

FCC 47 CFR PART 15 SUBPART C

RF Test Report

Applicant : Comtrend Corporation
Product Type : Wireless Gateway
Trade Name : COMTREND
Model Number : VR-3060u, VR-3060
Applicable Standard : FCC 47 CFR PART 15 SUBPART C
ANSI C63.10:2013
Receive Date : Apr. 19, 2016
Test Period : Apr. 29 ~ Jun. 20, 2016
Issue Date : Jul. 11, 2016

Issue by

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Taiwan Accreditation Foundation accreditation number: 1330

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Revision History

Rev.	Issue Date	Revisions	Revised By
00	Jul. 11, 2016	Initial Issue	Snow Wang

Verification of Compliance

Issued Date: Jul. 11, 2016

Applicant : Comtrend Corporation
Product Type : Wireless Gateway
Trade Name : COMTREND
Model Number : VR-3060u, VR-3060
FCC ID : L9VVR3060U
EUT Rated Voltage : DC 12V, 2.5A
Test Voltage : 120 Vac / 60 Hz
Applicable Standard : FCC 47 CFR PART 15 SUBPART C
ANSI C63.10:2013

Test Result : Complied

Performing Lab. : A Test Lab Techno Corp.

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Taiwan Accreditation Foundation accreditation number: 1330
<http://www.atl-lab.com.tw/e-index.htm>

A Test Lab Techno Corp. tested the above equipment in accordance with the requirements set forth in the above standards. All indications of Pass/Fail in this report are opinions expressed by A Test Lab Techno Corp. based on interpretations and/or observations of test results. Measurement Uncertainties were not taken into account and are published for informational purposes only. The test results show that the equipment tested is capable of demonstrating compliance with the requirements as documented in this report.

Approved By

: Fly Lu

(Manager)

(Fly Lu)

Reviewed By

: Eric Ou Yang

(Testing Engineer)

(Eric Ou Yang)

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1 General Information

1.1 Summary of Test Result

Standard	Item	Result	Remark
15.247			
15.207	AC Power Conducted Emission	PASS	-----
Standard	Item	Result	Remark
15.247			
15.247(d)	Transmitter Radiated Emissions	PASS	-----
15.247(b)(3)	Max. Output Power	PASS	-----
15.247(a)(2)	6dB RF Bandwidth	PASS	-----
15.247(e)	Power Spectral Density	PASS	-----
15.247(d)	Out of Band Conducted Spurious Emission	PASS	-----
15.203	Antenna Requirement	PASS	-----

The test results of this report relate only to the tested sample(s) identified in this report. Manufacturer or whom it may concern should recognize the pass or fail of the test result.

1.2 Measurement Uncertainty

Test Item	Frequency Range	Uncertainty (dB)
Conducted Emission	9kHz ~ 150KHz	2.7
	150kHz ~ 30MHz	2.8
Radiated Emission	9kHz ~ 30MHz	1.457
	30MHz ~ 1000MHz	6.300
	1000MHz ~ 18000MHz	5.474
	18000MHz ~ 26500MHz	5.630
	26500MHz ~ 40000MHz	5.054
Conducted Output Power	+0.27 dB / -0.28 dB	
RF Bandwidth	4.96%	
Power Spectral Density	+0.71 dB / -0.77 dB	

2 EUT Description

Applicant	Comtrend Corporation 3F-1, No. 10, Lane 609, Chung Hsin Road, Section 5, San Chung Dist, New Taipei City 24159, Taiwan				
Manufacturer	Comtrend Corporation 3F-1, No. 10, Lane 609, Chung Hsin Road, Section 5, San Chung Dist, New Taipei City 24159, Taiwan				
Product Type	Wireless Gateway				
Trade Name	COMTREND				
Model Number	VR-3060u, VR-3060				
Model Different Description	Those model numbers differ from each other in selling region.				
FCC ID	L9VVR3060U				
Operate Freq. Band	Frequency Range (MHz)	Modulation		Channel Bandwidth	Data Rate 400 GI (ns)
IEEE 802.11b	2412 ~ 2462	DSSS		20MHz	Up to 11Mbps
IEEE 802.11g	2412 ~ 2462	OFDM (64QAM)		20MHz	Up to 54Mbps
IEEE 802.11n 2.4GHz 20MHz	2412 ~ 2462	OFDM (64QAM)		20MHz	Up to 144.4Mbps
IEEE 802.11n 2.4GHz 40MHz	2422 ~ 2452	OFDM (64QAM)		40MHz	Up to 300Mbps
Antenna information	ANT	Trade Name	Model Number	Type	Max. Gain (dBi)
	ANT-0	Cortec	AN2450-64D02BBO	External antenna (Reversed-SMA Connector)	2.5
	ANT-1	Cortec	AN2450-64D03BBO	External antenna (Reversed-SMA Connector)	1.2
Antenna Delivery	See section 3.1				

Frequency Band	Max. RF Output Power (W)
IEEE 802.11b	0.861
IEEE 802.11g	0.962
IEEE 802.11n 2.4GHz 20MHz	0.936
IEEE 802.11n 2.4GHz 40MHz	0.927

3 Test Methodology

3.1. Mode of Operation

Decision of Test ATL has verified the construction and function in typical operation. All the test modes were carried out with the EUT in normal operation, which was shown in this test report and defined as:

Test Mode
Mode 1: Normal operation mode
Mode 2: IEEE 802.11b link mode
Mode 3: IEEE 802.11g link mode
Mode 4: IEEE 802.11n 2.4GHz 20MHz link mode
Mode 5: IEEE 802.11n 2.4GHz 40MHz link mode

Software used to control the EUT for staying in continuous transmitting mode was programmed.

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

Test Mode	ANT-0	ANT-1	ANT-0+1
Mode 2: IEEE 802.11b link mode	V	X	X
Mode 3: IEEE 802.11g link mode	V	X	X
Mode 4: IEEE 802.11n 2.4GHz 20MHz link mode	V	V	V
Mode 5: IEEE 802.11n 2.4GHz 40MHz link mode	V	V	V

Test Mode	Antenna Delivery	Test Channel	Data Rate 400G1 (ns)
Mode 2: IEEE 802.11b link mode	1TX / 1RX	1, 6, 11	1
Mode 3: IEEE 802.11g link mode	1TX / 1RX	1, 6, 11	6
Mode 4: IEEE 802.11n 2.4GHz 20MHz link mode	2TX / 2RX (MIMO)	1, 6, 11	13
Mode 5: IEEE 802.11n 2.4GHz 40MHz link mode	2TX / 2RX (MIMO)	3, 6, 9	27

Duty cycle

Test Mode	Frequency (MHz)	on time (ms)	on+off time (ms)	Duty cycle	Duty Factor (dB)	1/T Minimum VBW (kHz)
Mode 2: IEEE 802.11b link mode	2412	12.450	13.070	0.953	0.211	0.080
Mode 3: IEEE 802.11g link mode	2412	2.090	2.170	0.963	0.163	0.478
Mode 4: IEEE 802.11n 2.4GHz 20MHz link mode	2412	1.000	1.080	0.926	0.334	1.000
Mode 5: IEEE 802.11n 2.4GHz 40MHz link mode	2422	0.510	0.595	0.857	0.669	1.961



Duty Cycle Graphs

Mode 2: IEEE 802.11b link mode

On time



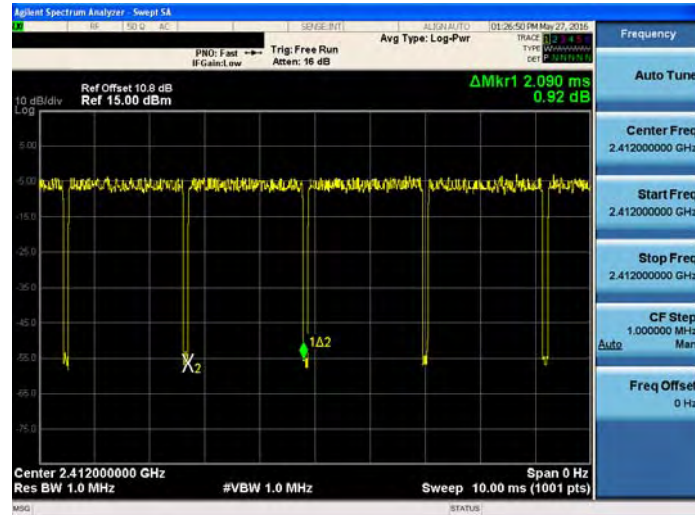
On+off time



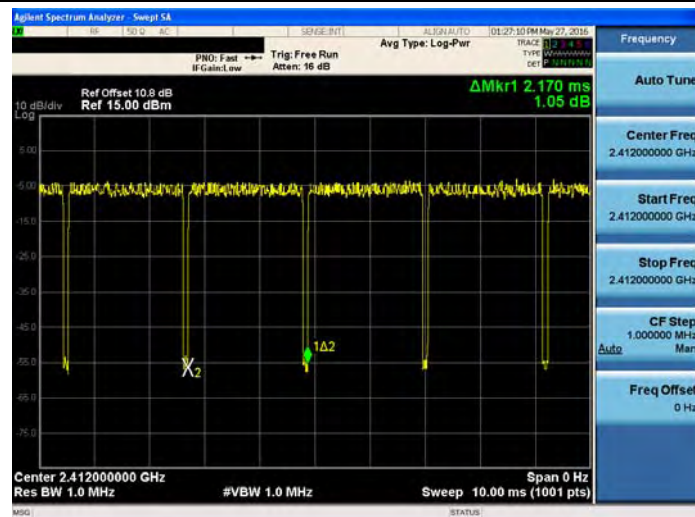


Mode 3: IEEE 802.11g Mode

On time



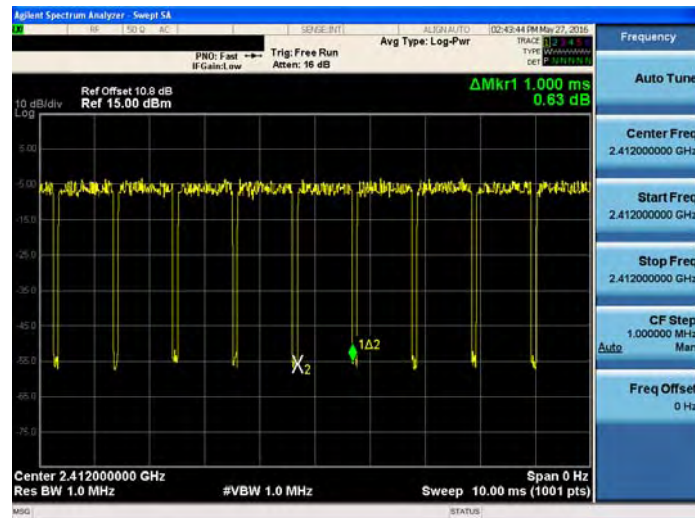
On+off time



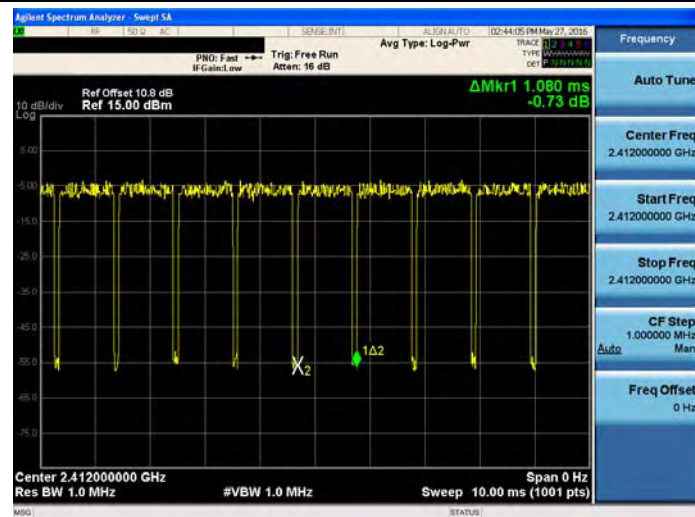


Mode 4: IEEE 802.11n 2.4GHz 20MHz Mode

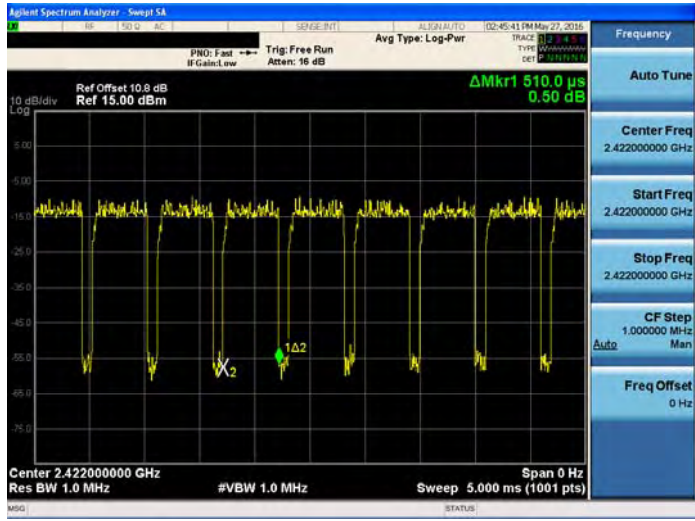
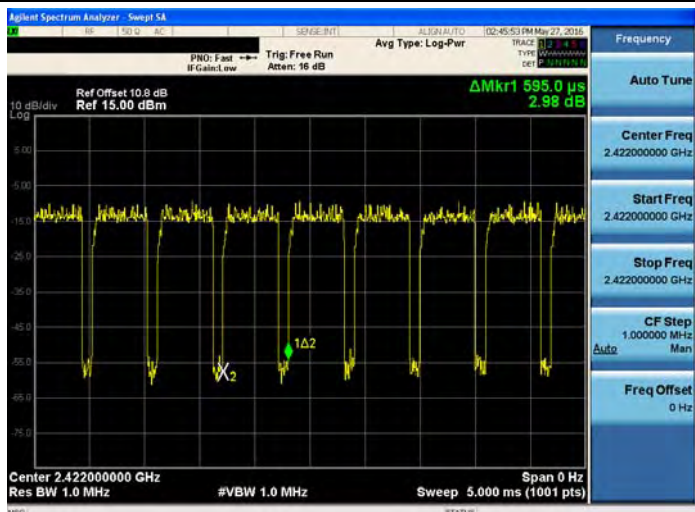
On time



On+off time



Mode 5: IEEE 802.11n 2.4GHz 40MHz Mode

On time	
On+off time	

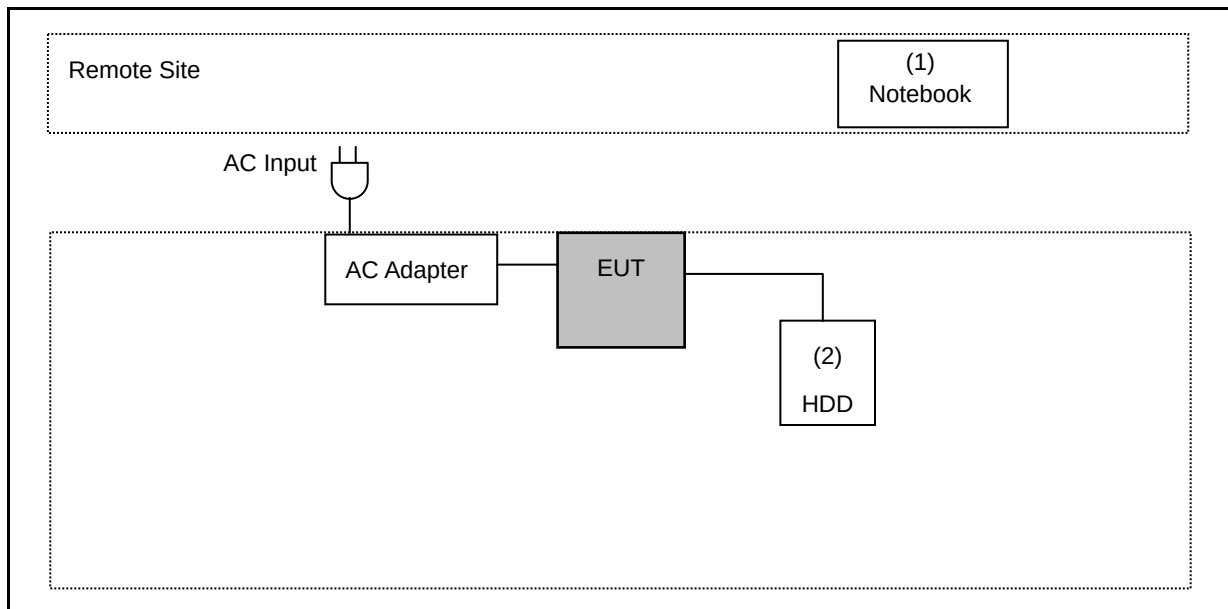
3.2. EUT Exercise Software

1. Setup the EUT shown on 3.3.
2. Turn on the power of all equipment.
3. Turn Wi-Fi function link to or Notebook.
4. EUT run test program.

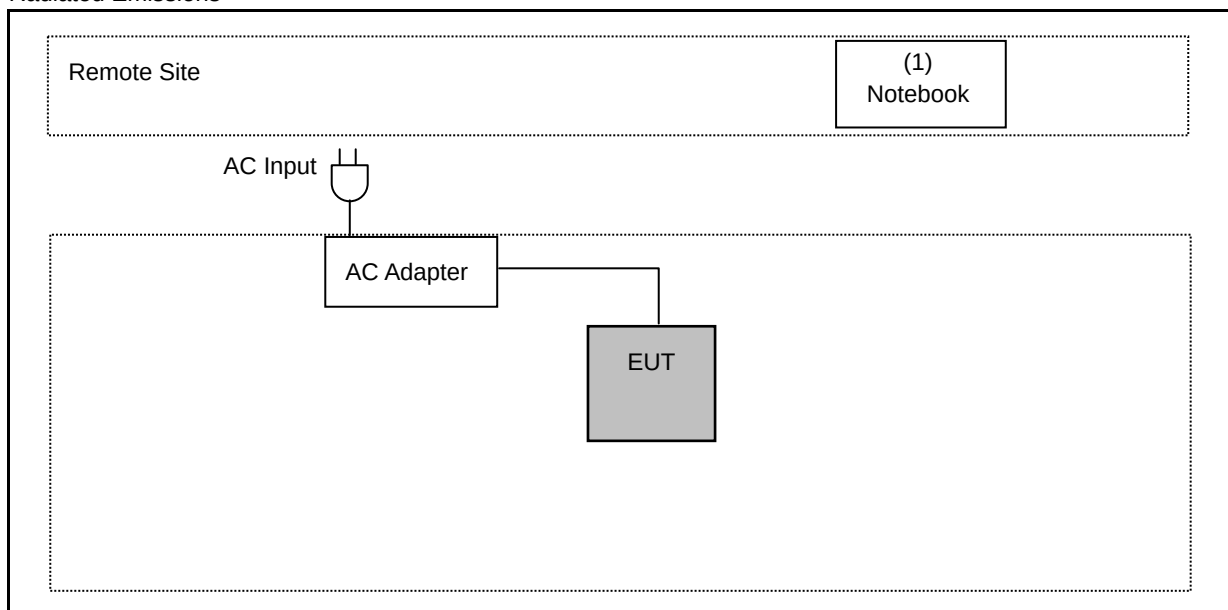
Measurement Software	
1	EZ-EMC Ver. ATL-03A1-1
2	EZ-EMC Ver ATL-ITC-3A1-1

3.3. Configuration of Test System Details

Conducted Emissions



Radiated Emissions



Devices Description					
	Product	Manufacturer	Model Number	Serial Number	Power Cord
(1)	Notebook	DELL	LAPTITU	6699565657	Non-Shielded, 0.8m
(2)	HDD	WD	My Passport	WX21A33S7013	Power by EUT



3.4. Test Site Environment

Items	Required (IEC 60068-1)	Actual
Temperature (°C)	15-35	26
Humidity (%RH)	25-75	60
Barometric pressure (mbar)	860-1060	950

4 AC Power Line Conducted Emission Measurement

4.1. Limit

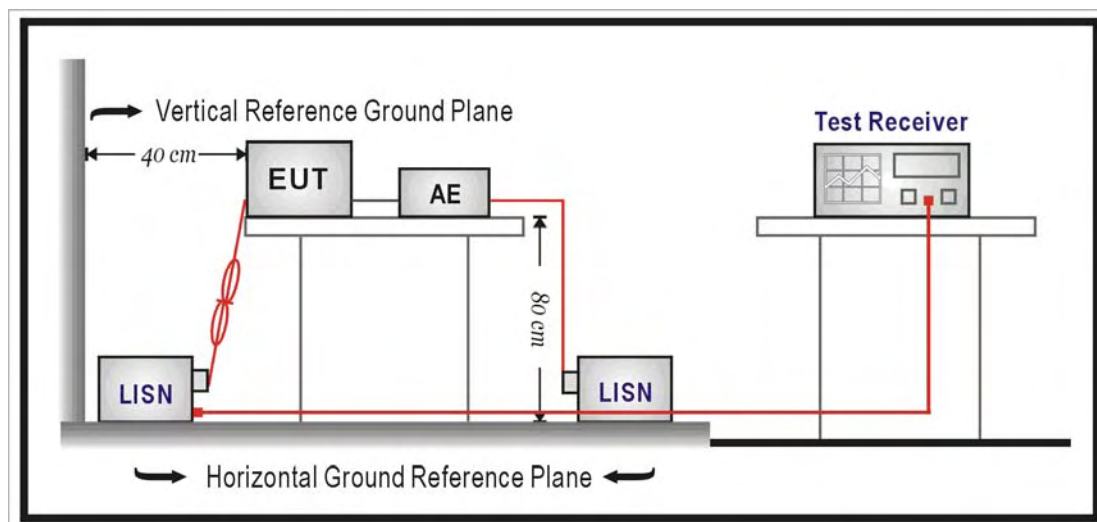
Frequency (MHz)	Quasi-peak	Average
0.15 - 0.5	66 to 56	56 to 46
0.50 - 5.0	56	46
5.0 - 30.0	60	50

4.2. Test Instruments

Describe	Manufacturer	Model Number	Serial Number	Cal. Date	Cal. Period
Test Receiver	R&S	ESCI	100367	06/25/2015	1 year
LISN	R&S	ENV216	101040	03/15/2016	1 year
LISN	R&S	ENV216	101041	03/07/2016	1 year
RF Cable	Woken	00100D1380194M	TE-02-02	06/26/2015	1 year
Test Site	ATL	TE02	TE02	N.C.R.	-----

Note: N.C.R. = No Calibration Request.

4.3. Test Setup



4.4. Test Procedure

The EUT and simulators are connected to the main power through a line impedance stabilization network (L.I.S.N.). This provides a $50\Omega // 50\mu\text{H}$ coupling impedance for the measuring equipment. The peripheral devices are also connected to the main power through a LISN that provides a $50\Omega // 50\mu\text{H}$ coupling impedance with 50ohm termination.

Tabletop device shall be placed on a non-conducting platform, of nominal size 1 m by 1.5 m, raised 80 cm above the reference ground plane. The wall of screened room shall be located 40cm to the rear of the EUT. Other surfaces of tabletop or floor standing EUT shall be at least 80cm from any other ground conducting surface including one or more LISNs. For floor-standing device shall be placed under the EUT with a 12mm insulating material.

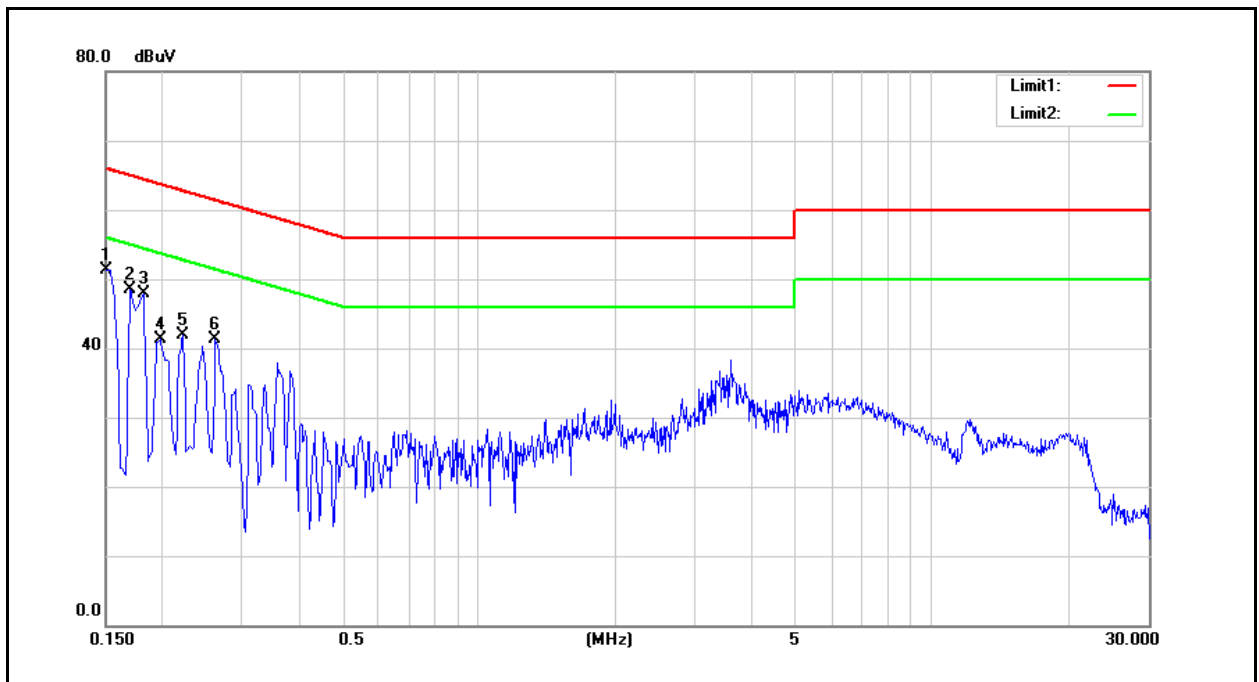
Conducted emissions were investigated over the frequency range from 0.15 MHz to 30 MHz using a resolution bandwidth of 9 kHz. The equipment under test (EUT) shall be meet the limits in section 4.1, as applicable, including the average limit and the quasi-peak limit when using respectively, an average detector and quasi-peak detector measured in accordance with the methods described of related standard. When all of peak value were complied with quasi-peak and average limit from 150kHz to 30MHz then quasi-peak and average measurement was unnecessary.

The AMN shall be placed 0,8 m from the boundary of the unit under test and bonded to a ground reference plane for AMNs mounted on top of the ground reference plane. This distance is between the closest points of the AMN and the EUT. All other units of the EUT and associated equipment shall be at least 0,8 m from the AMN. If the mains power cable is longer than 1m then the cable shall be folded back and forth at the centre of the lead to form a bundle no longer than 0.4m. All of interconnecting cables that hang closer than 40cm to the ground plane shall be folded back and forth in the center forming a bundle 30 cm to 40 cm long. All of EUT and AE shall be separate place more than 0.1m. All 50 Ω ports of the LISN shall be resistively terminated into 50 Ω loads when not connected to the measuring instrument.

If the reading of the measuring receiver shows fluctuations close to the limit, the reading shall be observed for at least 15 s at each measurement frequency; the higher reading shall be recorded with the exception of any brief isolated high reading which shall be ignored.

4.5. Test Result

Standard:	FCC Part 15C	Line:	L1
Test item:	Conducted Emission	Power:	AC 120V/60Hz
Model Number:	VR-3060u	Temp.(°C)/Hum.(%RH):	26(°C)/60%RH
Mode:	Mode 1	Date:	04/29/2016
		Test By:	Eric Ou Yang
Description:			



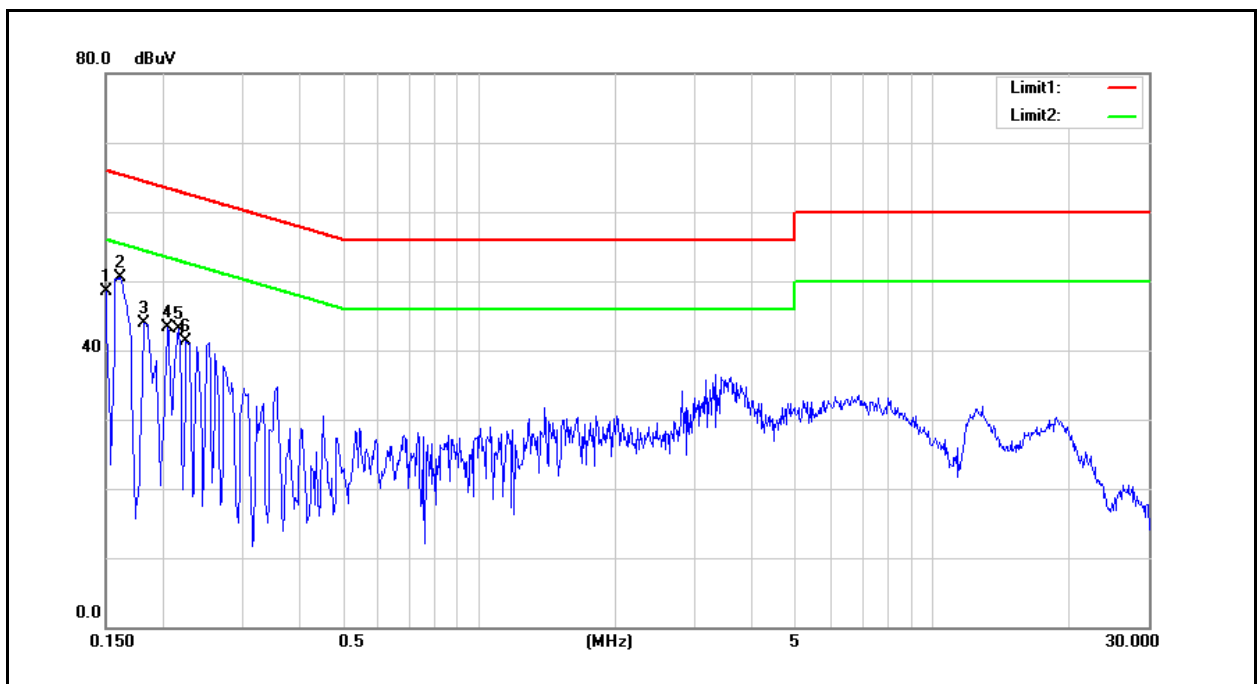
No.	Frequency (MHz)	QP reading (dBuV)	AVG reading (dBuV)	Correction factor (dB)	QP result (dBuV)	AVG result (dBuV)	QP limit (dBuV)	AVG limit (dBuV)	QP margin (dB)	AVG margin (dB)	Remark
1	0.1500	42.08	25.75	9.60	51.68	35.35	66.00	56.00	-14.32	-20.65	Pass
2	0.1700	36.10	20.06	9.60	45.70	29.66	64.96	54.96	-19.26	-25.30	Pass
3	0.1820	36.67	20.62	9.59	46.26	30.21	64.39	54.39	-18.13	-24.18	Pass
4	0.1980	31.35	21.12	9.59	40.94	30.71	63.69	53.69	-22.75	-22.98	Pass
5	0.2220	31.63	18.47	9.59	41.22	28.06	62.74	52.74	-21.52	-24.68	Pass
6	0.2620	29.36	17.50	9.60	38.96	27.10	61.37	51.37	-22.41	-24.27	Pass

Note: 1. Result (dBuV) = Correction factor (dB) + Reading(dBuV).

2. Correction factor (dB) = Cable loss (dB) + L.I.S.N. factor (dB).



Standard:	FCC Part 15C	Line:	N
Test item:	Conducted Emission	Power:	AC 120V/60Hz
Model Number:	VR-3060u	Temp.(°C)/Hum.(%RH):	26(°C)/60%RH
Mode:	Mode 1	Date:	04/29/2016
		Test By:	Eric Ou Yang
Description:			



No.	Frequency (MHz)	QP reading (dBuV)	AVG reading (dBuV)	Correction factor (dB)	QP result (dBuV)	AVG result (dBuV)	QP limit (dBuV)	AVG limit (dBuV)	QP margin (dB)	AVG margin (dB)	Remark
1	0.1500	40.36	25.44	9.59	49.95	35.03	66.00	56.00	-16.05	-20.97	Pass
2	0.1620	38.52	20.77	9.59	48.11	30.36	65.36	55.36	-17.25	-25.00	Pass
3	0.1820	36.22	19.58	9.58	45.80	29.16	64.39	54.39	-18.59	-25.23	Pass
4	0.2060	33.60	17.18	9.58	43.18	26.76	63.37	53.37	-20.19	-26.61	Pass
5	0.2180	29.88	14.37	9.58	39.46	23.95	62.89	52.89	-23.43	-28.94	Pass
6	0.2260	30.75	17.78	9.58	40.33	27.36	62.60	52.60	-22.27	-25.24	Pass

Note: 1. Result (dBuV) = Correction factor (dB) + Reading(dBuV).

2. Correction factor (dB) = Cable loss (dB) + L.I.S.N. factor (dB).



5 Radiated Emission Measurement

5.1. Limit

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 ($\mu\text{V}/\text{m}$ at meter)	Measurement Distance (meters)
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

** 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.

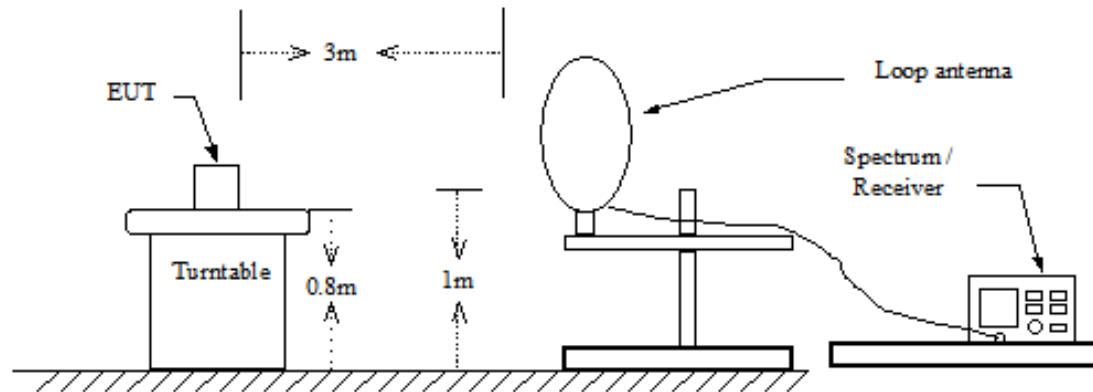
5.2. Test Instruments

3 Meter Chamber					
Equipment	Manufacturer	Model Number	Serial Number	Cal. Date	Cal. Period
RF Pre-selector	Agilent	N9039A	MY46520256	01/08/2016	1 year
Spectrum Analyzer	Agilent	E4446A	MY46180578	01/08/2016	1 year
Pre Amplifier	Agilent	8449B	3008A02237	10/07/2015	1 year
Pre Amplifier	Agilent	8447D	2944A11119	01/11/2016	1 year
Broadband Antenna	Schwarzbeck	VULB9168	416	09/25/2015	1 year
Horn Antenna (1~18GHz)	SCHWARZBECK MESS-ELEKTRONIK	BBHA9120D	9120D-550	06/12/2015	1 year
Horn Antenna (18~40GHz)	ETS	3116	86467	09/01/2015	1 year
Loop Antenna	COM-POWER CORPORATION	AL-130	121014	02/01/2016	1 year
Microwave Cable	EMCI	EMC102-KM-KM-14000	151001	10/15/2015	1 year
Microwave Cable	EMCI	EMC-104-SM-SM-14000	140202	10/15/2015	1 year
Microwave Cable	EMCI	EMC104-SM-SM-600	140301	10/15/2015	1 year
Test Site	ATL	TE01	888001	08/27/2015	1 year

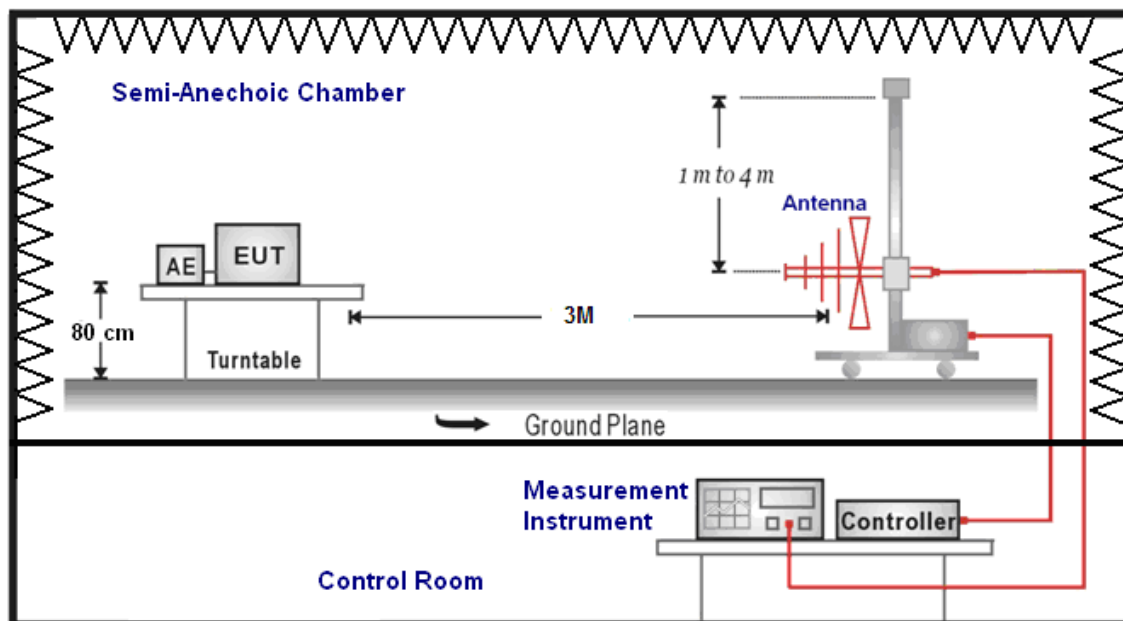
Note: N.C.R. = No Calibration Request.

5.3. Setup

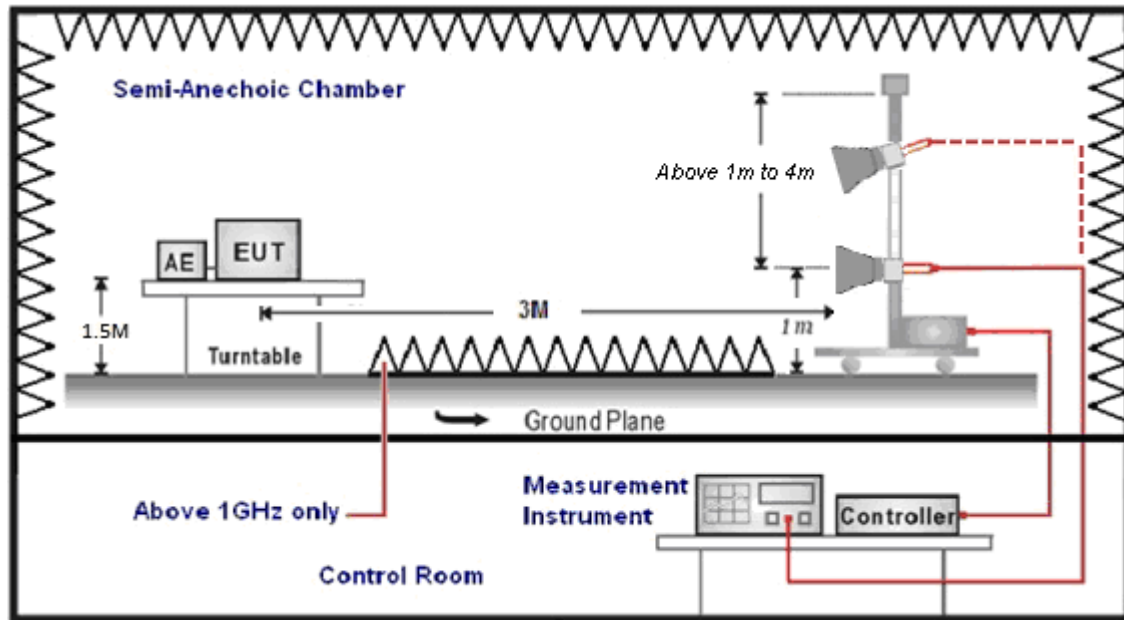
9kHz ~ 30MHz



Below 1GHz



Above 1GHz



5.4. Test Procedure

Final radiation measurements were made on a three-meter, Semi Anechoic Chamber. The EUT system was placed on a nonconductive turntable which is 0.8 or 1.5 meters height (below 1GHz use 0.8m turntable / above 1GHz use 1.5m turntable), top surface 1.0 x 1.5 meter. The spectrum was examined from 250 MHz to 2.5 GHz in order to cover the whole spectrum below 10th harmonic which could generate from the EUT. During the test, EUT was set to transmit continuously & Measurements spectrum range from 9 kHz to 26.5 GHz is investigated.

For measurements below 1 GHz the resolution bandwidth is set to 100 kHz for peak detection measurements or 120 kHz for quasi-peak detection measurements. Peak detection is used unless otherwise noted as quasi-peak.

For measurements above 1 GHz the resolution bandwidth is set to 1 MHz, and then the video bandwidth is set to 1 MHz for peak measurements and 10 Hz for average measurements when Duty cycle >0.98 / $1/T$ for average measurements when Duty cycle <0.98 . A nonconductive material surrounded the EUT to supporting the EUT for standing on three orthogonal planes. At each condition, the EUT was rotated 360 degrees, and the antenna was raised and lowered from one to four meters to find the maximum emission levels. Measurements were taken using both horizontal and vertical antenna polarization.

SCHWARZBECK MESS-ELEKTRONIK Biconilog Antenna at 3 Meter and the SCHWARZBECK Double Ridged Guide Antenna was used in frequencies 1 –26.5 GHz at a distance of 3 meter. The antenna at an angle toward the source of the emission. All test results were extrapolated to equivalent signal at 3 meters utilizing an inverse linear distance extrapolation Factor (20dB/decade).

For testing above 1GHz, the emission level of the EUT in peak mode was 20dB lower than average limit (that means the emission level in peak mode also complies with the limit in average mode), then testing will be stopped and peak values of EUT will be reported, otherwise, the emissions will be measured in average mode again and reported.

Appropriate preamplifiers were used for improving sensitivity and precautions were taken to avoid overloading or desensitizing the spectrum analyzer. No post – detector video filters were used in the test.

The spectrum analyzer's 6 dB bandwidth was set to 1 MHz, and the analyzer was operated in the peak detection mode, for frequencies both below and up 1 GHz. The average levels were obtained by subtracting the duty cycle correction factor from the peak readings.

The following procedures were used to convert the emission levels measured in decibels referenced to 1 microvolt (dBuV) into field intensity in micro volts per meter (uV/m).

The actual field intensity in decibels referenced to 1 microvolt in to field intensity in micro volts per meter (dBuV/m).



The actual field intensity in referenced to 1 microvolt per meter (dBuV/m) is determined by algebraically adding the measured reading in dBuV, the antenna factor (dB), and cable loss (dB) and Subtracting the gain of preamplifier (dB) is auto calculate in spectrum analyzer.

(1) $\text{Amplitude (dBuV/m)} = \text{FI (dBuV)} + \text{AF (dBuV)} + \text{CL (dBuV)} - \text{Gain (dB)}$

FI= Reading of the field intensity.

AF= Antenna factor.

CL= Cable loss.

P.S Amplitude is auto calculate in spectrum analyzer.

(2) $\text{Actual Amplitude (dBuV/m)} = \text{Amplitude (dBuV)} - \text{Dis(dB)}$

The FCC specified emission limits were calculated according the EUT operating frequency and by following linear interpolation equations:

(a) For fundamental frequency : Transmitter Output < +30dBm

(b) For spurious frequency : Spurious emission limits = fundamental emission limit /10

Data of measurement within this frequency range without mark 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.



5.5. Test Result

Below 1GHz

Standard:		FCC Part 15C		Test Distance:		3m	
Test item:		Radiated Emission		Power:		AC 120V/60Hz	
Model Number:		VR-3060u		Temp.(°C)/Hum.(%RH):		26(°C)/60%RH	
Mode:		Mode 1		Date:		05/24/2016	
				Test By:		Eric Ou Yang	
Frequency (MHz)	Reading (dBuV)	Correct Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark	Ant.Polar. H / V
184.0000	39.38	-6.65	32.73	43.50	-10.77	QP	H
248.5000	39.32	-5.37	33.95	46.00	-12.05	QP	H
421.0000	37.80	-1.06	36.74	46.00	-9.26	QP	H
472.0000	39.79	0.23	40.02	46.00	-5.98	QP	H
675.5000	28.24	4.28	32.52	46.00	-13.48	QP	H
872.0000	29.78	8.01	37.79	46.00	-8.21	QP	H
247.0000	39.35	-5.46	33.89	46.00	-12.11	QP	V
293.5000	29.19	-3.59	25.60	46.00	-20.40	QP	V
442.5000	36.26	-0.39	35.87	46.00	-10.13	QP	V
506.5000	27.55	0.84	28.39	46.00	-17.61	QP	V
702.0000	27.49	4.70	32.19	46.00	-13.81	QP	V
883.0000	25.35	8.24	33.59	46.00	-12.41	QP	V

Note:1.Result (dBuV) = Correction factor (dB) + Reading(dBuV).

2.Correction factor (dB/m) = Antenna Factor (dB/m) + Cable loss (dB) – Pre-Amplifier gain (dB).

3.No emission found between lowest internal used/generated frequencies to 30MHz (9 kHz~30MHz).

**Above 1GHz**

Standard:	FCC Part 15C			Test Distance:	3m		
Test item:	Radiated Emission			Power:	AC 120V/60Hz		
Model Number:	VR-3060u			Temp.(°C)/Hum.(%RH):	26(°C)/60%RH		
Mode:	Mode 2			Date:	04/29/2016		
Frequency:	2412MHz			Test By:	Eric Ou Yang		
Frequency (MHz)	Reading (dBuV)	Correct Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark	Ant.Polar. H / V
4824.000	59.48	-7.86	51.62	74.00	-22.38	peak	H
7236.000	52.28	-1.01	51.27	74.00	-22.73	peak	H
4824.000	63.85	-7.86	55.99	74.00	-18.01	peak	V
4824.000	61.32	-7.86	53.46	54.00	-0.54	AVG	V
7236.000	56.36	-1.01	55.35	74.00	-18.65	peak	V
7236.000	54.02	-1.01	53.01	54.00	-0.99	AVG	V
9648.000	51.48	3.65	55.13	74.00	-18.87	peak	V
9648.000	48.75	3.65	52.40	54.00	-1.60	AVG	V

Standard:	FCC Part 15C			Test Distance:	3m		
Test item:	Radiated Emission			Power:	AC 120V/60Hz		
Model Number:	VR-3060u			Temp.(°C)/Hum.(%RH):	26(°C)/60%RH		
Mode:	Mode 2			Date:	04/29/2016		
Frequency:	2437MHz			Test By:	Eric Ou Yang		
Frequency (MHz)	Reading (dBuV)	Correct Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark	Ant.Polar. H / V
4874.000	58.98	-7.70	51.28	74.00	-22.72	peak	H
4874.000	64.45	-7.70	56.75	74.00	-17.25	peak	V
4874.000	61.21	-7.70	53.51	54.00	-0.49	AVG	V
7311.000	59.07	-0.69	58.38	74.00	-15.62	peak	V
7311.000	53.79	-0.69	53.10	54.00	-0.90	AVG	V
9748.000	52.01	3.80	55.81	74.00	-18.19	peak	V
9748.000	48.51	3.80	52.31	54.00	-1.69	AVG	V

Note:1.Result (dBuV/m) = Correction factor (dB/m) + Reading(dBuV).

2.Correction factor (dB/m) = Antenna Factor (dB/m) + Cable loss (dB) – Pre-Amplifier gain (dB).



Standard:	FCC Part 15C			Test Distance:	3m		
Test item:	Radiated Emission			Power:	AC 120V/60Hz		
Model Number:	VR-3060u			Temp.(°C)/Hum.(%RH):	26(°C)/60%RH		
Mode:	Mode 2			Date:	04/29/2016		
Frequency:	2462MHz			Test By:	Eric Ou Yang		
Frequency (MHz)	Reading (dBuV)	Correct Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark	Ant.Polar. H / V
4924.000	58.52	-7.55	50.97	74.00	-23.03	peak	H
7386.000	51.45	-0.37	51.08	74.00	-22.92	peak	H
4924.000	63.17	-7.55	55.62	74.00	-18.38	peak	V
4924.000	60.89	-7.55	53.34	54.00	-0.66	AVG	V
7386.000	57.66	-0.37	57.29	74.00	-16.71	peak	V
7386.000	53.15	-0.37	52.78	54.00	-1.22	AVG	V
9848.000	53.83	3.95	57.78	74.00	-16.22	peak	V
9848.000	48.17	3.95	52.12	54.00	-1.88	AVG	V

Standard:	FCC Part 15C			Test Distance:	3m		
Test item:	Radiated Emission			Power:	AC 120V/60Hz		
Model Number:	VR-3060u			Temp.(°C)/Hum.(%RH):	26(°C)/60%RH		
Mode:	Mode 3			Date:	04/29/2016		
Frequency:	2412MHz			Test By:	Eric Ou Yang		
Frequency (MHz)	Reading (dBuV)	Correct Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark	Ant.Polar. H / V
4824.000	53.73	-7.86	45.87	74.00	-28.13	peak	H
4824.000	55.72	-7.86	47.86	74.00	-26.14	peak	V
7236.000	51.46	-1.01	50.45	74.00	-23.55	peak	V

Note:1.Result (dBuV/m) = Correction factor (dB/m) + Reading(dBuV).

2.Correction factor (dB/m) = Antenna Factor (dB/m) + Cable loss (dB) – Pre-Amplifier gain (dB).



Standard:	FCC Part 15C			Test Distance:	3m		
Test item:	Radiated Emission			Power:	AC 120V/60Hz		
Model Number:	VR-3060u			Temp.(°C)/Hum.(%RH):	26(°C)/60%RH		
Mode:	Mode 3			Date:	04/29/2016		
Frequency:	2437MHz			Test By:	Eric Ou Yang		
Frequency (MHz)	Reading (dBuV)	Correct Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark	Ant.Polar. H / V
4874.000	54.94	-7.70	47.24	74.00	-26.76	peak	H
7311.000	52.01	-0.69	51.32	74.00	-22.68	peak	H
7311.000	59.34	-0.69	58.65	74.00	-15.35	peak	V
7311.000	45.85	-0.69	45.16	54.00	-8.84	peak	V

Standard:	FCC Part 15C			Test Distance:	3m		
Test item:	Radiated Emission			Power:	AC 120V/60Hz		
Model Number:	VR-3060u			Temp.(°C)/Hum.(%RH):	26(°C)/60%RH		
Mode:	Mode 3			Date:	04/29/2016		
Frequency:	2462MHz			Test By:	Eric Ou Yang		
Frequency (MHz)	Reading (dBuV)	Correct Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark	Ant.Polar. H / V
4924.000	50.66	-7.55	43.11	74.00	-30.89	peak	H
4924.000	53.98	-7.55	46.43	74.00	-27.57	peak	V
7386.000	51.19	-0.37	50.82	74.00	-23.18	peak	V

Note:1.Result (dBuV/m) = Correction factor (dB/m) + Reading(dBuV).

2.Correction factor (dB/m) = Antenna Factor (dB/m) + Cable loss (dB) – Pre-Amplifier gain (dB).



Standard:	FCC Part 15C			Test Distance:	3m		
Test item:	Radiated Emission			Power:	AC 120V/60Hz		
Model Number:	VR-3060u			Temp.(°C)/Hum.(%RH):	26(°C)/60%RH		
Mode:	Mode 4			Date:	04/29/2016		
Frequency:	2412MHz			Test By:	Eric Ou Yang		
Frequency (MHz)	Reading (dBuV)	Correct Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark	Ant.Polar. H / V
4824.000	50.69	-7.86	42.83	74.00	-31.17	peak	H
4824.000	56.45	-7.86	48.59	74.00	-25.41	peak	V

Standard:	FCC Part 15C			Test Distance:	3m		
Test item:	Radiated Emission			Power:	AC 120V/60Hz		
Model Number:	VR-3060u			Temp.(°C)/Hum.(%RH):	26(°C)/60%RH		
Mode:	Mode 4			Date:	04/29/2016		
Frequency:	2437MHz			Test By:	Eric Ou Yang		
Frequency (MHz)	Reading (dBuV)	Correct Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark	Ant.Polar. H / V
4874.000	57.33	-7.70	49.63	74.00	-24.37	peak	H
4874.000	58.93	-7.70	51.23	74.00	-22.77	peak	V
7311.000	58.32	-0.69	57.63	74.00	-16.37	peak	V
7311.000	54.36	-0.69	53.67	54.00	-0.33	AVG	V

Standard:		FCC Part 15C		Test Distance:		3m	
Test item:		Radiated Emission		Power:		AC 120V/60Hz	
Model Number:		VR-3060u		Temp.(℃)/Hum.(%RH):		26(℃)/60%RH	
Mode:		Mode 4		Date:		04/29/2016	
Frequency:		2462MHz		Test By:		Eric Ou Yang	
Frequency (MHz)	Reading (dBuV)	Correct Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark	Ant.Polar. H / V
4924.000	50.07	-7.55	42.52	74.00	-31.48	peak	H
4924.000	52.20	-7.55	44.65	74.00	-29.35	peak	V

Note:1.Result (dBuV/m) = Correction factor (dB/m) + Reading(dBuV).

2.Correction factor (dB/m) = Antenna Factor (dB/m) + Cable loss (dB) – Pre-Amplifier gain (dB).



Standard:	FCC Part 15C			Test Distance:	3m		
Test item:	Radiated Emission			Power:	AC 120V/60Hz		
Model Number:	VR-3060u			Temp.(°C)/Hum.(%RH):	26(°C)/60%RH		
Mode:	Mode 5			Date:	04/29/2016		
Frequency:	2422MHz			Test By:	Eric Ou Yang		
Frequency (MHz)	Reading (dBuV)	Correct Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark	Ant.Polar. H / V
4844.000	48.49	-7.78	40.71	74.00	-33.29	peak	H
4844.000	53.12	-7.78	45.34	74.00	-28.66	peak	V

Standard:	FCC Part 15C			Test Distance:	3m		
Test item:	Radiated Emission			Power:	AC 120V/60Hz		
Model Number:	VR-3060u			Temp.(°C)/Hum.(%RH):	26(°C)/60%RH		
Mode:	Mode 5			Date:	04/29/2016		
Frequency:	2437MHz			Test By:	Eric Ou Yang		
Frequency (MHz)	Reading (dBuV)	Correct Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark	Ant.Polar. H / V
4874.000	49.41	-7.70	41.71	74.00	-32.29	peak	H
4874.000	53.80	-7.70	46.10	74.00	-27.90	peak	V

Standard:		FCC Part 15C		Test Distance:		3m	
Test item:		Radiated Emission		Power:		AC 120V/60Hz	
Model Number:		VR-3060u		Temp.(℃)/Hum.(%RH):		26(℃)/60%RH	
Mode:		Mode 5		Date:		04/29/2016	
Frequency:		2452MHz		Test By:		Eric Ou Yang	
Frequency (MHz)	Reading (dBuV)	Correct Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark	Ant.Polar. H / V
4904.000	49.82	-7.60	42.22	74.00	-31.78	peak	H
4904.000	50.40	-7.60	42.80	74.00	-31.20	peak	V

Note:1.Result (dBuV/m) = Correction factor (dB/m) + Reading(dBuV).

2.Correction factor (dB/m) = Antenna Factor (dB/m) + Cable loss (dB) – Pre-Amplifier gain (dB).



Standard:		FCC Part 15C		Test Distance:		3m	
Test item:		Radiated Emission		Power:		AC 120V/60Hz	
Model Number:		VR-3060u		Temp.(℃)/Hum.(%RH):		26(℃)/60%RH	
Mode:		Simultaneous Transmitting		Date:		06/20/2016	
(DTS+NII)				Test By:		Eric Ou Yang	
Frequency (MHz)	Reading (dBuV)	Correct Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark	Ant.Polar. H / V
2751.000	49.31	-13.59	35.72	74.00	-38.28	peak	H
4230.000	47.49	-9.43	38.06	74.00	-35.94	peak	H
7511.000	44.21	0.13	44.34	74.00	-29.66	peak	H
2785.000	50.79	-13.50	37.29	74.00	-36.71	peak	H
4247.000	47.23	-9.38	37.85	74.00	-36.15	peak	H
7613.000	45.86	0.39	46.25	74.00	-27.75	peak	H

Note:1.Result (dBuV/m) = Correction factor (dB/m) + Reading(dBuV).

2. Correction factor (dB/m) = Antenna Factor (dB/m) + Cable loss (dB) – Pre-Amplifier gain (dB).

**Band Edge**

Standard:	FCC Part 15C			Test Distance:	3m		
Test item:	Radiated Emission			Power:	AC 120V/60Hz		
Model Number:	VR-3060u			Temp.(°C)/Hum.(%RH):	26(°C)/60%RH		
Mode:	Mode 2			Date:	05/23/2016		
Frequency:	2412 MHz			Test By:	Eric Ou Yang		
Frequency (MHz)	Reading (dBuV)	Correct Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark	Ant.Polar. H / V
2381.940	55.37	-0.25	55.12	74.00	-18.88	peak	H
2381.940	43.72	-0.25	43.47	54.00	-10.53	AVG	H
2390.000	54.83	-0.22	54.61	74.00	-19.39	peak	H
2390.000	44.18	-0.22	43.96	54.00	-10.04	AVG	H
2386.120	62.58	-0.24	62.34	74.00	-11.66	peak	V
2386.120	51.84	-0.24	51.60	54.00	-2.40	AVG	V
2390.000	61.57	-0.22	61.35	74.00	-12.65	peak	V
2390.000	53.73	-0.22	53.51	54.00	-0.49	AVG	V

Note:1.Result (dBuV/m) = Correction factor (dB/m) + Reading(dBuV).

2.Correction factor (dB/m) = Antenna Factor (dB/m) + Cable loss (dB) – Pre-Amplifier gain (dB).



Standard:	FCC Part 15C			Test Distance:	3m		
Test item:	Radiated Emission			Power:	AC 120V/60Hz		
Model Number:	VR-3060u			Temp.(°C)/Hum.(%RH):	26(°C)/60%RH		
Mode:	Mode 2			Date:	05/23/2016		
Frequency:	2437 MHz			Test By:	Eric Ou Yang		
Frequency (MHz)	Reading (dBuV)	Correct Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark	Ant.Polar. H / V
2357.500	54.79	-0.34	54.45	74.00	-19.55	peak	H
2357.500	43.93	-0.34	43.59	54.00	-10.41	AVG	H
2390.000	51.35	-0.22	51.13	74.00	-22.87	peak	H
2483.500	55.32	0.14	55.46	74.00	-18.54	peak	H
2483.500	43.87	0.14	44.01	54.00	-9.99	AVG	H
2484.990	58.01	0.14	58.15	74.00	-15.85	peak	H
2484.990	43.57	0.14	43.71	54.00	-10.29	AVG	H
2372.510	61.74	-0.28	61.46	74.00	-12.54	peak	V
2372.510	52.47	-0.28	52.19	54.00	-1.81	AVG	V
2390.000	60.37	-0.22	60.15	74.00	-13.85	peak	V
2390.000	53.53	-0.22	53.31	54.00	-0.69	AVG	V
2483.500	64.65	0.14	64.79	74.00	-9.21	peak	V
2483.500	53.30	0.14	53.44	54.00	-0.56	AVG	V
2497.340	66.98	0.19	67.17	74.00	-6.83	peak	V
2497.340	52.78	0.19	52.97	54.00	-1.03	AVG	V

Note:1.Result (dBuV/m) = Correction factor (dB/m) + Reading(dBuV).

2.Correction factor (dB/m) = Antenna Factor (dB/m) + Cable loss (dB) – Pre-Amplifier gain (dB).



Standard:	FCC Part 15C			Test Distance:	3m		
Test item:	Radiated Emission			Power:	AC 120V/60Hz		
Model Number:	VR-3060u			Temp.(°C)/Hum.(%RH):	26(°C)/60%RH		
Mode:	Mode 2			Date:	05/23/2016		
Frequency:	2462 MHz			Test By:	Eric Ou Yang		
Frequency (MHz)	Reading (dBuV)	Correct Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark	Ant.Polar. H / V
2483.500	53.84	0.14	53.98	74.00	-20.02	peak	H
2483.500	44.05	0.14	44.19	54.00	-9.81	AVG	H
2485.160	56.58	0.14	56.72	74.00	-17.28	peak	H
2485.160	43.91	0.14	44.05	54.00	-9.95	AVG	H
2483.500	63.76	0.14	63.90	74.00	-10.10	peak	V
2483.500	53.48	0.14	53.62	54.00	-0.38	AVG	V
2484.640	65.54	0.14	65.68	74.00	-8.32	peak	V
2484.640	53.01	0.14	53.15	54.00	-0.85	AVG	V

Note:1.Result (dBuV/m) = Correction factor (dB/m) + Reading(dBuV).

2.Correction factor (dB/m) = Antenna Factor (dB/m) + Cable loss (dB) – Pre-Amplifier gain (dB).



Standard:	FCC Part 15C	Test Distance:	3m
Test item:	Radiated Emission	Power:	AC 120V/60Hz
Model Number:	VR-3060u	Temp.(°C)/Hum.(%RH):	26(°C)/60%RH
Mode:	Mode 3	Date:	05/23/2016
Frequency:	2412 MHz	Test By:	Eric Ou Yang

Frequency (MHz)	Reading (dBuV)	Correct Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark	Ant.Polar. H / V
2387.880	62.28	-0.22	62.06	74.00	-11.94	peak	H
2387.880	45.98	-0.22	45.76	54.00	-8.24	AVG	H
2390.000	61.84	-0.22	61.62	74.00	-12.38	peak	H
2390.000	47.19	-0.22	46.97	54.00	-7.03	AVG	H
2389.420	72.43	-0.22	72.21	74.00	-1.79	peak	V
2389.420	53.30	-0.22	53.08	54.00	-0.92	AVG	V
2390.000	71.97	-0.22	71.75	74.00	-2.25	peak	V
2390.000	53.58	-0.22	53.36	54.00	-0.64	AVG	V

Note:1.Result (dBuV/m) = Correction factor (dB/m) + Reading(dBuV).

2.Correction factor (dB/m) = Antenna Factor (dB/m) + Cable loss (dB) – Pre-Amplifier gain (dB).



Standard:	FCC Part 15C			Test Distance:	3m		
Test item:	Radiated Emission			Power:	AC 120V/60Hz		
Model Number:	VR-3060u			Temp.(°C)/Hum.(%RH):	26(°C)/60%RH		
Mode:	Mode 3			Date:	05/23/2016		
Frequency:	2437 MHz			Test By:	Eric Ou Yang		
Frequency (MHz)	Reading (dBuV)	Correct Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark	Ant.Polar. H / V
2362.630	55.24	-0.33	54.91	74.00	-19.09	peak	H
2362.630	45.90	-0.33	45.57	54.00	-8.43	AVG	H
2390.000	51.41	-0.22	51.19	74.00	-22.81	peak	H
2483.500	53.36	0.14	53.50	74.00	-20.50	peak	H
2483.500	53.36	0.14	53.50	54.00	-0.50	AVG	H
2484.610	54.52	0.14	54.66	74.00	-19.34	peak	H
2484.610	45.07	0.14	45.21	54.00	-8.79	AVG	H
2357.690	63.05	-0.34	62.71	74.00	-11.29	peak	V
2357.690	53.23	-0.34	52.89	54.00	-1.11	AVG	V
2390.000	61.81	-0.22	61.59	74.00	-12.41	peak	V
2390.000	53.61	-0.22	53.39	54.00	-0.61	AVG	V
2483.500	63.83	0.14	63.97	74.00	-10.03	peak	V
2483.500	53.33	0.14	53.47	54.00	-0.53	AVG	V
2486.130	66.17	0.14	66.31	74.00	-7.69	peak	V
2486.130	53.11	0.14	53.25	54.00	-0.75	AVG	V

Note:1.Result (dBuV/m) = Correction factor (dB/m) + Reading(dBuV).

2.Correction factor (dB/m) = Antenna Factor (dB/m) + Cable loss (dB) – Pre-Amplifier gain (dB).



Standard:	FCC Part 15C			Test Distance:	3m		
Test item:	Radiated Emission			Power:	AC 120V/60Hz		
Model Number:	VR-3060u			Temp.(°C)/Hum.(%RH):	26(°C)/60%RH		
Mode:	Mode 3			Date:	05/23/2016		
Frequency:	2462 MHz			Test By:	Eric Ou Yang		
Frequency (MHz)	Reading (dBuV)	Correct Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark	Ant.Polar. H / V
2483.500	57.57	0.14	57.71	74.00	-16.29	peak	H
2483.500	44.69	0.14	44.83	54.00	-9.17	AVG	H
2484.160	63.58	0.14	63.72	74.00	-10.28	peak	H
2484.160	44.41	0.14	44.55	54.00	-9.45	AVG	H
2483.500	70.55	0.14	70.69	74.00	-3.31	peak	V
2483.500	53.28	0.14	53.42	54.00	-0.58	AVG	V
2483.600	73.44	0.14	73.58	74.00	-0.42	peak	V
2483.600	53.25	0.14	53.39	54.00	-0.61	AVG	V

Note:1.Result (dBuV/m) = Correction factor (dB/m) + Reading(dBuV).

2.Correction factor (dB/m) = Antenna Factor (dB/m) + Cable loss (dB) – Pre-Amplifier gain (dB).



Standard:	FCC Part 15C			Test Distance:	3m		
Test item:	Radiated Emission			Power:	AC 120V/60Hz		
Model Number:	VR-3060u			Temp.(°C)/Hum.(%RH):	26(°C)/60%RH		
Mode:	Mode 4			Date:	05/23/2016		
Frequency:	2412 MHz			Test By:	Eric Ou Yang		
Frequency (MHz)	Reading (dBuV)	Correct Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark	Ant.Polar. H / V
2389.640	62.98	-0.22	62.76	74.00	-11.24	peak	H
2389.640	46.19	-0.22	45.97	54.00	-8.03	AVG	H
2390.000	58.73	-0.22	58.51	74.00	-15.49	peak	H
2390.000	46.26	-0.22	46.04	54.00	-7.96	AVG	H
2388.540	71.80	-0.22	71.58	74.00	-2.42	peak	V
2388.540	53.05	-0.22	52.83	54.00	-1.17	AVG	V
2390.000	70.83	-0.22	70.61	74.00	-3.39	peak	V
2390.000	53.90	-0.22	53.68	54.00	-0.32	AVG	V

Note:1.Result (dBuV/m) = Correction factor (dB/m) + Reading(dBuV).

2.Correction factor (dB/m) = Antenna Factor (dB/m) + Cable loss (dB) – Pre-Amplifier gain (dB).



Standard:		FCC Part 15C		Test Distance:		3m	
Test item:		Radiated Emission		Power:		AC 120V/60Hz	
Model Number:		VR-3060u		Temp.(℃)/Hum.(%RH):		26(℃)/60%RH	
Mode:		Mode 4		Date:		05/23/2016	
Frequency:		2437 MHz		Test By:		Eric Ou Yang	
Frequency (MHz)	Reading (dBuV)	Correct Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark	Ant.Polar. H / V
2364.910	57.72	-0.31	57.41	74.00	-16.59	peak	H
2364.910	46.23	-0.31	45.92	54.00	-8.08	AVG	H
2390.000	52.71	-0.22	52.49	74.00	-21.51	peak	H
2390.000	44.53	-0.22	44.31	54.00	-9.69	AVG	H
2483.500	53.11	0.14	53.25	74.00	-20.75	peak	H
2483.500	43.42	0.14	43.56	54.00	-10.44	AVG	H
2486.320	56.34	0.14	56.48	74.00	-17.52	peak	H
2486.320	43.57	0.14	43.71	54.00	-10.29	AVG	H
2358.070	65.67	-0.34	65.33	74.00	-8.67	peak	V
2358.070	53.72	-0.34	53.38	54.00	-0.62	AVG	V
2390.000	62.45	-0.22	62.23	74.00	-11.77	peak	V
2390.000	50.12	-0.22	49.90	54.00	-4.10	AVG	V
2483.500	64.22	0.14	64.36	74.00	-9.64	peak	V
2483.500	53.23	0.14	53.37	54.00	-0.63	AVG	V
2485.180	65.09	0.14	65.23	74.00	-8.77	peak	V
2485.180	52.59	0.14	52.73	54.00	-1.27	AVG	V

Note:1.Result (dBuV/m) = Correction factor (dB/m) + Reading(dBuV).

2.Correction factor (dB/m) = Antenna Factor (dB/m) + Cable loss (dB) – Pre-Amplifier gain (dB).



Standard:	FCC Part 15C			Test Distance:	3m		
Test item:	Radiated Emission			Power:	AC 120V/60Hz		
Model Number:	VR-3060u			Temp.(°C)/Hum.(%RH):	26(°C)/60%RH		
Mode:	Mode 4			Date:	05/23/2016		
Frequency:	2462 MHz			Test By:	Eric Ou Yang		
Frequency (MHz)	Reading (dBuV)	Correct Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark	Ant.Polar. H / V
2483.500	55.46	0.14	55.60	74.00	-18.40	peak	H
2483.500	44.01	0.14	44.15	54.00	-9.85	AVG	H
2484.000	59.64	0.14	59.78	74.00	-14.22	peak	H
2484.000	43.95	0.14	44.09	54.00	-9.91	AVG	H
2483.500	70.14	0.14	70.28	74.00	-3.72	peak	V
2483.500	53.45	0.14	53.59	54.00	-0.41	AVG	V
2484.000	72.35	0.14	72.49	74.00	-1.51	peak	V
2484.000	53.06	0.14	53.20	54.00	-0.80	AVG	V

Note:1.Result (dBuV/m) = Correction factor (dB/m) + Reading(dBuV).

2.Correction factor (dB/m) = Antenna Factor (dB/m) + Cable loss (dB) – Pre-Amplifier gain (dB).



Standard:	FCC Part 15C			Test Distance:	3m		
Test item:	Radiated Emission			Power:	AC 120V/60Hz		
Model Number:	VR-3060u			Temp.(°C)/Hum.(%RH):	26(°C)/60%RH		
Mode:	Mode 5			Date:	04/29/2016		
Frequency:	2422 MHz			Test By:	Eric Ou Yang		
Frequency (MHz)	Reading (dBuV)	Correct Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark	Ant.Polar. H / V
2386.560	61.16	-0.23	60.93	74.00	-13.07	peak	H
2386.560	44.59	-0.23	44.36	54.00	-9.64	AVG	H
2390.000	57.52	-0.22	57.30	74.00	-16.70	peak	H
2390.000	44.93	-0.22	44.71	54.00	-9.29	AVG	H
2386.800	72.98	-0.22	72.76	74.00	-1.24	peak	V
2386.800	52.07	-0.22	51.85	54.00	-2.15	AVG	V
2390.000	69.18	-0.22	68.96	74.00	-5.04	peak	V
2390.000	53.53	-0.22	53.31	54.00	-0.69	AVG	V

Note:1.Result (dBuV/m) = Correction factor (dB/m) + Reading(dBuV).

2.Corrected factor (dB/m) = Antenna Factor (dB/m) + Cable loss (dB) – Pre-Amplifier gain (dB).



Standard:	FCC Part 15C			Test Distance:	3m		
Test item:	Radiated Emission			Power:	AC 120V/60Hz		
Model Number:	VR-3060u			Temp.(°C)/Hum.(%RH):	26(°C)/60%RH		
Mode:	Mode 5			Date:	04/29/2016		
Frequency:	2437 MHz			Test By:	Eric Ou Yang		
Frequency (MHz)	Reading (dBuV)	Correct Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark	Ant.Polar. H / V
2384.670	58.16	-0.24	57.92	74.00	-16.08	peak	H
2384.670	44.14	-0.24	43.90	54.00	-10.10	AVG	H
2390.000	56.82	-0.22	56.60	74.00	-17.40	peak	H
2390.000	44.90	-0.22	44.68	54.00	-9.32	AVG	H
2483.500	54.51	0.14	54.65	74.00	-19.35	peak	H
2483.500	44.73	0.14	44.87	54.00	-9.13	AVG	H
2483.850	56.40	0.14	56.54	74.00	-17.46	peak	H
2483.850	44.46	0.14	44.60	54.00	-9.40	AVG	H
2381.630	70.44	-0.25	70.19	74.00	-3.81	peak	V
2381.630	51.02	-0.25	50.77	54.00	-3.23	AVG	V
2390.000	67.45	-0.22	67.23	74.00	-6.77	peak	V
2390.000	53.58	-0.22	53.36	54.00	-0.64	AVG	V
2483.500	69.23	0.14	69.37	74.00	-4.63	peak	V
2483.500	53.37	0.14	53.51	54.00	-0.49	AVG	V
2491.450	71.67	0.17	71.84	74.00	-2.16	peak	V
2491.450	51.15	0.17	51.32	54.00	-2.68	AVG	V

Note:1.Result (dBuV/m) = Correction factor (dB/m) + Reading(dBuV).

2.Correction factor (dB/m) = Antenna Factor (dB/m) + Cable loss (dB) – Pre-Amplifier gain (dB).



Standard:	FCC Part 15C			Test Distance:	3m		
Test item:	Radiated Emission			Power:	AC 120V/60Hz		
Model Number:	VR-3060u			Temp.(°C)/Hum.(%RH):	26(°C)/60%RH		
Mode:	Mode 5			Date:	04/29/2016		
Frequency:	2452 MHz			Test By:	Eric Ou Yang		
Frequency (MHz)	Reading (dBuV)	Correct Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark	Ant.Polar. H / V
2483.500	52.76	0.14	52.90	74.00	-21.10	peak	H
2483.500	44.01	0.14	44.15	54.00	-9.85	AVG	H
2483.550	57.40	0.14	57.54	74.00	-16.46	peak	H
2483.550	43.96	0.14	44.10	54.00	-9.90	AVG	H
2483.500	65.06	0.14	65.20	74.00	-8.80	peak	V
2483.500	53.14	0.14	53.28	54.00	-0.72	AVG	V
2485.650	66.72	0.14	66.86	74.00	-7.14	peak	V
2485.650	52.52	0.14	52.66	54.00	-1.34	AVG	V

Note:1.Result (dBuV/m) = Correction factor (dB/m) + Reading(dBuV).

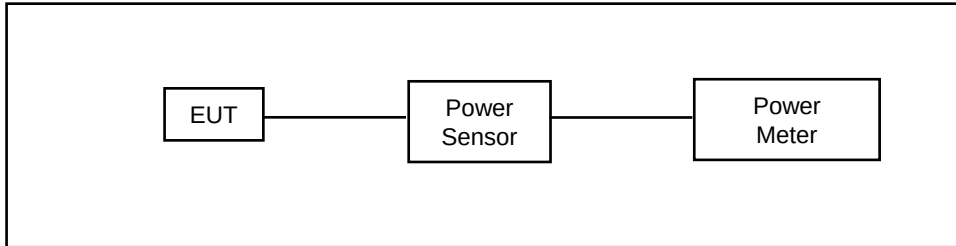
2.Correction factor (dB/m) = Antenna Factor (dB/m) + Cable loss (dB) – Pre-Amplifier gain (dB).

6 Maximum Conducted Output Power Measurement

6.1. Limit

For systems using digital modulation in the 2400-2483.5MHz, the limit for maximum output power is 30dBm.

6.2. Test Setup



6.3. Test Instruments

Equipment	Manufacturer	Model Number	Serial Number	Cal. Date	Cal. Period
Power Sensor	Anritsu	MA2411B	1126022	08/24/2015	1 year
Power Meter	Anritsu	ML2495A	1135009	08/24/2015	1 year
Microwave Cable	EMCI	EMC104-SM-SM-1500	140303	02/23/2016	1 year
Test Site	ATL	TE05	TE05	N.C.R.	-----

Note: N.C.R. = No Calibration Request.

6.4. Test Procedure

The tests below are run with the EUT's transmitter set at high power in TX mode. The EUT is needed to force selection of output power level and channel number. While testing, EUT was set to transmit continuously. Remove the Subjective device's antenna and connect the RF output port to power sensor.



6.5. Test Result

Test Item	Maximum Conducted Output Power						
Date of Test	04/29/2016						
ANT-0							
Test Mode	Frequency (MHz)	Data Rate	Average Output Power		Peak Output Power		
			Measurement Results		Measurement Results		Limit
			(dBm)	(W)	(dBm)	(W)	(dBm)
Mode 2	2412	1M	25.75	0.376	29.35	0.861	< 30
	2437		25.45	0.351	28.99	0.793	< 30
	2462		25.37	0.344	28.90	0.776	< 30
	2437	2M	25.44	0.350	28.98	0.791	< 30
	2437	5.5M	25.42	0.348	28.97	0.789	< 30
	2437	11M	25.41	0.348	28.95	0.785	< 30
Mode 3	2412	6M	21.03	0.127	29.83	0.962	< 30
	2437		20.85	0.122	29.68	0.929	< 30
	2462		20.55	0.114	29.50	0.891	< 30
	2437	9M	20.83	0.121	29.65	0.923	< 30
	2437	12M	20.82	0.121	29.63	0.918	< 30
	2437	18M	20.79	0.120	29.60	0.912	< 30
	2437	24M	20.78	0.120	29.59	0.910	< 30
	2437	36M	20.76	0.119	29.55	0.902	< 30
	2437	48M	20.75	0.119	29.53	0.897	< 30
	2437	54M	20.72	0.118	29.51	0.893	< 30

Note: The relevant measured result has the offset with cable loss already.



Test Item	Maximum Conducted Output Power						
Date of Test	04/29/2016						
ANT-0							
Test Mode	Frequency (MHz)	Data Rate	Average Output Power		Peak Output Power		
			Measurement Results		Measurement Results		Limit
			(dBm)	(W)	(dBm)	(W)	(dBm)
Mode 4	2412	13M	16.88	0.049	26.81	0.480	< 30
	2437		16.85	0.048	26.71	0.469	< 30
	2462		16.67	0.046	26.52	0.449	< 30
	2437	26M	16.82	0.048	26.68	0.466	< 30
	2437	39M	16.79	0.048	26.66	0.463	< 30
	2437	52M	16.76	0.047	26.63	0.460	< 30
	2437	78M	16.74	0.047	26.61	0.458	< 30
	2437	104M	16.71	0.047	26.58	0.455	< 30
	2437	117M	16.66	0.046	26.54	0.451	< 30
	2437	130M	16.63	0.046	26.50	0.447	< 30
Mode 5	2422	27M	16.42	0.044	25.78	0.378	< 30
	2437		16.95	0.050	26.57	0.454	< 30
	2452		16.35	0.043	25.71	0.372	< 30
	2437	54M	16.91	0.049	26.53	0.450	< 30
	2437	81M	16.88	0.049	26.50	0.447	< 30
	2437	108M	16.85	0.048	26.47	0.444	< 30
	2437	162M	16.82	0.048	26.45	0.442	< 30
	2437	216M	16.78	0.048	26.41	0.438	< 30
	2437	243M	16.75	0.047	26.38	0.435	< 30
	2437	270M	16.71	0.047	26.31	0.428	< 30

Note: The relevant measured result has the offset with cable loss already.



Test Item	Maximum Conducted Output Power						
Date of Test	04/29/2016						
ANT-1							
Test Mode	Frequency (MHz)	Data Rate	Average Output Power		Peak Output Power		
			Measurement Results		Measurement Results		Limit
			(dBm)	(W)	(dBm)	(W)	(dBm)
Mode 4	2412	13M	16.62	0.046	26.59	0.456	< 30
	2437		16.83	0.048	26.68	0.466	< 30
	2462		16.41	0.044	26.28	0.425	< 30
	2437	26M	16.79	0.048	26.62	0.459	< 30
	2437	39M	16.78	0.048	26.59	0.456	< 30
	2437	52M	16.75	0.047	26.56	0.453	< 30
	2437	78M	16.70	0.047	26.54	0.451	< 30
	2437	104M	16.66	0.046	26.51	0.448	< 30
	2437	117M	16.61	0.046	26.46	0.443	< 30
	2437	130M	16.59	0.046	26.43	0.440	< 30
Mode 5	2422	27M	16.34	0.043	25.66	0.368	< 30
	2437		17.22	0.053	26.75	0.473	< 30
	2452		16.27	0.042	25.59	0.362	< 30
	2437	54M	17.18	0.052	26.71	0.469	< 30
	2437	81M	17.17	0.052	26.67	0.465	< 30
	2437	108M	17.12	0.052	26.64	0.461	< 30
	2437	162M	17.08	0.051	26.62	0.459	< 30
	2437	216M	17.00	0.050	26.59	0.456	< 30
	2437	243M	16.93	0.049	26.55	0.452	< 30
	2437	270M	16.88	0.049	26.50	0.447	< 30

Note: The relevant measured result has the offset with cable loss already.



Test Item	Maximum Conducted Output Power						
Date of Test	04/29/2016						
ANT-0+1							
Test Mode	Frequency (MHz)	Data Rate	Average Output Power		Peak Output Power		
			Measurement Results		Measurement Results		Limit
			(dBm)	(W)	(dBm)	(W)	(dBm)
Mode 4	2412	13M	19.76	0.095	29.71	0.936	< 30
	2437		19.85	0.097	29.71	0.934	< 30
	2462		19.55	0.090	29.41	0.873	< 30
	2437	26M	19.82	0.096	29.66	0.925	< 30
	2437	39M	19.80	0.095	29.64	0.919	< 30
	2437	52M	19.77	0.095	29.61	0.913	< 30
	2437	78M	19.73	0.094	29.59	0.909	< 30
	2437	104M	19.70	0.093	29.56	0.903	< 30
	2437	117M	19.65	0.092	29.51	0.893	< 30
	2437	130M	19.62	0.092	29.48	0.886	< 30
Mode 5	2422	27M	19.39	0.087	28.73	0.747	< 30
	2437		20.10	0.102	29.67	0.927	< 30
	2452		19.32	0.086	28.66	0.735	< 30
	2437	54M	20.06	0.101	29.63	0.919	< 30
	2437	81M	20.04	0.101	29.60	0.911	< 30
	2437	108M	20.00	0.100	29.57	0.905	< 30
	2437	162M	19.96	0.099	29.55	0.901	< 30
	2437	216M	19.90	0.098	29.51	0.894	< 30
	2437	243M	19.85	0.097	29.48	0.886	< 30
	2437	270M	19.81	0.096	29.42	0.874	< 30

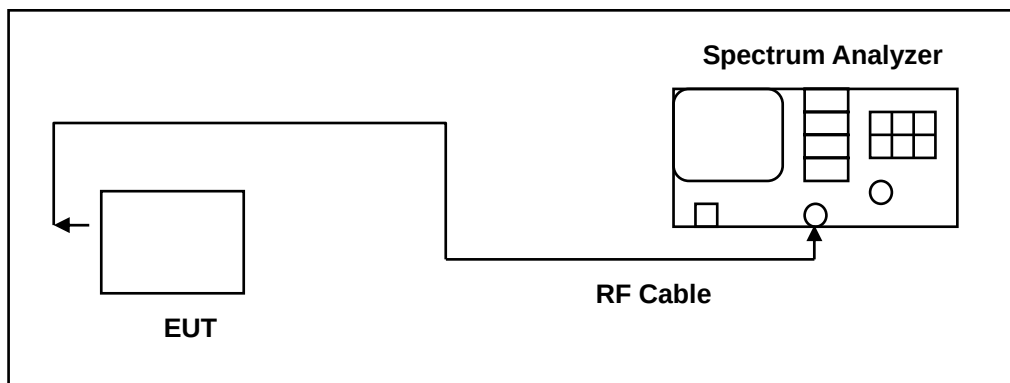
Note: The relevant measured result has the offset with cable loss already.

7 6dB RF Bandwidth Measurement

7.1. Limit

6dB RF Bandwidth: Systems using digital modulation techniques may operate in the 2400–2483.5 MHz bands. The minimum 6 dB band-width shall be at least 500 kHz.

7.2. Test Setup



7.3. Test Instruments

Equipment	Manufacturer	Model Number	Serial Number	Cal. Date	Cal. Period
Spectrum Analyzer	Agilent	E4445A	MY45300744	12/15/2015	1 year
Microwave Cable	EMCI	EMC104-SM-SM-1500	140303	02/23/2016	1 year
Test Site	ATL	TE05	TE05	N.C.R.	-----

Note: N.C.R. = No Calibration Request.

7.4. Test Procedure

The EUT tested to DTS test procedure of KDB558074D01 for compliance to FCC 47CFR 15.247 requirements.

6dB RF Bandwidth: The antenna port of the EUT was connected to the input of a spectrum analyzer. Analyzer RBW was set to 100 kHz. For each RF output channel investigated, the spectrum analyzer center frequency was set to the channel carrier. A peak output reading was taken, a DISPLAY line was drawn 6 dB lower than peak level. The 6 dB bandwidth was determined from where the channel output spectrum intersected the display line.

The test was performed at 3 channels (Channel low, middle, high)



7.5. Test Result

Test Item	6dB RF Bandwidth			
Date of Test	05/27/2016			
Test Mode	Frequency (MHz)	Measurement (kHz)		Limit (kHz)
		ANT-0	ANT-1	
Mode 2	2412	8112	---	> 500
	2437	8085	---	> 500
	2462	8118	---	> 500
Mode 3	2412	16430	---	> 500
	2437	16400	---	> 500
	2462	16400	---	> 500
Mode 4	2412	16940	17640	> 500
	2437	17600	17630	> 500
	2462	17640	17630	> 500
Mode 5	2422	35380	35710	> 500
	2437	35730	35470	> 500
	2452	35490	36070	> 500



7.6. Test Graphs

Mode 2: IEEE 802.11b link mode_ANT-0

2412 MHz



2437 MHz



2462 MHz



Mode 3: IEEE 802.11g link mode_ANT-0

2412 MHz



2437 MHz



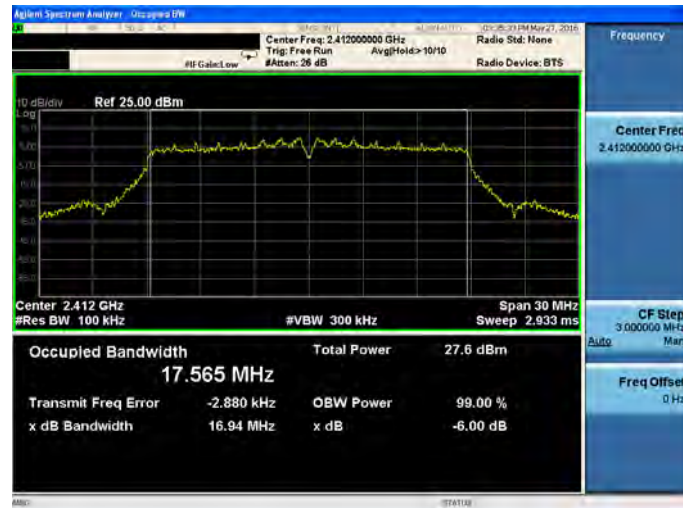
2462 MHz





Mode 4: IEEE 802.11n 2.4GHz 20MHz link mode _ANT-0

2412 MHz



2437 MHz



2462 MHz





Mode 5: IEEE 802.11n 2.4GHz 40MHz link mode _ANT-0

2422 MHz



2437 MHz



2452 MHz





Mode 4: IEEE 802.11n 2.4GHz 20MHz link mode _ANT-1

2412 MHz



2437 MHz



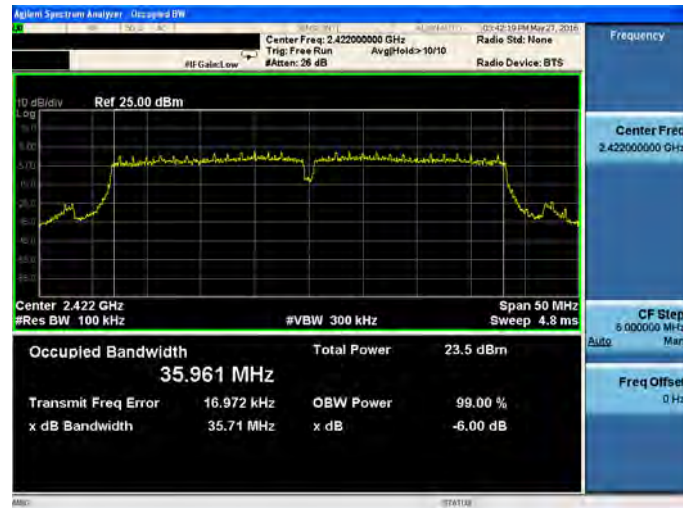
2462 MHz





Mode 5: IEEE 802.11n 2.4GHz 40MHz link mode _ANT-1

2422 MHz



2437 MHz



2452 MHz

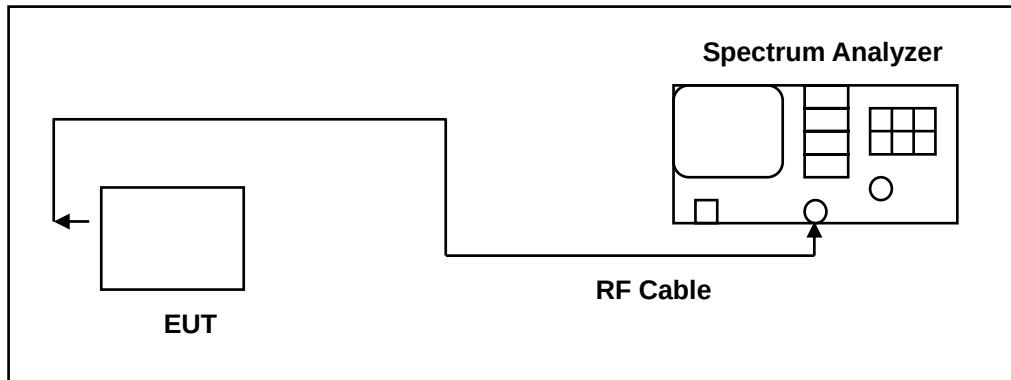


8 Maximum Power Density Measurement

8.1. Limit

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.

8.2. Test Setup



8.3. Test Instruments

Equipment	Manufacturer	Model Number	Serial Number	Cal. Date	Cal. Period
Spectrum Analyzer	Agilent	E4445A	MY45300744	12/15/2015	1 year
Microwave Cable	EMCI	EMC104-SM-SM-1500	140303	02/23/2016	1 year
Test Site	ATL	TE05	TE05	N.C.R.	-----

Note: N.C.R. = No Calibration Request.

8.4. Test Procedure

The EUT tested to DTS test procedure of KDB558074D01 for compliance to FCC 47CFR 15.247 requirements.

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.

8.5. Test Result

Test Item	Maximum Power Density				
Date of Test	06/01/2016				
Test Mode	Frequency (MHz)	Measurement (dBm/3KHz)			Limit (dBm/3KHz)
		ANT-0	ANT-1	ANT-0+1	
Mode 2	2412	3.946	---	---	< 8
	2437	3.436	---	---	< 8
	2462	3.548	---	---	< 8
Mode 3	2412	-3.842	---	---	< 8
	2437	-5.062	---	---	< 8
	2462	-5.071	---	---	< 8
Mode 4	2412	-8.424	-9.386	-5.868	< 8
	2437	-7.728	-10.277	-5.808	< 8
	2462	-8.853	-10.570	-6.617	< 8
Mode 5	2422	-12.088	-11.404	-8.722	< 8
	2437	-11.480	-12.245	-8.835	< 8
	2452	-11.269	-12.292	-8.740	< 8



8.6. Test Graphs

Mode 2: IEEE 802.11b link mode_ANT-0

2412 MHz



2437 MHz



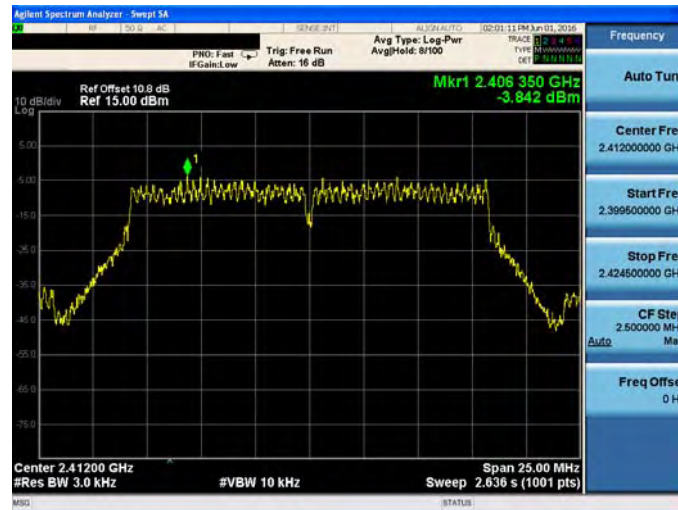
2462 MHz





Mode 3: IEEE 802.11g link mode_ANT-0

2412 MHz



2437 MHz



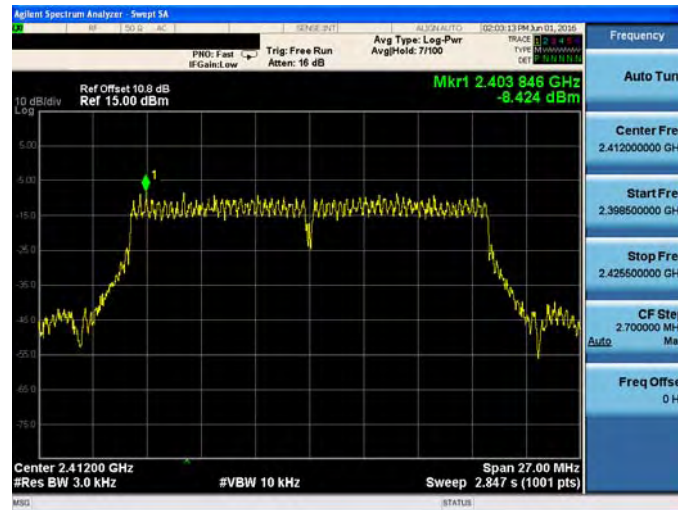
2462 MHz



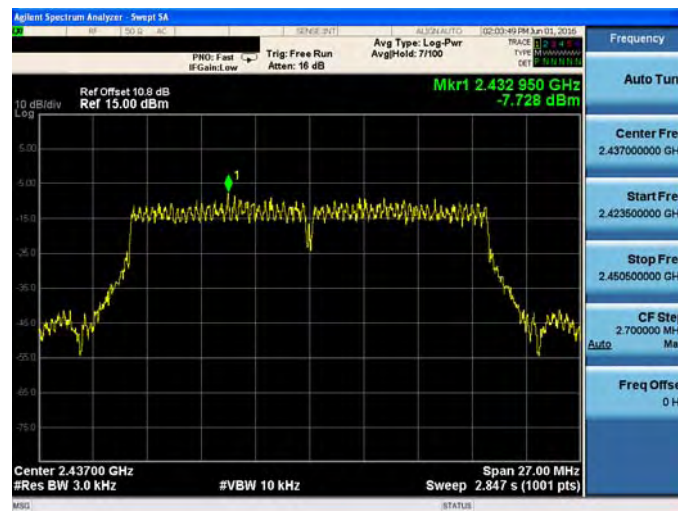


Mode 4: IEEE 802.11n 2.4GHz 20MHz link mode _ANT-0

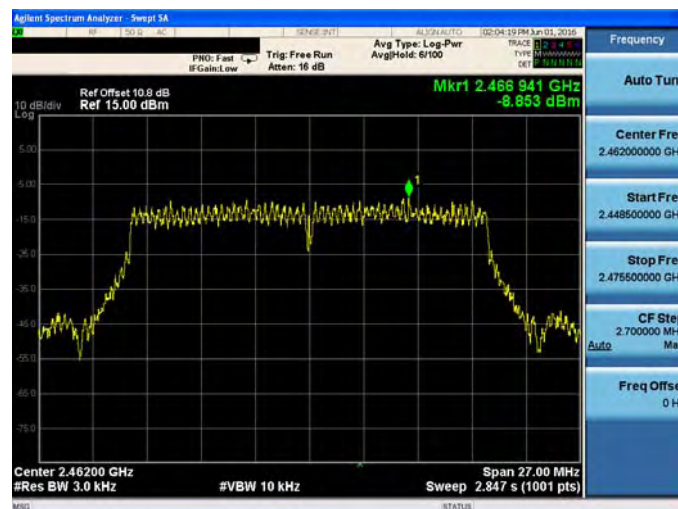
2412 MHz



2437 MHz



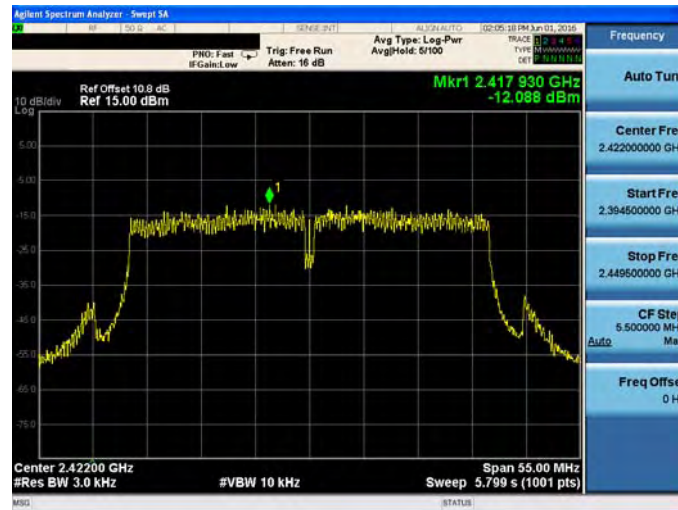
2462 MHz



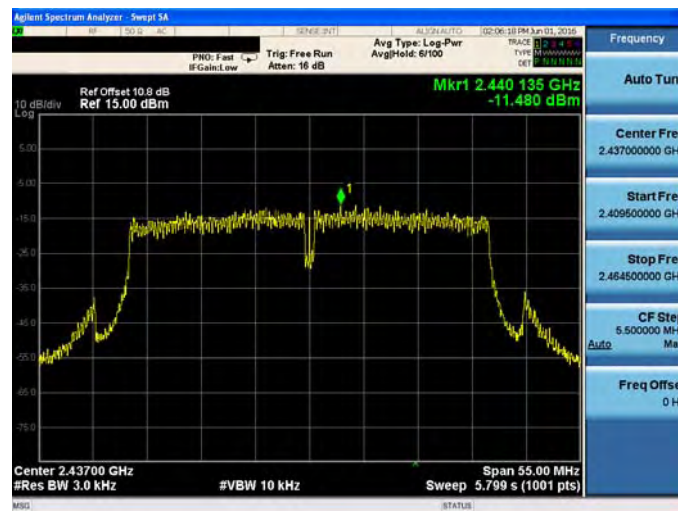


Mode 5: IEEE 802.11n 2.4GHz 40MHz link mode _ANT-0

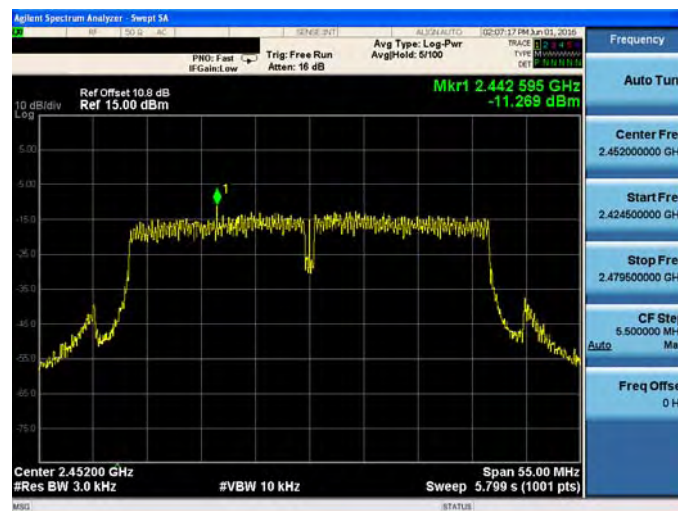
2422 MHz



2437 MHz



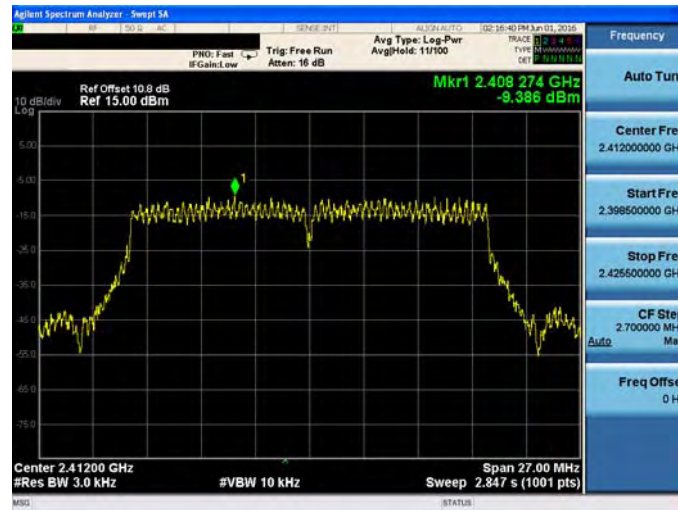
2452 MHz



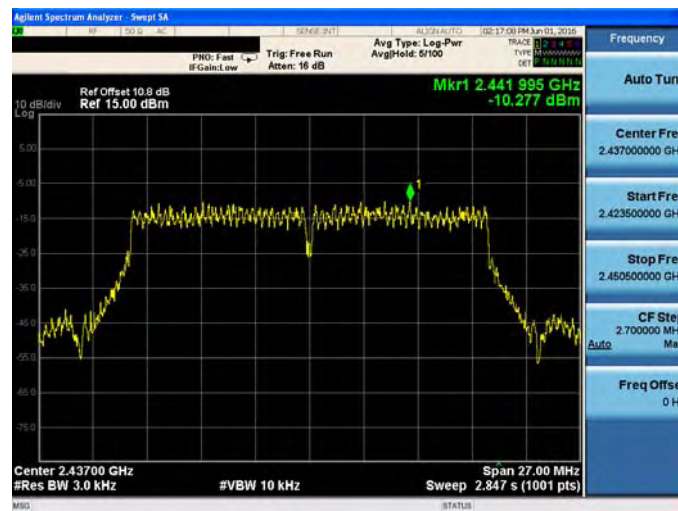


Mode 4: IEEE 802.11n 2.4GHz 20MHz link mode _ANT-1

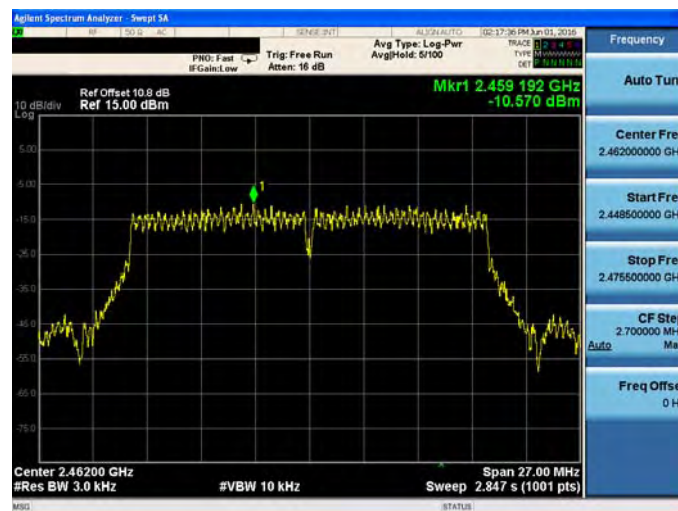
2412 MHz



2437 MHz



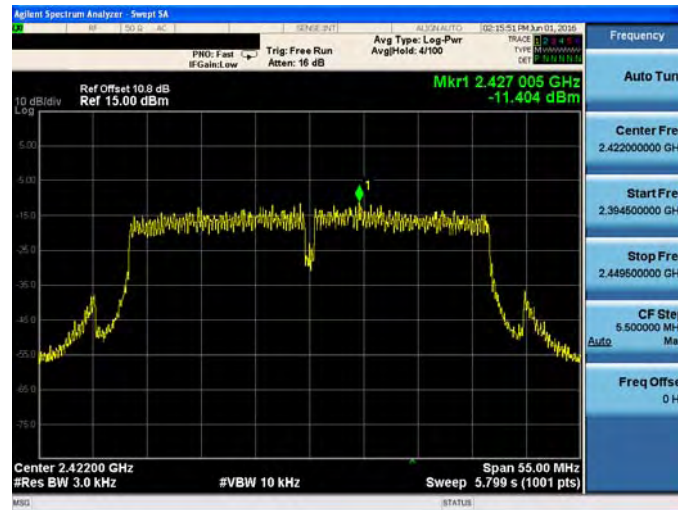
2462 MHz



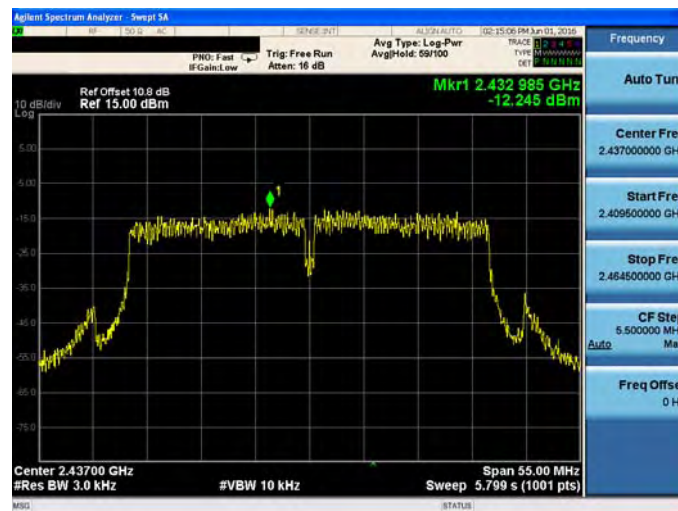


Mode 5: IEEE 802.11n 2.4GHz 40MHz link mode _ANT-1

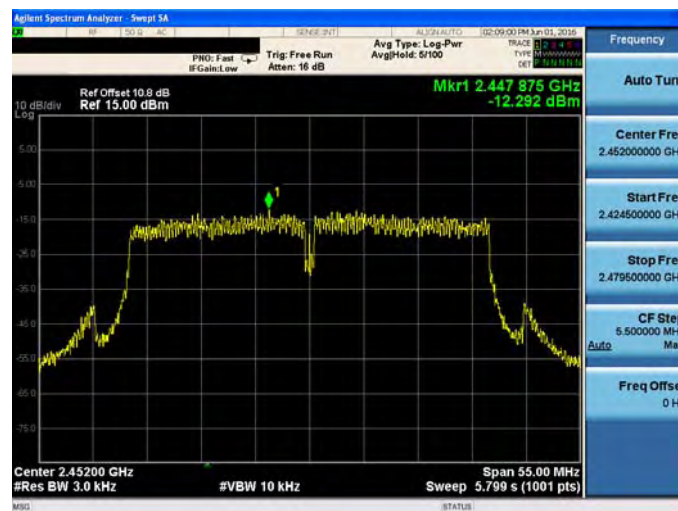
2422 MHz



2437 MHz



2452 MHz

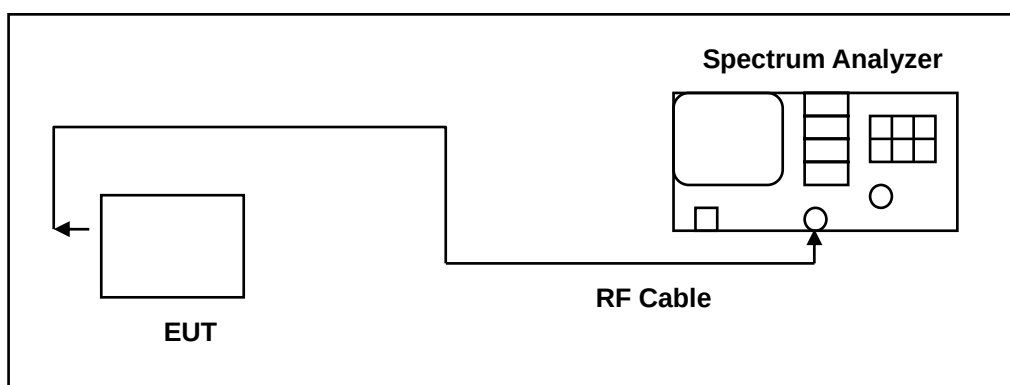


9 Out of Band Conducted Emissions Measurement

9.1. Limit

In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power

9.2. Test Setup



9.3. Test Instruments

Equipment	Manufacturer	Model Number	Serial Number	Cal. Date	Cal. Period
Spectrum Analyzer	Agilent	E4445A	MY45300744	12/15/2015	1 year
Spectrum Analyzer	Agilent	E4408B	MY45107753	07/27/2015	1 year
Microwave Cable	EMCI	EMC104-SM-SM-1500	140303	02/23/2016	1 year
Test Site	ATL	TE05	TE05	N.C.R.	-----

Note: N.C.R. = No Calibration Request.

9.4. Test Procedure

In any 100 kHz bandwidth outside the EUT pass band, the RF power produced by the modulation products of the spreading sequence, the information sequence, and the carrier frequency shall be at least 20 dB below that of the maximum in-band 100 kHz emission, antenna output of the EUT was coupled directly to spectrum analyzer; if an external attenuator and/or cable was used, these losses are compensated for with the analyzer OFFSET function. All other types of emissions from the EUT shall meet the general limits for radiated frequencies outside the pass band. The test was performed at 3 channels.

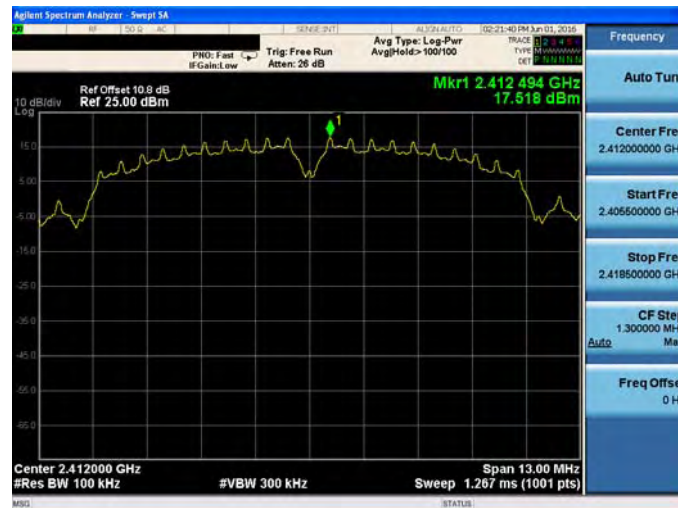


9.5. Test Graphs

Reference level

Mode 2: IEEE 802.11b link mode _ANT-0

2412 MHz



2437 MHz



2462 MHz





Mode 3: IEEE 802.11g link mode_ANT-0

2412 MHz



2437 MHz



2462 MHz





Mode 4: IEEE 802.11n 2.4GHz 20MHz link mode _ANT-0

2412 MHz



2437 MHz



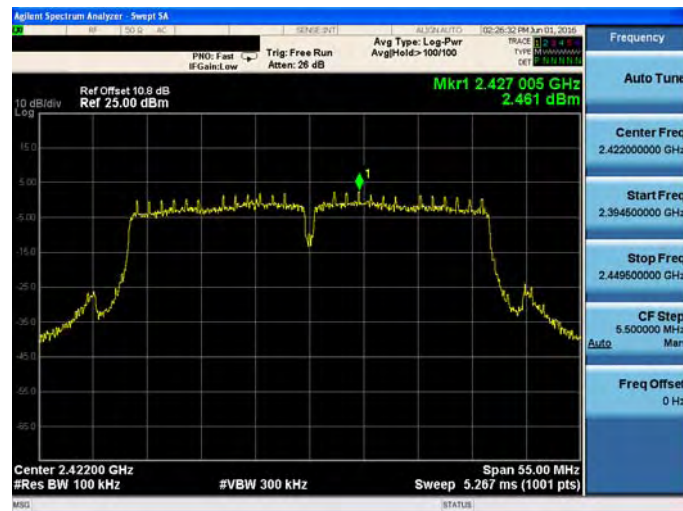
2462 MHz



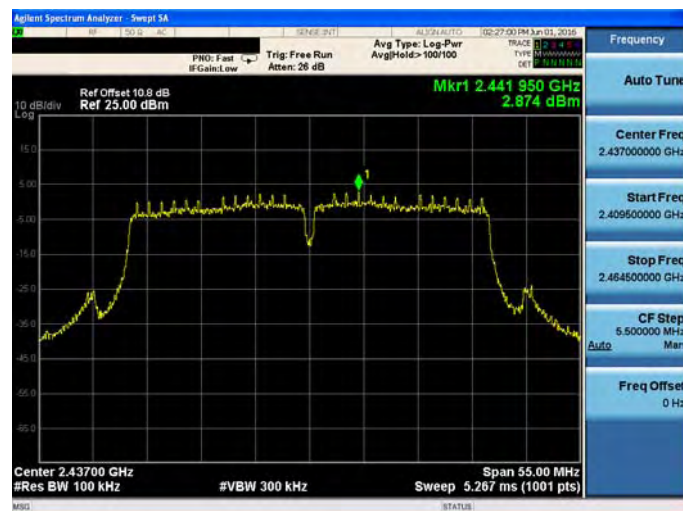


Mode 5: IEEE 802.11n 2.4GHz 40MHz link mode_ANT-0

2422 MHz



2437 MHz



2452 MHz





Mode 4: IEEE 802.11n 2.4GHz 20MHz link mode _ANT-1

2412 MHz



2437 MHz



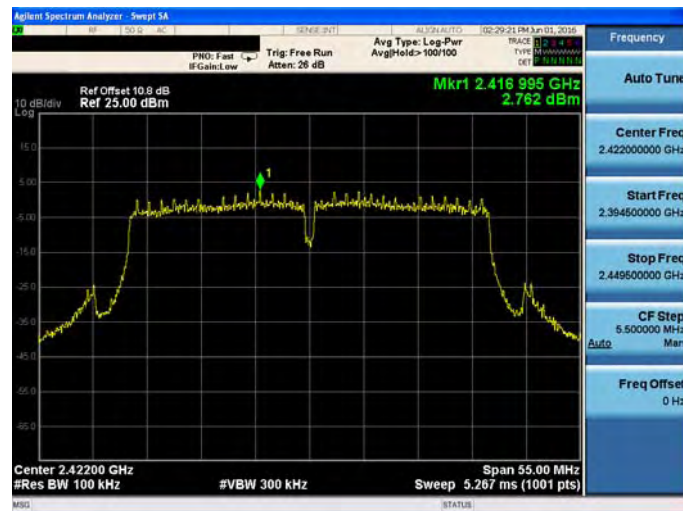
2462 MHz





Mode 5: IEEE 802.11n 2.4GHz 40MHz link mode_ANT-1

2422 MHz



2437 MHz



2452 MHz

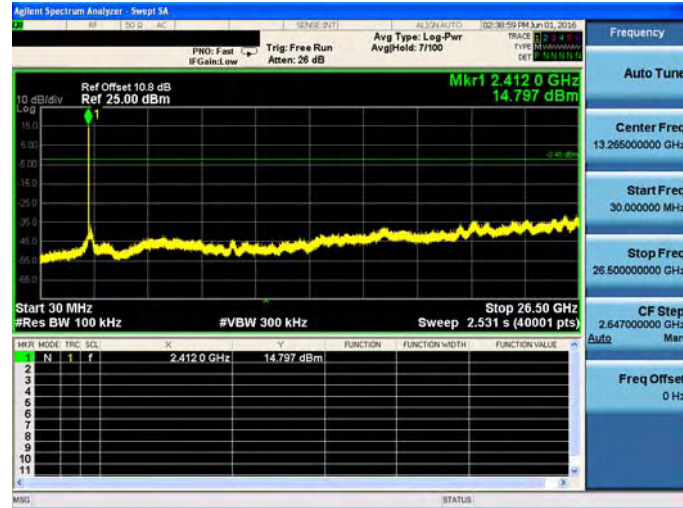




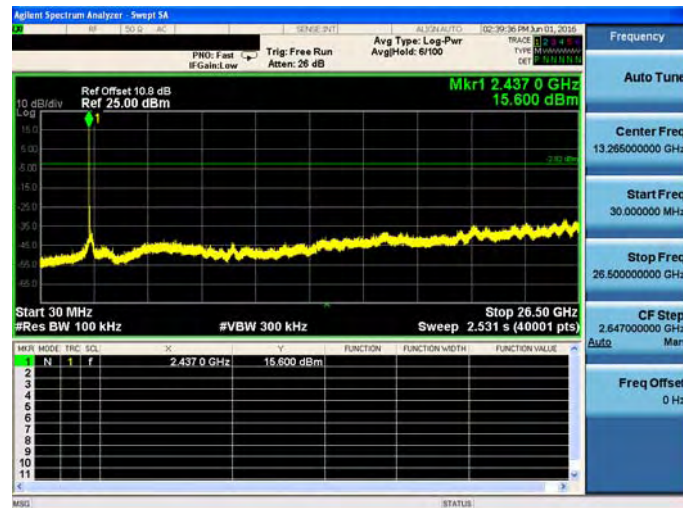
Out of Band Conducted Emissions

Mode 2: IEEE 802.11b link mode_ANT-0

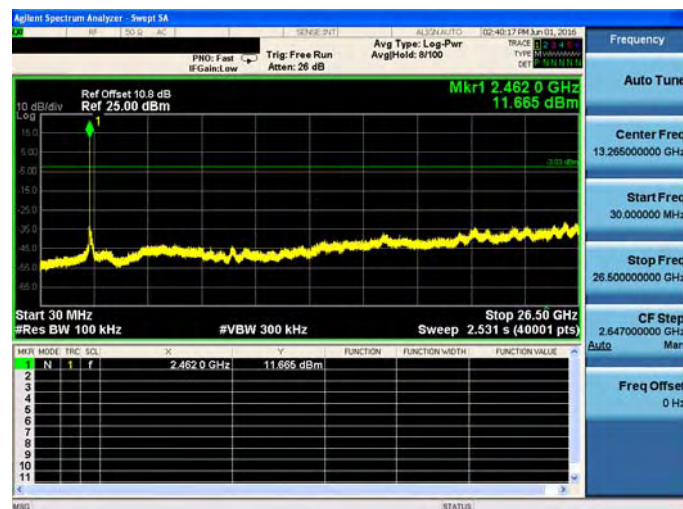
2412 MHz



2437 MHz



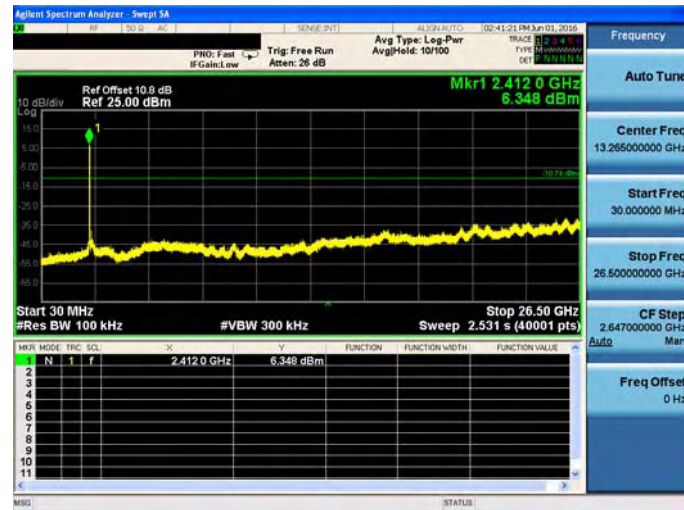
2462 MHz



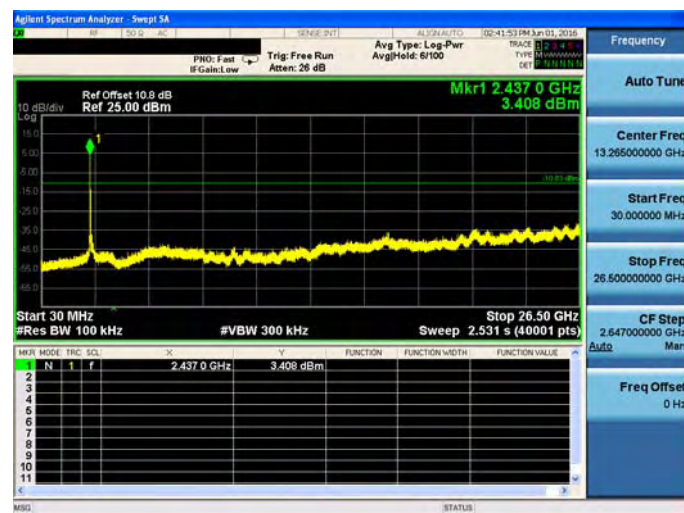


Mode 3: IEEE 802.11g link mode_ANT-0

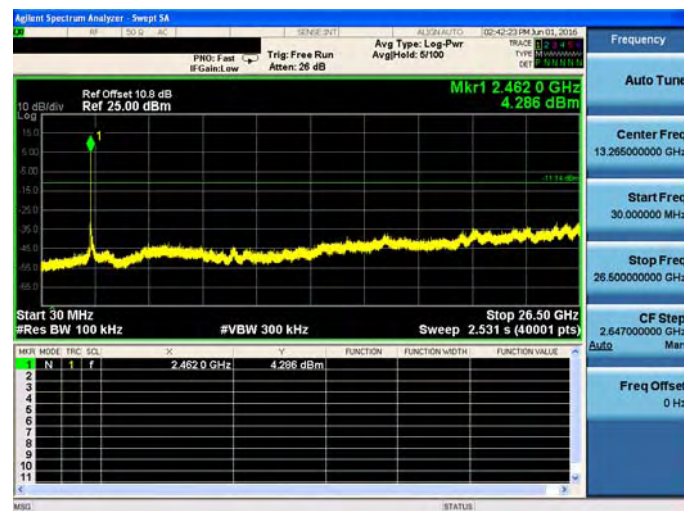
2412 MHz



2437 MHz



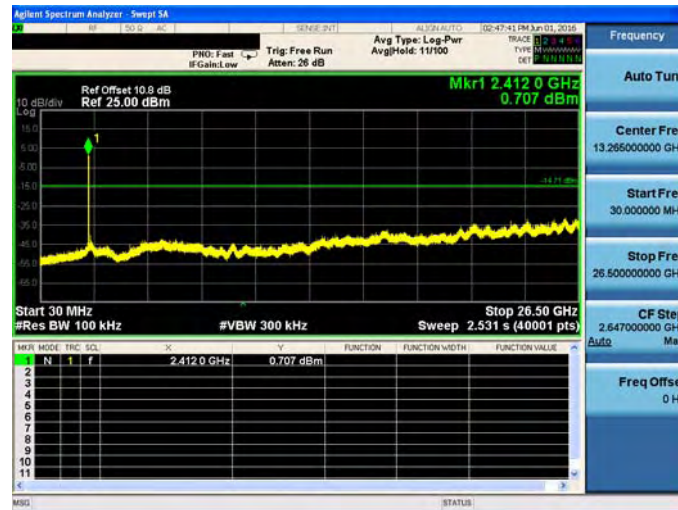
2462 MHz



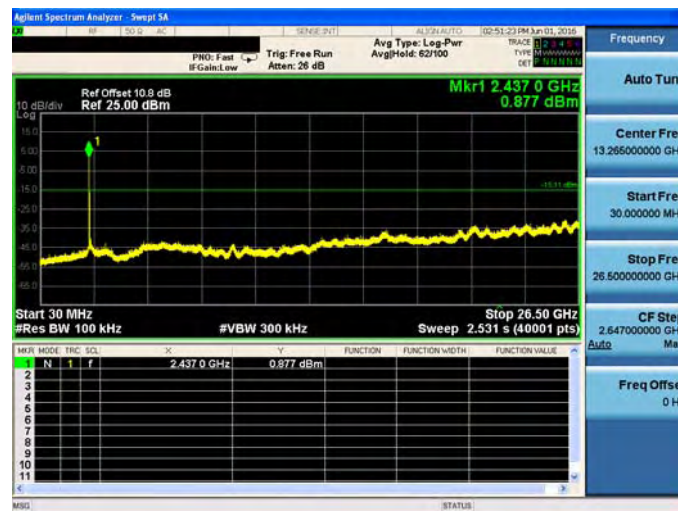


Mode 4: IEEE 802.11n 2.4GHz 20MHz link mode _ANT-0

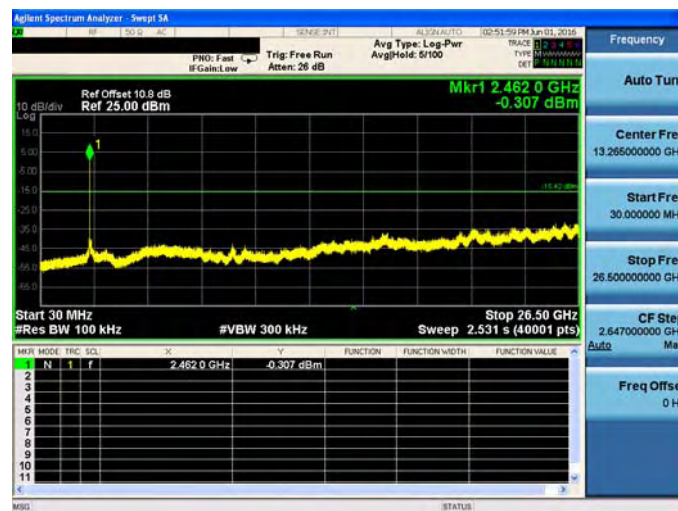
2412 MHz



2437 MHz



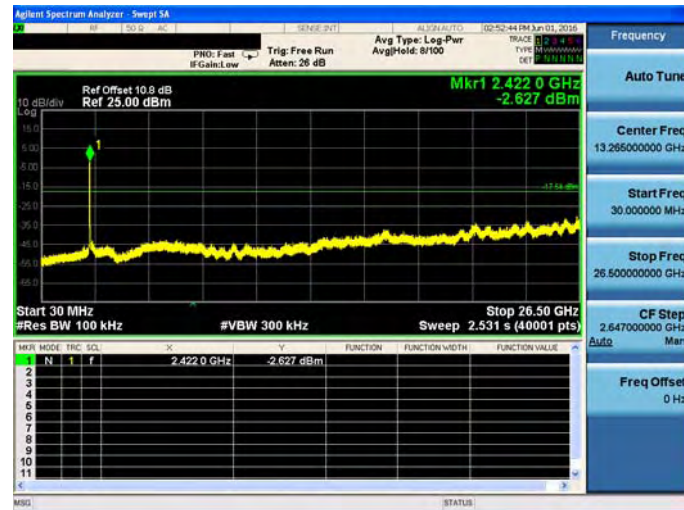
2462 MHz



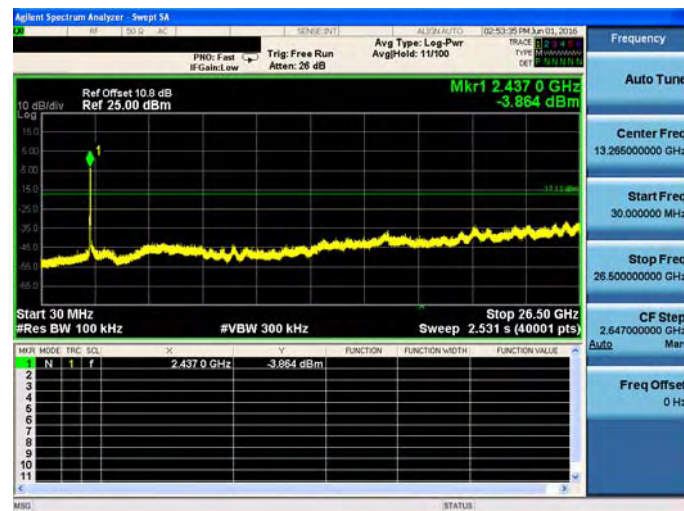


Mode 5: IEEE 802.11n 2.4GHz 40MHz link mode _ANT-0

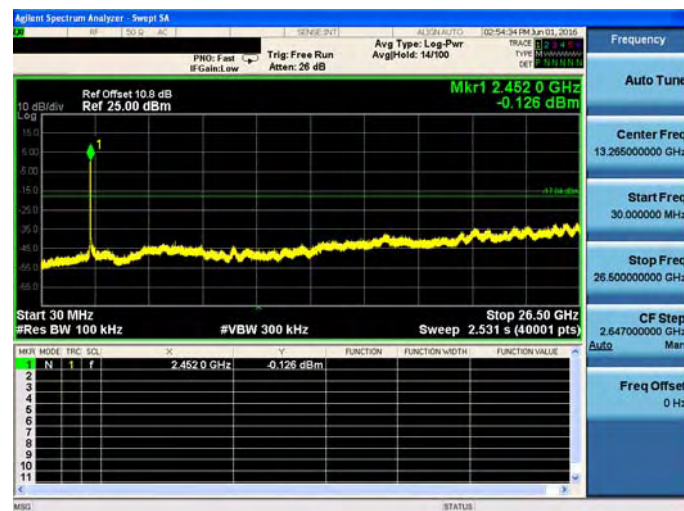
2422 MHz



2437 MHz



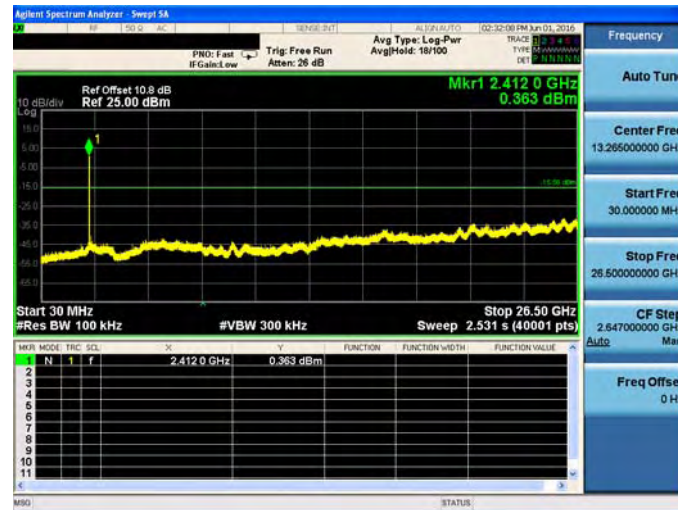
2452 MHz



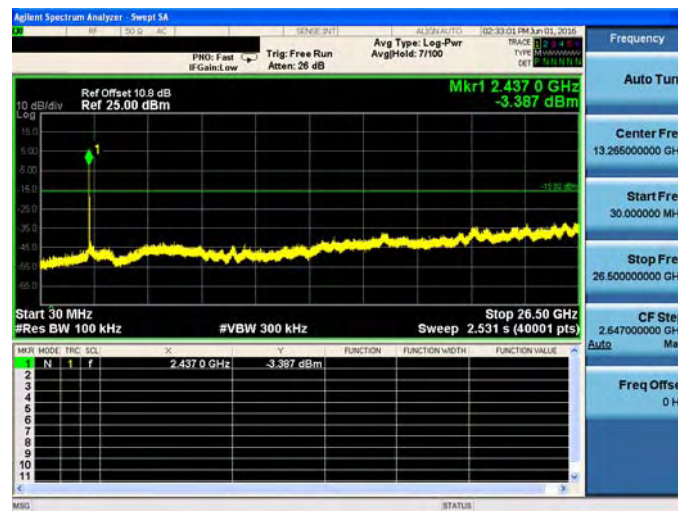


Mode 4: IEEE 802.11n 2.4GHz 20MHz link mode _ANT-1

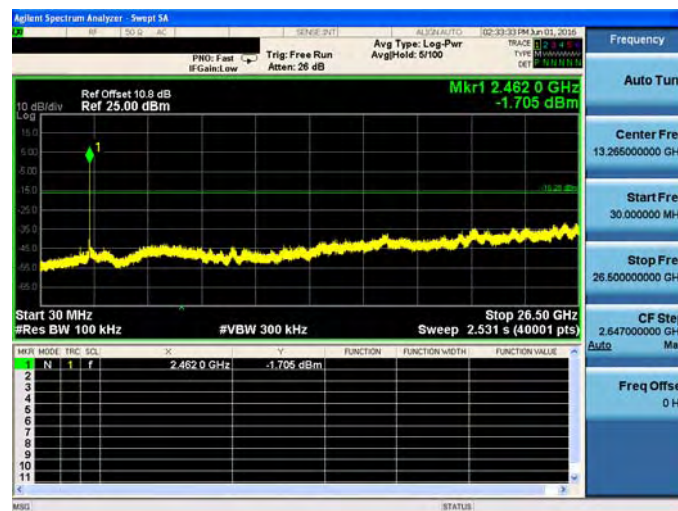
2412 MHz



2437 MHz



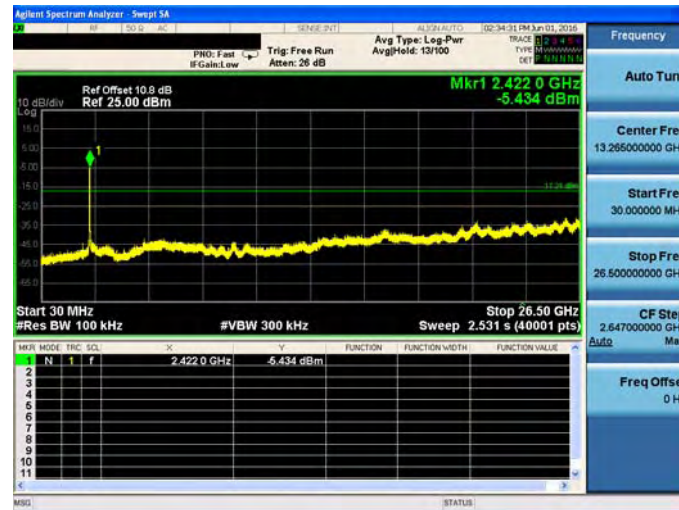
2462 MHz



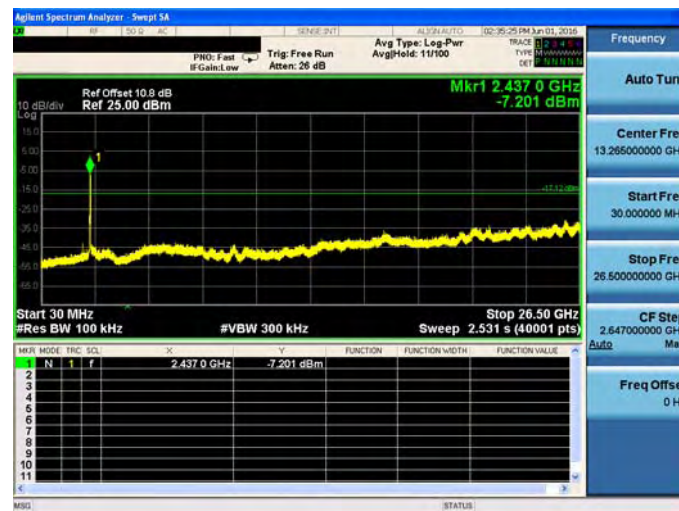


Mode 5: IEEE 802.11n 2.4GHz 40MHz link mode _ANT-1

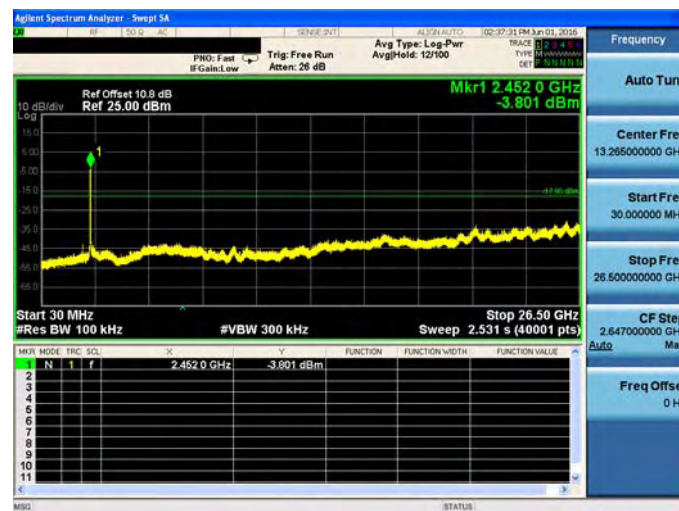
2422 MHz



2437 MHz



2452 MHz

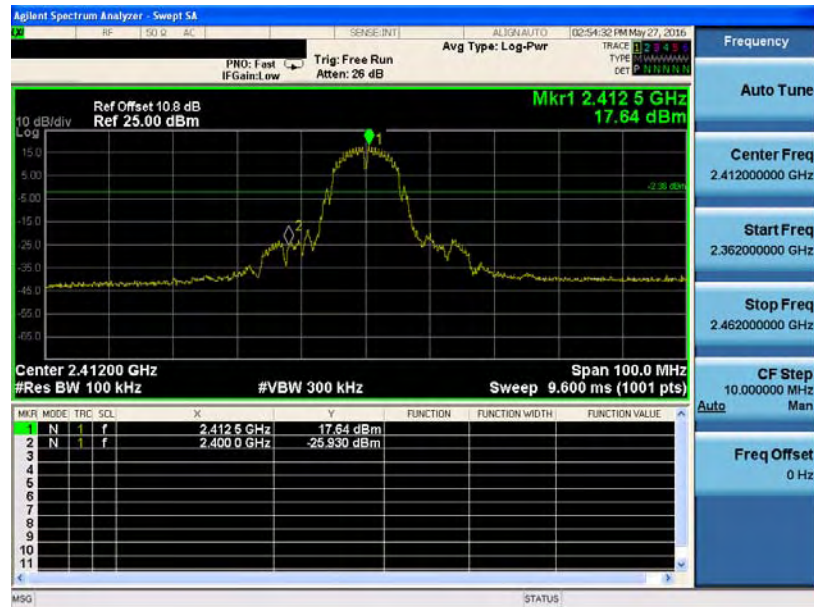




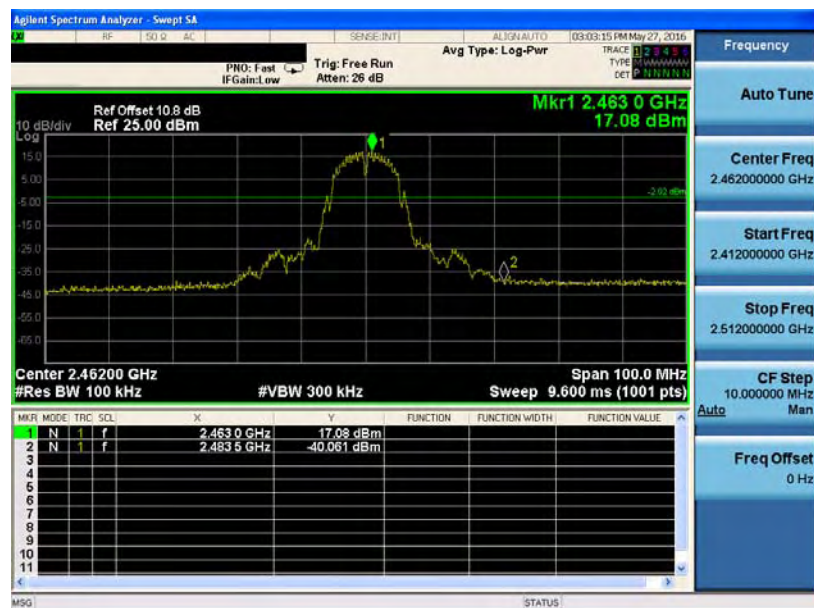
Conducted Band Edge

Mode 2: IEEE 802.11b link mode_ANT-0

2412 MHz

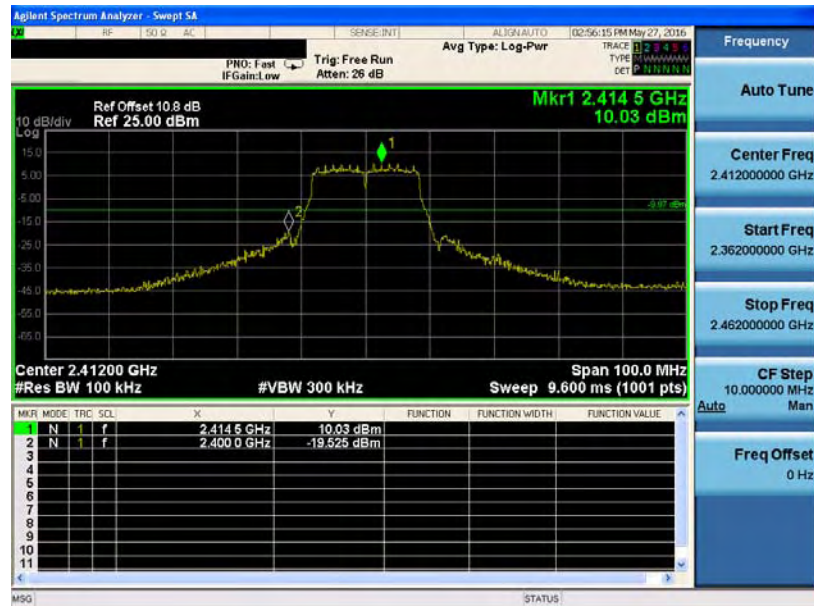


2462 MHz

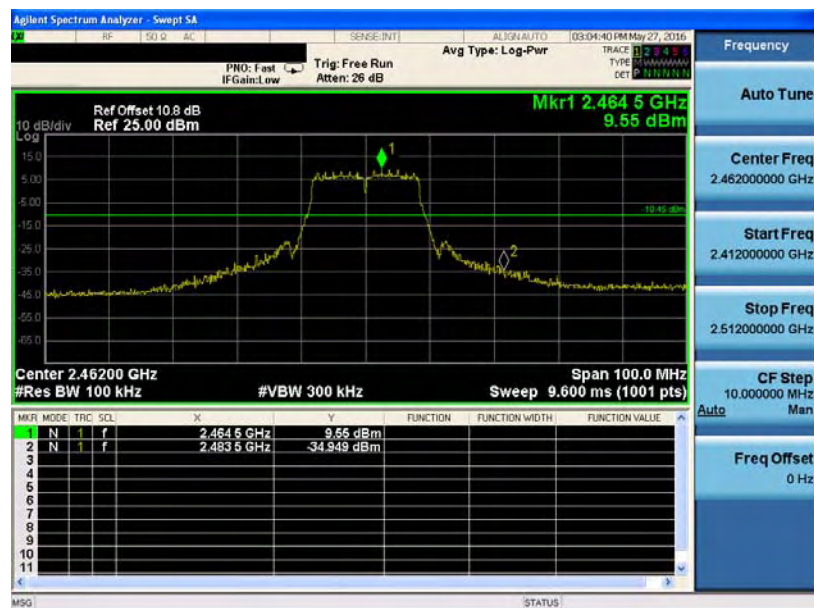




2412 MHz



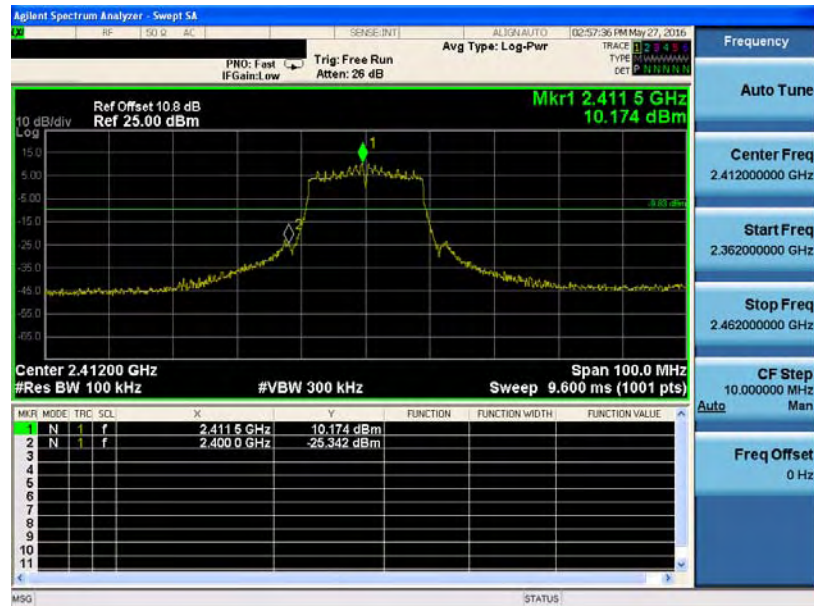
2462 MHz



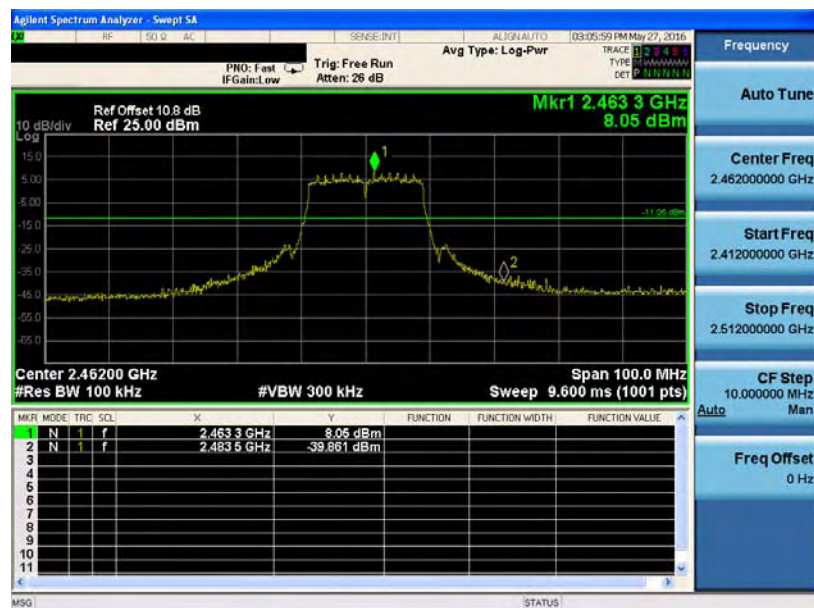


Mode 4: IEEE 802.11n 2.4GHz 20MHz link mode_ANT-0

2412 MHz



2462 MHz





Mode 5: IEEE 802.11n 2.4GHz 40MHz link mode_ANT-0

2422 MHz



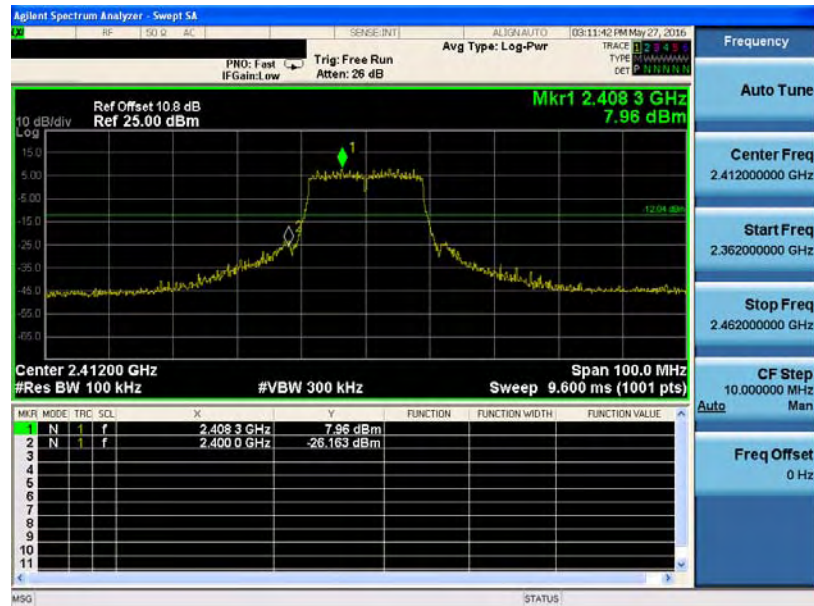
2452 MHz



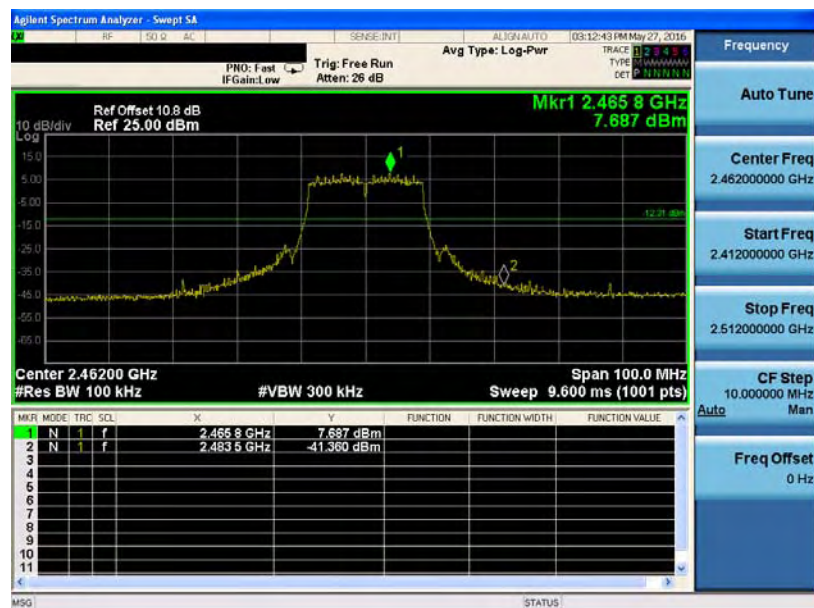


Mode 4: IEEE 802.11n 2.4GHz 20MHz link mode_ANT-1

2412 MHz



2462 MHz





Mode 5: IEEE 802.11n 2.4GHz 40MHz link mode_ANT-1

2422 MHz



2452 MHz





10 Antenna Measurement

10.1.Limit

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

And According to 15.247 (b), if transmitting antennas of directional gain greater than 6 dBi are used, the power shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6dBi.

10.2.Antenna Description

See section 2 – antenna information.

10.3.Directiona Gain Calculated

$$\text{Directional Gain} = 10 \cdot \log \left[\left(10^{G1/20} + 10^{G2/20} + \dots + 10^{GN/20} \right)^2 / N_{\text{ANT}} \right] = 4.88 \text{ dBi} < 6 \text{ dBi}$$

Operate Freq. Band	Directional Gain (dBi)
IEEE 802.11n 2.4GHz 20MHz	4.88
IEEE 802.11n 2.4GHz 40MHz	4.88