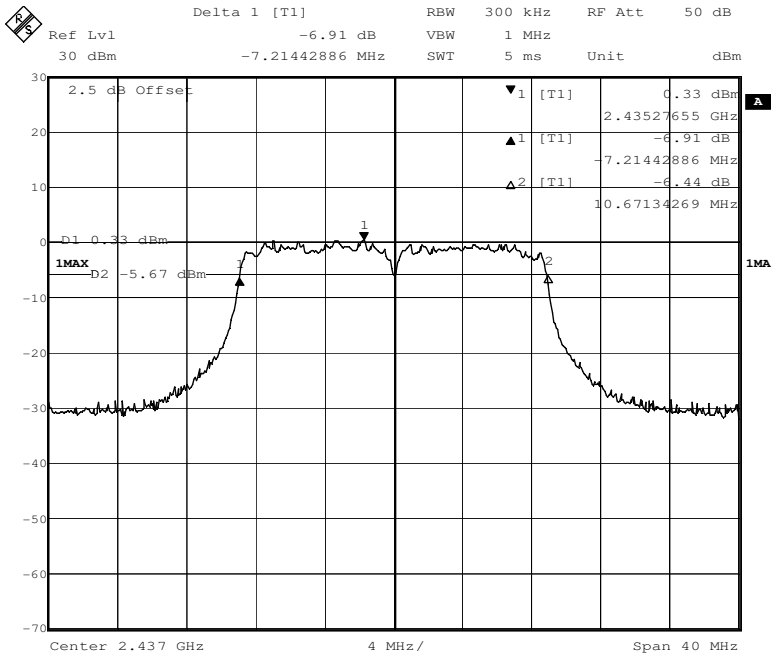


802.11n(HT20) mode with 65Mbps data rate

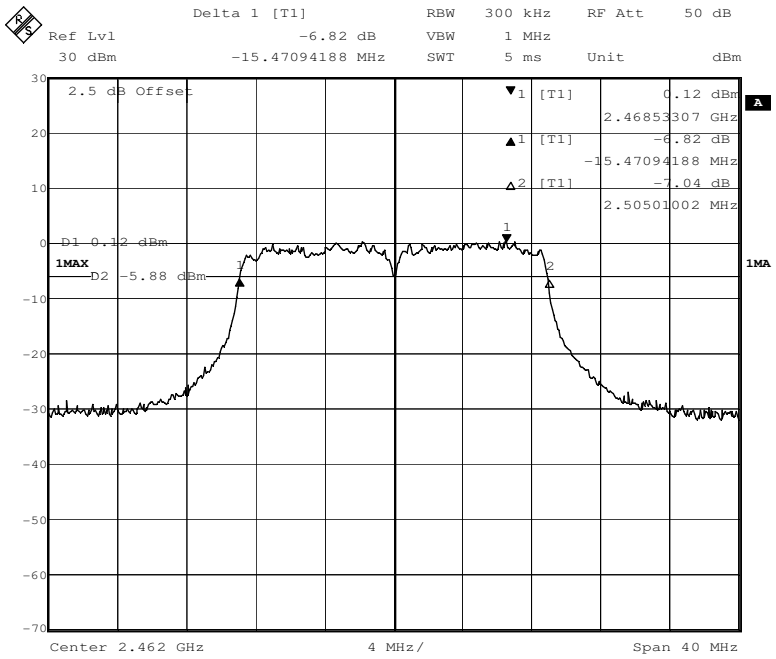
Channel 1: 2.412GHz:



Channel 6: 2.437GHz:

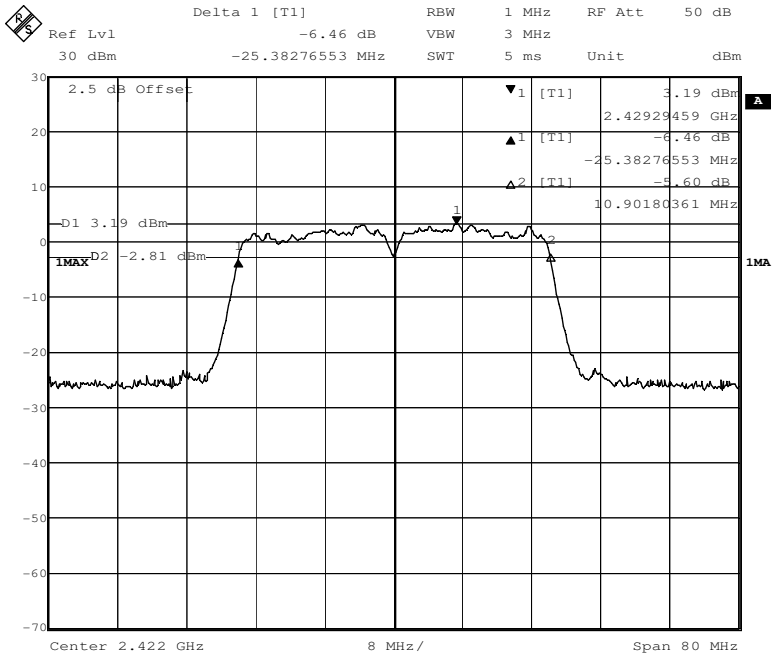


Channel 11: 2.462GHz:

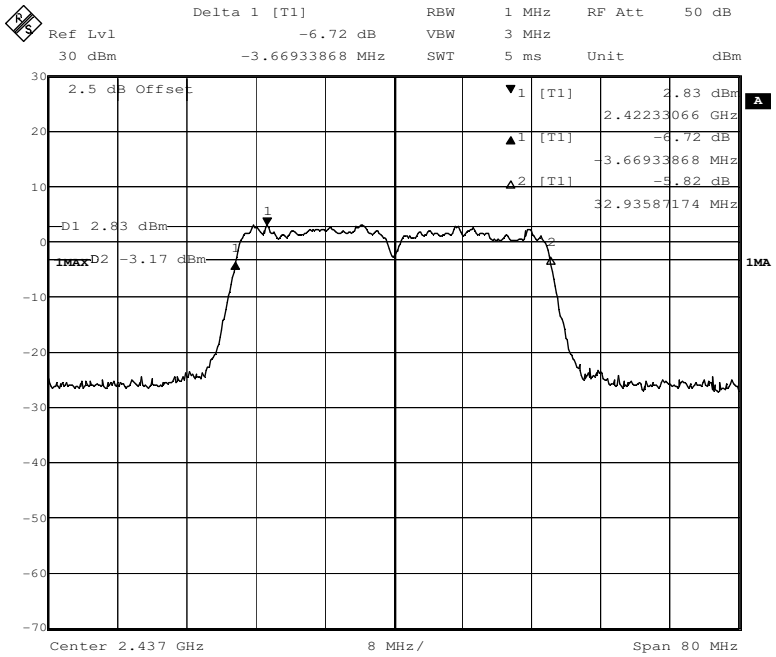


802.11n(HT40) mode with 130Mbps data rate

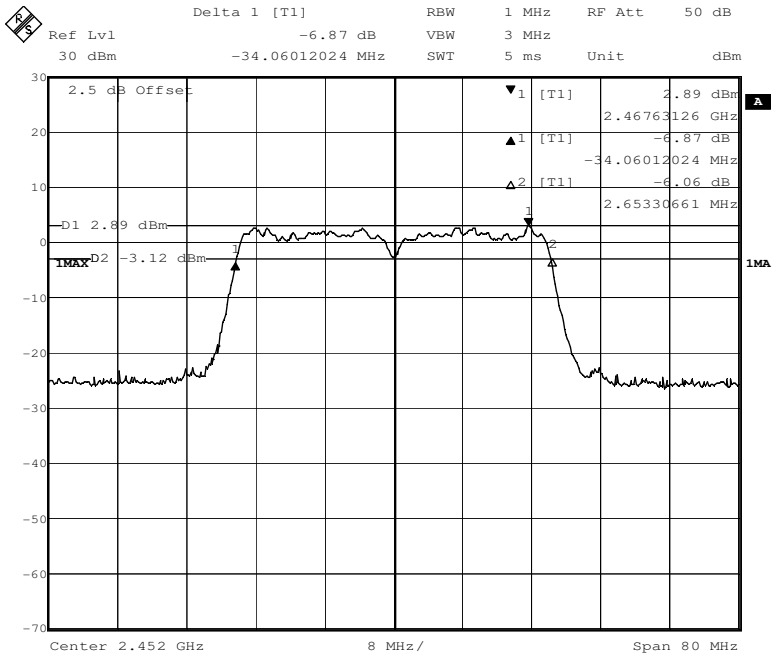
Channel 3: 2.422GHz:



Channel 6: 2.437GHz:



Channel 9: 2.452GHz:



7.4 Maximum Peak Output Power

Test Requirement: FCC Part 15 C section 15.247

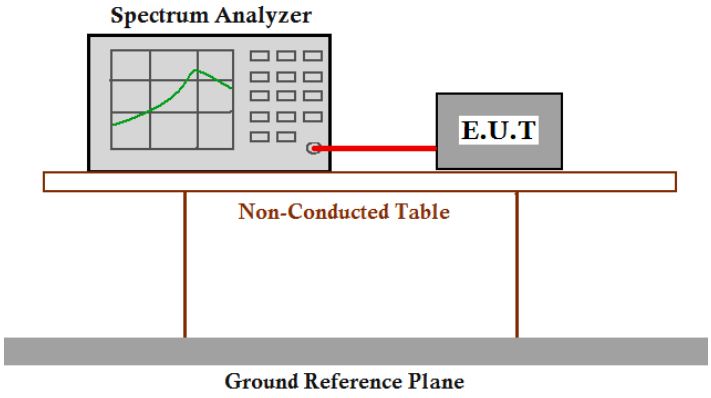
(b)(3) For systems using digital modulation in the 902-928 MHz, 2400-2483.5 MHz, and 5725-5850 MHz bands: 1 Watt.

Except as shown in paragraph (c) of this section, if transmitting antennas of directional gain greater than 6 dBi are used, the conducted output power from the intentional radiator shall be reduced below the stated values in paragraphs (b) (1), (b) (2), and (b) (3) of this section, as appropriate, by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

Test Method: ANSI C63.10: Clause 6. 10. 3. 1 (Method 1—spectral trace averaging).

Test Status: Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, data rates and antenna ports (if EUT with antenna diversity architecture). Following channel(s) was (were) selected for the final test as listed below.

Test Configuration:



Test Procedure:

1. Remove the antenna from the EUT and then connect a low attention attenuation RF cable from the antenna port to the spectrum.
2. Set span to encompass the entire emission bandwidth (EBW) of the signal.
3. Set RBW = 1 MHz.
4. Set VBW ≥ 3 MHz.
5. Use sample detector mode if bin width (i.e., span/number of points in spectrum display) < 0.5 RBW. Otherwise use peak detector mode.
6. Use a video trigger with the trigger level set to enable triggering only on full power pulses. Transmitter must operate at full control power for entire sweep of every sweep.

   If the device transmits continuously, with no off intervals or reduced power intervals, the trigger may be set to “free run”.
7. Trace average 100 traces in power averaging mode.
8. Compute power by integrating the spectrum across the 26 dB EBW of the signal. The integration can be performed using the spectrum analyzer’s band power measurement function with band limits set equal to the EBW band edges or by summing power levels in each 1 MHz band in linear power terms. The 1 MHz band power levels to be summed can be obtained by averaging, in linear power terms, power levels in each frequency bin across the 1 MHz.
9. Measure the channel power of the test frequency with special test status.
10. Repeat until all the test status is investigated.
11. Report the worse case.

Test result:

Channel No.	Frequency (MHz)	Mode	Data Rate	Measured Channel Power (dBm)	Limit	Result
1	2412	802.11b	11 Mbps	26.42	1W(30dBm)	Pass
6	2437		11 Mbps	27.19		Pass
11	2462		11 Mbps	27.36		Pass
1	2412	802.11g	54 Mbps	24.76		Pass
6	2437		54 Mbps	25.45		Pass
11	2462		54 Mbps	25.88		Pass
1	2412	802.11n (HT20)	65 Mbps	24.77		Pass
6	2437		65 Mbps	25.39		Pass
11	2462		65 Mbps	25.92		Pass
3	2422	802.11n (HT40)	130 Mbps	25.88		Pass
6	2437		130 Mbps	25.44		Pass
9	2452		130 Mbps	25.29		Pass

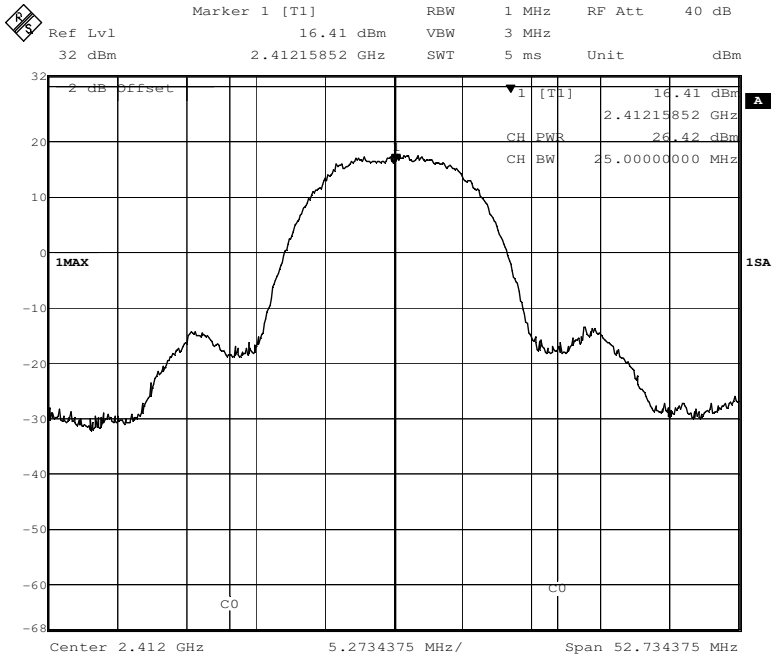
Remark: Level = Read Level + Cable Loss.

The unit does meet the FCC requirements.

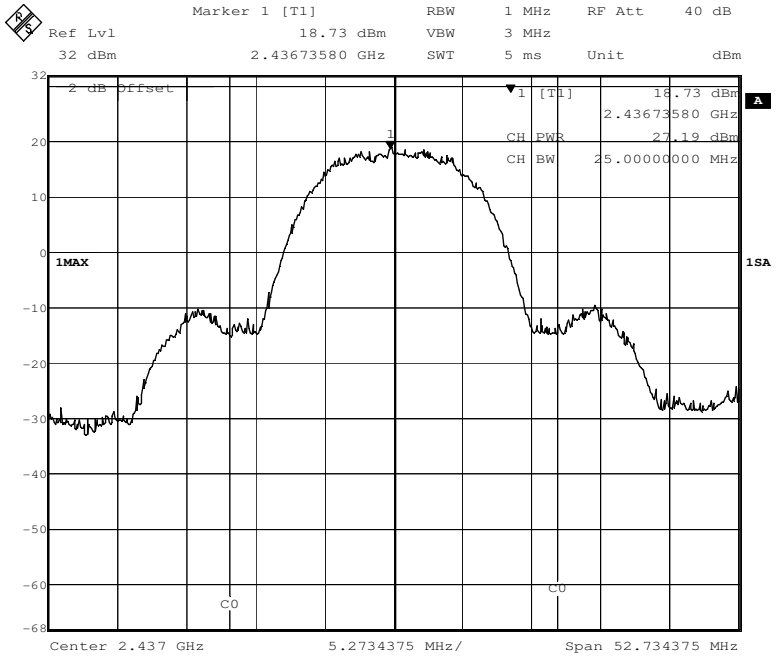
Result plot as follows:

802.11b mode with 11Mbps data rate

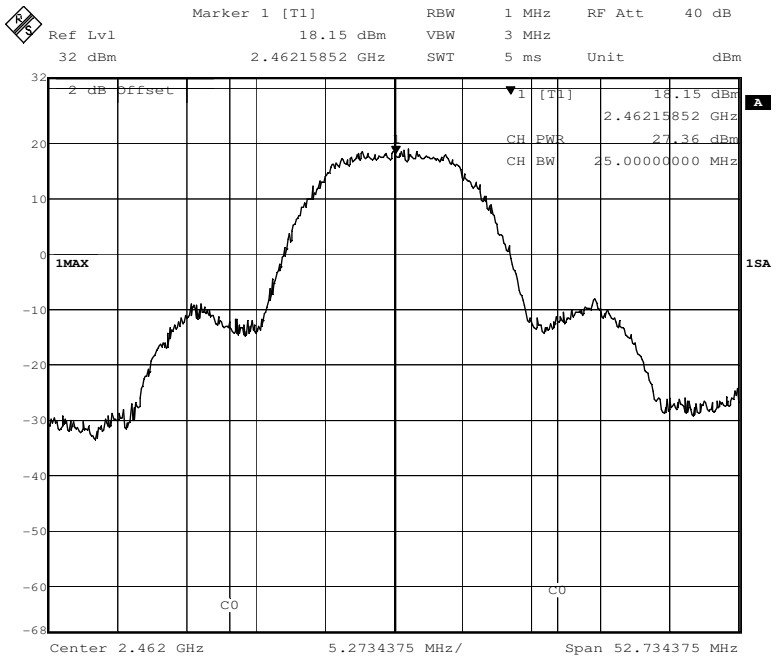
Channel 1: 2.412GHz:



Channel 6: 2.437GHz:

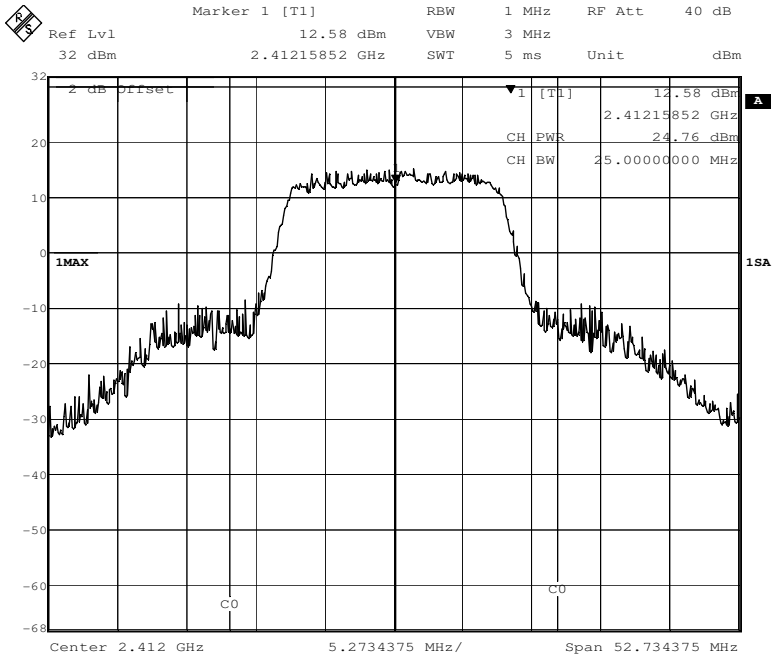


Channel 11: 2.462GHz:

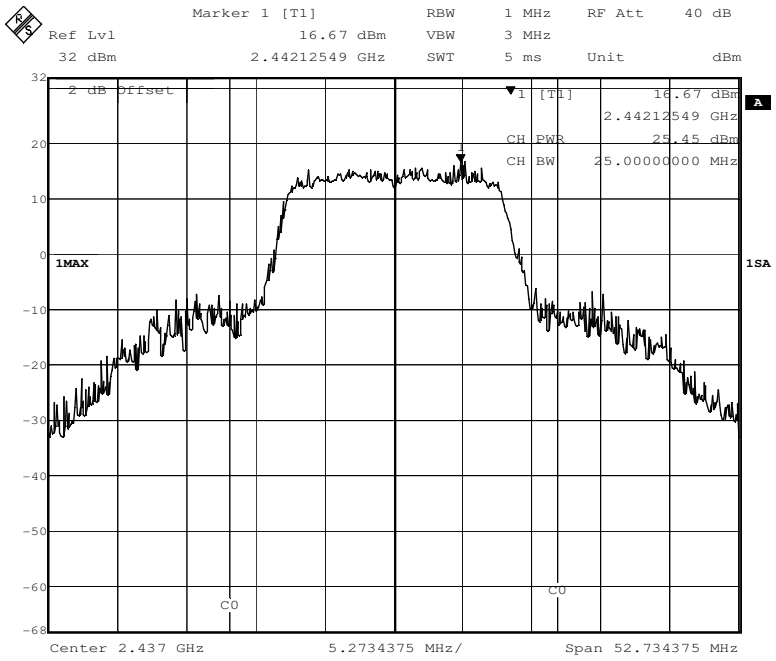


802.11g mode with 54Mbps data rate

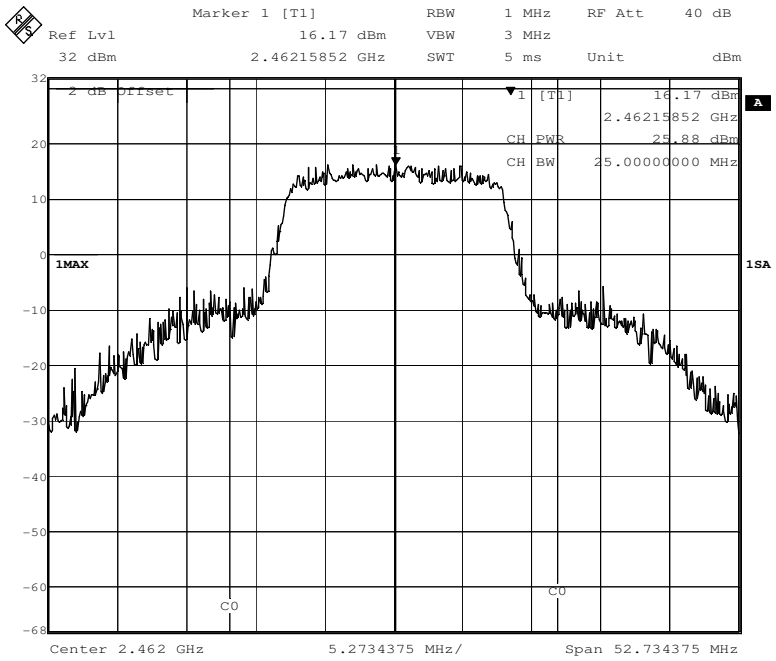
Channel 1: 2.412GHz:



Channel 6: 2.437GHz:

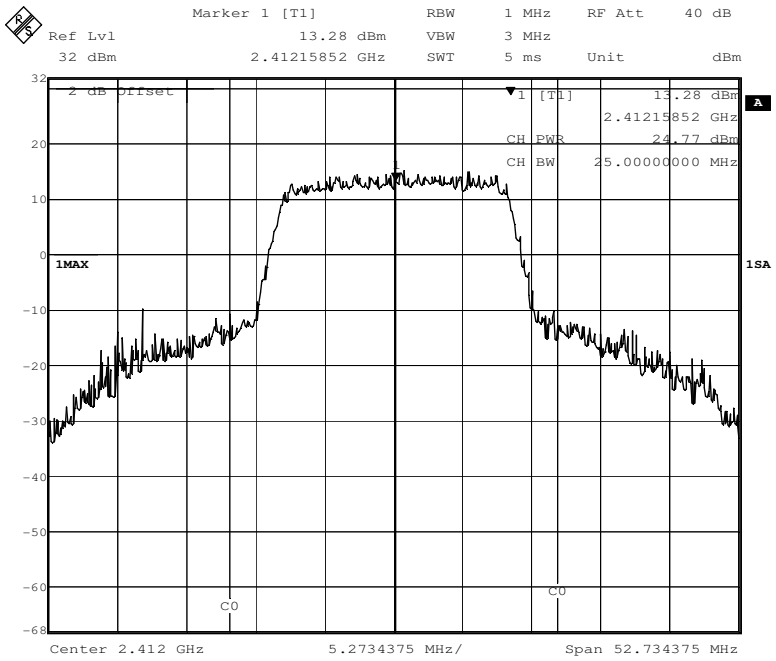


Channel 11: 2.462GHz:

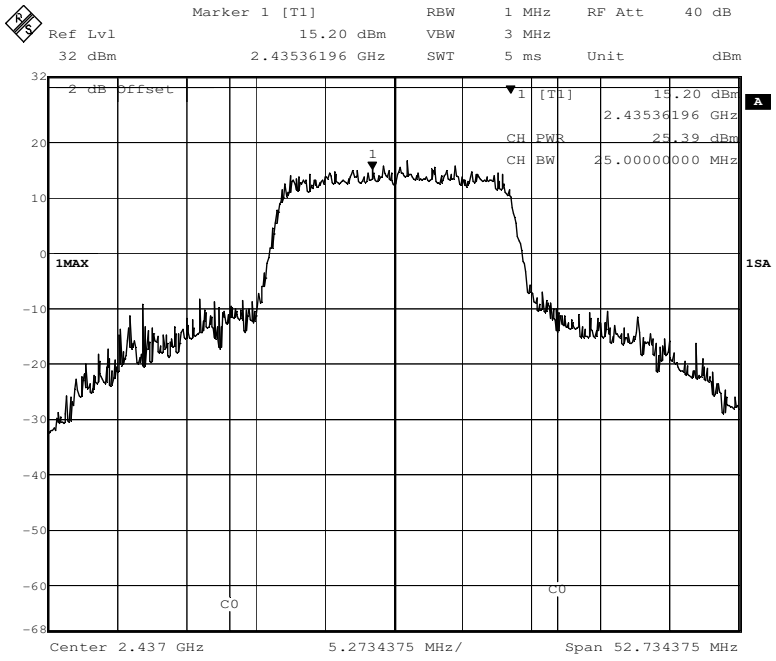


802.11n(HT20) mode with 65Mbps data rate

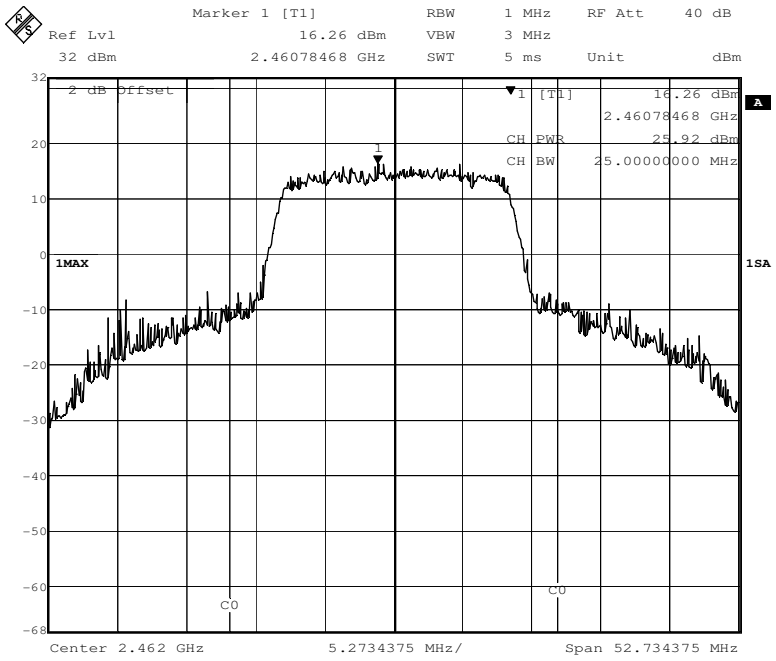
Channel 1: 2.412GHz:



Channel 6: 2.437GHz:

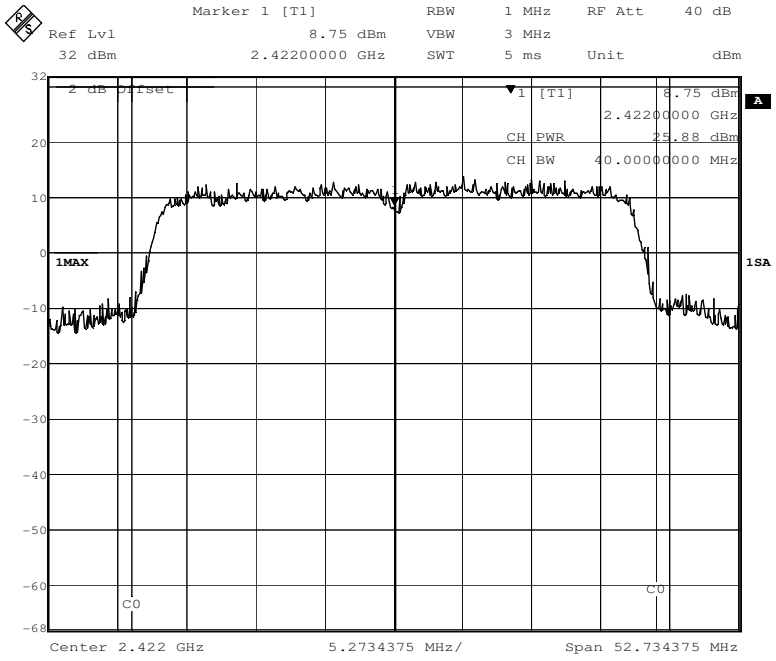


Channel 11: 2.462GHz:

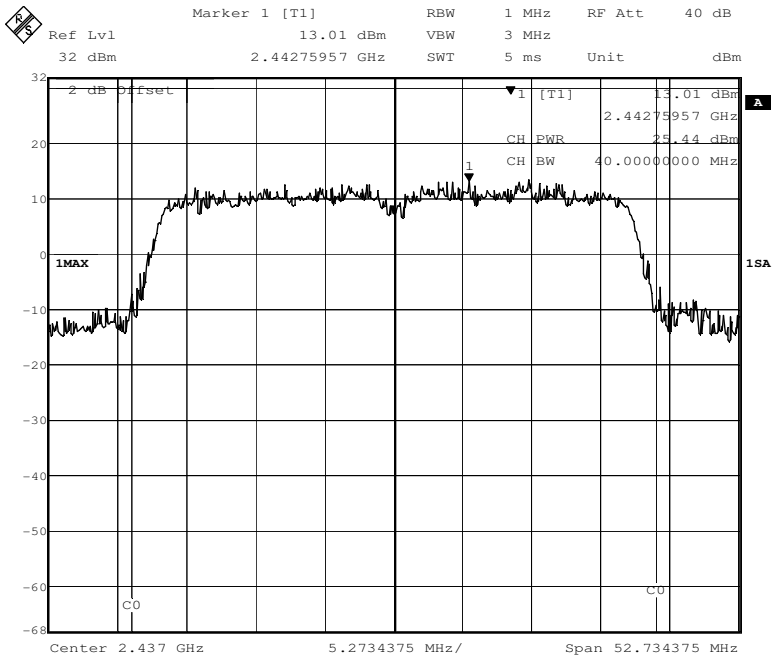


802.11n(HT40) mode with 130Mbps data rate

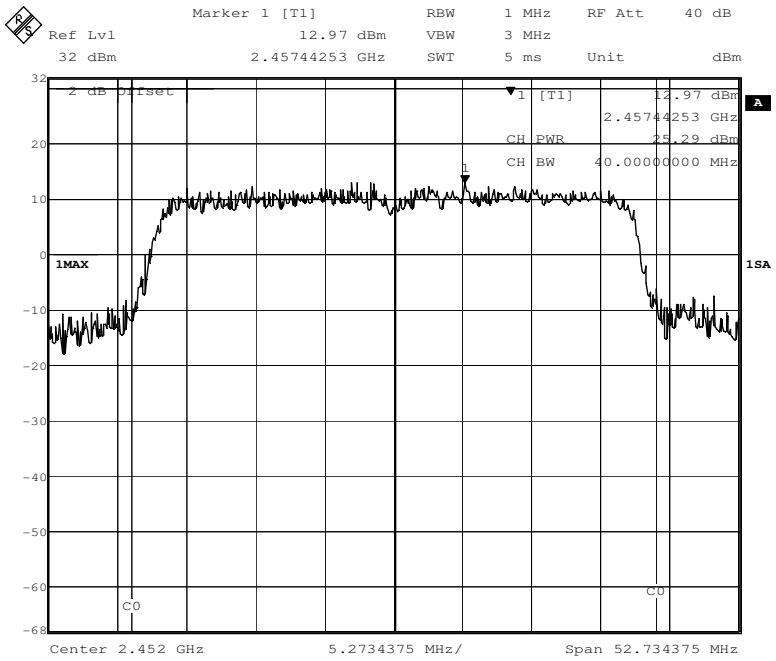
Channel 3: 2.422GHz:



Channel 6: 2.437GHz:



Channel 9: 2.452GHz:



7.5 Peak Power Spectral Density

Test Requirement: FCC Part 15 C section 15.247

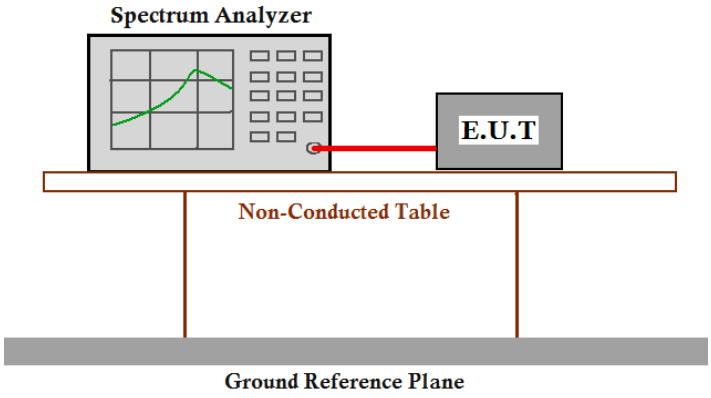
(e) For digitally modulated systems, the power spectral density conducted from the intentional radiator to the antenna shall not be greater than 8 dBm in any 3 kHz band during any time interval of continuous transmission.

This power spectral density shall be determined in accordance with the provisions of paragraph (b) of this section. The same method of determining the conducted output power shall be used to determine the power spectral density.

Test Method: ANSI C63.10: Clause 6. 11. 2. 4

Test Status: Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, data rates and antenna ports (if EUT with antenna diversity architecture). Following channel(s) was (were) selected for the final test as listed below.

Test Configuration:



Test Procedure:

1. Remove the antenna from the EUT and then connect a low attention attenuation RF cable (cable loss =2.5dB) from the antenna port to the spectrum analyzer or power meter.
2. Set the spectrum analyzer:

a) Set RBW = 3 kHz

b) Set VBW = 9 kHz

c) Set Sweep time to Automatic

d) Use a peak detector. A sample detector mode can be used only if the following conditions can be achieved with automatic sweep time and adjusting the bin width.

1) Bin width (i.e., span/number of points in spectrum display) < 0.5 RBW.

2) The transmission pulse or sequence of pulses remains at maximum transmit power throughout each of the 100 sweeps of averaging and that the interval between pulses is not included in any of the sweeps.

NOTE—If condition 2) cannot be achieved, then PSD Option 1 (method of 6.11.2.3) shall be used and trace averaging cannot be used.

e) Use a video trigger (or RF gating) with the trigger level set to enable the sweep only during full power pulses. Transmitter shall operate at full control power for entire sweep of every sweep. If the device transmits continuously, with no off intervals or reduced power intervals, the trigger may be set to “free run.”

f) Trace average 100 traces in power averaging mode. Do not use video averaging mode.

NOTE—Some analyzers will automatically select sample mode when trace averaging is selected. If a peak detector is used, then peak detector must be manually selected when trace averaging is enabled.

3. Measure the Power Spectral Density of the test frequency with special test status.
4. Repeat until all the test status is investigated.
5. Report the worse case.

Channel No.	Frequency (MHz)	Mode	Data Rate	Measured Peak Power Spectral Density (dBm/3KHz)	Limit	Result
1	2412	802.11b	11 Mbps	-1.63	8dBm/3KHz	Pass
6	2437		11 Mbps	-3.63		Pass
11	2462		11 Mbps	-1.86		Pass
1	2412	802.11g	54 Mbps	-5.96		Pass
6	2437		54 Mbps	-5.92		Pass
11	2462		54 Mbps	-4.45		Pass
1	2412	802.11n (HT20)	65 Mbps	-5.61		Pass
6	2437		65 Mbps	-5.65		Pass
11	2462		65 Mbps	-4.94		Pass
3	2422	802.11n (HT40)	130 Mbps	-6.96		Pass
6	2437		130 Mbps	-6.32		Pass
9	2452		130 Mbps	-6.48		Pass

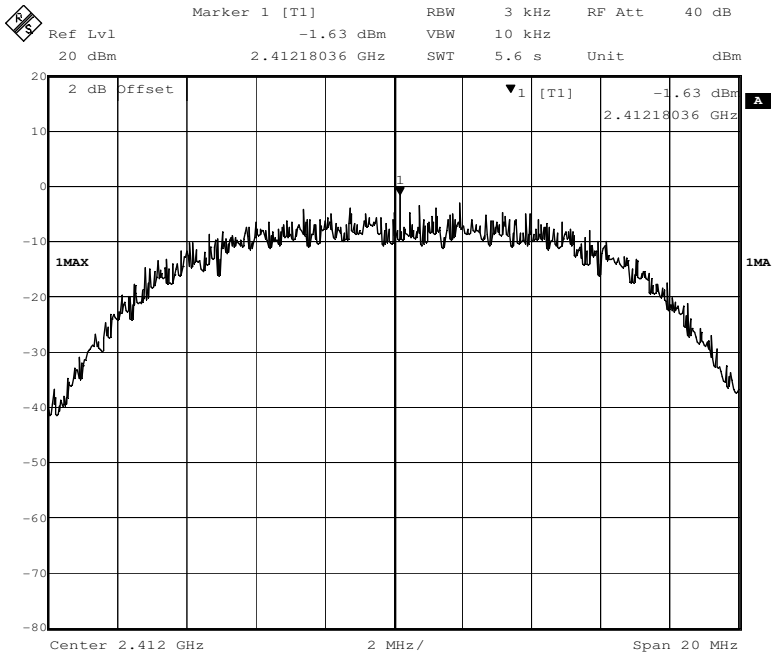
Test result: Level = Read Level + Cable Loss.

The unit does meet the FCC requirements.

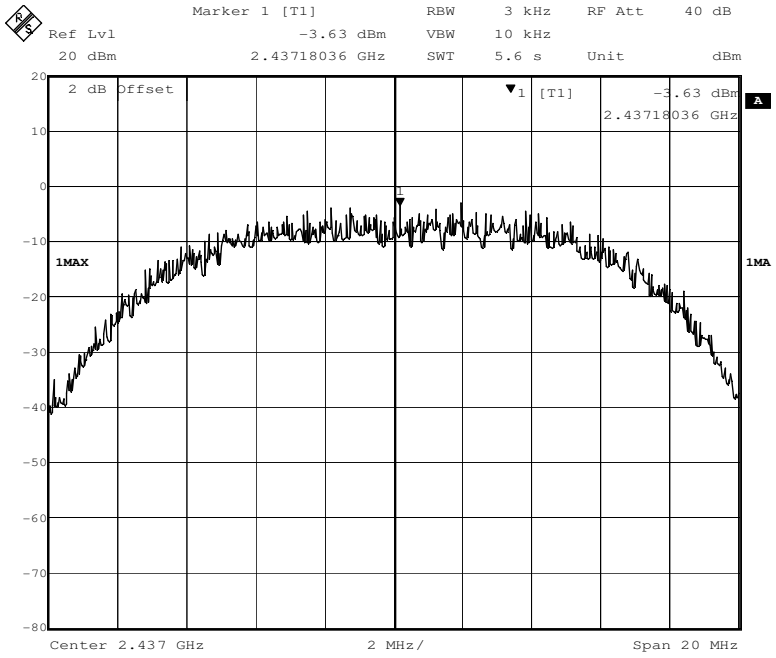
Result plot as follows:

802.11b mode with 11Mbps data rate

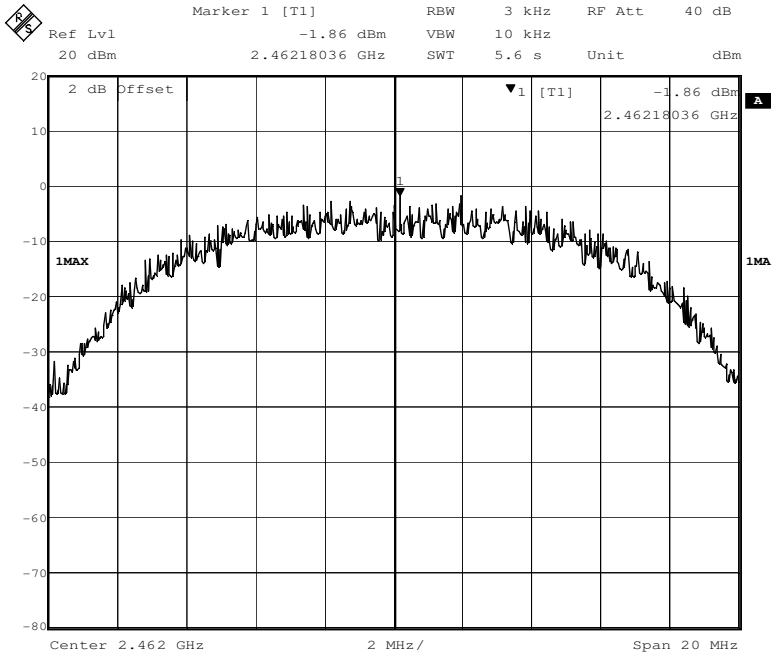
Channel 1: 2.412GHz:



Channel 6: 2.437GHz:

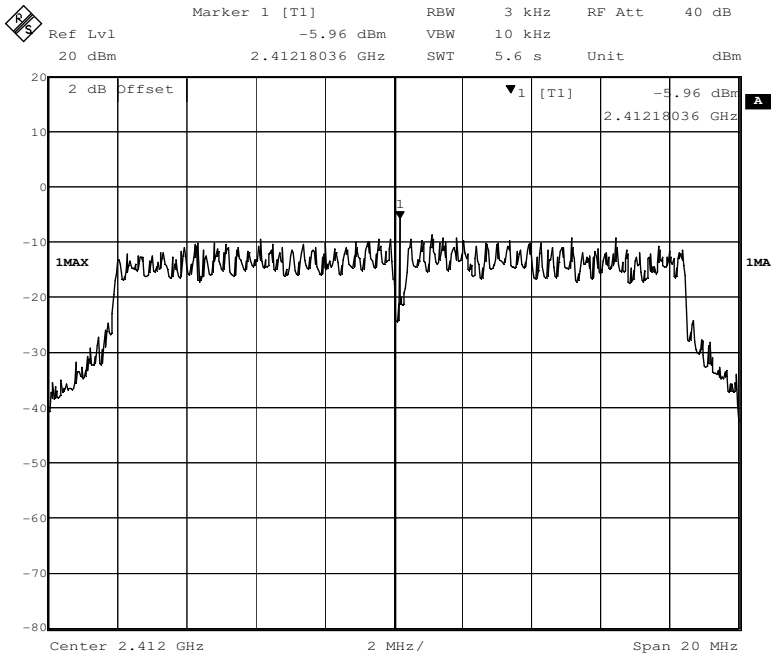


Channel 11: 2.462GHz:

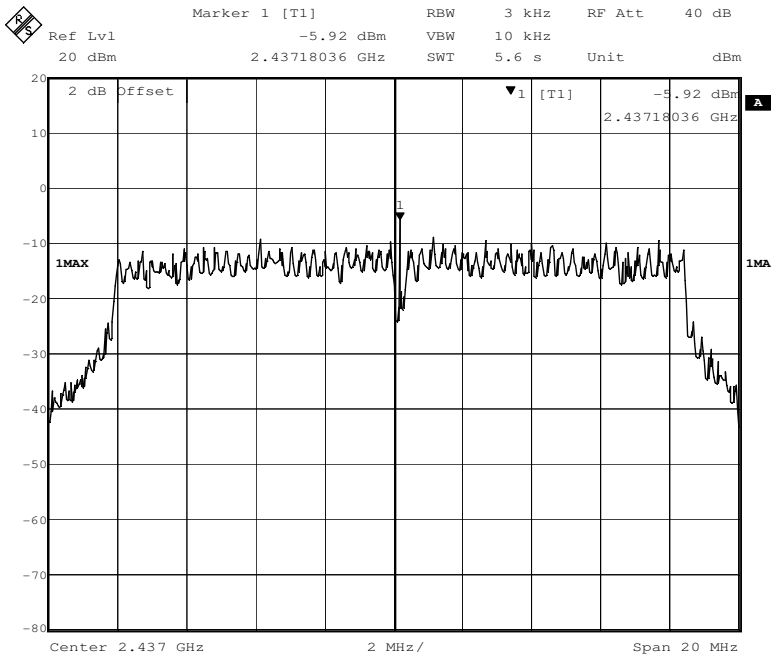


802.11g mode with 54Mbps data rate

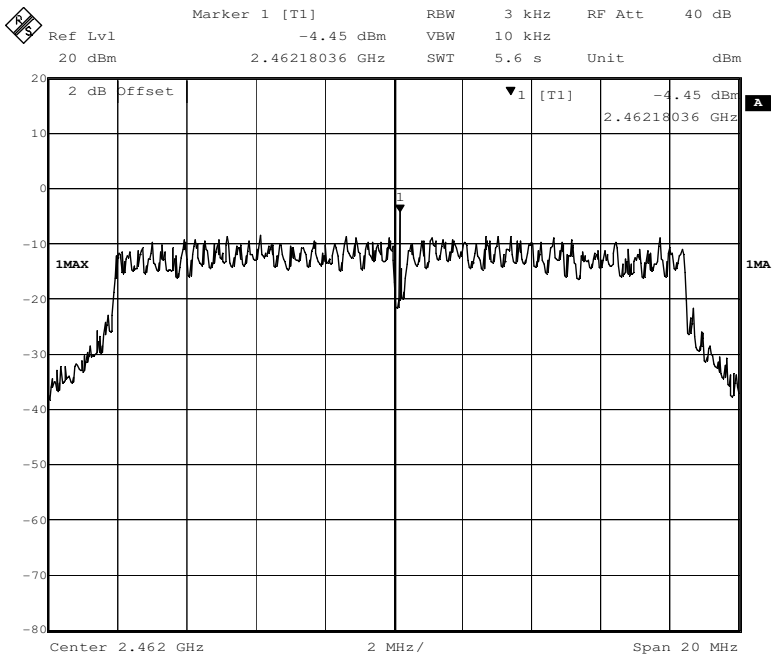
Channel 1: 2.412GHz:



Channel 6: 2.437GHz:

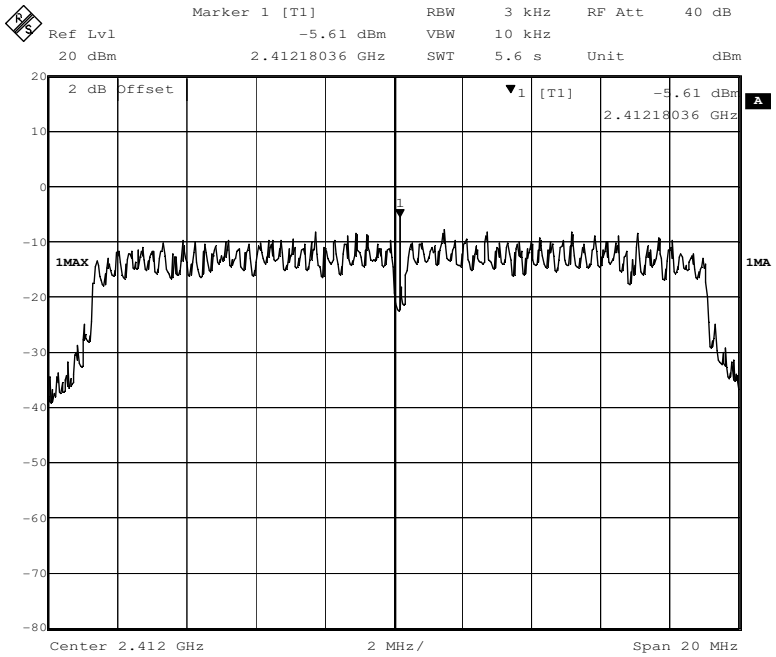


Channel 11: 2.462GHz:

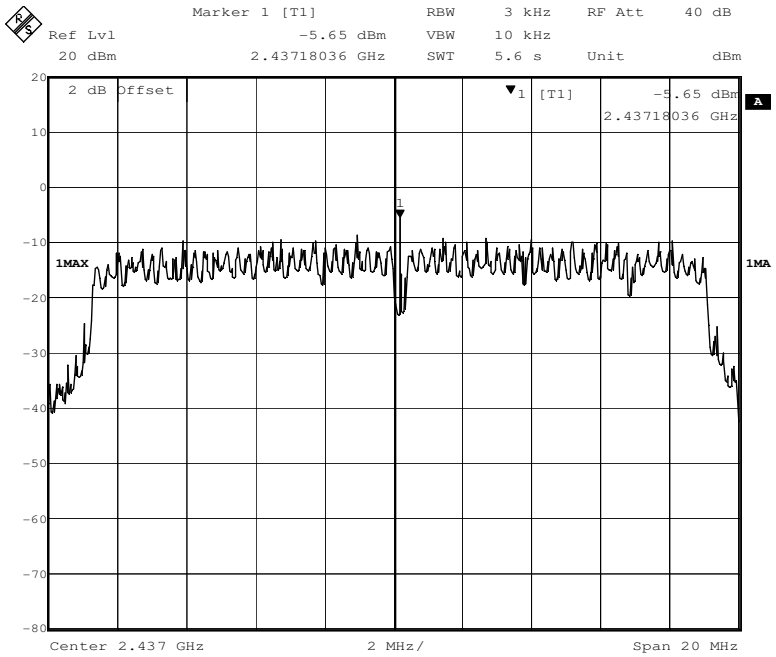


802.11n(HT20) mode with 65Mbps data rate

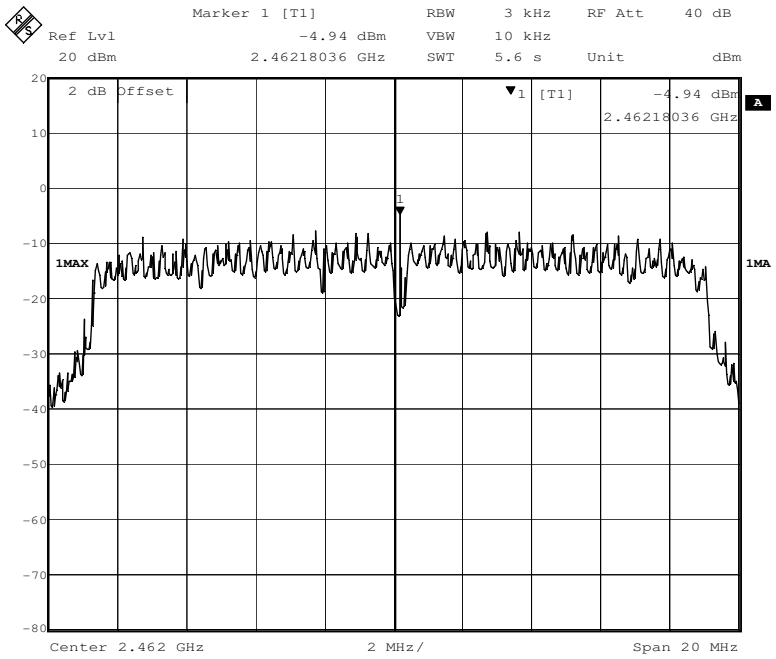
Channel 1: 2.412GHz:



Channel 6: 2.437GHz:

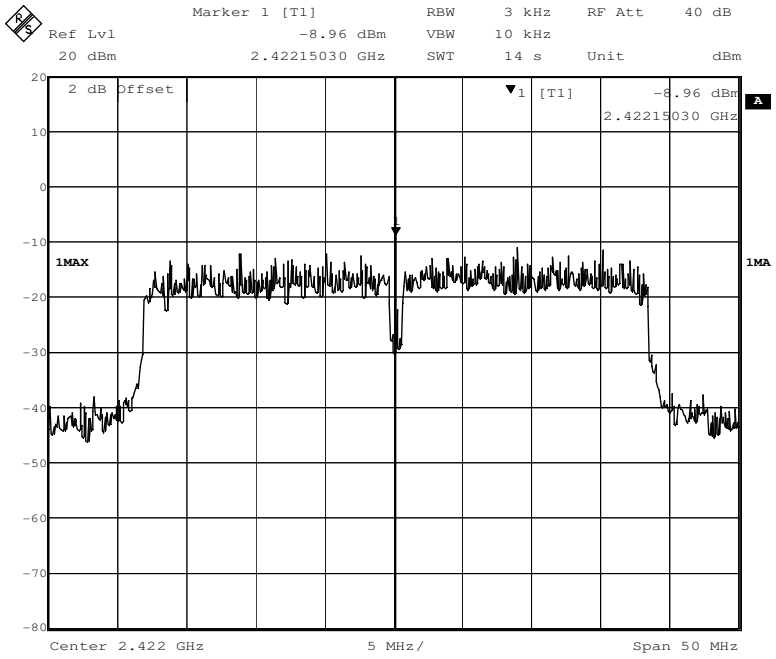


Channel 11: 2.462GHz:

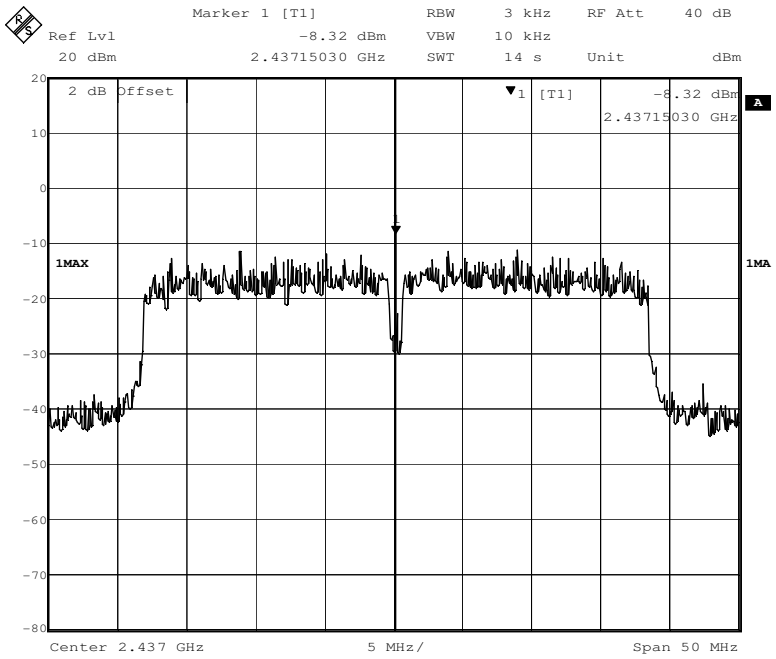


802.11n(HT40) mode with 130Mbps data rate

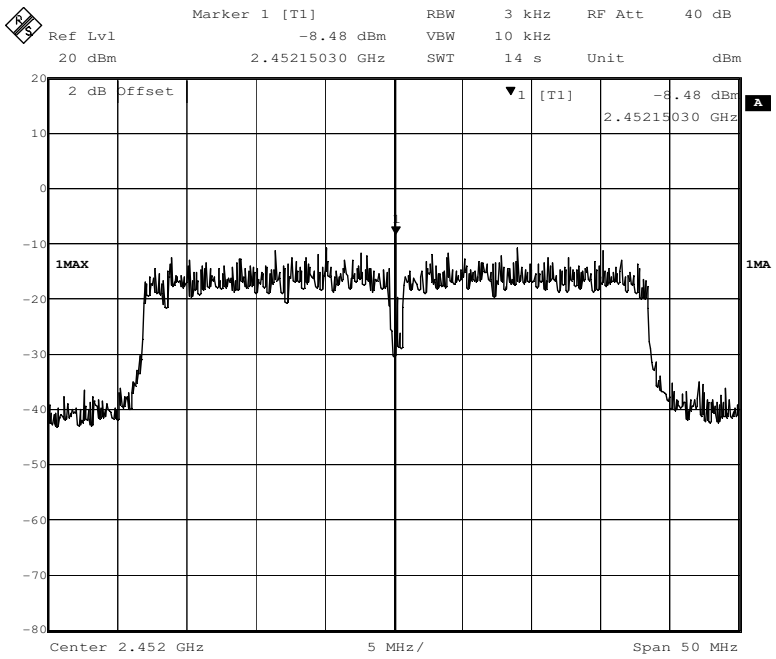
Channel 3: 2.422GHz:



Channel 6: 2.437GHz:



Channel 9: 2.452GHz:



7.6 Conducted Spurious Emissions

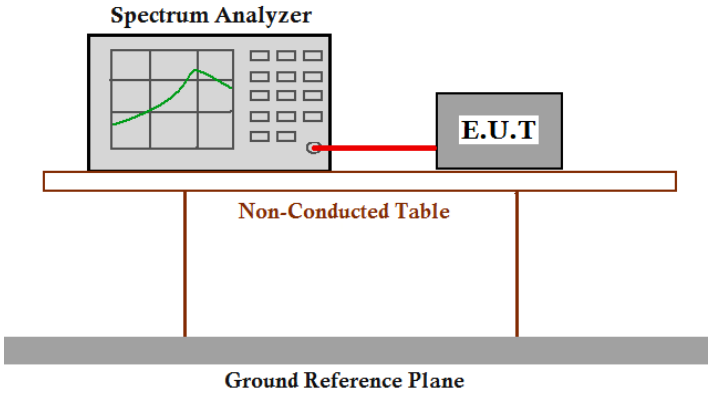
Test Requirement: FCC Part 15 C section 15.247

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

Test Method: ANSI C63.10: Clause 6.7

Test Status: Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, data rates and antenna ports (if EUT with antenna diversity architecture). Following channel(s) was (were) selected for the final test as listed below.

Test Configuration:



Test Procedure:

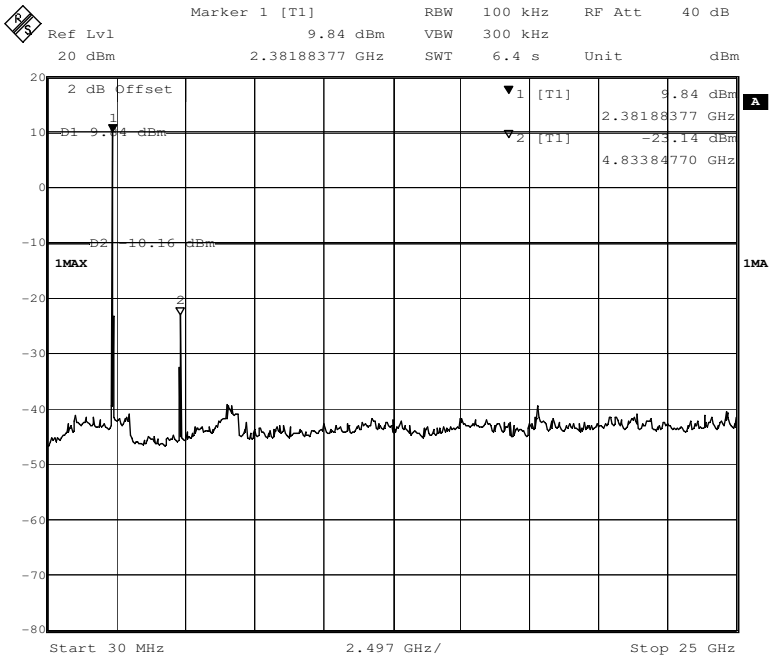
1. Remove the antenna from the EUT and then connect a low RF cable from the antenna port to the spectrum analyzer or power meter.
2. Set the spectrum analyzer: RBW=100 KHz, VBW = 300KHz. Sweep = auto; Detector Function = Peak. Trace = Max Hold, Scan up through 10th harmonic.
3. Measure the Conducted Spurious Emissions of the test frequency with special test status.
4. Repeat until all the test status is investigated.
5. Report the worse case.

Result plot as follows:

802.11b mode with 11Mbps data rate

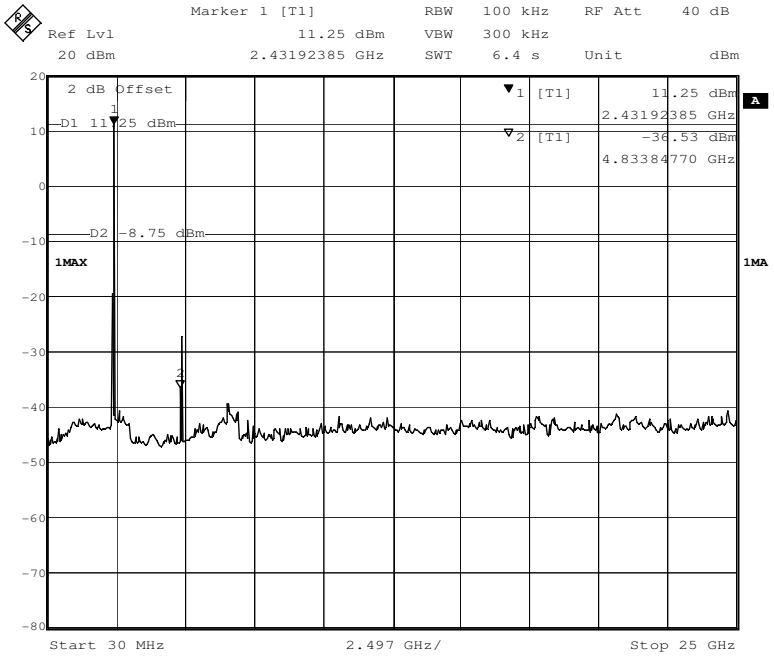
Channel 1: 2.412GHz:

30 MHz to 25 GHz



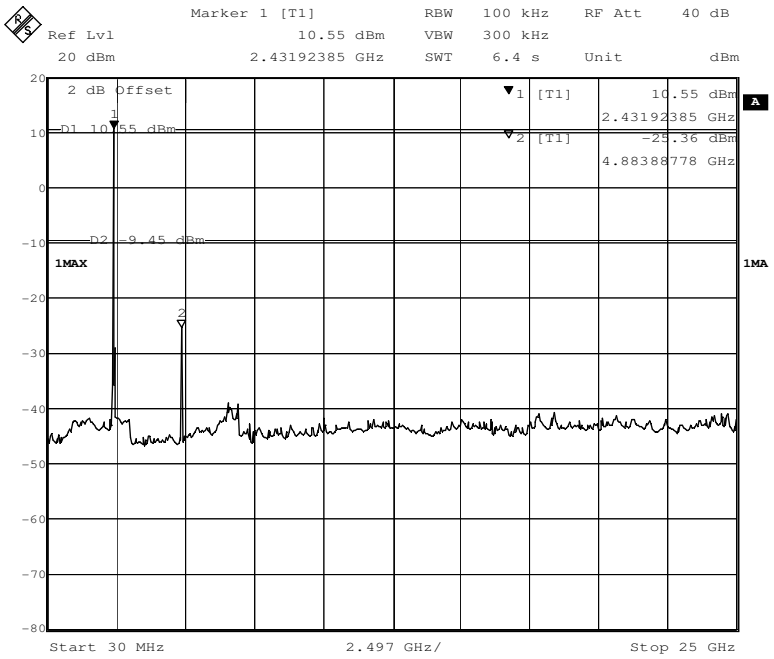
Channel 6: 2.437GHz:

30 MHz to 25 GHz



Channel 11:2.462 GHz

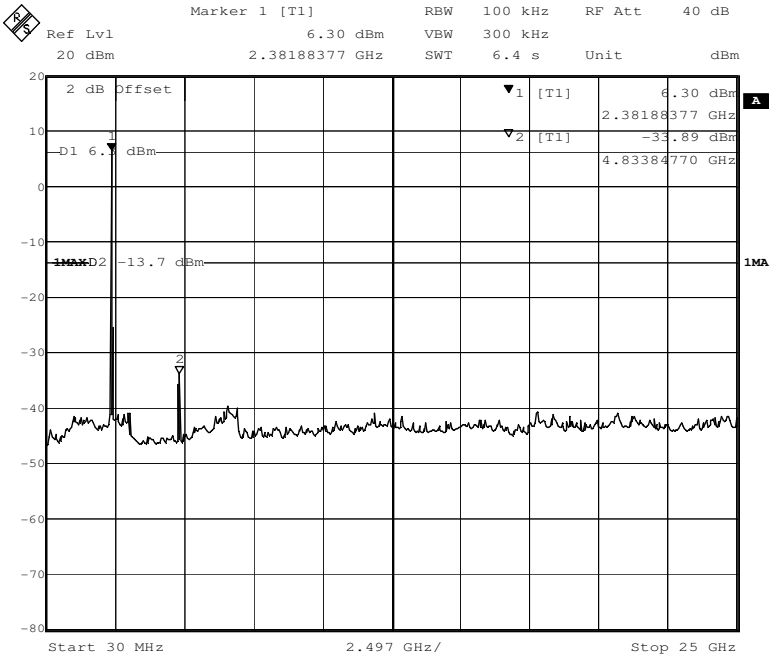
30 MHz to 25 GHz



802.11g mode with 54Mbps data rate

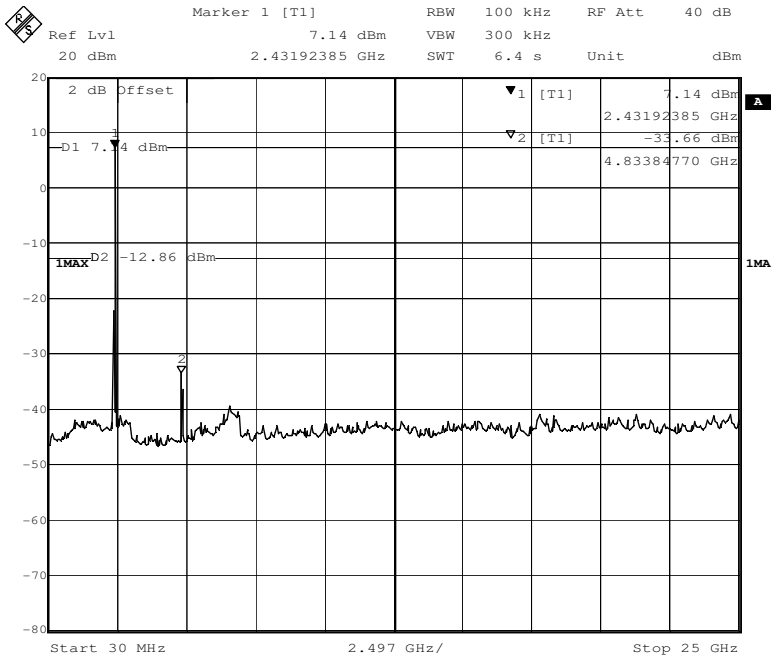
Channel 1: 2.412GHz:

30 MHz to 25 GHz



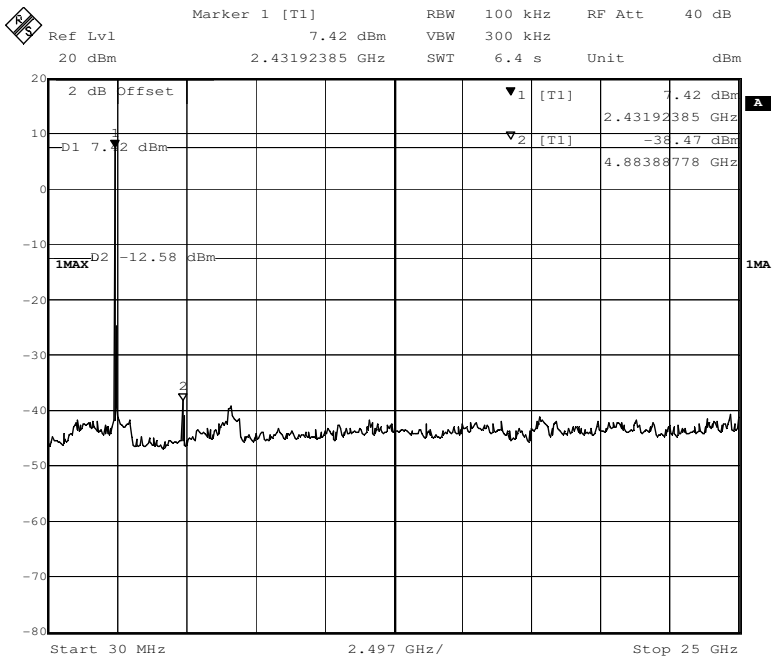
Channel 6: 2.437GHz:

30 MHz to 25 GHz



Channel 11:2.462 GHz

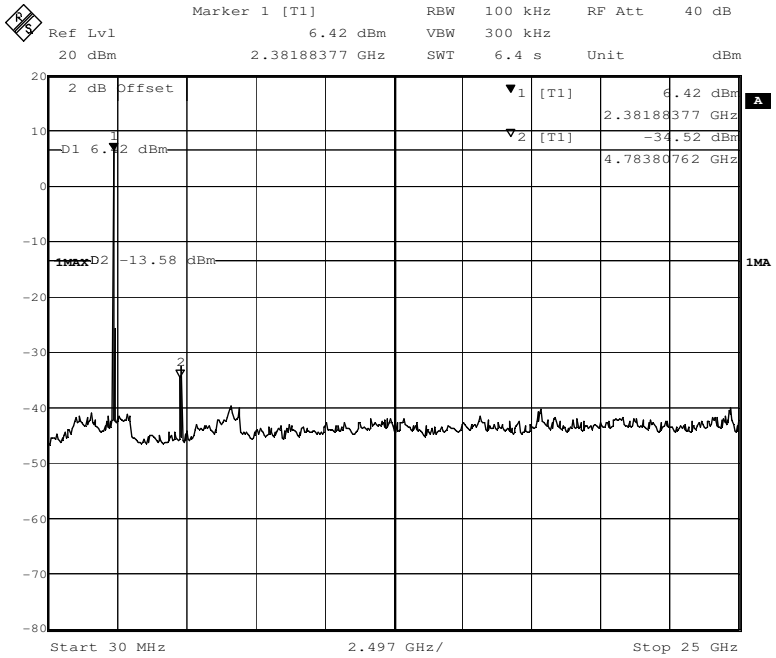
30 MHz to 25 GHz



802.11n(HT20) mode with 65Mbps data rate

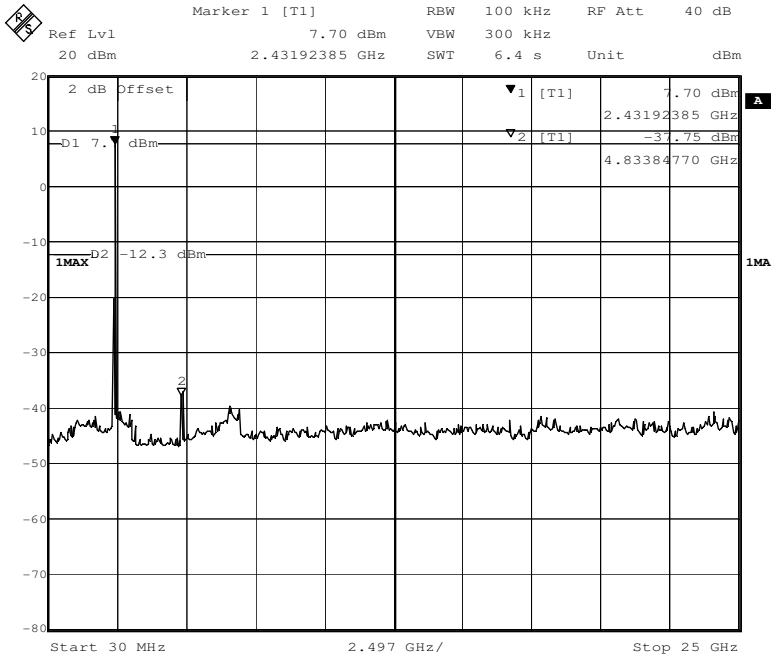
Channel 1: 2.412GHz:

30 MHz to 25 GHz



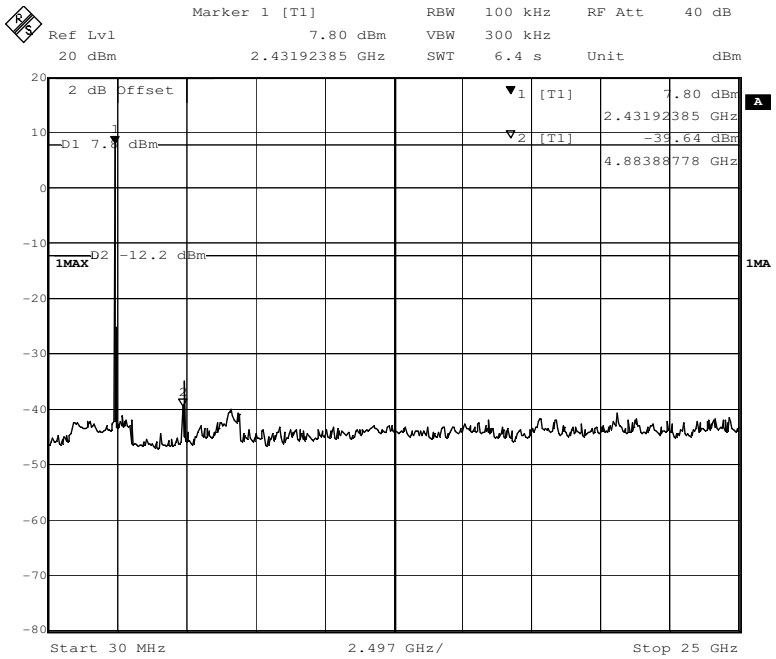
Channel 6: 2.437GHz:

30 MHz to 25 GHz



Channel 11:2.462 GHz

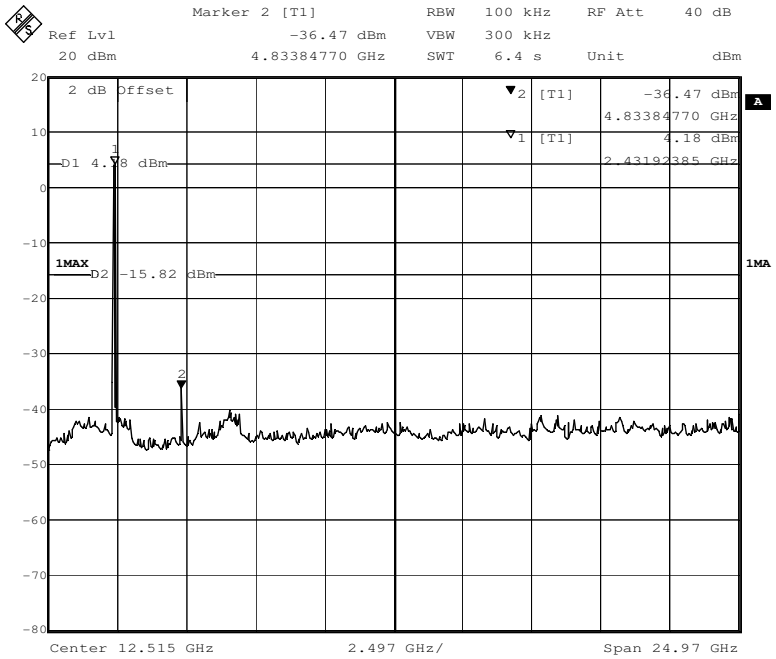
30 MHz to 25 GHz



802.11n(HT40) mode with 130Mbps data rate

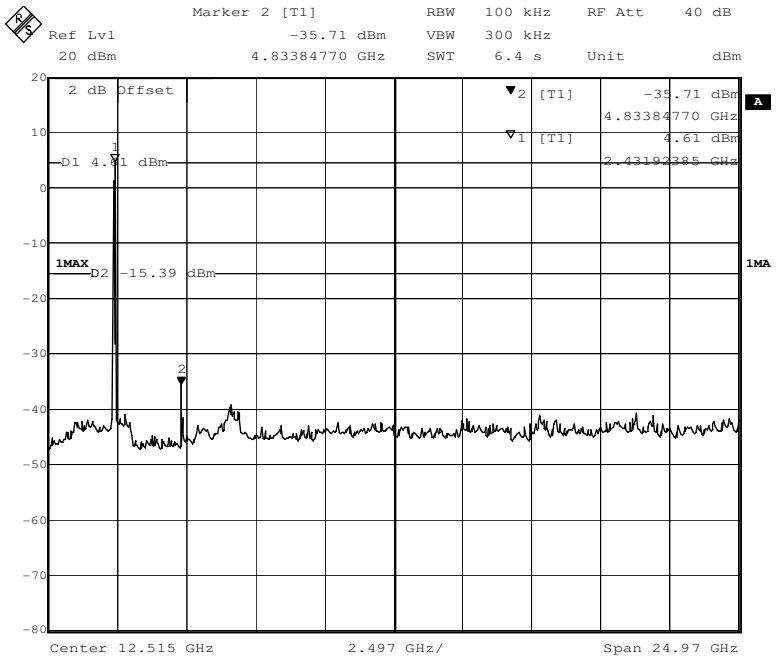
Channel 3: 2.422GHz:

30 MHz to 25 GHz



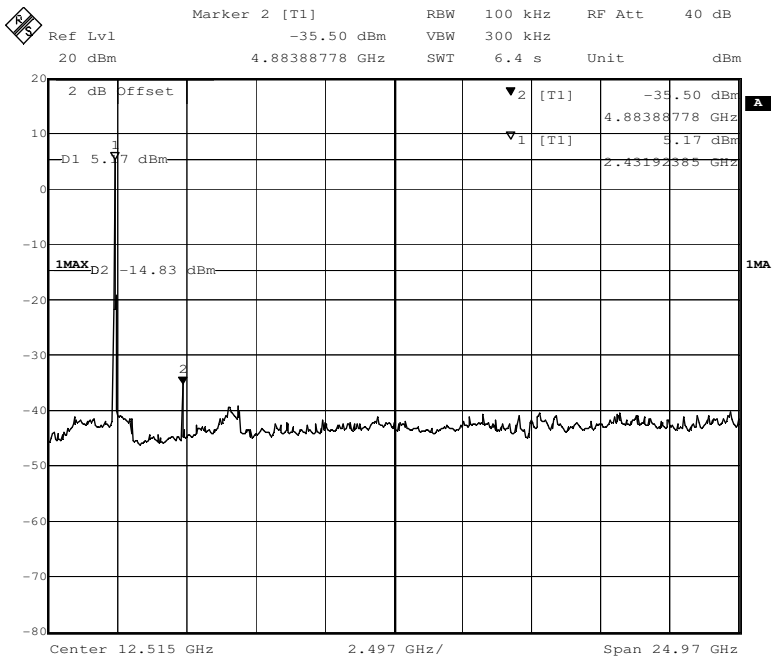
Channel 6: 2.437GHz:

30 MHz to 25 GHz



Channel 9:2.452 GHz

30 MHz to 25 GHz

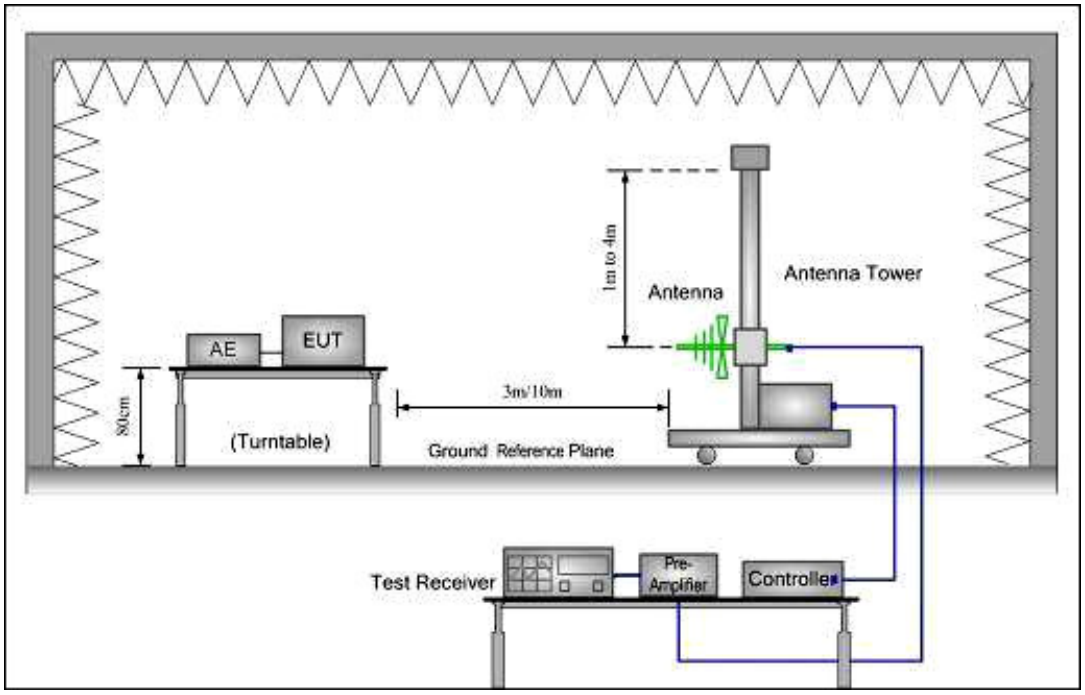


7.7 Radiated Spurious Emissions

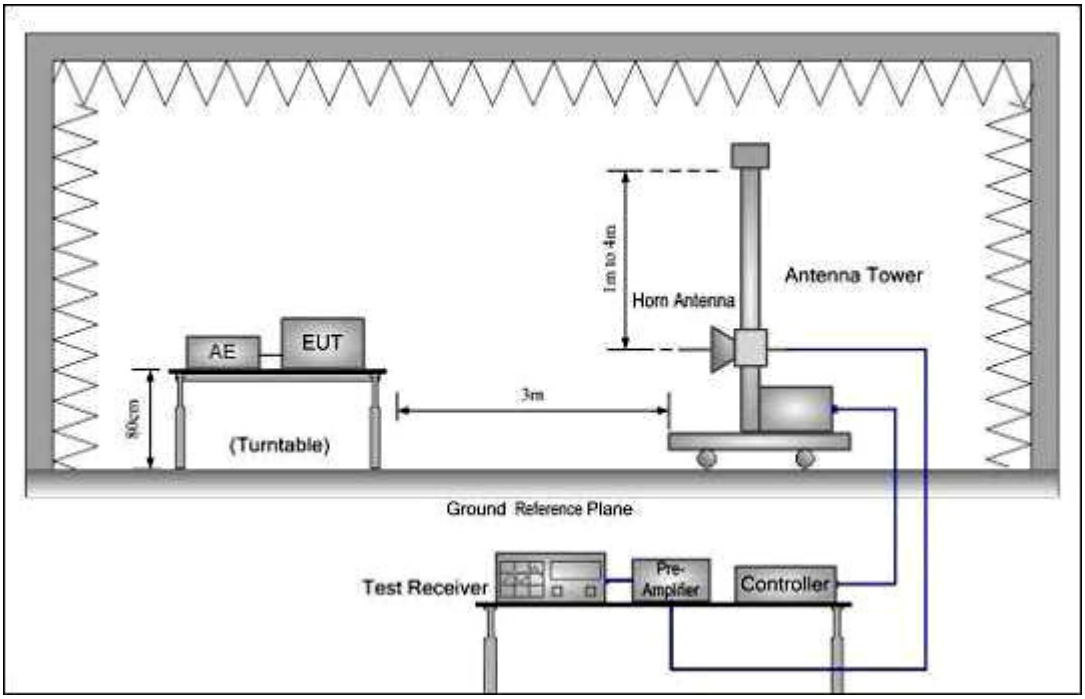
Test Requirement:	FCC Part 15 C section 15.247 (d) In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating. The radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that Contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, and provided the transmitter demonstrates compliance with the peak conducted power limits.
Test Method:	ANSI C63.10: Clause 6.4, 6.5 and 6.6
Test Status:	Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, data rates and antenna ports (if EUT with antenna diversity architecture). Following channel(s) was (were) selected for the final test as listed below.
Detector:	For PK value: RBW = 1 MHz for f ≥ 1 GHz, 100 kHz for f < 1 GHz VBW ≥ RBW Sweep = auto Detector function = peak Trace = max hold For AV value: RBW = 1 MHz for f ≥ 1 GHz, 100 kHz for f < 1 GHz VBW =10Hz Sweep = auto Detector function = peak Trace = max hold
15.209 Limit:	40.0 dBμV/m between 30MHz & 88MHz 43.5 dBμV/m between 88MHz & 216MHz 46.0 dBμV/m between 216MHz & 960MHz 54.0 dBμV/m above 960MHz

Test Configuration:

1) 30 MHz to 1 GHz emissions:



2) 1 GHz to 40 GHz emissions:



Test Procedure: The receiver was scanned from 30MHz to 25GHz.When an emission was found, the table was rotated to produce the maximum signal strength. An initial pre-scan was performed for in peak detection mode using the receiver. The EUT was measured for both the Horizontal and Vertical polarities and performed a pre-test three orthogonal planes. For intentional radiators, measurements of the variation of the input power or the radiated signal level of the fundamental frequency component of the emission, as appropriate, shall be performed with the supply voltage varied between 85% and 115% of the nominal rated supply voltage. The worst case emissions were reported.

From 30MHz to 1GHz, read the Quasi-Peak field strength of the emissions with receiver QP detector RBW=120KHz.

Above 1GHz, read the Peak field strength and Average field strength.

Read the Peak field strength through RBW=1MHz,VBW=3MHz in spectrum analyzer setting;

Read the Average field strength through RBW=1MHz,VBW=10Hz in spectrum analyzer setting;

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 dwell time per channel of the hopping signal is less than 100 ms, then the average field strength reading obtained with the 10 Hz VBW may be further adjusted by a "duty cycle correction factor", derived from 20log(dwell time/100 ms), in an effort to demonstrate compliance with the 15.209 limit.

7.7.1 Harmonic and other spurious emissions

7.7.1.1 802.11b mode with 11Mbps data rate

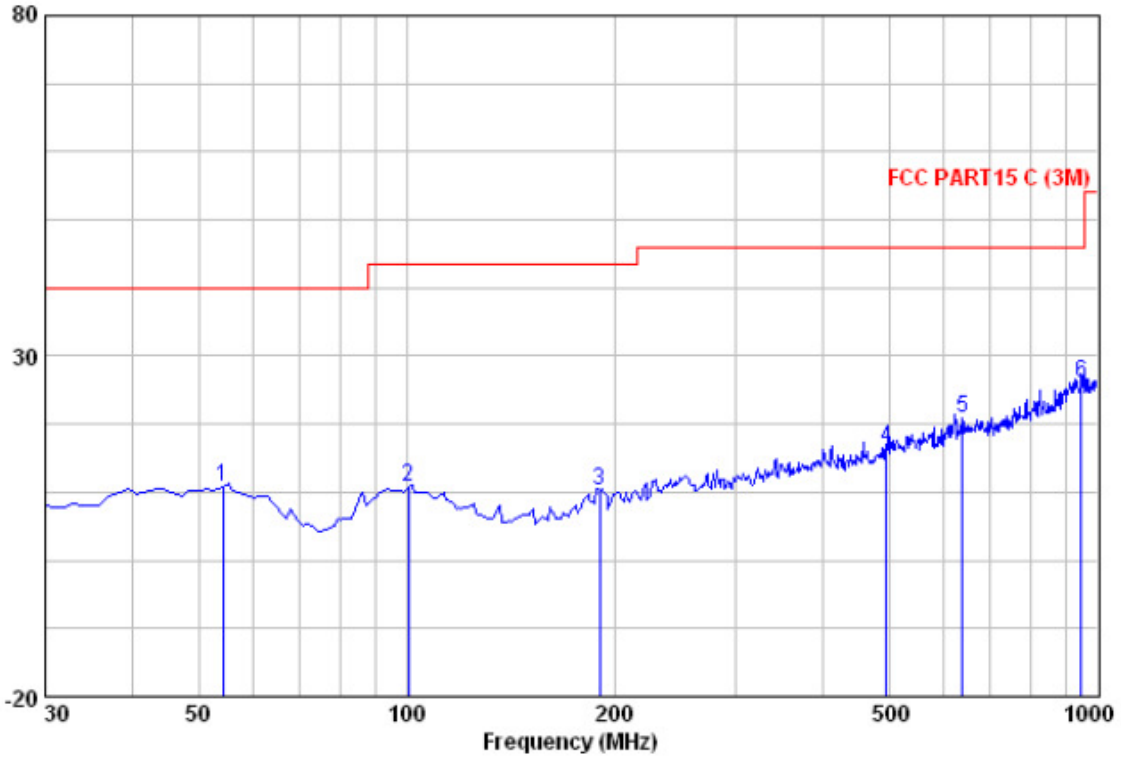
Test at Channel 1 (2.412 GHz) in transmitting status

30 MHz~1 GHz Spurious Emissions .Quasi-Peak Measurement

Vertical:

Peak scan

Level (dBμV/m)



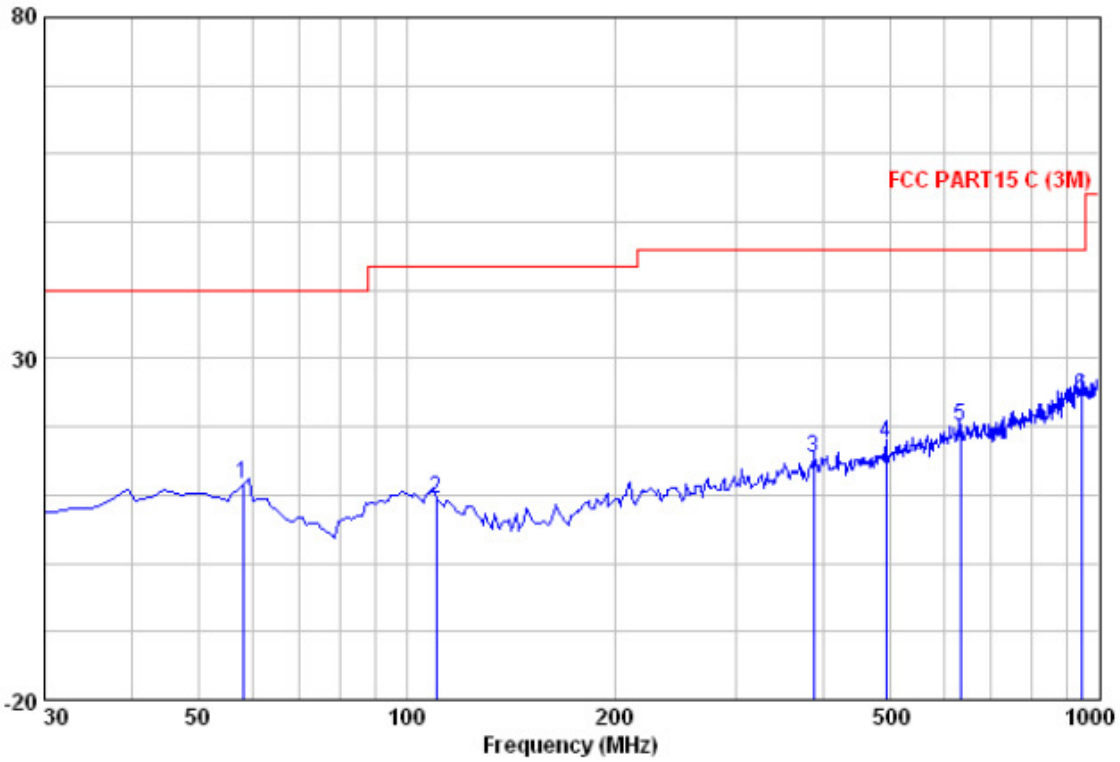
Quasi-peak measurement

Freq	ReadAntenna Level	Antenna Factor	Cable Loss	Preamp Factor	Level	Limit Line	Over Limit	Remark
MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB	
54.250	26.68	13.05	0.70	29.52	10.91	40.00	-29.09	QP
100.810	26.48	13.06	0.90	29.70	10.74	43.50	-32.76	QP
190.050	28.10	10.56	1.20	29.54	10.32	43.50	-33.18	QP
495.600	27.32	16.52	2.05	29.50	16.38	46.00	-29.62	QP
638.190	29.15	18.59	2.40	29.36	20.78	46.00	-25.22	QP
946.650	29.57	21.40	2.90	27.93	25.95	46.00	-20.05	QP

Horizontal:

Peak scan

Level (dBμV/m)



Quasi-peak measurement

Freq	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Level	Limit Line	Over Limit	Remark
MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB	
58.130	27.72	12.82	0.70	29.54	11.69	40.00	-28.31	QP
110.510	26.14	12.15	0.90	29.70	9.48	43.50	-34.02	QP
387.930	28.46	14.78	1.80	29.60	15.44	46.00	-30.56	QP
492.690	28.63	16.39	2.05	29.51	17.57	46.00	-28.43	QP
631.400	28.58	18.57	2.40	29.37	20.18	46.00	-25.82	QP
943.740	28.17	21.37	2.90	27.95	24.49	46.00	-21.51	QP

1~25 GHz Harmonics & Spurious Emissions. Peak & Average Measurement

Peak Measurement:

Frequency (MHz)	Reading Level (dBμV)	Antenna factors (dB/m)	Cable loss (dB)	Preamp factor (dB)	Emission Level (dBμV/m)	Limit (dBμV/m)	Antenna polarization
4824.00	46.87	31.54	7.65	34.30	51.76	74	V
7236.00	39.08	36.48	8.80	34.30	50.06	74	V
4824.00	47.95	31.54	7.65	34.30	52.84	74	H
7236.00	37.72	36.48	8.80	34.30	48.70	74	H

Average Measurement:

Frequency (MHz)	Reading Level (dBμV)	Antenna factors (dB/m)	Cable loss (dB)	Preamp factor (dB)	Emission Level (dBμV/m)	Limit (dBμV/m)	Antenna polarization
4824.00	44.19	31.54	7.65	34.30	49.08	54	V
7236.00	37.12	36.48	8.80	34.30	48.10	54	V
4824.00	44.28	31.54	7.65	34.30	49.17	54	H
7236.00	36.24	36.48	8.80	34.30	47.22	54	H

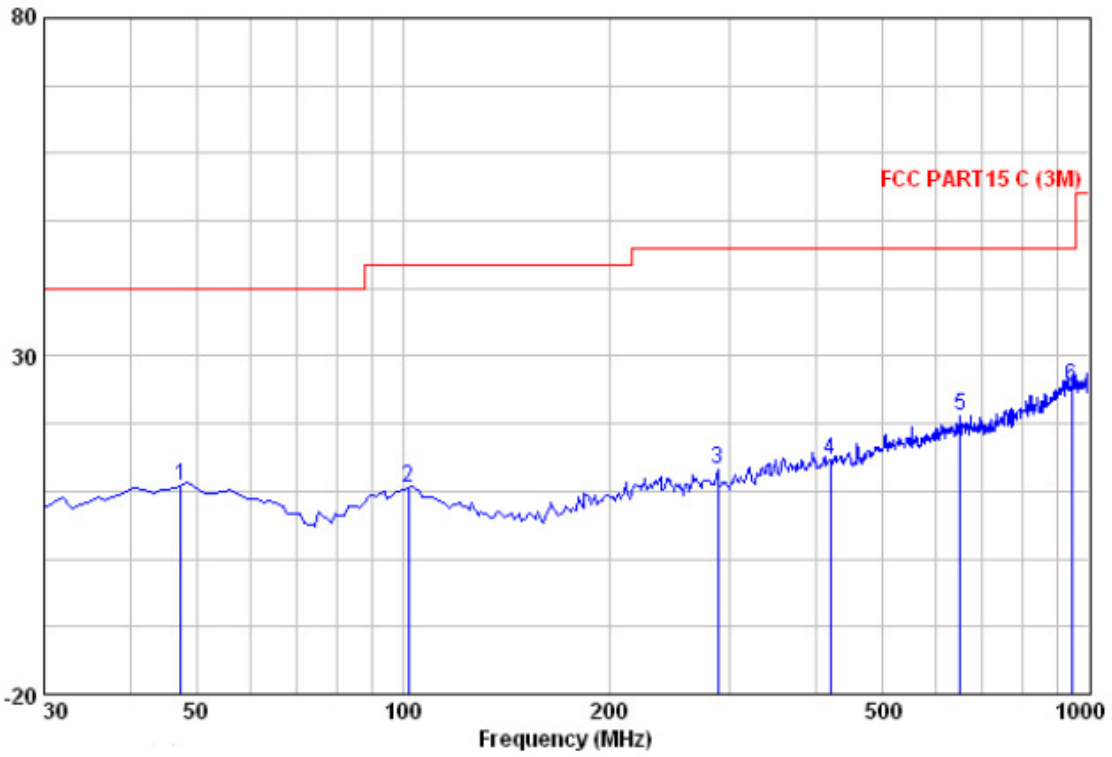
Test at Channel 6 (2.437 GHz) in transmitting status

30 MHz~1 GHz Spurious Emissions .Quasi-Peak Measurement

Vertical:

Peak scan

Level (dBμV/m)



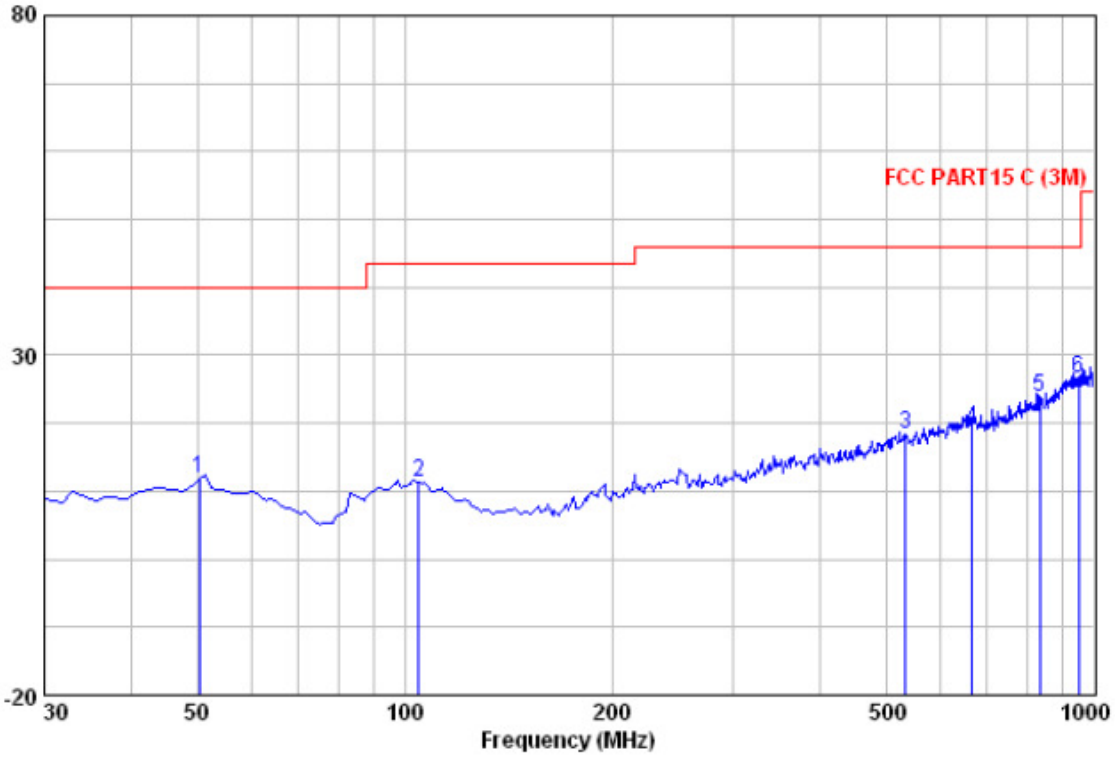
Quasi-peak measurement

Freq	ReadAntenna Level	Factor	Cable Loss	Preamp Factor	Level	Limit Line	Over Limit	Remark
MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB	
47.460	26.07	13.41	0.70	29.50	10.67	40.00	-29.33	QP
101.780	26.27	12.97	0.90	29.70	10.44	43.50	-33.06	QP
288.020	28.36	12.84	1.50	29.59	13.11	46.00	-32.89	QP
419.940	26.87	15.47	1.90	29.58	14.66	46.00	-31.34	QP
648.860	29.59	18.64	2.40	29.35	21.28	46.00	-24.72	QP
943.740	29.22	21.37	2.90	27.95	25.54	46.00	-20.46	QP

Horizontal:

Peak scan

Level (dBμV/m)



Quasi-peak measurement

Freq	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Level	Limit Line	Over Limit	Remark
MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB	
50.370	27.34	13.24	0.70	29.50	11.78	40.00	-28.22	QP
104.690	27.29	12.73	0.90	29.70	11.22	43.50	-32.28	QP
532.460	28.56	17.26	2.20	29.47	18.55	46.00	-27.45	QP
665.350	27.35	18.69	2.50	29.33	19.22	46.00	-26.78	QP
835.100	29.55	20.42	2.70	28.85	23.81	46.00	-22.19	QP
950.530	30.08	21.43	2.90	27.87	26.54	46.00	-19.46	QP

1~25 GHz Harmonics & Spurious Emissions. Peak & Average Measurement

Peak Measurement:

Frequency (MHz)	Reading Level (dBμV)	Antenna factors (dB/m)	Cable loss (dB)	Preamp factor (dB)	Emission Level (dBμV/m)	Limit (dBμV/m)	Antenna polarization
4874.00	46.29	31.57	7.75	34.30	51.31	74.00	V
7311.00	39.08	36.49	8.80	34.30	50.07	74.00	V
4874.00	44.45	31.57	7.75	34.30	49.47	74.00	H
7311.00	39.70	36.49	8.80	34.30	50.69	74.00	H

Average Measurement:

Frequency (MHz)	Reading Level (dBμV)	Antenna factors (dB/m)	Cable loss (dB)	Preamp factor (dB)	Emission Level (dBμV/m)	Limit (dBμV/m)	Antenna polarization
4874.00	44.13	31.57	7.75	34.30	49.15	54.00	V
7311.00	37.46	36.49	8.80	34.30	48.45	54.00	V
4874.00	42.22	31.57	7.75	34.30	47.24	54.00	H
7311.00	37.46	36.49	8.80	34.30	48.45	54.00	H

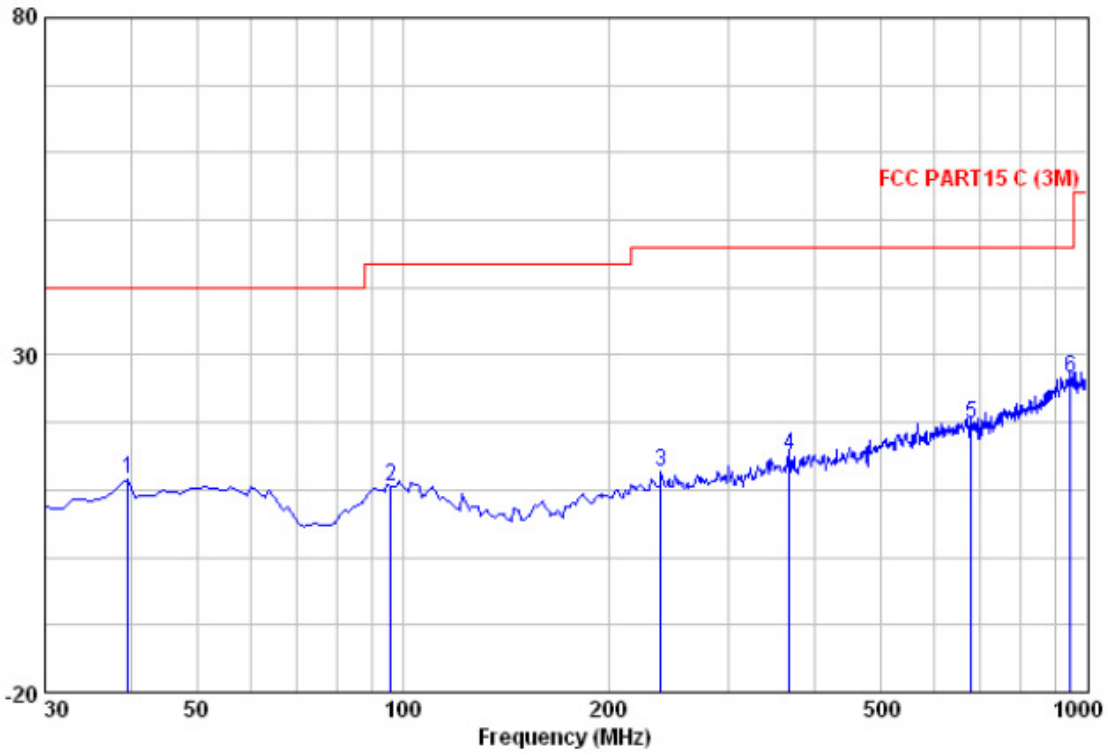
Test at Channel 11 (2.462 GHz) in transmitting status

30 MHz~1 GHz Spurious Emissions .Quasi-Peak Measurement

Vertical:

Peak scan

Level (dBμV/m)



Quasi-peak measurement

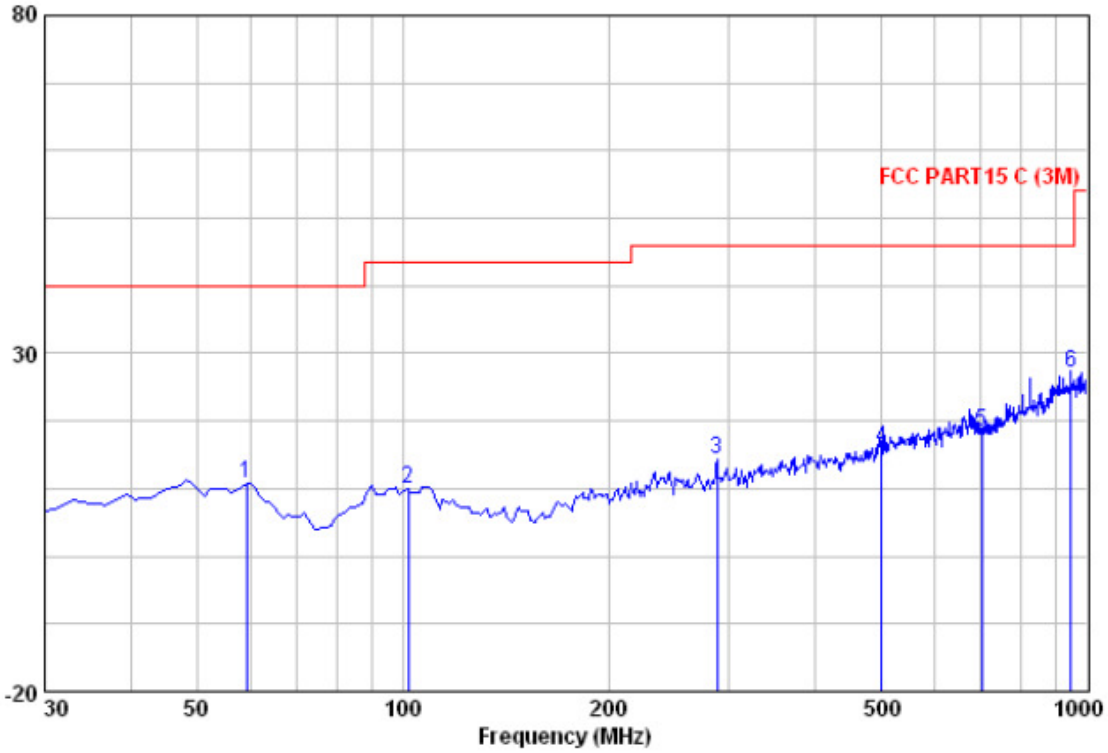
:

Freq	ReadAnterna Level	Factor	Cable Loss	Preamp Factor	Level	Limit Line	Over Limit	Remark
MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB	
39.700	27.24	13.49	0.50	29.50	11.72	40.00	-28.28	QP
95.960	26.52	12.90	0.90	29.69	10.63	43.50	-32.87	QP
238.550	28.88	11.99	1.30	29.54	12.62	46.00	-33.38	QP
367.560	28.43	14.49	1.70	29.60	15.02	46.00	-30.98	QP
678.930	27.87	18.74	2.50	29.32	19.79	46.00	-26.21	QP
946.650	30.18	21.40	2.90	27.93	26.55	46.00	-19.45	QP

Horizontal:

Peak scan

Level (dBμV/m)



Quasi-peak measurement

Freq	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Level	Limit Line	Over Limit	Remark
MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB	
59.100	26.85	12.75	0.70	29.55	10.75	40.00	-29.25	QP
101.780	25.80	12.97	0.90	29.70	9.97	43.50	-33.53	QP
288.020	29.64	12.84	1.50	29.59	14.39	46.00	-31.61	QP
501.420	26.63	16.63	2.10	29.50	15.87	46.00	-30.13	QP
702.210	26.35	18.81	2.50	29.30	18.37	46.00	-27.63	QP
946.650	30.67	21.40	2.90	27.93	27.04	46.00	-18.96	QP

1~25 GHz Harmonics & Spurious Emissions. Peak & Average Measurement

Peak Measurement:

Frequency (MHz)	Reading Level (dBμV)	Antenna factors (dB/m)	Cable loss (dB)	Preamp factor (dB)	Emission Level (dBμV/m)	Limit (dBμV/m)	Antenna polarization
4924.00	43.68	31.65	7.80	34.30	48.83	74.00	V
7386.00	39.75	36.54	8.90	34.30	50.89	74.00	V
4924.00	44.68	31.65	7.80	34.30	49.83	74.00	H
7386.00	40.75	36.54	8.90	34.30	51.89	74.00	H

Average Measurement:

Frequency (MHz)	Reading Level (dBμV)	Antenna factors (dB/m)	Cable loss (dB)	Preamp factor (dB)	Emission Level (dBμV/m)	Limit (dBμV/m)	Antenna polarization
4924.00	42.05	31.65	7.80	34.30	47.20	54.00	V
7386.00	38.48	36.54	8.90	34.30	49.62	54.00	V
4924.00	42.05	31.65	7.80	34.30	47.20	54.00	H
7386.00	38.48	36.54	8.90	34.30	49.62	54.00	H

The field strength is calculated by adding the Antenna Factor. Cable Factor & Preamplifier. The basic equation with a sample calculation is as follows:

Final Test Level =Receiver Reading + Antenna Factor + Cable Loss –Preamplifier Factor.

As shown in Section, for frequencies above 1000 MHz. the above field strength limits are based on average limits. However, the peak field strength of any emission shall not exceed the maximum permitted average limits specified above by more than 20 dB under any condition of modulation.

No any other emissions level which are attenuated less than 20dB below the limit.

According to 15.31(o), The amplitude of spurious emissions from intentional radiators and emissions from unintentional radiators which are attenuated more than 20 dB below the permissible value need not be reported unless specifically required elsewhere in this Part.

Hence there no other emissions have been reported.

7.7.1.2 802.11g mode with 54Mbps data rate

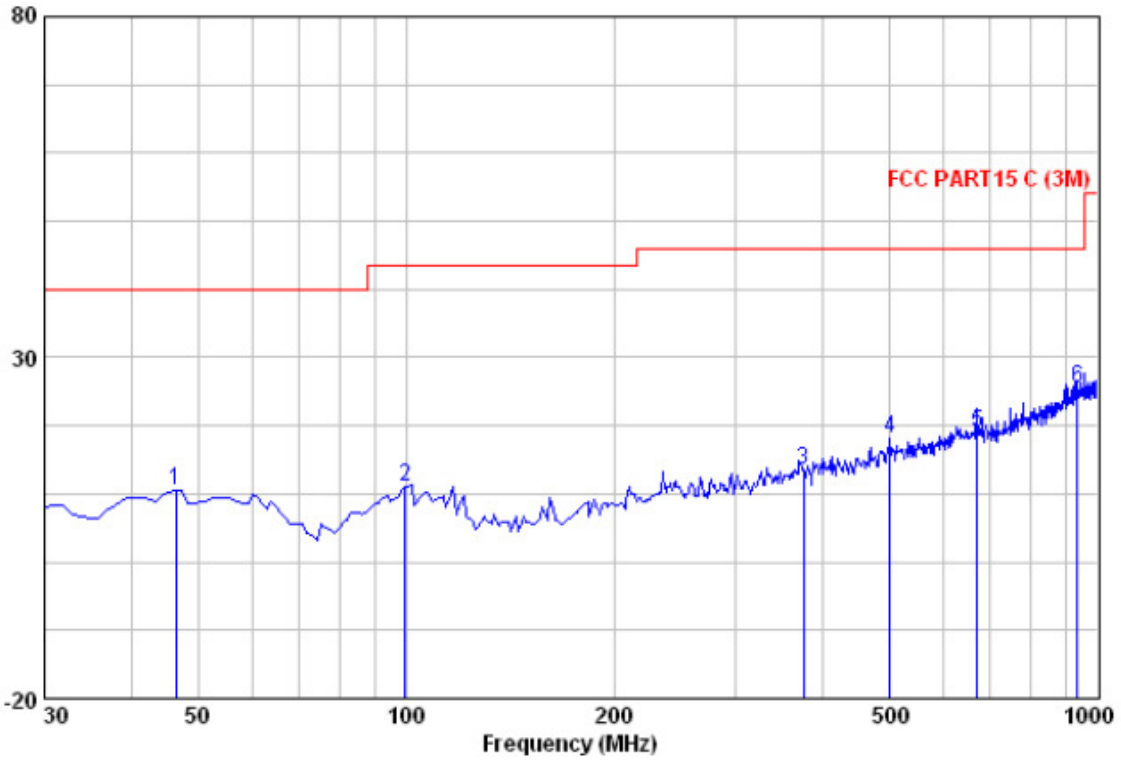
Test at Channel 1 (2.412 GHz) in transmitting status

30 MHz~1 GHz Spurious Emissions .Quasi-Peak Measurement

Vertical:

Peak scan

Level (dBμV/m)



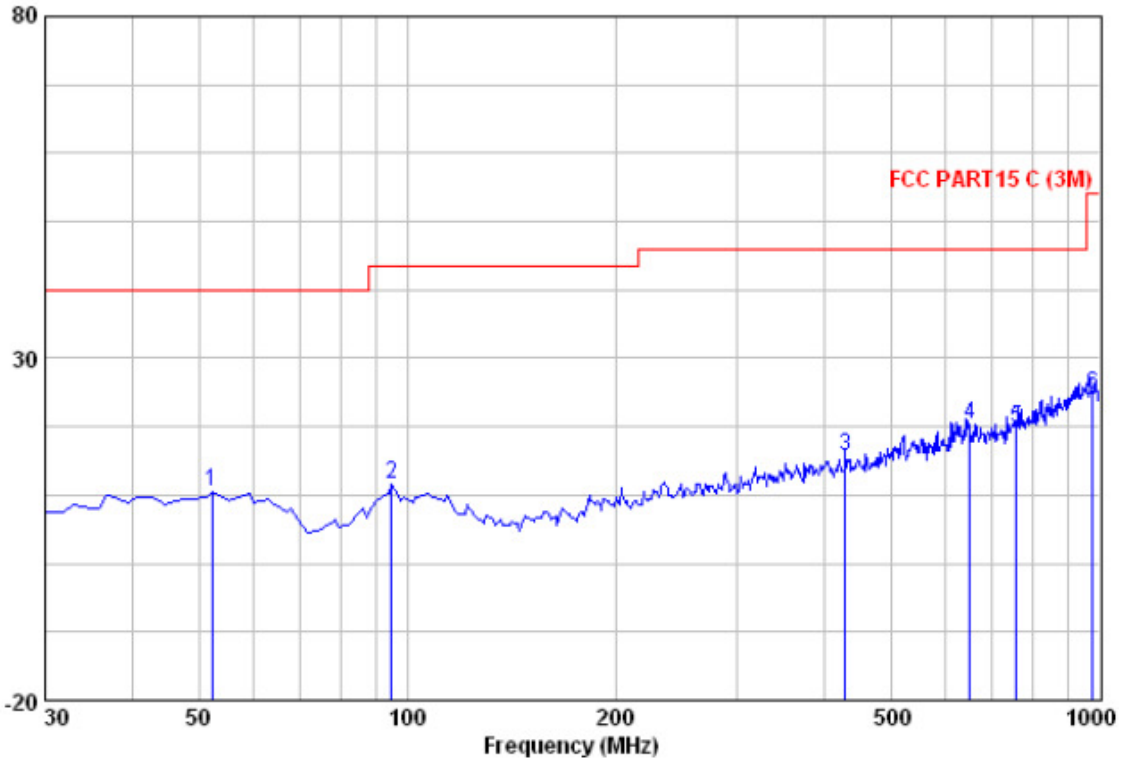
Quasi-peak measurement

Freq	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Level	Limit Line	Over Limit	Remark
MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB	
46.490	25.79	13.46	0.70	29.50	10.45	40.00	-29.55	QP
99.840	26.65	13.16	0.90	29.70	11.01	43.50	-32.49	QP
375.320	26.98	14.56	1.70	29.60	13.63	46.00	-32.37	QP
501.420	29.03	16.63	2.10	29.50	18.27	46.00	-27.73	QP
669.230	26.96	18.71	2.50	29.33	18.83	46.00	-27.17	QP
936.950	29.28	21.34	2.90	28.00	25.52	46.00	-20.48	QP

Horizontal:

Peak scan

Level (dBμV/m)



Quasi-peak measurement

Freq	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Level	Limit Line	Over Limit	Remark
MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB	
52.310	26.10	13.15	0.70	29.51	10.44	40.00	-29.56	QP
94.990	27.63	12.84	0.90	29.69	11.69	43.50	-31.81	QP
429.640	27.83	15.51	1.90	29.57	15.67	46.00	-30.33	QP
648.860	28.52	18.64	2.40	29.35	20.21	46.00	-25.79	QP
758.470	26.82	19.53	2.60	29.24	19.72	46.00	-26.28	QP
976.720	27.77	21.59	3.00	27.69	24.67	54.00	-29.33	QP

1~25 GHz Harmonics & Spurious Emissions. Peak & Average Measurement

Peak Measurement:

Frequency (MHz)	Reading Level (dBμV)	Antenna factors (dB/m)	Cable loss (dB)	Preamp factor (dB)	Emission Level (dBμV/m)	Limit (dBμV/m)	Antenna polarization
4824.00	45.64	31.54	7.65	34.30	50.53	74.00	V
7236.00	39.78	36.48	8.80	34.30	50.76	74.00	V
4824.00	45.36	31.54	7.65	34.30	50.25	74.00	H
7236.00	37.11	36.48	8.80	34.30	48.09	74.00	H

Average Measurement:

Frequency (MHz)	Reading Level (dBμV)	Antenna factors (dB/m)	Cable loss (dB)	Preamp factor (dB)	Emission Level (dBμV/m)	Limit (dBμV/m)	Antenna polarization
4824.00	42.51	31.54	7.65	34.30	47.40	54.00	V
7236.00	36.54	36.48	8.80	34.30	47.52	54.00	V
4824.00	42.35	31.54	7.65	34.30	47.24	54.00	H
7236.00	34.25	36.48	8.80	34.30	45.23	54.00	H

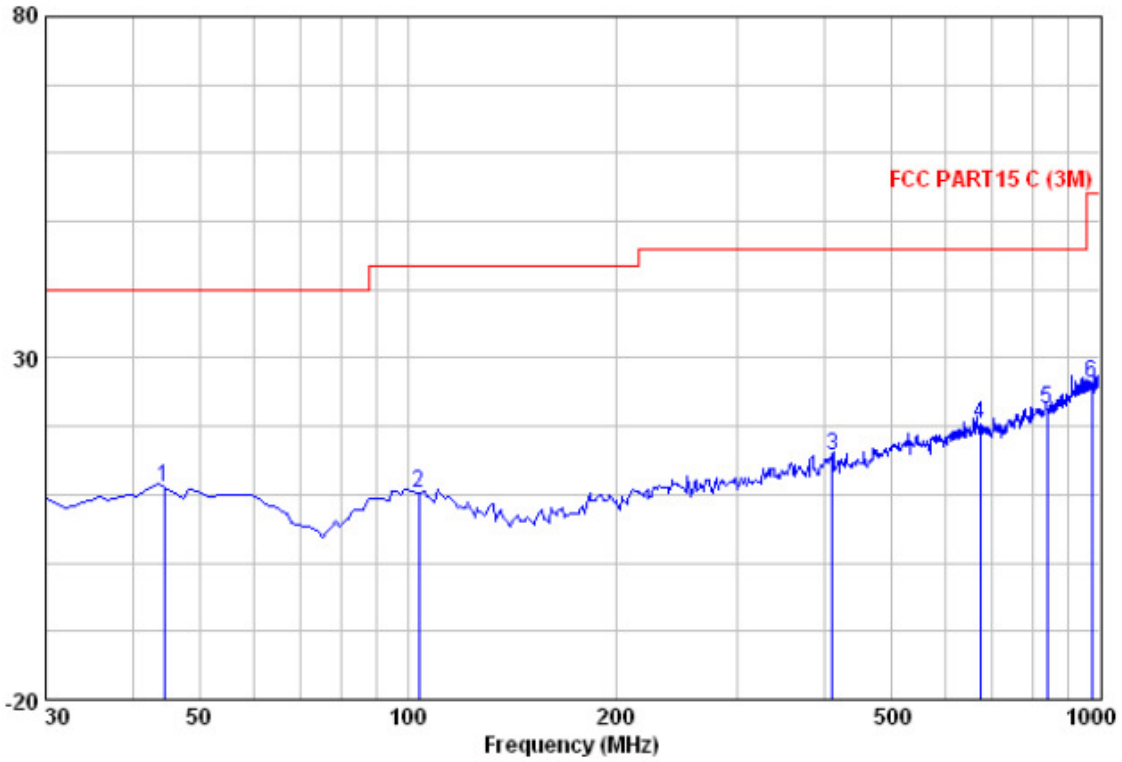
Test at Channel 6 (2.437GHz) in transmitting status

30 MHz~1 GHz Spurious Emissions .Quasi-Peak Measurement

Vertical:

Peak scan

Level (dBμV/m)



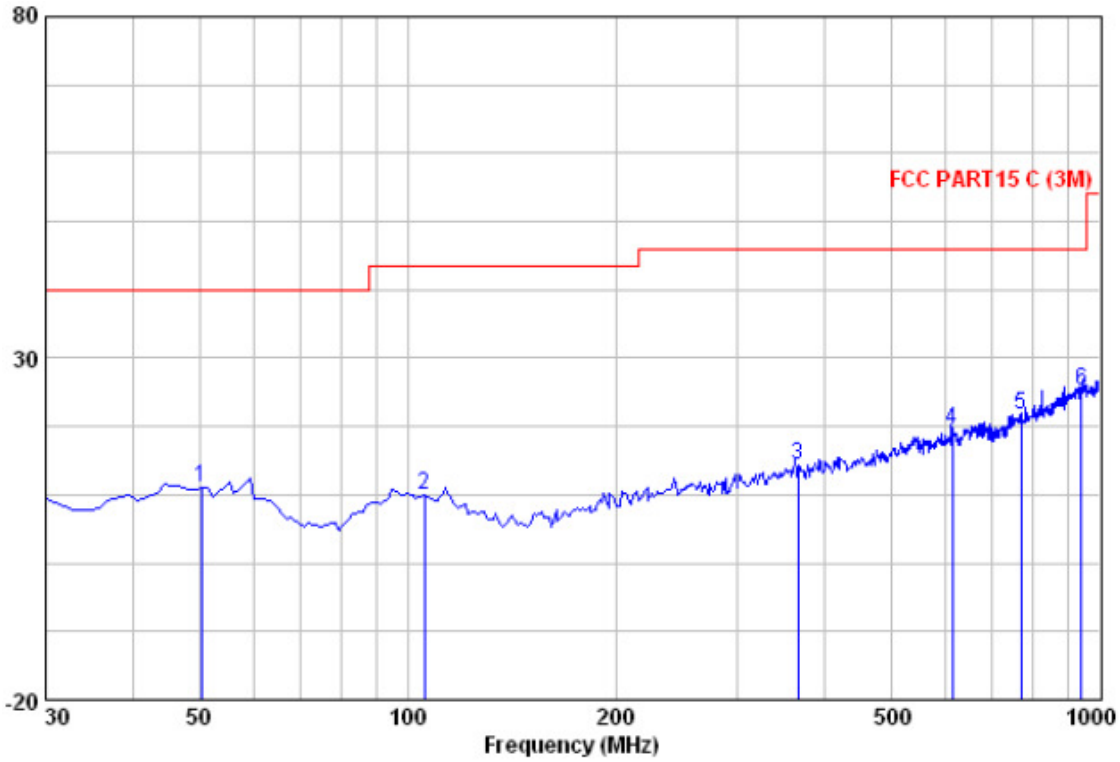
Quasi-peak measurement

Freq	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Level	Limit Line	Over Limit	Remark
MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB	
44.550	26.48	13.55	0.60	29.50	11.13	40.00	-28.87	QP
103.720	26.28	12.82	0.90	29.70	10.30	43.50	-33.20	QP
411.210	28.16	15.31	1.90	29.59	15.78	46.00	-30.22	QP
672.140	28.36	18.72	2.50	29.33	20.25	46.00	-25.75	QP
840.920	27.99	20.51	2.70	28.80	22.40	46.00	-23.60	QP
972.840	29.45	21.55	3.00	27.71	26.29	54.00	-27.71	QP

Horizontal:

Peak scan

Level (dBμV/m)



Quasi-peak measurement

Freq	ReadAntenna Level	Antenna Factor	Cable Loss	Preamp Factor	Level	Limit Line	Over Limit	Remark
MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB	
50.370	26.49	13.24	0.70	29.50	10.93	40.00	-29.07	QP
105.660	26.06	12.63	0.90	29.70	9.90	43.50	-33.60	QP
366.590	27.70	14.48	1.70	29.60	14.28	46.00	-31.72	QP
612.000	28.17	18.50	2.30	29.39	19.58	46.00	-26.42	QP
771.080	28.54	19.72	2.60	29.23	21.64	46.00	-24.36	QP
940.830	28.93	21.37	2.90	27.95	25.24	46.00	-20.76	QP

1~25 GHz Harmonics & Spurious Emissions. Peak & Average Measurement

Peak Measurement:

Frequency (MHz)	Reading Level (dBμV)	Antenna factors (dB/m)	Cable loss (dB)	Preamp factor (dB)	Emission Level (dBμV/m)	Limit (dBμV/m)	Antenna polarization
4874.00	45.05	31.57	7.75	34.30	50.07	74.00	V
7311.00	40.25	36.49	8.80	34.30	51.24	74.00	V
4874.00	46.73	31.57	7.75	34.30	51.75	74.00	H
7311.00	38.99	36.49	8.80	34.30	49.98	74.00	H

Average Measurement:

Frequency (MHz)	Reading Level (dBμV)	Antenna factors (dB/m)	Cable loss (dB)	Preamp factor (dB)	Emission Level (dBμV/m)	Limit (dBμV/m)	Antenna polarization
4874.00	42.52	31.57	7.75	34.30	47.54	54.00	V
7311.00	37.57	36.49	8.80	34.30	48.56	54.00	V
4874.00	42.66	31.57	7.75	34.30	47.68	54.00	H
7311.00	35.42	36.49	8.80	34.30	46.41	54.00	H

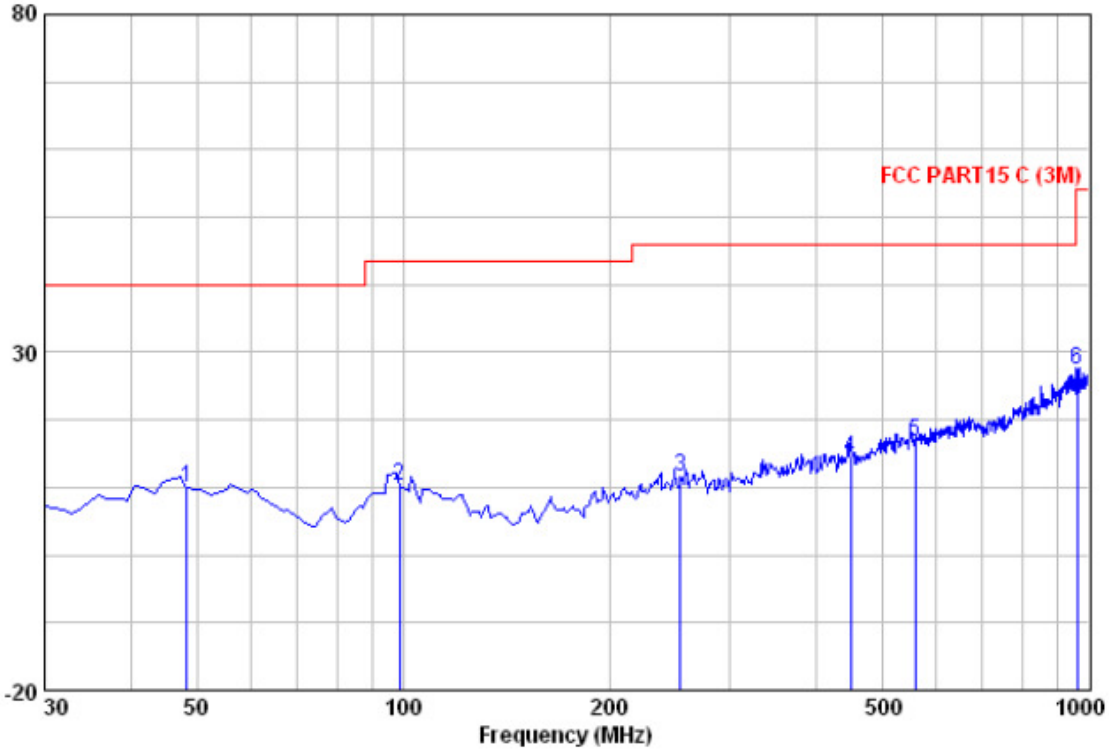
Test at Channel 11 (2.462 GHz) in transmitting status

30 MHz~1 GHz Spurious Emissions .Quasi-Peak Measurement

Vertical:

Peak scan

Level (dBμV/m)



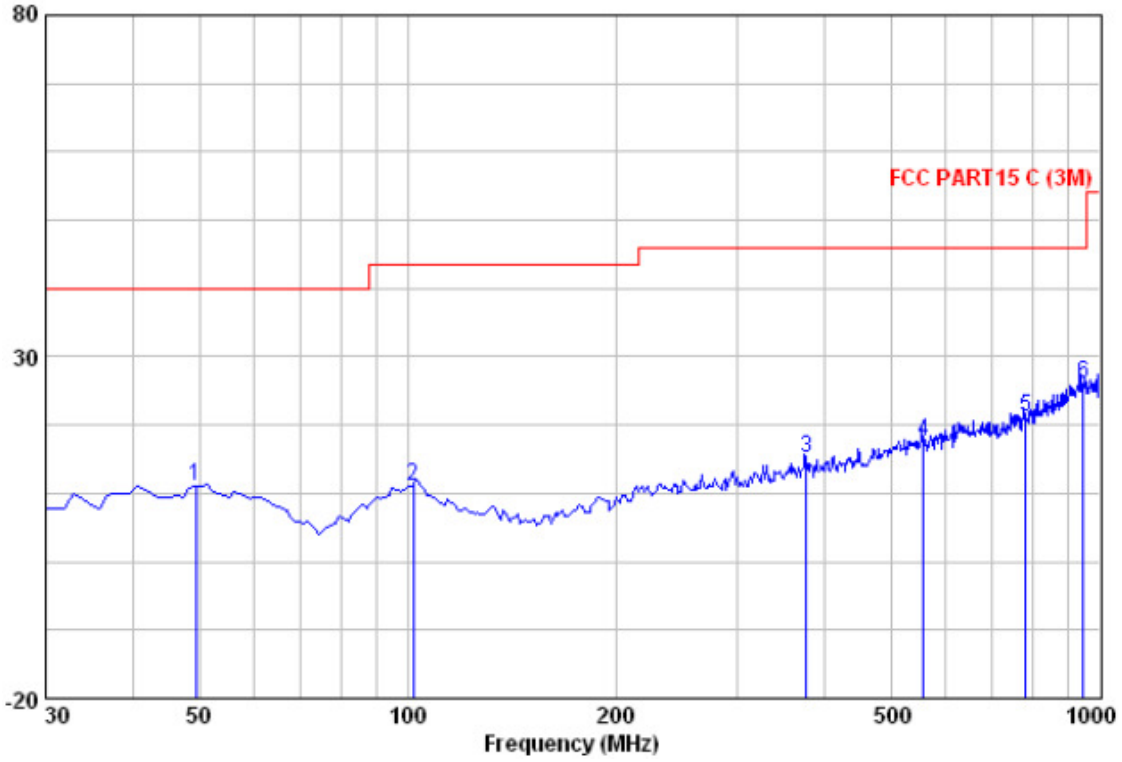
Quasi-peak measurement

Freq	ReadAntenna Level	Antenna Factor	Cable Loss	Preamp Factor	Level	Limit Line	Over Limit	Remark
MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB	
48.430	25.47	13.35	0.70	29.50	10.02	40.00	-29.98	QP
98.870	25.87	13.10	0.90	29.70	10.17	43.50	-33.33	QP
254.070	27.77	12.06	1.40	29.56	11.68	46.00	-34.32	QP
449.040	26.41	15.57	2.00	29.55	14.44	46.00	-31.56	QP
557.680	26.33	17.72	2.20	29.44	16.81	46.00	-29.19	QP
963.140	30.74	21.49	2.90	27.79	27.34	54.00	-26.66	QP

Horizontal:

Peak scan

Level (dBμV/m)



Quasi-peak measurement

Freq	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Level	Limit Line	Over Limit	Remark
MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB	
49.400	26.48	13.29	0.70	29.50	10.98	40.00	-29.02	QP
101.780	26.94	12.97	0.90	29.70	11.11	43.50	-32.39	QP
377.260	28.30	14.57	1.75	29.60	15.02	46.00	-30.98	QP
555.740	27.19	17.67	2.20	29.44	17.62	46.00	-28.38	QP
782.720	27.77	19.87	2.60	29.22	21.02	46.00	-24.98	QP
946.650	29.67	21.40	2.90	27.93	26.04	46.00	-19.96	QP

1~25 GHz Harmonics & Spurious Emissions. Peak & Average Measurement

Peak Measurement:

Frequency (MHz)	Reading Level (dBμV)	Antenna factors (dB/m)	Cable loss (dB)	Preamp factor (dB)	Emission Level (dBμV/m)	Limit (dBμV/m)	Antenna polarization
4924.00	44.54	31.65	7.80	34.30	49.69	74.00	V
7386.00	39.10	36.54	8.90	34.30	50.24	74.00	V
4924.00	46.02	31.65	7.80	34.30	51.17	74.00	H
7386.00	40.42	36.54	8.90	34.30	51.56	74.00	H

Average Measurement:

Frequency (MHz)	Reading Level (dBμV)	Antenna factors (dB/m)	Cable loss (dB)	Preamp factor (dB)	Emission Level (dBμV/m)	Limit (dBμV/m)	Antenna polarization
4924.00	40.34	31.65	7.80	34.30	45.49	54.00	V
7386.00	37.48	36.54	8.90	34.30	48.62	54.00	V
4924.00	43.05	31.65	7.80	34.30	48.20	54.00	H
7386.00	36.16	36.54	8.90	34.30	47.30	54.00	H

The field strength is calculated by adding the Antenna Factor. Cable Factor & Preamplifier. The basic equation with a sample calculation is as follows:

Final Test Level =Receiver Reading + Antenna Factor + Cable Factor –Preamplifier Factor.

No any other emissions level which are attenuated less than 20dB below the limit.

According to 15.31(o), The amplitude of spurious emissions from intentional radiators and emissions from unintentional radiators which are attenuated more than 20 dB below the permissible value need not be reported unless specifically required elsewhere in this Part.

Hence there no other emissions have been reported.

7.7.1.3 802.11n(HT20) mode with 65Mbps data rate

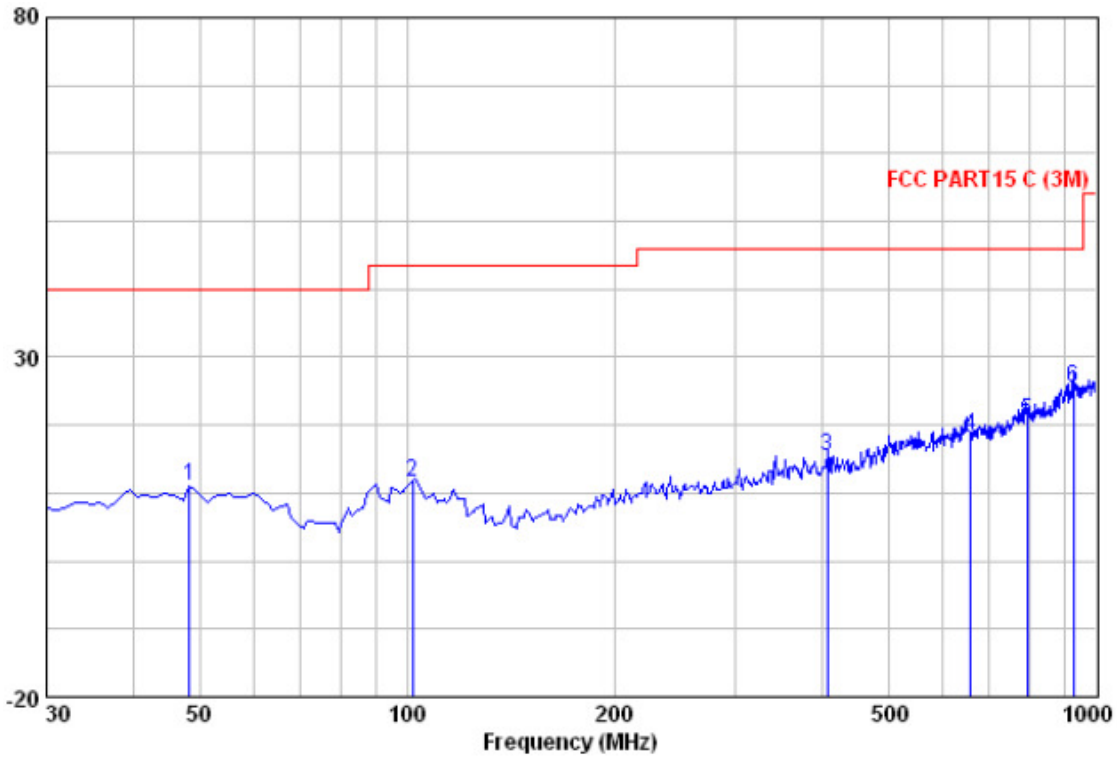
Test at Channel 1 (2.412 GHz) in transmitting status

30 MHz~1 GHz Spurious Emissions .Quasi-Peak Measurement

Vertical:

Peak scan

Level (dBμV/m)



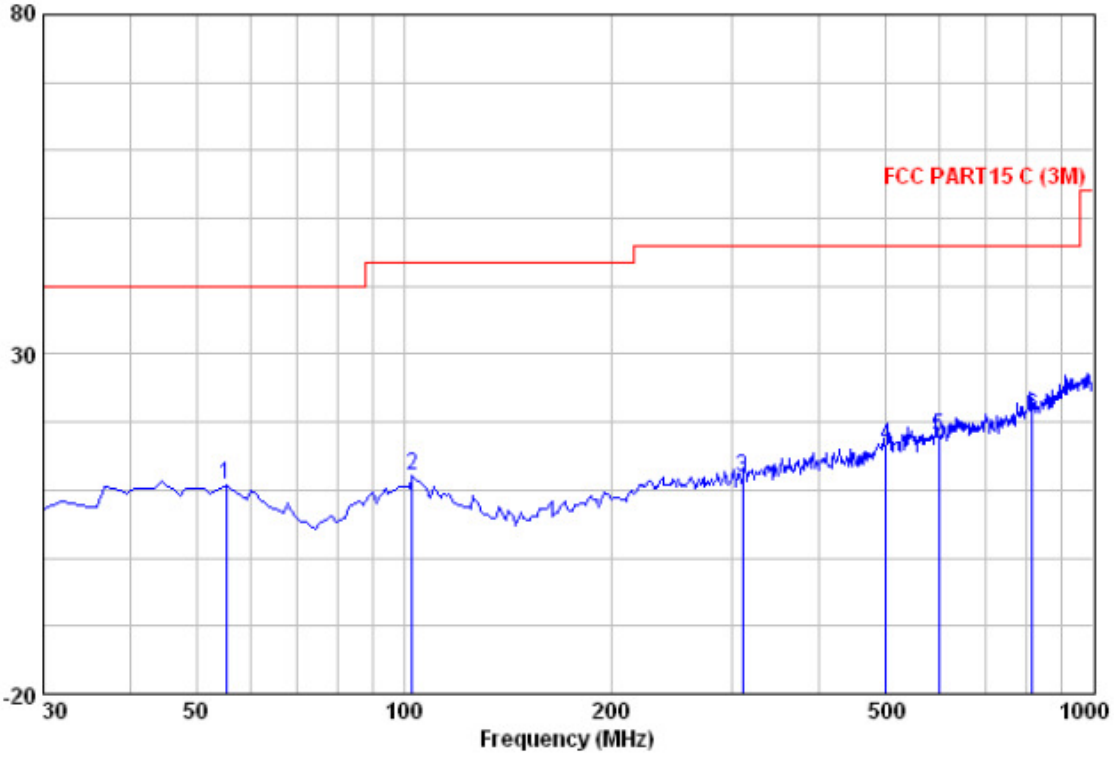
Quasi-peak measurement

Freq	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Level	Limit Line	Over Limit	Remark
MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB	
48.430	26.65	13.35	0.70	29.50	11.20	40.00	-28.80	QP
101.780	27.37	12.97	0.90	29.70	11.54	43.50	-31.96	QP
407.330	27.95	15.22	1.80	29.59	15.39	46.00	-30.61	QP
658.560	26.64	18.67	2.45	29.34	18.42	46.00	-27.58	QP
793.390	27.14	19.96	2.60	29.21	20.50	46.00	-25.50	QP
928.220	29.44	21.28	2.90	28.06	25.55	46.00	-20.45	QP

Horizontal:

Peak scan

Level (dBμV/m)



Quasi-peak measurement

Freq	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Level	Limit Line	Over Limit	Remark
MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB	
55.220	26.50	13.00	0.70	29.53	10.67	40.00	-29.33	QP
102.750	27.91	12.92	0.90	29.70	12.03	43.50	-31.47	QP
310.330	26.81	13.20	1.60	29.60	12.01	46.00	-33.99	QP
501.420	27.15	16.63	2.10	29.50	16.38	46.00	-29.62	QP
597.450	26.59	18.40	2.40	29.40	17.98	46.00	-28.02	QP
815.700	27.07	20.24	2.70	29.04	20.97	46.00	-25.03	QP

1~25 GHz Harmonics & Spurious Emissions. Peak & Average Measurement

Peak Measurement:

Frequency (MHz)	Reading Level (dBμV)	Antenna factors (dB/m)	Cable loss (dB)	Preamp factor (dB)	Emission Level (dBμV/m)	Limit (dBμV/m)	Antenna polarization
4824.00	54.94	31.54	7.65	34.30	59.83	74.00	V
7236.00	49.81	36.48	8.80	34.30	60.79	74.00	V
4824.00	52.05	31.54	7.65	34.30	56.94	74.00	H
7236.00	50.05	36.48	8.80	34.30	61.03	74.00	H

Average Measurement:

Frequency (MHz)	Reading Level (dBμV)	Antenna factors (dB/m)	Cable loss (dB)	Preamp factor (dB)	Emission Level (dBμV/m)	Limit (dBμV/m)	Antenna polarization
4824.00	36.94	31.54	7.65	34.30	41.83	54.00	V
7236.00	32.81	36.48	8.80	34.30	43.79	54.00	V
4824.00	38.05	31.54	7.65	34.30	42.94	54.00	H
7236.00	34.05	36.48	8.80	34.30	45.03	54.00	H

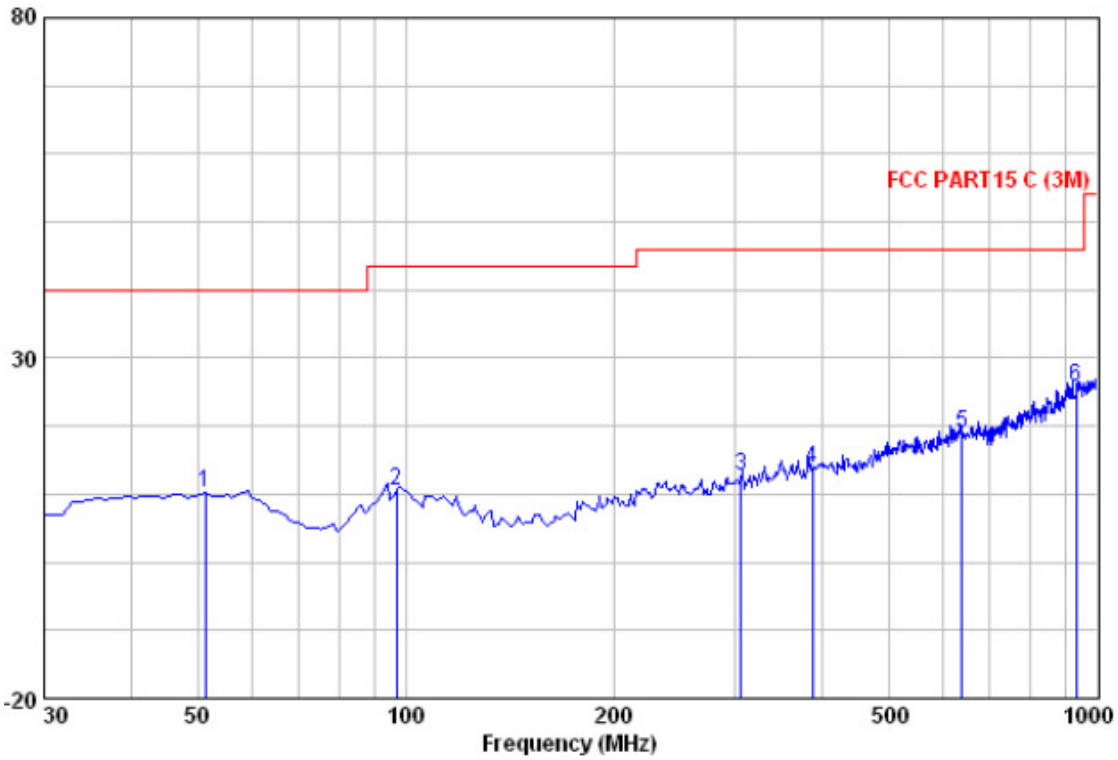
Test at Channel 6 (2.437 GHz) in transmitting status

30 MHz~1 GHz Spurious Emissions .Quasi-Peak Measurement

Vertical:

Peak scan

Level (dBμV/m)



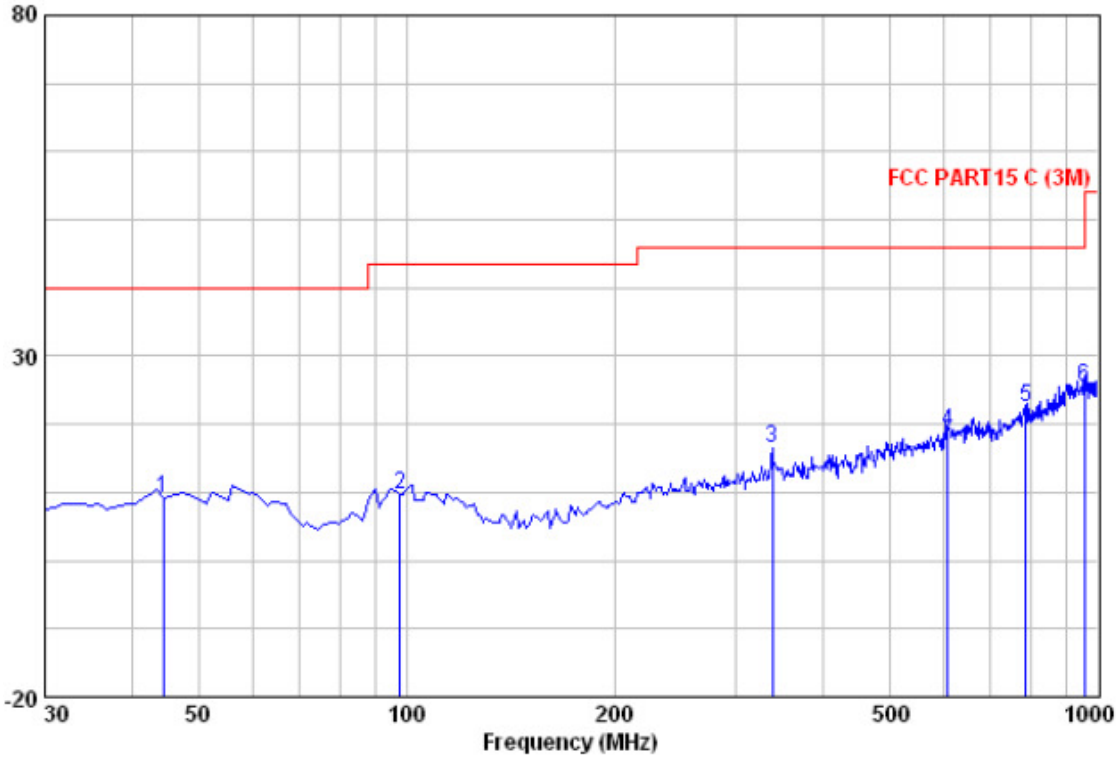
Quasi-peak measurement

Freq	ReadAnterna Level	Factor	Cable Loss	Preamp Factor	Level	Limit Line	Over Limit	Remark
MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB	
51.340	25.80	13.19	0.70	29.51	10.18	40.00	-29.82	QP
96.930	26.31	12.97	0.90	29.69	10.49	43.50	-33.01	QP
305.480	27.50	13.13	1.60	29.60	12.63	46.00	-33.37	QP
387.930	26.73	14.78	1.80	29.60	13.70	46.00	-32.30	QP
638.190	27.41	18.59	2.40	29.36	19.04	46.00	-26.96	QP
934.040	29.64	21.31	2.90	28.00	25.84	46.00	-20.16	QP

Horizontal:

Peak scan

Level (dBμV/m)



Quasi-peak measurement

Freq	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Level	Limit Line	Over Limit	Remark
MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB	
44.550	24.54	13.55	0.60	29.50	9.20	40.00	-30.80	QP
97.900	25.42	13.03	0.90	29.69	9.66	43.50	-33.84	QP
338.460	30.33	14.05	1.60	29.60	16.39	46.00	-29.61	QP
606.180	27.66	18.47	2.30	29.39	19.04	46.00	-26.96	QP
787.570	29.32	19.92	2.60	29.21	22.63	46.00	-23.37	QP
956.350	29.09	21.46	2.90	27.85	25.60	46.00	-20.40	QP

1~25 GHz Harmonics & Spurious Emissions. Peak & Average Measurement

Peak Measurement:

Frequency (MHz)	Reading Level (dBμV)	Antenna factors (dB/m)	Cable loss (dB)	Preamp factor (dB)	Emission Level (dBμV/m)	Limit (dBμV/m)	Antenna polarization
4874.00	49.71	31.57	7.75	34.30	54.73	74.00	V
7311.00	45.70	36.49	8.80	34.30	56.69	74.00	V
4874.00	45.09	31.57	7.75	34.30	50.11	74.00	H
7311.00	45.09	36.49	8.80	34.30	56.08	74.00	H

Average Measurement:

Frequency (MHz)	Reading Level (dBμV)	Antenna factors (dB/m)	Cable loss (dB)	Preamp factor (dB)	Emission Level (dBμV/m)	Limit (dBμV/m)	Antenna polarization
4874.00	39.71	31.57	7.75	34.30	44.73	54.00	V
7311.00	34.70	36.49	8.80	34.30	45.69	54.00	V
4874.00	36.09	31.57	7.75	34.30	41.11	54.00	H
7311.00	33.09	36.49	8.80	34.30	44.08	54.00	H

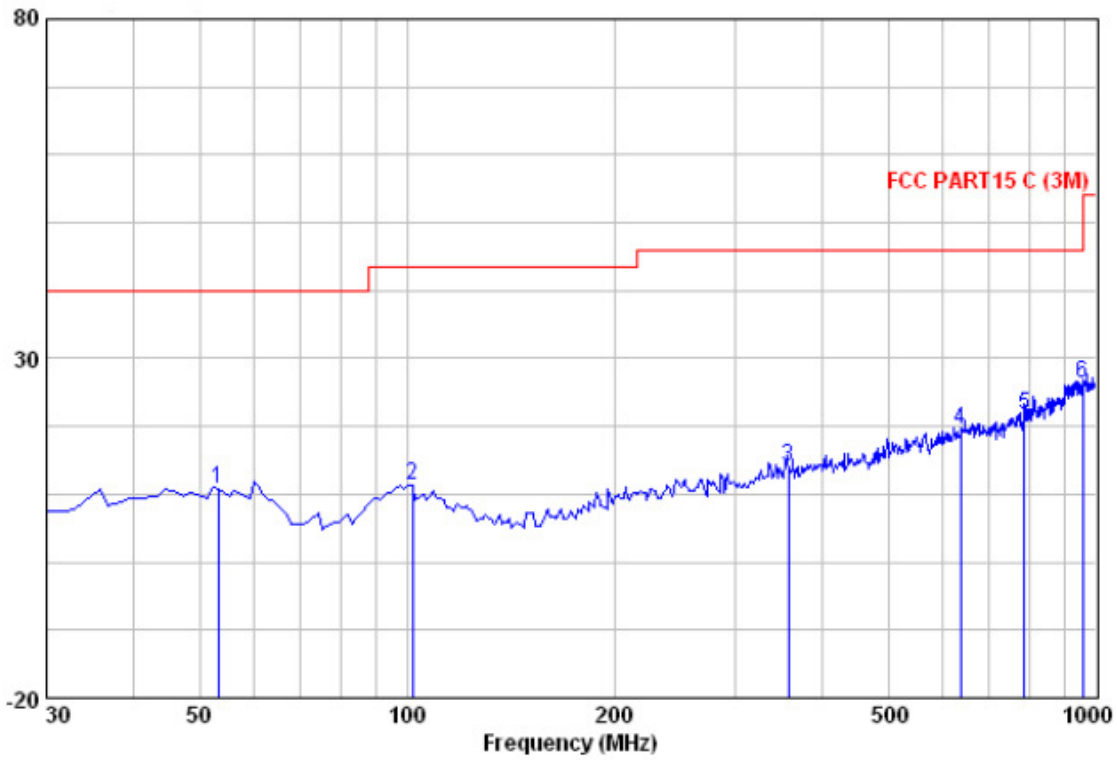
Test at Channel 11 (2.462 GHz) in transmitting status

30 MHz~1 GHz Spurious Emissions .Quasi-Peak Measurement

Vertical:

Peak scan

Level (dBμV/m)



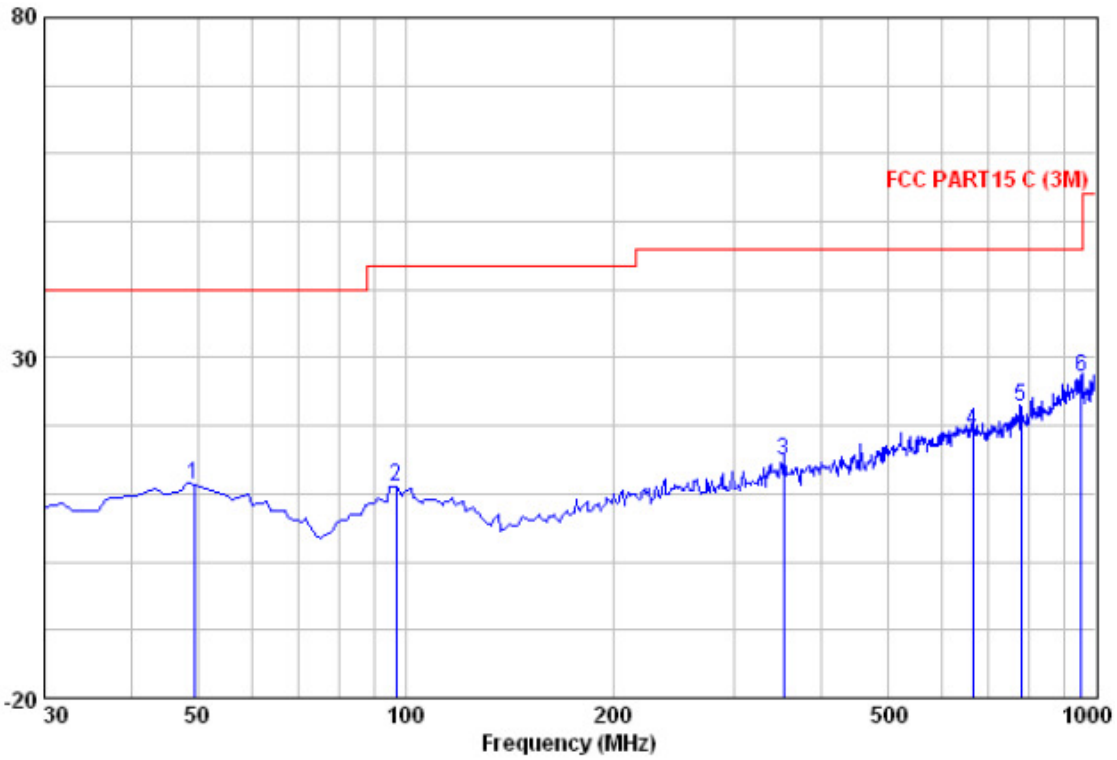
Quasi-peak measurement

Freq	ReadAnterna Level	Factor	Cable Loss	Preamp Factor	Level	Limit Line	Over Limit	Remark
MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB	
53.280	26.42	13.10	0.70	29.52	10.70	40.00	-29.30	QP
101.780	27.20	12.97	0.90	29.70	11.37	43.50	-32.13	QP
357.860	27.61	14.38	1.70	29.60	14.09	46.00	-31.91	QP
636.250	27.84	18.59	2.40	29.36	19.47	46.00	-26.53	QP
787.570	28.40	19.92	2.60	29.21	21.70	46.00	-24.30	QP
956.350	29.79	21.46	2.90	27.85	26.30	46.00	-19.70	QP

Horizontal:

Peak scan

Level (dBμV/m)



Quasi-peak measurement

Freq	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Level	Limit Line	Over Limit	Remark
MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB	
49.400	26.86	13.29	0.70	29.50	11.35	40.00	-28.65	QP
96.930	26.76	12.97	0.90	29.69	10.93	43.50	-32.57	QP
353.010	28.37	14.33	1.70	29.60	14.80	46.00	-31.20	QP
664.380	27.32	18.68	2.50	29.33	19.17	46.00	-26.83	QP
778.840	29.49	19.82	2.60	29.22	22.69	46.00	-23.31	QP
953.440	30.77	21.43	2.90	27.87	27.23	46.00	-18.77	QP

1~25 GHz Harmonics & Spurious Emissions. Peak & Average Measurement

Peak Measurement:

Frequency (MHz)	Reading Level (dBμV)	Antenna factors (dB/m)	Cable loss (dB)	Preamp factor (dB)	Emission Level (dBμV/m)	Limit (dBμV/m)	Antenna polarization
4924.00	46.11	31.65	7.80	34.30	51.26	74.00	V
7386.00	45.13	36.54	8.90	34.30	56.27	74.00	V
4924.00	45.82	31.65	7.80	34.30	50.97	74.00	H
7386.00	44.92	36.54	8.90	34.30	56.06	74.00	H

Average Measurement:

Frequency (MHz)	Reading Level (dBμV)	Antenna factors (dB/m)	Cable loss (dB)	Preamp factor (dB)	Emission Level (dBμV/m)	Limit (dBμV/m)	Antenna polarization
4924.00	40.11	31.65	7.80	34.30	45.26	54.00	V
7386.00	30.13	36.54	8.90	34.30	41.27	54.00	V
4924.00	36.82	31.65	7.80	34.30	41.97	54.00	H
7386.00	33.92	36.54	8.90	34.30	45.06	54.00	H

The field strength is calculated by adding the Antenna Factor. Cable Factor & Preamplifier. The basic equation with a sample calculation is as follows:

Final Test Level =Receiver Reading + Antenna Factor + Cable Loss –Preamplifier Factor.

As shown in Section, for frequencies above 1000 MHz. the above field strength limits are based on average limits. However, the peak field strength of any emission shall not exceed the maximum permitted average limits specified above by more than 20 dB under any condition of modulation.

No any other emissions level which are attenuated less than 20dB below the limit.

According to 15.31(o), The amplitude of spurious emissions from intentional radiators and emissions from unintentional radiators which are attenuated more than 20 dB below the permissible value need not be reported unless specifically required elsewhere in this Part.

Hence there no other emissions have been reported.

7.7.1.4 802.11n(HT40) mode with 130Mbps data rate

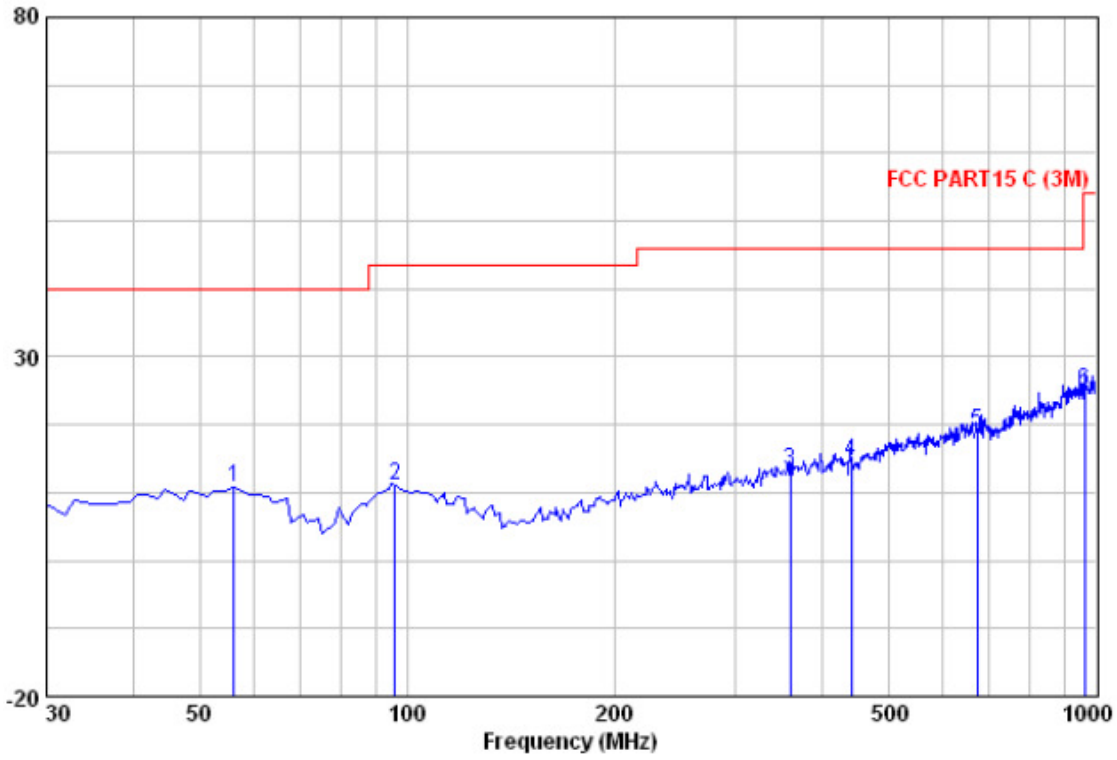
Test at Channel 3 (2.422 GHz) in transmitting status

30 MHz~1 GHz Spurious Emissions .Quasi-Peak Measurement

Vertical:

Peak scan

Level (dBμV/m)



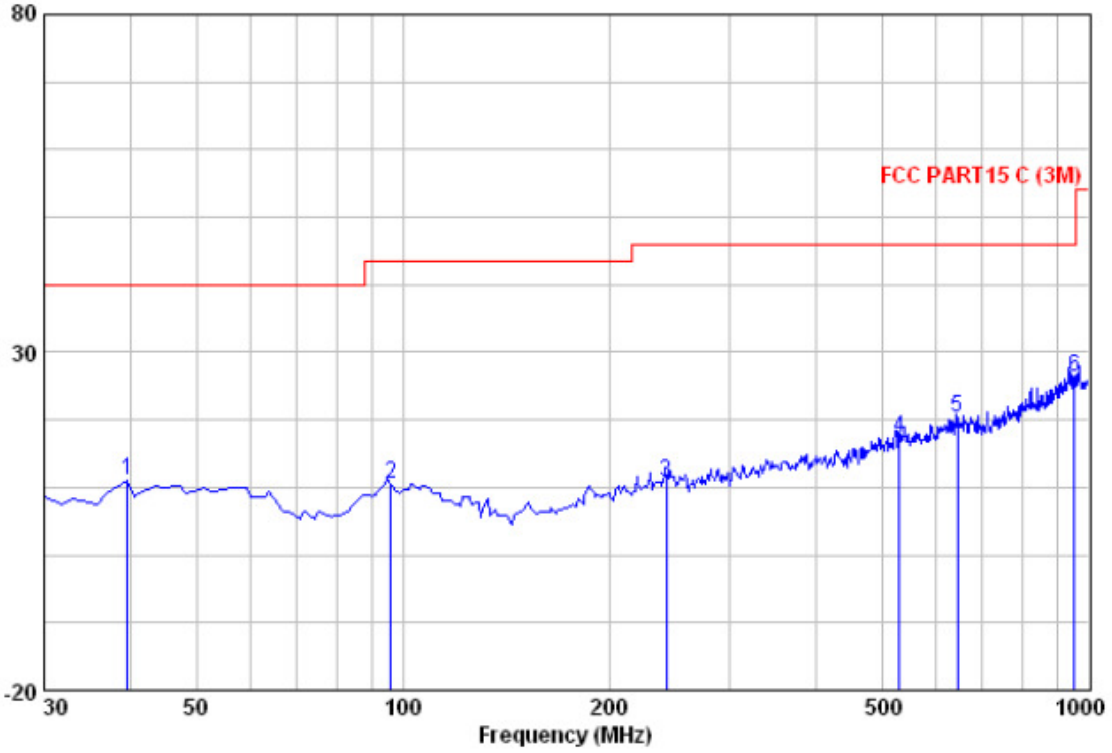
Quasi-peak measurement

Freq	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Level	Limit Line	Over Limit	Remark
MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB	
56.190	26.71	12.93	0.70	29.53	10.80	40.00	-29.20	QP
95.960	26.92	12.90	0.90	29.69	11.04	43.50	-32.46	QP
359.800	26.85	14.40	1.70	29.60	13.36	46.00	-32.64	QP
441.280	26.82	15.56	1.90	29.56	14.73	46.00	-31.27	QP
672.140	27.08	18.72	2.50	29.33	18.97	46.00	-27.03	QP
963.140	28.43	21.49	2.90	27.79	25.03	54.00	-28.97	QP

Horizontal:

Peak scan

Level (dBμV/m)



Quasi-peak measurement

Freq	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Level	Limit Line	Over Limit	Remark
MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB	
39.700	26.57	13.49	0.50	29.50	11.06	40.00	-28.94	QP
95.960	26.52	12.90	0.90	29.69	10.63	43.50	-32.87	QP
242.430	26.91	12.08	1.30	29.55	10.74	46.00	-35.26	QP
529.550	27.32	17.20	2.15	29.47	17.20	46.00	-28.80	QP
643.040	28.73	18.61	2.40	29.35	20.39	46.00	-25.61	QP
953.440	29.75	21.43	2.90	27.87	26.21	46.00	-19.79	QP

1~25 GHz Harmonics & Spurious Emissions. Peak & Average Measurement

Peak Measurement:

Frequency (MHz)	Reading Level (dBμV)	Antenna factors (dB/m)	Cable loss (dB)	Preamp factor (dB)	Emission Level (dBμV/m)	Limit (dBμV/m)	Antenna polarization
4844.00	47.85	31.56	7.70	34.30	52.81	74.00	V
7266.00	46.90	36.48	8.80	34.30	57.88	74.00	V
4844.00	45.14	31.56	7.70	34.30	50.10	74.00	H
7266.00	47.31	36.48	8.80	34.30	58.29	74.00	H

Average Measurement:

Frequency (MHz)	Reading Level (dBμV)	Antenna factors (dB/m)	Cable loss (dB)	Preamp factor (dB)	Emission Level (dBμV/m)	Limit (dBμV/m)	Antenna polarization
4844.00	41.85	31.56	7.70	34.30	46.81	54.00	V
7266.00	34.90	36.48	8.80	34.30	45.88	54.00	V
4844.00	41.14	31.56	7.70	34.30	46.10	54.00	H
7266.00	35.31	36.48	8.80	34.30	46.29	54.00	H

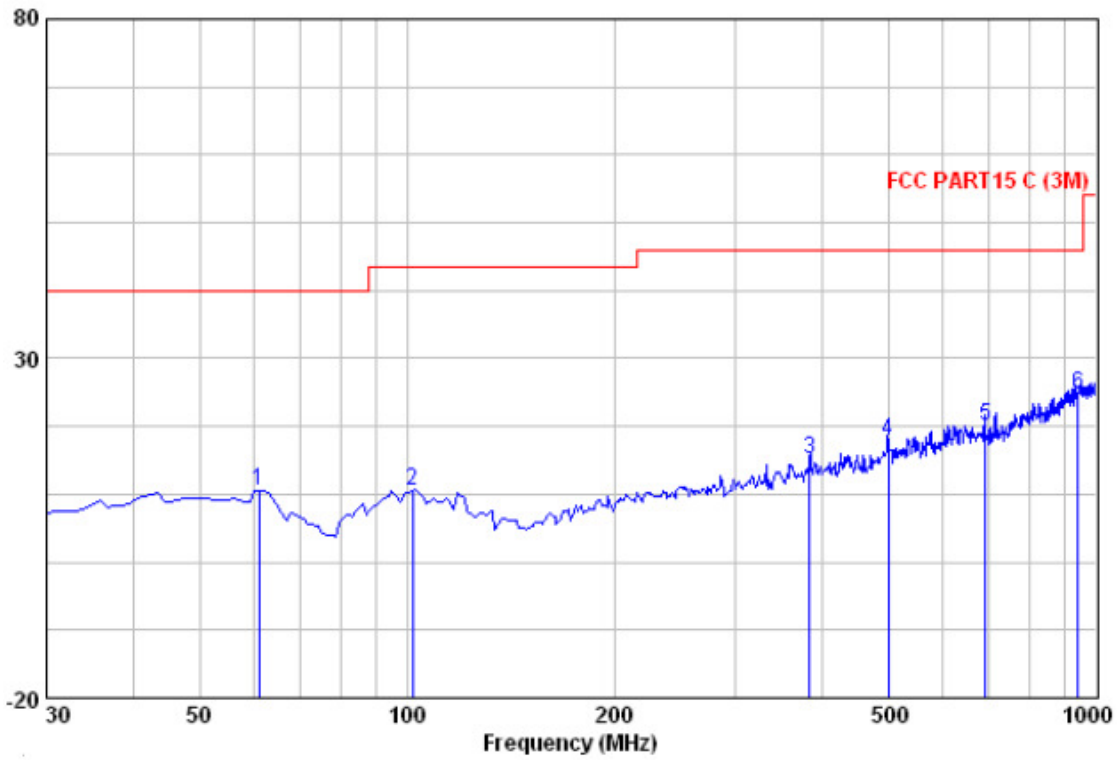
Test at Channel 6 (2.437 GHz) in transmitting status

30 MHz~1 GHz Spurious Emissions .Quasi-Peak Measurement

Vertical:

Peak scan

Level (dBμV/m)



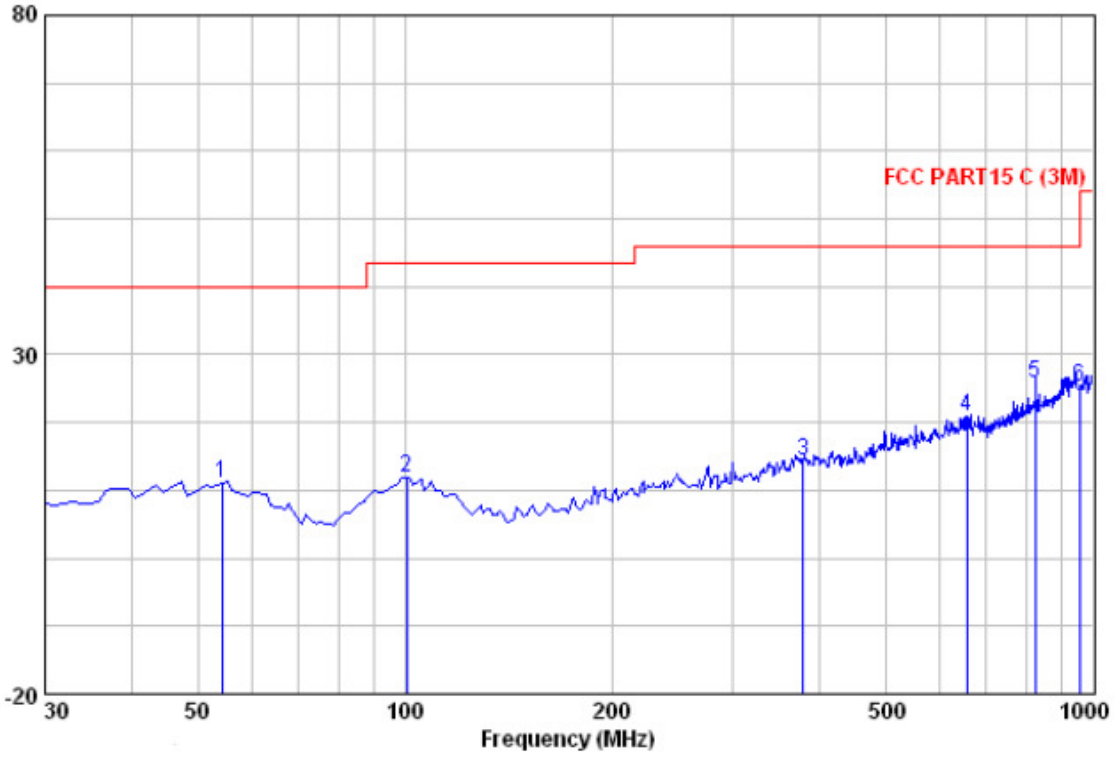
Quasi-peak measurement

Freq	ReadAntenna Level	Factor	Cable Loss	Preamp Factor	Level	Limit Line	Over Limit	Remark
MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB	
61.040	27.09	12.29	0.70	29.56	10.52	40.00	-29.48	QP
101.780	26.34	12.97	0.90	29.70	10.51	43.50	-32.99	QP
384.050	28.39	14.68	1.80	29.60	15.27	46.00	-30.73	QP
499.480	28.82	16.58	2.10	29.50	18.00	46.00	-28.00	QP
690.570	28.10	18.78	2.50	29.31	20.06	46.00	-25.94	QP
940.830	28.37	21.37	2.90	27.95	24.69	46.00	-21.31	QP

Horizontal:

Peak scan

Level (dBμV/m)



Quasi-peak measurement

Freq	ReadAntenna Level	Factor	Cable Loss	Preamp Factor	Level	Limit Line	Over Limit	Remark
MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB	
54.250	26.85	13.05	0.70	29.52	11.07	40.00	-28.93	QP
100.810	27.56	13.06	0.90	29.70	11.82	43.50	-31.68	QP
379.200	27.48	14.59	1.80	29.60	14.27	46.00	-31.73	QP
655.650	29.08	18.66	2.40	29.34	20.80	46.00	-25.20	QP
825.400	31.77	20.33	2.70	28.96	25.84	46.00	-20.16	QP
956.350	28.64	21.46	2.90	27.85	25.16	46.00	-20.84	QP

1~25 GHz Harmonics & Spurious Emissions. Peak & Average Measurement

Peak Measurement:

Frequency (MHz)	Reading Level (dBμV)	Antenna factors (dB/m)	Cable loss (dB)	Preamp factor (dB)	Emission Level (dBμV/m)	Limit (dBμV/m)	Antenna polarization
4874.00	48.57	31.57	9.33	34.30	55.17	74.00	V
7311.00	45.55	36.49	13.11	34.30	60.85	74.00	V
4874.00	44.18	31.57	9.33	34.30	50.78	74.00	H
7311.00	45.18	36.49	13.11	34.30	60.48	74.00	H

Average Measurement:

Frequency (MHz)	Reading Level (dBμV)	Antenna factors (dB/m)	Cable loss (dB)	Preamp factor (dB)	Emission Level (dBμV/m)	Limit (dBμV/m)	Antenna polarization
4874.00	42.57	31.57	9.33	34.30	49.17	54.00	V
7311.00	31.55	36.49	13.11	34.30	46.85	54.00	V
4874.00	42.18	31.57	9.33	34.30	48.78	54.00	H
7311.00	30.18	36.49	13.11	34.30	45.48	54.00	H

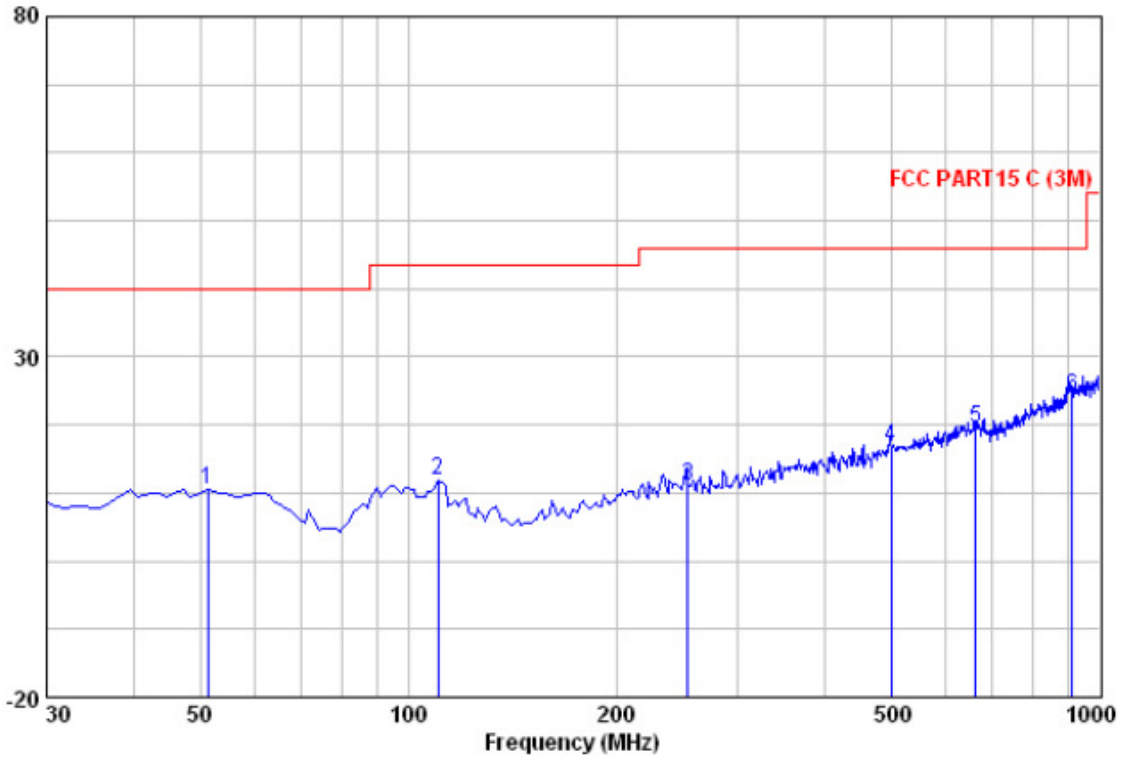
Test at Channel 9 (2.452 GHz) in transmitting status

30 MHz~1 GHz Spurious Emissions .Quasi-Peak Measurement

Vertical:

Peak scan

Level (dBμV/m)



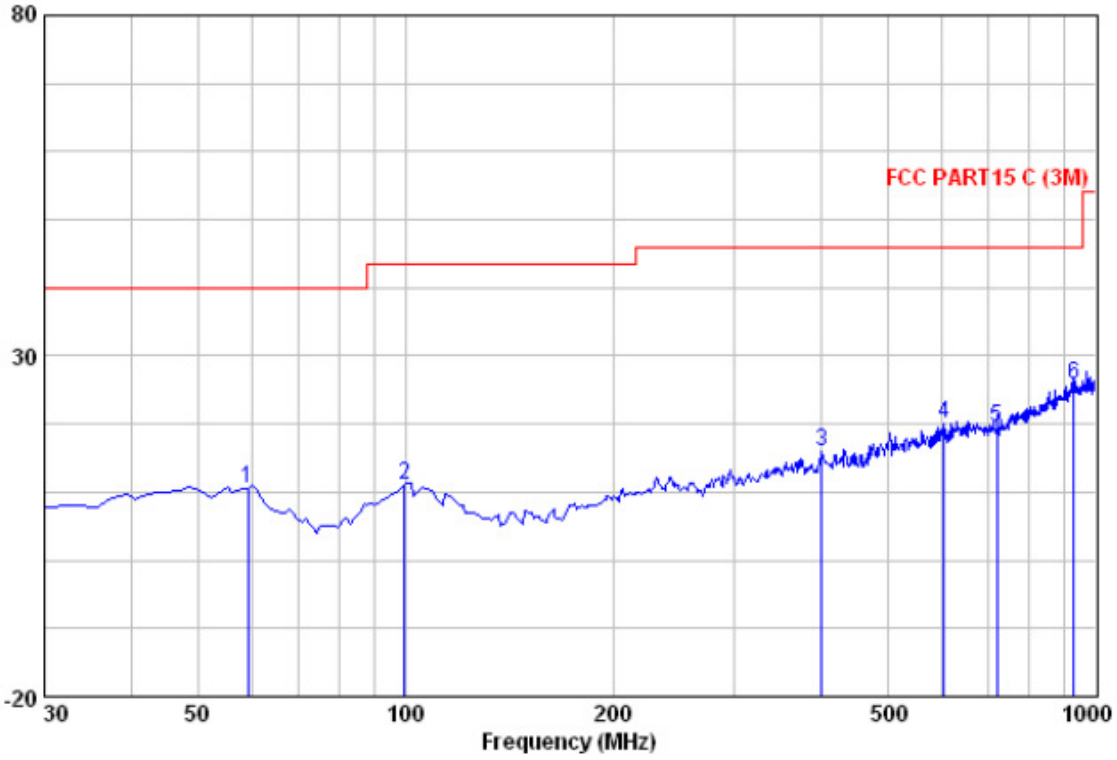
Quasi-peak measurement

Freq	ReadAntenna Level	Factor	Cable Loss	Preamp Factor	Level	Limit Line	Over Limit	Remark
MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB	
51.340	26.24	13.19	0.70	29.51	10.62	40.00	-29.38	QP
110.510	28.66	12.15	0.90	29.70	12.01	43.50	-31.49	QP
254.070	27.09	12.06	1.40	29.56	10.99	46.00	-35.01	QP
499.480	27.56	16.58	2.10	29.50	16.74	46.00	-29.26	QP
662.440	27.69	18.68	2.50	29.33	19.54	46.00	-26.46	QP
911.730	28.38	21.18	2.80	28.19	24.18	46.00	-21.82	QP

Horizontal:

Peak scan

Level (dBμV/m)



Quasi-peak measurement

Freq	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Level	Limit Line	Over Limit	Remark
MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB	
59.100	26.75	12.75	0.70	29.55	10.65	40.00	-29.35	QP
99.840	26.76	13.16	0.90	29.70	11.12	43.50	-32.38	QP
401.510	28.69	15.10	1.80	29.60	16.00	46.00	-30.00	QP
602.300	28.76	18.46	2.35	29.40	20.17	46.00	-25.83	QP
718.700	27.36	19.05	2.50	29.28	19.63	46.00	-26.37	QP
931.130	29.70	21.31	2.90	28.03	25.88	46.00	-20.12	QP

1~25 GHz Harmonics & Spurious Emissions. Peak & Average Measurement

Peak Measurement:

Frequency (MHz)	Reading Level (dBμV)	Antenna factors (dB/m)	Cable loss (dB)	Preamp factor (dB)	Emission Level (dBμV/m)	Limit (dBμV/m)	Antenna polarization
4904.00	46.07	31.59	9.32	34.30	52.68	74.00	V
7356.00	44.98	36.51	13.12	34.30	60.31	74.00	V
4904.00	43.71	31.59	9.32	34.30	50.32	74.00	H
7356.00	49.95	36.51	13.12	34.30	65.28	74.00	H

Average Measurement:

Frequency (MHz)	Reading Level (dBμV)	Antenna factors (dB/m)	Cable loss (dB)	Preamp factor (dB)	Emission Level (dBμV/m)	Limit (dBμV/m)	Antenna polarization
4904.00	40.17	31.59	9.32	34.30	46.78	54.00	V
7356.00	30.45	36.51	13.12	34.30	45.78	54.00	V
4904.00	40.71	31.59	9.32	34.30	47.32	54.00	H
7356.00	31.95	36.51	13.12	34.30	47.28	54.00	H

The field strength is calculated by adding the Antenna Factor. Cable Factor & Preamplifier. The basic equation with a sample calculation is as follows:

Final Test Level =Receiver Reading + Antenna Factor + Cable Loss –Preamplifier Factor.

As shown in Section, for frequencies above 1000 MHz. the above field strength limits are based on average limits. However, the peak field strength of any emission shall not exceed the maximum permitted average limits specified above by more than 20 dB under any condition of modulation.

No any other emissions level which are attenuated less than 20dB below the limit.

According to 15.31(o), The amplitude of spurious emissions from intentional radiators and emissions from unintentional radiators which are attenuated more than 20 dB below the permissible value need not be reported unless specifically required elsewhere in this Part.

Hence there no other emissions have been reported.

Remark:

1) .For this intentional radiator operates below 25 GHz. The spectrum shall be investigated to the tenth harmonics of the highest fundamental frequency. And above the third harmonic of this intentional radiator, the disturbance is very low. So the test result only displays to 3rd harmonic.
2). As shown in Section, for frequencies above 1000 MHz. the above field strength limits are based on average limits. However, the peak field strength of any emission shall not exceed the maximum permitted average limits specified above by more than 20 dB under any condition of modulation.
3). The test only perform the EUT in transmitting status since the test frequencies were over 1GHz only required transmitting status.

Test result: The unit does meet the FCC requirements.

7.7.2 Radiated Emissions which fall in the restricted bands

Test Requirement:	FCC Part 15 C section 15.247 (d) In addition, radiated emissions which fall in the restricted bands, as defined in Section 15.205(a), must also comply with the radiated emission limits specified in Section 15.209(a) (see Section 15.205(c)).
Test Method:	ANSI C63.10: Clause 6.4, 6.5 and 6.6
Test Status:	Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, data rates and antenna ports (if EUT with antenna diversity architecture). Following channel(s) was (were) selected for the final test as listed below.
Test site:	Measurement Distance: 3m (Semi-Anechoic Chamber)
Limit:	40.0 dBμV/m between 30MHz & 88MHz; 43.5 dBμV/m between 88MHz & 216MHz; 46.0 dBμV/m between 216MHz & 960MHz; 54.0 dBμV/m above 960MHz.
Detector:	For PK value: RBW = 1 MHz for f ≥ 1 GHz, 100 kHz for f < 1 GHz VBW ≥ RBW Sweep = auto Detector function = peak Trace = max hold For AV value: RBW = 1 MHz for f ≥ 1 GHz, 100 kHz for f < 1 GHz VBW =10Hz Sweep = auto Detector function = peak Trace = max hold

Section 15.205 Restricted bands of operation.

(a) Except as shown in paragraph (d) of this section. only spurious emissions are permitted in any of the frequency bands listed below:

MHz	MHz	MHz	GHz
0.090 - 0.110	16.42 - 16.423	399.9 - 410	4.5 - 5.15
[1]0.495 - 0.505	16.69475 - 16.69525	608 - 614	5.35 - 5.46
2.1735 - 2.1905	16.80425 - 16.80475	960 - 1240	7.25 - 7.75
4.125 - 4.128	25.5 - 25.67	1300 - 1427	8.025 - 8.5
4.17725 - 4.17775	37.5 - 38.25	1435 - 1626.5	9.0 - 9.2
4.20725 - 4.20775	73 - 74.6	1645.5 - 1646.5	9.3 - 9.5
6.215 - 6.218	74.8 - 75.2	1660 - 1710	10.6 - 12.7
6.26775 - 6.26825	108 - 121.94	1718.8 - 1722.2	13.25 - 13.4
6.31175 - 6.31225	123 - 138	2200 - 2300	14.47 - 14.5
8.291 - 8.294	149.9 - 150.05	2310 - 2390	15.35 - 16.2
8.362 - 8.366	156.52475 -	2483.5 - 2500	17.7 - 21.4
8.37625 - 8.38675	156.52525	2655 - 2900	22.01 - 23.12
8.41425 - 8.41475	156.7 - 156.9	3260 - 3267	23.6 - 24.0
12.29 - 12.293	162.0125 - 167.17	3332 - 3339	31.2 - 31.8
12.51975 - 12.52025	167.72 - 173.2	3345.8 - 3358	36.43 - 36.5
12.57675 - 12.57725	240 - 285	3600 - 4400	
13.36 - 13.41	322 - 335.4		

Test Result:

7.7.2.1 802.11b mode with 11Mbps data rate

Test at Channel 1 (2.412 GHz) in transmitting status

Peak Measurement:

Frequency (MHz)	Reading Level (dBμV)	Antenna factors (dB/m)	Cable loss (dB)	Preamp factor (dB)	Emission Level (dBμV/m)	Limit (dBμV/m)	Antenna polarization
2310.000	55.33	27.93	4.74	35.09	52.91	74.00	Vertical
2390.000	55.39	27.63	4.96	35.05	52.93	74.00	V
2483.500	55.46	27.55	4.9	34.99	52.92	74.00	V
2500.000	55.68	27.55	5.00	34.98	53.25	74.00	V
2310.000	54.14	27.93	4.74	35.09	51.72	74.00	Horizontal
2390.000	54.15	27.63	4.96	35.05	51.69	74.00	H
2483.500	54.37	27.55	4.9	34.99	51.83	74.00	H
2500.000	54.34	27.55	5.00	34.98	51.91	74.00	H

Average Measurement:

Frequency (MHz)	Reading Level (dBμV)	Antenna factors (dB/m)	Cable loss (dB)	Preamp factor (dB)	Emission Level (dBμV/m)	Limit (dBμV/m)	Antenna polarization
2310.000	46.24	27.93	4.74	35.09	43.82	54.00	Vertical
2390.000	45.32	27.63	4.96	35.05	42.86	54.00	V
2483.500	45.12	27.55	4.9	34.99	42.58	54.00	V
2500.000	43.21	27.55	5.00	34.98	40.78	54.00	V
2310.000	42.22	27.93	4.74	35.09	39.80	54.00	Horizontal
2390.000	45.36	27.63	4.96	35.05	42.90	54.00	H
2483.500	46.39	27.55	4.9	34.99	43.85	54.00	H
2500.000	44.24	27.55	5.00	34.98	41.81	54.00	H

Test at Channel 6 (2.437 GHz) in transmitting status

Peak Measurement:

Frequency (MHz)	Reading Level (dBμV)	Antenna factors (dB/m)	Cable loss (dB)	Preamp factor (dB)	Emission Level (dBμV/m)	Limit (dBμV/m)	Antenna polarization
2310.000	53.71	27.93	4.74	35.09	51.29	74.00	Vertical
2390.000	53.31	27.63	4.96	35.05	50.85	74.00	V
2483.500	53.54	27.55	4.90	34.99	51.00	74.00	V
2500.000	53.48	27.55	5.00	34.98	51.05	74.00	V
2310.000	51.79	27.93	4.74	35.09	49.37	74.00	Horizontal
2390.000	51.84	27.63	4.96	35.05	49.38	74.00	H
2483.500	52.09	27.55	4.90	34.99	49.55	74.00	H
2500.000	51.94	27.55	5.00	34.98	49.51	74.00	H

Average Measurement:

Frequency (MHz)	Reading Level (dBμV)	Antenna factors (dB/m)	Cable loss (dB)	Preamp factor (dB)	Emission Level (dBμV/m)	Limit (dBμV/m)	Antenna polarization
2310.000	45.69	27.93	4.74	35.09	43.27	54.00	Vertical
2390.000	45.84	27.63	4.96	35.05	43.38	54.00	V
2483.500	44.61	27.55	4.90	34.99	42.07	54.00	V
2500.000	43.74	27.93	4.74	35.09	41.32	54.00	V
2310.000	41.26	27.93	4.74	35.09	38.84	54.00	Horizontal
2390.000	41.89	27.63	4.96	35.05	39.43	54.00	H
2483.500	43.12	27.55	4.90	34.99	40.58	54.00	H
2500.000	42.90	27.93	4.74	35.09	40.48	54.00	H

Test at Channel 11 (2.462 GHz) in transmitting status

Peak Measurement:

Frequency (MHz)	Reading Level (dBμV)	Antenna factors (dB/m)	Cable loss (dB)	Preamp factor (dB)	Emission Level (dBμV/m)	Limit (dBμV/m)	Antenna polarization
2310.000	52.34	27.93	4.74	35.09	49.92	74.00	Vertical
2390.000	52.22	27.63	4.96	35.05	49.76	74.00	V
2483.500	52.47	27.55	4.90	34.99	49.93	74.00	V
2500.000	52.30	27.93	4.74	35.09	49.88	74.00	V
2310.000	51.30	27.93	4.74	35.09	48.88	74.00	Horizontal
2390.000	51.28	27.63	4.96	35.05	48.82	74.00	H
2483.500	51.31	27.55	4.90	34.99	48.77	74.00	H
2500.000	51.35	27.93	4.74	35.09	48.93	74.00	H

Average Measurement:

Frequency (MHz)	Reading Level (dBμV)	Antenna factors (dB/m)	Cable loss (dB)	Preamp factor (dB)	Emission Level (dBμV/m)	Limit (dBμV/m)	Antenna polarization
2310.000	41.31	27.93	4.74	35.09	38.89	54.00	Vertical
2390.000	42.14	27.63	4.96	35.05	39.68	54.00	V
2483.500	44.44	27.55	4.90	34.99	41.90	54.00	V
2500.000	45.26	27.93	4.74	35.09	42.84	54.00	V
2310.000	44.24	27.93	4.74	35.09	41.82	54.00	Horizontal
2390.000	44.31	27.63	4.96	35.05	41.85	54.00	H
2483.500	43.47	27.55	4.90	34.99	40.93	54.00	H
2500.000	41.26	27.93	4.74	35.09	38.84	54.00	H

7.7.2.2 802.11g mode with 54Mbps data rate

Test at Channel 1 (2.412 GHz) in transmitting status

Peak Measurement:

Frequency (MHz)	Reading Level (dBμV)	Antenna factors (dB/m)	Cable loss (dB)	Preamp factor (dB)	Emission Level (dBμV/m)	Limit (dBμV/m)	Antenna polarization
2310.000	53.18	27.93	4.74	35.09	50.76	74.00	Vertical
2390.000	53.22	27.63	4.96	35.05	50.76	74.00	V
2483.500	53.69	27.55	4.90	34.99	51.15	74.00	V
2500.000	53.54	27.55	5.00	34.98	51.11	74.00	V
2310.000	52.56	27.93	4.74	35.09	50.14	74.00	Horizontal
2390.000	52.71	27.63	4.96	35.05	50.25	74.00	H
2483.500	52.79	27.55	4.90	34.99	50.25	74.00	H
2500.000	52.66	27.55	5.00	34.98	50.23	74.00	H

Average Measurement:

Frequency (MHz)	Reading Level (dBμV)	Antenna factors (dB/m)	Cable loss (dB)	Preamp factor (dB)	Emission Level (dBμV/m)	Limit (dBμV/m)	Antenna polarization
2310.000	44.63	27.93	4.74	35.09	42.21	54.00	Vertical
2390.000	43.46	27.63	4.96	35.05	41.00	54.00	V
2483.500	43.30	27.55	4.90	34.99	40.76	54.00	V
2500.000	42.19	27.55	5.00	34.98	39.76	54.00	V
2310.000	44.67	27.93	4.74	35.09	42.25	54.00	Horizontal
2390.000	44.82	27.63	4.96	35.05	42.36	54.00	H
2483.500	42.32	27.55	4.90	34.99	39.78	54.00	H
2500.000	45.68	27.55	5.00	34.98	43.25	54.00	H

Test at Channel 6 (2.437 GHz) in transmitting status

Peak Measurement:

Frequency (MHz)	Reading Level (dBμV)	Antenna factors (dB/m)	Cable loss (dB)	Preamp factor (dB)	Emission Level (dBμV/m)	Limit (dBμV/m)	Antenna polarization
2310.000	53.78	27.93	4.74	35.09	51.36	74.00	Vertical
2390.000	53.70	27.63	4.96	35.05	51.24	74.00	V
2483.500	53.49	27.55	4.90	34.99	50.95	74.00	V
2500.000	53.33	27.55	5.00	34.98	50.90	74.00	V
2310.000	54.19	27.93	4.74	35.09	51.77	74.00	Horizontal
2390.000	54.26	27.63	4.96	35.05	51.80	74.00	H
2483.500	54.29	27.55	4.90	34.99	51.75	74.00	H
2500.000	54.34	27.55	5.00	34.98	51.91	74.00	H

Average Measurement:

Frequency (MHz)	Reading Level (dBμV)	Antenna factors (dB/m)	Cable loss (dB)	Preamp factor (dB)	Emission Level (dBμV/m)	Limit (dBμV/m)	Antenna polarization
2310.000	43.66	27.93	4.74	35.09	41.24	54.00	Vertical
2390.000	44.56	27.63	4.96	35.05	42.10	54.00	V
2483.500	42.78	27.55	4.90	34.99	40.24	54.00	V
2500.000	43.67	27.55	5.00	34.98	41.24	54.00	V
2310.000	43.17	27.93	4.74	35.09	40.75	54.00	Horizontal
2390.000	44.35	27.63	4.96	35.05	41.89	54.00	H
2483.500	42.64	27.55	4.90	34.99	40.10	54.00	H
2500.000	41.18	27.55	5.00	34.98	38.75	54.00	H

Test at Channel 11 (2.462 GHz) in transmitting status

Peak Measurement:

Frequency (MHz)	Reading Level (dBμV)	Antenna factors (dB/m)	Cable loss (dB)	Preamp factor (dB)	Emission Level (dBμV/m)	Limit (dBμV/m)	Antenna polarization
2310.000	52.32	27.93	4.74	35.09	49.90	74.00	Vertical
2390.000	52.53	27.63	4.96	35.05	50.07	74.00	V
2483.500	52.65	27.55	4.90	34.99	50.11	74.00	V
2500.000	52.24	27.55	5.00	34.98	49.81	74.00	V
2310.000	53.67	27.93	4.74	35.09	51.25	74.00	Horizontal
2390.000	53.63	27.63	4.96	35.05	51.17	74.00	H
2483.500	53.66	27.55	4.90	34.99	51.12	74.00	H
2500.000	53.60	27.55	5.00	34.98	51.17	74.00	H

Average Measurement:

Frequency (MHz)	Reading Level (dBμV)	Antenna factors (dB/m)	Cable loss (dB)	Preamp factor (dB)	Emission Level (dBμV/m)	Limit (dBμV/m)	Antenna polarization
2310.000	45.42	27.93	4.74	35.09	43.00	54.00	Vertical
2390.000	42.54	27.63	4.96	35.05	40.08	54.00	V
2483.500	41.25	27.55	4.90	34.99	38.71	54.00	V
2500.000	40.12	27.55	5.00	34.98	37.69	54.00	V
2310.000	41.43	27.93	4.74	35.09	39.01	54.00	Horizontal
2390.000	43.16	27.63	4.96	35.05	40.70	54.00	H
2483.500	42.12	27.55	4.90	34.99	39.58	54.00	H
2500.000	40.98	27.55	5.00	34.98	38.55	54.00	H

7.7.2.3 802.11n(HT20) mode with 65Mbps data rate

Test at Channel 1 (2.412 GHz) in transmitting status

Peak Measurement:

Frequency (MHz)	Reading Level (dBμV)	Antenna factors (dB/m)	Cable loss (dB)	Preamp factor (dB)	Emission Level (dBμV/m)	Limit (dBμV/m)	Antenna polarization
2310.000	62.32	27.93	4.74	35.09	59.90	74.00	Vertical
2390.000	62.26	27.63	4.96	35.05	59.80	74.00	V
2483.500	62.40	27.55	4.90	34.99	59.86	74.00	V
2500.000	62.30	27.55	5.00	34.98	59.87	74.00	V
2310.000	59.42	27.93	4.74	35.09	57.00	74.00	Horizontal
2390.000	59.41	27.63	4.96	35.05	56.95	74.00	H
2483.500	59.52	27.55	4.90	34.99	56.98	74.00	H
2500.000	59.31	27.55	5.00	34.98	56.88	74.00	H

Average Measurement:

Frequency (MHz)	Reading Level (dBμV)	Antenna factors (dB/m)	Cable loss (dB)	Preamp factor (dB)	Emission Level (dBμV/m)	Limit (dBμV/m)	Antenna polarization
2310.000	48.22	27.93	4.74	35.09	45.80	54.00	Vertical
2390.000	50.24	27.63	4.96	35.05	47.78	54.00	V
2483.500	49.84	27.55	4.90	34.99	47.30	54.00	V
2500.000	49.21	27.55	5.00	34.98	46.78	54.00	V
2310.000	50.35	27.93	4.74	35.09	47.93	54.00	Horizontal
2390.000	49.46	27.63	4.96	35.05	47.00	54.00	H
2483.500	49.41	27.55	4.90	34.99	46.87	54.00	H
2500.000	49.32	27.55	5.00	34.98	46.89	54.00	H

Test at Channel 6 (2.437 GHz) in transmitting status

Peak Measurement:

Frequency (MHz)	Reading Level (dBμV)	Antenna factors (dB/m)	Cable loss (dB)	Preamp factor (dB)	Emission Level (dBμV/m)	Limit (dBμV/m)	Antenna polarization
2310.000	57.21	27.93	4.74	35.09	54.79	74.00	Vertical
2390.000	57.25	27.63	4.96	35.05	54.79	74.00	V
2483.500	57.39	27.55	4.90	34.99	54.85	74.00	V
2500.000	57.25	27.55	5.00	34.98	54.82	74.00	V
2310.000	52.49	27.93	4.74	35.09	50.07	74.00	Horizontal
2390.000	52.55	27.63	4.96	35.05	50.09	74.00	H
2483.500	52.36	27.55	4.90	34.99	49.82	74.00	H
2500.000	52.48	27.55	5.00	34.98	50.05	74.00	H

Average Measurement:

Frequency (MHz)	Reading Level (dBμV)	Antenna factors (dB/m)	Cable loss (dB)	Preamp factor (dB)	Emission Level (dBμV/m)	Limit (dBμV/m)	Antenna polarization
2310.000	46.30	27.93	4.74	35.09	43.88	54.00	Vertical
2390.000	46.20	27.63	4.96	35.05	43.74	54.00	V
2483.500	45.35	27.55	4.90	34.99	42.81	54.00	V
2500.000	45.14	27.55	5.00	34.98	42.71	54.00	V
2310.000	42.51	27.93	4.74	35.09	40.09	54.00	Horizontal
2390.000	41.50	27.63	4.96	35.05	39.04	54.00	H
2483.500	41.45	27.55	4.90	34.99	38.91	54.00	H
2500.000	40.59	27.55	5.00	34.98	38.16	54.00	H

Test at Channel 11 (2.462 GHz) in transmitting status

Peak Measurement:

Frequency (MHz)	Reading Level (dBμV)	Antenna factors (dB/m)	Cable loss (dB)	Preamp factor (dB)	Emission Level (dBμV/m)	Limit (dBμV/m)	Antenna polarization
2310.000	53.72	27.93	4.74	35.09	51.30	74.00	Vertical
2390.000	53.35	27.63	4.96	35.05	50.89	74.00	V
2483.500	53.83	27.55	4.90	34.99	51.29	74.00	V
2500.000	53.64	27.55	5.00	34.98	51.21	74.00	V
2310.000	53.46	27.93	4.74	35.09	51.04	74.00	Horizontal
2390.000	53.52	27.63	4.96	35.05	51.06	74.00	H
2483.500	53.61	27.55	4.90	34.99	51.07	74.00	H
2500.000	53.48	27.55	5.00	34.98	51.05	74.00	H

Average Measurement:

Frequency (MHz)	Reading Level (dBμV)	Antenna factors (dB/m)	Cable loss (dB)	Preamp factor (dB)	Emission Level (dBμV/m)	Limit (dBμV/m)	Antenna polarization
2310.000	40.15	27.93	4.74	35.09	37.73	54.00	Vertical
2390.000	41.45	27.63	4.96	35.05	38.99	54.00	V
2483.500	41.78	27.55	4.90	34.99	39.24	54.00	V
2500.000	39.62	27.55	5.00	34.98	37.19	54.00	V
2310.000	38.50	27.93	4.74	35.09	36.08	54.00	Horizontal
2390.000	41.65	27.63	4.96	35.05	39.19	54.00	H
2483.500	41.47	27.55	4.90	34.99	38.93	54.00	H
2500.000	41.46	27.55	5.00	34.98	39.03	54.00	H

7.7.2.4 802.11n(HT40) mode with 130Mbps data rate

Test at Channel 3 (2.422 GHz) in transmitting status

Peak Measurement:

Frequency (MHz)	Reading Level (dBμV)	Antenna factors (dB/m)	Cable loss (dB)	Preamp factor (dB)	Emission Level (dBμV/m)	Limit (dBμV/m)	Antenna polarization
2310.000	55.43	27.93	4.74	35.09	53.01	74.00	Vertical
2390.000	55.52	27.63	4.96	35.05	53.06	74.00	V
2483.500	55.42	27.55	4.90	34.99	52.88	74.00	V
2500.000	55.54	27.55	5.00	34.98	53.11	74.00	V
2310.000	52.58	27.93	4.74	35.09	50.16	74.00	Horizontal
2390.000	52.54	27.63	4.96	35.05	50.08	74.00	H
2483.500	52.78	27.55	4.90	34.99	50.24	74.00	H
2500.000	52.48	27.55	5.00	34.98	50.05	74.00	H

Average Measurement:

Frequency (MHz)	Reading Level (dBμV)	Antenna factors (dB/m)	Cable loss (dB)	Preamp factor (dB)	Emission Level (dBμV/m)	Limit (dBμV/m)	Antenna polarization
2310.000	43.28	27.93	4.74	35.09	40.86	54.00	Vertical
2390.000	43.34	27.63	4.96	35.05	40.88	54.00	V
2483.500	43.15	27.55	4.90	34.99	40.61	54.00	V
2500.000	42.87	27.55	5.00	34.98	40.44	54.00	V
2310.000	40.51	27.93	4.74	35.09	38.09	54.00	Horizontal
2390.000	40.45	27.63	4.96	35.05	37.99	54.00	H
2483.500	40.25	27.55	4.90	34.99	37.71	54.00	H
2500.000	39.87	27.55	5.00	34.98	37.44	54.00	H

Test at Channel 6 (2.437 GHz) in transmitting status

Peak Measurement:

Frequency (MHz)	Reading Level (dBμV)	Antenna factors (dB/m)	Cable loss (dB)	Preamp factor (dB)	Emission Level (dBμV/m)	Limit (dBμV/m)	Antenna polarization
2310.000	55.48	27.93	4.74	35.09	53.06	74.00	Vertical
2390.000	55.64	27.63	4.96	35.05	53.18	74.00	V
2483.500	55.12	27.55	4.90	34.99	52.58	74.00	V
2500.000	55.21	27.55	5.00	34.98	52.78	74.00	V
2310.000	51.15	27.93	4.74	35.09	48.73	74.00	Horizontal
2390.000	51.48	27.63	4.96	35.05	49.02	74.00	H
2483.500	50.86	27.55	4.90	34.99	48.32	74.00	H
2500.000	50.25	27.55	5.00	34.98	47.82	74.00	H

Average Measurement:

Frequency (MHz)	Reading Level (dBμV)	Antenna factors (dB/m)	Cable loss (dB)	Preamp factor (dB)	Emission Level (dBμV/m)	Limit (dBμV/m)	Antenna polarization
2310.000	42.56	27.93	4.74	35.09	40.14	54.00	Vertical
2390.000	42.78	27.63	4.96	35.05	40.32	54.00	V
2483.500	42.39	27.55	4.90	34.99	39.85	54.00	V
2500.000	41.35	27.55	5.00	34.98	38.92	54.00	V
2310.000	39.35	27.93	4.74	35.09	36.93	54.00	Horizontal
2390.000	40.37	27.63	4.96	35.05	37.91	54.00	H
2483.500	38.79	27.55	4.90	34.99	36.25	54.00	H
2500.000	38.48	27.55	5.00	34.98	36.05	54.00	H

Test at Channel 9 (2.452 GHz) in transmitting status

Peak Measurement:

Frequency (MHz)	Reading Level (dBμV)	Antenna factors (dB/m)	Cable loss (dB)	Preamp factor (dB)	Emission Level (dBμV/m)	Limit (dBμV/m)	Antenna polarization
2310.000	53.35	27.93	4.74	35.09	50.93	74.00	Vertical
2390.000	53.36	27.63	4.96	35.05	50.90	74.00	V
2483.500	52.78	27.55	4.90	34.99	50.24	74.00	V
2500.000	52.87	27.55	5.00	34.98	50.44	74.00	V
2310.000	50.71	27.93	4.74	35.09	48.29	74.00	Horizontal
2390.000	50.48	27.63	4.96	35.05	48.02	74.00	H
2483.500	50.54	27.55	4.90	34.99	48.00	74.00	H
2500.000	50.43	27.55	5.00	34.98	48.00	74.00	H

Average Measurement:

Frequency (MHz)	Reading Level (dBμV)	Antenna factors (dB/m)	Cable loss (dB)	Preamp factor (dB)	Emission Level (dBμV/m)	Limit (dBμV/m)	Antenna polarization
2310.000	41.26	27.93	4.74	35.09	38.84	54.00	Vertical
2390.000	41.25	27.63	4.96	35.05	38.79	54.00	V
2483.500	39.49	27.55	4.90	34.99	36.95	54.00	V
2500.000	40.65	27.55	5.00	34.98	38.22	54.00	V
2310.000	39.78	27.93	4.74	35.09	37.36	54.00	Horizontal
2390.000	38.73	27.63	4.96	35.05	36.27	54.00	H
2483.500	39.68	27.55	4.90	34.99	37.14	54.00	H
2500.000	38.46	27.55	5.00	34.98	36.03	54.00	H

7.8 Band Edges Requirement

Test Requirement: FCC Part 15 C section 15.247

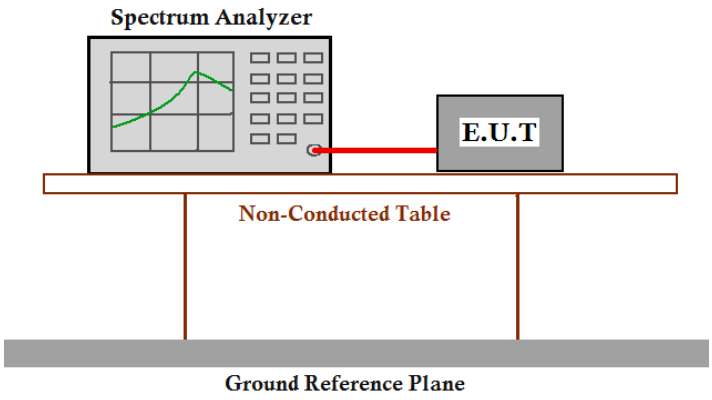
(d) In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating. The radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains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

Frequency Band: 2400 MHz to 2483.5 MHz

Test Method: ANSI C63.10: Clause 6.9.2

Test Status: Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, data rates and antenna ports (if EUT with antenna diversity architecture). Following channel(s) was (were) selected for the final test as listed below.

Test Configuration:



Test Procedure:

1. Remove the antenna from the EUT and then connect a low RF cable from the antenna port to the spectrum analyzer or power meter.
2. Set span to encompass the entire emission bandwidth (EBW) of the signal.
3. RBW≥1% of spectrum analyzer display span; VBW≥RBW.
4. Sweep=auto; Detector function=Peak; Trace=Max hold.
5. Measure the Conducted Spurious Emissions and Radiated Emissions of the test frequency with special test status.
6. Repeat until all the test status is investigated.
7. Report the worse.

Test result with plots as follows:

The band edges was measured and recorded Result:

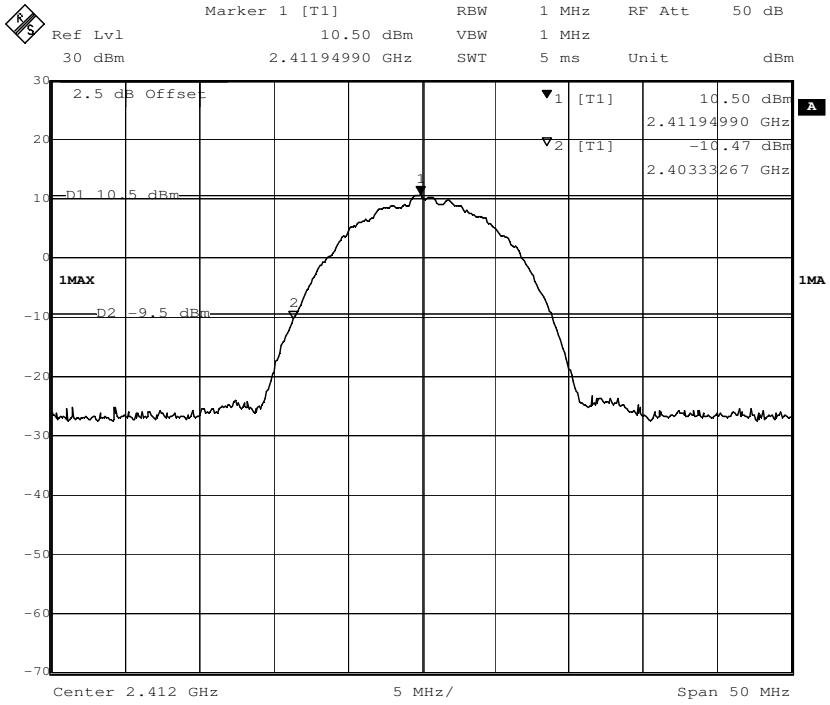
The Lower Edges attenuated more than 20dB.

The Upper Edges attenuated more than 20dB.

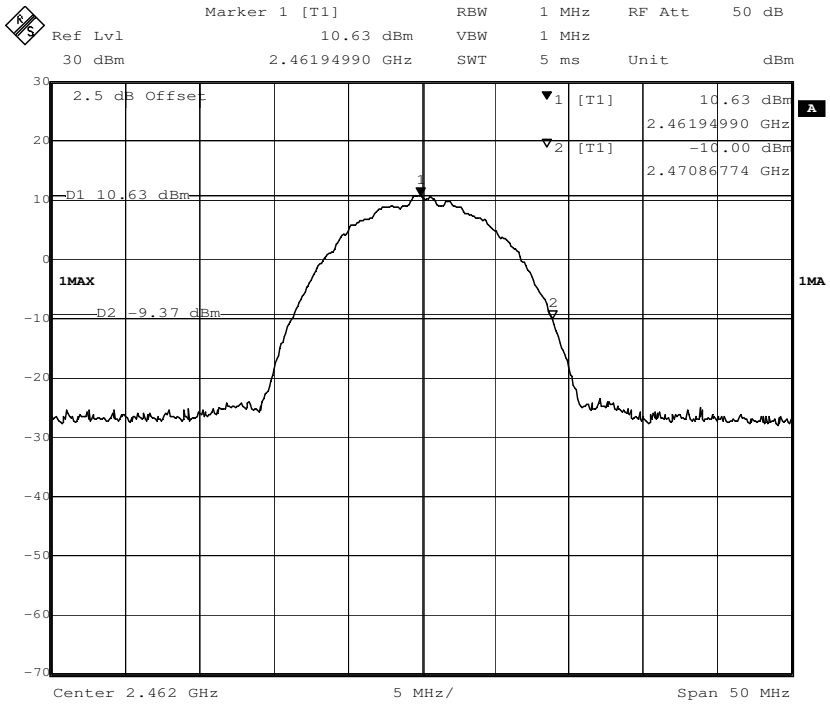
Result plot as follows:

802.11b mode with 11 Mbps data rate

Channel1: 2.412 GHz

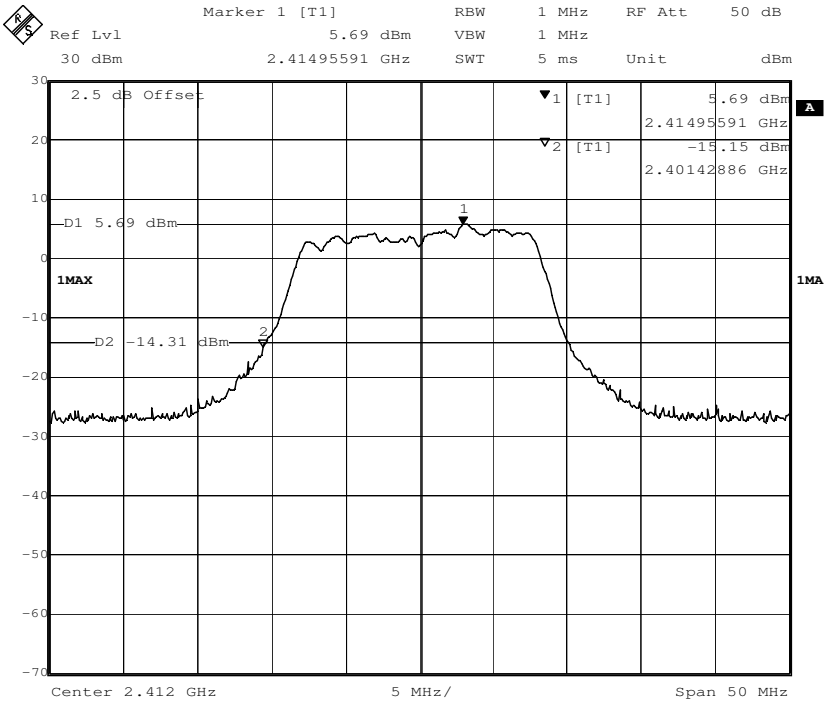


Channel 11: 2.462 GHz

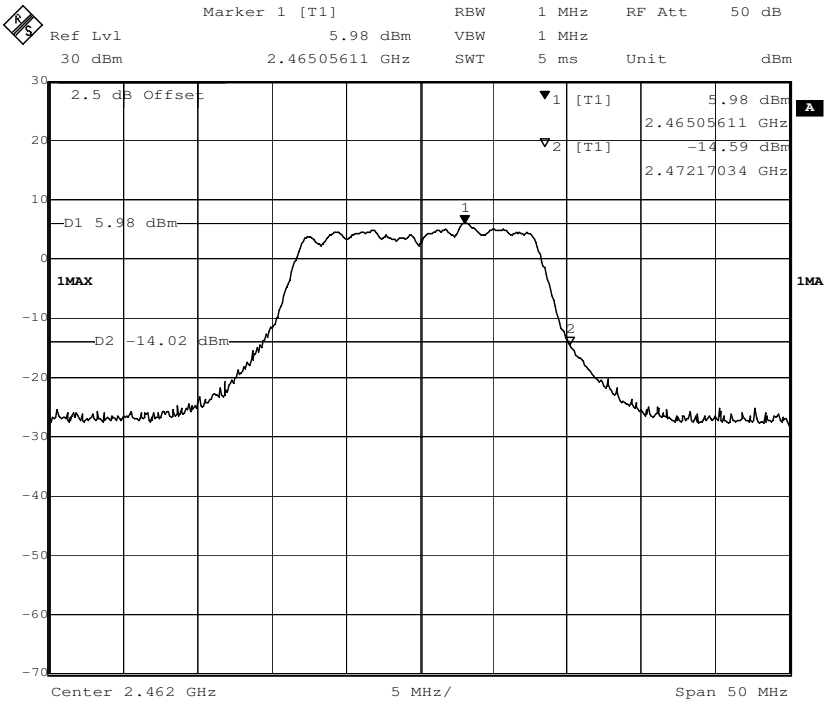


802.11g mode with 54 Mbps data rate

Channel1: 2.412 GHz

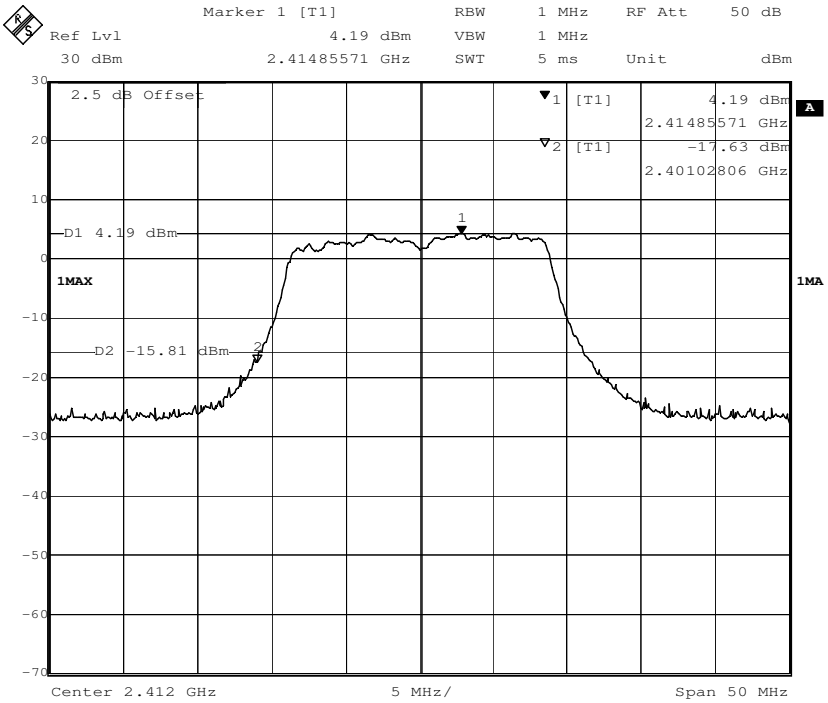


Channel 11: 2.462 GHz

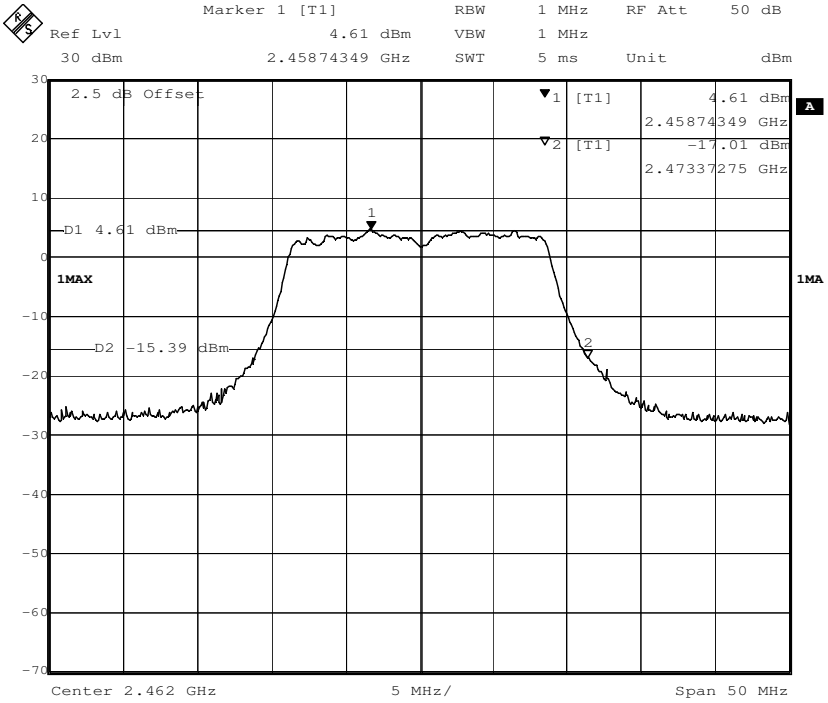


802.11n(HT20) mode with 65Mbps data rate

Channel1: 2.412 GHz

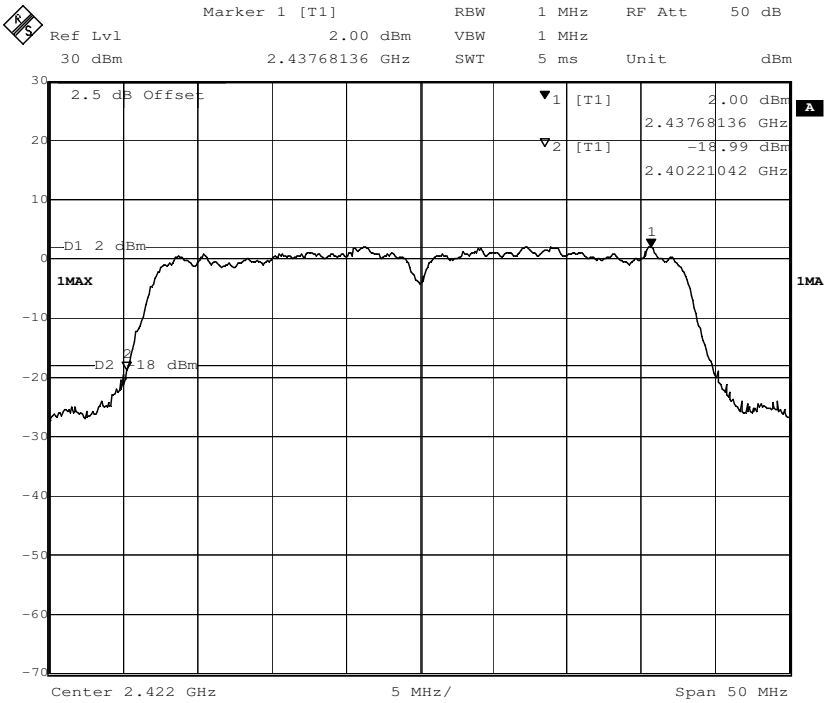


Channel 11: 2.462 GHz

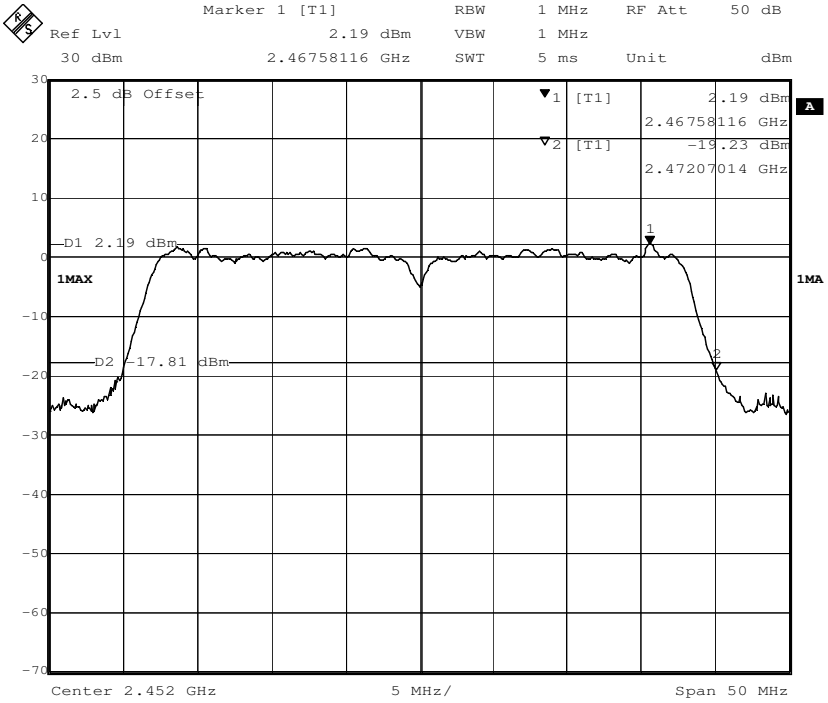


802.11n(HT40) mode with 130Mbps data rate

Channel 3: 2.422 GHz



Channel 9: 2.452 GHz



7.9 Conducted Emissions at Mains Terminals 150 kHz to 30MHz

Test Requirement: FCC Part 15 C section 15.207

Test Method: ANSI C63.10: Clause 6.2

Frequency Range: 150 kHz to 30 MHz

Detector: Peak for pre-scan (9kHz Resolution Bandwidth)

Test Limit

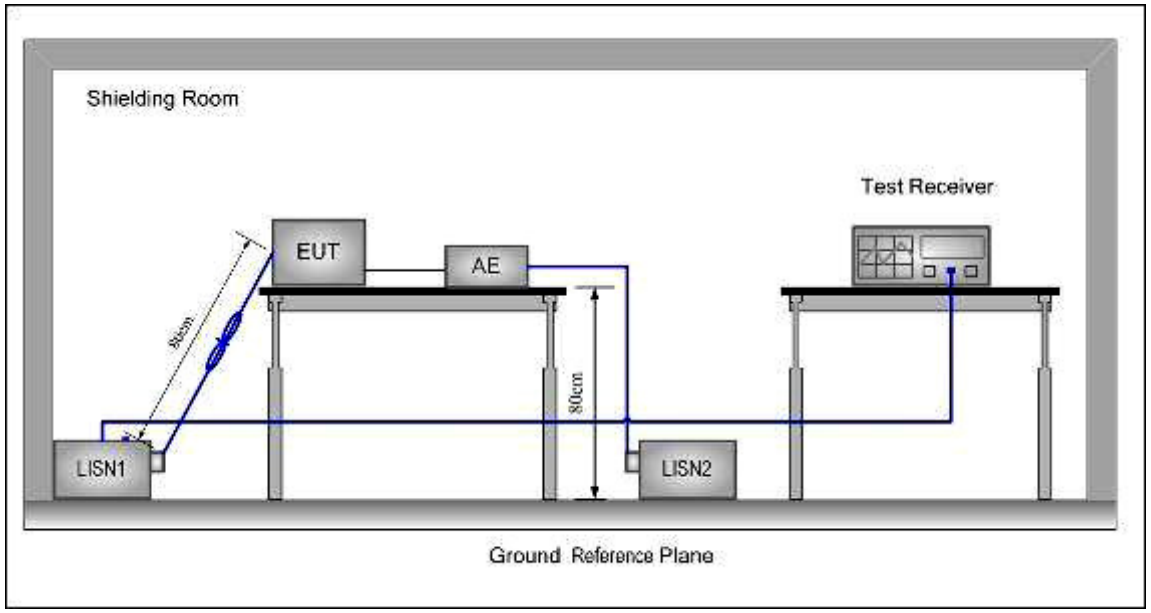
Limits for conducted disturbance at the mains ports of class B

Frequency Range (MHz)	Class B Limit (dBuV)	
	Quasi-peak	Average
0.15 to 0.50	66 to 56	56 to 46
0.50 to 5	56	46
5 to 30	60	50
NOTE 1 The limit decreases linearly with the logarithm of the frequency in the range 0,15 MHz to 0,50 MHz.		

EUT Operation: Test in normal operating mode. For intentional radiators, measurements of the variation of the input power or the radiated signal level of the fundamental frequency component of the emission, as appropriate, shall be performed with the supply voltage varied between 85% and 115% of the nominal rated supply voltage.

Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, data rates and antenna ports (if EUT with antenna diversity architecture).

Test Configuration:



Test procedure:

1. The mains terminal disturbance voltage test was conducted in a shielded room.

2. The EUT was connected to AC power source through a LISN 1 (Line Impedance Stabilization Network) which provides a 50Ω/50μH + 5Ω linear impedance. The power cables of all other units of the EUT were connected to a second LISN 2, which was bonded to the ground reference plane in the same way as the LISN 1 for the unit being measured. A multiple socket outlet strip was used to connect multiple power cables to a single LISN provided the rating of the LISN was not exceeded.

3. The tabletop EUT was placed upon a non-metallic table 0.8m above the ground reference plane. And for floor-standing arrangement, the EUT was placed on the horizontal ground reference plane, but separated from metallic contact with the ground reference plane by 0.1m of insulation.

4. The test was performed with a vertical ground reference plane. The rear of the EUT shall be 0,4 m from the vertical ground reference plane. The vertical ground reference plane was bonded to the horizontal ground reference plane. The LISN 1 was placed 0,8 m from the boundary of the unit under test and bonded to a ground reference plane for LISNs mounted on top of the ground reference plane. This distance was between the closest points of the LISN 1 and the EUT. All other units of the EUT and associated equipment was at least 0,8 m from the LISN 2.

7.9.1 Measurement Data

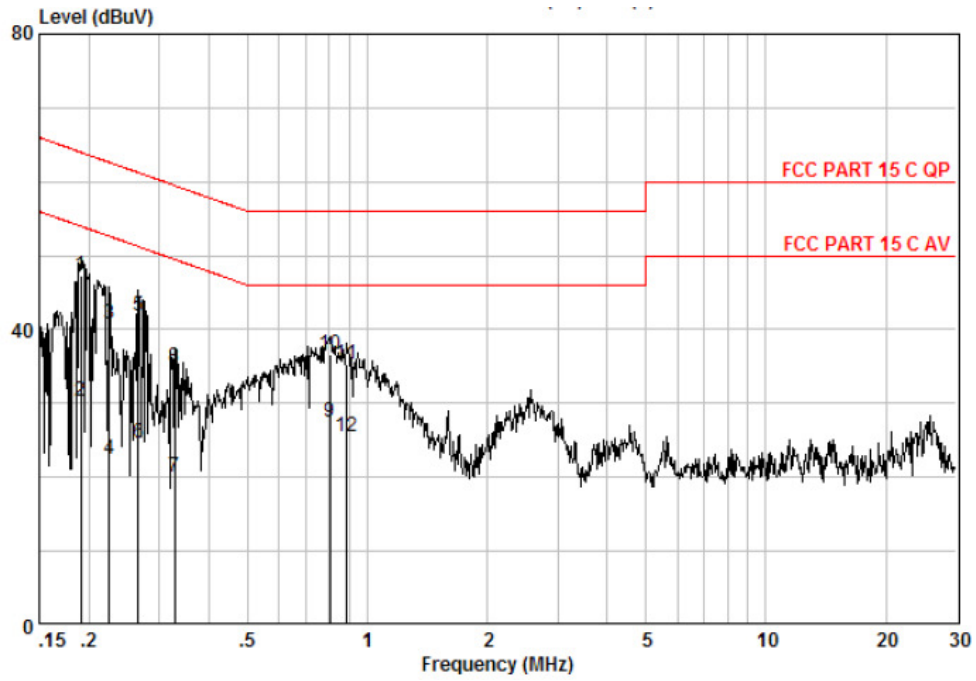
An initial pre-scan was performed on the live and neutral lines with peak detector.

Quasi-Peak and Average measurement were performed at the frequencies with maximized peak emission were detected. For EUT the communicating was worst case mode.

The following Quasi-Peak and Average measurements were performed on the EUT:

Neutral Line

Level(dB μ V)

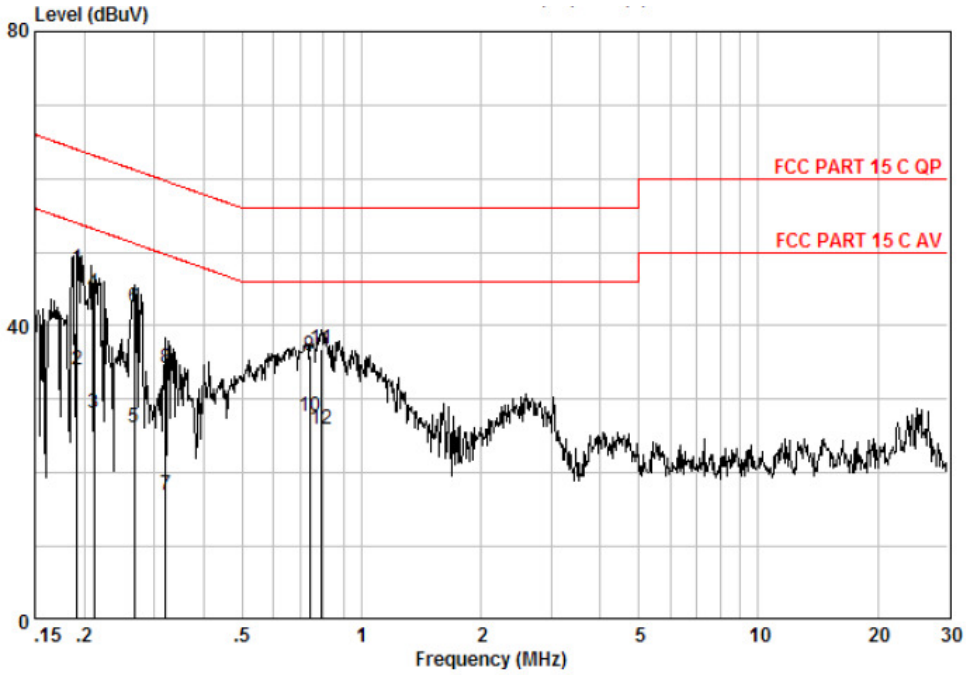


Measure data:

Freq	Read Level	Cable Loss	LISN Factor	Level	Limit Line	Over Limit	Remark
MHz	dBuV	dB	dB	dBuV	dBuV	dB	
0.190	37.48	0.12	9.62	47.22	64.02	-16.80	QP
0.190	20.46	0.12	9.62	30.20	54.02	-23.82	AVERAGE
0.224	31.00	0.12	9.62	40.74	62.66	-21.92	QP
0.224	12.81	0.12	9.62	22.55	52.66	-30.11	AVERAGE
0.266	32.08	0.09	9.62	41.80	61.25	-19.45	QP
0.266	14.81	0.09	9.62	24.53	51.25	-26.72	AVERAGE
0.329	10.29	0.07	9.63	19.98	49.49	-29.50	AVERAGE
0.329	25.28	0.07	9.63	34.97	59.49	-24.51	QP
0.804	17.88	0.05	9.62	27.55	46.00	-18.45	AVERAGE
0.804	26.98	0.05	9.62	36.65	56.00	-19.35	QP
0.885	25.70	0.05	9.63	35.38	56.00	-20.62	QP
0.885	15.91	0.05	9.63	25.59	46.00	-20.41	AVERAGE

Live Line

Level(dB μ V)



Measure result:

Freq	Read Level	Cable Loss	LISN Factor	Level	Limit Line	Over Limit	Remark
MHz	dBuV	dB	dB	dBuV	dBuV	dB	
0.191	38.06	0.12	9.62	47.80	63.98	-16.18	QP
0.191	24.18	0.12	9.62	33.92	53.98	-20.06	AVERAGE
0.212	18.30	0.12	9.62	28.04	53.14	-25.10	AVERAGE
0.212	34.74	0.12	9.62	44.48	63.14	-18.66	QP
0.267	16.39	0.09	9.62	26.10	51.20	-25.10	AVERAGE
0.267	32.76	0.09	9.62	42.47	61.20	-18.73	QP
0.320	7.35	0.07	9.61	17.04	49.71	-32.67	AVERAGE
0.320	24.44	0.07	9.61	34.13	59.71	-25.58	QP
0.739	26.32	0.04	9.62	35.98	56.00	-20.02	QP
0.739	18.09	0.04	9.62	27.75	46.00	-18.25	AVERAGE
0.792	27.26	0.05	9.62	36.93	56.00	-19.07	QP
0.792	16.31	0.05	9.62	25.98	46.00	-20.02	AVERAGE

--End of Report--