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TEST REPORT

Product Name .....: Mobile Phone

Trademark .....: elementt

Model/Type reference.....: Twister ES-A771

Listed Model(s) .....: /

FCC ID.....: **2AEMYESA771**

Test Standards .....: **FCC Part 15.247: Operation within the bands 902-928 MHz, 2400-2483.5 MHz and 5725-5850 MHz**

Applicant .....: South Mobile Ltda

Address of applicant .....: Avenida Apoquindo 6410, Of. 803. Las Condes. Santiago – Chile

Date of Receipt .....: May 24, 2015

Date of Test Date.....: May 24, 2015 - Jun. 11, 2015

Data of issue. .....: Jun. 12, 2015

Test result	**Pass ***

* In the configuration tested, the EUT complied with the standards specified above

GENERAL DESCRIPTION OF EUT	
Equipment:	Mobile Phone
Model Name:	Twister ES-A771
Manufacturer:	South Mobile Ltda
Manufacturer Address:	Avenida Apoquindo 6410, Of. 803. Las Condes. Santiago – Chile
Power Rating:	DC 3.8V form 2400mAh by rechargeable battery or DC 5.0V form Input:100-240V~,50/60Hz Output: 5.0V⎓1000mA adapter

Compiled By: (Allen Wang)

Reviewed By: (Tony Wang)

Approved By: (Walter Chen)

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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

ANSI C63.4:2003: American National Standard for Testing Unlicensed Wireless Devices

KDB558074 D01 V03r03: Guidance for Performing Compliance Measurements on Digital Transmission Systems (DTS) Operating Under §15.247

1.2. Test Description

FCC PART 15 15.247		
FCC Part 15.207	AC Power Conducted Emission	PASS
FCC Part 15.247(a)(2)	6dB Bandwidth	PASS
FCC Part 15.247(d)	Spurious RF Conducted Emission	PASS
FCC Part 15.247(b)	Maximum Peak Output Power	PASS
FCC Part 15.247(e)	Power Spectral Density	PASS
FCC Part 15.109/ 15.205/ 15.209	Radiated Emissions	PASS
FCC Part 15.247(d)	Band Edge	PASS
FCC Part 15.203/15.247 (b)	Antenna Requirement	PASS

Remark: The measurement uncertainty is not included in the test result.

1.3. Test Facility

1.3.1 Address of the test laboratory

Shenzhen General Testing & Inspection Technology Co., Ltd.

Add: 1F, 2 Block,Jiaquan Building, Guanlan High-tech Park Baoan District, Shenzhen, Guangdong,China

1.3.2 Laboratory accreditation

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

IC Registration No.: 9783A

The 3m alternate test site of Shenzhen GTI Technology Co., Ltd.EMC Laboratory has been registered by Certification and Engineer Bureau of Industry Canada for the performance of with Registration NO.: 9783A on Aug, 2011.

FCC-Registration No.: 214666

Shenzhen GTI 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 214666, Sep 19, 2011

1.4. 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 General Testing & Inspection 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 General Testing & Inspection laboratory is reported:

Test Items	Measurement Uncertainty	Notes
Transmitter power conducted	0.57 dB	(1)
Transmitter power Radiated	2.20 dB	(1)
Conducted spurious emission 9KHz-40 GHz	1.60 dB	(1)
Radiated spurious emission 9KHz-40 GHz	2.20 dB	(1)
Conducted Emission 9KHz-30MHz	3.39 dB	(1)
Radiated Emission 30~1000MHz	4.24 dB	(1)
Radiated Emission 1~18GHz	5.16 dB	(1)
Radiated Emission 18-40GHz	5.54 dB	(1)
Occupied Bandwidth	---------	(1)

(1) This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=1.96.

2. GENERAL INFORMATION

2.1. Environmental conditions

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

Temperature:	15~35°C
Relative Humidity:	30~60 %
Air Pressure:	950~1050mba

2.2. General Description of EUT

Product Name:	Mobile Phone
Model/Type reference:	Twister ES-A771
Power supply:	DC 3.8V from battery
Adapter information :	Model:C1000 Input: 100-240V, 50/60Hz 0.2A Output:DC5V⎓1000m A
Hardware version:	E2702_V1.2.1
Software version:	702v92_cxq1_20150210
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:	FPC Antenna
Antenna gain:	-1.1dBi
Bluetooth:	
Supported type:	Version 4.0 for low Energy
Modulation:	GFSK
Operation frequency:	2402MHz to 2480MHz
Channel number:	40
Channel separation:	2 MHz
Antenna type:	FPC Antenna
Antenna gain:	-1.1dBi

Note: For a more detailed features description, please refer to the manufacturer's specifications or the User's Manual.

2.3. Description of Test Modes

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.

BT 4.0 Operation Frequency：

Channel	Frequency (MHz)
00	**2402**
02	2404
03	2406
⋮	⋮
19	**2440**
⋮	⋮
37	2476
38	2478
39	**2480**

WIFI Operation Frequency：

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		

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 Peak 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. Measurement Instruments List

Maximum Peak Output Power					
Item	Test Equipment	Manufacturer	Model No.	Serial No.	Calibrated until
1	Spectrum Analyzer	Agilent	N9030A	MY51380383	Oct 25,2015

Power Spectral Density / 6dB Bandwidth / Band Edge Compliance of RF Emission / Spurious RF Conducted Emission					
Item	Test Equipment	Manufacturer	Model No.	Serial No.	Calibrated until
1	Spectrum Analyzer	Agilent	N9030A	MY51380383	Oct 25,2015

Conducted Emission					
Item	Test Equipment	Manufacturer	Model No.	Serial No.	Calibrate until
1	LISN	R&S	ENV216	101112	Jan. 07, 2016
2	LISN	R&S	ENV216	101113	Jan. 07, 2016
3	EMI Test Receiver	R&S	ESCI	100920	Jan. 07, 2016
4	Cable	Schwarzbeck	AK9515E	33156	Jan. 07, 2016

Radiated Emission					
Item	Test Equipment	Manufacturer	Model No.	Serial No.	Calibrated until
1	EMI Test Receiver	R&S	ESCI	100967	Jan 07,2016
2	High pass filter	micro-tranics	HPM50111	34202	Jan 07,2016
3	Log-Bicon Antenna	Schwarzbeck	CBL6141A	4180	Jan. 10,2016
4	Ultra-Broadband Antenna	ShwarzBeck	BBHA9170	25841	Jan. 10,2016
5	Loop Antenna	LAPLAC	RF300	9138	Jan. 10,2016
6	Spectrum Analyzer	Rohde & Schwarz	FSU	100105	Jan 07,2016
7	Horn Antenna	Schwarzbeck	BBHA 9120D	648	Jan. 10,2016
8	Pre-Amplifier	HP	8447D	1937A03050	Jan. 07,2016
9	Pre-Amplifier	EMCI	EMC051835	980075	Jan. 07,2016
10	Antenna Mast	UC	UC3000	N/A	N/A
11	Turn Table	UC	UC3000	N/A	N/A
12	Cable Below 1GHz	Schwarzbeck	AK9515E	33155	Jan. 07,2016
13	Cable Above 1GHz	Hubersuhner	SUCOFLEX102	DA1580	Jan. 07,2016

Note: 1. The Cal. Interval was one year.
2. The cable loss has calculated in test result which connection between each test instruments.

3. TEST CONDITIONS AND RESULTS

3.1. Conducted Emission (AC Main)

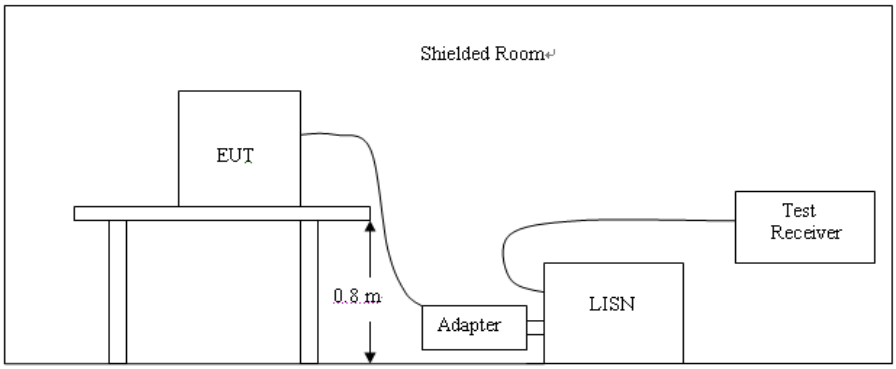
LIMIT

FCC CFR Title 47 Part 15 Subpart C Section 15.207

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 C63.4:2003.
2. Support equipment, if needed, was placed as per ANSI C63.4:2003
3. All I/O cables were positioned to simulate typical actual usage as per ANSI C63.4:2003
4. The EUT received DC5V power from the adapter, the adapter received AC120V/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.

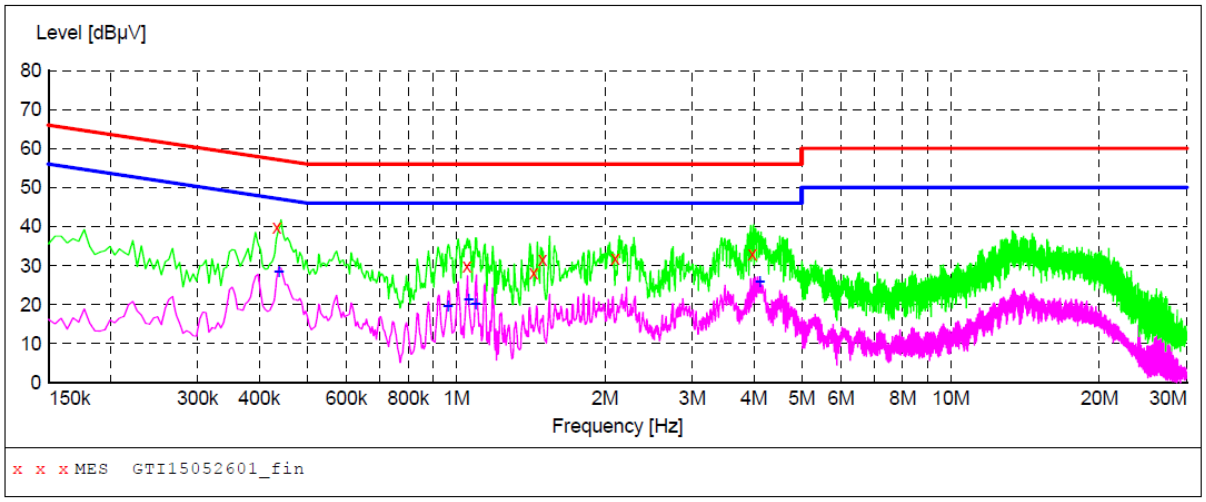
TEST RESULTS

Note: We tested all modes, recorded the worst case at wifi 802.11b mode

LINE	L

SCAN TABLE: "Voltage (9K-30M)FIN"

Short Description: 150K-30M Voltage



MEASUREMENT RESULT: "GTI15052601_fin"

5/26/2015 9:47AM

Frequency MHz	Level dBµV	Transd dB	Limit dBµV	Margin dB	Detector	Line	PE
0.434000	39.70	9.9	57	17.5	QP	L1	GND
1.052000	29.80	10.1	56	26.2	QP	L1	GND
1.436000	28.10	10.3	56	27.9	QP	L1	GND
1.496000	31.50	10.3	56	24.5	QP	L1	GND
2.096000	31.90	10.4	56	24.1	QP	L1	GND
3.968000	33.00	10.6	56	23.0	QP	L1	GND

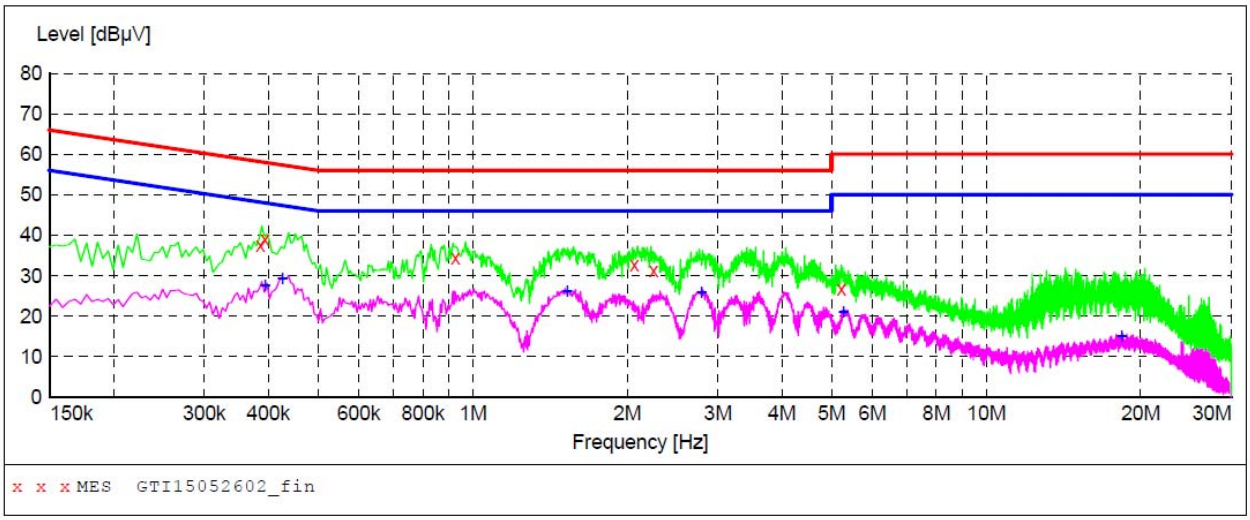
MEASUREMENT RESULT: "GTI15052601_fin2"

5/26/2015 9:47AM

Frequency MHz	Level dBµV	Transd dB	Limit dBµV	Margin dB	Detector	Line	PE
0.438000	28.50	9.9	47	18.6	AV	L1	GND
0.962000	19.60	10.1	46	26.4	AV	L1	GND
1.058000	21.40	10.1	46	24.6	AV	L1	GND
1.094000	20.20	10.2	46	25.8	AV	L1	GND
4.106000	25.90	10.6	46	20.1	AV	L1	GND

LINE	N

SCAN TABLE: "Voltage (9K-30M)FIN"
Short Description: 150K-30M Voltage



MEASUREMENT RESULT: "GTI15052602_fin"

5/26/2015 9:50AM

Frequency MHz	Level dBµV	Transd dB	Limit dBµV	Margin dB	Detector	Line	PE
0.386000	37.70	9.9	58	20.4	QP	N	GND
0.394000	39.10	9.9	58	18.9	QP	N	GND
0.926000	34.30	10.1	56	21.7	QP	N	GND
2.066000	32.70	10.4	56	23.3	QP	N	GND
2.252000	31.30	10.4	56	24.7	QP	N	GND
5.222000	26.80	10.6	60	33.2	QP	N	GND

MEASUREMENT RESULT: "GTI15052602_fin2"

5/26/2015 9:50AM

Frequency MHz	Level dBµV	Transd dB	Limit dBµV	Margin dB	Detector	Line	PE
0.394000	27.60	9.9	48	20.4	AV	N	GND
0.426000	29.30	9.9	47	18.0	AV	N	GND
1.526000	26.10	10.3	46	19.9	AV	N	GND
2.786000	26.00	10.5	46	20.0	AV	N	GND
5.270000	21.10	10.6	50	28.9	AV	N	GND
18.344000	14.90	10.8	50	35.1	AV	N	GND

3.2. Radiated Emission

Limit

For intentional device, according to § 15.209(a), the general requirement of field strength of radiated emission from intentional radiators at a distance of 3 meters shall not exceed the following table. According to § 15.247(d), in any 100kHz bandwidth outside the frequency band in which the EUT is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20dB below that in the100kHz bandwidth within the band that contains the highest level of desired power.

The frequency spectrum above 1 GHz for Transmitter was investigated. All emission not reported are much lower than the prescribed limits. Set the RBW=1MHz, VBW=3MHz for Peak Detector while the RBW=1MHz, VBW=10Hz for Average Detector, Readings are both peak and average values. The pre-test have done for the EUT in three axes and found the worst emission at position shown in test setup photos.

Frequency (MHz)	Distance (Meters)	Radiated (dBuV/m)	Radiated (μV/m)
0.009-0.49	3	20log(2400/F(KHz))+40log(300/3)	2400/F(KHz)
0.49-1.705	3	20log(24000/F(KHz))+ 40log(30/3)	24000/F(KHz)
1.705-30	3	20log(30)+ 40log(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 Procedure

1. The EUT was placed on a turn table which is 0.8m above ground plane..
2. 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
3. And also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical.
4. Repeat above procedures until all frequency measurements have been completed.

Field Strength Calculation

The field strength is calculated by adding the Antenna Factor and Cable Factor and subtracting the Amplifier Gain and Duty Cycle Correction Factor (if any) from the measured reading. The basic equation with a sample calculation is as follows:

FS = RA + AF + CL – AG

Where FS = Field Strength	CL = Cable Attenuation Factor (Cable Loss)
RA = Reading Amplitude	AG = Amplifier Gain
AF = Antenna Factor	

For example

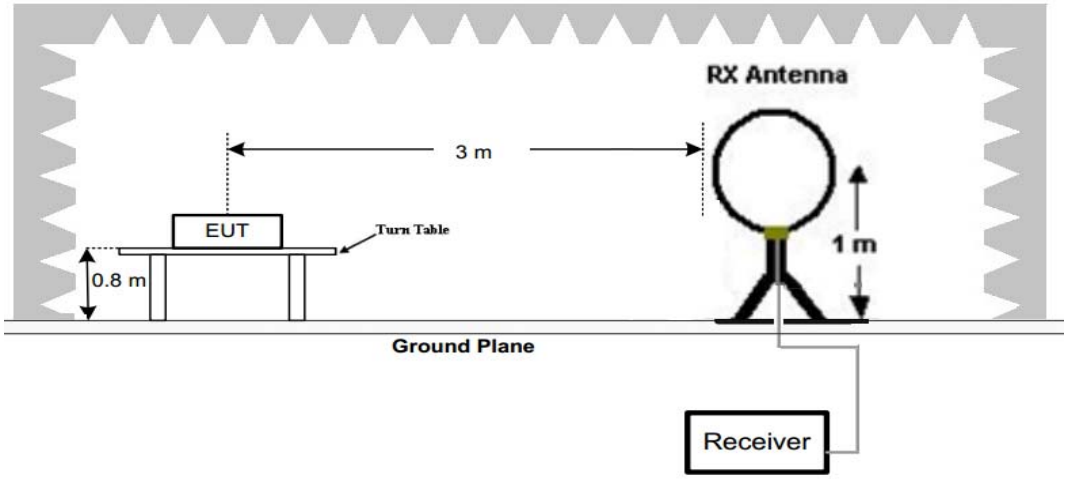
Frequency (MHz)	FS (dBμV/m)	RA (dBμV/m)	AF (dB)	CL (dB)	AG (dB)	Transd (dB)
150.00	40	58.1	12.2	1.6	31.90	-18.1

Transd=AF +CL-AG

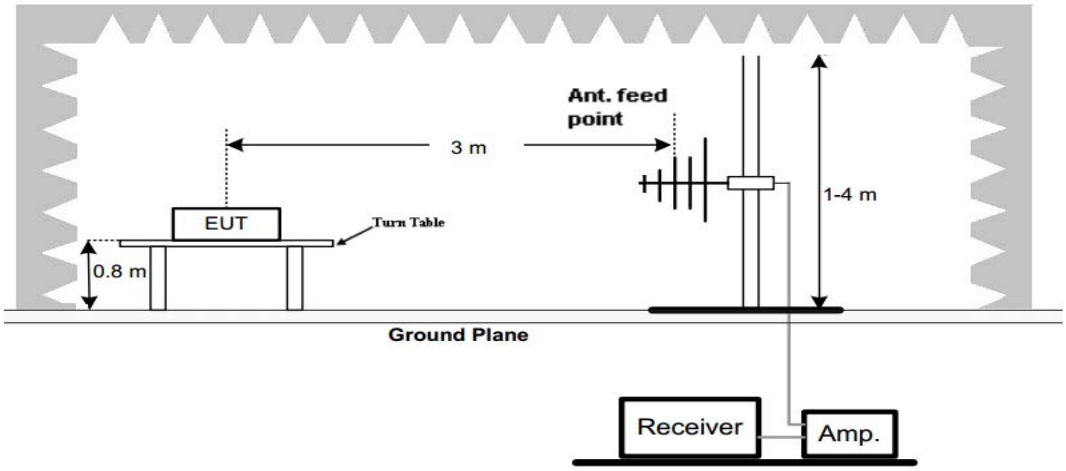
Test Configuration

For the actual test configuration, please refer to the related Item –EUT Test Photos.

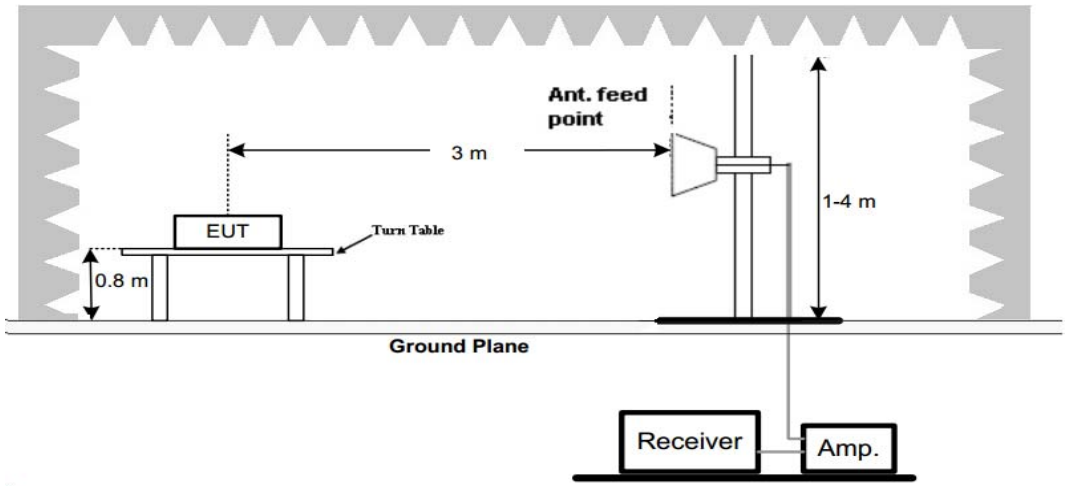
Frequency range 9 KHz – 30MHz



Frequency range 30MHz – 1000MHz



Frequency range above 1GHz-25GHz



Test Results

Remark:

1. We tested three channels for each mode and recorded worst case at low channel of 802.11b and BT 4.0 mode below 1GHz

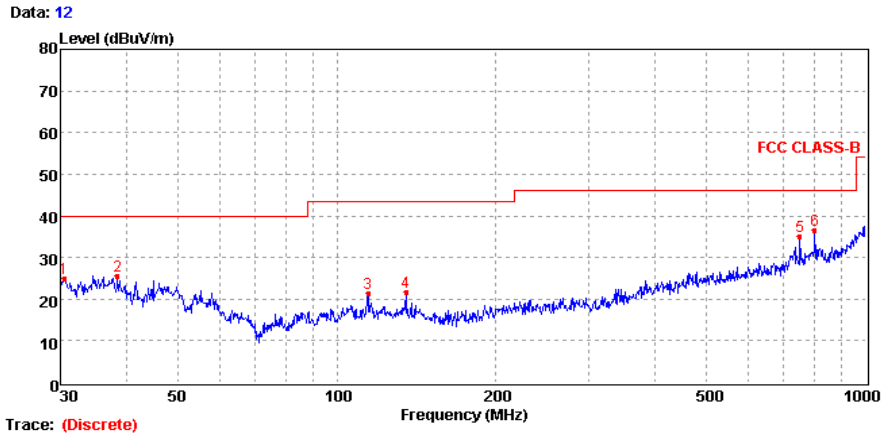
For 9 KHz-30MHz

Frequency (MHz)	Corrected Reading (dBuV/m)@3m	FCC Limit (dBuV/m) @3m	Margin (dB)	Detector	Result
0.46	52.32	94.35	42.03	QP	PASS
1.44	44.96	64.44	19.48	QP	PASS
13.58	58.11	69.54	11.43	QP	PASS
24.58	48.67	69.54	20.87	QP	PASS

For 30MHz-1GHz

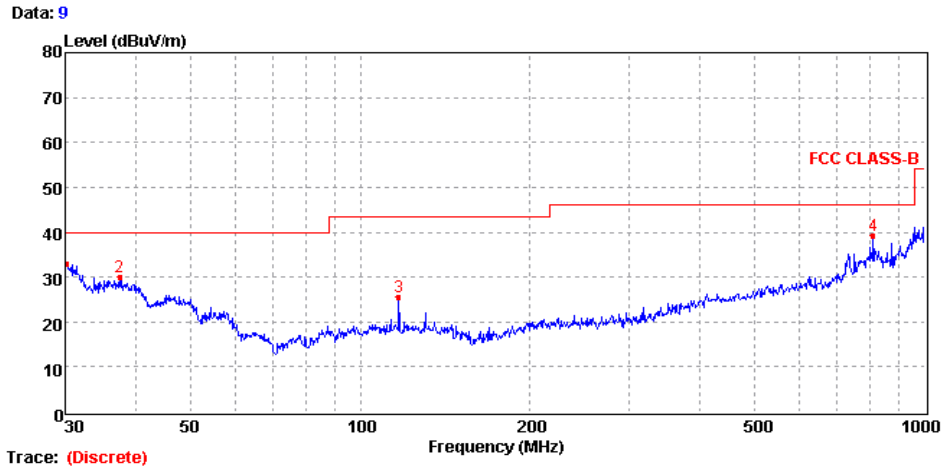
For 802.11B Low Channel

Horizontal



Mark	Frequency MHz	Level dBuV/m	Factor dB/m	Reading dBuV	Limit dBuV/m	Margin dB	Polarization	Detector
1	30.53	24.89	-8.89	33.78	40.00	15.11	HORIZONTAL	Peak
2	38.48	25.67	-12.07	37.74	40.00	14.33	HORIZONTAL	Peak
3	114.51	21.47	-18.88	40.35	43.50	22.03	HORIZONTAL	Peak
4	135.03	21.76	-18.87	40.63	43.50	21.74	HORIZONTAL	Peak
5	750.11	35.09	-8.34	43.43	46.00	10.91	HORIZONTAL	Peak
6	801.79	36.53	-7.24	43.77	46.00	9.47	HORIZONTAL	Peak

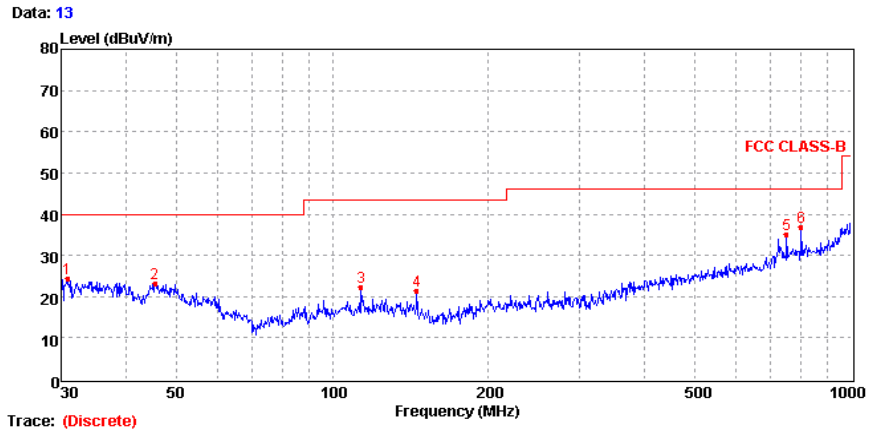
Vertical



Mark	Frequency MHz	Level dBuV/m	Factor dB/m	Reading dBuV	Limit dBuV/m	Margin dB	Polarization	Detector
1	30.11	33.09	-8.49	41.58	40.00	6.91	VERTICAL	Peak
2	37.42	30.10	-11.67	41.77	40.00	9.90	VERTICAL	Peak
3	116.95	25.57	-18.78	44.35	43.50	17.93	VERTICAL	Peak
4	810.27	39.14	-7.21	46.35	46.00	6.86	VERTICAL	Peak

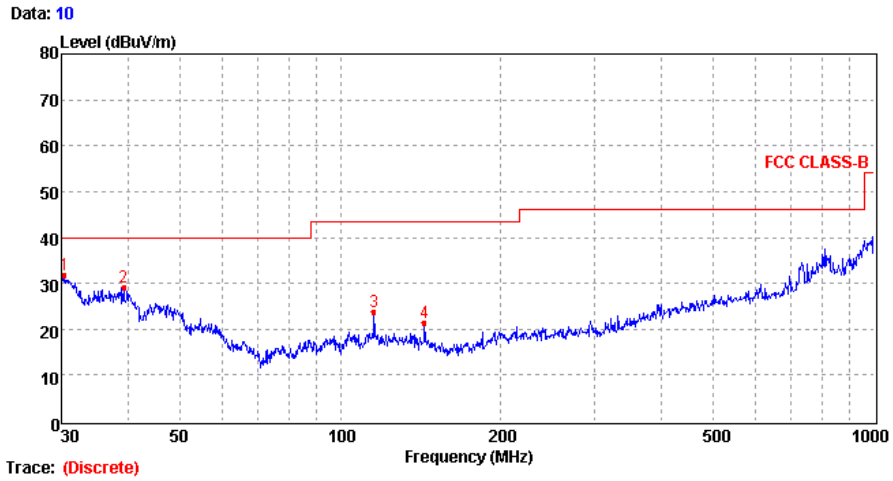
For BT 4.0 Low Channel

Horizontal



Mark	Frequency MHz	Level dBuV/m	Factor dB/m	Reading dBuV	Limit dBuV/m	Margin dB	Polarization	Detector
1	30.85	24.28	-8.89	33.17	40.00	15.72	HORIZONTAL	Peak
2	45.53	23.09	-14.06	37.15	40.00	16.91	HORIZONTAL	Peak
3	113.71	22.26	-18.91	41.17	43.50	21.24	HORIZONTAL	Peak
4	145.35	21.35	-19.47	40.82	43.50	22.15	HORIZONTAL	Peak
5	750.11	35.21	-8.34	43.55	46.00	10.79	HORIZONTAL	Peak
6	801.79	37.00	-7.24	44.24	46.00	9.00	HORIZONTAL	Peak

Vertical



Mark	Frequency MHz	Level dBuV/m	Factor dB/m	Reading dBuV	Limit dBuV/m	Margin dB	Polarization	Detector
1	30.42	31.75	-8.49	40.24	40.00	8.25	VERTICAL	Peak
2	39.30	29.08	-12.47	41.55	40.00	10.92	VERTICAL	Peak
3	115.73	23.76	-18.84	42.60	43.50	19.74	VERTICAL	Peak
4	143.83	21.47	-19.29	40.76	43.50	22.03	VERTICAL	Peak

For 1GHz to 25GHz

802.11b Mode (above 1GHz)

Frequency(MHz):				2412			Polarity:			HORIZONTAL		
No.	Frequency (MHz)	Emission Level (dBuV/m)		Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Antenna Factor (dB/m)	Cable Factor (dB)	Pre-amplifier (dB)	Correction Factor (dB/m)
1	4824	56.85	PK	74.00	17.15	1.00	130	54.75	31.6	7.00	36.5	2.10
1	4824	47.33	AV	54.00	6.67	1.00	130	45.23	31.6	7.00	36.5	2.10
2	7236	51.18	PK	74.00	22.82	1.00	130	40.25	37.33	8.90	35.3	10.93
2	7236	42.95	AV	54.00	11.05	1.00	130	32.02	37.33	8.90	35.3	10.93

Frequency(MHz):				2412			Polarity:			VERTICAL		
No.	Frequency (MHz)	Emission Level (dBuV/m)		Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Antenna Factor (dB/m)	Cable Factor (dB)	Pre-amplifier (dB)	Correction Factor (dB/m)
1	4824	59.05	PK	74.00	14.95	1.00	120	56.95	31.60	7.00	36.50	2.10
1	4824	50.70	AV	54.00	3.30	1.00	120	48.60	31.60	7.00	36.50	2.10
2	7236	51.94	PK	74.00	22.06	1.00	145	41.01	37.33	8.90	35.30	10.93
2	7236	44.87	AV	54.00	9.13	1.00	145	33.94	37.33	8.90	35.30	10.93

Frequency(MHz):				2437			Polarity:			HORIZONTAL		
No.	Frequency (MHz)	Emission Level (dBuV/m)		Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Antenna Factor (dB/m)	Cable Factor (dB)	Pre-amplifier (dB)	Correction Factor (dB/m)
1	4874.00	66.50	PK	74.00	7.50	1.00	130	64.38	31.02	7.60	36.5	2.12
1	4874.00	47.74	AV	54.00	6.26	1.00	130	45.62	31.02	7.60	36.5	2.12
2	7311.00	58.60	PK	74.00	15.40	1.00	130	47.52	37.28	8.60	34.8	11.08
2	7311.00	39.77	AV	54.00	14.23	1.00	130	28.69	37.28	8.60	34.8	11.08

Frequency(MHz):				2437			Polarity:			VERTICAL		
No.	Frequency (MHz)	Emission Level (dBuV/m)		Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Antenna Factor (dB/m)	Cable Factor (dB)	Pre-amplifier (dB)	Correction Factor (dB/m)
1	4874.00	57.74	PK	74.00	16.26	1.00	110	55.62	31.02	7.60	36.5	2.12
1	4874.00	48.67	AV	54.00	5.33	1.00	110	46.55	31.02	7.60	36.5	2.12
2	7311.00	50.17	PK	74.00	23.83	1.00	181	39.09	37.28	8.60	34.8	11.08
2	7311.00	41.39	AV	54.00	12.61	1.00	181	30.31	37.28	8.60	34.8	11.08

Frequency(MHz):				2462			Polarity:			HORIZONTAL		
No.	Frequency (MHz)	Emission Level (dBuV/m)		Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Antenna Factor (dB/m)	Cable Factor (dB)	Pre-amplifier (dB)	Correction Factor (dB/m)
1	4924.00	57.17	PK	74.00	16.83	1.00	130	55.05	31.58	7.82	36.2	3.20
1	4924.00	51.00	AV	54.00	3.00	1.00	130	48.88	31.58	7.82	36.2	3.20
2	7386.00	53.06	PK	74.00	20.94	1.00	130	41.98	38.51	8.73	35.3	11.94
2	7386.00	44.35	AV	54.00	9.65	1.00	130	33.27	38.51	8.73	35.3	11.94

Frequency(MHz):				2462			Polarity:			VERTICAL		
No.	Frequency (MHz)	Emission Level (dBuV/m)		Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Antenna Factor (dB/m)	Cable Factor (dB)	Pre-amplifier (dB)	Correction Factor (dB/m)
1	4924.00	57.04	PK	74.00	16.96	1.00	130	53.84	31.58	7.82	36.2	3.20
1	4924.00	47.24	AV	54.00	6.76	1.00	130	44.04	31.58	7.82	36.2	3.20
2	7386.00	50.23	PK	74.00	23.77	1.00	120	38.29	38.51	8.73	35.3	11.94
2	7386.00	41.76	AV	54.00	12.24	1.00	120	29.82	38.51	8.73	35.3	11.94

802.11g Mode (above 1GHz)

Frequency(MHz):				2412			Polarity:			HORIZONTAL		
No.	Frequency (MHz)	Emission Level (dBuV/m)		Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Antenna Factor (dB/m)	Cable Factor (dB)	Pre-amplifier (dB)	Correction Factor (dB/m)
1	4824	54.95	PK	74.00	19.05	1.00	132	52.85	31.6	7.00	36.5	2.10
1	4824	45.06	AV	54.00	8.94	1.00	132	42.96	31.6	7.00	36.5	2.10
2	7236	49.69	PK	74.00	24.31	1.00	132	38.76	37.33	8.90	35.3	10.93
2	7236	38.99	AV	54.00	15.01	1.00	132	28.06	37.33	8.90	35.3	10.93

Frequency(MHz):				2412			Polarity:			VERTICAL		
No.	Frequency (MHz)	Emission Level (dBuV/m)		Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Antenna Factor (dB/m)	Cable Factor (dB)	Pre-amplifier (dB)	Correction Factor (dB/m)
1	4824	55.65	PK	74.00	18.35	1.00	197	53.55	31.60	7.00	36.50	2.10
1	4824	45.44	AV	54.00	8.56	1.00	197	43.34	31.60	7.00	36.50	2.10
2	7236	50.02	PK	74.00	23.98	1.00	197	39.09	37.33	8.90	35.30	10.93
2	7236	41.11	AV	54.00	12.89	1.00	197	30.18	37.33	8.90	35.30	10.93

Frequency(MHz):				2437			Polarity:			HORIZONTAL		
No.	Frequency (MHz)	Emission Level (dBuV/m)		Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Antenna Factor (dB/m)	Cable Factor (dB)	Pre-amplifier (dB)	Correction Factor (dB/m)
1	4874.00	55.66	PK	74.00	18.34	1.00	132	53.54	31.02	7.60	36.5	2.12
1	4874.00	47.03	AV	54.00	6.97	1.00	132	44.91	31.02	7.60	36.5	2.12
2	7311.00	50.04	PK	74.00	23.96	1.00	132	38.96	37.28	8.60	34.8	11.08
2	7311.00	39.74	AV	54.00	14.26	1.00	132	28.66	37.28	8.60	34.8	11.08

Frequency(MHz):				2437			Polarity:			VERTICAL		
No.	Frequency (MHz)	Emission Level (dBuV/m)		Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Antenna Factor (dB/m)	Cable Factor (dB)	Pre-amplifier (dB)	Correction Factor (dB/m)
1	4874.00	55.22	PK	74.00	18.78	1.00	197	53.10	31.02	7.60	36.5	2.12
1	4874.00	45.68	AV	54.00	8.32	1.00	197	43.56	31.02	7.60	36.5	2.12
2	7311.00	48.88	PK	74.00	25.12	1.00	197	37.80	37.28	8.60	34.8	11.08
2	7311.00	39.74	AV	54.00	14.26	1.00	197	28.66	37.28	8.60	34.8	11.08

Frequency(MHz):				2462			Polarity:			HORIZONTAL		
No.	Frequency (MHz)	Emission Level (dBuV/m)		Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Antenna Factor (dB/m)	Cable Factor (dB)	Pre-amplifier (dB)	Correction Factor (dB/m)
1	4924.00	54.39	PK	74.00	19.61	1.00	132	51.19	31.58	7.82	36.2	3.20
1	4924.00	45.88	AV	54.00	8.12	1.00	132	42.68	31.58	7.82	36.2	3.20
2	7386.00	48.72	PK	74.00	25.28	1.00	132	36.78	38.51	8.73	35.3	11.94
2	7386.00	39.75	AV	54.00	14.25	1.00	132	27.81	38.51	8.73	35.3	11.94

Frequency(MHz):				2462			Polarity:			VERTICAL		
No.	Frequency (MHz)	Emission Level (dBuV/m)		Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Antenna Factor (dB/m)	Cable Factor (dB)	Pre-amplifier (dB)	Correction Factor (dB/m)
1	4924.00	56.55	PK	74.00	17.45	1.00	197	53.35	31.58	7.82	36.2	3.20
1	4924.00	47.44	AV	54.00	6.56	1.00	197	44.24	31.58	7.82	36.2	3.20
2	7386.00	50.85	PK	74.00	23.15	1.00	197	38.91	38.51	8.73	35.3	11.94
2	7386.00	40.28	AV	54.00	13.72	1.00	197	28.34	38.51	8.73	35.3	11.94

802.11n20 Mode (above 1GHz)

Frequency(MHz):				2412			Polarity:			HORIZONTAL		
No.	Frequency (MHz)	Emission Level (dBuV/m)		Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Antenna Factor (dB/m)	Cable Factor (dB)	Pre-amplifier (dB)	Correction Factor (dB/m)
1	4824	54.15	PK	74.00	19.85	1.00	128	52.05	31.6	7.00	36.5	2.10
1	4824	44.09	AV	54.00	9.91	1.00	128	41.99	31.6	7.00	36.5	2.10
2	7236	49.11	PK	74.00	24.89	1.00	128	38.18	37.33	8.90	35.3	10.93
2	7236	38.95	AV	54.00	15.05	1.00	128	28.02	37.33	8.90	35.3	10.93

Frequency(MHz):				2412			Polarity:			VERTICAL		
No.	Frequency (MHz)	Emission Level (dBuV/m)		Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Antenna Factor (dB/m)	Cable Factor (dB)	Pre-amplifier (dB)	Correction Factor (dB/m)
1	4824	55.06	PK	74.00	18.94	1.00	156	52.96	31.60	7.00	36.50	2.10
1	4824	46.95	AV	54.00	7.05	1.00	156	44.85	31.60	7.00	36.50	2.10
2	7236	49.30	PK	74.00	24.70	1.00	156	38.37	37.33	8.90	35.30	10.93
2	7236	39.91	AV	54.00	14.09	1.00	156	28.98	37.33	8.90	35.30	10.93

Frequency(MHz):				2437			Polarity:			HORIZONTAL		
No.	Frequency (MHz)	Emission Level (dBuV/m)		Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Antenna Factor (dB/m)	Cable Factor (dB)	Pre-amplifier (dB)	Correction Factor (dB/m)
1	4874.00	53.06	PK	74.00	20.94	1.00	128	50.94	31.02	7.60	36.5	2.12
1	4874.00	44.91	AV	54.00	9.09	1.00	128	42.79	31.02	7.60	36.5	2.12
2	7311.00	48.32	PK	74.00	25.68	1.00	128	37.24	37.28	8.60	34.8	11.08
2	7311.00	38.80	AV	54.00	15.20	1.00	128	27.72	37.28	8.60	34.8	11.08

Frequency(MHz):				2437			Polarity:			VERTICAL		
No.	Frequency (MHz)	Emission Level (dBuV/m)		Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Antenna Factor (dB/m)	Cable Factor (dB)	Pre-amplifier (dB)	Correction Factor (dB/m)
1	4874.00	55.72	PK	74.00	18.28	1.00	156	53.60	31.02	7.60	36.5	2.12
1	4874.00	47.16	AV	54.00	6.84	1.00	156	45.04	31.02	7.60	36.5	2.12
2	7311.00	49.30	PK	74.00	24.70	1.00	156	38.22	37.28	8.60	34.8	11.08
2	7311.00	40.19	AV	54.00	13.81	1.00	156	29.11	37.28	8.60	34.8	11.08

Frequency(MHz):				2462			Polarity:			HORIZONTAL		
No.	Frequency (MHz)	Emission Level (dBuV/m)		Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Antenna Factor (dB/m)	Cable Factor (dB)	Pre-amplifier (dB)	Correction Factor (dB/m)
1	4924.00	53.45	PK	74.00	20.55	1.00	128	50.25	31.58	7.82	36.2	3.20
1	4924.00	44.12	AV	54.00	9.88	1.00	128	40.92	31.58	7.82	36.2	3.20
2	7386.00	47.15	PK	74.00	26.85	1.00	128	35.21	38.51	8.73	35.3	11.94
2	7386.00	38.40	AV	54.00	15.60	1.00	128	26.46	38.51	8.73	35.3	11.94

Frequency(MHz):				2462			Polarity:			VERTICAL		
No.	Frequency (MHz)	Emission Level (dBuV/m)		Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Antenna Factor (dB/m)	Cable Factor (dB)	Pre-amplifier (dB)	Correction Factor (dB/m)
1	4924.00	54.30	PK	74.00	19.70	1.00	156	51.10	31.58	7.82	36.2	3.20
1	4924.00	46.78	AV	54.00	7.22	1.00	156	43.58	31.58	7.82	36.2	3.20
2	7386.00	48.14	PK	74.00	25.86	1.00	156	36.20	38.51	8.73	35.3	11.94
2	7386.00	40.73	AV	54.00	13.27	1.00	156	28.79	38.51	8.73	35.3	11.94

802.11n40 Mode (above 1GHz)

Frequency(MHz):				2422			Polarity:			HORIZONTAL		
No.	Frequency (MHz)	Emission Level (dBuV/m)		Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Antenna Factor (dB/m)	Cable Factor (dB)	Pre-amplifier (dB)	Correction Factor (dB/m)
1	4844.00	51.91	PK	74.00	22.09	1.00	145	49.81	31.6	7.00	36.5	2.10
1	4844.00	43.40	AV	54.00	10.60	1.00	145	41.30	31.6	7.00	36.5	2.10
2	7266.00	44.83	PK	74.00	29.17	1.00	145	33.90	37.33	8.90	35.3	10.93
2	7266.00	37.28	AV	54.00	16.72	1.00	145	26.35	37.33	8.90	35.3	10.93

Frequency(MHz):				2422			Polarity:			VERTICAL		
No.	Frequency (MHz)	Emission Level (dBuV/m)		Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Antenna Factor (dB/m)	Cable Factor (dB)	Pre-amplifier (dB)	Correction Factor (dB/m)
1	4844.00	52.53	PK	74.00	21.47	1.00	162	50.43	31.60	7.00	36.50	2.10
1	4844.00	44.27	AV	54.00	9.73	1.00	162	42.17	31.60	7.00	36.50	2.10
2	7266.00	45.71	PK	74.00	28.29	1.00	162	34.78	37.33	8.90	35.30	10.93
2	7266.00	38.22	AV	54.00	15.78	1.00	162	27.29	37.33	8.90	35.30	10.93

Frequency(MHz):				2437			Polarity:			HORIZONTAL		
No.	Frequency (MHz)	Emission Level (dBuV/m)		Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Antenna Factor (dB/m)	Cable Factor (dB)	Pre-amplifier (dB)	Correction Factor (dB/m)
1	4844.00	52.43	PK	74.00	21.57	1.00	145	50.31	31.02	7.60	36.5	2.12
1	4844.00	42.41	AV	54.00	11.59	1.00	145	40.29	31.02	7.60	36.5	2.12
2	7266.00	45.86	PK	74.00	28.14	1.00	145	34.78	37.28	8.60	34.8	11.08
2	7266.00	38.11	AV	54.00	15.89	1.00	145	27.03	37.28	8.60	34.8	11.08

Frequency(MHz):				2437			Polarity:			VERTICAL		
No.	Frequency (MHz)	Emission Level (dBuV/m)		Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Antenna Factor (dB/m)	Cable Factor (dB)	Pre-amplifier (dB)	Correction Factor (dB/m)
1	4874.00	52.66	PK	74.00	21.34	1.00	162	50.54	31.02	7.60	36.5	2.12
1	4874.00	42.53	AV	54.00	11.47	1.00	162	40.41	31.02	7.60	36.5	2.12
2	7311.00	47.73	PK	74.00	26.27	1.00	162	36.65	37.28	8.60	34.8	11.08
2	7311.00	37.53	AV	54.00	16.47	1.00	162	26.45	37.28	8.60	34.8	11.08

Frequency(MHz):				2452			Polarity:			HORIZONTAL		
No.	Frequency (MHz)	Emission Level (dBuV/m)		Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Antenna Factor (dB/m)	Cable Factor (dB)	Pre-amplifier (dB)	Correction Factor (dB/m)
1	4924.00	52.75	PK	74.00	21.25	1.00	145	49.55	31.58	7.82	36.2	3.20
1	4924.00	43.78	AV	54.00	10.22	1.00	145	40.58	31.58	7.82	36.2	3.20
2	7386.00	46.41	PK	74.00	27.59	1.00	145	34.47	38.51	8.73	35.3	11.94
2	7386.00	36.53	AV	54.00	17.47	1.00	145	24.59	38.51	8.73	35.3	11.94

Frequency(MHz):				2452			Polarity:			VERTICAL		
No.	Frequency (MHz)	Emission Level (dBuV/m)		Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Antenna Factor (dB/m)	Cable Factor (dB)	Pre-amplifier (dB)	Correction Factor (dB/m)
1	4924.00	51.95	PK	74.00	22.05	1.00	162	48.75	31.58	7.82	36.2	3.20
1	4924.00	42.95	AV	54.00	11.05	1.00	162	39.75	31.58	7.82	36.2	3.20
2	7386.00	46.75	PK	74.00	27.25	1.00	162	34.81	38.51	8.73	35.3	11.94
2	7386.00	36.34	AV	54.00	17.66	1.00	162	24.40	38.51	8.73	35.3	11.94

BT 4.0 Mode (above 1GHz)

Frequency(MHz):				2402			Polarity:			HORIZONTAL		
No.	Frequency (MHz)	Emission Level (dBuV/m)		Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Antenna Factor (dB/m)	Cable Factor (dB)	Pre-amplifier (dB)	Correction Factor (dB/m)
1	4804.00	48.52	PK	74.00	25.48	1.00	110	46.62	31.6	7.00	36.5	2.10
1	4804.00	39.63	AV	54.00	14.37	1.00	110	37.73	31.6	7.00	36.5	2.10
2	7206.00	42.38	PK	74.00	31.62	1.00	110	31.78	37.33	8.90	35.3	10.93
2	7206.00	--	AV	--	--	--	--	--	--	--	--	--

Frequency(MHz):				2402			Polarity:			VERTICAL		
No.	Frequency (MHz)	Emission Level (dBuV/m)		Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Antenna Factor (dB/m)	Cable Factor (dB)	Pre-amplifier (dB)	Correction Factor (dB/m)
1	4804.00	50.08	PK	74.00	23.92	1.00	155	48.18	31.60	7.00	36.50	2.10
1	4804.00	40.75	AV	54.00	13.25	1.00	155	38.85	31.60	7.00	36.50	2.10
2	7206.00	44.13	PK	74.00	29.87	1.00	155	33.53	37.33	8.90	35.30	10.93
2	7206.00	--	AV	--	--	--	--	--	--	--	--	--

Frequency(MHz):				2440			Polarity:			HORIZONTAL		
No.	Frequency (MHz)	Emission Level (dBuV/m)		Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Antenna Factor (dB/m)	Cable Factor (dB)	Pre-amplifier (dB)	Correction Factor (dB/m)
1	4880.00	48.24	PK	74.00	25.76	1.00	110	46.18	31.02	7.60	36.5	2.12
1	4880.00	37.40	AV	54.00	16.60	1.00	110	35.34	31.02	7.60	36.5	2.12
2	7320.00	42.17	PK	74.00	31.83	1.00	110	31.25	37.28	8.60	34.8	11.08
2	7320.00	--	AV	--	--	--	--	--	--	--	--	--

Frequency(MHz):				2440			Polarity:			VERTICAL		
No.	Frequency (MHz)	Emission Level (dBuV/m)		Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Antenna Factor (dB/m)	Cable Factor (dB)	Pre-amplifier (dB)	Correction Factor (dB/m)
1	4880.00	49.07	PK	74.00	24.93	1.00	155	47.01	31.02	7.60	36.5	2.12
1	4880.00	39.70	AV	54.00	14.30	1.00	155	37.64	31.02	7.60	36.5	2.12
2	7320.00	41.02	PK	74.00	32.98	1.00	155	30.1	37.28	8.60	34.8	11.08
2	7320.00	--	AV	--	--	--	--	--	--	--	--	--

Frequency(MHz):				2480			Polarity:			HORIZONTAL		
No.	Frequency (MHz)	Emission Level (dBuV/m)		Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Antenna Factor (dB/m)	Cable Factor (dB)	Pre-amplifier (dB)	Correction Factor (dB/m)
1	4880.00	52.75	PK	74.00	21.25	1.00	110	49.55	31.58	7.82	36.2	3.20
1	4880.00	43.78	AV	54.00	10.22	1.00	110	40.58	31.58	7.82	36.2	3.20
2	7320.00	46.41	PK	74.00	27.59	1.00	110	34.47	38.51	8.73	35.3	11.94
2	7320.00	--	AV	--	--	--	--	--	--	--	--	--

Frequency(MHz):				2480			Polarity:			VERTICAL		
No.	Frequency (MHz)	Emission Level (dBuV/m)		Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Antenna Factor (dB/m)	Cable Factor (dB)	Pre-amplifier (dB)	Correction Factor (dB/m)
1	4880.00	51.95	PK	74.00	22.05	1.00	155	48.75	31.58	7.82	36.2	3.20
1	4880.00	42.95	AV	54.00	11.05	1.00	155	39.75	31.58	7.82	36.2	3.20
2	7320.00	46.75	PK	74.00	27.25	1.00	155	34.81	38.51	8.73	35.3	11.94
2	7320.00	--	AV	--	--	--	--	--	--	--	--	--

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.

3.3. Maximum Conducted Output Power

Limit

30dBm for digital modulation systems.

Test Procedure

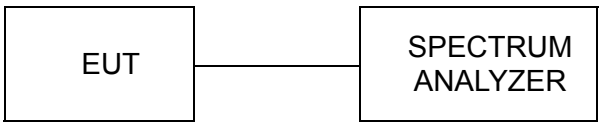
- For Maximum conducted (average) output power
  1. Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to the SPECTRUM.
  2. Ensure EUT transmitting with a duty cycle ≥ 98 %.
  3. Set SA as fellow:
     a) Center frequency: frequency to be tested.
     b) Span: ≥1.5 times the OBW.
     c) RBW:= 1-5% of the OBW, not to exceed 1 MHz
     d) VBW: ≥ 3 x RBW.
     e) Sweep points: 8001
     f) Sweep time: auto.
     g) Detector: RMS power averaging (RMS)
     h) Trace: Average(100 traces)
  4. Allow trace to fully stabilize
  5. Use instrument's band power measurement function to integrate power in this band across a bandwidth OBW.

6. Note: This test procedure is used for WIFI in this report

- Maximum peak conducted output power
  1. Set the RBW ≥ *DTS bandwidth*
  2. Set VBW ≥ 3 × RBW.
  3. Set span ≥ 3 x RBW
  4. Sweep time = auto couple.
  5. Detector = peak.
  6. Trace mode = max hold.
  7. Allow trace to fully stabilize.
  8. Use peak marker function to determine the peak amplitude level

Note: This test procedure is used for bt 4.0 in this report

Test Configuration



Test Results

WIFI

Type	Channel	Output power AV(dBm)	Limit (dBm)	Result
802.11b	01	14.57	30.00	Pass
	06	14.68		
	11	14.44		
802.11g	01	13.44	30.00	Pass
	06	13.70		
	11	13.52		
802.11n(H20)	01	13.40	30.00	Pass
	06	13.44		
	11	13.29		
802.11n(H40)	03	12.82	30.00	Pass
	06	12.96		
	09	12.61		

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

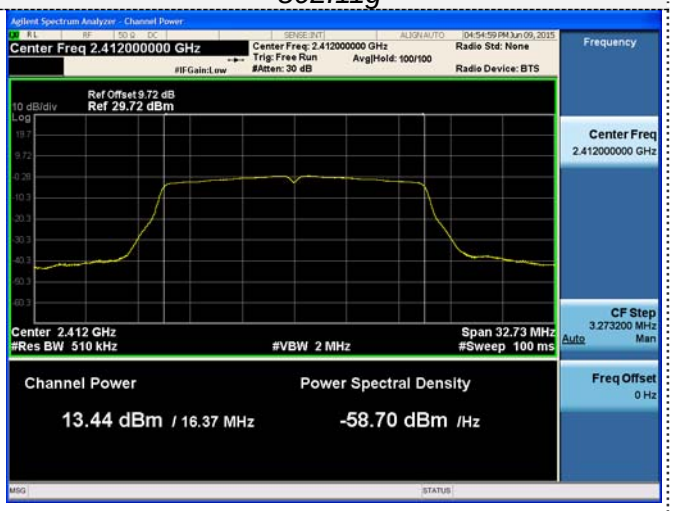
BT4.0

Type	Channel	Output power PK(dBm)	Limit (dBm)	Result
GFSK	00	-2.679	30.00	Pass
	19	-1.598		
	39	-2.192		

Note: The test results including the cable loss.

802.11b

802.11g



CH01

CH01

CH06

CH06

CH11

CH11

802.11n(HT20)

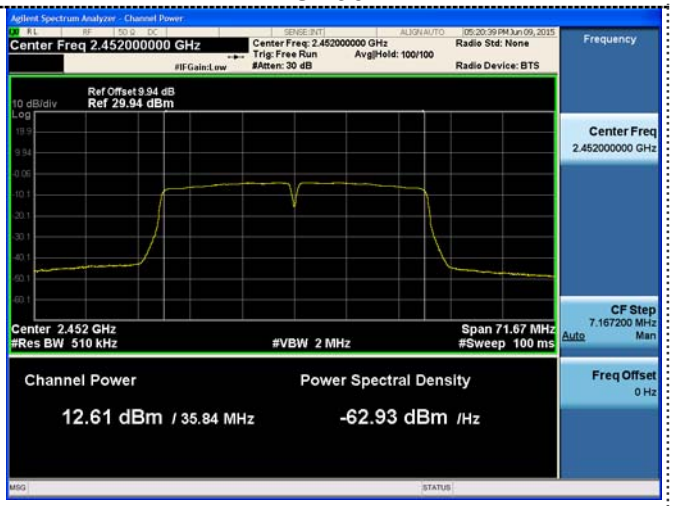
802.11n(HT40)

CH01

CH03

CH06

CH06



CH11

CH09

BT4.0

CH00

CH19

CH39

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

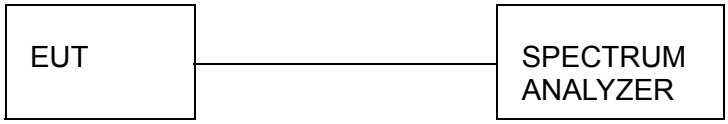
1. Use this procedure when the maximum (average) conducted output power was used to demonstrate compliance to the output power limit.
   a) Set analyzer center frequency to DTS channel center frequency.
   b) Set span to at least 1.5 times the OBW
   c) RBW: 3 kHz ≤ RBW ≤ 100 kHz.
   d) VBW: ≥3 x RBW.
   e) Detector: power averaging (RMS)
   f) Sweep time: Auto couple.
   g) Swoop points: ≥ 2 × span / RBW.
   h) Trace mode = Average (100 traces)
   i) Use the peak marker function to determine the maximum power level.
   j) If measured value exceeds limit, reduce RBW (no less than 3 kHz) and repeat.

Note: This test procedure is used for WIFI in this report

2. This procedure shall be used if maximum peak conducted output power was used to demonstrate compliance to the output power limit.
   a) Set analyzer center frequency to DTS channel center frequency.
   b) Set the span to 1.5 times the DTS bandwidth.
   c) Set the RBW to: 3 kHz ≤ RBW ≤ 100 kHz.
   d) Set the VBW ≥ 3 × RBW.
   e) Detector = peak.
   f) Sweep time = auto couple.
   g) Trace mode = max hold.
   h) Allow trace to fully stabilize.
   i) Use the peak marker function to determine the maximum amplitude level within the RBW.
   j) If measured value exceeds limit, reduce RBW (no less than 3 kHz) and repeat

Note: This test procedure is used for bt 4.0 in this report

Test Configuration



Test Results

WIFI

Type	Channel	Power Spectral Density (dBm/30KHz)	Limit (dBm/3KHz)	Result
802.11b	01	-7.490	8.00	Pass
	06	-7.482		
	11	-7.956		
802.11g	01	-10.044	8.00	Pass
	06	-10.018		
	11	-10.152		
802.11n(HT20)	01	-8.686	8.00	Pass
	06	-10.143		
	11	-9.813		
802.11n(HT40)	03	-14.485	8.00	Pass
	06	-14.471		
	09	-14.774		

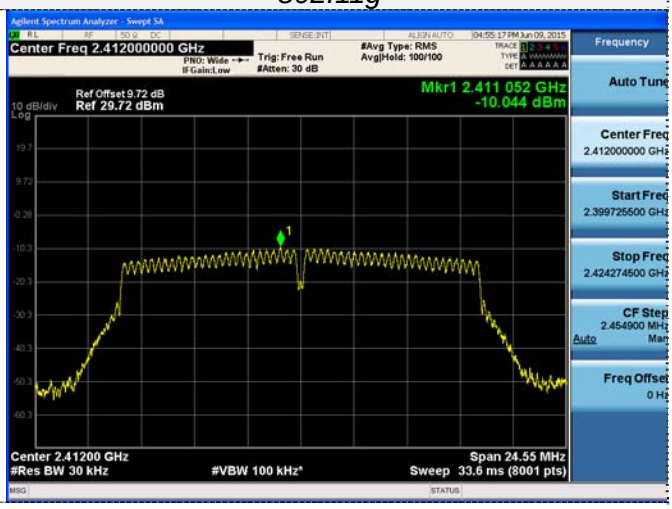
BT4.0

Type	Channel	Power Spectral Density (dBm/30KHz)	Limit (dBm/3KHz)	Result
BT4.0	00	-7.086	8.00	Pass
	19	-5.995		
	39	-6.665		

Test plot as follows:

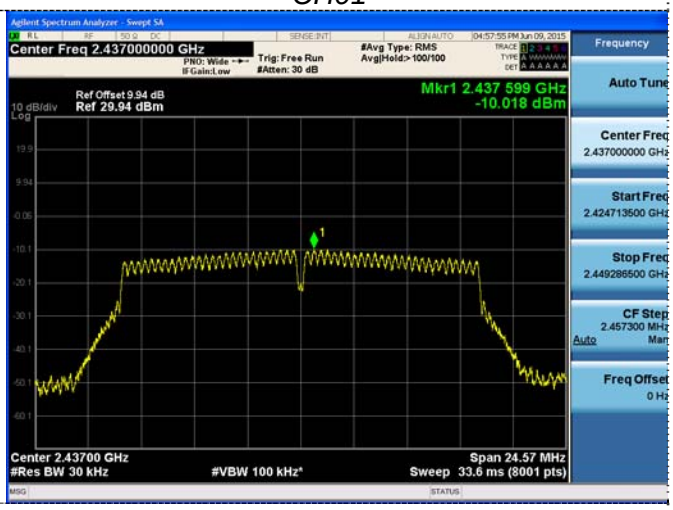
802.11b

802.11g

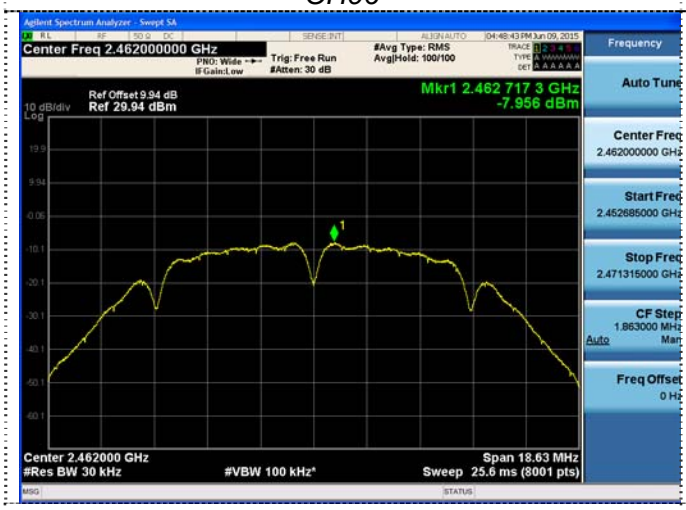


CH01

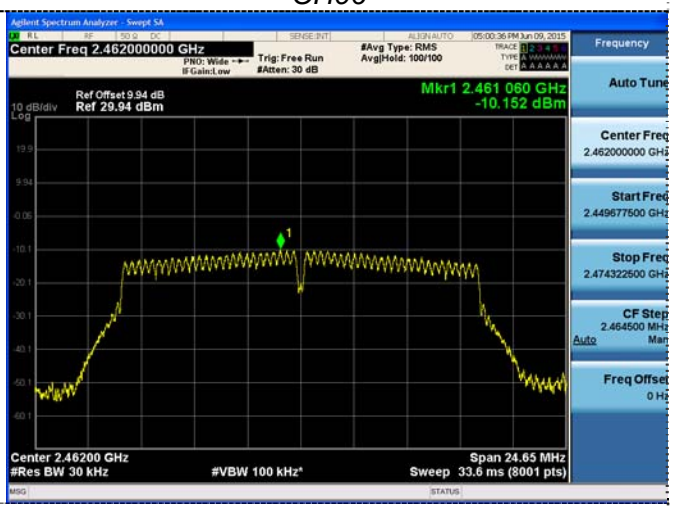
CH01



CH06



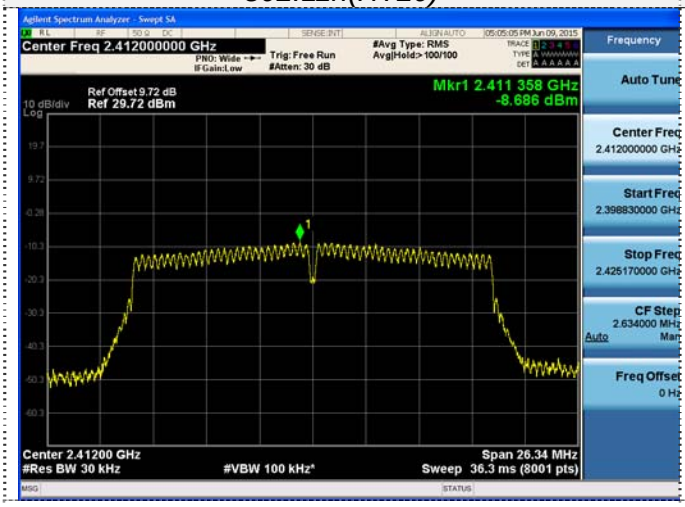
CH06



CH11

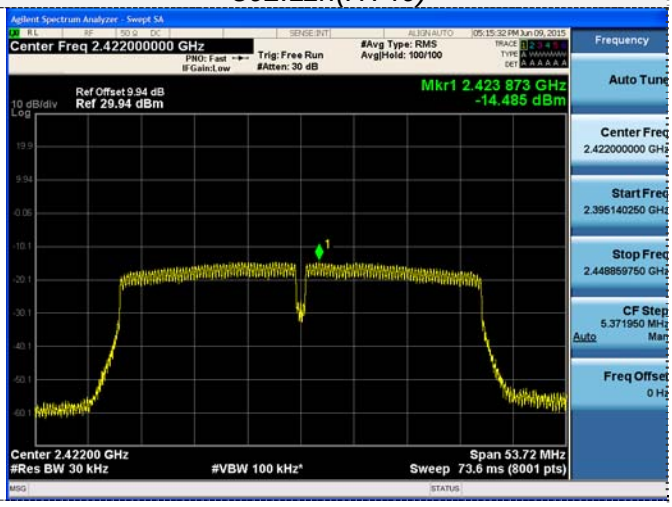
CH11

802.11n(HT20)

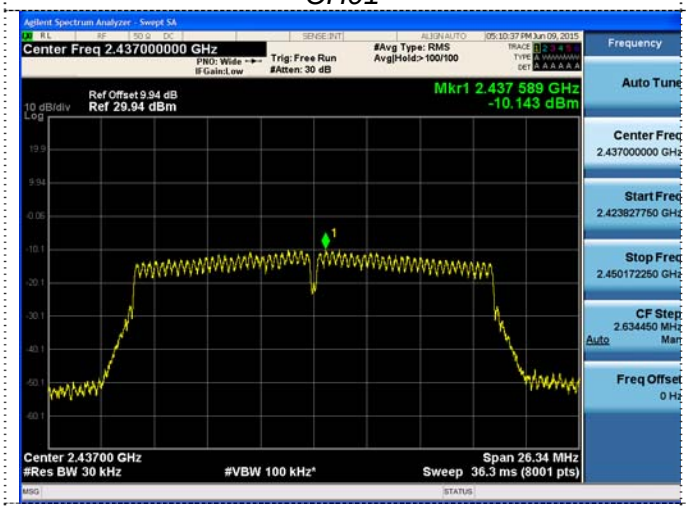


CH01

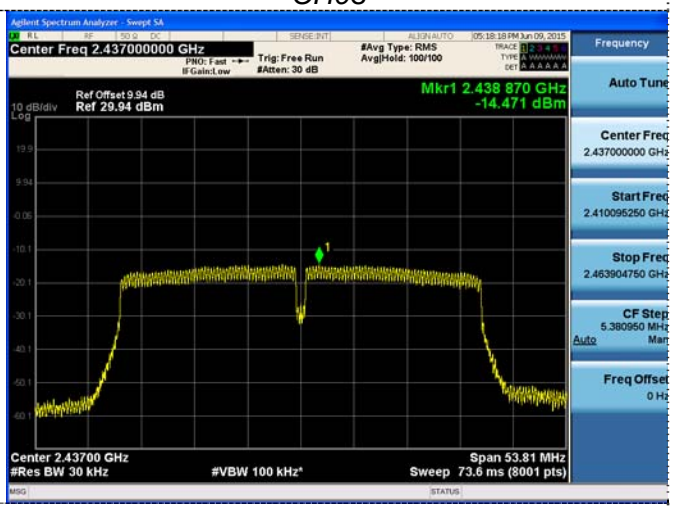
802.11n(HT40)



CH03

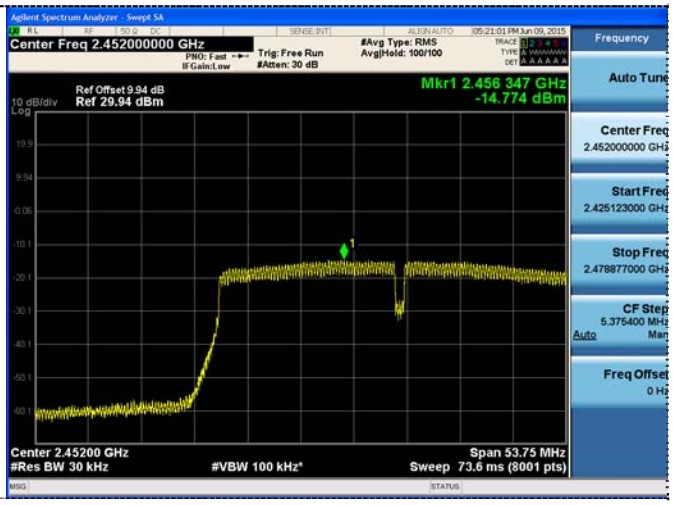


CH06



CH06

CH11



CH09

BT4.0

CH00

CH19

CH39

3.5. 6dB Bandwidth

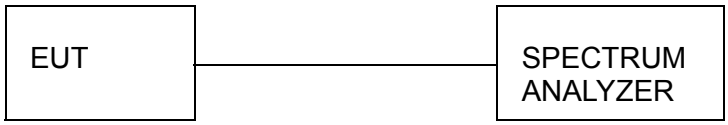
Limit

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

Test Procedure

1. The transmitter output was connected to the spectrum analyzer.
2. Set SA as follow:
   a) RBW: 100 kHz.
   b) VBW: ≥ 3 × RBW.
   c) Detector: Peak.
   d) Trace mode: max hold.
   e) Sweep: auto couple.
3. Allow the trace to stabilize.
4. Measure the maximum width of the emission that is constrained by the frequencies associated with the two outermost amplitude points (upper and lower frequencies) that are attenuated by 6 dB relative to the maximum level measured in the fundamental emission.

Test Configuration



Test Results

WIFI

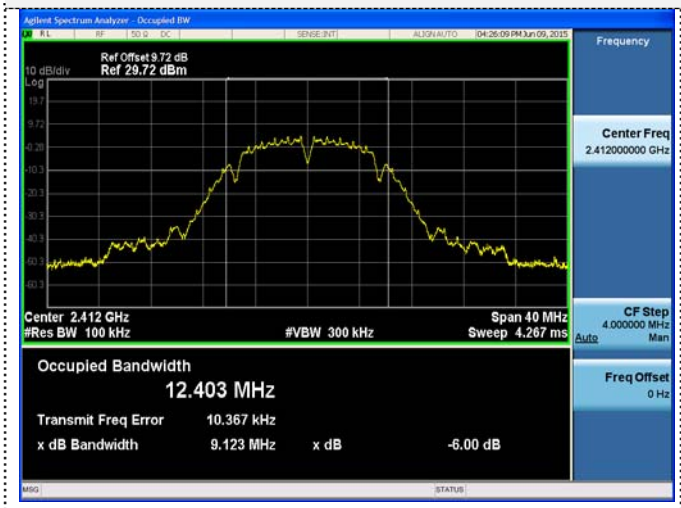
Type	Channel	6dB Bandwidth (MHz)	99% OBW (MHz)	Limit (KHz)	Result
802.11b	01	9.123	12.403	≥500	Pass
	06	9.125	12.427		
	11	9.124	12.420		
802.11g	01	16.38	16.366	≥500	Pass
	06	16.39	16.382		
	11	16.39	16.430		
802.11n(HT20)	01	17.59	17.560	≥500	Pass
	06	17.60	17.563		
	11	17.60	17.555		
802.11n(HT40)	03	36.30	35.813	≥500	Pass
	06	36.35	35.873		
	09	36.33	35.836		

BT4.0

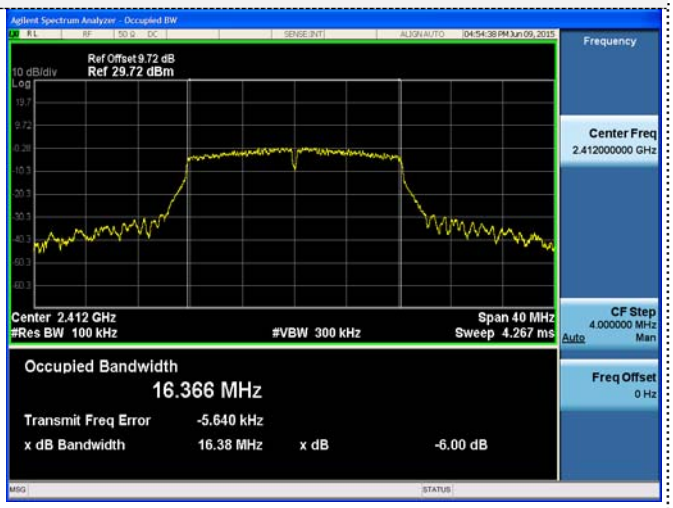
Type	Channel	6dB Bandwidth (MHz)	99% OBW (MHz)	Limit (KHz)	Result
GFSK	00	0.6861	1.0269	≥500	Pass
	19	0.6929	1.0284		
	39	0.6911	1.0297		

Test plot as follows:

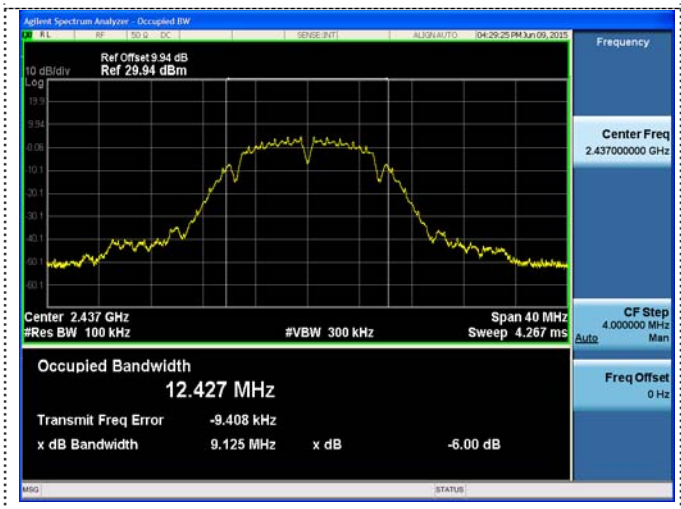
802.11b



802.11g

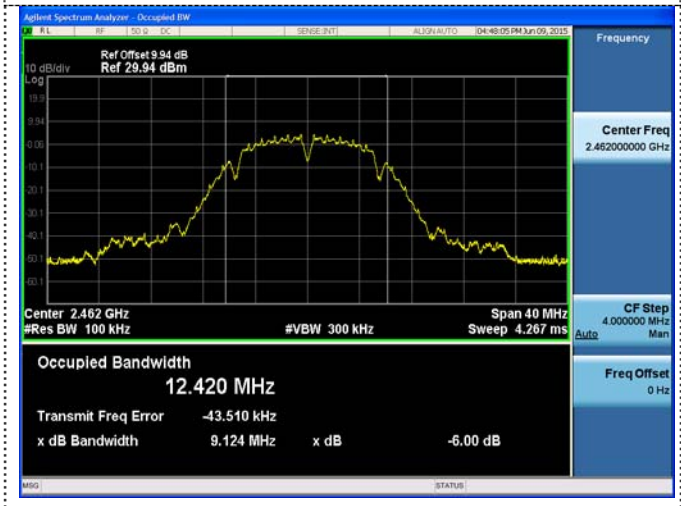


CH01



CH01

CH06



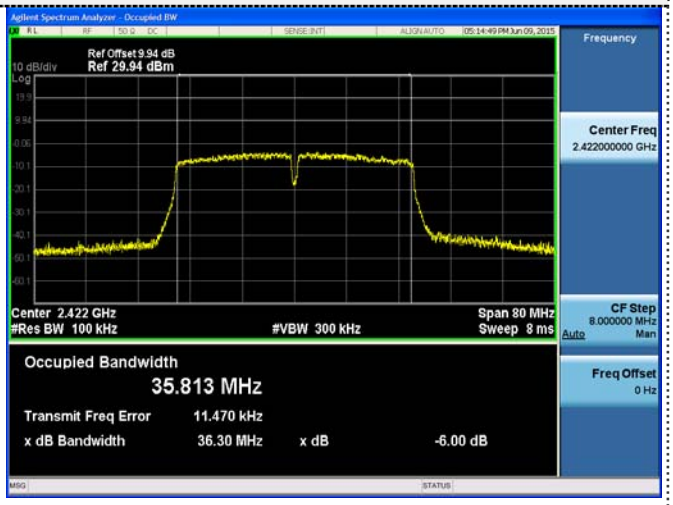
CH06

CH11

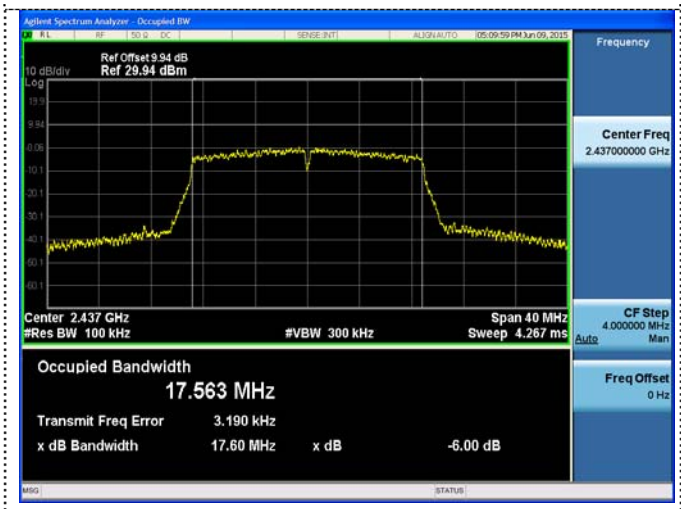
CH11

802.11n(HT20)

802.11n(HT40)

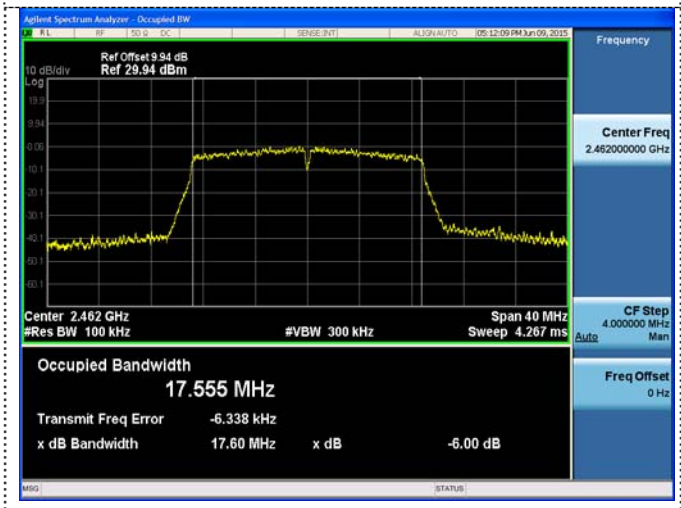


CH01

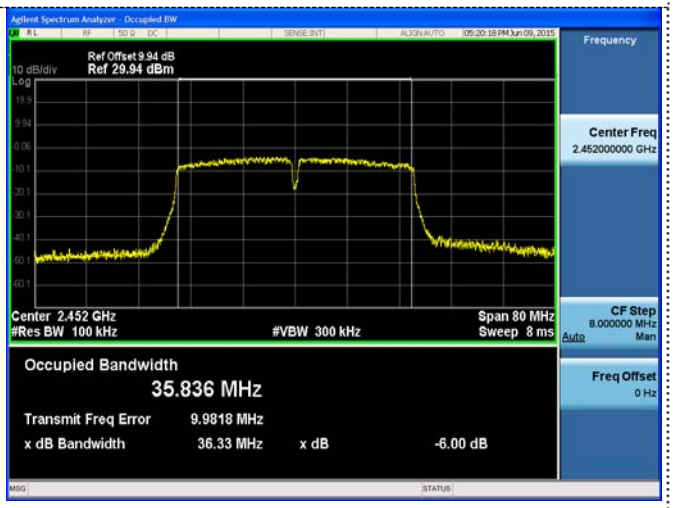


CH00

CH06



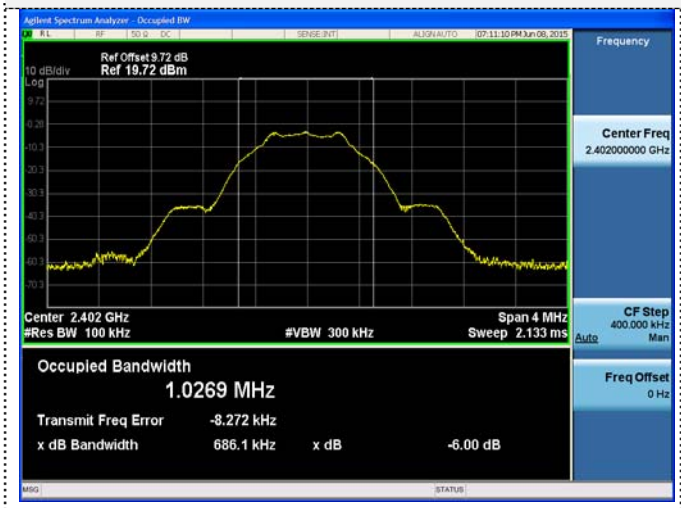
CH06



CH11

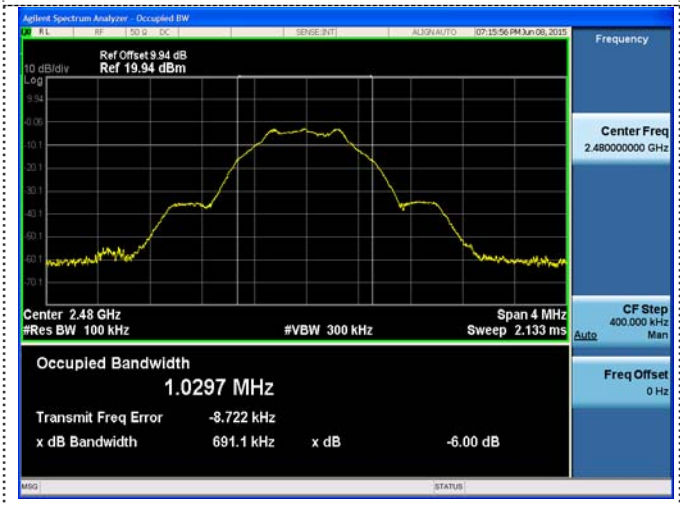
CH09

BT4.0



CH00

CH19



CH39

3.6. Band Edge Compliance of RF Emission

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, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under paragraph (b)(3) of this section, the attenuation required under this paragraph shall be 30 dB instead of 20 dB. Attenuation below the general limits specified in §15.209(a) is not required. In addition, radiated emissions which fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emission limits specified in §15.209(a) (see §15.205(c)).

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)

Test Procedure

- Use this procedure when the maximum (average) conducted output power was used to demonstrate compliance to the output power limit.
  1. Remove the antenna from the EUT and then connect to a low loss RF cable from the antenna port to a spectrum analyzer
  2. Turn on the EUT and make it operate in transmitting mode. Then set it to Low Channel and High Channel within its operating range, and make sure the instrument is operated in its linear range.
  3. Set spectrum analyzer RBW =100 kHz, VBW=300 kHz, Detector= power averaging (RMS), Sweep point=≥ 2 × span / RBW, Sweep time=Auto, trace= Average(100 traces)
  4. Marker the highest point which fall into restricted frequency bands
  5. Repeat above procedures until all measured frequencies were complete.

Note: This test procedure is used for WIFI in this report

- This procedure shall be used if maximum peak conducted output power was used to demonstrate compliance to the output power limit.
  1. Remove the antenna from the EUT and then connect to a low loss RF cable from the antenna port to a spectrum analyzer
  2. Turn on the EUT and make it operate in transmitting mode. Then set it to Low Channel and High Channel within its operating range, and make sure the instrument is operated in its linear range.
  3. Set spectrum analyzer RBW =100 kHz, VBW=300 kHz, Detector=peak, Sweep time=Auto, trace=maxhold
  4. Marker the highest point which fall into restricted frequency bands
  5. Repeat above procedures until all measured frequencies were complete.

Note: This test procedure is used for BT4.0 in this report

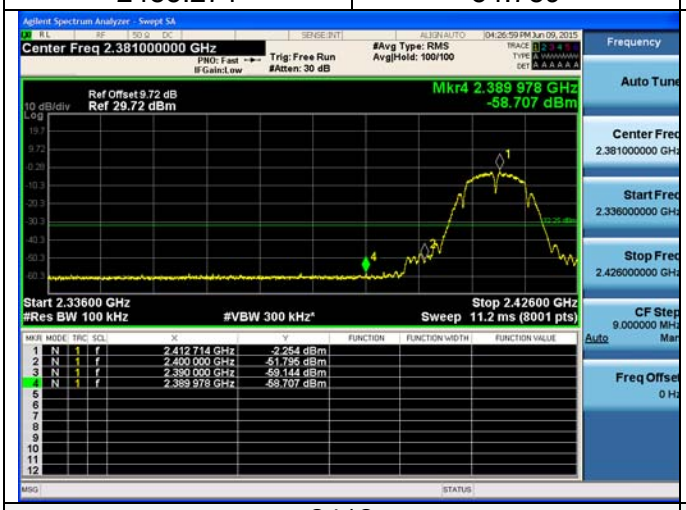
Test Procedure tor radiated method

1. The EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 meter anechoic camber. The table was rotated 360 degrees to determine the position of the highest radiation.
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 antenna height is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.
4. For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading.
5. The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.
6. Place a marker at the end of the restricted band closest to the transmit frequency to show compliance. Also measure any emissions in the restricted bands. Save the spectrum analyzer plot. Repeat for each power and modulation for lowest and highest channel
7. Test the EUT in the lowest channel, the highest channel
8. The radiation measurements are performed in X, Y, Z axis positioning. And found the X axis positioning which it is worse case, only the test worst case mode is recorded in the report.
9. Repeat above procedures until all frequencies measured was complete.

Test Results

A. Conducted measurements

802.11b			
Frequency (MHz)	Delta Peak to Band emission (dBc)	Limit (dBc)	Verdict
2389.978	56.453	30	PASS
2485.271	54.789	30	PASS



2412

2462

802.11g			
Frequency (MHz)	Delta Peak to Band emission (dBc)	Limit (dBc)	Verdict
2389.179	49.025	30	PASS
2483.500	46.904	30	PASS

2412

2462

802.11n20			
Frequency (MHz)	**Delta Peak to Band emission (dBc)**	**Limit (dBc)**	**Verdict**
2389.190	44.914	30	PASS
2483.500	46.567	30	PASS

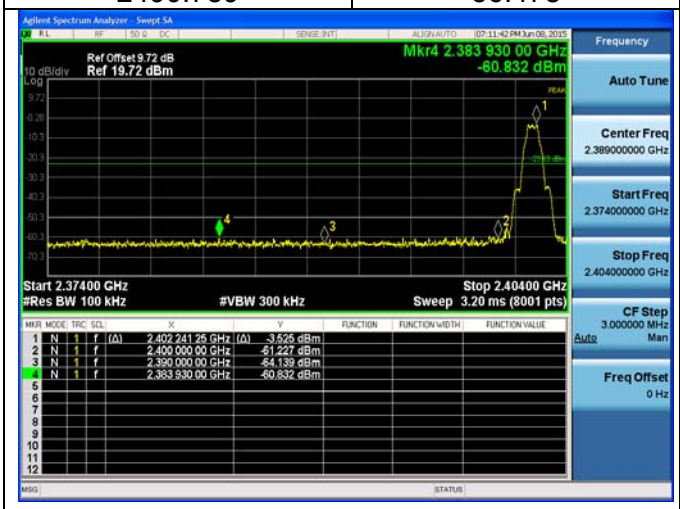
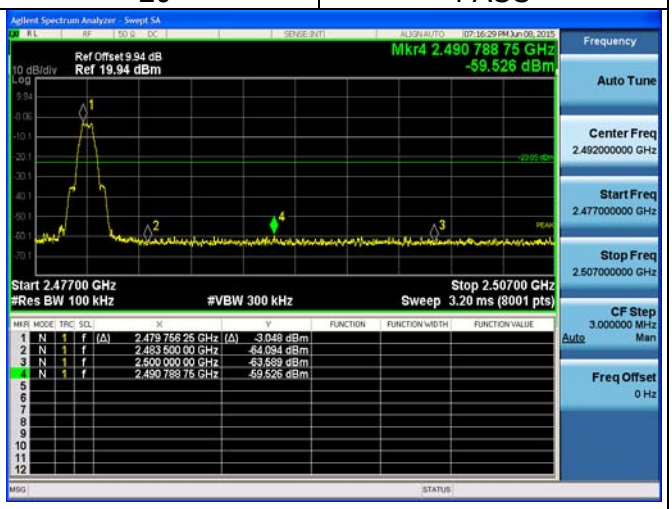
2412

2462

802.11n40			
Frequency (MHz)	**Delta Peak to Band emission (dBc)**	**Limit (dBc)**	**Verdict**
2389.465	43.954	30	PASS
2485.775	35.870	30	PASS

2422

2452

BT4.0			
Frequency (MHz)	**Delta Peak to Band emission (dBc)**	**Limit (dBc)**	**Verdict**
2383.930	57.307	20	PASS
2490.789	56.478	20	PASS
			
2402		2480	

B. **Radiated measurements**

802.11b

Frequency(MHz):			**2412**			**Polarity:**			**HORIZONTAL**		
Frequency (MHz)	Emission Level (dBuV/m)		Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Antenna Factor (dB/m)	Cable Factor (dB)	Pre-amplifier (dB)	Correction Factor (dB/m)
2390.00	49.87	PK	74.00	24.13	1.00	80	55.18	27.49	3.32	36.12	-5.31
2390.00	41.34	AV	54.00	12.66	1.00	80	46.65	27.49	3.32	36.12	-5.31
Frequency(MHz):			**2412**			**Polarity:**			**VERTICAL**		
Frequency (MHz)	Emission Level (dBuV/m)		Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Antenna Factor (dB/m)	Cable Factor (dB)	Pre-amplifier (dB)	Correction Factor (dB/m)
2390.00	46.75	PK	74.00	27.25	1.00	45	52.06	27.49	3.32	36.12	-5.31
2390.00	40.52	AV	54.00	13.48	1.00	45	45.83	27.49	3.32	36.12	-5.31
Frequency(MHz):			**2462**			**Polarity:**			**HORIZONTAL**		
Frequency (MHz)	Emission Level (dBuV/m)		Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Antenna Factor (dB/m)	Cable Factor (dB)	Pre-amplifier (dB)	Correction Factor (dB/m)
2483.50	47.93	PK	74.00	26.07	1.00	170	53.65	27.45	3.38	36.55	-5.72
2483.50	37.04	AV	54.00	16.96	1.00	170	42.76	27.45	3.38	36.55	-5.72
Frequency(MHz):			**2462**			**Polarity:**			**VERTICAL**		
Frequency (MHz)	Emission Level (dBuV/m)		Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Antenna Factor (dB/m)	Cable Factor (dB)	Pre-amplifier (dB)	Correction Factor (dB/m)
2483.50	45.76	PK	74.00	28.24	1.00	145	51.48	27.45	3.38	36.55	-5.72
2483.50	37.03	AV	54.00	16.97	1.00	145	42.75	27.45	3.38	36.55	-5.72

802.11g

Frequency(MHz):			2412			Polarity:			HORIZONTAL		
Frequency (MHz)	Emission Level (dBuV/m)		Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Antenna Factor (dB/m)	Cable Factor (dB)	Pre-amplifier (dB)	Correction Factor (dB/m)
2390.00	50.02	PK	74.00	23.98	1.00	80	55.33	27.49	3.32	36.12	-5.31
2390.00	41.82	AV	54.00	12.18	1.00	80	47.13	27.49	3.32	36.12	-5.31
Frequency(MHz):			**2412**			**Polarity:**			**VERTICAL**		
Frequency (MHz)	Emission Level (dBuV/m)		Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Antenna Factor (dB/m)	Cable Factor (dB)	Pre-amplifier (dB)	Correction Factor (dB/m)
2390.00	47.10	PK	74.00	26.90	1.00	48	52.41	27.49	3.32	36.12	-5.31
2390.00	40.63	AV	54.00	13.37	1.00	48	45.94	27.49	3.32	36.12	-5.31
Frequency(MHz):			**2462**			**Polarity:**			**HORIZONTAL**		
Frequency (MHz)	Emission Level (dBuV/m)		Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Antenna Factor (dB/m)	Cable Factor (dB)	Pre-amplifier (dB)	Correction Factor (dB/m)
2483.50	46.19	PK	74.00	27.81	1.00	185	51.91	27.45	3.38	36.55	-5.72
2483.50	37.06	AV	54.00	16.94	1.00	185	42.78	27.45	3.38	36.55	-5.72
Frequency(MHz):			**2462**			**Polarity:**			**VERTICAL**		
Frequency (MHz)	Emission Level (dBuV/m)		Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Antenna Factor (dB/m)	Cable Factor (dB)	Pre-amplifier (dB)	Correction Factor (dB/m)
2483.50	44.16	PK	74.00	29.84	1.00	145	49.88	27.45	3.38	36.55	-5.72
2483.50	37.63	AV	54.00	16.37	1.00	145	43.35	27.45	3.38	36.55	-5.72

802.11n20

Frequency(MHz):			2412			Polarity:			HORIZONTAL		
Frequency (MHz)	Emission Level (dBuV/m)		Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Antenna Factor (dB/m)	Cable Factor (dB)	Pre-amplifier (dB)	Correction Factor (dB/m)
2390.00	50.89	PK	74.00	23.11	1.00	75	56.20	27.49	3.32	36.12	-5.31
2390.00	43.57	AV	54.00	10.43	1.00	75	48.88	27.49	3.32	36.12	-5.31
Frequency(MHz):			**2412**			**Polarity:**			**VERTICAL**		
Frequency (MHz)	Emission Level (dBuV/m)		Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Antenna Factor (dB/m)	Cable Factor (dB)	Pre-amplifier (dB)	Correction Factor (dB/m)
2390.00	48.60	PK	74.00	25.40	1.00	50	53.91	27.49	3.32	36.12	-5.31
2390.00	40.73	AV	54.00	13.27	1.00	50	46.04	27.49	3.32	36.12	-5.31
Frequency(MHz):			**2462**			**Polarity:**			**HORIZONTAL**		
Frequency (MHz)	Emission Level (dBuV/m)		Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Antenna Factor (dB/m)	Cable Factor (dB)	Pre-amplifier (dB)	Correction Factor (dB/m)
2483.50	48.15	PK	74.00	25.85	1.00	180	53.87	27.45	3.38	36.55	-5.72
2483.50	39.58	AV	54.00	14.42	1.00	180	45.30	27.45	3.38	36.55	-5.72
Frequency(MHz):			**2462**			**Polarity:**			**VERTICAL**		
Frequency (MHz)	Emission Level (dBuV/m)		Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Antenna Factor (dB/m)	Cable Factor (dB)	Pre-amplifier (dB)	Correction Factor (dB/m)
2483.50	46.20	PK	74.00	27.80	1.00	142	51.92	27.45	3.38	36.55	-5.72
2483.50	37.68	AV	54.00	16.32	1.00	142	43.40	27.45	3.38	36.55	-5.72

802.11n40

Frequency(MHz):			2422			Polarity:			HORIZONTAL		
Frequency (MHz)	Emission Level (dBuV/m)		Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Antenna Factor (dB/m)	Cable Factor (dB)	Pre-amplifier (dB)	Correction Factor (dB/m)
2390.00	49.78	PK	74.00	24.22	1.00	70	55.09	27.49	3.32	36.12	-5.31
2390.00	42.05	AV	54.00	11.95	1.00	70	47.36	27.49	3.32	36.12	-5.31
Frequency(MHz):			**2422**			**Polarity:**			**VERTICAL**		
Frequency (MHz)	Emission Level (dBuV/m)		Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Antenna Factor (dB/m)	Cable Factor (dB)	Pre-amplifier (dB)	Correction Factor (dB/m)
2390.00	47.49	PK	74.00	26.51	1.00	48	52.80	27.49	3.32	36.12	-5.31
2390.00	39.51	AV	54.00	14.49	1.00	48	44.82	27.49	3.32	36.12	-5.31
Frequency(MHz):			**2452**			**Polarity:**			**HORIZONTAL**		
Frequency (MHz)	Emission Level (dBuV/m)		Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Antenna Factor (dB/m)	Cable Factor (dB)	Pre-amplifier (dB)	Correction Factor (dB/m)
2483.50	47.51	PK	74.00	26.49	1.00	172	53.23	27.45	3.38	36.55	-5.72
2483.50	37.34	AV	54.00	16.66	1.00	172	43.06	27.45	3.38	36.55	-5.72
Frequency(MHz):			**2452**			**Polarity:**			**VERTICAL**		
Frequency (MHz)	Emission Level (dBuV/m)		Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Antenna Factor (dB/m)	Cable Factor (dB)	Pre-amplifier (dB)	Correction Factor (dB/m)
2483.50	45.52	PK	74.00	28.48	1.00	140	51.24	27.45	3.38	36.55	-5.72
2483.50	37.91	AV	54.00	16.09	1.00	140	43.63	27.45	3.38	36.55	-5.72

Bt 4.0

Frequency(MHz):			2402			Polarity:			HORIZONTAL		
Frequency (MHz)	Emission Level (dBuV/m)		Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Antenna Factor (dB/m)	Cable Factor (dB)	Pre-amplifier (dB)	Correction Factor (dB/m)
2390.00	47.25	PK	74.00	26.75	1.00	150	52.56	27.49	3.32	36.12	-5.31
2390.00	38.84	AV	54.00	15.16	1.00	150	44.15	27.49	3.32	36.12	-5.31
Frequency(MHz):			**2402**			**Polarity:**			**VERTICAL**		
Frequency (MHz)	Emission Level (dBuV/m)		Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Antenna Factor (dB/m)	Cable Factor (dB)	Pre-amplifier (dB)	Correction Factor (dB/m)
2390.00	44.70	PK	74.00	29.30	1.00	124	50.01	27.49	3.32	36.12	-5.31
2390.00	36.42	AV	54.00	17.58	1.00	124	41.73	27.49	3.32	36.12	-5.31
Frequency(MHz):			**2480**			**Polarity:**			**HORIZONTAL**		
Frequency (MHz)	Emission Level (dBuV/m)		Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Antenna Factor (dB/m)	Cable Factor (dB)	Pre-amplifier (dB)	Correction Factor (dB/m)
2483.50	43.11	PK	74.00	30.89	1.00	251	48.83	27.45	3.38	36.55	-5.72
2483.50	35.68	AV	54.00	18.32	1.00	251	41.40	27.45	3.38	36.55	-5.72
Frequency(MHz):			**2480**			**Polarity:**			**VERTICAL**		
Frequency (MHz)	Emission Level (dBuV/m)		Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Antenna Factor (dB/m)	Cable Factor (dB)	Pre-amplifier (dB)	Correction Factor (dB/m)
2483.50	41.76	PK	74.00	32.24	1.00	152	47.48	27.45	3.38	36.55	-5.72
2483.50	35.99	AV	54.00	18.01	1.00	152	41.71	27.45	3.38	36.55	-5.72