FCC RADIO TEST REPORT

FCC ID: 2AVAE-T10

Product： Intelligent Voice Translator

Trade Name： N/A

Model Name： T10

Serial Model： T1,T2,T3,T4,T5,T6,T7,T8,T9 ,T10PRO,T11,T12,T13, T14,T15,T16,T17,T18,T19,T20

Report No.： UNIA1912120914ER-01

Prepared for

Shenzhen Intelligent Voice Technology Co., Ltd

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Prepared by

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TEST RESULT CERTIFICATION

Applicant's name ..... :	Shenzhen Intelligent Voice Technology Co., Ltd
Address ..... :	401/F,Xinghui Sci-Tech Park,Gushu 2nd Rd,Gushu Community,Xixiang St, Bao'an Dist, Shenzhen, China.
Manufacture's Name..... :	Shenzhen Intelligent Voice Technology Co., Ltd
Address ..... :	401/F,Xinghui Sci-Tech Park,Gushu 2nd Rd,Gushu Community,Xixiang St, Bao'an Dist, Shenzhen, China.

Product description

Product name ..... :	Intelligent Voice Translator
Trade Mark ..... :	N/A
Model and/or type reference :	T10,T1,T2,T3,T4,T5,T6,T7,T8,T9,T10PRO,T11,T12,T13, T14,T15,T16,T17,T18,T19,T20
Standards ..... :	FCC Rules and Regulations Part 15 Subpart C Section 15.247 ANSI C63.10: 2013

This device described above has been tested by Shenzhen United Testing Technology Co., Ltd., and the test results show that the equipment under test (EUT) is in compliance with the FCC requirements. And it is applicable only to the tested sample identified in the report.

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Date of Test .....:

Date (s) of performance of tests .....:	2019-11-18 ~ 2019-12-06
Date of Issue.....:	2019-12-06
Test Result.....:	Pass

Prepared by: Kate Yang

Kate Yang/Editor

Reviewer: Sherwin Qian

Sherwin Qian/Supervisor

Approved & Authorized Signer: liuze

Liuze/Manager

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1. TEST SUMMARY

1.1 TEST PROCEDURES AND RESULTS

DESCRIPTION OF TEST	STANDARD	RESULT
6dB Bandwidth Bandwidth	FCC Part 15.247 (a)(2)	COMPLIANT
Peak Output Power	FCC Part 15.247(b)(3)	COMPLIANT
Power Spectral Density	FCC Part 15.247(e)	COMPLIANT
Spurious Emissions at Antenna Port	FCC Part 15.247(d)&	COMPLIANT
Spurious Emissions	FCC Part 15.205, 15.209,FCC Part 15.247(d)	COMPLIANT
100 kHz Bandwidth of Frequency Band Edge	FCC Part 15.205, 15.209,FCC Part 15.247(d)	COMPLIANT
AC Line Conducted Emissions	FCC Part 15.207 (a)	COMPLIANT
Antenna requirement	FCC Part 15: 15.203	COMPLIANT

1.2 TEST FACILITY

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

Address : 2F, Annex Bldg, Jiahuangyuan Tech Park, #365 Baotian 1 Rd, Tiegang Community, Xixiang Str, Bao'an District, Shenzhen, China

The testing quality ability of our laboratory meet with "Quality Law of People's Republic of China" Clause 19.The testing quality system of our laboratory meets with ISO/IEC-17025 requirements, which is approved by CNAS. This approval result is accepted by MRA of APLAC.

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

CNAS-LAB Code: L6494

The EMC Laboratory has been assessed and in compliance with CNAS-CL01 accreditation criteria for testing Laboratories (identical to ISO/IEC 17025:2017 General Requirements) for the Competence of testing Laboratories.

Designation Number: CN1227

Test Firm Registration Number: 674885

The 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.

1.3 MEASUREMENT UNCERTAINTY

Measurement Uncertainty

Conducted Emission Expanded Uncertainty	=	2.23dB, k=2
Radiated emission expanded uncertainty(9kHz-30MHz)	=	3.08dB, k=2
Radiated emission expanded uncertainty(30MHz-1000MHz)	=	4.42dB, k=2
Radiated emission expanded uncertainty(Above 1GHz)	=	4.06dB, k=2

2. GENERAL INFORMATION

2.1 GENERAL DESCRIPTION OF EUT

Equipment	Intelligent Voice Translator
Trade Mark	N/A
Model Name	T10
Serial No.	T1,T2,T3,T4,T5,T6,T7,T8,T9,T10,T10PRO,T11,T12,T13,T14,T15,T16,T17,T18,T19,T20
Model Difference	N/A
FCC ID	**2AVAE**-T10
Antenna Type	FPCB Antenna
Antenna Gain	2.11dBi
Radio Specification	IEEE802.11b/g/n20/n40
Operation frequency	IEEE 802.11b: 2412MHz—2462MHz IEEE 802.11g: 2412MHz—2462MHz IEEE 802.11n20: HT20: 2412MHz—2462MHz IEEE 802.11n40: HT40: 2422MHz—2452MHz
Modulation Type	IEEE 802.11b: DSSS(CCK,DQPSK,DBPSK) IEEE 802.11g: OFDM(64QAM, 16QAM, QPSK, BPSK) IEEE 802.11n20: HT20: OFDM (64QAM, 16QAM, QPSK,BPSK) IEEE 802.11n40: HT40: OFDM (64QAM, 16QAM, QPSK,BPSK)
Battery	N/A
Power Source	DC 5V from adapter or DC 3.7V from battery
Adapter	N/A

2.2 DESCRIPTION OF TEST SETUP

Operation of EUT during Conducted testing:

Operation of EUT during Radiation and Above1GHz Radiation testing:

Table for auxiliary equipment:

Equipment Description	Manufacturer	Model	Calibration Due Date
N/A	N/A	N/A	N/A
N/A	N/A	N/A	N/A

2.3 Operation of EUT during testing

EUT was connected to control to a special test jig provided by manufacturer , and the Notebook will run a special test software “rtwpriv ” provided by manufacturer to control EUT work in test mode as blow table.

Tested mode, channel, and data rate information			
Mode	data rate (Mpbs) (see Note)	Channel	Frequency (MHz)
IEEE 802.11b	1	Low :CH1	2412
	1	Middle: CH6	2437
	1	High: CH11	2462
IEEE 802.11g	6	Low :CH1	2412
	6	Middle: CH6	2437
	6	High: CH11	2462
IEEE 802.11n HT20	MCS 0	Low :CH1	2412
	MCS 0	Middle: CH6	2437
	MCS 0	High: CH11	2462
IEEE 802.11n HT40	MCS 0	Low :CH3	2422
	MCS 0	Middle: CH6	2437
	MCS 0	High: CH9	2452

Note: 1.According exploratory test, EUT will have maximum output power in those data rate, so those data rate were used for all test.

2. The EUT was used fully-charged battery and programmed to be in continuously transmitting mode and the transmit duty cycle is not less than 98%.

2.4 MEASUREMENT INSTRUMENTS LIST

Item	Equipment	Manufacturer	Model No.	Serial No.	Calibrated until
CONDUCTED EMISSIONS TEST					
1	AMN	Schwarzbeck	NNLK8121	8121370	2020.9.9
2	AMN	ETS	3810/2	00020199	2020.9.9
3	EMI TEST RECEIVER	Rohde&Schwarz	ESCI	101210	2020.9.9
4	AAN	TESEQ	T8-Cat6	38888	2020.9.9
RADIATED EMISSION TEST					
1	Horn Antenna	Sunol	DRH-118	A101415	2020.9.9
2	BicoNILog Antenna	Sunol	JB1 Antenna	A090215	2020.9.9
3	PREAMP	HP	8449B	3008A00160	2020.9.9
4	PREAMP	HP	8447D	2944A07999	2020.9.9
5	EMI TEST RECEIVER	Rohde&Schwarz	ESR3	101891	2020.9.9
6	VECTOR Signal Generator	Rohde&Schwarz	SMU200A	101521	2020.9.28
7	Signal Generator	Agilent	E4421B	MY4335105	2020.9.28
8	MXA Signal Analyzer	Agilent	N9020A	MY50510140	2020.9.28
9	MXA Signal Analyzer	Agilent	N9020A	MY51110104	2020.9.9
10	ANT Tower&Turn table Controller	Champro	EM 1000	60764	2020.9.28
11	Anechoic Chamber	Taihe Maorui	9m*6m*6m	966A0001	2020.9.9
12	Shielding Room	Taihe Maorui	6.4m*4m*3m	643A0001	2020.9.9
13	RF Power sensor	DARE	RPR3006W	15I00041SNO88	2020.3.14
14	RF Power sensor	DARE	RPR3006W	15I00041SNO89	2020.3.14
15	RF power divider	Anritsu	K241B	992289	2020.9.28
16	Wideband radio communication tester	Rohde&Schwarz	CMW500	154987	2020.9.28
17	Biconical antenna	Schwarzbeck	VHA 9103	91032360	2020.9.8
18	Biconical antenna	Schwarzbeck	VHA 9103	91032361	2020.9.8
19	Broadband Hybrid Antennas	Schwarzbeck	VULB9163	VULB9163#958	2020.9.8
20	Horn Antenna	Schwarzbeck	BBHA9120D	9120D-1680	2020.1.12
21	Active Receive Loop Antenna	Schwarzbeck	FMZB 1919B	00023	2020.9.8
22	Horn Antenna	Schwarzbeck	BBHA 9170	BBHA9170651	2020.03.14
23	Microwave Broadband Preamplifier	Schwarzbeck	BBV 9721	100472	2020.9.8
24	Active Loop Antenna	Com-Power	AL-130R	10160009	2020.05.10
25	Power Meter	KEYSIGHT	N1911A	MY50520168	2020.05.10
26	Frequency Meter	VICTOR	VC2000	997406086	2020.05.10
27	DC Power Source	HYELEC	HY5020E	055161818	2020.05.10

3. CONDUCTED EMISSIONS TEST

3.1 Conducted Power Line Emission Limit

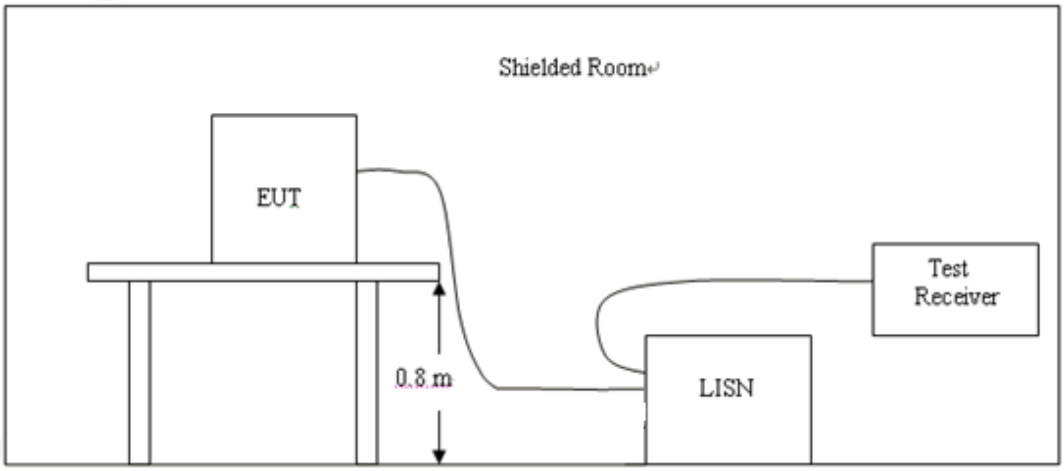
For unintentional device, according to § 15.107(a) Line Conducted Emission Limits is as following

Frequency (MHz)	Maximum RF Line Voltage(dB V)			
	CLASS A		CLASS B	
	Q.P.	Ave.	Q.P.	Ave.
0.15~0.50	79	66	66~56*	56~46*
0.50~5.00	73	60	56	46
5.00~30.0	73	60	60	50

* Decreasing linearly with the logarithm of the frequency

For intentional device, according to §15.207(a) Line Conducted Emission Limit is same as above table.

3.2 Test Setup



3.3 Test Procedure

1, The equipment was set up as per the test configuration to simulate typical actual usage per the user's manual. A wooden table with a height of 0.8 meters is used and is placed on the ground plane as per ANSI C63.10.
2, Support equipment, if needed, was placed as per ANSI C63.10.
3, All I/O cables were positioned to simulate typical actual usage as per ANSI C63.10.
4, If a EUT received DC power from the USB Port of Notebook PC, the PC's 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.

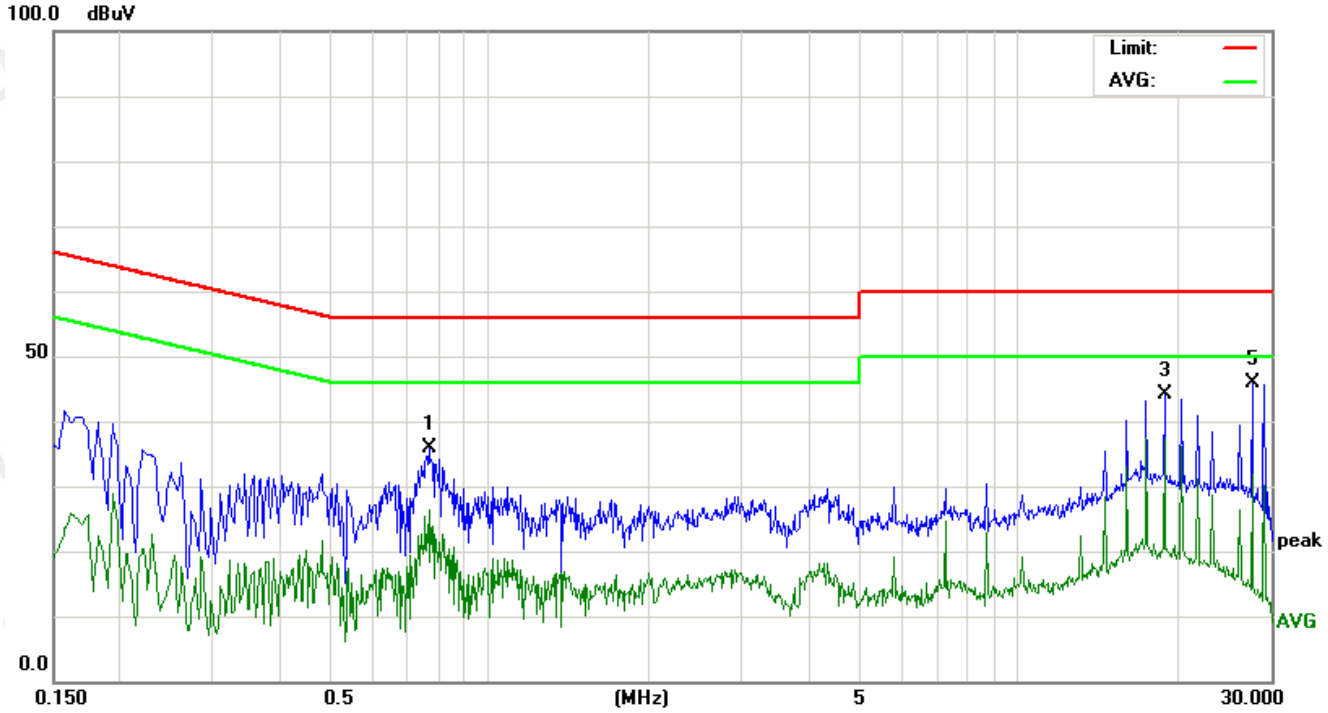
3.4 Test Result

Pass

Remark:

1. All modes were tested at AC 120V and 240V, only the worst result of AC 120V was reported.
2. All modes were tested at Low, Middle, and High channel, only the worst result of 802.11b Low Channel was reported as below:

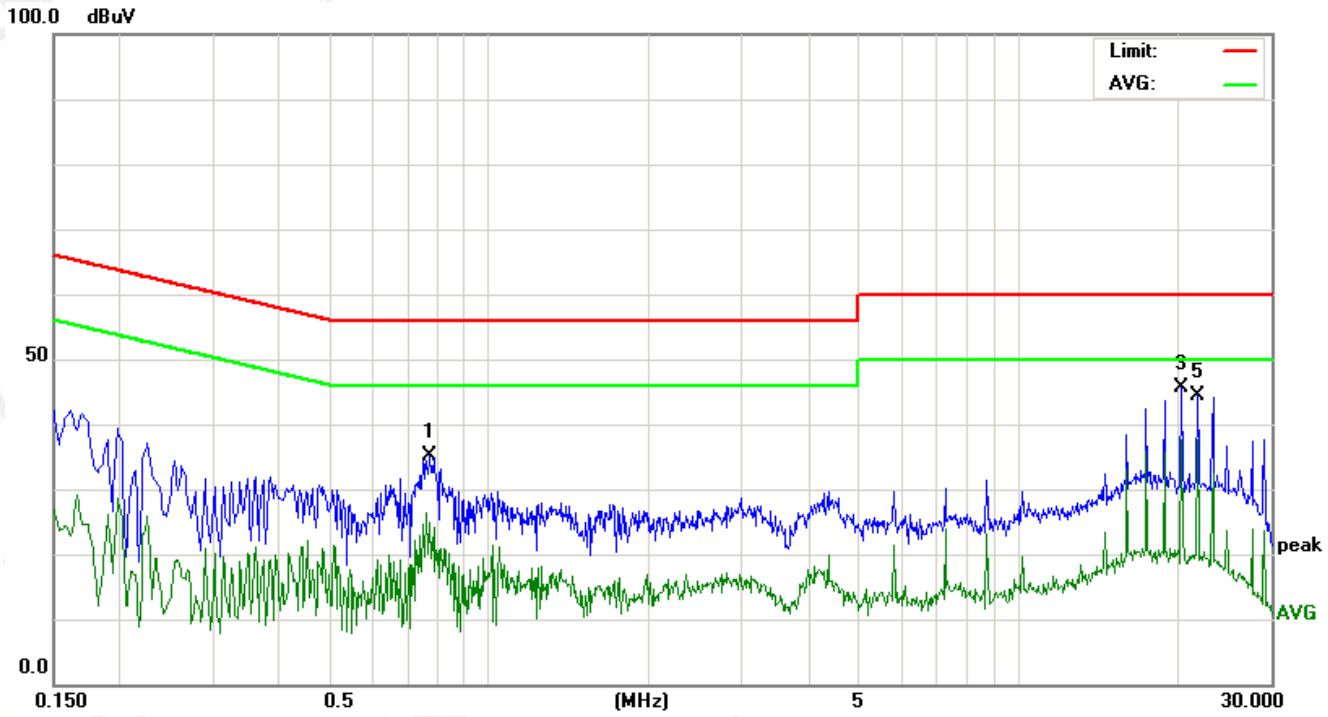
Temperature:	24℃	Relative Humidity:	48%
Test Date:	2019-11-20	Pressure:	1010hPa
Test Voltage:	AC 120V, 60Hz	Phase:	Line
Test Mode:	TX (1Mbps) CH01(worst case)		



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over	
		MHz	dBuV	dB	dBuV	dBuV	dB	Detector
1		0.7700	34.94	0.84	35.78	56.00	-20.22	peak
2		0.7700	25.64	0.84	26.48	46.00	-19.52	AVG
3		18.8940	33.62	10.62	44.24	60.00	-15.76	peak
4	*	18.8940	26.69	10.62	37.31	50.00	-12.69	AVG
5		27.6140	34.40	11.41	45.81	60.00	-14.19	peak
6		27.6140	20.54	11.41	31.95	50.00	-18.05	AVG

Remark: Factor = Insertion Loss + Cable Loss, Result = Reading + Factor, Margin = Result – Limit.

Temperature:	24℃	Relative Humidity:	48%
Test Date:	2019-11-20	Pressure:	1010hPa
Test Voltage:	AC 120V, 60Hz	Phase:	Neutral
Test Mode:	TX (1Mbps) CH01(worst case)		



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over	
		MHz	dBuV	dB	dBuV	dBuV	dB	Detector
1		0.7740	34.21	0.84	35.05	56.00	-20.95	peak
2		0.7740	25.43	0.84	26.27	46.00	-19.73	AVG
3		20.3660	34.84	10.77	45.61	60.00	-14.39	peak
4	*	20.3660	26.96	10.77	37.73	50.00	-12.27	AVG
5		21.8100	33.50	10.95	44.45	60.00	-15.55	peak
6		21.8100	26.75	10.95	37.70	50.00	-12.30	AVG

Remark: Factor = Insertion Loss + Cable Loss, Result = Reading + Factor, Margin = Result – Limit.

4 RADIATED EMISSION TEST

4.1 Radiation Limit

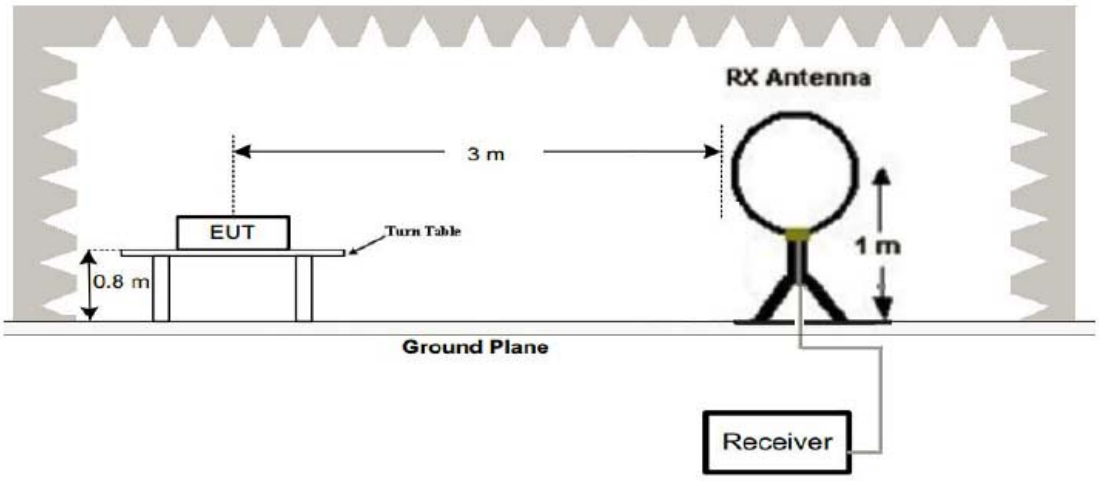
For unintentional device, according to § 15.109(a), except for Class A digital devices, the field strength of radiated emissions from unintentional radiators at a distance of 3 meters shall not exceed the following values：

Frequency (MHz)	Distance (Meters)	Radiated (dBμV/m)	Radiated (μV/m)
30-88	3	40	100
88-216	3	43.5	150
216-960	3	46	200
Above 960	3	54	500

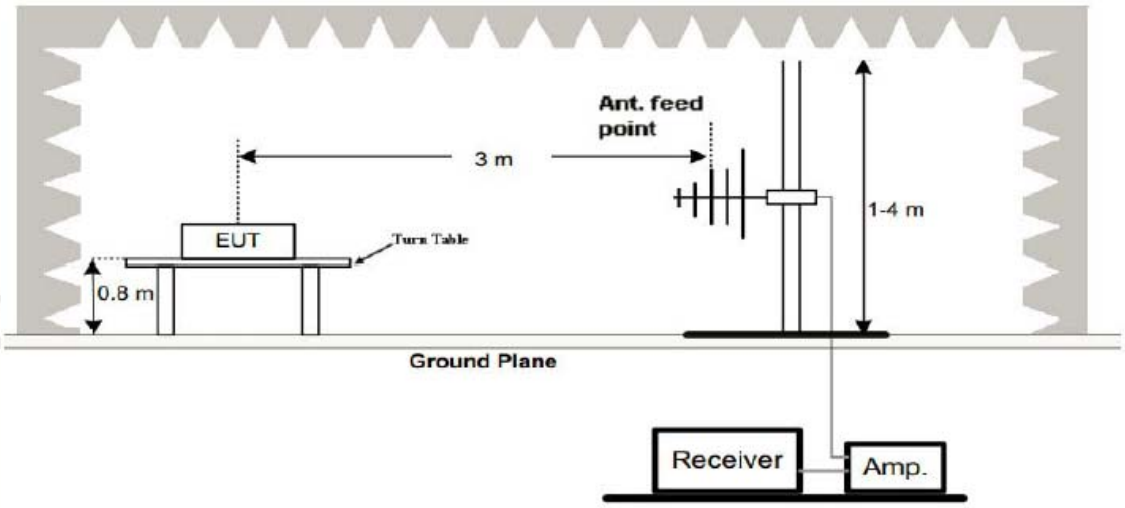
For intentional device, according to § 15.209(a), the general requirement of field strength of radiated emissions from intentional radiators at a distance of 3 meters shall not exceed the above table.

4.2 Test Setup

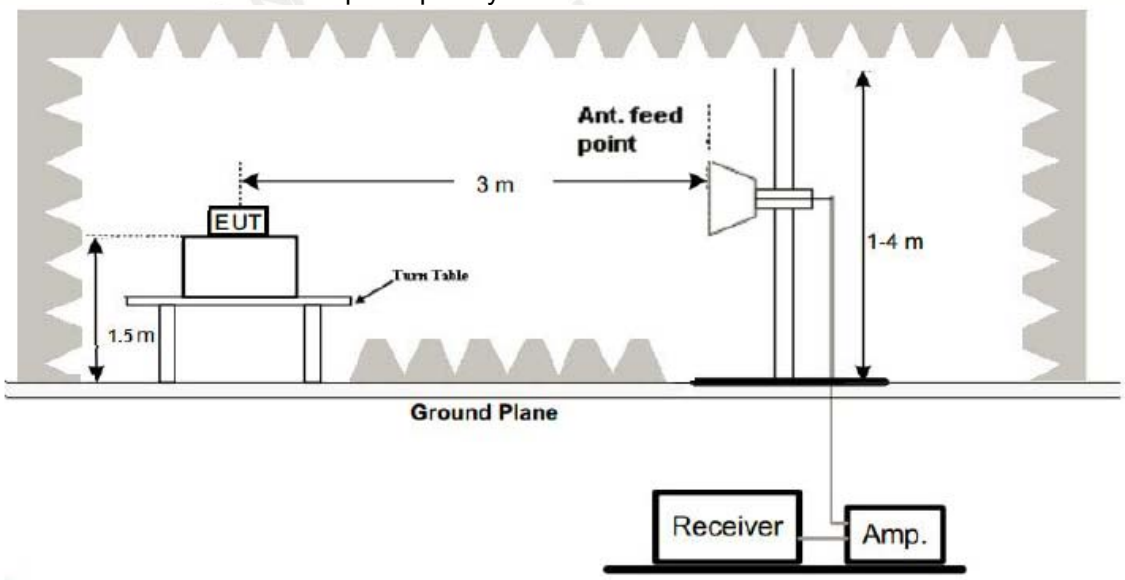
1. Radiated Emission Test-Up Frequency Below 30MHz



2. Radiated Emission Test-Up Frequency 30MHz~1GHz



3. Radiated Emission Test-Up Frequency Above 1GHz



4.3 Test Procedure

1. Below 1GHz measurement the EUT is placed on turntable which is 0.8m above ground plane. And above 1GHz measurement EUT was placed on low permittivity and low tangent turn table which is 1.5m above ground plane.
2. The turntable shall be rotated for 360 degrees to determine the position of maximum emission level.
3. EUT is set 3m away from the receiving antenna, which is varied from 1m to 4m to find out the highest emissions.
4. Maximum procedure was performed on the six highest emissions to ensure EUT compliance.
5. And also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical.
6. Repeat above procedures until the measurements for all frequencies are complete.
7. The test frequency range from 9KHz to 25GHz per FCC PART 15.33(a).

Note:
For battery operated equipment, the equipment tests shall be performed using a new battery.

4.4 Test Result

PASS
Remark:
1. All modes of mode were tested at Low, Middle, and High channel, and only the worst result of GFSK (1Mbps) Low Channel was reported for below 1GHz test.
2. By preliminary testing and verifying three axis (X, Y and Z) position of EUT transmitted status, it was found that “Z axis” position was the worst, and test data recorded in this report.

Below 30M

Temperature:	22℃	Relative Humidity:	48%
Test Date:	2019-11-20	Pressure:	1010hPa
Test Voltage:	AC 120V, 60Hz	Polarization:	Horizontal
Test Mode:	TX (1Mbps) CH01(worst case)		

Freq.	Reading	Limit	Margin	State
(MHz)	(dBuV/m)	(dBuV/m)	(dB)	P/F
--	--	--	--	P
--	--	--	--	P

Note:

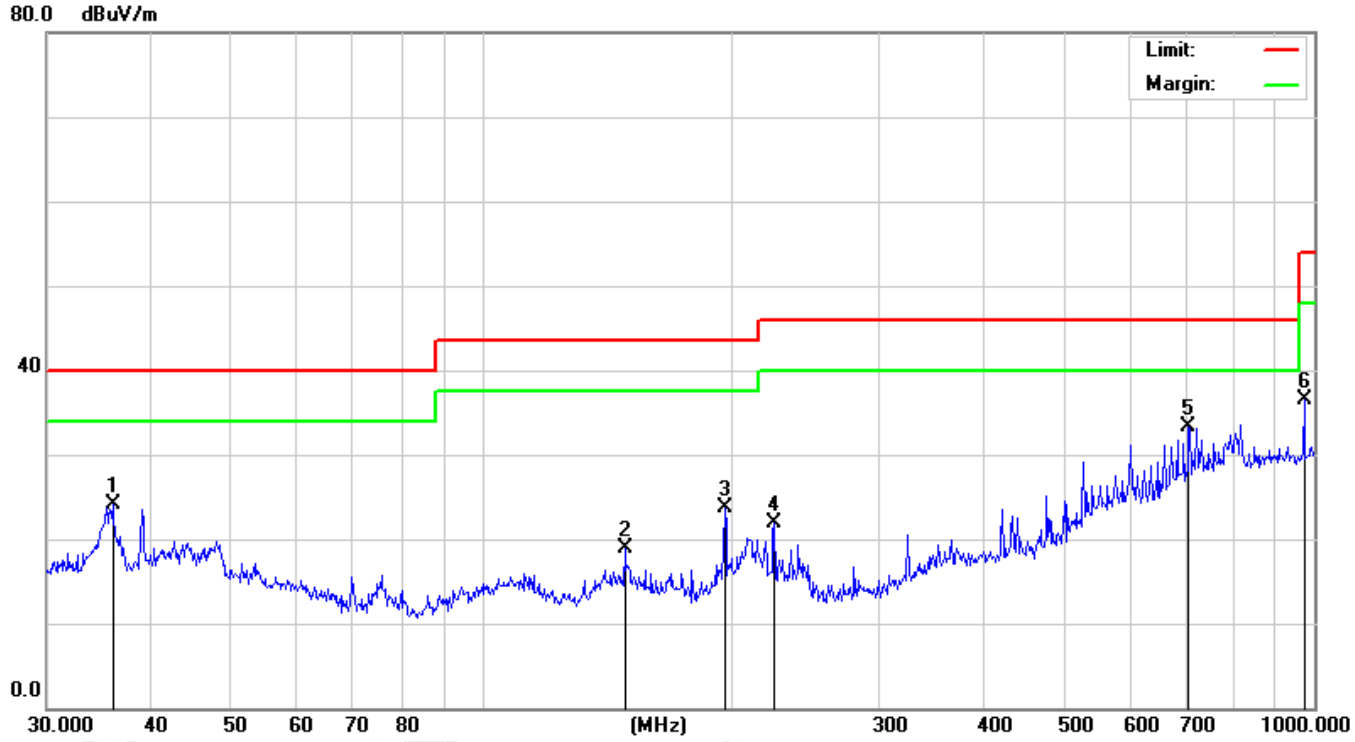
The amplitude of spurious emissions which are attenuated by more than 20dB below the permissible value has no need to be reported.

Distance extrapolation factor =20 log (specific distance/test distance)(dB);

Limit line = specific limits(dBuv) + distance extrapolation factor

Below 1GHz Test Results:

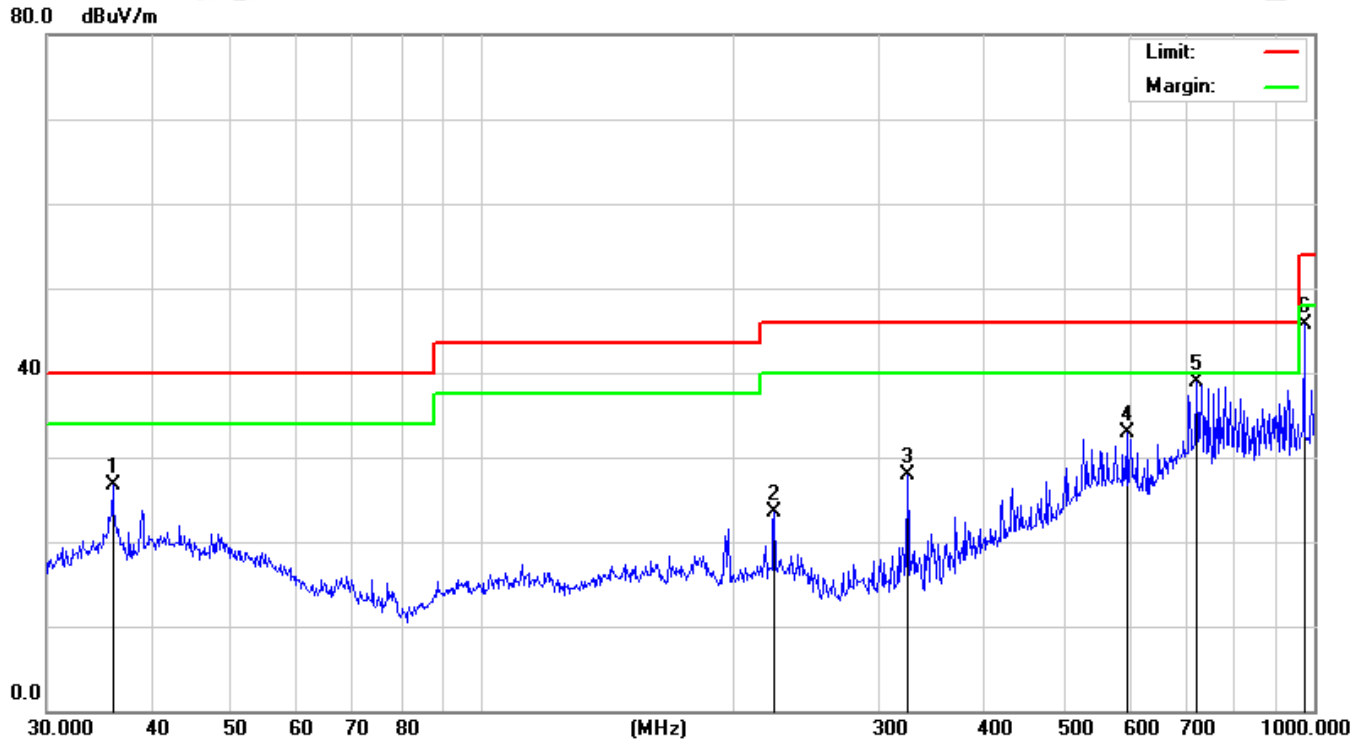
Temperature:	22℃	Relative Humidity:	48%
Test Date:	2019-11-20	Pressure:	1010hPa
Test Voltage:	AC 120V, 60Hz	Polarization:	Horizontal
Test Mode:	TX (1Mbps) CH01(worst case)		



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over	
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector
1		36.0007	28.68	-4.67	24.01	40.00	-15.99	peak
2		148.4410	26.35	-7.51	18.84	43.50	-24.66	peak
3		195.8220	30.72	-7.09	23.63	43.50	-19.87	peak
4		224.5192	29.01	-7.12	21.89	46.00	-24.11	peak
5	*	706.6998	29.14	4.13	33.27	46.00	-12.73	peak
6		972.3374	30.49	6.04	36.53	54.00	-17.47	peak

Remark: Absolute Level = Reading Level + Factor, Margin = Absolute Level – Limit
Factor = Ant. Factor + Cable Loss – Pre-amplifier

Temperature:	22℃	Relative Humidity:	48%
Test Date:	2019-11-20	Pressure:	1010hPa
Test Voltage:	AC 120V, 60Hz	Polarization:	Vertical
Test Mode:	TX (1Mbps) CH01(worst case)		



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over	
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector
1		36.0007	30.22	-3.45	26.77	40.00	-13.23	peak
2		224.5193	30.01	-6.46	23.55	46.00	-22.45	peak
3		324.4561	35.69	-7.73	27.96	46.00	-18.04	peak
4		595.1329	28.65	4.33	32.98	46.00	-13.02	peak
5	*	721.7259	31.59	7.34	38.93	46.00	-7.07	peak
6		972.3374	37.54	8.25	45.79	54.00	-8.21	peak

Remark: Absolute Level = Reading Level + Factor, Margin = Absolute Level – Limit
Factor = Ant. Factor + Cable Loss – Pre-amplifier

Remark:
(1) Measuring frequencies from 9 KHz to the 1 GHz, Radiated emission test from 9KHz to 30MHz was verified, and no any emission was found except system noise floor.
(2) * denotes emission frequency which appearing within the Restricted Bands specified in provision of 15.205, then the general radiated emission limits in 15.209 apply.
(3) The IF bandwidth of EMI Test Receiver between 30MHz to 1GHz was 120KHz, 1 MHz for measuring above 1 GHz, below 30MHz was 10KHz.

Between 1000M – 25000 MHz Test Results:

802.11b CH Low of 2412MHz

Horizontal:

Frequency (MHz)	Reading Result (dBμV)	Factor (dB)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector Type
4824	42.93	5.06	47.99	74	-26.01	PK
4824	32.28	5.06	37.34	54	-16.66	AV
Remark: Factor = Antenna Factor + Cable Loss – Pre-amplifier. Margin = Absolute Level – Limit						

Vertical:

Frequency (MHz)	Reading Result (dBμV)	Factor (dB)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector Type
4824	42.34	5.06	47.4	74	-26.6	PK
4824	31.67	5.06	36.73	54	-17.27	AV
Remark: Factor = Antenna Factor + Cable Loss – Pre-amplifier. Margin = Absolute Level – Limit						

802.11b CH Middle of 2437MHz

Horizontal:

Frequency (MHz)	Reading Result (dBμV)	Factor (dB)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector Type
4874	43.88	5.14	49.02	74	-24.98	PK
4874	32.06	5.14	37.2	54	-16.8	AV
Remark: Factor = Antenna Factor + Cable Loss – Pre-amplifier. Margin = Absolute Level – Limit						

Vertical:

Frequency (MHz)	Reading Result (dBμV)	Factor (dB)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector Type
4874	43.25	5.14	48.39	74	-25.61	PK
4874	31.77	5.14	36.91	54	-17.09	AV
Remark: Factor = Antenna Factor + Cable Loss – Pre-amplifier. Margin = Absolute Level – Limit						

802.11b CH High of 2462MHz

Horizontal:

Frequency (MHz)	Reading Result (dBμV)	Factor (dB)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector Type
4924	43.34	5.22	48.56	74	-25.44	PK
4924	32.96	5.22	38.18	54	-15.82	AV
Remark: Factor = Antenna Factor + Cable Loss – Pre-amplifier. Margin = Absolute Level – Limit						

Vertical:

Frequency (MHz)	Reading Result (dBμV)	Factor (dB)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector Type
4924	43.36	5.22	48.58	74	-25.42	PK
4924	32.59	5.22	37.81	54	-16.19	AV
Remark: Factor = Antenna Factor + Cable Loss – Pre-amplifier. Margin = Absolute Level – Limit						

802.11g CH Low of 2412MHz

Horizontal:

Frequency (MHz)	Reading Result (dBμV)	Factor (dB)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector Type
4824	43.52	5.06	48.58	74	-25.42	PK
4824	32.28	5.06	37.34	54	-16.66	AV
Remark: Factor = Antenna Factor + Cable Loss – Pre-amplifier. Margin = Absolute Level – Limit						

Vertical:

Frequency (MHz)	Reading Result (dBμV)	Factor (dB)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector Type
4824	42.46	5.06	47.52	74	-26.48	PK
4824	31.75	5.06	36.81	54	-17.19	AV
Remark: Factor = Antenna Factor + Cable Loss – Pre-amplifier. Margin = Absolute Level – Limit						

802.11g CH Middle of 2437MHz

Horizontal:

Frequency (MHz)	Reading Result (dBμV)	Factor (dB)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector Type
4874	42.87	5.14	48.01	74	-25.99	PK
4874	32.08	5.14	37.22	54	-16.78	AV
Remark: Factor = Antenna Factor + Cable Loss – Pre-amplifier. Margin = Absolute Level – Limit						

Vertical:

Frequency (MHz)	Reading Result (dBμV)	Factor (dB)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector Type
4874	43.53	5.14	48.67	74	-25.33	PK
4874	32.44	5.14	37.58	54	-16.42	AV
Remark: Factor = Antenna Factor + Cable Loss – Pre-amplifier. Margin = Absolute Level – Limit						

802.11g CH High of 2462MHz

Horizontal:

Frequency (MHz)	Reading Result (dBμV)	Factor (dB)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector Type
4924	43.26	5.22	48.48	74	-25.52	PK
4924	32.97	5.22	38.19	54	-15.81	AV
Remark: Factor = Antenna Factor + Cable Loss – Pre-amplifier. Margin = Absolute Level – Limit						

Vertical:

Frequency (MHz)	Reading Result (dBμV)	Factor (dB)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector Type
4924	43.16	5.22	48.38	74	-25.62	PK
4924	32.59	5.22	37.81	54	-16.19	AV
Remark: Factor = Antenna Factor + Cable Loss – Pre-amplifier. Margin = Absolute Level – Limit						

802.11n20 CH Low of 2412MHz

Horizontal:

Frequency (MHz)	Reading Result (dBμV)	Factor (dB)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector Type
4824	42.46	5.06	47.52	74	-26.48	PK
4824	31.87	5.06	36.93	54	-17.07	AV
Remark: Factor = Antenna Factor + Cable Loss – Pre-amplifier. Margin = Absolute Level – Limit						

Vertical:

Frequency (MHz)	Reading Result (dBμV)	Factor (dB)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector Type
4824	42.25	5.06	47.31	74	-26.69	PK
4824	31.36	5.06	36.42	54	-17.58	AV
Remark: Factor = Antenna Factor + Cable Loss – Pre-amplifier. Margin = Absolute Level – Limit						

802.11n20 CH Middle of 2437MHz

Horizontal:

Frequency (MHz)	Reading Result (dBμV)	Factor (dB)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector Type
4874	42.89	5.14	48.03	74	-25.97	PK
4874	31.91	5.14	37.05	54	-16.95	AV
Remark: Factor = Antenna Factor + Cable Loss – Pre-amplifier. Margin = Absolute Level – Limit						

Vertical:

Frequency (MHz)	Reading Result (dBμV)	Factor (dB)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector Type
4874	42.79	5.14	47.93	74	-26.07	PK
4874	31.86	5.14	37	54	-17	AV
Remark: Factor = Antenna Factor + Cable Loss – Pre-amplifier. Margin = Absolute Level – Limit						

802.11n20 CH High of 2462MHz

Horizontal:

Frequency (MHz)	Reading Result (dBμV)	Factor (dB)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector Type
4924	43.06	5.22	48.28	74	-25.72	PK
4924	32.14	5.22	37.36	54	-16.64	AV
Remark: Factor = Antenna Factor + Cable Loss – Pre-amplifier. Margin = Absolute Level – Limit						

Vertical:

Frequency (MHz)	Reading Result (dBμV)	Factor (dB)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector Type
4924	43.16	5.22	48.38	74	-25.62	PK
4924	32.58	5.22	37.8	54	-16.20	AV
Remark: Factor = Antenna Factor + Cable Loss – Pre-amplifier. Margin = Absolute Level – Limit						

802.11n40 CH Low of 2422MHz

Horizontal:

Frequency (MHz)	Reading Result (dBμV)	Factor (dB)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector Type
4844	43.34	5.22	48.56	74	-25.44	PK
4844	32.96	5.22	38.18	54	-15.82	AV
Remark: Factor = Antenna Factor + Cable Loss – Pre-amplifier. Margin = Absolute Level – Limit						

Vertical:

Frequency (MHz)	Reading Result (dBμV)	Factor (dB)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector Type
4844	43.36	5.22	48.58	74	-25.42	PK
4844	32.59	5.22	37.81	74	-36.19	AV
Remark: Factor = Antenna Factor + Cable Loss – Pre-amplifier. Margin = Absolute Level – Limit						

802.11n40 CH Middle of 2437MHz

Horizontal:

Frequency (MHz)	Reading Result (dBμV)	Factor (dB)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector Type
4874	43.52	5.06	48.58	74	-25.42	PK
4874	32.28	5.06	37.34	54	-16.66	AV
Remark: Factor = Antenna Factor + Cable Loss – Pre-amplifier. Margin = Absolute Level – Limit						

Vertical:

Frequency (MHz)	Reading Result (dBμV)	Factor (dB)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector Type
4874	42.46	5.06	47.52	74	-26.48	PK
4874	31.75	5.06	36.81	54	-17.19	AV
Remark: Factor = Antenna Factor + Cable Loss – Pre-amplifier. Margin = Absolute Level – Limit						

802.11n40 CH High of 2452MHz

Horizontal:

Frequency (MHz)	Reading Result (dBμV)	Factor (dB)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector Type
4904	42.87	5.14	48.01	74	-25.99	PK
4904	32.08	5.14	37.22	54	-16.78	AV
Remark: Factor = Antenna Factor + Cable Loss – Pre-amplifier. Margin = Absolute Level – Limit						

Vertical:

Frequency (MHz)	Reading Result (dBμV)	Factor (dB)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector Type
4904	43.53	5.14	48.67	74	-25.33	PK
4904	32.44	5.14	37.58	54	-16.42	AV
Remark: Factor = Antenna Factor + Cable Loss – Pre-amplifier. Margin = Absolute Level – Limit						

Remark：
(1) Measuring frequencies from 1 GHz to the 25 GHz.
(2) “F” denotes fundamental frequency; “H” denotes spurious frequency. “E” denotes band edge frequency.
(3) * denotes emission frequency which appearing within the Restricted Bands specified in provision of 15.205, then the general radiated emission limits in 15.209 apply.
(4) Data of measurement within this frequency range shown “--- ” in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.
(5) The IF bandwidth of EMI Test Receiver between 30MHz to 1GHz was 120KHz, 1 MHz for measuring above 1 GHz, below 30MHz was 10KHz. The resolution bandwidth of test receiver/spectrum analyzer is 1MHz and video bandwidth is 3MHz for peak measurement with peak detector at frequency above 1GHz. The resolution bandwidth of test receiver/spectrum analyzer is 1MHz and video bandwidth is 10Hz for Average measurement with peak detection at frequency above 1GHz.
(6) When the test results of Peak Detected below the limits of Average Detected, the Average Detected is not need completed. For example: Top Channel at Fundamental 73.16dBuV/m(PK Value) <93.98(AV Limit), at harmonic 53.20 dBuV/m(PK Value) <54 dBuV/m(AV Limit), the Average Detected not need to completed.

5 BAND EDGE

5.1 Limits

FCC PART 15.247 Emissions radiated outside of the specified frequency bands, except for harmonics, shall be attenuated by at least 20 dB below the level of the fundamental or to the general radiated emission limits in §15.209, whichever is the lesser attenuation.

5.2 Test Procedure

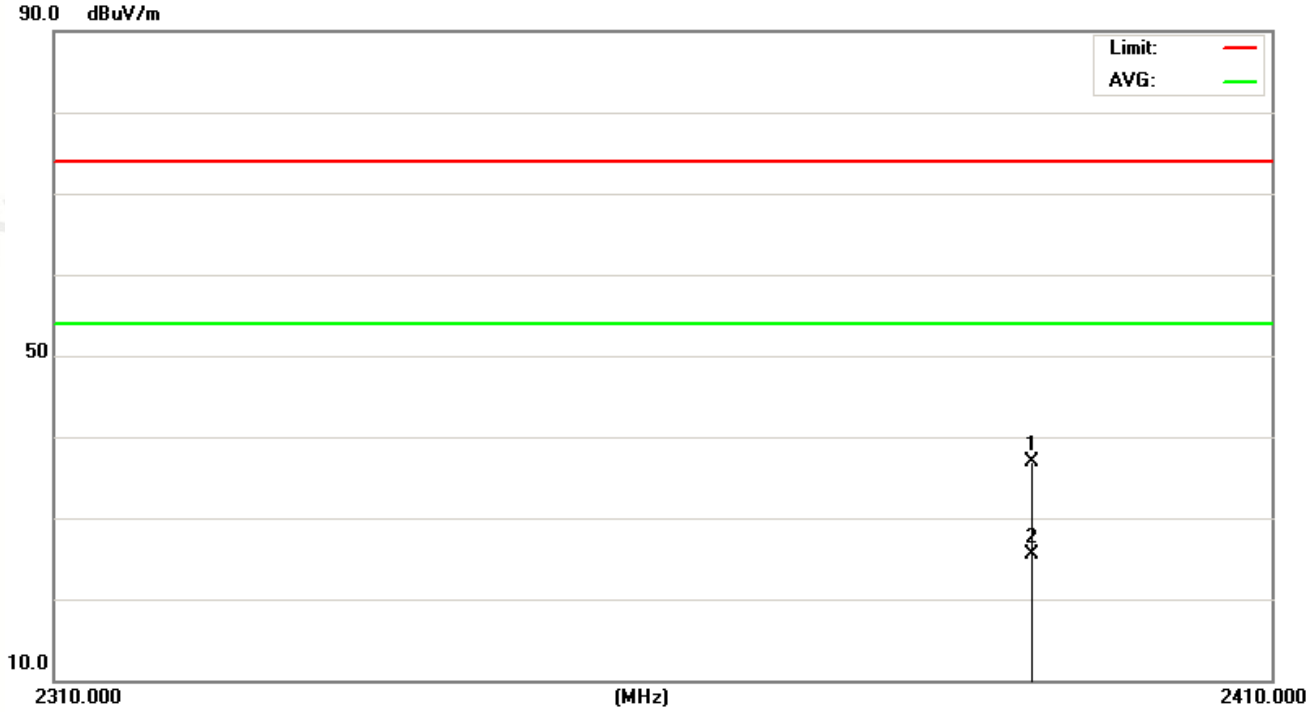
The band edge compliance of RF radiated emission should be measured by following the guidance in ANSI C63.10 with respect to maximizing the emission by rotating the EUT, measuring the emission while the EUT is situated in three orthogonal planes (if appropriate), adjusting the measurement antenna height and polarization etc. Set RBW to 100KHz and VBM to 300KHz to measure the peak field strength and set RBW to 1MHz and VBW to 10Hz to measure the average radiated field strength. The conducted RF band edge was measured by using a spectrum analyzer. Set span wide enough to capture the highest in-band emission and the emission at the band edge. Set RBW to 100 KHz and VBW to 300 KHz, to measure the conducted peak band edge.

5.3 Test Result

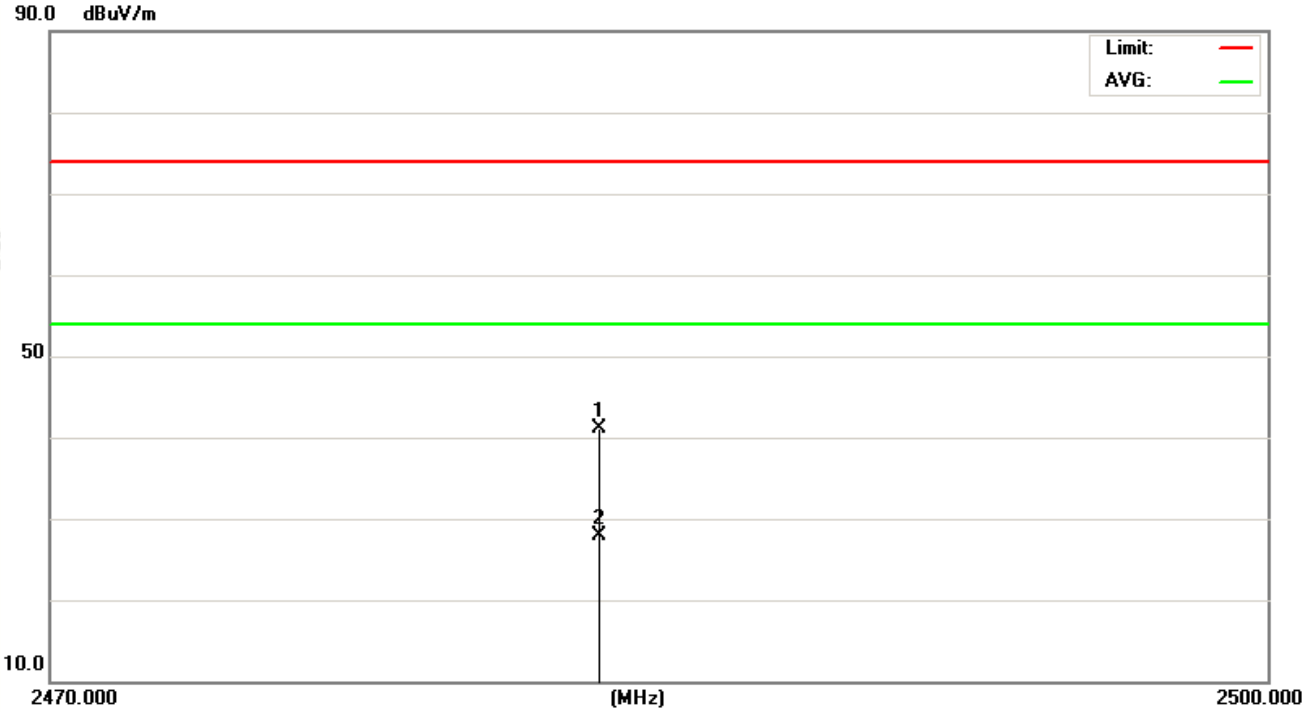
PASS

Operation Mode: TX 1Mbps Mode(Worst case)

Vertical

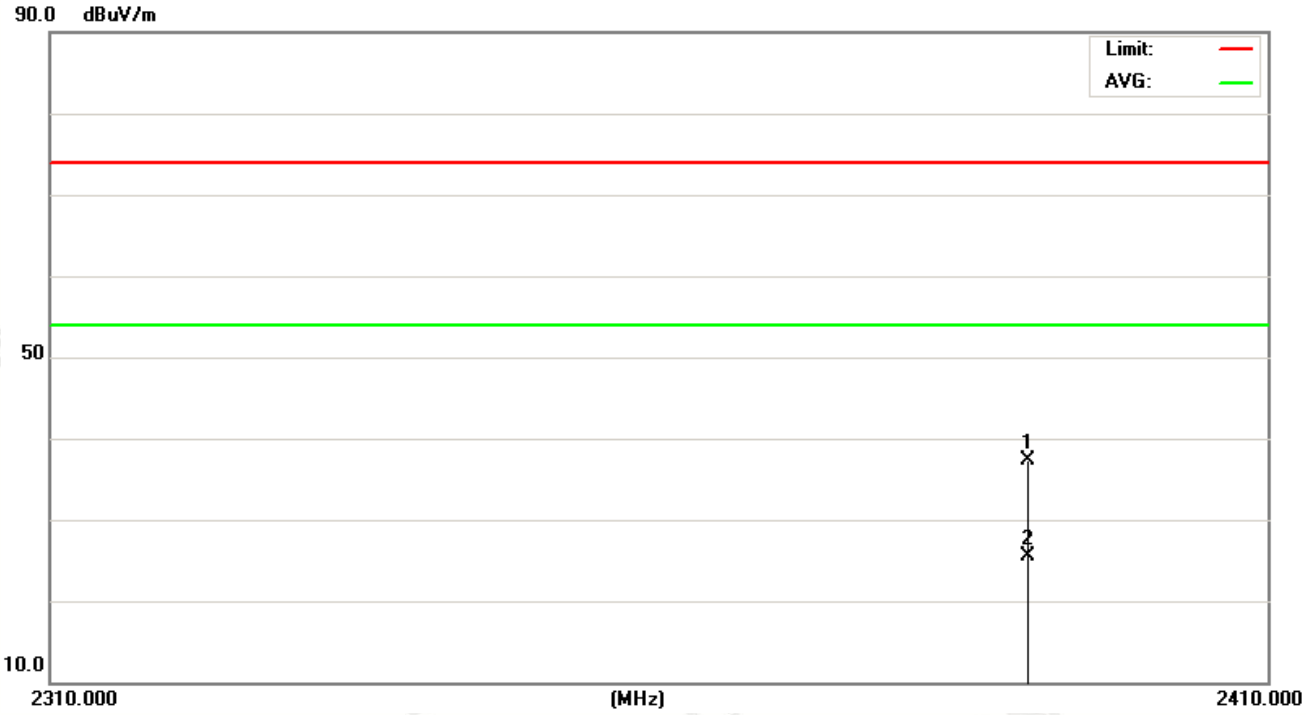


No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over	
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector
1		2390.000	42.63	-5.79	36.84	74.00	-37.16	peak
2	*	2390.000	31.34	-5.79	25.55	54.00	-28.45	AVG

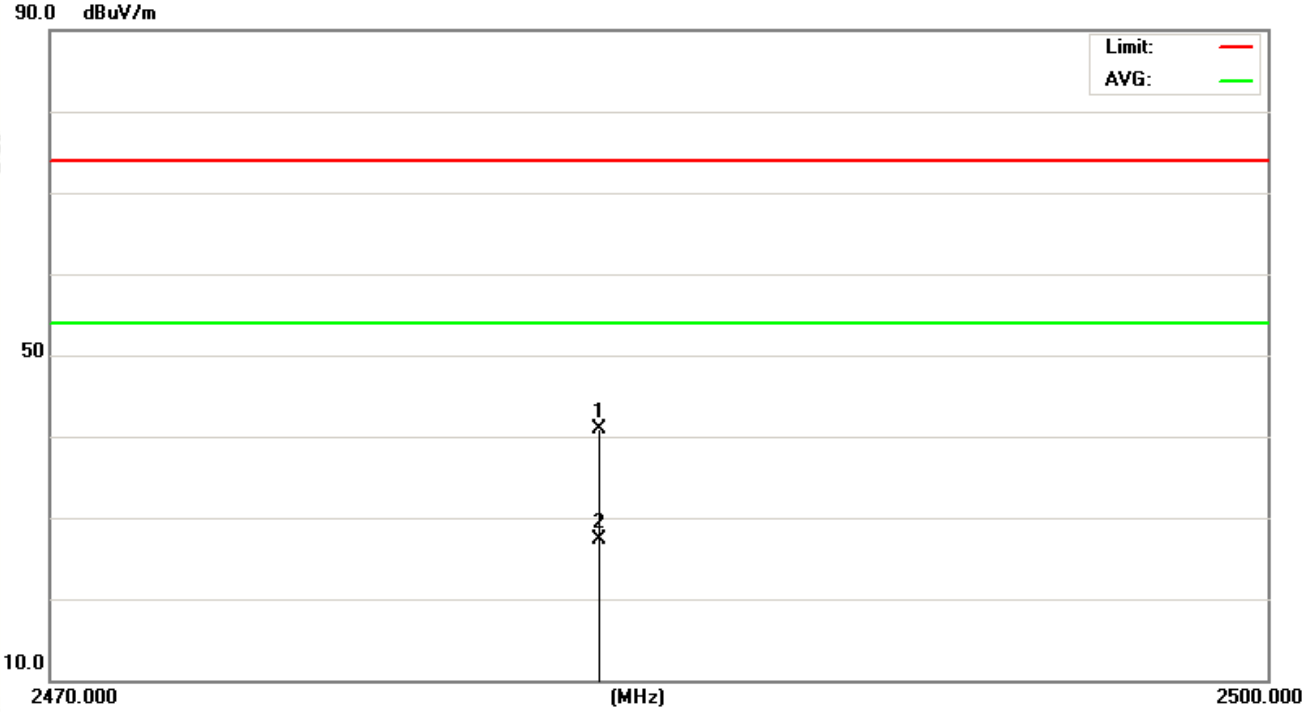


No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over	
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector
1		2483.500	46.09	-4.98	41.11	74.00	-32.89	peak
2	*	2483.500	32.97	-4.98	27.99	54.00	-26.01	AVG

Horizontal



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over	
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector
1		2390.000	43.01	-5.79	37.22	74.00	-36.78	peak
2	*	2390.000	31.25	-5.79	25.46	54.00	-28.54	AVG



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over	
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector
1		2483.500	45.83	-4.98	40.85	74.00	-33.15	peak
2	*	2483.500	32.29	-4.98	27.31	54.00	-26.69	AVG

6 OCCUPIED BANDWIDTH MEASUREMENT

6.1 Test Limit

FCC Part15(15.247), Subpart C				
Section	Test Item	Limit	Frequency Range (MHz)	Result
15.247(a)(2)	Bandwidth	>= 500KHz (6dB bandwidth)	2400-2483.5	PASS

6.2 Test Procedure

1. The EUT was placed on a turn table which is 0.8m above ground plane.
2. Set EUT as normal operation.
3. Based on FCC Part15 C Section 15.247: RBW=100KHz, VBW=300KHz.
4. The useful radiated emission from the EUT was detected by the spectrum analyzer with peak detector.

6.3 Measurement Equipment Used

Same as Radiated Emission Measurement

6.4 Test Result

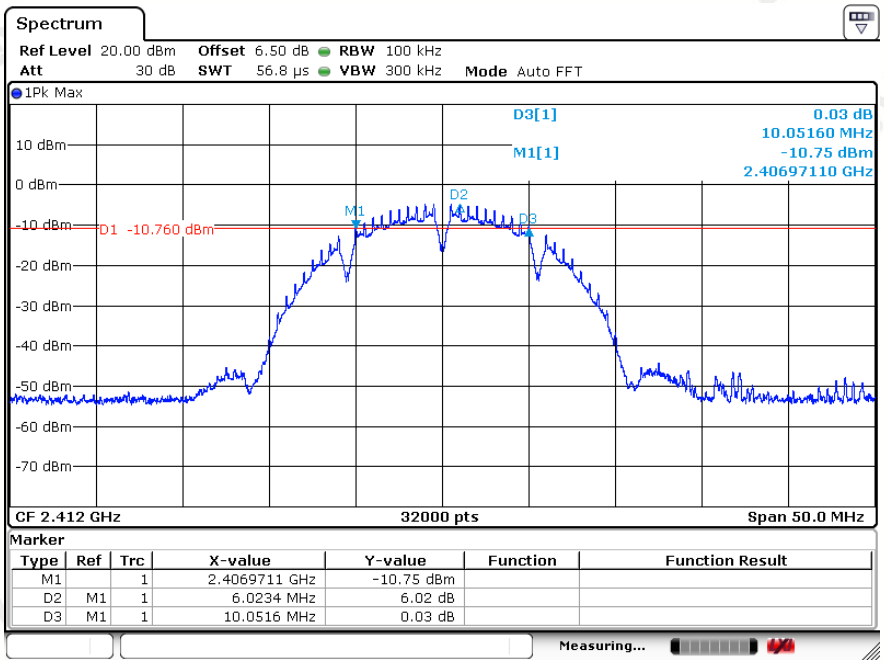
PASS

Antenna A:

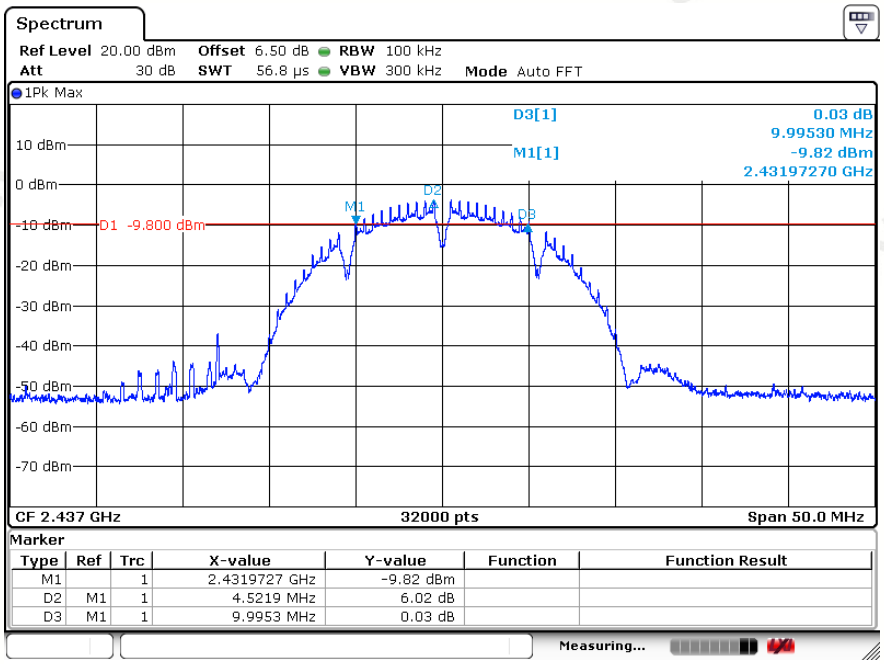
EUT Set Mode	CH or Frequency	6 dB bandwidth Result (MHz)	99% dB bandwidth Result (MHz)	Limt >500KHz	Conclusion PASS
IEEE 802.11B	CH 1	10.0516	/	>500KHz	PASS
	CH 6	9.9953	/		PASS
	CH 11	10.0484	/		PASS
IEEE 802.11G	CH 1	16.3388	/		PASS
	CH 6	16.3363	/		PASS
	CH 11	16.3363	/		PASS
IEEE 802.11N20	CH 1	17.5413	/		PASS
	CH 6	17.5450	/		PASS
	CH 11	17.5450	/		PASS
IEEE 802.11N40	CH 1	35.1675	/		PASS
	CH 6	35.1700	/		PASS
	CH 11	35.1225	/		PASS

3.6. Original test data

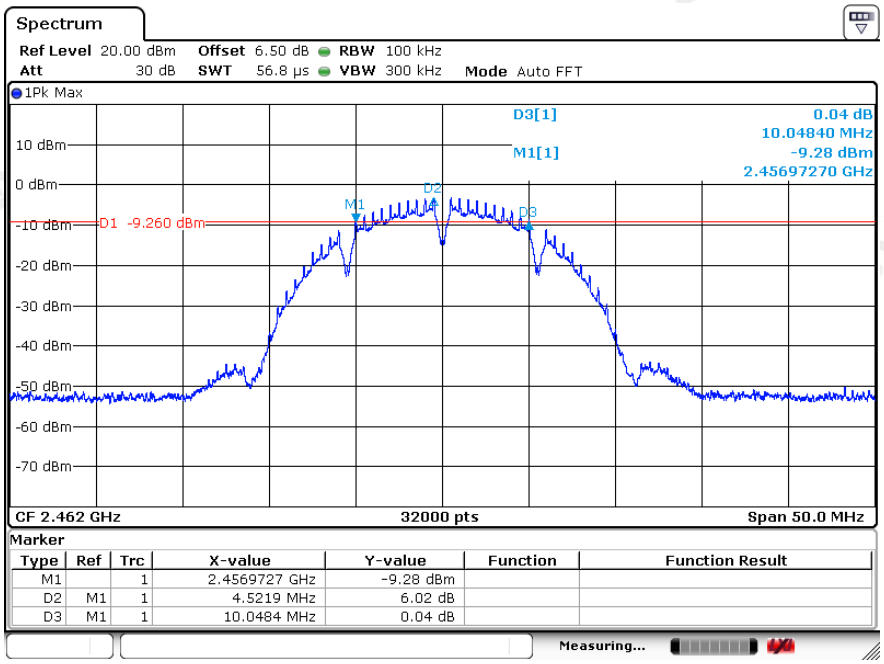
802.11 B Mode CH1



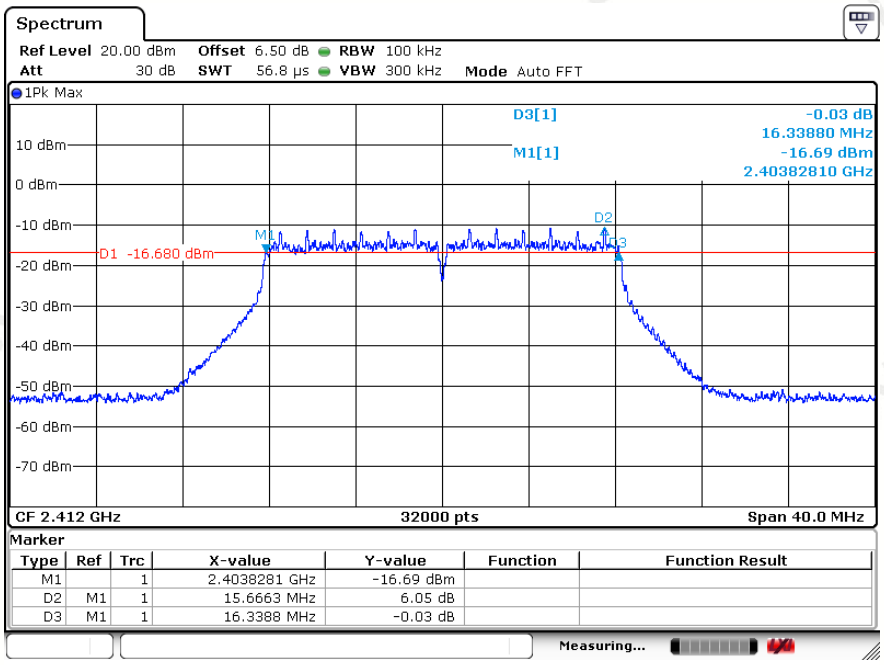
802.11 B Mode CH6



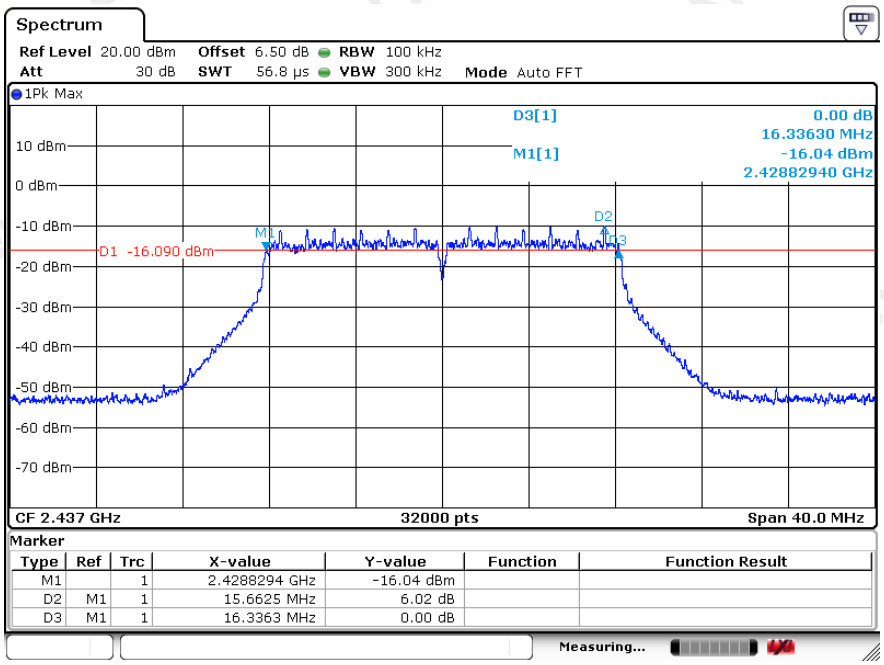
802.11 B Mode CH11



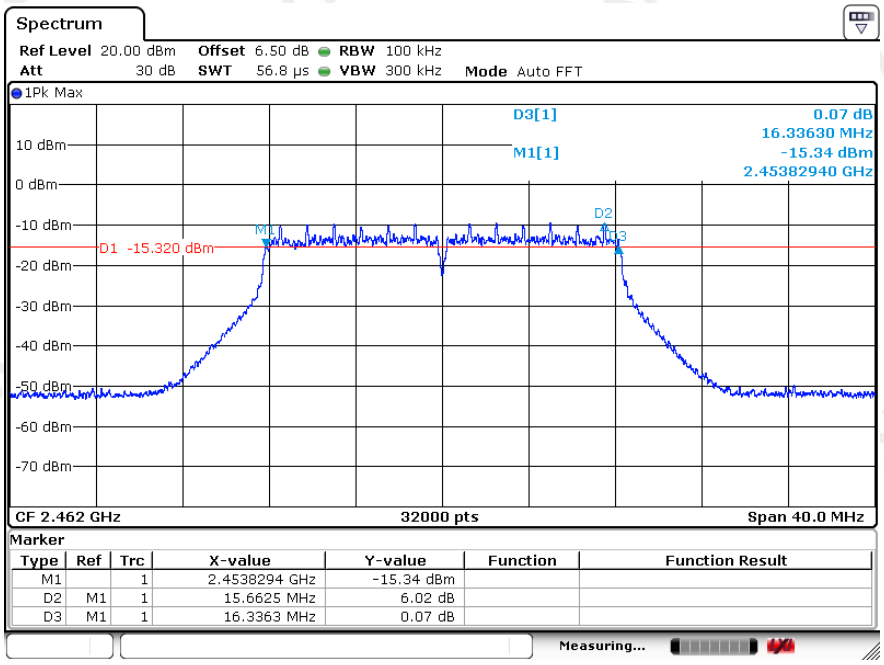
802.11 G Mode CH1



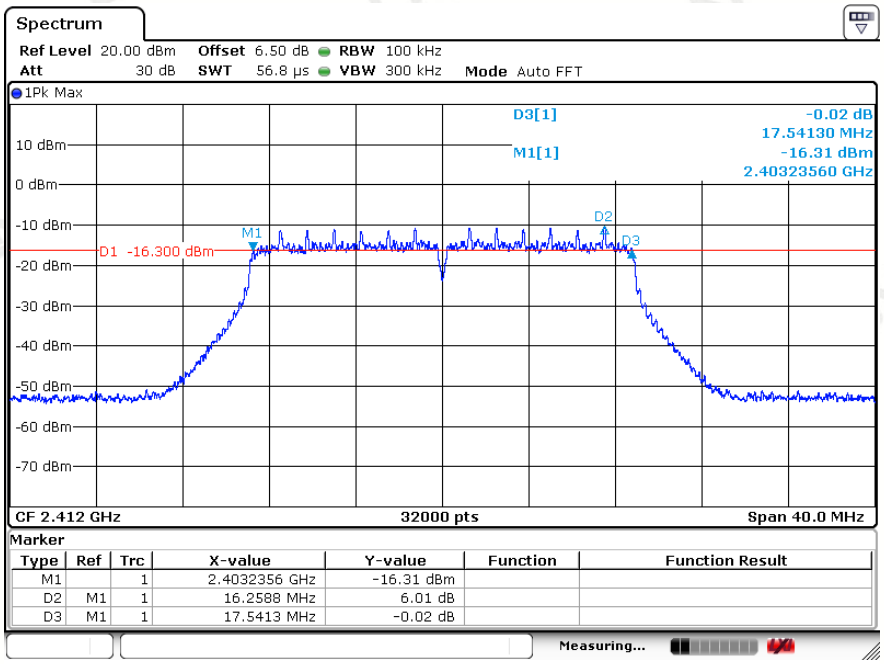
802.11 G Mode CH6



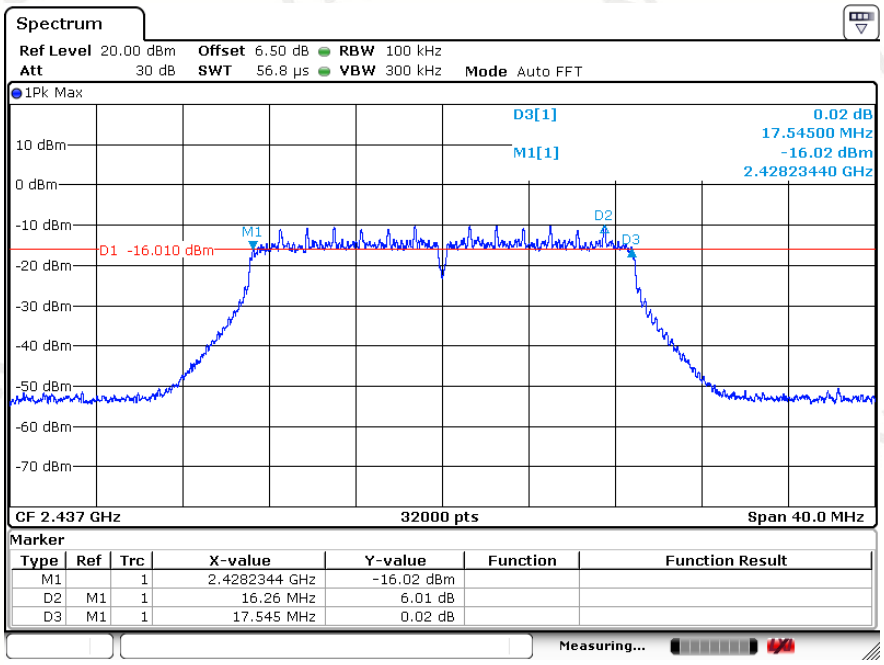
802.11 G Mode CH11



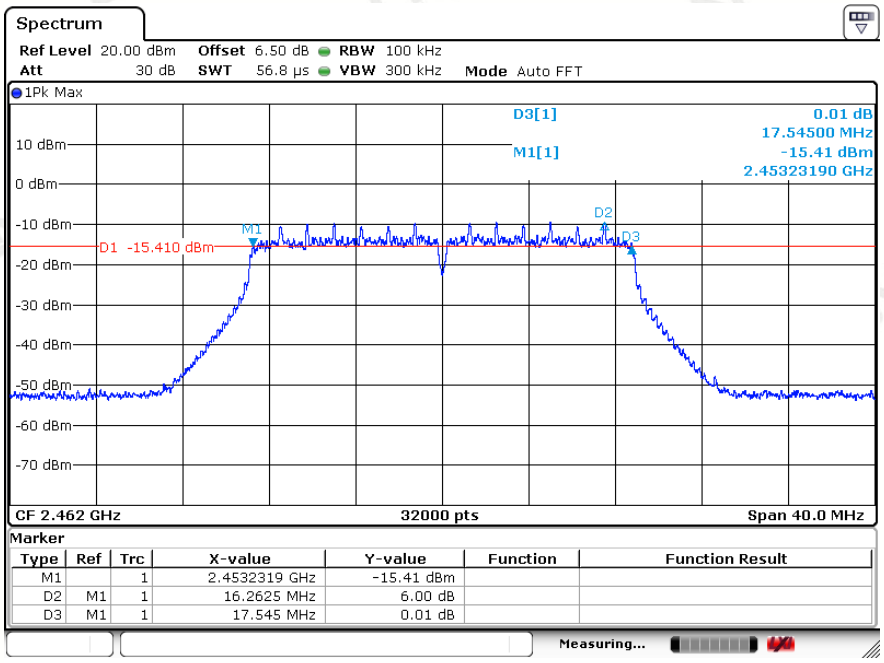
802.11 N20 Mode CH1



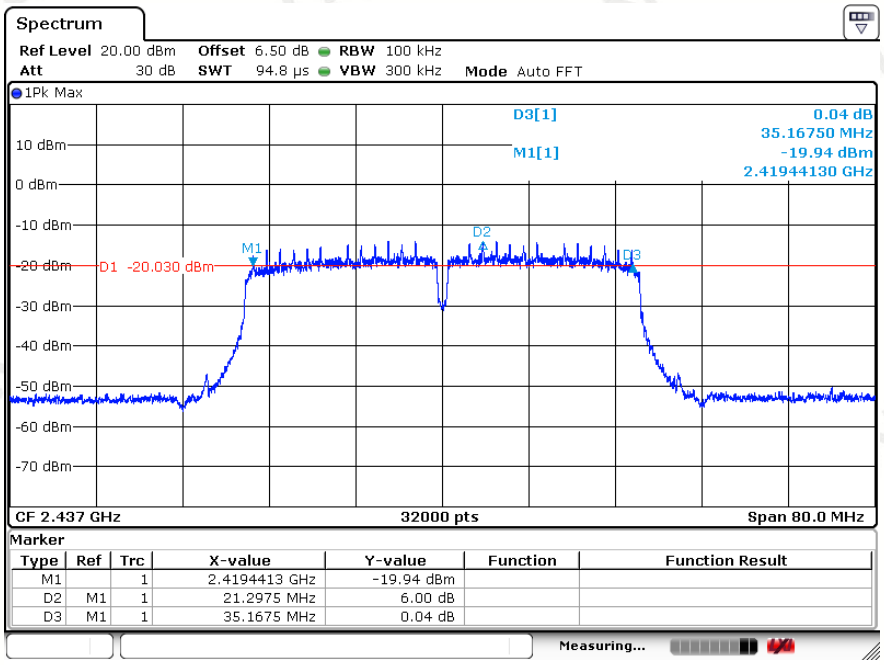
802.11 N20 Mode CH6



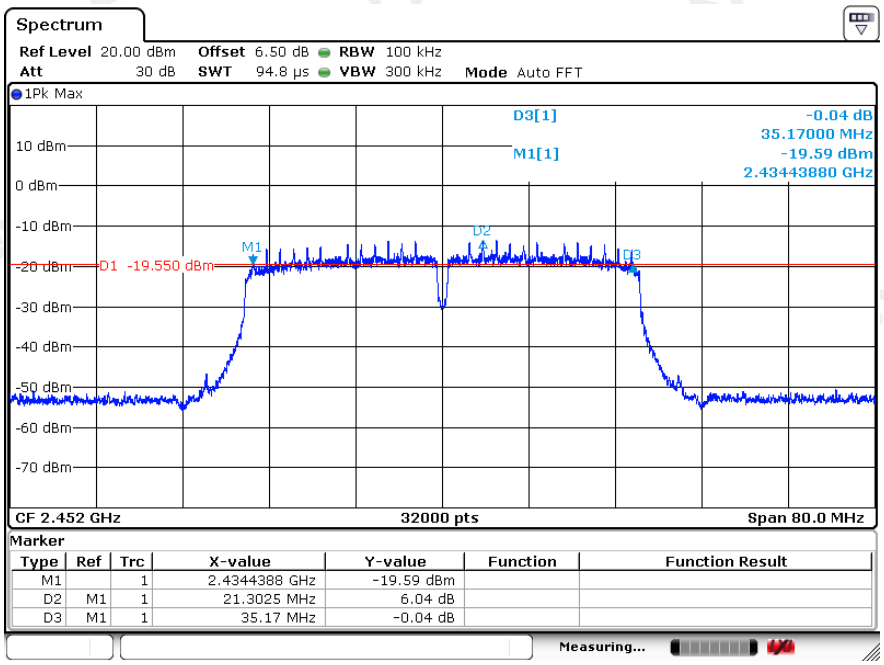
802.11 N20 Mode CH11



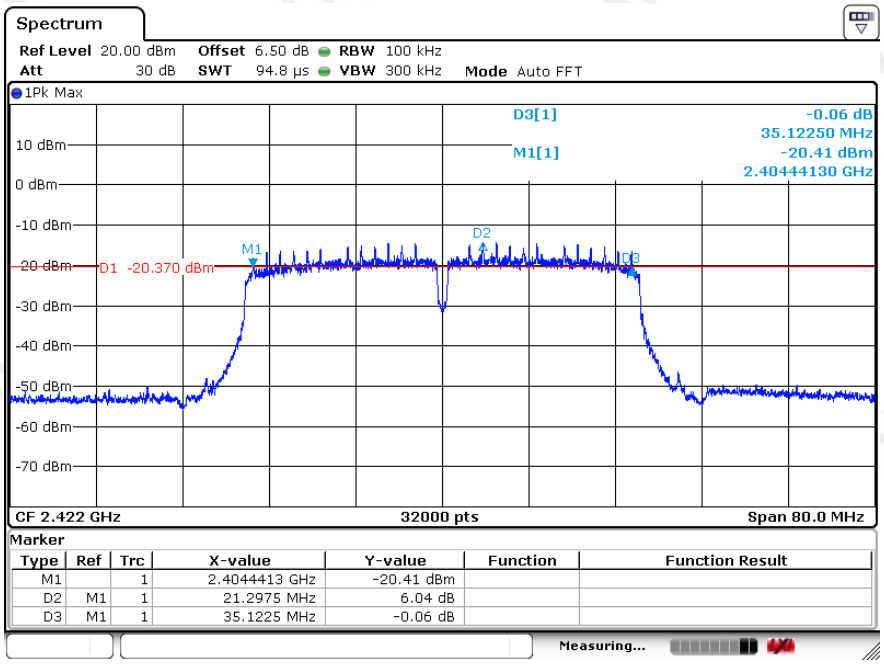
802.11 N40 Mode CH3



802.11 N40 Mode CH6



802.11 N40 Mode CH9



7 POWER SPECTRAL DENSITY TEST

7.1 Test Limit

FCC Part15(15.247), Subpart C				
Section	Test Item	Limit	Frequency Range (MHz)	Result
15.247	Power Spectral Density	8 dBm (in any 3KHz)	2400-2483.5	PASS

7.2 Test Procedure

1. The EUT was placed on a turn table which is 0.8m above ground plane.
2. Set EUT as normal operation.
3. Based on FCC Part15 C Section 15.247: RBW=3KHz, VBW=10KHz.
4. The useful radiated emission from the EUT was detected by the spectrum analyzer with peak detector.

7.3 Measurement Equipment Used

Same as Radiated Emission Measurement

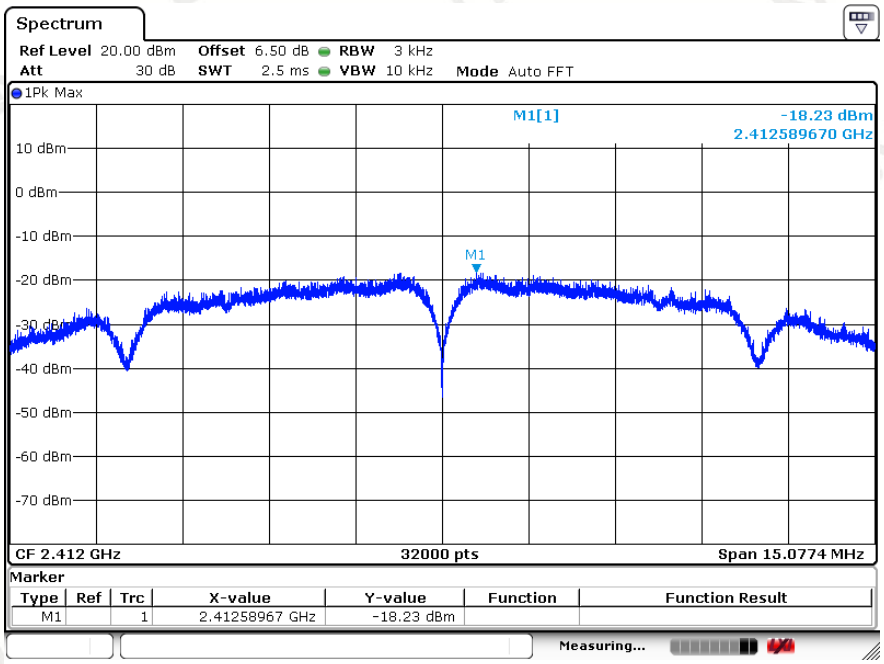
7.4 Test Result

PASS

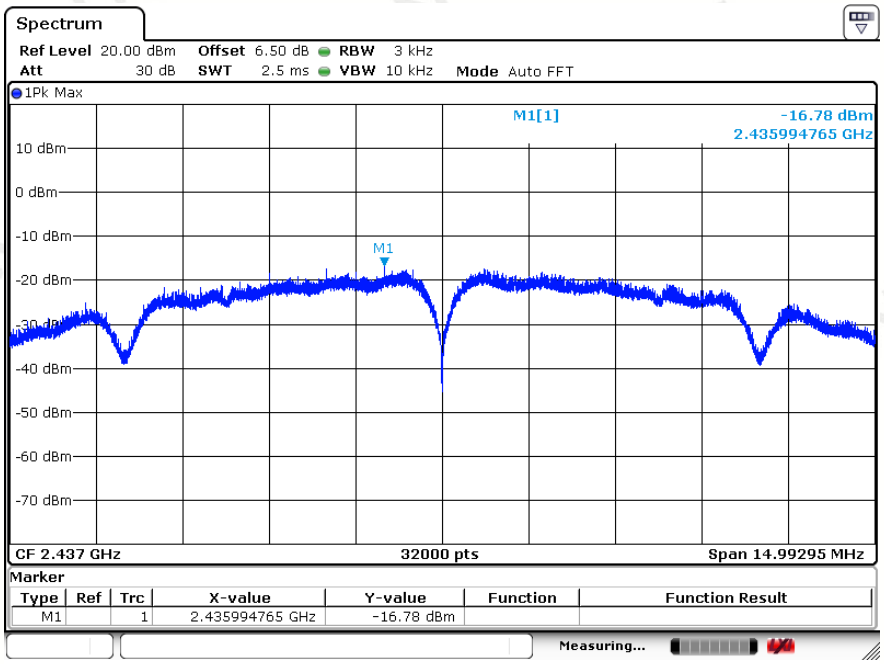
EUT Set Mode	CH	Result(dBm)	Total (dBm)	Limit (dBm)	Conclusion
IEEE 802.11B	CH 1	-18.23	/	8	PASS
	CH 6	-16.78	/	8	PASS
	CH 11	-14.32	/	8	PASS
IEEE 802.11G	CH 1	-24.14	/	8	PASS
	CH 6	-25.58	/	8	PASS
	CH 11	-22.95	/	8	PASS
IEEE 802.11N20	CH 1	-24.73	/	8	PASS
	CH 6	-24.14	/	8	PASS
	CH 11	-23.33	/	8	PASS
IEEE 802.11N40	CH 1	-29.90	/	8	PASS
	CH 6	-29.41	/	8	PASS
	CH 11	-28.99	/	8	PASS

5.6. Original test data

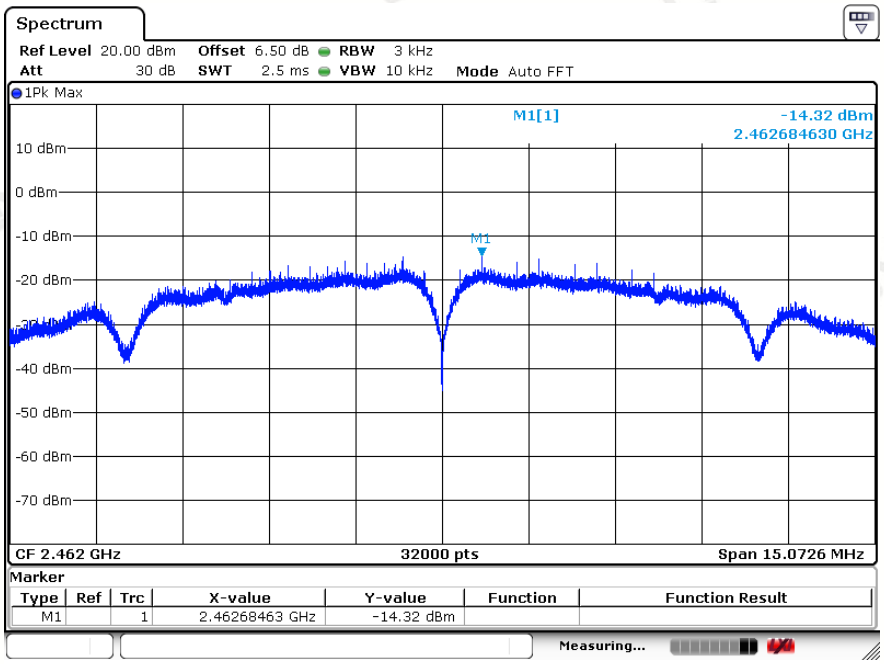
802.11 B Mode CH1



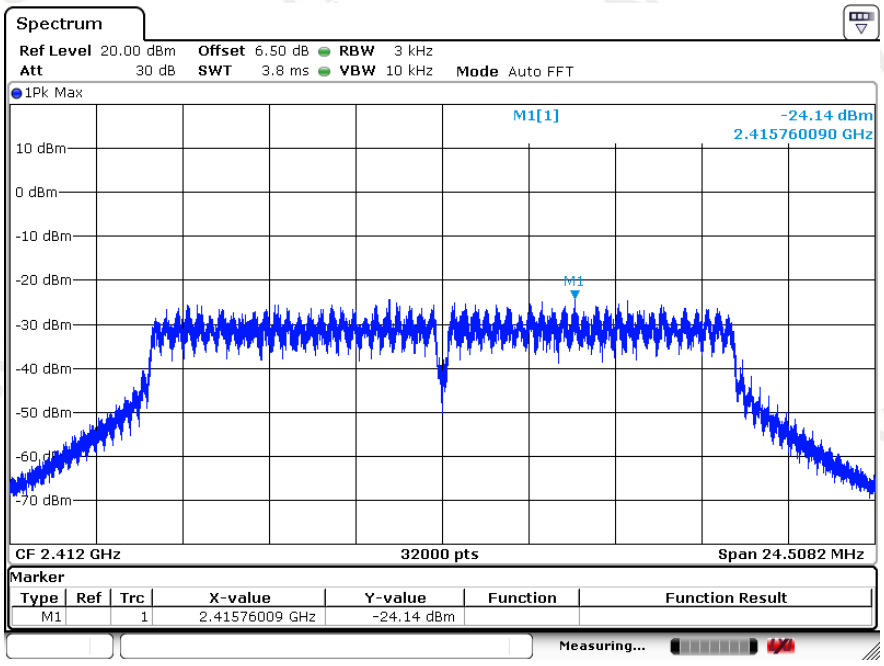
802.11 B Mode CH6



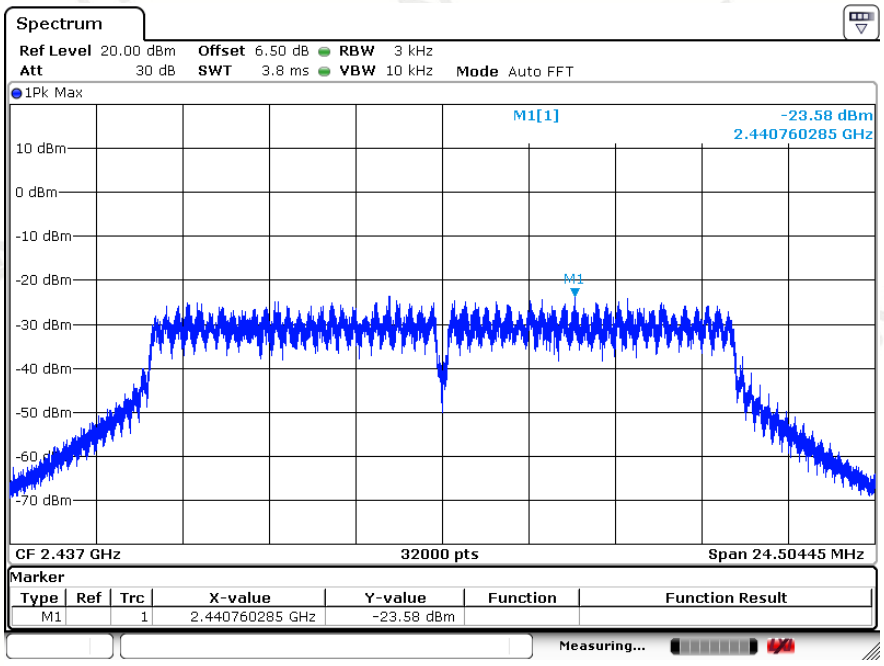
802.11 B Mode CH11



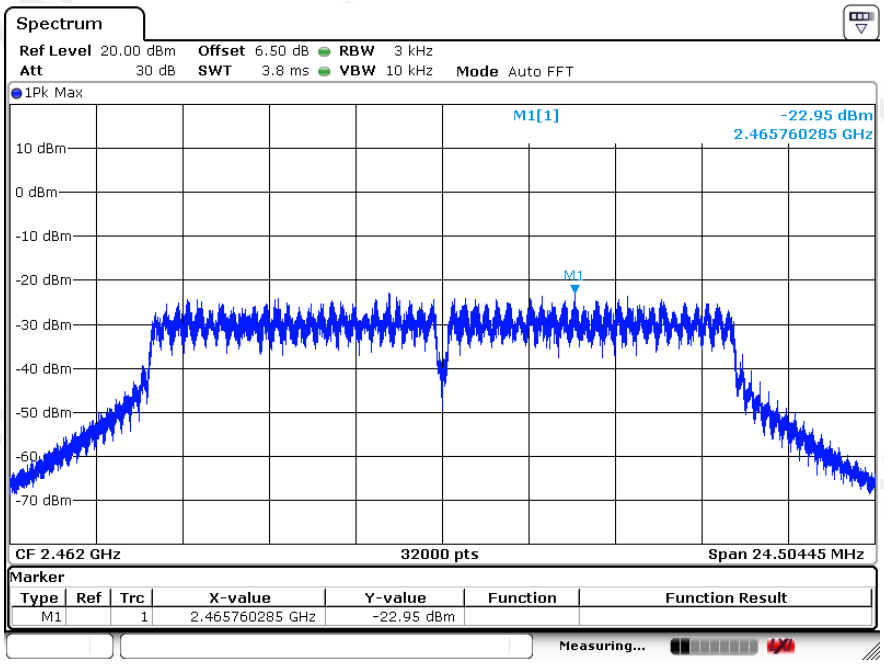
802.11 G Mode CH1



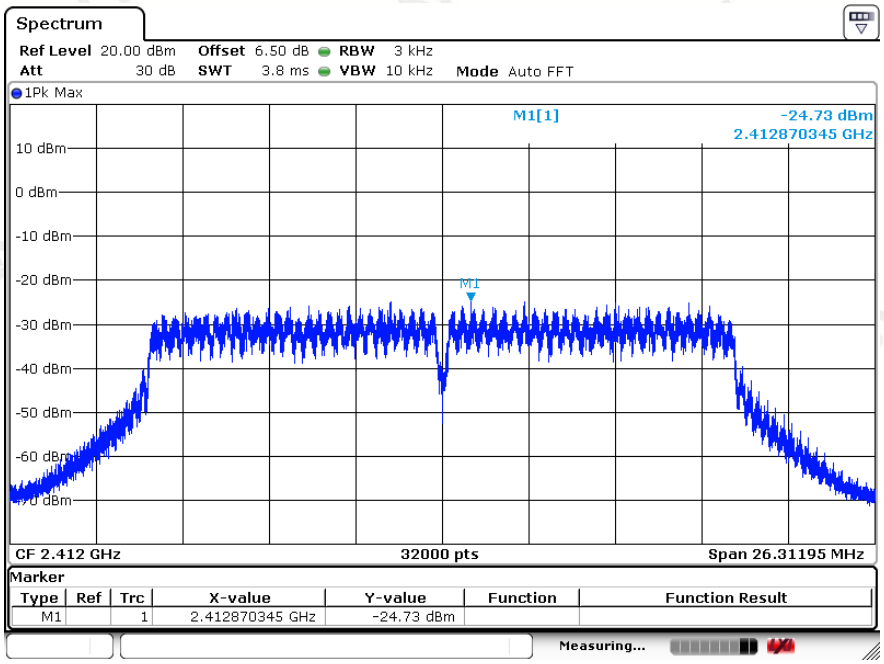
802.11 G Mode CH6



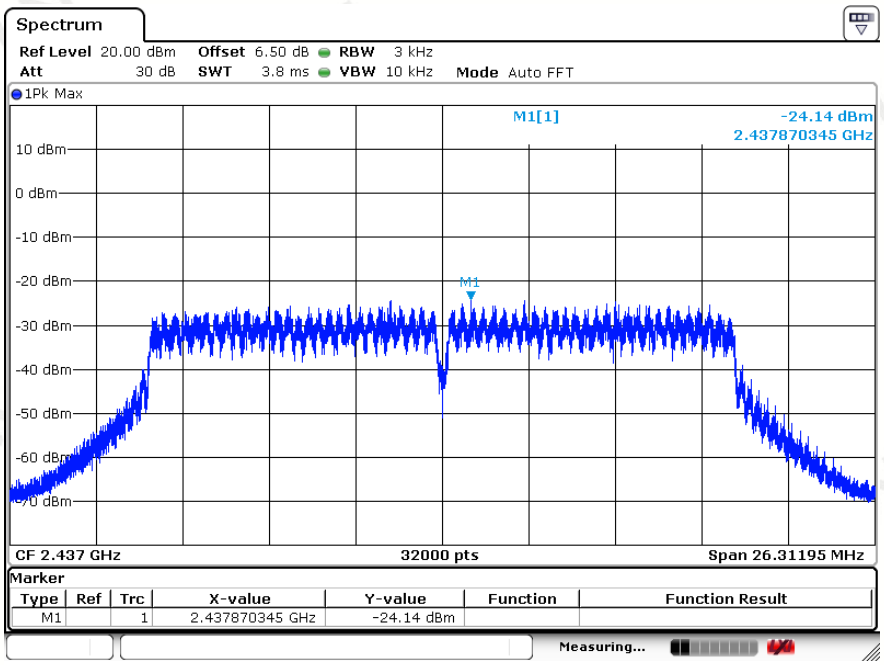
802.11 G Mode CH11



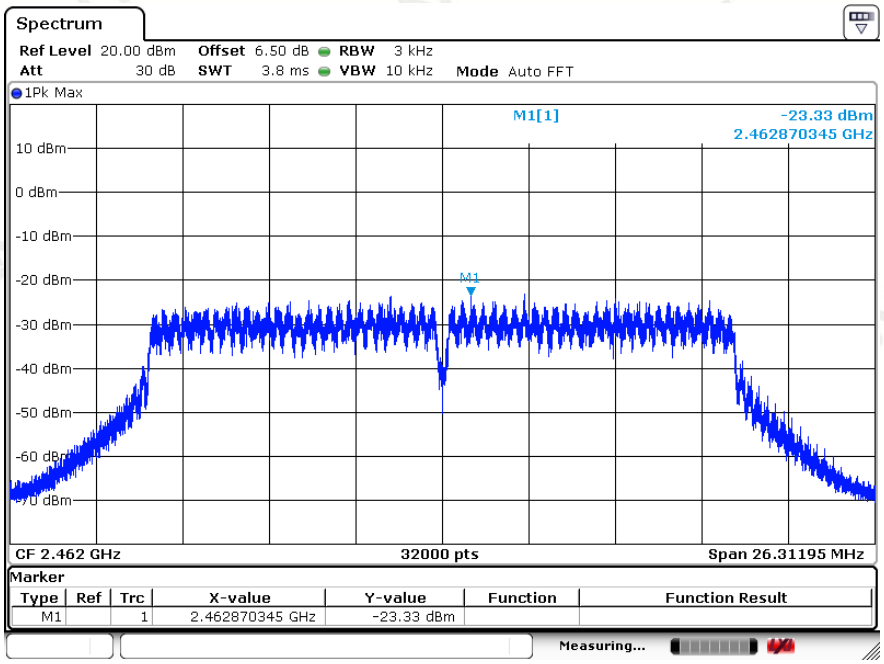
802.11 N20 Mode CH1



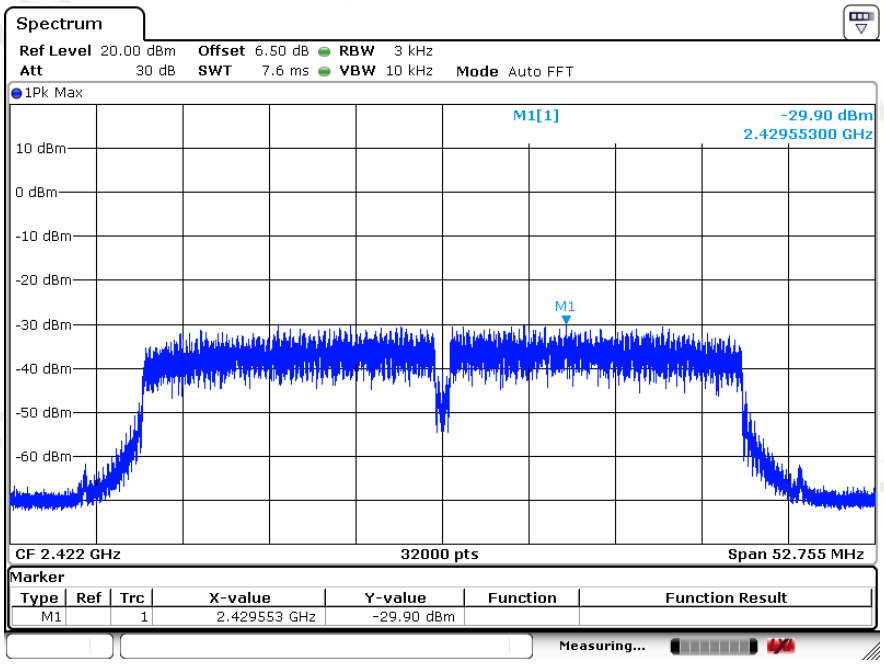
802.11 N20 Mode CH6



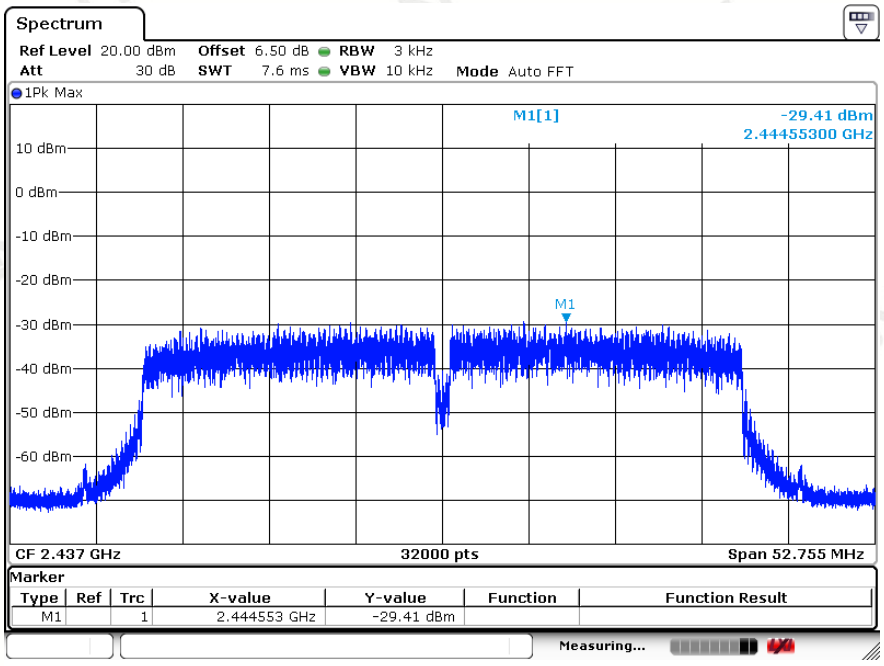
802.11 N20 Mode CH11



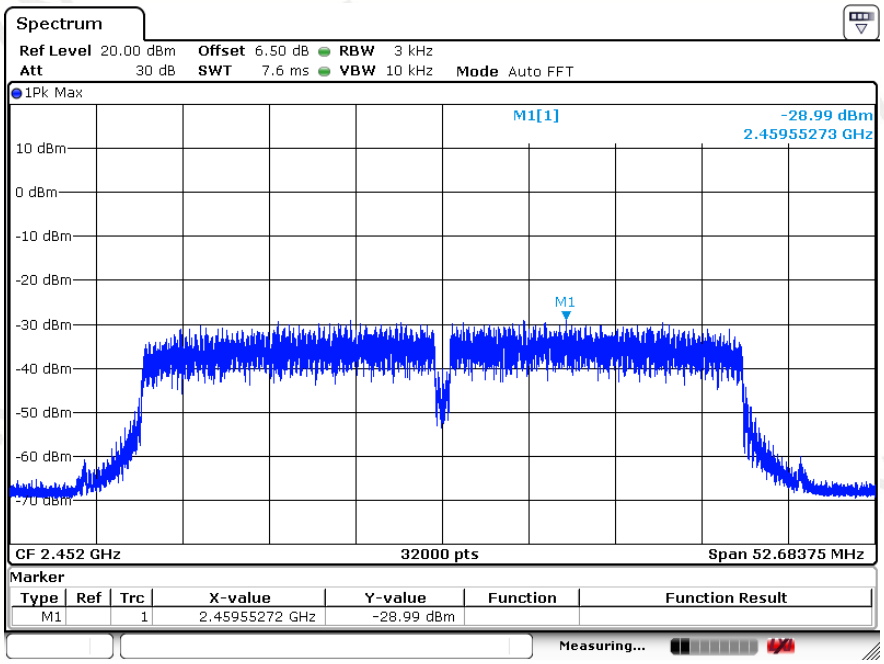
802.11 N40 Mode CH3



802.11 N40 Mode CH6



802.11 N40 Mode CH9



8 PEAK OUTPUT POWER TEST

8.1 Test Limit

FCC Part15(15.247), Subpart C				
Section	Test Item	Limit	Frequency Range (MHz)	Result
15.247(b)(3)	Peak Output Power	1 watt or 30dBm	2400-2483.5	PASS

8.2 Test Procedure

1. The EUT was placed on a turn table which is 0.8m above ground plane.
2. The EUT was directly connected to the Power meter.

8.3 Measurement Equipment Used

Same as Radiated Emission Measurement

8.4 Test Result

PASS

All the test modes completed for test.

EUT Set Mode	CH	Result(dBm) Peak	Total Power (dBm)	Limit	Conclusion
IEEE 802.11B	CH 1	8.65	/	30dBm	PASS
	CH 6	8.83	/	30dBm	PASS
	CH 11	8.75	/	30dBm	PASS
IEEE 802.11G	CH 1	8.11	/	30dBm	PASS
	CH 6	8.65	/	30dBm	PASS
	CH 11	8.77	/	30dBm	PASS
IEEE 802.11N20	CH 1	7.96	/	30dBm	PASS
	CH 6	8.03	/	30dBm	PASS
	CH 11	8.57	/	30dBm	PASS
IEEE 802.11N40	CH 3	7.62	/	30dBm	PASS
	CH 6	7.92	/	30dBm	PASS
	CH 9	8.32	/	30dBm	PASS

9 OUT OF BAND EMISSIONS TEST

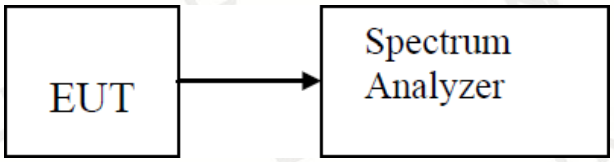
9.1 Test Limit

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.

9.2 Test Procedure

1. The EUT was placed on a turn table which is 0.8m above ground plane.
2. Set EUT as TX operation and connect directly to the spectrum analyzer.
3. Based on FCC Part15 C Section 15.247: RBW=100KHz, VBW=300KHz.
4. Set detected by the spectrum analyzer with peak detector.

9.3 Test Setup

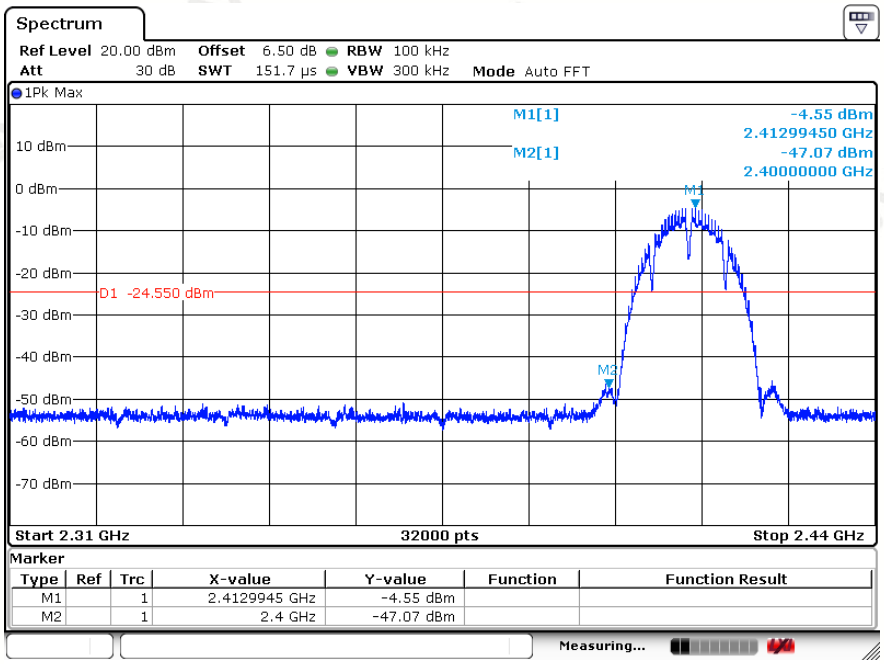


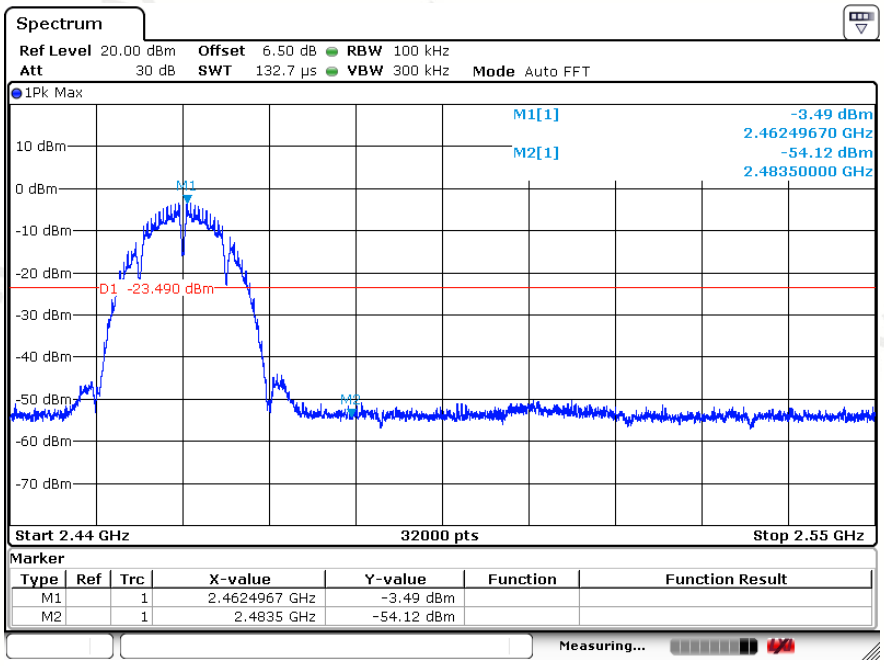
9.4 Test Result

PASS

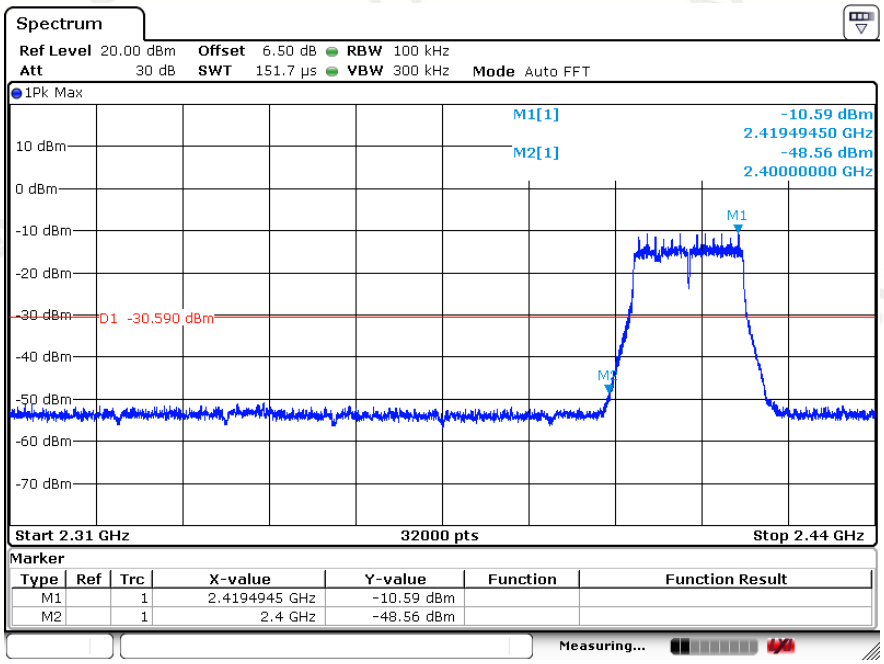
Frequency Band	Delta Peak to band emission (dBc)	＞Limit (dBc)	Result
IEEE 802.11B Mdoe			
2390	51.62	20	Pass
2483.5	57.61	20	Pass
IEEE 802.11G Mdoe			
2390	59.15	20	Pass
2483.5	63.51	20	Pass
IEEE 802.11N20 Mdoe			
2390	58.37	20	Pass
2483.5	62.90	20	Pass
IEEE 802.11N40 Mdoe			
2390	65.19	20	Pass
2483.5	66.54	20	Pass

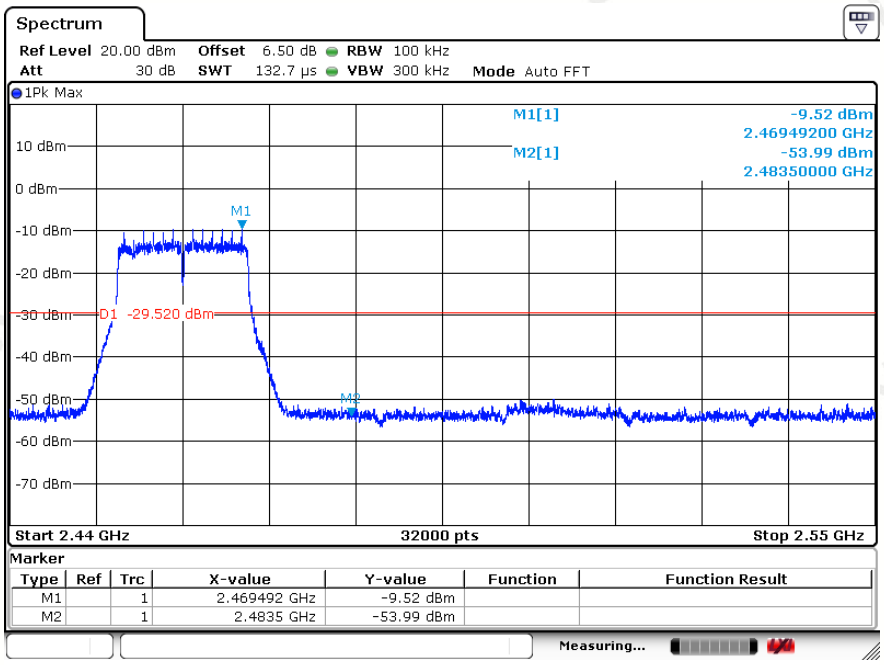
802.11B Mode


Spectrum
Ref Level 20.00 dBm Offset 6.50 dB RBW 100 kHz
Att 30 dB SWT 151.7 µs VBW 300 kHz Mode Auto FFT
1Pk Max
M1[1] -4.55 dBm
2.41299450 GHz
M2[1] -47.07 dBm
2.40000000 GHz
D1 -24.550 dBm
Start 2.31 GHz 32000 pts Stop 2.44 GHz
Marker
Type Ref Trc X-value Y-value Function Function Result
M1 1 2.4129945 GHz -4.55 dBm
M2 1 2.4 GHz -47.07 dBm
Measuring...

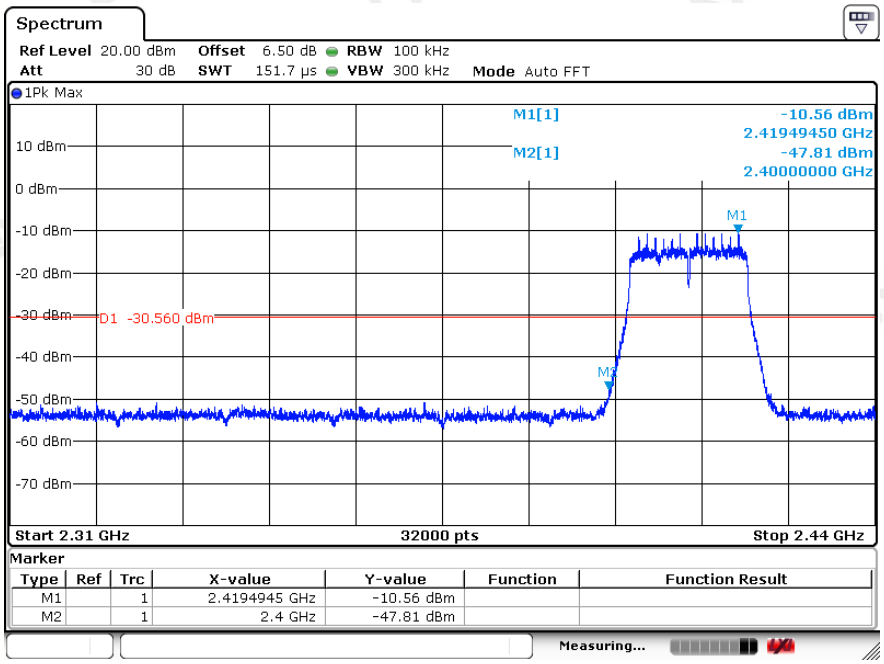

Spectrum
Ref Level 20.00 dBm Offset 6.50 dB RBW 100 kHz
Att 30 dB SWT 132.7 µs VBW 300 kHz Mode Auto FFT
1Pk Max
M1[1] -3.49 dBm
2.46249670 GHz
M2[1] -54.12 dBm
2.48350000 GHz
D1 -23.490 dBm
Start 2.44 GHz 32000 pts Stop 2.55 GHz
Marker
Type Ref Trc X-value Y-value Function Function Result
M1 1 2.4624967 GHz -3.49 dBm
M2 1 2.4835 GHz -54.12 dBm
Measuring...

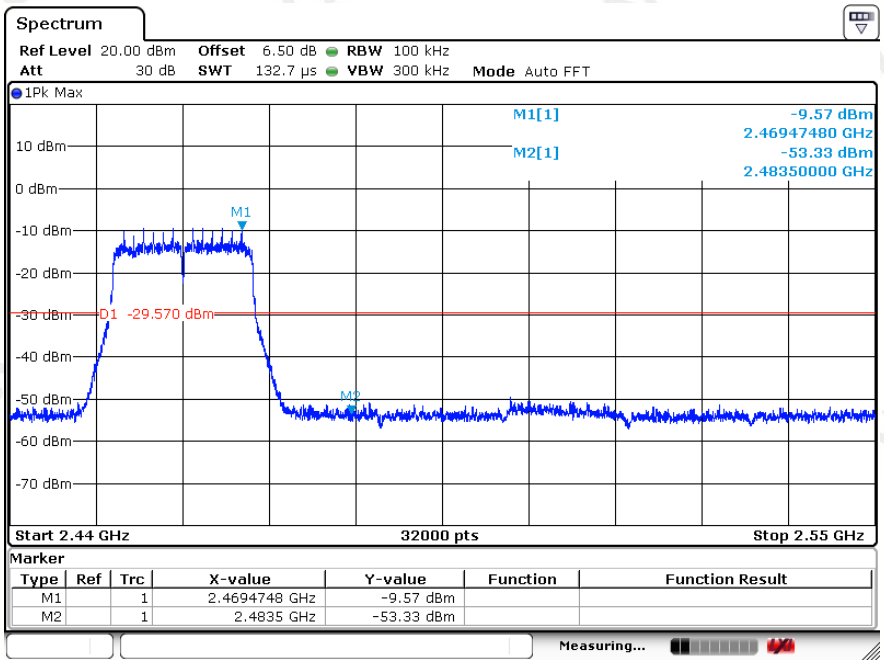
802.11G Mode


Spectrum
Ref Level 20.00 dBm Offset 6.50 dB RBW 100 kHz
Att 30 dB SWT 151.7 µs VBW 300 kHz Mode Auto FFT
1Pk Max
M1[1] -10.59 dBm
2.41949450 GHz
M2[1] -48.56 dBm
2.40000000 GHz
D1 -30.590 dBm
Start 2.31 GHz 32000 pts Stop 2.44 GHz
Marker
Type Ref Trc X-value Y-value Function Function Result
M1 1 2.4194945 GHz -10.59 dBm
M2 1 2.4 GHz -48.56 dBm
Measuring...

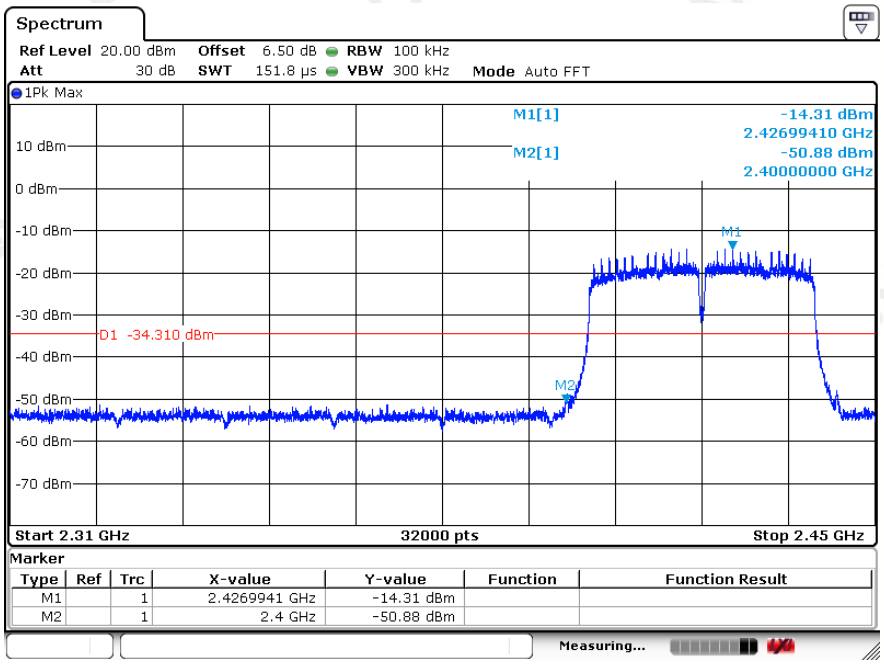

Spectrum
Ref Level 20.00 dBm Offset 6.50 dB RBW 100 kHz
Att 30 dB SWT 132.7 µs VBW 300 kHz Mode Auto FFT
1Pk Max
M1[1] -9.52 dBm
2.46949200 GHz
M2[1] -53.99 dBm
2.48350000 GHz
D1 -29.520 dBm
Start 2.44 GHz 32000 pts Stop 2.55 GHz
Marker
Type Ref Trc X-value Y-value Function Function Result
M1 1 2.469492 GHz -9.52 dBm
M2 1 2.4835 GHz -53.99 dBm
Measuring...

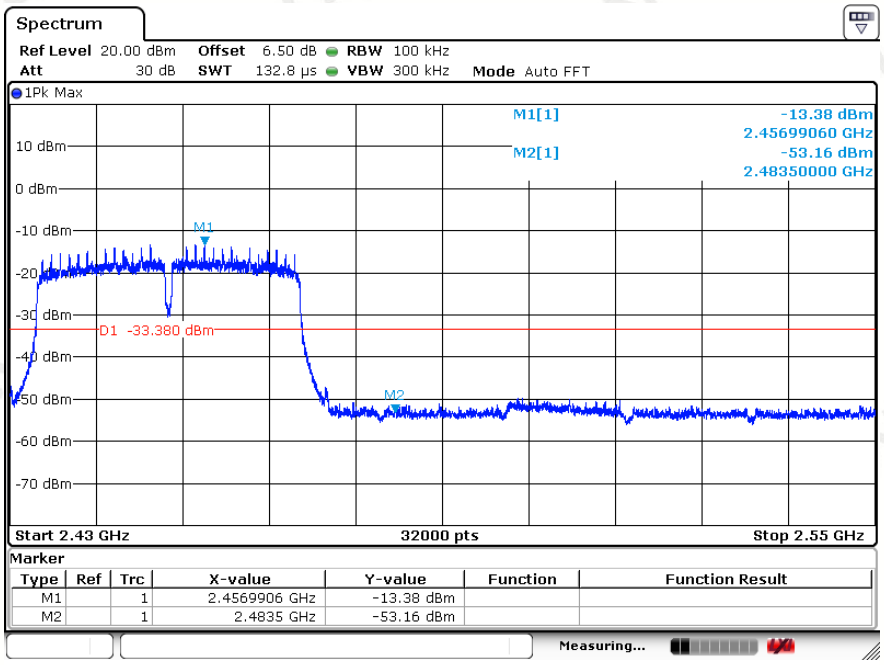
802.11 N20 Mode





802.11 N40 Mode





9 Conducted Spurious Emissions

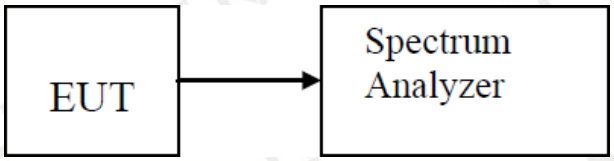
9.1 Test Limit

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.

9.2 Test Procedure

1. The EUT was placed on a turn table which is 0.8m above ground plane.
2. Set EUT as TX operation and connect directly to the spectrum analyzer.
3. Based on FCC Part15 C Section 15.247: RBW=100KHz, VBW=300KHz.
4. Set detected by the spectrum analyzer with peak detector.

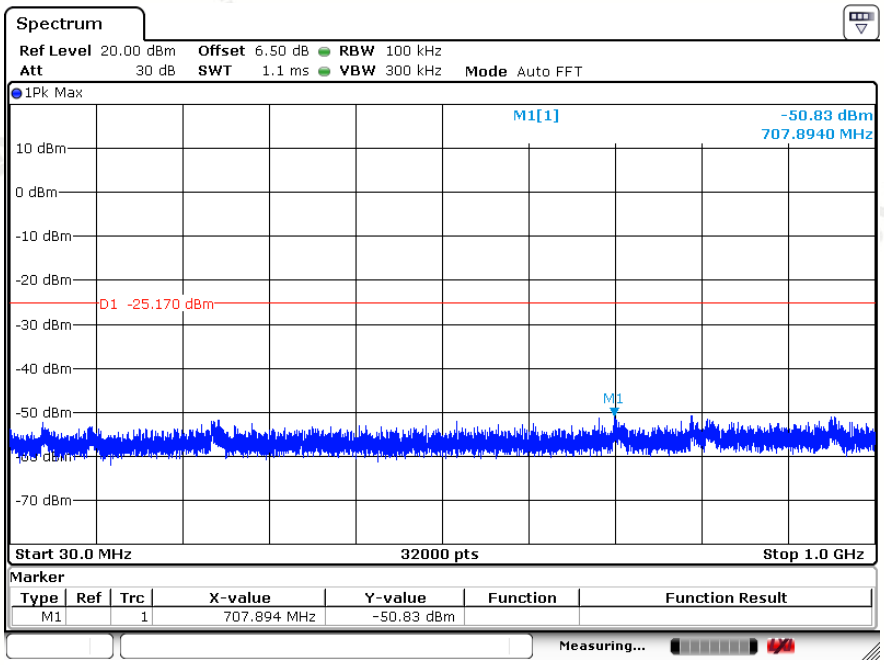
9.3 Test Setup

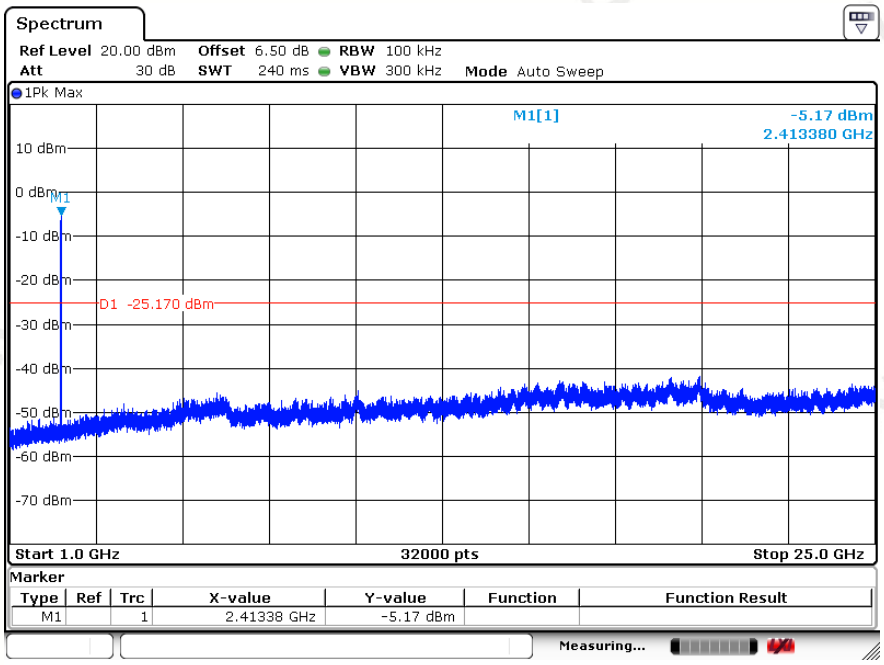


9.4 Test Result

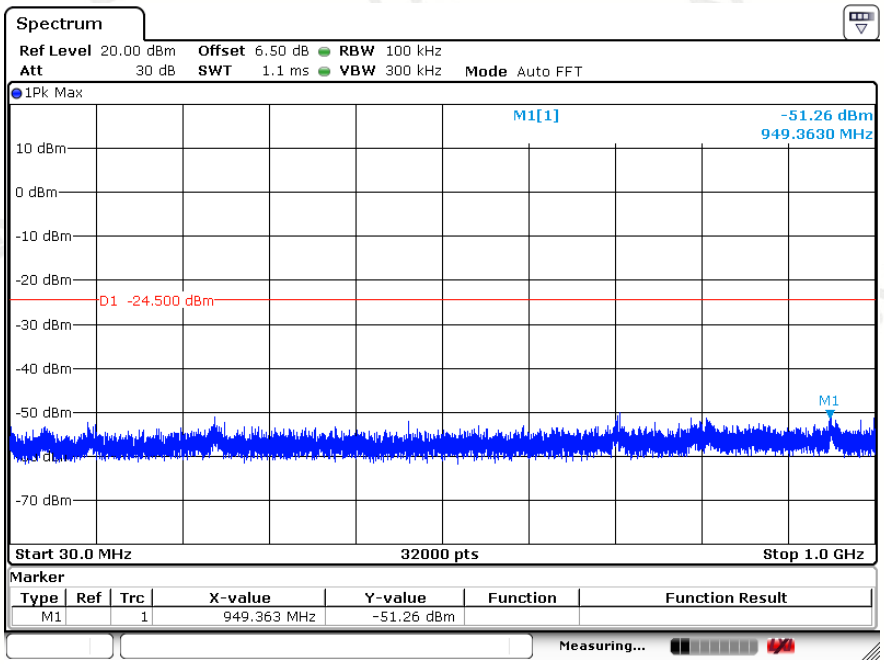
PASS

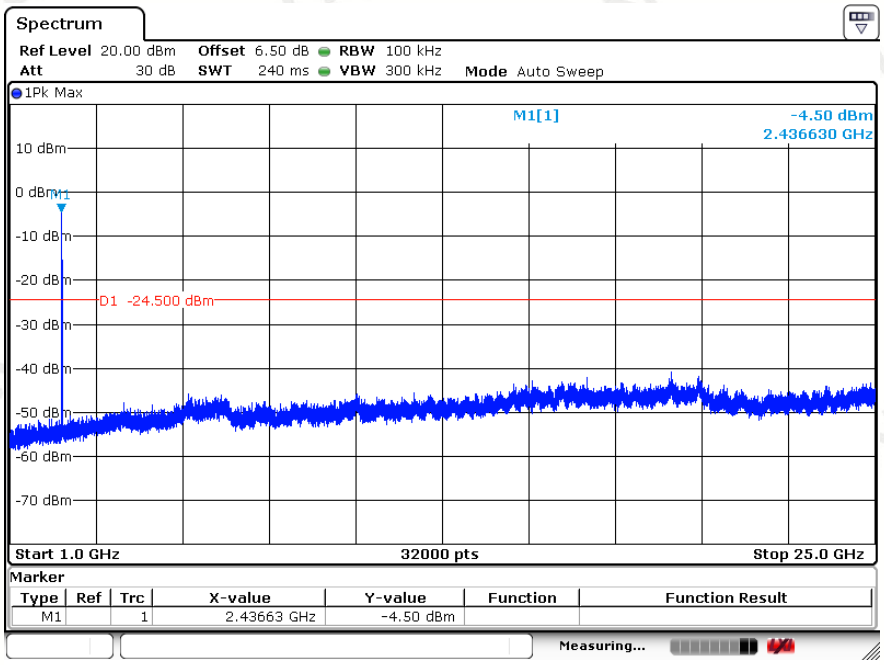
802.11 B Mode CH0



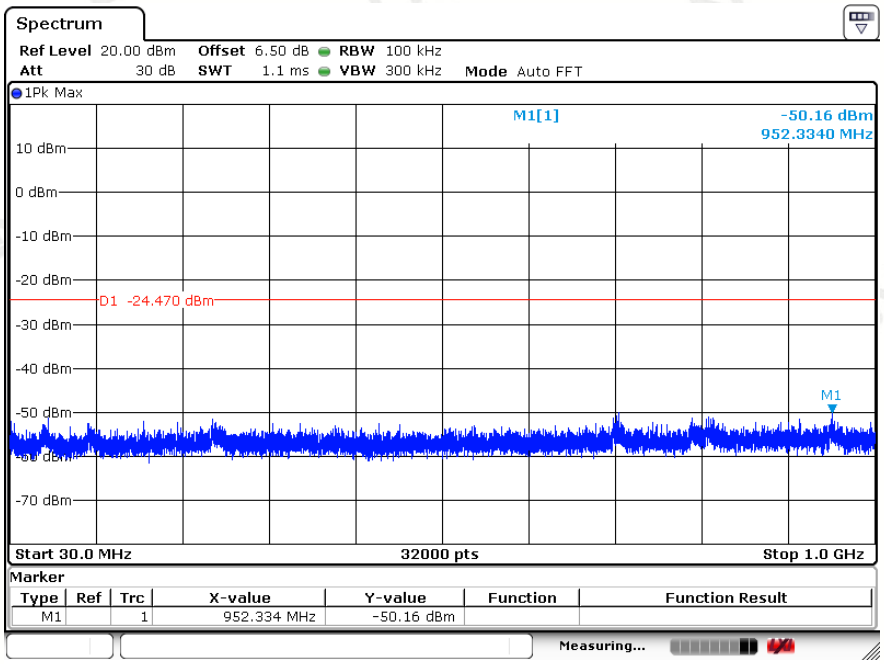


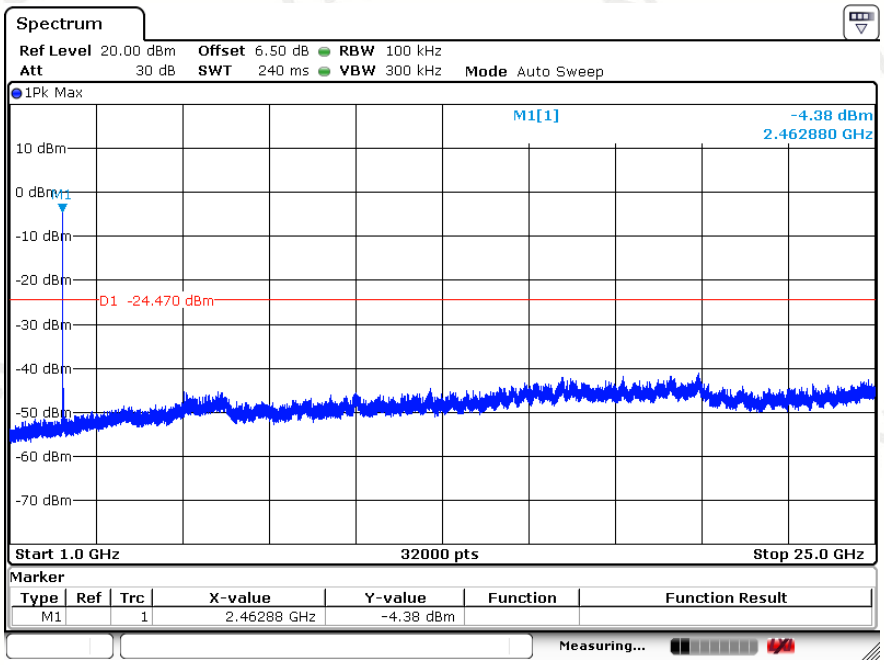
802.11 B Mode CH6



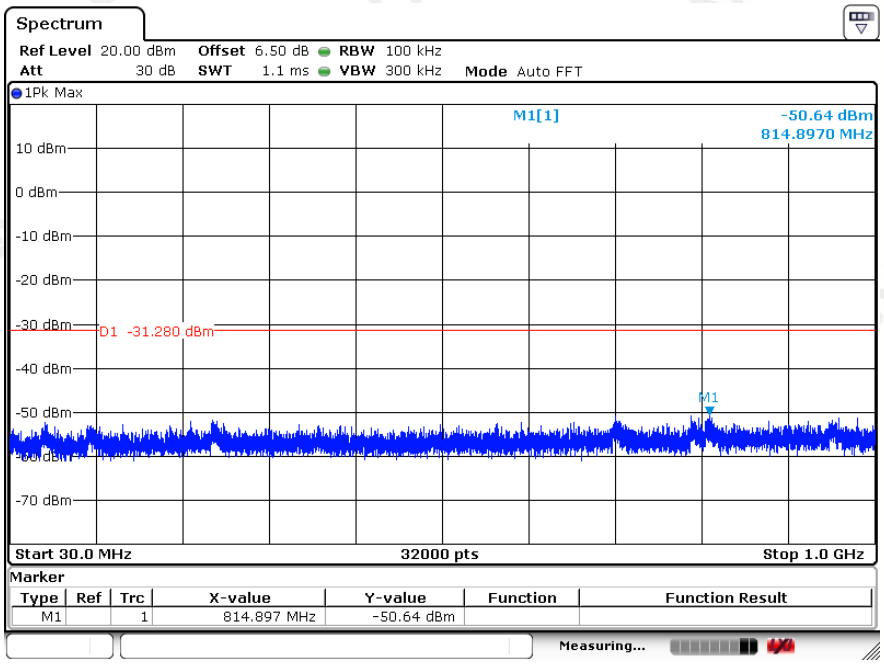


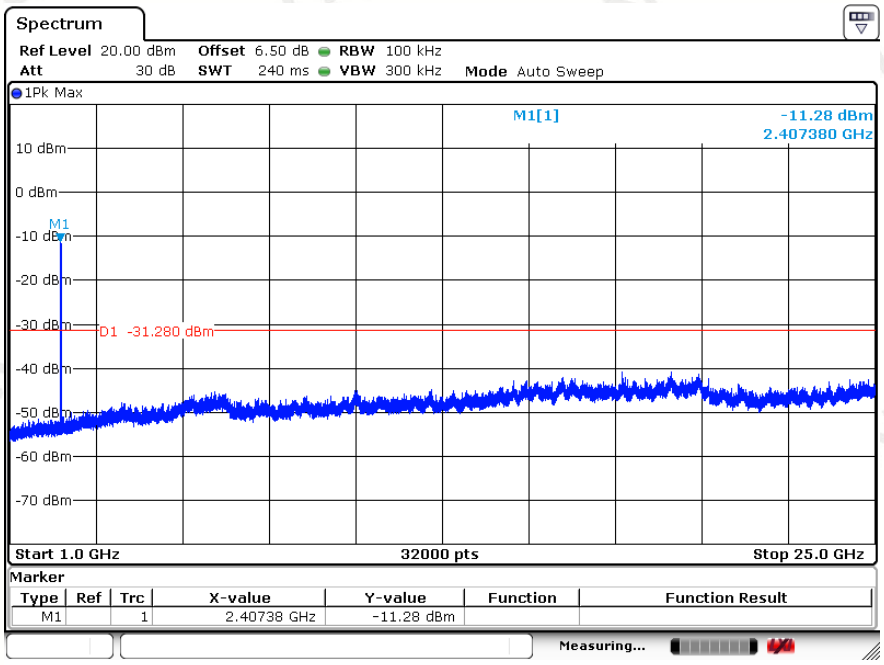
802.11 B Mode CH11



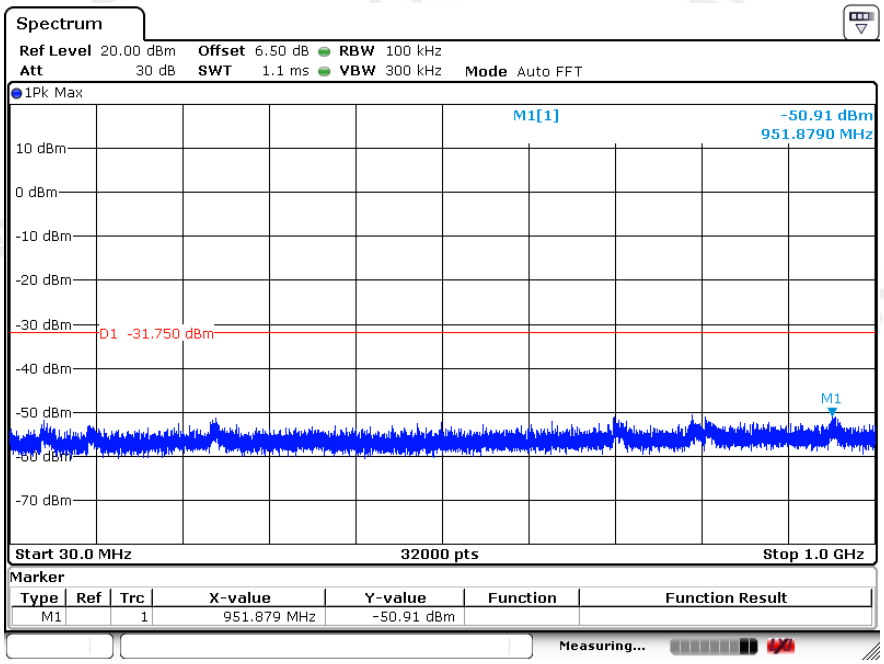


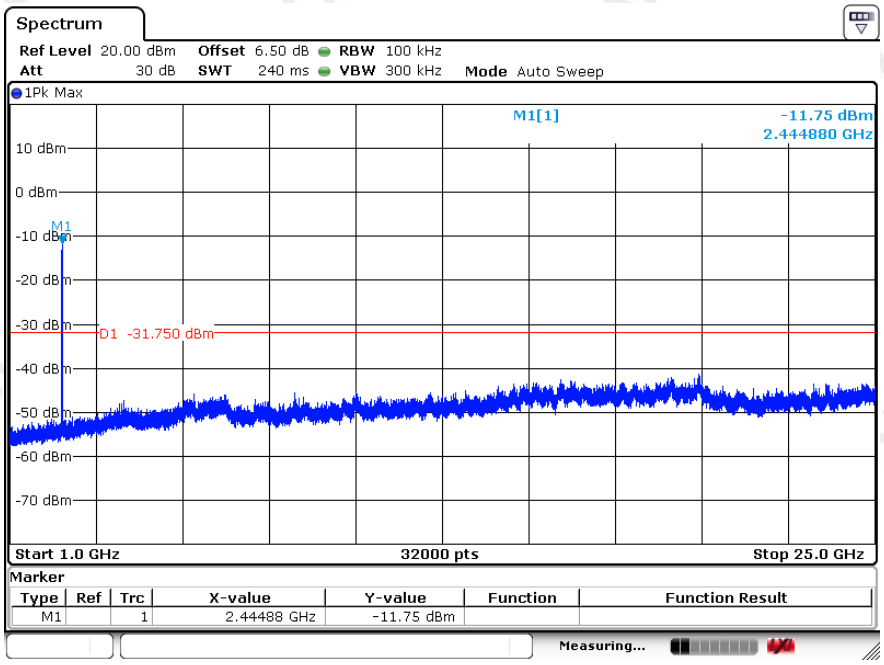
802.11 G Mode CH1



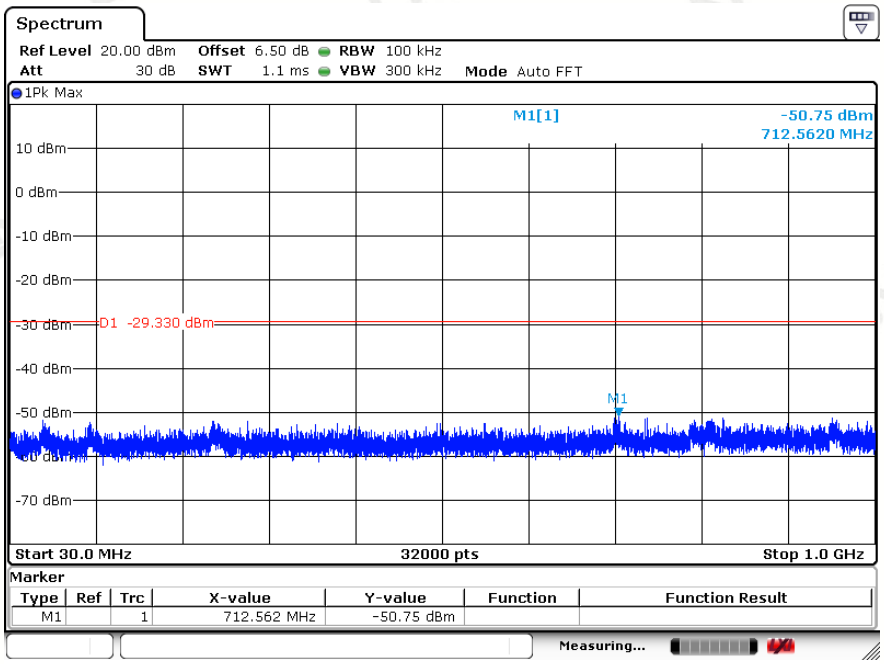


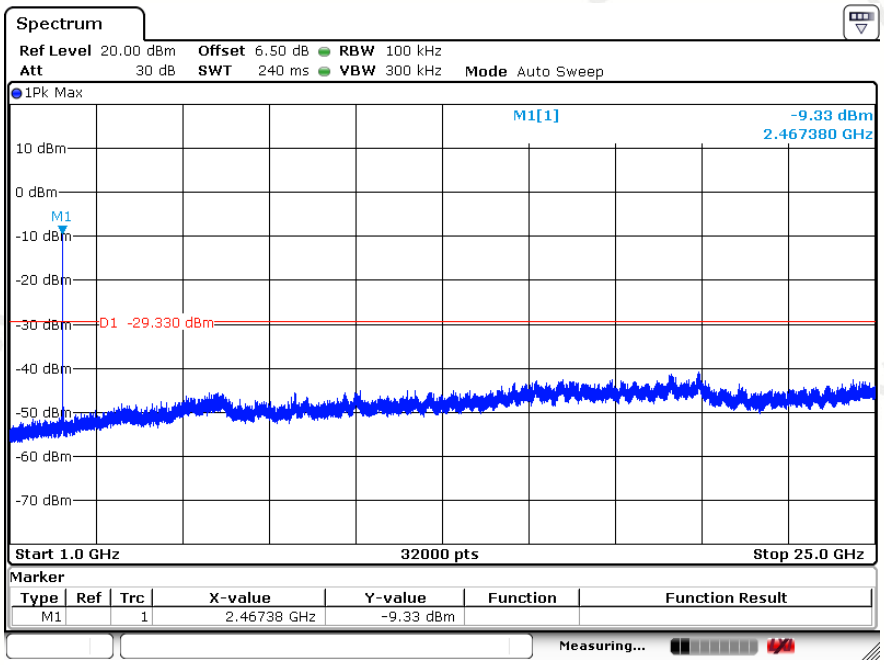
802.11 G Mode CH6



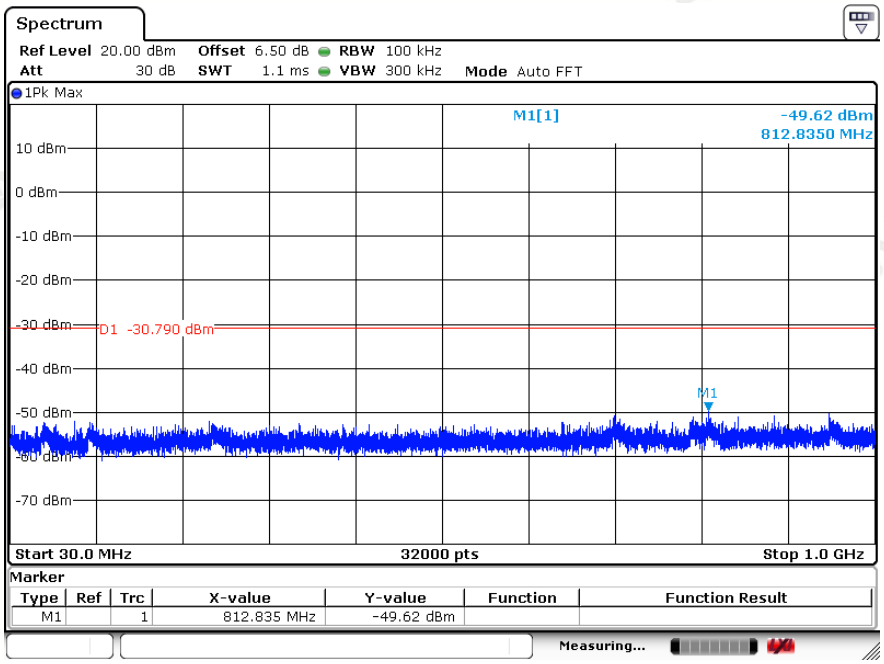


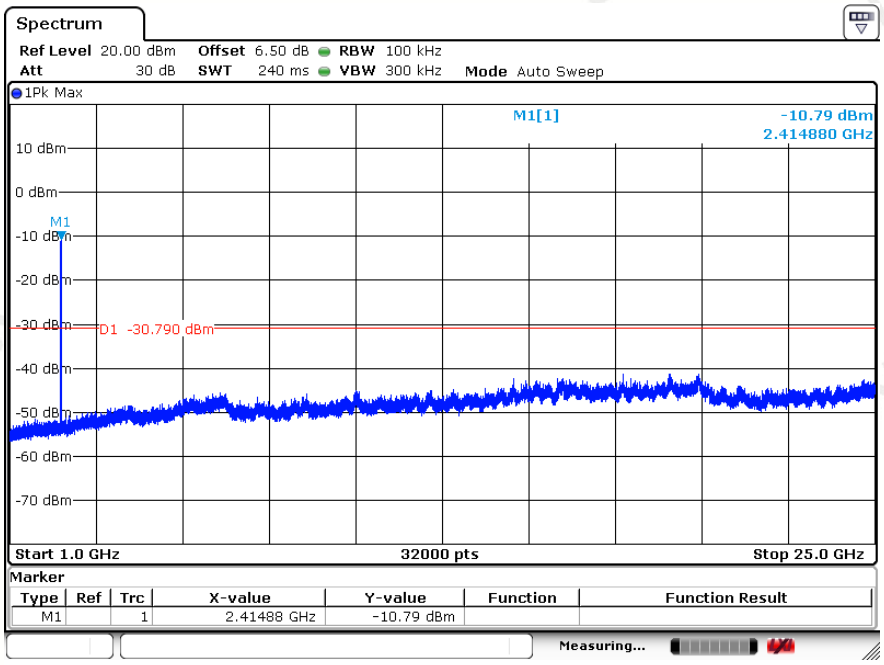
802.11 G Mode CH11



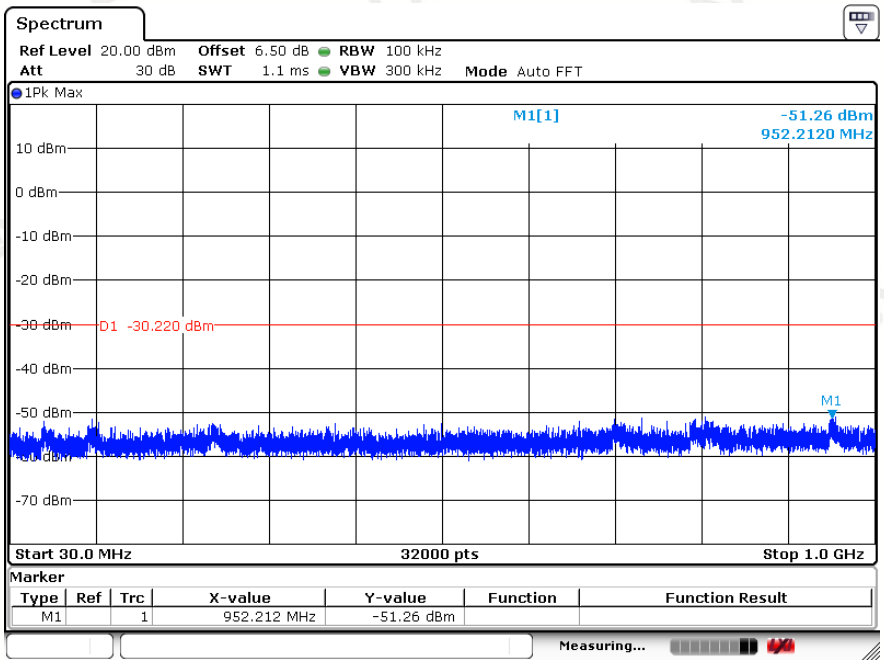


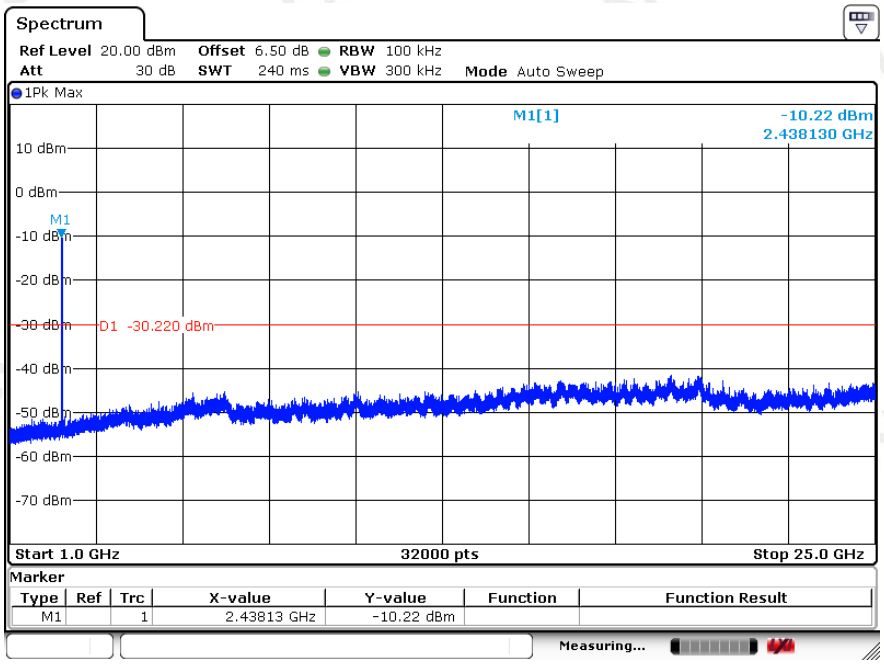
802.11 N20 Mode CH1



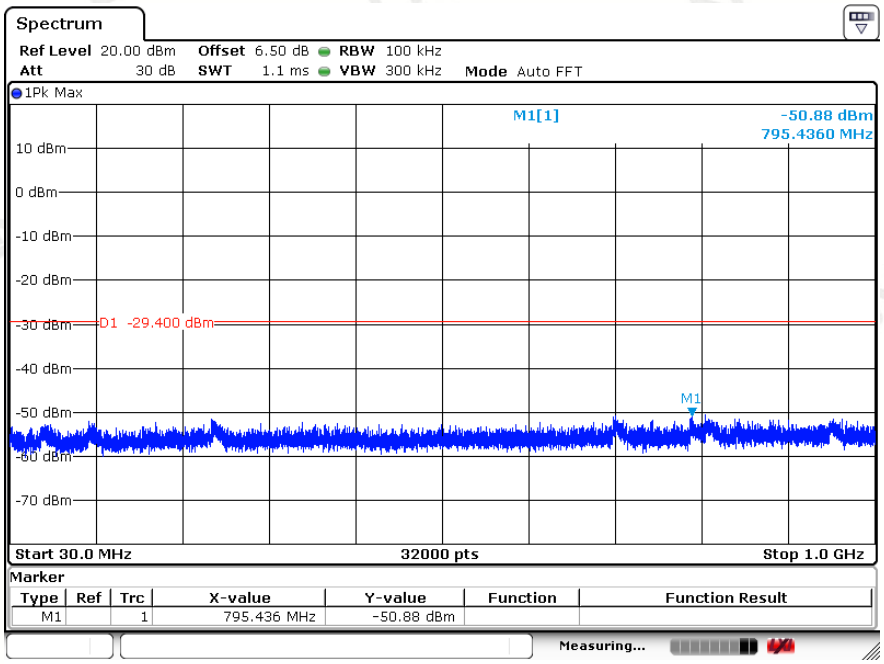


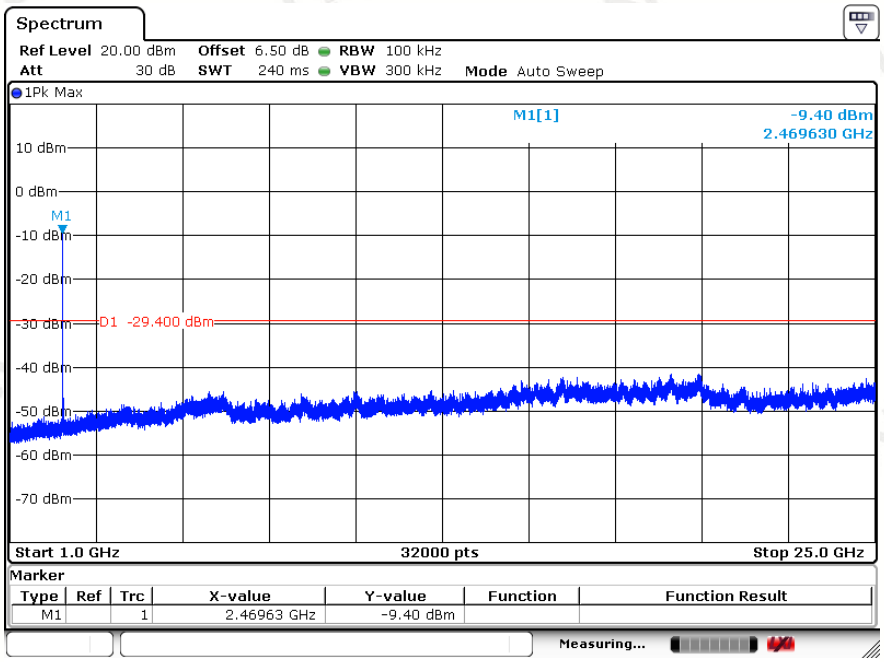
802.11 N20 Mode CH6



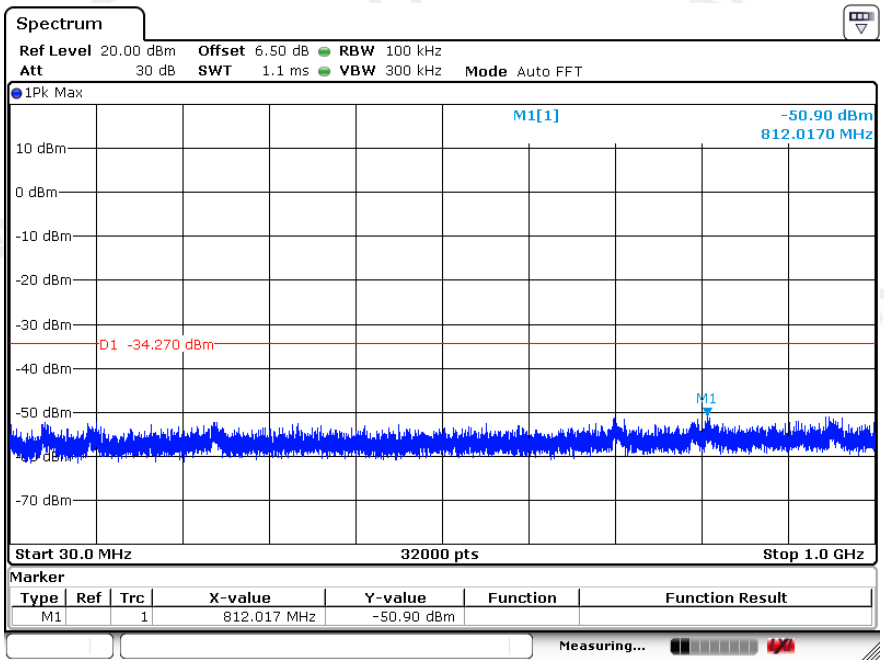


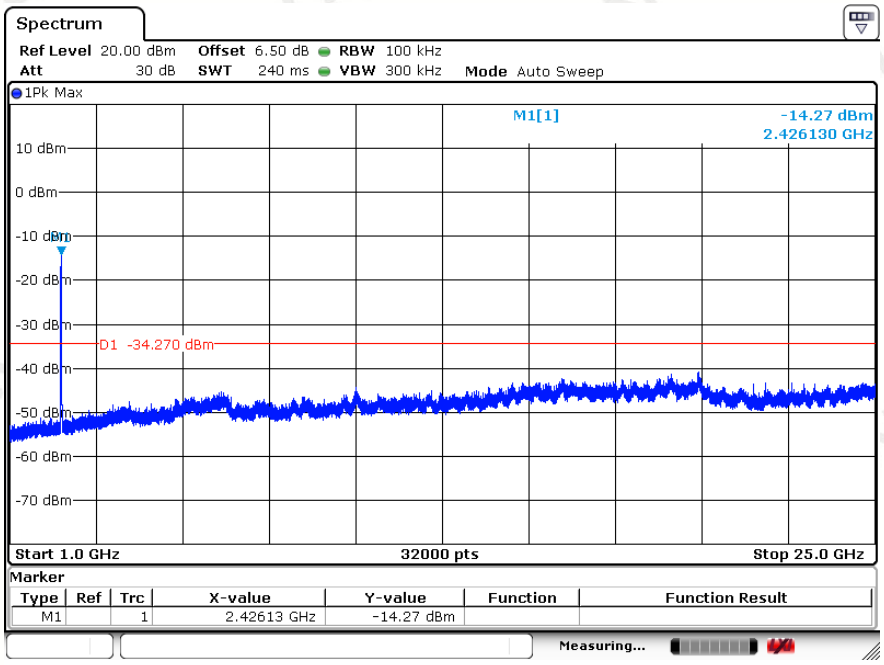
802.11 N20 Mode CH11



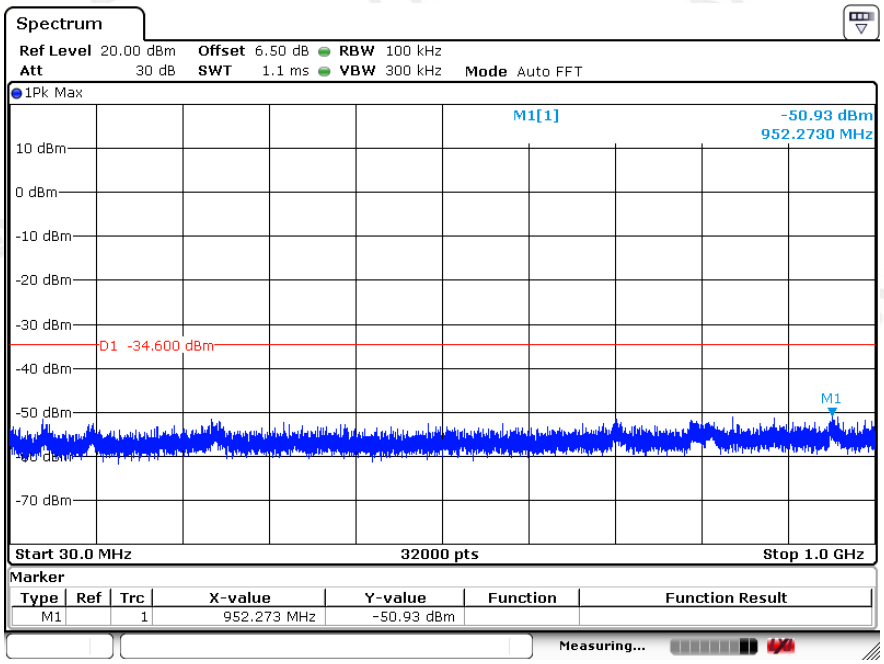


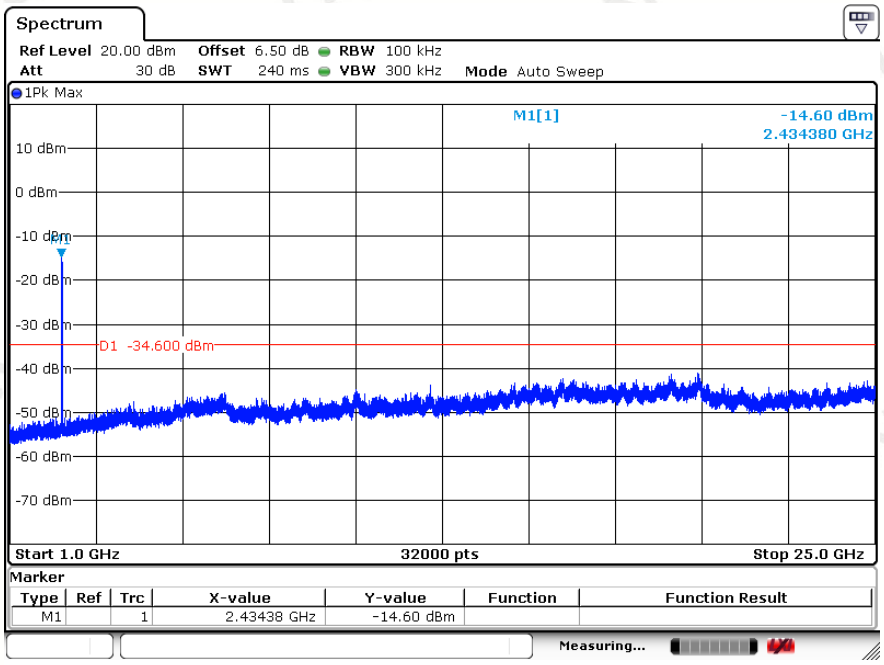
802.11 N40 Mode CH3



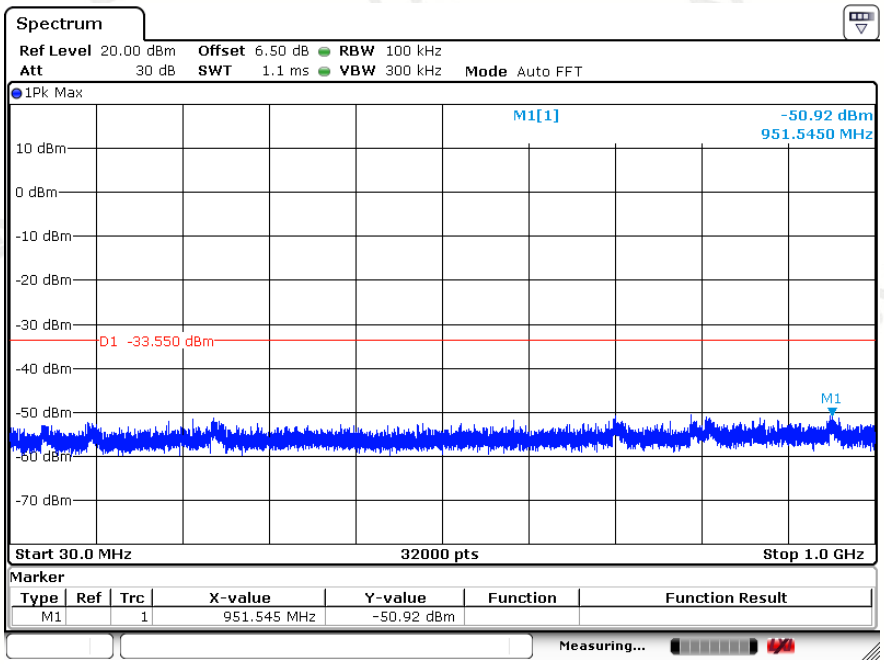


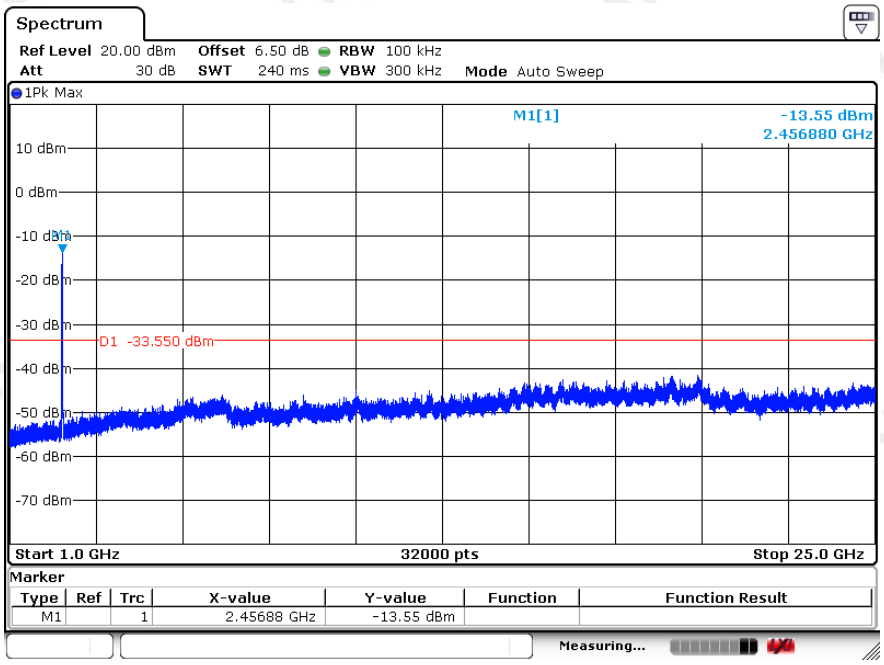
802.11 N40 Mode CH6





802.11 N40 Mode CH9





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.

Antenna Connected Construction
The antenna used in this product is a FPCB Antenna, The directional gains of antenna used for transmitting is 2.11dBi.

ANTENNA:

End of Report