



Shenzhen GTI Technology Co., Ltd.

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

Tel: +86-755-27559792

Fax: +86-755-86116468

Report No.: GTI20150585F-1

Page 1 of 59

TEST REPORT

Product Name: USB WIFI

Trademark: /

Model/Type reference: ZN-U9021

Listed Model(s): /

FCC ID.....: QISZN-U9021

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

Applicant: Huawei Technologies Co.,Ltd

Address of applicant: Administration Building, Headquarters of Huawei Technologies Co., Ltd., Bantian, Longgang District, Shenzhen, Guangdong, China

Date of Receipt: Oct. 25, 2015

Date of Test Date.....: Oct. 26, 2015 -Jan. 22, 2016

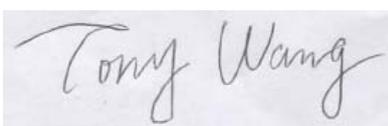
Data of issue.: Jan. 23, 2016

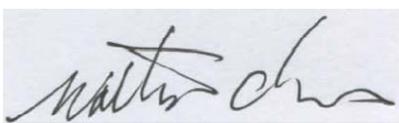
Test result	Pass *
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* In the configuration tested, the EUT complied with the standards specified above

GENERAL DESCRIPTION OF EUT	
Equipment:	USB WIFI
Model Name:	ZN-U9021
Manufacturer:	Nanjing Z-Com Wireless Co., Ltd.
Manufacturer Address:	Z-Com Building, No.30 Jiangsu Software Park, No.699-22 Xuanwu Avenue, Nanjing, Jiangsu, China
Power Rating:	DC 5V via USB port

Compiled By: 
(Sevin Li)

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 C63.10-2013: 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 Conducted Output Power	PASS
FCC Part 15.247(e)	Power Spectral Density	PASS
FCC Part 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:	USB WIFI
Model/Type reference:	ZN-U9021
Listed model:	/
Power supply:	DC 5V via USB port
Hardware version:	5.0.0.28
Software version:	v0.3
WIFI :	
Supported type:	802.11b/802.11g/802.11n(H20)
Modulation technology:	802.11b: DSSS 802.11g/802.11n(H20): OFDM
Modulation type:	802.11b: BPSK/QPSK/CCK 802.11g/802.11n(H20): BPSK/QPSK/16QAM/64QAM
Operation frequency:	802.11b/802.11g/802.11n(H20): 2412MHz~2472MHz
Channel number:	802.11b/802.11g/802.11n(H20): 13
Channel separation:	5MHz
Antenna type:	Internal Antenna
Antenna gain:	0.67 dBi

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

Peripherals Devices:

OUTSIDE SUPPORT EQUIPMENT						
No.	Equipment	Model	Serial No.	Manufacture	Trade name	Remark
1.	PC Note	1717-A31	L3-M1102	Lenovo	IBM	N/A
2.	AC adapter	PA-1650-161	Qzp1158	Lenovo	Lenovo	Input: AC 100-240V,50-60Hz Output: DC 20V, 3.25A

Note: All the above equipment /cable were placed in worse case position to maximize emission signals during emission test.

WIFI Operation Frequency

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

Channel	Frequency(MHz)	Channel	Frequency(MHz)
1	2412	8	2447
2	2417	9	2452
3	2422	10	2457
4	2427	11	2462
5	2432	12	2467
6	2437	13	2472
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	1/6/11/12/13
	11g/OFDM	6 Mbps	1/6/11/12/13
	11n(20MHz)/OFDM	6.5Mbps	1/6/11/12/13
Band Edge	11b/DSSS	1 Mbps	1/11/12/13
	11g/OFDM	6 Mbps	1/11/12/13
	11n(20MHz)/OFDM	6.5Mbps	1/11/12/13

2.1. Measurement Instruments List

Maximum Output Power					
Item	Test Equipment	Manufacturer	Model No.	Serial No.	Calibrated until
1	Power Meter	Anritsu	ML2487B	110553	July 10,2016
2	Power Sensor	Anritsu	MA2411B	100345	July 10,2016

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	R&S	FSU26	100105	Jan. 04, 2017

Conducted Emission					
Item	Test Equipment	Manufacturer	Model No.	Serial No.	Calibrate until
1	LISN	R&S	ENV216	101112	Jan. 04, 2017
2	LISN	R&S	ENV216	101113	Jan. 04, 2017
3	EMI Test Receiver	R&S	ESCI	100920	Jan. 04, 2017
4	Cable	Schwarzbeck	AK9515E	33156	Jan. 04, 2017

Radiated Emission					
Item	Test Equipment	Manufacturer	Model No.	Serial No.	Calibrated until
1	EMI Test Receiver	R&S	ESCI	100658	Jan. 04, 2017
2	High pass filter	micro-tranics	HPM50111	34202	Jan. 04, 2017
3	Log-Bicon Antenna	Schwarzbeck	CBL6141A	4180	Jan. 04, 2017
4	Ultra-Broadband Antenna	ShwarzBeck	BBHA9170	25841	Jan. 04, 2017
5	Loop Antenna	LAPLAC	RF300	9138	Jan. 04, 2017
6	Spectrum Analyzer	Rohde & Schwarz	FSU	100105	Jan. 04, 2017
7	Horn Antenna	Schwarzbeck	BBHA 9120D	647	Jan. 04, 2017
8	Pre-Amplifier	HP	8447D	1937A03050	Jan. 04, 2017
9	Pre-Amplifier	EMCI	EMC05183 5	980075	Jan. 04, 2017
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. 04, 2017
13	Cable Above 1GHz	Hubersuhner	SUCOFLEX1 02	DA1580	Jan. 04, 2017

Note: 1. The Cal.Interval was one year.

2. The cable loss has calculated in test result which connection between each test instruments.

2.2. TEST CONDITIONS AND RESULTS

2.3. Conducted Emission (AC Main)

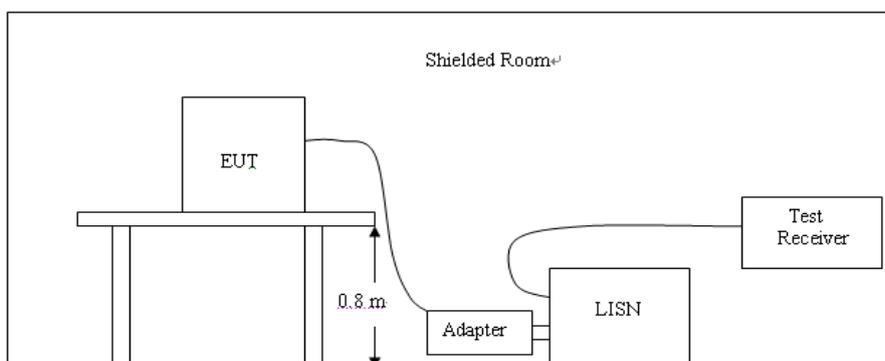
LIMIT

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 C63.10-2013.
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 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.

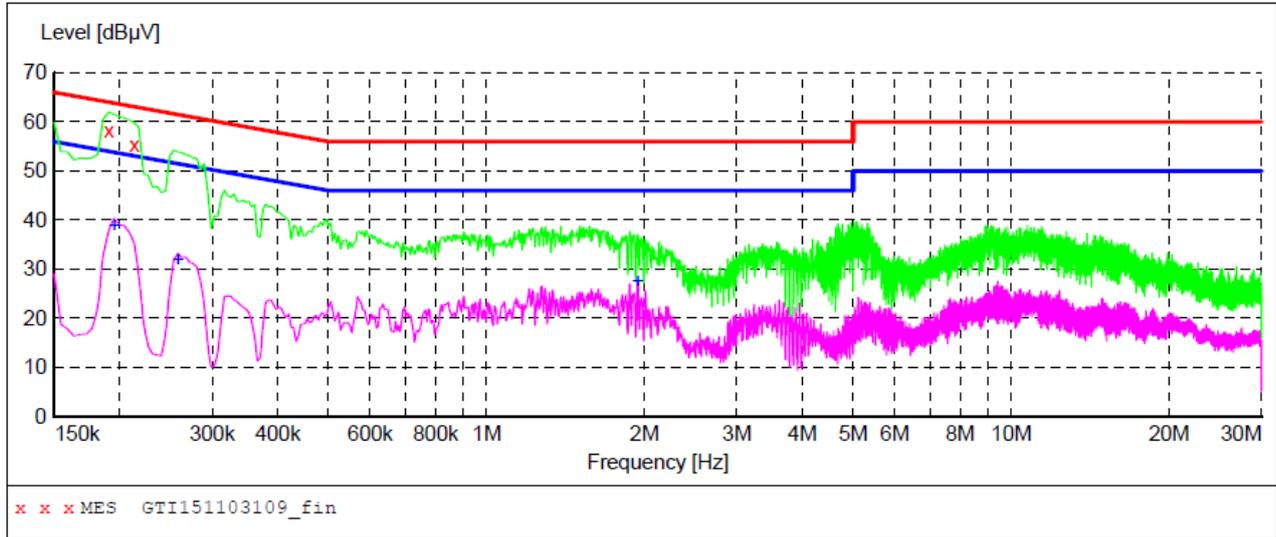
TEST RESULTS

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

LINE	L
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SCAN TABLE: "Vol (9K-30M) FIN-N"

Short Description: 150K-30M Voltage



MEASUREMENT RESULT: "GTI151103109_fin"

11/3/2015 10:25AM

Frequency MHz	Level dBµV	Transd dB	Limit dBµV	Margin dB	Detector	Line	PE
0.190500	58.10	9.7	64	5.9	QP	L1	GND
0.213000	55.20	9.7	63	7.9	QP	L1	GND

MEASUREMENT RESULT: "GTI151103109_fin2"

11/3/2015 10:25AM

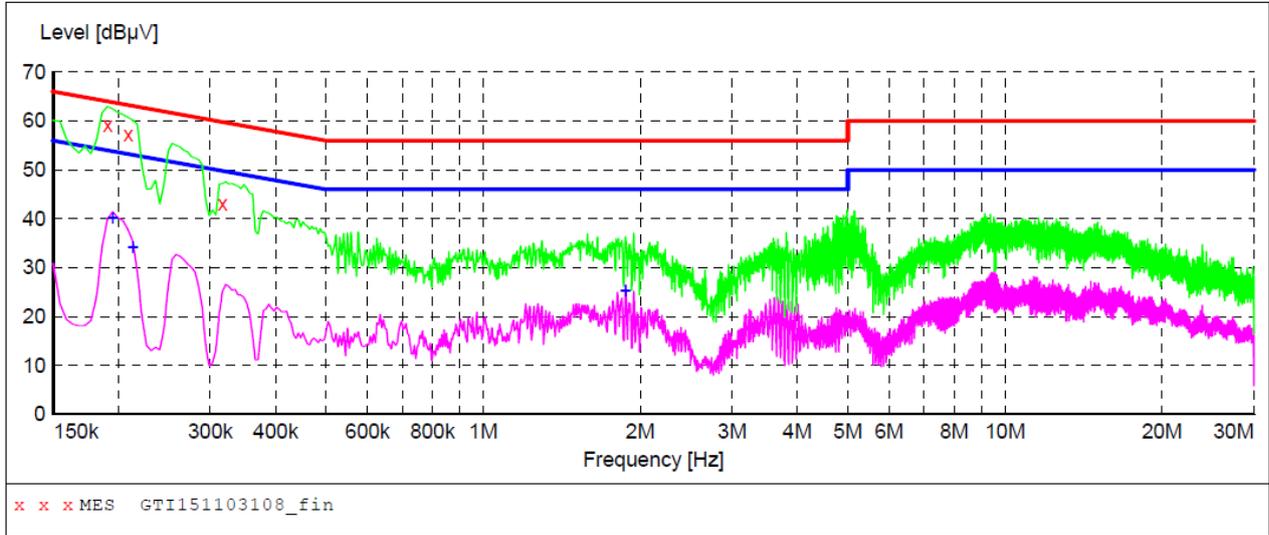
Frequency MHz	Level dBµV	Transd dB	Limit dBµV	Margin dB	Detector	Line	PE
0.195000	38.90	9.7	54	14.9	AV	L1	GND
0.258000	31.70	9.7	52	19.8	AV	L1	GND
1.940000	27.50	10.3	46	18.5	AV	L1	GND

LINE

N

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

Short Description: 150K-30M Voltage



MEASUREMENT RESULT: "GTI151103108_fin"

11/3/2015 10:22AM

Frequency MHz	Level dBµV	Transd dB	Limit dBµV	Margin dB	Detector	Line	PE
0.190500	59.10	9.5	64	4.9	QP	N	GND
0.208500	57.20	9.5	63	6.1	QP	N	GND
0.316500	43.10	9.5	60	16.7	QP	N	GND

MEASUREMENT RESULT: "GTI151103108_fin2"

11/3/2015 10:22AM

Frequency MHz	Level dBµV	Transd dB	Limit dBµV	Margin dB	Detector	Line	PE
0.195000	40.10	9.5	54	13.7	AV	N	GND
0.213000	34.20	9.5	53	18.9	AV	N	GND
1.872500	25.30	10.0	46	20.7	AV	N	GND

2.4. 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 the 100kHz 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	$20\log(2400/F(\text{KHz}))+40\log(300/3)$	$2400/F(\text{KHz})$
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 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°C to 360°C 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

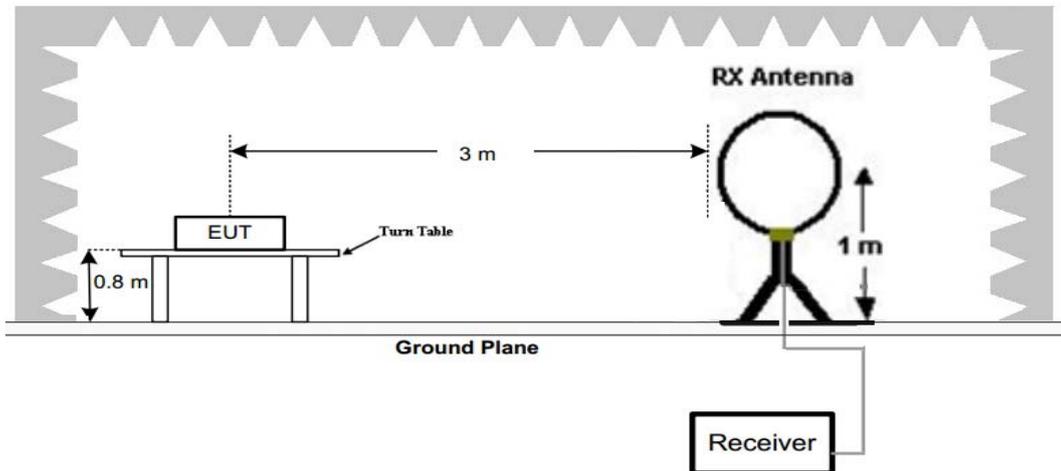
Frequency (MHz)	FS (dBµV/m)	RA (dBµV/m)	AF (dB)	CL (dB)	AG (dB)	Transd (dB)
150.00	40	58.1	12.2	1.6	31.90	-18.1

$$\text{Transd} = \text{AF} + \text{CL} - \text{AG}$$

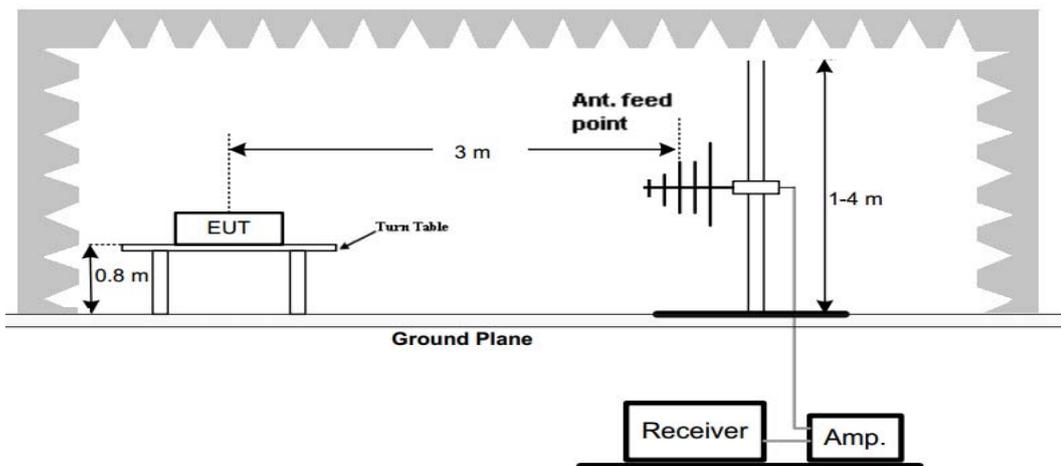
Test Configuration

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

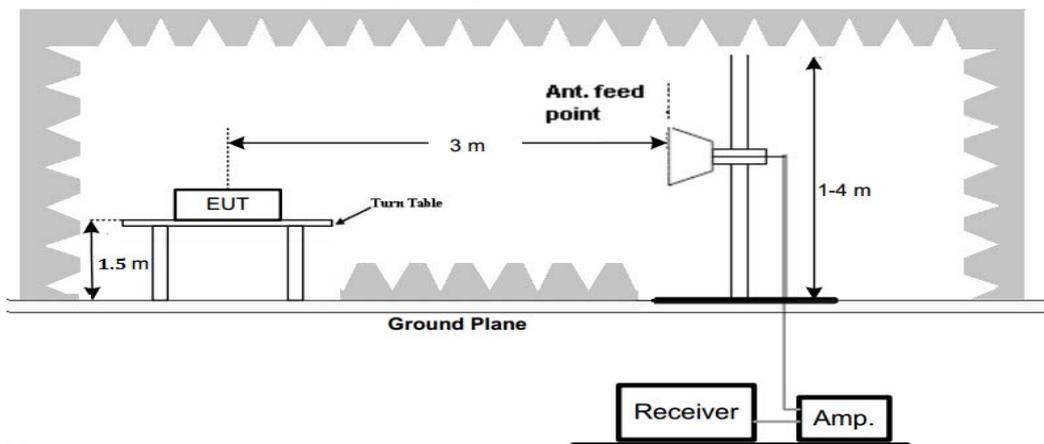
Frequency range 9 KHz – 30MHz



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 low channel mode below 1GHz

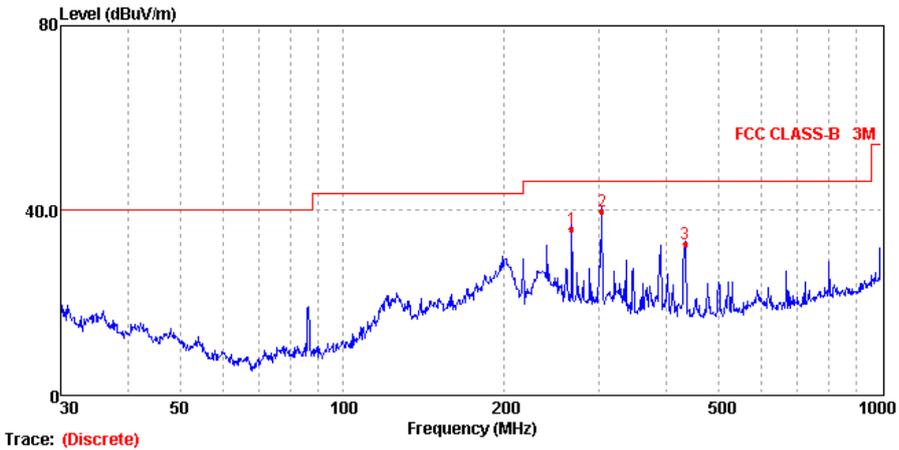
For 9 KHz-30MHz

Frequency (MHz)	Corrected Reading (dBuV/m)@3m	FCC Limit (dBuV/m) @3m	Margin (dB)	Detector	Result
0.39	51.41	95.78	44.37	QP	PASS
1.58	45.69	63.63	17.94	QP	PASS
13.75	57.22	69.54	12.32	QP	PASS
22.66	49.54	69.54	20.00	QP	PASS

For 30MHz-1GHz
For 802.11B Low Channel

Horizontal

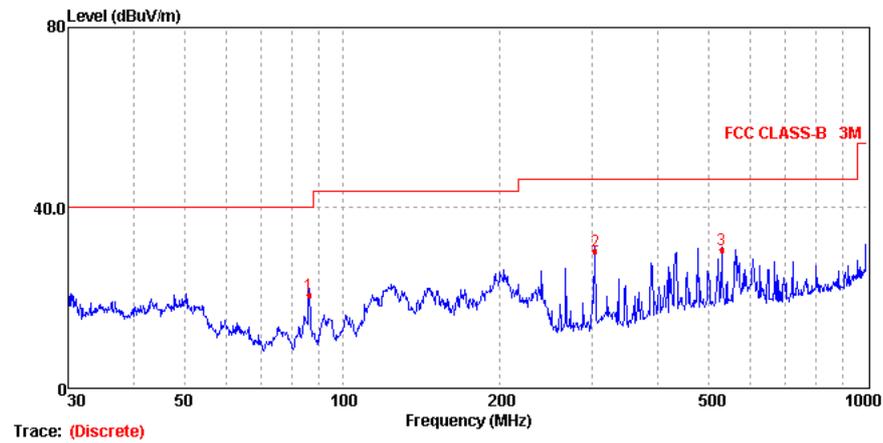
Data: 7



Mark	Frequency MHz	Level dBuV/m	Factor dB/m	Reading dBuV	Limit dBuV/m	Margin dB	Polarization	Detector
1	266.61	35.60	-17.50	53.10	46.00	10.40	HORIZONTAL	QP
2	303.54	39.50	-17.16	56.66	46.00	6.50	HORIZONTAL	QP
3	432.55	32.40	-12.67	45.07	46.00	13.60	HORIZONTAL	QP

Vertical

Data: 8



Mark	Frequency MHz	Level dBuV/m	Factor dB/m	Reading dBuV	Limit dBuV/m	Margin dB	Polarization	Detector
1	86.50	20.30	-20.80	41.10	40.00	19.70	VERTICAL	QP
2	303.54	29.90	-17.16	47.06	46.00	16.10	VERTICAL	QP
3	528.25	30.20	-11.14	41.34	46.00	15.80	VERTICAL	QP

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	49.69	PK	74.00	24.31	1.00	86	47.59	31.6	7.00	36.5	2.10
1	4824	42.53	AV	54.00	11.47	1.00	86	40.43	31.6	7.00	36.5	2.10
2	7236	42.58	PK	74.00	31.42	1.00	86	31.65	37.33	8.90	35.3	10.93
2	7236	35.61	AV	54.00	18.39	1.00	86	24.68	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	50.75	PK	74.00	23.25	1.00	174	48.65	31.60	7.00	36.5	2.10
1	4824	43.69	AV	54.00	10.31	1.00	174	41.59	31.60	7.00	36.5	2.10
2	7236	42.50	PK	74.00	31.50	1.00	174	31.57	37.33	8.90	35.3	10.93
2	7236	37.24	AV	54.00	16.76	1.00	174	26.31	37.33	8.90	35.3	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	49.80	PK	74.00	24.20	1.00	80	47.68	31.02	7.60	36.5	2.12
1	4874.00	43.94	AV	54.00	10.06	1.00	80	41.82	31.02	7.60	36.5	2.12
2	7311.00	42.43	PK	74.00	31.57	1.00	80	31.35	37.28	8.60	34.8	11.08
2	7311.00	35.27	AV	54.00	18.73	1.00	80	24.19	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	51.08	PK	74.00	22.92	1.00	184	48.96	31.02	7.60	36.5	2.12
1	4874.00	45.14	AV	54.00	8.86	1.00	184	43.02	31.02	7.60	36.5	2.12
2	7311.00	43.65	PK	74.00	30.35	1.00	184	32.57	37.28	8.60	34.8	11.08
2	7311.00	36.18	AV	54.00	17.82	1.00	184	25.10	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	49.24	PK	74.00	24.76	1.00	98	46.04	31.58	7.82	36.2	3.20
1	4924.00	44.60	AV	54.00	9.40	1.00	98	41.40	31.58	7.82	36.2	3.20
2	7386.00	42.07	PK	74.00	31.93	1.00	98	30.13	38.51	8.73	35.3	11.94
2	7386.00	36.60	AV	54.00	17.40	1.00	98	24.66	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	50.67	PK	74.00	23.33	1.00	170	47.47	31.58	7.82	36.2	3.20
1	4924.00	44.05	AV	54.00	9.95	1.00	170	40.85	31.58	7.82	36.2	3.20
2	7386.00	43.62	PK	74.00	30.38	1.00	170	31.68	38.51	8.73	35.3	11.94
2	7386.00	35.67	AV	54.00	18.33	1.00	170	23.73	38.51	8.73	35.3	11.94

802.11b Mode (above 1GHz)

Frequency(MHz):				2467			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	4934.00	46.82	PK	74.00	27.18	1.00	107	43.62	31.58	7.82	36.2	3.20
1	4934.00	40.95	AV	54.00	13.05	1.00	107	37.75	31.58	7.82	36.2	3.20
2	7401.00	40.60	PK	74.00	33.40	1.00	107	28.66	38.51	8.73	35.3	11.94
2	7401.00	31.37	AV	54.00	22.63	1.00	107	19.43	38.51	8.73	35.3	11.94

Frequency(MHz):				2467			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	4934.00	48.55	PK	74.00	25.45	1.00	158	45.35	31.58	7.82	36.2	3.20
1	4934.00	40.67	AV	54.00	13.33	1.00	158	37.47	31.58	7.82	36.2	3.20
2	7401.00	39.34	PK	74.00	34.66	1.00	158	27.40	38.51	8.73	35.3	11.94
2	7401.00	31.89	AV	54.00	22.11	1.00	158	19.95	38.51	8.73	35.3	11.94

Frequency(MHz):				2472			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	4944.00	45.78	PK	74.00	28.22	1.00	120	42.58	31.58	7.82	36.2	3.20
1	4944.00	38.30	AV	54.00	15.70	1.00	120	35.10	31.58	7.82	36.2	3.20
2	7416.00	37.14	PK	74.00	36.86	1.00	120	25.20	38.51	8.73	35.3	11.94
2	7416.00	31.46	AV	54.00	22.54	1.00	120	19.52	38.51	8.73	35.3	11.94

Frequency(MHz):				2472			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	4944.00	44.94	PK	74.00	29.06	1.00	158	41.74	31.58	7.82	36.2	3.20
1	4944.00	40.18	AV	54.00	13.82	1.00	158	36.98	31.58	7.82	36.2	3.20
2	7416.00	39.68	PK	74.00	34.32	1.00	158	27.74	38.51	8.73	35.3	11.94
2	7416.00	32.25	AV	54.00	21.75	1.00	158	20.31	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	48.56	PK	74.00	25.44	1.00	86	46.46	31.6	7.00	36.5	2.10
1	4824	41.32	AV	54.00	12.68	1.00	86	39.22	31.6	7.00	36.5	2.10
2	7236	42.74	PK	74.00	31.26	1.00	86	31.81	37.33	8.90	35.3	10.93
2	7236	34.88	AV	54.00	19.12	1.00	86	23.95	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	50.76	PK	74.00	23.24	1.00	174	48.66	31.60	7.00	36.50	2.10
1	4824	40.72	AV	54.00	13.28	1.00	174	38.62	31.60	7.00	36.50	2.10
2	7236	43.82	PK	74.00	30.18	1.00	174	32.89	37.33	8.90	35.30	10.93
2	7236	37.93	AV	54.00	16.07	1.00	174	27.00	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	49.05	PK	74.00	24.95	1.00	80	46.93	31.02	7.60	36.5	2.12
1	4874.00	40.55	AV	54.00	13.45	1.00	80	38.43	31.02	7.60	36.5	2.12
2	7311.00	42.62	PK	74.00	31.38	1.00	80	31.54	37.28	8.60	34.8	11.08
2	7311.00	33.36	AV	54.00	20.64	1.00	80	22.28	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	50.15	PK	74.00	23.85	1.00	184	48.03	31.02	7.60	36.5	2.12
1	4874.00	40.92	AV	54.00	13.08	1.00	184	38.80	31.02	7.60	36.5	2.12
2	7311.00	44.84	PK	74.00	29.16	1.00	184	33.76	37.28	8.60	34.8	11.08
2	7311.00	35.58	AV	54.00	18.42	1.00	184	24.50	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	50.01	PK	74.00	23.99	1.00	184	46.81	31.58	7.82	36.2	3.20
1	4924.00	39.77	AV	54.00	14.23	1.00	184	36.57	31.58	7.82	36.2	3.20
2	7386.00	42.75	PK	74.00	31.25	1.00	184	30.81	38.51	8.73	35.3	11.94
2	7386.00	33.73	AV	54.00	20.27	1.00	184	21.79	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	49.40	PK	74.00	24.60	1.00	170	46.20	55.70	7.82	36.2	3.20
1	4924.00	40.72	AV	54.00	13.28	1.00	170	37.52	49.20	7.82	36.2	3.20
2	7386.00	44.32	PK	74.00	29.68	1.00	170	32.38	50.45	8.73	35.3	11.94
2	7386.00	33.84	AV	54.00	20.16	1.00	170	21.90	41.28	8.73	35.3	11.94

802.11g Mode (above 1GHz)

Frequency(MHz):				2467			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	4934.00	45.69	PK	74.00	28.31	1.00	172	42.49	31.58	7.82	36.2	3.20
1	4934.00	35.53	AV	54.00	18.47	1.00	172	32.33	31.58	7.82	36.2	3.20
2	7401.00	39.71	PK	74.00	34.29	1.00	172	27.77	38.51	8.73	35.3	11.94
2	7401.00	29.71	AV	54.00	24.29	1.00	172	17.77	38.51	8.73	35.3	11.94

Frequency(MHz):				2467			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	4934.00	47.46	PK	74.00	26.54	1.00	158	44.26	31.58	7.82	36.2	3.20
1	4934.00	37.17	AV	54.00	16.83	1.00	158	33.97	31.58	7.82	36.2	3.20
2	7401.00	41.36	PK	74.00	32.64	1.00	158	29.42	38.51	8.73	35.3	11.94
2	7401.00	30.28	AV	54.00	23.72	1.00	158	18.34	38.51	8.73	35.3	11.94

Frequency(MHz):				2472			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	4944.00	45.17	PK	74.00	28.83	1.00	172	41.97	31.58	7.82	36.2	3.20
1	4944.00	36.37	AV	54.00	17.63	1.00	172	33.17	31.58	7.82	36.2	3.20
2	7416.00	40.70	PK	74.00	33.30	1.00	172	28.76	38.51	8.73	35.3	11.94
2	7416.00	30.28	AV	54.00	23.72	1.00	172	18.34	38.51	8.73	35.3	11.94

Frequency(MHz):				2472			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	4944.00	45.78	PK	74.00	28.22	1.00	158	42.58	31.58	7.82	36.2	3.20
1	4944.00	36.26	AV	54.00	17.74	1.00	158	33.06	31.58	7.82	36.2	3.20
2	7416.00	41.28	PK	74.00	32.72	1.00	158	29.34	38.51	8.73	35.3	11.94
2	7416.00	32.22	AV	54.00	21.78	1.00	158	20.28	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	47.15	PK	74.00	26.85	1.00	74	45.05	31.6	7.00	36.5	2.10
1	4824	39.49	AV	54.00	14.51	1.00	74	37.39	31.6	7.00	36.5	2.10
2	7236	43.86	PK	74.00	30.14	1.00	74	32.93	37.33	8.90	35.3	10.93
2	7236	33.38	AV	54.00	20.62	1.00	74	22.45	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	49.11	PK	74.00	24.89	1.00	159	47.01	31.60	7.00	36.50	2.10
1	4824	40.11	AV	54.00	13.89	1.00	159	38.01	31.60	7.00	36.50	2.10
2	7236	42.62	PK	74.00	31.38	1.00	159	31.69	37.33	8.90	35.30	10.93
2	7236	34.66	AV	54.00	19.34	1.00	159	23.73	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	47.76	PK	74.00	26.24	1.00	74	45.64	56.38	7.60	36.5	2.12
1	4874.00	38.61	AV	54.00	15.39	1.00	74	36.49	48.60	7.60	36.5	2.12
2	7311.00	42.89	PK	74.00	31.11	1.00	74	31.81	51.34	8.60	34.8	11.08
2	7311.00	33.47	AV	54.00	20.53	1.00	74	22.39	43.25	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	48.77	PK	74.00	25.23	1.00	189	46.65	31.02	7.60	36.5	2.12
1	4874.00	39.92	AV	54.00	14.08	1.00	189	37.80	31.02	7.60	36.5	2.12
2	7311.00	42.60	PK	74.00	31.40	1.00	189	31.52	37.28	8.60	34.8	11.08
2	7311.00	34.75	AV	54.00	19.25	1.00	189	23.67	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	48.91	PK	74.00	25.09	1.00	194	45.71	31.58	7.82	36.2	3.20
1	4924.00	41.82	AV	54.00	12.18	1.00	194	38.62	31.58	7.82	36.2	3.20
2	7386.00	41.88	PK	74.00	32.12	1.00	194	29.94	38.51	8.73	35.3	11.94
2	7386.00	34.63	AV	54.00	19.37	1.00	194	22.69	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	50.51	PK	74.00	23.49	1.00	164	47.31	31.58	7.82	36.2	3.20
1	4924.00	39.87	AV	54.00	14.13	1.00	164	36.67	31.58	7.82	36.2	3.20
2	7386.00	44.78	PK	74.00	29.22	1.00	164	32.84	38.51	8.73	35.3	11.94
2	7386.00	33.62	AV	54.00	20.38	1.00	164	21.68	38.51	8.73	35.3	11.94

802.11n20 Mode (above 1GHz)

Frequency(MHz):				2467			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	4934.00	44.82	PK	74.00	29.18	1.00	182	41.62	31.58	7.82	36.2	3.20
1	4934.00	37.10	AV	54.00	16.90	1.00	182	33.90	31.58	7.82	36.2	3.20
2	7401.00	38.27	PK	74.00	35.73	1.00	182	26.33	38.51	8.73	35.3	11.94
2	7401.00	30.03	AV	54.00	23.97	1.00	182	18.09	38.51	8.73	35.3	11.94

Frequency(MHz):				2467			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	4934.00	46.54	PK	74.00	27.46	1.00	152	43.34	31.58	7.82	36.2	3.20
1	4934.00	35.41	AV	54.00	18.59	1.00	152	32.21	31.58	7.82	36.2	3.20
2	7401.00	39.33	PK	74.00	34.67	1.00	152	27.39	38.51	8.73	35.3	11.94
2	7401.00	29.43	AV	54.00	24.57	1.00	152	17.49	38.51	8.73	35.3	11.94

Frequency(MHz):				2472			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	4944.00	45.14	PK	74.00	28.86	1.00	182	41.94	31.58	7.82	36.2	3.20
1	4944.00	36.75	AV	54.00	17.25	1.00	182	33.55	31.58	7.82	36.2	3.20
2	7416.00	39.78	PK	74.00	34.22	1.00	182	27.84	38.51	8.73	35.3	11.94
2	7416.00	31.13	AV	54.00	22.87	1.00	182	19.19	38.51	8.73	35.3	11.94

Frequency(MHz):				2472			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	4944.00	44.18	PK	74.00	29.82	1.00	152	40.98	31.58	7.82	36.2	3.20
1	4944.00	37.62	AV	54.00	16.38	1.00	152	34.42	31.58	7.82	36.2	3.20
2	7416.00	40.49	PK	74.00	33.51	1.00	152	28.55	38.51	8.73	35.3	11.94
2	7416.00	30.63	AV	54.00	23.37	1.00	152	18.69	38.51	8.73	35.3	11.94

2.5. Maximum Conducted Output Power

Limit

30dBm for digital modulation systems.

Test Procedure

- Measurement using a RF average power meter
 1. Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to the Power Meter.
 2. Ensure EUT transmitting with a duty cycle $\geq 98\%$.
 3. Record the value of Power Meter.

Test Configuration



Test Results

WIFI				
Type	Channel	Output power AV(dBm)	Limit (dBm)	Result
802.11b	01	17.35	30.00	Pass
	06	17.92		
	11	16.98		
	12	14.95		
	13	13.09		
802.11g	01	15.99	30.00	Pass
	06	16.36		
	11	16.00		
	12	13.26		
	13	11.54		
802.11n(H20)	01	15.23	30.00	Pass
	06	15.34		
	11	15.36		
	12	13.30		
	13	11.10		

2.6. Power Spectral Density

Limit

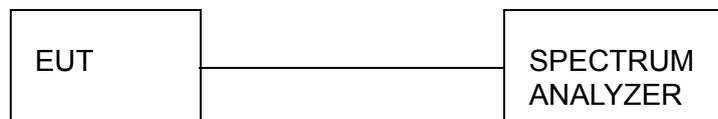
For digitally modulated systems, the power spectral density conducted from the intentional radiator to the antenna shall not be greater than 8 dBm in any 3 kHz band during any time interval of continuous transmission.

Test Procedure

- Use this procedure when the maximum (average) conducted output power was used to demonstrate compliance to the output power limit.
 1. Set analyzer center frequency to DTS channel center frequency.
 2. Set span to at least 1.5 times the OBW
 3. RBW: $3 \text{ kHz} \leq \text{RBW} \leq 100 \text{ kHz}$.
 4. VBW: $\geq 3 \times \text{RBW}$.
 5. Detector: power averaging (RMS)
 6. Sweep time: Auto couple.
 7. Swoop points: ≥ 8001 .
 8. Trace mode = Average (100 traces)
 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.

Note: The OBW test data please see the section 3.5

Test Configuration

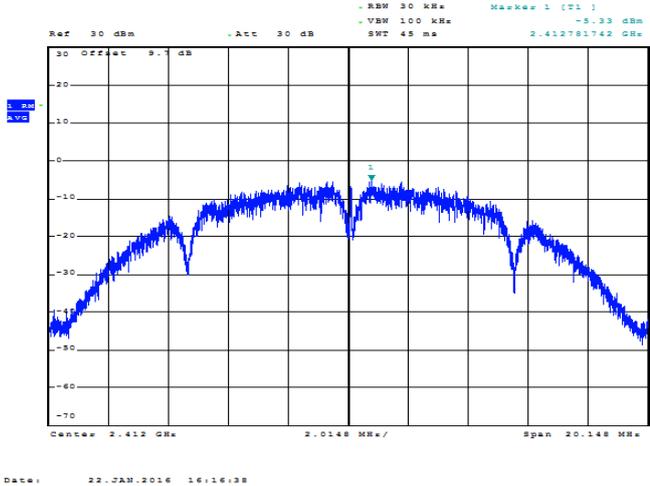


Test Results

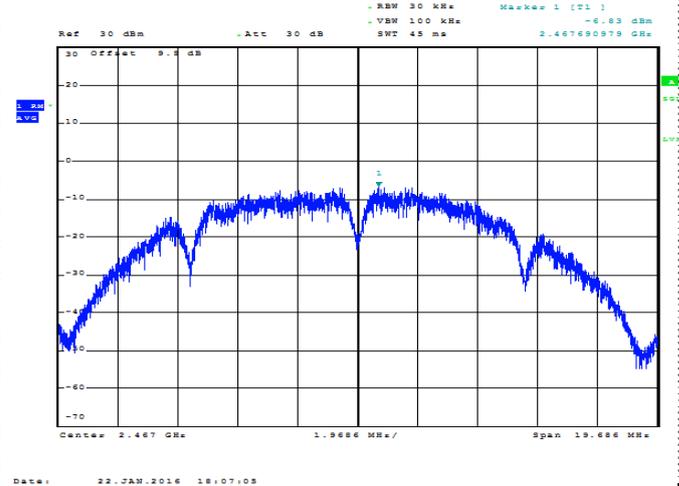
WIFI				
Type	Channel	Power Spectral Density (dBm/30KHz)	Limit (dBm/3KHz)	Result
802.11b	01	-5.33	8.00	Pass
	06	-4.65		
	11	-4.58		
	12	-6.83		
	13	-9.47		
802.11g	01	-8.26	8.00	Pass
	06	-8.43		
	11	-8.27		
	12	-9.76		
	13	-10.54		
802.11n(HT20)	01	-9.08	8.00	Pass
	06	-9.00		
	11	-9.36		
	12	-10.28		
	13	-11.52		

Test plot as follows:

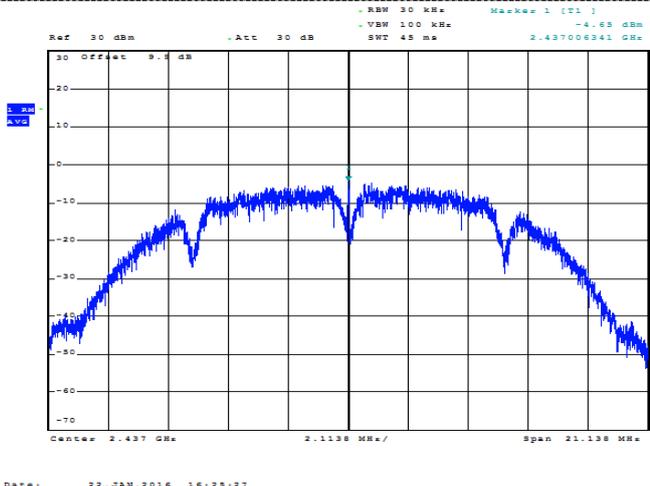
802.11b



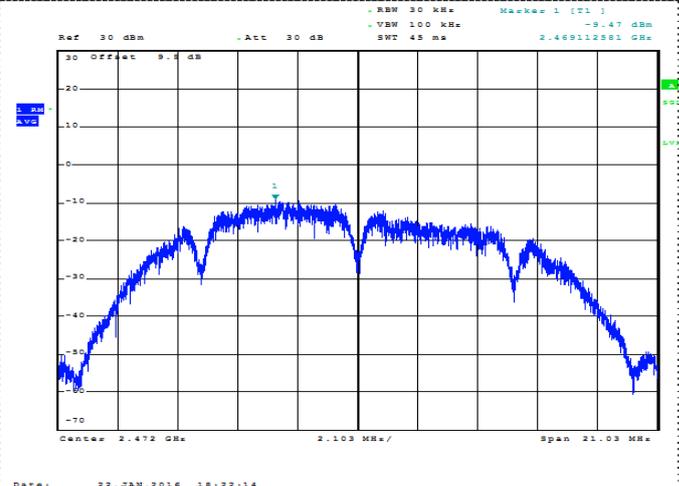
CH01



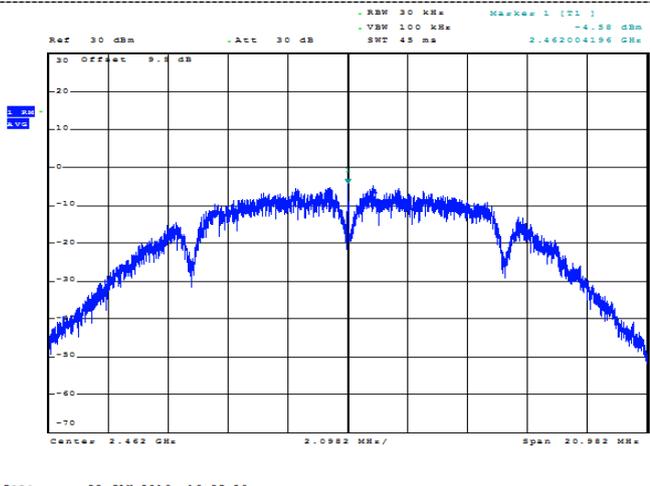
CH12



CH06

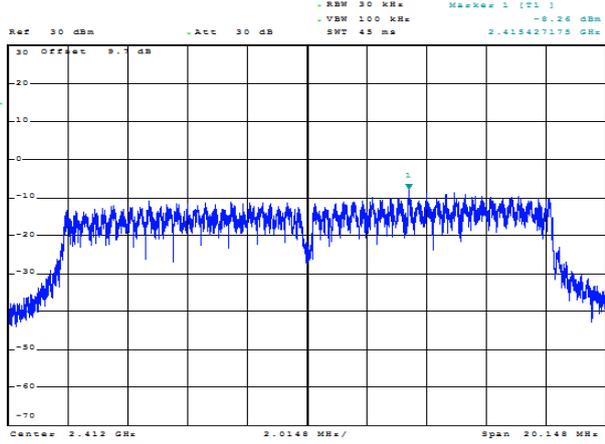


CH13



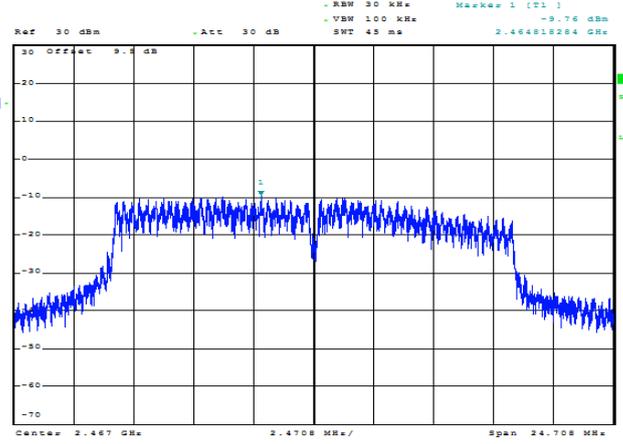
CH11

802.11g



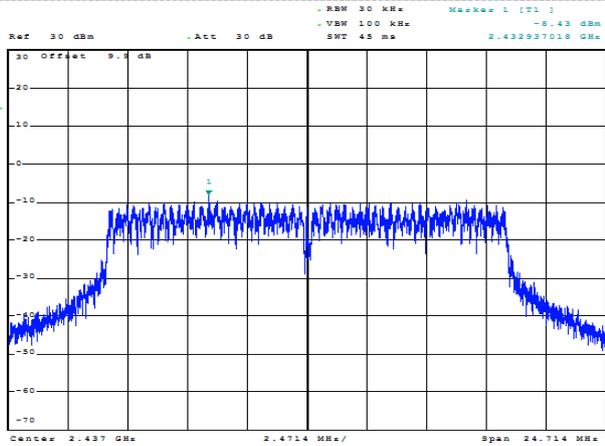
Date: 22 JAN 2016 17:00:33

CH01



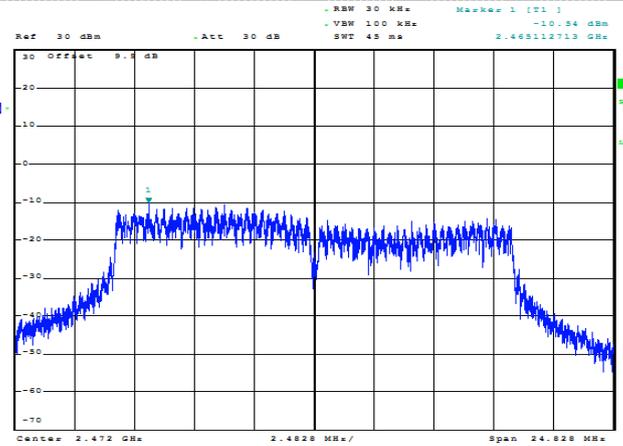
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CH012



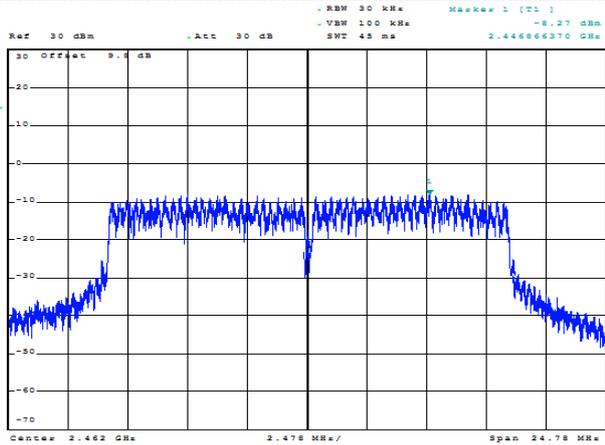
Date: 22 JAN 2016 16:49:39

CH06



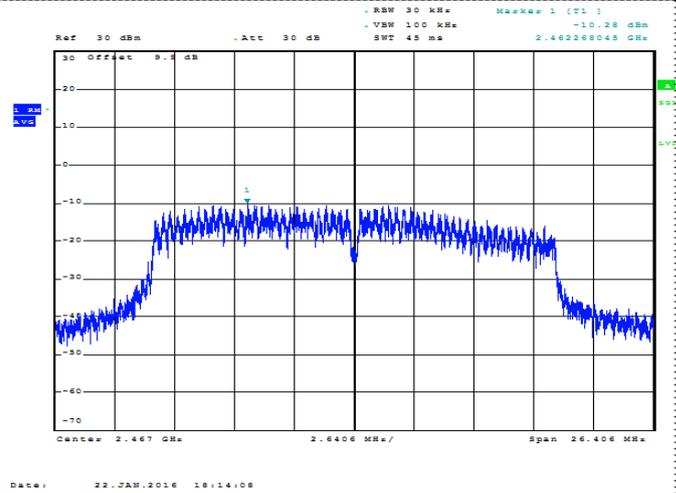
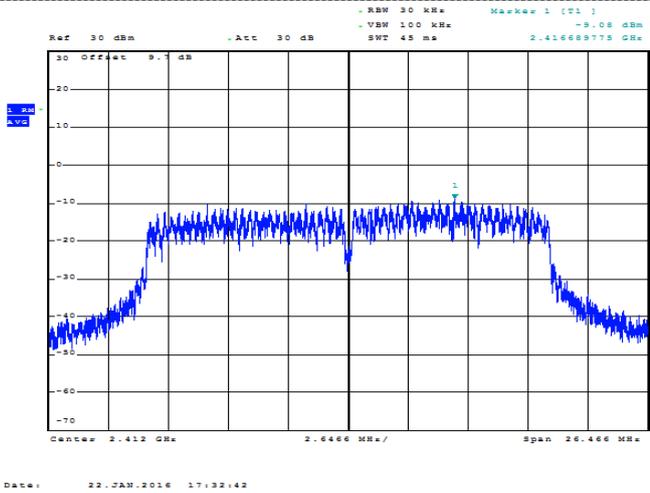
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CH013

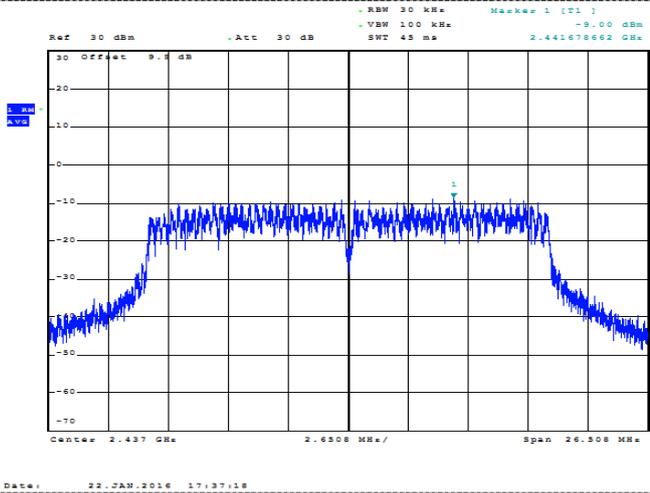


Date: 22 JAN 2016 16:59:33

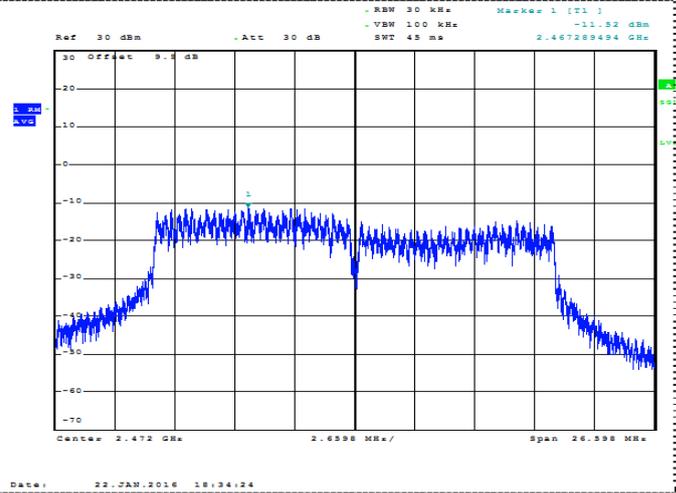
802.11n(HT20)



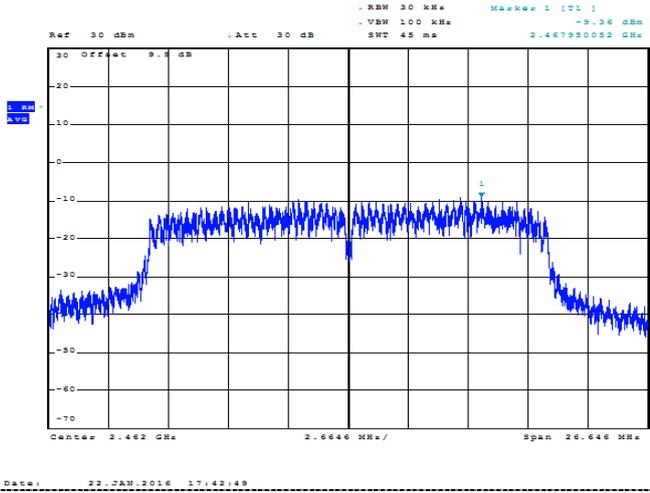
CH01



CH12



CH06



CH13

CH11

2.7. 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: $\geq 3 \times$ 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



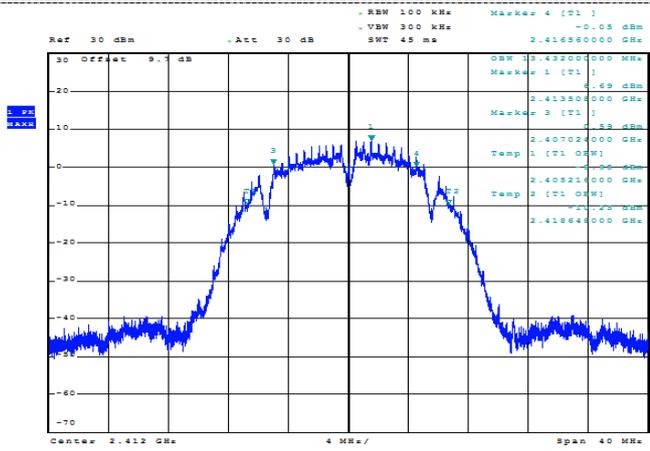
Test Results

WIFI

Type	Channel	6dB Bandwidth (MHz)	99% OBW (MHz)	Limit (KHz)	Result
802.11b	01	9.536	13.432	≥500	Pass
	06	10.076	14.092		
	11	10.040	13.988		
	12	9.032	13.316		
	13	9.244	14.020		
802.11g	01	15.628	16.456	≥500	Pass
	06	16.300	16.476		
	11	16.024	16.520		
	12	15.148	16.472		
	13	15.676	16.656		
802.11n(HT20)	01	15.088	17.628	≥500	Pass
	06	16.268	17.672		
	11	15.516	17.764		
	12	15.400	17.604		
	13	16.304	17.732		

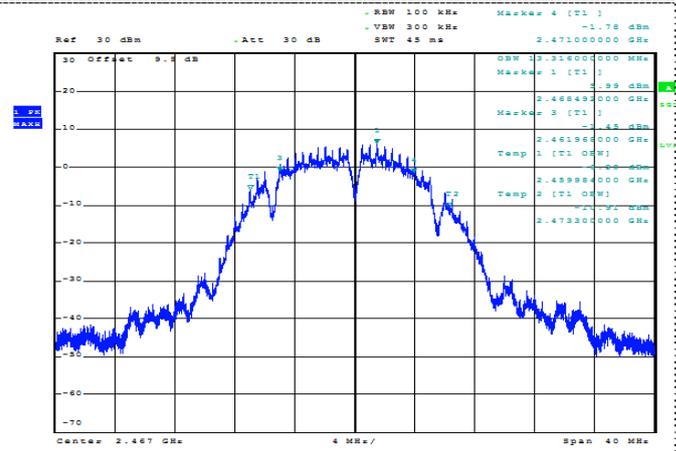
Test plot as follows:

802.11b



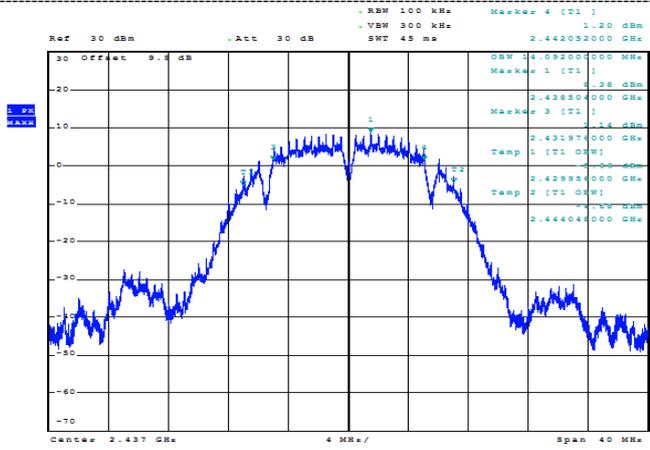
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CH01



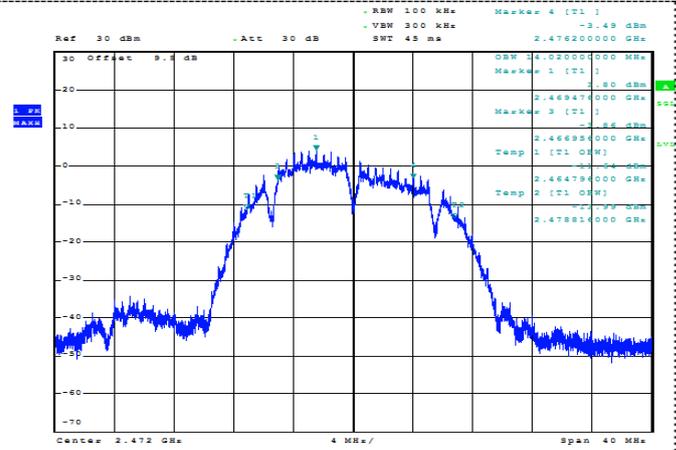
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CH12



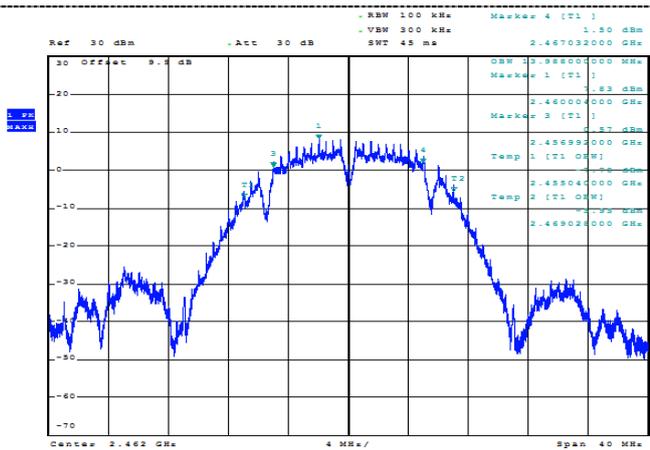
Date: 22 JAN 2016 16:24:33

CH06



Date: 22 JAN 2016 18:21:38

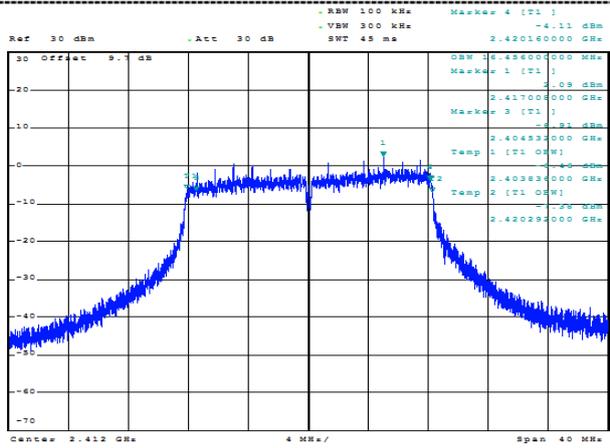
CH13



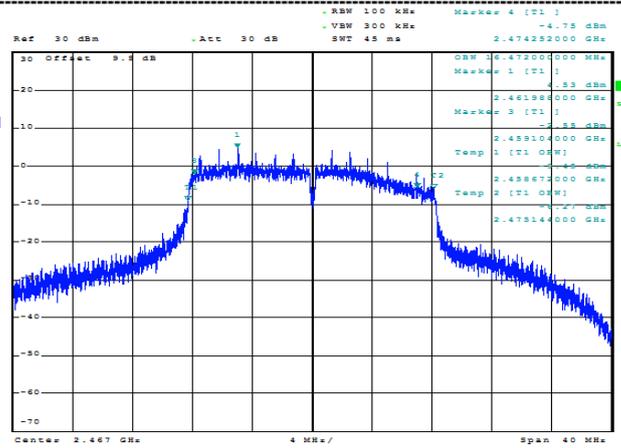
Date: 22 JAN 2016 16:27:20

CH11

802.11g

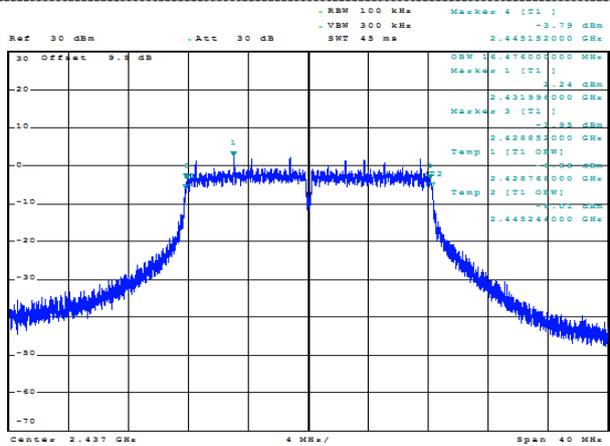


Date: 22 JAN 2016 16:40:46



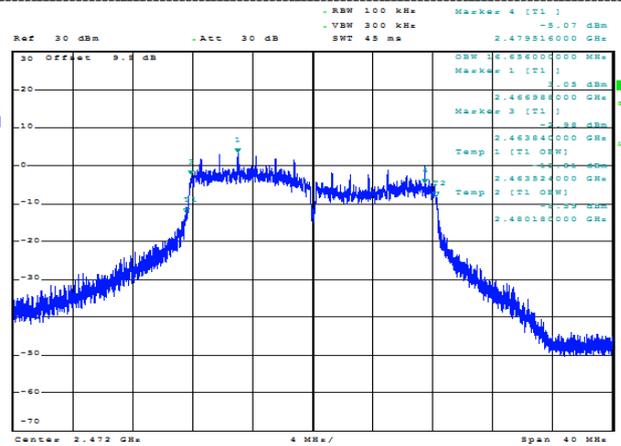
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CH01



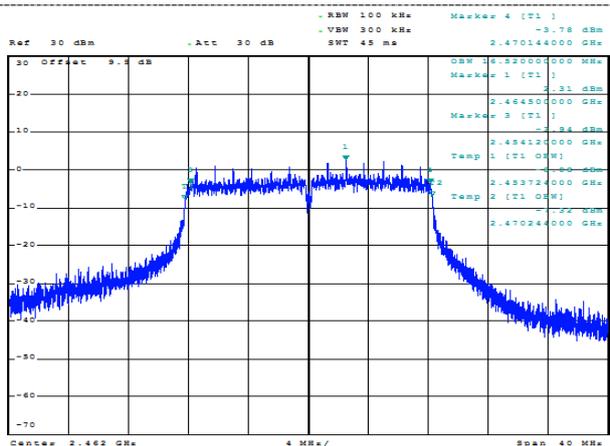
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CH12



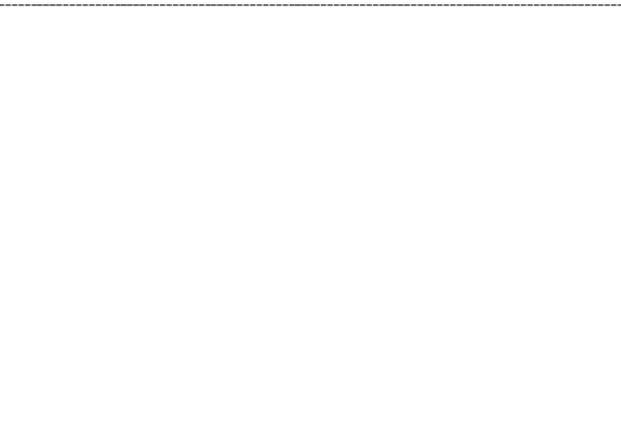
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CH06



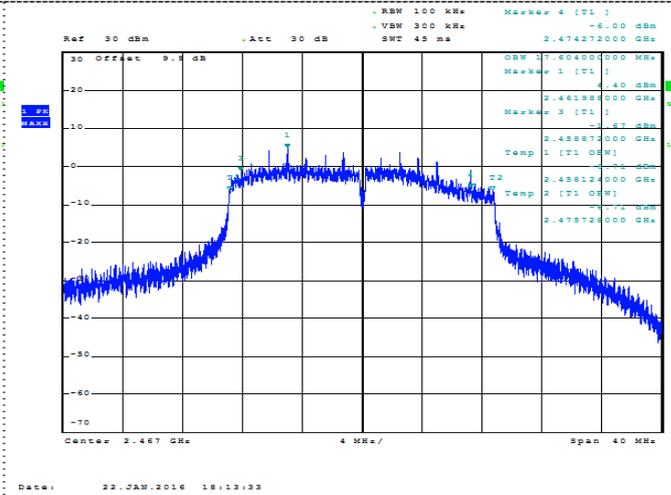
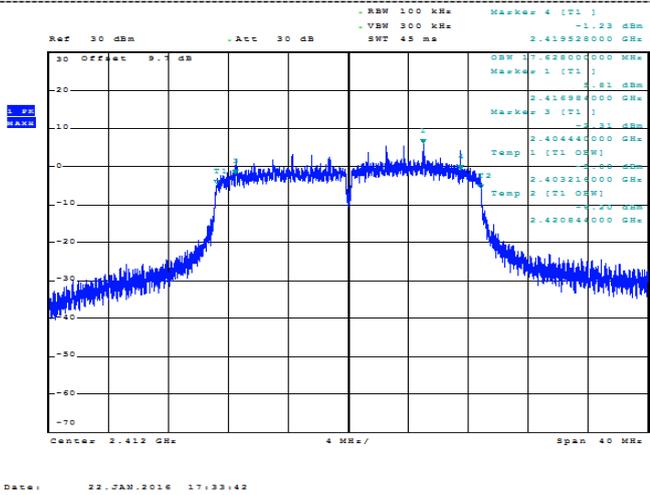
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CH13

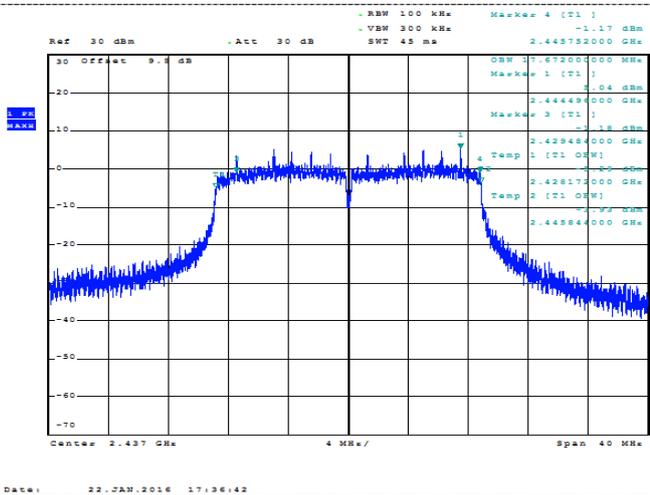


CH11

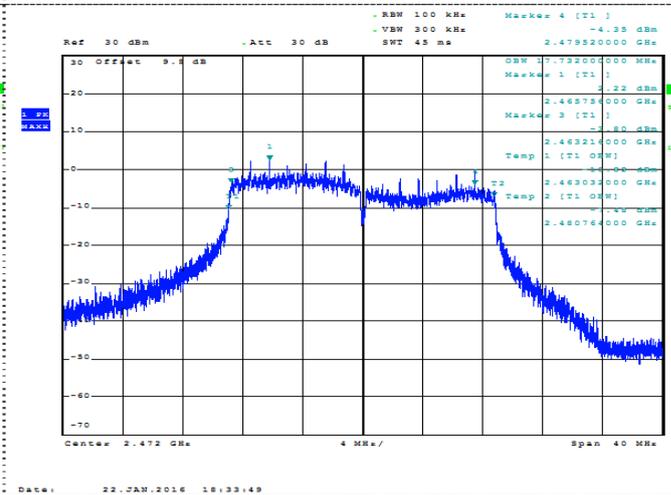
802.11n(HT20)



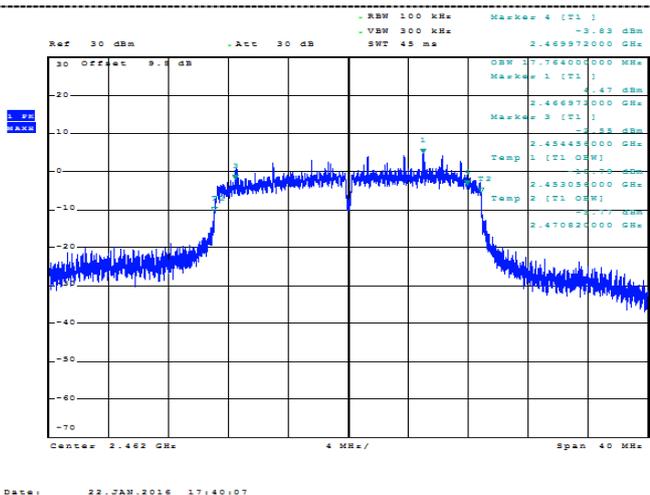
CH01



CH12



CH06



CH13

CH11

2.8. 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

Test Procedure for conducted method

- 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=RMS, Sweep point= ≥ 8001 , 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.

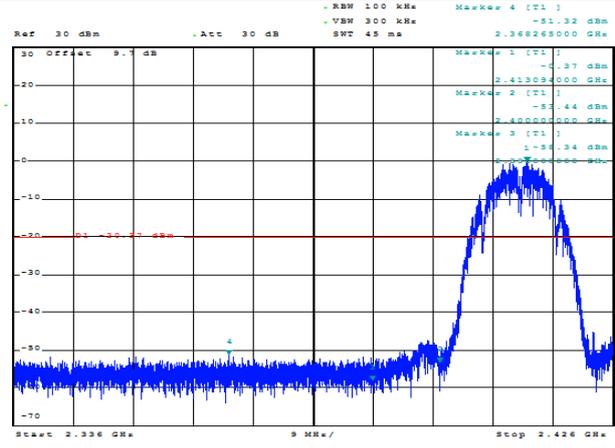
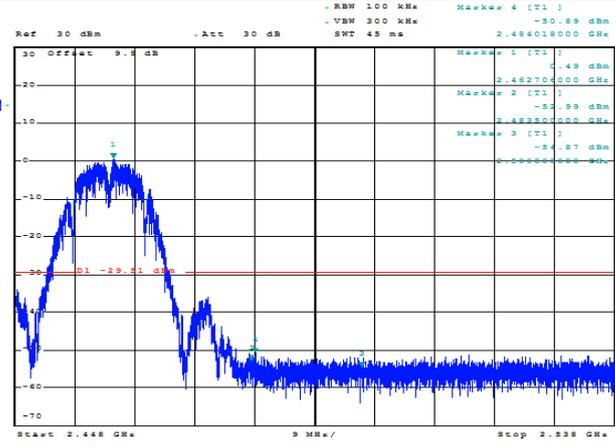
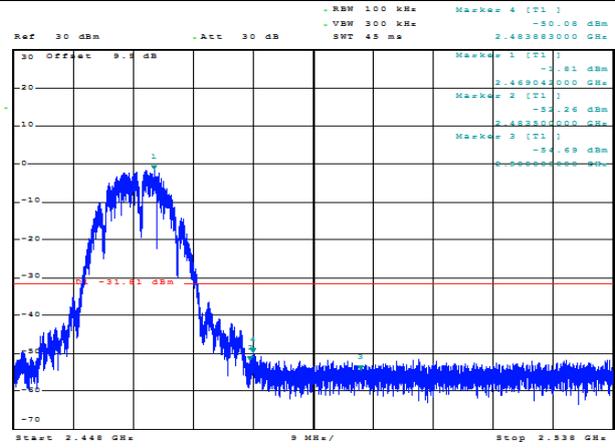
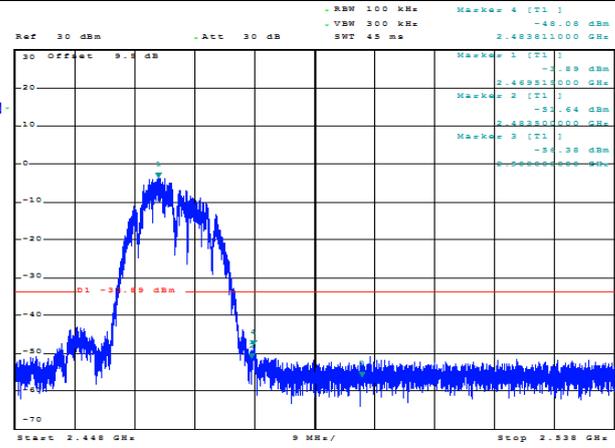
Test Procedure for radiated method

1. The EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 meter anechoic chamber. 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.

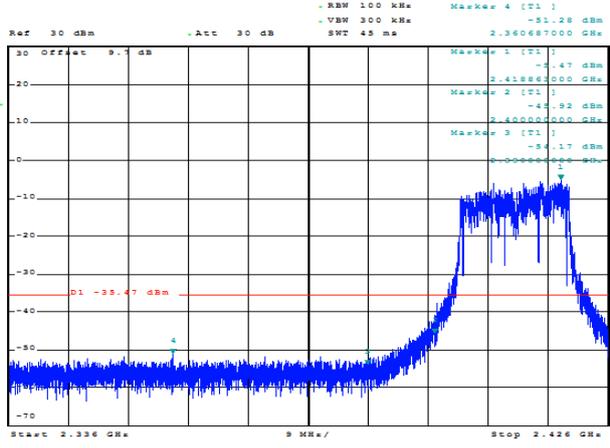
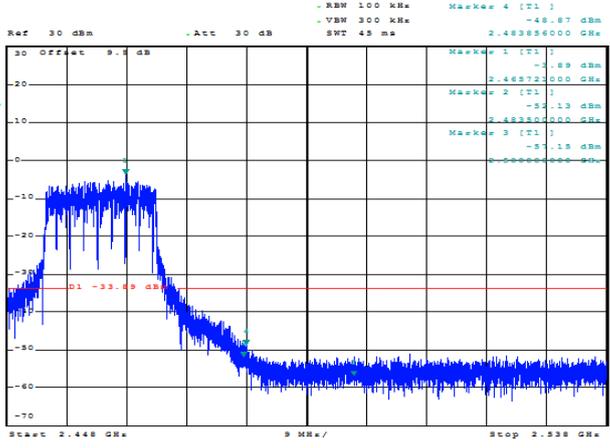
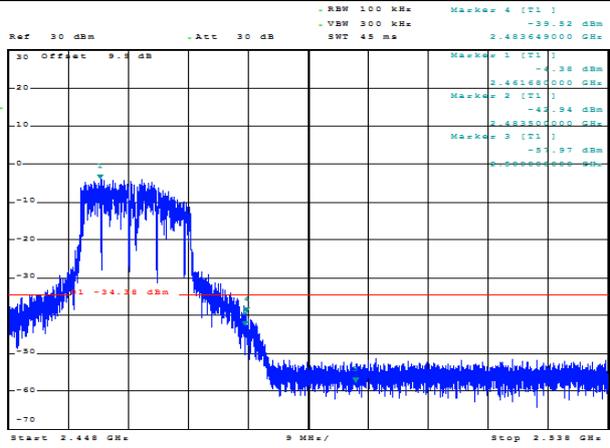
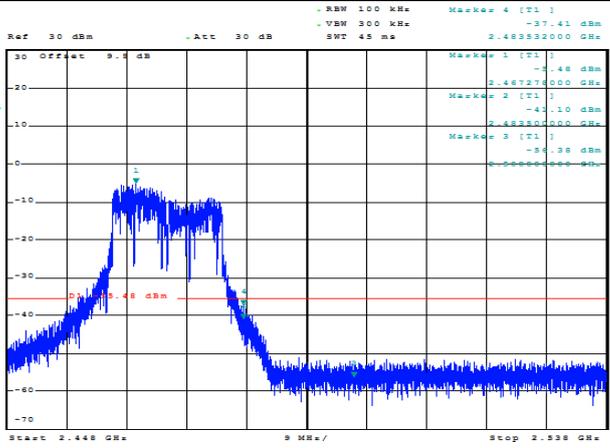
Test Results

A. Conducted measurements

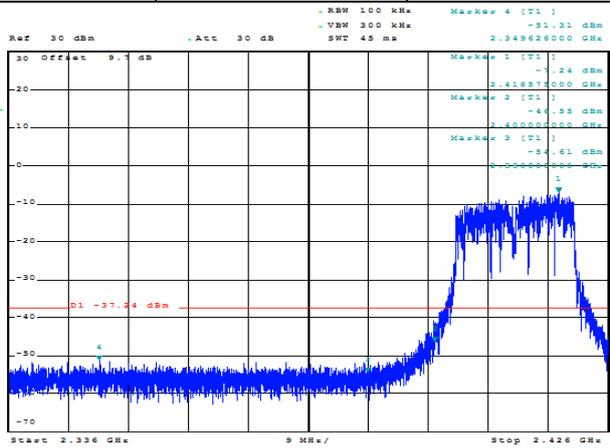
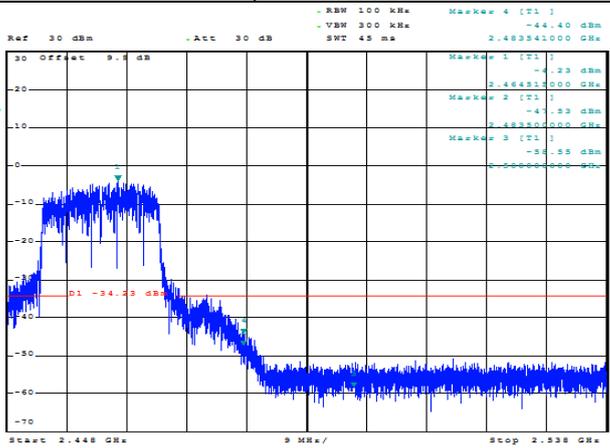
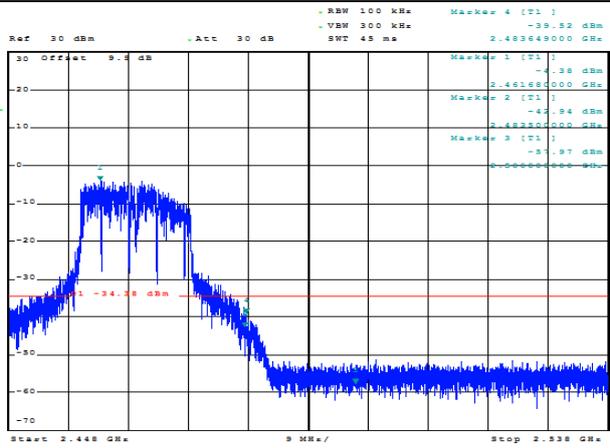
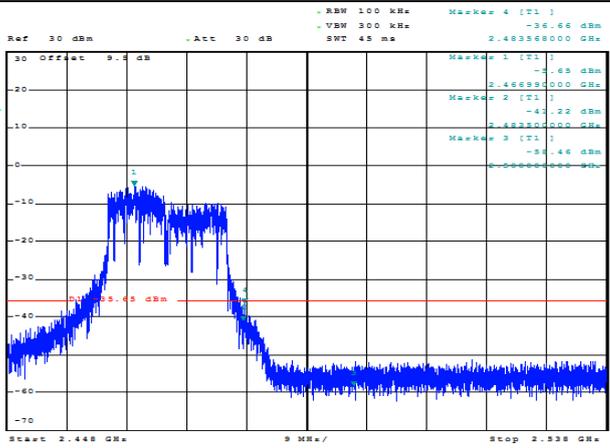
802.11b				
Channel	Frequency (MHz)	Delta Peak to Band emission (dBc)	Limit (dBc)	Verdict
CH01	2368.265	50.954	30	PASS
CH11	2484.018	51.380	30	PASS
CH12	2483.883	48.274	30	PASS
CH13	2483.811	44.191	30	PASS

 <p style="text-align: center;">2412</p>	 <p style="text-align: center;">2462</p>
 <p style="text-align: center;">2467</p>	 <p style="text-align: center;">2472</p>

802.11g				
Channel	Frequency (MHz)	Delta Peak to Band emission (dBc)	Limit (dBc)	Verdict
CH01	2360.687	45.814	30	PASS
CH11	2483.856	44.978	30	PASS
CH12	2483.649	35.139	30	PASS
CH13	2483.532	31.929	30	PASS

 <p>Ref 30 dBm - Att 30 dB - RBW 100 kHz - VSW 300 kHz - SWT 45 ms</p> <p>Marker 4 [T1] -51.28 dBm</p> <p>Marker 1 [T1] -5.47 dBm</p> <p>Marker 2 [T1] -42.92 dBm</p> <p>Marker 3 [T1] -54.17 dBm</p> <p>Start 2.336 GHz - Stop 2.426 GHz</p> <p>Date: 22 JAN 2016 16:41:35</p>	2412
 <p>Ref 30 dBm - Att 30 dB - RBW 100 kHz - VSW 300 kHz - SWT 45 ms</p> <p>Marker 4 [T1] -48.87 dBm</p> <p>Marker 1 [T1] -5.89 dBm</p> <p>Marker 2 [T1] -32.13 dBm</p> <p>Marker 3 [T1] -57.15 dBm</p> <p>Start 2.448 GHz - Stop 2.538 GHz</p> <p>Date: 22 JAN 2016 16:55:35</p>	2462
 <p>Ref 30 dBm - Att 30 dB - RBW 100 kHz - VSW 300 kHz - SWT 45 ms</p> <p>Marker 4 [T1] -39.52 dBm</p> <p>Marker 1 [T1] -4.38 dBm</p> <p>Marker 2 [T1] -42.94 dBm</p> <p>Marker 3 [T1] -51.97 dBm</p> <p>Start 2.448 GHz - Stop 2.538 GHz</p> <p>Date: 22 JAN 2016 16:11:24</p>	2467
 <p>Ref 30 dBm - Att 30 dB - RBW 100 kHz - VSW 300 kHz - SWT 45 ms</p> <p>Marker 4 [T1] -37.41 dBm</p> <p>Marker 1 [T1] -4.48 dBm</p> <p>Marker 2 [T1] -42.10 dBm</p> <p>Marker 3 [T1] -56.38 dBm</p> <p>Start 2.448 GHz - Stop 2.538 GHz</p> <p>Date: 22 JAN 2016 16:28:48</p>	2472

802.11n20				
Channel	Frequency (MHz)	Delta Peak to Band emission (dBc)	Limit (dBc)	Verdict
CH01	2349.626	44.066	30	PASS
CH11	2483.541	40.170	30	PASS
CH12	2483.811	35.427	30	PASS
CH13	2483.568	31.008	30	PASS

	
2412	2462
	
2467	2472

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	57.22	PK	74.00	16.78	1.00	130	62.53	27.49	3.32	36.12	-5.31
2390.00	49.13	AV	54.00	4.87	1.00	130	54.44	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	55.76	PK	74.00	18.24	1.00	45	61.07	27.49	3.32	36.12	-5.31
2390.00	46.91	AV	54.00	7.09	1.00	45	52.22	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	53.72	PK	74.00	20.28	1.00	170	59.44	27.45	3.38	36.55	-5.72
2483.50	45.17	AV	54.00	8.83	1.00	170	50.89	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	51.35	PK	74.00	22.65	1.00	145	57.07	27.45	3.38	36.55	-5.72
2483.50	45.48	AV	54.00	8.52	1.00	145	51.20	27.45	3.38	36.55	-5.72
Frequency(MHz):			2467			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	60.79	PK	74.00	13.21	1.00	147	66.51	27.45	3.38	36.55	-5.72
2483.50	50.86	AV	54.00	3.14	1.00	147	56.58	27.45	3.38	36.55	-5.72
Frequency(MHz):			2467			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	59.85	PK	74.00	14.15	1.00	219	65.57	27.45	3.38	36.55	-5.72
2483.50	49.61	AV	54.00	4.39	1.00	219	55.33	27.45	3.38	36.55	-5.72
Frequency(MHz):			2472			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	61.38	PK	74.00	12.62	1.00	155	67.10	27.45	3.38	36.55	-5.72
2483.50	50.72	AV	54.00	3.28	1.00	155	56.44	27.45	3.38	36.55	-5.72
Frequency(MHz):			2472			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	59.49	PK	74.00	14.51	1.00	196	65.21	27.45	3.38	36.55	-5.72
2483.50	48.79	AV	54.00	5.21	1.00	196	54.51	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	58.34	PK	74.00	15.66	1.00	130	63.65	27.49	3.32	36.12	-5.31
2390.00	49.57	AV	54.00	4.43	1.00	130	54.88	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	55.59	PK	74.00	18.41	1.00	45	60.90	27.49	3.32	36.12	-5.31
2390.00	47.76	AV	54.00	6.24	1.00	45	53.07	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	55.34	PK	74.00	18.66	1.00	170	61.06	27.45	3.38	36.55	-5.72
2483.50	46.72	AV	54.00	7.28	1.00	170	52.44	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	52.33	PK	74.00	21.67	1.00	145	58.05	27.45	3.38	36.55	-5.72
2483.50	45.31	AV	54.00	8.69	1.00	145	51.03	27.45	3.38	36.55	-5.72
Frequency(MHz):			2467			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	60.56	PK	74.00	13.44	1.00	83	66.28	27.45	3.38	36.55	-5.72
2483.50	51.04	AV	54.00	2.96	1.00	83	56.76	27.45	3.38	36.55	-5.72
Frequency(MHz):			2467			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	60.35	PK	74.00	13.65	1.00	152	66.07	27.45	3.38	36.55	-5.72
2483.50	51.47	AV	54.00	2.53	1.00	152	57.19	27.45	3.38	36.55	-5.72
Frequency(MHz):			2472			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	60.32	PK	74.00	13.68	1.00	94	66.04	27.45	3.38	36.55	-5.72
2483.50	50.55	AV	54.00	3.45	1.00	94	56.27	27.45	3.38	36.55	-5.72
Frequency(MHz):			2472			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	60.31	PK	74.00	13.69	1.00	211	66.03	27.45	3.38	36.55	-5.72
2483.50	49.58	AV	54.00	4.42	1.00	211	55.30	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	58.15	PK	74.00	15.85	1.00	130	63.46	27.49	3.32	36.12	-5.31
2390.00	49.11	AV	54.00	4.89	1.00	130	54.42	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	56.40	PK	74.00	17.60	1.00	45	61.71	27.49	3.32	36.12	-5.31
2390.00	47.48	AV	54.00	6.52	1.00	45	52.79	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	54.54	PK	74.00	19.46	1.00	170	60.26	27.45	3.38	36.55	-5.72
2483.50	45.57	AV	54.00	8.43	1.00	170	51.29	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	53.84	PK	74.00	20.16	1.00	145	59.56	27.45	3.38	36.55	-5.72
2483.50	47.18	AV	54.00	6.82	1.00	145	52.90	27.45	3.38	36.55	-5.72
Frequency(MHz):			2467			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	60.77	PK	74.00	13.23	1.00	109	66.49	27.45	3.38	36.55	-5.72
2483.50	49.87	AV	54.00	4.13	1.00	109	55.59	27.45	3.38	36.55	-5.72
Frequency(MHz):			2467			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	60.45	PK	74.00	13.55	1.00	197	66.17	27.45	3.38	36.55	-5.72
2483.50	51.65	AV	54.00	2.35	1.00	197	57.37	27.45	3.38	36.55	-5.72
Frequency(MHz):			2472			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	62.27	PK	74.00	11.73	1.00	100	67.99	27.45	3.38	36.55	-5.72
2483.50	50.1	AV	54.00	3.90	1.00	100	55.82	27.45	3.38	36.55	-5.72
Frequency(MHz):			2472			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	60.23	PK	74.00	13.77	1.00	186	65.95	27.45	3.38	36.55	-5.72
2483.50	49.92	AV	54.00	4.08	1.00	186	55.64	27.45	3.38	36.55	-5.72

2.9. Spurious RF Conducted Emission

Limit

1. Below -20dB of the highest emission level in operating band.
2. Fall in the restricted bands listed in section 15.205. The maximum permitted average field strength is listed in section 15.209.

Test Procedure

The Spurious RF conducted emissions compliance of RF radiated emission should be measured by following the guidance in ANSI C63.10-2013 with respect to maximizing the emission by rotating the EUT, measuring the emission while the EUT is situated in three orthogonal planes (if appropriate), adjusting the measurement antenna height and polarization etc. Set RBW=100 kHz and VBM= 300 KHz to measure the peak field strength, and measured frequency range from 30MHz to 26.5GHz.

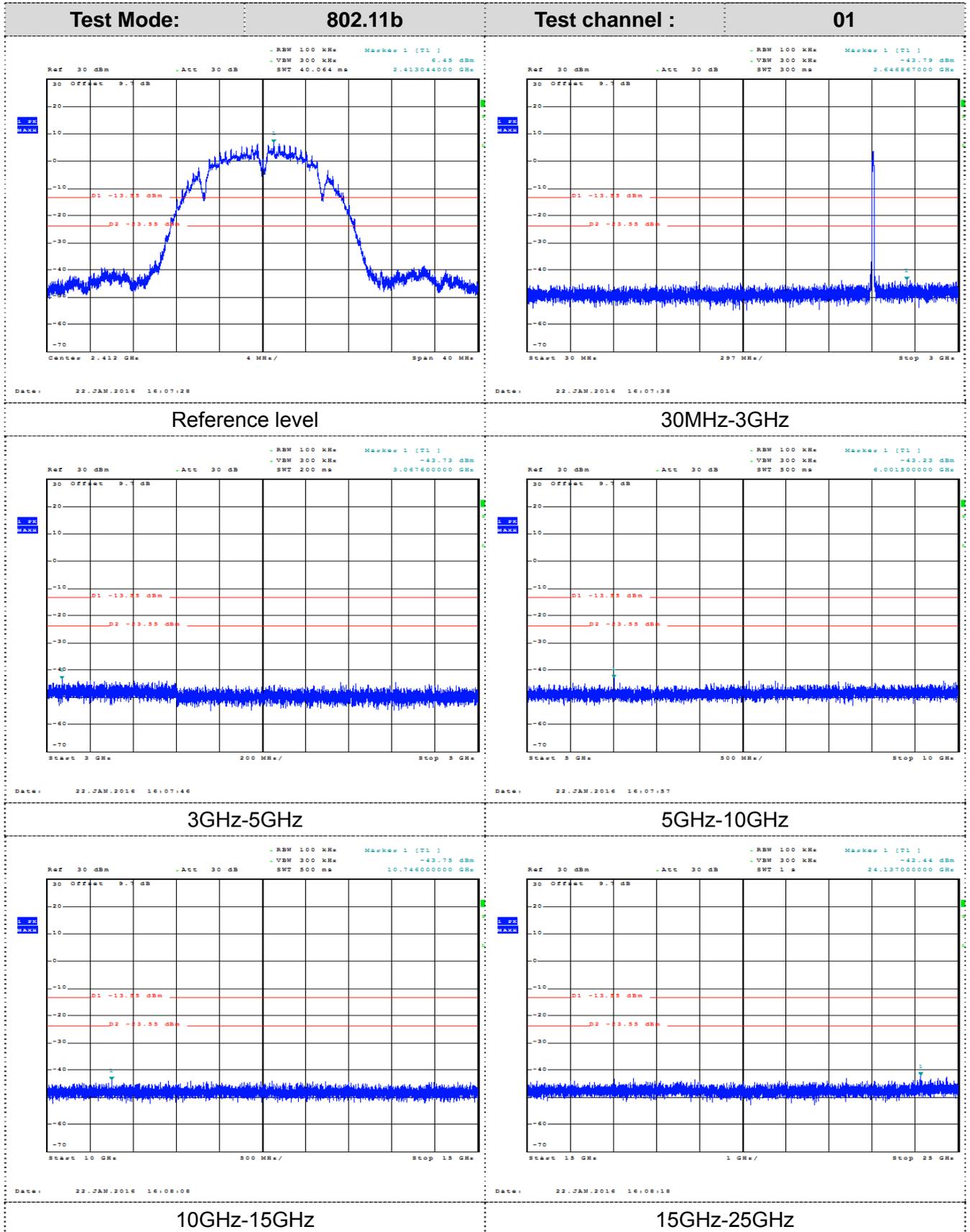
Test Configuration

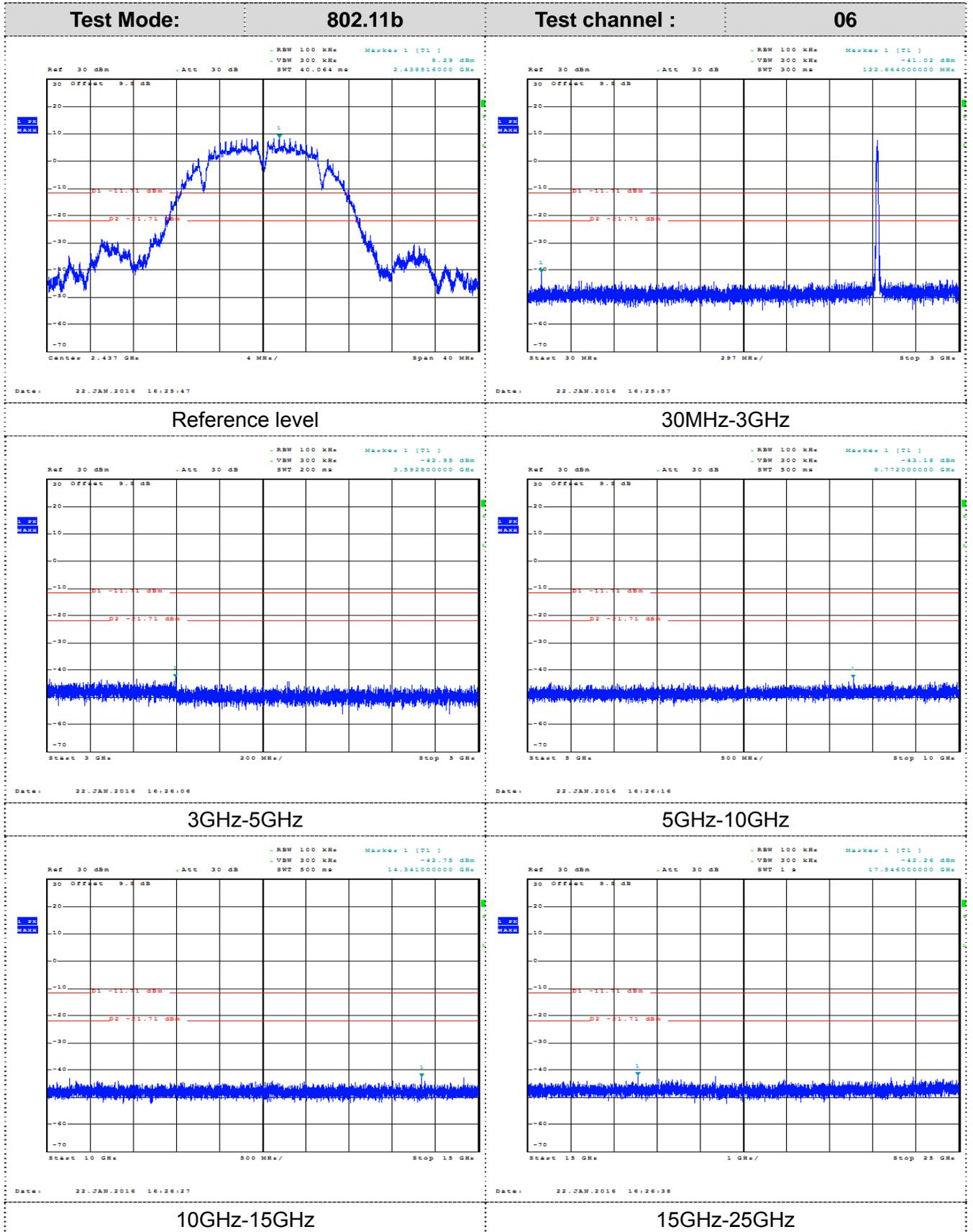


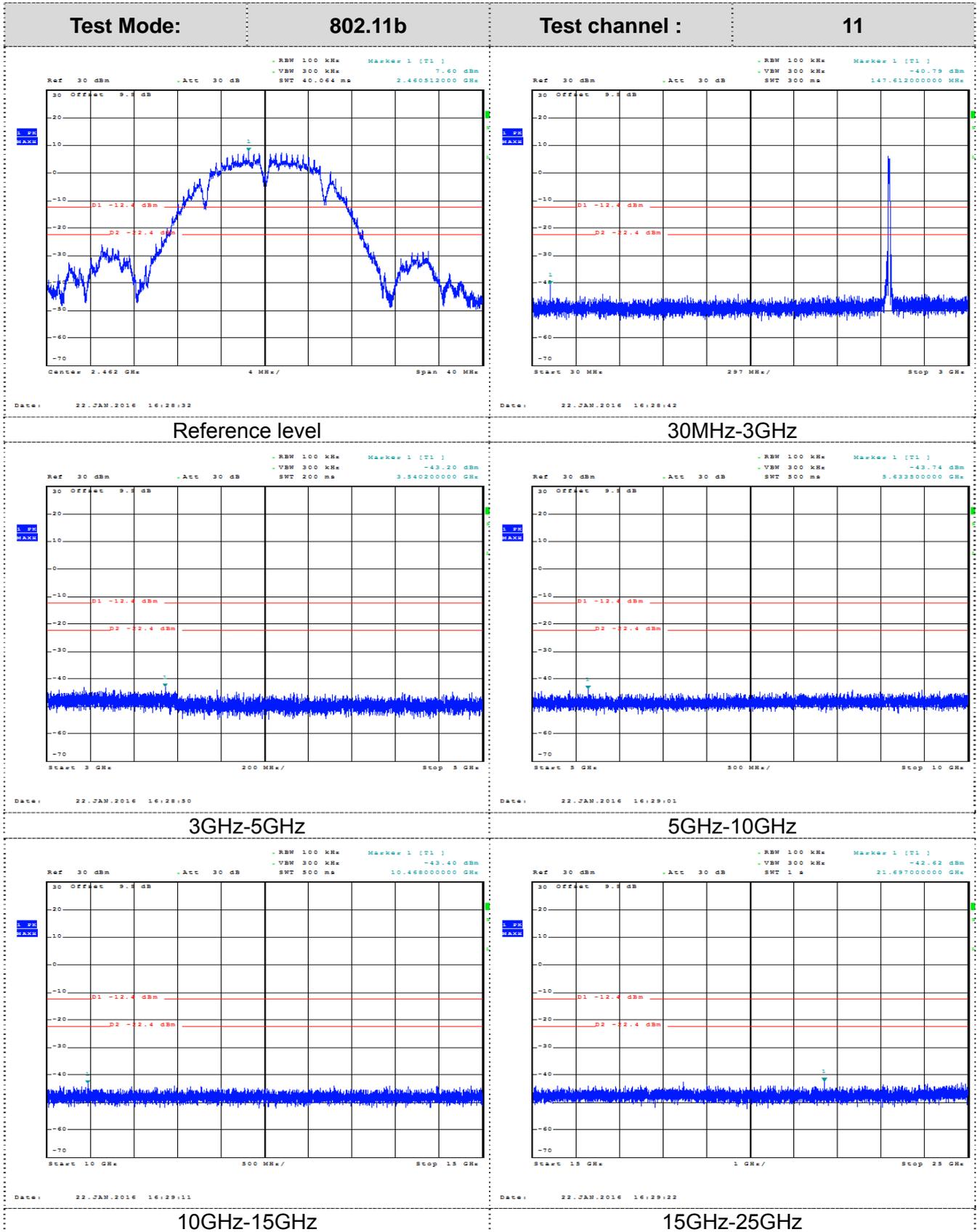
Test Results

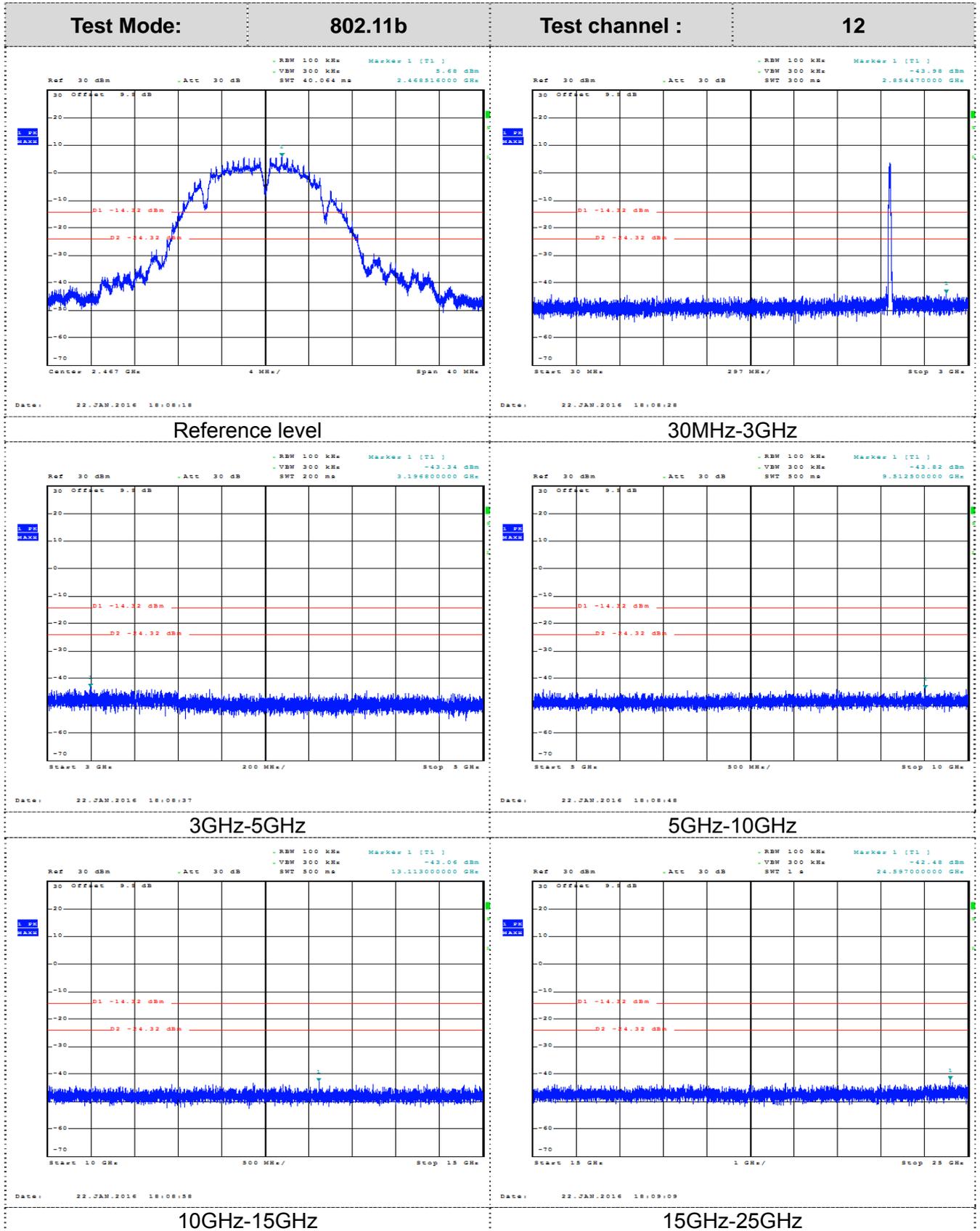
Remark: The measurement frequency range is from 30MHz to the 10th harmonic of the fundamental frequency. The lowest, middle and highest channels are tested to verify the spurious emissions and bandage measurement data.

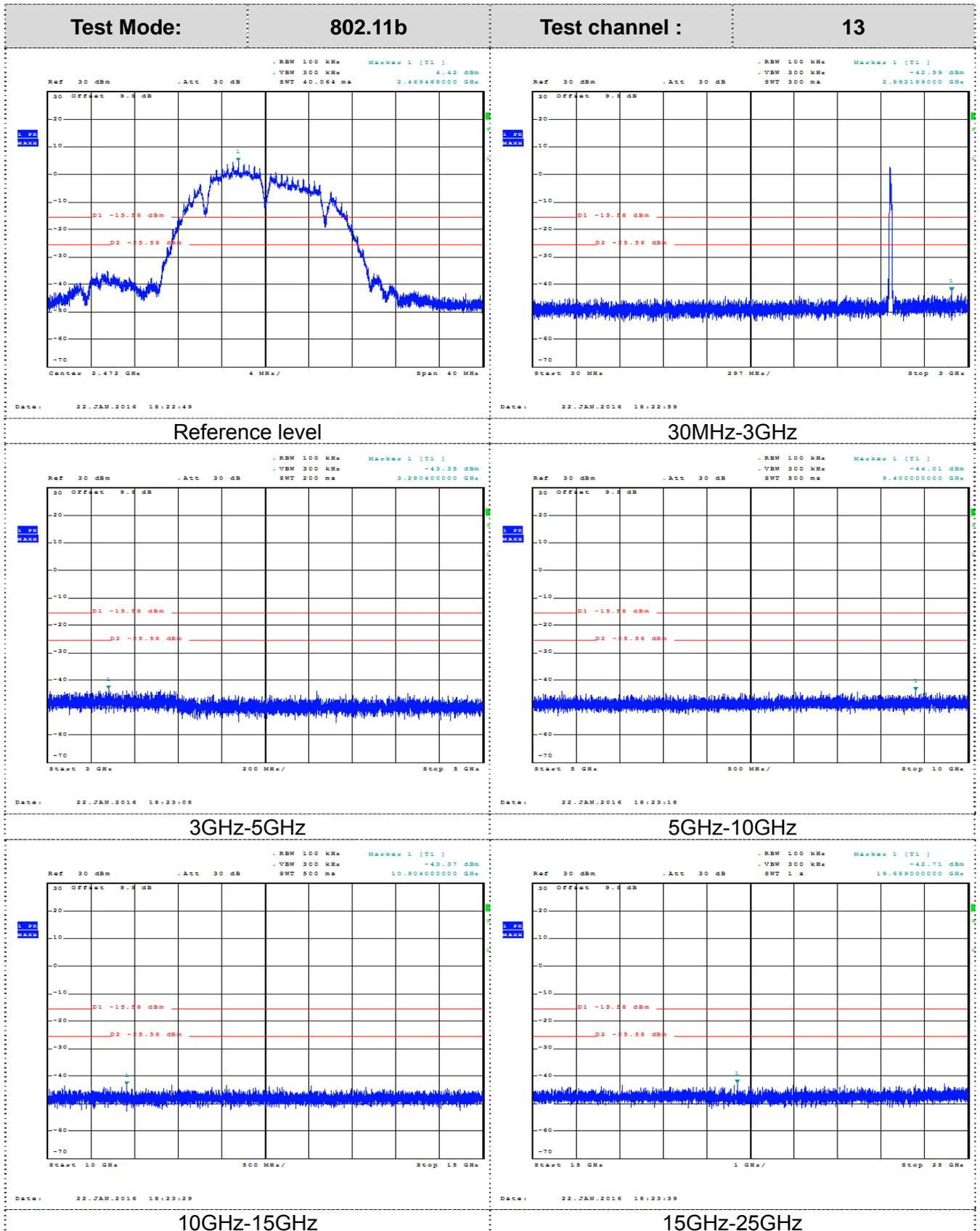
Test plot as follows:

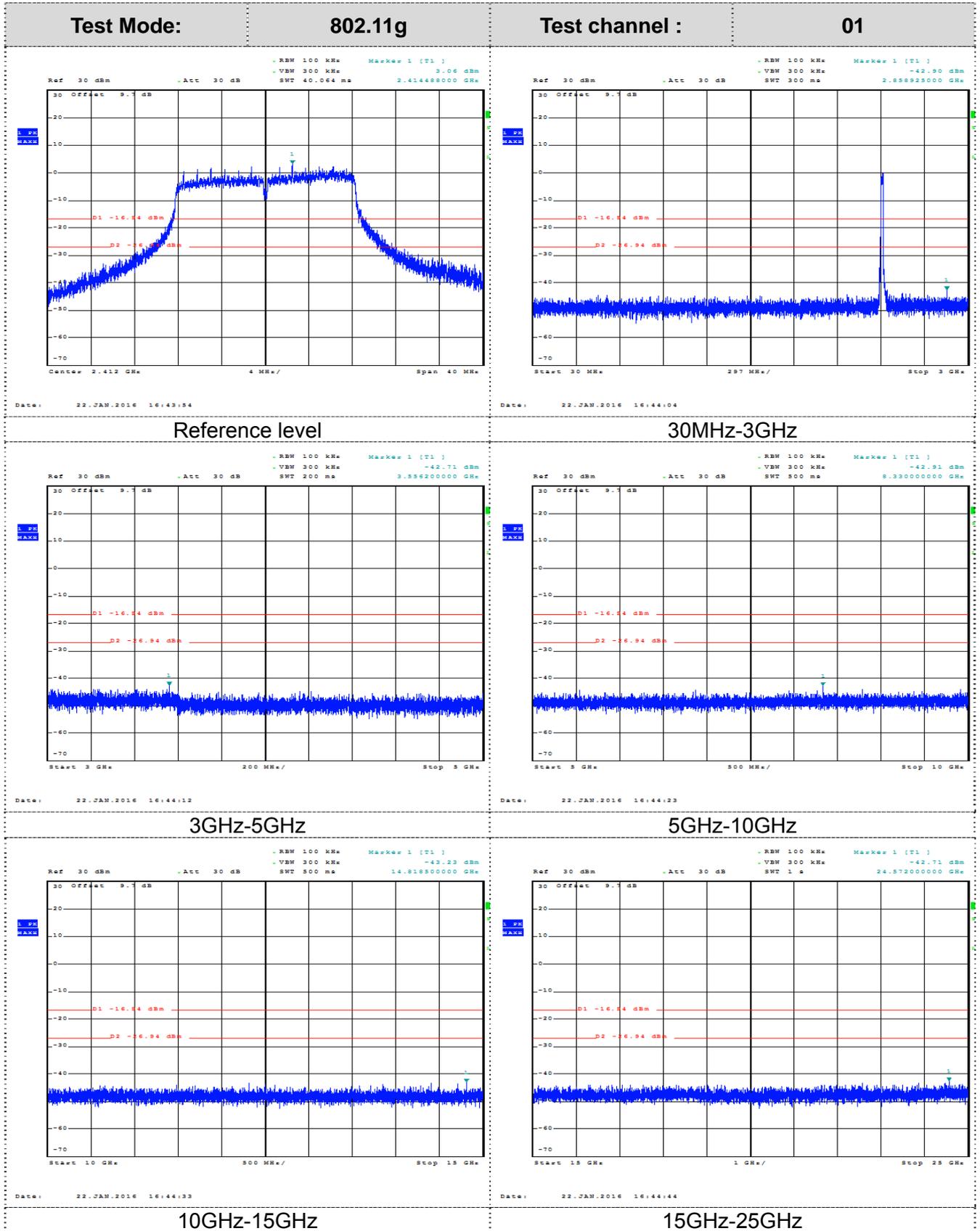


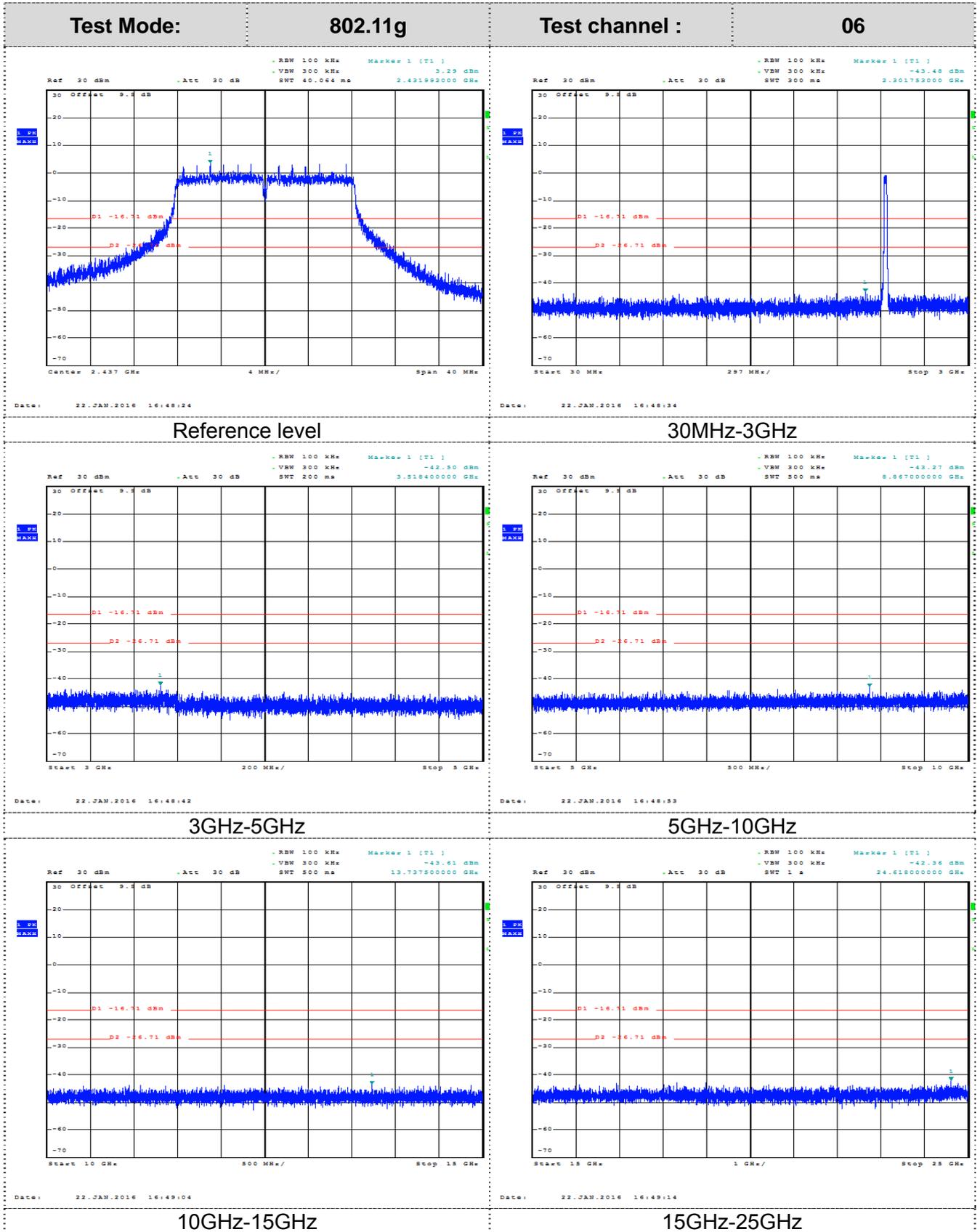


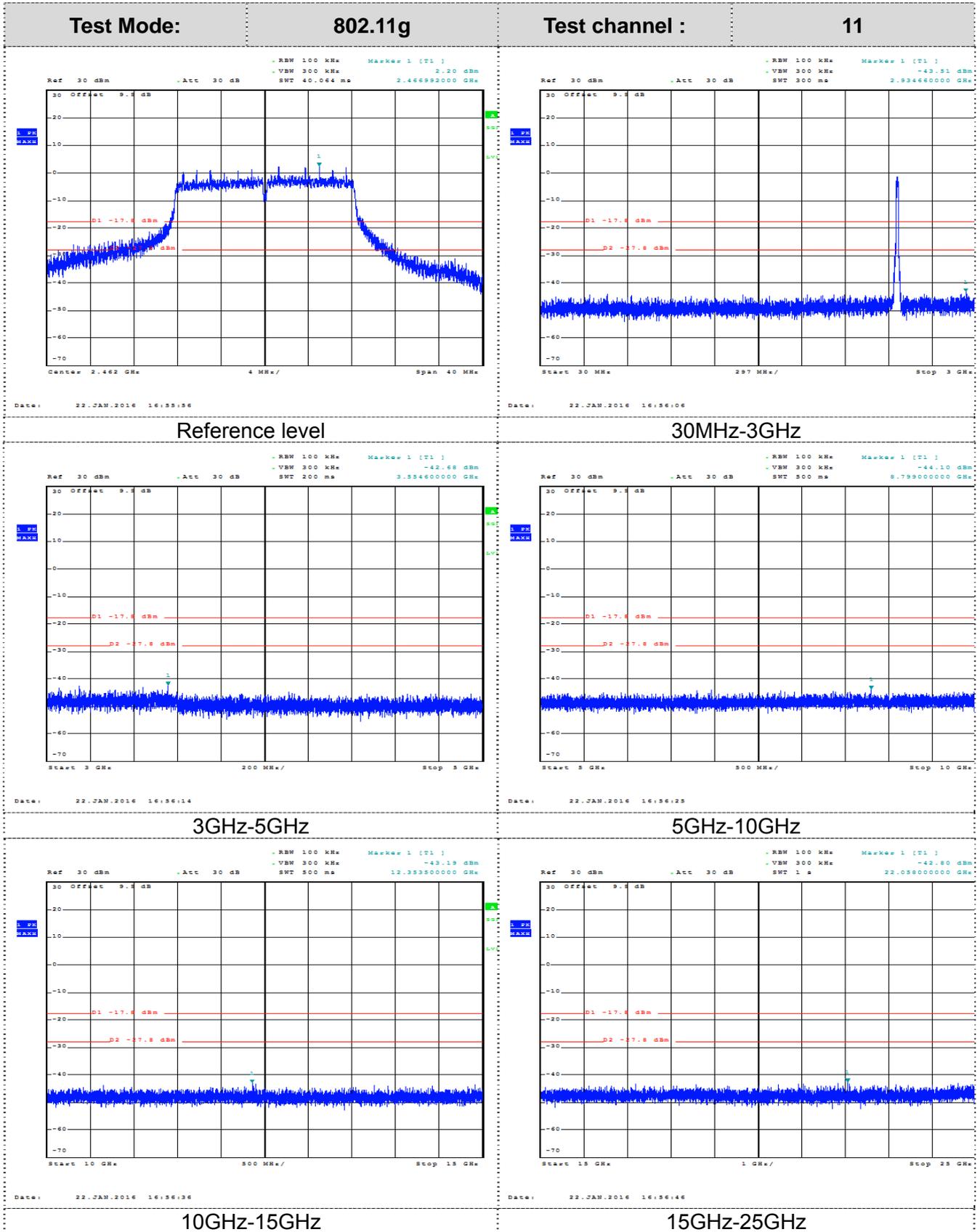


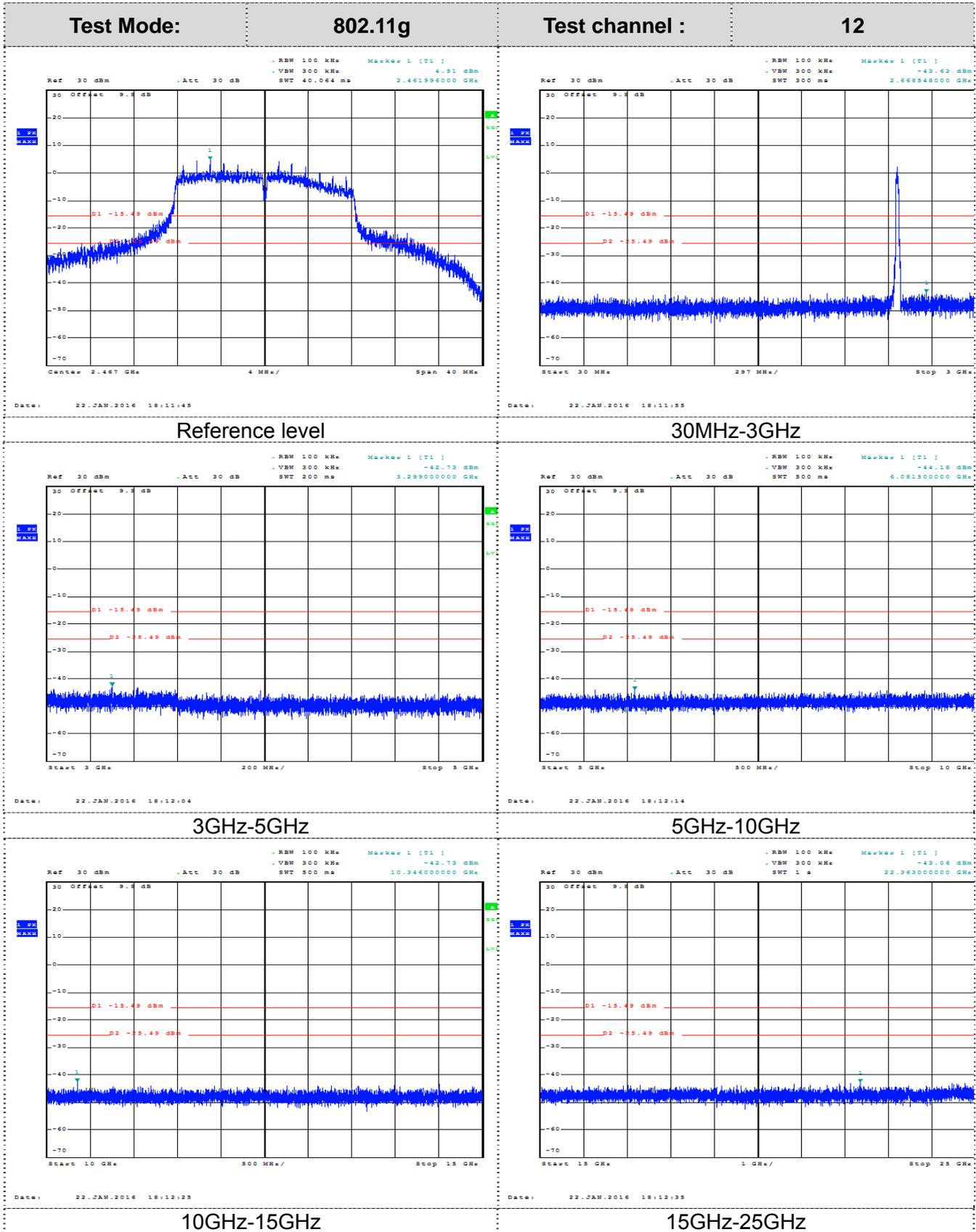


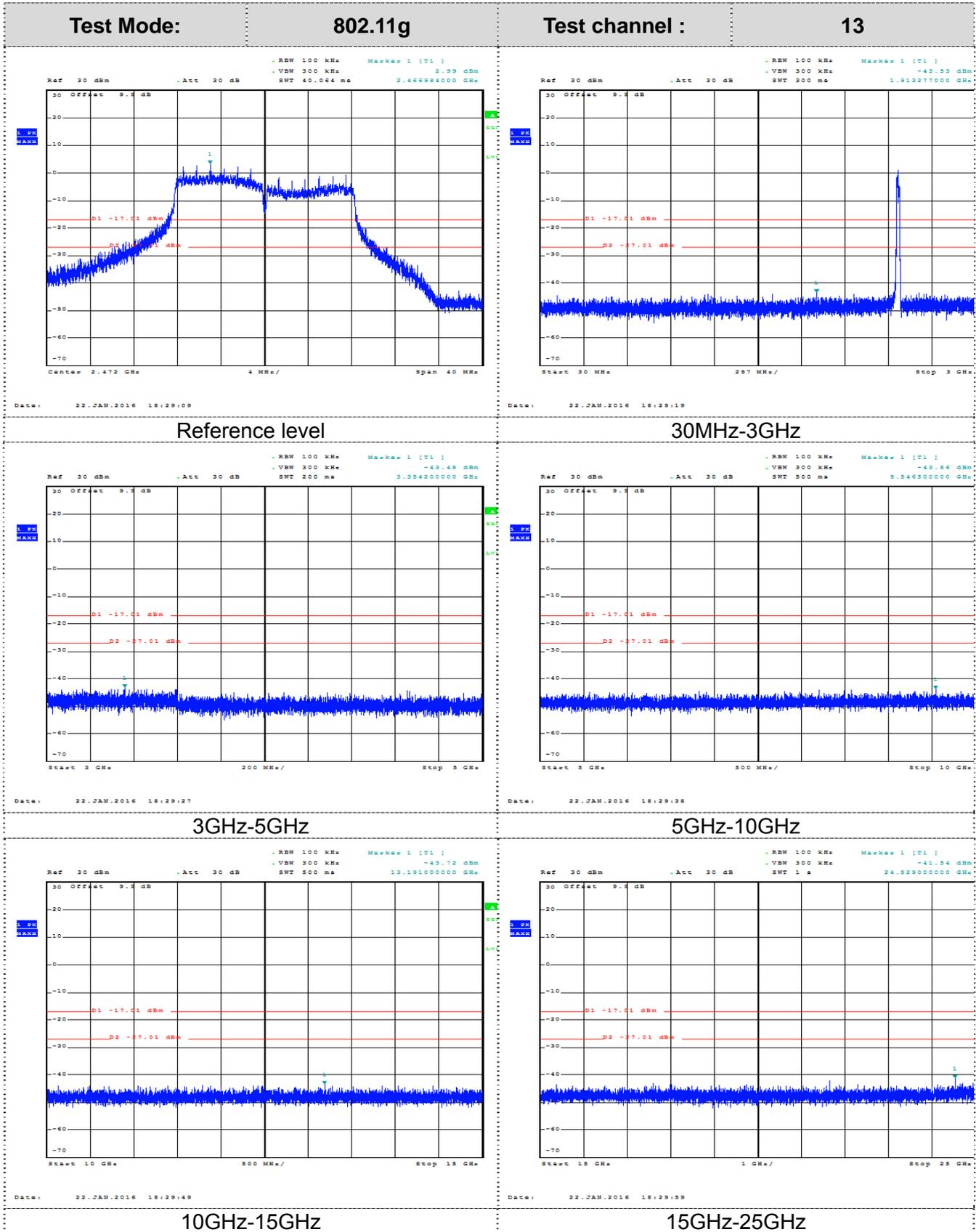


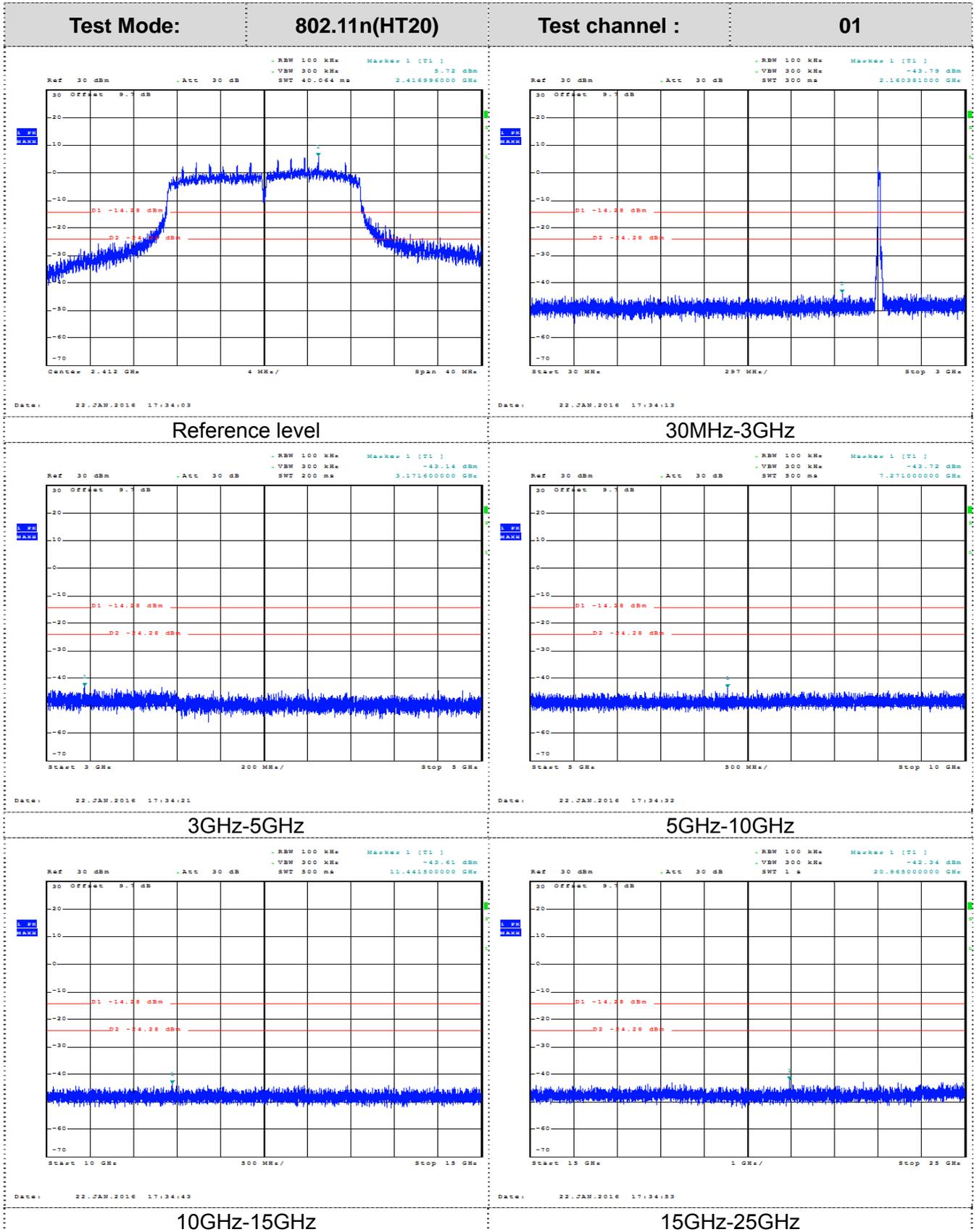


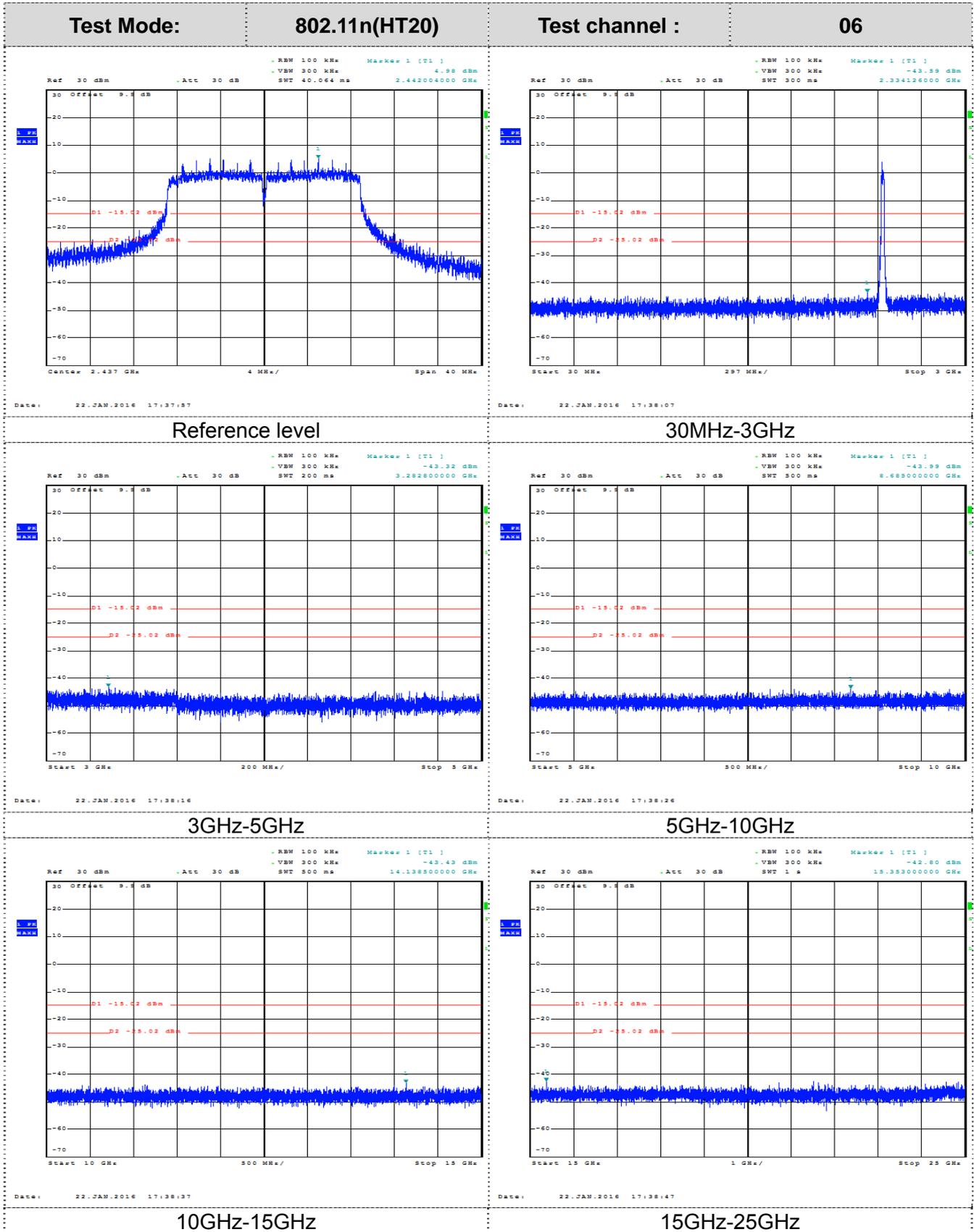


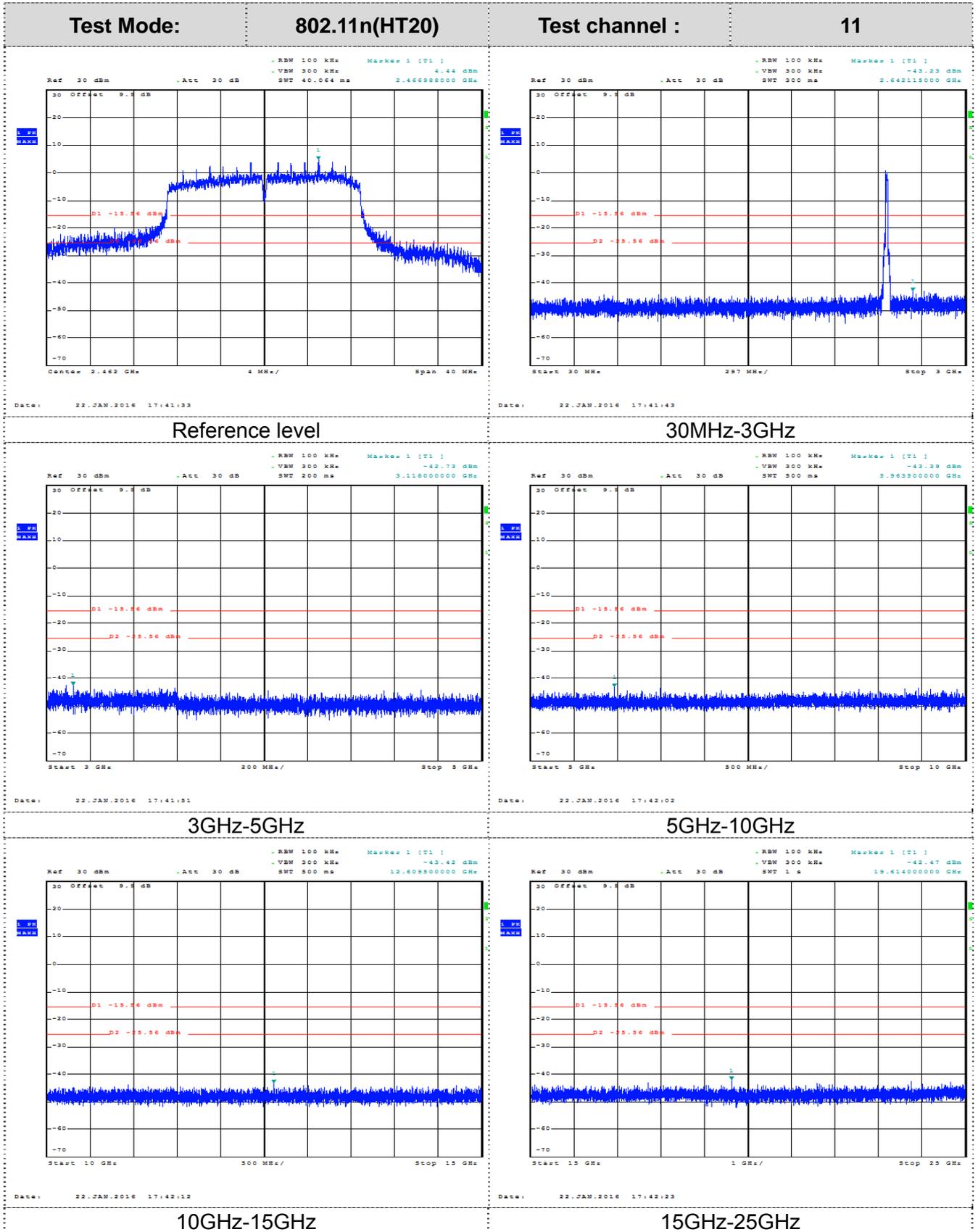


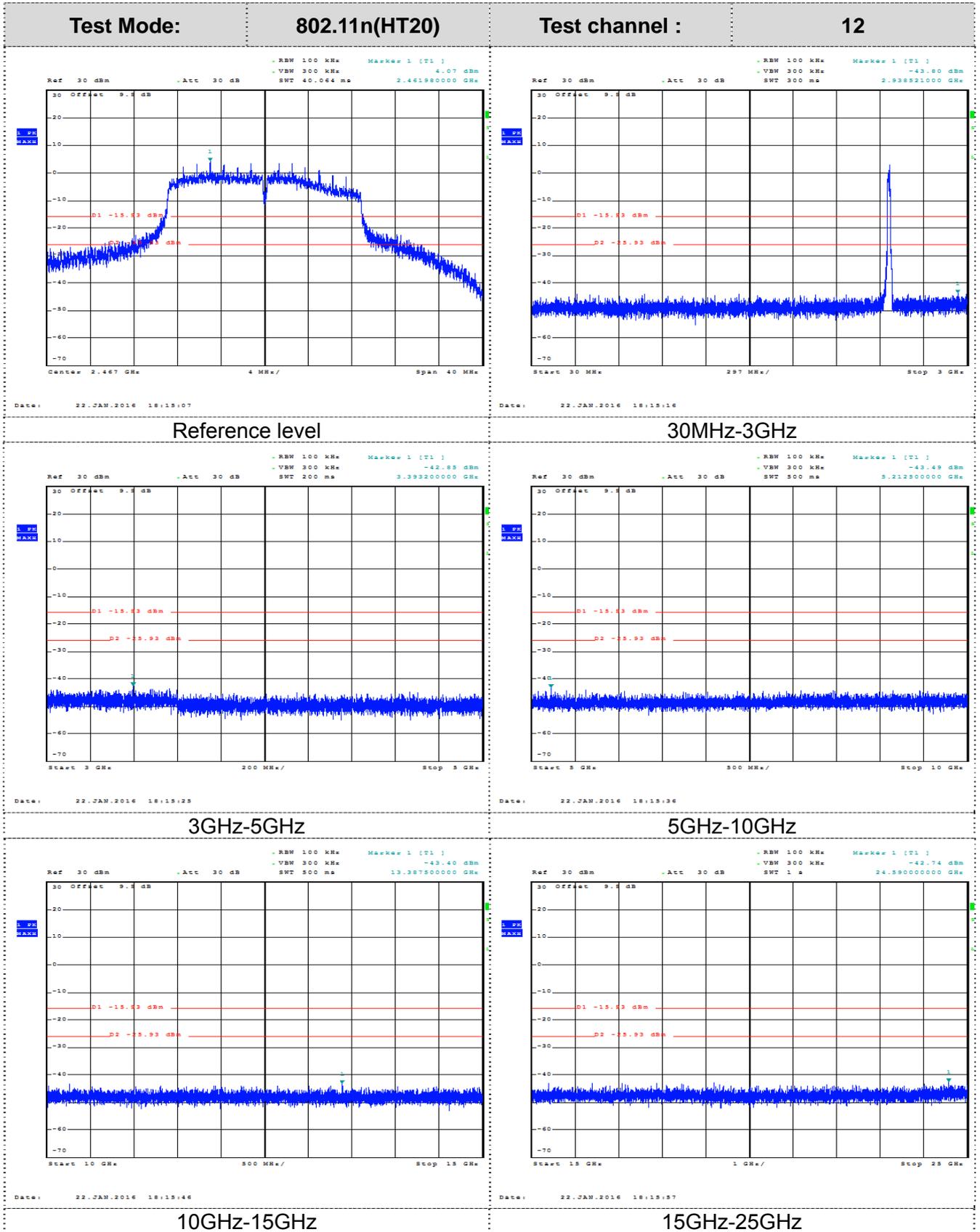


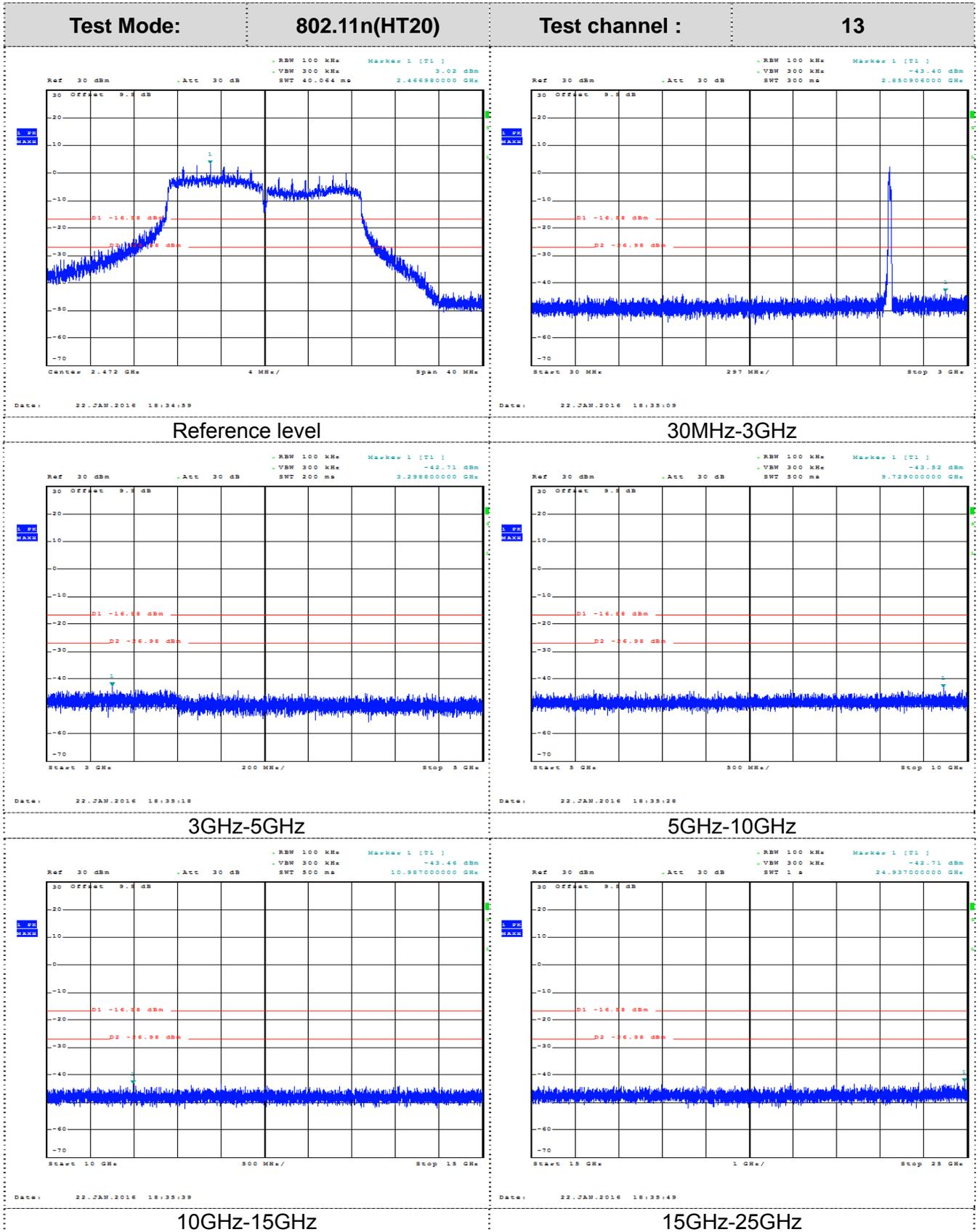












2.10. Antenna Requirement

Standard Applicable

For intentional device, according to FCC 47 CFR Section 15.203:

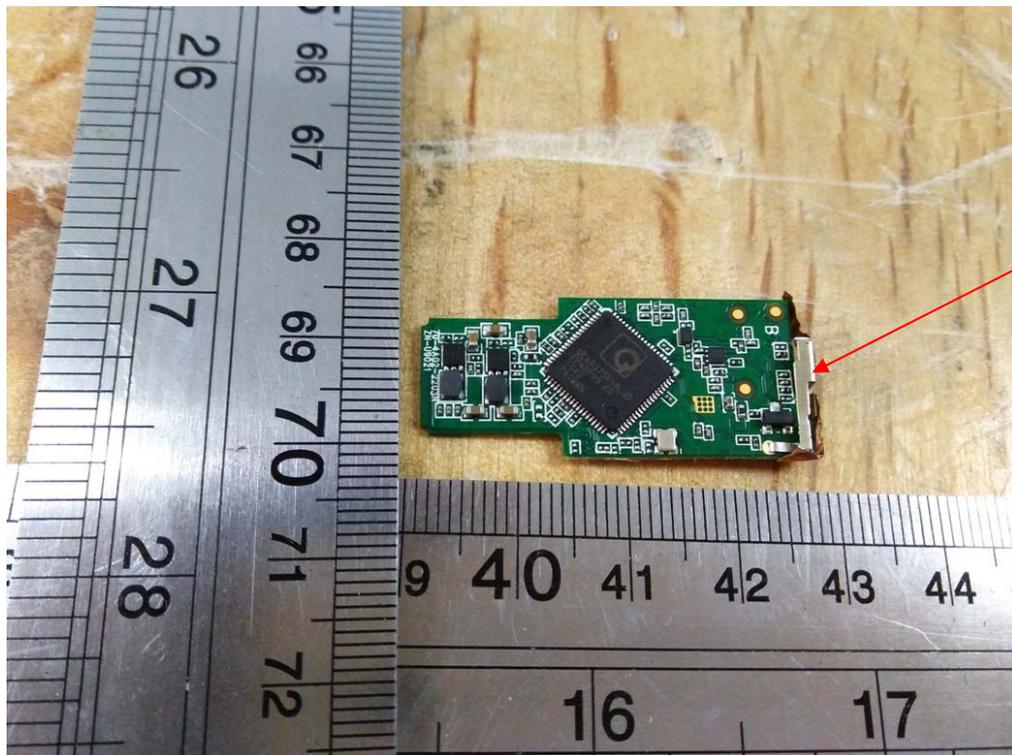
An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator, the manufacturer may design the unit so that a broken antenna can be replaced by the user, but the use of a standard antenna jack or electrical connector is prohibited

FCC CFR Title 47 Part 15 Subpart C Section 15.247(c) (1) (I):

(i) Systems operating in the 2400-2483.5 MHz band that is used exclusively for fixed. Point-to-point operations may employ transmitting antennas with directional gain greater than 6dBi provided the maximum conducted output power of the intentional radiator is reduced by 1 dB for every 3 dB that the directional gain of the antenna exceeds 6dBi.

Test Result:

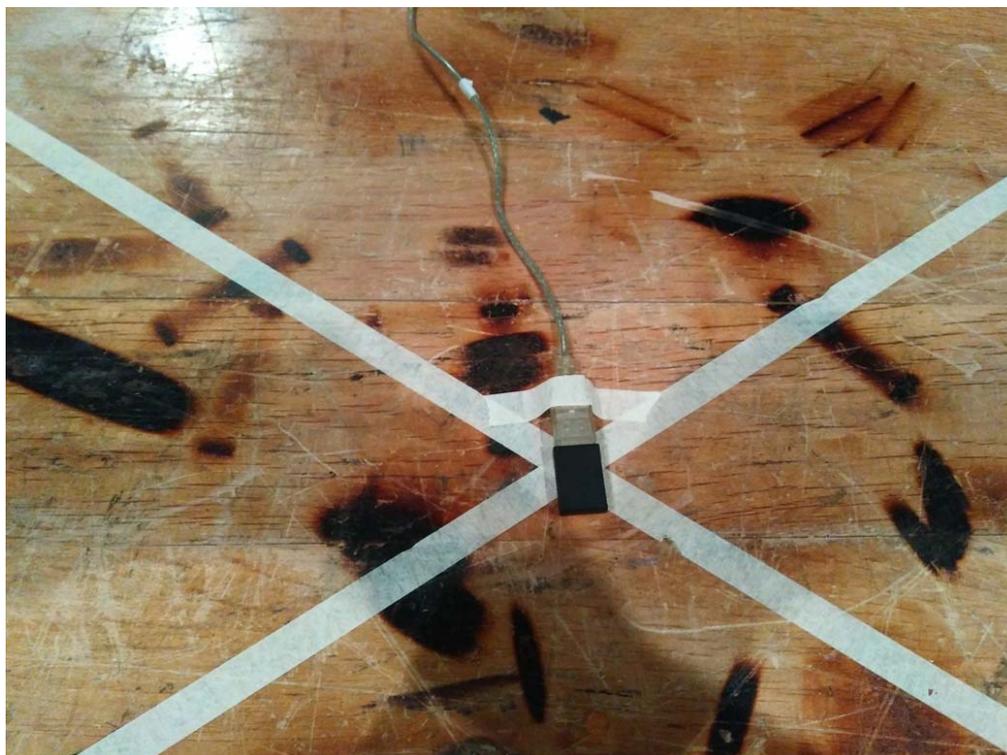
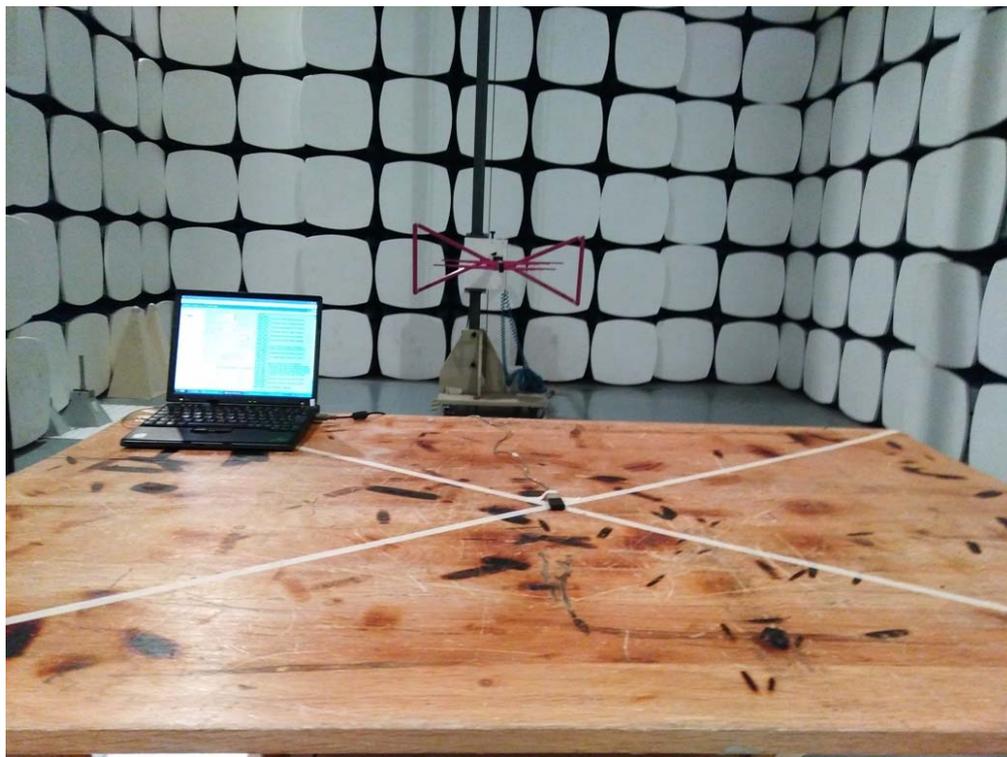
The maximum gain of WiFi antenna was 0.67dBi.



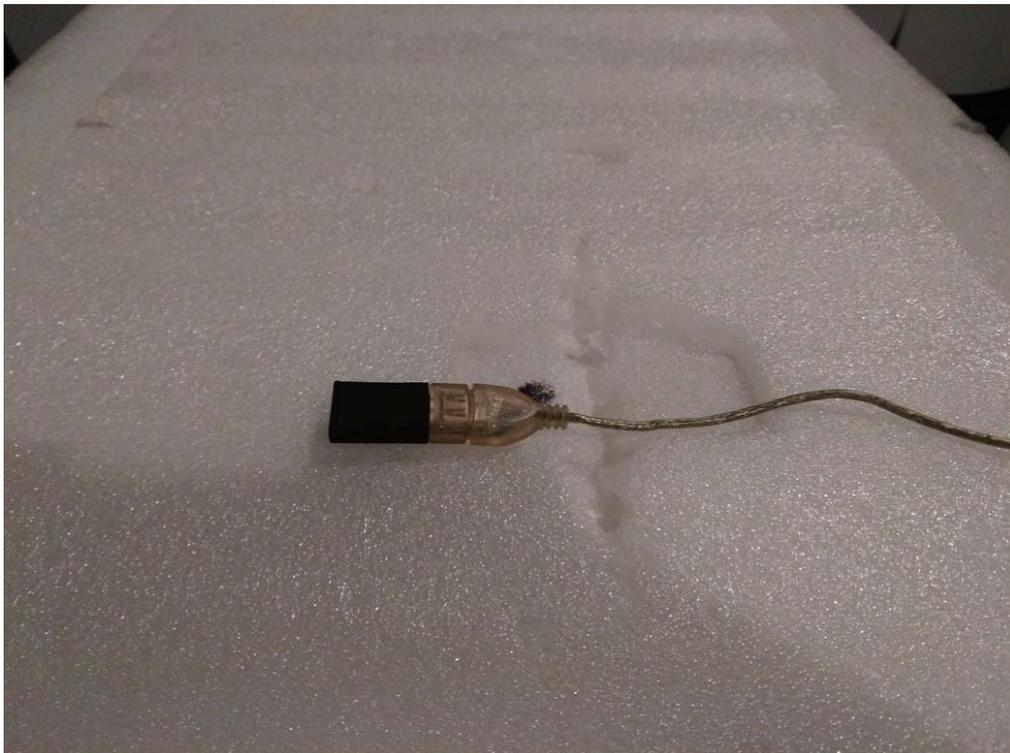
WIFI
Antenna

3. EUT TEST PHOTO

Radiated Emission (30MHz-1GHz)



Radiated Emission (1GHz-25GHz)



Conducted Emission



*****THE END*****