



TEST REPORT

FCC PART 15 SUBPART C 15.247 & RSS 247

Report Reference No.: CTL1712278061-WF

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Product Name: Music for Business Internet Radio

Model/Type reference: GDI-SXBR2

Trade Mark: ECOXGEAR,SiriusXM

FCC ID: 2AAUI-GDISXBR2

IC: 11210A-GDISXBR2

Applicant's name: Grace Digital Inc.

Address of applicant: 10531 4S Commons Drive #166 Suite #430 San Diego,CA
92127,United States

Test Firm: Shenzhen CTL Testing Technology Co., Ltd.

Address of Test Firm: Floor 1-A, Baisha Technology Park, No.3011, Shahehexi Road,
Nanshan District, Shenzhen, China 518055

Test specification: 47 CFR FCC Part 15 Subpart C 15.247 &
Standard: RSS 247 Issue 2, February 2017

TRF Originator: Shenzhen CTL Testing Technology Co., Ltd.

Master TRF: Dated 2011-01

Date of Receipt: Jan. 10, 2018

Date of Test Date: Jan. 10, 2018 –Feb. 01, 2018

Data of Issue: Feb. 01, 2018

Result: Pass

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TEST REPORT

Test Report No. :	CTL1712278061-WF	Feb. 01, 2018 ----- Date of issue
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Equipment under Test : Music for Business Internet Radio

Model /Type : GDI-SXBR2

Applicant : **Grace Digital Inc.**

Address : 10531 4S Commons Drive #166 Suite #430 San Diego, CA
92127, United States

Manufacturer : **NEO Telecom Corporation**

Address : 7F, 674-24, Anyang Dong, Manan Gu, Anyang City, Kyunggi Do
South Korea

Test result	Pass *
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* In the configuration tested, the EUT complied with the standards specified page 5.

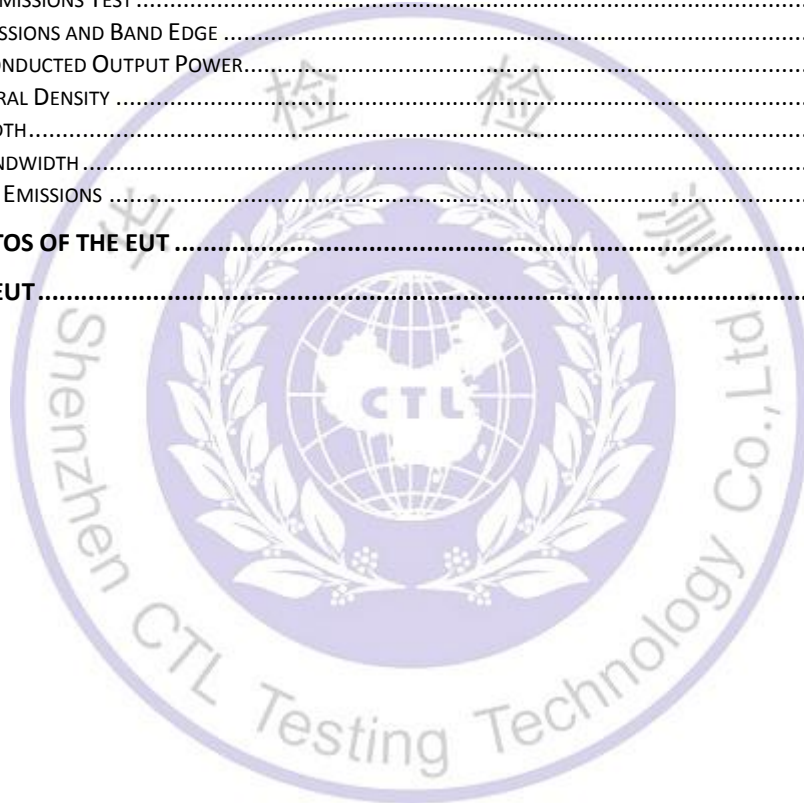
The test report merely corresponds to the test sample.

It is not permitted to copy extracts of these test result without the written permission of the test laboratory.

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1. SUMMARY

1.1. TEST STANDARDS

The tests were performed according to following standards:

FCC Rules Part 15.247: Frequency Hopping, Direct Spread Spectrum and Hybrid Systems that are in operation within the bands of 902-928 MHz, 2400-2483.5 MHz, and 5725-5850 MHz

RSS-247-Issue 2: Digital Transmission Systems (DTSs), Frequency Hopping Systems (FHSs) and Licence-Exempt Local Area Network (LE-LAN) Devices.

RSS-Gen Issue 4: — General Requirements for Compliance of Radio Apparatus

ANSI C63.10:2013 : American National Standard for Testing Unlicensed Wireless Devices

ANSI C63.4: 2014: –American National Standard for Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40GHz

KDB 662911 D01 v02r01: Multiple Transmitter Output

KDB558074 D01 V04: Guidance for Performing Compliance Measurements on Digital Transmission Systems (DTS) Operating Under §15.247

1.2. Test Description

FCC and IC Requirements		
FCC Part 15.207 RSS-Gen 8.8	AC Power Conducted Emission	PASS
FCC Part 15.247(a)(2) RSS 247 5.2(a) RSS GEN	6dB Bandwidth & 99% Bandwidth	PASS
FCC Part 15.247(d) RSS 247 5.5	Spurious RF Conducted Emission	PASS
FCC Part 15.247(b) RSS 247 5.4 (d)	Maximum Conducted Output Power	PASS
FCC Part 15.247(e) RSS 247 5.2(b)	Power Spectral Density	PASS
FCC Part 15.205/ 15.209 RSS-Gen 8.9	Radiated Emissions	PASS
FCC Part 15.247(d) RSS-Gen 8.10	Band Edge	PASS

1.3. Test Facility

1.3.1 Address of the test laboratory

Shenzhen CTL Testing Technology Co., Ltd.

Floor 1-A, Baisha Technology Park, No. 3011, Shahexi Road, Nanshan, Shenzhen 518055 China

There is one 3m semi-anechoic chamber and two line conducted labs for final test. The Test Sites meet the requirements in documents ANSI C63.4 and CISPR 32/EN 55032 requirements.

1.3.2 Laboratory accreditation

The test facility is recognized, certified, or accredited by the following organizations:

IC Registration No.: 9618B

The 3m alternate test site of Shenzhen CTL Testing Technology Co., Ltd. EMC Laboratory has been registered by Certification and Engineer Bureau of Industry Canada for the performance of with Registration No.: 9618B on November 13, 2013.

FCC-Registration No.: 399832

Shenzhen CTL Testing Technology Co., Ltd. EMC Laboratory has been registered and fully described in a report filed with the (FCC) Federal Communications Commission. The acceptance letter from the FCC is maintained in our files. Registration 399832, December 08, 2017.

1.4. Statement of the measurement uncertainty

The data and results referenced in this document are true and accurate. The reader is cautioned that there may be errors within the calibration limits of the equipment and facilities. The measurement uncertainty was calculated for all measurements listed in this test report acc. to CISPR 16 - 4 -Specification for radio disturbance and immunity measuring apparatus and methods – Part 4: Uncertainty in EMC Measurements—and is documented in the Shenzhen CTL Testing Technology Co., Ltd. quality system acc. to DIN EN ISO/IEC 17025. Furthermore, component and process variability of devices similar to that tested may result in additional deviation. The manufacturer has the sole responsibility of continued compliance of the device.

Hereafter the best measurement capability for CTL laboratory is reported:

Test	Measurement Uncertainty	Notes
Transmitter power conducted	±0.57 dB	(1)
Transmitter power Radiated	±2.20 dB	(1)
Conducted spurious emission 9KHz-40 GHz	±2.20 dB	(1)
Occupied Bandwidth	±0.01ppm	(1)
Radiated Emission 30~1000MHz	±4.10dB	(1)
Radiated Emission Above 1GHz	±4.32dB	(1)
Conducted Disturbance0.15~30MHz	±3.20dB	(1)

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

2. GENERAL INFORMATION

2.1.Environmental conditions

During the measurement the environmental conditions were within the listed ranges:

Normal Temperature:	25℃
Relative Humidity:	55 %
Air Pressure:	101 kPa

2.2.General Description of EUT

Product Name:	Music for Business Internet Radio
Model/Type reference:	GDI-SXBR2
Power supply:	12V $\overline{\text{---}}$ 1.0A (supplied by adapter)
Information of the adapter:	Model: GA120010 Input: 100-240V~50/60Hz 0.4A Output:DC 12V/1A
Hardware Version:	SXBR2_0
Software Version:	V1.0
WIFI	
Supported type:	802.11b/802.11g/802.11n(H20)/802.11n(H40)
Modulation:	802.11b: DSSS 802.11g/802.11n(H20)/802.11n(H40): OFDM
Operation frequency:	802.11b/802.11g/802.11n(H20): 2412MHz~2462MHz 802.11n(H40): 2422MHz~2452MHz
Channel number:	802.11b/802.11g/802.11n(H20): 11 802.11n(H40): 7
Channel separation:	5MHz
Antenna type:	Coaxial Antenna
Antenna gain:	Single antenna:1.24dBi Directional gain:4.25dBi

Note: For more details, refer to the user's manual of the EUT.

2.3.Description of Test Modes and Test Frequency

The Applicant provides communication tools software to control the EUT for staying in continuous transmitting (Duty Cycle more than 98%) and receiving mode for testing.

All test performed at the low, middle and high of operational frequency range of each mode.

Operation Frequency WIFI :

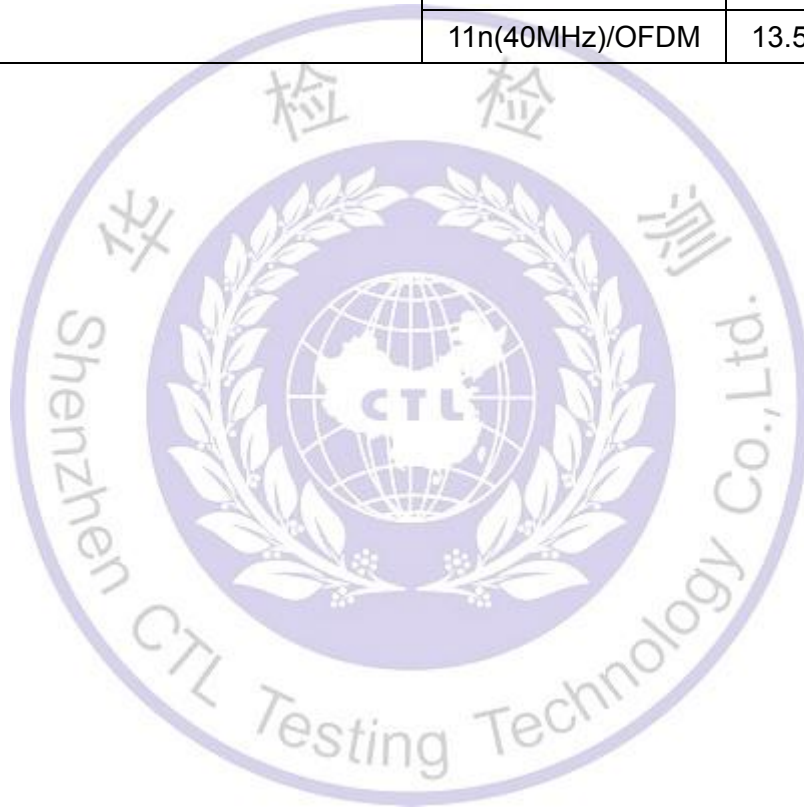
Channel	Frequency(MHz)	Channel	Frequency(MHz)
1	2412	8	2447
2	2417	9	2452
3	2422	10	2457
4	2427	11	2462
5	2432		
6	2437		
7	2442		

Note: The line display in grey were the channel selected for testing

Data Rate Used:

Preliminary tests were performed in different data rate to find the worst radiated emission. The data rate shown in the table below is the worst-case rate with respect to the specific test item. Investigation has been done on all the possible configurations for searching the worst cases. The following table is a list of the test modes shown in this test report.

Test Items	Mode	Data Rate	Channel
Maximum Conducted Output Power Power Spectral Density 6dB Bandwidth Spurious RF conducted emission Radiated Emission 9kHz~1GHz& Radiated Emission 1GHz~10th Harmonic	11b/DSSS	1 Mbps	1/6/11
	11g/OFDM	6 Mbps	1/6/11
	11n(20MHz)/OFDM	6.5Mbps	1/6/11
	11n(40MHz)/OFDM	13.5 Mbps	3/6/9
Band Edge	11b/DSSS	1 Mbps	1/11
	11g/OFDM	6 Mbps	1/11
	11n(20MHz)/OFDM	6.5Mbps	1/11
	11n(40MHz)/OFDM	13.5 Mbps	3//9



2.4. Equipments Used during the Test

Test Equipment	Manufacturer	Model No.	Serial No.	Calibration Date	Calibration Due Date
LISN	R&S	ENV216	3560.6550.1 2	2017/06/02	2018/06/01
LISN	R&S	ESH2-Z5	860014/010	2017/06/02	2018/06/01
Power Meter	Anritsu	ML2487B	110553	2017/06/02	2018/06/01
Power Sensor	Anritsu	MA2411B	100345	2017/05/21	2018/05/20
Bilog Antenna	Sunol Sciences Corp.	JB1	A061713	2017/06/02	2018/06/01
EMI Test Receiver	R&S	ESCI	103710	2017/06/02	2018/06/01
Spectrum Analyzer	Agilent	E4407B	MY41440676	2017/05/21	2018/05/20
Spectrum Analyzer	Agilent	N9020	US46220290	2018/01/16	2018/01/15
Controller	EM Electronics	Controller EM 1000	N/A	2017/05/21	2018/05/20
Horn Antenna	Sunol Sciences Corp.	DRH-118	A062013	2017/05/19	2018/05/18
Active Loop Antenna	SCHWARZBECK	FMZB1519	1519-037	2017/05/19	2018/05/18
Amplifier	Agilent	8349B	3008A02306	2017/05/19	2018/05/18
Amplifier	Agilent	8447D	2944A10176	2017/05/19	2018/05/18
Temperature/Humidity Meter	Gangxing	CTH-608	02	2017/05/20	2018/05/19
High-Pass Filter	K&L	9SH10-2700/X1 2750-O/O	N/A	2017/05/20	2018/05/19
High-Pass Filter	K&L	41H10-1375/U1 2750-O/O	N/A	2017/05/20	2018/05/19
Coaxial Cables	HUBER+SUHNER	SUCOFLEX 104PEA-10M	10m	2017/06/02	2018/06/01
Coaxial Cables	HUBER+SUHNER	SUCOFLEX 104PEA-3M	3m	2017/06/02	2018/06/01
Coaxial Cables	HUBER+SUHNER	SUCOFLEX 104PEA-3M	3m	2017/06/02	2018/06/01
RF Cable	Megalon	RF-A303	N/A	2017/06/02	2018/06/01

The calibration interval was one year

2.5. Related Submittal(s) / Grant (s)

This submittal(s) (test report) is intended to comply with Section 15.247 of the FCC Part 15 Subpart C Rules, RSS Gen and RSS 247 Rules.

2.6. Modifications

No modifications were implemented to meet testing criteria.

3. TEST CONDITIONS AND RESULTS

3.1. Conducted Emissions Test

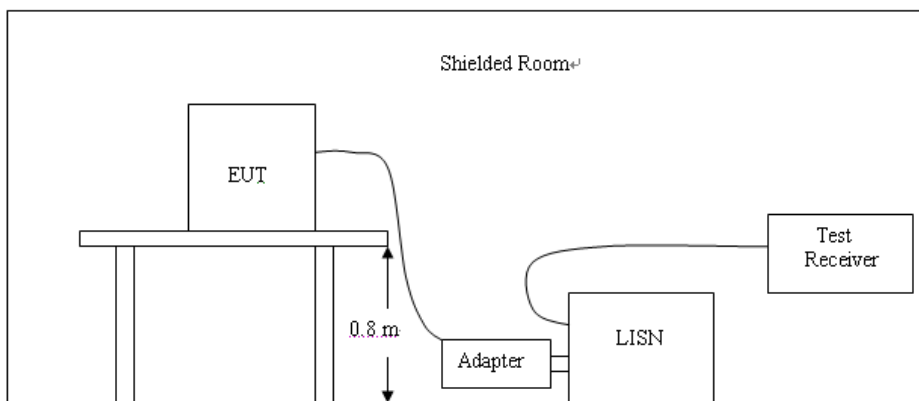
LIMIT

According to FCC CFR Title 47 Part 15 Subpart C Section 15.207 and RSS Gen 8.8, AC Power Line Conducted Emissions Limits for Licence-Exempt Radio Apparatus as below:

Frequency range (MHz)	Limit (dBuV)	
	Quasi-peak	Average
0.15-0.5	66 to 56*	56 to 46*
0.5-5	56	46
5-30	60	50

* Decreases with the logarithm of the frequency.

TEST CONFIGURATION



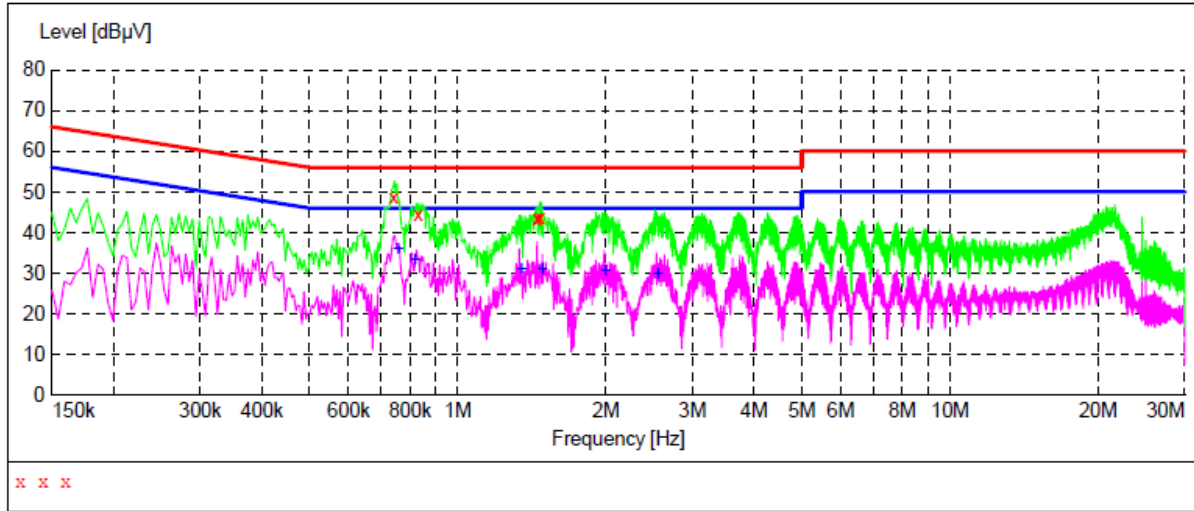
TEST PROCEDURE

1. The equipment was set up as per the test configuration to simulate typical actual usage per the user's manual. The EUT is a tabletop system; a wooden table with a height of 0.8 meters is used and is placed on the ground plane as per ANSI C63.10:2013.
2. Support equipment, if needed, was placed as per ANSI C63.10:2013.
3. All I/O cables were positioned to simulate typical actual usage as per ANSI C63.10:2013.
4. The adapter received AC120V/60Hz and AC240V/60Hz power through a Line Impedance Stabilization Network (LISN) which supplied power source and was grounded to the ground plane.
5. All support equipments received AC power from a second LISN, if any.
6. The EUT test program was started. Emissions were measured on each current carrying line of the EUT using a spectrum Analyzer / Receiver connected to the LISN powering the EUT. The LISN has two monitoring points: Line 1 (Hot Side) and Line 2 (Neutral Side). Two scans were taken: one with Line 1 connected to Analyzer / Receiver and Line 2 connected to a 50 ohm load; the second scan had Line 1 connected to a 50 ohm load and Line 2 connected to the Analyzer / Receiver.
7. Analyzer / Receiver scanned from 150 KHz to 30MHz for emissions in each of the test modes.
8. During the above scans, the emissions were maximized by cable manipulation.

TEST RESULTS

Remark: We measured Conducted Emission at 802.11b/802.11g/802.11n HT20/802.11n HT40 mode in AC 120V/60Hz and 240V/60Hz, the worst case was recorded .

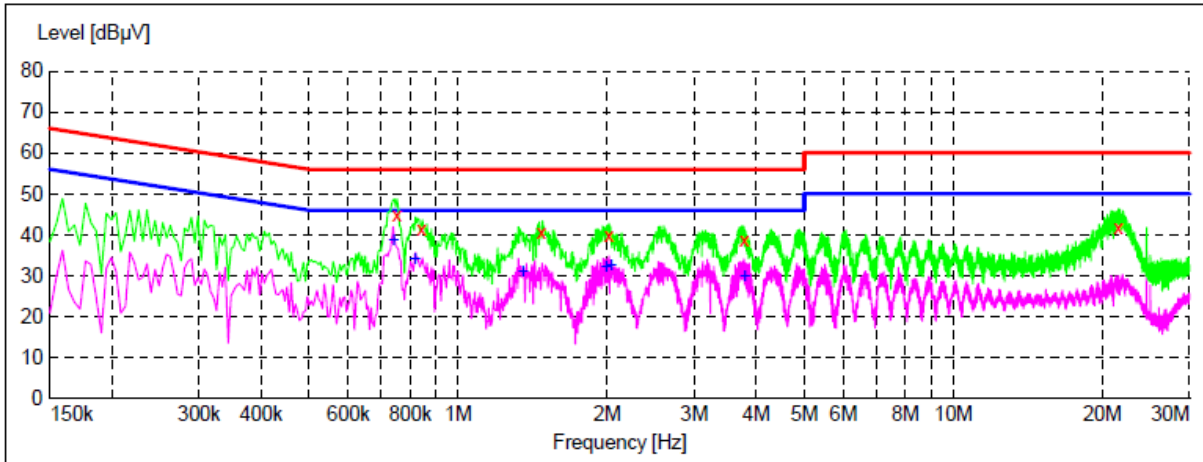
Power supply:	DC 12V from Adapter AC 120V/60Hz	Polarization	L
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Frequency MHz	Level dBµV	Transd dB	Limit dBµV	Margin dB	Detector	Line	PE
0.740000	48.60	10.2	56	7.4	QP	L1	GND
0.830000	44.50	10.2	56	11.5	QP	L1	GND
1.448000	43.40	10.3	56	12.6	QP	L1	GND
1.454000	43.60	10.3	56	12.4	QP	L1	GND
1.472000	43.80	10.3	56	12.2	QP	L1	GND

Frequency MHz	Level dBµV	Transd dB	Limit dBµV	Margin dB	Detector	Line	PE
0.758000	36.10	10.2	46	9.9	AV	L1	GND
0.818000	33.50	10.2	46	12.5	AV	L1	GND
1.346000	31.00	10.3	46	15.0	AV	L1	GND
1.484000	31.00	10.3	46	15.0	AV	L1	GND
1.994000	30.50	10.3	46	15.5	AV	L1	GND
2.546000	30.00	10.4	46	16.0	AV	L1	GND

Power supply:	DC 12V from Adapter AC 120V/60Hz	Polarization	N
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x x x

Frequency MHz	Level dBµV	Transd dB	Limit dBµV	Margin dB	Detector	Line	PE
0.752000	45.00	10.2	56	11.0	QP	N	GND
0.842000	41.30	10.2	56	14.7	QP	N	GND
1.472000	40.80	10.3	56	15.2	QP	N	GND
2.012000	39.90	10.4	56	16.1	QP	N	GND
3.776000	38.70	10.4	56	17.3	QP	N	GND
21.530000	41.70	11.0	60	18.3	QP	N	GND

Frequency MHz	Level dBµV	Transd dB	Limit dBµV	Margin dB	Detector	Line	PE
0.740000	38.60	10.2	46	7.4	AV	N	GND
0.818000	34.20	10.2	46	11.8	AV	N	GND
1.352000	31.10	10.3	46	14.9	AV	N	GND
1.988000	32.40	10.3	46	13.6	AV	N	GND
2.036000	32.50	10.4	46	13.5	AV	N	GND
3.788000	30.00	10.4	46	16.0	AV	N	GND

3.2. Radiated Emissions and Band Edge

Limit

For intentional device, according to § 15.209(a), the general requirement of field strength of radiated emission out of authorized band shall not exceed the following table at a 3 meters measurement distance.

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)

Except when the requirements applicable to a given device state otherwise, emissions from licence-exempt transmitters shall comply with the field strength limits shown in table below. Additionally, the level of any transmitter emission shall not exceed the level of the transmitter's fundamental emission

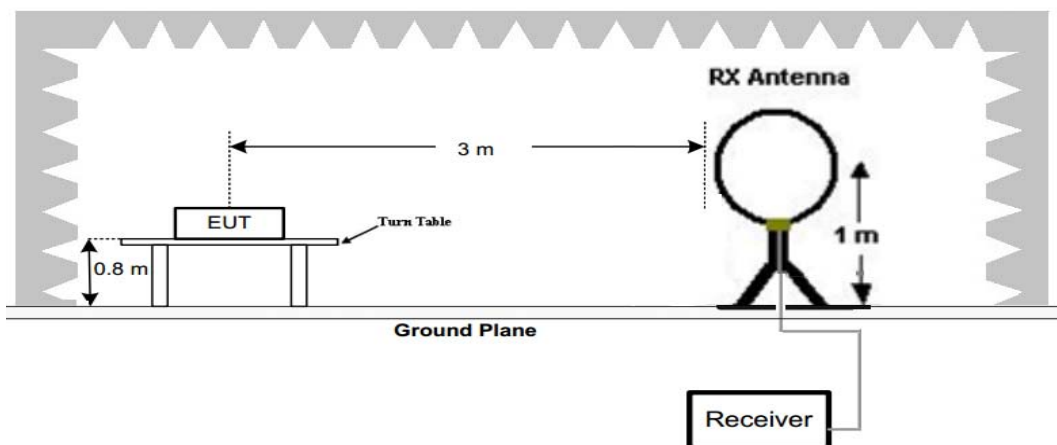
Unwanted emissions that fall into restricted bands shall comply with the limits specified in RSS-Gen; and Unwanted emissions that do not fall within the restricted frequency bands shall comply either with the limits specified in the applicable RSS or with those specified in this RSS-Gen.

Radiated emission limits

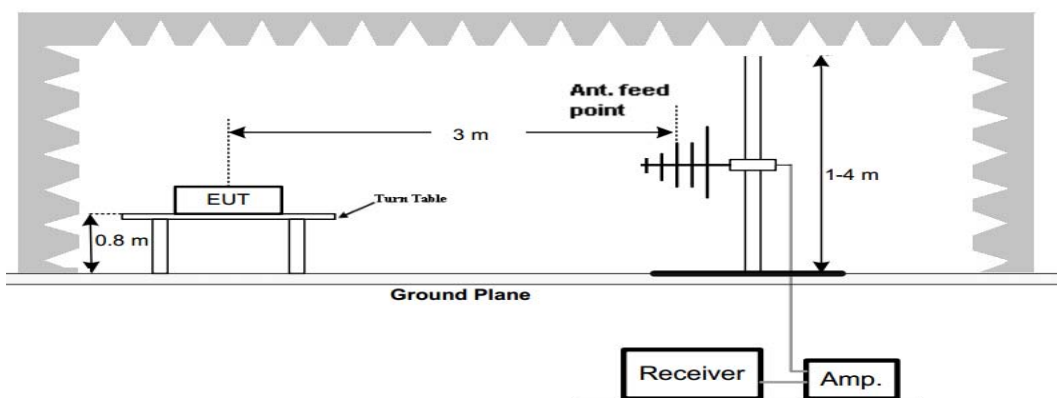
Frequency (MHz)	Distance (Meters)	Radiated (dB μ V/m)	Radiated (μ V/m)
0.009-0.49	3	$20\log(2400/F(\text{KHz}))+40\log(300/3)$	$2400/F(\text{KHz})$
0.49-1.705	3	$20\log(24000/F(\text{KHz}))+40\log(30/3)$	$24000/F(\text{KHz})$
1.705-30	3	$20\log(30)+40\log(30/3)$	30
30-88	3	40.0	100
88-216	3	43.5	150
216-960	3	46.0	200
Above 960	3	54.0	500

TEST CONFIGURATION

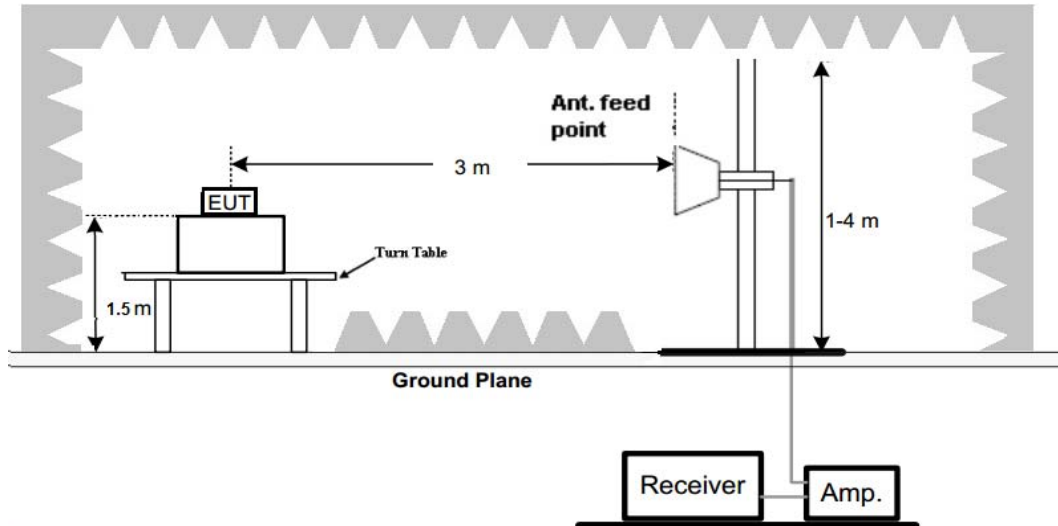
(A) Radiated Emission Test Set-Up, Frequency Below 30MHz



(B) Radiated Emission Test Set-Up, Frequency below 1000MHz



(C) Radiated Emission Test Set-Up, Frequency above 1000MHz

**Test Procedure**

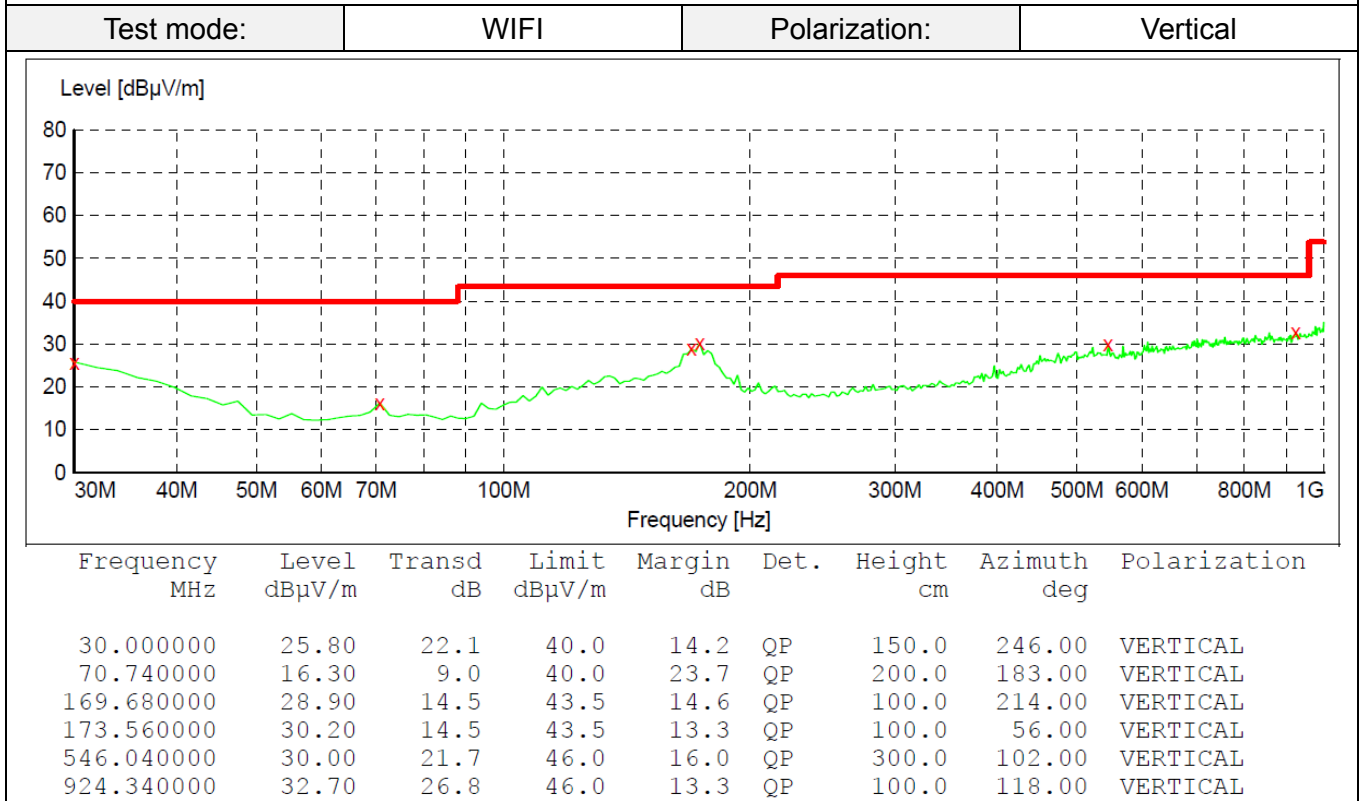
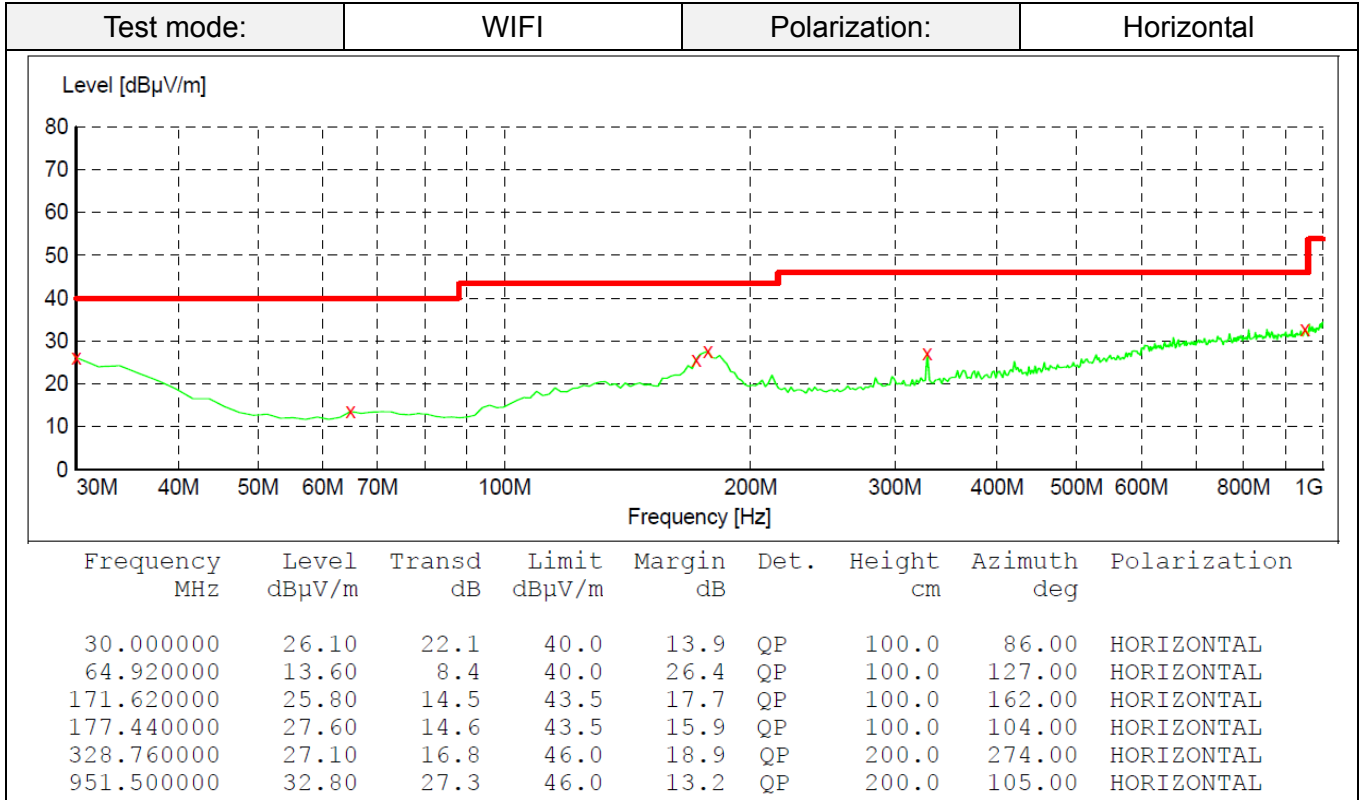
1. Below 1GHz measurement the EUT is placed on a turntable which is 0.8m above ground plane, and above 1GHz measurement EUT was placed on a low permittivity and low loss tangent turn table which is 1.5m above ground plane.
2. The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.
3. The test-receiver system was set to quasi-peak detect function and specified bandwidth with maximum hold mode when the test frequency is below 1 GHz.
4. The test-receiver system was set to peak and average detects function and specified bandwidth with maximum hold mode when the test frequency is above 1 GHz. If the peak reading value also meets average limit, measurement with the average detector is unnecessary.
5. Maximum procedure was performed by raising the receiving antenna from 1m to 4m and rotating the turn table from 0° to 360° to acquire the highest emissions from EUT
6. And also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical.
7. Repeat above procedures until all frequency measurements have been completed.

TEST RESULTS

Remark:

1. Radiated emission test from 9KHz to 10th harmonic of fundamental was verified, and no emission found except system noise floor in 9KHz to 30MHz and not recorded in this report.
2. For below 1GHz measurement, we tested at 802.11b/802.11g/802.11n HT20/802.11n HT40 mode at the antenna single transmitting mode and 802.11n HT20/802.11n HT40 at the Mimo mode in AC 120V/60Hz and AC 240V/60Hz, all three channels (lowest/middle/highest) of each mode were tested and recorded worst case at 802.11b low channel at the antenna single transmitting mode.
3. For above 1GHz measurement, we tested at 802.11b/802.11g/802.11n HT20/802.11n HT40 mode at the antenna single transmitting mode and 802.11n HT20/802.11n HT40 at the Mimo mode in AC 120V/60Hz and AC 240V/60Hz, all three channels (lowest/middle/highest) of each mode were tested and recorded worst case at the antenna single transmitting mode.

For 30MHz-1GHz



For 1GHz to 25GHz

802.11b Mode (above 1GHz)

Frequency(MHz):			2412		Polarity:			HORIZONTAL	
Frequency (MHz)	Emission Level (dBuV/m)		Limit (dBuV/m)	Margin (dB)	Raw Value (dBuV)	Antenna Factor (dB/m)	Cable Factor (dB)	Pre-amplifier (dB)	Correction Factor (dB/m)
4824.00	56.45	PK	74	17.55	51.90	33.52	6.92	35.89	4.55
4824.00	46.73	AV	54	7.27	42.18	33.52	6.92	35.89	4.55
7236.00	43.52	PK	74	30.48	32.25	37.10	9.19	35.02	11.27
7236.00	--	AV	54	--	--	--	--	--	--

Frequency(MHz):			2412		Polarity:			VERTICAL	
Frequency (MHz)	Emission Level (dBuV/m)		Limit (dBuV/m)	Margin (dB)	Raw Value (dBuV)	Antenna Factor (dB/m)	Cable Factor (dB)	Pre-amplifier (dB)	Correction Factor (dB/m)
4824.00	57.28	PK	74	16.72	52.73	33.52	6.92	35.89	4.55
4824.00	46.34	AV	54	7.66	41.79	33.52	6.92	35.89	4.55
7236.00	42.29	PK	74	31.71	31.02	37.10	9.19	35.02	11.27
7236.00	--	AV	54	--	--	--	--	--	--

Frequency(MHz):			2437		Polarity:			HORIZONTAL	
Frequency (MHz)	Emission Level (dBuV/m)		Limit (dBuV/m)	Margin (dB)	Raw Value (dBuV)	Antenna Factor (dB/m)	Cable Factor (dB)	Pre-amplifier (dB)	Correction Factor (dB/m)
4874.00	58.63	PK	74	15.37	53.99	33.59	6.95	35.90	4.64
4874.00	47.54	AV	54	6.46	42.90	33.59	6.95	35.90	4.64
7311.00	43.82	PK	74	30.18	32.16	37.44	9.22	35.00	11.66
7311.00	--	AV	54	--	--	--	--	--	--

Frequency(MHz):			2437		Polarity:			VERTICAL	
Frequency (MHz)	Emission Level (dBuV/m)		Limit (dBuV/m)	Margin (dB)	Raw Value (dBuV)	Antenna Factor (dB/m)	Cable Factor (dB)	Pre-amplifier (dB)	Correction Factor (dB/m)
4874.00	57.87	PK	74	16.13	53.23	33.59	6.95	35.90	4.64
4874.00	45.35	AV	54	8.65	40.71	33.59	6.95	35.90	4.64
7311.00	42.66	PK	74	31.34	31.00	37.44	9.22	35.00	11.66
7311.00	--	AV	54	--	--	--	--	--	--

Frequency(MHz):			2462		Polarity:			HORIZONTAL	
Frequency (MHz)	Emission Level (dBuV/m)		Limit (dBuV/m)	Margin (dB)	Raw Value (dBuV)	Antenna Factor (dB/m)	Cable Factor (dB)	Pre-amplifier (dB)	Correction Factor (dB/m)
4924.00	58.25	PK	74	15.75	53.47	33.71	6.98	35.91	4.78
4924.00	46.82	AV	54	7.18	42.04	33.71	6.98	35.91	4.78
7386.00	42.85	PK	74	31.15	30.97	37.61	9.25	34.98	11.88
7386.00	--	AV	54	--	--	--	--	--	--

Frequency(MHz):			2462		Polarity:			VERTICAL	
Frequency (MHz)	Emission Level (dBuV/m)		Limit (dBuV/m)	Margin (dB)	Raw Value (dBuV)	Antenna Factor (dB/m)	Cable Factor (dB)	Pre-amplifier (dB)	Correction Factor (dB/m)
4924.00	57.93	PK	74	16.07	53.15	33.71	6.98	35.91	4.78
4924.00	45.46	AV	54	8.54	40.68	33.71	6.98	35.91	4.78
7386.00	42.72	PK	74	31.28	30.84	37.61	9.25	34.98	11.88
7386.00	--	AV	54	--	--	--	--	--	--

REMARKS:

1. Emission level (dBuV/m) = Raw Value (dBuV) + Correction Factor (dB/m)
2. Correction Factor (dB/m) = Antenna Factor (dB/m) + Cable Factor (dB) - Pre-amplifier Factor (dB)
3. Margin value = Limit value - Emission level
4. -- Mean the PK detector measured value is below average limit.
5. The other emission levels were very low against the limit.
6. RBW 1MHz VBW 3MHz Peak detector is for PK value; RBW 1MHz VBW 10Hz Peak detector is for AV value.



802.11g Mode (above 1GHz)

Frequency(MHz):			2412		Polarity:			HORIZONTAL	
Frequency (MHz)	Emission Level (dBuV/m)		Limit (dBuV/m)	Margin (dB)	Raw Value (dBuV)	Antenna Factor (dB/m)	Cable Factor (dB)	Pre-amplifier (dB)	Correction Factor (dB/m)
4824.00	57.36	PK	74	16.64	52.81	33.52	6.92	35.89	4.55
4824.00	48.05	AV	54	5.95	43.50	33.52	6.92	35.89	4.55
7236.00	44.82	PK	74	29.18	33.55	37.10	9.19	35.02	11.27
7236.00	--	AV	54	--	--	--	--	--	--

Frequency(MHz):			2412		Polarity:			VERTICAL	
Frequency (MHz)	Emission Level (dBuV/m)		Limit (dBuV/m)	Margin (dB)	Raw Value (dBuV)	Antenna Factor (dB/m)	Cable Factor (dB)	Pre-amplifier (dB)	Correction Factor (dB/m)
4824.00	56.74	PK	74	17.26	52.19	33.52	6.92	35.89	4.55
4824.00	46.32	AV	54	7.68	41.77	33.52	6.92	35.89	4.55
7236.00	43.15	PK	74	30.85	31.88	37.10	9.19	35.02	11.27
7236.00	--	AV	54	--	--	--	--	--	--

Frequency(MHz):			2437		Polarity:			HORIZONTAL	
Frequency (MHz)	Emission Level (dBuV/m)		Limit (dBuV/m)	Margin (dB)	Raw Value (dBuV)	Antenna Factor (dB/m)	Cable Factor (dB)	Pre-amplifier (dB)	Correction Factor (dB/m)
4874.00	58.63	PK	74	15.37	53.99	33.59	6.95	35.90	4.64
4874.00	46.77	AV	54	7.23	42.13	33.59	6.95	35.90	4.64
7311.00	45.15	PK	74	28.85	33.49	37.44	9.22	35.00	11.66
7311.00	--	AV	54	--	--	--	--	--	--

Frequency(MHz):			2437		Polarity:			VERTICAL	
Frequency (MHz)	Emission Level (dBuV/m)		Limit (dBuV/m)	Margin (dB)	Raw Value (dBuV)	Antenna Factor (dB/m)	Cable Factor (dB)	Pre-amplifier (dB)	Correction Factor (dB/m)
4874.00	57.16	PK	74	16.84	52.52	33.59	6.95	35.90	4.64
4874.00	44.83	AV	54	9.17	40.19	33.59	6.95	35.90	4.64
7311.00	42.06	PK	74	31.94	30.40	37.44	9.22	35.00	11.66
7311.00	--	AV	54	--	--	--	--	--	--

Frequency(MHz):			2462		Polarity:			HORIZONTAL	
Frequency (MHz)	Emission Level (dBuV/m)		Limit (dBuV/m)	Margin (dB)	Raw Value (dBuV)	Antenna Factor (dB/m)	Cable Factor (dB)	Pre-amplifier (dB)	Correction Factor (dB/m)
4924.00	58.66	PK	74	15.34	53.88	33.71	6.98	35.91	4.78
4924.00	47.28	AV	54	6.72	42.50	33.71	6.98	35.91	4.78
7386.00	43.17	PK	74	30.83	31.29	37.61	9.25	34.98	11.88
7386.00	--	AV	54	--	--	--	--	--	--

Frequency(MHz):			2462		Polarity:			VERTICAL	
Frequency (MHz)	Emission Level (dBuV/m)		Limit (dBuV/m)	Margin (dB)	Raw Value (dBuV)	Antenna Factor (dB/m)	Cable Factor (dB)	Pre-amplifier (dB)	Correction Factor (dB/m)
4924.00	58.72	PK	74	15.28	53.94	33.71	6.98	35.91	4.78
4924.00	46.85	AV	54	7.15	42.07	33.71	6.98	35.91	4.78
7386.00	42.54	PK	74	31.46	30.66	37.61	9.25	34.98	11.88
7386.00	--	AV	54	--	--	--	--	--	--

REMARKS:

1. Emission level (dBuV/m) = Raw Value (dBuV) + Correction Factor (dB/m)
2. Correction Factor (dB/m) = Antenna Factor (dB/m) + Cable Factor (dB) - Pre-amplifier Factor (dB)
3. Margin value = Limit value - Emission level
4. -- Mean the PK detector measured value is below average limit.
5. The other emission levels were very low against the limit.
6. RBW 1MHz VBW 3MHz Peak detector is for PK value; RBW 1MHz VBW 10Hz Peak detector is for AV value.



802.11n HT20 Mode (above 1GHz)

Frequency(MHz):			2412		Polarity:			HORIZONTAL	
Frequency (MHz)	Emission Level (dBuV/m)		Limit (dBuV/m)	Margin (dB)	Raw Value (dBuV)	Antenna Factor (dB/m)	Cable Factor (dB)	Pre-amplifier (dB)	Correction Factor (dB/m)
4824.00	55.24	PK	74	18.76	50.69	33.52	6.92	35.89	4.55
4824.00	43.27	AV	54	10.73	38.72	33.52	6.92	35.89	4.55
7236.00	41.05	PK	74	32.95	29.78	37.10	9.19	35.02	11.27
7236.00	--	AV	54	--	--	--	--	--	--

Frequency(MHz):			2412		Polarity:			VERTICAL	
Frequency (MHz)	Emission Level (dBuV/m)		Limit (dBuV/m)	Margin (dB)	Raw Value (dBuV)	Antenna Factor (dB/m)	Cable Factor (dB)	Pre-amplifier (dB)	Correction Factor (dB/m)
4824.00	56.34	PK	74	17.66	51.79	33.52	6.92	35.89	4.55
4824.00	42.82	AV	54	11.18	38.27	33.52	6.92	35.89	4.55
7236.00	41.34	PK	74	32.66	30.07	37.10	9.19	35.02	11.27
7236.00	--	AV	54	--	--	--	--	--	--

Frequency(MHz):			2437		Polarity:			HORIZONTAL	
Frequency (MHz)	Emission Level (dBuV/m)		Limit (dBuV/m)	Margin (dB)	Raw Value (dBuV)	Antenna Factor (dB/m)	Cable Factor (dB)	Pre-amplifier (dB)	Correction Factor (dB/m)
4874.00	56.47	PK	74	17.53	51.83	33.59	6.95	35.90	4.64
4874.00	43.62	AV	54	10.38	38.98	33.59	6.95	35.90	4.64
7311.00	42.18	PK	74	31.82	30.52	37.44	9.22	35.00	11.66
7311.00	--	AV	54	--	--	--	--	--	--

Frequency(MHz):			2437		Polarity:			VERTICAL	
Frequency (MHz)	Emission Level (dBuV/m)		Limit (dBuV/m)	Margin (dB)	Raw Value (dBuV)	Antenna Factor (dB/m)	Cable Factor (dB)	Pre-amplifier (dB)	Correction Factor (dB/m)
4874.00	56.88	PK	74	17.12	52.24	33.59	6.95	35.90	4.64
4874.00	44.25	AV	54	9.75	39.61	33.59	6.95	35.90	4.64
7311.00	42.67	PK	74	31.33	31.01	37.44	9.22	35.00	11.66
7311.00	--	AV	54	--	--	--	--	--	--

Frequency(MHz):			2462		Polarity:			HORIZONTAL	
Frequency (MHz)	Emission Level (dBuV/m)		Limit (dBuV/m)	Margin (dB)	Raw Value (dBuV)	Antenna Factor (dB/m)	Cable Factor (dB)	Pre-amplifier (dB)	Correction Factor (dB/m)
4924.00	57.34	PK	74	16.66	52.56	33.71	6.98	35.91	4.78
4924.00	43.52	AV	54	10.48	38.74	33.71	6.98	35.91	4.78
7386.00	41.79	PK	74	32.21	29.91	37.61	9.25	34.98	11.88
7386.00	--	AV	54	--	--	--	--	--	--

Frequency(MHz):			2462		Polarity:			VERTICAL	
Frequency (MHz)	Emission Level (dBuV/m)		Limit (dBuV/m)	Margin (dB)	Raw Value (dBuV)	Antenna Factor (dB/m)	Cable Factor (dB)	Pre-amplifier (dB)	Correction Factor (dB/m)
4924.00	55.48	PK	74	18.52	50.70	33.71	6.98	35.91	4.78
4924.00	42.65	AV	54	11.35	37.87	33.71	6.98	35.91	4.78
7386.00	40.83	PK	74	33.17	28.95	37.61	9.25	34.98	11.88
7386.00	--	AV	54	--	--	--	--	--	--

REMARKS:

1. Emission level (dBuV/m) = Raw Value (dBuV) + Correction Factor (dB/m)
2. Correction Factor (dB/m) = Antenna Factor (dB/m) + Cable Factor (dB) - Pre-amplifier Factor (dB)
3. Margin value = Limit value - Emission level
4. -- Mean the PK detector measured value is below average limit.
5. The other emission levels were very low against the limit.
6. RBW 1MHz VBW 3MHz Peak detector is for PK value; RBW 1MHz VBW 10Hz Peak detector is for AV value.



802.11n HT40 Mode (above 1GHz)

Frequency(MHz):			2422		Polarity:			HORIZONTAL	
Frequency (MHz)	Emission Level (dBuV/m)		Limit (dBuV/m)	Margin (dB)	Raw Value (dBuV)	Antenna Factor (dB/m)	Cable Factor (dB)	Pre-amplifier (dB)	Correction Factor (dB/m)
4844.00	58.05	PK	74	15.95	53.55	33.48	6.93	35.91	4.50
4844.00	46.75	AV	54	7.25	42.25	33.48	6.93	35.91	4.50
7266.00	42.81	PK	74	31.19	31.52	37.12	9.20	35.03	11.29
7266.00	--	AV	54	--	--	--	--	--	--

Frequency(MHz):			2422		Polarity:			VERTICAL	
Frequency (MHz)	Emission Level (dBuV/m)		Limit (dBuV/m)	Margin (dB)	Raw Value (dBuV)	Antenna Factor (dB/m)	Cable Factor (dB)	Pre-amplifier (dB)	Correction Factor (dB/m)
4844.00	57.83	PK	74	16.17	53.33	33.48	6.93	35.91	4.50
4844.00	45.86	AV	54	8.14	41.36	33.48	6.93	35.91	4.50
7266.00	43.27	PK	74	30.73	31.98	37.12	9.20	35.03	11.29
7266.00	--	AV	54	--	--	--	--	--	--

Frequency(MHz):			2437		Polarity:			HORIZONTAL	
Frequency (MHz)	Emission Level (dBuV/m)		Limit (dBuV/m)	Margin (dB)	Raw Value (dBuV)	Antenna Factor (dB/m)	Cable Factor (dB)	Pre-amplifier (dB)	Correction Factor (dB/m)
4874.00	56.37	PK	74	17.63	51.73	33.59	6.95	35.90	4.64
4874.00	45.22	AV	54	8.78	40.58	33.59	6.95	35.90	4.64
7311.00	41.36	PK	74	32.64	29.70	37.44	9.22	35.00	11.66
7311.00	--	AV	54	--	--	--	--	--	--

Frequency(MHz):			2437		Polarity:			VERTICAL	
Frequency (MHz)	Emission Level (dBuV/m)		Limit (dBuV/m)	Margin (dB)	Raw Value (dBuV)	Antenna Factor (dB/m)	Cable Factor (dB)	Pre-amplifier (dB)	Correction Factor (dB/m)
4874.00	56.89	PK	74	17.11	52.25	33.59	6.95	35.90	4.64
4874.00	44.74	AV	54	9.26	40.10	33.59	6.95	35.90	4.64
7311.00	42.05	PK	74	31.95	30.39	37.44	9.22	35.00	11.66
7311.00	--	AV	54	--	--	--	--	--	--

Frequency(MHz):			2452		Polarity:			HORIZONTAL	
Frequency (MHz)	Emission Level (dBuV/m)		Limit (dBuV/m)	Margin (dB)	Raw Value (dBuV)	Antenna Factor (dB/m)	Cable Factor (dB)	Pre-amplifier (dB)	Correction Factor (dB/m)
4904.00	57.46	PK	74	16.54	52.74	33.65	6.95	35.88	4.72
4904.00	45.83	AV	54	8.17	41.11	33.65	6.95	35.88	4.72
7356.00	42.21	PK	74	31.79	30.38	37.57	9.21	34.95	11.83
7356.00	--	AV	54	--	--	--	--	--	--

Frequency(MHz):			2452		Polarity:			VERTICAL	
Frequency (MHz)	Emission Level (dBuV/m)		Limit (dBuV/m)	Margin (dB)	Raw Value (dBuV)	Antenna Factor (dB/m)	Cable Factor (dB)	Pre-amplifier (dB)	Correction Factor (dB/m)
4904.00	57.05	PK	74	16.95	52.33	33.65	6.95	35.88	4.72
4904.00	45.24	AV	54	8.76	40.52	33.65	6.95	35.88	4.72
7356.00	43.13	PK	74	30.87	31.30	37.57	9.21	34.95	11.83
7356.00	--	AV	54	--	--	--	--	--	--

REMARKS:

- 1.Emission level (dBuV/m) =Raw Value (dBuV)+Correction Factor (dB/m)
- 2.Correction Factor (dB/m) = Antenna Factor (dB/m)+Cable Factor (dB)-Pre-amplifier Factor
- 3.Margin value = Limit value- Emission level
- 4.--Mean the PK detector measured value is below average limit.
- 5.The other emission levels were very low against the limit.
- 6.RBW1MHz VBW3MHz Peak detector is for PK value; RBW 1MHz VBW10Hz Peak detector is for AV value.



Results of Band Edges Test (Radiated)

Note: We tested at 802.11b/802.11g/802.11n HT20/802.11n HT40 mode at the antenna single transmitting mode and 802.11n HT20/802.11n HT40 at the Mimo mode, and recorded the worst data at the antenna single transmitting mode.

Frequency(MHz):			2422		Polarity:			HORIZONTAL	
Frequency (MHz)	Emission Level (dBuV/m)		Limit (dBuV/m)	Margin (dB)	Raw Value (dBuV)	Antenna Factor (dB/m)	Cable Factor (dB)	Pre-amplifier (dB)	Correction Factor (dB/m)
2422.00	103.42	PK	--	--	69.97	28.82	4.63	0.00	33.45
2422.00	96.52	AV	--	--	63.07	28.82	4.63	0.00	33.45
2389.50	52.37	PK	74	21.63	19.06	28.71	4.60	0.00	33.31
2389.50	44.81	AV	54	9.19	11.50	28.71	4.60	0.00	33.31
2390.00	51.43	PK	74	22.57	18.11	28.72	4.60	0.00	33.32
2390.00	41.06	AV	54	12.94	7.74	28.72	4.60	0.00	33.32
2400.00	53.46	PK	74	20.54	20.07	28.78	4.61	0.00	33.39
2400.00	42.82	AV	54	11.18	9.43	28.78	4.61	0.00	33.39

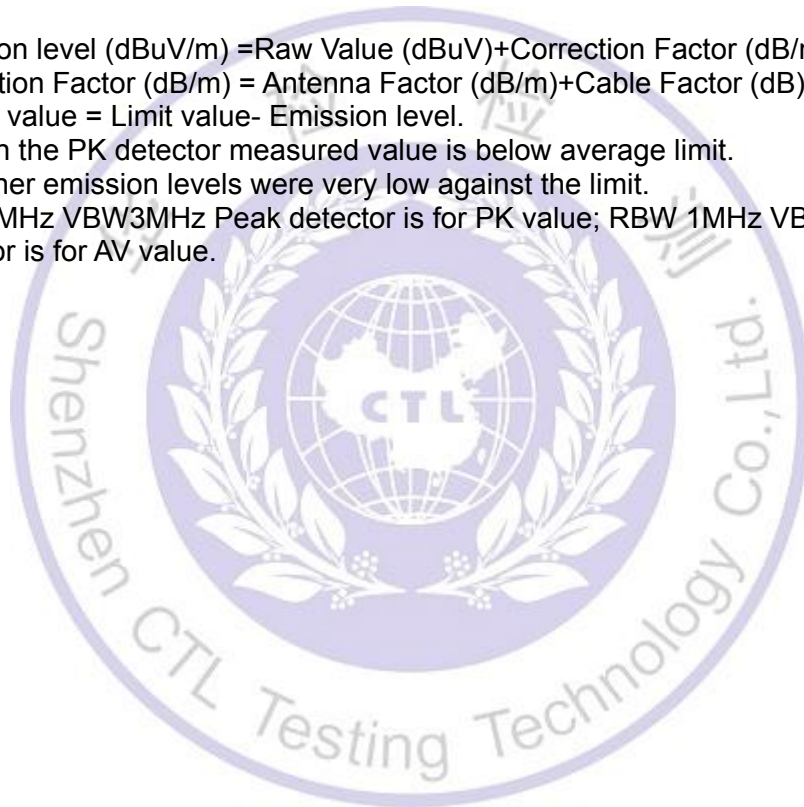
Frequency(MHz):			2422		Polarity:			VERTICAL	
Frequency (MHz)	Emission Level (dBuV/m)		Limit (dBuV/m)	Margin (dB)	Raw Value (dBuV)	Antenna Factor (dB/m)	Cable Factor (dB)	Pre-amplifier (dB)	Correction Factor (dB/m)
2422.00	104.65	PK	--	--	71.20	28.82	4.63	0.00	33.45
2422.00	97.21	AV	--	--	63.76	28.82	4.63	0.00	33.45
2389.50	53.74	PK	74	20.26	20.43	28.71	4.60	0.00	33.31
2389.50	46.33	AV	54	7.67	13.02	28.71	4.60	0.00	33.31
2390.00	52.16	PK	74	21.84	18.84	28.72	4.60	0.00	33.32
2390.00	45.47	AV	54	8.53	12.15	28.72	4.60	0.00	33.32
2400.00	52.08	PK	74	21.92	18.69	28.78	4.61	0.00	33.39
2400.00	42.87	AV	54	11.13	9.48	28.78	4.61	0.00	33.39

Frequency(MHz):			2452		Polarity:			HORIZONTAL	
Frequency (MHz)	Emission Level (dBuV/m)		Limit (dBuV/m)	Margin (dB)	Raw Value (dBuV)	Antenna Factor (dB/m)	Cable Factor (dB)	Pre-amplifier (dB)	Correction Factor (dB/m)
2452.00	104.27	PK	--	--	70.73	28.87	4.67	0.00	33.54
2452.00	94.55	AV	--	--	61.01	28.87	4.67	0.00	33.54
2483.50	52.64	PK	74	21.36	19.01	28.93	4.70	0.00	33.63
2483.50	43.27	AV	54	10.73	9.64	28.93	4.70	0.00	33.63
2484.50	51.64	PK	74	22.36	18.00	28.93	4.70	0.00	33.64
2484.50	--	AV	54	--	--	--	--	--	--
2500.00	44.53	PK	74	29.47	10.85	28.96	4.72	0.00	33.68
2500.00	--	AV	54	--	--	--	--	--	--

Frequency(MHz):			2452		Polarity:			VERTICAL	
Frequency (MHz)	Emission Level (dBuV/m)		Limit (dBuV/m)	Margin (dB)	Raw Value (dBuV)	Antenna Factor (dB/m)	Cable Factor (dB)	Pre-amplifier (dB)	Correction Factor (dB/m)
2452.00	105.36	PK	--	--	71.82	28.87	4.67	0.00	33.54
2452.00	95.72	AV	--	--	62.18	28.87	4.67	0.00	33.54
2483.50	54.27	PK	74	19.73	20.64	28.93	4.70	0.00	33.63
2483.50	44.06	AV	54	9.94	10.43	28.93	4.70	0.00	33.63
2484.50	50.75	PK	74	23.25	17.11	28.93	4.70	0.00	33.64
2484.50	--	AV	54	--	--	--	--	--	--
2500.00	46.58	PK	74	27.42	12.90	28.96	4.72	0.00	33.68
2500.00	--	AV	54	--	--	--	--	--	--

REMARKS:

1. Emission level (dBuV/m) =Raw Value (dBuV)+Correction Factor (dB/m)
2. Correction Factor (dB/m) = Antenna Factor (dB/m)+Cable Factor (dB)-Pre-amplifier Factor
3. Margin value = Limit value- Emission level.
4. -- Mean the PK detector measured value is below average limit.
5. The other emission levels were very low against the limit.
6. RBW1MHz VBW3MHz Peak detector is for PK value; RBW 1MHz VBW10Hz Peak detector is for AV value.



3.3. Maximum Conducted Output Power

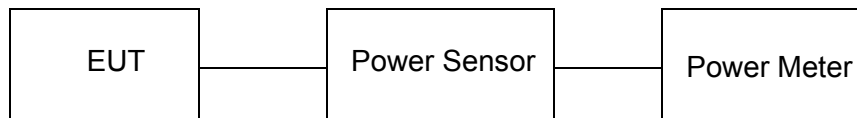
Limit

The Maximum Peak Output Power Measurement is 30dBm.

Test Procedure

Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to the power sensor.

Test Configuration



Test Results

Antenna 1

Type	Channel	Output power PK (dBm)	Output power AV (dBm)	Limit (dBm)	Result
802.11b	01	15.84	12.76	30.00	Pass
	06	15.63	12.58		
	11	15.45	12.34		
802.11g	01	14.75	11.83	30.00	Pass
	06	14.82	11.27		
	11	14.27	11.62		
802.11n(HT20)	01	14.65	11.27	30.00	Pass
	06	14.34	11.34		
	11	14.17	11.15		
802.11n(HT40)	03	12.81	8.23	30.00	Pass
	06	12.36	8.64		
	09	12.42	8.51		

Note: 1.The test results including the cable lose.

Antenna 2

Type	Channel	Output power PK (dBm)	Output power AV (dBm)	Limit (dBm)	Result
802.11b	01	15.42	12.53	30.00	Pass
	06	15.35	12.62		
	11	15.67	12.45		
802.11g	01	14.27	11.46	30.00	Pass
	06	14.15	11.34		
	11	14.36	11.51		
802.11n(HT20)	01	14.45	11.42	30.00	Pass
	06	14.14	11.28		
	11	14.02	11.24		
802.11n(HT40)	03	12.64	8.35	30.00	Pass
	06	12.57	8.33		
	09	12.34	8.42		

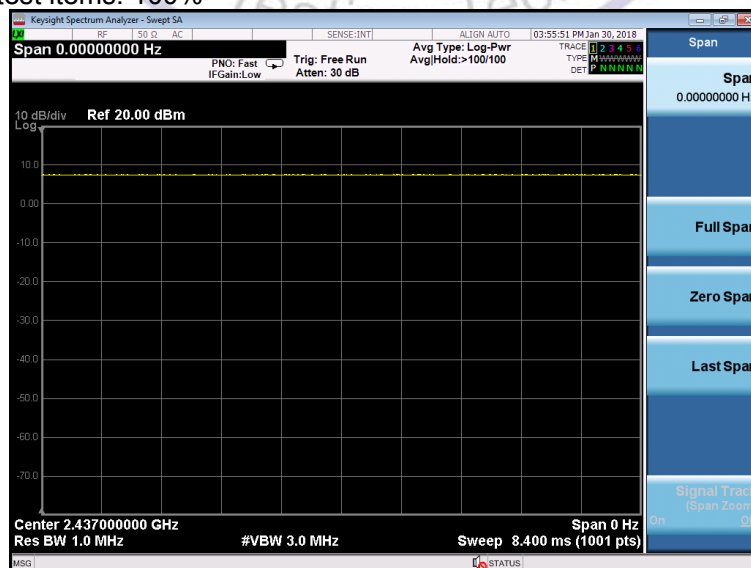
Note: 1.The test results including the cable lose.

MIMO

Type	Channel	Peak Output power ANT1 (dBm)	Peak Output power ANT2 (dBm)	Peak Output power Total (dBm)	Limit (dBm)	Result
802.11n(HT20)	01	14.65	14.45	17.56	30	Pass
	06	14.34	14.14	17.25		
	11	14.17	14.02	17.11		
802.11n(HT40)	03	12.81	12.64	15.74	30	Pass
	06	12.36	12.57	15.48		
	09	12.42	12.34	15.39		

Note: 1.The test results including the cable lose.

Duty cycle used in all test items: 100%



3.4. Power Spectral Density

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.

Test 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 \geq 3 kHz.
3. Set the VBW \geq 3 \times RBW.
4. Set the span to 1.5 times the DTS channel bandwidth.
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.
10. If measured value exceeds limit, reduce RBW (no less than 3 kHz) and repeat.
11. The resulting peak PSD level must be 8dBm.

Test Configuration



Test Results

Antenna 1

Type	Channel	Power Spectral Density (dBm/3KHz)	Limit (dBm/3KHz)	Result
802.11b	01	-18.163	8.00	Pass
	06	-17.820		
	11	-18.077		
802.11g	01	-20.414	8.00	Pass
	06	-20.774		
	11	-21.118		
802.11n(HT20)	01	-20.783	8.00	Pass
	06	-20.365		
	11	-20.576		
802.11n(HT40)	03	-22.583	8.00	Pass
	06	-23.220		
	09	-22.620		

Antenna 2

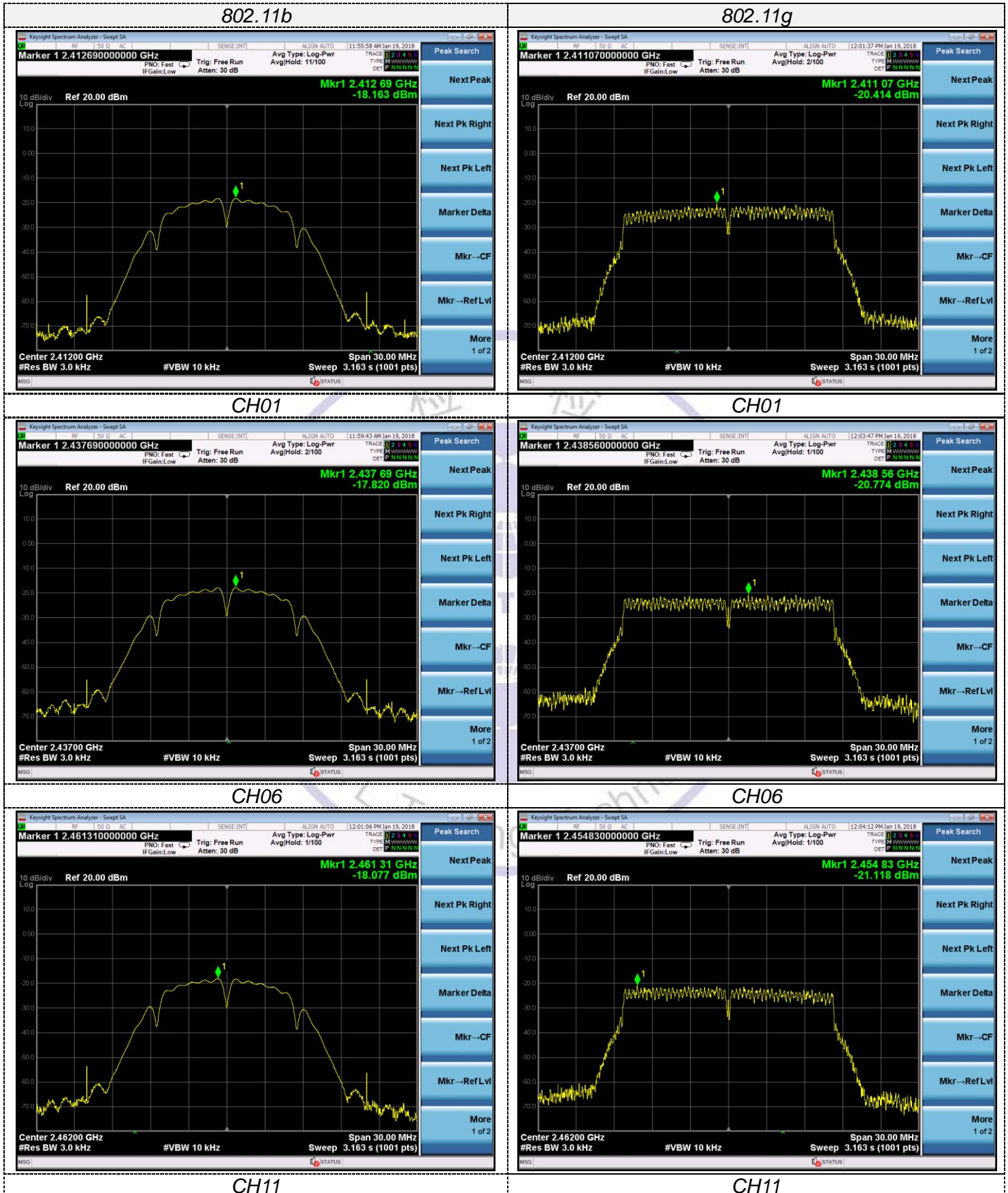
Type	Channel	Power Spectral Density (dBm/3KHz)	Limit (dBm/3KHz)	Result
802.11b	01	-17.331	8.00	Pass
	06	-16.726		
	11	-16.879		
802.11g	01	-19.879	8.00	Pass
	06	-20.082		
	11	-19.691		
802.11n(HT20)	01	-19.193	8.00	Pass
	06	-19.413		
	11	-20.074		
802.11n(HT40)	03	-23.383	8.00	Pass
	06	-23.959		
	09	-22.512		

MIMO

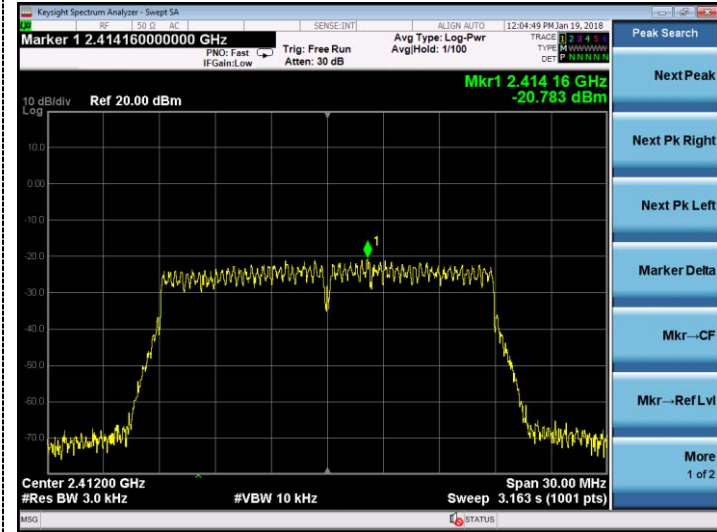
Type	Channel	Power Spectral Density ANT1 (dBm/3KHz)	Power Spectral Density ANT2 (dBm/3KHz)	Power Spectral Density Total (dBm/3KHz)	Limit (dBm/3KHz)	Result
802.11n(H T20)	01	-20.783	-19.193	-16.91	8.00	Pass
	06	-20.365	-19.413	-16.85		
	11	-20.576	-20.074	-17.31		
802.11n(H T40)	03	-22.583	-23.383	-19.95	8.00	Pass
	06	-23.220	-23.959	-20.56		
	09	-22.620	-22.512	-19.56		

Test plot as follows:

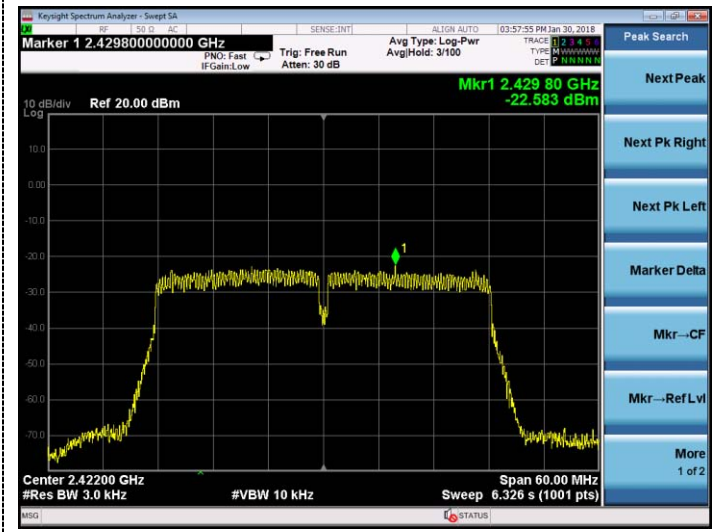
Antenna 1



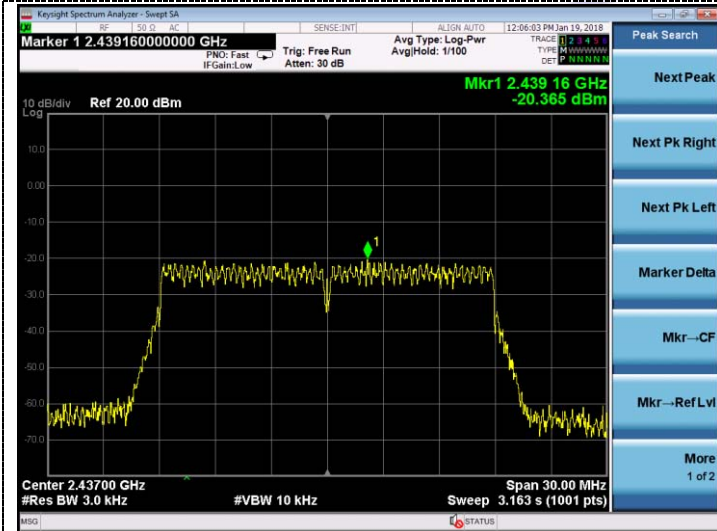
802.11n(HT20)



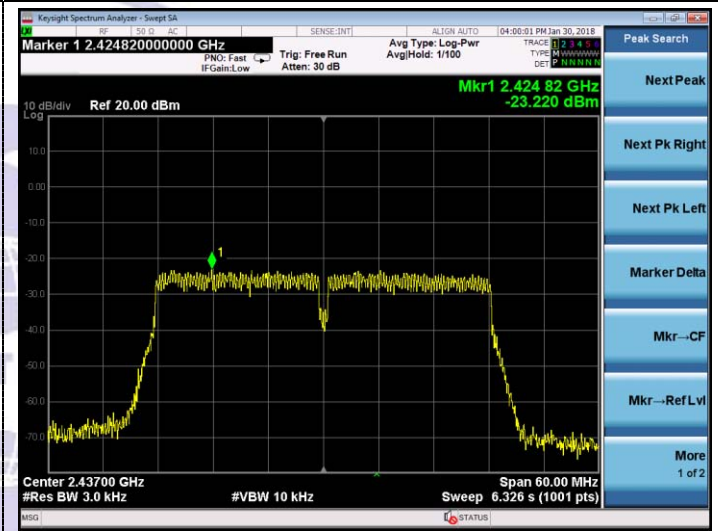
802.11n(HT40)



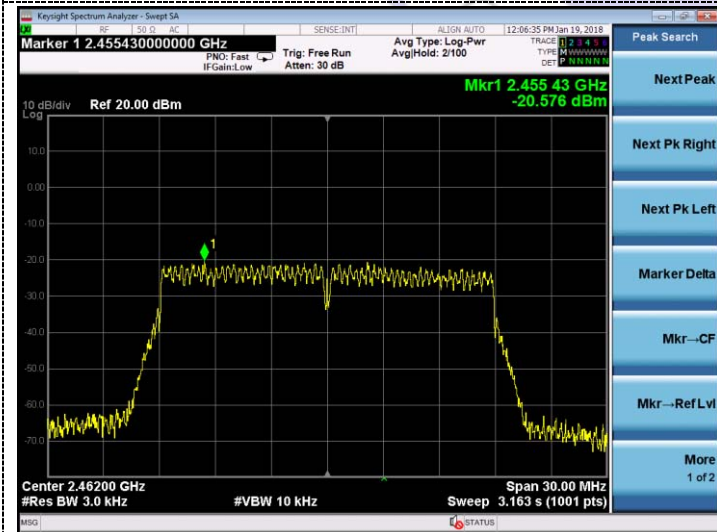
CH01



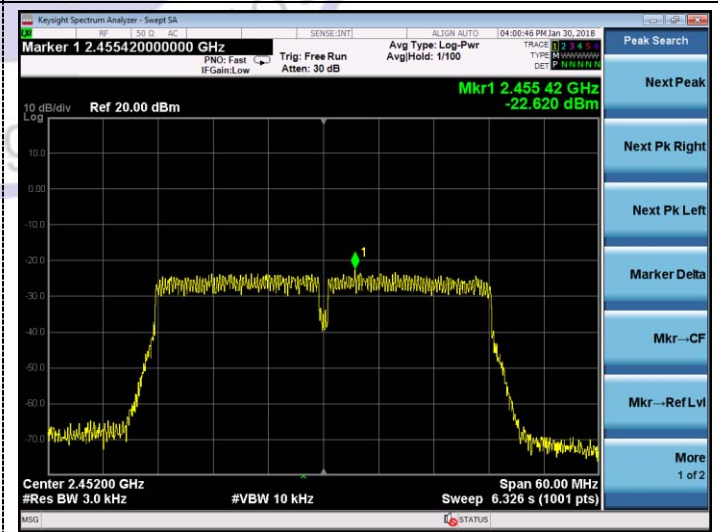
CH03



CH06



CH06

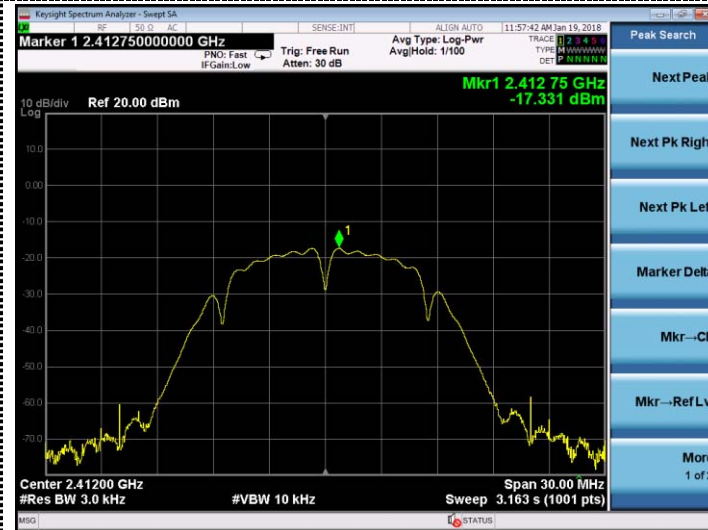


CH11

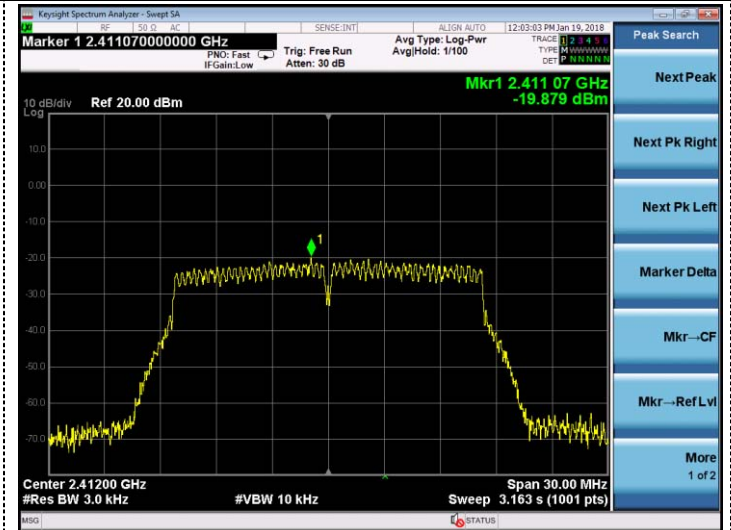
CH09

Antenna 2

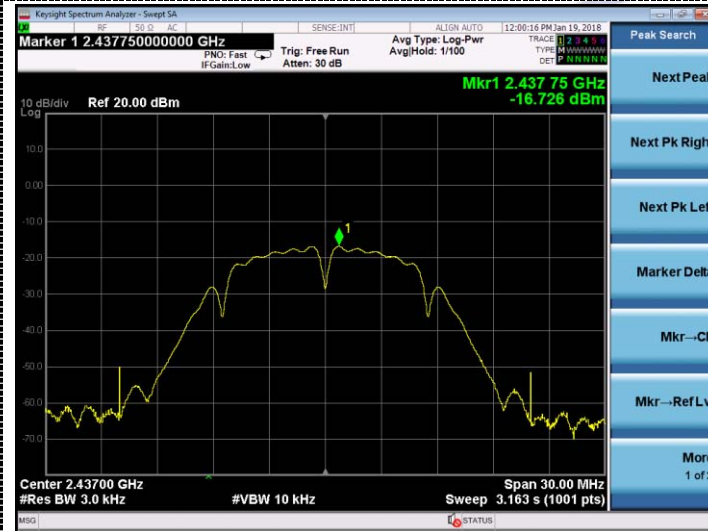
802.11b



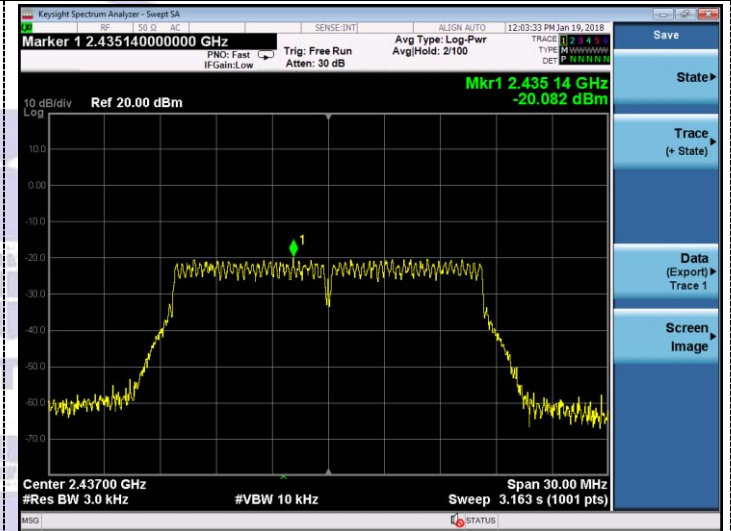
802.11g



CH01



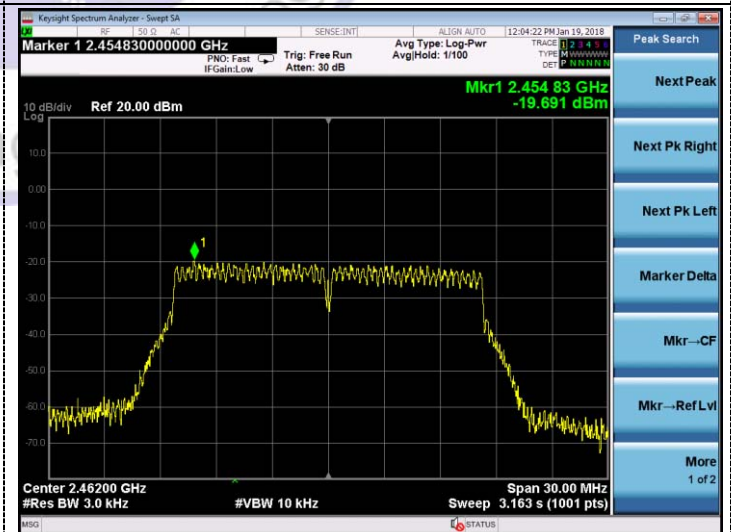
CH01



CH06

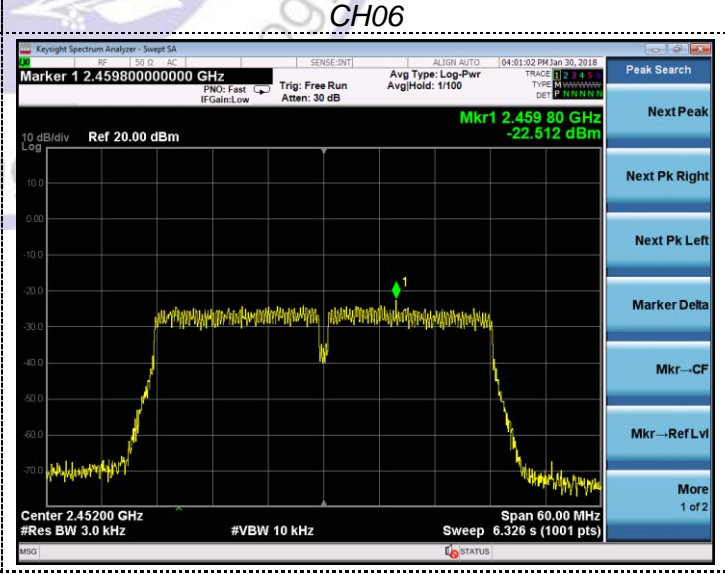
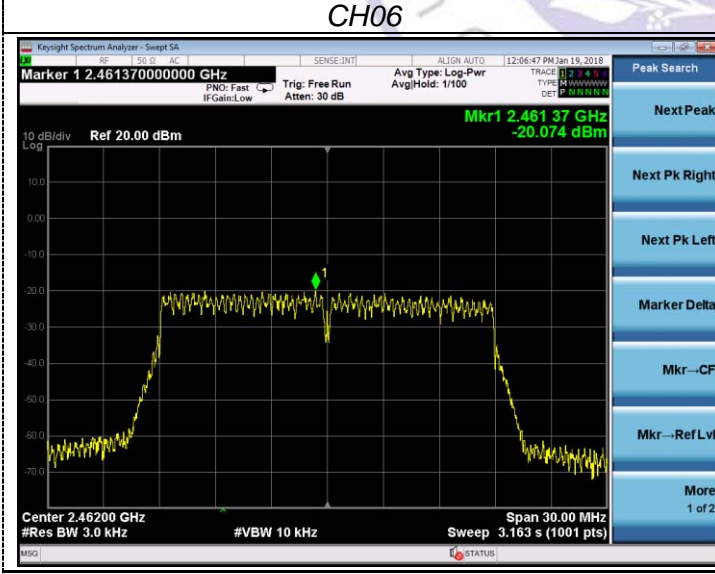
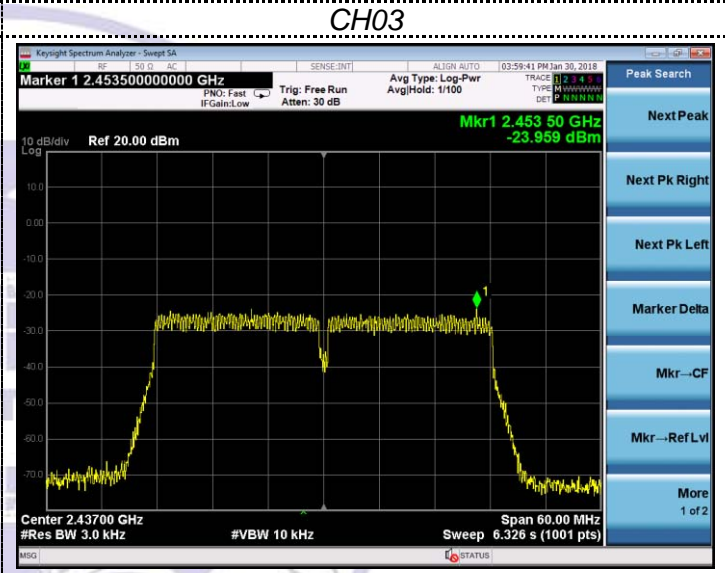
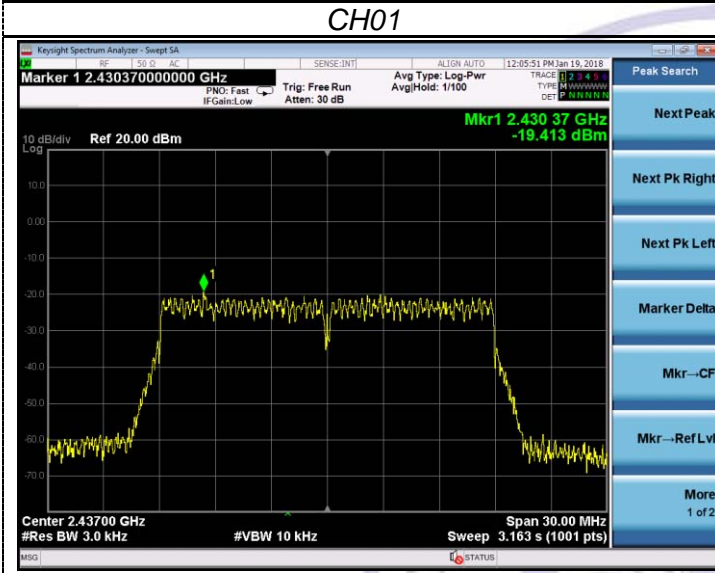
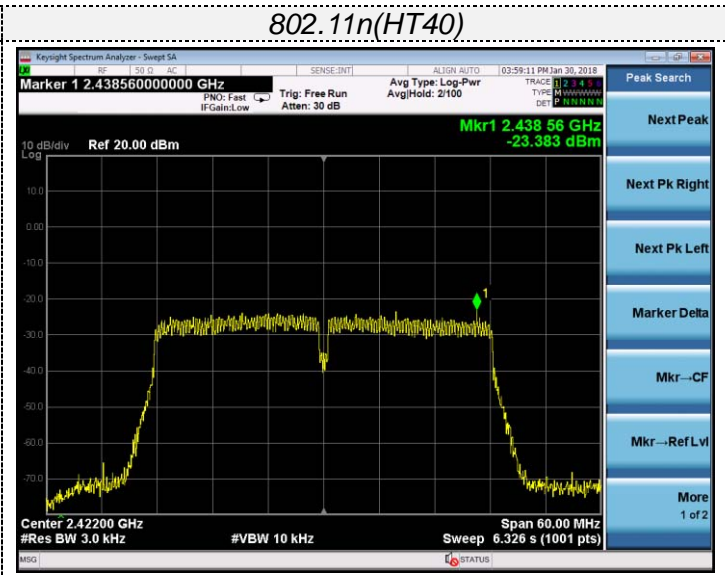
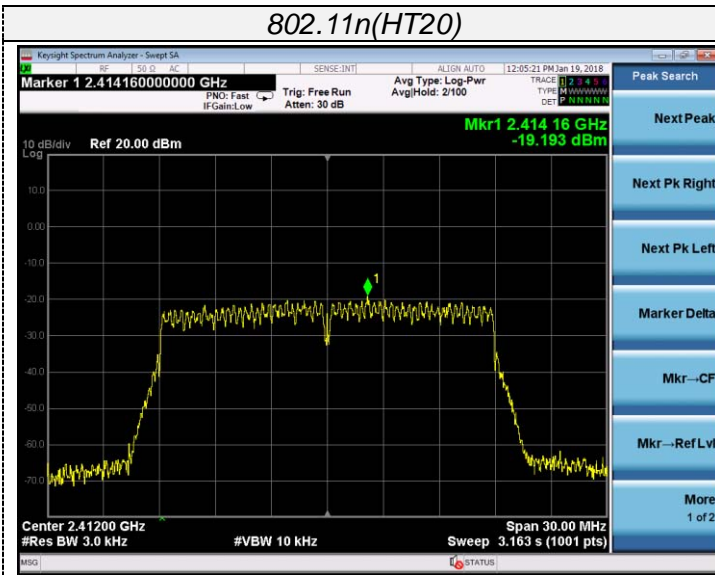


CH06



CH11

CH11



CH11

CH09

3.5.6dB Bandwidth

Limit

For digital modulation systems, the minimum 6 dB bandwidth shall be at least 500 kHz

Test Procedure

The transmitter output was connected to the spectrum analyzer through an attenuator. The bandwidth of the fundamental frequency was measured by spectrum analyzer with 100 KHz RBW and 300 KHz VBW. The 6dB bandwidth is defined as the total spectrum the power of which is higher than peak power minus 6dB.

Test Configuration



Test Results

Antenna 1

Type	Channel	6dB Bandwidth (MHz)	Limit (KHz)	Result
802.11b	01	9.123	≥500	Pass
	06	9.151		
	11	9.146		
802.11g	01	16.51	≥500	Pass
	06	16.63		
	11	16.58		
802.11n(HT20)	01	17.74	≥500	Pass
	06	17.84		
	11	17.74		
802.11n(HT40)	03	36.40	≥500	Pass
	06	36.56		
	09	36.46		