



Produkte
Products

| | | | |
|---|---|---|--|
| Prüfbericht - Nr.: 02422602 001 | | Seite 1 von 58 | |
| <i>Test Report No.:</i> | | <i>Page 1 of 58</i> | |
| Auftraggeber: <i>Client:</i> | | Redpine Signals Inc. 2107 N.First Street, Suite 680 San Jose, CA 95131-2019 U.S.A | |
| Gegenstand der Prüfung: <i>Test item:</i> | | 802.11 abgn MODULE | |
| Bezeichnung: <i>Identification:</i> | RS9110-N-11-03 | Serien-Nr.: <i>Serial No.</i> | Engineering Sample |
| Wareneingangs-Nr.: <i>Receipt No.:</i> | 1403011050 | Eingangsdatum: <i>Date of receipt:</i> | 07.08.2010 |
| Prüfart: <i>Testing location:</i> | | Refer Page 4 of 58 for test facilities | |
| Prüfgrundlage: <i>Test specification:</i> | | FCC Part 15, Subpart C | |
| Prüfergebnis: <i>Test Result:</i> | | Der Prüfgegenstand entspricht oben genannter Prüfgrundlage(n). <i>The tests item passed the test specification(s).</i> | |
| Prüflaboratorium: <i>Testing Laboratory:</i> | | TÜV Rheinland (India) Pvt. Ltd. Alpha Tower, Sigma Soft Tech Park, # 7, Whitefield Main Road, Varthur Kodi, Bangalore – 560066, India | |
| geprüft / tested by: | | kontrolliert / reviewed by: | |
| 10.06.2011 Vinay.N Engineer  | | 13.06.2011 Kalyan Varma G Manager  | |
| Datum <i>Date</i> | Name/Stellung <i>Name/Position</i> | Unterschrift <i>Signature</i> | Datum <i>Date</i> |
| | | | |
| Sonstiges / Other Aspects: | | FCC ID : XF6- RS9110N1103 | |
| Abkürzungen: | P(ass) = entspricht Prüfgrundlage F(ail) = entspricht nicht Prüfgrundlage N/A = nicht anwendbar N/T = nicht getestet | Abbreviations: | P(ass) = passed F(ail) = failed N/A = not applicable N/T = not tested |
| Dieser Prüfbericht bezieht sich nur auf das o.g. Prüfmuster und darf ohne Genehmigung der Prüfstelle nicht auszugsweise vervielfältigt werden. Dieser Bericht berechtigt nicht zur Verwendung eines Prüfzeichens. <i>This test report relates to the a. m. test sample. Without permission of the test center this test report is not permitted to be duplicated in extracts. This test report does not entitle to carry any safety mark on this or similar products.</i> | | | |

Test Result Summary

| Clause | Test Item | Result |
|------------------|-----------------------------------|--------|
| FCC 15.247(b)(3) | Conducted Peak Output Power | Pass |
| FCC 15.247(a)(2) | 6dB Bandwidth | Pass |
| FCC 15.247(e) | Power Spectral Density | Pass |
| FCC 15.247(d) | Band-edge compliance | Pass |
| FCC 15.209 | Spurious Radiated Emissions | Pass |
| Section 15.205 | Restricted Bands of Operation | Pass |
| FCC 15.207 | AC Power Line Conducted Emissions | Pass |

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List of Test and Measurement Instruments

Wipro Technologies, Bangalore

List of Test and Measurements

| Equipment | Manufacturer | Type | S/N | Calibration Due Date |
|-----------------------------|--------------------------------|-----------|----------------|----------------------|
| EMI Test Receiver | Rohde & Schwarz | ESIB40 | 100306 | 24.03.2012 |
| Hybrid Log Periodic Antenna | TDK | HLP3003C | 130334 | 21.03.2012 |
| Broadband Horn Antenna | Schwarzbeck Mess-Electronik | BBHA9170 | 9170-344 | 21.03.2012 |
| Double Ridged Horn Antenna | Schwarzbeck Mess-Electronik | BBHA9120D | 9120D-687 | 21.03.2012 |
| Pre-Amplifier | TDK-RFSolution | PA-02 | 100008 | 15.02.2012 |
| Spectrum Analyser | Agilent Technologies | E4407B | US41192 772 | 27.01.2012 |

Testing Facilities

- 1) Wipro Technologies
Survey No. 70,77,78 / 8A, Dodda Kannelli,
Sarjapur Road, Bangalore – 560 035
India
- 2) HCL Technologies
73-74, Ground Floor,
South Phase, Ambattur Estate,
Ambattur, Chennai – 600058
India

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General Product Information

Product Function and Intended Use

The Product has many applications.viz.

- Multi-mode cellular phones, smart phones, and PDAs needing Wi-Fi capability
- VoWiFi handsets
- Personal Media Players
- Digital still cameras and camcorders

Ratings and System Details

| | | |
|---------------------|---|-------------------------------------|
| Operating Frequency | 2400 – 2483.5 MHz | |
| No. of channel | 13 | |
| Channel Spacing | 5 MHz | |
| Transmitted Power | 802.11b | 15.15dBm |
| | 802.11g | 14.58dBm |
| | 802.11n | 14.87dBm |
| Modulation | 802.11b | DSSS with DBPSK,DQPSK |
| | 802.11g | OFDM with BPSK,QPSK, 16-QAM, 64-QAM |
| | 802.11n | BPSK,QPSK,16-QAM,64-QAM |
| Data Rate | 802.11n: 6.5, 13, 19.5, 26, 39, 52, 58.5, 65 Mbps 802.11g: 6, 9, 12, 18, 24, 36, 48, 54 Mbps 802.11b:1,2, 5.5,11 Mbps | |
| Antenna Type | Chip | |
| Number of antenna | One | |
| Antenna Gain | 0.5 dBi | |
| Supply Voltage | 3.1-3.6 V DC | |
| Dimensions | 104 mm x 34 mm x 12 mm | |
| Environmental | -40°C to +85°C | |

Test Conditions:

Voltage: 110V AC, 60Hz

Environmental conditions:

Temperature: +23 °C **RH:** 62%

Note: 5725 – 5850 MHz Band test results are covered in Test report : 02423392 001 and 5150MHz – 5350 MHz, 5470MHz – 5725MHz Band test results are covered in Test report : 02422603 001

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Operation Descriptions

The RS9110-N-11-03 module is a complete IEEE802.11abgn Wi-Fi client device with an integrated MAC, baseband processor, RF transceiver and power amplifier. Based on the Redpine's Lite-FiTM RS9110 MAC/baseband processor, the module provides a complete end-to-end solution for ultra low power WLAN applications. It conforms to the draft 802.11n standard in single-stream mode for handheld devices and includes an embedded processor with a rich set of peripherals offering minimal load on a host processor, to which it can connect through SDIO and SPI interfaces. In a small form factor of 20 x 17.5 sq mm and operation on a single power supply, the RS9110-N-11-03 is ideal for integration into mobile phones and other handheld devices.

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Test Set-up and Operation Mode

Principle of Configuration Selection

Emission: The test was performed under continuous transmission to obtain the maximum emissions.

Test Operation and Test Software

- Redpine's Lite-Fi™ device driver which was installed in a Personal Digital Assistant (PDA) was used to control channels, data rates and power levels

Special Accessories and Auxiliary Equipment

The EUT was tested together with the following additional accessory:

- Personal Digital Assistant (PDA) for controlling different transmits channels, transmit profiles and power levels.

Countermeasures to achieve EMC Compliance

- None

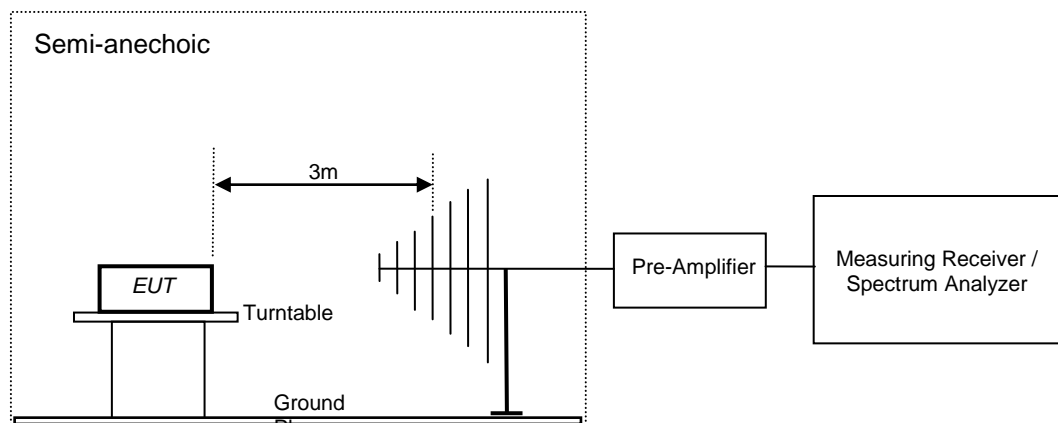
Table of carrier frequencies

| Frequency Band | Channel No. | Frequency (MHz) |
|-------------------|-------------|-----------------|
| 2400 – 2483.5 MHz | 1 | 2412 |
| | 2 | 2417 |
| | 3 | 2422 |
| | 4 | 2427 |
| | 5 | 2432 |
| | 6 | 2437 |
| | 7 | 2442 |
| | 8 | 2447 |
| | 9 | 2452 |
| | 10 | 2457 |
| | 11 | 2462 |
| | 12 | 2467 |
| | 13 | 2472 |

Test Methodology

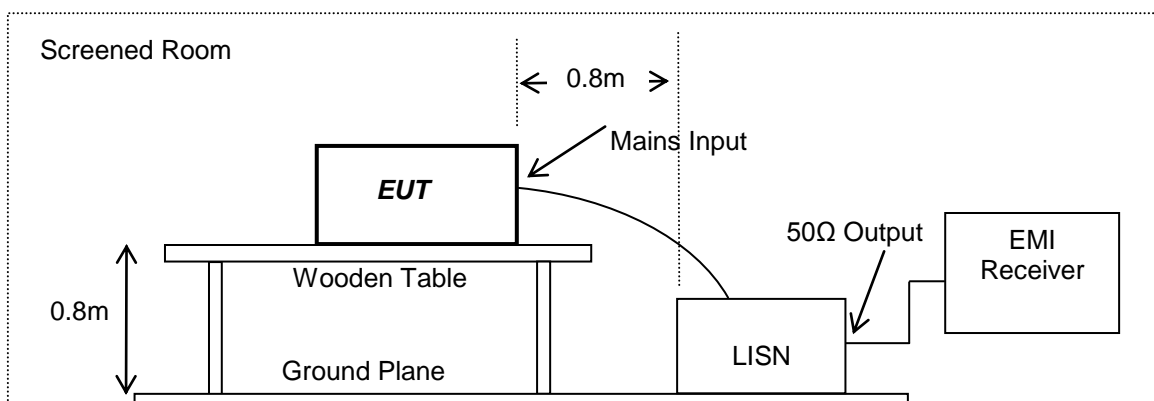
Radiated Emission Test

The radiated emission measurement was performed according to the procedures in ANSI C63.4-2003. The equipment under test (EUT) was placed at the middle of the 80 cm high turntable, and the EUT is 3 meters far from the measuring antenna. The turntable was rotated 360° for obtaining the maximum emission. The height of the measuring antennas was scanned between 1m and 4m, and the antenna rotated to repeat the measurements for both the horizontal and vertical antenna polarizations. Repeat the measurement steps until the maximum emissions were obtained. The measurement above 1000MHz was performed by horn antenna. The measurement below 30MHz was performed by loop antenna. The EUT was rotated around the X-, Y-, and Z-Axis and the results from worst case axis are recorded.



Conducted Emission Test on a.c. mains line

The equipment under test (EUT) was placed on a wooden table 80cm above the ground plane, the LISN was placed 80cm away from the EUT. The test was performed in accordance with ANSI C63.4: 2003, with the following: an initial measurement was performed in peak and average detection mode on the live and neutral lines. The pre-scan was performed by peak detection on both live and neutral conductors. Any emissions recorded within 20dB of the relevant limit line were re-measured using quasi-peak and average detections, the 6 worst cases were recorded in the table of results.



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Test Results

Conducted Peak Output Power

Section 15.247(b) (3)

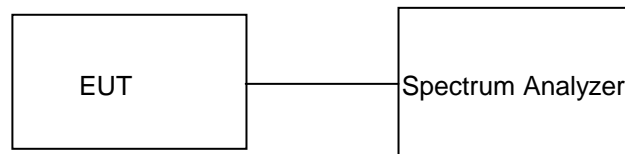
Result

Pass

Test Specification
Measurement Bandwidth (RBW)
Requirement

FCC Part 15 Subpart C
1 MHz
<1 watt (30dBm) for Digital Transmission System.

Test Method:

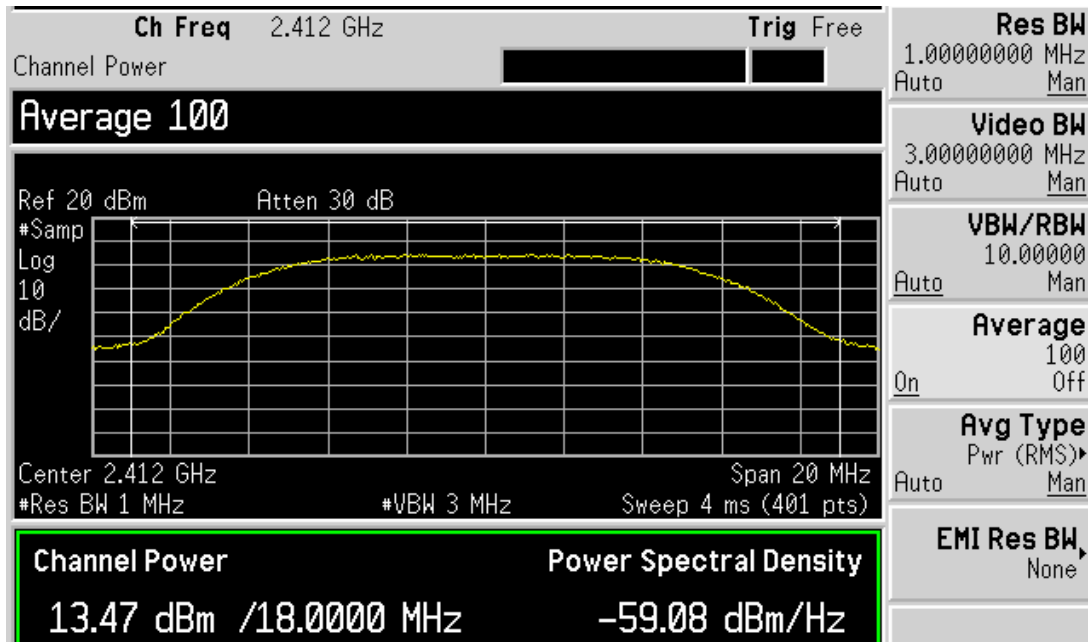


Test Result:

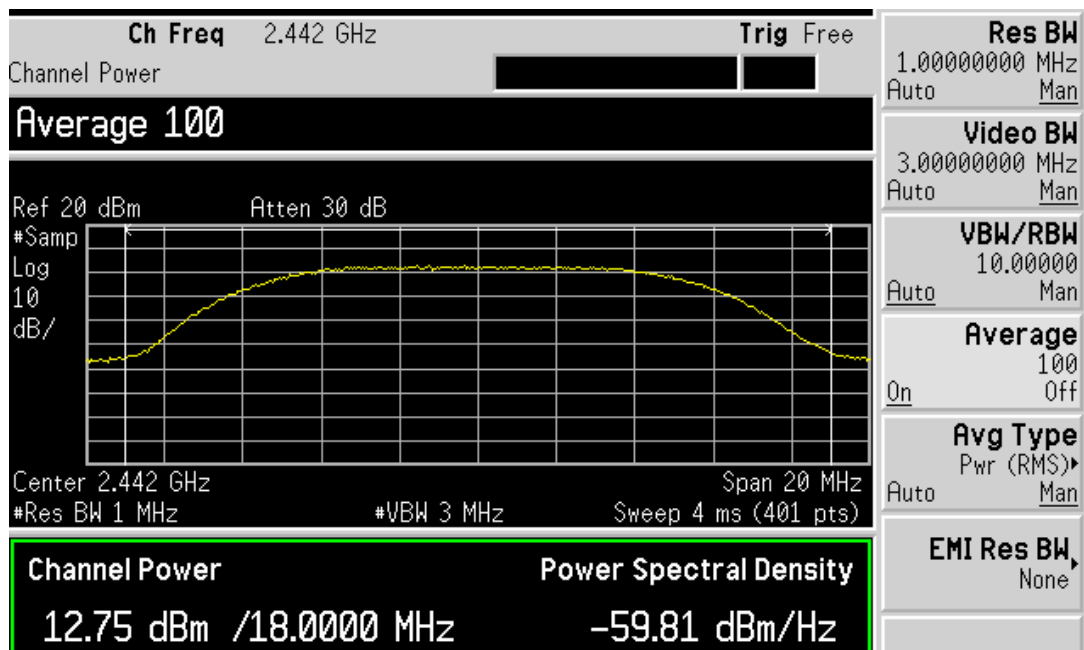
Modulation: 802.11b

Cable Loss: 1.68dB

| Frequency (MHz) | Measured RF Output power (dBm) | Cable Loss (dB) | Total Output power (dBm) | Limit (dBm) |
|--------------------|--------------------------------------|--------------------|--------------------------------|----------------|
| 2412 | 13.47 | 1.68 | 15.15 | 30.00 |
| 2442 | 12.75 | 1.68 | 14.43 | 30.00 |
| 2472 | 12.59 | 1.68 | 14.27 | 30.00 |

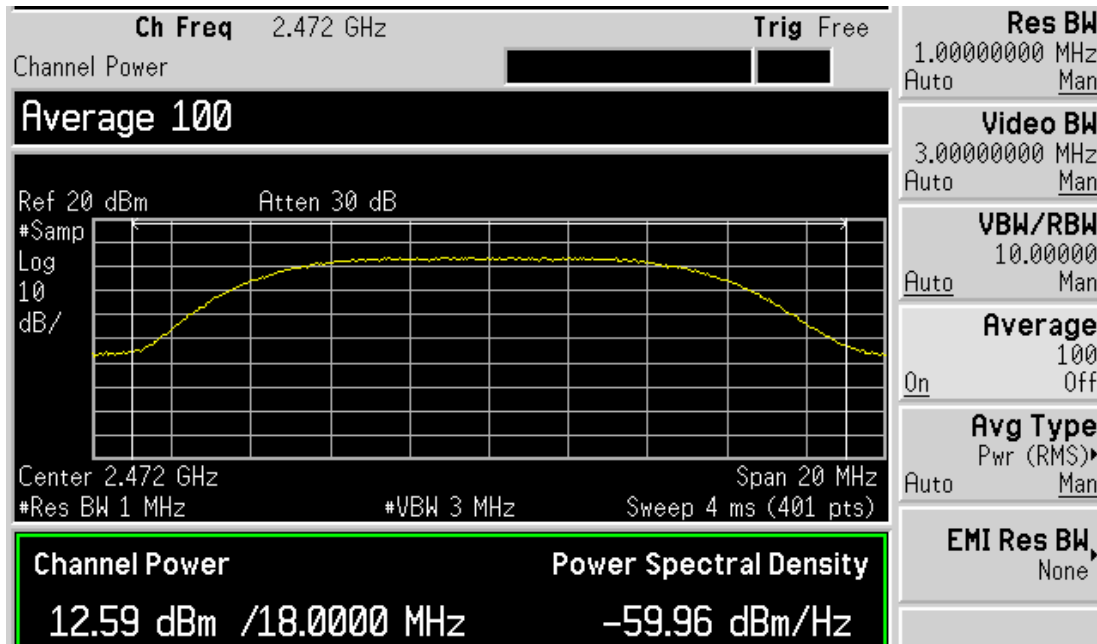


Channel Frequency: 2412 MHz



Channel Frequency: 2442 MHz

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Channel Frequency: 2472 MHz

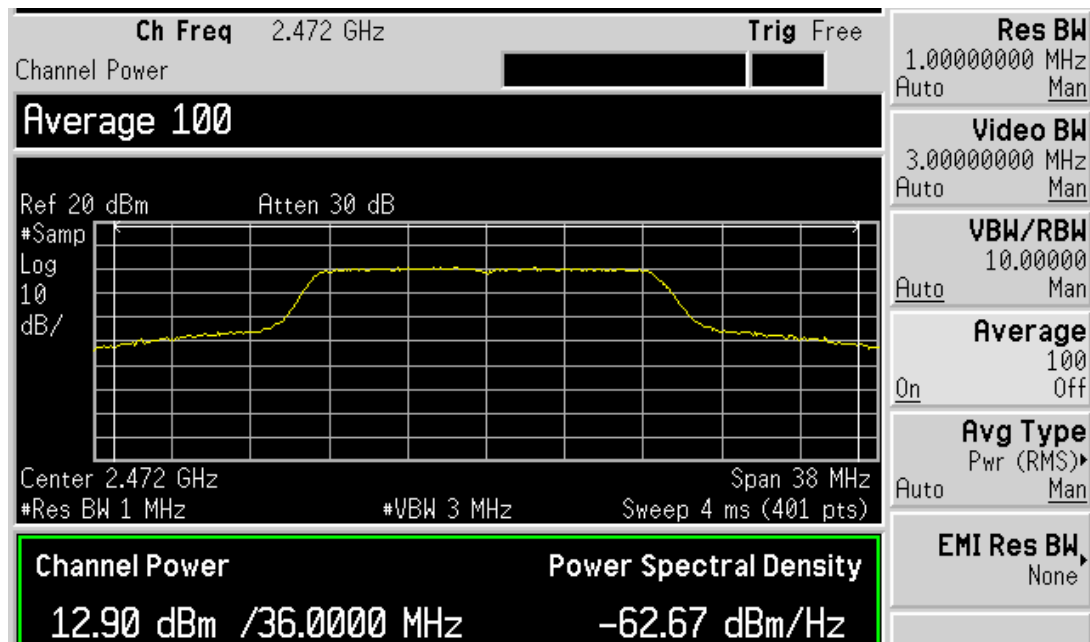
Modulation: 802.11g

Test Results:

| Frequency (MHz) | Measured RF Output power (dBm) | Cable Loss (dB) | Total Output power (dBm) | Limit (dBm) |
|-----------------|--------------------------------|-----------------|--------------------------|-------------|
| 2412 | 12.84 | 1.68 | 14.52 | 30.00 |
| 2442 | 12.27 | 1.68 | 13.95 | 30.00 |
| 2472 | 12.90 | 1.68 | 14.58 | 30.00 |



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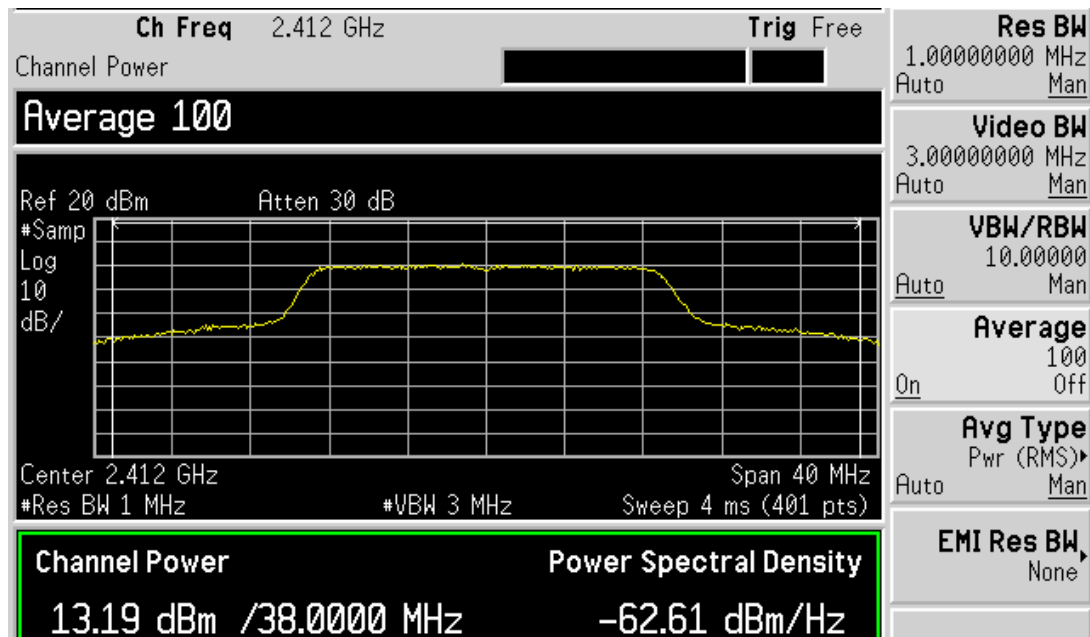


Channel Frequency: 2472 MHz

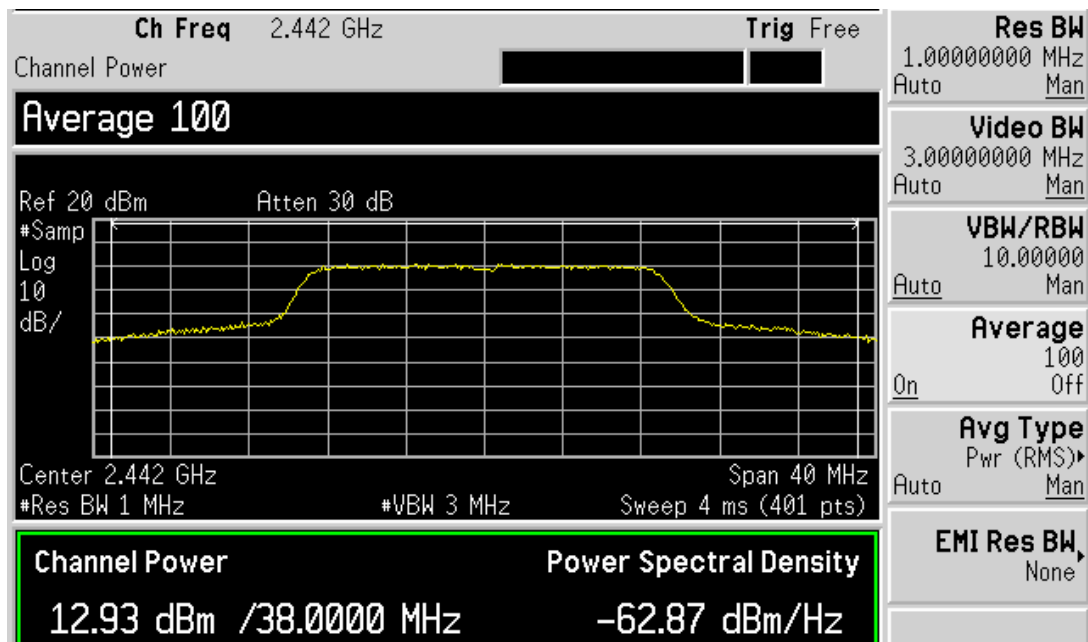
Modulation: 802.11n

Test Results:

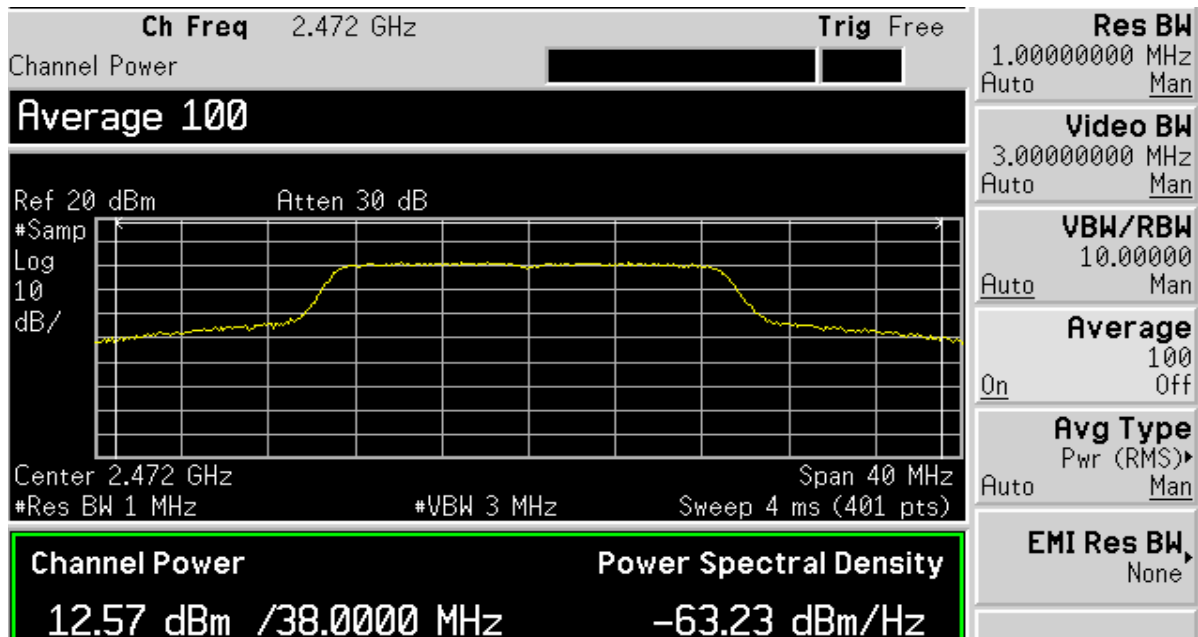
| Frequency (MHz) | Measured RF Output power (dBm) | Cable Loss (dB) | Total Output power (dBm) | Limit (dBm) |
|-----------------|--------------------------------|-----------------|--------------------------|-------------|
| 2412 | 13.19 | 1.68 | 14.87 | 30.00 |
| 2442 | 12.93 | 1.68 | 14.61 | 30.00 |
| 2472 | 12.57 | 1.68 | 14.25 | 30.00 |



Channel Frequency: 2412 MHz



Channel Frequency: 2442 MHz



Channel Frequency: 2472 MHz

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Power Spectral Density

Section 15.247(e)

Result

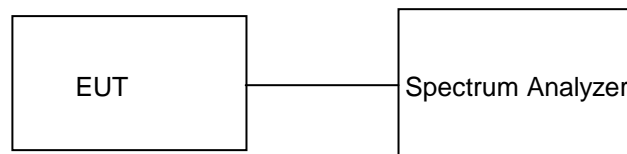
Pass

Test Specification
Detector Function
Requirement

FCC Part 15 Section 15.247 (e)
Peak

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.

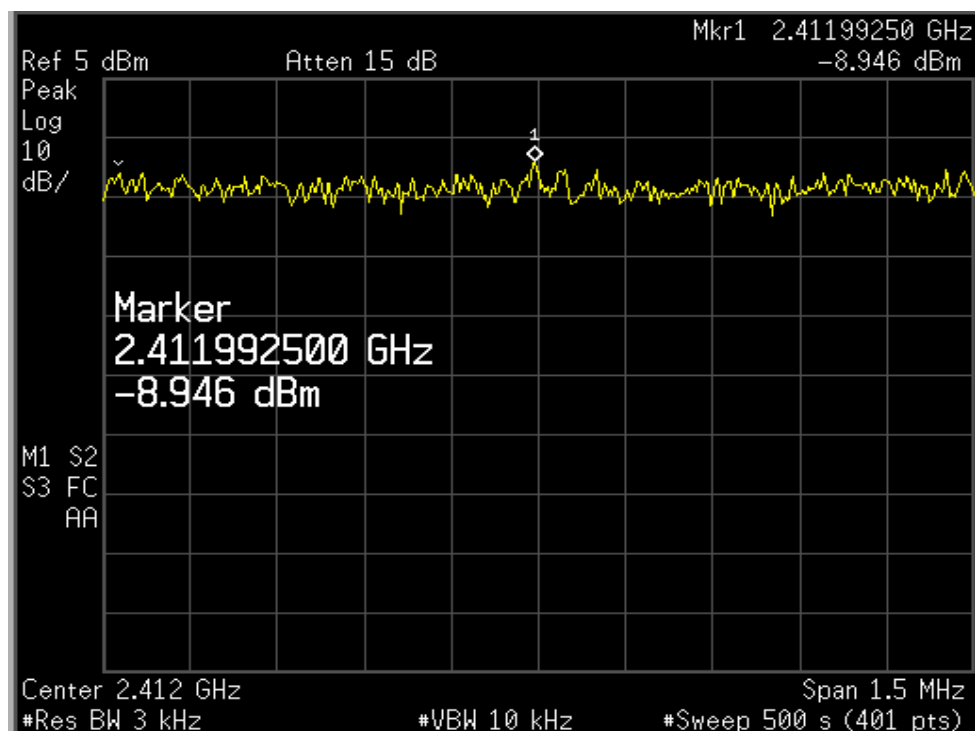
Test Method:



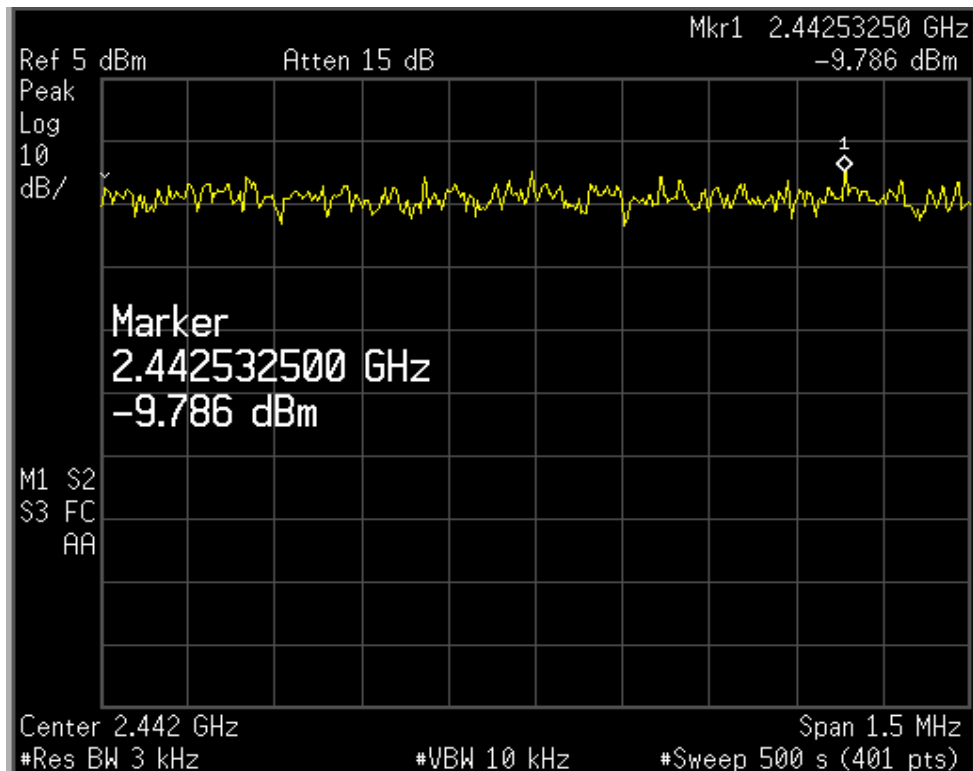
Test Result:

Modulation: 802.11b

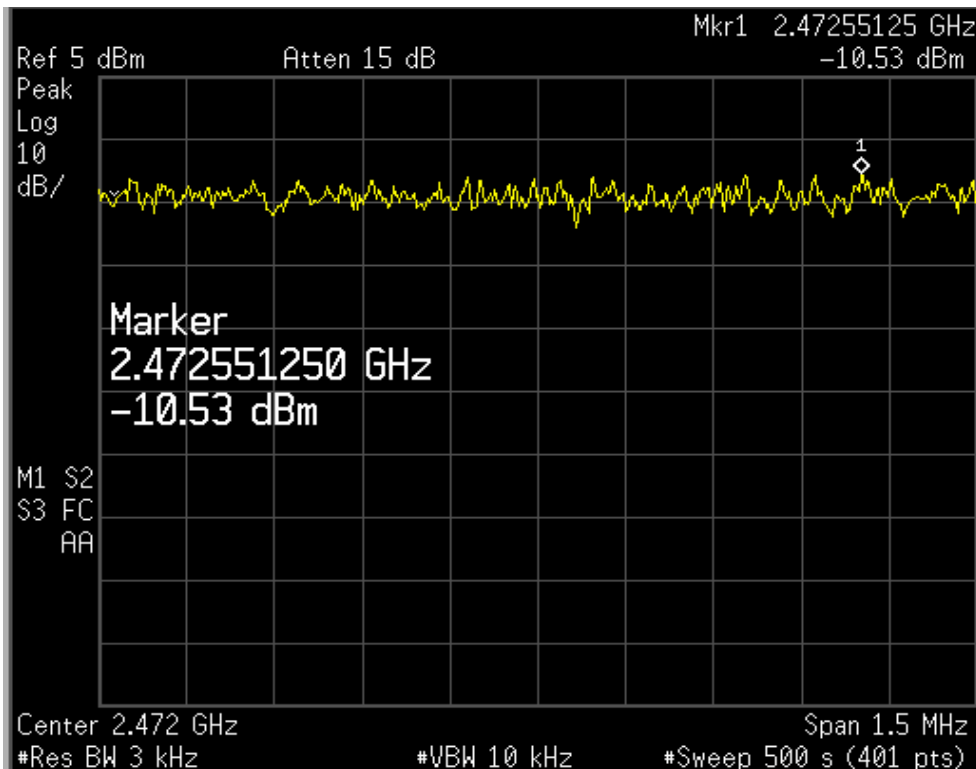
| Frequency (MHz) | Measured RF Output power (dBm) | Cable Loss (dB) | PSD (dBm) | Limit (dBm) |
|-----------------|--------------------------------|-----------------|-----------|-------------|
| 2412 | -08.94 | 1.68 | -7.26 | 8.00 |
| 2442 | -09.78 | 1.68 | -8.10 | 8.00 |
| 2472 | -10.53 | 1.68 | -8.85 | 8.00 |



Channel Frequency: 2412 MHz



Channel Frequency: 2442 MHz



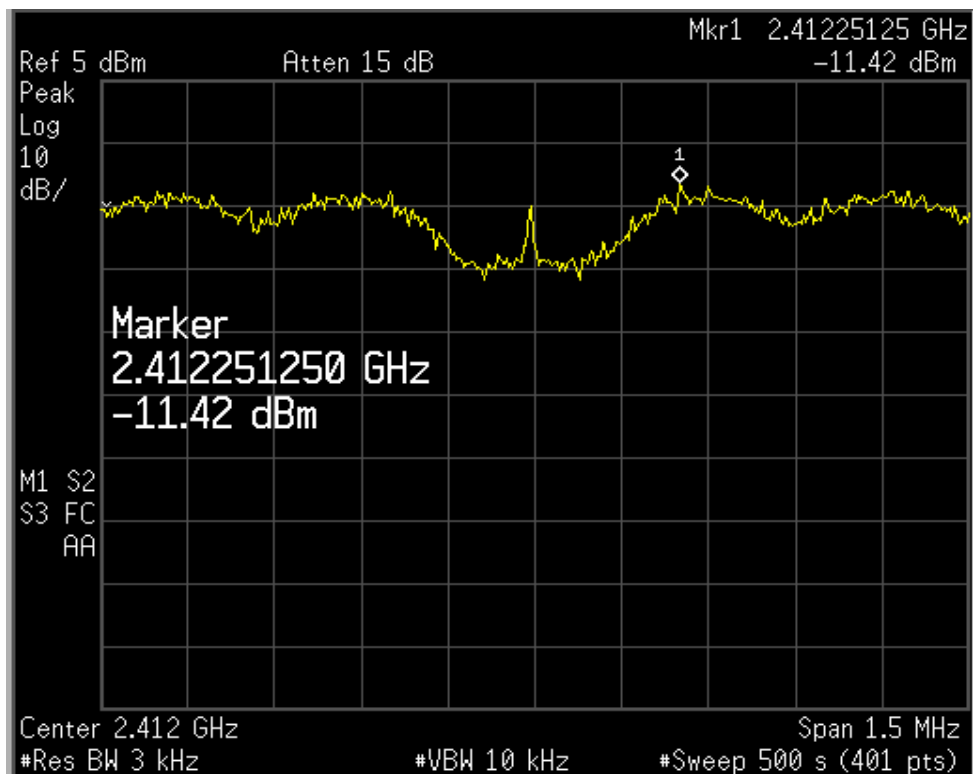
Channel Frequency: 2472 MHz

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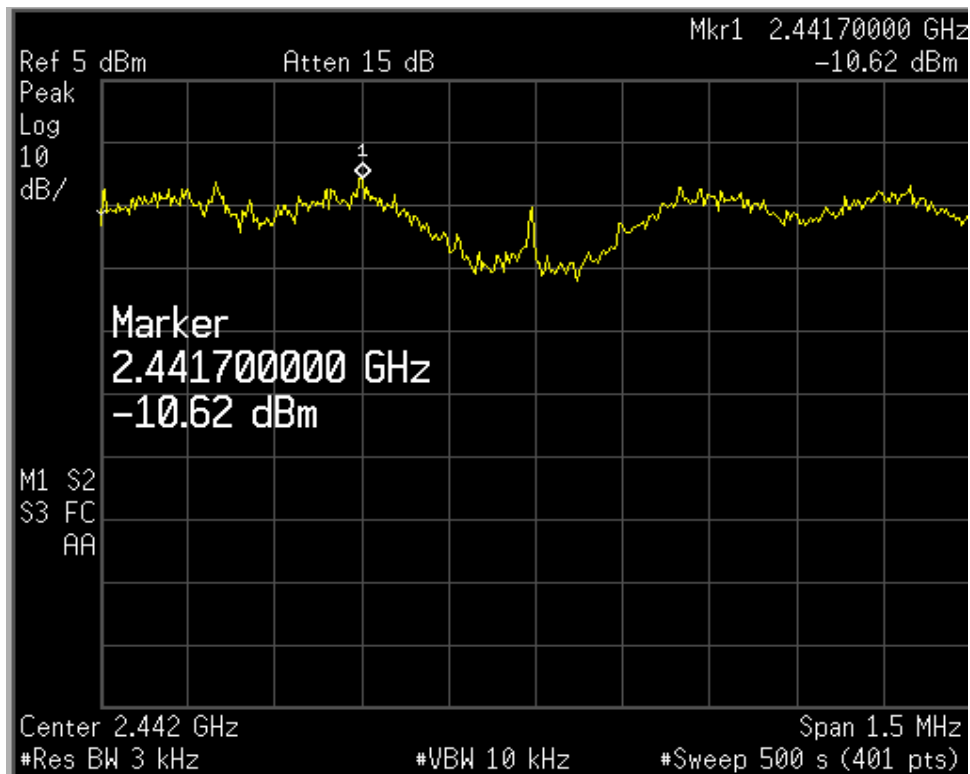
Modulation: 802.11g

Test Results:

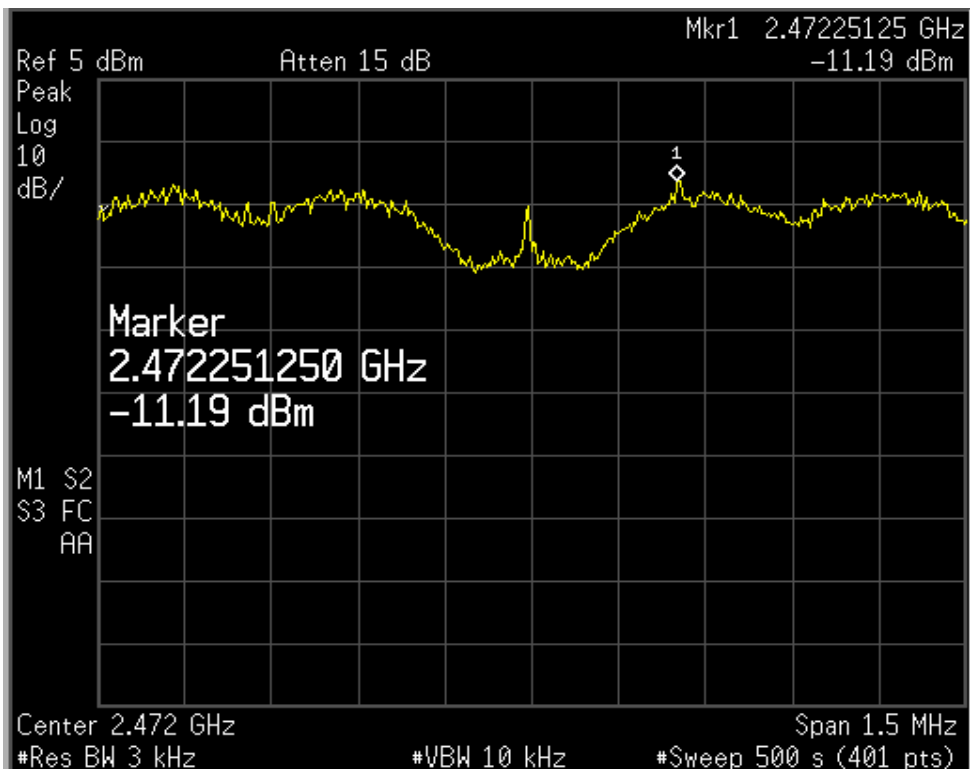
| Frequency (MHz) | Measured RF Output power (dBm) | Cable Loss (dB) | PSD (dBm) | Limit (dBm) |
|-----------------|--------------------------------|-----------------|-----------|-------------|
| 2412 | -11.42 | 1.68 | -9.74 | 8.00 |
| 2442 | -10.62 | 1.68 | -8.94 | 8.00 |
| 2472 | -11.19 | 1.68 | -9.51 | 8.00 |



Channel Frequency: 2412 MHz



Channel Frequency: 2442 MHz



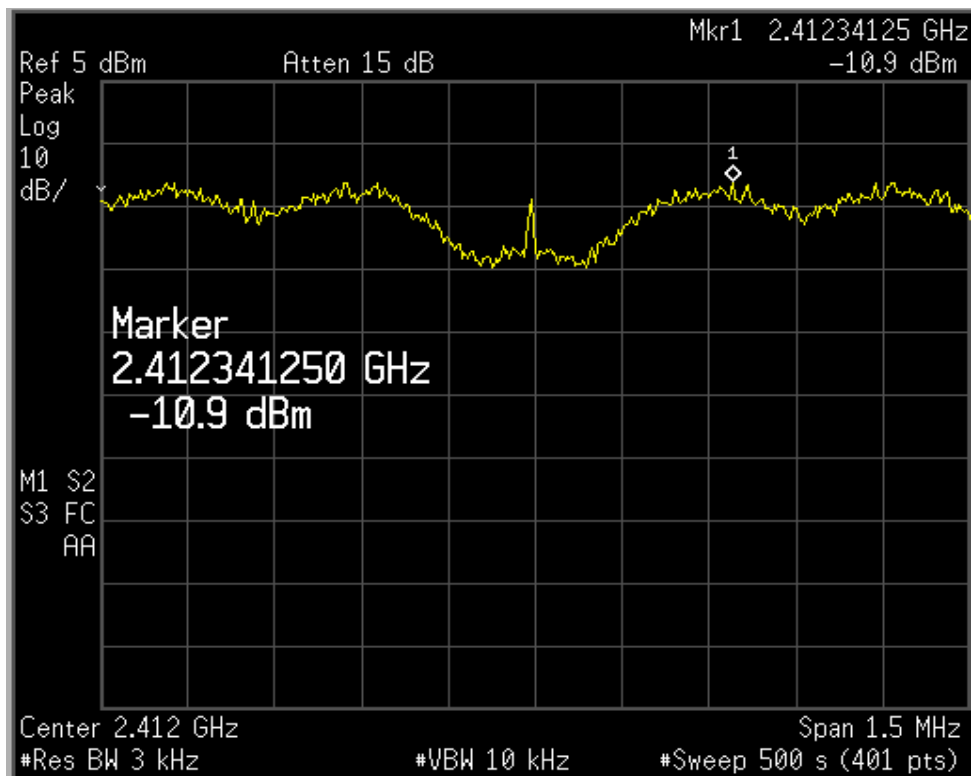
Channel Frequency: 2472 MHz

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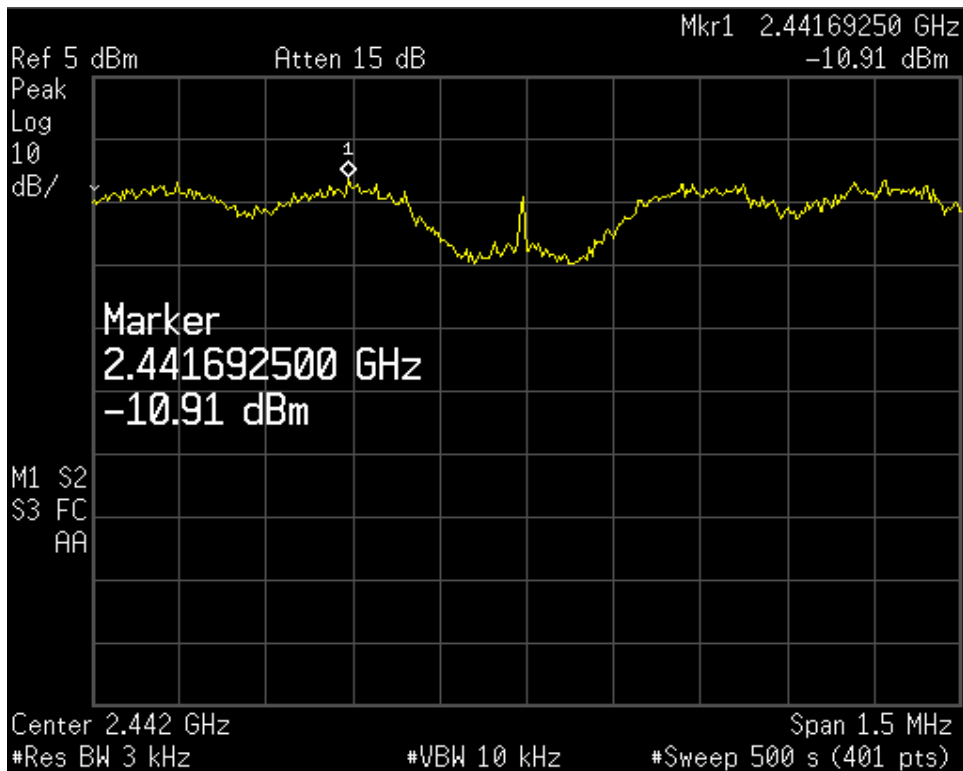
Modulation: 802.11n

Test Results:

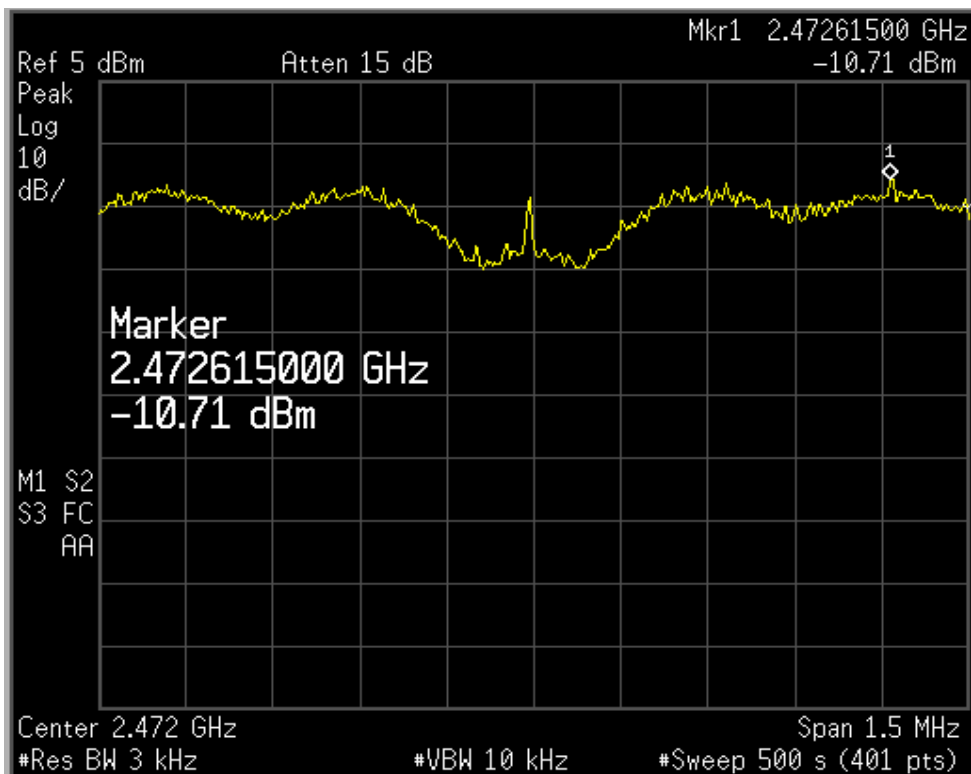
| Frequency (MHz) | Measured RF Output power (dBm) | Cable Loss (dB) | PSD (dBm) | Limit (dBm) |
|-----------------|--------------------------------|-----------------|-----------|-------------|
| 2412 | -10.90 | 1.68 | -9.22 | 8.00 |
| 2442 | -10.91 | 1.68 | -9.23 | 8.00 |
| 2472 | -10.71 | 1.68 | -9.03 | 8.00 |



Channel Frequency: 2414 MHz



Channel Frequency: 2442 MHz



Channel Frequency: 2472 MHz

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6 dB Bandwidth

Section 15.247(a)(2)

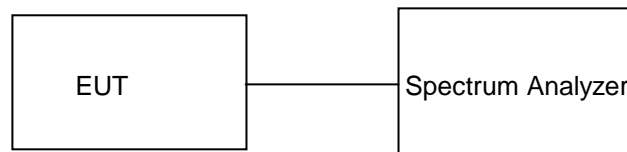
Result

Pass

Test Specification
Requirement

FCC Part 15 Section 15.247 (a) (2)
The minimum 6 dB bandwidth shall be at least 500 kHz.

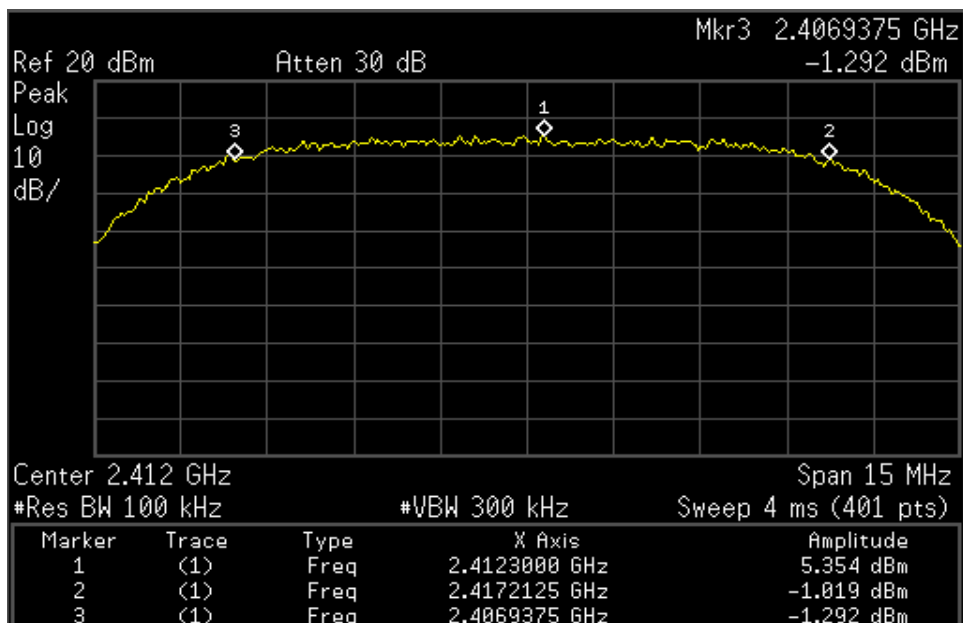
Test Method:



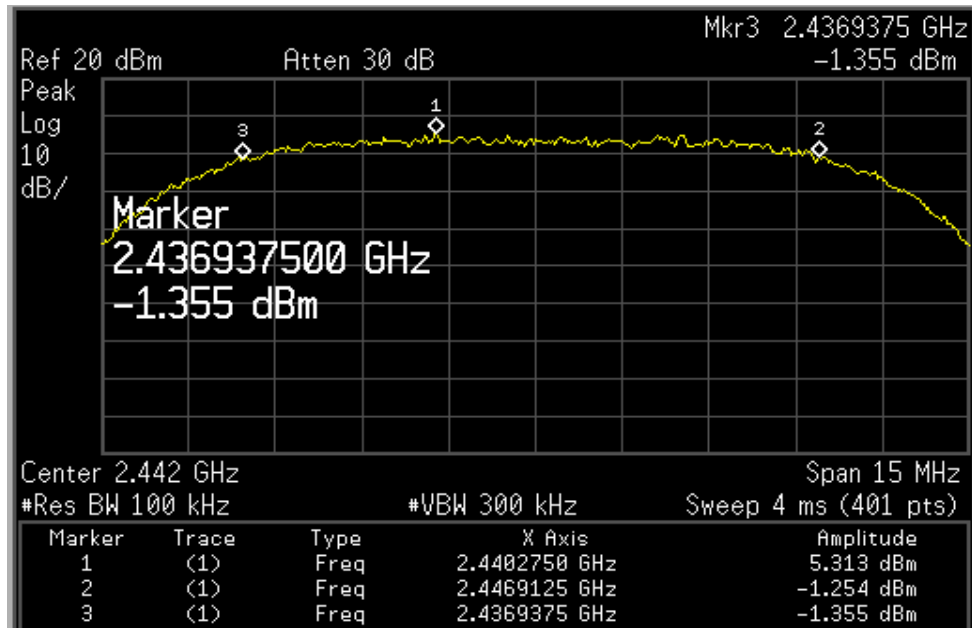
Test Result:

Modulation: 802.11b

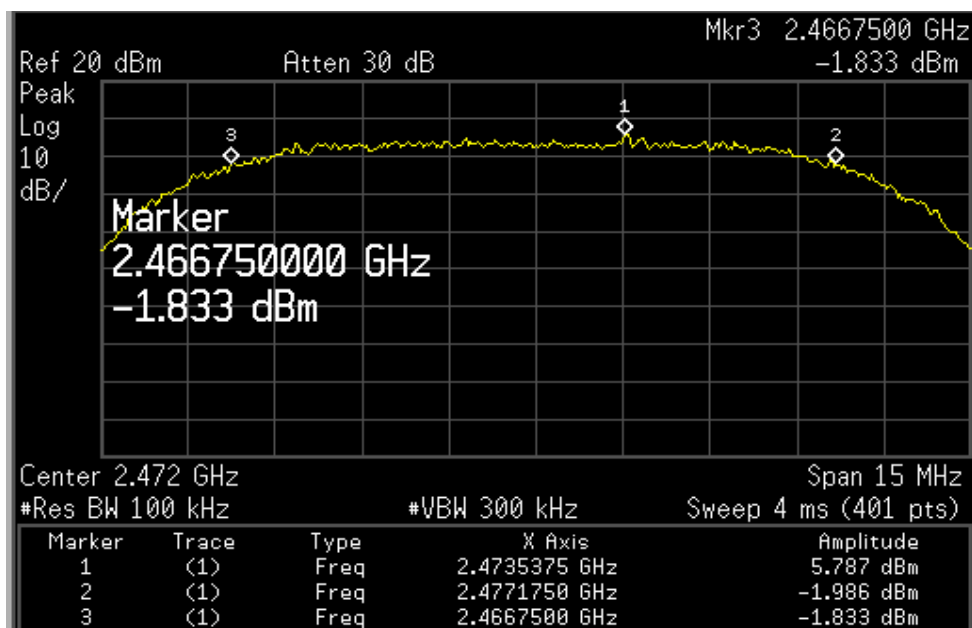
| Carrier Frequency (MHz) | Lower Frequency (MHz) | Upper Frequency (MHz) | 6 dB Bandwidth (MHz) | 99% OBW (MHz) |
|-------------------------|-----------------------|-----------------------|----------------------|---------------|
| 2412 | 2406.93 | 2417.21 | 10.28 | 12.20 |
| 2442 | 2436.93 | 2446.91 | 09.98 | 12.05 |
| 2472 | 2466.75 | 2477.17 | 10.42 | 12.38 |



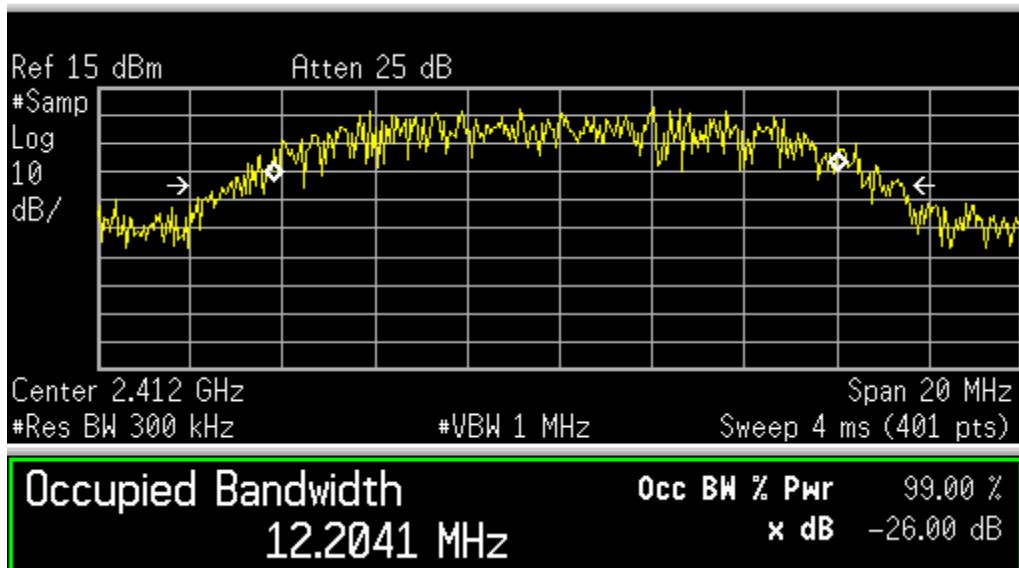
Channel frequency: 2412 MHz



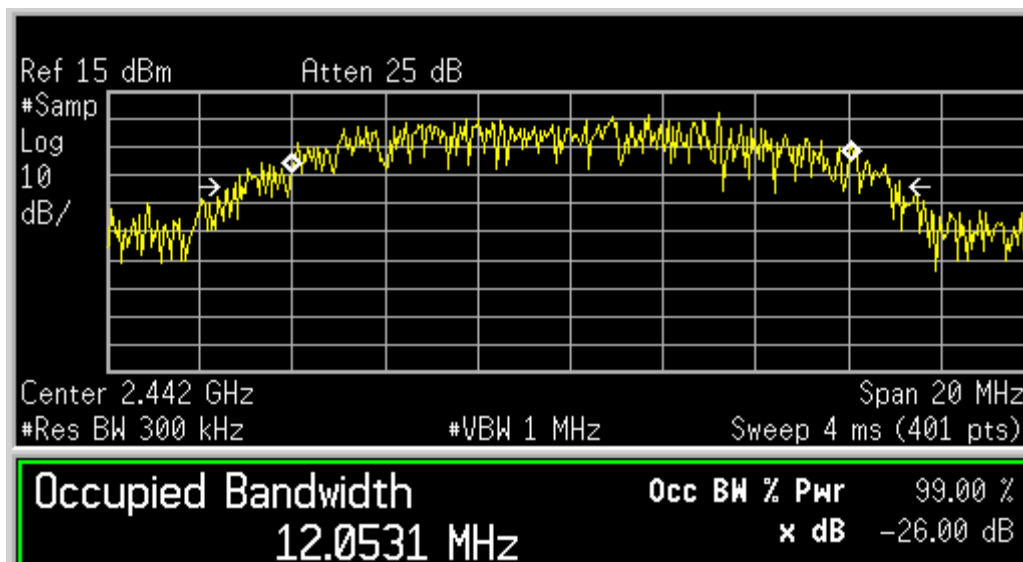
Channel frequency: 2442 MHz



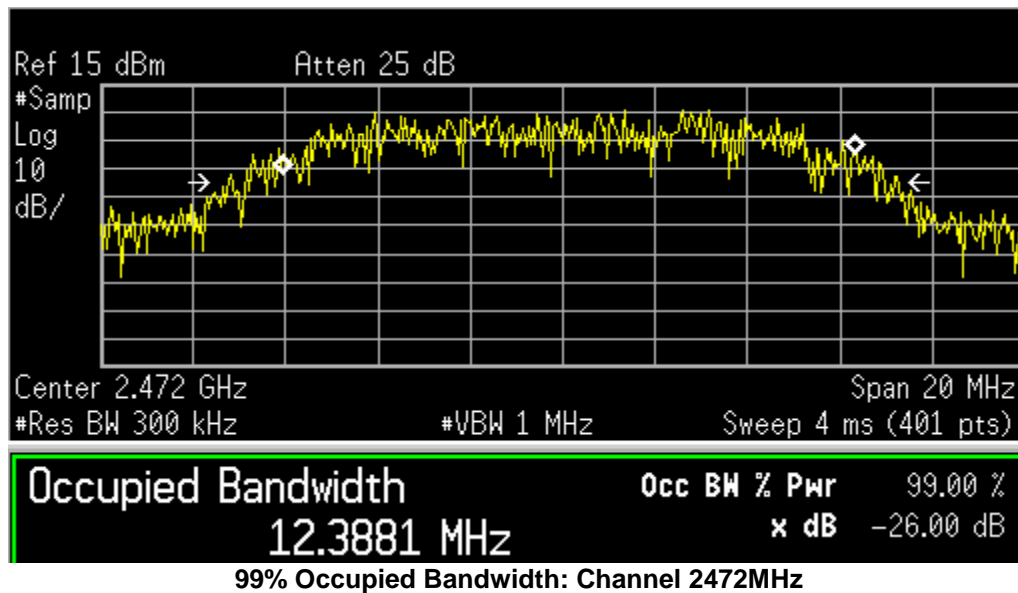
Channel frequency: 2462 MHz



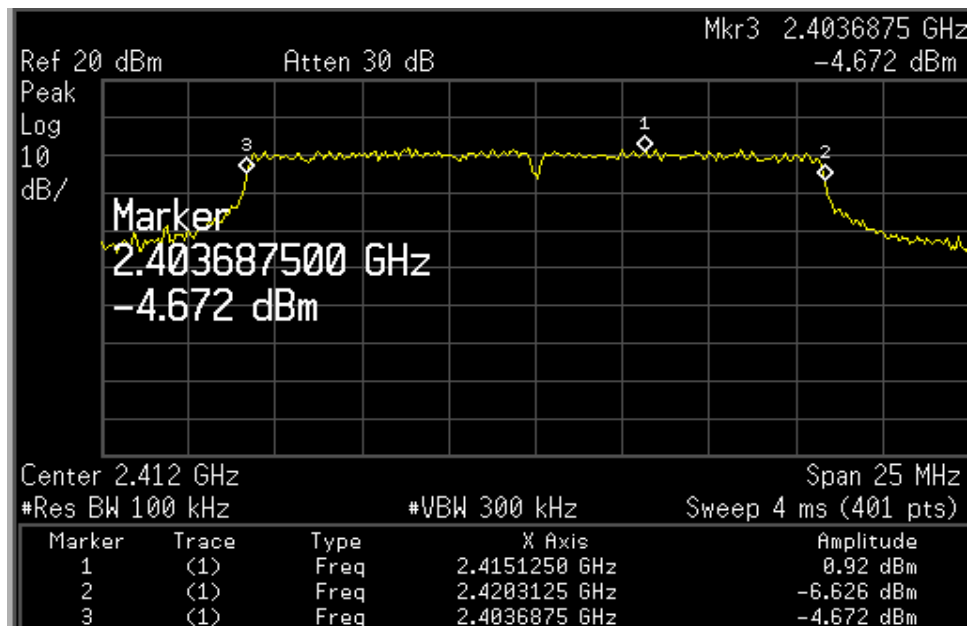
99% Occupied Bandwidth: Channel 2412MHz



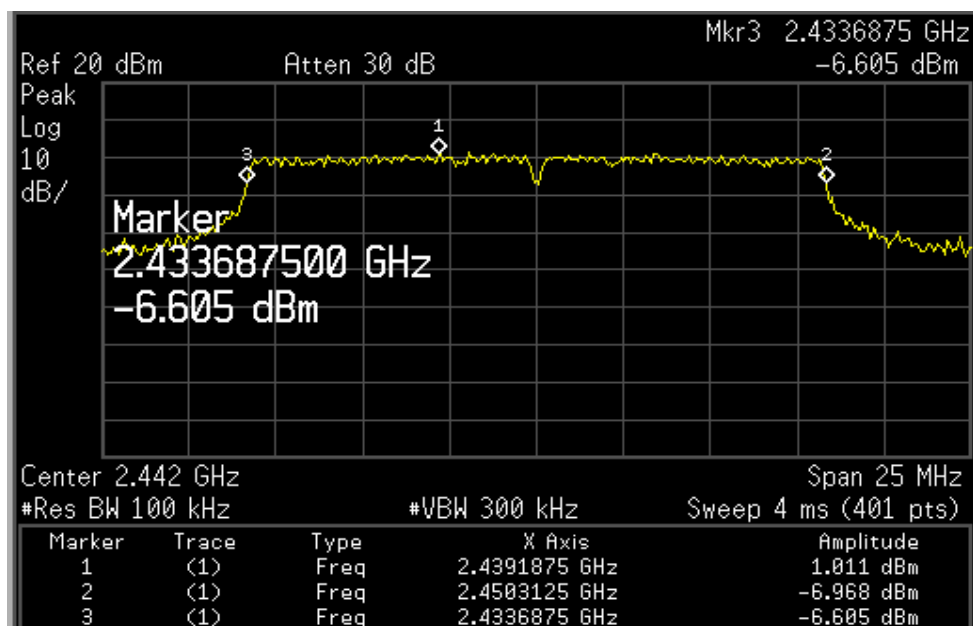
99% Occupied Bandwidth: Channel 2442MHz


Modulation: 802.11g

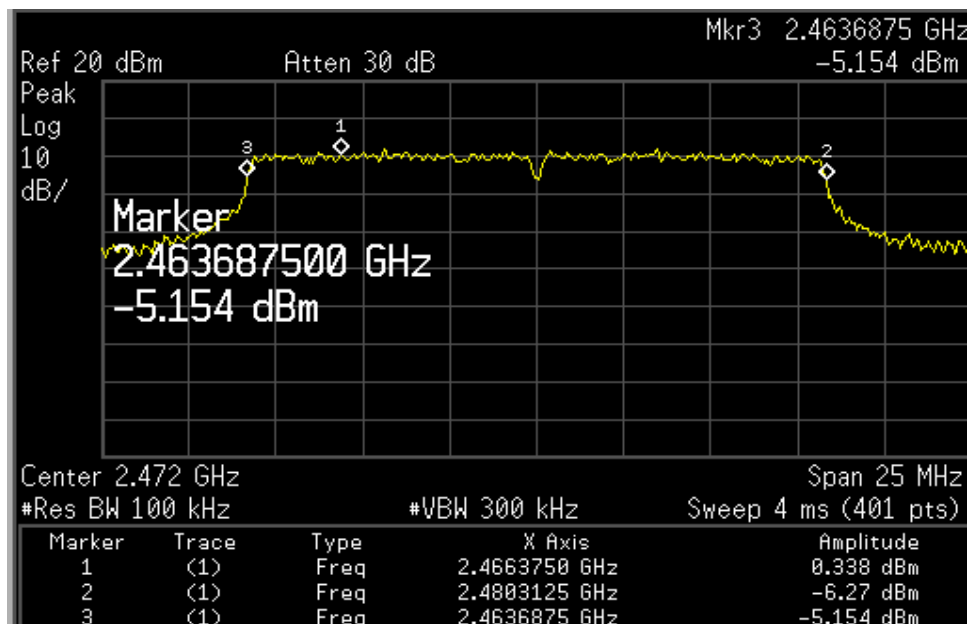
| Carrier Frequency (MHz) | Lower Frequency (MHz) | Upper Frequency (MHz) | 6 dB Bandwidth (MHz) | 99% OBW (MHz) |
|-------------------------|-----------------------|-----------------------|----------------------|---------------|
| 2412 | 2403.68 | 2420.31 | 16.63 | 16.62 |
| 2442 | 2433.68 | 2450.31 | 16.63 | 16.60 |
| 2472 | 2463.68 | 2480.31 | 16.63 | 16.54 |



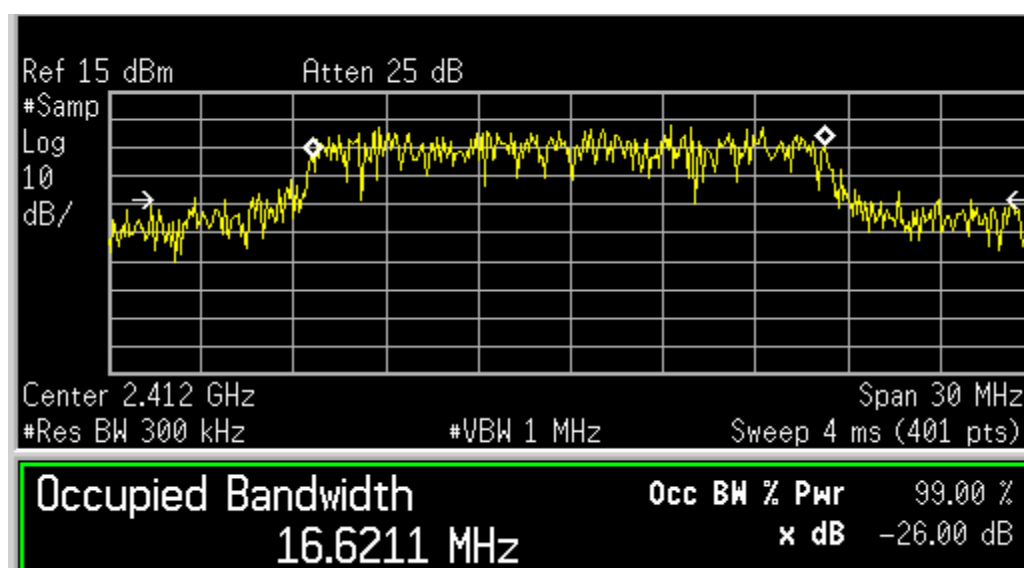
Channel frequency: 2412 MHz



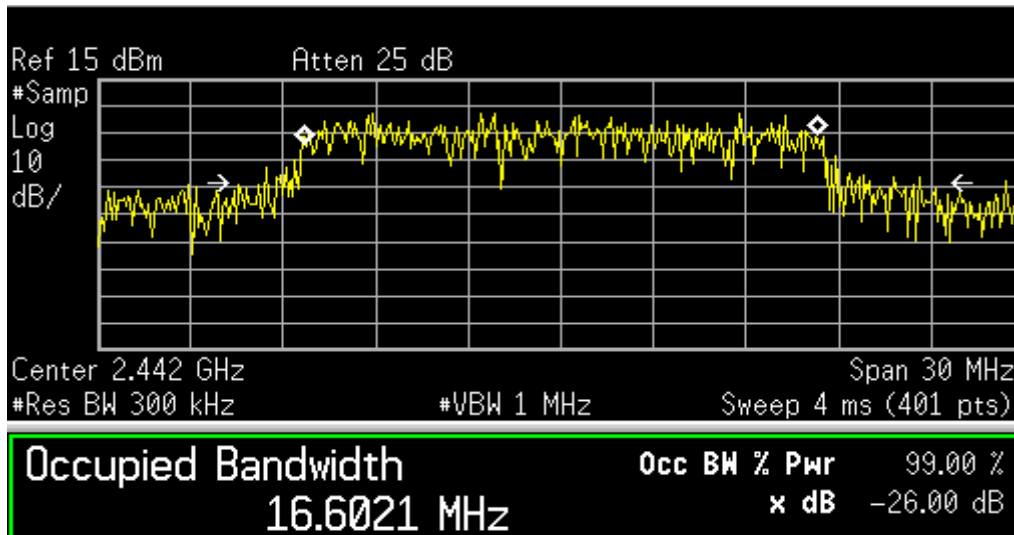
Channel frequency: 2442 MHz



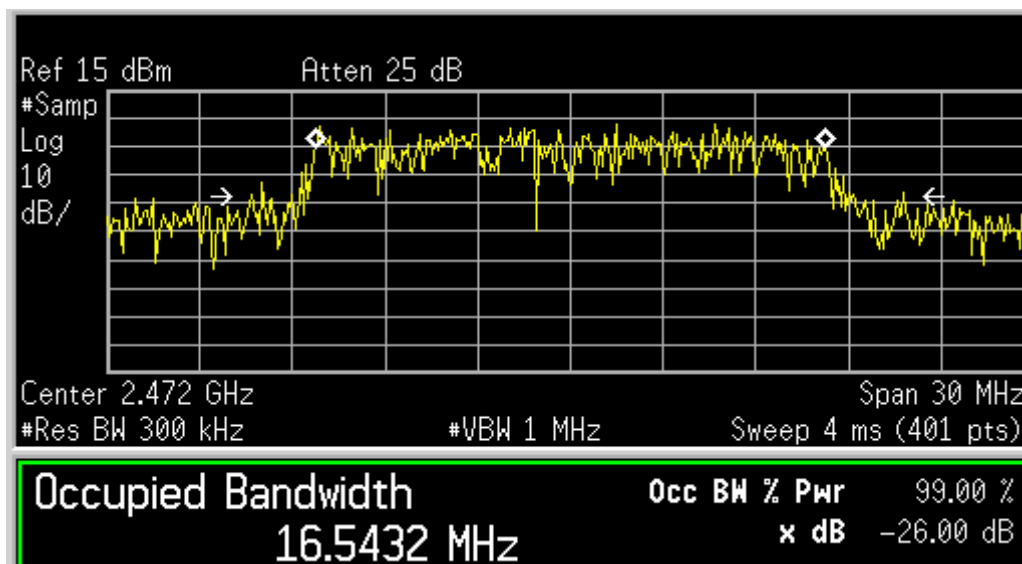
Channel frequency: 2472 MHz



99% Occupied Bandwidth: Channel 2412MHz



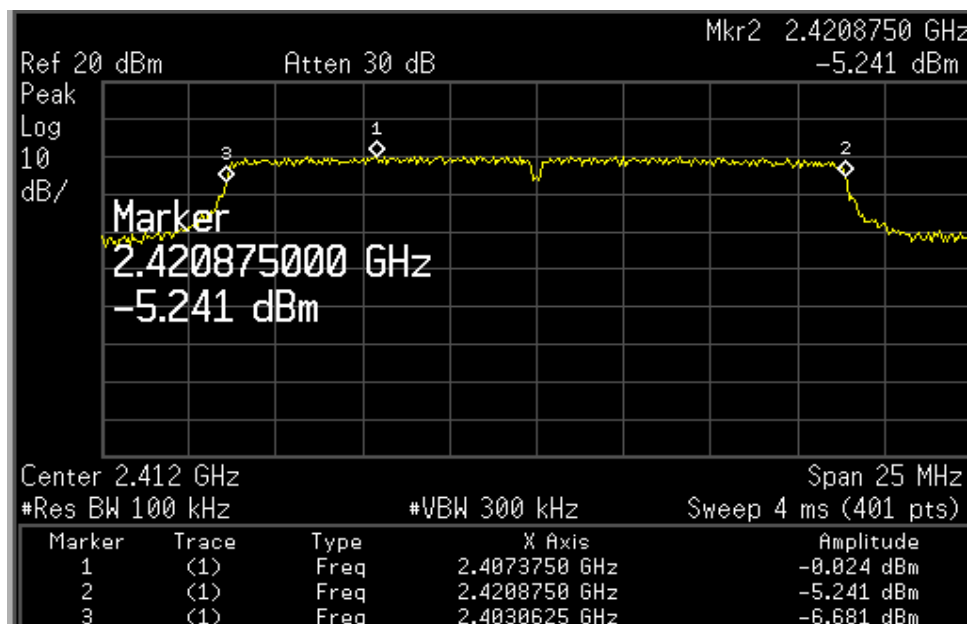
99% Occupied Bandwidth: Channel 2442MHz



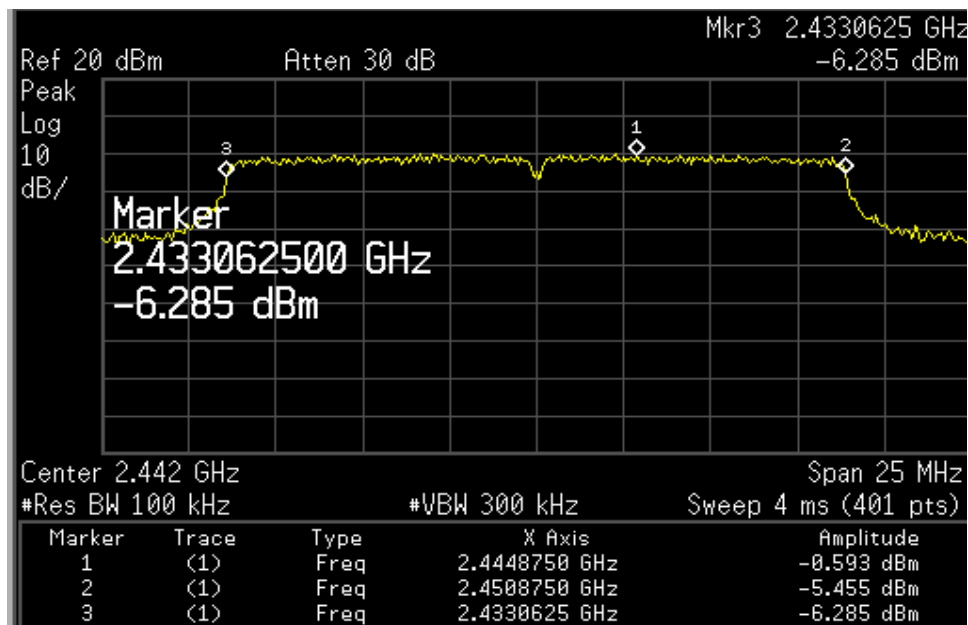
99% Occupied Bandwidth: Channel 2472MHz

Modulation: 802.11n

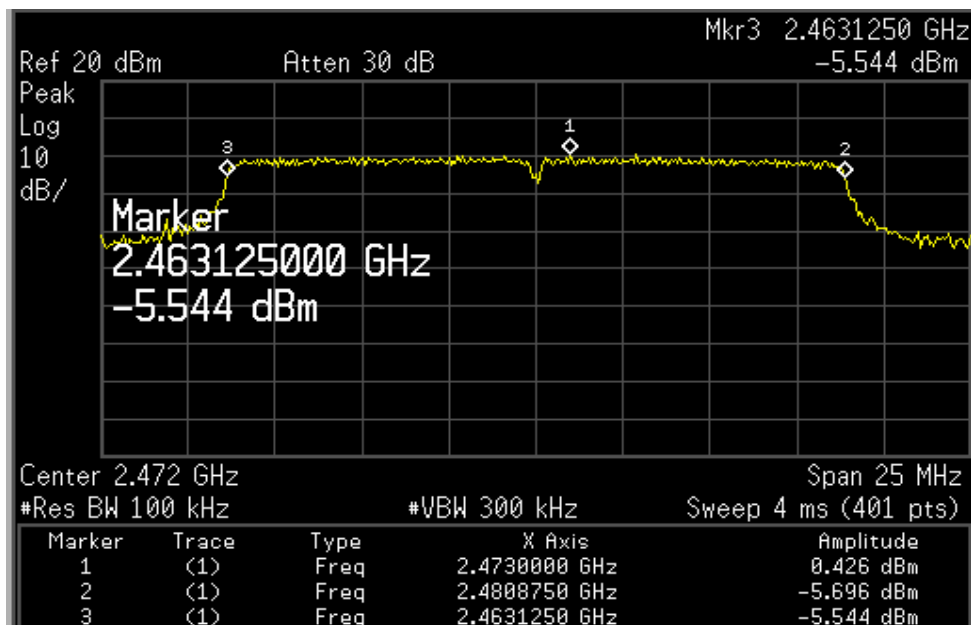
| Carrier Frequency (MHz) | Lower Frequency (MHz) | Upper Frequency (MHz) | 6 dB Bandwidth (MHz) | 99% OBW (MHz) |
|-------------------------|-----------------------|-----------------------|----------------------|---------------|
| 2412 | 2403.06 | 2420.87 | 17.81 | 17.76 |
| 2442 | 2433.06 | 2450.87 | 17.81 | 17.69 |
| 2462 | 2463.12 | 2480.87 | 17.75 | 17.56 |



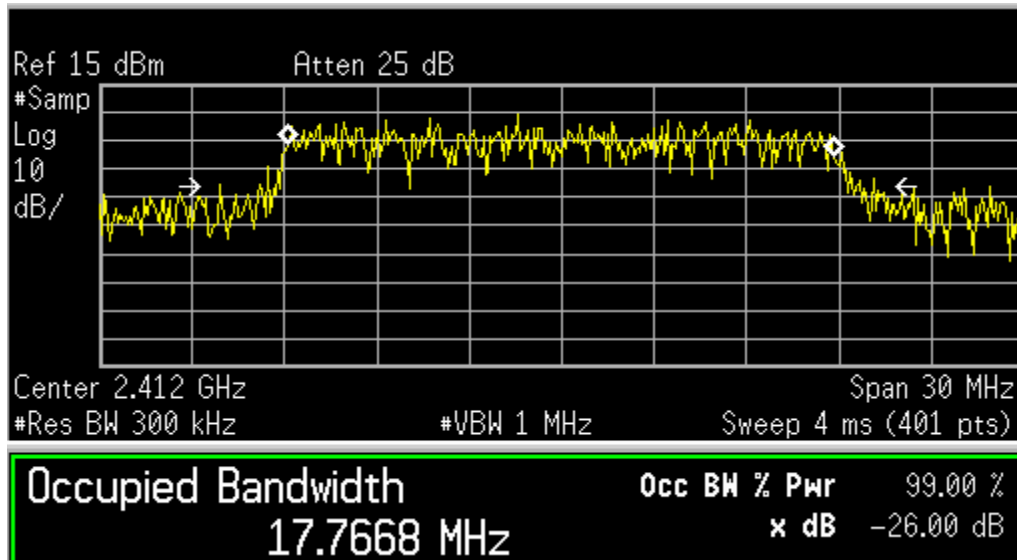
Channel frequency: 2412 MHz



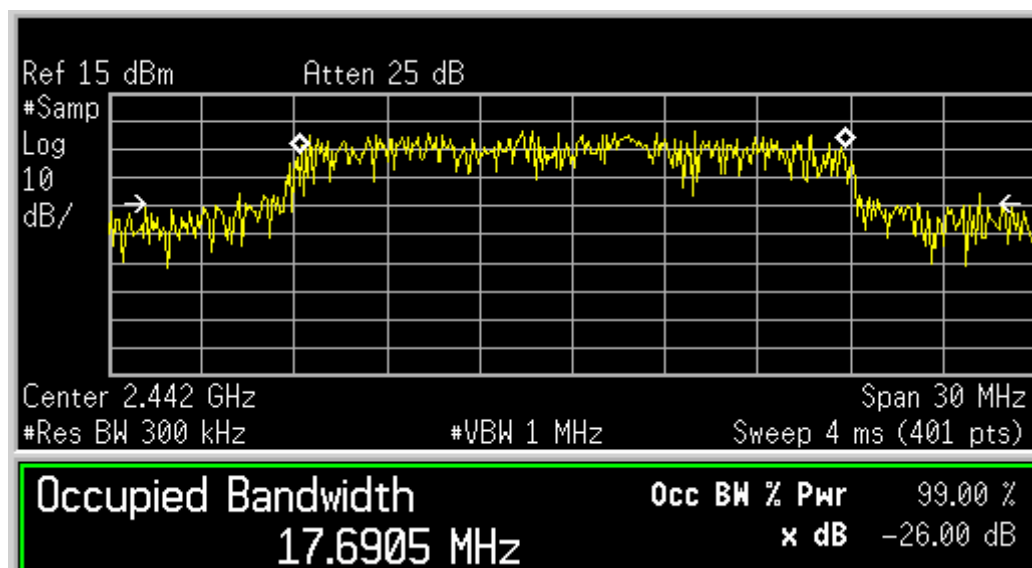
Channel frequency: 2442 MHz



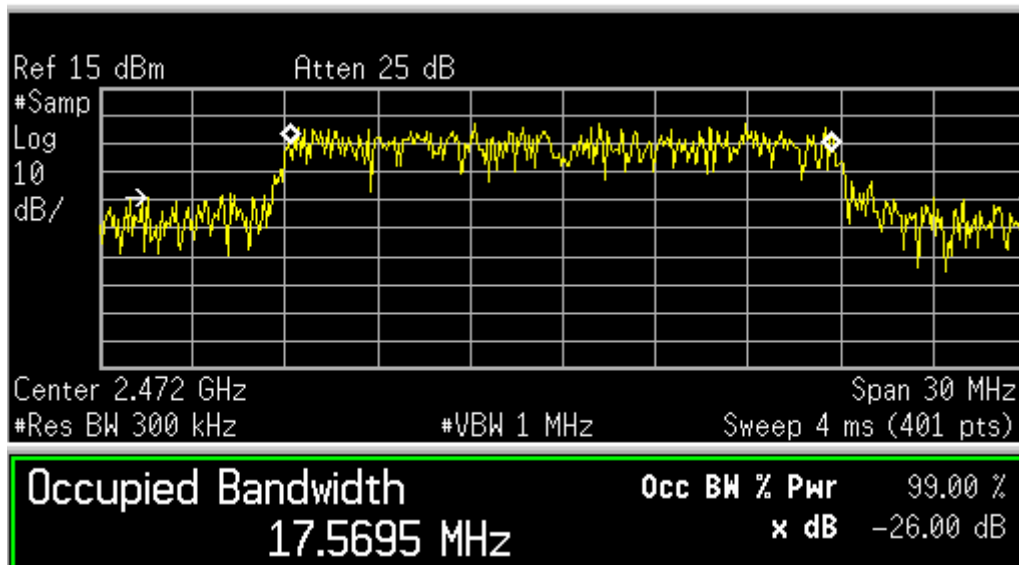
Channel frequency: 2472 MHz



99% Occupied Bandwidth: Channel 2412MHz



99% Occupied Bandwidth: Channel 2442MHz



99% Occupied Bandwidth: Channel 2472MHz

Band-edge Compliance

Section 15.247(d)

Result

Pass

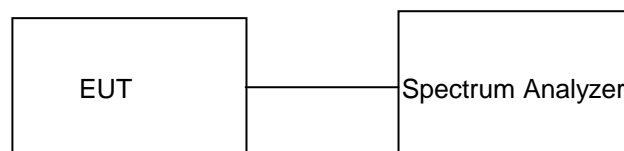
Test Specification
Detector Function
Requirement

FCC Part 15 C

Peak

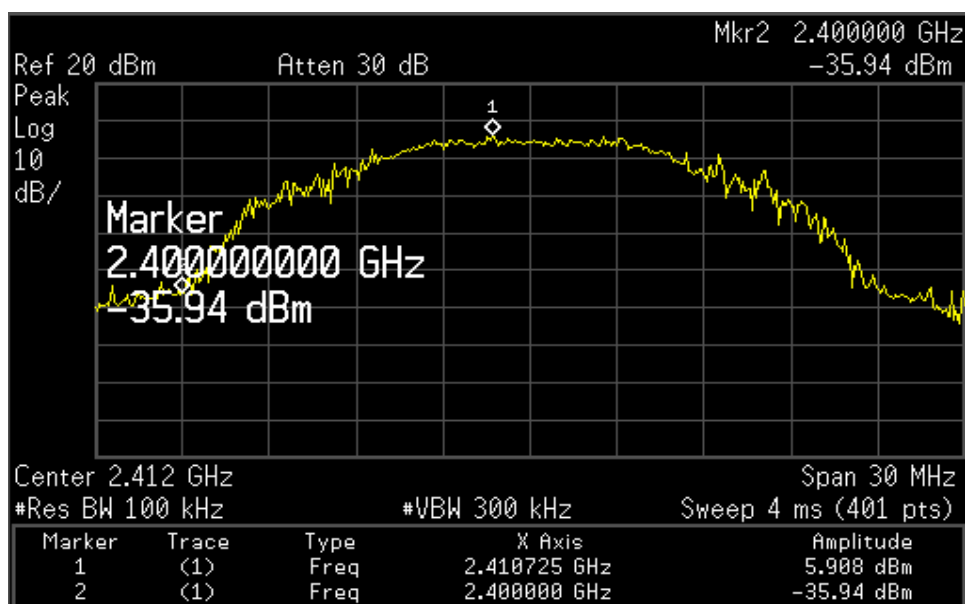
In any 100kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20dB below that in the 100kHz bandwidth within the band that contains the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

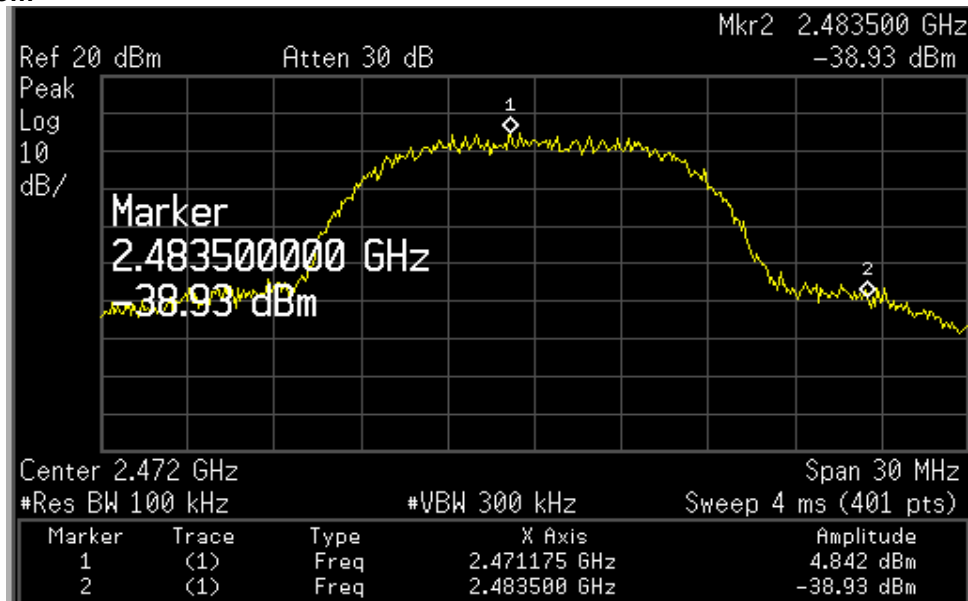
Test Method:



Test Result:
Modulation: 802.11b

| Channel | Fundamental Frequency (MHz) | Value at Band Edge | | Limit (dB) |
|---------|-----------------------------|--------------------|------------|------------|
| | | Frequency (MHz) | Value (dB) | |
| Low | 2412 | 2400.00 | -35.94 | -20.00 |
| High | 2472 | 2483.50 | -38.93 | -20.00 |

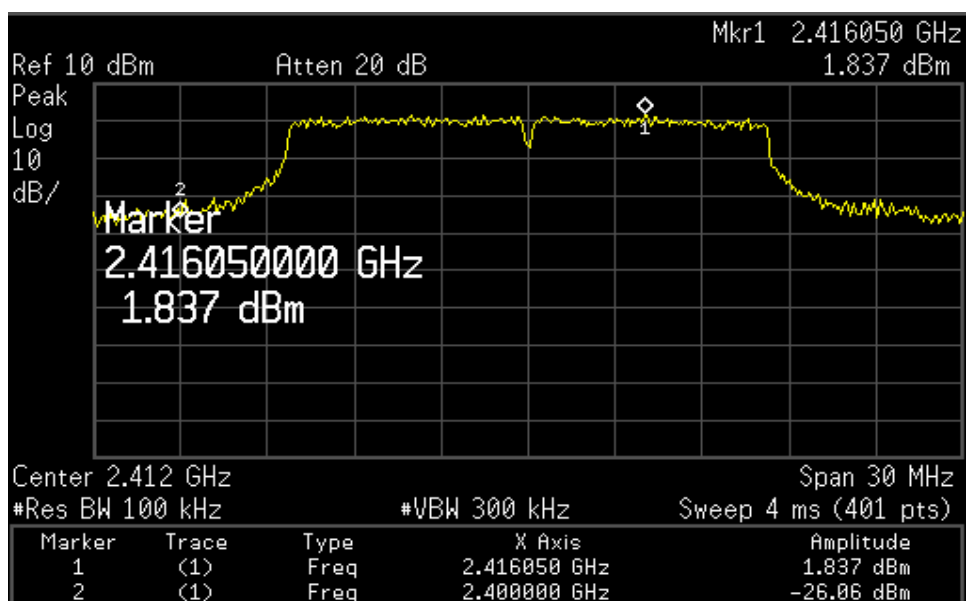

Channel Frequency: 2412 MHz



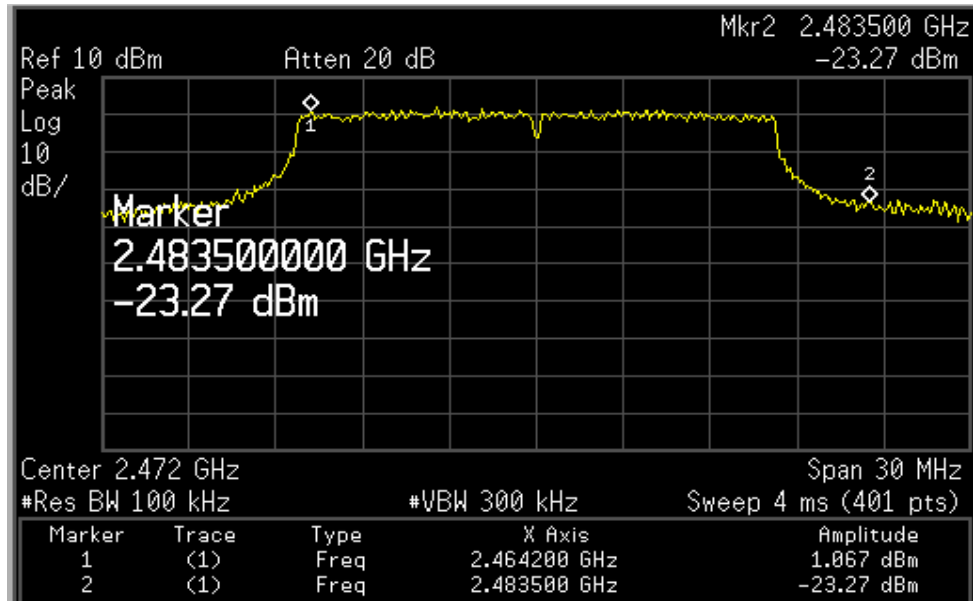
Channel Frequency: 2472 MHz

Modulation: 802.11g

| Channel | Fundamental Frequency (MHz) | Value at Band Edge | | Limit (dB) |
|---------|-----------------------------|--------------------|------------|------------|
| | | Frequency (MHz) | Value (dB) | |
| Low | 2412 | 2400.00 | -26.06 | -20.00 |
| High | 2472 | 2483.50 | -23.27 | -20.00 |



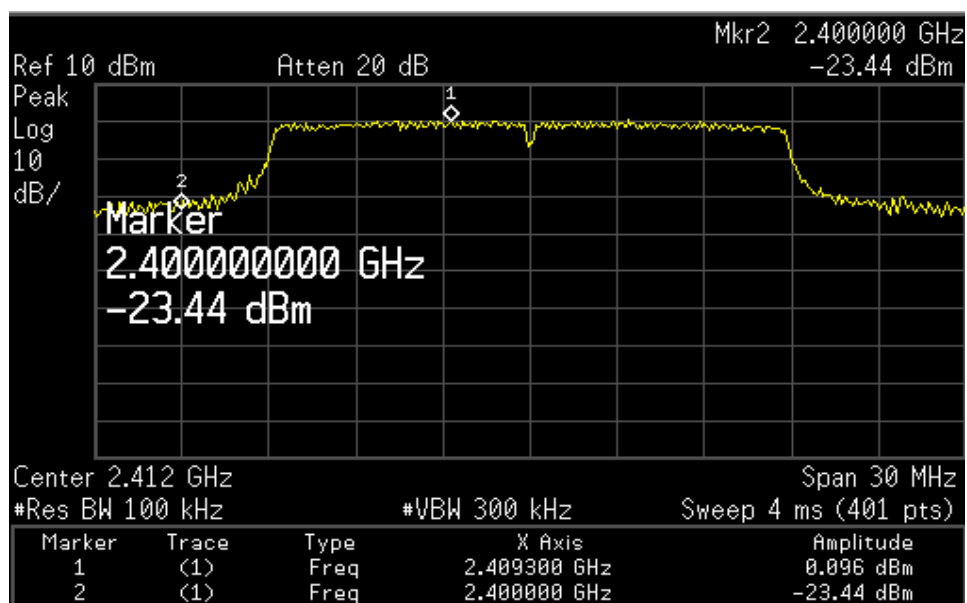
Channel Frequency: 2412 MHz



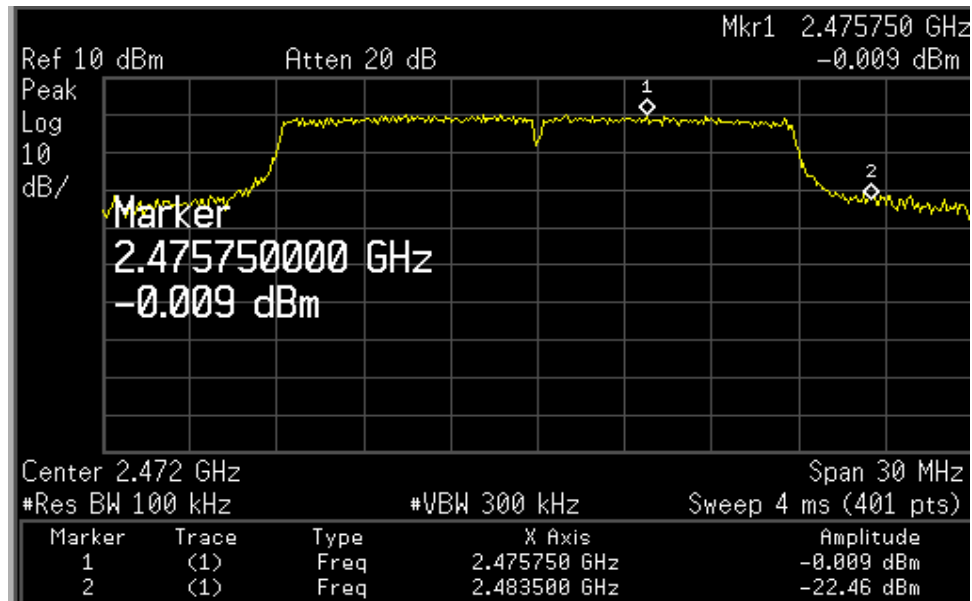
Channel Frequency: 2472 MHz

Modulation: 802.11n

| Channel | Fundamental Frequency (MHz) | Value at Band Edge | | Limit (dB) |
|---------|-----------------------------|--------------------|------------|------------|
| | | Frequency (MHz) | Value (dB) | |
| Low | 2412 | 2400.00 | -23.44 | -20.00 |
| High | 2472 | 2483.50 | -22.46 | -20.00 |



Channel Frequency: 2412 MHz

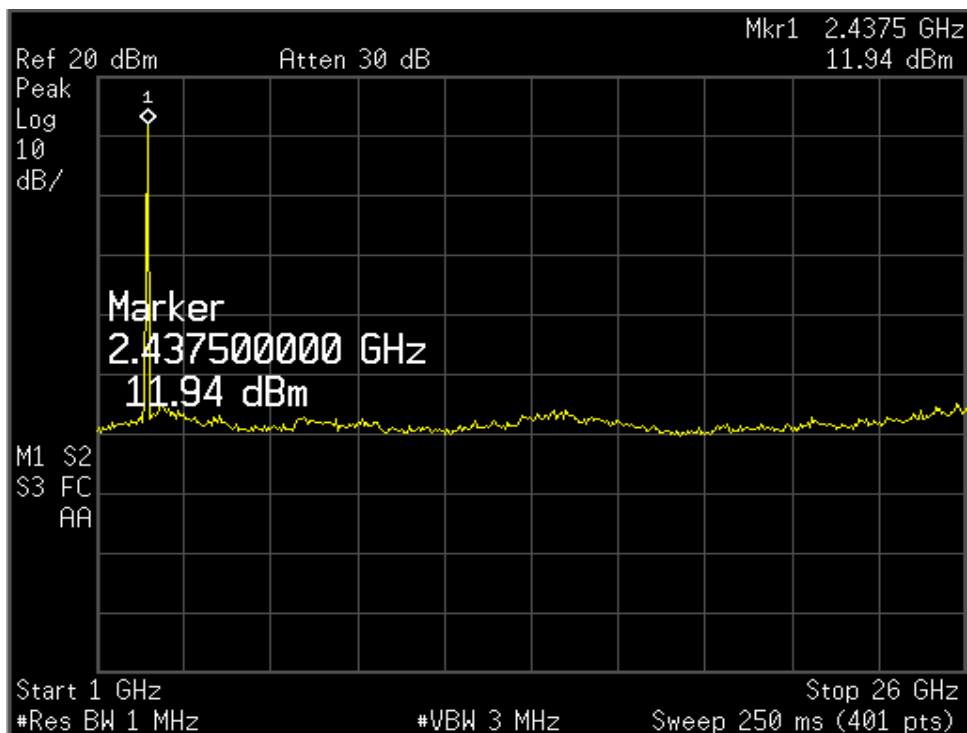
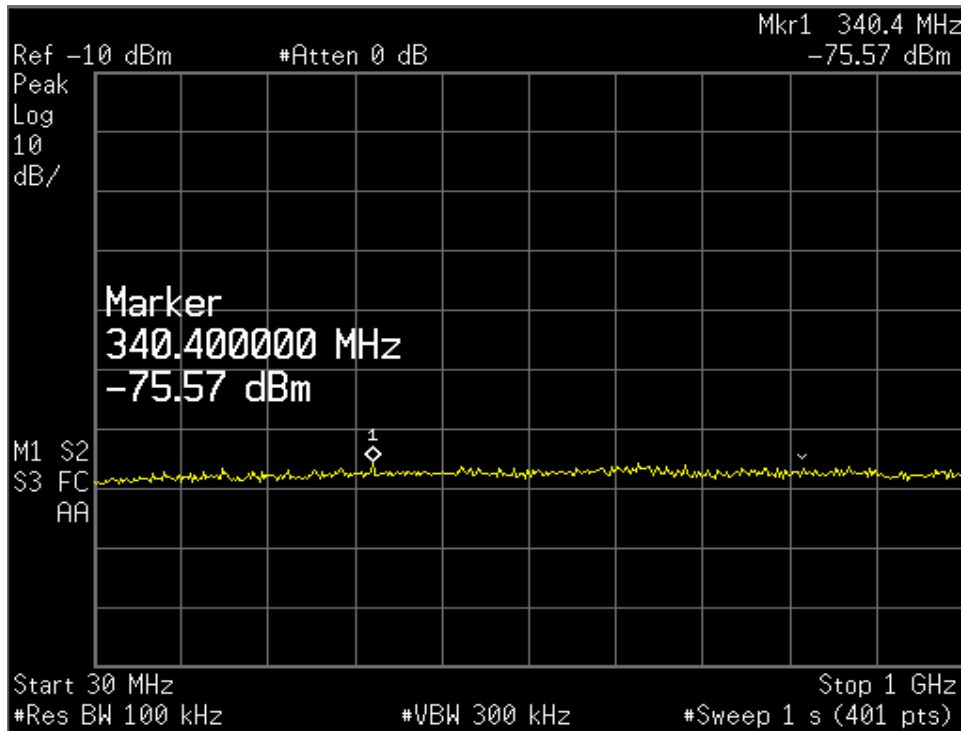


Channel Frequency: 2472 MHz

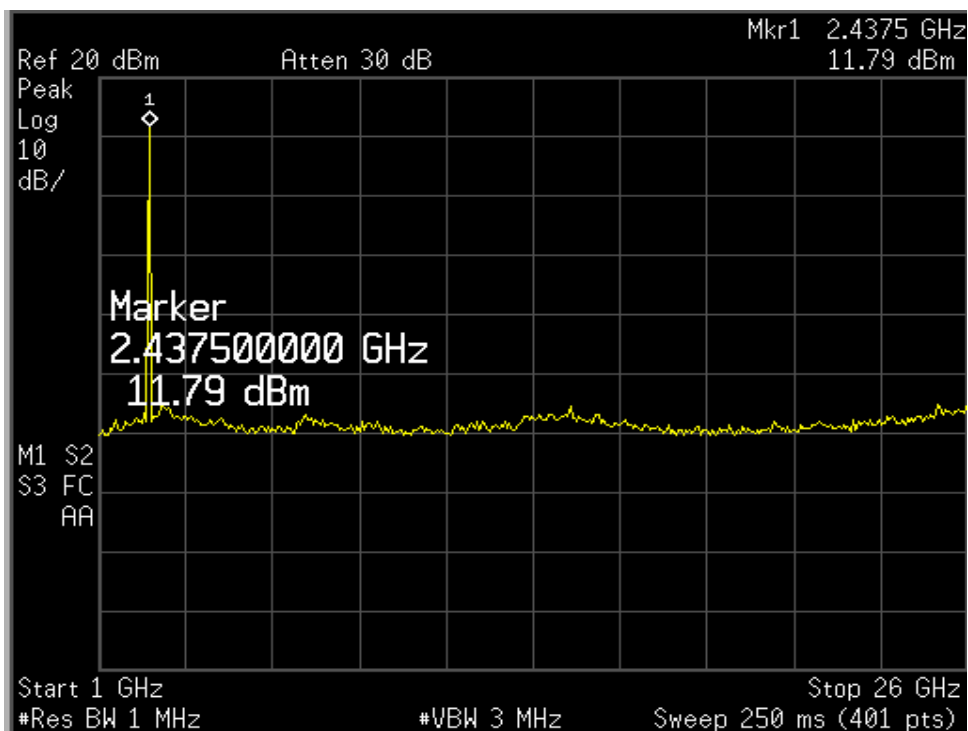
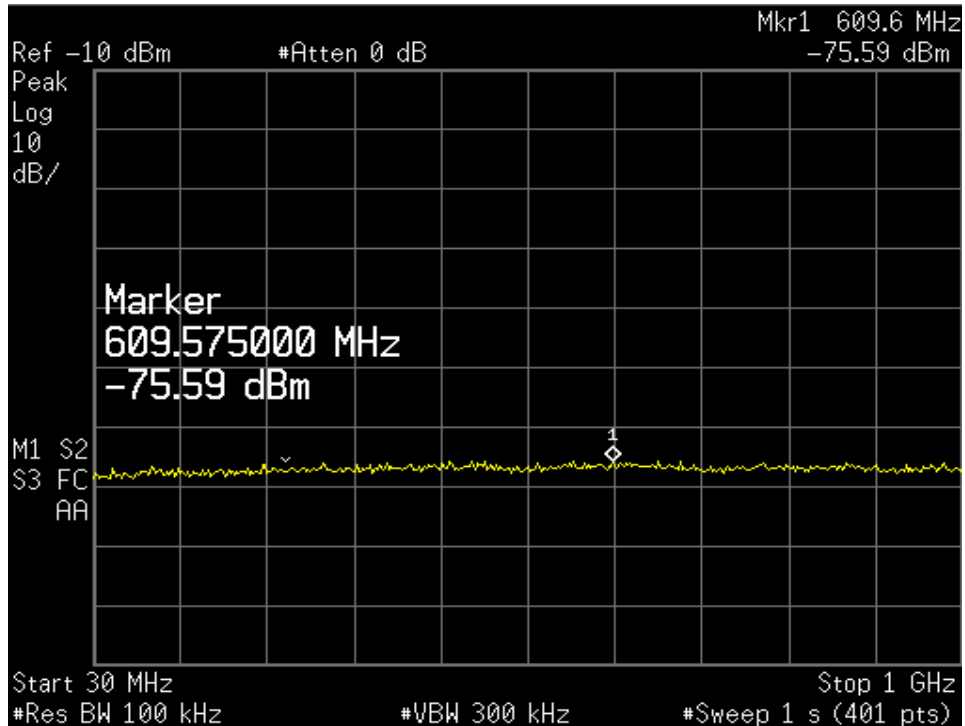
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Conducted Spurious Emission

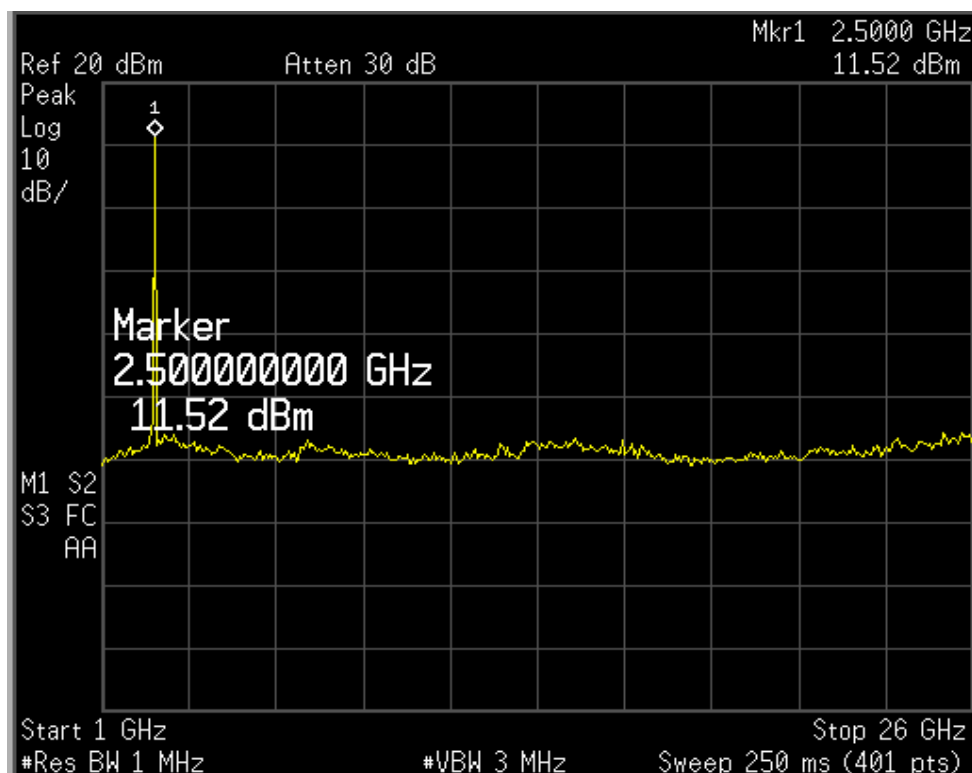
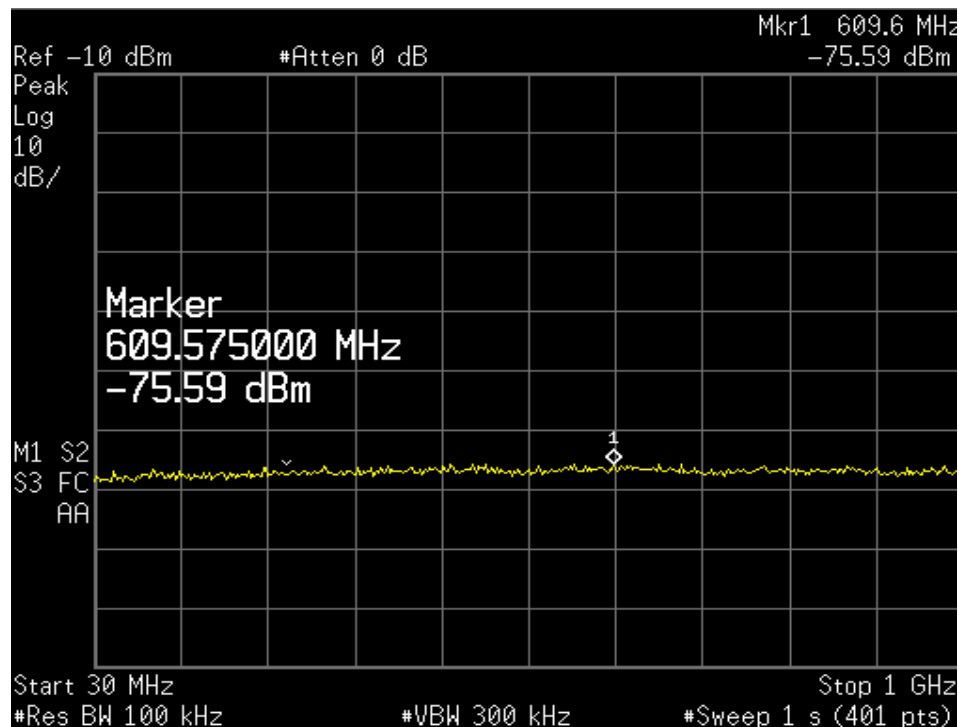
Modulation: 802.11b



Channel frequency: 2412 MHz



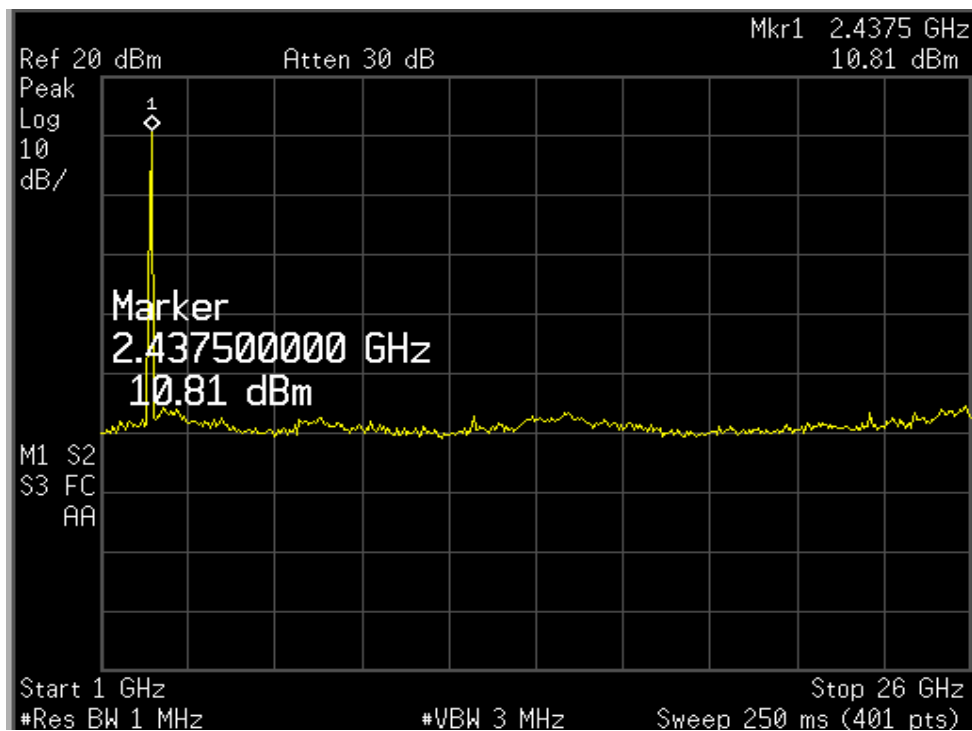
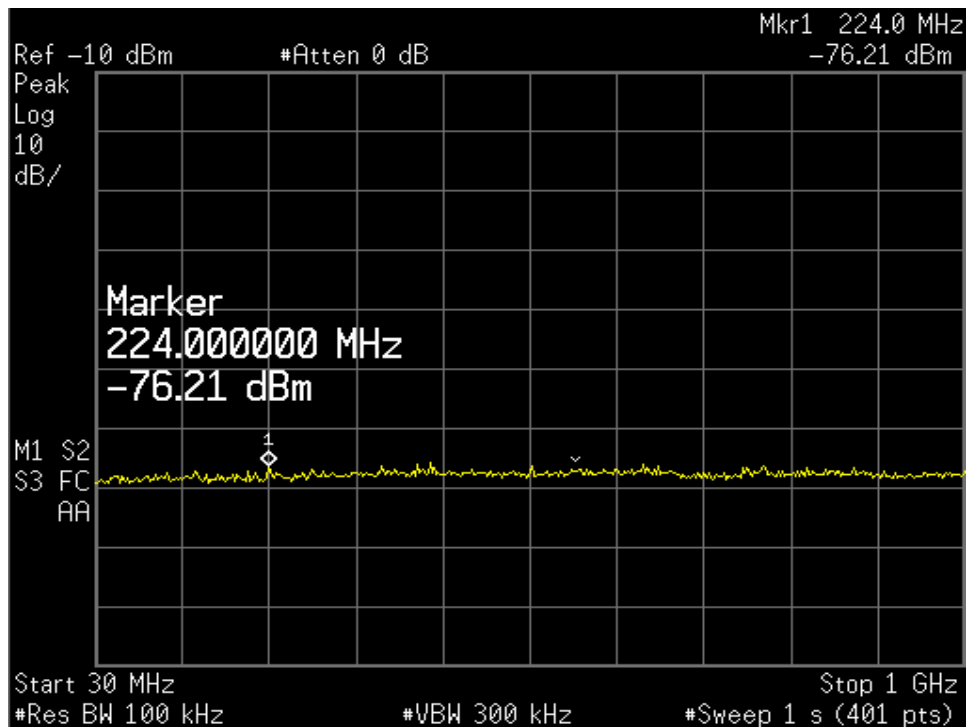
Channel frequency: 2442 MHz



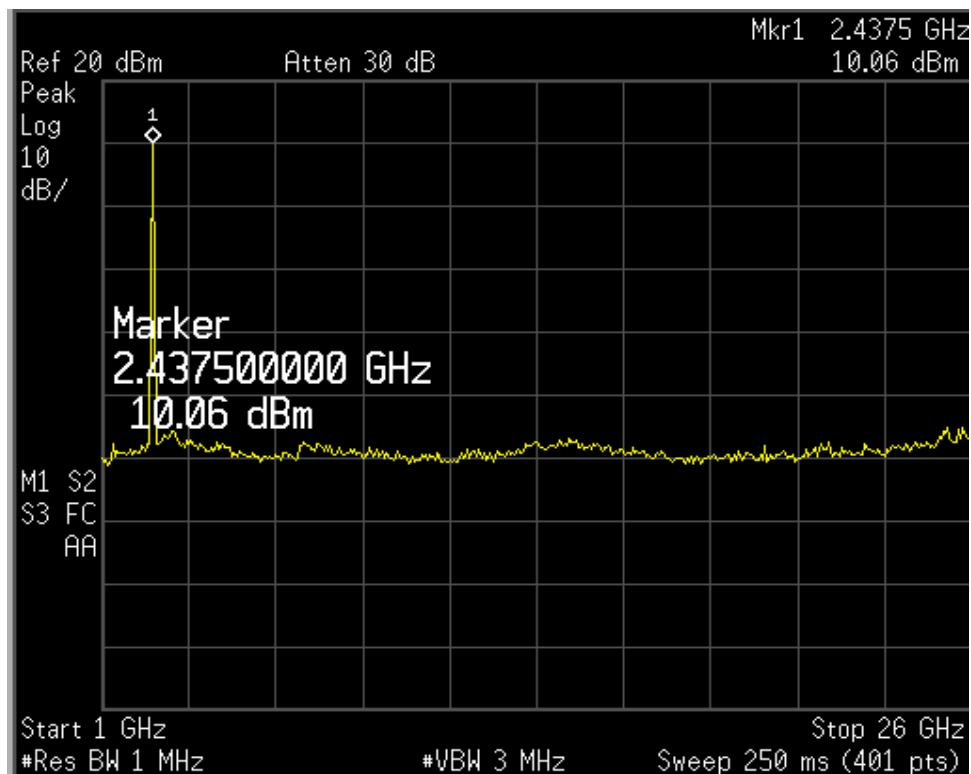
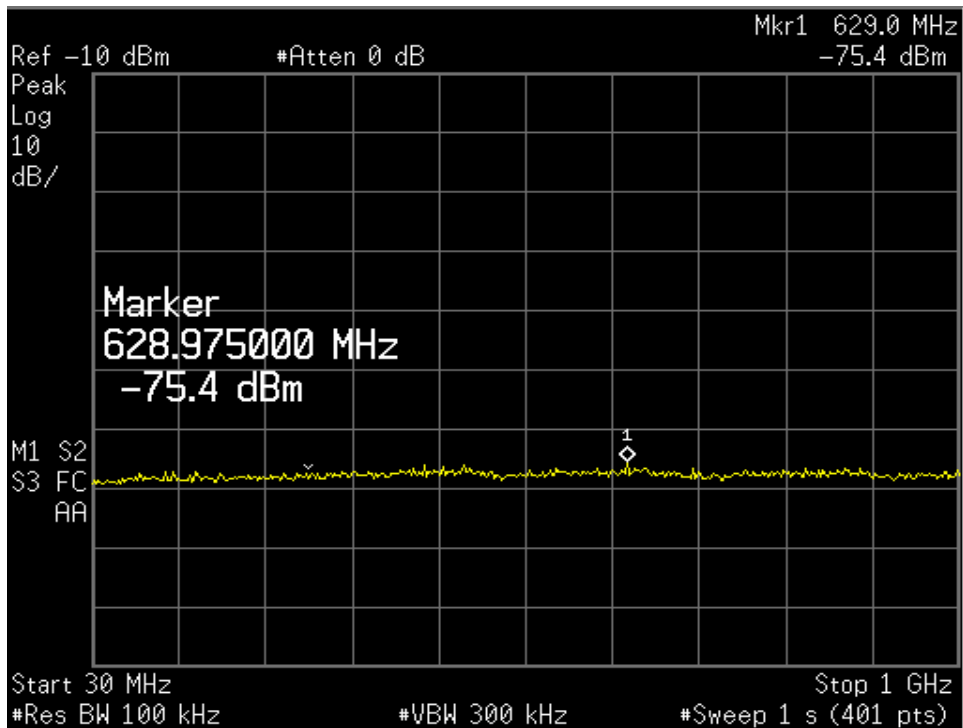
Channel frequency: 2472 MHz

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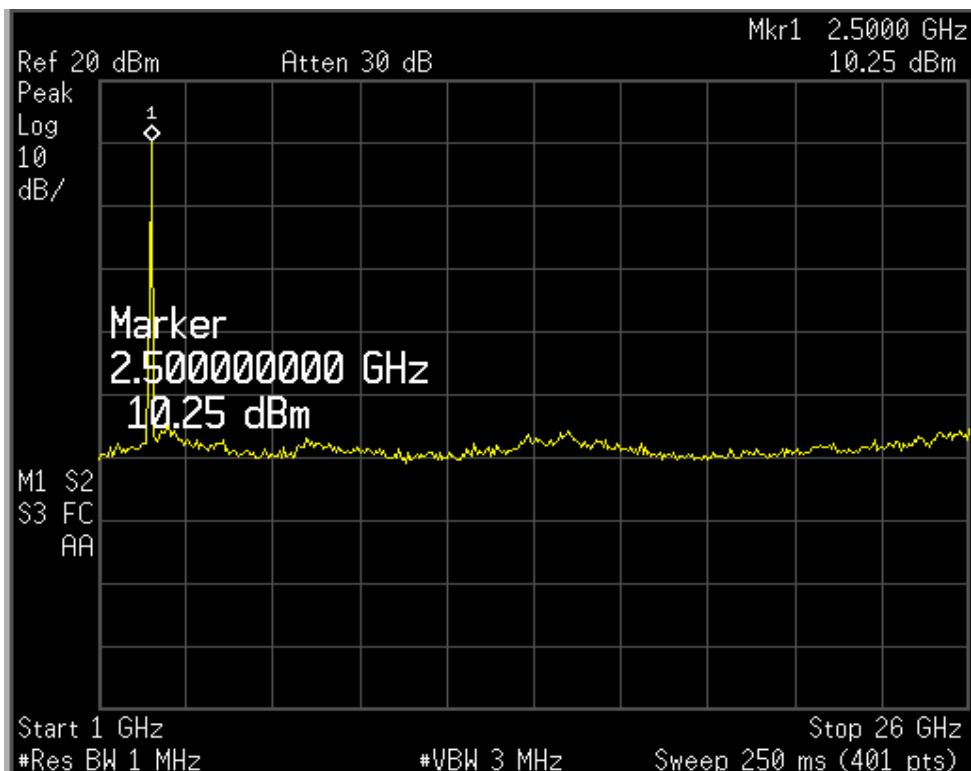
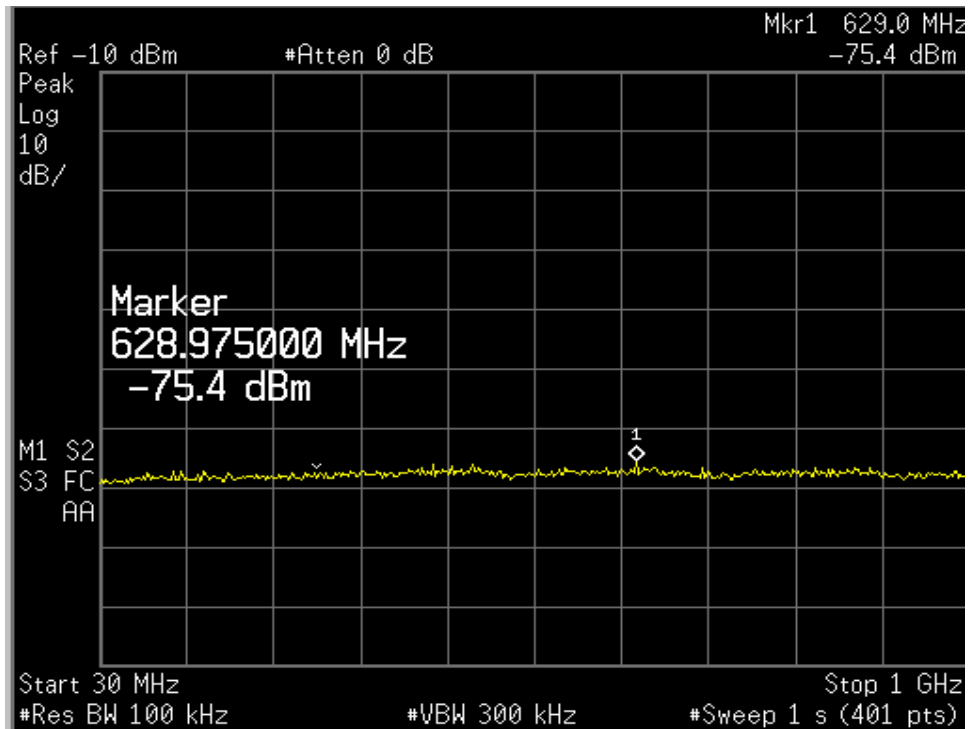
Modulation: 802.11g



Channel frequency: 2412 MHz



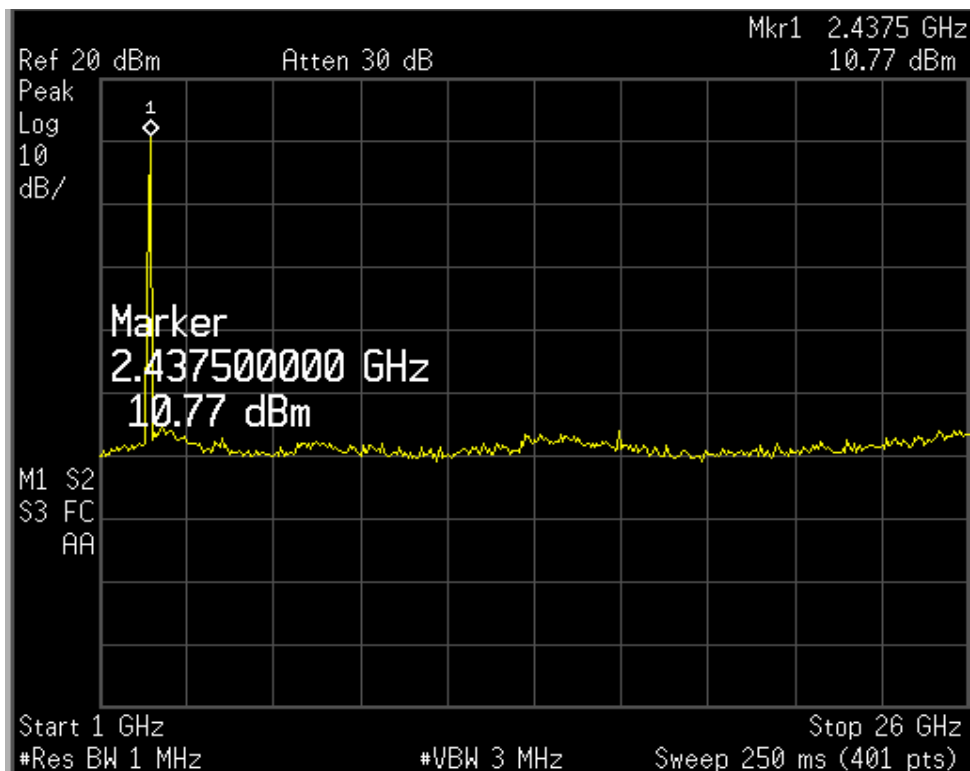
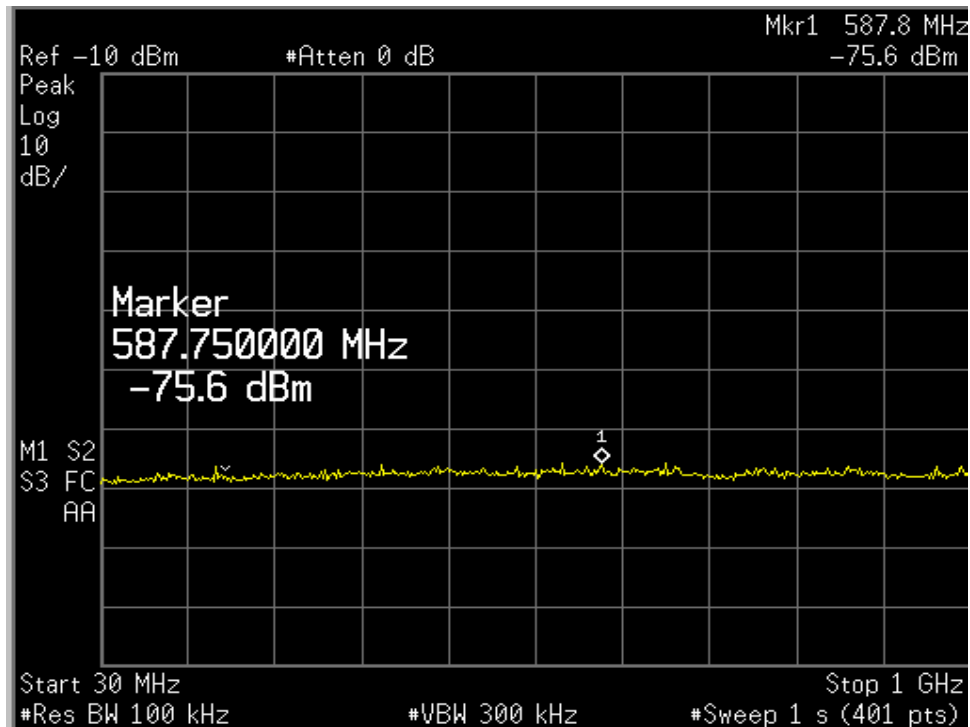
Channel frequency: 2442 MHz



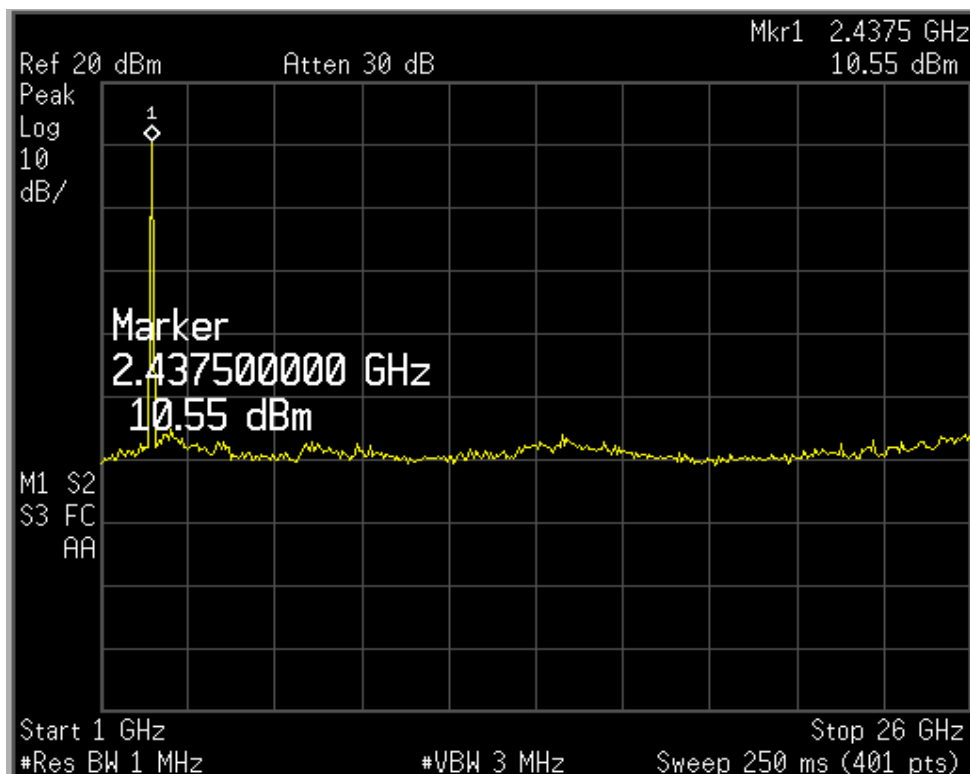
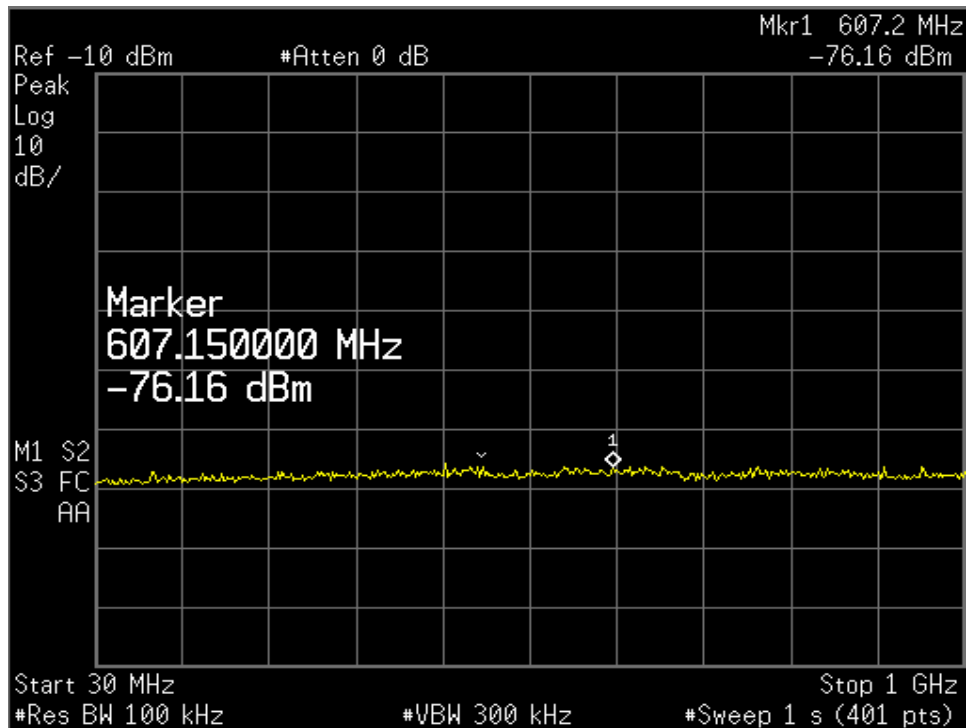
Channel frequency: 2472 MHz

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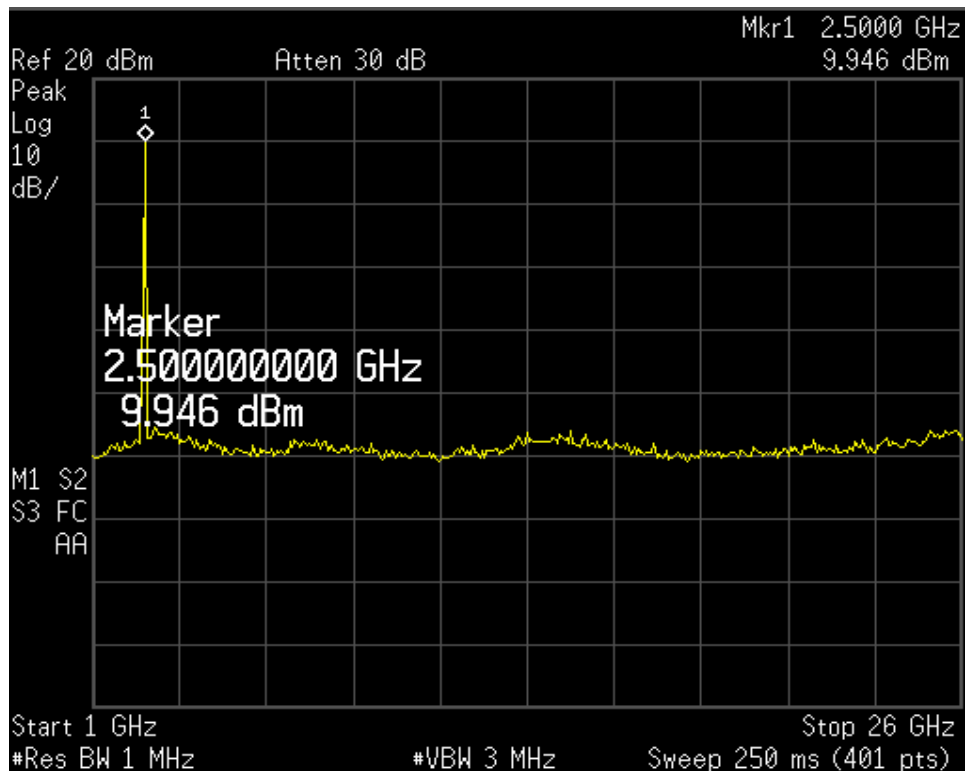
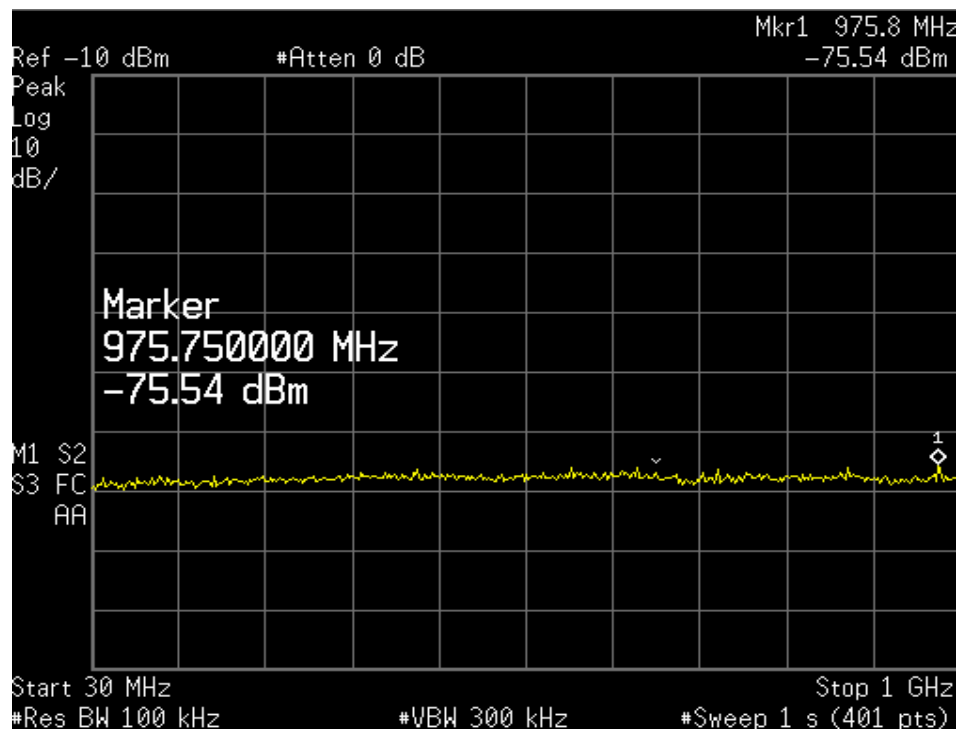
Modulation: 802.11n



Channel frequency: 2412 MHz



Channel frequency: 2442 MHz



Channel frequency: 2472 MHz

Spurious Radiated Emissions**Section 15.209****Result****Pass**

| | |
|----------------------|---|
| Test Specification | FCC Part 15 Section 15.209 |
| Test Method | ANSI C63.4-2003 |
| Measurement Location | Semi Anechoic Chamber |
| Measuring Distance | 3m |
| Detection | QP for frequency below 1GHz, Average for frequency above 1GHz |
| Requirement | As per the limits mentioned in the bellow table |

Limit for Radiated Emission of Section 15.209:

| Frequency (MHz) | Field strength ($\mu\text{V/m}$) | Field strength ($\text{dB}\mu\text{V/m}$) | Distance of Measurement (m) |
|-----------------|------------------------------------|---|-----------------------------|
| 0.009 – 0.490 | 2400/F(kHz) | 48.50 – 13.80 | 300* |
| 0.490 – 1.705 | 24000/F(kHz) | 33.80 – 23.00 | 30* |
| 1.705 -30 | 30 | 29.54 | 30* |
| 30-88 | 100 | 40.0 | 3 |
| 88-216 | 150 | 43.5 | 3 |
| 216-960 | 200 | 46.0 | 3 |
| Above 960 | 500 | 54.0 | 3 |

Remark: * the limit shows in the table above of frequency range 0.009 – 0.490, 0.490 – 1.705 MHz and 1.705-30MHz is at 300 meter, 30 meter and 30 meter range respectively, which corresponds to 88,50 – 53.80, 53.80 – 43.00 and 49.5dB $\mu\text{V/m}$ at 3m range by extrapolation calculation and the measurement of loop antenna.

The emission limits shown in the above table are based on measurements employing a CISPR quasi-peak detector except for the frequency bands 9–90 kHz, 110–490 kHz and above 1000 MHz Radiated emission limits in these three bands are based on measurements employing an average detector.

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Test result:

Modulation: 802.11b

| Fundamental Frequency (MHz) | Antenna Polarization | Spurious Emission (MHz) | Field Strength (dBμV/m) | Limit (dBμV/m) | Margin (dB) |
|-----------------------------|----------------------|-------------------------|-------------------------|----------------|-------------|
| 2412 | V | 33.36 | 26.90 | 40.00 | -13.10 |
| | | 37.64 | 31.30 | 40.00 | -08.70 |
| | | 40.00 | 32.80 | 40.00 | -07.20 |
| | | 44.12 | 26.30 | 40.00 | -13.70 |
| | | 87.76 | 27.10 | 40.00 | -12.90 |
| | | 146.56 | 26.20 | 43.50 | -17.30 |
| | | 170.32 | 27.70 | 43.50 | -15.80 |
| | | 200.00 | 31.50 | 43.50 | -12.00 |
| | | 440.00 | 41.40 | 46.00 | -04.60 |
| | | 479.96 | 35.50 | 46.00 | -10.50 |
| | | 519.98 | 43.40 | 46.00 | -02.60 |
| | | 599.96 | 38.20 | 46.00 | -07.80 |
| | | 950.51 | 32.50 | 46.00 | -13.50 |
| | | 2410.40(P) | 90.80 | - | * |
| | | 2410.40(Av) | 78.52 | - | * |
| | | 4824.00(P) | 50.20 | 74.00 | -23.80 |
| | | 4824.00(Av) | 45.50 | 54.00 | -08.50 |
| | H | 40.24 | 18.70 | 40.00 | -21.30 |
| | | 170.28 | 29.70 | 43.50 | -13.80 |
| | | 200.00 | 37.10 | 43.50 | -06.40 |
| | | 279.98 | 38.90 | 46.00 | -07.10 |
| | | 440.00 | 38.40 | 46.00 | -07.60 |
| | | 519.98 | 36.80 | 46.00 | -09.20 |
| | | 680.00 | 35.60 | 46.00 | -10.40 |
| | | 914.18 | 32.80 | 46.00 | -13.20 |
| | | 2409.20(P) | 88.50 | - | * |
| | | 2409.20(Av) | 74.62 | - | * |
| | | 4824.00(P) | 51.41 | 74.00 | -22.59 |
| | | 4824.00(Av) | 43.20 | 54.00 | -10.80 |

| | | | | | |
|-------------|----------|-------------|-------|-------|--------|
| 2442 | V | 33.36 | 26.90 | 40.00 | -13.10 |
| | | 44.12 | 26.30 | 40.00 | -13.70 |
| | | 78.36 | 23.30 | 40.00 | -16.70 |
| | | 146.56 | 26.20 | 43.50 | -17.30 |
| | | 170.32 | 27.70 | 43.50 | -15.80 |
| | | 200.00 | 31.50 | 43.50 | -12.00 |
| | | 440.00 | 41.40 | 46.00 | -04.60 |
| | | 479.96 | 35.50 | 46.00 | -10.50 |
| | | 519.98 | 43.40 | 46.00 | -02.60 |
| | | 599.96 | 38.20 | 46.00 | -07.80 |
| | | 950.51 | 32.50 | 46.00 | -13.50 |
| | | 2442.40(P) | 89.40 | - | * |
| | | 2442.40(Av) | 76.35 | - | * |
| | | 4884.00(P) | 49.32 | 74.00 | -24.68 |
| | | 4884.00(Av) | 46.20 | 54.00 | -07.80 |
| | H | 200.00 | 37.10 | 43.50 | -06.40 |
| | | 279.98 | 38.90 | 46.00 | -07.10 |
| | | 440.00 | 38.40 | 46.00 | -07.60 |
| | | 519.98 | 36.80 | 46.00 | -09.20 |
| | | 680.00 | 35.60 | 46.00 | -10.40 |
| | | 914.18 | 32.80 | 46.00 | -13.20 |
| | | 2441.20(P) | 80.60 | - | * |
| | | 2441.20(Av) | 71.36 | - | * |
| | | 4883.00(P) | 46.35 | 74.00 | -27.65 |
| | | 4883.00(Av) | 42.32 | 54.00 | -11.68 |
| 2472 | V | 33.36 | 26.90 | 40.00 | -13.10 |
| | | 37.64 | 31.30 | 40.00 | -08.70 |
| | | 40.00 | 32.80 | 40.00 | -07.20 |
| | | 44.12 | 26.30 | 40.00 | -13.70 |
| | | 78.36 | 23.30 | 40.00 | -16.70 |
| | | 87.76 | 27.10 | 40.00 | -12.90 |
| | | 146.56 | 26.20 | 43.50 | -17.30 |
| | | 170.32 | 27.70 | 43.50 | -15.80 |
| | | 200.00 | 31.50 | 43.50 | -12.00 |
| | | 440.00 | 41.40 | 46.00 | -04.60 |

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| | | | | | |
|--|----------|-------------|-------|-------|--------|
| | | 479.96 | 35.50 | 46.00 | -10.50 |
| | | 519.98 | 43.40 | 46.00 | -02.60 |
| | | 599.96 | 38.20 | 46.00 | -07.80 |
| | | 950.51 | 32.50 | 46.00 | -13.50 |
| | | 2472.20(P) | 77.90 | - | * |
| | | 2472.20(Av) | 68.54 | - | * |
| | | 4943.00(P) | 51.20 | 74.00 | -22.80 |
| | | 4943.00(Av) | 47.60 | 54.00 | -06.40 |
| | H | 170.28 | 29.70 | 43.50 | -13.80 |
| | | 200.00 | 37.10 | 43.50 | -06.40 |
| | | 279.98 | 38.90 | 46.00 | -07.10 |
| | | 440.00 | 38.40 | 46.00 | -07.60 |
| | | 519.98 | 36.80 | 46.00 | -09.20 |
| | | 680.00 | 35.60 | 46.00 | -10.40 |
| | | 914.18 | 32.80 | 46.00 | -13.20 |
| | | 2473.20(P) | 70.90 | - | * |
| | | 2473.20(Av) | 66.32 | - | * |
| | | 4943.40(P) | 52.30 | 74.00 | -21.70 |
| | | 4943.40(Av) | 44.32 | 54.00 | -09.68 |

* - --> Fundamental Frequency

P--> Peak Detector

Av--> Average Detector

Modulation: 802.11g

| Fundamental Frequency (MHz) | Antenna Polarization | Spurious Emission (MHz) | Field Strength (dBμV/m) | Limit (dBμV/m) | Margin (dB) |
|-----------------------------|----------------------|-------------------------|---------------------------|-----------------|---------------|
| 2412 | V | 34.00 | 26.20 | 40.00 | -13.80 |
| | | 37.60 | 31.50 | 40.00 | -08.50 |
| | | 40.00 | 32.40 | 40.00 | -07.60 |
| | | 13.96 | 26.40 | 40.00 | -13.60 |
| | | 78.52 | 23.00 | 40.00 | -17.00 |
| | | 87.96 | 28.40 | 40.00 | -11.60 |
| | | 139.88 | 24.70 | 43.50 | -18.80 |
| | | 159.96 | 28.30 | 43.50 | -15.20 |
| | | 200.00 | 31.20 | 43.50 | -12.30 |

| | | | | | |
|------|---|-------------|-------|-------|--------|
| 2442 | | 399.98 | 39.40 | 46.00 | -06.60 |
| | | 440.00 | 40.30 | 46.00 | -05.70 |
| | | 519.98 | 40.00 | 46.00 | -06.00 |
| | | 599.96 | 38.90 | 46.00 | -07.10 |
| | | 957.86 | 32.70 | 46.00 | -13.30 |
| | | 2406.00(P) | 86.70 | - | * |
| | | 2406.00(Av) | 78.61 | - | * |
| | | 4824.00(P) | 44.12 | 74.00 | -29.88 |
| | | 4824.00(Av) | 37.20 | 54.00 | -16.80 |
| | H | 170.20 | 29.30 | 43.50 | -14.20 |
| | | 200.00 | 37.00 | 43.50 | -06.50 |
| | | 279.98 | 37.10 | 46.00 | 08.90 |
| | | 440.00 | 39.00 | 46.00 | 07.00 |
| | | 519.98 | 32.20 | 46.00 | 13.80 |
| | | 680.00 | 35.30 | 46.00 | 10.70 |
| | | 943.46 | 32.70 | 46.00 | 13.30 |
| | | 2404.80(P) | 86.60 | - | * |
| | | 2404.80(Av) | 76.52 | - | * |
| | | 4824.00(P) | 42.81 | 74.00 | -31.19 |
| | | 4824.00(Av) | 34.30 | 54.00 | -19.70 |
| | V | 34.00 | 26.20 | 40.00 | -13.80 |
| | | 37.60 | 31.50 | 40.00 | -08.50 |
| | | 40.00 | 32.40 | 40.00 | -07.60 |
| | | 13.96 | 26.40 | 40.00 | -13.60 |
| | | 78.52 | 23.00 | 40.00 | -17.00 |
| | | 87.96 | 28.40 | 40.00 | -11.60 |
| | | 139.88 | 24.70 | 43.50 | -18.80 |
| | | 159.96 | 28.30 | 43.50 | -15.20 |
| | | 200.00 | 31.20 | 43.50 | -12.30 |
| | | 399.98 | 39.40 | 46.00 | -06.60 |
| | | 440.00 | 40.30 | 46.00 | -05.70 |
| | | 519.98 | 40.00 | 46.00 | -06.00 |
| | | 599.96 | 38.90 | 46.00 | -07.10 |
| | | 957.86 | 32.70 | 46.00 | -13.30 |
| | | 2441.80(P) | 83.50 | - | * |
| | | 2441.80(Av) | 75.62 | - | * |
| | | 4885.20(P) | 44.85 | 74.00 | -29.15 |
| | | 4885.20(Av) | 38.50 | 54.00 | -15.50 |
| | H | 170.20 | 29.30 | 43.50 | -14.20 |
| | | 200.00 | 37.00 | 43.50 | -06.50 |
| | | 279.98 | 37.10 | 46.00 | -08.90 |

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| | | | | | | |
|-------------|----------|--|-------------|-------|-------|--------|
| 2472 | | | 440.00 | 39.00 | 46.00 | -07.00 |
| | | | 519.98 | 32.20 | 46.00 | -13.80 |
| | | | 680.00 | 35.30 | 46.00 | -10.70 |
| | | | 943.46 | 32.70 | 46.00 | -13.30 |
| | | | 2430.40(P) | 79.10 | - | * |
| | | | 2430.40(Av) | 68.65 | - | * |
| | | | 4885.57(P) | 42.36 | 74.00 | -31.64 |
| | | | 4885.57(Av) | 34.90 | 54.00 | -19.10 |
| | V | | 34.00 | 26.20 | 40.00 | -13.80 |
| | | | 37.60 | 31.50 | 40.00 | -08.50 |
| | | | 40.00 | 32.40 | 40.00 | -07.60 |
| | | | 13.96 | 26.40 | 40.00 | -13.60 |
| | | | 78.52 | 23.00 | 40.00 | -17.00 |
| | | | 87.96 | 28.40 | 40.00 | -11.60 |
| | | | 139.88 | 24.70 | 43.50 | -18.80 |
| | | | 159.96 | 28.30 | 43.50 | -15.20 |
| | | | 200.00 | 31.20 | 43.50 | -12.30 |
| | | | 399.98 | 39.40 | 46.00 | -06.60 |
| | | | 440.00 | 40.30 | 46.00 | -05.70 |
| | | | 519.98 | 40.00 | 46.00 | -06.00 |
| | | | 599.96 | 38.90 | 46.00 | -07.10 |
| | | | 957.86 | 32.70 | 46.00 | -13.30 |
| | | | 2473.20(P) | 75.80 | - | * |
| | | | 2473.20(Av) | 75.80 | - | * |
| | | | 4945.52(P) | 45.21 | 74.00 | -28.79 |
| | | | 4945.52(Av) | 39.10 | 54.00 | -14.90 |
| | H | | 170.20 | 29.30 | 43.50 | -14.20 |
| | | | 200.00 | 37.00 | 43.50 | -06.50 |
| | | | 279.98 | 37.10 | 46.00 | -08.90 |
| | | | 440.00 | 39.00 | 46.00 | -07.00 |
| | | | 519.98 | 32.20 | 46.00 | -13.80 |
| | | | 680.00 | 35.30 | 46.00 | -10.70 |
| | | | 943.46 | 32.70 | 46.00 | -13.30 |
| | | | 2474.85(P) | 70.50 | - | * |
| | | | 2474.85(Av) | 65.35 | - | * |
| | | | 4945.65(P) | 42.80 | 74.00 | -31.20 |
| | | | 4945.65(Av) | 35.80 | 54.00 | -18.20 |

* - --> Fundamental Frequency

P--> Peak Detector

Av--> Average Detector

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Modulation: 802.11n

| Fundamental Frequency (MHz) | Antenna Polarization | Spurious Emission (MHz) | Field Strength (dBμV/m) | Limit (dBμV/m) | Margin (dB) |
|-----------------------------|----------------------|-------------------------|---------------------------|-----------------|---------------|
| 2412 | V | 37.60 | 30.20 | 40.00 | -09.80 |
| | | 40.00 | 31.52 | 40.00 | -08.48 |
| | | 13.96 | 25.61 | 40.00 | -14.39 |
| | | 78.52 | 21.50 | 40.00 | -18.50 |
| | | 159.96 | 28.30 | 43.50 | -15.20 |
| | | 200.00 | 30.6 | 43.50 | -12.90 |
| | | 399.98 | 34.00 | 46.00 | -12.00 |
| | | 440.00 | 42.00 | 46.00 | -4.00 |
| | | 519.98 | 40.21 | 46.00 | -05.79 |
| | | 599.96 | 37.85 | 46.00 | -08.15 |
| | | 957.86 | 31.52 | 46.00 | -14.48 |
| | | 2406.00(P) | 81.56 | - | * |
| | | 2406.00(Av) | 75.65 | - | * |
| | | 4824.00(P) | 41.20 | 74.00 | -32.80 |
| | | 4824.00(Av) | 34.42 | 54.00 | -19.58 |
| | H | 32.00 | 10.23 | 40.00 | -29.77 |
| | | 136.28 | 20.65 | 43.50 | -22.85 |
| | | 137.36 | 21.50 | 43.50 | -22.00 |
| | | 170.20 | 28.60 | 43.50 | -14.90 |
| | | 200.00 | 37.00 | 43.50 | -06.50 |
| | | 279.98 | 37.12 | 46.00 | -08.88 |
| | | 440.00 | 38.20 | 46.00 | -07.80 |
| | | 519.98 | 32.20 | 46.00 | -13.80 |
| | | 680.00 | 34.57 | 46.00 | -11.43 |
| | | 943.46 | 32.70 | 46.00 | -13.30 |
| | | 2404.80(P) | 80.42 | - | * |
| | | 2404.80(Av) | 74.62 | - | * |
| | | 4824.00(P) | 35.62 | 74.00 | -38.38 |
| | | 4824.00(Av) | 29.86 | 54.00 | -24.14 |

| | | | | | |
|-------------|----------|-------------|-------|-------|--------|
| 2442 | V | 37.60 | 30.25 | 40.00 | -09.75 |
| | | 40.00 | 31.65 | 40.00 | -08.35 |
| | | 13.96 | 26.4 | 40.00 | -13.60 |
| | | 78.52 | 22.62 | 40.00 | -17.38 |
| | | 87.96 | 27.64 | 40.00 | -12.36 |
| | | 139.88 | 24.7 | 43.50 | -18.8 |
| | | 159.96 | 24.01 | 43.50 | -19.49 |
| | | 200.00 | 30.06 | 43.50 | -13.44 |
| | | 399.98 | 38.56 | 46.00 | -07.44 |
| | | 440.00 | 38.62 | 46.00 | -07.38 |
| | | 519.98 | 39.65 | 46.00 | -06.35 |
| | | 599.96 | 37.54 | 46.00 | -08.46 |
| | | 957.86 | 31.2 | 46.00 | -14.8 |
| | | 2441.80(P) | 79.82 | - | * |
| | | 2441.80(Av) | 71.64 | - | * |
| | | 4885.20(P) | 36.51 | 74.00 | -37.49 |
| | | 4885.20(Av) | 30.62 | 54.00 | -23.38 |
| | H | 170.20 | 29.30 | 43.50 | -14.20 |
| | | 200.00 | 37.00 | 43.50 | -06.50 |
| | | 279.98 | 37.10 | 46.00 | -08.90 |
| | | 440.00 | 39.00 | 46.00 | -07.00 |
| | | 519.98 | 32.20 | 46.00 | -13.80 |
| | | 680.00 | 35.30 | 46.00 | -10.70 |
| | | 943.46 | 32.70 | 46.00 | -13.30 |
| | | 2440.40(P) | 77.62 | - | * |
| | | 2440.40(Av) | 71.35 | - | * |
| | | 4885.57(P) | 34.51 | 74.00 | -39.49 |
| | | 4885.57(Av) | 30.42 | 54.00 | -23.58 |
| 2472 | V | 37.60 | 30.50 | 40.00 | -09.50 |
| | | 40.00 | 32.40 | 40.00 | -07.60 |
| | | 13.96 | 24.40 | 40.00 | -15.60 |
| | | 78.52 | 23.00 | 40.00 | -17.00 |
| | | 87.96 | 28.40 | 40.00 | -11.60 |
| | | 139.88 | 22.70 | 43.50 | -20.80 |

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| | | | | | |
|--|----------|-------------|-------|-------|--------|
| | | 159.96 | 28.30 | 43.50 | -15.20 |
| | | 200.00 | 30.20 | 43.50 | -13.30 |
| | | 399.98 | 37.40 | 46.00 | -08.60 |
| | | 440.00 | 40.30 | 46.00 | -05.70 |
| | | 519.98 | 40.00 | 46.00 | -06.00 |
| | | 599.96 | 36.90 | 46.00 | -09.10 |
| | | 957.86 | 32.70 | 46.00 | -13.30 |
| | | 2473.20(P) | 70.65 | - | * |
| | | 2473.20(Av) | 65.36 | - | * |
| | | 4945.52(P) | 41.23 | 74.00 | -32.77 |
| | | 4945.52(Av) | 34.58 | 54.00 | -19.42 |
| | H | 170.20 | 29.30 | 43.50 | -14.20 |
| | | 200.00 | 35.00 | 43.50 | -08.50 |
| | | 279.98 | 37.10 | 46.00 | -08.90 |
| | | 440.00 | 37.00 | 46.00 | -09.00 |
| | | 519.98 | 32.20 | 46.00 | -13.80 |
| | | 680.00 | 35.30 | 46.00 | -10.70 |
| | | 943.46 | 32.70 | 46.00 | -13.30 |
| | | 2474.85 | 68.91 | - | * |
| | | 2474.85 | 62.78 | - | * |
| | | 4945.65 | 35.62 | 74.00 | -38.38 |
| | | 4945.65 | 31.64 | 54.00 | -22.36 |

* - --> Fundamental Frequency

P--> Peak Detector

Av--> Average Detector

Restricted Bands of Operation
Section 15.205
Result
Pass

| | |
|----------------------|---|
| Test Specification | FCC Part 15 Section 15.205 |
| Test Method | ANSI C63.4-2003 |
| Measurement Location | Semi Anechoic Chamber |
| Measuring Distance | 3m |
| Detection | Peak and Average for frequency above 1GHz |

| Modulation | Fundamental Frequency (MHz) | Antenna Polarization | Spurious Emission (MHz) | Field Strength (dBµV/m) | Limit (dBµV/m) | Margin (dB) |
|------------|-----------------------------|----------------------|-------------------------|-------------------------|----------------|---------------|
| 802.11b | 2412 | V | 2390.00(P) | 47.52 | 74.00 | -26.48 |
| | | | 2390.00(Av) | 42.00 | 54.00 | -12.00 |
| | | H | 2390.00(P) | 45.64 | 74.00 | -28.36 |
| | | | 2390.00(Av) | 41.35 | 54.00 | -12.65 |
| | 2472 | V | 2483.50(P) | 45.14 | 74.00 | -28.86 |
| | | | 2483.50(Av) | 39.72 | 54.00 | -14.28 |
| | | H | 2483.50(P) | 43.68 | 74.00 | -30.32 |
| | | | 2483.50(Av) | 38.15 | 54.00 | -15.85 |
| 802.11g | 2412 | V | 2390.00(P) | 40.84 | 74.00 | -33.16 |
| | | | 2390.00(Av) | 35.01 | 54.00 | -18.99 |
| | | H | 2390.00(P) | 39.48 | 74.00 | -34.52 |
| | | | 2390.00(Av) | 34.62 | 54.00 | -19.38 |
| | 2472 | V | 2483.50(P) | 47.74 | 74.00 | -26.26 |
| | | | 2483.50(Av) | 41.22 | 54.00 | -12.78 |
| | | H | 2483.50(P) | 46.62 | 74.00 | -27.38 |
| | | | 2483.50(Av) | 42.55 | 54.00 | -11.45 |
| 802.11n | 2412 | V | 2390.00(P) | 39.46 | 74.00 | -34.54 |
| | | | 2390.00(Av) | 34.62 | 54.00 | -19.38 |
| | | H | 2390.00(P) | 40.24 | 74.00 | -33.76 |
| | | | 2390.00(Av) | 32.62 | 54.00 | -21.38 |
| | 2472 | V | 2483.50(P) | 46.85 | 74.00 | -27.15 |
| | | | 2483.50(Av) | 39.52 | 54.00 | -14.48 |
| | | H | 2483.50(P) | 45.27 | 74.00 | -28.73 |
| | | | 2483.50(Av) | 40.32 | 54.00 | -13.68 |

P---> Peak detector
Av-->Average Detector

Conducted Emission Test on a.c. Power Line**Section 15.207****Result****Pass**

Test Specification : FCC Part 15 Section 15.207
Test Method : ANSI C63.4-2003
Testing Location : Screened room
Measurement Bandwidth : 9kHz
Frequency Range : 150kHz – 30MHz
Supply Voltage : 110 Volt 60Hz AC (Supply to the host)

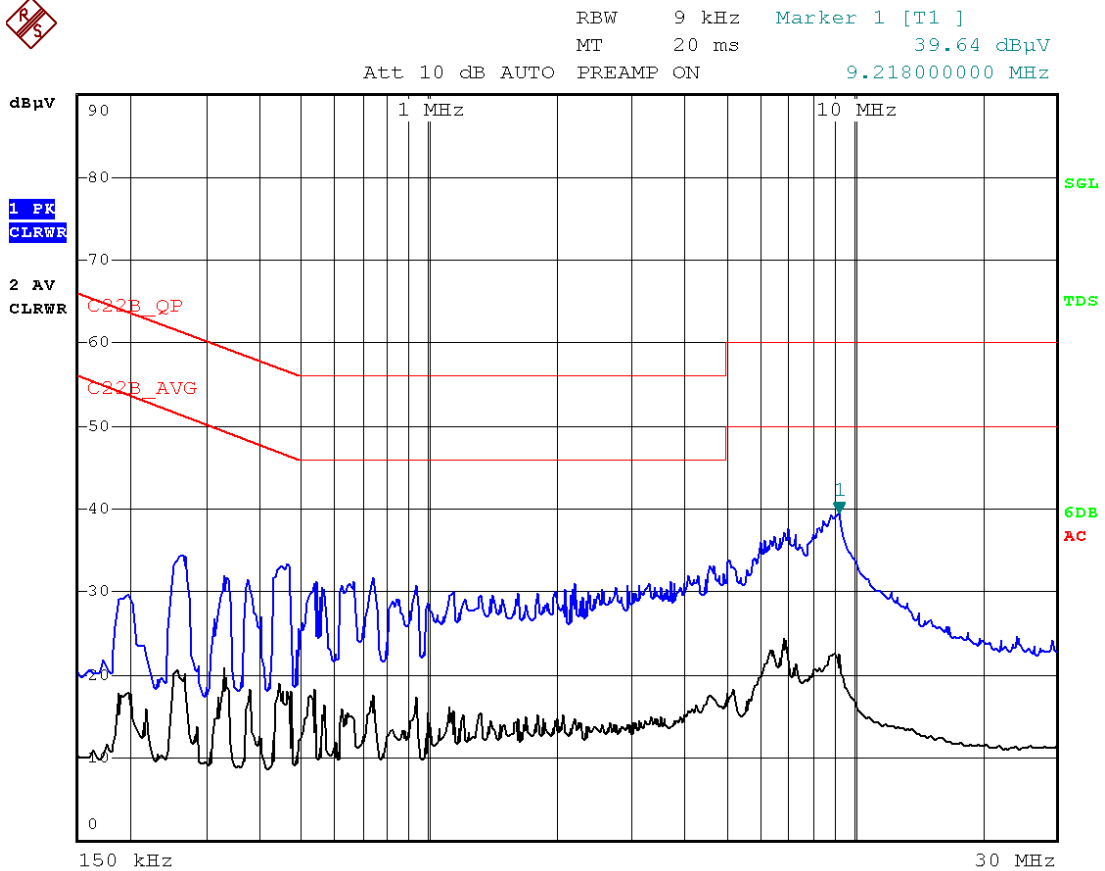
Test Result:

Note: The module was tested with the PDA for this test with supply 110V AC 60Hz

Limit of section 15.207

| Frequency of emission (MHz) | QP Limit (dB μ V) | AV Limit (dB μ V/m) |
|--------------------------------|--------------------------|----------------------------|
| 0.15 – 0.5 | 66 – 56* | 56 – 46* |
| 0.5 – 5 | 56 | 46 |
| 5 – 30 | 60 | 50 |

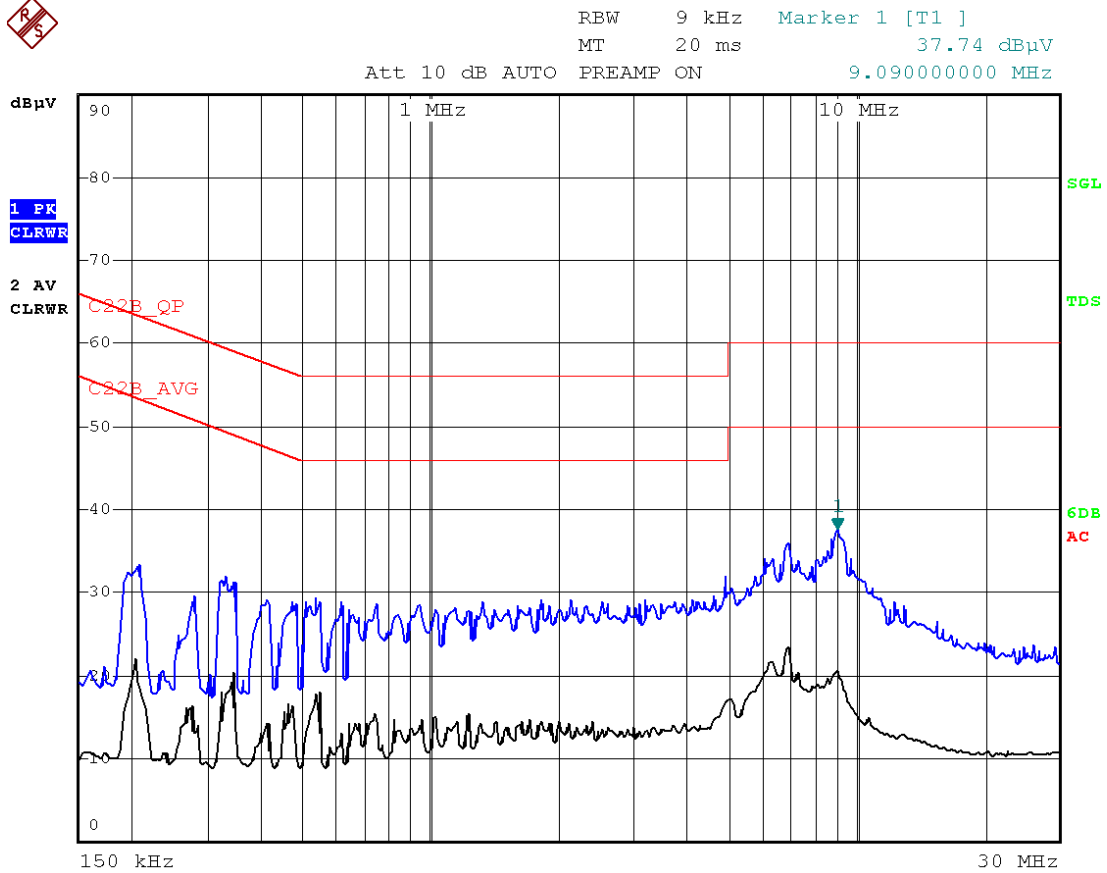
* Decreases with the logarithm of the frequency



Plot: Line

| EDIT PEAK LIST (Final Measurement Results) | | | | | |
|--|-----------|-------|------|--------|----------|
| Trace1: | C22B_QP | | | | |
| Trace2: | C22B_AVG | | | | |
| Trace3: | --- | | | | |
| TRACE | FREQUENCY | LEVEL | dBµV | DELTA | LIMIT dB |
| 1 Quasi Peak | 462 kHz | 30.36 | L1 | -26.29 | |
| 1 Quasi Peak | 9.218 MHz | 33.64 | L1 | -26.35 | |
| 2 Average | 6.906 MHz | 23.36 | L1 | -26.63 | |
| 1 Quasi Peak | 742 kHz | 28.07 | L1 | -27.92 | |
| 2 Average | 534 kHz | 17.23 | L1 | -28.76 | |
| 1 Quasi Peak | 266 kHz | 31.56 | L1 | -29.68 | |
| 2 Average | 330 kHz | 18.79 | L1 | -30.65 | |
| 2 Average | 254 kHz | 20.85 | L1 | -30.77 | |
| 2 Average | 442 kHz | 16.19 | L1 | -30.82 | |
| 1 Quasi Peak | 330 kHz | 27.59 | L1 | -31.85 | |

Table: Line



Plot: Neutral

| EDIT PEAK LIST (Final Measurement Results) | | | | |
|--|-----------|------------|---|----------------|
| Trace1: | C22B_QP | | | |
| Trace2: | C22B_AVG | | | |
| Trace3: | --- | | | |
| TRACE | FREQUENCY | LEVEL dBµV | | DELTA LIMIT dB |
| 2 Average | 6.918 MHz | 22.31 | N | -27.68 |
| 1 Quasi Peak | 9.09 MHz | 32.04 | N | -27.95 |
| 2 Average | 546 kHz | 17.19 | N | -28.80 |
| 2 Average | 342 kHz | 19.93 | N | -29.22 |
| 1 Quasi Peak | 538 kHz | 25.90 | N | -30.10 |
| 2 Average | 462 kHz | 15.69 | N | -30.95 |
| 1 Quasi Peak | 410 kHz | 26.57 | N | -31.07 |
| 1 Quasi Peak | 330 kHz | 28.00 | N | -31.44 |
| 1 Quasi Peak | 206 kHz | 30.65 | N | -32.70 |
| 2 Average | 202 kHz | 20.32 | N | -33.20 |
| 2 Average | 274 kHz | 16.36 | N | -34.62 |
| 1 Quasi Peak | 278 kHz | 24.50 | N | -36.37 |

Table: Neutral