Report No.: 151109101GZU-005
Issued: 2017-3-15

TEST REPORT

Applicant Name & Address	:	SINBON Electronics Co., Ltd 4F-13,No 79, Sec. 1 Hsin Tai Wu Rd., Hsi-Chih Dist., New Taipei City 221, Taiwan
Sample Description		
Product	:	Trutankless Hot Water Heater
FCC ID	:	SLB-TRUTANKLESSXY
Model No.	:	TR-15, TR-20, TR-24, TR-29, TR-36; TC-13, TC-17, TC-21, TC-25, TC-33
Electrical Rating	:	Refer to page 4
Date Received	:	14 February 2017
Date Test Conducted	:	14 February 2017 – 10 March 2017
Test standards	:	**47 CFR PART 15 Subpart C: 2015 section 15.407**
Test Result	:	Pass
Conclusion	:	The submitted samples complied with the above rules/standards.
Remark	:	None.

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

Prepared and Checked By:

Sky Zhu

Sky Zhu
Project Engineer
Intertek Guangzhou

Approved By:

Helen Ma ***Signature***

Helen Ma
Team Leader
Intertek Guangzhou
15 March 2017 Date

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Intertek Testing Services Shenzhen Ltd. Guangzhou Branch
Block E, No.7-2 Guang Dong Software Science Park, Caipin Road, Guangzhou Science City, GETDD Guangzhou, China
Tel / Fax: 86-20-8213 9688/86-20-3205 7538
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CONTENT

TEST REPORT 1
CONTENT 2
1.0 Summary of Test 3
2.0 General Description 4
2.1 Product Description 4
2.2 Related Submittal(s) Grants 5
2.3 Test Methodology 6
2.4 Test Facility 6
3.0 System Test Configuration 7
3.1 Justification 7
3.2 EUT Exercising Software 7
3.3 Special Accessories 8
3.4 Measurement Uncertainty 8
3.5 Equipment Modification 8
3.6 Support Equipment List and Description 8
4.0 Measurement Results 9
4.1 Antenna Requirement: 9
4.2 Duty Cycle: 11
4.3 26 dB and 99% Bandwidth: 15
4.4 6 dB Bandwidth: 29
4.5 Maximum Conducted Output Power 34
4.6 Maximum Peak Power Spectral Density 44
4.7 Radiated Spurious Emissions 53
4.8 Band Edges Requirement 87
4.9 Frequency Stability Test 100
4.10 Conducted Emission Test 105
5.0 Test Equipment List 108

1.0 Summary of Test

TEST	TEST REQUIREMENT	TEST METHOD	RESULT
Antenna Requirement	FCC PART 15 C clause 15.203	FCC PART 15 C clause 15.203	PASS
26 dB Bandwidth / 99% Occupied Bandwidth	FCC PART 15 C clause 15.407(a)	FCC KDB 789033 D02 General UNII Test Procedures New Rules v01r03,Clause C&D	PASS
6 dB Bandwidth	FCC PART 15 C clause 15.407(e) Only for band IV	FCC KDB 789033 D02 General UNII Test Procedures New Rules v01r03,Clause C	PASS
Maximum Conducted Output Power	FCC PART 15 C clause 15.407(a)	FCC KDB 789033 D02 General UNII Test Procedures New Rules v01r03,Clause E	PASS
Maximum Peak Power Spectral Density	FCC PART 15 C clause 15.407(a)	FCC KDB 789033 D02 General UNII Test Procedures New Rules v01r03,Clause F	PASS
Radiated spurious emission	FCC PART 15 C clause 15.407(b)	FCC KDB 789033 D02 General UNII Test Procedures New Rules v01r03,Clause G	PASS
Band Edge	FCC PART 15 C clause 15.407(b)	FCC KDB 789033 D02 General UNII Test Procedures New Rules v01r03,Clause G	PASS
Frequency Stability	FCC PART 15 C clause 15.407(g)	ANSI C63.10: clause 6.8	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 C63.10:2013 in the whole report.

2.0 General Description

2.1 Product Description

Operating Frequency	Band I 5150 MHz to 5250 MHz and Band IV 5725 MHz to 5850MHz for 802.11a(20)/n(HT20)
Type of Modulation:	802.11a: OFDM (BPSK/QPSK/16QAM/64QAM) 802.11n(HT20): OFDM (BPSK/QPSK/16QAM/64QAM)
Transmit Data Rate:	802.11a(20): 6Mbps, 9Mbps,12Mbps,18Mbps, 24Mbps,36Mbps,48Mbps, 54Mbps 802.11n(HT20): MCS0: 7.2Mbps, MCS1:14.2Mbps, MCS2:21.7Mbps, MCS3:28.9Mbps, MCS4:43.3Mbps, MCS5:57.8Mbps, MCS6:65.0Mbps, MCS7:72.2Mbps
Number of Channels	Band I 5150MHz to 5250MHz 4 Channels for 802.11a (20)/n(HT20) Band IV 5725MHz to 5850MHz 5 Channels for 802.11a(20)/n(HT20)
Channel Separation:	20 MHz
Antenna Type	The wire antenna that uses a unique coupling to the intentional radiator
Antenna gain:	3 dBi
Function:	Trutankless Hot Water Heater with 5 GHz WIFI
EUT Power Supply:	Refer to rating characteristics

Model list and rating characteristics

Models:	TR-15, TR-20, TR-24, TR-29, TR-36; TC-13, TC-17, TC-21, TC-25, TC-33
Ratings & Principle Characteristics:	220/240Vac, 60Hz： TR-15: Max. Current: 60 A, Max. Power: 13.2/14.4kW; TR-20: Max. Current: 80 A, Max. Power: 17.6/19.2kW; TR-24: Max. Current: 100 A, Max. Power: 22/24kW; TR-29: Max. Current: 120 A, Max. Power: 26.4/28.8kW; TR-36: Max. Current: 160 A, Max. Power: 31.8/36kW; 208Vac, 60Hz： TC-13, Max. Current: 60 A, Max. Power: 12.5kW; TC-17, Max. Current: 80 A, Max. Power: 16.6kW; TC-21, Max. Current: 100 A, Max. Power: 20.8kW; TC-25, Max. Current: 120 A, Max. Power: 25.0kW; TC-33, Max. Current: 160 A, Max. Power: 33.3kW

Model differences:
TR-15, TR-20, TR-24, TR-29, TR-36: All models above are identical except for model name and input power.
TC-13, TC-17, TC-21, TC-25, TC-33: All models above are identical except for model name and input power.
TR type and TC type are identical, except model name, input power, and the number of silicon controllers.
Model TR-15 had been performed full test.

EUT channels and frequencies list:

Band I 5150 MHz to 5250 MHz

For 802.11a (20)/n (HT20): test frequencies are lowest channel 36: 5180 MHz, middle channel 44: 5220 MHz and highest channel 48: 5240.

Band I 5725 MHz to 5850 MHz

For 802.11a (20)/n (HT20): test frequencies are lowest channel 149: 5745 MHz, middle channel 157: 5785 MHz and highest channel 165: 5825 MHz

For 802.11 a(20)/802.11 n(HT20):

Band I(5150MHz-5250MHz)		**Band IV(5725MHz-5850MHz)**	
Channel	Frequency (MHz)	Channel	Frequency (MHz)
36	5180	149	5745
40	5200	153	5765
44	5220	157	5785
48	5240	161	5805
		165	5825

2.2 Related Submittal(s) Grants

This is an application for certification of:
Unlicensed National Information Infrastructure Devices (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 heating function: exempt from FCC requirement.

2.3 Test Methodology

The EUT was performed according to the procedures in FCC Part 15 E, Section15.203, 15.207, 15.209, 15.407 and ANSI C63.4:2014, ANSI C63.10:2013, method of measurement: reference to FCC KDB 789033 D02 General UNII Test Procedures New Rules v01r03.
Both AC mains line-conducted and radiated emission measurements were performed according to the procedures in ANSI C63.10:2013. 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 208V/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 “USI_BCM43XX_Testing_Tool_V1_4_10r8.apk” software to fix the frequency, the software 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 SINBON Electronics Co., 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

None

4.0 Measurement Results

4.1 Antenna Requirement:

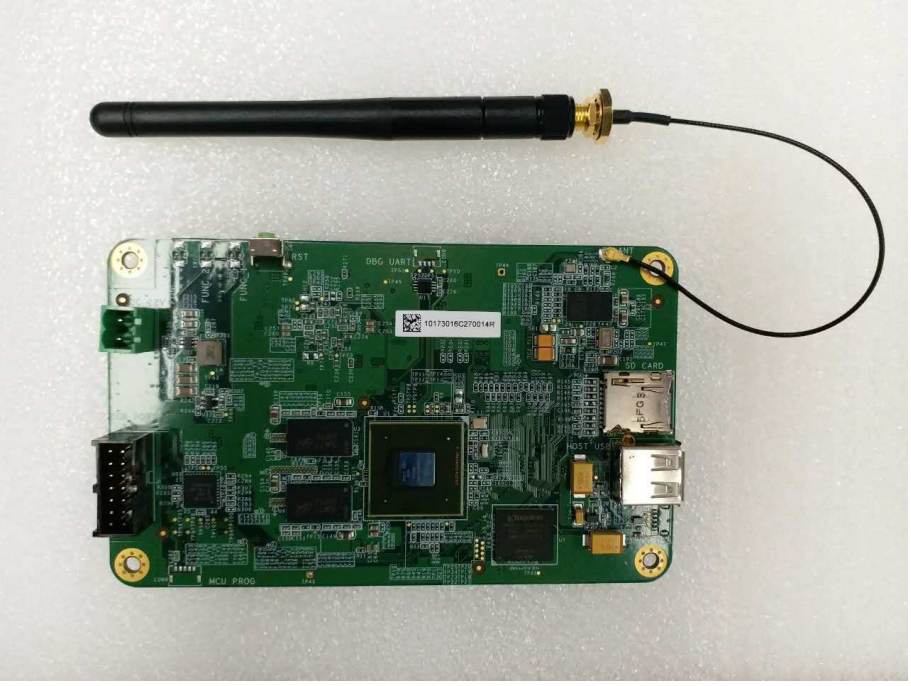
Standard requirement

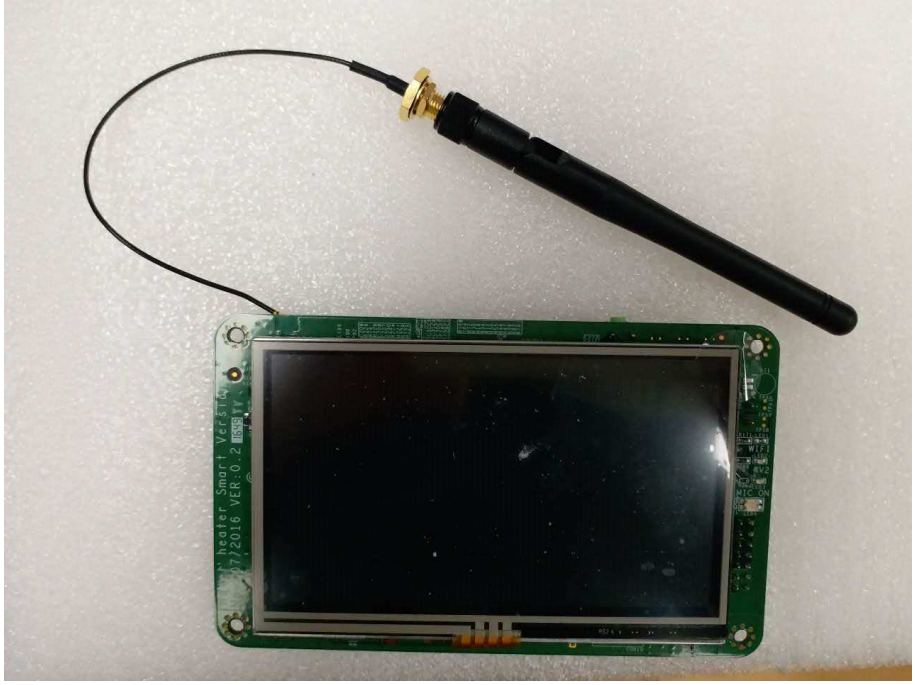
15.203 requirement:

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.

EUT Antenna

The antenna is a dedicated antenna and no consideration of replacement. The best case gain of the antenna is 3 dBi.





RS485
WiFi
trutankless
Intertek
5002104

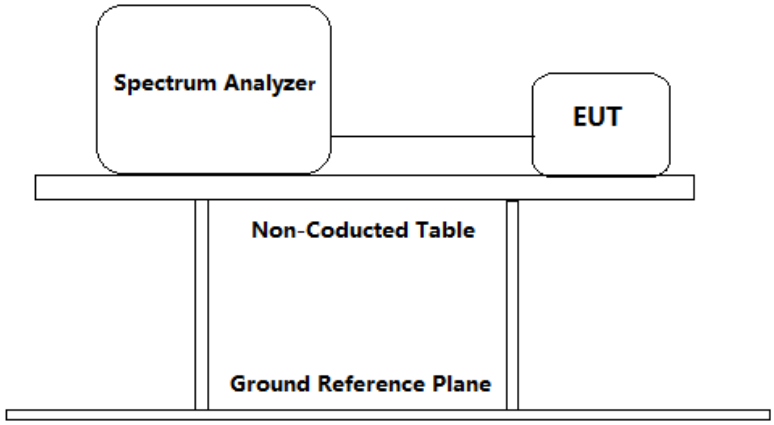
4.2 Duty Cycle:

Test Requirement: FCC KDB 789033 D02 General UNII Test Procedures New Rules v01r03,Clause B

Test Method: FCC KDB 789033 D02 General UNII Test Procedures New Rules v01r03,Clause B

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

Test Configuration:



Test Procedure:

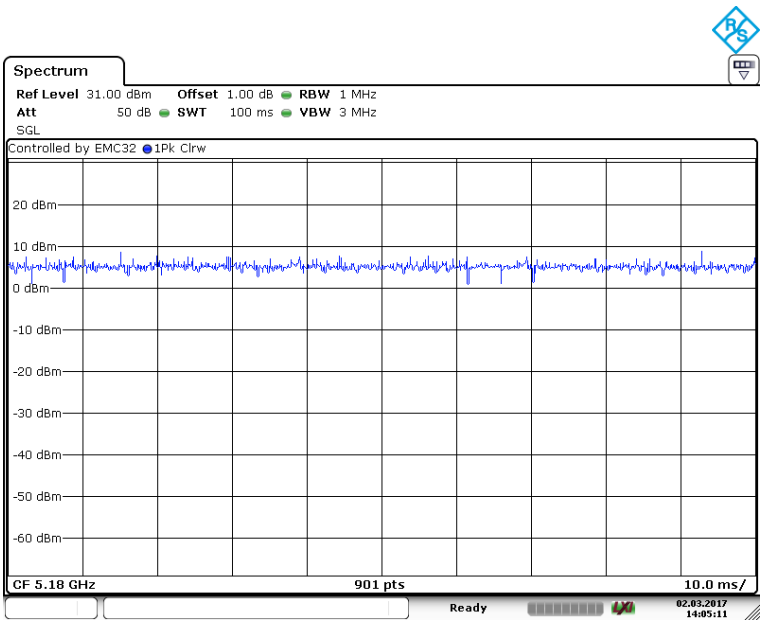
1. Remove the antenna from the EUT and then connect a low attention attenuation RF cable (cable loss =1 dB) from the antenna port to the spectrum.
2. Set the spectrum analyzer:
   a) Set the center frequency of the analyzer to the center frequency of the transmission.
   b) Set RBW ≥ 1MHz
   c) Set the VBW≥ [3 × RBW]
   d) Detector = peak.
   e) Span = Zero span.
   f) Sweep time = 100ms
   g) Trace mode = Free run
3. Repeat until all the test status is investigated.
4. Report the worst case.

Test result:

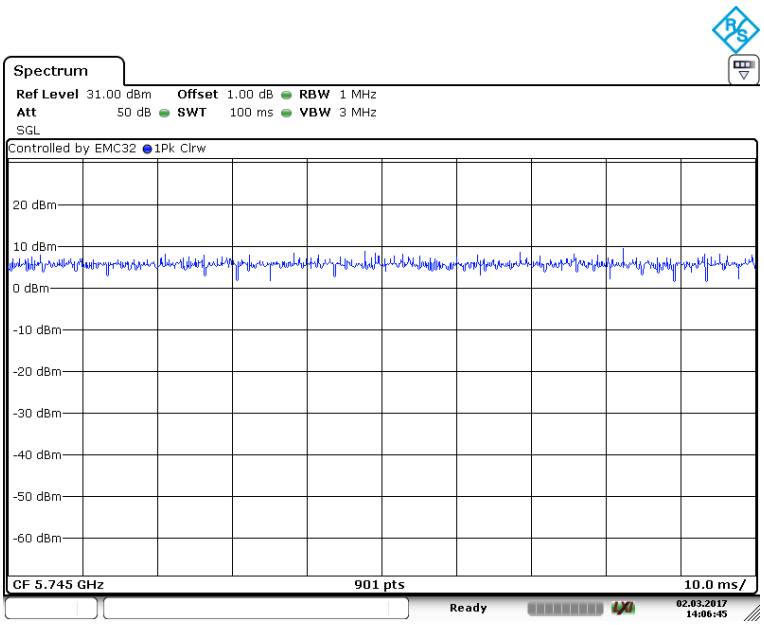
Channel No.	Frequency (MHz)	Mode	On time (ms)	Period (ms)	Duty Cycle (%)
36	5180	802.11a(20)	100	100	100
149	5745		100	100	100
36	5180	802.11n (HT20)	100	100	100
149	5745		100	100	100

Result plot as follows:

802.11a(20) mode
Channel 36: 5180 MHz:

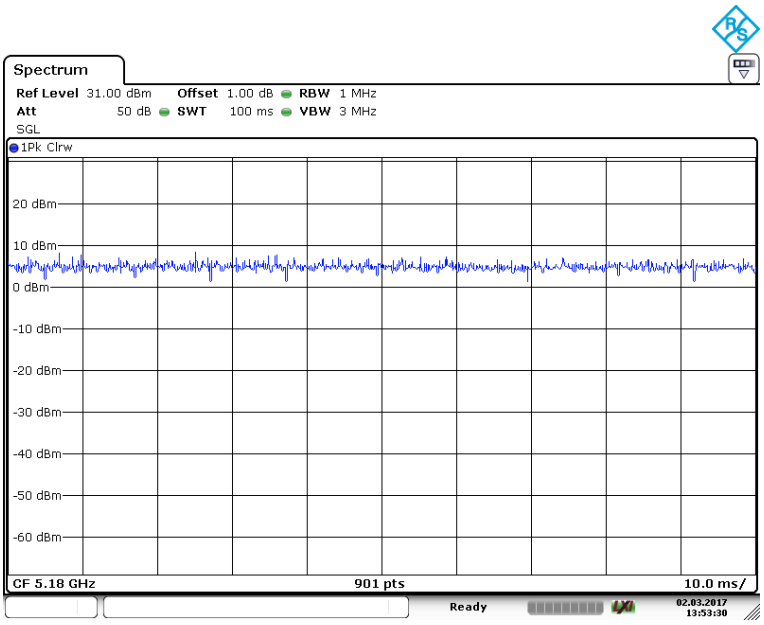


Channel 149: 5745 MHz:

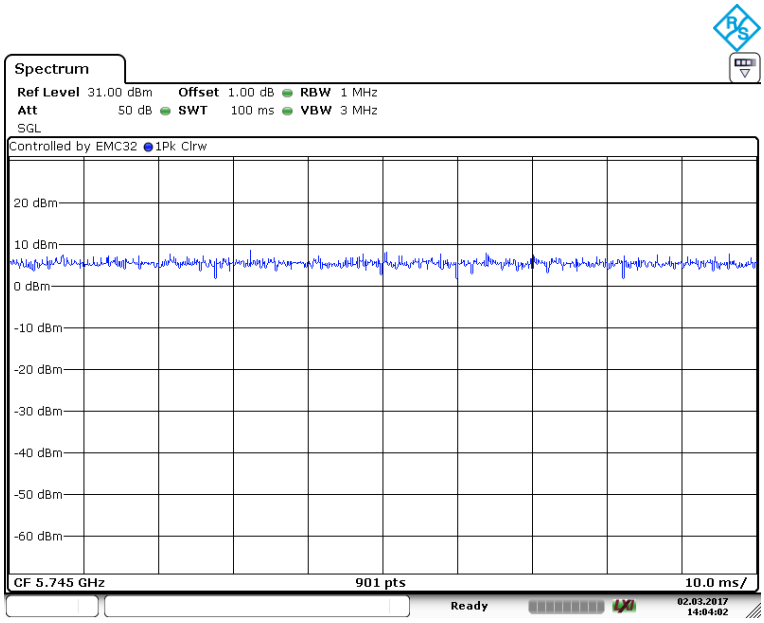


802.11n(HT20) mode

Channel 36: 5180 MHz:



Channel 149: 5745 MHz:



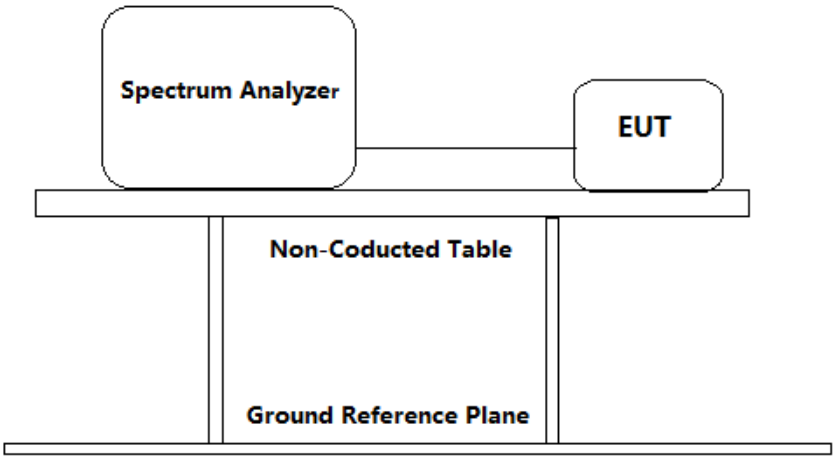
4.3 26 dB and 99% Bandwidth:

Test Requirement: FCC PART 15 C clause 15.407(a)

Test Method: FCC KDB 789033 D02 General UNII Test Procedures New Rules v01r03,Clause C&D

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:

5. Remove the antenna from the EUT and then connect a low attention attenuation RF cable (cable loss =1 dB) from the antenna port to the spectrum.
6. Set the spectrum analyzer:
   a) Set RBW = approximately 1% of the emission bandwidth
   b) Set the VBW≥ [3 × RBW]
   c) Detector = peak.
   d) Trace mode = max hold.
   e) Sweep = auto couple
   f) Allow the trace to stabilize.
   g) Measure the maximum width of the emission that is constrained by the frequencies associated with the two outermost amplitude points (upper and lower frequencies) that are attenuated by 26 dB relative to the maximum level measured in the fundamental emission and measurement of the 99-percent occupied bandwidth.

7. Repeat until all the test status is investigated.
8. Report the worst case.

Band I (5150MHz-5250MHz)

Channel No.	Frequency (MHz)	Mode	Data Rate	26dB bandwidth (MHz)	99% bandwidth (MHz)
36	5180	802.11a(20)	24 Mbps	23.92	17.64
44	5220		24 Mbps	24.02	17.64
48	5240		24 Mbps	23.64	17.64
36	5180	802.11n (HT20)	MCS 4	24.58	18.59
44	5220		MCS 4	24.31	18.59
48	5240		MCS 4	24.08	18.47

Band IV (5725MHz-5850MHz)

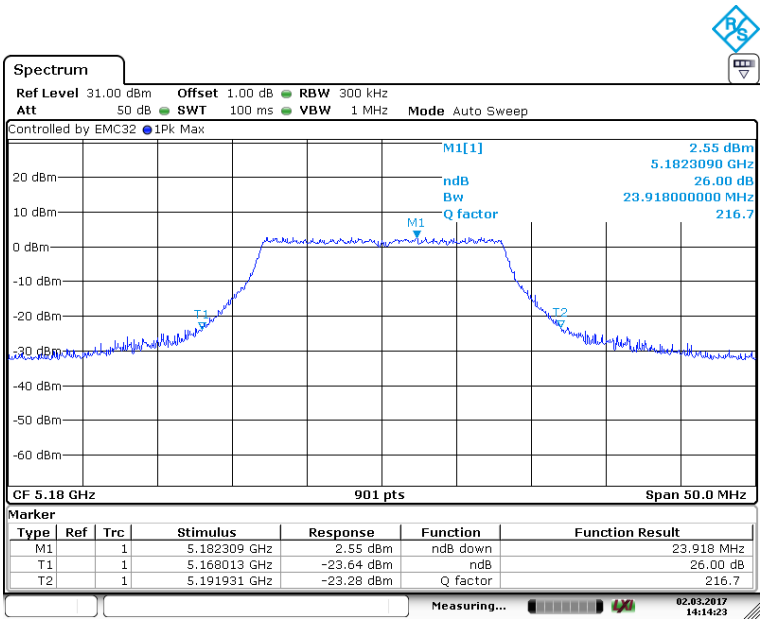
Channel No.	Frequency (MHz)	Mode	Data Rate	26dB bandwidth (MHz)	99% bandwidth (MHz)
149	5745	802.11a(20)	24 Mbps	24.02	17.70
157	5785		24 Mbps	24.19	17.64
165	5825		24 Mbps	24.19	17.59
149	5745	802.11n (HT20)	MCS 4	23.75	18.53
157	5785		MCS 4	24.30	18.53
165	5825		MCS 4	24.19	18.53

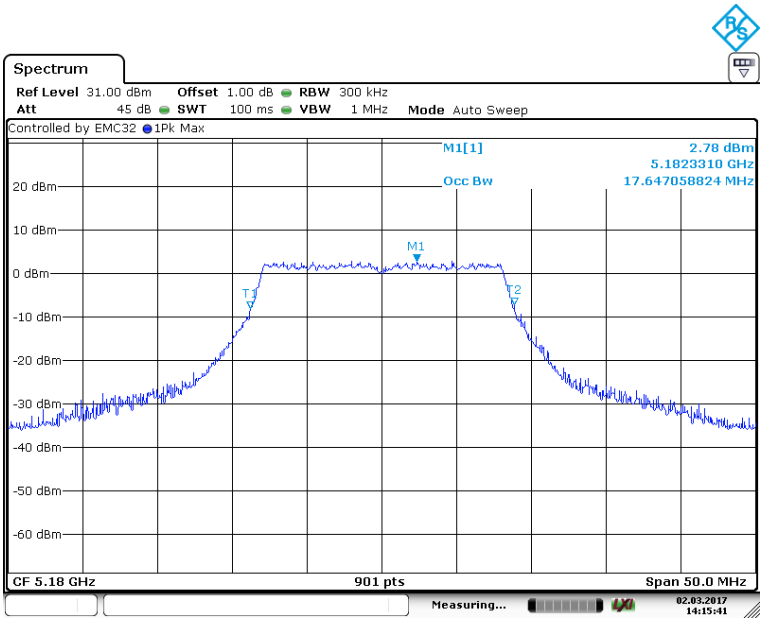
Test result: The unit does meet the FCC requirements.

Result plot as follows:

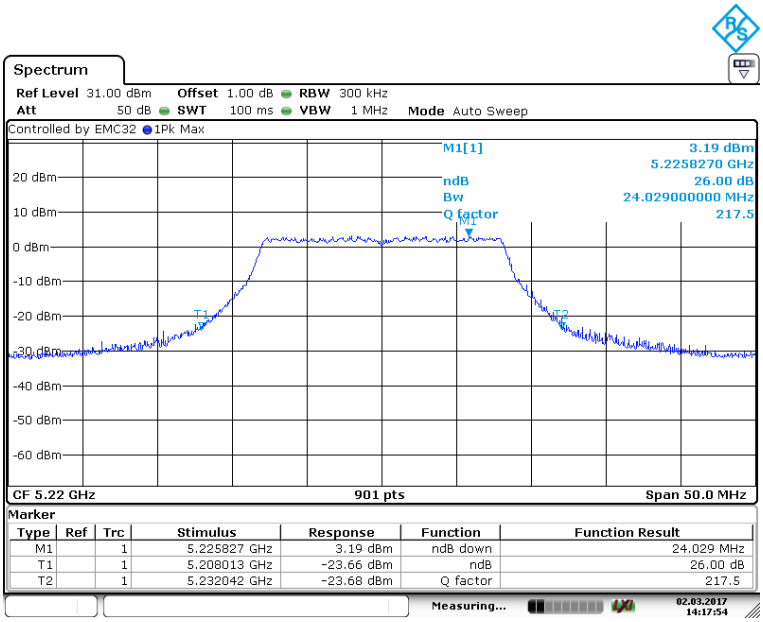
Band I 5150 MHz to 5250 MHz

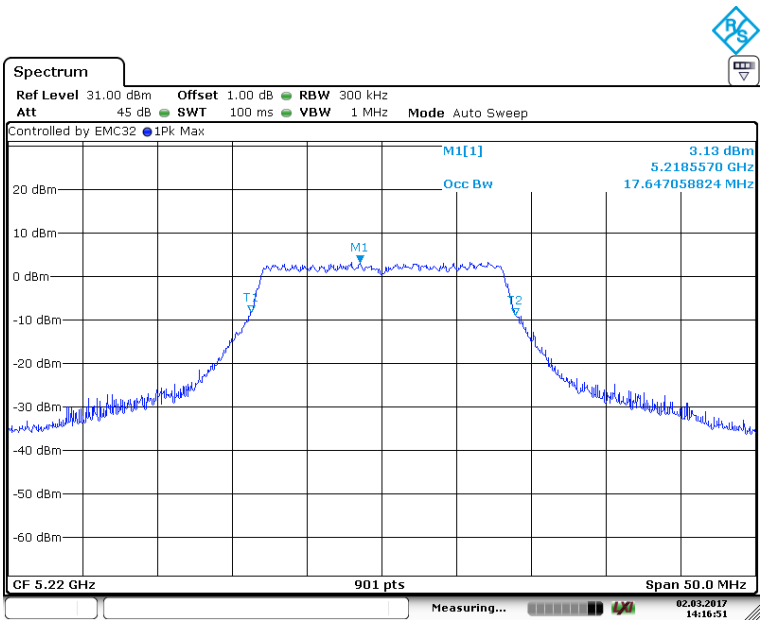
802.11a(20) mode
Channel 36: 5180 MHz:



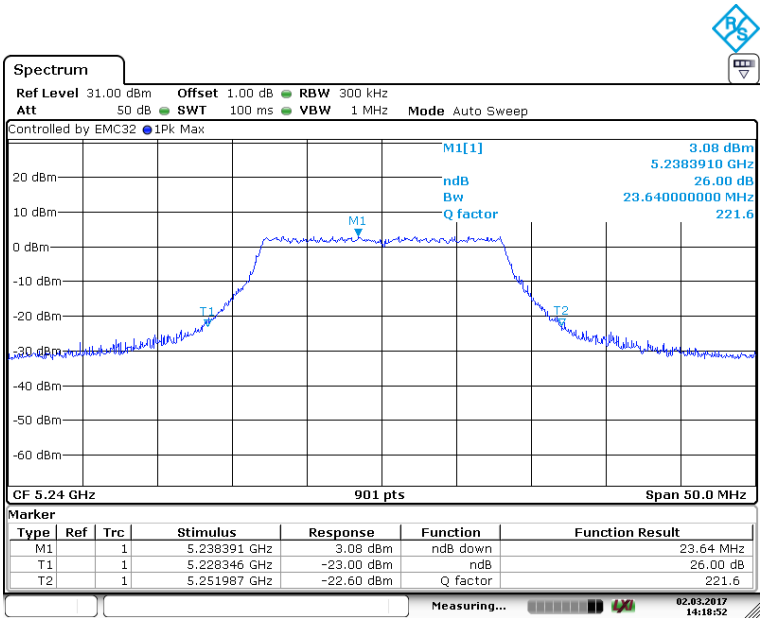


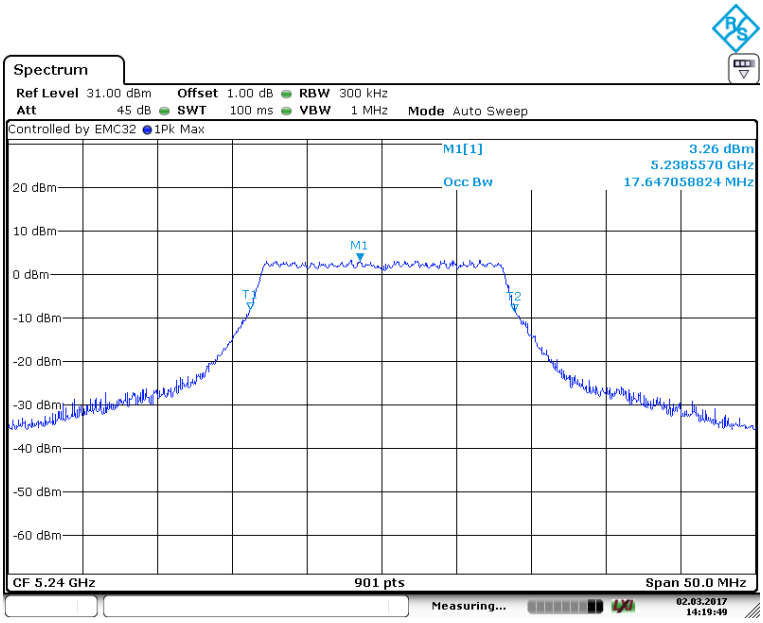
Channel 44: 5220 MHz:



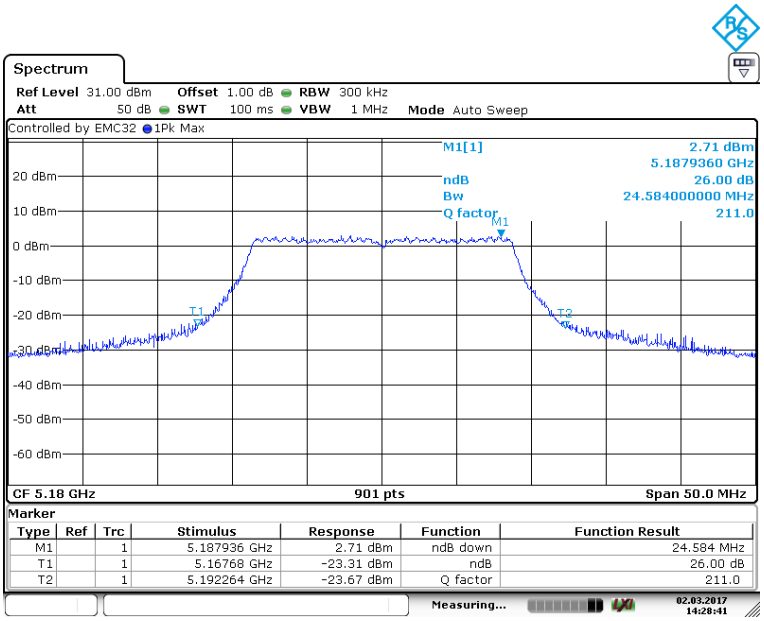


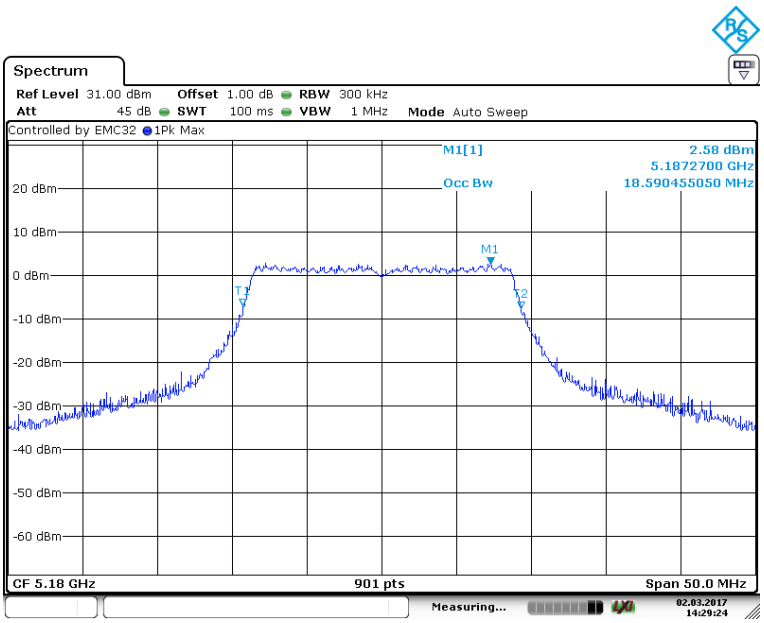
Channel 48: 5240 MHz:



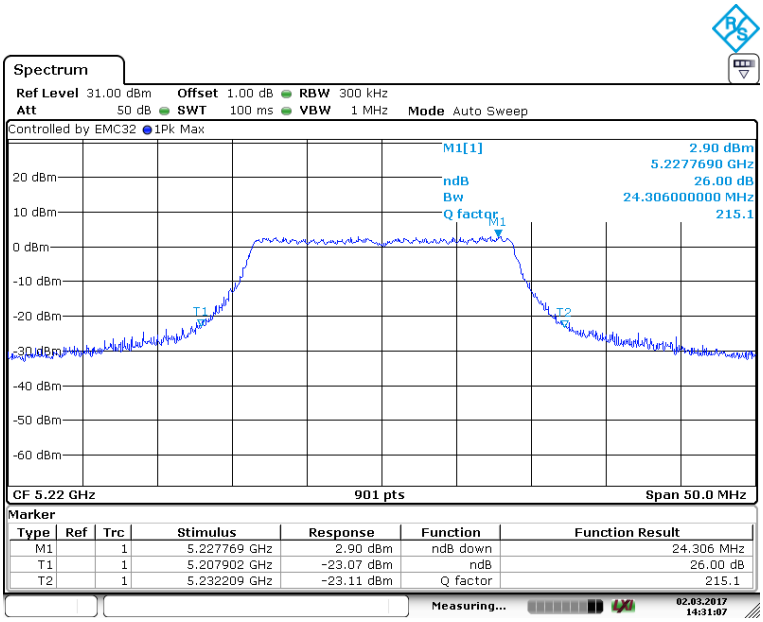


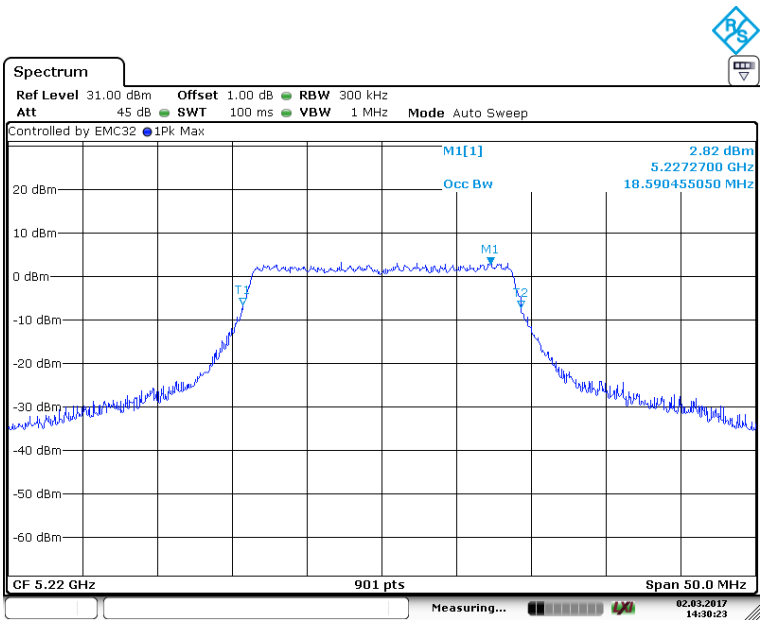
802.11n(HT 20)
Channel 36: 5180 MHz:



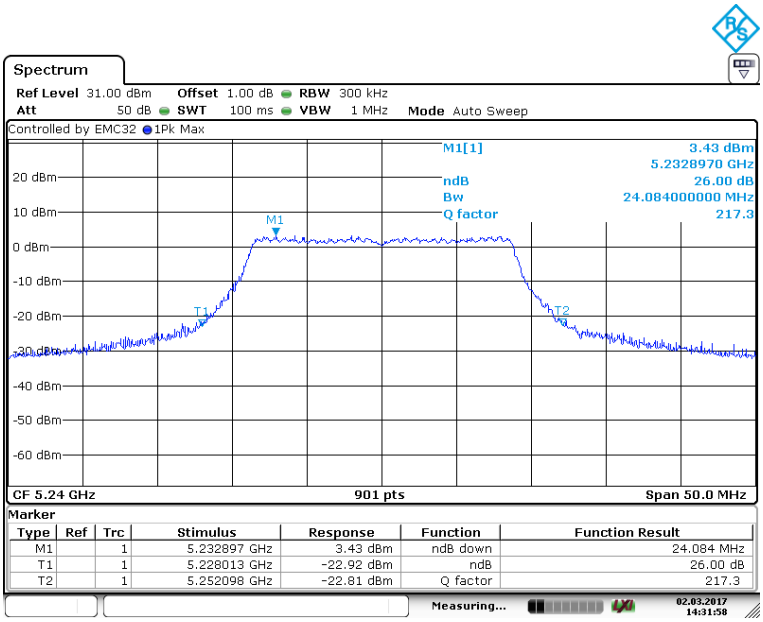


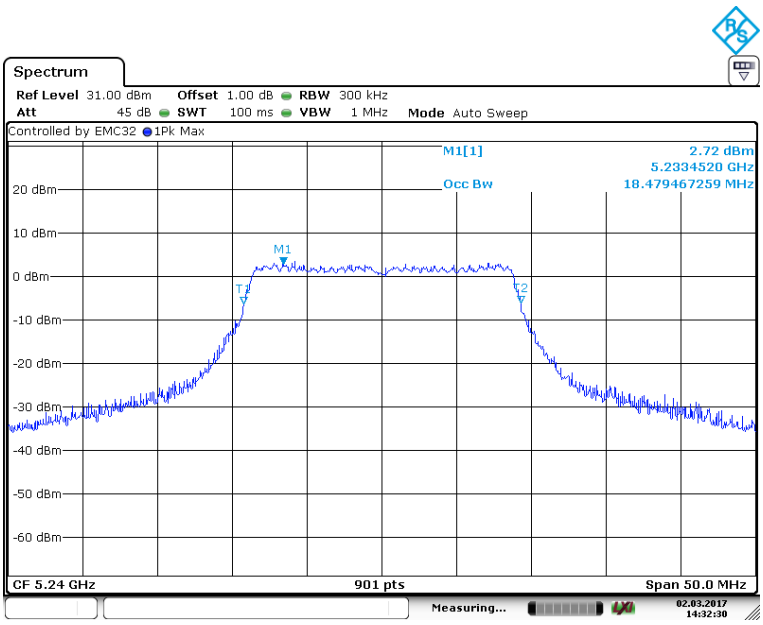
Channel 44: 5220 MHz:





Channel 48: 5240 MHz:

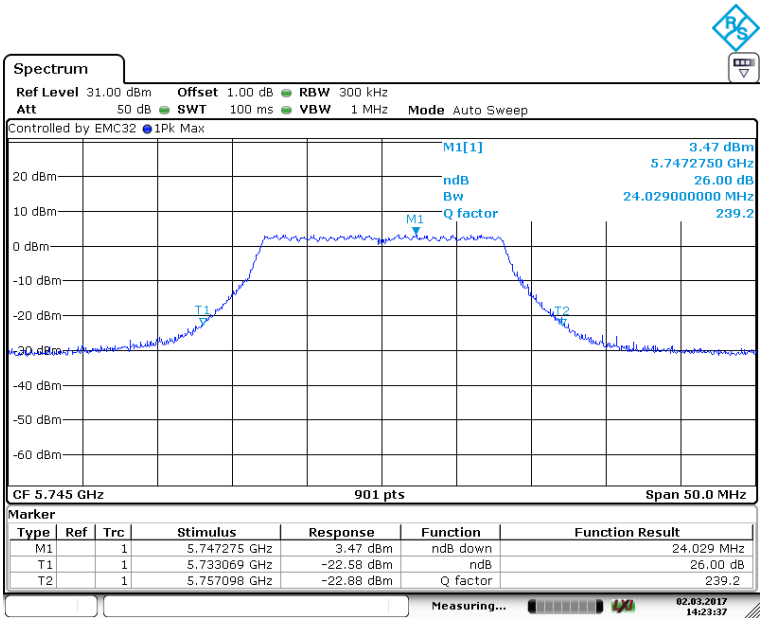


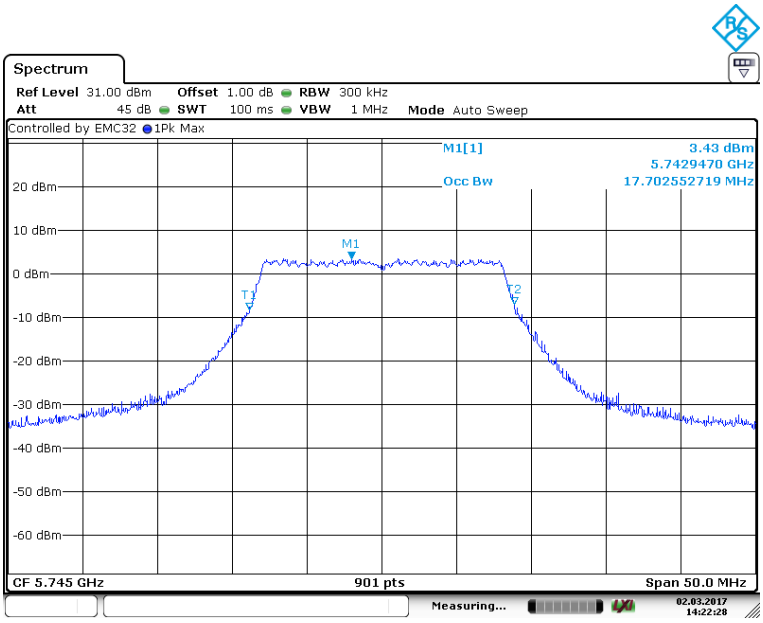


Result plot as follows:

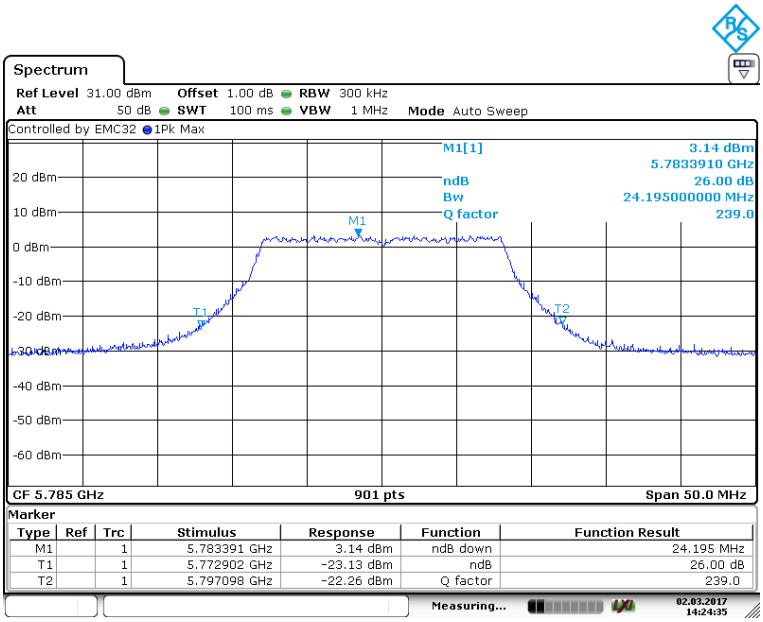
Band IV 5725 MHz to 5850 MHz

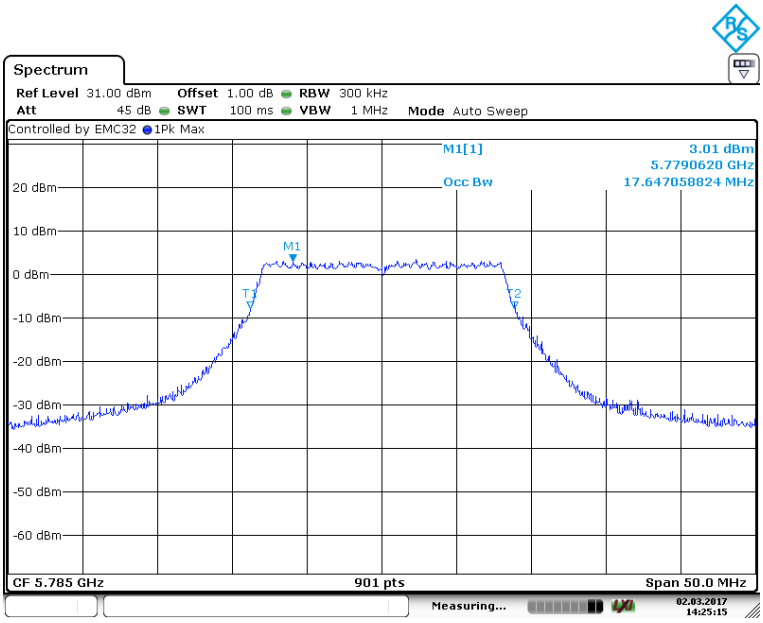
802.11a(20) mode
Channel 149: 5745 MHz:



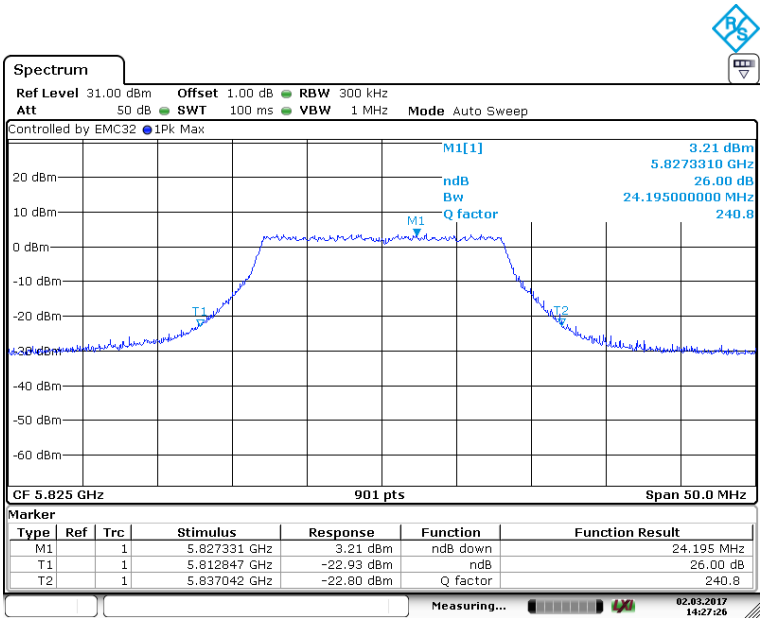


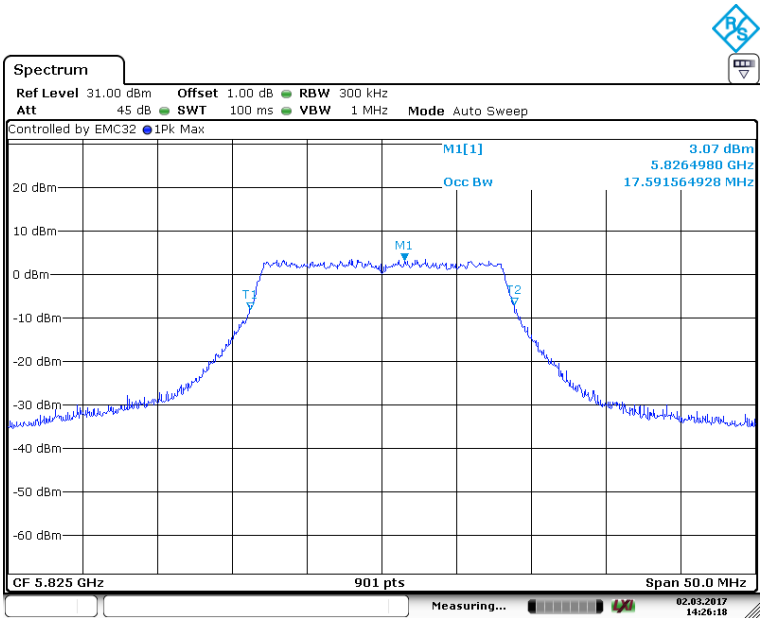
Channel 157: 5785 MHz:



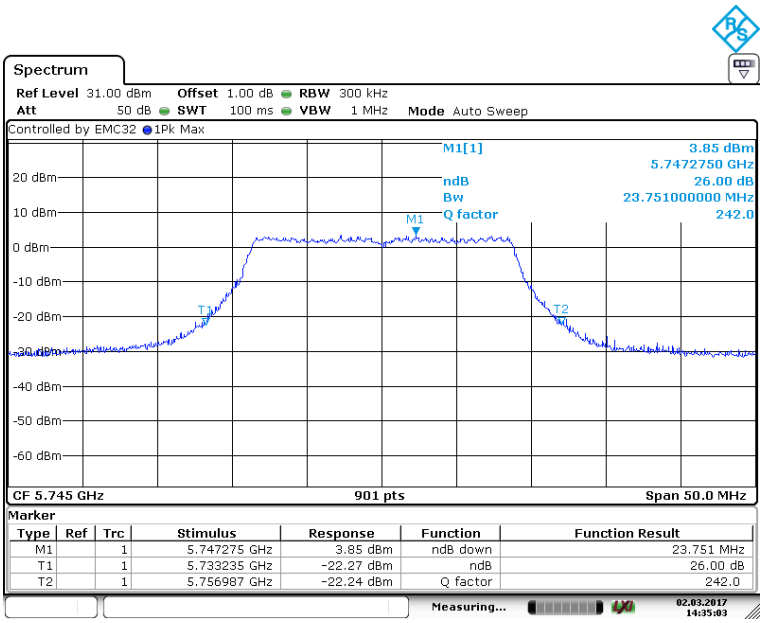


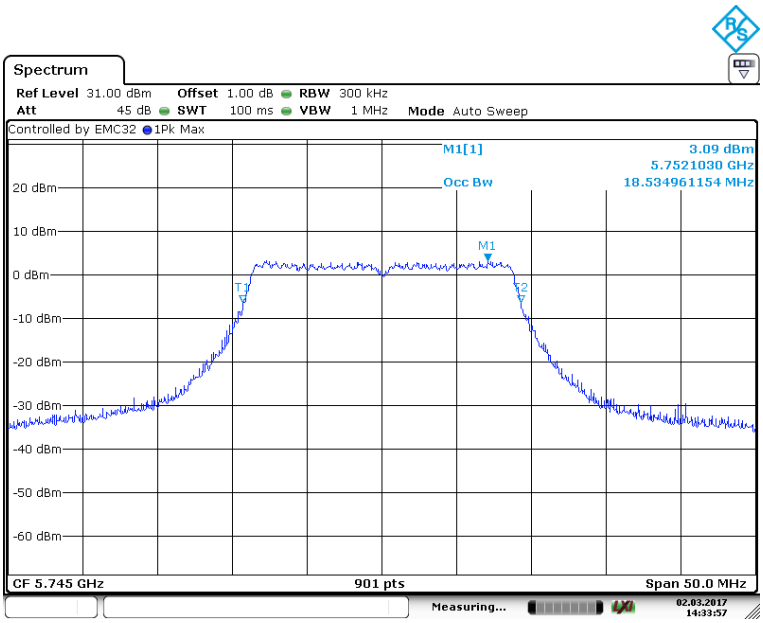
Channel 165: 5825 MHz:



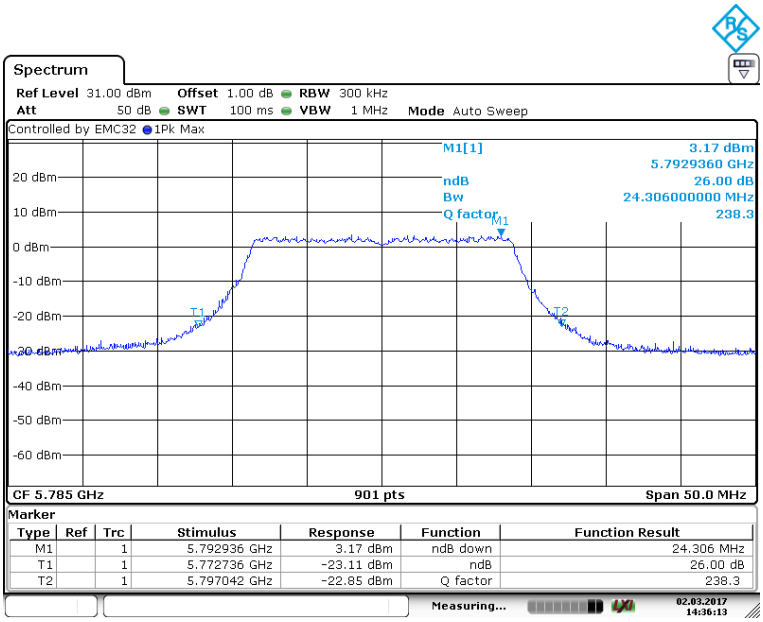


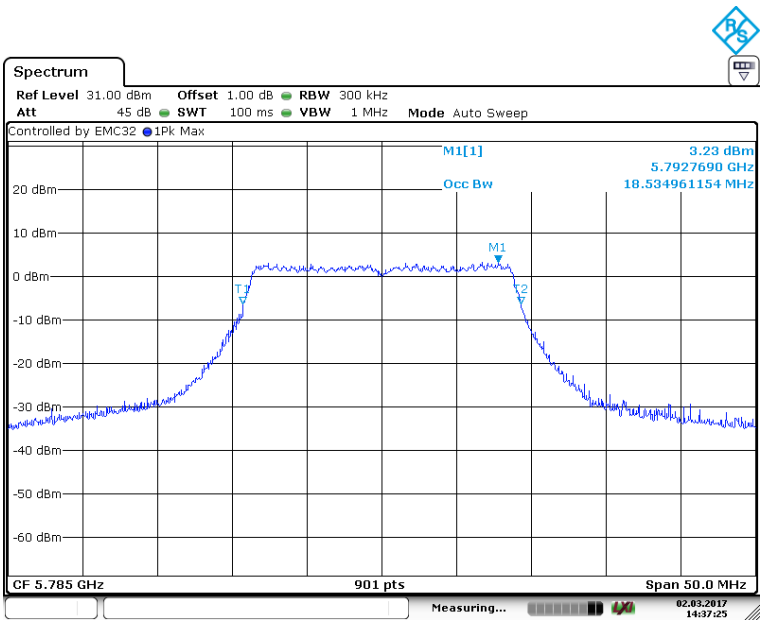
802.11n(HT 20)
Channel 149: 5745 MHz:



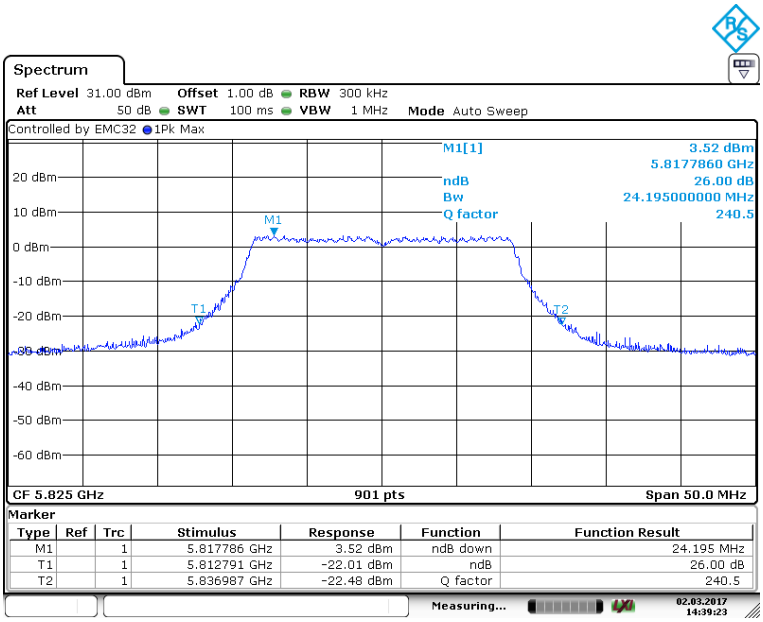


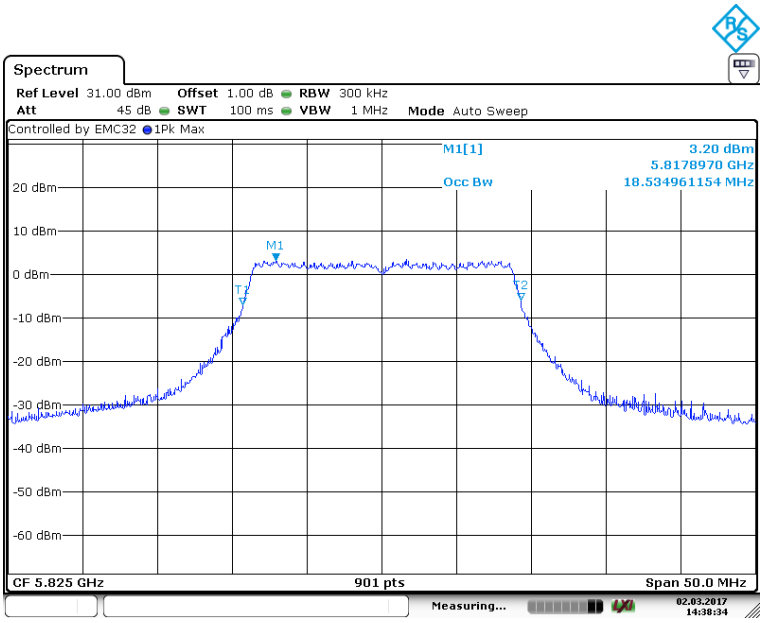
Channel 157: 5785 MHz:





Channel 165: 5825 MHz:

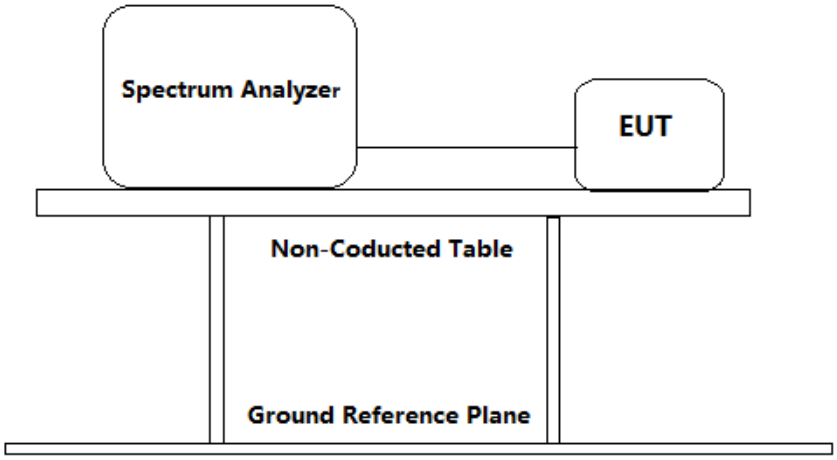




4.4 6 dB Bandwidth:

Test Requirement:	FCC PART 15 C clause 15.407(e) Within the 5.725–5.85 GHz band the minimum 6 dB bandwidth of U–NII devices shall be at least 500 kHz.
Test Method:	FCC KDB 789033 D02 General UNII Test Procedures New Rules v01r03,Clause C
Test Status:	Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, data rates and antenna ports (if EUT with antenna diversity architecture). Following channel(s) was (were) selected for the final test as listed below.

Test Configuration:



Test Procedure:

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

2. Set the spectrum analyzer:

a) Set RBW = 100 kHz
b) Set the VBW≥ [3 × RBW]
c) Detector = peak.
d) Trace mode = max hold.
e) Sweep = auto couple
f) Allow the trace to stabilize.
g) Measure the maximum width of the emission that is constrained by the frequencies associated with the two outermost amplitude points (upper and lower frequencies) that are attenuated by 6 dB relative to the maximum level measured in the fundamental emission.

3. Repeat until all the test status is investigated.
4. Report the worst case.

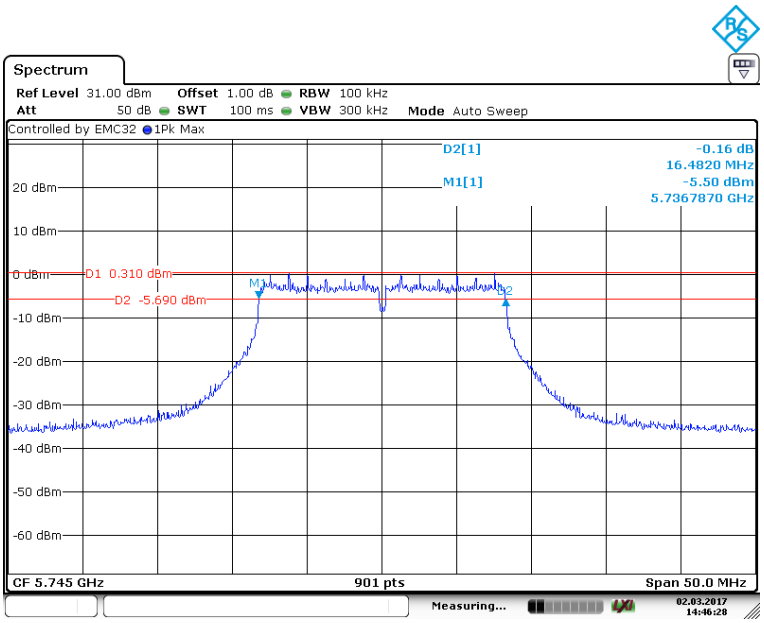
Channel No.	Frequency (MHz)	Mode	Data Rate	6dB bandwidth (MHz)	Limit	Result
149	5745	802.11a(20)	24 Mbps	16.48	≥500kHz	Pass
157	5785		24 Mbps	16.53		Pass
165	5825		24 Mbps	16.42		Pass
149	5745	802.11n (HT20)	MCS 4	17.75		Pass
157	5785		MCS 4	17.70		Pass
165	5825		MCS 4	17.64		Pass

Test result: The unit does meet the FCC requirements.

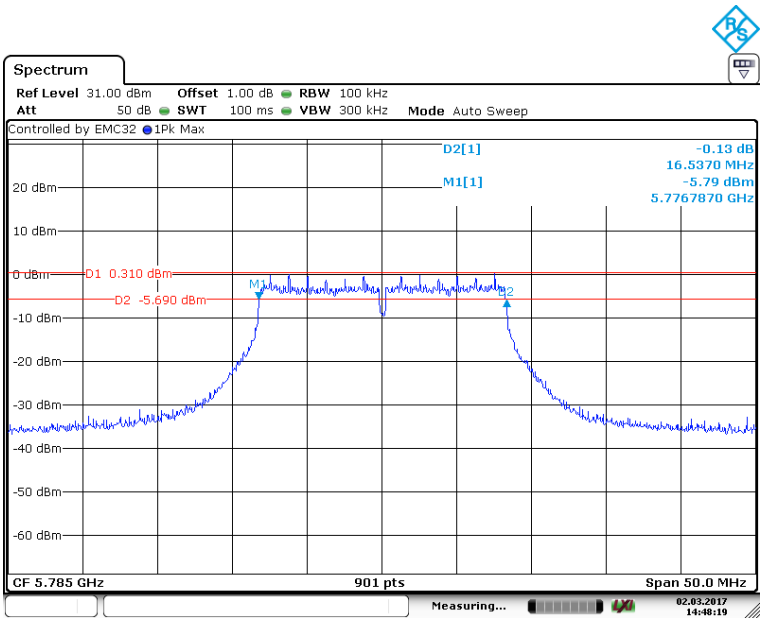
Result plot as follows:

Band IV 5725 MHz to 5850 MHz

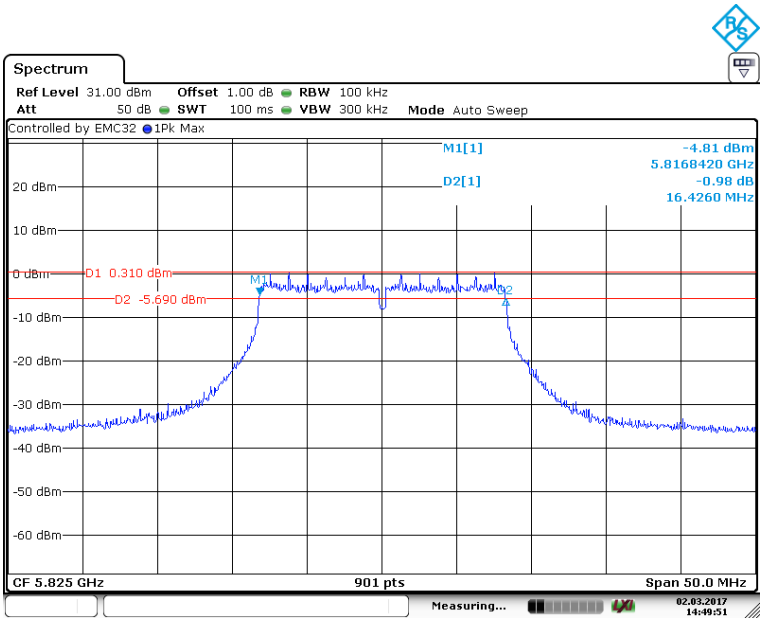
802.11a(20) mode
Channel 149: 5745 MHz:



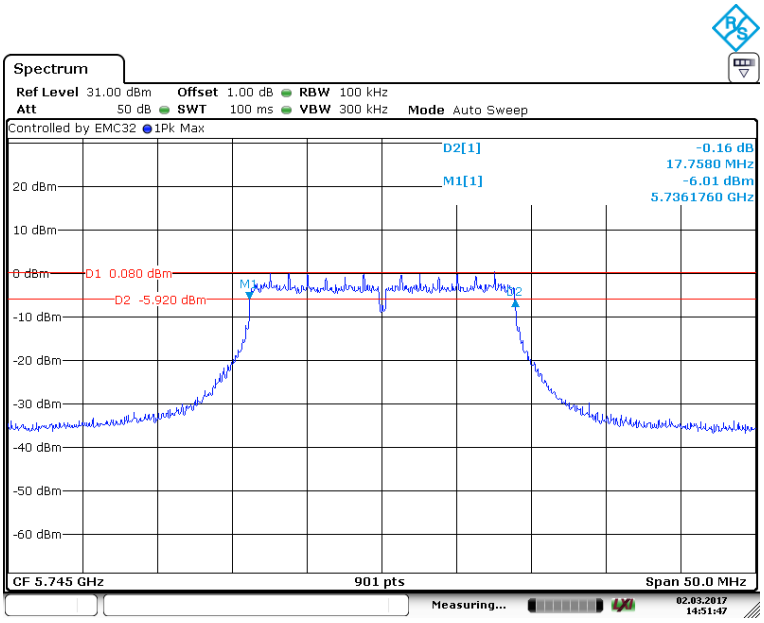
Channel 157: 5785 MHz:



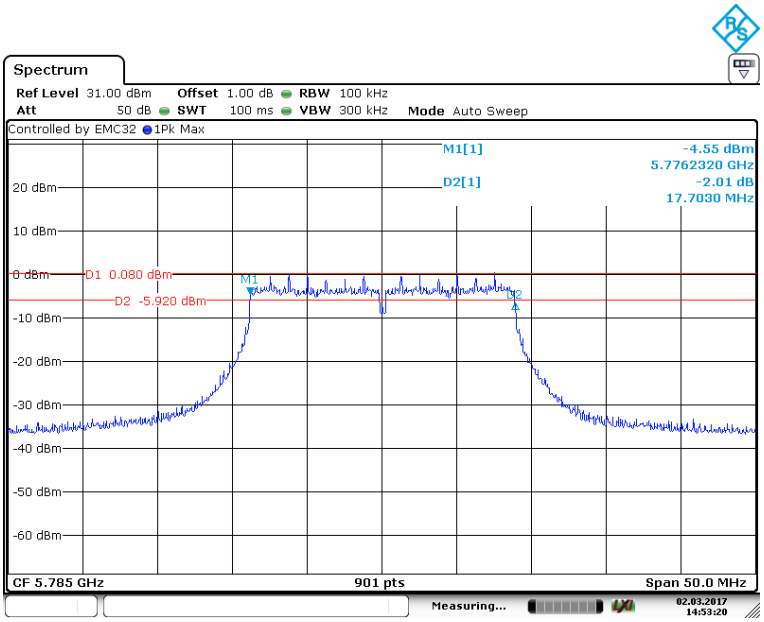
Channel 165: 5825 MHz:



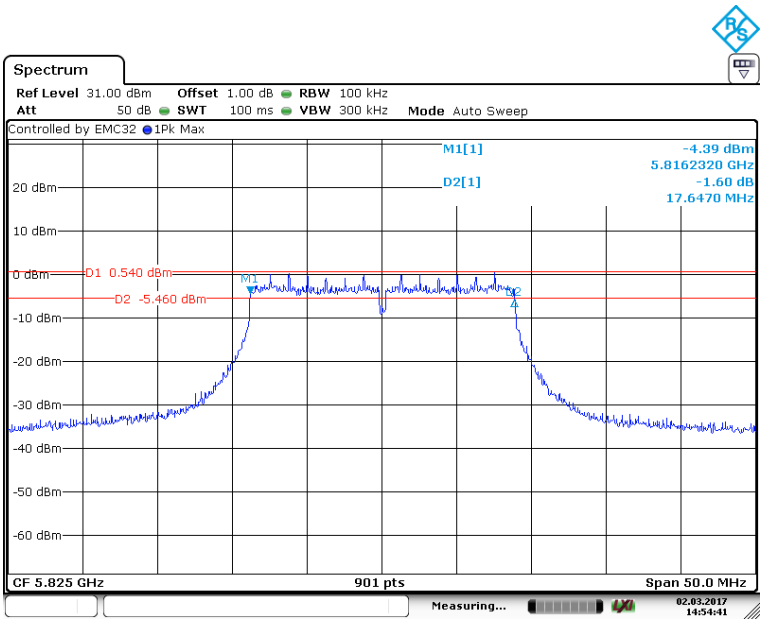
802.11n(HT 20)
Channel 149: 5745 MHz:



Channel 157: 5785 MHz:



Channel 165: 5825 MHz:



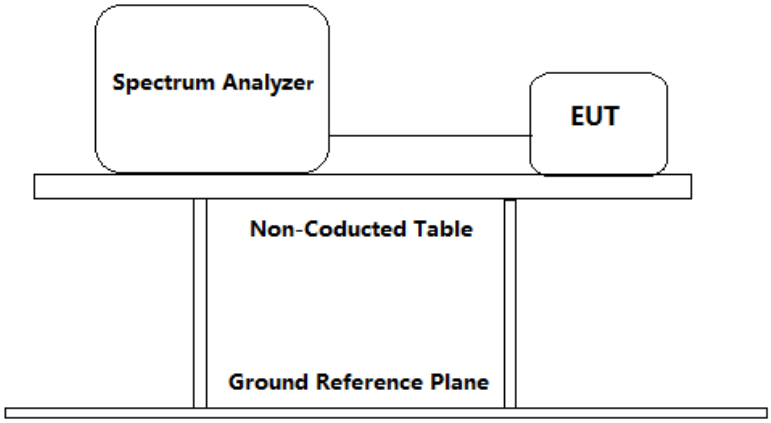
4.5 Maximum Conducted Output Power

Test Requirement: FCC Part 15 C clause 15.407(a)

Test Method: FCC KDB 789033 D02 General UNII Test Procedures New Rules v01r03,Clause E

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

Test Configuration:



Test Procedure:

1. Remove the antenna from the EUT and then connect a low attention attenuation RF cable (cable loss =1 dB) from the antenna port to the spectrum.
2. Set the spectrum analyzer:
   a) Set the RBW = 1 MHz.
   b) Set the VBW⩾[3 × RBW].
   c) Set the span⩾26 dB Bandwidth
   d) Number of points in sweep ⩾ 2 Span / RBW
   e) Detector = RMS
   f) Sweep time = auto couple.
   g) Trace mode = max hold.
   h) Allow trace to fully stabilize.
   i) Use the instrument's band/channel power measurement function with the band limits set equal to the 26 dB Bandwidth.
3. Repeat until all the test status is investigated.
4. Report the worst case.

Test result:

Data Rate selection

Mode.	Data Rate (Mbps)	Test Result (dBm)
		5180MHz
802.11a(20)	6	11.45
	9	11.40
	12	11.38
	18	11.47
	24	11.54
	36	11.39
	48	11.42
	54	11.48
Worse case	24	11.54

Mode.	Data Rate	Test Result (dBm)
		5180MHz
802.11n (HT20)	MCS0	11.42
	MCS1	11.49
	MCS2	11.42
	MCS3	11.60
	MCS4	11.64
	MCS5	11.56
	MCS6	11.52
	MCS7	11.50
Worse case	MCS4	11.64

Maximum Conducted Output Power
Band I (5150MHz-5250MHz)

Channel No.	Frequency (MHz)	Mode	Data Rate	Maximum Conducted output power (dBm)	Limit dBm	Result
36	5180	802.11a(20)	24 Mbps	11.54	24	Pass
44	5220		24 Mbps	11.83		Pass
48	5240		24 Mbps	12.02		Pass
36	5180	802.11n (HT20)	MCS4	11.64		Pass
44	5220		MCS4	11.85		Pass
48	5240		MCS4	12.01		Pass

Band IV (5725MHz-5850MHz)

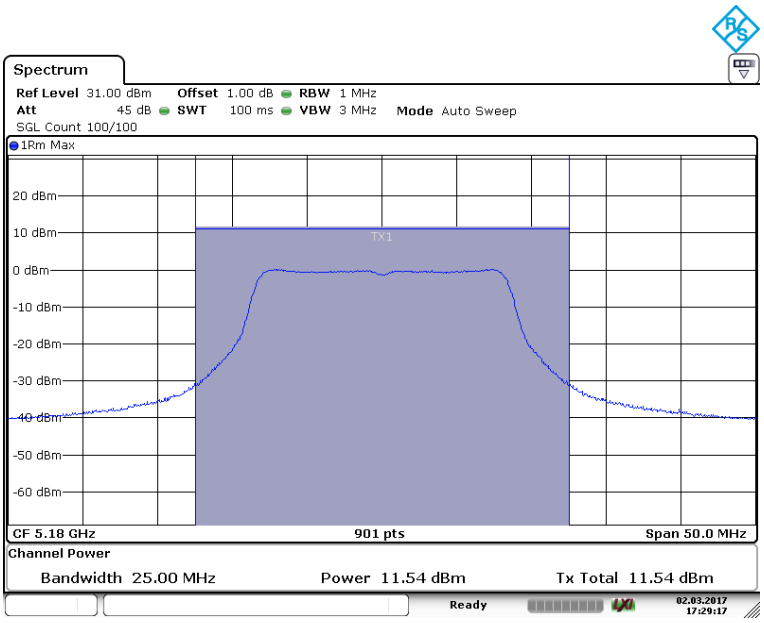
Channel No.	Frequency (MHz)	Mode	Data Rate	Maximum Conducted output power (dBm)	Limit dBm	Result
149	5745	802.11a(20)	24 Mbps	12.18	30	Pass
157	5785		24 Mbps	11.98		Pass
165	5825		24 Mbps	12.09		Pass
149	5745	802.11n (HT20)	MCS4	12.22		Pass
157	5785		MCS4	12.16		Pass
165	5825		MCS4	12.13		Pass

Remark: Level = Read Level + Cable Loss (1 dB).
The unit does meet the FCC requirements.

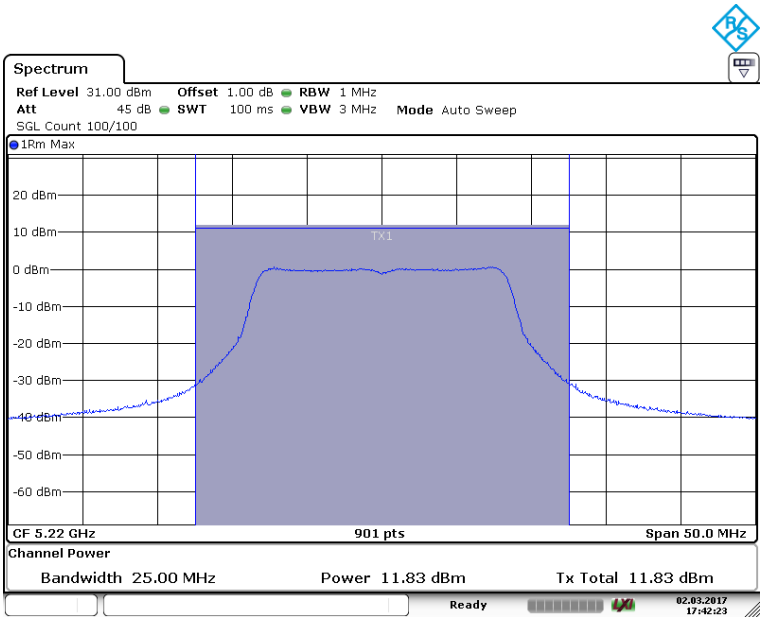
Result plot as follows:

Band I 5150 MHz to 5250 MHz

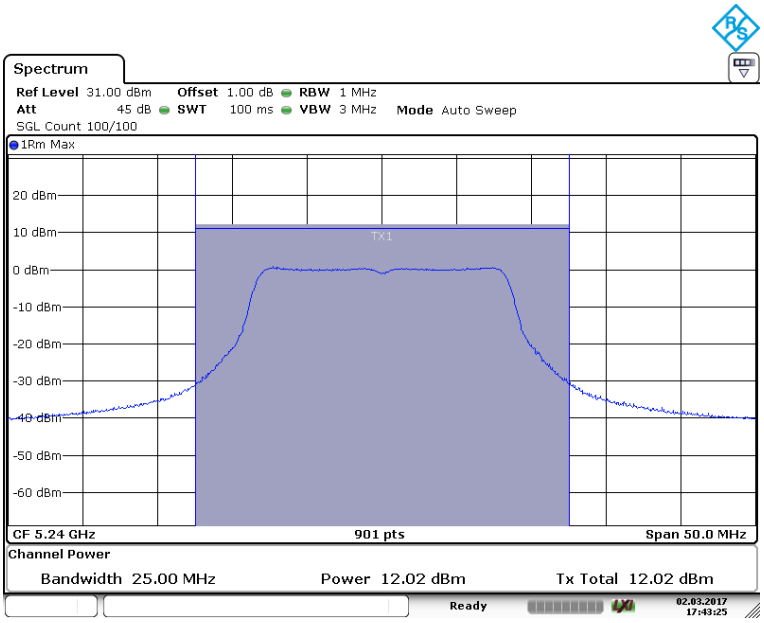
802.11a(20) mode
Channel 36: 5180 MHz:



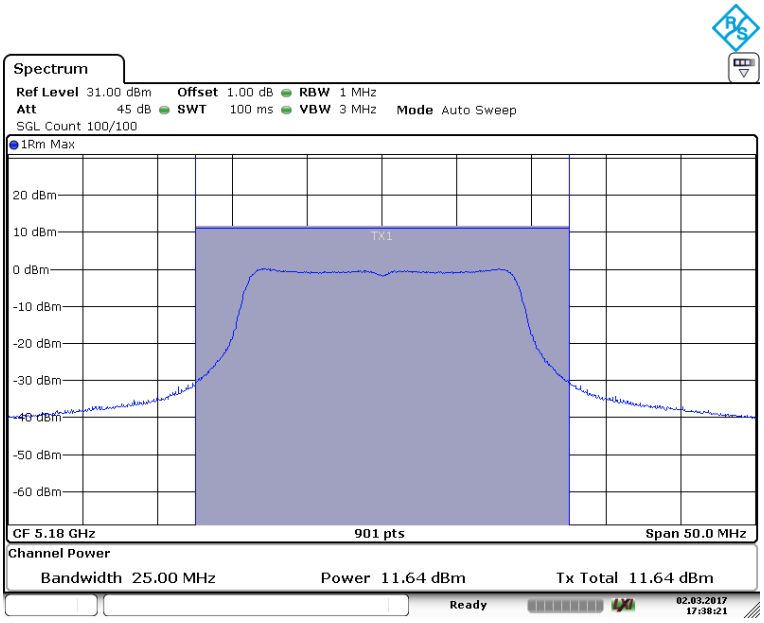
Channel 44: 5220 MHz:



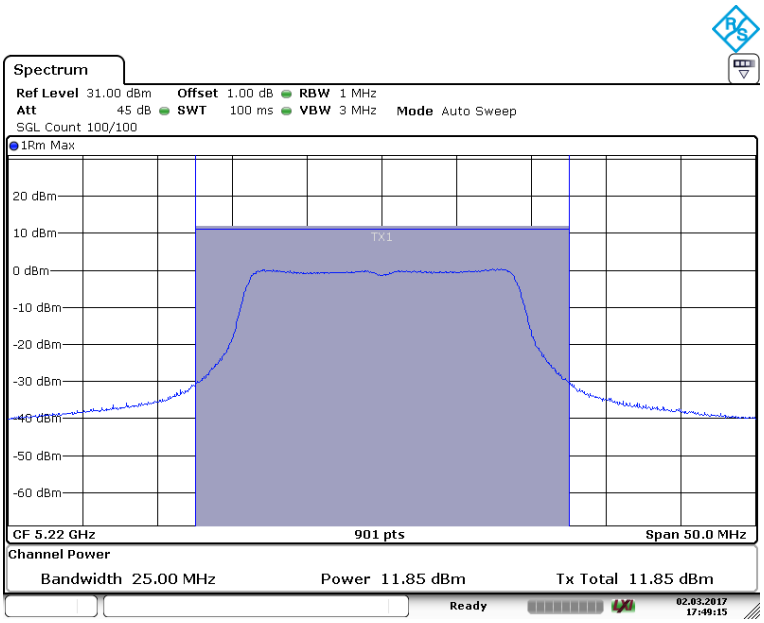
Channel 48: 5240 MHz:



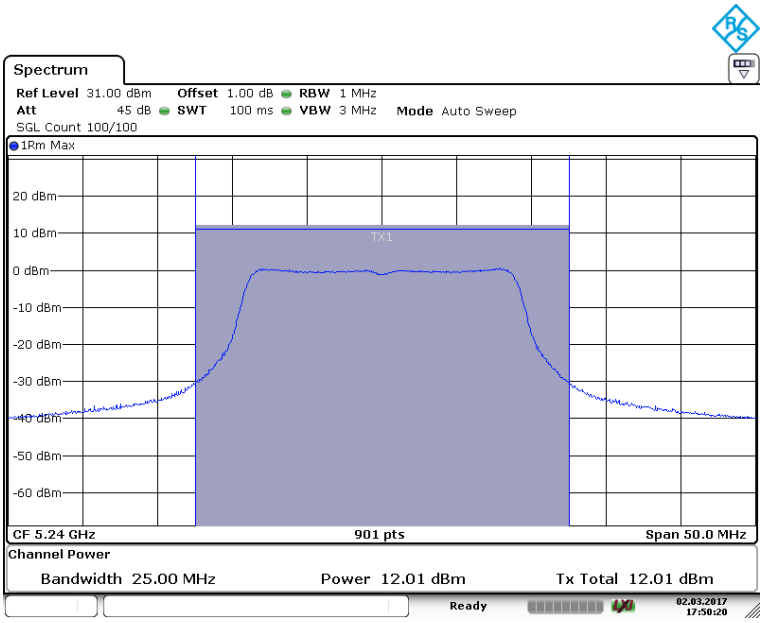
802.11n(HT 20)
Channel 36: 5180 MHz:



Channel 44: 5220 MHz:



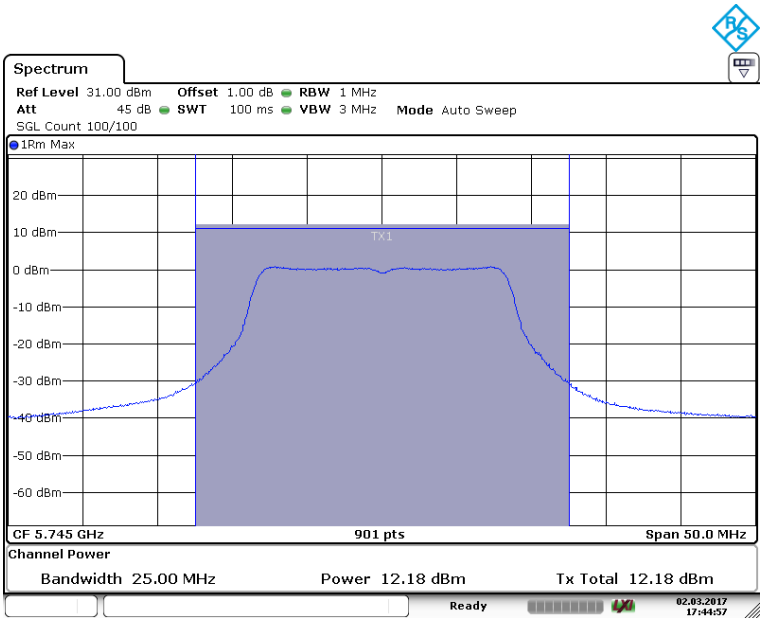
Channel 48: 5240 MHz:



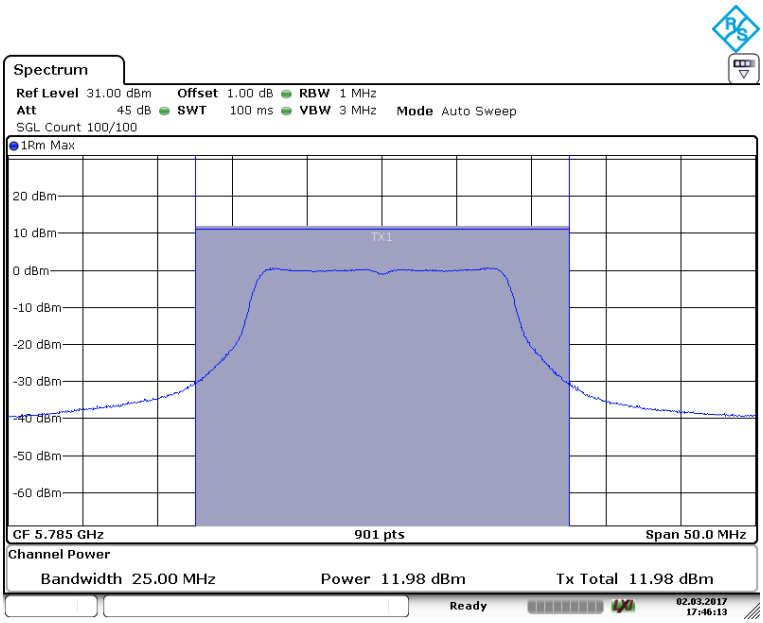
Result plot as follows:

Band IV 5725 MHz to 5850 MHz

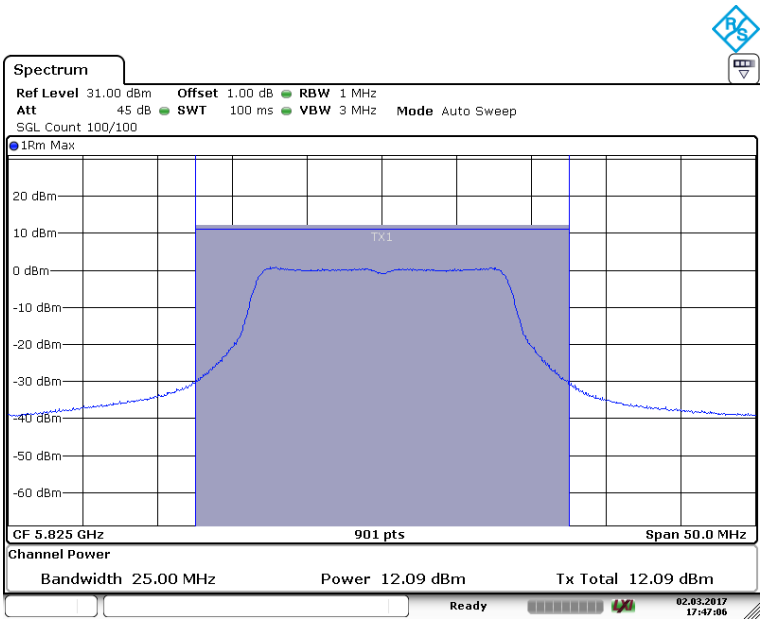
802.11a(20) mode
Channel 149: 5745 MHz:



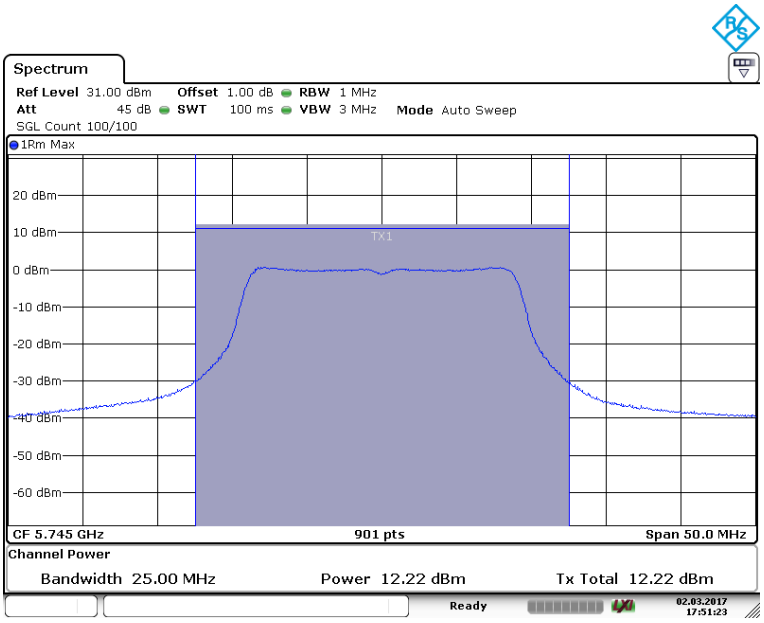
Channel 157: 5785 MHz:



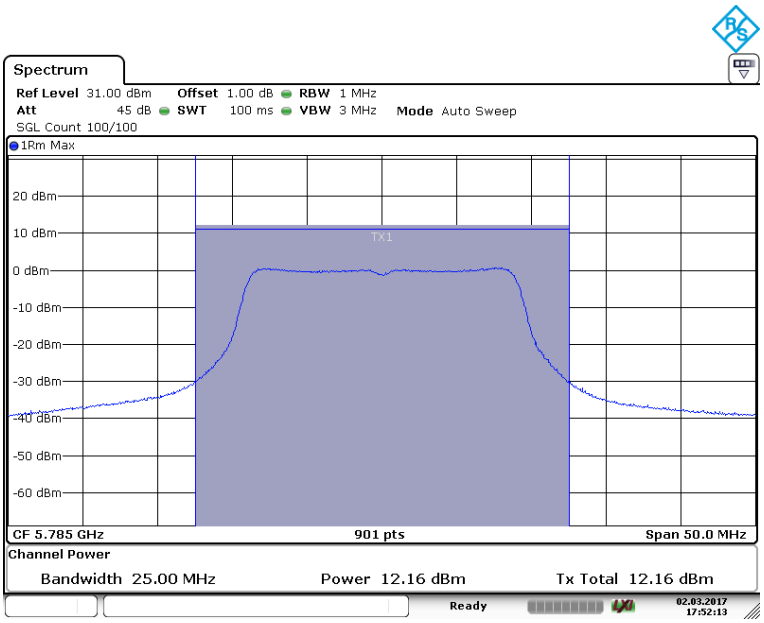
Channel 165: 5825 MHz:



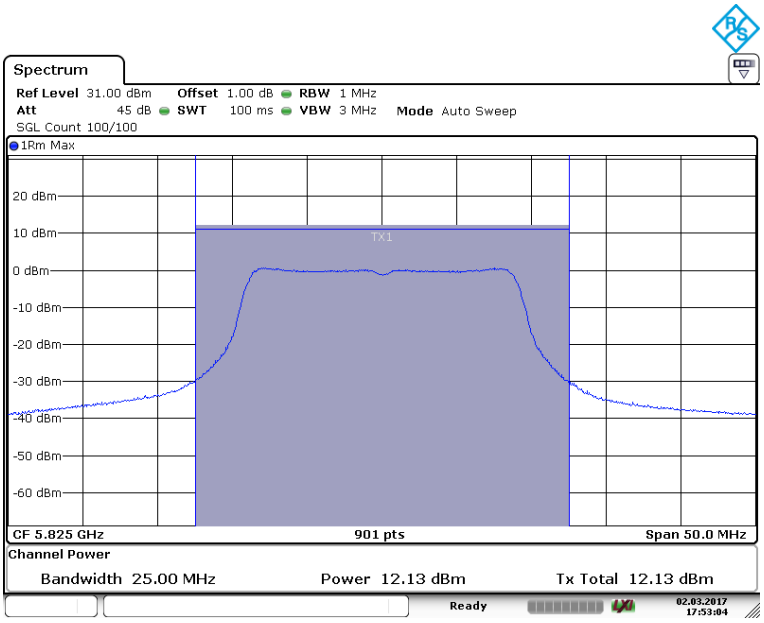
802.11n(HT 20)
Channel 149: 5745 MHz:



Channel 157: 5785 MHz:



Channel 165: 5825 MHz:



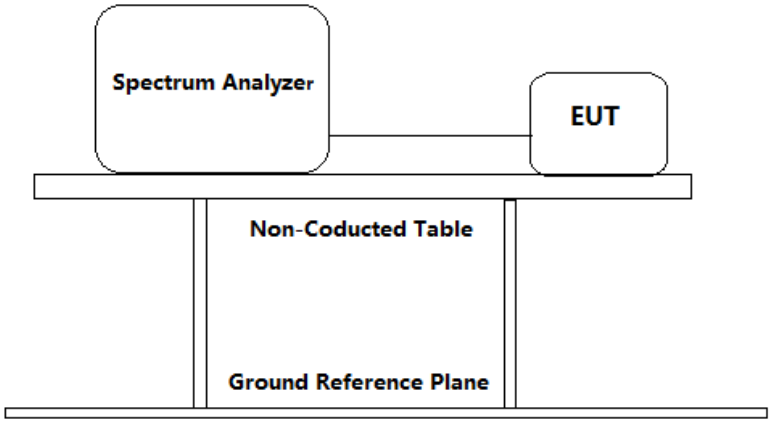
4.6 Maximum Peak Power Spectral Density

Test Requirement: FCC Part 15 C clause 15.407(a)

Test Method: FCC KDB 789033 D02 General UNII Test Procedures New Rules v01r03,Clause F

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

Test Configuration:



Test Procedure:

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

   For Band I (5150MHz-5250MHz)
   a) Set the RBW = 1MHz.
   b) Set the VBW≥ (3 × RBW).
   c) Set the span≥ 26 dB Bandwidth
   d) Detector = peak
   e) Sweep time = auto couple.
   f) Trace mode = max hold.
   g) Allow trace to fully stabilize.
   i) Use the peak marker function to determine the maximum amplitude level within the RBW.

   For Band IV (5725MHz-5850MHz)
   a) Set the RBW = 500kHz.
   b) Set the VBW≥ (3 × RBW).
   c) Set the span≥ 26 dB Bandwidth.
   d) Detector = peak
   e) Sweep time = auto couple.
   f) Trace mode = max hold.
   g) Allow trace to fully stabilize.
   i) Use the peak marker function to determine the maximum amplitude level within the RBW.Measure the Power Spectral Density of the test frequency with special test status.
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.

Band I (5150MHz-5250MHz)

Channel No.	Frequency (MHz)	Mode	Data Rate	Maximum Power Spectral Density (dBm/MHz)	Limit	Result
36	5180	802.11a(20)	24 Mbps	9.24	11dBm/ MHz	Pass
44	5220		24 Mbps	9.53		Pass
48	5240		24 Mbps	9.57		Pass
36	5180	802.11an (HT20)	MCS4	10.08		Pass
44	5220		MCS4	10.57		Pass
48	5240		MCS4	9.50		Pass

Band IV (5725MHz-5850MHz)

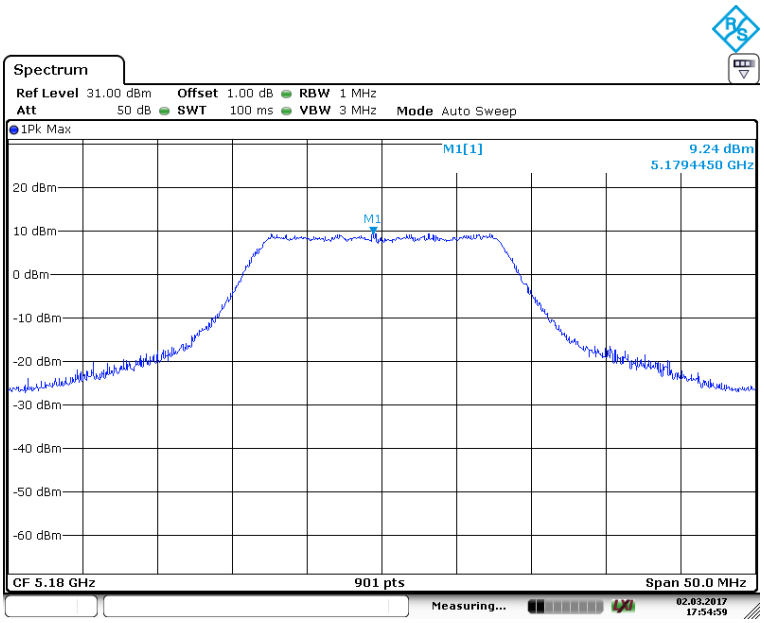
Channel No.	Frequency (MHz)	Mode	Data Rate	Maximum Power Spectral Density (dBm/500kHz)	Limit	Result
149	5745	802.11a(20)	24 Mbps	6.65	30dBm/ 500kHz	Pass
157	5785		24 Mbps	7.27		Pass
165	5825		24 Mbps	6.57		Pass
149	5745	802.11an (HT20)	MCS4	7.03		Pass
157	5785		MCS4	6.18		Pass
165	5825		MCS4	6.49		Pass

Test result: Level = Read Level + Cable Loss(1dB).
The unit does meet the FCC requirements.

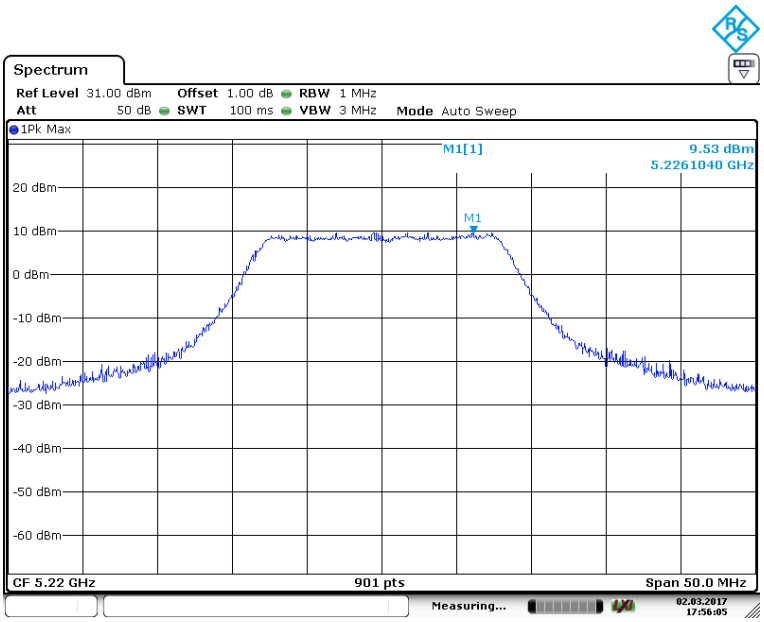
Result plot as follows:

Band I 5150 MHz to 5250 MHz

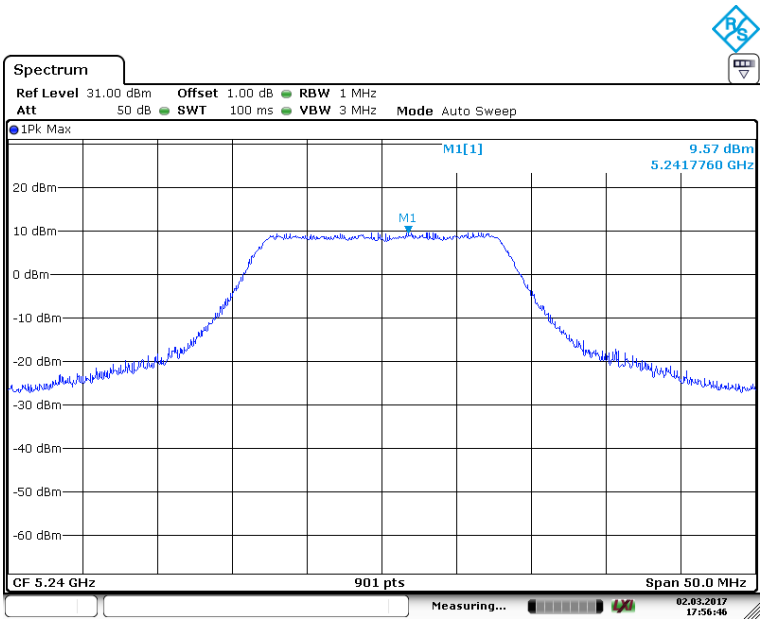
802.11a(20) mode
Channel 36: 5180 MHz:



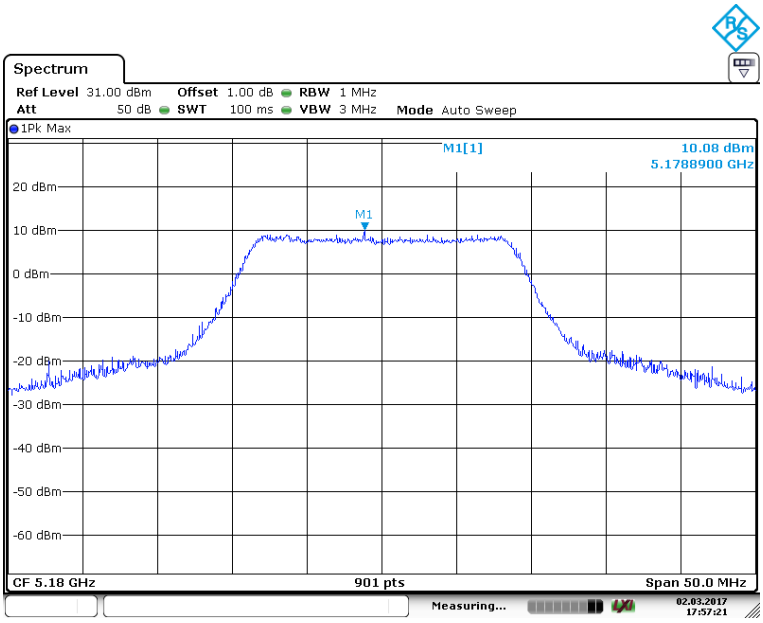
Channel 44: 5220 MHz:



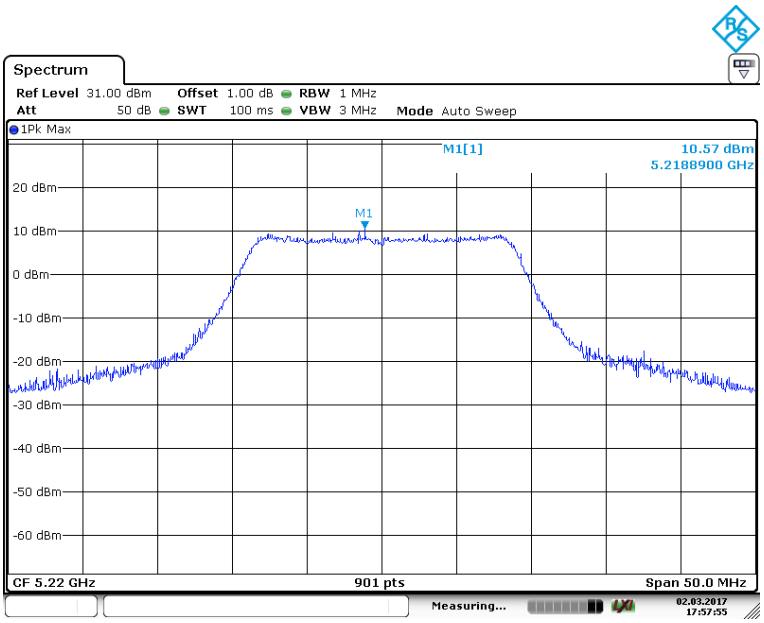
Channel 48: 5240 MHz:



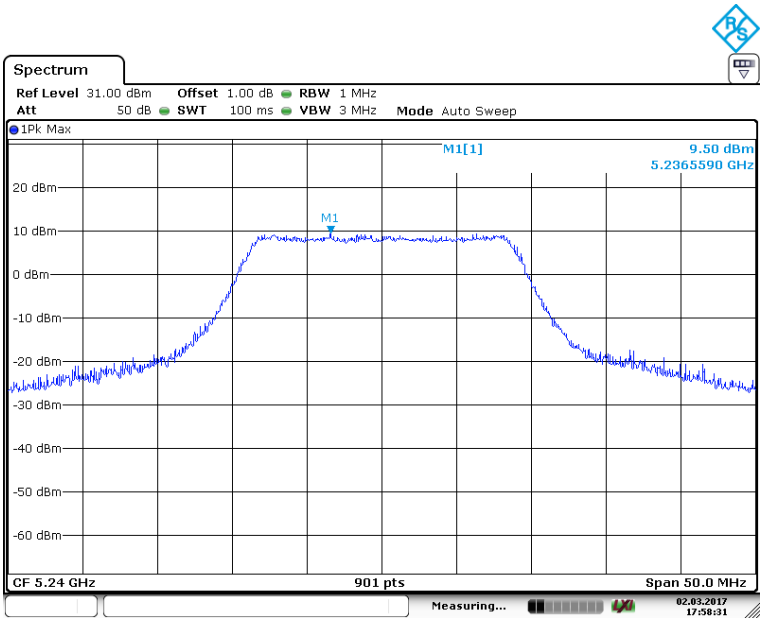
802.11n(HT 20)
Channel 36: 5180 MHz:



Channel 44: 5220 MHz:



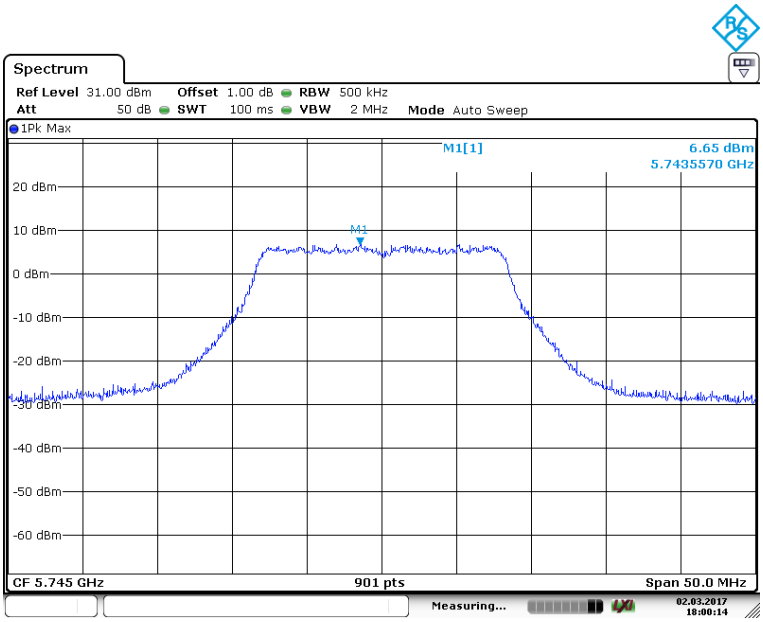
Channel 48: 5240 MHz:



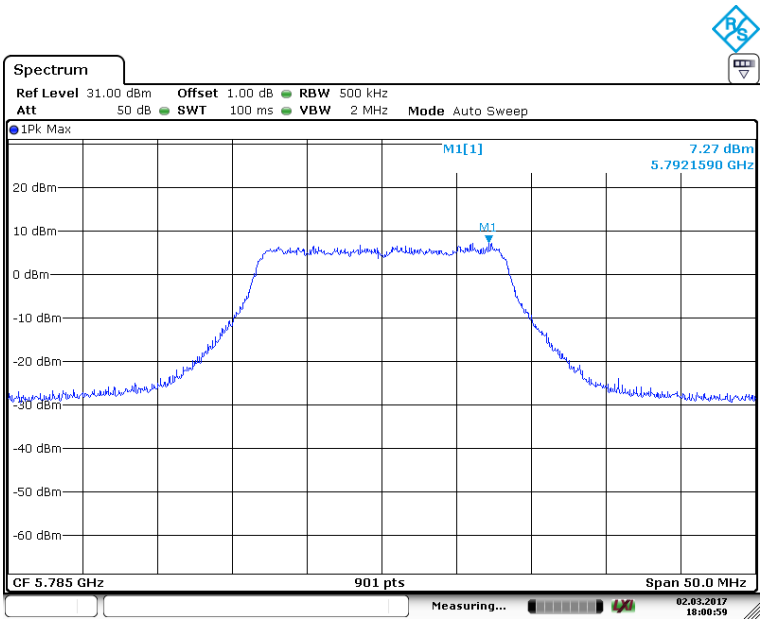
Result plot as follows:

Band IV 5725 MHz to 5850 MHz

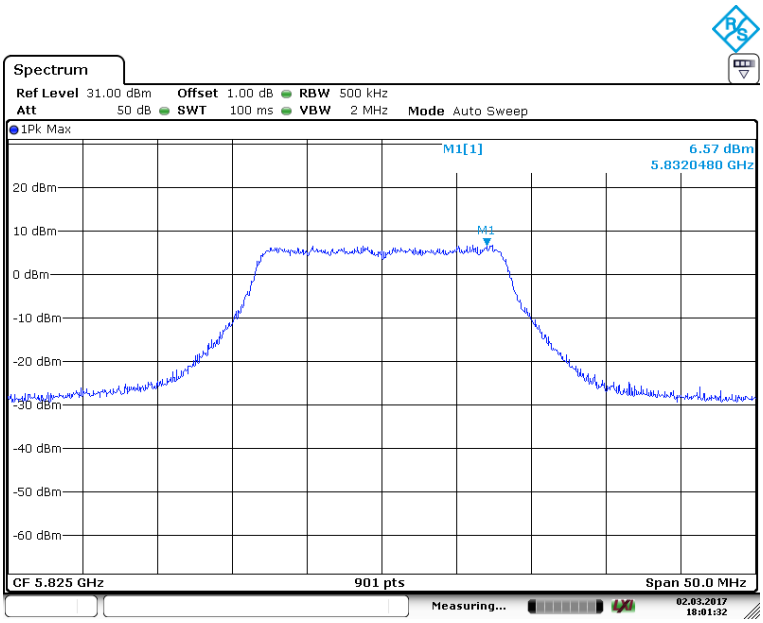
802.11a(20) mode
Channel 149: 5745 MHz:



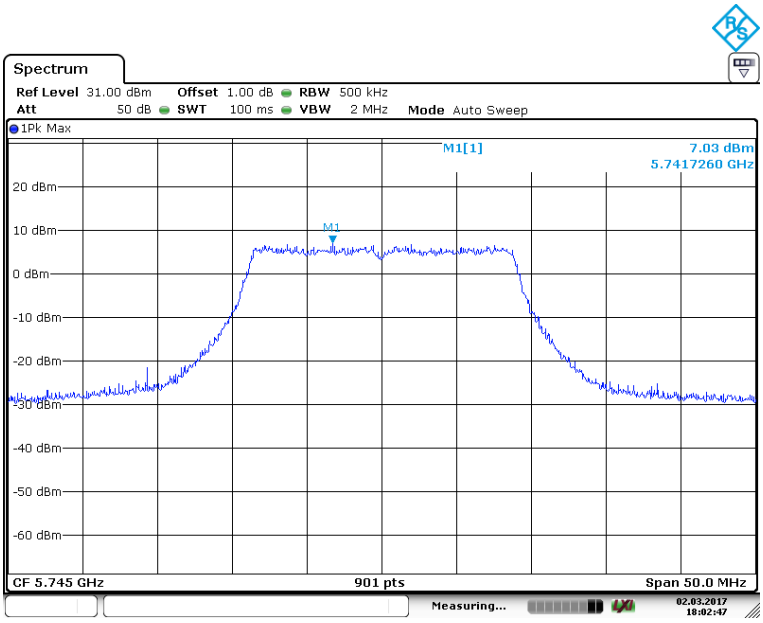
Channel 157: 5785 MHz:



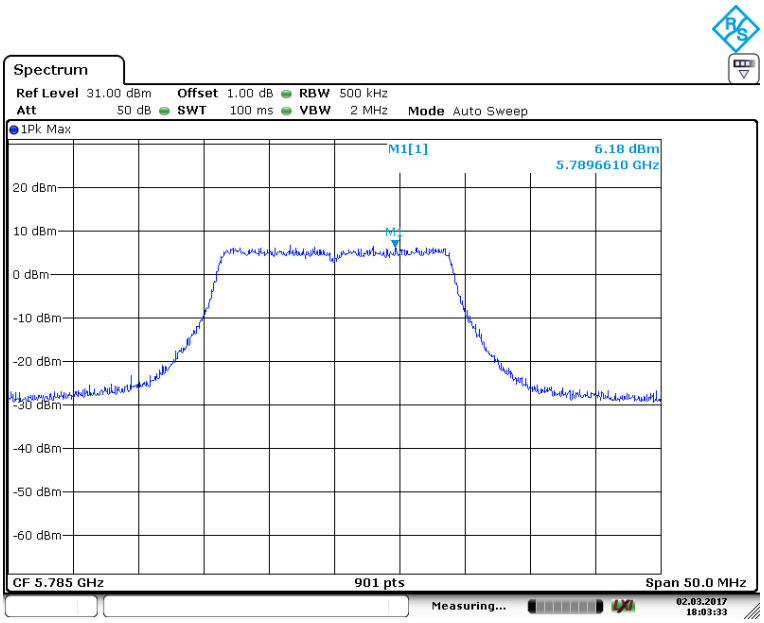
Channel 165: 5825 MHz:



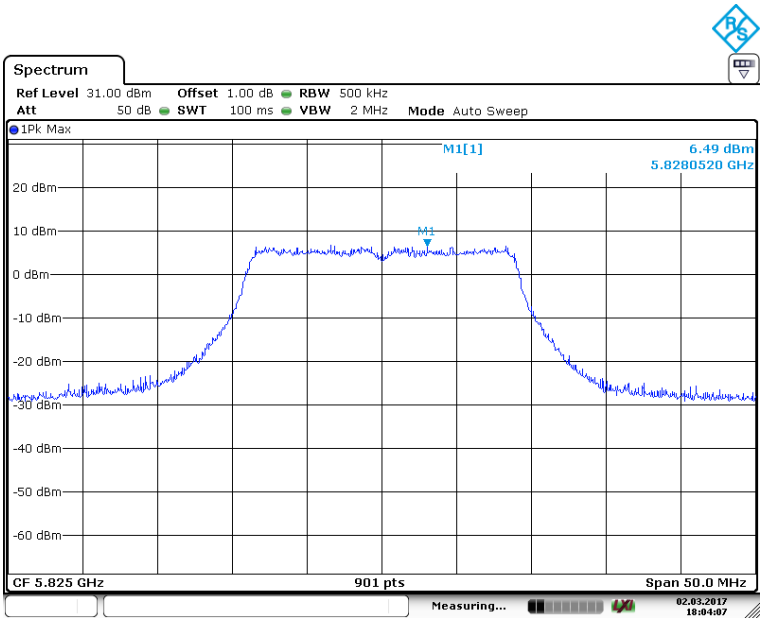
802.11n(HT 20)
Channel 149: 5745 MHz:



Channel 157: 5785 MHz:



Channel 165: 5825 MHz:



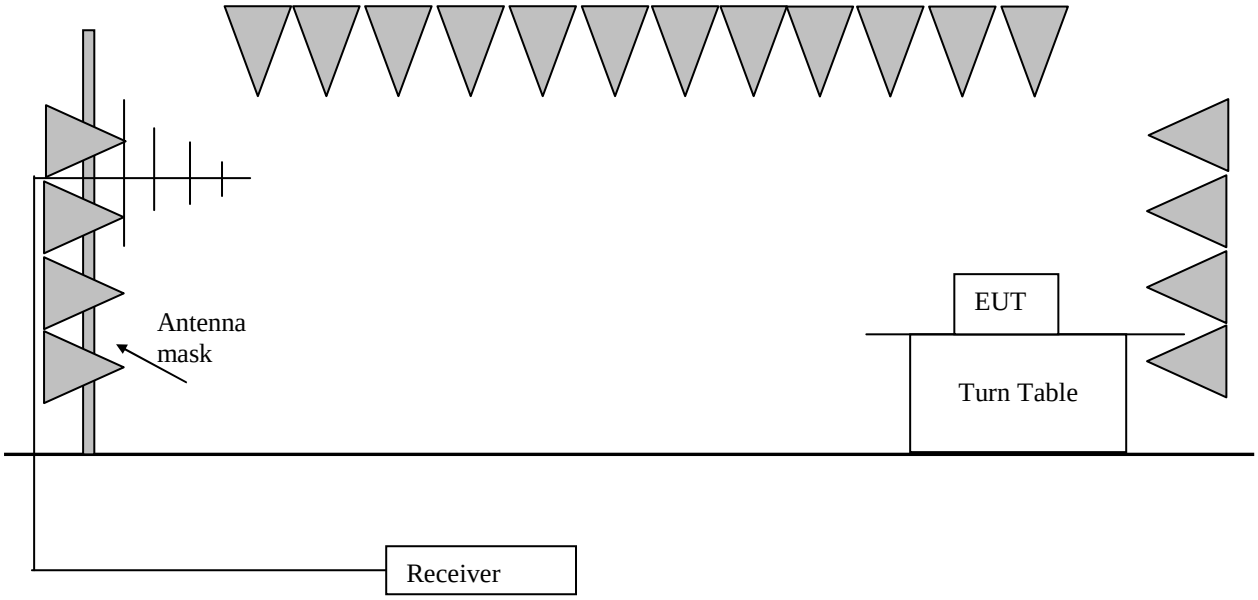
4.7 Radiated Spurious Emissions

Test Requirement:	FCC Part 15 C clause 15.407(b) 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:	FCC KDB 789033 D02 General UNII Test Procedures New Rules v01r03,Clause G
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

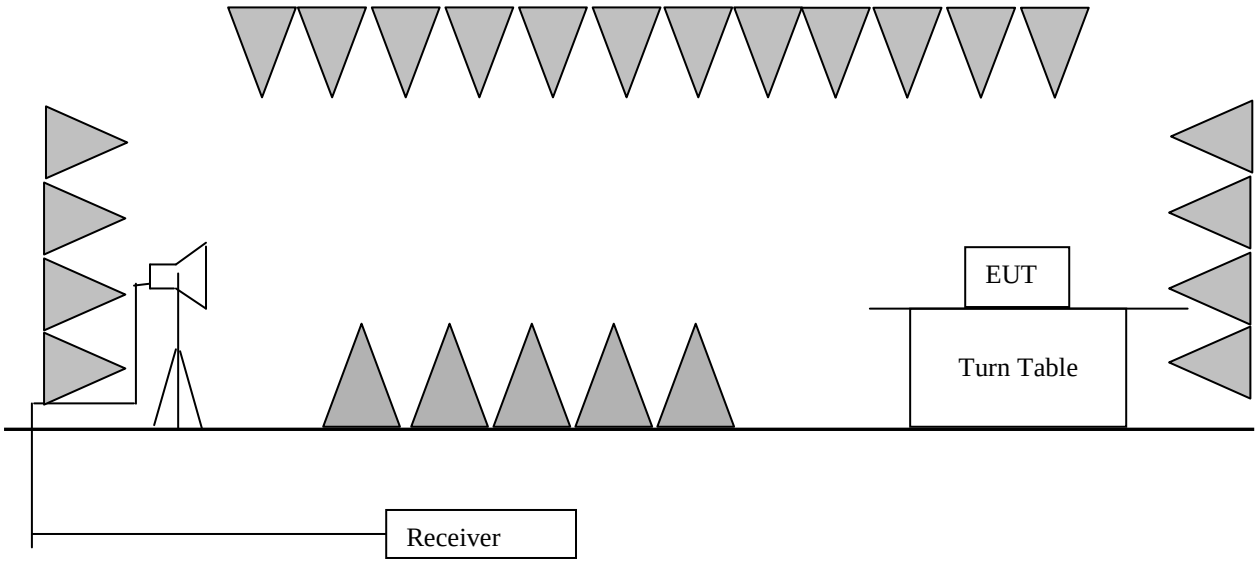
Section 15.205 Restricted bands of operation.
(a) Except as shown in paragraph (d) of this section. Only spurious emissions are permitted in any of the frequency bands listed below:

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

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 16-1-4:2010 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.

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.

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

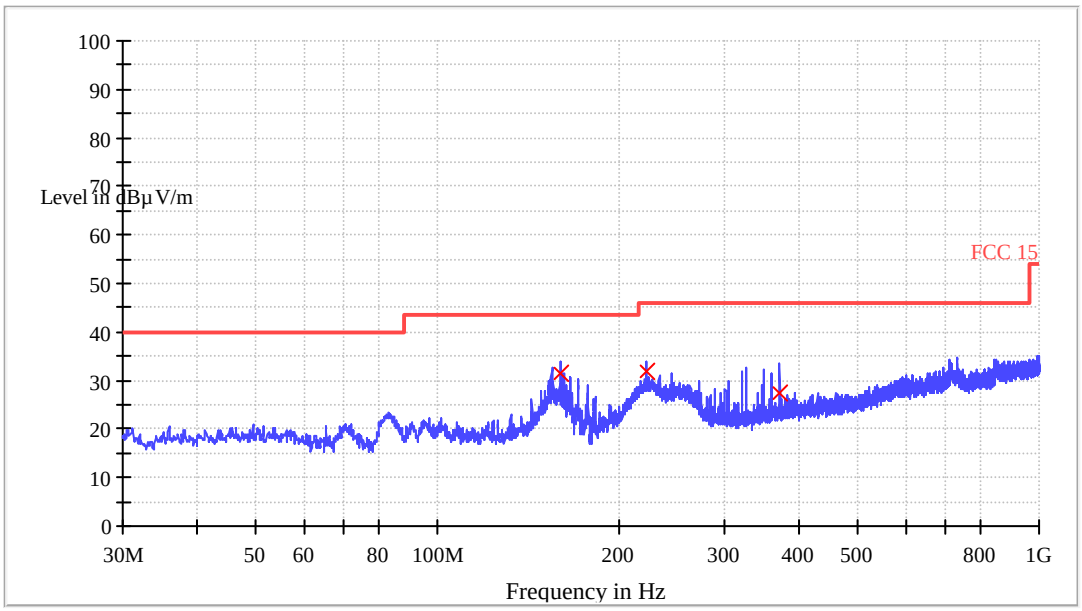
Pretest on the lowest channel, middle channel and highest channel for each mode of the brand I and brand IV.

Band I 5150 MHz to 5250 MHz

802.11a(20) mode

Channel 36: 5180 MHz:

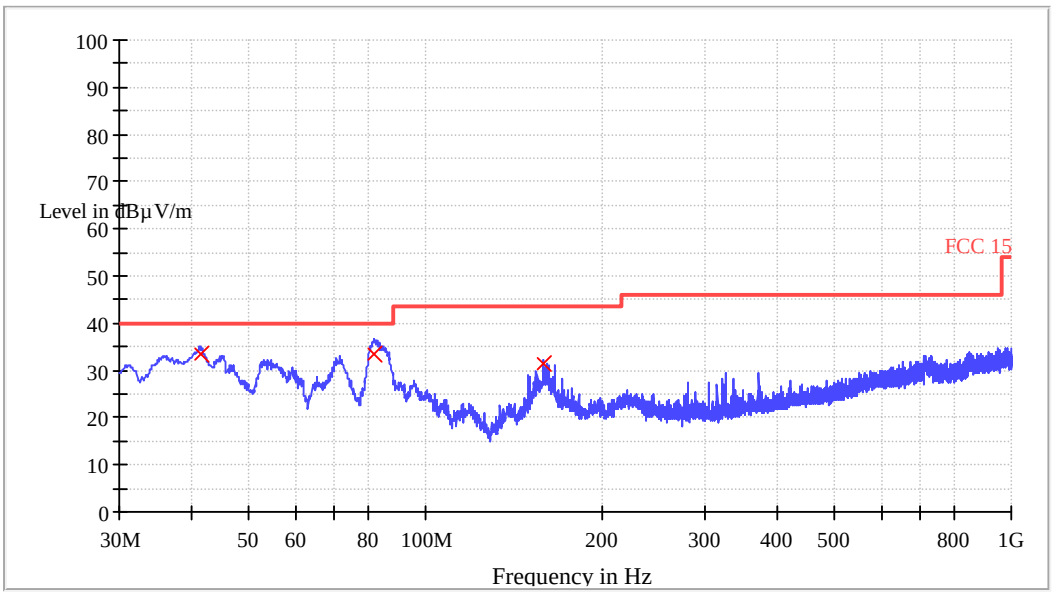
Horizontal:



QP

Frequency (MHz)	QuasiPeak (dBµV/m)	Bandwidth (kHz)	Pol	Corr. (dB)	Margin - QPK (dB)	Limit - QPK (dBµV/m)
159.960000	31.5	120.000	H	9.6	12.0	43.5
222.720000	31.9	120.000	H	13.3	14.1	46.0
371.200000	27.4	120.000	H	17.0	18.6	46.0

Vertical:

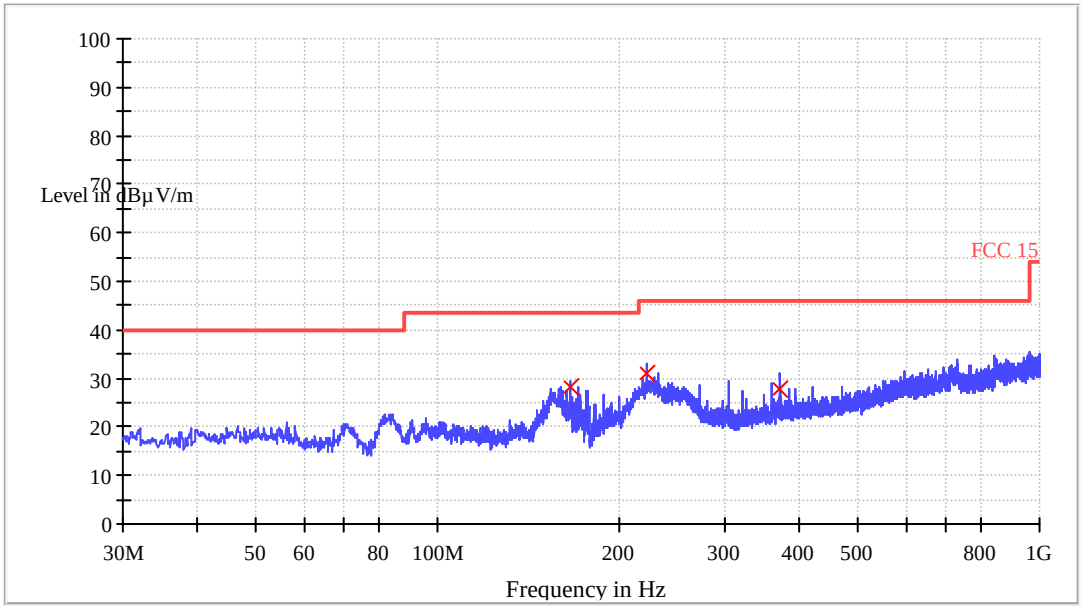


QP

Frequency (MHz)	QuasiPeak (dBµV/m)	Bandwidth (kHz)	Pol	Corr. (dB)	Margin - QPK (dB)	Limit - QPK (dBµV/m)
41.280000	33.4	120.000	V	13.5	6.6	40.0
81.760000	33.4	120.000	V	8.7	6.6	40.0
159.080000	31.4	120.000	V	9.5	12.1	43.5

Channel 36: 5220 MHz:

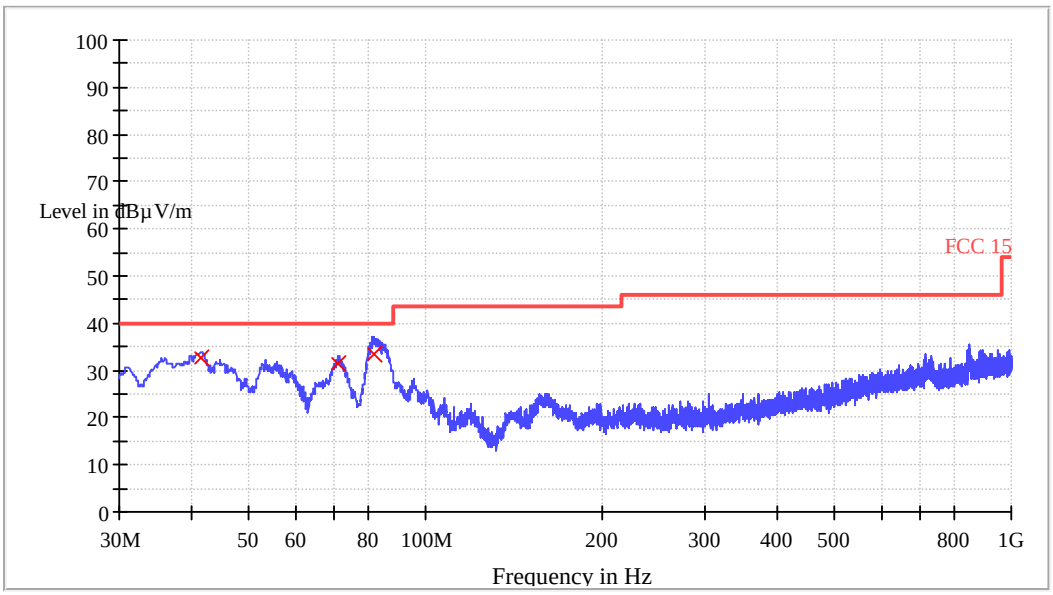
Horizontal:



QP

Frequency (MHz)	QuasiPeak (dBµV/m)	Bandwidth (kHz)	Pol	Corr. (dB)	Margin - QPK (dB)	Limit - QPK (dBµV/m)
166.200000	28.4	120.000	H	9.9	15.1	43.5
222.720000	31.1	120.000	H	13.3	14.9	46.0
371.200000	27.8	120.000	H	17.0	18.2	46.0

Vertical:

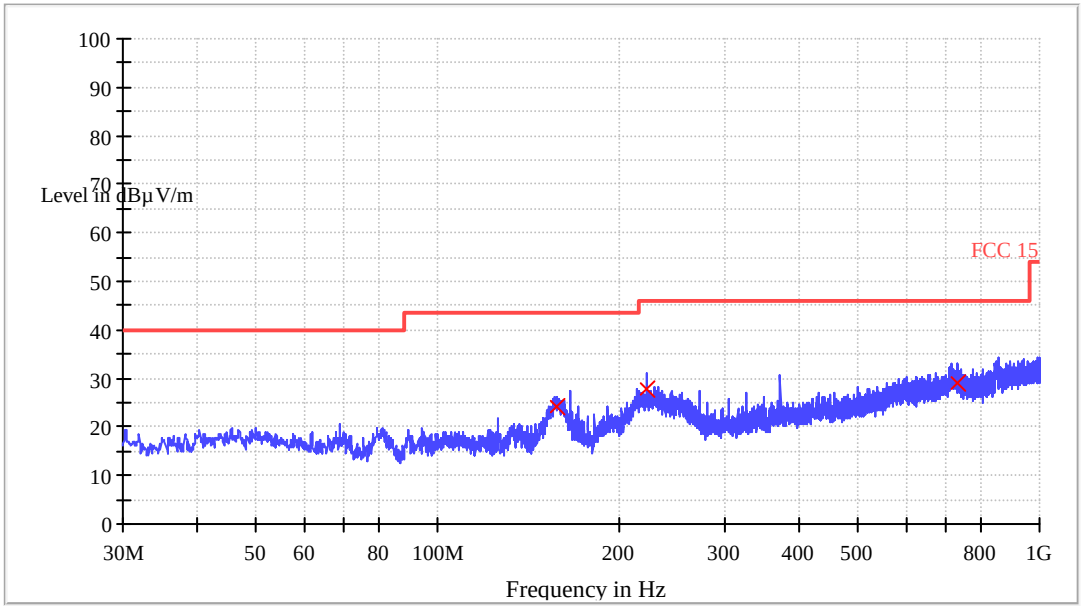


QP

Frequency (MHz)	QuasiPeak (dBµV/m)	Bandwidth (kHz)	Pol	Corr. (dB)	Margin - QPK (dB)	Limit - QPK (dBµV/m)
41.400000	32.5	120.000	V	13.5	7.5	40.0
71.080000	31.5	120.000	V	9.9	8.5	40.0
81.680000	33.5	120.000	V	8.7	6.5	40.0

Channel 36: 5240 MHz:

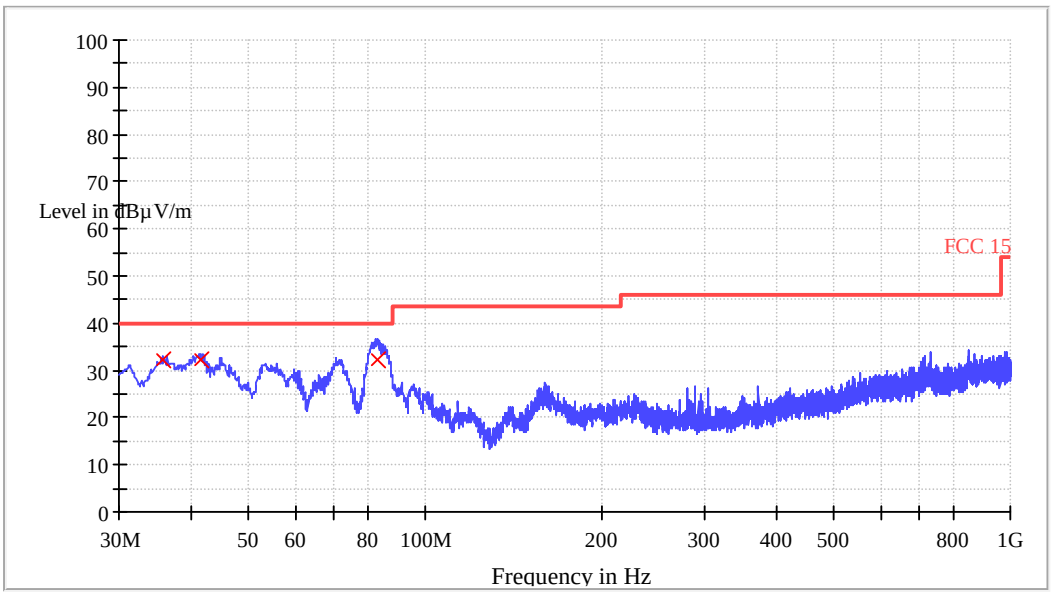
Horizontal:



QP

Frequency (MHz)	QuasiPeak (dBµV/m)	Bandwidth (kHz)	Pol	Corr. (dB)	Margin - QPK (dB)	Limit - QPK (dBµV/m)
157.400000	24.2	120.000	H	9.4	19.3	43.5
222.720000	28.0	120.000	H	13.3	18.0	46.0
729.800000	29.2	120.000	H	23.3	16.8	46.0

Vertical:



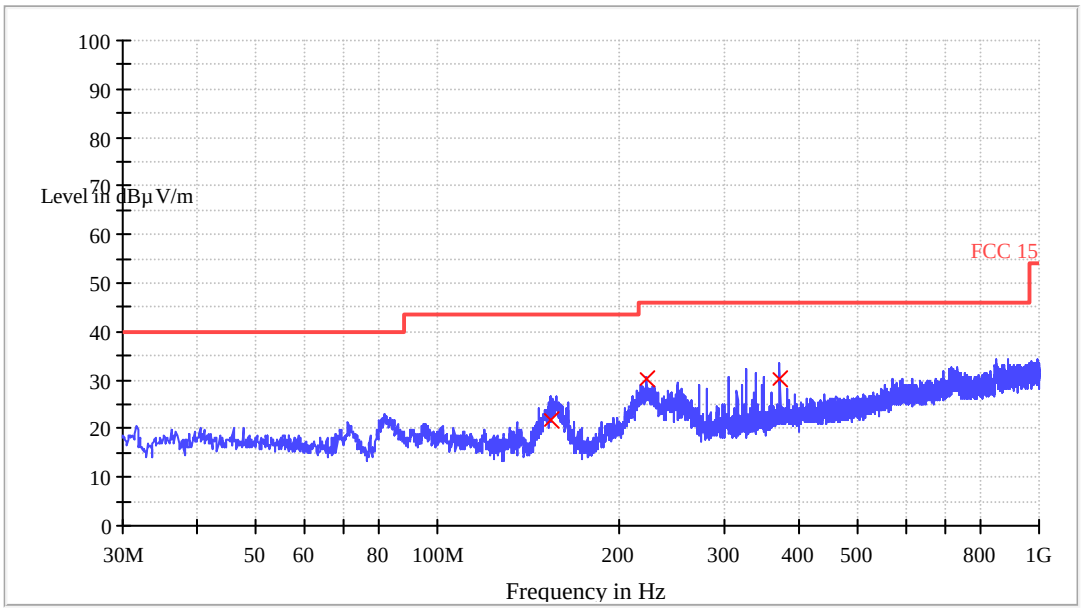
QP

Frequency (MHz)	QuasiPeak (dBµV/m)	Bandwidth (kHz)	Pol	Corr. (dB)	Margin - QPK (dB)	Limit - QPK (dBµV/m)
35.760000	32.2	120.000	V	11.8	7.8	40.0
41.280000	32.2	120.000	V	13.5	7.8	40.0
82.760000	32.2	120.000	V	8.9	7.8	40.0

802.11n(HT20) mode

Channel 36: 5180 MHz:

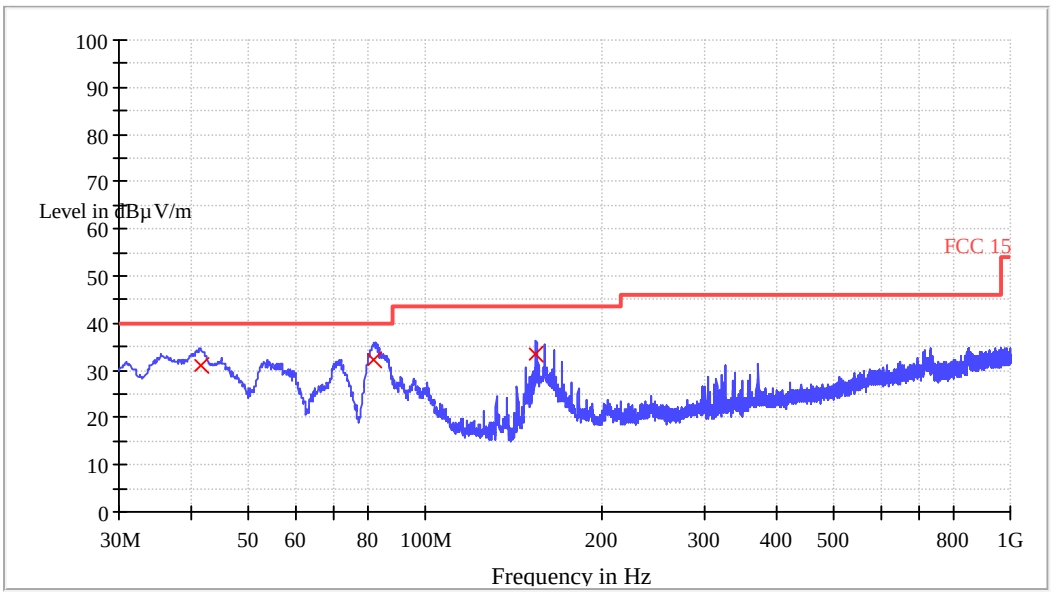
Horizontal:



QP

Frequency (MHz)	QuasiPeak (dBµV/m)	Bandwidth (kHz)	Pol	Corr. (dB)	Margin - QPK (dB)	Limit - QPK (dBµV/m)
154.600000	22.0	120.000	H	9.3	21.5	43.5
222.720000	30.4	120.000	H	13.3	15.6	46.0
371.200000	30.4	120.000	H	17.0	15.6	46.0

Vertical:

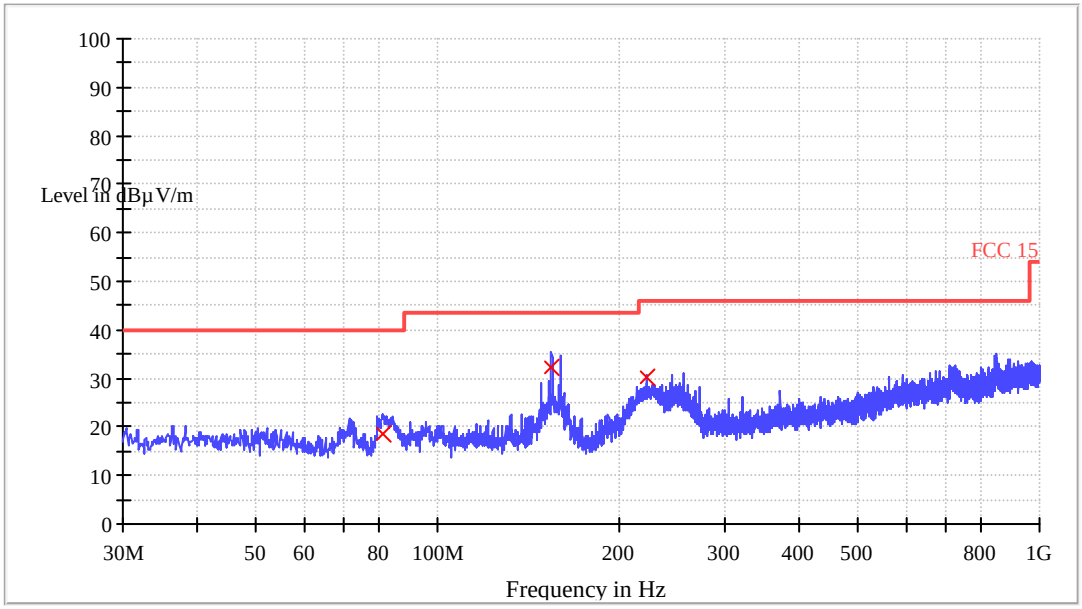


QP

Frequency (MHz)	QuasiPeak (dBµV/m)	Bandwidth (kHz)	Pol	Corr. (dB)	Margin - QPK (dB)	Limit - QPK (dBµV/m)
41.400000	31.2	120.000	V	13.5	8.8	40.0
81.880000	32.3	120.000	V	8.7	7.7	40.0
154.800000	33.3	120.000	V	9.3	10.2	43.5

Channel 36: 5220 MHz:

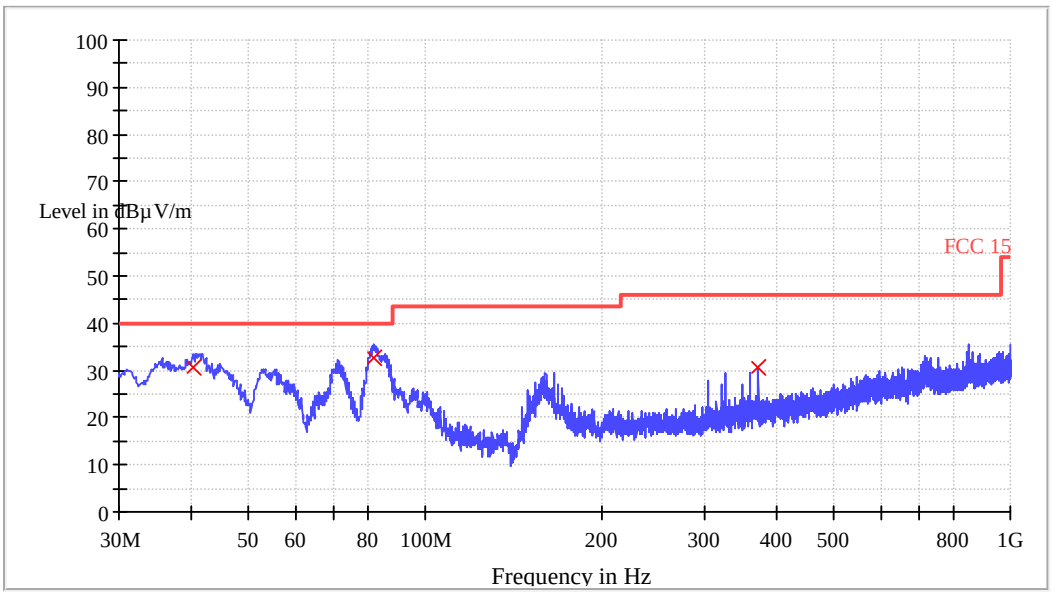
Horizontal:



QP

Frequency (MHz)	QuasiPeak (dBµV/m)	Bandwidth (kHz)	Pol	Corr. (dB)	Margin - QPK (dB)	Limit - QPK (dBµV/m)
81.160000	18.6	120.000	H	8.5	21.4	40.0
154.800000	32.1	120.000	H	9.3	11.4	43.5
222.720000	30.4	120.000	H	13.3	15.6	46.0

Vertical:

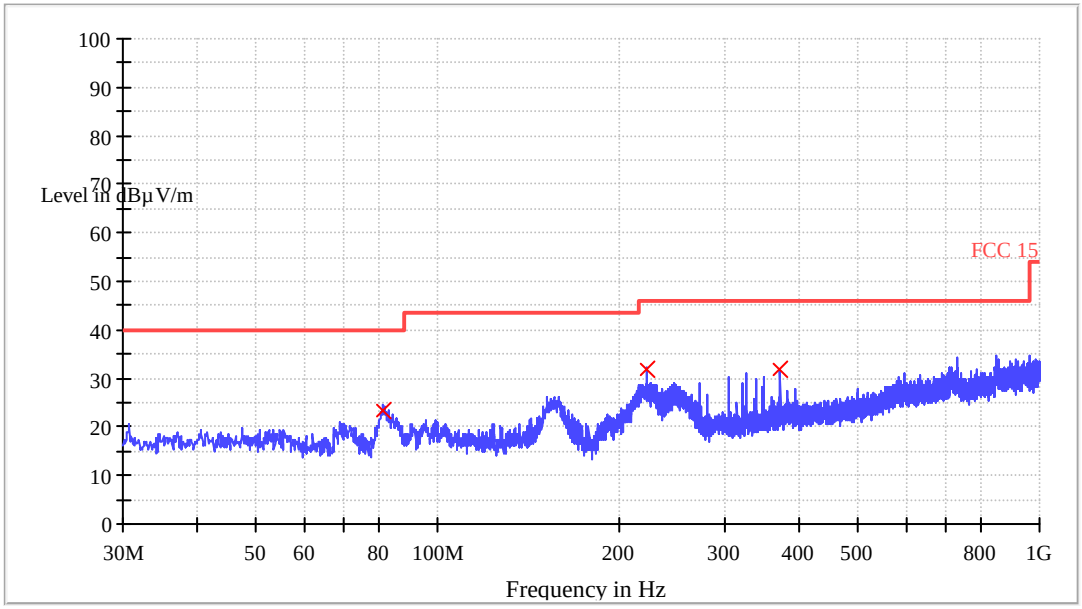


QP

Frequency (MHz)	QuasiPeak (dBµV/m)	Bandwidth (kHz)	Pol	Corr. (dB)	Margin - QPK (dB)	Limit - QPK (dBµV/m)
40.200000	30.5	120.000	V	13.3	9.5	40.0
81.960000	32.6	120.000	V	8.7	7.5	40.0
371.200000	30.6	120.000	V	17.0	15.5	46.0

Channel 36: 5240 MHz:

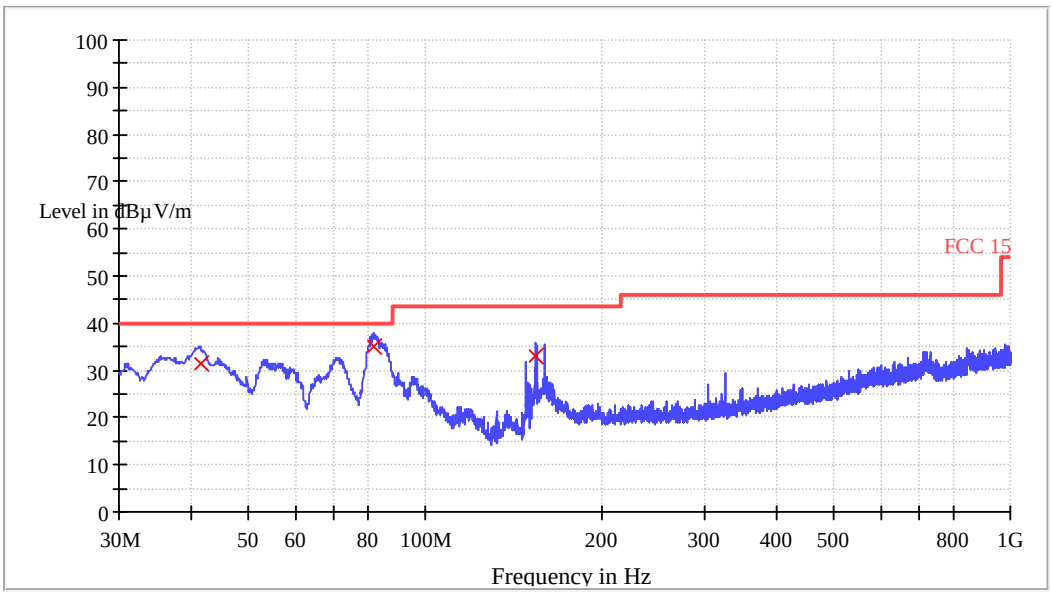
Horizontal:



QP

Frequency (MHz)	QuasiPeak (dBµV/m)	Bandwidth (kHz)	Pol	Corr. (dB)	Margin - QPK (dB)	Limit - QPK (dBµV/m)
81.360000	23.4	120.000	H	8.6	16.7	40.0
222.720000	31.8	120.000	H	13.3	14.2	46.0
371.200000	31.7	120.000	H	17.0	14.3	46.0

Vertical:



QP

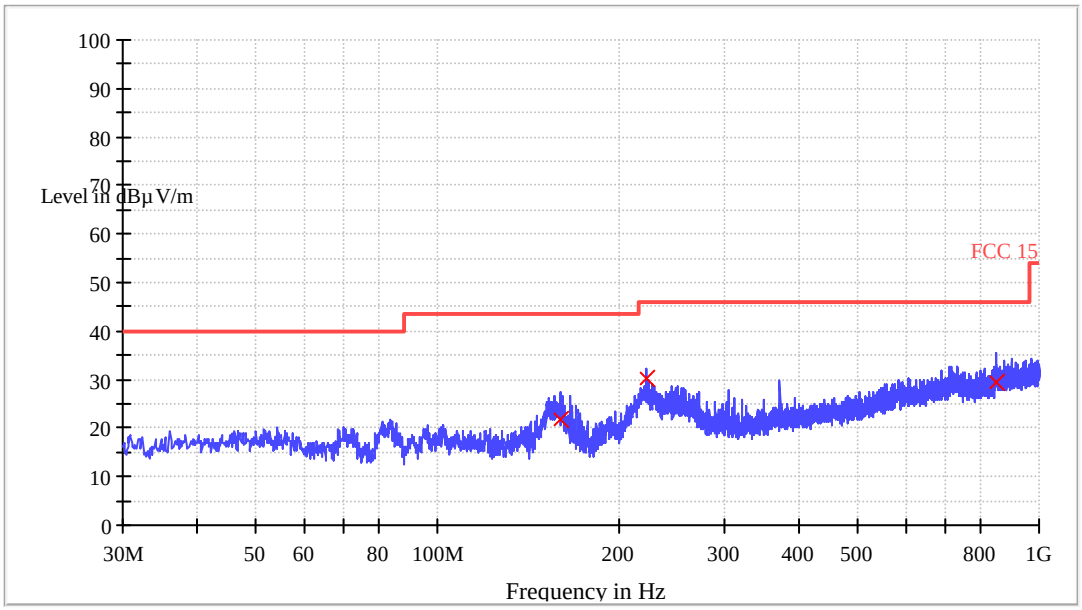
Frequency (MHz)	QuasiPeak (dBµV/m)	Bandwidth (kHz)	Pol	Corr. (dB)	Margin - QPK (dB)	Limit - QPK (dBµV/m)
41.280000	31.5	120.000	V	13.5	8.5	40.0
81.560000	34.9	120.000	V	8.6	5.1	40.0
154.800000	32.9	120.000	V	9.3	10.6	43.5

Band IV 5725 MHz to 5850 MHz

802.11a(20) mode

Channel 149: 5745 MHz:

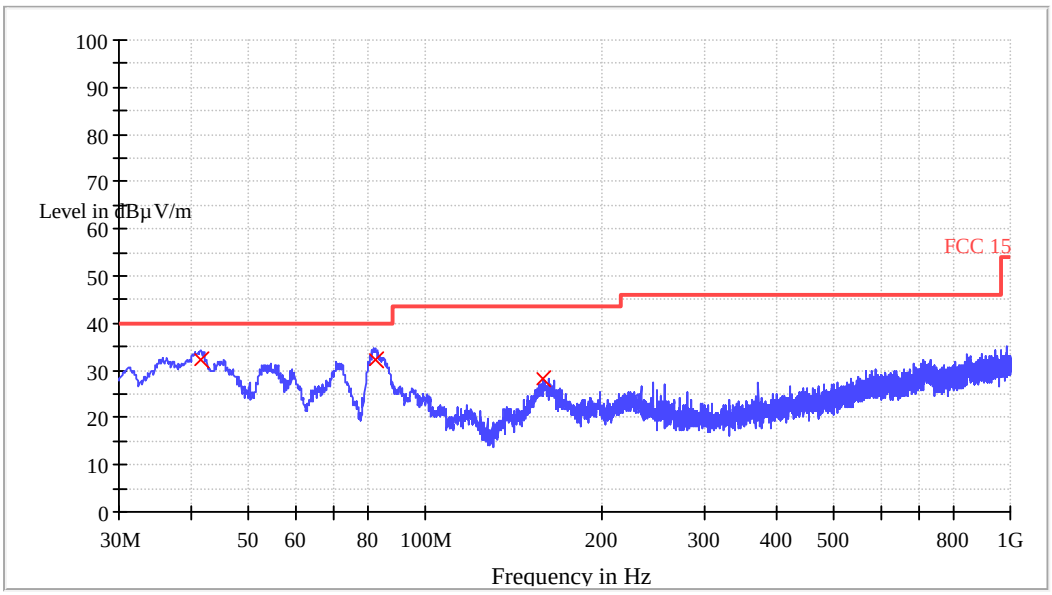
Horizontal:



QP

Frequency (MHz)	QuasiPeak (dBµV/m)	Bandwidth (kHz)	Pol	Corr. (dB)	Margin - QPK (dB)	Limit - QPK (dBµV/m)
160.560000	21.7	120.000	H	9.6	21.8	43.5
222.720000	30.4	120.000	H	13.3	15.6	46.0
847.360000	29.3	120.000	H	24.9	16.7	46.0

Vertical:

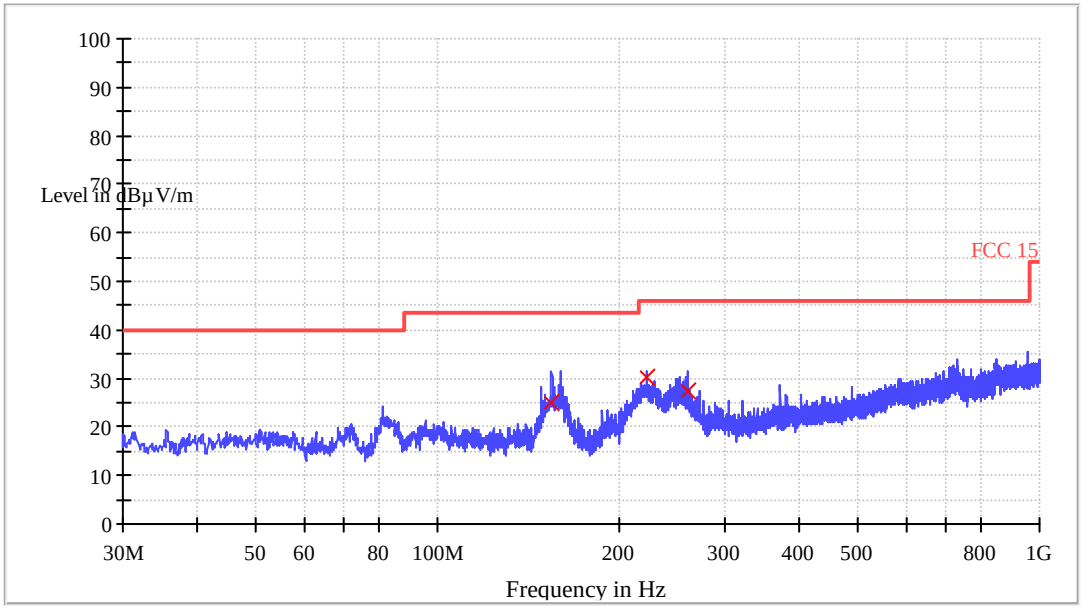


QP

Frequency (MHz)	QuasiPeak (dBµV/m)	Bandwidth (kHz)	Pol	Corr. (dB)	Margin - QPK (dB)	Limit - QPK (dBµV/m)
41.480000	32.3	120.000	V	13.5	7.8	40.0
82.160000	32.1	120.000	V	8.8	7.9	40.0
159.160000	28.3	120.000	V	9.5	15.3	43.5

Channel 157: 5785 MHz:

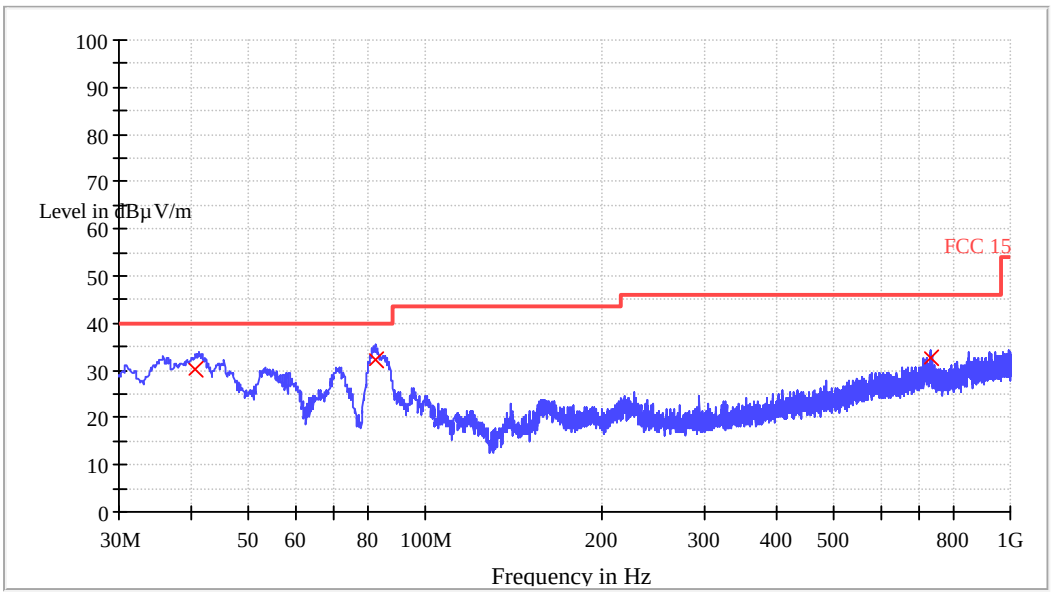
Horizontal:



QP

Frequency (MHz)	QuasiPeak (dBµV/m)	Bandwidth (kHz)	Pol	Corr. (dB)	Margin - QPK (dB)	Limit - QPK (dBµV/m)
154.800000	25.1	120.000	H	9.3	18.4	43.5
222.720000	30.4	120.000	H	13.3	15.6	46.0
259.520000	27.2	120.000	H	14.3	18.8	46.0

Vertical:

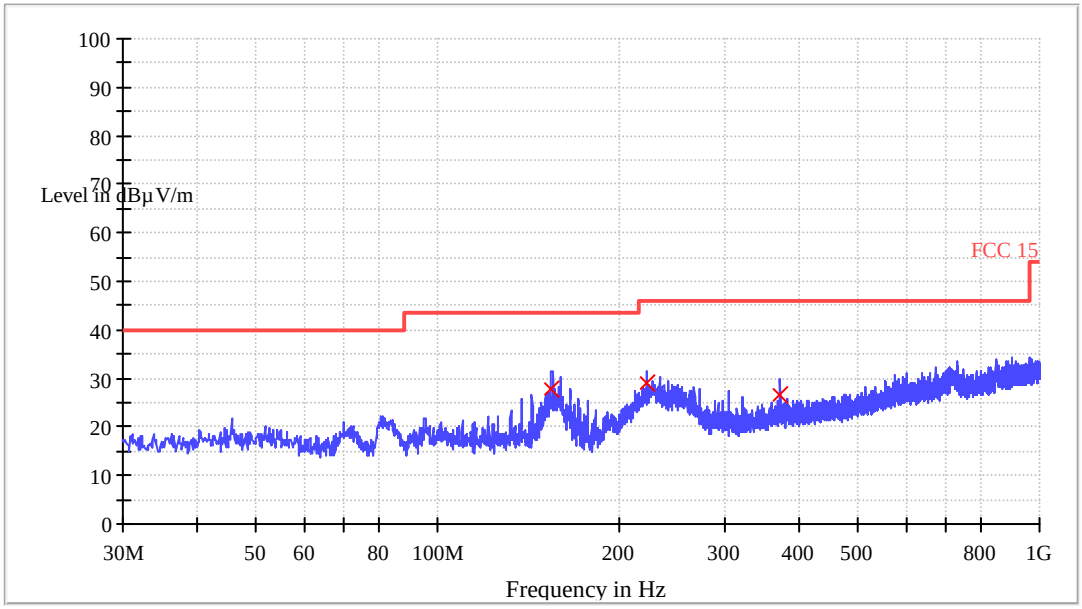


QP

Frequency (MHz)	QuasiPeak (dBµV/m)	Bandwidth (kHz)	Pol	Corr. (dB)	Margin - QPK (dB)	Limit - QPK (dBµV/m)
40.480000	30.4	120.000	V	13.3	9.6	40.0
82.160000	32.4	120.000	V	8.8	7.6	40.0
728.600000	32.5	120.000	V	23.3	13.5	46.0

Channel 165: 5825 MHz:

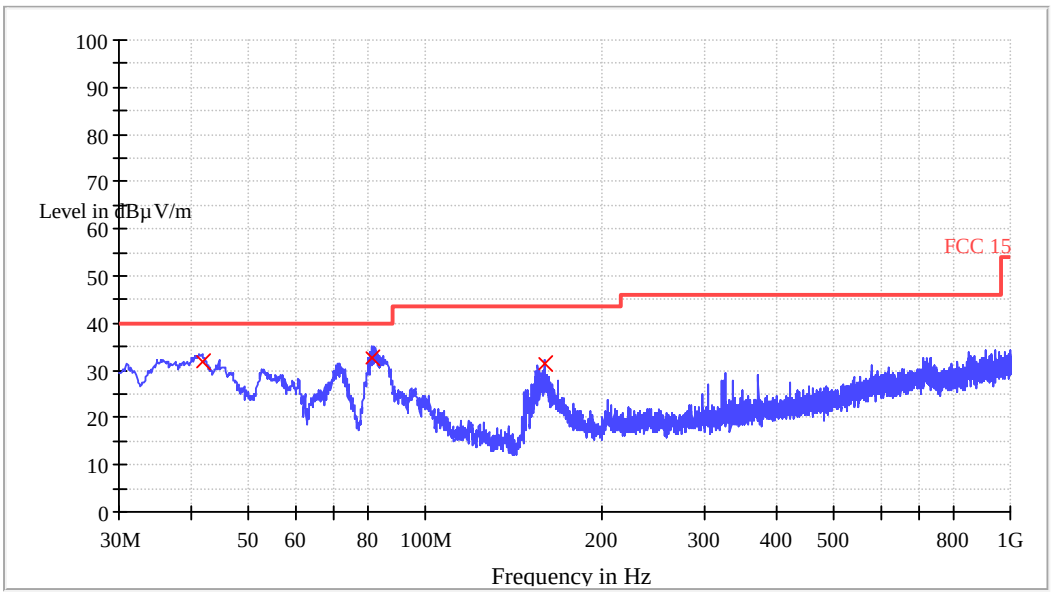
Horizontal:



QP

Frequency (MHz)	QuasiPeak (dBµV/m)	Bandwidth (kHz)	Pol	Corr. (dB)	Margin - QPK (dB)	Limit - QPK (dBµV/m)
154.800000	27.8	120.000	H	9.3	15.7	43.5
222.720000	29.0	120.000	H	13.3	17.0	46.0
371.200000	26.5	120.000	H	17.0	19.5	46.0

Vertical:



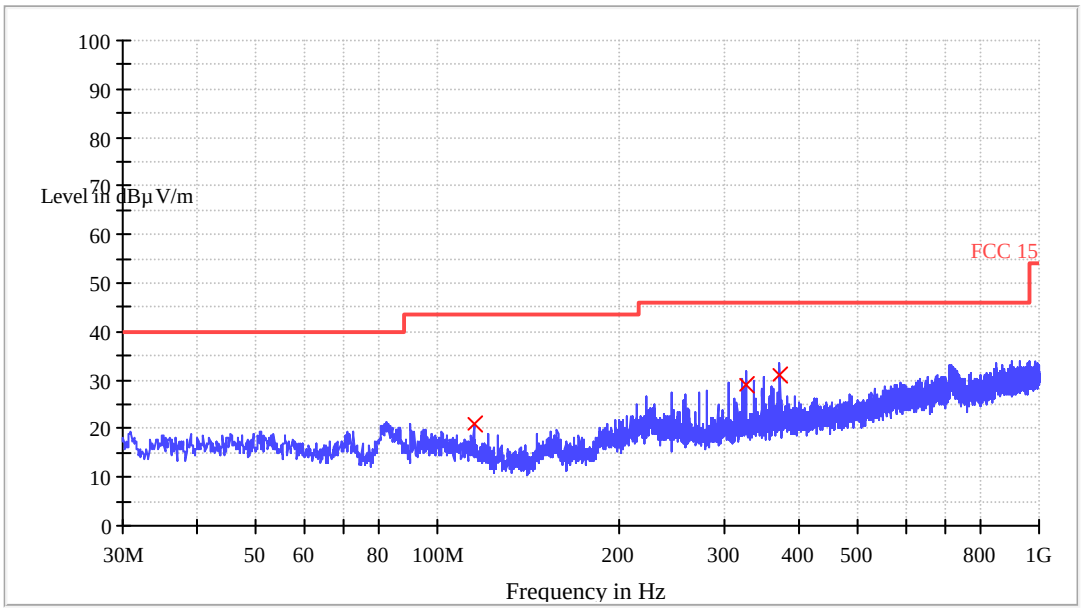
QP

Frequency (MHz)	QuasiPeak (dBµV/m)	Bandwidth (kHz)	Pol	Corr. (dB)	Margin - QPK (dB)	Limit - QPK (dBµV/m)
41.600000	32.0	120.000	V	13.5	8.0	40.0
80.960000	32.6	120.000	V	8.5	7.4	40.0
159.880000	31.6	120.000	V	9.5	11.9	43.5

802.11n(HT20) mode

Channel 149: 5745 MHz:

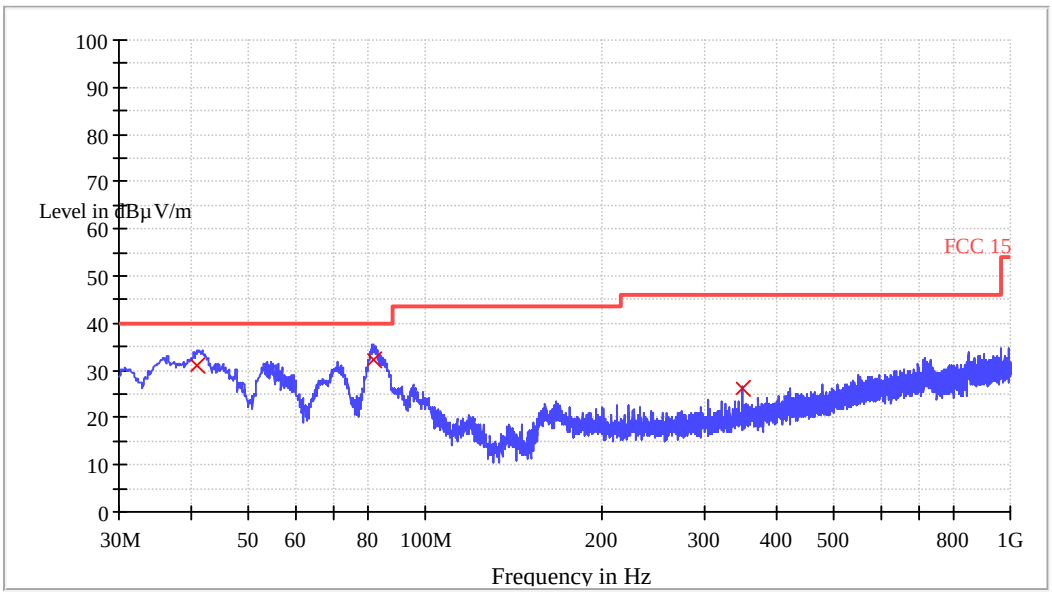
Horizontal:



QP

Frequency (MHz)	QuasiPeak (dBµV/m)	Bandwidth (kHz)	Pol	Corr. (dB)	Margin - QPK (dB)	Limit - QPK (dBµV/m)
81.360000	23.4	120.000	H	8.6	16.7	40.0
222.720000	31.8	120.000	H	13.3	14.2	46.0
371.200000	31.7	120.000	H	17.0	14.3	46.0

Vertical:

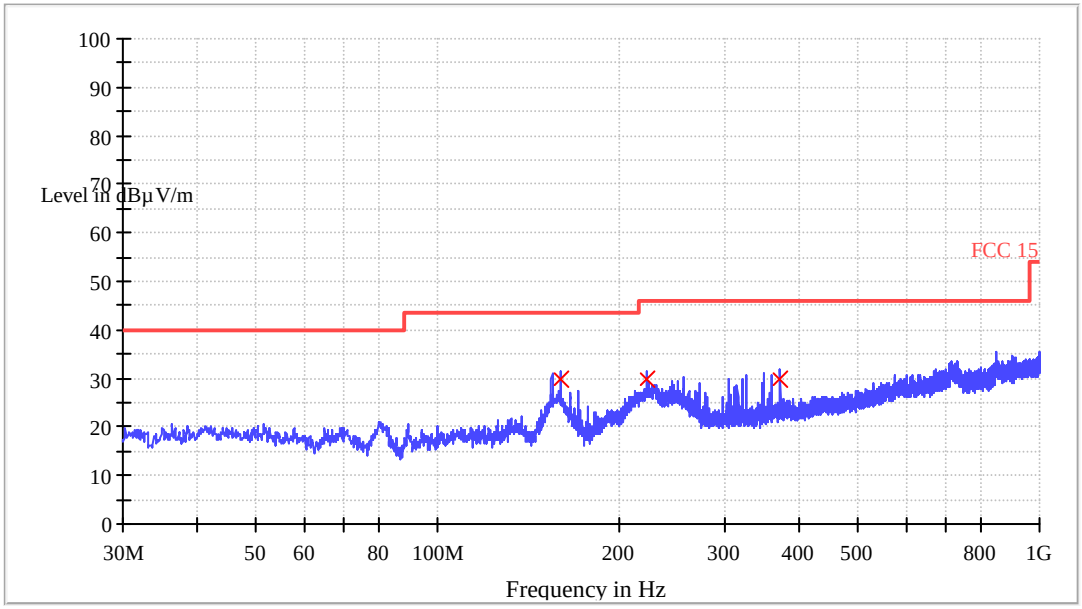


QP

Frequency (MHz)	QuasiPeak (dBµV/m)	Bandwidth (kHz)	Pol	Corr. (dB)	Margin - QPK (dB)	Limit - QPK (dBµV/m)
40.800000	31.2	120.000	V	13.4	8.8	40.0
81.480000	32.4	120.000	V	8.6	7.6	40.0
348.720000	26.4	120.000	V	16.5	19.6	46.0

Channel 157: 5785 MHz:

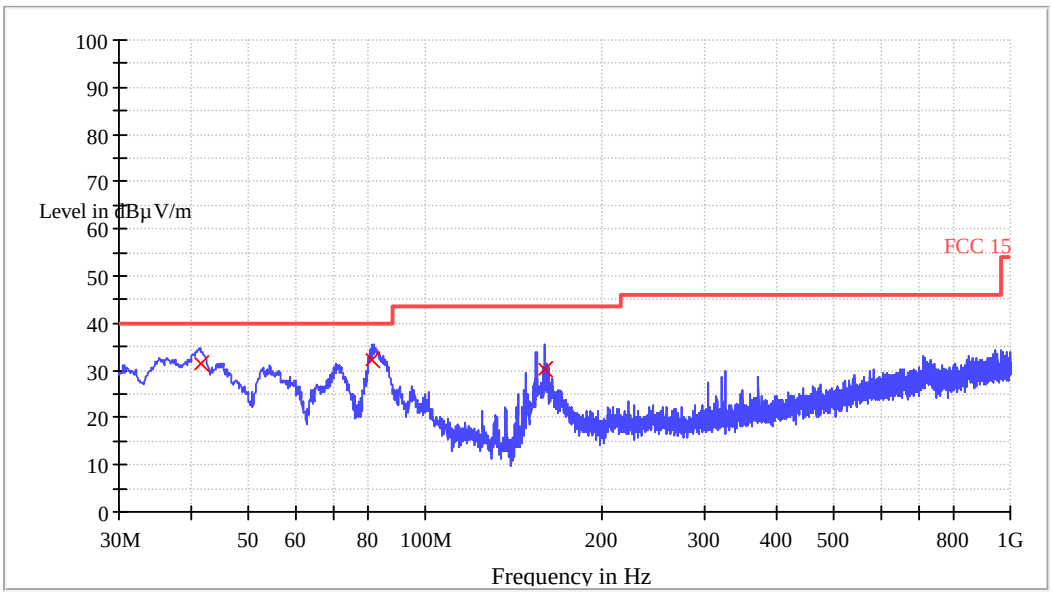
Horizontal:



QP

Frequency (MHz)	QuasiPeak (dBµV/m)	Bandwidth (kHz)	Pol	Corr. (dB)	Margin - QPK (dB)	Limit - QPK (dBµV/m)
160.040000	29.9	120.000	H	9.6	13.6	43.5
222.720000	29.9	120.000	H	13.3	16.1	46.0
371.200000	29.9	120.000	H	17.0	16.1	46.0

Vertical:

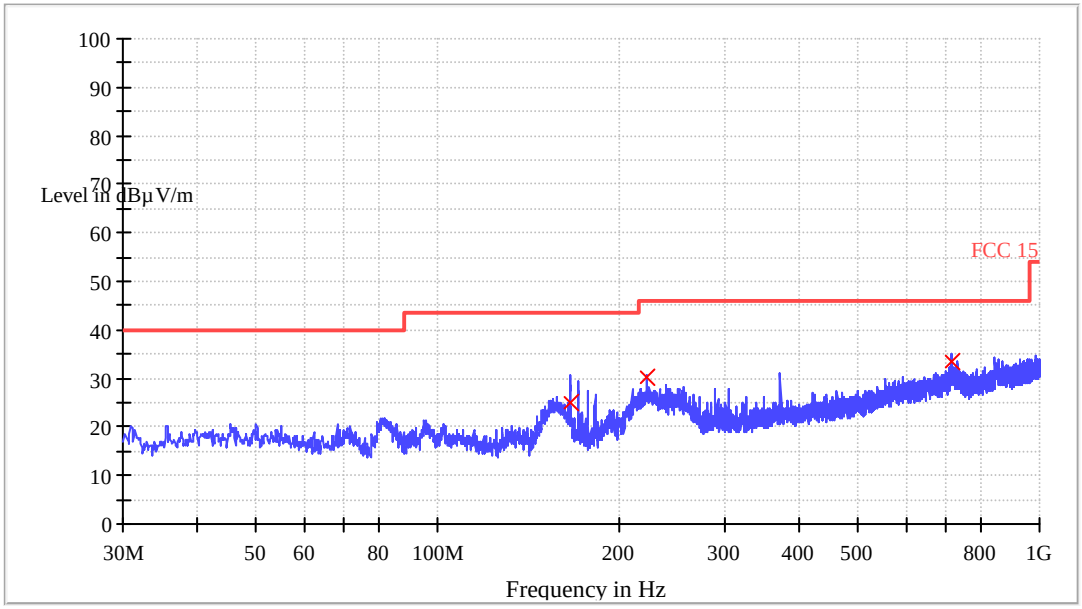


QP

Frequency (MHz)	QuasiPeak (dBµV/m)	Bandwidth (kHz)	Pol	Corr. (dB)	Margin - QPK (dB)	Limit - QPK (dBµV/m)
41.280000	31.3	120.000	V	13.5	8.7	40.0
81.360000	32.1	120.000	V	8.6	7.9	40.0
160.040000	30.1	120.000	V	9.6	13.4	43.5

Channel 165: 5825 MHz:

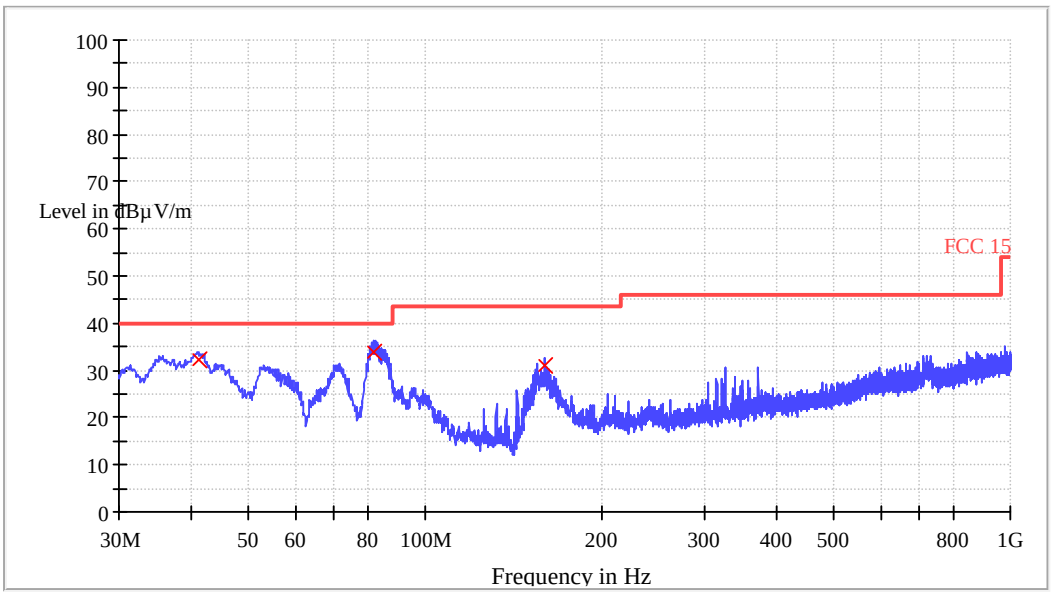
Horizontal:



QP

Frequency (MHz)	QuasiPeak (dBµV/m)	Bandwidth (kHz)	Pol	Corr. (dB)	Margin - QPK (dB)	Limit - QPK (dBµV/m)
166.080000	25.0	120.000	H	9.9	18.5	43.5
222.720000	30.3	120.000	H	13.3	15.7	46.0
714.440000	33.3	120.000	H	23.1	12.7	46.0

Vertical:



QP

Frequency (MHz)	QuasiPeak (dBµV/m)	Bandwidth (kHz)	Pol	Corr. (dB)	Margin - QPK (dB)	Limit - QPK (dBµV/m)
41.000000	32.3	120.000	V	13.4	7.7	40.0
81.680000	33.8	120.000	V	8.7	6.2	40.0
160.040000	31.2	120.000	V	9.6	12.3	43.5

1~40 GHz Radiated Emissions.

Result follows:

Band I 5150 MHz to 5250 MHz

802.11a(20) mode
Channel 36: 5180 MHz:

Polarization	Frequency (MHz)	Reading (dBµV/m)	Correction Factor (dB)	Net at 3m (dBµV/m)	Limit at 3m (dBuV/m)	Margin (dB)	Detector
Horizontal	1584.000	49.9	-11.7	38.2	54.0	-15.8	Peak
Horizontal	7750.000	41.9	4.8	46.7	54.0	-7.3	Peak
Horizontal	10282.400	43.0	5.5	48.5	54.0	-5.5	Peak
Vertical	3878.400	44.0	-2.7	41.3	54.0	-12.7	Peak
Vertical	7647.600	41.6	4.6	46.2	54.0	-7.8	Peak
Vertical	10144.800	40.6	7.6	48.2	54.0	-5.8	Peak

Channel 44: 5220 MHz:

Polarization	Frequency (MHz)	Reading (dBµV/m)	Correction Factor (dB)	Net at 3m (dBµV/m)	Limit at 3m (dBuV/m)	Margin (dB)	Detector
Horizontal	1584.000	48.1	-11.7	36.4	54.0	-17.6	Peak
Horizontal	7760.800	42.2	4.8	47.0	54.0	-7.0	Peak
Horizontal	10361.200	41.4	7.7	49.1	54.0	-4.9	Peak
Vertical	4589.600	43.9	-0.5	43.4	54.0	-10.6	Peak
Vertical	7712.800	43.5	4.7	48.2	54.0	-5.8	Peak
Vertical	11562.800	40.7	8.1	48.8	54.0	-5.2	Peak

Channel 48: 5240 MHz:

Polarization	Frequency (MHz)	Reading (dBµV/m)	Correction Factor (dB)	Net at 3m (dBµV/m)	Limit at 3m (dBuV/m)	Margin (dB)	Detector
Horizontal	4413.200	42.2	-0.8	41.4	54.0	-12.6	Peak
Horizontal	7772.400	41.5	4.8	46.3	54.0	-7.7	Peak
Horizontal	11277.200	38.5	8.1	46.6	54.0	-7.4	Peak
Vertical	4552.000	41.8	-0.5	41.3	54.0	-12.7	Peak
Vertical	7714.400	42.0	4.7	46.7	54.0	-7.3	Peak
Vertical	10922.800	41.7	8.0	49.7	54.0	-4.3	Peak

802.11n(HT 20)
Channel 36: 5180 MHz:

Polarization	Frequency (MHz)	Reading (dBµV/m)	Correction Factor (dB)	Net at 3m (dBµV/m)	Limit at 3m (dBuV/m)	Margin (dB)	Detector
Horizontal	4510.400	43.6	-0.5	43.1	54.0	-10.9	Peak
Horizontal	7728.800	41.5	4.7	46.2	54.0	-7.8	Peak
Horizontal	10296.400	40.7	7.7	48.4	54.0	-5.6	Peak
Vertical	1584.000	47.9	-11.7	36.2	54.0	-17.8	Peak
Vertical	7725.200	31.5	4.7	36.2	54.0	-17.8	Peak
Vertical	10320.400	41.8	7.7	49.5	54.0	-4.5	Peak

Channel 44: 5220 MHz:

Polarization	Frequency (MHz)	Reading (dBµV/m)	Correction Factor (dB)	Net at 3m (dBµV/m)	Limit at 3m (dBuV/m)	Margin (dB)	Detector
Horizontal	1723.600	49.3	-10.5	38.8	54.0	-15.2	Peak
Horizontal	5656.000	45.2	1.0	46.2	54.0	-7.8	Peak
Horizontal	10920.400	38.2	8.0	46.2	54.0	-7.8	Peak
Vertical	3465.600	44.4	-3.1	41.3	54.0	-12.7	Peak
Vertical	7646.400	43.3	4.6	47.9	54.0	-6.1	Peak
Vertical	10942.000	41.8	8.1	49.9	54.0	-4.1	Peak

Channel 48: 5240 MHz:

Polarization	Frequency (MHz)	Reading (dBµV/m)	Correction Factor (dB)	Net at 3m (dBµV/m)	Limit at 3m (dBuV/m)	Margin (dB)	Detector
Horizontal	4558.400	43.6	-0.5	43.1	54.0	-10.9	Peak
Horizontal	5459.200	48.4	0.2	48.6	54.0	-5.4	Peak
Horizontal	10147.600	41.2	7.6	48.8	54.0	-5.2	Peak
Vertical	3488.800	45.4	-3.0	42.4	54.0	-11.6	Peak
Vertical	7734.800	43.3	4.7	48.0	54.0	-6.0	Peak
Vertical	10936.400	41.3	8.0	49.3	54.0	-4.7	Peak

Result as follows:

Band IV 5725 MHz to 5850 MHz

802.11a(20) mode
Channel 149: 5745 MHz:

Polarization	Frequency (MHz)	Reading (dBµV/m)	Correction Factor (dB)	Net at 3m (dBµV/m)	Limit at 3m (dBuV/m)	Margin (dB)	Detector
Horizontal	1584.000	48.8	-11.7	37.1	54.0	-16.9	Peak
Horizontal	8388.000	42.5	4.9	47.4	54.0	-6.6	Peak
Horizontal	10756.000	40.9	8.0	48.9	54.0	-5.1	Peak
Vertical	3466.000	44.0	-3.1	40.9	54.0	-13.1	Peak
Vertical	7750.400	36.1	4.8	40.9	54.0	-13.1	Peak
Vertical	12032.400	40.8	7.7	48.5	54.0	-5.5	Peak

Channel 157: 5785 MHz:

Polarization	Frequency (MHz)	Reading (dBµV/m)	Correction Factor (dB)	Net at 3m (dBµV/m)	Limit at 3m (dBuV/m)	Margin (dB)	Detector
Horizontal	1722.000	49.0	-10.5	38.5	54.0	-15.5	Peak
Horizontal	8132.400	42.6	5.0	47.6	54.0	-6.4	Peak
Horizontal	10915.600	40.9	8.0	48.9	54.0	-5.1	Peak
Vertical	4756.000	42.3	-0.5	41.8	54.0	-12.2	Peak
Vertical	7582.000	42.8	4.5	47.3	54.0	-6.7	Peak
Vertical	12542.400	40.1	8.3	48.4	54.0	-5.6	Peak

Channel 165: 5825 MHz:

Polarization	Frequency (MHz)	Reading (dBµV/m)	Correction Factor (dB)	Net at 3m (dBµV/m)	Limit at 3m (dBuV/m)	Margin (dB)	Detector
Horizontal	5055.600	44.3	-0.4	43.9	54.0	-10.1	Peak
Horizontal	7774.400	41.9	4.8	46.7	54.0	-7.3	Peak
Horizontal	10003.200	40.6	7.5	48.1	54.0	-5.9	Peak
Vertical	4942.400	43.4	-0.5	42.9	54.0	-11.1	Peak
Vertical	8033.600	42.4	5.1	47.5	54.0	-6.5	Peak
Vertical	10330.800	41.4	7.7	49.1	54.0	-4.9	Peak

802.11n(HT 20)
Channel 149: 5745 MHz:

Polarization	Frequency (MHz)	Reading (dBµV/m)	Correction Factor (dB)	Net at 3m (dBµV/m)	Limit at 3m (dBuV/m)	Margin (dB)	Detector
Horizontal	1723.600	50.1	-10.5	39.6	54.0	-14.4	Peak
Horizontal	8031.200	41.2	5.1	46.3	54.0	-7.7	Peak
Horizontal	10908.800	40.7	8.0	48.7	54.0	-5.3	Peak
Vertical	4591.200	41.7	4.7	46.4	54.0	-7.6	Peak
Vertical	7703.200	37.2	4.7	41.9	54.0	-12.1	Peak
Vertical	10286.400	40.4	7.7	48.1	54.0	-5.9	Peak

Channel 157: 5785 MHz:

Polarization	Frequency (MHz)	Reading (dBµV/m)	Correction Factor (dB)	Net at 3m (dBµV/m)	Limit at 3m (dBuV/m)	Margin (dB)	Detector
Horizontal	3710.800	43.8	-2.8	41.0	54.0	-13.0	Peak
Horizontal	8256.000	41.7	5.0	46.7	54.0	-7.3	Peak
Horizontal	10087.600	40.4	7.6	48.0	54.0	-6.0	Peak
Vertical	1898.400	50.2	-8.9	41.3	54.0	-12.7	Peak
Vertical	7749.600	43.1	4.8	47.9	54.0	-6.1	Peak
Vertical	10879.600	41.3	8.0	49.3	54.0	-4.7	Peak

Channel 165: 5825 MHz:

Polarization	Frequency (MHz)	Reading (dBµV/m)	Correction Factor (dB)	Net at 3m (dBµV/m)	Limit at 3m (dBuV/m)	Margin (dB)	Detector
Horizontal	2018.800	48.9	-8.0	40.9	54.0	-13.1	Peak
Horizontal	8056.400	42.0	5.1	47.1	54.0	-6.9	Peak
Horizontal	12065.600	41.6	7.8	49.4	54.0	-4.6	Peak
Vertical	4702.400	43.9	-0.5	43.4	54.0	-10.6	Peak
Vertical	7752.800	42.8	4.8	47.6	54.0	-6.4	Peak
Vertical	10764.800	40.5	8.0	48.5	54.0	-5.5	Peak

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 + Correction Factor

Correction Factor =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

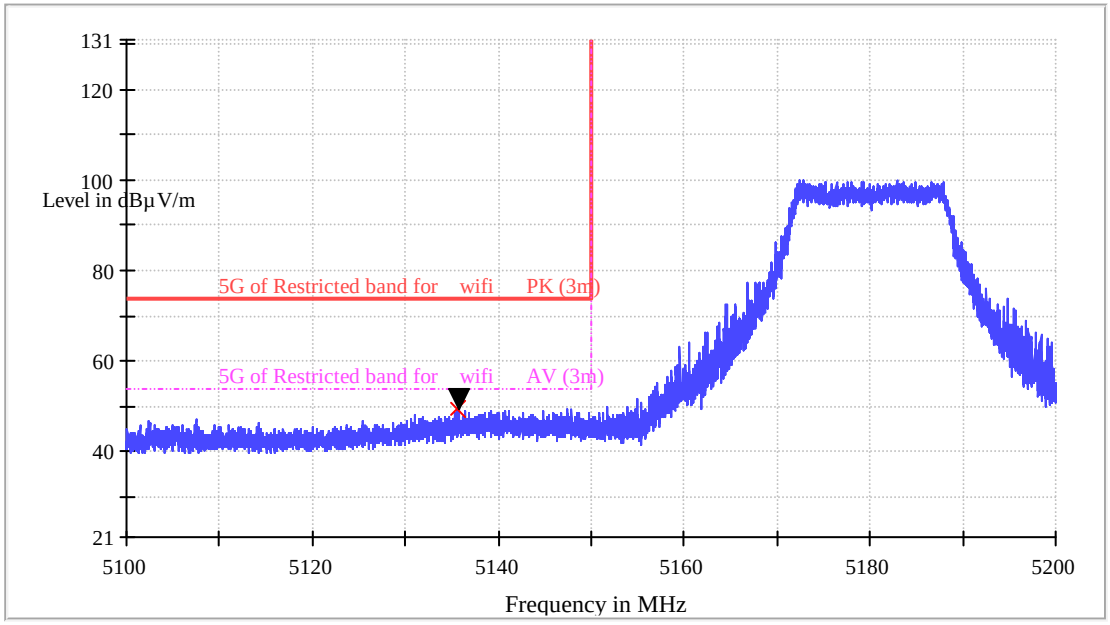
Test Requirement:	FCC Part 15 C clause 15.407(b) (1)For transmitters operating in the 5.15–5.25GHz band: All emission outside of the 5.15–5.35 GHz band shall not exceed an e.i.r.p of -27dBm/MHz (4) For transmitters operating in the 5.725–5.85 GHz band: (i) All emissions shall be limited to a level of -27 dBm/MHz at 75 MHz or more above or below the band edge increasing linearly to 10 dBm/MHz at 25MHz above or below the band edge, and from 25 MHz above or below the band edge increasing linearly to a level of 15.6 dBm/MHz at 5 MHz above or below the band edge, and from 5 MHz above or below the band edge increasing linearly to a level of 27 dBm/MHz at the band edge.
Frequency Band:	Brand I: 5150MHz to 5250MHz Brand IV: 5725MHz to 5850MHz
Test Method:	FCC KDB 789033 D02 General UNII Test Procedures New Rules v01r03,Clause G
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:	Refer to the Radiated Spurious Emission test.
Test Procedure:	Refer to the Radiated Spurious Emission test.

Test result as follows:

Band I 5150 MHz to 5250 MHz

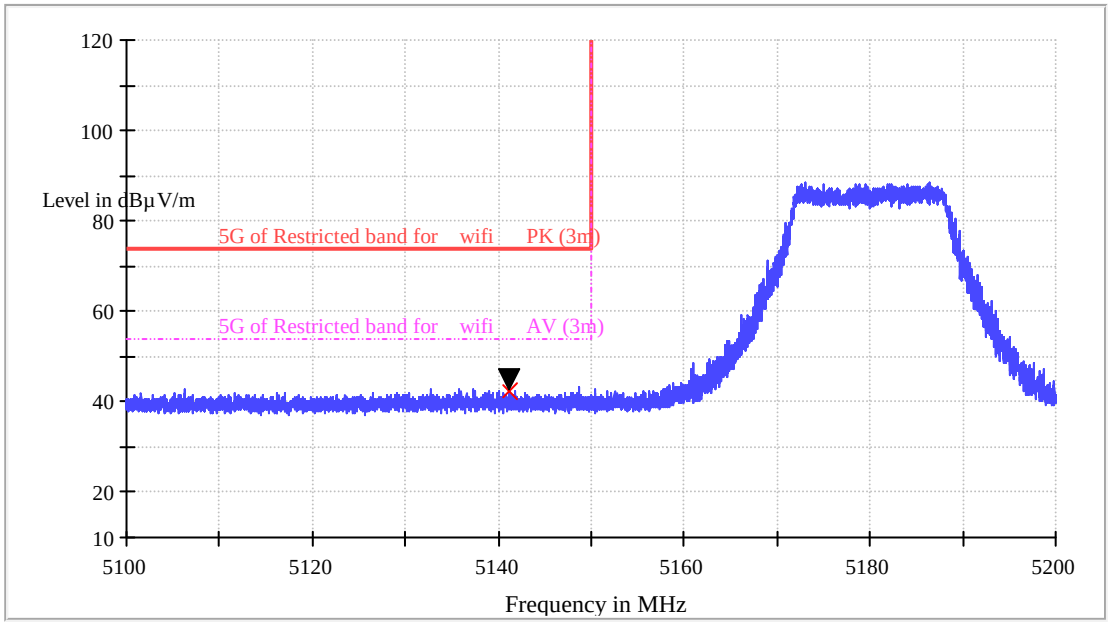
802.11a(20) mode
Channel 36: 5180 MHz:

Horizontal



Frequency (MHz)	MaxPeak (dBµV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)	Margin - AVG (dB)	Limit - AVG (dBµV/m)
5135.600000	49.4	1000.0	1000.000	150.0	H	359.0	-0.3	-4.6	54

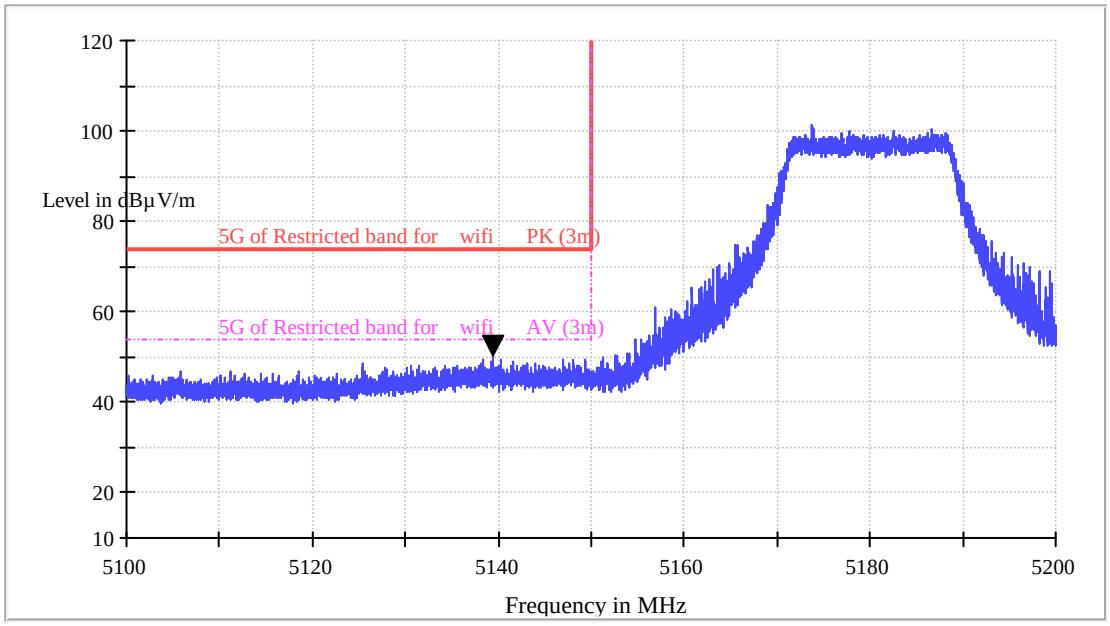
Vertical



Frequency (MHz)	MaxPeak (dBµV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)	Margin - AVG (dB)	Limit - AVG (dBµV/m)
5141.200000	42.6	1000.0	1000.000	150.0	V	1.0	-0.3	-11.4	54

802.11n(HT20)
Channel 36: 5180 MHz:

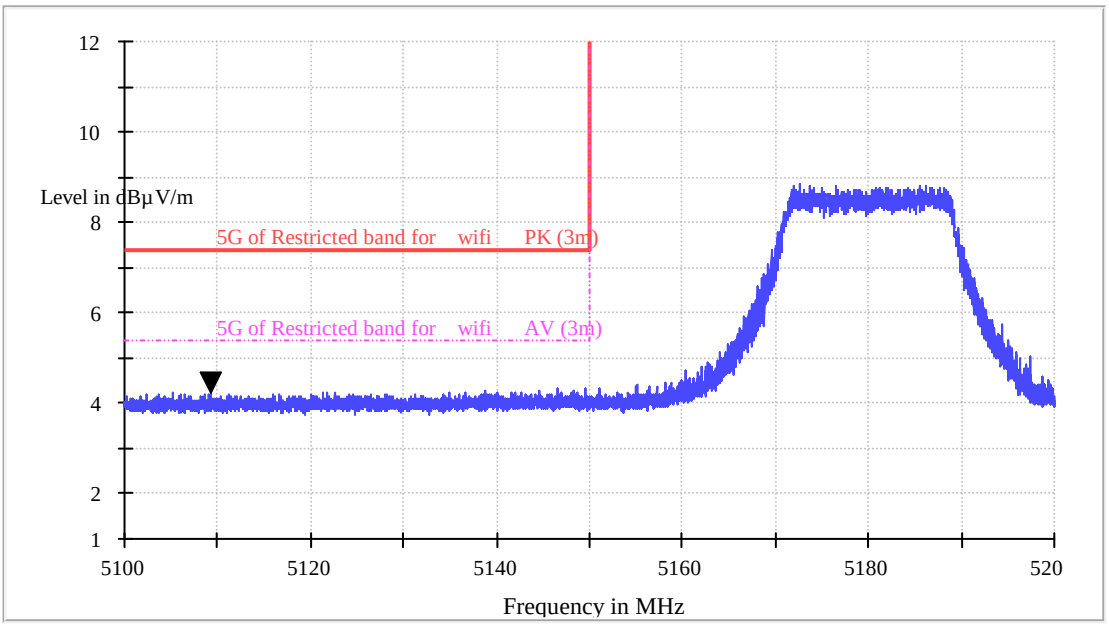
Horizontal



AV

Frequency (MHz)	MaxPeak (dBµV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)	Margin - AVG (dB)	Limit - AVG (dBµV/m)
5109.200000	42.3	1000.0	1000.000	150.0	V	359.0	-0.3	-11.7	54

Vertical



AV

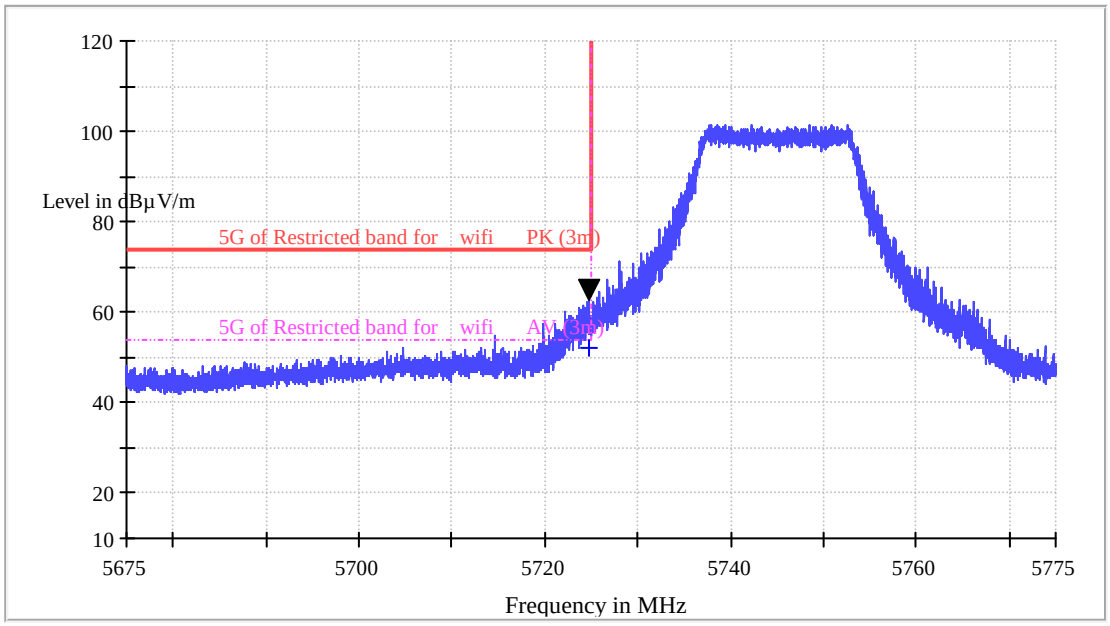
Frequency (MHz)	MaxPeak (dBµV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)	Margin - AVG (dB)	Limit - AVG (dBµV/m)
5109.200000	42.3	1000.0	1000.000	150.0	V	359.0	-0.3	-11.7	54

Result as follows:

Band IV 5725 MHz to 5850 MHz

802.11a(20) mode
Channel 149: 5745 MHz:

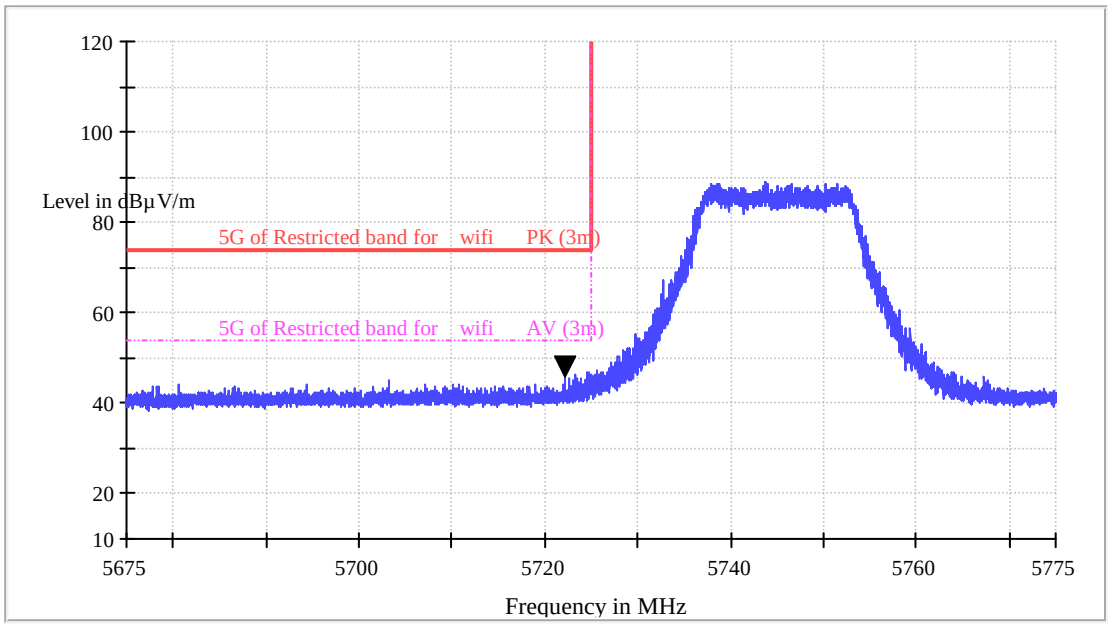
Horizontal



Frequency (MHz)	MaxPeak (dBµV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)	Margin - PK (dB)	Limit - PK (dBµV/
5724.800000	63.2	1000.0	1000.000	150.0	H	1.0	1.3	-10.8	74

Frequency (MHz)	Average (dBµV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)	Margin - AVG (dB)	Limit - AVG (dBµV/
5724.400000	52.2	1000.0	1000.000	150.0	H	1.0	1.2	1.8	54

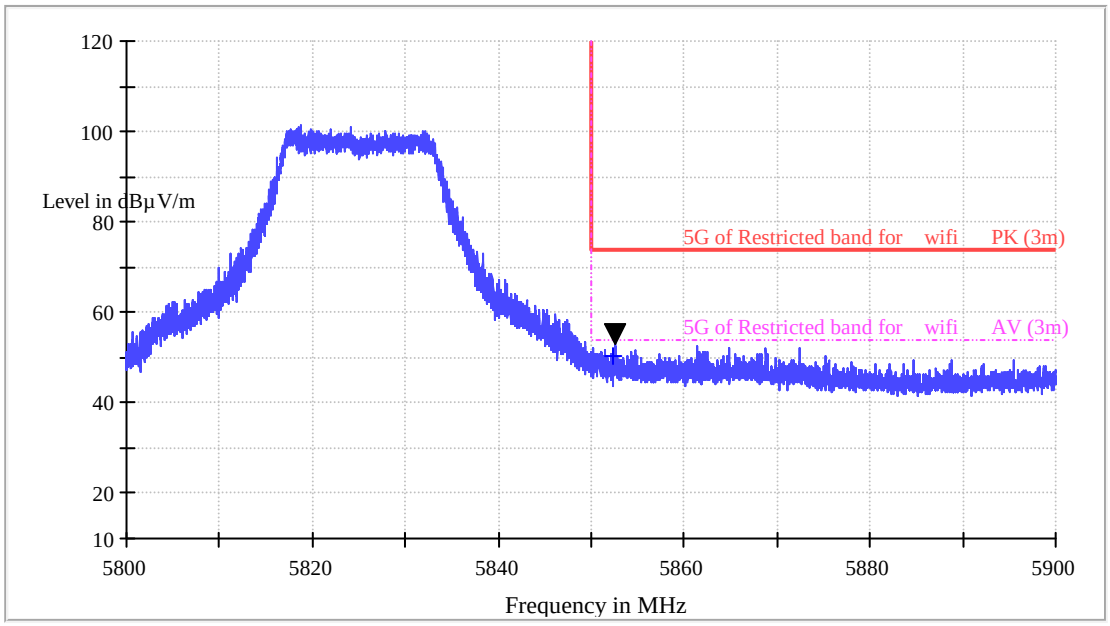
Vertical



Frequency (MHz)	MaxPeak (dBµV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)	Margin - AVG (dB)	Limit - AVG (dBµV/
5722.400000	46.4	1000.0	1000.000	150.0	V	1.0	1.2	-7.6	54

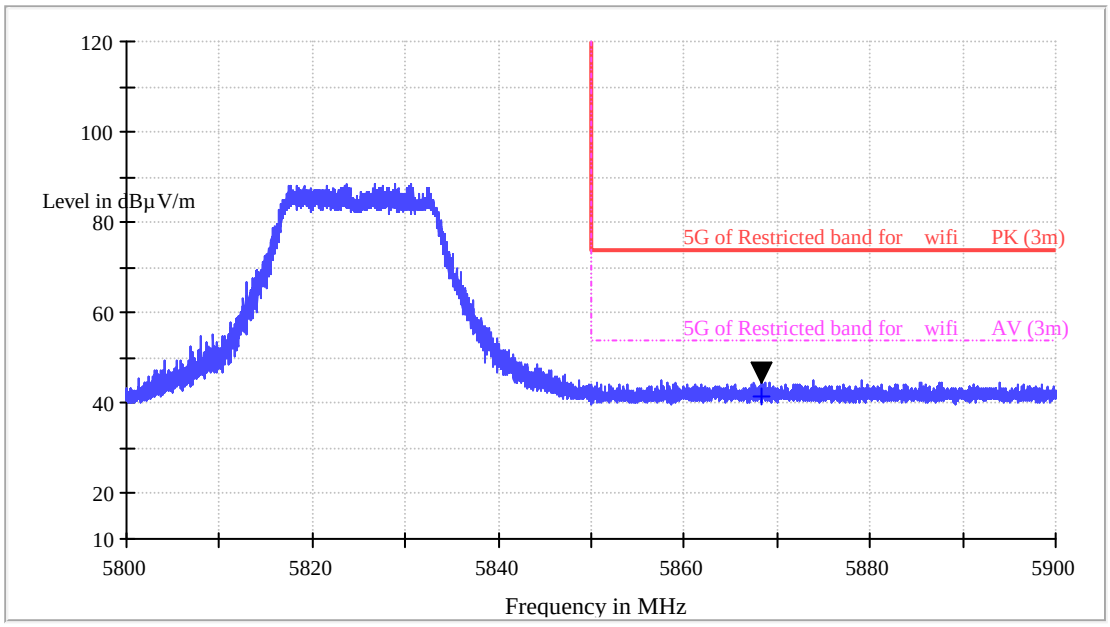
Channel 165: 5825 MHz:

Horizontal



Frequency (MHz)	MaxPeak (dBµV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)	Margin - AVG (dB)	Limit - AVG (dBµV/
5852.400000	53.4	1000.0	1000.000	150.0	H	1.0	1.8	-0.6	54

Vertical

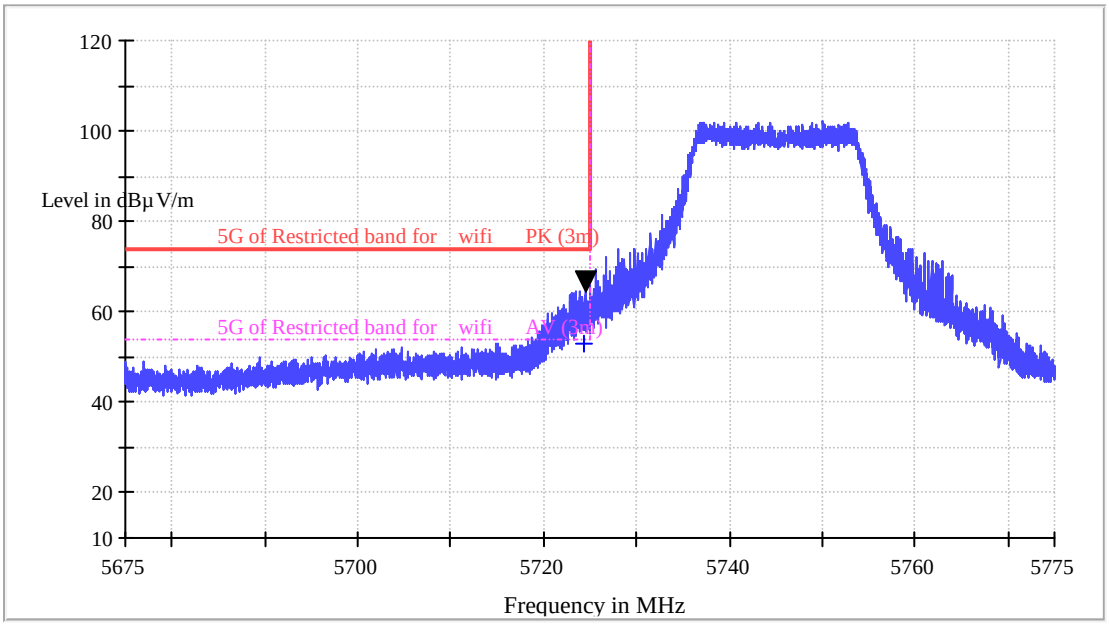


AV

Frequency (MHz)	MaxPeak (dBµV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)	Margin - AVG (dB)	Limit - AVG (dBµV/
5868.400000	45.3	1000.0	1000.000	150.0	V	1.0	1.9	-8.7	54

802.11n(HT 20)
Channel 149: 5745 MHz:

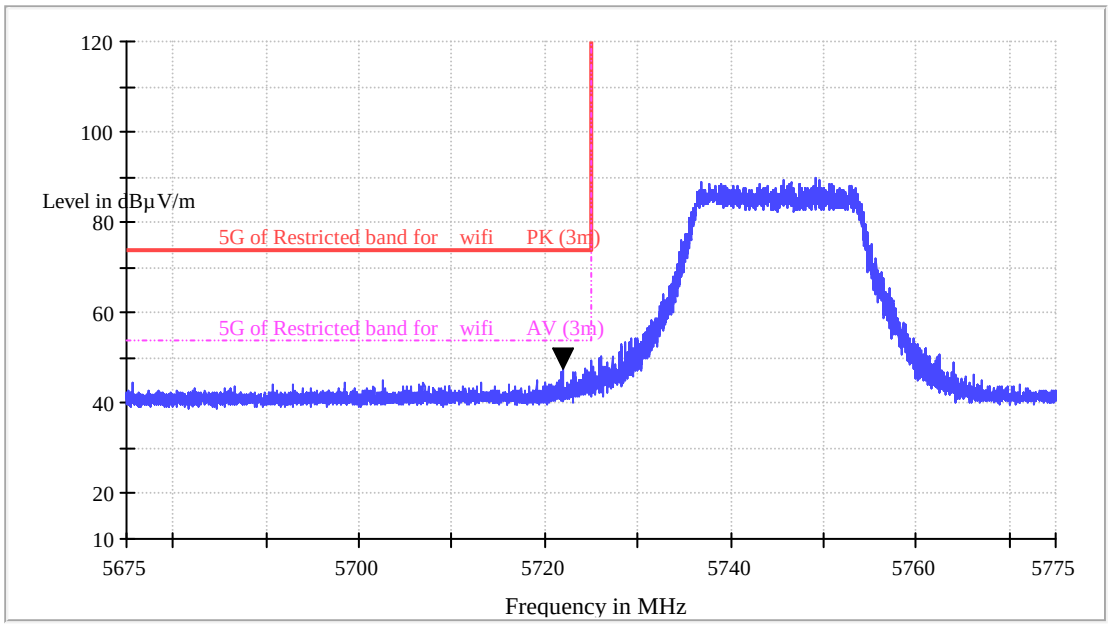
Horizontal



Frequency (MHz)	MaxPeak (dBµV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)	Margin - PK (dB)	Limit - PK (dBµV/
5724.400000	64.8	1000.0	1000.000	150.0	H	1.0	1.2	-9.2	74

Frequency (MHz)	Average (dBµV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)	Margin - AVG (dB)	Limit - AVG (dBµV/
5724.400000	52.8	1000.0	1000.000	150.0	H	1.0	1.2	1.2	54

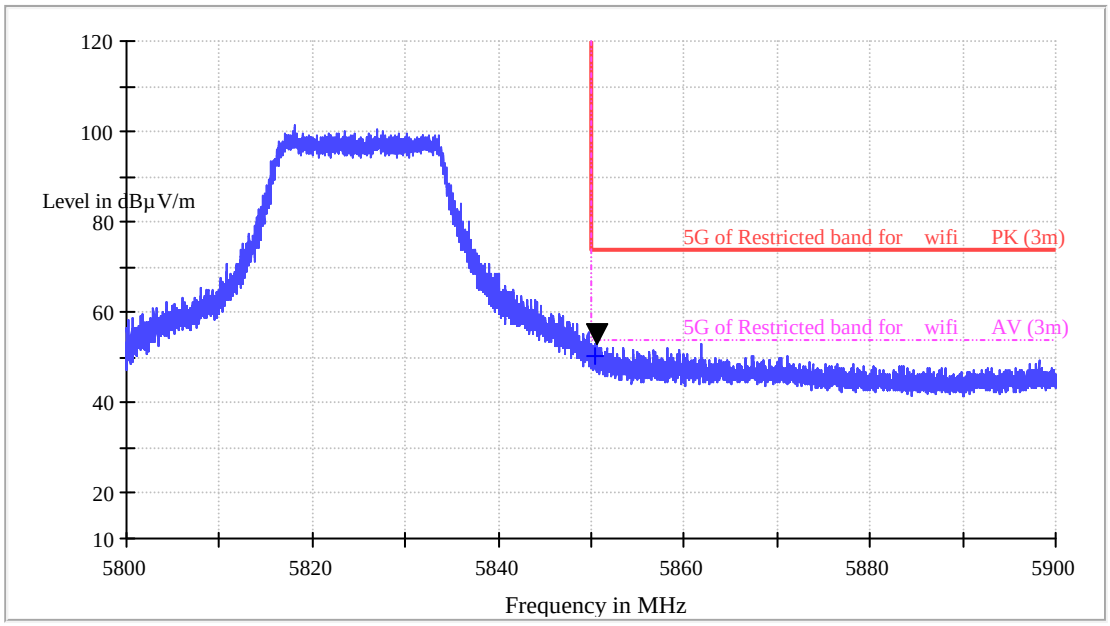
Vertical



Frequency (MHz)	MaxPeak (dBµV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)	Margin - AVG (dB)	Limit - AVG (dBµV/
5722.000000	48.1	1000.0	1000.000	150.0	V	359.0	1.2	-5.9	54

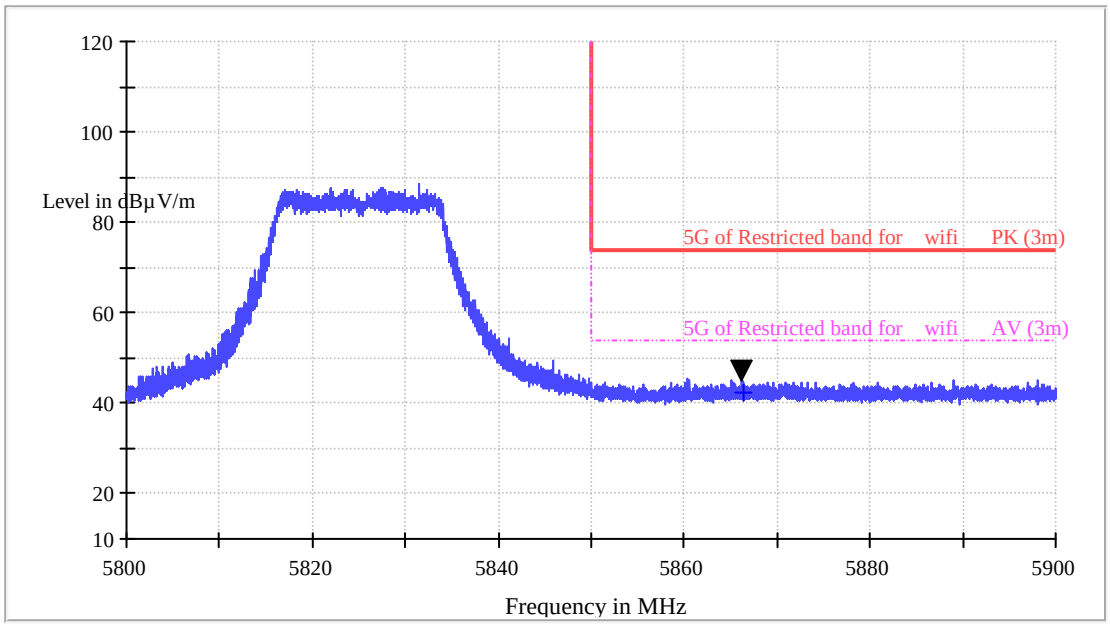
Channel 165: 5825 MHz:

Horizontal



Frequency (MHz)	MaxPeak (dBµV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)	Margin - AVG (dB)	Limit - AVG (dBµV/
5850.400000	53.3	1000.0	1000.000	150.0	H	359.0	1.8	-0.7	54

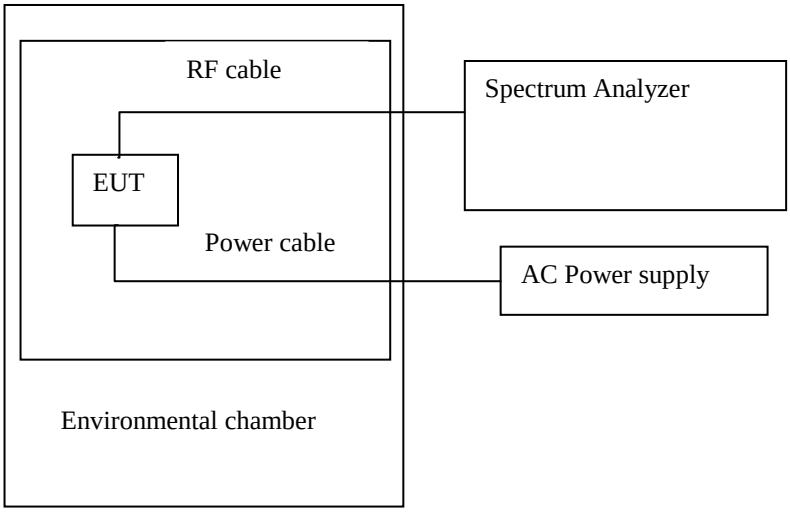
Vertical



Frequency (MHz)	MaxPeak (dBµV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)	Margin - AVG (dB)	Limit - AVG (dBµV/
5866.400000	45.4	1000.0	1000.000	150.0	V	359.0	1.9	-8.6	54

4.9 Frequency Stability Test

Test setup & procedure



Frequency stability with respect to ambient temperature test procedure:

1. The EUT was placed inside the environmental test chamber and powered by nominal AC voltage 120/60Hz.
2. Turn the EUT on and couple its output to a spectrum analyser.
3. Turn the EUT off and set the chamber to the highest temperature specified.
4. Allow sufficient time (approximately 30 min) for the temperature of the chamber to stabilize, turn the EUT on and measure the operating frequency 20dB bandwidth.
5. Lower the chamber temperature by not more than 10℃, and allow the temperature inside the chamber to stabilize Repeat step 4

Frequency stability when varying supply voltage test procedure:

1. The EUT was placed at ambient room temperature (+15℃ to +25℃)
2. Turn the EUT on and couple its output to a spectrum analyser.
3. The supply voltage was then adjusted on the EUT from 85% to 115%
4. Measure the operating frequency 20dB bandwidth.

Test result as follows:

Test mode:		802.11 a(20)	Frequency (MHz)	5180
Voltage (VAC)	Test Temperature ℃	20dB Bandwidth FL(MHz)	20dB Bandwidth FH(MHz)	Limit MHz
208	40	5170.72	5189.26	5150-5350
	30	5170.88	5189.47	
	20	5170.88	5189.47	
	10	5170.76	5189.28	
	5	5170.64	5189.35	
239	20	5170.76	5189.37	
208		5170.75	5189.67	
176		5170.69	5189.25	

Test mode:		802.11 n(HT20)	Frequency (MHz)	5180
Voltage (VAC)	Test Temperature ℃	20dB Bandwidth FL(MHz)	20dB Bandwidth FH(MHz)	Limit MHz
208	40	5170.18	5190.01	5150-5350
	30	5170.37	5190.24	
	20	5170.25	5190.39	
	10	5170.34	5190.26	
	5	5170.24	5190.32	
239	20	5170.47	5190.45	
208		5170.34	5190.36	
176		5170.47	5190.29	

Test mode:		802.11 a(20)	Frequency (MHz)	5745
Voltage (VAC)	Test Temperature ℃	20dB Bandwidth FL(MHz)	20dB Bandwidth FH(MHz)	Limit MHz
208	40	5735.89	5755.01	5725-5850
	30	5735.42	5735.66	
	20	5735.77	5755.21	
	10	5735.76	5755.48	
	5	5735.78	5755.37	
239	20	5735.64	5735.46	
208		5735.59	5755.57	
176		5735.76	5755.41	

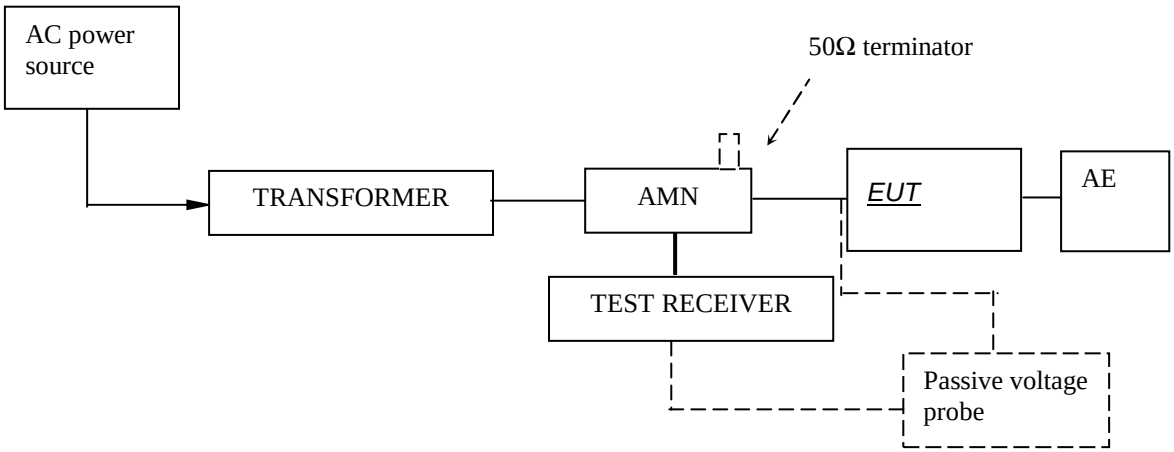
Test mode:		802.11 a(20)	Frequency (MHz)	5825
Voltage (VAC)	Test Temperature ℃	20dB Bandwidth FL(MHz)	20dB Bandwidth FH(MHz)	Limit MHz
208	40	5816.03	5835.21	5725-5850
	30	5816.21	5835.48	
	20	5816.19	5835.68	
	10	5816.65	5835.47	
	5	5816.29	5835.59	
239	20	5816.20	5835.62	
208		5816.18	5835.49	
176		5816.39	5835.85	

Test mode:		802.11 n(HT20)	Frequency (MHz)	5745
Voltage (VAC)	Test Temperature ℃	20dB Bandwidth FL(MHz)	20dB Bandwidth FH(MHz)	Limit MHz
208	40	5735.69	5755.01	5725-5850
	30	5735.28	5745.90	
	20	5735.67	5755.79	
	10	5735.83	5745.94	
	5	5735.39	5755.23	
239	20	5735.65	5745.48	
208		5735.62	5755.75	
176		5735.98	5745.93	

Test mode:		802.11 n(HT20)	Frequency (MHz)	5825
Voltage (VAC)	Test Temperature ℃	20dB Bandwidth FL(MHz)	20dB Bandwidth FH(MHz)	Limit MHz
208	40	5815.03	5835.24	5725-5850
	30	5815.18	5835.27	
	20	5815.56	5835.56	
	10	5815.37	5835.25	
	5	5815.23	5835.86	
239	20	5815.87	5835.48	
208		5815.83	5835.26	
176		5815.29	5835.29	

4.10 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
2	Average	362 kHz	43.76	L1	-4.92
2	Average	366 kHz	40.25	L1	-8.33
1	Quasi Peak	362 kHz	47.49	L1	-11.18
1	Quasi Peak	366 kHz	44.14	L1	-14.44
2	Average	2.718 MHz	30.43	L1	-15.56
2	Average	1.934 MHz	30.09	L1	-15.91

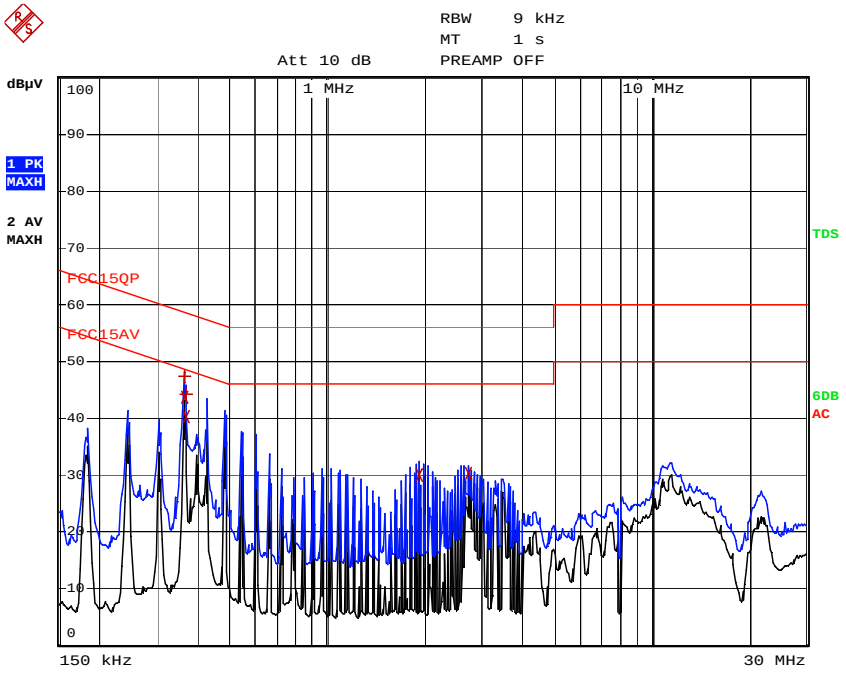
Tested Wire: Neutral Operation Mode: transmitting mode

EDIT PEAK LIST (Final Measurement Results)

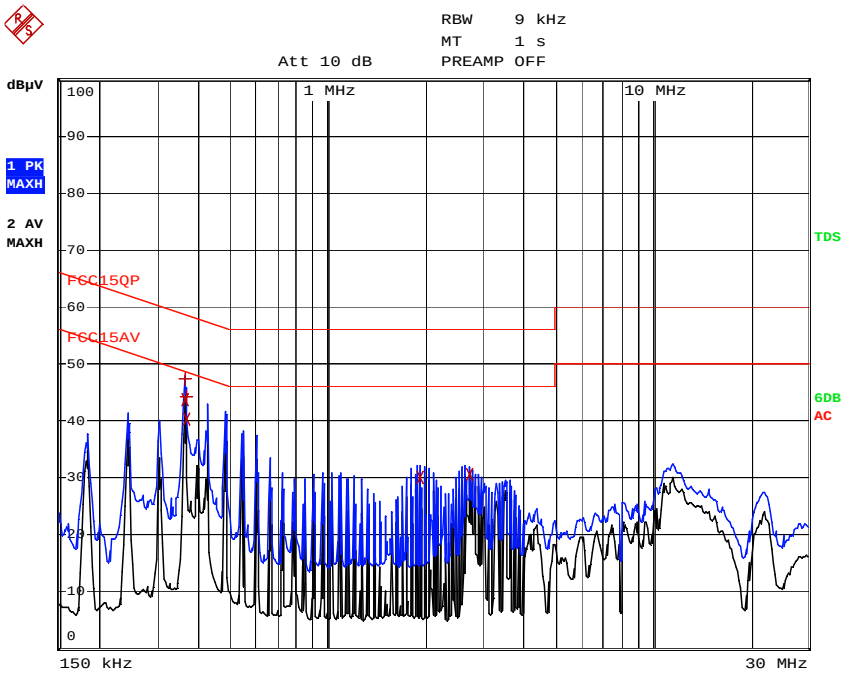
Trace1:		FCC15QP			
Trace2:		FCC15AV			
Trace3:		---			
	TRACE	FREQUENCY	LEVEL dBµV		DELTA LIMIT dB
2	Average	362 kHz	43.74	L1	-4.94
1	Quasi Peak	362 kHz	47.48	L1	-11.19
2	Average	366 kHz	40.32	L1	-8.26
1	Quasi Peak	366 kHz	44.17	L1	-14.41
2	Average	1.934 MHz	30.07	L1	-15.92
2	Average	2.718 MHz	30.66	L1	-15.34

Emission Curve

Tested Wire: Live



Tested Wire: Neutral



5.0 Test Equipment List

Equipment No.	Equipment	Model	Manufacturer	Cal. Due date (YYYY-MM-DD)	Calibration Interval
EM030-04	3m Semi-Anechoic Chamber	9×6×6 m^3	ETS·LINDGREN	2017/5/9	1Y
EM031-02	EMI Test Receiver (9 kHz~7 GHz)	R&S ESR7	R&S	2017/6/7	1Y
EM031-03	Signal and Spectrum Analyzer (10 Hz~40 GHz)	R&S FSV40	R&S	2017/6/3	1Y
EM011-04	Loop antenna (9 kHz-30 MHz)	HFH2-Z2	R&S	2017/6/6	1Y
EM061-03	TRILOG Super Broadband test Antenna (30 MHz-1.5 GHz）(TX)	VULB 9161	SCHWARZBECK	2017/6/6	1Y
EM033-01	TRILOG Super Broadband test Antenna(30 MHz-3 GHz）(RX)	VULB 9163	SCHWARZBECK	2017/9/2	1Y
EM033-02	Bouble-Ridged Waveguide Horn Antenna (800 MHz-18 GHz)(RX)	R&S HF907	R&S	2017/6/6	1Y
EM033-03	High Frequency Antenna & preamplifier(18 GHz~26.5 GHz) (RX)	R&S SCU-26	R&S	2017/4/1	1Y
EM033-04	High Frequency Antenna & preamplifier (26 GHz-40 GHz)	R&S SCU-40	R&S	2017/4/1	1Y
EM031-02-01	Coaxial cable(9 kHz-1 GHz)	N/A	R&S	2017/5/30	1Y
EM033-02-02	Coaxial cable(1 GHz-18 GHz)	N/A	R&S	2017/5/30	1Y
EM033-04-02	Coaxial cable(18 GHz~40 GHz)	N/A	R&S	2017/4/1	1Y
EM031-01	Signal Generator (9 kHz~6 GHz)	SMB100A	R&S	2017/6/11	1Y
SZ180-10	Signal Generator (10MHz-40GHz)	68369B	Wiltron	2017/5/23	1Y
EM040-01	Band Reject/Notch Filter	WRHFV	Wainwright	N/A	1Y
EM040-02	Band Reject/Notch Filter	WRCGV	Wainwright	N/A	1Y
EM040-03	Band Reject/Notch Filter	WRCGV	Wainwright	N/A	1Y
EM022-03	2.45 GHz Filter	BRM50702	Micro-Tronics	2017/5/9	1Y
SA016-16	Programmable Temperature & Humidity Test Chamber	MHU-800LJ	TERCHY	2017/10/26	1Y
SA012-74	Digital Multimeter	FLUKE175	FLUKE	2017/10/12	1Y
EM010-01	Regulated DC Power supply	PAB-3003A	GUANHUA	N/A	1Y
SA040-22	Regulated DC Power supply	IT6721	ITECH	2017/9/22	1Y
EM084-06	Audio Analyzer	8903B	HP	2017/3/29	1Y
EM084-07	Modulation Analyzer	8901B	HP	2017/6/5	1Y

Equipment No.	Equipment	Model	Manufacturer	Cal. Due date (YYYY-MM-DD)	Calibration Interval
EM080-05	EMI receiver	ESCI	R&S	2017/7/27	1Y
EM006-05	LISN	ENV216	R&S	2017/9/28	1Y
EM006-06	LISN	ENV216	R&S	2017/9/16	1Y
EM006-06-01	Coaxial cable	/	R&S	2017/4/11	1Y
EM004-04	EMC shield Room	8m×3m×3m	Zhongyu	2018/1/25	1Y