RADIO TEST REPORT

Product	:	VX1 HD Video Doorbell
Model Name	:	CAMW-WDB
FCC ID	:	CFS8DLCAMWWDB1
Test Regulation	:	FCC 47 CFR Part 15 Subpart C (Section 15.247)
Received Date	:	2022/9/7
Test Date	:	2022/9/10 ~ 2022/10/8
Issued Date	:	2023/4/7
Applicant	:	Ademco Inc. 2 Corporate Center Dr, Melville, NY 11747, United States
Issued By	:	Underwriters Laboratories Taiwan Co., Ltd. Building B and Building E, No. 372-7, Sec. 4, Zhongxing Rd., Zhudong Township, Hsinchu County, Taiwan

Testing Laboratory
3398

The results reported herein have been performed in accordance with the laboratory's terms of accreditation. This report shall not be reproduced except in full without the written approval of the Laboratory. The results in this report are responsible of the test sample(s) provided by the client only and are not to be used to indicate applicability to other similar products.

REVISION HISTORY

Original Test Report No.: 4790533920-US-R0-V0

Rev.	Test report No.	Date	Page revised	Contents
Original	4790533920-US-R0-V0	2023/4/7	-	Initial issue

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1. Attestation of Test Results

APPLICANT:	Ademco Inc. 2 Corporate Center Dr, Melville, NY 11747, United States
MANUFACTURER:	XAVi Technologies Corporation 22F., No.69, Sec.2, Guangfu Rd., Sanchong Dist.,New Taipei City 24158, Taiwan (R.O.C)
EUT DESCRIPTION:	VX1 HD Video Doorbell
BRAND:	resideo
MODEL:	CAMW-WDB
SAMPLE STAGE:	Design Verification Test sample
DATE of TESTED:	2022/9/10 ~ 2022/10/8

APPLICABLE STANDARDS	
STANDARD	**Test Results**
FCC 47 CFR PART 15 Subpart C (Section 15.247)	PASS

Underwriters Laboratories Taiwan Co., Ltd. tested the above equipment in accordance with the requirements set forth in the above standards. All indications of Pass/Fail in this report are opinions expressed by Underwriters Laboratories Taiwan Co., Ltd. based on interpretations and/or observations of test results. The test results show that the equipment tested is capable of demonstrating compliance with the requirements as documented in this report.

Note: The results documented in this report apply only to the tested sample, under the conditions and modes of operation as described herein. This document may not be altered or revised in any way unless done so by Underwriters Laboratories Taiwan Co., Ltd. and all revisions are duly noted in the revisions section. Any alteration of this document not carried out by Underwriters Laboratories Taiwan Co., Ltd. will constitute fraud and shall nullify the document. This report must not be used by the client to claim product certification, approval, or endorsement by NVLAP, NIST, any agency of the Federal Government, or any agency of any government.

Prepared By:

Sally Lu Date : 2023/4/7
Project Handler

Approved and Authorized By:

Eric Lee Date : 2023/4/7
Senior Laboratory Engineer

2. Summary of Test Results

Summary of Test Results		
FCC Clause	**Test Items**	**Result**
15.247(a)(2)	6dB Bandwidth	PASS
15.247(b)	Conducted Output Power	PASS
15.247(e)	Power Spectral Density	PASS
15.247(d)	Antenna Port Emission	PASS
15.205 / 15.209 / 15.247(d)	Radiated Emissions and Band Edge Measurement	PASS
15.207	AC Power Conducted Emission	PASS
15.203	Antenna Requirement	PASS

3. Test Methodology and Reference Procedures

The tests documented in this report were performed in accordance with 47 CFR FCC Part 2, KDB558074 D01 Meas Guidance v05r02, KDB414788 D01 Radiated Test Site v01r01, ANSI C63.10-2013 and KDB 662911 D01 Multiple Transmitter Output v02r01.

4. Facilities and Accreditation

Test Location	Underwriters Laboratories Taiwan Co., Ltd.
Address	Building B and Building E, No. 372-7, Sec. 4, Zhongxing Rd., Zhudong Township, Hsinchu County, Taiwan
Accreditation Certificate	Underwriters Laboratories Taiwan Co., Ltd. is accredited by TAF, Laboratory Code 3398.

5. Measurement Uncertainty

For statement of conformity, accuracy method (Section 8.2.4 and 8.2.5 of ISO Guide 98-4) was applied as decision rule for measurement in this test report.

The following uncertainties have been calculated to provide a confidence level of 95 % using a coverage factor k=2.

Measurement	Frequency	Uncertainty
Conducted disturbance at mains terminals ports	150kHz ~ 30MHz	±2.9 dB
RF Conducted	9 kHz - 40GHz	±2.4 dB
Radiated disturbance below 30MHz	9 kHz - 30 MHz	±1.9 dB
Radiated disturbance below 1 GHz	30MHz ~ 1GHz	±5.8 dB
Radiated disturbance above 1 GHz	1GHz ~ 40GHz	±4.8 dB

6. Equipment under Test

6.1. Description of EUT

Product	VX1 HD Video Doorbell
Brand Name	resideo
Model Name	CAMW-WDB
Operating Frequency	2412MHz ~ 2462MHz
Modulation	CCK, DQPSK, DBPSK for DSSS 256QAM, 64QAM, 16QAM, QPSK, BPSK for OFDM
Transfer Rate	802.11b: up to 11 Mbps 802.11g: up to 54 Mbps 802.11n: up to MCS15 802.11ac: up to MCS9
Number of Channel	11 for 802.11b, 802.11g, 802.11n (HT20), 802.11ac (VHT20) 7 for 802.11n (HT40), 802.11ac (VHT40)
Maximum Output Power	802.11b: 23.46 dBm 802.11g: 29.42 dBm 802.11ac (VHT20): 29.39 dBm 802.11ac (VHT40): 29.15 dBm
Normal Voltage	24Vac/60Hz from adapter
Sample ID	Conducted Test: 5312255 Radiated Test: 5312256

Note:

1. The EUT have two kind of outer case which for marketing requirement.

2. The EUT incorporates a MIMO function. Physically, the EUT provides two completed transmitters and two receivers.

Modulation Mode	Tx,Rx Function
802.11b	2TX,2RX
802.11g	2TX,2RX
802.11n (HT20)	2TX,2RX
802.11n (HT40)	2TX,2RX
802.11ac (VHT20)	2TX,2RX
802.11ac (VHT40)	2TX,2RX

* The modulation and bandwidth are similar for 802.11n mode for HT20 / HT40 and 802.11ac mode for VHT20 / VHT40, therefore investigated worst case to representative mode in test report.

3. The EUT contains following accessory devices:

Product	Brand	Model	Description
CAMW-CHA Chime Adapter	resideo	CAMW-CHA	-
Angled Mounting Bracket	resideo	N/A	-
Flat Mounting Bracket	resideo	N/A	-
Trim Ring (Inside BOX)	resideo	N/A	Color: gray and white
Trim Ring (On the Device)	resideo	N/A	Color: gray and white

4. The EUT could be supplied with rechargeable battery as the following table:

Brand Name	Model	Description
Chi Jiun Technologies Co	602025	3.8Vdc, 300mAh
Energy Master Limited	FT602025P	3.7Vdc, 240mAh

5. The above EUT information is declared by manufacturer and for more detailed features description, please refer the manufacturer's or user's manual.

6.2. Channel List

11 channels are provided for 802.11b, 802.11g and 802.11n (HT20), 802.11ac (VHT20):

Channel	Frequency (MHz)	Channel	Frequency (MHz)
1	2412	7	2442
2	2417	8	2447
3	2422	9	2452
4	2427	10	2457
5	2432	11	2462
6	2437	-	-

7 channels are provided for 802.11n (HT40), 802.11ac (VHT40):

Channel	Frequency (MHz)	Channel	Frequency (MHz)
3	2422	7	2442
4	2427	8	2447
5	2432	9	2452
6	2437	-	-

6.3. Test Condition

Test Item	Test Site No.	Environmental Condition	Input Power	Test Date	Tested by
Antenna Port Conducted Measurement	SR4	21~26℃/ 51~68%RH	24Vac/60Hz	2022/09/10~ 2022/10/08	WaterNil Guan
Radiated Spurious Emission	966-2	21~26℃/ 51~68%RH	24Vac/60Hz	2022/09/10~ 2022/10/08	WaterNil Guan
AC power Line Conducted Emission	SR1	21~26℃/ 51~68%RH	24Vac/60Hz	2022/10/07~ 2022/10/08	Rex Chen

FCC Test Firm Registration Number: 498077

6.4. Description of Available Antennas

Ant. No.	Transmitter Circuit	Brand Name	Model Name	Ant. Type	Maximum Gain (dBi)
1	Chain (0)	Lynwave	ALX21M 222AA7	PIFA	2.4GHz: 0.8 5GHz: 2.3
2	Chain (1)	Cirocomm	FDAH0I20	PCB	2.4GHz: 1.56 5GHz: 5.62

Note: The above antenna information was provided from customer and for more detailed features description, please refer the manufacturer's specification or user's manual.

6.5. Test Mode Applicability and Tested Channel Detail

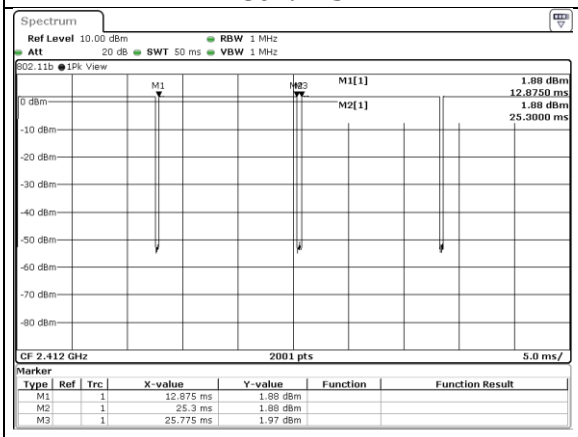
- The fundamental of the EUT was investigated in three orthogonal axes X-Y/Y-Z/X-Z, it was determined that Y-Z plane was worst-case. Therefore, all final radiated testing was performed with the EUT in Y-Z plane.
- The EUT has two batteries: 3.8Vdc from the battery (model: 602025), and 3.7Vdc from the battery (model: FT602025P), and one external power source: 24Vac/60Hz from adapter (model: MODEL-LD-09700).
- The 24Vac/60Hz from adapter (model: MODEL-LD-09700) and 3.8Vdc from battery (model: 602025) were evaluated to be the worst case. Therefore, these combinations were recorded in the test report.
- For Antenna Port Conducted Measurement, this item includes all test value of each mode, but only includes spectrum plot of worst value of each mode.
- For below 30MHz testing, investigation was done on three antenna orientations (parallel, perpendicular, and ground-parallel), parallel and perpendicular are the worst orientations, therefore testing was performed on these two orientations only.
- For below 1 GHz radiated emission and AC power line conducted emission have performed all modes of operation were investigated and the worst-case emissions are reported.
- Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, data rates and antenna ports (if EUT with antenna diversity architecture).

Test Item	Mode	Modulation Technology	Modulation Type	Available Channel	Test Channel	Data Rate
Radiated Emissions (Above 1GHz)	802.11b	DSSS	DBPSK	1 to 11	1,6,11	1 Mbps
	802.11g	OFDM	BPSK	1 to 11	1,6,11	6 Mbps
	802.11ac20	OFDM	BPSK	1 to 11	1,6,11	MCS0 Nss1
	802.11ac40	OFDM	BPSK	3 to 9	3,6,9	MCS0 Nss1
Radiated Emissions (Below 1GHz)	802.11g	OFDM	BPSK	1 to 11	1	6 Mbps
AC Power Line Conducted Emission	802.11g	OFDM	BPSK	1 to 11	1	6 Mbps
*Antenna Port Conducted Measurement	802.11b	DSSS	DBPSK	1 to 11	1,6,11	1 Mbps
	802.11g	OFDM	BPSK	1 to 11	1,6,11	6 Mbps
	802.11ac20	OFDM	BPSK	1 to 11	1,6,11	MCS0 Nss1
	802.11ac40	OFDM	BPSK	3 to 9	3,6,9	MCS0 Nss1

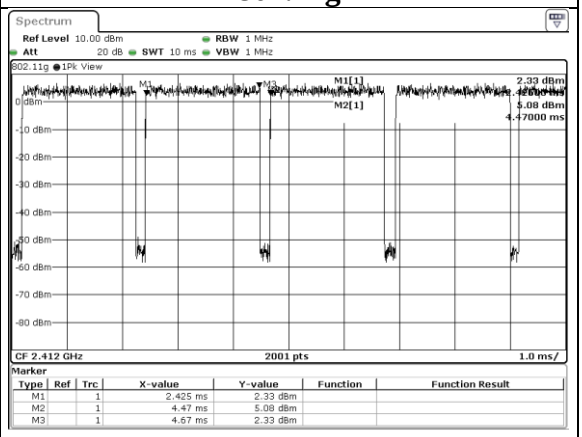
6.6. Duty cycle

Mode	On Time (ms)	On+Off Time (ms)	Duty Cycle	Duty Factor (dB)	VBW Set (above 1GHz)
802.11b	12.425	12.900	0.9632	0.16	100Hz
802.11g	2.045	2.245	0.9109	0.41	510Hz
802.11ac(VHT20)	1.910	2.100	0.9095	0.41	1kHz
802.11ac(VHT40)	0.910	1.170	0.7778	1.09	2kHz

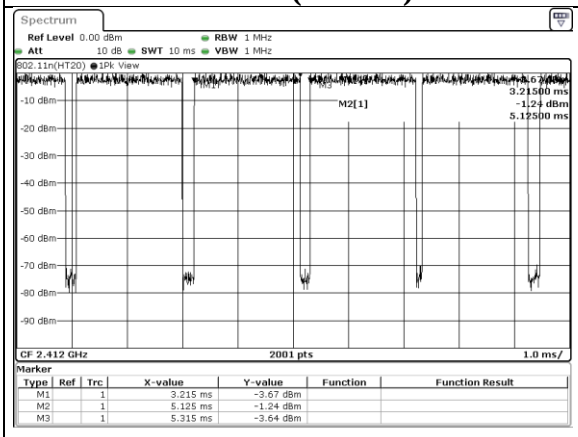
802.11b



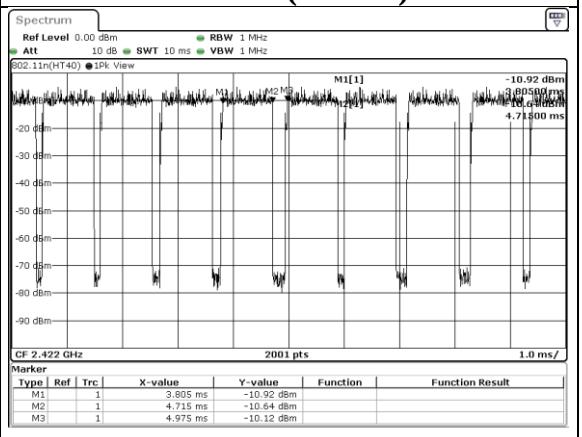
802.11g



802.11ac(VHT20)



802.11ac(VHT40)



7. Test Equipment

Test Equipment List					
Equipment	**Manufacturer**	**Model No.**	**Serial No.**	**Cal. Date**	**Expired date**
Radiated Spurious Emission					
Spectrum Analyzer	Keysight	N9010A	MY56070827	2021/11/9	2022/11/8
EMI Test Receiver	Rohde & Schwarz	ESR7	101754	2021/12/10	2022/12/9
Loop Antenna	ETS lindgren	6502	00213440	2021/12/23	2022/12/22
Trilog-Broadband Antenna with 5dB Attenuator	Schwarzbeck & EMCI	VULB 9168 & N-6-05	774 & AT-N0538	2022/2/8	2023/2/7
Horn Antenna (1-18 GHz)	Schwarzbeck	BBHA 9120 D	01690	2021/12/13	2022/12/12
Horn Antenna (18-40 GHz)	Schwarzbeck	BBHA 9170	781	2021/12/17	2022/12/16
Preamplifier (30-1000 MHz)	EMCI	EMC330E	980405	2022/6/7	2023/6/6
Preamplifier (1-18 GHz)	EMCI	EMC051835BE	980406	2022/2/16	2023/2/15
Preamplifier (18-40GHz)	EMCI	EMC184040SEE	980426	2022/5/17	2023/5/16
Cables	Hanyitek	K1K50-UP0264-K1K50-2500	170214-4 & 170425-2	2021/12/3	2022/12/2
Cables	Hanyitek	K1K50-UP0264-K1K50-2500	170214-1 & 170214-2	2021/12/3	2022/12/2

Test Equipment List					
Equipment	**Manufacturer**	**Model No.**	**Serial No.**	**Cal. Date**	**Expired date**
Antenna Port Conducted Measurement					
Spectrum Analyzer	Keysight	N9010A	MY56070834	2021/10/29	2022/10/28
Pulse Power Sensor	Anritsu	MA2411B	1531202	2021/12/22	2022/12/21
Power Meter	Anritsu	ML2495A	1645002	2021/12/22	2022/12/21
AC power Line Conducted Emission					
EMI Test Receiver	Rohde & Schwarz	ESR7	101753	2021/11/15	2022/11/14
Two-Line V-Network	Rohde & Schwarz	ENV216	102136	2022/8/29	2023/8/28
Impuls-Begrenzer Pulse Limiter	Rohde & Schwarz	ESH3-Z2	102219-Qt	2022/8/30	2023/8/29
Cables	TITAN	CFD200	T0732ACFD20 020A300-2	2022/4/9	2023/4/8

UL Software		
Description	**Name**	**Version**
Radiated measurement	e3	6.191211 (V6)
Conducted measurement	RF-Conducted-FCC 15247	ver 1.0
AC power Line Conducted Emission	EZ_EMC	UL-3A1.2

8. Description of Test Setup

Support Equipment

ID	Equipment	Brand Name	Model Name	S/N	Remark
A	Adapter	ZD	MODEL-LD-09700	NA	Supplied by client
B	Laptop	DELL	Latitude E5470	5M2MWF2	Provide by lab
C	Test Tool	N/A	RCD3916_TEST	N/A	Supplied by client
D	Micro SD Card	SanDisk	UHS-I C10	NA	Provide by lab
E	Battery	Chi Jiun Technologies Co	602025	NA	Supplied by client

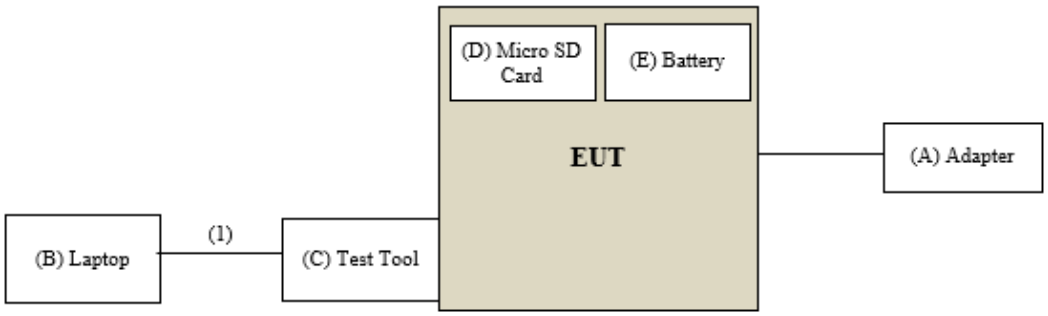
I/O Cables

ID	Equipment	Brand Name	Model Name	Length (m)	Remark
1	Micro USB Cable	N/A	N/A	0.92	Provide by lab

Test Setup

Controlled using a bespoke application (Typing RF command by terminal tool(Putty version 0.76)) on a test Notebook. The application was used to enable a continuous transmission mode and to select the test channels, data rates, modulation schemes and power setting as required.

Setup Diagram for Test



Under Table

Remote Site

9. Test Results

9.1. 6dB Bandwidth

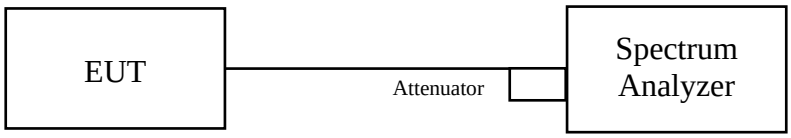
Requirements

The minimum 6 dB bandwidth shall be at least 500 kHz.

Test procedure

a. Set resolution bandwidth (RBW) = 100kHz.
b. Set the video bandwidth (VBW) ≥ 3 x RBW, Detector = Peak.
c. Trace mode = max hold.
d. Sweep = auto couple.
e. Measure the maximum width of the emission that is constrained by the frequencies associated with the two amplitude points (upper and lower) that are attenuated by 6 dB relative to the maximum level measured in the fundamental emission.

Test Setup

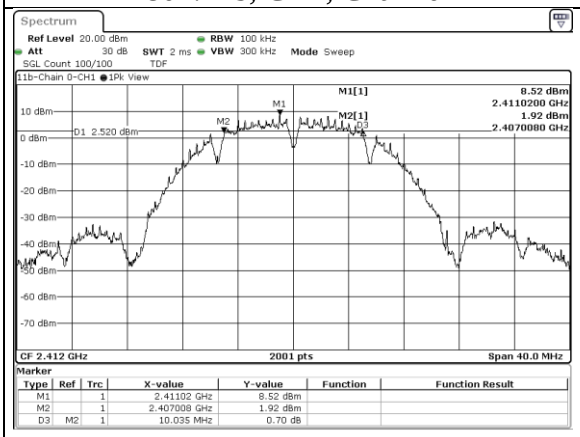


The loss between RF output port of the EUT and the input port of the Spectrum Analyzer has been taken into consideration.

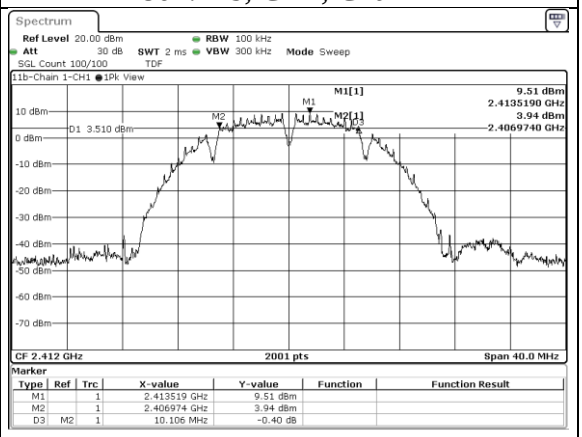
Test Data

Mode	CH	Freq (MHz)	6dB BW (MHz)		Limit (MHz)	Result
			Chain 0	Chain 1		
802.11b	1	2412	10.035	10.106	0.5	PASS
	6	2437	10.088	10.093	0.5	PASS
	11	2462	10.113	10.065	0.5	PASS

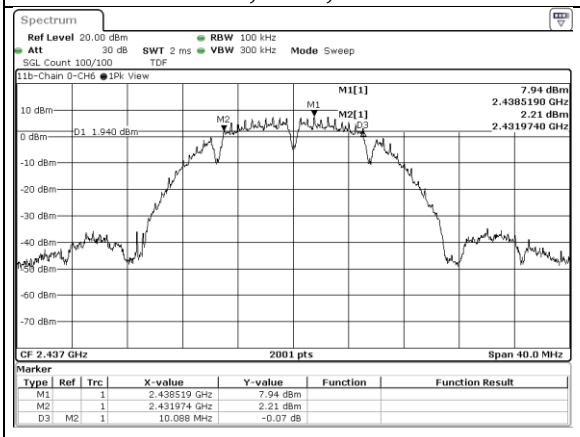
802.11b, CH1, Chain 0



802.11b, CH1, Chain 1



802.11b, CH6, Chain 0



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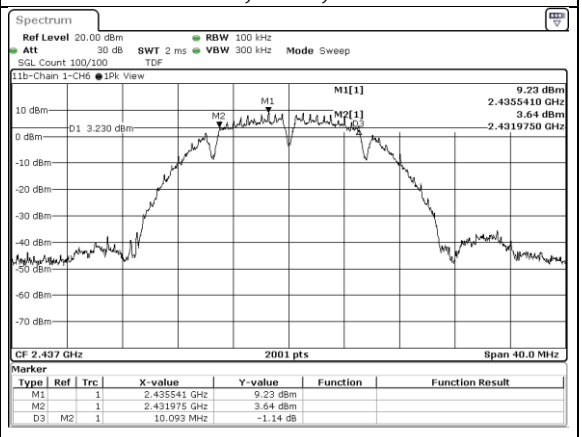

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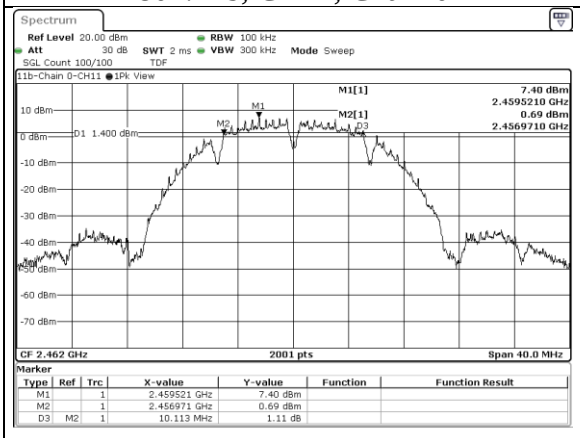

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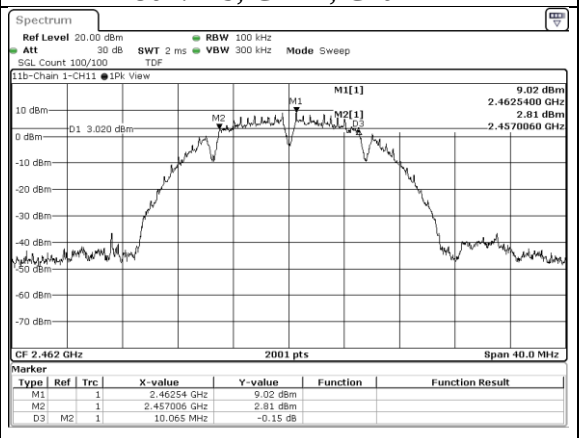
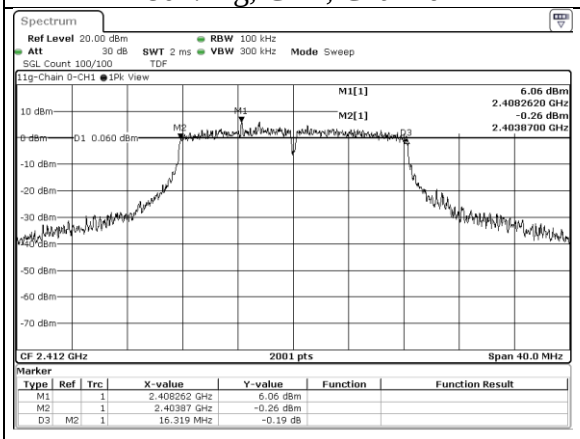


Mode	CH	Freq (MHz)	6dB BW (MHz)		Limit (MHz)	Result
			Chain 0	Chain 1		
802.11g	1	2412	16.319	16.327	0.5	PASS
	6	2437	16.050	16.339	0.5	PASS
	11	2462	16.314	16.360	0.5	PASS

802.11g, CH1, Chain 0



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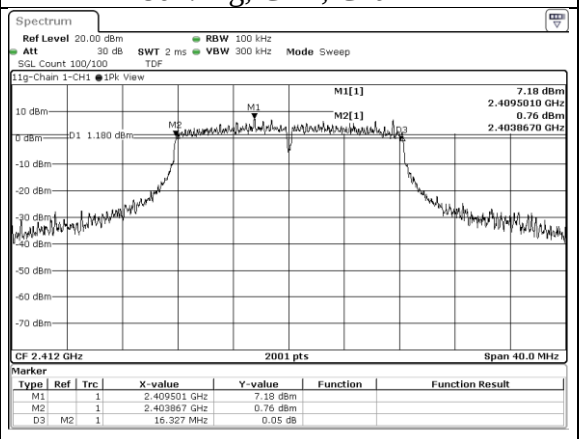

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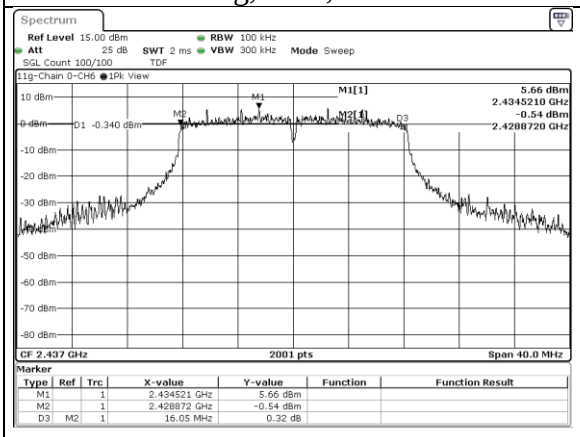

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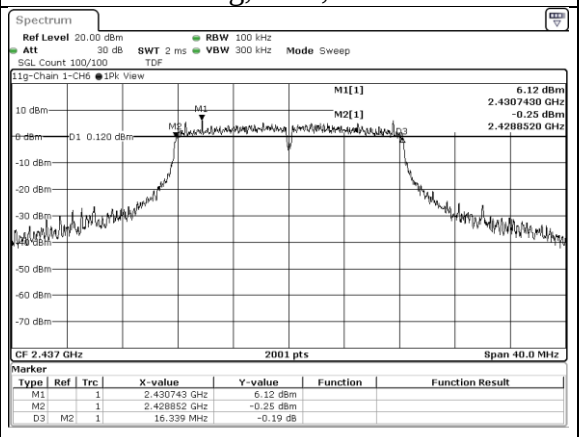

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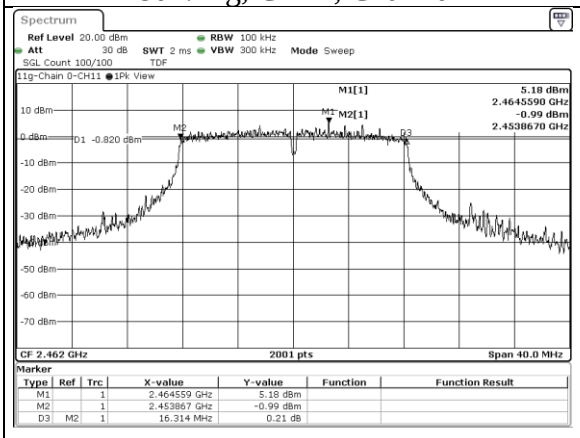

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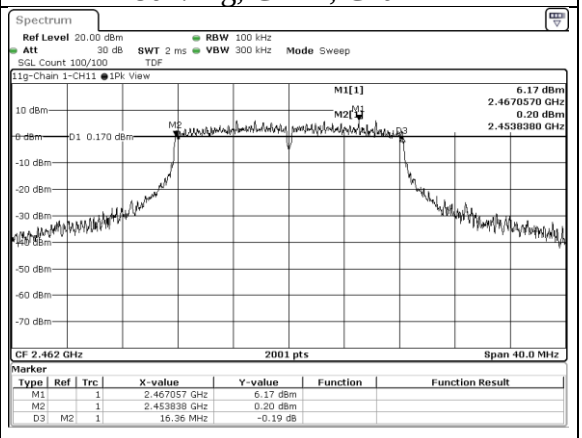
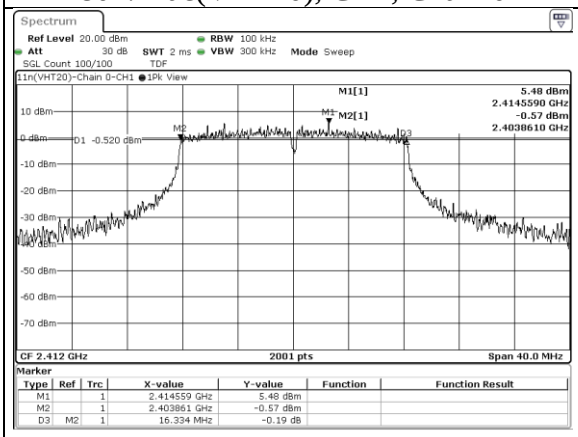
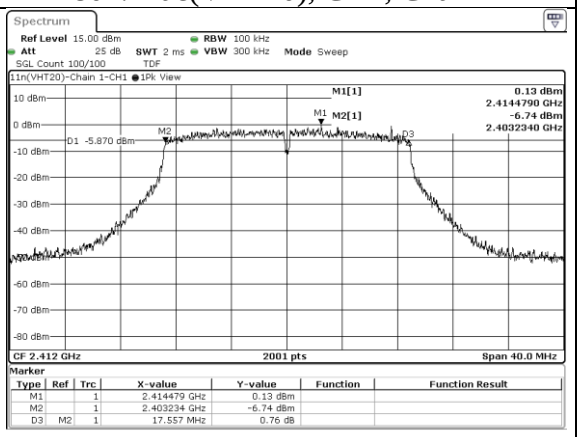


Mode	CH	Freq (MHz)	6dB BW (MHz)		Limit (MHz)	Result
			Chain 0	Chain 1		
802.11ac(VHT20)	1	2412	16.334	17.557	0.5	PASS
	6	2437	16.114	17.048	0.5	PASS
	11	2462	15.328	16.308	0.5	PASS

802.11ac(VHT20), CH1, Chain 0



802.11ac(VHT20), CH1, Chain 1



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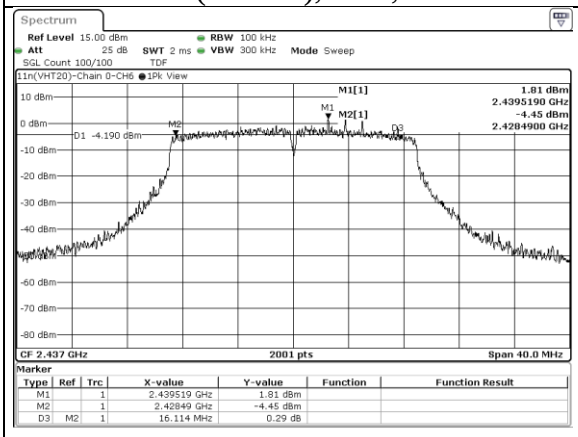
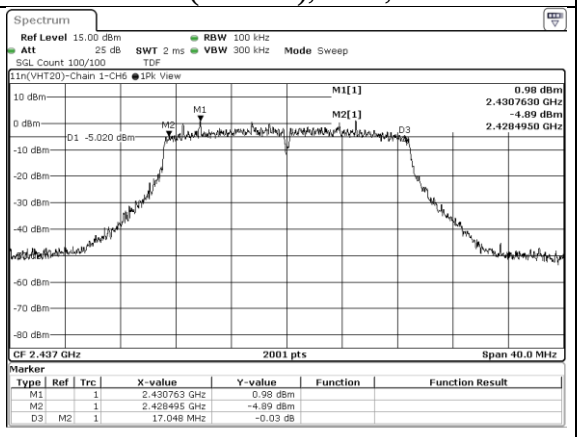
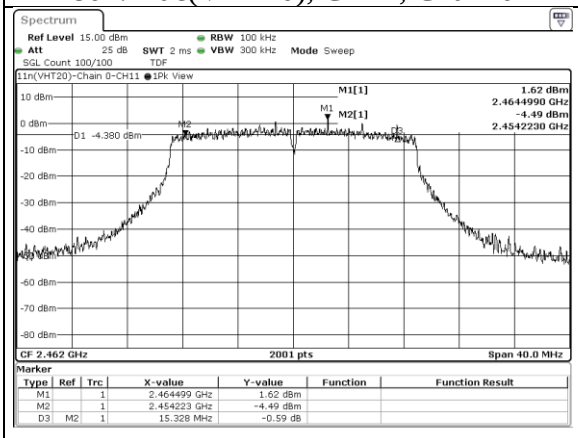


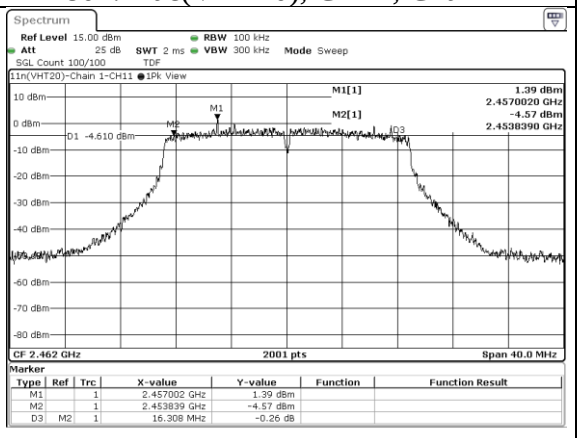
802.11ac(VHT20), CH6, Chain 1



802.11ac(VHT20), CH11, Chain 0

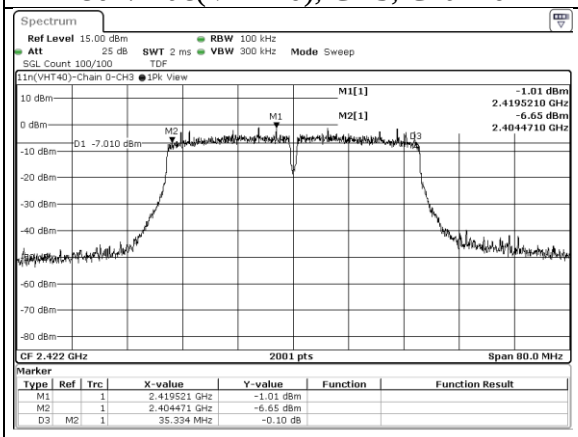


802.11ac(VHT20), CH11, Chain 1

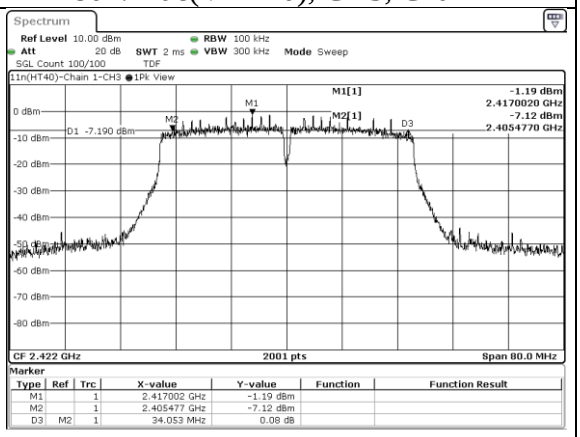


Mode	CH	Freq (MHz)	6dB BW (MHz)		Limit (MHz)	Result
			Chain 0	Chain 1		
802.11ac(VHT40)	3	2422	35.334	34.053	0.5	PASS
	6	2437	35.176	35.036	0.5	PASS
	9	2452	35.139	33.901	0.5	PASS

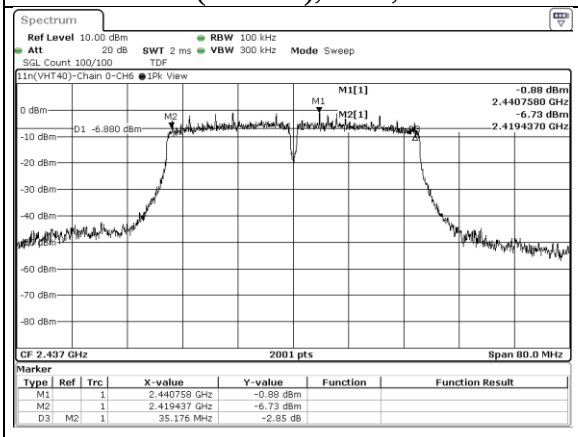
802.11ac(VHT40), CH3, Chain 0



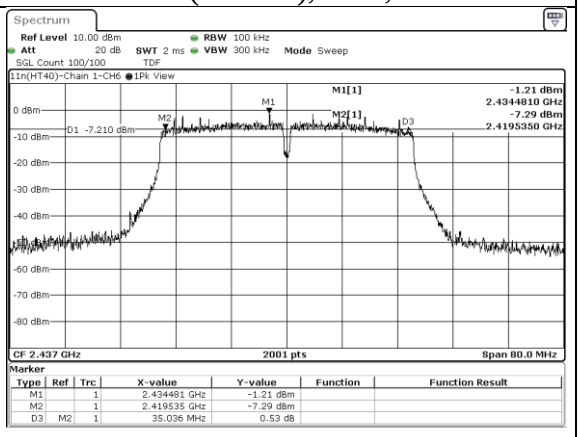
802.11ac(VHT40), CH3, Chain 1



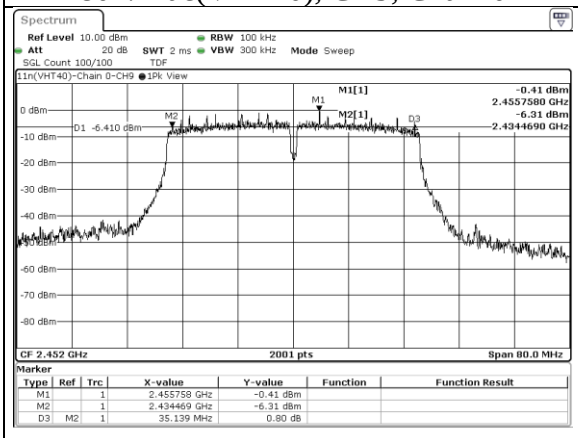
802.11ac(VHT40), CH6, Chain 0



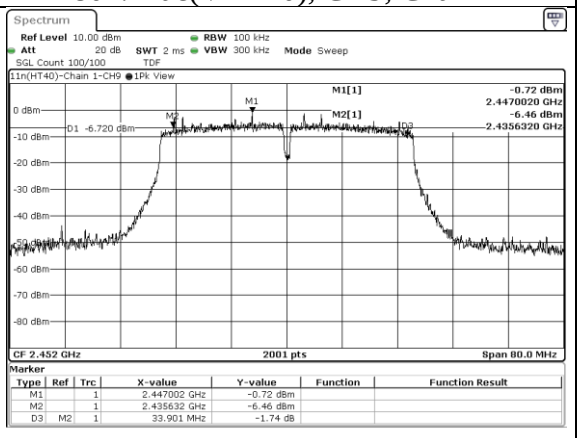
802.11ac(VHT40), CH6, Chain 1



802.11ac(VHT40), CH9, Chain 0



802.11ac(VHT40), CH9, Chain 1



9.2. Conducted Output Power

Requirements

For systems using digital modulation in the 2400-2483.5 MHz bands: 1 Watt.

Note:

1. Directional Gain = 10 log[($10^{G1/20}$ + $10^{G2/20}$ +...+$10^{Gn/20}$)^2 / Nant] dBi.

   N*a*nt: Number of Transmit Antennas
   G1, G2,..., Gn: Gain of Individual Antennas

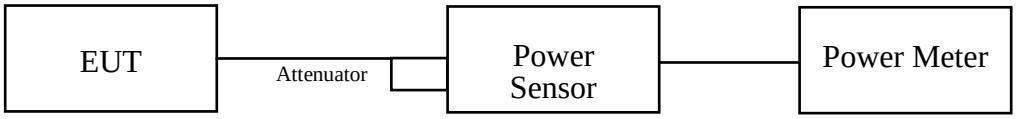
2. Per KDB 662911 Method of conducted output power measurement on IEEE 802.11 devices,

   Array Gain = 0 dB (i.e., no array gain) for $N_{ANT} \leq 4$;
   Array Gain = 0 dB (i.e., no array gain) for channel widths $\geq$ 40 MHz for any N_{ANT};
   Array Gain = 5 log(N_{ANT}/N_{SS}) dB or 3 dB, whichever is less for 20-MHz channel widths with $N_{ANT} \geq 5$.

Test Procedure

A peak power sensor was used on the output port of the EUT. A power meter was used to read the response of the peak power sensor. Record the power level.

Test Setup



The loss between RF output port of the EUT and the input port of the Power Meter has been taken into consideration.

Test Data

Peak Power

802.11b

Channel	Frequency (MHz)	Peak Power (dBm)		Total Power (mW)	Total Power (dBm)	Limit (dBm)	Pass / Fail
		Chain 0	Chain 1				
1	2412	19.95	20.89	221.82	23.46	30	PASS
6	2437	19.14	20.92	205.589	23.13	30	PASS
11	2462	19.42	20.89	210.378	23.23	30	PASS

802.11g

Channel	Frequency (MHz)	Peak Power (dBm)		Total Power (mW)	Total Power (dBm)	Limit (dBm)	Pass / Fail
		Chain 0	Chain 1				
1	2412	25.86	26.89	874.984	29.42	30	PASS
6	2437	24.72	26.55	748.17	28.74	30	PASS
11	2462	24.56	26.53	736.207	28.67	30	PASS

802.11ac (VHT20)

Channel	Frequency (MHz)	Peak Power (dBm)		Total Power (mW)	Total Power (dBm)	Limit (dBm)	Pass / Fail
		Chain 0	Chain 1				
1	2412	25.77	26.91	868.96	29.39	30	PASS
6	2437	25.50	26.05	756.833	28.79	30	PASS
11	2462	24.07	25.64	622.3	27.94	30	PASS

802.11ac (VHT40)

Channel	Frequency (MHz)	Peak Power (dBm)		Total Power (mW)	Total Power (dBm)	Limit (dBm)	Pass / Fail
		Chain 0	Chain 1				
3	2422	25.29	26.85	822.243	29.15	30	PASS
6	2437	25.14	26.54	778.037	28.91	30	PASS
9	2452	25.22	26.27	756.833	28.79	30	PASS

Note: The FDAH0I20 with the highest antenna gain(1.56 dBi) in this project.
For directional gain = 1.56 dBi + Array Gain = 1.56 dBi + 0 dB = 1.56 dBi
So, the power limit shall not be reduced.

Average Power (Reference Only)

802.11b

Channel	Frequency (MHz)	Average Power (dBm)		Total Power (mW)	Total Power (dBm)
		Chain 0	Chain 1		
1	2412	17.83	19.53	150.314	21.77
6	2437	16.94	18.69	123.31	20.91
11	2462	17.27	19.01	133.045	21.24

802.11g

Channel	Frequency (MHz)	Average Power (dBm)		Total Power (mW)	Total Power (dBm)
		Chain 0	Chain 1		
1	2412	18.24	19.86	163.682	22.14
6	2437	17.06	18.99	130.017	21.14
11	2462	16.16	18.68	115.08	20.61

802.11ac (VHT20)

Channel	Frequency (MHz)	Average Power (dBm)		Total Power (mW)	Total Power (dBm)
		Chain 0	Chain 1		
1	2412	17.24	19.18	135.831	21.33
6	2437	16.45	18.17	109.648	20.40
11	2462	16.25	18.05	105.925	20.25

802.11ac (VHT40)

Channel	Frequency (MHz)	Average Power (dBm)		Total Power (mW)	Total Power (dBm)
		Chain 0	Chain 1		
3	2422	18.35	20.03	169.044	22.28
6	2437	17.42	19.05	135.519	21.32
9	2452	17.20	18.81	128.529	21.09

9.3. Power Spectral Density

Requirements

The Maximum of Power Spectral Density Measurement is 8dBm in any 3 kHz (If G_{TX} > 6 dBi, then PSD = 8 – (G_{TX} – 6)).

Note:

1. PSD = power spectral density that he same method as used to determine the conducted output power shall be used to determine the power spectral density. And power spectral density in dBm/MHz.
2. G_{TX} = the maximum transmitting antenna directional gain in dBi.
3. Directional Gain = 10 log[($10^{G1/20}$ + $10^{G2/20}$ +...+$10^{Gn/20}$)^2 / Nant] dBi.

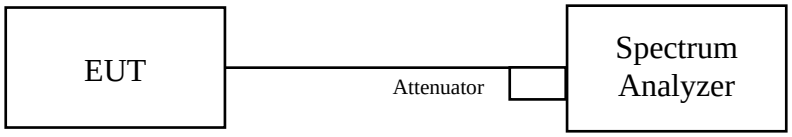
   Nant: Number of Transmit Antennas
   G1, G2,..., Gn: Gain of Individual Antennas
4. "PSD per chain" of the report shown is maximum value for each chain, at the "Total PSD" is summing entire spectra across corresponding frequency bins on the various outputs by computer, refer KDB 662911 Method a) for calculating total power density.
5. For example, the ALX21M 222AA7 with 0.8 dBi and FDAH0I20 with 1.56 dBi. So, it were used for power spectral measurement

   $$\text{Directional Gain} = 10\log[(10^{G1/20} + 10^{G2/20})^2 / \text{Nant}]\ \text{dBi}$$
   $$= 10\log[(10^{0.8/20} + 10^{1.56/20})^2 / 2]\ \text{dBi}$$
   $$= 10\log[(2.29322)^2 / 2]\ \text{dBi}$$
   $$= 4.2\ \text{dBi}$$

Test procedure

a. Set analyzer center frequency to DTS channel center frequency.
b. Set the span to 1.5 times the DTS bandwidth.
c. Set the RBW to: 3 kHz ≤ RBW ≤ 100 kHz.
d. Set the VBW ≥ 3 × RBW.
e. Detector = peak.
f. Sweep time = auto couple.
g. Trace mode = max hold.
h. Allow trace to fully stabilize.
i. Use the peak marker function to determine the maximum amplitude level within the RBW.

Test Setup



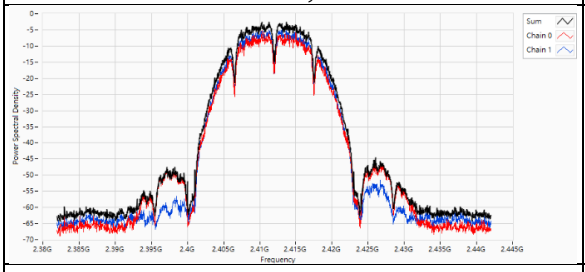
The loss between RF output port of the EUT and the input port of the Spectrum Analyzer has been taken into consideration.

Test Data

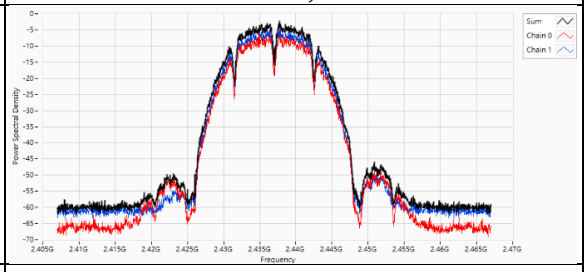
Mode	CH	Freq (MHz)	Total PSD (dBm/3kHz)	Limit (dBm/3kHz)	Directional Gain (dBi)	Result
802.11b	1	2412	-2.53	8	4.2	PASS
	6	2437	-2.26	8	4.2	PASS
	11	2462	-2.95	8	4.2	PASS

Mode	CH	Freq (MHz)	PSD per Chain (dBm/3kHz)	
			Chain 0	Chain 1
802.11b	1	2412	-5.19	-4.179
	6	2437	-6.658	-4.038
	11	2462	-5.128	-4.643

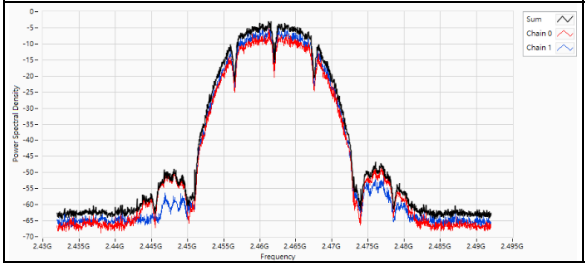
802.11b, CH1



802.11b, CH6



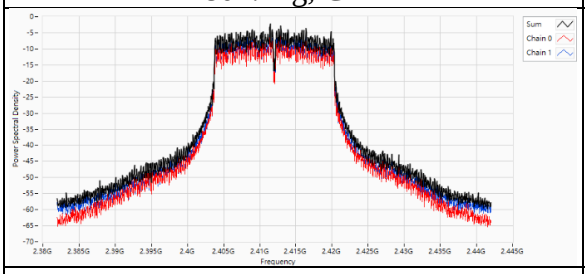
802.11b, CH11



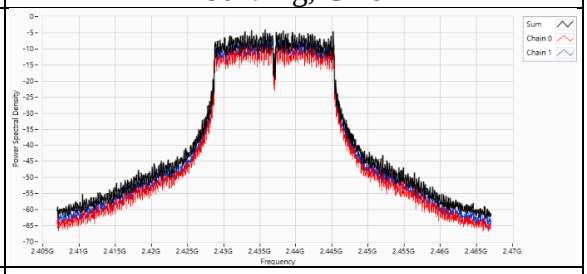
Mode	CH	Freq (MHz)	Total PSD (dBm/3kHz)	Limit (dBm/3kHz)	Directional Gain (dBi)	Result
802.11g	1	2412	-2.26	8	4.2	PASS
	6	2437	-4.06	8	4.2	PASS
	11	2462	-3.41	8	4.2	PASS

Mode	CH	Freq (MHz)	PSD per Chain (dBm/3kHz)	
			Chain 0	Chain 1
802.11g	1	2412	-5.708	-4.873
	6	2437	-7.751	-6.362
	11	2462	-7.372	-5.639

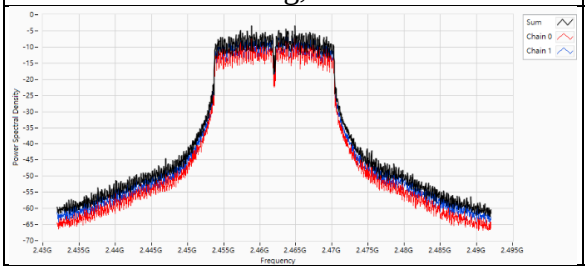
802.11g, CH1



802.11g, CH6



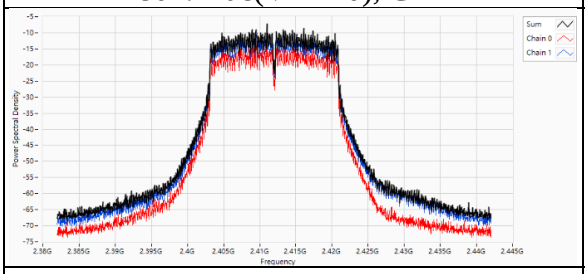
802.11g, CH11



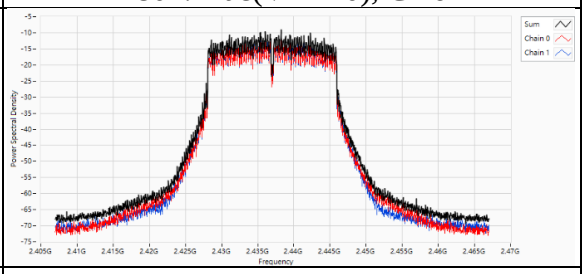
Mode	CH	Freq (MHz)	Total PSD (dBm/3kHz)	Limit (dBm/3kHz)	Directional Gain (dBi)	Result
802.11ac(VHT20)	1	2412	-7.12	8	4.2	PASS
	6	2437	-9.06	8	4.2	PASS
	11	2462	-9.47	8	4.2	PASS

Mode	CH	Freq (MHz)	PSD per Chain (dBm/3kHz)	
			Chain 0	Chain 1
802.11ac(VHT20)	1	2412	-12.042	-8.809
	6	2437	-11.29	-12.47
	11	2462	-12.636	-11.972

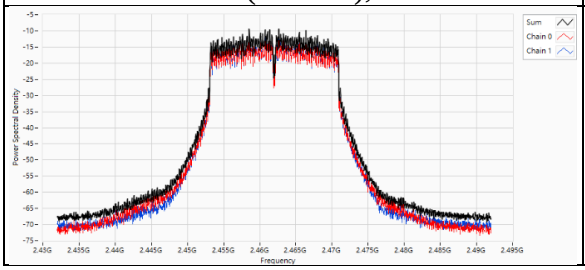
802.11ac(VHT20), CH1



802.11ac(VHT20), CH6



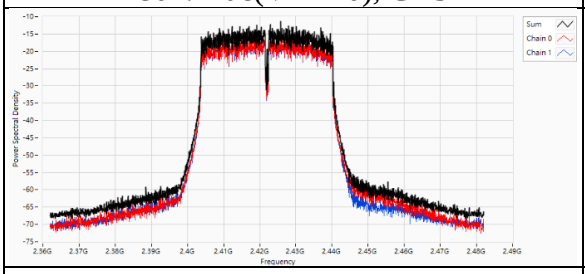
802.11ac(VHT20), CH11



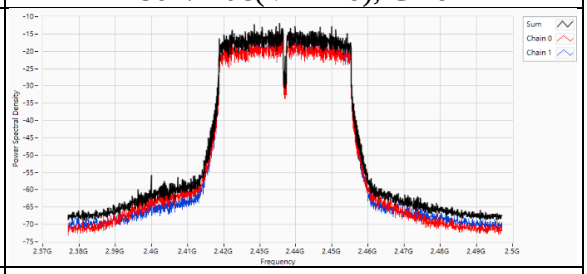
Mode	CH	Freq (MHz)	Total PSD (dBm/3kHz)	Limit (dBm/3kHz)	Directional Gain (dBi)	Result
802.11ac(VHT40)	3	2422	-11.35	8	4.2	PASS
	6	2437	-11.85	8	4.2	PASS
	9	2452	-12.61	8	4.2	PASS

Mode	CH	Freq (MHz)	PSD per Chain (dBm/3kHz)	
			Chain 0	Chain 1
802.11ac(VHT40)	3	2422	-14.073	-14.667
	6	2437	-15.223	-14.525
	9	2452	-15.651	-15.592

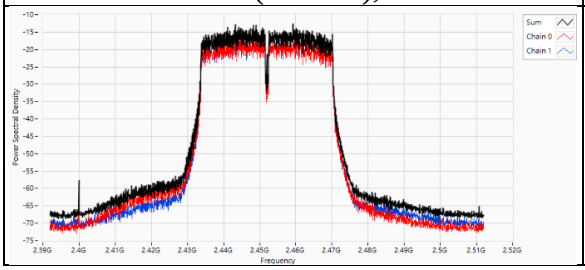
802.11ac(VHT40), CH3



802.11ac(VHT40), CH6



802.11ac(VHT40), CH9



9.4. Conducted Out of Band Emission

Requirements

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.

Test procedure

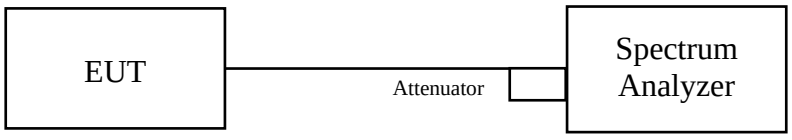
Measurement Procedure REF

1. Set the RBW = 100 kHz.
2. Set the VBW ≥ 300 kHz.
3. Set the span to 1.5 times the DTS bandwidth.
4. Detector = peak.
5. Sweep time = auto couple.
6. Trace mode = max hold.
7. Allow trace to fully stabilize.
8. Use the peak marker function to determine the maximum power level in any 100 kHz band segment within the fundamental EBW.

Measurement Procedure OOBE

1. Set RBW = 100 kHz.
2. Set VBW ≥ 300 kHz.
3. Detector = peak.
4. Sweep = auto couple.
5. Trace Mode = max hold.
6. Allow trace to fully stabilize.
7. Use the peak marker function to determine the maximum amplitude level.

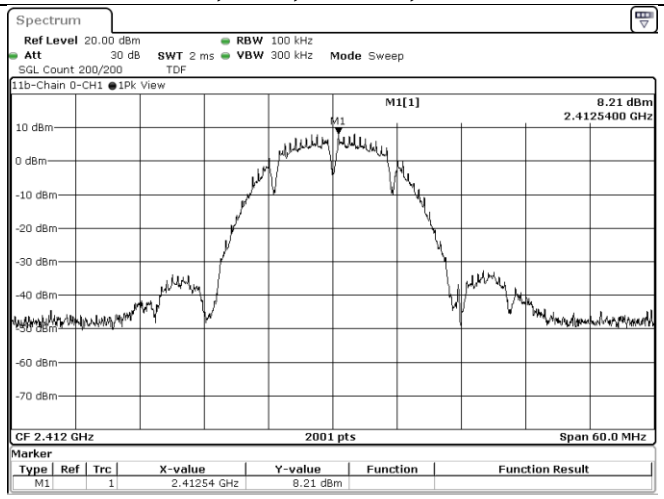
Test Setup



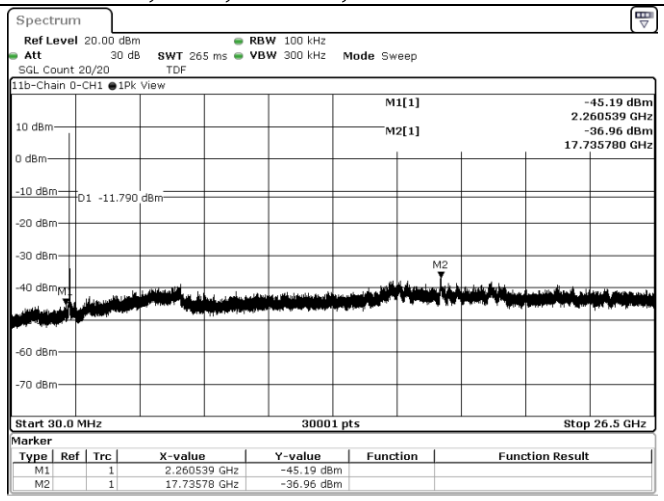
The loss between RF output port of the EUT and the input port of the Spectrum Analyzer has been taken into consideration.

Test Data

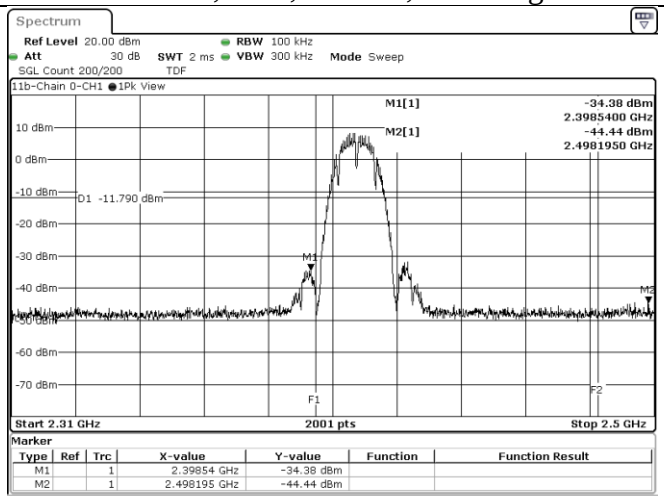
802.11b, CH1, Chain 0, Reference



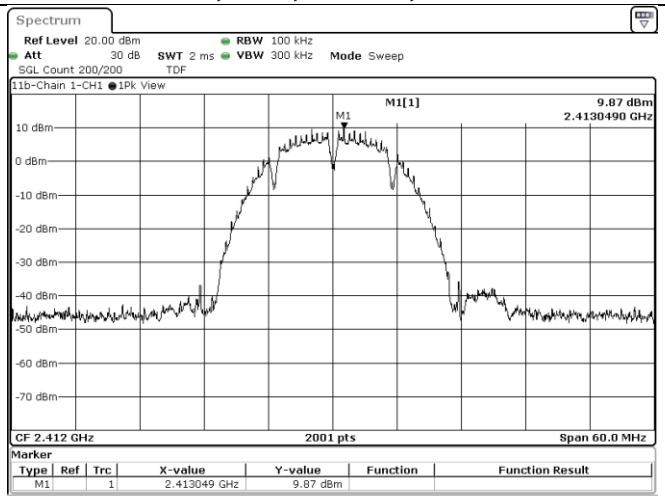
802.11b, CH1, Chain 0, Conducted Emission



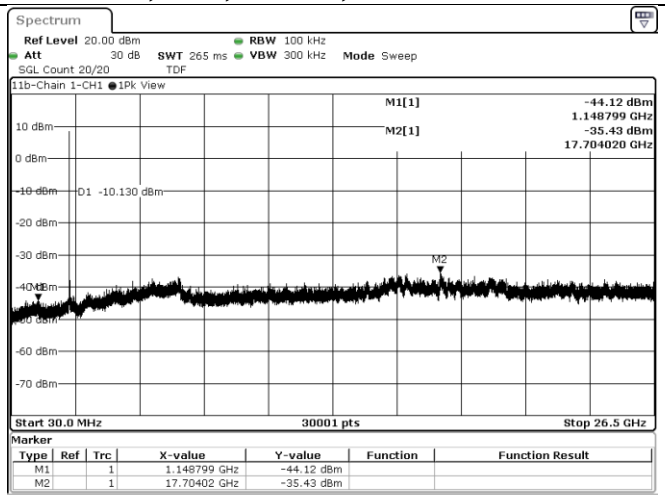
802.11b, CH1, Chain 0, Band edge



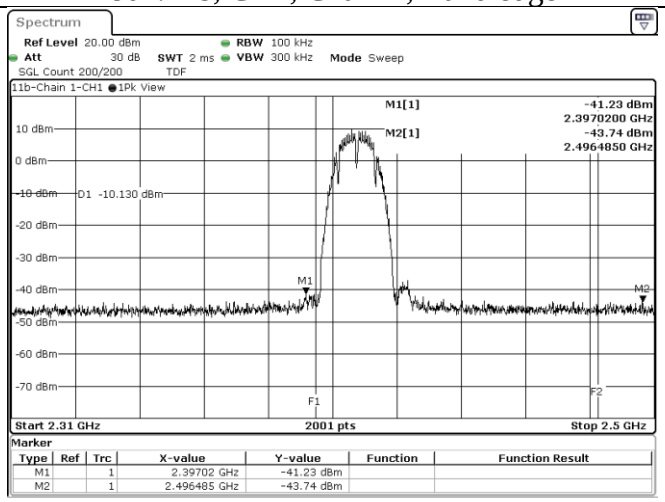
802.11b, CH1, Chain 1, Reference



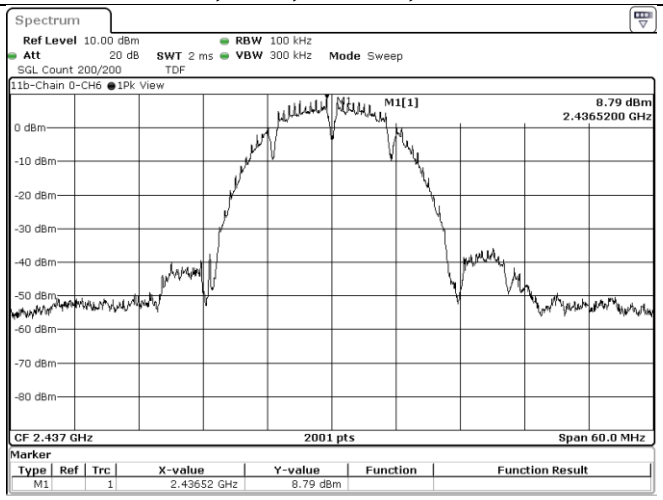
802.11b, CH1, Chain 1, Conducted Emission



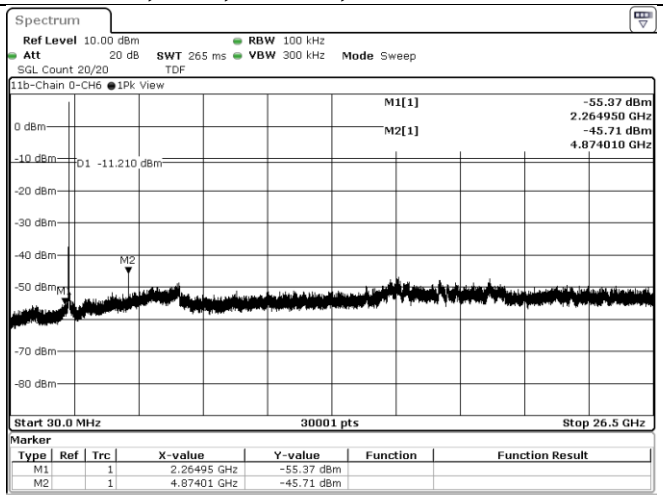
802.11b, CH1, Chain 1, Band edge



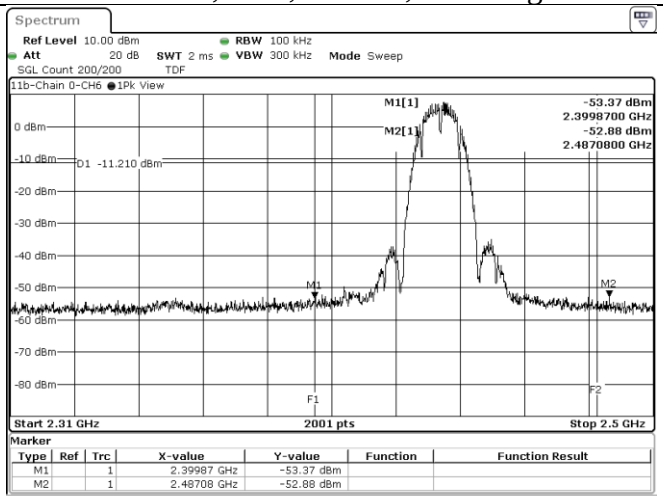
802.11b, CH6, Chain 0, Reference



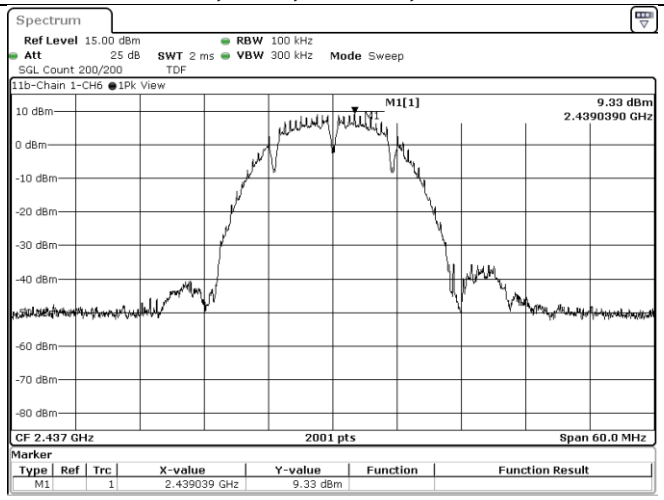
802.11b, CH6, Chain 0, Conducted Emission



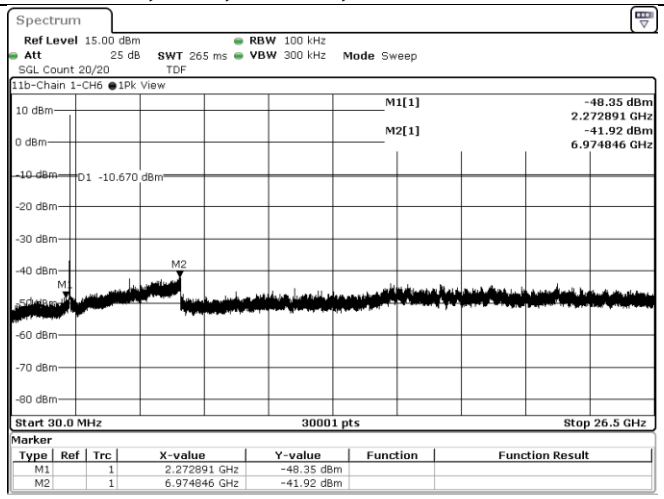
802.11b, CH6, Chain 0, Band edge



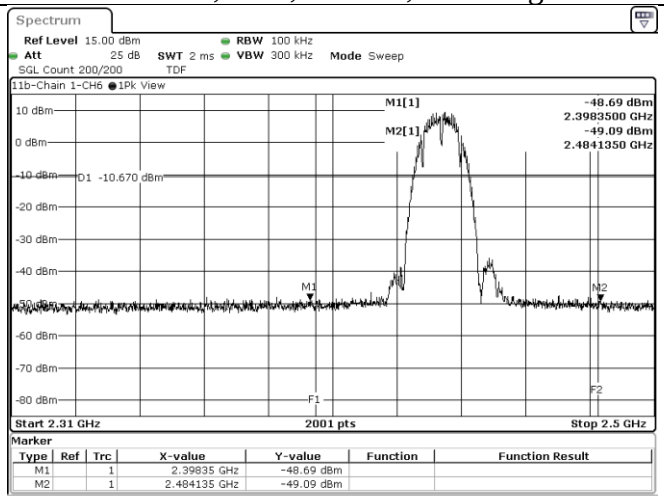
802.11b, CH6, Chain 1, Reference



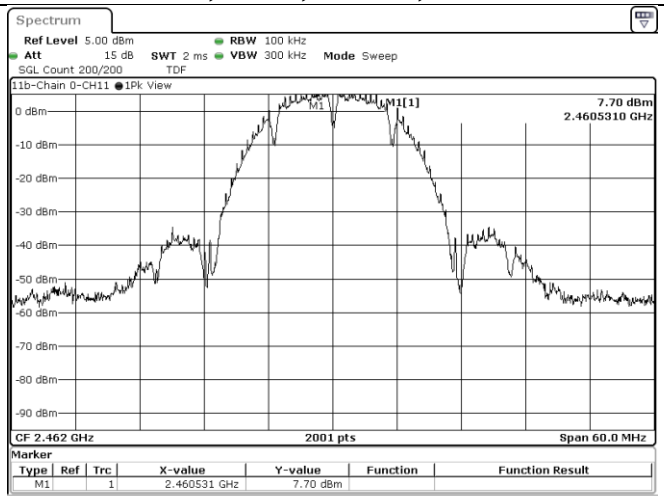
802.11b, CH6, Chain 1, Conducted Emission



802.11b, CH6, Chain 1, Band edge



802.11b, CH11, Chain 0, Reference



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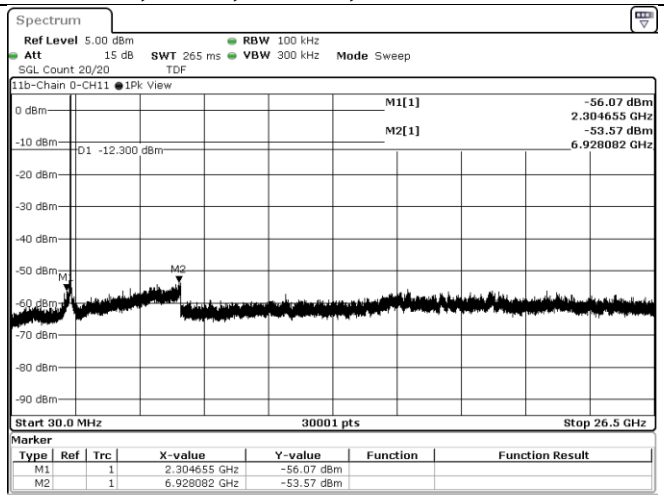

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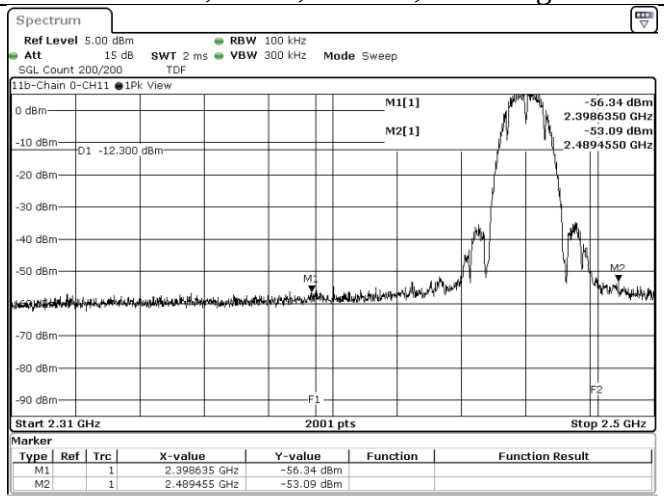

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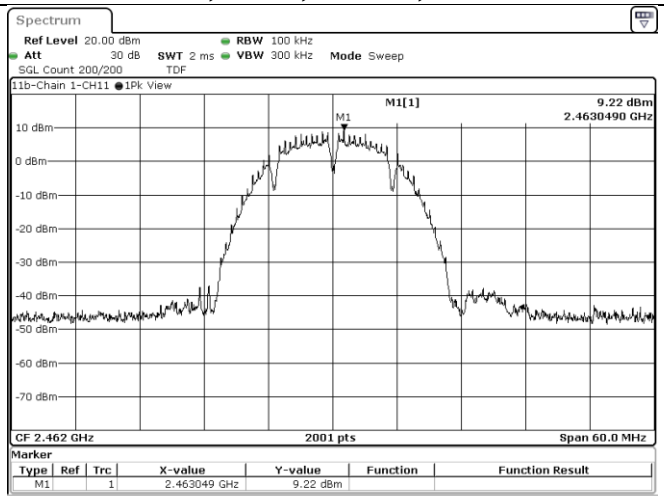

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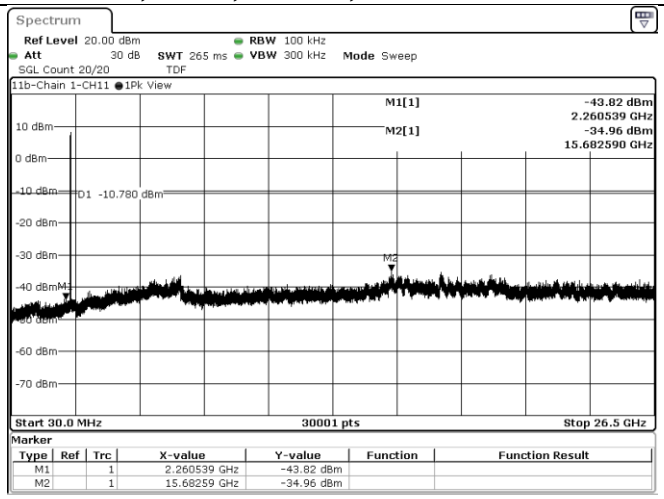
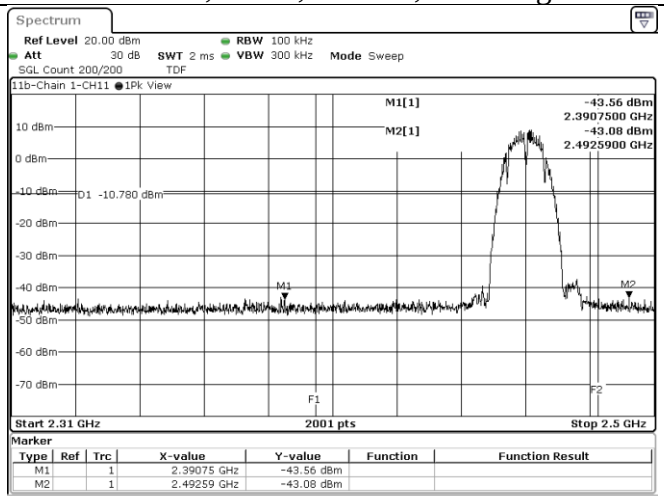
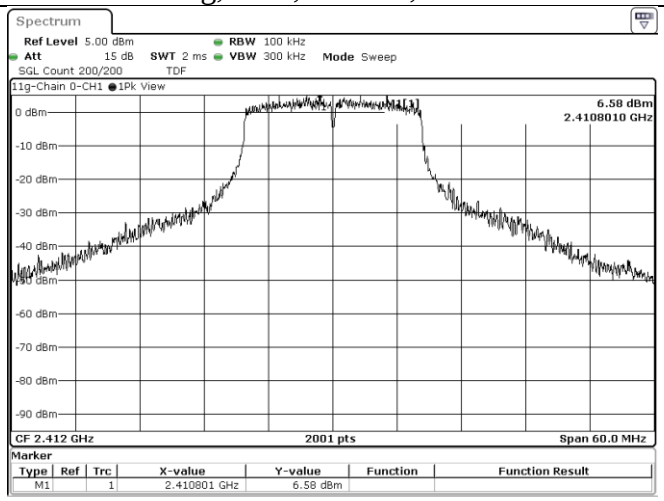


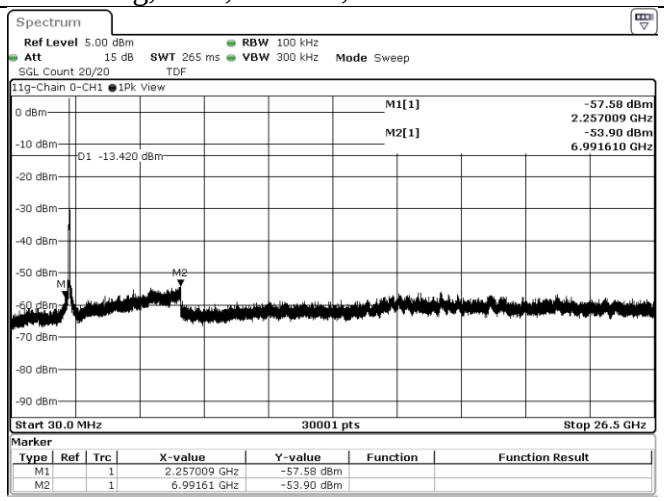
802.11b, CH11, Chain 1, Band edge



802.11g, CH1, Chain 0, Reference



802.11g, CH1, Chain 0, Conducted Emission



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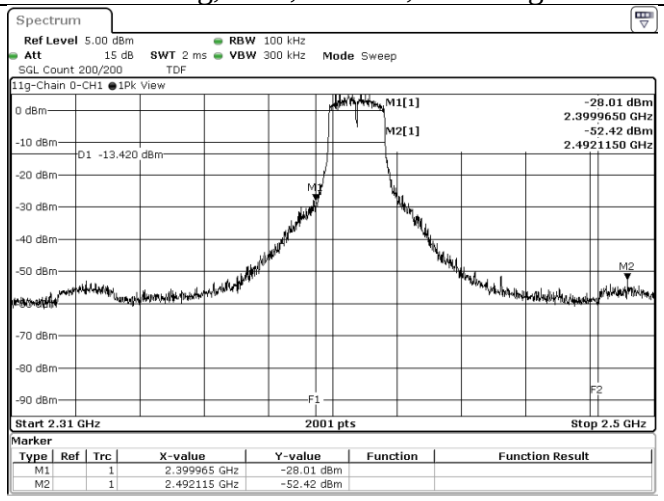

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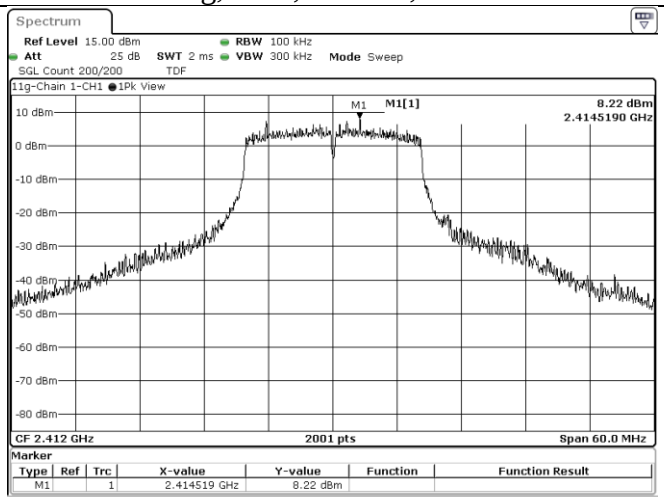

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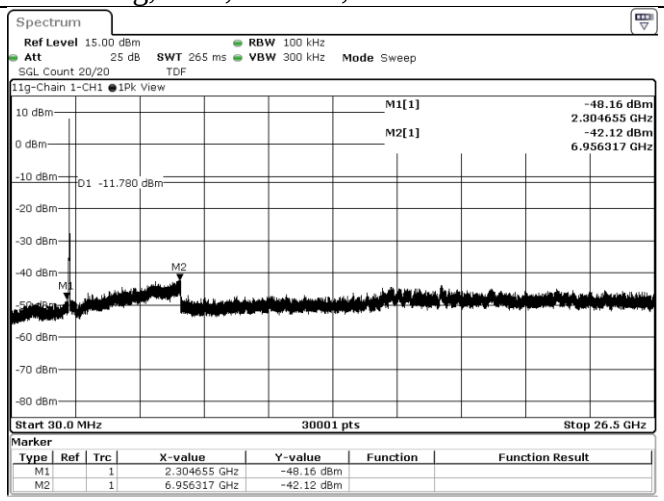
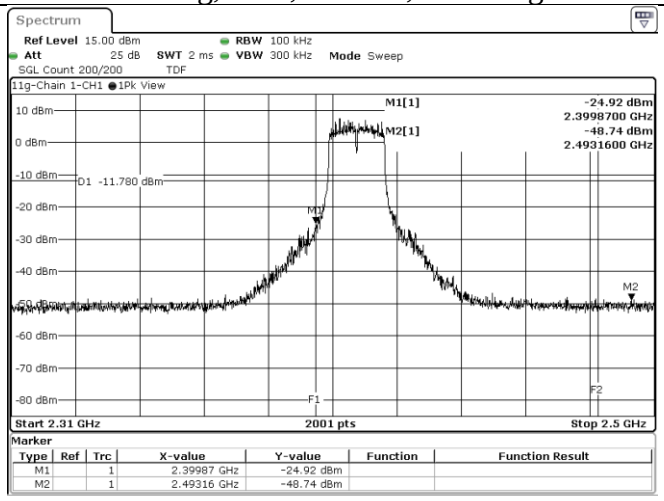


802.11g, CH1, Chain 1, Band edge



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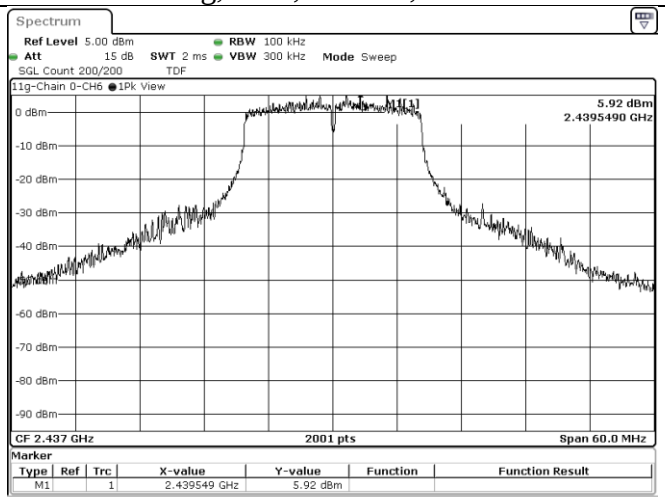
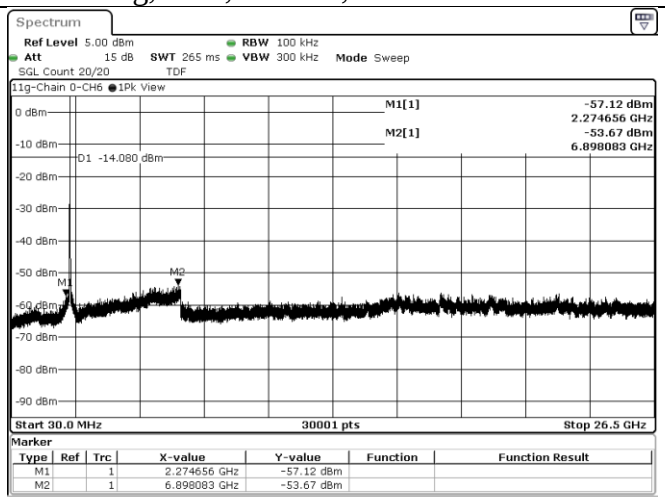


802.11g, CH6, Chain 0, Conducted Emission



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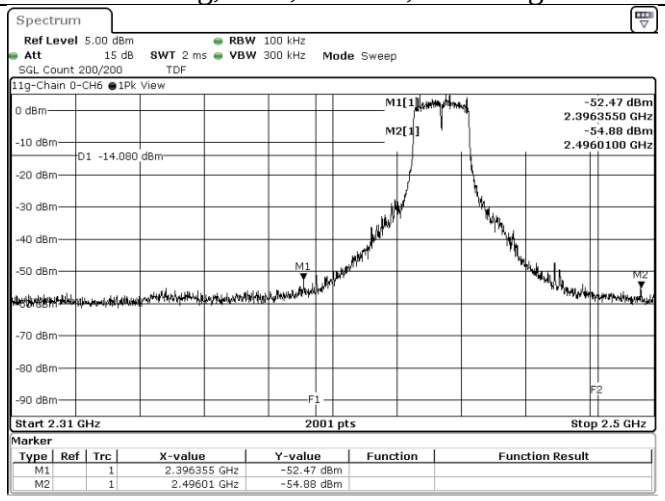

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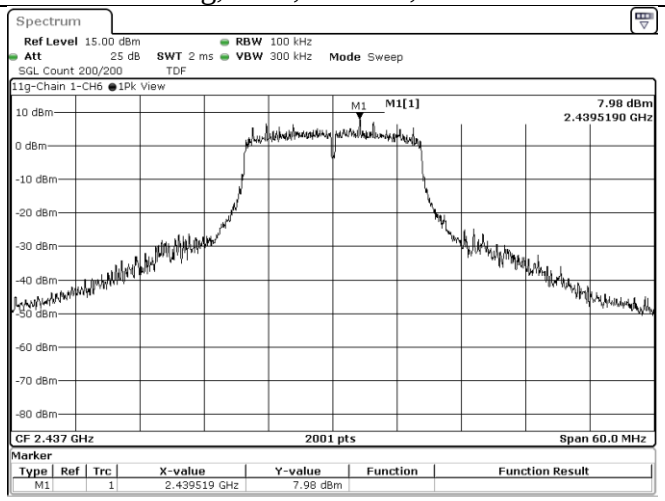
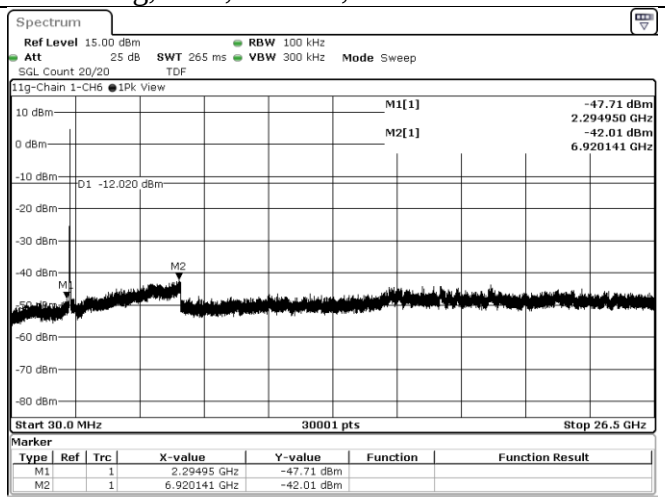


802.11g, CH6, Chain 1, Conducted Emission



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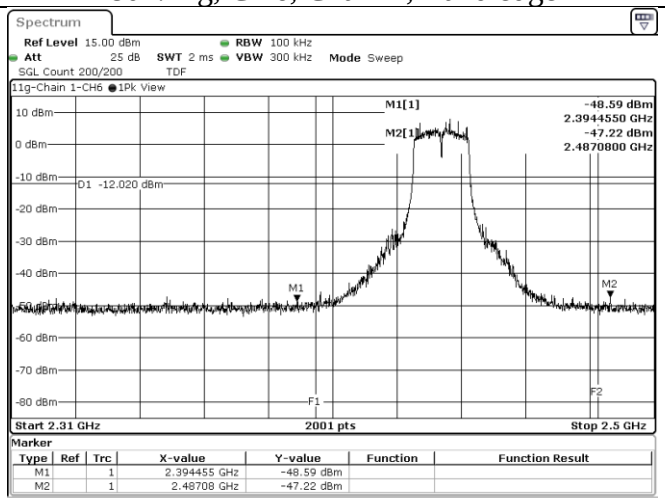

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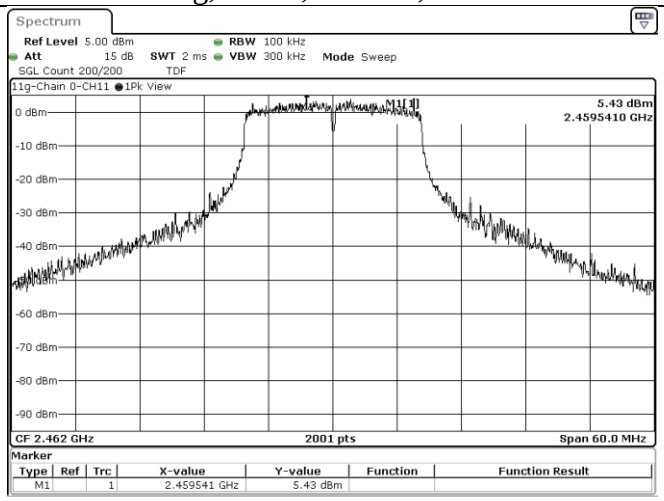

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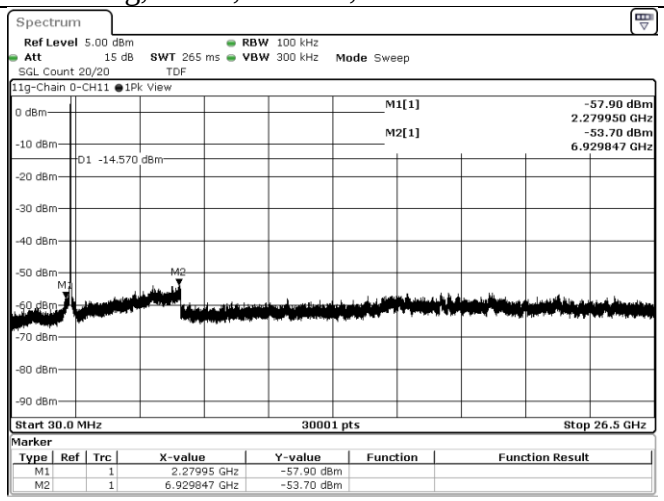
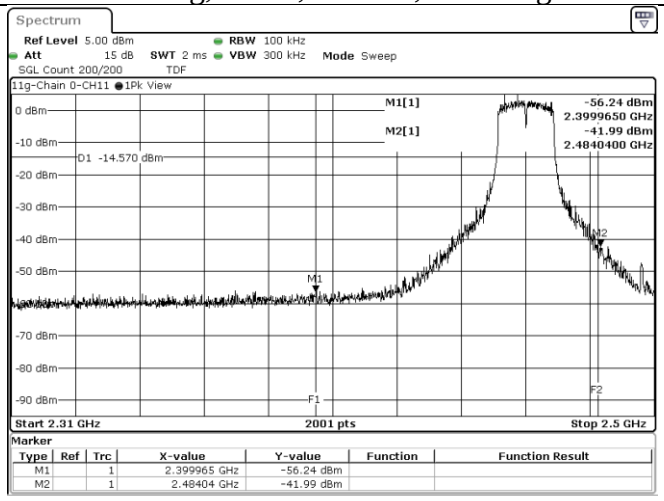


802.11g, CH11, Chain 0, Band edge



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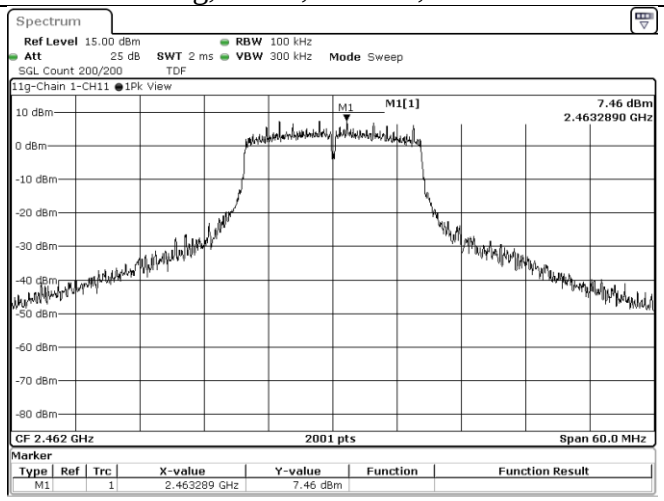

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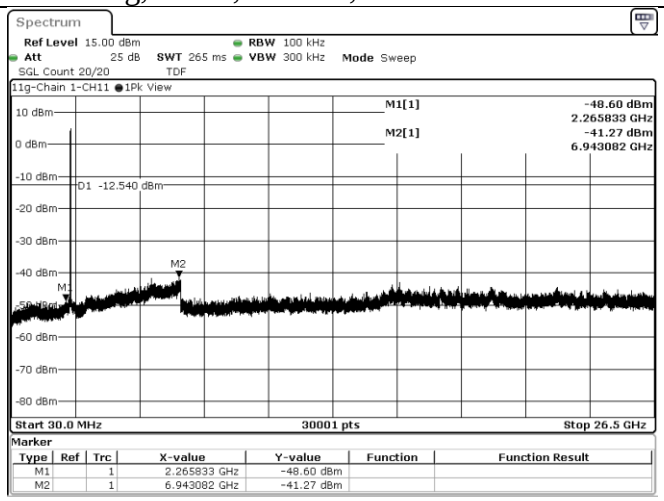
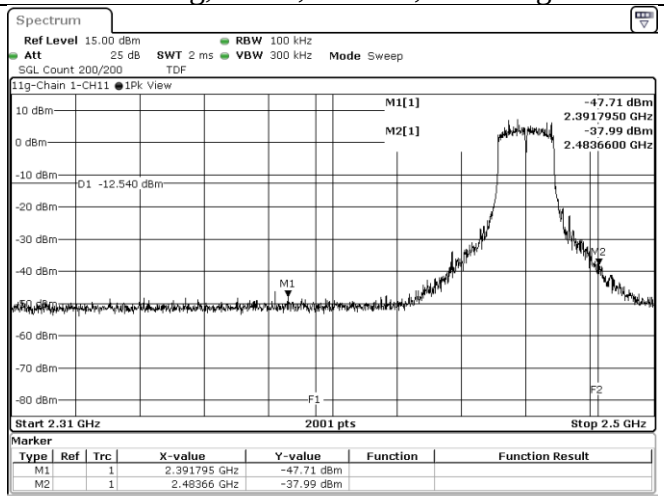
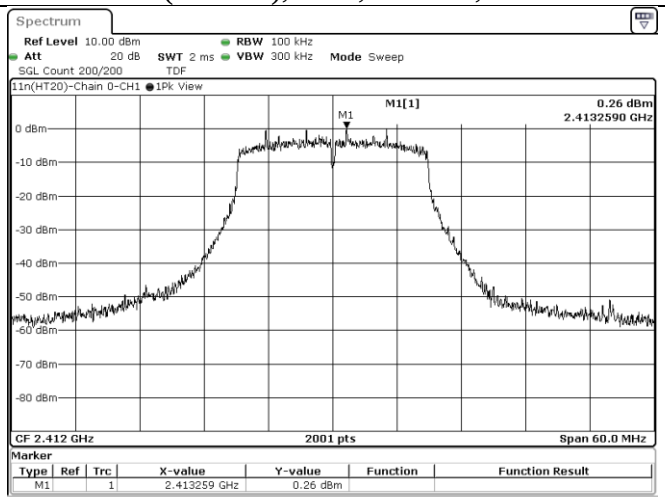


802.11g, CH11, Chain 1, Band edge



802.11ac(VHT20), CH1, Chain 0, Reference



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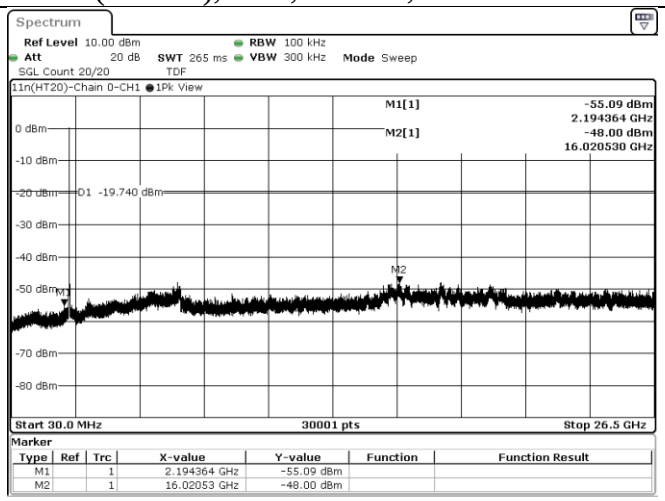

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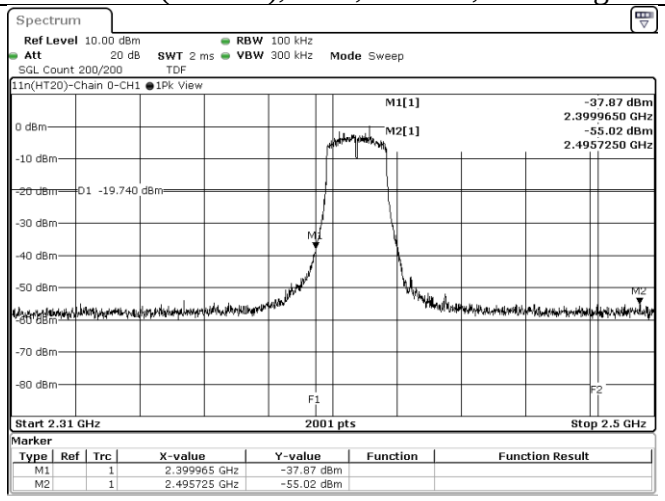
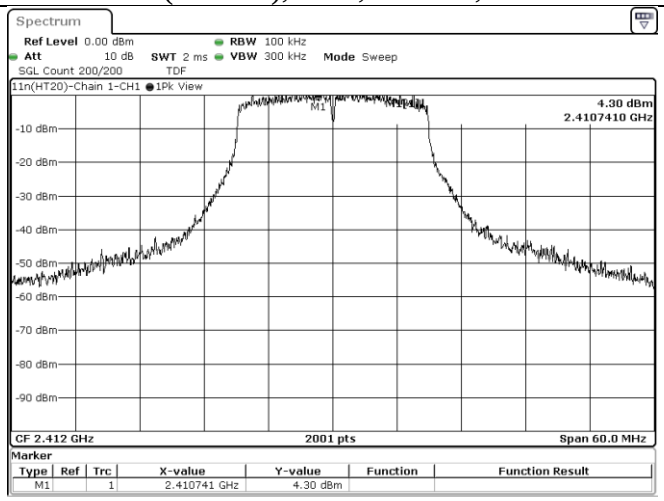


802.11ac(VHT20), CH1, Chain 1, Reference



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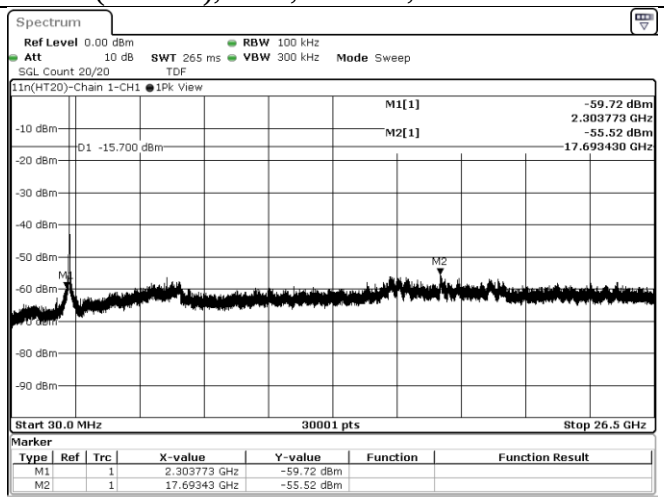
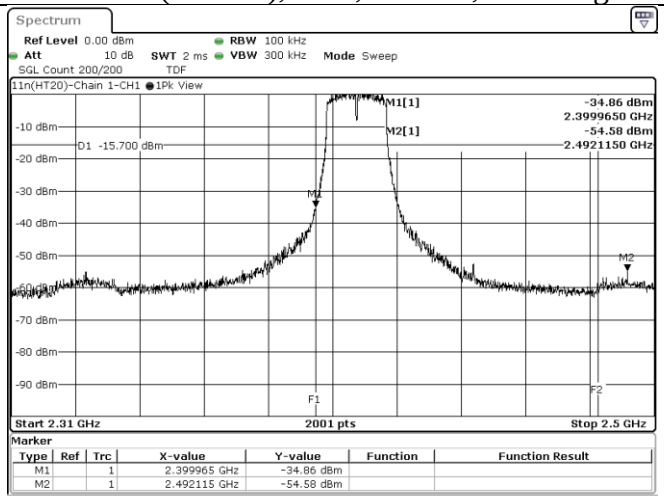
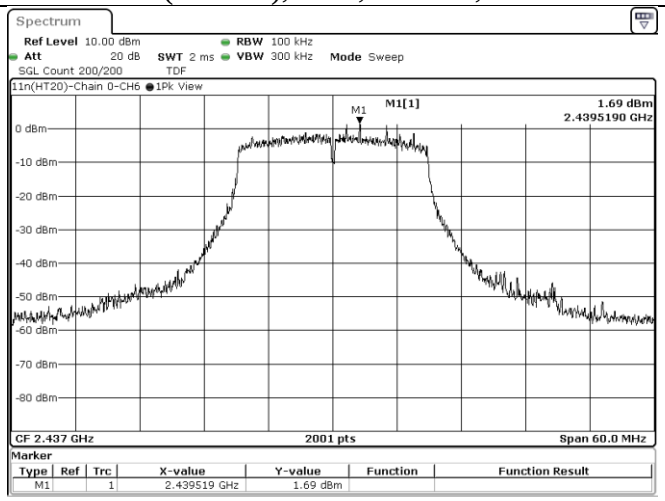


802.11ac(VHT20), CH1, Chain 1, Band edge



802.11ac(VHT20), CH6, Chain 0, Reference



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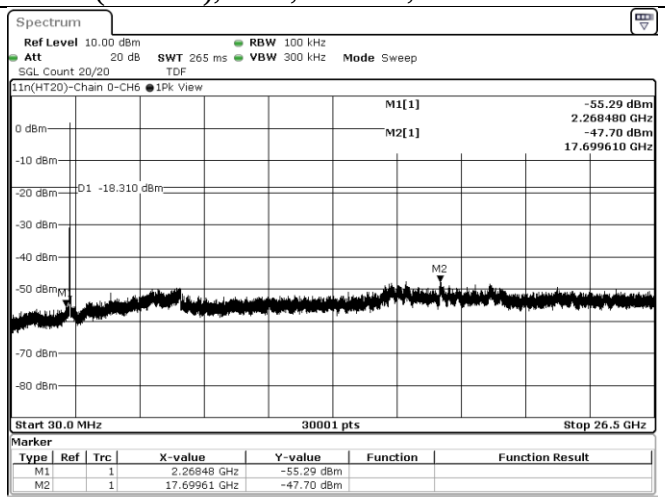

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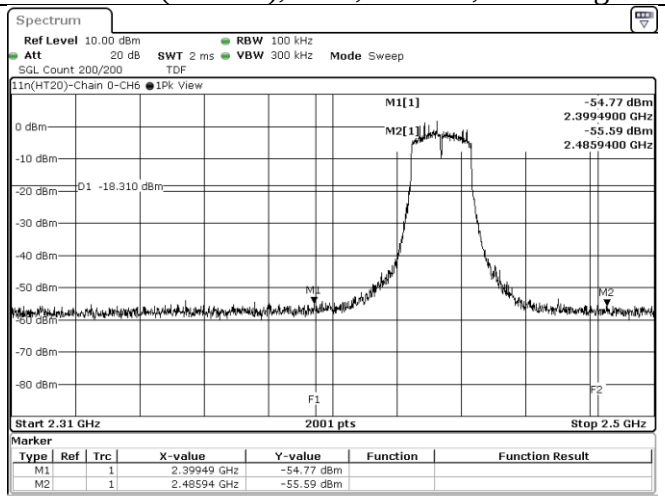

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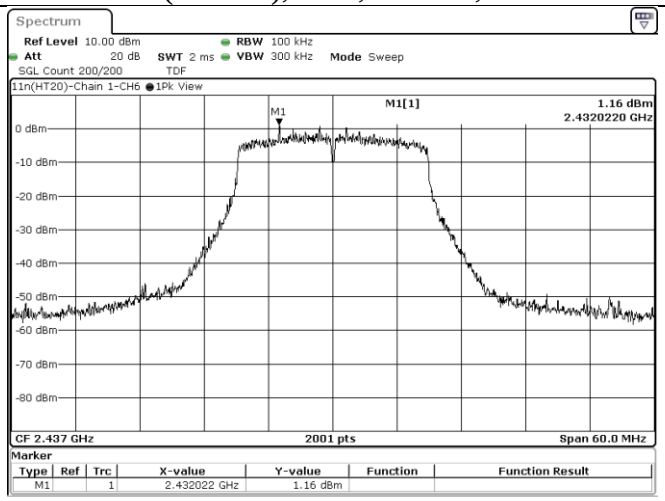

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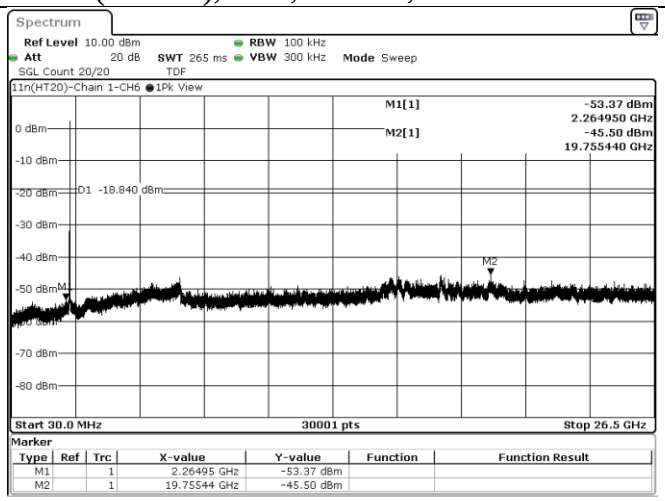
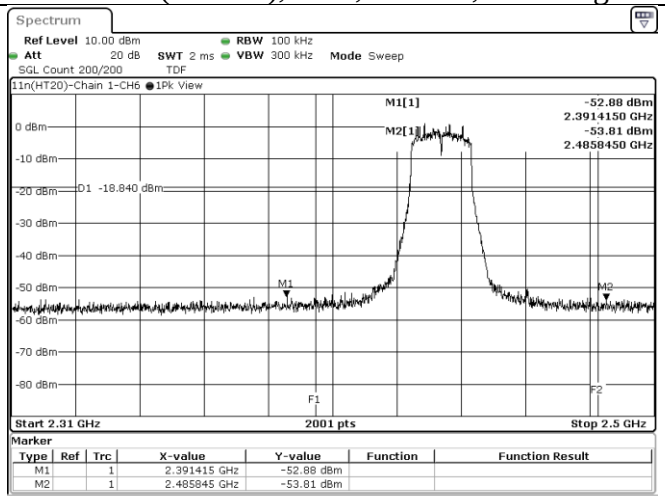
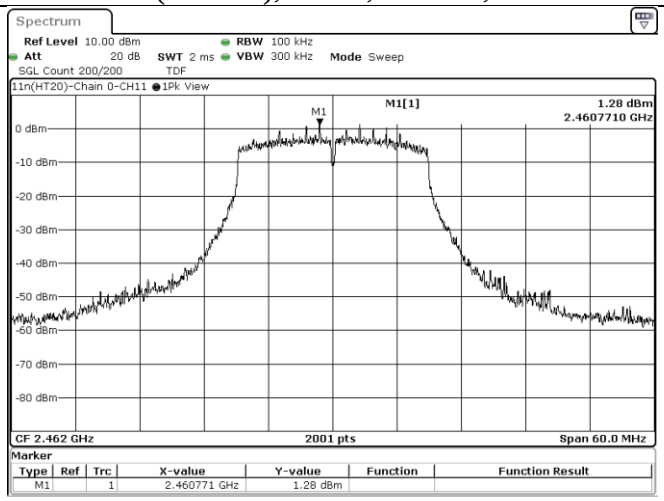


802.11ac(VHT20), CH6, Chain 1, Band edge



802.11ac(VHT20), CH11, Chain 0, Reference



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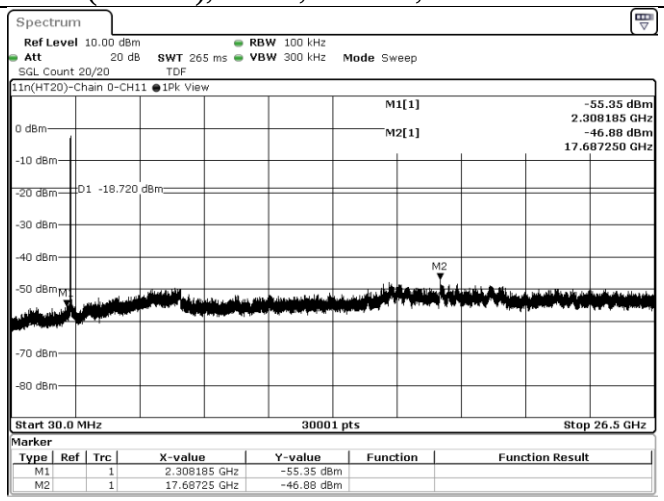
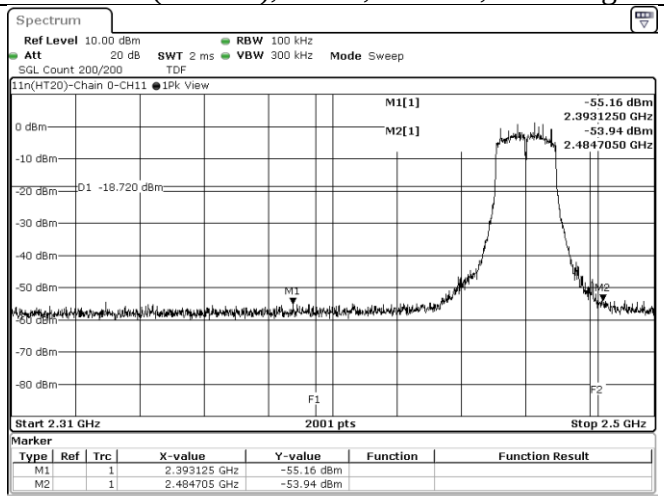


802.11ac(VHT20), CH11, Chain 0, Band edge



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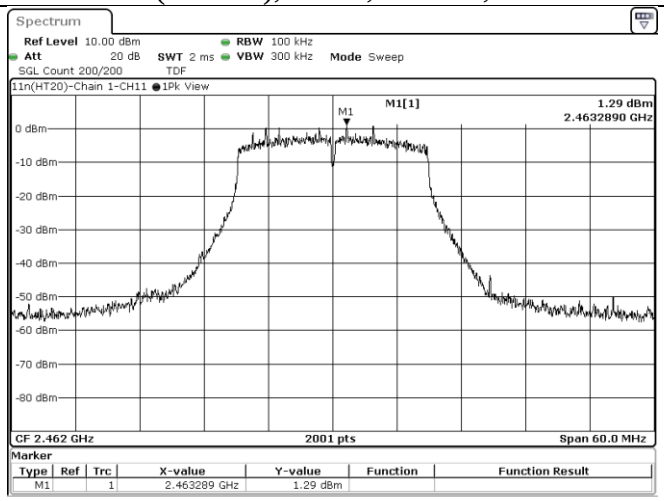

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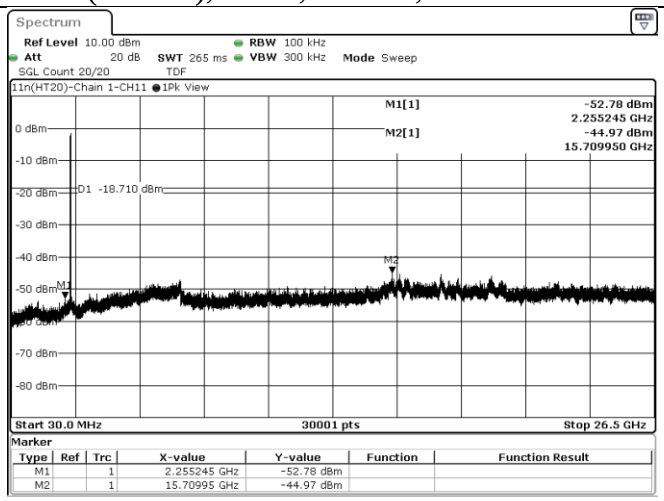
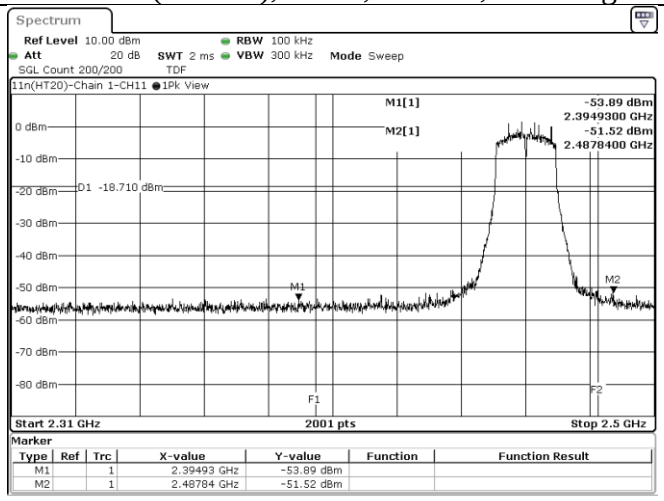
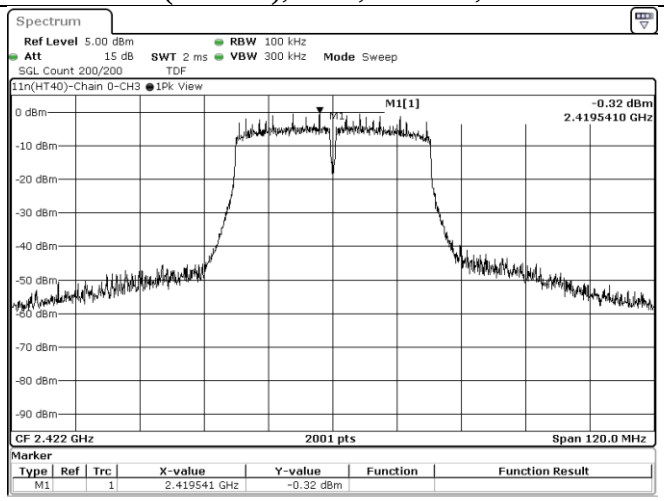


802.11ac(VHT20), CH11, Chain 1, Band edge



802.11ac(VHT40), CH3, Chain 0, Reference



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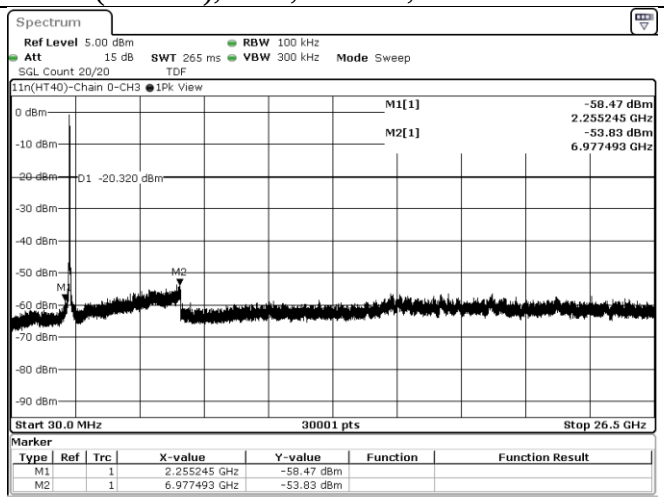

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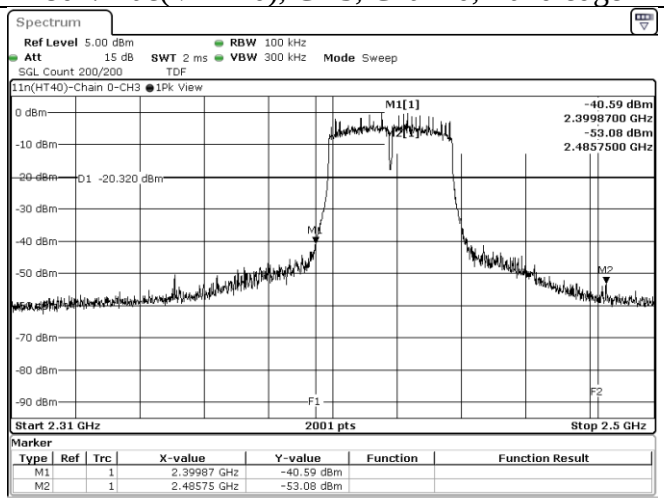
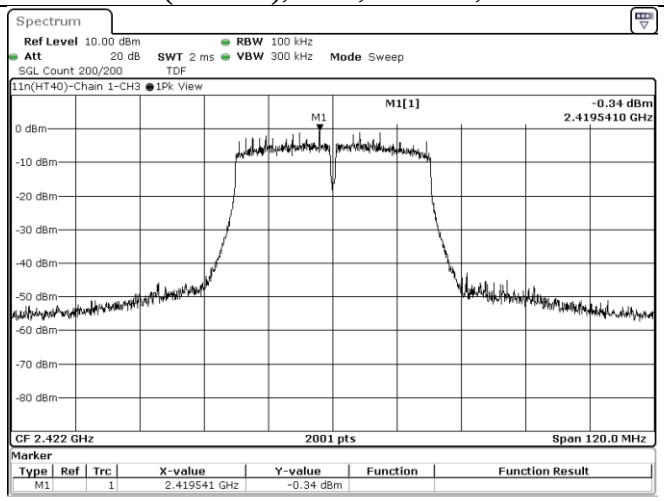


802.11ac(VHT40), CH3, Chain 1, Reference



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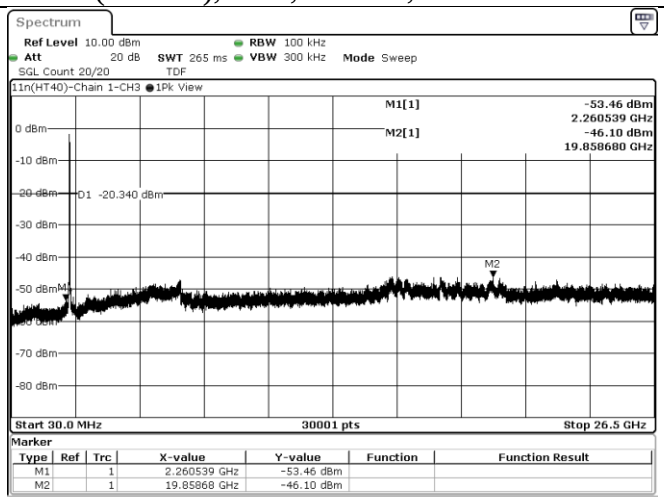

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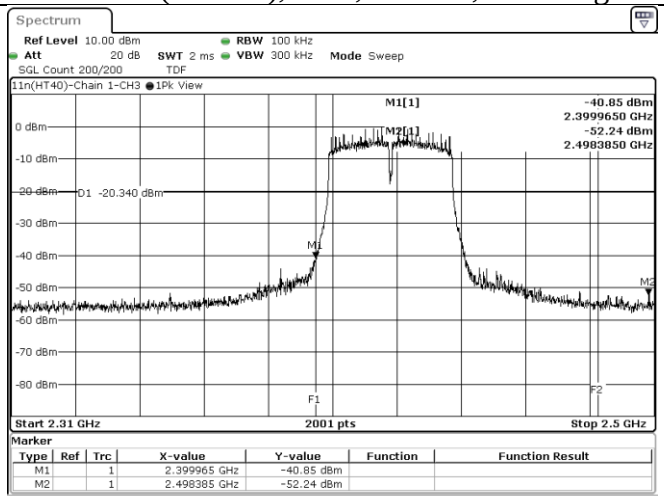
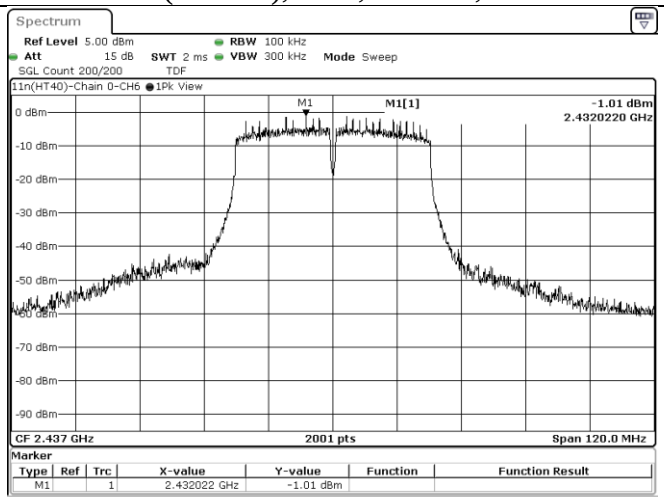
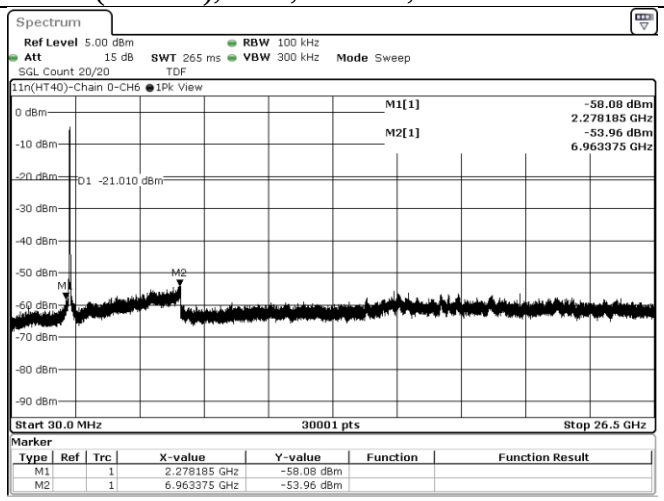


802.11ac(VHT40), CH6, Chain 0, Reference



802.11ac(VHT40), CH6, Chain 0, Conducted Emission



802.11ac(VHT40), CH6, Chain 0, Band edge