FCC TEST REPORT

FCC ID: 2ARRCR11S

Product	:	Projector
Model Name	:	R11S, R15 , S1 , S3 ,T3 ,T5 , Q3 , Q5 , Q7 , P20 , P30
Brand	:	PODOOR
Report No.	:	PTC18110903101E-FC01

Prepared for

Shenzhen Ptah Technology Co.,Ltd

4/F,D Block, Xinda Technology Innovation Park, Baotian 2rd Road, Xixiang, Bao'an, Shenzhen, China

Prepared by

Dongguan Precise Testing & Certification Corp., Ltd.

Building D, Baoding Technology Park, Guangming Road 2, Guangming Community, Dongcheng District, Dongguan, Guangdong, China

1 TEST RESULT CERTIFICATION

Applicant's name	:	Shenzhen Ptah Technology Co.,Ltd
Address	:	4/F,D Block, Xinda Technology Innovation Park, Baotian 2rd Road, Xixiang, Bao'an, Shenzhen, China
Manufacture's name	:	Shenzhen Ptah Technology Co.,Ltd
Address	:	4/F,D Block, Xinda Technology Innovation Park, Baotian 2rd Road, Xixiang, Bao'an, Shenzhen, China
Product name	:	Projector
Model name	:	R11S, R15 , S1 , S3 ,T3 ,T5 , Q3 , Q5 , Q7 , P20 , P30
Standards	:	FCC CFR47 Part 15 Section 15.247: 2017
Test procedure	:	ANSI C63.10:2013
Test Date	:	October 24, 2018 to November 08, 2018
Date of Issue	:	November 08, 2018
Test Result	:	Pass

This device described above has been tested by PTC, 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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Test Engineer:

Leo Yang / Engineer

Technical Manager:

Chris Du / Manager

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2 Test Summary

Test Items	Test Requirement	Result
Conduct Emission	15.207	PASS
Radiated Spurious Emissions	15.205(a) 15.209 15.247(d)	PASS
Conducted Spurious Emission	15.247(d)	PASS
Band edge	15.247(d) 15.205(a)	PASS
6dB Bandwidth	15.247(a)(2)	PASS
Maximum Peak Output Power	15.247(b)(1)	PASS
Power Spectral Density	15.247(e)	PASS
Antenna Requirement	15.203	PASS
Remark: N/A: Not Applicable		

3 General Information

3.1 General Description of E.U.T.

Product Name	:	Projector
Model Name	:	R11S, R15 , S1 , S3 ,T3 ,T5 , Q3 , Q5 , Q7 , P20 , P30 (Note: The samples are the same except appearance and model number. So R11S was selected for full tested.)
Specification	:	802.11b/g/n HT20/HT40
MIMO	:	802.11n(HT20), 802.11n(HT40)
Operation Frequency	:	2412-2462MHz for 802.11b/g/n(HT20) 2422-2452MHz for 802.11n(HT40)
Number of Channel	:	11 channels for 802.11b/g/n(HT20) 7 channels for 802.11b/g/n(HT20)
Type of Modulation	:	DSSS with DBPSK/DQPSK/CCK for 802.11b; OFDM with BPSK/QPSK/16QAM/64QAM for 802.11g/n;
Antenna installation	:	Built-in Antenna
Antenna Type	:	2TX2RX
Antenna Port	:	Ant1, Ant2
Antenna Gain	:	2.5 dBi for SISO 5.51 dBi for MIMO
Power supply	:	For Adapter: Model: EQ-24BCN Input: AC 100-240V, 50/60Hz, 0.8A MAX Output: DC 3.6V-8V, 3.0A or DC 12V, 2.0A
Hardware Version	:	N/A
Software Version	:	N/A

3.2 Channel List

The EUT has been tested under its typical operating condition.

The EUT configuration for testing is installed on RF field strength measurement to meet the Commissions requirement and operating in a manner which intends to maximize its emission characteristics in a continuous normal application.

The Transmitter was operated in the normal operating mode. The TX frequency was fixed which was for the purpose of the measurements.

Test of channel included the lowest and middle and highest frequency to perform the test, then record on this report.

Pre-defined engineering program for regulatory testing used to control the EUT for staying in continuous transmitting and receiving mode is programmed.

Frequency and Channel list :

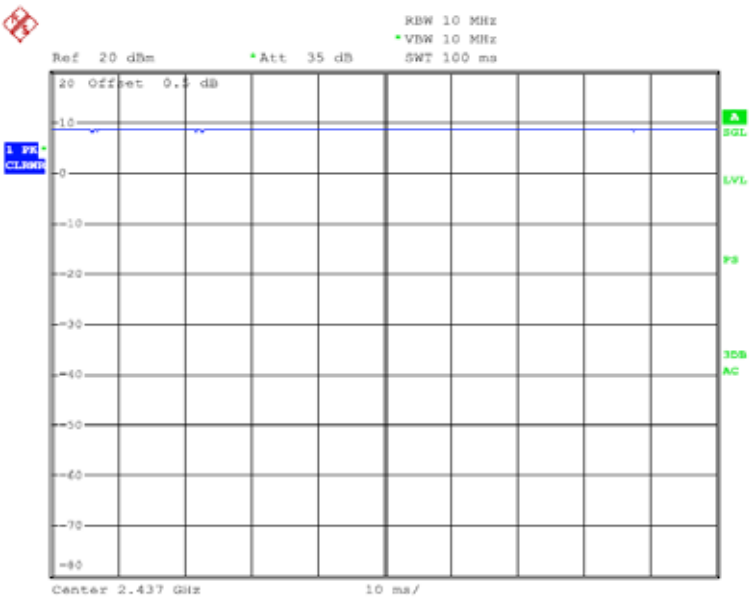
802.11b/g/n(HT20)		802.11n(HT40)	
Channel	Frequency (MHz)	Channel	Frequency (MHz)
1	**2412**	1	--
2	2417	2	--
3	2422	**3**	**2422**
4	2427	4	2427
5	2432	5	2432
6	**2437**	**6**	**2437**
7	2442	7	2442
8	2447	8	2447
9	2452	**9**	**2452**
10	2457	10	--
11	**2462**	11	--

The maximum duty cycle as following table:

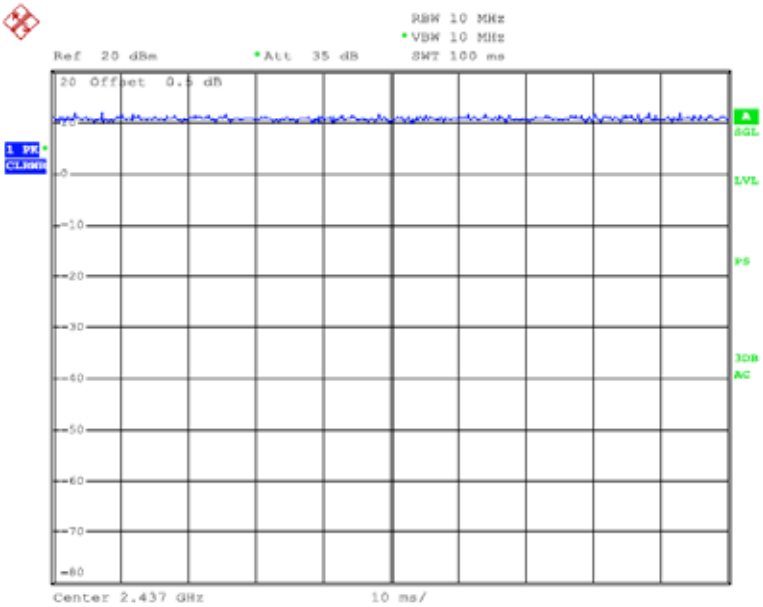
Test Mode	T_{on}(ms)	T_{on+off}(ms)	Duty Cycle(%)
802.11b	100	100	100%
802.11g	100	100	100%
802.11n(HT20)	100	100	100%
802.11n(HT40)	100	100	100%

Test Plots:

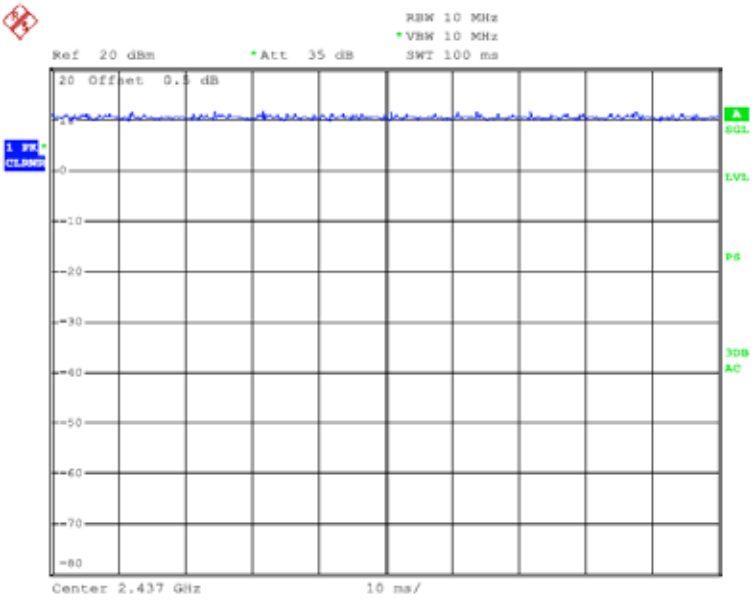
802.11b



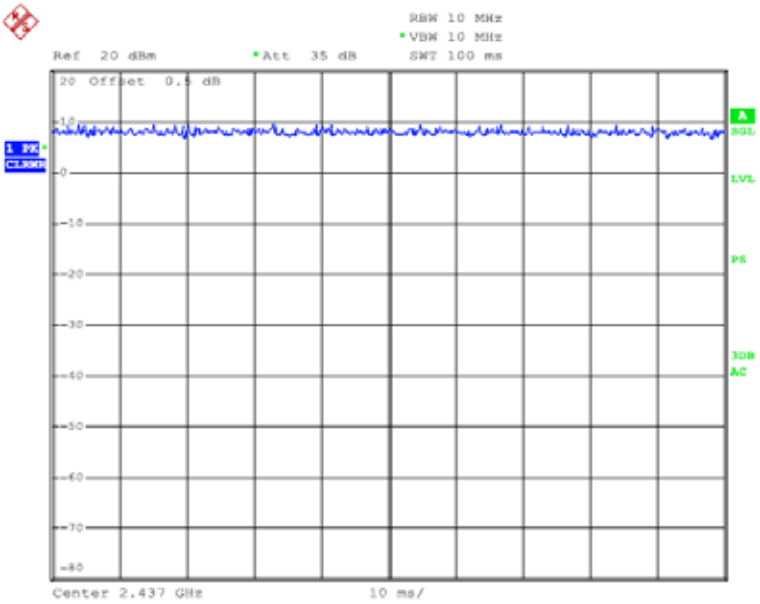
802.11g



802.11n(HT20)



802.11n(HT40)


RBW 10 MHz
VBW 10 MHz
Ref 20 dBm
Att 35 dB
SWT 100 ms
20 Offset 0.5 dB
1 PK
CLRWR
A
SGL
LVL
PS
3DB
AC
Center 2.437 GHz
10 ms/

3.3 Test Site

Dongguan Precise Testing & Certification Corp., Ltd.

Building D, Baoding Technology Park, Guangming Road2, Dongcheng District, Dongguan, Guangdong, China

FCC Registration Number: 790290

A2LA Certificate No.: 4408.01

IC Registration Number: 12191A-1

Test Lab: Shenzhen BCTC Testing Co., Ltd.

Address: BCTC Building & 1-2F, East of B Building, Pengzhou Industrial, Fuyuan 1st Road, Qiaotou Community, Fuyong Street, Bao'an District, Shenzhen, China

FCC Registered No.: 712850

Test items: Radiated Spurious Emission(18GHz to 25GHz)

4 Equipment During Test

4.1 Equipments List

RF Conducted Test

Name of Equipment	Manufacturer	Model	Serial No.	Characteristics	Calibration Due
MXG Signal Analyzer	Agilent	N9020A	MY56070279	10Hz-30GHz	Sep.19, 2019
Coaxial Cable	CDS	79254	46107086	10Hz-30GHz	Sep.19, 2019
Power Meter	Anritsu	ML2495A	0949003	300MHz-40GHz	Sep.19, 2019
Power Sensor	Anritsu	MA2411B	0917017	300MHz-40GHz	Sep.19, 2019

Remark: The temporary antenna connector is soldered on the PCB board in order to perform conducted tests and this temporary antenna connector is listed in the equipment list.

Radiated Emissions(Test Frequency from 9KHz-18GHz)

Name of Equipment	Manufacturer	Model	Serial No.	Characteristics	Calibration Due
EMI Test Receiver	Rohde&Schwarz	ESCI	101417	9KHz-3GHz	Sep.19, 2019
Loop Antenna	Schwarzbeck	FMZB 1519	012	9 KHz -30MHz	Sep.19, 2019
Bilog Antenna	SCHWARZBECK	VULB 9168	9168-572	25MHz-2GHz	Sep. 21, 2019
Preamplifier (low frequency)	SCHWARZBECK	BBV 9475	9745-0013	1MHz-1GHz	Sep.19, 2019
Cable	Schwarzbeck	PLF-100	549489	9KHz-3GHz	Sep.19, 2019
Spectrum Analyzer	Agilent	E4407B	MY45109572	9KHz-40GHz	Sep.19, 2019
Horn Antenna	SCHWARZBECK	9120D	9120D-1246	1GHz-18GHz	Sep.26, 2019
Power Amplifier	LUNAR EM	LNA1G18-40	J10100000081	1GHz-26.5GHz	Sep.19, 2019
Cable	H+S	CBL-26	N/A	1GHz-26.5GHz	Sep.19, 2019

Radiated Emission (Test Frequency from 18GHz-25GHz) (For Shenzhen BCTC Testing Co., Ltd.)

Name of Equipment	Manufacturer	Model	Serial No.	Characteristics	Calibration Due
Spectrum Analyzer	Agilent	E4407B	MY45109572	9KHz-26.5GHz	Aug. 25, 2019
Test Receiver	R&S	ESPI	101396	9KHz-7GHz	Aug. 25, 2019
Horn Antenna	SCHWARZBECK	BBHA 9170	9170-181	14GHz-40GHz	Aug. 25, 2019
Amplifier	SCHWARZBECK	BBV 9721	9721-205	18GHz-40GHz	Aug. 25, 2019
RF Cable	R&S	R204	R21X	1GHz-40GHz	Aug. 25, 2019
Antenna Connector	Florida RF Labs	N/A	RF01#	N/A	Aug. 25, 2019

Conducted Emissions

Name of Equipment	Manufacturer	Model	Serial No.	Characteristics	Calibration Due
EMI Test Receiver	Rohde&Schwarz	ESCI	101417	9KHz-3GHz	Sep.19, 2019
Artificial Mains Network	Rohde&Schwarz	L2-16B	000WX31025	9KHz-300MHz	Sep.19, 2019
Artificial Mains Network	Rohde&Schwarz	ENV216	101342	9KHz-300MHz	Sep.19, 2019

4.2 Measurement Uncertainty

Parameter	Uncertainty
RF output power, conducted	±1.0dB
Power Spectral Density, conducted	±2.2dB
Radio Frequency	± 1 x 10^{-6}
Bandwidth	± 1.5 x 10^{-6}
Time	±2%
Duty Cycle	±2%
Temperature	±1°C
Humidity	±5%
DC and low frequency voltages	±3%
Conducted Emissions (150kHz~30MHz)	±3.64dB
Radiated Emission(30MHz~1GHz)	±5.03dB
Radiated Emission(1GHz~25GHz)	±4.74dB

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

4.3 Description of Support Units

Equipment	Model No.	Series No.
N/A	N/A	N/A

5 Conducted Emission

Test Requirement:	:	FCC CFR 47 Part 15 Section 15.207
Test Method	:	ANSI C63.10: 2013
Test Result	:	PASS
Frequency Range	:	150kHz to 30MHz
Class/Severity	:	Class B

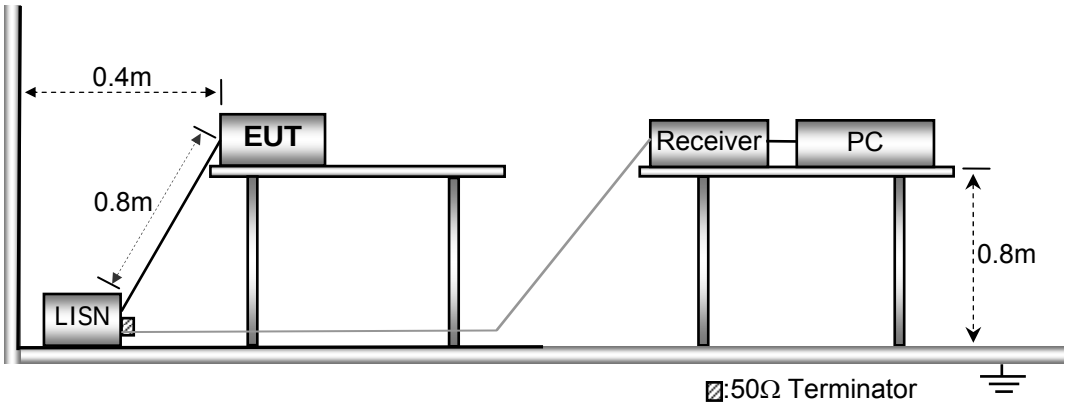
5.1 E.U.T. Operation

Operating Environment **:**

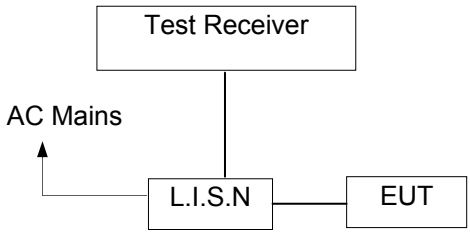
Temperature	:	25.5 °C
Humidity	:	51 % RH
Atmospheric Pressure	:	101.2kPa

5.2 EUT Setup

The conducted emission tests were performed using the setup accordance with the ANSI C63.10:2013.



5.3 Test SET-UP (Block Diagram of Configuration)



5.4 Measurement Procedure

1. The EUT was placed on a table, which is 0.8m above ground plane.
2. Maximum procedure was performed on the six highest emissions to ensure EUT compliance.
3. Repeat above procedures until all frequency measured was complete.

5.5 Conducted Emission Limit

Conducted Emission

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

Note:
1. The lower limit shall apply at the transition frequencies
2.The limit decreases in line with the logarithm of the frequency in the range of 0.15 to 0.50MHz.

5.6 Measurement Description

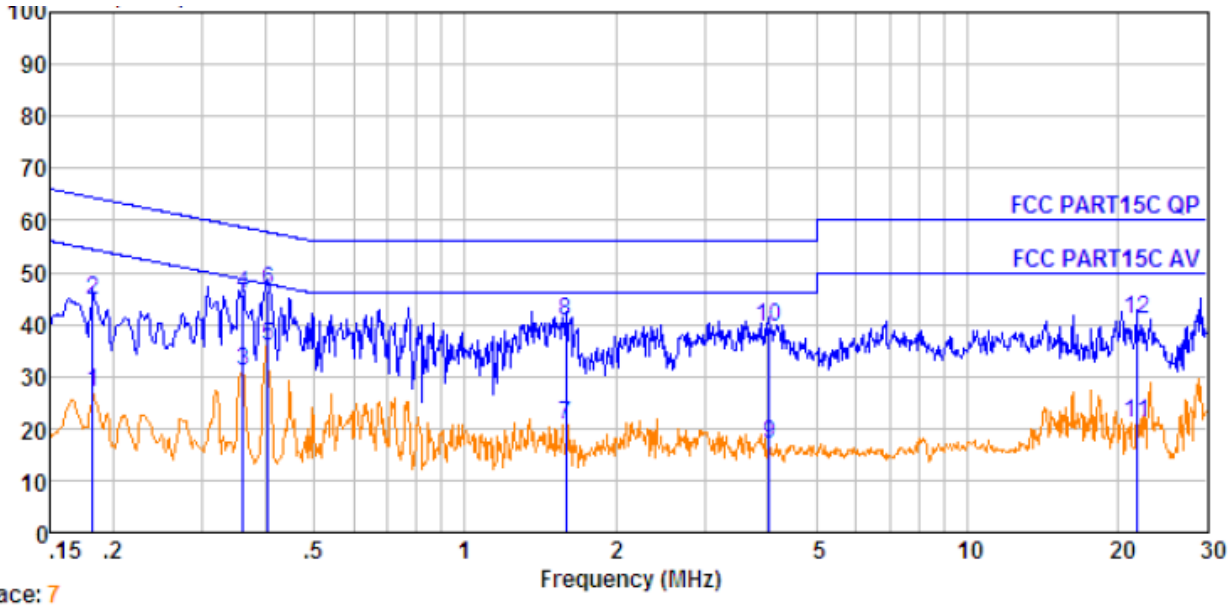
The maximised peak emissions from the EUT was scanned and measured for both the Live and Neutral Lines. Quasi-peak & average measurements were performed if peak emissions were within 6dB of the average limit line.

5.7 Conducted Emission Test Result

Pass.

Please refer to the following pages.

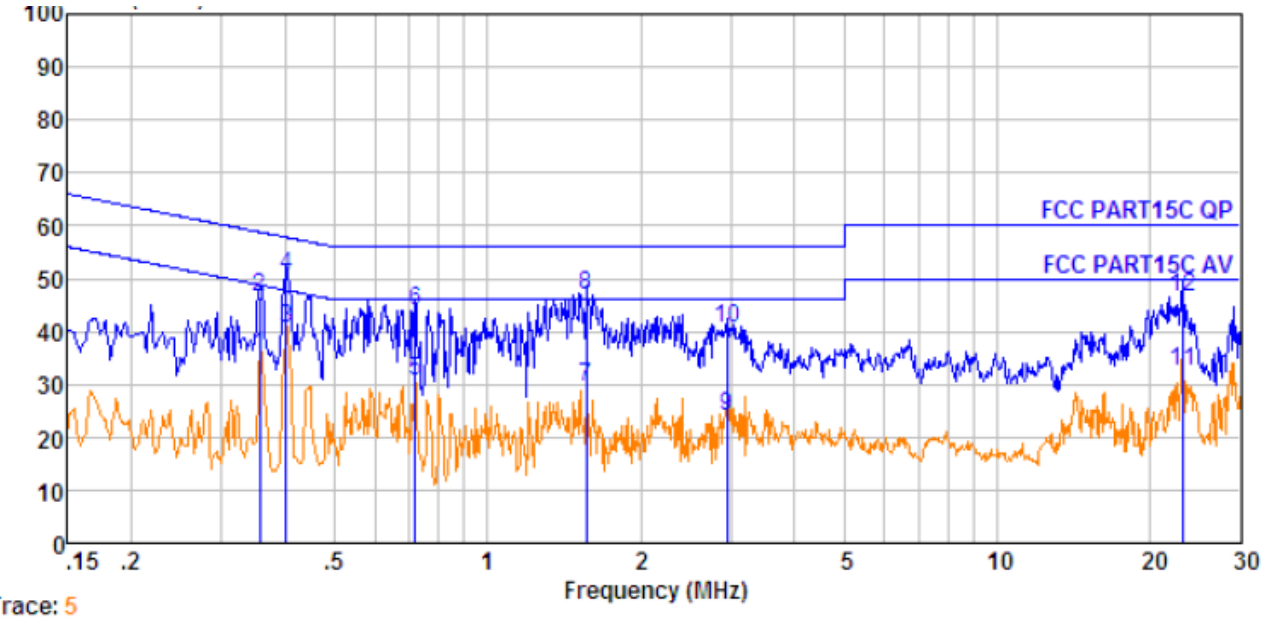
Line-AC 120V/60Hz



Trace: 7

No.	Freq MHz	Cable Loss dB	AMN Factor dB	Receiver Reading dBuV	Emission Level dBuV	Limit dBuV	Over Limit dB	Remark
1.	0.182	0.25	9.56	17.12	26.93	54.42	-27.49	Average
2.	0.182	0.25	9.56	34.96	44.77	64.42	-19.65	QP
3.	0.361	0.39	9.71	20.89	30.99	48.69	-17.70	Average
4.	0.361	0.39	9.71	35.79	45.89	58.69	-12.80	QP
5.	0.406	0.41	9.74	25.46	35.61	47.73	-12.12	Average
6.	0.406	0.41	9.74	36.38	46.53	57.73	-11.20	QP
7.	1.585	0.47	9.84	10.43	20.74	46.00	-25.26	Average
8.	1.585	0.47	9.84	30.20	40.51	56.00	-15.49	QP
9.	4.027	0.47	9.90	6.58	16.95	46.00	-29.05	Average
10.	4.027	0.47	9.90	29.14	39.51	56.00	-16.49	QP
11.	21.715	0.45	9.86	10.89	21.20	50.00	-28.80	Average
12.	21.715	0.45	9.86	30.51	40.82	60.00	-19.18	QP

Neutral-AC 120V/60Hz



Trace: 5

No.	Freq MHz	Cable Loss dB	AMN Factor dB	Receiver Reading dBuV	Emission Level dBuV	Limit dBuV	Over Limit dB	Remark
1.	0.358	0.39	9.74	25.47	35.60	48.78	-13.18	Average
2.	0.358	0.39	9.74	36.37	46.50	58.78	-12.28	QP
3.	0.402	0.40	9.76	30.50	40.66	47.81	-7.15	Average
4.	0.402	0.40	9.76	40.42	50.58	57.81	-7.23	QP
5.	0.720	0.44	9.83	20.43	30.70	46.00	-15.30	Average
6.	0.720	0.44	9.83	33.46	43.73	56.00	-12.27	QP
7.	1.560	0.47	9.87	19.34	29.68	46.00	-16.32	Average
8.	1.560	0.47	9.87	36.39	46.73	56.00	-9.27	QP
9.	2.946	0.47	9.91	13.77	24.15	46.00	-21.85	Average
10.	2.946	0.47	9.91	30.16	40.54	56.00	-15.46	QP
11.	23.140	0.49	10.02	21.81	32.32	50.00	-17.68	Average
12.	23.140	0.49	10.02	35.87	46.38	60.00	-13.62	QP

6 Radiated Spurious Emissions

Test Requirement : FCC CFR47 Part 15 Section 15.209 & 15.247

Test Method : ANSI C63.10:2013

Test Result : PASS

Measurement Distance : 3m

Limit : See the follow table

Frequency (MHz)	Field Strength		Field Strength Limit at 3m Measurement Dist	
	uV/m	Distance (m)	uV/m	dBuV/m
0.009 ~ 0.490	2400/F(kHz)	300	10000 * 2400/F(kHz)	$20\log^{(2400/F(kHz))} + 80$
0.490 ~ 1.705	24000/F(kHz)	30	100 * 24000/F(kHz)	$20\log^{(24000/F(kHz))} + 40$
1.705 ~ 30	30	30	100 * 30	$20\log^{(30)} + 40$
30 ~ 88	100	3	100	$20\log^{(100)}$
88 ~ 216	150	3	150	$20\log^{(150)}$
216 ~ 960	200	3	200	$20\log^{(200)}$
Above 960	500	3	500	$20\log^{(500)}$

6.1 EUT Operation

Operating Environment :

Temperature: : 23.5 °C

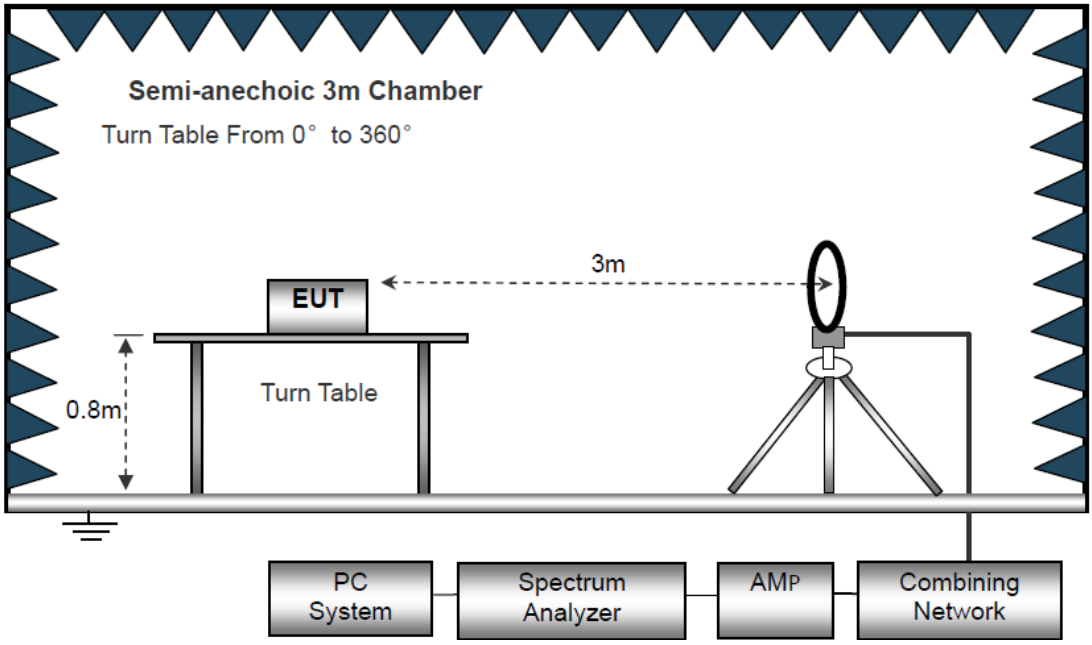
Humidity: : 51.1 % RH

Atmospheric Pressure: : 101.2kPa

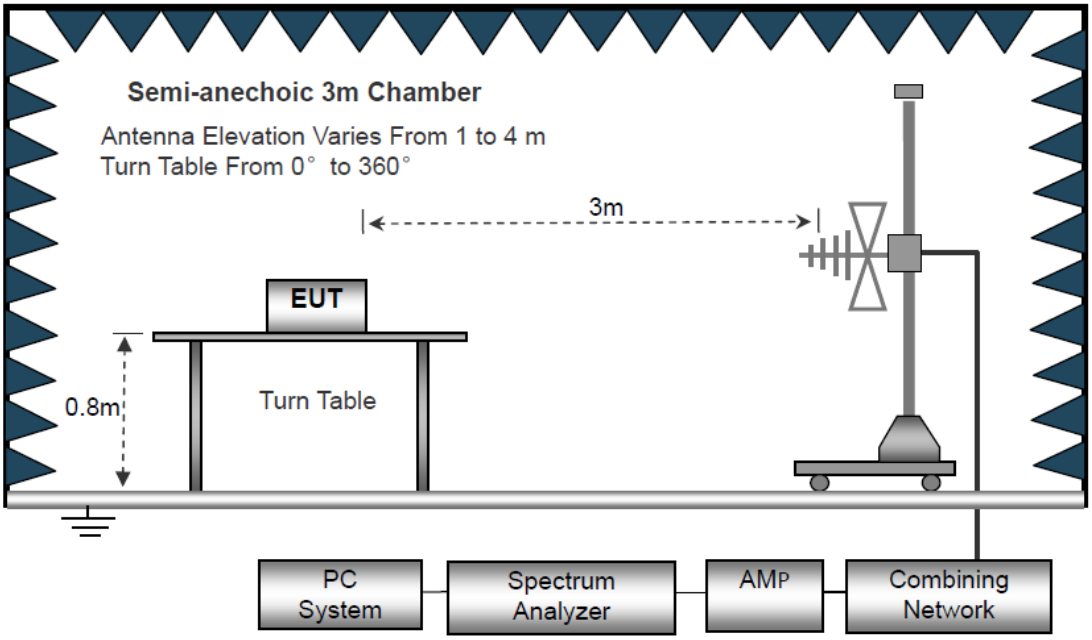
6.2 Test Setup

The radiated emission tests were performed in the 3m Semi- Anechoic Chamber test site

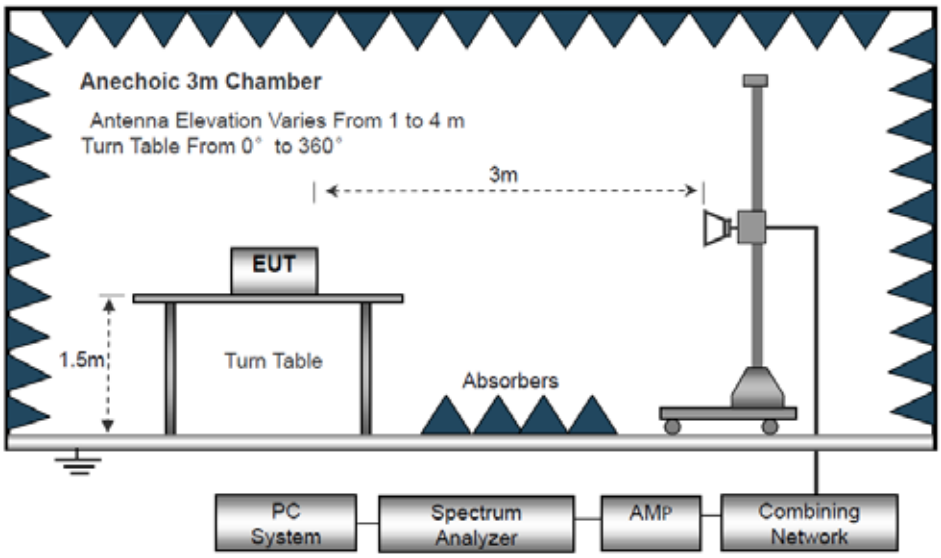
The test setup for emission measurement below 30MHz



The test setup for emission measurement from 30 MHz to 1 GHz.



The test setup for emission measurement above 1 GHz



6.3 Spectrum Analyzer Setup

	Frequency	Detector	RBW	VBW	Remark
Receiver Setup	Below 30MHz	--	10kHz	10kHz	--
	30MHz ~ 1GHz	Quasi-peak	120kHz	300kHz	Quasi-peak Value
	Above 1GHz	Peak	1MHz	3MHz	Peak Value
		RMS	1MHz	3MHz	Average Value

6.4 Test Procedure

1. Below 1000MHz, The EUT was placed on a turn table which is 0.8m above ground plane, And above 1000MHz, The EUT was placed on a styrofoam 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 moved from 1m to 4m to find out the maximum emissions. The spectrum was investigated from the lowest radio frequency signal generated in the device, without going below 9 kHz, up to the tenth harmonic of the highest fundamental frequency or to 40 GHz, whichever is lower.

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 radiation measurements are tested under 3-axes(X,Y,Z) position(X denotes lying on the table, Y denotes side stand and Z denotes vertical stand), After pre-test, It was found that the worse radiation emission was get at the X position. So the data shown was the X position only.

8. The test above 1GHz must be use the fully anechoic room, and the test below 1GHz use the half anechoic room

6.5 Summary of Test Results

Test Frequency: 9KHz-30MHz

Freq. (MHz)	Ant.Pol. H/V	Emission Level (dBuV/m)	Limit 3m (dBuV/m)	Over (dB)
--	--	--	--	>20

Note:

The amplitude of spurious emission that is attenuated by more than 20dB below the permissible limit has no need to be reported.

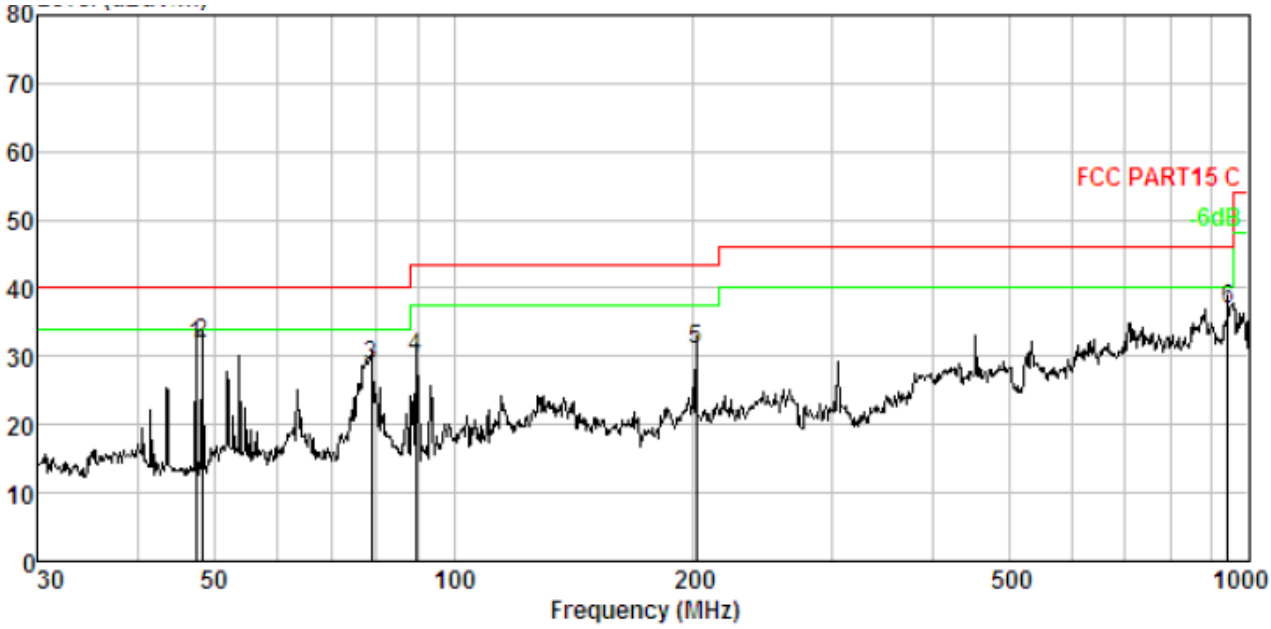
Distance extrapolation factor =40log(Specific distance/ test distance)(dB);
Limit line=Specific limits(dBuV) + distance extrapolation factor.

Test Frequency: 30MHz ~ 1GHz

All the modulation modes were tested the data of the worst mode (TX 802.11b Low Channel) are recorded in the following pages and the others modulation methods do not exceed the limits.

Please refer to the following test plots:

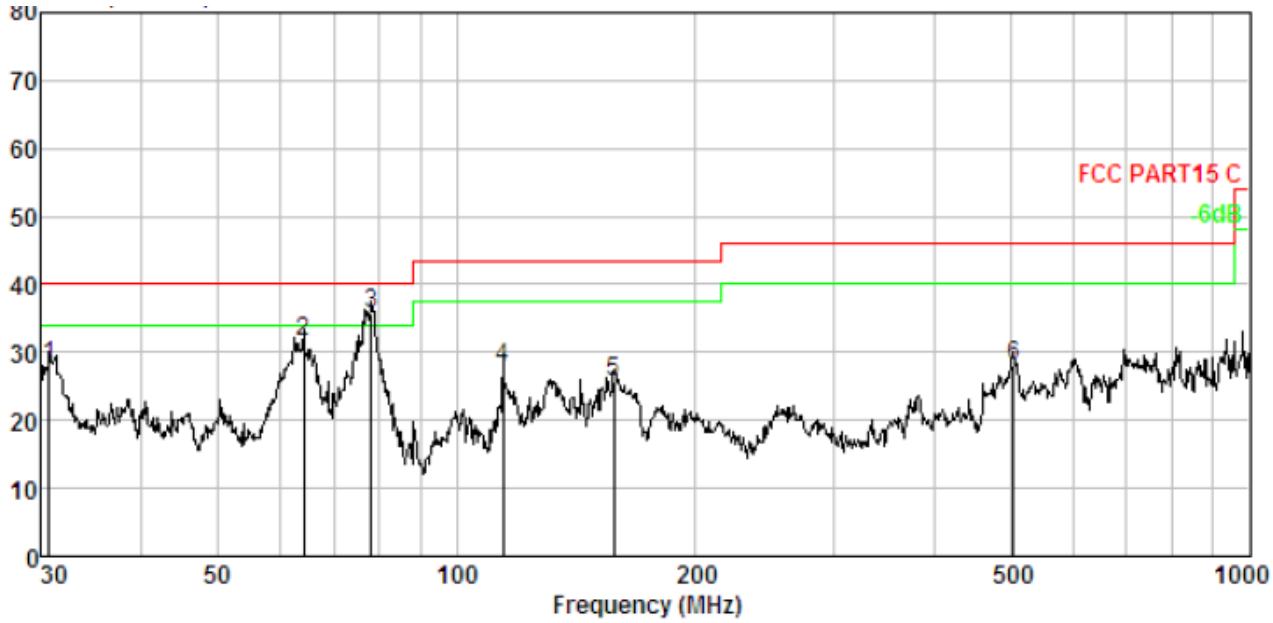
Antenna Polarization: Horizontal



No.	Freq MHz	Cable Loss dB	ANT Factor dB/m	Receiver Reading dBuV	Preamp Factor dB	Emission Level dBuV/m	Limit dBuV/m	Over Limit dB	Remark
1.	47.326	1.47	12.78	47.60	30.13	31.72	40.00	-8.28	QP
2.	48.163	1.48	12.62	47.79	30.13	31.76	40.00	-8.24	QP
3.	78.689	1.93	9.05	48.09	30.31	28.76	40.00	-11.24	QP
4.	89.590	2.05	9.25	48.88	30.35	29.83	43.50	-13.67	QP
5.	202.100	2.78	10.42	48.51	30.63	31.08	43.50	-12.42	QP
6.	942.131	4.18	23.28	40.64	31.17	36.93	46.00	-9.07	QP

Remark:Emission Level=Reading+Cable Loss+ANT Factor-AMP Factor

Antenna Polarization: Vertical



No.	Freq MHz	Cable Loss dB	ANT Factor dB/m	Receiver Reading dBuV	Preamp Factor dB	Emission Level dBuV/m	Limit dBuV/m	Over Limit dB	Remark
1.	30.638	1.07	13.23	43.83	29.98	28.15	40.00	-11.85	QP
2.	64.208	1.74	11.89	48.05	30.23	31.45	40.00	-8.55	QP
3.	78.139	1.92	9.17	54.84	30.30	35.63	40.00	-4.37	QP
4.	114.515	2.27	11.51	44.54	30.44	27.88	43.50	-15.62	QP
5.	158.112	2.56	13.88	39.71	30.55	25.60	43.50	-17.90	QP
6.	504.706	3.61	17.12	38.21	30.95	27.99	46.00	-18.01	QP

Remark:Emission Level=Reading+Cable Loss+ANT Factor-AMP Factor

Test Frequency: From 1GHz to 18GHz

Low Channel (2412MHz) Worst case 802.11g

Frequency (MHz)	S.A Reading (dBuV)	Detector (PK/AV)	Polarity (H/V)	Ant. Factor (dB/m)	Cable Loss (dB)	Pre-Amp. Gain (dB)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)
4824	35.69	AV	V	35.16	10.55	40.05	41.35	54	-12.65
4824	36.15	AV	H	35.16	10.55	40.05	41.81	54	-12.19
4824	41.45	PK	V	35.16	10.55	40.05	47.11	74	-26.89
4824	46.22	PK	H	35.16	10.55	40.05	51.88	74	-22.12
16884	34.28	AV	V	35.39	10.58	39.42	40.83	54	-13.17
16884	35.02	AV	H	35.39	10.58	39.42	41.57	54	-12.43
16884	46.82	PK	V	35.39	10.58	39.42	53.37	74	-20.63
16884	48.12	PK	H	35.39	10.58	39.42	54.67	74	-19.33

Middle Channel (2437MHz) Worst case 802.11n (HT20)

Frequency (MHz)	S.A Reading (dBuV)	Detector (PK/AV)	Polarity (H/V)	Ant. Factor (dB/m)	Cable Loss (dB)	Pre-Amp. Gain (dB)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)
4874	36.15	AV	V	35.18	10.58	40.07	41.84	54	-12.16
4874	37.22	AV	H	35.18	10.58	40.07	42.91	54	-11.09
4874	45.92	PK	V	35.18	10.58	40.07	51.61	74	-22.39
4874	48.17	PK	H	35.18	10.58	40.07	53.86	74	-20.14
17059	35.04	AV	V	35.42	10.62	39.16	41.92	54	-12.08
17059	36.62	AV	H	35.42	10.62	39.16	43.5	54	-10.5
17059	46.92	PK	V	35.42	10.62	39.16	53.8	74	-20.2
17059	47.15	PK	H	35.42	10.62	39.16	54.03	74	-19.97

High Channel (2462MHz) Worst case 802.11b

Frequency (MHz)	S.A Reading (dBuV)	Detector (PK/AV)	Polarity (H/V)	Ant. Factor (dB/m)	Cable Loss (dB)	Pre-Amp. Gain (dB)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)
4924	36.32	AV	V	35.26	10.54	40.01	42.11	54	-11.89
4924	37.12	AV	H	35.26	10.54	40.01	42.91	54	-11.09
4924	46.58	PK	V	35.26	10.54	40.01	52.37	74	-21.63
4924	49.67	PK	H	35.26	10.54	40.01	55.46	74	-18.54
17234	35.24	AV	V	35.67	10.66	39.04	42.53	54	-11.47
17234	36.72	AV	H	35.67	10.66	39.04	44.01	54	-9.99
17234	47.12	PK	V	35.67	10.66	39.04	54.41	74	-19.59
17234	48.67	PK	H	35.67	10.66	39.04	55.96	74	-18.04

Note:

1. The testing has been conformed to 10*2462MHz=24620MHz.
2. All other emissions more than 30dB below the limit.
3. Factor = Antenna Factor + Cable Loss – Pre-amplifier.
   Emission Level = Reading + Factor
   Margin=Emission Level-Limit
4. X-Axis, Y-Axis and Z-Axis were investigated. The results above show only the worst case.

Spurious Emission in Restricted Band 2310-2390MHz and 2483.5-2500MHz

2.4G WiFi (802.11b/g/n)mode have been tested, and the worst result(802.11g) was report as below

Test Mode: 802.11g Low Channel 2412MHz

Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Level (dBuV/m)	Limit (dBuV/m)	Over (dB)	Polarity H/V	Test Value
2310.00	26.76	27.27	6.62	60.65	74	-13.35	V	Peak
2390.00	27.29	27.53	6.75	61.57	74	-12.43	V	
2310.00	26.37	27.27	6.62	60.26	74	-13.74	H	
2390.00	26.77	27.53	6.75	61.05	74	-12.95	H	
2310.00	12.91	27.27	6.62	46.8	54	-7.2	V	Average
2390.00	13.21	27.53	6.75	47.49	54	-6.51	V	
2310.00	12.93	27.27	6.62	46.82	54	-7.18	H	
2390.00	14.16	27.53	6.75	48.44	54	-5.56	H	

Test Mode: 802.11g High Channel 2462MHz

Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Level (dBuV/m)	Limit (dBuV/m)	Over (dB)	Polarity H/V	Test Value
2483.50	25.69	27.85	6.83	60.37	74	-13.63	V	Peak
2500.00	25.68	27.9	6.84	60.42	74	-13.58	V	
2483.50	26.12	27.85	6.83	60.8	74	-13.2	H	
2500.00	26.17	27.9	6.84	60.91	74	-13.09	H	
2483.50	13.03	27.85	6.83	47.71	54	-6.29	V	Average
2500.00	12.7	27.9	6.84	47.44	54	-6.56	V	
2483.50	14.11	27.85	6.83	48.79	54	-5.21	H	
2500.00	12.94	27.9	6.84	47.68	54	-6.32	H	

Test Frequency: From 18GHz to 25GHz

The measurements were more than 20dB below the limit and not reported.

7 Conducted Spurious Emission

Test Requirement	:	FCC CFR47 Part 15 Section 15.247
Test Method	:	ANSI C63.10:2013
Test Limit	:	Regulation 15.247 (d),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)).

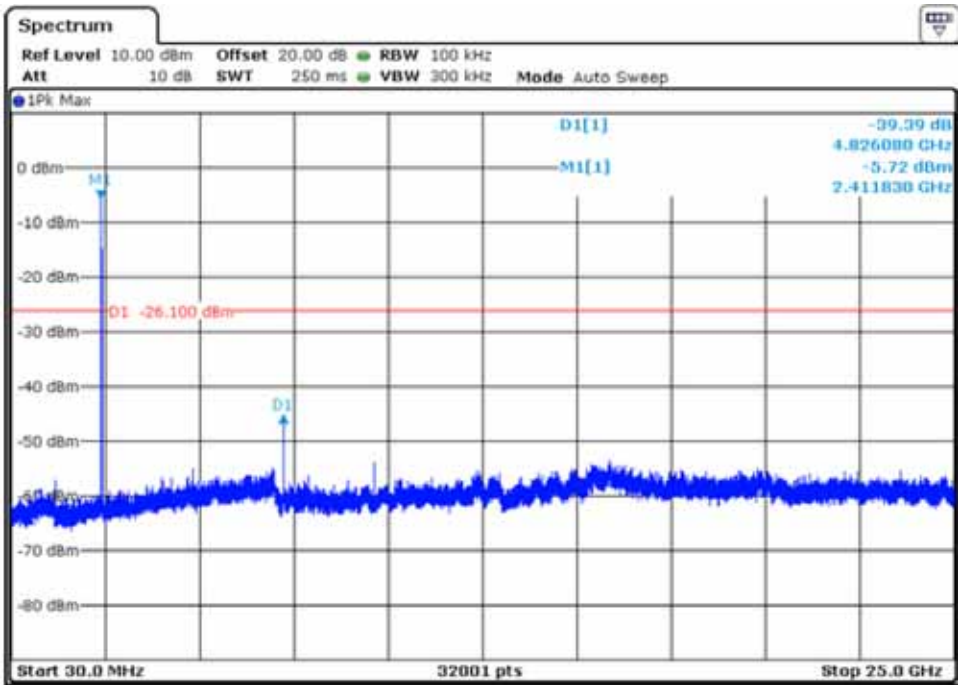
7.1 Test Procedure

1. Remove the antenna from the EUT and then connect a low RF cable from the antenna port to the spectrum;
2. Set the spectrum analyzer: RBW = 100kHz, VBW = 300kHz, Sweep = auto
Detector function = peak, Trace = max hold

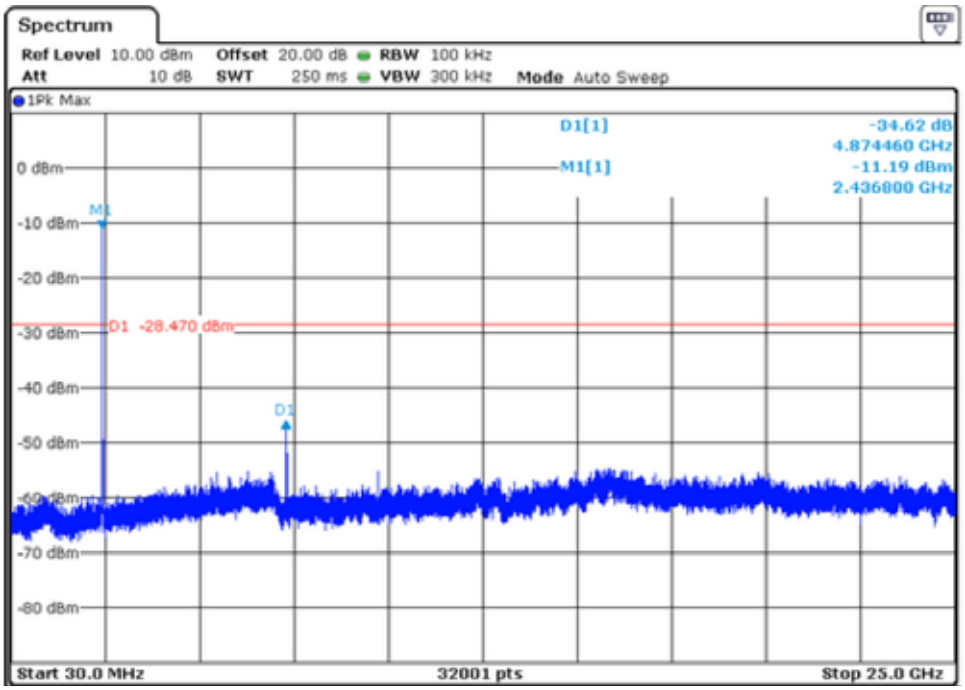
7.2 Test Result

802.11 b Ant1

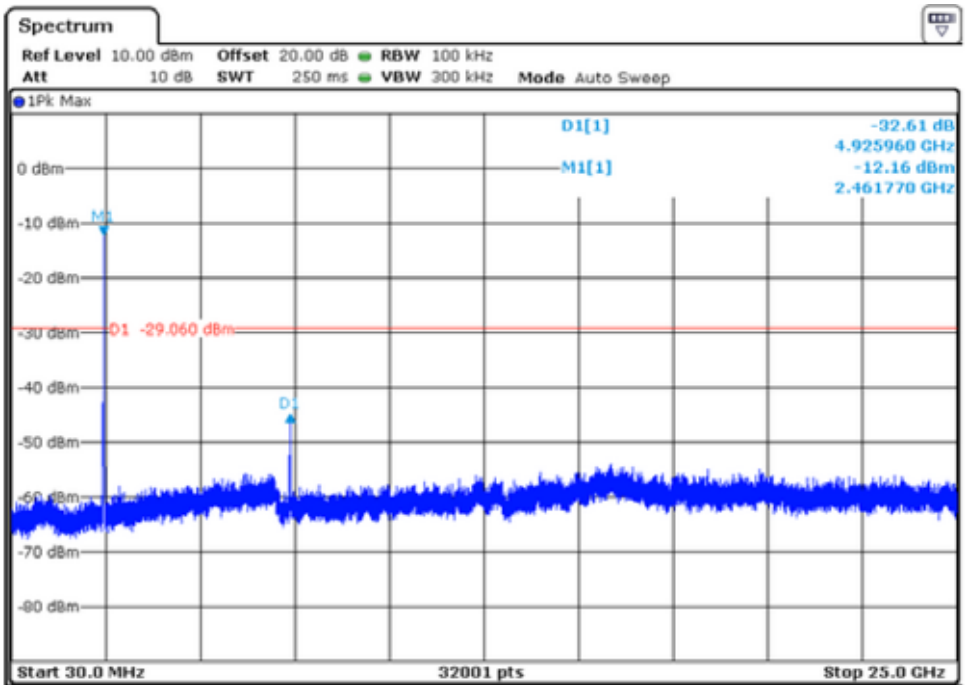
Low Channel



Middle Channel

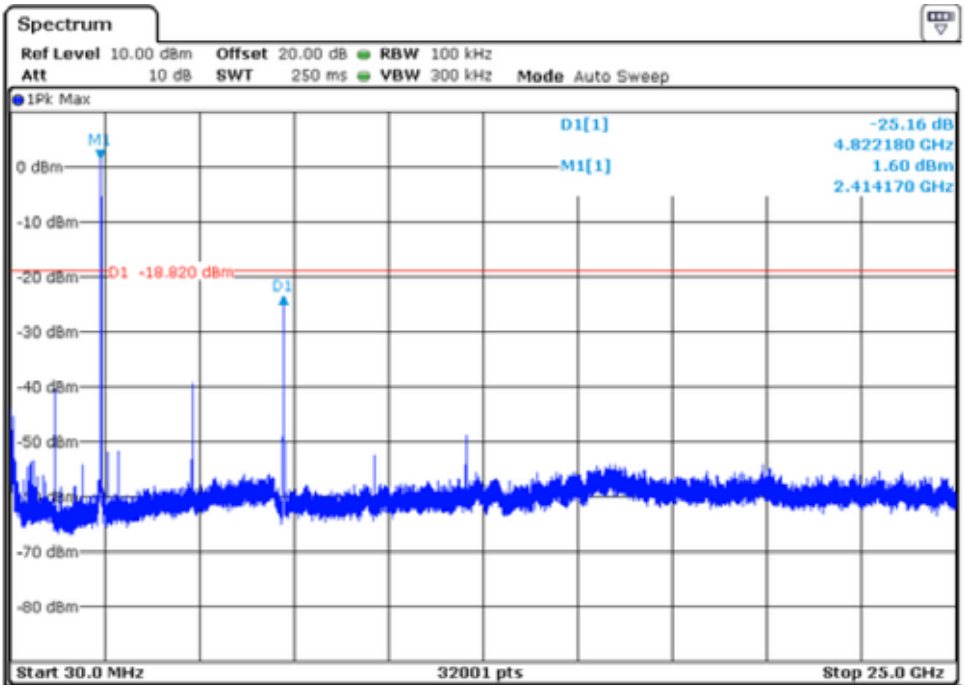


High Channel

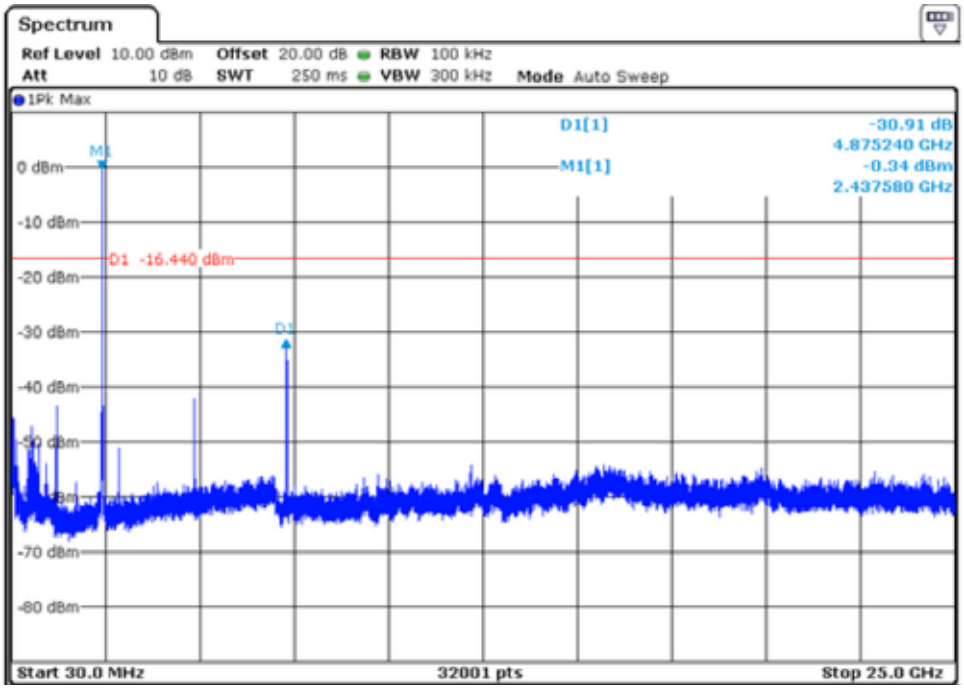


802.11 b Ant2

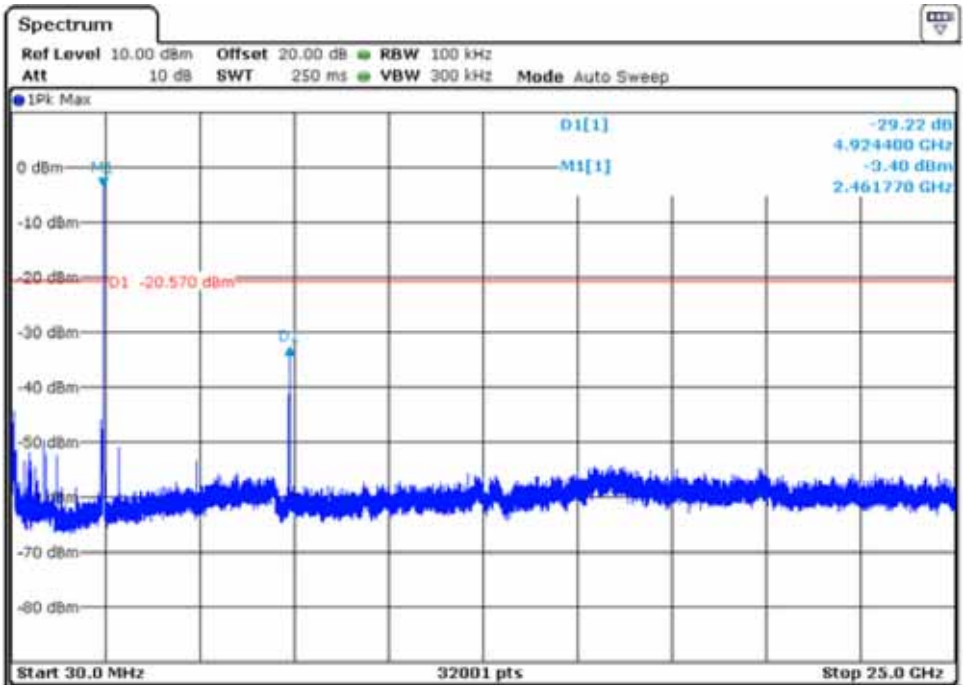
Low Channel



Middle Channel

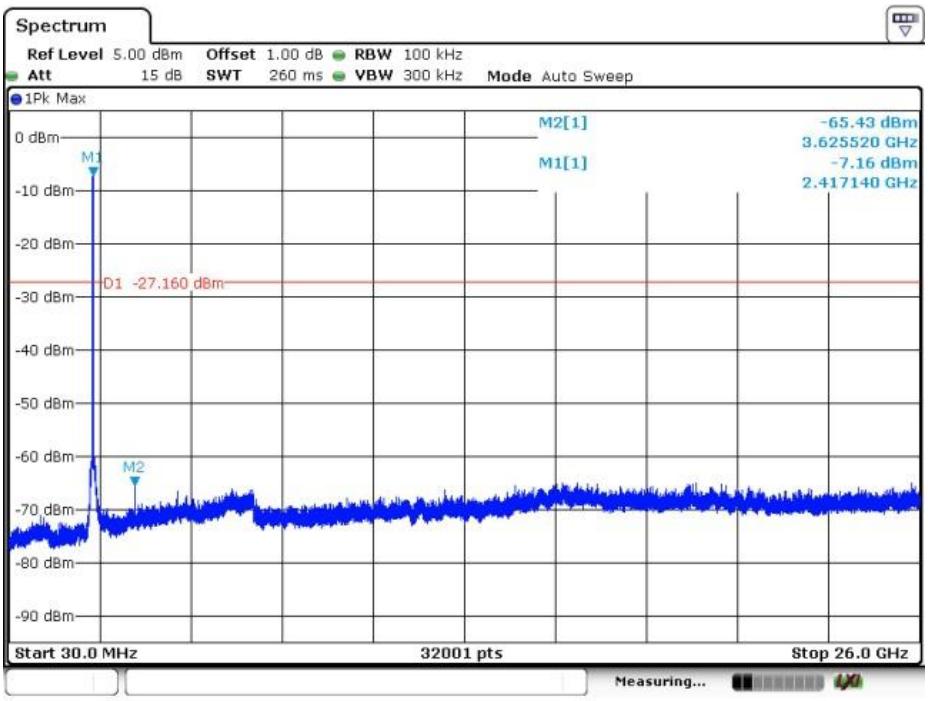


High Channel

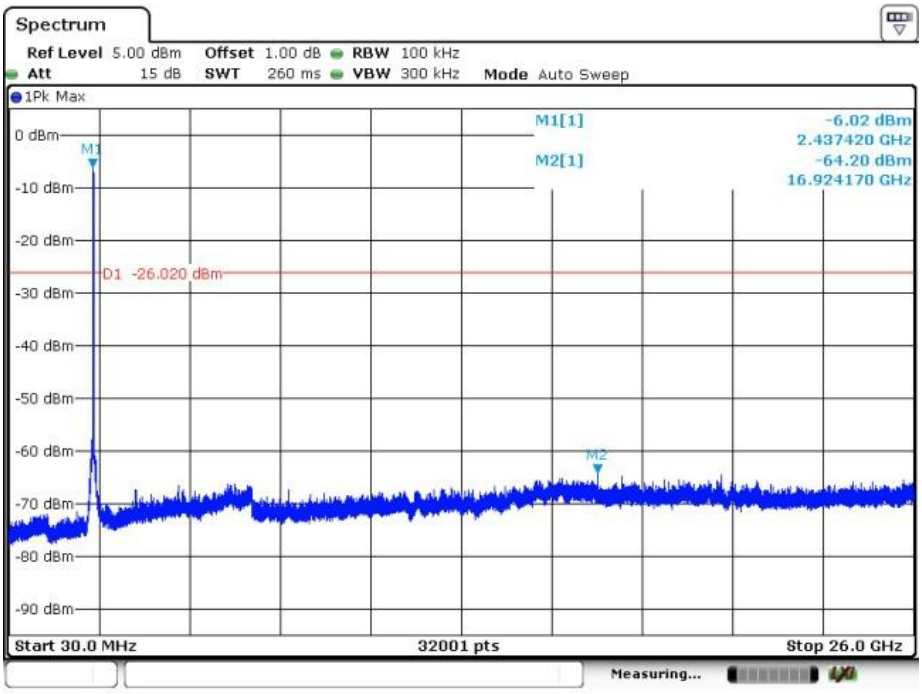


802.11g Ant1

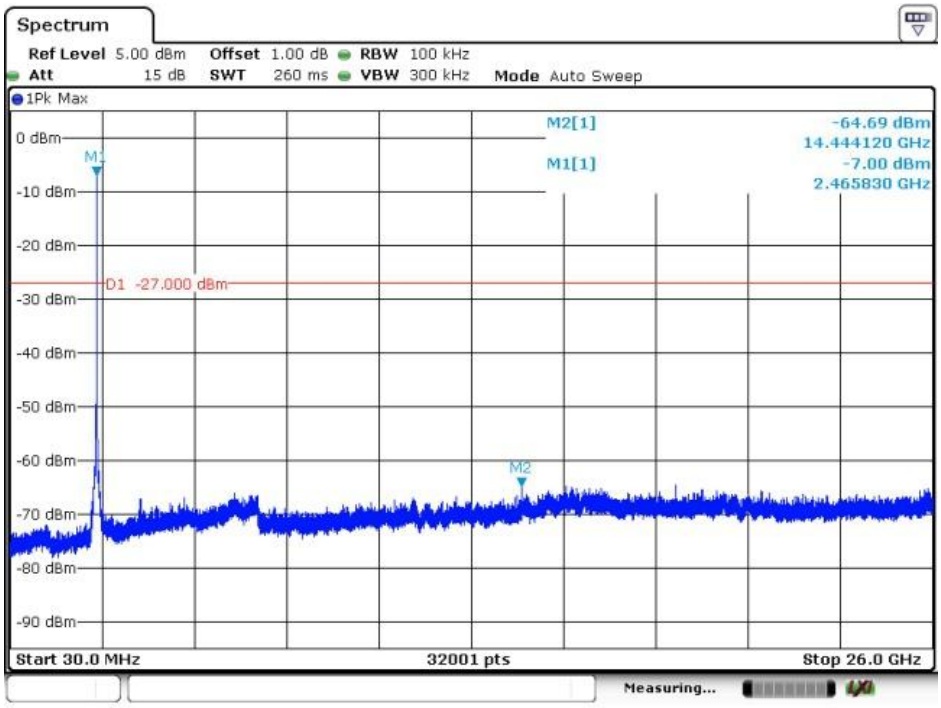
Low Channel



Middle Channel

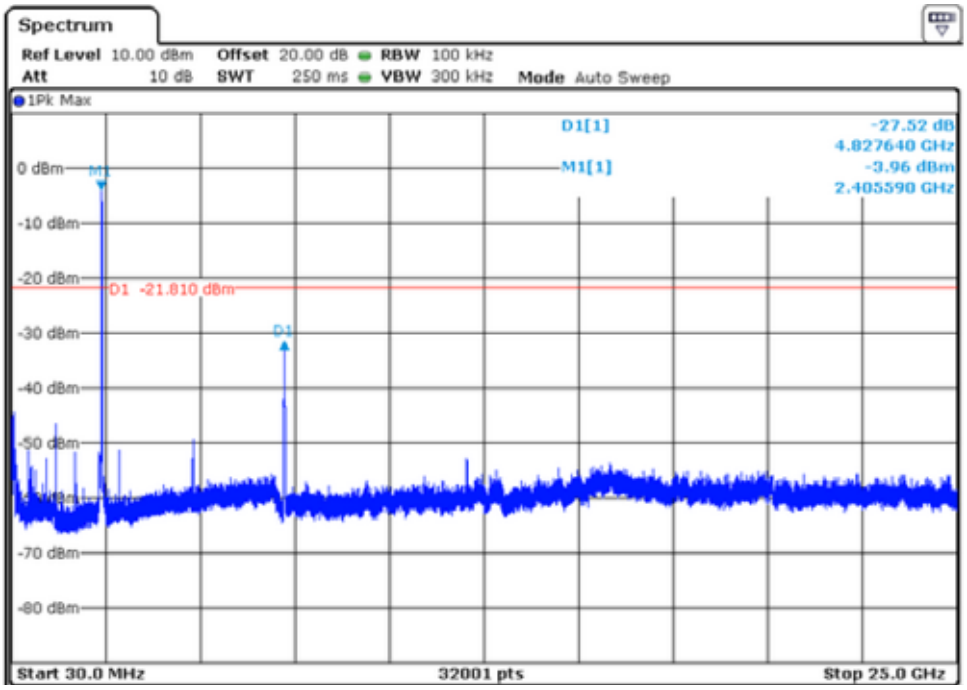


High Channel

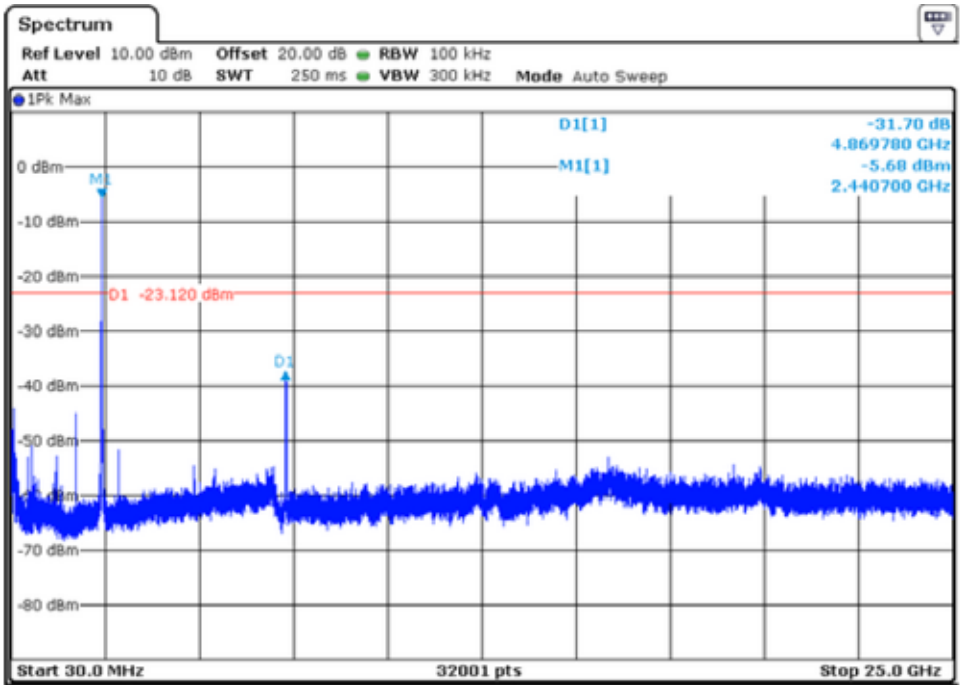


802.11g Ant2

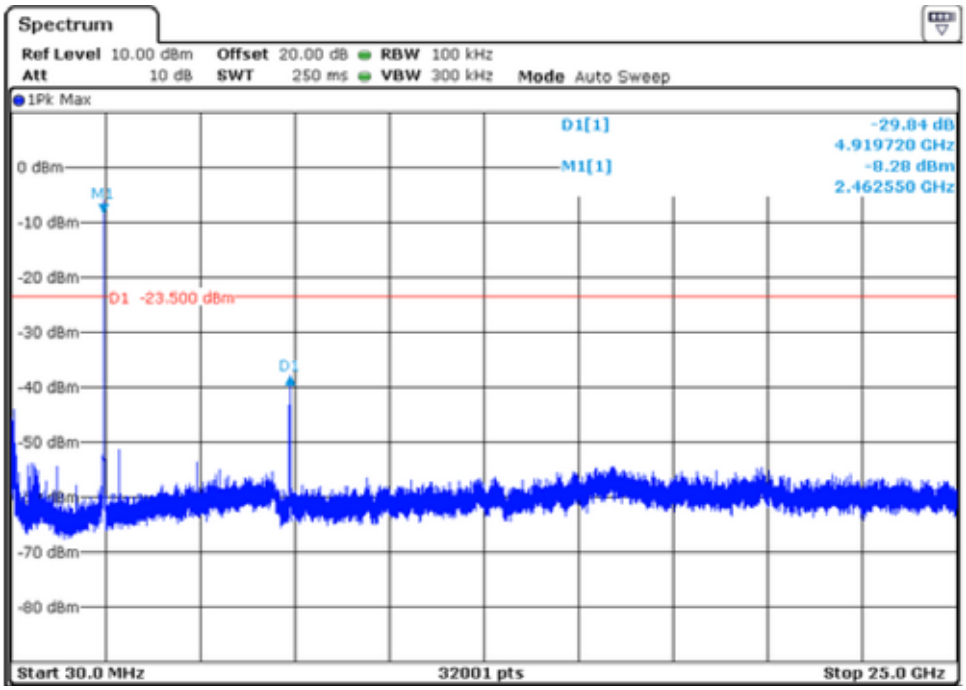
Low Channel



Middle Channel

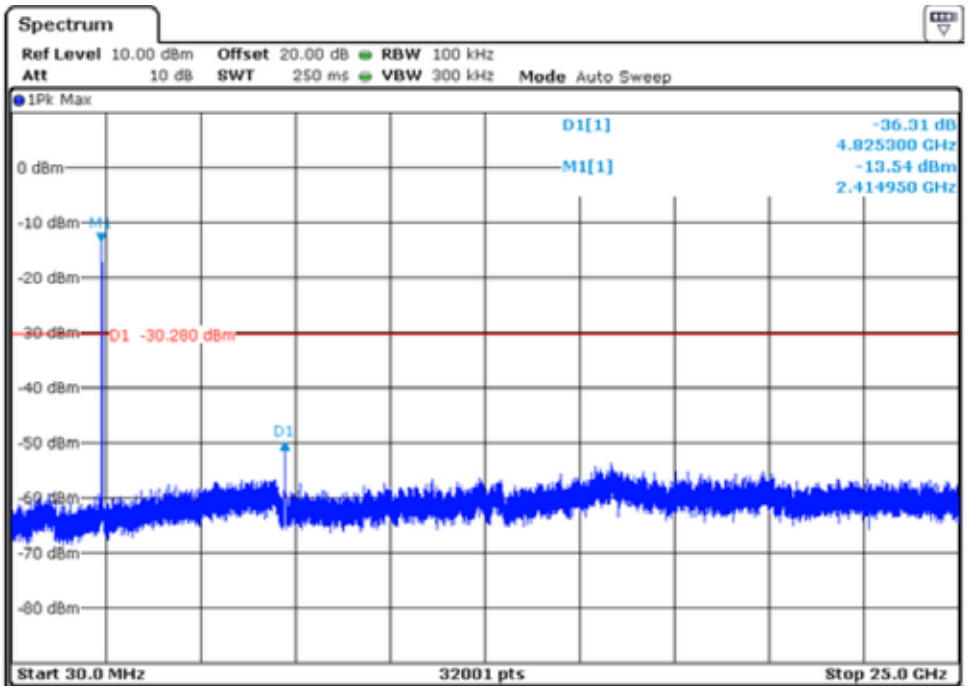


High Channel

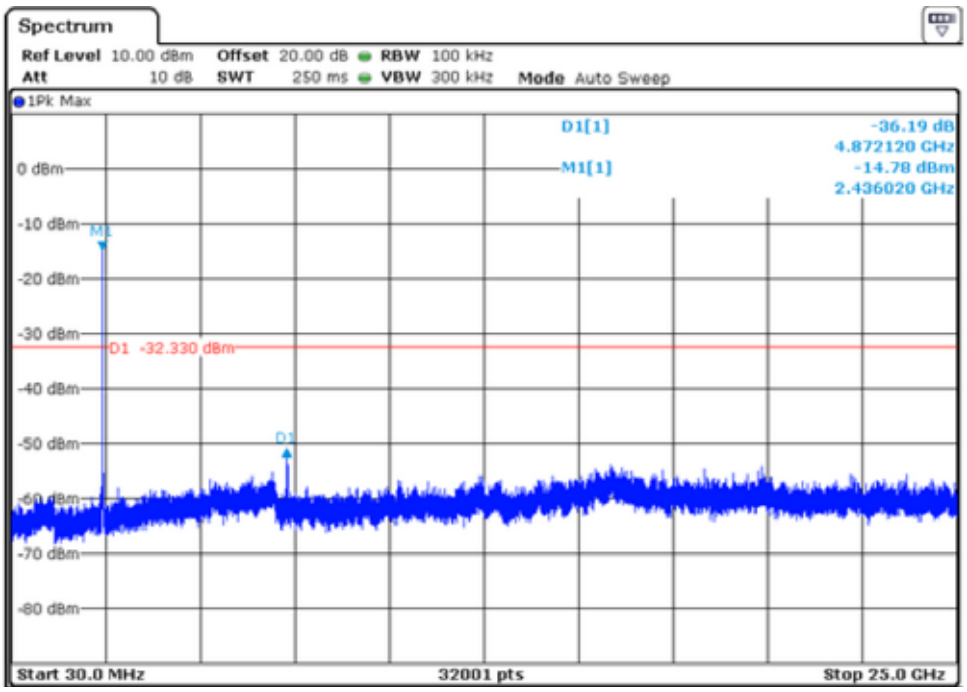


802.11n-HT20 MIMO

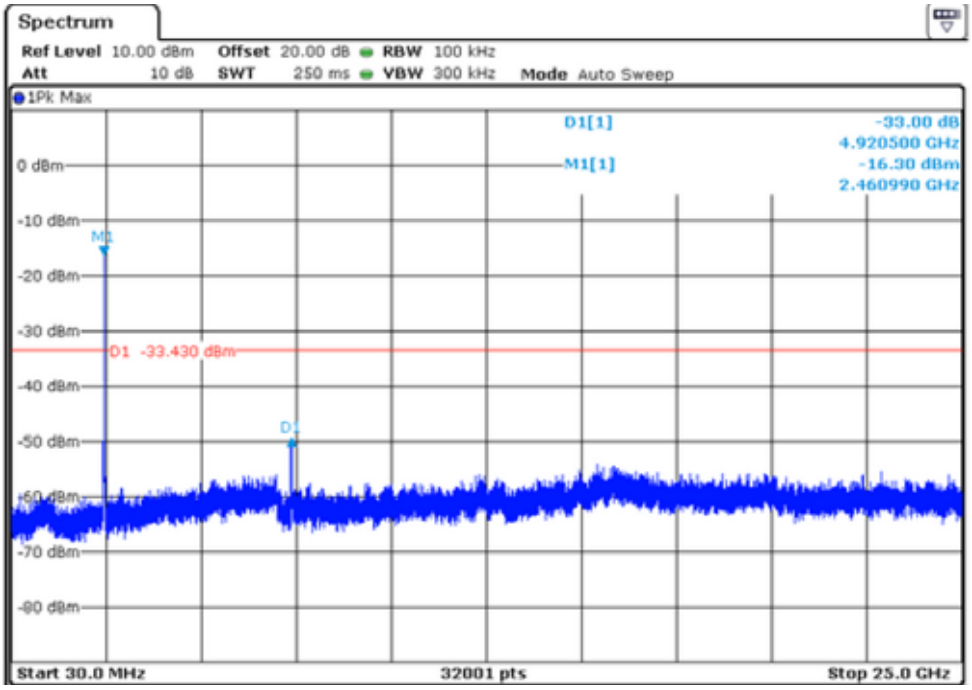
Low Channel



Middle Channel

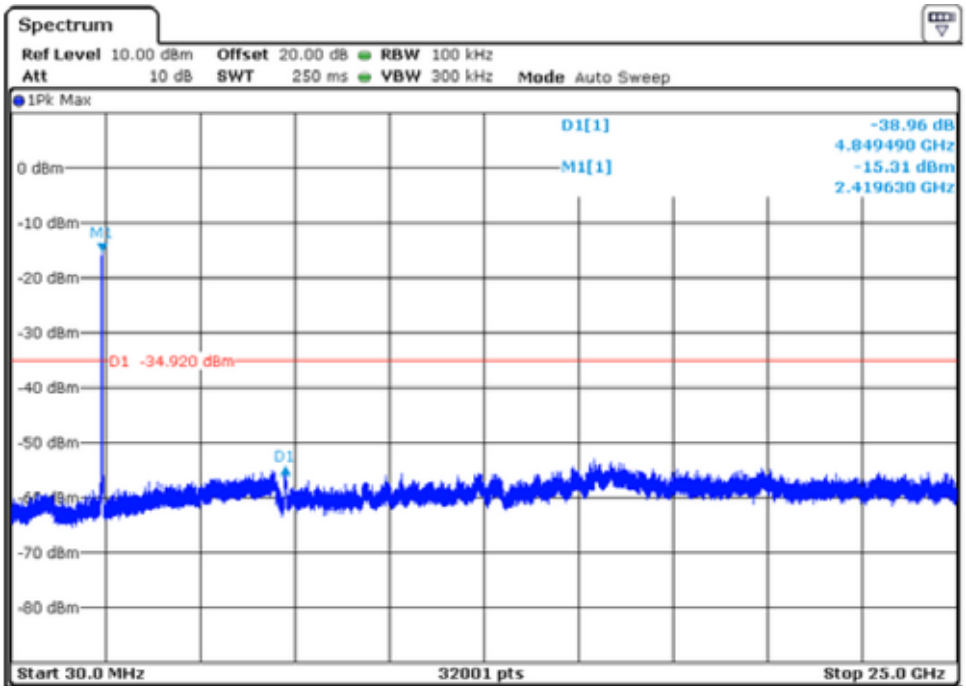


High Channel

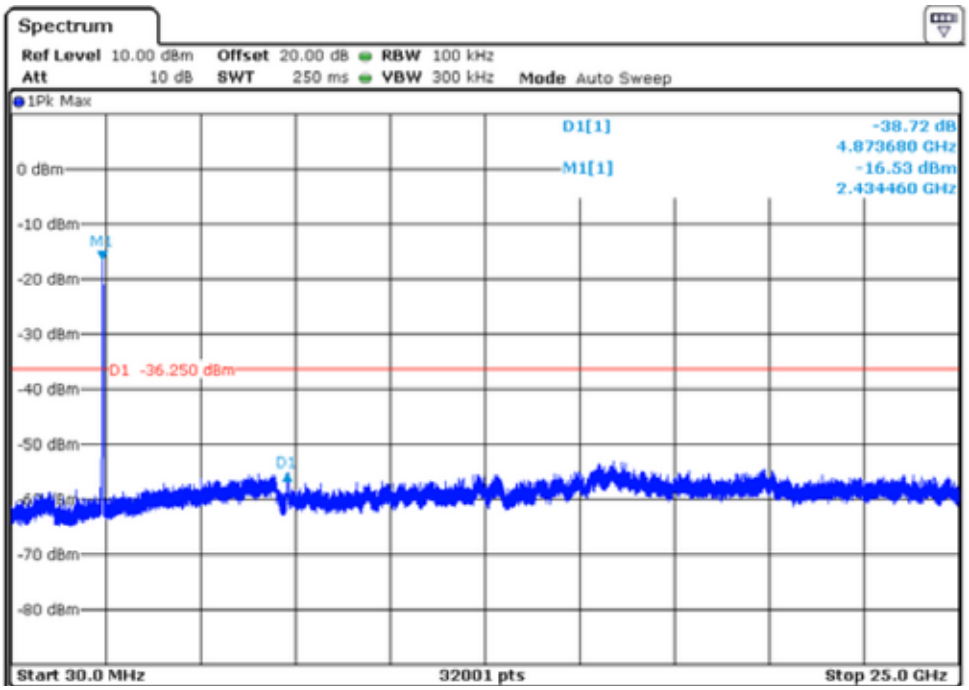


802.11n-HT40 MIMO

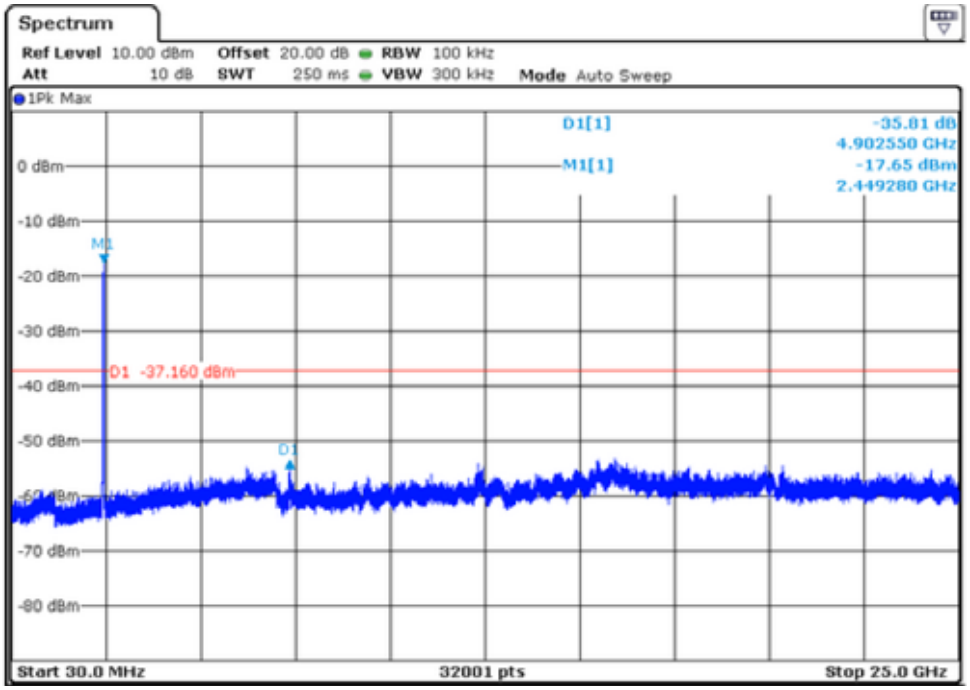
Low Channel



Middle Channel



High Channel



8 Band Edge Measurement

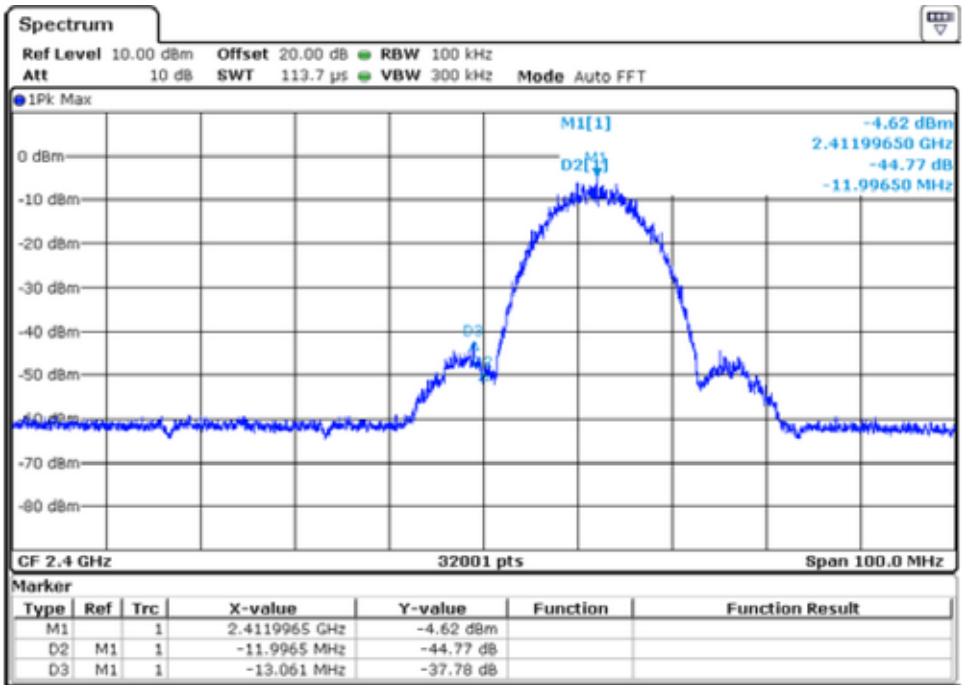
Test Requirement	:	Section 15.247(d) In addition, radiated emissions which fall in the restricted bands. as defined in Section 15.205(a), must also comply with the radiated emission limits specified in Section 15.209(a) (see Section 15.205(c)).
Test Method	:	ANSI C63.10:2013
Test Limit	:	Regulation 15.247 (d),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)).

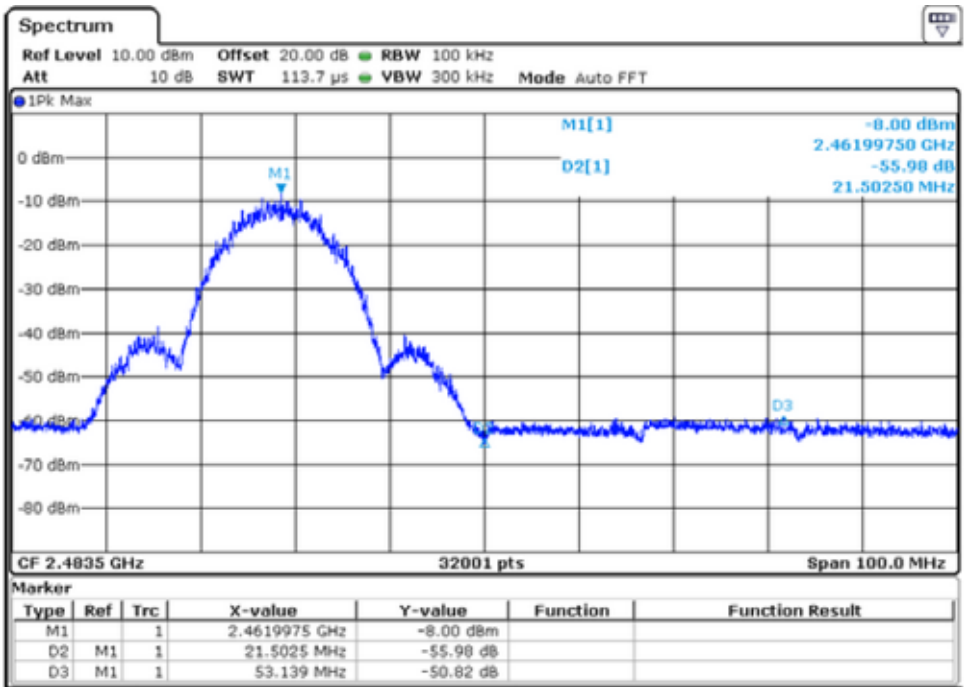
8.1 Test Procedure

1. Remove the antenna from the EUT and then connect a low RF cable from the antenna port to the spectrum;
2. Set the spectrum analyzer: RBW = 100kHz, VBW = 300kHz, Sweep = auto
Detector function = peak, Trace = max hold

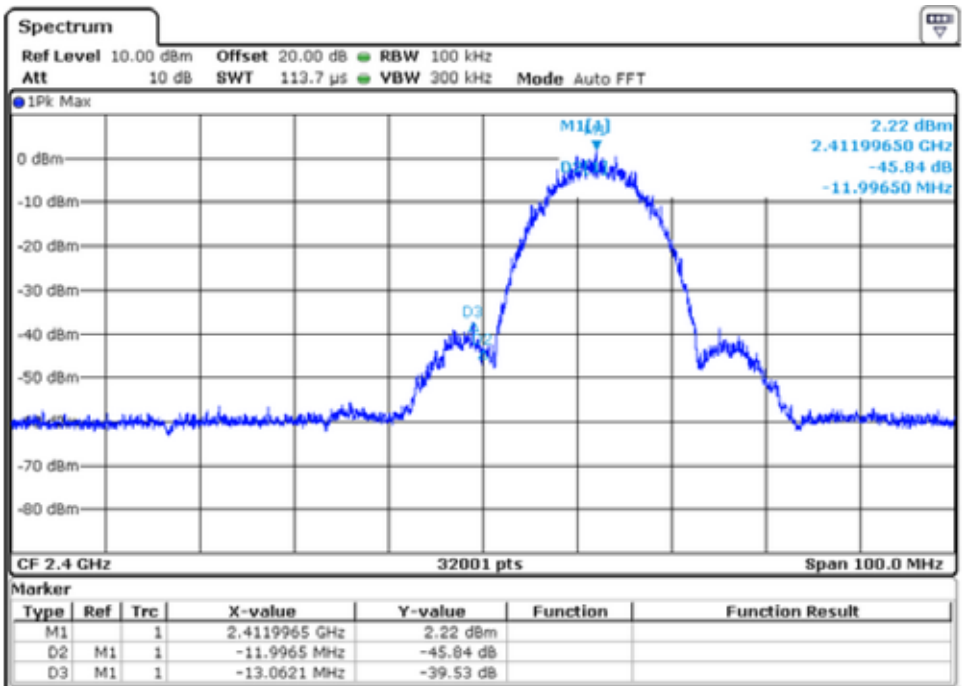
8.2 Test Result

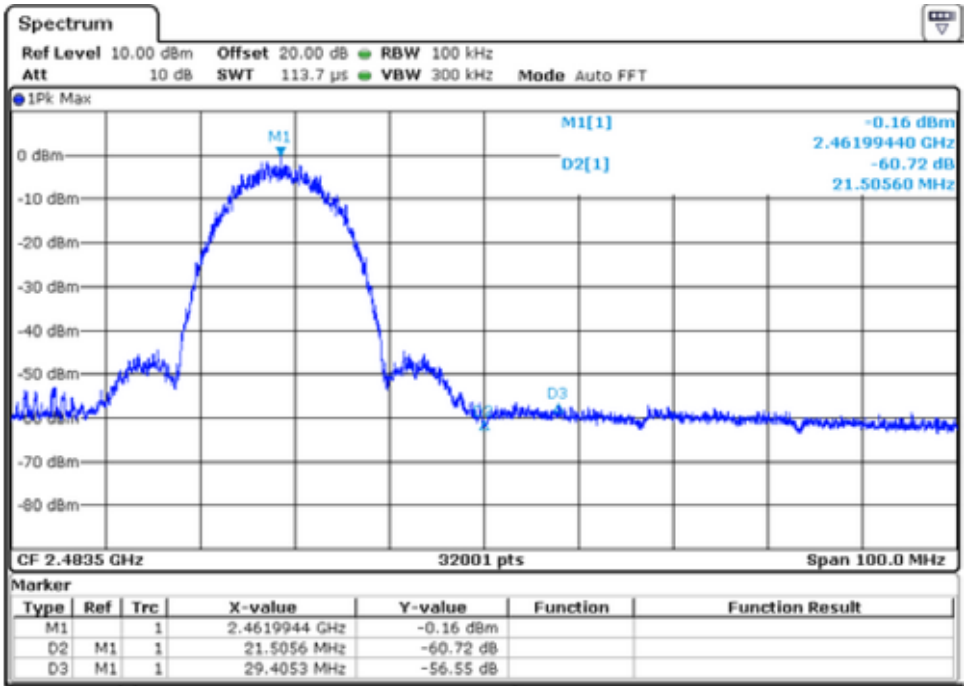
802.11b SISO Ant 1



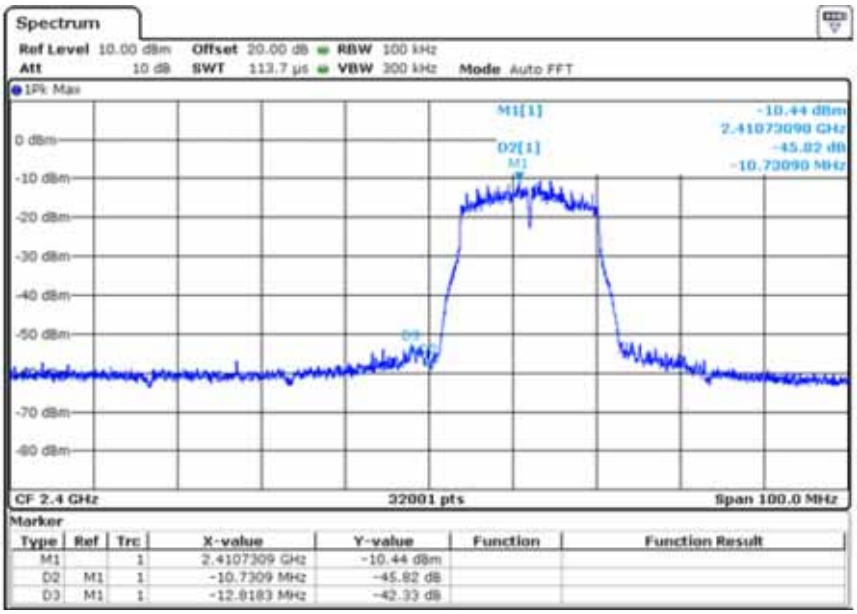


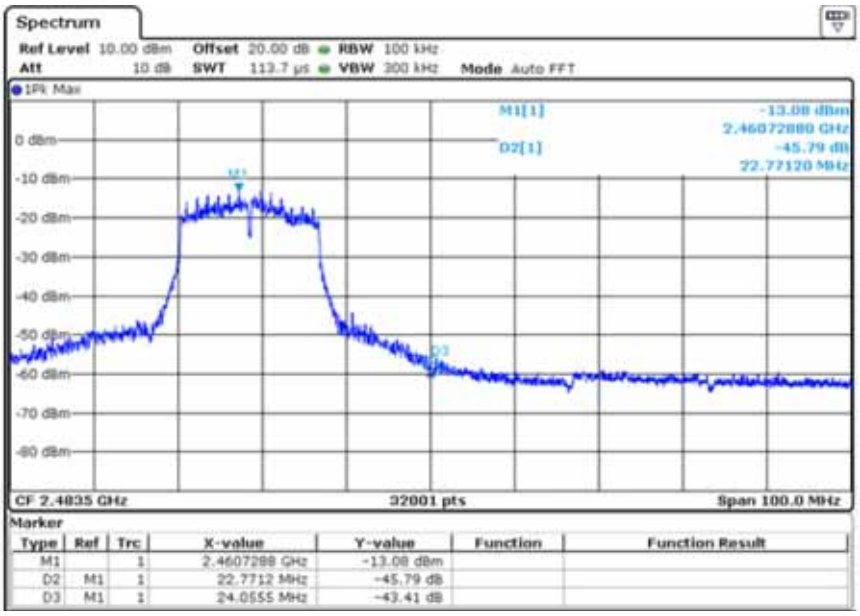
802.11b SISO Ant 2



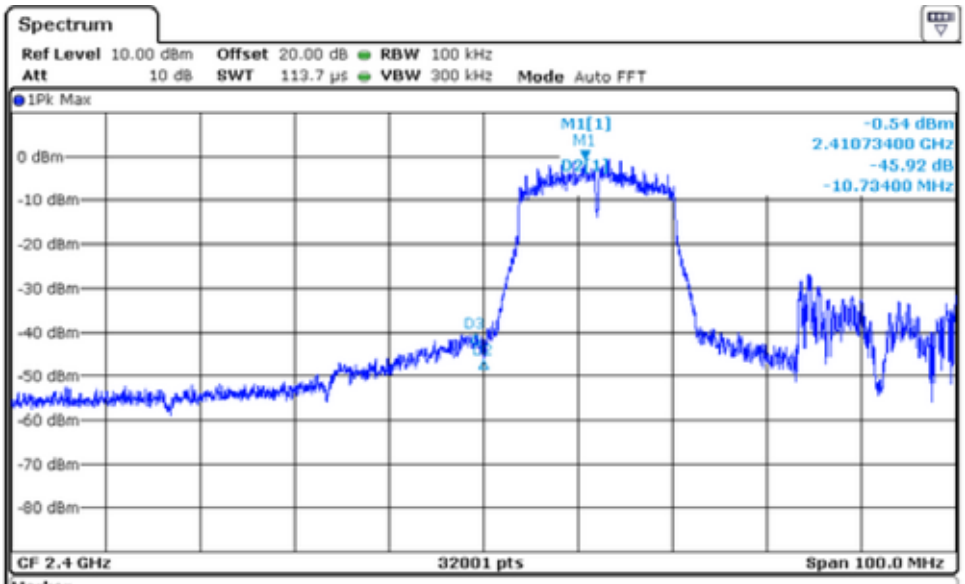


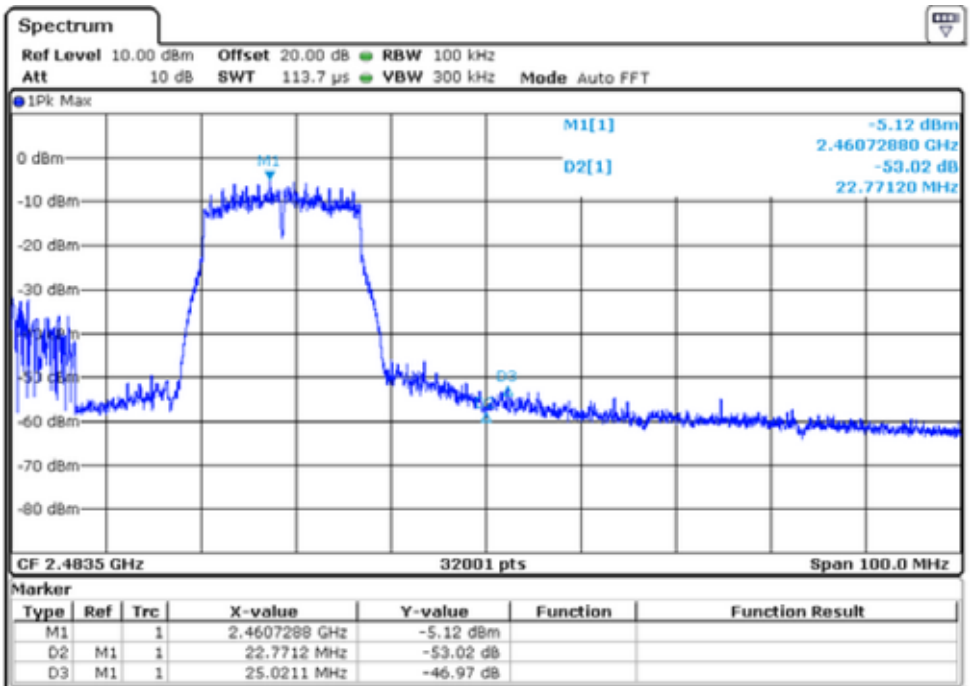
802.11g SISO Ant1



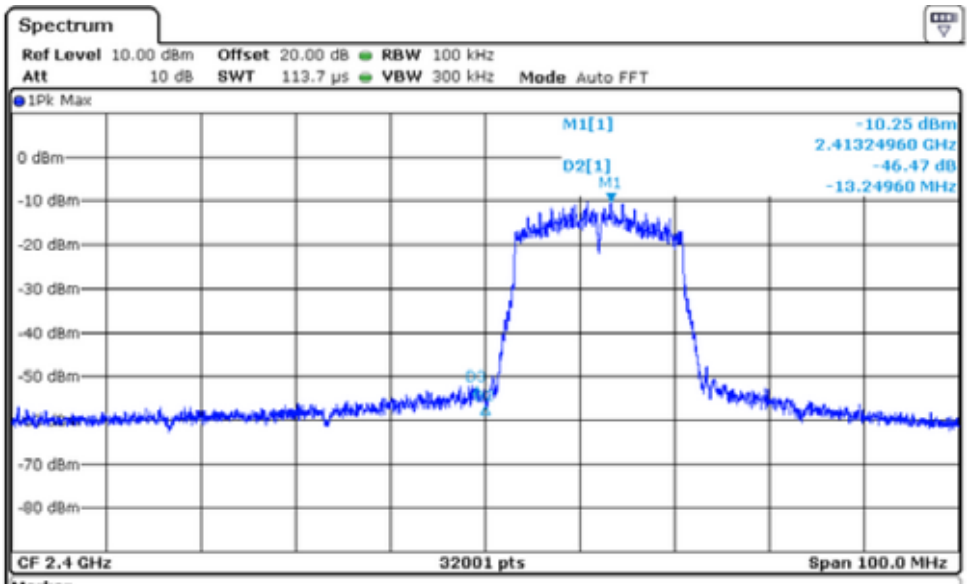


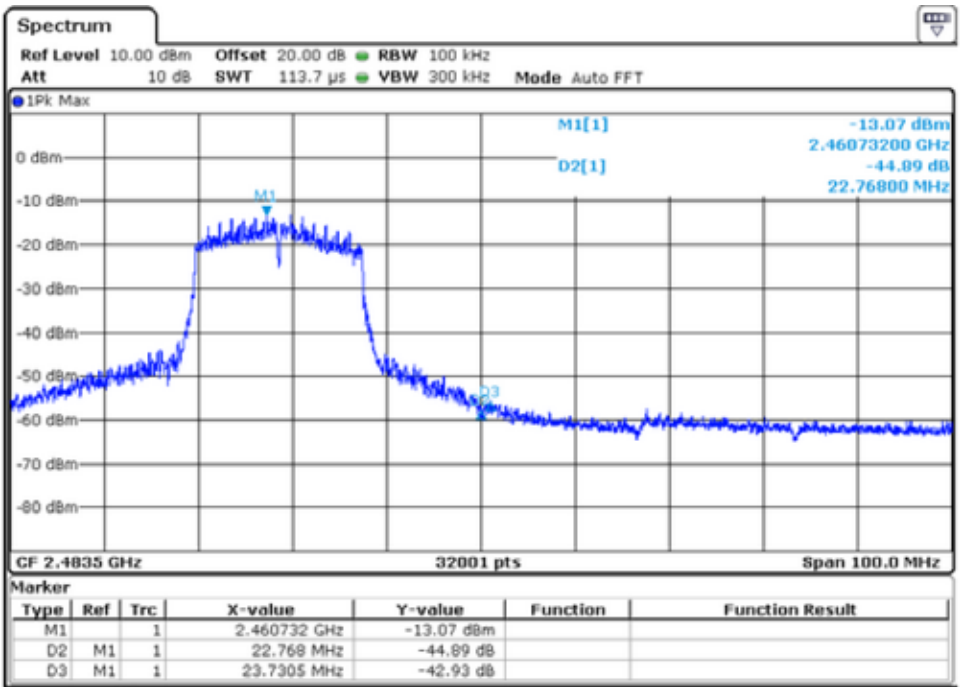
802.11g SISO Ant2



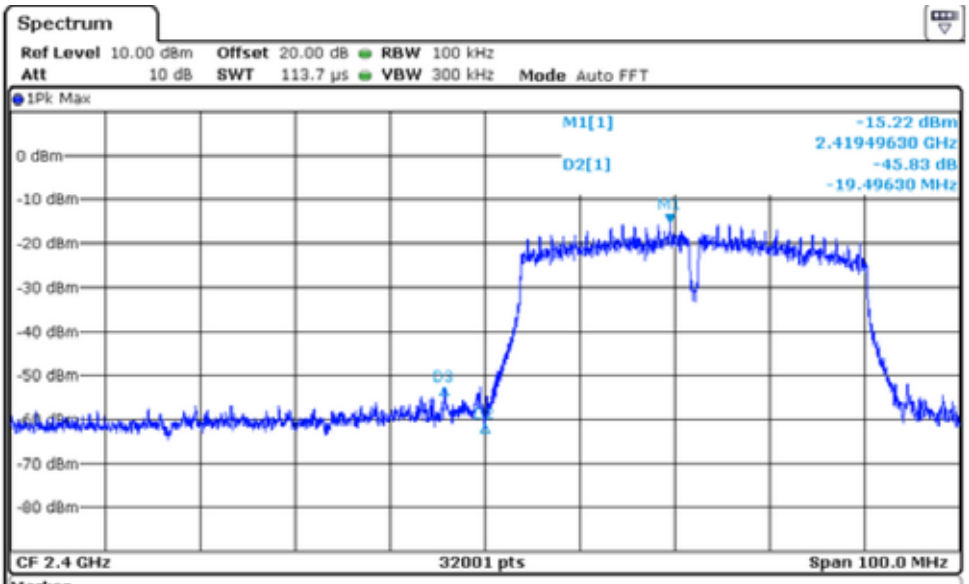


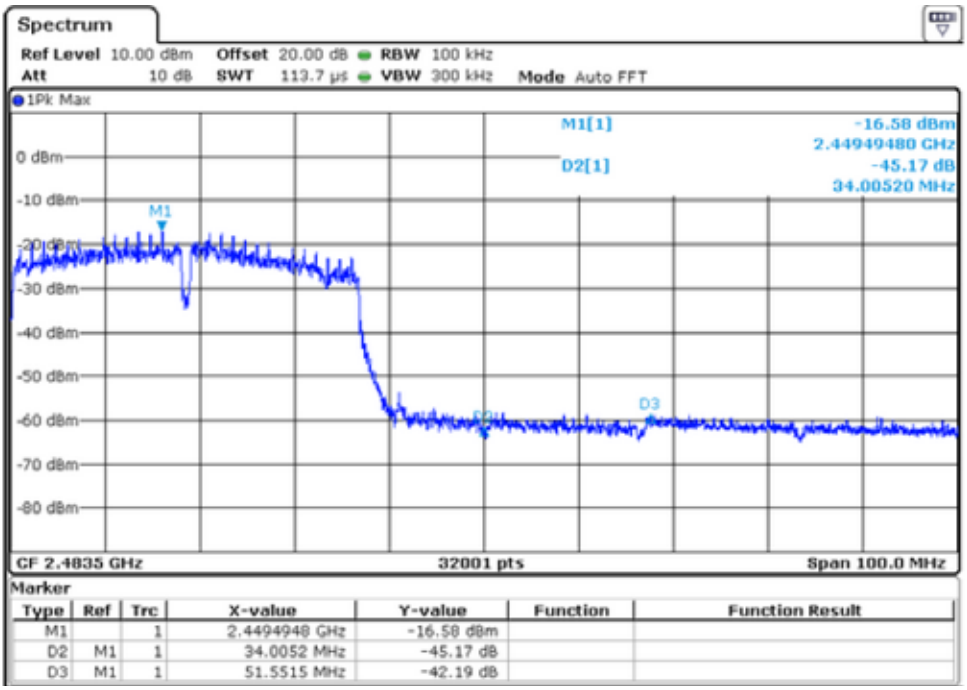
802.11n-HT20 MIMO





802.11n-HT40 MIMO





9 6dB Bandwidth Measurement

Test Requirement	:	FCC CFR47 Part 15 Section 15.247
Test Method	:	ANSI C63.10:2013
Test Limit		Systems using digital modulation techniques may operate in the 902-928 MHz, 2400-2483.5 MHz, and 5725-5850 MHz bands. The minimum 6 dB bandwidth shall be at least 500 kHz.

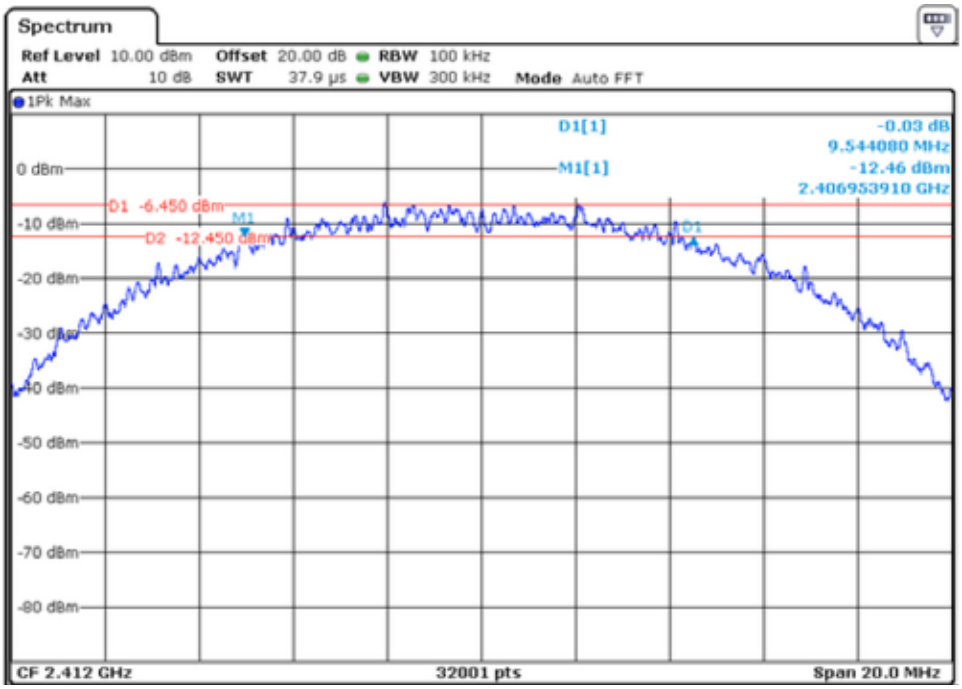
9.1 Test Procedure

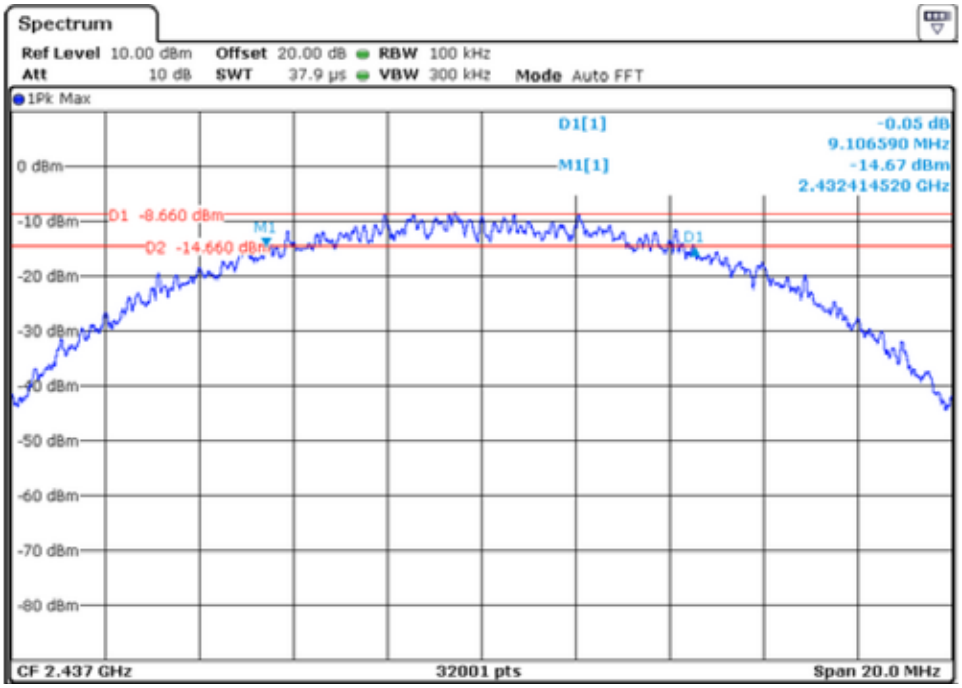
The EUT was operating in IEEE 802.11b, 802.11g, 802.11n(HT20), 802.11n(HT40) mode or could be controlled its channel. Printed out the test result from the spectrum by hard copy function.

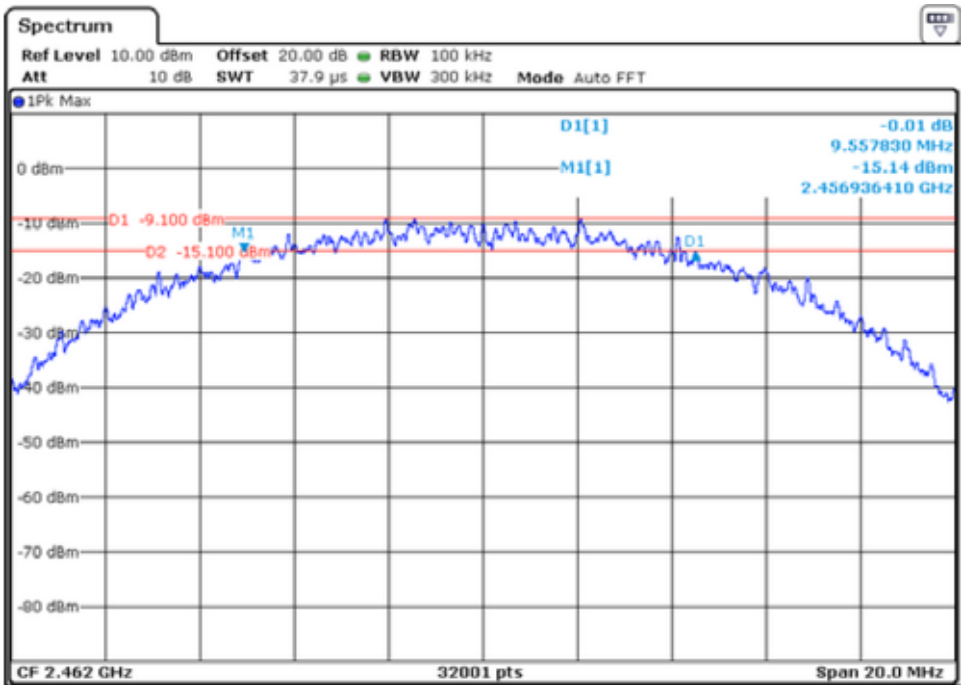
1. Set resolution bandwidth (RBW) = 100 kHz.
2. Set the video bandwidth (VBW) ≥ 3 x RBW.
3. Detector = Peak.
4. Trace mode = max hold.
5. Sweep = auto couple.
6. Allow the trace to stabilize.
7. Measure the maximum width of the emission that is constrained by the frequencies associated with the two outermost amplitude points (upper and lower frequency) that are attenuated by 6 dB relative to the maximum level measured in the fundamental emission.

9.2 Test Result

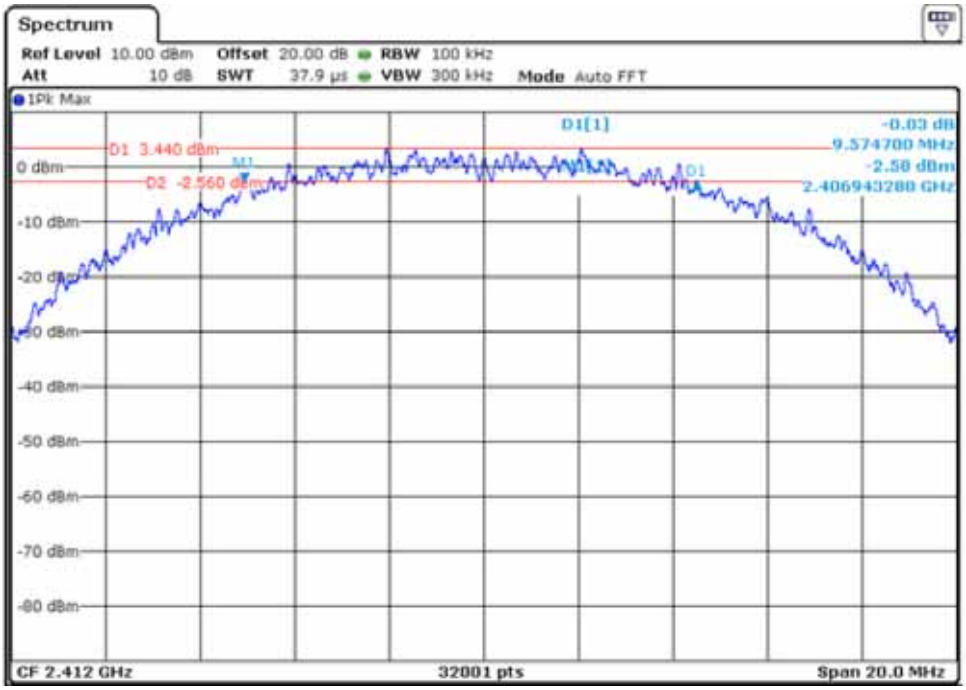
IEEE 802.11b SISO Ant1			
Channel frequency (MHz)	Measurement level (KHz)	Required Limit (KHz)	Result
2412	9544	>500	Pass
2437	9107	>500	
2462	9558	>500	

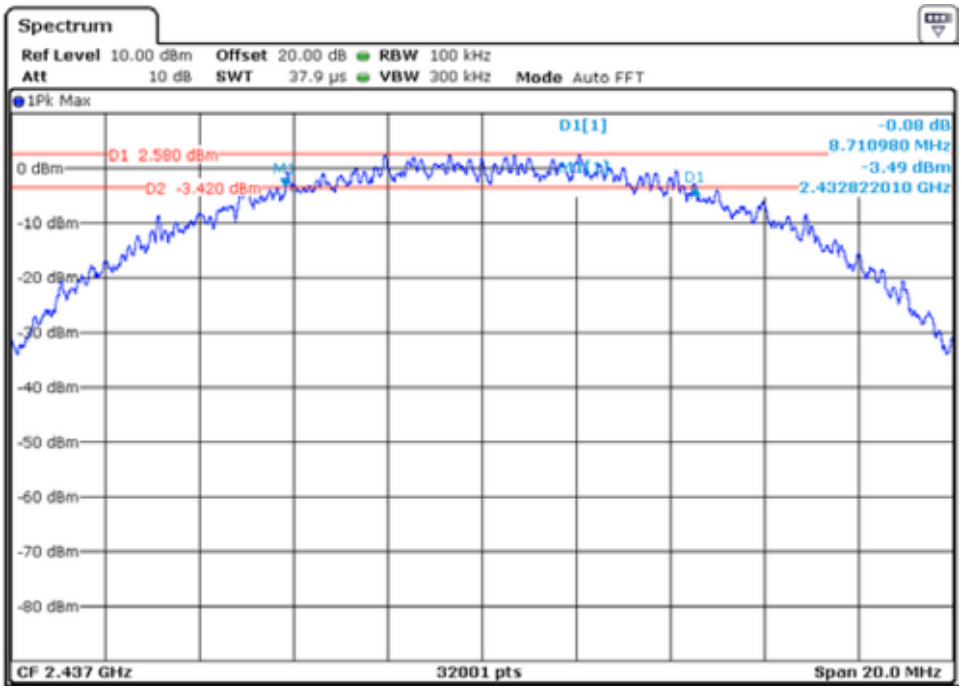

Spectrum
Ref Level 10.00 dBm Offset 20.00 dB RBW 100 kHz
Att 10 dB SWT 37.9 µs VBW 300 kHz Mode Auto FFT
1Pk Max
D1[1] -0.03 dB
9.544080 MHz
M1[1] -12.46 dBm
2.406953910 GHz
D1 -6.450 dBm
D2 -12.450 dBm
0 dBm
-10 dBm
-20 dBm
-30 dBm
-40 dBm
-50 dBm
-60 dBm
-70 dBm
-80 dBm
CF 2.412 GHz
32001 pts
Span 20.0 MHz

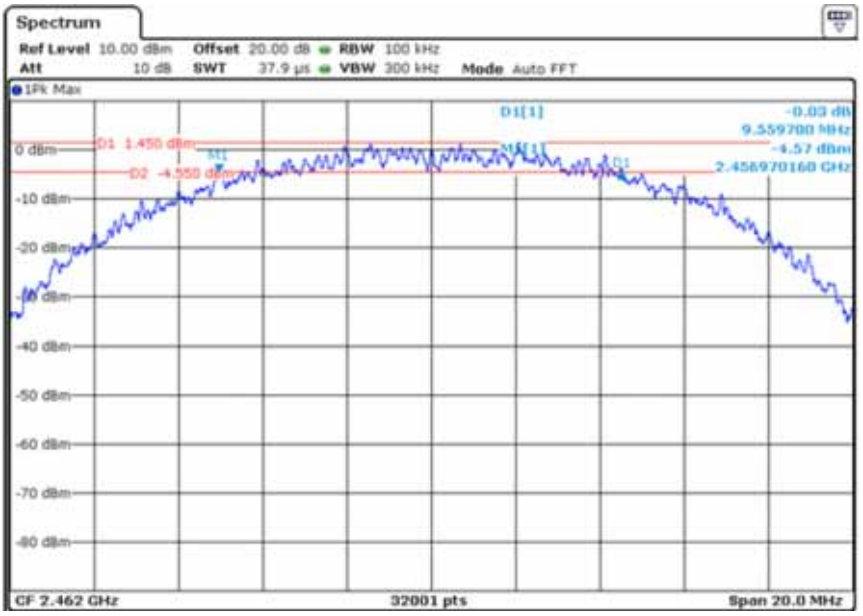

Spectrum
Ref Level 10.00 dBm Offset 20.00 dB RBW 100 kHz
Att 10 dB SWT 37.9 µs VBW 300 kHz Mode Auto FFT
1Pk Max
D1[1] -0.05 dB
9.106590 MHz
M1[1] -14.67 dBm
2.432414520 GHz
D1 -8.660 dBm
D2 -14.660 dBm
0 dBm
-10 dBm
-20 dBm
-30 dBm
-40 dBm
-50 dBm
-60 dBm
-70 dBm
-80 dBm
CF 2.437 GHz
32001 pts
Span 20.0 MHz



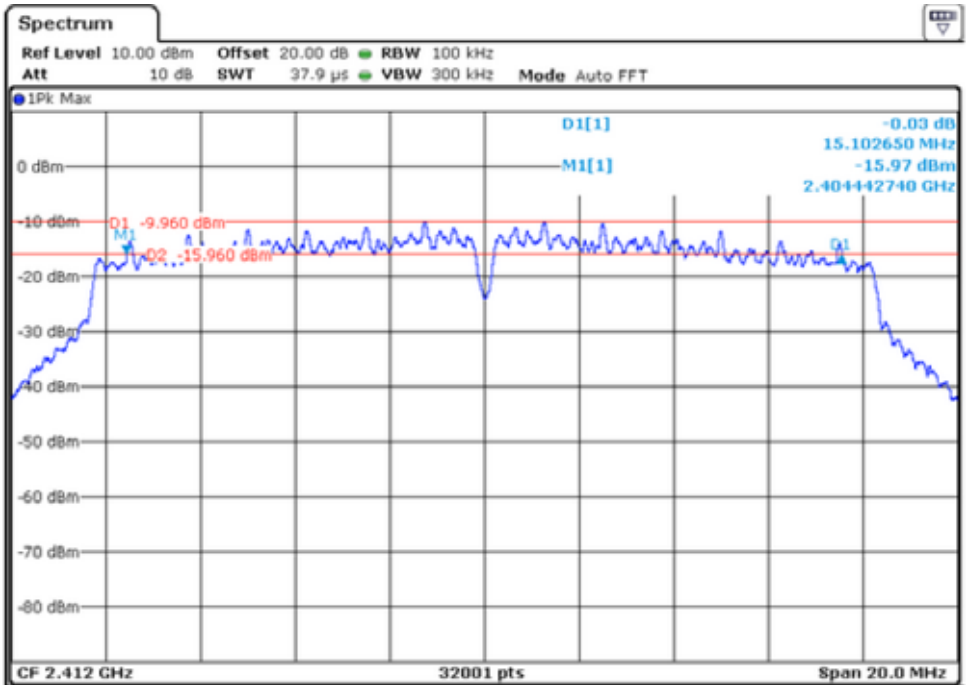
IEEE 802.11b SISO Ant2			
Channel frequency (MHz)	Measurement level (KHz)	Required Limit (KHz)	Result
2412	9575	>500	Pass
2437	8711	>500	
2462	9560	>500	

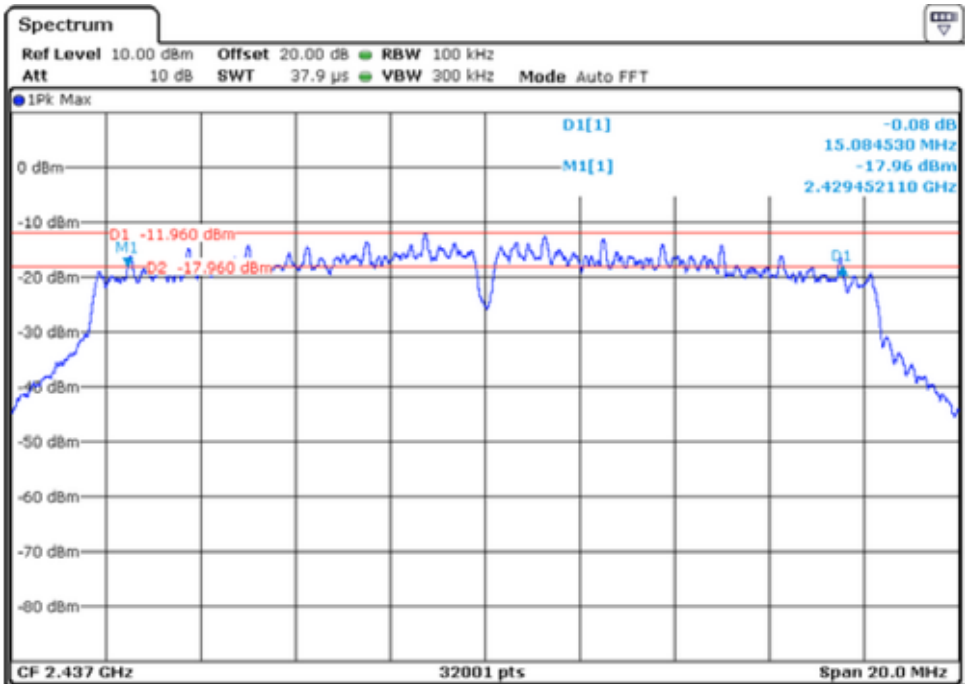

Spectrum
Ref Level 10.00 dBm Offset 20.00 dB RBW 100 kHz
Att 10 dB SWT 37.9 µs VBW 300 kHz Mode Auto FFT
1Pk Max
D1[1] -0.03 dB
9.574700 MHz
-2.50 dBm
2.406943280 GHz
D1 3.440 dBm
D2 -2.560 dBm
0 dBm
-10 dBm
-20 dBm
-30 dBm
-40 dBm
-50 dBm
-60 dBm
-70 dBm
-80 dBm
CF 2.412 GHz
32001 pts
Span 20.0 MHz

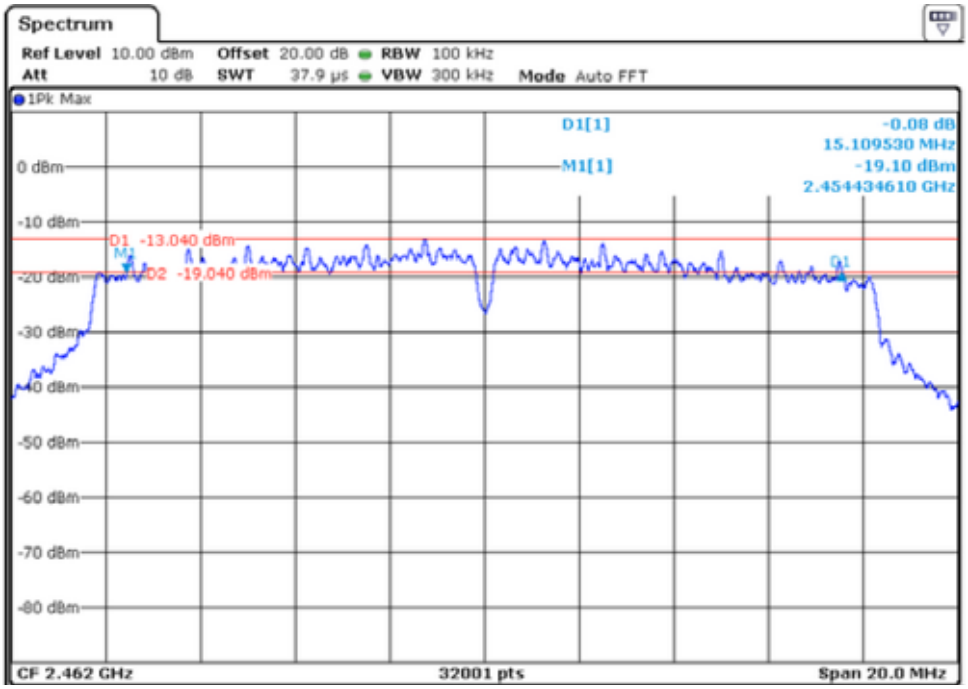

Spectrum
Ref Level 10.00 dBm Offset 20.00 dB RBW 100 kHz
Att 10 dB SWT 37.9 µs VBW 300 kHz Mode Auto FFT
1Pk Max
D1[1] -0.08 dB
8.710980 MHz
-3.49 dBm
2.432822010 GHz
D1 2.580 dBm
D2 -3.420 dBm
0 dBm
-10 dBm
-20 dBm
-30 dBm
-40 dBm
-50 dBm
-60 dBm
-70 dBm
-80 dBm
CF 2.437 GHz
32001 pts
Span 20.0 MHz



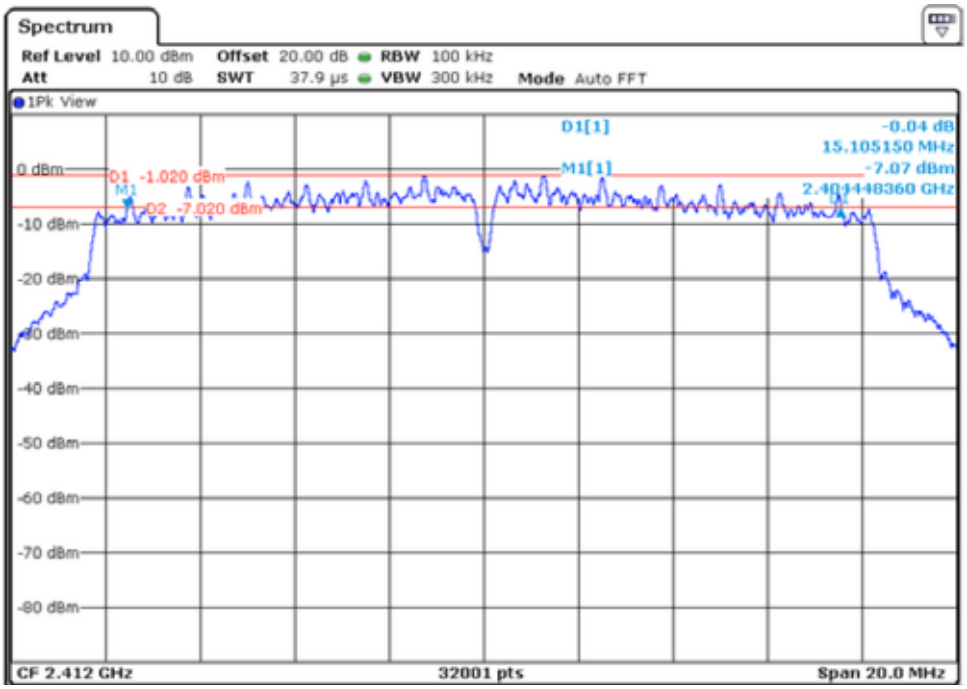
IEEE 802.11g SISO Ant1			
Channel frequency (MHz)	Measurement level (KHz)	Required Limit (KHz)	Result
2412	15103	>500	Pass
2437	15085	>500	
2462	15110	>500	

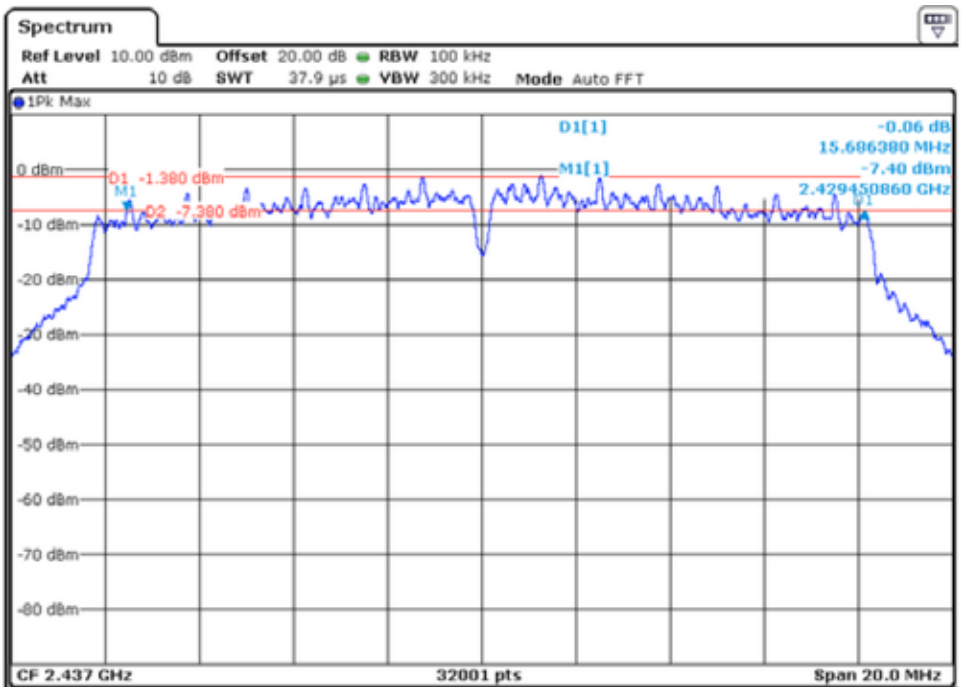

Spectrum
Ref Level 10.00 dBm Offset 20.00 dB RBW 100 kHz
Att 10 dB SWT 37.9 µs VBW 300 kHz Mode Auto FFT
1Pk Max
D1[1] -0.03 dB
15.102650 MHz
M1[1] -15.97 dBm
2.404442740 GHz
D1 -9.960 dBm
D2 -15.960 dBm
0 dBm
-10 dBm
-20 dBm
-30 dBm
-40 dBm
-50 dBm
-60 dBm
-70 dBm
-80 dBm
CF 2.412 GHz
32001 pts
Span 20.0 MHz

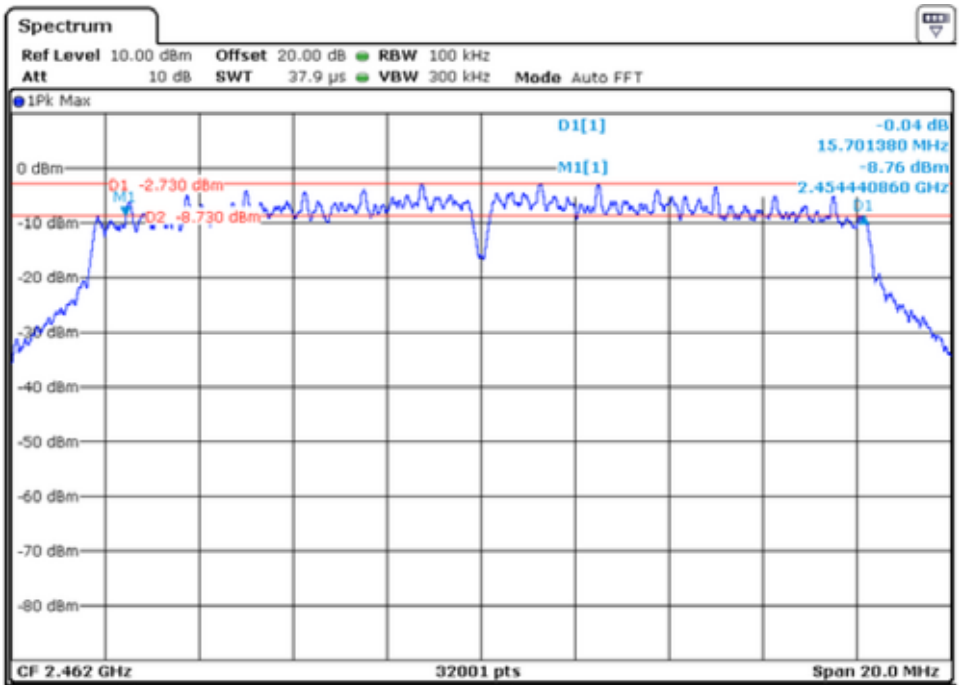

Spectrum
Ref Level 10.00 dBm Offset 20.00 dB RBW 100 kHz
Att 10 dB SWT 37.9 µs VBW 300 kHz Mode Auto FFT
1Pk Max
D1[1] -0.08 dB
15.084530 MHz
M1[1] -17.96 dBm
2.429452110 GHz
D1 -11.960 dBm
D2 -17.960 dBm
0 dBm
-10 dBm
-20 dBm
-30 dBm
-40 dBm
-50 dBm
-60 dBm
-70 dBm
-80 dBm
CF 2.437 GHz
32001 pts
Span 20.0 MHz



IEEE 802.11g SISO Ant2			
Channel frequency (MHz)	Measurement level (KHz)	Required Limit (KHz)	Result
2412	15105	>500	Pass
2437	15687	>500	
2462	15701	>500	

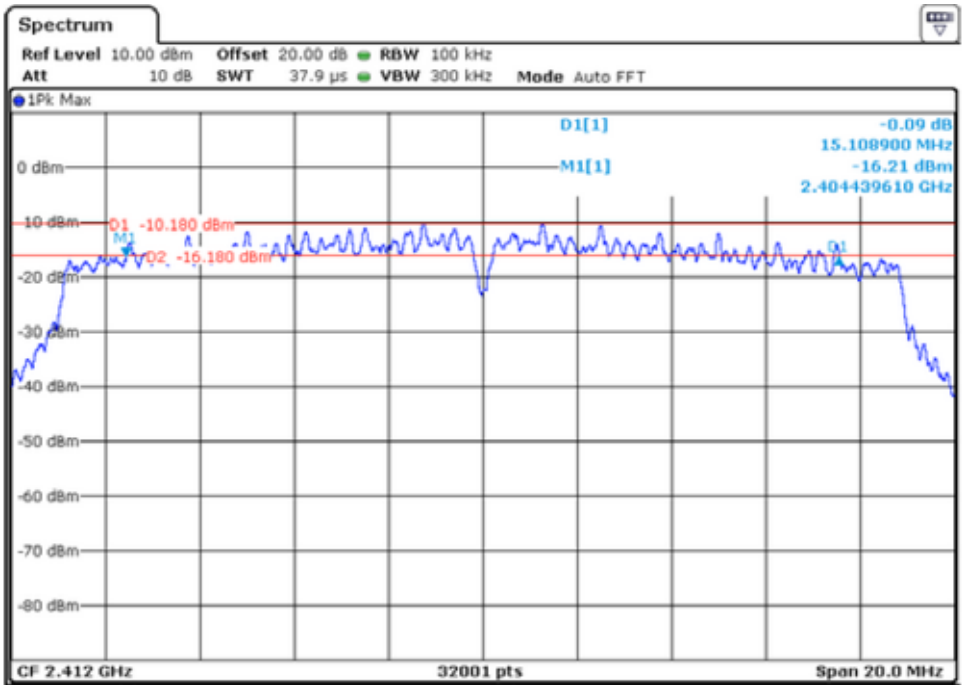

Spectrum
Ref Level 10.00 dBm Offset 20.00 dB RBW 100 kHz
Att 10 dB SWT 37.9 µs VBW 300 kHz Mode Auto FFT
1Pk View
D1[1] -0.04 dB
15.105150 MHz
M1[1] -7.07 dBm
2.401448360 GHz
D1 -1.020 dBm
D2 -7.020 dBm
0 dBm
-10 dBm
-20 dBm
-30 dBm
-40 dBm
-50 dBm
-60 dBm
-70 dBm
-80 dBm
CF 2.412 GHz
32001 pts
Span 20.0 MHz

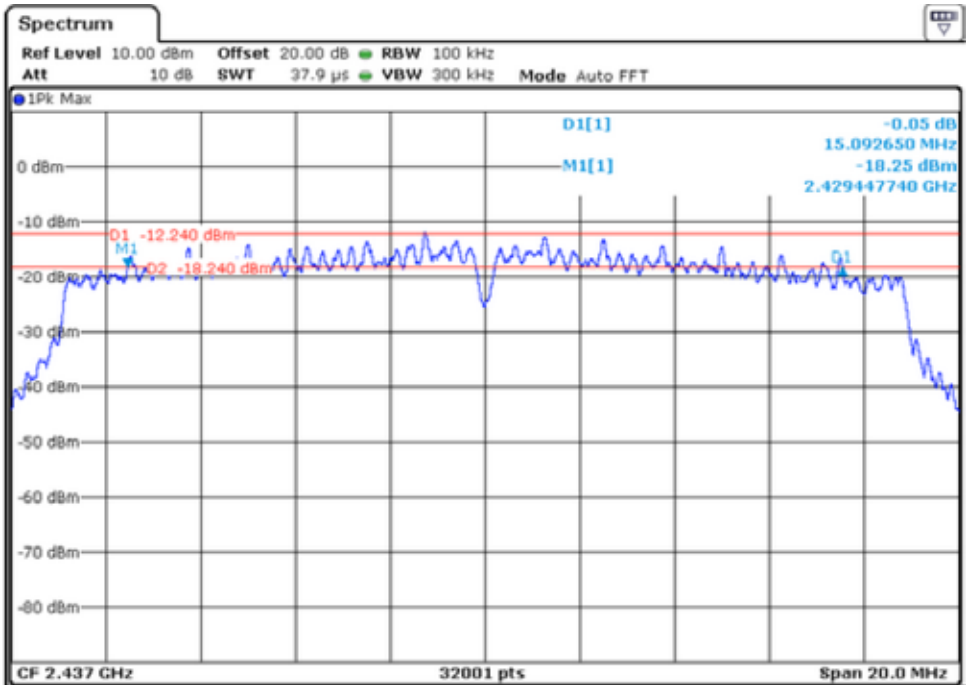

Spectrum
Ref Level 10.00 dBm Offset 20.00 dB RBW 100 kHz
Att 10 dB SWT 37.9 µs VBW 300 kHz Mode Auto FFT
1Pk Max
D1[1] -0.06 dB
15.686380 MHz
M1[1] -7.40 dBm
2.429450860 GHz
D1 -1.380 dBm
D2 -7.380 dBm
0 dBm
-10 dBm
-20 dBm
-30 dBm
-40 dBm
-50 dBm
-60 dBm
-70 dBm
-80 dBm
CF 2.437 GHz
32001 pts
Span 20.0 MHz

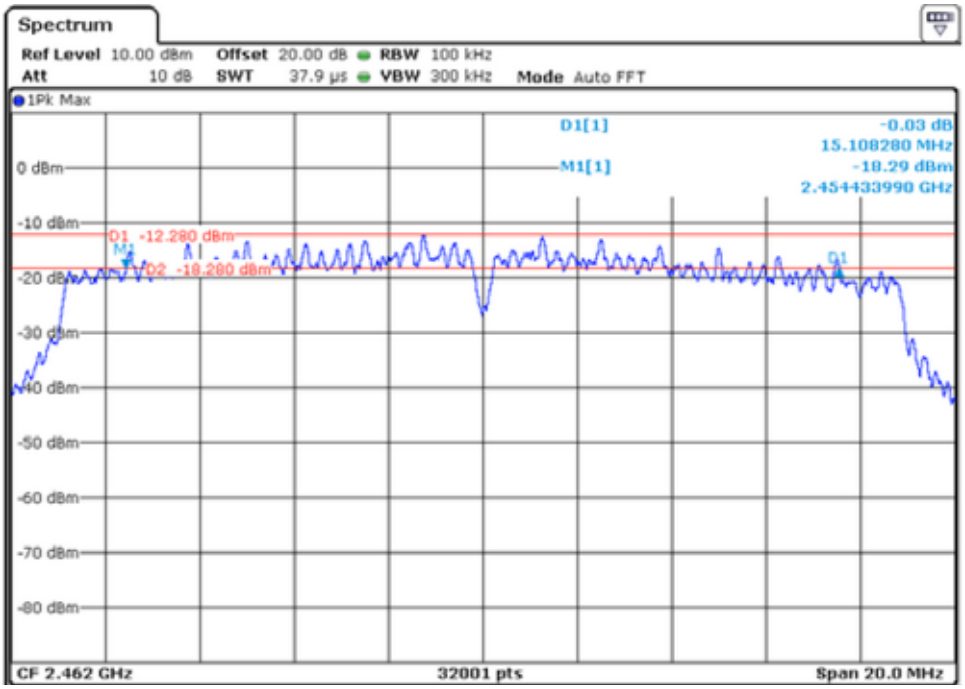


IEEE 802.11n(HT20) MIMO				
Channel frequency (MHz)	Measurement level (KHz)		Required Limit (KHz)	Result
	Ant1	Ant2		
2412	15109	15100	>500	Pass
2437	15093	15090	>500	
2462	15108	16062	>500	

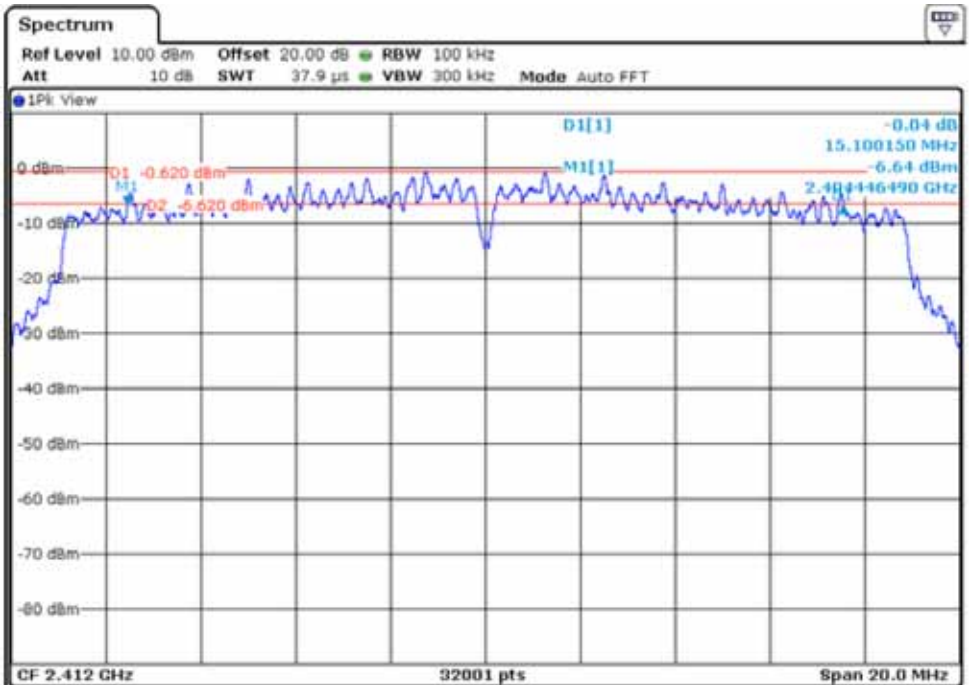
Ant1

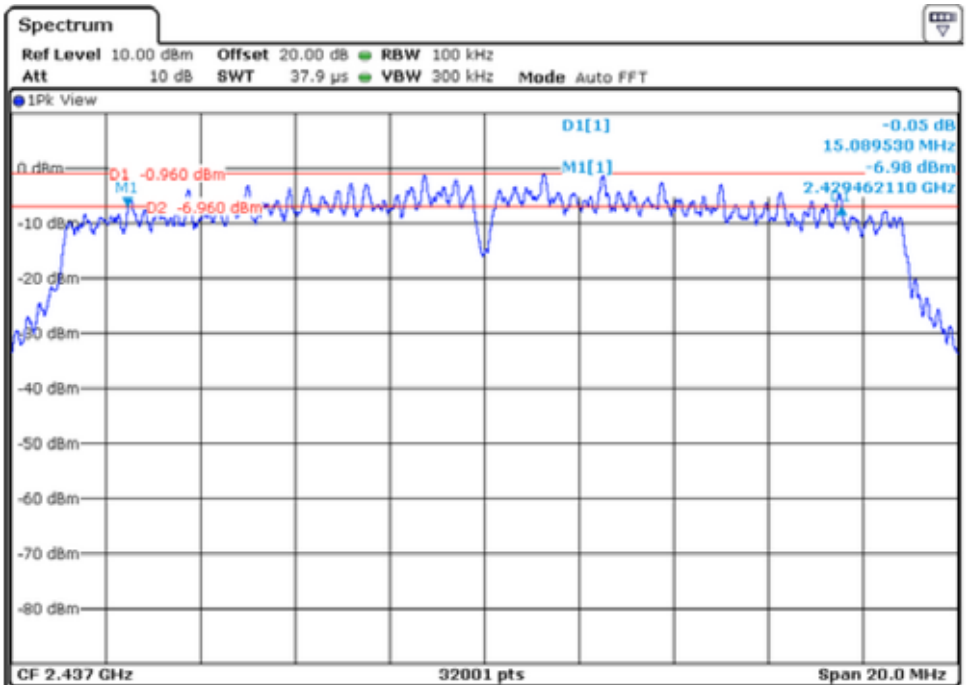

Spectrum
Ref Level 10.00 dBm Offset 20.00 dB RBW 100 kHz
Att 10 dB SWT 37.9 µs VBW 300 kHz Mode Auto FFT
1Pk Max
D1[1] -0.09 dB
15.108900 MHz
M1[1] -16.21 dBm
2.404439610 GHz
D1 -10.180 dBm
D2 -16.180 dBm
0 dBm
-10 dBm
-20 dBm
-30 dBm
-40 dBm
-50 dBm
-60 dBm
-70 dBm
-80 dBm
CF 2.412 GHz
32001 pts
Span 20.0 MHz

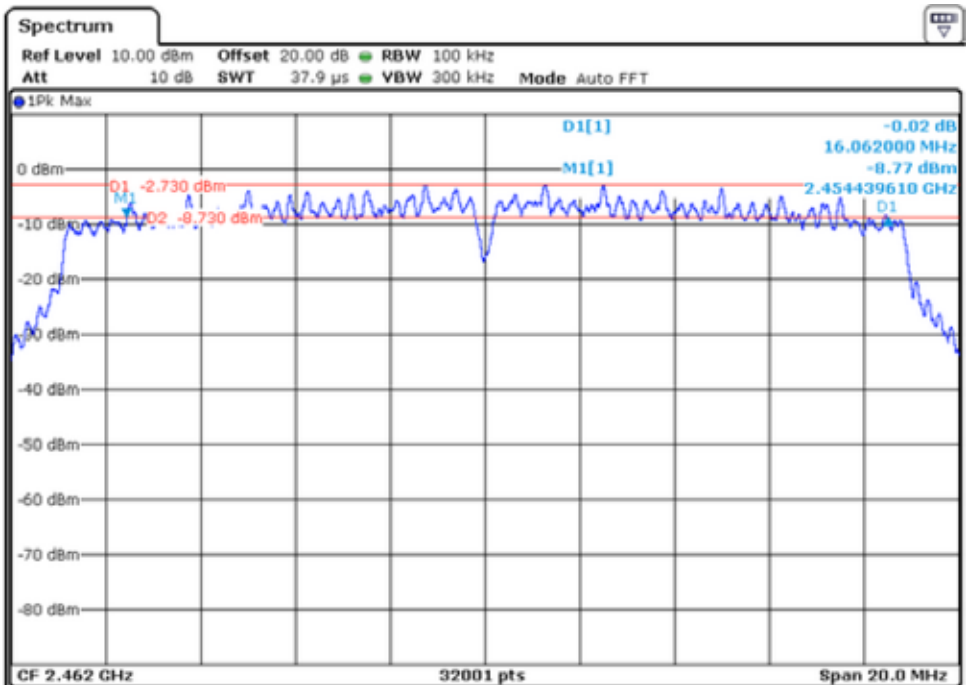

Spectrum
Ref Level 10.00 dBm Offset 20.00 dB RBW 100 kHz
Att 10 dB SWT 37.9 µs VBW 300 kHz Mode Auto FFT
1Pk Max
D1[1] -0.05 dB
15.092650 MHz
M1[1] -18.25 dBm
2.429447740 GHz
D1 -12.240 dBm
D2 -18.240 dBm
0 dBm
-10 dBm
-20 dBm
-30 dBm
-40 dBm
-50 dBm
-60 dBm
-70 dBm
-80 dBm
CF 2.437 GHz
32001 pts
Span 20.0 MHz


Spectrum
Ref Level 10.00 dBm Offset 20.00 dB RBW 100 kHz
Att 10 dB SWT 37.9 µs VBW 300 kHz Mode Auto FFT
1Pk Max
D1[1] -0.03 dB
15.108280 MHz
M1[1] -18.29 dBm
2.454433990 GHz
D1 -12.280 dBm
D2 -18.280 dBm
0 dBm
-10 dBm
-20 dBm
-30 dBm
-40 dBm
-50 dBm
-60 dBm
-70 dBm
-80 dBm
CF 2.462 GHz
32001 pts
Span 20.0 MHz

Ant2

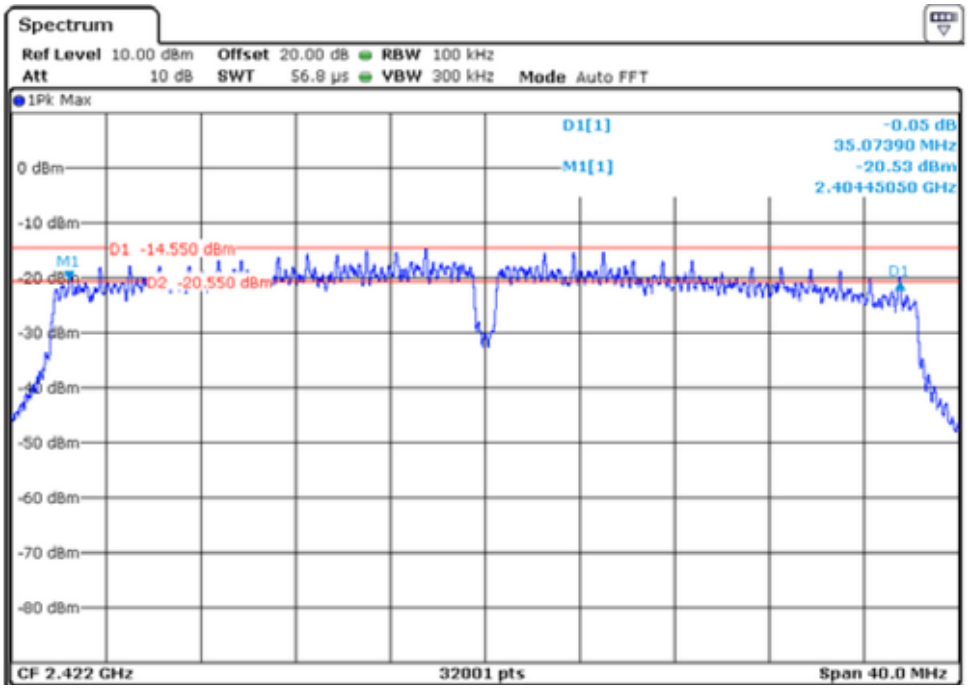

Spectrum
Ref Level 10.00 dBm Offset 20.00 dB RBW 100 kHz
Att 10 dB SWT 37.9 µs VBW 300 kHz Mode Auto FFT
1Pk View
D1[1] -0.04 dB
15.100150 MHz
M1[1] -6.64 dBm
2.484446490 GHz
D1 -0.620 dBm
D2 -6.620 dBm
0 dBm
-10 dBm
-20 dBm
-30 dBm
-40 dBm
-50 dBm
-60 dBm
-70 dBm
-80 dBm
CF 2.412 GHz
32001 pts
Span 20.0 MHz

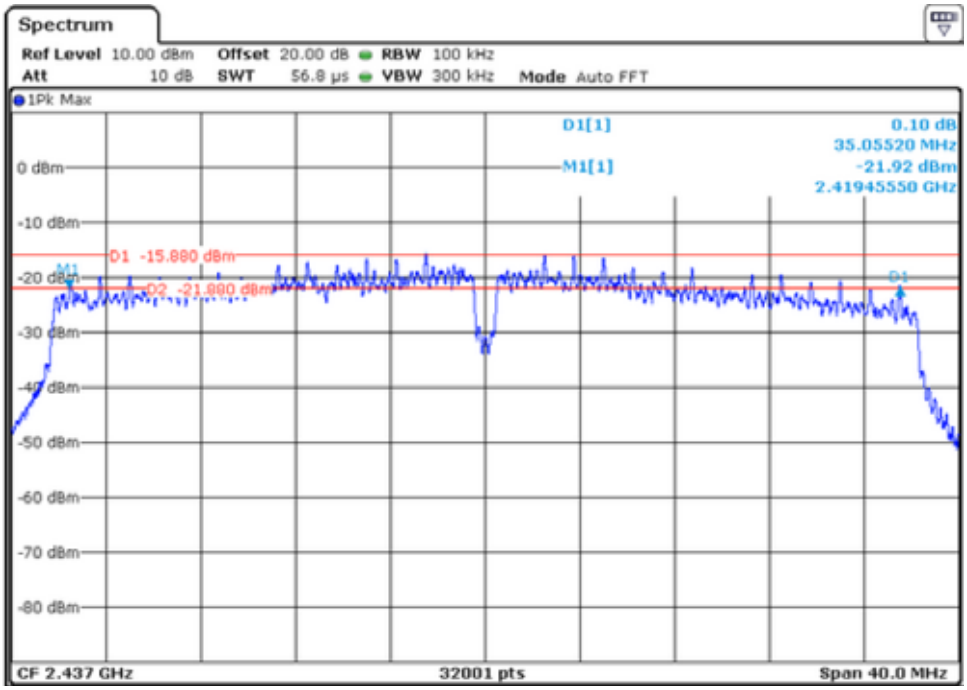

Spectrum
Ref Level 10.00 dBm Offset 20.00 dB RBW 100 kHz
Att 10 dB SWT 37.9 µs VBW 300 kHz Mode Auto FFT
1Pk View
D1[1] -0.05 dB
15.089530 MHz
M1[1] -6.98 dBm
2.429462110 GHz
D1 -0.960 dBm
M1
D2 -6.960 dBm
0 dBm
-10 dBm
-20 dBm
-30 dBm
-40 dBm
-50 dBm
-60 dBm
-70 dBm
-80 dBm
CF 2.437 GHz
32001 pts
Span 20.0 MHz

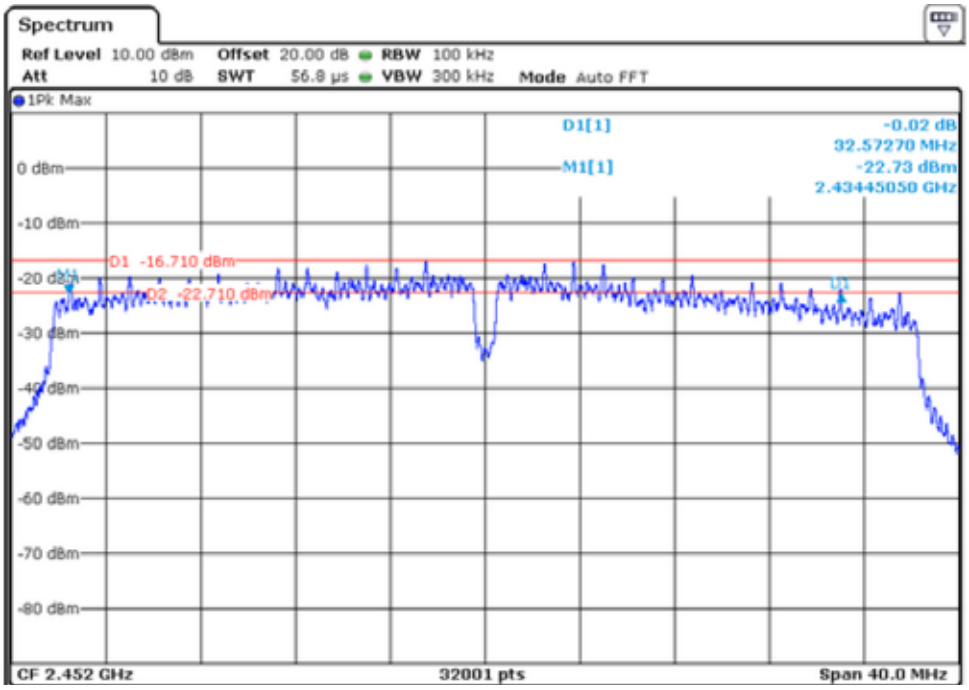

Spectrum
Ref Level 10.00 dBm Offset 20.00 dB RBW 100 kHz
Att 10 dB SWT 37.9 µs VBW 300 kHz Mode Auto FFT
1Pk Max
D1[1] -0.02 dB
16.062000 MHz
M1[1] -8.77 dBm
2.454439610 GHz
D1 -2.730 dBm
M1
D2 -8.730 dBm
D1
0 dBm
-10 dBm
-20 dBm
-30 dBm
-40 dBm
-50 dBm
-60 dBm
-70 dBm
-80 dBm
CF 2.462 GHz
32001 pts
Span 20.0 MHz

IEEE 802.11n (HT40) MIMO				
Channel frequency (MHz)	Measurement level (KHz)		Required Limit (KHz)	Result
	Ant1	Ant2		
2422	35074	35090	>500	Pass
2437	35055	35095	>500	
2452	32573	35088	>500	

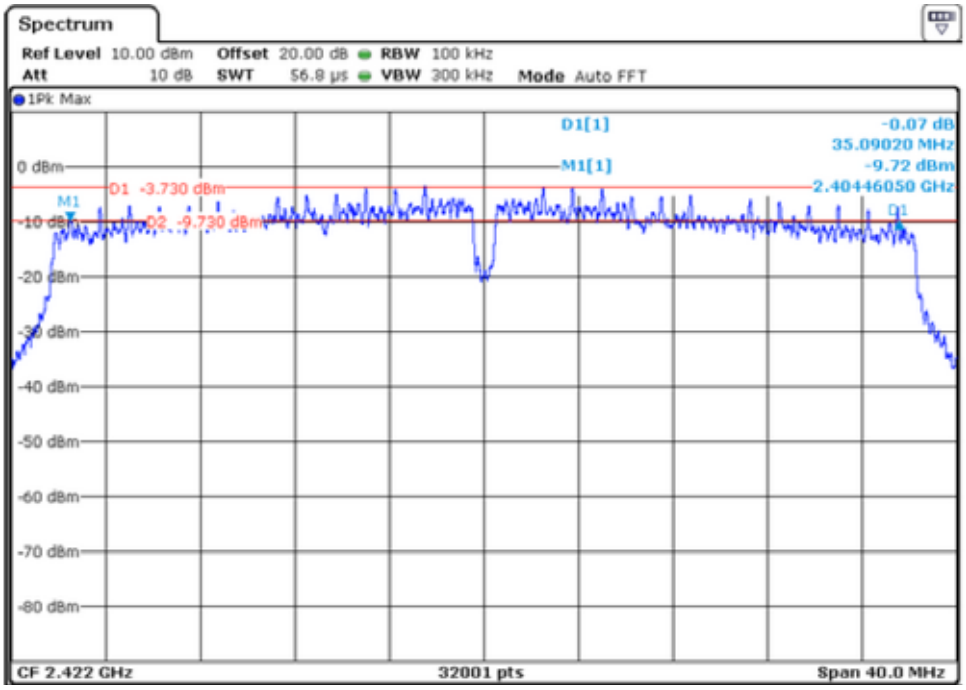
Ant1

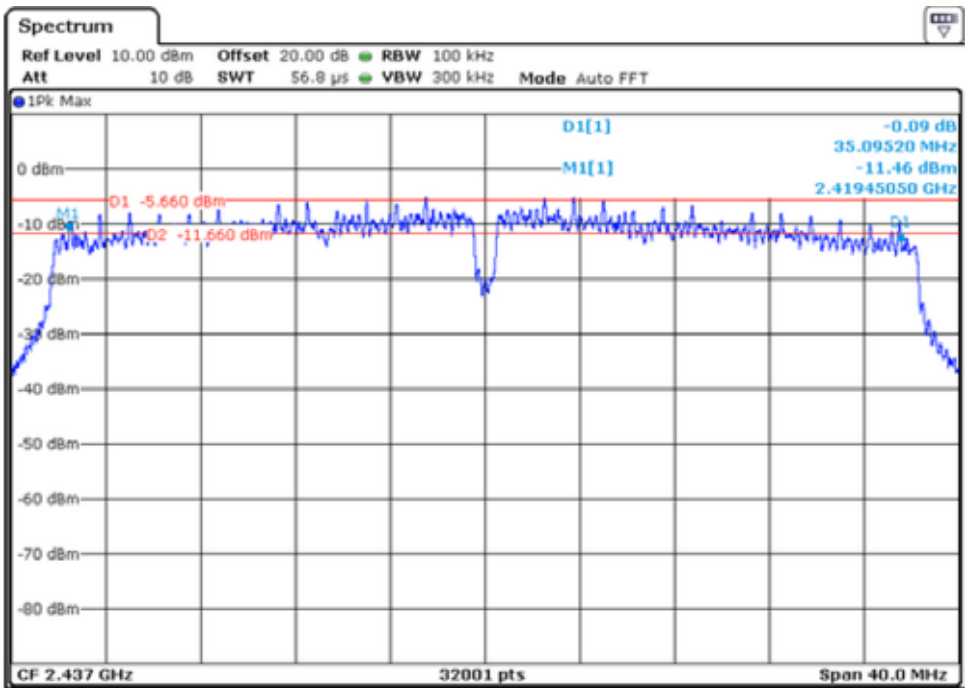


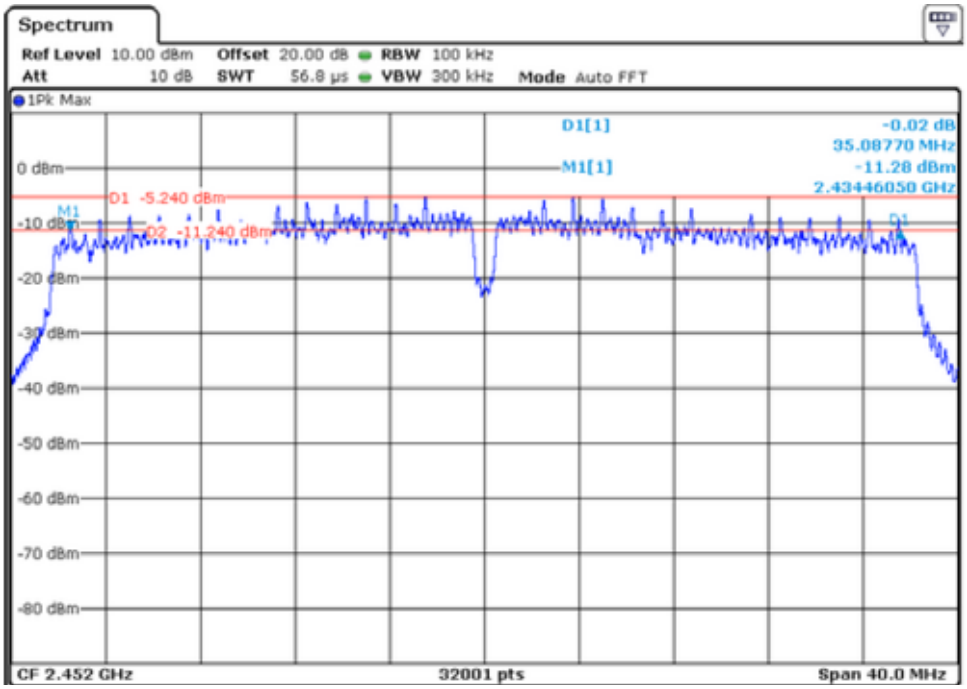

Spectrum
Ref Level 10.00 dBm Offset 20.00 dB RBW 100 kHz
Att 10 dB SWT 56.8 µs VBW 300 kHz Mode Auto FFT
1Pk Max
D1[1] 0.10 dB
35.05520 MHz
M1[1] -21.92 dBm
2.41945550 GHz
D1 -15.880 dBm
D2 -21.880 dBm
0 dBm
-10 dBm
-20 dBm
-30 dBm
-40 dBm
-50 dBm
-60 dBm
-70 dBm
-80 dBm
CF 2.437 GHz
32001 pts
Span 40.0 MHz


Spectrum
Ref Level 10.00 dBm Offset 20.00 dB RBW 100 kHz
Att 10 dB SWT 56.8 µs VBW 300 kHz Mode Auto FFT
1Pk Max
D1[1] -0.02 dB
32.57270 MHz
M1[1] -22.73 dBm
2.43445050 GHz
D1 -16.710 dBm
D2 -22.710 dBm
0 dBm
-10 dBm
-20 dBm
-30 dBm
-40 dBm
-50 dBm
-60 dBm
-70 dBm
-80 dBm
CF 2.452 GHz
32001 pts
Span 40.0 MHz

Ant2


Spectrum
Ref Level 10.00 dBm Offset 20.00 dB RBW 100 kHz
Att 10 dB SWT 56.8 µs VBW 300 kHz Mode Auto FFT
1Pk Max
D1[1] -0.07 dB
35.09020 MHz
M1[1] -9.72 dBm
2.40446050 GHz
D1 -3.730 dBm
D2 -9.730 dBm
0 dBm
-10 dBm
-20 dBm
-30 dBm
-40 dBm
-50 dBm
-60 dBm
-70 dBm
-80 dBm
CF 2.422 GHz
32001 pts
Span 40.0 MHz


Spectrum
Ref Level 10.00 dBm Offset 20.00 dB RBW 100 kHz
Att 10 dB SWT 56.8 µs VBW 300 kHz Mode Auto FFT
1Pk Max
D1[1] -0.09 dB
35.09520 MHz
M1[1] -11.46 dBm
2.41945050 GHz
D1 -5.660 dBm
D2 -11.660 dBm
0 dBm
-10 dBm
-20 dBm
-30 dBm
-40 dBm
-50 dBm
-60 dBm
-70 dBm
-80 dBm
CF 2.437 GHz
32001 pts
Span 40.0 MHz


Spectrum
Ref Level 10.00 dBm Offset 20.00 dB RBW 100 kHz
Att 10 dB SWT 56.8 µs VBW 300 kHz Mode Auto FFT
1Pk Max
D1[1] -0.02 dB
35.08770 MHz
M1[1] -11.28 dBm
2.43446050 GHz
D1 -5.240 dBm
D2 -11.240 dBm
M1
D1
0 dBm
-10 dBm
-20 dBm
-30 dBm
-40 dBm
-50 dBm
-60 dBm
-70 dBm
-80 dBm
CF 2.452 GHz
32001 pts
Span 40.0 MHz

10 Maximum Peak Output Power

Test Requirement	:	FCC CFR47 Part 15 Section 15.247
Test Method	:	ANSI C63.10:2013
Test Limit	:	Regulation 15.247 (b)(3), For systems using digital modulation in the 902-928 MHz, 2400-2483.5 MHz, and 5725-5850 MHz bands: 1 Watt. As an alternative to a peak power measurement, compliance with the one Watt limit can be based on a measurement of the maximum conducted output power.

10.1 Test Procedure

(1) According to FCC Part15.247(b)(3)

The maximum peak conducted output power may be measured using a broadband peak RF power meter. The power meter shall have a video bandwidth that is greater than or equal to the DTS bandwidth and shall utilize a fast-responding diode detector.

The RF output of EUT was connected to the power meter by RF cable and attnuator. The path loss was compensated to the results for each measurement.

Set to the maximum output power setting and enable the EUT transmit continuously.

Measure the conducted output power with cable loss and record the results in the test report.

Measure and record the results in the report.

(2) According to FCC Part 15.247(b)(4):

Conducted output power limit specified in paragraph (b) of this section is based on the use of antennas with directional gains that do not exceed 6 dBi. If transmitting antennas of directional gain greater than 6 dBi are used, the conducted output power from the intentional radiator shall be reduced below the stated values in paragraphs (b)(3) of this section, as appropriate, by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

Note: If antenna Gain exceeds 6 dBi, then Output power Limit=30-(Gain - 6)

10.2 Test Result

Operation Mode	Channel Number	Channel Frequency (MHz)	Measurement Level (dBm)			Limit (dBm)	Verdict
			Ant1	Ant2	Sum		
802.11b	1	2412	8.62	8.71	--	30	PASS
	6	2437	7.22	7.53	--	30	PASS
	11	2462	6.58	6.82	--	30	PASS
802.11g	1	2412	6.54	6.43	--	30	PASS
	6	2437	5.84	5.77	--	30	PASS
	11	2462	5.68	5.53	--	30	PASS
802.11n (HT20)	1	2412	4.85	4.86	6.34	30	PASS
	6	2437	4.53	4.59	6.02	30	PASS
	11	2462	4.35	4.29	5.76	30	PASS
802.11n (HT40)	3	2422	3.34	3.25	4.72	30	PASS
	6	2437	3.26	3.18	4.65	30	PASS
	9	2452	3.18	3.08	4.56	30	PASS

Note:
1. For MIMO System of 802.11n(HT20) and 802.11n(HT40), total power is calculated by combining the output power of each antenna according to KDB662911.
2. Antenna 1 Gain: 2.5dBi, Antenna 2 Gain: 2.5dBi. For antennas with gains of 6dBi or less, maximum allowed Transmitter output watt(+30dBm)
3. In MIMO, Ant1+Ant2 Directional Gain=G_{ANT}+10Log(N)dBi=2.5+10log(2)=5.51dBi.

11 Power Spectral density

Test Requirement : FCC CFR47 Part 15 Section 15.247

Test Method : ANSI C63.10:2013

Test Limit : Regulation 15.247(f) The power spectral density conducted from the intentional radiator to the antenna due to the digital modulation operation of the hybrid system, with the frequency hopping operation turned off, shall not be greater than 8 dBm in any 3 kHz band during any time interval of continuous transmission.

11.1 Test Procedure

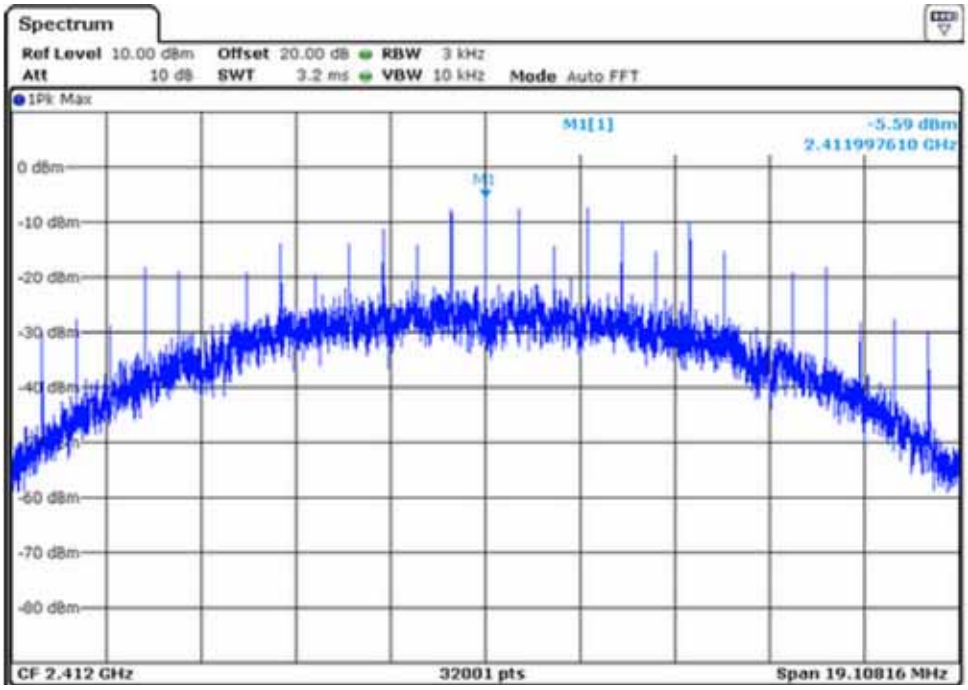
1. Remove the antenna from the EUT and then connect a low RF cable from the antenna port to the spectrum.

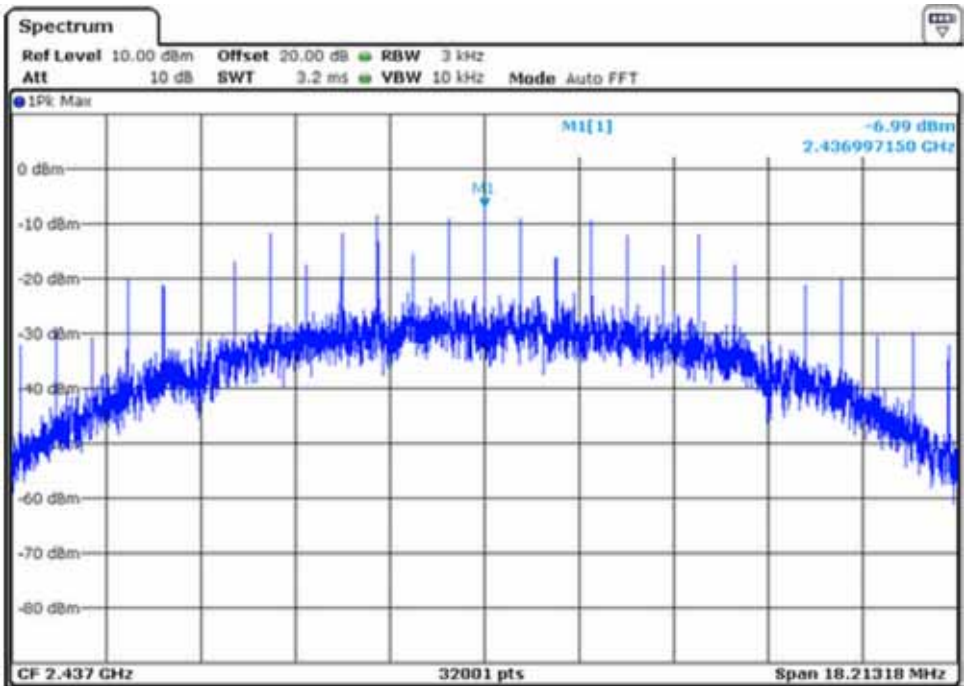
2. Set the spectrum analyzer: RBW = 3kHz. VBW = 10kHz, Span = 1.5 times the DTS channel bandwidth(6 dB bandwidth). Sweep = auto; Detector Function = Peak. Trace = Max hold.

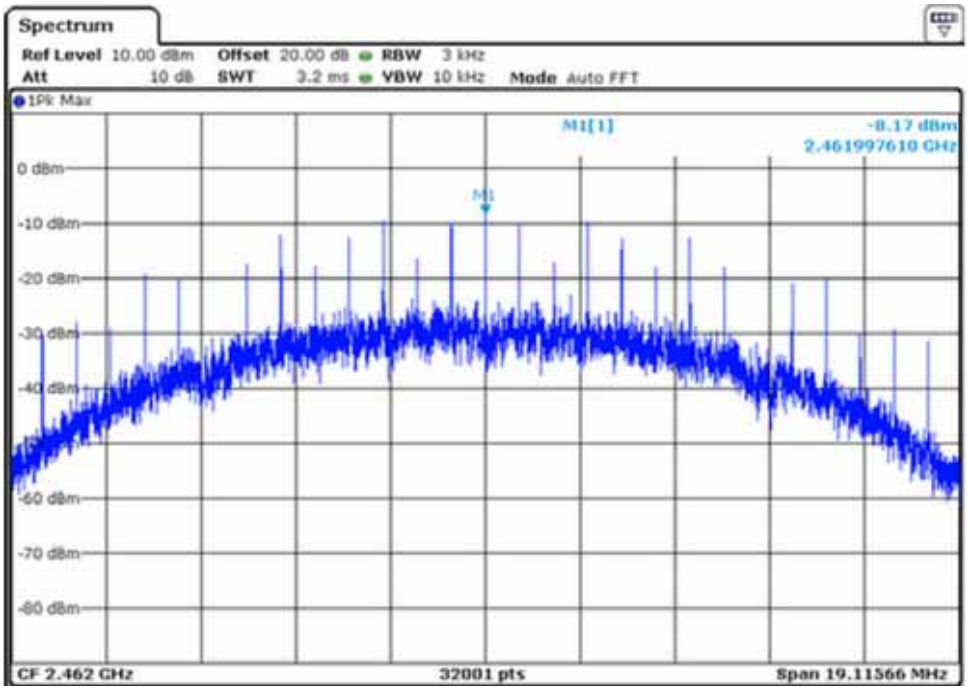
3. Allow the trace to stabilize. Use the marker-delta function to determine the separation between the peaks of the adjacent channels. The limit is specified in one of the subparagraphs of this Section Submit this plot.

11.2 Test Result

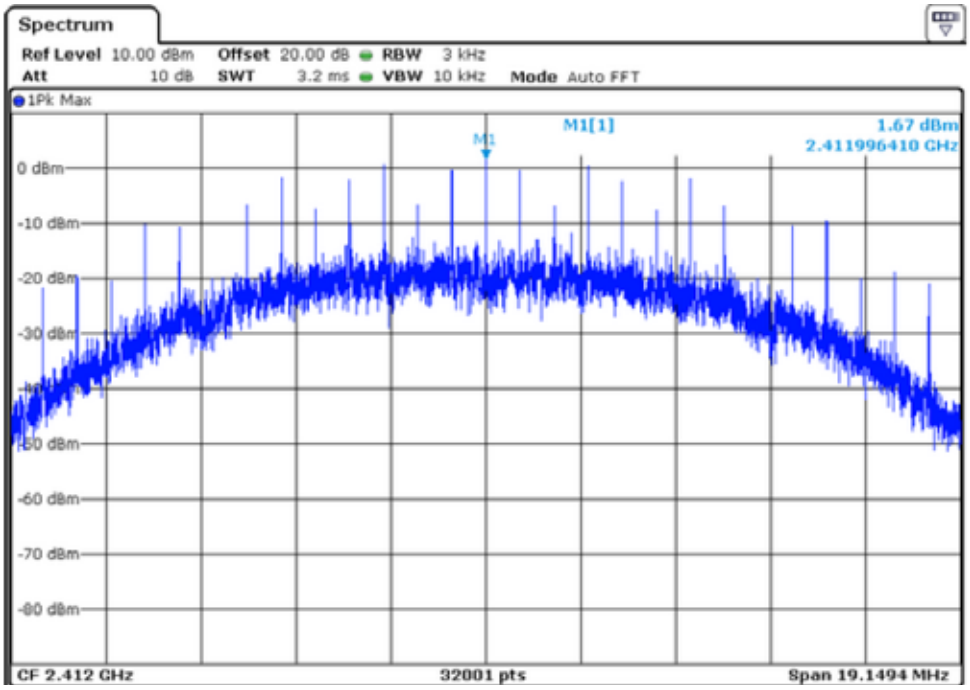
IEEE 802.11b SISO Ant1			
Channel frequency (MHz)	Power Density (dBm/3kHz)	Power Density Limit (dBm/3kHz)	Result
2412	-5.59	8	Pass
2437	-6.99		
2462	-8.17		

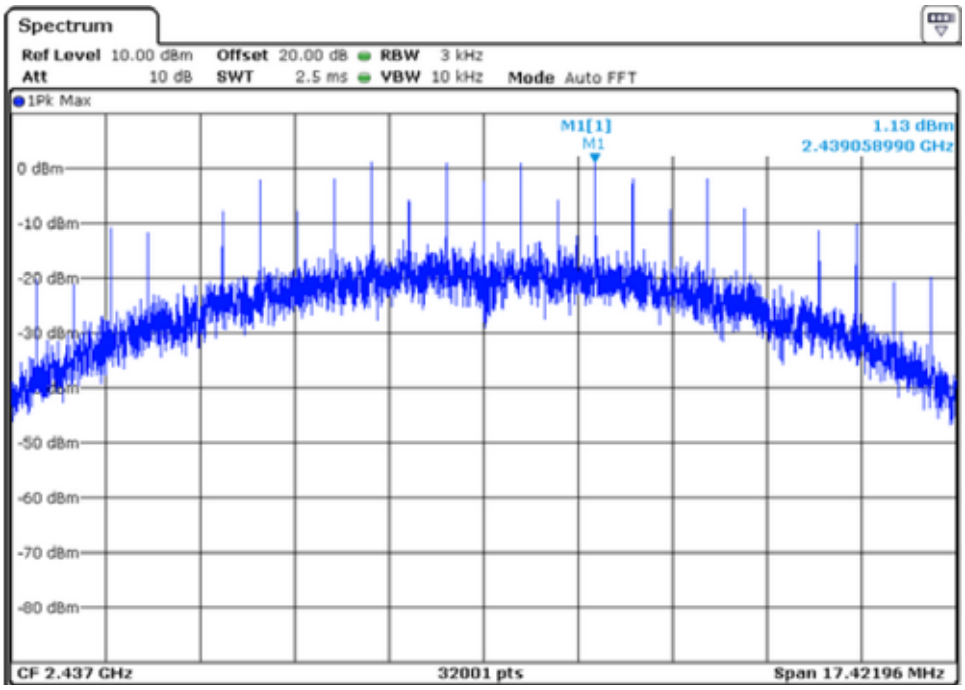

Spectrum
Ref Level 10.00 dBm Offset 20.00 dB RBW 3 kHz
Att 10 dB SWT 3.2 ms VBW 10 kHz Mode Auto FFT
1Pk Max
M1[1] -5.59 dBm
2.411997610 GHz
M1
0 dBm
-10 dBm
-20 dBm
-30 dBm
-40 dBm
-50 dBm
-60 dBm
-70 dBm
-80 dBm
CF 2.412 GHz
32001 pts
Span 19.10816 MHz

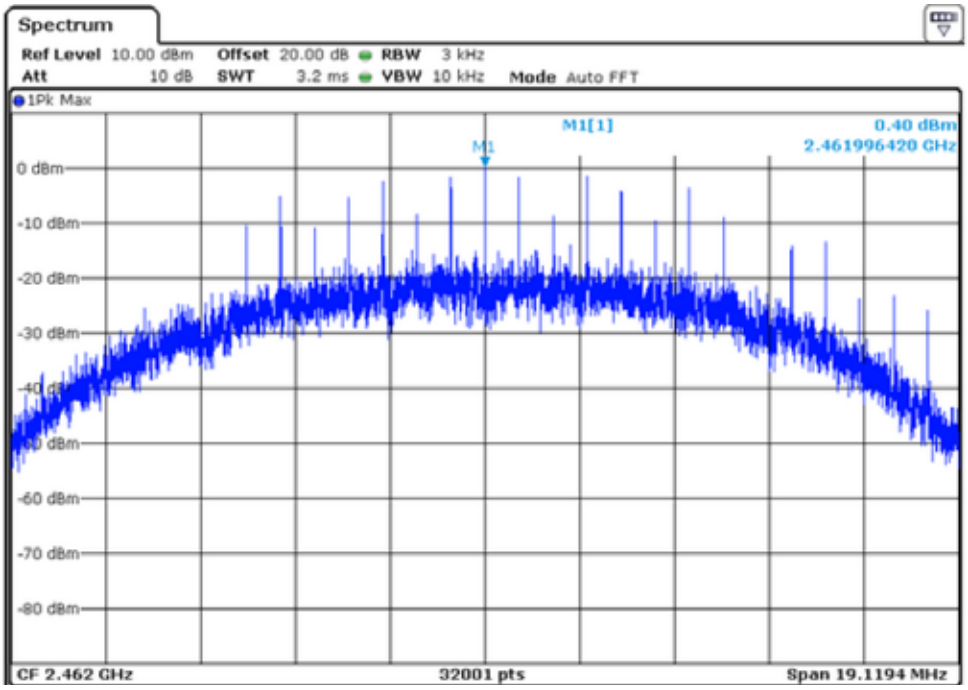

Spectrum
Ref Level 10.00 dBm Offset 20.00 dB RBW 3 kHz
Att 10 dB SWT 3.2 ms VBW 10 kHz Mode Auto FFT
1Pk Max
M1[1] -6.99 dBm
2.436997150 GHz
M1
0 dBm
-10 dBm
-20 dBm
-30 dBm
-40 dBm
-50 dBm
-60 dBm
-70 dBm
-80 dBm
CF 2.437 GHz
32001 pts
Span 18.21318 MHz



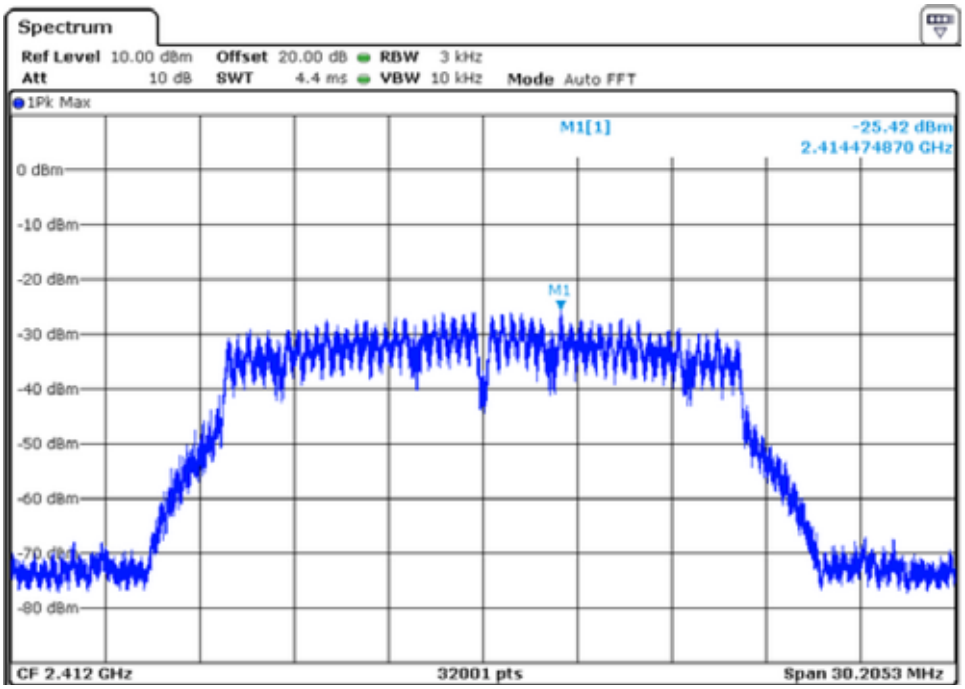
IEEE 802.11b SISO Ant2			
Channel frequency (MHz)	Power Density (dBm/3kHz)	Power Density Limit (dBm/3kHz)	Result
2412	1.67	8	Pass
2437	1.13		
2462	0.40		

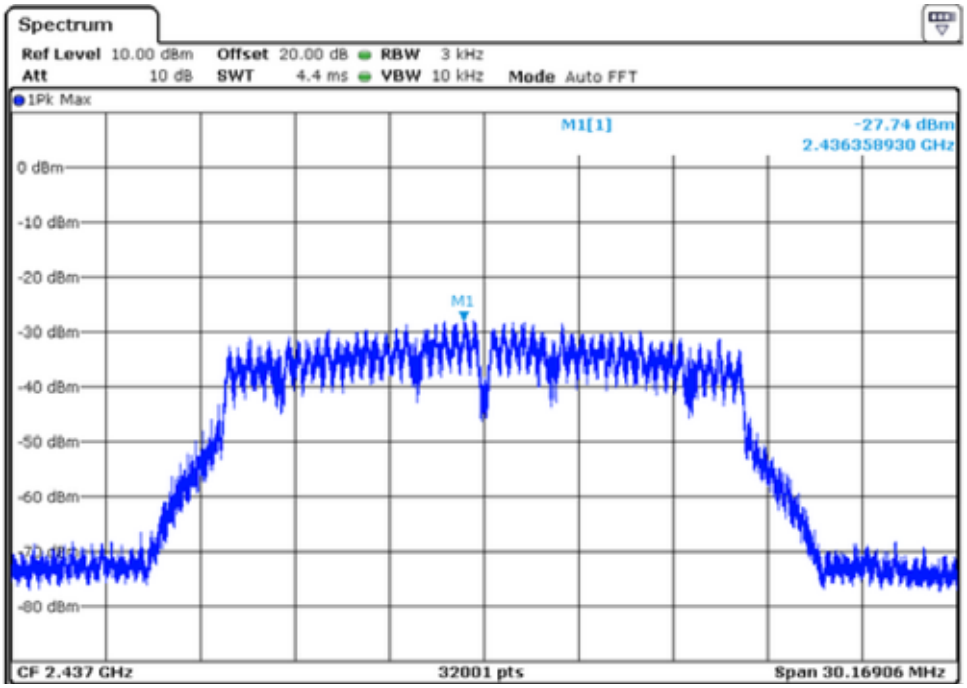

Spectrum
Ref Level 10.00 dBm Offset 20.00 dB RBW 3 kHz
Att 10 dB SWT 3.2 ms VBW 10 kHz Mode Auto FFT
1Pk Max
M1[1]
1.67 dBm
2.411996410 GHz
M1
0 dBm
-10 dBm
-20 dBm
-30 dBm
-50 dBm
-60 dBm
-70 dBm
-80 dBm
CF 2.412 GHz
32001 pts
Span 19.1494 MHz

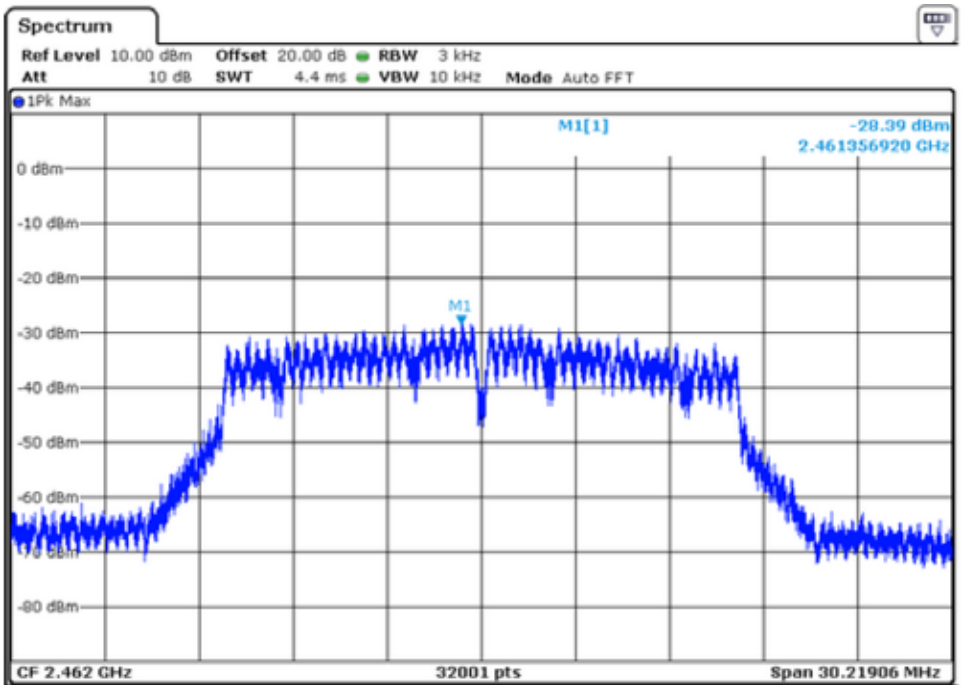

Spectrum
Ref Level 10.00 dBm Offset 20.00 dB RBW 3 kHz
Att 10 dB SWT 2.5 ms VBW 10 kHz Mode Auto FFT
1Pk Max
M1[1]
1.13 dBm
2.439058990 GHz
M1
0 dBm
-10 dBm
-20 dBm
-30 dBm
-50 dBm
-60 dBm
-70 dBm
-80 dBm
CF 2.437 GHz
32001 pts
Span 17.42196 MHz



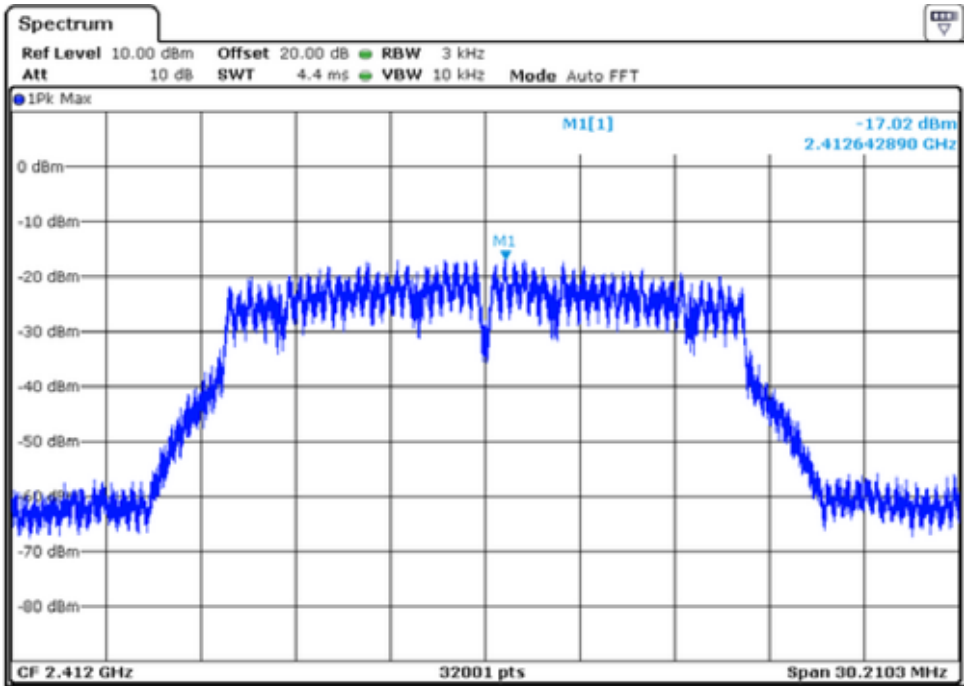
IEEE 802.11g SISO Ant1			
Channel frequency (MHz)	Power Density (dBm/3kHz)	Power Density Limit (dBm/3kHz)	Result
2412	-25.42	8	Pass
2437	-27.74		
2462	-28.39		

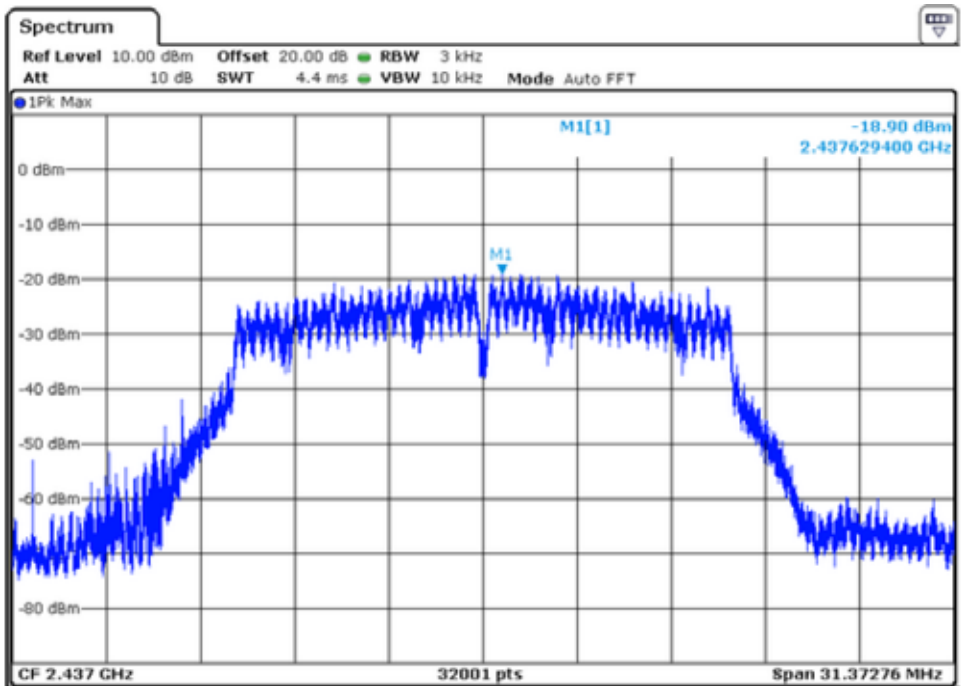

Spectrum
Ref Level 10.00 dBm Offset 20.00 dB RBW 3 kHz
Att 10 dB SWT 4.4 ms VBW 10 kHz Mode Auto FFT
1Pk Max
M1[1] -25.42 dBm
2.414474870 GHz
0 dBm
-10 dBm
-20 dBm
-30 dBm
-40 dBm
-50 dBm
-60 dBm
-70 dBm
-80 dBm
M1
CF 2.412 GHz
32001 pts
Span 30.2053 MHz

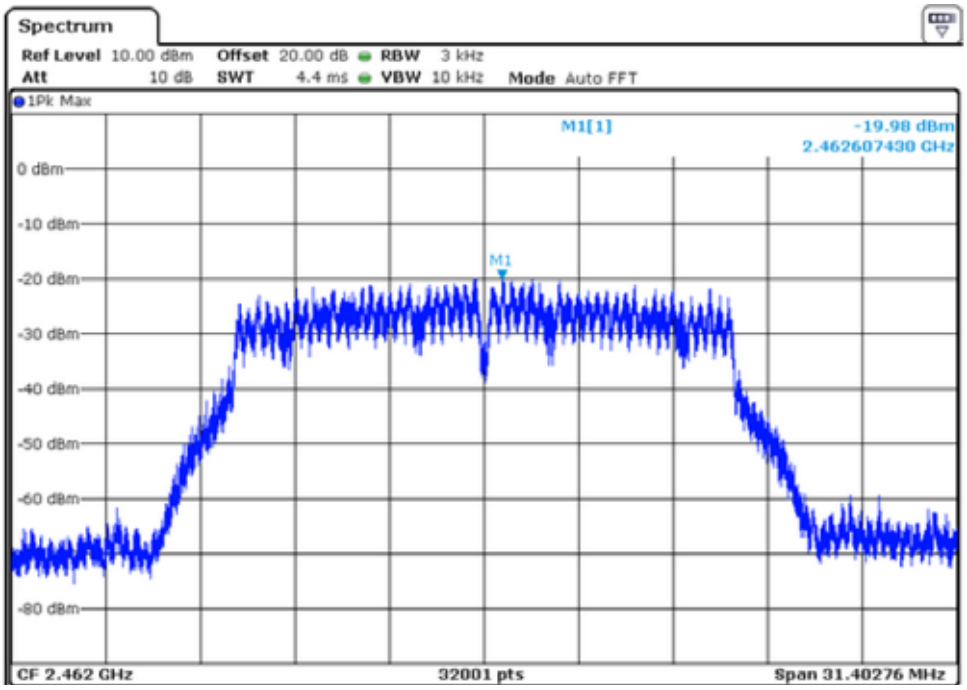

Spectrum
Ref Level 10.00 dBm Offset 20.00 dB RBW 3 kHz
Att 10 dB SWT 4.4 ms VBW 10 kHz Mode Auto FFT
1Pk Max
M1[1] -27.74 dBm
2.436358930 GHz
0 dBm
-10 dBm
-20 dBm
-30 dBm
-40 dBm
-50 dBm
-60 dBm
-70 dBm
-80 dBm
M1
CF 2.437 GHz
32001 pts
Span 30.16906 MHz



IEEE 802.11g SISO Ant2			
Channel frequency (MHz)	Power Density (dBm/3kHz)	Power Density Limit (dBm/3kHz)	Result
2412	-17.02	8	Pass
2437	-18.90		
2462	-19.98		

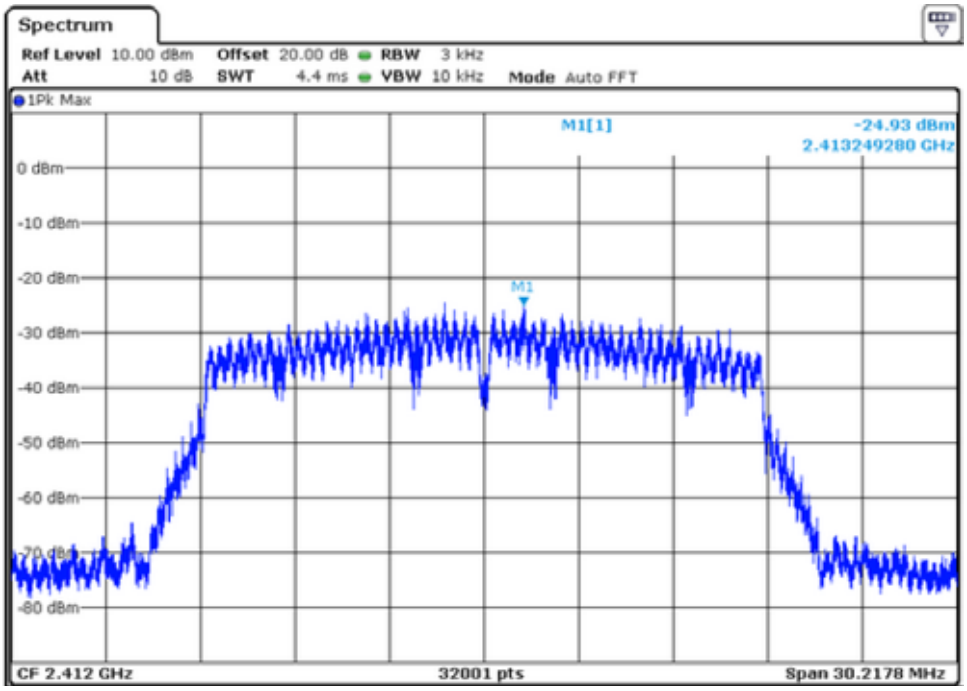

Spectrum
Ref Level 10.00 dBm Offset 20.00 dB RBW 3 kHz
Att 10 dB SWT 4.4 ms VBW 10 kHz Mode Auto FFT
1Pk Max
M1[1] -17.02 dBm
2.412642890 GHz
M1
0 dBm
-10 dBm
-20 dBm
-30 dBm
-40 dBm
-50 dBm
-60 dBm
-70 dBm
-80 dBm
CF 2.412 GHz
32001 pts
Span 30.2103 MHz

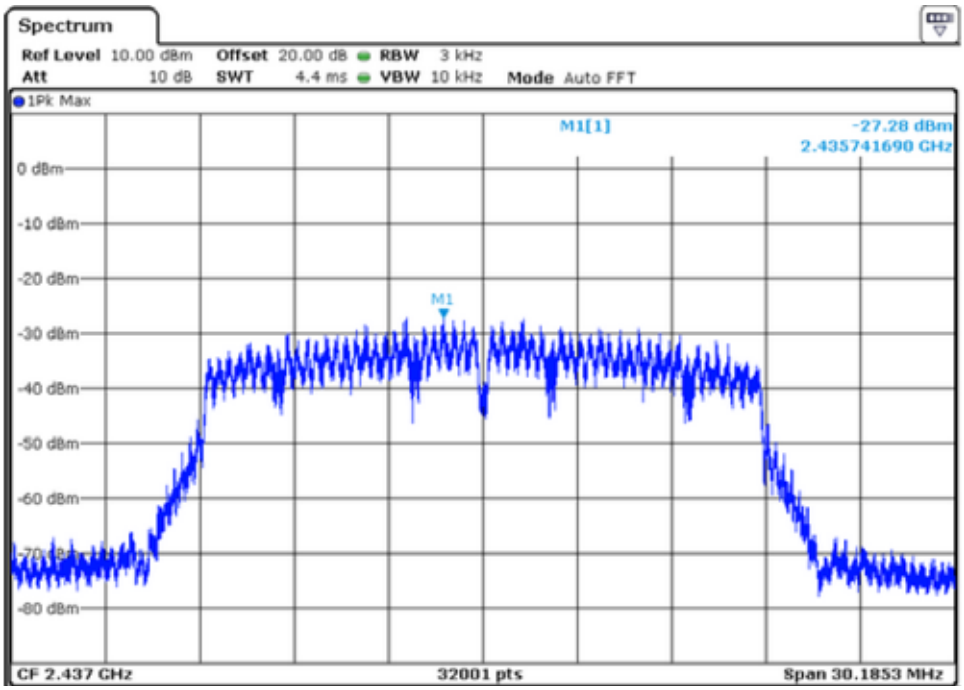

Spectrum
Ref Level 10.00 dBm Offset 20.00 dB RBW 3 kHz
Att 10 dB SWT 4.4 ms VBW 10 kHz Mode Auto FFT
1Pk Max
M1[1] -18.90 dBm
2.437629400 GHz
M1
0 dBm
-10 dBm
-20 dBm
-30 dBm
-40 dBm
-50 dBm
-60 dBm
-80 dBm
CF 2.437 GHz
32001 pts
Span 31.37276 MHz

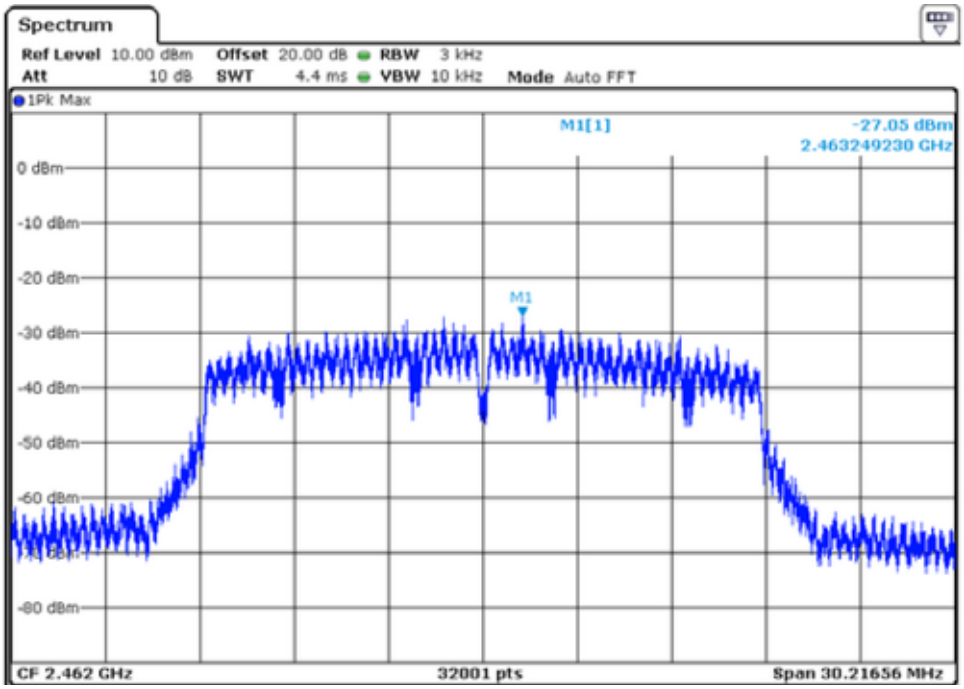


IEEE 802.11n(HT20) MIMO(Antenna Gain=5.51dBi)					
Channel frequency (MHz)	Power Density (dBm/3kHz)			Power Density Limit (dBm/3kHz)	Result
	Ant1	Ant2	Total		
2412	-24.93	-15.49	-15.02	8	Pass
2437	-27.28	-17.93	-17.45		
2462	-27.05	-19.32	-18.64		
Remark: In MIMO, Ant1+Ant2 Directional Gain=G_{ant}+10Log(N)dBi=2.5+10Log(2)=5.51dBi. Directional Gain was according to KDB662911.					

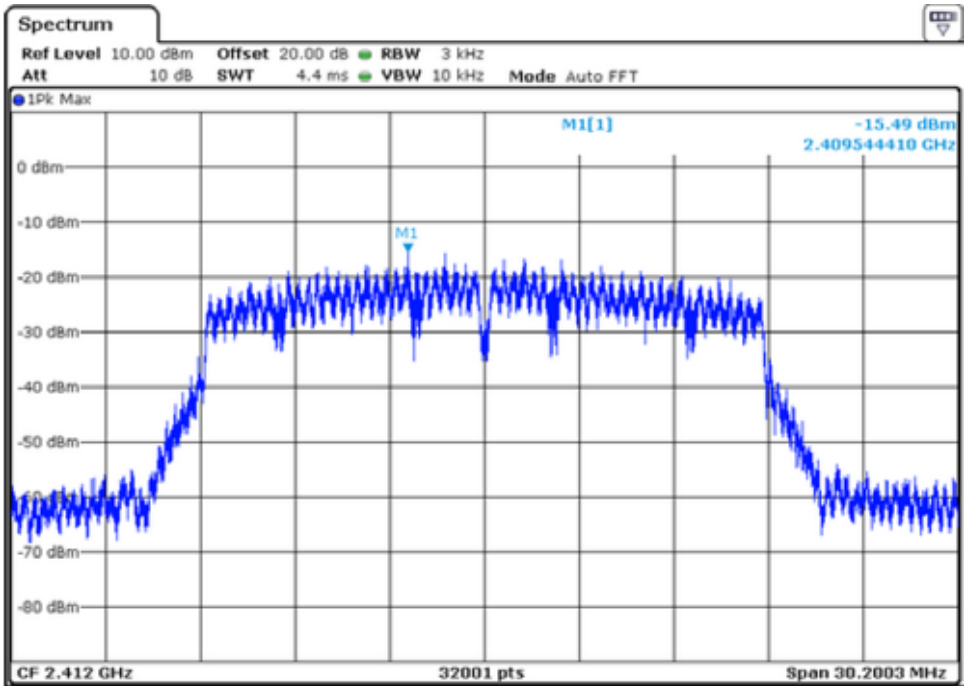
Ant1

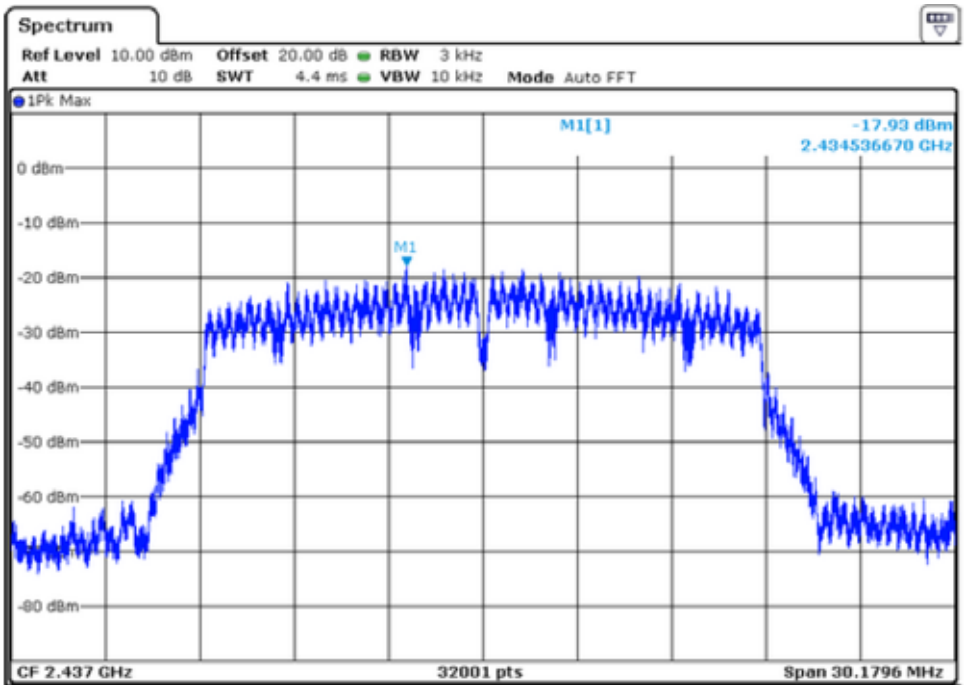

Spectrum
Ref Level 10.00 dBm Offset 20.00 dB RBW 3 kHz
Att 10 dB SWT 4.4 ms VBW 10 kHz Mode Auto FFT
1Pk Max
M1[1] -24.93 dBm
2.413249280 GHz
0 dBm
-10 dBm
-20 dBm
-30 dBm
-40 dBm
-50 dBm
-60 dBm
-70 dBm
-80 dBm
M1
CF 2.412 GHz
32001 pts
Span 30.2178 MHz

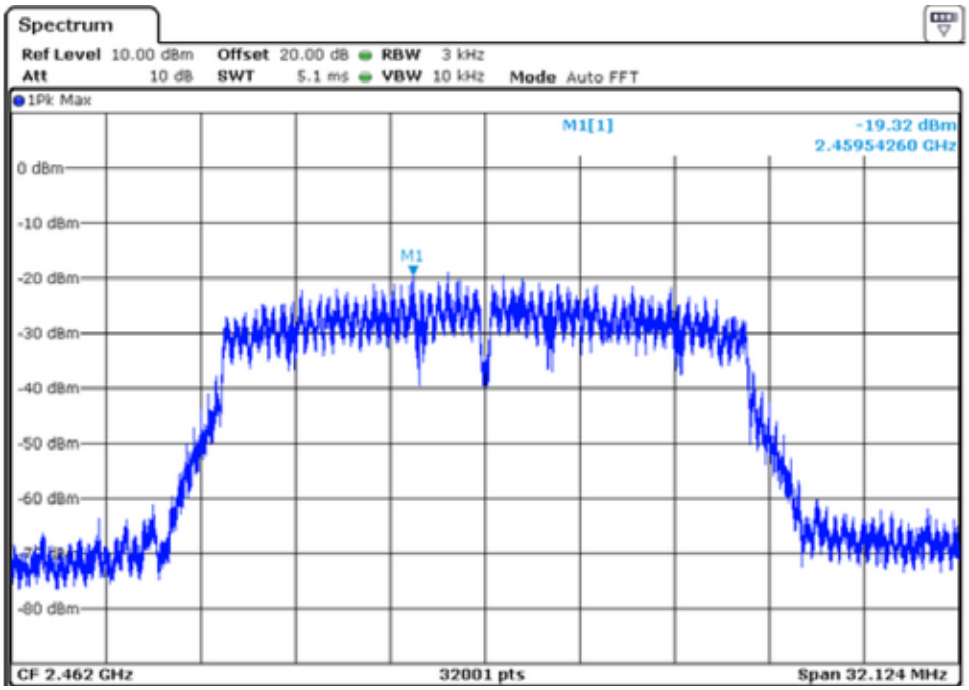

Spectrum
Ref Level 10.00 dBm Offset 20.00 dB RBW 3 kHz
Att 10 dB SWT 4.4 ms VBW 10 kHz Mode Auto FFT
1Pk Max
M1[1] -27.28 dBm
2.435741690 GHz
0 dBm
-10 dBm
-20 dBm
-30 dBm
-40 dBm
-50 dBm
-60 dBm
-70 dBm
-80 dBm
M1
CF 2.437 GHz
32001 pts
Span 30.1853 MHz


Spectrum
Ref Level 10.00 dBm Offset 20.00 dB RBW 3 kHz
Att 10 dB SWT 4.4 ms VBW 10 kHz Mode Auto FFT
1Pk Max
M1[1] -27.05 dBm
2.463249230 GHz
M1
0 dBm
-10 dBm
-20 dBm
-30 dBm
-40 dBm
-50 dBm
-60 dBm
-80 dBm
CF 2.462 GHz
32001 pts
Span 30.21656 MHz

Ant2

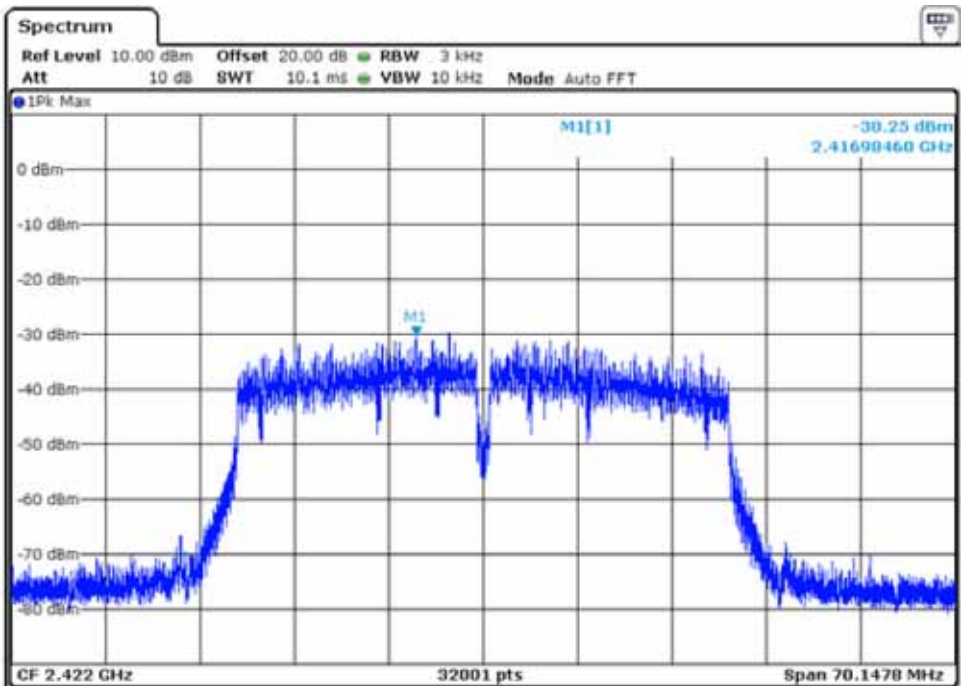

Spectrum
Ref Level 10.00 dBm Offset 20.00 dB RBW 3 kHz
Att 10 dB SWT 4.4 ms VBW 10 kHz Mode Auto FFT
1Pk Max
M1[1] -15.49 dBm
2.409544410 GHz
M1
0 dBm
-10 dBm
-20 dBm
-30 dBm
-40 dBm
-50 dBm
-70 dBm
-80 dBm
CF 2.412 GHz
32001 pts
Span 30.2003 MHz

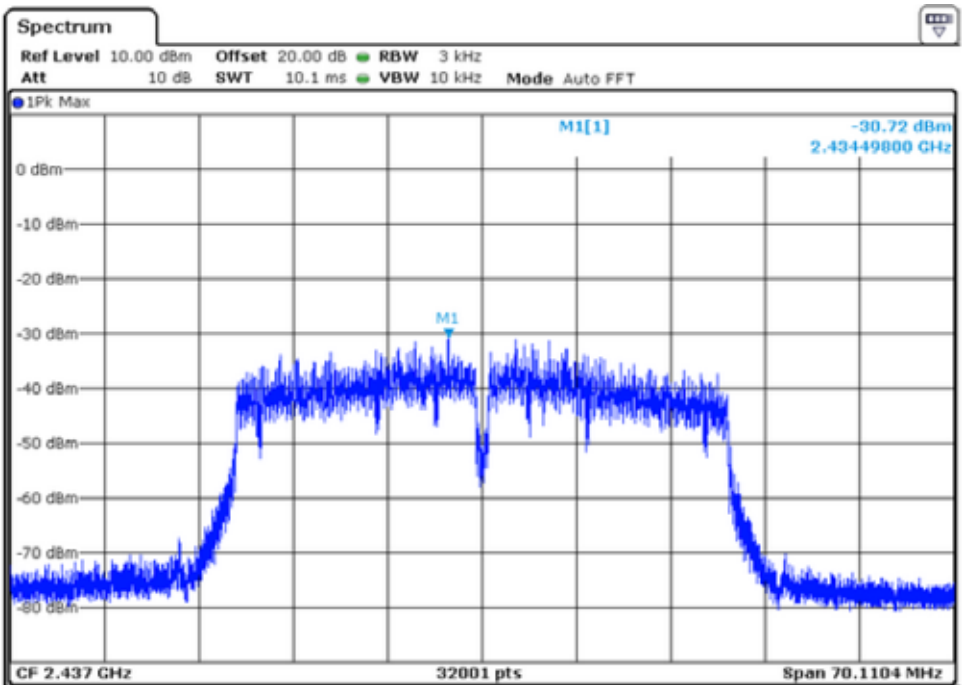

Spectrum
Ref Level 10.00 dBm Offset 20.00 dB RBW 3 kHz
Att 10 dB SWT 4.4 ms VBW 10 kHz Mode Auto FFT
1Pk Max
M1[1] -17.93 dBm
2.434536670 GHz
M1
0 dBm
-10 dBm
-20 dBm
-30 dBm
-40 dBm
-50 dBm
-60 dBm
-80 dBm
CF 2.437 GHz
32001 pts
Span 30.1796 MHz

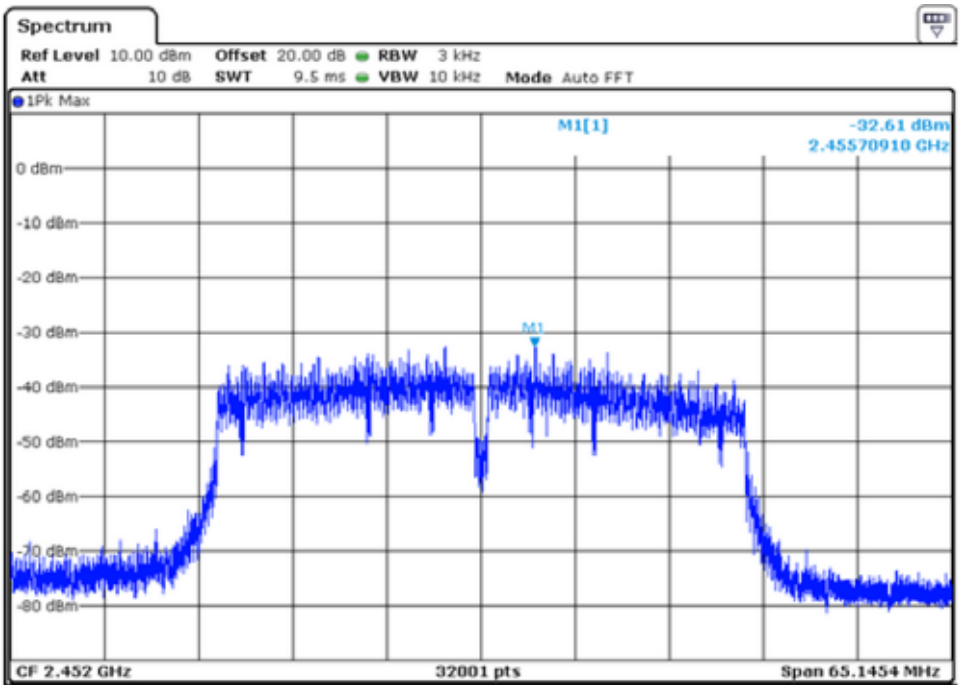

Spectrum
Ref Level 10.00 dBm Offset 20.00 dB RBW 3 kHz
Att 10 dB SWT 5.1 ms VBW 10 kHz Mode Auto FFT
1Pk Max
M1[1] -19.32 dBm
2.45954260 GHz
M1
0 dBm
-10 dBm
-20 dBm
-30 dBm
-40 dBm
-50 dBm
-60 dBm
-80 dBm
CF 2.462 GHz
32001 pts
Span 32.124 MHz

IEEE 802.11n(HT40) MIMO(Antenna Gain=5.51dBi)					
Channel frequency (MHz)	Power Density (dBm/3kHz)			Power Density Limit (dBm/3kHz)	Result
	Ant 1	Ant 2	Total		
2422	-30.25	-19.67	-19.31	8	Pass
2437	-30.72	-20.93	-20.50		
2452	-32.61	-23.48	-22.98		
Remark: In MIMO, Ant1+Ant2 Directional Gain=G_{ant}+10Log(N)dBi=2.5+10Log(2)=5.51dBi. Directional Gain was according to KDB662911.					

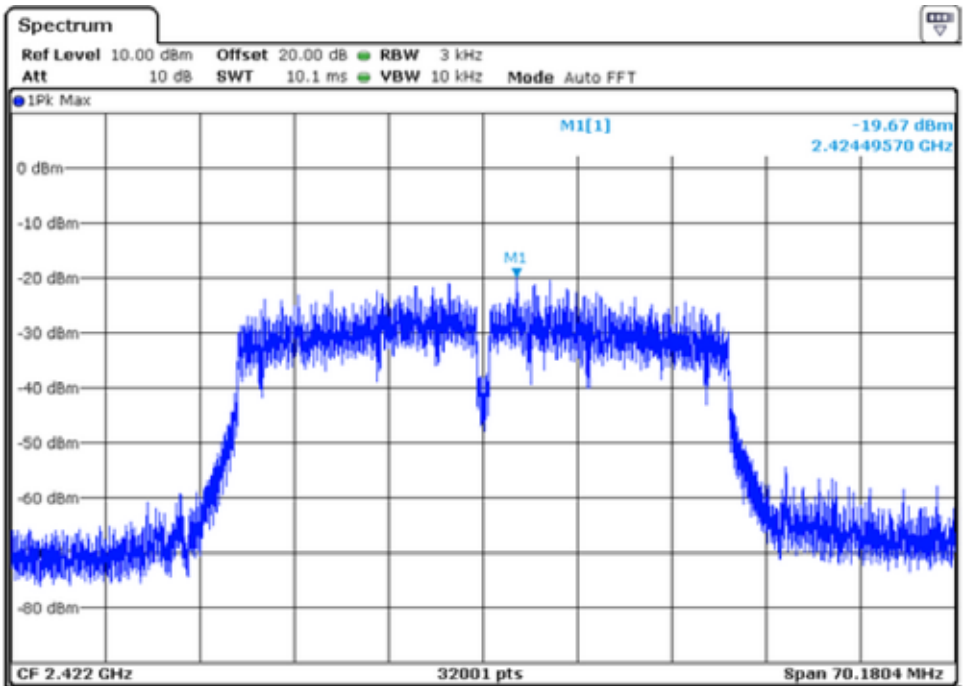
Ant1

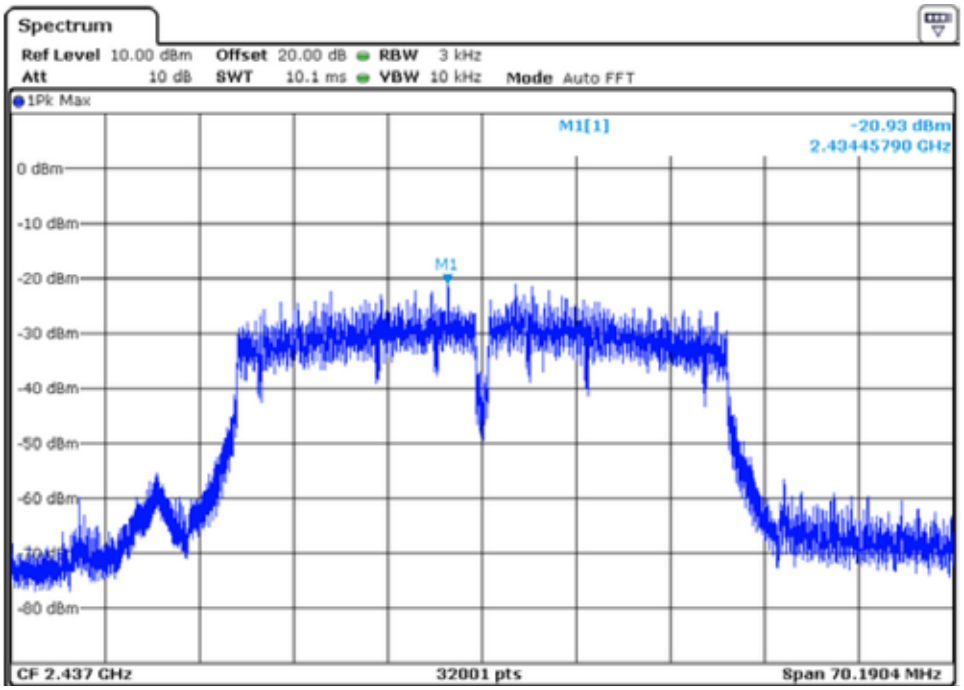


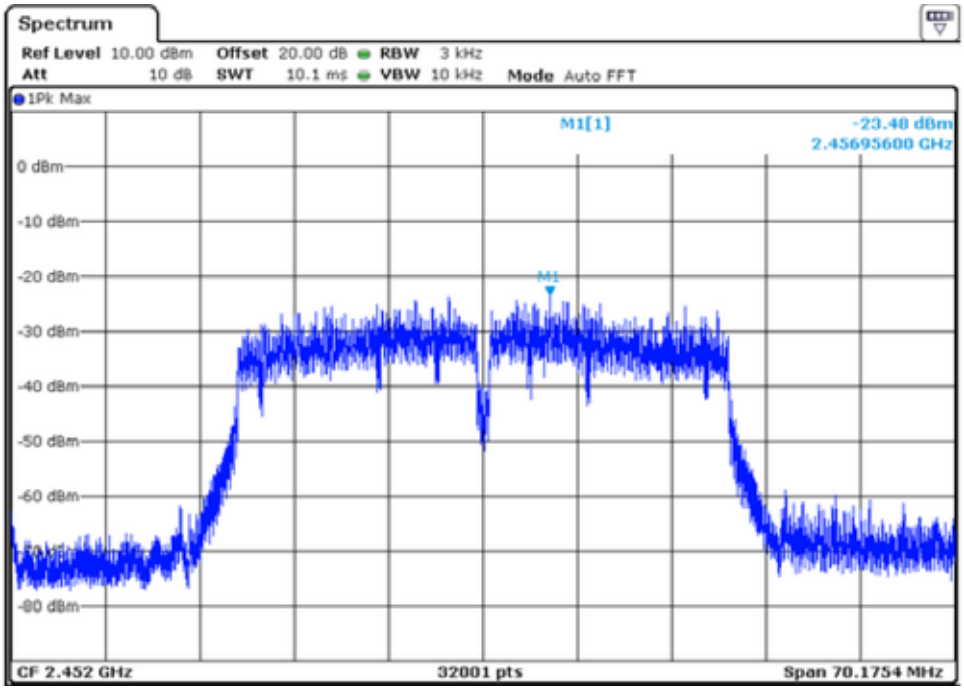

Spectrum
Ref Level 10.00 dBm Offset 20.00 dB RBW 3 kHz
Att 10 dB SWT 10.1 ms VBW 10 kHz Mode Auto FFT
1Pk Max
M1[1] -30.72 dBm
2.43449800 GHz
0 dBm
-10 dBm
-20 dBm
-30 dBm
-40 dBm
-50 dBm
-60 dBm
-70 dBm
-80 dBm
M1
CF 2.437 GHz
32001 pts
Span 70.1104 MHz


Spectrum
Ref Level 10.00 dBm Offset 20.00 dB RBW 3 kHz
Att 10 dB SWT 9.5 ms VBW 10 kHz Mode Auto FFT
1Pk Max
M1[1] -32.61 dBm
2.45570910 GHz
0 dBm
-10 dBm
-20 dBm
-30 dBm
-40 dBm
-50 dBm
-60 dBm
-70 dBm
-80 dBm
M1
CF 2.452 GHz
32001 pts
Span 65.1454 MHz

Ant2


Spectrum
Ref Level 10.00 dBm Offset 20.00 dB RBW 3 kHz
Att 10 dB SWT 10.1 ms VBW 10 kHz Mode Auto FFT
1Pk Max
M1[1] -19.67 dBm
2.42449570 GHz
M1
0 dBm
-10 dBm
-20 dBm
-30 dBm
-40 dBm
-50 dBm
-60 dBm
-80 dBm
CF 2.422 GHz
32001 pts
Span 70.1804 MHz


Spectrum
Ref Level 10.00 dBm Offset 20.00 dB RBW 3 kHz
Att 10 dB SWT 10.1 ms VBW 10 kHz Mode Auto FFT
1Pk Max
M1[1] -20.93 dBm
2.43445790 GHz
M1
0 dBm
-10 dBm
-20 dBm
-30 dBm
-40 dBm
-50 dBm
-60 dBm
-80 dBm
CF 2.437 GHz
32001 pts
Span 70.1904 MHz


Spectrum
Ref Level 10.00 dBm Offset 20.00 dB RBW 3 kHz
Att 10 dB SWT 10.1 ms VBW 10 kHz Mode Auto FFT
1Pk Max
M1[1] -23.48 dBm
2.45695600 GHz
M1
0 dBm
-10 dBm
-20 dBm
-30 dBm
-40 dBm
-50 dBm
-60 dBm
-80 dBm
CF 2.452 GHz
32001 pts
Span 70.1754 MHz

12 Antenna Application

12.1 Antenna Requirement

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. And according to FCC 47 CFR Section 15.247 (b), if transmitting antennas of directional gain greater than 6dBi are used, the power shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6dBi.

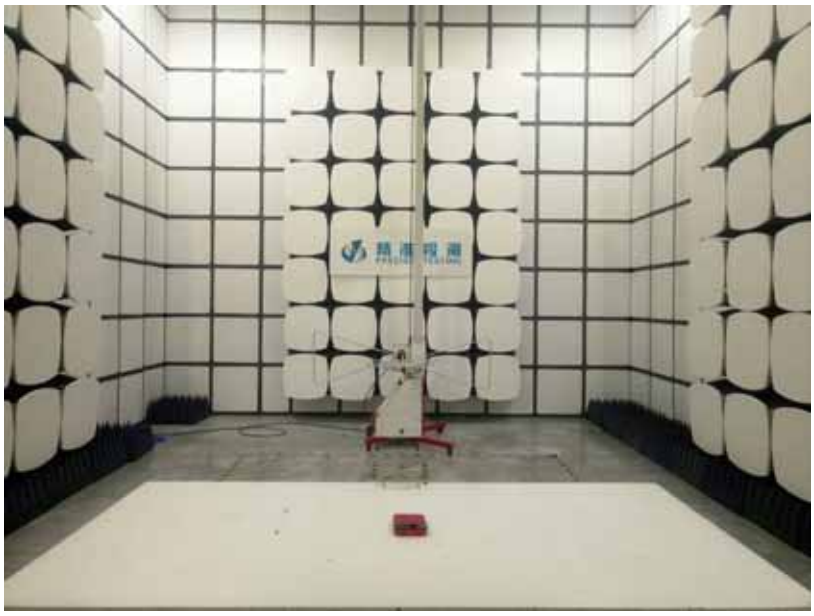
12.2 Result

The EUT'S antenna, permanent attached antenna, is internal antenna. The antenna's gain is 2.5dBi and meets the requirement.

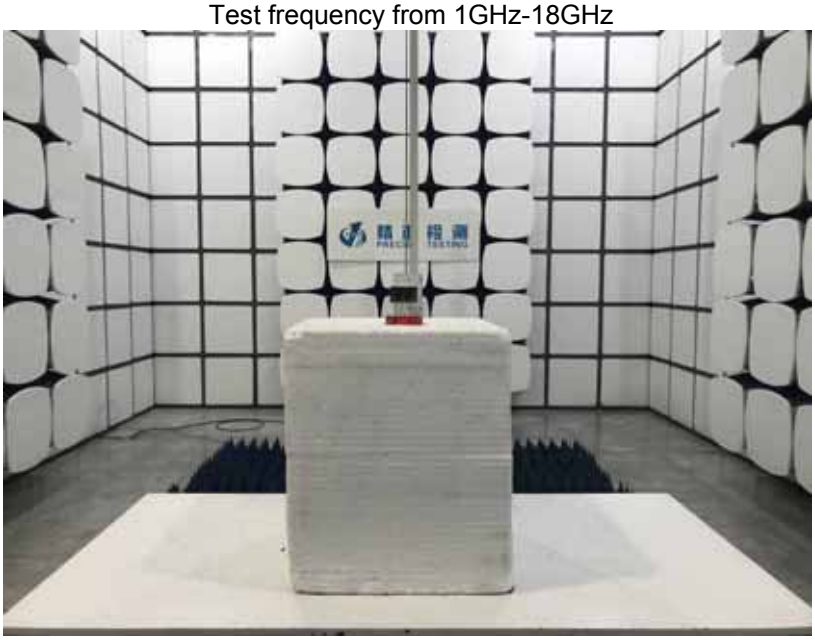
13 Test Setup

Conducted Emissions

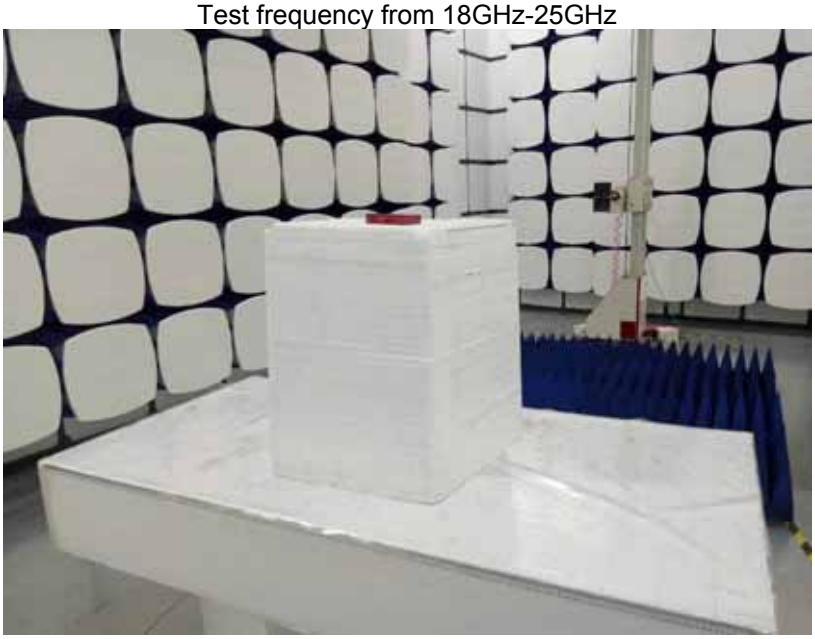
Radiated Spurious Emissions
From 30MHz-1000MHz



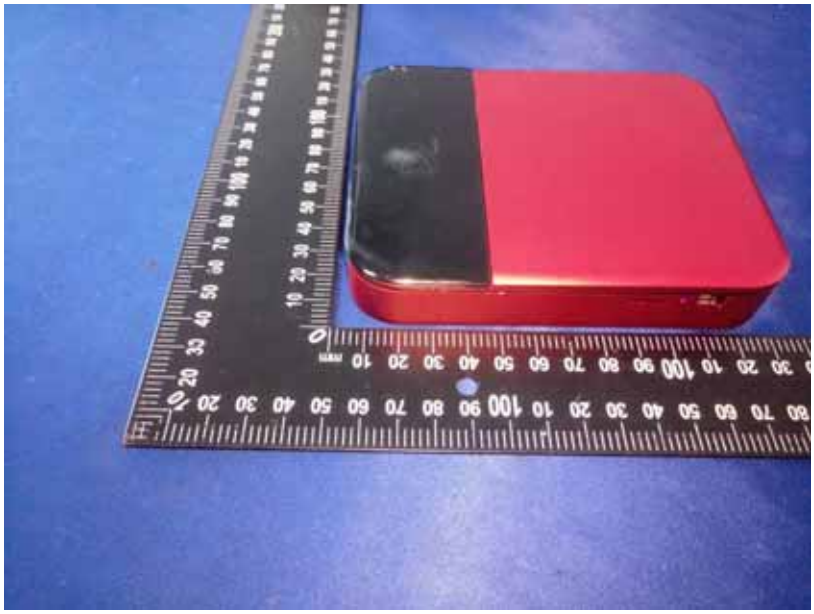
Test frequency from 1GHz-18GHz

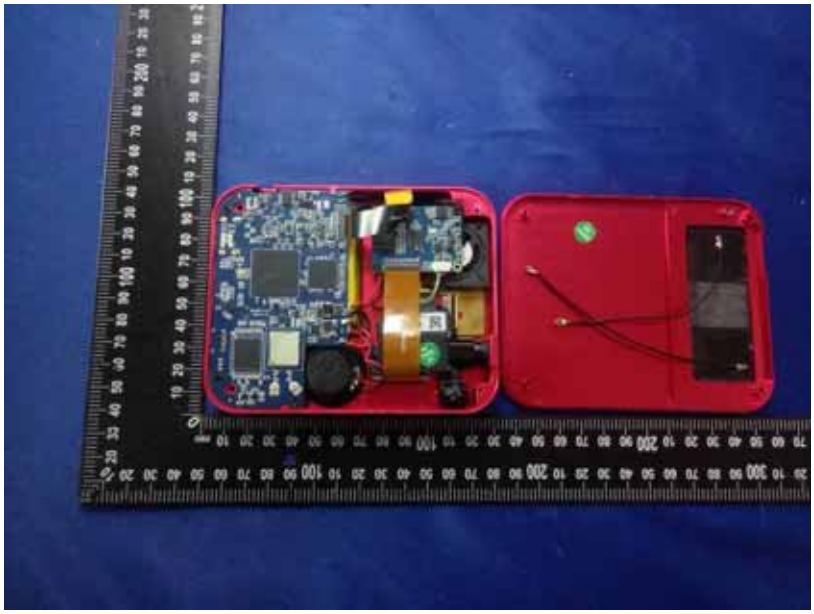


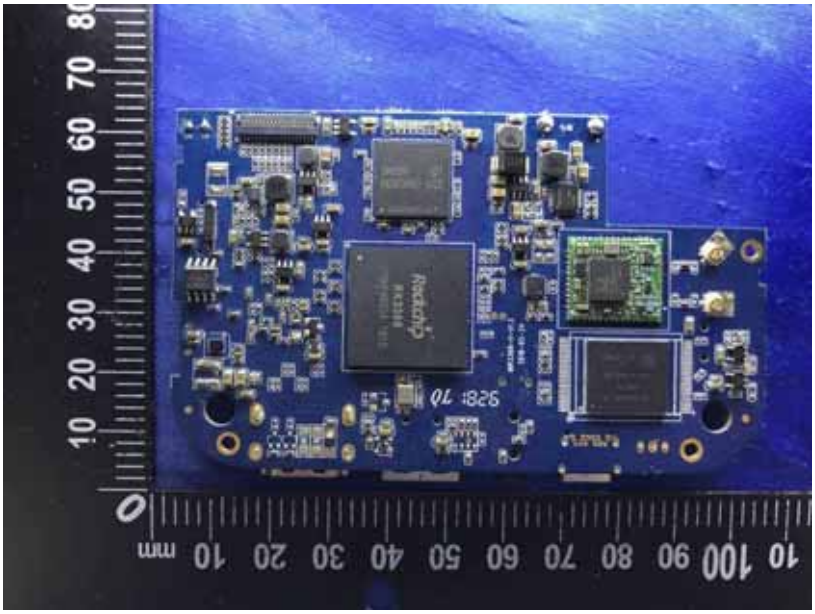
Test frequency from 18GHz-25GHz

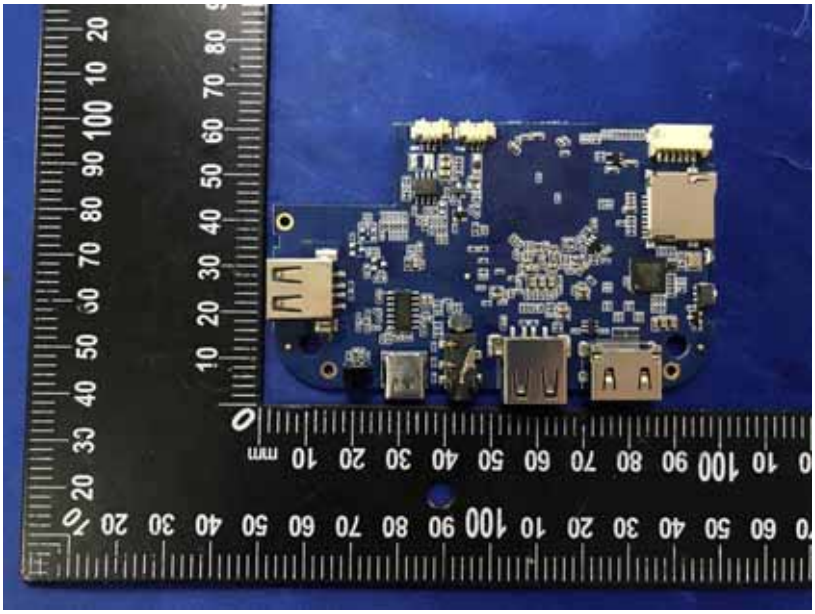


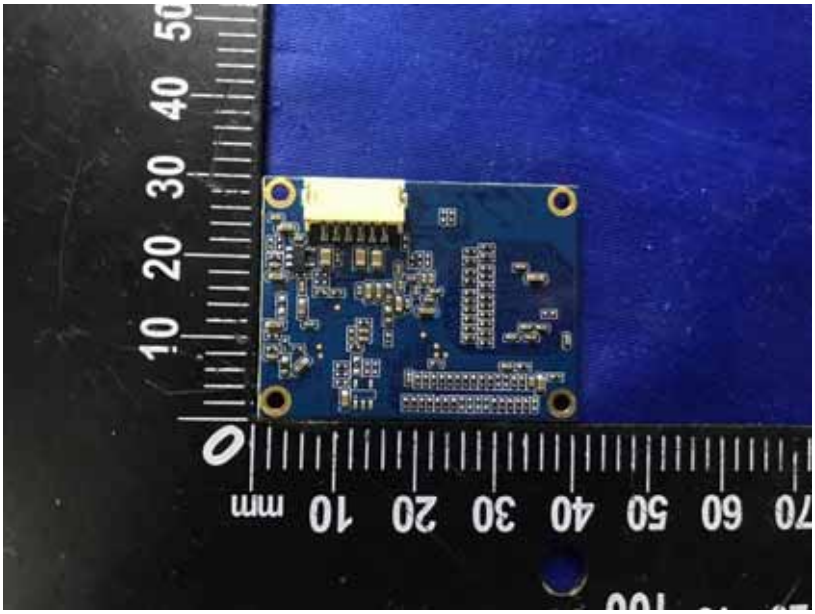
14 EUT Photos

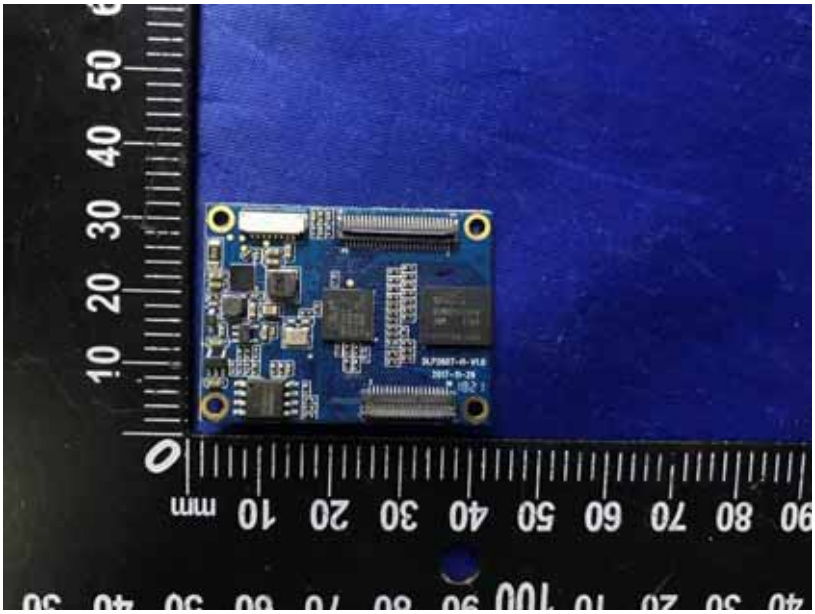


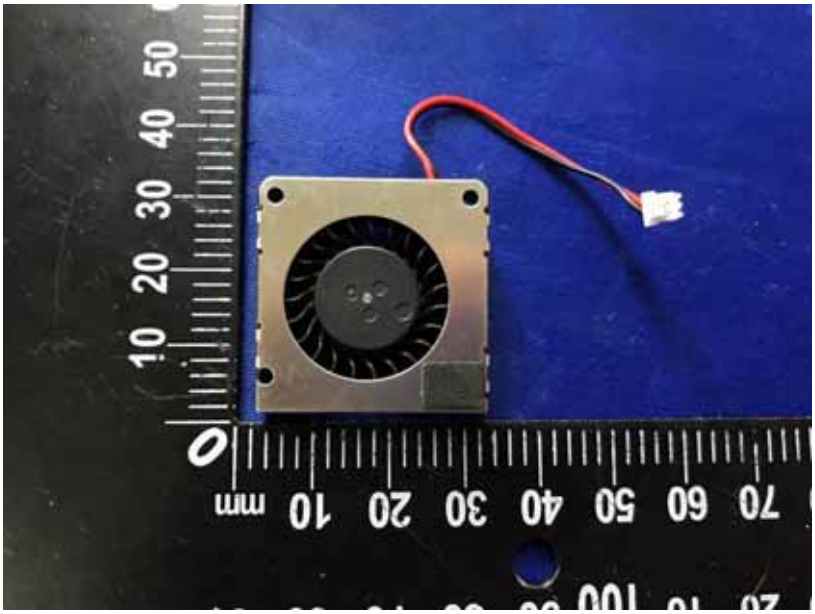


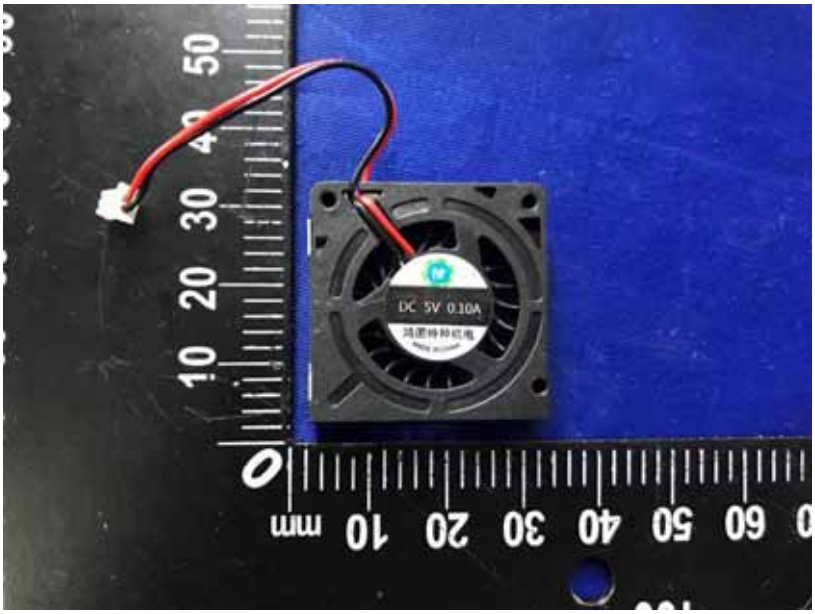








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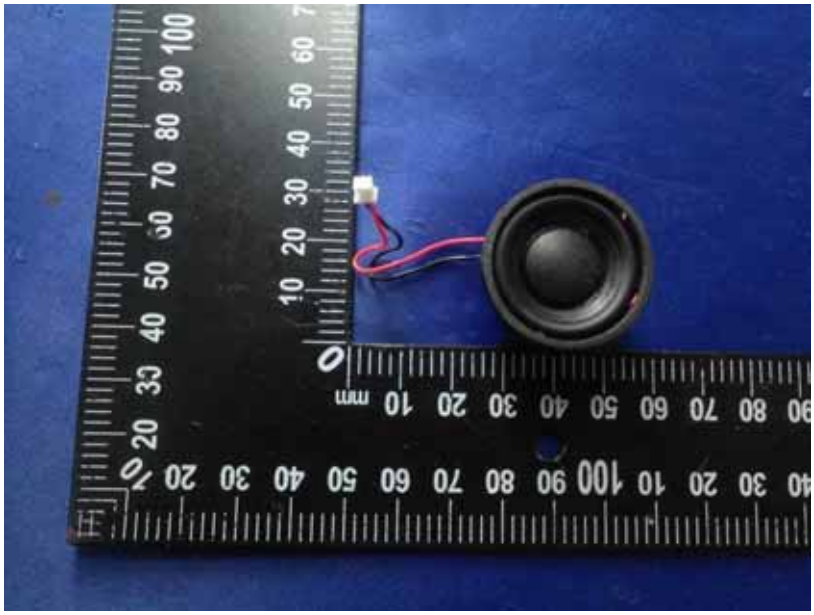

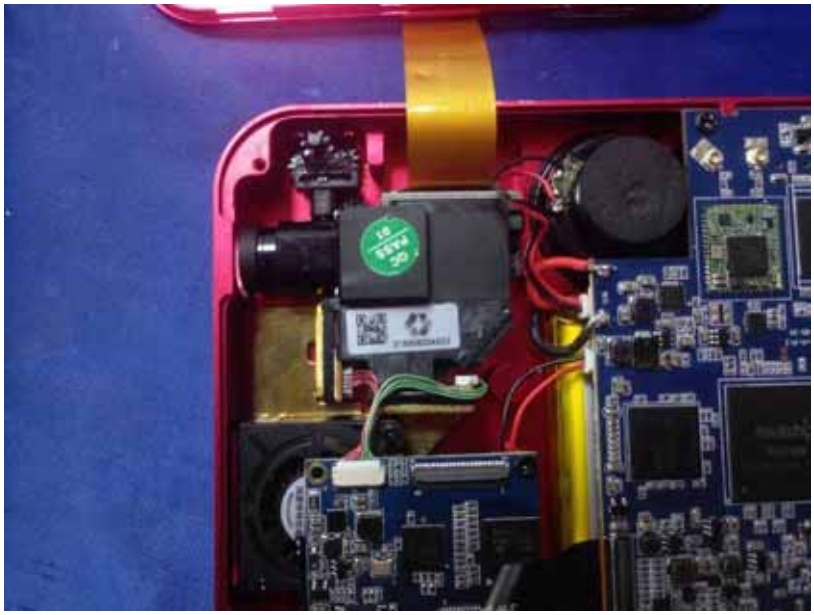

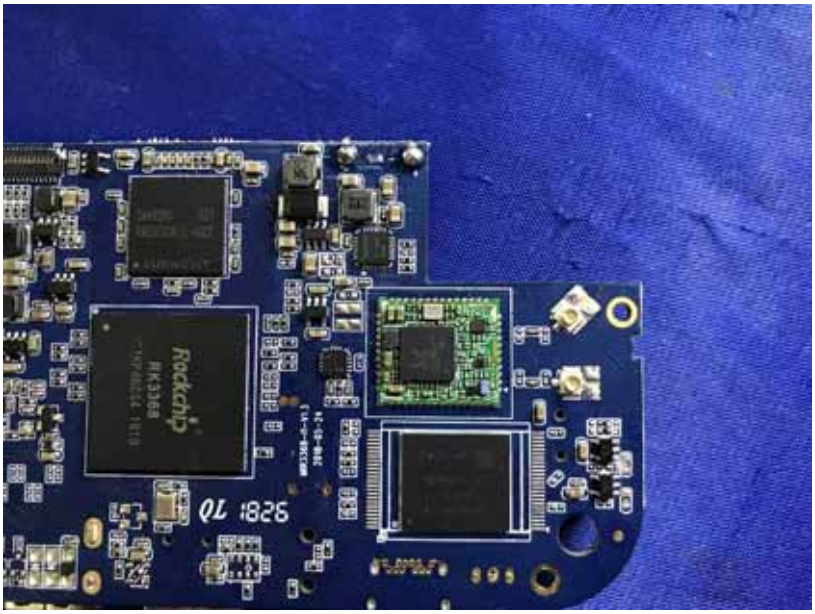
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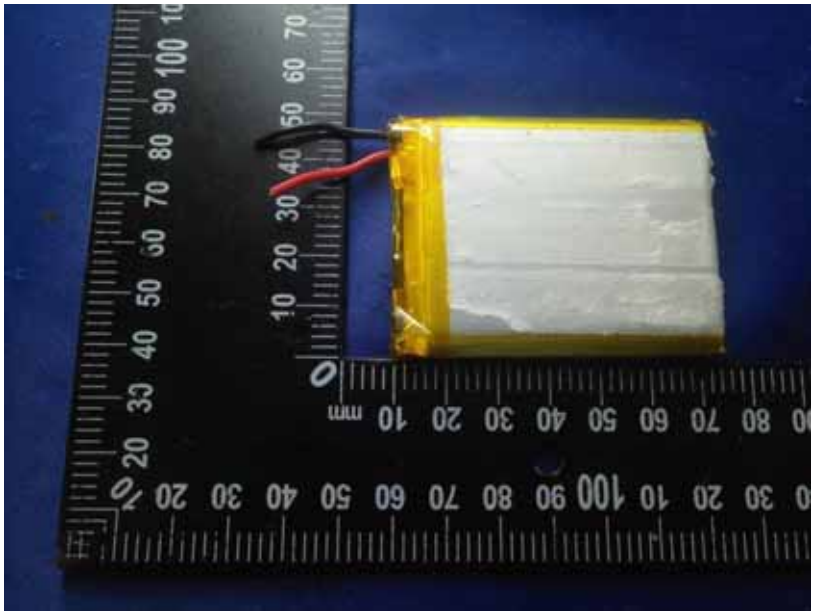

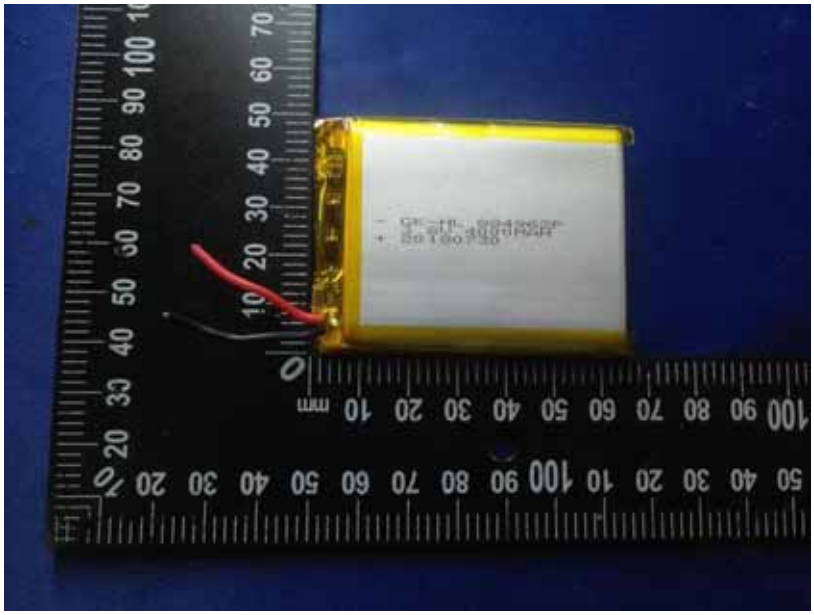

********THE END REPORT********