Intertek

Report No.: 140812032GZU-001
Issued: 2014-11-12

TEST REPORT

Applicant Name & Address	:	TOP Electric Appliances Industrial Ltd 34 Minchang Road, Beixing, Huadu District, Guangzhou, China
Sample Description		
Product	:	Smart Decanter(isommelier)
FCC ID	:	2ACX3-D033
Model No.	:	D033
Electrical Rating	:	120V/60Hz, 70W
Date Received	:	12 Aug., 2014
Date Test Conducted	:	18 Aug., 2014 – 16 Oct.,2014
Test standards	:	**47 CFR PART 15 Subpart C: 2013 section 15.247**
Test Result	:	Pass
Conclusion	:	The submitted samples complied with the above rules/standards.
Remark	:	None.

**********End of Page**********

Prepared and Checked By:

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Approved By:

Strong Yao

Signature

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Assist. Tech. Manager
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12 Nov.,2014 Date

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1.0 Summary of Test

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 Conducted Output Power	FCC PART 15 C section 15.247(b)(3)	ANSI C63.10: Clause 6.10.2.1	PASS
Peak Power Spectral Density	FCC PART 15 C section 15.247(e)	ANSI C63.10: Clause 6.11.2.3	PASS
Out of Band Conducted Emissions	FCC PART 15 C section 15.209 &15.247(d)	ANSI C63.10: Clause 6.7	PASS
Out of Band Radiated Emission	FCC PART 15 C section 15.209 &15.247(d)	ANSI C63.10: Clause 6.4, 6.5 and 6.6	N/A
Radiated Emissions in Restricted Bands	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.

2.0 General Description

2.1 Product Description

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): 6.5/13/19.5/26/39/52/58.5/65 Mbps/72.2Mbps 802.11n(HT40): 150Mbps
Number of Channels	11 Channels for 802.11b/g/n(HT20) 7 Channels for 802.11n(HT40)
Channel Separation:	5 MHz
Antenna Type	The wire antenna that uses a unique coupling to the intentional radiator
Antenna gain:	2 dBi
Function:	Smart Decanter(isommelier) with 2.4 GHz WIFI
EUT Power Supply:	AC 120V 60 Hz
Power cord:	1.1 m x 3 wires unscreened AC supply cable

EUT channels and frequencies list:

For 802.11b/g/n(HT20): test frequencies are lowest channel 1: 2412 MHz, middle channel 6: 2437 MHz and highest channel 11: 2462 MHz.

For 802.11n(HT40): test frequencies are lowest channel 3: 2422 MHz, middle channel 6: 2437 MHz and highest channel 9: 2452 MHz

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

2.2 Related Submittal(s) Grants

This is an application for certification of:
DTS- Part 15 Digital Transmission Systems (WIFI transmitter portion)

Remaining portions are subject to the following procedures:
1. Receiver portion of WIFI: exempt from technical requirement of this Part.
2. The Decanter function: exempt from FCC requirement.

2.3 Test Methodology

Both AC mains line-conducted and radiated emission measurements were performed according to the procedures in ANSI C63.10:2009. Radiated emission measurement was performed in semi-anechoic chamber and conducted emission measurement was performed in shield room. For radiated emission measurement, preliminary scans and final tests were performed in the semi-anechoic chamber to determine the worst case modes. All radiated tests were performed at an antenna to EUT distance of 3 meters, unless stated otherwise.

2.4 Test Facility

All of the tests are performed at:
Intertek Testing Services Shenzhen Ltd. Guangzhou Branch. located at Block E, No.7-2 Guang Dong Software Science Park, Caipin Road, Guangzhou Science City, GETDD Guangzhou, 510663, China. This test facility and site measurement data have been fully placed on file with the FCC, test firm registration number is 549654.

3.0 System Test Configuration

3.1 Justification

For emissions testing, the equipment under test (EUT) setup to transmit continuously to simplify the measurement methodology. During testing, AC power line was manipulated to produce worst case emissions. It was powered by AC 120V/60Hz supply.

The signal is maximized through rotation and placement in the three orthogonal axes. The antenna height and polarization are varied during the search for maximum signal level. The antenna height is varied from 1 to 4 meters. Radiated emissions are taken at three meters unless the signal level is too low for measurement at that distance. If necessary, a pre-amplifier is used and/or the test is conducted at a closer distance.

All readings are extrapolated back to the equivalent three meter reading using inverse scaling with distance. Analyzer resolution is 100 kHz or greater for frequencies below 1000 MHz. The resolution is 1 MHz or greater for frequencies above 1000 MHz. The spurious emissions more than 20 dB below the permissible value are not reported.

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:

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.

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

3.2 EUT Exercising Software

The test was performed under “MP_TEST” which was provided by manufacture.

3.3 Special Accessories

No special accessories used.

3.4 Measurement Uncertainty

When determining of the test conclusion, the Measurement Uncertainty of test has been considered.

Uncertainty and Compliance – Unless the standard specifically states that measured values are to be extended by the measurement uncertainty in determining compliance, all compliance determinations are based on the actual measured value.

3.5 Equipment Modification

Any modifications installed previous to testing by TOP Electric Appliances Industrial Ltd. will be incorporated in each production model sold / leased in the United States.

No modifications were installed by Intertek Testing Services Shenzhen Ltd. Guangzhou Branch.

3.6 Support Equipment List and Description

This product was tested with corresponding accessories as below:

Supplied by Intertek:

Description	Manufacturer	Model No.	SN/Certificate NO
NoteBook	Lenovo	2344-IS4	PB-FR45R

4.0 Measurement Results

4.1 Antenna Requirement:

Standard requirement

15.203 requirement:

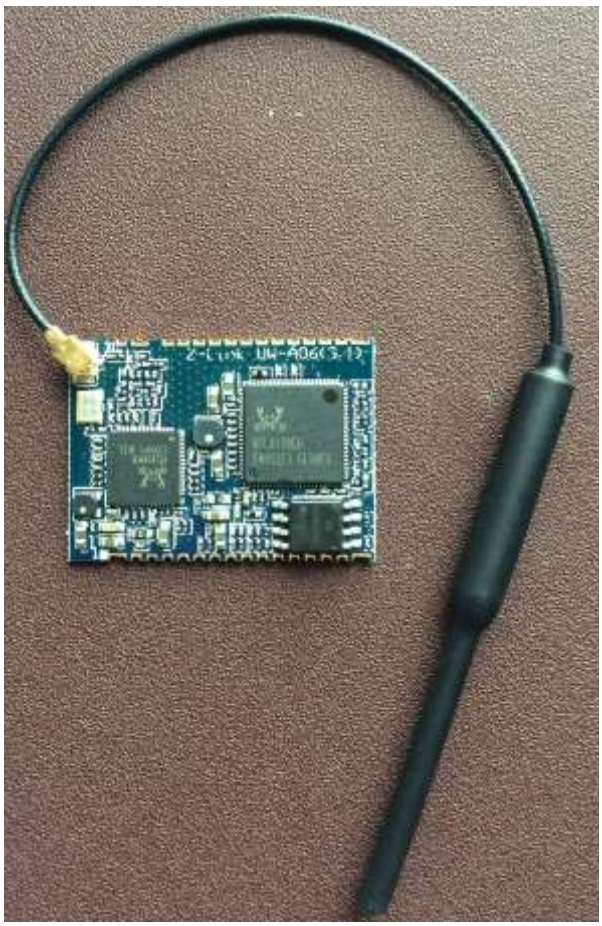
For intentional device. According to 15.203 an intentional radiator shall be designed to Ensure that no antenna other than that furnished by the responsible party shall be used with the device.

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

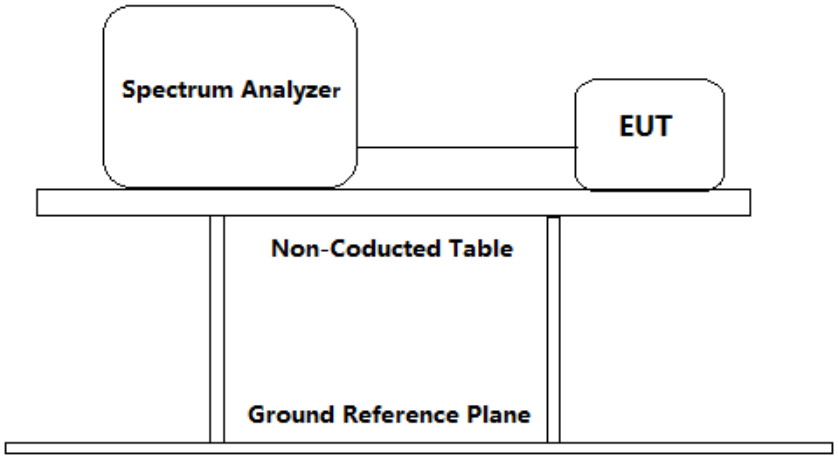
The antenna is an integral antenna and no consideration of replacement. The best case gain of the antenna is 2 dBi.



4.2 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 =0 dB) 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

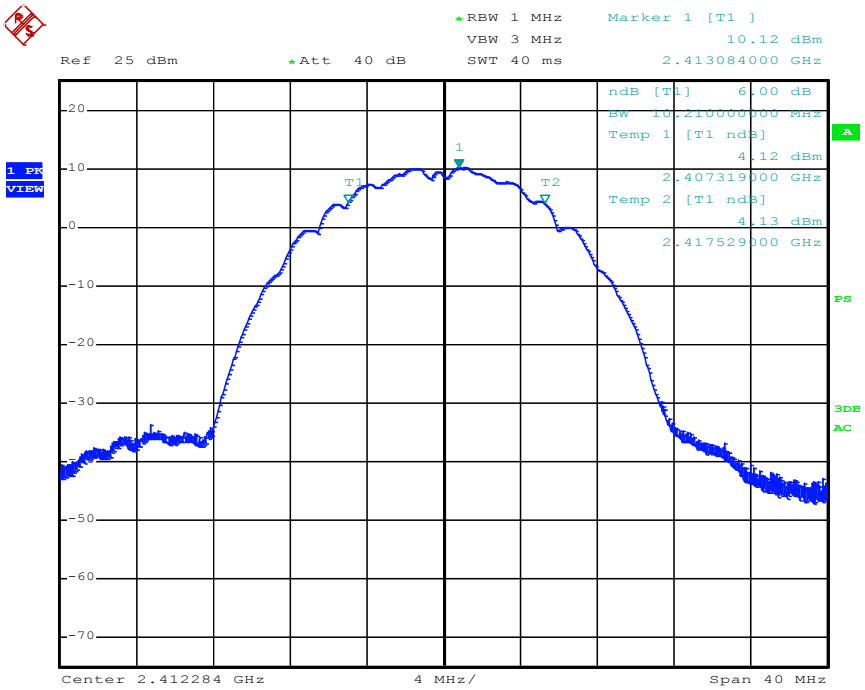
   Span=2*OBW~5*OBW
3. Mark the peak power frequency and -6dB (upper and lower) power frequency.
4. Repeat until all the test status is investigated.
5. Report the worst case.

Channel No.	Frequency (MHz)	Mode	Data Rate	Measured 6dB bandwidth (MHz)	Limit	Result
1	2412	802.11b	11 Mbps	10.210	≥500KHz	Pass
6	2437		11 Mbps	10.175		Pass
11	2462		11 Mbps	9.540		Pass
1	2412	802.11g	54 Mbps	16.760		Pass
6	2437		54 Mbps	16.660		Pass
11	2462		54 Mbps	16.700		Pass
1	2412	802.11n (HT20)	72.2 Mbps	18.160		Pass
6	2437		72.2 Mbps	18.180		Pass
11	2462		72.2 Mbps	18.220		Pass
3	2422	802.11n (HT40)	150 Mbps	38.320		Pass
6	2437		150 Mbps	37.200		Pass
9	2452		150 Mbps	37.480		Pass

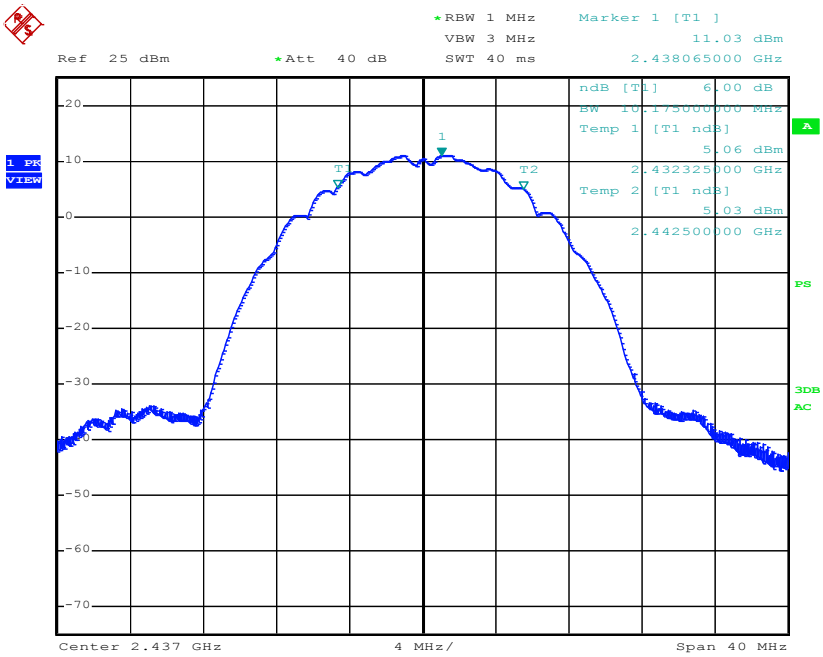
Test result: The unit does meet the FCC requirements.

Result plot as follows:

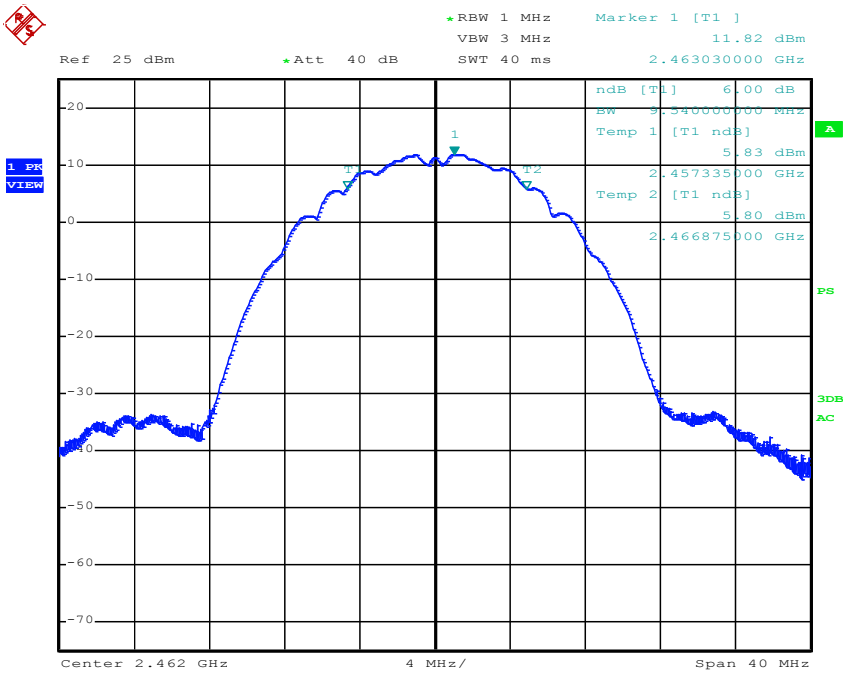
802.11b mode with 11Mbps data rate
Channel 1: 2.412GHz:



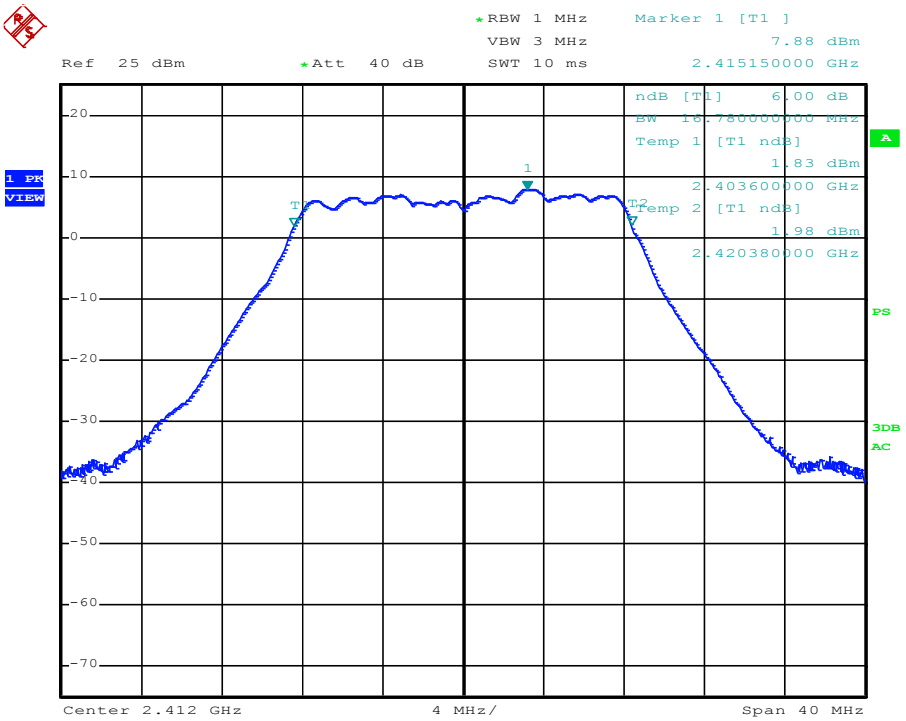
Channel 6: 2.437GHz:



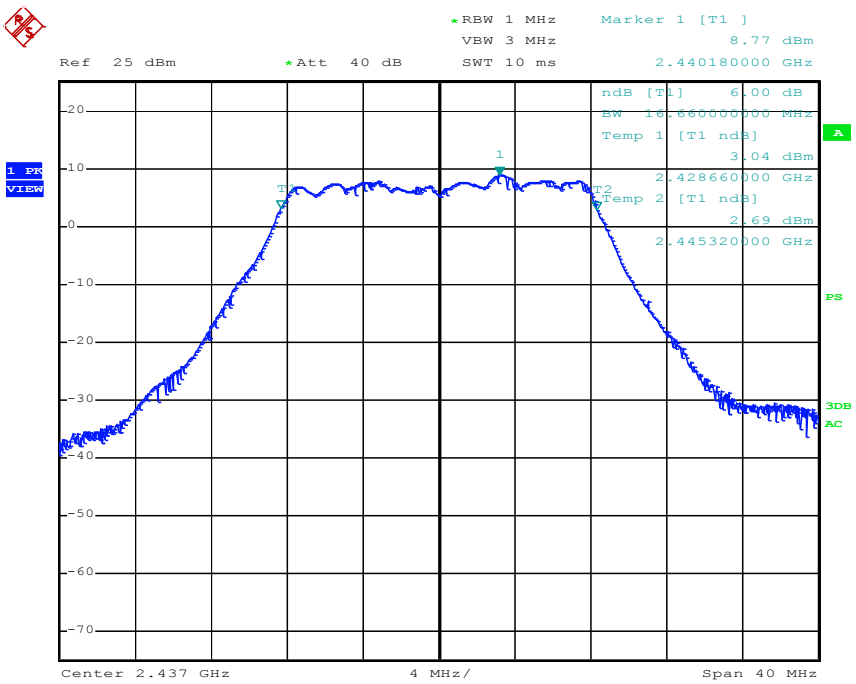
Channel 11: 2.462GHz



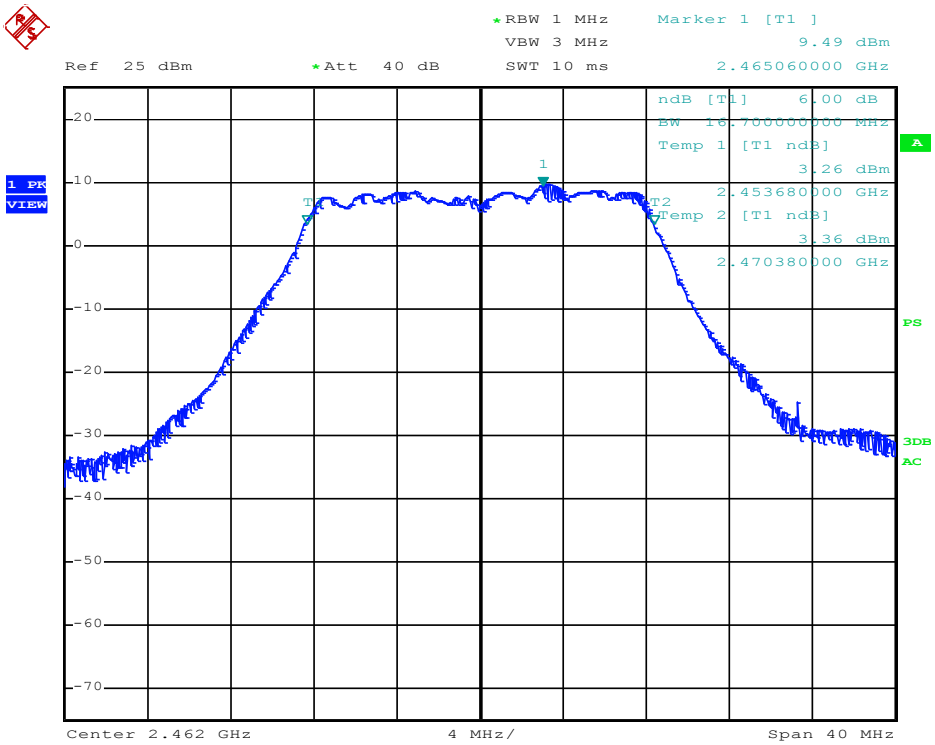
802.11g mode with 54Mbps data rate
Channel 1: 2.412GHz:



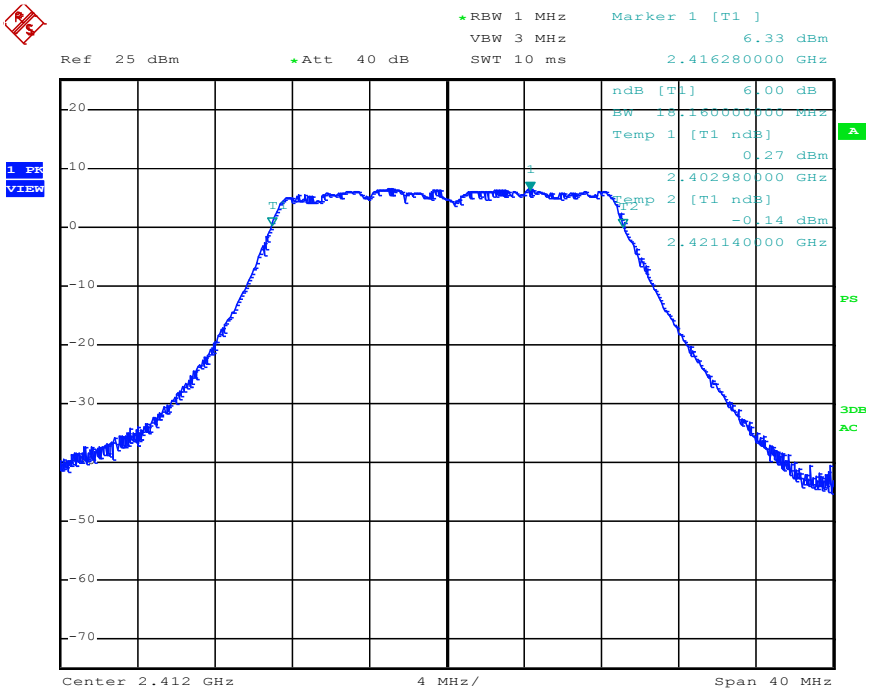
Channel 6: 2.437GHz:



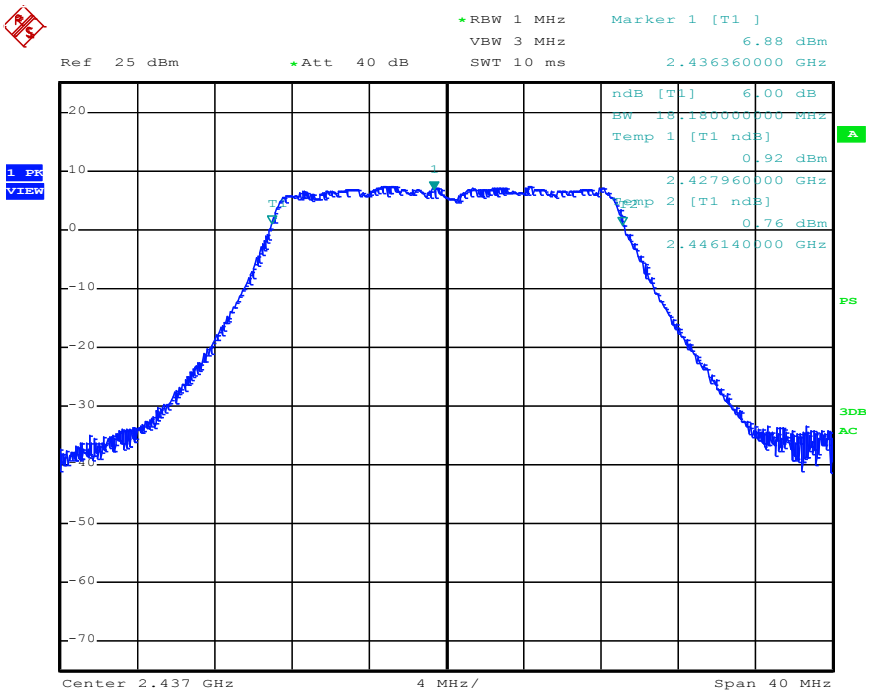
Channel 11: 2.462GHz:



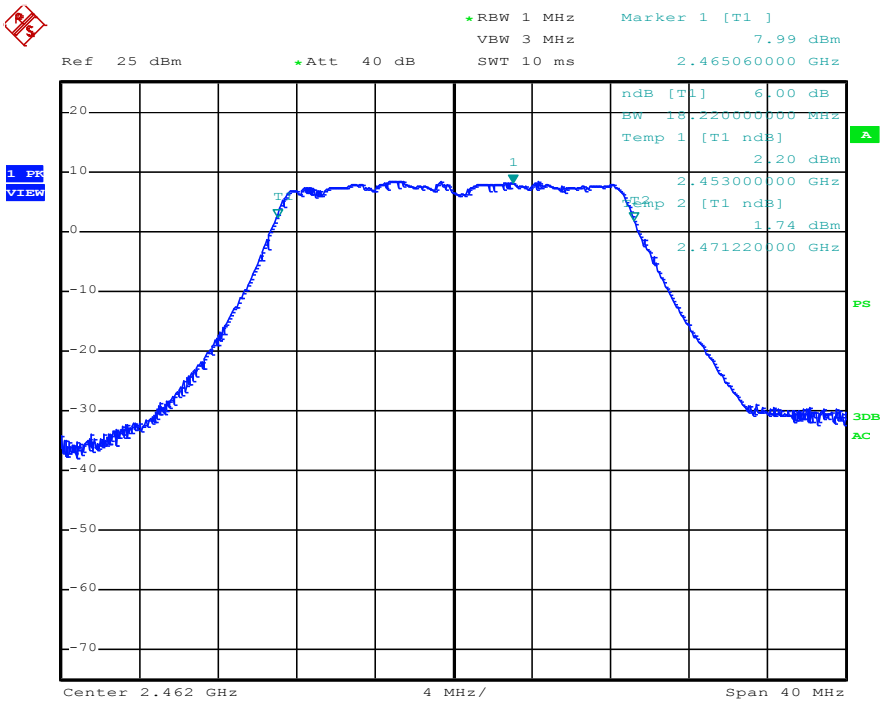
802.11n(HT20) mode with 72.2Mbps data rate
Channel 1: 2.412GHz:



Channel 6: 2.437GHz:

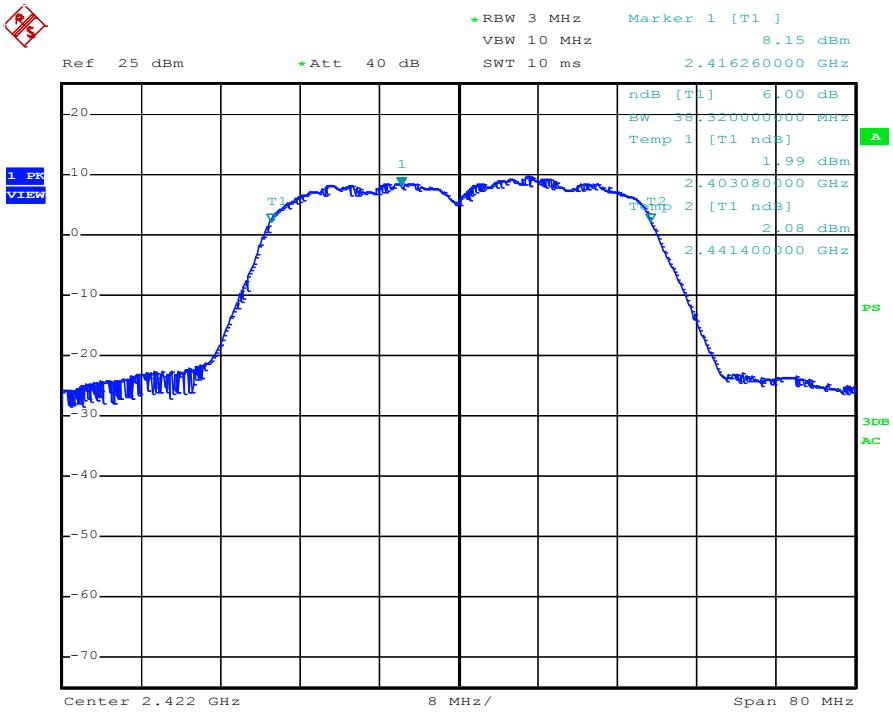


Channel 11: 2.462GHz:

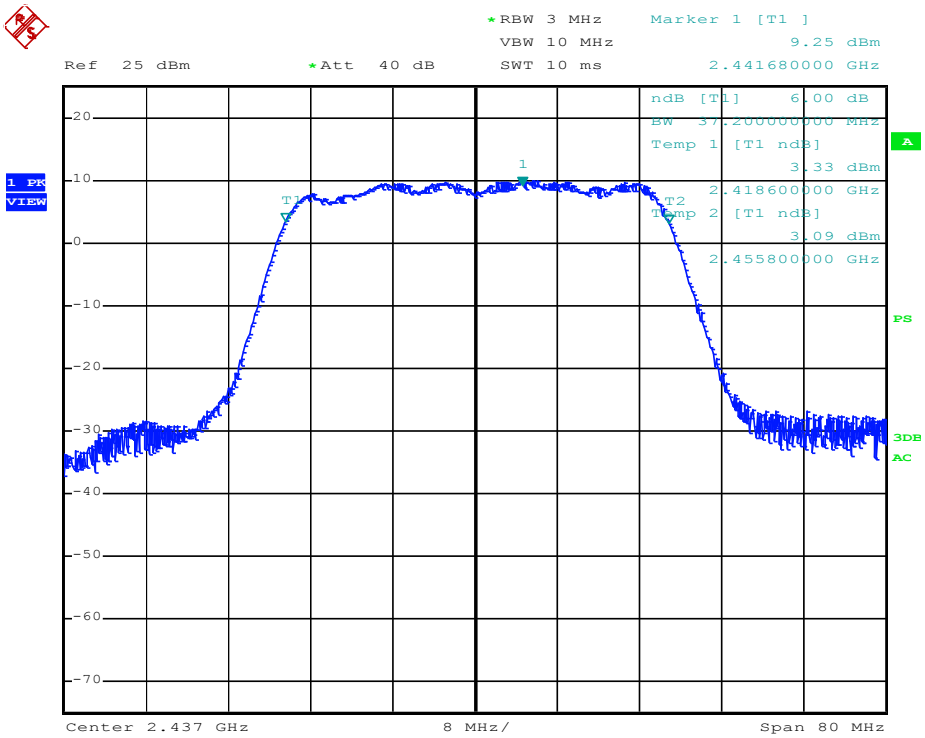


802.11n(HT40) mode with 150Mbps data rate

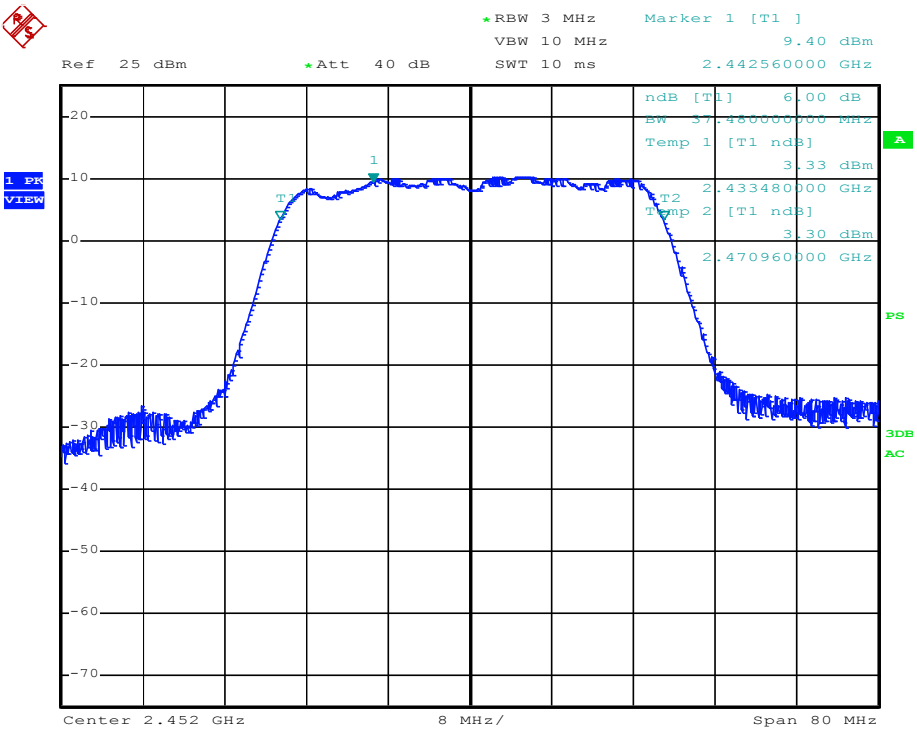
Channel 3: 2.422GHz:



Channel 6: 2.437GHz:



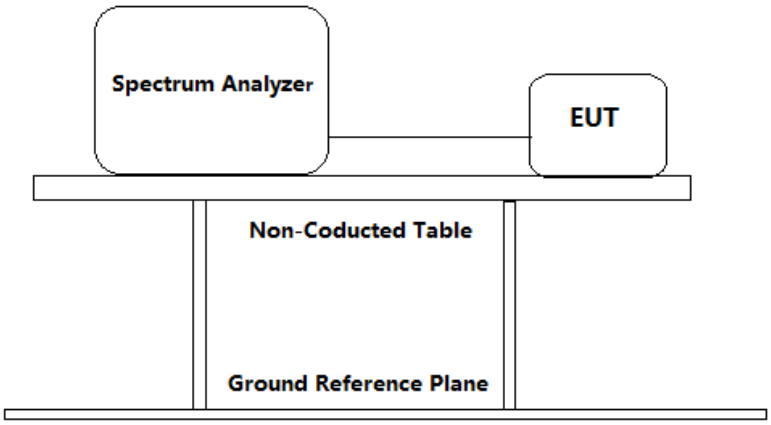
Channel 9: 2.452GHz:



4.3 Maximum Peak Conducted 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 6.10.2.1(Channel integration method)
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:

a) Set the RBW ≥ 6 dB bandwidth of the emission, or use a peak power meter. A peak power meter is required if the 6 dB bandwidth is greater than the capability of the spectrum analyzer (typically 3 MHz RBW).
b) Channel integration method. For peak output power measurements when the analyzer RBW is not large enough, the analyzer band power function can be used. For U-NII output power measurements where power averaging is allowed, see 6.10.3. For the channel integration method, maximum peak power shall be measured over any interval of continuous transmission.

1) Set the RBW and VBW to the maximum available
2) Set the band limits as appropriate for the power measurement; e.g., 6 dB, 20 dB, or 26 dB bandwidth. Expand the band limits by about 0.5 × RBW on each end
3) Turn averaging off
4) Set sweep to automatic
5) Set the span just large enough to capture the emission
6) Use a peak detector on max hold
7) The analyzer should be in linear (rather than log) display mode
8) Let the emission stabilize before making a final reading

c) Bandwidth correction method. Using largest available analyzer RBW, the BW correction factor is 10 log [(6 dB BW of emission)/ (analyzer RBW)].
d) Record the measured power.

Test result:

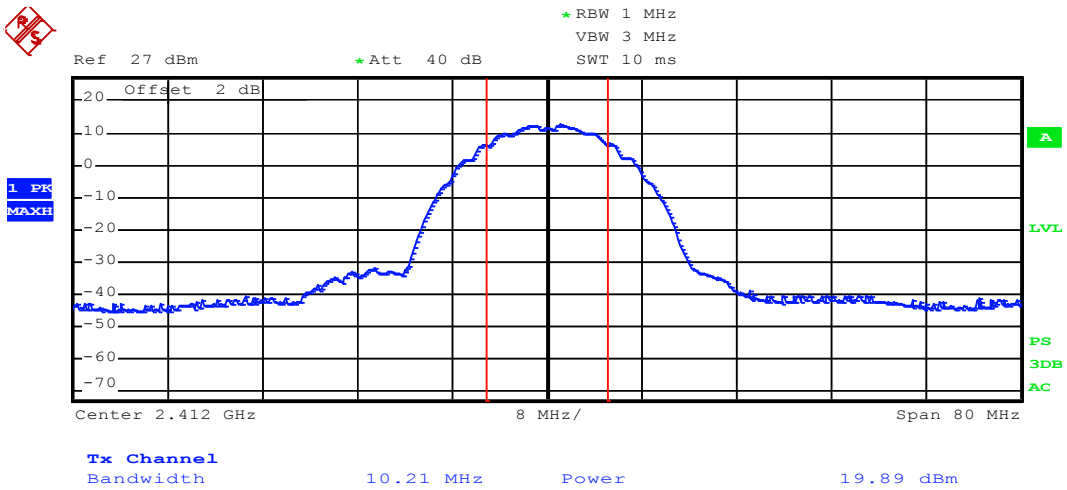
Channel No.	Frequency (MHz)	Mode	Data Rate	Measured Channel Power (dBm)	Limit	Result
1	2412	802.11b	11 Mbps	19.89	1W (30dBm)	Pass
6	2437		11 Mbps	20.69		Pass
11	2462		11 Mbps	21.41		Pass
1	2412	802.11g	54 Mbps	19.88		Pass
6	2437		54 Mbps	20.74		Pass
11	2462		54 Mbps	21.54		Pass
1	2412	802.11n (HT20)	72.2 Mbps	19.69		Pass
6	2437		72.2 Mbps	20.42		Pass
11	2462		72.2 Mbps	21.17		Pass
3	2422	802.11n (HT40)	150 Mbps	19.80		Pass
6	2437		150 Mbps	20.00		Pass
9	2452		150 Mbps	21.05		Pass

Remark: Level = Read Level + Cable Loss(2dB).
The unit does meet the FCC requirements.

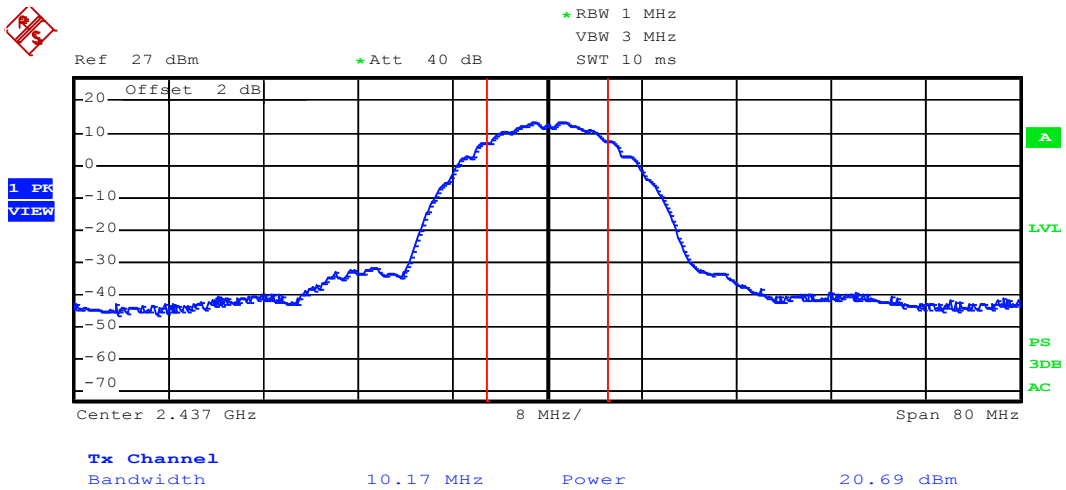
Result plot as follows:

802.11b mode with 11Mbps data rate

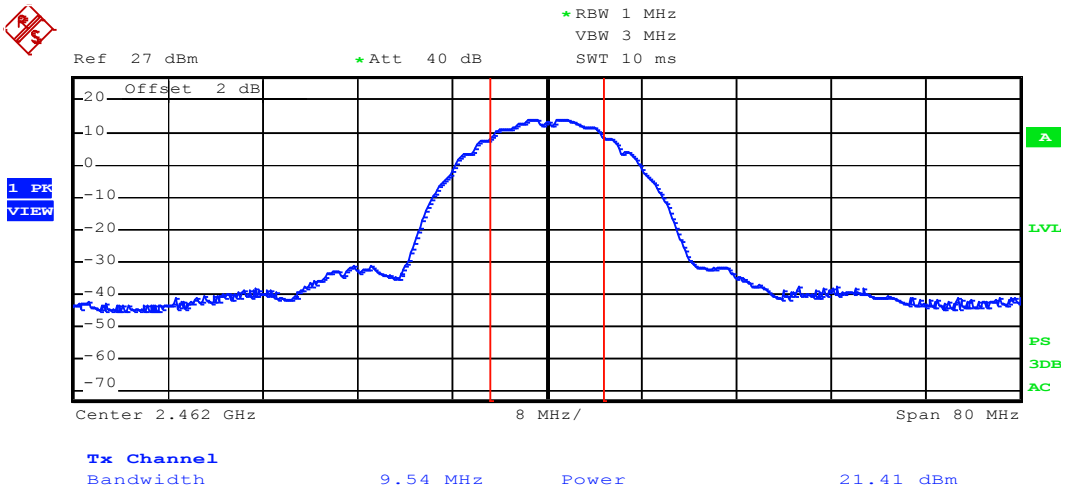
Channel 1: 2.412GHz:



Channel 6: 2.437GHz:

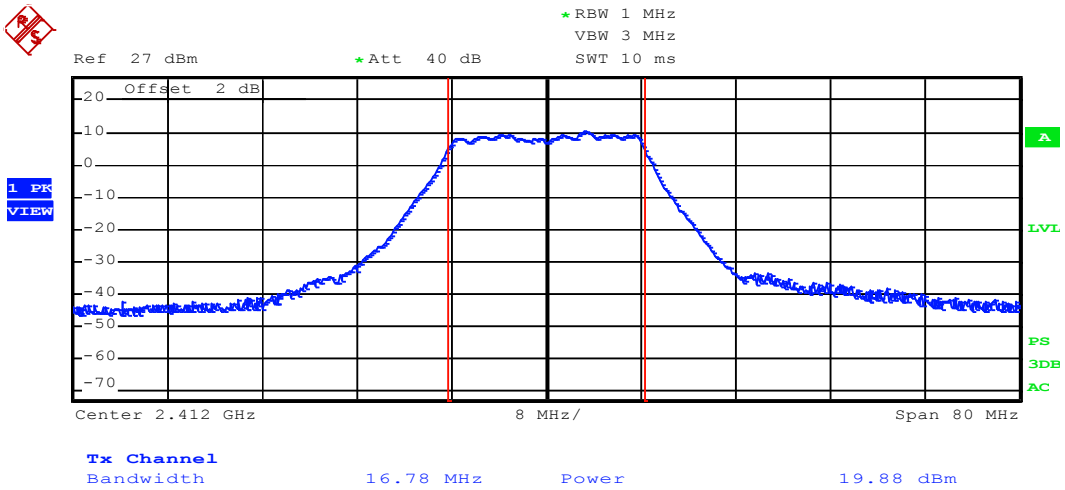


Channel 11: 2.462GHz:

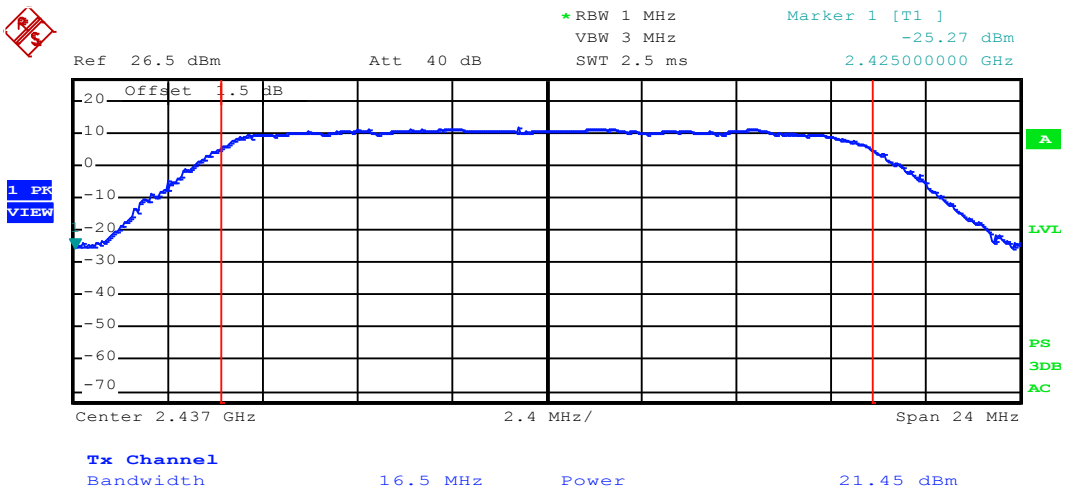


802.11g mode with 54Mbps data rate

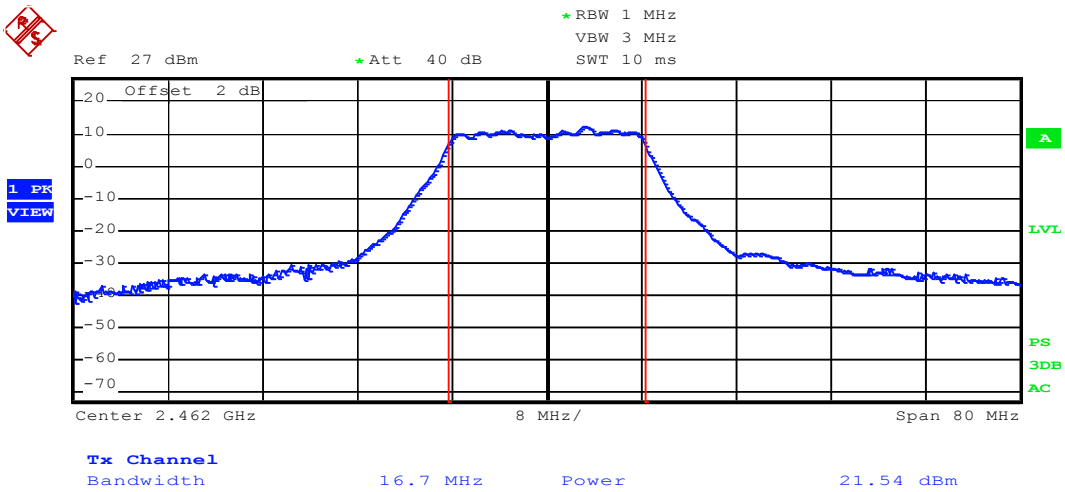
Channel 1: 2.412GHz:



Channel 6: 2.437GHz:

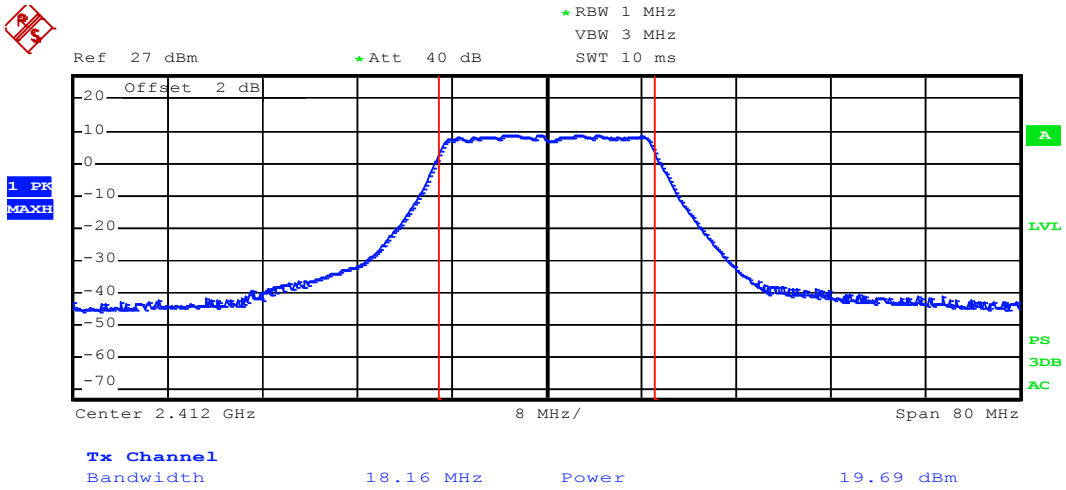


Channel 11: 2.462GHz:

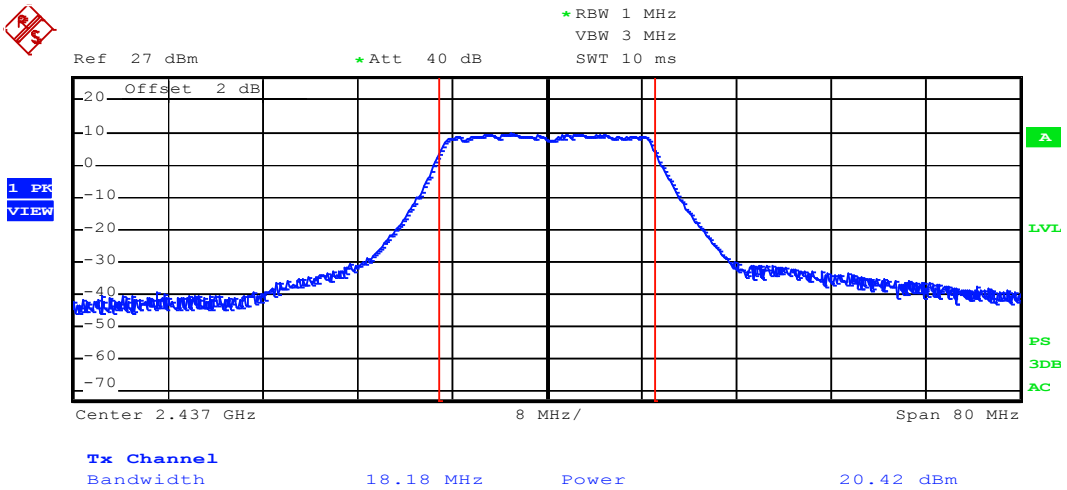


802.11n(HT20) mode with 72.2Mbps data rate

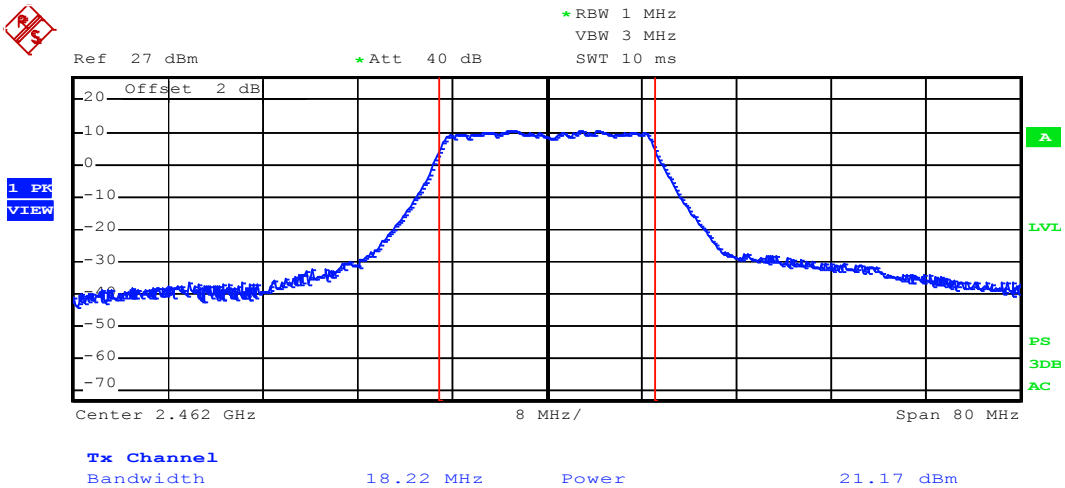
Channel 1: 2.412GHz:



Channel 6: 2.437GHz:

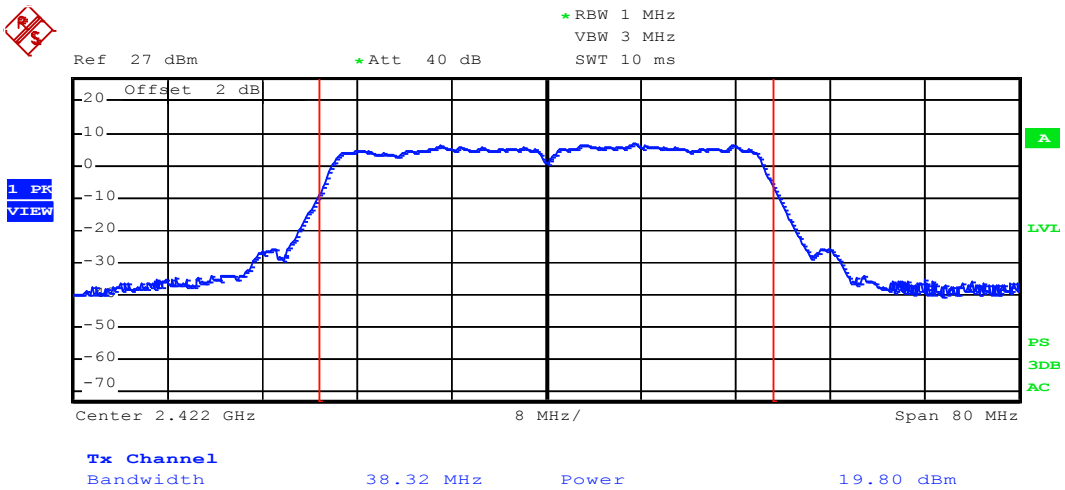


Channel 11: 2.462GHz:

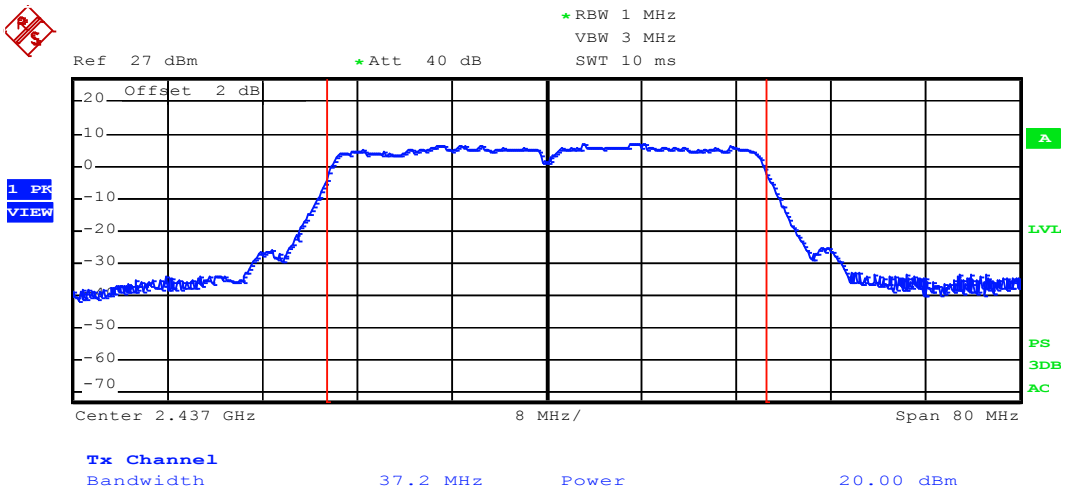


802.11n(HT40) mode with 150Mbps data rate

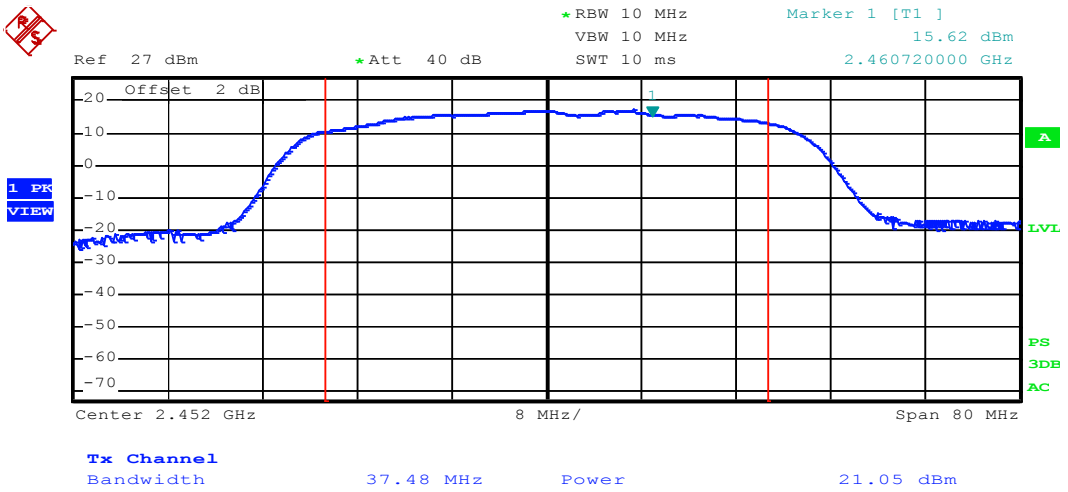
Channel 3: 2.422GHz:



Channel 6: 2.437GHz:



Channel 9: 2.452GHz:



4.4 Peak Power Spectral Density

Test Requirement: FCC Part 15 C section 15.247

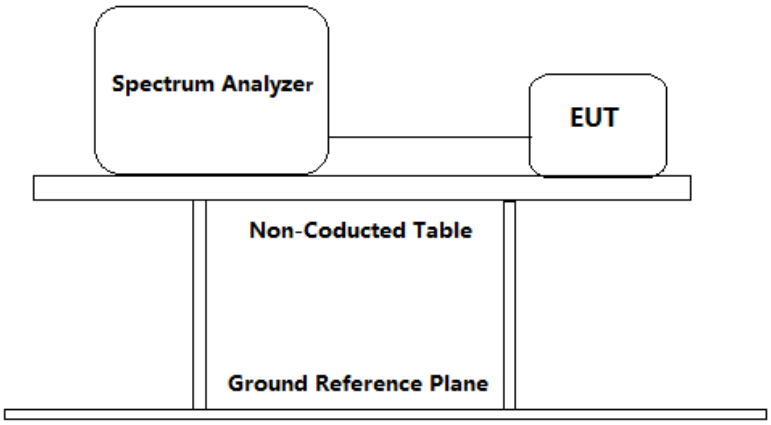
(e) For digitally modulated systems, the power spectral density conducted from the intentional radiator to the antenna shall not be greater than 8 dBm in any 3 kHz band during any time interval of continuous transmission.

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 6.11.2.3

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:

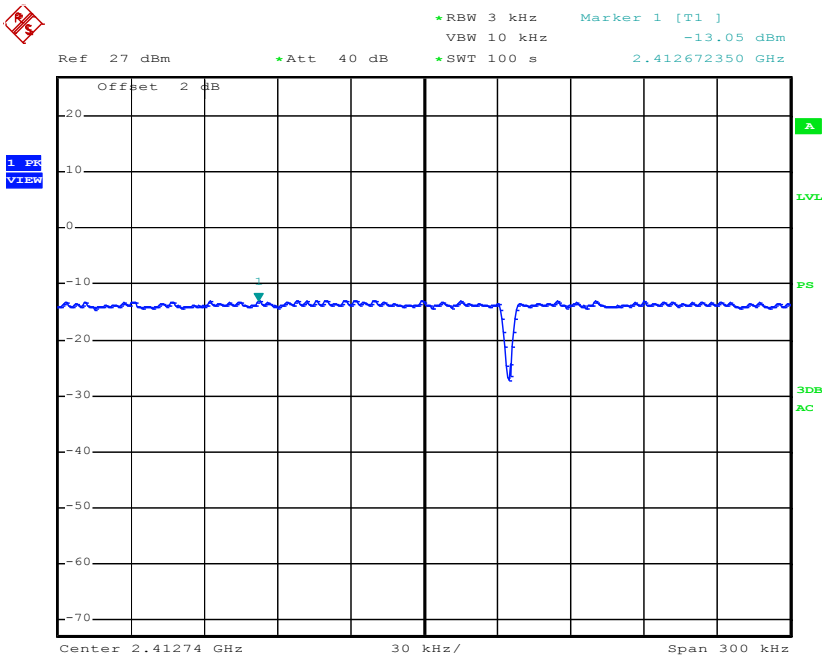
1. Remove the antenna from the EUT and then connect a low attention attenuation RF cable (cable loss =2dB) from the antenna port to the spectrum analyzer or power meter.
2. Set the spectrum analyzer:
   a) Set CENTER FREQUENCY = Frequency from Power Spectral Density Test Matrix
   b) Set SPAN = 20 MHz (For devices with a nominal 40 MHz BW, 50 MHz span will be needed)
   c) Set REFERENCE LEVEL = 20 dBm
   d) Set ATTENUATION = 0 dB
   e) Set SWEEP TIME = Coupled
   f) Set RBW = 3 kHz
   g) Set VBW = 10 kHz
   h) Set DETECTOR = Peak
   i) Set MKR = Center Frequency
   j) Set TRACE = CLEAR WRITE
   Place the radio in continuous transmit mode. Set the TRACE to MAX HOLD, and after the trace stabilizes, the TRACE to VIEW. Set the marker on the peak of the signal and then adjust the center frequency of the spectrum analyzer to the marker frequency.
   After viewing the EUT waveform on the spectrum analyzer, perform the following spectrum analyser functions to capture the trace:
   Set SPAN = 300 kHz
   Set SWEEP TIME = 100 s
   Set TRACE = MAX HOLD
   Set MKR = PEAK SEARCH
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 worst case.

Channel No.	Frequency (MHz)	Mode	Data Rate	Measured Peak Power Spectral Density (dBm/3KHz)	Limit	Result
1	2412	802.11b	11 Mbps	-13.05	8dBm/ 3 KHz	Pass
6	2437		11 Mbps	-12.19		Pass
11	2462		11 Mbps	-11.37		Pass
1	2412	802.11g	54 Mbps	-14.43		Pass
6	2437		54 Mbps	-14.51		Pass
11	2462		54 Mbps	-13.25		Pass
1	2412	802.11n (HT20)	72.2 Mbps	-15.88		Pass
6	2437		72.2 Mbps	-15.20		Pass
11	2462		72.2 Mbps	-14.20		Pass
3	2422	802.11n (HT40)	150 Mbps	-17.18		Pass
6	2437		150 Mbps	-16.41		Pass
9	2452		150 Mbps	-16.27		Pass

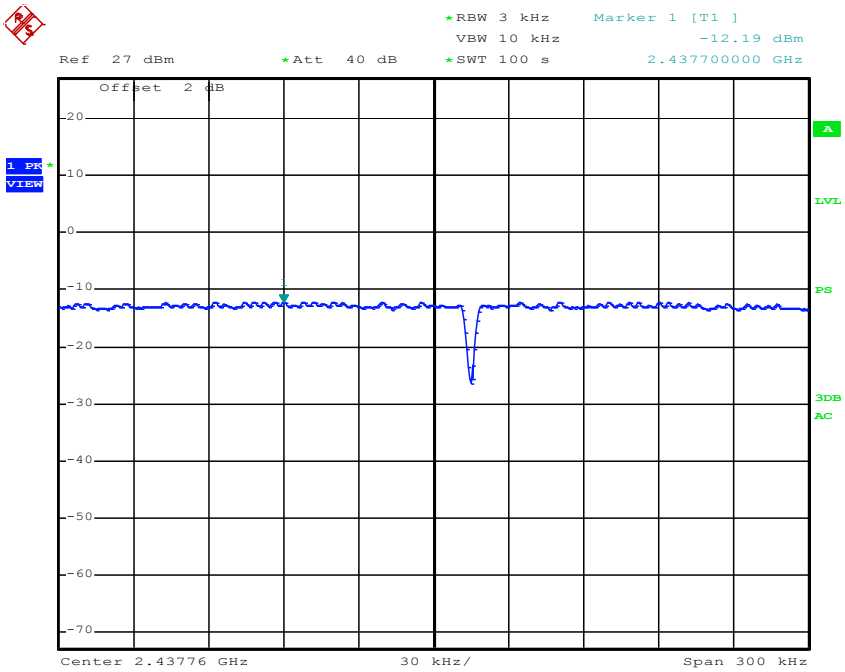
Test result: Level = Read Level + Cable Loss(2dB).
The unit does meet the FCC requirements.

Result plot as follows:

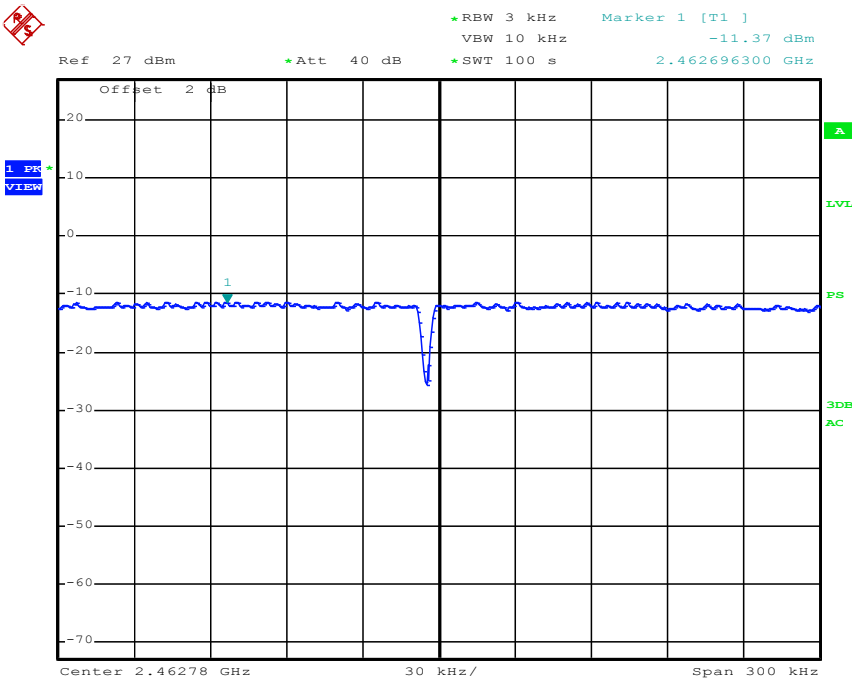
802.11b mode with 11Mbps data rate
Channel 1: 2.412GHz:



Channel 6: 2.437GHz:

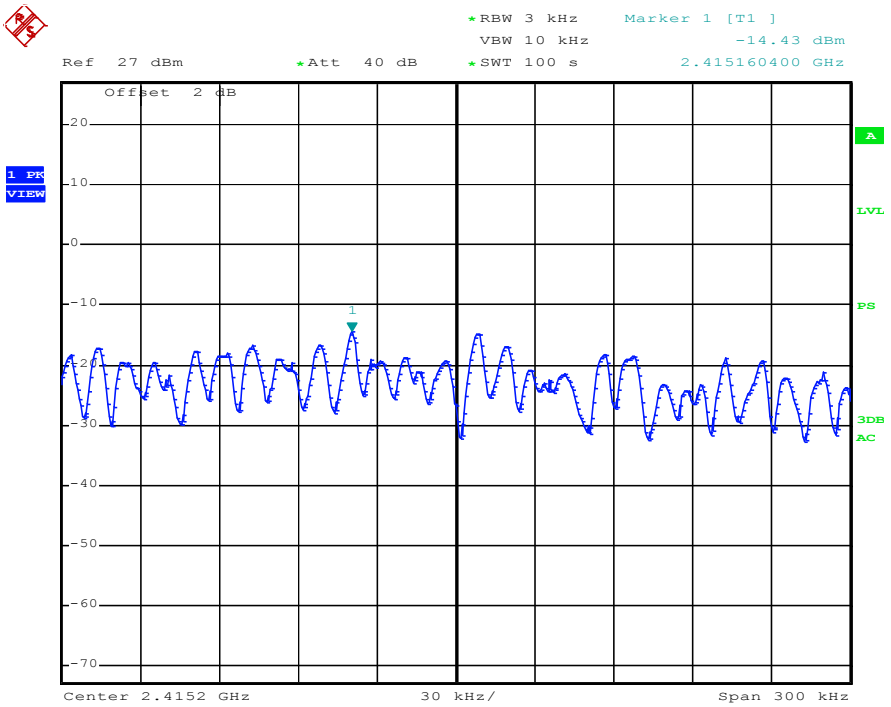


Channel 11: 2.462GHz:

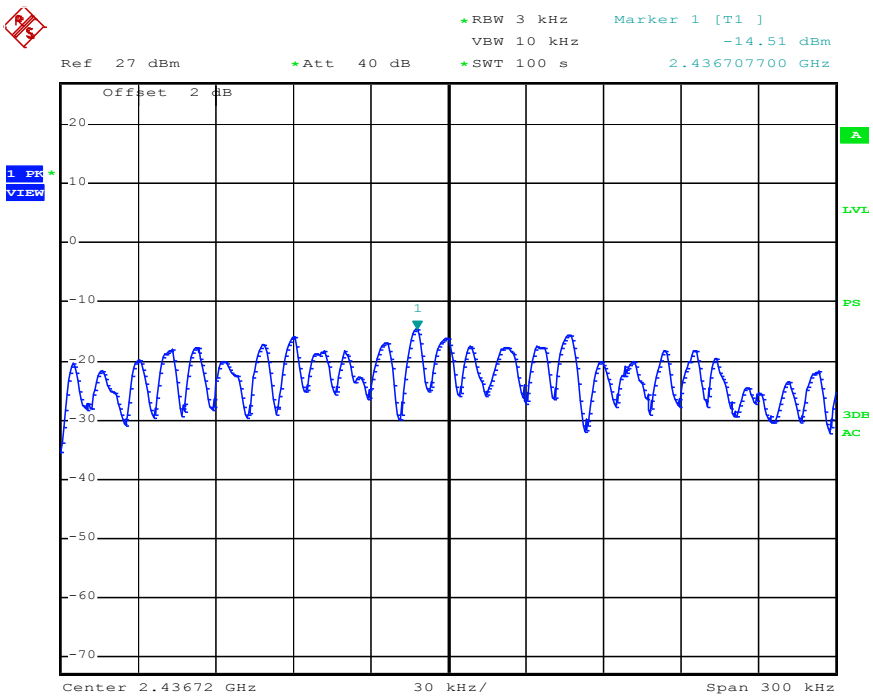


802.11g mode with 54Mbps data rate

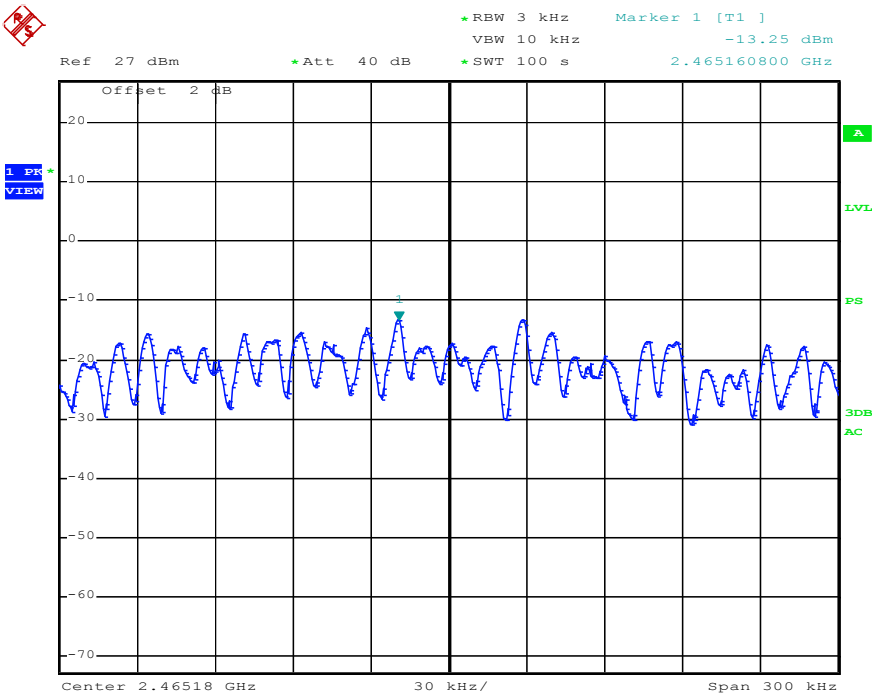
Channel 1: 2.412GHz:



Channel 6: 2.437GHz:

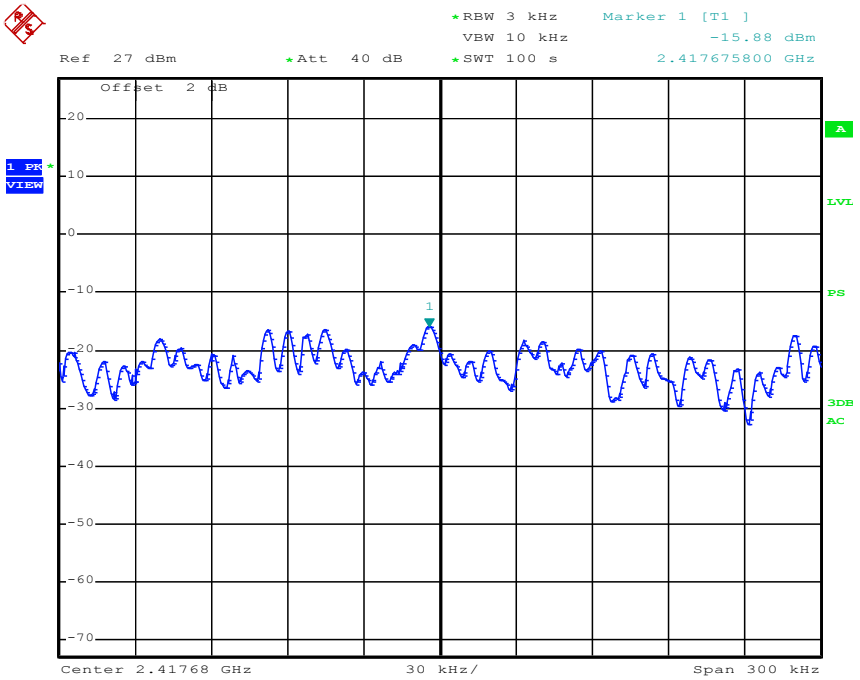


Channel 11: 2.462GHz:

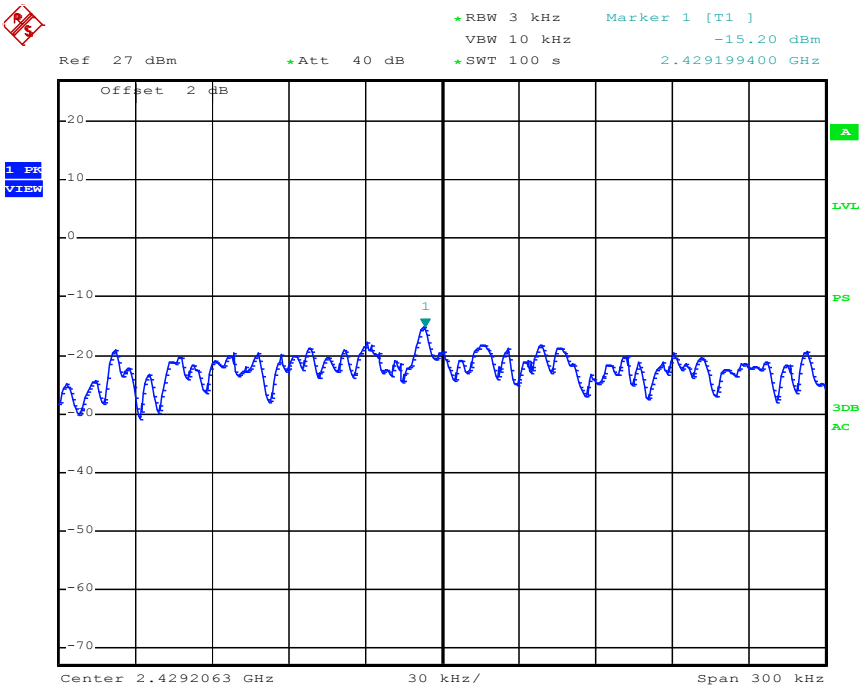


802.11n(HT20) mode with 72.2Mbps data rate

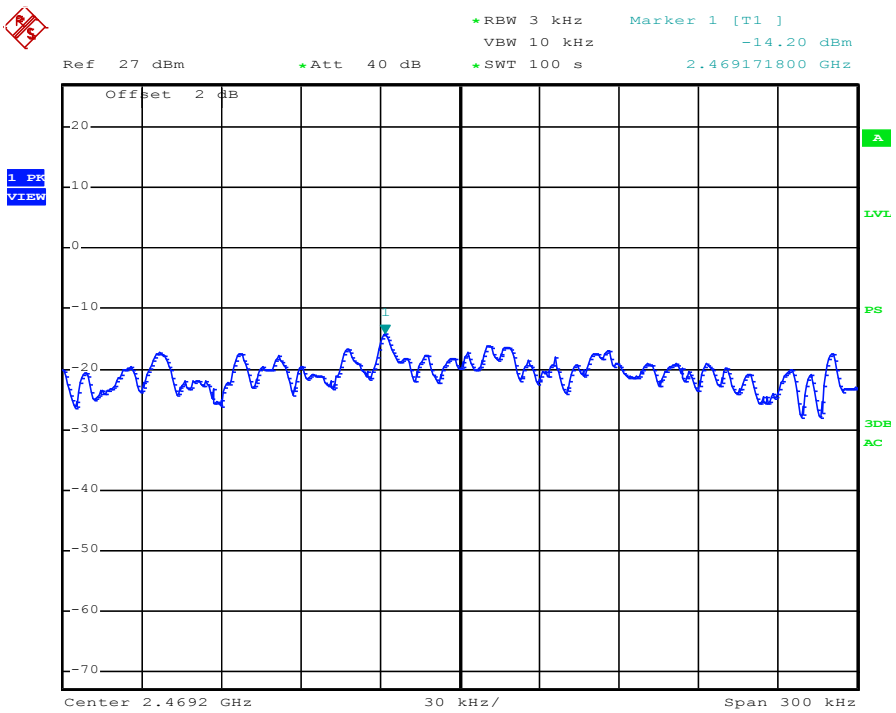
Channel 1: 2.412GHz:



Channel 6: 2.437GHz:

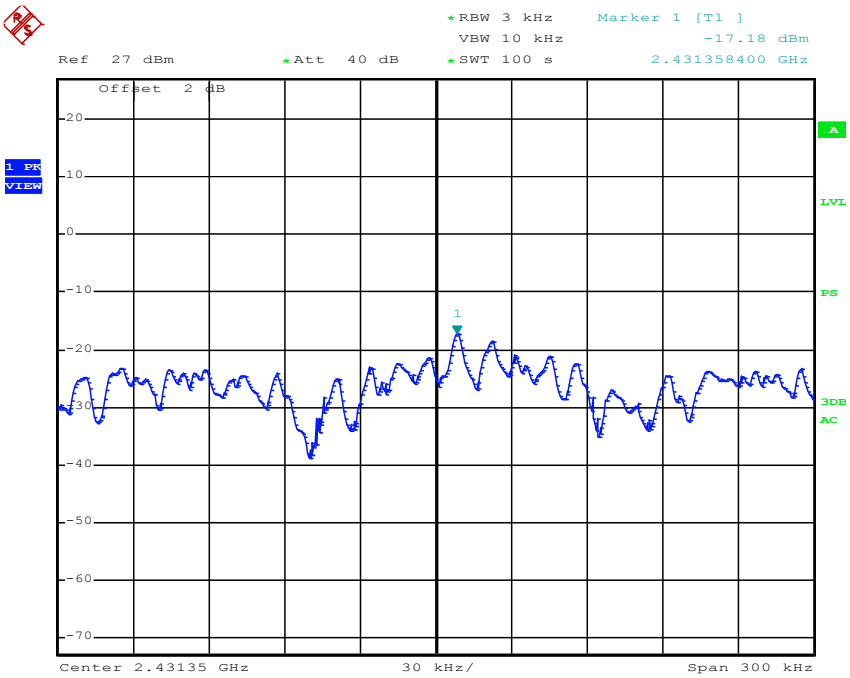


Channel 11: 2.462GHz:

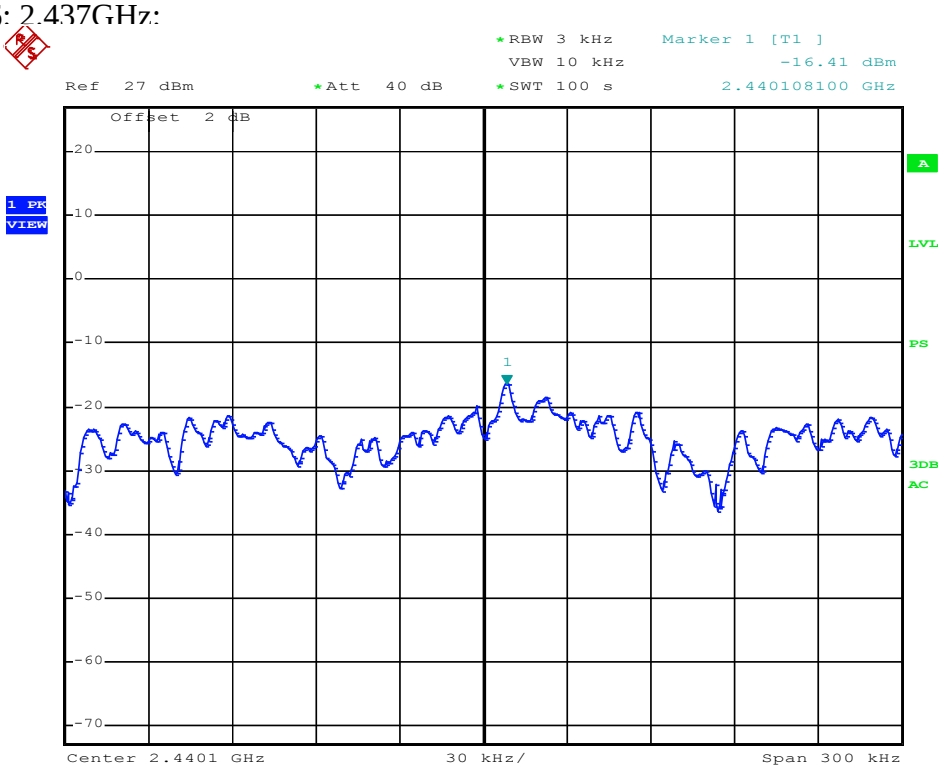


802.11n(HT40) mode with 150Mbps data rate

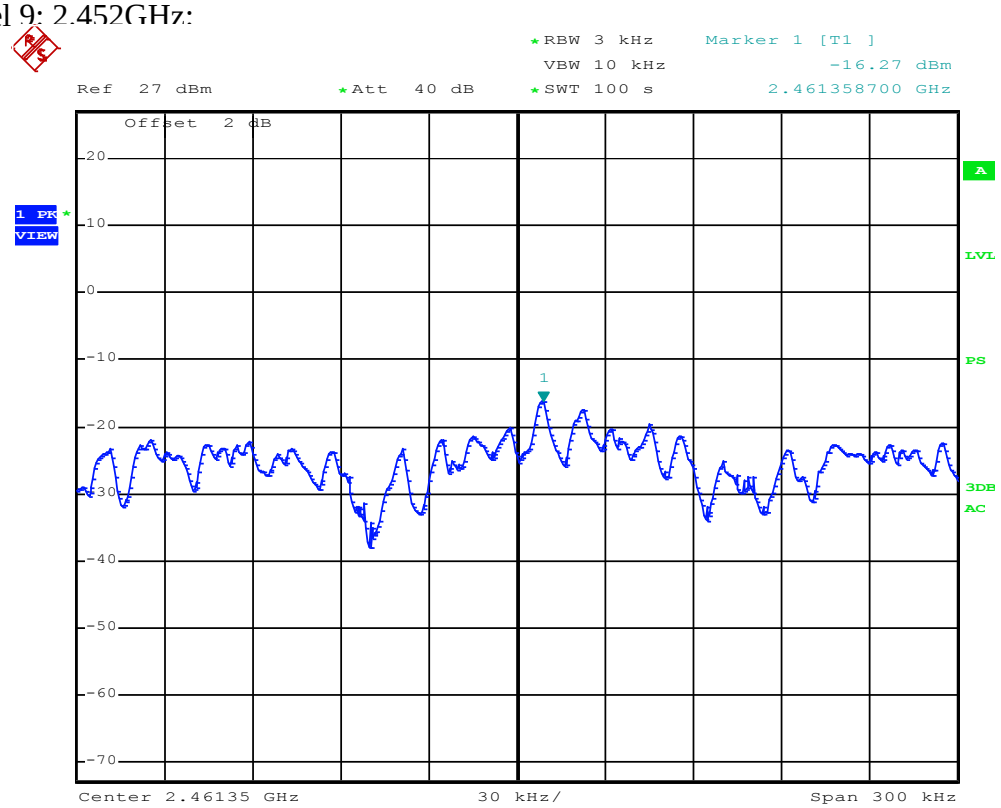
Channel 3: 2.422GHz:



Channel 6: 2.437GHz:



Channel 9: 2.452GHz:



4.5 Out of Band Conducted Emissions

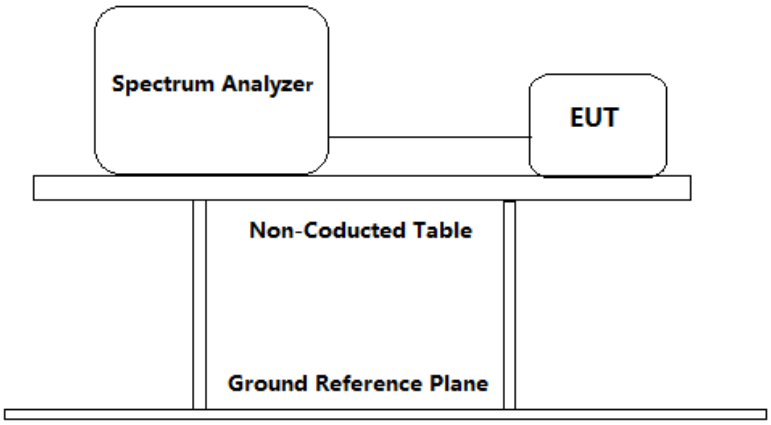
Test Requirement: FCC Part 15 C section 15.247

(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:



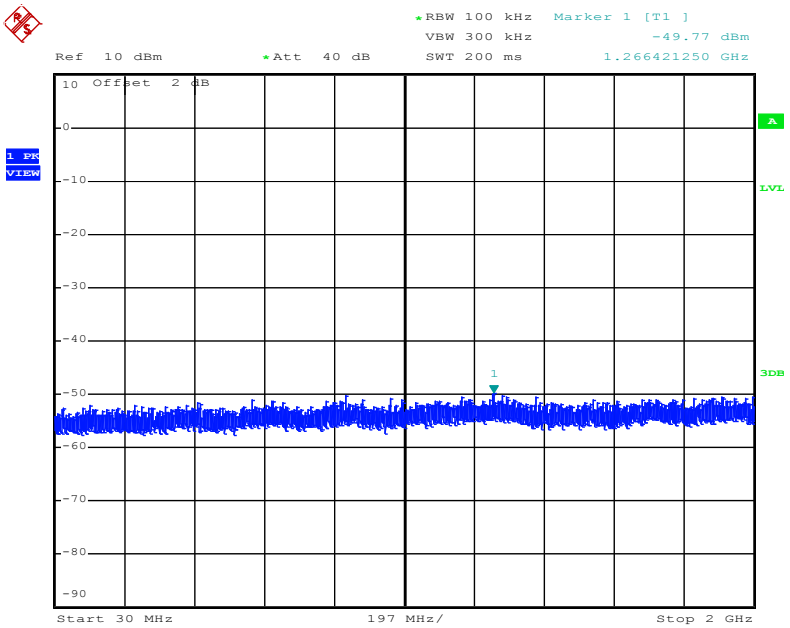
Test Procedure:

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

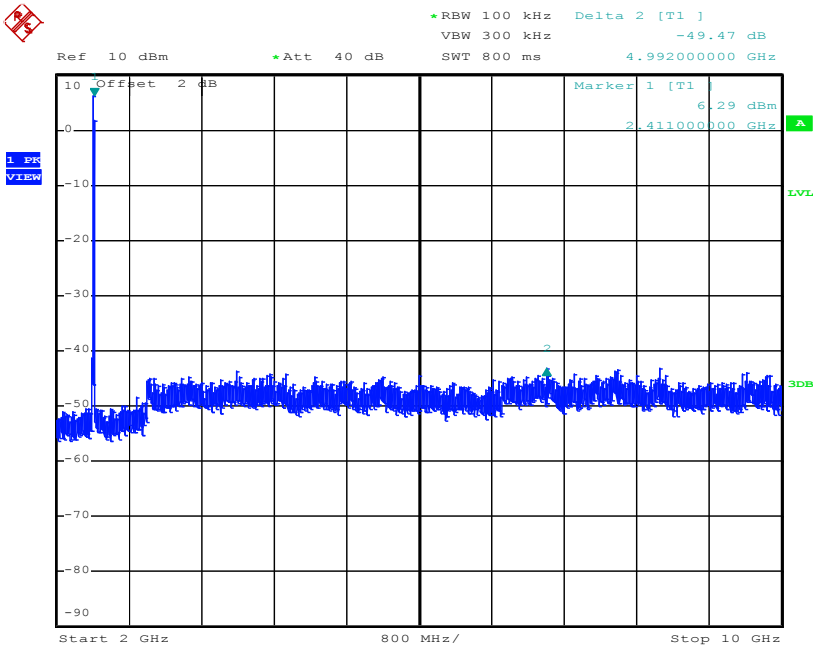
Result plot as follows:

802.11b mode with 11Mbps data rate
Channel 1: 2.412GHz:

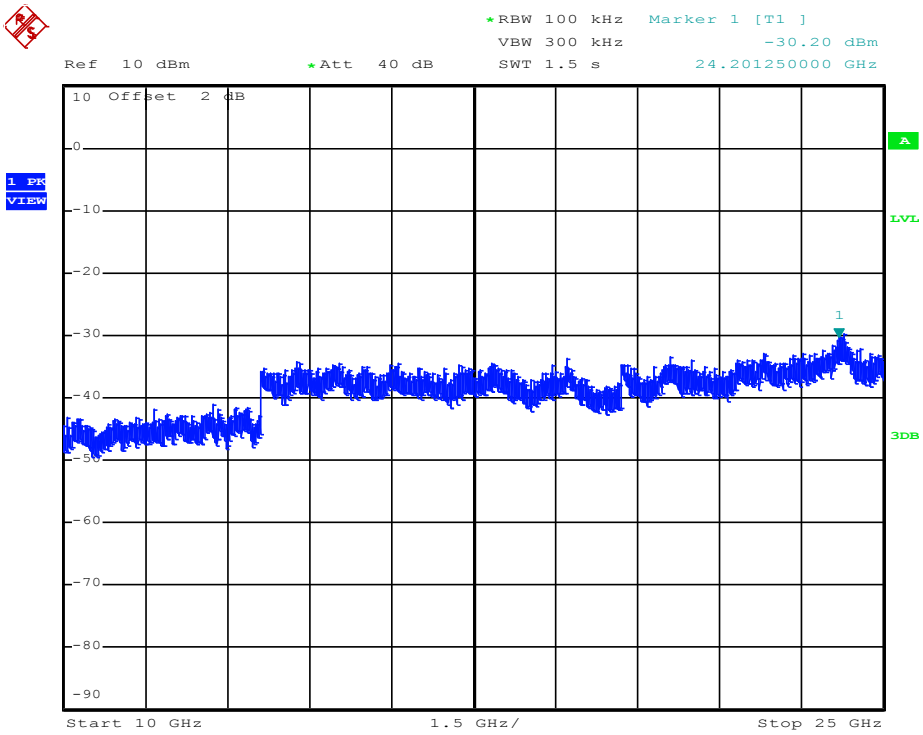
30 MHz to 2 GHz:



2 GHz to 10 GHz:



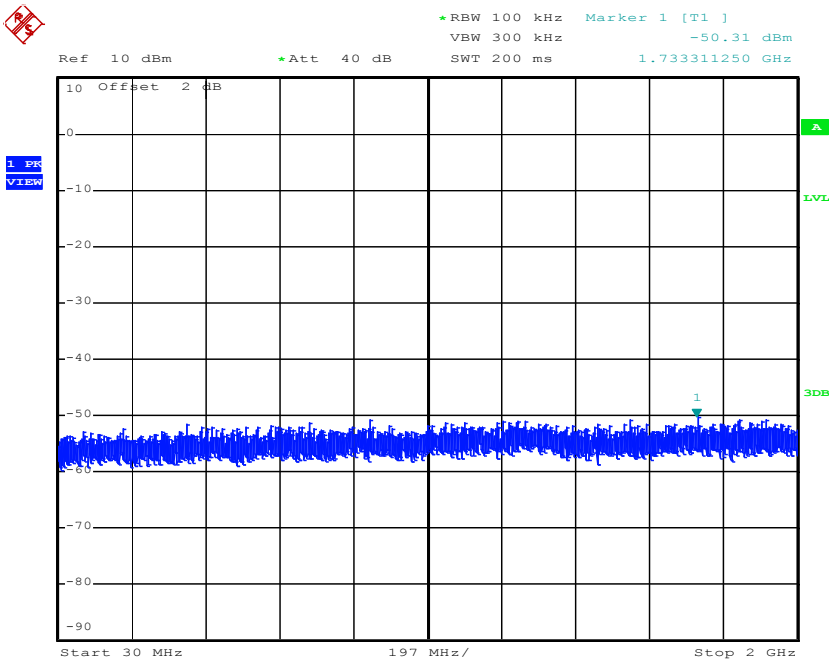
10 GHz to 25 GHz:



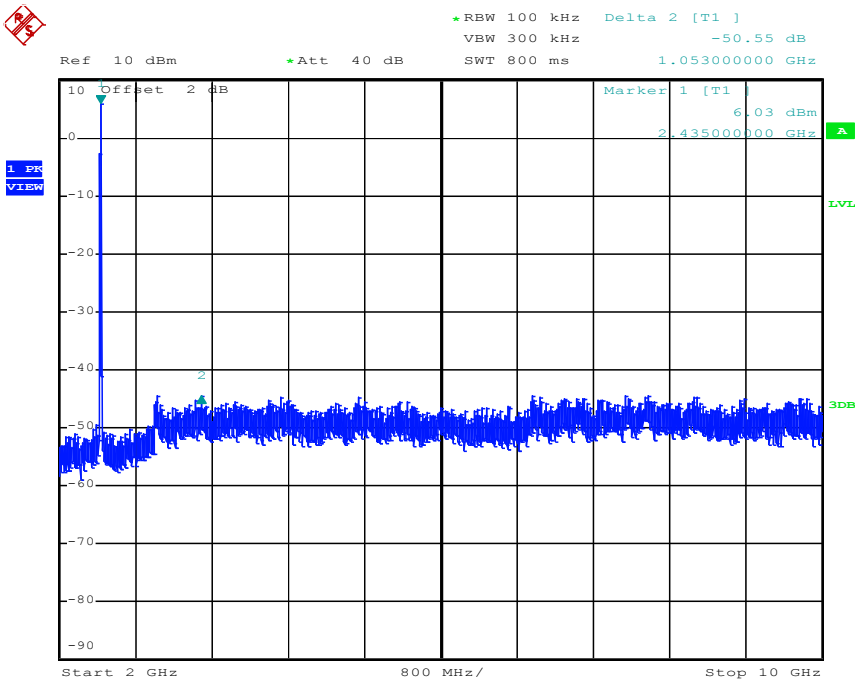
In any 100kHz bandwidth, the Conducted Spurious Emissions from 30 MHz to 25 GHz were greater than 20dB below the peak emission within the band that contains the highest level of the desired power.

802.11b mode with 11Mbps data rate
Channel 6: 2.437GHz:

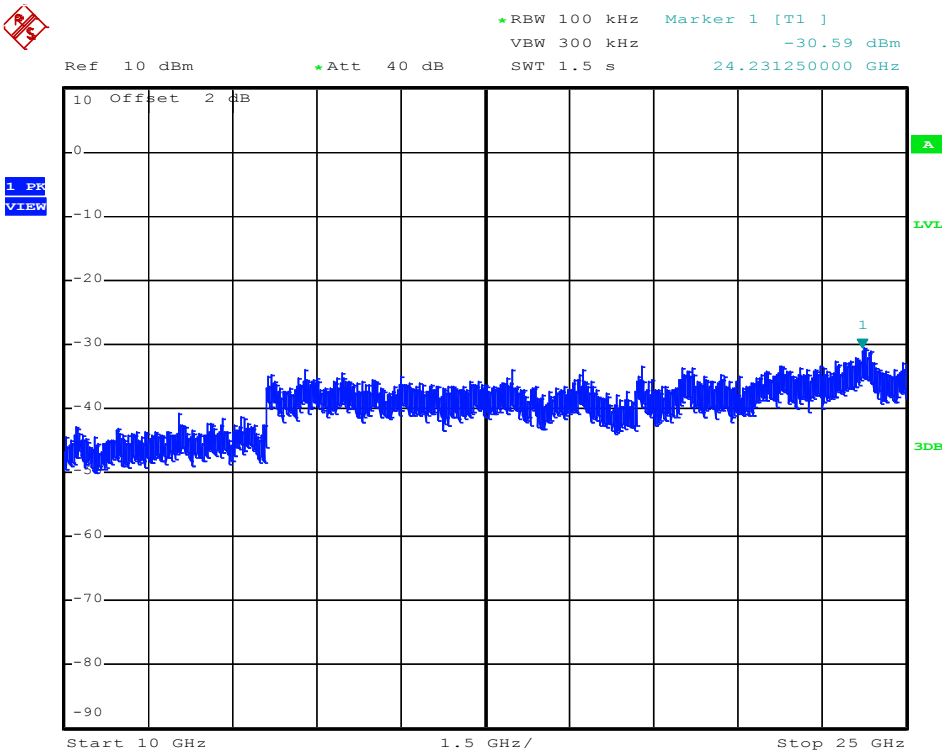
30 MHz to 2 GHz:



2 GHz to 10 GHz:



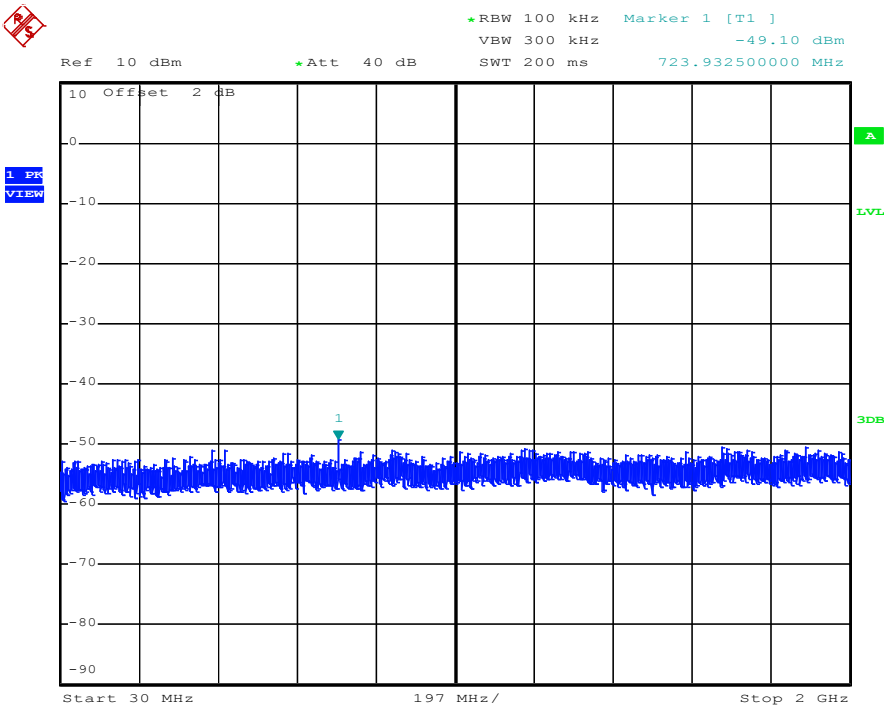
10 GHz to 25 GHz:



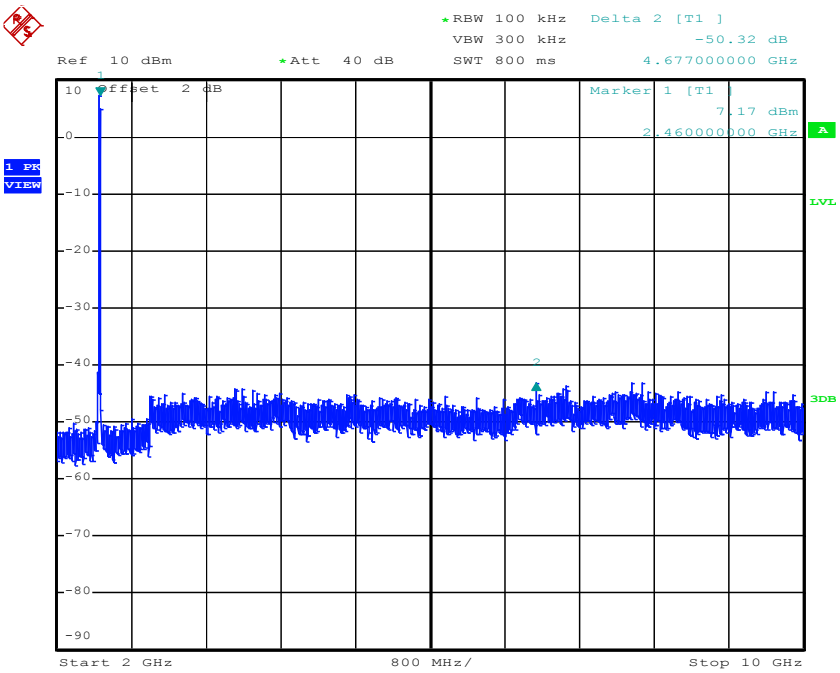
In any 100kHz bandwidth, the Conducted Spurious Emissions from 30 MHz to 25 GHz were greater than 20dB below the peak emission within the band that contains the highest level of the desired power.

Channel 11:2.462 GHz:

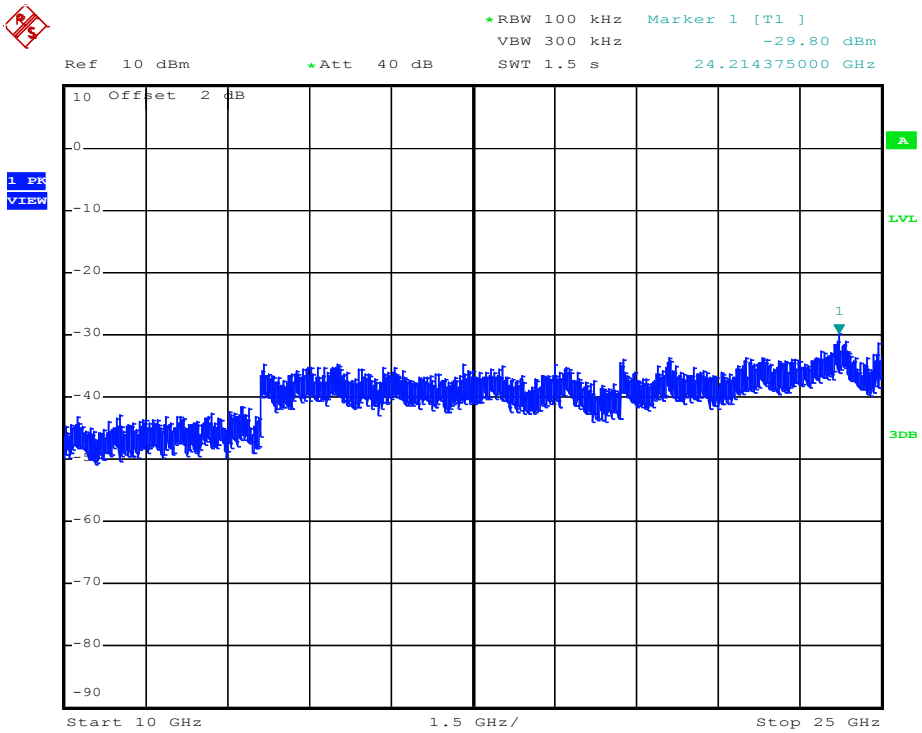
30 MHz to 2 GHz:



2 GHz to 10 GHz:



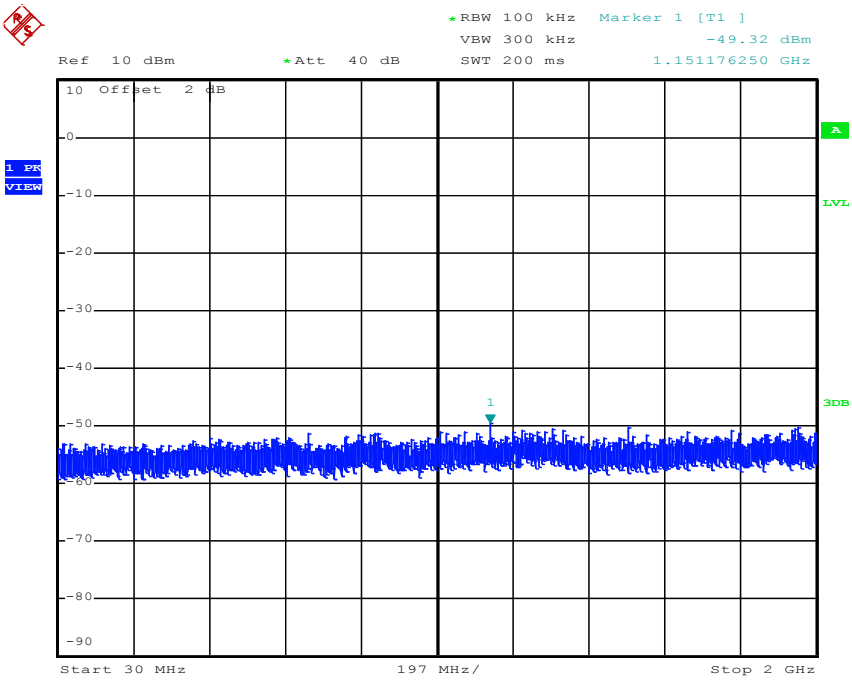
10 GHz to 25 GHz:



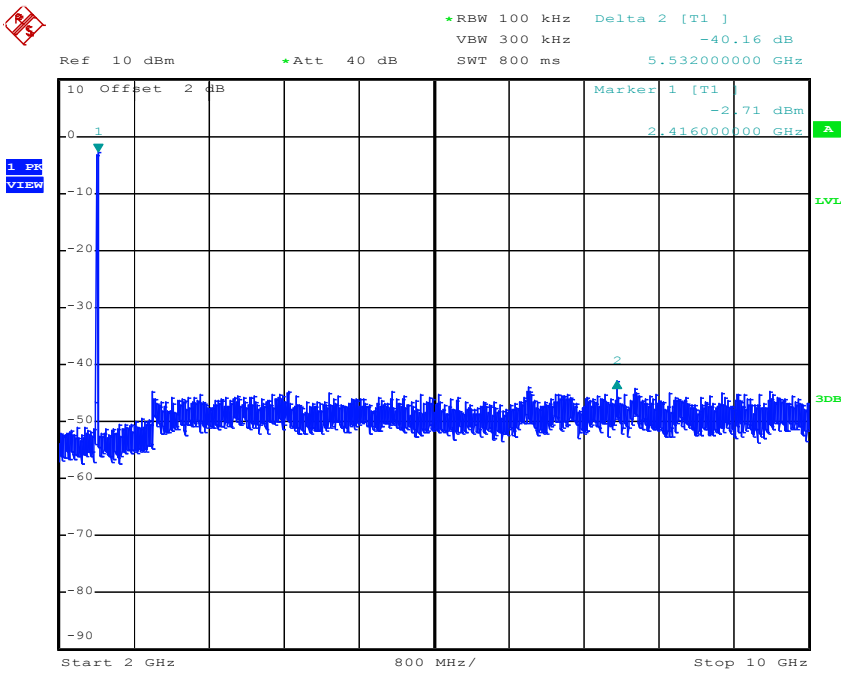
In any 100kHz bandwidth, the Conducted Spurious Emissions from 30 MHz to 25 GHz were greater than 20dB below the peak emission within the band that contains the highest level of the desired power.

802.11g mode with 54Mbps data rate
Channel 1: 2.412GHz:

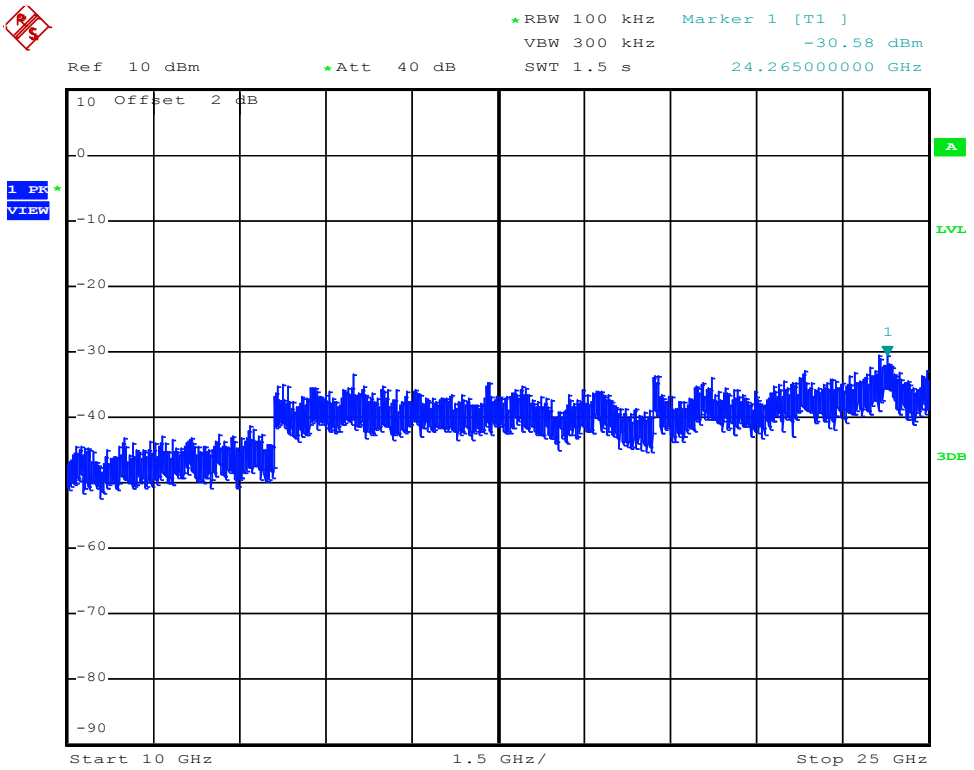
30 MHz to 2 GHz:



2 GHz to 10 GHz:



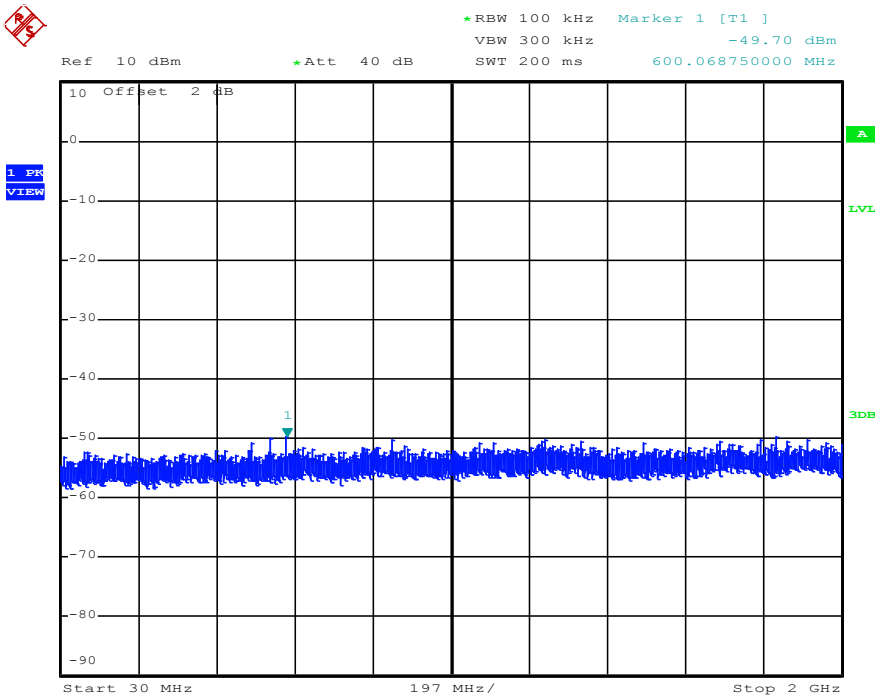
10 GHz to 25 GHz:



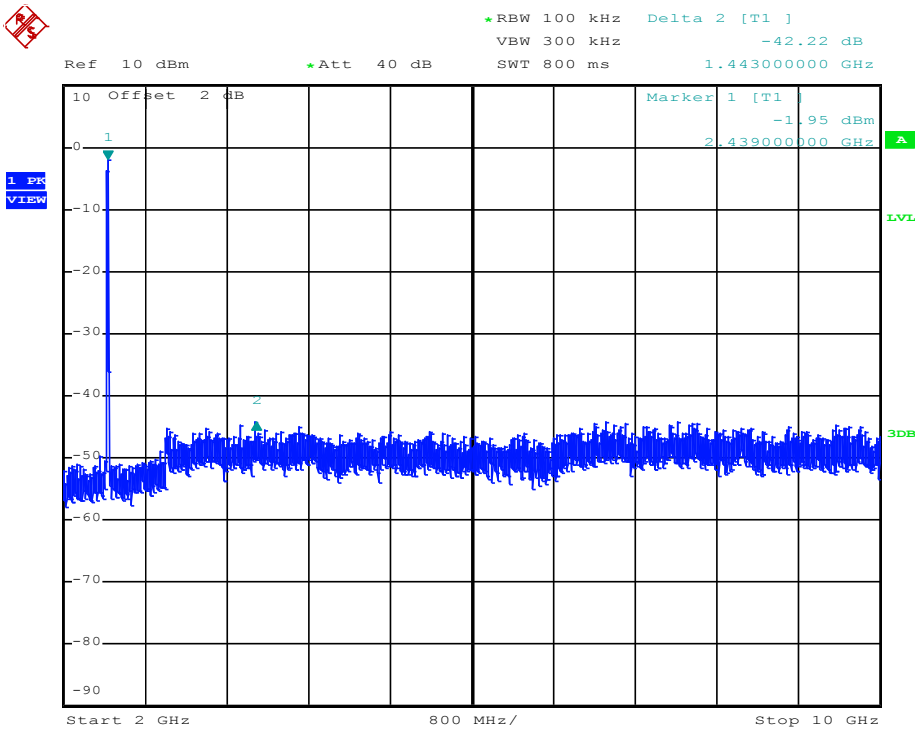
In any 100kHz bandwidth, the Conducted Spurious Emissions from 30 MHz to 25 GHz were greater than 20dB below the peak emission within the band that contains the highest level of the desired power.

Channel 6: 2.437GHz:

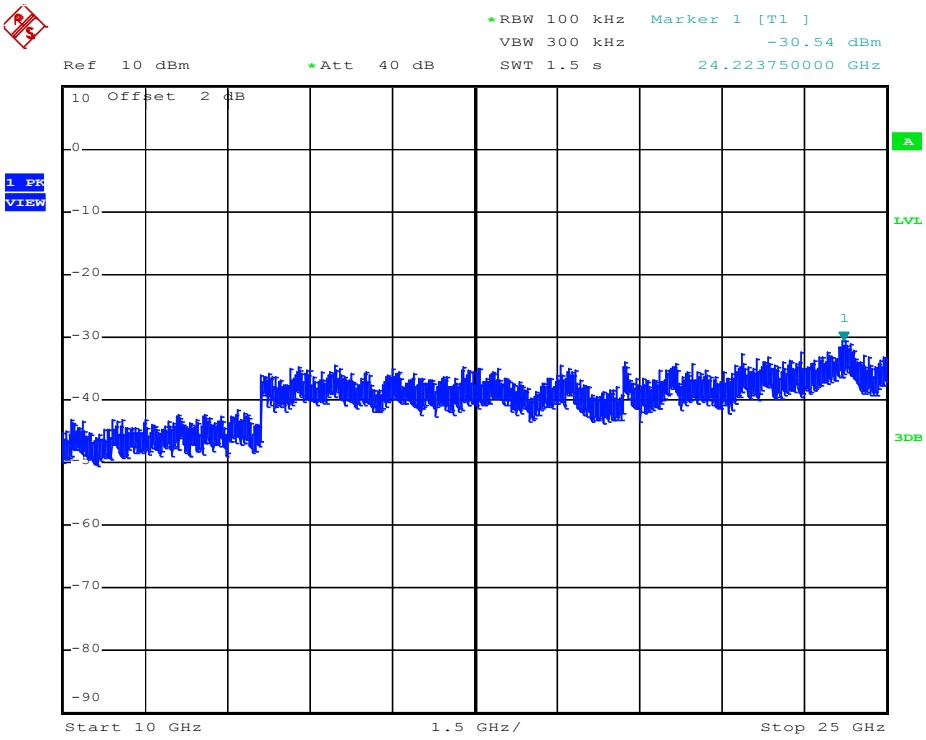
30 MHz to 2 GHz:



2 GHz to 10 GHz:



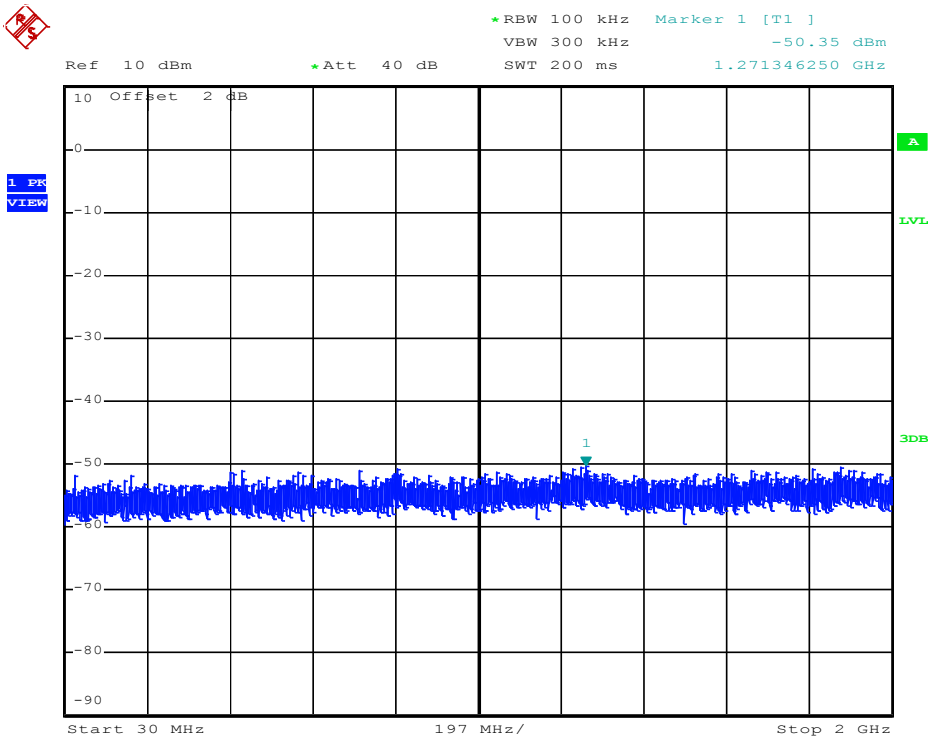
10 GHz to 25 GHz:



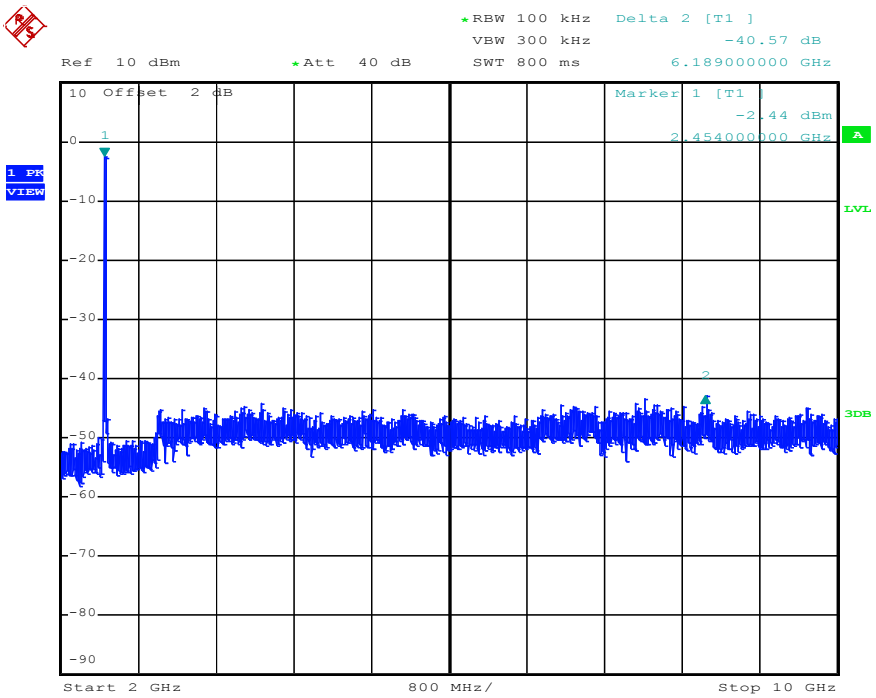
In any 100kHz bandwidth, the Conducted Spurious Emissions from 30 MHz to 25 GHz were greater than 20dB below the peak emission within the band that contains the highest level of the desired power.

Channel 11:2.462 GHz:

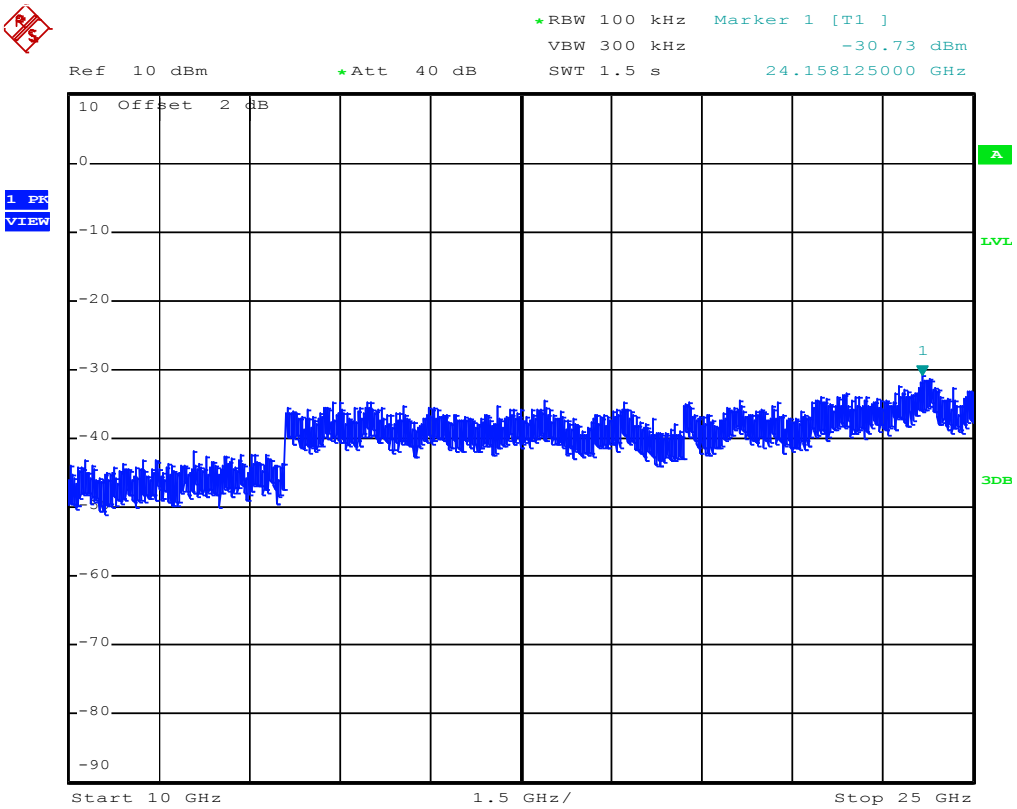
30 MHz to 2 GHz:



2 GHz to 10 GHz:



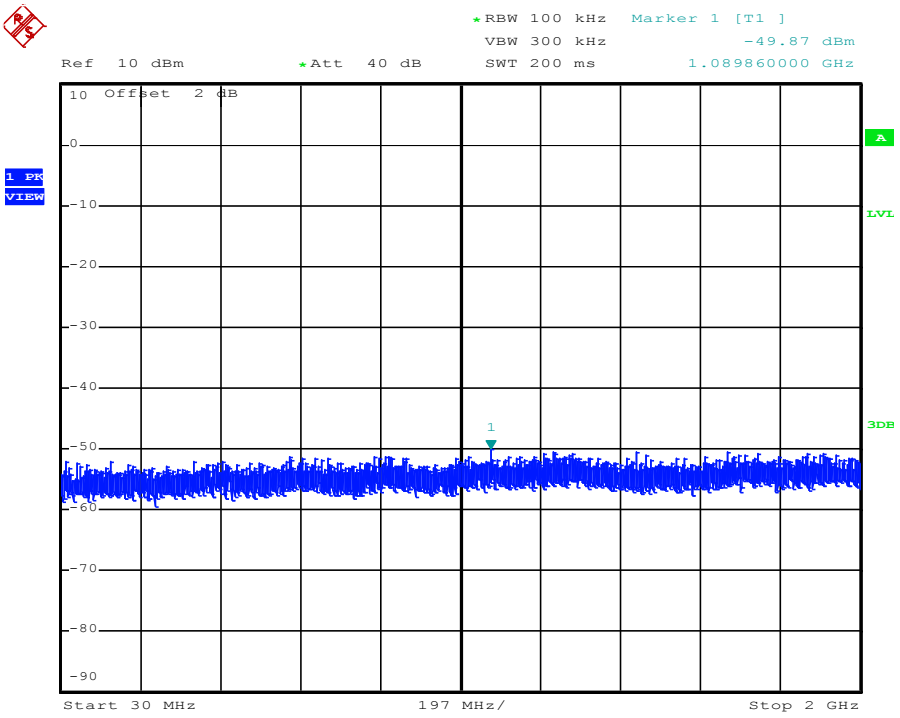
10 GHz to 25 GHz:



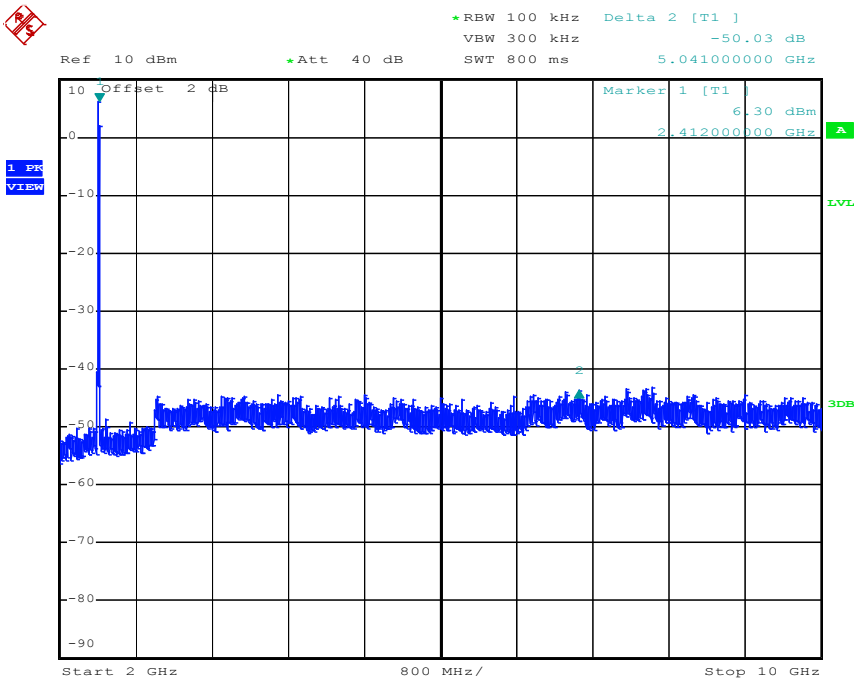
In any 100kHz bandwidth, the Conducted Spurious Emissions from 30 MHz to 25 GHz were greater than 20dB below the peak emission within the band that contains the highest level of the desired power.

802.11n(HT20) mode with 72.2Mbps data rate
Channel 1: 2.412GHz:

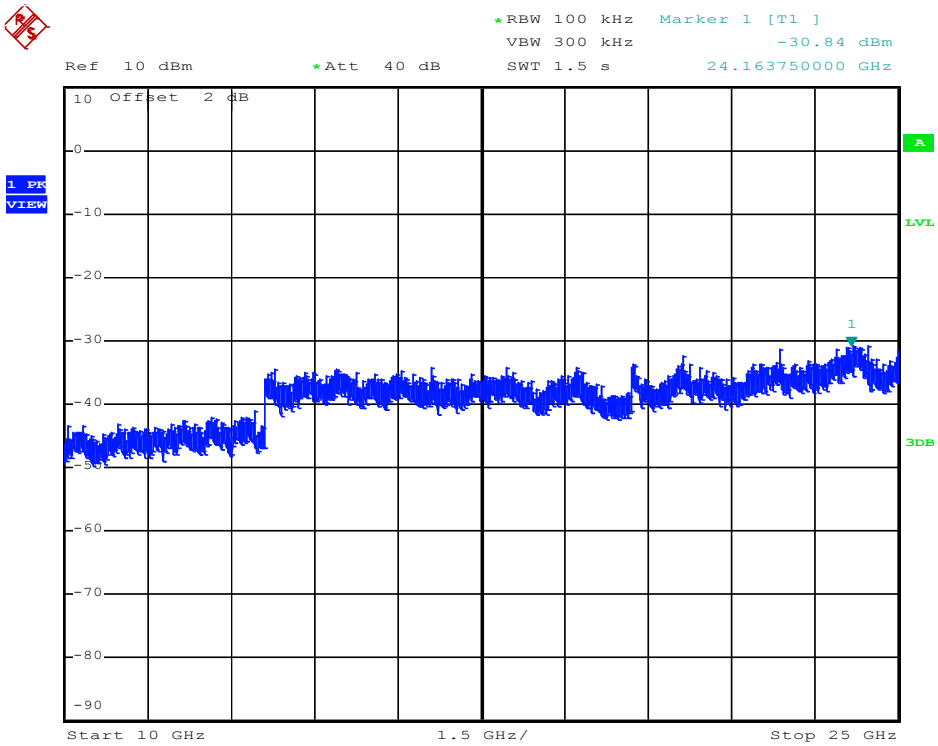
30 MHz to 2 GHz:



2 GHz to 10 GHz:



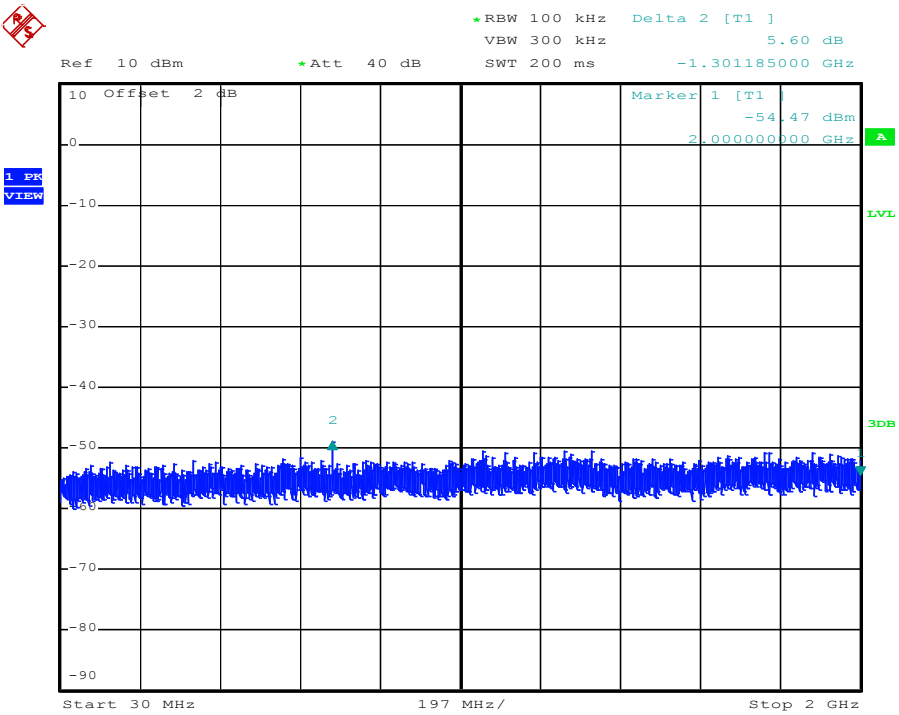
10 GHz to 25 GHz:



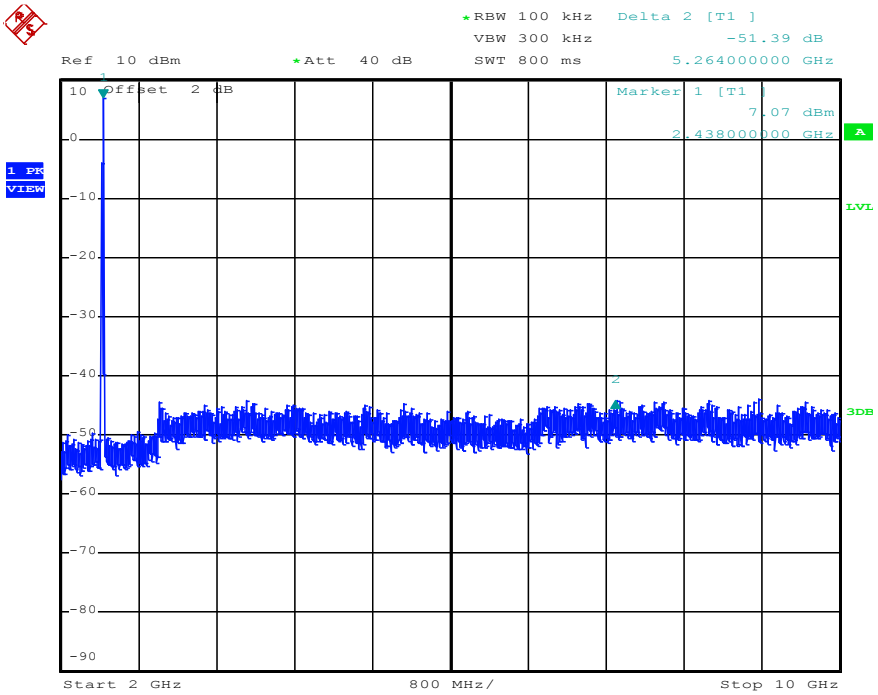
In any 100kHz bandwidth, the Conducted Spurious Emissions from 30 MHz to 25 GHz were greater than 20dB below the peak emission within the band that contains the highest level of the desired power.

Channel 6: 2.437GHz:

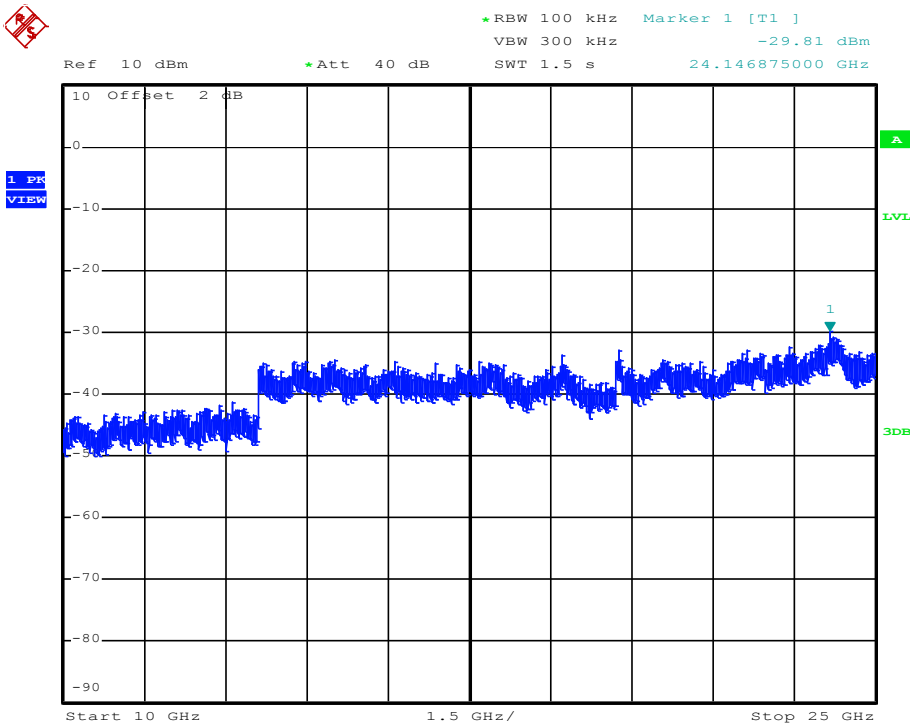
30 MHz to 2 GHz:



2 GHz to 10 GHz:



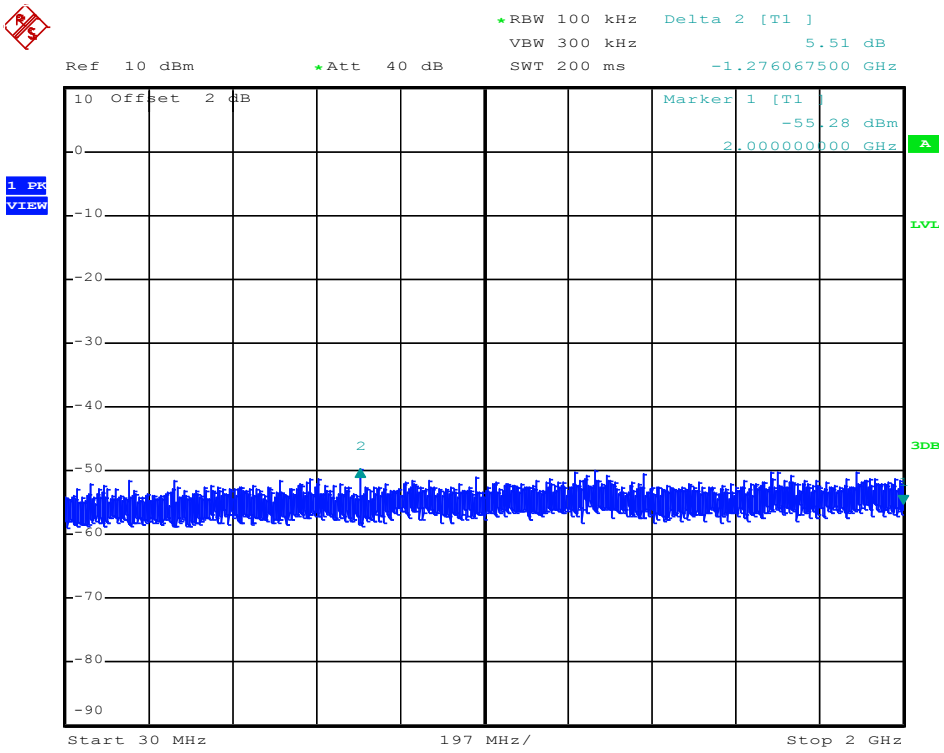
10 GHz to 25 GHz:



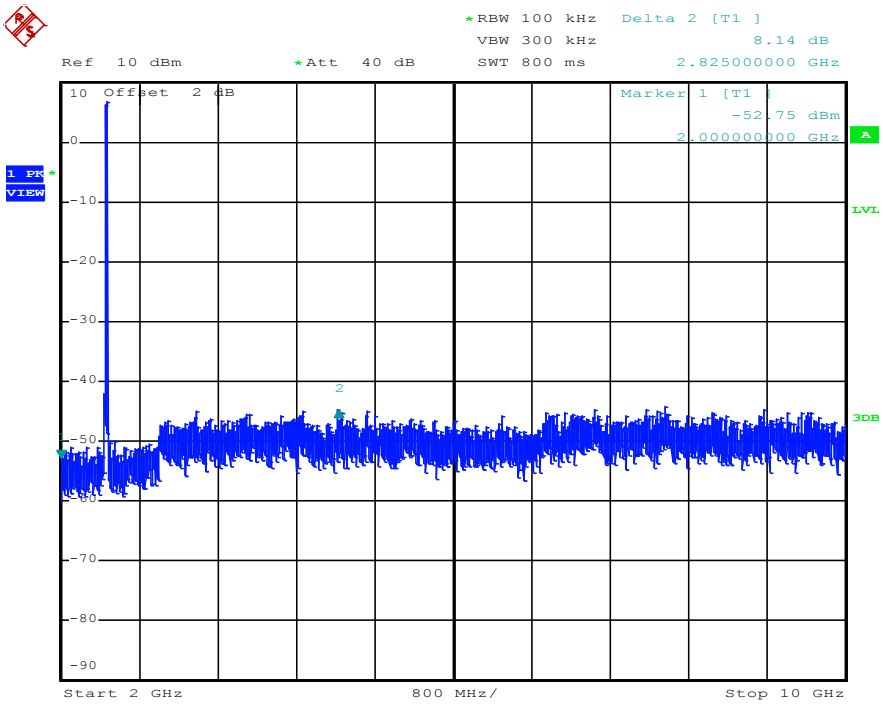
In any 100kHz bandwidth, the Conducted Spurious Emissions from 30 MHz to 25 GHz were greater than 20dB below the peak emission within the band that contains the highest level of the desired power.

Channel 11:2.462 GHz:

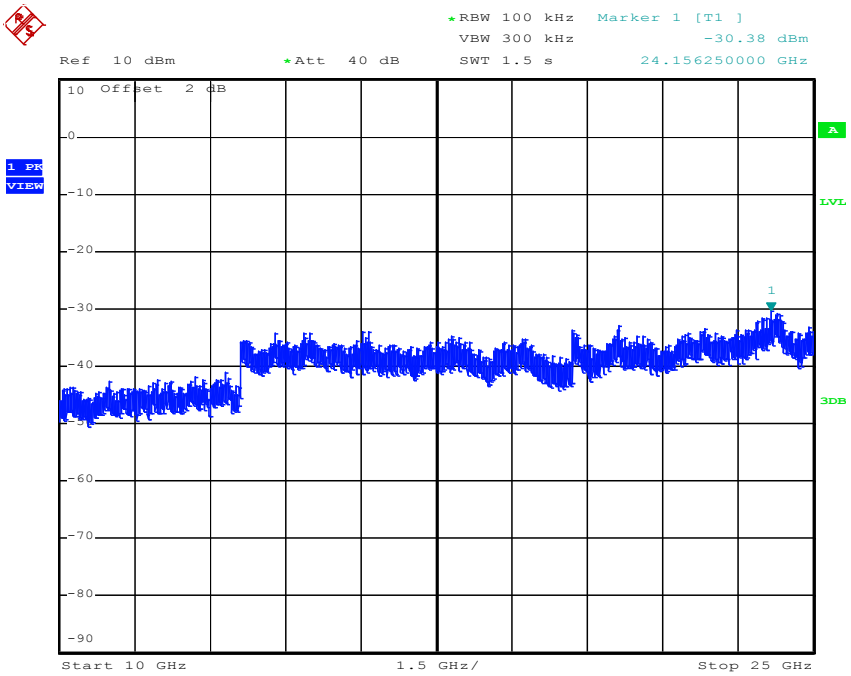
30 MHz to 2 GHz:



2 GHz to 10 GHz:



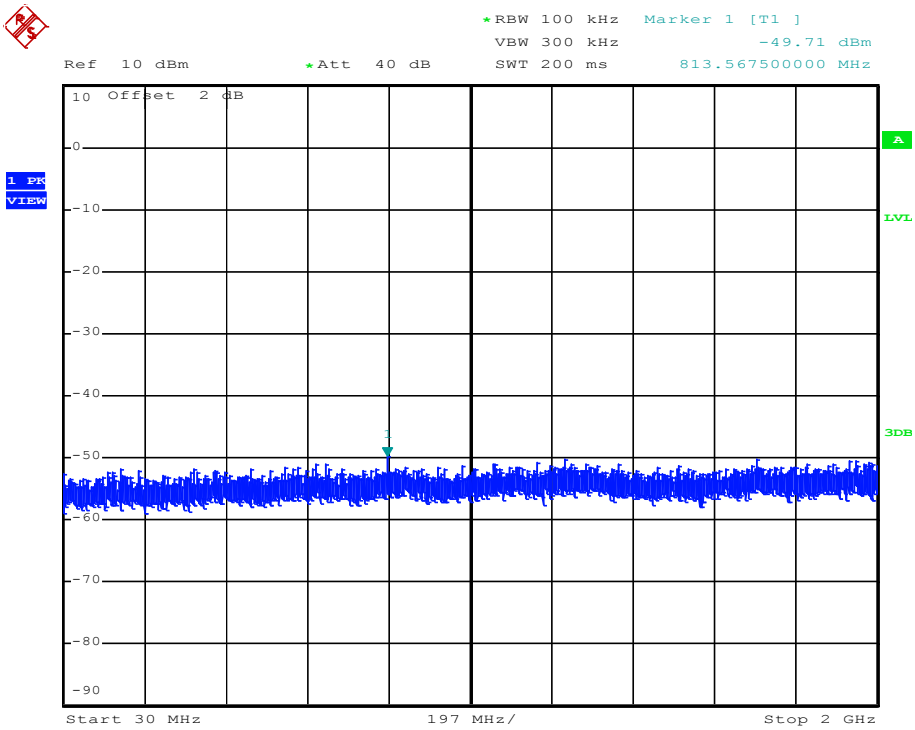
10 GHz to 25 GHz:



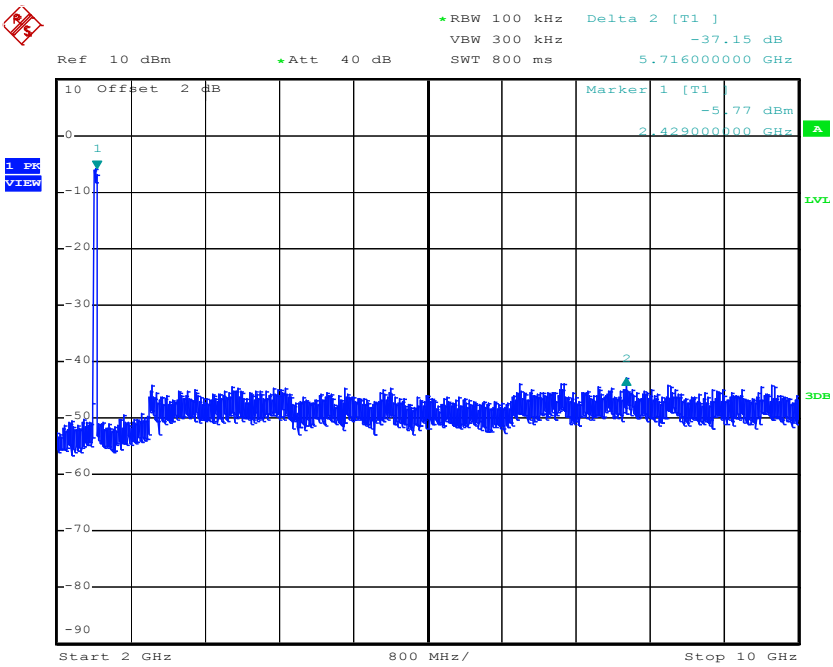
In any 100kHz bandwidth, the Conducted Spurious Emissions from 30 MHz to 25 GHz were greater than 20dB below the peak emission within the band that contains the highest level of the desired power.

802.11n(HT40) mode with 150Mbps data rate
Channel 3: 2.422GHz:

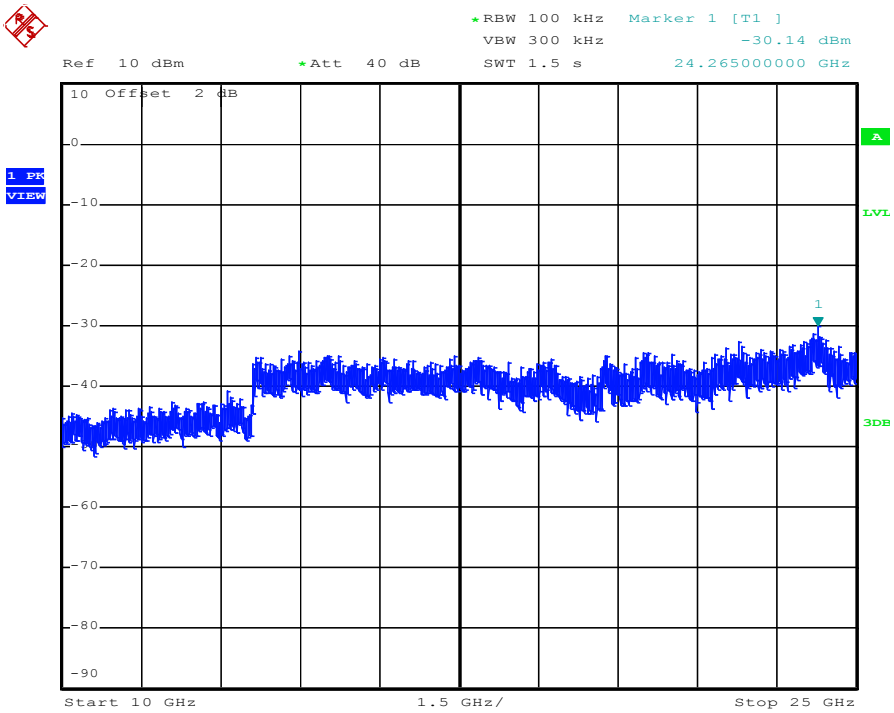
30 MHz to 2 GHz:



2 GHz to 10 GHz:



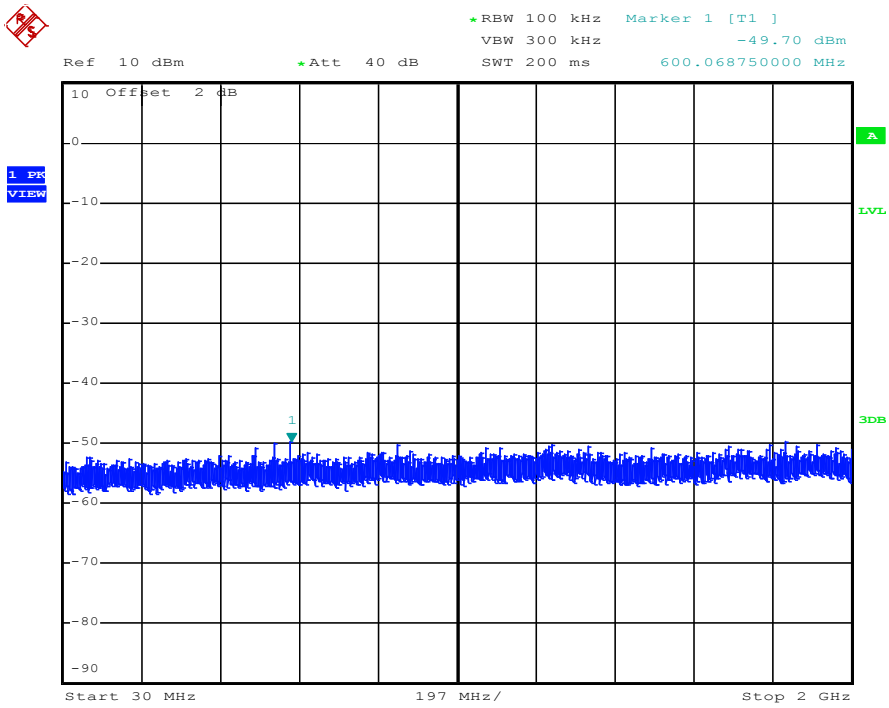
10 GHz to 25 GHz:



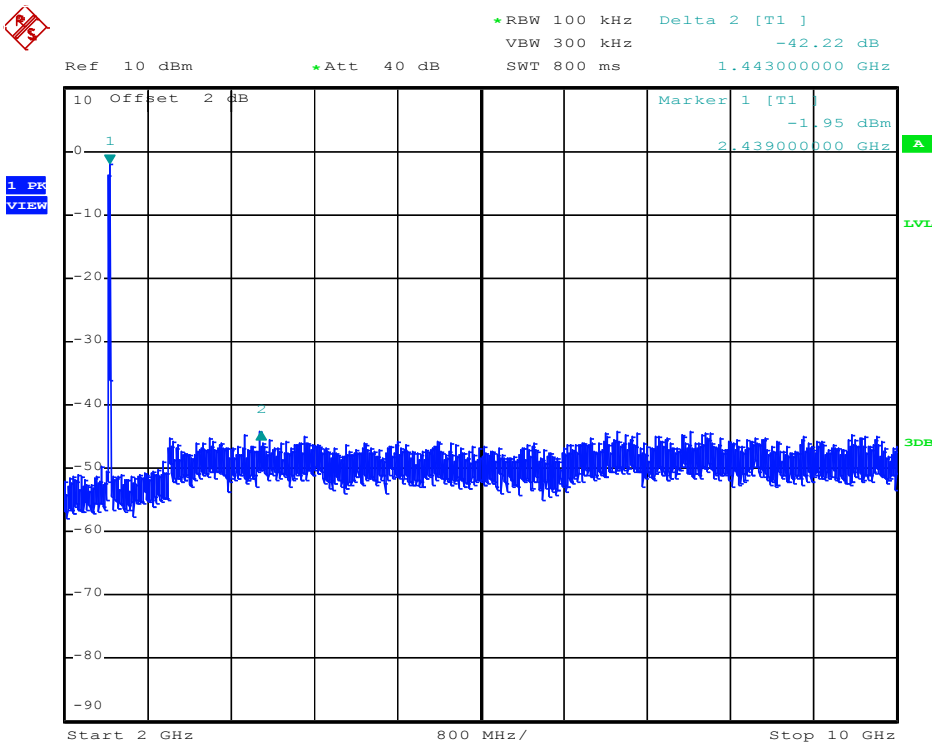
In any 100kHz bandwidth, the Conducted Spurious Emissions from 30 MHz to 25 GHz were greater than 20dB below the peak emission within the band that contains the highest level of the desired power.

Channel 6: 2.437GHz:

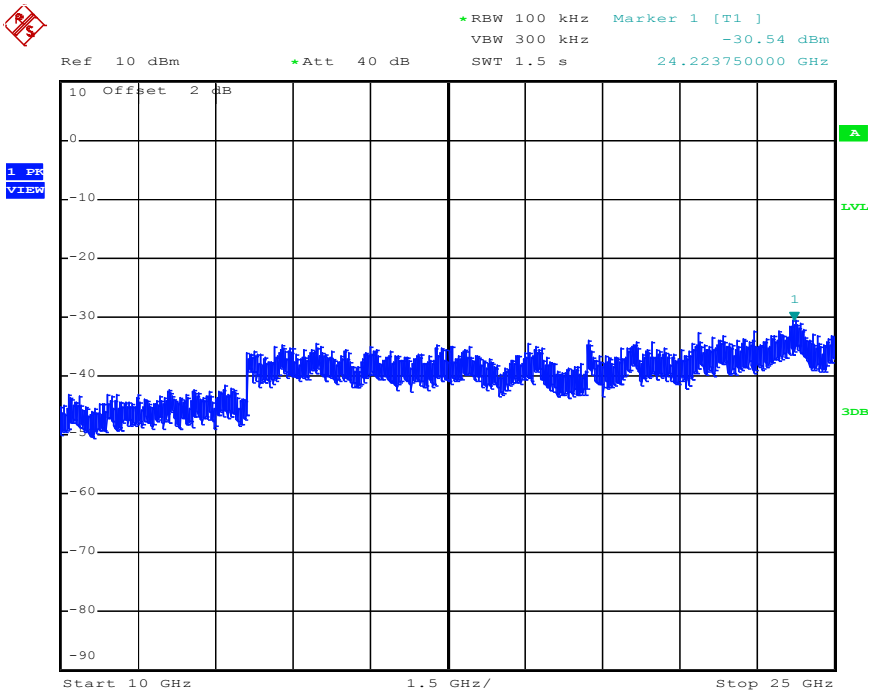
30 MHz to 2 GHz:



2 GHz to 10 GHz:



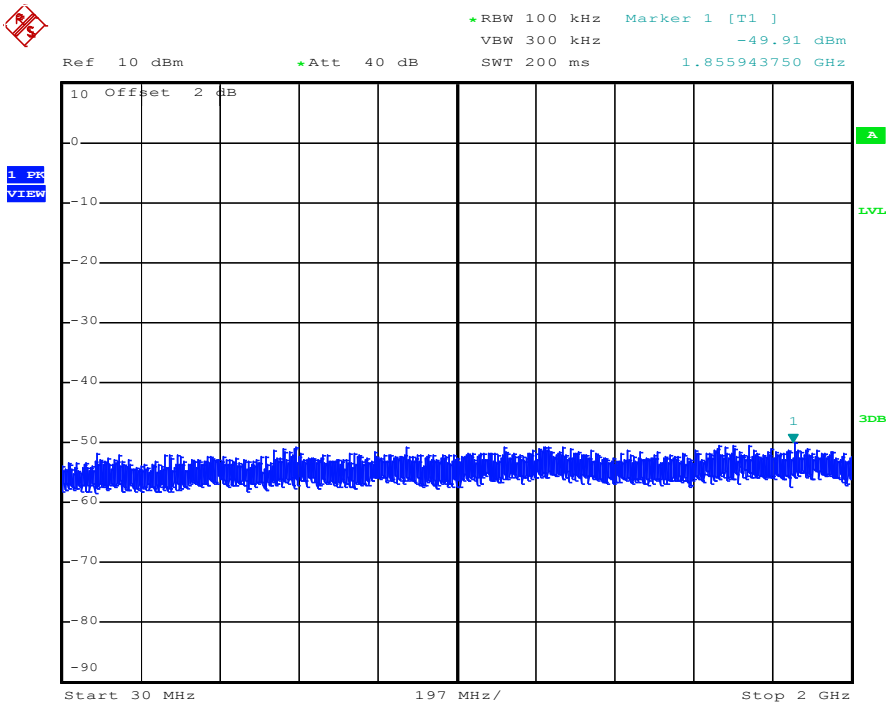
10 GHz to 25 GHz:



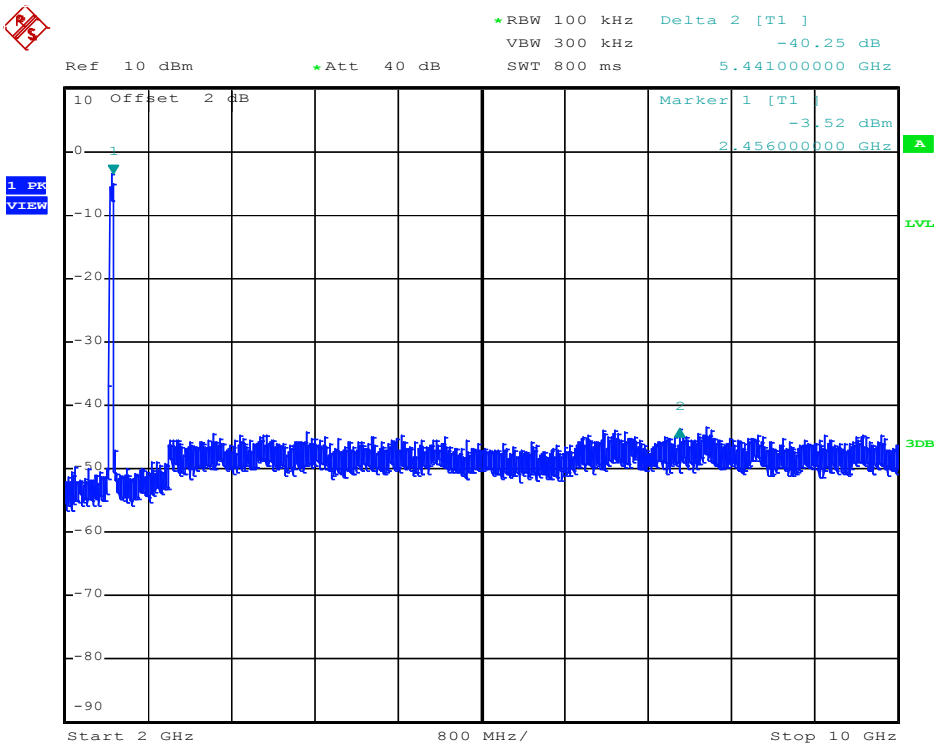
In any 100kHz bandwidth, the Conducted Spurious Emissions from 30 MHz to 25 GHz were greater than 20dB below the peak emission within the band that contains the highest level of the desired power.

Channel 9: 2.452 GHz:

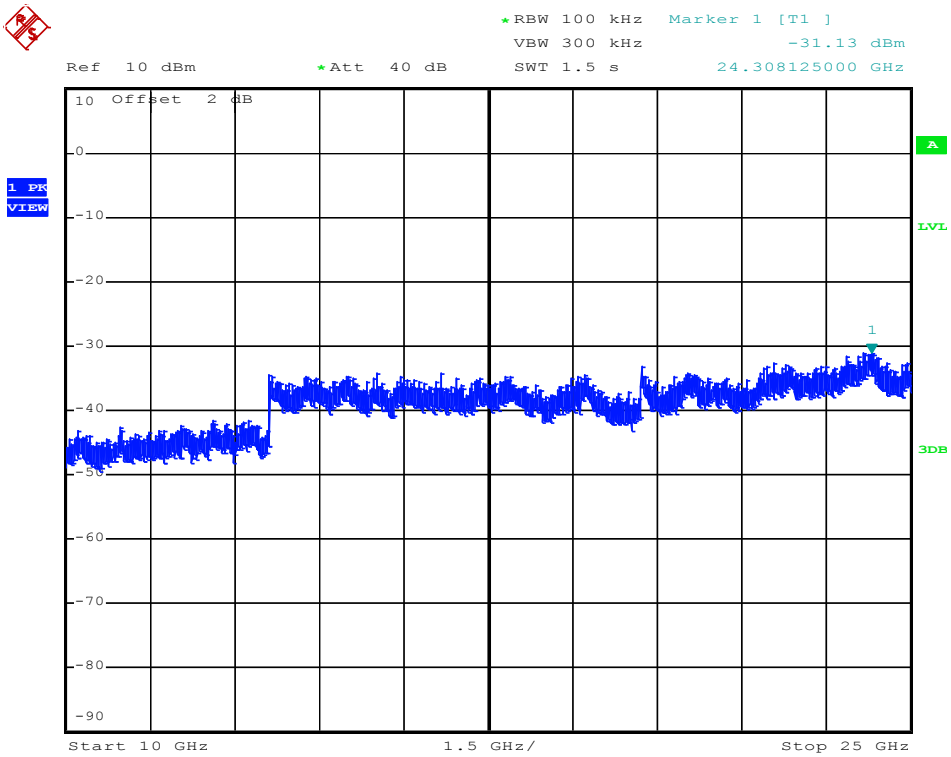
30 MHz to 2 GHz:



2 GHz to 10 GHz:



10 GHz to 25 GHz:



In any 100kHz bandwidth, the Conducted Spurious Emissions from 30 MHz to 25 GHz were greater than 20dB below the peak emission within the band that contains the highest level of the desired power.

4.6 Out of Band Radiated Emissions

For out of band radiated emissions into Non-Restricted Frequency Bands were performed at a 3m separation distance to determine whether these emissions complied with the 20dB attenuation requirement.

[×] Not required, since all emissions are more than 20dB below fundamental
[ ] See attached data sheet

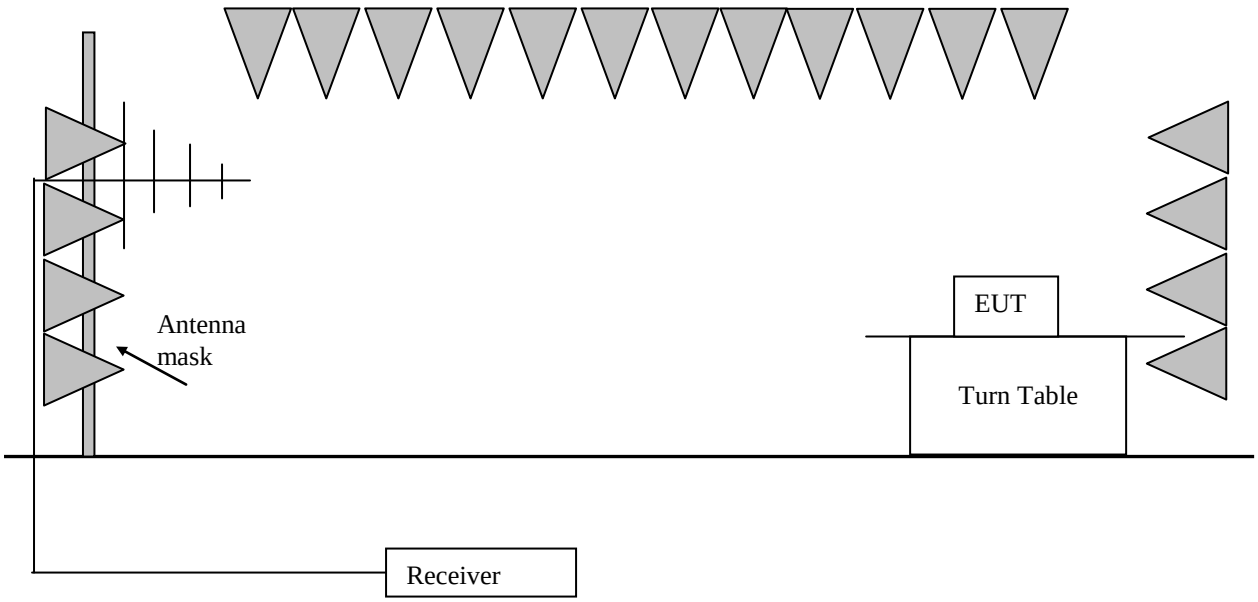
4.7 Radiated Emissions in Restricted Bands

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 Peak and Quasi-Peak value: RBW = 1 MHz for f ≥ 1 GHz, 200 Hz for 9 kHz to 150 kHz 9 kHz for 150 kHz to 30 MHz 120 kHz for 30 MHz to 1GHz VBW ≥ RBW Sweep = auto Detector function = peak for f ≥ 1 GHz, QP for f < 1 GHz Trace = max hold For AV value: RBW = 1 MHz for f ≥ 1 GHz, 100 kHz for f < 1 GHz VBW=10 Hz Sweep = auto Trace = max hold

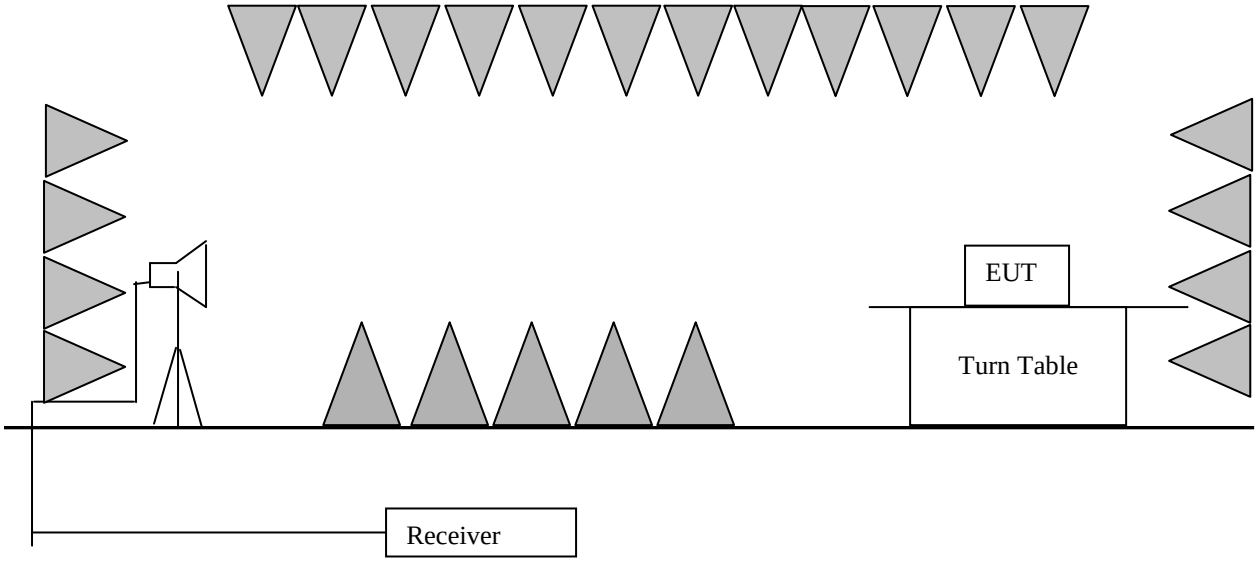
Section 15.205 Restricted bands of operation.
(a) Except as shown in paragraph (d) of this section. Only spurious emissions are permitted in any of the frequency bands listed below:

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 - 156.52525	2483.5 - 2500	17.7 - 21.4
8.37625 - 8.38675	156.7 - 156.9	2655 - 2900	22.01 - 23.12
8.41425 - 8.41475	162.0125 - 167.17	3260 - 3267	23.6 - 24.0
12.29 - 12.293	167.72 - 173.2	3332 - 3339	31.2 - 31.8
12.51975 - 12.52025	240 - 285	3345.8 - 3358	36.43 - 36.5
12.57675 - 12.57725	322 - 335.4	3600 - 4400	
13.36 - 13.41			

Test Configuration:
1) 30 MHz to 1 GHz emissions:



2) 1 GHz to 40 GHz emissions:



Test Procedure:

Test site with RF absorbing material covering the ground plane that met the site validation criterion called out in CISPR 16-1-4:2007 was used to perform radiated emission test above 1 GHz.

The receiver was scanned from 9 kHz to 25 GHz. 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.

802.11b mode with 11Mbps data rate

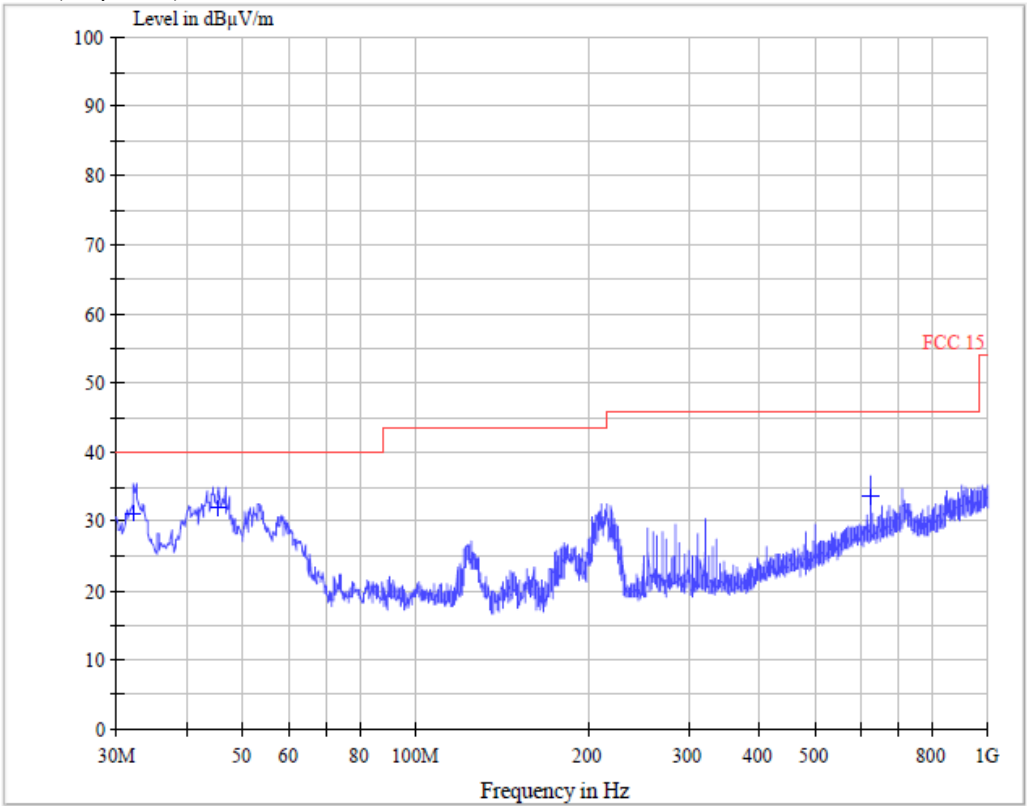
9 kHz~30 MHz Field Strength of Unwanted Emissions for Quasi-Peak Measurement
The measurements with active loop antenna were greater than 20dB below the limit, so the test data were not recorded in the test report.

Test at Channel 1 (2.412 GHz) in transmitting status.

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

Vertical:

Level (dBµV/m)

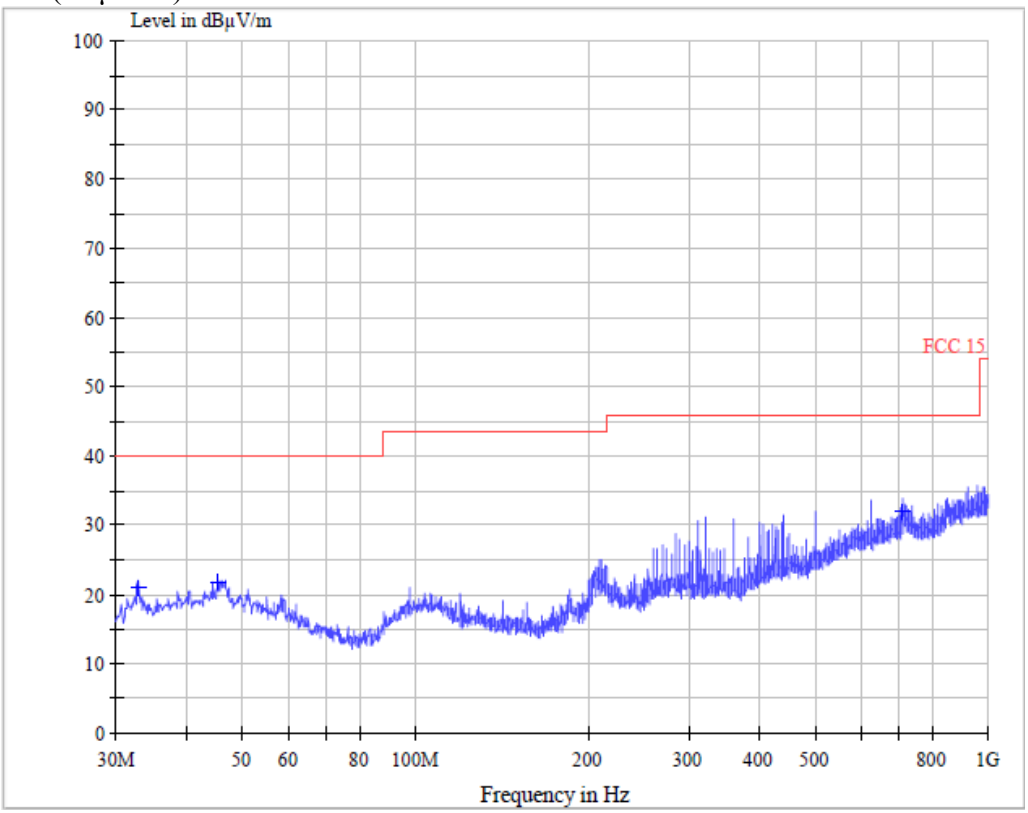


Quasi-peak measurement

Frequency (MHz)	QuasiPeak (dBµV/m)	Bandwidth (kHz)	Pol	Corr. (dB)	Margin - QPK (dB)	Limit - QPK (dBµV/m)
32.200000	31.1	120.000	V	12.3	8.9	40.0
45.280000	32.0	120.000	V	14.0	8.0	40.0
625.080000	33.6	120.000	V	22.7	12.5	46.0

Horizontal:

Level (dBµV/m)



Quasi-peak measurement

Frequency (MHz)	QuasiPeak (dBµV/m)	Bandwidth (kHz)	Pol	Corr. (dB)	Margin - QPK (dB)	Limit - QPK (dBµV/m)
32.800000	20.9	120.000	H	12.4	19.1	40.0
45.280000	21.9	120.000	H	14.0	18.1	40.0
709.600000	32.0	120.000	H	23.6	14.0	46.0

1~25 GHz Radiated Emissions.

PK Measurement:

Frequency (MHz)	PK Reading Level (dBμV)	Correction factors (dB/m)	PK Emission Level (dBμV/m)	PK Limit (dBμV/m)	Antenna polarization
2387	39.20	4.79	43.99	74	V
2390	36.45	4.78	41.23	74	V
4825	39.49	15.5	54.99	74	V
2387	36.84	4.79	41.63	74	H
2390	34.57	4.78	39.35	74	H
4824	35.94	15.5	51.44	74	H

AV Measurement:

Frequency (MHz)	AV Reading Level (dBμV)	Correction factors (dB/m)	AV Emission Level (dBμV/m)	AV Limit (dBμV/m)	Antenna polarization
2387	-	-	-	54	V
2390	-	-	-	54	V
4825	32.76	15.5	48.26	54	V
2387	-	-	-	54	H
2390	-	-	-	54	H
4824	-	-	-	54	H

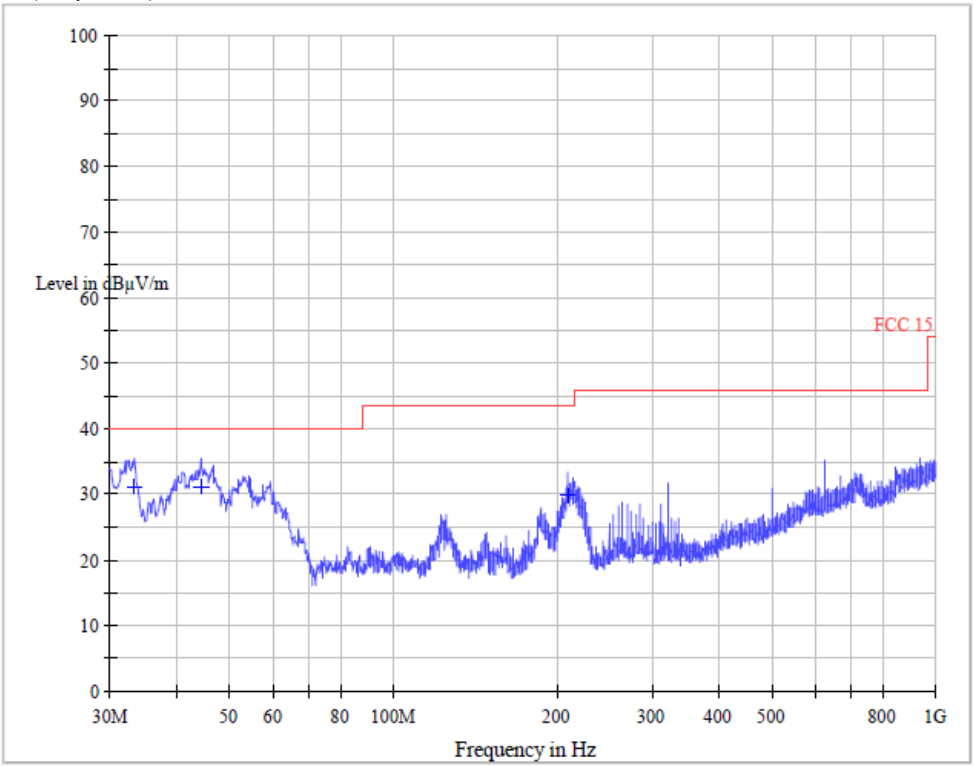
Remark: When Peak emission level was below AV limit, the AV emission level did not be recorded.

Test at Channel 6 (2.437 GHz) in transmitting status

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

Vertical:

Level (dBµV/m)

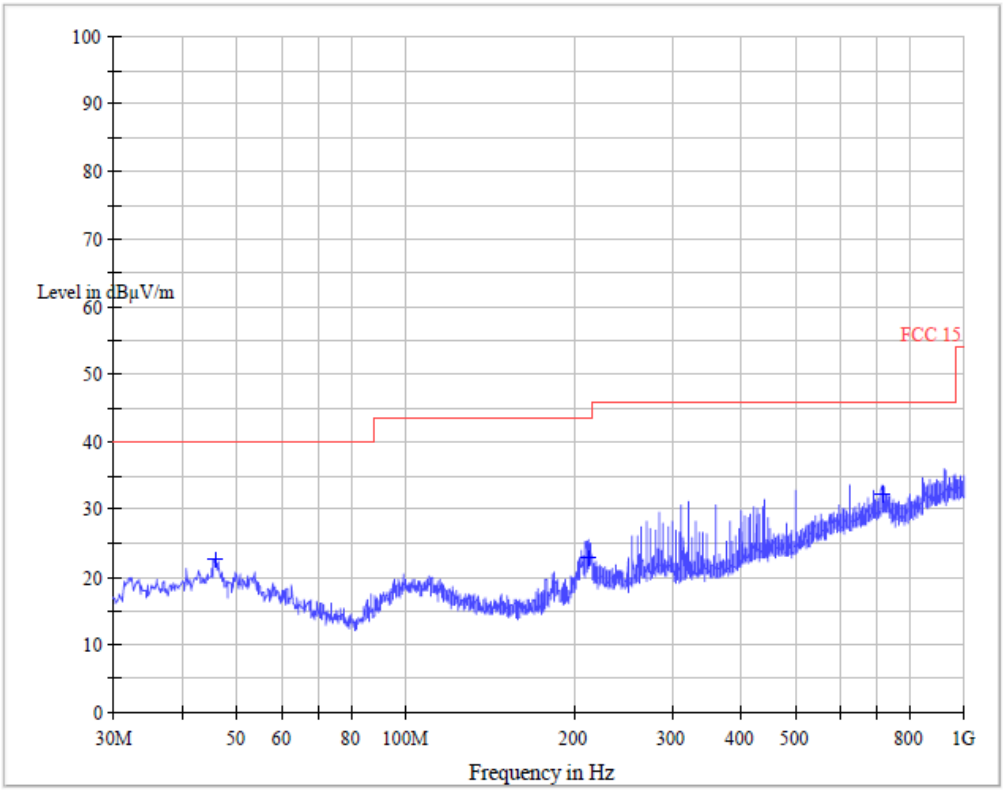


Quasi-peak measurement

Frequency (MHz)	QuasiPeak (dBµV/m)	Bandwidth (kHz)	Pol	Corr. (dB)	Margin - QPK (dB)	Limit - QPK (dBµV/m)
33.400000	31.2	120.000	V	12.6	8.8	40.0
44.120000	31.3	120.000	V	13.9	8.7	40.0
209.880000	29.9	120.000	V	11.2	13.6	43.5

Horizontal:

Level (dBµV/m)



Quasi-peak measurement

Frequency (MHz)	QuasiPeak (dBµV/m)	Bandwidth (kHz)	Pol	Corr. (dB)	Margin - QPK (dB)	Limit - QPK (dBµV/m)
45.560000	22.7	120.000	H	14.0	17.3	40.0
212.520000	22.9	120.000	H	11.4	20.6	43.5
711.640000	32.2	120.000	H	23.6	13.8	46.0

1~25 GHz Radiated Emissions.

PK Measurement:

Frequency (MHz)	PK Reading Level (dBμV)	Correction factors (dB/m)	PK Emission Level (dBμV/m)	PK Limit (dBμV/m)	Antenna polarization
4876	39.28	15.63	54.91	74	V
7312	34.21	19.07	53.28	74	V
4874	35.72	15.62	51.34	74	H
7311	35.05	19.07	54.12	74	H

AV Measurement:

Frequency (MHz)	AV Reading Level (dBμV)	Correction factors (dB/m)	AV Emission Level (dBμV/m)	AV Limit (dBμV/m)	Antenna polarization
4876	35.99	15.63	51.62	54	V
7312	-	-	-	54	V
4874	-	-	-	54	H
7311	31.27	19.07	50.34	54	H

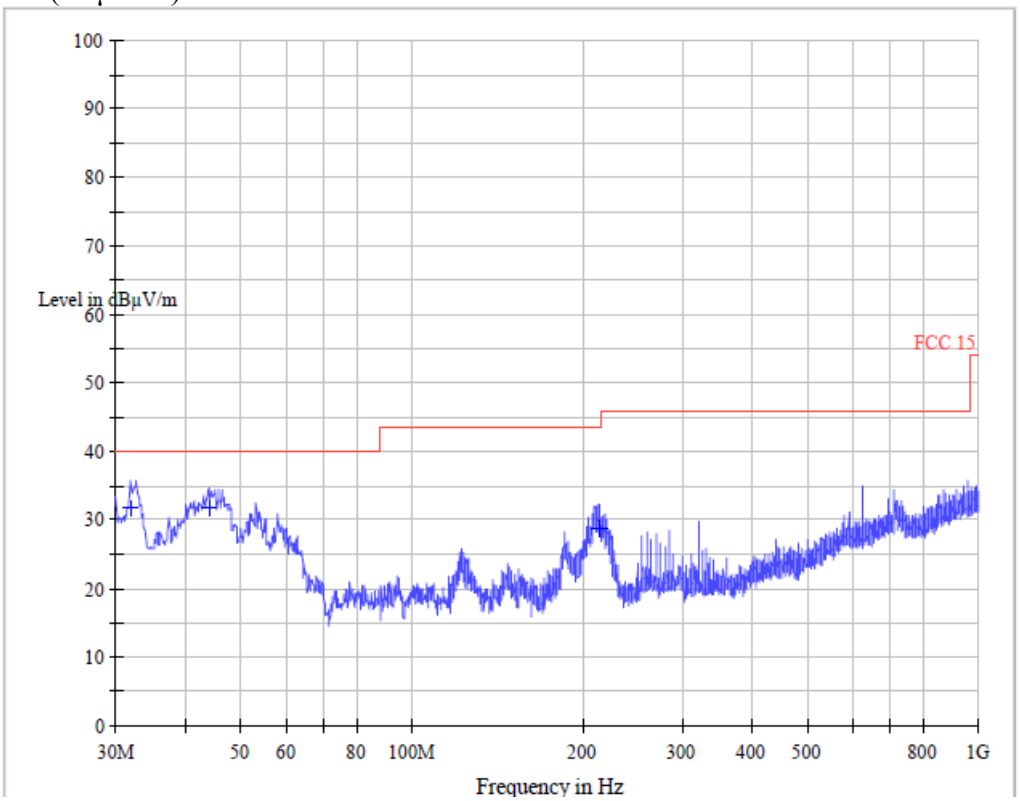
Remark: When Peak emission level was below AV limit, the AV emission level did not be recorded.

Test at Channel 11 (2.462 GHz) in transmitting status

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

Vertical:

Level (dBµV/m)

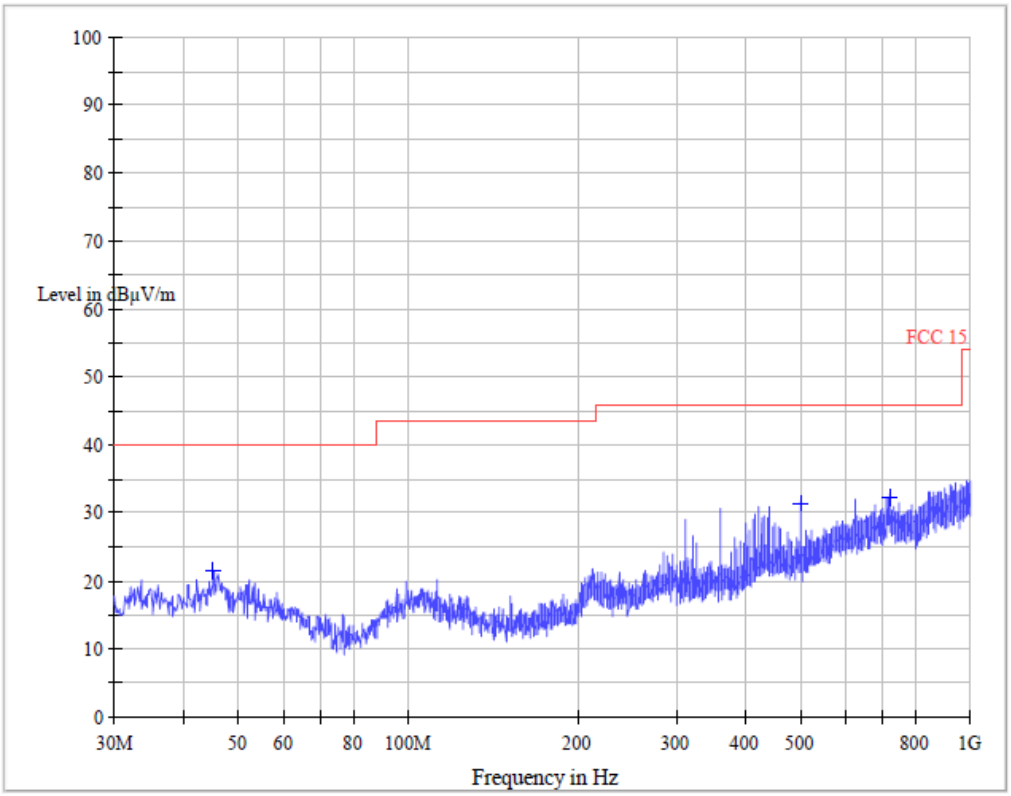


Quasi-peak measurement

Frequency (MHz)	QuasiPeak (dBµV/m)	Bandwidth (kHz)	Pol	Corr. (dB)	Margin - QPK (dB)	Limit - QPK (dBµV/m)
31.920000	31.8	120.000	V	12.2	8.2	40.0
43.800000	31.8	120.000	V	13.8	8.2	40.0
214.760000	28.7	120.000	V	11.6	14.8	43.5

Horizontal:

Level (dBµV/m)



Quasi-peak measurement

Frequency (MHz)	QuasiPeak (dBµV/m)	Bandwidth (kHz)	Pol	Corr. (dB)	Margin - QPK (dB)	Limit - QPK (dBµV/m)
45.000000	21.5	120.000	H	13.9	18.5	40.0
500.000000	31.4	120.000	H	20.1	14.6	46.0
719.720000	32.4	120.000	H	23.7	13.6	46.0

1~25 GHz Radiated Emissions. Peak & Average Measurement

PK Measurement:

Frequency (MHz)	PK Reading Level (dBμV)	Correction factors (dB/m)	PK Emission Level (dBμV/m)	PK Limit (dBμV/m)	Antenna polarization
2483.5	38.52	4.08	42.60	74	V
2494.2	40.83	4.01	44.84	74	V
4927.0	41.38	15.74	57.12	74	V
2483.5	39.11	4.08	43.19	74	H
2487.8	39.18	4.05	43.23	74	H
4924.0	32.34	15.72	48.06	74	H

AV Measurement:

Frequency (MHz)	AV Reading Level (dBμV)	Correction factors (dB/m)	AV Emission Level (dBμV/m)	AV Limit (dBμV/m)	Antenna polarization
2483.5	-	-	-	54	V
2494.2	-	-	-	54	V
4927.0	37.90	15.74	53.64	54	V
2483.5	-	-	-	54	H
2487.8	-	-	-	54	H
4924.0	-	-	-	54	H

Remark: When Peak emission level was below AV limit, the AV emission level did not be recorded.

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.

802.11g mode with 54Mbps data rate

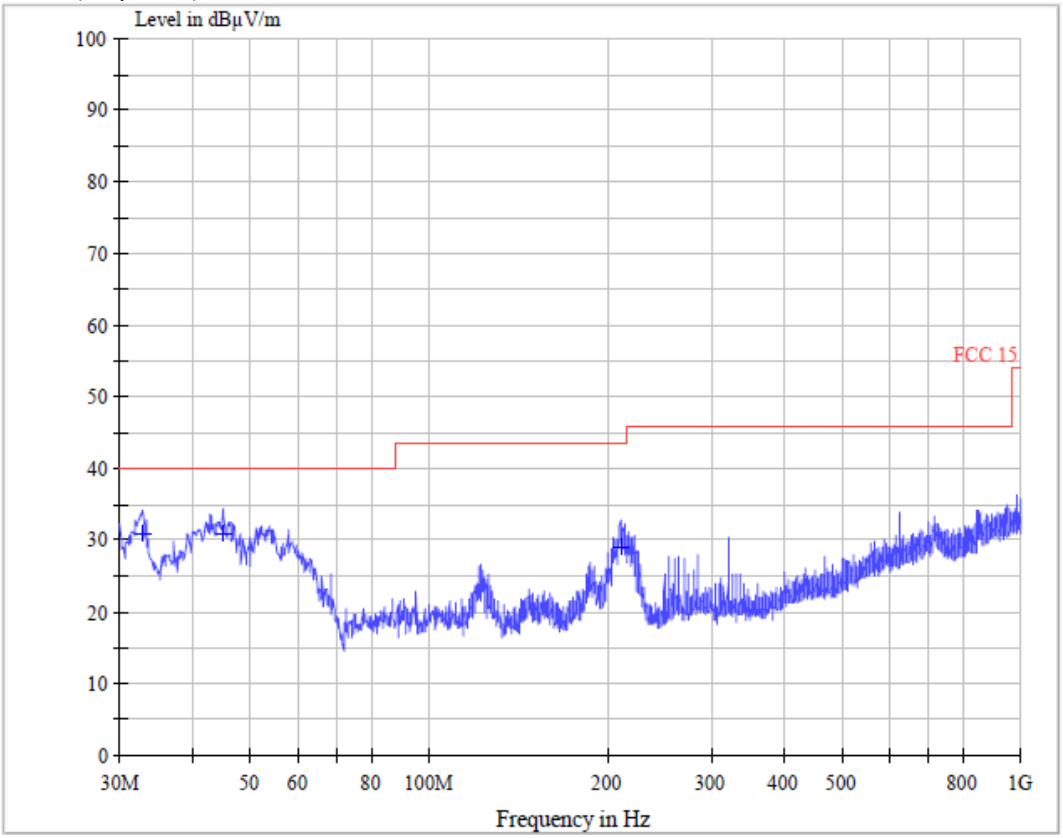
9 kHz~30 MHz Field Strength of Unwanted Emissions. Quasi-Peak Measurement
The measurements with active loop antenna were greater than 20dB below the limit, so the test data were not recorded in the test report.

Test at Channel 1 (2.412 GHz) in transmitting status

30 MHz~1 Radiated Emissions .Quasi-Peak Measurement

Vertical:

Level (dBµV/m)

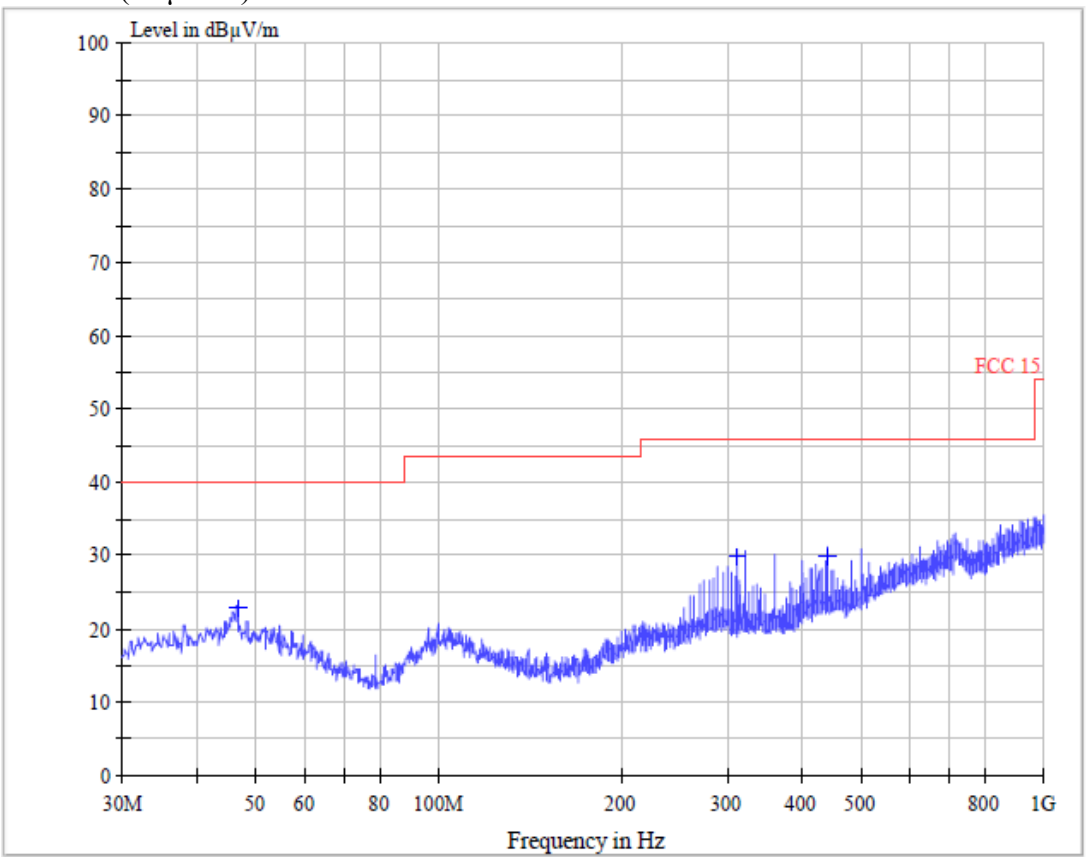


Quasi-peak measurement

Frequency (MHz)	QuasiPeak (dBµV/m)	Bandwidth (kHz)	Pol	Corr. (dB)	Margin - QPK (dB)	Limit - QPK (dBµV/m)
32.800000	31.0	120.000	V	12.4	9.0	40.0
44.840000	31.0	120.000	V	13.9	9.0	40.0
210.480000	28.9	120.000	V	11.3	14.6	43.5

Horizontal:

Level (dBµV/m)



Quasi-peak measurement

Frequency (MHz)	QuasiPeak (dBµV/m)	Bandwidth (kHz)	Pol	Corr. (dB)	Margin - QPK (dB)	Limit - QPK (dBµV/m)
46.480000	22.8	120.000	H	13.9	17.2	40.0
312.480000	29.9	120.000	H	16.3	16.1	46.0
440.040000	29.9	120.000	H	18.6	16.1	46.0

1~25 GHz Radiated Emissions. Peak & Average Measurement

PK Measurement:

Frequency (MHz)	PK Reading Level (dBμV)	Correction factors (dB/m)	PK Emission Level (dBμV/m)	PK Limit (dBμV/m)	Antenna polarization
2385	43.0	4.8	47.8	74	V
2390	42.7	4.8	47.5	74	V
4824	34.9	15.5	50.4	74	V
2385	39.2	4.8	44.0	74	H
2390	39.0	4.8	43.8	74	H
4824	34.6	15.5	50.1	74	H

AV Measurement:

Frequency (MHz)	AV Reading Level (dBμV)	Correction factors (dB/m)	AV Emission Level (dBμV/m)	AV Limit (dBμV/m)	Antenna polarization
2385	-	-	-	54	V
2390	-	-	-	54	V
4824	-	-	-	54	V
2385	-	-	-	54	H
2390	-	-	-	54	H
4824	-	-	-	54	H

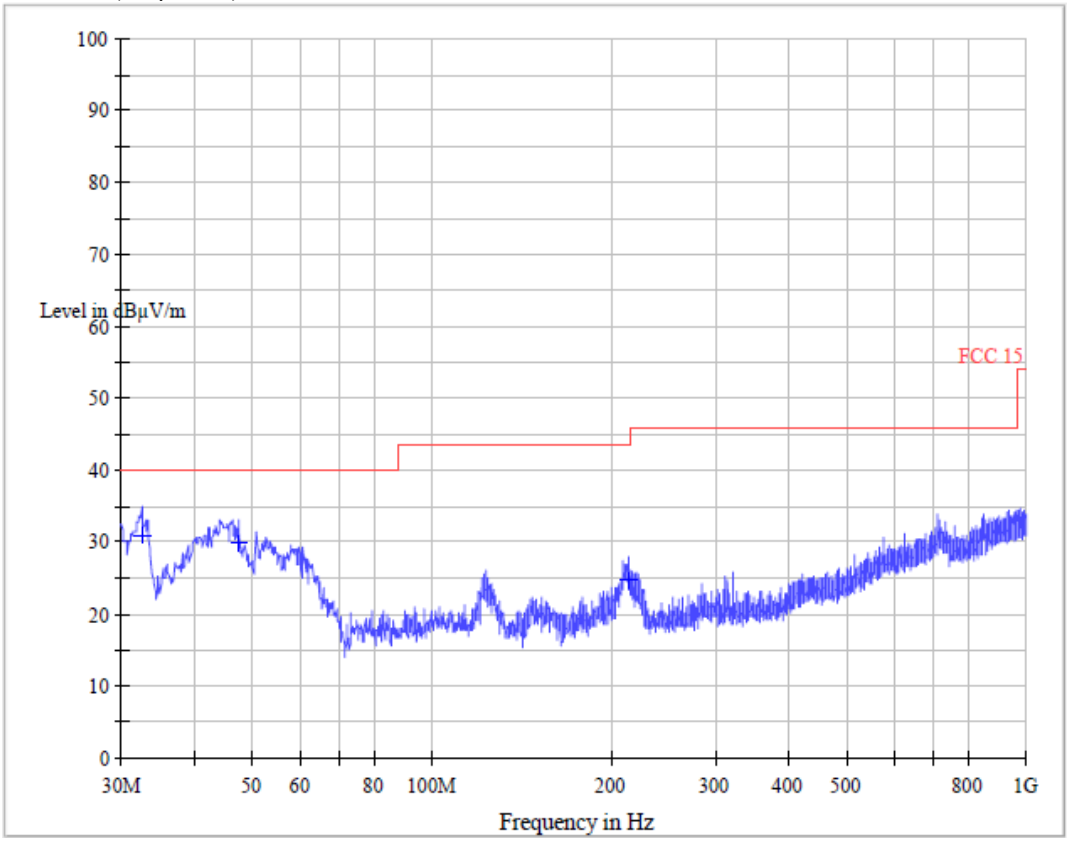
Remark: When Peak emission level was below AV limit, the AV emission level did not be recorded.

Test at Channel 6 (2.437GHz) in transmitting status

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

Vertical:

Level (dBµV/m)

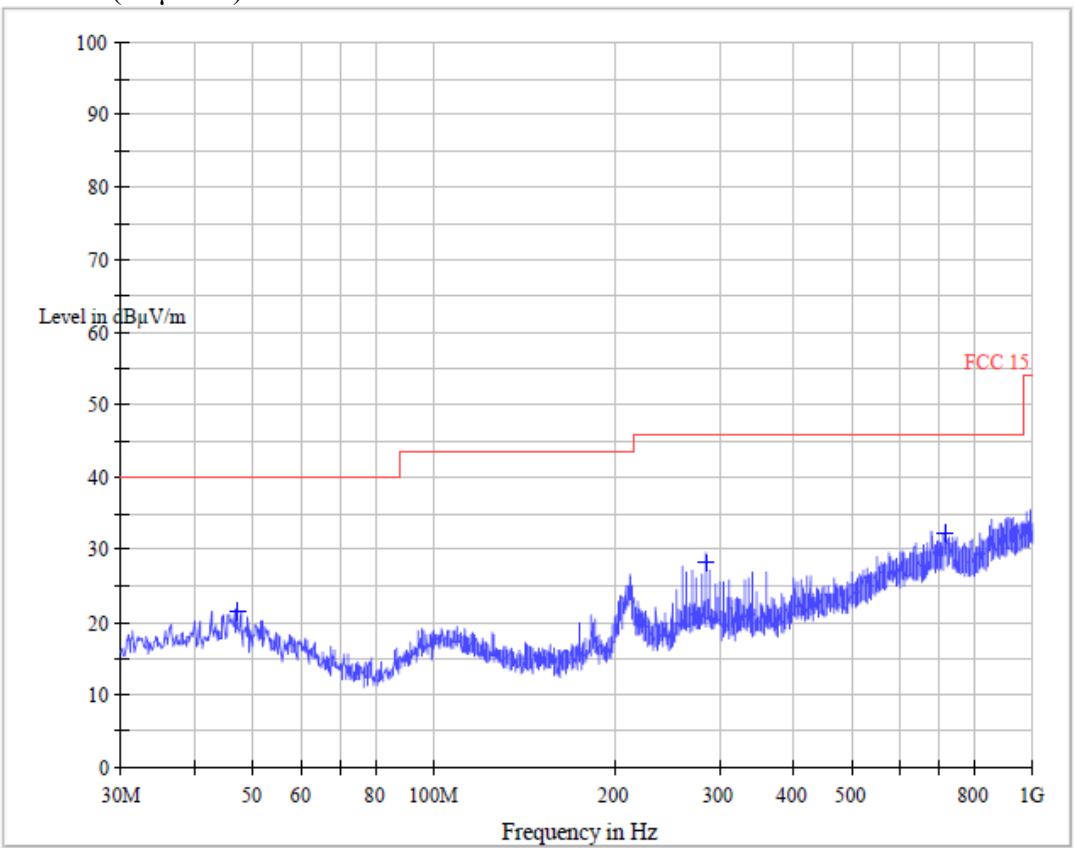


Quasi-peak measurement

Frequency (MHz)	QuasiPeak (dBµV/m)	Bandwidth (kHz)	Pol	Corr. (dB)	Margin - QPK (dB)	Limit - QPK (dBµV/m)
32.480000	30.9	120.000	V	12.3	9.1	40.0
47.360000	29.9	120.000	V	13.7	10.1	40.0
214.440000	24.6	120.000	V	11.6	18.9	43.5

Horizontal:

Level (dBµV/m)



Quasi-peak measurement

Frequency (MHz)	QuasiPeak (dBµV/m)	Bandwidth (kHz)	Pol	Corr. (dB)	Margin - QPK (dB)	Limit - QPK (dBµV/m)
46.920000	21.4	120.000	H	13.8	18.6	40.0
285.000000	28.3	120.000	H	15.4	17.7	46.0
714.880000	32.2	120.000	H	23.6	13.8	46.0

1~25 GHz Radiated Emissions. Peak & Average Measurement

PK Measurement:

Frequency (MHz)	PK Reading Level (dBμV)	Correction factors (dB/m)	PK Emission Level (dBμV/m)	PK Limit (dBμV/m)	Antenna polarization
4874	35.8	15.6	51.4	74	V
4874	35.0	15.6	50.6	74	H

AV Measurement:

Frequency (MHz)	AV Reading Level (dBμV)	Correction factors (dB/m)	AV Emission Level (dBμV/m)	AV Limit (dBμV/m)	Antenna polarization
4874	-	-	-	54	V
4874	-	-	-	54	H

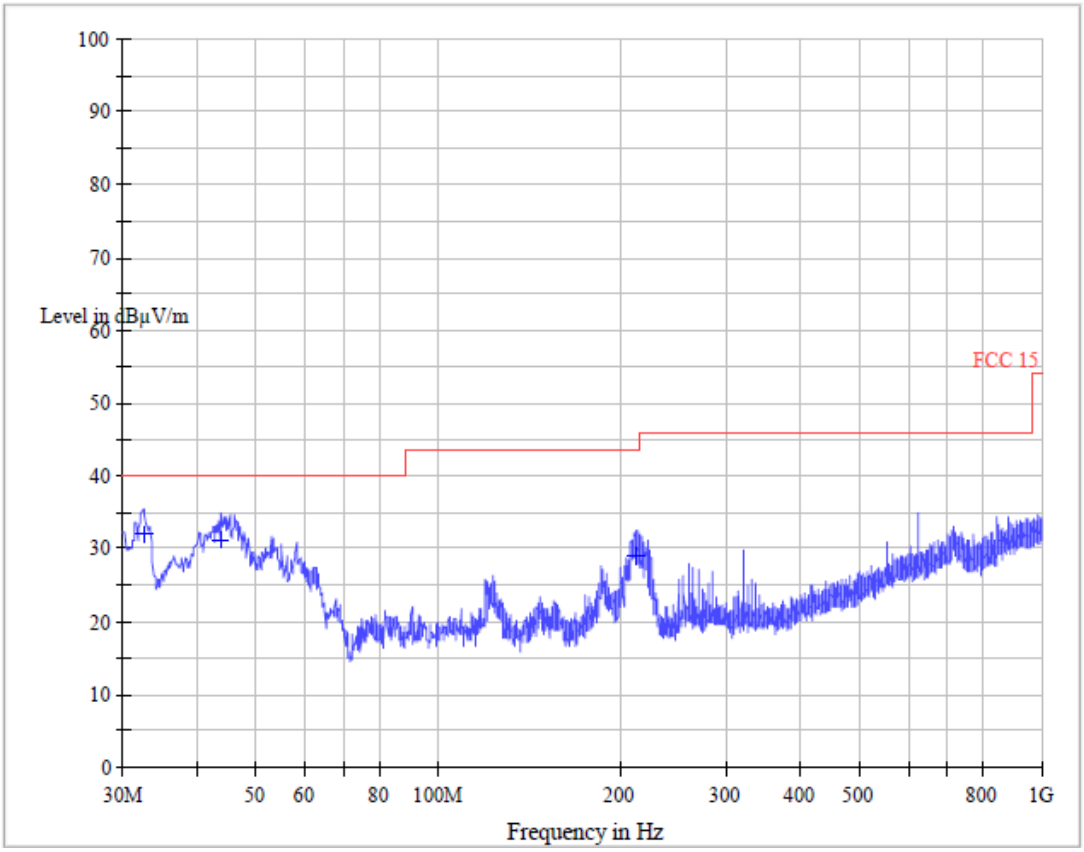
Remark: When Peak emission level was below AV limit, the AV emission level did not be recorded.

Test at Channel 11 (2.462 GHz) in transmitting status

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

Vertical:

Level (dBµV/m)

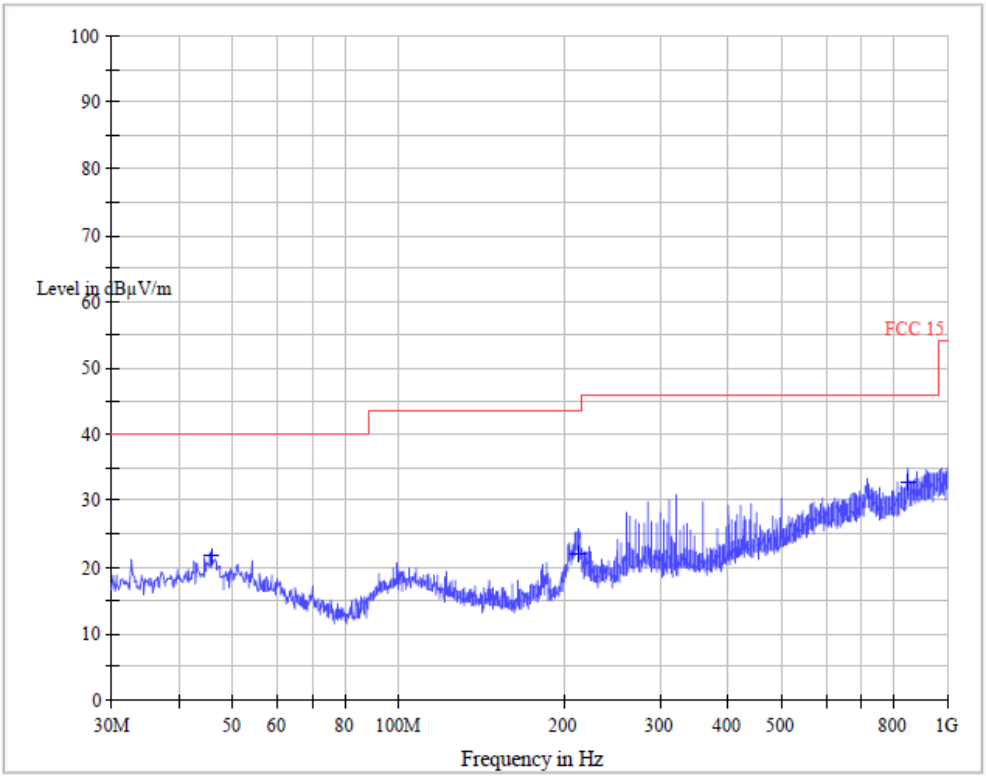


Quasi-peak measurement

Frequency (MHz)	QuasiPeak (dBµV/m)	Bandwidth (kHz)	Pol	Corr. (dB)	Margin - QPK (dB)	Limit - QPK (dBµV/m)
32.480000	32.0	120.000	V	12.3	8.0	40.0
43.680000	31.1	120.000	V	13.8	8.9	40.0
213.280000	29.1	120.000	V	11.5	14.4	43.5

Horizontal:

Level (dBµV/m)



Quasi-peak measurement

Frequency (MHz)	QuasiPeak (dBµV/m)	Bandwidth (kHz)	Pol	Corr. (dB)	Margin - QPK (dB)	Limit - QPK (dBµV/m)
45.440000	21.7	120.000	H	14.0	18.3	40.0
213.280000	22.0	120.000	H	11.5	21.5	43.5
845.240000	32.8	120.000	H	25.3	13.2	46.0

1~25 GHz Radiated Emissions. Peak & Average Measurement

PK Measurement:

Frequency (MHz)	PK Reading Level (dBμV)	Correction factors (dB/m)	PK Emission Level (dBμV/m)	PK Limit (dBμV/m)	Antenna polarization
2483.5	48.0	4.3	52.3	74	V
2484.9	50.2	4.1	54.3	74	V
4924.0	35.1	15.7	50.8	74	V
2483.5	49.7	4.1	53.8	74	H
2484.9	51.4	4.1	55.5	74	H
2485.6	51.4	4.1	55.5	74	H
4924.0	34.6	15.7	50.3	74	H

AV Measurement:

Frequency (MHz)	AV Reading Level (dBμV)	Correction factors (dB/m)	AV Emission Level (dBμV/m)	AV Limit (dBμV/m)	Antenna polarization
2483.5	-	-	-	54	V
2484.9	46.1	4.1	50.2	54	V
4924.0	-	-	-	54	V
2483.5	-	-	-	54	H
2484.9	46.2	4.1	50.3	54	H
2485.6	48.3	4.1	52.4	54	H
4924.0	-	-	-	54	H

Remark: When Peak emission level was below AV limit, the AV emission level did not be recorded.

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.

802.11n (HT20) mode with 72.2Mbps data rate

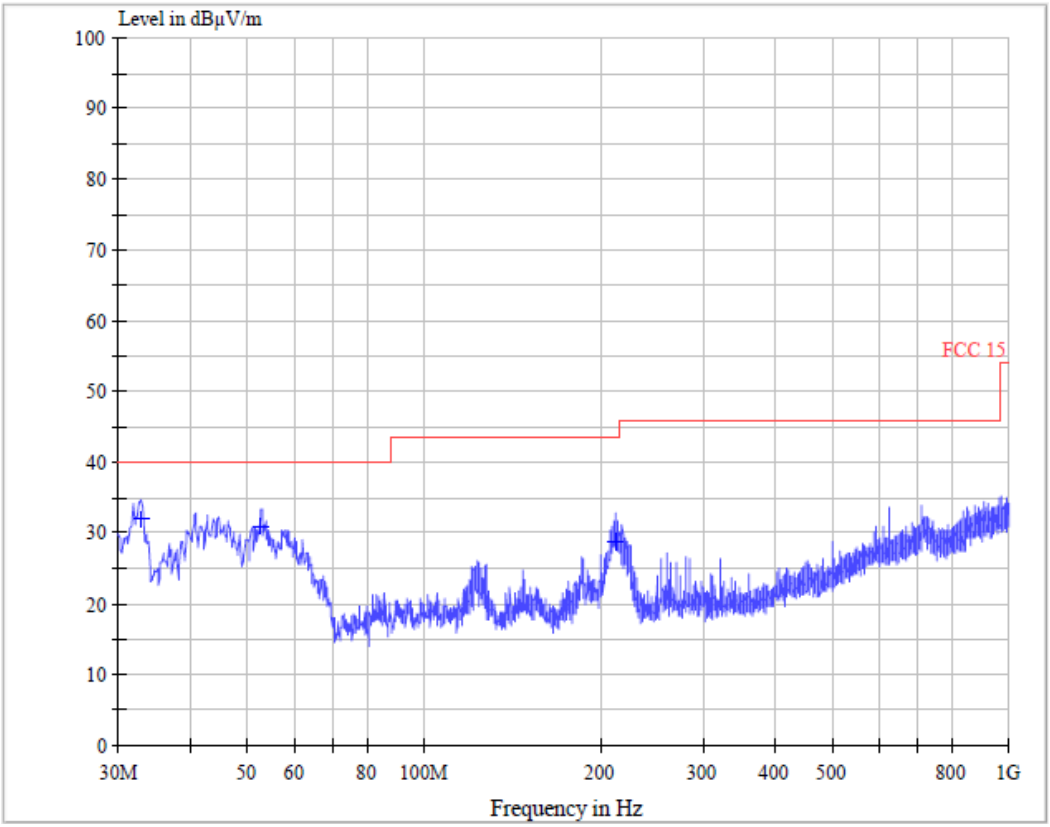
9 kHz~30 MHz Field Strength of Unwanted Emissions. Quasi-Peak Measurement
The measurements with active loop antenna were greater than 20dB below the limit, so the test data were not recorded in the test report.

Test at Channel 1 (2.412 GHz) in transmitting status

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

Vertical:

Level (dBµV/m)

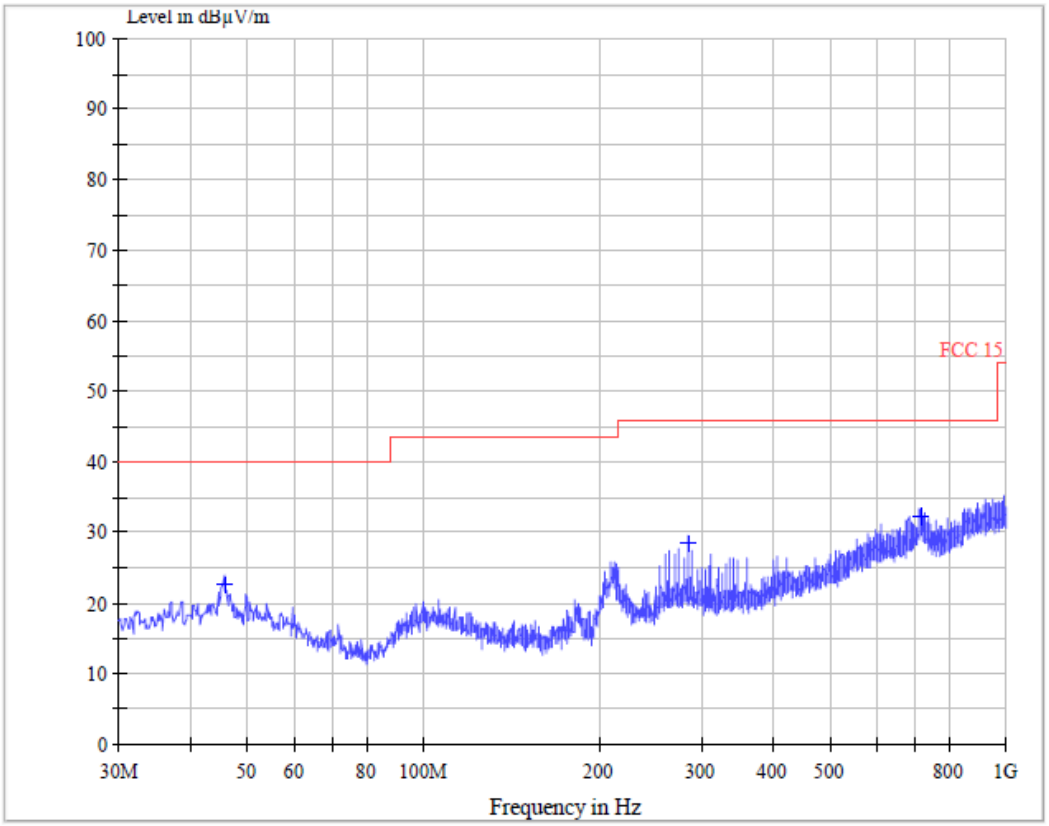


Quasi-peak measurement

Frequency (MHz)	QuasiPeak (dBµV/m)	Bandwidth (kHz)	Pol	Corr. (dB)	Margin - QPK (dB)	Limit - QPK (dBµV/m)
32.800000	31.9	120.000	V	12.4	8.1	40.0
52.640000	30.9	120.000	V	12.7	9.1	40.0
212.960000	28.9	120.000	V	11.5	14.6	43.5

Horizontal:

Level (dBµV/m)



Quasi-peak measurement

Frequency (MHz)	QuasiPeak (dBµV/m)	Bandwidth (kHz)	Pol	Corr. (dB)	Margin - QPK (dB)	Limit - QPK (dBµV/m)
45.440000	22.6	120.000	H	14.0	17.4	40.0
285.000000	28.4	120.000	H	15.4	17.6	46.0
713.120000	32.2	120.000	H	23.6	13.8	46.0

1~25 GHz Radiated Emissions. Peak & Average Measurement

PK Measurement:

Frequency (MHz)	PK Reading Level (dBμV)	Correction factors (dB/m)	PK Emission Level (dBμV/m)	PK Limit (dBμV/m)	Antenna polarization
2389	40.0	4.8	48.8	74	V
2390	45.3	4.8	50.1	74	V
4824	35.7	15.5	51.2	74	V
2386	44.7	4.8	49.5	74	H
2390	45.6	4.8	50.4	74	H
4824	35.1	15.5	50.6	74	H

AV Measurement:

Frequency (MHz)	AV Reading Level (dBμV)	Correction factors (dB/m)	AV Emission Level (dBμV/m)	AV Limit (dBμV/m)	Antenna polarization
2389	-	-	-	54	V
2390	-	-	-	54	V
4824	-	-	-	54	V
2386	-	-	-	54	H
2390	-	-	-	54	H
4824	-	-	-	54	H

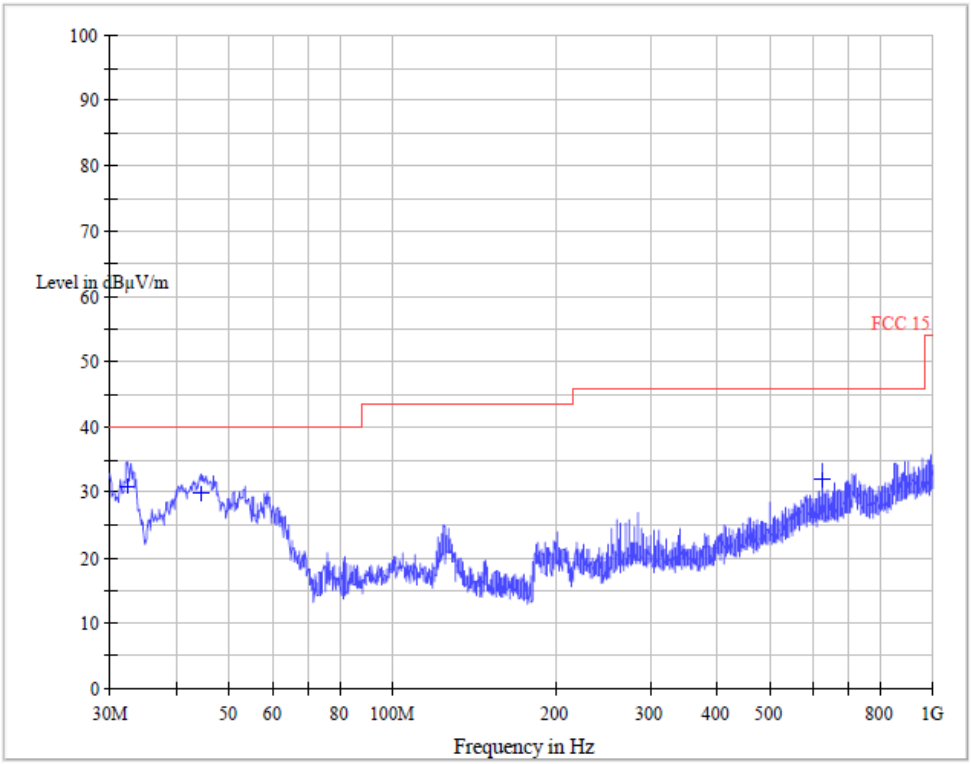
Remark: When Peak emission level was below AV limit, the AV emission level did not be recorded.

Test at Channel 6 (2.437 GHz) in transmitting status

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

Vertical:

Level (dBµV/m)

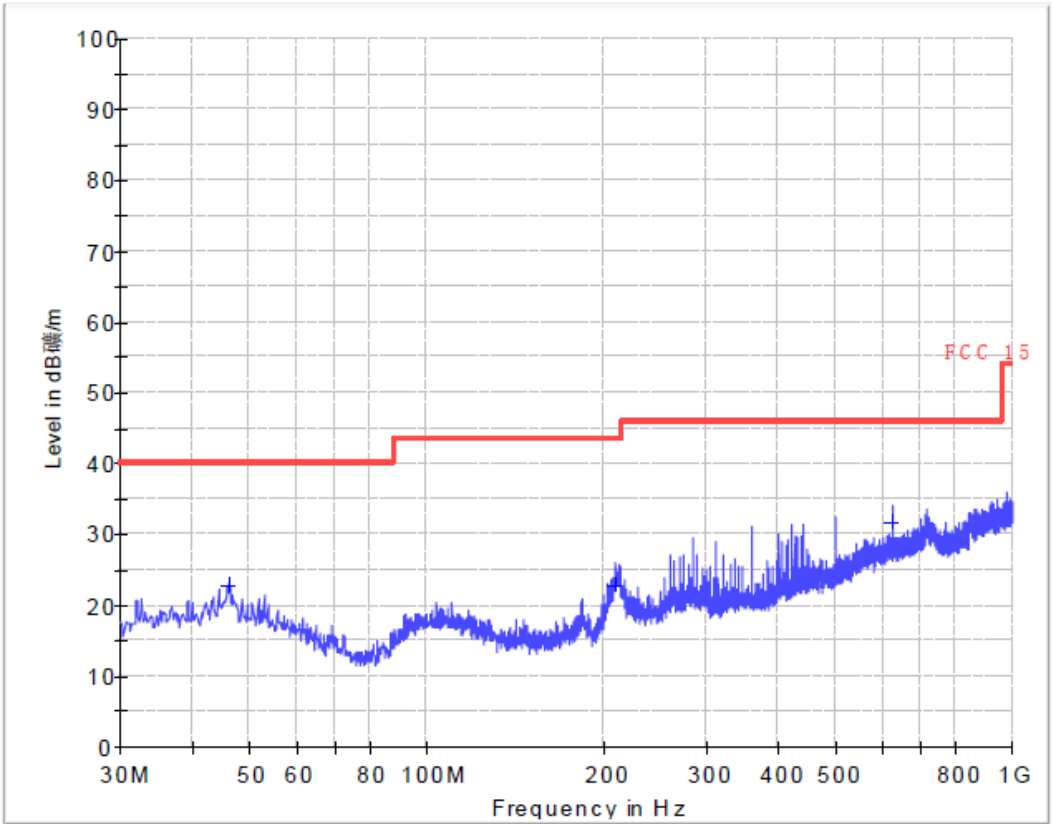


Quasi-peak measurement

Frequency (MHz)	QuasiPeak (dBµV/m)	Bandwidth (kHz)	Pol	Corr. (dB)	Margin - QPK (dB)	Limit - QPK (dBµV/m)
32.360000	30.9	120.000	V	12.3	9.1	40.0
44.120000	29.9	120.000	V	13.9	10.1	40.0
624.920000	31.9	120.000	V	22.7	14.1	46.0

Horizontal:

Level (dBµV/m)



Quasi-peak measurement

Frequency (MHz)	QuasiPeak (dBµV/m)	Bandwidth (kHz)	Pol	Corr. (dB)	Margin - QPK (dB)	Limit - QPK (dBµV/m)
46.000000	22.8	120.000	H	14.0	17.2	40.0
210.320000	22.9	120.000	H	11.3	20.6	43.5
624.920000	31.8	120.000	H	22.7	14.2	46.0

1~25 GHz Radiated Emissions. Peak & Average Measurement

PK Measurement:

Frequency (MHz)	PK Reading Level (dBμV)	Correction factors (dB/m)	PK Emission Level (dBμV/m)	PK Limit (dBμV/m)	Antenna polarization
4874	34.5	15.6	50.1	74	V
4874	35.4	15.6	51.0	74	H

AV Measurement:

Frequency (MHz)	AV Reading Level (dBμV)	Correction factors (dB/m)	AV Emission Level (dBμV/m)	AV Limit (dBμV/m)	Antenna polarization
4874	-	-	-	54	V
4874	-	-	-	54	H

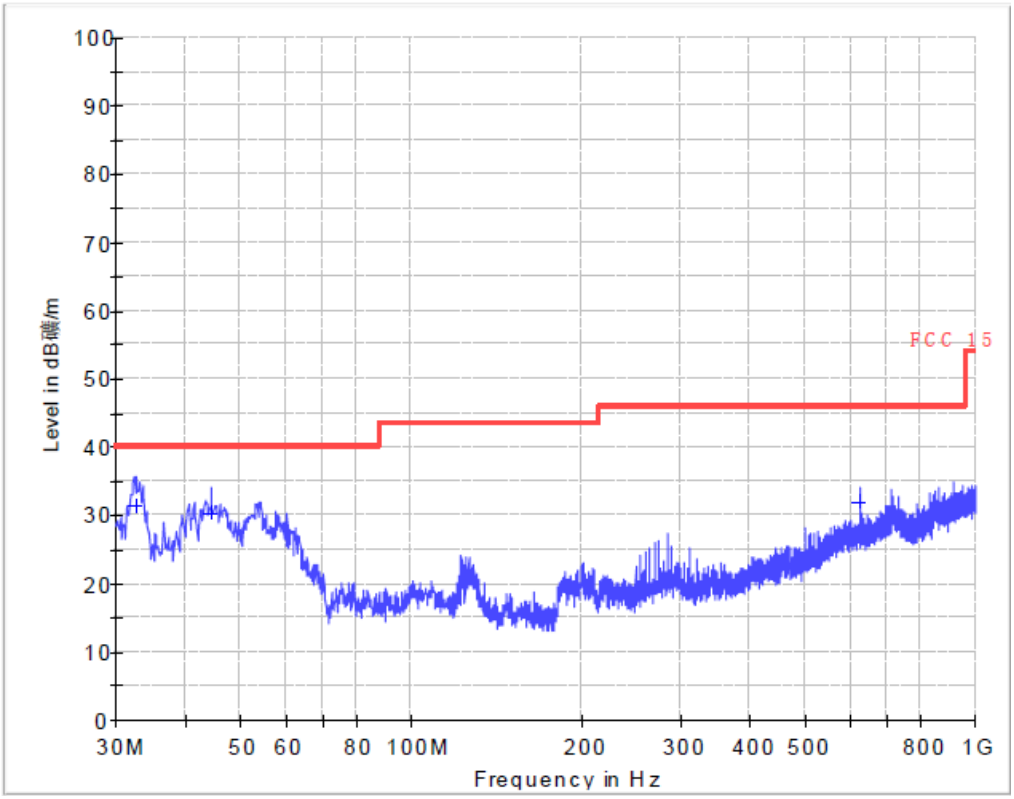
Remark: When Peak emission level was below AV limit, the AV emission level did not be record.

Test at Channel 11 (2.462 GHz) in transmitting status

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

Vertical:

Level (dBµV/m)

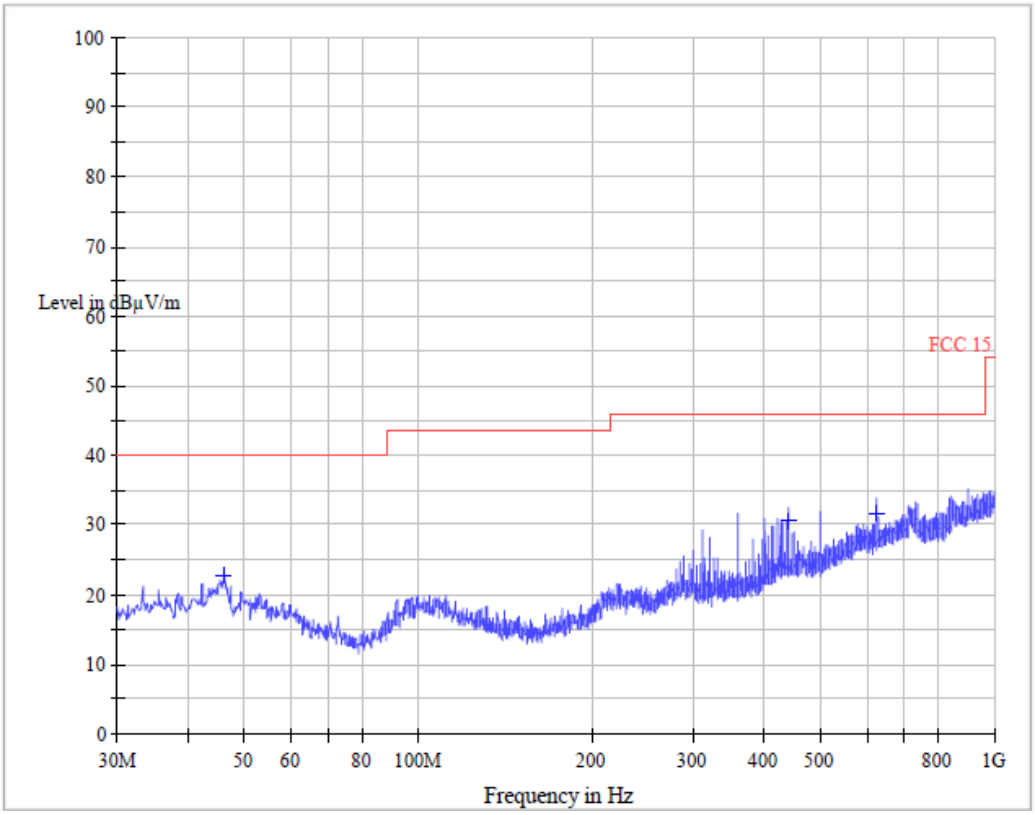


Quasi-peak measurement

Frequency (MHz)	QuasiPeak (dBµV/m)	Bandwidth (kHz)	Pol	Corr. (dB)	Margin - QPK (dB)	Limit - QPK (dBµV/m)
32.640000	31.5	120.000	V	12.4	8.5	40.0
44.240000	30.4	120.000	V	13.9	9.6	40.0
624.920000	32.0	120.000	V	22.7	14.0	46.0

Horizontal:

Level (dBµV/m)



Quasi-peak measurement

Frequency (MHz)	QuasiPeak (dBµV/m)	Bandwidth (kHz)	Pol	Corr. (dB)	Margin - QPK (dB)	Limit - QPK (dBµV/m)
46.000000	22.9	120.000	H	14.0	17.1	40.0
440.040000	30.7	120.000	H	18.6	15.3	46.0
624.920000	31.7	120.000	H	22.7	14.3	46.0

1~25 GHz Radiated Emissions. Peak & Average Measurement

PK Measurement:

Frequency (MHz)	PK Reading Level (dBμV)	Correction factors (dB/m)	PK Emission Level (dBμV/m)	PK Limit (dBμV/m)	Antenna polarization
2483.5	46.9	4.1	51.0	74	V
2483.7	48.6	4.1	52.7	74	V
2494.0	43.5	4.0	47.5	74	V
4904.0	33.8	15.7	49.5	74	V
2483.5	56.1	4.1	60.2	74	H
2483.7	56.4	4.1	60.5	74	H
2484.4	55.9	4.1	60.0	74	H
2484.8	54.5	4.1	58.6	74	H
4904.0	33.3	15.7	49.0	74	H

AV Measurement:

Frequency (MHz)	AV Reading Level (dBμV)	Correction factors (dB/m)	AV Emission Level (dBμV/m)	AV Limit (dBμV/m)	Antenna polarization
2483.5	-	-	-	54	V
2483.7	-	-	-	54	V
2494.0	-	-	-	54	V
4904.0	-	-	-	54	V
2483.5	41.5	4.1	45.6	54	H
2483.7	35.0	4.1	39.1	54	H
2484.4	34.0	4.1	38.1	54	H
2484.8	36.0	4.1	40.1	54	H
4904.0	-	-	-	54	H

Remark: When Peak emission level was below AV limit, the AV emission level did not be record.

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.

802.11n (HT40) mode with 150Mbps data rate

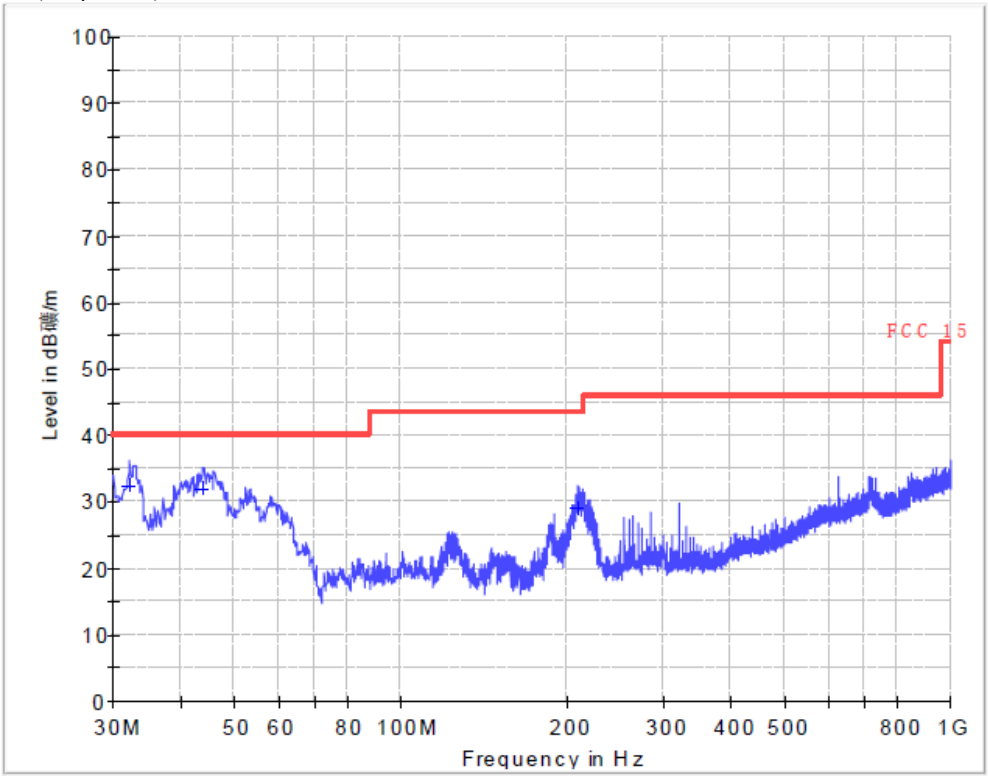
9 kHz~30 MHz Field Strength of Unwanted Emissions. Quasi-Peak Measurement
The measurements with active loop antenna were greater than 20dB below the limit, so the test data were not recorded in the test report.

Test at Channel 3 (2.422 GHz) in transmitting status

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

Vertical:

Level (dBµV/m)

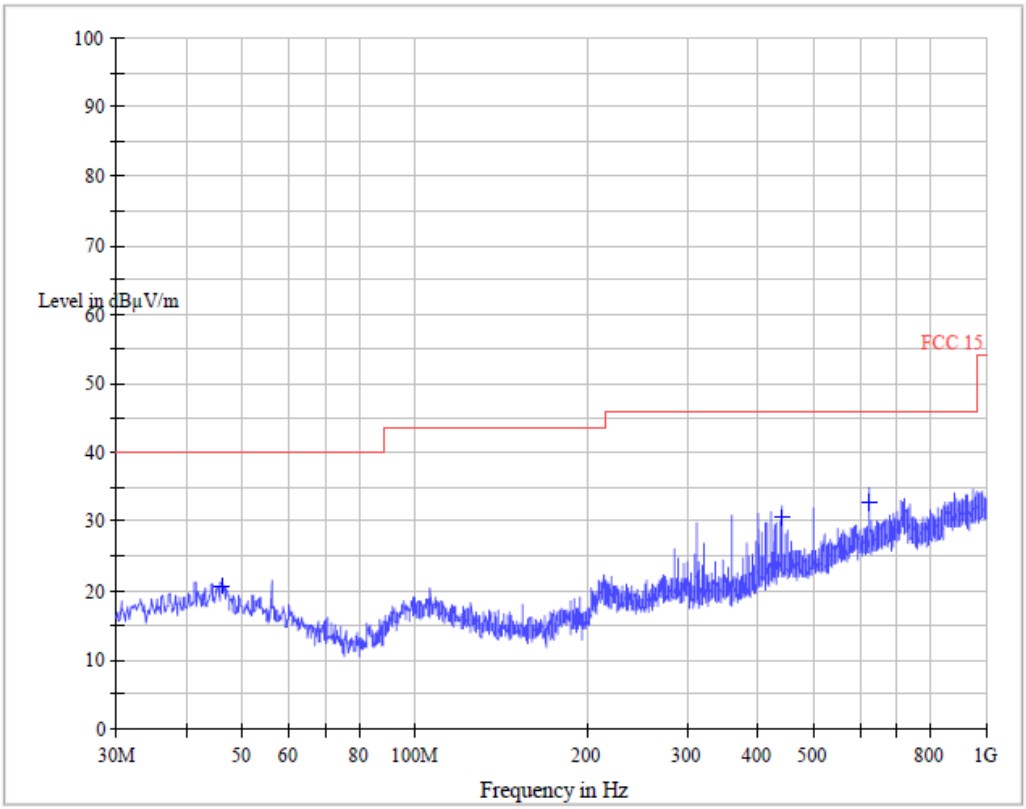


Quasi-peak measurement

Frequency (MHz)	QuasiPeak (dBµV/m)	Bandwidth (kHz)	Pol	Corr. (dB)	Margin - QPK (dB)	Limit - QPK (dBµV/m)
32.200000	32.6	120.000	V	12.3	7.4	40.0
43.680000	32.1	120.000	V	13.8	7.9	40.0
209.880000	29.0	120.000	V	11.2	14.5	43.5

Horizontal:

Level (dBµV/m)



Quasi-peak measurement

Frequency (MHz)	QuasiPeak (dBµV/m)	Bandwidth (kHz)	Pol	Corr. (dB)	Margin - QPK (dB)	Limit - QPK (dBµV/m)
46.000000	20.8	120.000	H	14.0	19.2	40.0
440.040000	30.7	120.000	H	18.6	15.3	46.0
625.080000	32.7	120.000	H	22.7	13.3	46.0

1~25 GHz Radiated Emissions. Peak & Average Measurement

PK Measurement:

Frequency (MHz)	PK Reading Level (dBμV)	Correction factors (dB/m)	PK Emission Level (dBμV/m)	PK Limit (dBμV/m)	Antenna polarization
2386.2	43.8	4.8	48.6	74	V
2390.0	42.8	4.8	47.6	74	V
4844.0	35.7	15.5	51.2	74	V
2387.8	40.9	4.8	45.7	74	H
2390.0	42.0	4.8	46.8	74	H
4844.0	34.9	15.5	50.4	74	H

AV Measurement:

Frequency (MHz)	AV Reading Level (dBμV)	Correction factors (dB/m)	AV Emission Level (dBμV/m)	AV Limit (dBμV/m)	Antenna polarization
2386.2	-	-	-	54	V
2390.0	-	-	-	54	V
4844.0	-	-	-	54	V
2387.8	-	-	-	54	H
2390.0	-	-	-	54	H
4844.0	-	-	-	54	H

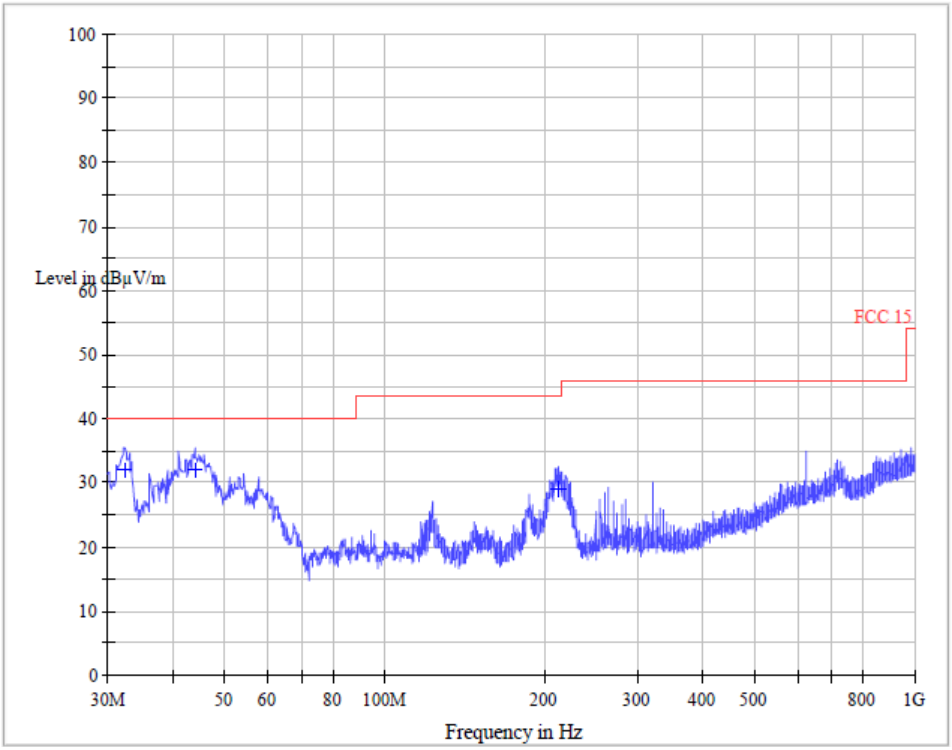
Remark: When Peak emission level was below AV limit, the AV emission level did not be recorded.

Test at Channel 6 (2.437 GHz) in transmitting status

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

Vertical:

Level (dBµV/m)

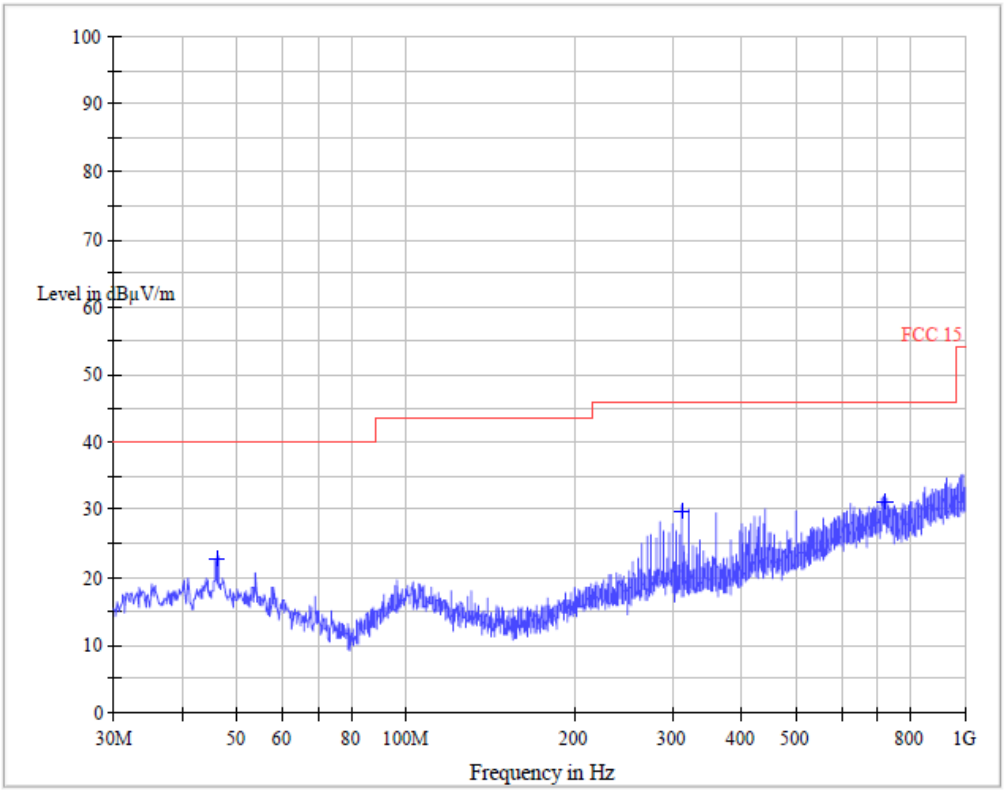


Quasi-peak measurement

Frequency (MHz)	QuasiPeak (dBµV/m)	Bandwidth (kHz)	Pol	Corr. (dB)	Margin - QPK (dB)	Limit - QPK (dBµV/m)
32.360000	31.9	120.000	V	12.3	8.1	40.0
43.800000	31.9	120.000	V	13.8	8.1	40.0
212.400000	29.1	120.000	V	11.4	14.4	43.5

Horizontal:

Level (dBµV/m)



Quasi-peak measurement

Frequency (MHz)	QuasiPeak (dBµV/m)	Bandwidth (kHz)	Pol	Corr. (dB)	Margin - QPK (dB)	Limit - QPK (dBµV/m)
46.000000	22.9	120.000	H	14.0	17.1	40.0
312.480000	29.9	120.000	H	16.3	16.1	46.0
719.880000	31.2	120.000	H	23.7	14.8	46.0

1~25 GHz Radiated Emissions. Peak & Average Measurement

PK Measurement:

Frequency (MHz)	PK Reading Level (dBμV)	Correction factors (dB/m)	PK Emission Level (dBμV/m)	PK Limit (dBμV/m)	Antenna polarization
4874	35.2	15.6	50.8	74	V
4874	32.9	15.6	48.5	74	H

AV Measurement:

Frequency (MHz)	AV Reading Level (dBμV)	Correction factors (dB/m)	AV Emission Level (dBμV/m)	AV Limit (dBμV/m)	Antenna polarization
4874	-	-	-	54	V
4874	-	-	-	54	H

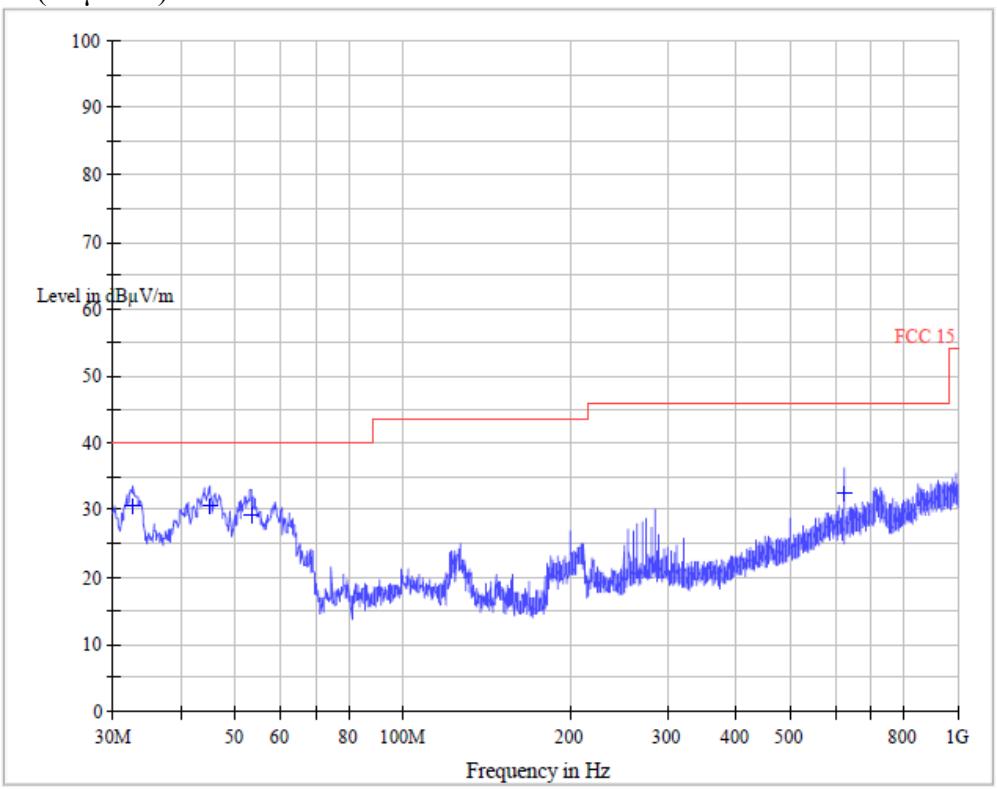
Remark: When Peak emission level was below AV limit, the AV emission level did not be record.

Test at Channel 11 (2.452 GHz) in transmitting status

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

Vertical:

Level (dBµV/m)

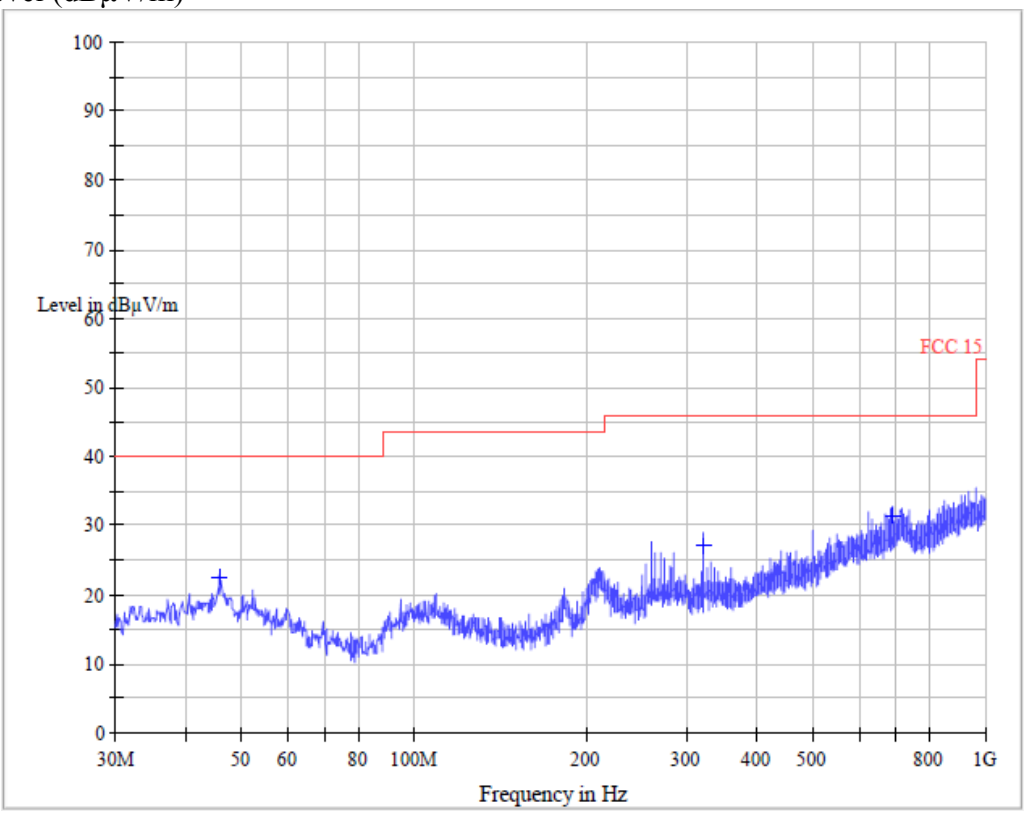


Quasi-peak measurement

Frequency (MHz)	QuasiPeak (dBµV/m)	Bandwidth (kHz)	Pol	Corr. (dB)	Margin - QPK (dB)	Limit - QPK (dBµV/m)
32.640000	30.7	120.000	V	12.4	9.3	40.0
44.840000	30.6	120.000	V	13.9	9.4	40.0
53.240000	29.2	120.000	V	12.6	10.8	40.0
625.080000	32.5	120.000	V	22.7	13.5	46.0

Horizontal:

Level (dBµV/m)



Quasi-peak measurement

Frequency (MHz)	QuasiPeak (dBµV/m)	Bandwidth (kHz)	Pol	Corr. (dB)	Margin - QPK (dB)	Limit - QPK (dBµV/m)
45.560000	22.6	120.000	H	14.0	17.4	40.0
319.960000	27.2	120.000	H	16.4	18.8	46.0
690.320000	31.6	120.000	H	23.4	14.4	46.0

1~25 GHz Radiated Emissions. Peak & Average Measurement

PK Measurement:

Frequency (MHz)	PK Reading Level (dBμV)	Correction factors (dB/m)	PK Emission Level (dBμV/m)	PK Limit (dBμV/m)	Antenna polarization
2483.5	45.8	4.1	49.9	74	V
2493.5	46.5	4.0	50.5	74	V
4904.0	35.8	15.7	51.5	74	V
2483.5	47.7	4.1	51.8	74	H
2490.0	47.3	4.0	51.3	74	H
4904.0	36.1	15.7	51.8	74	H

AV Measurement:

Frequency (MHz)	AV Reading Level (dBμV)	Correction factors (dB/m)	AV Emission Level (dBμV/m)	AV Limit (dBμV/m)	Antenna polarization
2483.5	-	-	-	54	V
2493.5	-	-	-	54	V
4904.0	-	-	-	54	V
2483.5	-	-	-	54	H
2490.0	-	-	-	54	H
4904.0	-	-	-	54	H

Remark: When Peak emission level was below AV limit, the AV emission level did not be record.

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

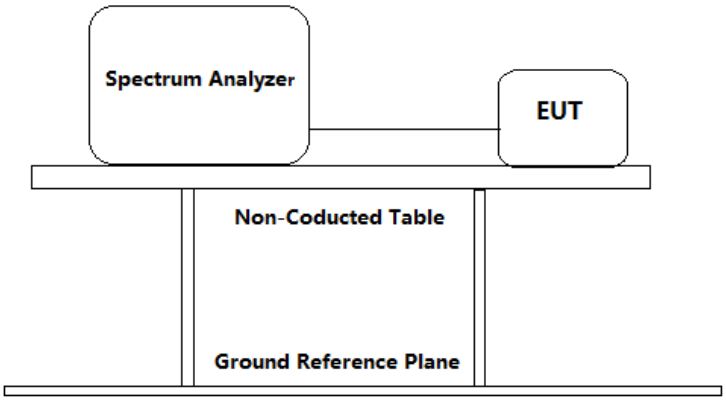
Final Test Level =Receiver Reading + Antenna Factor + Cable Loss –Preamplifier Factor.

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.

4.8 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:	For Band Edges Emission in Radiated mode, Please refer to clause 4.7



Test Procedure:	For Band Edges Emission in Radiated mode, Please refer to clause 4.7

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 RBW of spectrum analyzer to 100 kHz and VBW of spectrum analyzer to 300 kHz with suitable frequency span including 100 kHz bandwidth from band edge (minimum 50 MHz).
3. Repeat until all the test status is investigated.
4. Report the worst case.

Test result with plots as follows:

For conduct mode:

The band edges was measured and recorded Result:

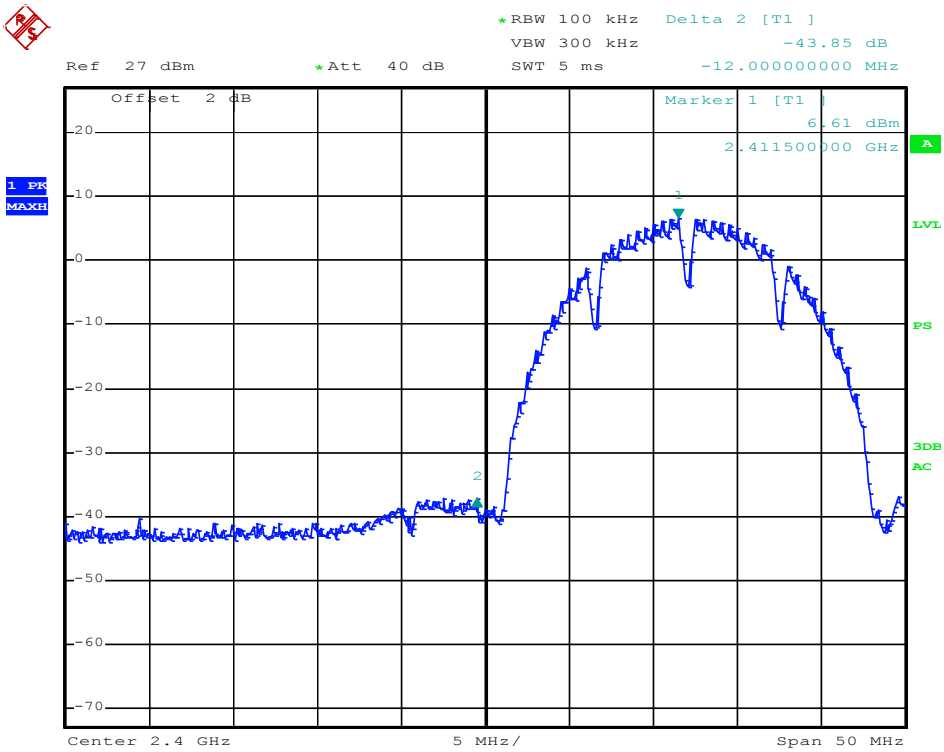
The Lower Edges attenuated more than 20dB.

The Upper Edges attenuated more than 20dB.

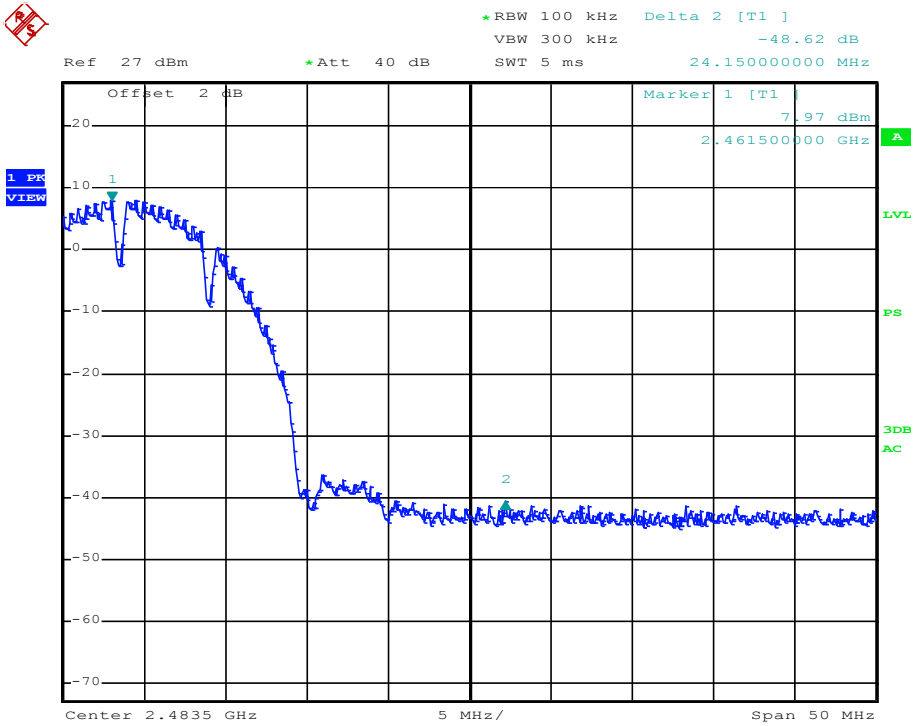
Result plots as follows:

802.11b mode with 11 Mbps data rate

Channel1: 2.412 GHz

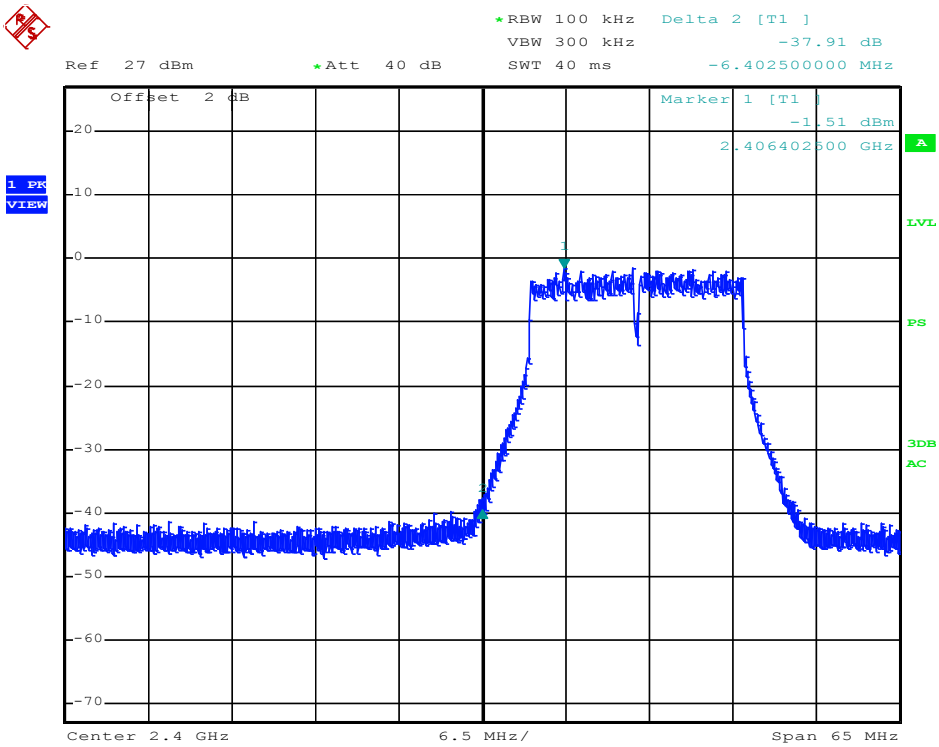


Channel 11: 2.462 GHz

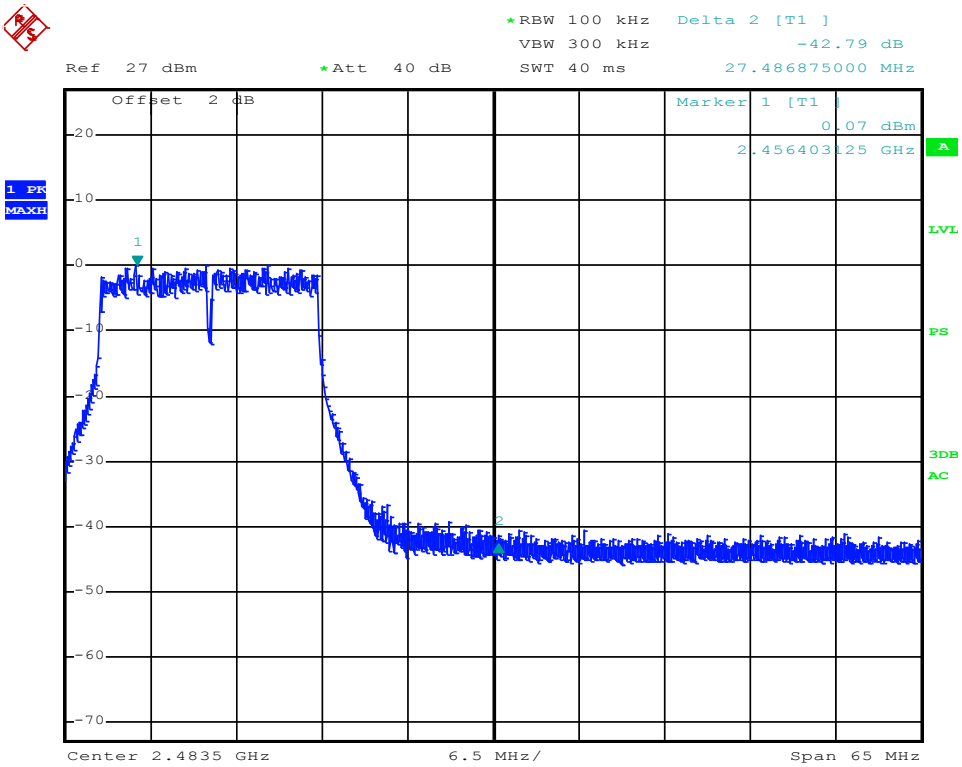


802.11g mode with 54 Mbps data rate

Channel1: 2.412 GHz

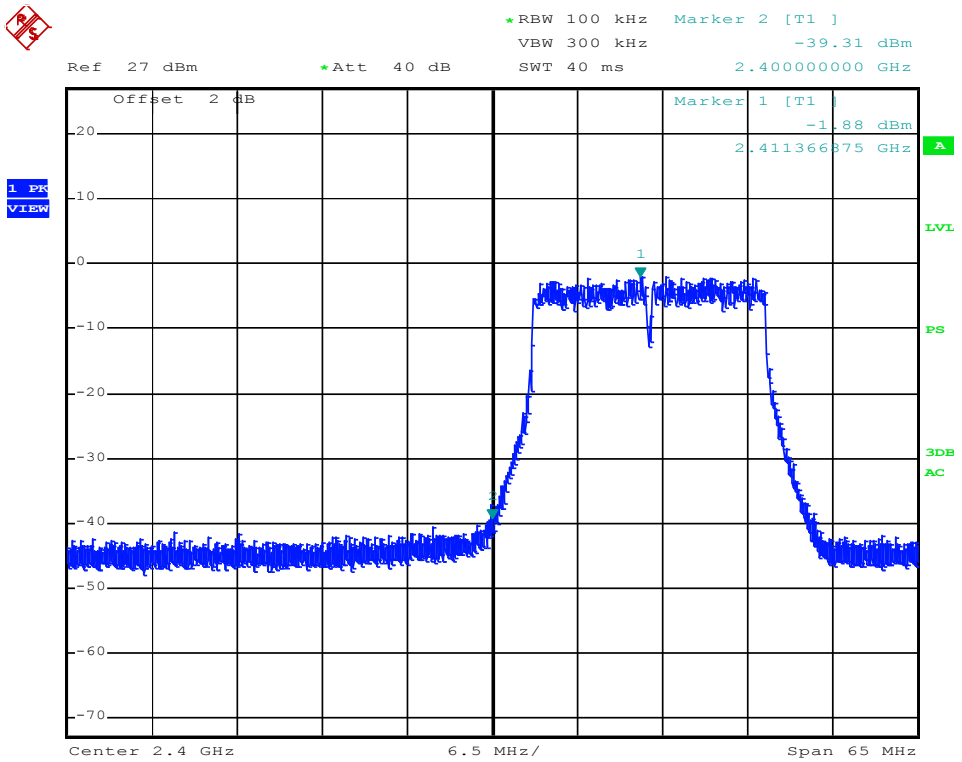


Channel 11: 2.462 GHz

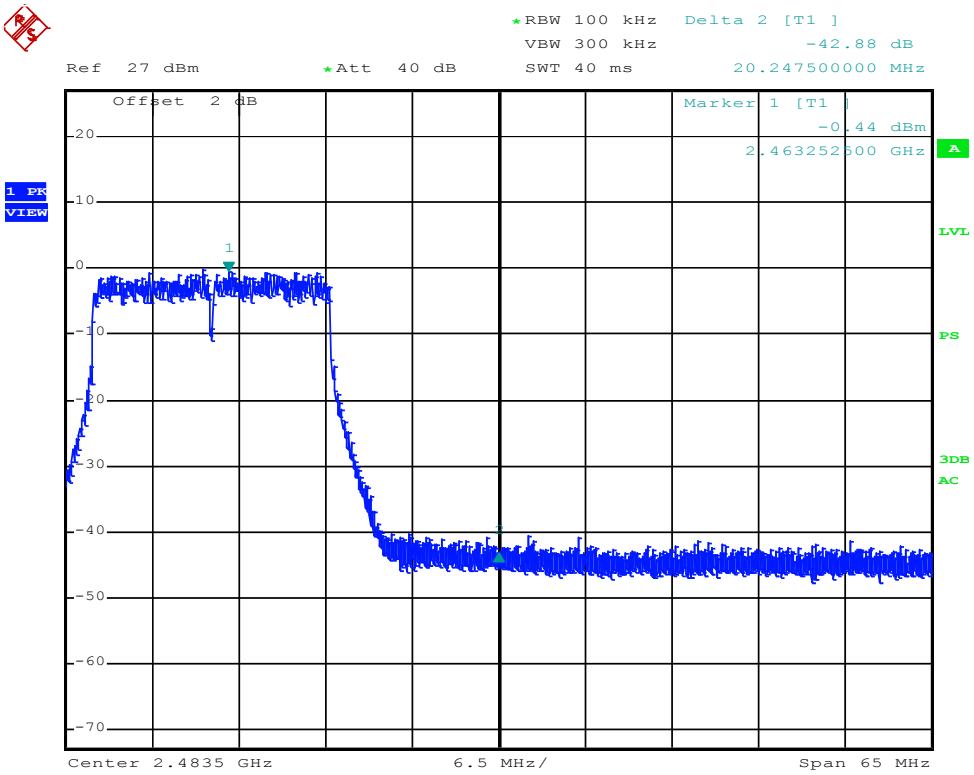


802.11n(HT20) mode with 72.2Mbps data rate

Channel1: 2.412 GHz

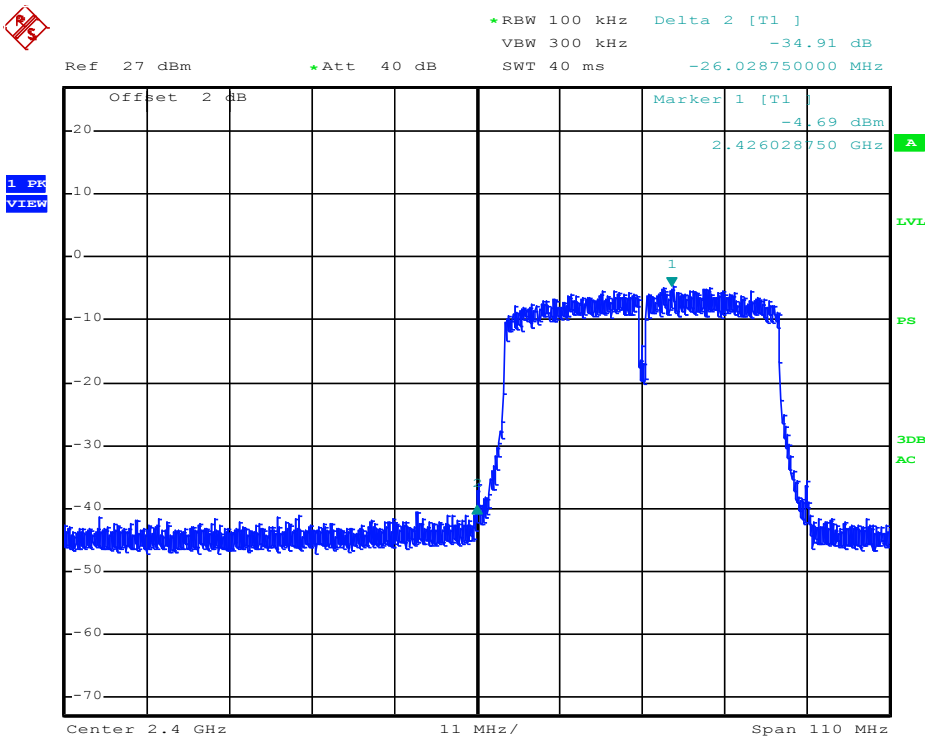


Channel 11: 2.462 GHz

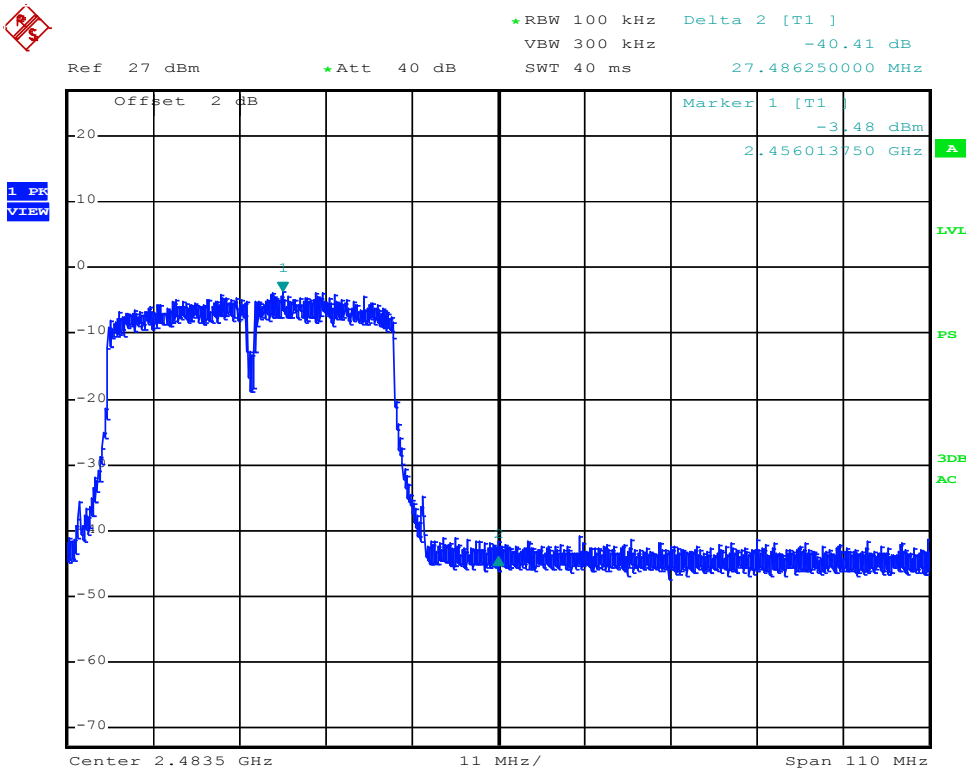


802.11n(HT40) mode with 150Mbps data rate

Channel 3: 2.422 GHz

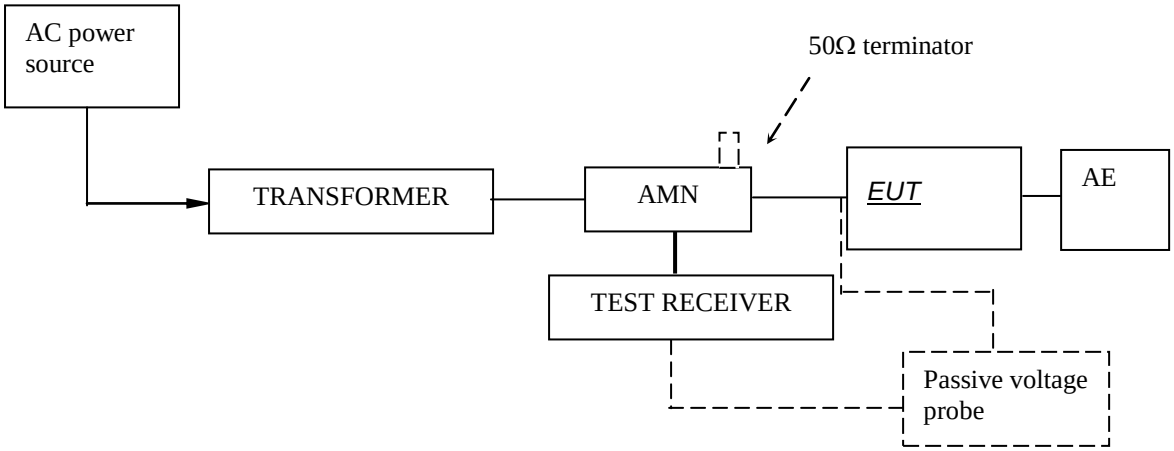


Channel 9: 2.452 GHz



4.9 Conducted Emission Test

Test Configuration:



Test Setup and Procedure

Test was performed according to ANSI C63.10 Clause 6.2. The EUT was set to achieve the maximum emission level. The mains terminal disturbance voltage was measured with the EUT in a shielded room. The EUT was connected to AC power source through an Artificial Mains Network which provides a 50Ω linear impedance Artificial hand is used if appropriate (for handheld apparatus). The load/control terminal disturbance voltage was measured with passive voltage probe if appropriate.

The table-top EUT was placed on a 0.8m high non-metallic table above earthed ground plane (Ground Reference Plane).And for floor standing EUT, was placed on a 0.1m high non-metallic supported on GRP. The EUT keeps a distance of at least 0.8m from any other of the metallic surface. The Artificial Mains Network is situated at a distance of 0.8m from the EUT.

During the test, mains lead of EUT excess 0.8m was folded back and forth parallel to the lead so as to form a horizontal bundle with a length between 0.3m and 0.4m.

The bandwidth of test receiver was set at 9 kHz. The frequency range from 150 kHz to 30MHz was checked.

Test Data

At main terminal: Pass

Tested Wire: Live Operation Mode: transmitting mode

EDIT PEAK LIST (Final Measurement Results)

Trace1:	FCC15QP				
Trace2:	FCC15AV				
Trace3:	---				
TRACE		FREQUENCY	LEVEL dBµV		DELTA LIMIT dB
1	Quasi Peak	182 kHz	60.14	L1	-4.24
2	Average	206 kHz	39.25	L1	-14.10
1	Quasi Peak	374 kHz	34.65	L1	-23.75
2	Average	714 kHz	18.66	L1	-27.33
1	Quasi Peak	1.71 MHz	25.47	L1	-30.52
2	Average	4.334 MHz	26.11	L1	-19.88
1	Quasi Peak	4.49 MHz	33.86	L1	-22.13
1	Quasi Peak	7.274 MHz	31.47	L1	-28.53
2	Average	7.302 MHz	24.67	L1	-25.33
1	Quasi Peak	22.822 MHz	41.81	L1	-18.18
2	Average	22.882 MHz	35.88	L1	-14.11

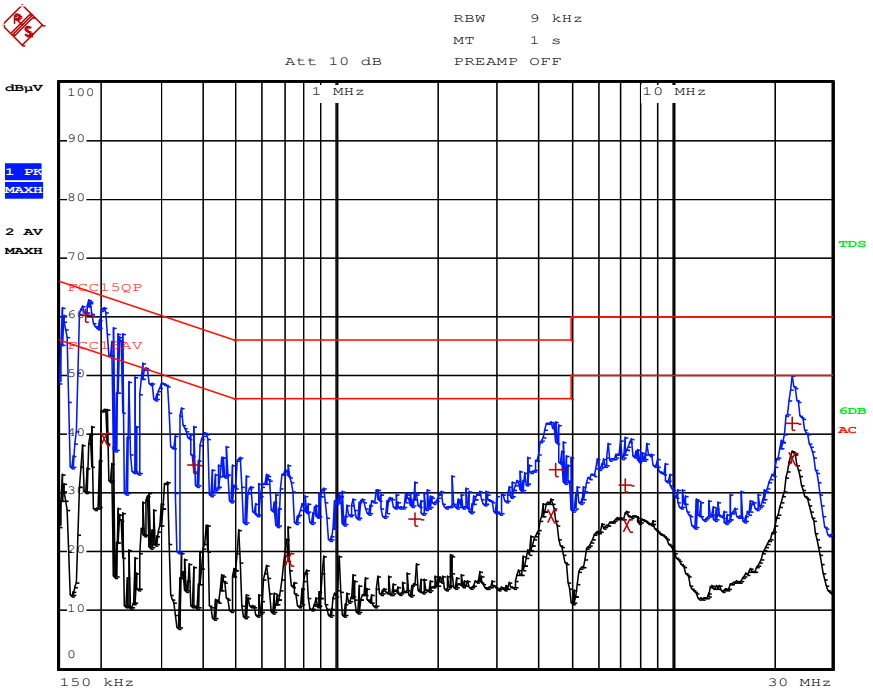
Tested Wire: Neutral Operation Mode: transmitting mode

EDIT PEAK LIST (Final Measurement Results)

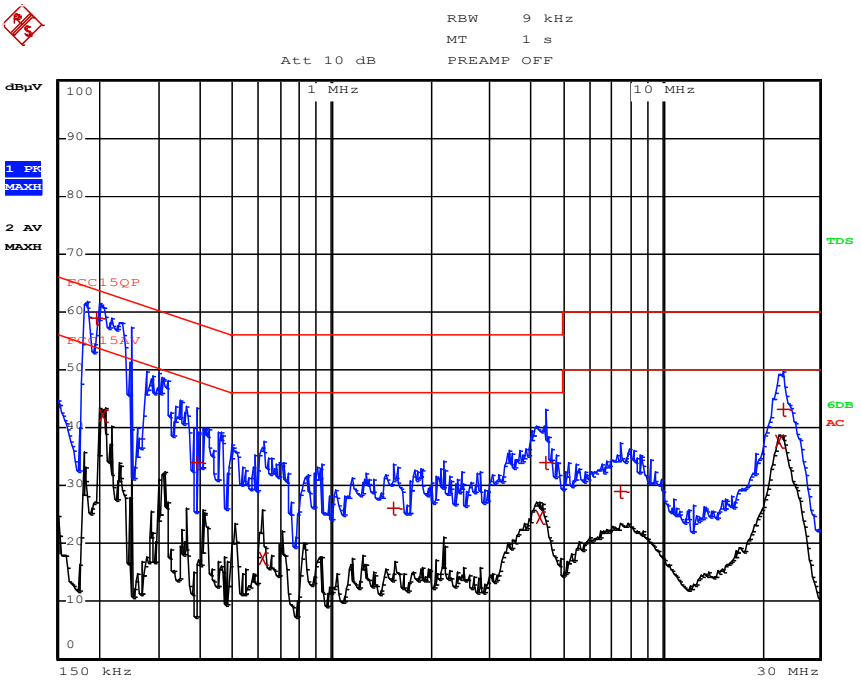
Trace1:	FCC15QP				
Trace2:	FCC15AV				
Trace3:	---				
TRACE		FREQUENCY	LEVEL dBµV		DELTA LIMIT dB
1	Quasi Peak	198 kHz	58.81	L1	-4.87
2	Average	206 kHz	42.08	L1	-11.27
1	Quasi Peak	390 kHz	33.99	L1	-24.06
2	Average	618 kHz	17.55	L1	-28.44
1	Quasi Peak	1.546 MHz	26.17	L1	-29.82
2	Average	4.266 MHz	24.63	L1	-21.36
1	Quasi Peak	4.43 MHz	33.94	L1	-22.05
1	Quasi Peak	7.478 MHz	28.88	L1	-31.11
2	Average	22.626 MHz	37.56	L1	-12.43
1	Quasi Peak	23.194 MHz	43.14	L1	-16.85

Emission Curve

Tested Wire: Live



Tested Wire: Neutral



5.0 Test Equipment List

Radiated Emission Equipment List

Equip. No.	Equipment	Model	Manufacturer	Cal. Date	Due Date
EM030-01	3m Semi-Anechoic Chamber	9×6×6 m3	ETS·LINDGREN	07 Jul. 2014	07 Jul. 2015
EM030-02	Control room for 3m Semi-Anechoic Chamber	4×4×3 m3	ETS·LINDGREN	28 Jun. 2014	28 Jun. 2015
EM031-02	EMI Test Receiver (9 kHz~7 GHz)	R&S ESR7	R&S	28 Nov. 2014	28 Nov. 2015
EM033-01	TRILOG Super Broadband test Antenna（30 MHz-3 GHz）	VULB 9163	SCHWARZBECK	07 Jul. 2014	07 Jul. 2015
EM031-02-01	Coaxial cable	/	R&S	07 Jul. 2014	07 Jul. 2015
EM031-03	Signal and Spectrum Analyzer (10 Hz~40 GHz)	R&S FSV40	R&S	07 Jul. 2014	07 Jul. 2015
EM033-02	Bouble-Ridged Waveguide Horn Antenna (800 MHz-18 GHz)	R&S HF907	R&S	11 Jul. 2014	11 Jul. 2015
EM033-02-02	Coaxial cable	/	R&S	07 Jul. 2014	07 Jul. 2015
EM022-03	2.45 GHz Filter	BRM 50702	Micro-Tronics	07 Jul. 2014	07 Jul. 2015

Conducted emission at the mains terminals test

Equipment No.	Equipment	Model	Manufacturer	Cal. Date	Due Date
EM080-05	EMI receiver	ESCI	R&S	07 Jul 2014	07 Jul 2015
EM006-05	LISN	ENV216	R&S	02 Jul 2014	02 Jul 2015
EM004-04	EMC shield Room	8m×3m×3m	Zhongyu	02 Jul 2014	02 Jul 2015