



## FCC 47 CFR PART 15 SUBPART C

for

**6.0\*50 NV monocular, 4.5\*40NV monocular, 3.0\*30NV monocular**

**Model: 260250, 260240, 260230**

**Brand: Bushnell**

**Test Report Number:**

**C180704Z09-RP1-3**

**Issued Date: August 24, 2018**

Issued for

**K-Mark Industrial LTD.**

**Flat A, 7/F., Mai On Ind. Bldg., 17-21, Kung Yip St., Kwai Chung, Hong Kong**

Issued by:

**Compliance Certification Services (Shenzhen) Inc.**

No.10-1 Mingkeda Logistics park, No.18, Huanguan South Rd.,

Guan Lan Town, Baoan District, Shenzhen, China

TEL: 86-755-28055000

FAX: 86-755-28055221

E-Mail: service@ccssz.com



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## Revision History

Rev.	Issue Date	Revisions	Effect Page	Revised By
00	August 24, 2018	Initial Issue	ALL	Anna Liu



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## 1 TEST CERTIFICATION

<b>Product</b>	6.0*50 NV monocular, 4.5*40NV monocular, 3.0*30NV monocular
<b>Model</b>	260250, 260240, 260230
<b>Brand</b>	Bushnell
<b>Tested</b>	July 4~ August 24, 2018
<b>Applicant</b>	<b>K-Mark Industrial LTD.</b> Flat A, 7/F., Mai On Ind. Bldg., 17-21, Kung Yip St., Kwai Chung, Hong Kong
<b>Manufacturer</b>	<b>K-Mark Industrial LTD.</b> Flat A, 7/F., Mai On Ind. Bldg., 17-21, Kung Yip St., Kwai Chung, Hong Kong

### APPLICABLE STANDARDS

Standard	Test Type	Standard	Test Type
15.207(a)	Power Line Conducted Emissions	15.247(d) 15.209(a)	● Spurious Emissions ● Conducted Measurement ● Radiated Emissions
15.247(a)(2)	6dB Bandwidth Measurement	15.247(b)(3) 15.247(b)(4)	Peak Power Measurement
15.247(d)	Band Edges Measurement	15.247(e)	Peak Power Spectral Density

### We hereby certify that:

The above equipment was tested by Compliance Certification Services (Shenzhen) Inc. The test data, data evaluation, test procedures, and equipment configurations shown in this report were made in accordance with the procedures given in **ANSI C63.10: 2013** and the energy emitted by the sample EUT tested as described in this report is in compliance with the requirements of FCC Rules Part 15.207, 15.209, 15.247.

The test results of this report relate only to the tested sample EUT identified in this report.

**Approved by:**

Eve Wang  
Supervisor of EMC Dept.  
Compliance Certification Services (Shenzhen) Inc.

**Reviewed by:**

Nancy Fu  
Supervisor of Report Dept.  
Compliance Certification Services (Shenzhen) Inc.



## 2 TEST RESULT SUMMARY

APPLICABLE STANDARDS			
Standard	Test Type	Result	Remark
15.247(a)(2)	6dB Bandwidth Measurement	Pass	Meet the requirement of limit.
15.247(b)(3) 15.247(b)(4)	Peak Power Measurement	Pass	Meet the requirement of limit.
15.247(d)	Band Edges Measurement	Pass	Meet the requirement of limit.
15.247(e)	Peak Power Spectral Density	Pass	Meet the requirement of limit.
15.247(d) 15.209(a)	● Spurious Emissions ● Conducted Measurement ● Radiated Emissions	Pass	Meet the requirement of limit.
15.207(a)	Power line Conducted Emissions	N/A	Not applicable, since the EUT powered by the DC Power.

Note:

1. The statements of test result on the above are decided by the request of test standard only; the measurement uncertainties are not factored into this compliance determination.
2. The information of measurement uncertainty is available upon the customer's request.



### 3 EUT DESCRIPTION

<b>Product</b>	6.0*50 NV monocular, 4.5*40NV monocular, 3.0*30NV monocular
<b>Model Number</b>	260250, 260240, 260230
<b>Brand</b>	Bushnell
<b>Model Discrepancy</b>	They are the same product except product name are different.
<b>Identify Number</b>	C180704Z09-RP1-3
<b>Received Date</b>	July 4, 2018
<b>Power Supply</b>	DC 6V supplied by Battery
<b>Transmit Power</b>	IEEE 802.11b mode: 11.45dBm IEEE 802.11g mode: 18.07dBm IEEE 802.11n HT20 MHz mode: 17.98Bm IEEE 802.11n HT40 MHz mode: 17.89dBm
<b>Modulation Technique</b>	IEEE 802.11b mode: DSSS(CCK,QPSK, BPSK) IEEE 802.11g mode: OFDM (BPSK/QPSK/16QAM/64QAM) IEEE 802.11n HT20 MHz mode: OFDM (BPSK/QPSK/16QAM/64QAM) IEEE 802.11n HT40 MHz mode: OFDM (BPSK/QPSK/16QAM/64QAM)
<b>Transmit Data Rate</b>	IEEE 802.11b: 11Mbps(CCK) with fall back rates of 5.5/2/1Mbps IEEE 802.11g: 54Mbps with fall back rates of 48/36/24/18/12/9 /6Mbps IEEE 802.11n HT20: 65Mbps with fall back rates of 65.0/58.5/52.0/ 39.0/26.0/19.5/13.0/6.5Mbps IEEE 802.11n HT40: 135Mbps with fall back rates of 135/121.5/108/ 81/54/40.5/27/13.5Mbps
<b>Number of Channels</b>	IEEE 802.11b mode: 11 Channels IEEE 802.11g mode: 11 Channels IEEE 802.11n HT20 MHz mode: 11 Channels IEEE 802.11n HT40 MHz mode: 7 Channels
<b>Antenna Specification</b>	PIFA Antenna with 3.64dBi gain (Max)
<b>Channels Spacing</b>	IEEE 802.11b/g ,802.11n HT20/HT40 : 5MHz
<b>Temperature Range</b>	-20°C ~ +60°C
<b>Hardware Version</b>	DUC321AV1.1
<b>Software Version</b>	0x 21 00( “X” represents the 3 or 4 or 5.)

**Note:** 1. The sample selected for test was engineering sample that approximated to production product and was provided by manufacturer.

2. This submittal(s) (test report) is intended for FCC ID: **VEP-NVM345** filing to comply with Section 15.207, 15.209 and 15.247 of the FCC Part 15, Subpart C Rules.



## 4 TEST METHODOLOGY

### 4.1. DESCRIPTION OF TEST MODES

The EUT has been tested under operating condition.

Used the “EngineerMode”software to control the EUT for staying in continuous transmitting and receiving mode is programmed.

Conducted emissions	
Test Mode	Description
1	Normal(120V/60Hz)
2	Normal(240V/50Hz)
The worst test results mode 1, mode 2 were recorded in the report.	

Radiated Emission	
Test Mode	Description
1	Continuously Transmitting
The worst test results were recorded in the report.	

After verification, all tests were carried out with the worst case test modes as shown below except radiated spurious emission below 1GHz, which worst case was in normal link mode only, and power line conducted emission below 30MHz, which worst case was in normal link mode.

IEEE802.11b mode: Channel Low (2412MHz), Channel Mid (2437MHz) and Channel High (2462MHz) with 1Mbps data rate were chosen for full testing.

IEEE802.11g mode: Channel Low (2412MHz), Channel Mid (2437MHz) and Channel High (2462MHz) with 6Mbps data rate were chosen for full testing.

IEEE 802.11n HT20 MHz mode: Channel Low (2412MHz), Channel Mid (2437MHz) and Channel High (2462MHz) with 6.5Mbps data rate were chosen for full testing.

IEEE 802.11n HT40 MHz mode: Channel Low (2422MHz), Channel Mid (2437MHz) and Channel High (2452MHz) with 13.5Mbps data rate were chosen for full testing.



## 5 SETUP OF EQUIPMENT UNDER TEST

### 5.1. DESCRIPTION OF SUPPORT UNITS

The EUT has been tested as an independent unit together with other necessary accessories or support units. The following support units or accessories were used to form a representative test configuration during the tests.

No.	Equipment	Model No.	Serial No.	FCC ID	Brand	Data Cable	Power Cord
1	DC power supply 2#	PS9065D	20018978	DOC	N/A	N/A	Unshielded 1.50m
2	Notebook	TianYi 310-14ISK	MP18DLC6	DOC	LENOVO	N/A	Unshielded 1.00m (AC Cable) Shielded 1.80m (DC Cable)

**Note:**

Grounding was established in accordance with the manufacturer's requirements and conditions for the intended use.

### 5.2. CONFIGURATION OF SYSTEM UNDER TEST

See test photographs attached in Appendix II for the actual connections between EUT and support equipment.



### 5.3. TEST INSTRUMENTS

Conducted Emission Test Site					
Name of Equipment	Manufacturer	Model Number	Serial Number	Last Calibration	Due Calibration
EMI TEST RECEIVER	ROHDE&SCHWARZ	ESCI	100783	01/27/2018	01/26/2019
LISN(EUT)	ROHDE&SCHWARZ	ENV216	101543-WX	01/27/2018	01/26/2019
LISN	EMCO	3825/2	8901-1459	01/27/2018	01/26/2019
Temp. / Humidity Meter	VICTOR	HTC-1	N/A	01/29/2018	01/28/2019
Test S/W	FARAD	EZ-EMC/ CCS-3A1-CE			

Radiated Emission Test Site 966 (2)					
Name of Equipment	Manufacturer	Model Number	Serial Number	Last Calibration	Due Calibration
Spectrum Analyzer	Agilent	N9010A	MY52221469	01/27/2018	01/26/2019
EMI TEST RECEIVER	ROHDE&SCHWARZ	ESCI	100783	01/27/2018	01/26/2019
Amplifier	EMEC	EM330	060661	01/27/2018	01/26/2019
High Noise Amplifier	Agilent	8449B	3008A01838	01/27/2018	01/26/2019
Loop Antenna	COM-POWER	AL-130	121044	01/30/2018	01/29/2019
Bilog Antenna	SCHAFFNER	CBL6143	5082	02/21/2018	02/20/2019
Horn Antenna	SCHWARZBECK	BBHA9120	D286	01/27/2018	01/26/2019
Board-Band Horn Antenna	Schwarzbeck	BBHA 9170	9170-497	01/24/2018	01/23/2019
Turn Table	N/A	N/A	N/A	N.C.R	N.C.R
Antenna Tower	SUNOL	TLT2	N/A	N.C.R	N.C.R
Controller	Sunol Sciences	SC104V	022310-1	N.C.R	N.C.R
Controller	CT	N/A	N/A	N.C.R	N.C.R
Temp. / Humidity Meter	Anymetre	JR913	N/A	01/29/2018	01/28/2019
Test S/W	FARAD	LZ-RF / CCS-SZ-3A2			

Antenna Conducted Spurious Emission					
Name of Equipment	Manufacturer	Model Number	Serial Number	Last Calibration	Due Calibration
Spectrum Analyzer	Agilent	N9010A	MY52221469	01/27/2018	01/26/2019

6dB Bandwidth					
Name of Equipment	Manufacturer	Model Number	Serial Number	Last Calibration	Due Calibration
Spectrum Analyzer	Agilent	N9010A	MY52221469	01/27/2018	01/26/2019



Antenna Gain					
Name of Equipment	Manufacturer	Model Number	Serial Number	Last Calibration	Due Calibration
Spectrum Analyzer	Agilent	N9010A	MY52221469	01/27/2018	01/26/2019

Peak Output Power					
Name of Equipment	Manufacturer	Model Number	Serial Number	Last Calibration	Due Calibration
Power Meter	Anritsu	ML2495A	1204003	01/27/2018	01/26/2019
Power Sensor	Anritsu	MA2411B	1126150	01/27/2018	01/26/2019

Band edges					
Name of Equipment	Manufacturer	Model Number	Serial Number	Last Calibration	Due Calibration
Spectrum Analyzer	Agilent	N9010A	MY52221469	01/27/2018	01/26/2019

Peak Power Spectral Density					
Name of Equipment	Manufacturer	Model Number	Serial Number	Last Calibration	Due Calibration
Spectrum Analyzer	Agilent	N9010A	MY52221469	01/27/2018	01/26/2019

Note: 1. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.  
2. N.C.R = No Calibration Request.



## 6 FACILITIES AND ACCREDITATIONS

### 6.1. FACILITIES

All measurement facilities used to collect the measurement data are located at  
**No.10-1 Mingkeda Logistics park, No.18, Huanguan South Rd., Guan Lan Town,  
Baoan District, Shenzhen, China**

The sites are constructed in conformance with the requirements of ANSI C63.10, ANSI C63.7 and CISPR Publication 22. All receiving equipment conforms to CISPR Publication 16-1, "Radio Interference Measuring Apparatus and Measurement Methods."

### 6.2. ACCREDITATIONS

Our laboratories are accredited and approved by the following accreditation body according to ISO/IEC 17025.

USA  
China

A2LA  
CNAS

USA  
Japan  
Canada

FCC  
VCCI (C-4815,R-4320,T-2317, G-10624)  
INDUSTRY CANADA

Copies of granted accreditation certificates are available for downloading from our web site, <http://www.ccssz.com>

### 6.3. MEASUREMENT UNCERTAINTY

Where relevant, the following measurement uncertainty levels have been estimated for tests performed on the EUT as specified in CISPR 16-4-2:

Parameter	Uncertainty
Radiated Emission, 30 to 200 MHz Test Site : 966(2)	+/-3.6880dB
Radiated Emission, 200 to 1000 MHz Test Site : 966(2)	+/-3.6695dB
Radiated Emission, 1 to 8 GHz	+/-5.1782dB
Radiated Emission, 8 to 18 GHz	+/-5.2173dB
Conducted Emissions	+/-3.6836dB
Band Width	178kHz
Peak Output Power MU	+/-1.906dB
Band Edge MU	+/-0.182dB
Channel Separation MU	416.178Hz
Duty Cycle MU	0.054ms
Frequency Stability MU	226Hz

This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=2.

The measured result is above (below) the specification limit by a margin less than the measurement uncertainty; it is therefore not possible to state compliance based on the 95% level of confidence. However, the result indicates that compliance (non-compliance) is more probable than non-compliance) with the specification limit.



## 7 FCC PART 15.247 REQUIREMENTS

### 7.1. POWER LINE CONDUCTED EMISSIONS MEASUREMENT

#### 7.1.1. LIMITS OF CONDUCTED EMISSIONS MEASUREMENT

According to §15.207(a), except as shown in paragraphs (b) and (c) of this section, for an intentional radiator that is designed to be connected to the public utility (AC) power line, the radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies within the band 150 kHz to 30 MHz shall not exceed the limits in the following table, as measured using a 50  $\mu$ H/50 ohms line impedance stabilization network (LISN). Compliance with the provisions of this paragraph shall be based on the measurement of the radio frequency voltage between each power line and ground at the power terminal. The lower limit applies at the boundary between the frequency ranges.

Frequency Range (MHz)	Limits (dB $\mu$ V)	
	Quasi-peak	Average
0.15 to 0.50	66 to 56*	56 to 46*
0.50 to 5	56	46
5 to 30	60	50

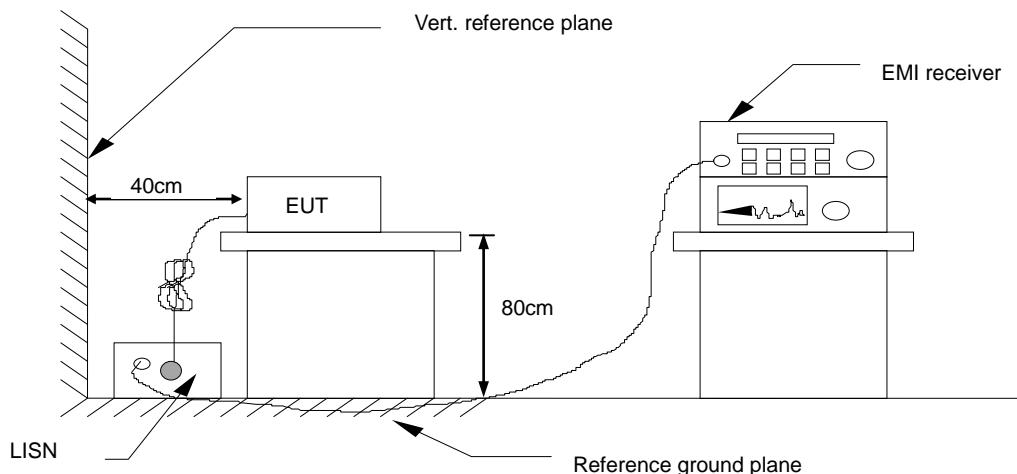
**NOTE:**

- (1) The lower limit shall apply at the transition frequencies.
- (2) The limit decreases in line with the logarithm of the frequency in the range of 0.15 to 0.50 MHz.
- (3) All emanations from a class A/B digital device or system, including any network of conductors and apparatus connected thereto, shall not exceed the level of field strengths specified above.

#### 7.1.2. TEST PROCEDURES (please refer to measurement standard)

- The EUT and Support equipment, if needed, was placed on a non-conducted table, which is 0.8m above the ground plane and 0.4m away from the conducted wall.
- The test equipment EUT installed received AC main power, through a Line Impedance Stabilization Network (LISN), which supplied power source and was grounded to the ground plane. All support equipment power received from a second LISN. The two LISNs provide 50 ohm/ 50uH of coupling impedance for the measuring instrument.
- The EUT test program was started. Emissions were measured on each current carrying line of the EUT using an EMI Test Receiver connected to the LISN powering the EUT.
- The frequency range from 150 kHz to 30 MHz was searched. The test data of the worst-case condition(s) was recorded. Emission levels under limit 20dB were not recorded.

### 7.1.3. TEST SETUP



For the actual test configuration, please refer to the related item – Photographs of the Test Configuration.

### 7.1.4. DATA SAMPLE

Frequency (MHz)	QuasiPeak Reading (dBuV)	Average Reading (dBuV)	Correction Factor (dB)	QuasiPeak Result (dBuV)	Average Result (dBuV)	QuasiPeak Limit (dBuV)	Average Limit (dBuV)	QuasiPeak Margin (dB)	Average Margin (dB)	Remark
X.XXXX	32.69	25.65	11.52	44.21	37.17	65.78	55.79	-21.57	-18.62	Pass

Factor = Insertion loss of LISN + Cable Loss  
Result = Quasi-peak Reading/ Average Reading + Factor  
Limit = Limit stated in standard  
Margin = Result (dBuV) – Limit (dBuV)

### 7.1.5. TEST RESULTS

***Not applicable, since the EUT powered by the DC Power.***



## 7.2. SPURIOUS EMISSIONS MEASUREMENT

### 7.2.1. CONDUCTED EMISSIONS MEASUREMENT

#### 7.2.1.1. LIMITS OF CONDUCTED EMISSIONS MEASUREMENT

§15.247(d) specifies that in any 100 kHz bandwidth outside of the authorized frequency band, the power shall be attenuated according to the following conditions:

If the peak output power procedure is used to measure the fundamental emission power to demonstrate compliance to 15.247(b)(3) requirements, then the peak conducted output power measured within any 100 kHz outside the authorized frequency band shall be attenuated by at least 20 dB relative to the maximum measured in-band peak PSD level.

If the average output power procedure is used to measure the fundamental emission power to demonstrate compliance to 15.247(b) (3) requirements, then the power in any 100 kHz outside of the authorized frequency band shall be attenuated by at least 30 dB relative to the maximum measured in-band average PSD level.

In addition, radiated emissions which fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emission limits specified in 15.209(a) (see Section 15.205(c)).

#### 7.2.1.2. TEST PROCEDURE (please refer to measurement standard)

Conducted RF measurements of the transmitter output were made to confirm that the EUT antenna port conducted emissions meet the specified limit and to identify any spurious signals that require further investigation or measurements on the radiated emissions site.

The transmitter output is connected to the spectrum analyzer. The resolution bandwidth is set to 100 kHz. The video bandwidth is set to 300 kHz.

Measurements are made over the 9 kHz to 26GHz range with the transmitter set to the lowest, middle, and highest channels. No emission found between lowest internal used/generated frequency to 10MHz , it is only recorded 10MHz to 26GHz.

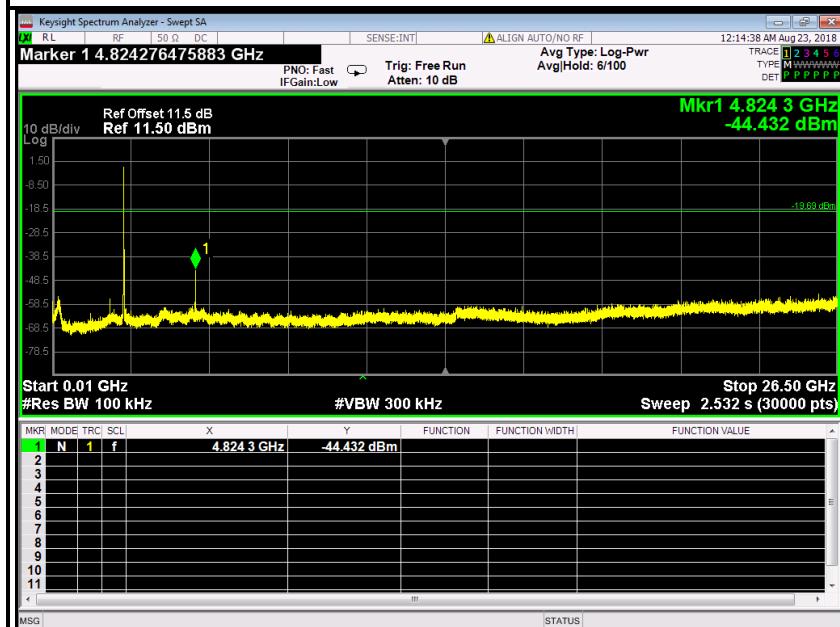


### 7.2.1.3. TEST RESULTS

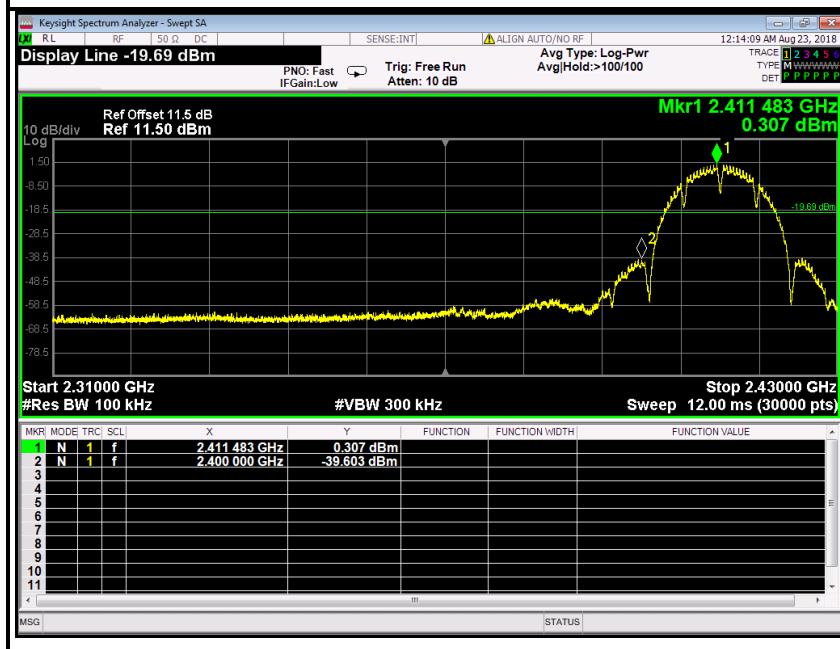
#### Test Plot

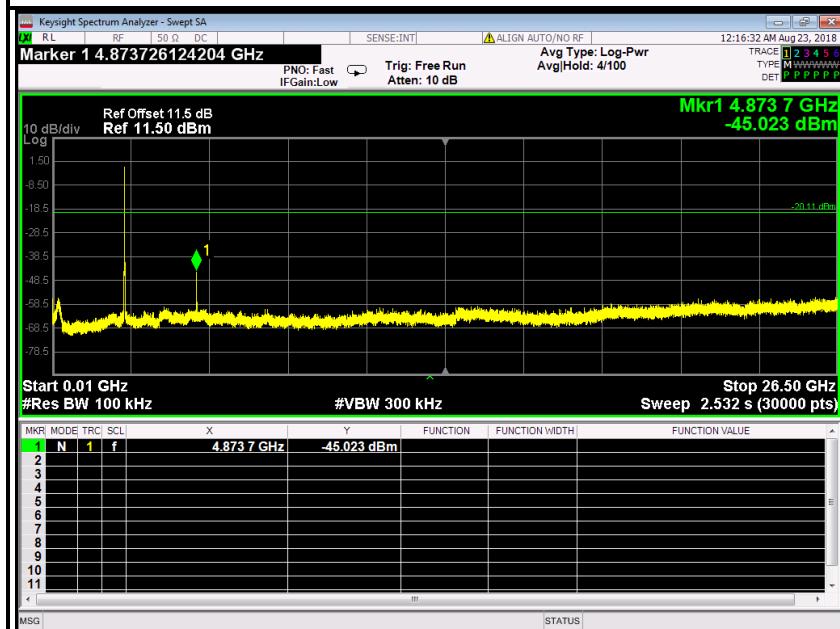
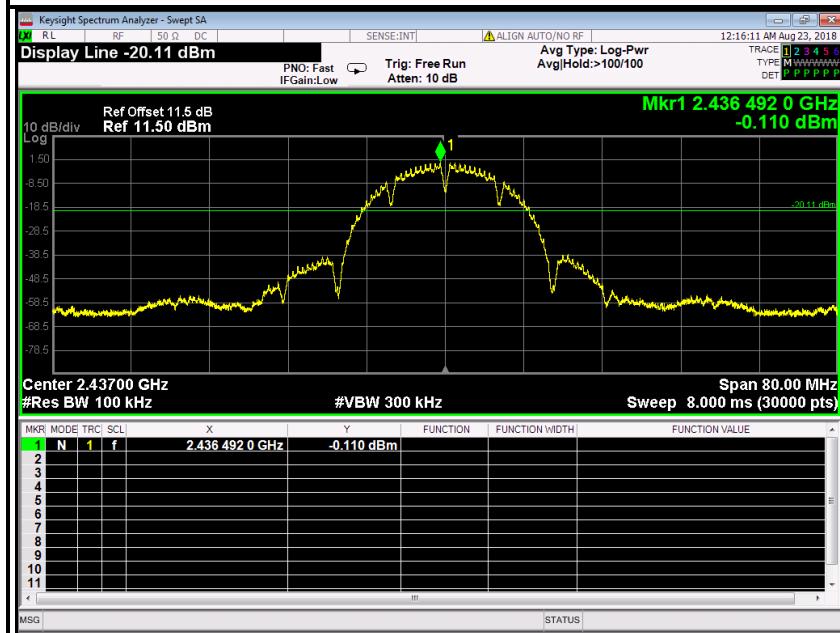
#### IEEE 802.11b mode

##### CH Low (10MHz ~26.5GHz)



##### CH Low (2.31GHz ~2.43GHz)



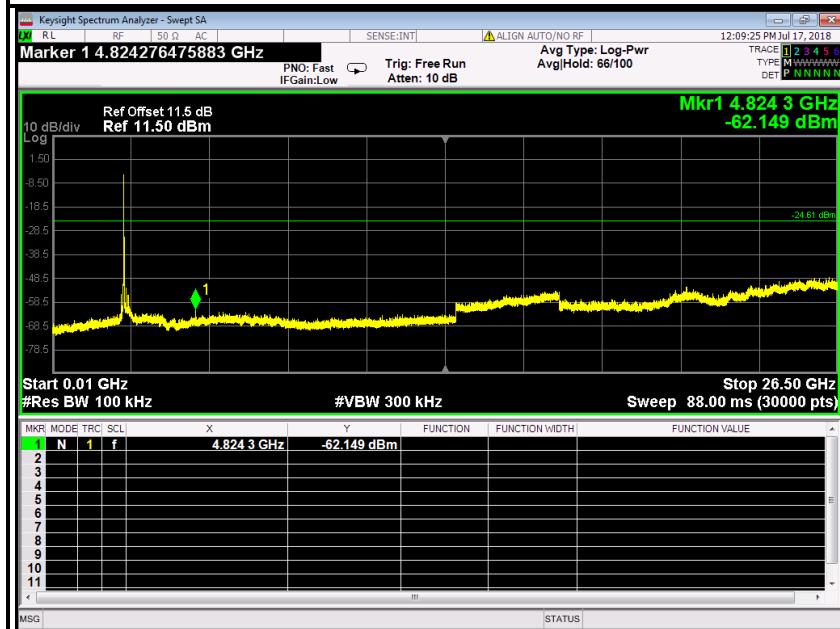
**CH Mid (10MHz ~26.5GHz)****CH Mid**



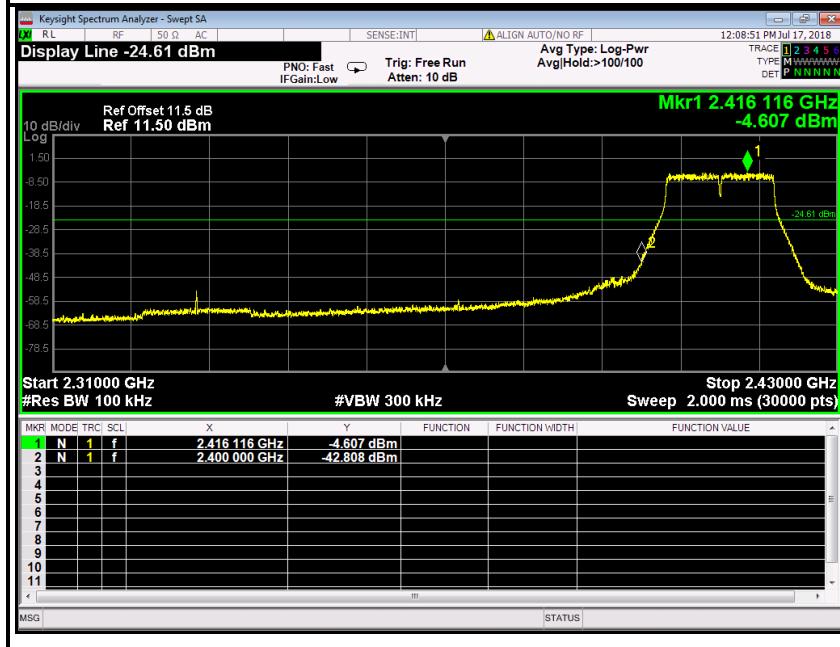


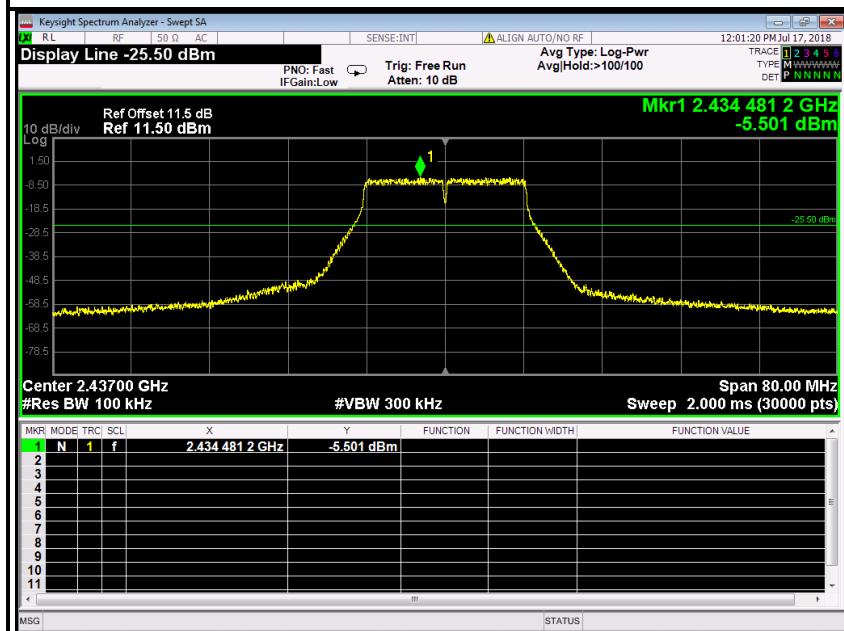
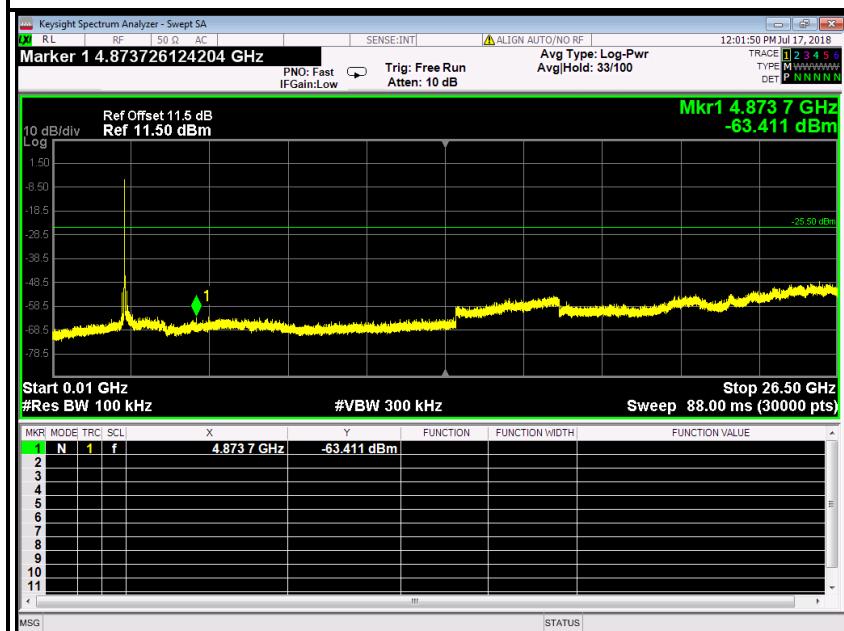
### IEEE 802.11g mode

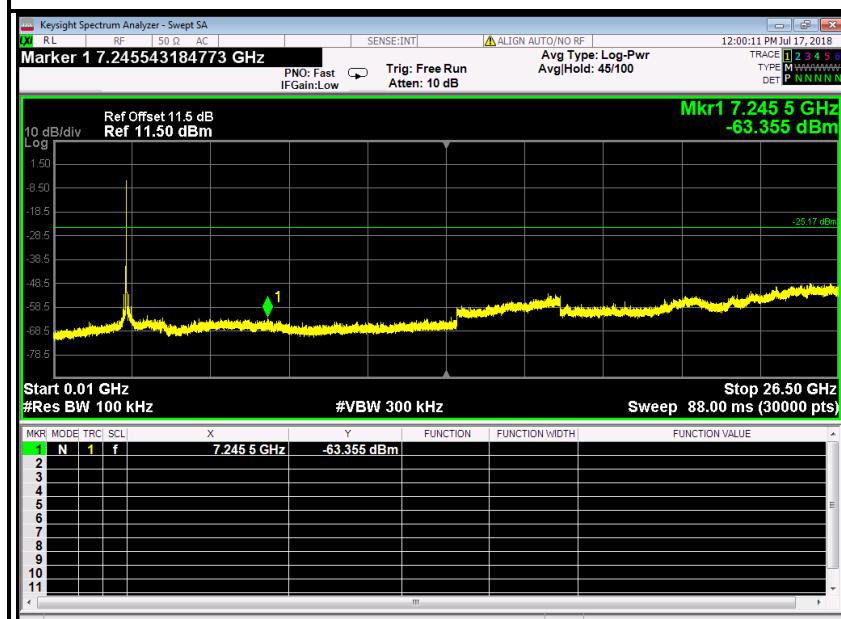
#### CH Low (10MHz ~26.5GHz)



#### CH Low (2.31GHz ~2.43GHz)



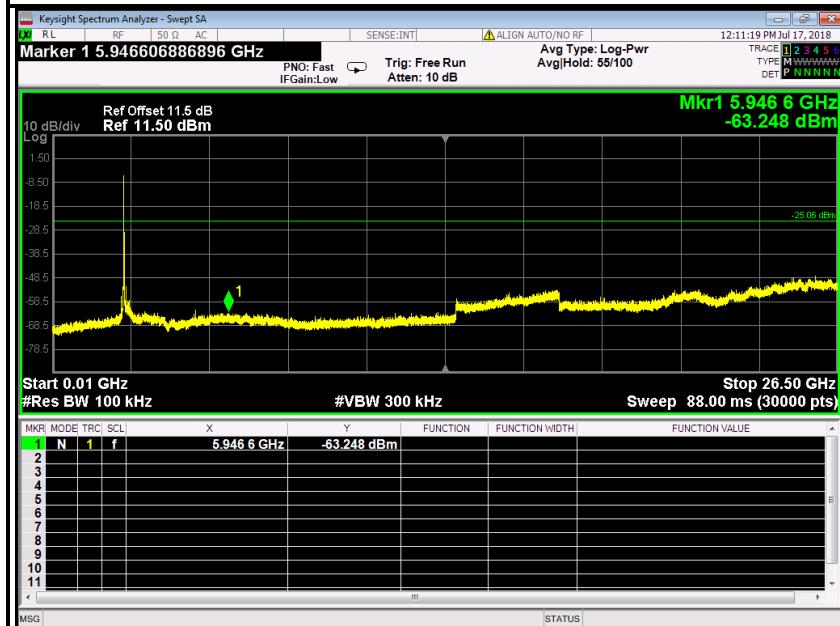
**CH Mid (10MHz ~26.5GHz)**

**CH High (10MHz ~26.5GHz)****CH High (2.45GHz ~2.5GHz)**

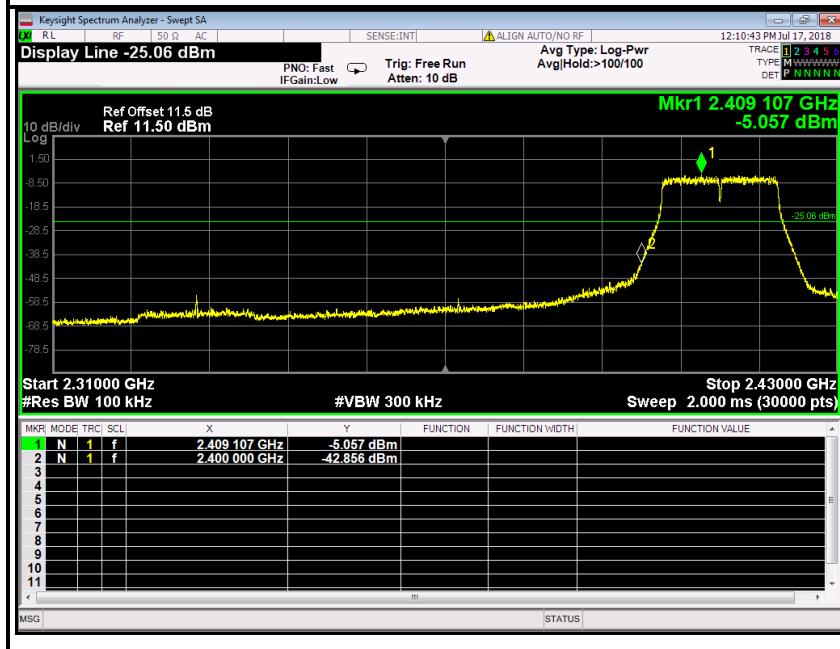


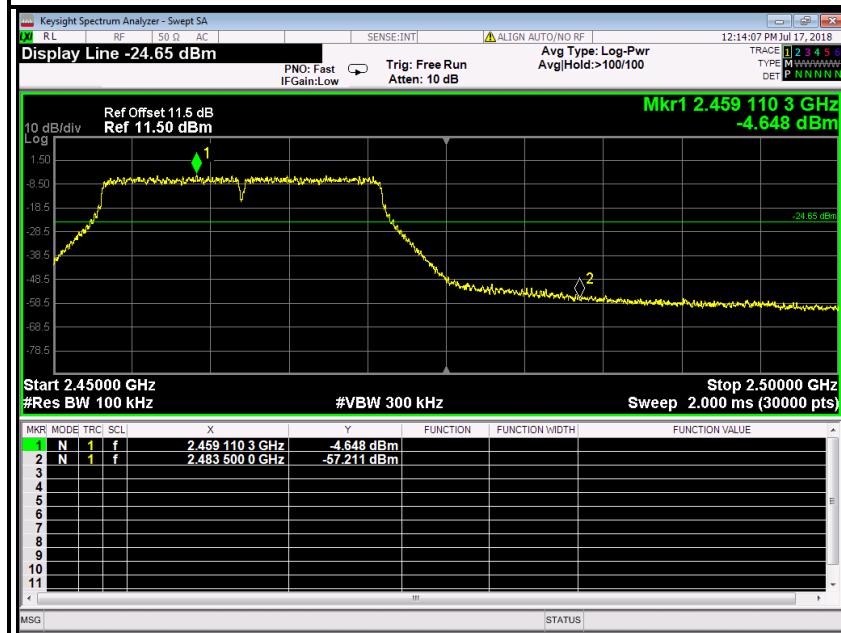
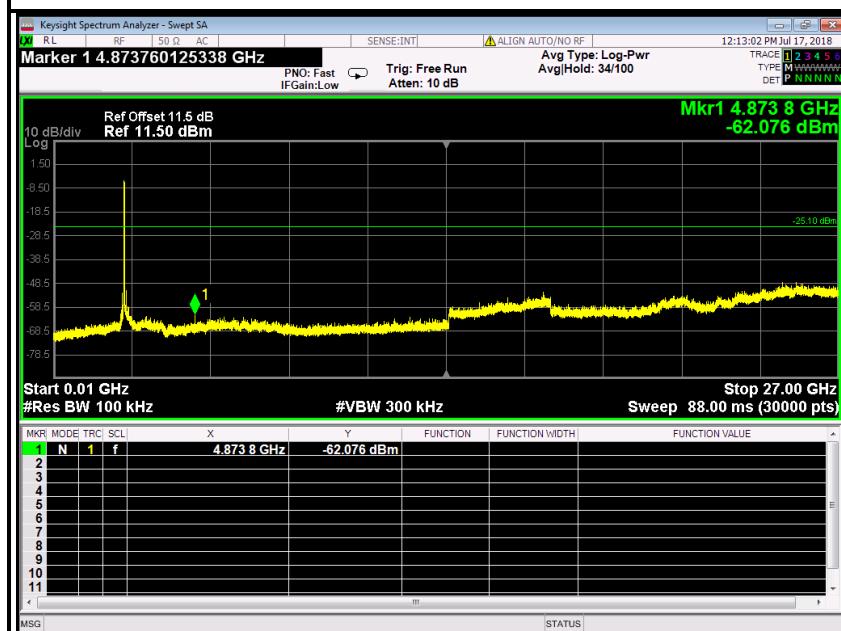
### IEEE 802.11n HT20 MHz mode

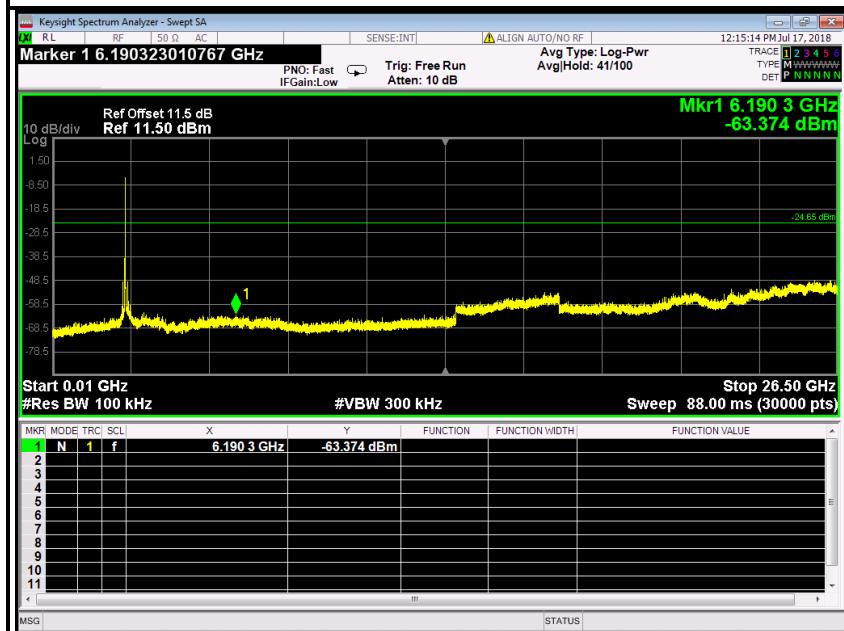
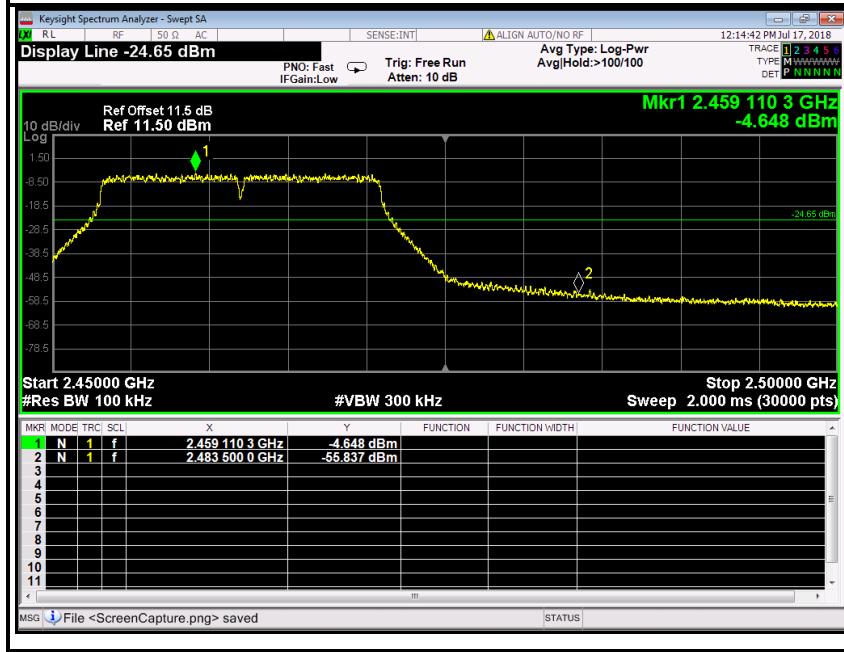
#### CH Low (10MHz ~26.5GHz)

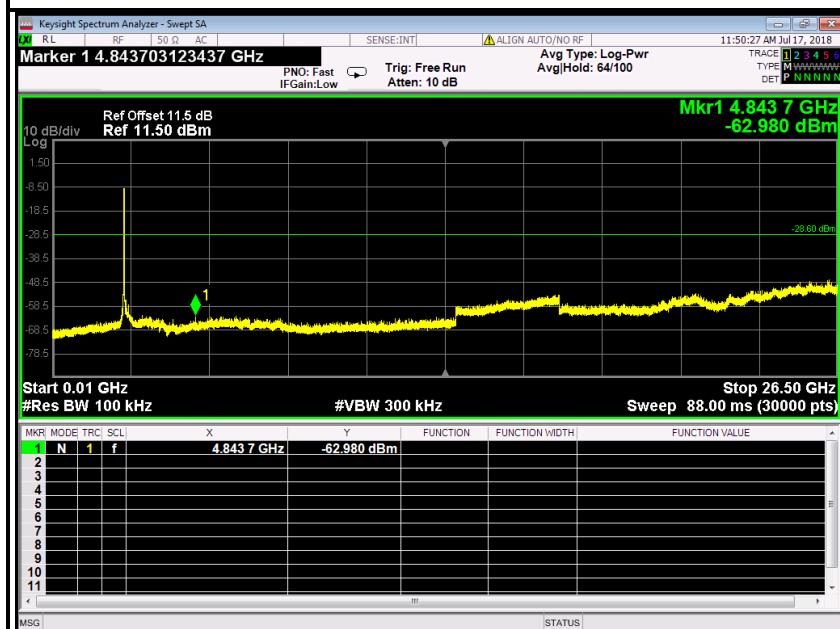
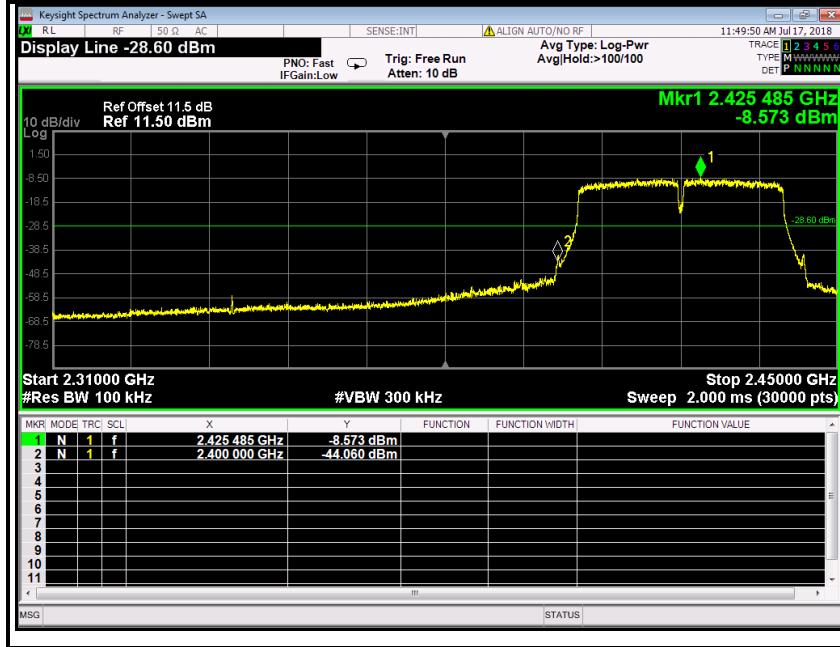


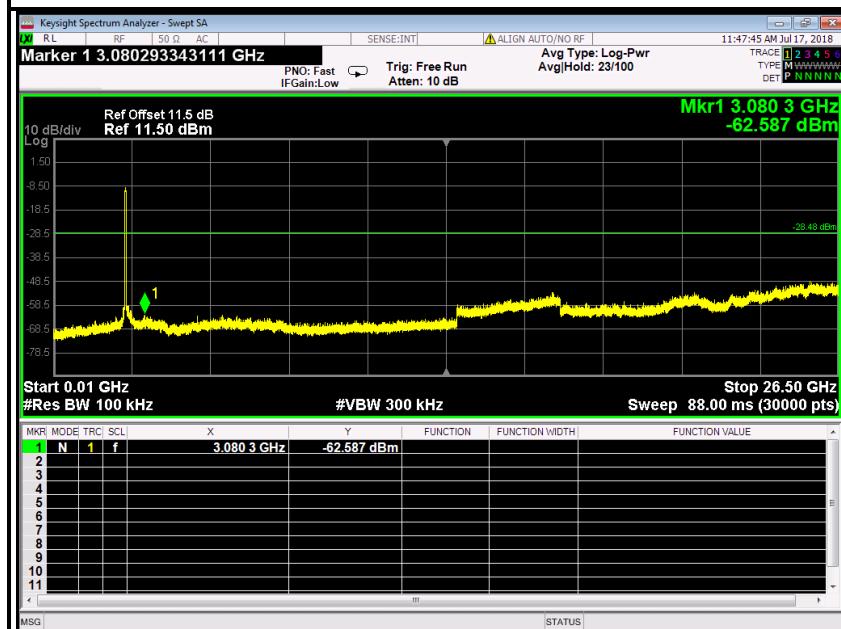
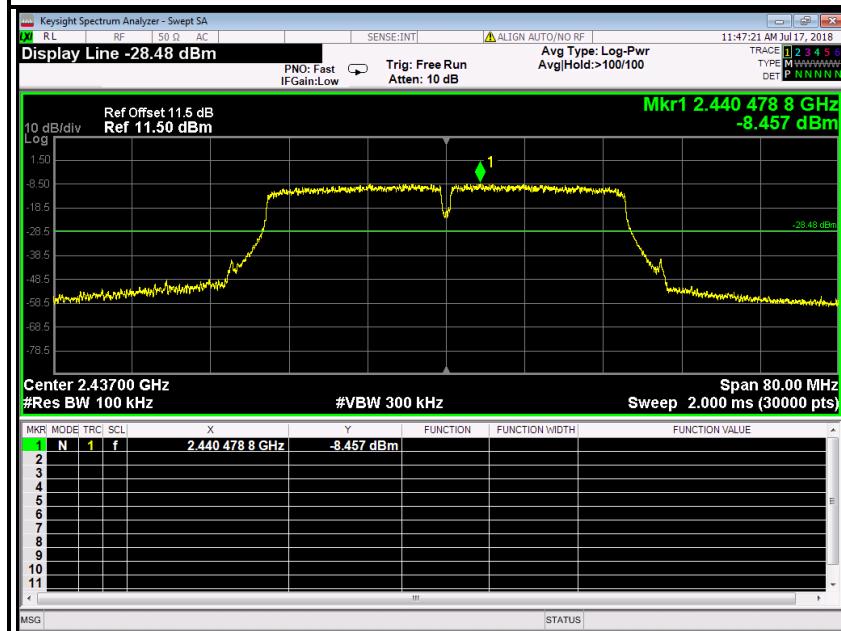
#### CH Low (2.31GHz ~2.43GHz)

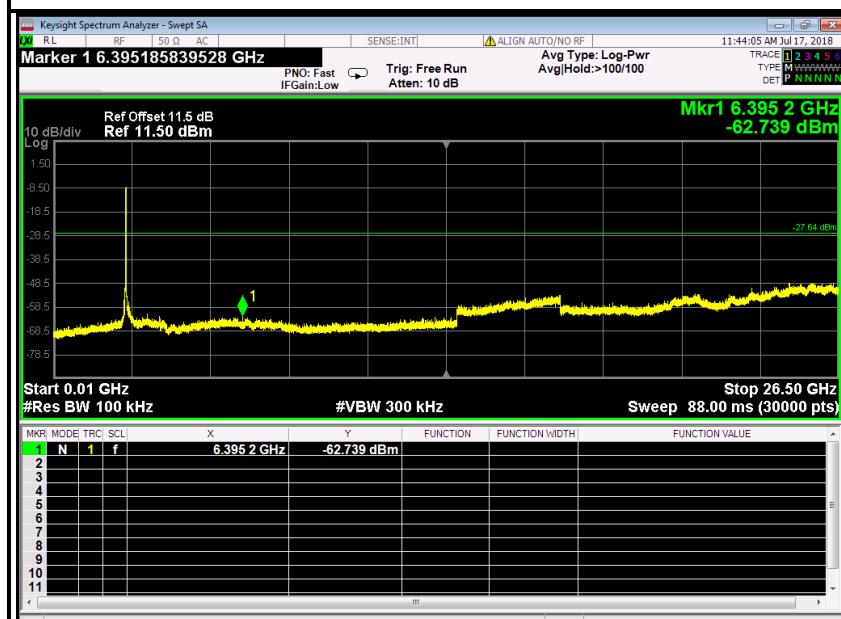
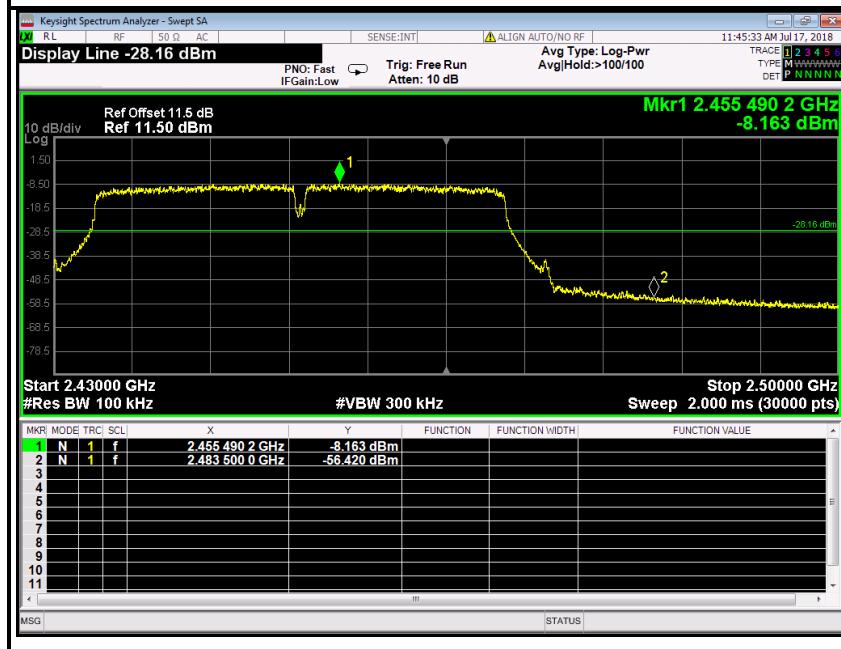


**CH Mid (10MHz ~26.5GHz)**

**CH High (10MHz ~26.5GHz)****CH High (2.45GHz ~2.5GHz)**

**IEEE 802.11n HT40 mode****CH Low (10MHz ~26.5GHz)****CH Low (2.31GHz ~2.45GHz)**

**CH Mid (10MHz ~26.5GHz)****CH Mid**

**CH High (10MHz ~26.5GHz)****CH High (2.43GHz ~2.5GHz)**



## 7.2.2. RADIATED EMISSIONS MEASUREMENT

### 7.2.2.1. LIMITS OF RADIATED EMISSIONS MEASUREMENT

According to §15.209(a), except as provided elsewhere in this Subpart, the emissions from an intentional radiator shall not exceed the field strength levels specified in the following table:

Frequency (MHz)	Field Strength (mV/m)	Measurement Distance (m)
0.009-0.490	2400/F(kHz)	300
0.490-1.705	24000/F(kHz)	30
1.705-30.0	30	30
30-88	100*	3
88-216	150*	3
216-960	200*	3
Above 960	500	3

**Remark:** Except as provided in paragraph (g), fundamental emissions from intentional radiators operating under this Section shall not be located in the frequency bands 54-72 MHz, 76-88 MHz, 174-216 MHz or 470-806 MHz. However, operation within these frequency bands is permitted under other sections of this Part, e.g., Sections 15.231 and 15.241.

1. In the emission table above, the tighter limit applies at the band edges.

Frequency (MHz)	Field Strength ( $\mu$ V/m at 3-meter)	Field Strength (dB $\mu$ V/m at 3-meter)
30-88	100	40
88-216	150	43.5
216-960	200	46
Above 960	500	54

**NOTE:**(1) The lower limit shall apply at the transition frequencies.

(2) Emission level (dB $\mu$ V/m) = 20 log Emission level ( $\mu$ V/m).



### 7.2.2.2. Measuring Instruments and Setting

The following table is the setting of spectrum analyzer and receiver.

Spectrum Parameter	Setting
Attenuation	Auto
Start Frequency	1000 MHz
Stop Frequency	10th carrier harmonic
RB / VB (Emission in restricted band)	1MHz / 1MHz for Peak, 1 MHz / 1/T for Average
RB / VB (Emission in non-restricted band)	1MHz / 1MHz for Peak, 1 MHz / 1/T for Average

Receiver Parameter	Setting
Attenuation	Auto
Start ~ Stop Frequency	9kHz~150kHz / RB 200Hz for QP/AVG
Start ~ Stop Frequency	150kHz~30MHz / RB 9kHz for QP/AVG
Start ~ Stop Frequency	30MHz~1000MHz / RB 100kHz for QP

### 7.2.2.3. TEST PROCEDURE (please refer to measurement standard)

#### 1) Sequence of testing 9 kHz to 30 MHz

##### Setup:

- The equipment was set up to simulate a typical usage like described in the user manual or described by manufacturer.
- If the EUT is a tabletop system, a rotatable table with 0.8 m height is used.
- If the EUT is a floor standing device, it is placed on the ground.
- Auxiliary equipment and cables were positioned to simulate normal operation conditions.
- The AC power port of the EUT (if available) is connected to a power outlet below the turntable.
- The measurement distance is 3 meter.
- The EUT was set into operation.

##### Pre measurement:

- The turntable rotates from 0° to 315° using 45° steps.
- The antenna height is 0.8 meter.
- At each turntable position the analyzer sweeps with peak detection to find the maximum of all emissions

**Final measurement:**

- Identified emissions during the pre measurement the software maximizes by rotating the turntable position (0° to 360°) and by rotating the elevation axes (0° to 360°).
- The final measurement will be done in the position (turntable and elevation) causing the highest emissions with QPK detector.
- The final levels, frequency, measuring time, bandwidth, turntable position, correction factor, margin to the limit and limit will be recorded. Also a plot with the graph of the pre measurement and the limit will be stored.

**2) Sequence of testing 30 MHz to 1 GHz****Setup:**

- The equipment was set up to simulate a typical usage like described in the user manual or described by manufacturer.
- If the EUT is a tabletop system, a table with 0.8 m height is used, which is placed on the ground plane.
- If the EUT is a floor standing device, it is placed on the ground plane with insulation between both.
- Auxiliary equipment and cables were positioned to simulate normal operation conditions
- The AC power port of the EUT (if available) is connected to a power outlet below the turntable.
- The measurement distance is 3 meter.
- The EUT was set into operation.

**Pre measurement:**

- The turntable rotates from 0° to 315° using 45° steps.
- The antenna is polarized vertical and horizontal.
- The antenna height changes from 1 to 3 meter.
- At each turntable position, antenna polarization and height the analyzer sweeps three times in peak to find the maximum of all emissions.



#### **Final measurement:**

- The final measurement will be performed with minimum the six highest peaks.
- According to the maximum antenna and turntable positions of premeasurement the software maximize the peaks by changing turntable position ( $\pm 45^\circ$ ) and antenna movement between 1 and 4 meter.
- The final measurement will be done with QP detector with an EMI receiver.
- The final levels, frequency, measuring time, bandwidth, antenna height, antenna polarization, turntable angle, correction factor, margin to the limit and limit will be recorded. Also a plot with the graph of the premeasurement with marked maximum final measurements and the limit will be stored.

### **3) Sequence of testing 1 GHz to 18 GHz**

#### **Setup:**

- The equipment was set up to simulate a typical usage like described in the user manual or described by manufacturer.
- If the EUT is a tabletop system, a rotatable table with 1.5 m height is used.
- If the EUT is a floor standing device, it is placed on the ground plane with insulation between both.
- Auxiliary equipment and cables were positioned to simulate normal operation conditions
- The AC power port of the EUT (if available) is connected to a power outlet below the turntable.
- The measurement distance is 3 meter.
- The EUT was set into operation.

#### **Pre measurement:**

- The turntable rotates from  $0^\circ$  to  $315^\circ$  using  $45^\circ$  steps.
- The antenna is polarized vertical and horizontal.
- The antenna height scan range is 1 meter to 2.5 meter.
- At each turntable position and antenna polarization the analyzer sweeps with peak detection to find the maximum of all emissions.

**Final measurement:**

- The final measurement will be performed with minimum the six highest peaks.
- According to the maximum antenna and turntable positions of premeasurement the software maximize the peaks by changing turntable position ( $\pm 45^\circ$ ) and antenna movement between 1 and 4 meter. This procedure is repeated for both antenna polarizations.
- The final measurement will be done in the position (turntable, EUT-table and antenna polarization) causing the highest emissions with Peak and Average detector.
- The final levels, frequency, measuring time, bandwidth, turntable position, EUT-table position, antenna polarization, correction factor, margin to the limit and limit will be recorded. Also a plot with the graph of the pre measurement with marked maximum final measurements and the limit will be stored.

**4) Sequence of testing above 18 GHz****Setup:**

- The equipment was set up to simulate a typical usage like described in the user manual or described by manufacturer.
- If the EUT is a tabletop system, a rotatable table with 1.5 m height is used.
- If the EUT is a floor standing device, it is placed on the ground plane with insulation between both.
- Auxiliary equipment and cables were positioned to simulate normal operation conditions
- The AC power port of the EUT (if available) is connected to a power outlet below the turntable.
- The measurement distance is 1 meter.
- The EUT was set into operation.

**Pre measurement:**

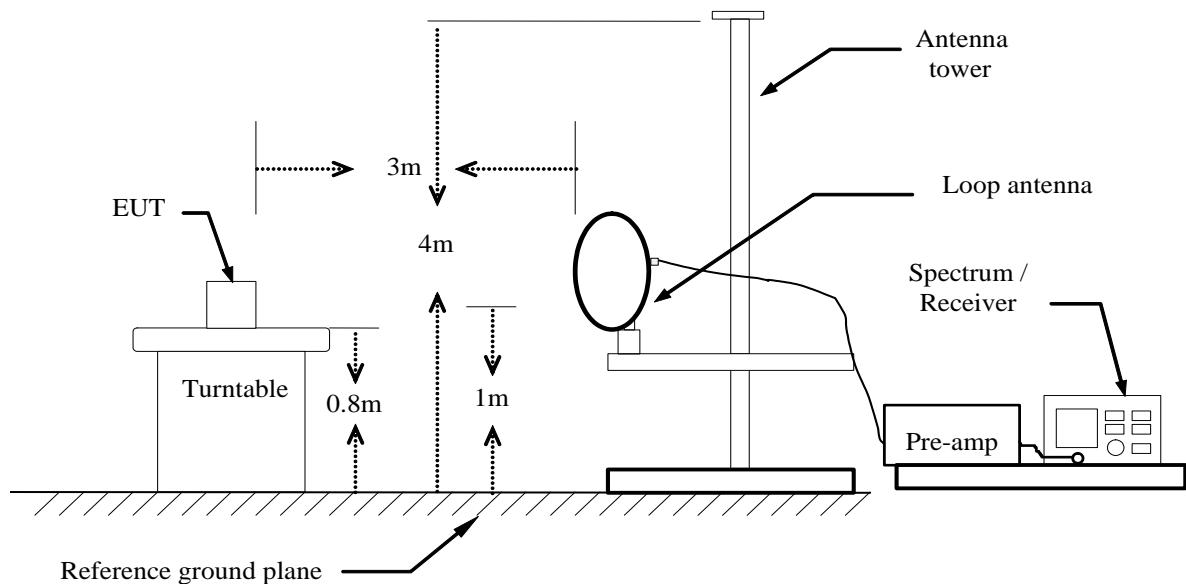
- The antenna is moved spherical over the EUT in different polarisations of the antenna.

**Final measurement:**

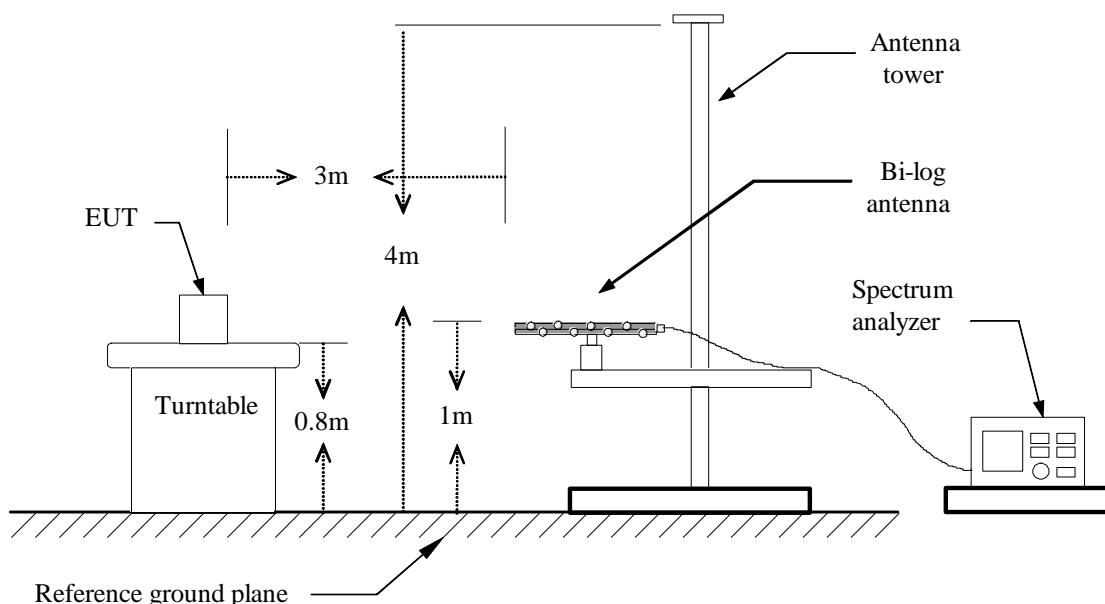
- The final measurement will be performed at the position and antenna orientation for all detected emissions that were found during the premeasurements with Peak and Average detector.
- The final levels, frequency, measuring time, bandwidth, correction factor, margin to the limit and limit will be recorded. Also a plot with the graph of the premeasurement and the limit will be stored.

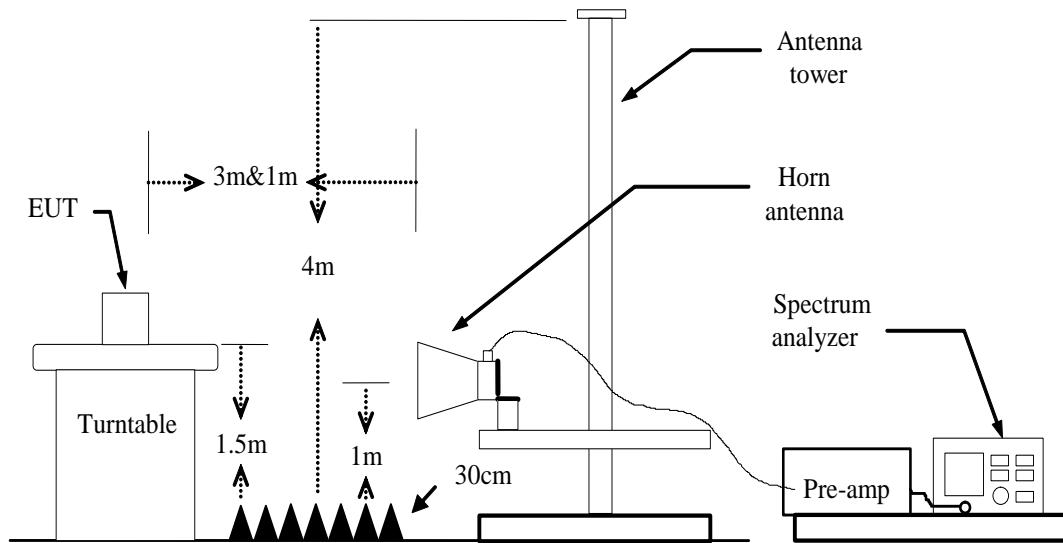
#### 7.2.2.4. TEST SETUP

##### Below 30MHz



##### Below 1 GHz



**Above 1 GHz**

For the actual test configuration, please refer to the related item – Photographs of the Test Configuration.



### 7.2.2.5. DATA SAMPLE

#### Below 1GHz

Frequency (MHz)	Reading (dBuV)	Correct Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Pole (V/H)	Remark
XXX.XXXX	36.37	-12.20	24.17	40.00	-15.83	V	QP

Frequency (MHz) = Emission frequency in MHz  
 Reading (dBuV) = Uncorrected Analyzer / Receiver reading  
 Correct Factor (dB/m) = Antenna factor + Cable loss – Amplifier gain  
 Result (dBuV/m) = Reading (dBuV) + Corr. Factor (dB/m)  
 Limit (dBuV/m) = Limit stated in standard  
 Margin (dB) = Result (dBuV/m) – Limit (dBuV/m)  
 Q.P. = Quasi-peak Reading

#### Above 1GHz

Frequency (MHz)	Reading (dBuV)	Correction Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Pole (V/H)	Remark
XXXX.XXXX	62.09	-11.42	50.67	74.00	-23.33	V	Peak
XXXX.XXXX	49.78	-11.42	38.36	54.00	-15.64	V	AVG

Frequency (MHz) = Emission frequency in MHz  
 Reading (dBuV) = Uncorrected Analyzer / Receiver reading  
 Correction Factor (dB/m) = Antenna factor + Cable loss – Amplifier gain  
 Result (dBuV/m) = Reading (dBuV) + Corr. Factor (dB/m)  
 Limit (dBuV/m) = Limit stated in standard  
 Margin (dB) = Result (dBuV/m) – Limit (dBuV/m)  
 Peak = Peak Reading  
 AVG = Average Reading

#### Calculation Formula

Margin (dB) = Result (dBuV/m) – Limits (dBuV/m)  
 Result (dBuV/m) = Reading (dBuV) + Correction Factor



### 7.2.2.6. TEST RESULTS

#### Below 1 GHz

Test Mode: TX / IEEE 802.11b(CH Low)

Tested by: Saber Huang

Ambient temperature: 24°C Relative humidity: 52% RH Date: June 27, 2018

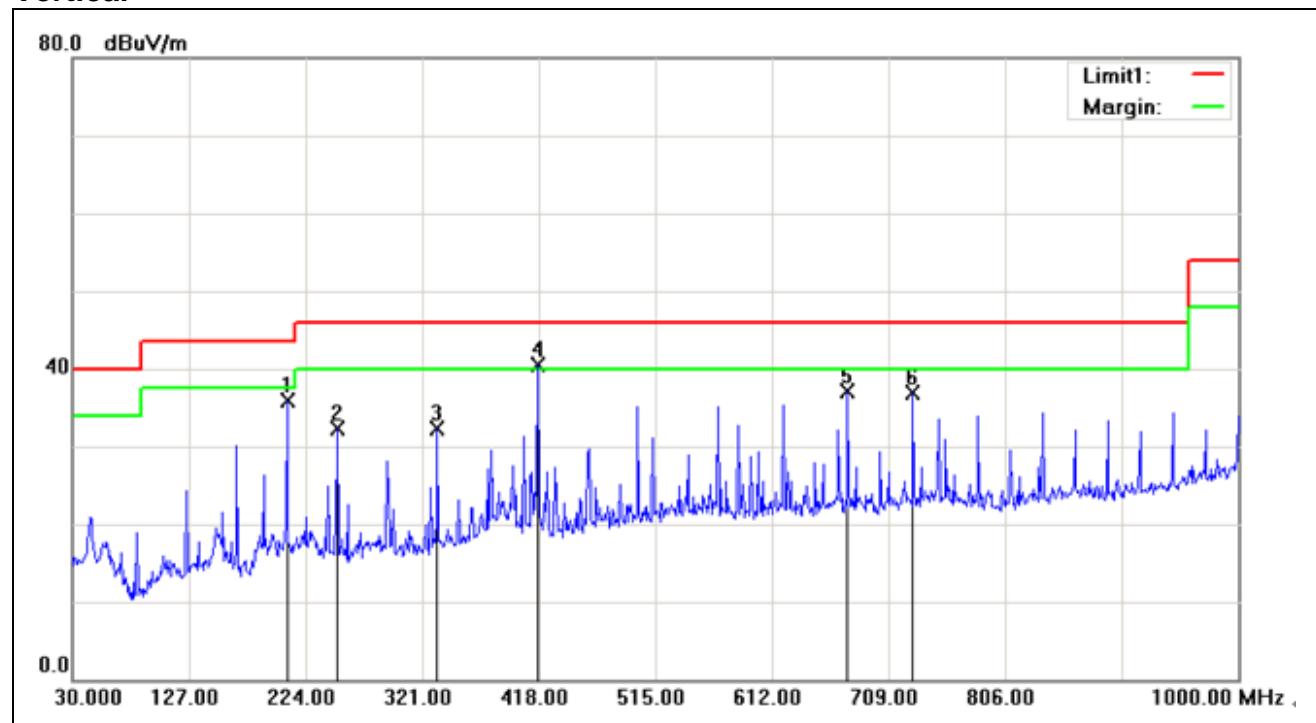
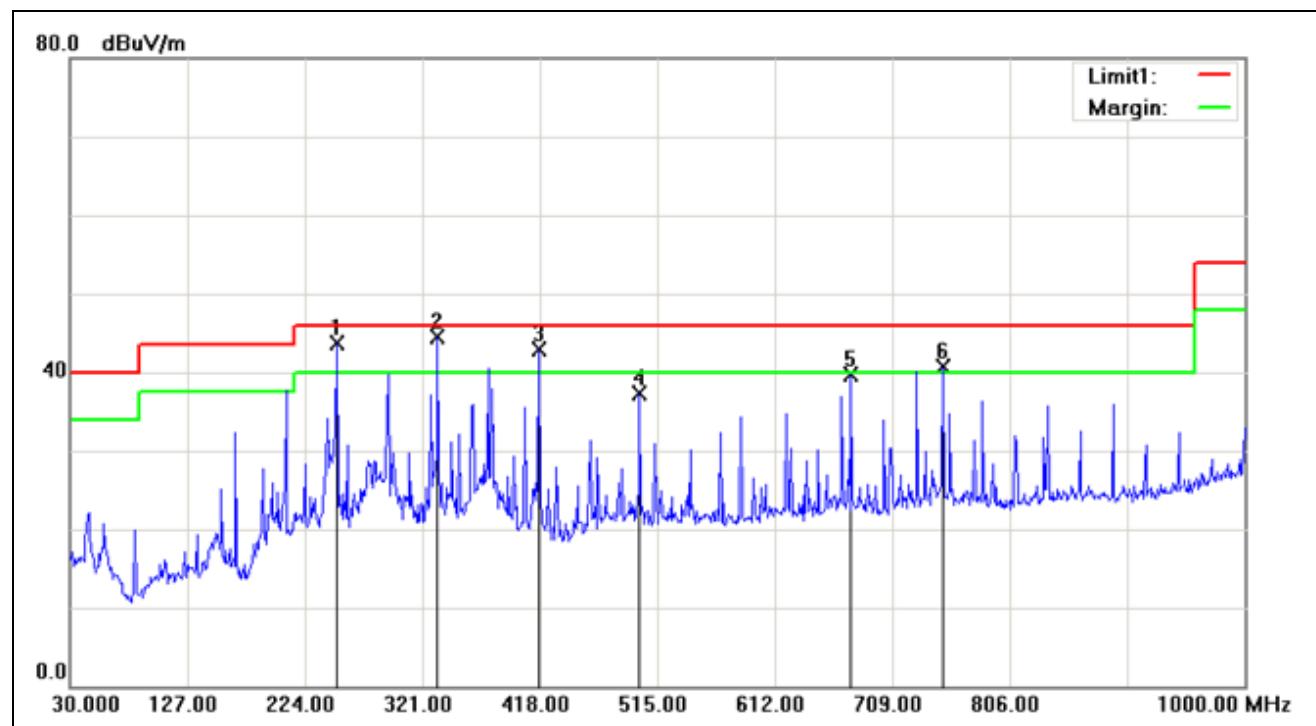
Frequency (MHz)	Reading (dBuV)	Correction Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Pole (V/H)	Remark
208.4800	47.47	-11.60	35.87	43.50	-7.63	V	QP
250.1900	43.15	-10.79	32.36	46.00	-13.64	V	QP
333.6100	41.96	-9.67	32.29	46.00	-13.71	V	QP
417.0300	49.05	-8.60	40.45	46.00	-5.55	V	QP
675.0500	41.81	-4.69	37.12	46.00	-8.88	V	QP
729.3700	40.82	-3.90	36.92	46.00	-9.08	V	QP
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250.1900	54.42	-10.79	43.63	46.00	-2.37	H	QP
333.6100	54.12	-9.67	44.45	46.00	-1.55	H	QP
417.0300	51.57	-8.60	42.97	46.00	-3.03	H	QP
500.4500	44.22	-6.88	37.34	46.00	-8.66	H	QP
675.0500	44.39	-4.69	39.70	46.00	-6.30	H	QP
750.7100	44.20	-3.51	40.69	46.00	-5.31	H	QP

#### Notes:

1. No emission found between lowest internal used/generated frequency to 30MHz.
2. Pre-scan all mode and recorded the worst case results in this report (802.11b (Low Channel))

#### Remark:

1. Radiated emissions measured in frequency range from 9 kHz to 1GHz were made with an instrument using Quasi-peak detector mode.
2. Data of measurement within this frequency range shown “---” in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.
3. The IF bandwidth of Receiver between 30MHz to 1GHz was 120 kHz.
4. Frequency (MHz). = Emission frequency in MHz  
Reading (dB $\mu$ V/m) = Receiver reading  
Correction Factor (dB) = Antenna factor + Cable loss – Amplifier gain  
Limit (dB $\mu$ V/m) = Limit stated in standard  
Margin (dB) = Measured (dB $\mu$ V/m) – Limits (dB $\mu$ V/m)  
Antenna Pol e (H/V) = Current carrying line of reading

**Vertical****Horizontal**

**Above 1 GHz****Test Mode:** TX / IEEE 802.11b(CH Low)**Tested by:** Fade Huang**Ambient temperature:** 24°C **Relative humidity:** 52% RH**Date:** July 11, 2018

Frequency (MHz)	Reading (dBuV)	Correction Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Pole (V/H)	Remark
1495.000	51.21	-6.89	44.32	74.00	-29.68	V	peak
1603.000	51.48	-6.69	44.79	74.00	-29.21	V	peak
1990.000	50.80	-5.06	45.74	74.00	-28.26	V	peak
3331.000	44.65	-0.80	43.85	74.00	-30.15	V	peak
4411.000	42.49	3.04	45.53	74.00	-28.47	V	peak
5446.000	41.86	5.77	47.63	74.00	-26.37	V	peak
3232.000	44.07	-0.97	43.10	74.00	-30.90	H	Peak
3898.000	43.32	1.16	44.48	74.00	-29.52	H	Peak
4339.000	42.54	2.78	45.32	74.00	-28.68	H	Peak
4879.000	42.62	4.59	47.21	74.00	-26.79	H	Peak
5509.000	41.78	5.87	47.65	74.00	-26.35	H	peak
6337.000	41.33	6.63	47.96	74.00	-26.04	H	peak

***Remark:***

1. Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.
2. Radiated emissions measured in frequency above 1000MHz were made with an instrument using peak/average detector mode.
3. Average test would be performed if the peak result were greater than the average limit or as required by the applicant.
4. Data of measurement within this frequency range shown “ --- ” in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.
5. Measurements above show only up to 6 maximum emissions noted, or would be lesser, with “ N/A ” remark, if no specific emissions from the EUT are recorded (ie: margin>20dB from the applicable limit) and considered that's already beyond the background noise floor.
6. Margin (dB) = Remark result (dBuV/m) – Average limit (dBuV/m).

**Test Mode:** TX / IEEE 802.11b (CH Mid)**Tested by:** Fade Huang**Ambient temperature:** 24°C    **Relative humidity:** 52% RH**Date:** July 11, 2018

Frequency (MHz)	Reading (dBuV)	Correction Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Pole (V/H)	Remark
2827.000	45.57	-1.67	43.90	74.00	-30.10	V	Peak
3574.000	44.28	-0.21	44.07	74.00	-29.93	V	Peak
3952.000	43.22	1.39	44.61	74.00	-29.39	V	Peak
4321.000	43.45	2.72	46.17	74.00	-27.83	V	Peak
4798.000	42.45	4.32	46.77	74.00	-27.23	V	Peak
5113.000	42.20	5.18	47.38	74.00	-26.62	V	Peak
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1945.000	50.06	-5.35	44.71	74.00	-29.29	H	Peak
2809.000	44.59	-1.70	42.89	74.00	-31.11	H	Peak
3700.000	44.60	0.32	44.92	74.00	-29.08	H	Peak
4411.000	41.86	3.04	44.90	74.00	-29.10	H	Peak
4906.000	41.87	4.67	46.54	74.00	-27.46	H	Peak
5518.000	41.69	5.88	47.57	74.00	-26.43	H	Peak

**Remark:**

1. Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.
2. Radiated emissions measured in frequency above 1000MHz were made with an instrument using peak/average detector mode.
3. Average test would be performed if the peak result were greater than the average limit or as required by the applicant.
4. Data of measurement within this frequency range shown “ --- ” in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.
5. Measurements above show only up to 6 maximum emissions noted, or would be lesser, with “ N/A ” remark, if no specific emissions from the EUT are recorded (ie: margin>20dB from the applicable limit) and considered that's already beyond the background noise floor.
6. Margin (dB) = Remark result (dBuV/m) – Average limit (dBuV/m).

**Test Mode:** TX / IEEE 802.11b (CH High)**Tested by:** Fade Huang**Ambient temperature:** 24°C    **Relative humidity:** 52% RH**Date:** July 11, 2018

Frequency (MHz)	Reading (dBuV)	Correction Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Pole (V/H)	Remark
1495.000	49.85	-6.89	42.96	74.00	-31.04	V	Peak
1999.000	50.96	-5.01	45.95	74.00	-28.05	V	Peak
3331.000	45.46	-0.80	44.66	74.00	-29.34	V	Peak
4132.000	43.40	2.05	45.45	74.00	-28.55	V	Peak
4879.000	41.43	4.59	46.02	74.00	-27.98	V	Peak
5347.000	41.50	5.60	47.10	74.00	-26.90	V	Peak
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1432.000	47.16	-7.00	40.16	74.00	-33.84	H	Peak
3358.000	43.84	-0.76	43.08	74.00	-30.92	H	Peak
3727.000	42.85	0.44	43.29	74.00	-30.71	H	Peak
4186.000	42.04	2.24	44.28	74.00	-29.72	H	Peak
4474.000	42.05	3.26	45.31	74.00	-28.69	H	Peak
5050.000	42.00	5.07	47.07	74.00	-26.93	H	Peak

**Remark:**

1. Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.
2. Radiated emissions measured in frequency above 1000MHz were made with an instrument using peak/average detector mode.
3. Average test would be performed if the peak result were greater than the average limit or as required by the applicant.
4. Data of measurement within this frequency range shown “ --- ” in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.
5. Measurements above show only up to 6 maximum emissions noted, or would be lesser, with “ N/A ” remark, if no specific emissions from the EUT are recorded (ie: margin>20dB from the applicable limit) and considered that's already beyond the background noise floor.
6. Margin (dB) = Remark result (dBuV/m) – Average limit (dBuV/m).

**Test Mode:** TX / IEEE 802.11g(CH Low)**Tested by:** Fade Huang**Ambient temperature:** 24°C**Relative humidity:** 52% RH**Date:** July 11, 2018

Frequency (MHz)	Reading (dBuV)	Correction Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Pole (V/H)	Remark
1171.000	48.03	-7.90	40.13	74.00	-33.87	V	Peak
1459.000	44.17	-6.95	37.22	74.00	-36.78	V	Peak
1882.000	43.88	-5.75	38.13	74.00	-35.87	V	Peak
3214.000	42.57	-1.00	41.57	74.00	-32.43	V	Peak
3421.000	43.53	-0.65	42.88	74.00	-31.12	V	Peak
4321.000	41.16	2.72	43.88	74.00	-30.12	V	Peak
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1351.000	47.67	-7.24	40.43	74.00	-33.57	H	Peak
1513.000	45.89	-6.86	39.03	74.00	-34.97	H	Peak
3718.000	41.25	0.40	41.65	74.00	-32.35	H	Peak
4078.000	40.41	1.86	42.27	74.00	-31.73	H	Peak
4384.000	41.50	2.94	44.44	74.00	-29.56	H	Peak
4798.000	41.03	4.32	45.35	74.00	-28.65	H	Peak

**Remark:**

1. Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.
2. Radiated emissions measured in frequency above 1000MHz were made with an instrument using peak/average detector mode.
3. Average test would be performed if the peak result were greater than the average limit or as required by the applicant.
4. Data of measurement within this frequency range shown “ --- ” in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.
5. Measurements above show only up to 6 maximum emissions noted, or would be lesser, with “ N/A ” remark, if no specific emissions from the EUT are recorded (ie: margin>20dB from the applicable limit) and considered that's already beyond the background noise floor.
6. Margin (dB) = Remark result (dBuV/m) – Average limit (dBuV/m).

**Test Mode:** TX / IEEE 802.11g (CH Mid)**Tested by:** Fade Huang**Ambient temperature:** 24°C**Relative humidity:** 52% RH**Date:** July 11, 2018

Frequency (MHz)	Reading (dBuV)	Correction Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Pole (V/H)	Remark
1369.000	44.22	-7.17	37.05	74.00	-36.95	V	Peak
1630.000	44.45	-6.64	37.81	74.00	-36.19	V	Peak
2080.000	44.40	-4.56	39.84	74.00	-34.16	V	Peak
4051.000	40.81	1.77	42.58	74.00	-31.42	V	Peak
4627.000	41.34	3.76	45.10	74.00	-28.90	V	Peak
4852.000	40.01	4.50	44.51	74.00	-29.49	V	Peak
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1999.000	45.49	-5.01	40.48	74.00	-33.52	H	Peak
3673.000	42.45	0.21	42.66	74.00	-31.34	H	Peak
4258.000	41.66	2.50	44.16	74.00	-29.84	H	Peak
4600.000	41.89	3.68	45.57	74.00	-28.43	H	Peak
5014.000	41.65	5.00	46.65	74.00	-27.35	H	Peak
5473.000	40.95	5.82	46.77	74.00	-27.23	H	Peak

**Remark:**

1. Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.
2. Radiated emissions measured in frequency above 1000MHz were made with an instrument using peak/average detector mode.
3. Average test would be performed if the peak result were greater than the average limit or as required by the applicant.
4. Data of measurement within this frequency range shown “ --- ” in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.
5. Measurements above show only up to 6 maximum emissions noted, or would be lesser, with “ N/A ” remark, if no specific emissions from the EUT are recorded (ie: margin>20dB from the applicable limit) and considered that's already beyond the background noise floor.
6. Margin (dB) = Remark result (dBuV/m) – Average limit (dBuV/m).

**Test Mode:** TX / IEEE 802.11g (CH High)**Tested by:** Fadé Huang**Ambient temperature:** 24°C**Relative humidity:** 52% RH**Date:** July 11, 2018

Frequency (MHz)	Reading (dBuV)	Correction Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Pole (V/H)	Remark
1558.000	44.18	-6.78	37.40	74.00	-36.60	V	Peak
1765.000	44.27	-6.35	37.92	74.00	-36.08	V	Peak
3178.000	41.78	-1.06	40.72	74.00	-33.28	V	Peak
3538.000	40.72	-0.36	40.36	74.00	-33.64	V	Peak
4213.000	42.07	2.34	44.41	74.00	-29.59	V	Peak
4969.000	41.19	4.88	46.07	74.00	-27.93	V	Peak
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1477.000	45.50	-6.92	38.58	74.00	-35.42	H	Peak
1738.000	44.77	-6.40	38.37	74.00	-35.63	H	Peak
1900.000	43.85	-5.63	38.22	74.00	-35.78	H	Peak
3871.000	41.62	1.05	42.67	74.00	-31.33	H	Peak
4276.000	40.89	2.56	43.45	74.00	-30.55	H	Peak
5266.000	39.93	5.45	45.38	74.00	-28.62	H	Peak

**Remark:**

1. Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.
2. Radiated emissions measured in frequency above 1000MHz were made with an instrument using peak/average detector mode.
3. Average test would be performed if the peak result were greater than the average limit or as required by the applicant.
4. Data of measurement within this frequency range shown “ --- ” in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.
5. Measurements above show only up to 6 maximum emissions noted, or would be lesser, with “ N/A ” remark, if no specific emissions from the EUT are recorded (ie: margin>20dB from the applicable limit) and considered that's already beyond the background noise floor.
6. Margin (dB) = Remark result (dBuV/m) – Average limit (dBuV/m).

**Test Mode:** TX / IEEE 802.11n HT20 MHz (CH Low)**Tested by:** Fadé Huang**Ambient temperature:** 24°C**Relative humidity:** 52% RH**Date:** July 11, 2018

Frequency (MHz)	Reading (dBuV)	Correction Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Pole (V/H)	Remark
1198.000	46.34	-7.80	38.54	74.00	-35.46	V	Peak
1630.000	44.84	-6.64	38.20	74.00	-35.80	V	Peak
3241.000	42.84	-0.96	41.88	74.00	-32.12	V	Peak
3799.000	41.64	0.74	42.38	74.00	-31.62	V	Peak
4312.000	41.54	2.69	44.23	74.00	-29.77	V	Peak
4582.000	41.40	3.62	45.02	74.00	-28.98	V	Peak
<hr/>							
1495.000	45.41	-6.89	38.52	74.00	-35.48	H	Peak
1765.000	45.27	-6.35	38.92	74.00	-35.08	H	Peak
1999.000	45.05	-5.01	40.04	74.00	-33.96	H	Peak
3889.000	41.43	1.12	42.55	74.00	-31.45	H	Peak
4474.000	41.43	3.26	44.69	74.00	-29.31	H	Peak
5005.000	41.21	4.99	46.20	74.00	-27.80	H	Peak

**Remark:**

1. Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.
2. Radiated emissions measured in frequency above 1000MHz were made with an instrument using peak/average detector mode.
3. Average test would be performed if the peak result were greater than the average limit or as required by the applicant.
4. Data of measurement within this frequency range shown “ --- ” in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.
5. Measurements above show only up to 6 maximum emissions noted, or would be lesser, with “ N/A ” remark, if no specific emissions from the EUT are recorded (ie: margin>20dB from the applicable limit) and considered that's already beyond the background noise floor.
6. Margin (dB) = Remark result (dBuV/m) – Average limit (dBuV/m).

**Test Mode:** TX / IEEE 802.11n HT20 MHz (CH Mid)**Tested by:** Fadé Huang**Ambient temperature:** 24°C**Relative humidity:** 52% RH**Date:** July 11, 2018

Frequency (MHz)	Reading (dBuV)	Correction Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Pole (V/H)	Remark
2494.000	45.34	-2.29	43.05	74.00	-30.95	V	Peak
2818.000	43.60	-1.69	41.91	74.00	-32.09	V	Peak
3214.000	42.60	-1.00	41.60	74.00	-32.40	V	Peak
3493.000	40.97	-0.53	40.44	74.00	-33.56	V	Peak
4024.000	41.82	1.67	43.49	74.00	-30.51	V	Peak
4249.000	41.52	2.47	43.99	74.00	-30.01	V	Peak
<hr/>							
1468.000	45.32	-6.94	38.38	74.00	-35.62	H	Peak
1765.000	46.27	-6.35	39.92	74.00	-34.08	H	Peak
1999.000	44.71	-5.01	39.70	74.00	-34.30	H	Peak
2485.000	45.00	-2.34	42.66	74.00	-31.34	H	Peak
2809.000	43.19	-1.70	41.49	74.00	-32.51	H	Peak
3358.000	43.04	-0.76	42.28	74.00	-31.72	H	Peak

**Remark:**

1. Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.
2. Radiated emissions measured in frequency above 1000MHz were made with an instrument using peak/average detector mode.
3. Average test would be performed if the peak result were greater than the average limit or as required by the applicant.
4. Data of measurement within this frequency range shown “ --- ” in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.
5. Measurements above show only up to 6 maximum emissions noted, or would be lesser, with “ N/A ” remark, if no specific emissions from the EUT are recorded (ie: margin>20dB from the applicable limit) and considered that's already beyond the background noise floor.
6. Margin (dB) = Remark result (dBuV/m) – Average limit (dBuV/m).

**Test Mode:** TX / EEE 802.11n HT20 MHz (CH High)**Tested by:** Fade Huang**Ambient temperature:** 24°C**Relative humidity:** 52% RH**Date:** July 11, 2018

Frequency (MHz)	Reading (dBuV)	Correction Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Pole (V/H)	Remark
1351.000	45.81	-7.24	38.57	74.00	-35.43	V	Peak
1738.000	45.02	-6.40	38.62	74.00	-35.38	V	Peak
1999.000	44.45	-5.01	39.44	74.00	-34.56	V	Peak
3655.000	42.73	0.13	42.86	74.00	-31.14	V	Peak
4357.000	41.48	2.85	44.33	74.00	-29.67	V	Peak
5149.000	40.96	5.25	46.21	74.00	-27.79	V	Peak
<hr/>							
1351.000	47.09	-7.24	39.85	74.00	-34.15	H	Peak
1729.000	43.84	-6.42	37.42	74.00	-36.58	H	Peak
3223.000	42.37	-0.99	41.38	74.00	-32.62	H	Peak
3601.000	41.38	-0.09	41.29	74.00	-32.71	H	Peak
4114.000	41.78	1.99	43.77	74.00	-30.23	H	Peak
4852.000	40.34	4.50	44.84	74.00	-29.16	H	Peak

**Remark:**

1. Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.
2. Radiated emissions measured in frequency above 1000MHz were made with an instrument using peak/average detector mode.
3. Average test would be performed if the peak result were greater than the average limit or as required by the applicant.
4. Data of measurement within this frequency range shown “ --- ” in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.
5. Measurements above show only up to 6 maximum emissions noted, or would be lesser, with “ N/A ” remark, if no specific emissions from the EUT are recorded (ie: margin>20dB from the applicable limit) and considered that's already beyond the background noise floor.
6. Margin (dB) = Remark result (dBuV/m) – Average limit (dBuV/m).

**Test Mode:** TX / IEEE 802.11n HT40 MHz (CH Low)**Tested by:** Fadie Huang**Ambient temperature:** 24°C**Relative humidity:** 52% RH**Date:** July 11, 2018

Frequency (MHz)	Reading (dBuV)	Correction Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Pole (V/H)	Remark
1603.000	44.04	-6.69	37.35	74.00	-36.65	V	Peak
1954.000	43.30	-5.29	38.01	74.00	-35.99	V	Peak
2944.000	42.16	-1.46	40.70	74.00	-33.30	V	Peak
3367.000	41.13	-0.74	40.39	74.00	-33.61	V	Peak
3781.000	42.00	0.67	42.67	74.00	-31.33	V	Peak
4213.000	40.52	2.34	42.86	74.00	-31.14	V	Peak
<hr/>							
1999.000	45.04	-5.01	40.03	74.00	-33.97	H	Peak
2521.000	44.32	-2.22	42.10	74.00	-31.90	H	Peak
3610.000	41.00	-0.06	40.94	74.00	-33.06	H	Peak
3916.000	41.82	1.24	43.06	74.00	-30.94	H	Peak
4339.000	41.35	2.78	44.13	74.00	-29.87	H	Peak
5023.000	41.14	5.02	46.16	74.00	-27.84	H	Peak

**Remark:**

1. Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.
2. Radiated emissions measured in frequency above 1000MHz were made with an instrument using peak/average detector mode.
3. Average test would be performed if the peak result were greater than the average limit or as required by the applicant.
4. Data of measurement within this frequency range shown “ --- ” in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.
5. Measurements above show only up to 6 maximum emissions noted, or would be lesser, with “ N/A ” remark, if no specific emissions from the EUT are recorded (ie: margin>20dB from the applicable limit) and considered that's already beyond the background noise floor.
6. Margin (dB) = Remark result (dBuV/m) – Average limit (dBuV/m).

**Test Mode:** TX / IEEE 802.11n HT40 MHz (CH Mid)**Tested by:** Fadé Huang**Ambient temperature:** 24°C**Relative humidity:** 52% RH**Date:** July 11, 2018

Frequency (MHz)	Reading (dBuV)	Correction Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Pole (V/H)	Remark
1162.000	45.58	-7.94	37.64	74.00	-36.36	V	Peak
1333.000	45.71	-7.30	38.41	74.00	-35.59	V	Peak
1630.000	44.95	-6.64	38.31	74.00	-35.69	V	Peak
1990.000	46.57	-5.06	41.51	74.00	-32.49	V	Peak
3484.000	41.24	-0.55	40.69	74.00	-33.31	V	Peak
3790.000	41.63	0.70	42.33	74.00	-31.67	V	Peak
<hr/>							
1747.000	45.69	-6.38	39.31	74.00	-34.69	H	Peak
2134.000	44.58	-4.27	40.31	74.00	-33.69	H	Peak
3313.000	42.07	-0.83	41.24	74.00	-32.76	H	Peak
3763.000	42.65	0.59	43.24	74.00	-30.76	H	Peak
3853.000	42.33	0.97	43.30	74.00	-30.70	H	Peak
4141.000	41.63	2.09	43.72	74.00	-30.28	H	Peak

**Remark:**

1. Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.
2. Radiated emissions measured in frequency above 1000MHz were made with an instrument using peak/average detector mode.
3. Average test would be performed if the peak result were greater than the average limit or as required by the applicant.
4. Data of measurement within this frequency range shown “ --- ” in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.
5. Measurements above show only up to 6 maximum emissions noted, or would be lesser, with “ N/A ” remark, if no specific emissions from the EUT are recorded (ie: margin>20dB from the applicable limit) and considered that's already beyond the background noise floor.
6. Margin (dB) = Remark result (dBuV/m) – Average limit (dBuV/m).

**Test Mode:** TX / EEE 802.11n HT40 MHz (CH High)**Tested by:** Fade Huang**Ambient temperature:** 24°C**Relative humidity:** 52% RH**Date:** July 11, 2018

Frequency (MHz)	Reading (dBuV)	Correction Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Pole (V/H)	Remark
1999.000	44.09	-5.01	39.08	74.00	-34.92	V	Peak
2251.000	43.85	-3.62	40.23	74.00	-33.77	V	Peak
3232.000	42.16	-0.97	41.19	74.00	-32.81	V	Peak
3646.000	41.64	0.10	41.74	74.00	-32.26	V	Peak
4330.000	41.50	2.75	44.25	74.00	-29.75	V	Peak
4726.000	40.11	4.09	44.20	74.00	-29.80	V	Peak
<hr/>							
1504.000	44.95	-6.87	38.08	74.00	-35.92	H	Peak
1990.000	46.03	-5.06	40.97	74.00	-33.03	H	Peak
2836.000	44.12	-1.66	42.46	74.00	-31.54	H	Peak
3052.000	42.51	-1.27	41.24	74.00	-32.76	H	Peak
3781.000	43.27	0.67	43.94	74.00	-30.06	H	Peak
4069.000	42.00	1.83	43.83	74.00	-30.17	H	Peak

**Remark:**

1. Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.
2. Radiated emissions measured in frequency above 1000MHz were made with an instrument using peak/average detector mode.
3. Average test would be performed if the peak result were greater than the average limit or as required by the applicant.
4. Data of measurement within this frequency range shown “ --- ” in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.
5. Measurements above show only up to 6 maximum emissions noted, or would be lesser, with “ N/A ” remark, if no specific emissions from the EUT are recorded (ie: margin>20dB from the applicable limit) and considered that's already beyond the background noise floor.
6. Margin (dB) = Remark result (dBuV/m) – Average limit (dBuV/m).



### 7.3. 6dB BANDWIDTH MEASUREMENT

#### 7.3.1. LIMITS

According to §15.247(a)(2), systems using digital modulation techniques may operate in the 902 - 928 MHz, 2400 - 2483.5 MHz. The minimum 6 dB bandwidth shall be at least 500 kHz.

#### 7.3.2. TEST INSTRUMENTS

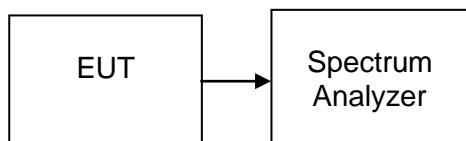
Name of Equipment	Manufacturer	Model	Serial Number	Last Calibration	Calibration Due
Spectrum Analyzer	Agilent	N9010A	MY52221469	01/27/2018	01/26/2019

#### 7.3.3. TEST PROCEDURES (please refer to measurement standard)

##### 8.2 Option 2:

The automatic bandwidth measurement capability of an instrument may be employed using the X dB bandwidth mode with X set to 6 dB, if the functionality described above (i.e., RBW = 100 kHz, VBW  $\geq$  3 RBW, peak detector with maximum hold) is implemented by the instrumentation function. When using this capability, care shall be taken so that the bandwidth measurement is not influenced by any intermediate power nulls in the fundamental emission that might be  $\geq$  6 dB.

#### 7.3.4. TEST SETUP





### 7.3.5. TEST RESULTS

No non-compliance noted

#### Test Data

##### Test mode: IEEE 802.11b

Channel	Frequency (MHz)	Bandwidth (kHz)	Limit (kHz)	Test Result
Low	2412	10060	>500	PASS
Mid	2437	10070		PASS
High	2462	10070		PASS

##### Test mode: IEEE 802.11g

Channel	Frequency (MHz)	Bandwidth (kHz)	Limit (kHz)	Test Result
Low	2412	16560	>500	PASS
Mid	2437	16560		PASS
High	2462	16560		PASS

##### Test mode: IEEE 802.11n HT20 MHz

Channel	Frequency (MHz)	Bandwidth (kHz)	Limit (kHz)	Test Result
Low	2412	17770	>500	PASS
Mid	2437	17780		PASS
High	2462	17790		PASS

##### Test mode: IEEE 802.11n HT40 MHz

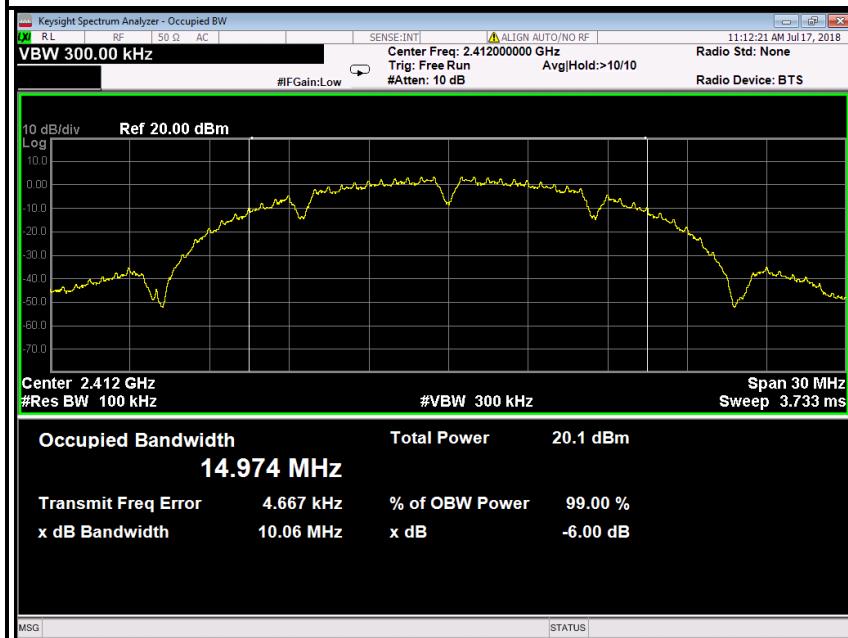
Channel	Frequency (MHz)	Bandwidth (kHz)	Limit (kHz)	Test Result
Low	2422	36370	>500	PASS
Mid	2437	36370		PASS
High	2452	36370		PASS



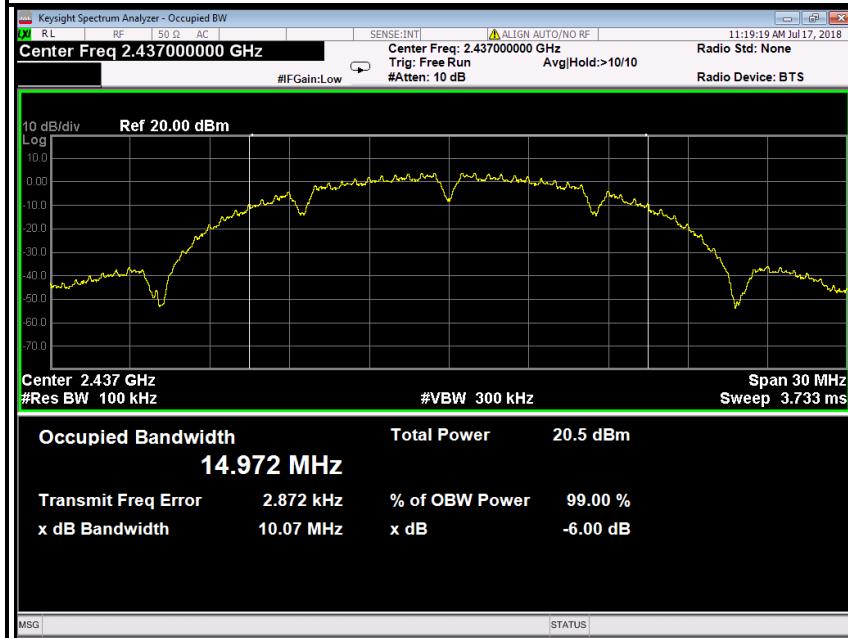
### Test Plot

#### IEEE 802.11b mode

##### 6dB Bandwidth (CH Low)

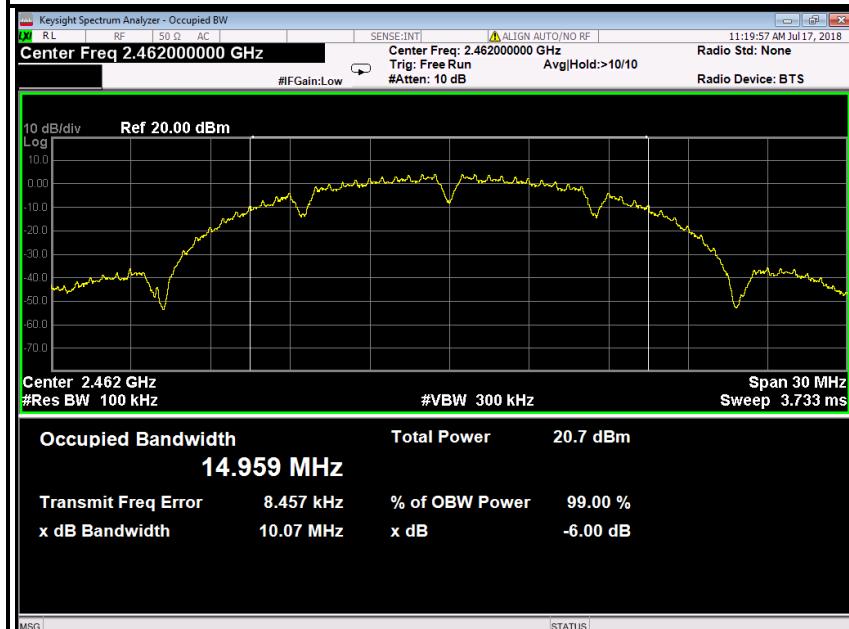


##### 6dB Bandwidth (CH Mid)



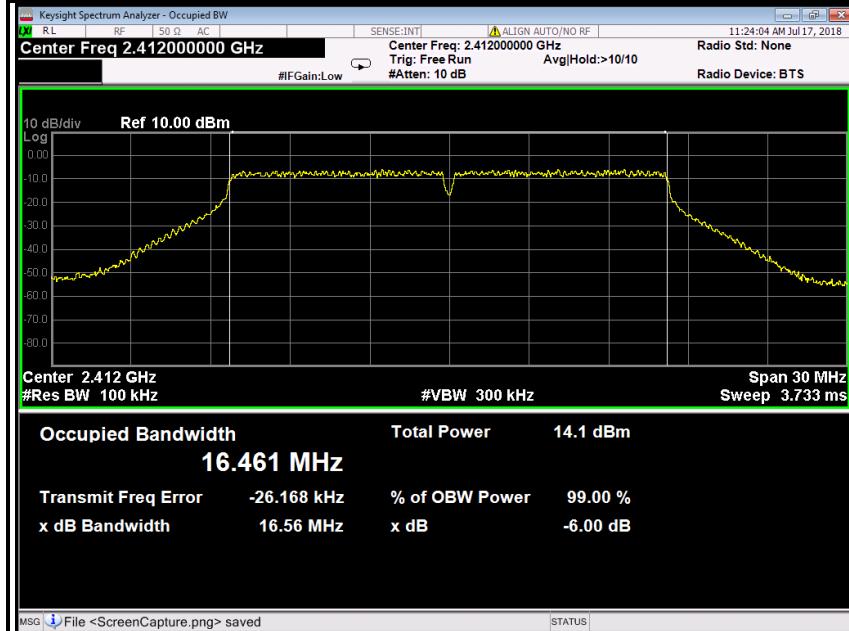


### 6dB Bandwidth (CH High)



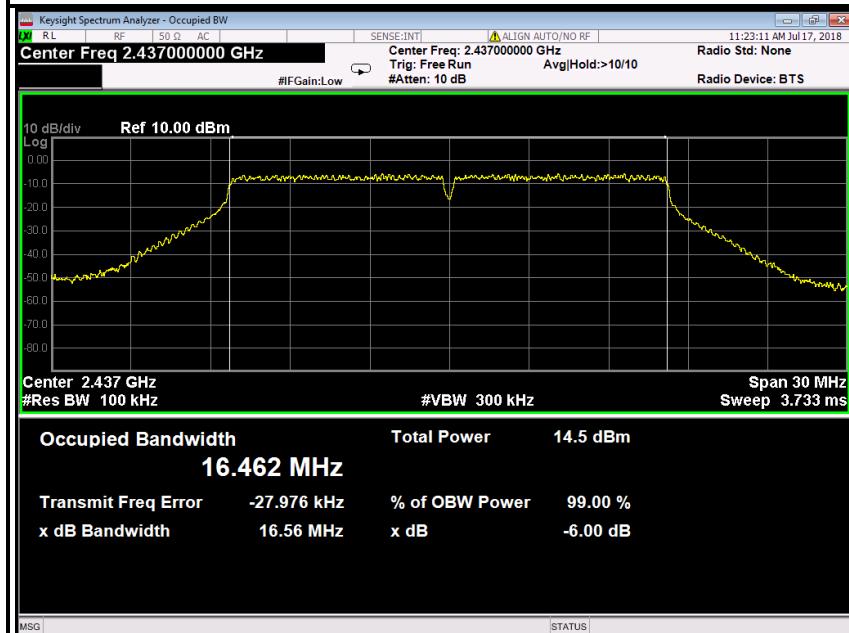
### IEEE 802.11g mode

### 6dB Bandwidth (CH Low)

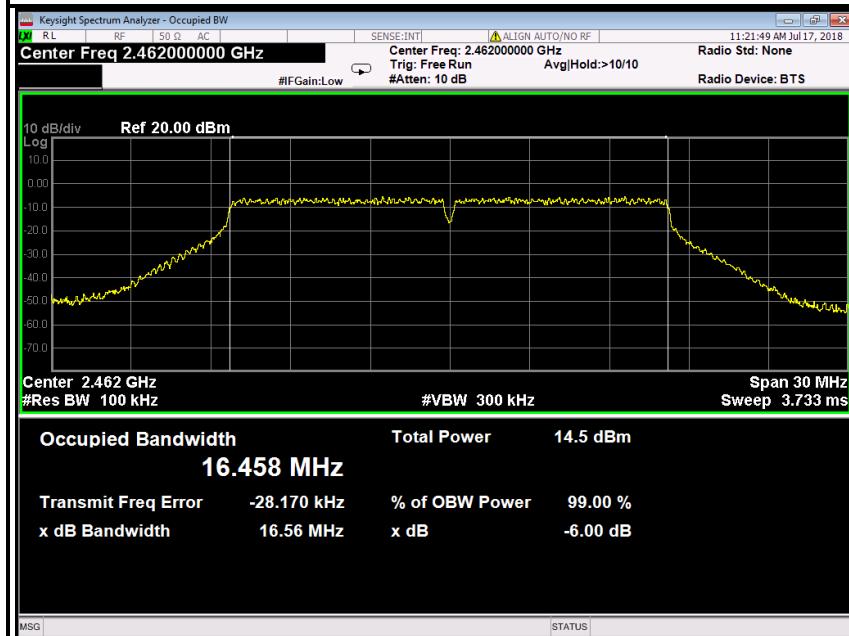


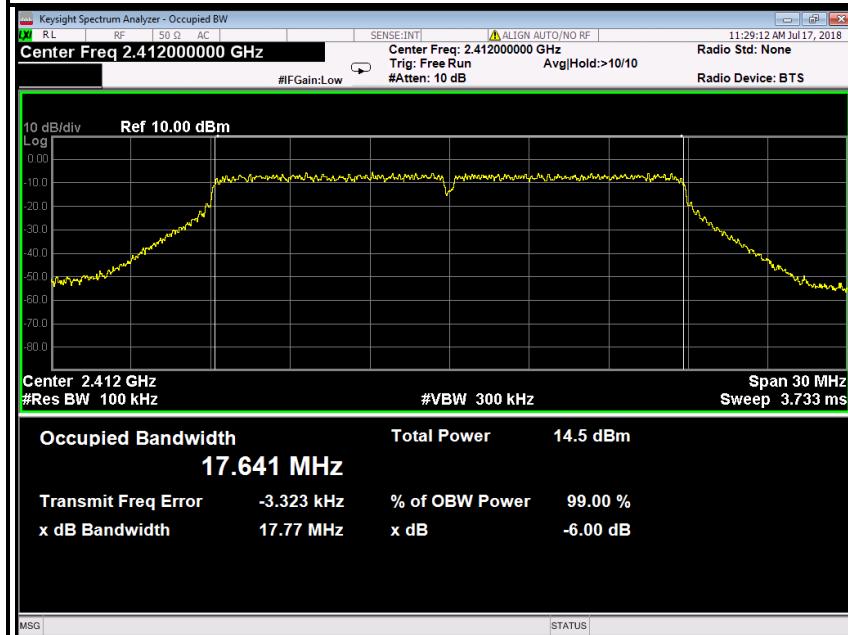
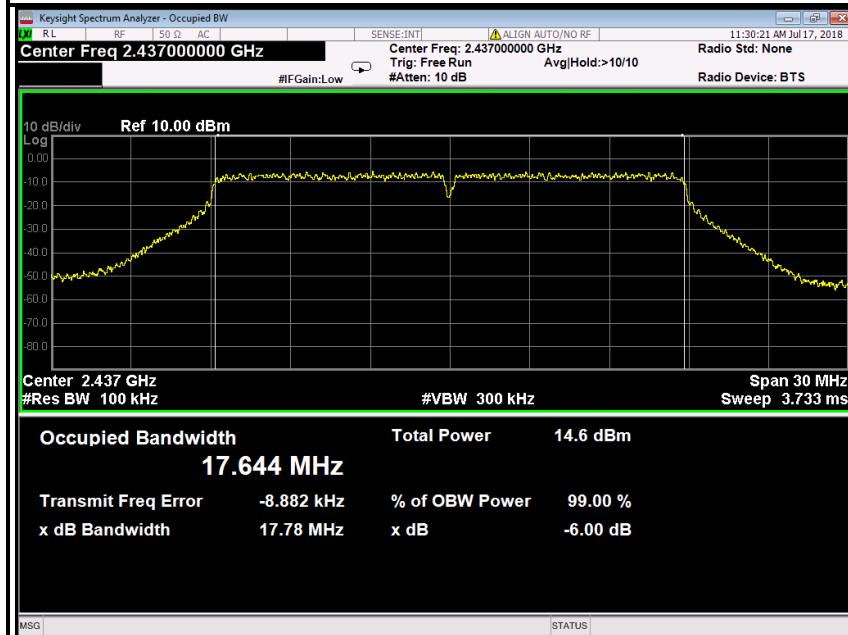


### 6dB Bandwidth (CH Mid)



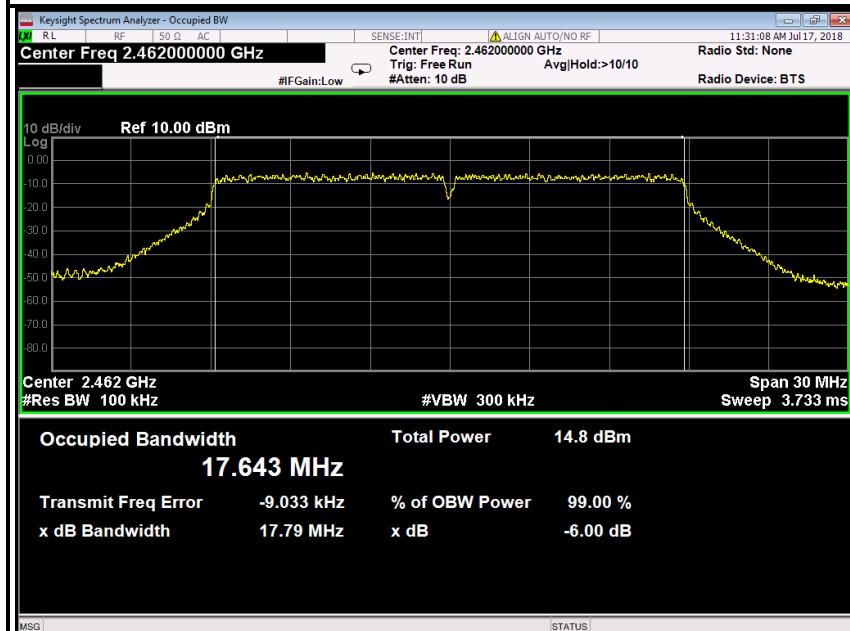
### 6dB Bandwidth (CH High)



**IEEE 802.11n HT20 MHz mode****6dB Bandwidth (CH Low)****6dB Bandwidth (CH Mid)**

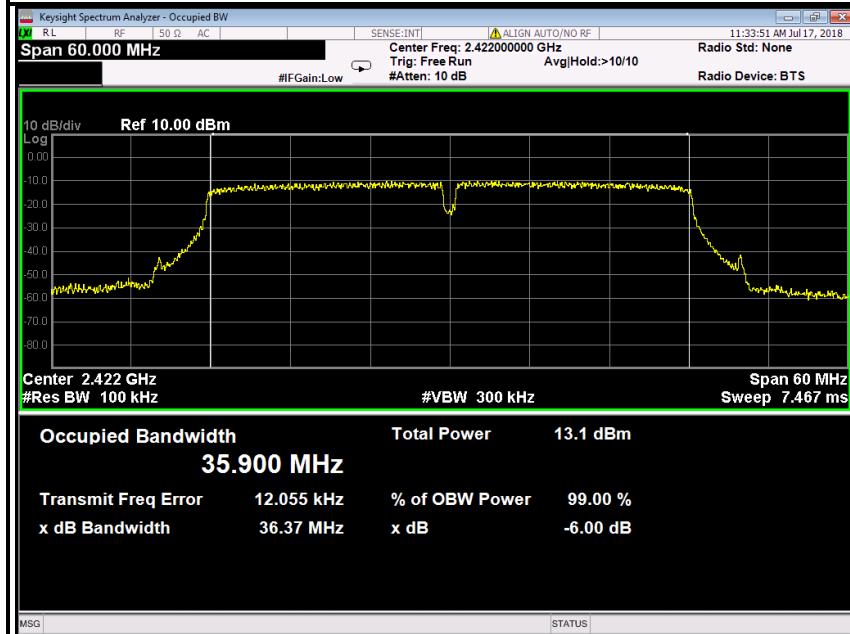


### 6dB Bandwidth (CH High)



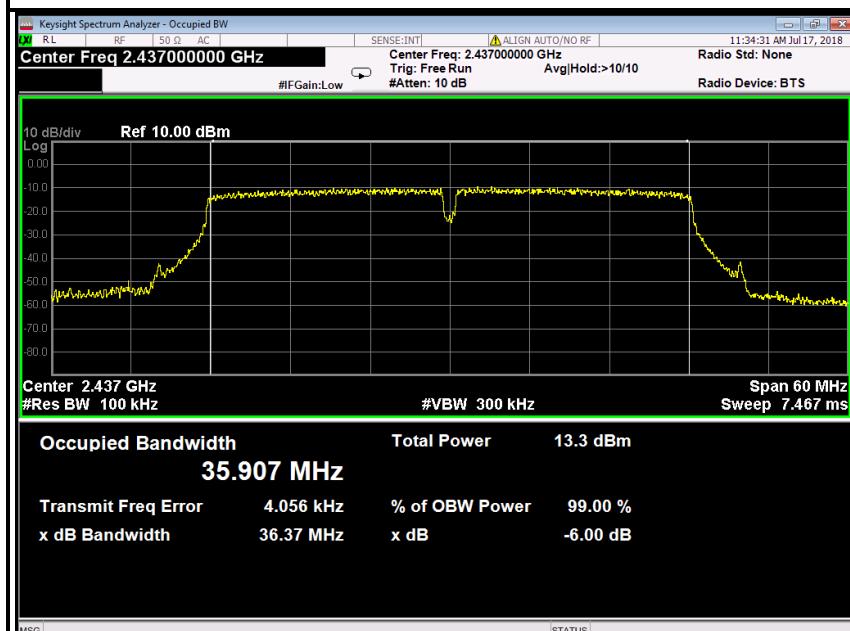
### IEEE 802.11n HT40 mode

### 6dB Bandwidth (CH Low)

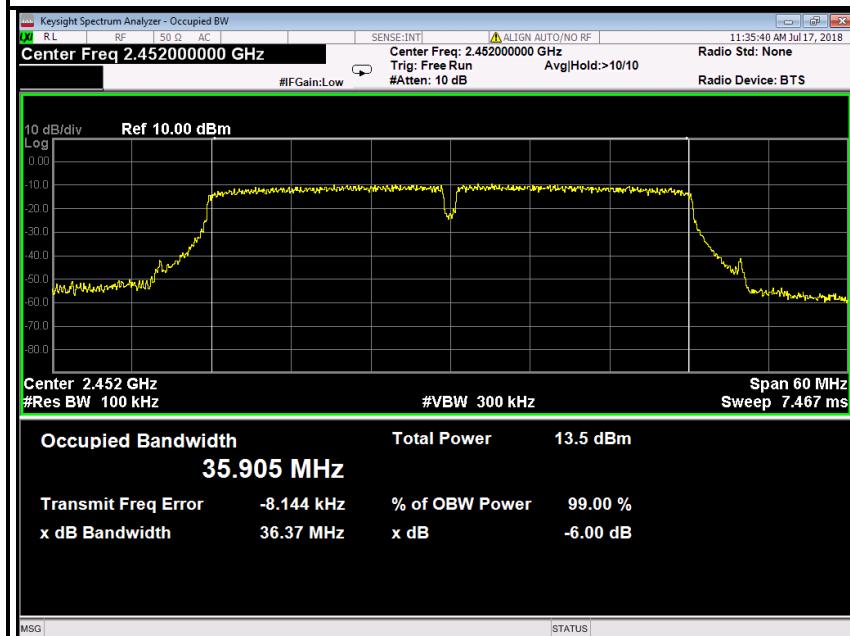




### 6dB Bandwidth (CH Mid)



### 6dB Bandwidth (CH High)





## 7.4. ANTENNA GAIN

### MEASUREMENT

The antenna gain of the complete system is calculated by the difference of radiated power in EIRP and the conducted power of the module. For normal WLAN devices, the DSSS mode is used.

### MEASUREMENT PARAMETERS

Measurement parameter	
Detector	Peak
Sweep time	Auto
Resolution bandwidth	3 MHz
Video bandwidth	3 MHz
Trace-Mode	Max hold

### LIMITS

FCC	IC
Antenna Gain	
6 dBi	

## TEST RESULTS

### IEEE 802.11b

T <sub>nom</sub>	V <sub>nom</sub>	Lowest channel 2412MHz	Middle channel 2437MHz	Highest channel 2462MHz
Conducted power [dBm/MHz] Measured with DSSS modulation		11.45	11.35	11.06
Radiated power [dBm/MHz] Measured with DSSS modulation		14.95	14.80	14.62
Gain [dBi] Calculated		3.50	3.45	3.56
Measurement uncertainty	± 1.5 dB (cond.) / ± 3 dB (rad.)			



## 7.5. PEAK OUTPUT POWER

### 7.5.1. LIMITS

The maximum peak output power of the intentional radiator shall not exceed the following:

1. According to §15.247(b)(3), for systems using digital modulation in the bands of 902-928 MHz, 2400-2483.5 MHz, and 5725-5850 MHz: 1 Watt.
2. According to §15.247(b)(4), the conducted output power limit specified in paragraph (b) of this section is based on the use of antennas with directional gains that do not exceed 6 dBi. 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.

### 7.5.2. TEST INSTRUMENTS

Name of Equipment	Manufacturer	Model	Serial Number	Last Calibration	Calibration Due
Power Meter	Anritsu	ML2495A	1204003	02/21/2018	02/20/2019
Power Sensor	Anritsu	MA2411B	1126150	02/21/2018	02/20/2019

### 7.5.3. TEST PROCEDURES (please refer to measurement standard)

#### 9.1.1 RBW $\geq$ DTS bandwidth

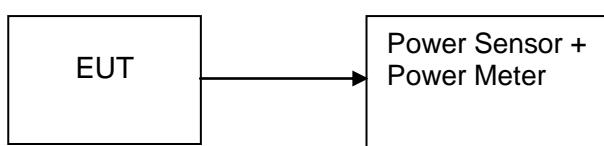
This procedure shall be used when the measurement instrument has available a resolution bandwidth that is greater than the *DTS bandwidth*.

- a) Set the RBW  $\geq$  DTS bandwidth.
- b) Set VBW  $\geq$  3 RBW.
- c) Set span  $\geq$  3 x RBW
- d) Sweep time = auto couple.
- e) Detector = peak.
- f) Trace mode = max hold.
- g) Allow trace to fully stabilize.
- h) Use peak marker function to determine the peak amplitude level.

#### 9.1.3 PKPM1 Peak power meter method

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

### 7.5.4. TEST SETUP





### 7.5.5. TEST RESULTS

No non-compliance noted

#### Test Data

##### Test mode: IEEE 802.11b

Channel	Frequency (MHz)	Output Power (dBm)	Output Power (W)	Peak / AVG	Limit (W)	Result
Low	2412	11.45	0.01396	Peak	1	PASS
Mid	2437	11.35	0.01365			PASS
High	2462	11.06	0.01276			PASS
Low	2412	9.35	0.00861	AVG	1	PASS
Mid	2437	9.33	0.00857			PASS
High	2462	9.17	0.00826			PASS

##### Test mode: IEEE 802.11g

Channel	Frequency (MHz)	Output Power (dBm)	Output Power (W)	Peak / AVG	Limit (W)	Result
Low	2412	17.69	0.05875	Peak	1	PASS
Mid	2437	18.07	0.06412			PASS
High	2462	17.85	0.06095			PASS
Low	2412	9.08	0.00809	AVG	1	PASS
Mid	2437	9.48	0.00887			PASS
High	2462	9.34	0.00859			PASS

##### Test mode: IEEE 802.11n HT20 MHz

Channel	Frequency (MHz)	Output Power (dBm)	Output Power (W)	Peak/ AVG	Limit (W)	Result
Low	2412	17.71	0.05902	Peak	1	PASS
Mid	2437	17.98	0.06281			PASS
High	2462	17.86	0.06109			PASS
Low	2412	9.35	0.00861	AVG	1	PASS
Mid	2437	9.49	0.00889			PASS
High	2462	9.45	0.00881			PASS

##### Test mode: IEEE 802.11n HT40 MHz

Channel	Frequency (MHz)	Output Power (dBm)	Output Power (W)	Peak / AVG	Limit (W)	Result
Low	2422	16.60	0.04571	Peak	1	PASS
Mid	2437	17.34	0.05420			PASS
High	2452	17.89	0.06152			PASS
Low	2422	8.86	0.00769	AVG	1	PASS
Mid	2437	8.91	0.00778			PASS
High	2452	9.39	0.00869			PASS



## 7.6. BAND EDGES MEASUREMENT

### 7.6.1. LIMITS

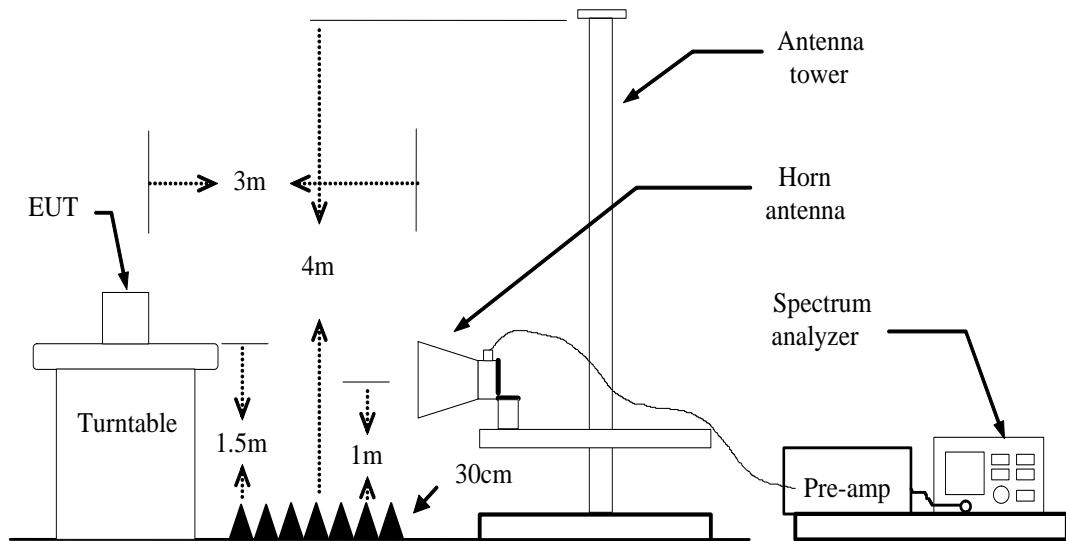
According to §15.247(d), in any 100 kHz bandwidth outside the frequency bands in which the spread spectrum intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains 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. In addition, radiated emissions which fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emission limits specified in 15.209(a) (see Section 15.205(c)).

### 7.6.2. TEST PROCEDURES (please refer to measurement standard)

1. The EUT is placed on a turntable, which is 1.5m above the ground plane.
2. The turntable shall be rotated for 360 degrees to determine the position of maximum emission level.
3. EUT is set 3m away from the receiving antenna, which is varied from 1m to 4m to find out the highest emission.
4. Set the spectrum analyzer in the following setting in order to capture the lower and upper band-edges of the emission:
  - (a) PEAK: RBW=1MHz / VBW=3MHz / Sweep=AUTO
  - (b) AVERAGE: RBW=1MHz / VBW=1/T / Sweep=AUTO / Detector=PEAK
5. Repeat the procedures until all the PEAK and AVERAGE versus POLARIZATION are measured.



### 7.6.3. TEST SETUP



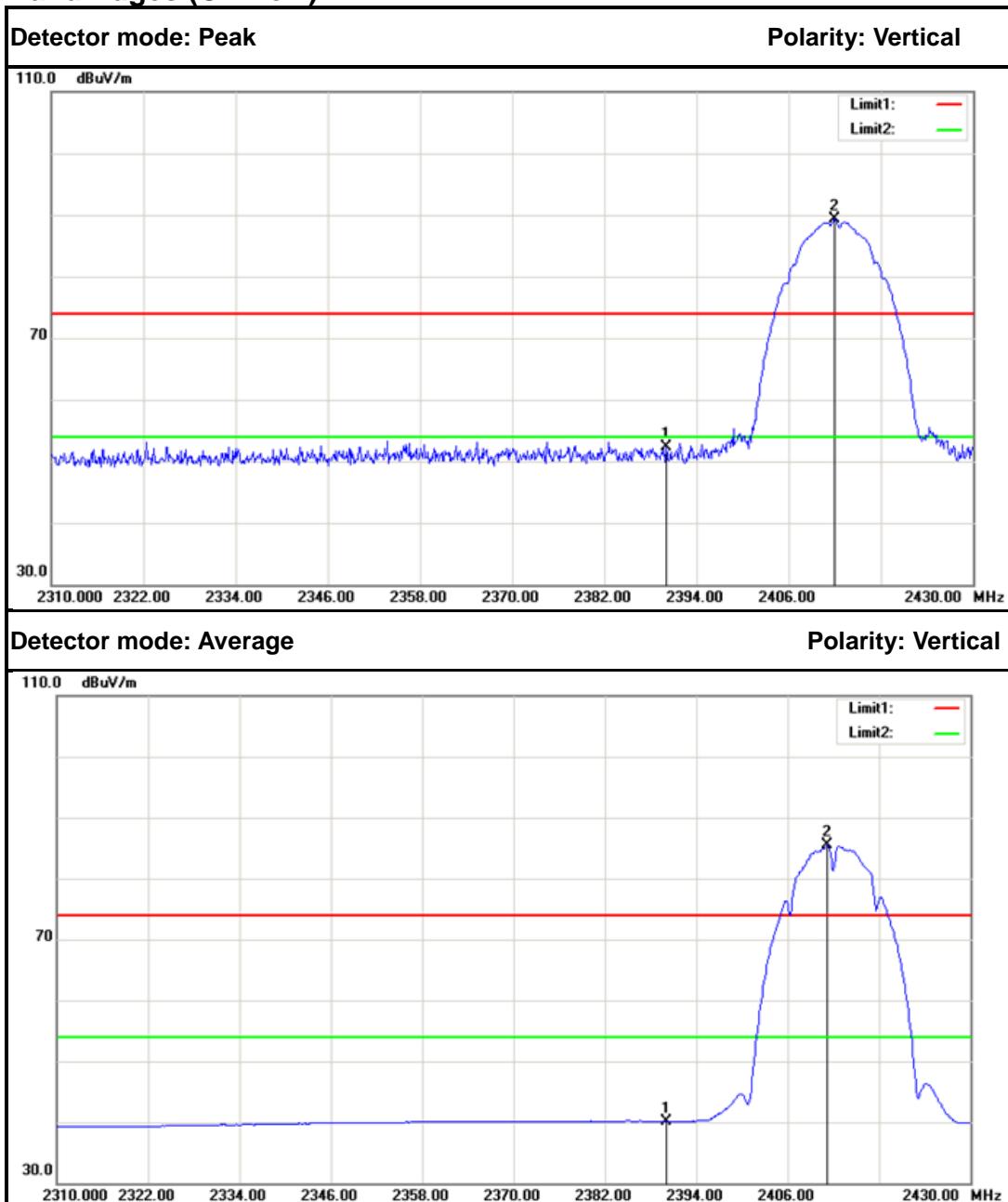


#### 7.6.4. TEST RESULTS

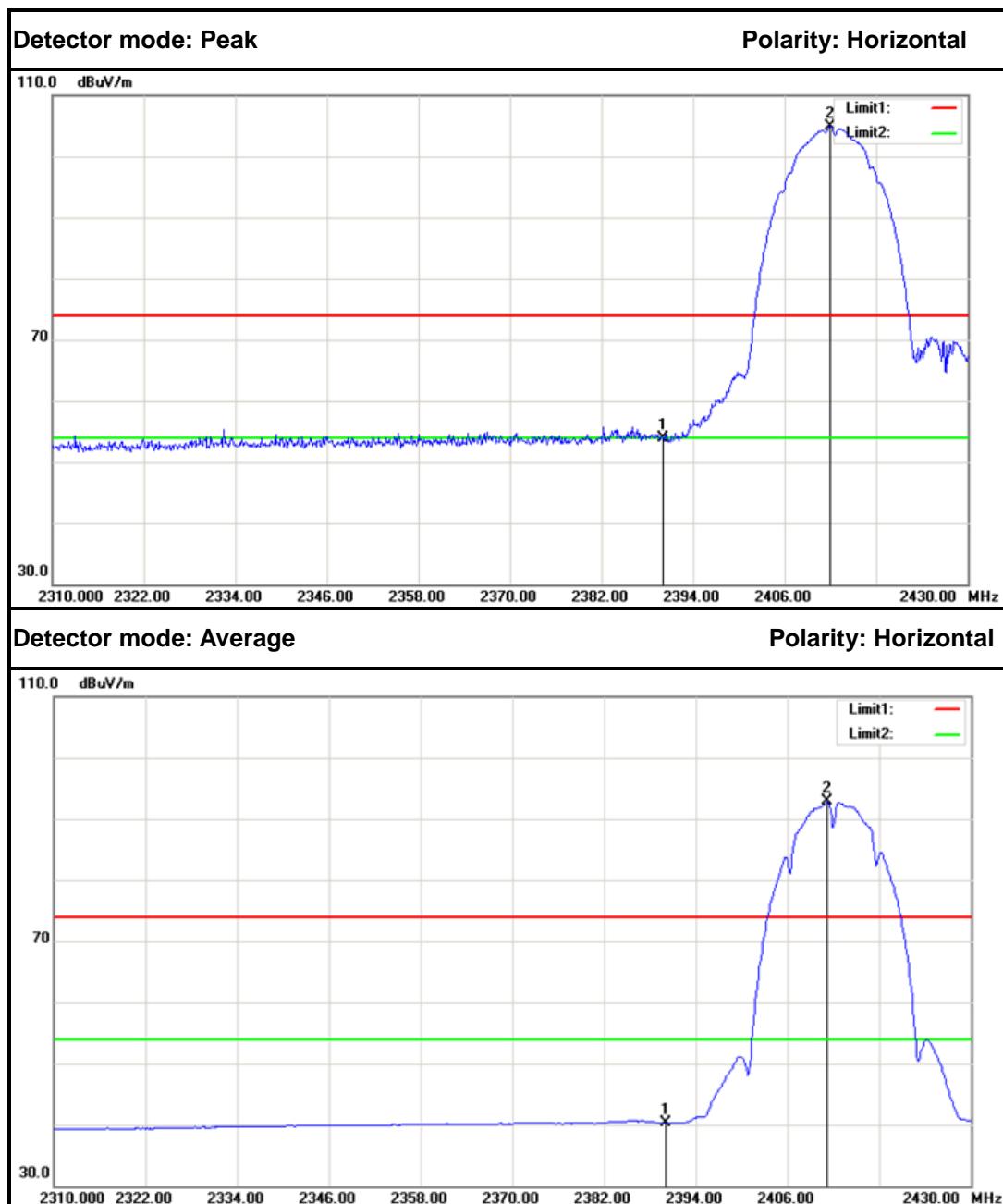
##### Test Plot

IEEE 802.11b mode

Band Edges (CH Low)



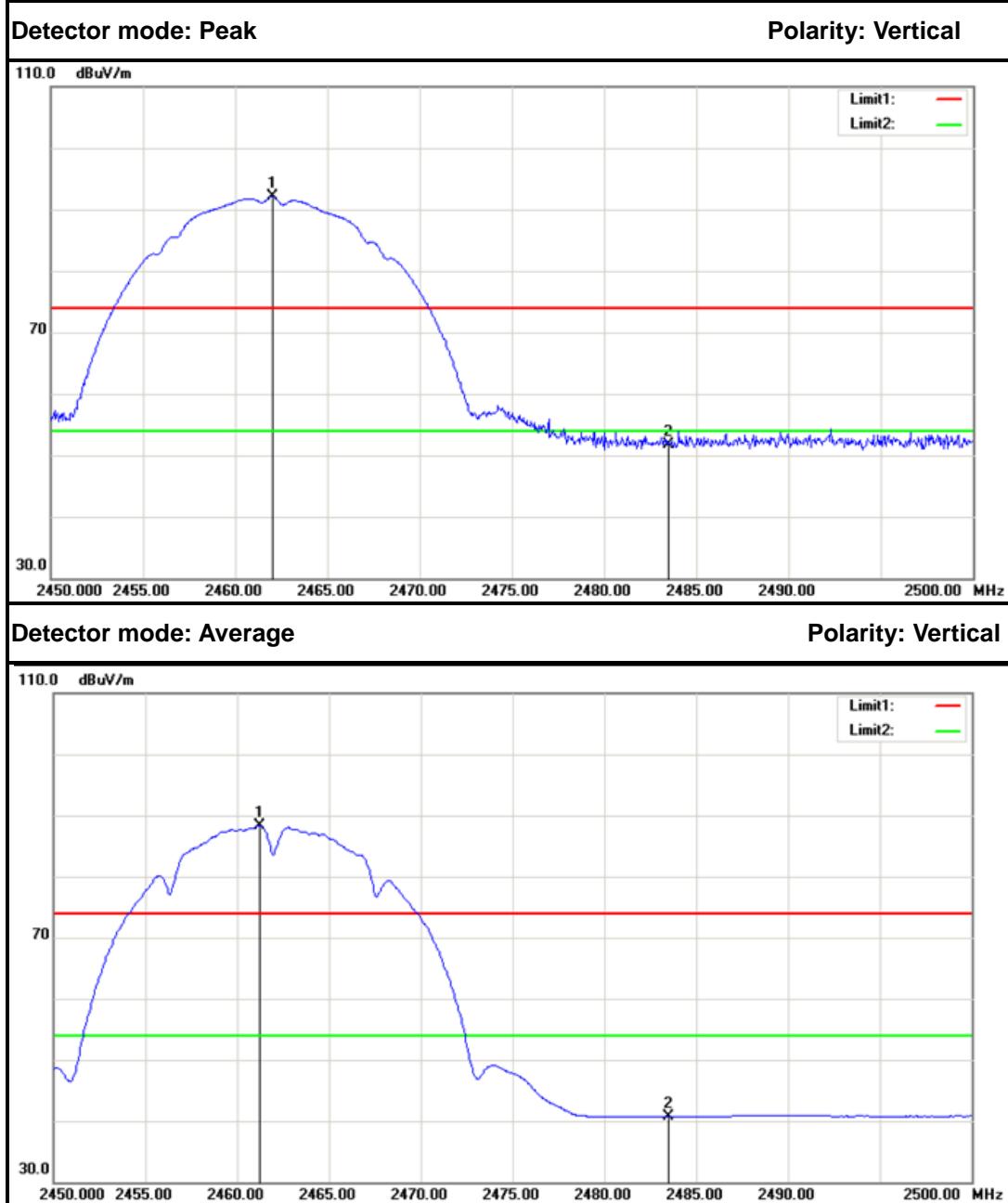
No.	Frequency (MHz)	Reading (dB)	Factor (dB/m)	Result (dB/m)	Limit (dB/m)	Margin (dB)	Remark	Antenna Polar
1.	2390.000	55.10	-2.86	52.24	74.00	-21.76	Peak	Vertical
2.	2412.000	92.09	-2.74	89.35	---	---	Peak	Vertical
1.	2390.000	42.95	-2.86	40.09	54.00	-13.91	Average	Vertical
2.	2411.160	88.23	-2.75	85.48	---	---	Average	Vertical



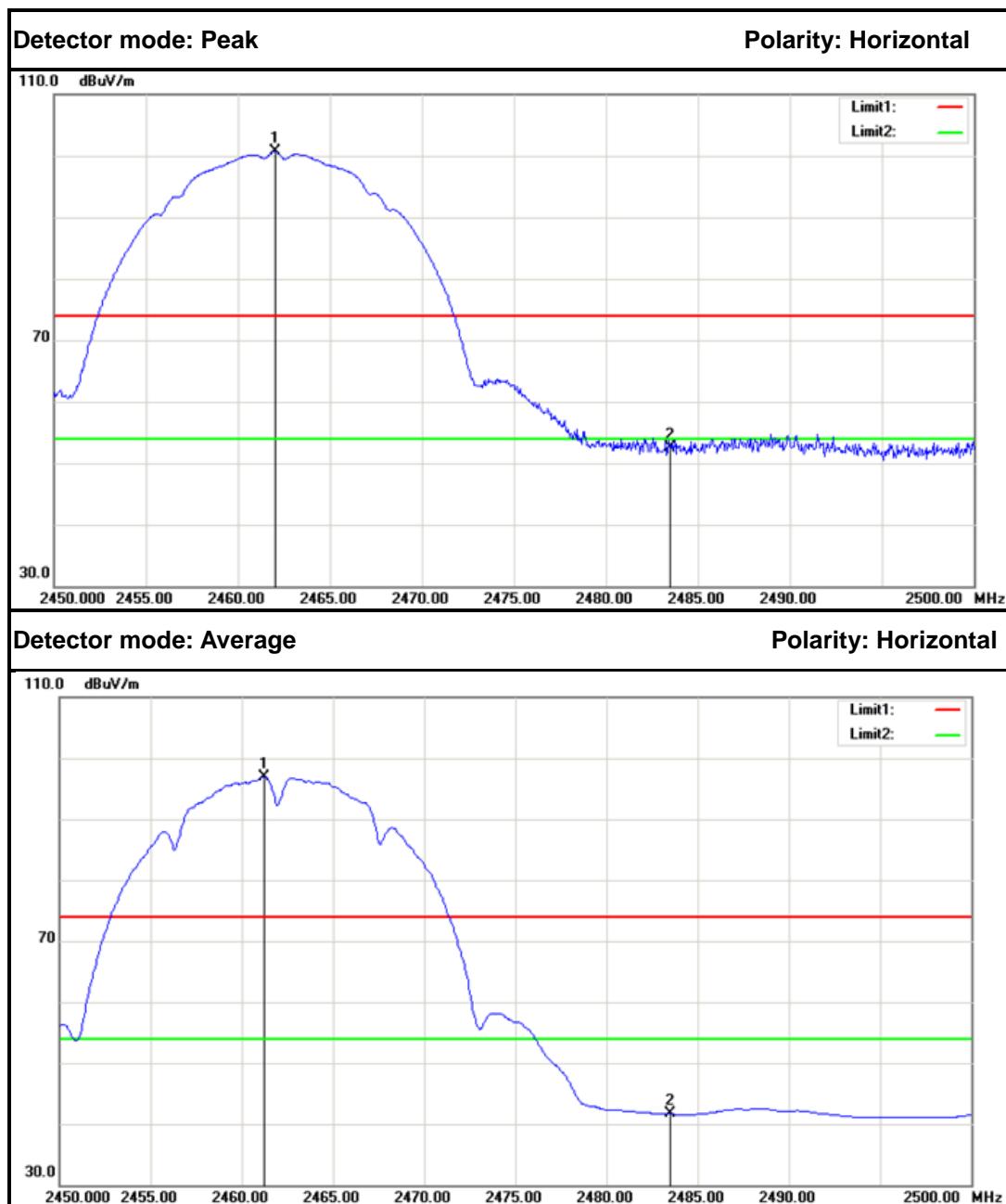
No.	Frequency (MHz)	Reading (dB)	Factor (dB/m)	Result (dB/m)	Limit (dB/m)	Margin (dB)	Remark	Antenna Polar
1.	2390.000	54.18	-2.86	51.32	74.00	-22.68	Peak	Horizontal
2.	2412.000	99.40	-2.74	96.66	---	---	Peak	Horizontal
1.	2390.000	43.17	-2.86	40.31	54.00	-13.69	Average	Horizontal
2.	2411.160	95.58	-2.75	92.83	---	---	Average	Horizontal



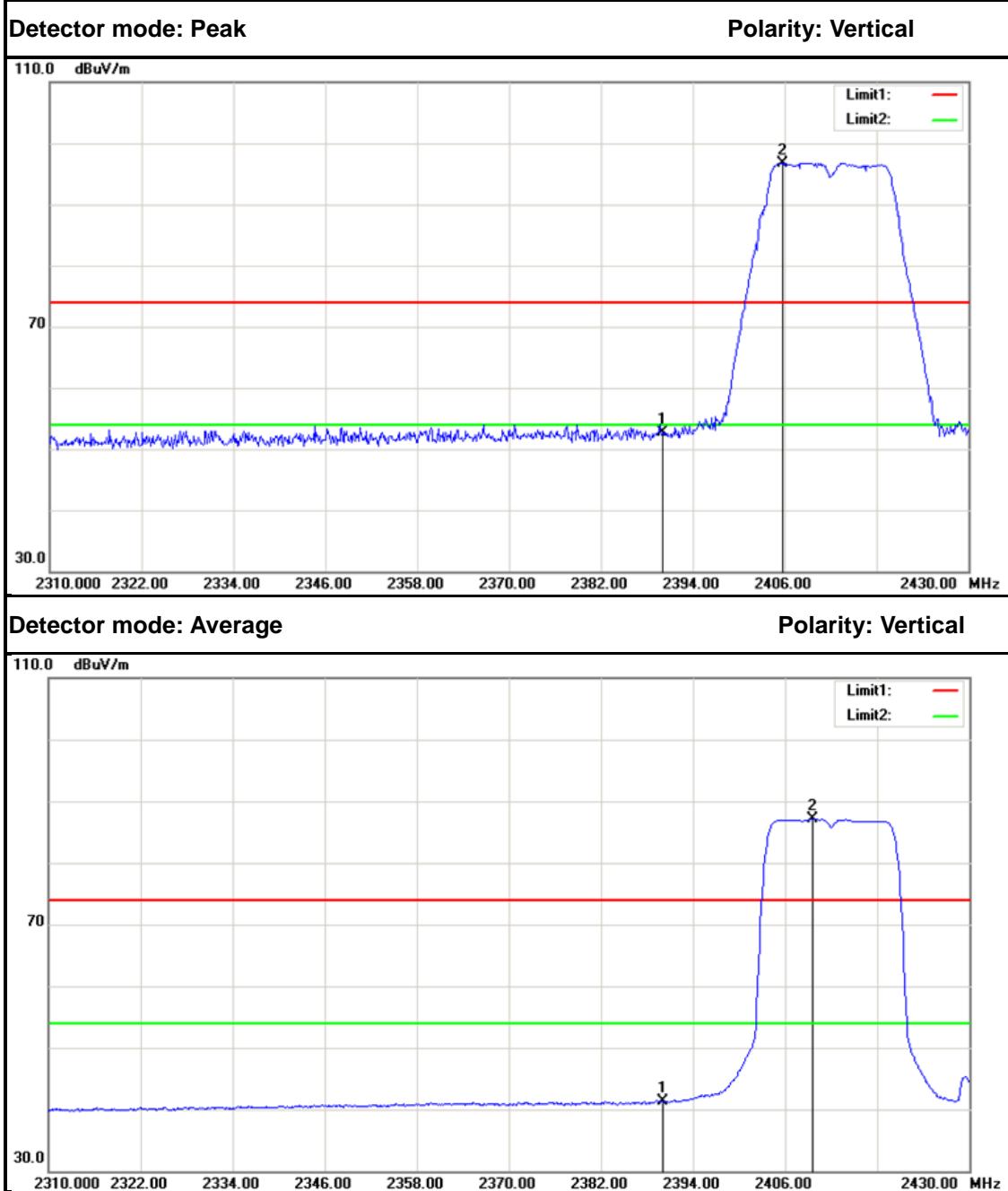
## Band Edges (CH High)



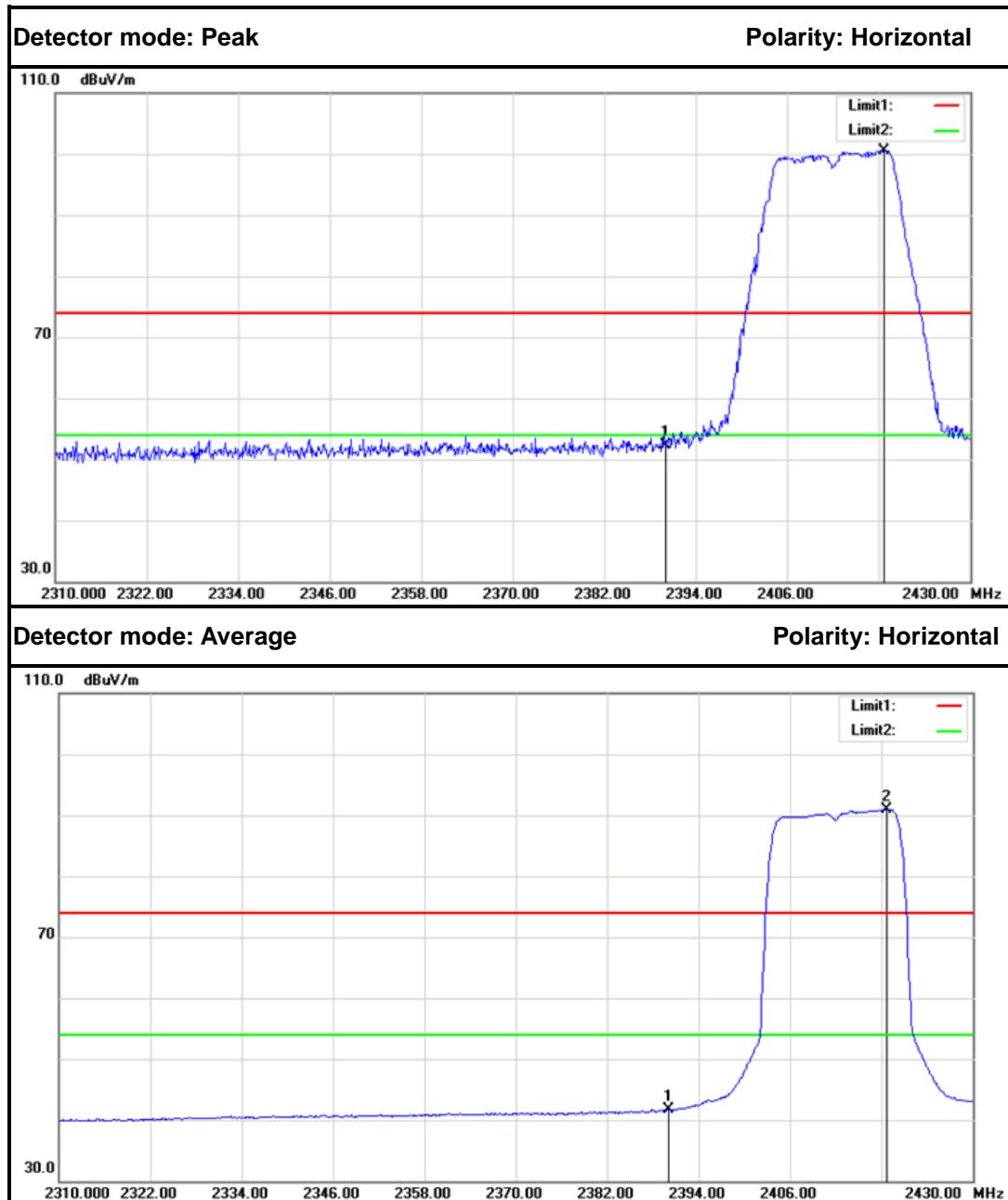
No.	Frequency (MHz)	Reading (dB)	Factor (dB/m)	Result (dB/m)	Limit (dB/m)	Margin (dB)	Remark	Antenna Polar
1.	2462.000	94.54	-2.47	92.07	---	---	Peak	Vertical
2.	2483.500	54.06	-2.35	51.71	74.00	-22.29	Peak	Vertical
1.	2461.200	90.85	-2.47	88.38	---	---	Average	Vertical
2.	2483.500	43.01	-2.35	40.66	54.00	-13.34	Average	Vertical



No.	Frequency (MHz)	Reading (dB)	Factor (dB/m)	Result (dB/m)	Limit (dB/m)	Margin (dB)	Remark	Antenna Polar
1.	2462.000	103.14	-2.47	100.67	---	---	Peak	Horizontal
2.	2483.500	54.80	-2.35	52.45	74.00	-21.55	Peak	Horizontal
1.	2461.200	99.38	-2.47	96.91	---	---	Average	Horizontal
2.	2483.500	43.96	-2.35	41.61	54.00	-12.39	Average	Horizontal

**IEEE 802.11g mode  
Band Edges (CH Low)**

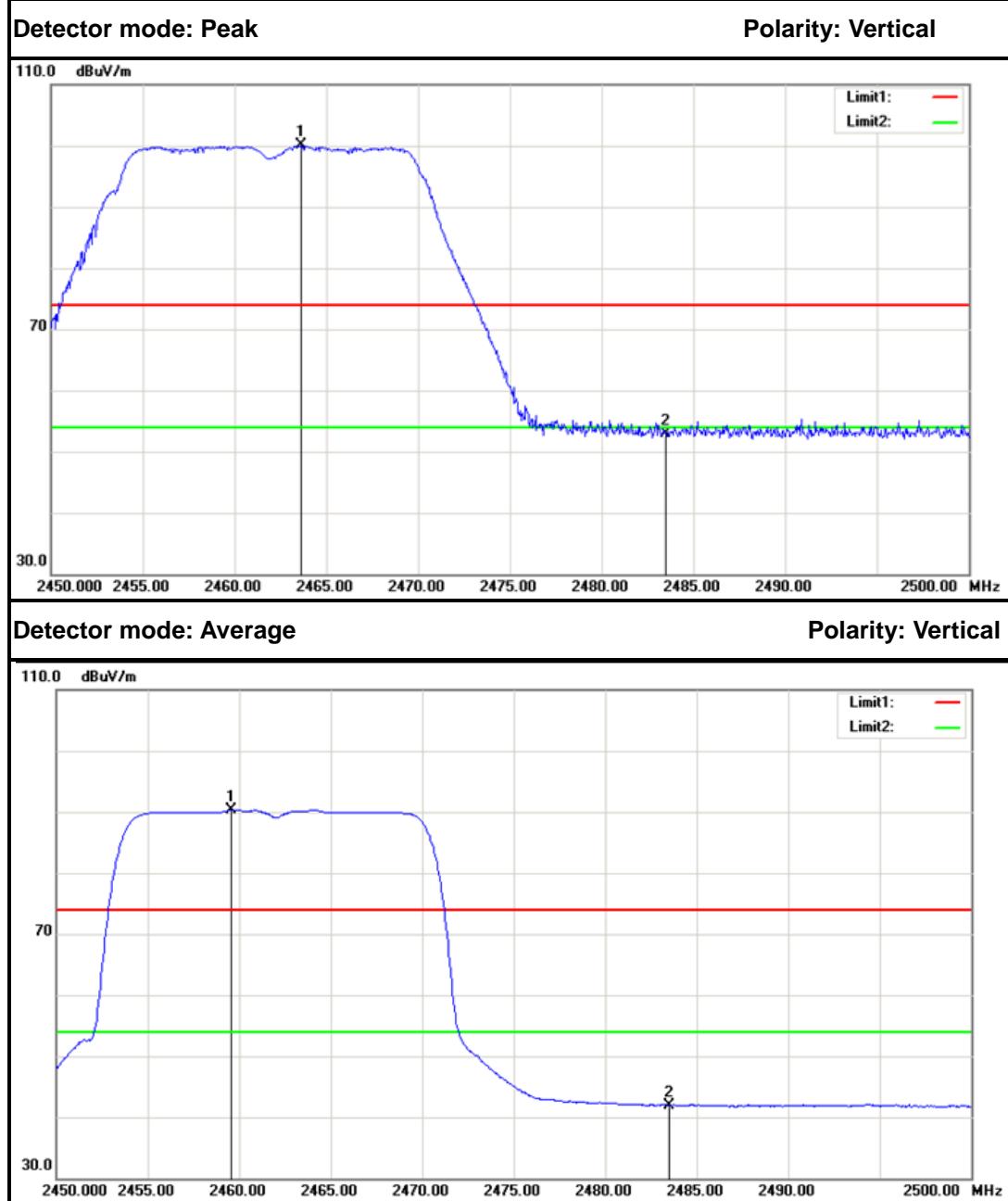
No.	Frequency (MHz)	Reading (dB)	Factor (dB/m)	Result (dB/m)	Limit (dB/m)	Margin (dB)	Remark	Antenna Polar
1.	2390.000	55.51	-2.86	52.65	74.00	-21.35	Peak	Vertical
2.	2405.760	99.58	-2.78	96.80	---	---	Peak	Vertical
1.	2390.000	44.20	-2.86	41.34	54.00	-12.66	Average	Vertical
2.	2409.600	89.91	-2.76	87.15	---	---	Average	Vertical



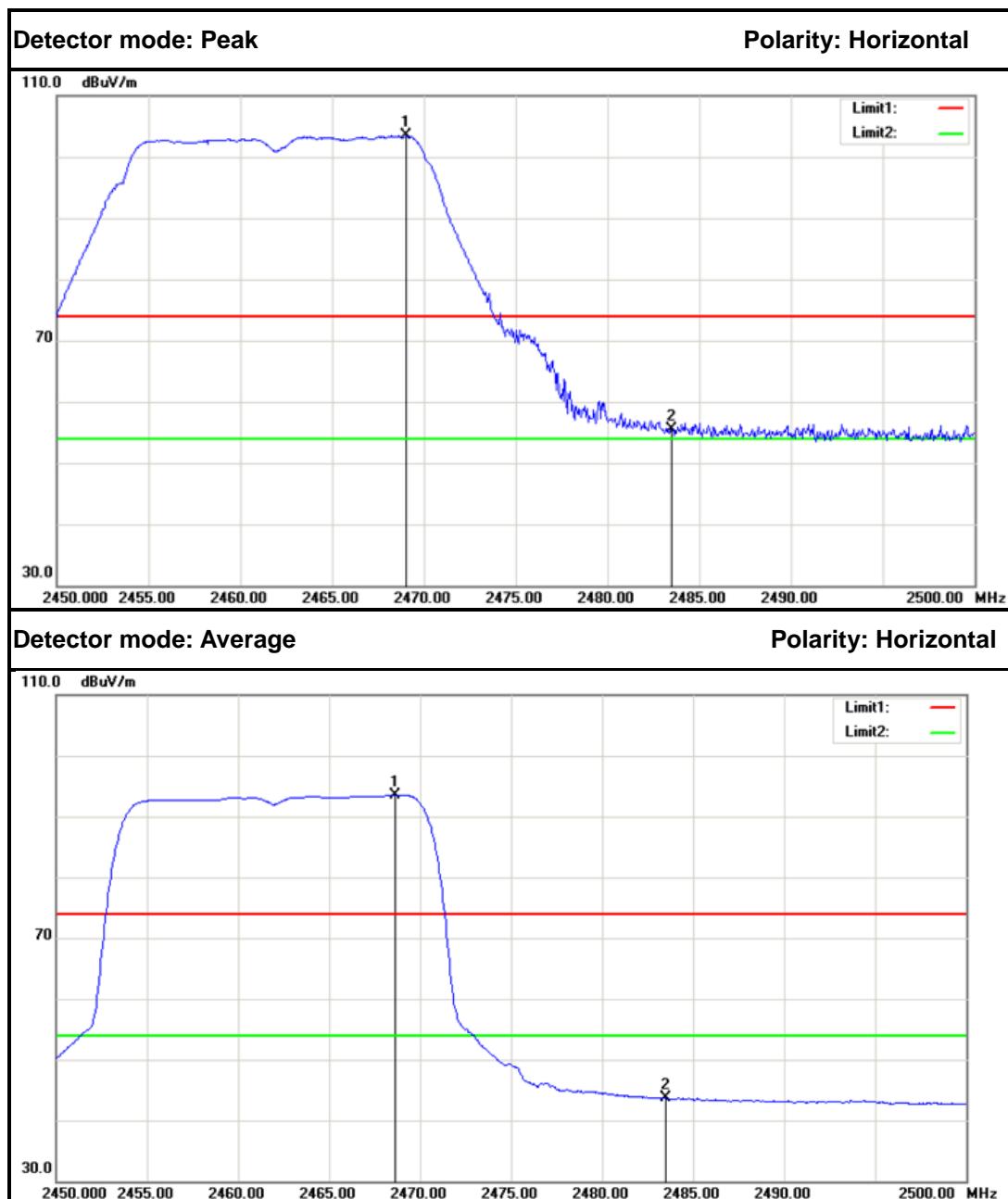
No.	Frequency (MHz)	Reading (dB)	Factor (dB/m)	Result (dB/m)	Limit (dB/m)	Margin (dB)	Remark	Antenna Polar
1.	2390.000	55.17	-2.86	52.31	74.00	-21.69	Peak	Horizontal
2.	2418.720	103.30	-2.71	100.59	---	---	Peak	Horizontal
1.	2390.000	44.51	-2.86	41.65	54.00	-12.35	Average	Horizontal
2.	2418.720	93.71	-2.71	91.00	---	---	Average	Horizontal



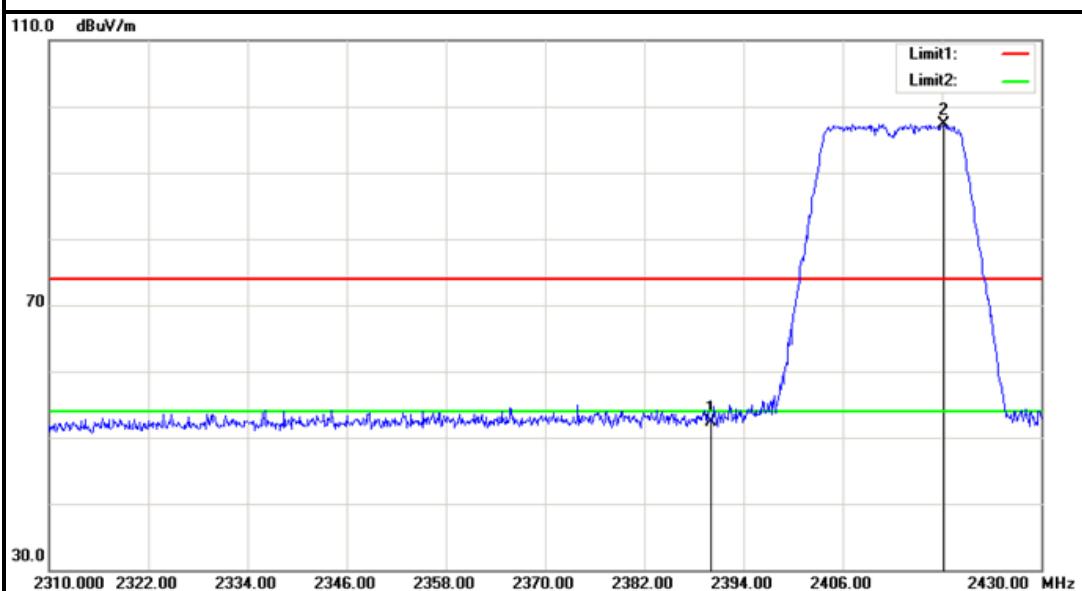
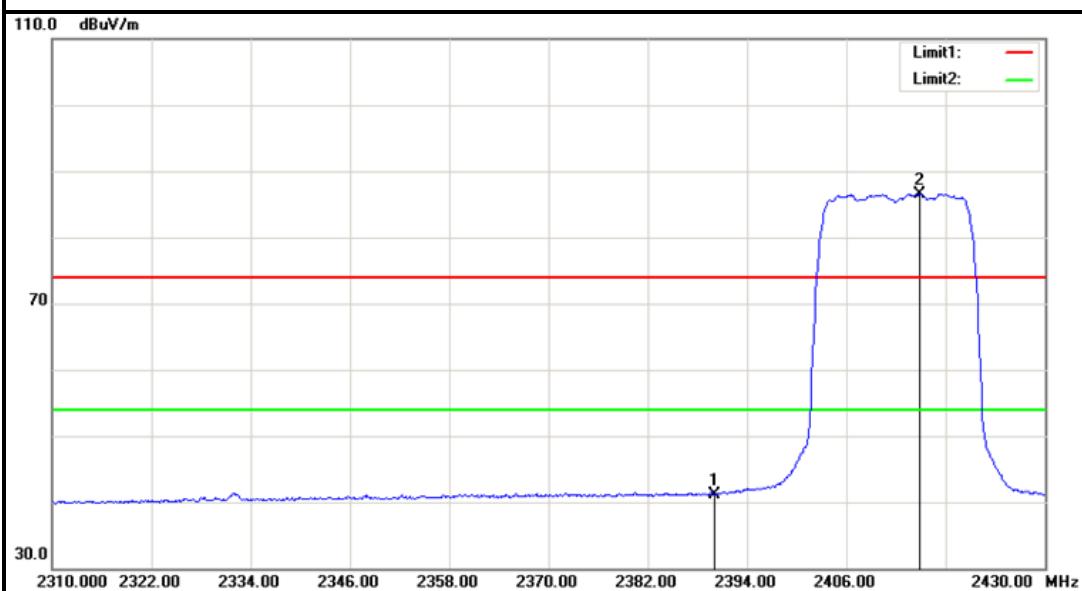
## Band Edges (CH High)



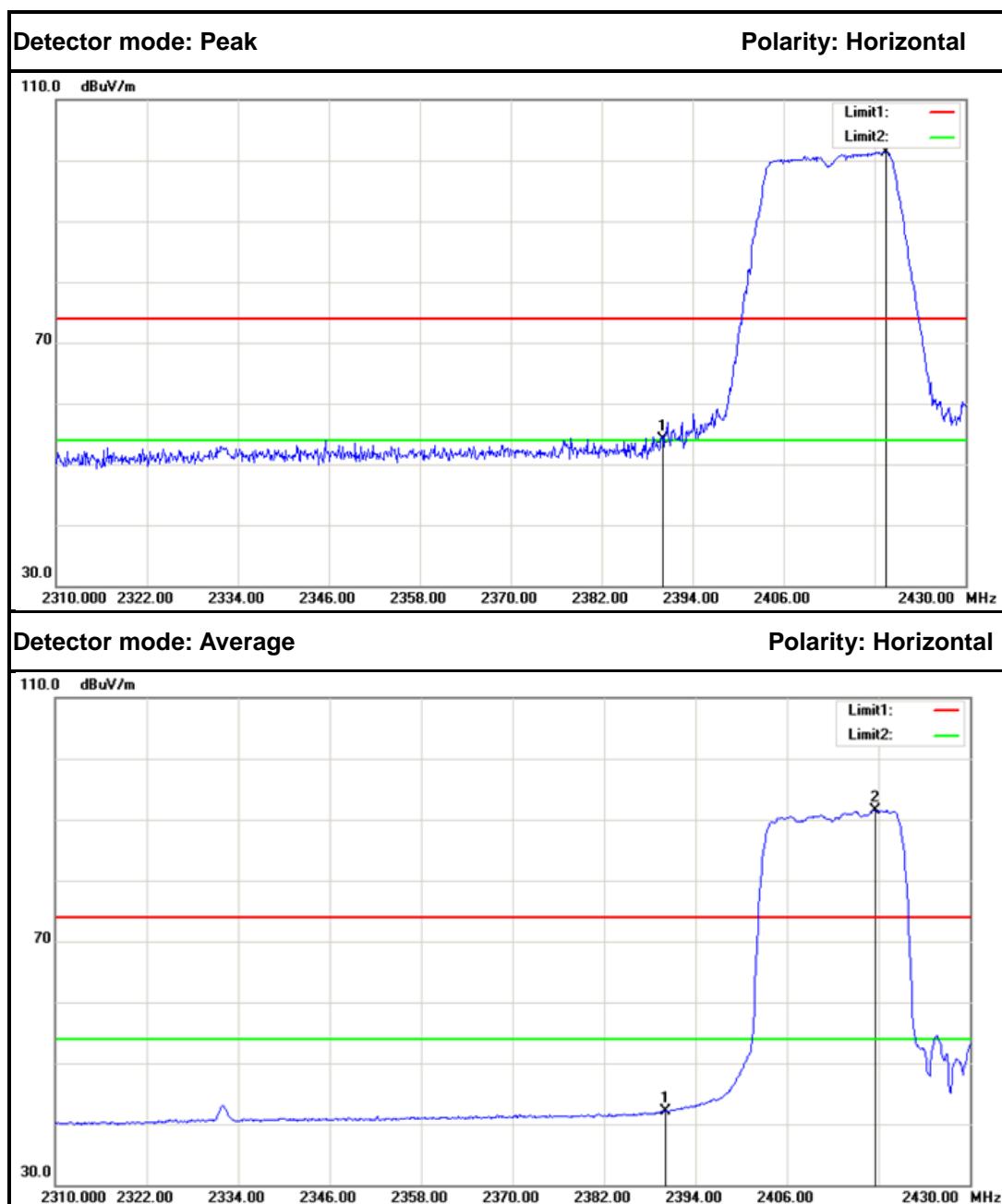
No.	Frequency (MHz)	Reading (dB)	Factor (dB/m)	Result (dB/m)	Limit (dB/m)	Margin (dB)	Remark	Antenna Polar
1.	2463.600	102.47	-2.46	100.01	---	---	Peak	Vertical
2.	2483.500	55.35	-2.35	53.00	74.00	-21.00	Peak	Vertical
1.	2459.550	92.76	-2.48	90.28	---	---	Average	Vertical
2.	2483.500	44.32	-2.35	41.97	54.00	-12.03	Average	Vertical



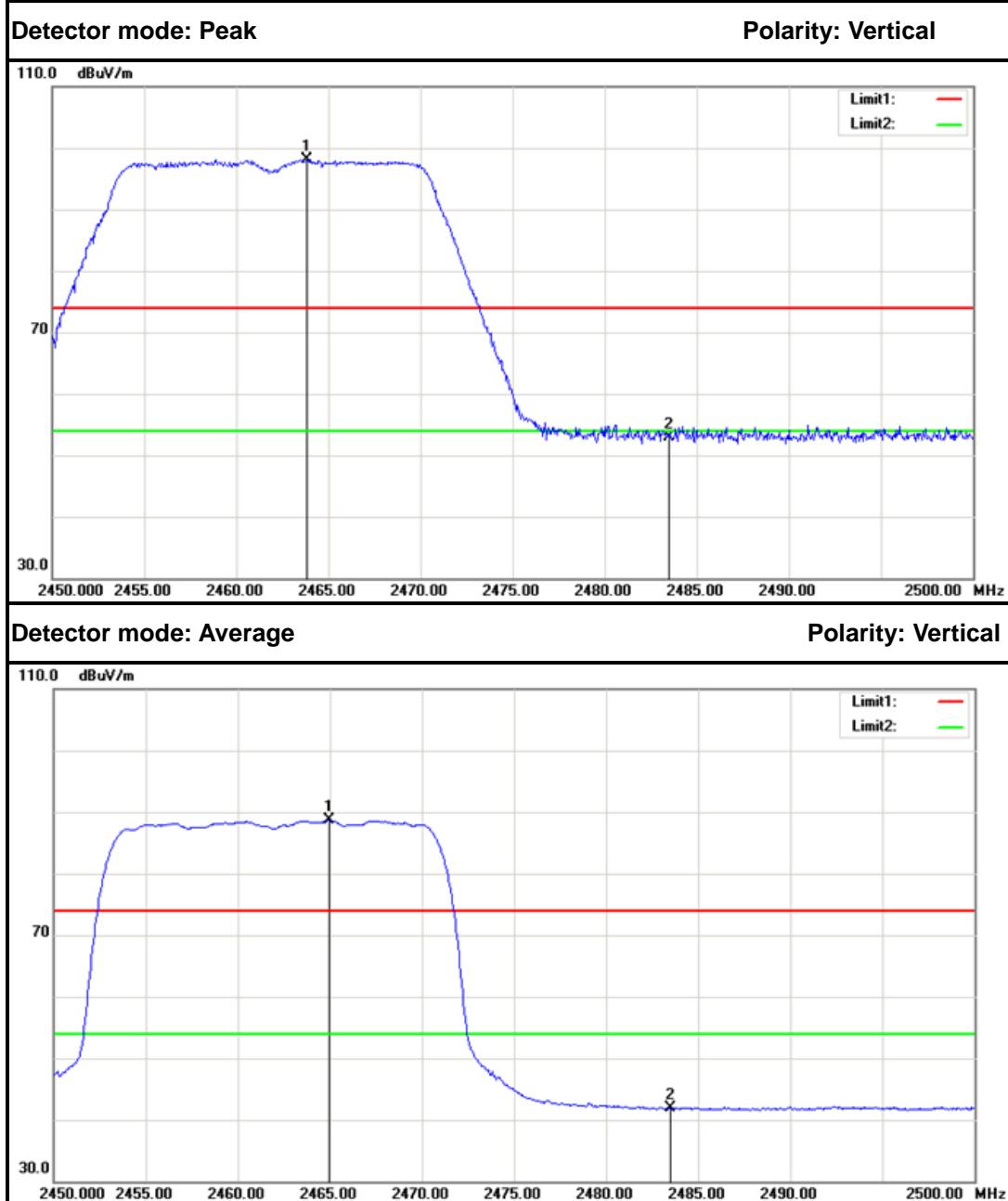
No.	Frequency (MHz)	Reading (dB)	Factor (dB/m)	Result (dB/m)	Limit (dB/m)	Margin (dB)	Remark	Antenna Polar
1.	2469.050	105.87	-2.43	103.44	---	---	Peak	Horizontal
2.	2483.500	57.83	-2.35	55.48	74.00	-18.52	Peak	Horizontal
1.	2468.650	96.00	-2.43	93.57	---	---	Average	Horizontal
2.	2483.500	46.04	-2.35	43.69	54.00	-10.31	Average	Horizontal

**IEEE 802.11n HT20 MHz mode  
Band Edges (CH Low)****Detector mode: Peak****Polarity: Vertical****Detector mode: Average****Polarity: Vertical**

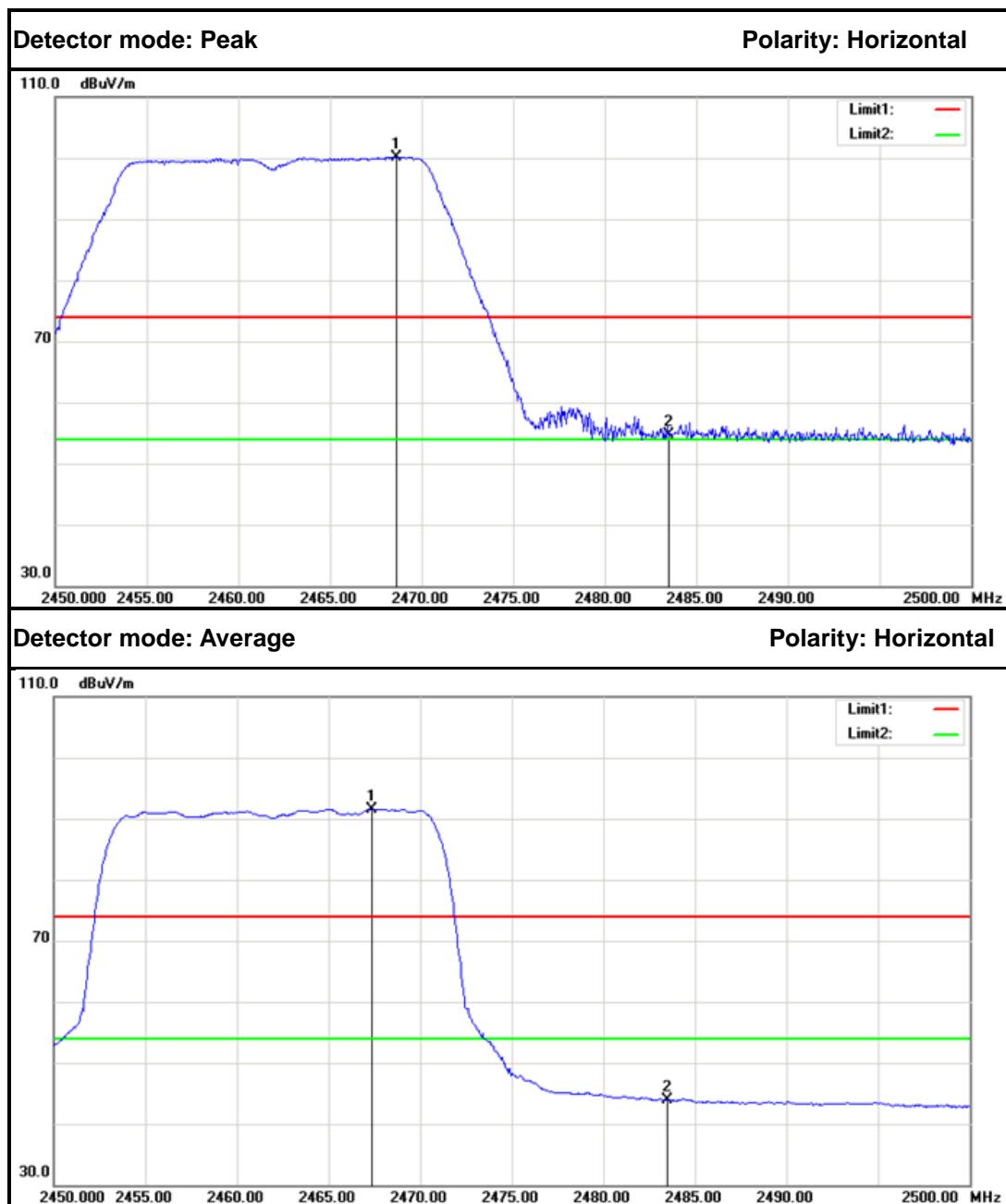
No.	Frequency (MHz)	Reading (dB)	Factor (dB/m)	Result (dB/m)	Limit (dB/m)	Margin (dB)	Remark	Antenna Polar
1.	2390.000	55.25	-2.86	52.39	74.00	-21.61	Peak	Vertical
2.	2418.240	100.02	-2.71	97.31	---	---	Peak	Vertical
1.	2390.000	43.99	-2.86	41.13	54.00	-12.87	Average	Vertical
2.	2414.880	89.32	-2.73	86.59	---	---	Average	Vertical



No.	Frequency (MHz)	Reading (dB)	Factor (dB/m)	Result (dB/m)	Limit (dB/m)	Margin (dB)	Remark	Antenna Polar
1.	2390.000	56.93	-2.86	54.07	74.00	-19.93	Peak	Horizontal
2.	2419.440	104.07	-2.70	101.37	---	---	Peak	Horizontal
1.	2390.000	44.91	-2.86	42.05	54.00	-11.95	Average	Horizontal
2.	2417.520	94.22	-2.71	91.51	---	---	Average	Horizontal

**Band Edges (CH High)**

No.	Frequency (MHz)	Reading (dB)	Factor (dB/m)	Result (dB/m)	Limit (dB/m)	Margin (dB)	Remark	Antenna Polar
1.	2463.800	100.60	-2.46	98.14	---	---	Peak	Vertical
2.	2483.500	55.35	-2.35	53.00	74.00	-21.00	Peak	Vertical
1.	2464.950	91.13	-2.45	88.68	---	---	Average	Vertical
2.	2483.500	44.34	-2.35	41.99	54.00	-12.01	Average	Vertical

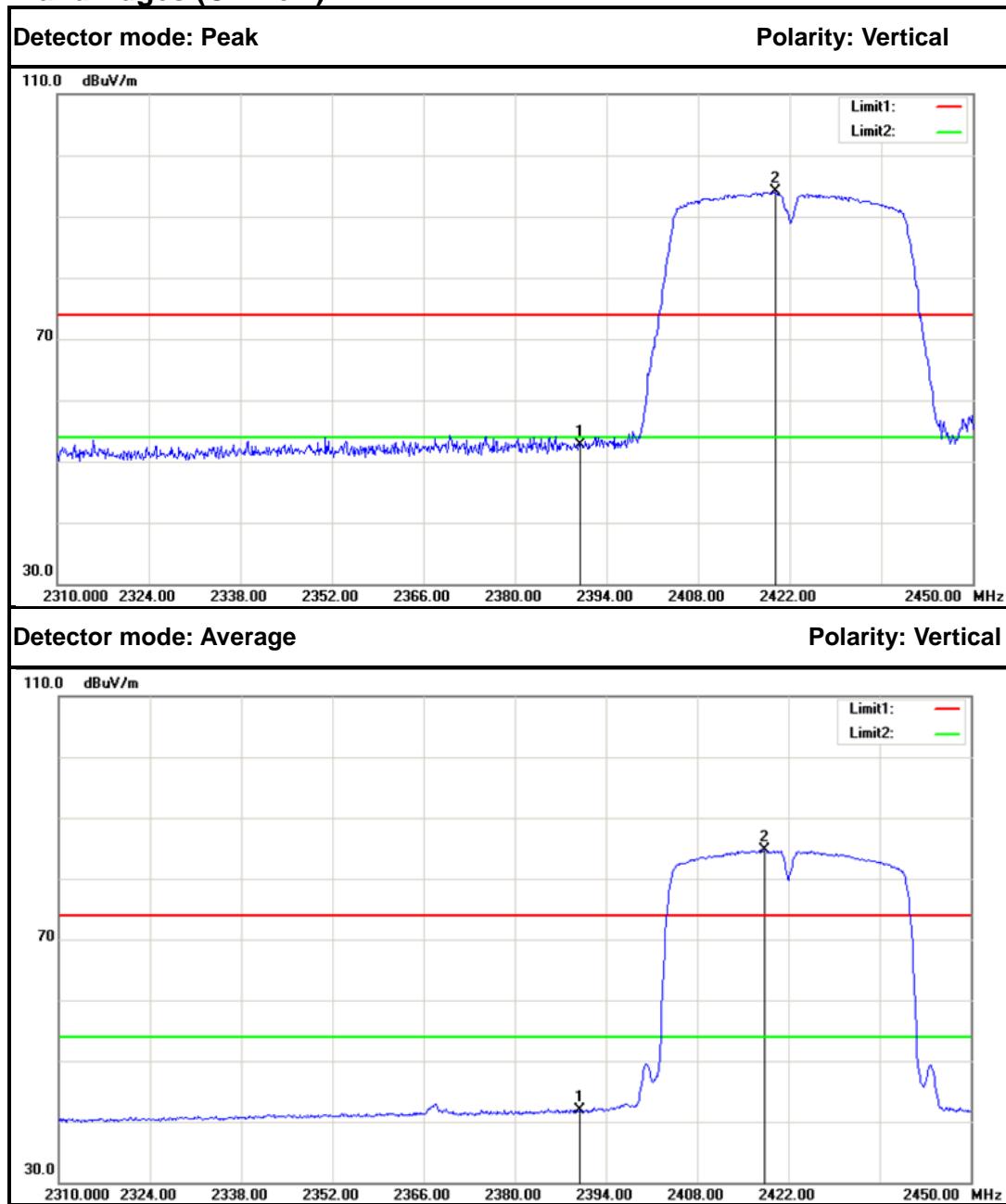


No.	Frequency (MHz)	Reading (dB)	Factor (dB/m)	Result (dB/m)	Limit (dB/m)	Margin (dB)	Remark	Antenna Polar
1.	2468.650	102.62	-2.43	100.19	---	---	Peak	Horizontal
2.	2483.500	57.06	-2.35	54.71	74.00	-19.29	Peak	Horizontal
1.	2467.350	94.04	-2.44	91.60	---	---	Average	Horizontal
2.	2483.500	46.29	-2.35	43.94	54.00	-10.06	Average	Horizontal

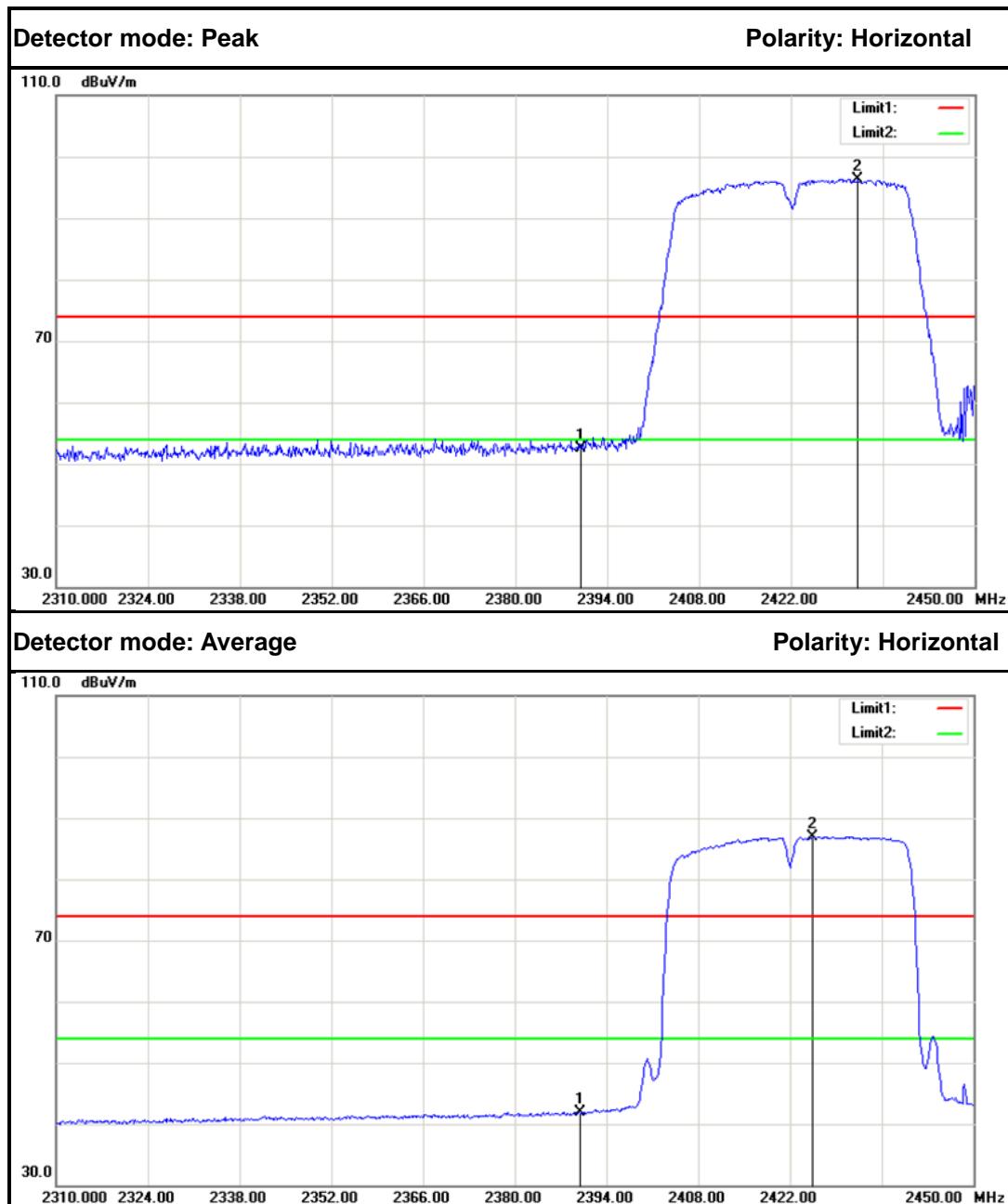


## IEEE 802.11n HT40 MHz mode

## Band Edges (CH Low)



No.	Frequency (MHz)	Reading (dB)	Factor (dB/m)	Result (dB/m)	Limit (dB/m)	Margin (dB)	Remark	Antenna Polar
3.	2390.000	55.65	-2.86	52.79	74.00	-21.21	Peak	Vertical
4.	2419.760	96.83	-2.70	94.13	---	---	Peak	Vertical
3.	2390.000	44.71	-2.86	41.85	54.00	-12.15	Average	Vertical
4.	2418.360	87.41	-2.71	84.70	---	---	Average	Vertical

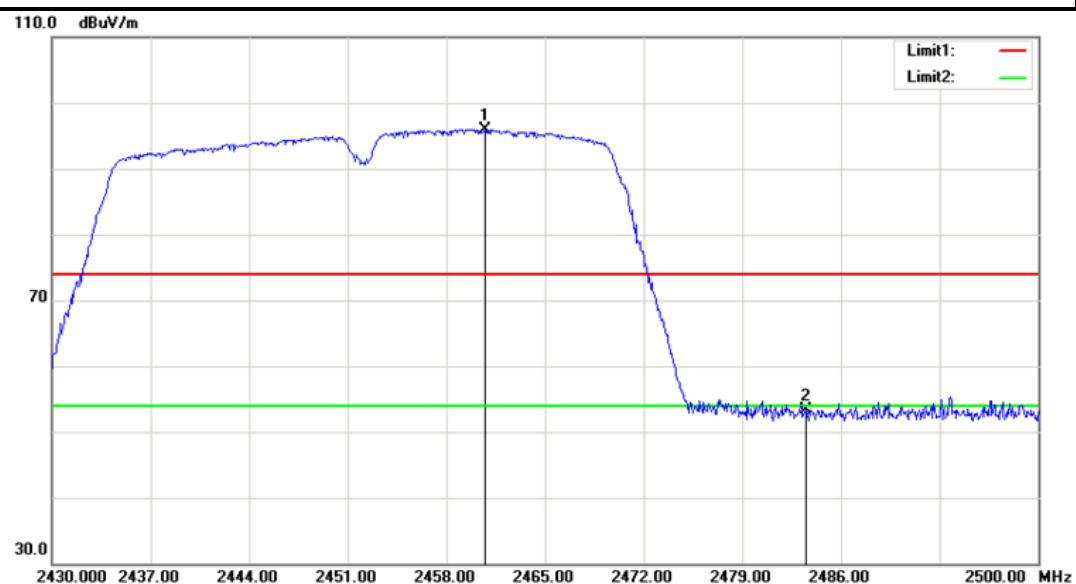


No.	Frequency (MHz)	Reading (dB)	Factor (dB/m)	Result (dB/m)	Limit (dB/m)	Margin (dB)	Remark	Antenna Polar
3.	2390.000	55.29	-2.86	52.43	74.00	-21.57	Peak	Horizontal
4.	2432.220	98.92	-2.63	96.29	---	---	Peak	Horizontal
3.	2390.000	44.76	-2.86	41.90	54.00	-12.10	Average	Horizontal
4.	2425.500	89.63	-2.67	86.96	---	---	Average	Horizontal

**Band Edges (CH High)**

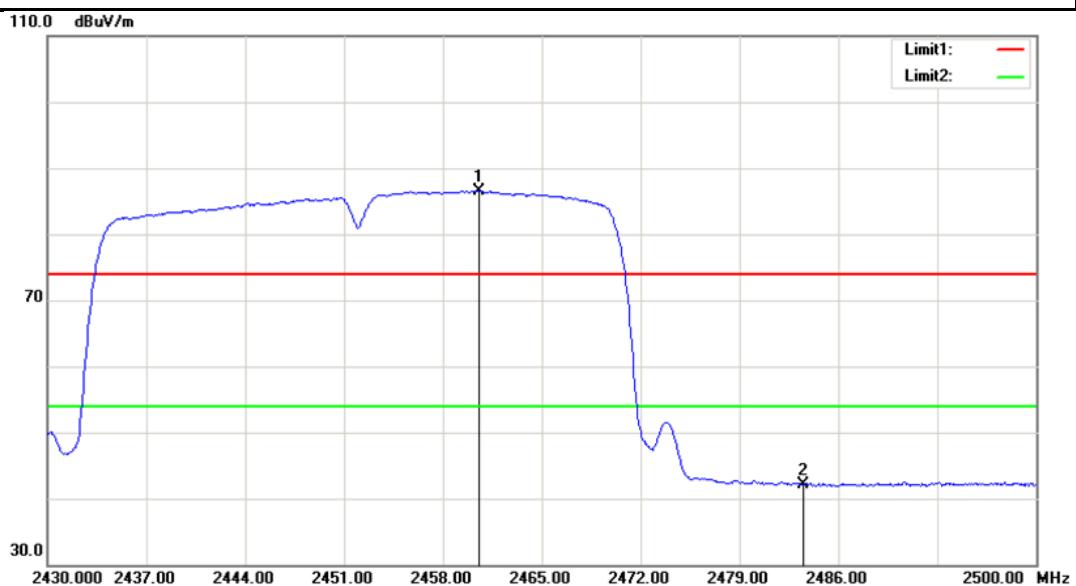
Detector mode: Peak

Polarity: Vertical

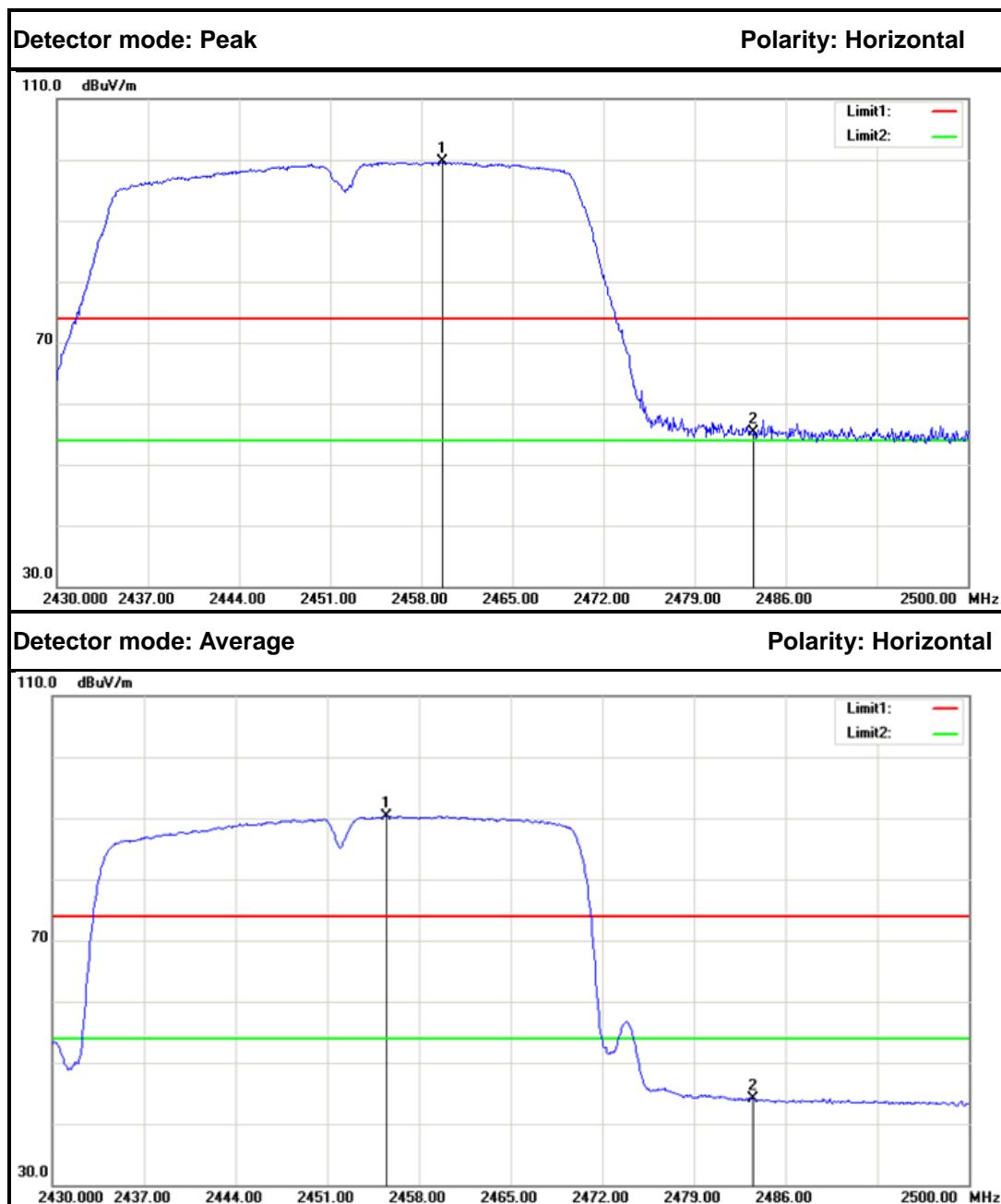


Detector mode: Average

Polarity: Vertical



No.	Frequency (MHz)	Reading (dB)	Factor (dB/m)	Result (dB/m)	Limit (dB/m)	Margin (dB)	Remark	Antenna Polar
3.	2460.730	98.41	-2.48	95.93	---	---	Peak	Vertical
4.	2483.500	55.62	-2.35	53.27	74.00	-20.73	Peak	Vertical
3.	2460.520	89.01	-2.48	86.53	---	---	Average	Vertical
4.	2483.500	44.42	-2.35	42.07	54.00	-11.93	Average	Vertical



No.	Frequency (MHz)	Reading (dB)	Factor (dB/m)	Result (dB/m)	Limit (dB/m)	Margin (dB)	Remark	Antenna Polar
3.	2459.610	102.09	-2.48	99.61	---	---	Peak	Horizontal
4.	2483.500	57.74	-2.35	55.39	74.00	-18.61	Peak	Horizontal
3.	2455.550	92.84	-2.50	90.34	---	---	Average	Horizontal
4.	2483.500	46.53	-2.35	44.18	54.00	-9.82	Average	Horizontal



## 7.7. PEAK POWER SPECTRAL DENSITY MEASUREMENT

### 7.7.1. LIMITS

According to §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.

According to §15.247(f), the digital modulation operation of the hybrid system, with the frequency hopping turned off, shall comply with the power density requirements of paragraph (d) of this section.

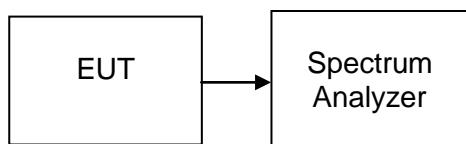
### 7.7.2. TEST PROCEDURES (please refer to measurement standard)

§15.247(e) specifies a conducted power spectral density (PSD) limit of 8 dBm in any 3 kHz band segment within the fundamental EBW during any time interval of continuous transmission. The same method as used to determine the conducted output power shall be used to determine the power spectral density (i.e., if peak-detected fundamental power was measured then use the peak PSD procedure and if average fundamental power was measured then use the average PSD procedure).

#### 10.2 Method PKPSD (peak PSD)

1. Set analyzer center frequency to DTS channel center frequency.
2. Set the span to 1.5 times the DTS bandwidth.
3. Set the RBW to:  $3 \text{ kHz} \leq \text{RBW} \leq 100 \text{ kHz}$ .
4. Set the VBW  $\geq 3 \times \text{RBW}$ .
5. Detector = peak.
6. Sweep time = auto couple.
7. Trace mode = max hold.
8. Allow trace to fully stabilize.
9. Use the peak marker function to determine the maximum amplitude level within the RBW.
10. If measured value exceeds limit, reduce RBW (no less than 3 kHz) and repeat.

### 7.7.3. TEST SETUP





#### 7.7.4. TEST RESULTS

No non-compliance noted

##### Test Data

IEEE 802.11b mode				
Channel	Frequency (MHz)	PPSD (dBm)	Limit (dBm)	Test Result
Low	2412	-20.020	8	PASS
Mid	2437	-20.274		PASS
High	2462	-20.138		PASS

IEEE 802.11g mode				
Channel	Frequency (MHz)	PPSD (dBm)	Limit (dBm)	Test Result
Low	2412	-19.708	8	PASS
Mid	2437	-19.301		PASS
High	2462	-19.068		PASS

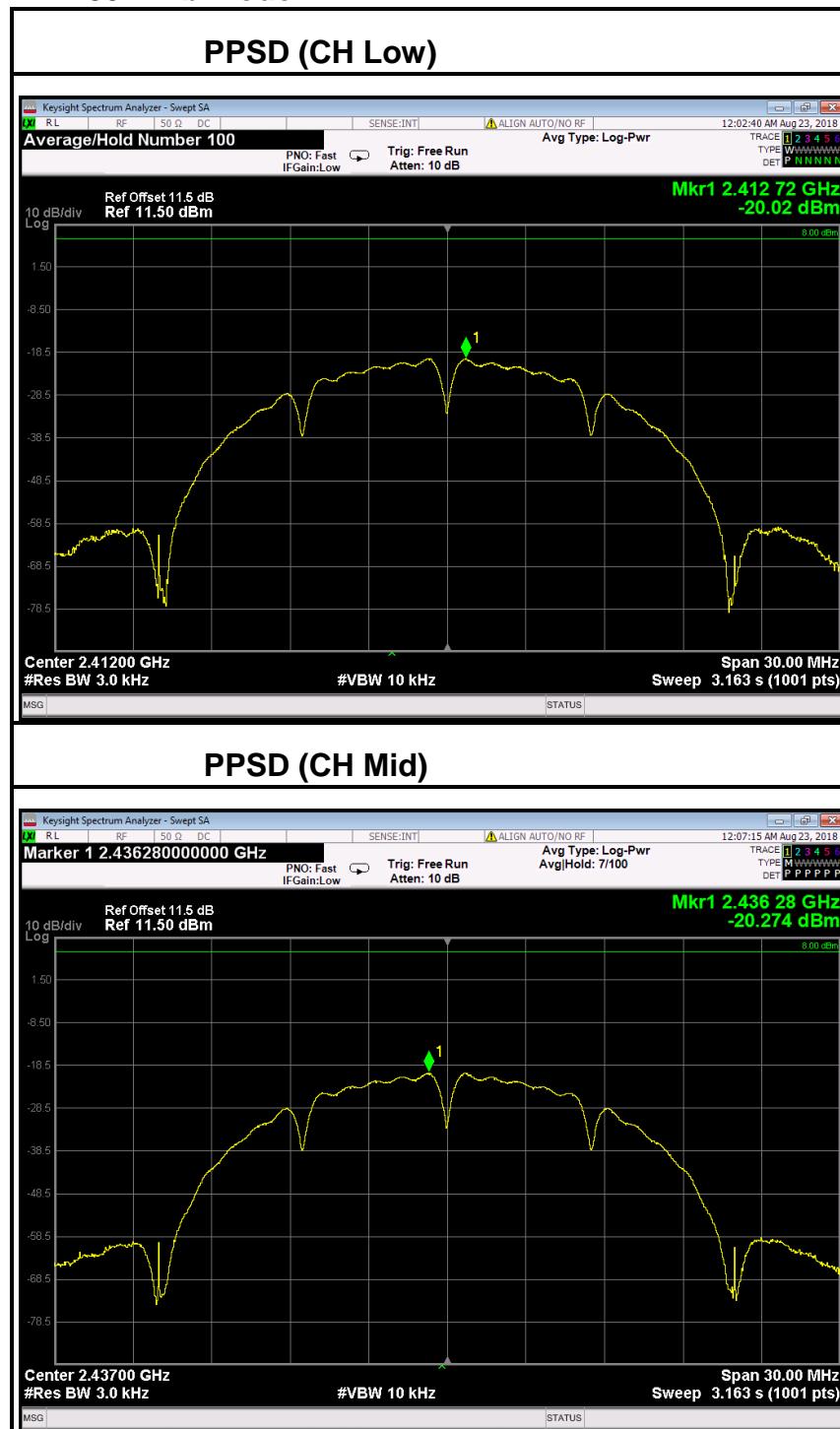
IEEE 802.11 n HT20 mode				
Channel	Frequency (MHz)	PPSD (dBm)	Limit (dBm)	Test Result
Low	2412	-18.327	8	PASS
Mid	2437	-18.288		PASS
High	2462	-18.526		PASS

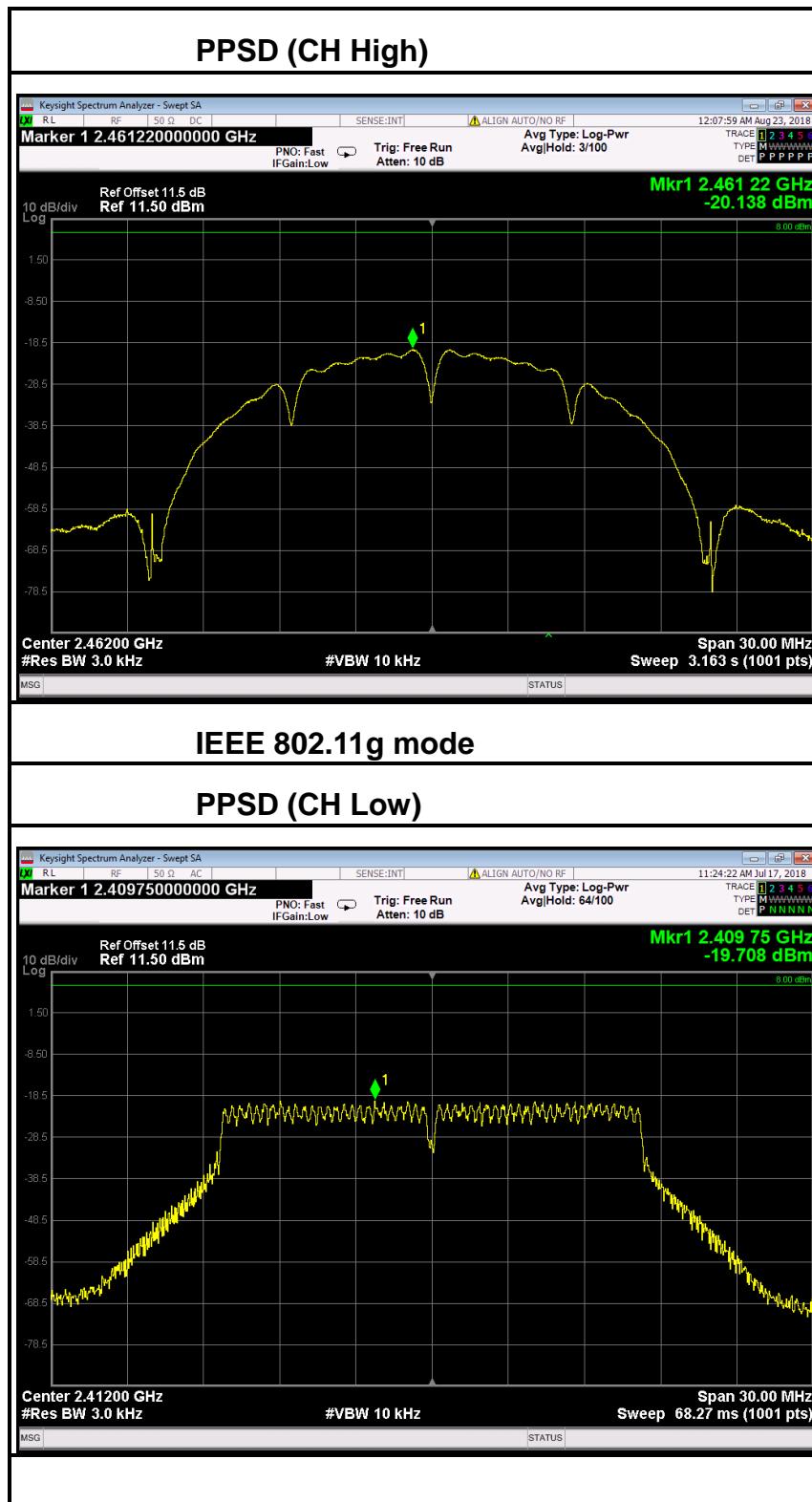
IEEE 802.11 n HT40 mode				
Channel	Frequency (MHz)	PPSD (dBm)	Limit (dBm)	Test Result
Low	2412	-19.497	8	PASS
Mid	2437	-19.527		PASS
High	2462	-19.456		PASS

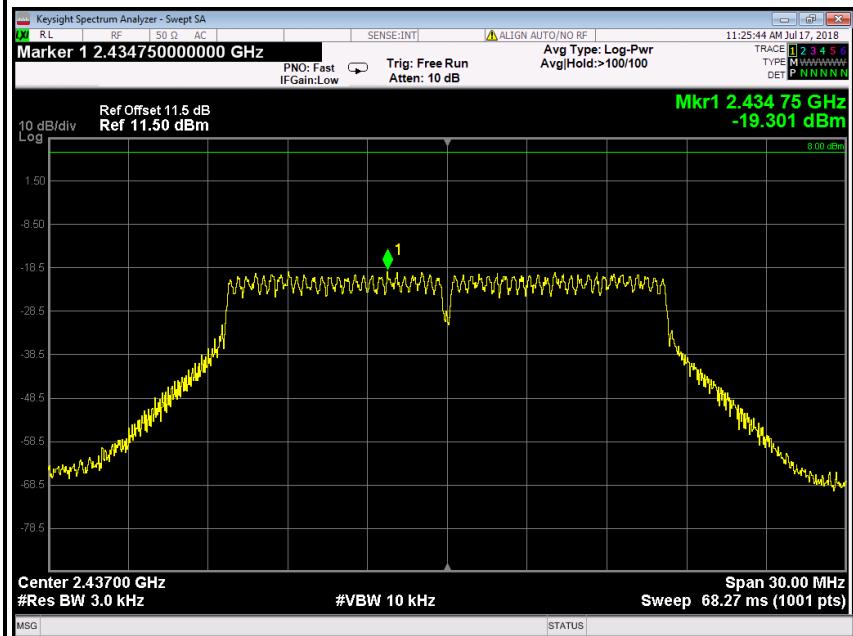
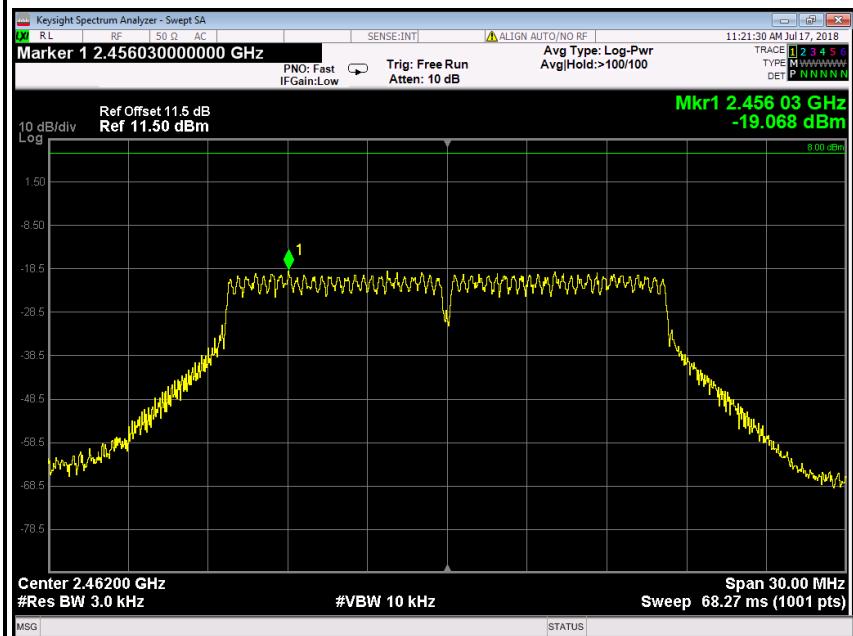


## Test Plot

### IEEE 802.11b mode





**PPSD (CH Mid)****PPSD (CH High)**



## IEEE 802.11n HT20 MHz mode

