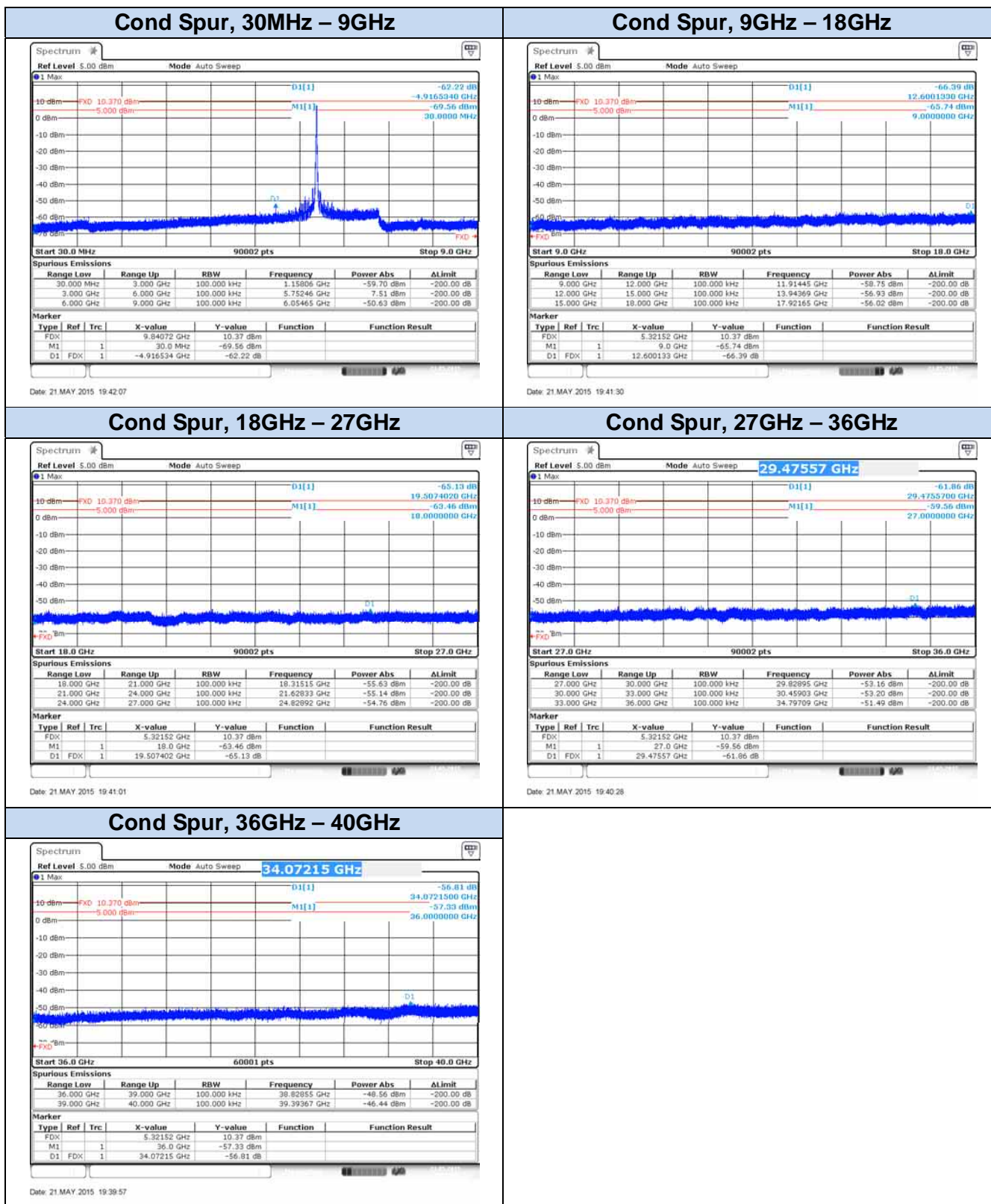
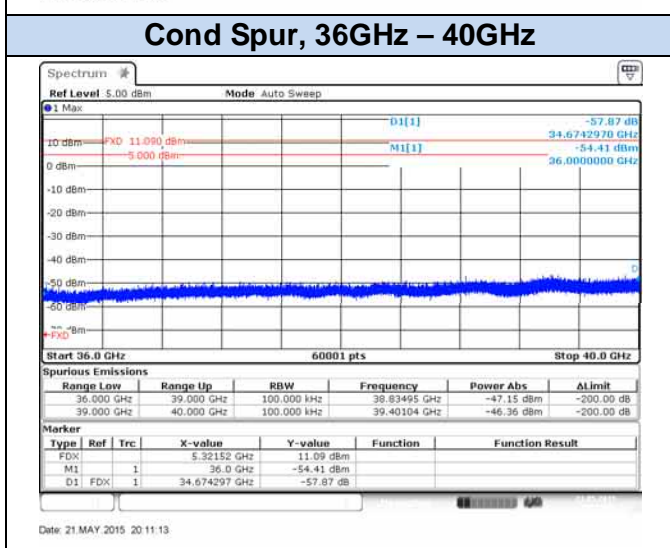
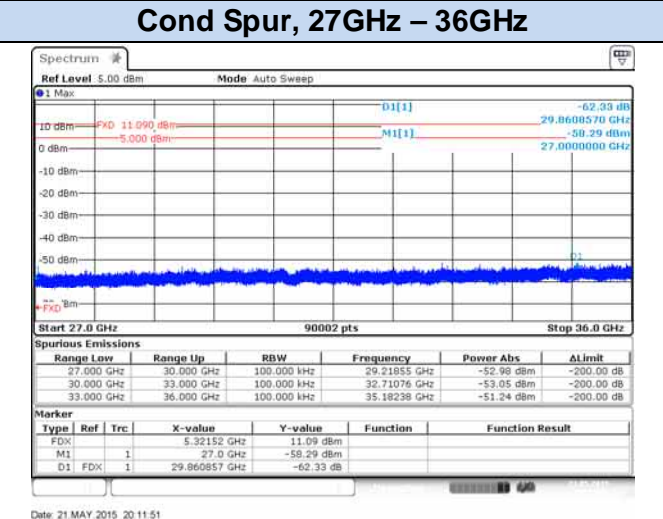
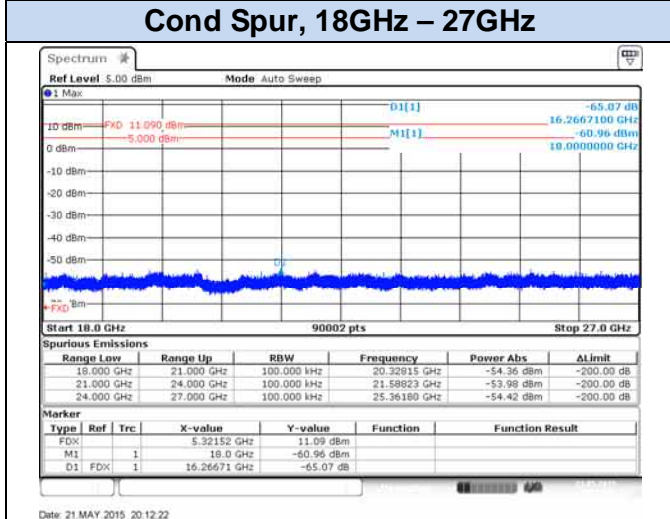
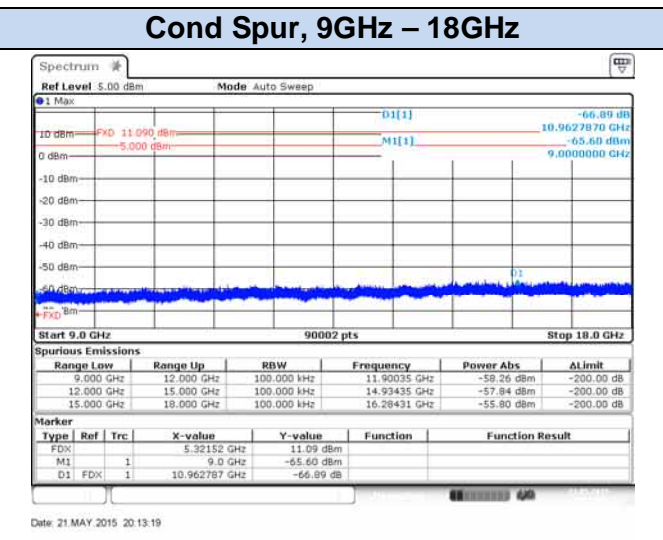
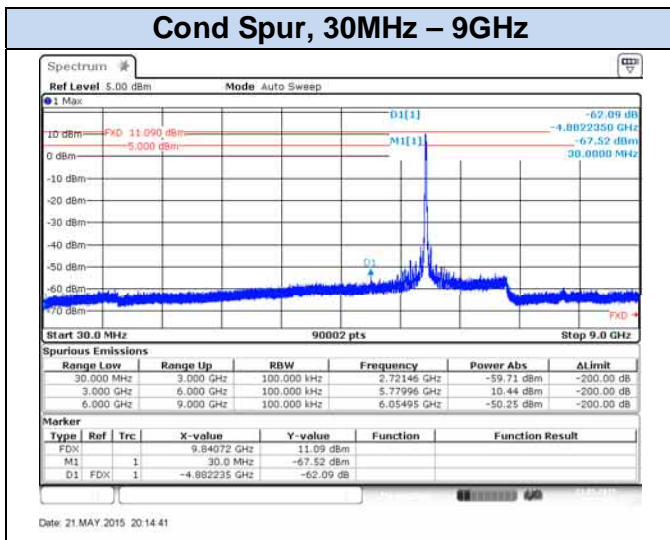


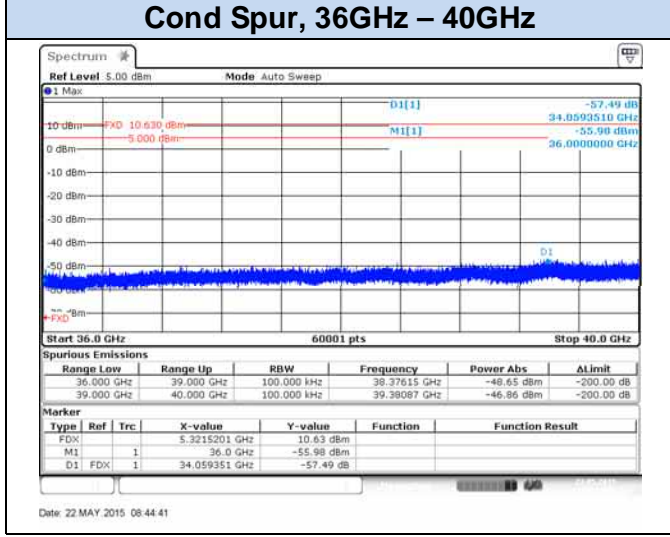
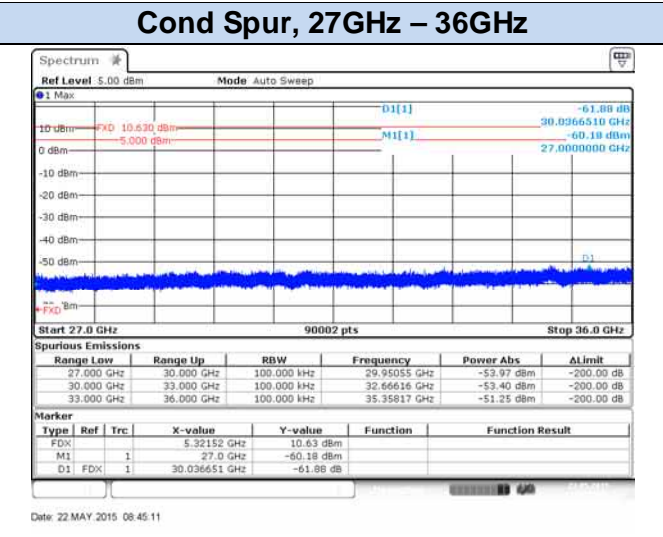
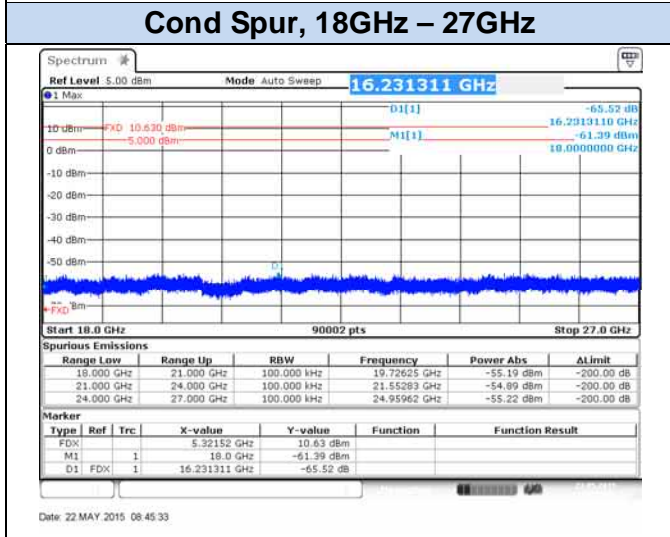
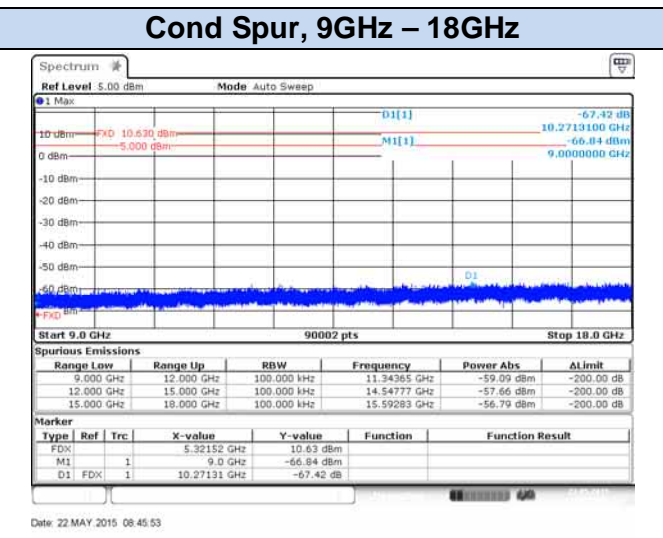
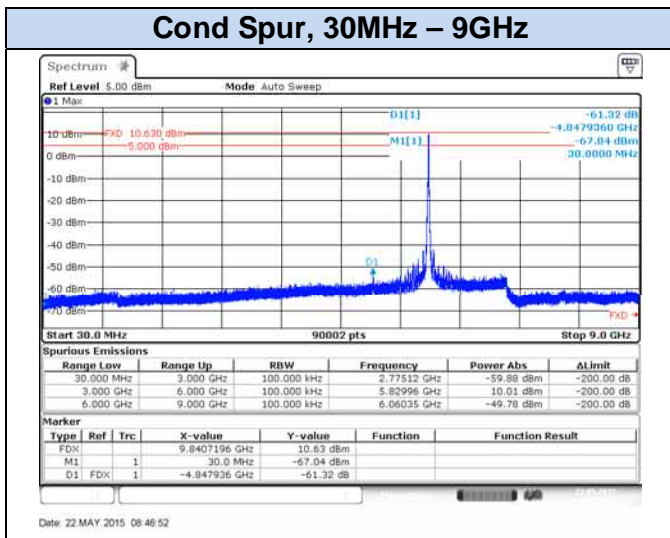
802.11n20, HT0 (SISO) – Chain B, CH149



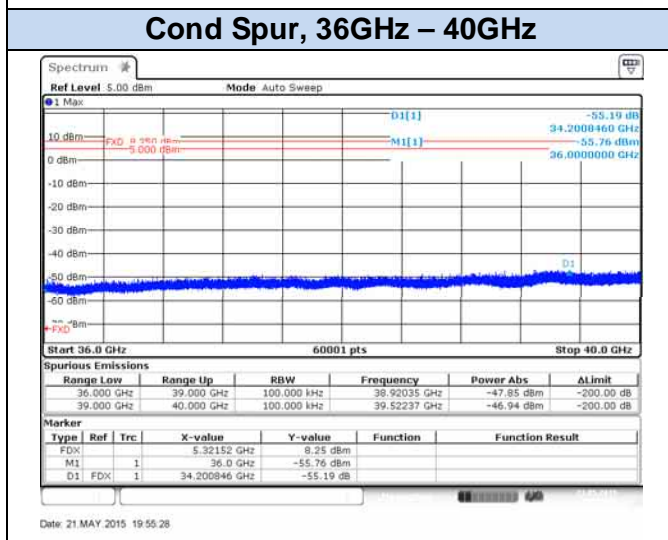
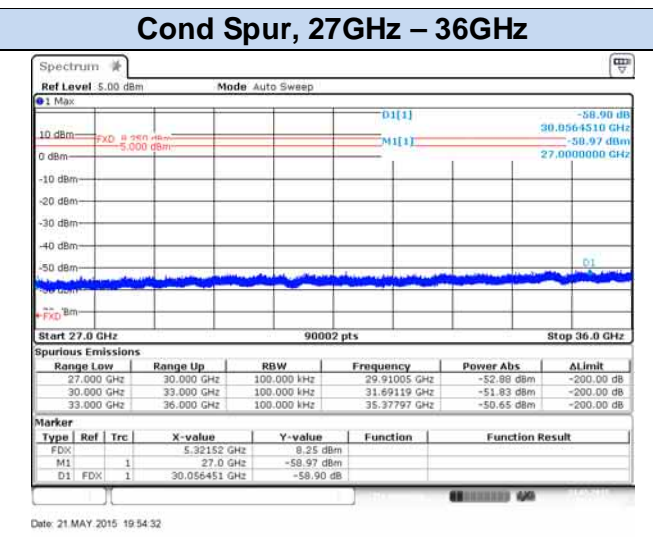
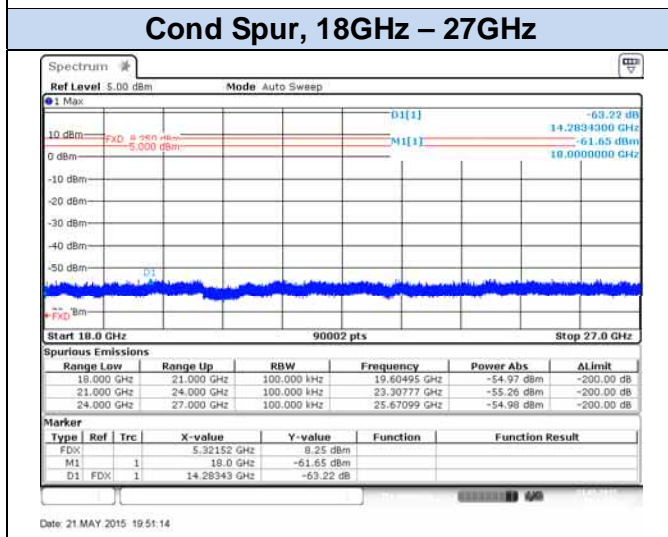
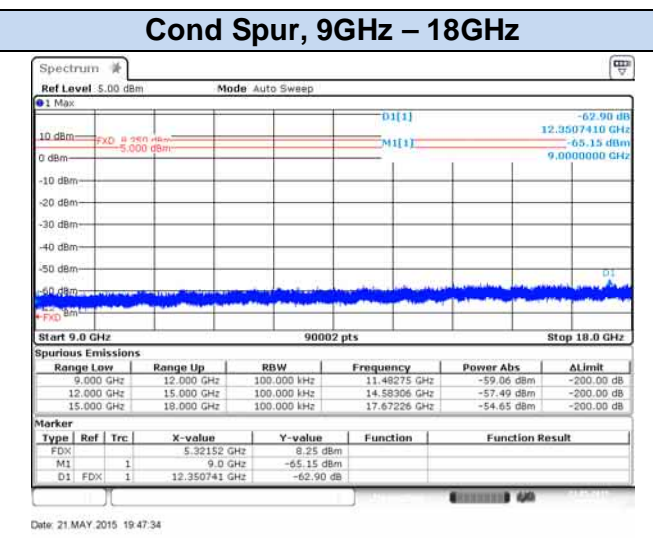
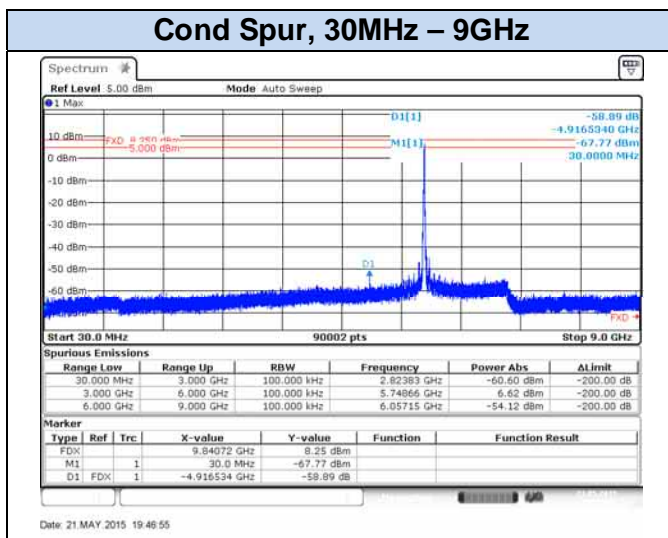
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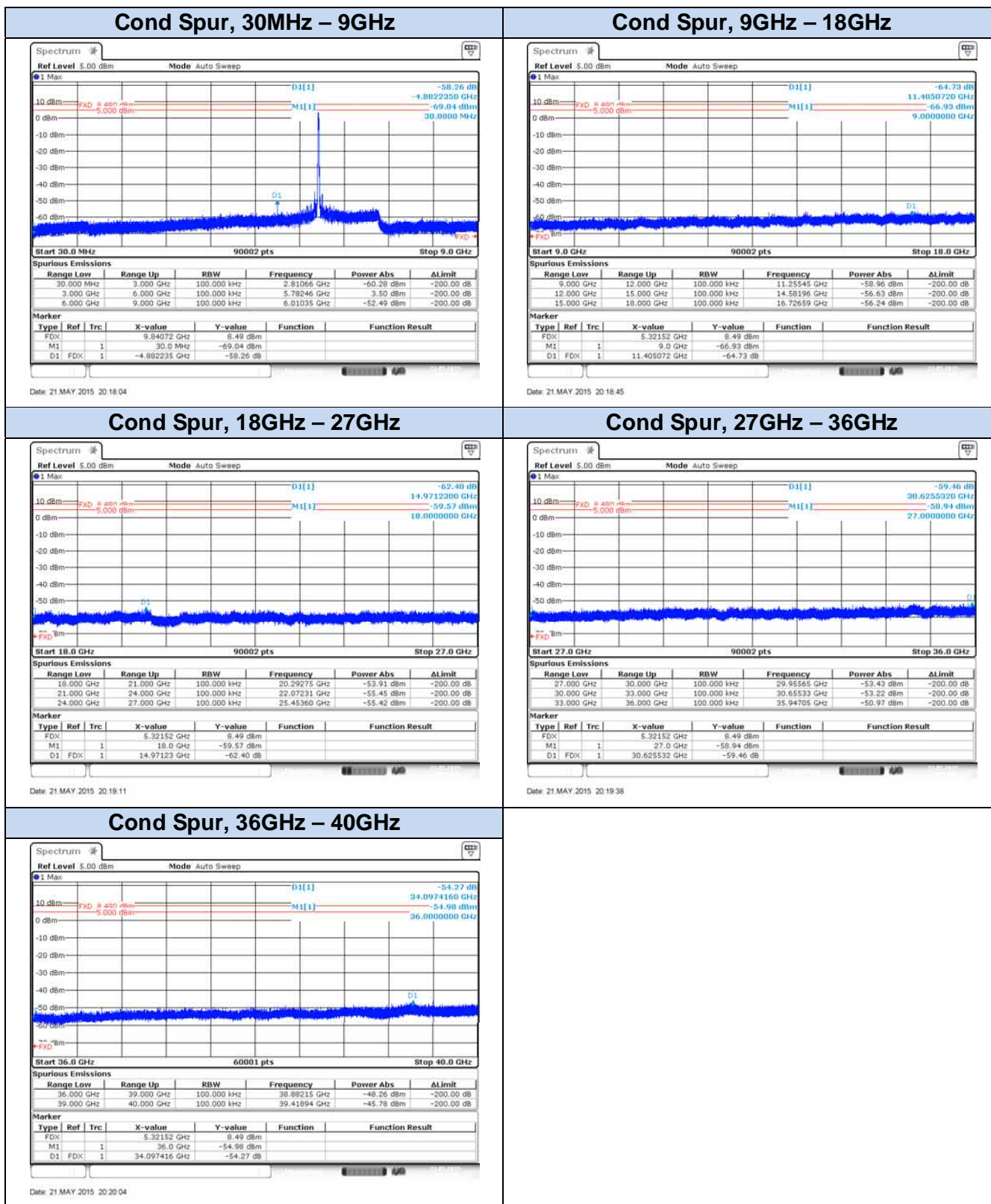
802.11n20, HT0 (SISO) – Chain B, CH165



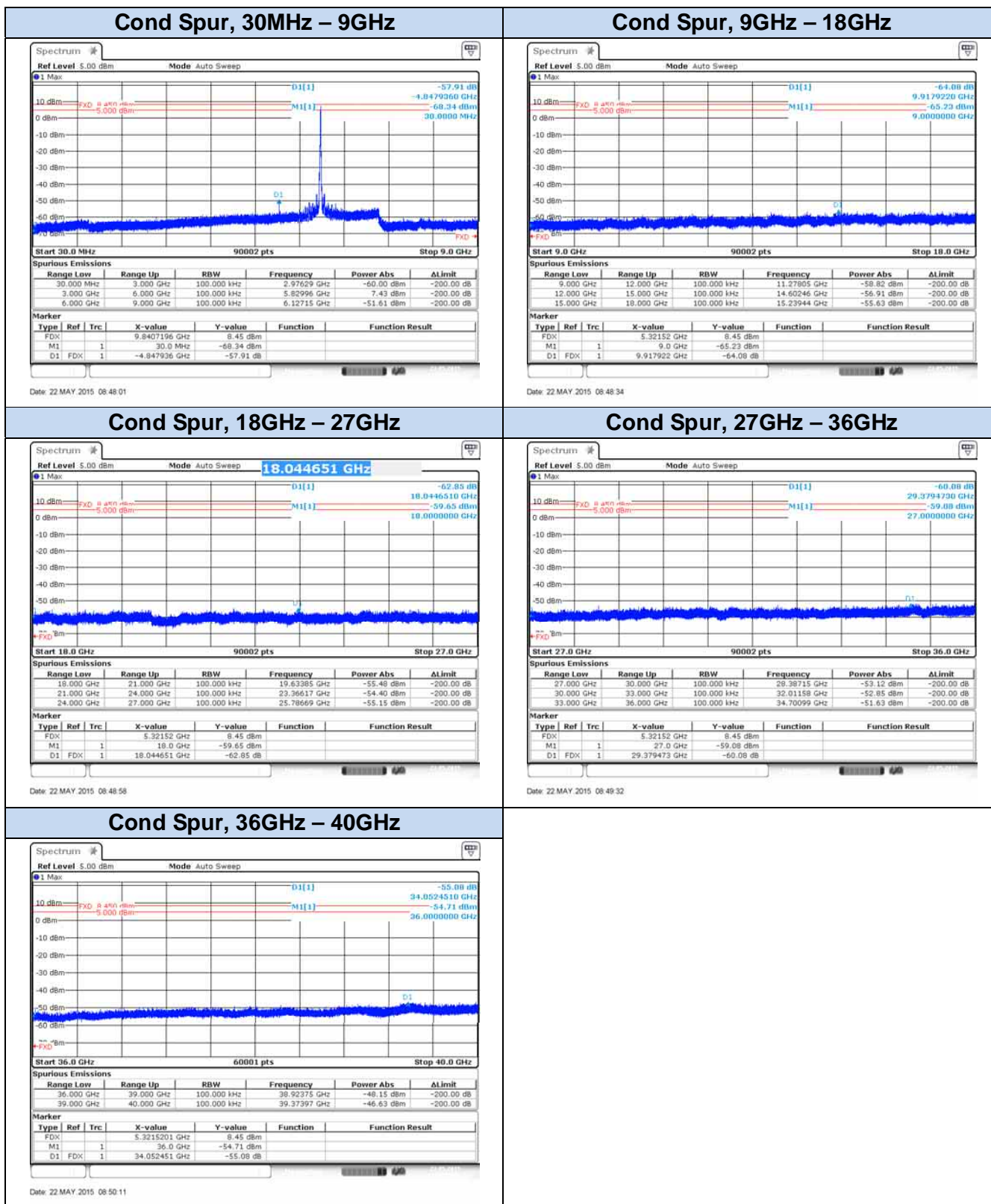
802.11n20, HT8 (MIMO) – Chain A, CH149



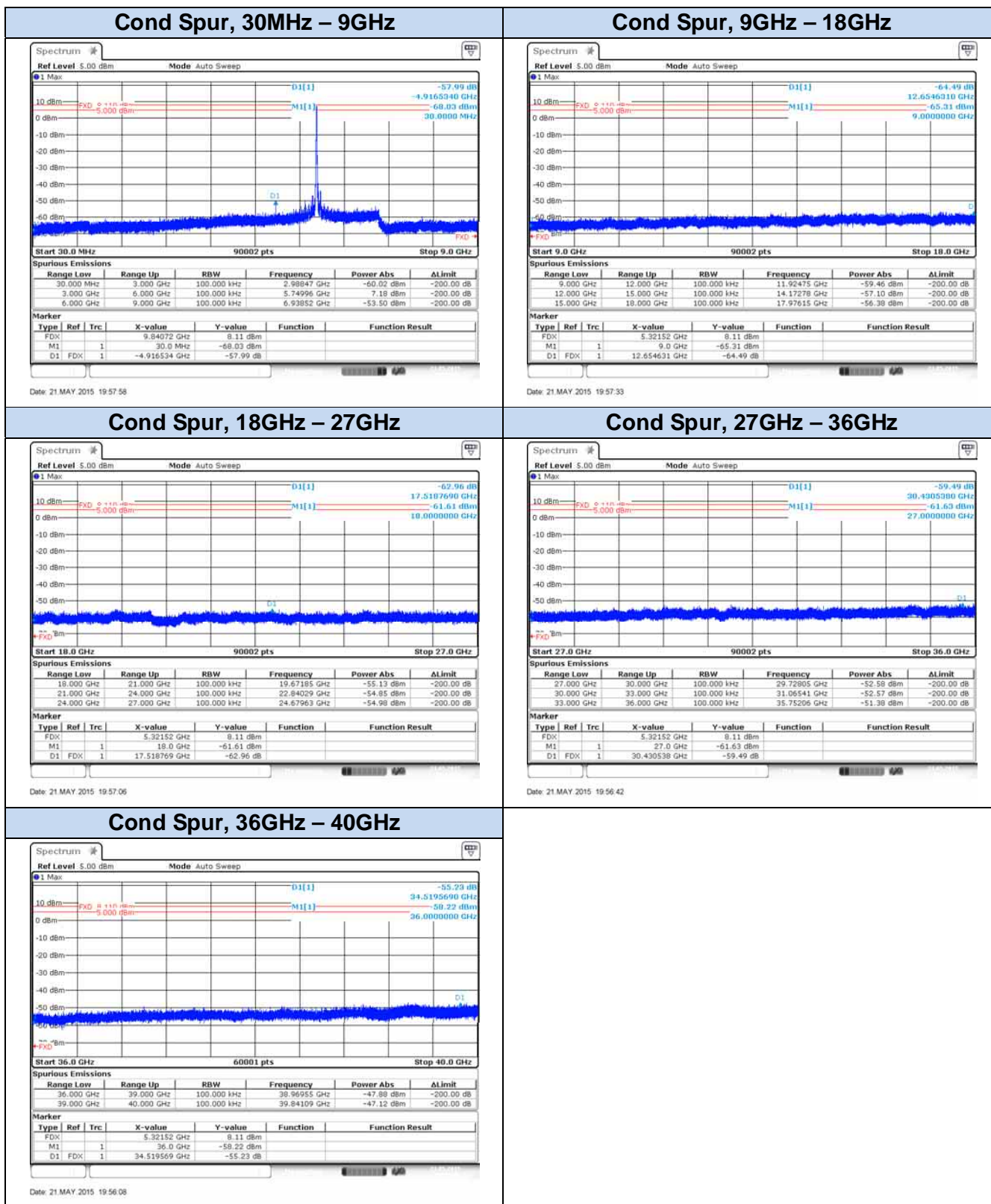
802.11n20, HT8 (MIMO) – Chain A, CH157



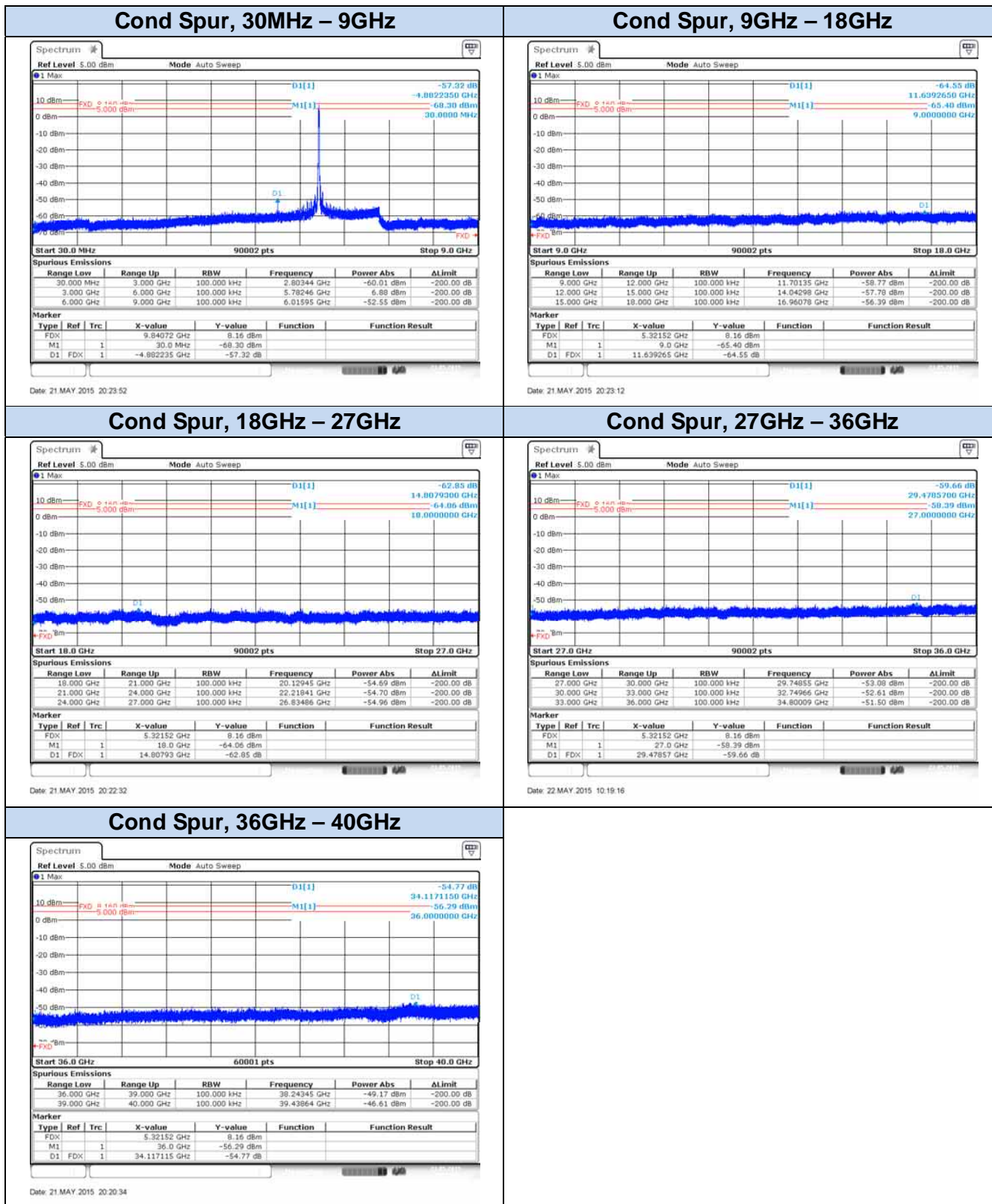
802.11n20, HT8 (MIMO) – Chain A, CH165



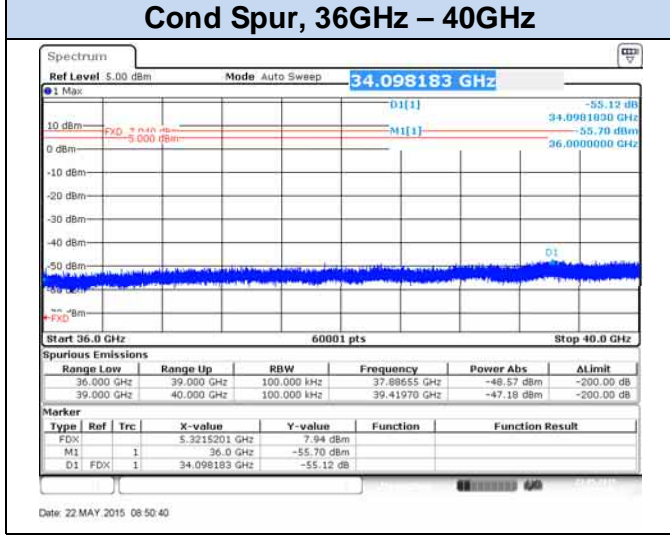
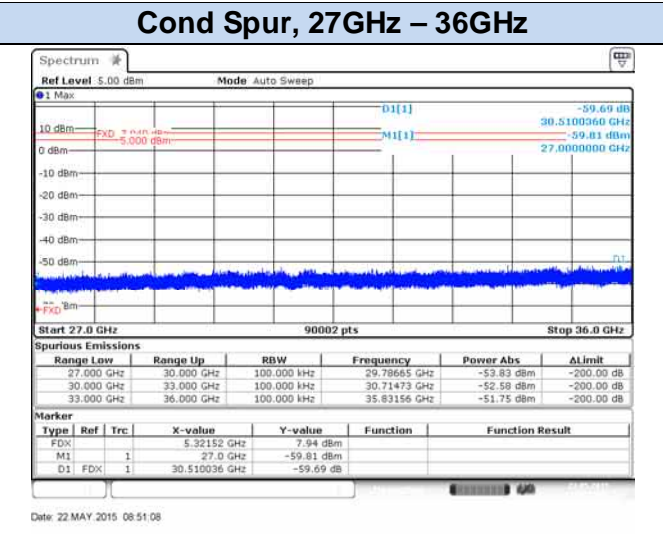
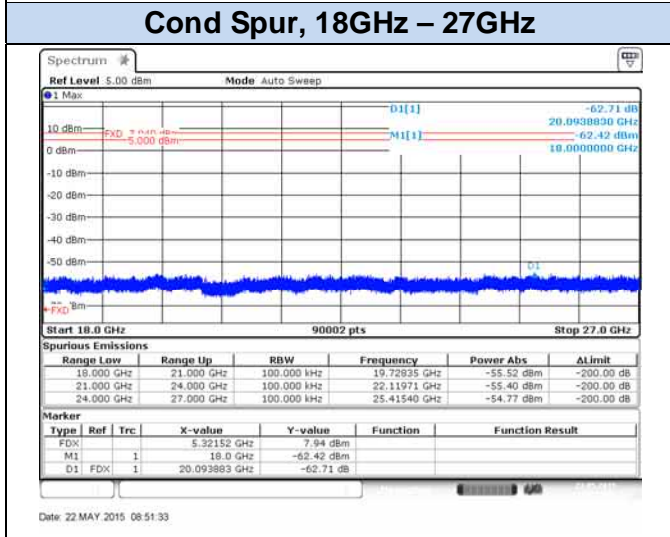
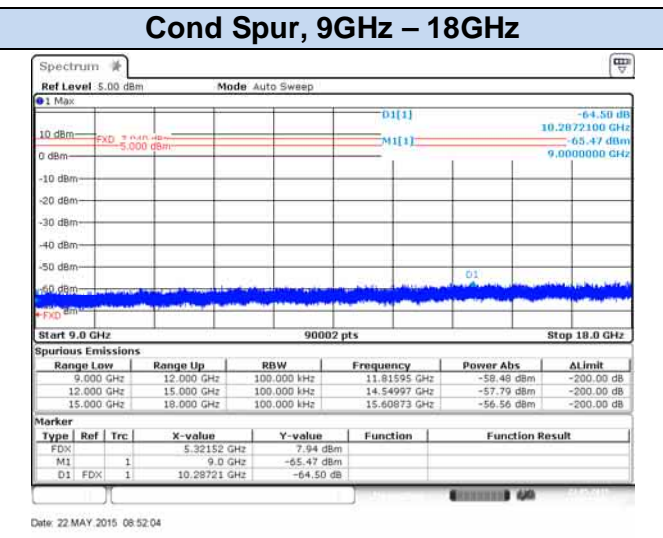
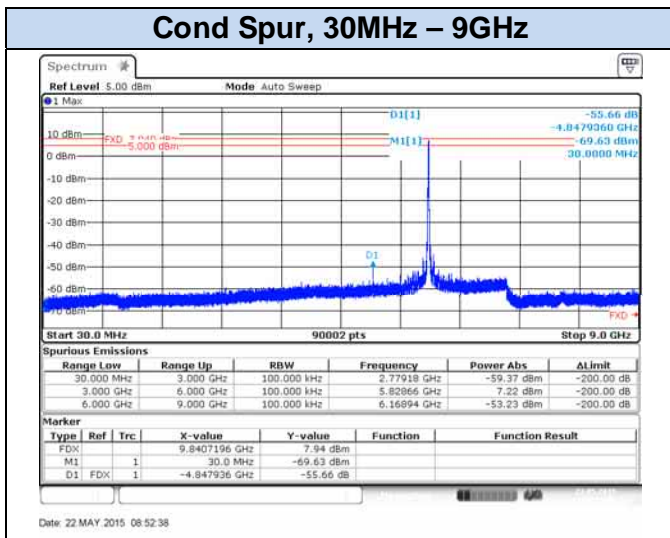
802.11n20, HT8 (MIMO) – Chain B, CH149



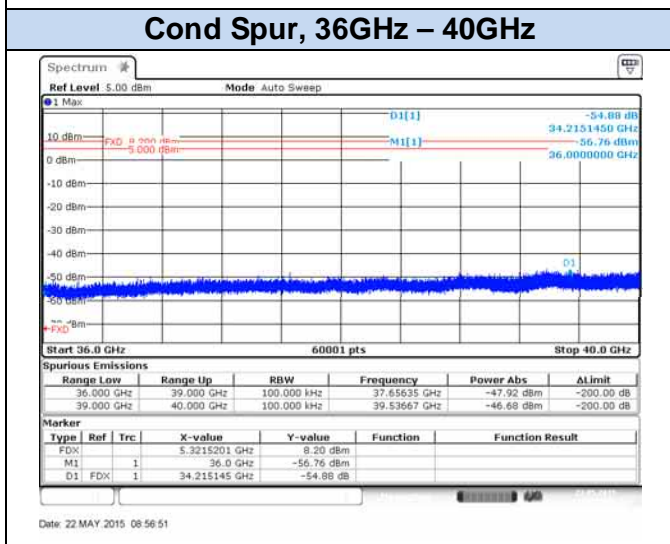
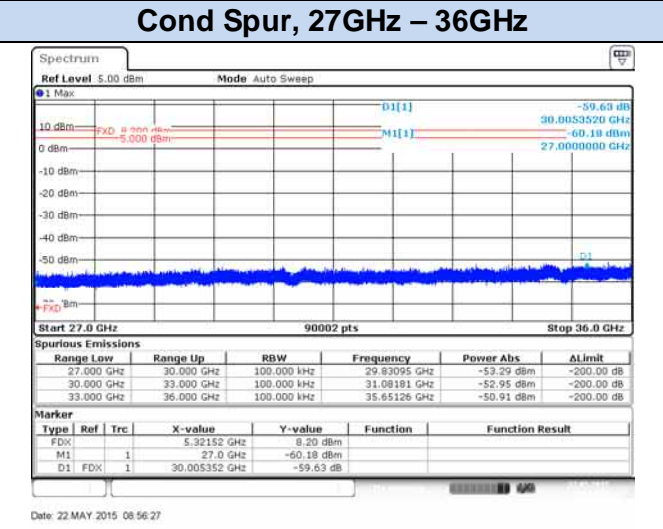
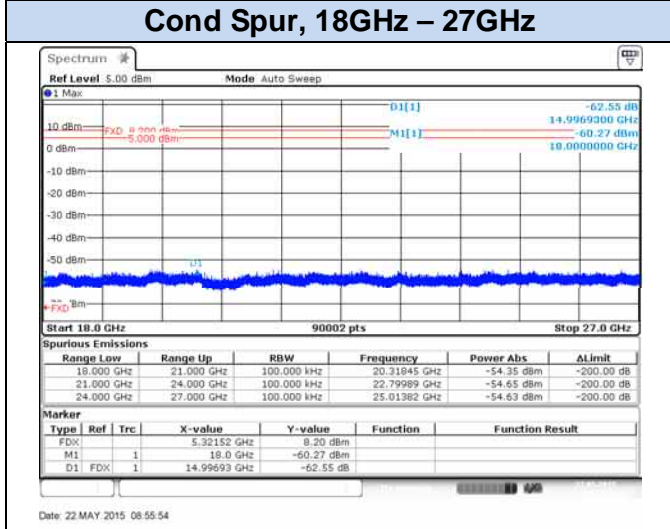
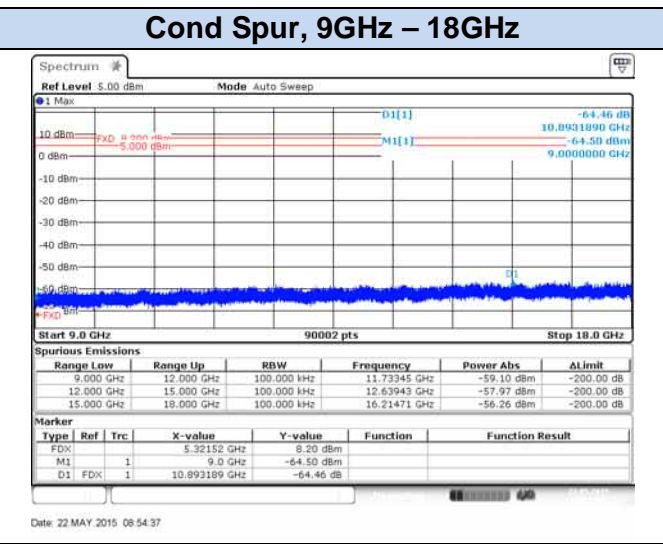
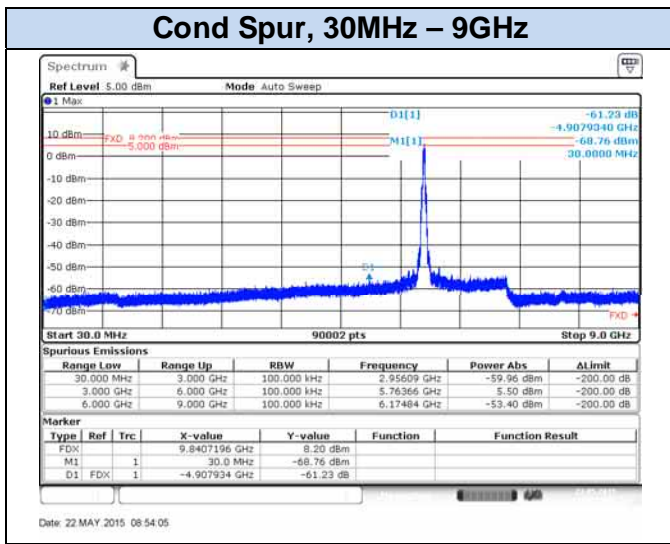
802.11n20, HT8 (MIMO) – Chain B, CH157



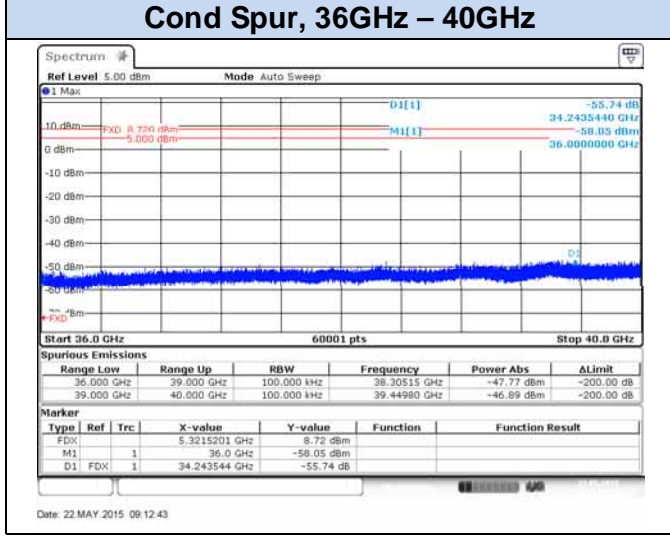
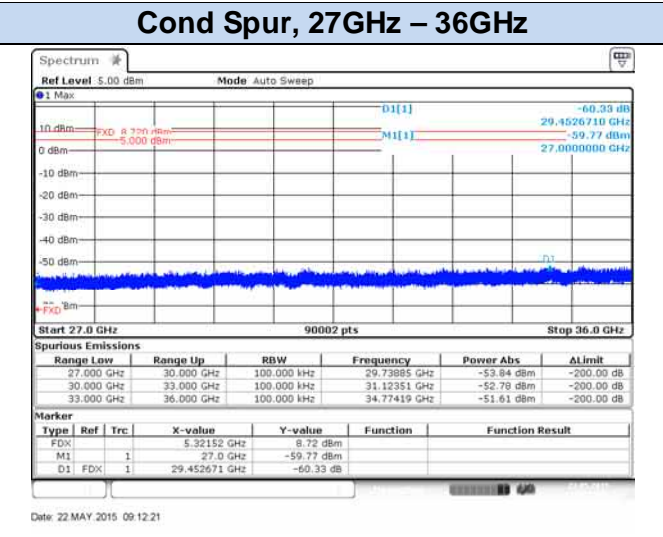
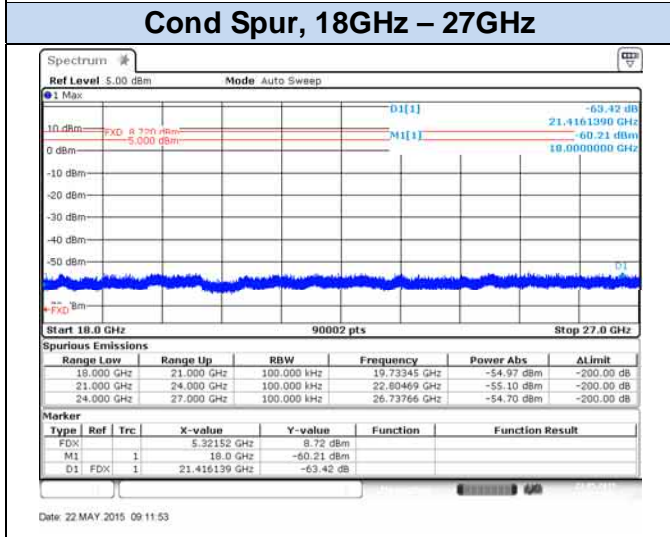
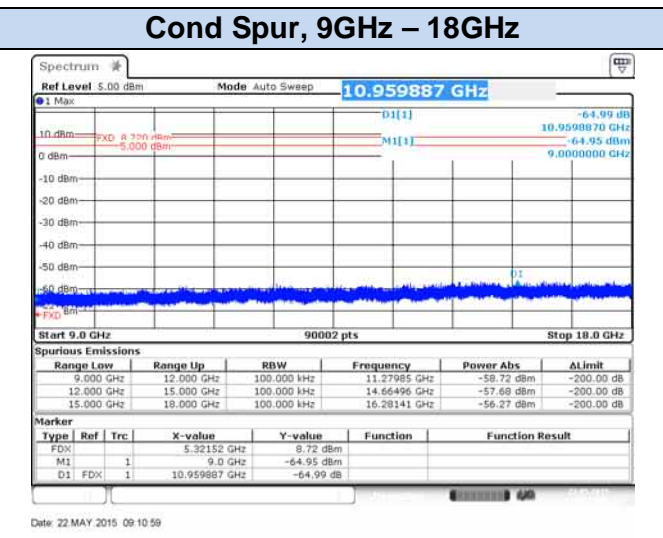
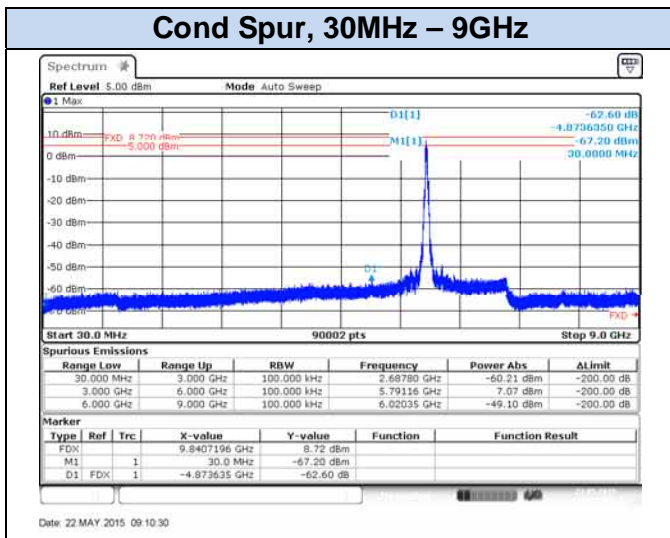
802.11n20, HT8 (MIMO) – Chain B, CH165



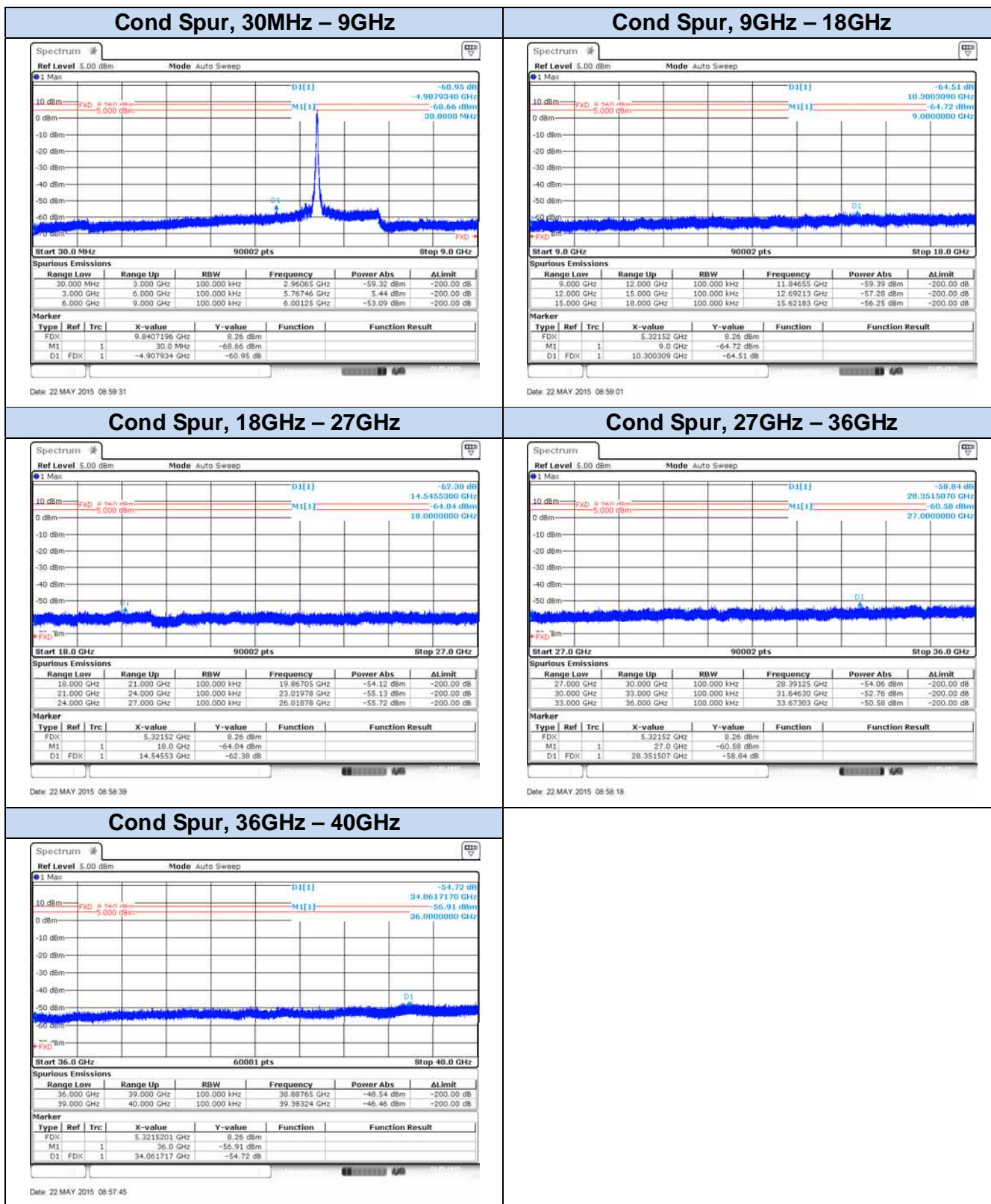
802.11n40, HT0 (SISO) – Chain A, CH151



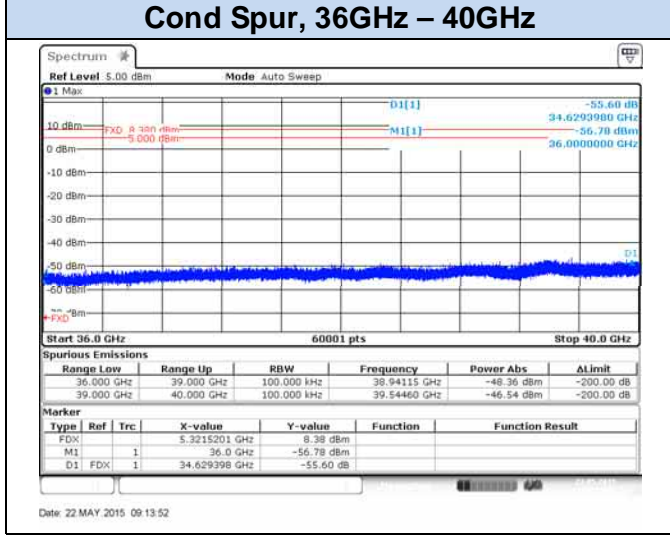
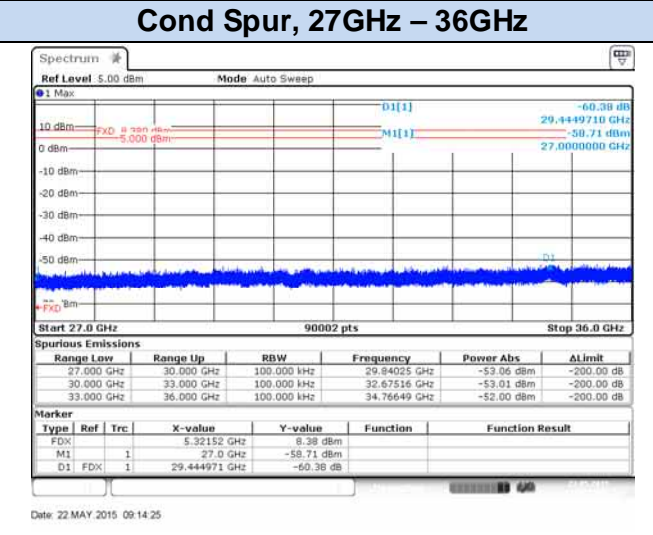
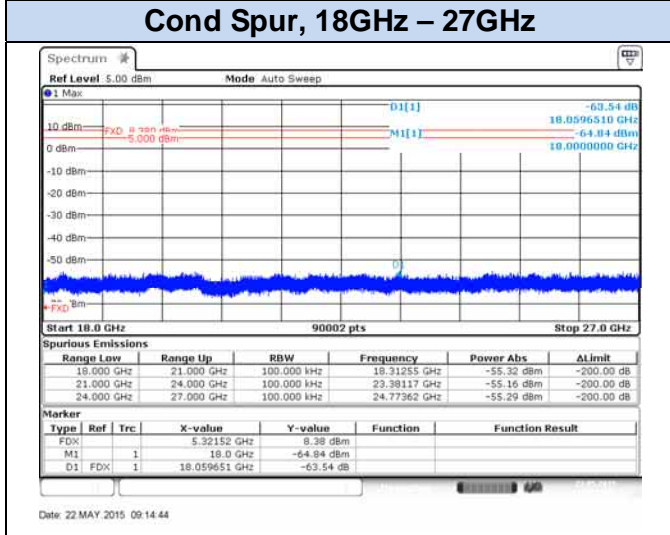
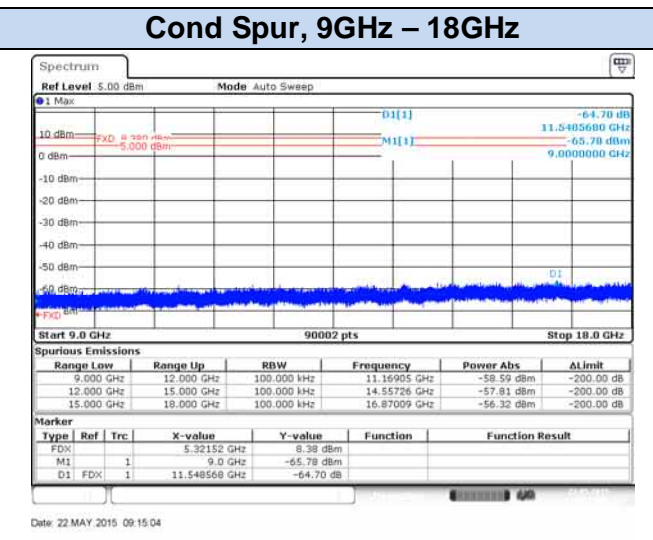
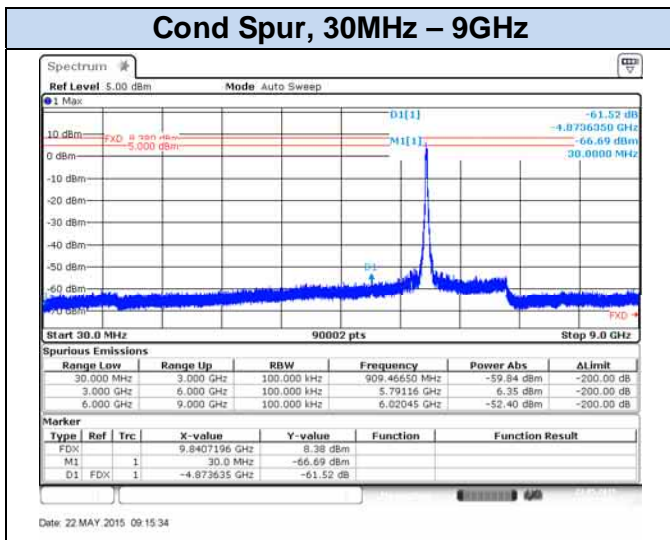
802.11n40, HT0 (SISO) – Chain A, CH159



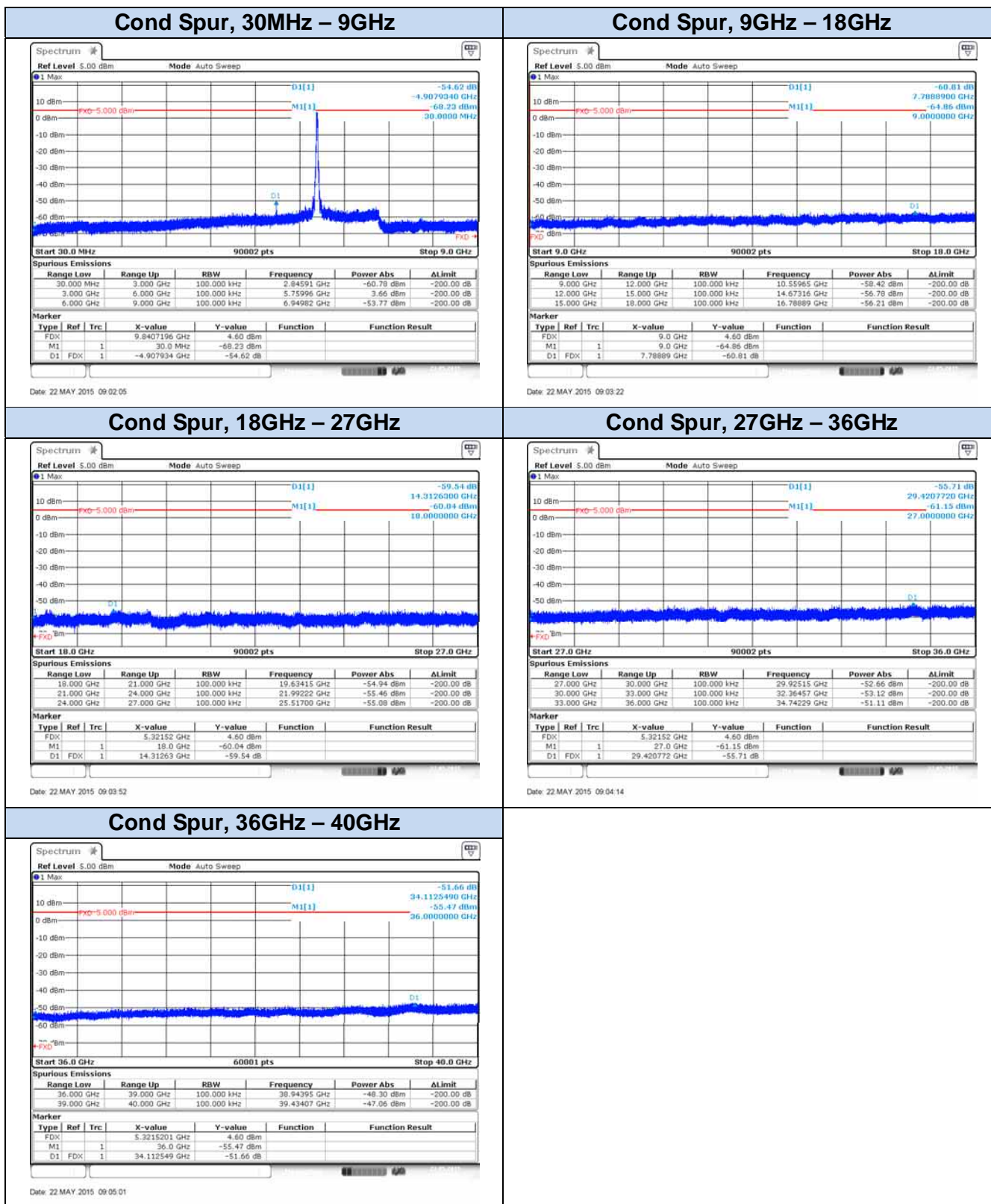
802.11n40, HT0 (SISO) – Chain B, CH151



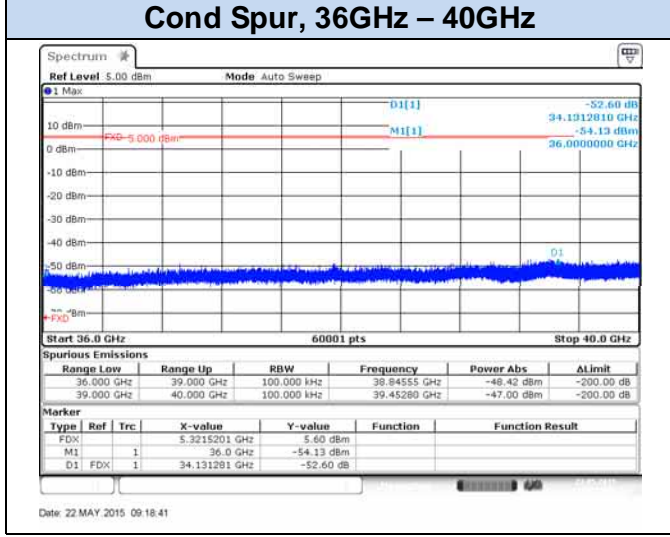
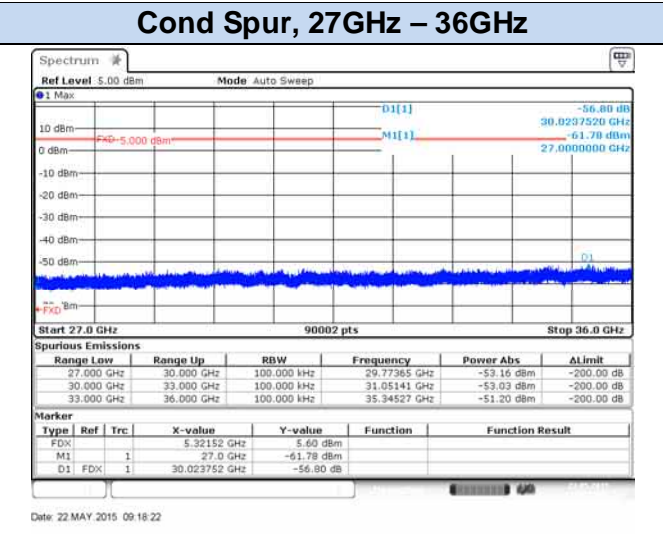
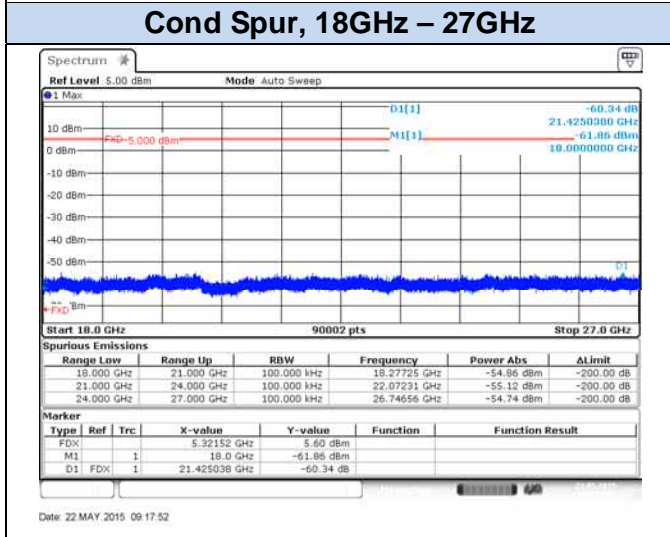
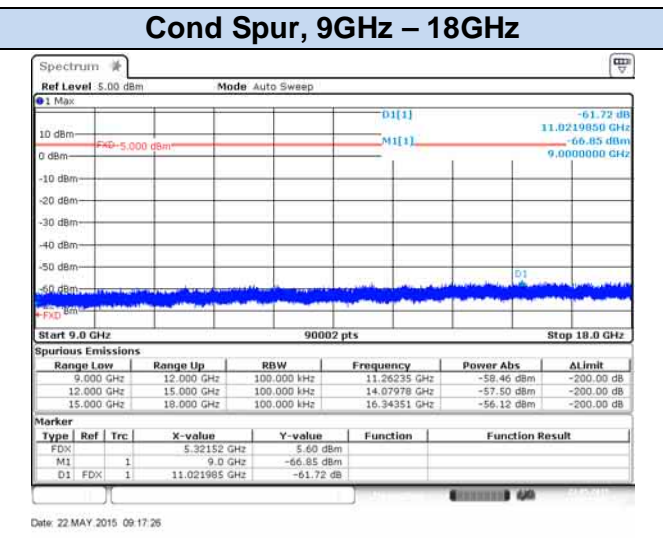
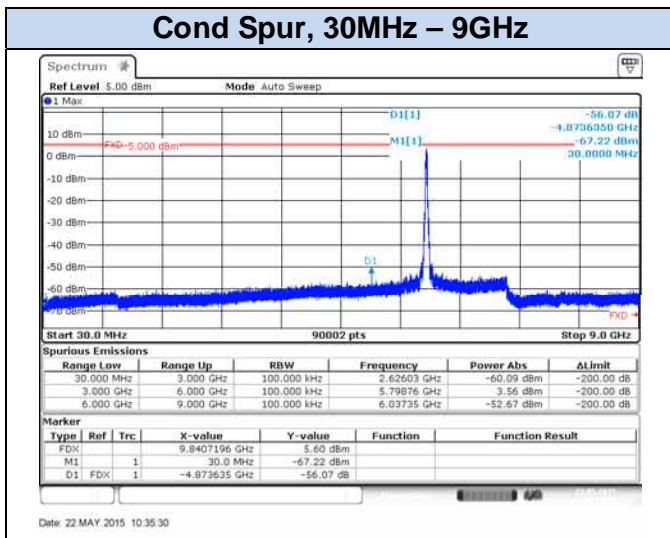
802.11n40, HT0 (SISO) – Chain B, CH159



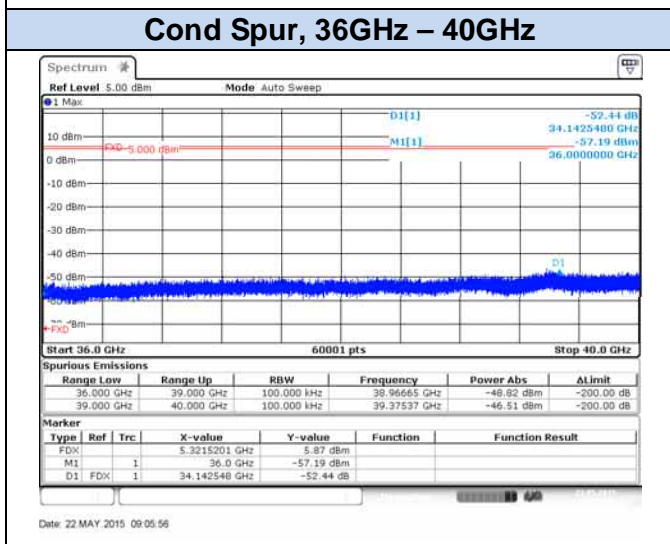
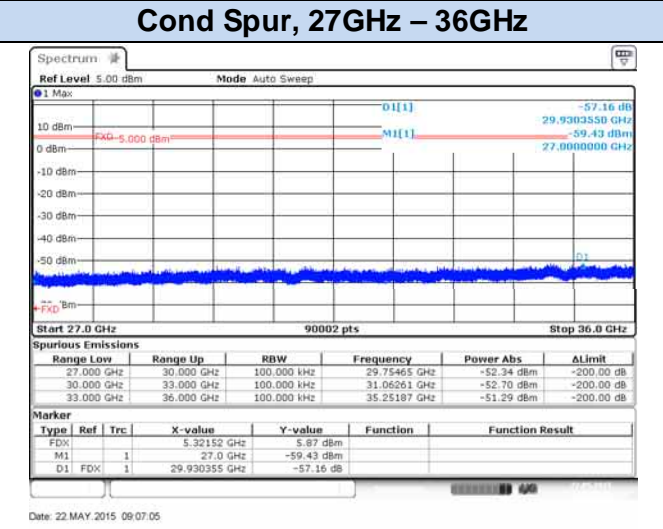
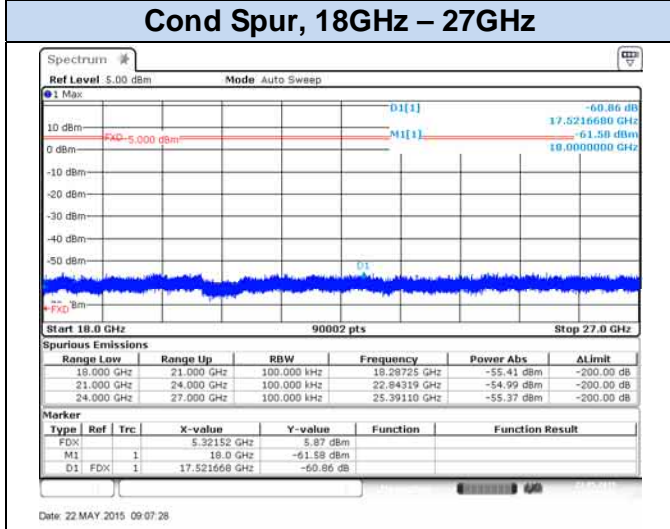
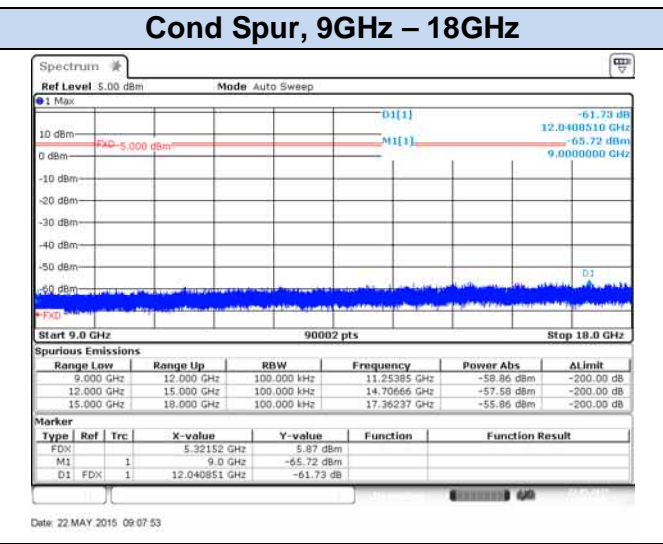
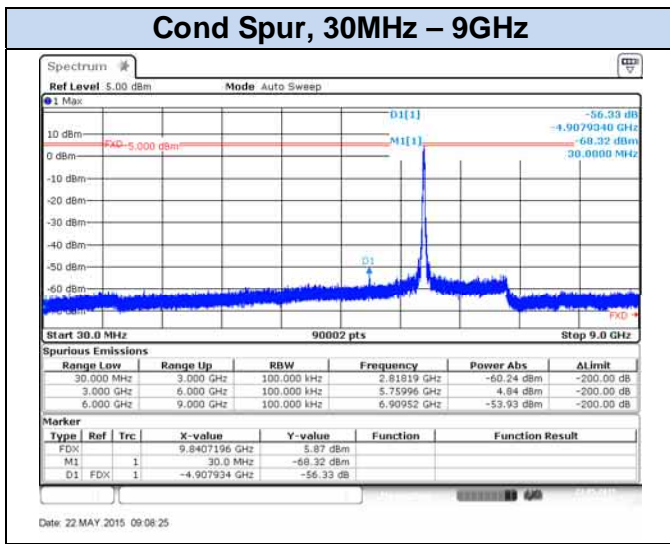
802.11n40, HT8 (MIMO) – Chain A, CH151



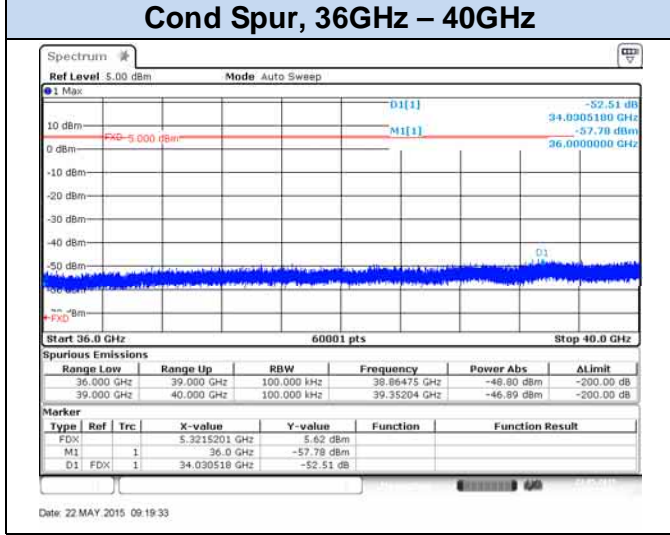
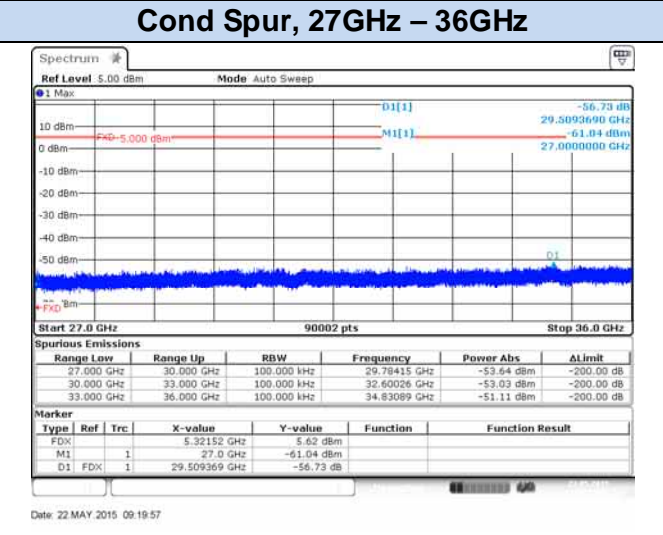
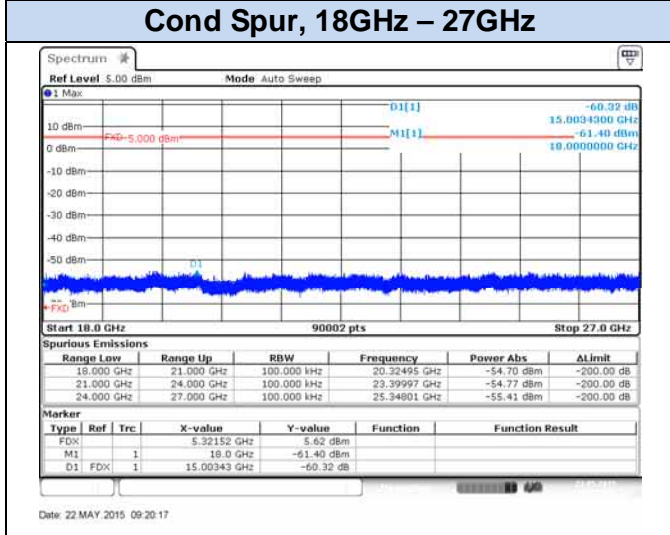
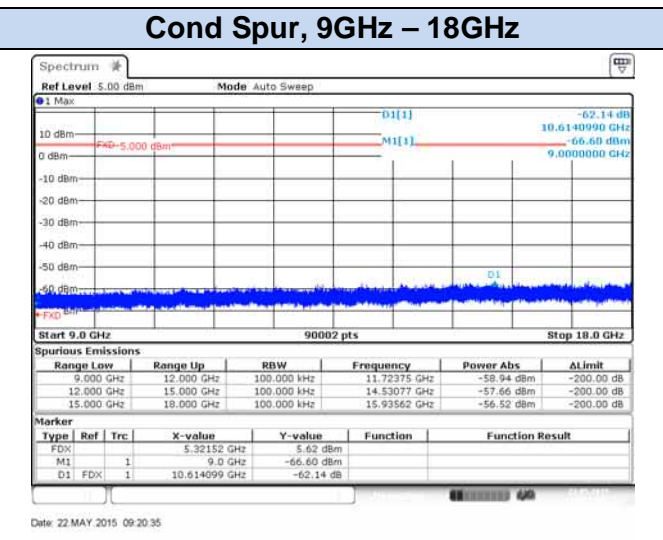
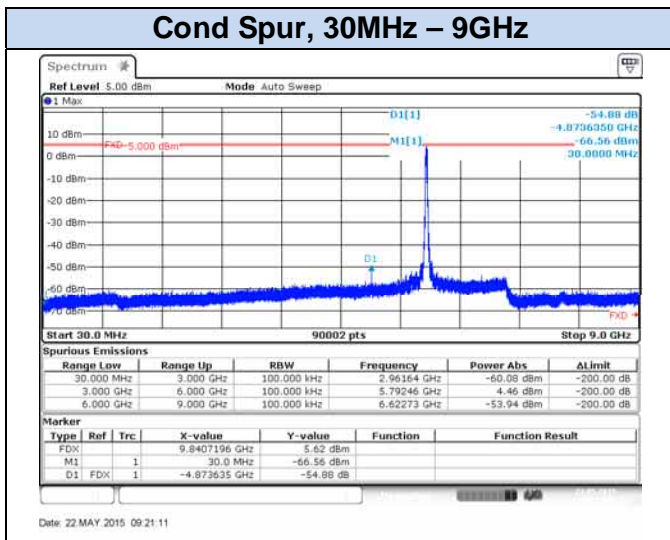
802.11n40, HT8 (MIMO) – Chain A, CH159



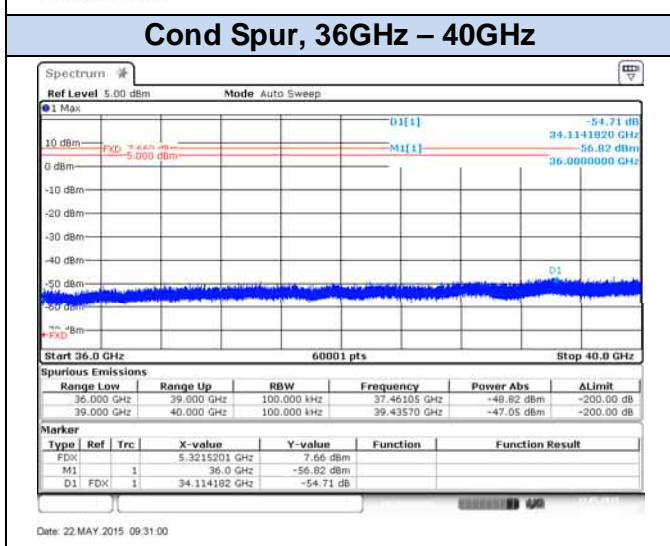
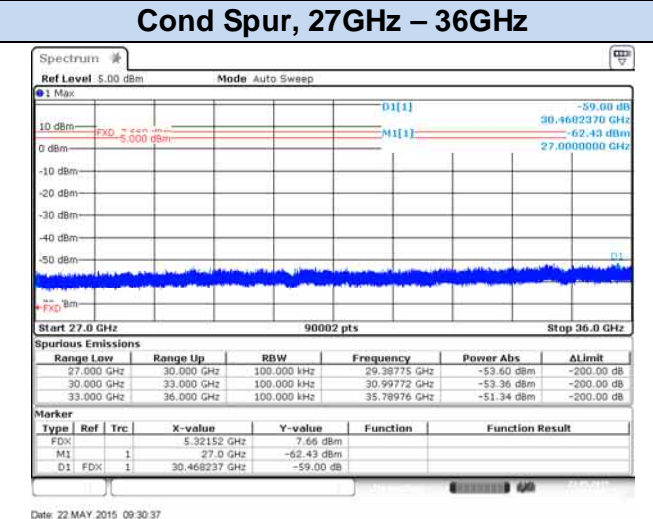
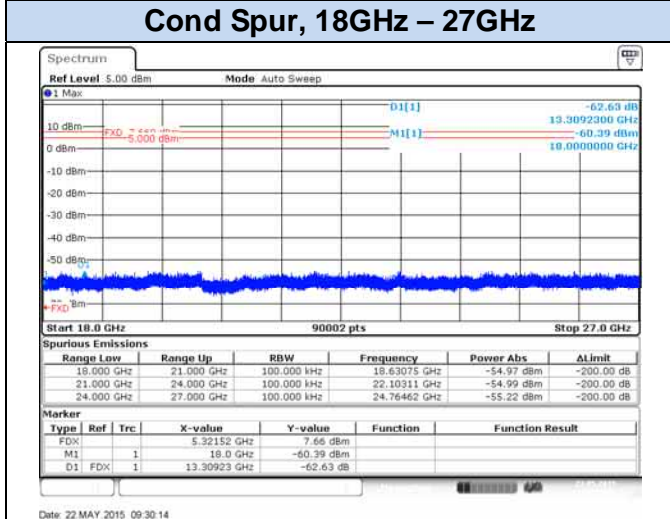
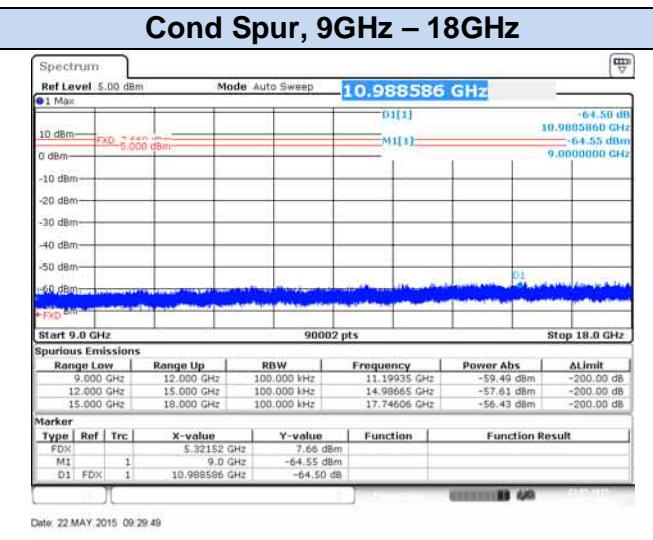
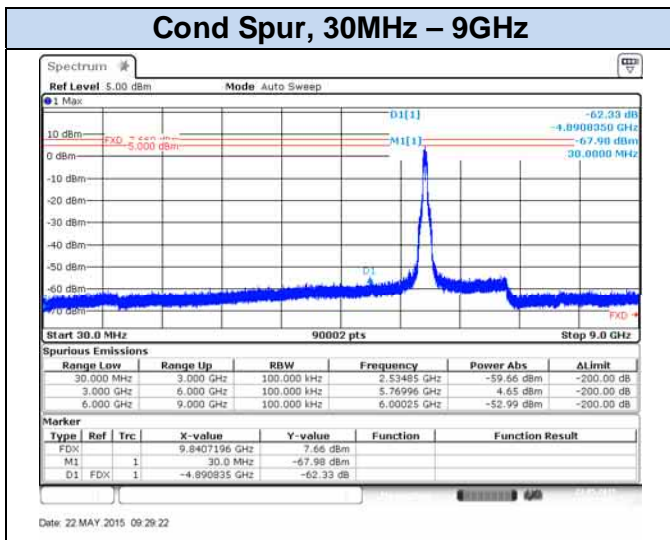
802.11n40, HT8 (MIMO) – Chain B, CH151



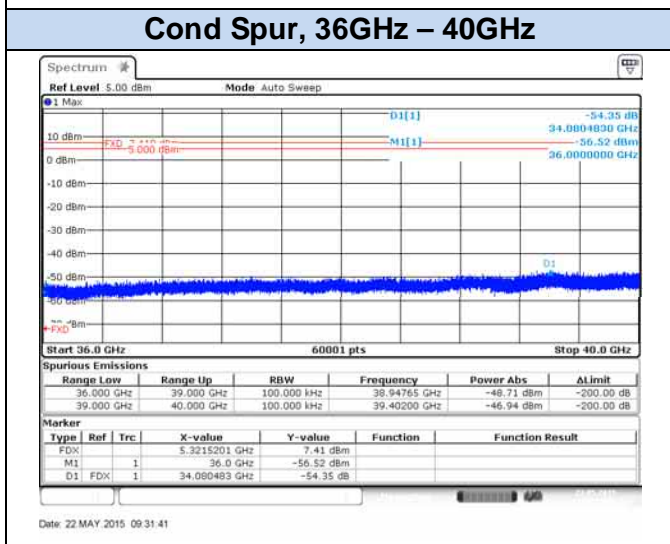
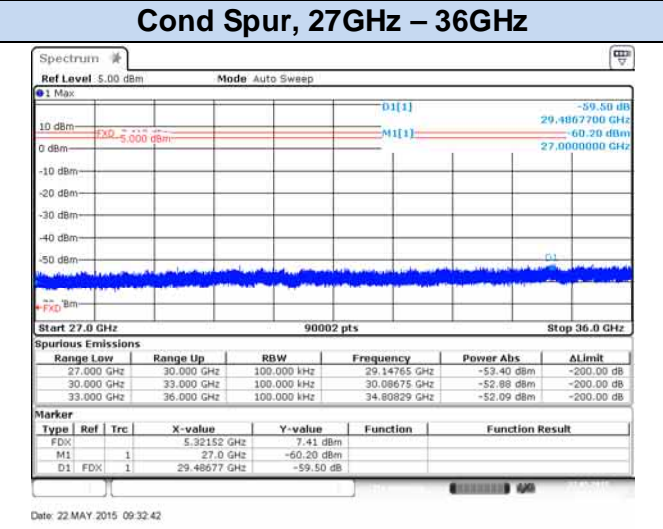
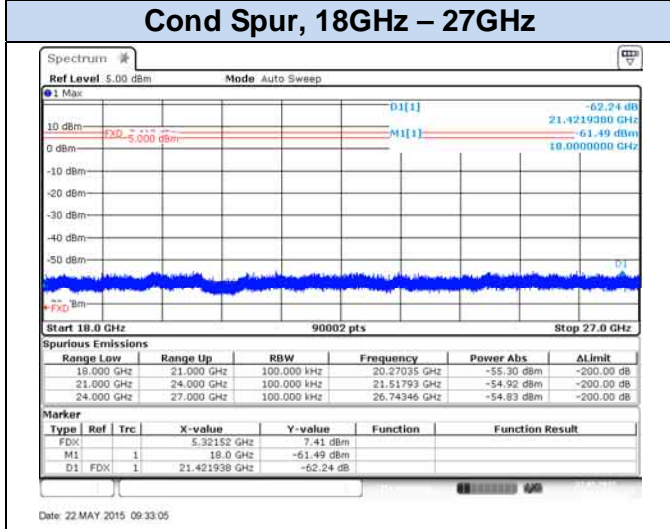
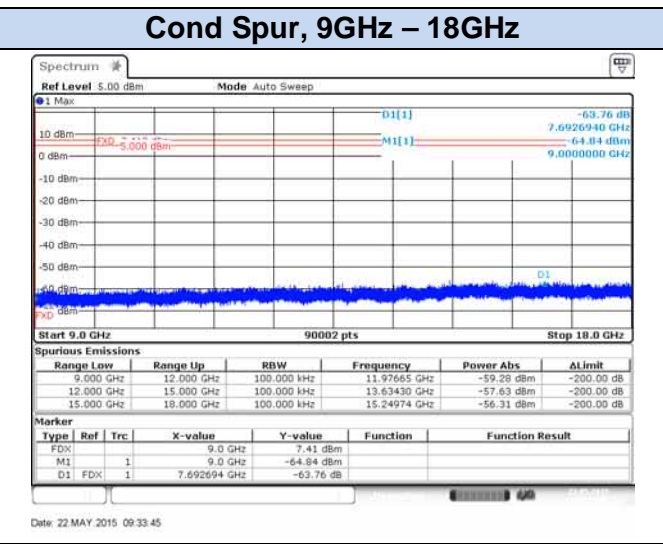
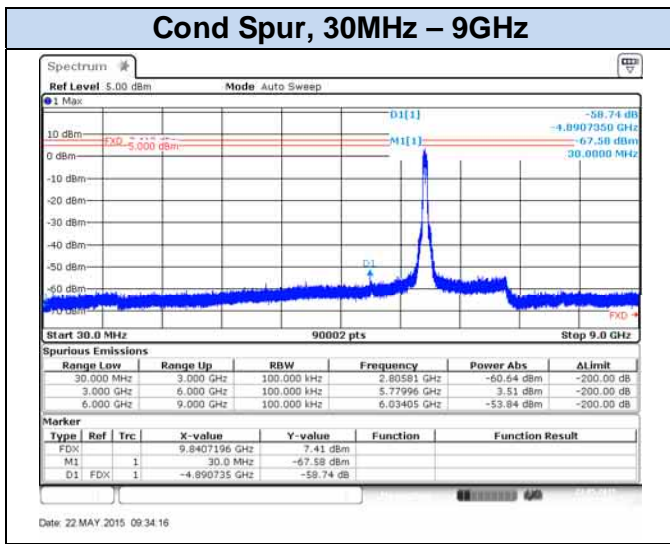
802.11n40, HT8 (MIMO) – Chain B, CH159



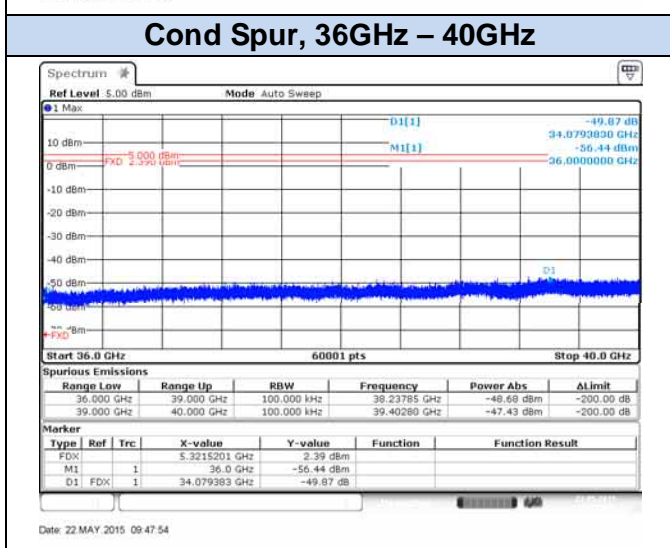
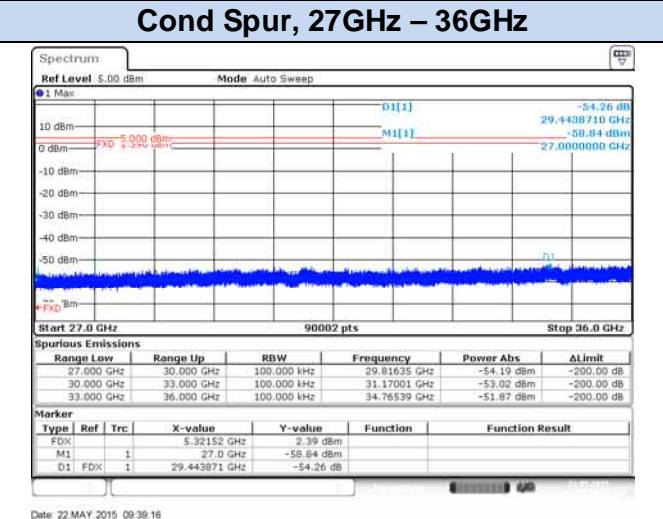
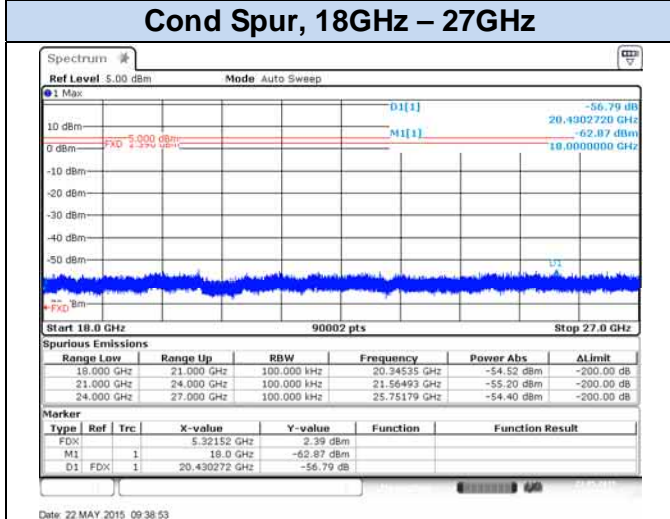
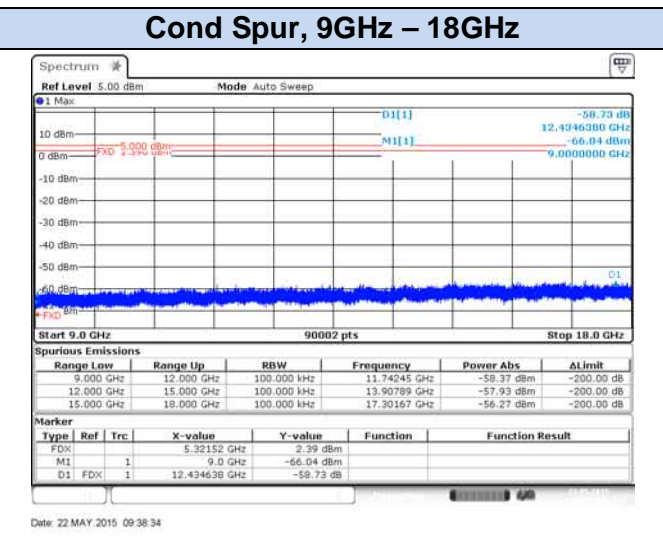
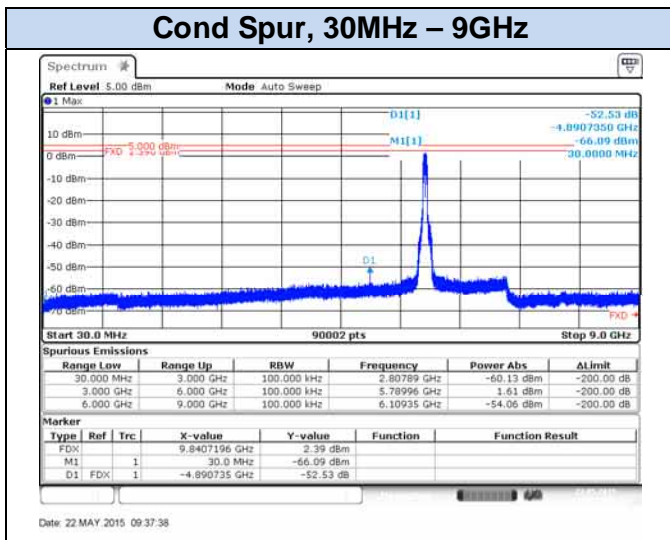
802.11ac80, VHT0 (SISO) – Chain A, CH155



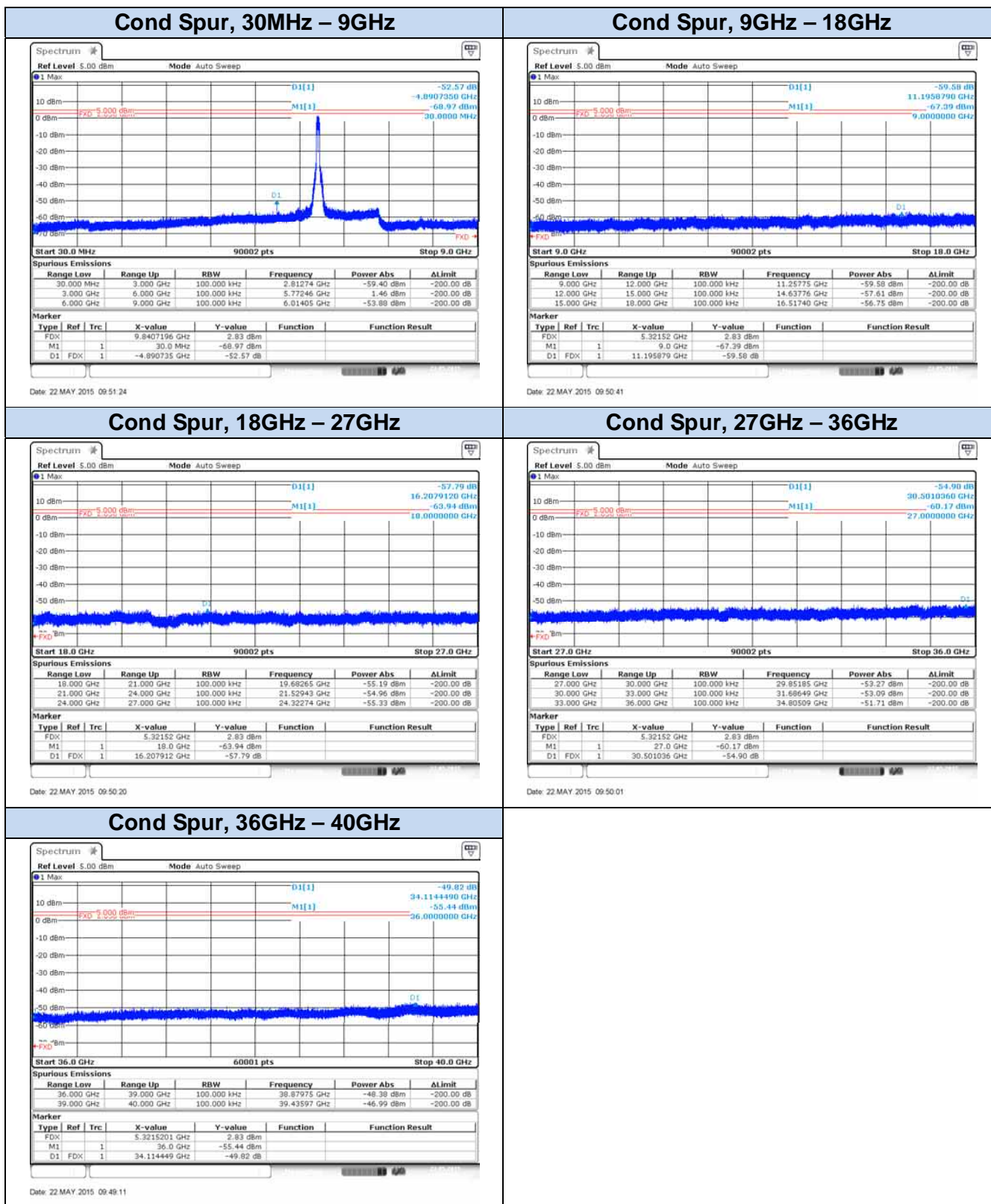
802.11ac80, VHT0 (SISO) – Chain B, CH155



802.11ac80, VHT0 (MIMO) – Chain A, CH155



802.11ac80, VHT0 (MIMO) – Chain B, CH155



B.4 Power Spectral Density

Test limits

FCC part	RSS part	Limits
15.247 (e)	RSS-210 Clause A8.2 (b)	For digitally modulated systems, the power spectral density conducted from the intentional radiator to the antenna shall not be greater than 8 dBm in any 3 kHz band during any time interval of continuous transmission. This power spectral density shall be determined in accordance with the provisions of paragraph (b) of this section. The same method of determining the conducted output power shall be used to determine the power spectral density.

Test procedure

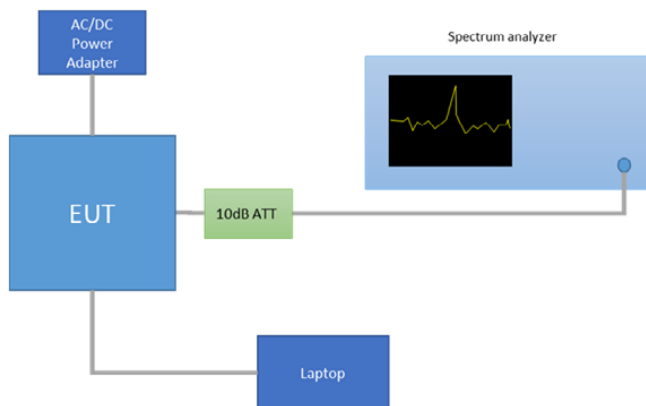
The maximum power spectral density level in the fundamental emission was measured using the method of trace averaging with EUT transmitting at full power throughout each sweep according to point 10.5 of Guidance for Performing Compliance Measurements on Digital Transmission Systems (DTS) Operating Under §15.247 558074 D01 DTS Meas Guidance v03r02 dated 2014/06/05. This method was used for 802.11a, 802.11n20, 802.11n40 and 802.11ac80 modes.

The peak power spectral density level in the fundamental emission was measured using the method of trace averaging with EUT transmitting at full power throughout each sweep according to point 10.2 of Guidance for Performing Compliance Measurements on Digital Transmission Systems (DTS) Operating Under §15.247 558074 D01 DTS Meas Guidance v03r02 dated 2014/06/05. This method was used for 802.11a, 802.11n20, 802.11n40 and 802.11ac80 modes. The peak power spectral density level was used as reference from the marker-delta method measurement of the out of band emissions.

For MIMO mode, the *Measure and add $10 \log(N_{ANT})$ dB*, (where N_{ANT} is the number of outputs) technique was used according to the Guidance for Emission Testing of Transmitters with Multiple Outputs in the Same Band 662911 D01 Multiple Transmitter Output v02r01 dated 2013/10/31.

With this technique, spectrum measurements are performed at each output of the device, and the quantity $10 \log(N_{ANT})$ dB is added to each spectrum value before comparing to the emission limit. Number of outputs = 2.

The setup below was used to measure the power spectral density. The antenna terminal of the EUT is connected to the spectrum through an attenuator, and the spectrum analyzer reading is compensated to include the RF path loss.



Results tables
PSD RMS

SISO modes						PSD RMS [dBm]	
Mode	Rate	Meas. Duty Cycle [%]	CH	Frequency [MHz]	Antenna	Measured Conducted	Duty cycle Compensated
802.11a	6Mbps	0.98	149	5745	SISO CHAIN A	0.68	0.75
					SISO CHAIN B	1.12	1.19
			157	5785	SISO CHAIN A	0.92	0.99
					SISO CHAIN B	1.09	1.16
			165	5825	SISO CHAIN A	1.72	1.79
					SISO CHAIN B	1.20	1.27
802.11n20	HT0	0.99	149	5745	SISO CHAIN A	1.00	1.05
					SISO CHAIN B	0.75	0.80
			157	5785	SISO CHAIN A	0.52	0.57
					SISO CHAIN B	0.55	0.60
			165	5825	SISO CHAIN A	0.66	0.71
					SISO CHAIN B	1.03	1.08
802.11n40	HT0	0.97	151F	5755	SISO CHAIN A	-2.80	-2.66
					SISO CHAIN B	-3.55	-3.41
			159F	5795	SISO CHAIN A	-2.41	-2.27
					SISO CHAIN B	-2.34	-2.20
802.11ac80	VHT0	0.94	155ac80	5775	SISO CHAIN A	-5.30	-5.01
					SISO CHAIN B	-5.70	-5.41

MIMO modes						PSD RMS [dBm]		
Mode	Rate	Meas. Duty Cycle [%]	CH	Freq. [MHz]	Antenna	Measured Conducted	Duty cycle Compensated	MIMO Compensated +10·log(N _{ant})
802.11n20	HT8	0.96	149	5745	CHAIN A	-2.10	-1.94	1.07
					CHAIN B	-2.69	-2.53	0.48
			157	5785	CHAIN A	-1.96	-1.80	1.21
					CHAIN B	-2.00	-1.84	1.17
			165	5825	CHAIN A	-1.99	-1.83	1.18
					CHAIN B	-2.58	-2.42	0.59
802.11n40	HT8	0.93	151F	5755	CHAIN A	-5.92	-5.61	-2.60
					CHAIN B	-4.64	-4.33	-1.32
			159F	5795	CHAIN A	-5.85	-5.54	-2.53
					CHAIN B	-4.65	-4.34	-1.33
802.11ac80	VHT8	0.63	155ac80	5775	CHAIN A	-6.24	-4.24	-1.23
					CHAIN B	-4.00	-2.00	1.01

PSD Peak

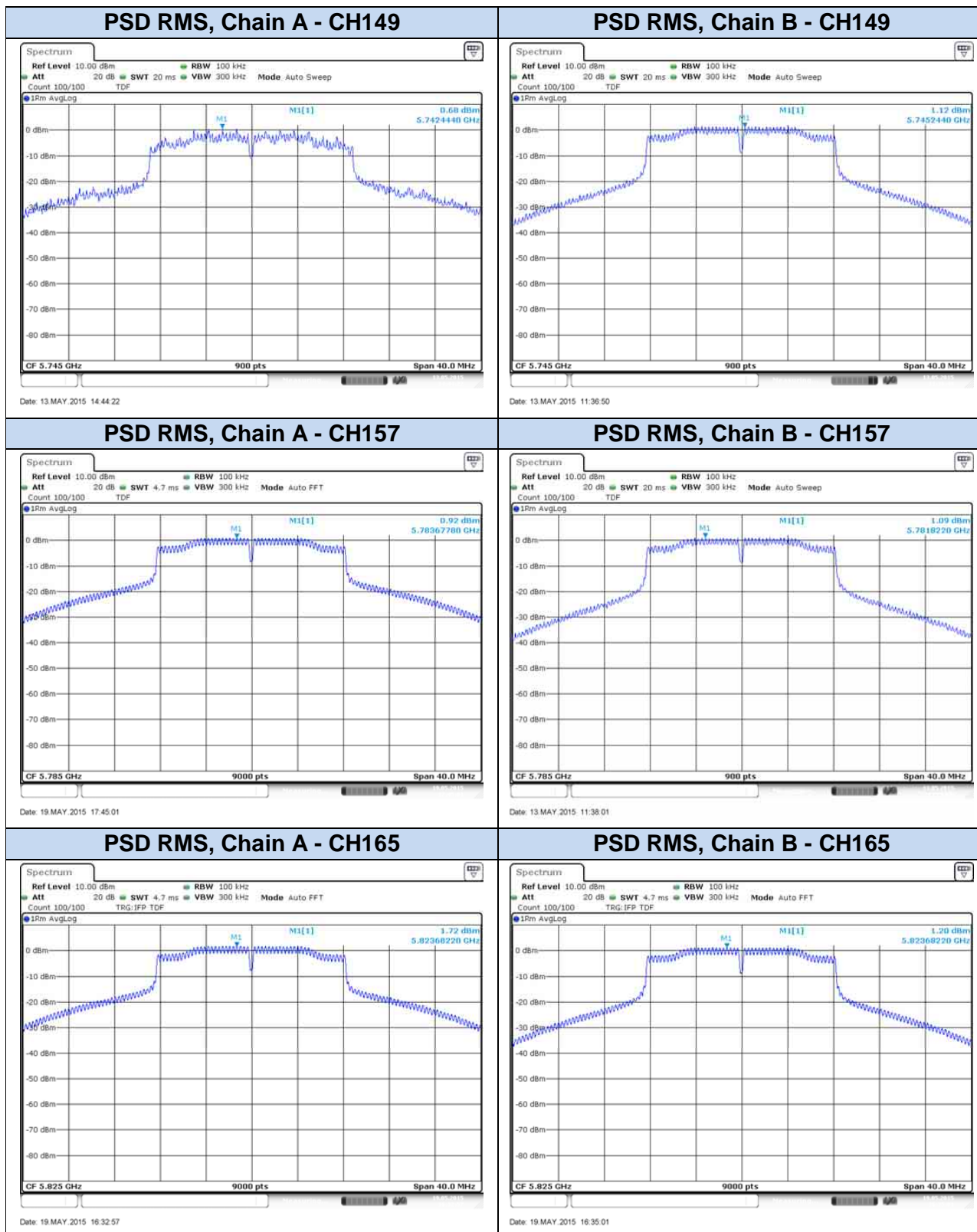
Mode	Rate	Measured Duty Cycle [%]	Channel	Frequency [MHz]	Antenna	PSD Peak [dBm]
802.11a	6Mbps	0.98	149	5745	SISO CHAIN A	11.47
					SISO CHAIN B	10.71
			157	5785	SISO CHAIN A	11.54
					SISO CHAIN B	10.56
			165	5825	SISO CHAIN A	10.68
					SISO CHAIN B	10.48
802.11n20	HT0	0.99	149	5745	SISO CHAIN A	11.26
					SISO CHAIN B	10.37
			157	5785	SISO CHAIN A	11.24
					SISO CHAIN B	11.09
			165	5825	SISO CHAIN A	10.31
					SISO CHAIN B	10.63
802.11n40	HT0	0.97	151F	5755	SISO CHAIN A	8.20
					SISO CHAIN B	8.26
			159F	5795	SISO CHAIN A	8.72
					SISO CHAIN B	8.38
802.11ac80	VHT0	0.94	155ac80	5775	SISO CHAIN A	7.66
					SISO CHAIN B	7.41

MIMO modes

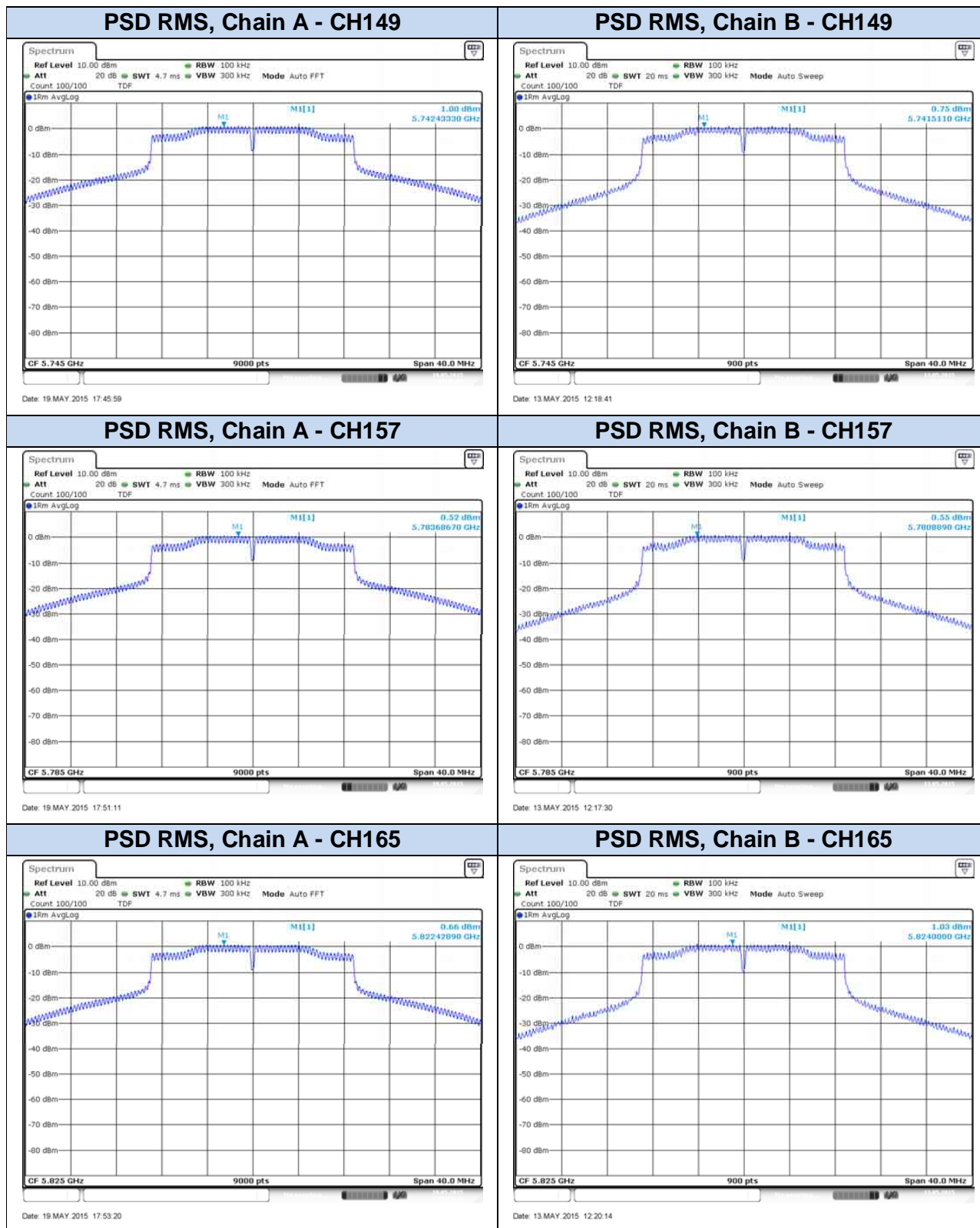
Mode	Rate	Meas. Duty Cycle [%]	CH	Freq. [MHz]	Antenna	PSD Peak [dBm]	
						Measured Conducted	MIMO Compensated +10·log(N _{ant})
802.11n20	HT8	0.96	149	5745	CHAIN A	8.25	11.26
					CHAIN B	8.11	11.12
			157	5785	CHAIN A	8.49	11.50
					CHAIN B	8.16	11.17
			165	5825	CHAIN A	8.45	11.46
					CHAIN B	7.94	10.95
802.11n40	HT8	0.93	151F	5755	CHAIN A	4.60	7.61
					CHAIN B	5.87	8.88
			159F	5795	CHAIN A	5.60	8.61
					CHAIN B	5.62	8.63
802.11ac80	VHT8	0.63	155ac80	5775	CHAIN A	2.39	5.40
					CHAIN B	2.83	5.84

Results screenshot

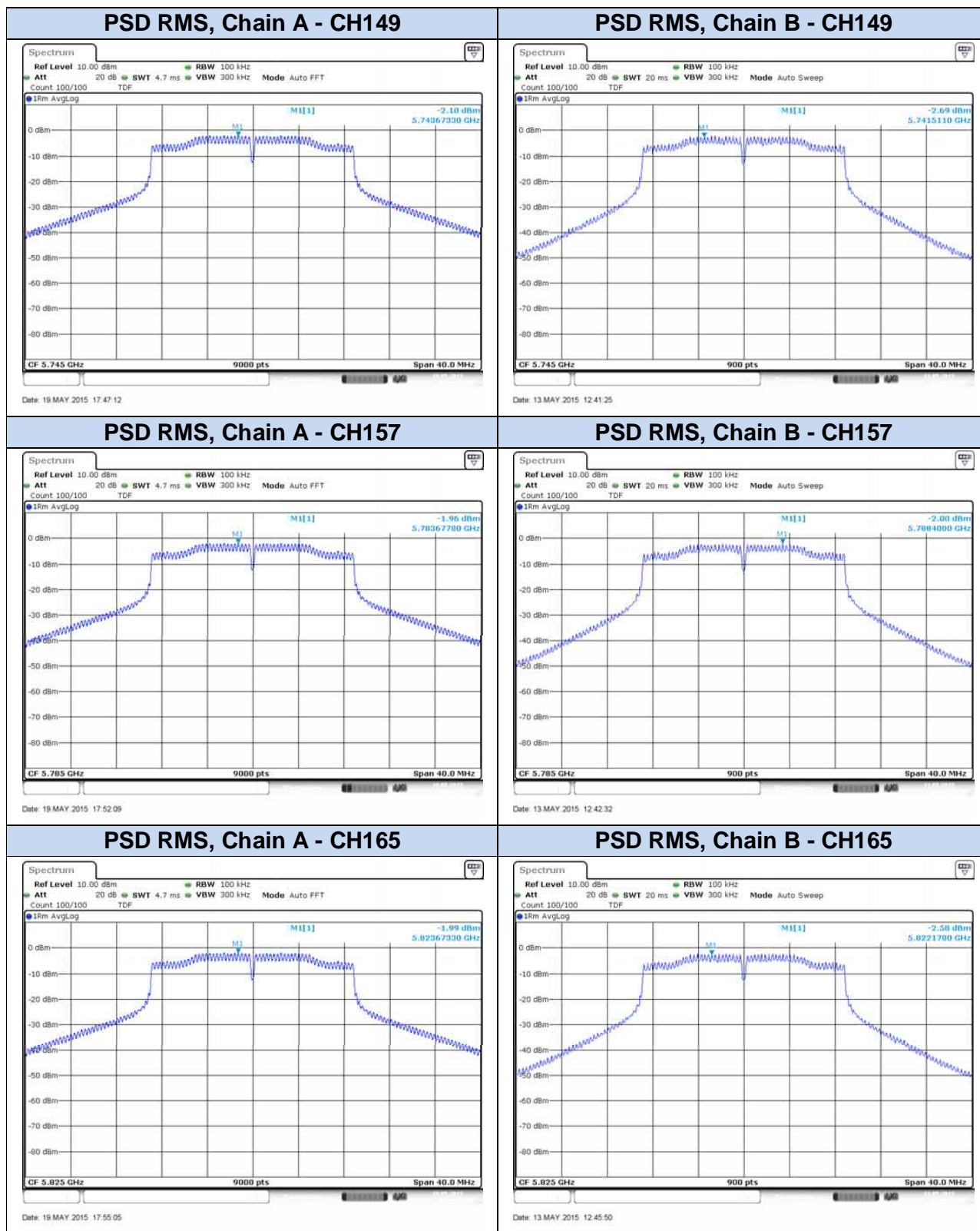
802.11a, 6Mbps



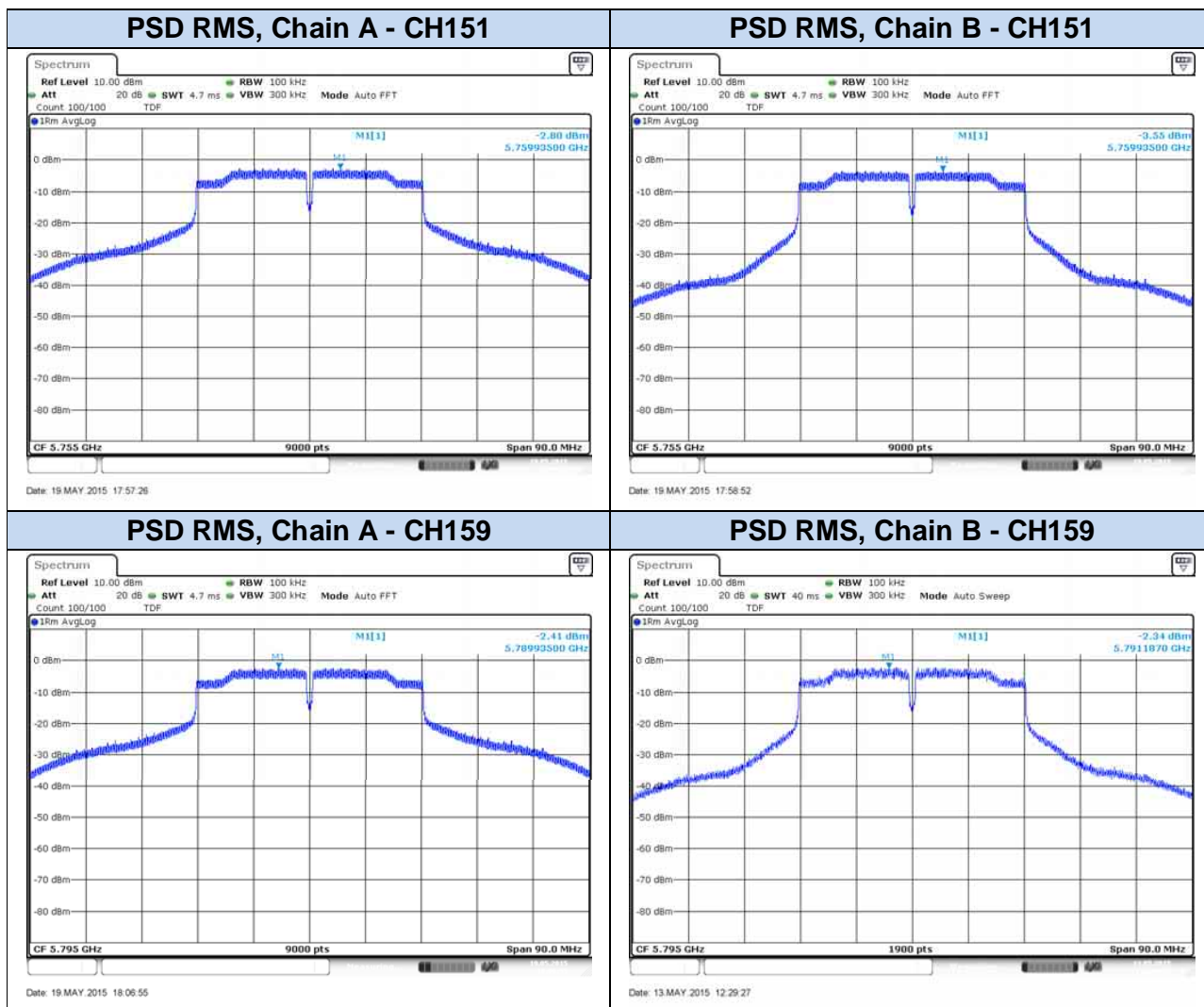
802.11n20, HT0 (SISO)



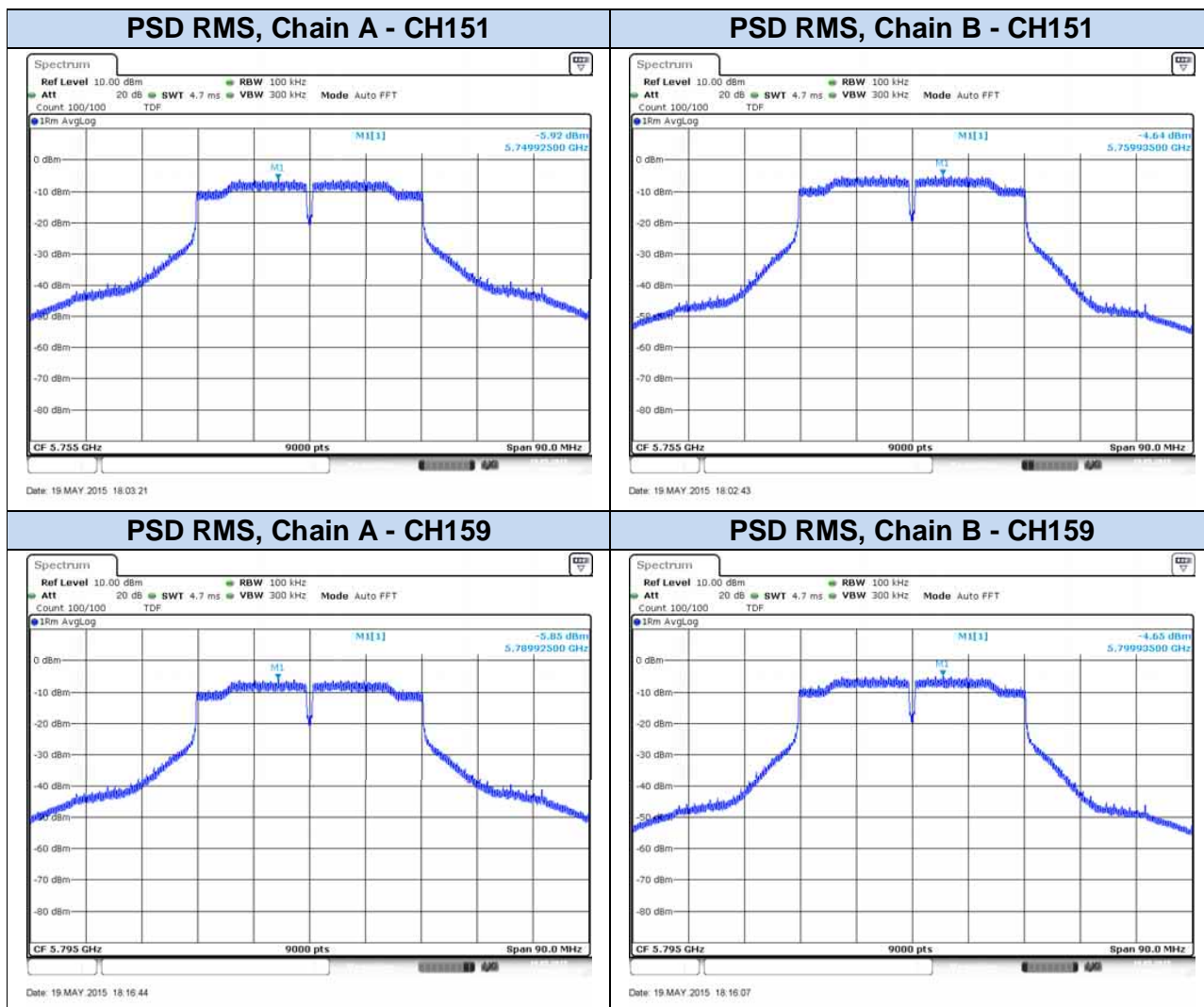
802.11n20, HT8 (MIMO)



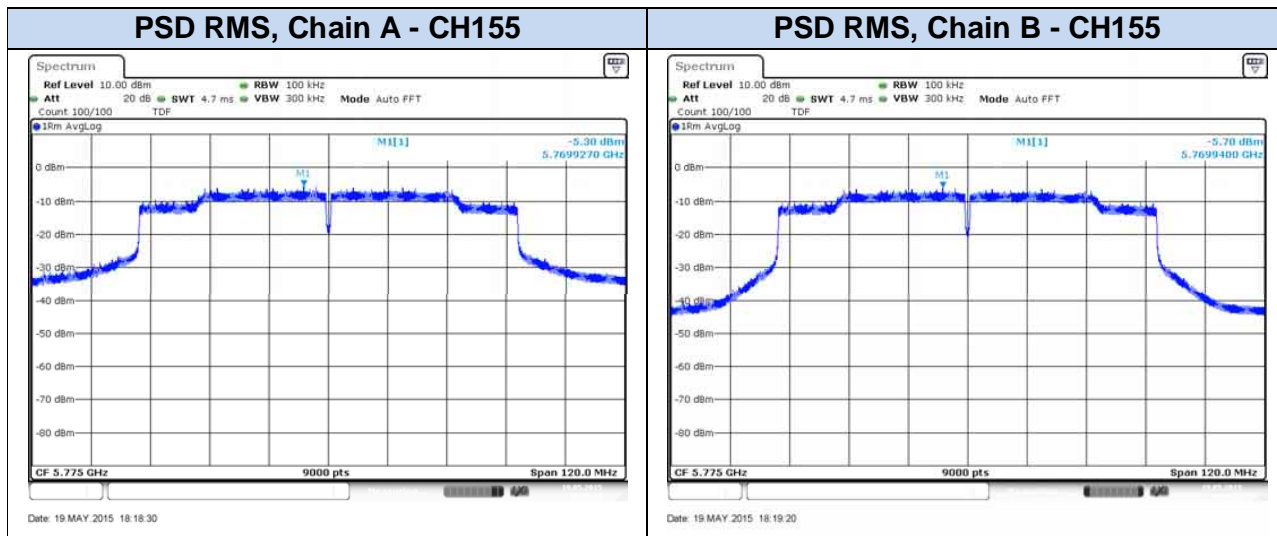
802.11n40, HT0 (SISO)



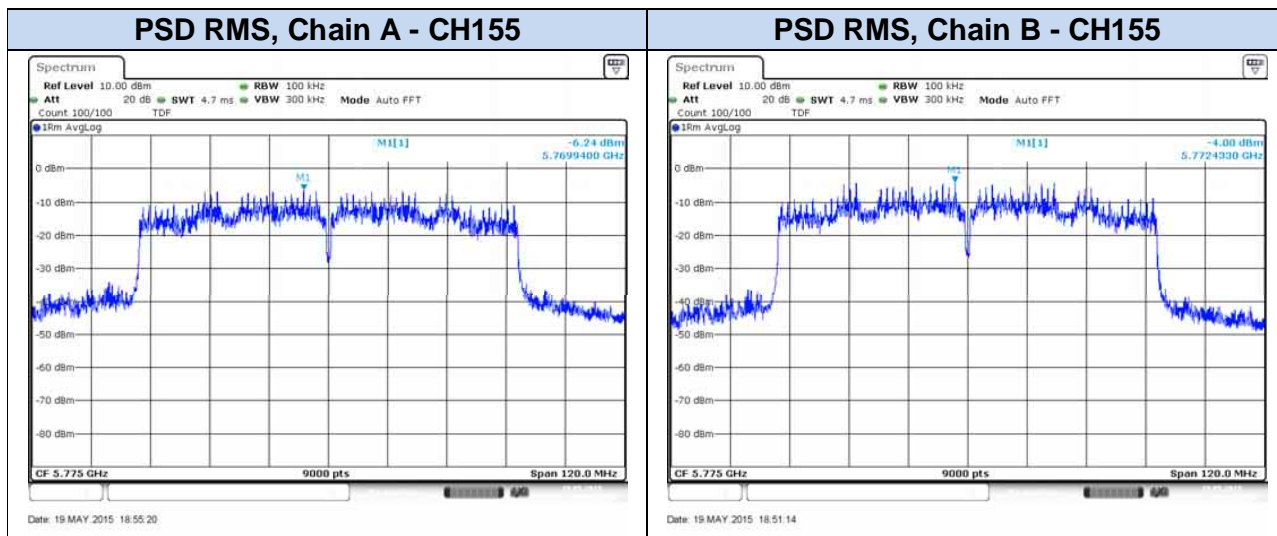
802.11n40, HT8 (MIMO)



802.11ac80, VHT0 (SISO)



802.11ac80, VHT0 (MIMO)



B.5 Radiated spurious emission

Standard references

FCC part	RSS part	Limits			
15.247 (d)	RSS-210 Clause A8.5	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):			
		Freq Range (MHz)	Field Strength ($\mu\text{V}/\text{m}$)	Field Strength ($\text{dB}\mu\text{V}/\text{m}$)	Meas. Distance (m)
		0.009-0.490	2400/f(kHz)	-	300
		0.490-1.705	24000/f(kHz)	-	300
		1.705-30.0	30	-	30
		30-88	100	40	3
		88-216	150	43.5	3
		216-960	200	46	3
		960-25000	500	54	3
		<p>The emission limits shown in the above table are based on measurements employing CISPR quasi-peak detector except for the frequency bands 9-90 kHz, 110-490 kHz and above 1000 MHz. Radiated emission limits in these three bands are based on measurements employing an average detector.</p> <p>For average radiated emission measurements above 1000 MHz, there is also a limit specified when measuring with peak detector function, corresponding to 20 dB above the indicated values in the table.</p>			

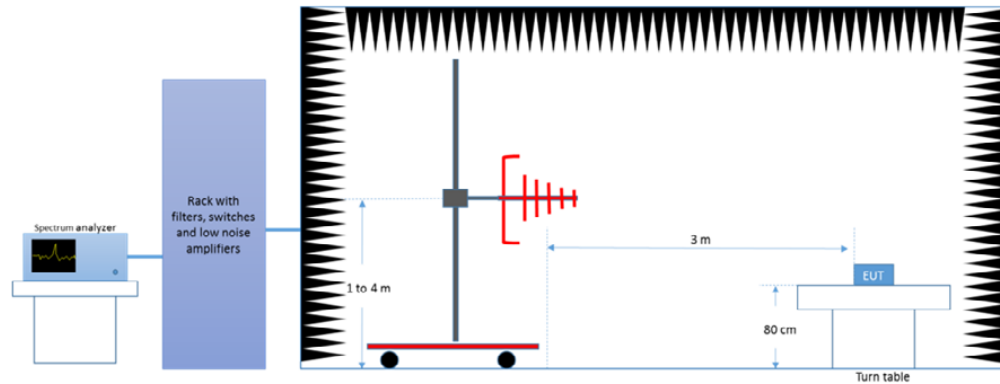
Test procedure

The setup below was used to measure the radiated spurious emissions. The test was done following the FCC OET KDB 971168 D01 v02r02 § 7.

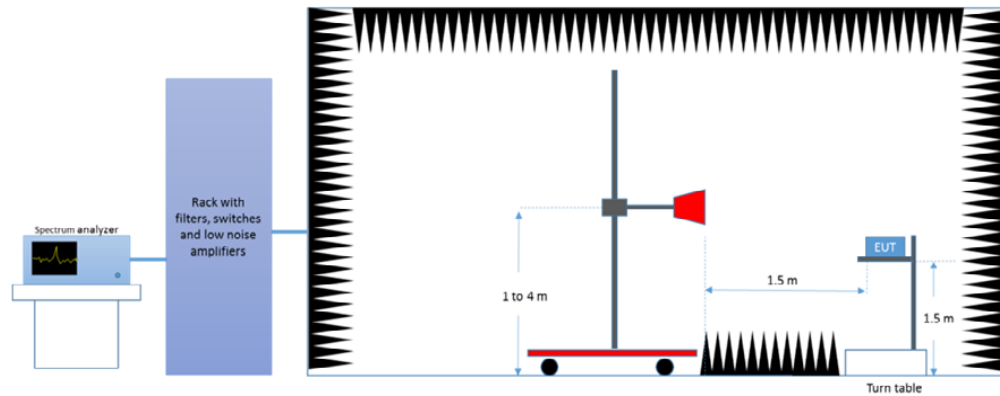
Depending of the frequency range and bands being tested, different antennas and filters were used. The final measurement is done by varying the antenna height from 1 to 4 meters, the EUT azimuth over 360° and for both Vertical and Horizontal polarizations.

The radiated spurious emission was measured on the worst case configuration selected from the chapter **Error! Reference source not found.** and on the low, middle and high channel.

Radiated Setup < 1GHz



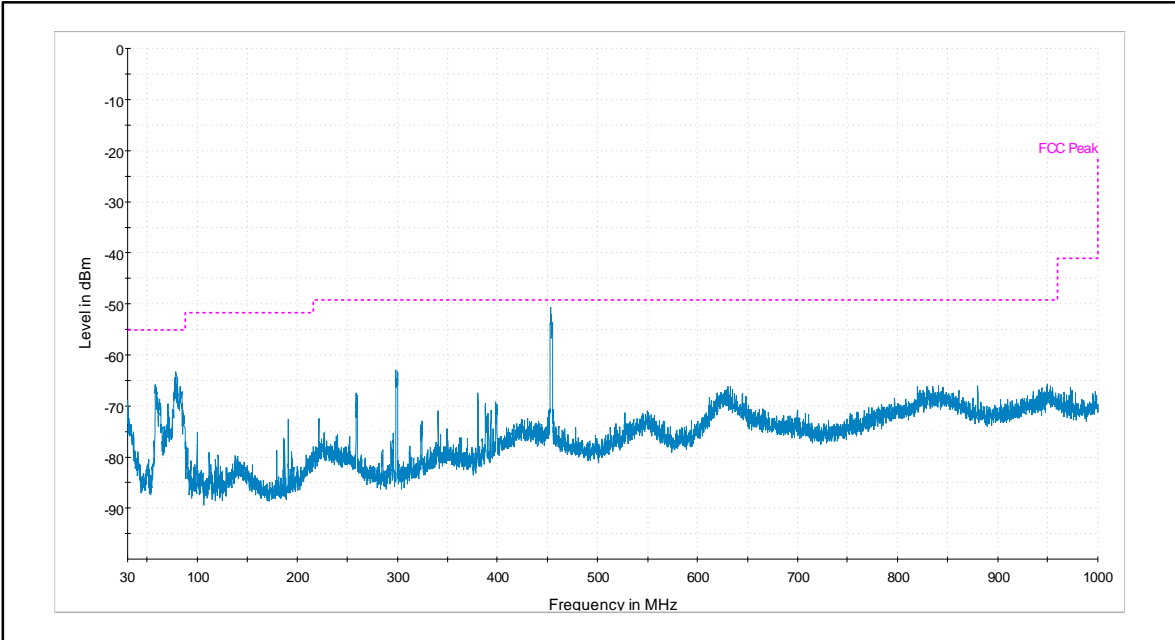
Radiated Setup > 1GHz



Test Results

30 MHz – 1 GHz

Radiated Spurious – All modes

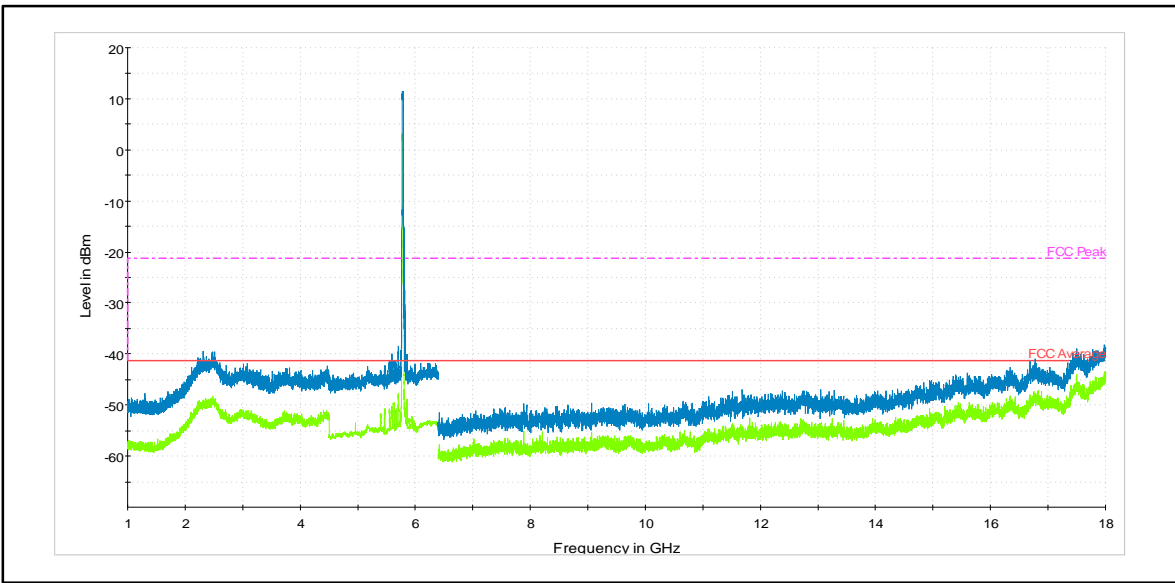


Frequency	MaxPeak	RMS	Height	Pol	Azimuth	Corr.
MHz	dBm	dBm	cm		deg	dB
453.233877	-50.76	---	102.2	H	91.0	-103
454.295510	---	-53.88	113.2	H	62.0	-103

Note 1: The spurious signals detected do not depend on either the operating channel or the modulation mode.
 Note 2: This plot is valid for both SISO and MIMO modes.

1 GHz – 18GHz

Radiated Spurious – 802.11a, Chain A, CH 157

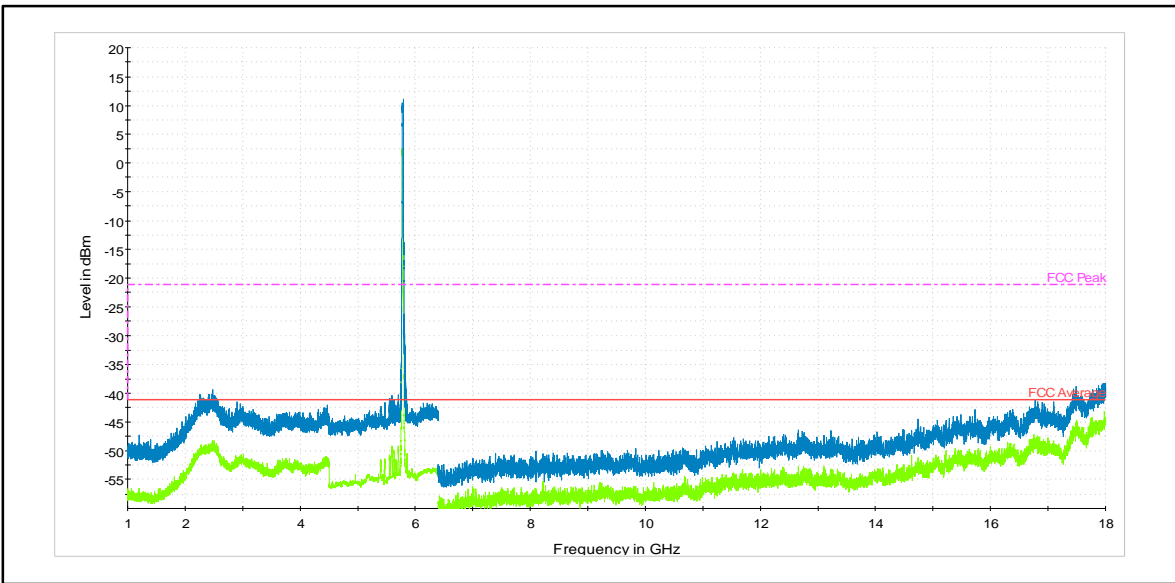


Frequency	MaxPeak	RMS	Height	Pol	Azimuth	Corr.
MHz	dBm	dBm	cm		deg	dB
2318.500000	---	-48.94	150.0	H	41.0	-90.6
2318.500000	-39.40	---	150.0	H	41.0	-90.6
17977.766667	---	-43.11	150.0	H	223.0	-83.6
17994.200000	-38.13	---	150.0	H	184.0	-83.2

Note 1: The spurious signals detected do not depend on the operating channel.

1 GHz – 18GHz

Radiated Spurious – 802.11a, Chain B, CH157

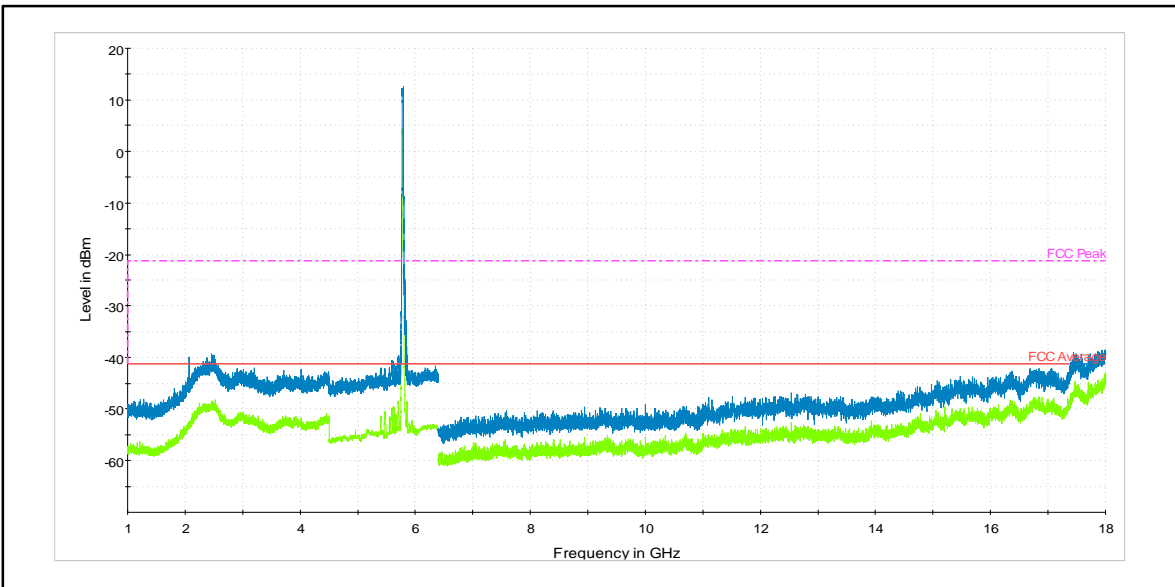


Frequency	MaxPeak	RMS	Height	Pol	Azimuth	Corr.
MHz	dBm	dBm	cm		deg	dB
2259.000000	-40.14	---	150.0	H	134.0	-90.9
2262.000000	---	-49.49	150.0	H	216.0	-90.9
17975.833333	-38.17	---	150.0	H	27.0	-83.6
17976.800000	---	-43.67	150.0	H	196.0	-83.6

Note 1: The spurious signals detected do not depend on the operating channel.

1 GHz – 18GHz

Radiated Spurious – 802.11n20, SISO Chain A, CH157

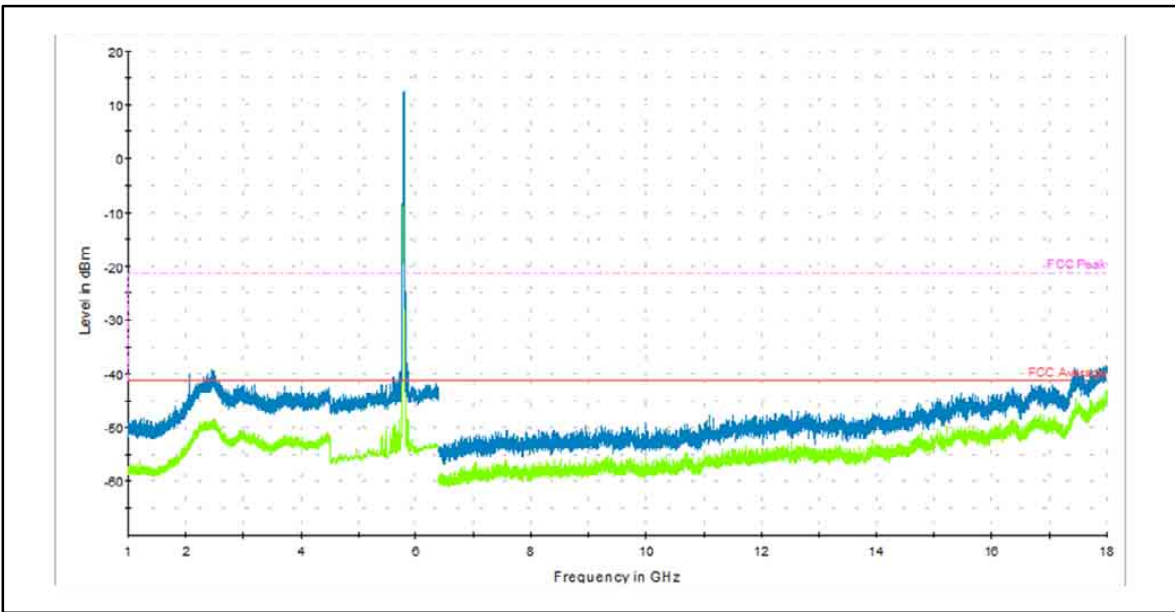


Frequency	MaxPeak	RMS	Height	Pol	Azimuth	Corr.
MHz	dBm	dBm	cm		deg	dB
2385.000000	---	-49.20	150.0	H	283.0	-90.3
2386.000000	-39.92	---	150.0	H	160.0	-90.3
17980.666667	-38.53	---	150.0	H	205.0	-83.5
17986.466667	---	-43.14	150.0	H	220.0	-83.4

Note 1: The spurious signals detected do not depend on the operating channel.

1 GHz – 18GHz

Radiated Spurious – 802.11n20, SISO Chain B, CH157

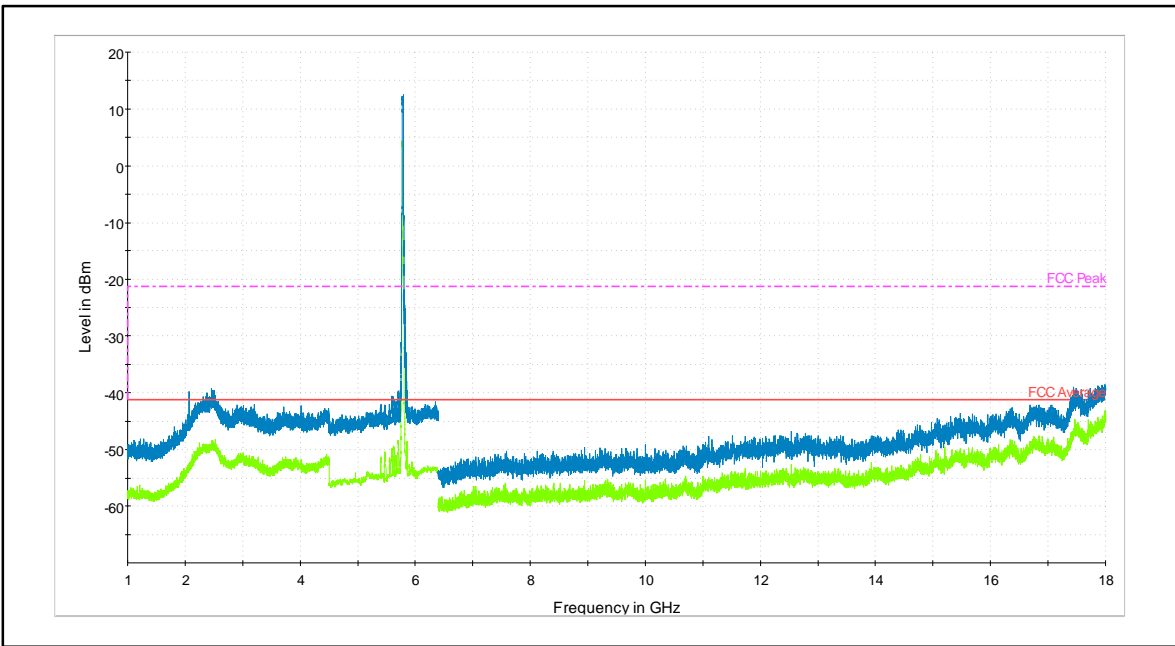


Frequency	MaxPeak	RMS	Height	Pol	Azimuth	Corr.
MHz	dBm	dBm	cm		deg	dB
2338.500000	-40.16	---	150.0	H	245.0	-90.5
2339.500000	---	-49.03	150.0	H	260.0	-90.5
17987.433333	---	-43.55	150.0	H	118.0	-83.4
17987.433333	-37.17	---	150.0	H	118.0	-83.4

Note 1: The spurious signals detected do not depend on the operating channel.

1 GHz – 18GHz

Radiated Spurious – 802.11n20, MIMO Chain A+B, CH157

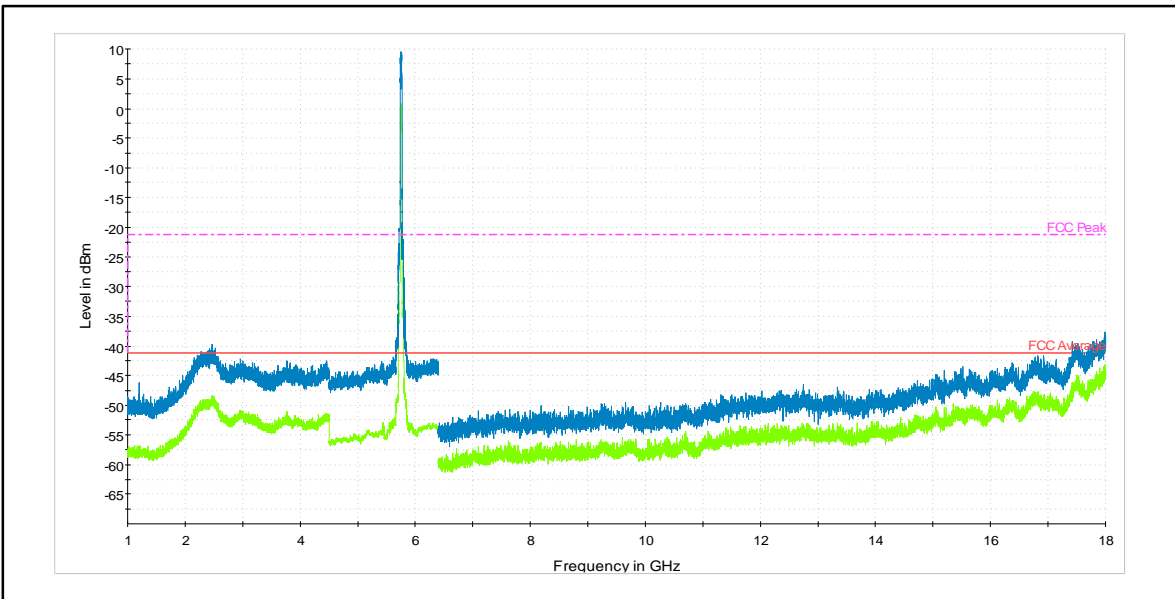


Frequency	MaxPeak	RMS	Height	Pol	Azimuth	Corr.
MHz	dBm	dBm	cm		deg	dB
2504.000000		-48.08	150.0	H	32.0	-89.9
2458.500000	-37.43	---	150.0	H	250.0	-90.0
17998.066667	-37.52	---	150.0	H	49.0	-83.1
17999.033333	---	-43.44	150.0	H	93.0	-83.1

Note 1: The spurious signals detected do not depend on the operating channel.

1 GHz – 18GHz

Radiated Spurious – 802.11n40, SISO Chain A, CH151

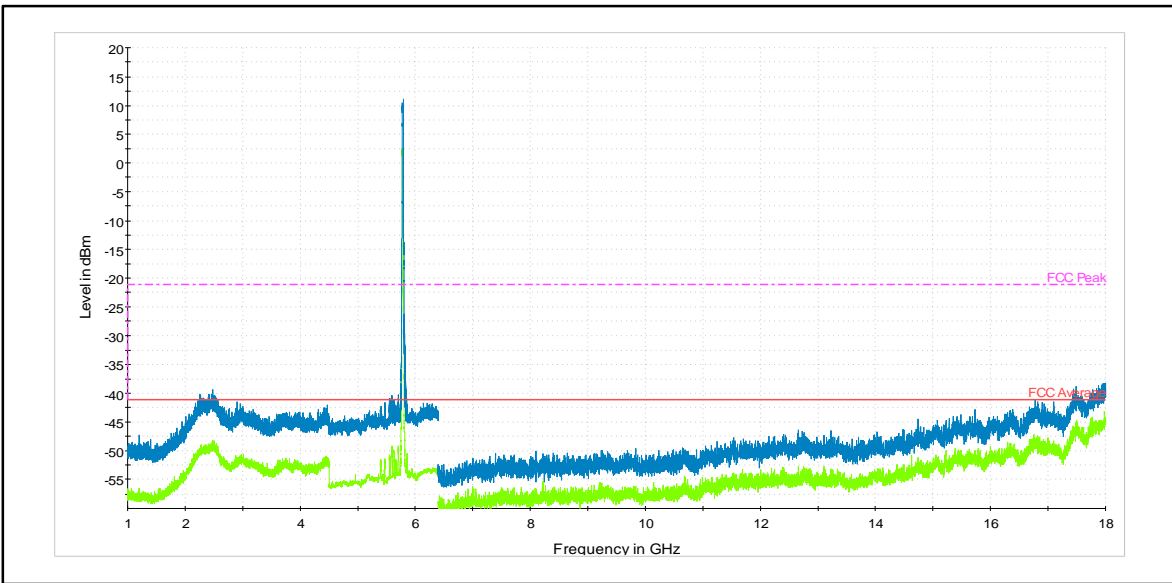


Frequency	MaxPeak	RMS	Height	Pol	Azimuth	Corr.
MHz	dBm	dBm	cm		deg	dB
2318.500000	---	-48.94	150.0	H	41.0	-90.6
2318.500000	-39.40	---	150.0	H	41.0	-90.6
17977.766667	---	-43.11	150.0	H	223.0	-83.6
17994.200000	-38.13	---	150.0	H	184.0	-83.2

Note 1: The spurious signals detected do not depend on the operating channel.

1 GHz – 18GHz

Radiated Spurious – 802.11n40, SISO Chain B, CH151

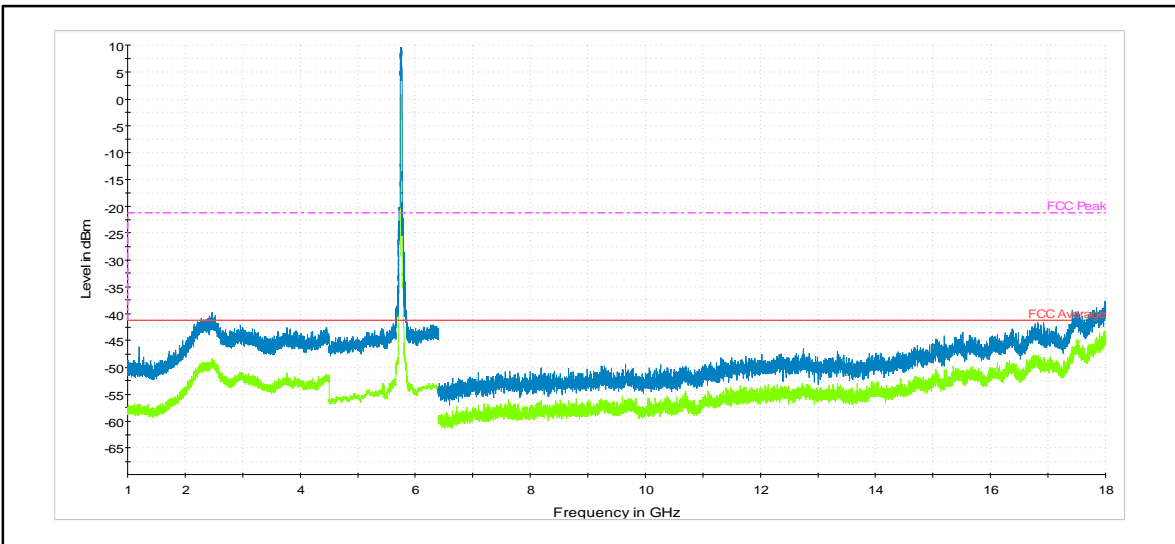


Frequency	MaxPeak	RMS	Height	Pol	Azimuth	Corr.
MHz	dBm	dBm	cm		deg	dB
2259.000000	-40.14	---	150.0	H	134.0	-90.9
2262.000000	---	-49.49	150.0	H	216.0	-90.9
17975.833333	-38.17	---	150.0	H	27.0	-83.6
17976.800000	---	-43.67	150.0	H	196.0	-83.6

Note 1: The spurious signals detected do not depend on the operating channel.

1 GHz – 18GHz

Radiated Spurious – 802.11n40, MIMO Chain A+B, CH151

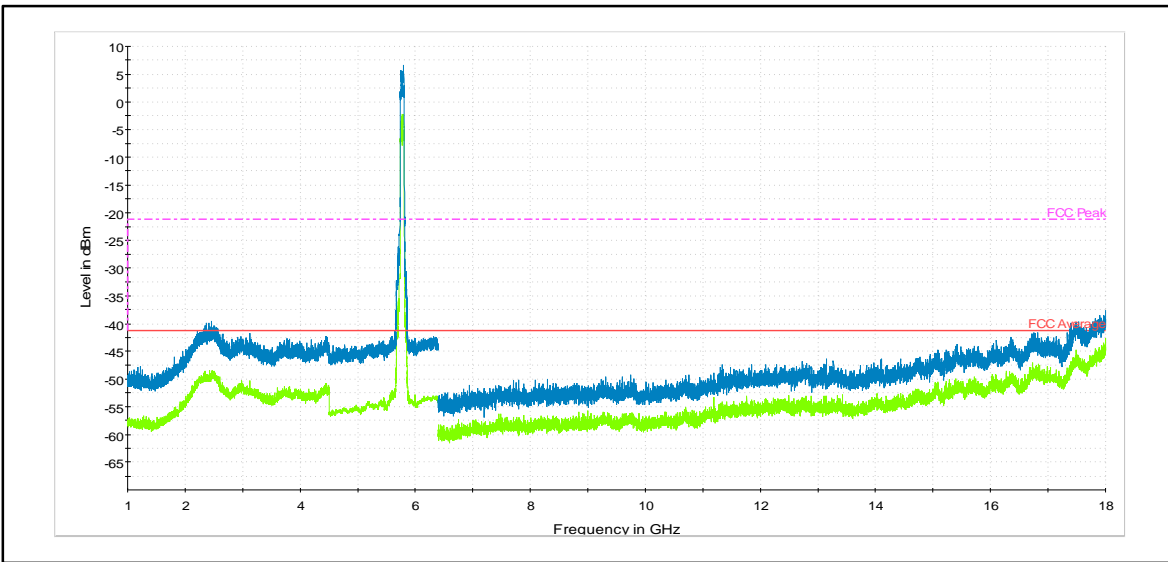


Frequency	MaxPeak	RMS	Height	Pol	Azimuth	Corr.
MHz	dBm	dBm	cm		deg	dB
2444.500000		-48.15	150.0	H	251.0	-90.1
2492.500000	-40.05	--	150.0	H	94.0	-89
17984.533333		-43.87	150.0	H	105.0	-83.4
17994.200000	-37.33	---	150.0	H	114.0	-83.2

Note 1: The spurious signals detected do not depend on the operating channel.

1 GHz – 18GHz

Radiated Spurious – 802.11ac80, SISO Chain A, CH155

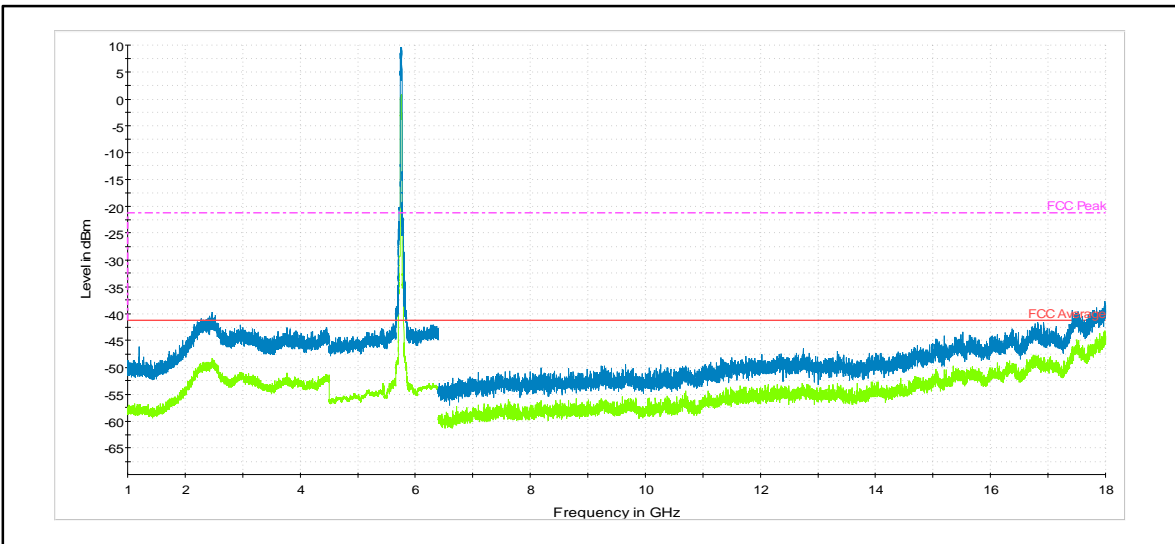


Frequency	MaxPeak	RMS	Height	Pol	Azimuth	Corr.
MHz	dBm	dBm	cm		deg	dB
2489.500000	---	-49.42	150.0	H	216.0	-89.8
2492.500000	-40.87	---	150.0	H	311.0	-89.8
17994.200000	---	-42.67	150.0	H	334.0	-83.2
17996.133333	-38.70	---	150.0	V	69.0	-84.2

Note 1: The spurious signals detected do not depend on the operating channel.

1 GHz – 18GHz

Radiated Spurious – 802.11ac80, SISO Chain B, CH155

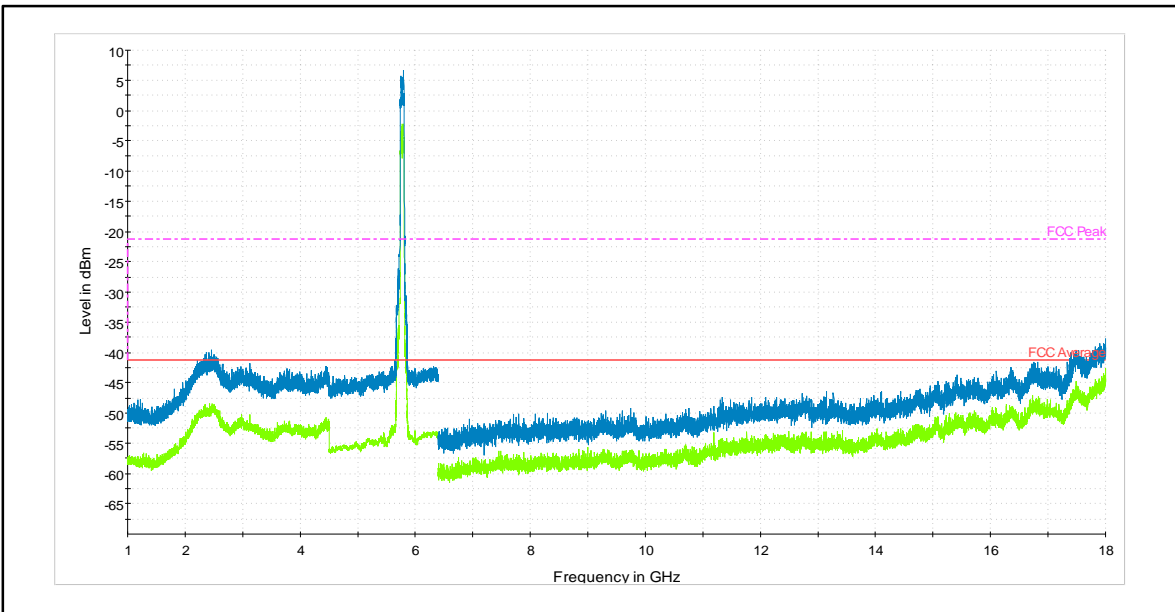


Frequency	MaxPeak	RMS	Height	Pol	Azimuth	Corr.
MHz	dBm	dBm	cm		deg	dB
2487.500000	---	-49.08	150.0	H	0.0	-89.8
2488.000000	-40.36	---	150.0	H	197.0	-89.8
17956.500000	---	-44.21	150.0	V	290.0	-85.0
17957.466667	-37.79	---	150.0	H	187.0	-84.0

Note 1: The spurious signals detected do not depend on the operating channel.

1 GHz – 18GHz

Radiated Spurious – 802.11ac80, MIMO Chain A+B, CH155

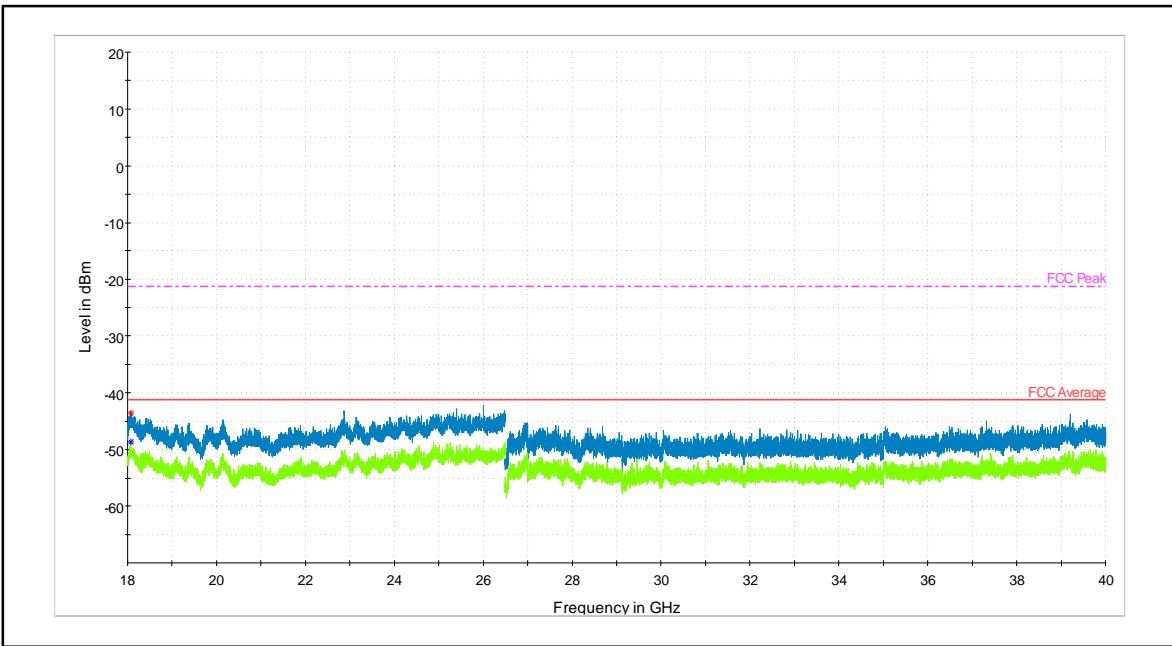


Frequency	MaxPeak	RMS	Height	Pol	Azimuth	Corr.
MHz	dBm	dBm	cm		deg	dB
2483.000000	---	-47.94	150.0	H	247.0	-89.9
2490.500000	-40.37	---	150.0	H	174.0	-89.8
17848.233333	---	-44.53	150.0	H	261.0	-86.4
17848.233333	-37.95	---	150.0	H	261.0	-86.4

Note 1: The spurious signals detected do not depend on the operating channel.

18 GHz – 40GHz

Radiated Spurious – All modes



Frequency	MaxPeak	RMS	Height	Pol	Azimuth	Corr.
MHz	dBm	dBm	cm		deg	dB
18074.127907		-48.70	150.0	V	73.0	-91.0
18074.127907	-43.63	---	150.0	V	73.0	-91.0
39769.656250		-50.00	150.0	V	308.0	-79.2
39791.593750	-45.43	---	150.0	V	276.0	-79.2

Note 1: The spurious signals detected do not depend on either the operating channel or the modulation mode.

Note 2: This plot is valid for both SISO and MIMO modes.