SGS-CSTC Standards Technical Services (Shanghai) Co., Ltd.

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1 Cover Page

FCC Part 15E TEST REPORT

Application No.:	SHEM1603001413CR
Applicant:	Hangzhou Hikvision Digital Technology Co., Ltd.
FCC ID:	2ADTD-CSSP
Equipment Under Test (EUT): **NOTE:** The following sample(s) was/were submitted and identified by the client as	
Product Name:	Action Camera
Model No.:	CS-SP208
Add Model No.:	CS-SP200, CS-SP206, CS-SP300, CS-SP306, CS-SP308
Standards:	FCC PART 15 Subpart E: 2015
Date of Receipt:	2016-03-29
Date of Test:	2016-03-31 to 2016-04-20
Date of Issue:	2016-04-27
Test Result:	**Pass***

*In the configuration tested, the EUT detailed in this report complied with the standards specified above.

Parlam Zhan
E&E Section Manager
SGS-CSTC (Shanghai) Co., Ltd.

The manufacturer should ensure that all products in series production are in conformity with the product sample detailed in this report. If the product in this report is used in any configuration other than that detailed in the report, the manufacturer must ensure the new system complies with all relevant standards.

The report must not be used by the client to claim product certification, approval, or endorsement by NVLAP, NIST, or any agency of the federal government. All test results in this report can be traceable to National or International Standards.

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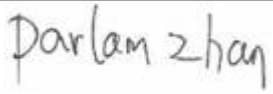
2 Version

Revision Record				
Version	**Chapter**	**Date**	**Modifier**	**Remark**
00	/	2016-04-27	/	Original

Authorized for issue by:				
Engineer		Eddy Zong **Print Name**		
Clerk		Susie Liu **Print Name**		
Reviewer		Parlam Zhan **Print Name**		

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3 Test Summary

Test Item	Test Requirement	Test method	Result
Antenna Requirement	15.203 & 15.407 a(1)&(3)	-	PASS
AC Power Line Conducted Emission	15.407 b(6)	ANSI C63.10 (2013) Clause 6.2	N/A
26 dB Emission bandwidth	15.403 i	KDB 789033 D02 KDB 644545 KDB662911 D01	PASS
Minimum 6 dB bandwidth (5.725-5.85 GHz band)	15.407 (e)		PASS
Maximum Conducted output power	15.407 a(1)&(3)		PASS
Transmitter Power Control	15.407 (h)(1)		N/A
Peak Power spectrum density	15.407 a(1)&(3)		PASS
Radiated Spurious emissions and Band-edge	15.209 & 15.407		PASS
Transmission in the Absence of Data	15.407 (c)		PASS
Frequency Stability	15.407 (g)		PASS
Dynamic Frequency Selection	15.407 (h)(2)	KDB 905462 D02 KDB 905462 D03	N/A

Notes: N/A: The device no DFS Band.

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4 Contents

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5 General Information

5.1 Client Information

Applicant:	Hangzhou Hikvision Digital Technology Co., Ltd.
Address of Applicant:	No. 555 Qianmo Road, Binjiang District, Hangzhou 310052, China
Manufacturer:	Hangzhou Hikvision Digital Technology Co., Ltd.
Address of Manufacturer:	No. 555 Qianmo Road, Binjiang District, Hangzhou 310052, China
Factory:	Hangzhou Hikvision Technology Co., Ltd.
Address of Factory:	No. 700 Dongliu Road, Binjiang District, Hangzhou 310052, Zhejiang, China

5.2 General Description of E.U.T.

Product Description:	Portable product with BT function		
Brand Name:	eZVIZ		
Rechargeable Batteries:	DC 3.8V Li-on Rechargeable Battery, 1200mAh Supply the EUT with fully charged battery during the testing.		
Rated Input:	DC 5V 1A		
Adapter:	Model No.:	ED2-050100UE	
	Rated Input:	AC 100V-240V 50/60Hz 0.3A	
	Rated Output:	DC 5V 1.0A	
	Cable length:	AC port:	2 wires
		DC port:	100 cm

5.3 Technical Specifications

Operation Frequency:	802.11a/n(HT20)/ac(VHT20):U-NII 1:5180-5240MHz, U-NII-3:5745-5825MHz 802.11n(HT40)/ac(VHT40): U-NII 1:5190-5230MHz, U-NII 3:5755-5795MHz 802.11ac(VHT80): U-NII 1:5210 MHz, U-NII 3:5775 MHz
Modulation Technique:	OFDM(256QAM, 64QAM, 16QAM, QPSK, BPSK) Remark: 256QAM for 802.11 ac only
Data Rate:	802.11a: 6/9/12/18/24/36/48/54Mbps 802.11n(HT20)/n(HT40): MCS0-7 up to 300Mbps 802.11ac(VHT20)/ac(VHT40)/ac(VHT80): MCS0-9 up to 866.3Mbps
Antenna Type	Integral
Antenna Gain	3dBi
Number of Channel:	802.11 a/n(HT20)/ac(HT20): 9 Channel: 36,40,44,48, 149, 153, 157,161,165 802.11 n(HT40)/ac(HT40): 4 Channel: 38,46, 151,159 802.11 ac(HT80): 2 Channel 42,155

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5.4 Test Mode

Test Mode	Description of Test Mode
Engineering mode	Using test software to control EUT working in continuous transmitting, and select channel and modulation type.

5.5 Test Channel

Preliminary tests were performed in all tests in different data rata and antenna configurations at lowest channel, the data rates of worse case as below were chosen for final test.

Band	802.11a			802.11 n(HT20)			802.11n(HT40)		
	Channel	Freq	Rate	Chan	Freq	Rate	Channel	Freq	Rate
U-NII 1	36	5180	6 Mbps	36	5180	MSC0	38	5190	MSC0
	44	5220	6 Mbps	44	5200	MSC0	-	-	-
	48	5240	6 Mbps	48	5240	MSC0	46	5230	MSC0
U-NII 3	149	5745	6 Mbps	149	5745	MSC0	151	5755	MSC0
	157	5785	6 Mbps	157	5785	MSC0	-	-	-
	165	5825	6Mbps	165	5825	MSC0	159	5795	MSC0
Band	802.11ac(HT20)			802.11 ac(HT40)			802.11ac(HT80)		
	Channel	Freq	Rate	Chan	Freq	Rate	Channel	Freq	Rate
U-NII 1	36	5180	MSC0	38	5190	MSC0	42	5210	MSC0
	44	5220	MSC0	-	-	-	-	-	-
	48	5240	MSC0	46	5230	MSC0			
U-NII 3	149	5745	MSC0	151	5755		155	5775	MSC0
	157	5785	MSC0	-	-	-	-	-	-
	165	5825	MSC0	159	5795	MSC0	-	-	-

5.6 Description of Support Units

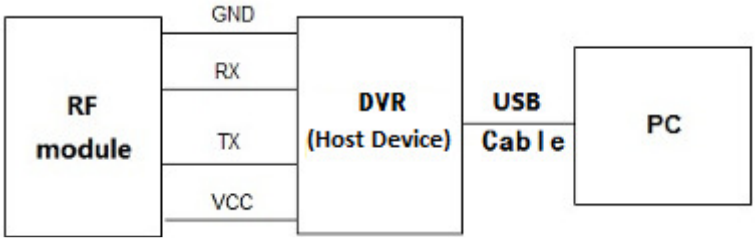
The EUT has been tested with support equipments as below.

Description	Manufacturer	Model No.	Supplied By
Laptop	Lenovo	ThinkPad X100e	SGS
Serial port adapter plate	/	Test Plate 3	SGS

Software name	Manufacturer	Version	Supplied By
QCART	/	/	Client

Cable Type	Length, m	Shield	Ferrite
USB	0.8	Yes	No

Description of connection:



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5.7 Test Location

All tests were performed at:

SGS-CSTC Standards Technical Services (Shanghai) Co., Ltd.

No.588 West Jindu Road, Songjiang District, Shanghai, China.201612.

Tel: +86 21 6191 5666

Fax: +86 21 6191 5678

5.8 Test Facility

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

- **CNAS (No. CNAS L0599)**

  CNAS has accredited SGS-CSTC Standards Technical Services (Shanghai) Co., Ltd. to ISO/IEC 17025:2005 General Requirements for the Competence of Testing and Calibration Laboratories (CNAS-CL01 Accreditation Criteria for the Competence of Testing and Calibration Laboratories) for the competence in the field of testing.

- **FCC – Registration No.: 402683**

  SGS-CSTC Standards Technical Services (Shanghai) Co., Ltd. has been registered and fully described in a report filed with the Federal Communications Commission (FCC). The acceptance letter from the FCC is maintained in our files. Registration No.: 402683.

- **Industry Canada (IC) – IC Assigned Code: 8617A**

  The 3m Semi-anechoic chamber of SGS-CSTC Standards Technical Services (Shanghai) Co., Ltd. has been registered by Certification and Engineering Bureau of Industry Canada for radio equipment testing with Registration No.: 8617A-1.

- **VCCI (Member No.: 3061)**

  The 3m Semi-anechoic chamber and Shielded Room of SGS-CSTC Standards Technical Services (Shanghai) Co., Ltd. has been registered in accordance with the Regulations for Voluntary Control Measures with Registration No.: R-3868 and C-4336 respectively.

5.9 Measurement Uncertainty

No.	Parameter	Measurement Uncertainty
1	Radio Frequency	< ±1 x 10^{-5}
2	Total RF power, conducted	< ±1.5 dB
3	RF power density, conducted	< ±3 dB
4	Spurious emissions, conducted	< ±3 dB
5	All emissions, radiated	< ±6 dB (30MHz – 1GHz) < ±6 dB (above 1GHz)
6	Temperature	< ±1°C
7	Humidity	< ±5 %
8	DC and low frequency voltages	< ±3 %

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6 Equipments Used during Test

Item	Test Equipment	Manufacturer	Model No.	Serial No.	Cal. Date	Cal. Due date
1	Power meter	Rohde & Schwarz	NRP	101641	2016-01-14	2017-01-13
2	Power Sensor	Rohde & Schwarz	NRP-Z22	101096	2015-08-06	2016-08-05
3	Spectrum Analyzer	Rohde & Schwarz	FSP-30	2705121009	2016-01-14	2017-01-13
4	EMI test receiver	Rohde & Schwarz	ESU40	100109	2015-02-13	2017-01-15
5	Active Loop Antenna (9kHz to 30MHz)	Rohde & Schwarz	FMZB1519	1519-034	2015-02-07	2017-01-15
6	Broadband UHF-VHF ANTENNA (25MHz to 2GHz)	SCHWARZBECK	VULB9168	9168-313	2015-02-07	2017-01-15
7	Ultra broadband antenna (25MHz to3GHz)	Rohde & Schwarz	HL562	100227	2015-08-30	2016-08-29
8	Horn Antenna (1GHz to 18GHz)	Rohde & Schwarz	HF906	100284	2015-02-07	2017-01-15
9	Horn Antenna (1GHz to 18GHz)	SCHWARZBECK	BBHA9120D	9120D-679	2015-02-07	2017-01-15
10	Horn Antenna(14GHz to 40GHz)	SCHWARZBECK	BBHA 9170	BBHA917-0373	2015-02-13	2017-01-15
11	Pre-amplifier (9KHz – 2GHz)	LNA6900	TESEQ	71033	/	/
12	Pre-amplifier (1GHz – 26.5GHz)	SCHWARZBECK	SCU-F0118-G40-BZ4-CSS(F)	10001	2016-01-14	2017-01-13
13	Pre-amplifie (14GHz – 40GHz)	SCHWARZBECK	SCU-F1840-G35-BZ3-CSS(F)	10001	2016-01-14	2017-01-13
14	Tunable Notch Filter	Wainwright instruments Gmbh	WRCT800.0/880.0-0.2/40-5SSK	170397 169777 169780 192507	/	/
15	High pass Filter	FSCW	HP 12/2800-5AA2	19A45-02	/	/
16	High-low temperature cabinet	Suzhou Zhihe	TL-40	50110050	2015-09-11	2016-09-10
17	AC power stabilizer	WOCEN	6100	51122	2016-01-14	2017-01-13
18	DC power	QJE	QJ30003SII	3573/4/3	2016-01-14	2017-01-13
19	Signal Generator (Interferer)	Rohde & Schwarz	SMR40	100555	2015-08-13	2016-08-12
20	Signal Generator (Blocker)	Rohde & Schwarz	SMJ100A	101394	2016-01-14	2017-01-13
21	Splitter	Anritsu	MA1612A	M12265	/	/
22	Coupler	e-meca	803-S-1	900-M01	/	/

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7 Test Results

7.1 E.U.T. Test Conditions

Test Voltage: DC 3.8V

Requirements: 15.31(e) For intentional radiators, measurements of the variation of the input power or the radiated signal level of the fundamental frequency component of the emission, as appropriate, shall be performed with the supply voltage varied between 85% and 115% of the nominal rated supply voltage. For battery operated equipment, the equipment tests shall be performed using a new battery.

Operating Environment:

Temperature:	20.0 -25.0 °C
Humidity:	35-75 % RH
Atmospheric Pressure:	99.2 -102.0 kPa

Test frequencies: According to the 15.31(m) Measurements on intentional radiators or receivers, other than TV broadcast receivers, shall be performed and. if required. reported for each band in which the device can be operated with the device operating at the number of frequencies in each band specified in the following table:

Frequency range over which device operates	Number of frequencies	Location in the range of operation
1 MHz or less	1	Middle
1 to 10 MHz	2	1 near top and 1 near bottom
More than 10 MHz	3	1 near top. 1 near middle and 1 near bottom

Pursuant to Part 15.31(c) For swept frequency equipment, measurements shall be made with the frequency sweep stopped at those frequencies chosen for the measurements to be reported

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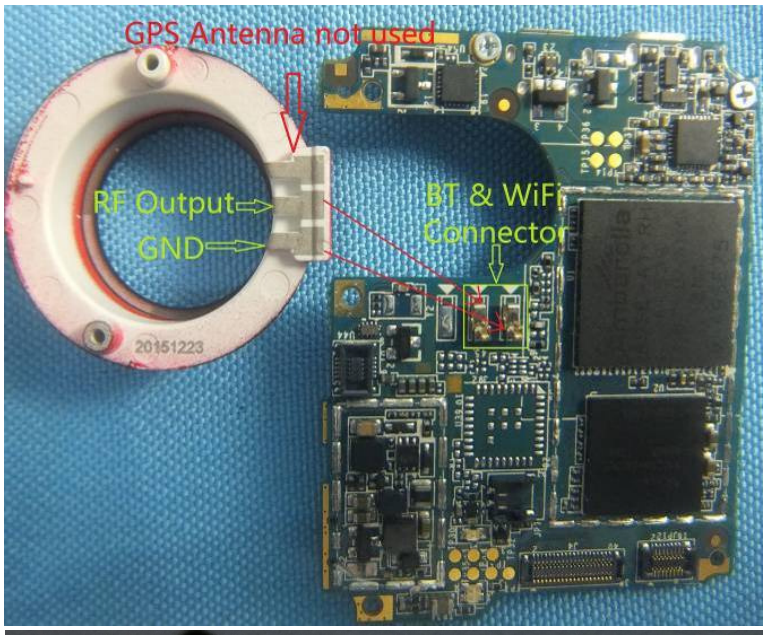
7.2 Antenna Requirement

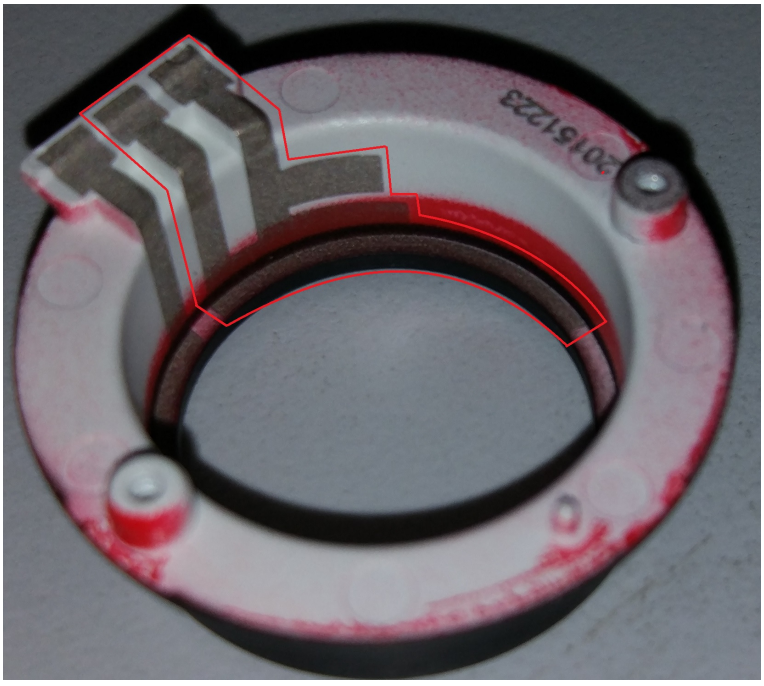
15.203Standard requirement:

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

EUT Antenna:

The antenna is PIFA antenna and no consideration of replacement.. The gain is less than 3.0dBi.





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7.3 Conducted Emissions on Mains Terminals

Frequency Range: 150 KHz to 30 MHz

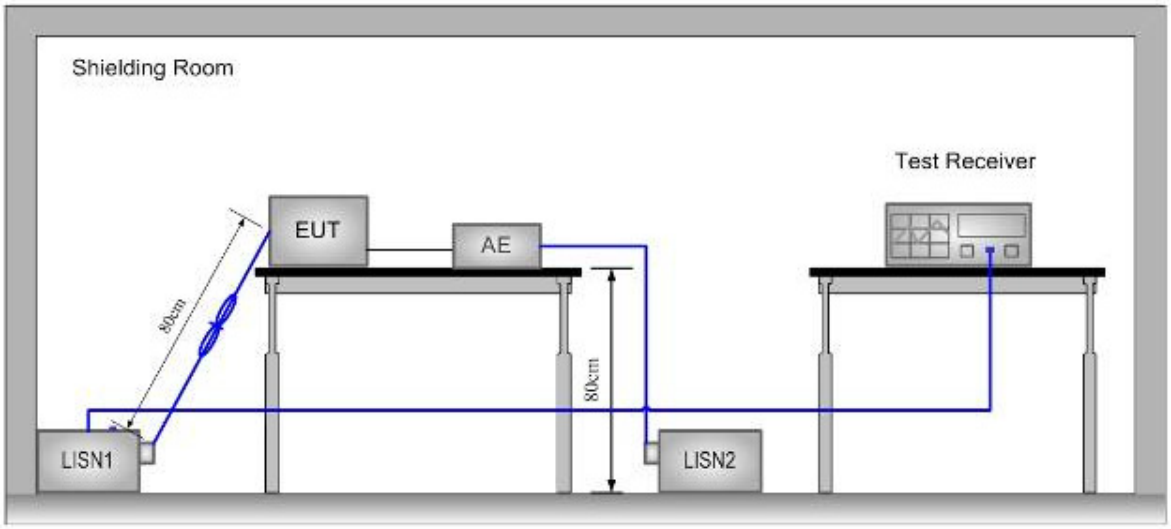
Class/Severity: Class B

Limit:

Frequency range MHz	Class B Limits: dB (μV)	
	Quasi-peak	Average
0.15 to 0.50	66 to 56	56 to 46
0.50 to 5	56	46
5 to 30	60	50
Note1: The limit decreases linearly with the logarithm of the frequency in the range 0.15 MHz to 0.50MHz. Note2: The lower limit is applicable at the transition frequency.		

Test site/setup: Test instrumentation set-up:

Frequency Range	Detector	RBW	VBW
9KHz to 150Hz	Quasi-peak	200Hz	500Hz
150KHz to 30MHz	Quasi-peak	9kHz	30kHz



Test Procedure:

a) The mains terminal disturbance voltage was measured with the EUT in a shielded room.

b) The EUT was connected to AC power source through a LISN 1 (Line Impedance Stabilization Network) which provides 50Ω/50μH + 5Ω linear impedance. The power cables of all other units of the EUT were connected to a second LISN, which was bonded to the ground reference plane in the same way as the LISN for the unit being measured. A multiple socket outlet strip was used to connect multiple power cables to a single LISN provided the rating of the LISN was not exceeded

c) The tabletop EUT was placed upon a non-metallic table 0.8m above the ground reference plane. And for floor-standing arrangement, the EUT was placed on the horizontal ground reference plane, but separated from metallic contact with the ground reference plane by 0.1m of insulation.

d) The test was performed with a vertical ground reference plane. The rear of the EUT shall be 0.4 m from the vertical ground reference plane. The vertical ground reference plane was bonded to

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the horizontal ground reference plane. The LISN was placed 0.8 m from the boundary of the unit under test and bonded to a ground reference plane for LISN mounted on top of the ground reference plane. This distance was between the closest points of the LISN and the EUT. The mains lead of EUT excess 0.8m was folded back and forth parallel to the lead so as to form a horizontal bundle with a length between 0.3m and 0.4m. All other units of the EUT and associated equipment were at least 0.8 m from the LISN.

Remark: Pre-scan was performed with peak detected on all ports, Quasi-peak & average measurements were performed at the frequencies at which maximum peak emission level were detected. Pretest under all modes; choose the worst case mode (802.11a in Middle channel) record on the report. Please see the attached Quasi-peak and Average test results.

Test Result: Pass

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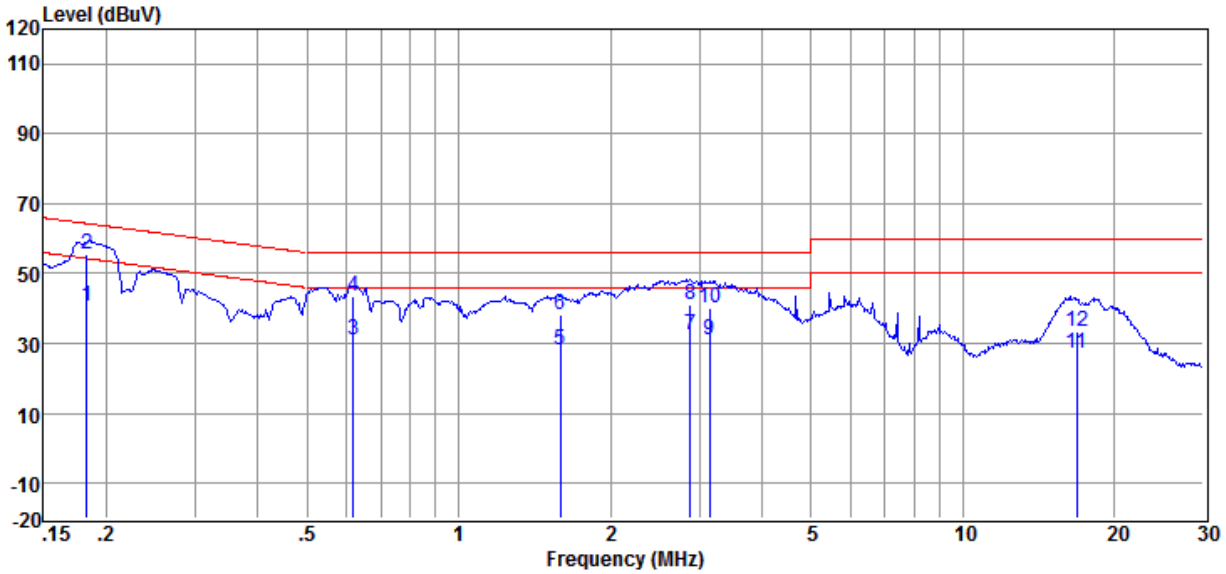
Test Data:

Test Mode:	802.11a	**Test Channel:**	Channel 157
Test Port:	AC Live Line		



Item	Freq.	Read Level	LISN Factor	Cable Loss	Level	Limit Line	Over Limit	Detector
(Mark)	(MHz)	(dBµV)	(dB)	(dB)	(dBµV)	(dBµV)	(dB)	
1	0.183	30.26	0.28	9.86	40.40	54.34	-13.94	Average
2	0.183	45.48	0.28	9.86	55.62	64.34	-8.72	QP
3	0.617	20.76	0.23	9.86	30.85	46.00	-15.15	Average
4	0.617	33.30	0.23	9.86	43.39	56.00	-12.61	QP
5	1.589	18.11	0.30	9.87	28.28	46.00	-17.72	Average
6	1.589	28.07	0.30	9.87	38.24	56.00	-17.76	QP
7	2.880	21.97	0.37	9.87	32.21	46.00	-13.79	Average
8	2.880	31.01	0.37	9.87	41.25	56.00	-14.75	QP
9	3.139	20.98	0.37	9.87	31.22	46.00	-14.78	Average
10	3.139	29.76	0.37	9.87	40.00	56.00	-16.00	QP
11	16.815	16.95	0.37	9.94	27.26	50.00	-22.74	Average
12	16.815	23.06	0.37	9.94	33.37	60.00	-26.63	QP

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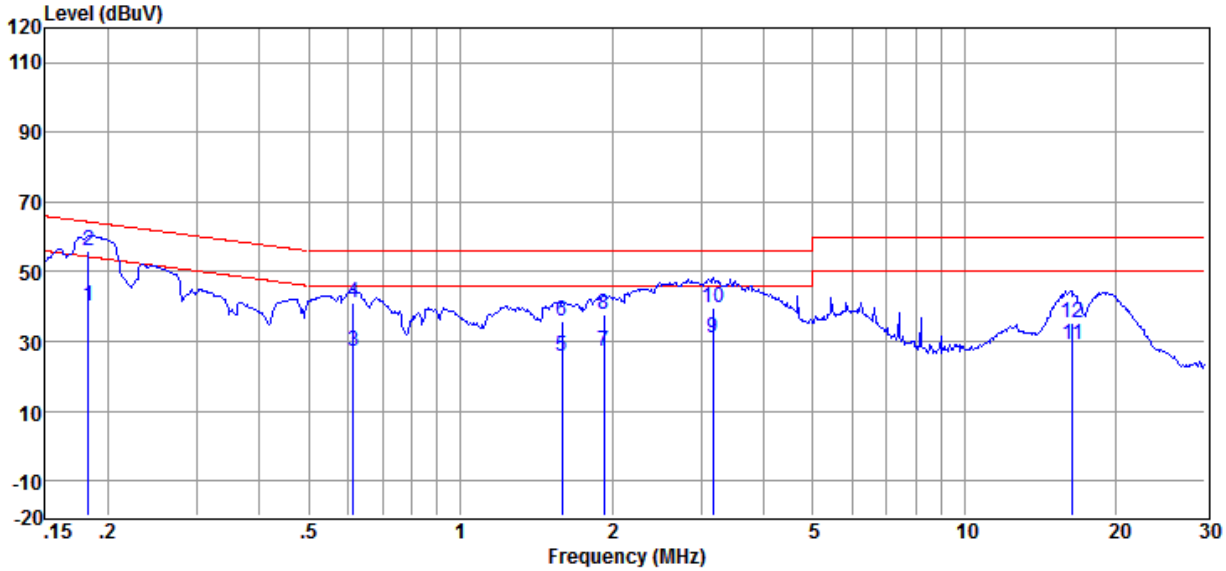
Test Port: AC Neutral Line



Item	Freq.	Read Level	LISN Factor	Cable Loss	Level	Limit Line	Over Limit	Detector
(Mark)	(MHz)	(dBµV)	(dB)	(dB)	(dBµV)	(dBµV)	(dB)	
1	0.183	29.74	0.31	9.86	39.91	54.34	-14.43	Average
2	0.183	46.07	0.31	9.86	56.24	64.34	-8.10	QP
3	0.613	17.12	0.23	9.86	27.21	46.00	-18.79	Average
4	0.613	31.20	0.23	9.86	41.29	56.00	-14.71	QP
5	1.590	15.03	0.75	9.87	25.65	46.00	-20.35	Average
6	1.590	25.33	0.75	9.87	35.95	56.00	-20.05	QP
7	1.927	16.35	0.96	9.87	27.18	46.00	-18.82	Average
8	1.927	26.89	0.96	9.87	37.72	56.00	-18.28	QP
9	3.169	20.24	0.71	9.87	30.82	46.00	-15.18	Average
10	3.169	29.14	0.71	9.87	39.72	56.00	-16.28	QP
11	16.393	18.55	0.41	9.93	28.89	50.00	-21.11	Average
12	16.393	24.84	0.41	9.93	35.18	60.00	-24.82	QP

Remark: Level = Read Level + LISN/ISN Factor + Cable Loss.

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7.4 Duty Cycle

In order to assist with the determination of the average level of fundamental and spurious emissions field strength, measurements were made of duty cycle to determine the transmission duration and the silent period time of the transmitter. The transmitter duty cycle was measured using a spectrum analyser in the time domain and calculated by using the following calculation:

Duty cycle= T on time / Period

Duty factor = 10 * log (1/Duty cycle)

If duty cycle of test signal is > 98%, duty factor is not required.

If duty cycle of test signal is < 98%, duty factor shall be considered.

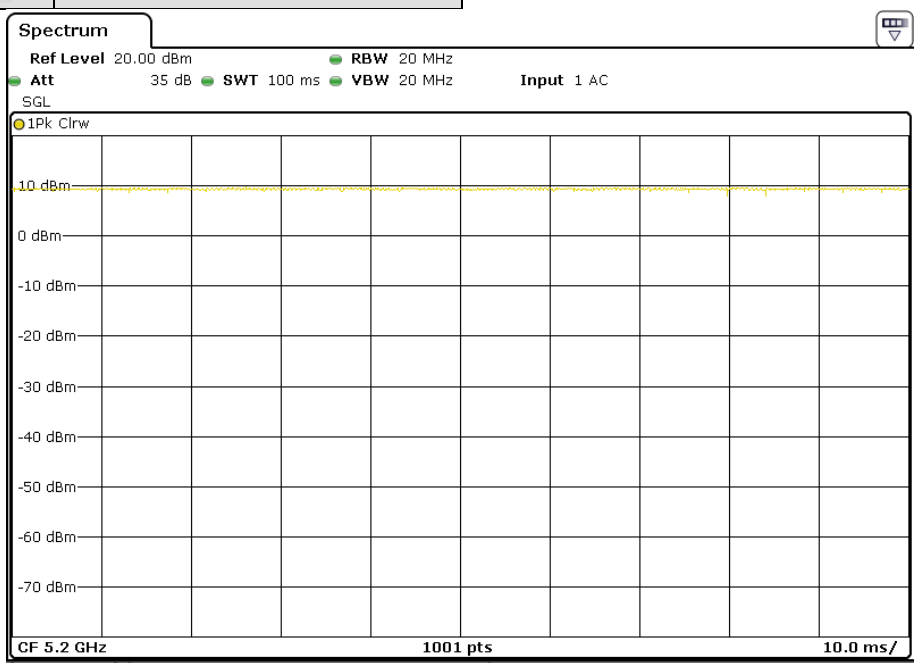
Test Data:

Test Mode	T on time(ms)	Period(ms)	Duty Cycle	Duty Factor
802.11a	10	10	100%	0
802.11n(HT20)	10	10	100%	0
802.11n(HT40)	10	10	100%	0
802.11ac(VHT20)	10	10	100%	0
802.11ac(VHT40)	10	10	100%	0
802.11ac(VHT80)	10	10	100%	0

Test Result: All measurements are to be performed with the EUT transmitting at 100 percent duty cycle at its maximum power control level. So duty factor is not required.

Test plot as follows:

Test mode:	802.11 a



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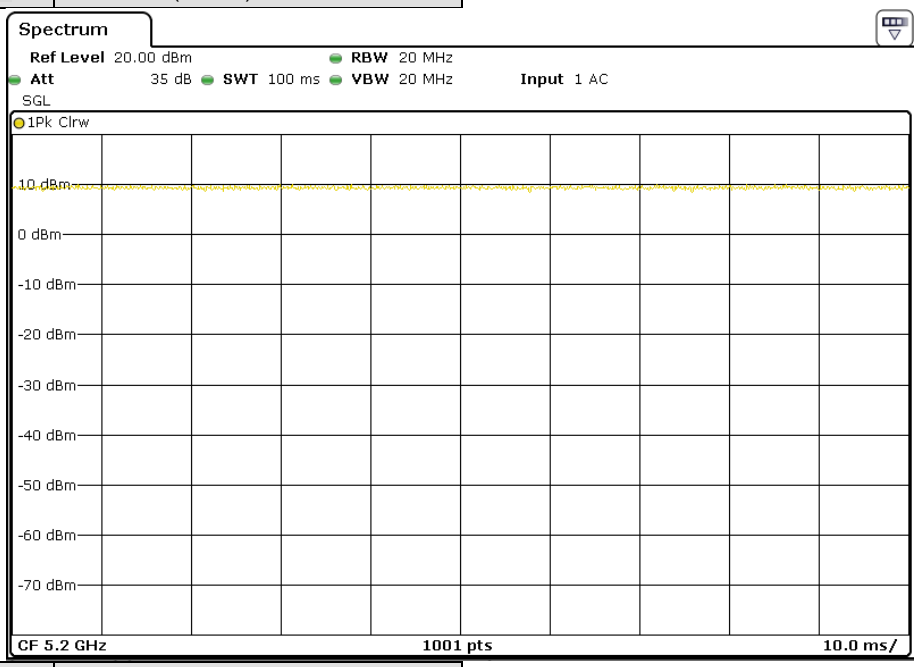
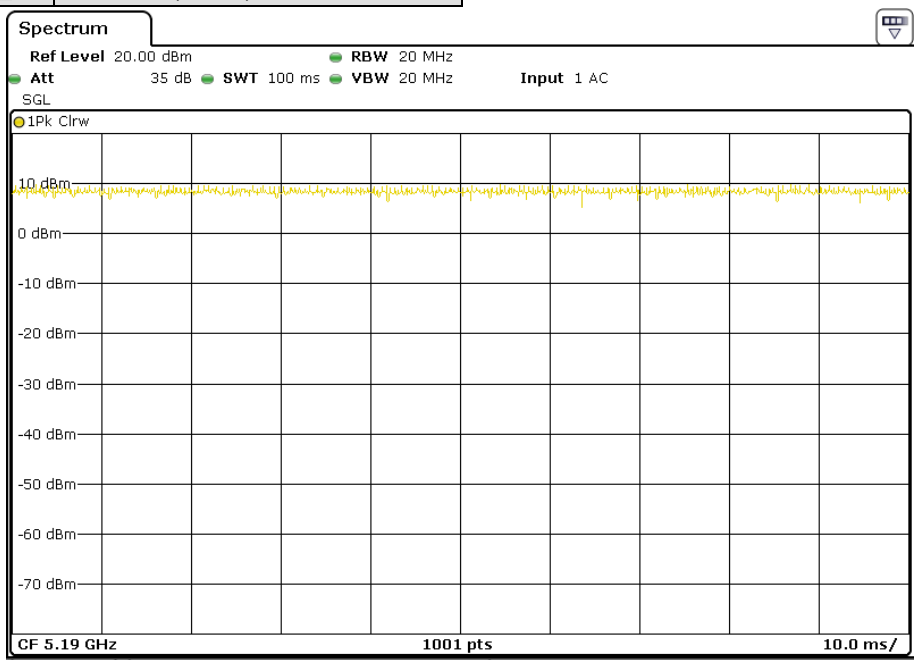
Test mode:	802.11 n(HT20)



Test mode:	802.11 n(HT40)



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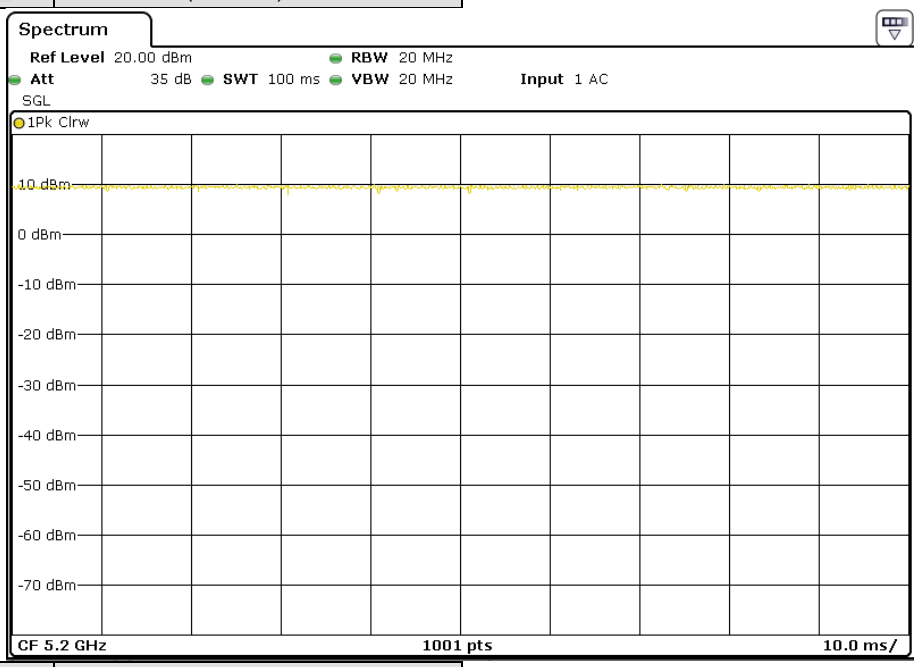
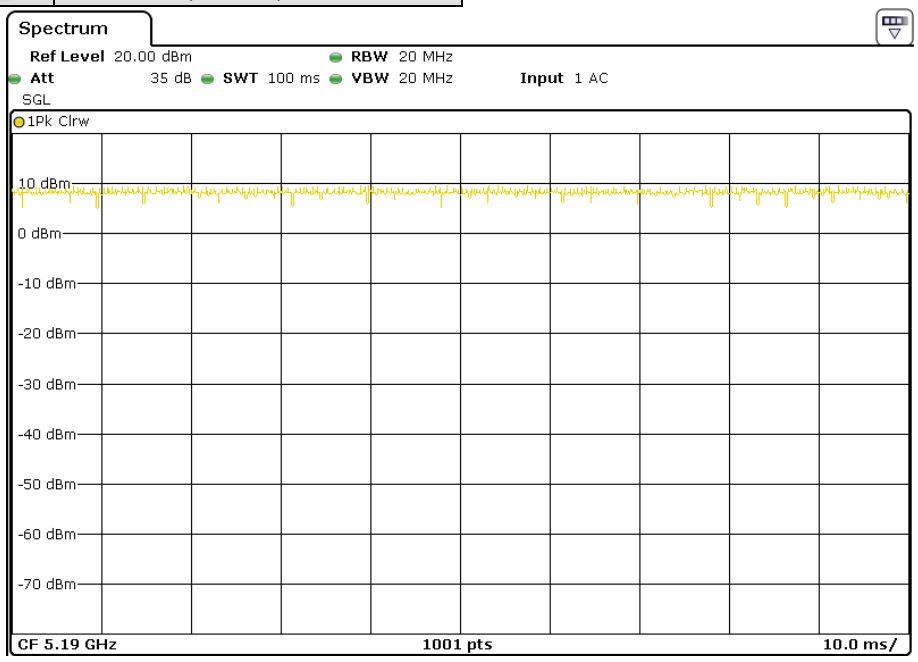
Test mode:	802.11 ac(VHT20)



Test mode:	802.11 ac(VHT40)



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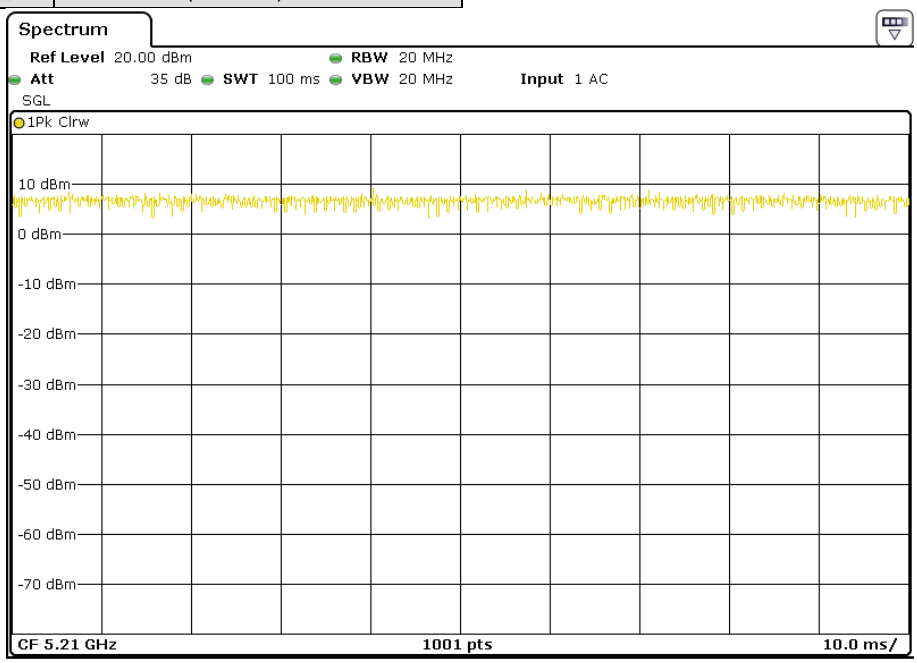
Test mode:	802.11 ac(VHT80)



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7.5 26dB Emission Bandwidth

For purposes of this subpart the emission bandwidth shall be determined by measuring the width of the signal between two points, one below the carrier center frequency and one above the carrier center frequency, that are 26 dB down relative to the maximum level of the modulated carrier. Determination of the emissions bandwidth is based on the use of measurement instrumentation employing a peak detector function with an instrument resolution bandwidth approximately equal to 1.0 percent of the emission bandwidth of the device under measurement.

Test Data:

Band	802.11a			802.11 n(HT20)			802.11n(HT40)		
	CH No.	Freq(MHz)	BW (MHz)	CH No.	Freq(MHz)	BW (MHz)	CH No.	Freq(MHz)	BW (MHz)
U-NII 1	36	5180	20.14	36	5180	19.86	38	5190	40.84
	44	5200	19.02	44	5200	19.82	--	--	--
	48	5240	19.18	48	5240	19.90	46	5230	41.00
U-NII 3	149	5745	22.30	149	5745	22.21	151	5755	42.92
	157	5785	19.70	157	5785	20.82	--	--	--
	165	5825	19.34	165	5825	20.26	159	5795	42.12
Band	802.11ac(HT20)			802.11 ac(HT40)			802.11ac(HT80)		
	CH No.	Freq(MHz)	BW (MHz)	CH No.	Freq(MHz)	BW (MHz)	CH No.	Freq(MHz)	BW (MHz)
U-NII 1	36	5180	19.94	38	5190	40.68	42	5210	82.16
	44	5200	19.94	--	--	--	--	--	--
	48	5240	20.90	46	5230	40.84			
U-NII 3	149	5745	21.06	151	5755	42.12	155	5775	82.80
	157	5785	20.86	--	--	--	--	--	--
	165	5825	20.22	159	5795	40.84	--	--	--

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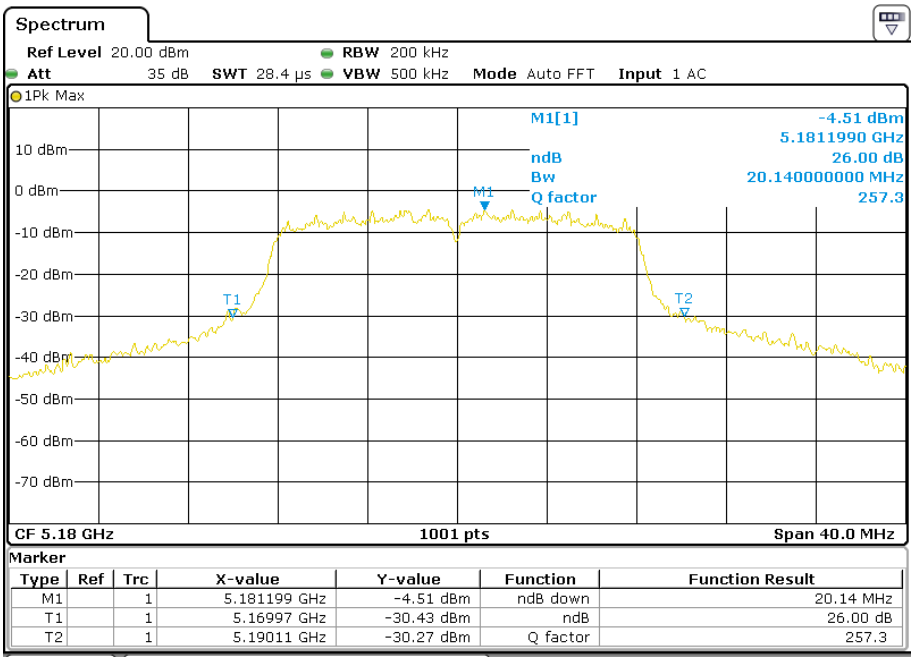
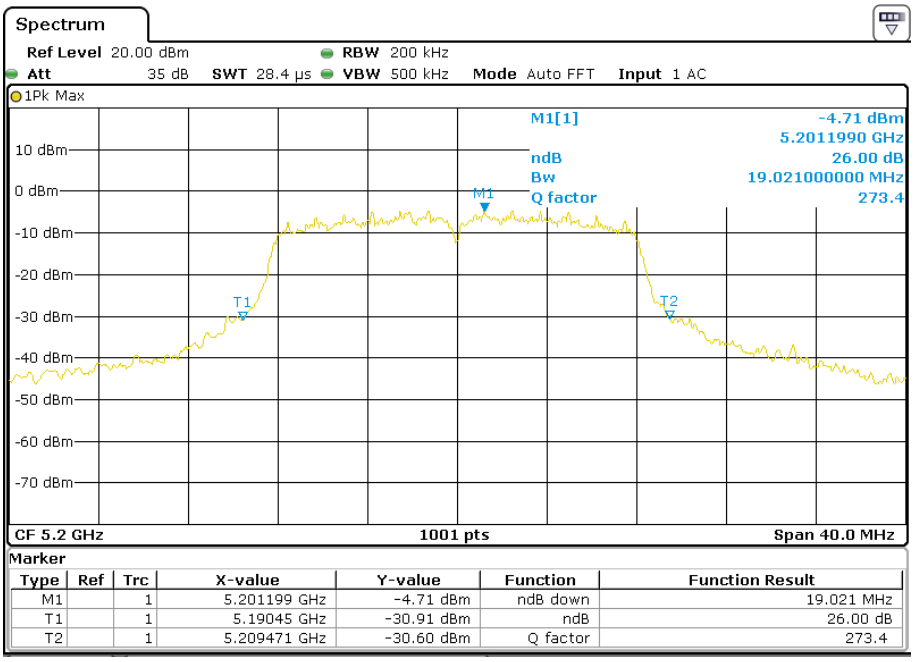
Test plot as follows:

802.11 a	Antenna A	Channel 36



Type	Ref	Trc	X-value	Y-value	Function	Function Result
M1		1	5.181199 GHz	-4.51 dBm	ndB down	20.14 MHz
T1		1	5.16997 GHz	-30.43 dBm	ndB	26.00 dB
T2		1	5.19011 GHz	-30.27 dBm	Q factor	257.3

802.11 a	Antenna A	Channel 40



Type	Ref	Trc	X-value	Y-value	Function	Function Result
M1		1	5.201199 GHz	-4.71 dBm	ndB down	19.021 MHz
T1		1	5.19045 GHz	-30.91 dBm	ndB	26.00 dB
T2		1	5.209471 GHz	-30.60 dBm	Q factor	273.4

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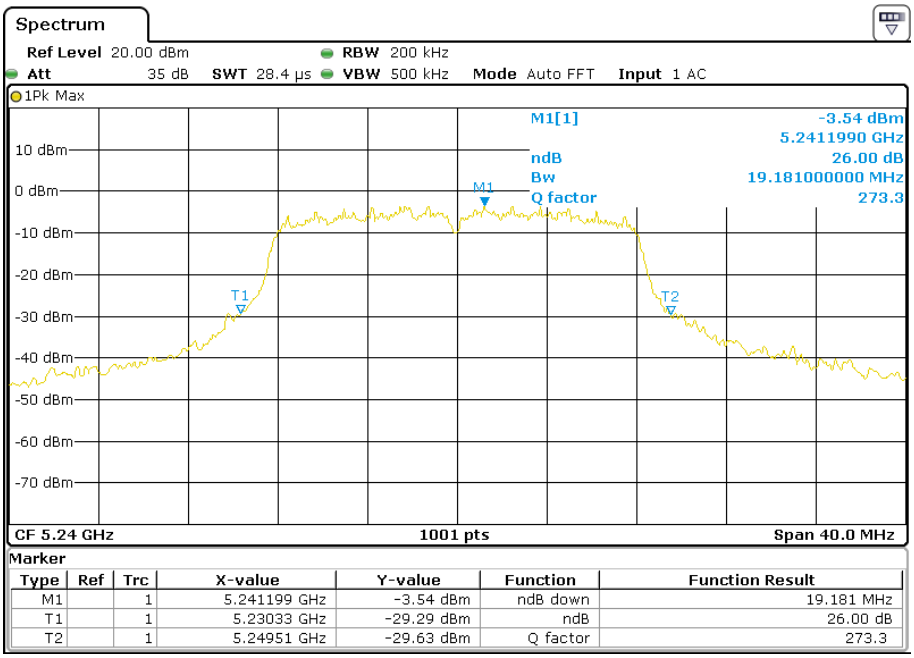
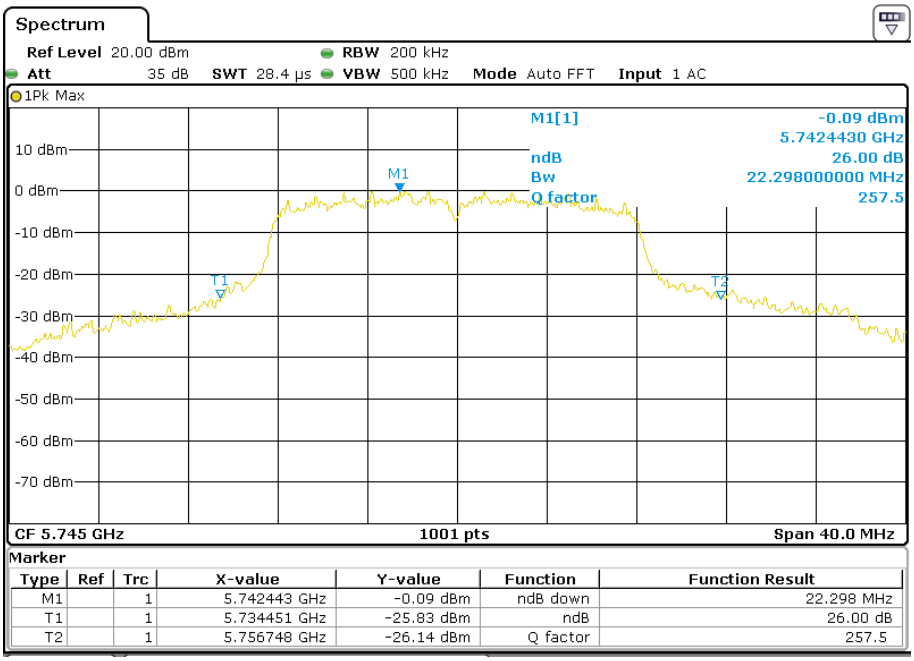
802.11 a	Antenna A	Channel 48



Type	Ref	Trc	X-value	Y-value	Function	Function Result
M1		1	5.241199 GHz	-3.54 dBm	ndB down	19.181 MHz
T1		1	5.23033 GHz	-29.29 dBm	ndB	26.00 dB
T2		1	5.24951 GHz	-29.63 dBm	Q factor	273.3

802.11 a	Antenna A	Channel 149



Type	Ref	Trc	X-value	Y-value	Function	Function Result
M1		1	5.742443 GHz	-0.09 dBm	ndB down	22.298 MHz
T1		1	5.734451 GHz	-25.83 dBm	ndB	26.00 dB
T2		1	5.756748 GHz	-26.14 dBm	Q factor	257.5

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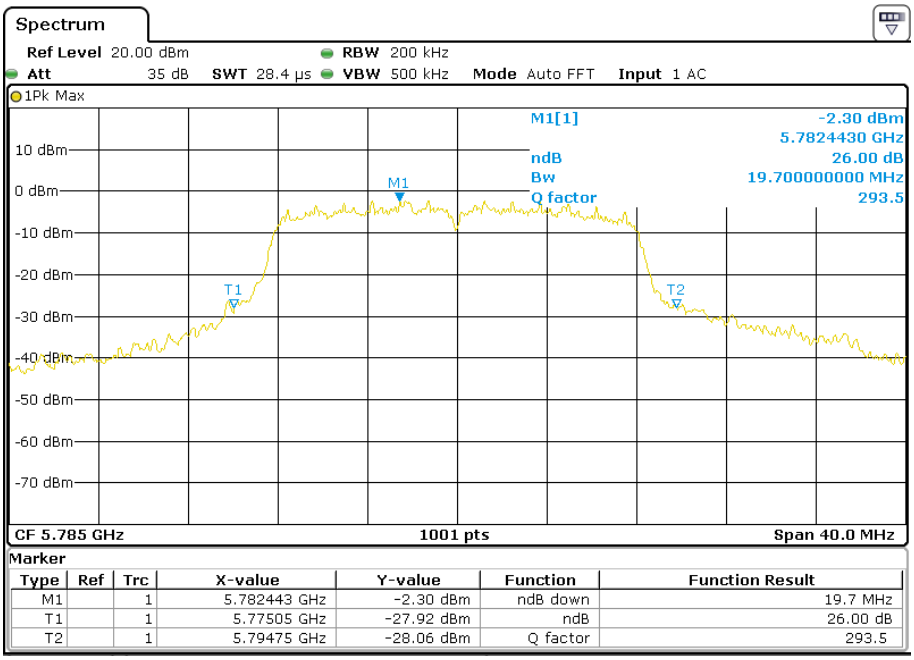
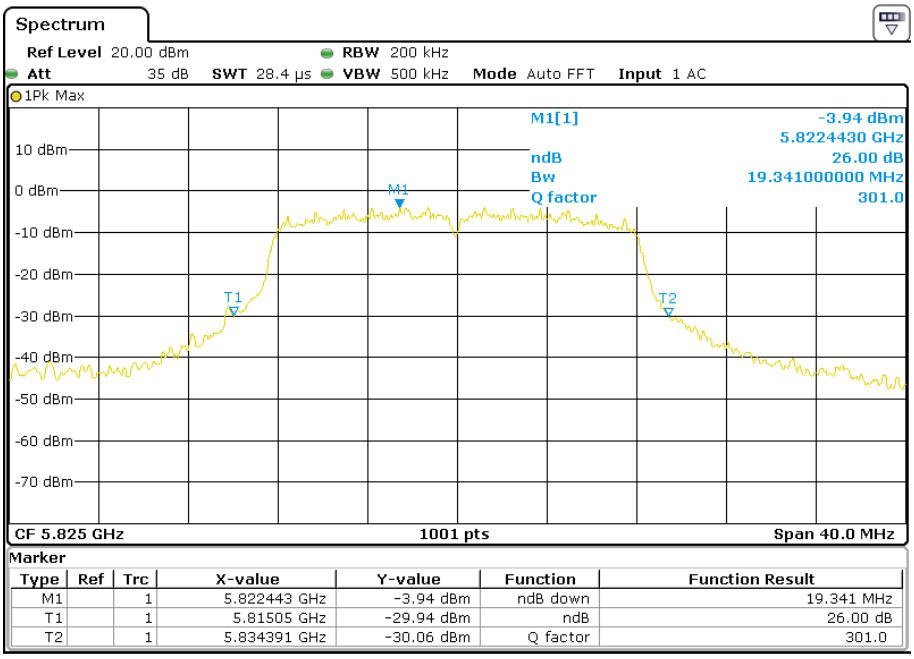
802.11 a	Antenna A	Channel 157



Type	Ref	Trc	X-value	Y-value	Function	Function Result
M1		1	5.782443 GHz	-2.30 dBm	ndB down	19.7 MHz
T1		1	5.77505 GHz	-27.92 dBm	ndB	26.00 dB
T2		1	5.79475 GHz	-28.06 dBm	Q factor	293.5

802.11 a	Antenna A	Channel 165



Type	Ref	Trc	X-value	Y-value	Function	Function Result
M1		1	5.822443 GHz	-3.94 dBm	ndB down	19.341 MHz
T1		1	5.81505 GHz	-29.94 dBm	ndB	26.00 dB
T2		1	5.834391 GHz	-30.06 dBm	Q factor	301.0

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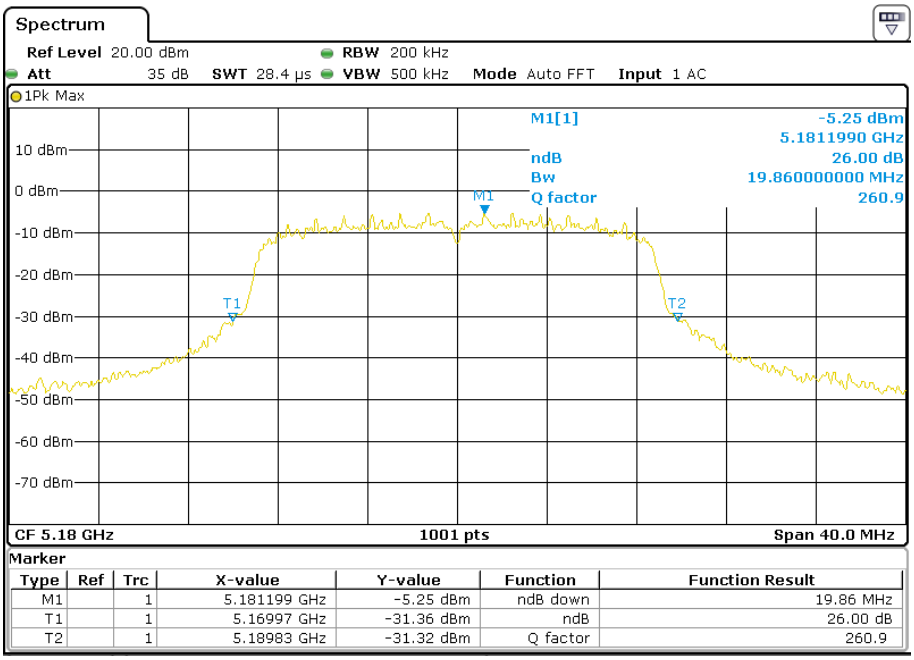
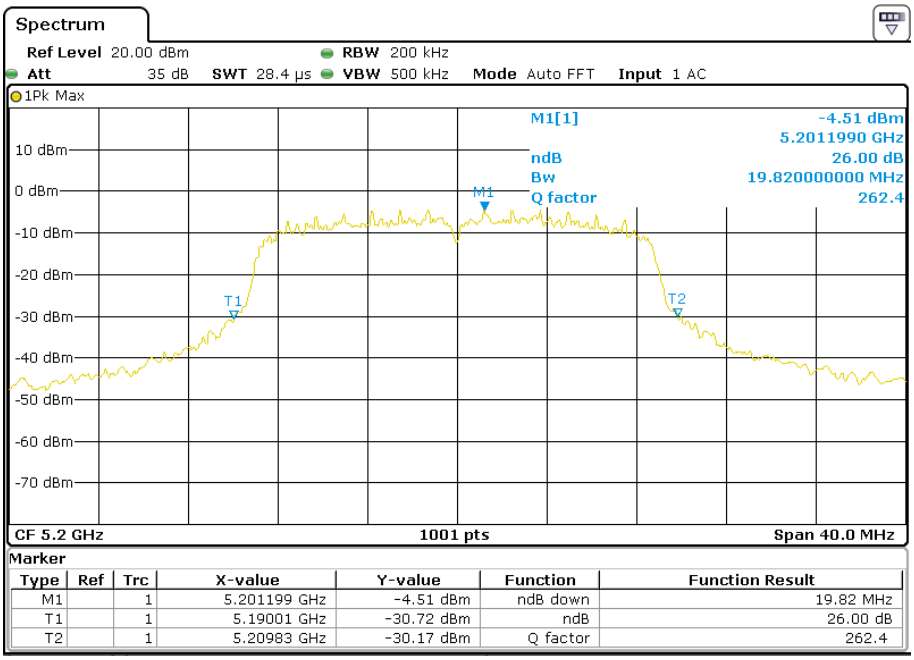
802.11 n(HT20)	Antenna A	Channel 36



Type	Ref	Trc	X-value	Y-value	Function	Function Result
M1		1	5.181199 GHz	-5.25 dBm	ndB down	19.86 MHz
T1		1	5.16997 GHz	-31.36 dBm	ndB	26.00 dB
T2		1	5.18983 GHz	-31.32 dBm	Q factor	260.9

802.11 n(HT20)	Antenna A	Channel 40



Type	Ref	Trc	X-value	Y-value	Function	Function Result
M1		1	5.201199 GHz	-4.51 dBm	ndB down	19.82 MHz
T1		1	5.19001 GHz	-30.72 dBm	ndB	26.00 dB
T2		1	5.20983 GHz	-30.17 dBm	Q factor	262.4

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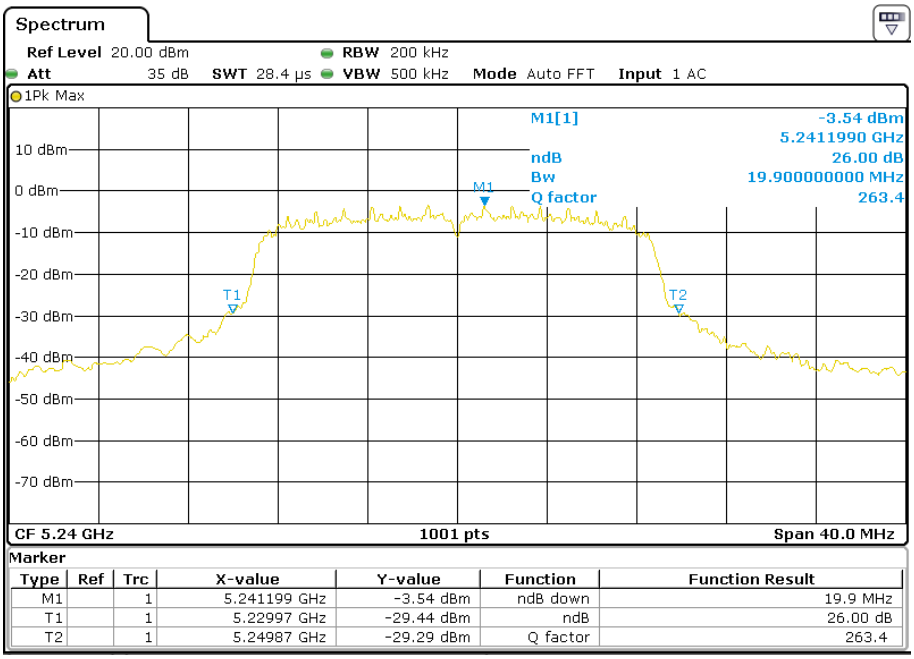
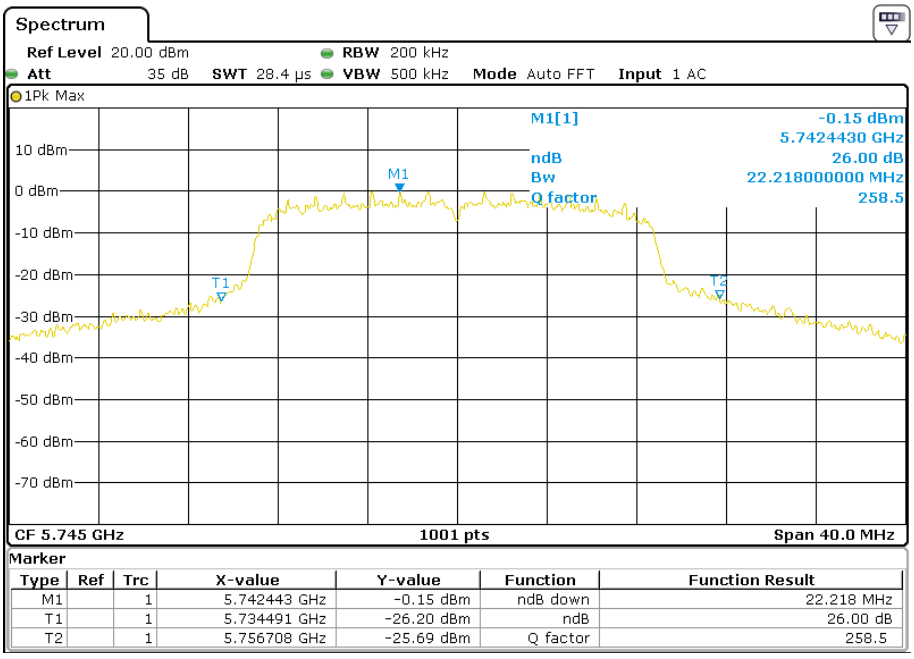
802.11 n(HT20)	Antenna A	Channel 48



Type	Ref	Trc	X-value	Y-value	Function	Function Result
M1		1	5.241199 GHz	-3.54 dBm	ndB down	19.9 MHz
T1		1	5.22997 GHz	-29.44 dBm	ndB	26.00 dB
T2		1	5.24987 GHz	-29.29 dBm	Q factor	263.4

802.11 n(HT20)	Antenna A	Channel 149



Type	Ref	Trc	X-value	Y-value	Function	Function Result
M1		1	5.742443 GHz	-0.15 dBm	ndB down	22.218 MHz
T1		1	5.734491 GHz	-26.20 dBm	ndB	26.00 dB
T2		1	5.756708 GHz	-25.69 dBm	Q factor	258.5

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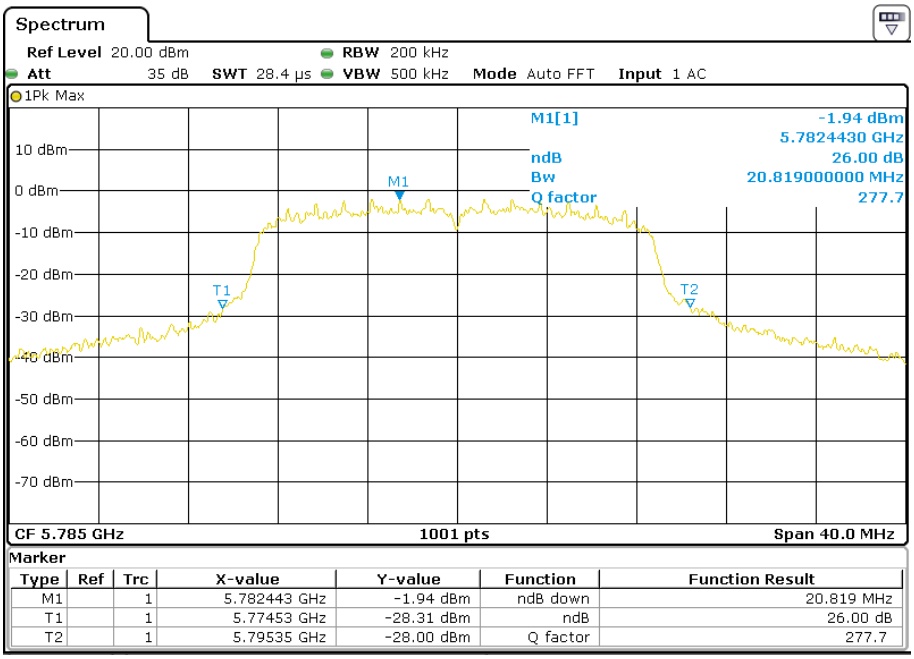
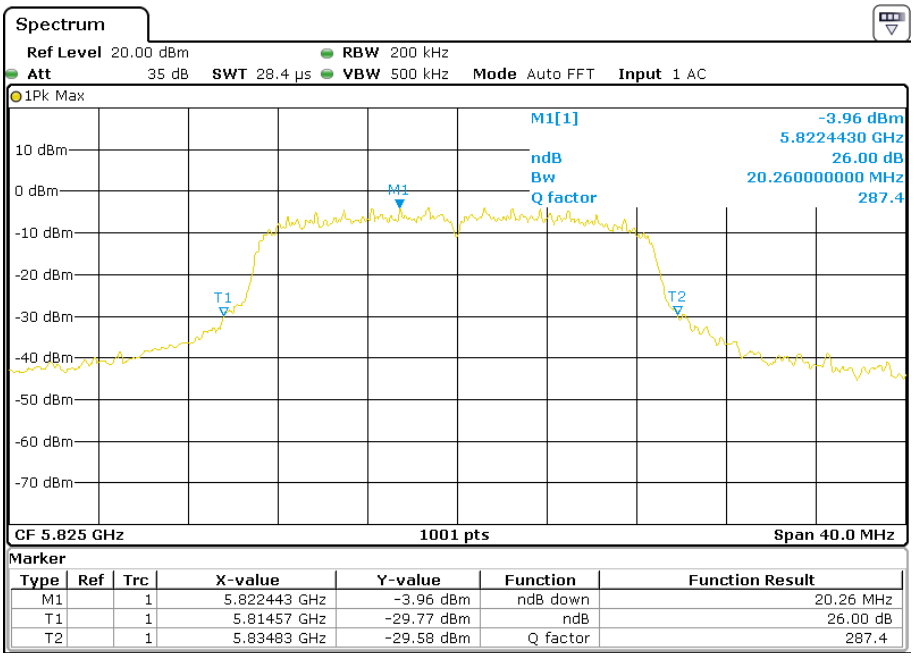
802.11 n(HT20)	Antenna A	Channel 157



Type	Ref	Trc	X-value	Y-value	Function	Function Result
M1		1	5.782443 GHz	-1.94 dBm	ndB down	20.819 MHz
T1		1	5.77453 GHz	-28.31 dBm	ndB	26.00 dB
T2		1	5.79535 GHz	-28.00 dBm	Q factor	277.7

802.11 n(HT20)	Antenna A	Channel 165



Type	Ref	Trc	X-value	Y-value	Function	Function Result
M1		1	5.822443 GHz	-3.96 dBm	ndB down	20.26 MHz
T1		1	5.81457 GHz	-29.77 dBm	ndB	26.00 dB
T2		1	5.83483 GHz	-29.58 dBm	Q factor	287.4

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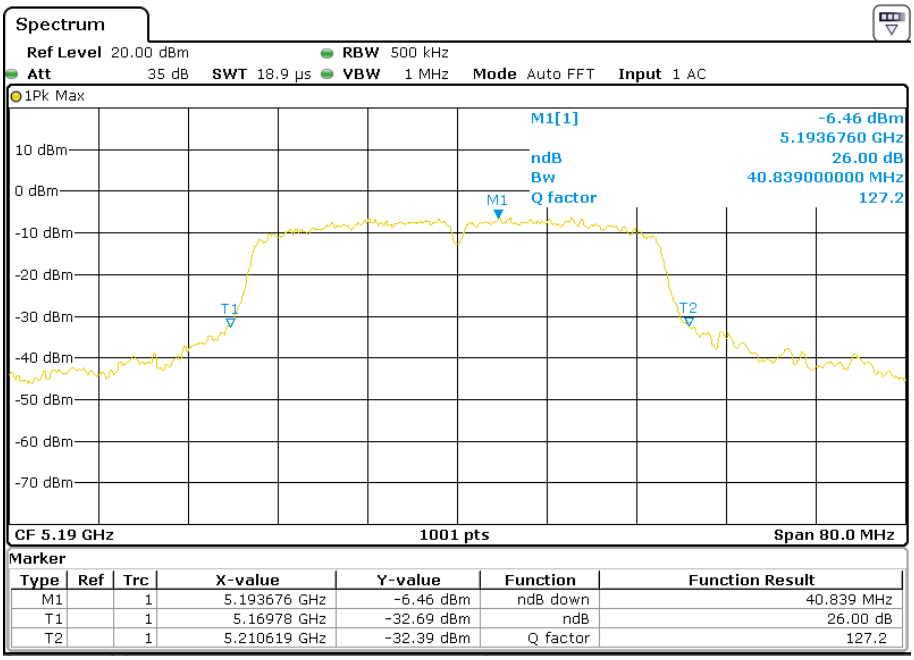
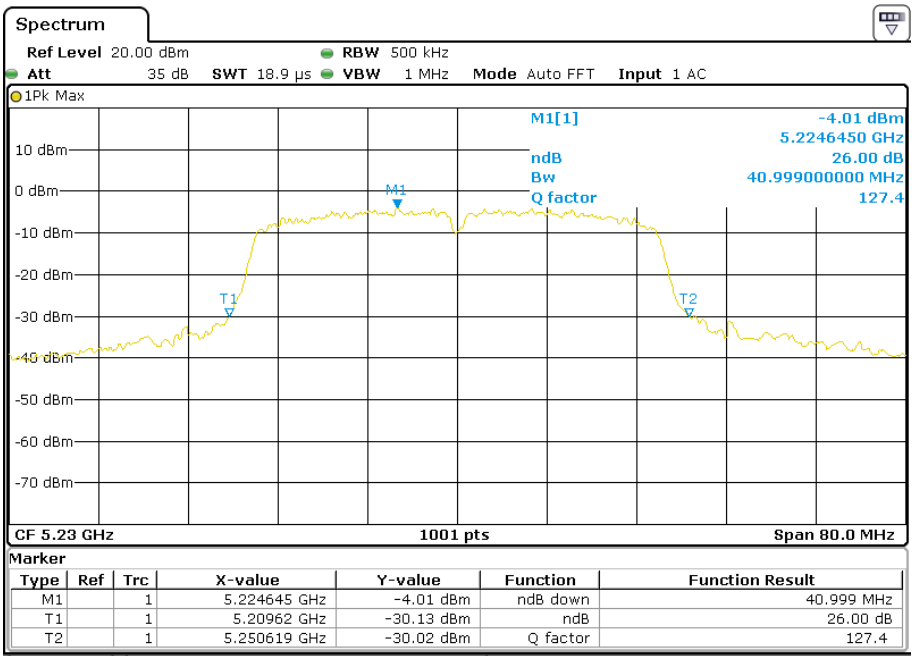
802.11 n(HT40)	Antenna A	Channel 38



Type	Ref	Trc	X-value	Y-value	Function	Function Result
M1		1	5.193676 GHz	-6.46 dBm	ndB down	40.839 MHz
T1		1	5.16978 GHz	-32.69 dBm	ndB	26.00 dB
T2		1	5.210619 GHz	-32.39 dBm	Q factor	127.2

802.11 n(HT40)	Antenna A	Channel 46



Type	Ref	Trc	X-value	Y-value	Function	Function Result
M1		1	5.224645 GHz	-4.01 dBm	ndB down	40.999 MHz
T1		1	5.20962 GHz	-30.13 dBm	ndB	26.00 dB
T2		1	5.250619 GHz	-30.02 dBm	Q factor	127.4

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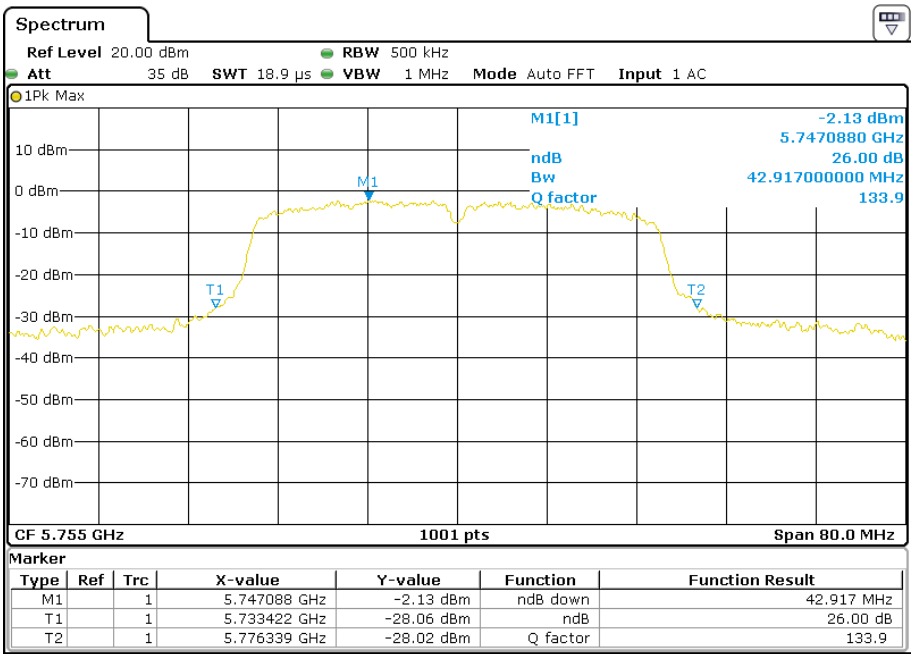
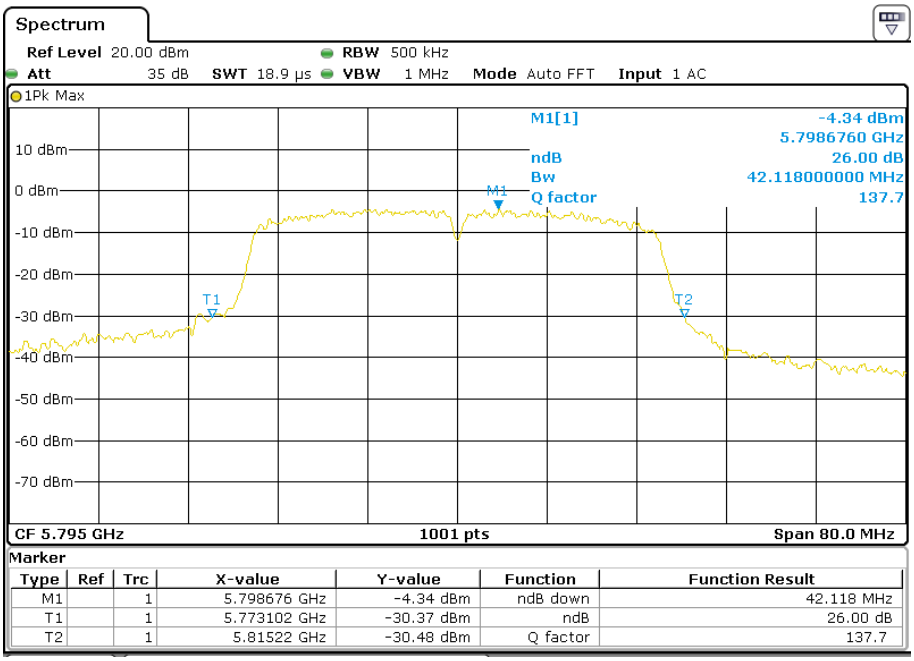
802.11 n(HT40)	Antenna A	Channel 151



Type	Ref	Trc	X-value	Y-value	Function	Function Result
M1		1	5.747088 GHz	-2.13 dBm	ndB down	42.917 MHz
T1		1	5.733422 GHz	-28.06 dBm	ndB	26.00 dB
T2		1	5.776339 GHz	-28.02 dBm	Q factor	133.9

802.11 n(HT40)	Antenna A	Channel 159



Type	Ref	Trc	X-value	Y-value	Function	Function Result
M1		1	5.798676 GHz	-4.34 dBm	ndB down	42.118 MHz
T1		1	5.773102 GHz	-30.37 dBm	ndB	26.00 dB
T2		1	5.81522 GHz	-30.48 dBm	Q factor	137.7

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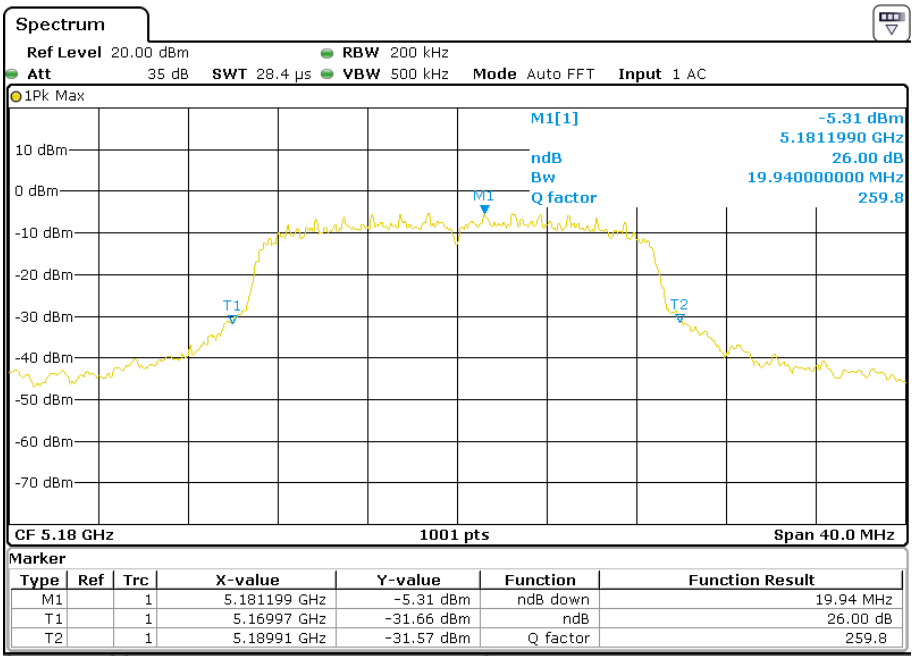
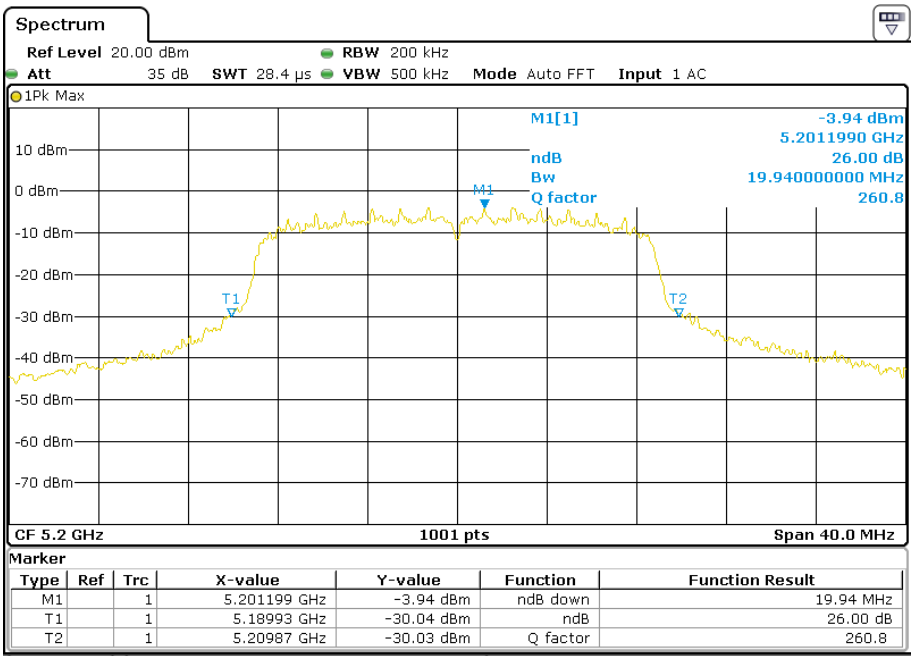
802.11 ac(VHT20)	Antenna A	Channel 36



802.11 ac(VHT20)	Antenna A	Channel 40



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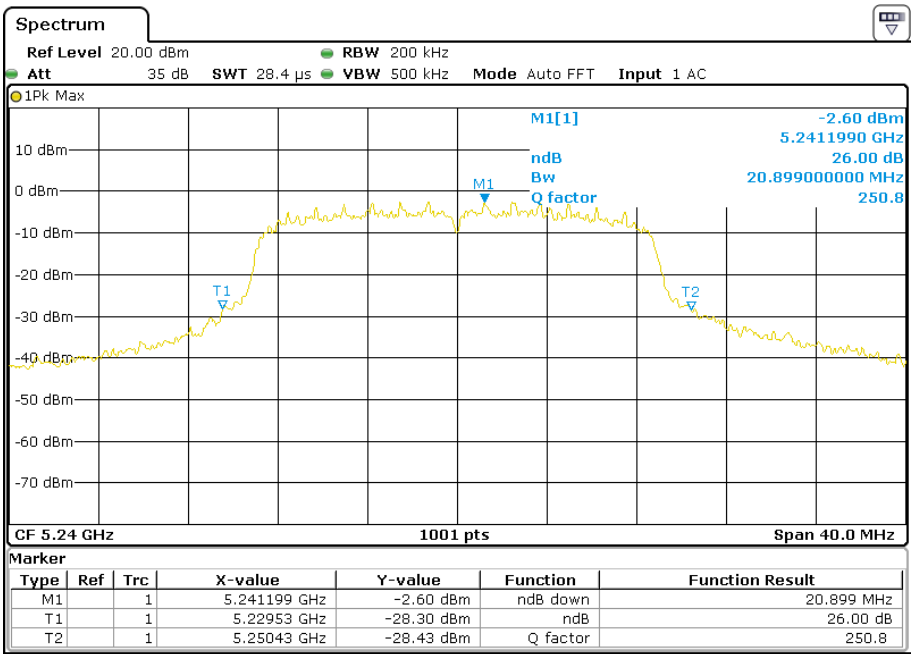
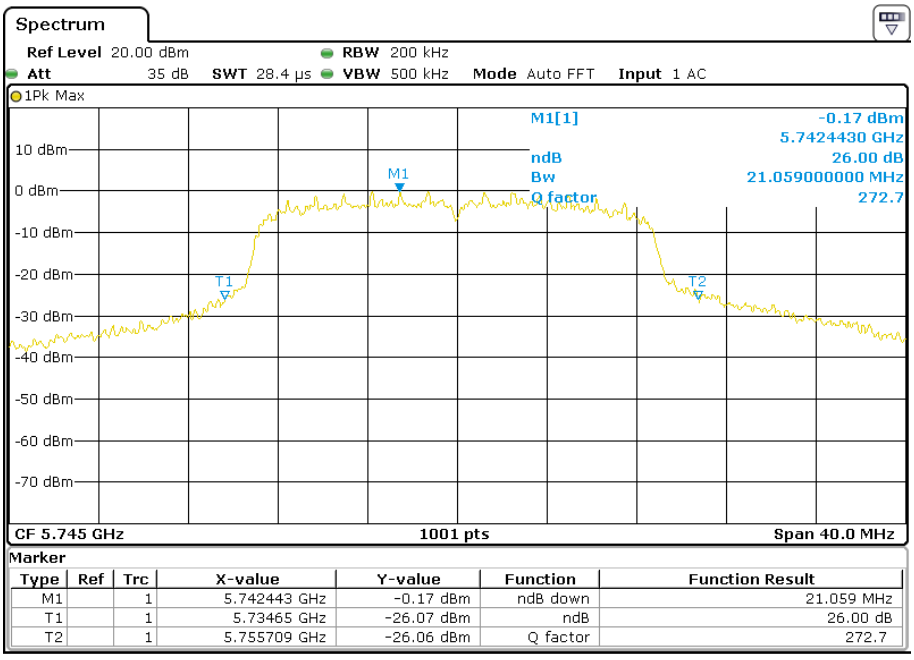
802.11 ac(VHT20)	Antenna A	Channel 48



Type	Ref	Trc	X-value	Y-value	Function	Function Result
M1		1	5.241199 GHz	-2.60 dBm	ndB down	20.899 MHz
T1		1	5.22953 GHz	-28.30 dBm	ndB	26.00 dB
T2		1	5.25043 GHz	-28.43 dBm	Q factor	250.8

802.11 ac(VHT20)	Antenna A	Channel 149



Type	Ref	Trc	X-value	Y-value	Function	Function Result
M1		1	5.742443 GHz	-0.17 dBm	ndB down	21.059 MHz
T1		1	5.73465 GHz	-26.07 dBm	ndB	26.00 dB
T2		1	5.755709 GHz	-26.06 dBm	Q factor	272.7

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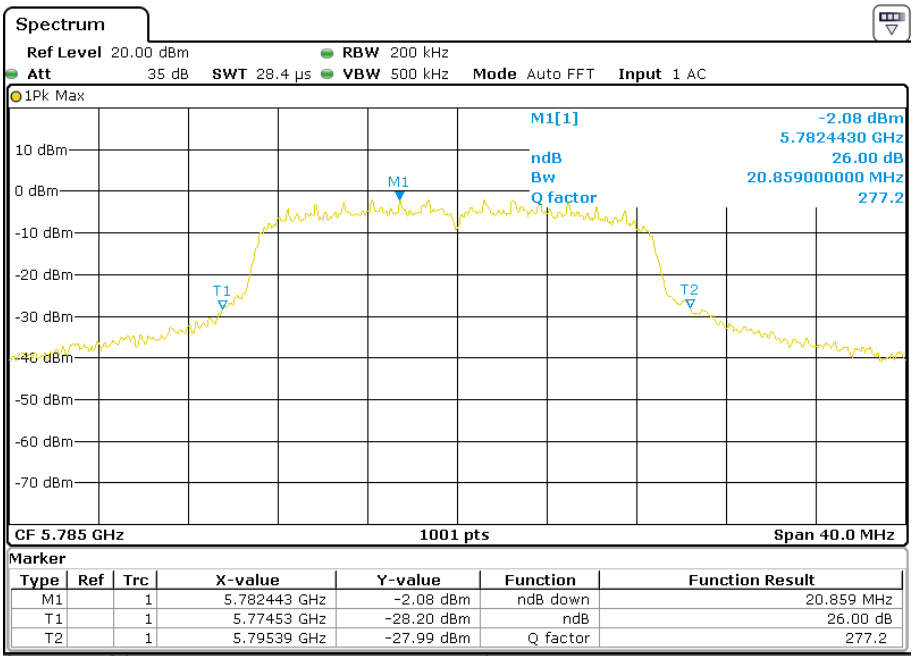
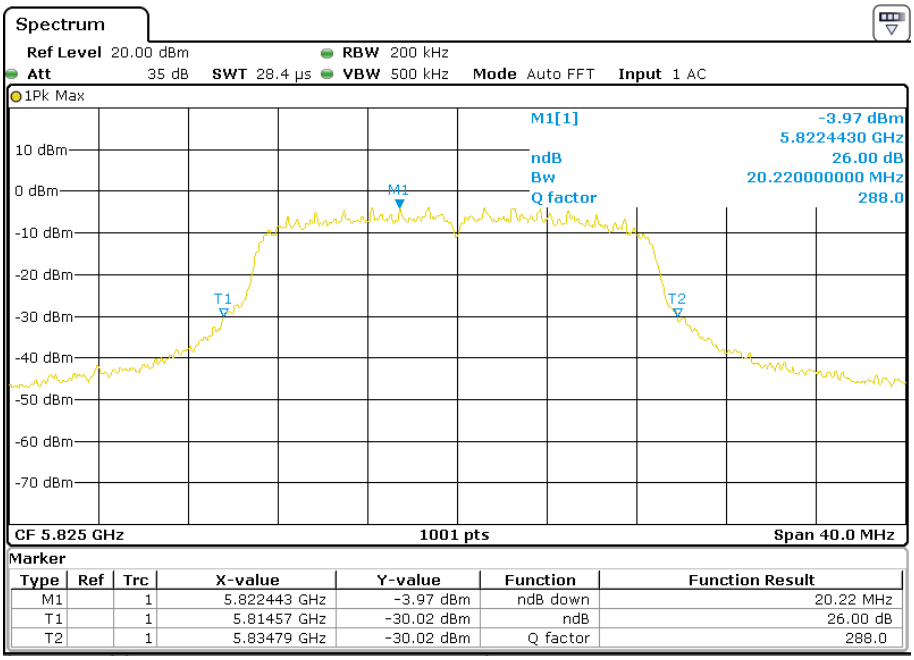
802.11 ac(VHT20)	Antenna A	Channel 157



Type	Ref	Trc	X-value	Y-value	Function	Function Result
M1		1	5.782443 GHz	-2.08 dBm	ndB down	20.859 MHz
T1		1	5.77453 GHz	-28.20 dBm	ndB	26.00 dB
T2		1	5.79539 GHz	-27.99 dBm	Q factor	277.2

802.11 ac(VHT20)	Antenna A	Channel 165



Type	Ref	Trc	X-value	Y-value	Function	Function Result
M1		1	5.822443 GHz	-3.97 dBm	ndB down	20.22 MHz
T1		1	5.81457 GHz	-30.02 dBm	ndB	26.00 dB
T2		1	5.83479 GHz	-30.02 dBm	Q factor	288.0

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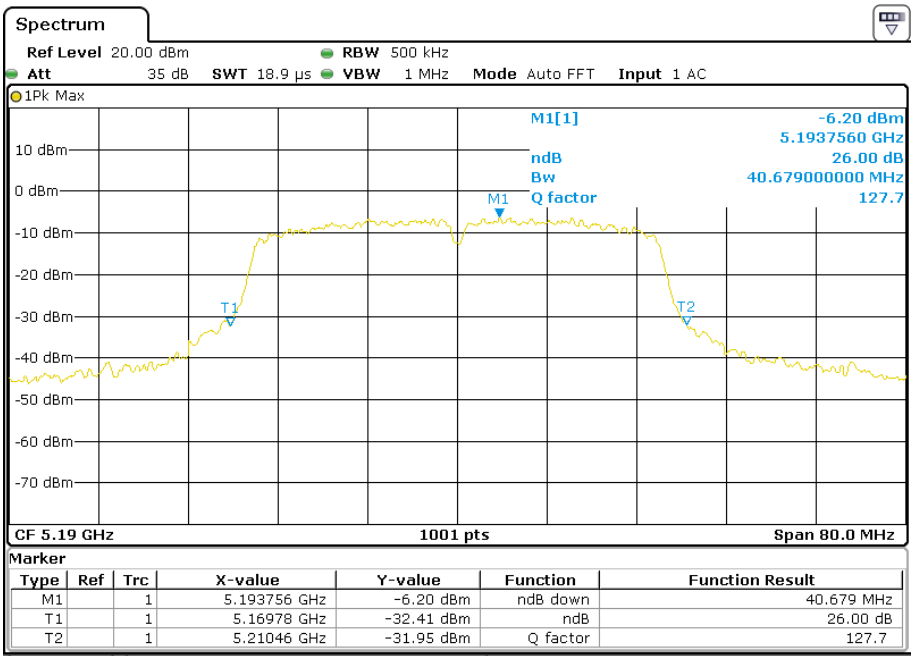
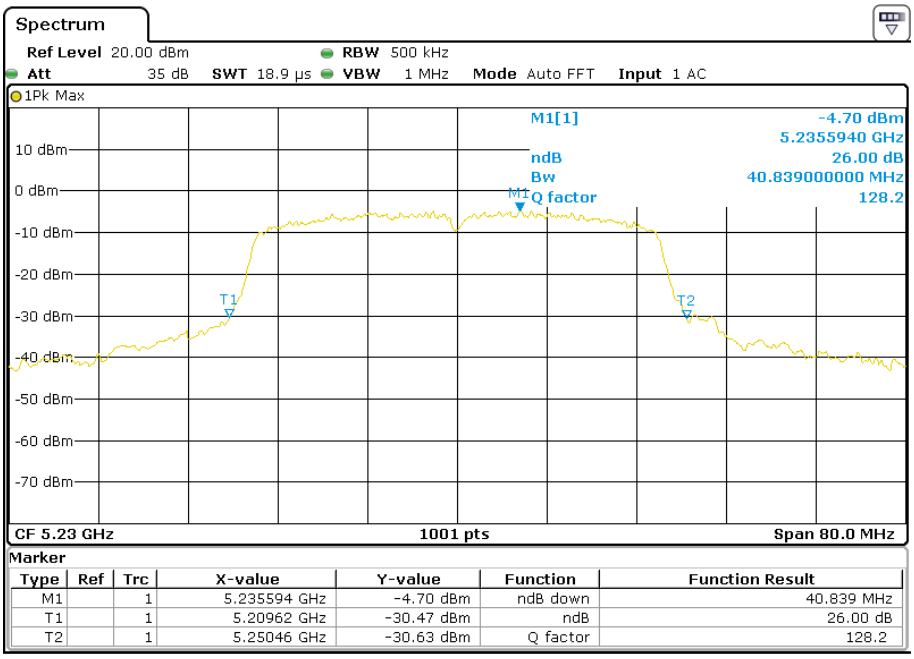
802.11 ac(VHT40)	Antenna A	Channel 38



Type	Ref	Trc	X-value	Y-value	Function	Function Result
M1		1	5.193756 GHz	-6.20 dBm	ndB down	40.679 MHz
T1		1	5.16978 GHz	-32.41 dBm	ndB	26.00 dB
T2		1	5.21046 GHz	-31.95 dBm	Q factor	127.7

802.11 ac(VHT40)	Antenna A	Channel 46



Type	Ref	Trc	X-value	Y-value	Function	Function Result
M1		1	5.235594 GHz	-4.70 dBm	ndB down	40.839 MHz
T1		1	5.20962 GHz	-30.47 dBm	ndB	26.00 dB
T2		1	5.25046 GHz	-30.63 dBm	Q factor	128.2

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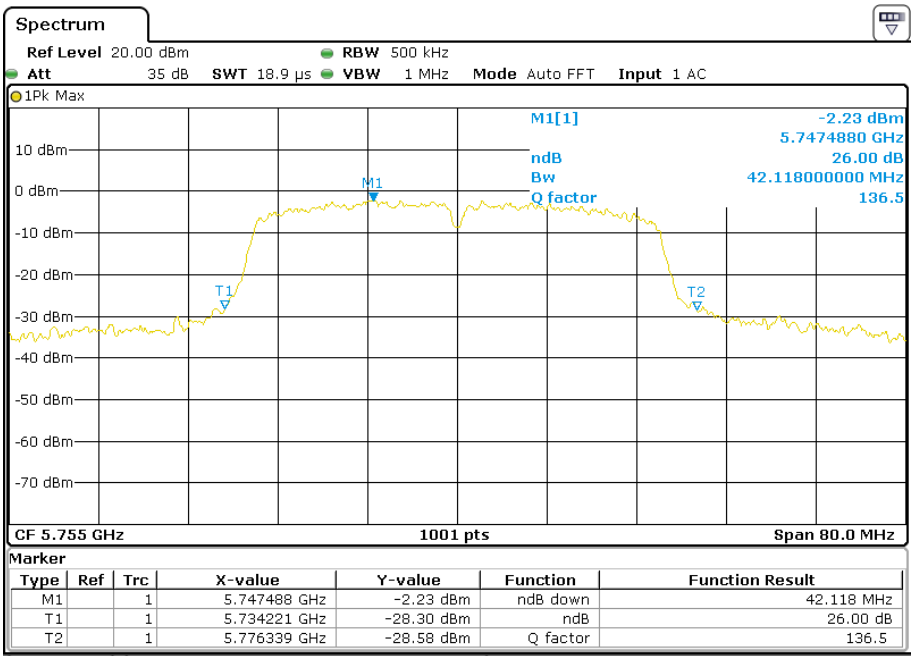
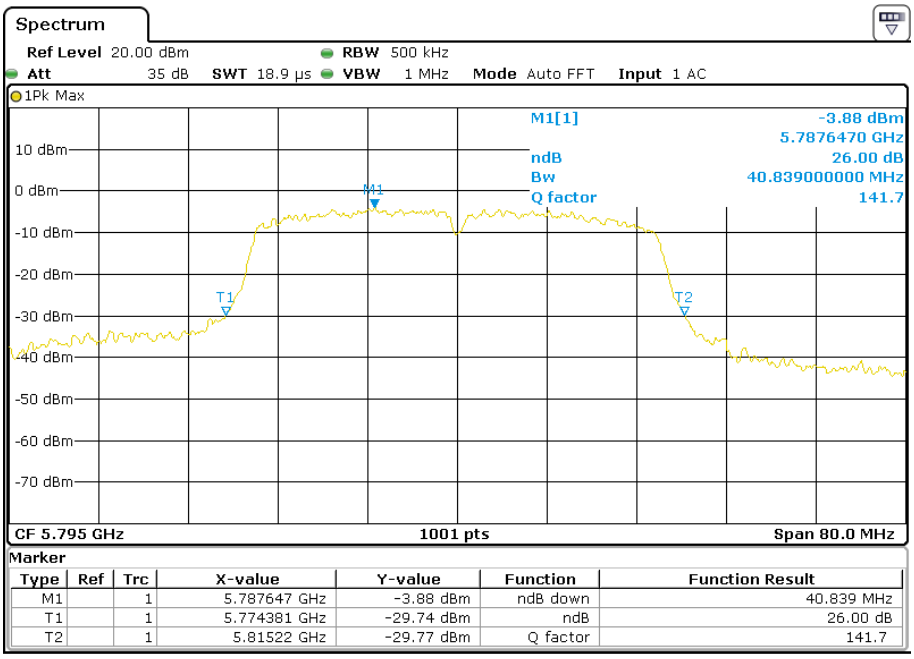
802.11 ac(VHT40)	Antenna A	Channel 151



Type	Ref	Trc	X-value	Y-value	Function	Function Result
M1		1	5.747488 GHz	-2.23 dBm	ndB down	42.118 MHz
T1		1	5.734221 GHz	-28.30 dBm	ndB	26.00 dB
T2		1	5.776339 GHz	-28.58 dBm	Q factor	136.5

802.11 ac(VHT40)	Antenna A	Channel 159



Type	Ref	Trc	X-value	Y-value	Function	Function Result
M1		1	5.787647 GHz	-3.88 dBm	ndB down	40.839 MHz
T1		1	5.774381 GHz	-29.74 dBm	ndB	26.00 dB
T2		1	5.81522 GHz	-29.77 dBm	Q factor	141.7

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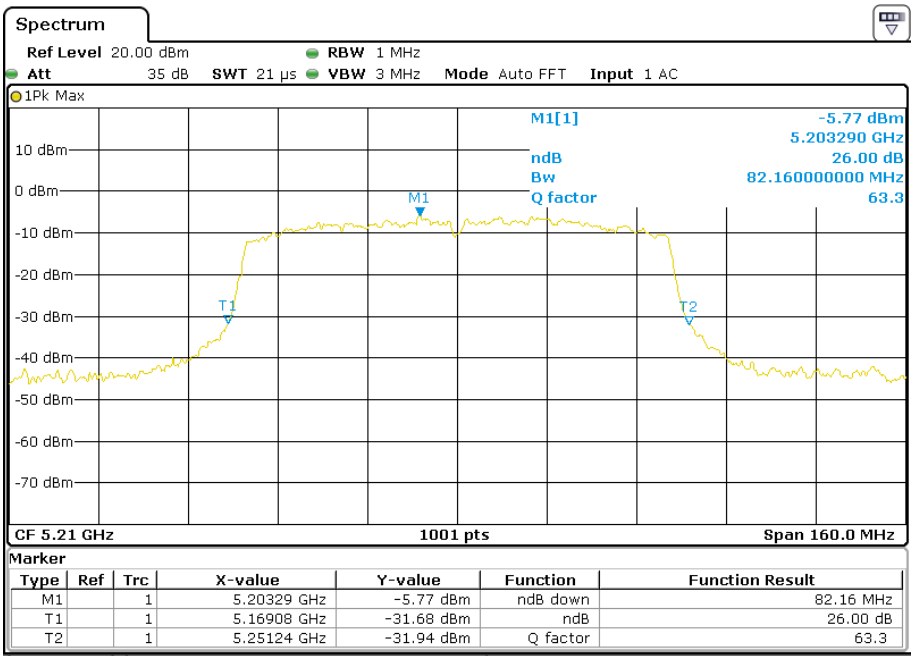
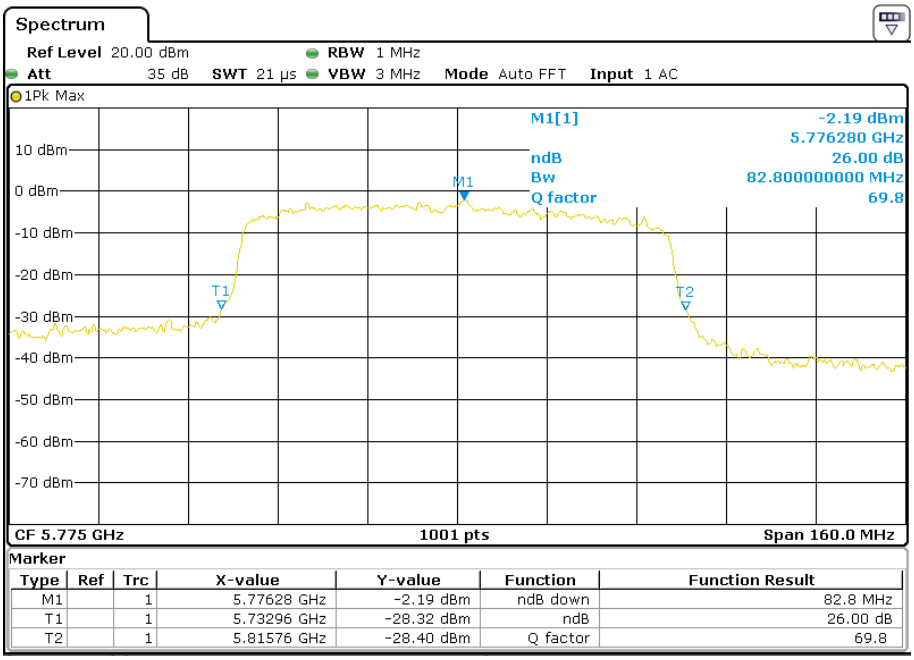
802.11 ac(VHT80)	Antenna A	Channel 42



Type	Ref	Trc	X-value	Y-value	Function	Function Result
M1		1	5.20329 GHz	-5.77 dBm	ndB down	82.16 MHz
T1		1	5.16908 GHz	-31.68 dBm	ndB	26.00 dB
T2		1	5.25124 GHz	-31.94 dBm	Q factor	63.3

802.11 ac(VHT80)	Antenna A	Channel 155



Type	Ref	Trc	X-value	Y-value	Function	Function Result
M1		1	5.77628 GHz	-2.19 dBm	ndB down	82.8 MHz
T1		1	5.73296 GHz	-28.32 dBm	ndB	26.00 dB
T2		1	5.81576 GHz	-28.40 dBm	Q factor	69.8

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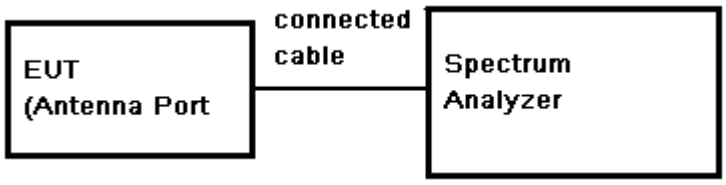
7.6 Minimum 6 dB bandwidth

Test Configuration:



Test Procedure:

a) Place the EUT on the table and set it in transmitting mode.
b) Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to the spectrum analyzer.
c) Set the spectrum analyzer as RBW=100KHz, VBW≥3* RBW, Span=40/80/160MHz, Sweep=auto couple
d) Mark the peak frequency and –6dB (upper and lower) frequency.
e) Repeat above procedures until all frequency measured was complete.

Limit: ≥ 500 kHz (For 5.725-5.85 GHz band)

Test Result: Pass

Test Data:

802.11a			802.11 n(HT20)			802.11n(HT40)		
CH No.	Freq(MHz)	BW (MHz)	CH No.	Freq(MHz)	BW (MHz)	CH No.	Freq(MHz)	BW (MHz)
149	5745	15.43	149	5745	15.23	151	5755	35.25
157	5785	15.39	157	5785	15.23	--	--	--
165	5825	15.39	165	5825	15.23	159	5795	35.25
802.11ac(HT20)			802.11 ac(HT40)			802.11ac(HT80)		
CH No.	Freq(MHz)	BW (MHz)	CH No.	Freq(MHz)	BW (MHz)	CH No.	Freq(MHz)	BW (MHz)
149	5745	15.23	151	5755	35.25	155	5775	72.97
157	5785	15.23	--	--	--	--	--	--
165	5825	15.23	159	5795	35.25	--	--	--

TEST RESULTS: The unit does meet the requirements.

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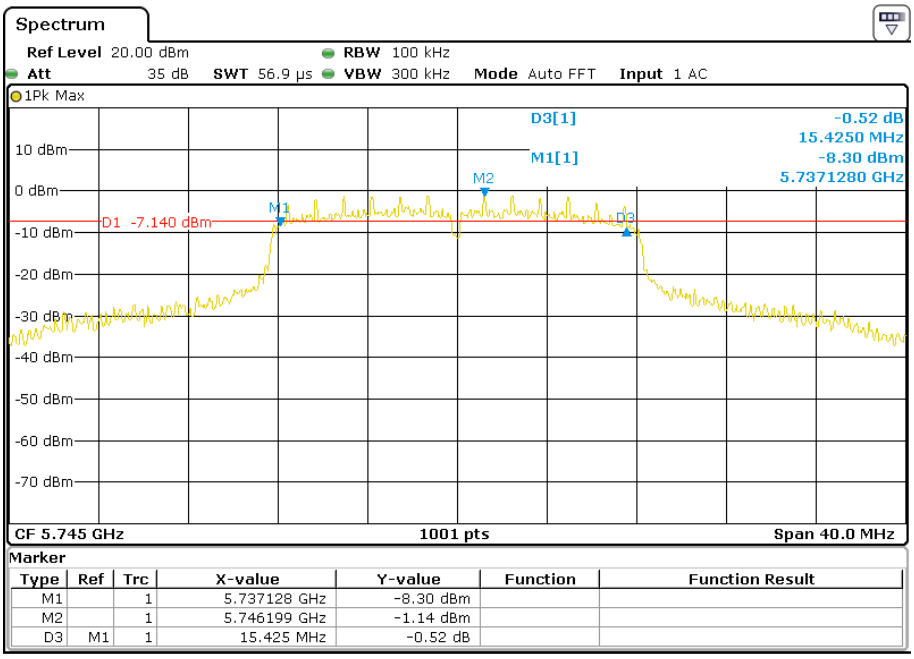
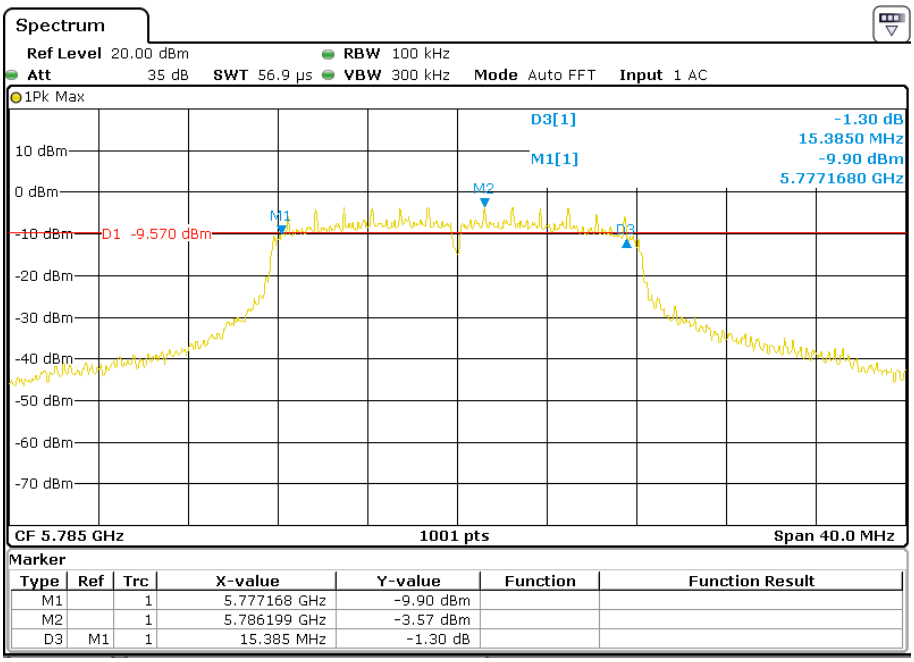
Test plot as follows:

802.11 a	Antenna A	Channel 149



802.11 a	Antenna A	Channel 157



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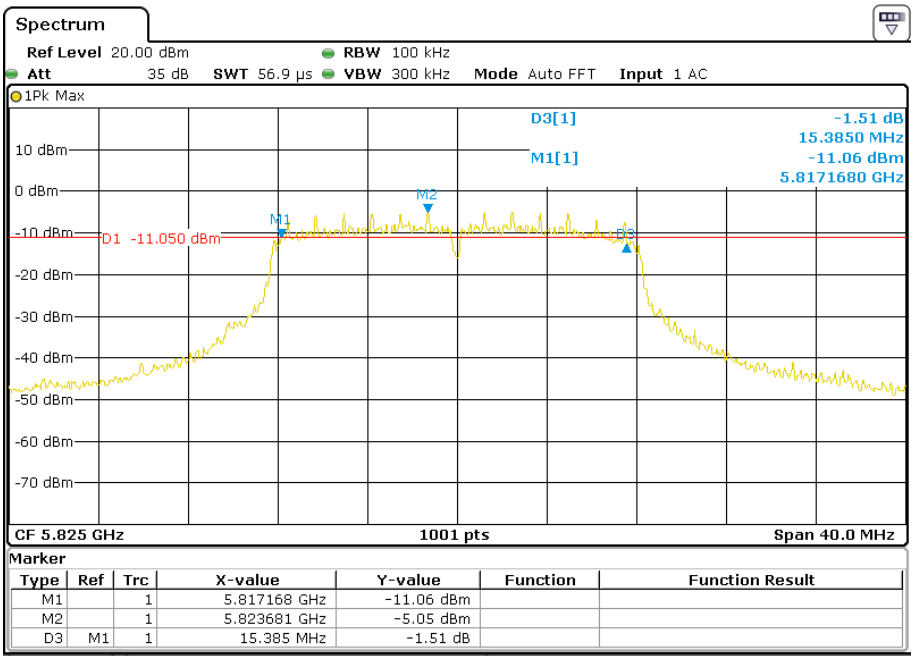
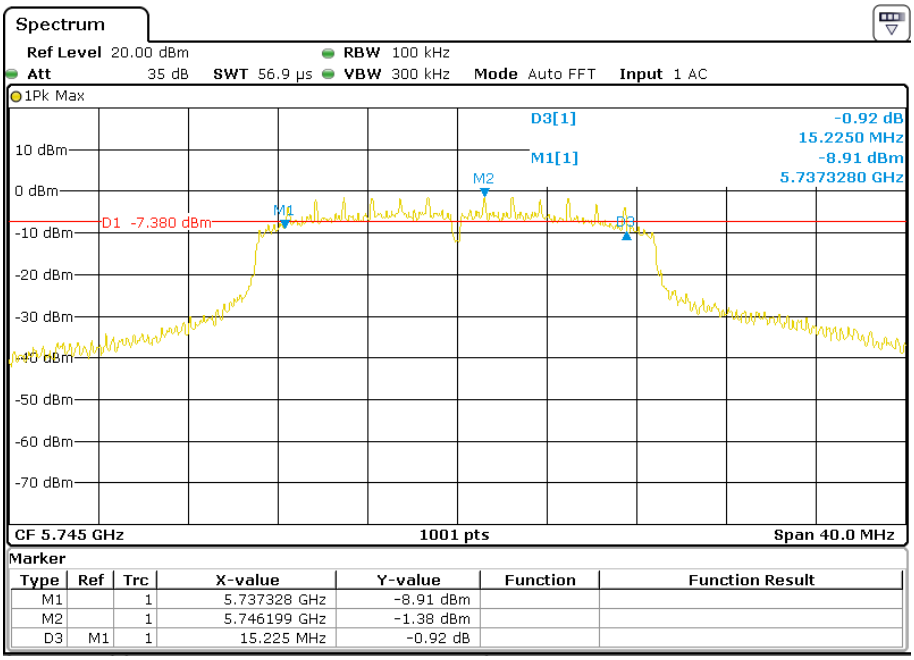
802.11 a	Antenna A	Channel 165



802.11 n(HT20)	Antenna A	Channel 149



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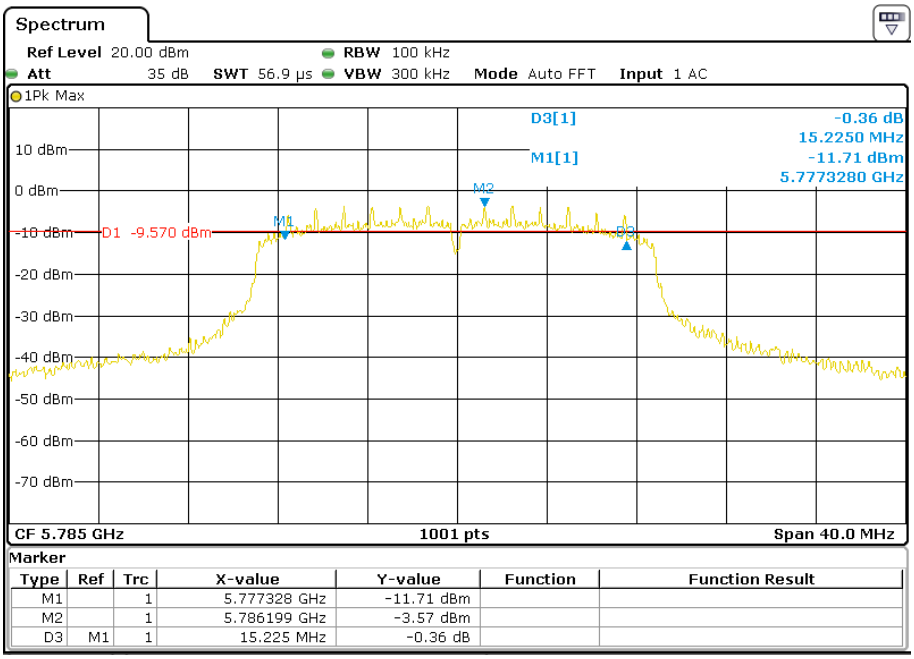
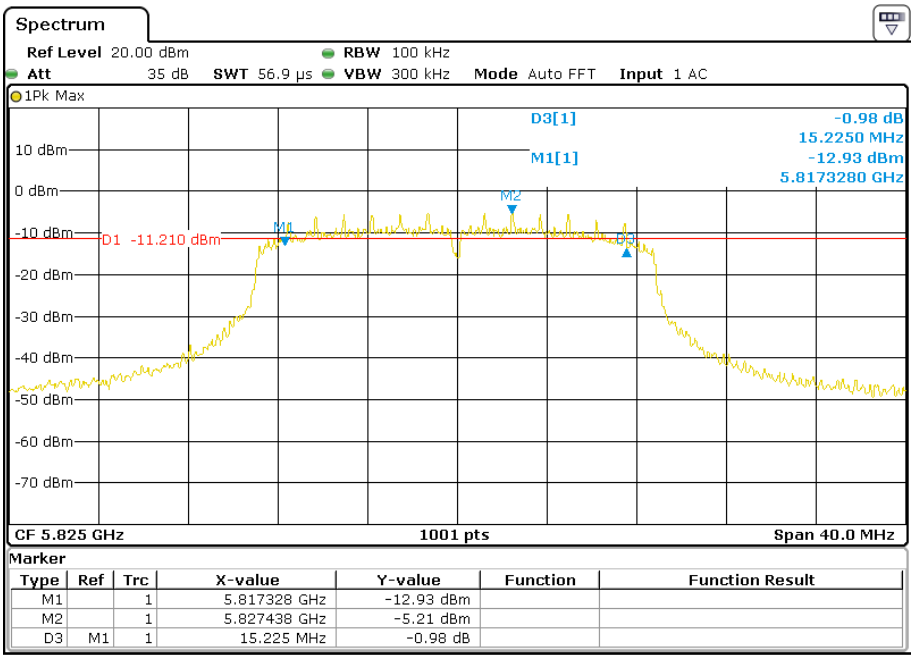
802.11 n(HT20)	Antenna A	Channel 157



Type	Ref	Trc	X-value	Y-value	Function	Function Result
M1		1	5.777328 GHz	-11.71 dBm		
M2		1	5.786199 GHz	-3.57 dBm		
D3	M1	1	15.225 MHz	-0.36 dB		

802.11 n(HT20)	Antenna A	Channel 165



Type	Ref	Trc	X-value	Y-value	Function	Function Result
M1		1	5.817328 GHz	-12.93 dBm		
M2		1	5.827438 GHz	-5.21 dBm		
D3	M1	1	15.225 MHz	-0.98 dB		

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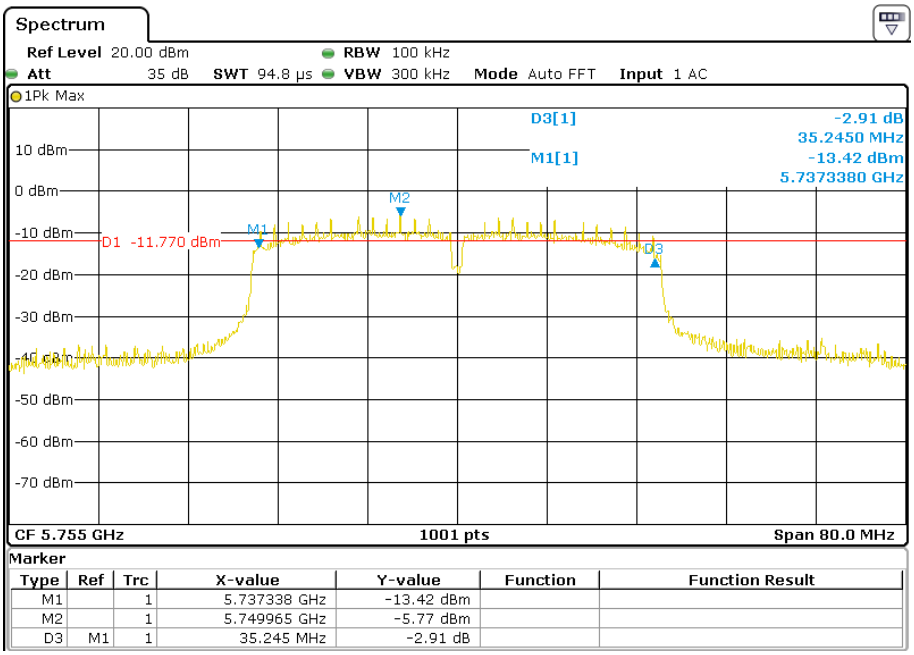
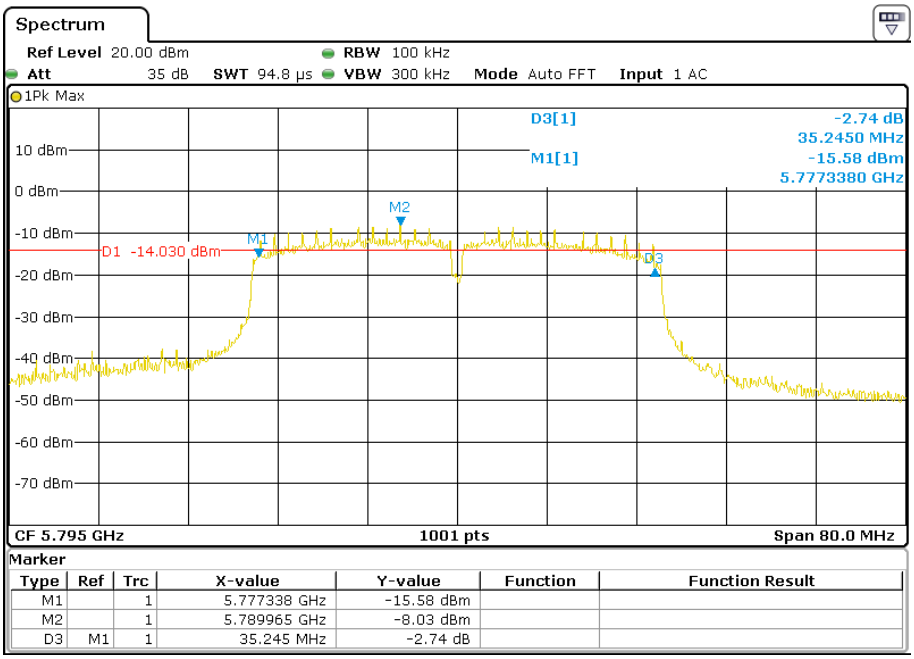
802.11 n(HT40)	Antenna A	Channel 151



802.11 n(HT40)	Antenna A	Channel 159



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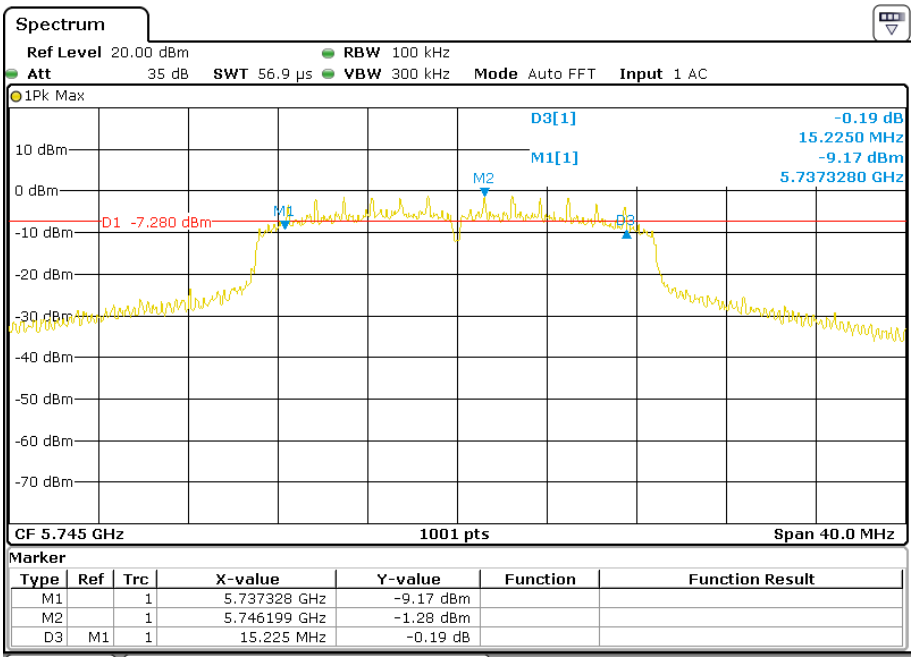
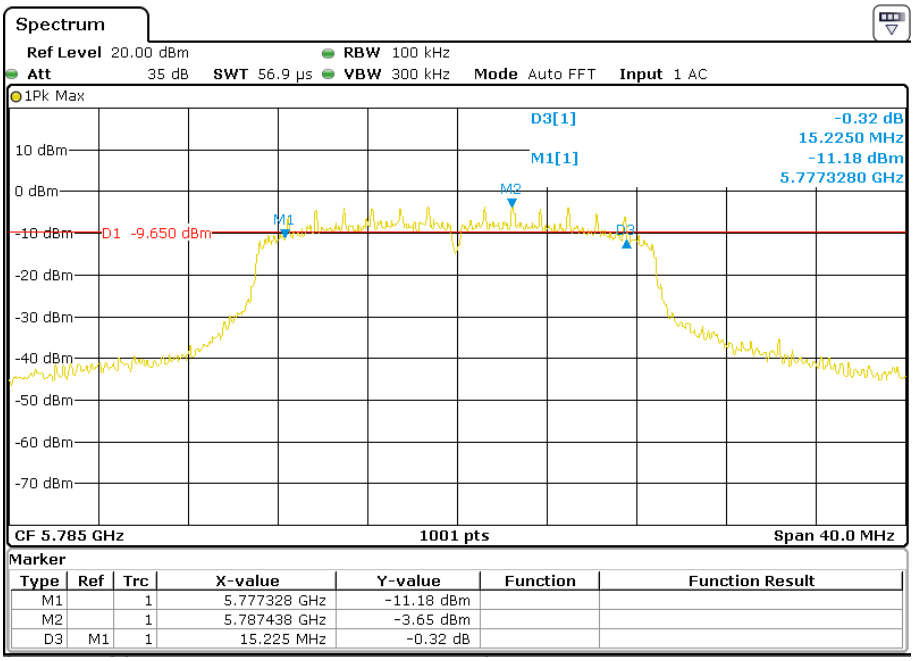
802.11 ac(VHT20)	Antenna A	Channel 149



802.11 ac(VHT20)	Antenna A	Channel 157



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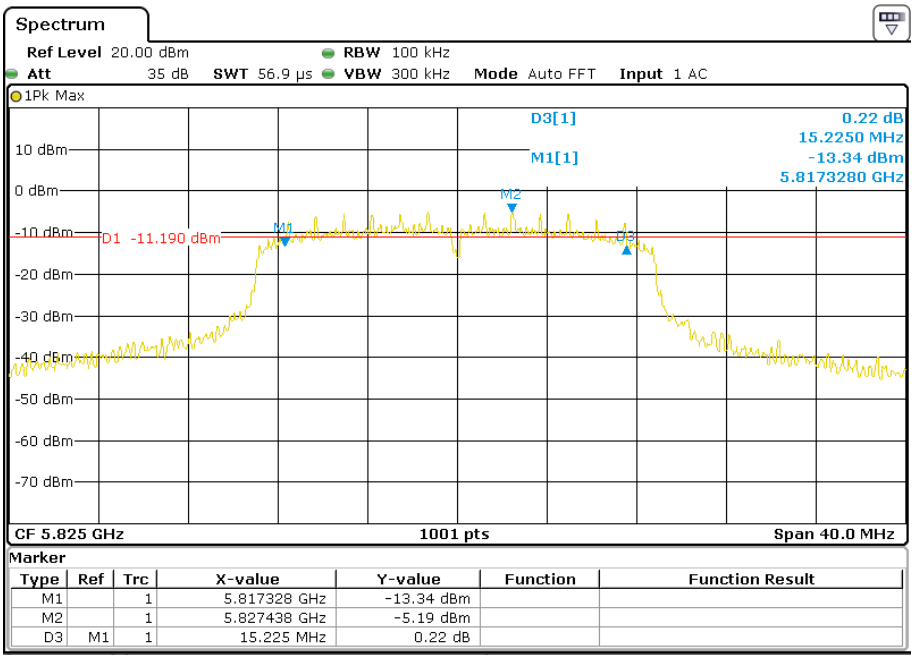
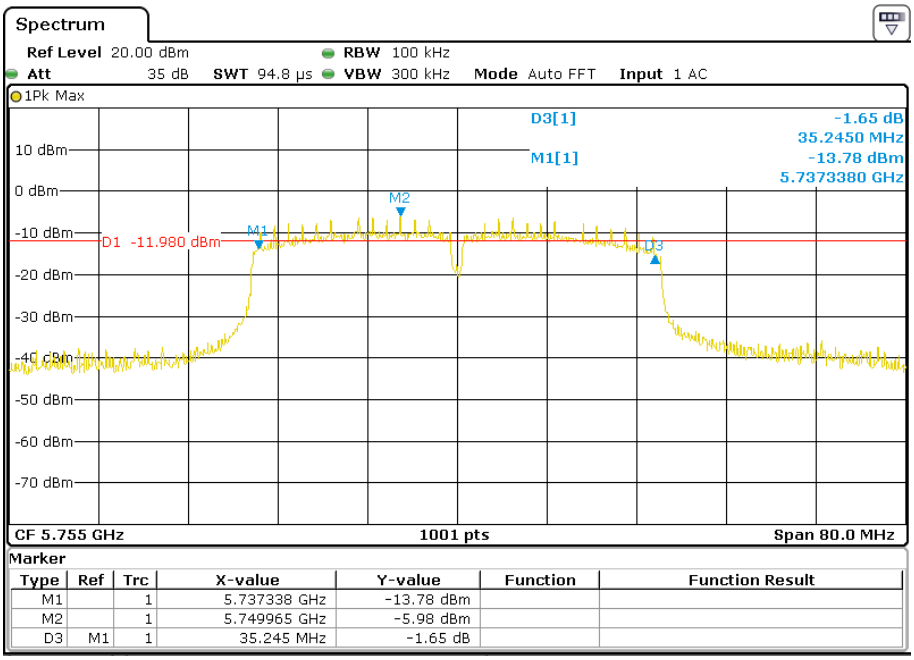
802.11 ac(VHT20)	Antenna A	Channel 165



802.11 ac(VHT40)	Antenna A	Channel 151



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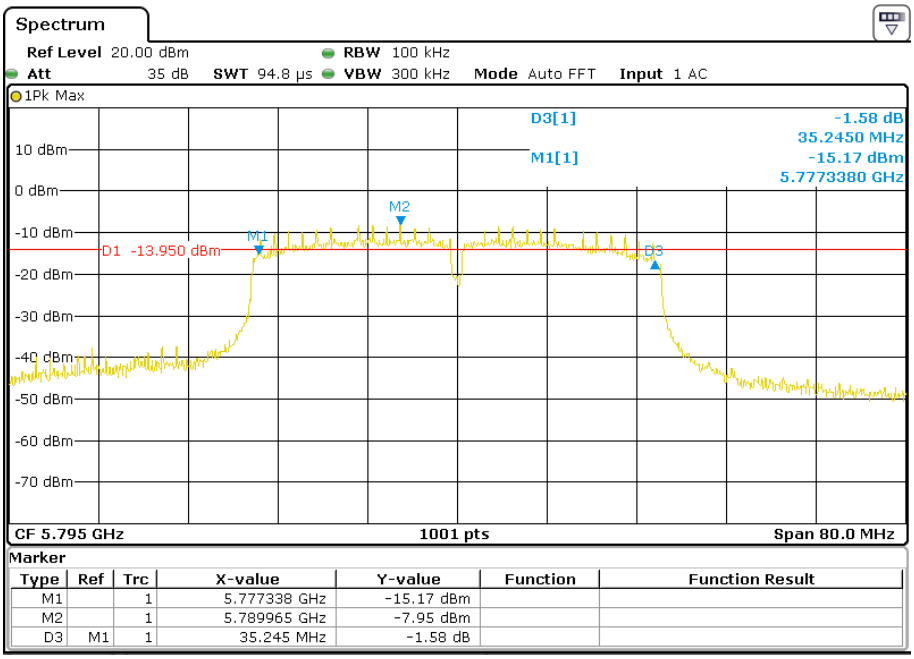
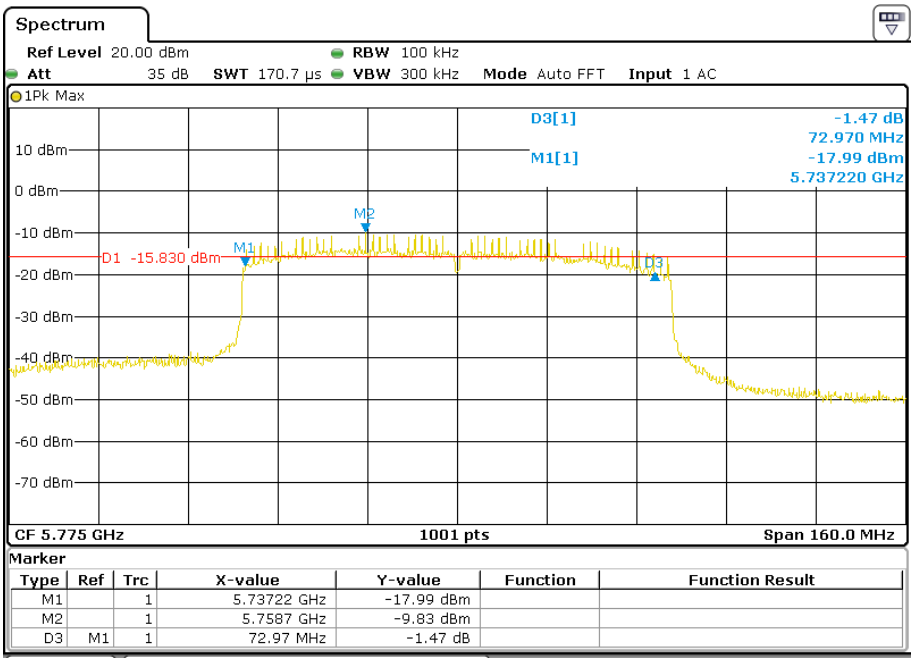
802.11 ac(VHT40)	Antenna A	Channel 159



Type	Ref	Trc	X-value	Y-value	Function	Function Result
M1		1	5.777338 GHz	-15.17 dBm		
M2		1	5.789965 GHz	-7.95 dBm		
D3	M1	1	35.245 MHz	-1.58 dB		

802.11 ac(VHT80)	Antenna A	Channel 155



Type	Ref	Trc	X-value	Y-value	Function	Function Result
M1		1	5.73722 GHz	-17.99 dBm		
M2		1	5.7587 GHz	-9.83 dBm		
D3	M1	1	72.97 MHz	-1.47 dB		

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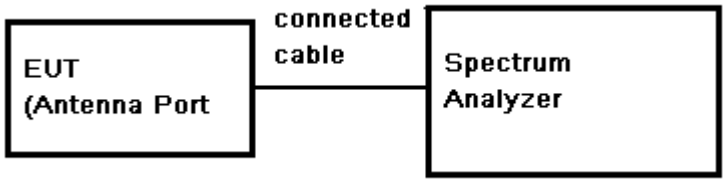
7.7 Maximum Conducted output power

Test Setup:



Test Procedure:

a) Place the EUT on the table and set it in transmitting mode.
b) Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to the spectrum.
c) Set the spectrum analyzer as RBW=1MHz, VBW≥3* RBW, Span=40/80MHz, Sweep=auto, Detector = RMS
d) Set the occur band to the entire emission 26dB bandwidth of the signal.
e) Trace average at least 100 traces in power averaging (i.e., RMS) mode.
f) Compute power by integrating the spectrum across the EBW (or, alternatively, the entire 26dB occupied bandwidth) of the signal using the instrument's band power measurement function with band limits set equal to the EBW (or occupied bandwidth) band edges.
g) Record the max. Power channel reading.
h) Repeat above procedures until all the frequency measured were complete.

Test Limit:

Frequency Band	EUT Category	Limit
U-NII-1	☐ Outdoor Access Point	1W(30dBm) The maximum e.i.r.p≤125 mW(21 dBm) at any elevation angle above 30 degrees as measured from the horizon.
	☐ Fixed Point-to-point Access Point	1W(30dBm)
	☐ Indoor Access Point	
	☒ Mobile and Portable client device	250mW (24dBm)
U-NII-2a	-	Lesser of 250mW (24dBm) or 11dBm + 10log B*
U-NII-2c		
U-NII-3		1W (30dBm)
Note: *Where B is the 26dB emission bandwidth in MHz.		

Test Result: Pass

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Test Data:

Test Mode	Band	CH No.	Freq (MHz)	Reading (dBm)	Conducted Power (dBm)	Limit (dBm)	Result
802.11a	U-NII 1	36	5180	7.37	7.87	24	Pass
		40	5200	6.70	7.20		Pass
		48	5240	7.08	7.58		Pass
	U-NII 3	149	5745	9.36	9.86	30	Pass
		157	5785	8.33	8.83		Pass
		165	5825	7.98	8.48		Pass
802.11n (HT20)	U-NII 1	36	5180	6.51	7.01	24	Pass
		40	5200	6.19	6.69		Pass
		48	5240	6.46	6.96		Pass
	U-NII 3	149	5745	9.20	9.70	30	Pass
		157	5785	7.96	8.46		Pass
		165	5825	7.56	8.06		Pass
802.11n (HT40)	U-NII 1	38	5190	5.84	6.34	24	Pass
		46	5230	6.04	6.54		Pass
	U-NII 3	151	5755	8.43	8.93	30	Pass
		159	5795	7.86	8.36		Pass
802.11ac (VHT20)	U-NII 1	36	5180	6.19	6.69	24	Pass
		40	5200	6.30	6.80		Pass
		48	5240	6.29	6.79		Pass
	U-NII 3	149	5745	8.92	9.42	30	Pass
		157	5785	7.92	8.42		Pass
		165	5825	7.55	8.05		Pass
802.11ac (VHT40)	U-NII 1	38	5190	5.77	6.27	24	Pass
		46	5230	5.39	5.89		Pass
	U-NII 3	151	5755	8.08	8.58	30	Pass
		159	5795	7.14	7.64		Pass
802.11ac (VHT80)	U-NII 1	42	5210	3.60	4.10	24	Pass
	U-NII 3	155	5775	6.01	6.51	30	Pass

Remark:

1) Output Peak Power = Reading Power + Cable loss+ Duty Cycle Correction Factor

2) Cable loss= 0.5dB. Duty cycle of test signal is > 98%, duty factor is not required, reference Section 7.4

Test plot as below:

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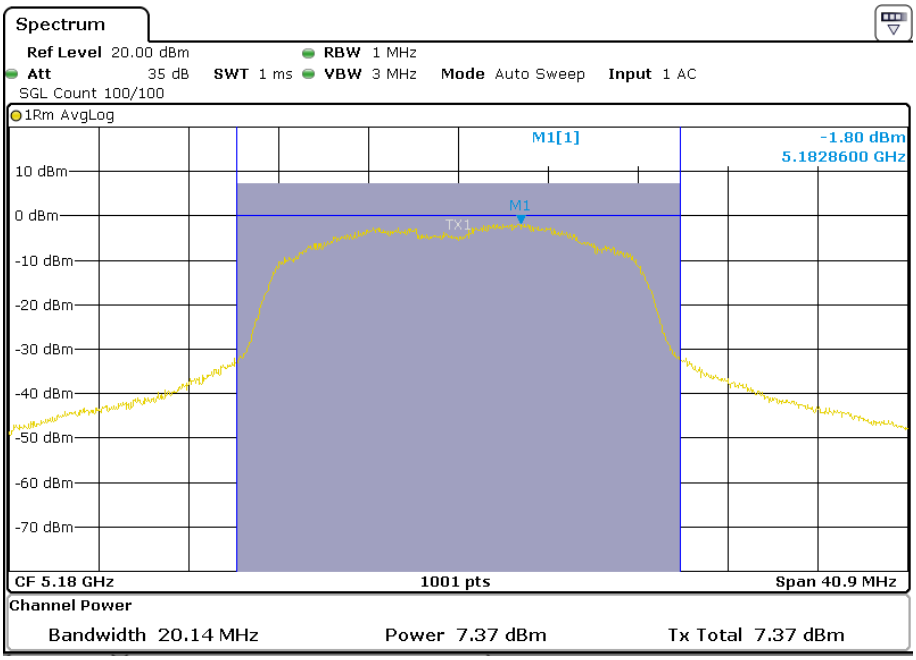
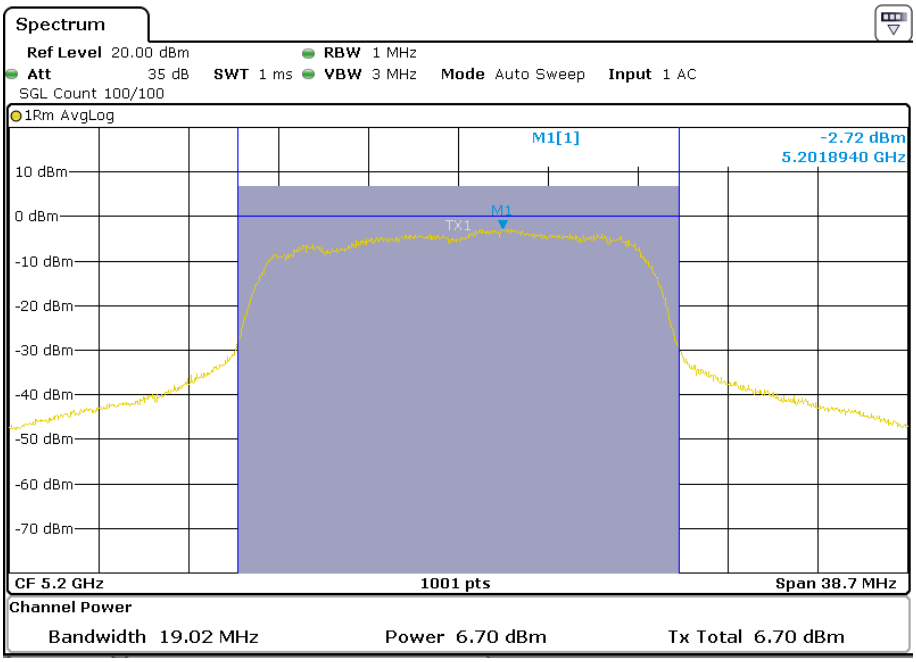
802.11 a		Channel 36



802.11 a		Channel 40



802.11 a		Channel 48

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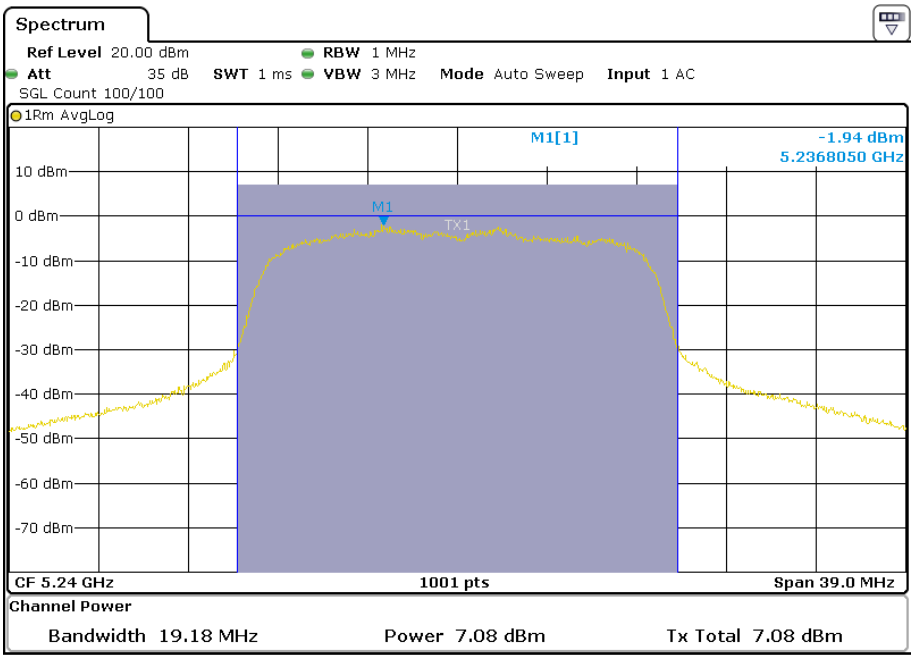
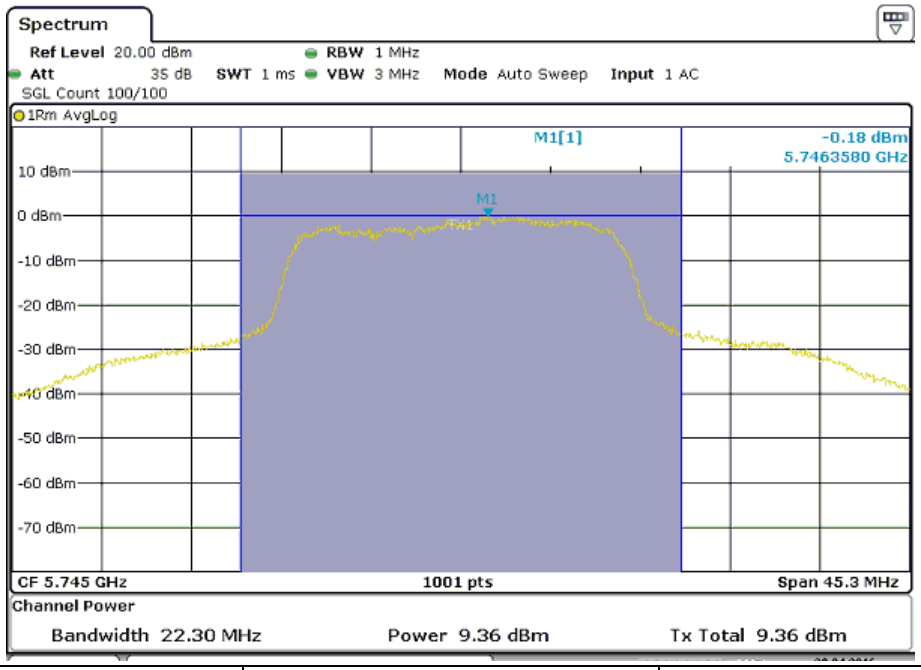


802.11 a		Channel 149



802.11 a		Channel 157

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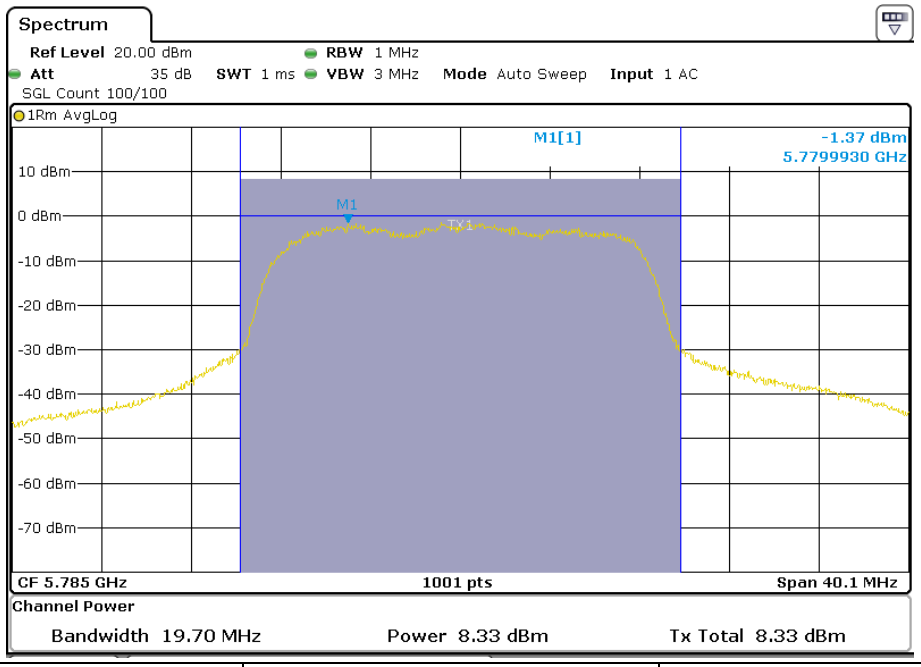
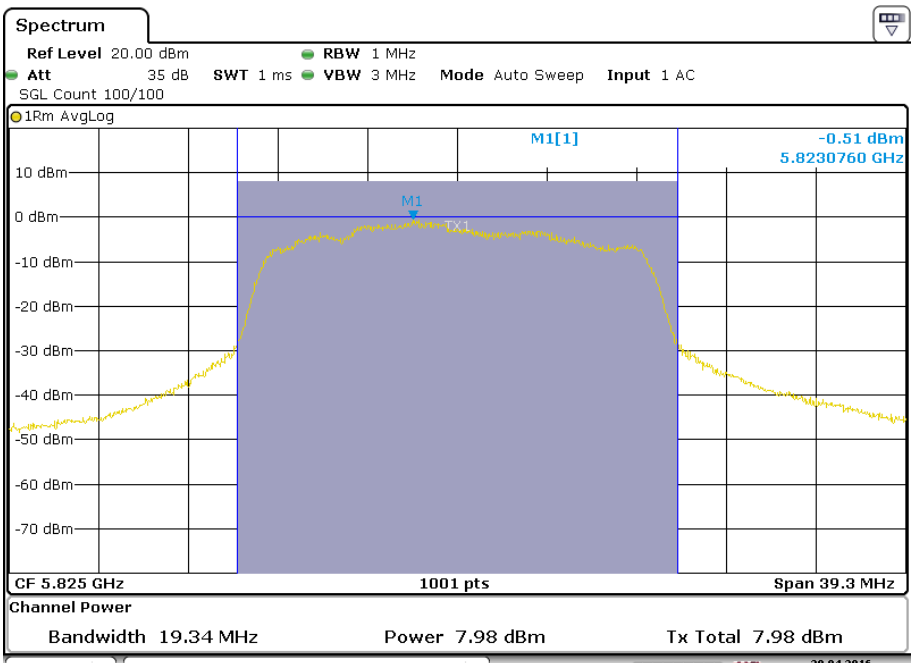


802.11 a		Channel 165



802.11 n(HT20)		Channel 36

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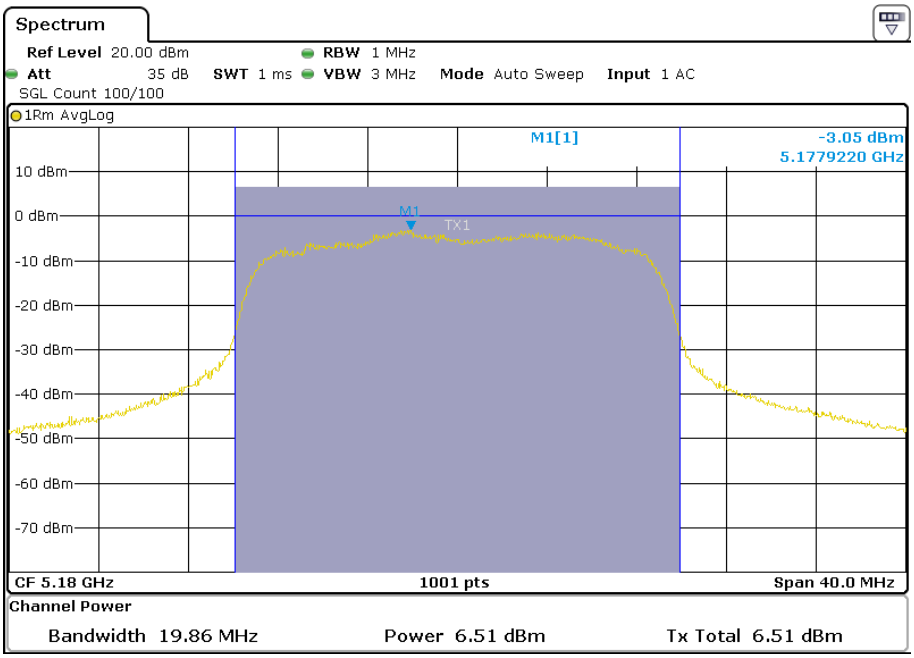
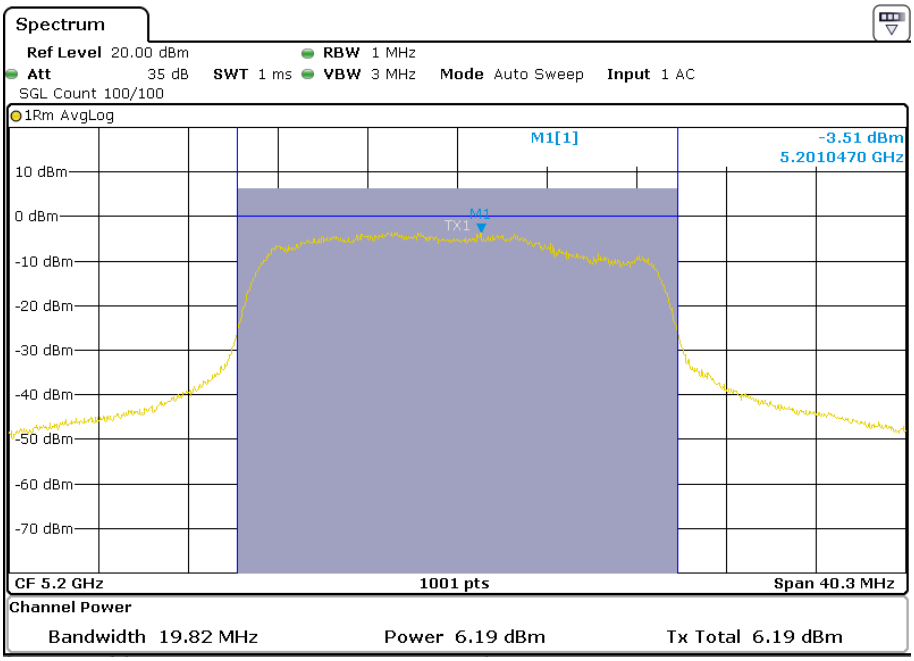


802.11 n(HT20)		Channel 40



802.11 n(HT20)		Channel 48

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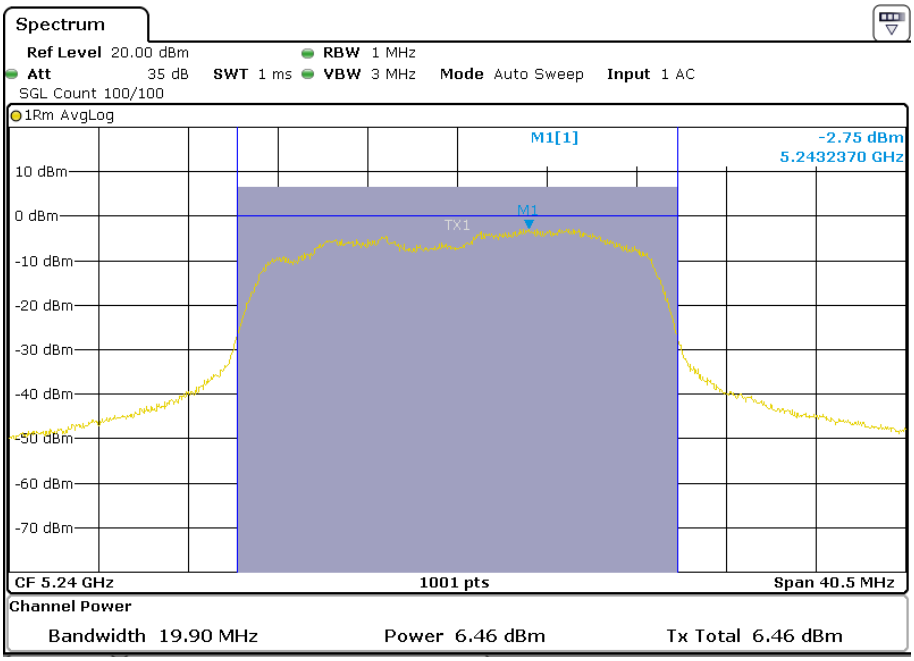
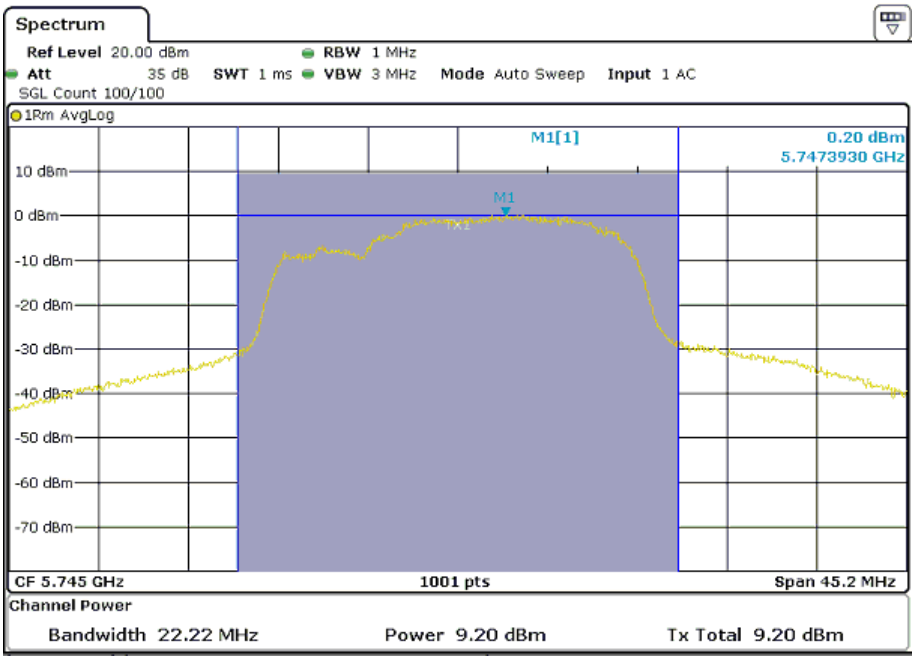


802.11 n(HT20)		Channel 149



802.11 n(HT20)		Channel 157

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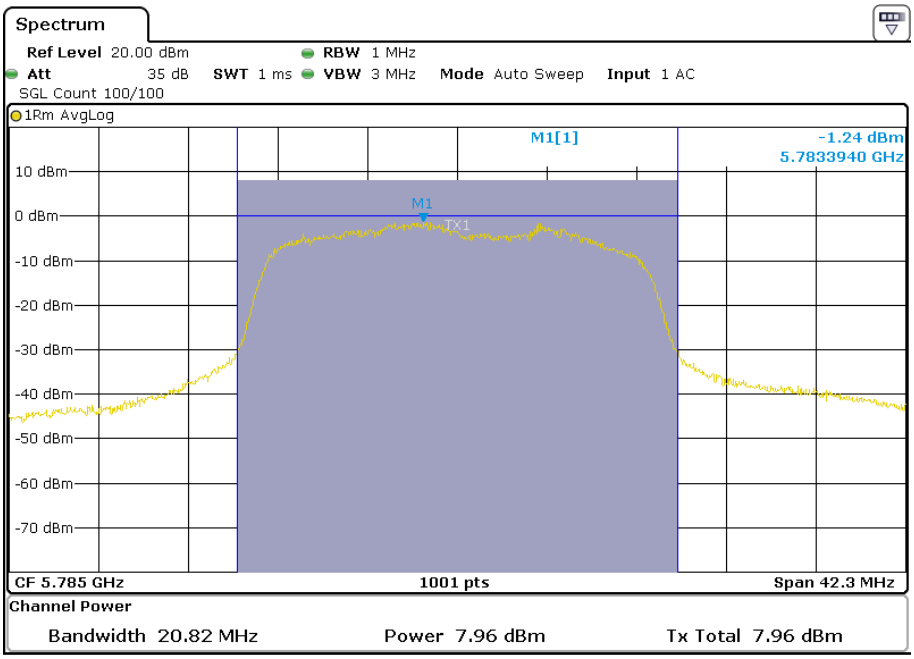
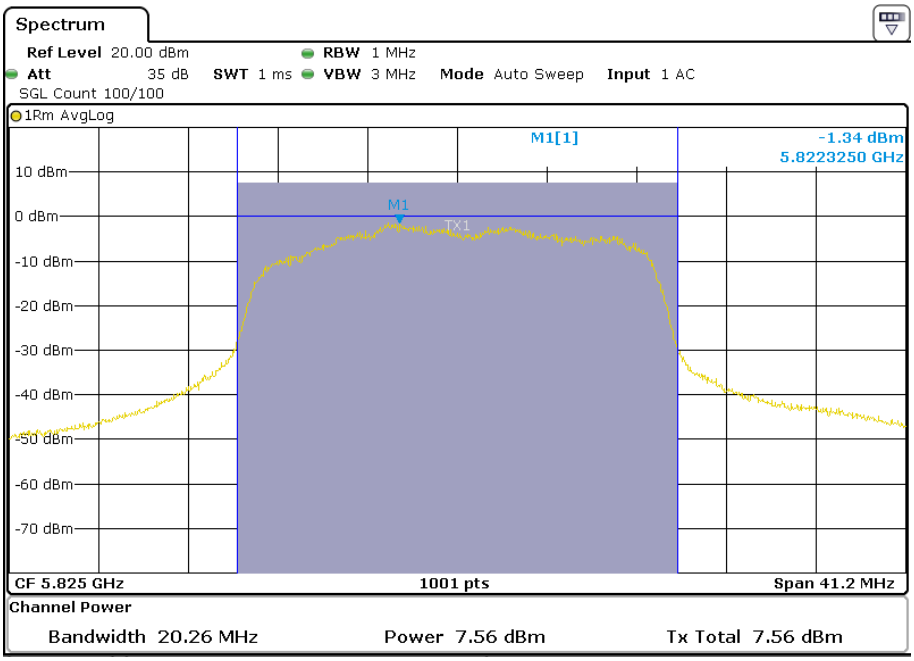


802.11 n(HT20)		Channel 165



802.11 n(HT40)		Channel 38

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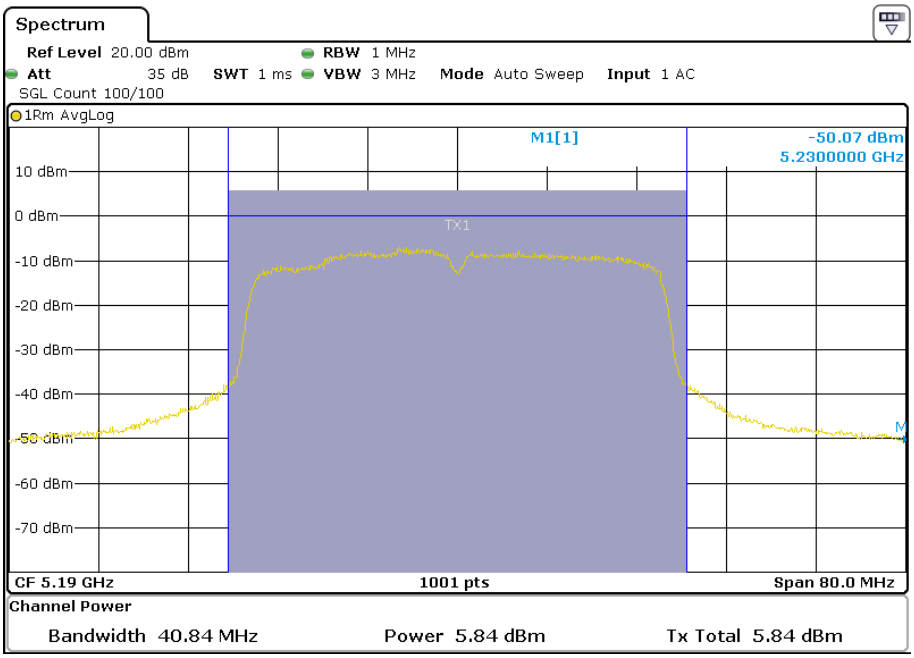
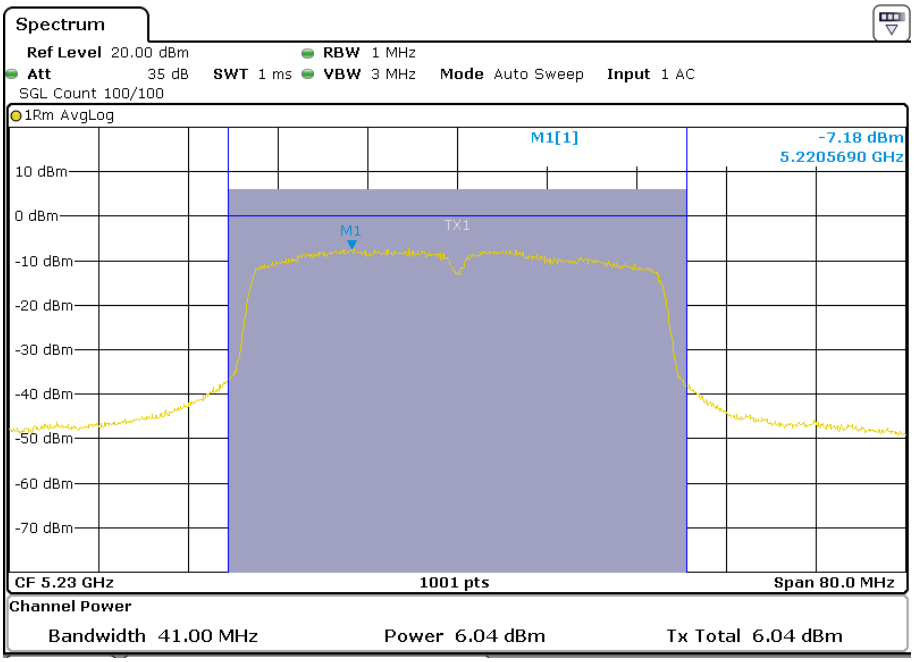


802.11 n(HT40)		Channel 46



802.11 n(HT40)		Channel 151

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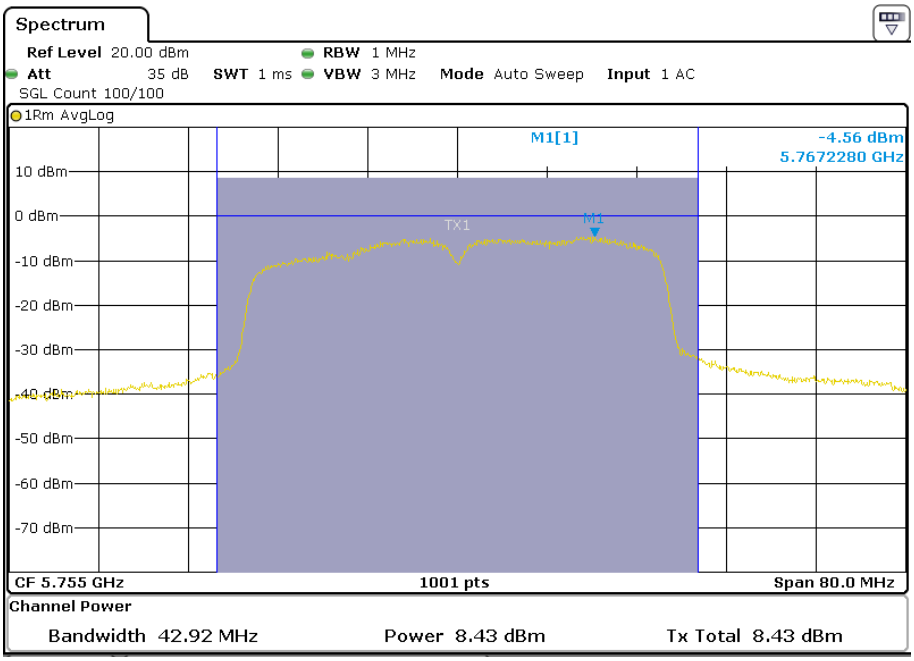
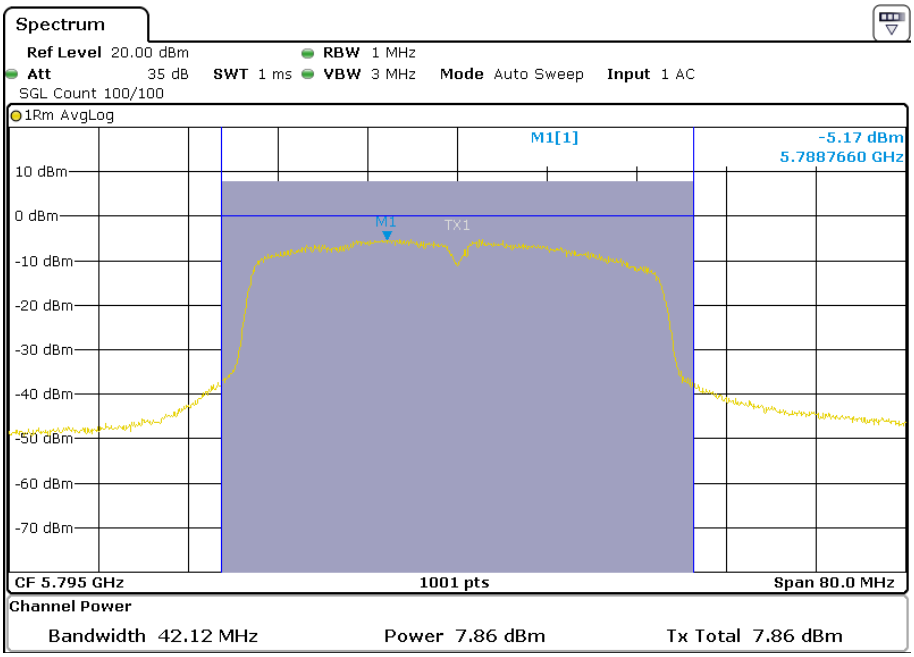


802.11 n(HT40)		Channel 159



802.11 ac(VHT20)		Channel 36

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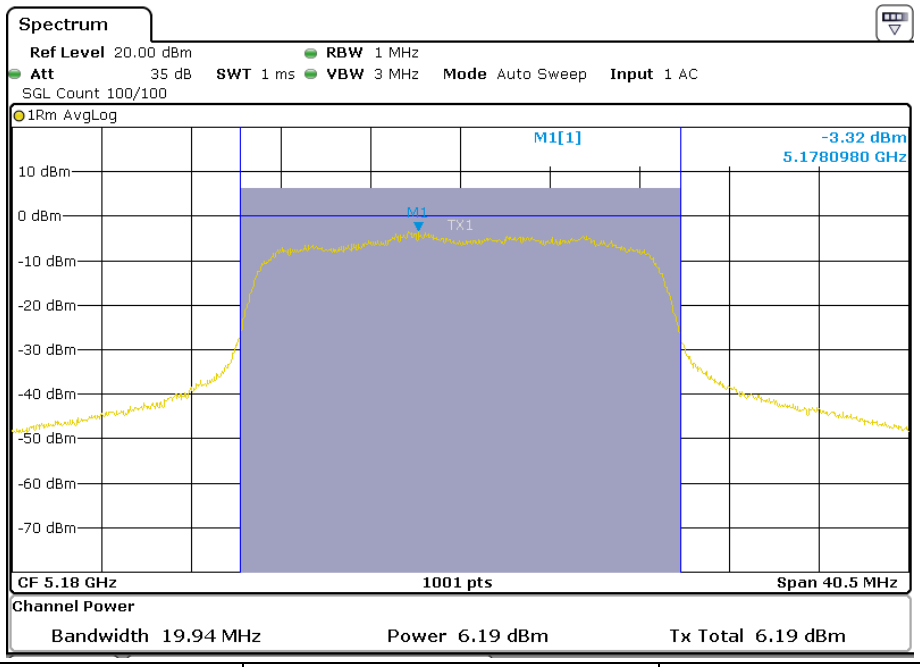
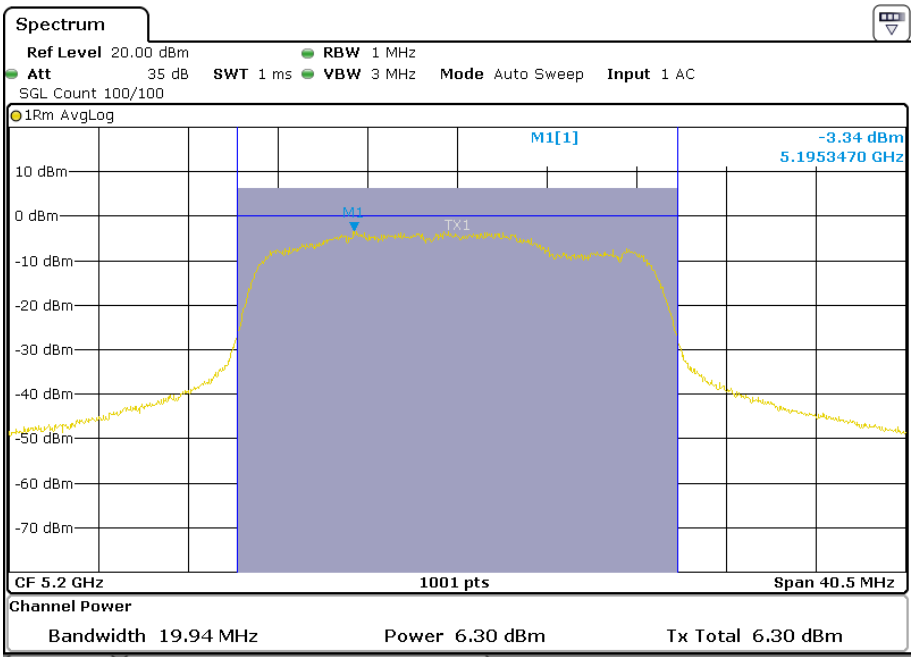


802.11 ac(VHT20)		Channel 40



802.11 ac(VHT20)		Channel 48

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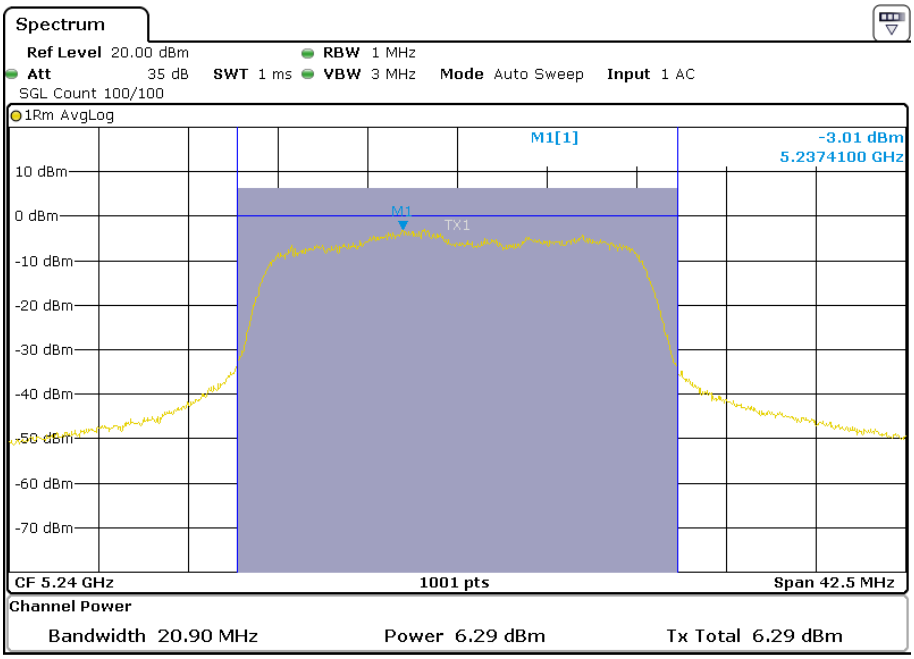
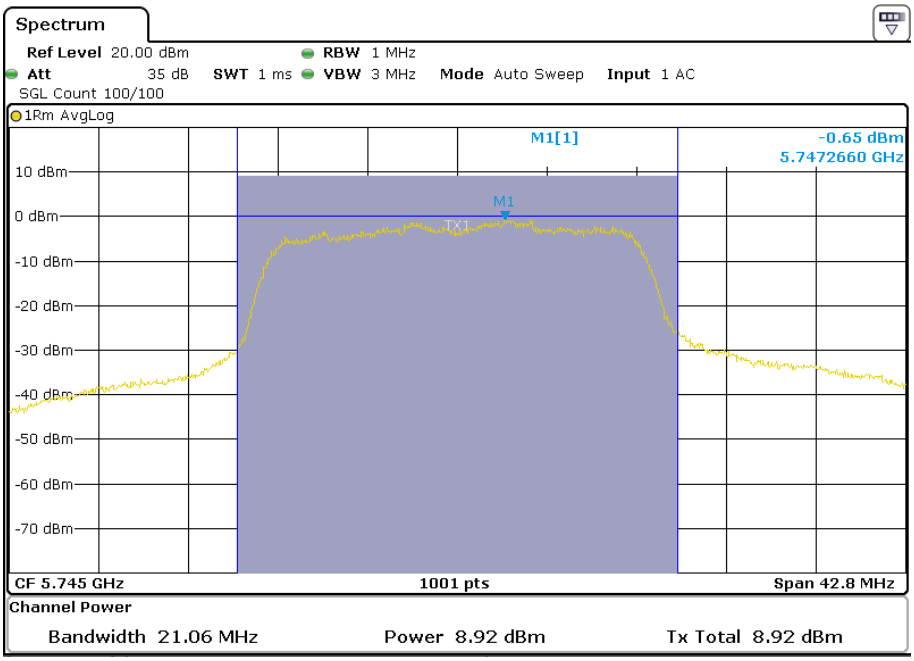


802.11 ac(VHT20)		Channel 149



802.11 ac(VHT20)		Channel 157

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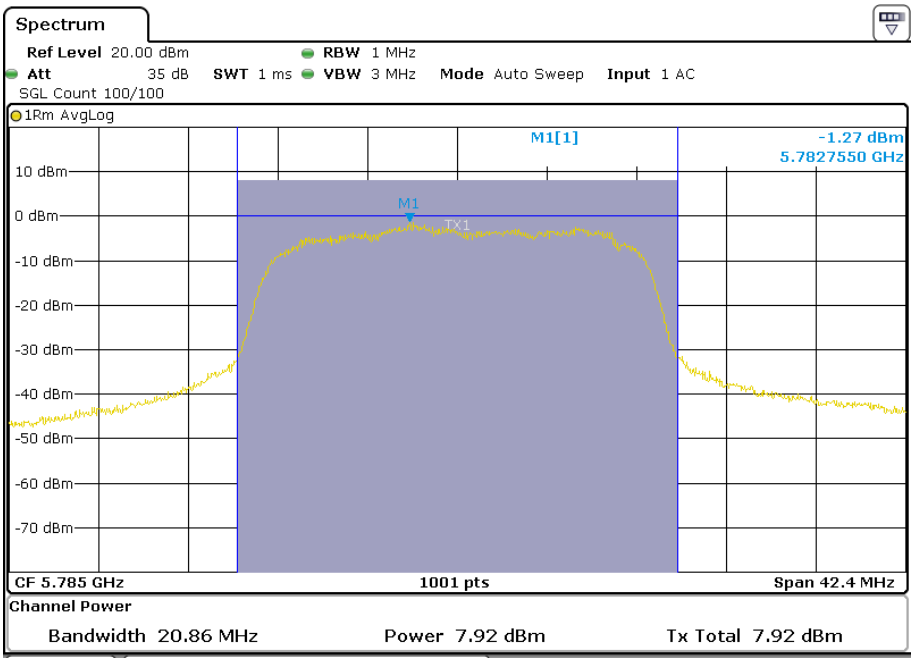
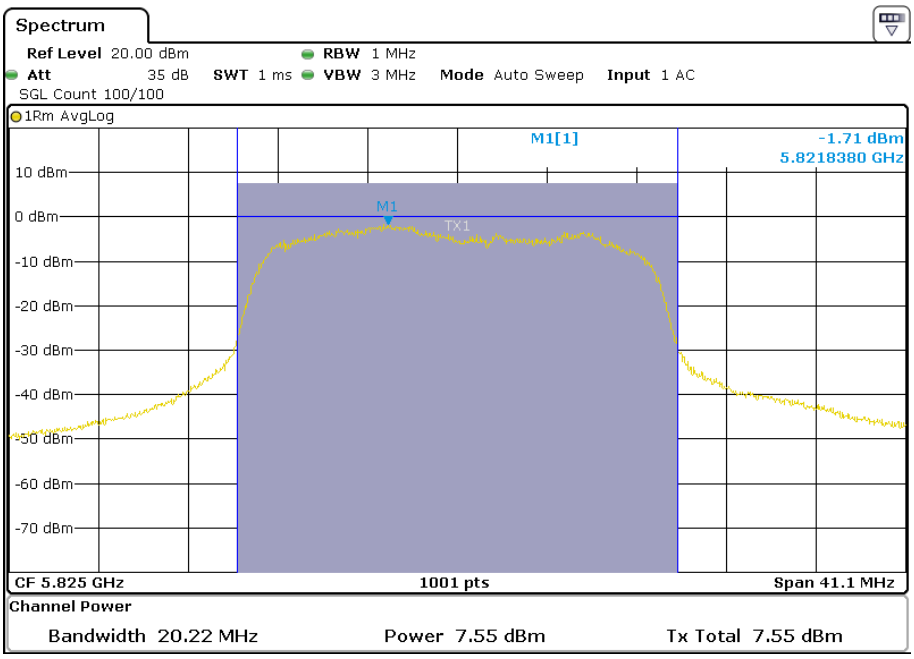


802.11 ac(VHT20)		Channel 165



802.11 ac(VHT40)		Channel 38

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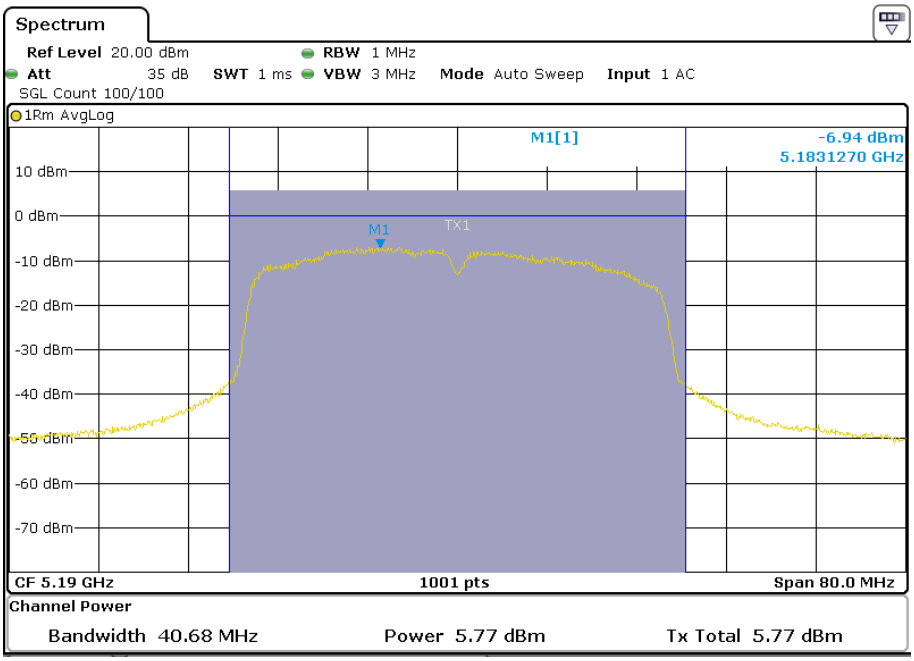
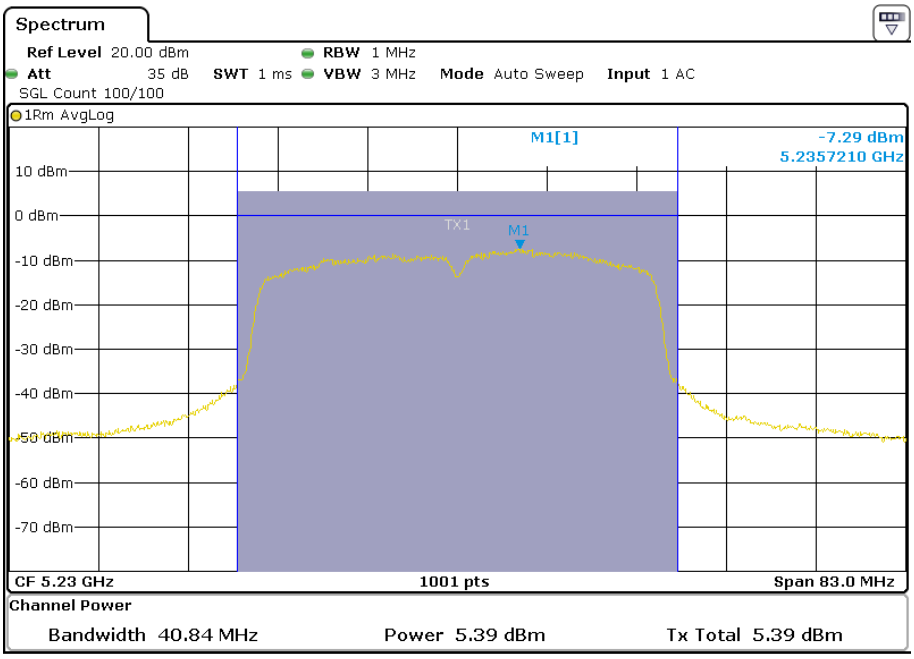


802.11 ac(VHT40)		Channel 46



802.11 ac(VHT40)		Channel 151

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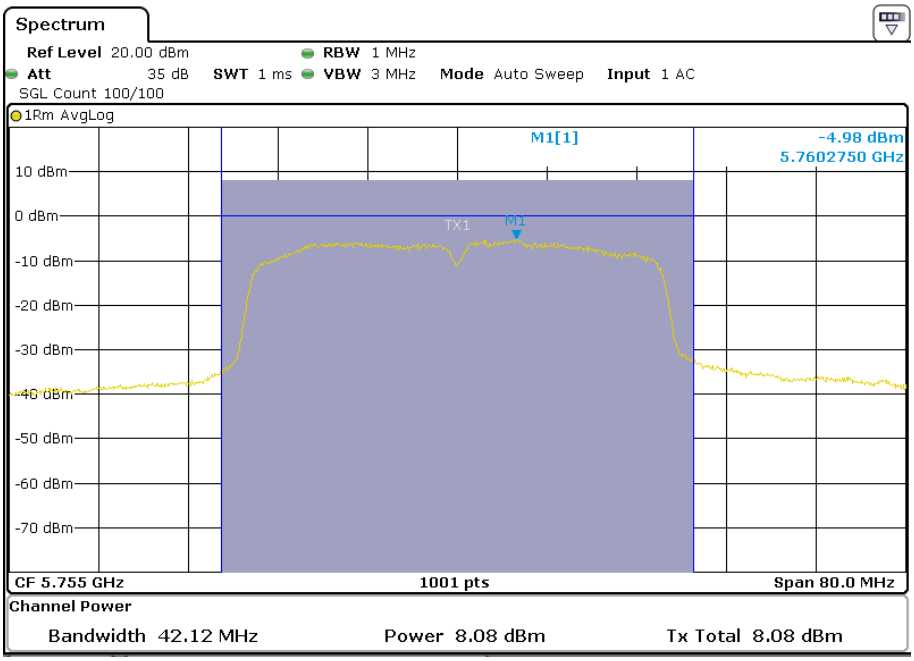
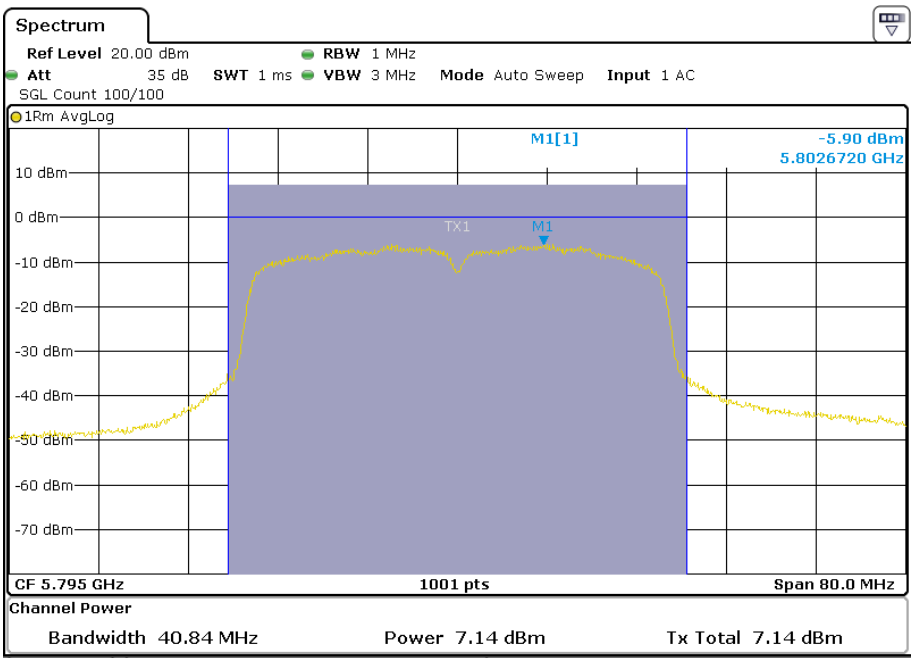


802.11 ac(VHT40)		Channel 159



802.11 ac(VHT80)		Channel 42

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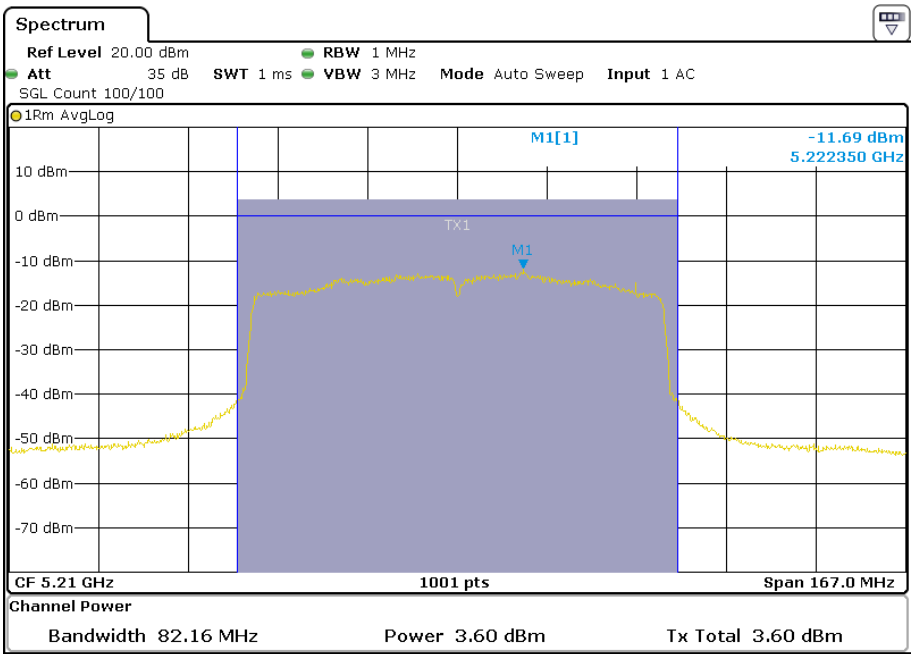
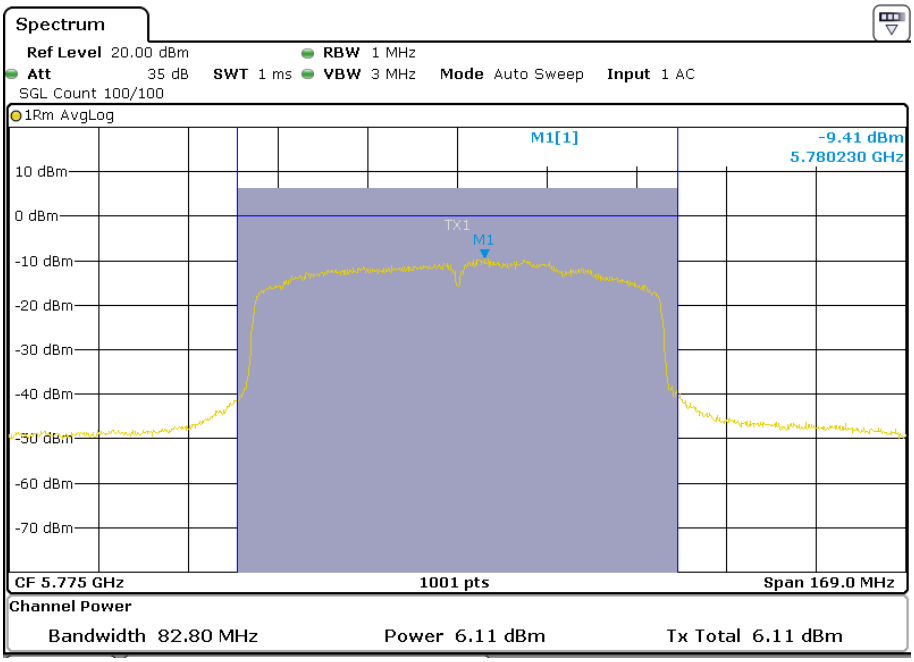


802.11 ac(VHT80)		Channel 155



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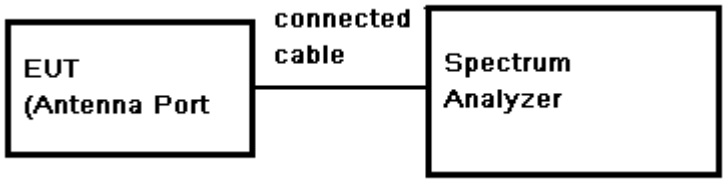
7.8 Peak Power Spectral Density

Test Setup:



Test Procedure:

a) Remove the antenna from the EUT and then connect a low RF cable from the antenna port to the spectrum.
b) Set span 40/80/160MHz; RBW = 1 MHz; VBW ≥ 3 MHz.
c) Number of points in sweep ≥ 2 Span / RBW; Sweep time = auto.
d) Detector = RMS, Trigger = Free run Record the marker level for the particular mode.
e) Use the peak search function on the instrument to find the peak of the spectrum and record its value.
f) Repeat these steps for other channel and device modes.

Test Limit:

Frequency Band	EUT Category	Limit
U-NII-1	☐ Outdoor Access Point	17dBm/MHz
	☐ Fixed Point-to-point Access Point	11 dBm/MHz
	☐ Indoor Access Point	
	☒ Mobile and Portable client device	11 dBm/MHz
U-NII-2a	-	11 dBm/MHz
U-NII-2c		
U-NII-3		30 dBm/500KHz

Test Result: Pass

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Test Data:

Test Mode	Band	CH No.	Freq (MHz)	Reading (dBm)	Conducted Power (dBm)	Limit (dBm/MHz)	Result
802.11a	U-NII 1	36	5180	-5.00	-4.50	11	Pass
		40	5200	-6.23	-5.73		Pass
		48	5240	-4.93	-4.43		Pass
802.11n (HT20)		36	5180	-4.47	-3.97	11	Pass
		40	5200	-6.45	-5.95		Pass
		48	5240	-5.63	-5.13		Pass
802.11n (HT40)		38	5190	-9.81	-9.31	11	Pass
		46	5230	-9.26	-8.76		Pass
802.11ac (VHT20)		36	5180	-5.64	-5.14	11	Pass
		40	5200	-5.01	-4.51		Pass
		48	5240	-6.74	-6.24		Pass
802.11ac (VHT40)		38	5190	-9.24	-8.74	11	Pass
		46	5230	-8.80	-8.30		Pass
802.11ac (VHT80)		42	5210	-14.83	-14.33	11	Pass

Test Mode	Band	CH No.	Freq (MHz)	Reading (dBm)	Conducted Power (dBm)	Limit (dBm/500KHz)	Result
802.11a	U-NII 3	149	5745	-5.83	-5.33	30	Pass
		157	5785	-4.06	-3.56		Pass
		165	5825	-4.12	-3.62		Pass
802.11n (HT20)		149	5745	-5.34	-4.84	30	Pass
		157	5785	-5.37	-4.87		Pass
		165	5825	-5.72	-5.22		Pass
802.11n (HT40)		151	5755	-8.78	-8.28	30	Pass
		159	5795	-8.22	-7.72		Pass
802.11ac (VHT20)		149	5745	-5.83	-5.33	30	Pass
		157	5785	-5.63	-5.13		Pass
		165	5825	-2.61	-2.11		Pass
802.11ac (VHT40)		151	5755	-9.12	-8.62	30	Pass
		159	5795	-6.45	-5.95		Pass
802.11ac (VHT80)		155	5775	-13.06	-12.56	30	Pass

Remark:

1) Peak Power Spectral Density = Reading + Cable loss+ Duty Cycle Correction Factor

2) Cable loss= 0.5dB. Duty cycle of test signal is > 98%, duty factor is not required, reference Section 7.4

3) For operating in the bands U-NII-1, the unit of PPSD is dBm/MHz. For operating in the bands U-NII-3, the unit of PPSD is dBm/500KHz.

Test plot as below:

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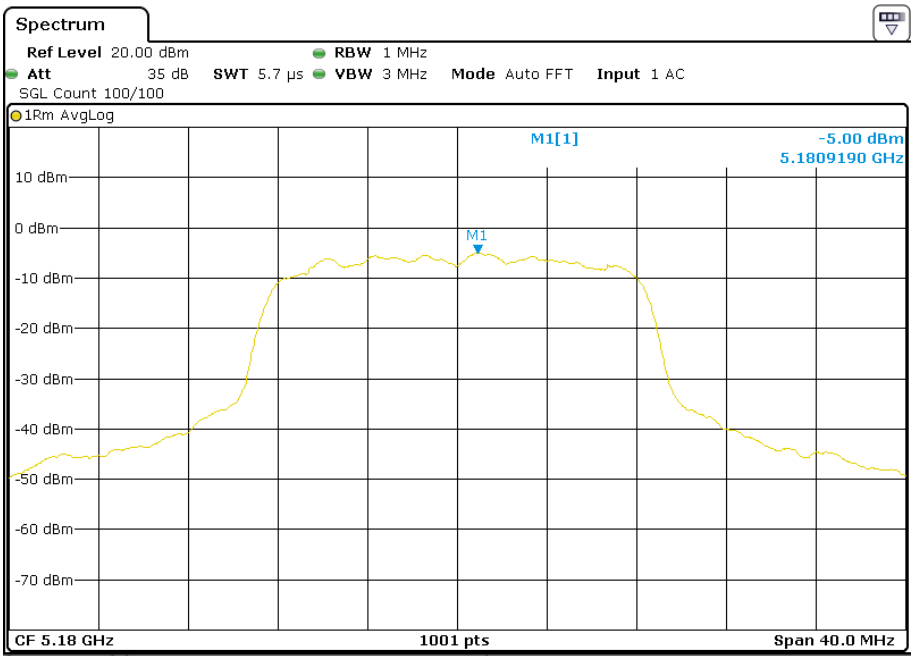
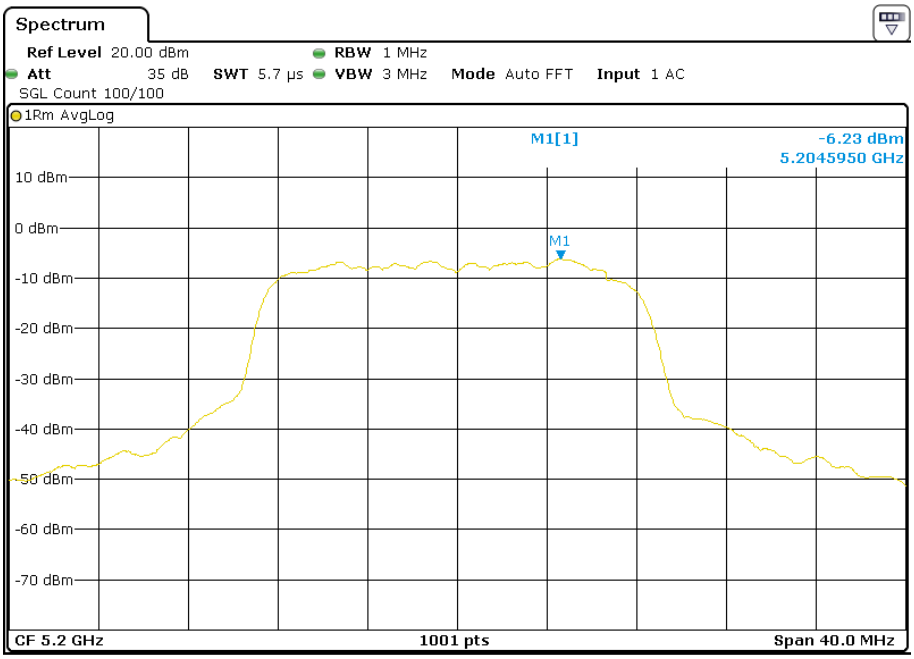
802.11 a		Channel 36



802.11 a		Channel 40



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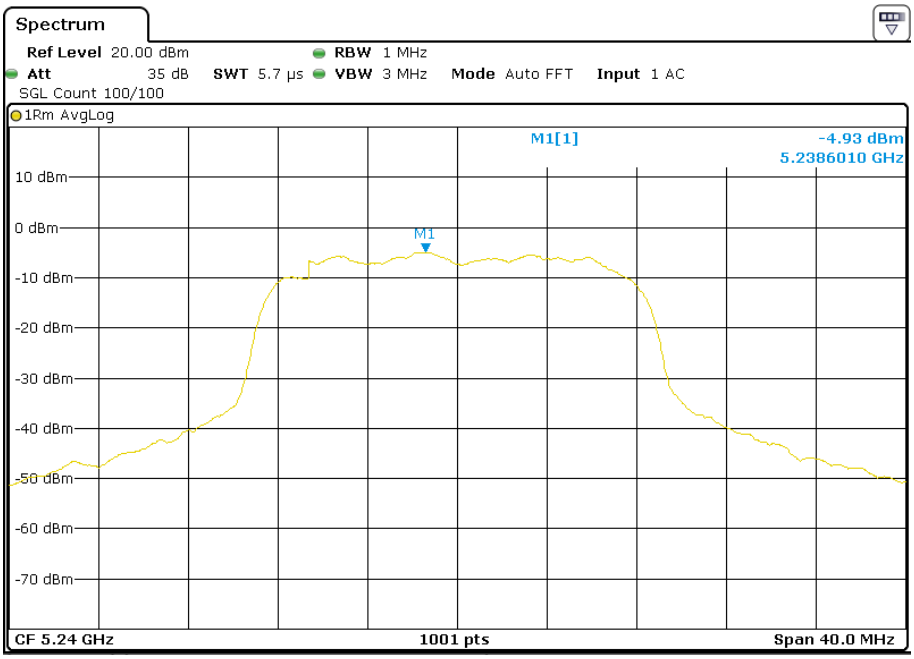
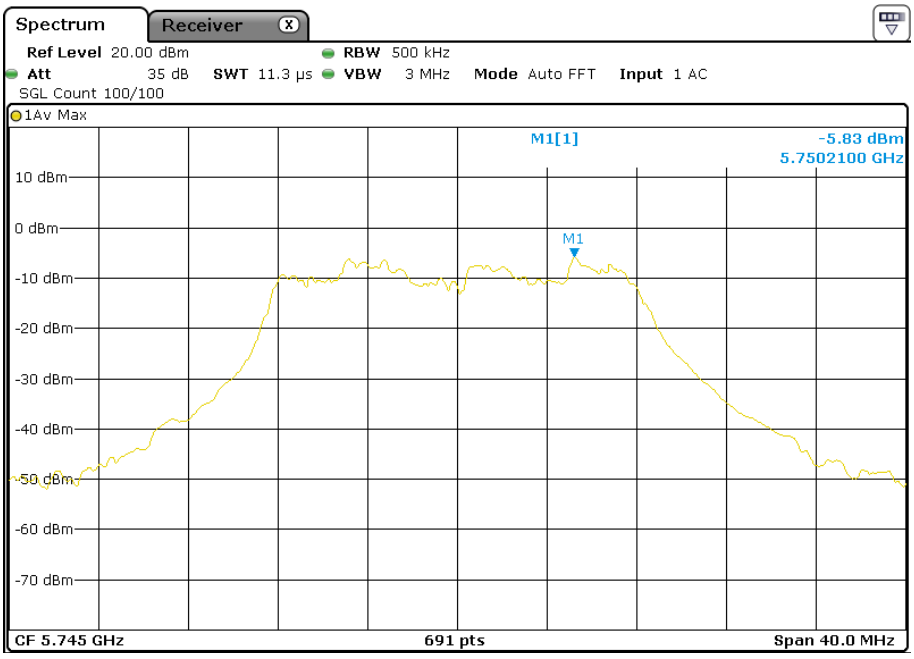
802.11 a		Channel 48



802.11 a		Channel 149



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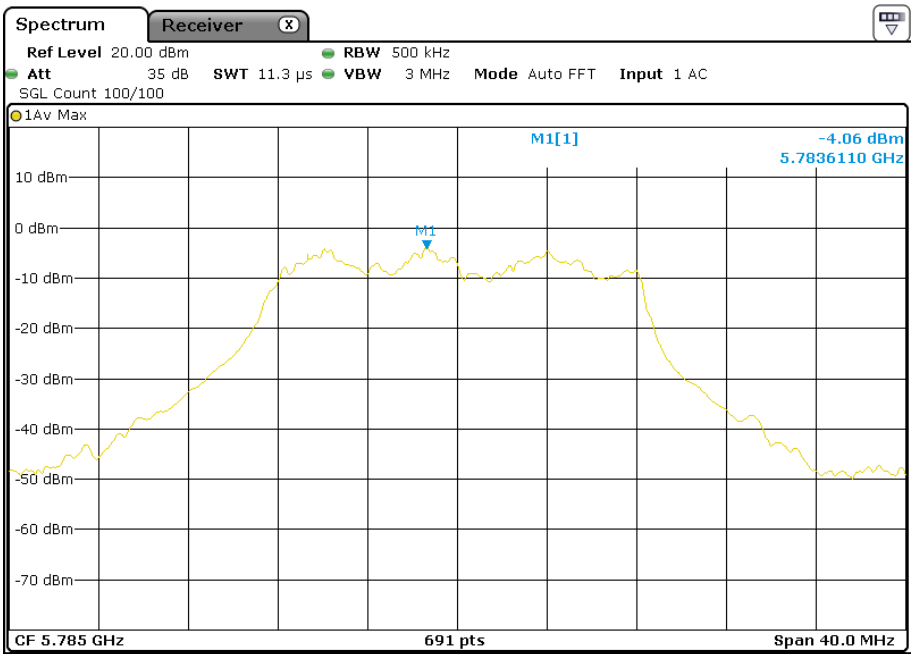
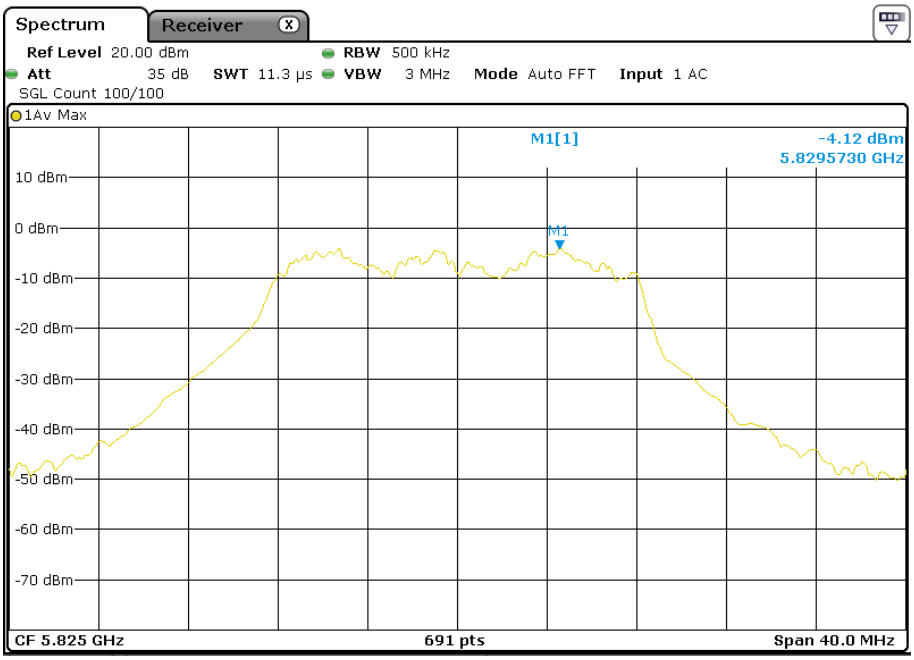
802.11 a		Channel 157



802.11 a		Channel 165



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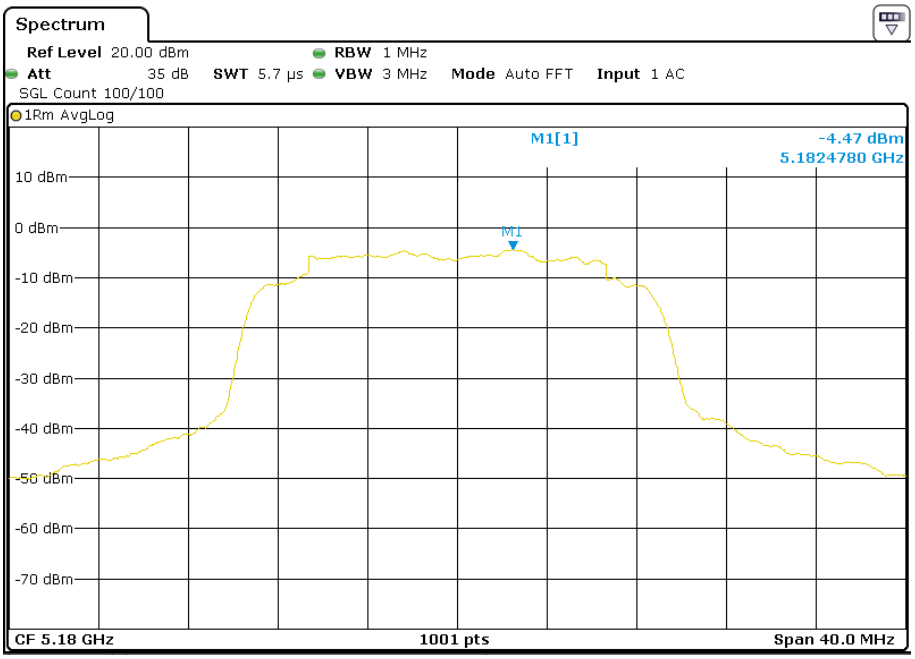
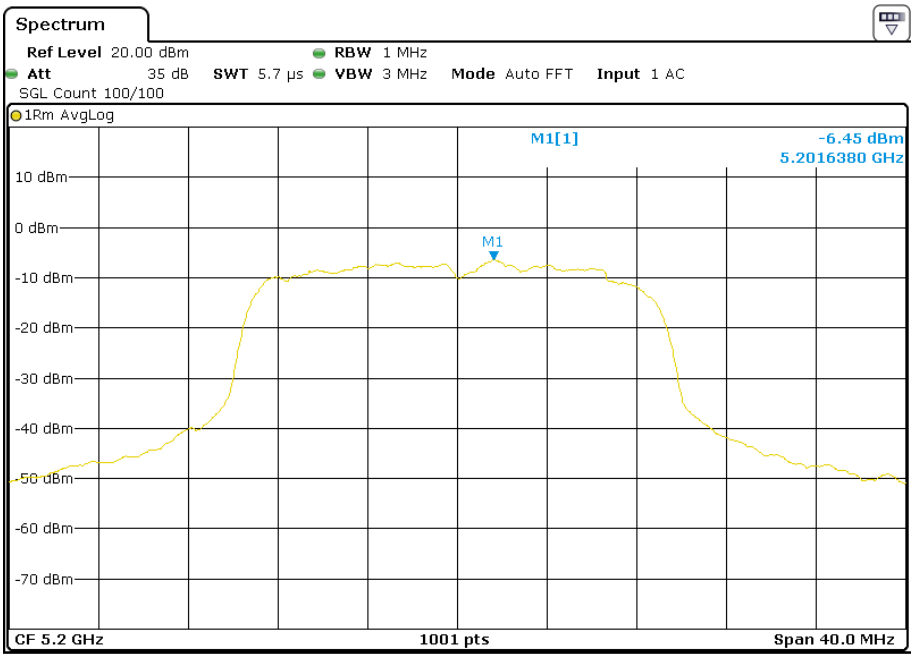
802.11 n(HT20)		Channel 36



802.11 n(HT20)		Channel 40



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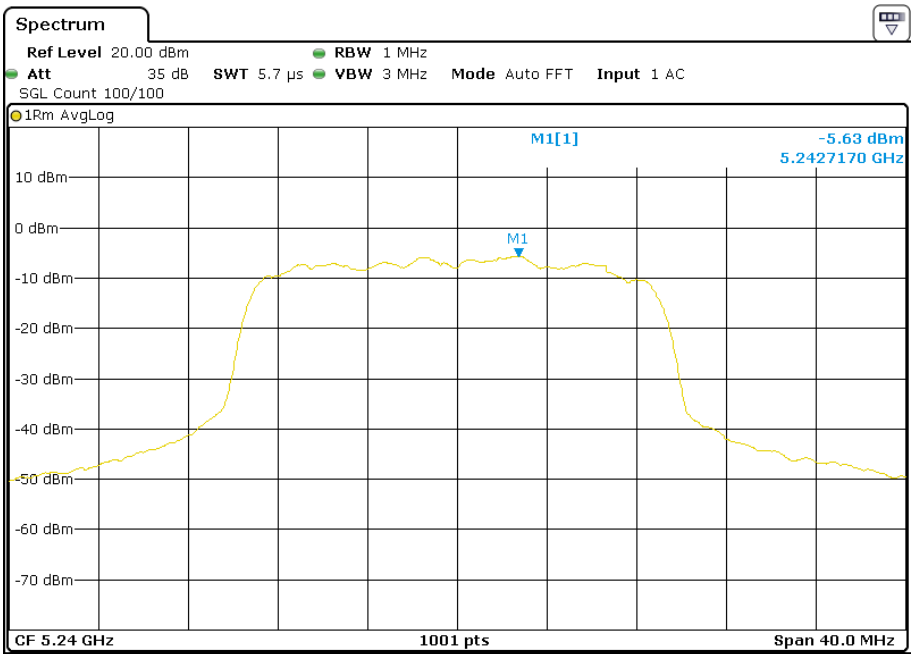
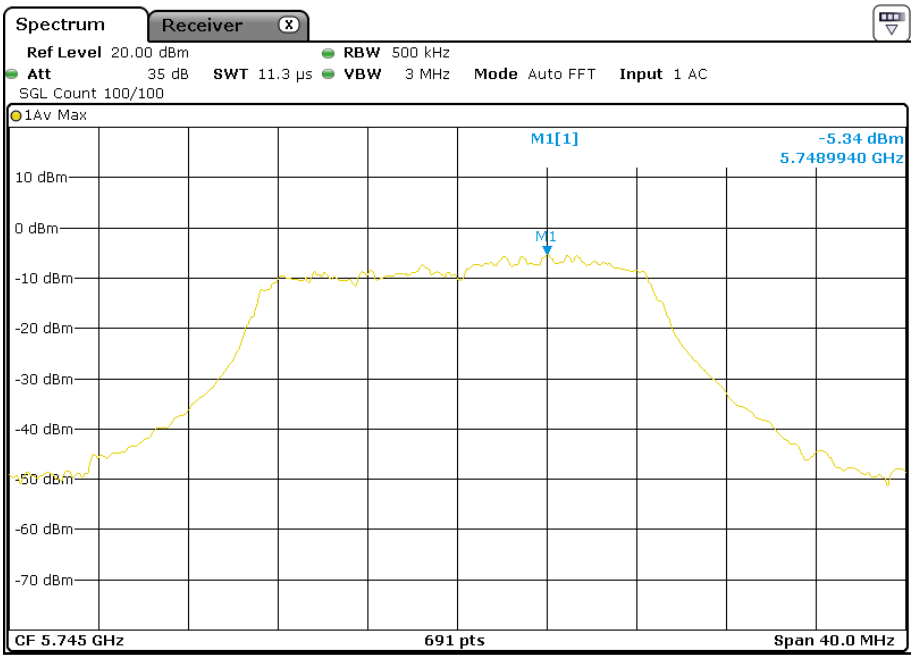
802.11 n(HT20)		Channel 48



802.11 n(HT20)		Channel 149



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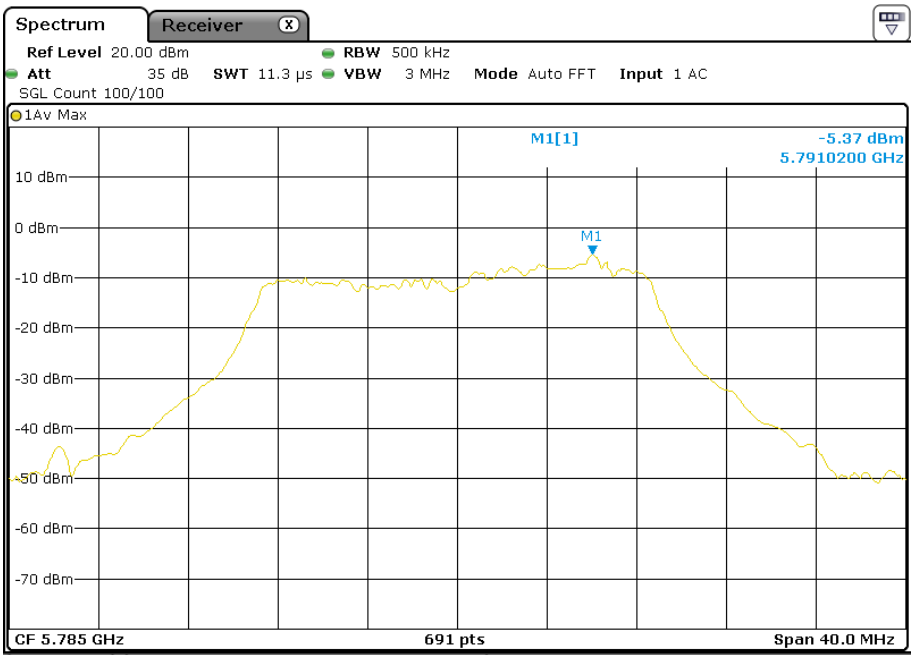
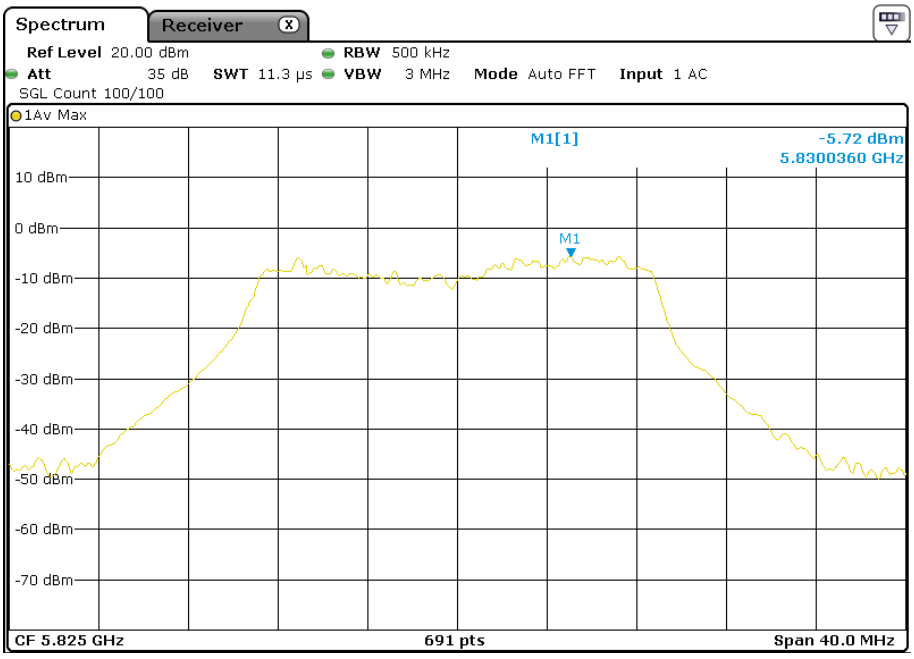
802.11 n(HT20)		Channel 157



802.11 n(HT20)		Channel 165



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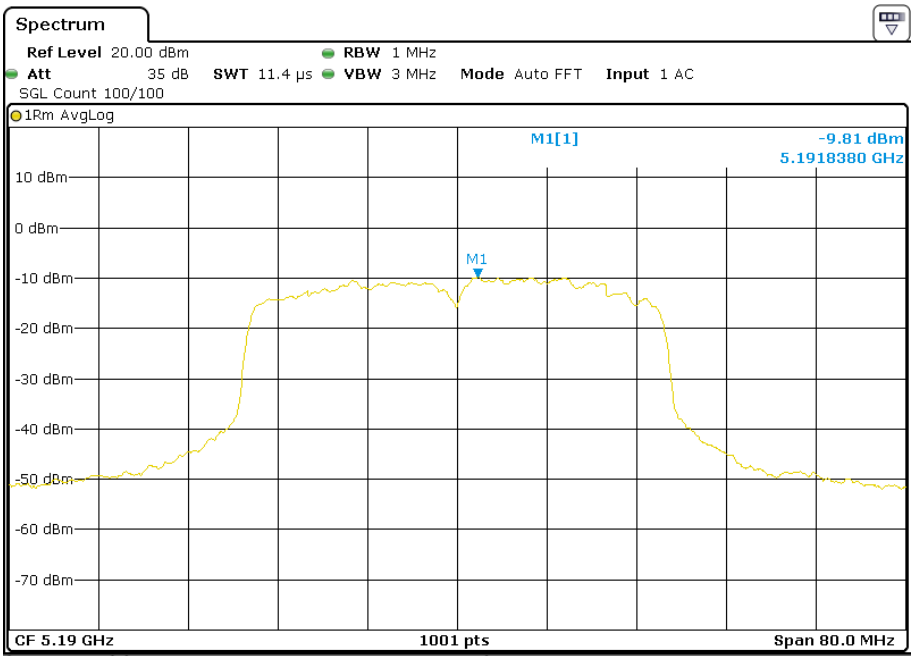
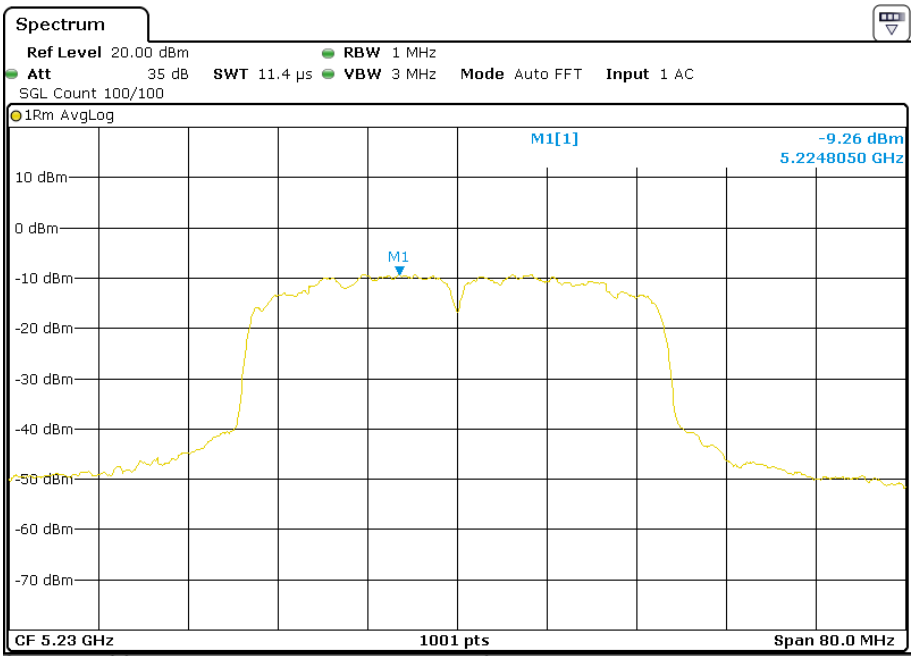
802.11 n(HT40)		Channel 38



802.11 n(HT40)		Channel 46



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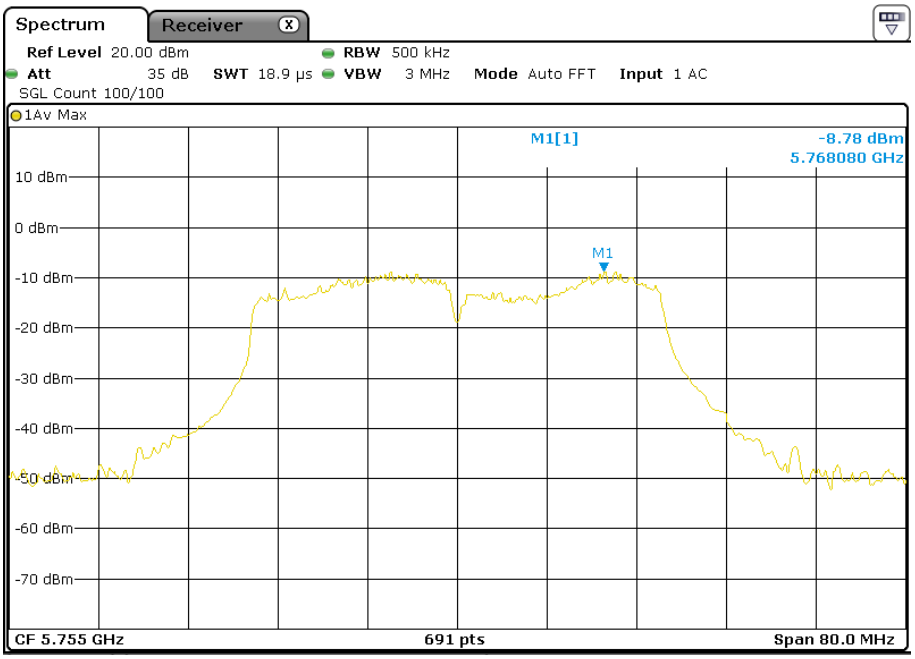
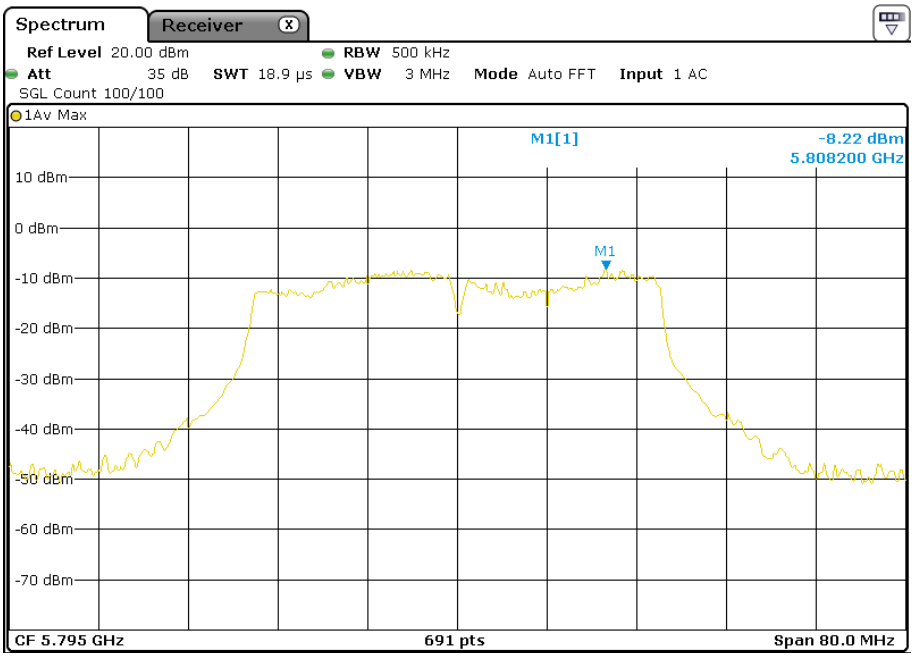
802.11 n(HT40)		Channel 151



802.11 n(HT40)		Channel 159



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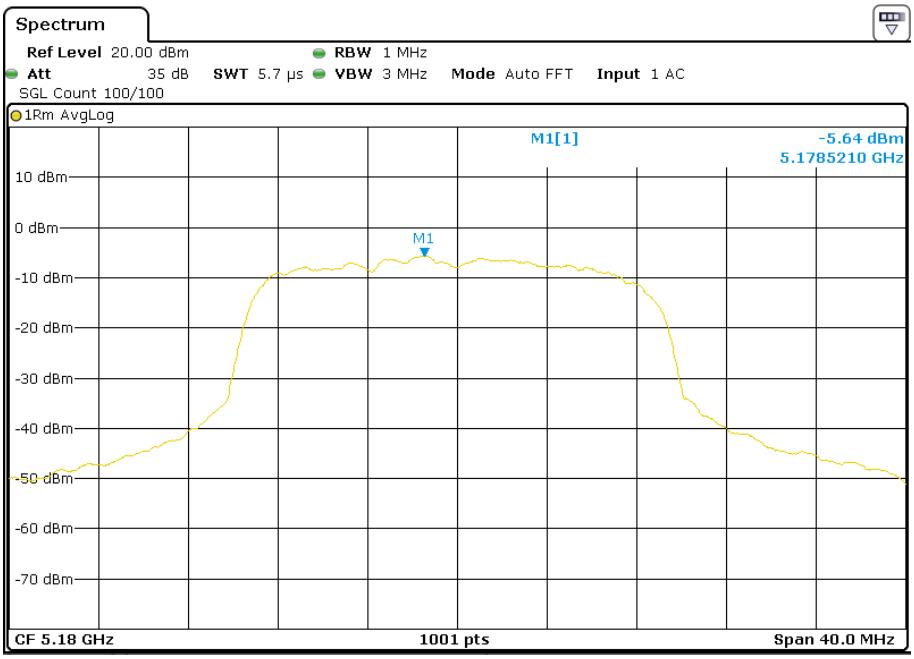
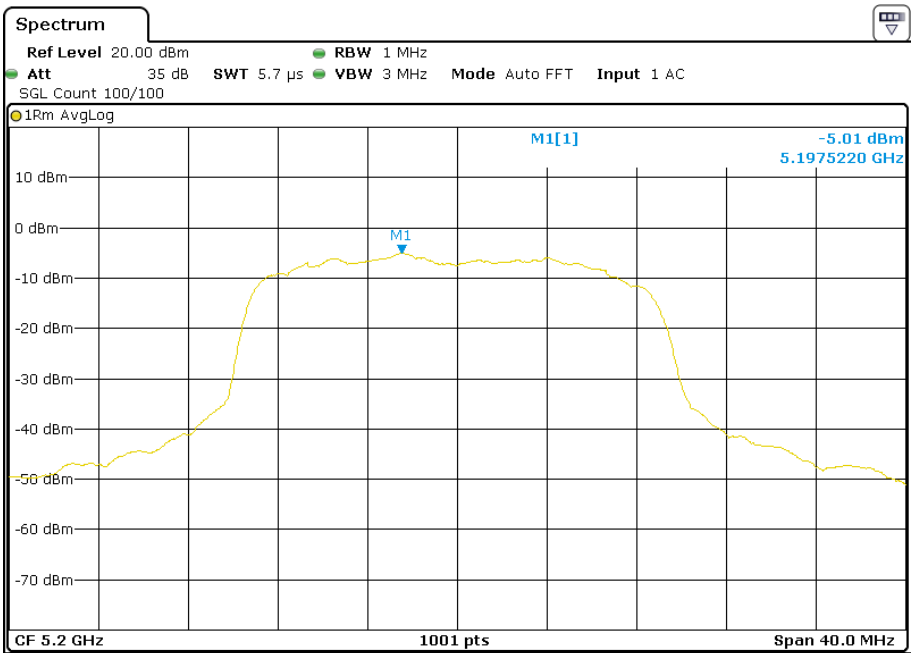
802.11 ac(VHT20)		Channel 36



802.11 ac(VHT20)		Channel 40



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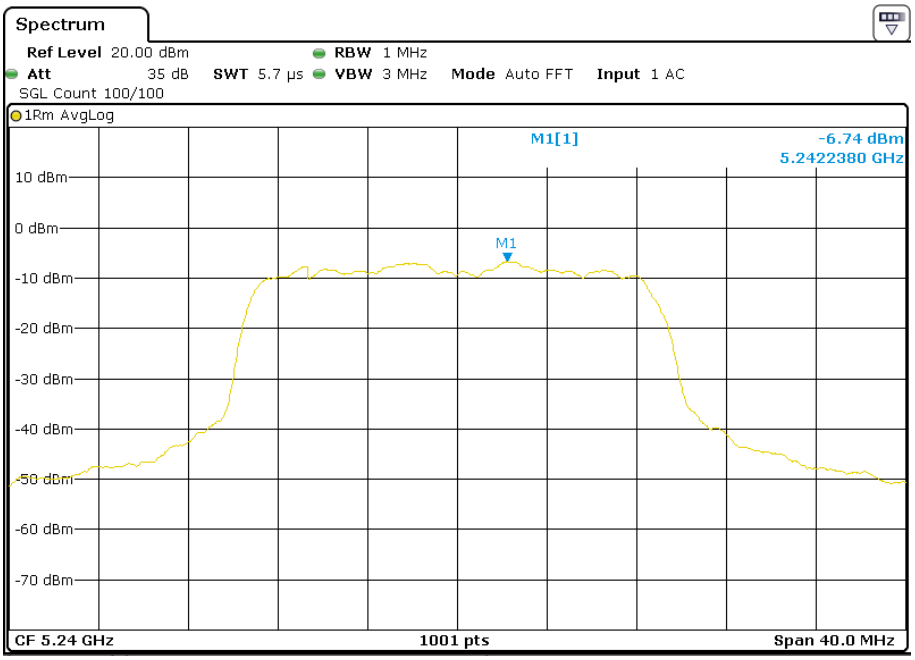
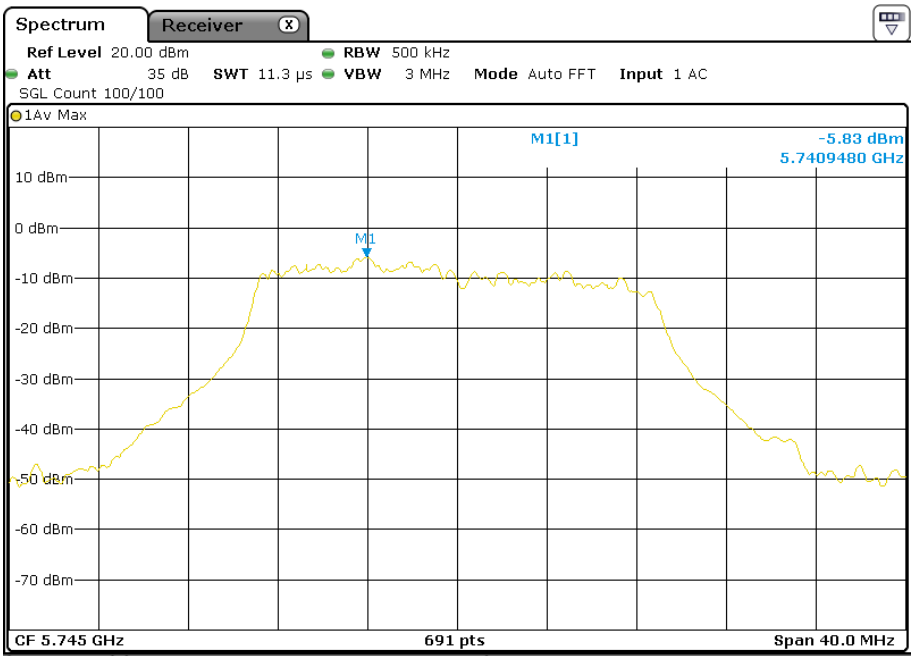
802.11 ac(VHT20)		Channel 48



802.11 ac(VHT20)		Channel 149



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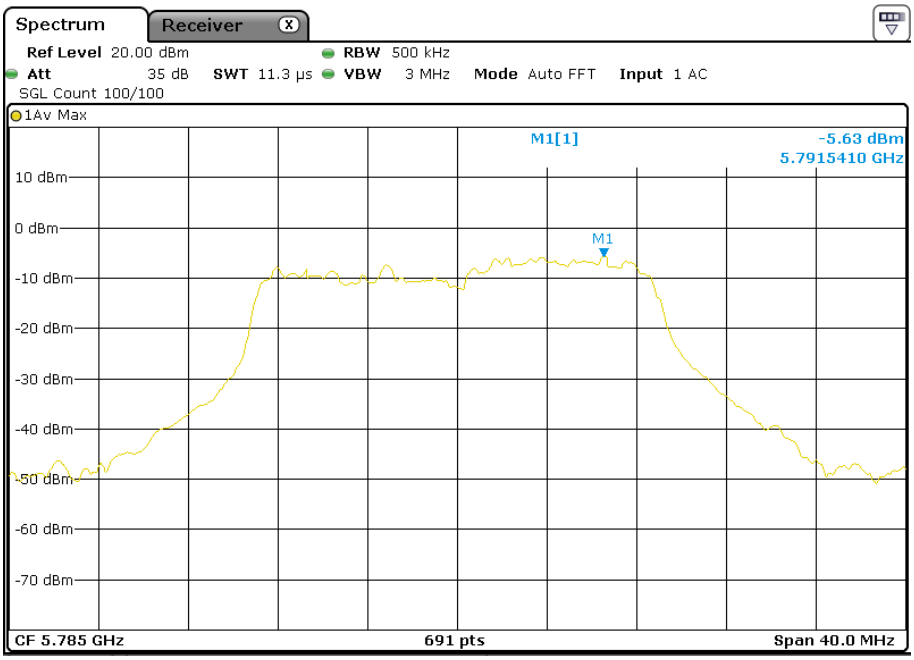
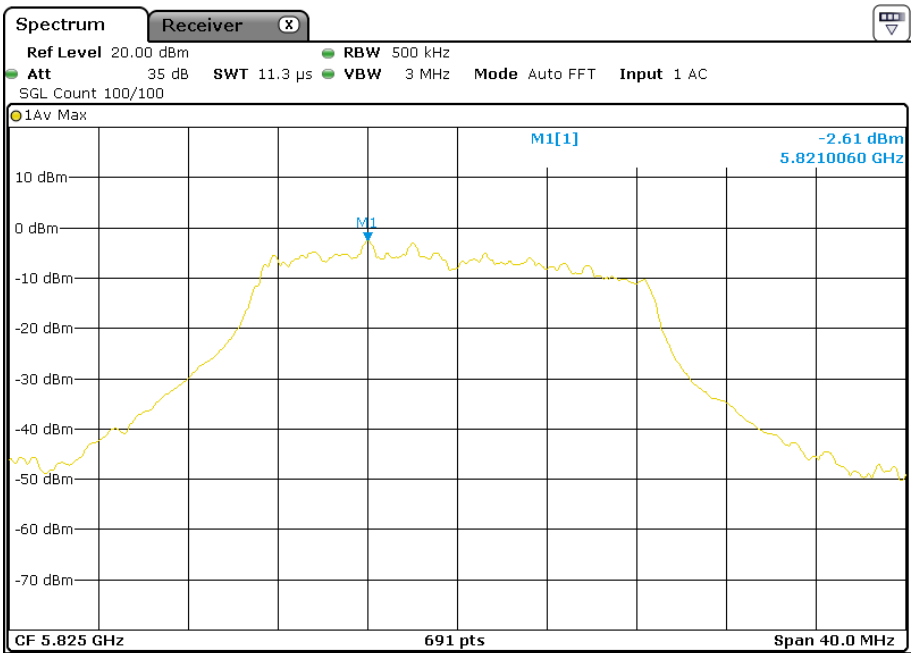
802.11 ac(VHT20)		Channel 157



802.11 ac(VHT20)		Channel 165



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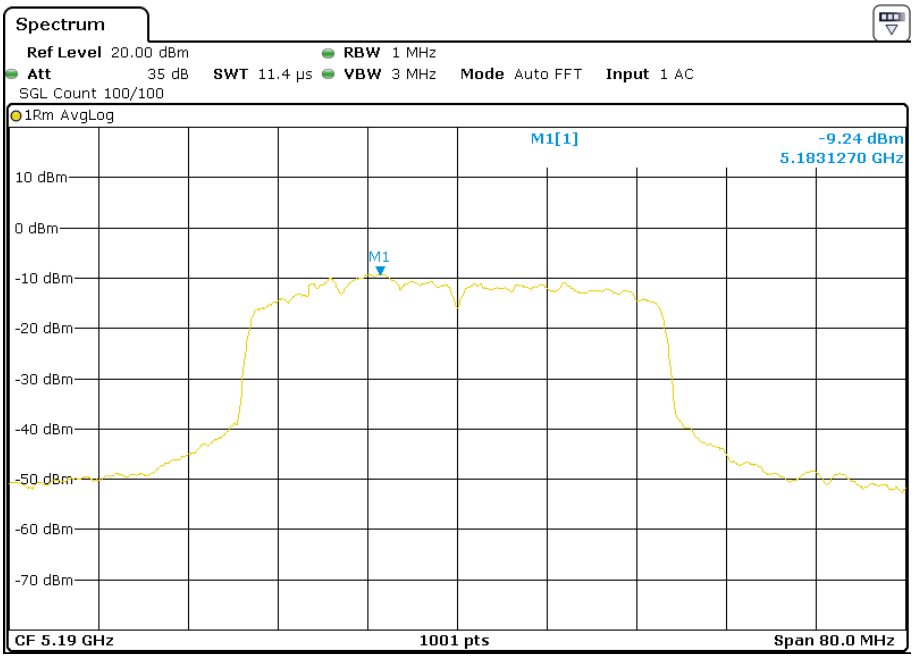
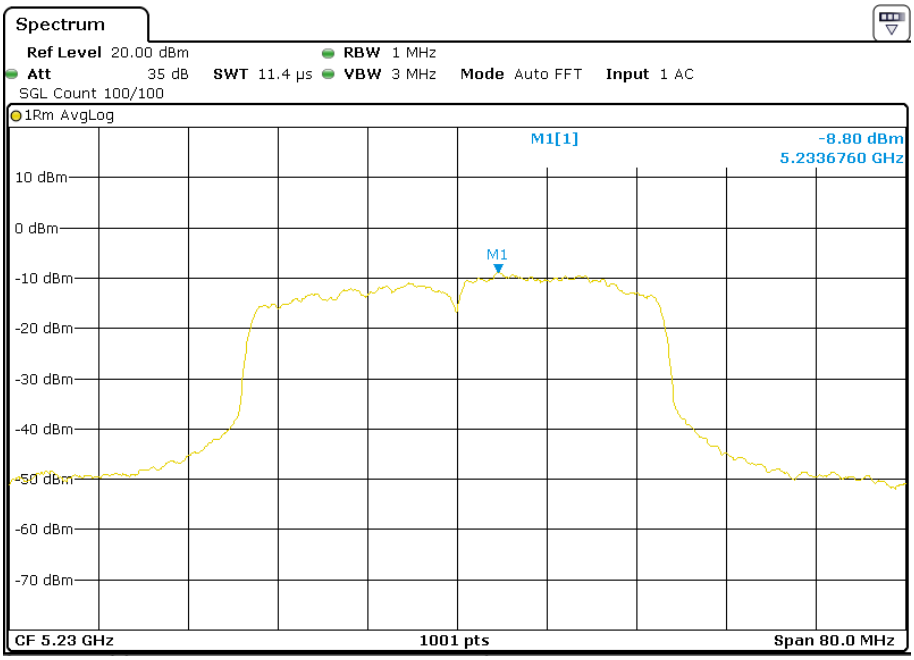
802.11 ac(VHT40)		Channel 38



802.11 ac(VHT40)		Channel 46



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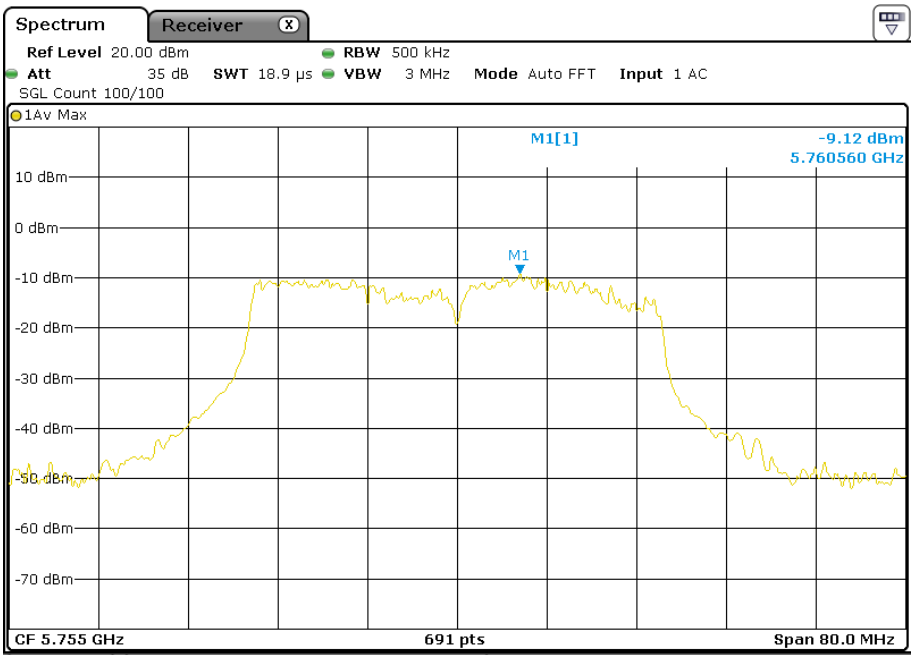
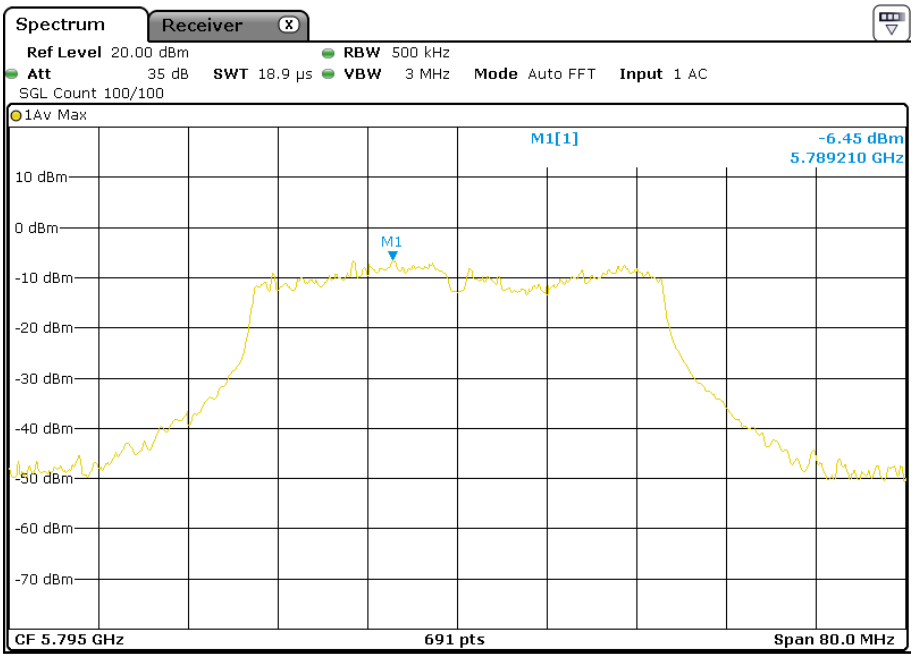
802.11 ac(VHT40)		Channel 151



802.11 ac(VHT40)		Channel 159



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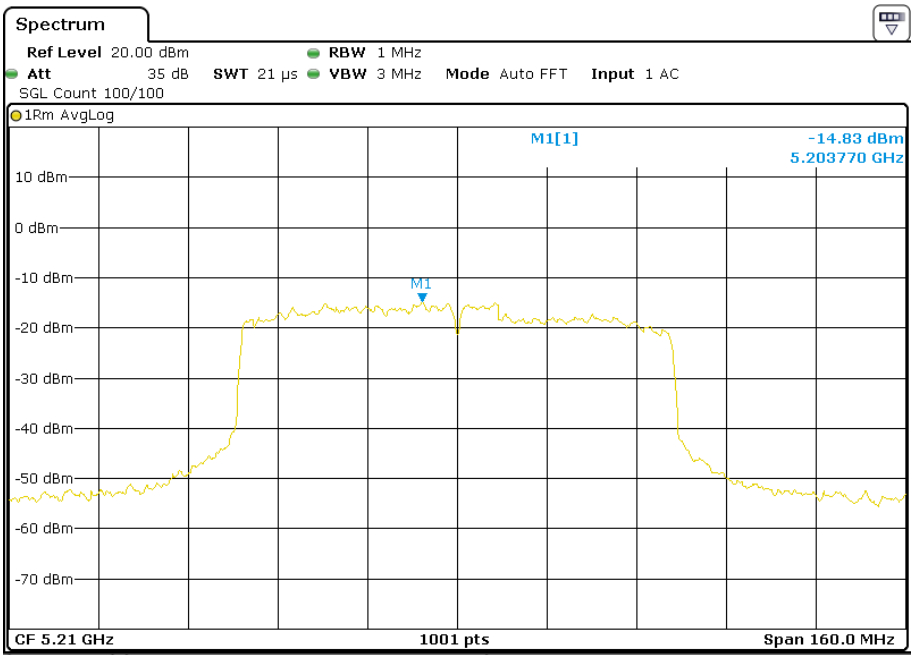
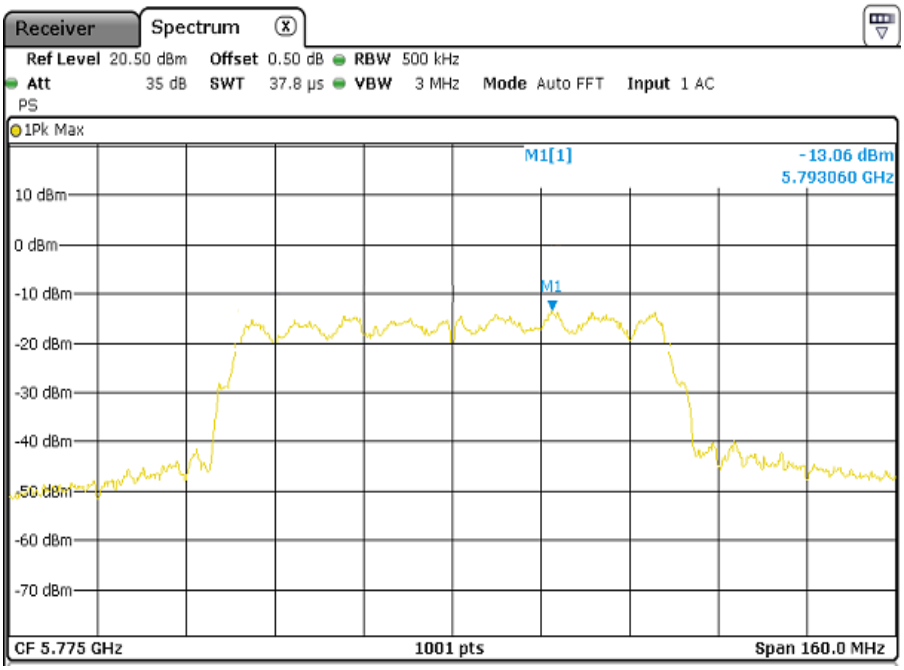
802.11 ac(VHT80)		Channel 42



802.11 ac(VHT80)		Channel 155



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