Huawei Technologies Co., Ltd.

TEST REPORT

SCOPE OF WORK
FCC TESTING–X22B-C , X22A-C, X22D-C, X22E-C

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TEST REPORT

Intertek Report No.: 190102037SZN-004

RF
TEST REPORT

Report No.	**: 190102037SZN-004**
Product	**: Huawei STB/Huawei BOX**
Model No.	**: X22B-C, X22A-C, X22D-C, X22E-C**
FCC ID:	**: QIS-X22B-C**

Applicant:	**Huawei Technologies Co., Ltd.**
Test Method/ Standard:	**FCC Part 15 Subpart E; KDB 789033 D02 v02r01; KDB 662911 D01 v02r01; KDB 905462 D02 v02; ANSI C63.10-2013**
Test By:	**Intertek Testing Services Shenzhen Ltd. Longhua Branch 101, 201, Building B, No. 308 Wuhe Avenue, Zhangkengjing Community, GuanHu Subdistrict, LongHua District, Shenzhen, P.R. China.**

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Summary of Tests

FCC Parts	Test	Section	Results
15.203	Antenna Requirement	1.3	Pass
15.407 a (1)/(3)	Maximum output power test	3	Pass
15.407 a (1)/(3)	Power Spectrum Density test	4	Pass
15.407 e	6dB Bandwidth	5	Pass
15.407 b, 15.205, 15.209	Radiated spurious emission test	6	Pass
15.207	AC line conducted emission test	7	Pass
15.407 g	Frequency Stability	8	Pass
15.407 h	DFS: Channel Closing Transmission Time	9.3	Pass
15.407 h	DFS: Channel Move Time	9.3	Pass

1. General information

1.1 Identification of the EUT

Product:	Huawei STB/Huawei BOX
Model No.:	X22B-C
Type of Device:	Slave device
Nominal Channel Bandwidth:	802.11a/n-HT20 (20 MHz), 802.11n-HT40 (40MHz), 802.11ac (20/40/80MHz)
Operating Frequency:	5150MHz~5250 MHz, 5250MHz~5350MHz, 5470MHz-5725MHZ, 5725MHz~5850MHz
Channel Number:	4 channels for 5180 MHz ~ 5240 MHz (802.11a/n/ac-HT20); 2 channels for 5190 MHz ~ 5230 MHz (802.11n/ac-HT40); 1 channels for 5210 MHz (802.11ac-HT80); 4 channels for 5260 MHz ~ 5320 MHz (802.11a/n/ac-HT20); 2 channels for 5270 MHz ~ 5310 MHz (802.11n/ac-HT40); 1 channels for 5290 MHz (802.11ac-HT80); 11 channels for 5500 MHz ~ 5700 MHz (802.11a/n/ac-HT20); 5 channels for 5510 MHz ~ 5670 MHz (802.11n/ac-HT40); 2 channels for 5530 MHz ~ 5610 MHz (802.11ac-HT80); 5 channels for 5745 MHz ~ 5825 MHz (802.11a/n/ac-HT20); 2 channels for 5755 MHz ~ 5795 MHz (802.11n/ac-HT40); 1 channels for 5775 MHz (802.11ac-HT80);
Modulation:	802.11a: OFDM (BPSK, QPSK, 16QAM, 64QAM) 802.11n: OFDM (BPSK, QPSK, 16QAM, 64QAM) 802.11ac: OFDM (BPSK, QPSK, 16QAM, 64QAM, 256QAM)
Rated Power:	DC 12V 1A by AC/DC adapter
Test Date(s):	05 January 2019 to 15 February 2019
Note 1:	This report is for the exclusive use of Intertek's Client and is provided pursuant to the agreement between Intertek and its Client. Intertek's responsibility and liability are limited to the terms and conditions of the agreement. Intertek assumes no liability to any party, other than to the Client in accordance with the agreement, for any loss, expense or damage occasioned by the use of this report. Only the Client is authorized to permit copying or distribution of this report and then only in its entirety. Any use of the Intertek name or one of its marks for the sale or advertisement of the tested material, product or service must first be approved in writing by Intertek. The observations and test results in this report are relevant only to the sample tested. This report by itself does not imply that the material, product, or service is or has ever been under an Intertek certification program.
Note 2:	When determining the test conclusion, the Measurement Uncertainty of test has been considered.

1.2 Additional information about the EUT

The EUT is a Huawei STB/Huawei Box with 5G WIFI technology. The EUT is powered by DC 12V/1A from AC/DC Adapter.
For more detail features, please refer to User's description as file name “descri.pdf”.

The Model: X22A-C, X22D-C, X22E-C are the same as the Model: X22B-C in hardware aspect (circuitry and electrical, mechanical and physical construction), the only differences is the model no. for trading purpose.

Each model may have multiple configurations due to the optional interfaces. The test was based on the worst configuration (full interface configuration).

Standard interface	Optional interface
ETH, USB (rear), HDMI, DVB, DC, 11ac 2*2 wifi, BT 4.2	SPDIF, Mini AV, WPS, Micro SD, Reset, USB(Side)

The Huawei STB/Huawei BOX, Model: X22B-C has three designing schemes. It would be placed on the market with three different adapters, Partly tests are required to both designing schemes, and show the worst case in report.

Adapter	Model	Manufacture	Electrical parameters
Adapter 1	HW-120100U0W	Shenzhen TOPOW Electronics Co.,Ltd.	Input: AC 100-240V, 50/60Hz, 0.5A Output: DC 12V 1A
Adapter 2	HW-120100U0W	Shenzhen Huntkey Electronic Co.,Ltd.	Input: AC 100-240V, 50/60Hz, 0.5A Output: DC 12V 1A
Adapter 3	HW-120100U0W	Dongguan Phitek Electronics Co.,Ltd.	Input: AC 100-240V, 50/60Hz, 0.5A Output: DC 12V 1A

Related Submittal(s) Grants
This is an application for certification of U–NII device (5GHz Wi-Fi transmitter portion).
For the BT classic function was tested and demonstrated in report 190102037SZN-001.
For the BT BLE function was tested and demonstrated in report 190102037SZN-002.
For the 2.4GHz WIFI function was tested and demonstrated in report 190102037SZN-003.
For other functions were reported in the SDOC report: 190102036SZN-001.

1.3 Antenna description (15.203)

The EUT uses Integral Antenna which in accordance to Section 15.203 is considered sufficient to comply with the provisions of this section.

Antenna 1 Gain: 1 dBi Max for 5G WIFI.
Antenna 2 Gain: 1 dBi Max for 5G WIFI.

1.4 Peripherals equipment

Refer List:

Description	Manufacturer	Model No.
Laptop (Provided by Intertek)	Lenovo	T420
Test TV (Provided by Intertek)	SONY	KDL-24EX520
Wireless Route (Provided by Intertek)	NETGEAR	R7800
USB Memory (Provided by Intertek)	SanDisk	SDCZ36-002G-P36
Optical cable (Provided by Intertek)	/	unshielded, 130cm
Dummy Load (Provided by Intertek)	/	/
HDMI Cable (Provided by Applicant)	/	unshielded, 150cm
AV out Cable (Provided by Applicant)	/	unshielded, 150cm
RJ45 Cable (Provided by Applicant)	/	unshielded, 150cm
Remote Control	/	/

2. Test specifications

2.1 Test standard

The EUT was performed according to the procedures in FCC Part 15 E, Section15.203, 15.207, 15.209, 15.407 and ANSI C63.10/2013, method of measurement: KDB 789033.

The test of radiated measurements according to FCC Part15 Section 15.33(a) had been conducted and the field strength of this frequency band was all meet limit requirement, thus we evaluate the EUT pass the specified test.

The AC power conducted emissions was invested over the frequency range from 0.15 MHz to 30 MHz using a receiver bandwidth of 9 kHz (15.207 paragraph).

Radiated emissions were invested cover the frequency range from 9KHz to 30MHz using a receiver RBW of 9kHz, from 30 MHz to 1000 MHz using a receiver RBW of 120 kHz record QP reading, and the frequency over 1 GHz using a spectrum analyzer RBW of 1 MHz, VBW of 3MHz, Detector=Peak record for Peak reading, RBW of 1 MHz, VBW of 3MHz, Detector=RMS record for Average reading recorded on the report.

The EUT setup configurations please refer to the photo of radiated setup photos.pdf & conducted setup photos.pdf.

2.2 Operation mode

The EUT was supplied by and it was run in TX mode that was controlled by client provided RF testing program.

The EUT was transmitted continuously during the test. The worst case test result was showed in the report.

With individual verifying, the maximum output power was found at 6 Mbps data rate for 802.11a mode, 6.5 Mbps data rate for 802.11n-HT20 mode, 13.5 Mbps data rate for 802.11n-HT40 mode, 29.3Mbps data rate for 802.11ac. The final tests were executed under these conditions and recorded in this report individually.

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

3. Maximum Output Power test (FCC 15.407)

3.1 Operating environment

Temperature:	25	℃
Relative Humidity:	55	%
Atmospheric Pressure:	1011	hPa

3.2 Test setup & procedure

The power output per FCC §15.407(a) was measured on the EUT using a 50 ohm SMA cable connected to Power Meter and the measurement method refer to 789033 D02. Power was read directly and cable loss correction (1.0dB) was added to the reading to obtain power at the EUT antenna terminals.

3.3 Limit

Operating Frequency (MHz)	Max Conducted TX Power	Max EIRP
5150~5250	30dBm (1W) for master device	4W (36dBm) with 6dBi antenna
	24dBm (250mW) for client device	
5250~5350	24dBm (250mW) or 11dBm+ 10logB*	1W (30dBm) with 6dBi antenna
5470~5725	24dBm (250mW) or 11dBm+ 10logB*	
5725~5850	30dBm (1W)	4W (36dBm) with 6dBi antenna

Remark: 1) *Where B is the 26dB emission Bandwidth in MHz.

2) The device was declared as Slave device.

3) Tx Power Reduction (dBm-by-dBi) required when antenna exceeds 6dBi.

4) In MIMO (2Tx), Ant1+Ant2 Directional gain = GANT + 10 log(N) dBi = 1.0 + 10 log(2) = 4.0 dBi< 6 dBi.

3.4 Measured data of Maximum Output Power test results

5150 MHz ~ 5250 MHz, 5250MHz~5350MHz, 5470MHz-5725MHZ, 5725 MHz ~ 5850 MHz

Max Conducted TX Power

SISO Mode, Ant1

Mode	Channel	Data Rate (Mbps)	Output Power (dBm)	Limit (dBm)
802.11a	36	6	18.51	24
	40		18.94	24
	48		18.92	24
	52		18.8	24
	56		19.19	24
	64		19.01	24
	100		19.38	24
	116		19.33	24
	140		18.96	24
	149		19.18	30
	157		19.78	30
	165		20.19	30
802.11n-HT20	36	6.5	19.14	24
	40		19.32	24
	48		19.48	24
	52		19.51	24
	56		19.58	24
	64		19.36	24
	100		19.67	24
	116		19.43	24
	140		19.01	24
	149		19.10	30
	157		19.95	30
	165		20.25	30
802.11n-HT40	38	13.5	19.30	24
	46		19.32	24
	54		18.95	24
	62		19.03	24
	102		19.31	24
	110		19.20	24
	134		18.88	24
	151		19.51	30
	159		20.45	30
802.11ac-HT20	36	6.5	18.81	24
	40		18.77	24
	48		18.99	24

	52		18.82	24
	56		18.86	24
	64		18.58	24
	100		18.89	24
	116		18.77	24
	140		18.47	24
	149		18.21	30
	157		19.13	30
	165		19.52	30
802.11ac-HT40	38	13.5	18.77	24
	46		18.87	24
	54		18.63	24
	62		18.71	24
	102		19.00	24
	110		19.20	24
	134		18.72	24
	151		19.11	30
	159		19.93	30
802.11ac-HT80	42	29.3	17.78	24
	58		17.81	24
	106		18.55	24
	122		19.36	24
	155		18.92	30

SISO Mode, Ant2

Mode	Channel	Data Rate (Mbps)	Output Power (dBm)	Limit (dBm)
802.11a	36	6	20.55	24
	40		20.77	24
	48		20.84	24
	52		20.44	24
	56		20.25	24
	64		19.04	24
	100		20.29	24
	116		20.10	24
	140		19.23	24
	149		19.59	30
	157		20.45	30
	165		20.54	30
802.11n-HT20	36	6.5	19.99	24
	40		20.26	24
	48		20.27	24

	52		20.24	24
	56		20.06	24
	64		18.83	24
	100		19.97	24
	116		19.80	24
	140		19.22	24
	149		19.46	30
	157		20.80	30
	165		20.61	30
802.11n-HT40	38	13.5	20.53	24
	46		20.85	24
	54		20.43	24
	62		19.54	24
	102		20.98	24
	110		20.74	24
	134		19.05	24
	151		20.56	30
	159		20.92	30
802.11ac-HT20	36	6.5	19.87	24
	40		20.44	24
	48		20.40	24
	52		20.12	24
	56		20.05	24
	64		18.95	24
	100		20.29	24
	116		19.75	24
	140		19.30	24
	149		19.76	30
	157		20.6	30
	165		19.82	30
802.11ac-HT40	38	13.5	20.50	24
	46		20.69	24
	54		20.34	24
	62		19.56	24
	102		20.71	24
	110		20.46	24
	134		19.14	24
	151		19.85	30
	159		20.65	30
802.11ac-HT80	42	29.3	18.86	24
	58		18.11	24
	106		18.17	24
	122		18.35	24
	155		19.04	30

MIMO Mode, Ant1+Ant2

Mode	Channel	Data Rate (Mbps)	Output Power (dBm)			Limit (dBm)
			Ant 1	Ant 2	Total	
802.11n-HT20	36	13	18.15	18.93	21.6	24
	40		16.55	16.73	19.7	24
	48		16.02	16.70	19.4	24
	52		17.94	18.82	21.4	24
	56		18.26	18.66	21.5	24
	64		18.04	17.48	20.8	24
	100		16.25	18.09	20.3	24
	116		18.48	18.81	21.7	24
	140		18.07	18.04	21.1	24
	149		18.07	18.41	21.3	30
	157		18.72	19.00	21.9	30
	165		19.21	19.14	22.2	30
802.11n-HT40	38	27	18.64	19.31	22.0	24
	46		18.48	19.64	22.1	24
	54		18.58	19.11	21.9	24
	62		18.56	18.42	21.5	24
	102		19.26	20.02	22.7	24
	110		19.01	19.73	22.4	24
	134		18.61	17.92	21.3	24
	151		18.63	19.55	22.1	30
	159		19.57	19.84	22.7	30
802.11ac-HT20	36	13	16.12	16.14	19.1	24
	40		16.19	16.55	19.4	24
	48		16.19	16.79	19.5	24
	52		16.14	16.83	19.5	24
	56		15.89	16.65	19.3	24
	64		18.28	17.70	21.0	24
	100		16.6	16.41	19.5	24
	116		17.06	17.97	20.5	24
	140		18.14	18.11	21.1	24
	149		18.34	18.69	21.5	30
	157		18.96	19.27	22.1	30
	165		19.44	19.17	22.3	30
802.11ac-HT40	38	27	18.66	19.33	22.0	24
	46		18.21	19.26	21.8	24

	54		18.25	19.12	21.7	24
	62		18.76	18.54	21.7	24
	102		18.99	20	22.5	24
	110		18.74	19.7	22.3	24
	134		18.52	17.97	21.3	24
	151		18.90	19.46	22.2	30
	159		19.47	19.76	22.6	30
802.11ac-HT80	42	58.5	17.77	18.25	20.9	24
	58		17.38	17.17	20.5	24
	106		17.30	18.38	20.9	24
	122		17.94	17.73	20.8	24
	155		17.77	18.02	21.0	30

Max EIRP
SISO Mode, Ant1

Mode	Channel	Data Rate (Mbps)	Duty cycle	Output Power (dBm)	Gain (dBi)	E.I.R.P (dBm)	Limit (dBm)
802.11a	36	6	99%	18.51	1.0	19.51	36
	40			18.94	1.0	19.94	36
	48			18.92	1.0	19.92	36
	52			18.8	1.0	19.8	30
	56			19.19	1.0	20.19	30
	64			19.01	1.0	20.01	30
	100			19.38	1.0	20.38	30
	116			19.33	1.0	20.33	30
	140			18.96	1.0	19.96	30
	149			19.18	1.0	20.18	36
	157			19.78	1.0	20.78	36
	165			20.19	1.0	21.19	36
802.11n-HT20	36	6.5	99%	19.14	1.0	20.14	36
	40			19.32	1.0	20.32	36
	48			19.48	1.0	20.48	36
	52			19.51	1.0	20.51	30
	56			19.58	1.0	20.58	30
	64			19.36	1.0	20.36	30
	100			19.67	1.0	20.67	30
	116			19.43	1.0	20.43	30
	140			19.01	1.0	20.01	30

	149			19.10	1.0	20.10	36
	157			19.95	1.0	20.95	36
	165			20.25	1.0	21.25	36
802.11n-HT40	38	13.5	99%	19.30	1.0	20.30	36
	46			19.32	1.0	20.32	36
	54			18.95	1.0	19.95	30
	62			19.03	1.0	20.03	30
	102			19.31	1.0	20.31	30
	110			19.20	1.0	20.20	30
	134			18.88	1.0	19.88	30
	151			19.51	1.0	20.51	36
	159			20.45	1.0	21.45	36
802.11ac-HT20	36	6.5	99%	18.81	1.0	19.81	36
	40			18.77	1.0	19.77	36
	48			18.99	1.0	19.99	36
	52			18.82	1.0	19.82	30
	56			18.86	1.0	19.86	30
	64			18.58	1.0	19.58	30
	100			18.89	1.0	19.89	30
	116			18.77	1.0	19.77	30
	140			18.47	1.0	19.47	30
	149			18.21	1.0	19.21	36
	157			19.13	1.0	20.13	36
	165			19.52	1.0	20.52	36
802.11ac-HT40	38	13.5	99%	18.77	1.0	19.77	36
	46			18.87	1.0	19.87	36
	54			18.63	1.0	19.63	30
	62			18.71	1.0	19.71	30
	102			19.00	1.0	20.0	30
	110			19.20	1.0	20.2	30
	134			18.72	1.0	19.72	30
	151			19.11	1.0	20.11	36
	159			19.93	1.0	20.93	36
802.11ac-HT80	42	29.3	99%	17.78	1.0	18.78	36
	58			17.81	1.0	18.81	30
	106			18.55	1.0	19.55	30
	122			19.36	1.0	20.36	30
	155			18.92	1.0	19.92	36

Max EIRP
SISO Mode, Ant2

Mode	Channel	Data Rate (Mbps)	Duty cycle	Output Power (dBm)	Gain (dBi)	E.I.R.P (dBm)	Limit (dBm)
802.11a	36	6	99%	20.55	1.0	21.55	36
	40			20.77	1.0	21.77	36
	48			20.84	1.0	21.84	36
	52			20.44	1.0	21.44	30
	56			20.25	1.0	21.25	30
	64			19.04	1.0	20.04	30
	100			20.29	1.0	21.29	30
	116			20.10	1.0	21.10	30
	140			19.23	1.0	20.23	30
	149			19.59	1.0	20.59	36
	157			20.45	1.0	21.45	36
	165			20.54	1.0	21.54	36
802.11n-HT20	36	6.5	99%	19.99	1.0	20.99	36
	40			20.26	1.0	21.26	36
	48			20.27	1.0	21.27	36
	52			20.24	1.0	21.24	30
	56			20.06	1.0	21.06	30
	64			18.83	1.0	19.83	30
	100			19.97	1.0	20.97	30
	116			19.80	1.0	20.8	30
	140			19.22	1.0	20.22	30
	149			19.46	1.0	20.46	36
	157			20.80	1.0	21.8	36
	165			20.61	1.0	21.61	36
802.11n-HT40	38	13.5	99%	20.53	1.0	21.53	36
	46			20.85	1.0	21.85	36
	54			20.43	1.0	21.43	30
	62			19.54	1.0	20.54	30
	102			20.98	1.0	21.98	30
	110			20.74	1.0	21.74	30
	134			19.05	1.0	20.05	30
	151			20.56	1.0	21.56	36
	159			20.92	1.0	21.92	36
802.11ac-HT20	36	6.5	99%	19.87	1.0	20.87	36

	40			20.44	1.0	21.44	36
	48			20.40	1.0	21.4	36
	52			20.12	1.0	21.12	30
	56			20.05	1.0	21.05	30
	64			18.95	1.0	19.95	30
	100			20.29	1.0	21.29	30
	116			19.75	1.0	20.75	30
	140			19.30	1.0	20.3	30
	149			19.76	1.0	20.76	36
	157			20.6	1.0	21.6	36
	165			19.82	1.0	20.82	36
802.11ac-HT40	38	13.5	99%	20.50	1.0	21.5	36
	46			20.69	1.0	21.69	36
	54			20.34	1.0	21.34	30
	62			19.56	1.0	20.56	30
	102			20.71	1.0	21.71	30
	110			20.46	1.0	21.46	30
	134			19.14	1.0	20.14	30
	151			19.85	1.0	20.85	36
	159			20.65	1.0	21.65	36
802.11ac-HT80	42	29.3	99%	18.86	1.0	19.86	36
	58			18.11	1.0	19.11	30
	106			18.17	1.0	19.17	30
	122			18.35	1.0	19.35	30
	155			19.04	1.0	20.04	36

Max EIRP
MIMO Mode, Ant1+Ant2

Mode	Channel	Data Rate (Mbps)	Duty cycle	Total Output Power (dBm)	Gain (dBi)	E.I.R.P (dBm)	Limit (dBm)
802.11n-HT20	36	13	99%	21.6	4.0	25.6	36
	40			19.7	4.0	23.7	36
	48			19.4	4.0	23.4	36
	52			21.4	4.0	25.4	30
	56			21.5	4.0	25.5	30
	64			20.8	4.0	24.8	30
	100			20.3	4.0	24.3	30
	116			21.7	4.0	25.7	30

	140			21.1	4.0	25.1	30
	149			21.3	4.0	25.3	36
	157			21.9	4.0	25.9	36
	165			22.2	4.0	26.2	36
802.11n-HT40	38	27	99%	22.0	4.0	26.0	36
	46			22.1	4.0	26.1	36
	54			21.9	4.0	25.9	30
	62			21.5	4.0	25.5	30
	102			22.7	4.0	26.7	30
	110			22.4	4.0	26.4	30
	134			21.3	4.0	25.3	30
	151			22.1	4.0	26.1	36
	159			22.7	4.0	26.7	36
802.11ac-HT20	36	13	99%	19.1	4.0	23.1	36
	40			19.4	4.0	23.4	36
	48			19.5	4.0	23.5	36
	52			19.5	4.0	23.5	30
	56			19.3	4.0	23.3	30
	64			21.0	4.0	25.0	30
	100			19.5	4.0	23.5	30
	116			20.5	4.0	24.5	30
	140			21.1	4.0	25.1	30
	149			21.5	4.0	25.5	36
	157			22.1	4.0	26.1	36
	165			22.3	4.0	26.3	36
802.11ac-HT40	38	27	99%	22.0	4.0	26.0	36
	46			21.8	4.0	25.8	36
	54			21.7	4.0	25.7	30
	62			21.7	4.0	25.7	30
	102			22.5	4.0	26.5	30
	110			22.3	4.0	26.3	30
	134			21.3	4.0	25.3	30
	151			22.2	4.0	26.2	36
	159			22.6	4.0	26.6	36
802.11ac-HT80	42	58.5	99%	20.9	4.0	24.9	36
	58			20.5	4.0	24.5	30
	106			20.9	4.0	24.9	30
	122			20.8	4.0	24.8	30
	155			21.0	4.0	25.0	36

4. Power Spectrum Density test (FCC 15.407)

4.1 Operating environment

Temperature:	25	℃
Relative Humidity:	50	%
Atmospheric Pressure:	1011	hPa

4.2 Test setup & procedure

Method of Measurement:

The power spectrum density per FCC §15.407(a) was measured from the antenna port of the EUT using a 50 ohm spectrum analyzer with the resolution bandwidth set at 1MHz/500KHz, the video bandwidth set at 3 MHz/2MHz (measurement method refer to KDB 789033 D02). Power spectrum density was read directly and cable loss (1.0 dB) reading to obtain power at the EUT antenna terminals.

4.3 Limit

Operating Frequency (MHz)	Max Conducted Power Spectral Density
5150~5250	*17dBm/MHz for master device
	11dBm/MHz for mobile/portable client device
5250~5350	11dBm/MHz
5470~5725	11dBm/MHz
5725~5850	30dBm/500KHz

Remark: 1) *The device was declared as Slave device.

2) Tx Power Reduction (dBm-by-dBi) required when antenna exceeds 6dBi.

3) In MIMO (2Tx), Ant1+Ant2 Directional gain = GANT + 10 log(N) dBi = 1.0 + 10 log(2) = 4.0 dBi< 6 dBi.

4.4 Measured data of Power Spectrum Density test results

5150 MHz ~ 5250 MHz, 5250MHz~5350MHz, 5470MHz-5725MHZ, 5725 MHz ~ 5850 MHz

SISO Mode, Ant1

Mode	Channel	Data Rate (Mbps)	PSD (dBm/MHz or 500KHz) (See remark)	Limit (dBm/MHz or 500KHz) (See remark)
802.11a	36	6	7.98	11
	40		8.28	11
	48		8.21	11
	52		7.96	11
	56		8.58	11
	64		7.99	11
	100		8.62	11
	116		8.83	11
	140		8.72	11
	149		7.15	30
	157		7.77	30
	165		8.37	30
802.11n-HT20	36	6.5	8.24	11
	40		8.44	11
	48		8.18	11
	52		8.41	11
	56		9.01	11
	64		8.46	11
	100		8.98	11
	116		8.54	11
	140		8.26	11
	149		7.68	30
	157		7.80	30
	165		8.53	30
802.11n-HT40	38	13.5	5.27	11
	46		5.5	11
	54		4.96	11
	62		4.83	11
	102		5.47	11
	110		5.12	11
	134		4.97	11
	151		4.60	30
	159		4.99	30
802.11ac-HT20	36	6.5	7.84	11
	40		7.71	11
	48		8.34	11
	52		8.07	11

	56		8.27	11
	64		7.39	11
	100		7.77	11
	116		7.71	11
	140		7.48	11
	149		6.42	30
	157		6.86	30
	165		7.69	30
802.11ac-HT40	38	13.5	5.13	11
	46		4.67	11
	54		5.17	11
	62		4.14	11
	102		5.15	11
	110		5.40	11
	134		5.14	11
	151		4.29	30
	159		4.45	30
802.11ac-HT80	42	29.3	1.78	11
	58		1.82	11
	106		2.99	11
	122		3.20	11
	155		1.87	30

SISO Mode, Ant2

Mode	Channel	Data Rate (Mbps)	PSD (dBm/MHz or 500KHz) (See remark)	Limit (dBm/MHz or 500KHz) (See remark)
802.11a	36	6	10.01	11
	40		10.26	11
	48		10.11	11
	52		9.93	11
	56		9.42	11
	64		8.5	11
	100		9.61	11
	116		9.49	11
	140		8.31	11
	149		7.66	30
	157		8.89	30
	165		9.36	30
802.11n-HT20	36	6.5	9.21	11
	40		9.30	11
	48		9.48	11
	52		9.74	11
	56		9.39	11

	64		7.94	11
	100		9.07	11
	116		9.07	11
	140		8.43	11
	149		7.17	30
	157		8.88	30
	165		8.34	30
802.11n-HT40	38	13.5	6.56	11
	46		6.83	11
	54		7.22	11
	62		5.45	11
	102		7.02	11
	110		6.99	11
	134		4.91	11
	151		5.90	30
	159		5.95	30
802.11ac-HT20	36	6.5	8.91	11
	40		9.44	11
	48		9.25	11
	52		8.81	11
	56		9.33	11
	64		7.62	11
	100		9.24	11
	116		8.8	11
	140		9.11	11
	149		8.22	30
	157		8.1	30
	165		7.83	30
802.11ac-HT40	38	13.5	7.25	11
	46		7.35	11
	54		6.44	11
	62		6.71	11
	102		6.88	11
	110		6.89	11
	134		4.87	11
	151		5.25	30
	159		5.97	30
802.11ac-HT80	42	29.3	3.59	11
	58		2.37	11
	106		2.34	11
	122		2.03	11
	155		2.53	30

MIMO Mode, Ant1+Ant2

Mode	Channel	Data Rate (Mbps)	PSD (dBm/MHz or 500KHz) (See remark)			Limit (dBm/MHz or 500KHz) (See remark)
			Ant 1	Ant 2	Total	
802.11n-HT20	36	13	7.31	8.25	10.82	11
	40		5.26	5.25	8.27	11
	48		5.49	6.1	8.82	11
	52		6.83	7.81	10.36	11
	56		7.38	7.85	10.63	11
	64		6.64	6.33	9.50	11
	100		5.90	7.6	9.84	11
	116		7.63	8.06	10.86	11
	140		7.13	6.98	10.07	11
	149		5.87	6.99	9.48	30
	157		6.80	6.9	9.86	30
	165		7.27	7.26	10.28	30
802.11n-HT40	38	27	4.61	5.5	8.09	11
	46		4.65	6.04	8.41	11
	54		4.33	4.9	7.63	11
	62		4.42	4.97	7.71	11
	102		5.38	6.22	8.83	11
	110		5.09	6.74	9.00	11
	134		4.89	3.63	7.32	11
	151		3.53	4.4	7.00	30
	159		4.81	4.94	7.89	30
802.11ac-HT20	36	13	5.14	5.78	8.48	11
	40		5.57	6.66	9.16	11
	48		5.25	7.07	9.26	11
	52		5.07	7.18	9.26	11
	56		5.54	6.24	8.91	11
	64		7.27	7.96	10.64	11
	100		5.57	5.93	8.76	11
	116		6.34	8.57	10.61	11
	140		7.32	7.6	10.47	11
	149		6.17	6.35	9.27	30
	157		6.92	7.99	10.5	30
	165		7.83	7.53	10.69	30
802.11ac-HT40	38	27	4.77	5.38	8.10	11

	46		4.6	5.56	8.12	11
	54		4.51	5.78	8.20	11
	62		5.02	4.53	7.79	11
	102		4.91	6.44	8.75	11
	110		5.05	6.57	8.89	11
	134		4.55	4.42	7.50	11
	151		3.87	4.57	7.24	30
	159		4.41	4.86	7.65	30
802.11ac-HT80	42	58.5	1.35	2.41	4.38	11
	58		1.74	0.96	5.15	11
	106		1.6	2.62	4.83	11
	122		1.33	2.26	3.99	11
	155		1.3	0.63	4.38	30

5. Minimum 6 dB RF Bandwidth (FCC 15.407)

5.1 Operating environment

Temperature:	25	℃
Relative Humidity:	50	%
Atmospheric Pressure:	1011	hPa

5.2 Test setup & procedure

The Minimum 6 dB RF Bandwidth per 789033 D02 was measured from the antenna port of the EUT using a 50 ohm spectrum analyzer with the resolution bandwidth set at 100KHz, and set the video bandwidth (VBW) ≥ 3 x RBW. For each RF output channel investigated, the spectrum analyzer center frequency was set to the channel carrier. A PEAK output reading was taken, a DISPLAY line was drawn 6 dB lower than PEAK level. The 6dB bandwidth was determined from where the channel output spectrum intersected the display line.

For 26dB down Emission Bandwidth

The 26dB down Emission Bandwidth per 789033 D02 was measured from the antenna port of the EUT using a 50 ohm spectrum analyzer with the resolution bandwidth set RBW = approximately 1% of the emission bandwidth. Set the VBW > RBW, Detector = Peak, Trace mode = max hold (Measure the maximum width of the emission that is 26 dB down from the maximum of the emission. Compare this with the RBW setting of the analyzer. Readjust RBW and repeat measurement as needed until the RBW/EBW ratio is approximately 1%).

For 99% Occupied Bandwidth

The 99% Occupied Bandwidth per 789033 D02 was measured from the antenna port of the EUT using a 50 ohm spectrum analyzer with the resolution bandwidth set center frequency to the nominal EUT channel center frequency, set span = 1.5 times to 5.0 times the OBW, set RBW = 1 % to 5 % of the OBW, set VBW ≥ 3x RBW, The 99% occupied bandwidth was determined from where the channel output spectrum intersected the display line.

5.3 Limit

Operating Frequency (MHz)	Minimum 6 dB RF Bandwidth Limit
5150~5250	N/A
5250~5350	N/A
5470~5725	N/A
5725~ 5850	≥500KHz

5.4 Measured data of 6dB down Emission Bandwidth test results

SISO Mode, Ant1

Test Mode	Test Channel	6dB EBW[MHz]	Limit[MHz]	Verdict
11a	149	16.4	0.5	PASS
11a	157	16.4	0.5	PASS
11a	165	16.4	0.5	PASS
11n-HT20	149	17.0	0.5	PASS
11n-HT20	157	17.16	0.5	PASS
11n-HT20	165	17.12	0.5	PASS
11n-HT40	151	36.24	0.5	PASS
11n-HT40	159	36.08	0.5	PASS
11ac-HT20	149	17.4	0.5	PASS
11ac-HT20	157	17.0	0.5	PASS
11ac-HT20	165	17.16	0.5	PASS
11ac-HT40	151	36.24	0.5	PASS
11ac-HT40	159	36.24	0.5	PASS
11ac-HT80	155	75.52	0.5	PASS

SISO Mode, Ant2

Test Mode	Test Channel	6dB EBW[MHz]	Limit[MHz]	Verdict
11a	149	16.4	0.5	PASS
11a	157	16.4	0.5	PASS
11a	165	16.4	0.5	PASS
11n-HT20	149	17.0	0.5	PASS
11n-HT20	157	17.08	0.5	PASS
11n-HT20	165	17.12	0.5	PASS
11n-HT40	151	35.92	0.5	PASS
11n-HT40	159	36.0	0.5	PASS
11ac-HT20	149	17.24	0.5	PASS
11ac-HT20	157	17.12	0.5	PASS
11ac-HT20	165	17.0	0.5	PASS
11ac-HT40	151	35.92	0.5	PASS
11ac-HT40	159	36.48	0.5	PASS
11ac-HT80	155	75.52	0.5	PASS

MIMO Mode, Ant1

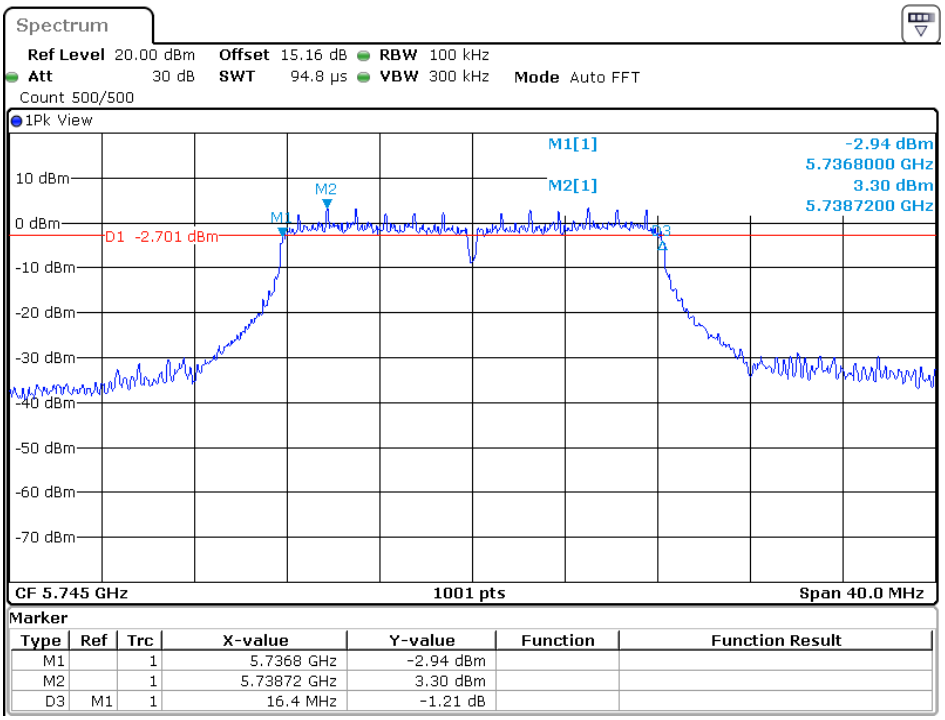
Test Mode	Test Channel	6dB EBW[MHz]	Limit[MHz]	Verdict
11n-HT20	149	17.4	0.5	PASS
11n-HT20	157	17.12	0.5	PASS
11n-HT20	165	17.16	0.5	PASS
11n-HT40	151	36.24	0.5	PASS
11n-HT40	159	36.08	0.5	PASS
11ac-HT20	149	17.64	0.5	PASS
11ac-HT20	157	17.36	0.5	PASS
11ac-HT20	165	17.12	0.5	PASS
11ac-HT40	151	36.08	0.5	PASS
11ac-HT40	159	36.32	0.5	PASS
11ac-HT80	155	75.52	0.5	PASS

MIMO Mode, Ant2

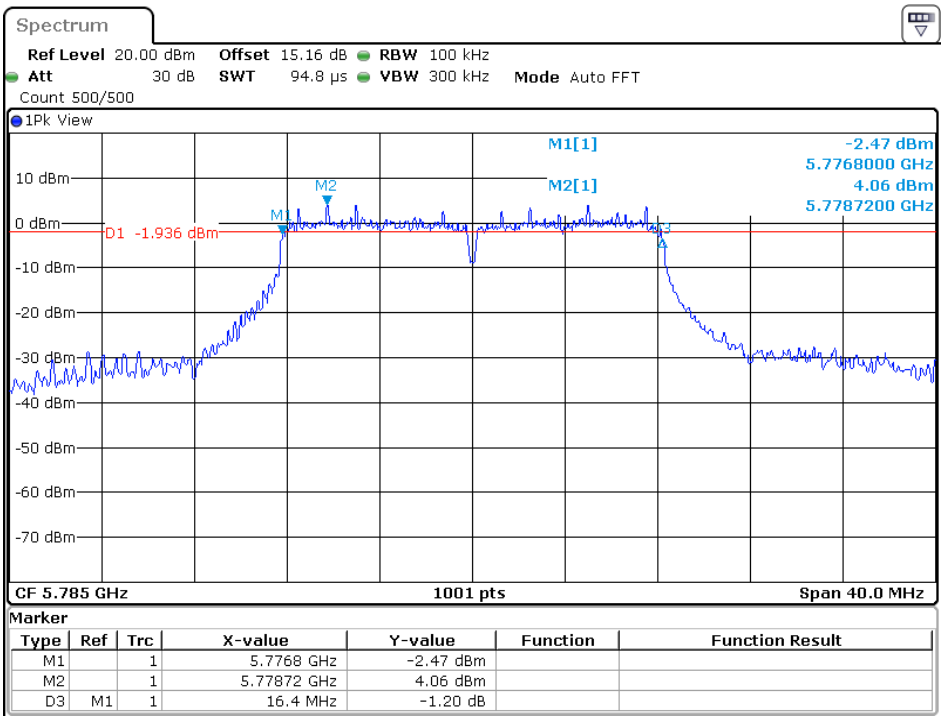
Test Mode	Test Channel	6dB EBW[MHz]	Limit[MHz]	Verdict
11n-HT20	149	17.16	0.5	PASS
11n-HT20	157	16.88	0.5	PASS
11n-HT20	165	17.0	0.5	PASS
11n-HT40	151	35.6	0.5	PASS
11n-HT40	159	36.48	0.5	PASS
11ac-HT20	149	17.0	0.5	PASS
11ac-HT20	157	17.16	0.5	PASS
11ac-HT20	165	17.12	0.5	PASS
11ac-HT40	151	35.28	0.5	PASS
11ac-HT40	159	36.16	0.5	PASS
11ac-HT80	155	75.52	0.5	PASS

The test plots are attached as below.

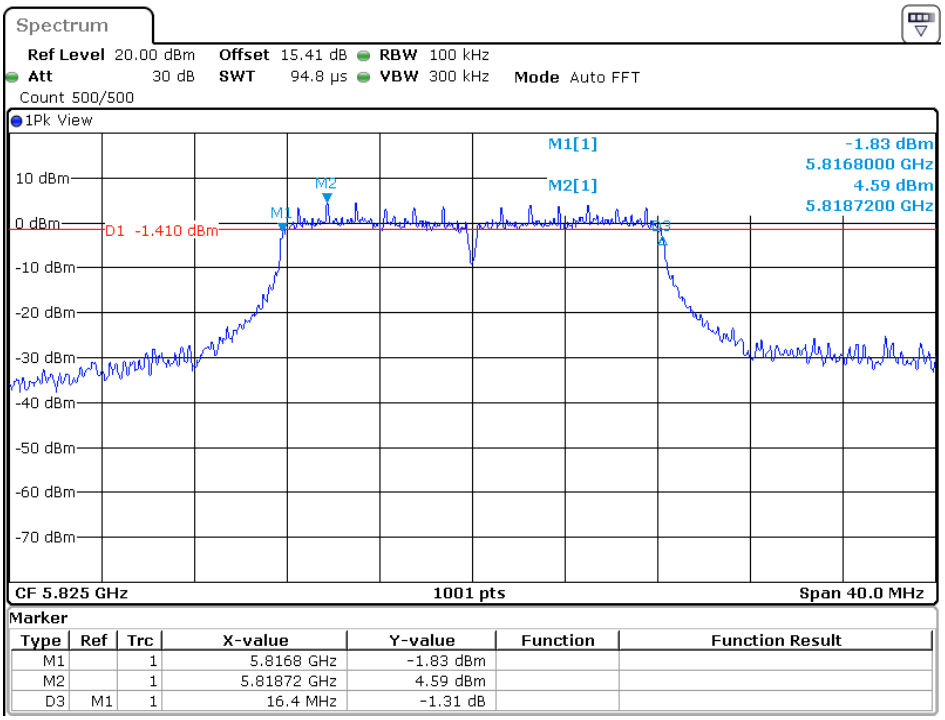
11a (SISO, ANT 1):



Date: 14.JAN.2019 14:49:55

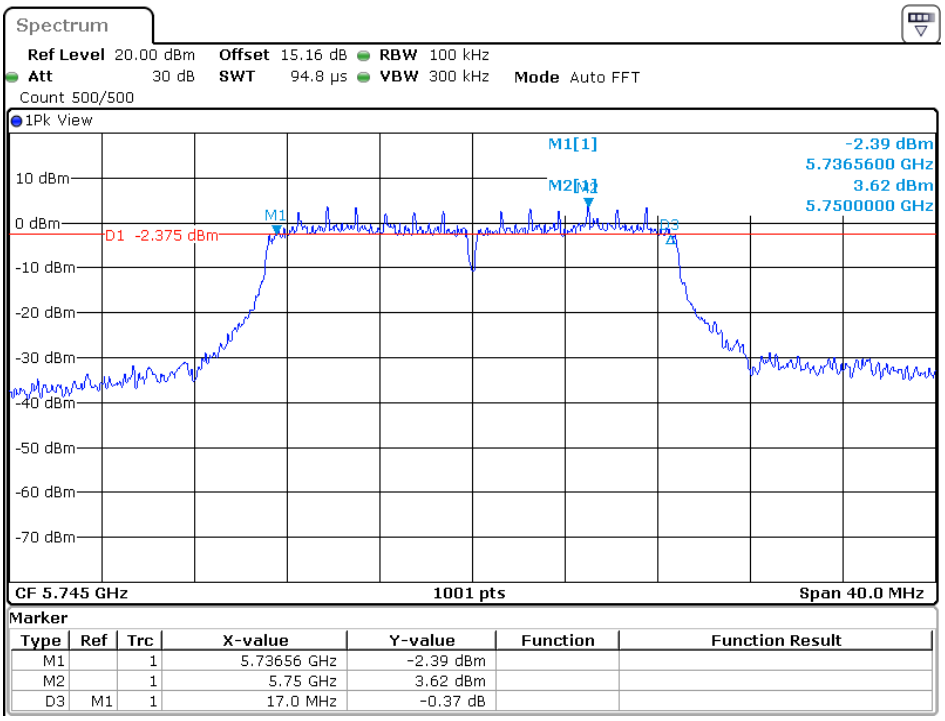


Date: 14.JAN.2019 14:57:26

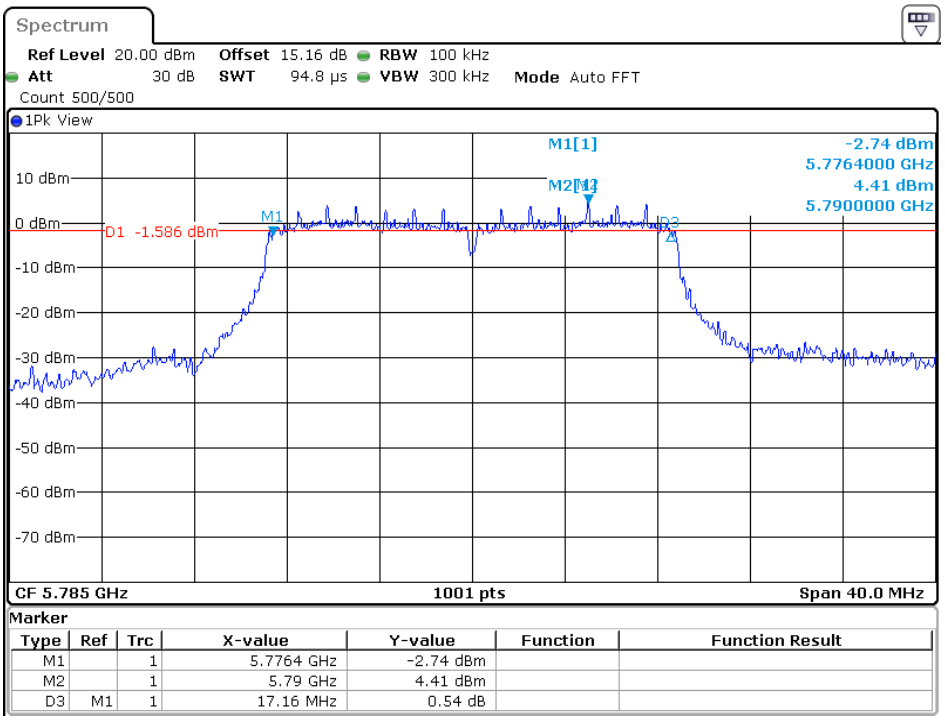


Date: 14.JAN.2019 15:08:32

11n-HT20 (SISO, ANT 1):



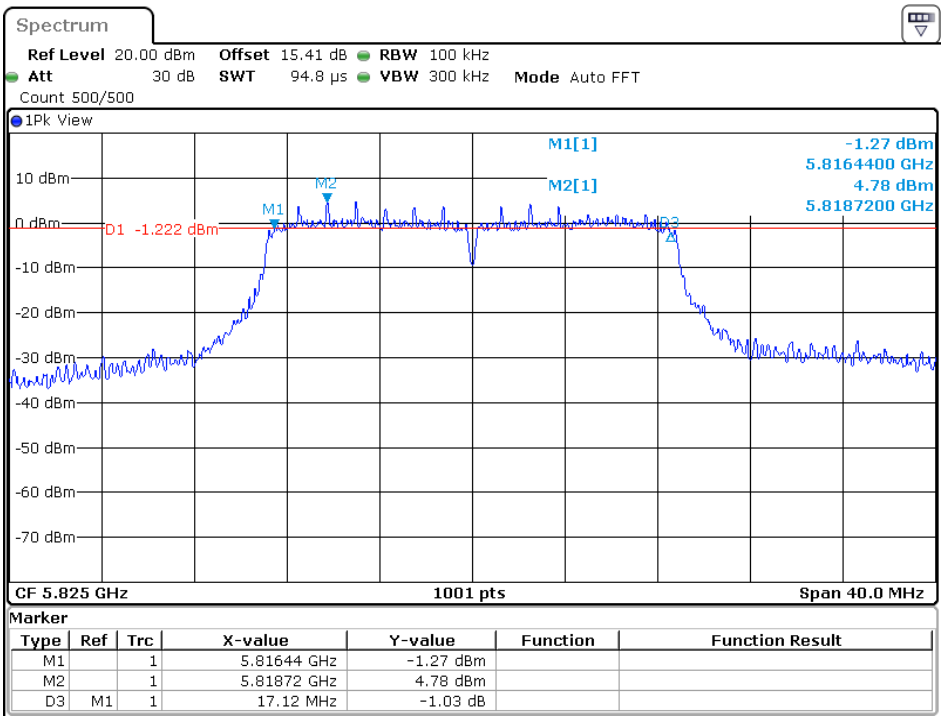
Date: 14.JAN.2019 16:32:05



Marker

Type	Ref	Trc	X-value	Y-value	Function	Function Result
M1		1	5.7764 GHz	-2.74 dBm		
M2		1	5.79 GHz	4.41 dBm		
D3	M1	1	17.16 MHz	0.54 dB		

Date: 14.JAN.2019 16:39:22

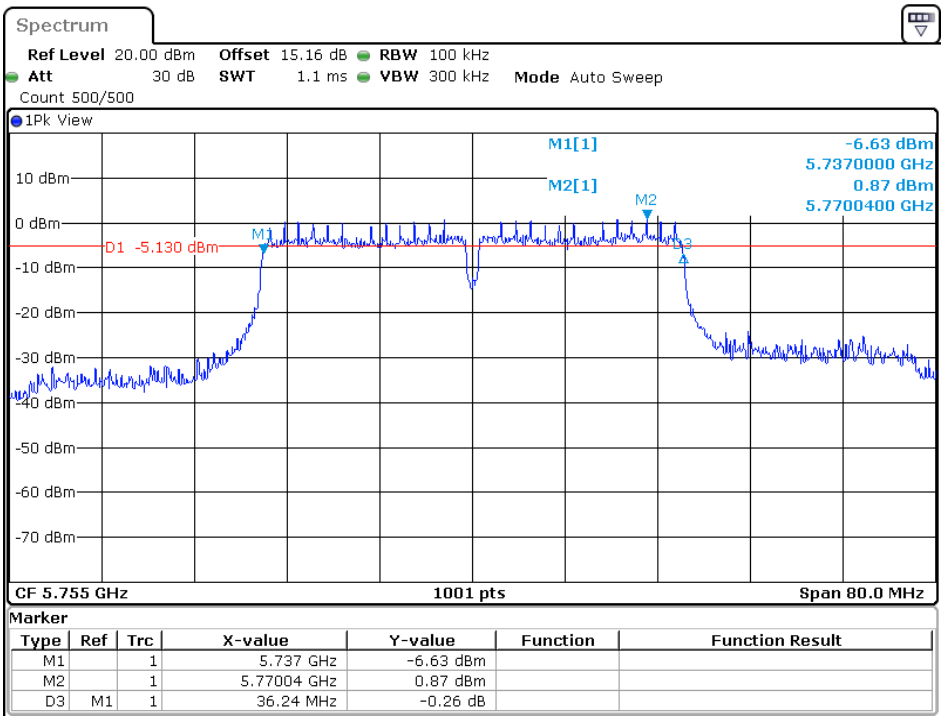


Marker

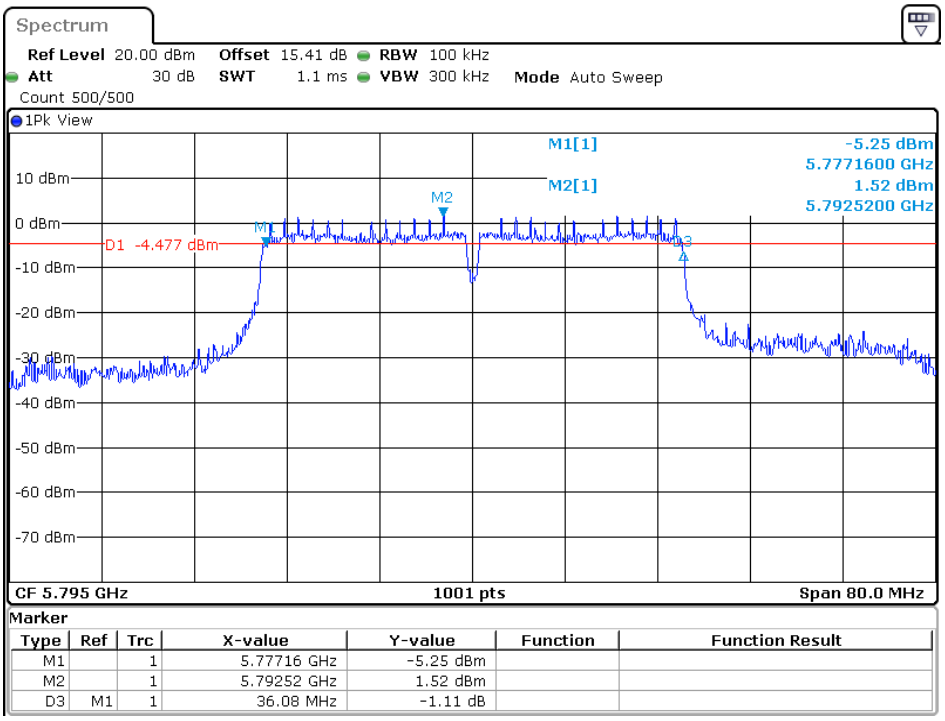
Type	Ref	Trc	X-value	Y-value	Function	Function Result
M1		1	5.81644 GHz	-1.27 dBm		
M2		1	5.81872 GHz	4.78 dBm		
D3	M1	1	17.12 MHz	-1.03 dB		

Date: 14.JAN.2019 16:45:21

11n-HT40 (SISO, ANT 1):

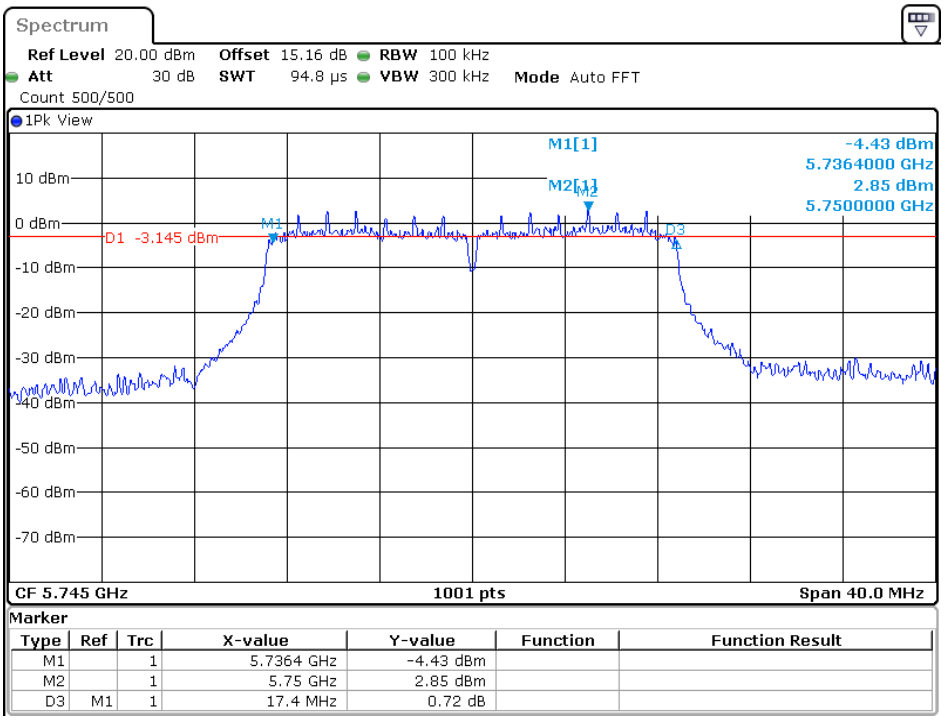


Date: 15.JAN.2019 09:38:54

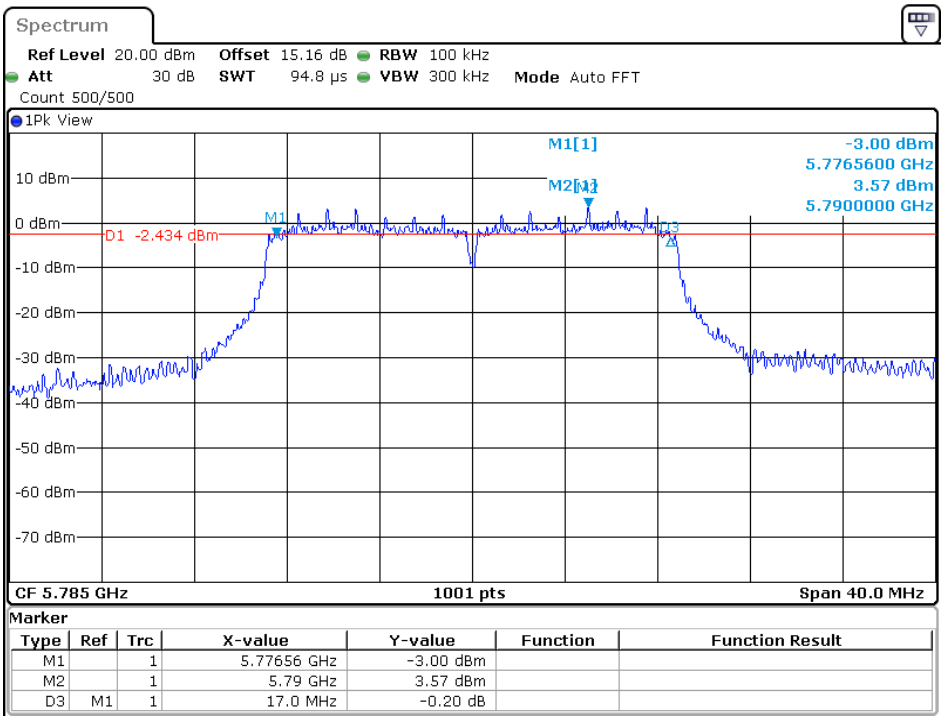


Date: 15.JAN.2019 09:45:41

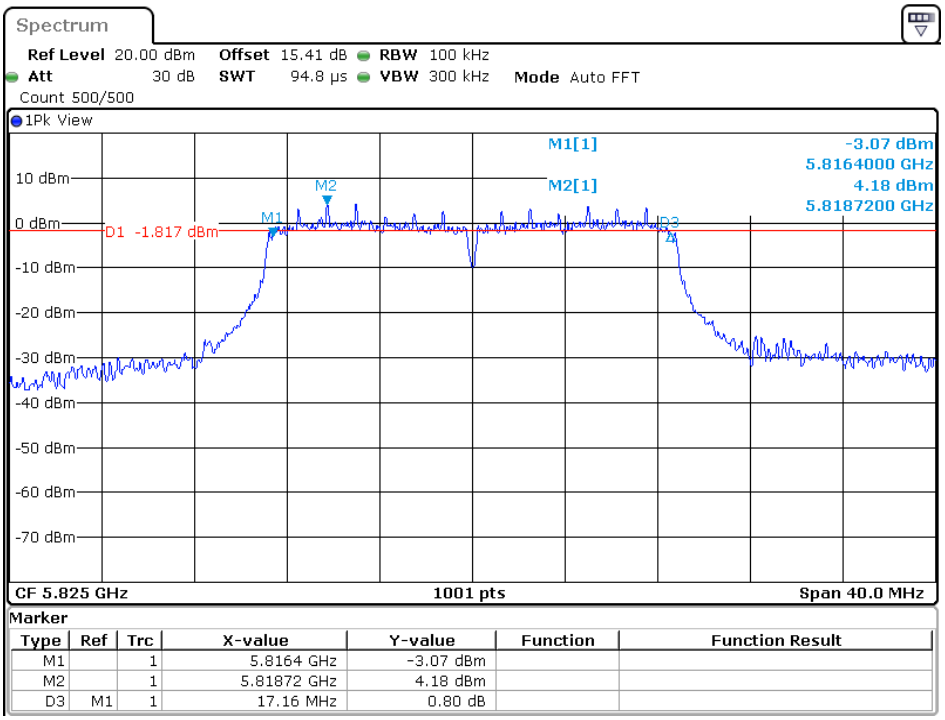
11ac-HT20 (SISO, ANT 1):



Date: 15.JAN.2019 11:02:31

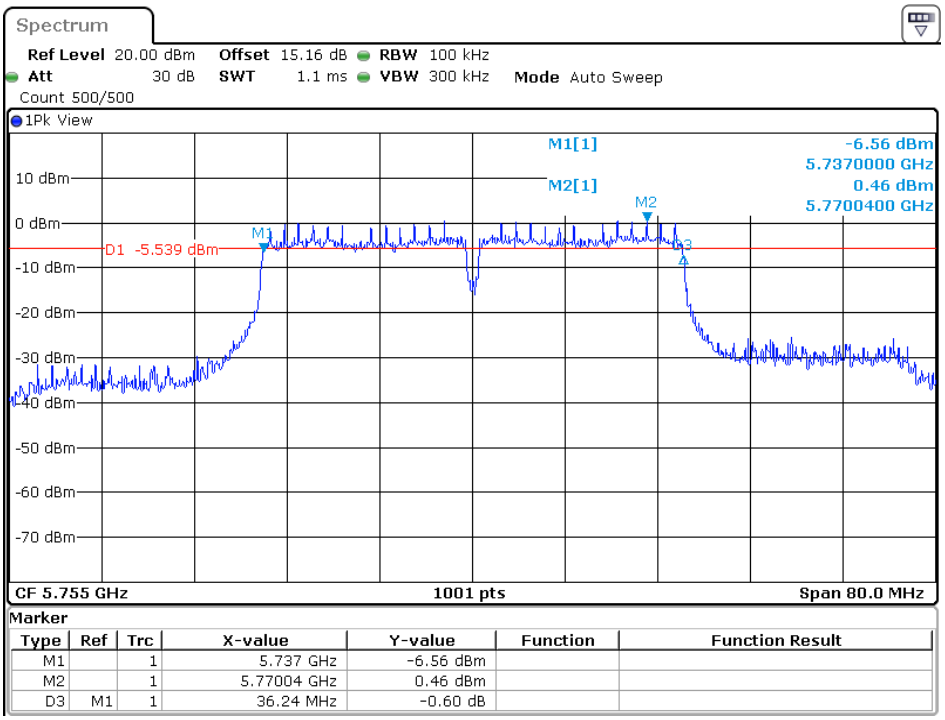


Date: 15.JAN.2019 11:07:55

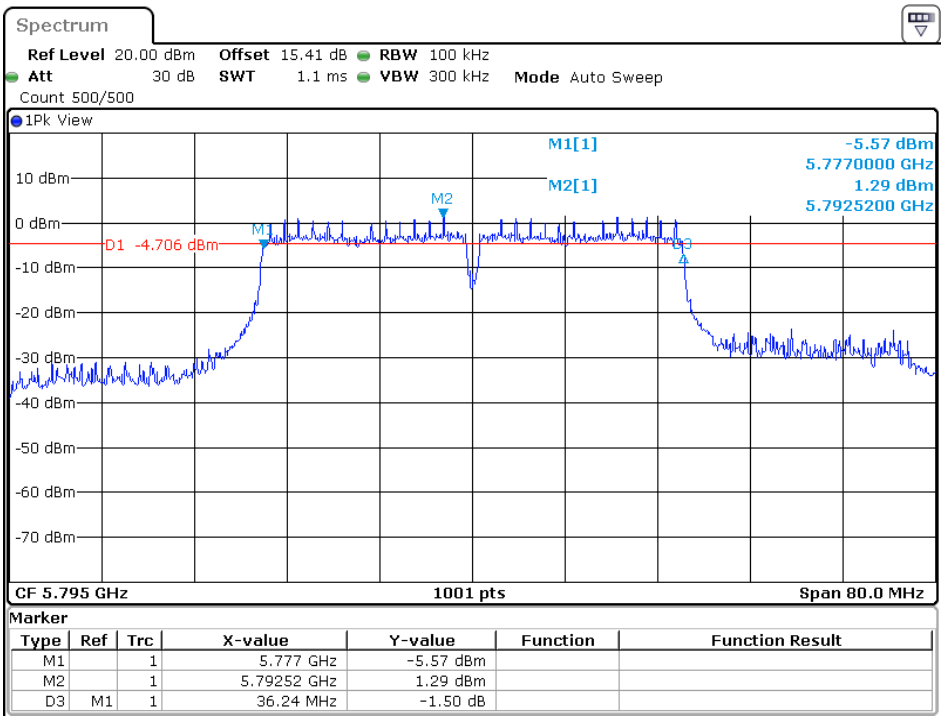


Date: 15.JAN.2019 11:13:32

11ac-HT40 (SISO, ANT 1):

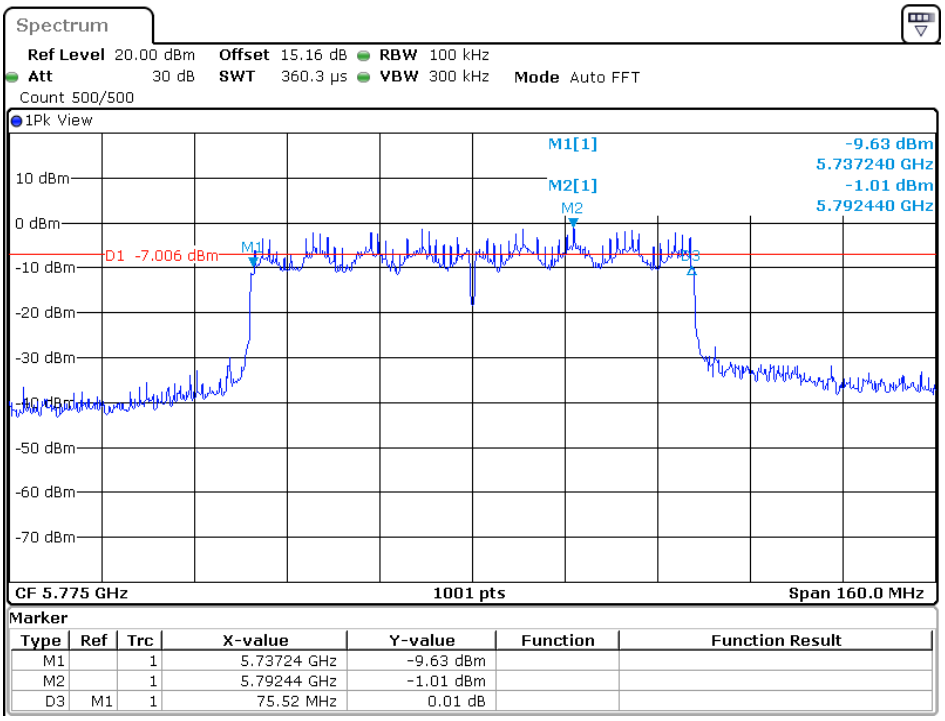


Date: 15.JAN.2019 13:56:40



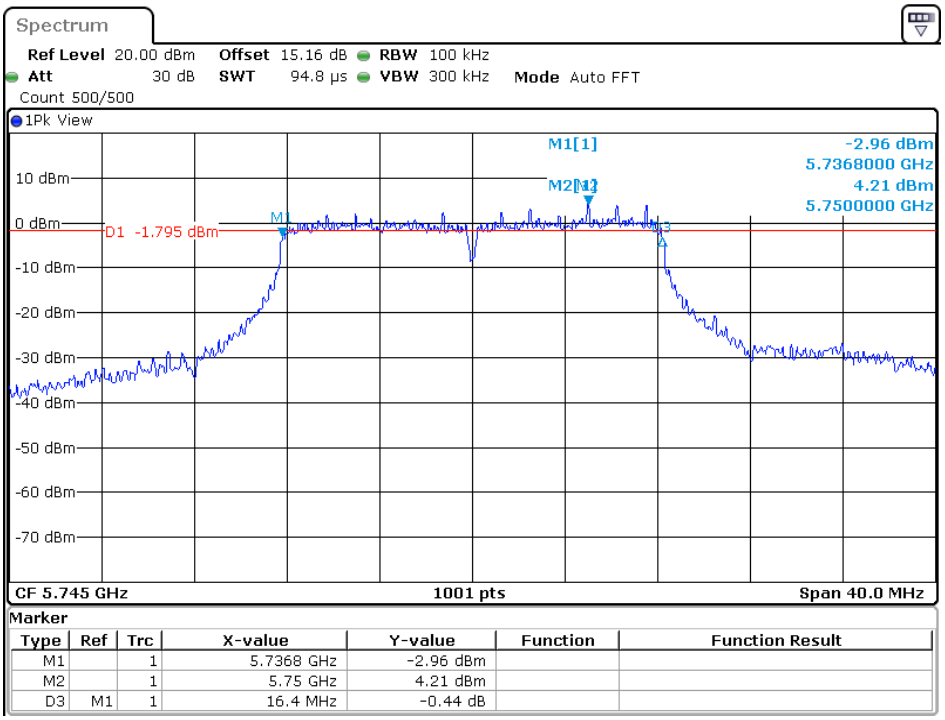
Date: 15.JAN.2019 14:02:23

11ac-HT80 (SISO, ANT 1):

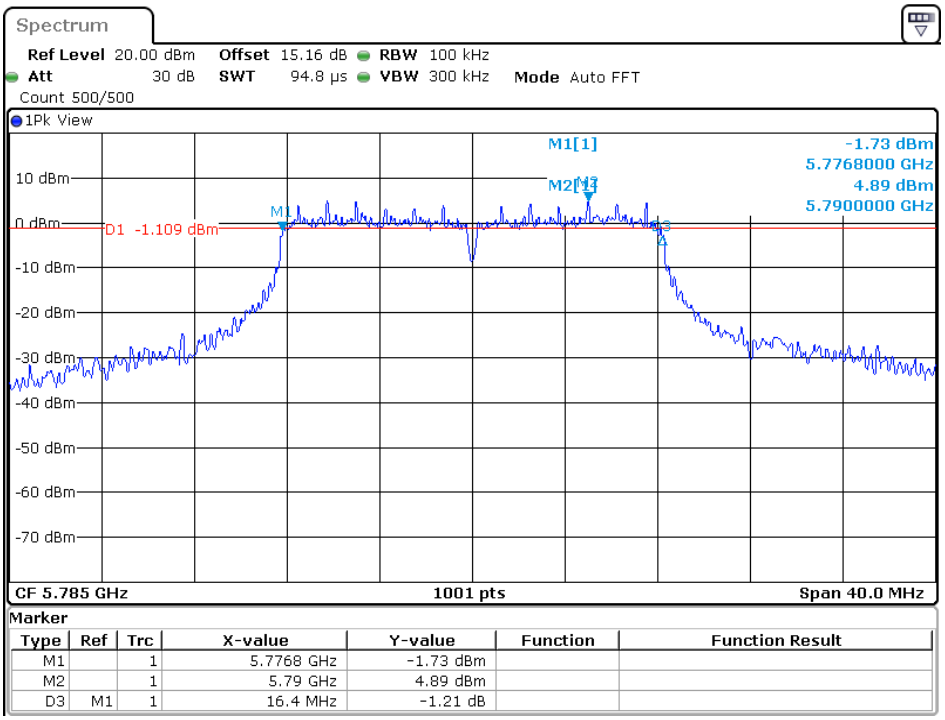


Date: 16.JAN.2019 09:28:04

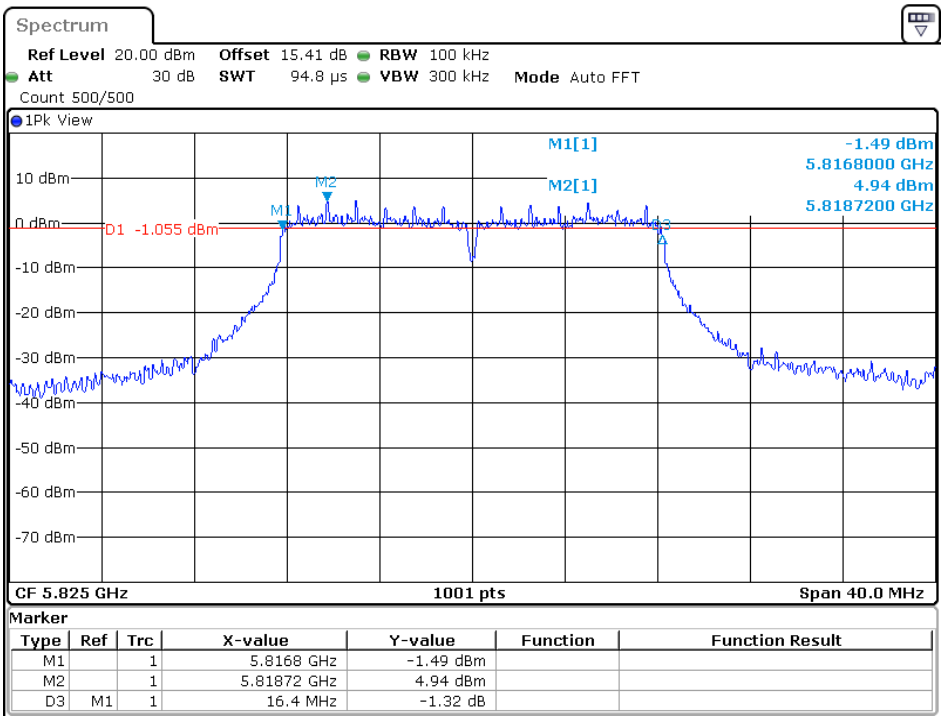
11a (SISO, ANT 2):



Date: 16.JAN.2019 10:41:14

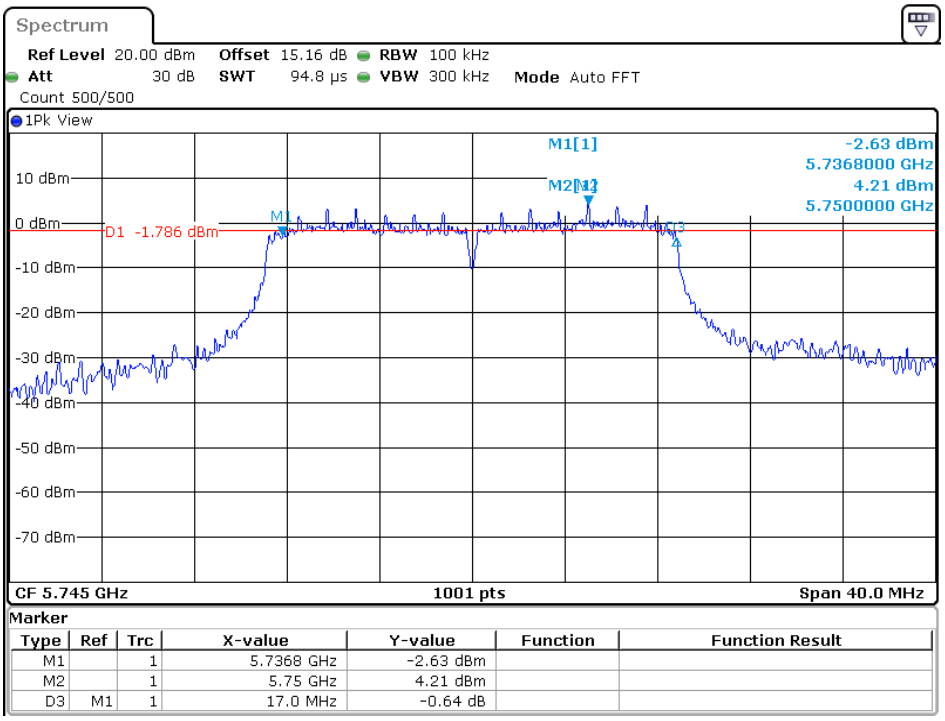


Date: 16.JAN.2019 10:48:02

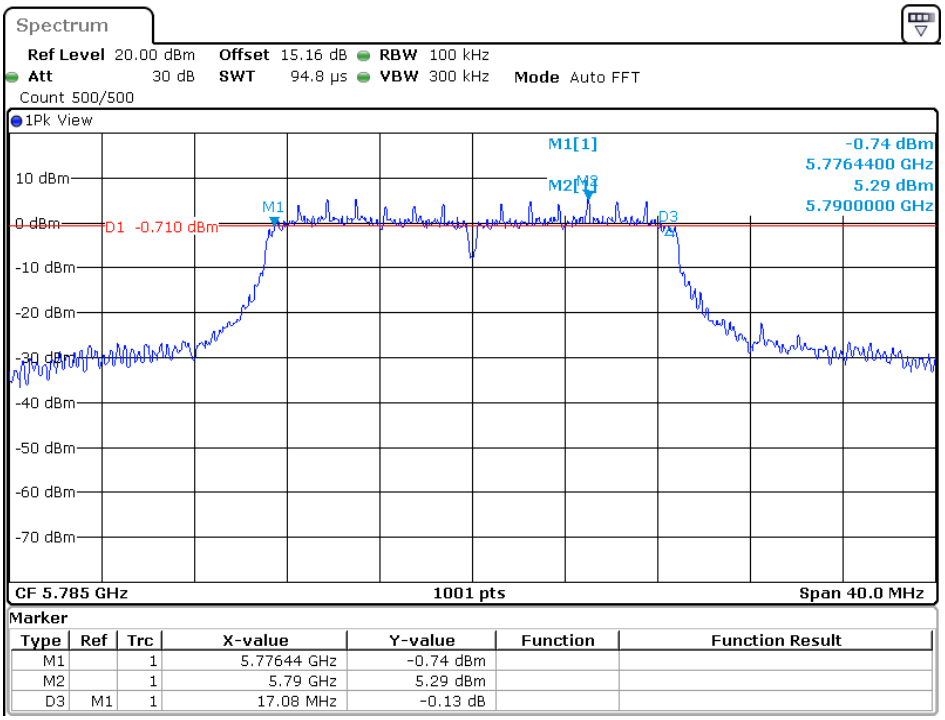


Date: 16.JAN.2019 10:55:02

11n-HT20 (SISO, ANT 2):



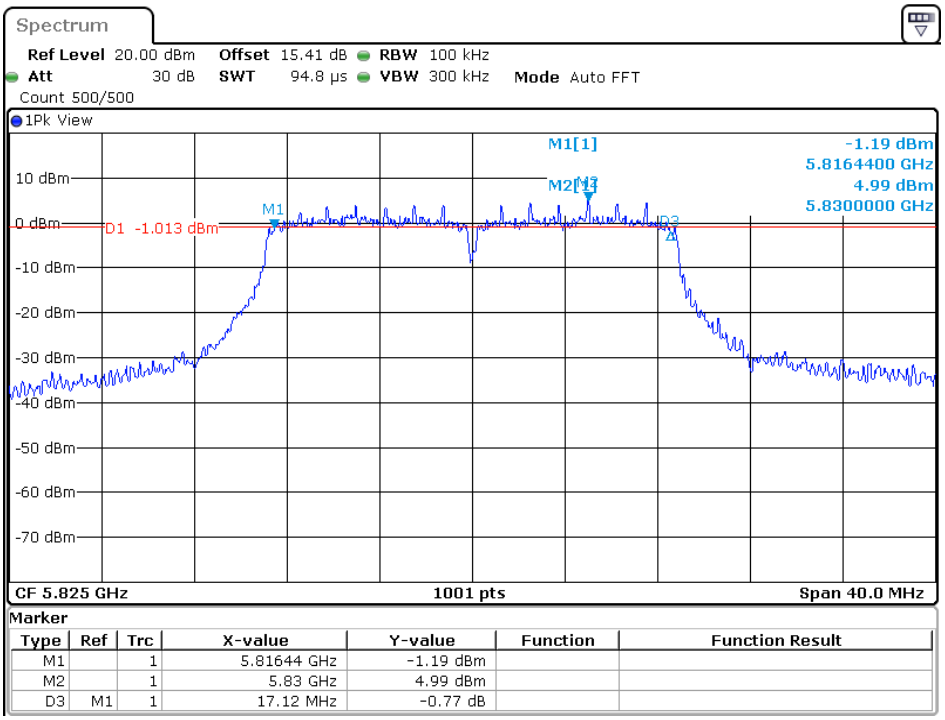
Date: 16.JAN.2019 12:00:06



Marker

Type	Ref	Trc	X-value	Y-value	Function	Function Result
M1		1	5.77644 GHz	-0.74 dBm		
M2		1	5.79 GHz	5.29 dBm		
D3	M1	1	17.08 MHz	-0.13 dB		

Date: 16.JAN.2019 13:08:00

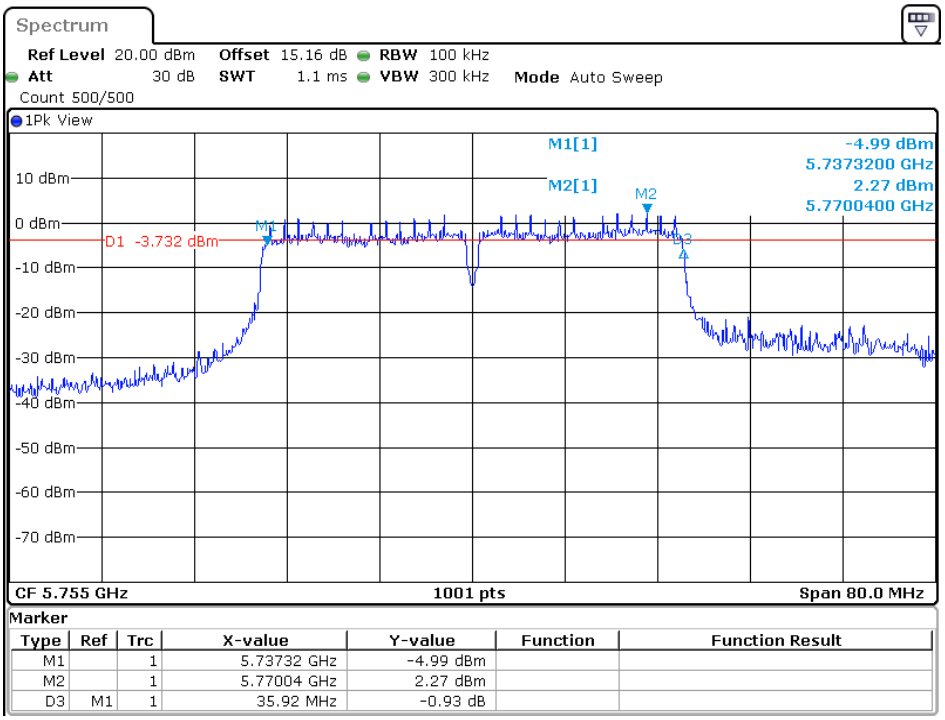


Marker

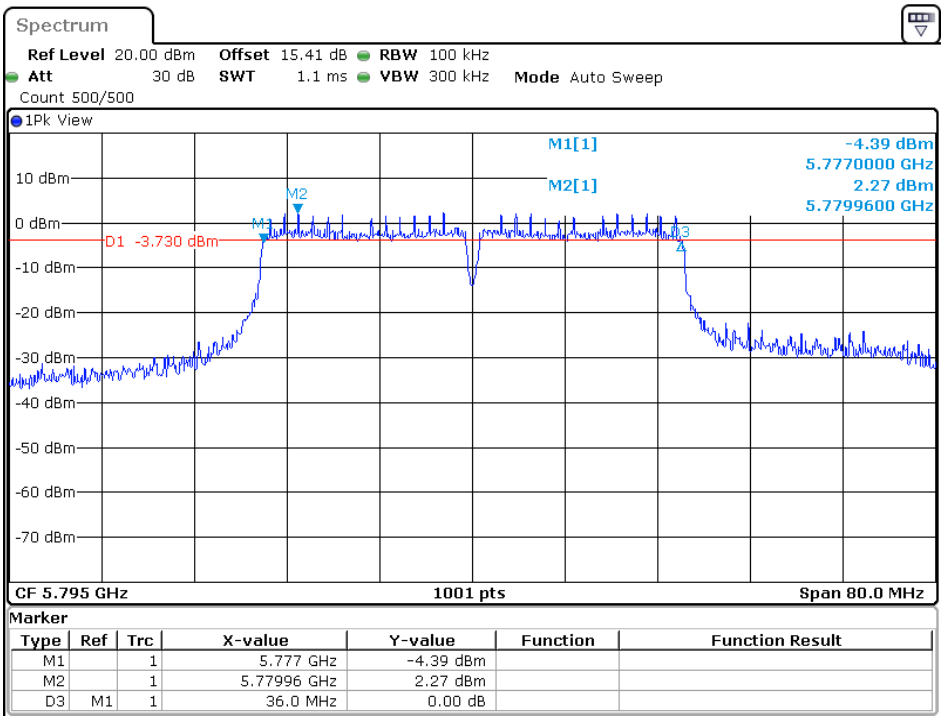
Type	Ref	Trc	X-value	Y-value	Function	Function Result
M1		1	5.81644 GHz	-1.19 dBm		
M2		1	5.83 GHz	4.99 dBm		
D3	M1	1	17.12 MHz	-0.77 dB		

Date: 16.JAN.2019 13:14:36

11n-HT40 (SISO, ANT 2):

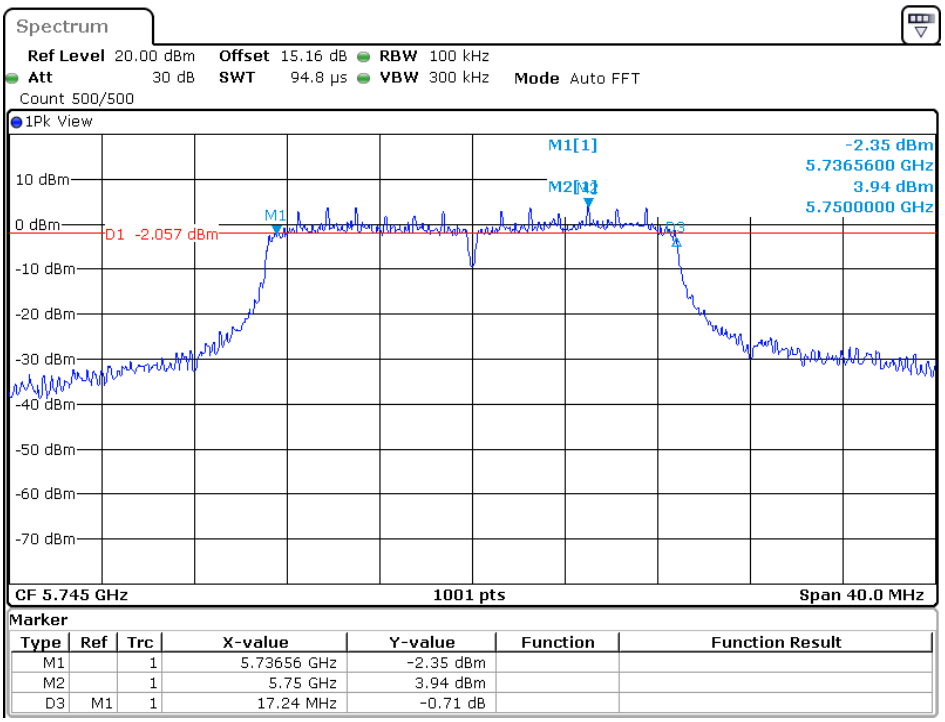


Date: 16.JAN.2019 14:19:26

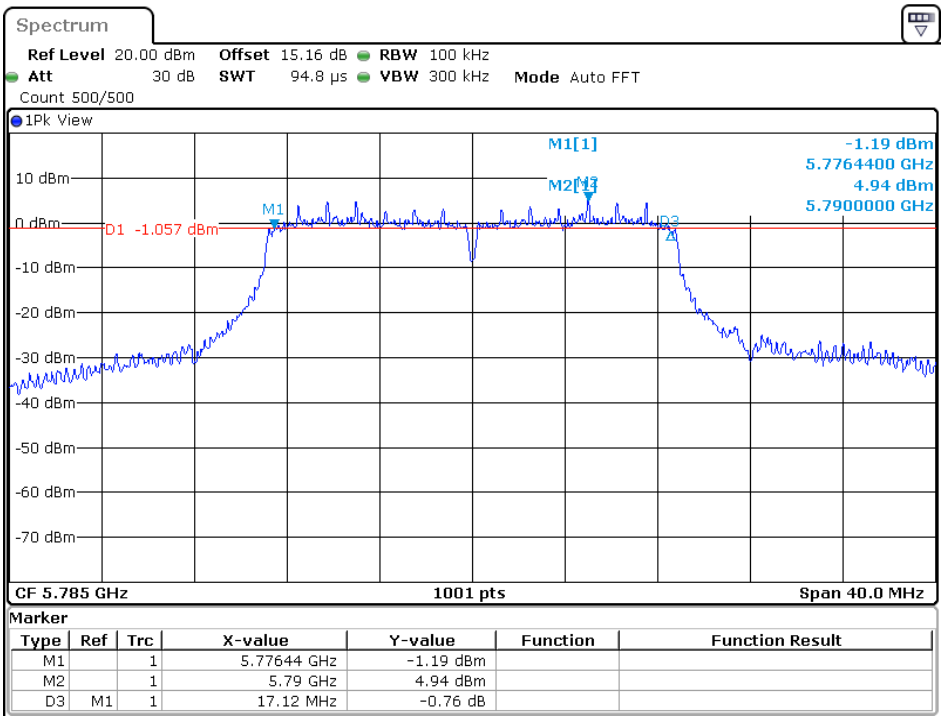


Date: 16.JAN.2019 14:25:37

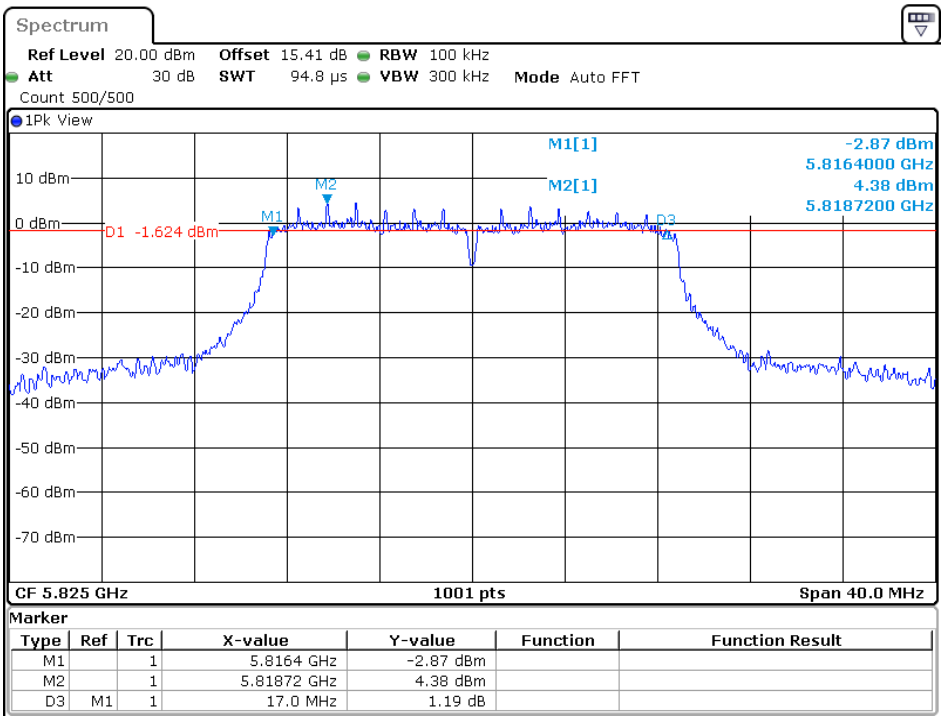
11ac-HT20 (SISO, ANT 2):



Date: 16.JAN.2019 15:34:28

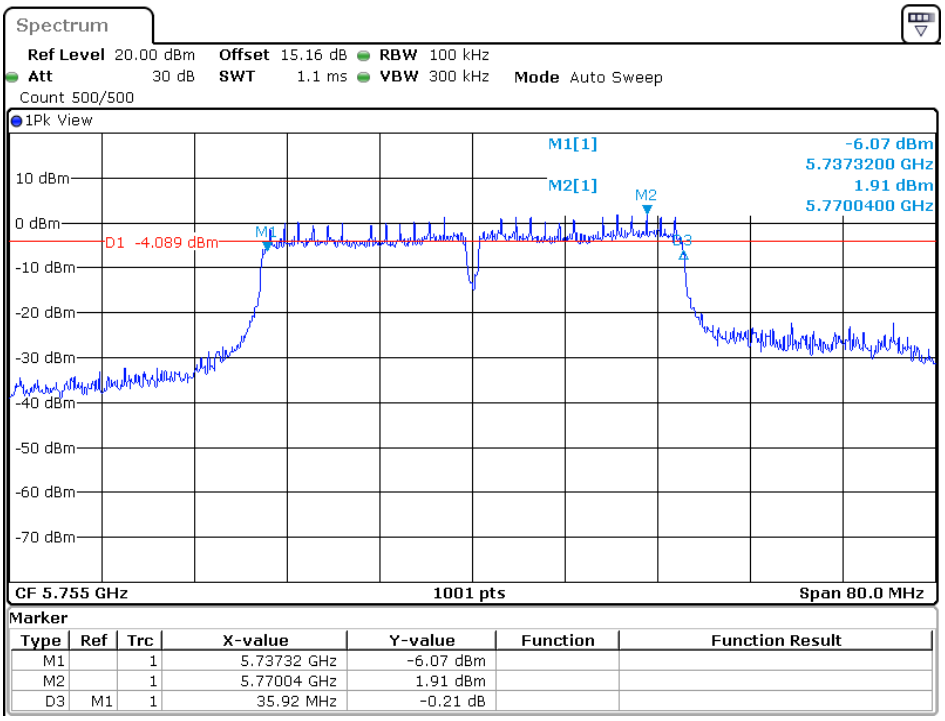


Date: 16.JAN.2019 15:40:02

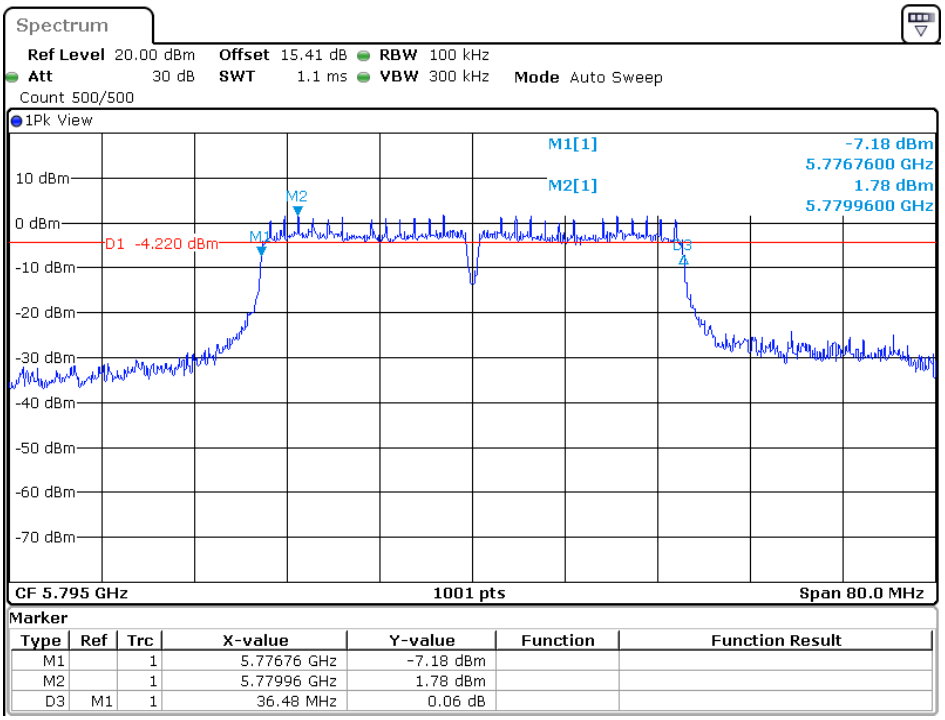


Date: 16.JAN.2019 15:49:04

11ac-HT40 (SISO, ANT 2):



Date: 16.JAN.2019 16:54:01

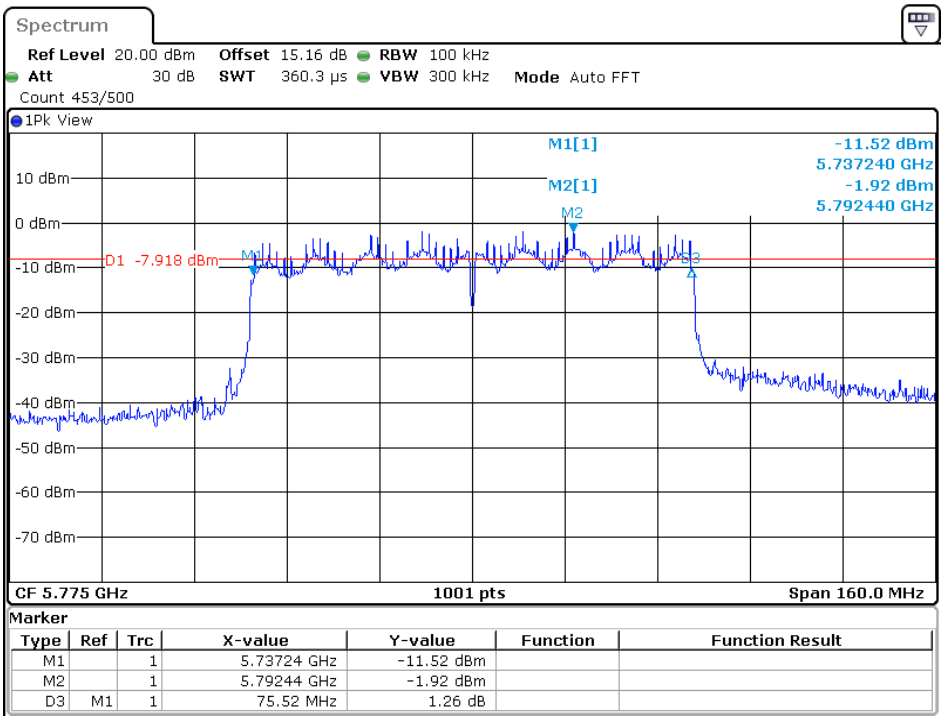


Marker

Type	Ref	Trc	X-value	Y-value	Function	Function Result
M1		1	5.77676 GHz	-7.18 dBm		
M2		1	5.77996 GHz	1.78 dBm		
D3	M1	1	36.48 MHz	0.06 dB		

Date: 16.JAN.2019 17:00:09

11ac-HT80 (SISO, ANT 2):

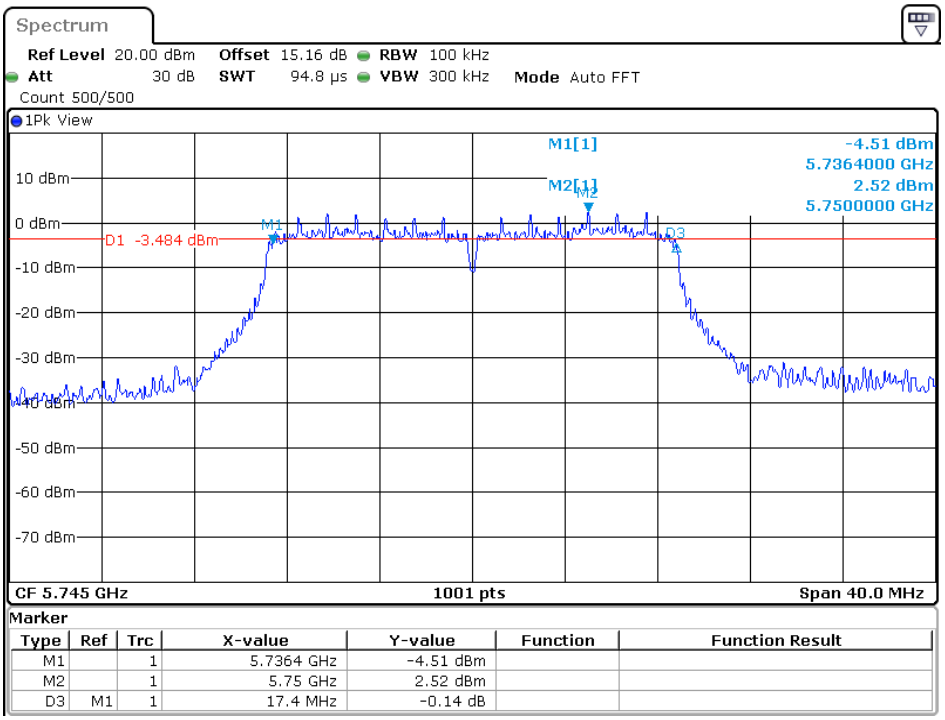


Marker

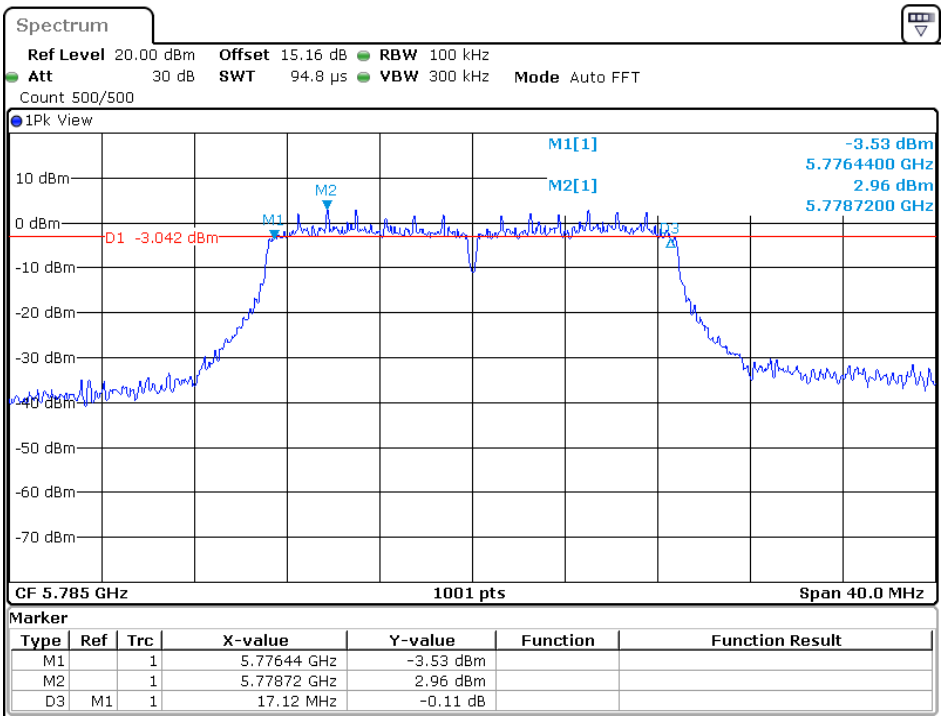
Type	Ref	Trc	X-value	Y-value	Function	Function Result
M1		1	5.73724 GHz	-11.52 dBm		
M2		1	5.79244 GHz	-1.92 dBm		
D3	M1	1	75.52 MHz	1.26 dB		

Date: 16.JAN.2019 17:29:33

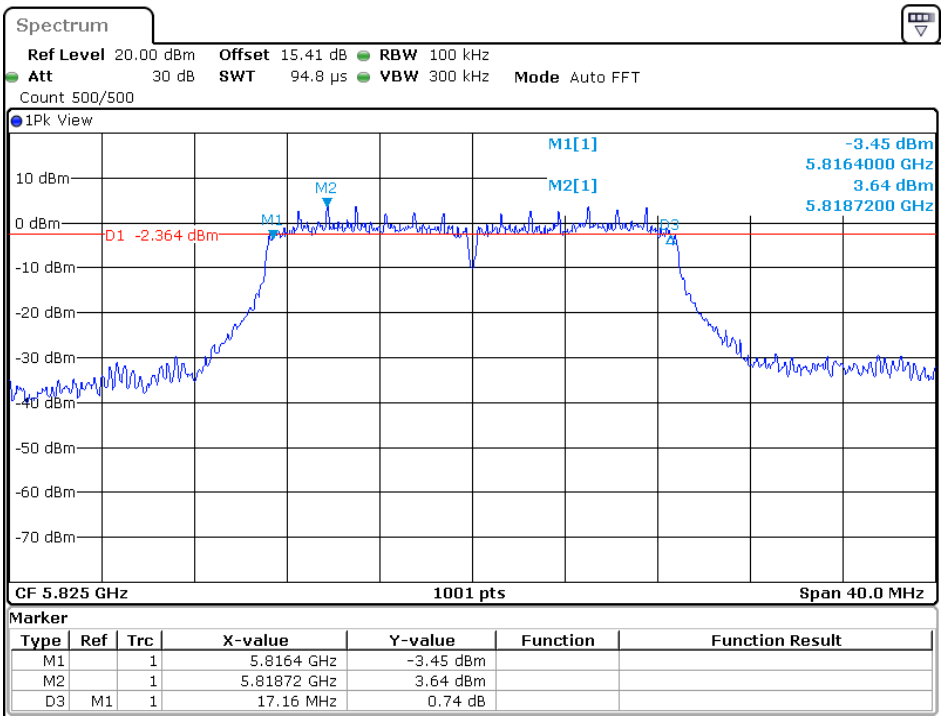
11n-HT20 (MIMO, ANT 1):



Date: 17.JAN.2019 14:32:50

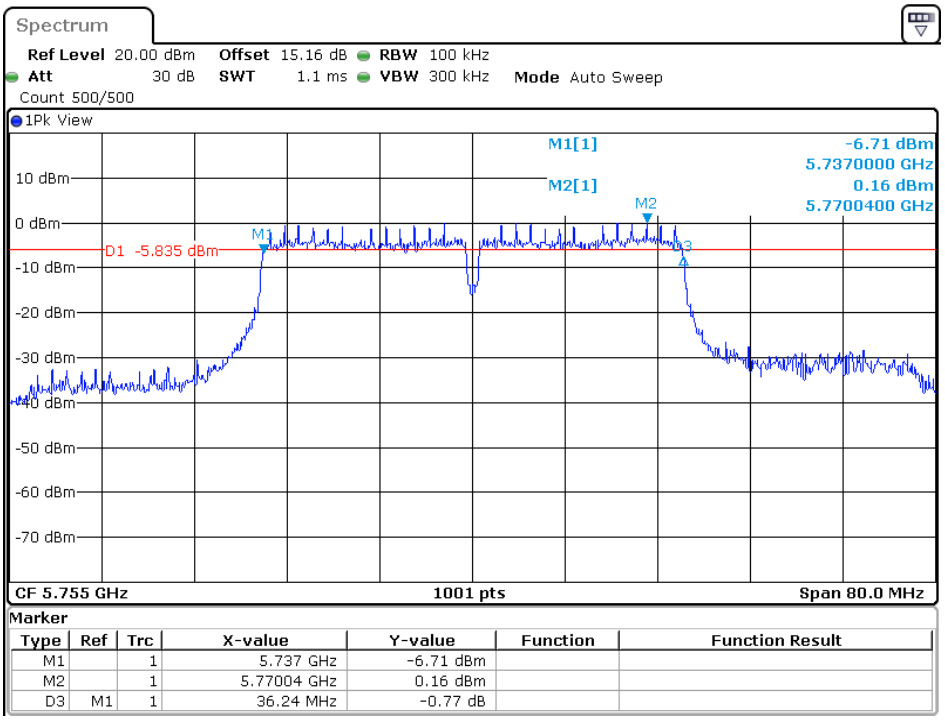


Date: 17.JAN.2019 14:38:43

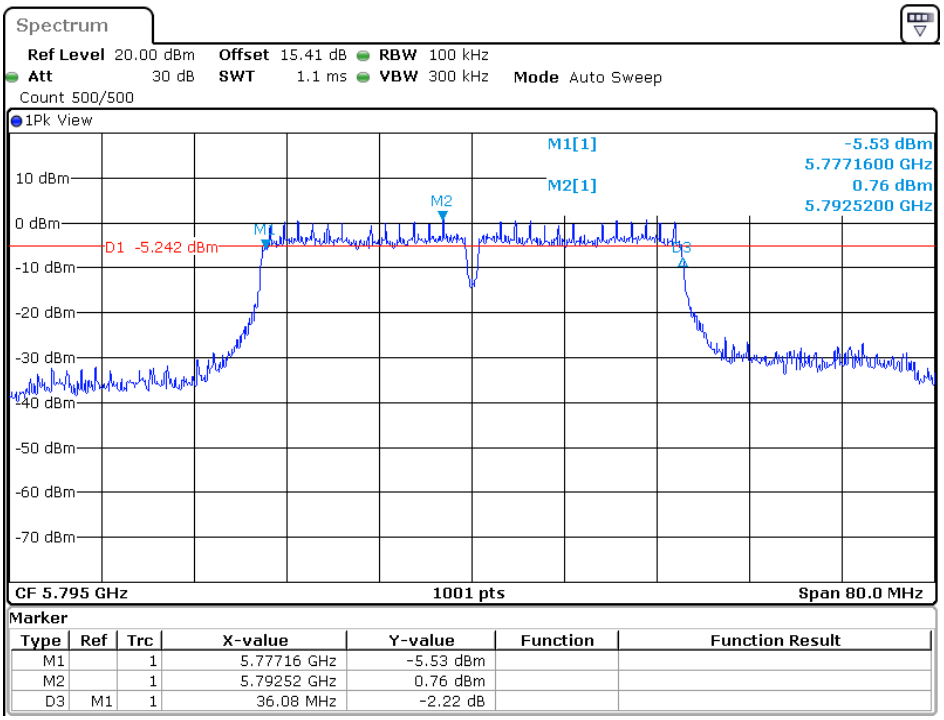


Date: 17.JAN.2019 14:42:34

11n-HT40 (MIMO, ANT 1):

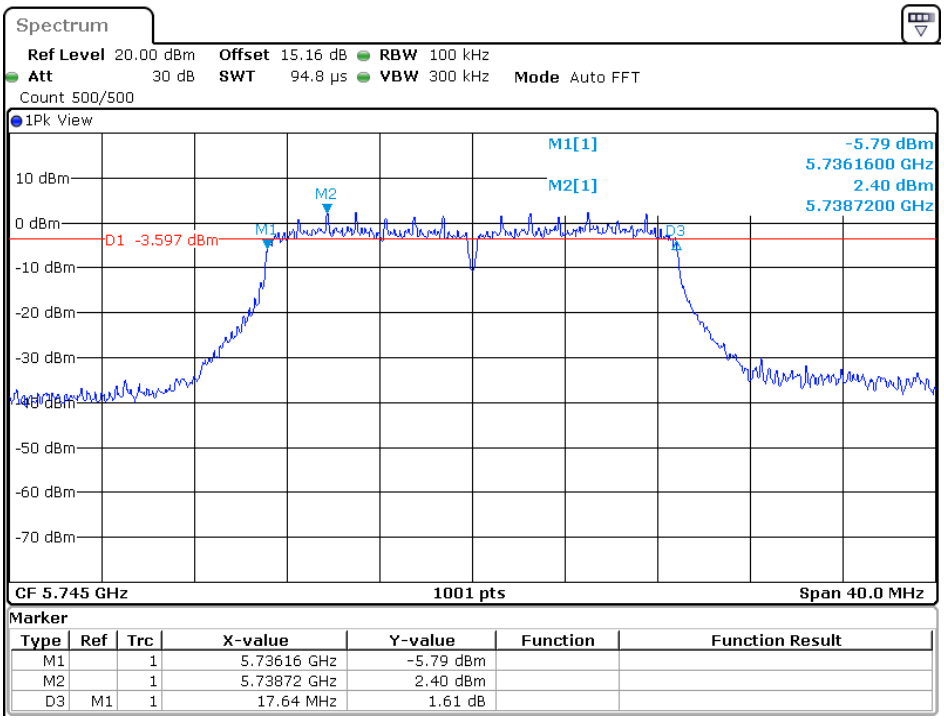


Date: 17.JAN.2019 15:09:52

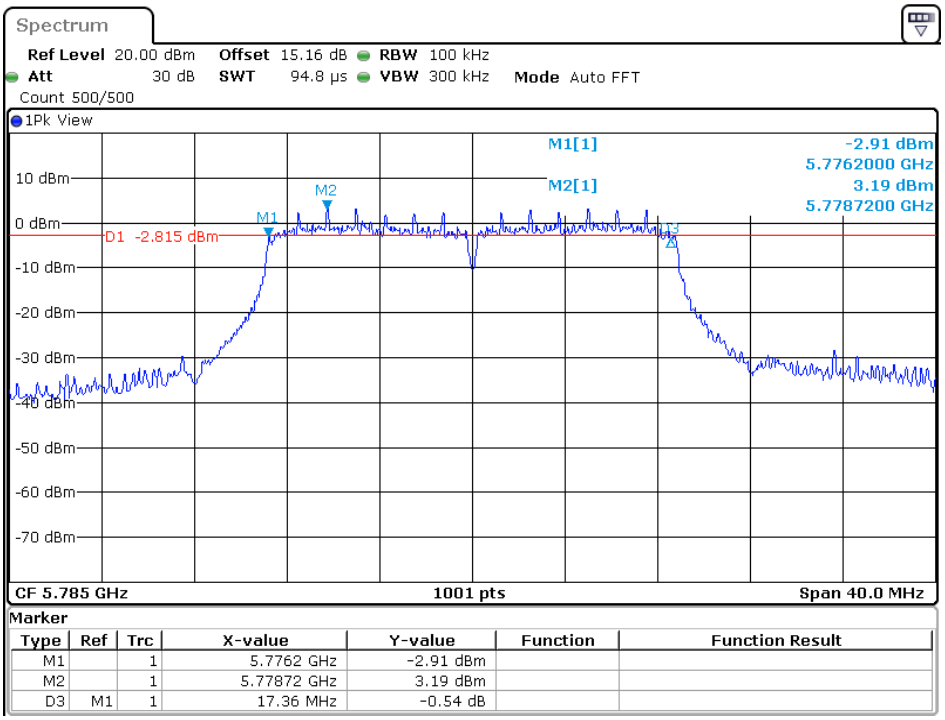


Date: 17.JAN.2019 15:13:58

11ac-HT20 (MIMO, ANT 1):



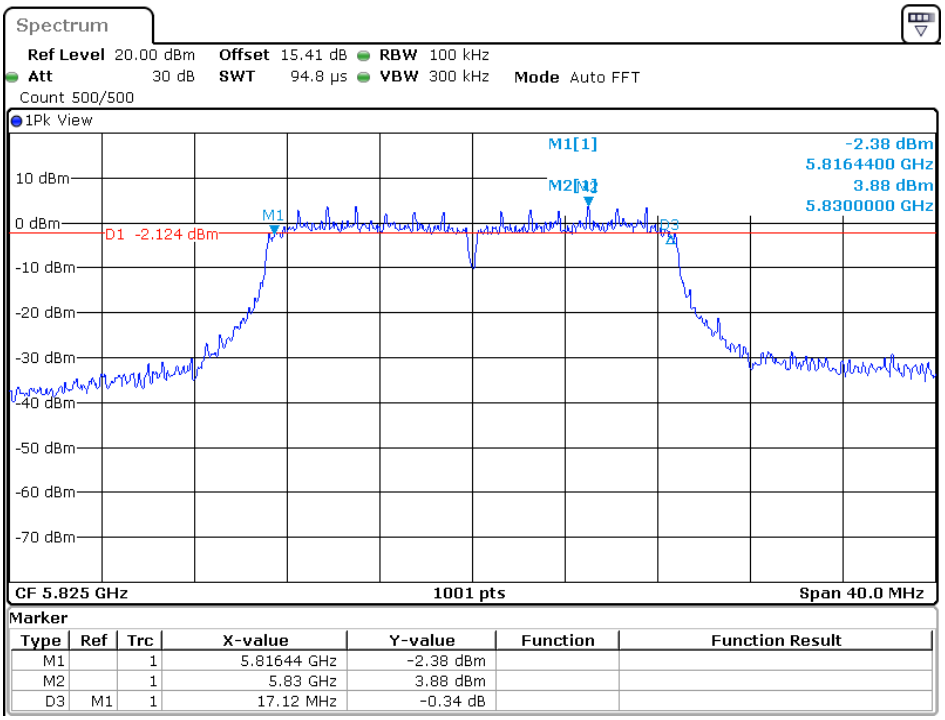
Date: 17.JAN.2019 16:01:25



Marker

Type	Ref	Trc	X-value	Y-value	Function	Function Result
M1		1	5.7762 GHz	-2.91 dBm		
M2		1	5.77872 GHz	3.19 dBm		
D3	M1	1	17.36 MHz	-0.54 dB		

Date: 17.JAN.2019 16:04:57

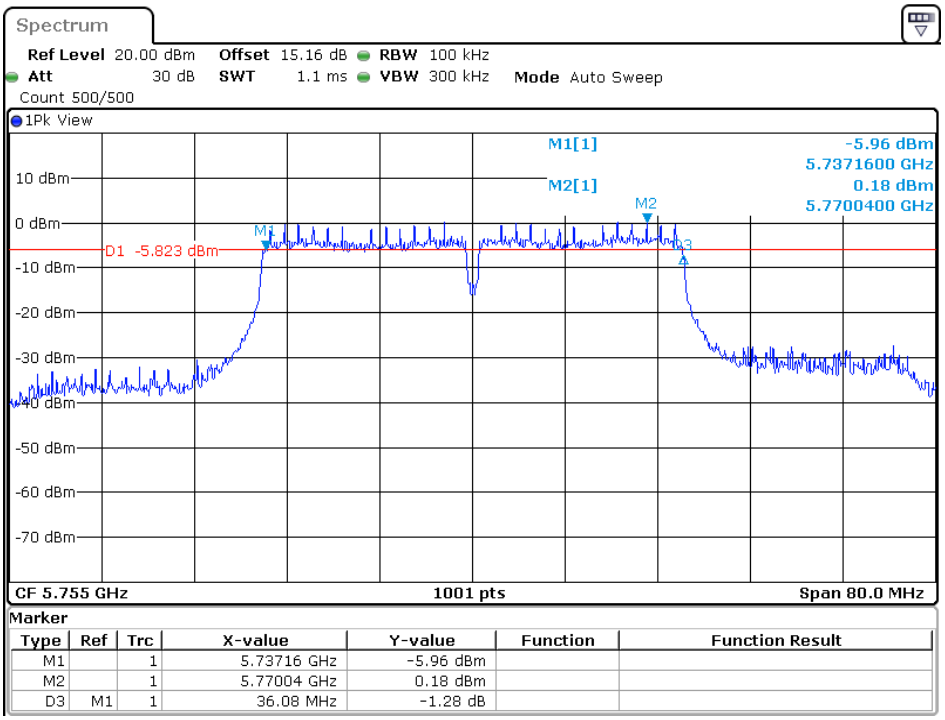


Marker

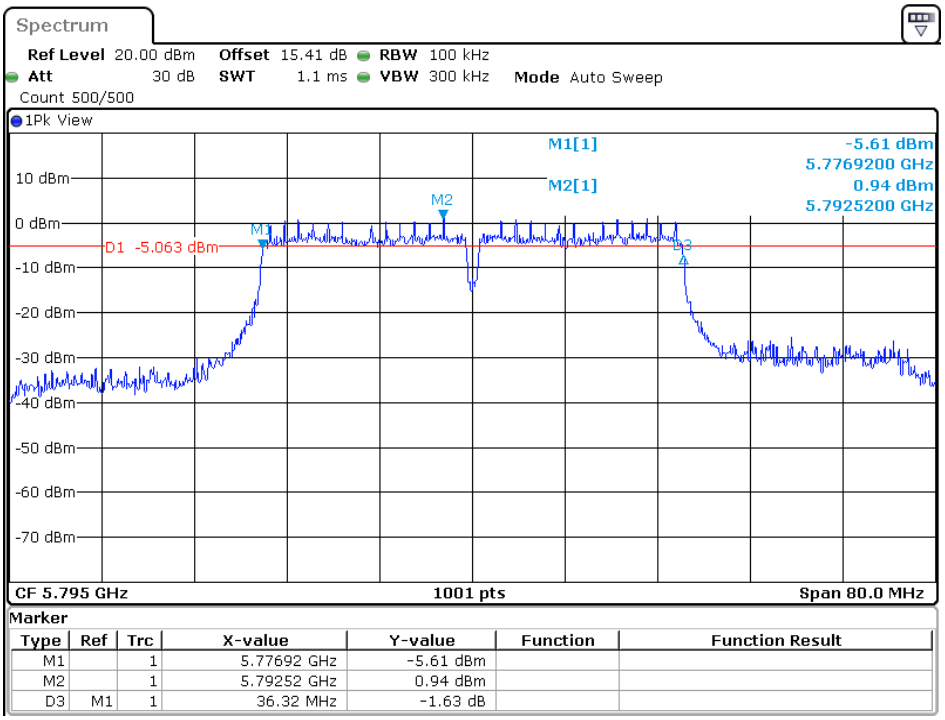
Type	Ref	Trc	X-value	Y-value	Function	Function Result
M1		1	5.81644 GHz	-2.38 dBm		
M2		1	5.83 GHz	3.88 dBm		
D3	M1	1	17.12 MHz	-0.34 dB		

Date: 17.JAN.2019 16:08:47

11ac-HT40 (MIMO, ANT 1):

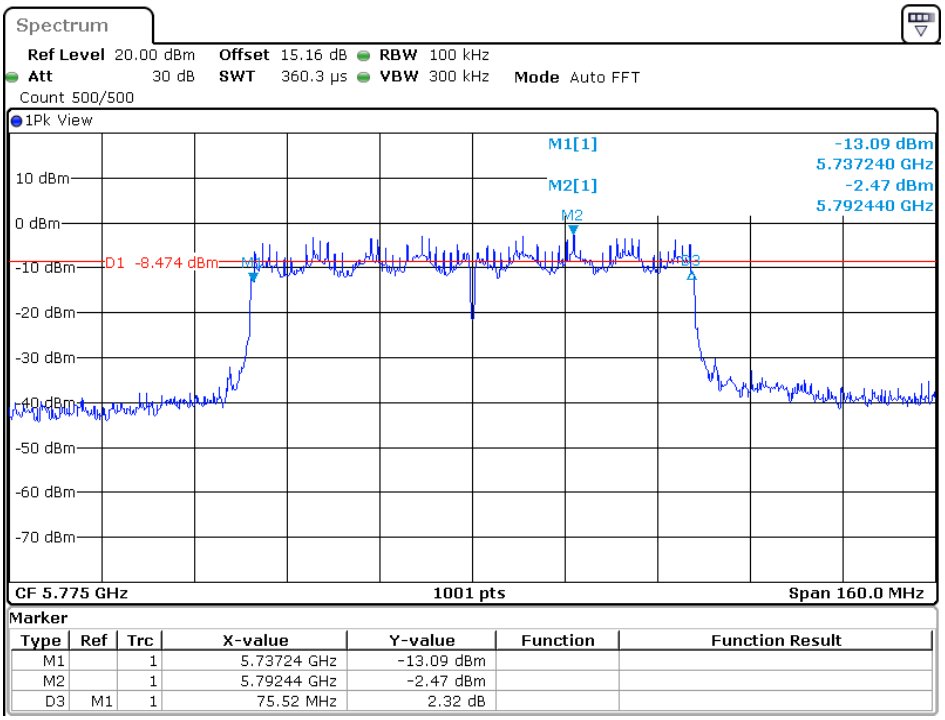


Date: 17.JAN.2019 16:55:31



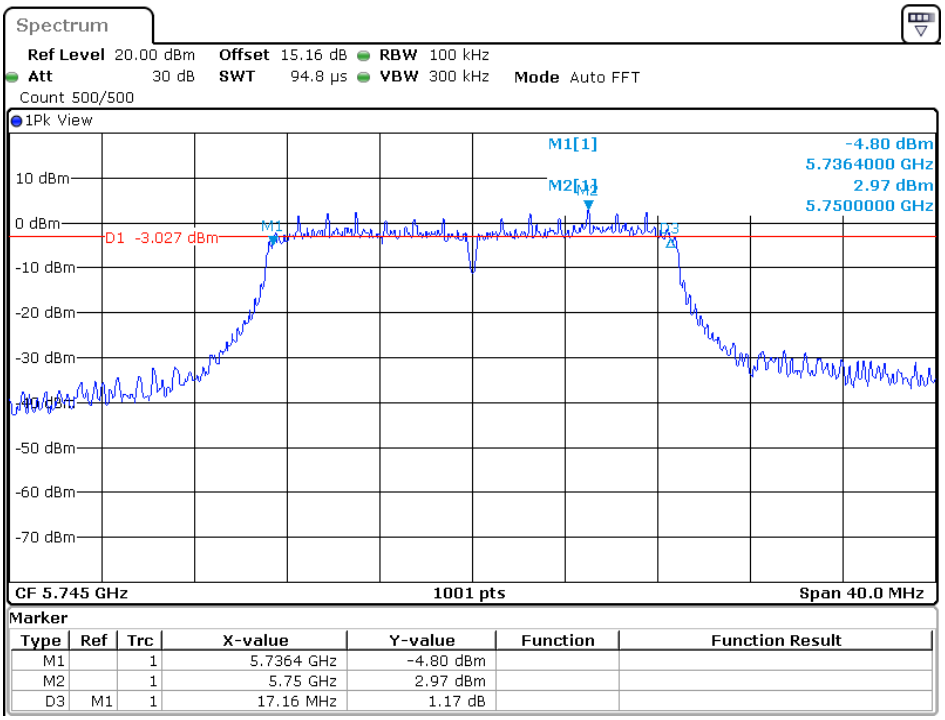
Date: 17.JAN.2019 16:59:20

11ac-HT80 (MIMO, ANT 1):

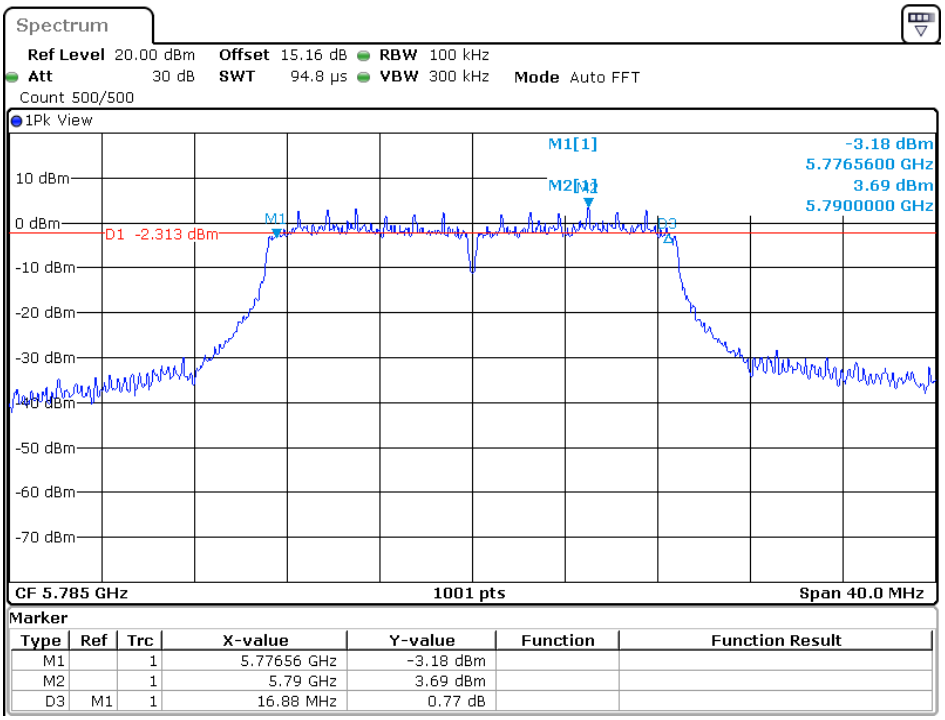


Date: 17.JAN.2019 17:17:56

11n-HT20 (MIMO, ANT 2):



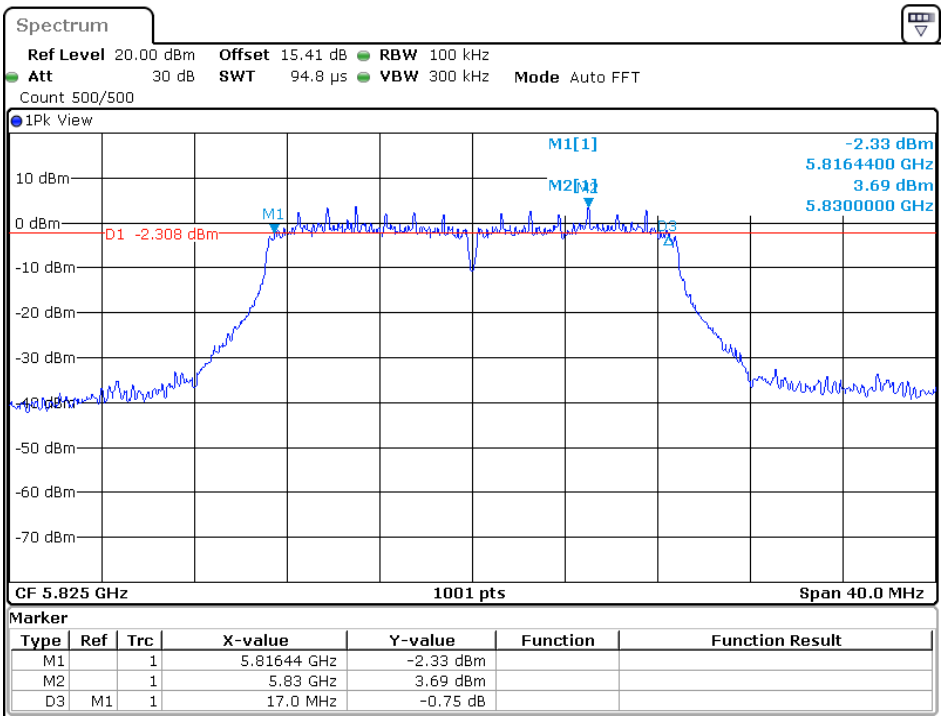
Date: 17.JAN.2019 14:36:30



Marker

Type	Ref	Trc	X-value	Y-value	Function	Function Result
M1		1	5.77656 GHz	-3.18 dBm		
M2		1	5.79 GHz	3.69 dBm		
D3	M1	1	16.88 MHz	0.77 dB		

Date: 17.JAN.2019 14:40:19

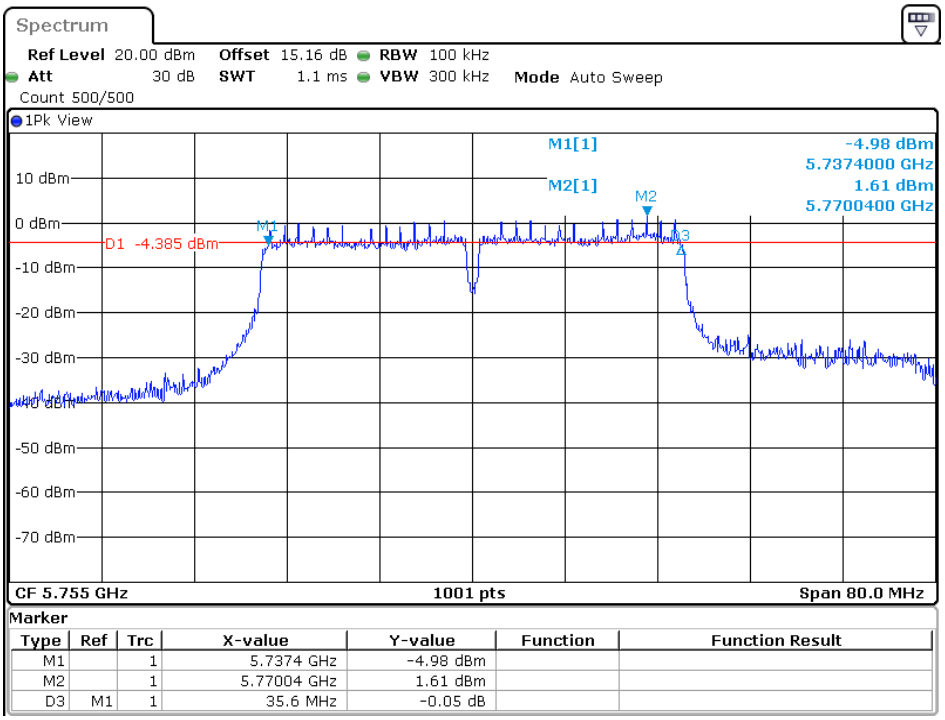


Marker

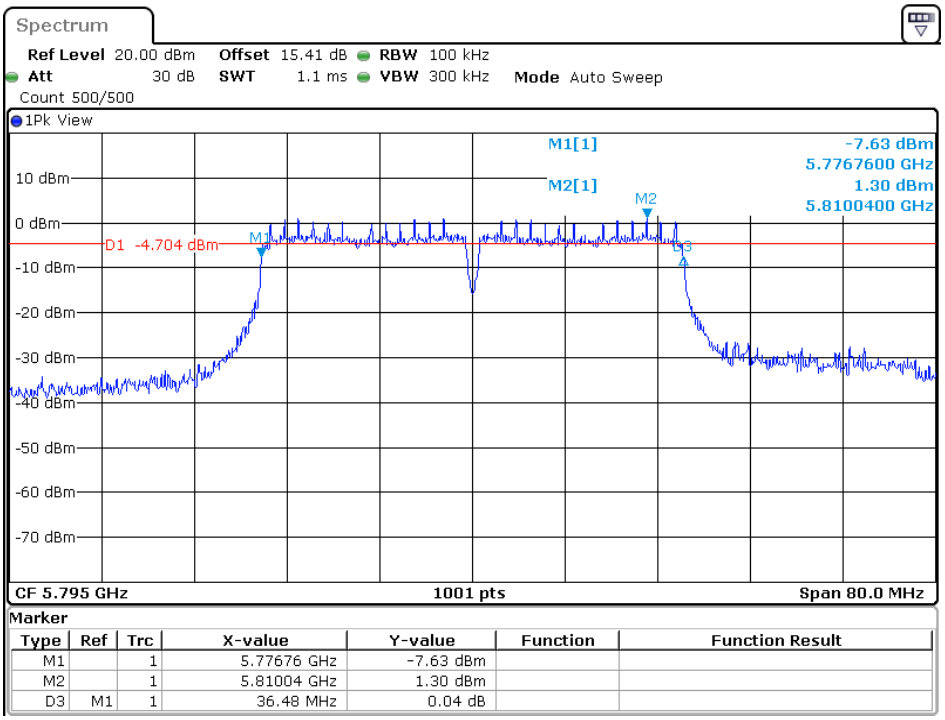
Type	Ref	Trc	X-value	Y-value	Function	Function Result
M1		1	5.81644 GHz	-2.33 dBm		
M2		1	5.83 GHz	3.69 dBm		
D3	M1	1	17.0 MHz	-0.75 dB		

Date: 17.JAN.2019 14:43:57

11n-HT40 (MIMO, ANT 2):

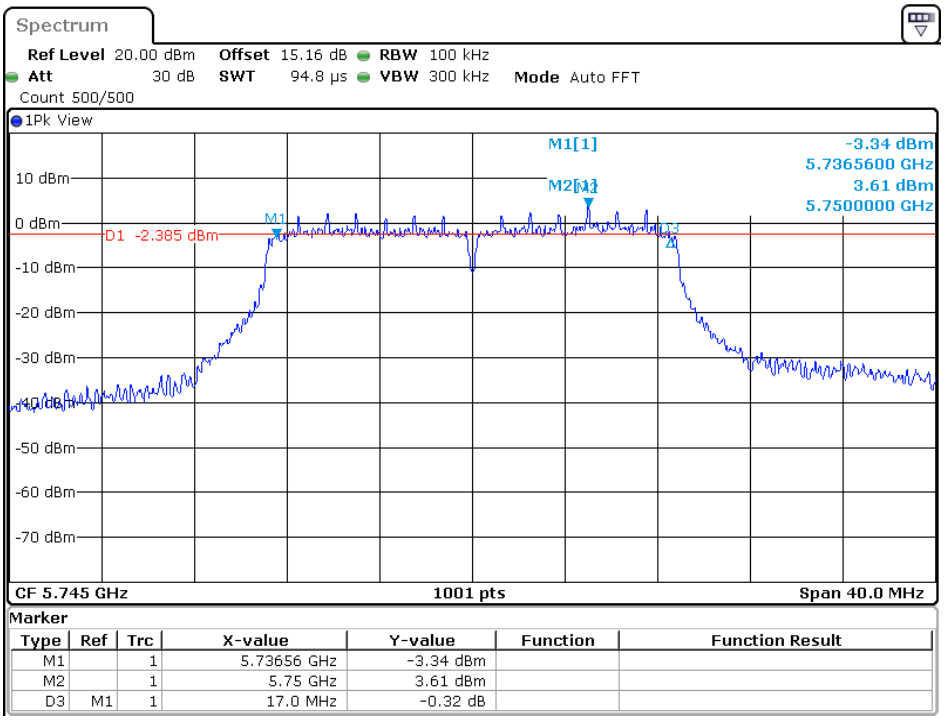


Date: 17.JAN.2019 15:11:20

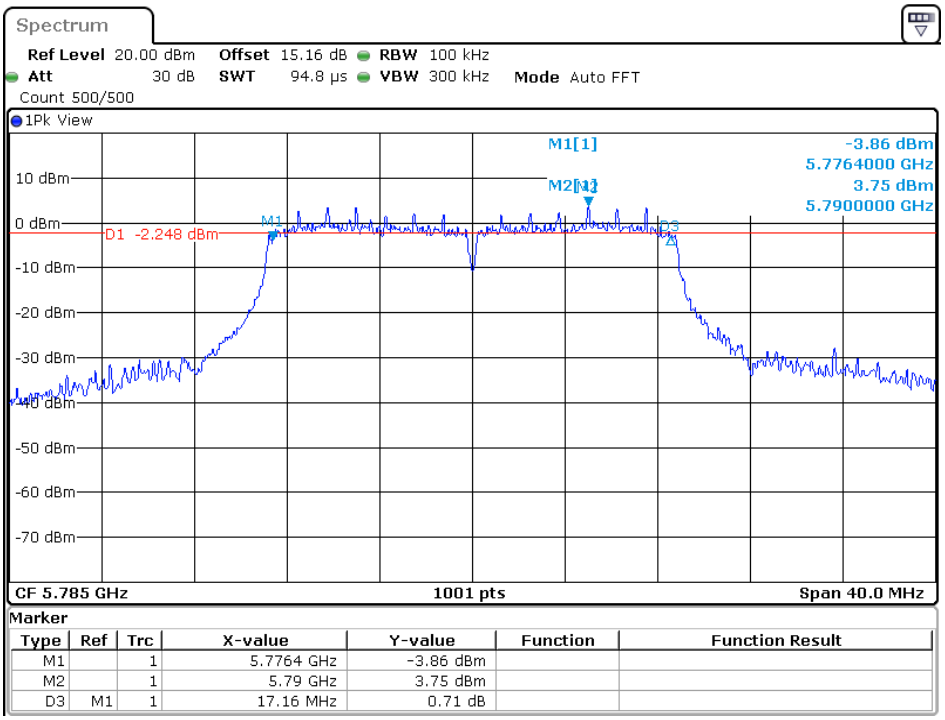


Date: 17.JAN.2019 15:15:25

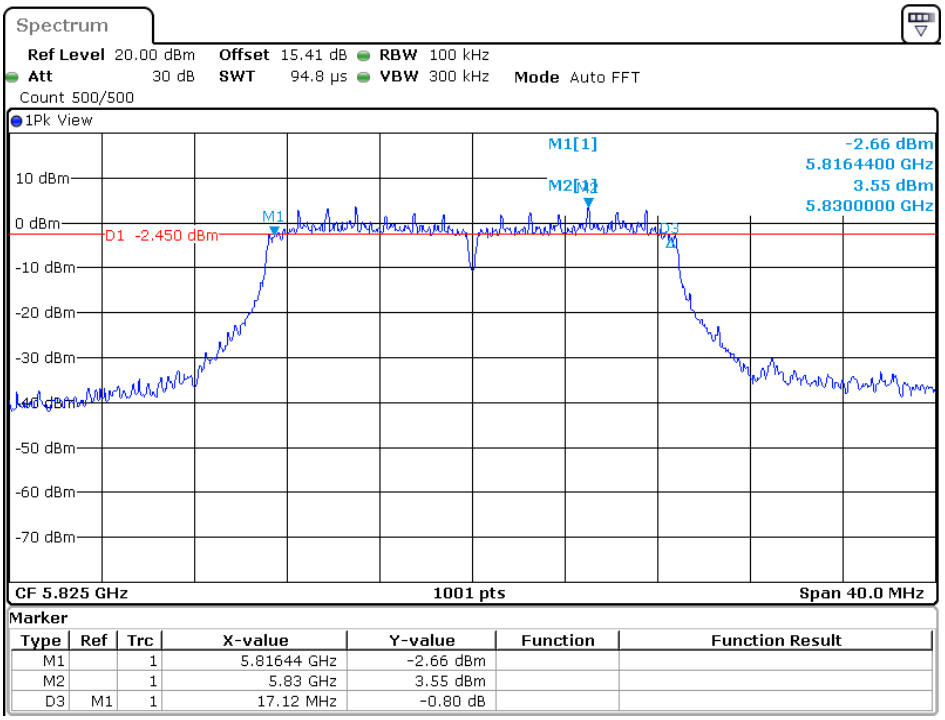
11ac-HT20 (MIMO, ANT 2):



Date: 17.JAN.2019 16:02:50

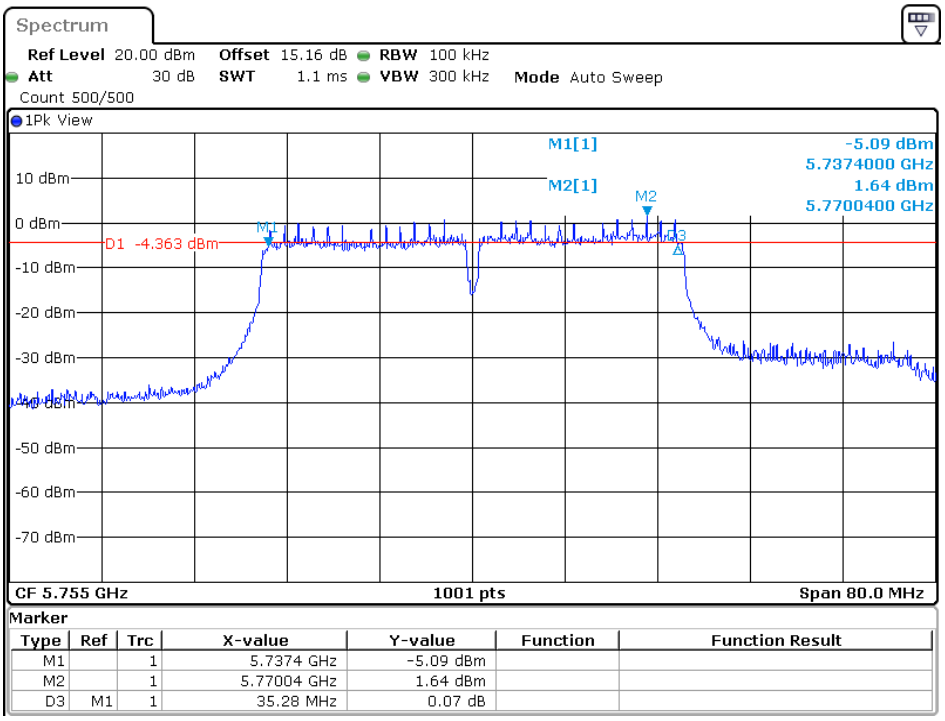


Date: 17.JAN.2019 16:06:23

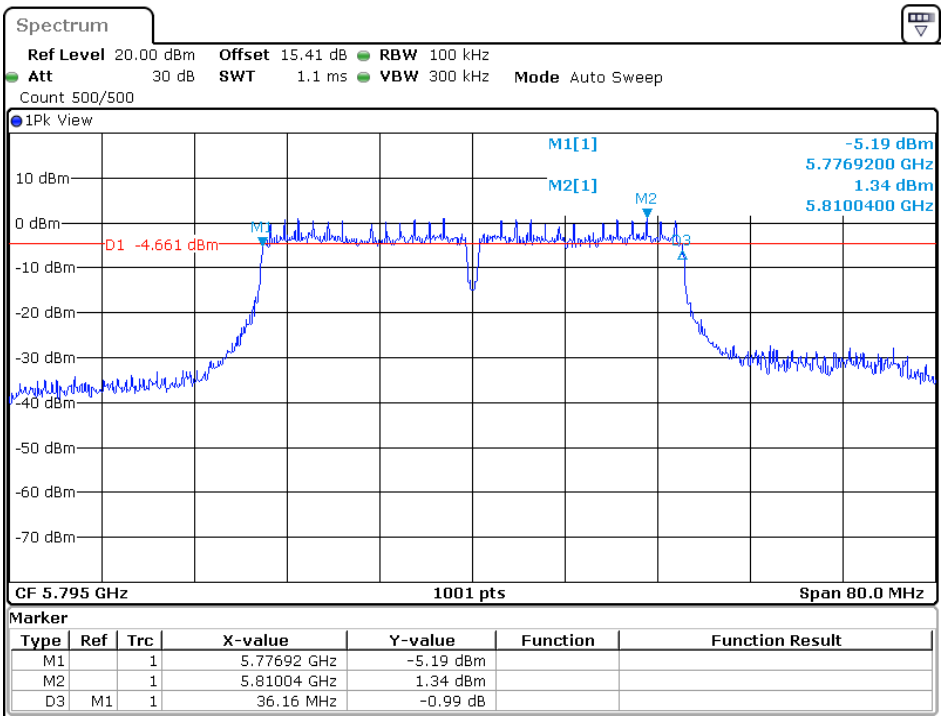


Date: 17.JAN.2019 16:10:11

11ac-HT40 (MIMO, ANT 2):

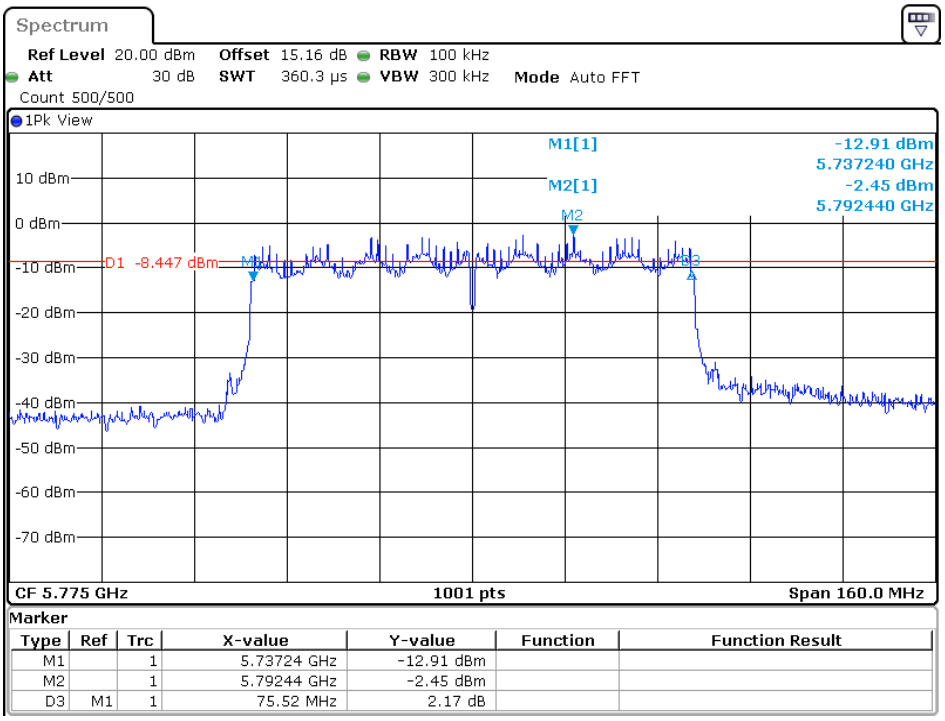


Date: 17.JAN.2019 16:57:00



Date: 17.JAN.2019 17:00:48

11ac-HT80 (MIMO, ANT 2):



Date: 17.JAN.2019 17:20:27

Note: 99% Occupied Bandwidth within the U-NII-1 band and 26dB Emission Bandwidth for reference. The plots are saved with filename: "26dB OBW" and "99% OBW"

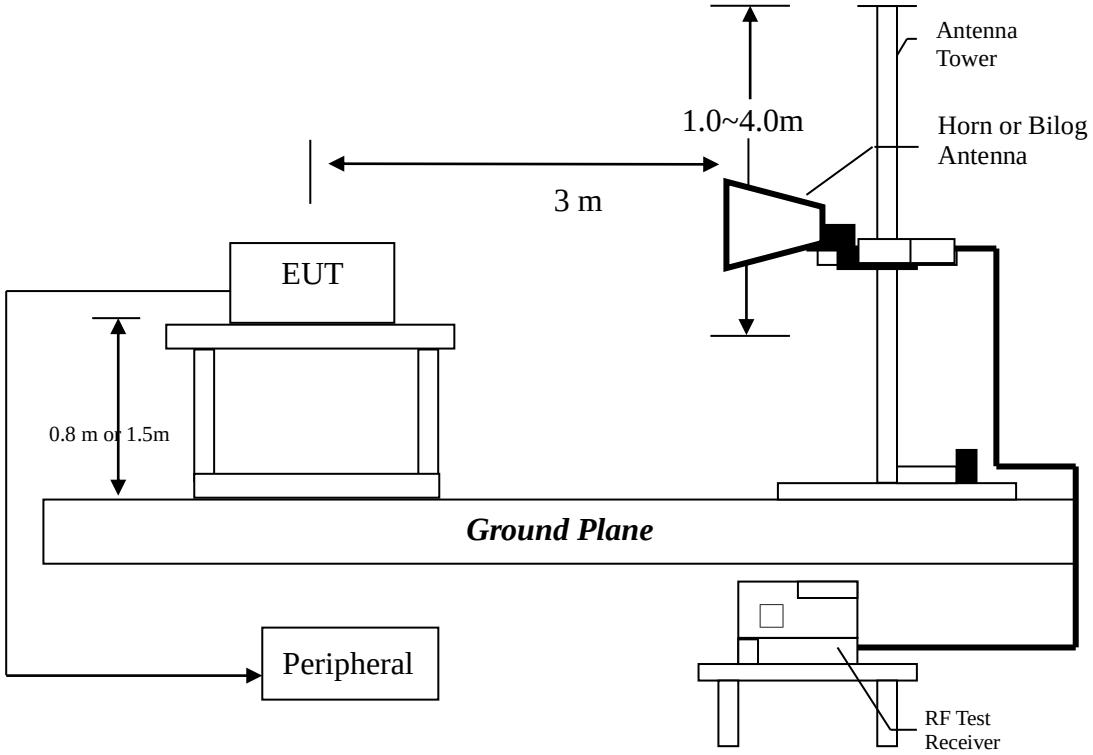
6. Radiated Emission test (FCC 15.205 & 15.209 & 15.407)

6.1 Operating environment

Temperature:	22	℃
Relative Humidity:	55	%
Atmospheric Pressure	1010	hPa

6.2 Test setup & procedure

The Diagram below shows the test setup, which is utilized to make these measurements.



Radiated emission measurements were performed from 9KHz to tenth harmonic or 40GHz.
The EUT for testing is arranged on a styrene turntable with the height of 0.8m up to 1GHz and 1.5m above 1GHz. If some peripherals apply to the EUT, the peripherals will be connected to EUT and the whole system. During the test, all cables were arranged to produce worst-case emissions. The signal is maximized through rotation. The height of antenna and polarization is changing constantly for exploring for maximum signal level. The height of antenna can be up to 4 meters and down to 1 meter.

The measurement for radiated emission will be done at the distance of three meters unless the signal level is too low to measure at that distance. In the case of the reading under noise floor, a pre-amplifier is used and/or the test is conducted at a closer distance. And then all readings are extrapolated back to the equivalent three meter reading using inverse scaling with distance.

Testing settings (refer to KDB 789033 D02)
Peak Measurements below 1GHz
1, Analyzer center frequency was set to the frequency of the radiated spurious emission.
2, Span=encompass the entire emission
3, RBW=120KHz
4, Detector=Quasi-Peak
5, Trace was allowed to stabilize

Peak Measurements above 1GHz
1, Analyzer center frequency was set to the frequency of the radiated spurious emission.
2, Span=encompass the entire emission
3, RBW=1MHz
4, VBW=3MHz
4, Detector= Peak (Max-hold)
5, Trace was allowed to stabilize

Average Measurements above 1GHz
1, Analyzer center frequency was set to the frequency of the radiated spurious emission.
2, Span=encompass the entire emission
3, RBW=1MHz
4, VBW=3MHz
4, Detector= RMS (Max-hold)
5, Trace was allowed to stabilize

6.3 Limit

The spurious Emission shall test through the 10th harmonic or 40GHz (whichever is lower). In addition, radiated emissions which fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emission limits specified in §15.209(a).

Notes:
1, All emission out-side of the 5.15-5.35GHz & 5.47-5.725GHz band shall not exceed an EIRP of -27dBm/MHz (68.2dBuV/m, test distance: 3 meter), for band 5.725-5.85GHz shall not exceed an≤-17dBm/MHz (78.2dBuV/m, test distance: 3 meter) within 5715-5725MHz and 5850-5860MHz, ≤-27dBm/MHz (68.2dBuV/m, test distance: 3 meter) outside 5715-5860MHz.
2, The spectrum is measured from 9KHz to the 10^{th} harmonic of the fundamental frequency of the transmitter using QP detector below 1GHz, above 1GHz, average & peak measurements were taken using for test. The worst-case emission are reported however emission whose levels were not within 20dB of the respective limited were not reported.
3, The test was performed on EUT under 802.11a/n-HT20/40/ac-HT20/40/80 continuously transmitting mode. Simultaneous transmitting was considered during the testing. All mode had been tested, but only the worst-case is recorded in the following graph and table.

Field Strength Calculation

The field strength is calculated by adding the reading on the Spectrum Analyzer to the factors associated with preamplifiers (if any), antennas, cables, pulse desensitization and average factors (when specified limit is in average and measurements are made with peak detectors). A sample calculation is included below.

FS = RA + AF + CF - AG + PD

Where FS = Field Strength in dBμV/m
RA = Receiver Amplitude (including preamplifier) in dBμV
CF = Cable Attenuation Factor in dB
AF = Antenna Factor in dB
AG = Amplifier Gain in dB
PD = Pulse Desensitization in dB

In the radiated emission table which follows, the reading shown on the data table may reflect the preamplifier gain. An example of the calculations, where the reading does not reflect the preamplifier gain, follows:

FS = RA + AF + CF - AG + PD

Example
Assume a receiver reading of 62.0 dBμV is obtained. The antenna factor of 7.4 dB and cable factor of 1.6 dB is added. The amplifier gain of 29 dB is subtracted. The pulse desensitization factor of the spectrum analyzer was 0 dB. The net field strength for comparison to the appropriate emission limit is 32 dBμV/m. This value in dBμV/m was converted to its corresponding level in μV/m.

RA = 62.0 dBμV
AF = 7.4 dB
CF = 1.6 dB
AG = 29.0 dB
PD = 0 dB
FS = 62 + 7.4 + 1.6 - 29 + 0 = 42 dBμV/m

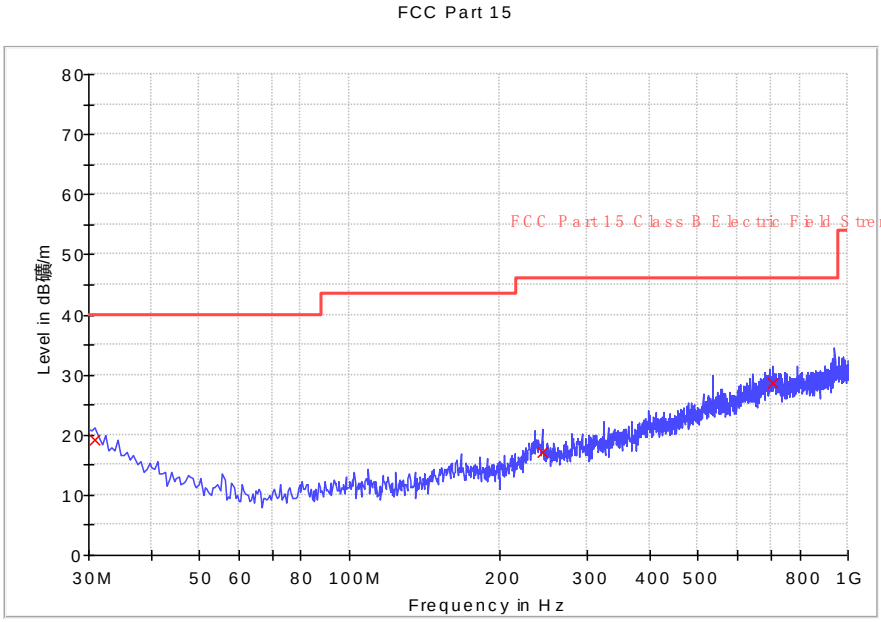
Level in mV/m = Common Antilogarithm [(42 dBμV/m)/20] = 125.9 μV/m

6.4 Radiated spurious emission test data

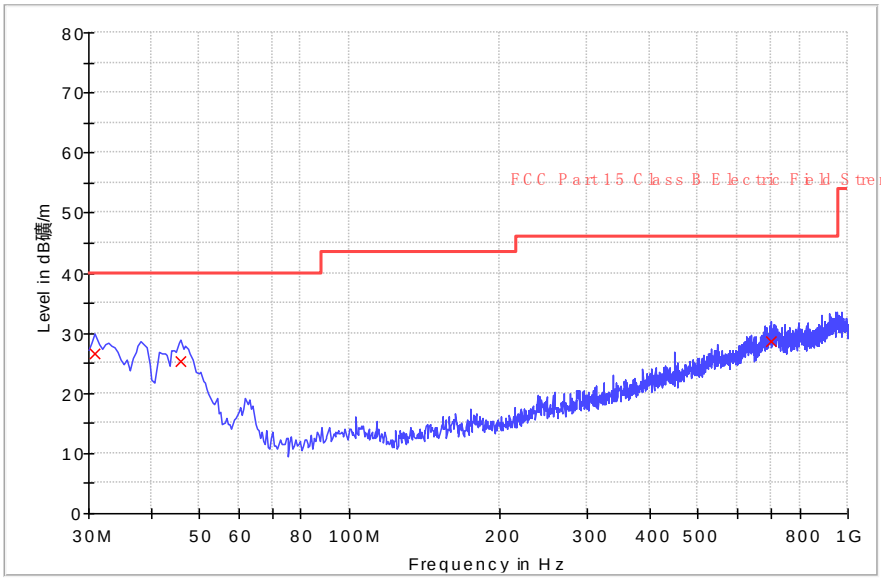
6.4.1 Measurement results: frequencies equal to or less than 1 GHz

Applicant: Huawei Technologies Co., Ltd.
Date of Test: January 25, 2019 Model: X22B-C
Worst Case Operating Mode: Transmitting (802.11ac-HT40 MIMO)
Worst Case Adapter: Adapter 1

ANT Polarity: Horizontal



ANT Polarity: Vertical



Applicant: Huawei Technologies Co., Ltd.
Date of Test: January 25, 2019 Model: X22B-C
Worst Case Operating Mode: Transmitting (802.11ac-HT40 MIMO)
Worst Case Adapter: Adapter 1

Radiated Emissions

Polarization	Frequency (MHz)	Reading (dBµV)	Pre-Amp Gain (dB)	Antenna Factor (dB)	Net at 3m (dBµV/m)	Limit at 3m (dBµV/m)	Margin (dB)
Horizontal	30.970000	21.9	20.0	17.3	19.2	40.0	-20.8
Horizontal	243.400000	23.4	20.0	13.8	17.2	46.0	-28.8
Horizontal	708.515000	23.2	20.0	25.3	28.5	46.0	-17.5
Vertical	30.970000	29.2	20.0	17.3	26.5	40.0	-13.5
Vertical	46.005000	35.0	20.0	10.3	25.3	40.0	-14.7
Vertical	703.180000	23.3	20.0	25.4	28.7	46.0	-17.3

NOTES:
1. Quasi-Peak detector is used for frequency below 1GHz.
2. All measurements were made at 3 meters. Harmonic emissions not detected at the 3-meter distances were measured at 0.3-meter and an inverse proportional extrapolation was performed to compare the signal level to the 3-meter limit. No other harmonic emissions than those reported were detected at a test distance of 0.3-meter.
3. Negative value in the margin column shows emission below limit.
4. All emissions are below the QP limit.

6.4.2 Measurement results: frequency above 1GHz

The worst case occurred at 802.11ac-VHT40 MIMO

Channel 38/27 Mbps

Polarization	Frequency (MHz)	Reading (dBµV)	Pre-Amp Gain (dB)	Antenna Factor (dB)	Net at 3m (dBµV/m)	Peak Limit at 3m (dBµV/m)	Margin (dB)
Horizontal	10380.000	51.1	36.3	38.9	53.7	68.2	-14.5
Horizontal	15570.000	51.5	34.7	41.0	57.8	68.2	-10.4

Polarization	Frequency (MHz)	Reading (dBµV)	Pre-Amp Gain (dB)	Antenna Factor (dB)	Net at 3m (dBµV/m)	Average Limit at 3m (dBµV/m)	Margin (dB)
Horizontal	10380.000	41.6	36.3	38.9	44.2	54.0	-9.8
Horizontal	15570.000	39.4	34.7	41.0	45.7	54.0	-8.3

Channel 46/27Mbps

Polarization	Frequency (MHz)	Reading (dBµV)	Pre-Amp Gain (dB)	Antenna Factor (dB)	Net at 3m (dBµV/m)	Peak Limit at 3m (dBµV/m)	Margin (dB)
Horizontal	10460.000	50.1	36.3	38.9	52.7	68.2	-15.5
Horizontal	15690.000	49.3	34.7	41.0	55.6	68.2	-12.6

Polarization	Frequency (MHz)	Reading (dBµV)	Pre-Amp Gain (dB)	Antenna Factor (dB)	Net at 3m (dBµV/m)	Average Limit at 3m (dBµV/m)	Margin (dB)
Horizontal	10460.000	41.6	36.3	38.9	44.2	54.0	-9.8
Horizontal	15690.000	39.0	34.7	41.0	45.3	54.0	-8.7

Channel 54/27Mbps

Polarization	Frequency (MHz)	Reading (dBµV)	Pre-Amp Gain (dB)	Antenna Factor (dB)	Net at 3m (dBµV/m)	Peak Limit at 3m (dBµV/m)	Margin (dB)
Horizontal	10540.000	49.6	36.3	38.9	52.2	68.2	-16.0
Horizontal	15810.000	46.0	34.7	41.0	52.3	68.2	-15.9

Polarization	Frequency (MHz)	Reading (dBµV)	Pre-Amp Gain (dB)	Antenna Factor (dB)	Net at 3m (dBµV/m)	Average Limit at 3m (dBµV/m)	Margin (dB)
Horizontal	10540.000	40.6	36.3	38.9	43.2	54.0	-10.8
Horizontal	15810.000	37.3	34.7	41.0	43.6	54.0	-10.4

Channel 62/27Mbps

Polarization	Frequency (MHz)	Reading (dBµV)	Pre-Amp Gain (dB)	Antenna Factor (dB)	Net at 3m (dBµV/m)	Peak Limit at 3m (dBµV/m)	Margin (dB)
Horizontal	10620.000	50.6	36.3	38.9	53.2	68.2	-15.0
Horizontal	15930.000	50.2	34.7	41.0	56.5	68.2	-11.7

Polarization	Frequency (MHz)	Reading (dBµV)	Pre-Amp Gain (dB)	Antenna Factor (dB)	Net at 3m (dBµV/m)	Average Limit at 3m (dBµV/m)	Margin (dB)
Horizontal	10620.000	40.6	36.3	38.9	43.2	54.0	-10.8
Horizontal	15930.000	39.1	34.7	41.0	45.4	54.0	-8.6

Channel 102/27Mbps

Polarization	Frequency (MHz)	Reading (dBµV)	Pre-Amp Gain (dB)	Antenna Factor (dB)	Net at 3m (dBµV/m)	Peak Limit at 3m (dBµV/m)	Margin (dB)
Horizontal	11020.000	52.1	36.3	38.9	54.7	68.2	-13.5
Horizontal	16530.000	48.3	34.7	41.0	54.6	68.2	-13.6

Polarization	Frequency (MHz)	Reading (dBµV)	Pre-Amp Gain (dB)	Antenna Factor (dB)	Net at 3m (dBµV/m)	Average Limit at 3m (dBµV/m)	Margin (dB)
Horizontal	11020.000	41.0	36.3	38.9	43.6	54.0	-10.4
Horizontal	16530.000	38.6	34.7	41.0	44.9	54.0	-9.1

Channel 110/27Mbps

Polarization	Frequency (MHz)	Reading (dBµV)	Pre-Amp Gain (dB)	Antenna Factor (dB)	Net at 3m (dBµV/m)	Peak Limit at 3m (dBµV/m)	Margin (dB)
Horizontal	11100.000	52.2	36.3	39.0	54.9	68.2	-13.3
Horizontal	16650.000	48.6	34.7	41.2	55.1	68.2	-13.1

Polarization	Frequency (MHz)	Reading (dBµV)	Pre-Amp Gain (dB)	Antenna Factor (dB)	Net at 3m (dBµV/m)	Average Limit at 3m (dBµV/m)	Margin (dB)
Horizontal	11100.000	40.7	36.3	39.0	43.4	54.0	-10.6
Horizontal	16650.000	38.6	34.7	41.2	45.1	54.0	-8.9

Channel 134/27Mbps

Polarization	Frequency (MHz)	Reading (dBµV)	Pre-Amp Gain (dB)	Antenna Factor (dB)	Net at 3m (dBµV/m)	Peak Limit at 3m (dBµV/m)	Margin (dB)
Horizontal	11340.000	2.3	36.3	39.0	5.0	68.2	-63.2
Horizontal	17010.000	47.1	34.7	41.2	53.6	68.2	-14.6

Polarization	Frequency (MHz)	Reading (dBµV)	Pre-Amp Gain (dB)	Antenna Factor (dB)	Net at 3m (dBµV/m)	Average Limit at 3m (dBµV/m)	Margin (dB)
Horizontal	11340.000	39.6	36.3	39.0	42.3	54.0	-11.7
Horizontal	17010.000	37.1	34.7	41.2	43.6	54.0	-10.4

Channel 151/27Mbps

Polarization	Frequency (MHz)	Reading (dBµV)	Pre-Amp Gain (dB)	Antenna Factor (dB)	Net at 3m (dBµV/m)	Peak Limit at 3m (dBµV/m)	Margin (dB)
Horizontal	11510.000	50.9	36.3	39.0	53.6	68.2	-14.6
Horizontal	17265.000	48.3	34.7	41.2	54.8	68.2	-13.4

Polarization	Frequency (MHz)	Reading (dBµV)	Pre-Amp Gain (dB)	Antenna Factor (dB)	Net at 3m (dBµV/m)	Average Limit at 3m (dBµV/m)	Margin (dB)
Horizontal	11510.000	38.6	36.3	39.0	41.3	54.0	-12.7
Horizontal	17265.000	37.4	34.7	41.2	43.9	54.0	-10.1

Channel 159/27Mbps

Polarization	Frequency (MHz)	Reading (dBµV)	Pre-Amp Gain (dB)	Antenna Factor (dB)	Net at 3m (dBµV/m)	Peak Limit at 3m (dBµV/m)	Margin (dB)
Horizontal	11590.000	51.6	36.3	39.0	54.3	68.2	-13.9
Horizontal	17385.000	47.2	34.7	41.2	53.7	68.2	-14.5

Polarization	Frequency (MHz)	Reading (dBµV)	Pre-Amp Gain (dB)	Antenna Factor (dB)	Net at 3m (dBµV/m)	Average Limit at 3m (dBµV/m)	Margin (dB)
Horizontal	11590.000	39.6	36.3	39.0	42.3	54.0	-11.7
Horizontal	17385.000	37.1	34.7	41.2	43.6	54.0	-10.4

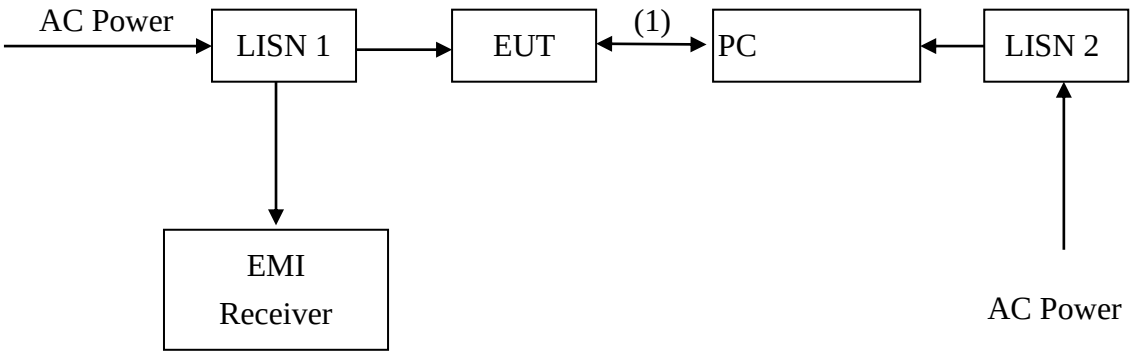
* Emission within the restricted band meets the requirement of section 15.205. The corresponding limit as per 15.209 is based on Quasi peak limit for frequencies below 1000 MHz and average limit for frequencies over 1000 MHz. The radio frequency emissions above 1GHz also meet corresponding 20dB permitted peak limit with a peak detector function.

7. Power Line Conducted Emission test

7.1 Operating environment

Temperature:	23	℃
Relative Humidity:	55	%
Atmospheric Pressure	1011	hPa

7.2 Test setup & procedure



The EUT are connected to the main power through a line impedance stabilization network (LISN). This provides a 50 ohm/50 uH coupling impedance for the measuring equipment. The peripheral devices are also connected to the main power through a LISN that provides a 50 ohm/50 uH coupling impedance with 50 ohm termination.
Both sides (Line and Neutral) of AC line are checked for maximum conducted interference. In order to find the maximum emission, the relative positions of equipment and all of the interface cables must be changed according to ANSI C63.10/2013 on conducted measurement.
The bandwidth of the field strength meter (R & S Test Receiver ESCI 30) is set at 9 kHz.

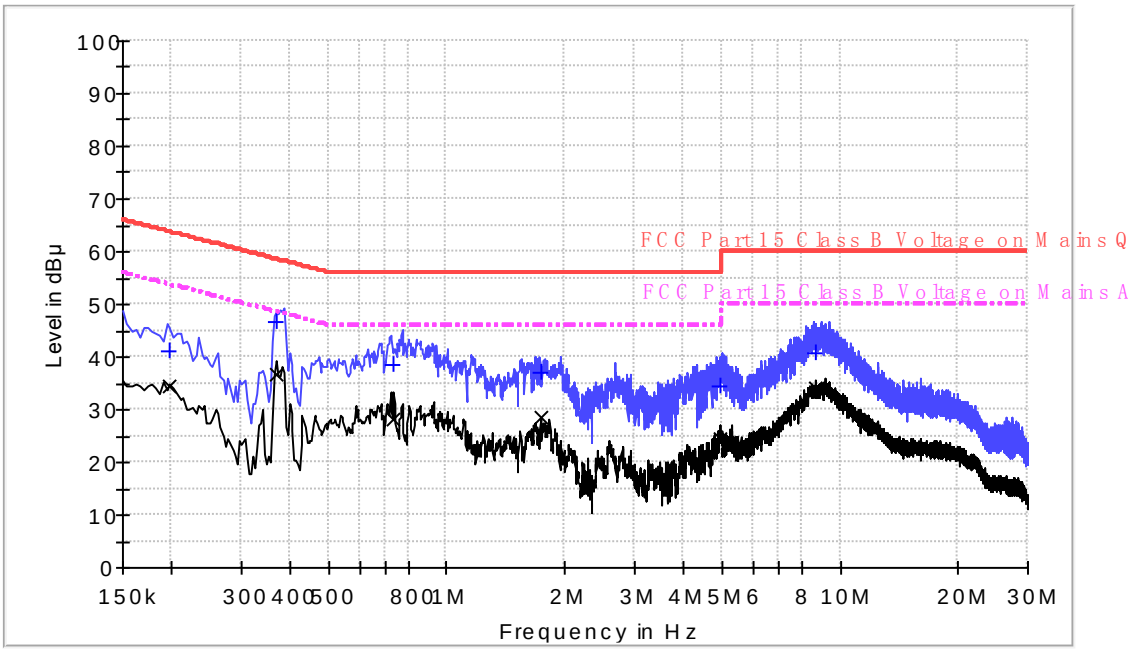
7.3 Limit

Freq. (MHz)	Conducted Limit (dBuV)	
	Q.P.	Ave.
0.15~0.50	66 – 56*	56 – 46*
0.50~5.00	56	46
5.00~30.0	60	50

*Decreases with the logarithm of the frequency.

7.4 Power Line Conducted Emission test data

Applicant: Huawei Technologies Co., Ltd.
Date of Test: January 18, 2019 Model: X22B-C
Worst Case Operating Mode: WIFI Link
Worst Case Adapter: Adapter 3
Phase: Live



Result Table QP

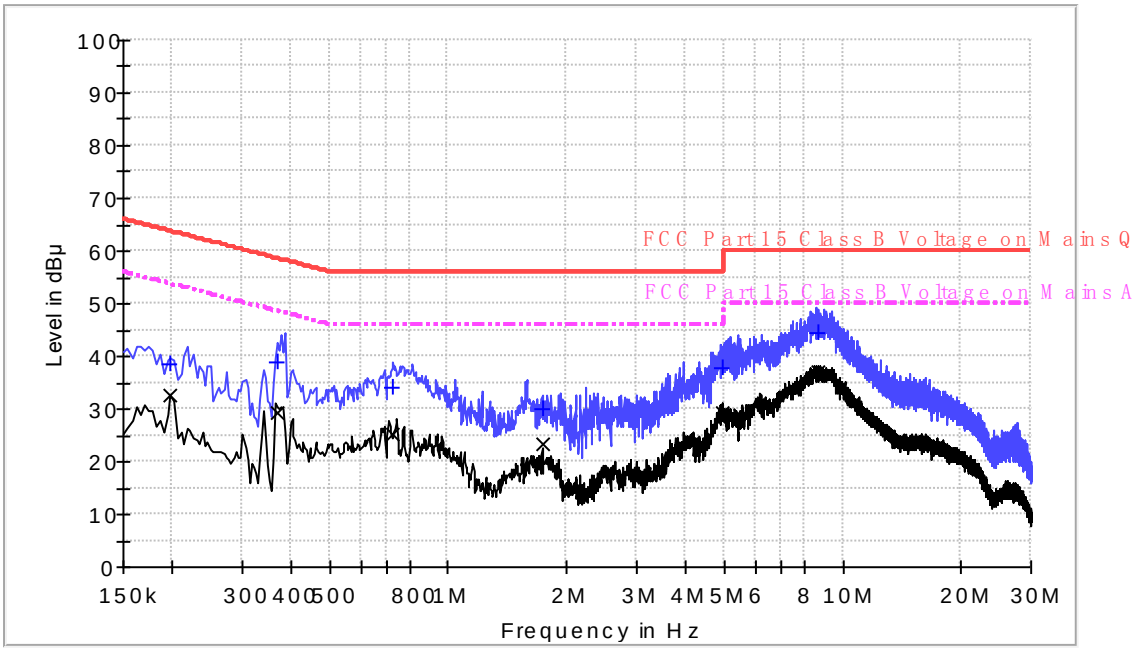
Frequency (MHz)	QuasiPeak (dB µV)	Line	Corr. (dB)	Margin (dB)	Limit (dB µV)
0.198000	41.3	L	9.6	22.5	63.7
0.370000	46.8	L	9.6	11.7	58.5
0.734000	38.4	L	9.7	17.6	56.0
1.730000	36.9	L	9.7	19.1	56.0
4.942000	34.6	L	9.7	21.4	56.0
8.686000	40.8	L	9.8	19.2	60.0

Result Table AV

Frequency (MHz)	Average (dB µV)	Line	Corr. (dB)	Margin (dB)	Limit (dB µV)
0.198000	34.3	L	9.6	19.4	53.7
0.370000	36.8	L	9.6	11.7	48.5
0.734000	28.2	L	9.6	17.8	46.0
1.730000	28.4	L	9.6	17.6	46.0
4.942000	24.5	L	9.6	21.5	46.0
8.686000	34.0	L	9.8	16.0	50.0

Remark:
1. Corr. Factor (dB) = LISN Factor (dB) + Cable Loss (dB)
2. Margin (dB) = Limit (dBuV) – Level (dBuV)

Applicant: Huawei Technologies Co., Ltd.
Date of Test: 18 February 2019 Model: X22B-C
Worst Case Operating Mode: WIFI Link
Worst Case Adapter: Adapter 3
Phase: Neutral



Result Table QP

Frequency (MHz)	QuasiPeak (dB µV)	Line	Corr. (dB)	Margin (dB)	Limit (dB µV)
0.198000	38.6	N	9.6	25.1	63.7
0.370000	38.8	N	9.6	19.7	58.5
0.726000	34.2	N	9.7	21.8	56.0
1.730000	30.0	N	9.7	26.0	56.0
4.966000	37.7	N	9.8	18.3	56.0
8.630000	44.5	N	9.9	15.5	60.0

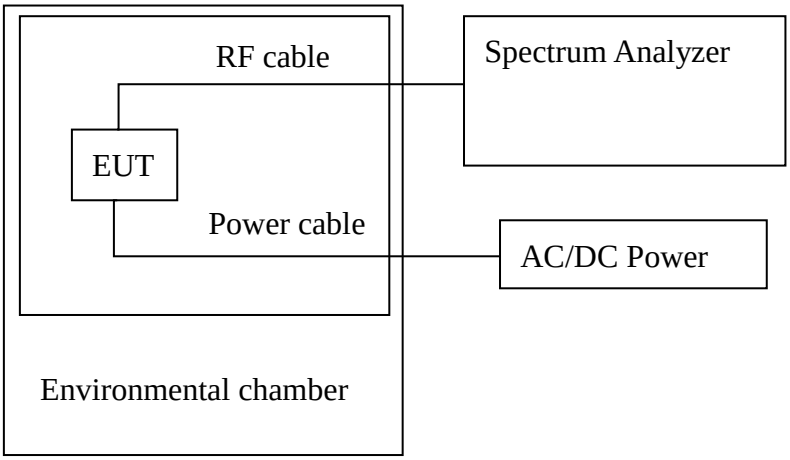
Result Table AV

Frequency (MHz)	Average (dB µV)	Line	Corr. (dB)	Margin (dB)	Limit (dB µV)
0.198000	32.6	N	9.6	21.1	53.7
0.370000	29.1	N	9.6	19.4	48.5
0.726000	25.3	N	9.7	20.7	46.0
1.730000	23.5	N	9.7	22.5	46.0
4.966000	29.4	N	9.8	16.6	46.0
8.630000	37.0	N	9.9	13.0	50.0

Remark:
1. Corr. Factor (dB) = LISN Factor (dB) + Cable Loss (dB)
2. Margin (dB) = Limit (dBuV) – Level (dBuV)

8. Frequency Stability Test

8.1 Test setup & procedure



Note1: The frequency stability is measured with the temperature variation range of 0˚C to +40˚C (5˚C increment), and voltage supply variation range of 85% to 115% of nominal AC supply voltage.

2: To ensure emission at the band-edge is maintained within the authorized band, the frequency 802.11a/n-HT20/40/ac-HT20/40/80 channel 36, 48, 52, 64, 100, 140, 149, 165, 38, 46, 54, 62, 102, 134, 151, 159, 42, 58, 106, 122,155 are selected to test and the worst case was reported.

8.2 Frequency Stability Test Data

20˚C is taken as temperature in normal condition.

Worst case: ANT 1

Model: 802.11a, Operation frequency: 5180MHz, Channel: 36, Rate: 6Mbps

Input voltage (VAC)	Temperature (˚C)	Measured Frequency (MHz)	Frequency deviation (KHz)	Result
120	0	5179.97	30	Pass
	+20	5179.97	30	Pass
	+40	5179.97	30	Pass
102	+20	5179.985	15	Pass
138	+20	5179.985	15	Pass

Model: 802.11a, Operation frequency: 5240MHz, Channel: 48, Rate: 6Mbps

Input voltage (VAC)	Temperature (˚C)	Measured Frequency (MHz)	Frequency deviation (KHz)	Result
120	0	5239.97	30	Pass
	+20	5239.985	15	Pass
	+40	5239.97	30	Pass
102	+20	5239.97	30	Pass
138	+20	5239.985	15	Pass

Model: 802.11a, Operation frequency: 5260MHz, Channel: 52, Rate: 6Mbps

Input voltage (VAC)	Temperature (˚C)	Measured Frequency (MHz)	Frequency deviation (KHz)	Result
120	0	5259.985	15	Pass
	+20	5259.985	15	Pass
	+40	5259.985	15	Pass
102	+20	5259.985	15	Pass
138	+20	5259.984	16	Pass

Model: 802.11a, Operation frequency: 5320MHz, Channel: 64, Rate: 6Mbps

Input voltage (VAC)	Temperature (˚C)	Measured Frequency (MHz)	Frequency deviation (KHz)	Result
120	0	5319.985	15	Pass
	+20	5319.985	15	Pass
	+40	5319.985	15	Pass
102	+20	5319.985	15	Pass
138	+20	5319.984	16	Pass

Model: 802.11a, Operation frequency: 5550MHz, Channel: 100, Rate: 6Mbps

Input voltage (VAC)	Temperature (˚C)	Measured Frequency (MHz)	Frequency deviation (KHz)	Result
120	0	5549.985	15	Pass
	+20	5549.985	15	Pass
	+40	5550	0	Pass
102	+20	5549.985	15	Pass
138	+20	5549.985	15	Pass

Model: 802.11a, Operation frequency: 5700MHz, Channel: 140, Rate: 6Mbps

Input voltage (VAC)	Temperature (˚C)	Measured Frequency (MHz)	Frequency deviation (KHz)	Result
120	0	5700	0	Pass
	+20	5699.985	15	Pass
	+40	5699.985	15	Pass
102	+20	5699.985	15	Pass
138	+20	5699.985	15	Pass

Model: 802.11a, Operation frequency: 5745MHz, Channel: 149, Rate: 6Mbps

Input voltage (VAC)	Temperature (˚C)	Measured Frequency (MHz)	Frequency deviation (KHz)	Result
120	0	5744.985	15	Pass
	+20	5744.985	15	Pass
	+40	5744.985	15	Pass
102	+20	5744.99	10	Pass
138	+20	5744.985	15	Pass

Model: 802.11a, Operation frequency: 5825MHz, Channel: 165, Rate: 6Mbps

Input voltage (VAC)	Temperature (˚C)	Measured Frequency (MHz)	Frequency deviation (KHz)	Result
120	0	5824.985	15	Pass
	+20	5824.985	15	Pass
	+40	5824.985	15	Pass
102	+20	5824.98	20	Pass
138	+20	5824.985	15	Pass

Model: 802.11n-HT20, Operation frequency: 5180MHz, Channel: 36, Rate: 6.5Mbps

Input voltage (VAC)	Temperature (˚C)	Measured Frequency (MHz)	Frequency deviation (KHz)	Result
120	0	5180	0	Pass
	+20	5179.985	15	Pass
	+40	5179.985	15	Pass
102	+20	5179.985	15	Pass
138	+20	5180	0	Pass

Model: 802.11n-HT20, Operation frequency: 5240MHz, Channel: 48, Rate: 6.5Mbps

Input voltage (VAC)	Temperature (˚C)	Measured Frequency (MHz)	Frequency deviation (KHz)	Result
120	0	5239.985	15	Pass
	+20	5240	0	Pass
	+40	5239.985	15	Pass
102	+20	5239.99	10	Pass
138	+20	5239.99	10	Pass

Model: 802.11n-HT20, Operation frequency: 5260MHz, Channel: 52, Rate: 6.5Mbps

Input voltage (VAC)	Temperature (˚C)	Measured Frequency (MHz)	Frequency deviation (KHz)	Result
120	0	5259.985	15	Pass
	+20	5259.985	15	Pass
	+40	5259.985	15	Pass
102	+20	5259.985	15	Pass
138	+20	5259.985	15	Pass

Model: 802.11n-HT20, Operation frequency: 5320MHz, Channel: 64, Rate: 6.5Mbps

Input voltage (VAC)	Temperature (˚C)	Measured Frequency (MHz)	Frequency deviation (KHz)	Result
120	0	5319.985	15	Pass
	+20	5319.985	15	Pass
	+40	5319.985	15	Pass
102	+20	5319.985	15	Pass
138	+20	5319.985	15	Pass

Model: 802.11n-HT20, Operation frequency: 5550MHz, Channel: 100, Rate: 6.5Mbps

Input voltage (VAC)	Temperature (˚C)	Measured Frequency (MHz)	Frequency deviation (KHz)	Result
120	0	5549.985	15	Pass
	+20	5550	0	Pass
	+40	5549.985	15	Pass
102	+20	5549.985	15	Pass
138	+20	5549.98	20	Pass

Model: 802.11n-HT20, Operation frequency: 5700MHz, Channel: 140, Rate: 6.5Mbps

Input voltage (VAC)	Temperature (˚C)	Measured Frequency (MHz)	Frequency deviation (KHz)	Result
120	0	5700	0	Pass
	+20	5700	0	Pass
	+40	5700	0	Pass
102	+20	5699.985	15	Pass
138	+20	5699.985	15	Pass

Model: 802.11n-HT20, Operation frequency: 5745MHz, Channel: 149, Rate: 6.5Mbps

Input voltage (VAC)	Temperature (˚C)	Measured Frequency (MHz)	Frequency deviation (KHz)	Result
120	0	5745	0	Pass
	+40	5744.985	15	Pass
	+35	5744.985	15	Pass
102	+20	5744.985	15	Pass
138	+20	5745	0	Pass

Model: 802.11n-HT20, Operation frequency: 5825MHz, Channel: 165, Rate: 6.5Mbps

Input voltage (VAC)	Temperature (˚C)	Measured Frequency (MHz)	Frequency deviation (KHz)	Result
120	0	5824.97	30	Pass
	+20	5824.97	30	Pass
	+40	5824.97	30	Pass
102	+20	5824.985	15	Pass
138	+20	5824.98	20	Pass

Model: 802.11n-HT40, Operation frequency: 5190MHz, Channel: 38, Rate: 13.5Mbps

Input voltage (VAC)	Temperature (˚C)	Measured Frequency (MHz)	Frequency deviation (KHz)	Result
120	0	5190	0	Pass
	+20	5190	0	Pass
	+40	5190	0	Pass
102	+20	5189.985	15	Pass
138	+20	5189.985	15	Pass

Model: 802.11n-HT40, Operation frequency: 5230MHz, Channel: 46, Rate: 13.5Mbps

Input voltage (VAC)	Temperature (˚C)	Measured Frequency (MHz)	Frequency deviation (KHz)	Result
120	0	5230	0	Pass
	+20	5229.97	30	Pass
	+40	5229.97	30	Pass
102	+20	5230	0	Pass
138	+20	5229.985	15	Pass

Model: 802.11n-HT40, Operation frequency: 5270MHz, Channel: 54, Rate: 13.5Mbps

Input voltage (VAC)	Temperature (˚C)	Measured Frequency (MHz)	Frequency deviation (KHz)	Result
120	0	5269.97	30	Pass
	+20	5269.985	15	Pass
	+40	5269.99	10	Pass
102	+20	5269.97	30	Pass
138	+20	5269.98	20	Pass

Model: 802.11n-HT40, Operation frequency: 5310MHz, Channel: 62, Rate: 13.5Mbps

Input voltage (VAC)	Temperature (˚C)	Measured Frequency (MHz)	Frequency deviation (KHz)	Result
120	0	5309.97	30	Pass
	+20	5309.97	30	Pass
	+40	5309.97	30	Pass
102	+20	5309.97	30	Pass
138	+20	5309.97	30	Pass

Model: 802.11n-HT40, Operation frequency: 5510MHz, Channel:102, Rate: 13.5Mbps

Input voltage (VAC)	Temperature (˚C)	Measured Frequency (MHz)	Frequency deviation (KHz)	Result
120	0	5509.97	30	Pass
	+20	5509.97	30	Pass
	+40	5509.985	15	Pass
102	+20	5509.97	30	Pass
138	+20	5509.97	30	Pass

Model: 802.11n-HT40, Operation frequency: 5670MHz, Channel:134, Rate: 13.5Mbps

Input voltage (VAC)	Temperature (˚C)	Measured Frequency (MHz)	Frequency deviation (KHz)	Result
120	0	5669.97	30	Pass
	+20	5669.97	30	Pass
	+40	5669.97	30	Pass
102	+20	5669.98	20	Pass
138	+20	5669.97	30	Pass

Model: 802.11n-HT40, Operation frequency: 5755MHz, Channel: 151, Rate: 13.5Mbps

Input voltage (VAC)	Temperature (˚C)	Measured Frequency (MHz)	Frequency deviation (KHz)	Result
120	0	5755	0	Pass
	+20	5755	0	Pass
	+40	5754.985	15	Pass
102	+20	5755	0	Pass
138	+20	5754.985	15	Pass

Model: 802.11n-HT40, Operation frequency: 5795MHz, Channel: 159, Rate: 13.5Mbps

Input voltage (VAC)	Temperature (˚C)	Measured Frequency (MHz)	Frequency deviation (KHz)	Result
120	0	5795	0	Pass
	+20	5794.97	30	Pass
	+40	5794.97	30	Pass
102	+20	5794.97	30	Pass
138	+20	5794.985	15	Pass

Model: 802.11ac-HT20, Operation frequency: 5180MHz, Channel: 36, Rate: 6.5Mbps

Input voltage (VAC)	Temperature (˚C)	Measured Frequency (MHz)	Frequency deviation (KHz)	Result
120	0	5180	0	Pass
	+20	5179.99	10	Pass
	+40	5180	0	Pass
102	+20	5180	0	Pass
138	+20	5180	0	Pass

Model: 802.11ac-HT20, Operation frequency: 5240MHz, Channel: 48, Rate: 6.5Mbps

Input voltage (VAC)	Temperature (˚C)	Measured Frequency (MHz)	Frequency deviation (KHz)	Result
120	0	5239.985	15	Pass
	+20	5239.985	15	Pass
	+40	5239.99	10	Pass
102	+20	5239.99	10	Pass
138	+20	5239.98	20	Pass

Model: 802.11ac-HT20, Operation frequency: 5260MHz, Channel: 52, Rate: 6.5Mbps

Input voltage (VAC)	Temperature (˚C)	Measured Frequency (MHz)	Frequency deviation (KHz)	Result
120	0	5259.985	15	Pass
	+20	5259.985	15	Pass
	+40	5259.985	15	Pass
102	+20	5259.985	15	Pass
138	+20	5259.98	20	Pass

Model: 802.11ac-HT20, Operation frequency: 5320MHz, Channel: 64, Rate: 6.5Mbps

Input voltage (VAC)	Temperature (˚C)	Measured Frequency (MHz)	Frequency deviation (KHz)	Result
120	0	5319.985	15	Pass
	+20	5319.97	30	Pass
	+40	5319.985	15	Pass
102	+20	5319.99	10	Pass
138	+20	5319.98	20	Pass

Model: 802.11ac-HT20, Operation frequency: 5550MHz, Channel: 100, Rate: 6.5Mbps

Input voltage (VAC)	Temperature (˚C)	Measured Frequency (MHz)	Frequency deviation (KHz)	Result
120	0	5549.985	15	Pass
	+20	5549.985	15	Pass
	+40	5549.985	15	Pass
102	+20	5549.98	20	Pass
138	+20	5549.985	15	Pass

Model: 802.11ac-HT20, Operation frequency: 5700MHz, Channel: 140, Rate: 6.5Mbps

Input voltage (VAC)	Temperature (˚C)	Measured Frequency (MHz)	Frequency deviation (KHz)	Result
120	0	5700	0	Pass
	+20	5700	0	Pass
	+40	5699.985	15	Pass
102	+20	5700	0	Pass
138	+20	5699.985	15	Pass

Model: 802.11ac-HT20, Operation frequency: 5745MHz, Channel: 149, Rate: 6.5Mbps

Input voltage (VAC)	Temperature (˚C)	Measured Frequency (MHz)	Frequency deviation (KHz)	Result
120	0	5745	0	Pass
	+20	5745	0	Pass
	+40	5745	0	Pass
102	+20	5744.985	15	Pass
138	+20	5744.985	15	Pass

Model: 802.11ac-HT20, Operation frequency: 5825MHz, Channel: 165, Rate: 6.5Mbps

Input voltage (VAC)	Temperature (˚C)	Measured Frequency (MHz)	Frequency deviation (KHz)	Result
120	0	5824.985	15	Pass
	+20	5824.985	15	Pass
	+40	5824.99	10	Pass
102	+20	5824.985	15	Pass
138	+20	5824.98	20	Pass

Model: 802.11ac-HT40, Operation frequency: 5190MHz, Channel: 38, Rate: 13.5Mbps

Input voltage (VAC)	Temperature (˚C)	Measured Frequency (MHz)	Frequency deviation (KHz)	Result
120	0	5189.97	30	Pass
	+20	5189.97	30	Pass
	+40	5189.97	30	Pass
102	+20	5189.985	15	Pass
138	+20	5189.97	30	Pass

Model: 802.11ac-HT40, Operation frequency: 5230MHz, Channel: 46, Rate: 13.5Mbps

Input voltage (VAC)	Temperature (˚C)	Measured Frequency (MHz)	Frequency deviation (KHz)	Result
120	0	5230	0	Pass
	+20	5230	0	Pass
	+40	5229.97	30	Pass
102	+20	5229.98	20	Pass
138	+20	5229.97	30	Pass

Model: 802.11ac-HT40, Operation frequency: 5270MHz, Channel: 54, Rate: 13.5Mbps

Input voltage (VAC)	Temperature (˚C)	Measured Frequency (MHz)	Frequency deviation (KHz)	Result
120	0	5269.97	30	Pass
	+20	5269.97	30	Pass
	+40	5269.97	30	Pass
102	+20	5269.985	15	Pass
138	+20	5269.97	30	Pass

Model: 802.11ac-HT40, Operation frequency: 5310MHz, Channel: 62, Rate: 13.5Mbps

Input voltage (VAC)	Temperature (˚C)	Measured Frequency (MHz)	Frequency deviation (KHz)	Result
120	0	5309.97	30	Pass
	+20	5309.97	30	Pass
	+40	5309.97	30	Pass
102	+20	5309.985	15	Pass
138	+20	5309.97	30	Pass

Model:802.11ac-HT40, Operation frequency: 5510MHz, Channel:102, Rate: 13.5Mbps

Input voltage (VAC)	Temperature (˚C)	Measured Frequency (MHz)	Frequency deviation (KHz)	Result
120	0	5510	0	Pass
	+20	5510	0	Pass
	+40	5510	0	Pass
102	+20	5509.985	15	Pass
138	+20	5510	0	Pass

Model:802.11ac-HT40, Operation frequency: 5670MHz, Channel:134, Rate: 13.5Mbps

Input voltage (VAC)	Temperature (˚C)	Measured Frequency (MHz)	Frequency deviation (KHz)	Result
120	0	5669.97	30	Pass
	+20	5669.97	30	Pass
	+40	5669.97	30	Pass
102	+20	5669.97	30	Pass
138	+20	5669.985	15	Pass

Model: 802.11ac-HT40, Operation frequency: 5755MHz, Channel:151, Rate: 13.5Mbps

Input voltage (VAC)	Temperature (˚C)	Measured Frequency (MHz)	Frequency deviation (KHz)	Result
120	0	5755	0	Pass
	+20	5755	0	Pass
	+40	5755	0	Pass
102	+20	5754.985	15	Pass
138	+20	5755	0	Pass

Model:802.11ac-HT40, Operation frequency: 5795MHz, Channel: 159, Rate: 13.5Mbps

Input voltage (VAC)	Temperature (˚C)	Measured Frequency (MHz)	Frequency deviation (KHz)	Result
120	0	5794.97	30	Pass
	+20	5794.97	30	Pass
	+40	5794.985	15	Pass
102	+20	5794.985	15	Pass
138	+20	5794.985	15	Pass

Model: 802.11ac-HT80, Operation frequency: 5210MHz, Channel: 42, Rate: 29.3Mbps

Input voltage (VAC)	Temperature (˚C)	Measured Frequency (MHz)	Frequency deviation (KHz)	Result
120	0	5210	0	Pass
	+20	5210	0	Pass
	+40	5209.97	30	Pass
102	+20	5210	0	Pass
138	+20	5209.985	15	Pass

Model: 802.11ac-HT80, Operation frequency: 5290MHz, Channel: 58, Rate: 29.3Mbps

Input voltage (VAC)	Temperature (˚C)	Measured Frequency (MHz)	Frequency deviation (KHz)	Result
120	0	5289.94	60	Pass
	+20	5289.94	60	Pass
	+40	5289.94	60	Pass
102	+20	5289.97	30	Pass
138	+20	5289.94	60	Pass

Model:802.11ac-HT80, Operation frequency: 5530MHz, Channel:106, Rate: 29.3Mbps

Input voltage (VAC)	Temperature (˚C)	Measured Frequency (MHz)	Frequency deviation (KHz)	Result
120	0	5530	0	Pass
	+20	5530	0	Pass
	+40	5530	0	Pass
102	+20	5529.985	15	Pass
138	+20	5530	0	Pass

Model: 802.11ac-HT80, Operation frequency: 5610MHz, Channel: 122, Rate: 29.3Mbps

Input voltage (VAC)	Temperature (˚C)	Measured Frequency (MHz)	Frequency deviation (KHz)	Result
120	0	5610	0	Pass
	+20	5610	0	Pass
	+40	5610	0	Pass
102	+20	5610	0	Pass
138	+20	5609.985	15	Pass

Model:802.11ac-HT80, Operation frequency: 5775MHz, Channel:155, Rate: 29.3Mbps

Input voltage (VAC)	Temperature (˚C)	Measured Frequency (MHz)	Frequency deviation (KHz)	Result
120	0	5775	0	Pass
	+20	5775	0	Pass
	+40	5774.985	15	Pass
102	+20	5775	0	Pass
138	+20	5775	0	Pass

Note: All emissions are maintained within the band of operation under all conditions of normal operation as specified in the user manual. It fulfills the requirement of 15.407(g).

9. Dynamic Frequency Selection (DFS) (FCC 15.407)

9.1 Requirement

Applicability of DFS Requirements Prior to Use of a Channel

Requirement	Operational Mode		
	Master	Client Without Radar Detection	
Non-Occupancy Period	Yes	Not Required	Yes
DFS Detection Threshold	Yes	Not Required	Yes
Channel Availability Check Time	Yes	Not Required	Not Required
U-NII Detection Bandwidth	Yes	Not Required	Yes

Applicability of DFS requirements during normal operation

Requirement	Operational Mode	
	Master Device or Client with Radar Detection	Client Without Radar Detection
DFS Detection Threshold	Yes	Not Required
Channel Closing Transmission Time	Yes	Yes
Channel Move Time	Yes	Yes
U-NII Detection Bandwidth	Yes	Not Required

Additional requirements for devices with multiple bandwidth modes	Master Device or Client with Radar Detection	Client Without Radar Detection
U-NII Detection Bandwidth and Statistical Performance Check	All BW modes must be tested	Not required
Channel Move Time and Channel Closing Transmission Time	Test using widest BW mode available	Test using the widest BW mode available for the link
All other tests	Any single BW mode	Not required
Note: Frequencies selected for statistical performance check should include several frequencies within the radar detection bandwidth and frequencies near the edge of the radar detection bandwidth. For 802.11 devices it is suggested to select frequencies in each of the bonded 20 MHz channels and the channel center frequency.		

Note: EUT is a client without DFS detection capabilities.

9.1.1 DFS Detection Thresholds for Master or Client Devices with DFS Detection

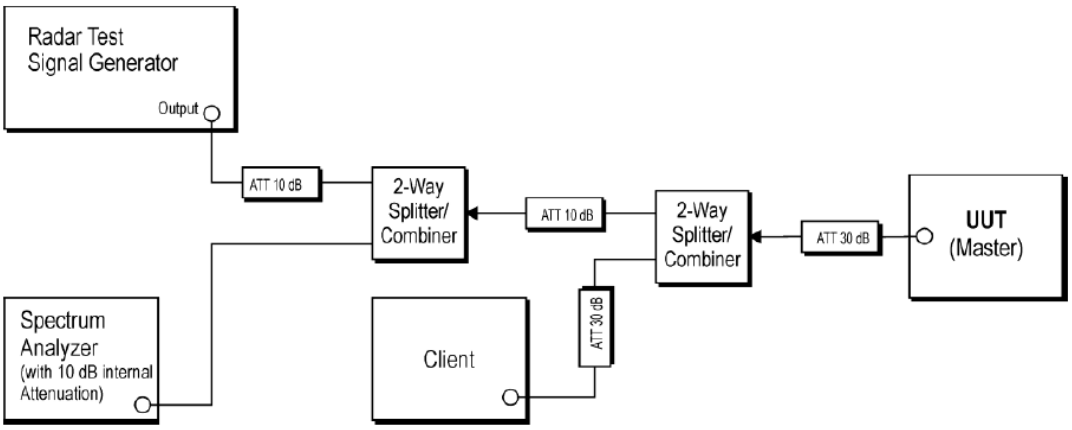
Maximum Transmit Power	Values (See Notes 1, 2, and 3)
EIRP ≥ 200 milliwatt	-64 dBm
EIRP < 200 milliwatt and power spectral density < 10 dBm/MHz	-62 dBm
EIRP < 200 milliwatt that do not meet the power spectral density requirement	-64 dBm
Note 1: This is the level at the input of the receiver assuming a 0 dBi receive antenna. **Note 2:** Throughout these test procedures an additional 1 dB has been added to the amplitude of the test transmission waveforms to account for variations in measurement equipment. This will ensure that the test signal is at or above the detection threshold level to trigger a DFS response. **Note3:** EIRP is based on the highest antenna gain. For MIMO devices refer to KDB Publication 662911 D01	

Parameter	Value
Non-Occupancy Period	Minimum 30 minutes
Channel Availability Check Time	60 Seconds
Channel Move Time	10 seconds (see note 1)
Channel Closing Transmission Time	200 ms + an aggregate of 60 ms over remaining 10 Second period. (see note 1 and 2)
U-NII Detection Bandwidth	Minimum 100% of the U-NII 99% transmission power bandwidth. (see note 3)
Note 1: Channel Move Time and the Channel Closing Transmission Time should be performed with Radar Type 0. The measurement timing begins at the end of the Radar Type 0 burst. **Note 2:** The Channel Closing Transmission Time is comprised of 200 milliseconds starting at the beginning of the Channel Move Time plus any additional intermittent control signals required to facilitate a Channel move (an aggregate of 60 milliseconds) during the remainder of the 10 second period. The aggregate duration of control signals will not count quiet periods in between transmissions. **Note 3:** During the U-NII Detection Bandwidth detection test, radar type 0 should be used. For each frequency step the minimum percentage of detection is 90 percent. Measurements are performed with no data traffic.	

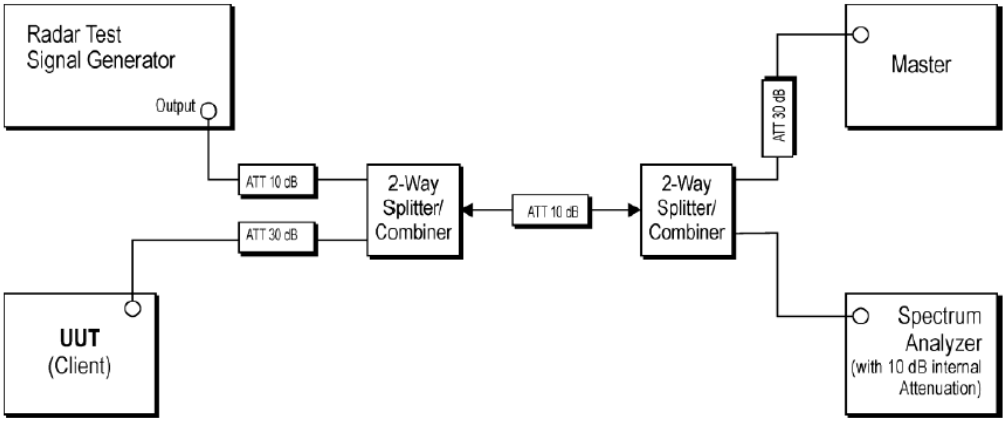
9.1.2 Radar Test Waveforms

Test procedures were made in accordance to KDB 905462 D02 UNII DFS Compliance Procedures New Rules v02, for more radar test waveform details please refer section 6 of KDB 905462 D02 UNII DFS Compliance Procedures New Rules v02.

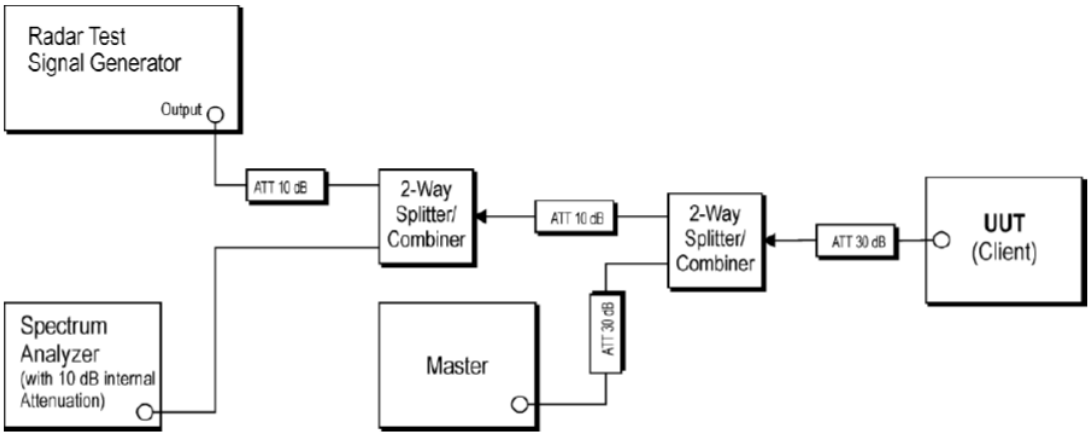
9.2 Test setup



Setup for Master with injection at the Master



Setup for Client with injection at the Master



Setup for Client with injection at the Client

Note: EUT is a client without DFS detection capabilities. Test procedures were made in accordance to KDB 905462 D02 UNII DFS Compliance Procedures New Rules v02. DFS testing was setup as a client with injection into the master.

9.3 In-Service Monitoring for Channel Move Time, Channel Closing Transmission Time and Non- Occupancy Period

9.3.1 Test Procedure

The EUT was configured to communicate with a master device. The test file was streamed from the Master to the Client (EUT) on the selected test channel. Measurements were made while utilizing the widest bandwidth of the EUT.

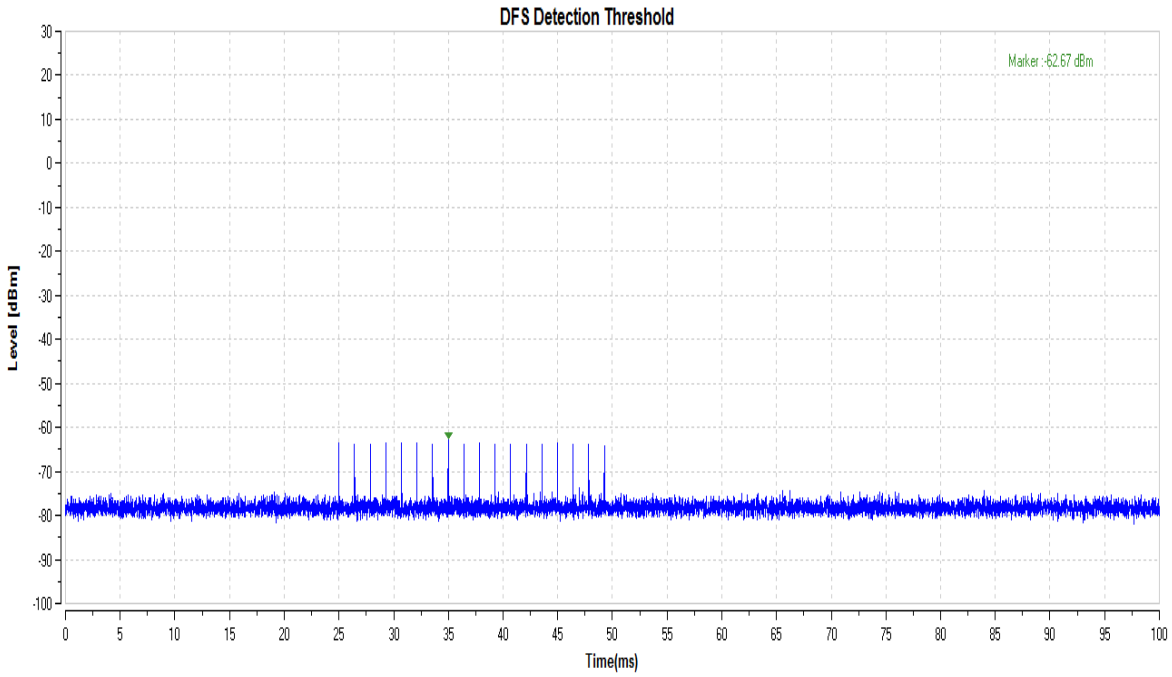
Channel closing transmission time and channel move time were measured by applying a radar type 0 at threshold + 1dB to the EUT. The EUT transmissions were observed on the EUT center channel. The time between the end of the applied radar waveform and the final transmission on the channel is the channel move time. The channel closing transmission time comprises only those fragments of the channel move time during which the EUT transmits.

The Channel Move time shall be less than 10 seconds
The Channel Close time shall be 200ms +60ms of aggregate time.
The Non-occupancy time shall 30 minutes or greater.

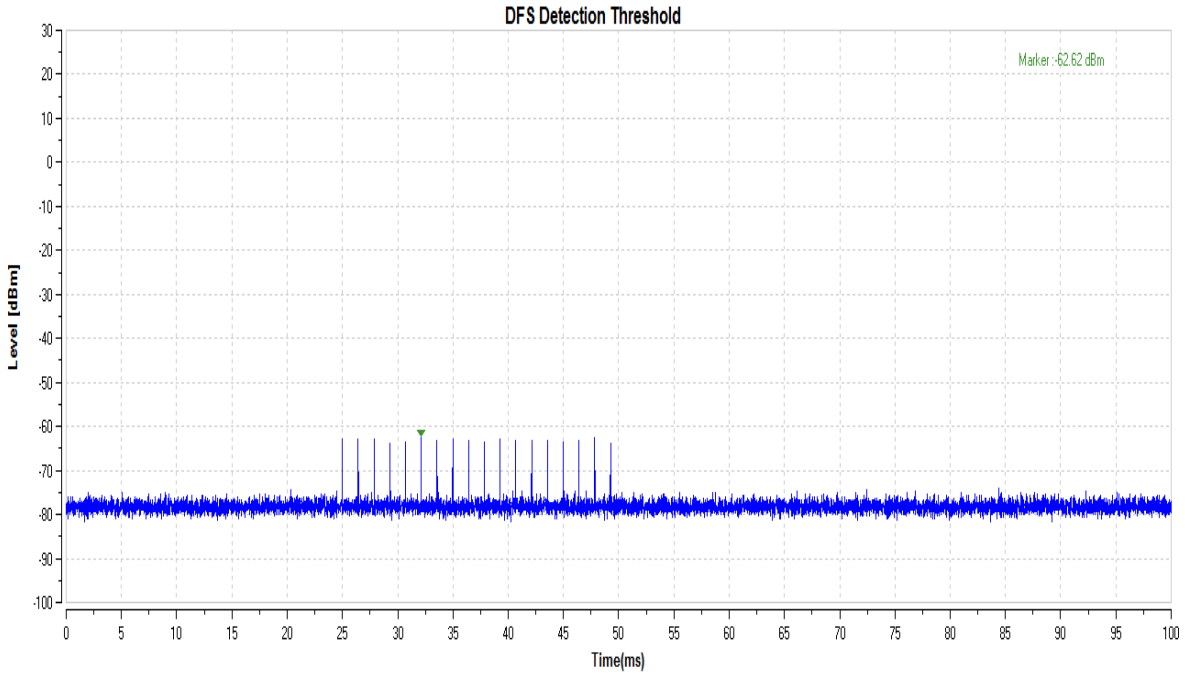
9.3.2 Calibration Results

Radar Type 0 Calibration:

Frequency	Radar Waveform Length:	Detection Threshold level
5290 MHz	0.025704s	-62.67 dBm



Frequency	Radar Waveform Length:	Detection Threshold level
5530 MHz	0.025704s	-62.62 dBm

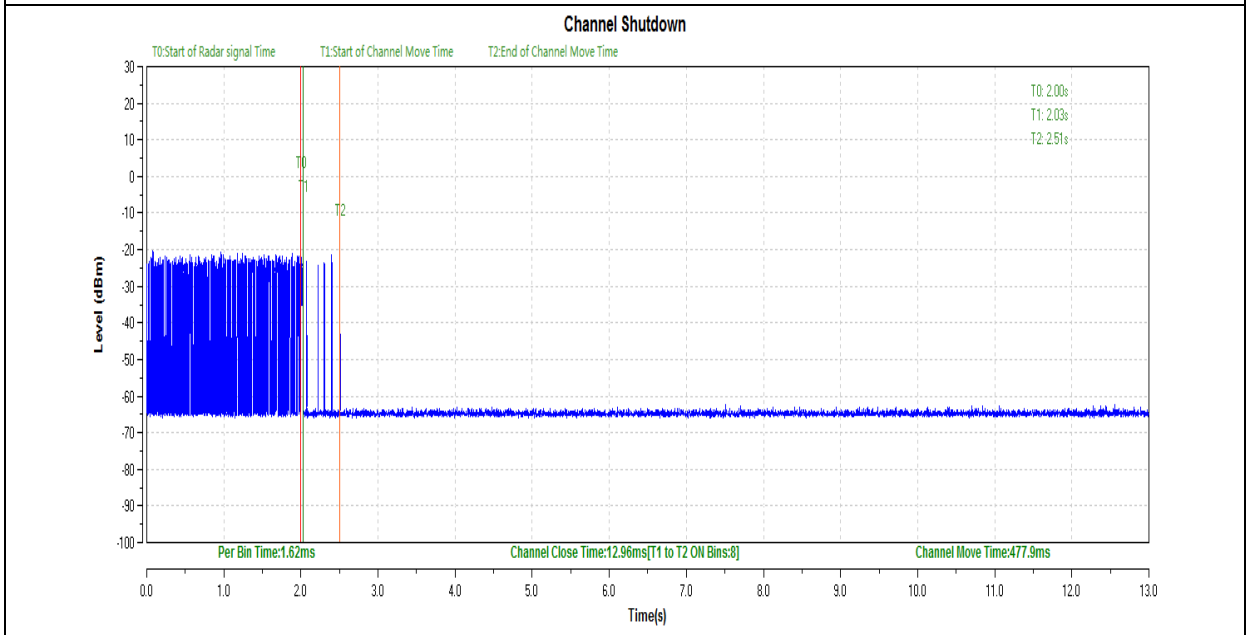


9.3.3 Channel Move time and Channel Closing Transmission Time Test Results

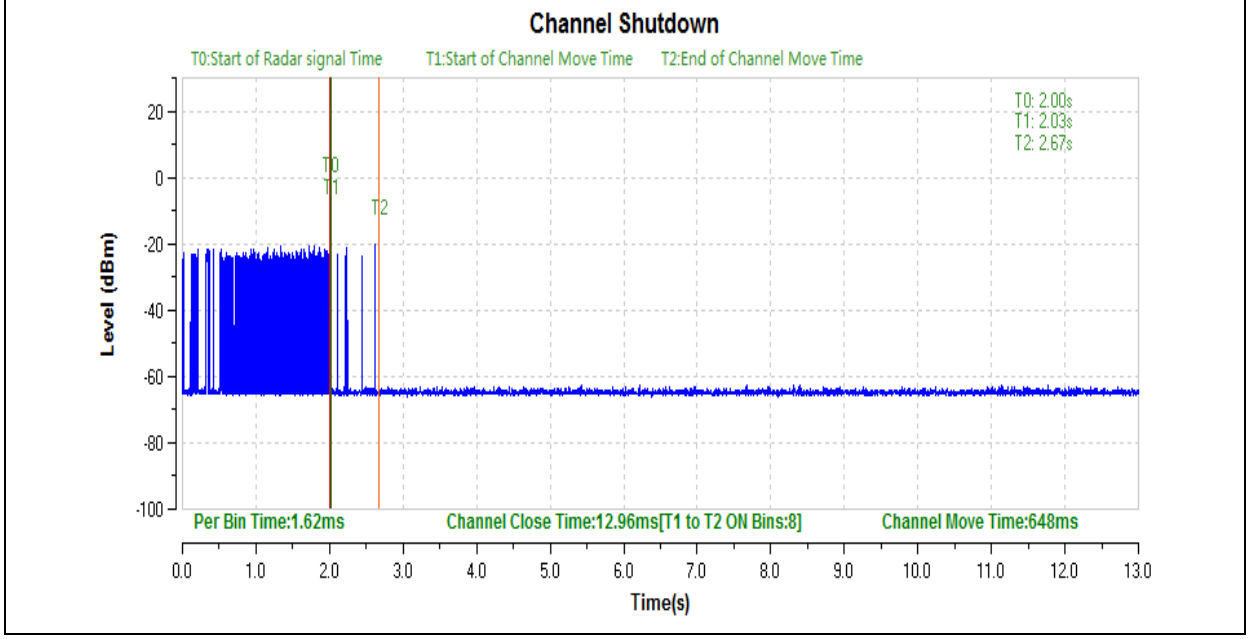
Frequency	Bandwidth	Channel Move Time [ms]	Limit[ms]	Channel Closing Transmission [ms]	Limit[ms]	Verdict
5290MHz	80 MHz	477.9	10000	12.96	260	PASS
5530 MHz	80 MHz	648.0	10000	12.96	260	PASS

Test Graph:

5290 MHz



5530MHz

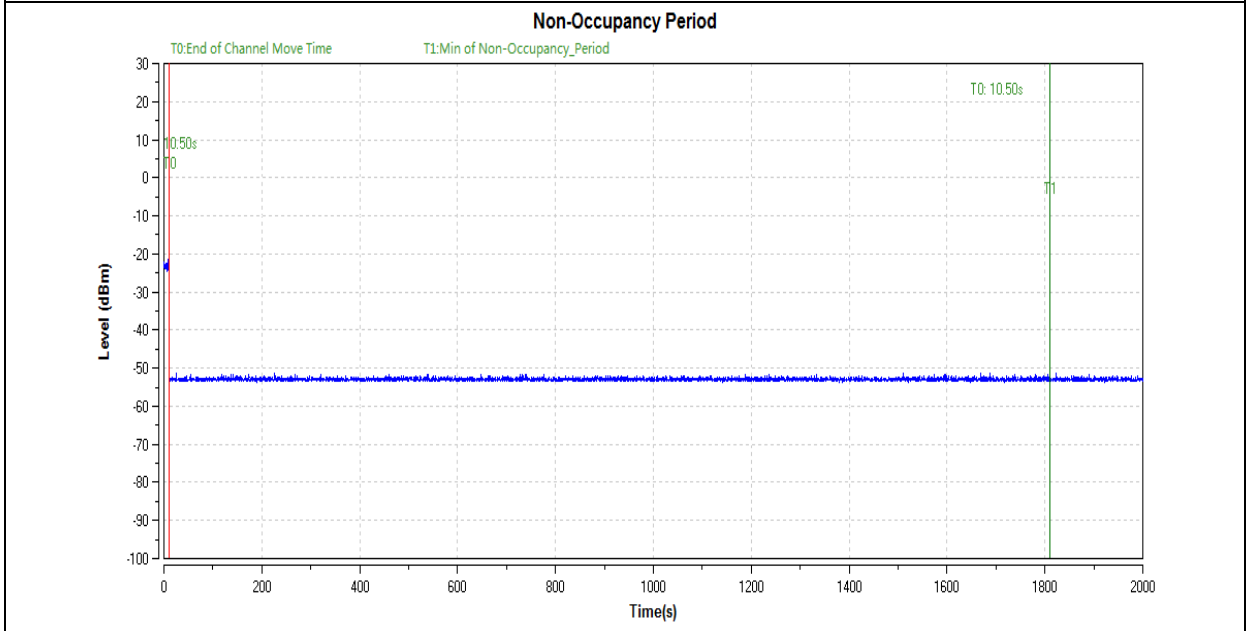


9.3.4 Non-Occupancy Period Test Results

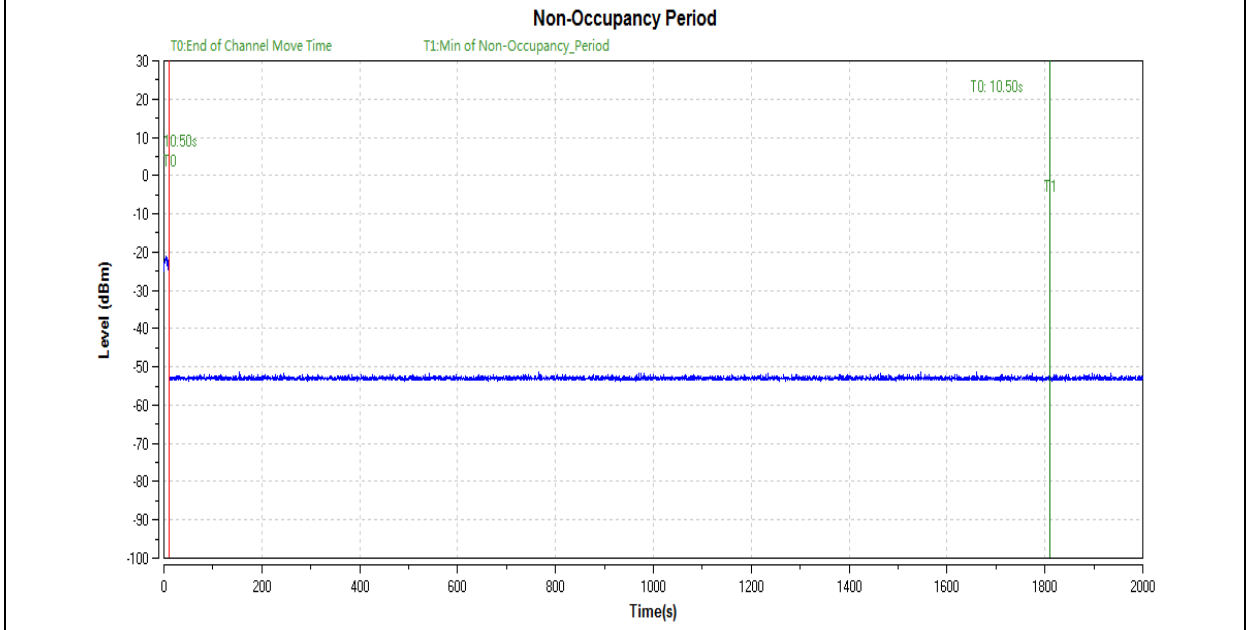
Frequency	Bandwidth	Measured Value	Limit Requirements	Verdict
5290MHz	80 MHz	> 30min	30min	Pass
5530 MHz	80 MHz	> 30min	30min	Pass

Test Graph:

5290 MHz



5530MHz



Appendix A: Test equipment list

Equipment No.	Equipment	Manufacturer	Model No.	Serial No.	Cal. Date	Due Date
SZ182-02	RF Power Meter	Anritsu	ML2496A	1302005	5-Jun-2018	5-Jun-2019
SZ182-02-01	Pulse Power Sensor	Anritsu	MA2411B	1207429	5-Jun-2018	5-Jun-2019
SZ070-24	Open Switch and Control Unit with TS8997 option for power measurement test	R&S	OSP120+B157	---	29-Oct-2018	29-Oct-2019
SZ070-20	Combiner	Mini-Circuits	ZN2PD-63-S+	---	5-Jun-2018	5-Jun-2019
SZ070-21	Combiner	Mini-Circuits	ZN2PD-63-S+	---	5-Jun-2018	5-Jun-2019
SZ056-05	Spectrum Analyzer	Agilent	E4407B	US40522113	28-Dec-2018	28-Dec-2019
SZ180-10	Signal Generator	Wiltron	68369B	972809	5-Jun-2018	5-Jun-2019
SZ180-13	MXG Vector Signal Generator	Keysight	N5182B	MY53051328	29-Oct-2018	29-Oct-2019
SZ061-03	BiConiLog Antenna	ETS	3142C	00078828	16-Oct-2018	16-Oct-2019
SZ061-06	Active Loop Antenna	Electro-Metrics	EM-6876	217	11-May-2018	11-May-2019
SZ061-09	Horn Antenna	ETS	3115	00092346	16-Oct-2018	16-Oct-2019
SZ061-07	Pyramidal Horn Antenna	ETS	3160-09	00083067	17-Mar-2018	17-Mar-2019
SZ185-01	EMI Receiver	R&S	ESCI	100547	4-Jan-2019	4-Jan-2020
SZ056-06	Signal Analyzer	R&S	FSV40	101101	5-Jun-2018	5-Jun-2019
SZ181-04	Preamplifier	Agilent	8449B	3008A02474	24-Jan-2018	24-Jan-2019
					15-Jan-2019	15-Jan-2020
SZ188-01	Anechoic Chamber	ETS	RFD-F/A-100	4102	15-Dec-2018	15-Dec-2020
SZ062-02	RF Cable	RADIALL	RG 213U	--	02-Jul-2018	02- Jul-2019
SZ062-05	RF Cable	RADIALL	0.04-26.5GHz	--	31-Aug-2018	31-Aug-2019
SZ062-12	RF Cable	RADIALL	0.04-26.5GHz	--	31-Aug-2018	31-Aug-2019
SZ067-25	Notch Filter	Micro-Tronics	BRM50716	--	30-Mar-2018	30-Mar-2019
SZ067-04	Notch Filter	Micro-Tronics	BRM50702-02	--	5-Jun-2018	5-Jun-2019
SZ185-02	EMI Test Receiver	R&S	ESCI	100692	26-Oct-2018	26-Oct-2019
SZ187-01	Two-Line V-Network	R&S	ENV216	100072	26-Oct-2018	26-Oct-2019
SZ187-02	Two-Line V-Network	R&S	ENV216	100073	04-Jul-2018	04-Jul-2019
SZ188-03	Shielding Room	ETS	RFD-100	4100	16-Jan-2017	16-Jan-2020
SZ016-12	Programmable Temperature & Humidity Chamber	Taili	MHK-120NK	AB0105	24-Jan-2018	24-Jan-2019
					17-Jan-2019	17-Jan-2020
SZ006-30	DC Power Supply	Guwei	SPS-3610	GEQ920551	24-Jan-2018	24-Jan-2019
					15-Jan-2019	15-Jan-2020

Expanded uncertainty of radiated emission measurement is ±4.9 dB.
Expanded uncertainty of conducted emission measurement is ±3.6 dB.

********** End of Report**********