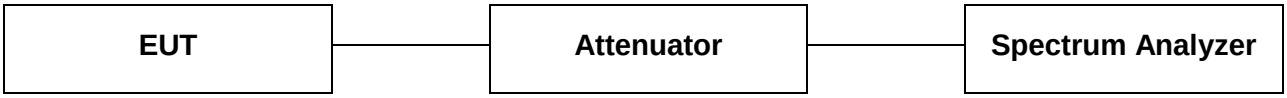
7. Maximum power spectral density

7.1. Test setup



7.2. Limit

7.2.1. FCC 15.407

(a)(1)(iv)
For mobile and portable client devices in the 5.15-5.25 GHz band, the maximum power spectral density shall not exceed 11 dBm in any 1 megahertz band. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

(a)(2) For the 5.25-5.35 GHz and 5.47-5.725 GHz bands, the maximum power spectral density shall not exceed 11 dBm in any 1 megahertz band. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

(a)(3) For the band 5.725-5.85 GHz, the maximum power spectral density shall not exceed 30 dBm in any 500-kHz band. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi. However, fixed point-topoint U-NII devices operating in this band may employ transmitting antennas with directional gain greater than 6 dBi without any corresponding reduction in transmitter conducted power. Fixed, point-to-point operations exclude the use of point-to-multipoint systems, omnidirectional applications, and multiple collocated transmitters transmitting the same information. The operator of the U-NII device, or if the equipment is professionally installed, the installer, is responsible for ensuring that systems employing high gain directional antennas are used exclusively for fixed, point-to-point operations.

7.2.1. IC RSS-210

A9.2 Limits
(1) Band 5150-5250 MHz
The e.i.r.p. spectral density shall not exceed 10 dBm in any 1.0 MHz band.

(2) Band 5250-5350 MHz
The power spectral density shall not exceed 11 dBm in any 1.0 MHz band.

(3) Bands 5470-5600 MHz and 5650-5725 MHz
The power spectral density shall not exceed 11 dBm in any 1.0 MHz band.

(4) Band 5725-5825 MHz
The power spectral density shall not exceed 17 dBm in any 1.0 MHz band.

The results shown in this test report refer only to the sample(s) tested unless otherwise stated. This test report cannot be reproduced, except in full, without prior written permission of the Company.

7.3. Test procedure

All data rates and modes were investigated for this test. The full data for the worst case data rate are reported in this section.

1. This measurement settings are specified in clause b) Method SA-1 of section E of KDB 789033 New Rules_v01.
2. Measure the duty cycle, x, of the transmitter output signal as described in section B).
3. Set span to encompass the entire emission bandwidth (EBW) (or, alternatively, the entire 99% occupied bandwidth) of the signal.
4. Set RBW = 1 ㎒
5. Set VBW ≥ 3 ㎒
6. Number of points in sweep ≥ 2 Span / RBW. (This ensures that bin-to-bin spacing is ≤ RBW/2, so that narrowband signals are not lost between frequency bins.)
7. Sweep time = auto.
8. Detector = RMS (i.e., power averaging), if available. Otherwise, use sample detector mode.
9. Do not use sweep triggering. Allow the sweep to “free run”.
10. Trace average at least 100 traces in power averaging (i.e., RMS) mode.
11. Use the peak search function on the spectrum analyzer to find the peak of the spectrum.
12. The result is the PSD.

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7.4. Test result

Ambient temperature : (24 ± 1) ℃
Relative humidity : 49 % R.H.

Band	Mode	Frequency (MHz)	Ch.	Data Rate	Measured PSD (dB m)	FCC Limit (dB m/MHz)	IC Limit (dB m/MHz)
U-NII 1	11a	5 180	36	6	-1.71	11	10
		5 220	44	6	-2.29	11	10
		5 240	48	6	-2.04	11	10
	11an_HT20	5 180	36	MCS0	-2.05	11	10
		5 220	44	MCS0	-3.09	11	10
		5 240	48	MCS0	-2.74	11	10
	11an_HT40	5 190	38	MCS0	-4.19	11	10
		5 230	46	MCS0	-5.62	11	10
	11ac_VHT20	5 180	36	MCS0	-4.39	11	10
		5 220	44	MCS0	-5.28	11	10
		5 240	48	MCS0	-4.13	11	10
	11ac_VHT40	5 190	38	MCS0	-6.48	11	10
		5 230	46	MCS0	-7.53	11	10
	11ac_VHT80	5 210	42	MCS0	-10.59	11	10
U-NII 2A	11a	5 260	52	6	-1.32	11	11
		5 300	60	6	-1.31	11	11
		5 320	64	6	-1.47	11	11
	11an_HT20	5 260	52	MCS0	-2.12	11	11
		5 300	60	MCS0	-1.83	11	11
		5 320	64	MCS0	-1.91	11	11
	11an_HT40	5 270	54	MCS0	-4.54	11	11
		5 310	62	MCS0	-4.73	11	11
	11ac_VHT20	5 260	52	MCS0	-4.00	11	11
		5 300	60	MCS0	-3.97	11	11
		5 320	64	MCS0	-3.93	11	11
	11ac_VHT40	5 270	54	MCS0	-6.64	11	11
		5 310	62	MCS0	-6.41	11	11
	11ac_VHT80	5 290	58	MCS0	-10.84	11	11

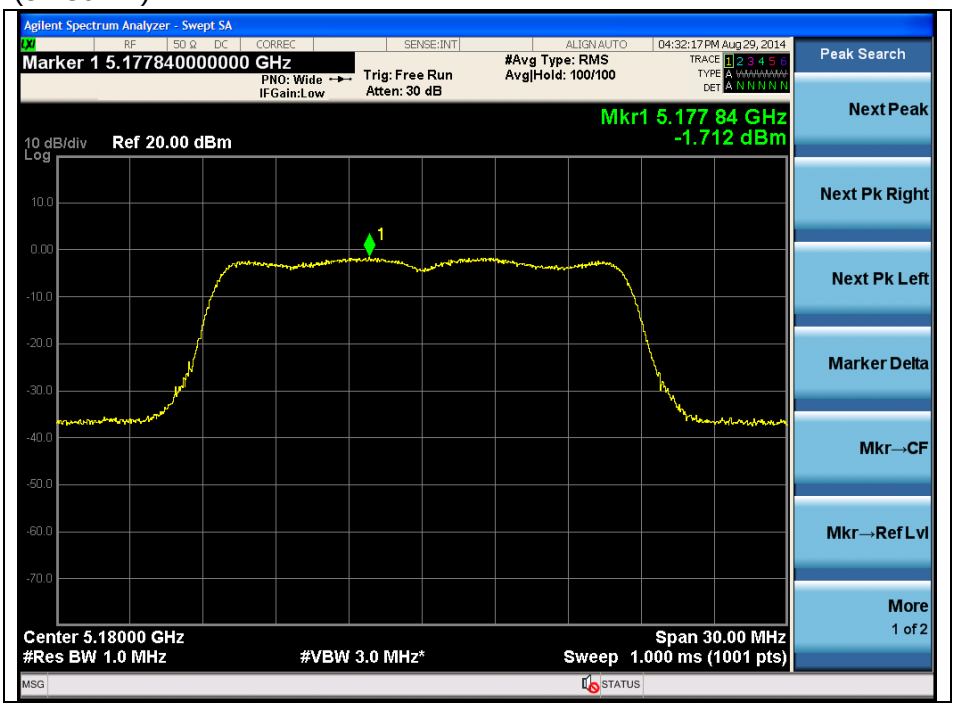
The results shown in this test report refer only to the sample(s) tested unless otherwise stated. This test report cannot be reproduced, except in full, without prior written permission of the Company.

Band	Mode	Frequency (MHz)	Ch.	Data Rate	Measured PSD (dB m)	FCC Limit (dB m/MHz)	IC Limit (dB m/MHz)
U-NII 2C	11a	5 500	100	6	-0.17	11	11
		5 580	116	6	-0.15	11	11
		5 700	140	6	0.06	11	11
	11an_HT20	5 500	100	MCS0	-0.08	11	11
		5 580	116	MCS0	-0.61	11	11
		5 700	140	MCS0	-0.73	11	11
	11an_HT40	5 510	102	MCS0	-3.73	11	11
		5 550	110	MCS0	-3.07	11	11
		5 670	134	MCS0	-3.06	11	11
	11ac_VHT20	5 500	100	MCS0	-2.65	11	11
		5 580	116	MCS0	-2.32	11	11
		5 700	140	MCS0	-2.48	11	11
	11ac_VHT40	5 510	102	MCS0	-5.39	11	11
		5 550	110	MCS0	-5.31	11	11
		5 670	134	MCS0	-4.73	11	11
	11ac_VHT80	5 530	106	MCS0	-8.93	11	11
U-NII 3	11a	5 745	149	6	-0.65	30	17
		5 785	157	6	-0.57	30	17
		5 825	165	6	-0.71	30	17
	11an_HT20	5 745	149	MCS0	-0.88	30	17
		5 785	157	MCS0	-0.45	30	17
		5 825	165	MCS0	-0.86	30	17
	11an_HT40	5 755	151	MCS0	-2.96	30	17
		5 795	159	MCS0	-2.94	30	17
	11ac_VHT20	5 745	149	MCS0	-3.00	30	17
		5 785	157	MCS0	-2.47	30	17
		5 825	165	MCS0	-2.49	30	17
	11ac_VHT40	5 755	151	MCS0	-5.13	30	17
		5 795	159	MCS0	-5.18	30	17
	11ac_VHT80	5 775	155	MCS0	-9.17	30	17

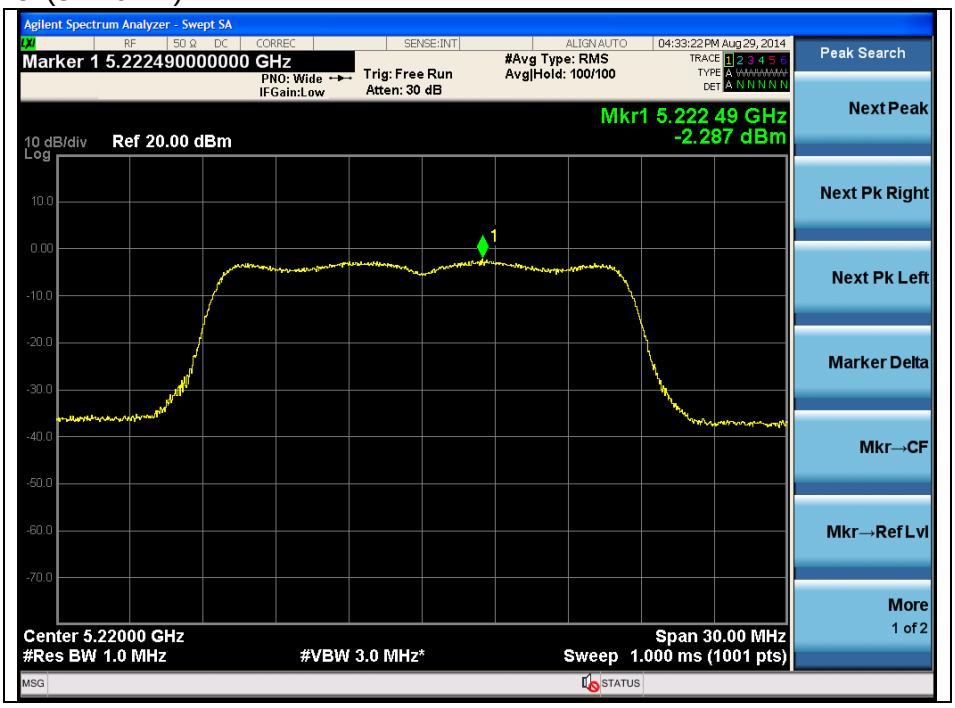
The results shown in this test report refer only to the sample(s) tested unless otherwise stated. This test report cannot be reproduced, except in full, without prior written permission of the Company.

802.11a (Band 1)

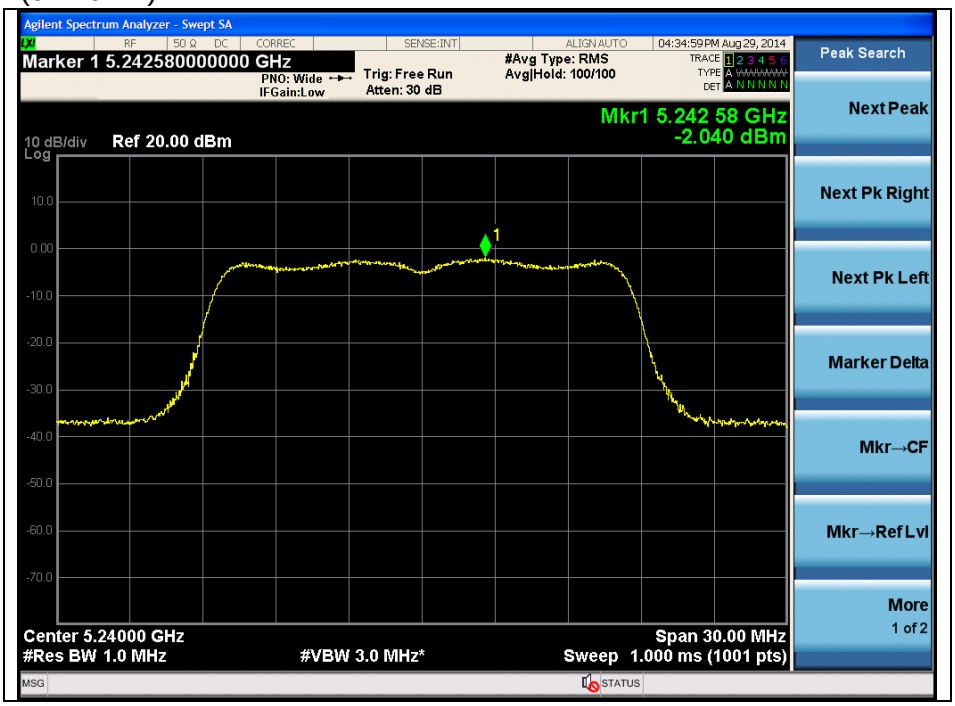
Low Channel (5 180 ㎒)



Middle Channel (5 220 ㎒)

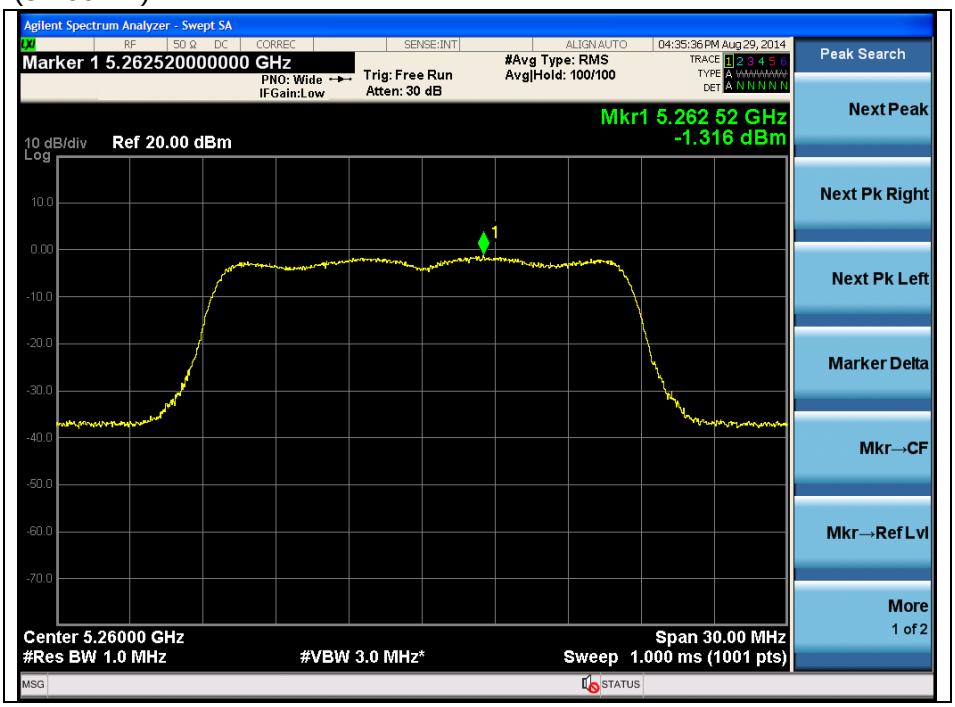


High Channel (5 240 ㎒)

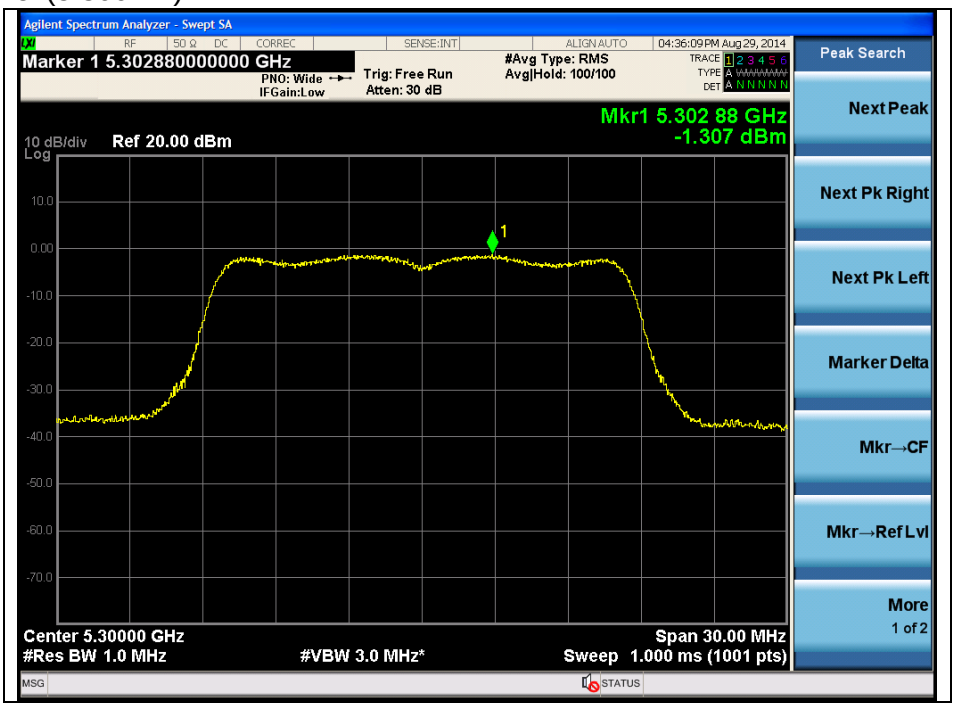


802.11a (Band 2A)

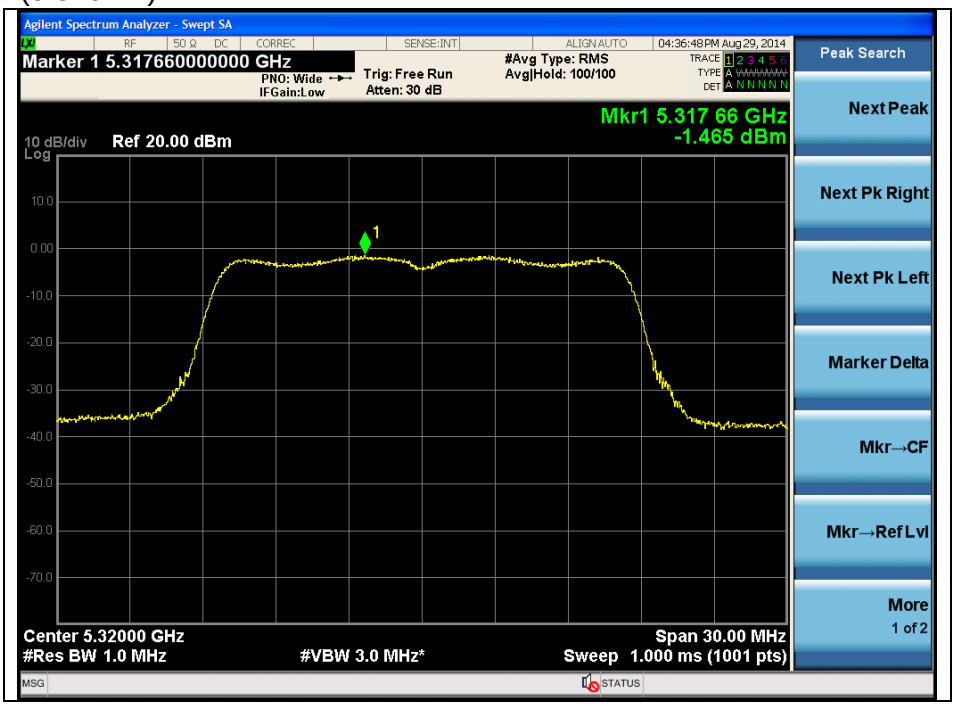
Low Channel (5 260 ㎒)



Middle Channel (5 300 ㎒)

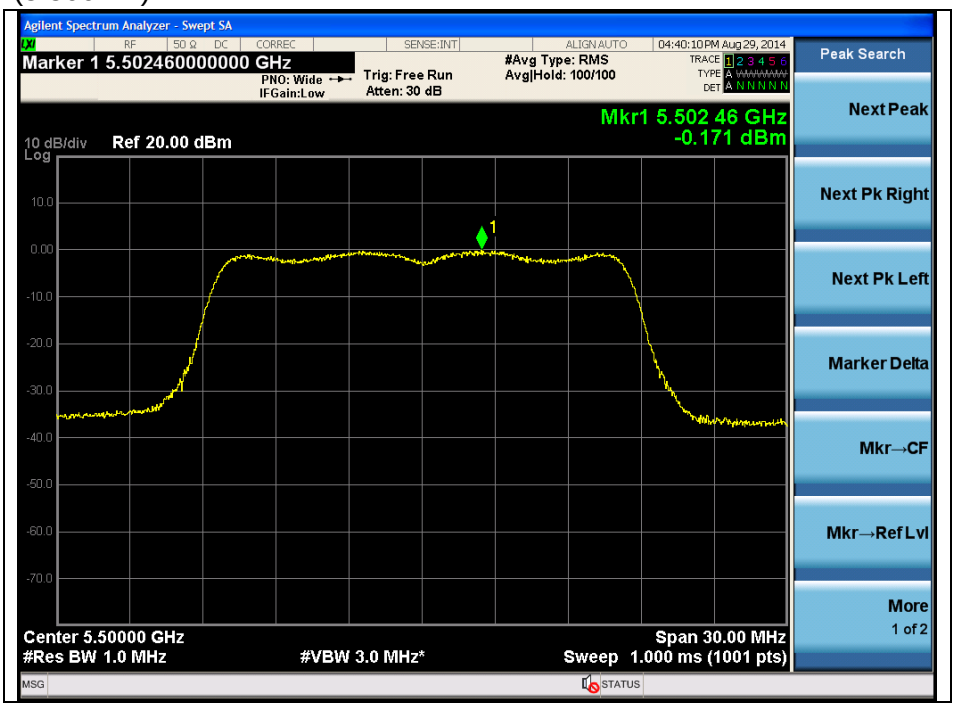


High Channel (5 320 ㎒)

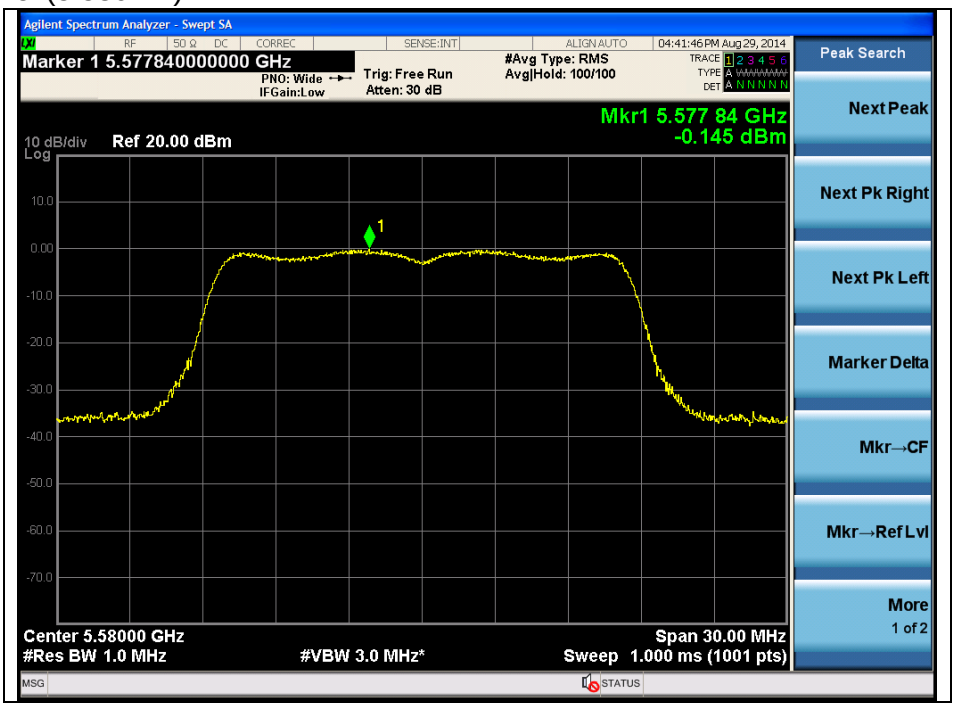


802.11a (Band 2C)

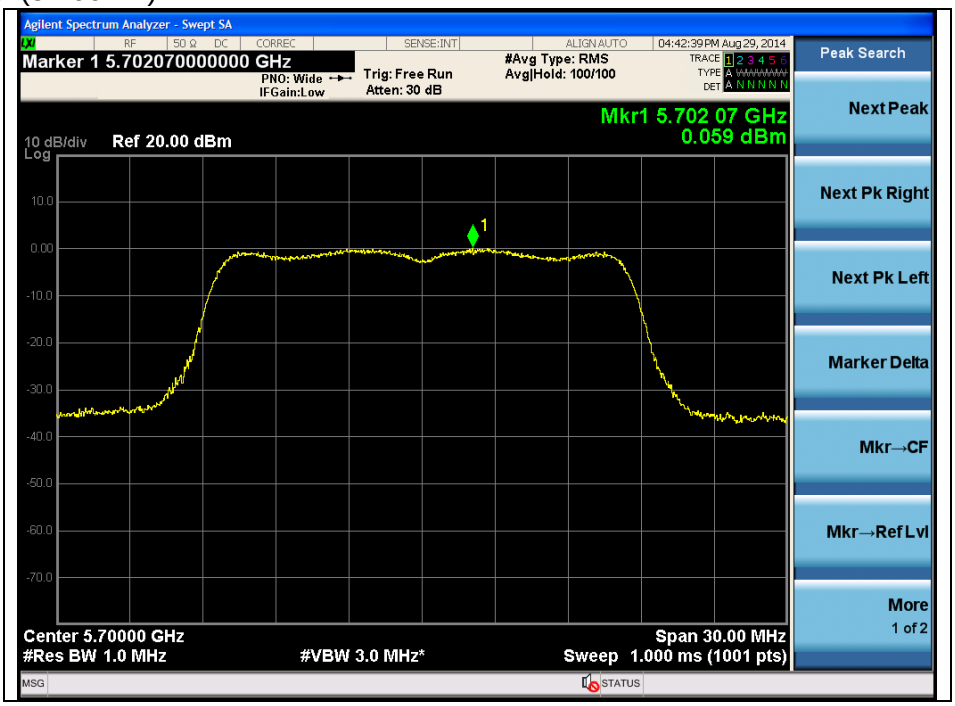
Low Channel (5 500 ㎒)



Middle Channel (5 580 ㎒)

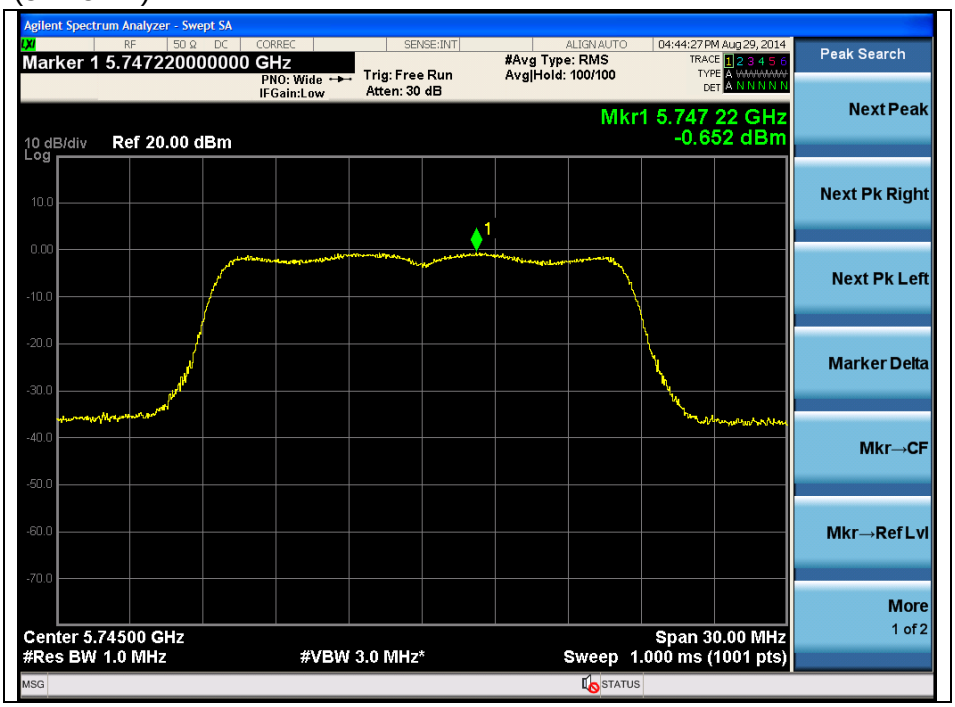


High Channel (5 700 ㎒)

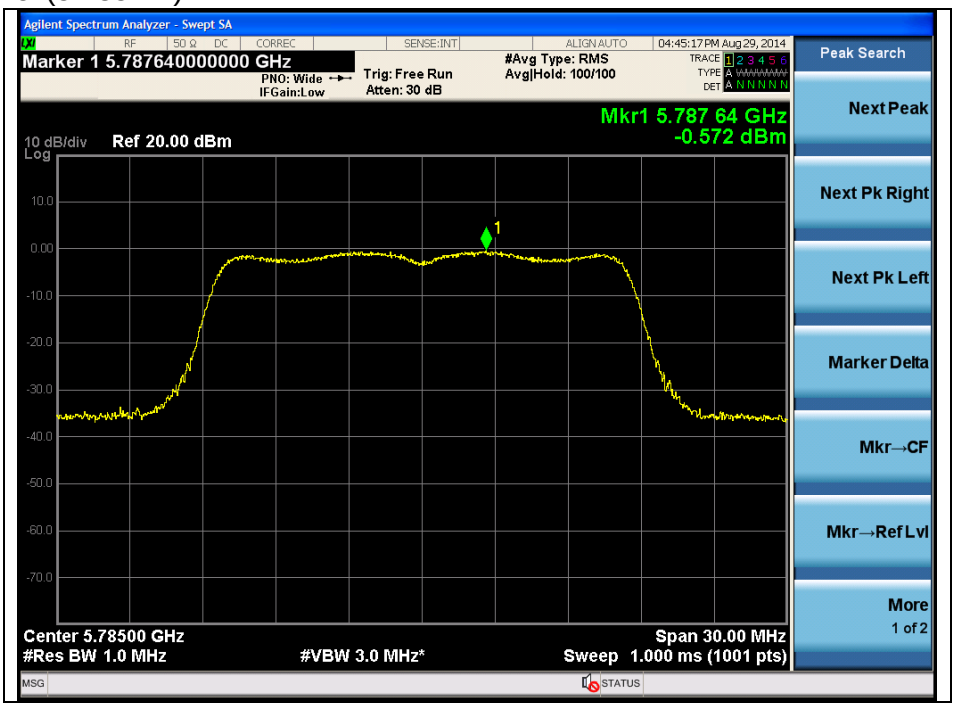


802.11a (Band 3)

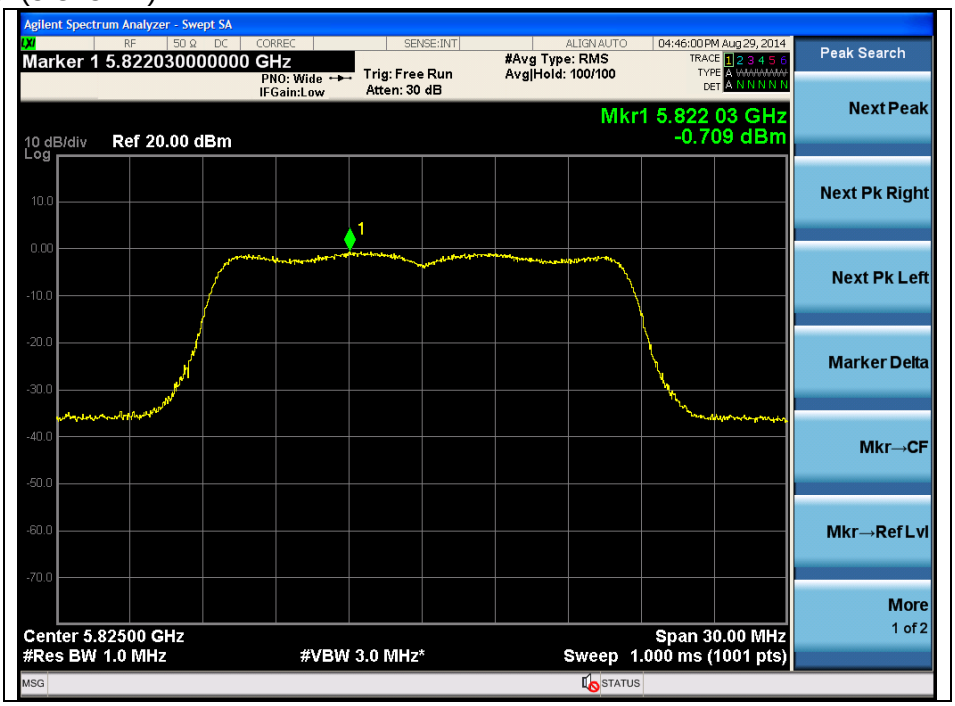
Low Channel (5 745 ㎒)



Middle Channel (5 785 ㎒)

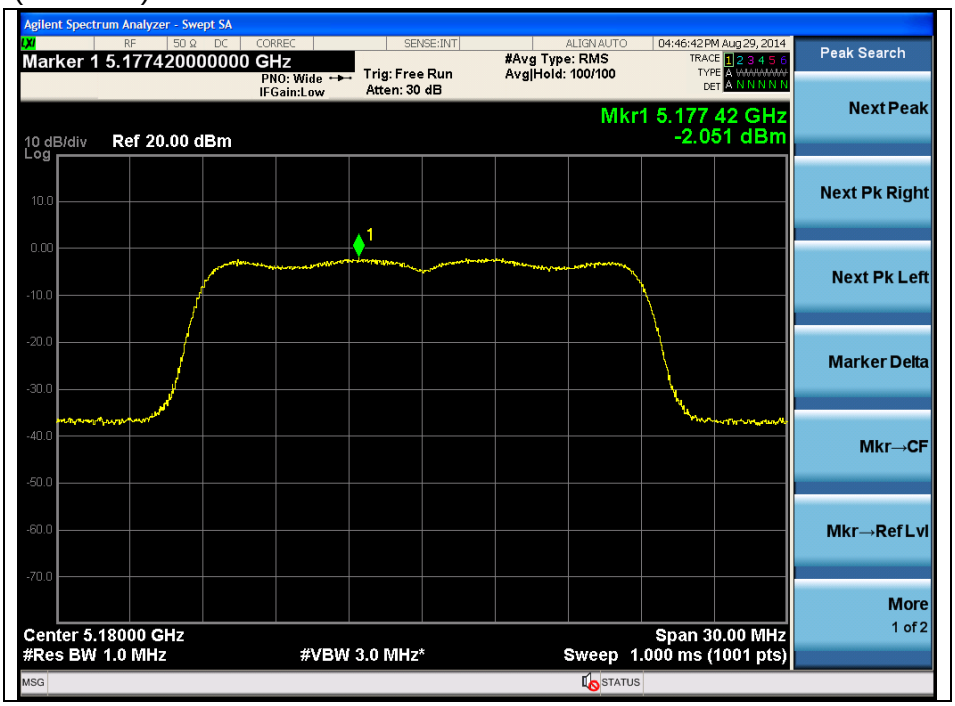


High Channel (5 825 ㎒)

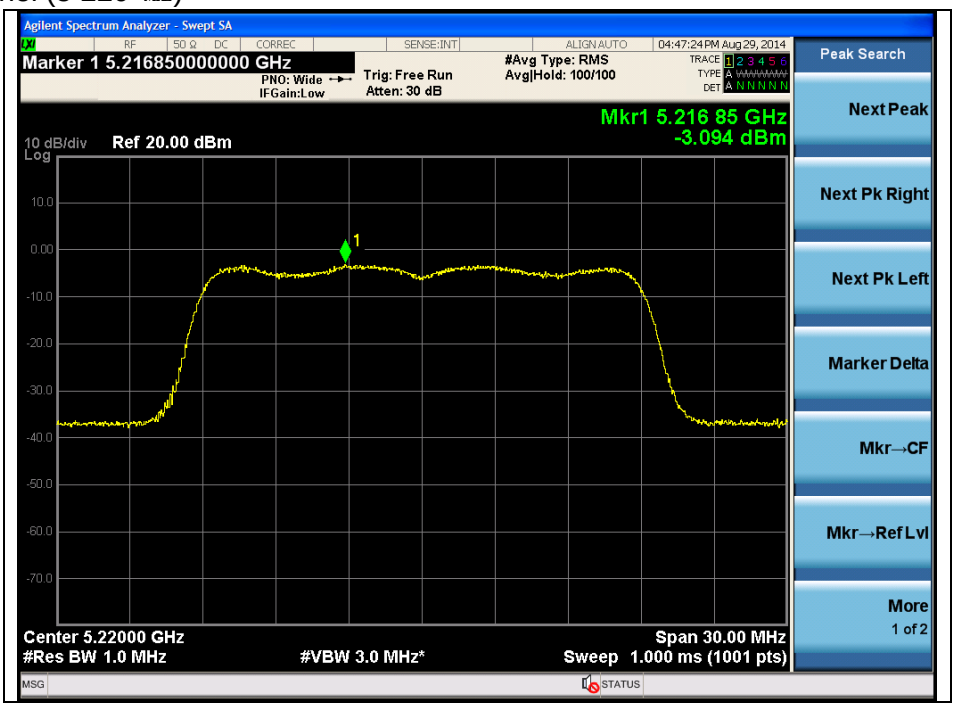


802.11n_HT20 (Band 1)

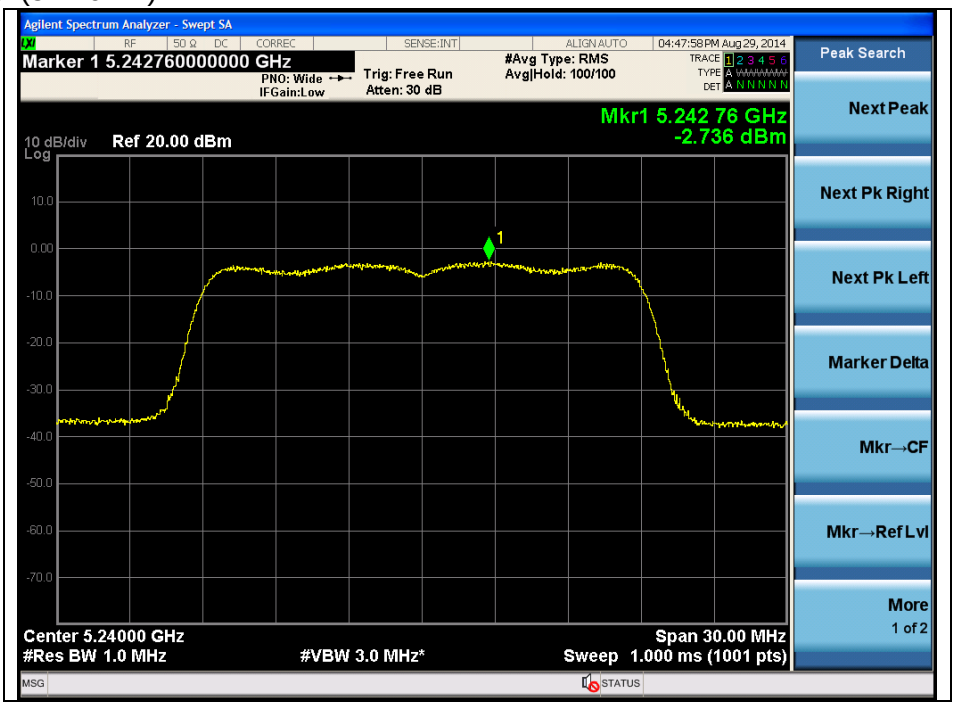
Low Channel (5 180 ㎒)



Middle Channel (5 220 ㎒)

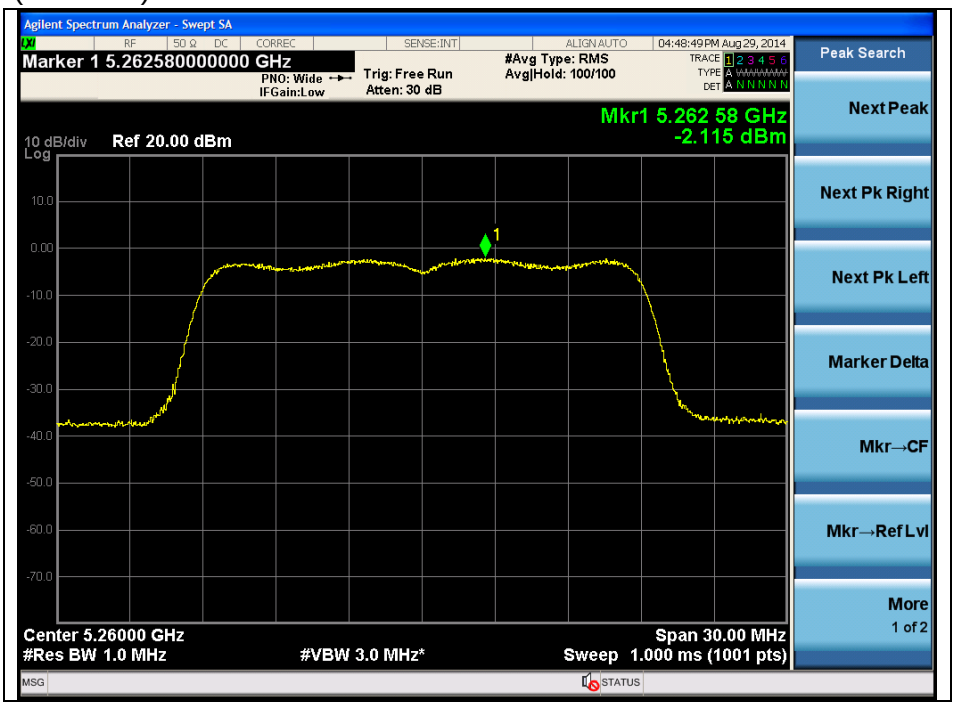


High Channel (5 240 ㎒)

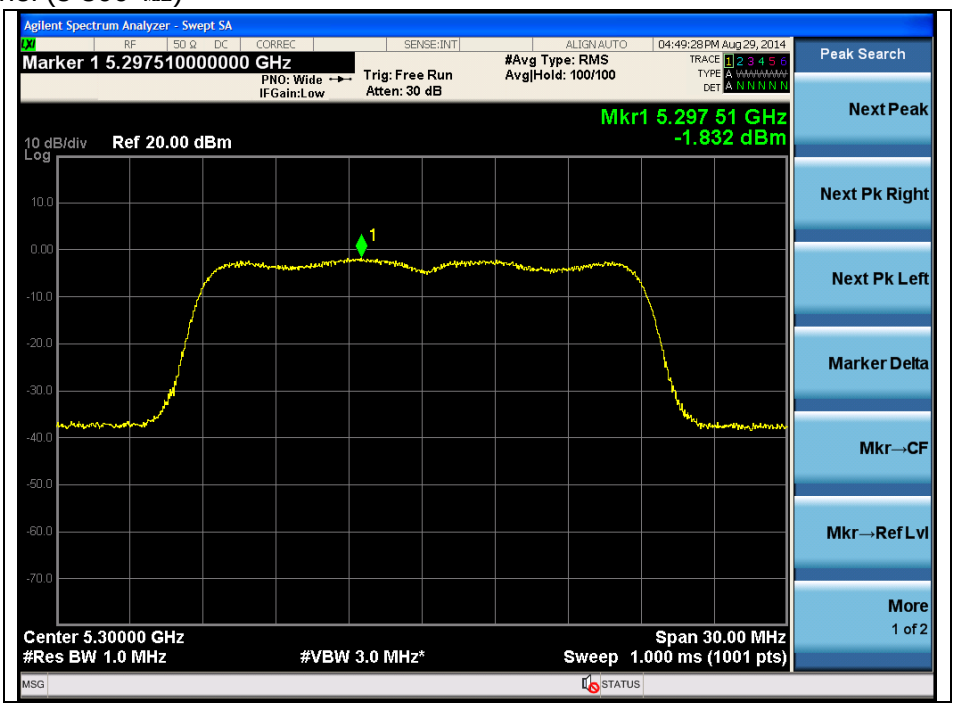


802.11_HT20 (Band 2A)

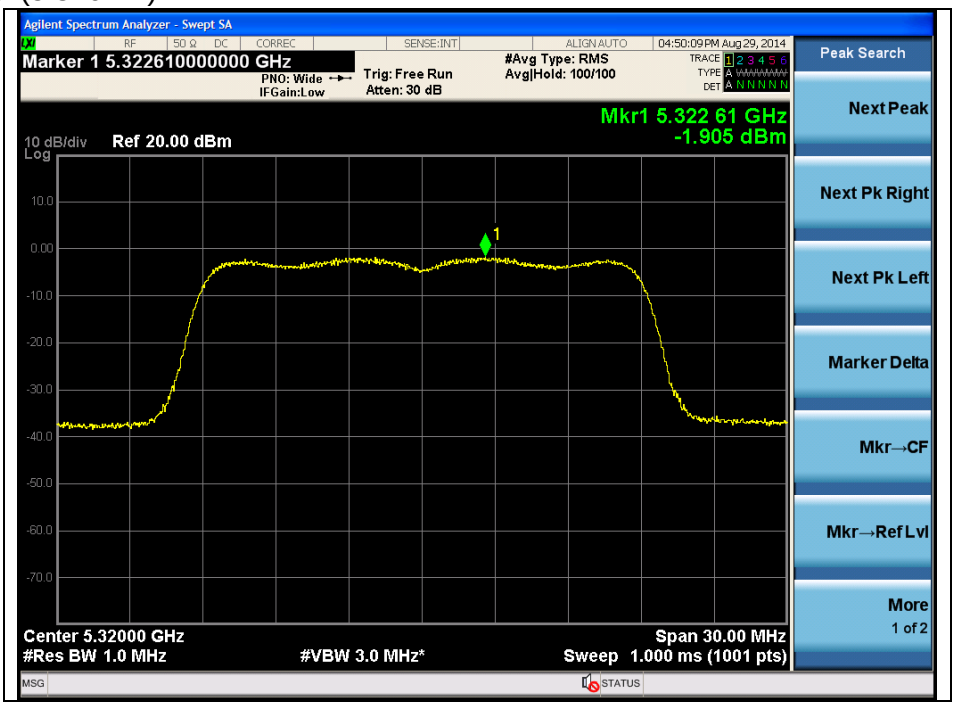
Low Channel (5 260 ㎒)



Middle Channel (5 300 ㎒)

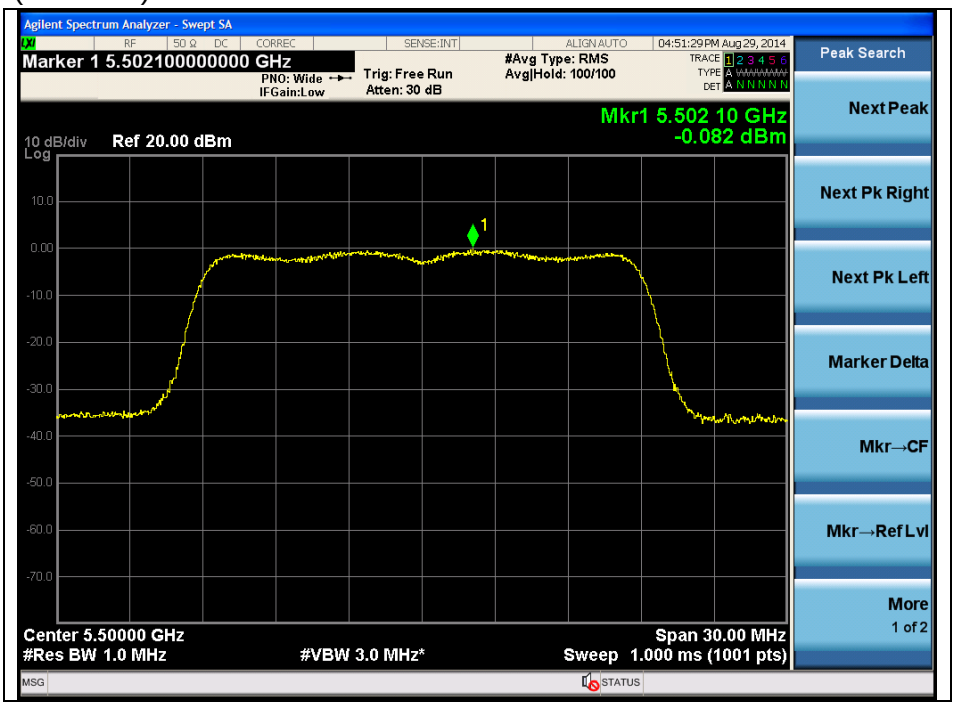


High Channel (5 320 ㎒)

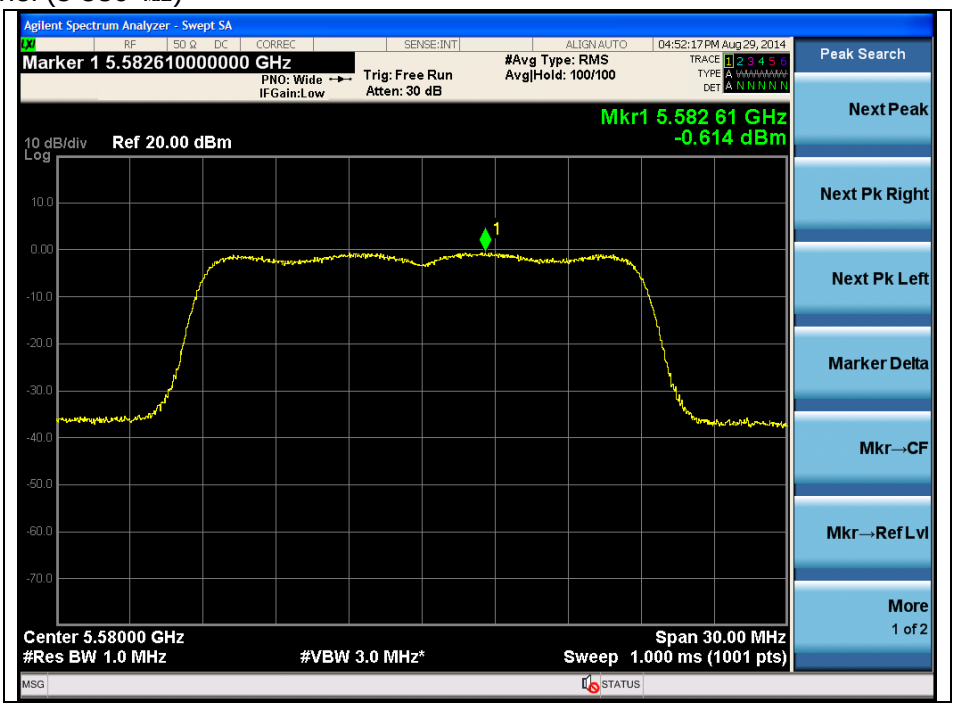


802.11_HT20 (Band 2C)

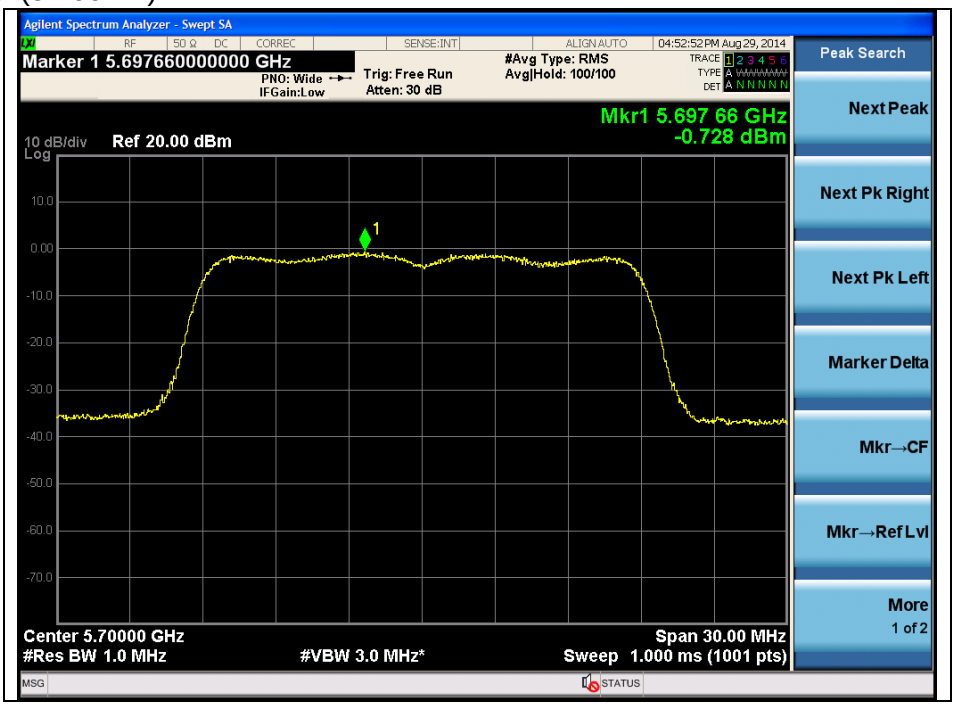
Low Channel (5 500 ㎒)



Middle Channel (5 580 ㎒)

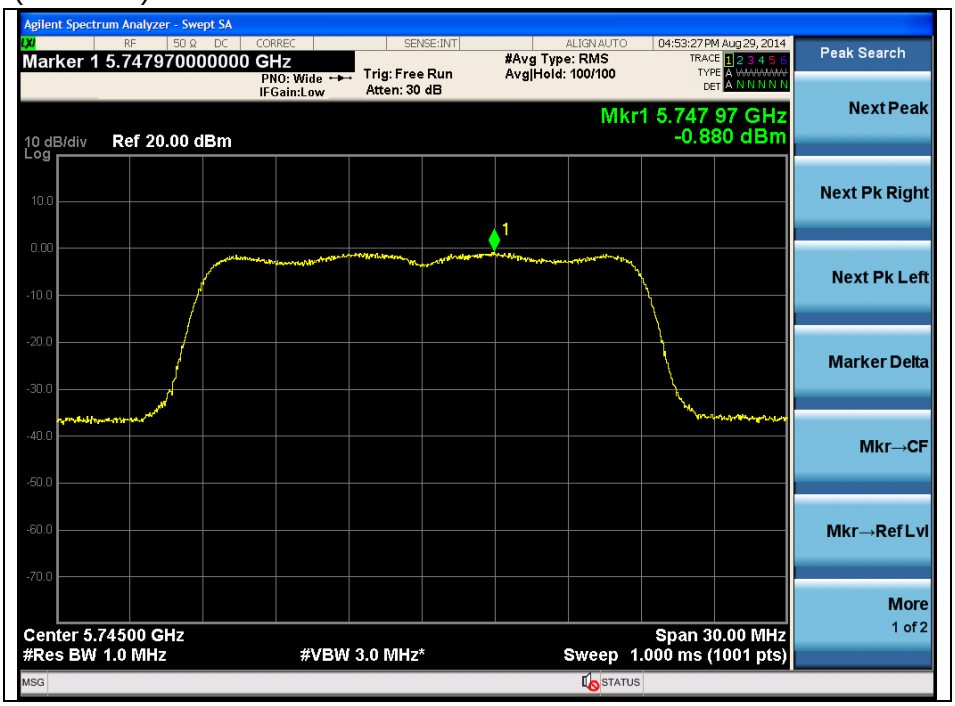


High Channel (5 700 ㎒)

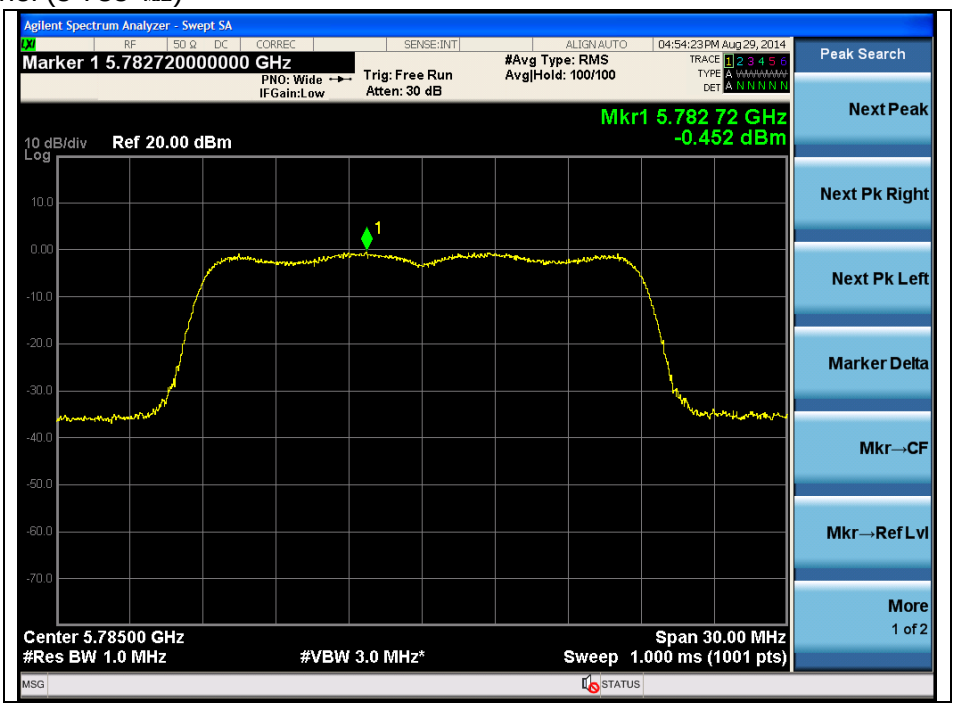


802.11_HT20 (Band 3)

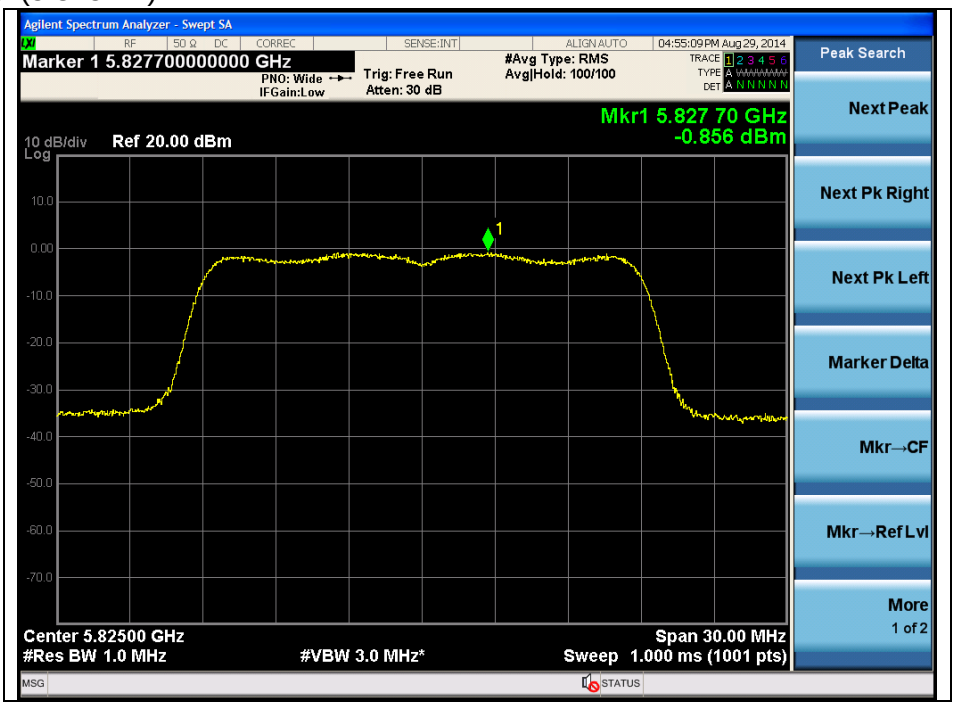
Low Channel (5 745 ㎒)



Middle Channel (5 785 ㎒)

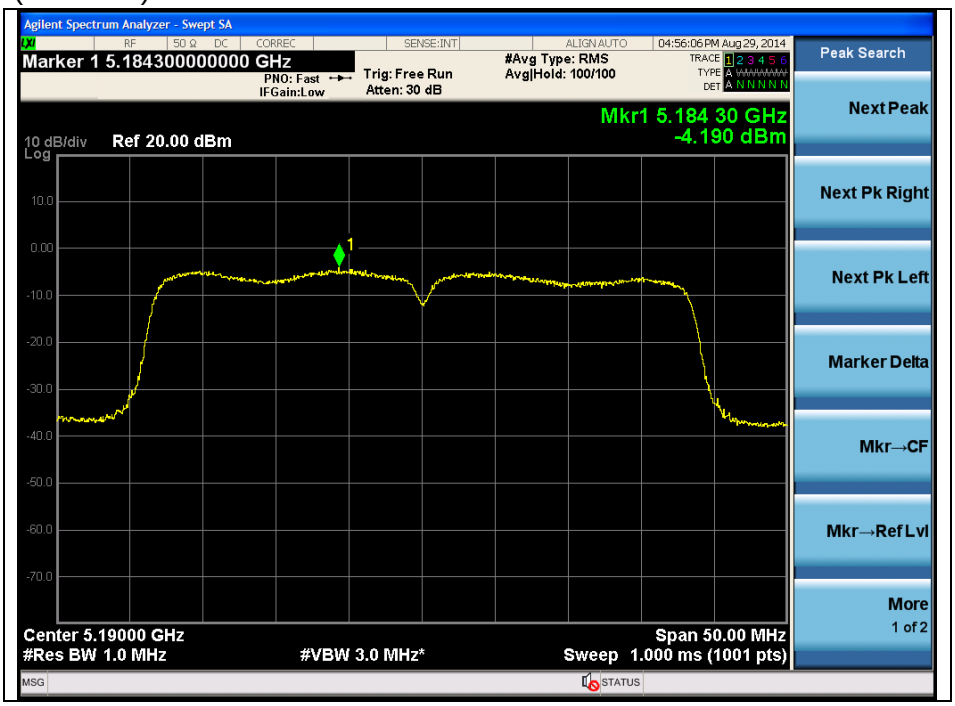


High Channel (5 825 ㎒)

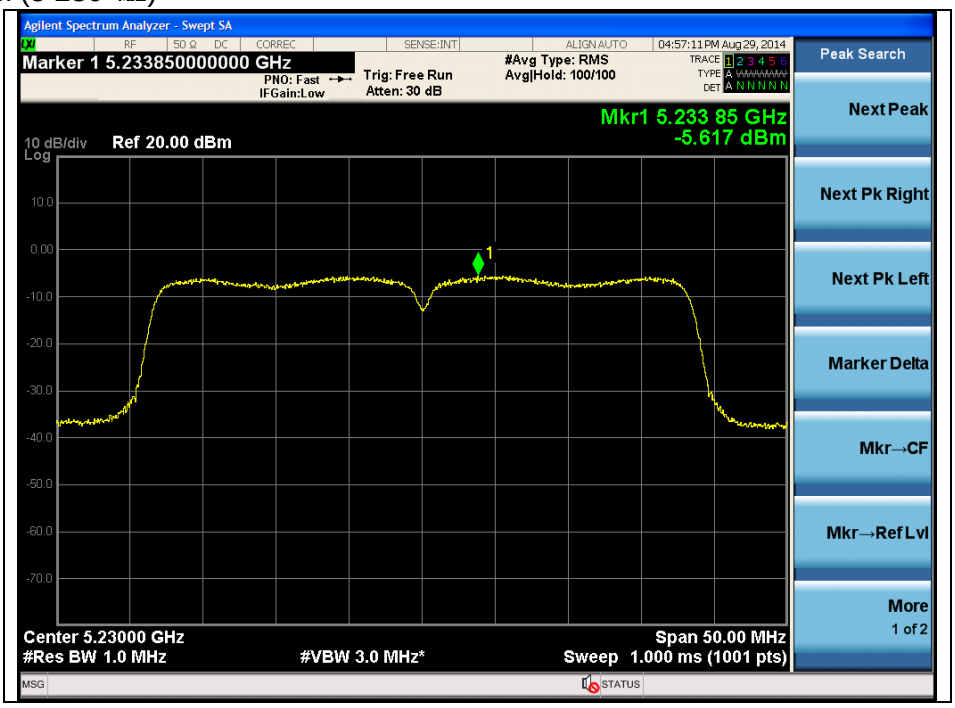


802.11n_HT40 (Band 1)

Low Channel (5 190 ㎒)

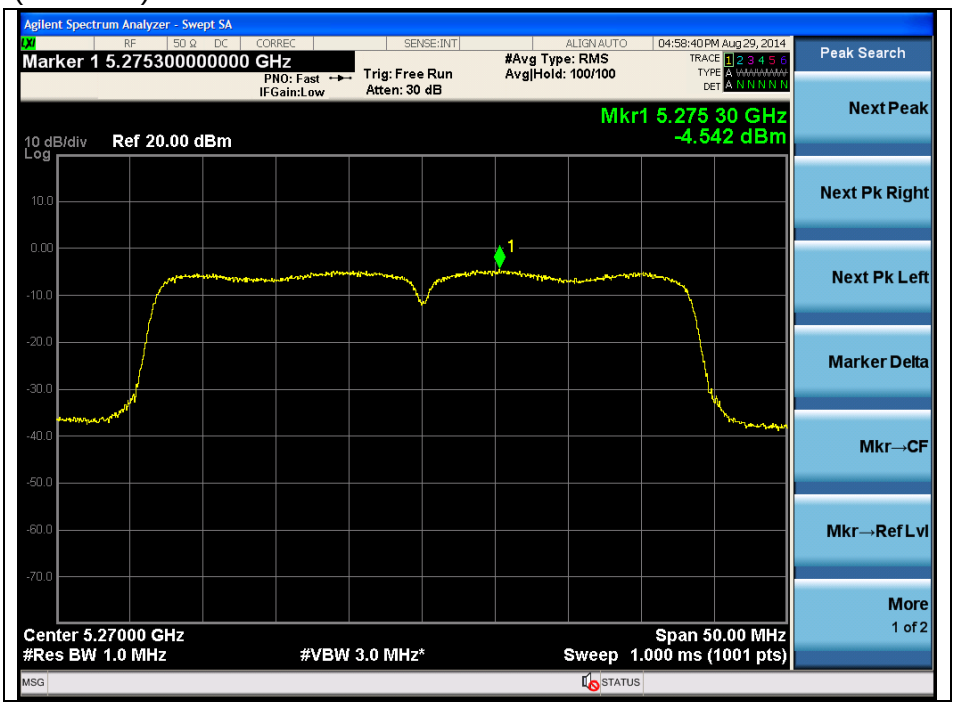


High Channel (5 230 ㎒)

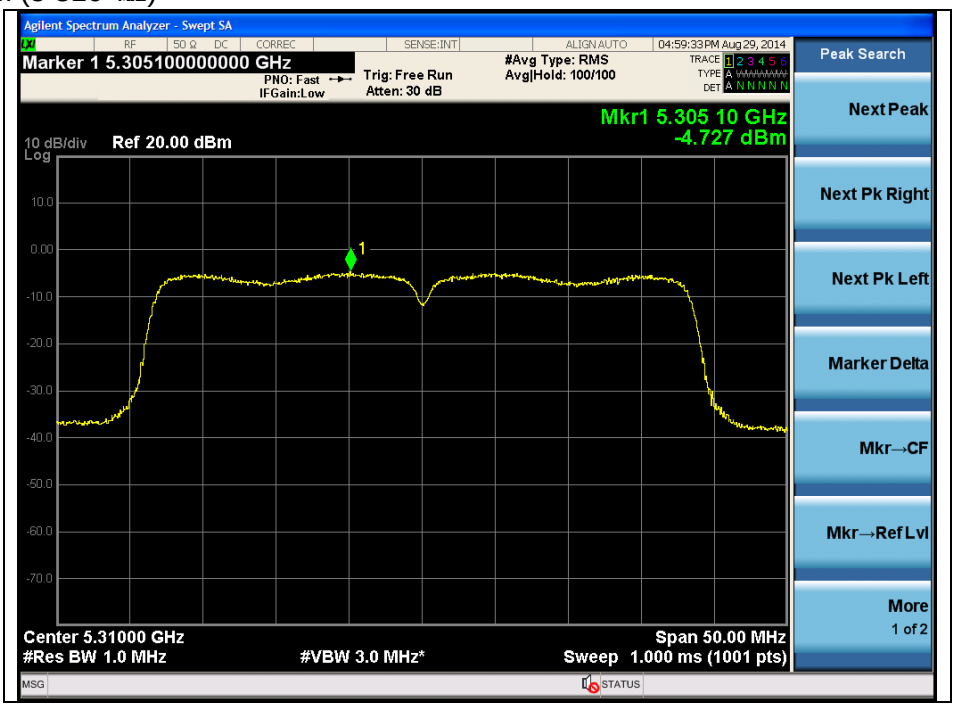


802.11_HT40 (Band 2A)

Low Channel (5 270 ㎒)

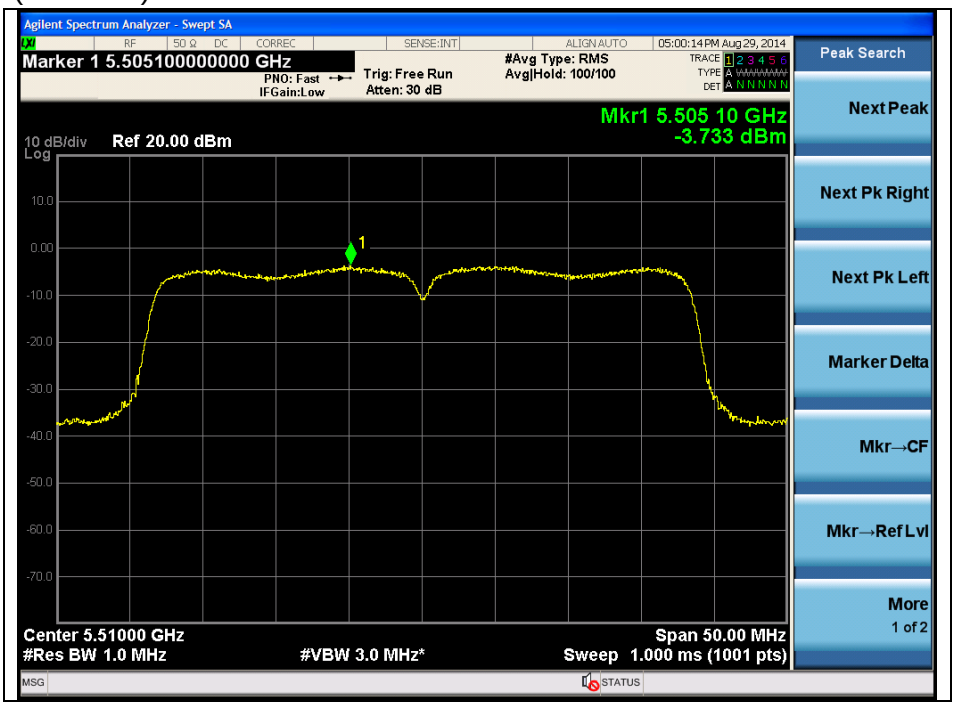


High Channel (5 310 ㎒)

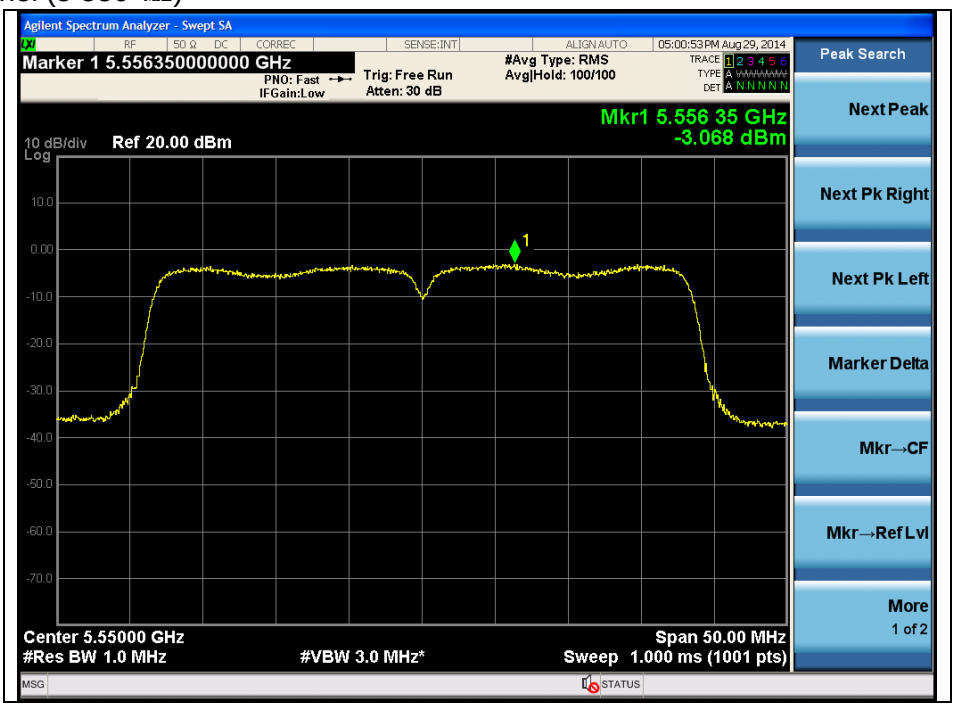


802.11_HT40 (Band 2C)

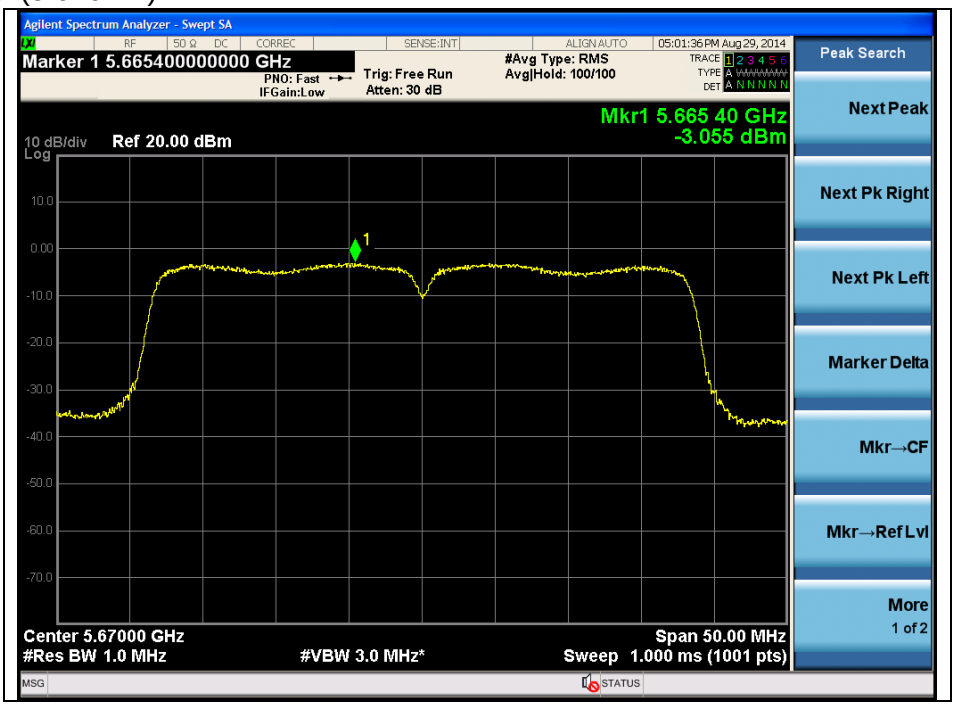
Low Channel (5 510 ㎒)



Middle Channel (5 550 ㎒)

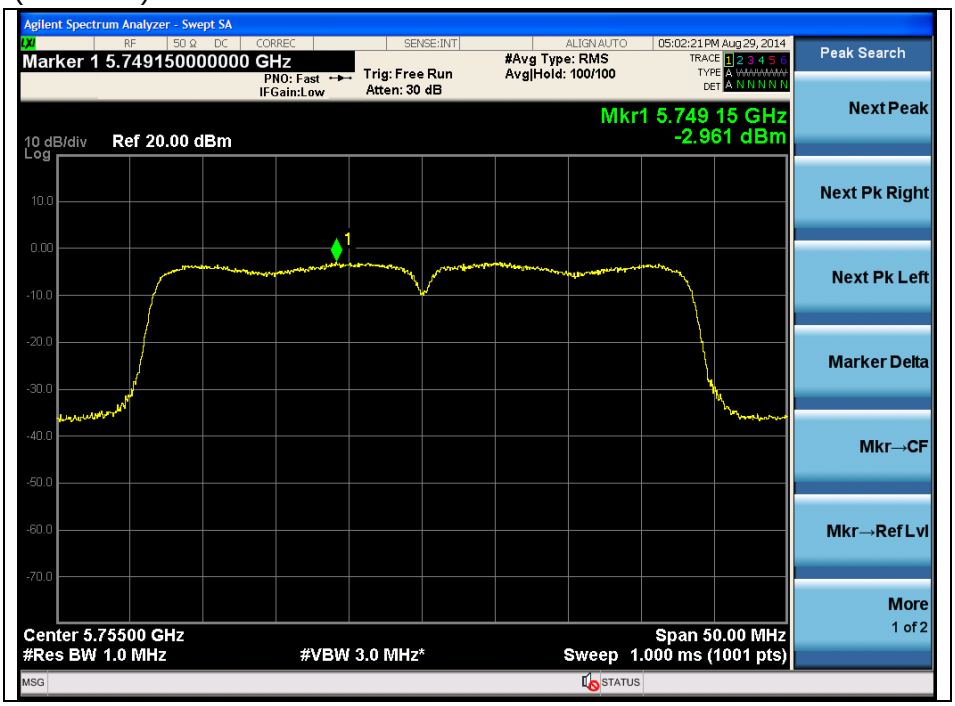


High Channel (5 670 ㎒)

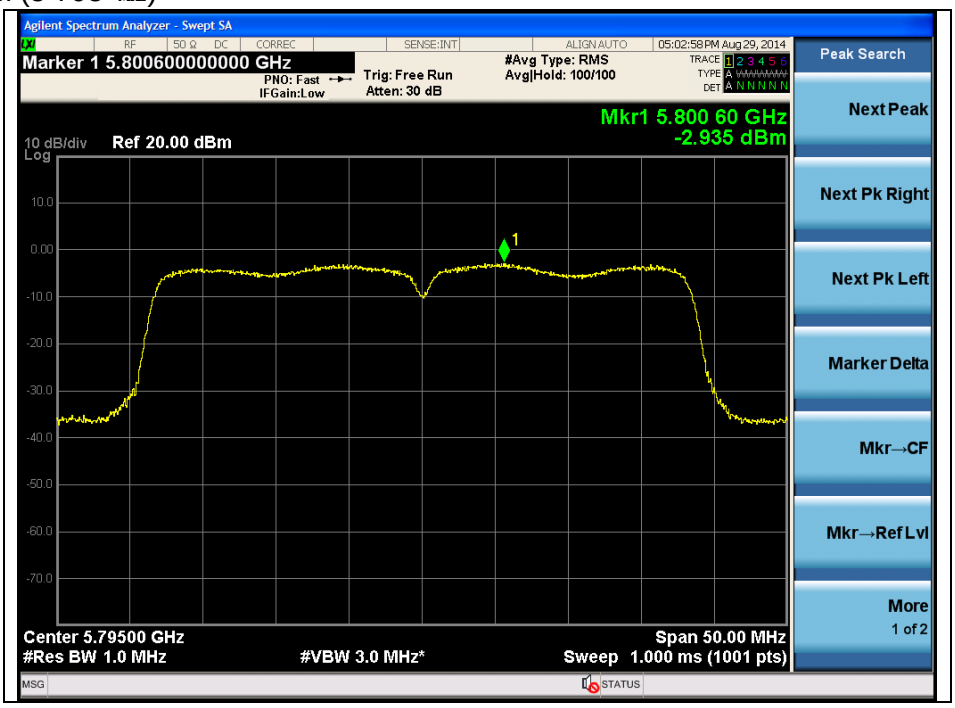


802.11_HT40 (Band 3)

Low Channel (5 755 ㎒)

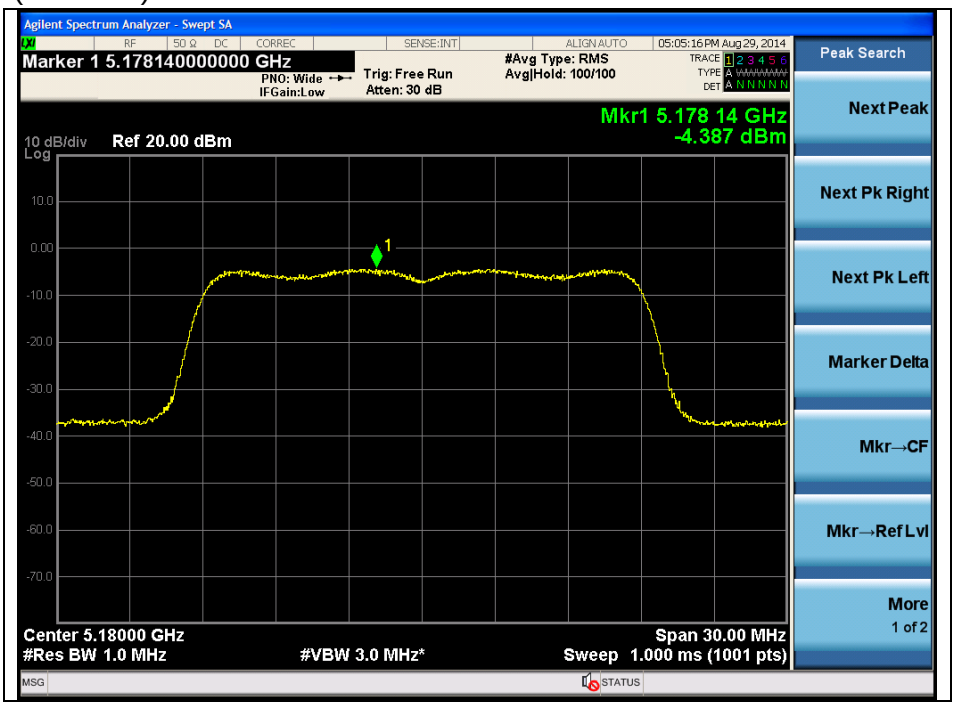


High Channel (5 795 ㎒)

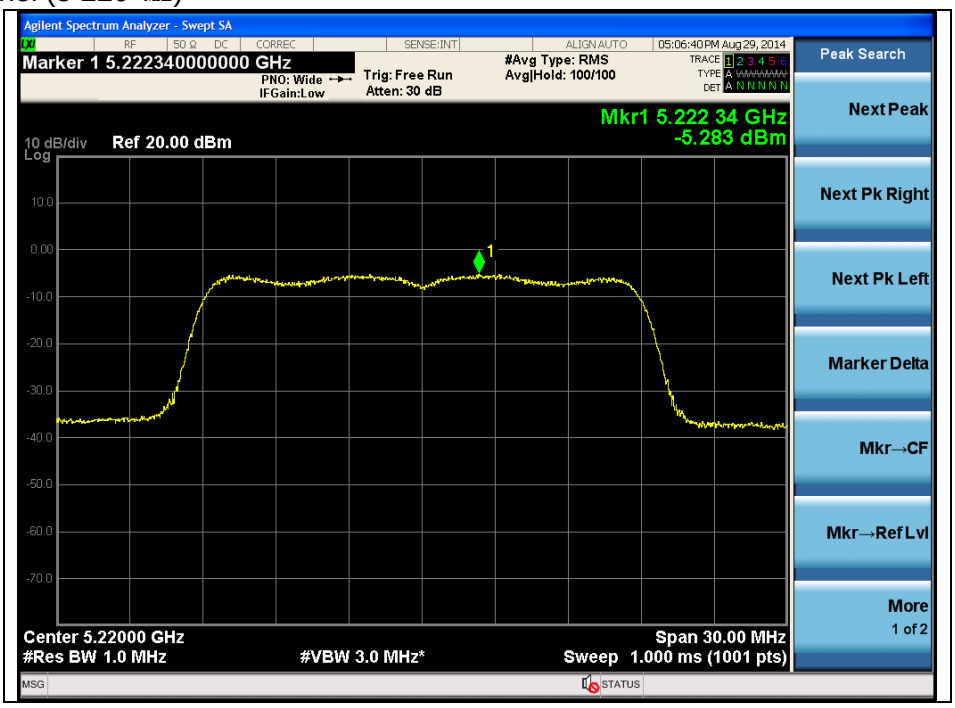


802.11ac_VHT20 (Band 1)

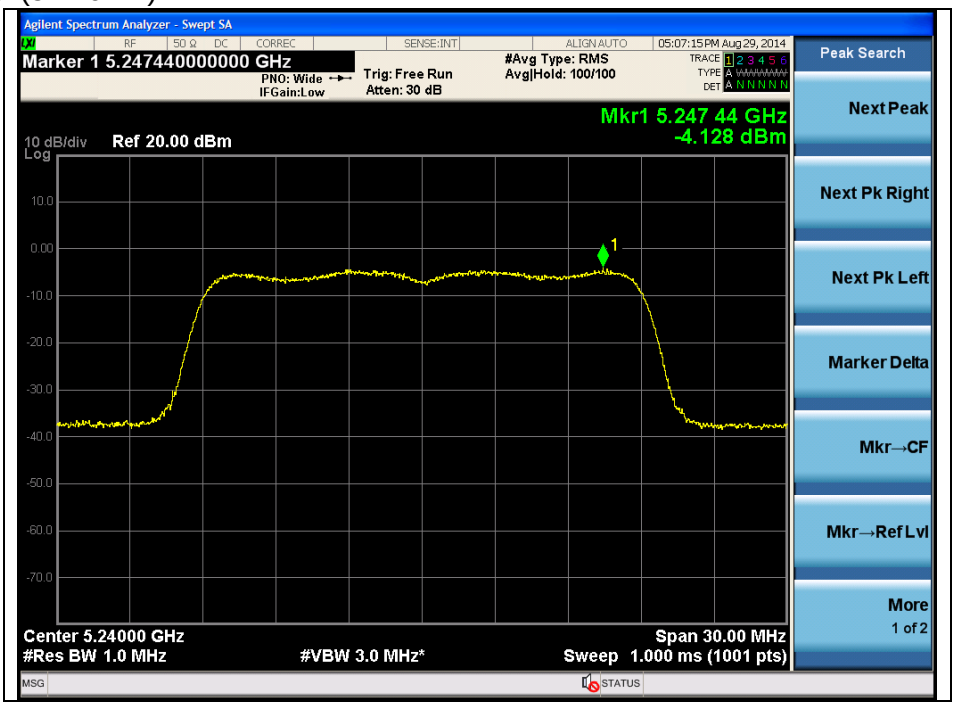
Low Channel (5 180 ㎒)



Middle Channel (5 220 ㎒)

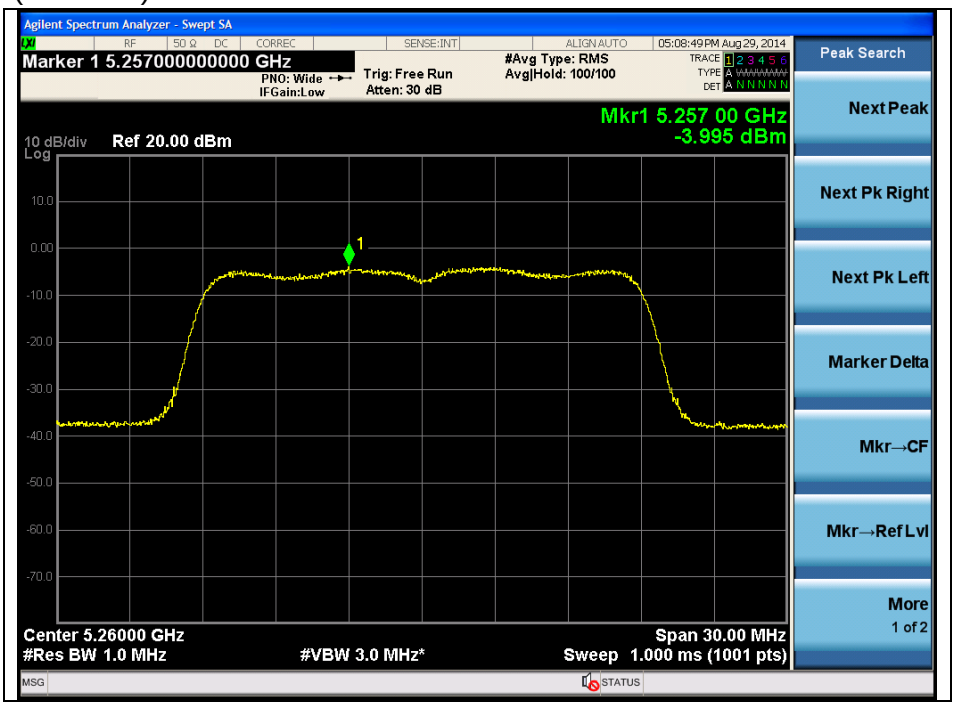


High Channel (5 240 ㎒)

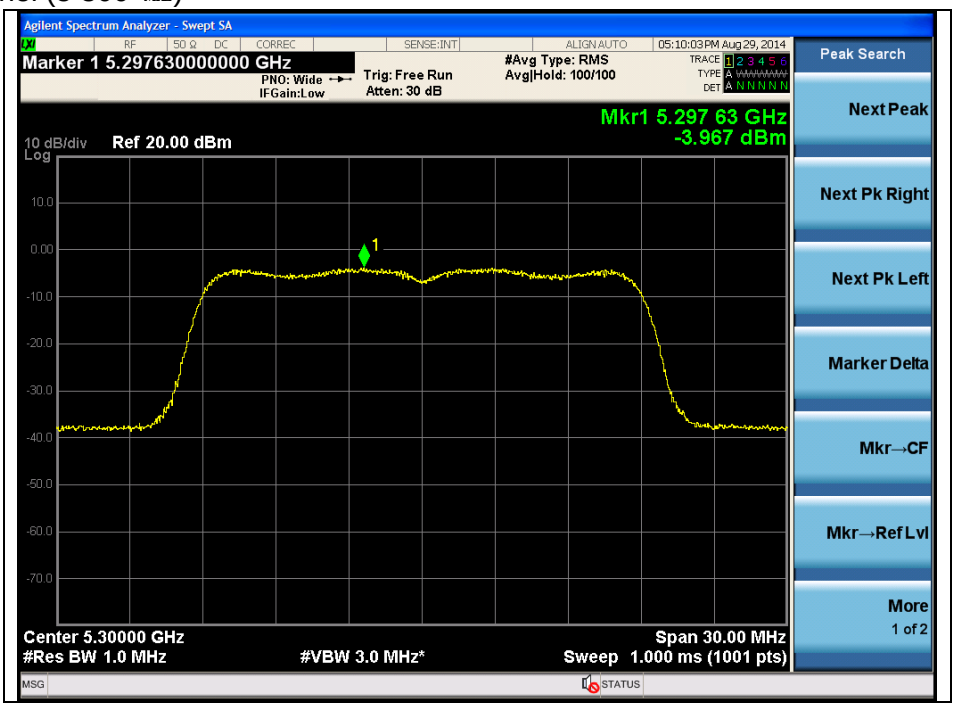


802.11ac_VHT20 (Band 2A)

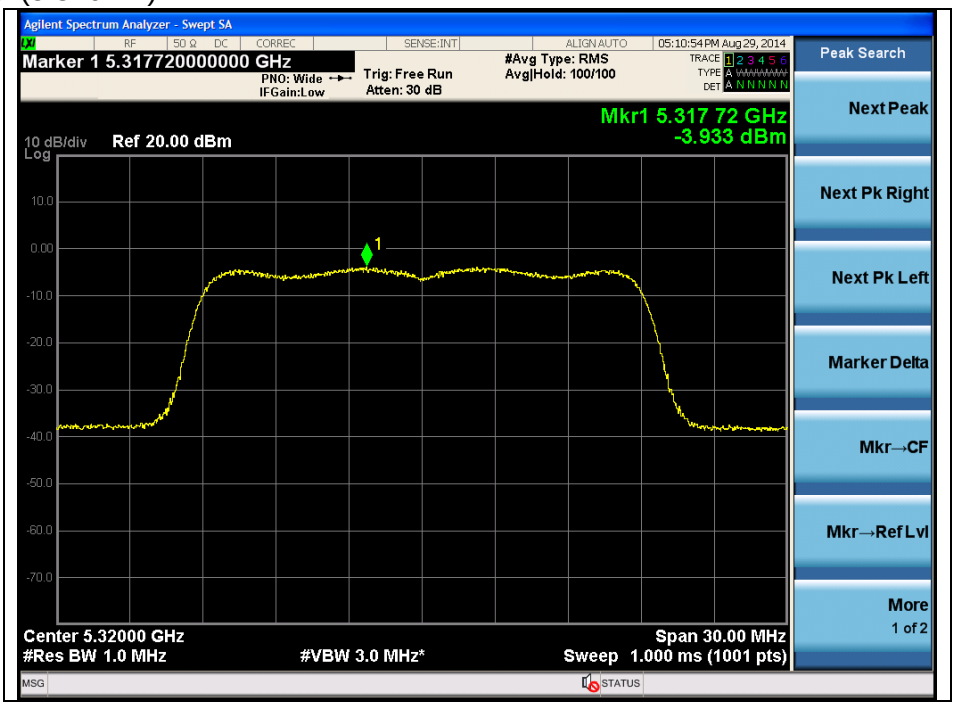
Low Channel (5 260 ㎒)



Middle Channel (5 300 ㎒)

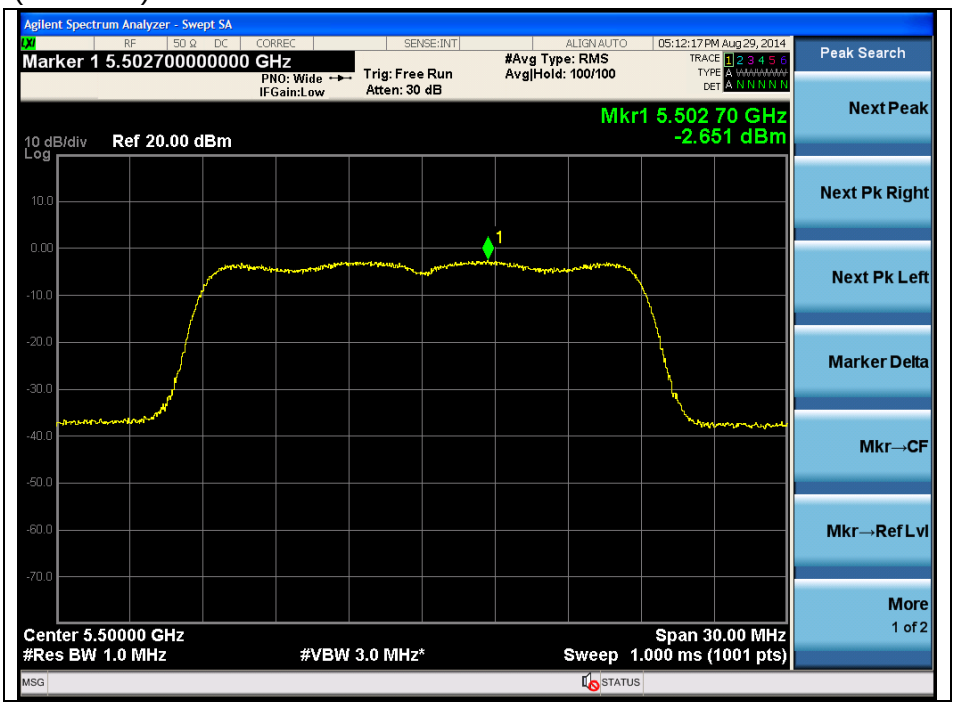


High Channel (5 320 ㎒)

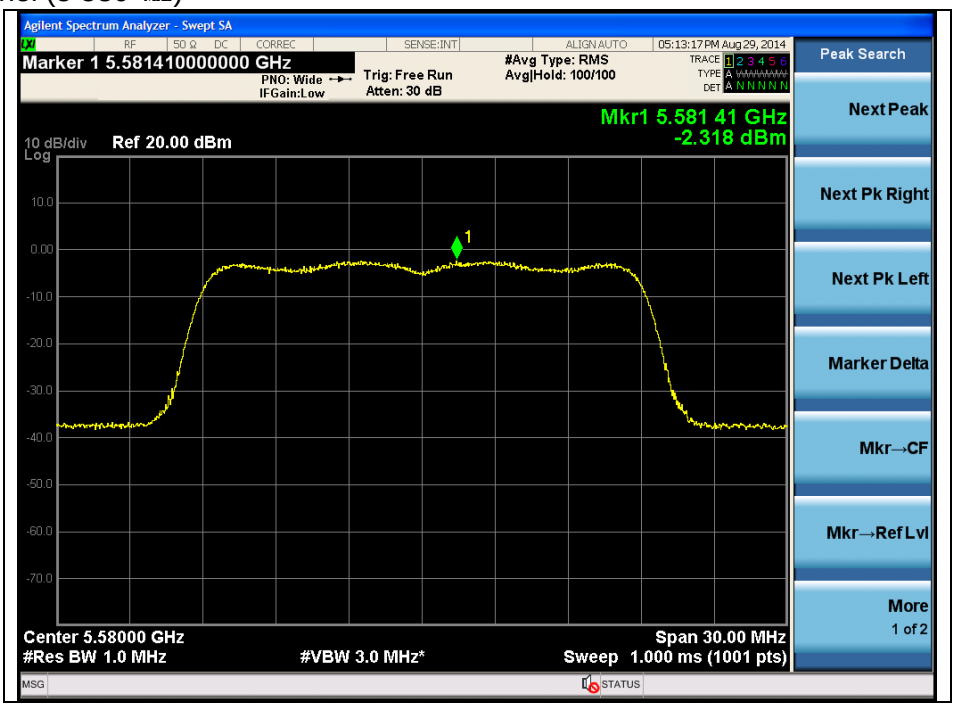


802. 11ac_VHT20 (Band 2C)

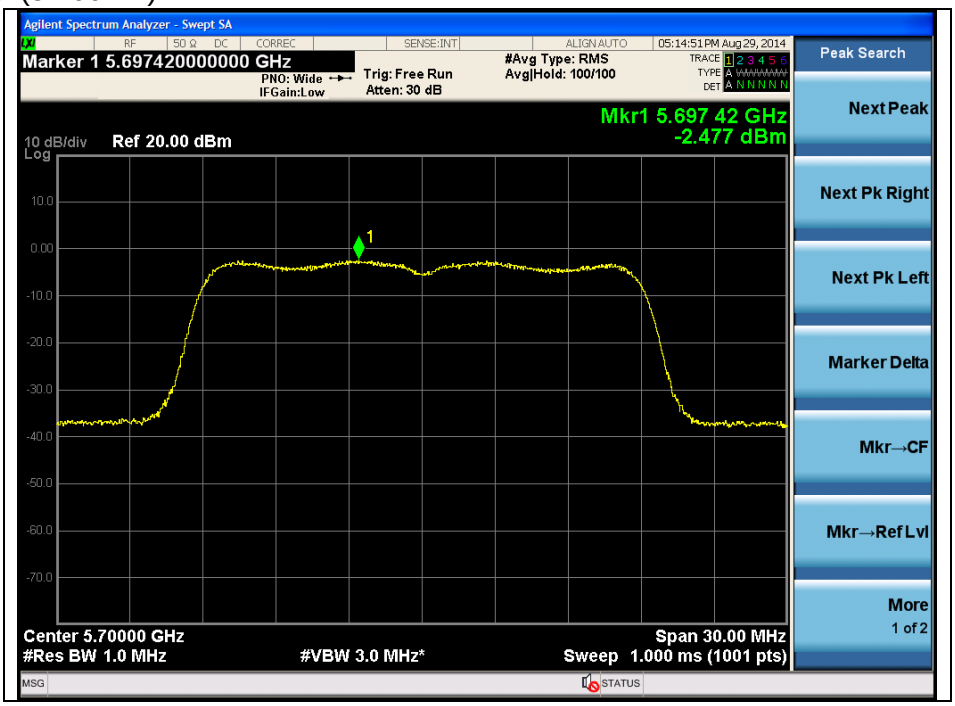
Low Channel (5 500 ㎒)



Middle Channel (5 580 ㎒)

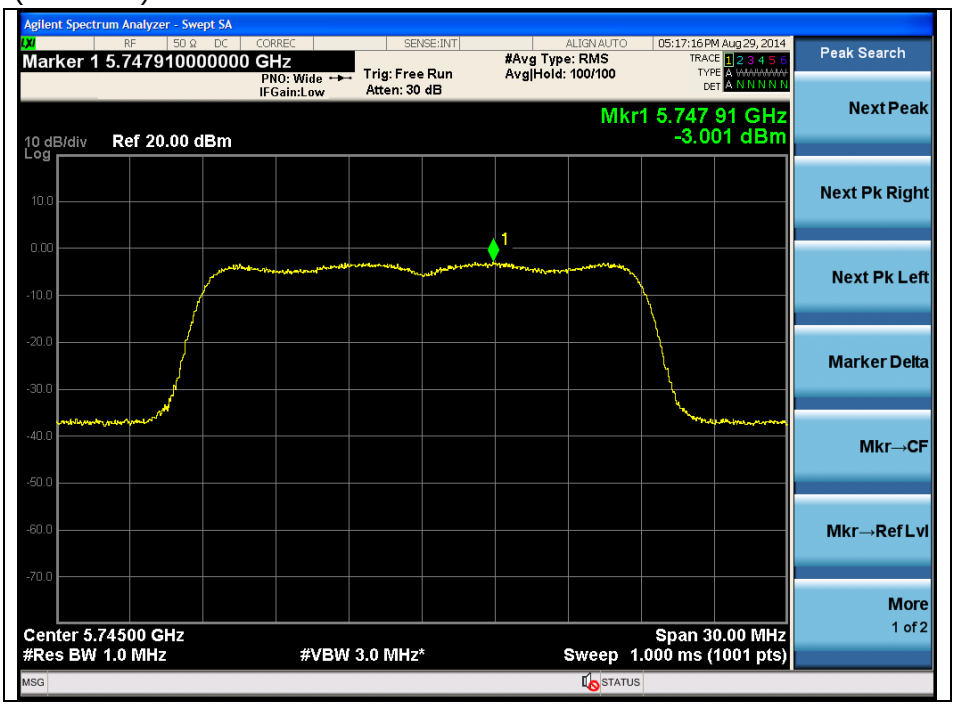


High Channel (5 700 ㎒)

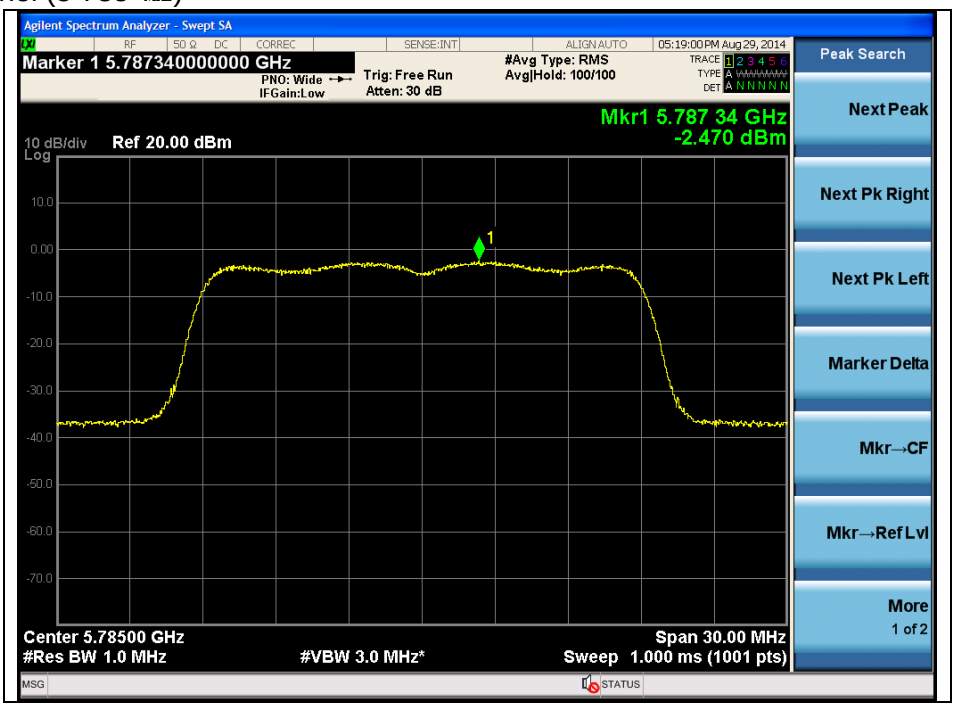


802. 11ac_VHT20 (Band 3)

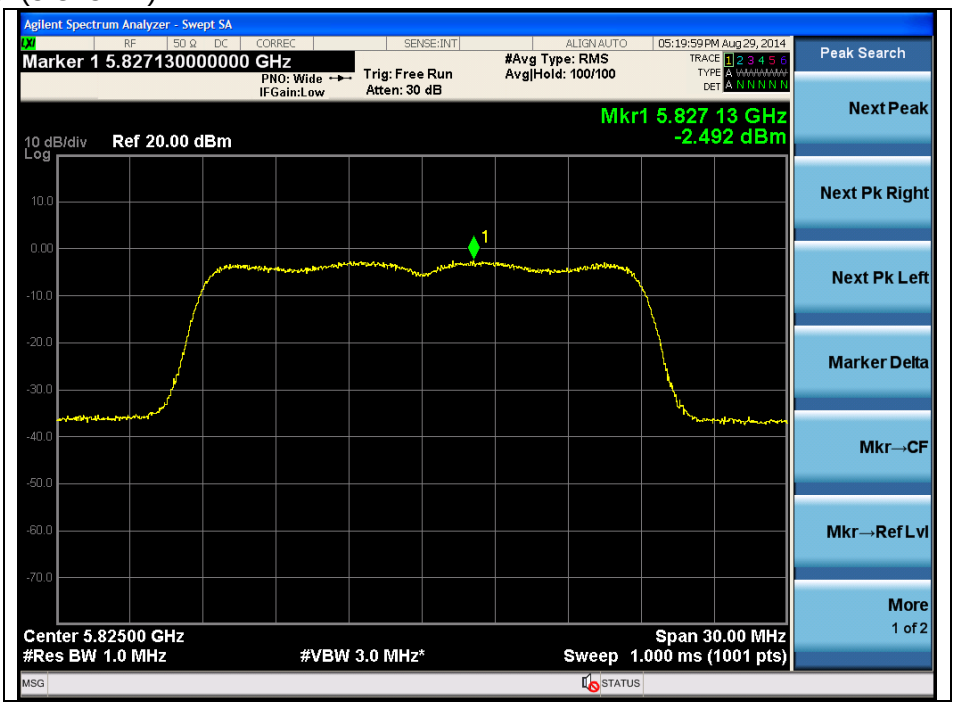
Low Channel (5 745 ㎒)



Middle Channel (5 785 ㎒)

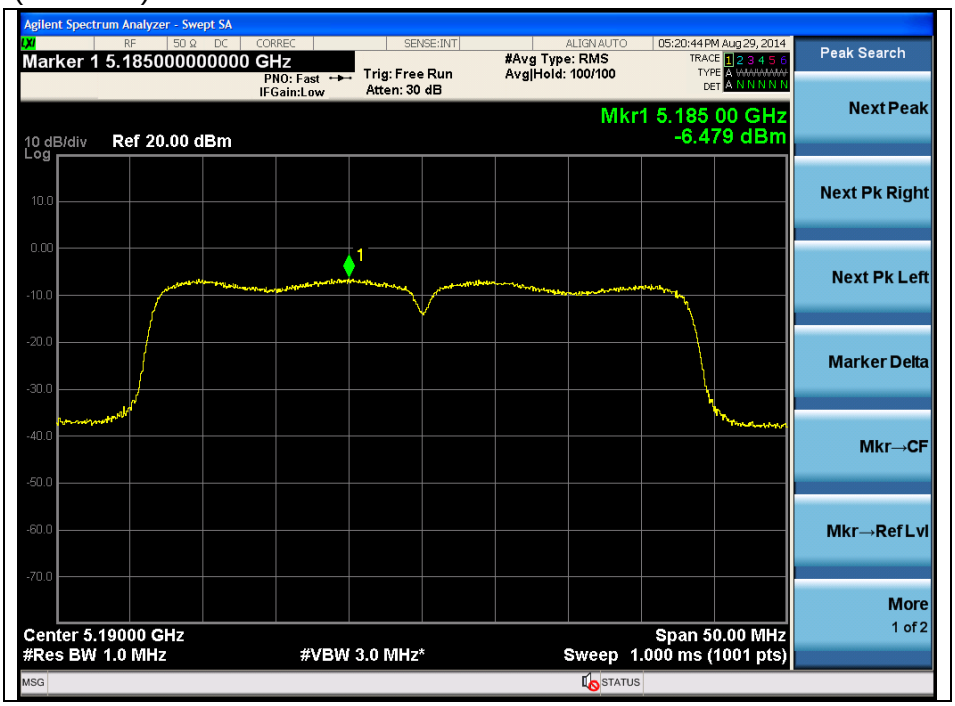


High Channel (5 825 ㎒)

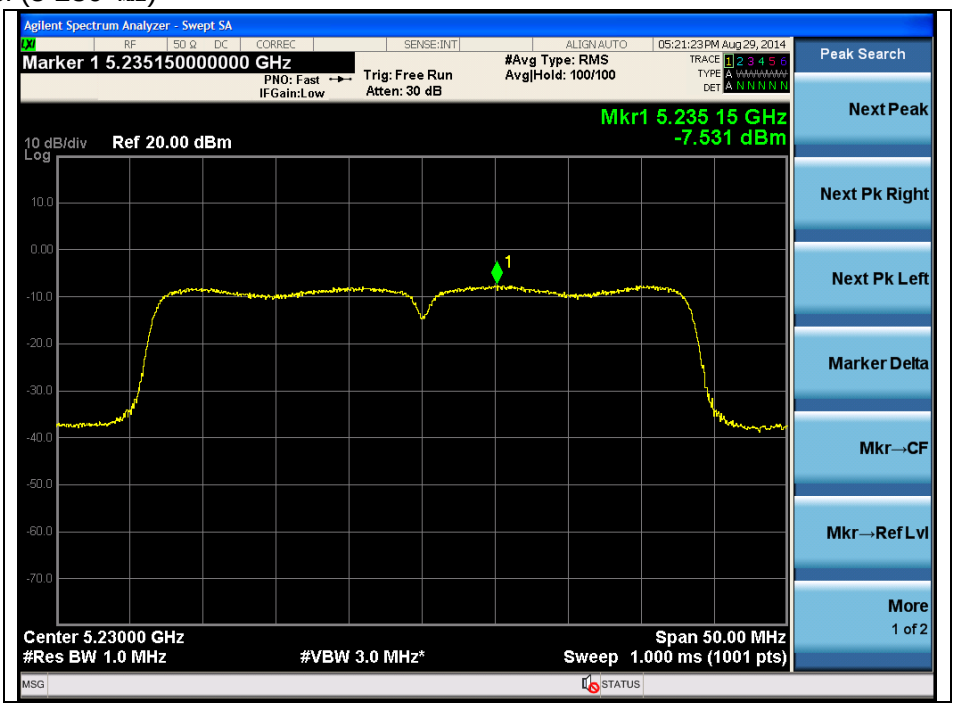


802.11ac_VHT40 (Band 1)

Low Channel (5 190 ㎒)

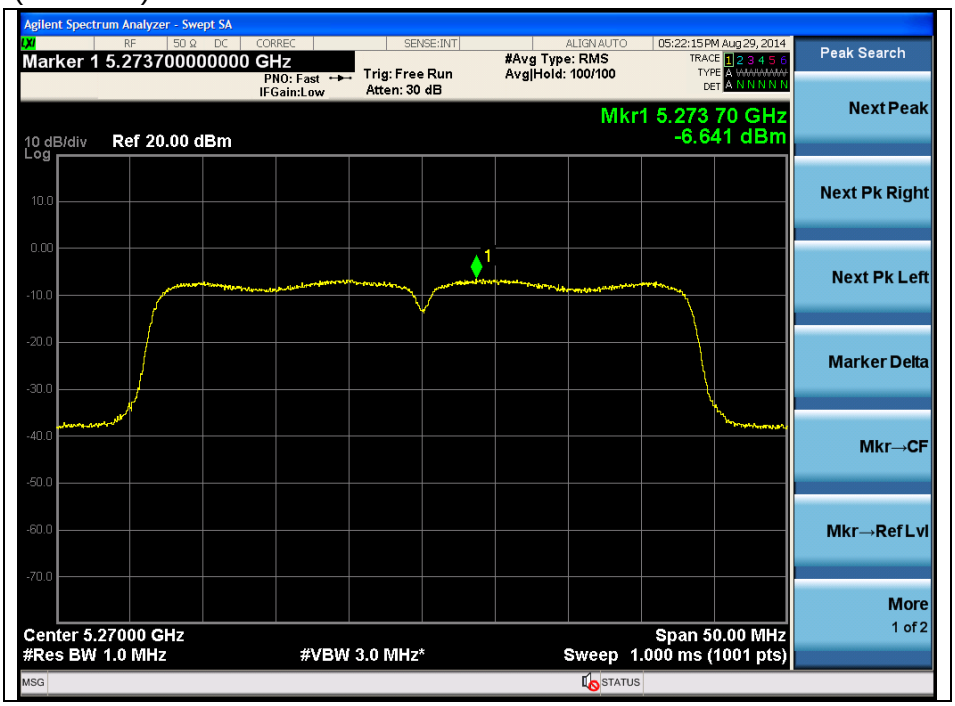


High Channel (5 230 ㎒)

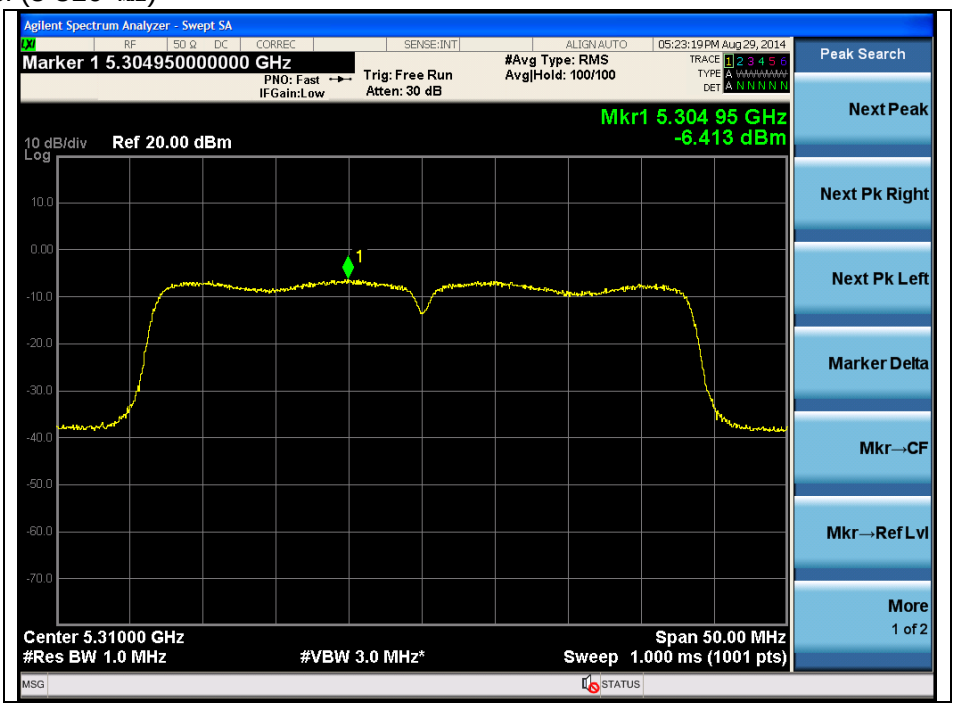


802.11ac_VHT40 (Band 2A)

Low Channel (5 270 ㎒)

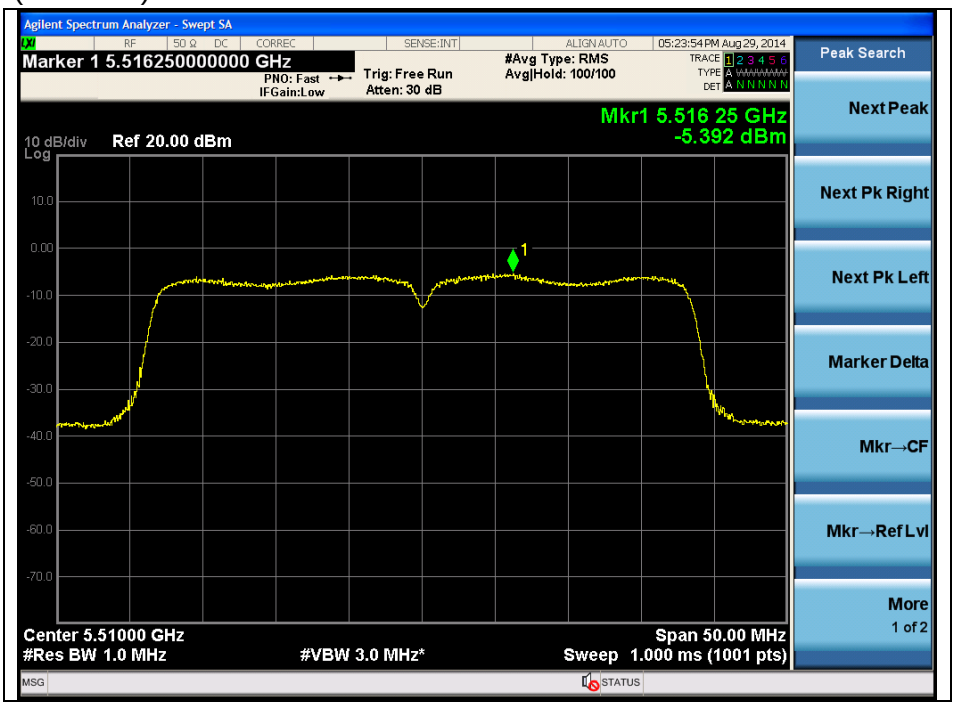


High Channel (5 310 ㎒)

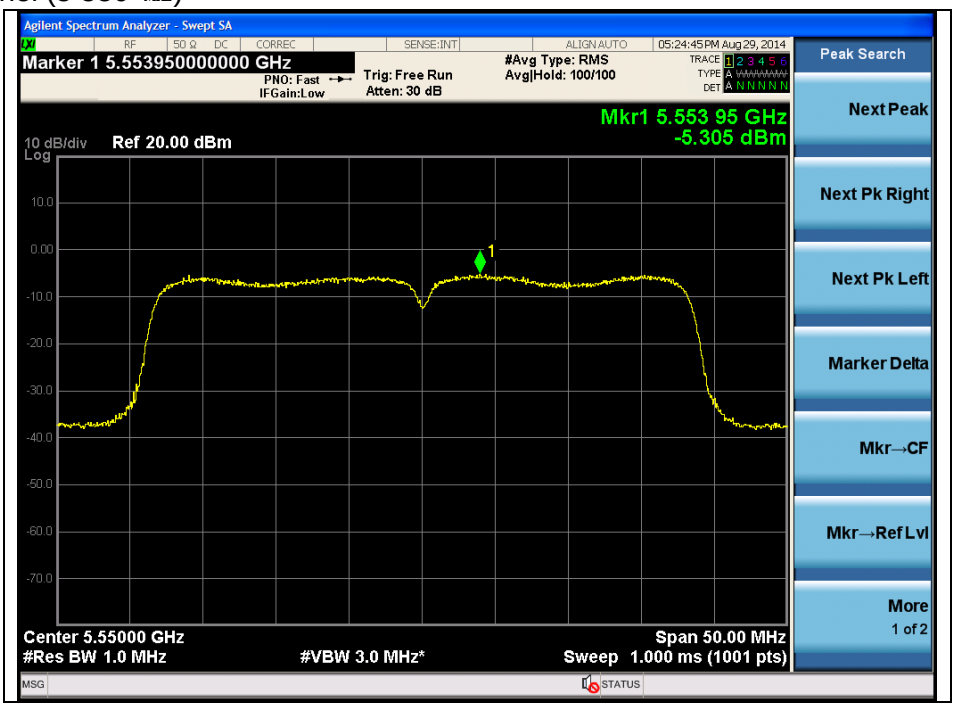


802.11ac_VHT40 (Band 2C)

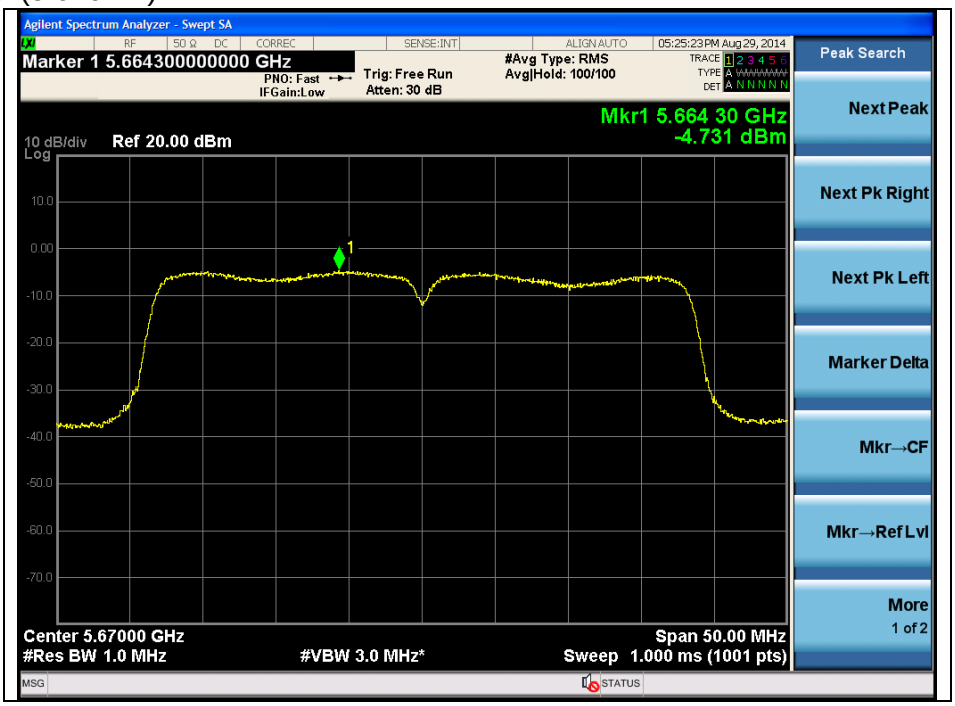
Low Channel (5 510 ㎒)



Middle Channel (5 550 ㎒)

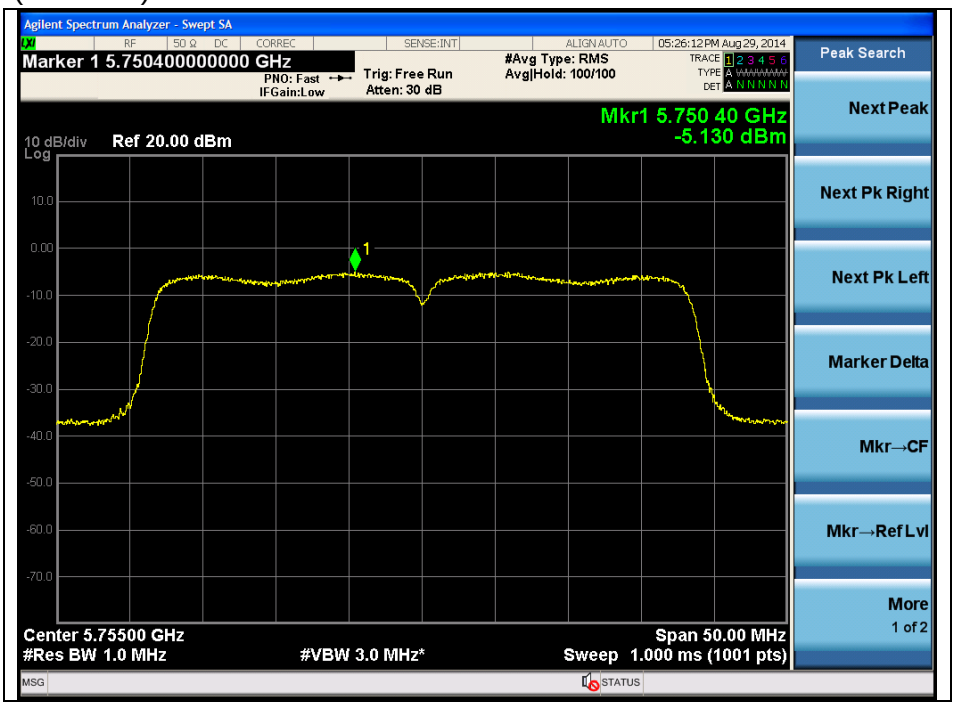


High Channel (5 670 ㎒)

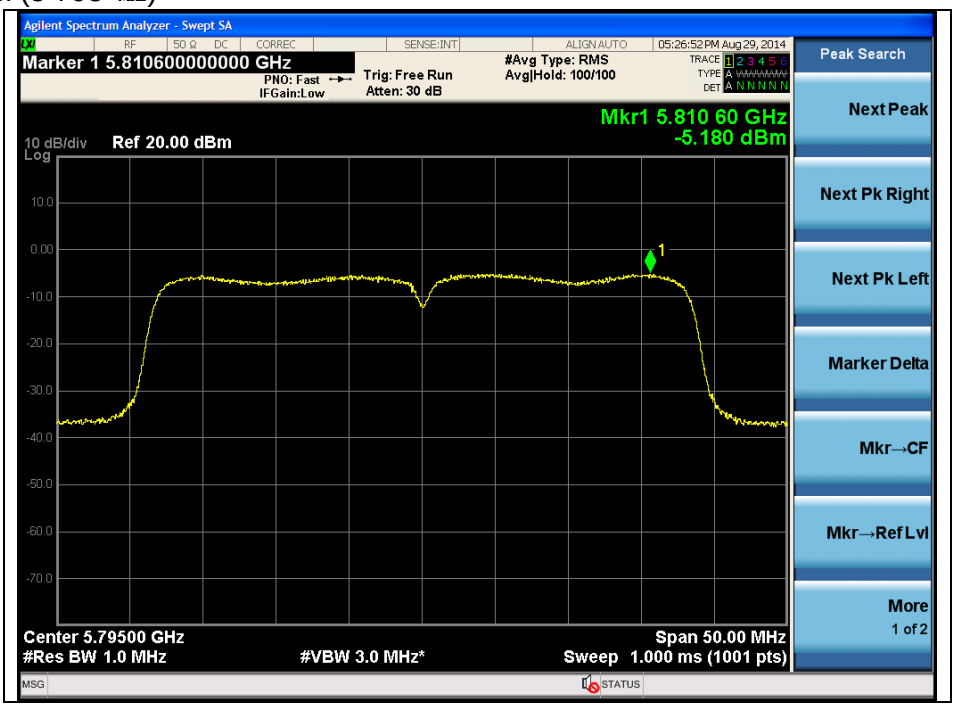


802.11ac_VHT40 (Band 3)

Low Channel (5 755 ㎒)

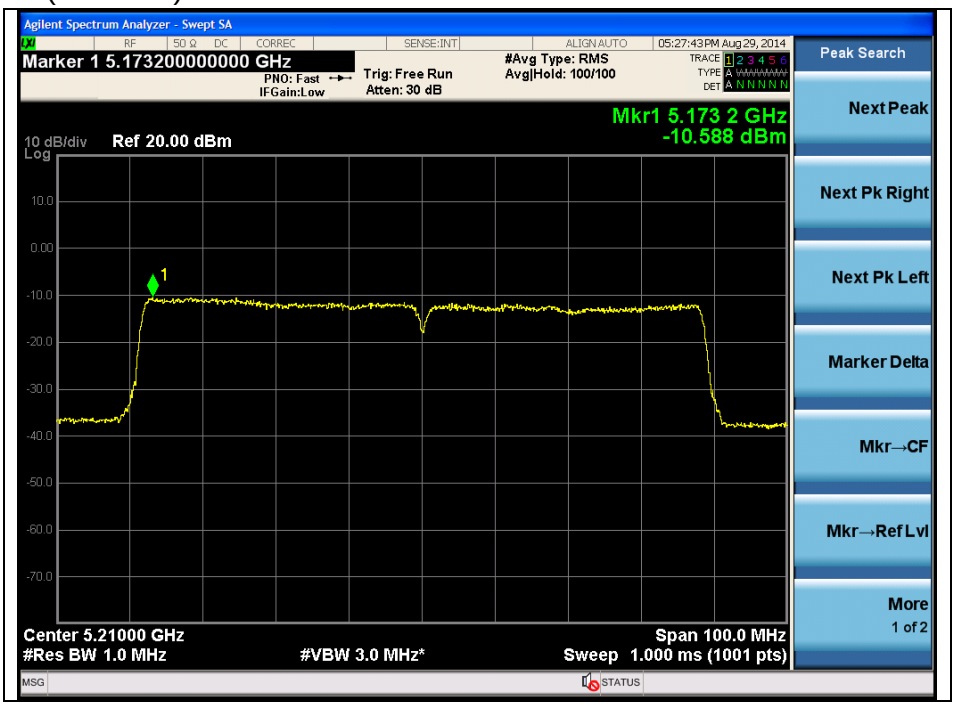


High Channel (5 795 ㎒)



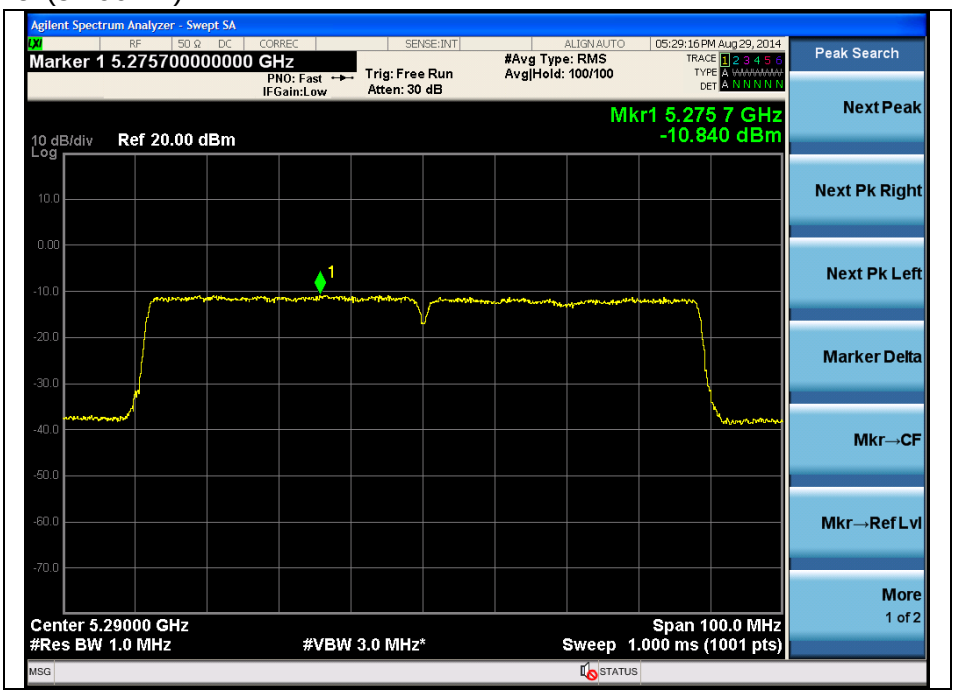
802.11ac_VHT80 (Band 1)

Middle Channel (5 210 ㎒)



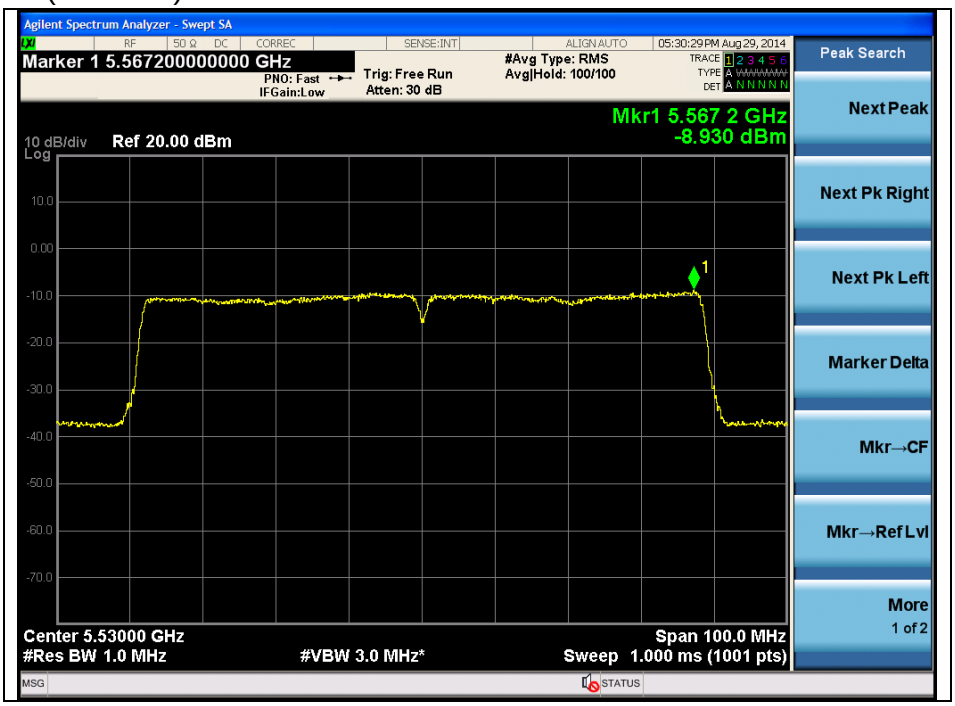
802.11ac_VHT80 (Band 2A)

Middle Channel (5 290 ㎒)



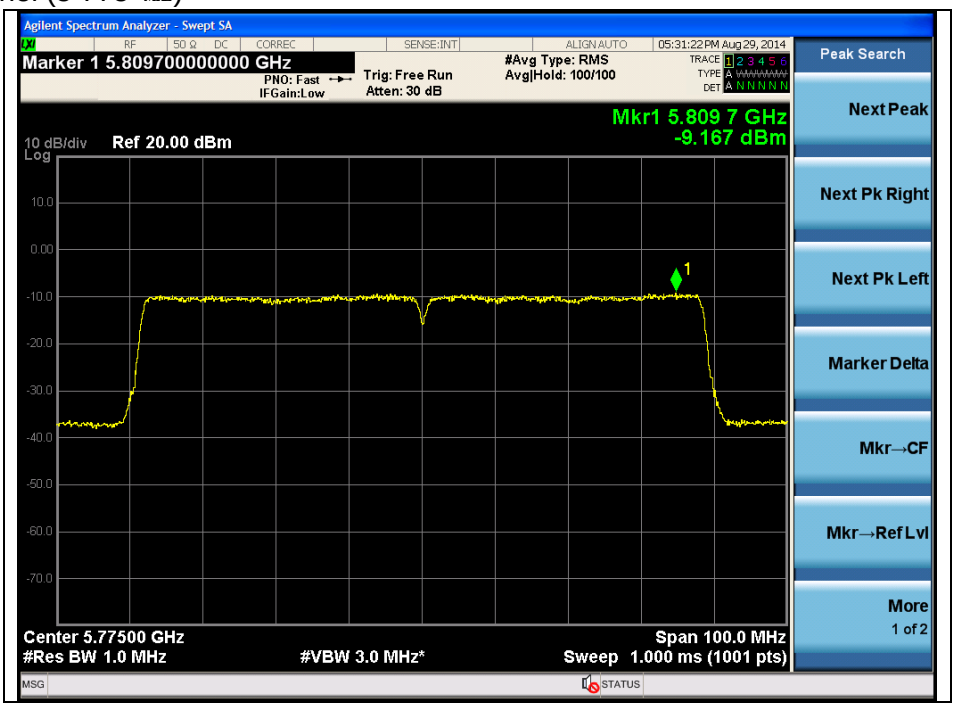
802.11ac_VHT80 (Band 2C)

Middle Channel (5 530 ㎒)



802.11ac_VHT80 (Band 3)

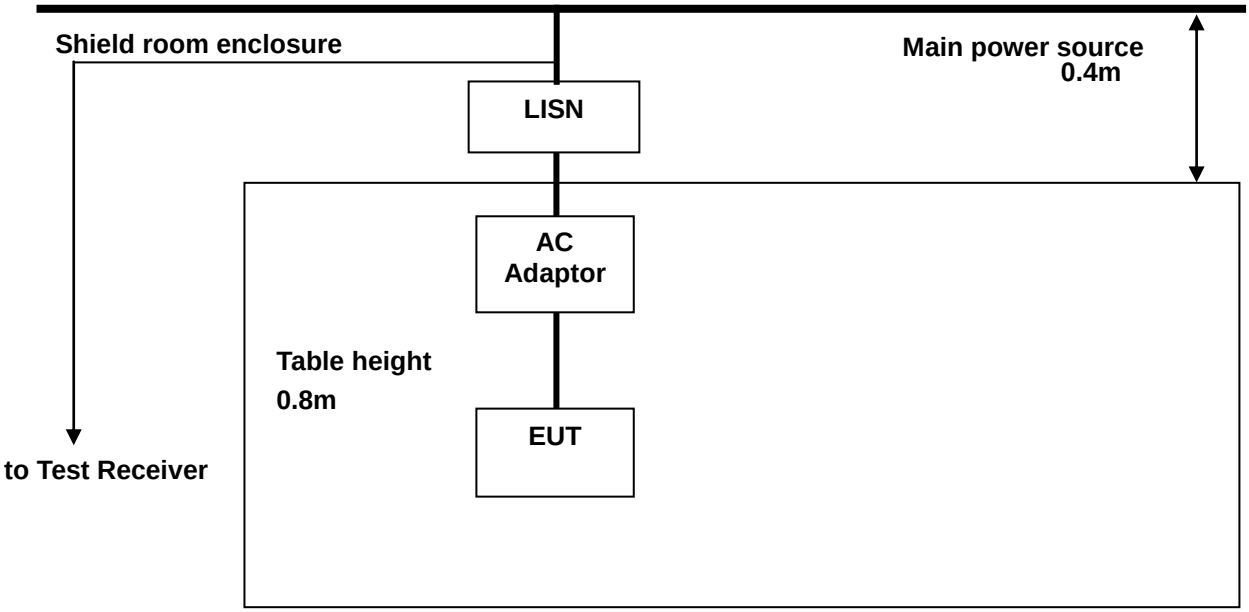
Middle Channel (5 775 ㎒)



The results shown in this test report refer only to the sample(s) tested unless otherwise stated. This test report cannot be reproduced, except in full, without prior written permission of the Company.

8. Transmitter AC Power Line Conducted Emission

8.1. Test Setup



8.2. Limit

According to §15.207(a) for an intentional radiator that is designed to be connected to the public utility (AC) power line, the radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies, within the band 150 ㎑ to 30 ㎒, shall not exceed the limits in the following table, as measured using a 50 uH/50 ohm line impedance stabilization network(LISN).
Compliance with the provision of this paragraph shall on the measurement of the radio frequency voltage between each power line and ground at the power terminal. The lower applies at the boundary between the frequency ranges.

Frequency of Emission (㎒)	Conducted limit (㏈㎶)	
	Quasi-peak	Average
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.

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8.3. Test Procedures

All data rates and modes were investigated for this test. The full data for the worst case data rate are reported in this section.
AC line conducted emissions from the EUT were measured according to the dictates of ANSI C63.4-2003

1. The test procedure is performed in a 6.5m × 3.6m× 3.6m (L × W × H) shielded room. The EUT along with its peripherals were placed on a 1.0 m(W)× 1.5 m(L) and 0.8 m in height wooden table and the EUT was adjusted to maintain a 0.4 meter space from a vertical reference plane.
2. The EUT was connected to power mains through a line impedance stabilization network (LISN) which provides 50 ohm coupling impedance for measuring instrument and the chassis ground was bounded to the horizontal ground plane of shielded room.
3. The excess power cable between the EUT and the LISN was bundled. All connecting cables of EUT were moved to find the maximum emission.

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8.4. Test Results

The following table shows the highest levels of conducted emissions on both phase of Hot and Neutral line

Ambient temperature : (23 ± 1) ℃
Relative humidity : 47 % R.H.

Frequency range : 0.15 ㎒ – 30 ㎒
Measured Bandwidth : 9 ㎑

FREQ.	LEVEL(dBμV)		LINE	LIMIT(dBμV)		MARGIN(dB)	
(㎒)	Q-Peak	Average		Q-Peak	Average	Q-Peak	Average
0.28	39.10	27.10	H	60.82	50.82	21.72	23.72
0.41	32.50	17.60	H	57.65	47.65	25.15	30.05
1.11	33.10	15.30	H	56.00	46.00	22.90	30.70
1.53	32.50	13.50	H	56.00	46.00	23.50	32.50
3.98	31.80	14.80	H	56.00	46.00	24.20	31.20
18.74	25.80	20.00	H	60.00	50.00	34.20	30.00
0.28	36.50	23.30	N	60.82	50.82	24.32	27.52
0.42	33.00	19.00	N	57.45	47.45	24.45	28.45
0.57	32.30	18.10	N	56.00	46.00	23.70	27.90
1.26	30.90	14.60	N	56.00	46.00	25.10	31.40
4.20	32.80	17.10	N	56.00	46.00	23.20	28.90
18.35	26.40	21.10	N	60.00	50.00	33.60	28.90

Remark;

1. Line (H): Hot, Line (N): Neutral
2. All modes of operation were investigated and the worst-case emissions were reported using 11a Mode 6 Mbps, 44 channel
3. Traces shown in plot mad using a peak detector and average detector
4. The limit for Class B device(s) from 150 ㎑ to 30 ㎒ are specified in Section of the Title 47 CFR.
5. Deviations to the Specifications: None.

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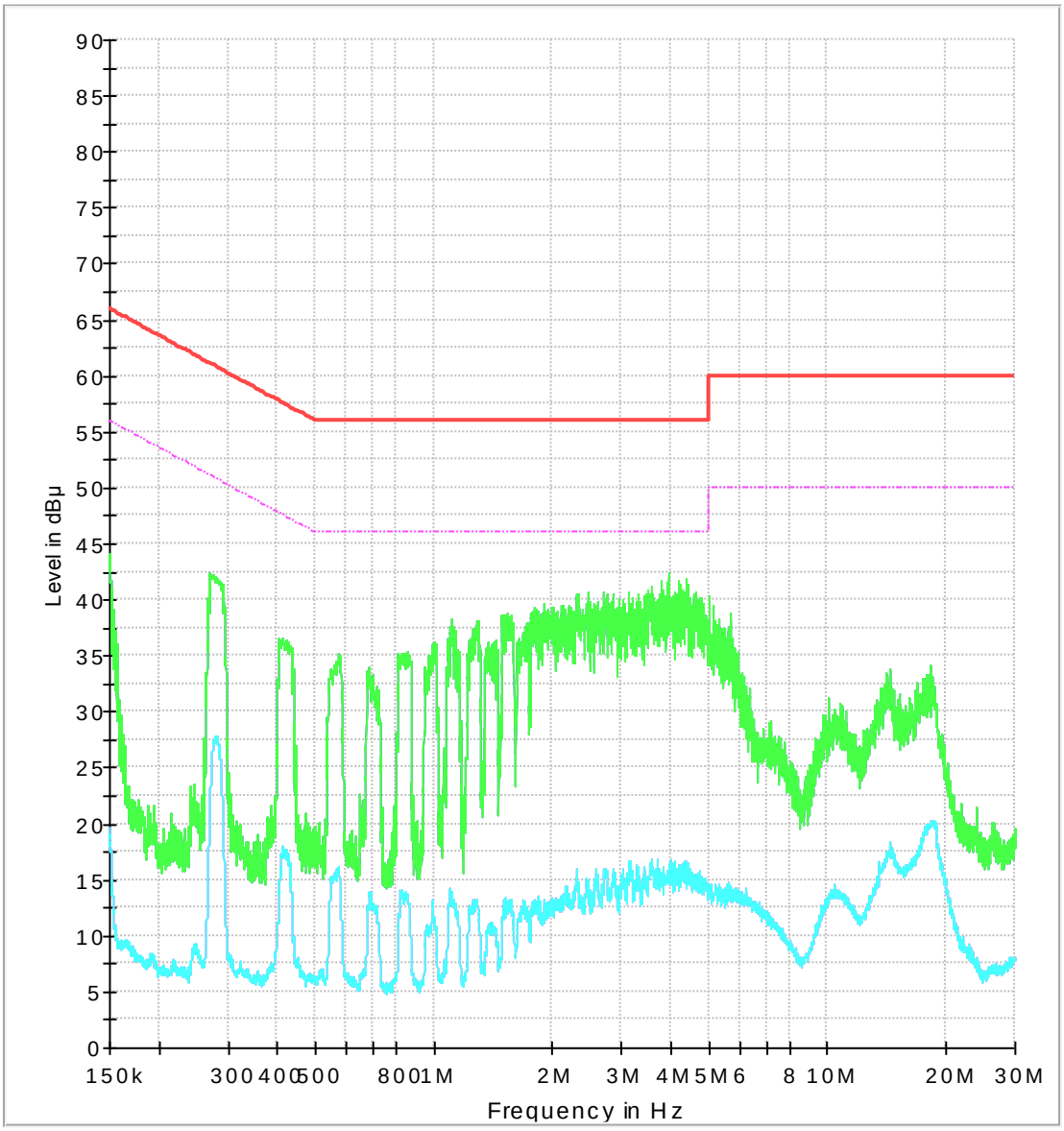
Plots of Conducted Power line

Test mode : (Neutral)



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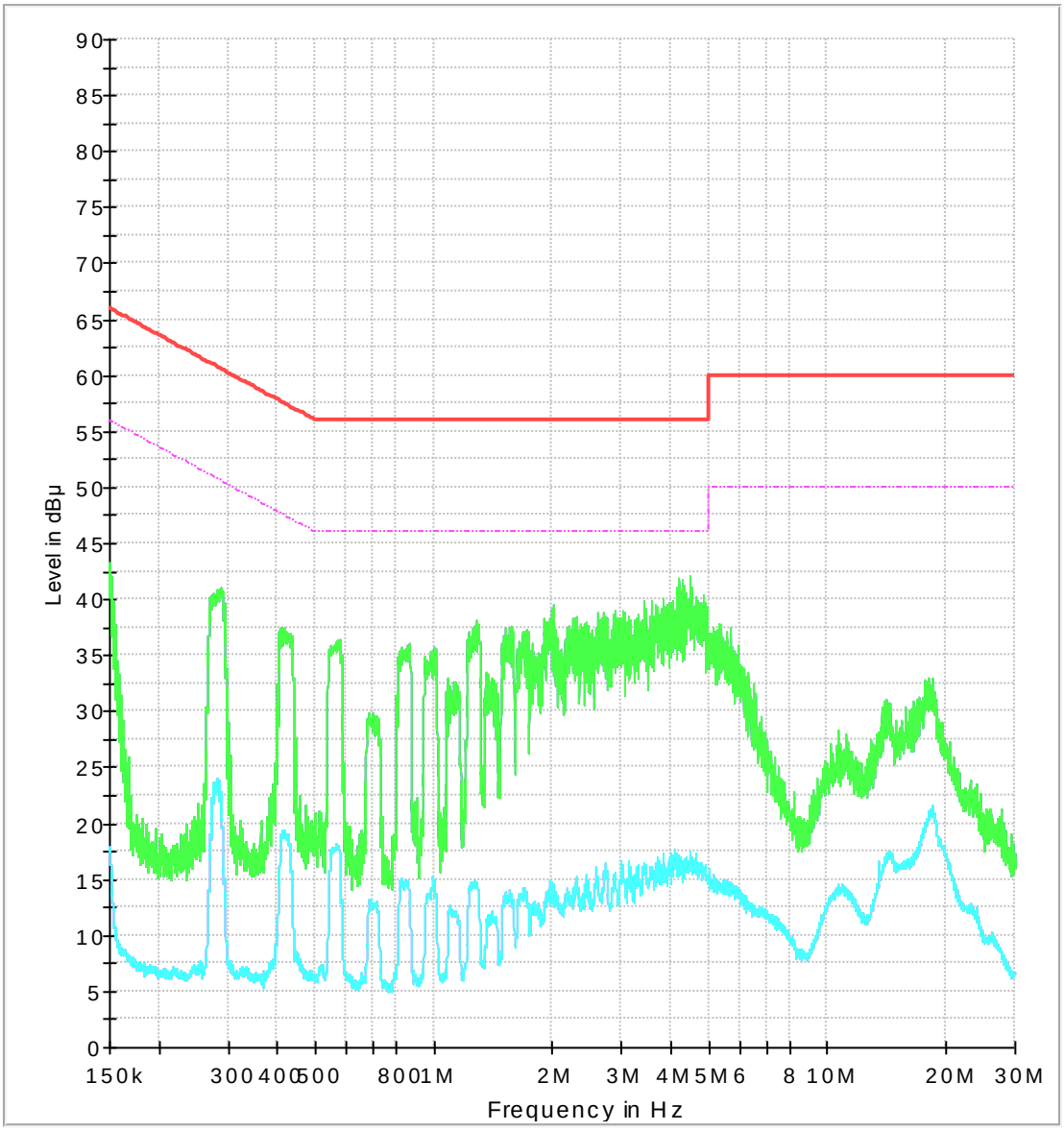
Test mode : (Hot)