

FCC/ISED

RF

TEST REPORT

ISSUED BY
Shenzhen BALUN Technology Co., Ltd.



FOR

AC1750 Wireless Daul Band Gigabit Ceiling Mount Access Point

ISSUED TO
TP-LINK TECHNOLOGIES CO., LTD.

Building 24 (floors 1, 3, 4, 5) and 28 (floors1- 4) Central Science
and Technology Park, Shennan Rd, Nanshan, Shenzhen, China



Tested by:

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Date

Dec. 26, 2016

Approved by:

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(Chief Engineer)

Date

Dec. 06, 2016

Report No.: BL-SZ1680250-601

EUT Type: AC1750 Wireless Dual Band Gigabit
Ceiling Mount Access Point

Model Name: EAP245

Brand Name: TP-LINK

Test Standard: 47 CFR Part 15 Subpart C
RSS-Gen (Issue 4, November 2014)
RSS-247 (Issue 1, May 2015)

FCC ID: TE7EAP245

ISED Number: 8853A-EAP245

Test conclusion: Pass

Test Date: Sep. 20, 2016 ~ Dec. 02, 2016

Date of Issue: Dec. 06, 2016

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Revision History

Version	Issue Date	Revisions Content
<u>Rev. 01</u>	<u>Nov. 15, 2016</u>	<u>Initial Issue</u>
<u>Rev. 02</u>	<u>Dec. 06, 2016</u>	<u>Updating radiated spurious emission and restricted-band edge data.</u>

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1 ADMINISTRATIVE DATA (GENERAL INFORMATION)

1.1 Identification of the Testing Laboratory

Company Name	Shenzhen BALUN Technology Co., Ltd.
Address	Block B, 1st FL, Baisha Science and Technology Park, Shahe Xi Road, Nanshan District, Shenzhen, Guangdong Province, P. R. China
Phone Number	+86 755 6685 0100
Fax Number	+86 755 6182 4271

1.2 Identification of the Responsible Testing Location

Test Location	Shenzhen BALUN Technology Co., Ltd.
Address	Block B, 1st FL, Baisha Science and Technology Park, Shahe Xi Road, Nanshan District, Shenzhen, Guangdong Province, P. R. China
Accreditation Certificate	The laboratory has been listed by Industry Canada to perform electromagnetic emission measurements. The recognition numbers of test site are 11524A-1. The laboratory has been listed by US Federal Communications Commission to perform electromagnetic emission measurements. The recognition numbers of test site are 832625. The laboratory is a testing organization accredited by China National Accreditation Service for Conformity Assessment (CNAS) according to ISO/IEC 17025. The accreditation certificate number is L6791.
Description	All measurement facilities used to collect the measurement data are located at Block B, FL 1, Baisha Science and Technology Park, Shahe Xi Road, Nanshan District, Shenzhen, Guangdong Province, P. R. China 518055

1.3 Laboratory Condition

Ambient Temperature	20 to 25°C
Ambient Relative Humidity	45% - 55%
Ambient Pressure	100 kPa - 102 kPa

1.4 Announce

- (1) The test report reference to the report template version v5.3.
- (2) The test report is invalid if not marked with the signatures of the persons responsible for preparing and approving the test report.
- (3) The test report is invalid if there is any evidence and/or falsification.
- (4) The results documented in this report apply only to the tested sample, under the conditions and modes of operation as described herein.
- (5) This document may not be altered or revised in any way unless done so by BALUN and all revisions are duly noted in the revisions section.
- (6) Content of the test report, in part or in full, cannot be used for publicity and/or promotional purposes without prior written approval from the laboratory.

2 PRODUCT INFORMATION

2.1 Applicant Information

Applicant	TP- LINK TECHNOLOGIES CO., LTD.
Address	Building 24 (floors 1, 3, 4, 5) and 28 (floors1- 4) Central Science and Technology Park, Shennan Rd, Nanshan, Shenzhen, China

2.2 Manufacturer Information

Manufacturer	TP- LINK TECHNOLOGIES CO., LTD.
Address	Building 24 (floors 1, 3, 4, 5) and 28 (floors1- 4) Central Science and Technology Park, Shennan Rd, Nanshan, Shenzhen, China

2.3 Factory Information

Factory	N/A
Address	N/A

2.4 General Description for Equipment under Test (EUT)

EUT Type	AC1750 Wireless Daul Band Gigabit Ceiling Mount Access Point
Model Name Under Test	EAP245
Series Model Name	N/A
Description of Model name differentiation	N/A
Hardware Version	N/A
Software Version	N/A
Dimensions (Approx.)	N/A
Weight (Approx.)	N/A
Network and Wireless connectivity	WIFI 802.11a, 802.11b, 802.11g and 802.11n(HT20/40) and 802.11ac

2.5 Ancillary Equipment

Ancillary Equipment 1	Charger	
	Brand Name	TP-LINK
	Model No.	T120150-2B1
	Serial No.	N/A
	Rated Input	100-240 V~, 0.6 A, 50/60 Hz
	Rated Output	12 V=, 1.5 A

2.6 Technical Information

The requirement for the following technical information of the EUT was tested in this report:

Frequency Range		802.11b/g/n(20 MHz): 2.412 GHz - 2.462 GHz $f_c = 2412 \text{ MHz} + (N-1)*5 \text{ MHz}$, where - f_c = "Operating Frequency" in MHz, - N = "Channel Number" with the range from 1 to 11. 802.11n(40 MHz): 2.422 GHz - 2.452 GHz $f_c = 2412 \text{ MHz} + (N-1)*5 \text{ MHz}$, where - f_c = "Operating Frequency" in MHz, - N = "Channel Number" with the range from 3 to 9.
Modulation Type		DSSS, OFDM
Product Type		Indoor for IC standard Indoor Access Point for FCC standard
Antenna System (eg., MIMO, Smart Antenna)		Cyclic Delay Diversity (CDD)
Categorization as Correlated or Completely Uncorrelated		Correlated
Antenna Type	Antenna 0 (ANT 0)	PIFA Antenna
	Antenna 1 (ANT 1)	
	Antenna 2 (ANT 2)	
Antenna Gain	Antenna 0 (ANT 0)	4.62 dBi
	Antenna 1 (ANT 1)	4.65 dBi
	Antenna 2 (ANT 2)	4.86 dBi
Total directional gain	For power spectral density(PSD) measurements	9.63 dBi Formulas: Directional gain = $G_{ANT} + \text{Array Gain}$, $\text{Array Gain} = 10 \log(N_{ANT}/N_{SS}) \text{ dB}$. $N_{SS} = 1$, G_{ANT} set equal to the gain of the antenna having the highest gain.
	For power measurements	4.86 dBi Formulas: Directional gain = $G_{ANT} + \text{Array Gain}$, $\text{Array Gain} = 0$, G_{ANT} set equal to the gain of the antenna having the highest gain.
Adaptive or non-adaptive		Adaptive
About the Product		Only the WIFI 802.11b, 802.11g and 802.11n (HT20/40) was tested in this report.

Mode	Antenna		
	Antenna 0	Antenna 1	Antenna 2
802.11b	√	√	√
802.11g	√	√	√
802.11n20	√	√	√
802.11n40	√	√	√

Modulation technology	Modulation Type	Transfer Rate (Mbps)
DSSS (802.11b)	DBPSK	1
	DQPSK	2
	CCK	5.5/ 11
OFDM (802.11g)	BPSK	6 / 9
	QPSK	12 / 18
	16QAM	24 / 36
	64QAM	48 / 54
OFDM (802.11n-20MHz)	BPSK	6.5
	QPSK	13/19.5
	16QAM	26/39
	64QAM	52/58.5/65
OFDM (802.11n-40MHz)	BPSK	13.5
	QPSK	27/40.5
	16QAM	54/81/108
	64QAM	121.5/135

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

Test Items	Mode	Data Rate	Channel	
Output Power	11b/11g/11n20/11n40	1/6/6.5/13.5 Mbps	1/6/11	3/6/9
6dB Bandwidth	11b/11g/11n20/11n40	1/6/6.5/13.5 Mbps	1/6/11	3/6/9
Conducted Spurious Emission	11b/11g/11n20/11n40	1/6/6.5/13.5 Mbps	1/6/11	3/6/9
Conducted Emission	11b/11g/11n20/11n40	1/6/6.5/13.5 Mbps	1/6/11	3/6/9
Radiated Spurious Emission	11b/11g/11n20/11n40	1/6/6.5/13.5 Mbps	1/6/11	3/6/9
Band Edge	11b/11g/11n20/11n40	1/6/6.5/13.5 Mbps	1/6/11	3/6/9
Power spectral density (PSD)	11b/11g/11n20/11n40	1/6/6.5/13.5 Mbps	1/6/11	3/6/9

Note: The above EUT information in section 2.4 and 2.6 was declared by manufacturer and for more detailed features description, please refer to the manufacturer's specifications or user's manual.

2.7 Additional Instructions

EUT Software Settings:

Mode	☒ Special software is used. The software provided by client to enable the EUT under transmission condition continuously at specific channel frequencies individually.
------	--

During testing. Channel and Power Controlling Software provided by the customer was used to control the operating channel as well as the output power level. The RF output power selection is for the setting of RF output power expected by the customer and is going to be fixed on the firmware of the final end product.

EUT Software Settings:

Power level setup in software			
Test Software Version	Cart		
Mode	Frequency(MHz)	Channel	Soft Set
802.11 b	2412	1	22
	2422	3	25
	2437	6	25
	2452	9	25
	2462	11	21
802.11 g	2412	1	17
	2422	3	21
	2437	6	25
	2452	9	21
	2462	11	16
802.11 n20	2412	1	16
	2422	3	22
	2437	6	25
	2452	9	20
	2462	11	17
802.11 n40	2422	3	13
	2432	5	20
	2437	6	18
	2442	7	18
	2452	9	16

Run software:

```

C:\> cart

connect 192.168.0.254:2390
5007 ERROR Closed connection to nart[0].
5000 INFO Trying to connect to nart[0] on 192.168.0.254:2390.
5001 INFO Connected to nart[0] on 192.168.0.254:2390.
[0] 5109 INFO Accepted control connection from client 0.
load
[0] 6606 INFO Link control functions loaded for "Link" from "/tmp/liblinkAr9k.so".
[0] 6506 INFO Device control functions loaded for "Ar9287" from "/tmp/libar9287.so". Version "4.0" built on "110602124500".
[0] 6501 WARNING Unable to find device dll "ar946x".
[0] 6501 WARNING Unable to find device dll "ar956x".
[0] 6501 WARNING Unable to find device dll "AR9485".
[0] 6606 INFO Link control functions loaded for "Link" from "/tmp/liblinkAr9k.so".
[0] 6506 INFO Device control functions loaded for "Ar9300" from "/tmp/libar9300.so". Version "4.5.3" built on "120510170000".
[0] 6011 INFO Calibration information read from flash.
[0] 6024 INFO Free memory for initialization and calibration is 991 (1023 - 32) bytes.
[0] 6000 INFO Loaded card.
tx r=6;f=5180;pc=-1;pl=1500;tx99=1;ch=7;ht40=0;tp=20
2004 WARNING Transmit forever requires rate interleaving. pc<0 => ir=1.
[0] 1001 ERROR Bad value "5180" for parameter "f".

```

3 SUMMARY OF TEST RESULTS

3.1 Test Standards

No.	Identity	Document Title
1	47 CFR Part 15, Subpart C (10-1-15 Edition)	Miscellaneous Wireless Communications Services
2	KDB Publication 558074 D01v03r05	Guidance for Performing Compliance Measurements on Digital Transmission Systems (DTS) Operating Under §15.247
3	KDB Publication 662911 D01v02r01	Emissions Testing of Transmitters with Multiple Outputs in the Same Band (e.g., MIMO, Smart Antenna, etc)
4	RSS-Gen (Issue 4, Nov. 2014)	General Requirements for Compliance of Radio Apparatus
5	RSS-247 (Issue 1, May 2015)	Digital Transmission Systems (DTSs), Frequency Hopping Systems(FHSs) and Licence-Exemp Local Area Network (LE-LAN) Devices
6	ANSI C63.10-2013	American National Standard of Procedures for Compliance Testing of Unlicensed Wireless Devices

3.2 Verdict

No.	Description	FCC PART No.	ISED Part No.	Test Result	Verdict
1	Antenna Requirement	15.203; 15.247(b)	RSS-247, 5.4 (6)	N/A	Pass ^{Note 1}
2	Output Power	15.247(b)	RSS-247, 5.4 (4)	ANNEX A.1	Pass
3	6dB Bandwidth	15.247(a)	RSS-GEN, 6.6; RSS-247, 5.2 (1)	ANNEX A.2	Pass
4	Conducted Spurious Emission	15.247(d)	RSS-247, 5.5	ANNEX A.3	Pass
5	Band Edge(Authorized- band band-edge)	5.209; 15.247(d)	RSS-GEN, 8.9; RSS-247, 5.5	ANNEX A.4	Pass
6	Conducted Emission	15.207	RSS-GEN, 8.8	ANNEX A.5	Pass
7	Radiated Spurious Emission	15.209; 15.247(d)	RSS-247, 5.5	ANNEX A.6	Pass
8	Band Edge(Restricted- band band-edge)	15.209; 15.247(d)	RSS-247, 5.5	ANNEX A.7	Pass
9	Power spectral density (PSD)	15.247(e)	RSS-247, 5.2 (2)	ANNEX A.8	Pass
10	Receiver Spurious Emissions	N/A	RSS-Gen, 7.1.2	N/A	N/A ^{Note 2}

Note 1: Please refer to section 5.1

Note 2: Only radio communication receivers operating in stand-alone mode within the band 30-960 MHz, as well as scanner receivers, are subject to Industry Canada requirements, so this test is not applicable.

4 GENERAL TEST CONFIGURATIONS

4.1 Test Environments

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

Relative Humidity	45% - 55%	
Atmospheric Pressure	100 kPa - 102 kPa	
Temperature	NT (Normal Temperature)	+22°C to +25°C
Working Voltage of the EUT	NV (Normal Voltage)	12 V

4.2 Test Equipment List

Description	Manufacturer	Model	Serial No.	Cal. Date	Cal. Due
Spectrum Analyzer	ROHDE&SCHWARZ	FSV-30	103118	2016.07.13	2017.07.12
Vector Signal Generator	ROHDE&SCHWARZ	SMBV100A	177746	2016.07.13	2017.07.12
Signal Generator	ROHDE&SCHWARZ	SMB100A	260592	2016.07.13	2017.07.12
Switch Unit with OSP-B157	ROHDE&SCHWARZ	OSP120	101270	2016.07.13	2017.07.12
Spectrum Analyzer	AGILENT	E4440A	MY45304434	2015.10.15	2016.10.14
EMI Receiver	ROHDE&SCHWARZ	ESRP	101036	2016.07.05	2017.07.04
LISN	SCHWARZBECK	NSLK 8127	8127-687	2016.07.05	2017.07.04
Bluetooth Tester	ROHDE&SCHWARZ	CBT	101005	2016.07.13	2017.07.12
Power Splitter	KMW	DCPD-LDC	1305003215	--	--
Power Sensor	ROHDE&SCHWARZ	NRP-Z21	103971	2016.07.13	2017.07.12
Attenuator (20 dB)	KMW	ZA-S1-201	110617091	--	--
Attenuator (6 dB)	KMW	ZA-S1-61	1305003189	--	--
DC Power Supply	ROHDE&SCHWARZ	HMP2020	018141664	2016.07.13	2017.07.12
Temperature Chamber	ANGELANTIONI SCIENCE	NTH64-40A	1310	2016.07.13	2017.07.12
Test Antenna-Loop(9 kHz-30 MHz)	SCHWARZBECK	FMZB 1519	1519-037	2015.07.22	2017.07.21
Test Antenna-Bi-Log(30 MHz-3 GHz)	SCHWARZBECK	VULB 9163	9163-624	2015.07.22	2017.07.21
Test Antenna-Horn(1-18 GHz)	SCHWARZBECK	BBHA 9120D	9120D-1148	2015.07.22	2017.07.21
Test Antenna-Horn(15-26.5 GHz)	SCHWARZBECK	BBHA 9170	9170-305	2015.07.22	2017.07.21
Anechoic Chamber	RAINFORD	9m*6m*6m	N/A	2015.02.28	2017.02.27
Shielded Enclosure	ChangNing	CN-130701	130703	--	--

4.3 Measurement Uncertainty

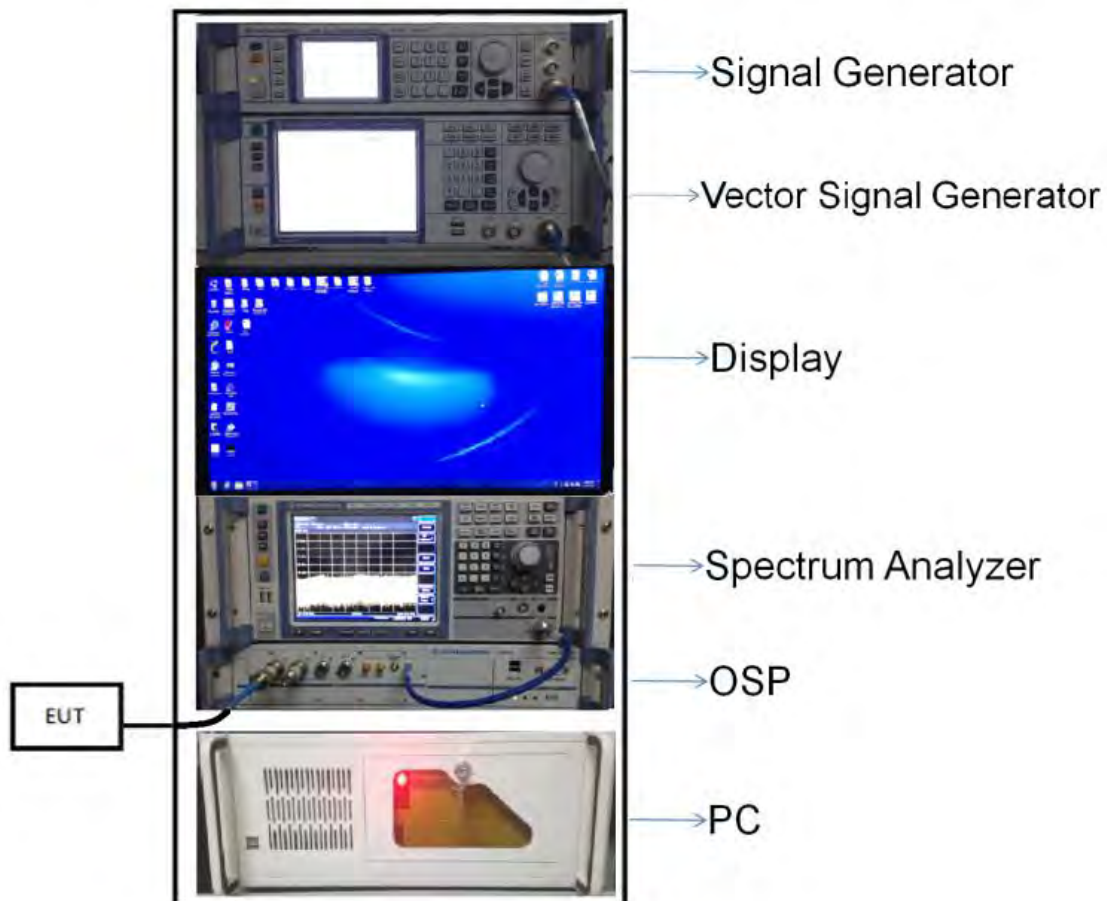
The following measurement uncertainty levels have been estimated for tests performed on the EUT as specified in CISPR 16-4-2.

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

Measurement	Value
Occupied Channel Bandwidth	$\pm 4\%$
RF output power, conducted	$\pm 1.4 \text{ dB}$
Power Spectral Density, conducted	$\pm 2.5 \text{ dB}$
Unwanted Emissions, conducted	$\pm 2.8 \text{ dB}$
All emissions, radiated	$\pm 5.4 \text{ dB}$
Temperature	$\pm 1^\circ\text{C}$
Humidity	$\pm 4\%$

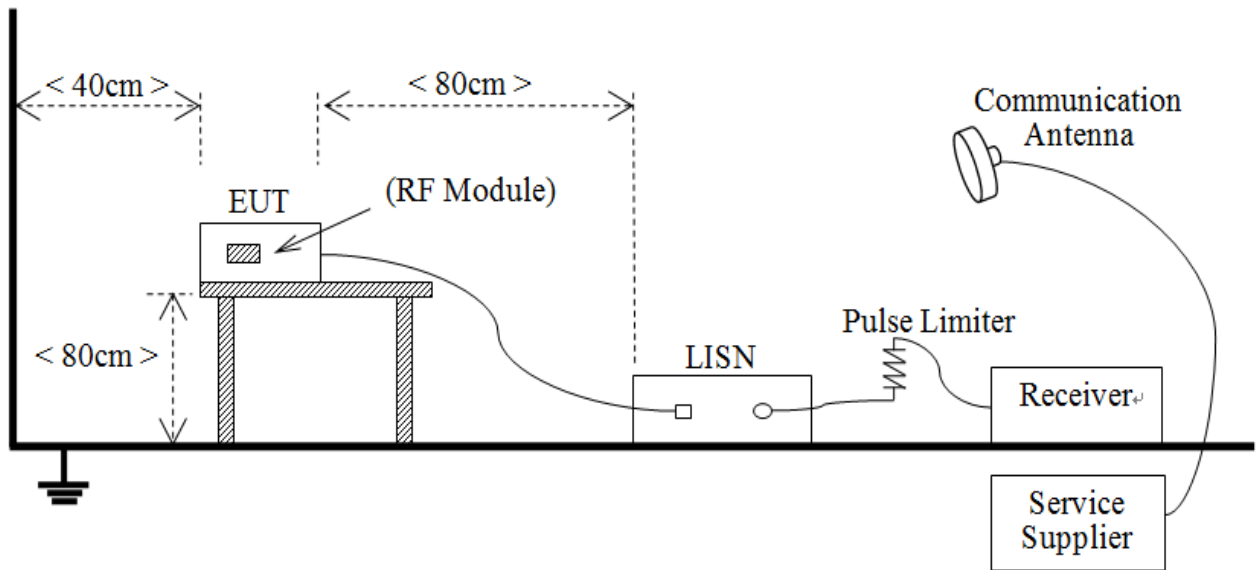
4.4 Description of Test Setup

4.4.1 For Antenna Port Test



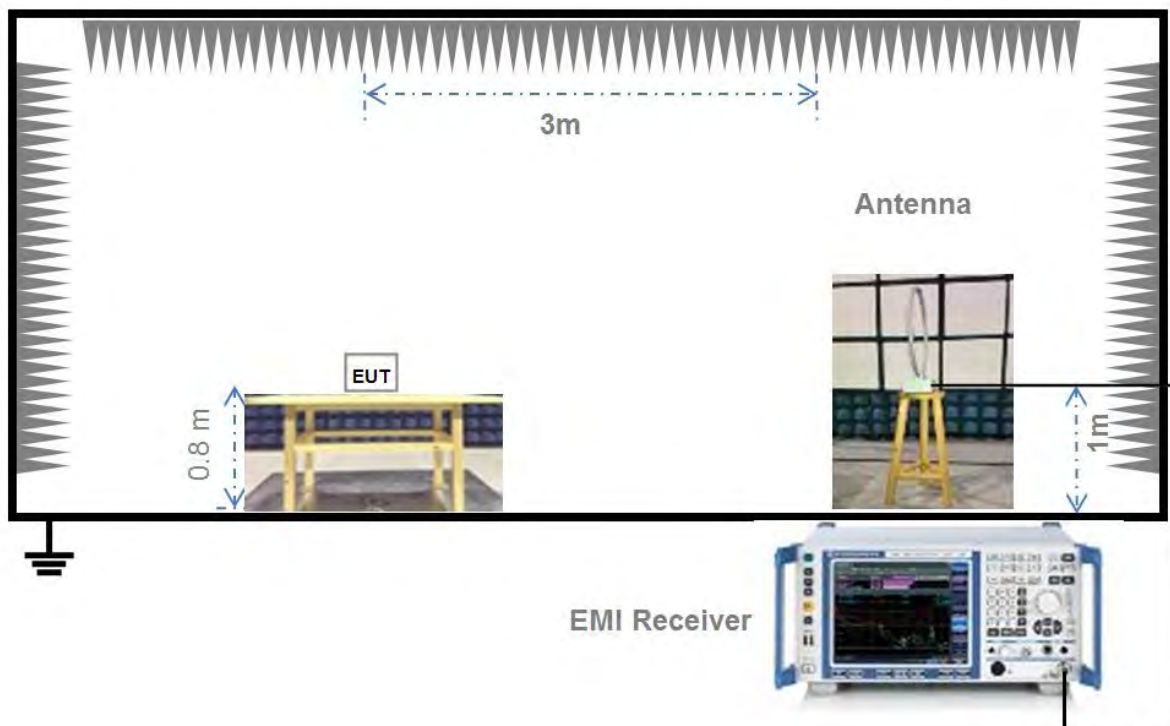
(Diagram 1)

4.4.2 For AC Power Supply Port Test



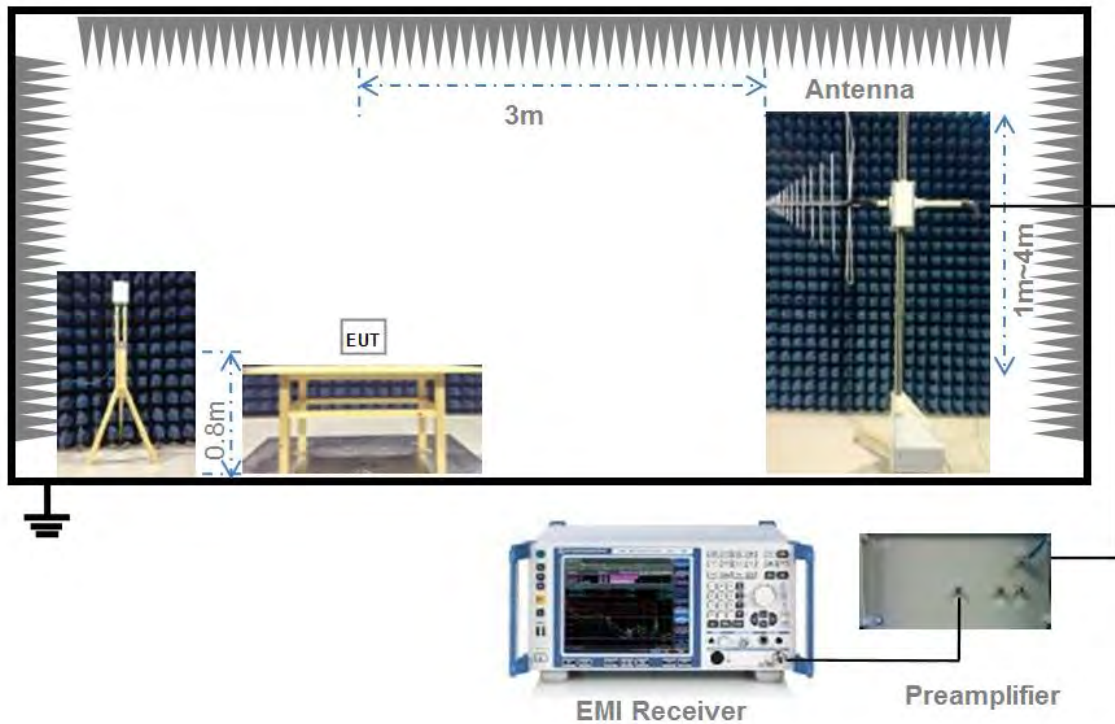
(Diagram 2)

4.4.3 For Radiated Test (Below 30 MHz)



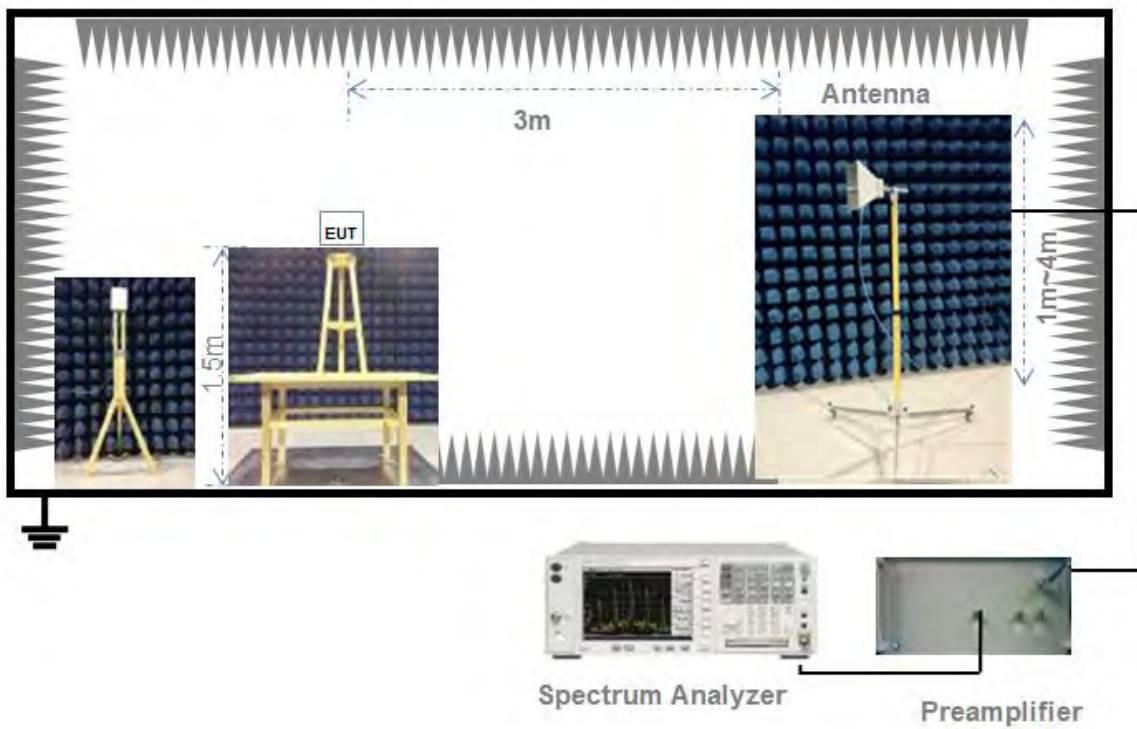
(Diagram 3)

4.4.4 For Radiated Test (30 MHz-1 GHz)



(Diagram 4)

4.4.5 For Radiated Test (Above 1 GHz)



(Diagram 5)

4.5 Measurement Results Explanation Example

4.5.1 For conducted test items:

The offset level is set in the spectrum analyzer to compensate the RF cable loss and attenuator between EUT conducted output port and spectrum analyzer. With the offset compensation, the spectrum analyzer reading level is exactly the EUT RF output level.

The spectrum analyzer offset is derived from RF cable loss and attenuator factor.

Offset = RF cable loss + attenuator factor.

4.5.2 For radiated band edges and spurious emission test:

$$E = \text{EIRP} - 20\log D + 104.8$$

where:

E = electric field strength in dB μ V/m,

EIRP = equivalent isotropic radiated power in dBm

D = specified measurement distance in meters.

EIRP= Measure Conducted output power Value (dBm) + Maximum transmit antenna gain (dBi) + the appropriate maximum ground reflection factor (dB)

5 TEST ITEMS

5.1 Antenna Requirements

5.1.1 Standard Applicable

FCC §15.203 & 15.247(b); RSS-247, 5.4 (6)

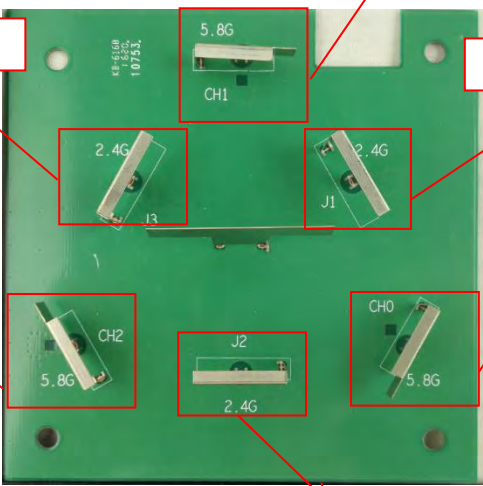
An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the provisions of this section. The manufacturer may design the unit so that a broken antenna can be replaced by the user, but the use of a standard antenna jack or electrical connector is prohibited. This requirement does not apply to carrier current devices or to devices operated under the provisions of § 15.211, § 15.213, § 15.217, § 15.219, or § 15.221. Further, this requirement does not apply to intentional radiators that must be professionally installed, such as perimeter protection systems and some field disturbance sensors, or to other intentional radiators which, in accordance with § 15.31(d), must be measured at the installation site. However, the installer shall be responsible for ensuring that the proper antenna is employed so that the limits in this part are not exceeded.

If directional gain of transmitting antennas is greater than 6 dBi, the power shall be reduced by the same level in dB comparing to gain minus 6 dBi. For the fixed point-to-point operation, the power shall be reduced by one dB for every 3 dB that the directional gain of the antenna exceeds 6 dBi. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the FCC rule.

5.1.2 Antenna Anti-Replacement Construction

The Antenna Anti-Replacement as following method:

Protected Method	Description
The antenna is An embedded-in	An embedded-in antenna design is used.

Reference Documents	Item
Photo	

5.1.3 Antenna Gain

The antenna peak gain of EUT is less than 6 dBi. Therefore, it is not necessary to reduce maximum peak output power limit.

5.2 Output Power

5.2.1 Test Limit

FCC § 15.247(b); RSS-247, 5.4 (4)

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. Maximum Conducted Output Power is defined as the total transmit power delivered to all antennas and antenna elements averaged across all symbols in the signaling alphabet when the transmitter is operating at its maximum power control level. Power must be summed across all antennas and antenna elements.

5.2.2 Test Setup

See section 4.4.1 for test setup description for the antenna port. The photo of test setup please refer to ANNEX B.

5.2.3 Test Procedure

Maximum peak conducted output power

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.

Maximum conducted (average) output power (Reporting Only)

a) As an alternative to spectrum analyzer or EMI receiver measurements, measurements may be performed using a wideband RF power meter with a thermocouple detector or equivalent if all of the conditions listed below are satisfied.

- 1) The EUT is configured to transmit continuously, or to transmit with a constant duty factor.
 - 2) At all times when the EUT is transmitting, it shall be transmitting at its maximum power control level.
 - 3) The integration period of the power meter exceeds the repetition period of the transmitted signal by at least a factor of five.
- b) If the transmitter does not transmit continuously, measure the duty cycle (x) of the transmitter output signal as described in Section 6.0.
- c) Measure the average power of the transmitter. This measurement is an average over both the on and off periods of the transmitter.
- d) Adjust the measurement in dBm by adding $10\log(1/x)$, where x is the duty cycle to the measurement result.

Measurements of duty cycle

The zero-span mode on a spectrum analyzer or EMI receiver if the response time and spacing between bins on the sweep are sufficient to permit accurate measurements of the on and off times of the transmitted signal.

Set the center frequency of the instrument to the center frequency of the transmission.

Set $RBW \geq OBW$ if possible; otherwise, set RBW to the largest available value.

Set $VBW \geq RBW$. Set detector = peak or average.

The zero-span measurement method shall not be used unless both RBW and VBW are $> 50/T$ and the number of sweep points across duration T exceeds 100. (For example, if VBW and/or RBW are limited to 3 MHz, then the zero-span method of measuring duty cycle shall not be used if $T \leq 16.7$ microseconds.)

5.2.4 Test Result

Please refer to ANNEX A.1.

5.36dB Bandwidth

5.3.1 Limit

FCC §15.247(a); RSS-GEN, 6.6

Make the measurement with the spectrum analyzer's resolution bandwidth (RBW) = 100 kHz. In order to make an accurate measurement, set the span greater than RBW. The 6 dB bandwidth must be greater than 500 kHz.

5.3.2 Test Setup

See section 4.4.1 for test setup description for the antenna port. The photo of test setup please refer to ANNEX B.

5.3.3 Test Procedure

Use the following spectrum analyzer settings:

Set RBW = 100 kHz.

Set the video bandwidth (VBW) ≥ 3 RBW.

Detector = Peak.

Trace mode = max hold.

Sweep = auto couple.

Allow the trace to stabilize.

Measure the maximum width of the emission that is constrained by the frequencies associated with the two outermost amplitude points (upper and lower frequencies) that are attenuated by 6 dB relative to the maximum level measured in the fundamental emission.

5.3.4 Test Result

Please refer to ANNEX A.2.

5.4 Conducted Spurious Emission

5.4.1 Limit

FCC §15.247(d); RSS-247, 5.5

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.

5.4.2 Test Setup

See section 4.4.1 for test setup description for the antenna port. The photo of test setup please refer to ANNEX B.

5.4.3 Test Procedure

The DTS rules specify that in any 100 kHz bandwidth outside of the authorized frequency band, the power shall be attenuated according to the following conditions:

- a) If the maximum peak conducted output power procedure was used to demonstrate compliance as described in 9.1, then the peak output power measured in any 100 kHz bandwidth outside of the authorized frequency band shall be attenuated by at least 20 dB relative to the maximum in-band peak PSD level in 100 kHz (i.e., 20 dBc).
- b) If maximum conducted (average) output power was used to demonstrate compliance as described in 9.2, then the peak power in any 100 kHz bandwidth outside of the authorized frequency band shall be attenuated by at least 30 dB relative to the maximum in-band peak PSD level in 100 kHz (i.e., 30 dBc).
- c) In either case, attenuation to levels below the 15.209 general radiated emissions limits is not required.

The following procedures shall be used to demonstrate compliance to these limits. Note that these procedures can be used in either an antenna-port conducted or radiated test set-up. Radiated tests must conform to the test site requirements and utilize maximization procedures defined herein.

Reference level measurement

Establish a reference level by using the following procedure:

Set instrument center frequency to DTS channel center frequency.

Set the span to ≥ 1.5 times the DTS bandwidth.

Set the RBW = 100 kHz.

Set the VBW $\geq 3 \times$ RBW.

Detector = peak.

Sweep time = auto couple.

Trace mode = max hold.

Allow trace to fully stabilize.

Use the peak marker function to determine the maximum PSD level.

Emission level measurement

Use the following spectrum analyzer settings:

Span = wide enough to capture the peak level of the in-band emission and all spurious emissions (e.g., harmonics) from the lowest frequency generated in the EUT up through the 10th harmonic. Typically, several plots are required to cover this entire span.

Set the RBW = 100 kHz.

Set the VBW $\geq 3 \times$ RBW.

Detector = peak.

Sweep time = auto couple.

Trace mode = max hold.

Allow trace to fully stabilize.

Use the peak marker function to determine the maximum amplitude level.

Ensure that the amplitude of all unwanted emissions outside of the authorized frequency band (excluding restricted frequency bands) are attenuated by at least the minimum requirements specified in 11.1 a) or 11.1 b). Report the three highest emissions relative to the limit.

5.4.4 Test Result

Please refer to ANNEX A.3.

5.5 Band Edge (Authorized-band band-edge)

5.5.1 Limit

FCC §15.247(d); RSS-GEN, 8.9, RSS-247, 5.5

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.

5.5.2 Test Setup

See section 4.4.1 for test setup description for the antenna port. The photo of test setup please refer to ANNEX B.

5.5.3 Test Procedure

The following procedures may be used to determine the peak or average field strength or power of an unwanted emission that is within 2 MHz of the authorized band edge. If a peak detector is utilized, use the procedure described in 13.2.1. Use the procedure described in 13.2.2 when using an average detector and the EUT can be configured to transmit continuously (i.e., duty cycle $\geq 98\%$). Use the procedure described in 13.2.3 when using an average detector and the EUT cannot be configured to transmit continuously but the duty cycle is constant (i.e., duty cycle variations are less than ± 2 percent). Use the procedure described in 13.2.4 when using an average detector for those cases where the EUT cannot be configured to transmit continuously and the duty cycle is not constant (duty cycle variations equal or exceed 2 percent).

When using a peak detector to measure unwanted emissions at or near the band edge (within 2 MHz of the authorized band), the following integration procedure can be used.

Set instrument center frequency to the frequency of the emission to be measured (must be within 2 MHz of the authorized band edge).

Set span to 2 MHz

RBW = 100 kHz.

VBW $\geq 3 \times$ RBW.

Detector = peak.

Sweep time = auto.

Trace mode = max hold.

Allow sweep to continue until the trace stabilizes (required measurement time may increase for low duty cycle applications)

Compute the power by integrating the spectrum over 1 MHz using the analyzer's band power measurement function with band limits set equal to the emission frequency (femission) ± 0.5 MHz. If the instrument does not have a band power function, then sum the amplitude levels (in power units) at 100 kHz intervals extending across the 1 MHz spectrum defined by femission ± 0.5 MHz.

Standard method(without 2 MHz of the authorized band):

Span: Wide enough to capture the peak level of the emission operating on the channel closest to the band edge, as well as any modulation products that fall outside of the authorized band of operation.

Reference level: As required to keep the signal from exceeding the maximum instrument input mixer level for linear operation. In general, the peak of the spectral envelope shall be more than $[10 \log (OBW/RBW)]$ below the reference level. Specific guidance is given in 4.1.5.2.

Attenuation: Auto (at least 10 dB preferred).

Sweep time: Coupled.

Resolution bandwidth: 100 kHz.

Video bandwidth: 300 kHz.

Detector: Peak.

Trace: Max hold.

5.5.4 Test Result

Please refer to ANNEX A.4.

5.6 Conducted Emission

5.6.1 Limit

FCC §15.207; RSS-GEN, 8.8

For an intentional radiator that is designed to be connected to the public utility (AC) power line, the radio frequency voltage that is conducted back onto the AC power line on any frequency within the band 150 kHz to 30 MHz shall not exceed the limits in the following table, as measured using a 50 μ H/50 Ω line impedance stabilization network (LISN).

Frequency range (MHz)	Conducted Limit (dB μ V)	
	Quai-peak	Average
0.15 - 0.50	66 to 56	56 to 46
0.50 - 5	56	46
0.50 - 30	60	50

5.6.2 Test Setup

See section 4.4.2 for test setup description for the AC power supply port. The photo of test setup please refer to ANNEX B.

5.6.3 Test Procedure

The maximum conducted interference is searched using Peak (PK), if the emission levels more than the AV and QP limits, and that have narrow margins from the AV and QP limits will be re-measured with AV and QP detectors. Tests for both L phase and N phase lines of the power mains connected to the EUT are performed. Refer to recorded points and plots below.

Devices subject to Part 15 must be tested for all available U.S. voltages and frequencies (such as a nominal 120 VAC, 50/60 Hz and 240 VAC, 50/60 Hz) for which the device is capable of operation. A device rated for 50/60 Hz operation need not be tested at both frequencies provided the radiated and line conducted emissions are the same at both frequencies.

5.6.4 Test Result

Please refer to ANNEX A.5.

5.7 Radiated Spurious Emission

5.7.1 Limit

FCC §15.209&15.247(c); RSS-247, 5.5

Radiated emission outside the frequency band attenuation below the general limits specified in FCC section 15.209(a) is not required. In addition, radiated emissions which fall in the restricted bands, as defined in FCC section 15.205(a), must also comply with the radiated emission limits specified in FCC section 15.209(a).

According to FCC section 15.209 (a), except as provided elsewhere in this subpart, the emissions from an intentional radiator shall not exceed the field strength levels specified in the following table:

Frequency (MHz)	Field Strength ($\mu\text{V/m}$)	Measurement Distance (m)
0.009 - 0.490	2400/F(kHz)	300
0.490 - 1.705	24000/F(kHz)	30
1.705 - 30.0	30	30
30 - 88	100	3
88 - 216	150	3
216 - 960	200	3
Above 960	500	3

Note:

1. For Above 1000 MHz, the emission limit in this paragraph is based on measurement instrumentation employing an average detector, measurement using instrumentation with a peak detector function, corresponding to 20dB above the maximum permitted average limit.
2. For above 1000 MHz, limit field strength of harmonics: 54dBuV/m@3m (AV) and 74dBuV/m@3m (PK).

5.7.2 Test Setup

See section 4.4.3 to 4.4.5 for test setup description for the antenna port. The photo of test setup please refer to ANNEX B.

5.7.3 Test Procedure

The measurement frequency range is from 9 kHz to the 10th harmonic of the fundamental frequency. The Turn Table is actuated to turn from 0° to 360°, and both horizontal and vertical polarizations of the Test Antenna are used to find the maximum radiated power. Mid channels on all channel bandwidth verified. Only the worst RB size/offset presented. The power of the EUT transmitting frequency should be ignored.

All Spurious Emission tests were performed in X, Y, Z axis direction. And only the worst axis test condition was recorded in this test report.

Use the following spectrum analyzer settings:

Span = wide enough to fully capture the emission being measured

RBW = 1 MHz for $f \geq 1$ GHz, 100 kHz for $f < 1$ GHz

VBW $\geq$ RBW

Sweep = auto

Detector function = peak

Trace = max hold

5.7.4 Test Result

Please refer to ANNEX A.6.

5.8 Band Edge (Restricted-band band-edge)

5.8.1 Limit

FCC §15.209&15.247(c); RSS-247, 5.5

Radiated emission outside the frequency band attenuation below the general limits specified in FCC section 15.209(a) is not required. In addition, radiated emissions which fall in the restricted bands, as defined in FCC section 15.205(a), must also comply with the radiated emission limits specified in FCC section 15.209(a).

5.8.2 Test Setup

See section 4.4.1 for test setup description for the antenna port. The photo of test setup please refer to ANNEX B.

5.8.3 Test Procedure

The measurement frequency range is from 9 kHz to the 10th harmonic of the fundamental frequency. The Turn Table is actuated to turn from 0° to 360°, and both horizontal and vertical polarizations of the Test Antenna are used to find the maximum radiated power. Mid channels on all channel bandwidth verified. Only the worst RB size/offset presented.

The power of the EUT transmitting frequency should be ignored.

All Spurious Emission tests were performed in X, Y, Z axis direction. And only the worst axis test condition was recorded in this test report.

Use the following spectrum analyzer settings:

Span = wide enough to fully capture the emission being measured

RBW = 1 MHz for $f \geq 1$ GHz, 100 kHz for $f < 1$ GHz

VBW $\geq$ RBW

Sweep = auto

Detector function = peak

Trace = max hold

For measurement below 1GHz, If the emission level of the EUT measured by the peak detector is 3 dB lower than the applicable limit, the peak emission level will be reported, Otherwise, the emission measurement will be repeated using the quasi-peak detector and reported.

5.8.4 Test Result

Please refer to ANNEX A.7.

5.9 Power Spectral density (PSD)

5.9.1 Limit

FCC §15.247(d); RSS-247, 5.2 (2)

The same method of determining the conducted output power shall be used to determine the power spectral density. If a peak output power is measured, then a peak power spectral density measurement is required. If an average output power is measured, then an average power spectral density measurement should be used.

5.9.2 Test Setup

See section 4.4.1 for test setup description for the antenna port. The photo of test setup please refer to ANNEX B.

5.9.3 Test Procedure

Set instrument center frequency to DTS channel center frequency.

Set span to at least 1.5 times the OBW.

Set RBW to: $3 \text{ kHz} \leq \text{RBW} \leq 100 \text{ kHz}$.

Set VBW $\geq 3 \times \text{RBW}$.

Detector = RMS

Ensure that the number of measurement points in the sweep $\geq 2 \times \text{span/RBW}$.

Sweep time = auto couple.

Employ trace averaging (RMS) mode over a minimum of 100 traces.

Use the peak marker function to determine the maximum amplitude level.

Add $10 \log (1/x)$, where x is the duty cycle.

If measured value exceeds limit, reduce RBW (no less than 3 kHz) and repeat.

5.9.4 Test Result

Please refer to ANNEX A.8.

ANNEX A TEST RESULT

A.1 Output Power

Duty Cycle

Test Mode	ANT 0+ANT 1+ ANT 2		
	Duty Cycle	T (ms)	1/T(kHz)
802.11b	1.00	1.00	1.00
802.11g	0.98	2.01	0.50
802.11n-20 MHz	0.97	1.88	0.53
802.11n-40 MHz	0.86	0.82	1.21

Average Power Test Data

802.11b Mode:

Channel(MHz)	Measured Output Peak Power								Limit		Verdict
	ANT 0		ANT 1		ANT 2		Total of output power				
	dBm	mW	dBm	mW	dBm	mW	dBm	mW	dBm	mW	
2412	23.27	212.32	22.42	174.58	22.69	185.78	27.58	572.69	30	1000	Pass
2422	25.45	350.75	25.12	325.09	24.89	308.32	29.93	984.16			Pass
2437	25.65	367.28	25.06	320.63	24.66	292.42	29.91	980.32			Pass
2442	25.53	357.27	24.22	264.24	24.92	310.46	29.69	931.97			Pass
2462	22.15	164.06	21.53	142.23	21.77	150.31	26.60	456.61			Pass

802.11g Mode:

Channel	Measured Output Peak Power								Limit		Verdict
	ANT 0		ANT 1		ANT 2		Total of output power				
	dBm	mW	dBm	mW	dBm	mW	dBm	mW	dBm	mW	
2412	18.25	66.83	17.77	59.84	17.53	56.62	22.63	183.30	30	1000	Pass
2422	22.23	167.11	21.85	153.11	21.53	142.23	26.65	462.45			Pass
2437	25.25	334.97	24.73	297.17	24.92	310.46	29.74	942.59			Pass
2442	22.23	167.11	21.57	143.55	21.48	140.60	26.54	451.26			Pass
2462	17.35	54.33	16.66	46.34	16.71	46.88	21.69	147.55			Pass

802.11n-20 MHz Mode:

Channel	Measured Output Peak Power								Limit		Verdict
	ANT 0		ANT 1		ANT 2		Total of output power				
	dBm	mW	dBm	mW	dBm	mW	dBm	mW	dBm	mW	
2412	16.95	49.55	16.12	40.93	16.20	41.69	21.21	132.16	30	1000	Pass
2422	22.89	194.54	22.35	171.79	22.47	176.60	27.35	542.93			Pass
2437	25.31	339.63	24.49	281.19	24.32	270.40	29.50	891.21			Pass
2442	21.52	141.91	21.23	132.74	20.88	122.46	25.99	397.11			Pass
2462	17.98	62.81	17.36	54.45	17.27	53.33	22.32	170.59			Pass

802.11n-40 MHz Mode:

Channel	Measured Output Peak Power								Limit		Verdict
	ANT 0		ANT 1		ANT 2		Total of output power				
	dBm	mW	dBm	mW	dBm	mW	dBm	mW	dBm	mW	
2422	14.18	26.18	13.75	23.71	13.68	23.33	18.65	73.23	30	1000	Pass
2432	21.23	132.74	21.16	130.62	20.47	111.43	25.74	374.79			Pass
2437	19.22	83.56	18.62	72.78	18.09	64.42	23.44	220.76			Pass
2442	19.22	83.56	18.88	77.27	18.57	71.94	23.67	232.77			Pass
2452	17.33	54.08	16.69	46.67	16.54	45.08	21.64	145.82			Pass

A.2 Bandwidth

Test Data

802.11b Mode:

Channel	6 dB Bandwidth (MHz)			99% Bandwidth (MHz)			6 dB Bandwidth Limits (kHz)
	ANT 0	ANT 1	ANT 2	ANT 0	ANT 1	ANT 2	
Low	7.16	6.16	7.46	12.62	12.50	12.62	≥500
Middle	7.16	6.26	7.16	12.79	12.39	12.62	≥500
High	7.16	7.16	8.16	12.74	12.50	12.62	≥500

802.11g Mode:

Channel	6 dB Bandwidth (MHz)			99% Bandwidth (MHz)			6 dB Bandwidth Limits (kHz)
	ANT 0	ANT 1	ANT 2	ANT 0	ANT 1	ANT 2	
Low	16.02	12.77	15.77	17.25	16.56	16.67	≥500
Middle	12.77	15.17	15.47	17.13	16.61	16.50	≥500
High	15.57	13.97	16.02	16.96	16.85	16.61	≥500

802.11n-20MHz Mode:

Channel	6 dB Bandwidth (MHz)			99% Bandwidth (MHz)			6 dB Bandwidth Limits (kHz)
	ANT 0	ANT 1	ANT 2	ANT 0	ANT 1	ANT 2	
Low	16.42	17.27	15.77	17.83	17.60	17.83	≥500
Middle	16.42	13.97	17.02	18.18	17.71	17.89	≥500
High	17.42	17.27	16.02	18.00	17.83	17.95	≥500

802.11n-40MHz Mode:

Channel	6 dB Bandwidth (MHz)			99% Bandwidth (MHz)			6 dB Bandwidth Limits (kHz)
	ANT 0	ANT 1	ANT 2	ANT 0	ANT 1	ANT 2	
Low	30.22	32.67	30.12	36.30	36.40	36.20	≥ 500
Middle	25.12	33.92	30.17	36.50	36.00	36.00	≥ 500
High	30.77	26.12	30.42	36.70	36.20	36.30	≥ 500

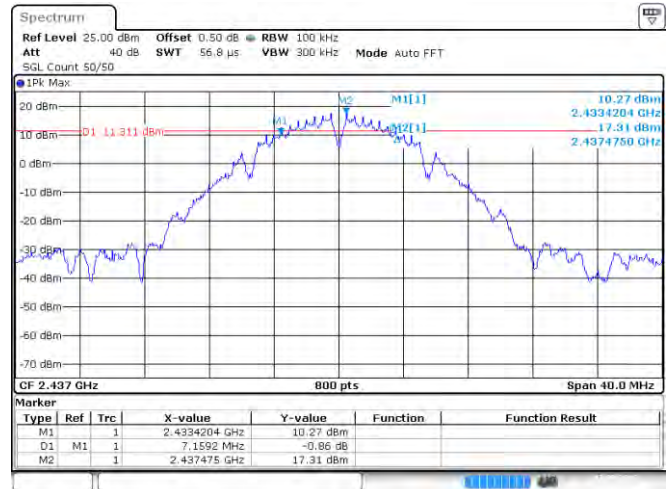
Test plots (6dBm Bandwidth)

ANT 0

802.11b LOW CHANNEL



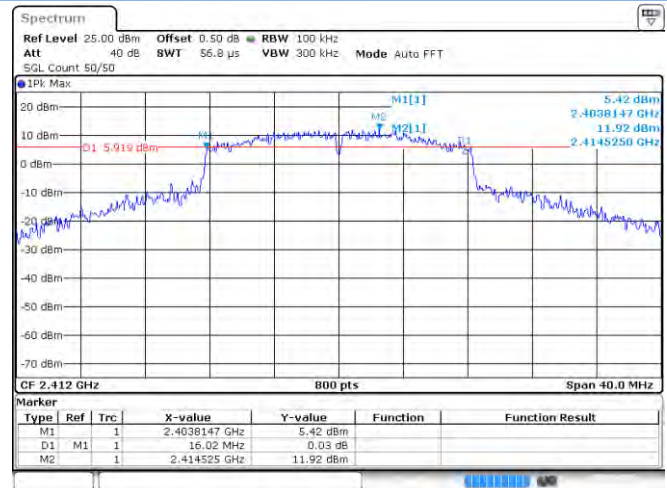
802.11b MIDDLE CHANNEL



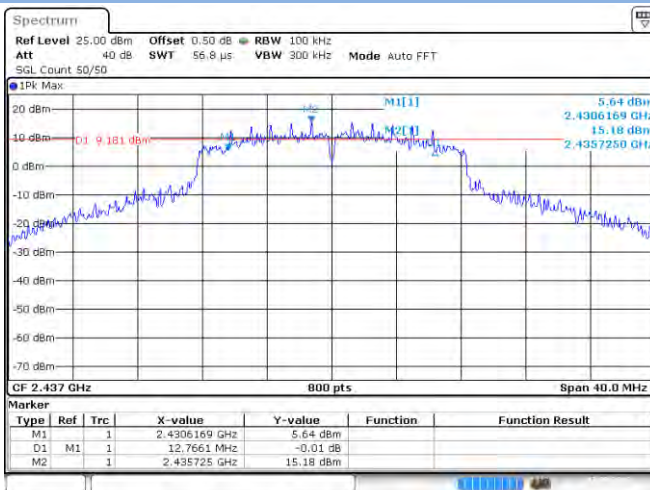
802.11b HIGH CHANNEL



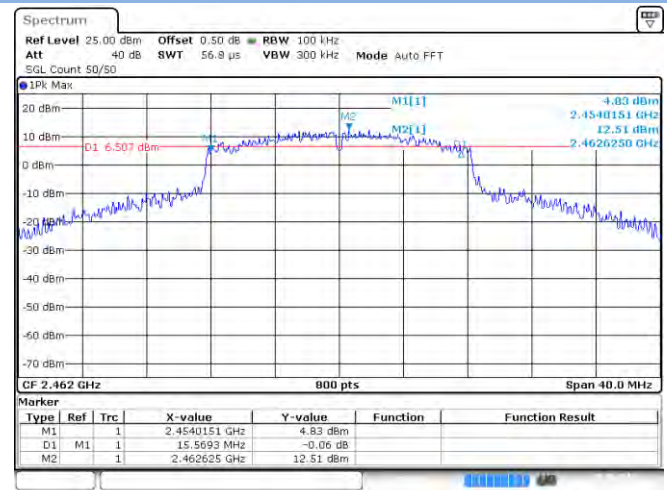
802.11g LOW CHANNEL



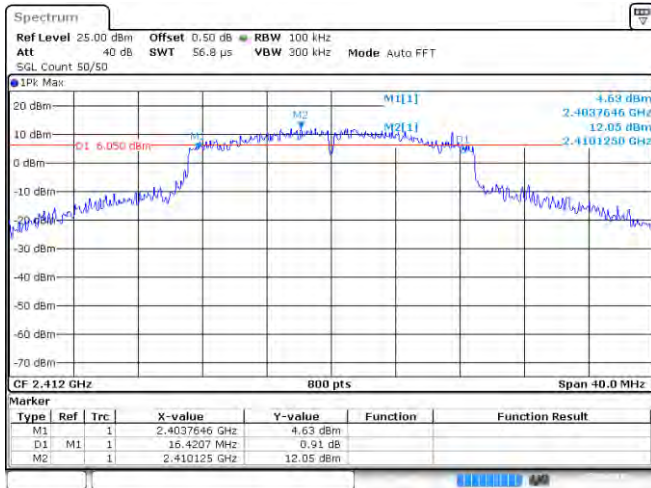
802.11g MIDDLE CHANNEL



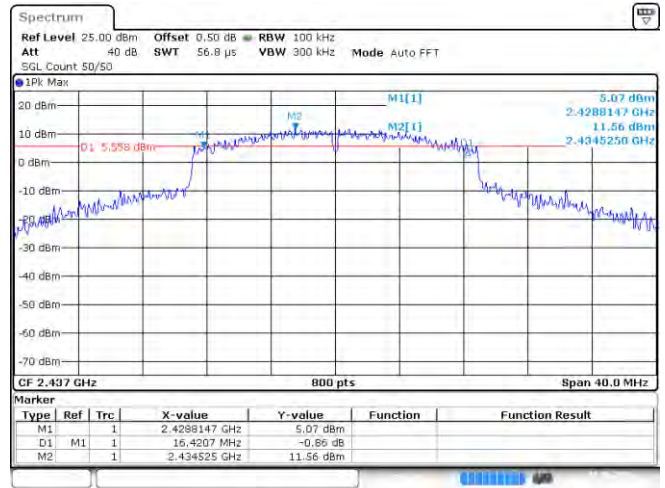
802.11g HIGH CHANNEL



802.11n-20 MHz LOW CHANNEL



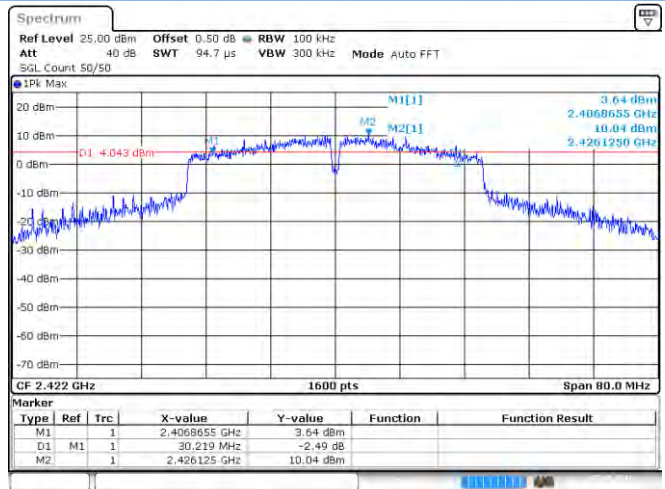
802.11 n-20 MHz MIDDLE CHANNEL



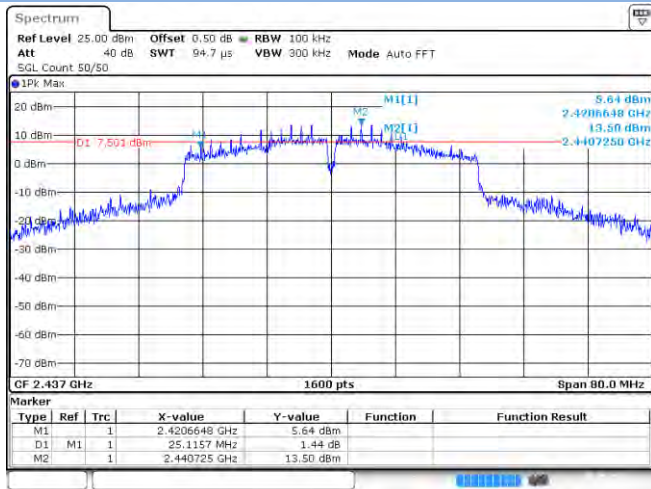
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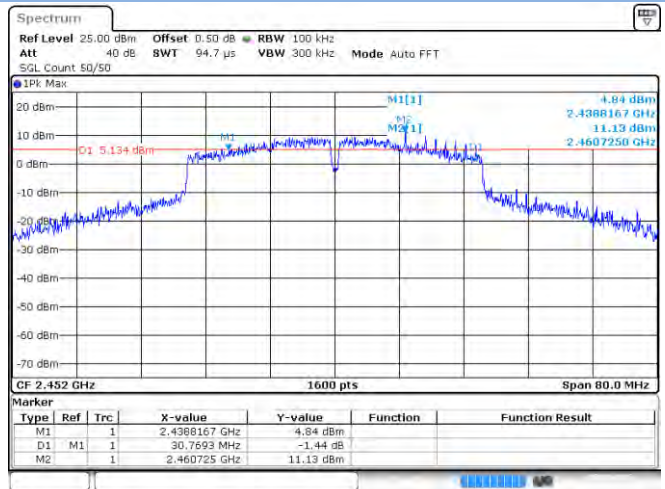
802.11n-40 MHz LOW CHANNEL



802.11 n-40 MHz MIDDLE CHANNEL



802.11n-40 MHz HIGH CHANNEL



ANT 1

802.11b LOW CHANNEL



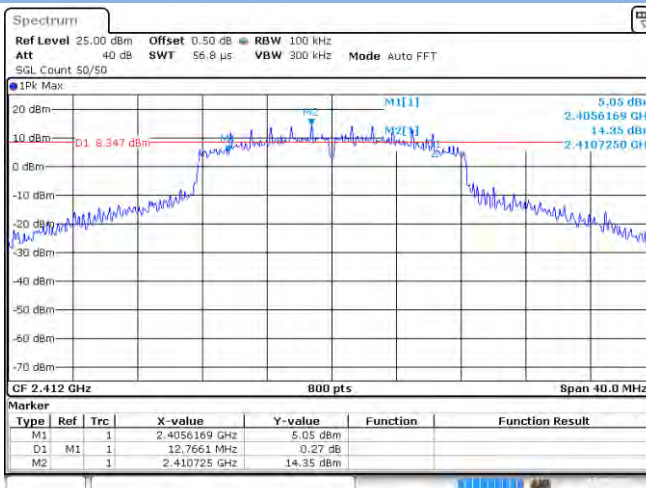
802.11b MIDDLE CHANNEL



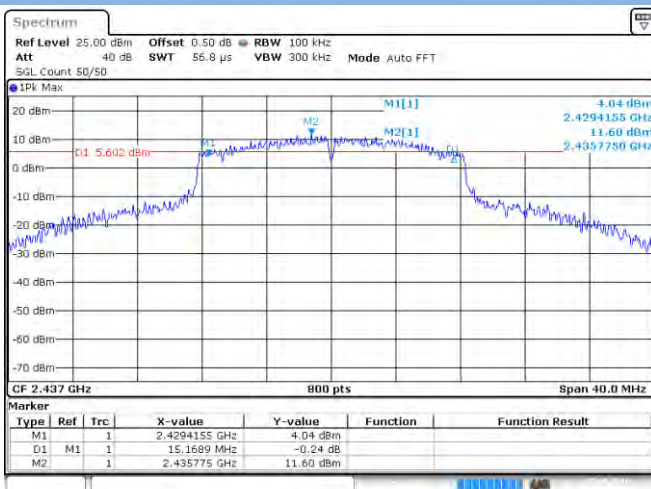
802.11b HIGH CHANNEL



802.11g LOW CHANNEL



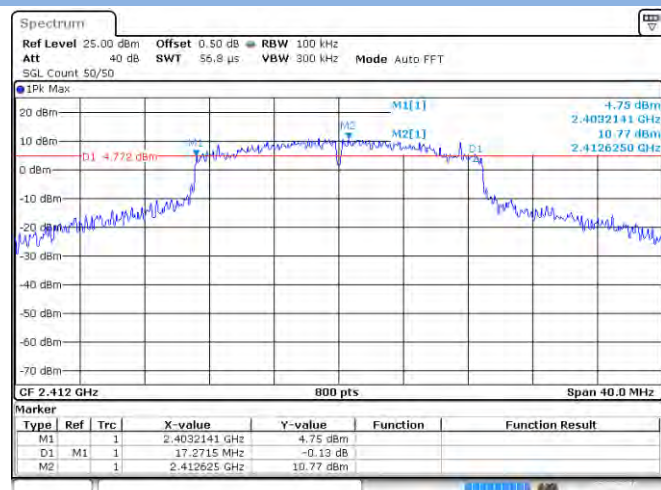
802.11g MIDDLE CHANNEL



802.11g HIGH CHANNEL



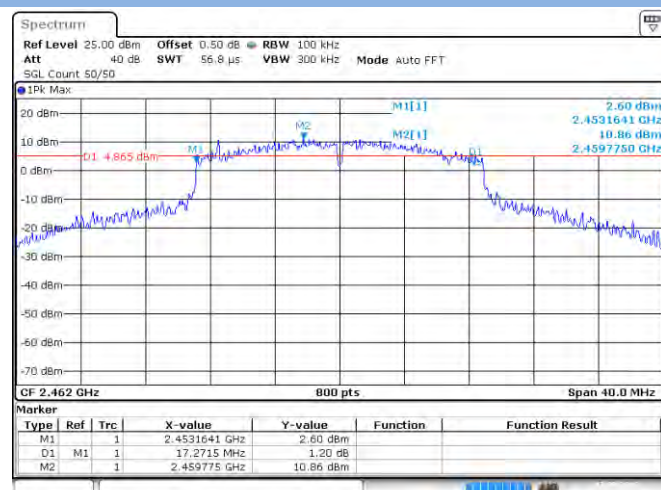
802.11n-20 MHz LOW CHANNEL



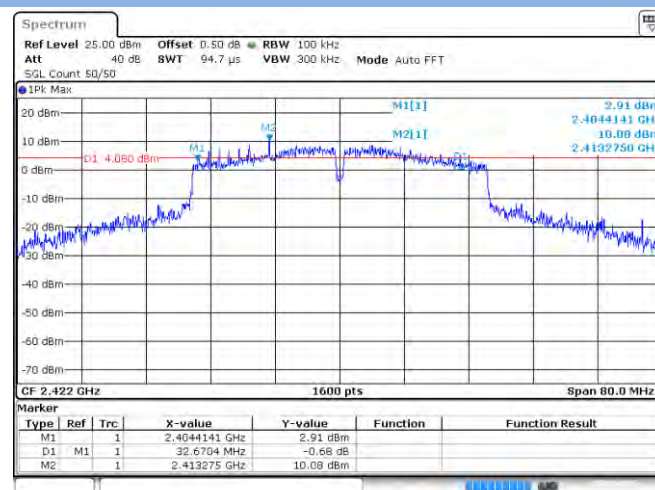
802.11 n-20 MHz MIDDLE CHANNEL



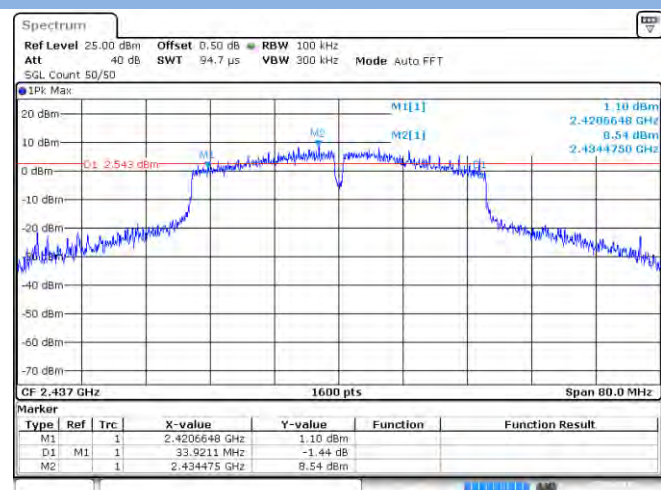
802.11n-20 MHz HIGH CHANNEL



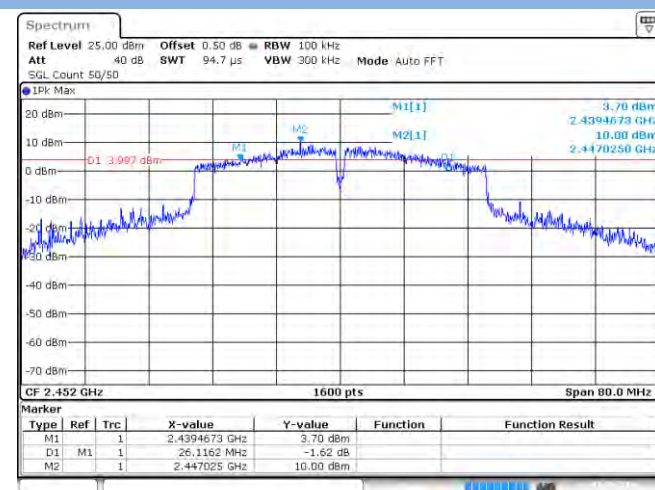
802.11n-40 MHz LOW CHANNEL



802.11 n-40 MHz MIDDLE CHANNEL



802.11n-40 MHz HIGH CHANNEL



ANT 2

802.11b LOW CHANNEL



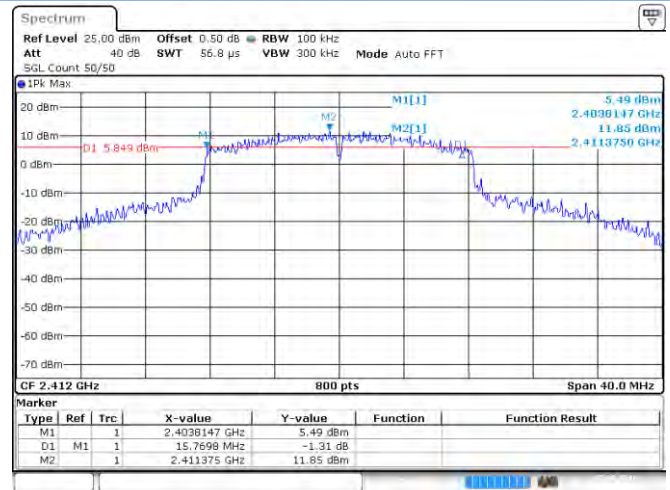
802.11b MIDDLE CHANNEL



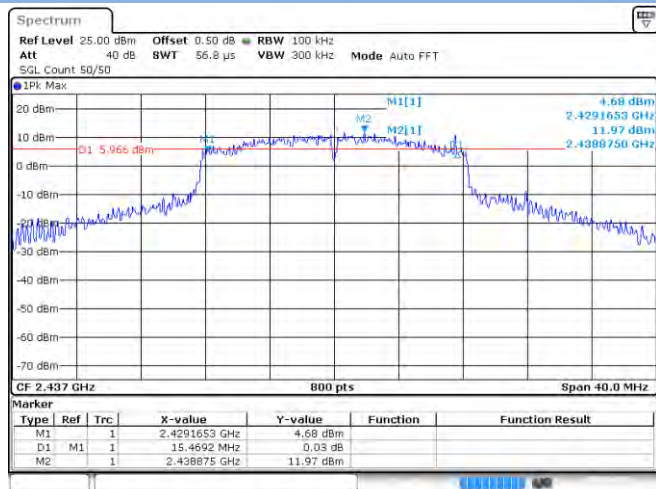
802.11b HIGH CHANNEL



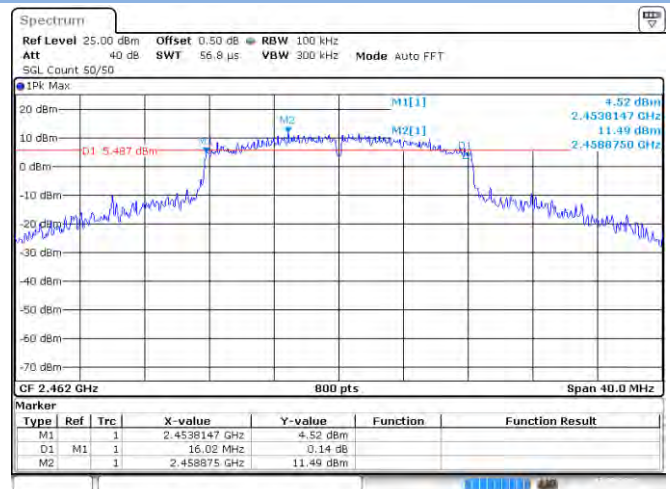
802.11g LOW CHANNEL



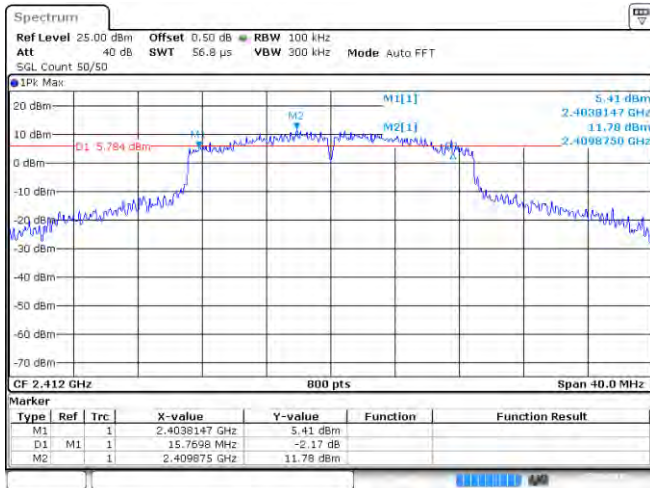
802.11g MIDDLE CHANNEL



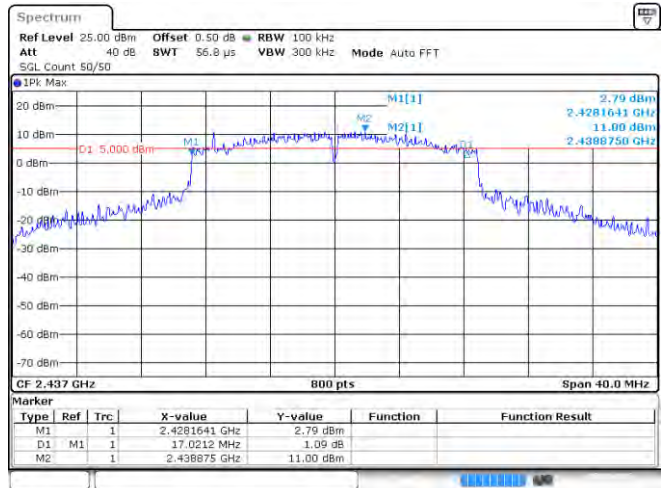
802.11g HIGH CHANNEL



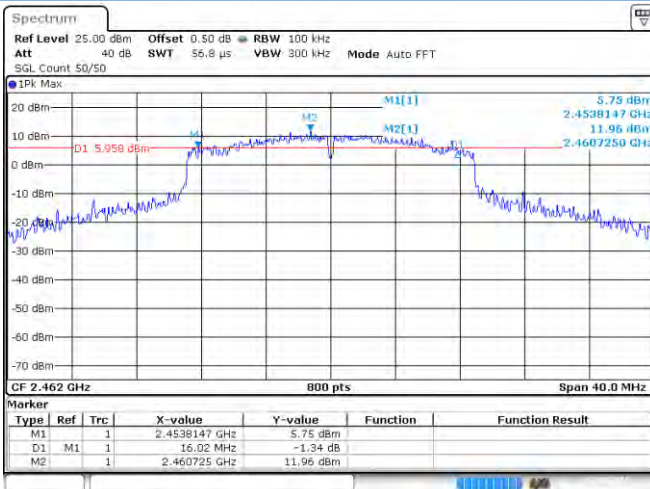
802.11n-20 MHz LOW CHANNEL



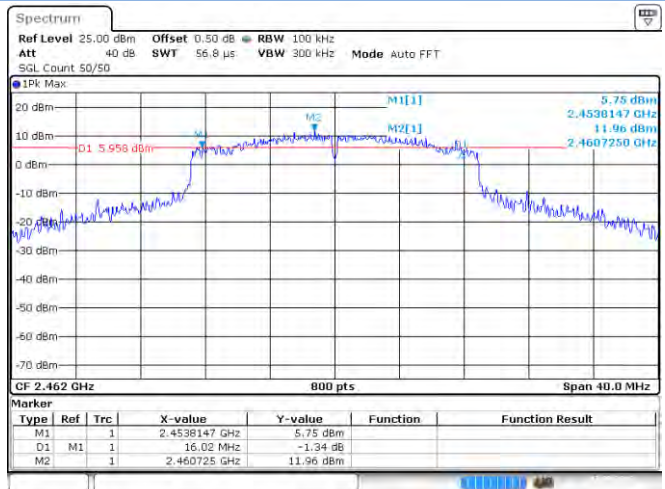
802.11 n-20 MHz MIDDLE CHANNEL



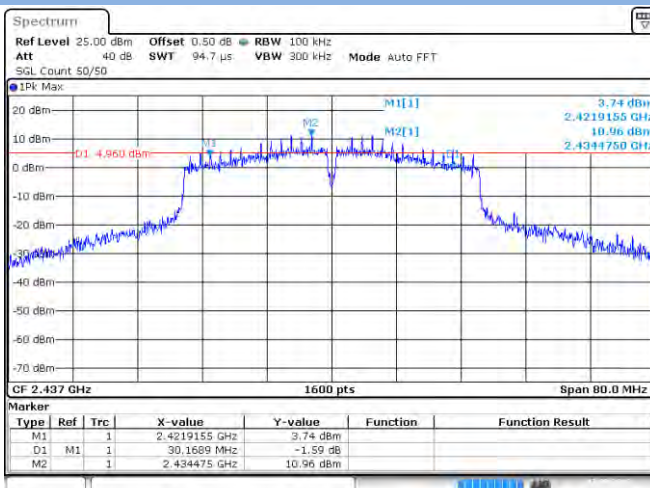
802.11n-20 MHz HIGH CHANNEL



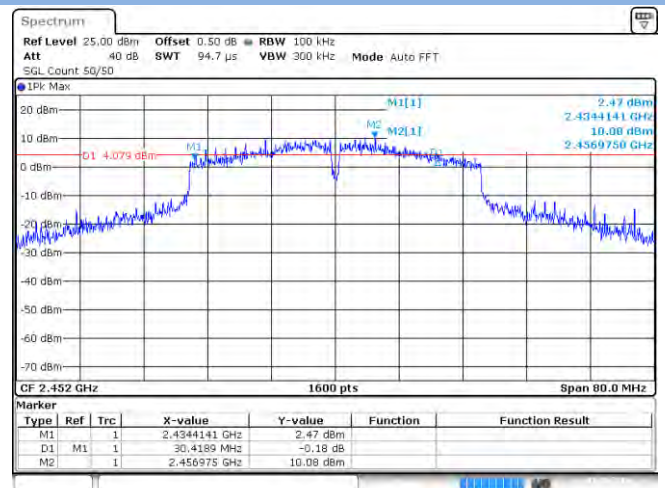
802.11n-40 MHz LOW CHANNEL



802.11 n-40 MHz MIDDLE CHANNEL



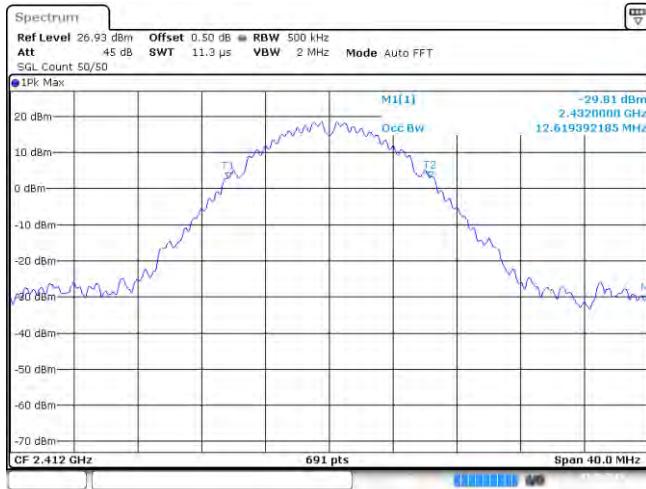
802.11n-40 MHz HIGH CHANNEL



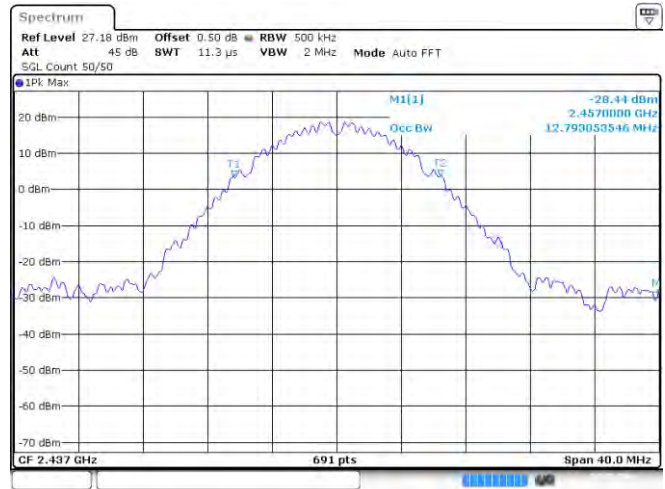
Test plots (99% Bandwidth)

ANT 0

802.11b LOW CHANNEL



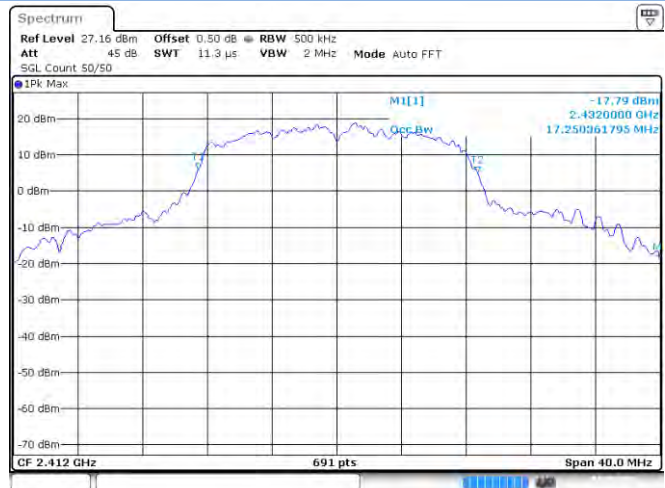
802.11b MIDDLE CHANNEL



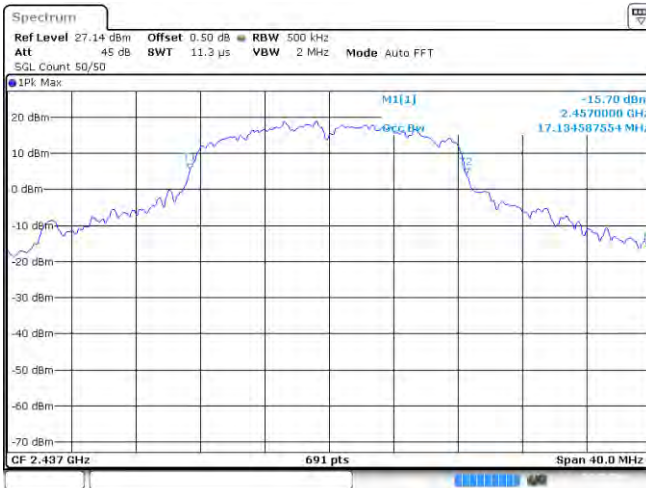
802.11b HIGH CHANNEL



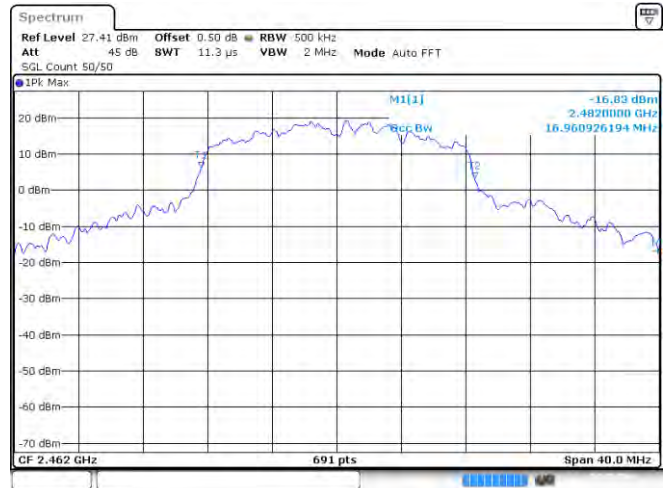
802.11g LOW CHANNEL



802.11g MIDDLE CHANNEL



802.11g HIGH CHANNEL



802.11n-20 MHz LOW CHANNEL



802.11 n-20 MHz MIDDLE CHANNEL



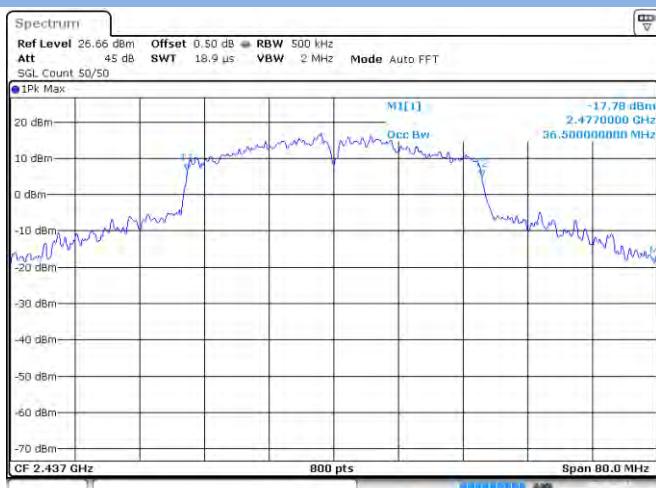
802.11n-20 MHz HIGH CHANNEL



802.11n-40 MHz LOW CHANNEL



802.11n-40 MHz MIDDLE CHANNEL

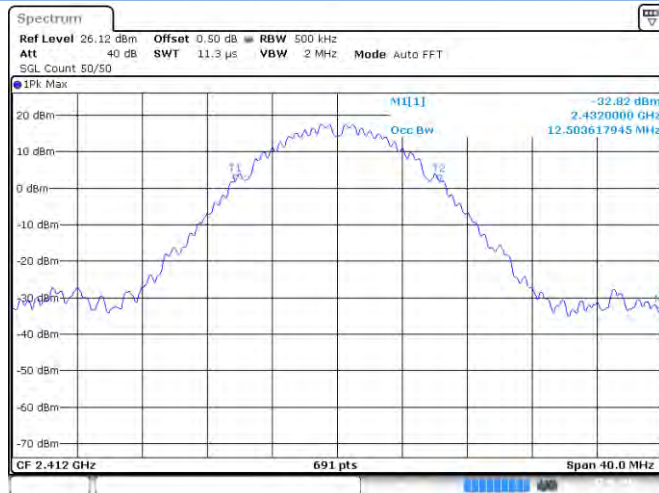


802.11 n-40 MHz HIGH CHANNEL

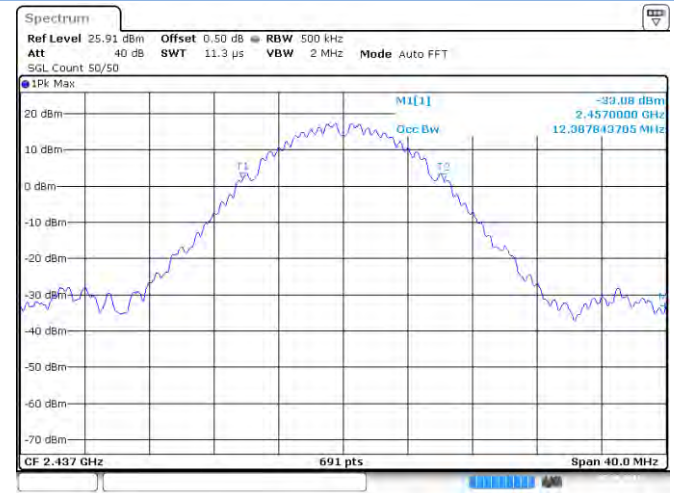


ANT 1

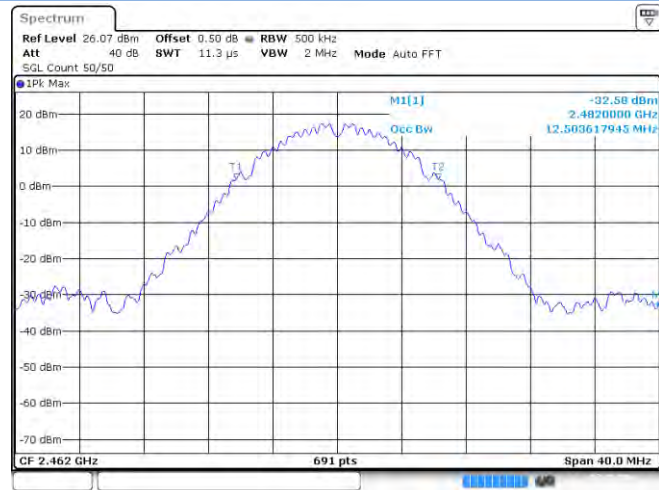
802.11b LOW CHANNEL



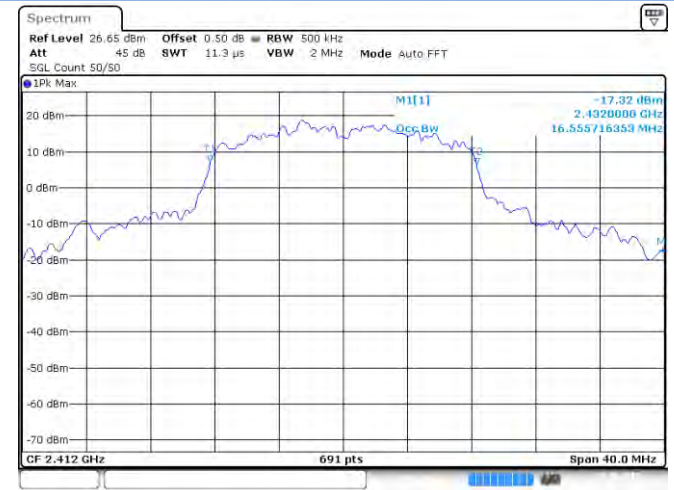
802.11b MIDDLE CHANNEL



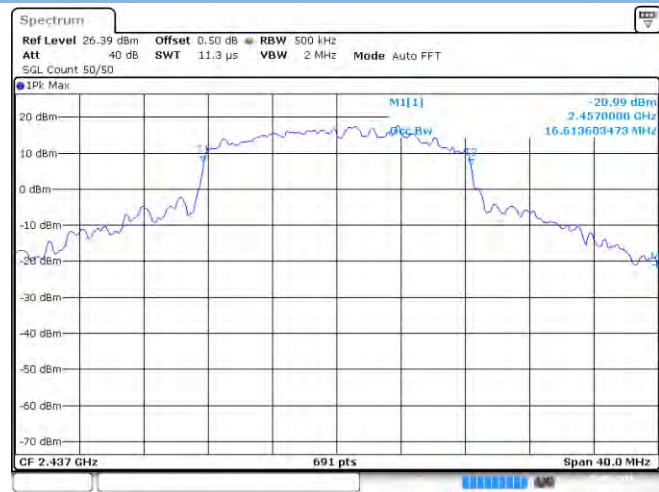
802.11b HIGH CHANNEL



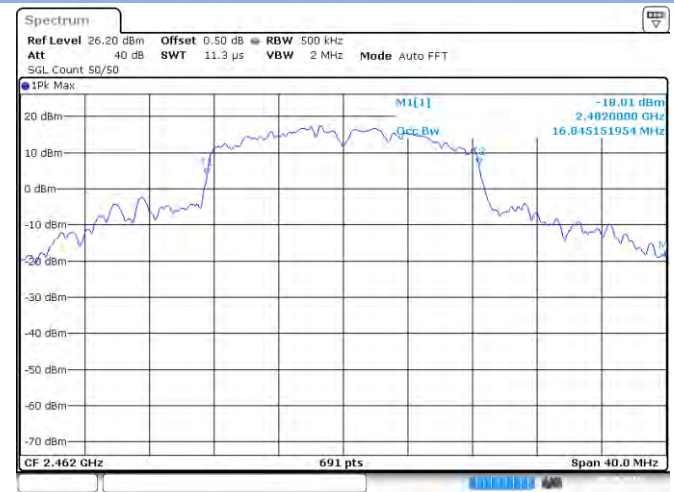
802.11g LOW CHANNEL



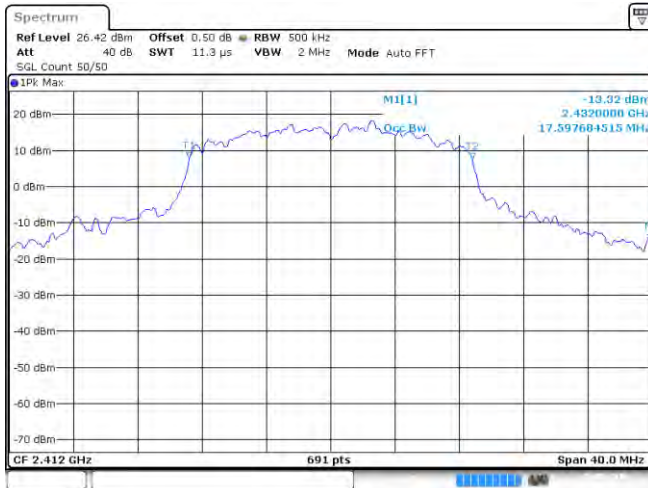
802.11g MIDDLE CHANNEL



802.11g HIGH CHANNEL



802.11n-20 MHz LOW CHANNEL



802.11 n-20 MHz MIDDLE CHANNEL



802.11n-20 MHz HIGH CHANNEL



802.11n-40 MHz LOW CHANNEL



802.11n-40 MHz MIDDLE CHANNEL

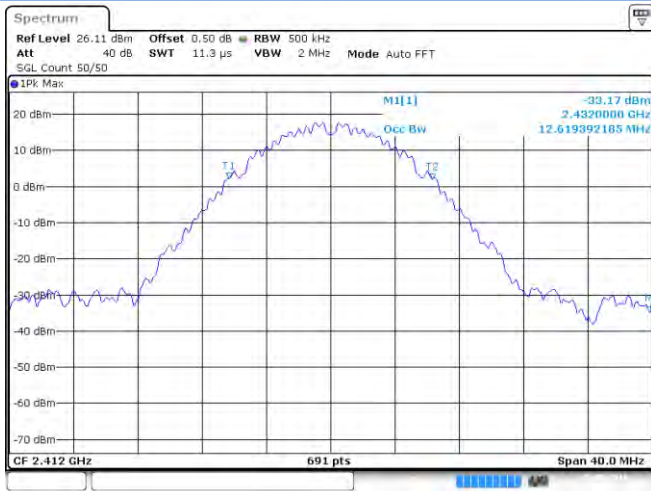


802.11 n-40 MHz HIGH CHANNEL

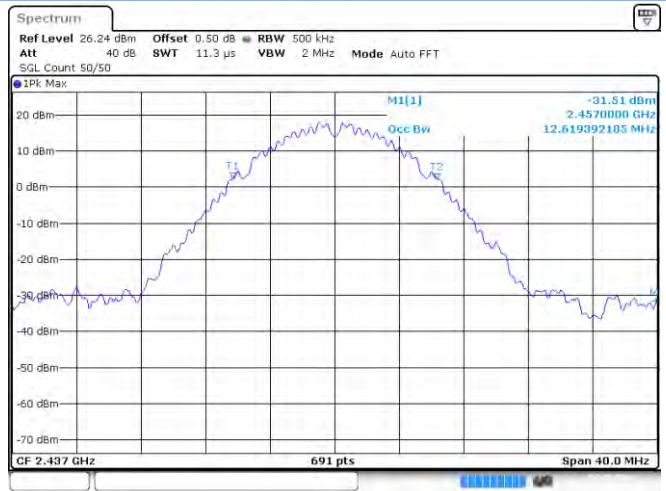


ANT 2

802.11b LOW CHANNEL



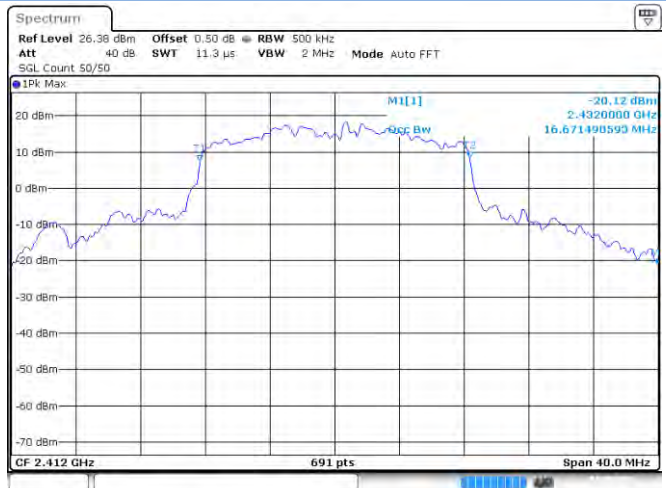
802.11b MIDDLE CHANNEL



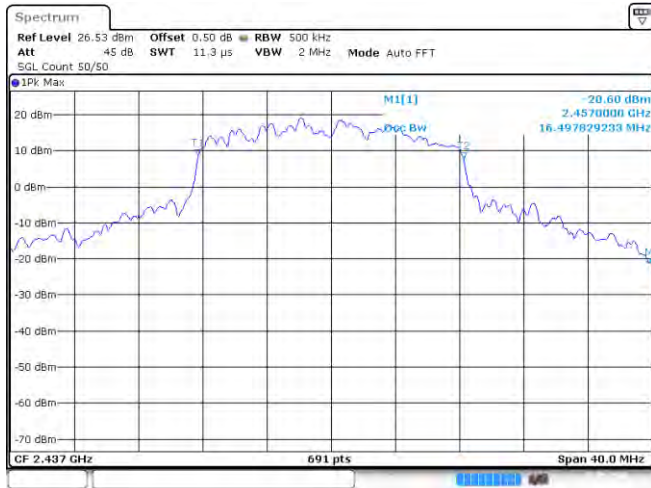
802.11b HIGH CHANNEL



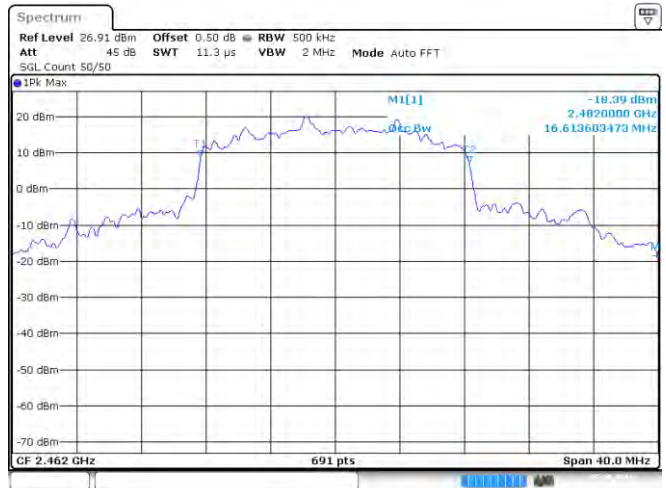
802.11g LOW CHANNEL



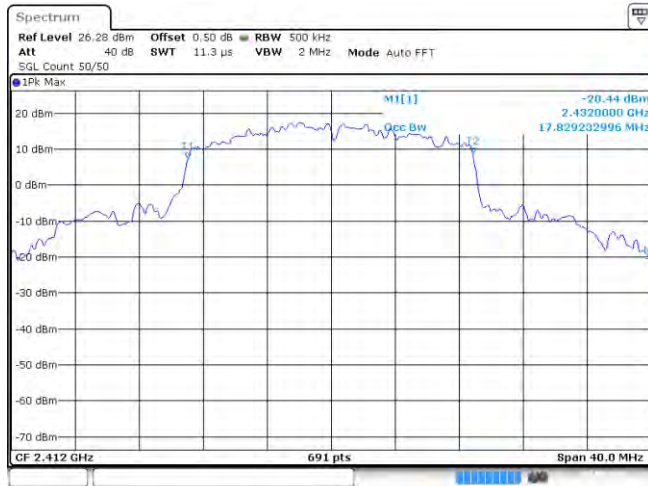
802.11g MIDDLE CHANNEL



802.11g HIGH CHANNEL



802.11n-20 MHz LOW CHANNEL



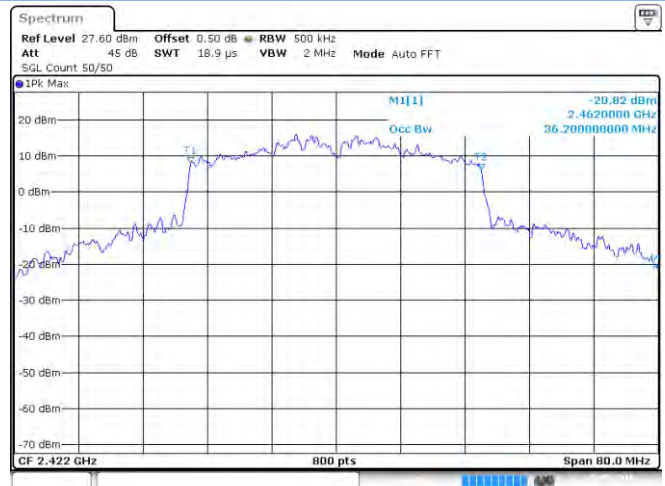
802.11 n-20 MHz MIDDLE CHANNEL



802.11n-20 MHz HIGH CHANNEL



802.11n-40 MHz LOW CHANNEL



802.11n-40 MHz MIDDLE CHANNEL



802.11 n-40 MHz HIGH CHANNEL



A.3 Conducted Spurious Emissions

Test Data

Note: For Multiple transmitter output, the quantity $10 \log(NANT)$ dB is added to each spectrum value before comparing to the emission limit. When testing out-of-band and spurious emissions against relative emission limits, tests may be performed on each output individually without summing or adding $10 \log(NANT)$ if the measurements are made relative to the in-band emissions on the individual outputs.

802.11b Mode:

Channel	Measured Max. Out of Band Emission (dBm)			Limit (dBm)						Verdict
				Carrier Level			Calculated 30 dBc Limit			
	ANT 0	ANT 1	ANT 2	ANT 0	ANT 1	ANT 2	ANT 0	ANT 1	ANT 2	
Low	-40.64	-47.56	-46.50	17.62	16.62	16.82	-12.38	-13.38	-13.18	Pass
Middle	-41.18	-46.73	-46.89	17.49	16.51	16.96	-12.51	-13.49	-13.04	Pass
High	-41.66	-47.40	-46.67	17.34	16.57	16.80	-12.66	-13.43	-13.20	Pass

802.11g Mode:

Channel	Measured Max. Out of Band Emission (dBm)			Limit (dBm)						Verdict
				Carrier Level			Calculated 30 dBc Limit			
	ANT 0	ANT 1	ANT 2	ANT 0	ANT 1	ANT 2	ANT 0	ANT 1	ANT 2	
Low	-45.58	-46.47	-47.03	15.58	14.41	14.54	-14.42	-15.59	-15.46	Pass
Middle	-46.17	-50.87	-45.84	11.93	14.38	14.41	-18.07	-15.62	-15.59	Pass
High	-45.52	-49.26	-47.40	15.13	14.35	14.51	-14.87	-15.65	-15.49	Pass

802.11n-20MHz Mode:

Channel	Measured Max. Out of Band Emission (dBm)			Limit (dBm)						Verdict
				Carrier Level			Calculated 30 dBc Limit			
	ANT 0	ANT 1	ANT 2	ANT 0	ANT 1	ANT 2	ANT 0	ANT 1	ANT 2	
Low	-46.39	-49.92	-47.68	15.53	14.39	14.25	-14.47	-15.61	-15.75	Pass
Middle	-46.19	-46.41	-46.98	15.46	14.40	14.69	-14.54	-15.60	-15.31	Pass
High	-44.66	-46.50	-46.57	15.14	14.46	14.55	-14.86	-15.54	-15.45	Pass

802.11n-40MHz Mode:

Channel	Measured Max. Out of Band Emission (dBm)			Limit (dBm)						Verdict
				Carrier Level			Calculated 30 dBc Limit			
	ANT 0	ANT 1	ANT 2	ANT 0	ANT 1	ANT 2	ANT 0	ANT 1	ANT 2	
Low	-44.37	-47.09	-46.61	13.59	12.47	12.81	-16.41	-17.53	-17.19	Pass
Middle	-44.94	-46.10	-46.60	13.67	11.01	12.71	-16.33	-18.99	-17.29	Pass
High	-44.68	-47.39	-45.93	13.57	13.23	12.58	-16.43	-16.77	-17.42	Pass

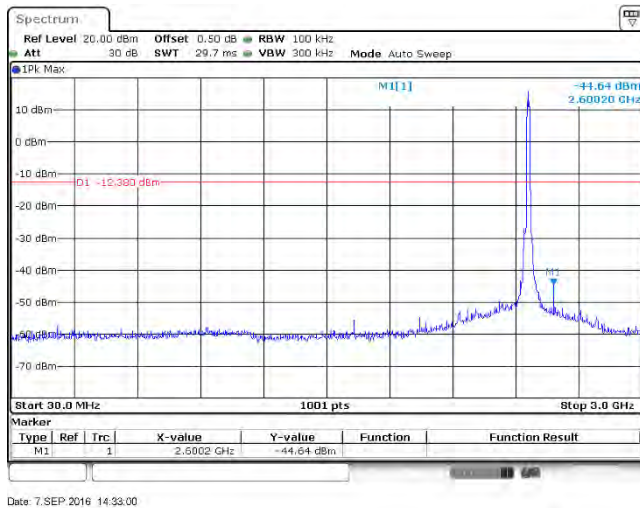
Test Plots

ANT 0

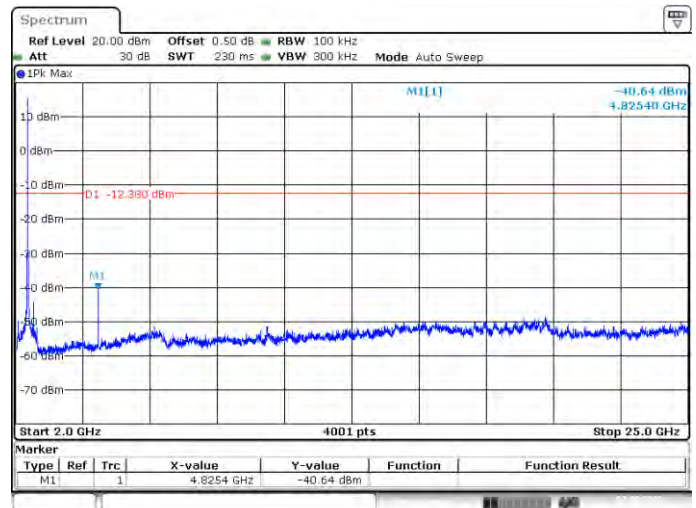
802.11b LOW CHANNEL CARRIER LEVEL



802.11b LOW CHANNEL, SPURIOUS 30 MHz ~ 3 GHz



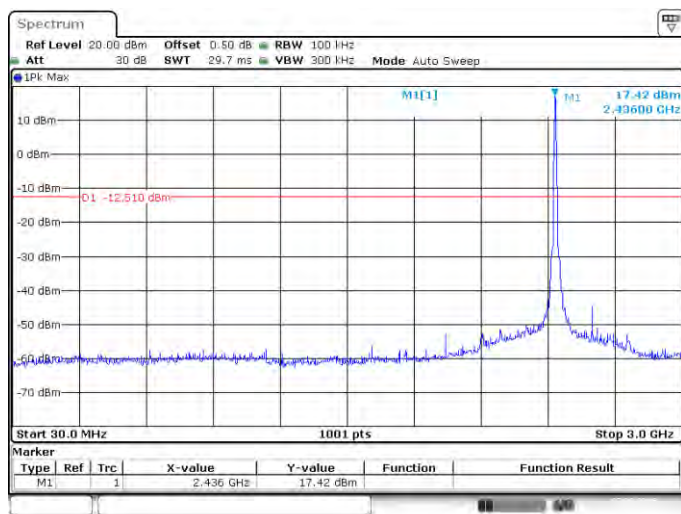
802.11b LOW CHANNEL, SPURIOUS 2 GHz ~ 25 GHz



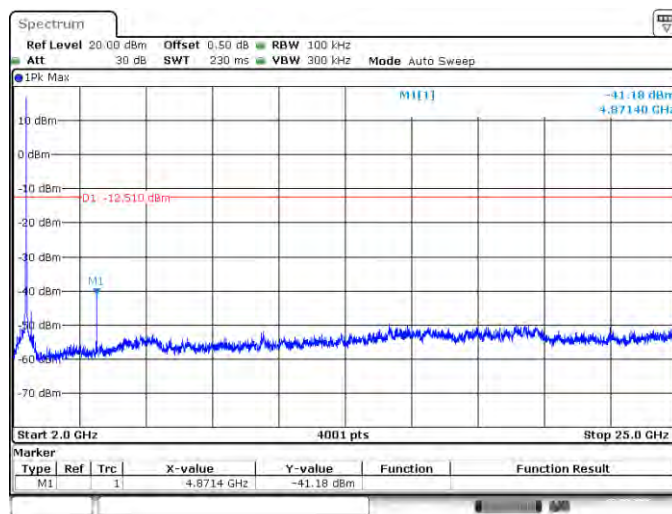
802.11b MIDDLE CHANNEL CARRIER LEVEL



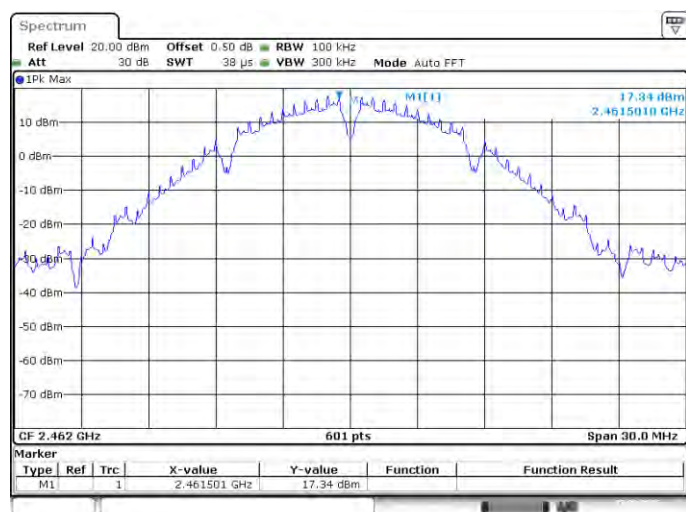
802.11b MIDDLE CHANNEL, SPURIOUS 30 MHz ~ 3 GHz



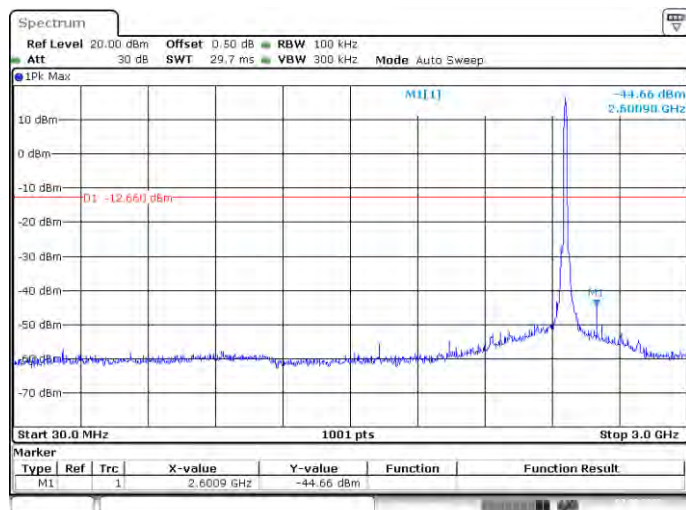
802.11b MIDDLE CHANNEL, SPURIOUS 2 GHz ~ 25 GHz



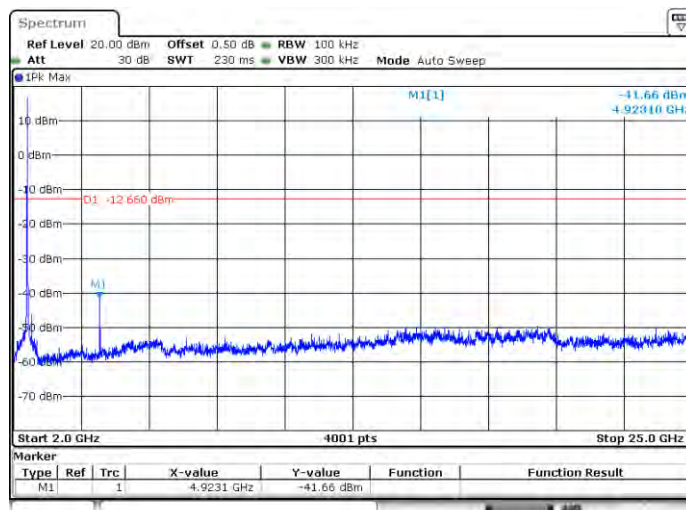
802.11b HIGH CHANNEL CARRIER LEVEL



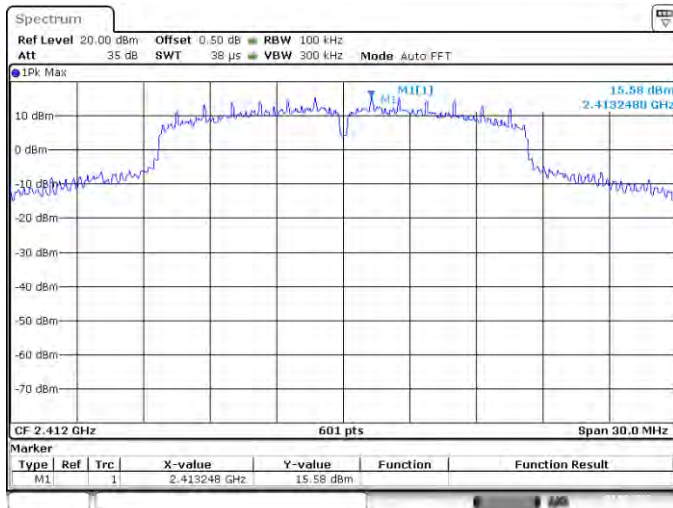
802.11b HIGH CHANNEL, SPURIOUS 30 MHz ~ 3 GHz



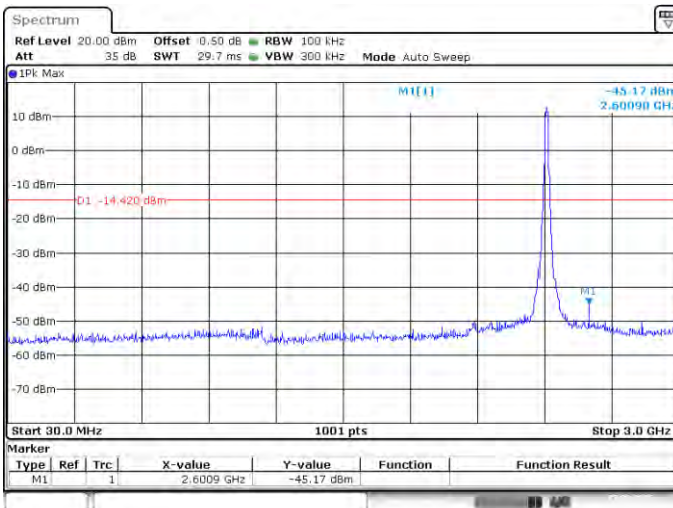
802.11b HIGH CHANNEL, SPURIOUS 2 GHz ~ 25 GHz



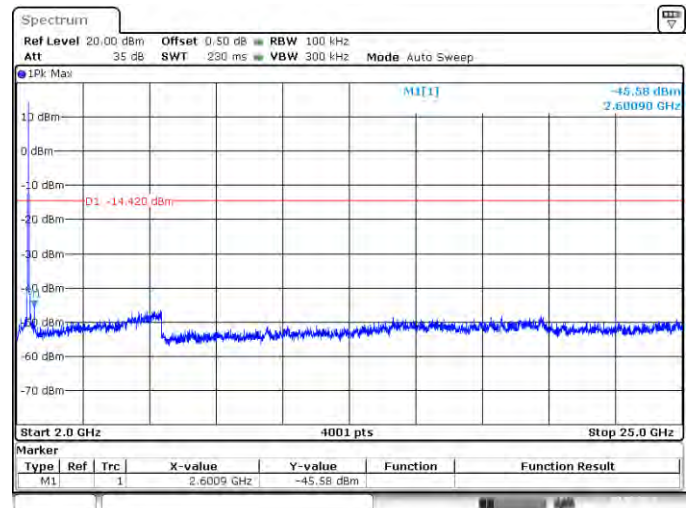
802.11g LOW CHANNEL CARRIER LEVEL



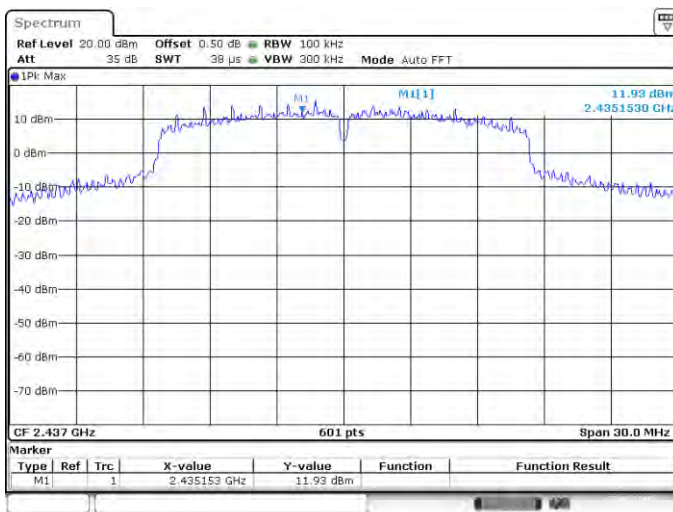
802.11g LOW CHANNEL, SPURIOUS 30 MHz ~ 3 GHz



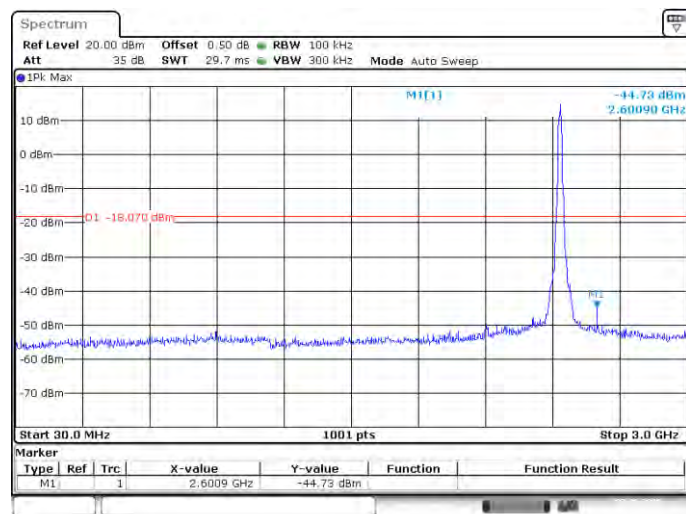
802.11g LOW CHANNEL, SPURIOUS 2 GHz ~ 25 GHz



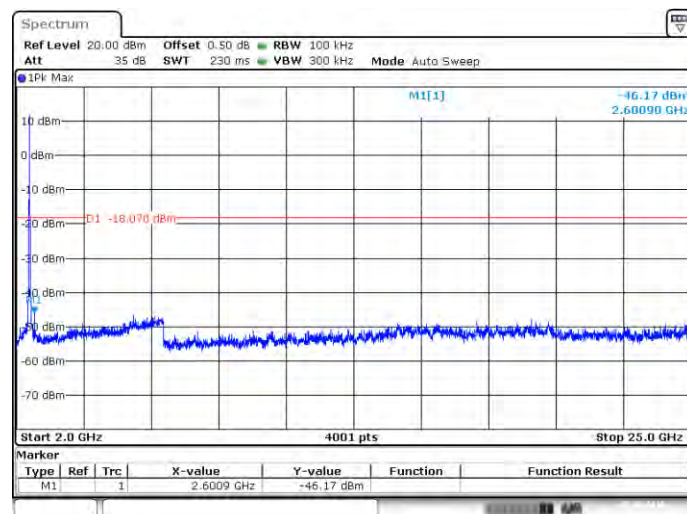
802.11g MIDDLE CHANNEL CARRIER LEVEL



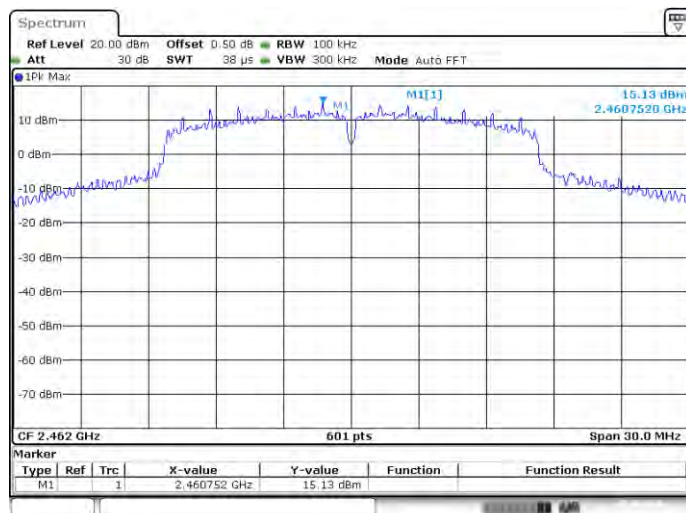
802.11g MIDDLE CHANNEL, SPURIOUS 30 MHz ~ 3 GHz



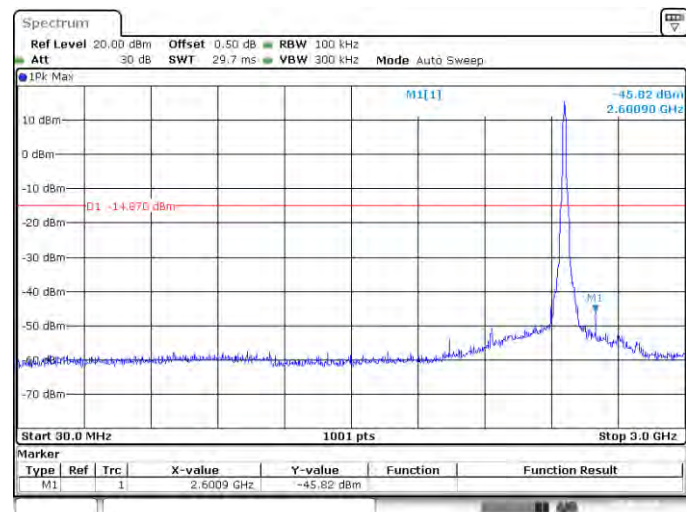
802.11g MIDDLE CHANNEL, SPURIOUS 2 GHz ~ 25 GHz



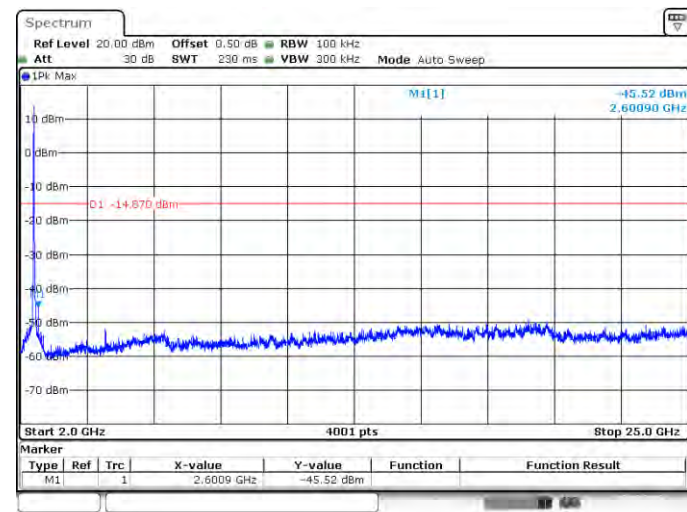
802.11g HIGH CHANNEL CARRIER LEVEL



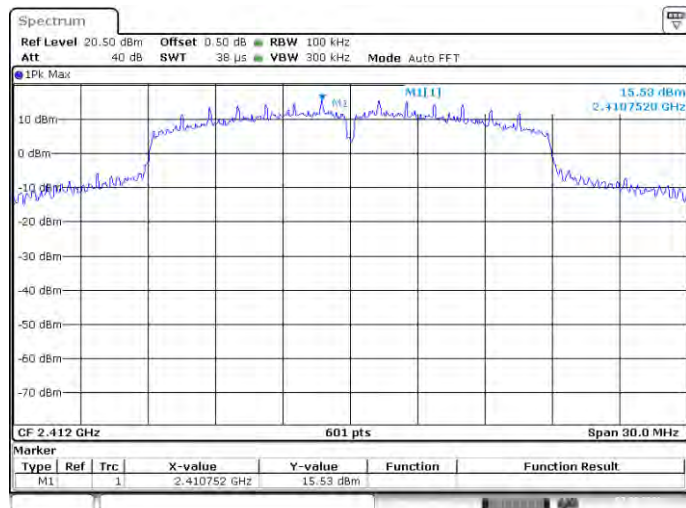
802.11g HIGH CHANNEL, SPURIOUS 30 MHz ~ 3 GHz



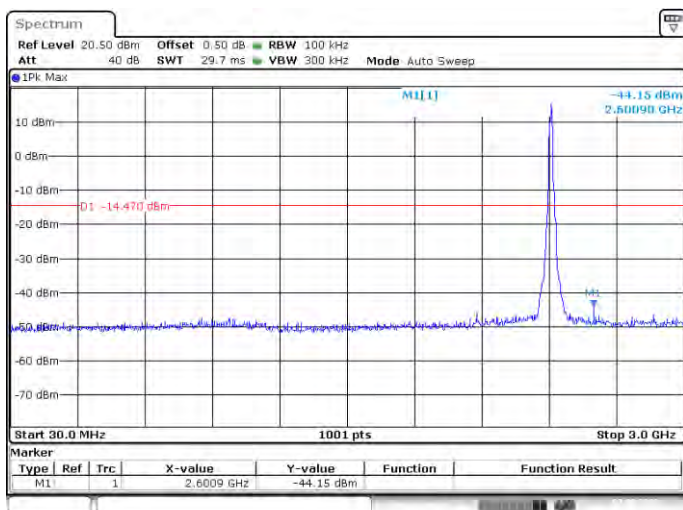
802.11g HIGH CHANNEL, SPURIOUS 2 GHz ~ 25 GHz



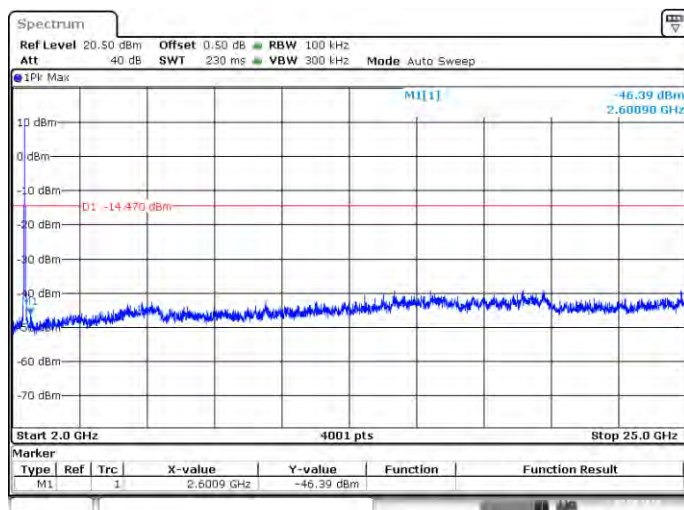
802.11n-20 MHz LOW CHANNEL CARRIER LEVEL



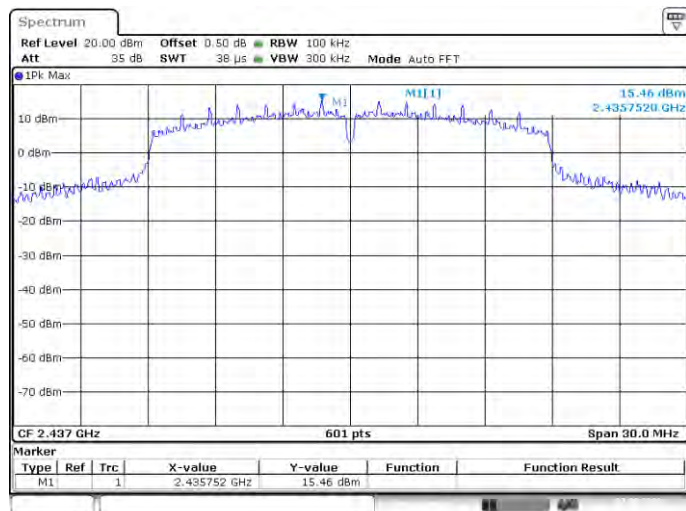
802.11n-20 MHz LOW CHANNEL, SPURIOUS 30 MHz ~ 3 GHz

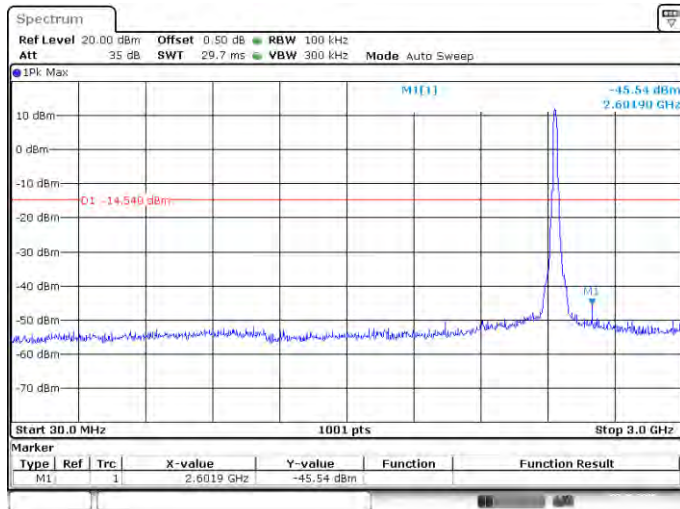
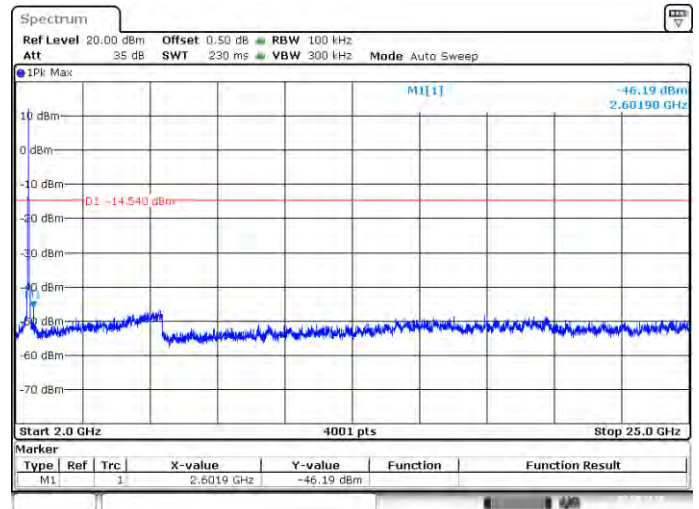


802.11n-20 MHz LOW CHANNEL, SPURIOUS 2 GHz ~ 25 GHz

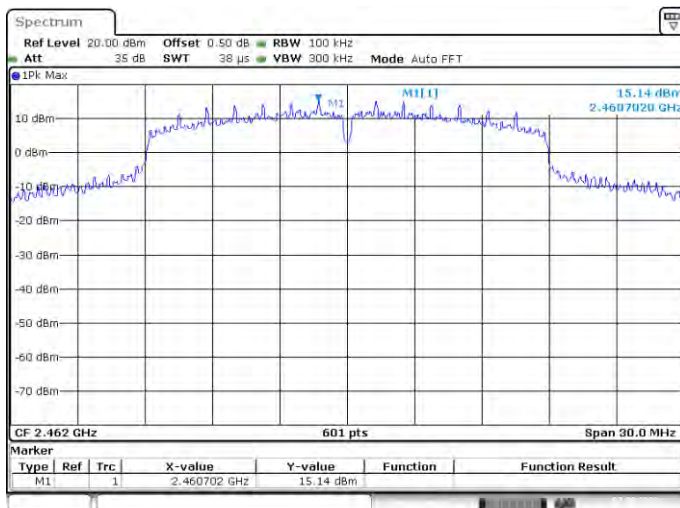
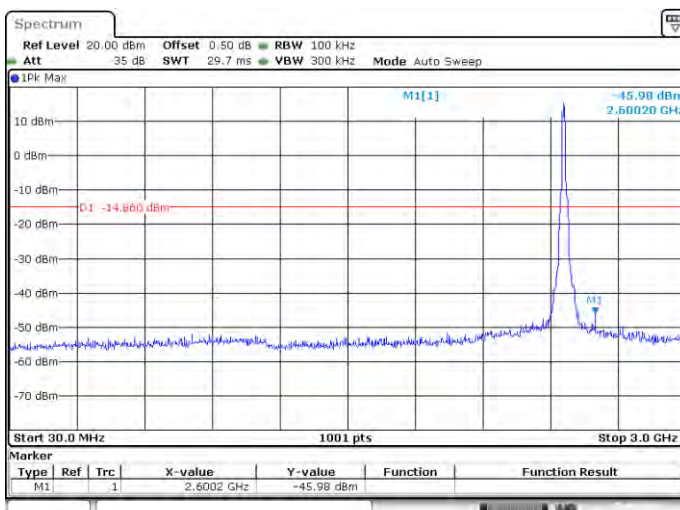
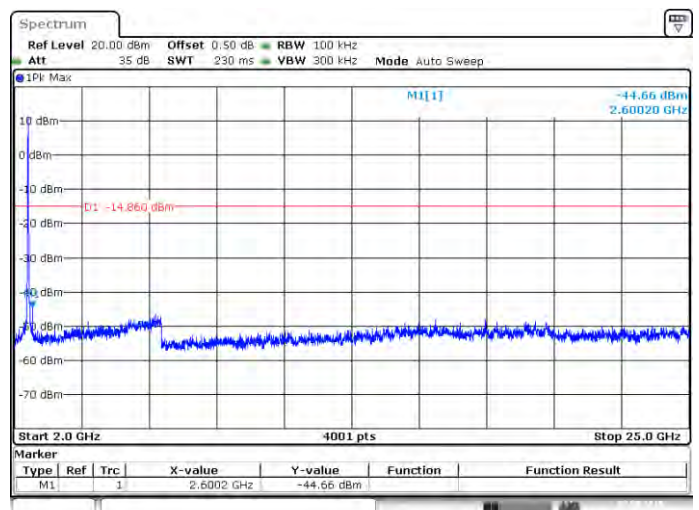


802.11n-20 MHz MIDDLE CHANNEL CARRIER LEVEL

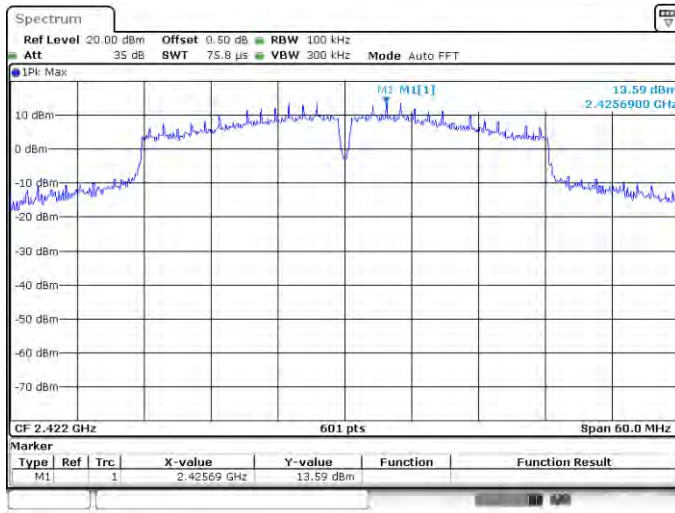


802.11n-20 MHz MIDDLE CHANNEL, SPURIOUS
30 MHz ~ 3 GHz

802.11n-20 MHz MIDDLE CHANNEL, SPURIOUS
2 GHz ~ 25 GHz


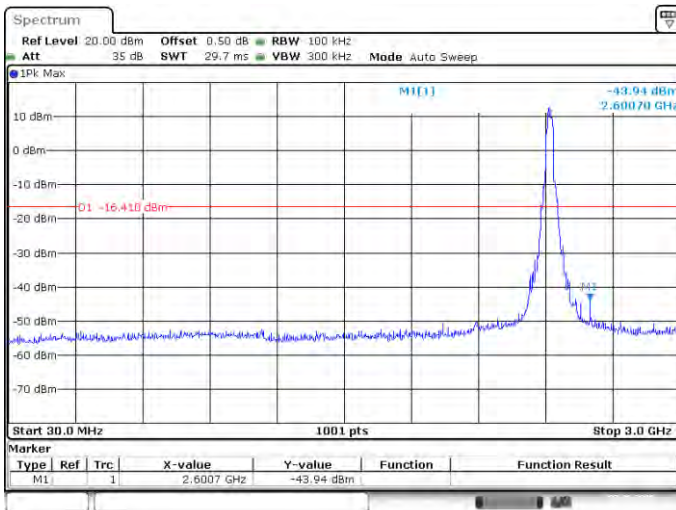
802.11n-20 MHz HIGH CHANNEL CARRIER LEVEL


802.11n-20 MHz HIGH CHANNEL, SPURIOUS
30 MHz ~ 3 GHz

802.11n-20 MHz HIGH CHANNEL, SPURIOUS
2 GHz ~ 25 GHz


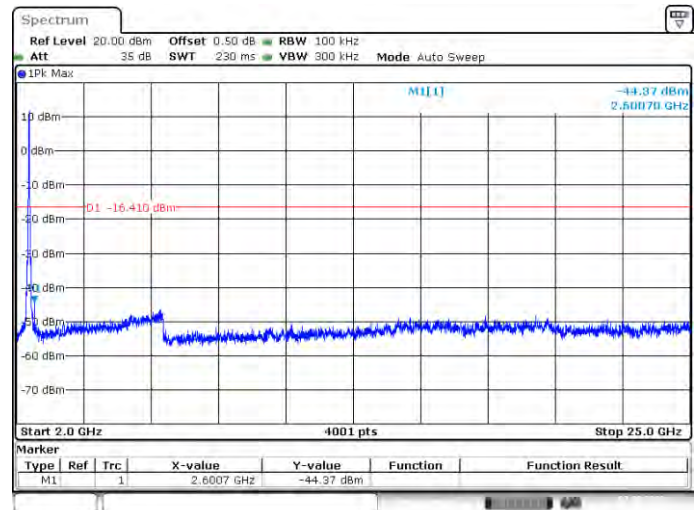
802.11n-40 LOW CHANNEL CARRIER LEVEL



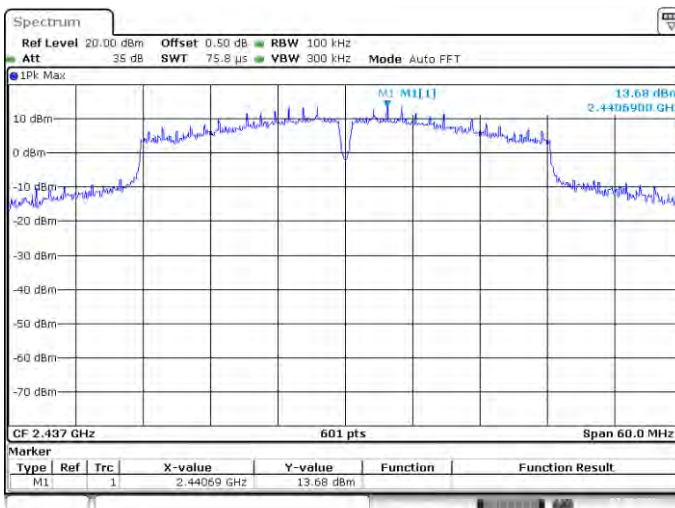
802.11n-40 LOW CHANNEL, SPURIOUS 30 MHz ~ 3 GHz

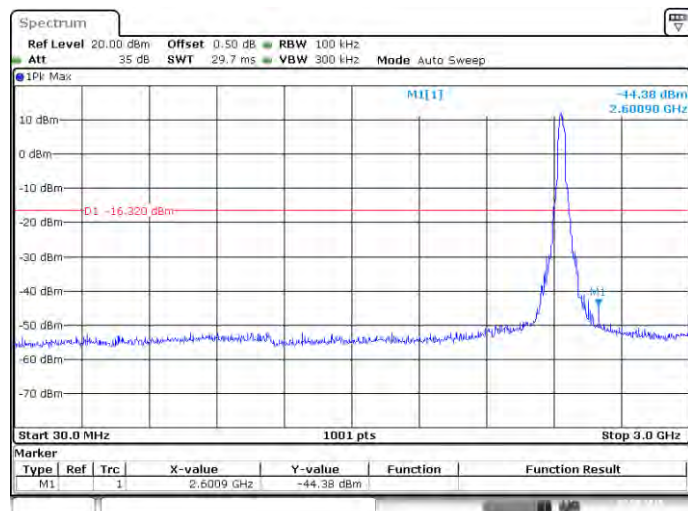
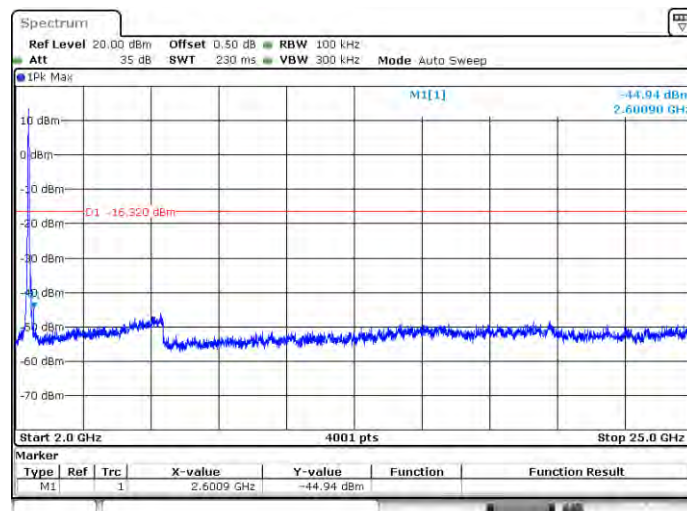


802.11n-40 LOW CHANNEL, SPURIOUS 2 GHz ~ 25 GHz

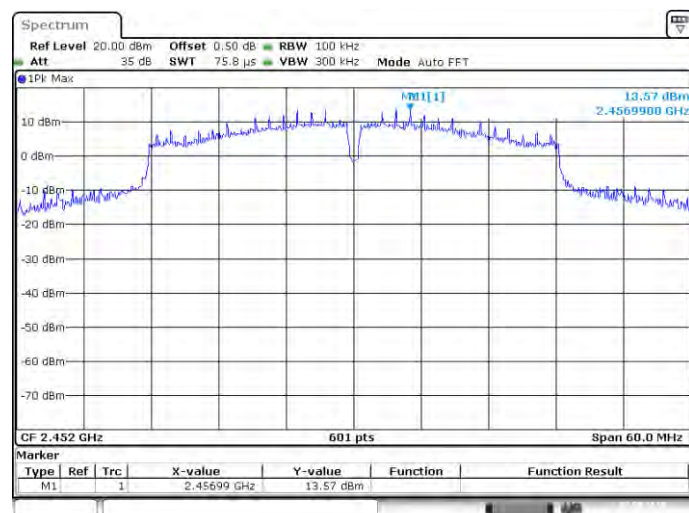
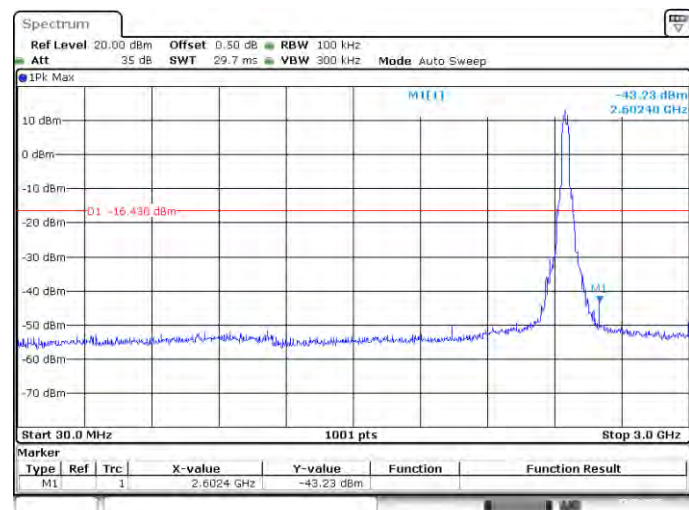
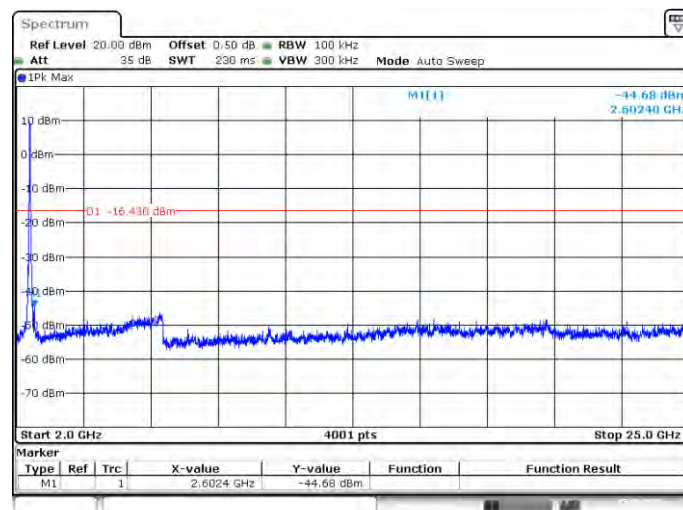


802.11n-40 MIDDLE CHANNEL CARRIER LEVEL



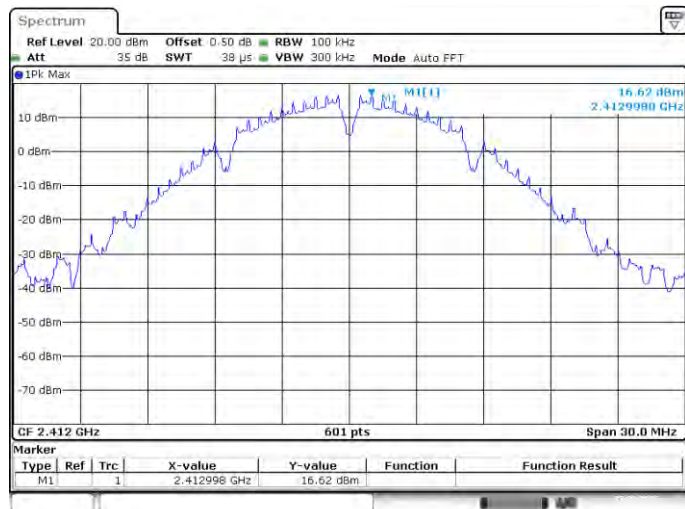
802.11n-40 MIDDLE CHANNEL, SPURIOUS
30 MHz ~ 3 GHz

802.11n-40 MIDDLE CHANNEL, SPURIOUS
2 GHz ~ 25 GHz


802.11n-40 HIGH CHANNEL CARRIER LEVEL

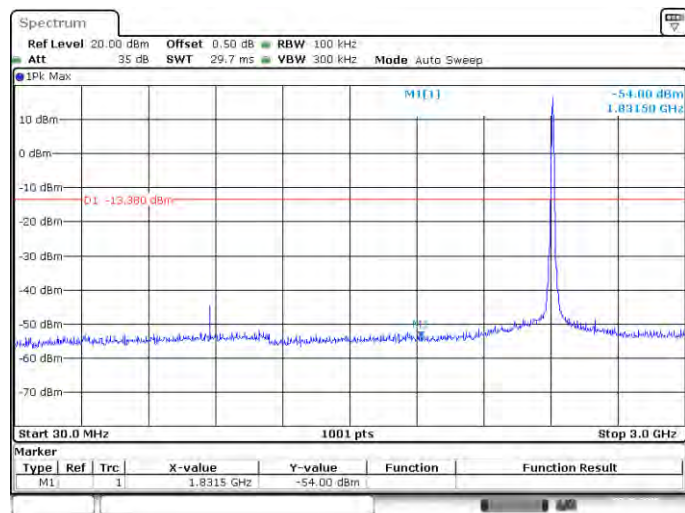

802.11n-40 HIGH CHANNEL, SPURIOUS
30 MHz ~ 3 GHz

802.11-40 HIGH CHANNEL, SPURIOUS
2 GHz ~ 25 GHz


ANT 1

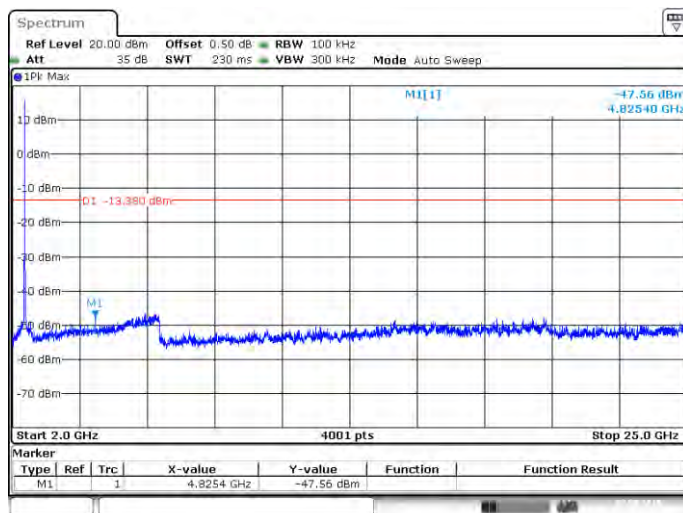
802.11b LOW CHANNEL CARRIER LEVEL



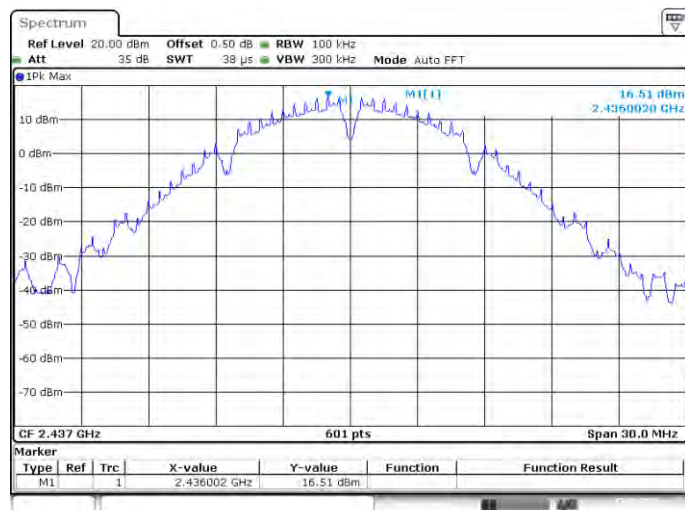
802.11b LOW CHANNEL, SPURIOUS 30 MHz ~ 3 GHz

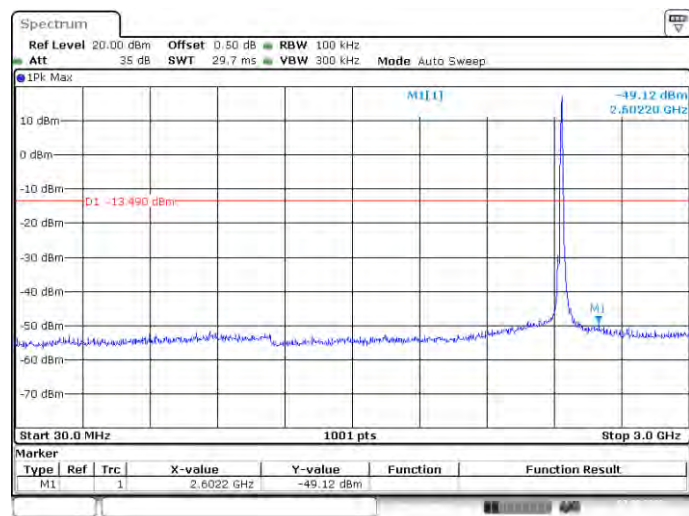
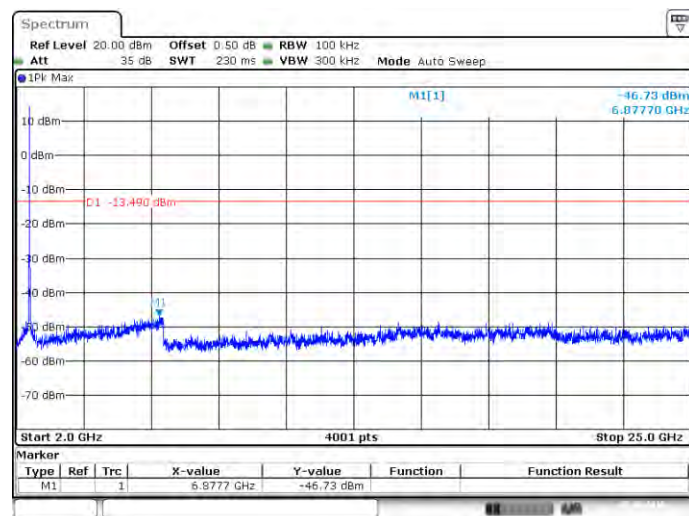


802.11b LOW CHANNEL, SPURIOUS 2 GHz ~ 25 GHz

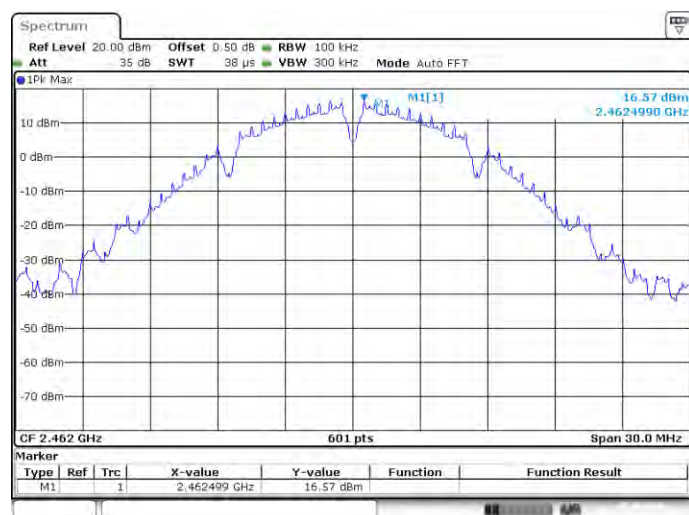
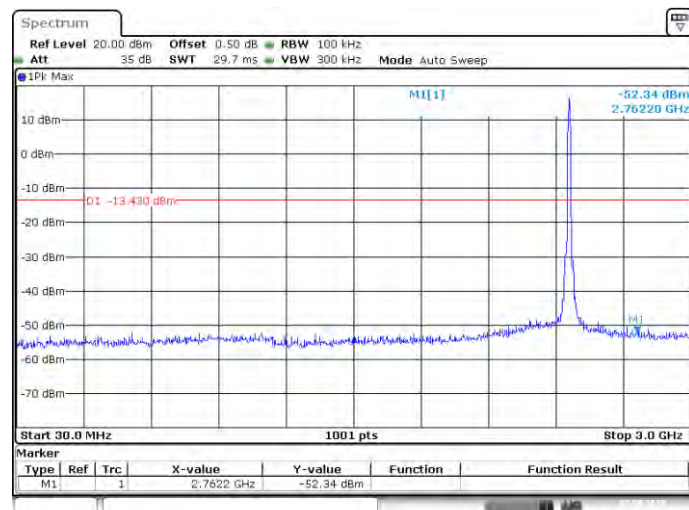
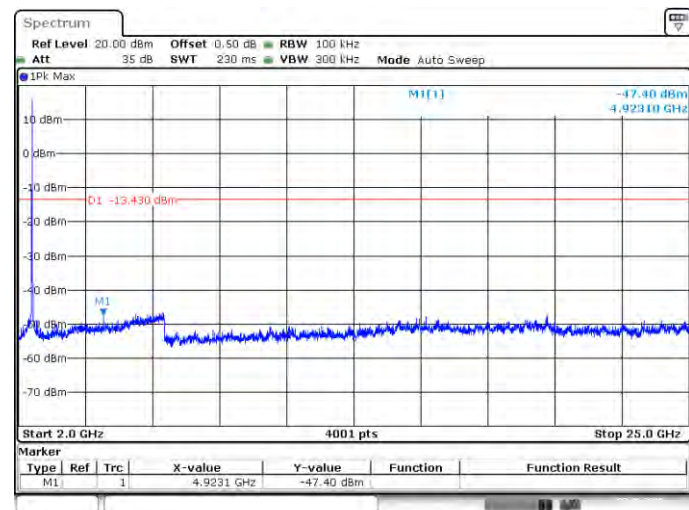


802.11b MIDDLE CHANNEL CARRIER LEVEL

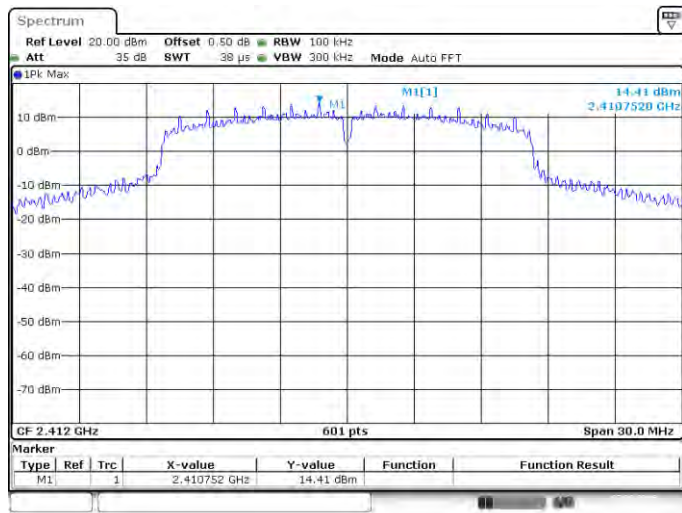


802.11b MIDDLE CHANNEL, SPURIOUS
30 MHz ~ 3 GHz

802.11b MIDDLE CHANNEL, SPURIOUS
2 GHz ~ 25 GHz


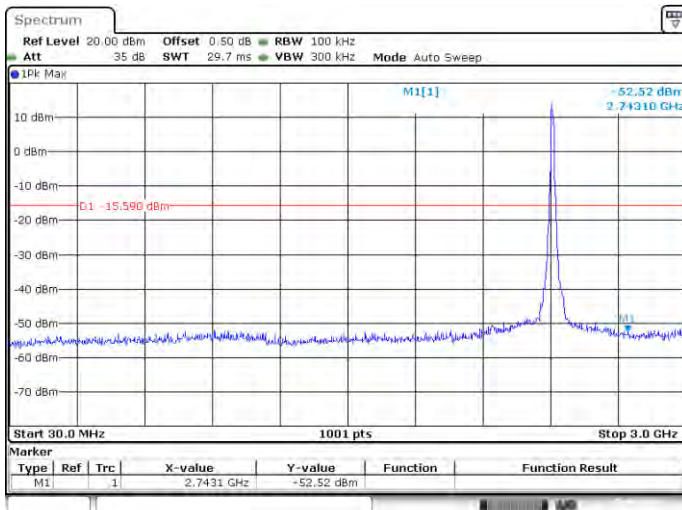
802.11b HIGH CHANNEL CARRIER LEVEL


802.11b HIGH CHANNEL, SPURIOUS
30 MHz ~ 3 GHz

802.11b HIGH CHANNEL, SPURIOUS
2 GHz ~ 25 GHz


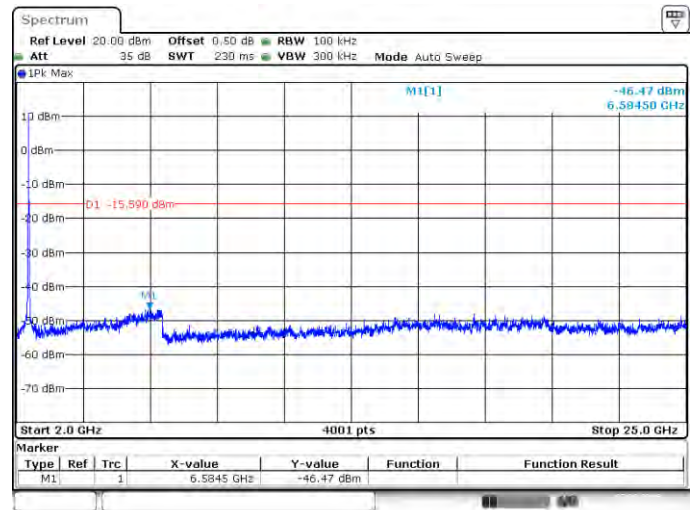
802.11g LOW CHANNEL CARRIER LEVEL



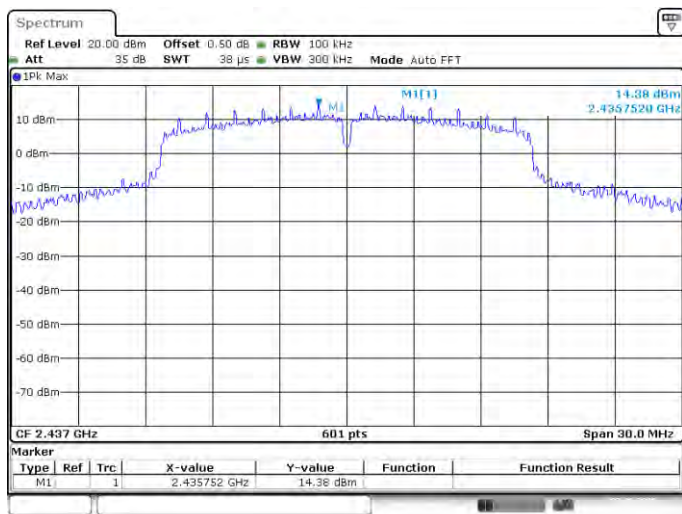
802.11g LOW CHANNEL, SPURIOUS 30 MHz ~ 3 GHz



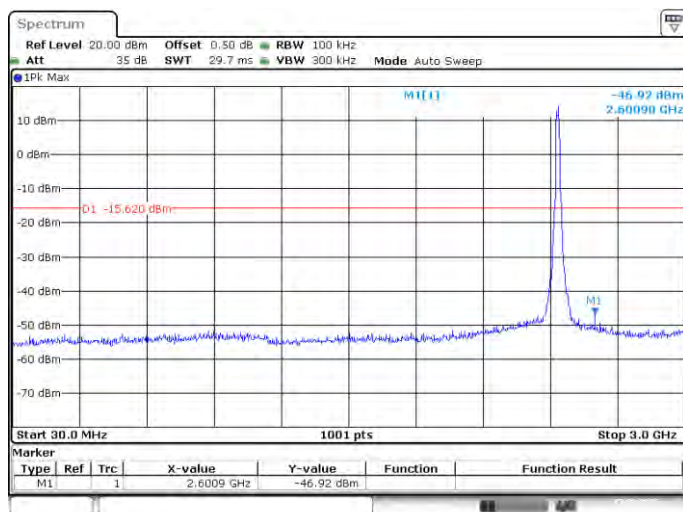
802.11g LOW CHANNEL, SPURIOUS 2 GHz ~ 25 GHz



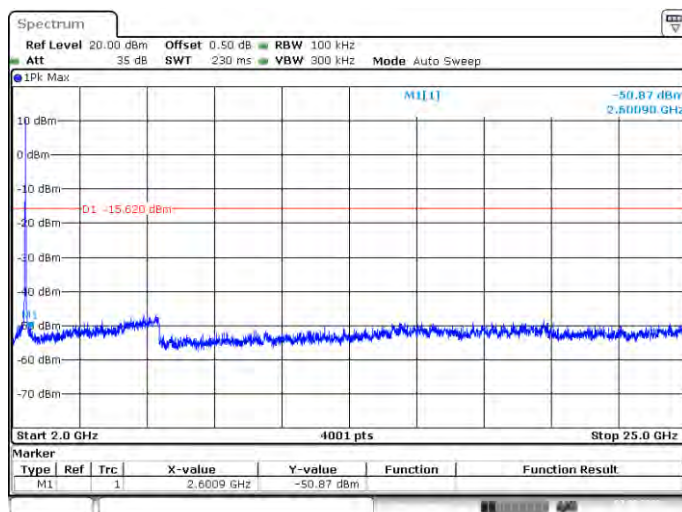
802.11g MIDDLE CHANNEL CARRIER LEVEL



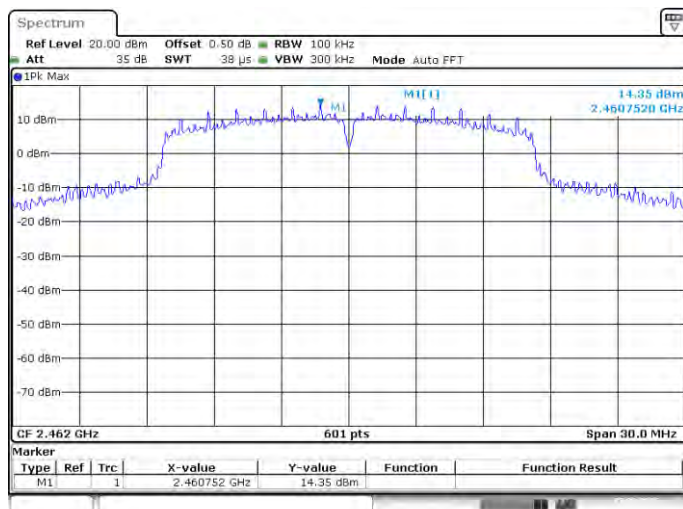
802.11g MIDDLE CHANNEL, SPURIOUS 30 MHz ~ 3 GHz



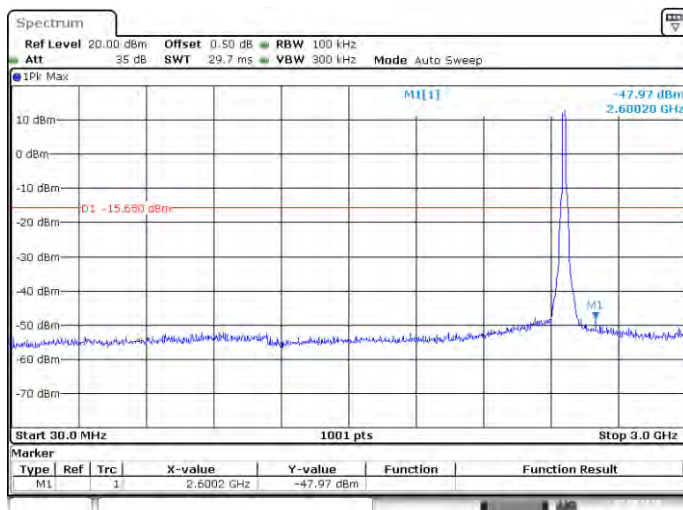
802.11g MIDDLE CHANNEL, SPURIOUS 2 GHz ~ 25 GHz



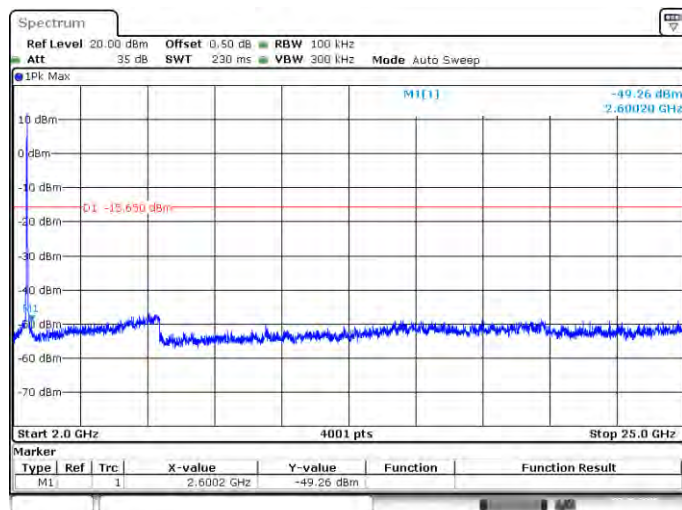
802.11g HIGH CHANNEL CARRIER LEVEL



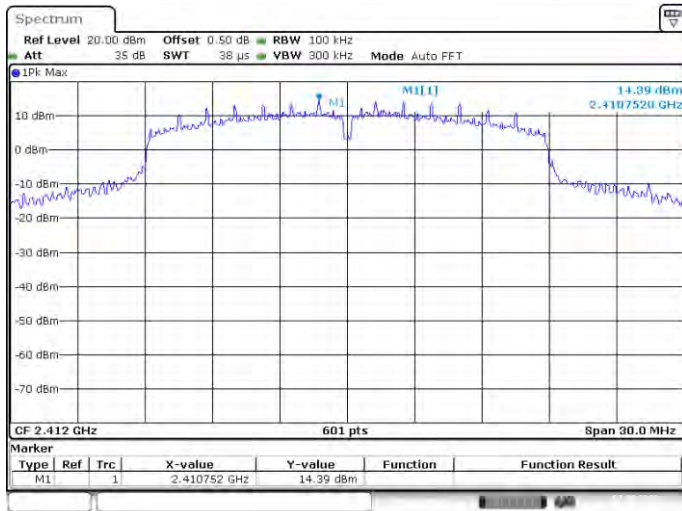
802.11g HIGH CHANNEL, SPURIOUS 30 MHz ~ 3 GHz



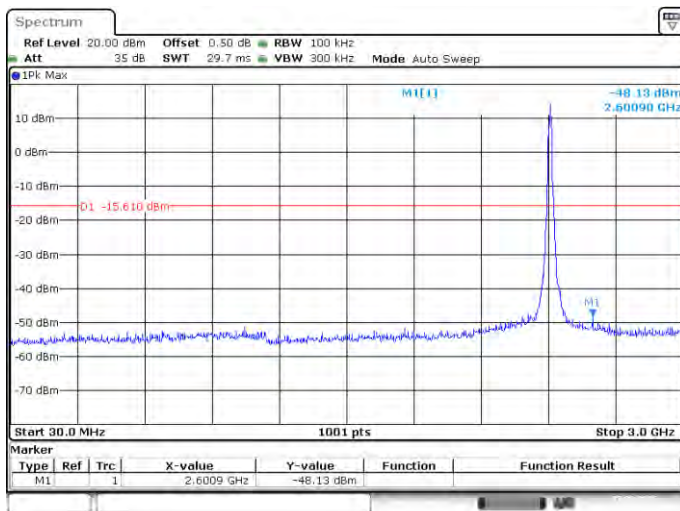
802.11g HIGH CHANNEL, SPURIOUS 2 GHz ~ 25 GHz



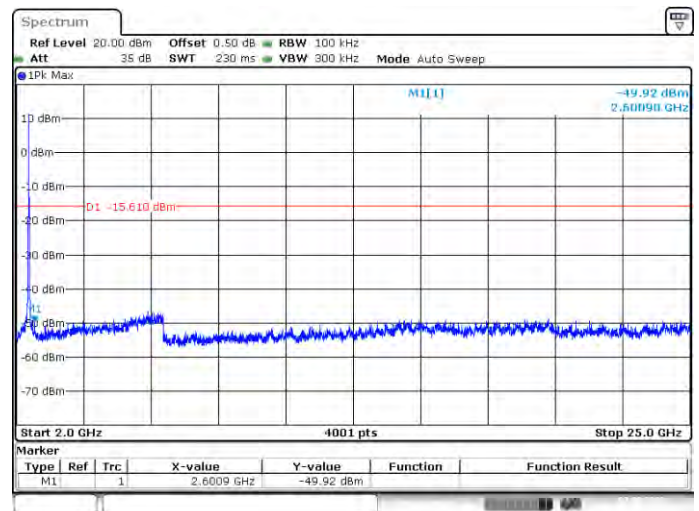
802.11n-20 MHz LOW CHANNEL CARRIER LEVEL



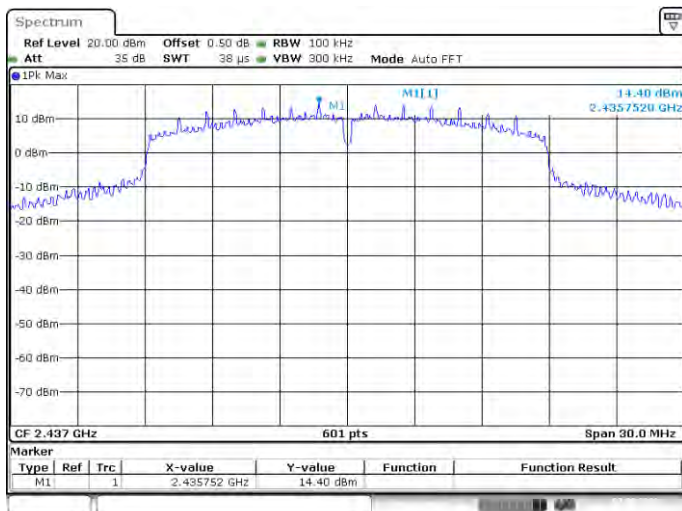
802.11n-20 MHz LOW CHANNEL, SPURIOUS 30 MHz ~ 3 GHz

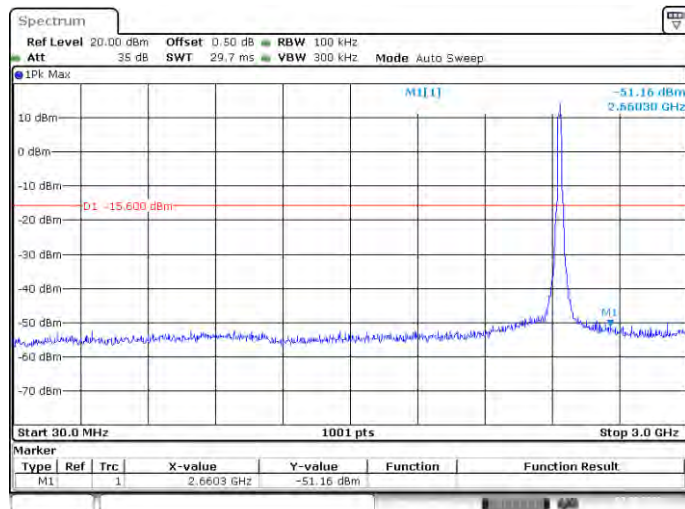
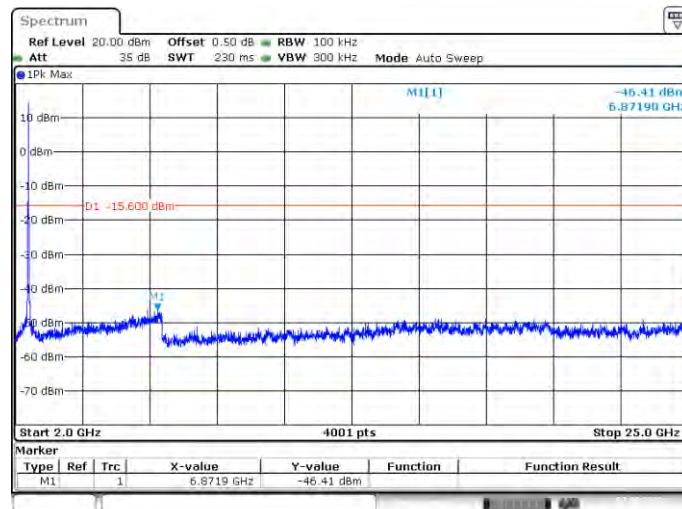


802.11n-20 MHz LOW CHANNEL, SPURIOUS 2 GHz ~ 25 GHz

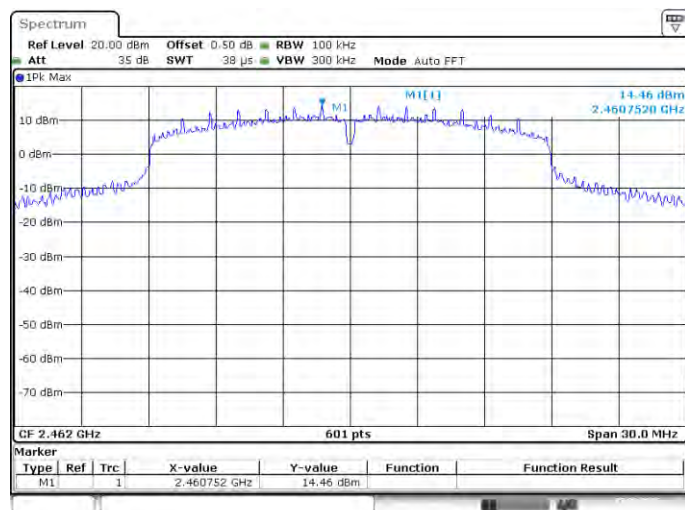
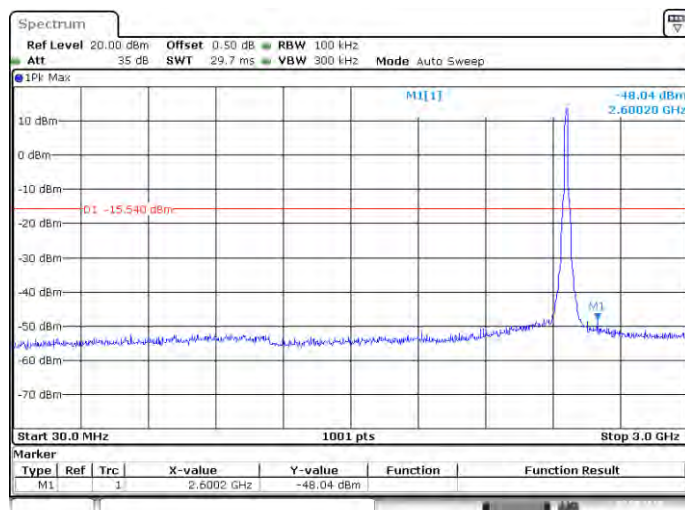
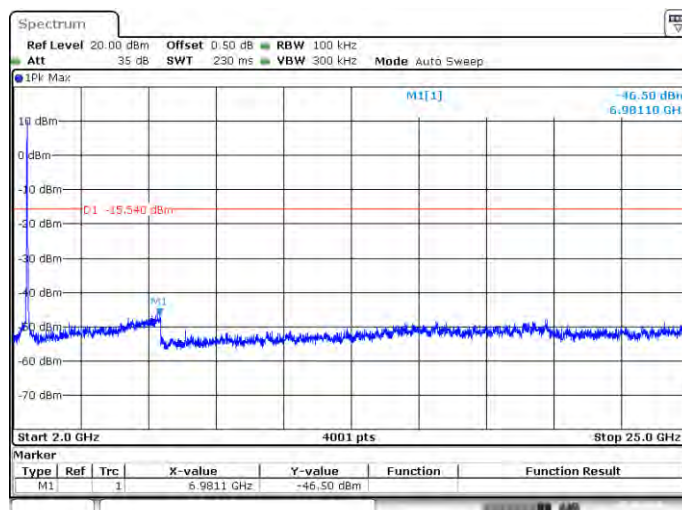


802.11n-20 MHz MIDDLE CHANNEL CARRIER LEVEL

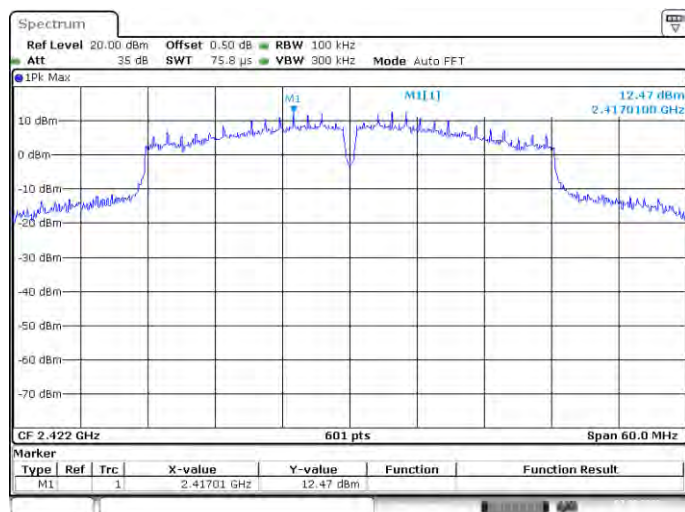


802.11n-20 MHz MIDDLE CHANNEL, SPURIOUS
30 MHz ~ 3 GHz

802.11n-20 MHz MIDDLE CHANNEL, SPURIOUS
2 GHz ~ 25 GHz


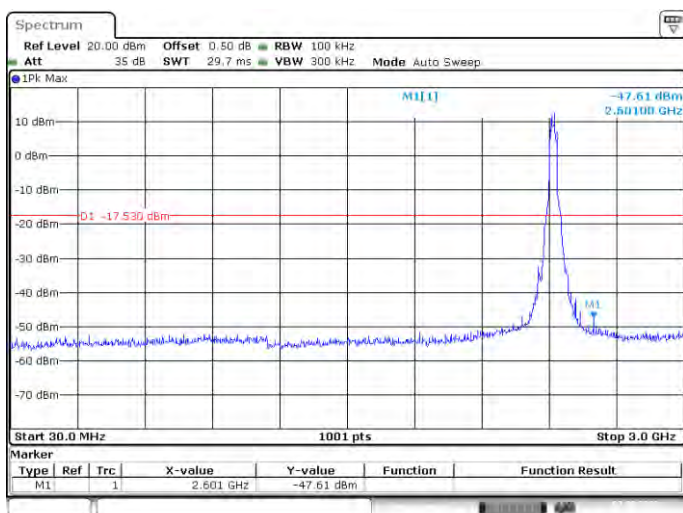
802.11n-20 MHz HIGH CHANNEL CARRIER LEVEL


802.11n-20 MHz HIGH CHANNEL, SPURIOUS
30 MHz ~ 3 GHz

802.11n-20 MHz HIGH CHANNEL, SPURIOUS
2 GHz ~ 25 GHz


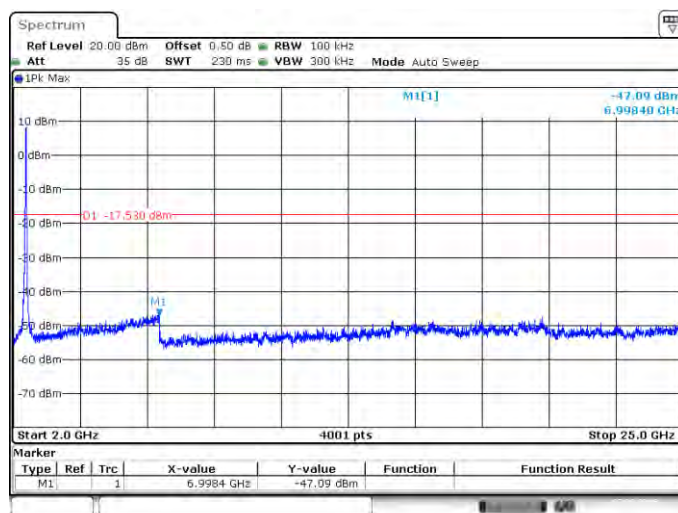
802.11n-40 LOW CHANNEL CARRIER LEVEL



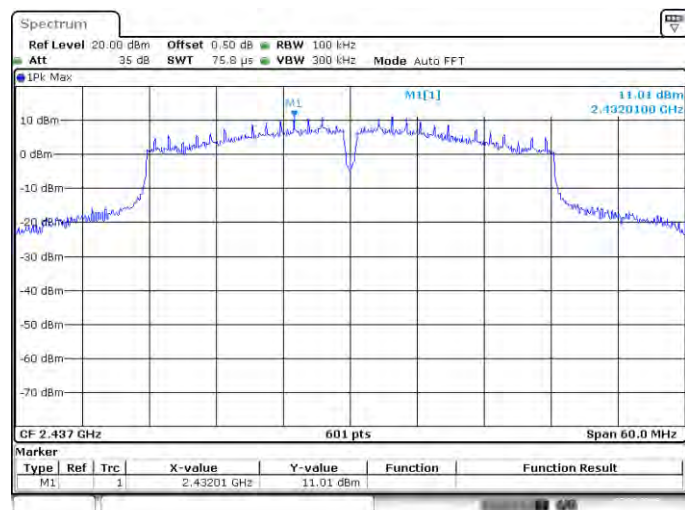
802.11n-40 LOW CHANNEL, SPURIOUS 30 MHz ~ 3 GHz

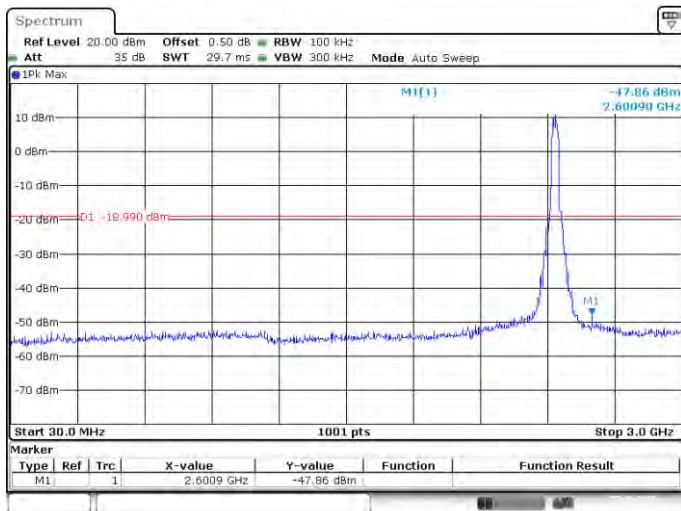
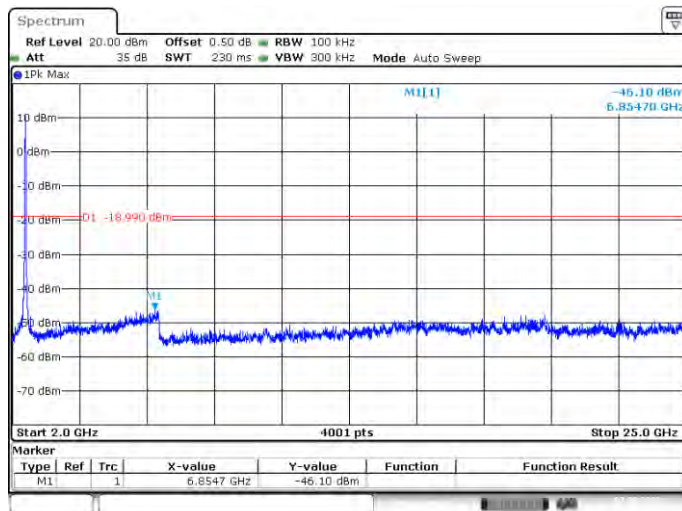


802.11n-40 LOW CHANNEL, SPURIOUS 2 GHz ~ 25 GHz

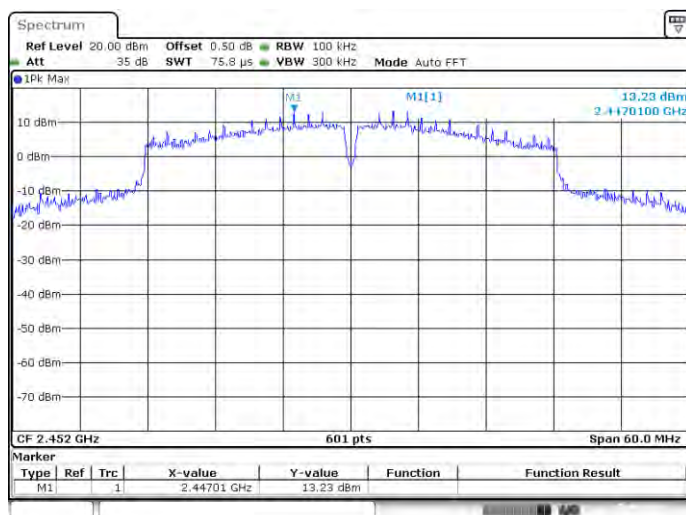
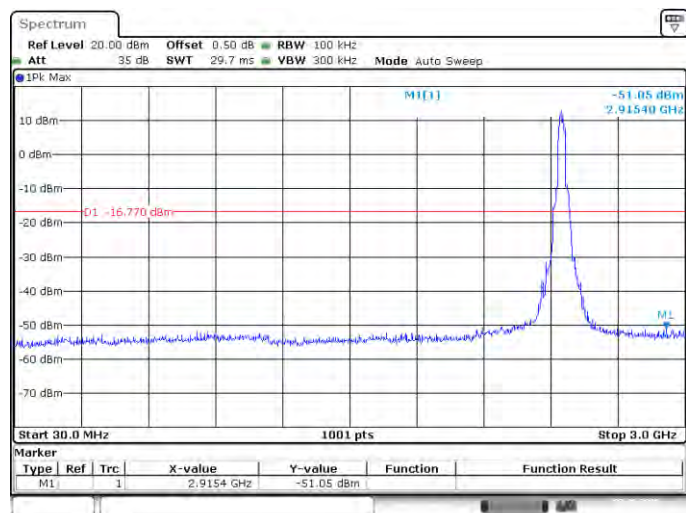
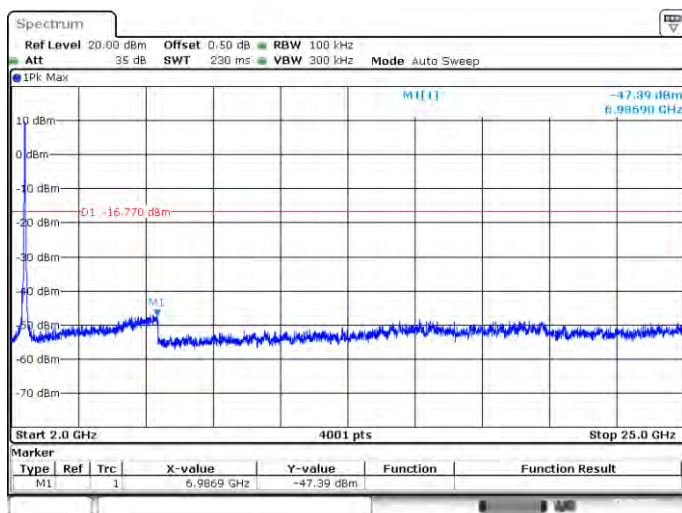


802.11n-40 MIDDLE CHANNEL CARRIER LEVEL



802.11n-40 MIDDLE CHANNEL, SPURIOUS
30 MHz ~ 3 GHz

802.11n-40 MIDDLE CHANNEL, SPURIOUS
2 GHz ~ 25 GHz


802.11n-40 HIGH CHANNEL CARRIER LEVEL

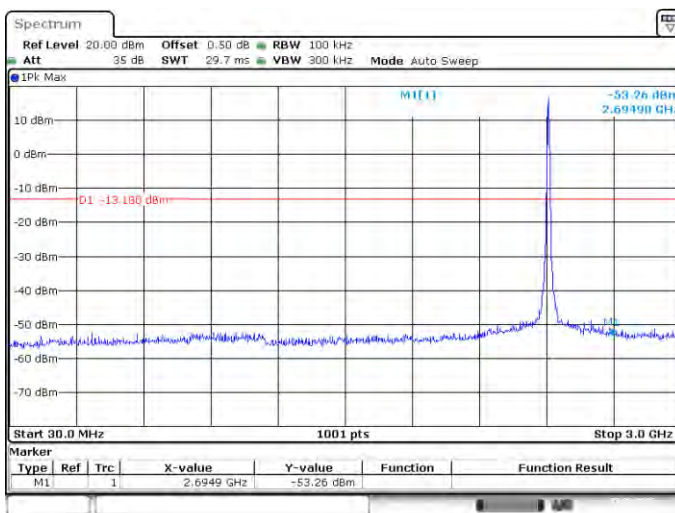

802.11n-40 HIGH CHANNEL, SPURIOUS
30 MHz ~ 3 GHz

802.11-40 HIGH CHANNEL, SPURIOUS
2 GHz ~ 25 GHz


ANT 2

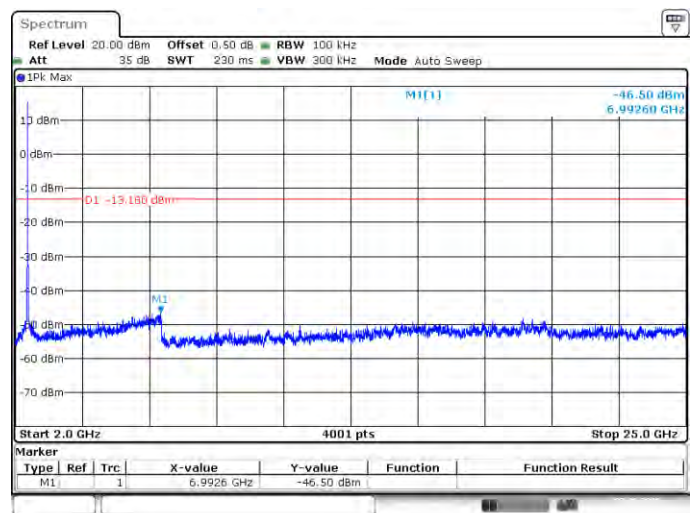
802.11b LOW CHANNEL CARRIER LEVEL



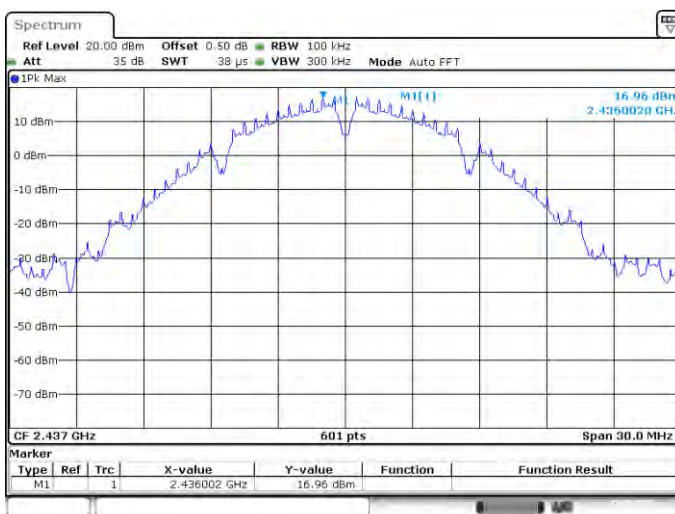
802.11b LOW CHANNEL, SPURIOUS 30 MHz ~ 3 GHz

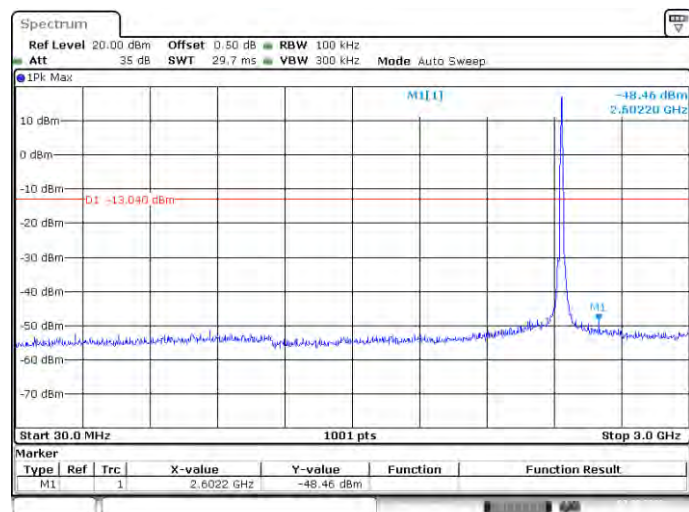
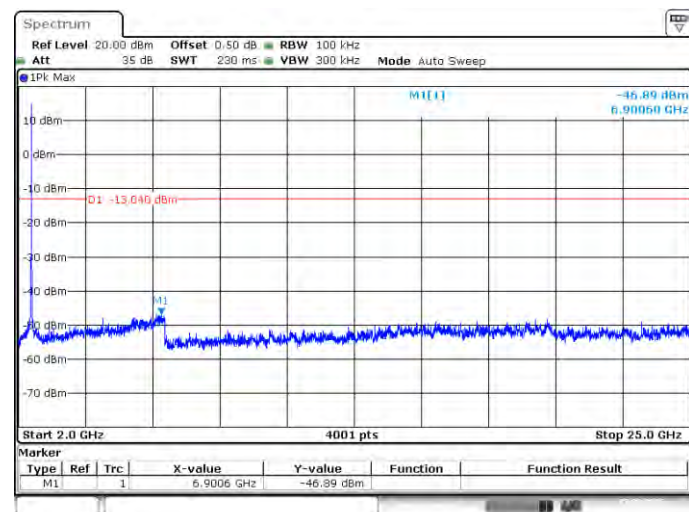


802.11b LOW CHANNEL, SPURIOUS 2 GHz ~ 25 GHz

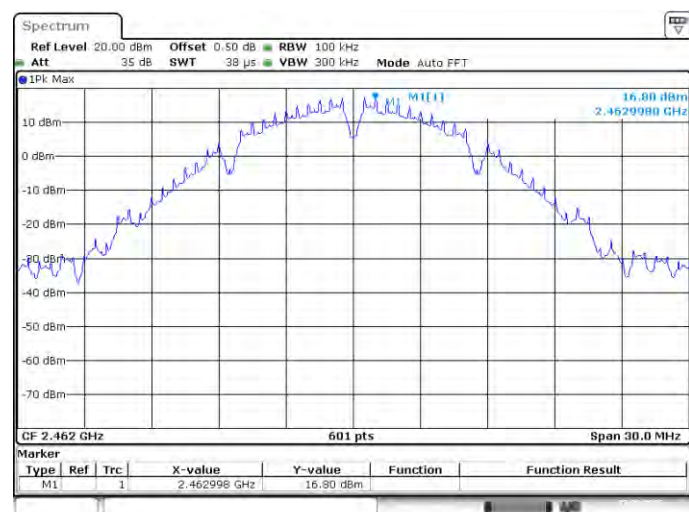
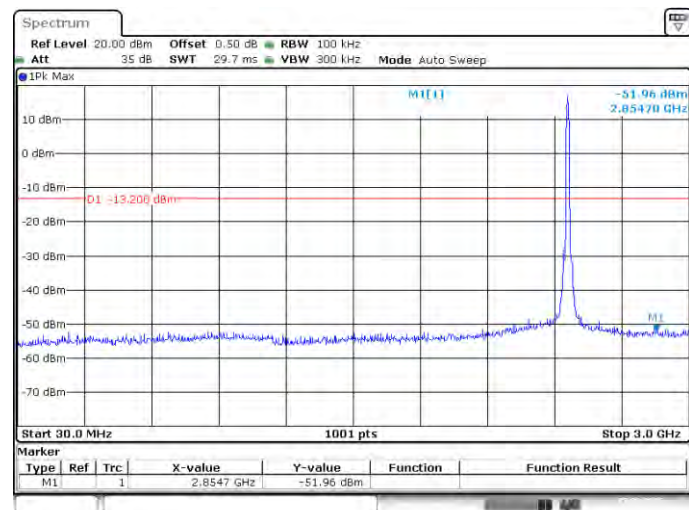
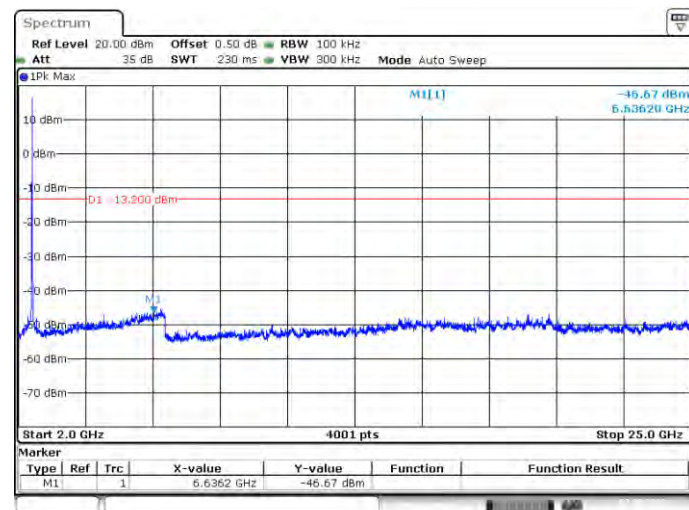


802.11b MIDDLE CHANNEL CARRIER LEVEL

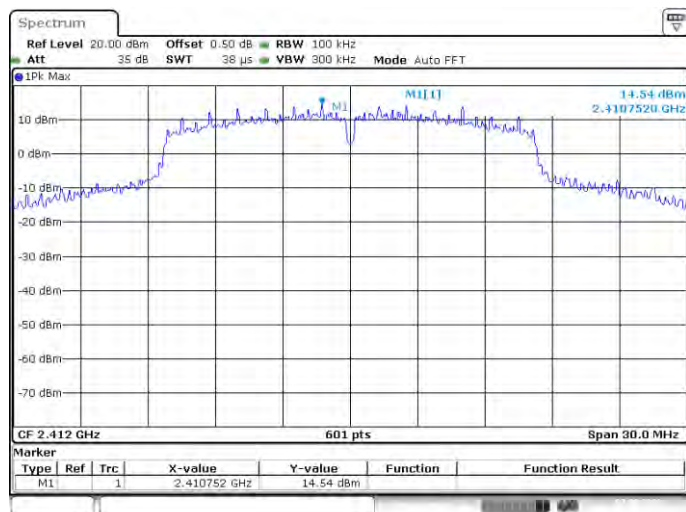


802.11b MIDDLE CHANNEL, SPURIOUS
30 MHz ~ 3 GHz

802.11b MIDDLE CHANNEL, SPURIOUS
2 GHz ~ 25 GHz


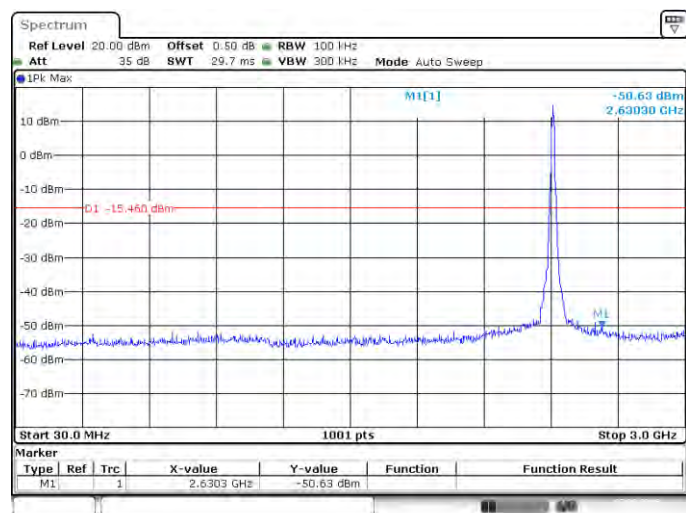
802.11b HIGH CHANNEL CARRIER LEVEL


802.11b HIGH CHANNEL, SPURIOUS
30 MHz ~ 3 GHz

802.11b HIGH CHANNEL, SPURIOUS
2 GHz ~ 25 GHz


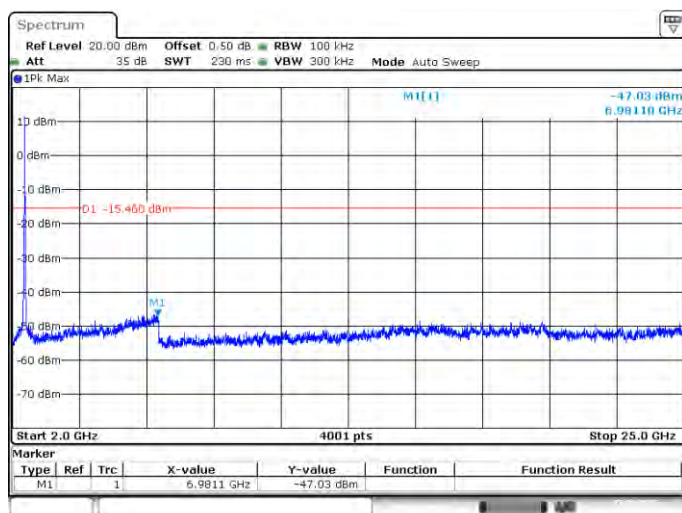
802.11g LOW CHANNEL CARRIER LEVEL



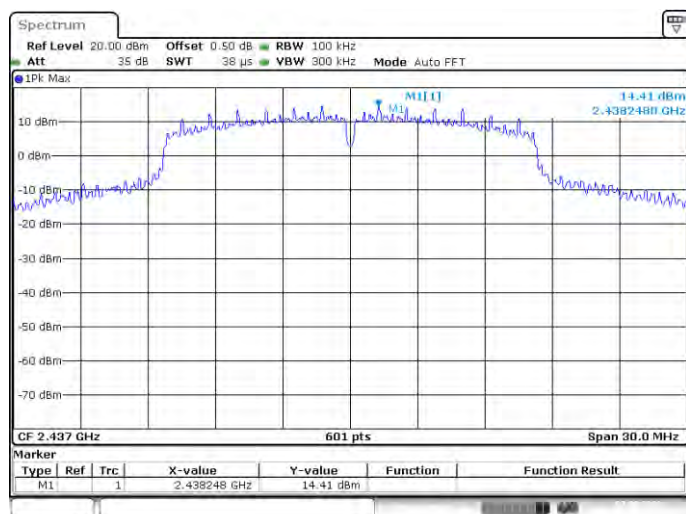
802.11g LOW CHANNEL, SPURIOUS 30 MHz ~ 3 GHz



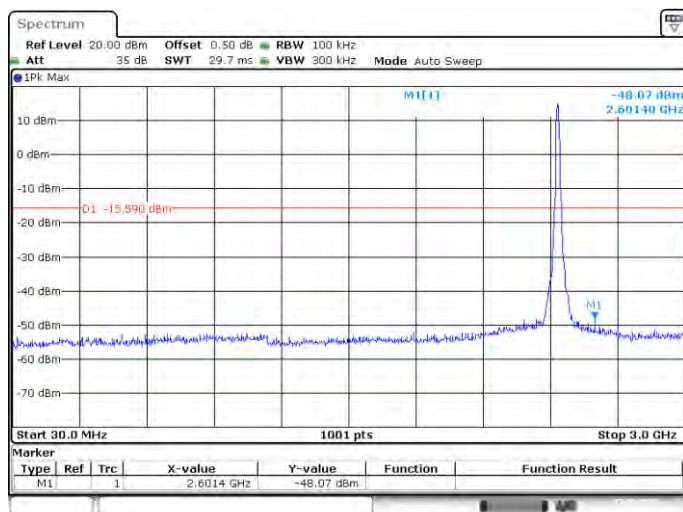
802.11g LOW CHANNEL, SPURIOUS 2 GHz ~ 25 GHz



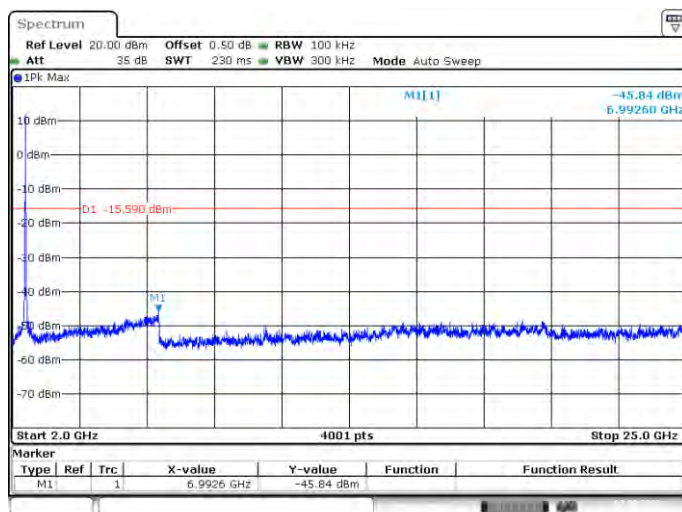
802.11g MIDDLE CHANNEL CARRIER LEVEL



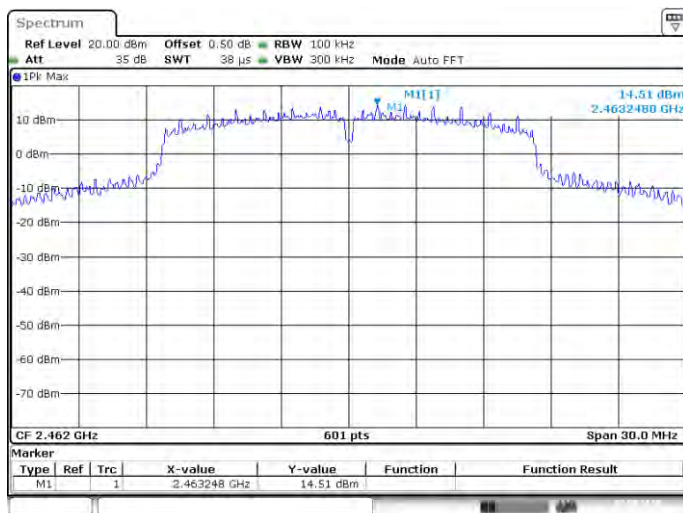
802.11g MIDDLE CHANNEL, SPURIOUS 30 MHz ~ 3 GHz



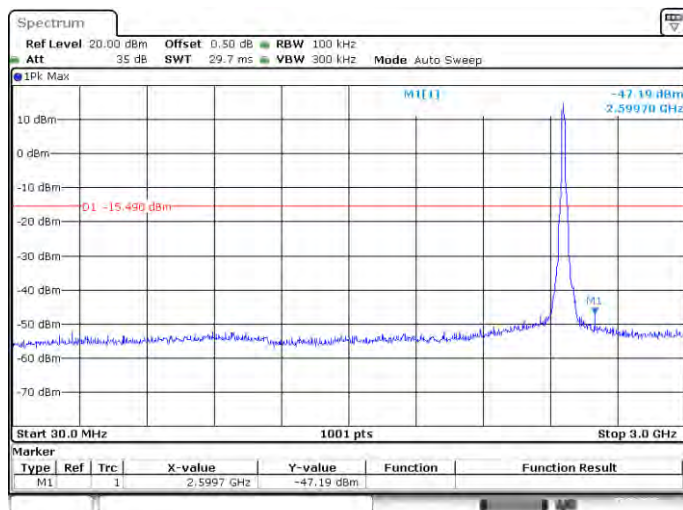
802.11g MIDDLE CHANNEL, SPURIOUS 2 GHz ~ 25 GHz



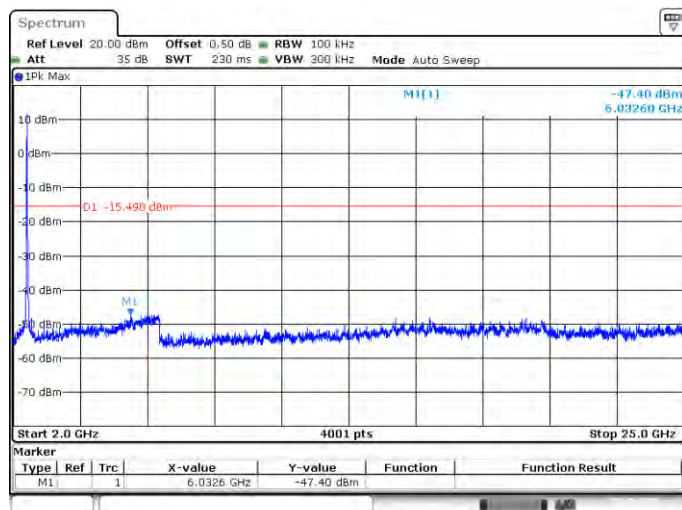
802.11g HIGH CHANNEL CARRIER LEVEL



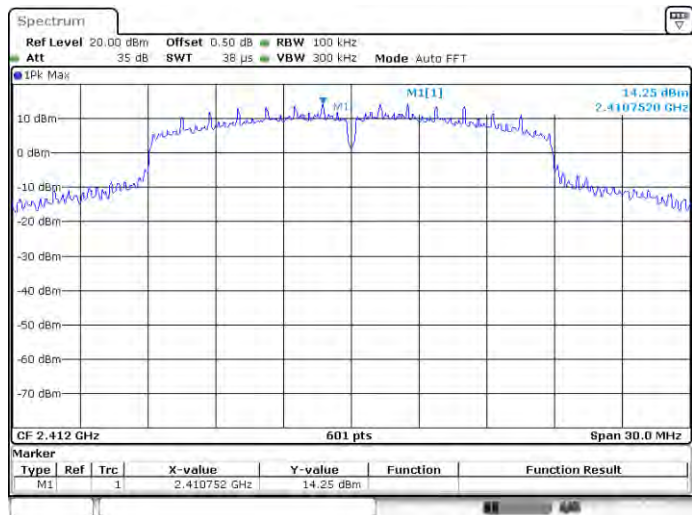
802.11g HIGH CHANNEL, SPURIOUS 30 MHz ~ 3 GHz



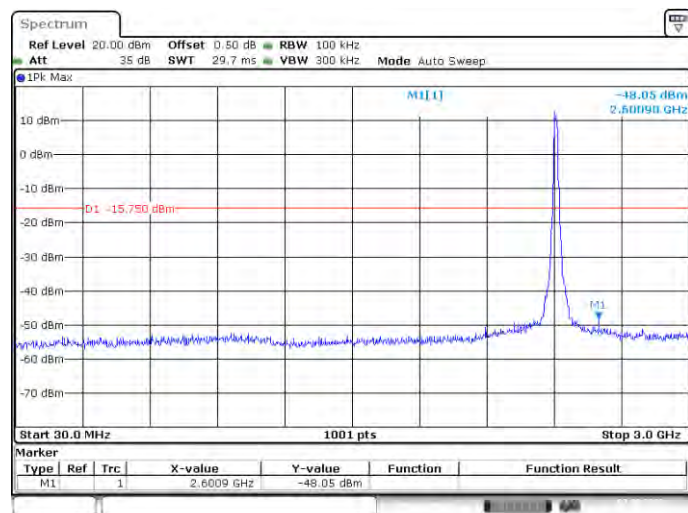
802.11g HIGH CHANNEL, SPURIOUS 2 GHz ~ 25 GHz



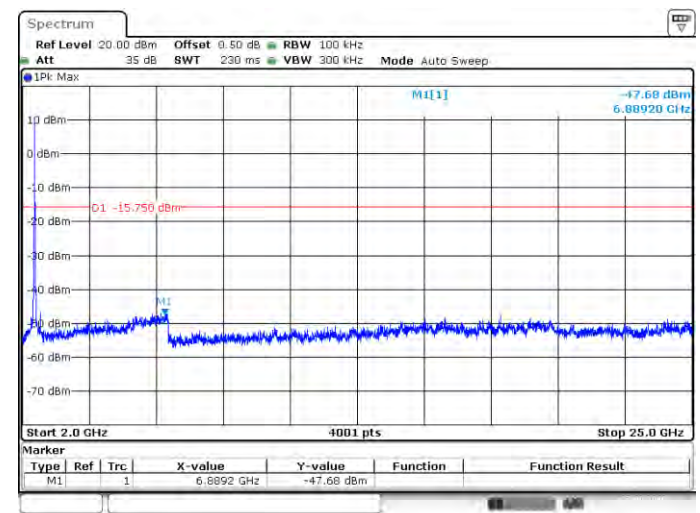
802.11n-20 MHz LOW CHANNEL CARRIER LEVEL



802.11n-20 MHz LOW CHANNEL, SPURIOUS 30 MHz ~ 3 GHz



802.11n-20 MHz LOW CHANNEL, SPURIOUS 2 GHz ~ 25 GHz



802.11n-20 MHz MIDDLE CHANNEL CARRIER LEVEL

