FCC 47 CFR PART 15 SUBPART C

for

Underwater camera system

Model: VT-7108,FP100

Brand: vdt

Test Report Number:
C131126Z01-RP1
Issued Date: December 2, 2013

Issued for

VIDEOTEK COMPANY LIMITED
Bldg 12,Section B,BaoSheng Industrial Area, BaiNikeng, PingHu Town, ShenZhen, China

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
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A2LA ACCREDITED
TESTING CERT #2861.01

Revision History

Rev.	Issue No.	Revisions	Effect Page	Revised By
00	C131126Z01-RP1	Initial Issue	ALL	Sinphy Xie

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1 TEST CERTIFICATION

Product	Underwater camera system
Model	VT-7108,FP100
Brand	vdt
Tested	November 26~December 2, 2013
Applicant	**VIDEOTEK COMPANY LIMITED** Bldg 12,Section B,BaoSheng Industrial Area, BaiNikeng, PingHu Town, ShenZhen, China
Manufacturer	**SHENZHEN KONLIKA ELECTRONICS CO., LTD** Bldg 12,Section B,BaoSheng Industrial Area, BaiNikeng, PingHu Town, ShenZhen, China

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 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 C63.4: 2009** 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:

Tom Gan.

Tom Gan
Supervisor of EMC Dept.
Compliance Certification Service Inc.

Reviewed by:

Ruby zhang

Ruby Zhang
Supervisor of Report Dept.
Compliance Certification Service 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	Pass	Meet the requirement of limit.

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

Product	Underwater camera system
Model Number	VT-7108,FP100
Brand	vdt
Model Discrepancy	They are the same of functions and internal PCB layout except for different appearance and model name
Serial Number	C131126Z01-RP1
Received Date	November 26, 2013
Power Supply	DC12V supplied by the battery or DC 13.5V supplied by the adapter
Video Cable	Shielded, 0.22m
Data Cable	Shielded, 0.25m+ Shielded, 15.20m
Transmit Power	IEEE 802.11b mode: 14.85dBm IEEE 802.11g mode: 18.75dBm IEEE 802.11n HT20 MHz mode: 19.06dBm
Modulation Technique	IEEE 802.11b mode: DSSS(DQPSK, DBPSK, DSSS,CCK) IEEE 802.11g mode: OFDM (BPSK/QPSK/16QAM/64QAM/OFDM) IEEE 802.11n HT20 MHz mode: OFDM (BPSK/QPSK/16QAM/64QAM)
Transmit Data Rate	IEEE 802.11b: 11Mbps(CCK) with fall back rates of11/ 5.5/2/1Mbps IEEE 802.11g: 54Mbps with fall back rates of 48/36/24/18/12/9 /6Mbps IEEE 802.11n HT20: up to150Mbps (downlink) and 150Mbps (uplink)
Number of Channels	IEEE 802.11b mode: 11 Channels IEEE 802.11g mode: 11 Channels IEEE 802.11n HT20 MHz mode: 11 Channels
Antenna Specification	Dipole Antenna with 2.0dBi gain (Max)
Channels Spacing	IEEE 802.11b/g ,802.11n HT20 : 5MHz
Temperature Range	-15°C ~ +65°C

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: 2ABFHVDT-7108 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.

Software used to control the EUT for staying in continuous transmitting and receiving mode is programmed.

Test Item	Test mode	Worse mode
Conducted Emission	**Mode 1:** Normal	**Mode 1**
Radiated Emission	**Mode 1:** TX	**Mode 1**

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.

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	NOTEBOOK	B475	WB04861612	N/A	Lenovo	N/A	Unshielded 1.50m
2	Adapter	V-410	N/A	N/A	N/A	N/A	Unshielded 1.50m
3	TV	19CE830LED	F0911925	N/A	SANYO	Unshielded 1.00m	Unshielded 1.50m

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 for the actual connections between EUT and support equipment.

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 C63.4, 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	**A2LA**
China	**CNAS**

The measuring facility of laboratories has been authorized or registered by the following approval agencies.

USA	**FCC**
Japan	**VCCI(C-3478, R-3135, T-652, G-624)**
Canada	**INDUSTRY CANADA**
Taiwan	**BSMI**
Norway	**Nemko**

Copies of granted accreditation certificates are available for downloading from our web site, http://www.ccsrf.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 μH/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 (dBμV)	
	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 INSTRUMENTS

Conducted Emission Test Site					
Name of Equipment	Manufacturer	Model Number	Serial Number	Last Calibration	Due Calibration
EMI TEST RECEIVER	ROHDE&SCHWARZ	ESCI	100783	03/09/2013	03/08/2014
LISN(EUT)	ROHDE&SCHWARZ	ENV216	101543-WX	09/20/2013	09/20/2014
LISN	EMCO	3825/2	8901-1459	03/09/2013	03/08/2014
Temp. / Humidity Meter	VICTOR	HTC-1	N/A	03/04/2013	03/03/2014
Test S/W	FARAD	EZ-EMC/ CCS-3A1-CE			

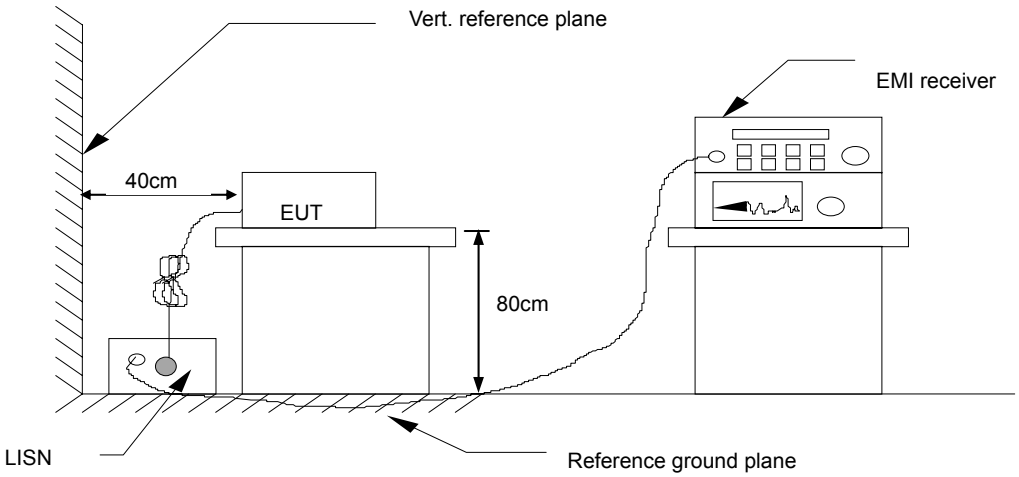
NOTE: 1. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.

2. N.C.R = No Calibration Request.

7.1.3. 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.

7.1.4. TEST SETUP



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

7.1.5. 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 (Pass/Fail)
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)

7.1.6. TEST RESULTS

Test Data

Operation Mode:	VT-7108	**Test Date:**	December 2, 2013
Temperature:	26°C	**Humidity:**	60% RH
Tested by:	Sun Guo	**Line:**	L1/L2

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)	Line (L1/L2)
0.1580	52.76	27.17	9.60	62.36	36.77	65.56	55.57	-3.20	-18.80	L1
0.2380	40.14	14.74	9.69	49.83	24.43	62.16	52.17	-12.33	-27.74	L1
0.5380	30.19	6.29	9.70	39.89	15.99	56.00	46.00	-16.11	-30.01	L1
2.6980	19.43	3.59	9.72	29.15	13.31	56.00	46.00	-26.85	-32.69	L1
3.2740	23.93	5.25	9.71	33.64	14.96	56.00	46.00	-22.36	-31.04	L1
5.5980	17.09	0.60	9.71	26.80	10.31	60.00	50.00	-33.20	-39.69	L1
0.1586	50.51	27.71	9.78	60.29	37.49	65.53	55.54	-5.24	-18.05	L2
0.2380	41.87	15.43	9.78	51.65	25.21	62.16	52.17	-10.51	-26.96	L2
0.3140	35.43	8.97	9.75	45.18	18.72	59.86	49.86	-14.68	-31.14	L2
0.4380	26.53	9.58	9.70	36.23	19.28	57.10	47.10	-20.87	-27.82	L2
1.7540	19.48	2.36	9.75	29.23	12.11	56.00	46.00	-26.77	-33.89	L2
3.4980	25.23	7.62	9.75	34.98	17.37	56.00	46.00	-21.02	-28.63	L2

Note:

1. *Measuring frequencies from 0.15 MHz to 30MHz.*
2. *The emissions measured in frequency range from 0.15 MHz to 30MHz were made with an instrument using Peak detector, Quasi-peak detector and average detector.*
3. *"---" denotes the emission level was or more than 2dB below the Average limit.*
4. *The IF bandwidth of SPA between 0.15MHz to 30MHz was 10kHz; the IF bandwidth of Test Receiver between 0.15MHz to 30MHz was 9kHz;*
5. *L1= Line One (Live Line)/ L2= Line Two (Neutral Line)*

7.2. SPURIOUS EMISSIONS MEASUREMENT

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

7.2.2. TEST INSTRUMENTS

Name of Equipment	Manufacturer	Model	Serial Number	Last Calibration	Due Calibration
Spectrum Analyzer	Agilent	E4446A	US44300399	03/09/2013	03/08/2014

7.2.3. TEST PROCEDURE (please refer to measurement standard)

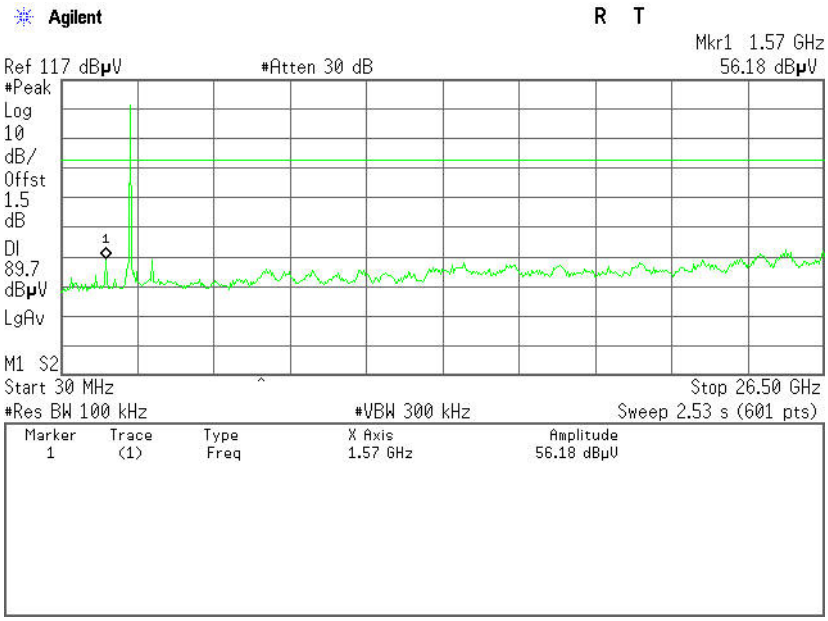
Conducted RF measurements of the transmitter output were made to confirm that the EUT antenna port conducted emissions meet the specified limit and to identify any spurious signals that require further investigation or measurements on the radiated emissions site.
The transmitter output is connected to the spectrum analyzer. The resolution bandwidth is set to 100 kHz. The video bandwidth is set to 300 kHz.
Measurements are made over the 30MHz to 26GHz range with the transmitter set to the lowest, middle, and highest channels.

7.2.4. TEST RESULTS

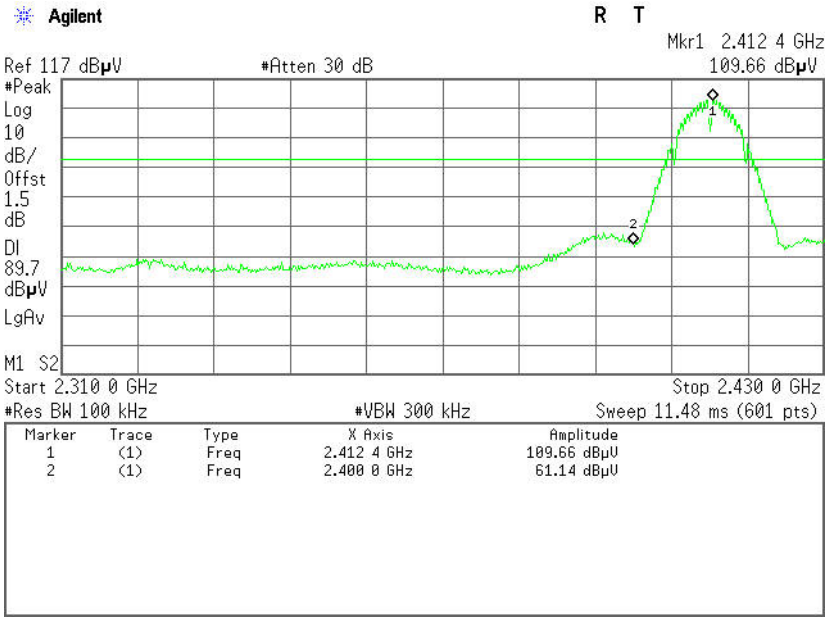
Test Plot

IEEE 802.11b mode

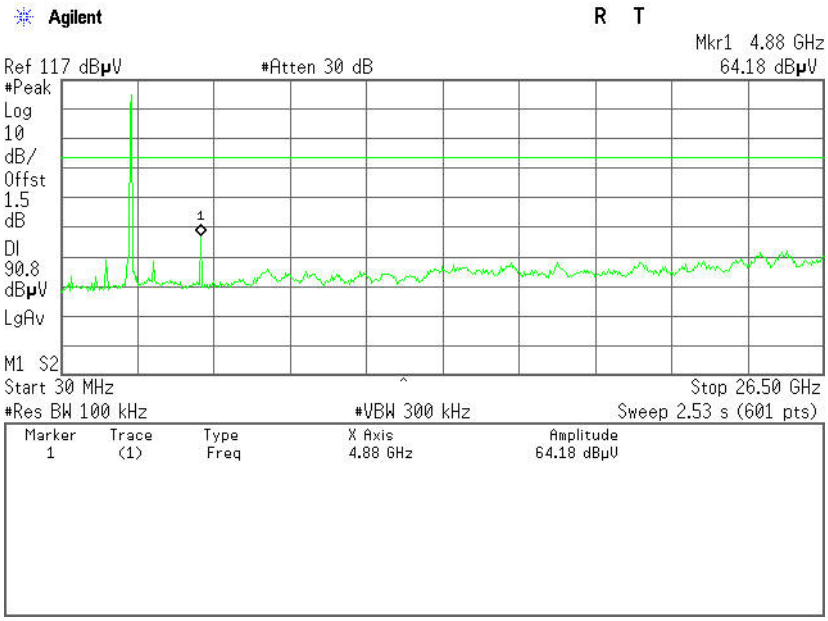
CH Low (30MHz ~26.5GHz)



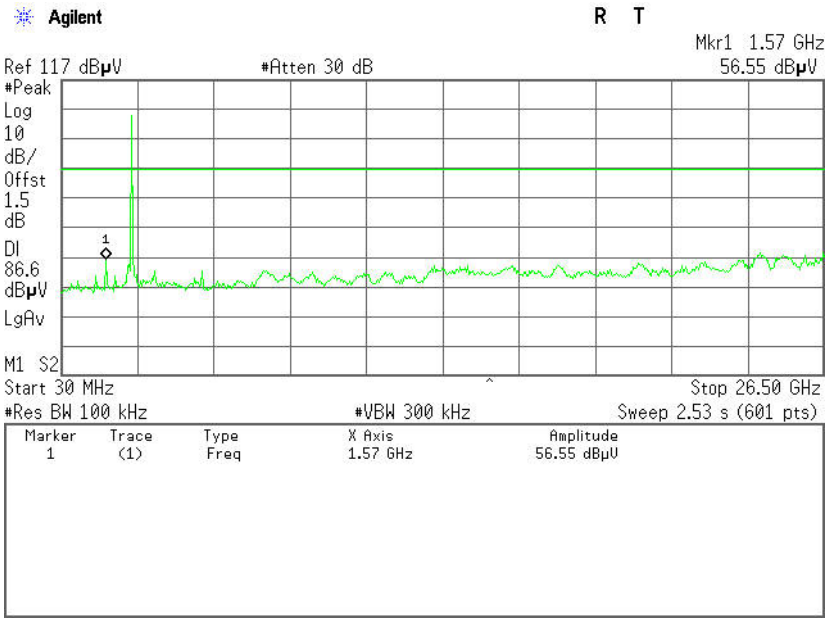
CH Low (2.31GHz ~2.43GHz)



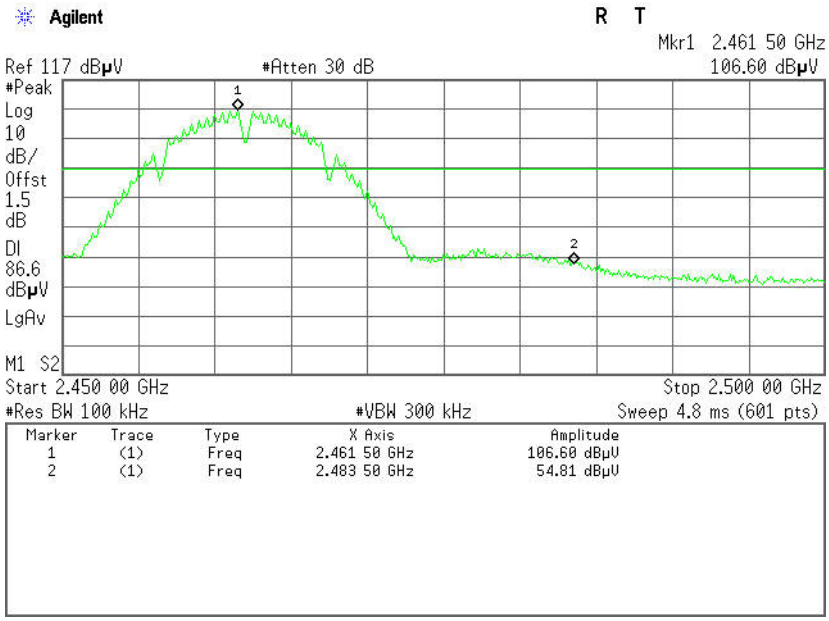
CH Mid (30MHz ~26.5GHz)



CH High (30MHz ~26.5GHz)

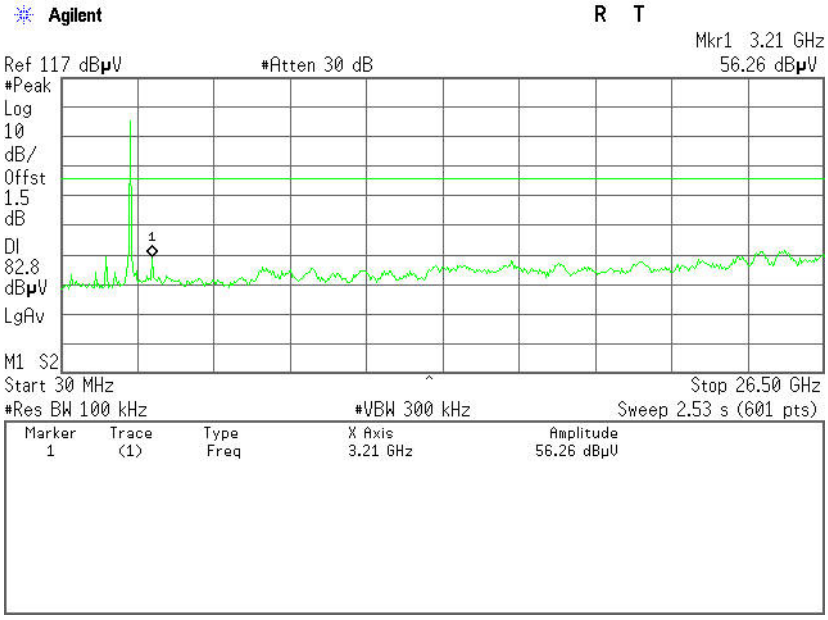


CH High (2.45GHz ~2.5GHz)

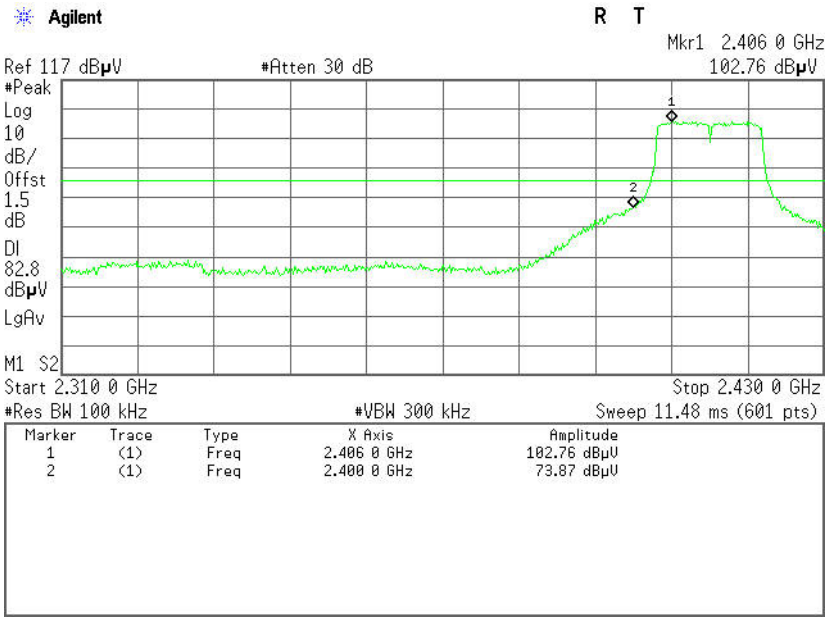


IEEE 802.11g mode

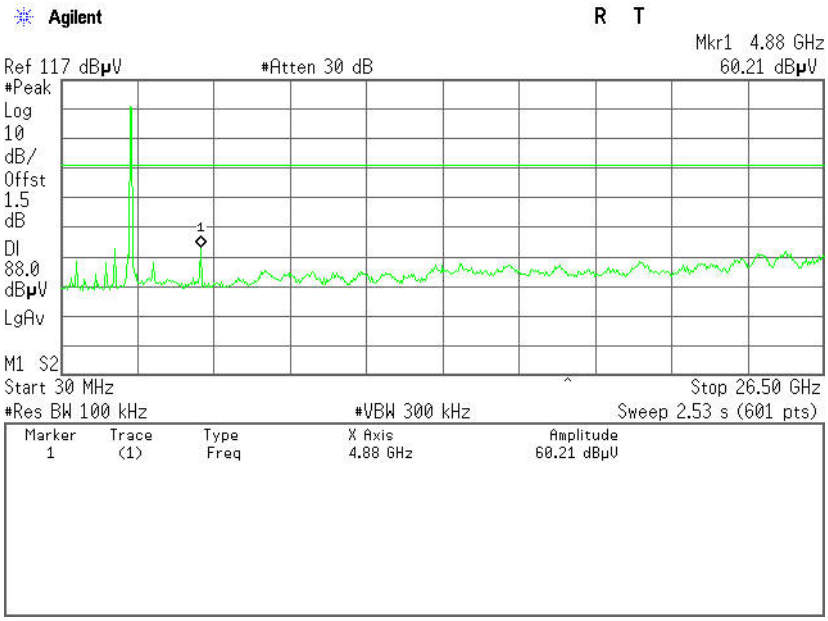
CH Low (30MHz ~26.5GHz)



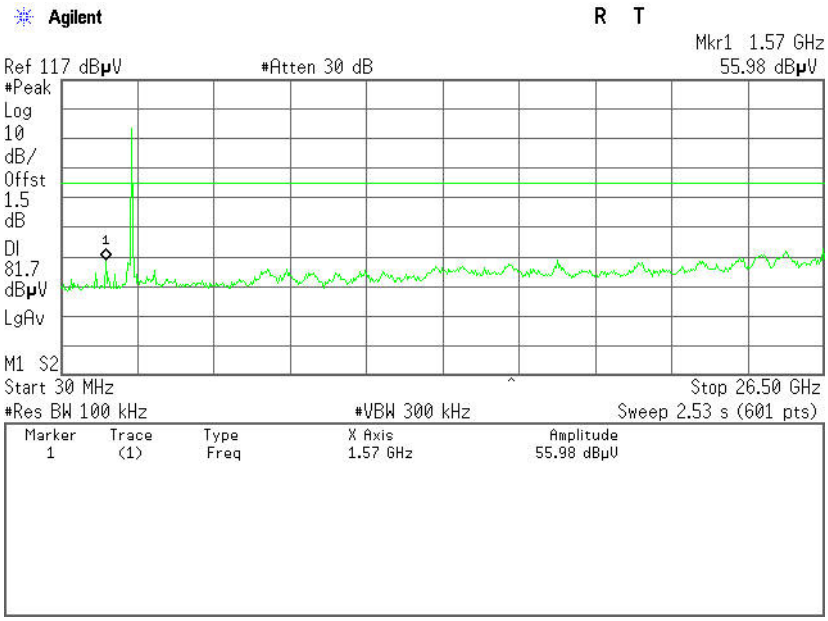
CH Low (2.31GHz ~2.43GHz)



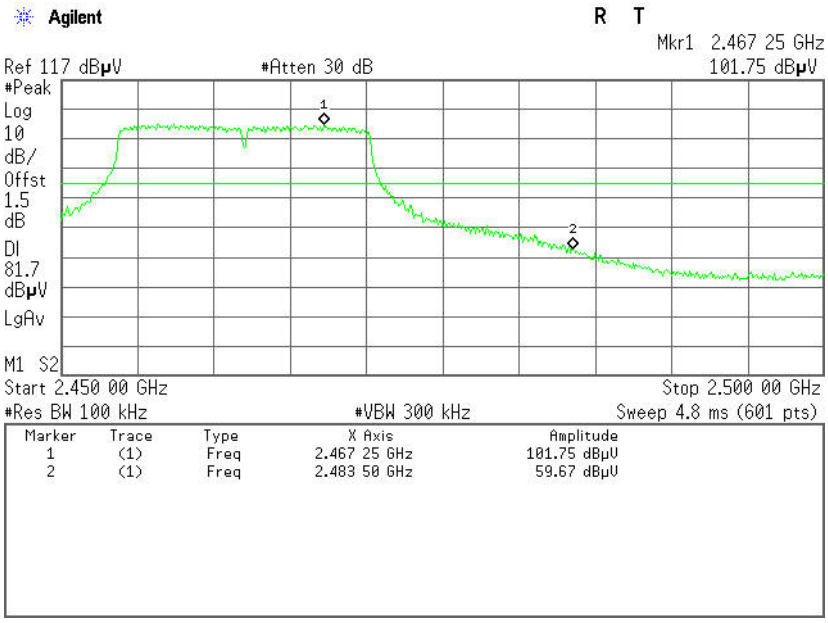
CH Mid (30MHz ~26.5GHz)



CH High (30MHz ~26.5GHz)

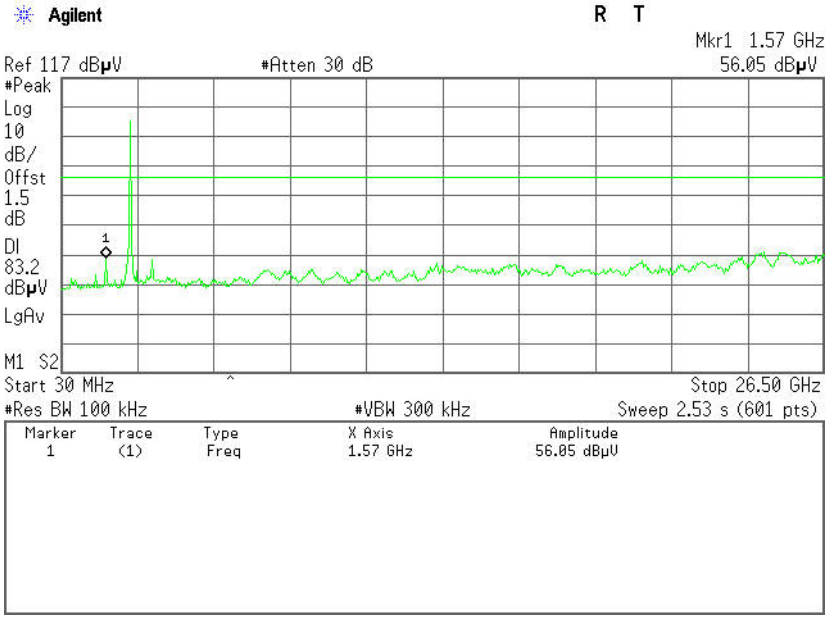


CH High (2.45GHz ~2.5GHz)

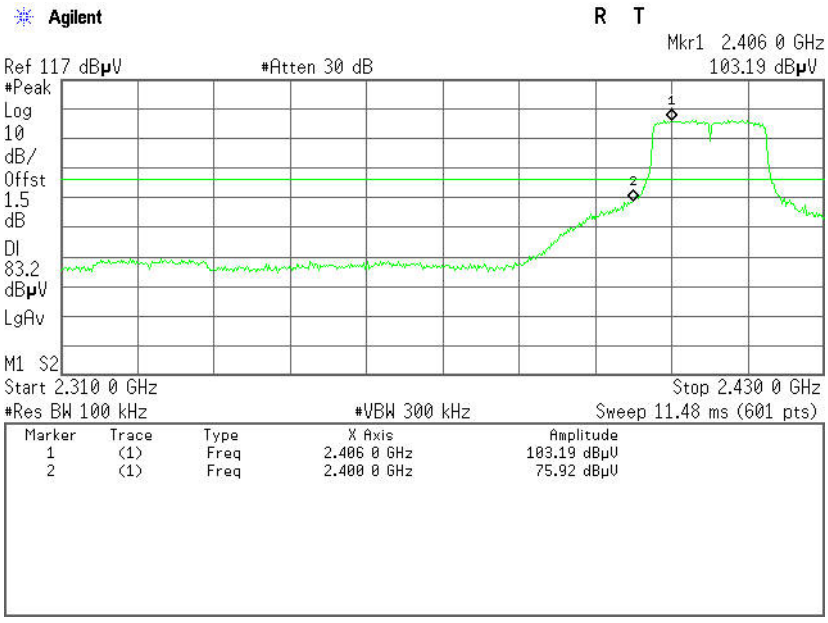


IEEE 802.11n HT20 MHz mode

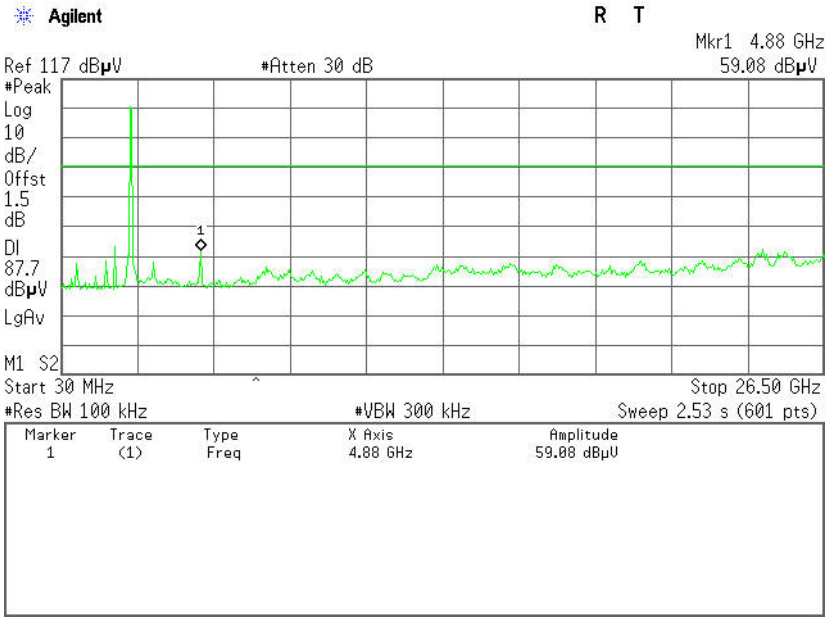
CH Low (30MHz ~26.5GHz)



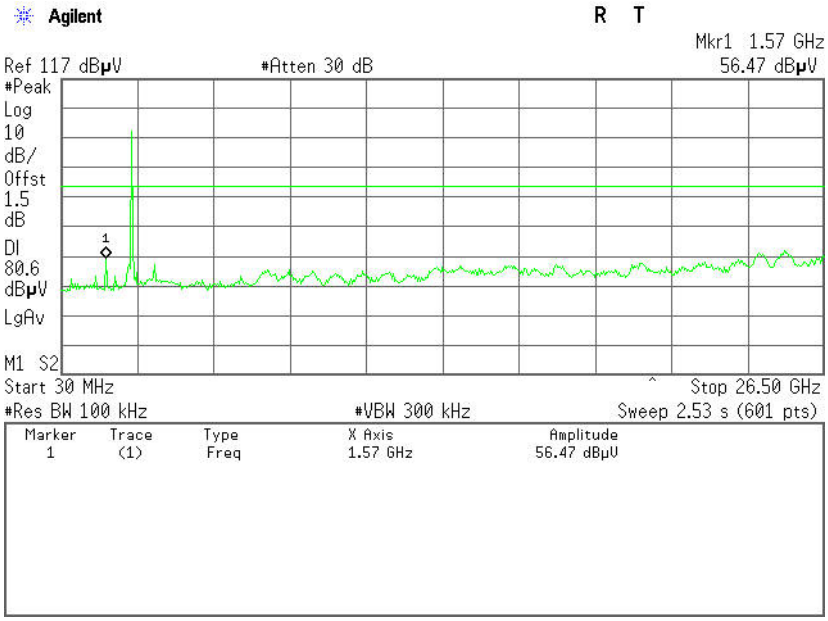
CH Low (2.31Hz ~2.43GHz)



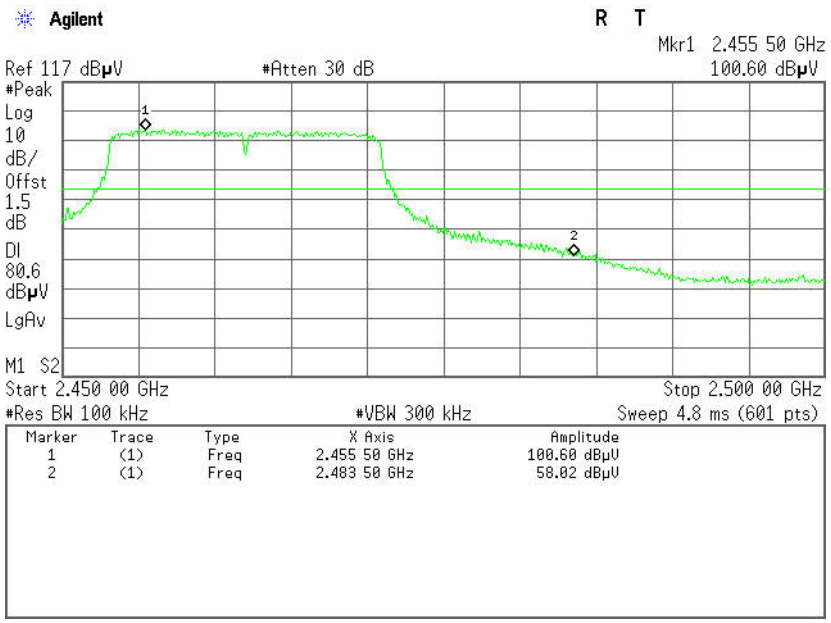
CH Mid (30MHz ~26.5GHz)



CH High (30MHz ~26.5GHz)



CH High (2.45GHz ~2.5GHz)



7.2.4.1. 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 (μV/m at 3-meter)	Field Strength (dBμV/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 (dBuV/m) = 20 log Emission level (uV/m).

7.2.4.2. TEST INSTRUMENTS

Radiated Emission Test Site 966（2）					
Name of Equipment	**Manufacturer**	**Model Number**	**Serial Number**	**Last Calibration**	**Due Calibration**
PSA Series Spectrum Analyzer	Agilent	E4446A	US44300399	03/09/2013	03/08/2014
EMI TEST RECEIVER	ROHDE&SCHWARZ	ESCI	100783	03/09/2013	03/08/2014
Amplifier	MITEQ	AM-1604-3000	1123808	03/18/2013	03/18/2014
High Noise Amplifier	Agilent	8449B	3008A01838	03/18/2013	03/18/2014
Board-Band Horn Antenna	Schwarzbeck	BBHA 9170	9170-497	06/21/2012	06/21/2014
Bilog Antenna	SCHAFFNER	CBL6143	5082	03/02/2013	03/01/2014
Horn Antenna	SCHWARZBECK	BBHA9120	D286	03/02/2013	03/01/2014
Loop Antenna	A、R、A	PLA-1030/B	1029	03/23/2013	03/23/2014
Turn Table	N/A	N/A	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	03/04/2013	03/03/2014
Antenna Tower	SUNOL	TLT2	N/A	N.C.R	N.C.R
Test S/W	FARAD	LZ-RF / CCS-SZ-3A2			

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. The FCC Site Registration number is 101879.

3. N.C.R = No Calibration Required.

7.2.4.3. TEST PROCEDURE (please refer to measurement standard)

1. The EUT is placed on a turntable, which is 0.8m above 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 emissions.
4. Maximum procedure was performed on the six highest emissions to ensure EUT compliance.
5. And also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical.
6. Set the spectrum analyzer in the following setting as:

   Below 1GHz:

   RBW=100kHz / VBW=300kHz / Sweep=AUTO

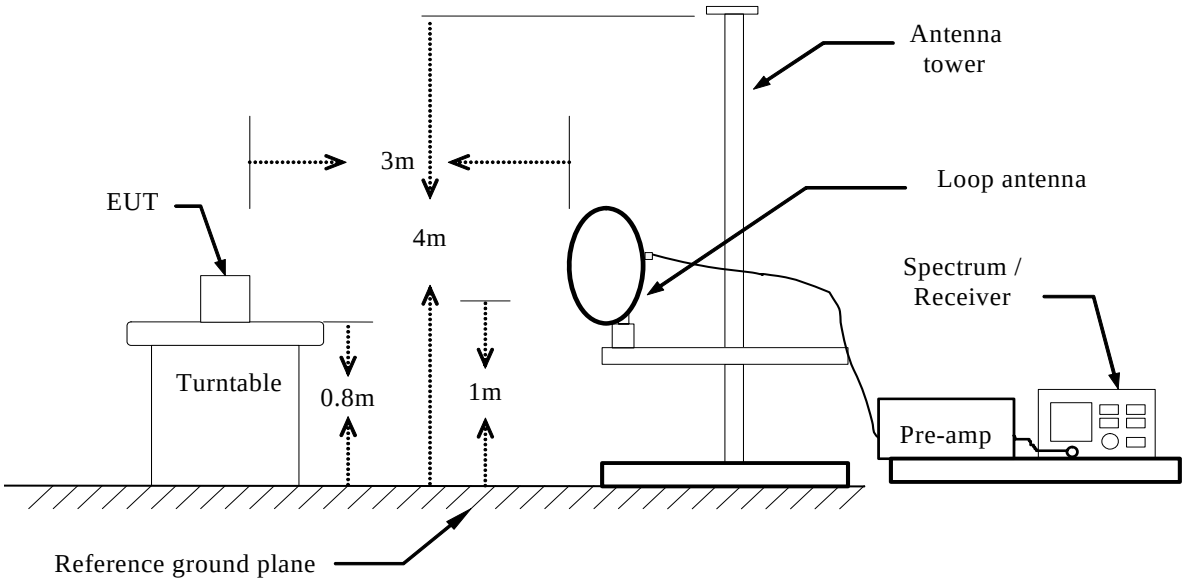
   Above 1GHz:

   (a) PEAK: RBW=1MHz,VBW=3MHz / Sweep=AUTO

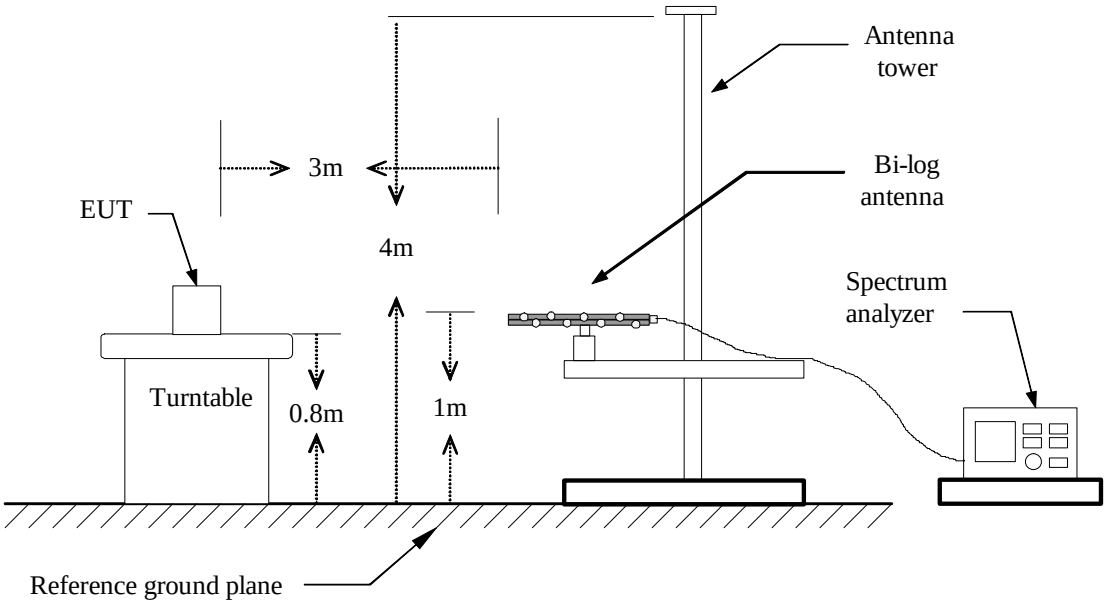
   (b) AVERAGE: RBW=1MHz / VBW=10Hz / Sweep=AUTO
7. Repeat above procedures until the measurements for all frequencies are complete.

7.2.4.4. TEST SETUP

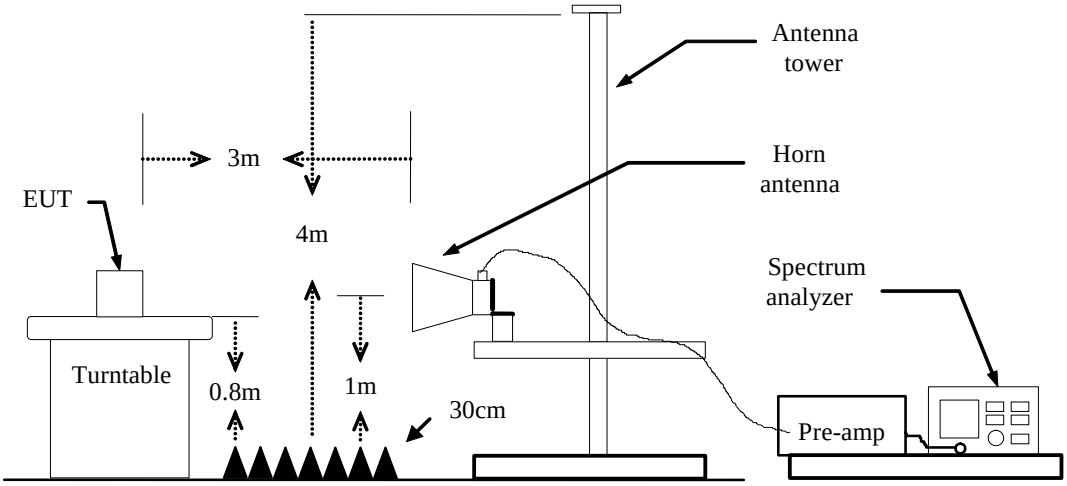
Below 30MHz



Below 1 GHz



Above 1 GHz



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

7.2.4.5. DATA SAPLE

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

7.2.4.6. TEST RESULTS

Below 1 GHz

Test Mode: TX **Test Date:** November 29,2013

Temperature: 24°C **Tested by:** Eve Wang

Humidity: 52% RH **Polarity:** Ver. / Hor.

Frequency (MHz)	Reading (dBuV)	Correction Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Pole (V/H)	Remark
46.1667	52.88	-15.67	37.21	40.00	-2.79	V	QP
143.1667	54.55	-19.07	35.48	43.50	-8.02	V	QP
236.9333	54.89	-17.73	37.16	46.00	-8.84	V	QP
400.2167	55.76	-16.19	39.57	46.00	-6.43	V	QP
600.6833	46.79	-12.92	33.87	46.00	-12.13	V	QP
1000.0000	54.62	-8.64	45.98	54.00	-8.02	V	QP
183.5833	57.28	-18.58	38.70	43.50	-4.80	H	QP
214.3000	59.35	-17.85	41.50	43.50	-2.00	H	QP
312.9166	57.36	-18.03	39.33	46.00	-6.67	H	QP
400.2167	57.87	-16.19	41.68	46.00	-4.32	H	QP
456.8000	49.13	-15.16	33.97	46.00	-12.03	H	QP
600.6833	45.00	-12.92	32.08	46.00	-13.92	H	QP

***Remark:** No emission found between lowest internal used/generated frequency to 30MHz.*

Notes:

1. *Radiated emissions measured in frequency range from 9kHz 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 120kHz.*
4. *Frequency (MHz). = Emission frequency in MHz*
   Reading (dBµV/m) = Receiver reading
   Correction Factor (dB) = Antenna factor + Cable loss – Amplifier gain
   Limit (dBµV/m) = Limit stated in standard
   Margin (dB) = Measured (dBµV/m) – Limits (dBµV/m)
   Antenna Pol e(H/V) = Current carrying line of reading

Above 1 GHz

Operation Mode: TX / IEEE 802.11b/ CH Low **Test Date:** November 28,2013

Temperature: 24°C **Tested by:** Eve Wang

Humidity: 52% RH **Polarity:** Ver. / Hor.

Frequency (MHz)	Reading (dBuV)	Correction Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Pole (V/H)	Remark
1000.0000	57.59	-10.33	47.26	74.00	-26.74	V	peak
1195.0000	54.27	-8.77	45.50	74.00	-28.50	V	peak
1495.0000	52.27	-8.23	44.04	74.00	-29.96	V	peak
3220.0000	47.88	-4.08	43.80	74.00	-30.20	V	peak
5125.0000	44.05	1.46	45.51	74.00	-28.49	V	peak
5815.0000	44.40	2.80	47.20	74.00	-26.80	V	peak
1495.0000	50.25	-8.23	42.02	74.00	-31.98	H	Peak
3220.0000	50.62	-4.08	46.54	74.00	-27.46	H	Peak
4090.0000	45.45	-2.10	43.35	74.00	-30.65	H	Peak
4825.0000	46.08	0.52	46.60	74.00	-27.40	H	Peak
5920.0000	44.29	2.97	47.26	74.00	-26.74	H	Peak
6550.0000	43.64	4.68	48.32	74.00	-25.68	H	Peak

***REMARKS**:*

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).*

Operation Mode: TX / IEEE 802.11b/ CH Mid **Test Date:** November 28,2013

Temperature: 24°C **Tested by:** Eve Wang

Humidity: 52% RH **Polarity:** Ver. / Hor.

Frequency (MHz)	Reading (dBuV)	Correction Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Pole (V/H)	Remark
1000.0000	56.61	-10.33	46.28	74.00	-27.72	V	Peak
1495.0000	55.72	-8.23	47.49	74.00	-26.51	V	Peak
3040.0000	47.21	-4.21	43.00	74.00	-31.00	V	Peak
4270.0000	45.06	-1.31	43.75	74.00	-30.25	V	Peak
4870.0000	54.75	0.73	55.48	74.00	-18.52	V	Peak
4870.0000	50.74	0.73	51.47	54.00	-2.53	V	AVG
6100.0000	44.22	3.39	47.61	74.00	-26.39	V	Peak
1000.0000	58.31	-10.33	47.98	74.00	-26.02	H	Peak
1495.0000	51.91	-8.23	43.68	74.00	-30.32	H	Peak
2785.0000	47.48	-5.10	42.38	74.00	-31.62	H	Peak
3250.0000	48.30	-4.07	44.23	74.00	-29.77	H	Peak
4525.0000	44.57	-0.59	43.98	74.00	-30.02	H	Peak
4870.0000	55.68	0.73	56.41	74.00	-17.59	H	Peak
4870.0000	50.91	0.73	51.64	54.00	-2.36	H	AVG

REMARKS:

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).*

Operation Mode: TX / IEEE 802.11b / CH High **Test Date:** November 28,2013

Temperature: 24°C **Tested by:** Eve Wang

Humidity: 52% RH **Polarity:** Ver. / Hor.

Frequency (MHz)	Reading (dBuV)	Correction Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Pole (V/H)	Remark
1000.0000	57.59	-10.33	47.26	74.00	-26.74	V	Peak
1495.0000	54.59	-8.23	46.36	74.00	-27.64	V	Peak
2590.0000	49.08	-5.87	43.21	74.00	-30.79	V	Peak
3280.0000	46.70	-4.05	42.65	74.00	-31.35	V	Peak
3760.0000	45.89	-2.59	43.30	74.00	-30.70	V	Peak
4930.0000	44.91	1.00	45.91	74.00	-28.09	V	Peak
1495.0000	52.67	-8.23	44.44	74.00	-29.56	H	Peak
2815.0000	47.49	-4.98	42.51	74.00	-31.49	H	Peak
3280.0000	48.12	-4.05	44.07	74.00	-29.93	H	Peak
4420.0000	44.93	-0.78	44.15	74.00	-29.85	H	Peak
4930.0000	46.01	1.00	47.01	74.00	-26.99	H	Peak
5695.0000	44.17	2.33	46.50	74.00	-27.50	H	Peak

REMARKS:

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).*

Operation Mode: TX / IEEE 802.11g / CH Low **Test Date:** November 28,2013
Temperature: 24°C **Tested by:** Eve Wang
Humidity: 52% RH **Polarity:** Ver. / Hor.

Frequency (MHz)	Reading (dBuV)	Correction Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Pole (V/H)	Remark
1000.0000	58.04	-10.33	47.71	74.00	-26.29	V	Peak
1495.0000	53.77	-8.23	45.54	74.00	-28.46	V	Peak
2830.0000	47.52	-4.92	42.60	74.00	-31.40	V	Peak
3265.0000	47.13	-4.06	43.07	74.00	-30.93	V	Peak
4015.0000	46.06	-2.46	43.60	74.00	-30.40	V	Peak
5200.0000	44.62	1.55	46.17	74.00	-27.83	V	Peak
1000.0000	57.32	-10.33	46.99	74.00	-27.01	H	Peak
1495.0000	50.47	-8.23	42.24	74.00	-31.76	H	Peak
1975.0000	53.17	-11.07	42.10	74.00	-31.90	H	Peak
2590.0000	48.88	-5.87	43.01	74.00	-30.99	H	Peak
3220.0000	50.55	-4.08	46.47	74.00	-27.53	H	Peak
4825.0000	47.26	0.52	47.78	74.00	-26.22	H	Peak

REMARKS:

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).*

Operation Mode: TX / IEEE 802.11g / CH Mid **Test Date:** November 28,2013

Temperature: 24°C **Tested by:** Eve Wang

Humidity: 52 % RH **Polarity:** Ver. / Hor.

Frequency (MHz)	Reading (dBuV)	Correction Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Pole (V/H)	Remark
1195.0000	54.97	-8.77	46.20	74.00	-27.80	V	Peak
1495.0000	53.82	-8.23	45.59	74.00	-28.41	V	Peak
2845.0000	48.07	-4.86	43.21	74.00	-30.79	V	Peak
3865.0000	45.18	-2.50	42.68	74.00	-31.32	V	Peak
4285.0000	44.73	-1.26	43.47	74.00	-30.53	V	Peak
4870.0000	54.45	0.73	55.18	74.00	-18.82	V	Peak
4870.0000	42.92	0.73	43.65	54.00	-10.35	V	AVG
1000.0000	57.39	-10.33	47.06	74.00	-26.94	H	Peak
1495.0000	52.08	-8.23	43.85	74.00	-30.15	H	Peak
2800.0000	47.98	-5.04	42.94	74.00	-31.06	H	Peak
3250.0000	47.91	-4.07	43.84	74.00	-30.16	H	Peak
4300.0000	45.31	-1.20	44.11	74.00	-29.89	H	Peak
4870.0000	56.35	0.73	57.08	74.00	-16.92	H	Peak
4870.0000	44.98	0.73	45.71	54.00	-8.29	H	AVG

REMARKS:

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).*

Operation Mode: TX / IEEE 802.11g / CH High **Test Date:** November 28,2013

Temperature: 24°C **Tested by:** Eve Wang

Humidity: 52 % RH **Polarity:** Ver. / Hor.

Frequency (MHz)	Reading (dBuV)	Correction Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Pole (V/H)	Remark
1195.0000	54.94	-8.77	46.17	74.00	-27.83	V	Peak
1495.0000	53.50	-8.23	45.27	74.00	-28.73	V	Peak
2590.0000	48.09	-5.87	42.22	74.00	-31.78	V	Peak
3265.0000	46.23	-4.06	42.17	74.00	-31.83	V	Peak
3865.0000	45.72	-2.50	43.22	74.00	-30.78	V	Peak
4915.0000	44.81	0.93	45.74	74.00	-28.26	V	Peak
1495.0000	51.71	-8.23	43.48	74.00	-30.52	H	Peak
3280.0000	47.91	-4.05	43.86	74.00	-30.14	H	Peak
3850.0000	46.63	-2.50	44.13	74.00	-29.87	H	Peak
4480.0000	44.38	-0.68	43.70	74.00	-30.30	H	Peak
4915.0000	45.97	0.93	46.90	74.00	-27.10	H	Peak
5845.0000	43.44	2.85	46.29	74.00	-27.71	H	Peak

REMARKS:

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).*

Operation Mode: TX / IEEE 802.11n HT20 MHz/ CH Low **Test Date:** November 28,2013

Temperature: 24°C **Tested by:** Eve Wang

Humidity: 52% RH **Polarity:** Ver. / Hor.

Frequency (MHz)	Reading (dBuV)	Correction Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Pole (V/H)	Remark
1000.0000	57.61	-10.33	47.28	74.00	-26.72	V	Peak
1195.0000	55.12	-8.77	46.35	74.00	-27.65	V	Peak
1495.0000	54.00	-8.23	45.77	74.00	-28.23	V	Peak
3220.0000	47.07	-4.08	42.99	74.00	-31.01	V	Peak
4960.0000	44.46	1.14	45.60	74.00	-28.40	V	Peak
5725.0000	44.38	2.46	46.84	74.00	-27.16	V	Peak
1000.0000	56.62	-10.33	46.29	74.00	-27.71	H	Peak
1495.0000	51.70	-8.23	43.47	74.00	-30.53	H	Peak
1930.0000	53.14	-10.65	42.49	74.00	-31.51	H	Peak
3220.0000	50.06	-4.08	45.98	74.00	-28.02	H	Peak
4405.0000	45.43	-0.81	44.62	74.00	-29.38	H	Peak
5215.0000	44.31	1.55	45.86	74.00	-28.14	H	Peak

REMARKS:

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).*

Operation Mode: TX / IEEE 802.11n HT20 MHz/ CH Mid **Test Date:** November 28,2013

Temperature: 24°C **Tested by:** Eve Wang

Humidity: 52% RH **Polarity:** Ver. / Hor.

Frequency (MHz)	Reading (dBuV)	Correction Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Pole (V/H)	Remark
1000.0000	57.43	-10.33	47.10	74.00	-26.90	V	Peak
1195.0000	54.89	-8.77	46.12	74.00	-27.88	V	Peak
1495.0000	53.38	-8.23	45.15	74.00	-28.85	V	Peak
2815.0000	47.24	-4.98	42.26	74.00	-31.74	V	Peak
3775.0000	46.03	-2.55	43.48	74.00	-30.52	V	Peak
4885.0000	54.40	0.80	55.20	74.00	-18.80	V	Peak
4885.0000	42.19	0.80	42.99	54.00	-11.01	V	AVG
1000.0000	56.76	-10.33	46.43	74.00	-27.57	H	Peak
1495.0000	51.98	-8.23	43.75	74.00	-30.25	H	Peak
2845.0000	48.45	-4.86	43.59	74.00	-30.41	H	Peak
3250.0000	48.72	-4.07	44.65	74.00	-29.35	H	Peak
4420.0000	44.37	-0.78	43.59	74.00	-30.41	H	Peak
4870.0000	55.11	0.73	55.84	74.00	-18.16	H	Peak
4870.0000	43.83	0.73	44.56	54.00	-9.44	H	AVG

REMARKS:

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).*

Operation Mode: TX / IEEE 802.11n HT20 MHz/ CH High **Test Date:** November 28,2013

Temperature: 24°C **Tested by:** Eve Wang

Humidity: 52% RH **Polarity:** Ver. / Hor.

Frequency (MHz)	Reading (dBuV)	Correction Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Pole (V/H)	Remark
1195.0000	54.49	-8.77	45.72	74.00	-28.28	V	Peak
1495.0000	54.65	-8.23	46.42	74.00	-27.58	V	Peak
2800.0000	47.29	-5.04	42.25	74.00	-31.75	V	Peak
3280.0000	46.87	-4.05	42.82	74.00	-31.18	V	Peak
4210.0000	45.06	-1.54	43.52	74.00	-30.48	V	Peak
5005.0000	44.65	1.33	45.98	74.00	-28.02	V	Peak
1495.0000	51.27	-8.23	43.04	74.00	-30.96	H	Peak
1930.0000	52.36	-10.65	41.71	74.00	-32.29	H	Peak
3280.0000	48.75	-4.05	44.70	74.00	-29.30	H	Peak
4180.0000	45.40	-1.67	43.73	74.00	-30.27	H	Peak
4675.0000	44.34	-0.13	44.21	74.00	-29.79	H	Peak
5110.0000	44.58	1.45	46.03	74.00	-27.97	H	Peak

REMARKS:

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, and 5725 - 5850 MHz bands. The minimum 6 dB bandwidth shall be at least 500 kHz.

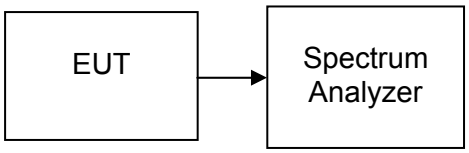
7.3.2. TEST INSTRUMENTS

Name of Equipment	Manufacturer	Model	Serial Number	Last Calibration	Calibration Due
Spectrum Analyzer	Agilent	E4446A	US44300399	03/09/2013	03/08/2014

7.3.3. TEST PROCEDURES (please refer to measurement standard)

1. Place the EUT on the table and set it in the transmitting mode.
2. Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to the spectrum analyzer.
3. Set the spectrum analyzer as RBW = 1-5 % of the emission bandwidth (EBW), VBW = ≥ 3 x RBW, Sweep = auto.
4. Mark the peak frequency and –6dB (upper and lower) frequency.
5. Repeat until all the rest channels are investigated.

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	7564	>500	PASS
Mid	2437	7565		PASS
High	2462	7116		PASS

Test mode: IEEE 802.11g

Channel	Frequency (MHz)	Bandwidth (kHz)	Limit (kHz)	Test Result
Low	2412	16570	>500	PASS
Mid	2437	16520		PASS
High	2462	16542		PASS

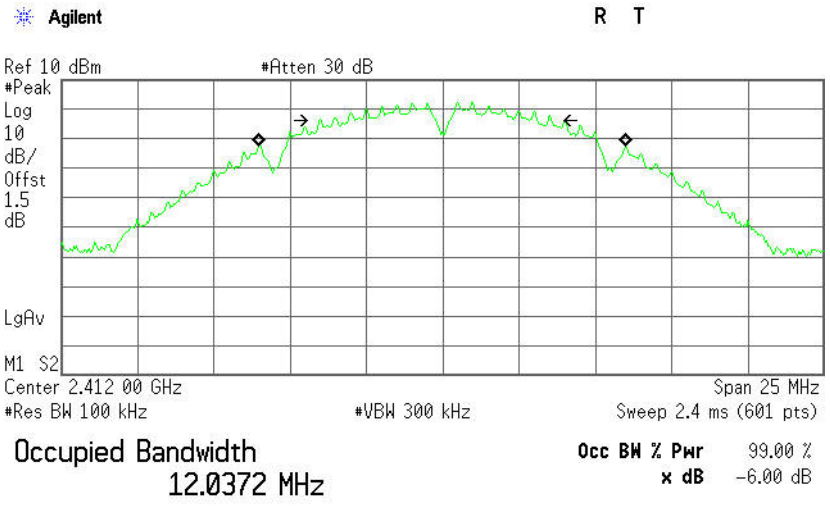
Test mode: IEEE 802.11n HT20 MHz

Channel	Frequency (MHz)	Bandwidth (kHz)	Limit (kHz)	Test Result
Low	2412	17780	>500	PASS
Mid	2437	17797		PASS
High	2462	17793		PASS

Test Plot

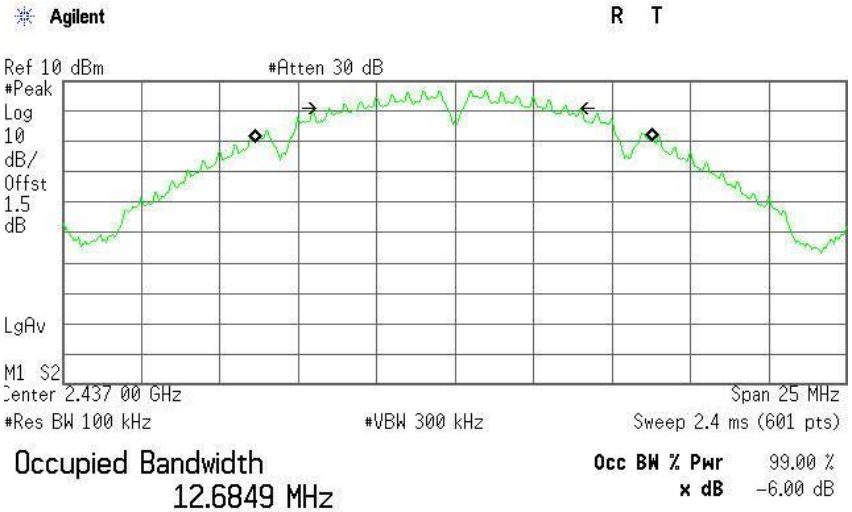
IEEE 802.11b mode

6dB Bandwidth (CH Low)



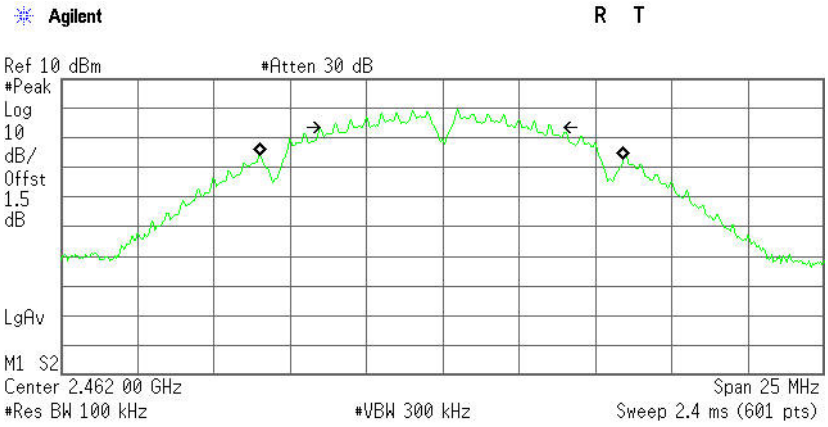
Transmit Freq Error	-17.984 kHz
x dB Bandwidth	7.564 MHz

6dB Bandwidth (CH Mid)



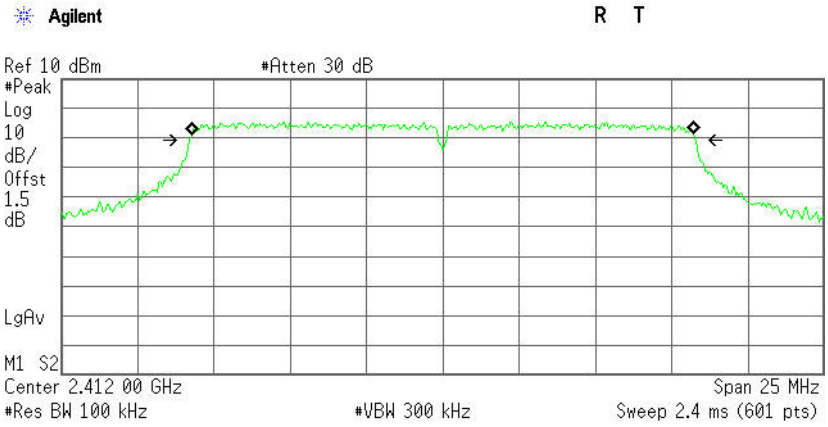
Transmit Freq Error	-39.078 kHz
x dB Bandwidth	7.565 MHz

6dB Bandwidth (CH High)

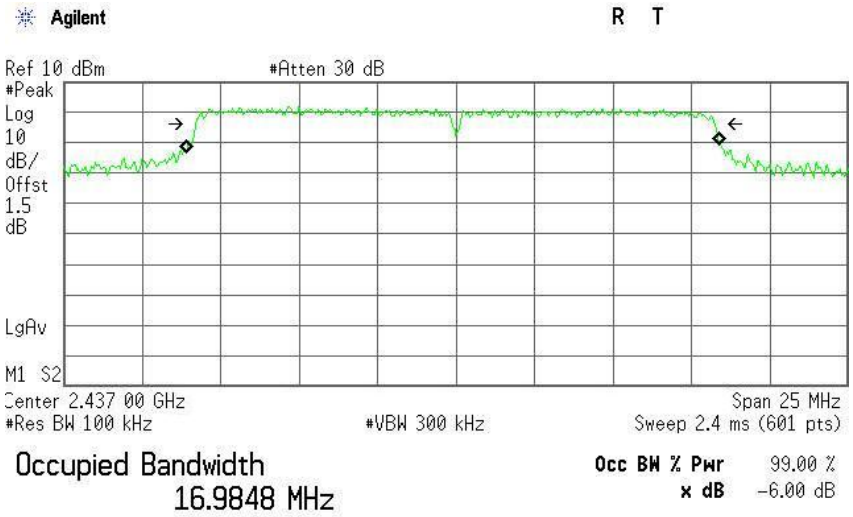


IEEE 802.11g mode

6dB Bandwidth (CH Low)

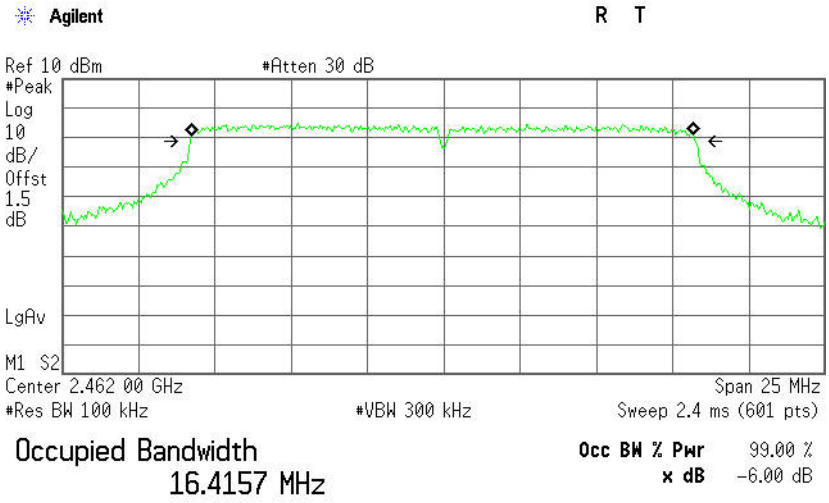


6dB Bandwidth (CH Mid)



Transmit Freq Error	-110.368 kHz
x dB Bandwidth	16.520 MHz

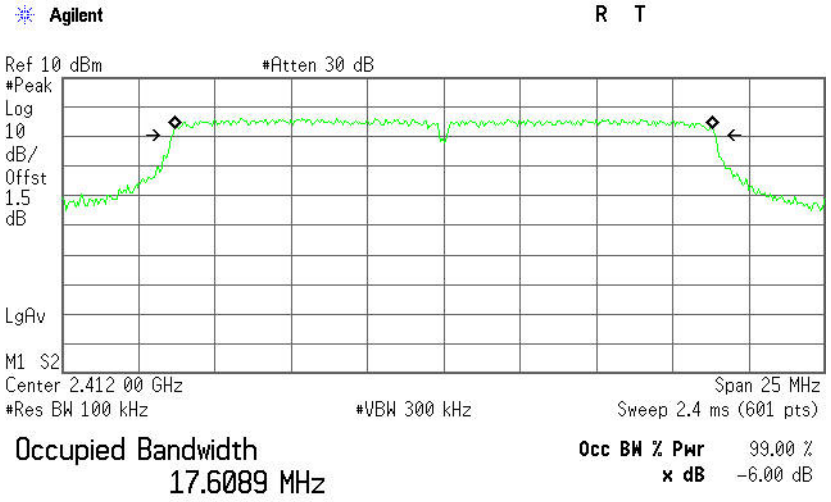
6dB Bandwidth (CH High)



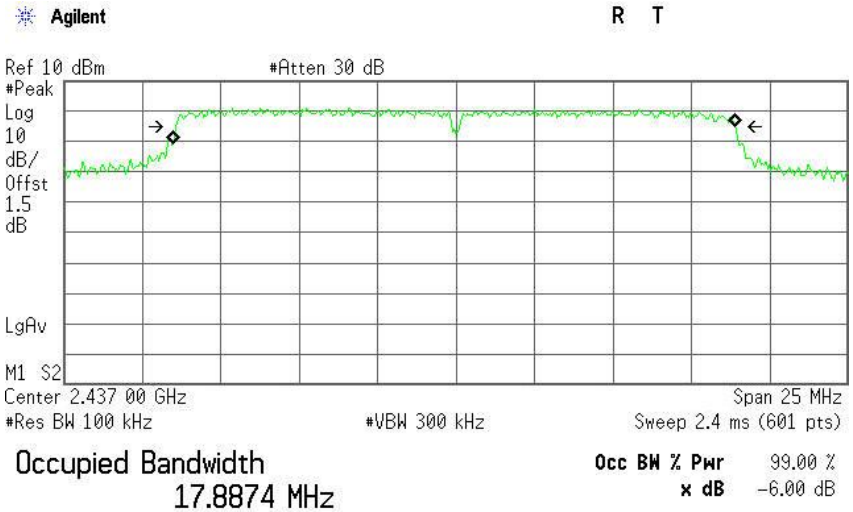
Transmit Freq Error	-25.645 kHz
x dB Bandwidth	16.542 MHz

IEEIEEE 802.11n HT20 MHz mode

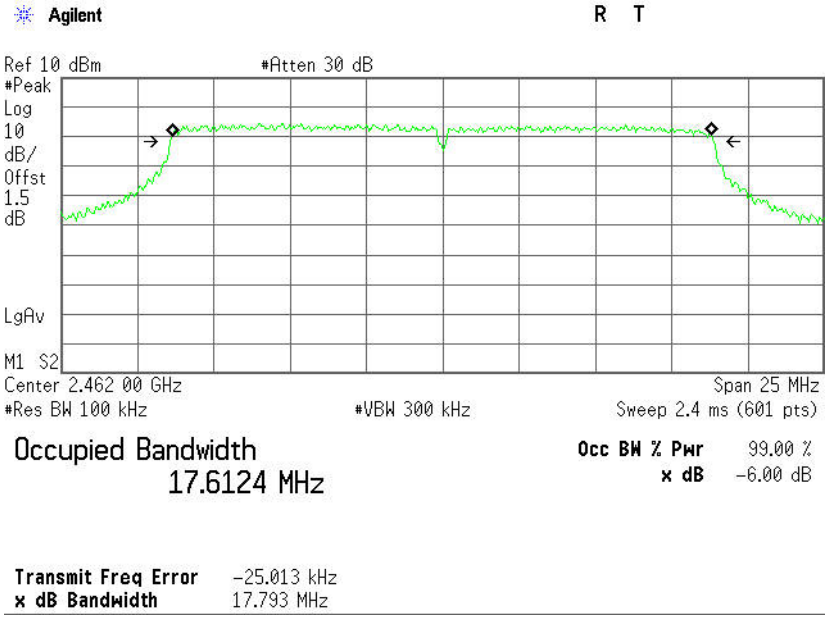
6dB Bandwidth (CH Low)



6dB Bandwidth (CH Mid)



6dB Bandwidth (CH High)



7.4. PEAK OUTPUT POWER

7.4.1. 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.

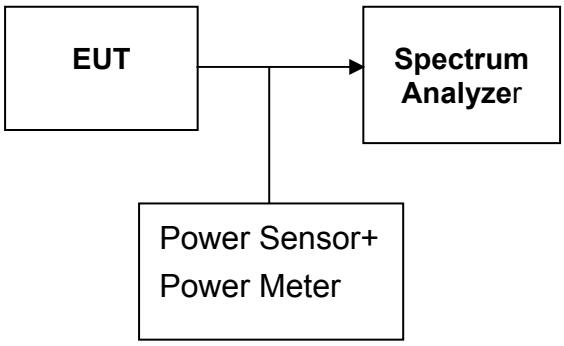
7.4.2. TEST INSTRUMENTS

Name of Equipment	Manufacturer	Model	Serial Number	Last Calibration	Calibration Due
Spectrum Analyzer	Agilent	E4446A	US44300399	03/09/2013	03/08/2014
Power Meter	Anritsu	ML2495A	1204003	03/09/2013	03/08/2014
Power Sensor	Anritsu	MA2411B	1126150	03/09/2013	03/08/2014

7.4.3. TEST PROCEDURES (please refer to measurement standard)

1. This procedure provides an integrated measurement alternative when the maximum available RBW < EBW.
2. Set the RBW = 1 MHz.
3. Set the VBW = 3 MHz.
4. Set the span to a value that is 5-30 % greater than the EBW.
5. Detector = peak.
6. Sweep time = auto couple.
7. Trace mode = max hold.
8. Allow trace to fully stabilize.
9. Use the spectrum analyzer's integrated band power measurement function with band limits set equal to the EBW band edges(for some analyzers, this may require a manual overrideto ensure use of peak detector). If the spectrum analyzer does not have a band power function, sum the spectrum levels (in linear power units) at 1 MHz intervals extending across the EBW of the spectrum.

7.4.4. TEST SETUP



7.4.5. TEST RESULTS

No non-compliance noted

Test Data

Test mode: IEEE 802.11b

Channel	Frequency (MHz)	Output Power (dBm)	Output Power (W)	Limit (W)	Result
Low	2412	12.67	0.01849	1	PASS
Mid	2437	14.85	0.03055		PASS
High	2462	10.84	0.01213		PASS

Test mode: IEEE 802.11g

Channel	Frequency (MHz)	Output Power (dBm)	Output Power (W)	Limit (W)	Result
Low	2412	16.58	0.04550	1	PASS
Mid	2437	18.75	0.07499		PASS
High	2462	15.44	0.03499		PASS

Test mode: IEEE 802.11n HT20 MHz

Channel	Frequency (MHz)	Output Power (dBm)	Output Power (W)	Limit (W)	Result
Low	2412	17.18	0.05224	1	PASS
Mid	2437	19.06	0.08054		PASS
High	2462	15.07	0.03214		PASS

7.5. BAND EDGES MEASUREMENT

7.5.1. LIMITS

According to §15.247(d), in any 100 kHz bandwidth outside the frequency bands in which the spread spectrum intentional radiator in 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)).

7.5.2. TEST INSTRUMENTS

Radiated Emission Test Site 966（2）					
Name of Equipment	**Manufacturer**	**Model Number**	**Serial Number**	**Last Calibration**	**Due Calibration**
PSA Series Spectrum Analyzer	Agilent	E4446A	US44300399	03/09/2013	03/08/2014
ESCI EMI TEST RECEIVER.ESCI	ROHDE&SCHWARZ	ESCI	100783	03/09/2013	03/08/2014
Amplifier	MITEQ	AM-1604-3000	1123808	03/18/2013	03/18/2014
High Noise Amplifier	Agilent	8449B	3008A01838	03/18/2013	03/18/2014
Board-Band Horn Antenna	Schwarzbeck	BBHA 9170	9170-497	06/21/2012	06/21/2014
Bilog Antenna	SCHAFFNER	CBL6143	5082	03/02/2013	03/01/2014
Horn Antenna	SCHWARZBECK	BBHA9120	D286	03/02/2013	03/01/2014
Loop Antenna	A、R、A	PLA-1030/B	1029	03/23/2013	03/23/2014
Turn Table	N/A	N/A	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	03/04/2013	03/03/2014
Antenna Tower	SUNOL	TLT2	N/A	N.C.R	N.C.R
Test S/W	FARAD	LZ-RF / CCS-SZ-3A2			

NOTE: 1. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.

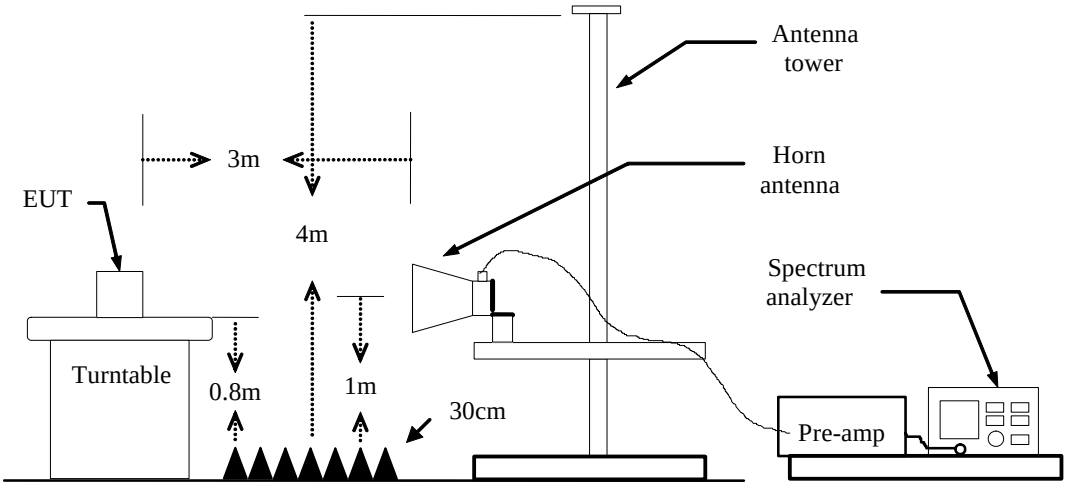
2. The FCC Site Registration number is 101879.

3. N.C.R = No Calibration Required.

7.5.3. TEST PROCEDURES (please refer to measurement standard)

1. The EUT is placed on a turntable, which is 0.8m 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=VBW=1MHz / Sweep=AUTO
   (b) AVERAGE: RBW=1MHz / VBW=10Hz / Sweep=AUTO
5. Repeat the procedures until all the PEAK and AVERAGE versus POLARIZATION are

7.5.4. TEST SETUP



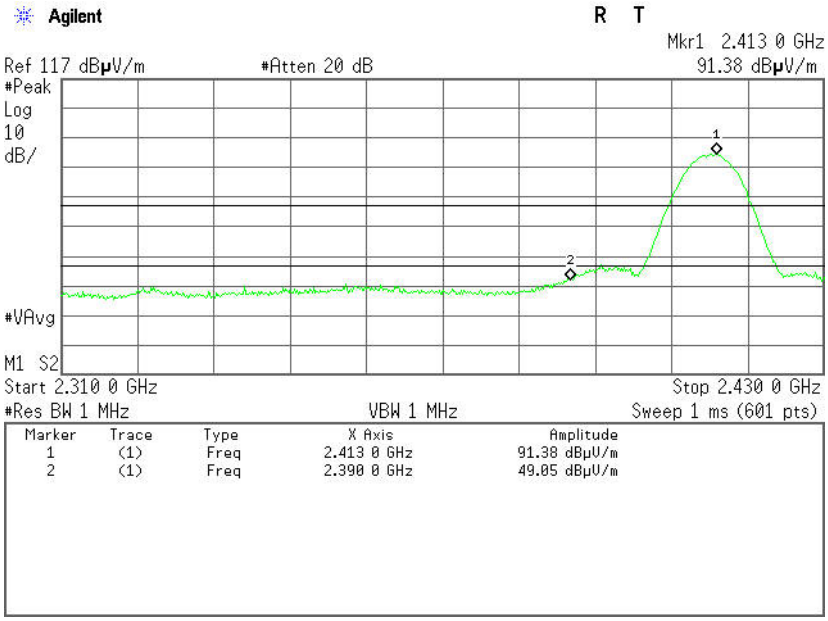
7.5.5. TEST RESULTS

Test Plot

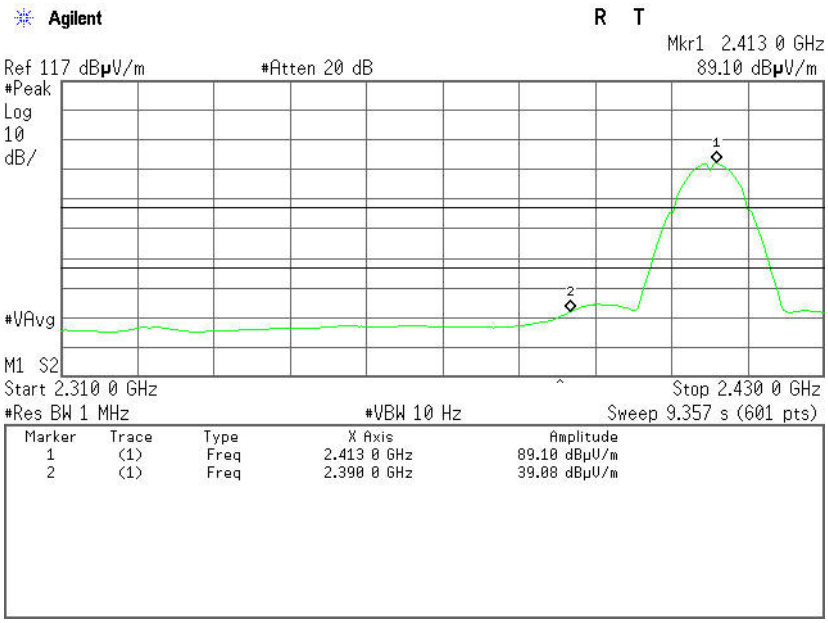
IEEE 802.11b mode

Band Edges (CH Low)

Detector mode: Peak **Polarity: Vertical**

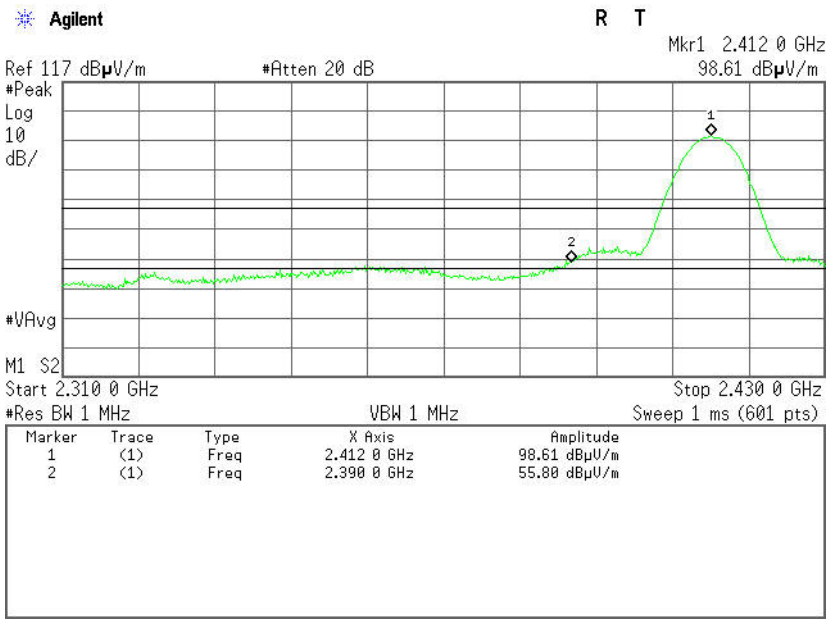


Detector mode: Average **Polarity: Vertical**

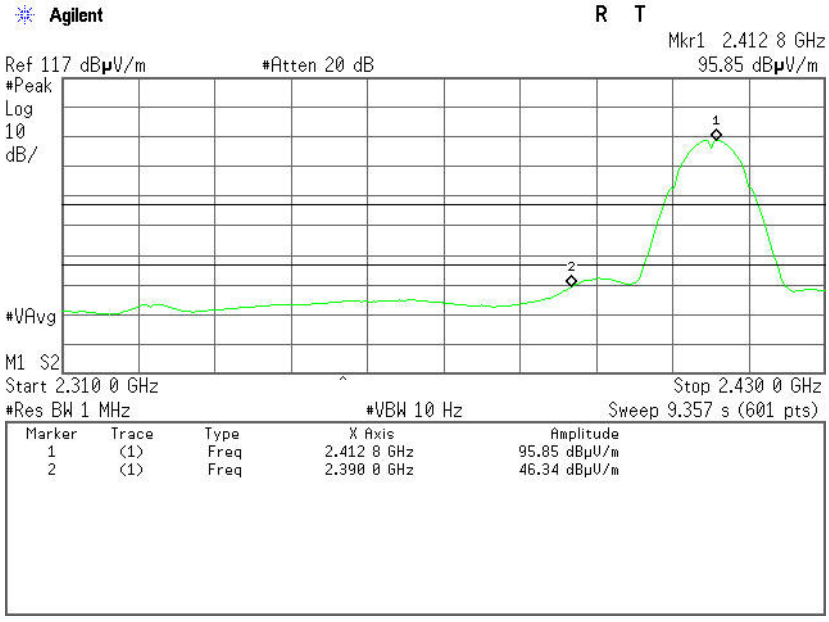


No.	Frequency (MHz)	Reading (dBuV)	Corrected (dB)	Result (dBuV)	Limit (dBuV)	Margin (dB)	Detector	Antenna Pole
1	2390.0000	42.45	-6.60	49.05	74.00	-24.95	Peak	Vertical
2	2390.0000	32.48	-6.60	39.08	54.00	-14.92	Average	Vertical

Detector mode: Peak **Polarity: Horizontal**



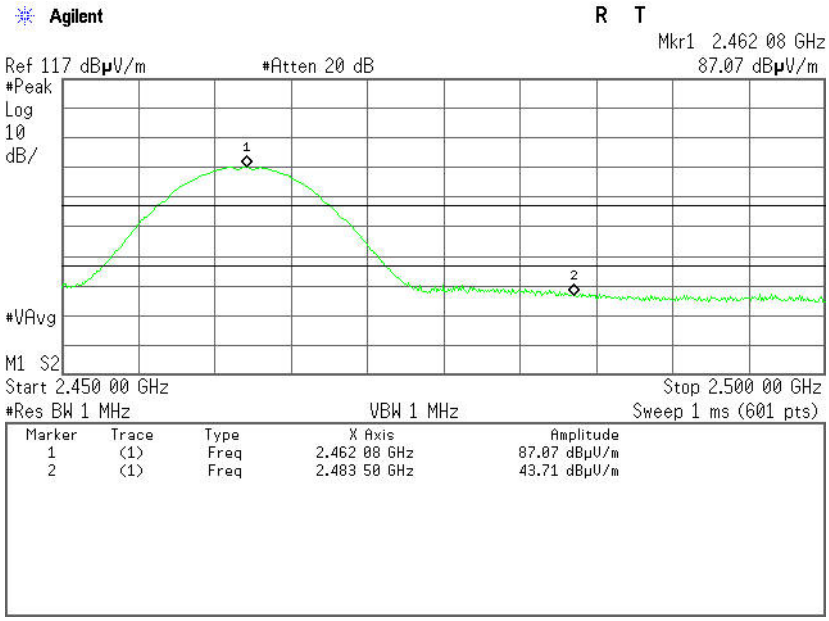
Detector mode: Average **Polarity: Horizontal**



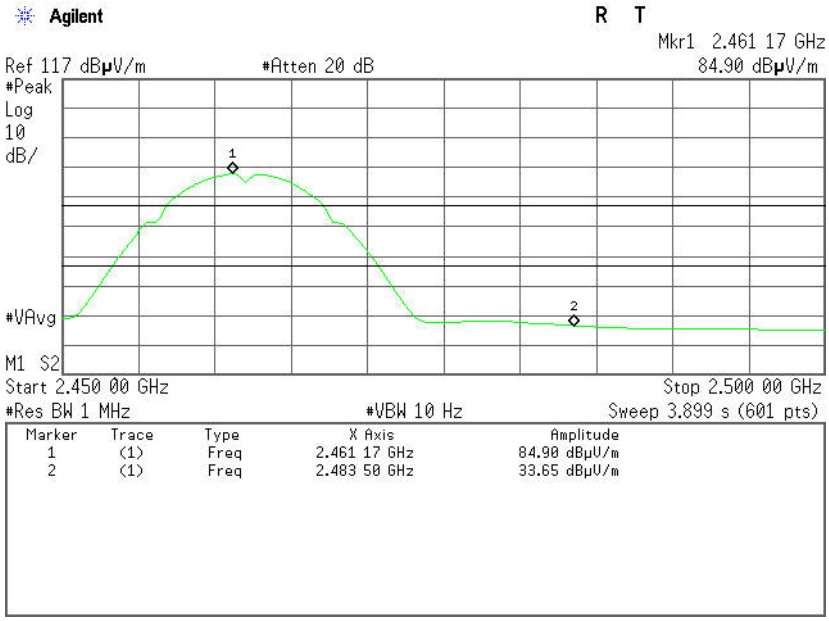
No.	Frequency (MHz)	Reading (dBuV)	Corrected (dB)	Result (dBuV)	Limit (dBuV)	Margin (dB)	Detector	Antenna Pole
1	2390.0000	49.20	-6.60	55.80	74.00	-18.20	Peak	Horizontal
2	2390.0000	39.74	-6.60	46.34	54.00	-7.66	Average	Horizontal

Band Edges (CH High)

Detector mode: Peak Polarity: Vertical

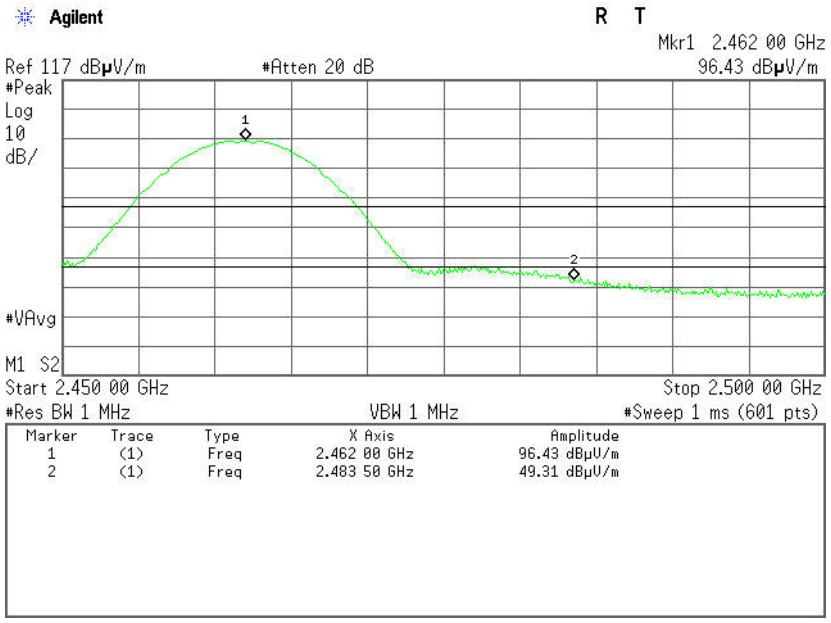


Detector mode: Average Polarity: Vertical

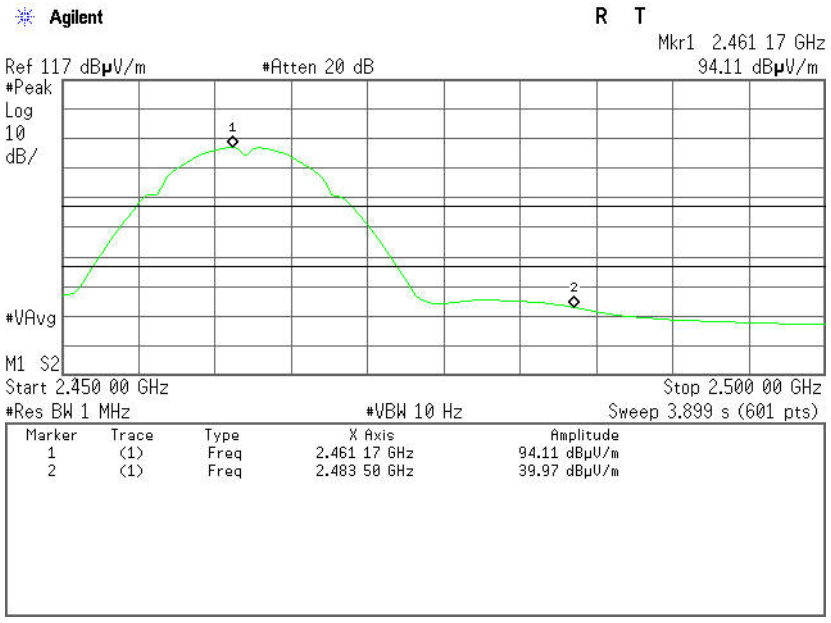


No.	Frequency (MHz)	Reading (dBuV)	Corrected (dB)	Result (dBuV)	Limit (dBuV)	Margin (dB)	Detector	Antenna Pole
1	2483.5000	37.47	-6.24	43.71	74.00	-30.29	Peak	Vertical
2	2483.5000	27.41	-6.24	33.65	54.00	-20.35	Average	Vertical

Detector mode: Peak **Polarity: Horizontal**



Detector mode: Average **Polarity: Horizontal**

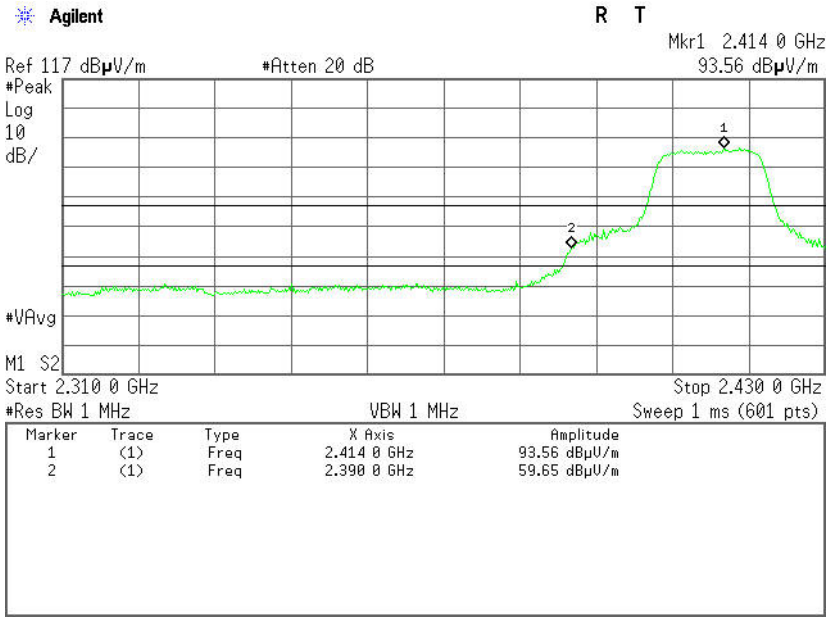


No.	Frequency (MHz)	Reading (dBuV)	Corrected (dB)	Result (dBuV)	Limit (dBuV)	Margin (dB)	Detector	Antenna Pole
1	2483.5000	43.07	-6.24	49.31	74.00	-24.69	Peak	Horizontal
2	2483.5000	33.73	-6.24	39.97	54.00	-14.03	Average	Horizontal

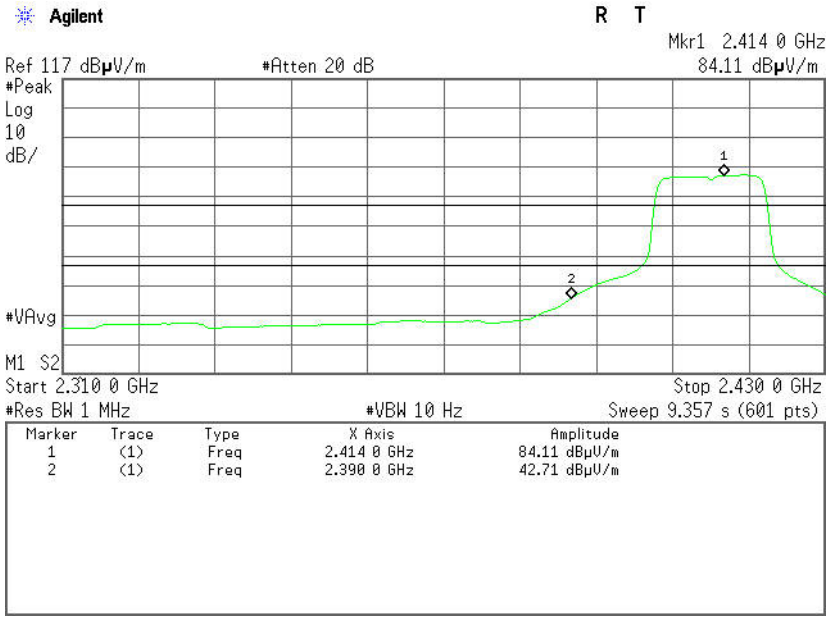
IEEE 802.11g mode

Band Edges (CH Low)

Detector mode: Peak Polarity: Vertical

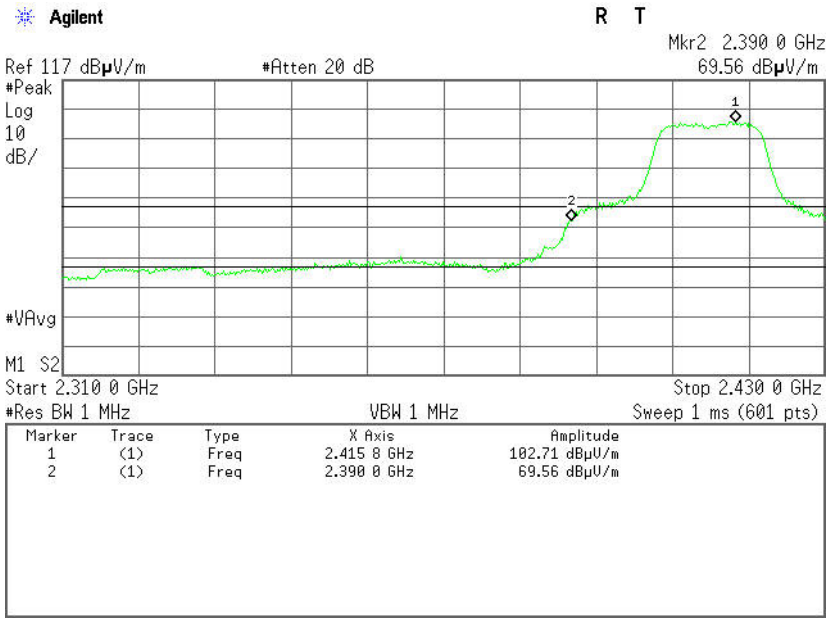


Detector mode: Average Polarity: Vertical

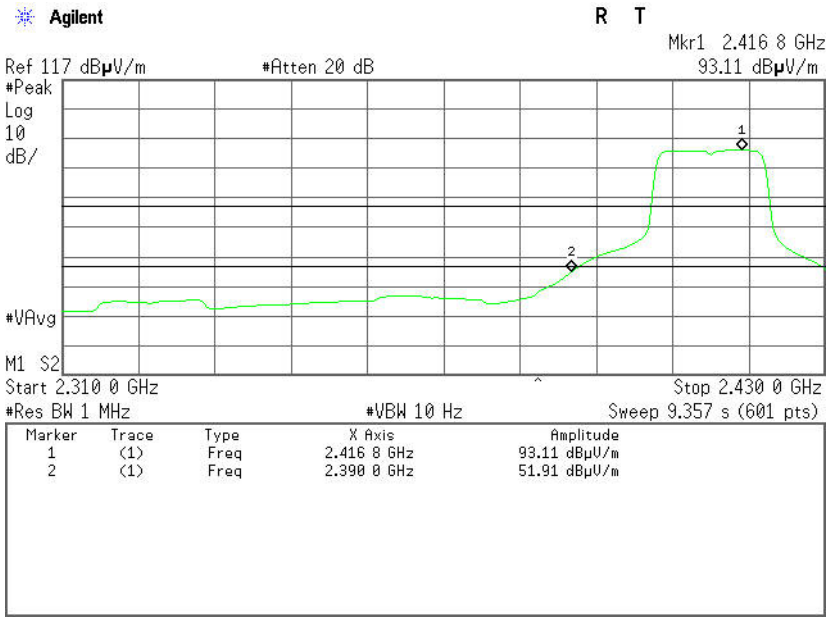


No.	Frequency (MHz)	Reading (dBuV)	Corrected (dB)	Result (dBuV)	Limit (dBuV)	Margin (dB)	Detector	Antenna Pole
1	2390.0000	53.05	-6.60	59.65	74.00	-14.35	Peak	Vertical
2	2390.0000	36.11	-6.60	42.71	54.00	-11.29	Average	Vertical

Detector mode: Peak **Polarity: Horizontal**



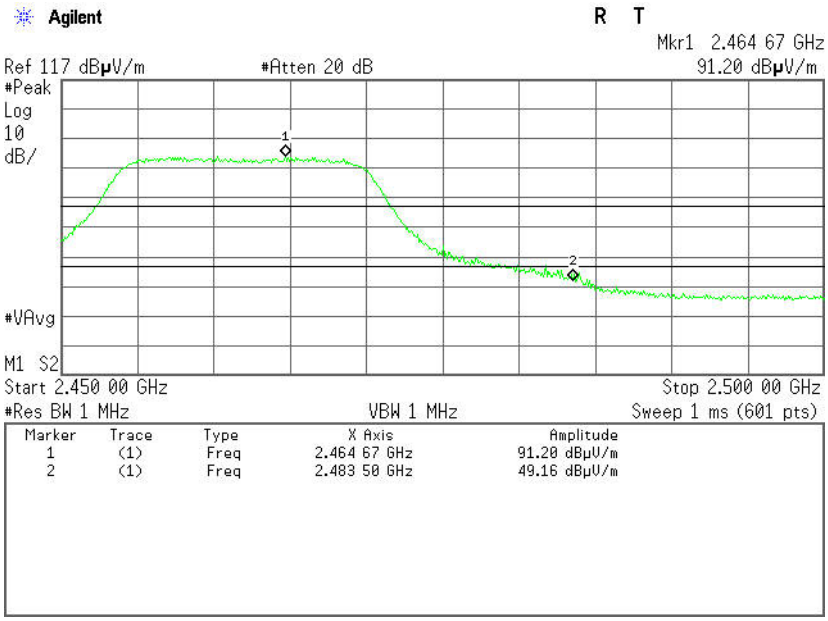
Detector mode: Average **Polarity: Horizontal**



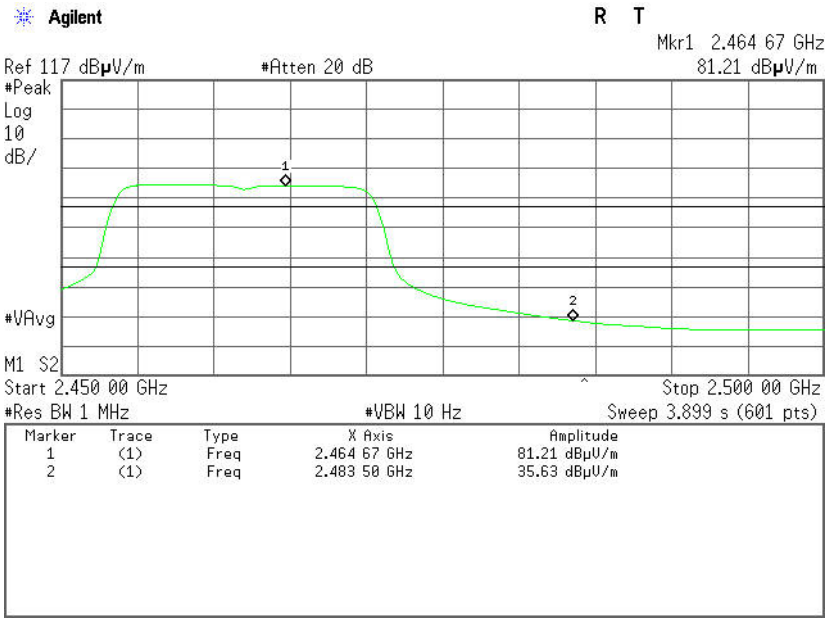
No.	Frequency (MHz)	Reading (dBuV)	Corrected (dB)	Result (dBuV)	Limit (dBuV)	Margin (dB)	Detector	Antenna Pole
1	2390.0000	62.96	-6.60	69.56	74.00	-4.44	Peak	Horizontal
2	2390.0000	45.31	-6.60	51.91	54.00	-2.09	Average	Horizontal

Band Edges (CH High)

Detector mode: Peak Polarity: Vertical

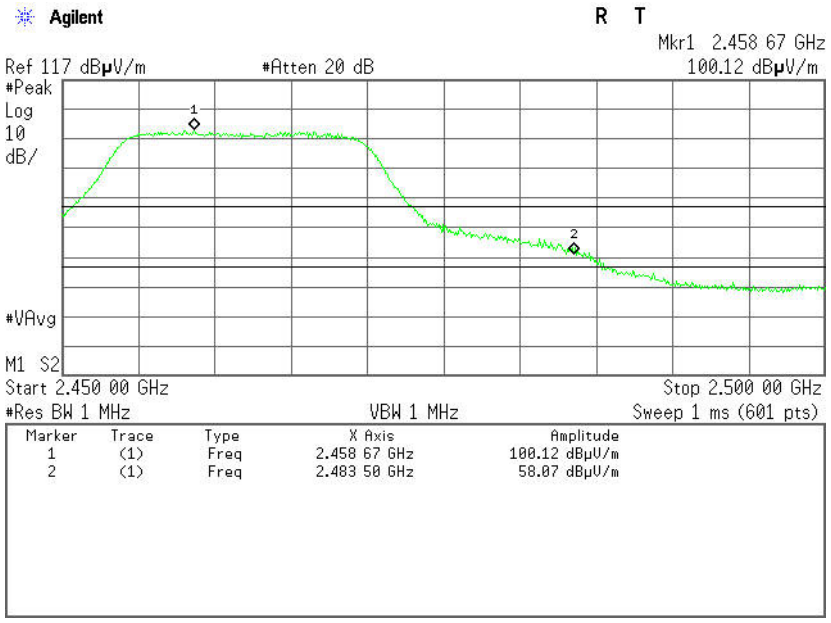


Detector mode: Average Polarity: Vertical

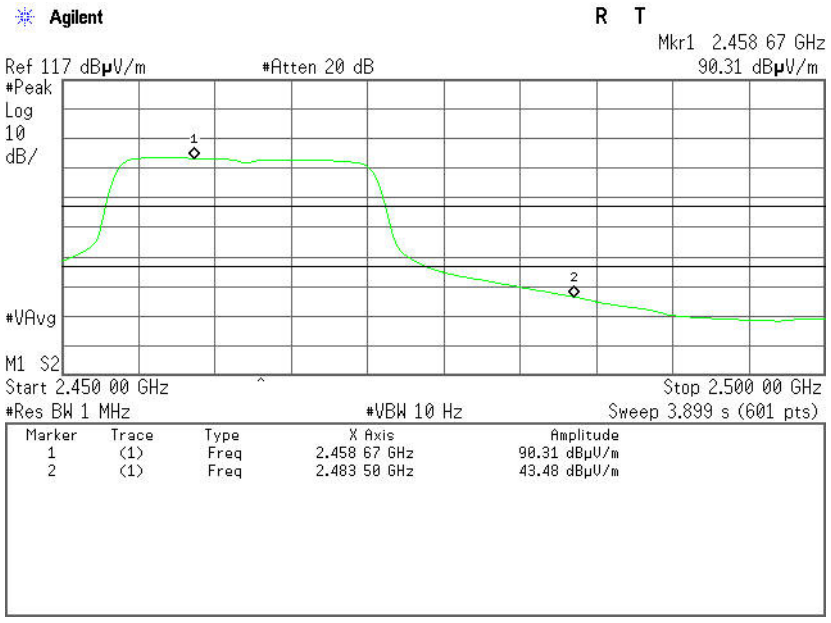


No.	Frequency (MHz)	Reading (dBuV)	Corrected (dB)	Result (dBuV)	Limit (dBuV)	Margin (dB)	Detector	Antenna Pole
1	2483.5000	42.92	-6.24	49.16	74.00	-24.84	Peak	Vertical
2	2483.5000	29.39	-6.24	35.63	54.00	-18.37	Average	Vertical

Detector mode: Peak **Polarity: Horizontal**



Detector mode: Average **Polarity: Horizontal**

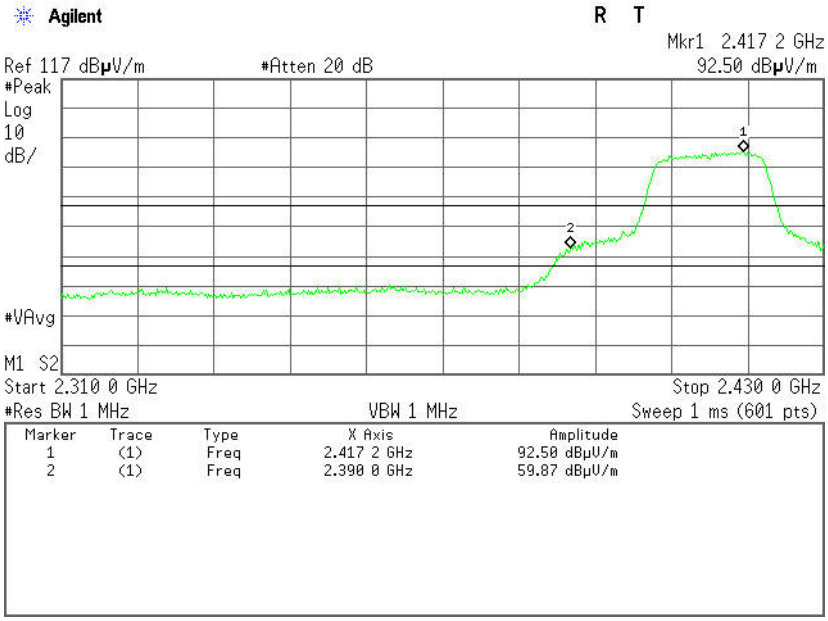


No.	Frequency (MHz)	Reading (dBuV)	Corrected (dB)	Result (dBuV)	Limit (dBuV)	Margin (dB)	Detector	Antenna Pole
1	2483.5000	51.83	-6.24	58.07	74.00	-15.93	Peak	Horizontal
2	2483.5000	37.24	-6.24	43.48	54.00	-10.52	Average	Horizontal

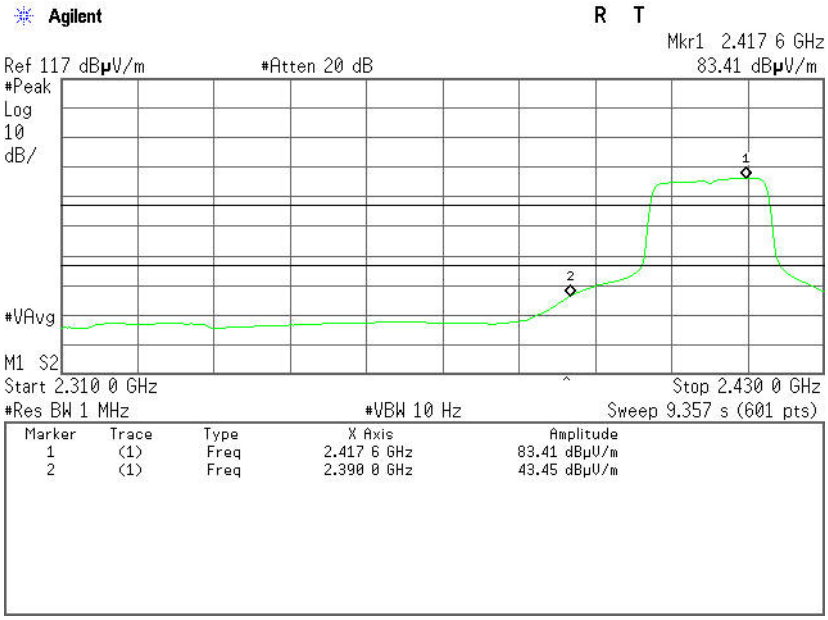
IEEE 802.11n HT20 MHz mode

Band Edges (CH Low)

Detector mode: Peak **Polarity: Vertical**

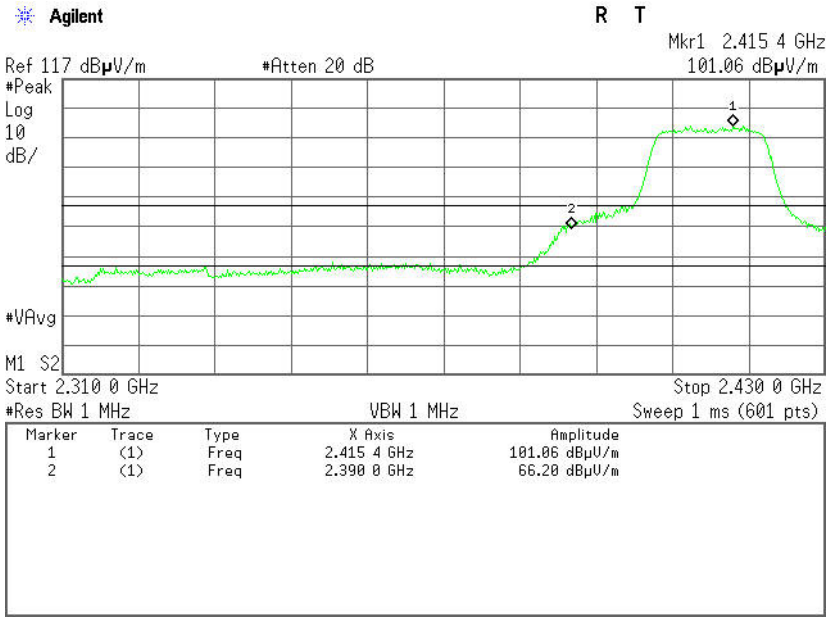


Detector mode: Average **Polarity: Vertical**

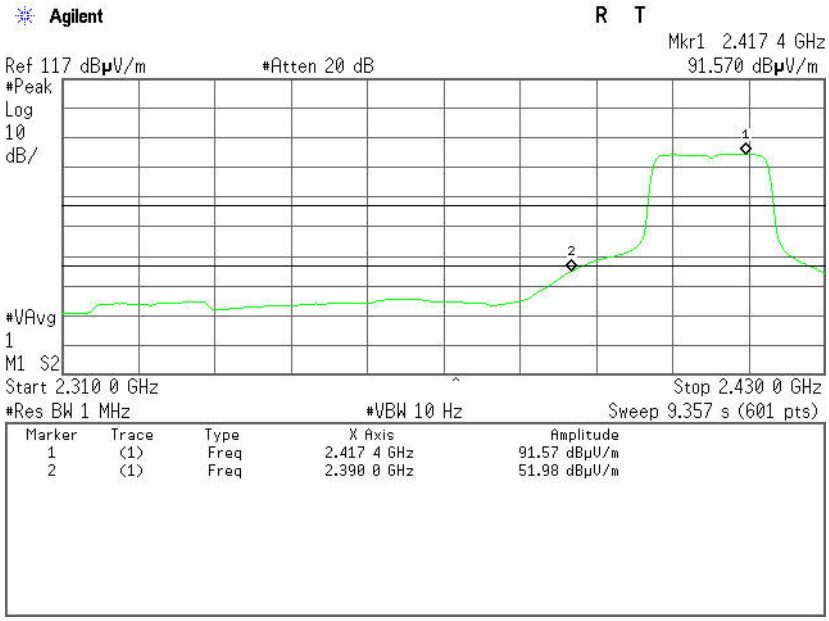


No.	Frequency (MHz)	Reading (dBuV)	Corrected (dB)	Result (dBuV)	Limit (dBuV)	Margin (dB)	Detector	Antenna Pole
1	2390.0000	53.27	-6.60	59.87	74.00	-14.13	Peak	Vertical
2	2390.0000	36.85	-6.60	43.45	54.00	-10.55	Average	Vertical

Detector mode: Peak **Polarity: Horizontal**



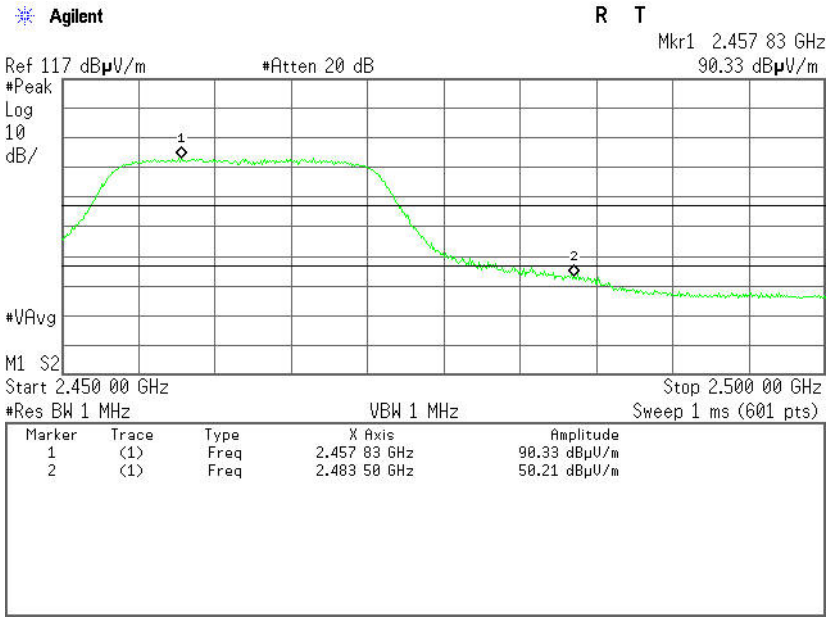
Detector mode: Average **Polarity: Horizontal**



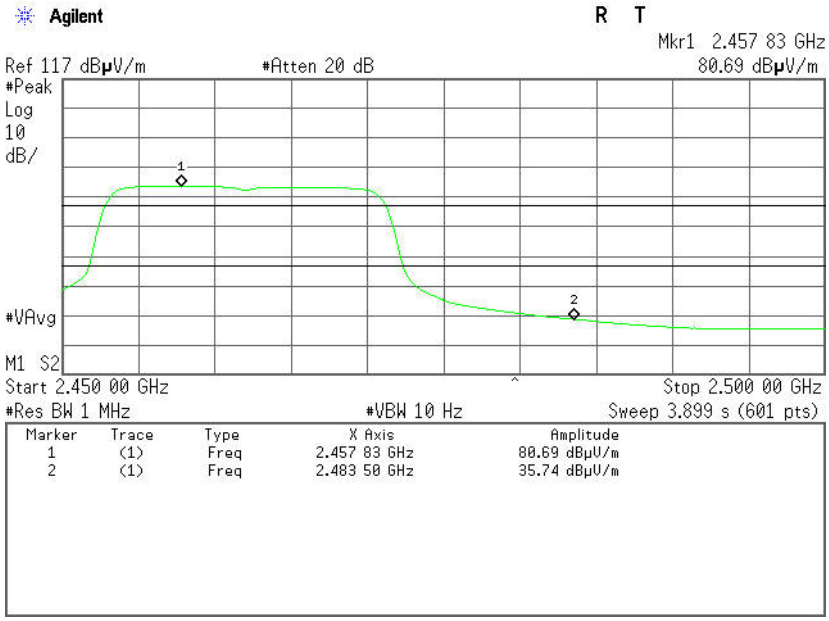
No.	Frequency (MHz)	Reading (dBuV)	Corrected (dB)	Result (dBuV)	Limit (dBuV)	Margin (dB)	Detector	Antenna Pole
1	2390.0000	59.60	-6.60	66.20	74.00	-7.80	Peak	Horizontal
2	2390.0000	45.38	-6.60	51.98	54.00	-2.02	Average	Horizontal

Band Edges (CH High)

Detector mode: Peak Polarity: Vertical

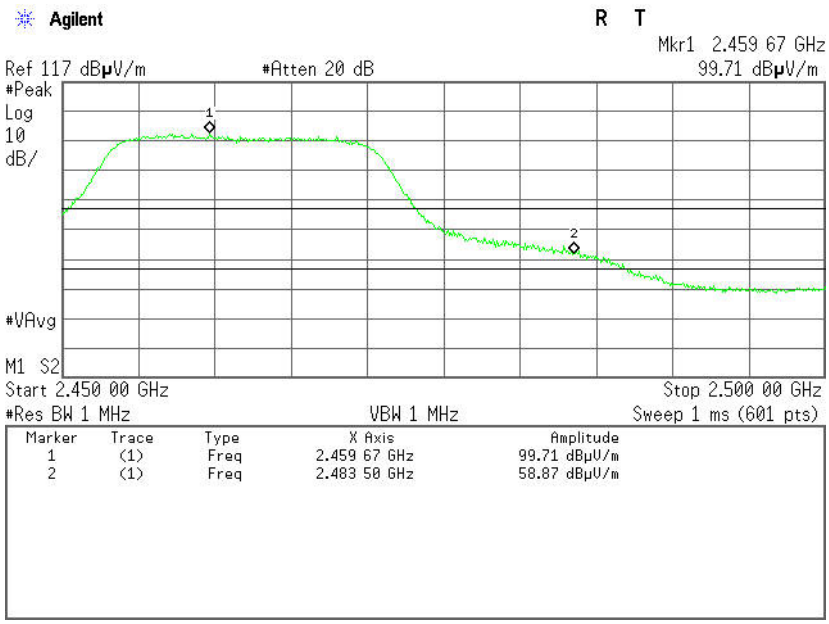


Detector mode: Average Polarity: Vertical

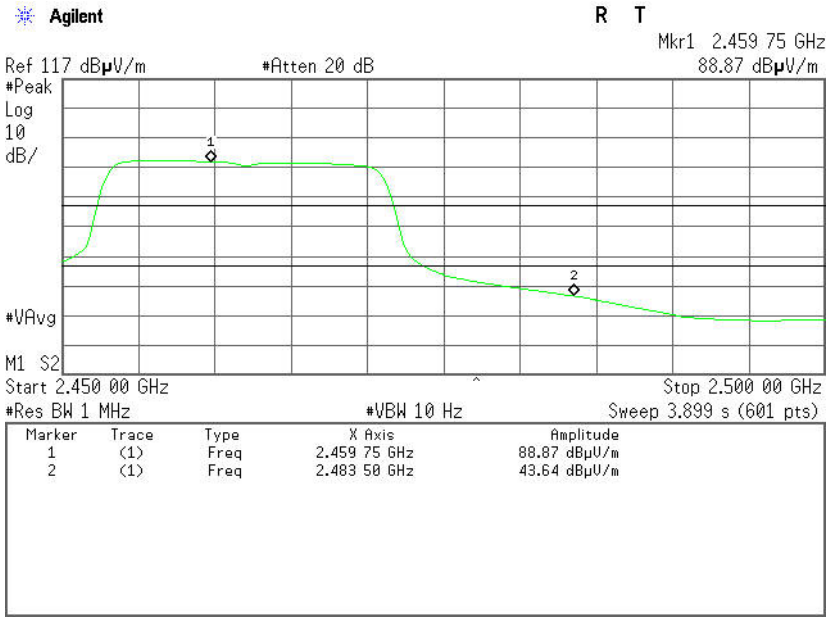


No.	Frequency (MHz)	Reading (dBuV)	Corrected (dB)	Result (dBuV)	Limit (dBuV)	Margin (dB)	Detector	Antenna Pole
1	2483.5000	43.97	-6.24	50.21	74.00	-23.79	Peak	Vertical
2	2483.5000	29.50	-6.24	35.74	54.00	-18.26	Average	Vertical

Detector mode: Peak **Polarity: Horizontal**



Detector mode: Average **Polarity: Horizontal**



No.	Frequency (MHz)	Reading (dBuV)	Corrected (dB)	Result (dBuV)	Limit (dBuV)	Margin (dB)	Detector	Antenna Pole
1	2483.5000	52.63	-6.24	58.87	74.00	-15.13	Peak	Horizontal
2	2483.5000	37.40	-6.24	43.64	54.00	-10.36	Average	Horizontal

7.6. PEAK POWER SPECTRAL DENSITY MEASUREMENT

7.6.1. 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.

7.6.2. TEST INSTRUMENTS

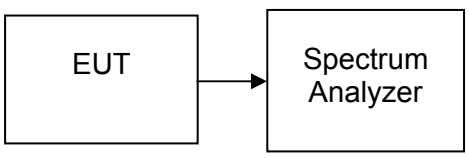
Name of Equipment	Manufacturer	Model	Serial Number	Last Calibration	Calibration Due
Spectrum Analyzer	Agilent	E4446A	US44300399	03/09/2013	03/08/2014

7.6.3. 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).

1. Use this procedure when the maximum peak conducted output power in the fundamental emission is used to demonstrate compliance.
2. Set the RBW = 100 kHz.
3. Set the VBW ≥ 300 kHz.
4. Set the span to 5-30 % greater than the EBW.
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 power level in any 100 kHz band segment within the fundamental EBW.
10. Scale the observed power level to an equivalent value in 3 kHz by adjusting (reducing) the measured power by a bandwidth correction factor (BWCF) where BWCF = 10log(3 kHz/100 kHz= -15.2 dB).
11. The resulting peak PSD level must be ≤ 8 dBm.

7.6.4. TEST SETUP



7.6.5. TEST RESULTS

No non-compliance noted

Test Data

Test mode: IEEE 802.11b

Channel	Frequency (MHz)	PPSD (dBm)	Limit (dBm)	Test Result
Low	2412	-11.66	8	PASS
Mid	2437	-7.29		PASS
High	2462	-15.05		PASS

Test mode: IEEE 802.11g

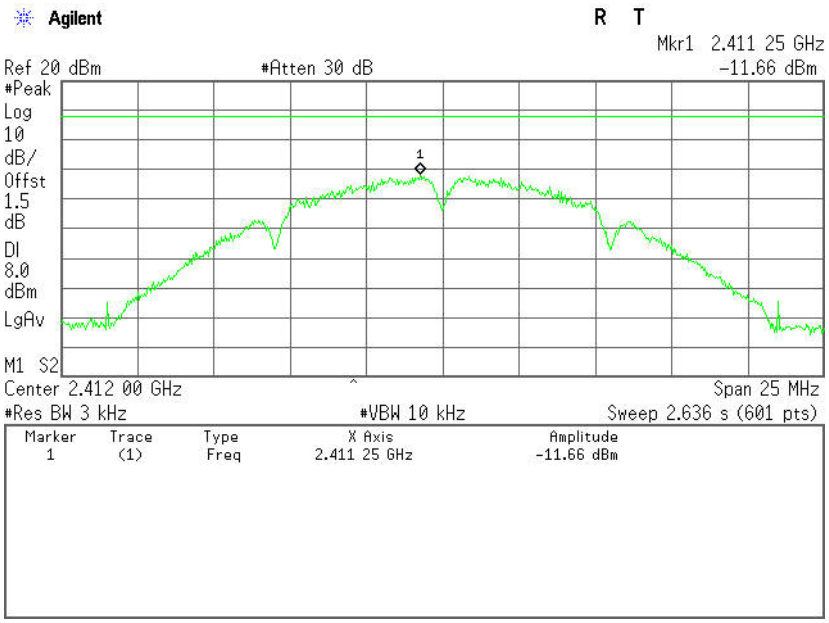
Channel	Frequency (MHz)	PPSD (dBm)	Limit (dBm)	Test Result
Low	2412	-13.99	8	PASS
Mid	2437	-9.87		PASS
High	2462	-16.75		PASS

Test mode: IEEE 802.11n HT20 MHz

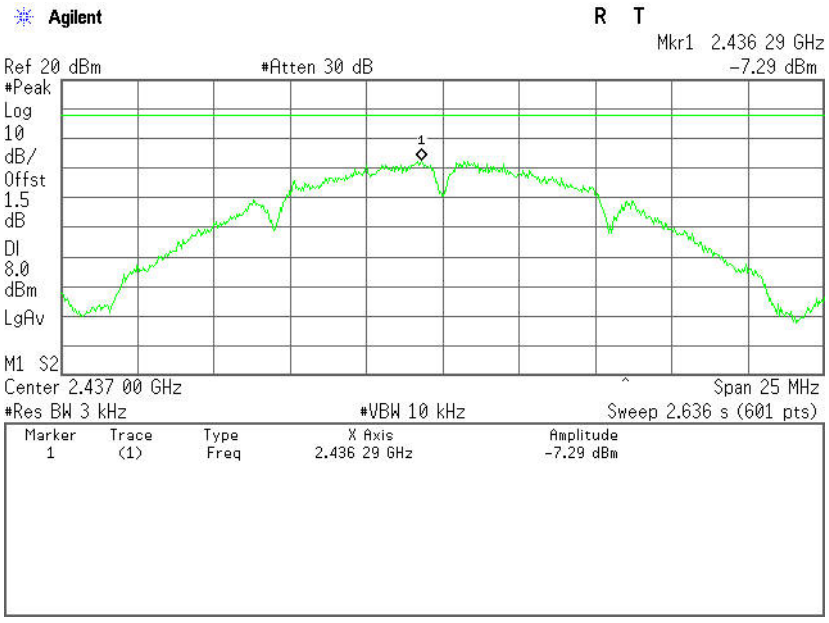
Channel	Frequency (MHz)	PPSD (dBm)	Limit (dBm)	Test Result
Low	2412	-15.65	8	PASS
Mid	2437	-10.87		PASS
High	2462	-17.93		PASS

Test Plot IEEE 802.11b mode

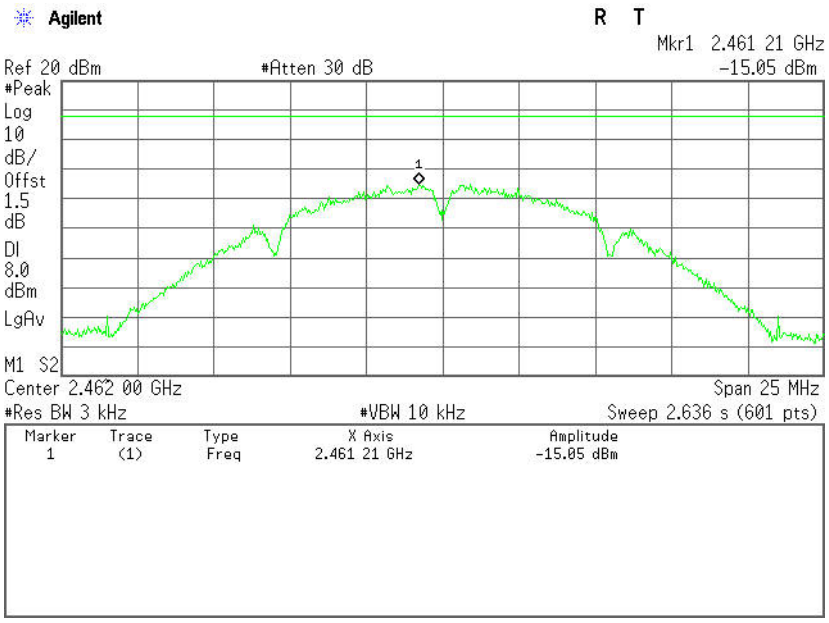
PPSD (CH Low)



PPSD (CH Mid)

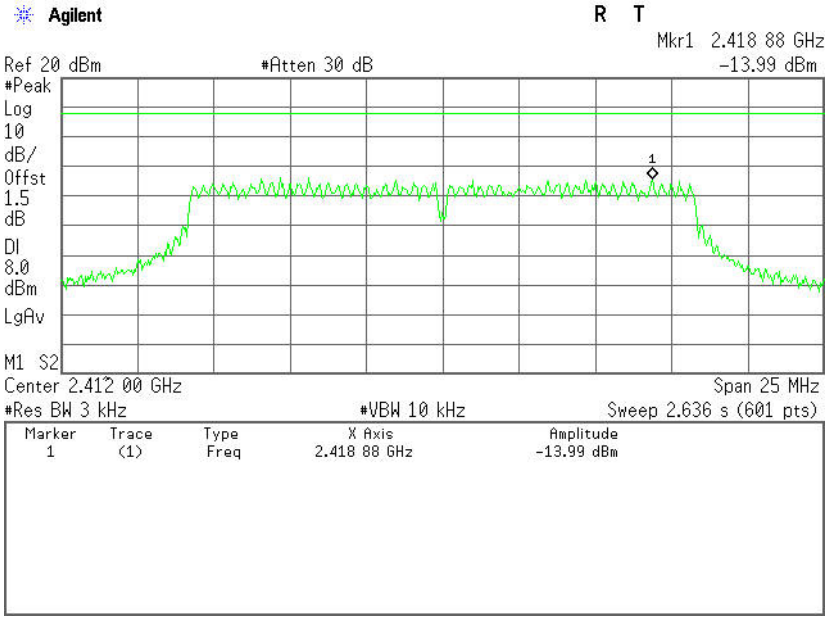


PPSD (CH High)

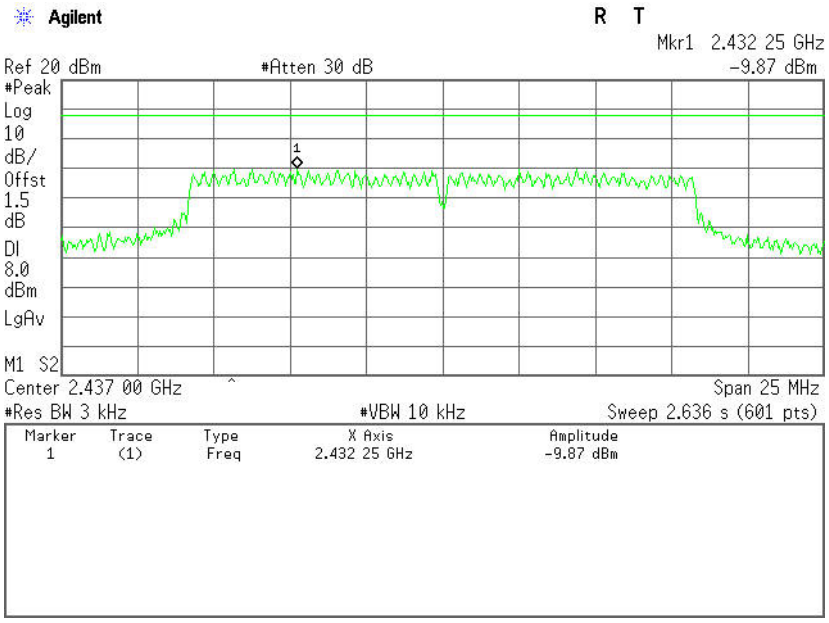


IEEE 802.11g mode

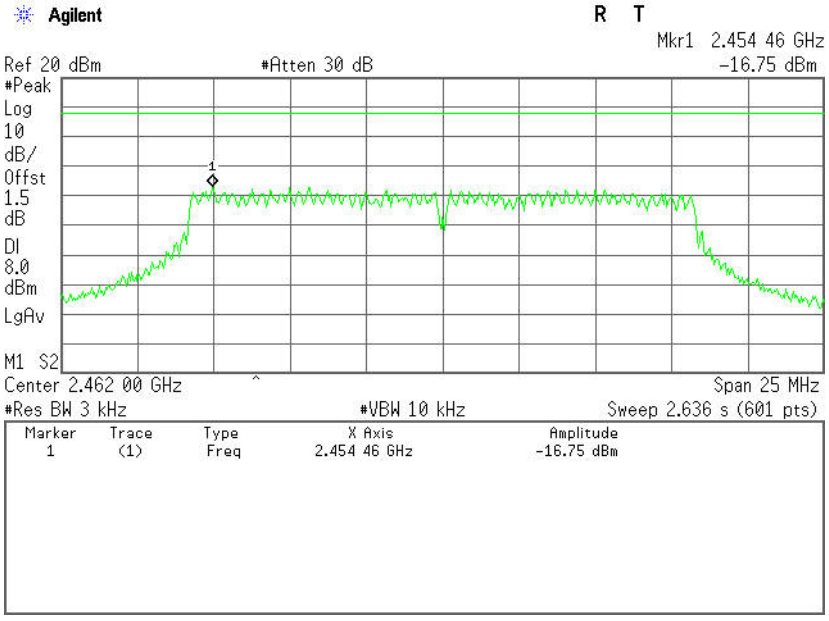
PPSD (CH Low)



PPSD (CH Mid)

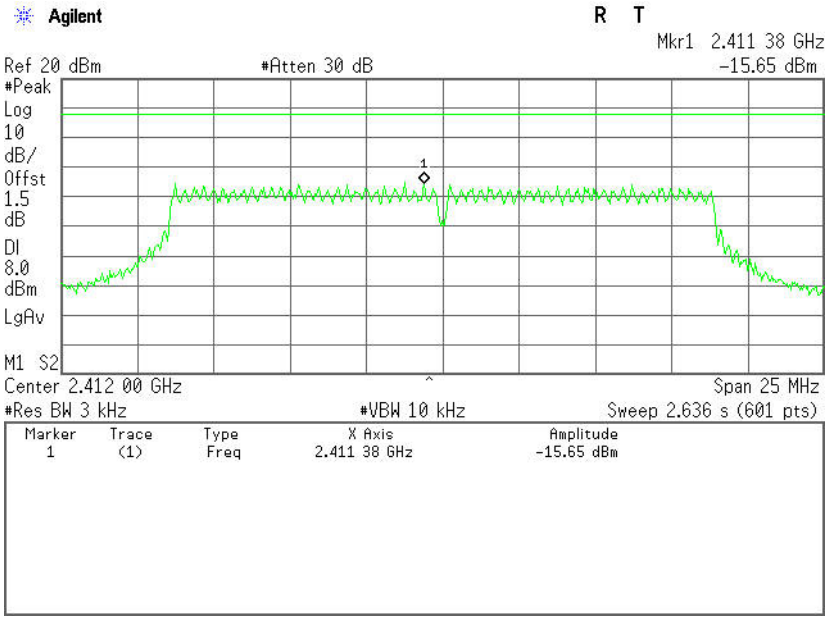


PPSD (CH High)

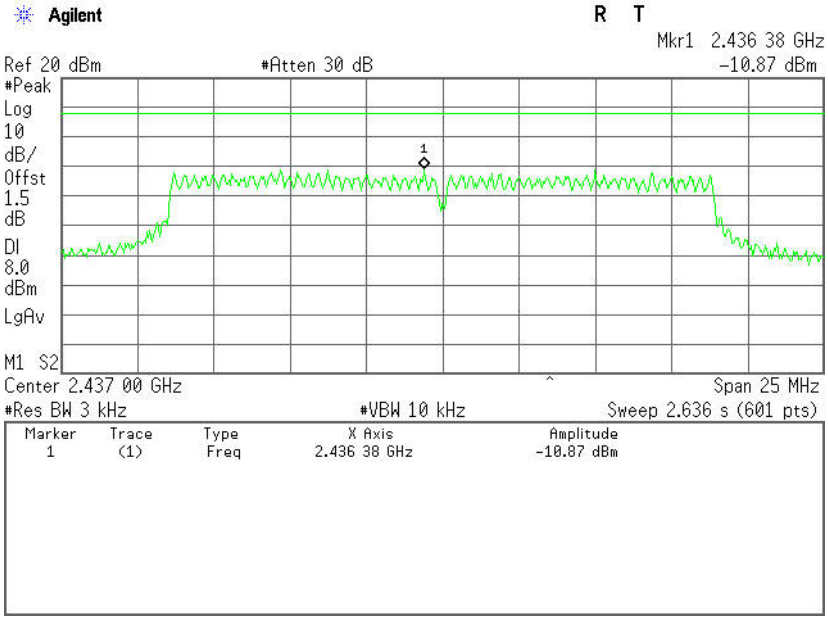


IEEE 802.11n HT20 MHz mode

PPSD (CH Low)



PPSD (CH Mid)



PPSD (CH High)