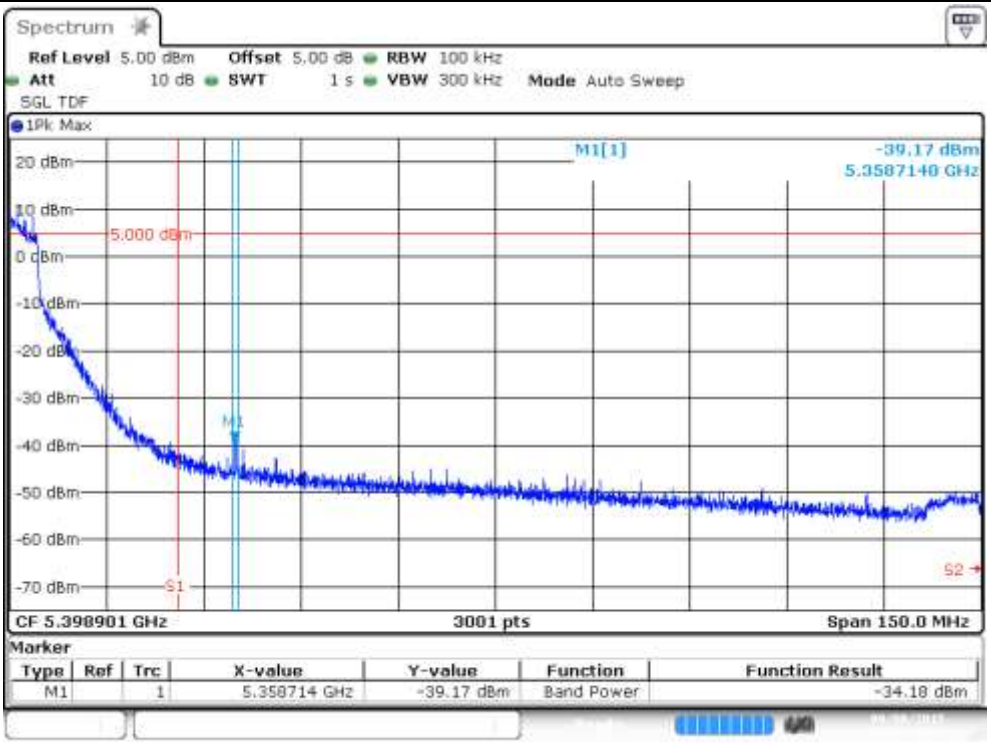
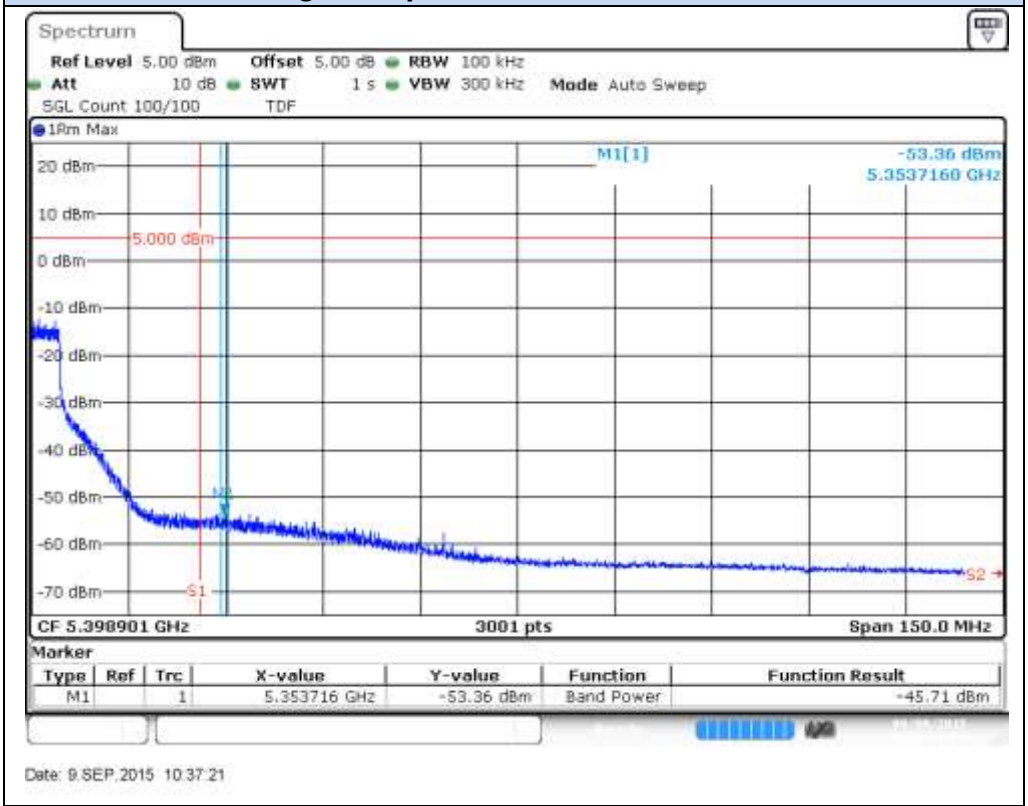
802.11ac80, VHT0 (MIMO)- Chain A

BE High Freq Section, Peak – CH58ac80



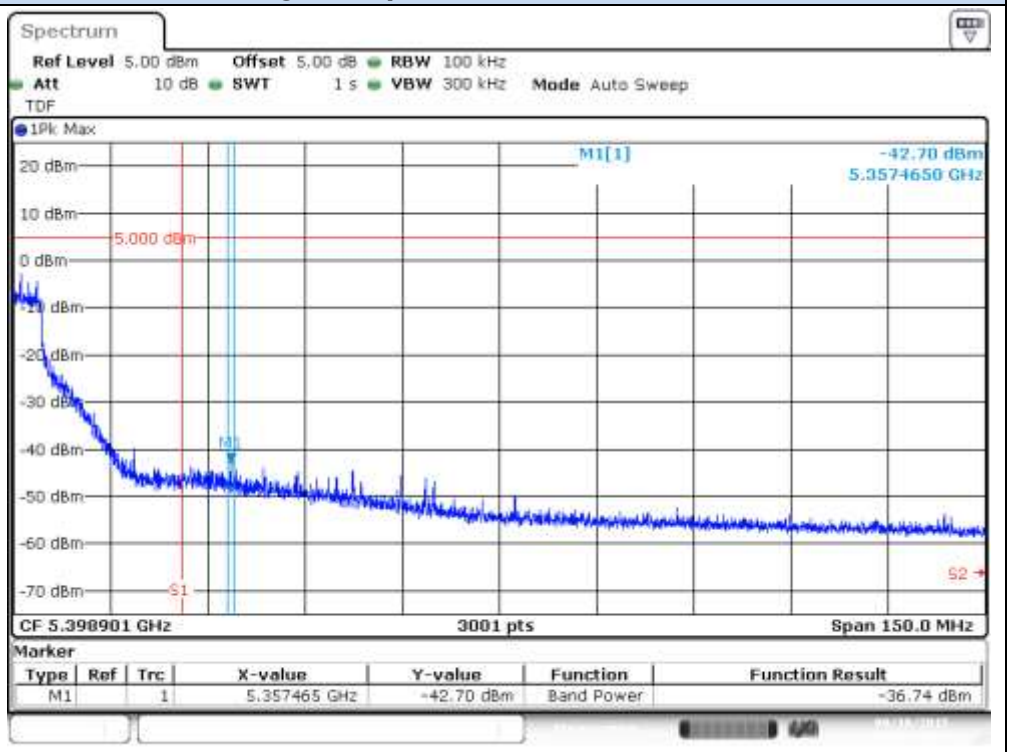
BE High Freq Section, RMS – CH58ac80



Printed copies are not controlled documents

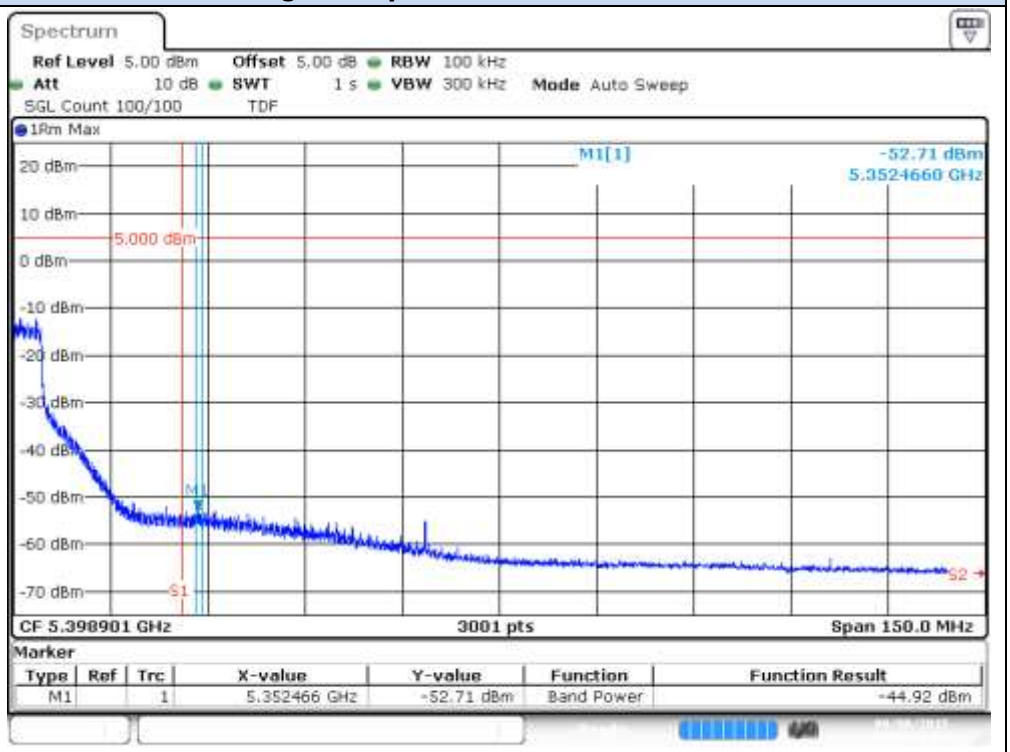
802.11ac80, VHT0 (MIMO)- Chain B

BE High Freq Section, Peak – CH58ac80



Date: 18.SEP.2015 16:06:22

BE High Freq Section, RMS – CH58ac80



Date: 8.SEP.2015 18:07:00

Printed copies are not controlled documents

C.4 Radiated spurious emission

Standard references:

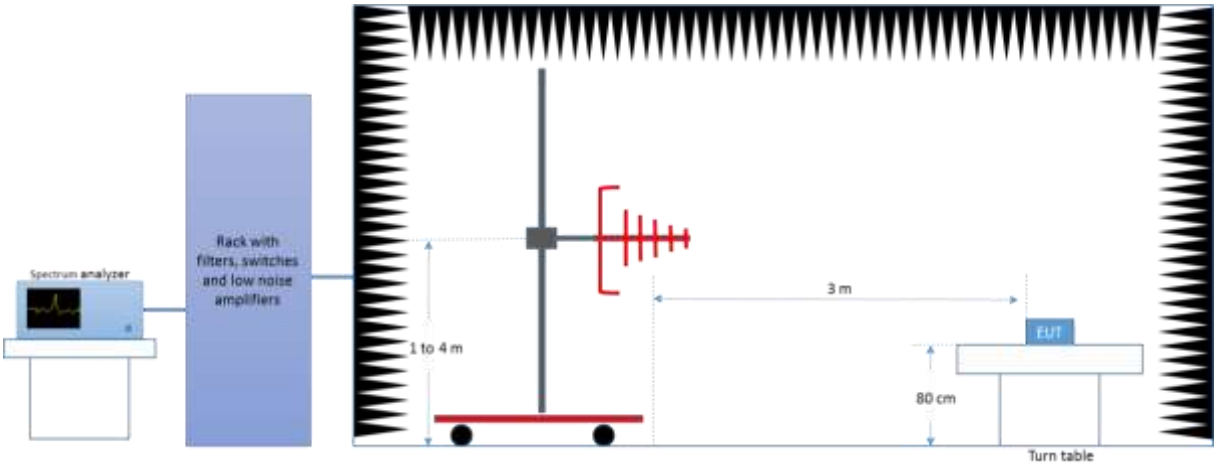
<table>
<tr><th>FCC part</th><th>RSS part</th><th>Limits</th></tr>
<tr><td>15.407 (b) (2)
15.209</td><td>RSS-247
Clause 6.2.2
(2)</td><td>Radiated emissions which fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emission limits specified in §15.209(a):

<table>
<tr><th>Freq Range (MHz)</th><th>Field Stregth (µV/m)</th><th>Field Stregth (dBµV/m)</th><th>Meas. Distance (m)</th></tr>
<tr><td>0.009-0.490</td><td>2400/f(kHz)</td><td>-</td><td>300</td></tr>
<tr><td>0.490-1.705</td><td>24000/f(kHz)</td><td>-</td><td>300</td></tr>
<tr><td>1.705-30.0</td><td>30</td><td>-</td><td>30</td></tr>
<tr><td>30-88</td><td>100</td><td>40</td><td>3</td></tr>
<tr><td>88-216</td><td>150</td><td>43.5</td><td>3</td></tr>
<tr><td>216-960</td><td>200</td><td>46</td><td>3</td></tr>
<tr><td>Above 960</td><td>500</td><td>54</td><td>3</td></tr>
</table>
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.
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.</td></tr>
</table>

Test procedure:

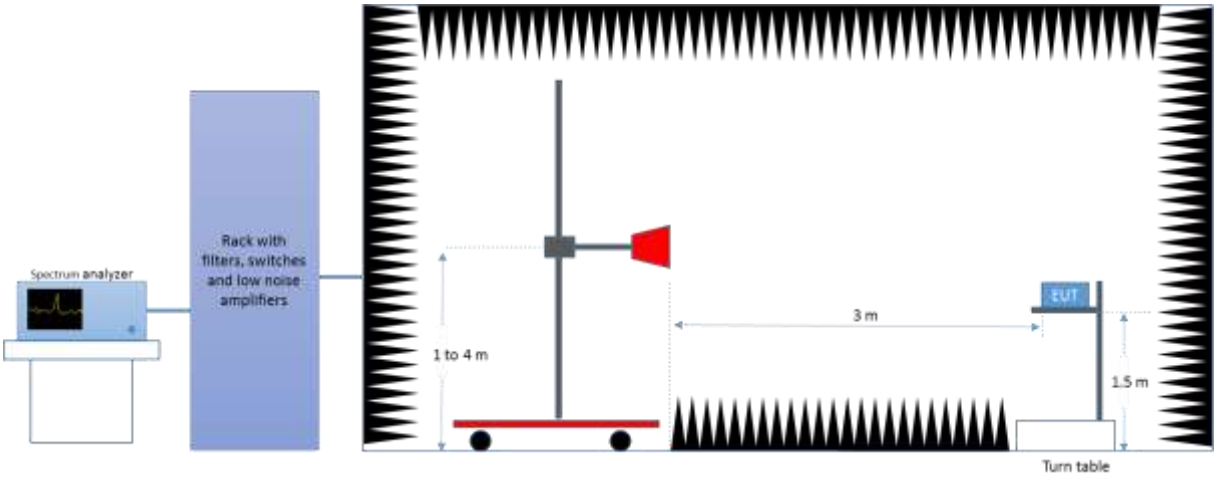
The below setups were used to measure the radiated spurious emissions.
Depending of the frequency range and bands being tested, different antennas and filters were used.
The final measurement is done by varying the antenna height from 1 to 4 meters, the EUT azimuth over 360º and for both Vertical and Horizontal polarizations.
The radiated spurious emissions were measured on the worst case configuration selected from the chapter *C.2 Power Limits. Maximum Output power & Peak power spectral density* and using the lowest, middle and highest channels.

Radiated Setup < 1GHz

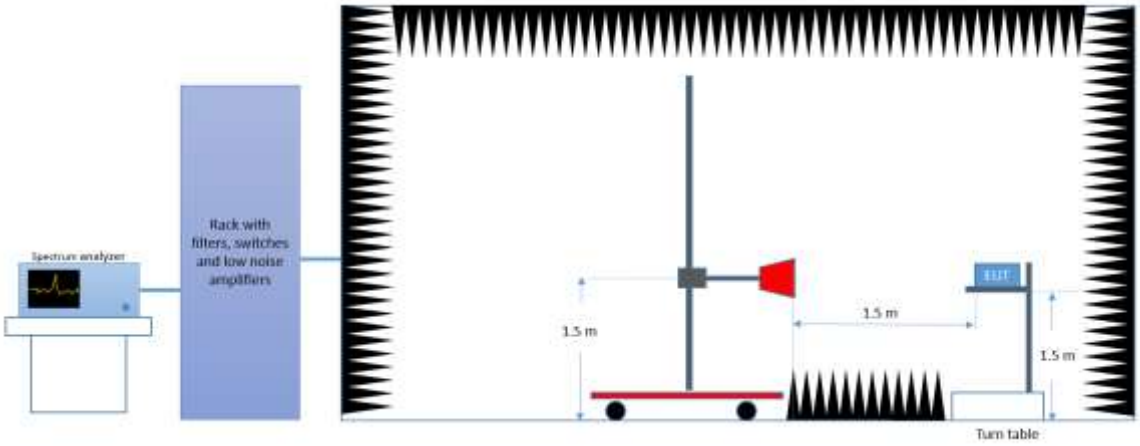


Printed copies are not controlled documents

Radiated Setup 1 GHz - 18 GHz



Radiated Setup > 18 GHz

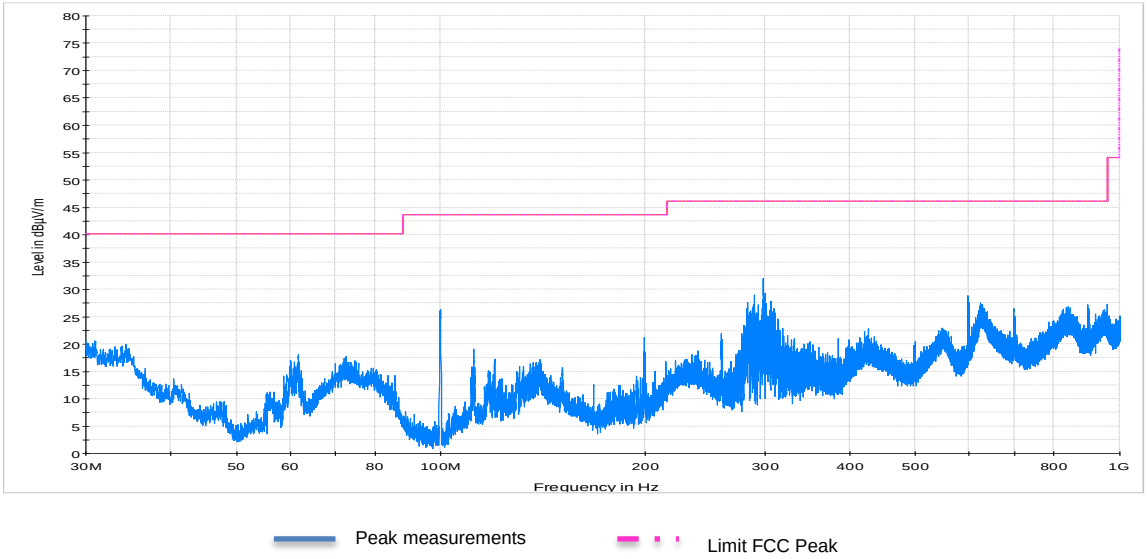


Printed copies are not controlled documents

Test Results:

All modes

Radiated Spurious – 30MHz – 1GHz



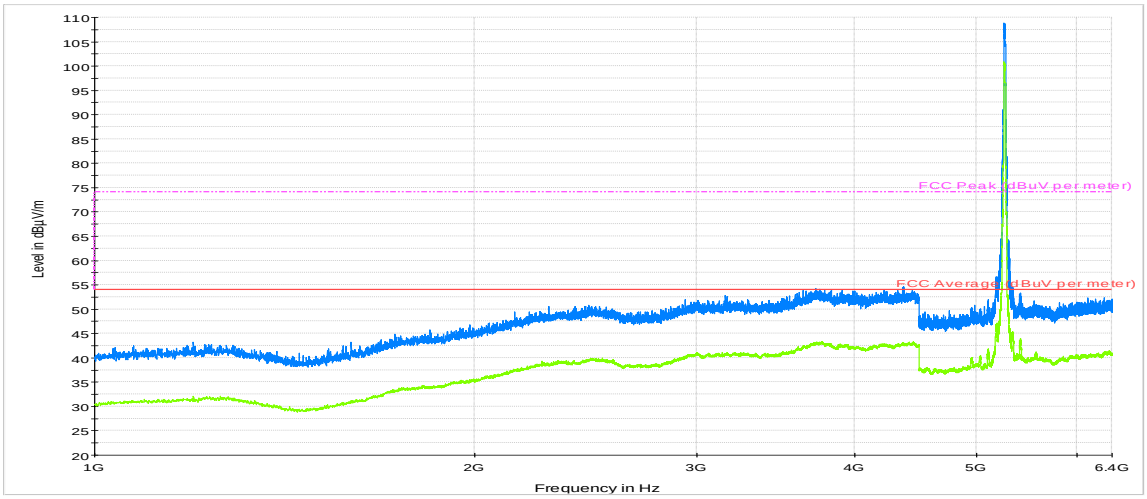
Frequency	MaxPeak	Limit	Margin
MHz	dBµV/m	dBµV/m	dB
298	32.0	46	14
598	28.9	46	17.1

Note 1: The spurious signals detected do not depend on either the operating channel or the modulation mode.
Note 2: No spurious signals were found in all modulations and channels tested.
Note 3: This plot is valid for both SISO and MIMO modes.

Printed copies are not controlled documents

802.11a, 6Mbps, Chain A

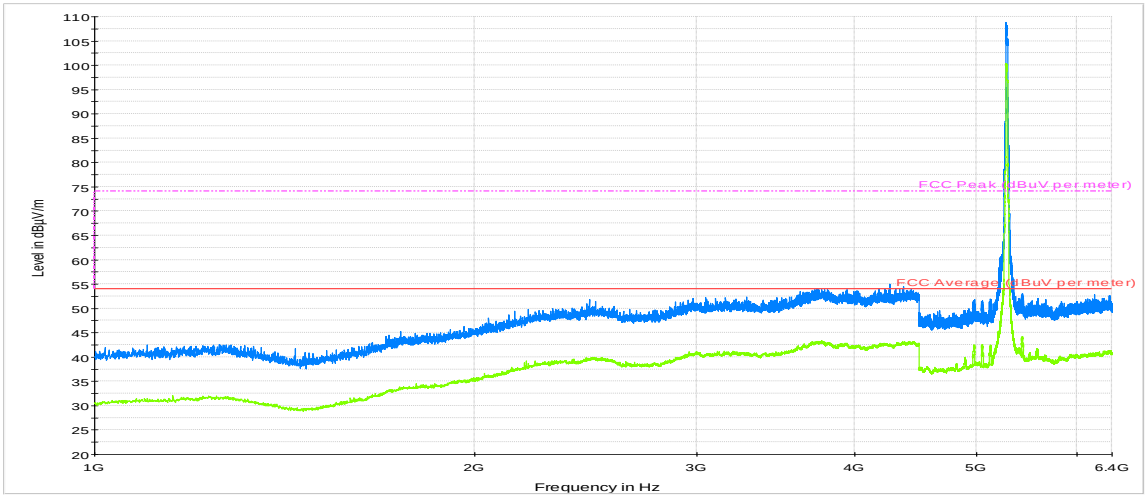
Radiated Spurious – 1GHz – 6.4GHz–CH52



Frequency	MaxPeak	RMS	Limit	Margin
MHz	dBm	dBm	dBm	dB
3770	54.0	---	74	20
3770	---	43.3	54	10.7

Printed copies are not controlled documents

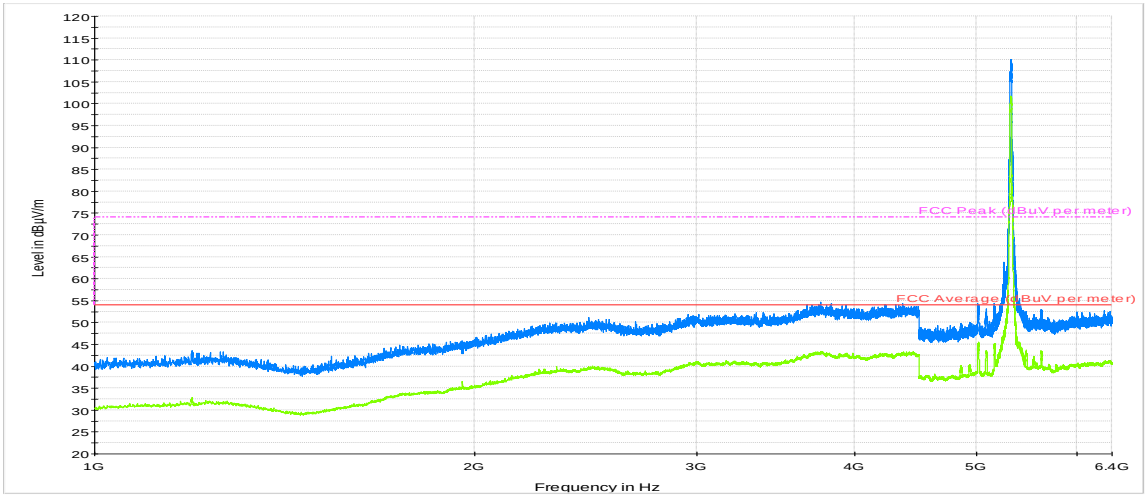
Radiated Spurious – 1GHz – 6.4GHz–CH56



Frequency	MaxPeak	RMS	Limit	Margin
MHz	dBµV/m	dBµV/m	dBµV/m	dB
3732	54.1	---	74	19.9
3732	---	43.1	54	10.9

Printed copies are not controlled documents

Radiated Spurious – 1GHz – 6.4GHz–CH64

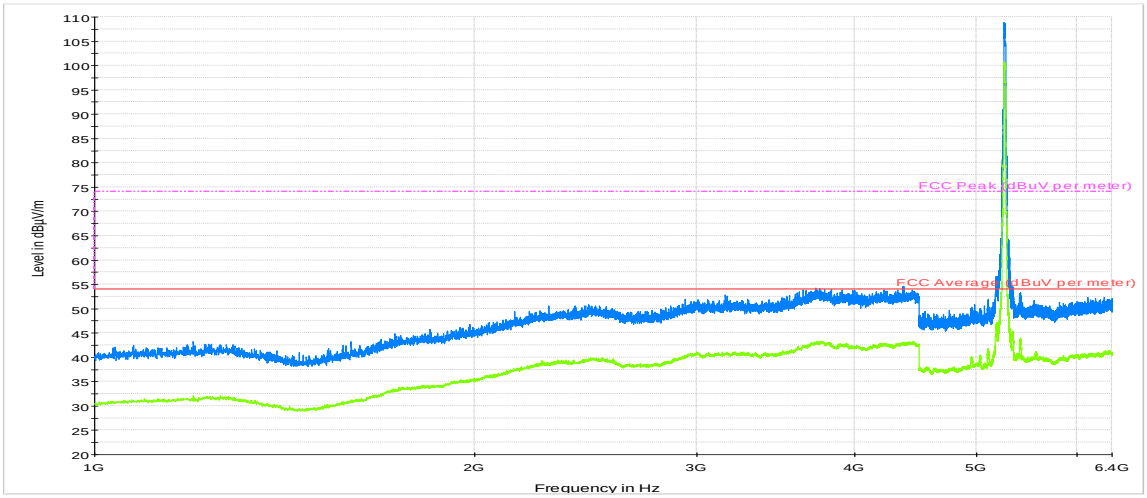


Frequency	MaxPeak	RMS	Limit	Margin
MHz	dBµV/m	dBµV/m	dBµV/m	dB
3758	54.6	---	74	19.4
3758	---	43.4	54	10.6

Printed copies are not controlled documents

802.11a, 6Mbps, Chain B

Radiated Spurious – 1GHz – 6.4GHz–CH52

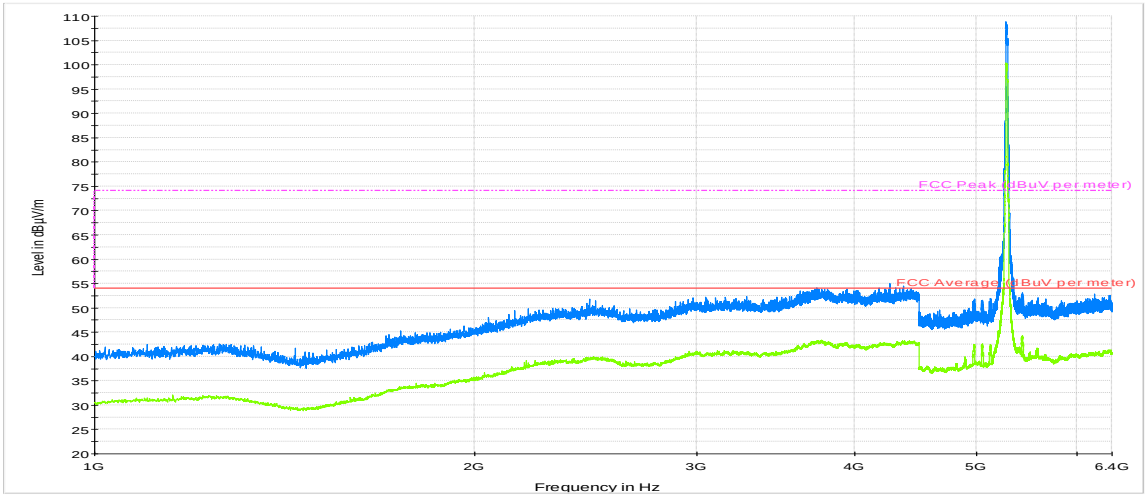


Peak measurements AVG measurements Limit FCC AVG Limit FCC Peak

Frequency	MaxPeak	RMS	Limit	Margin
MHz	dBµV/m	dBµV/m	dBµV/m	dB
3736	53.7	---	74	20.3
3736	---	42.7	54	11.3

Printed copies are not controlled documents

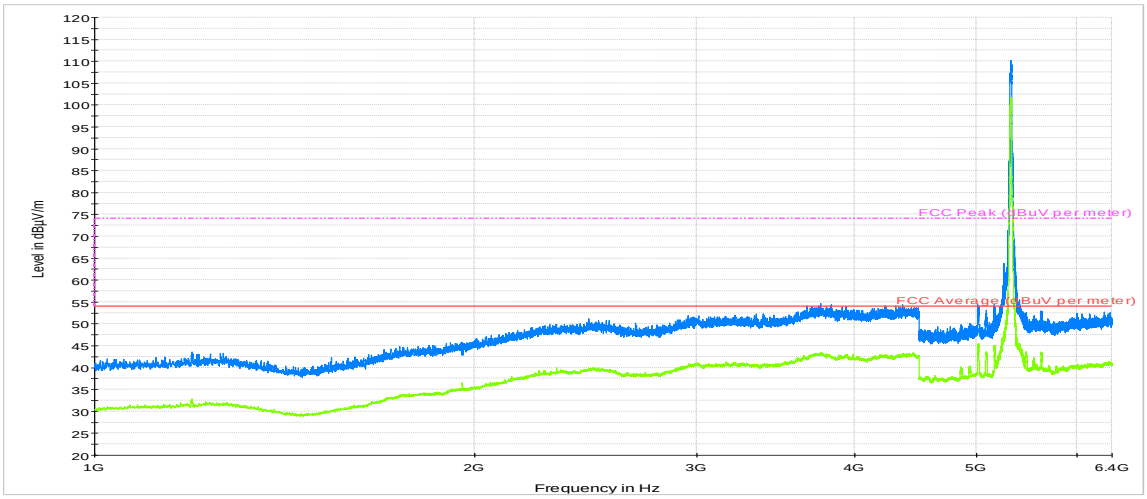
Radiated Spurious – 1GHz – 6.4GHz–CH56



Frequency	MaxPeak	RMS	Limit	Margin
MHz	dBµV/m	dBµV/m	dBµV/m	dB
3700	55.0	---	74	19
3700	---	43.4	54	10.6

Printed copies are not controlled documents

Radiated Spurious – 1GHz – 6.4GHz–CH64

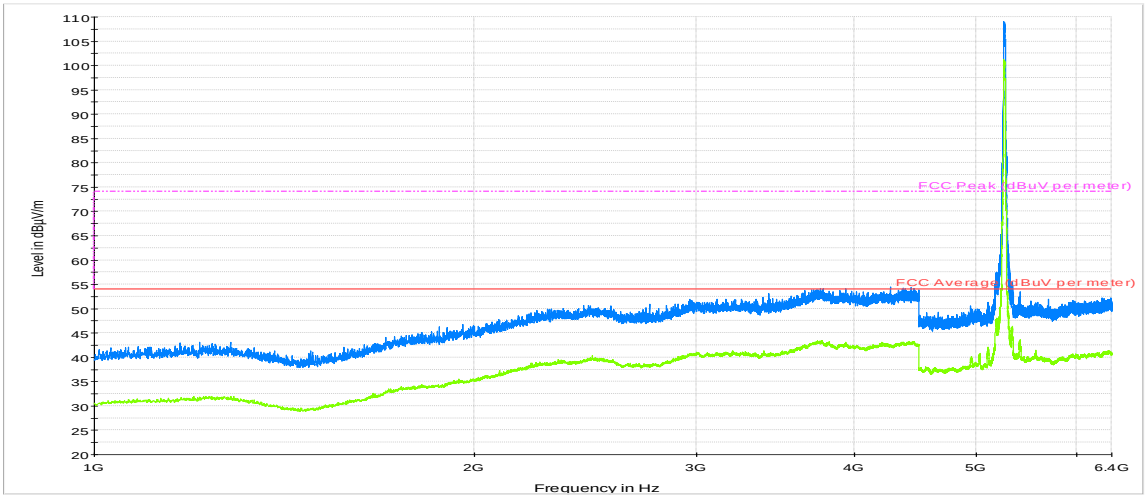


Frequency	MaxPeak	RMS	Limit	Margin
MHz	dBµV/m	dBµV/m	dBµV/m	dB
3715	53.6	---	74	20.4
3715	---	43.3	54	10.7

Printed copies are not controlled documents

802.11n20, HT0 (SISO), Chain A

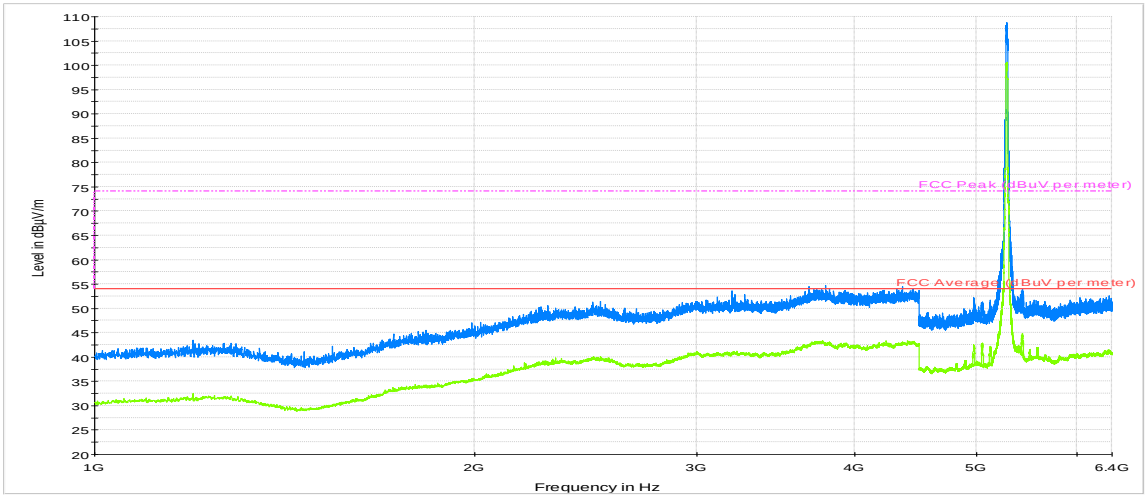
Radiated Spurious – 1GHz – 6.4GHz–CH52



Frequency	MaxPeak	RMS	Limit	Margin
MHz	dBµV/m	dBµV/m	dBµV/m	dB
3740	53.8	---	74	20.2
3740	---	43.5	54	10.5

Printed copies are not controlled documents

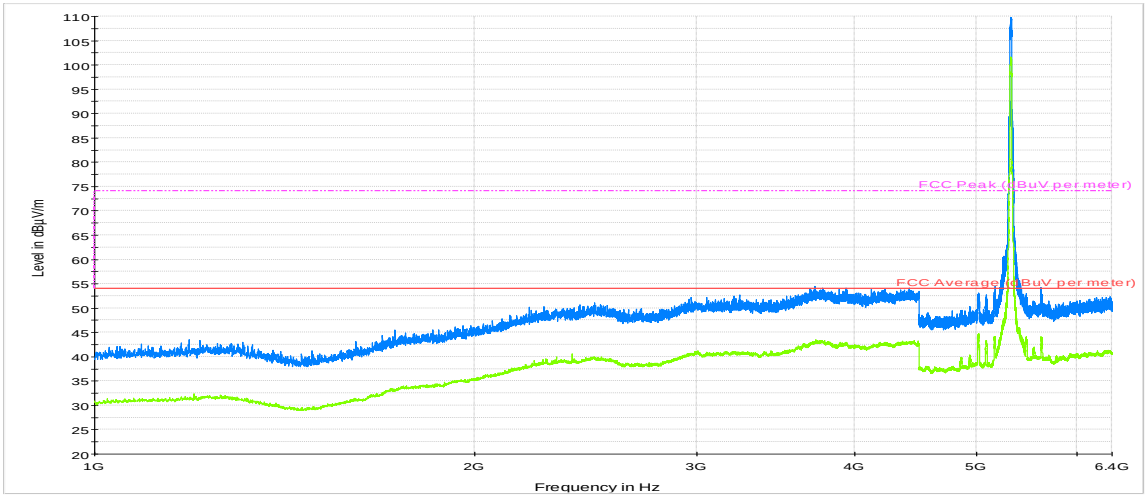
Radiated Spurious – 1GHz – 6.4GHz–CH56



Frequency	MaxPeak	RMS	Limit	Margin
MHz	dBµV/m	dBµV/m	dBµV/m	dB
3769	53.8	---	74	12.2
3769	---	43.4	54	18.6

Printed copies are not controlled documents

Radiated Spurious – 1GHz – 6.4GHz–CH64

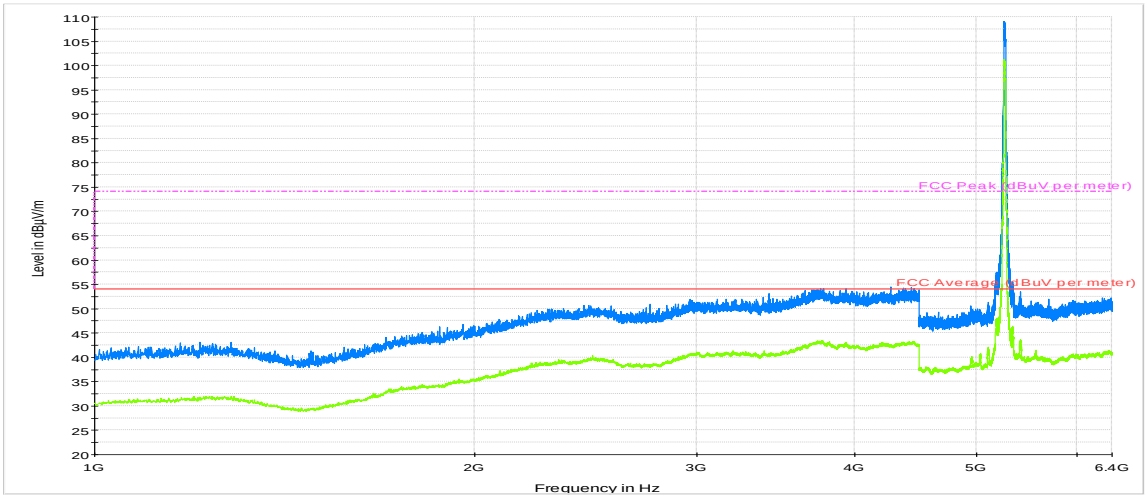


Frequency	MaxPeak	RMS	Limit	Margin
MHz	dBµV/m	dBµV/m	dBµV/m	dB
3777	53.8	---	74	20.2
3777	---	43.3	54	10.7

Printed copies are not controlled documents

802.11n20, HT0 (SISO), Chain B

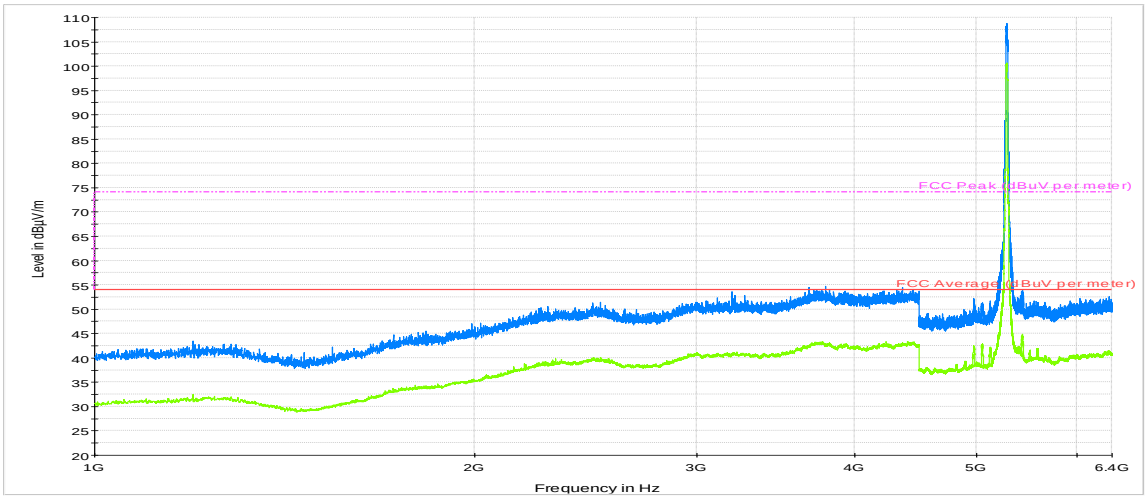
Radiated Spurious – 1GHz – 6.4GHz–CH52



Frequency	MaxPeak	RMS	Limit	Margin
MHz	dBµV/m	dBµV/m	dBµV/m	dB
3750	54.0	---	74	20.0
3750	---	43.2	54	10.8

Printed copies are not controlled documents

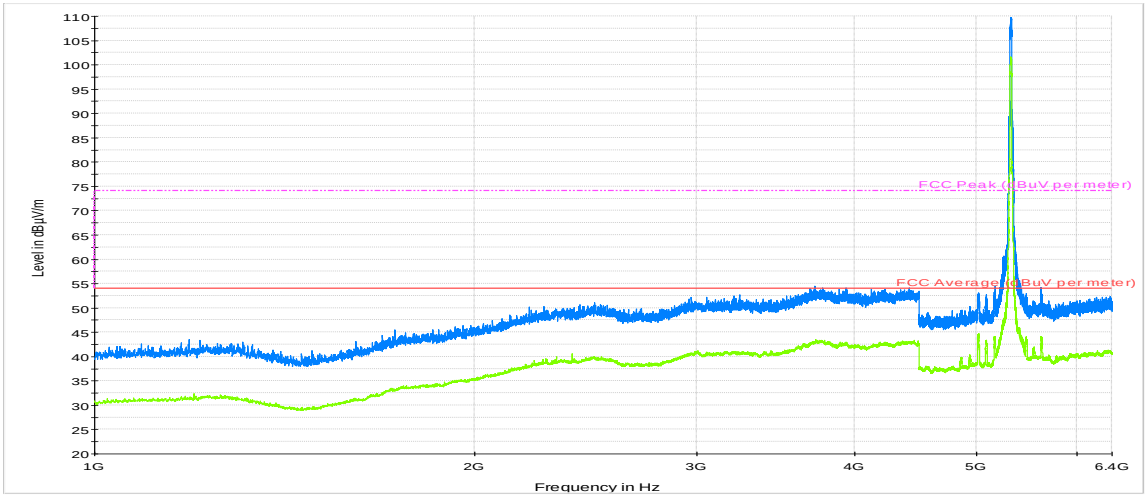
Radiated Spurious – 1GHz – 6.4GHz–CH56



Frequency	MaxPeak	RMS	Limit	Margin
MHz	dBµV/m	dBµV/m	dBµV/m	dB
3744	53.9	---	74	20.1
3744	---	42.7	54	11.3

Printed copies are not controlled documents

Radiated Spurious – 1GHz – 6.4GHz–CH64

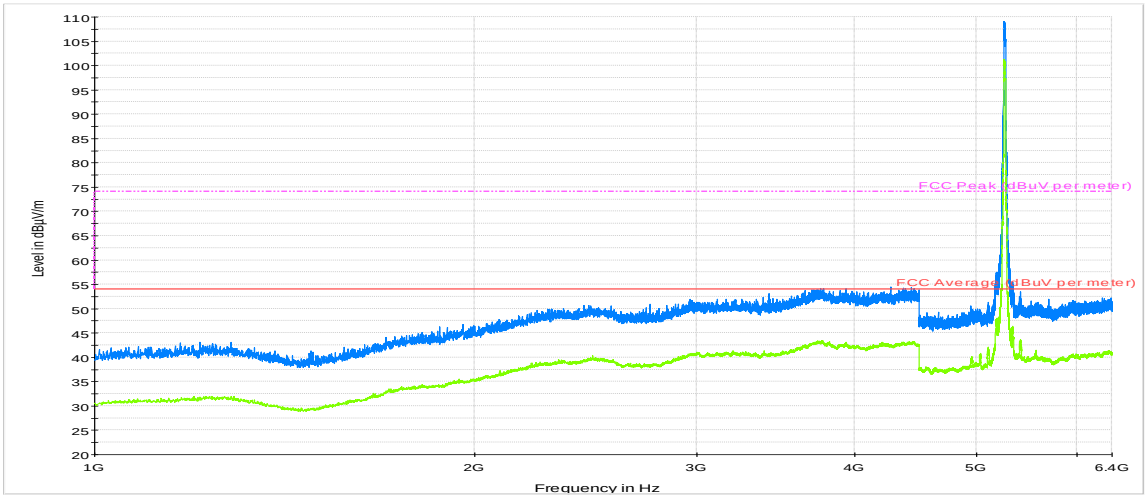


Frequency	MaxPeak	RMS	Limit	Margin
MHz	dBµV/m	dBµV/m	dBµV/m	dB
3771	54.2	---	74	19.8
3771	---	43.3	54	10.7

Printed copies are not controlled documents

802.11n20, HT8 (MIMO), Chain A+B

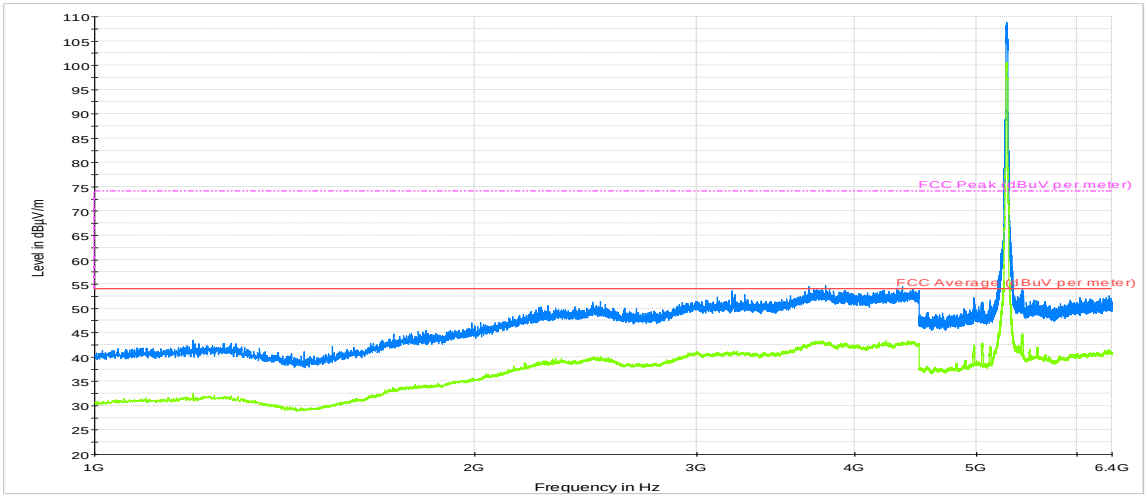
Radiated Spurious – 1GHz – 6.4GHz–CH52



Frequency	MaxPeak	RMS	Limit	Margin
MHz	dBµV/m	dBµV/m	dBµV/m	dB
3730	54.1	---	74	19.9
3730	---	43.1	54	10.9

Printed copies are not controlled documents

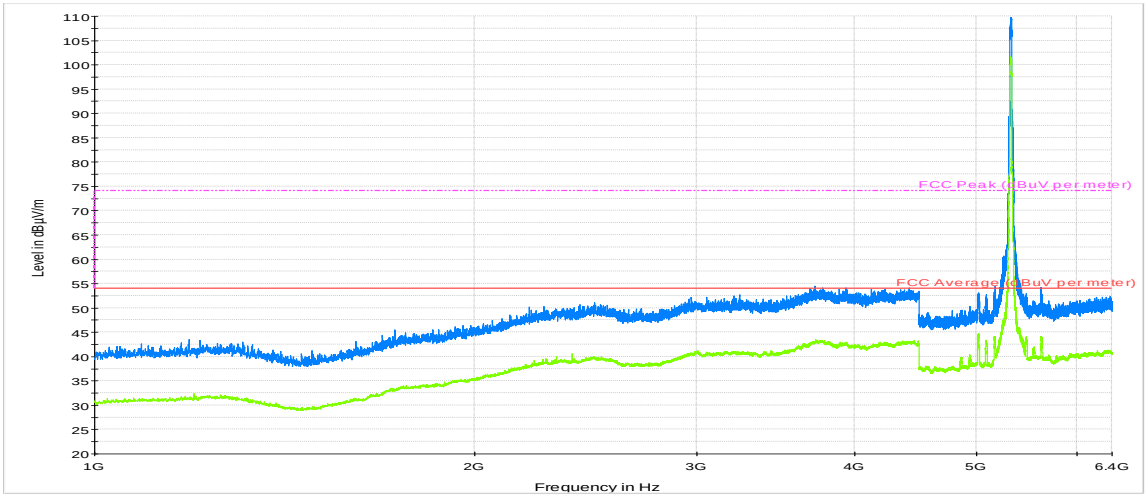
Radiated Spurious – 1GHz – 6.4GHz–CH56



Frequency	MaxPeak	RMS	Limit	Margin
MHz	dBµV/m	dBµV/m	dBµV/m	dB
3710	53.9	---	74	20.1
3710	---	43.3	54	10.7

Printed copies are not controlled documents

Radiated Spurious – 1GHz – 6.4GHz–CH64

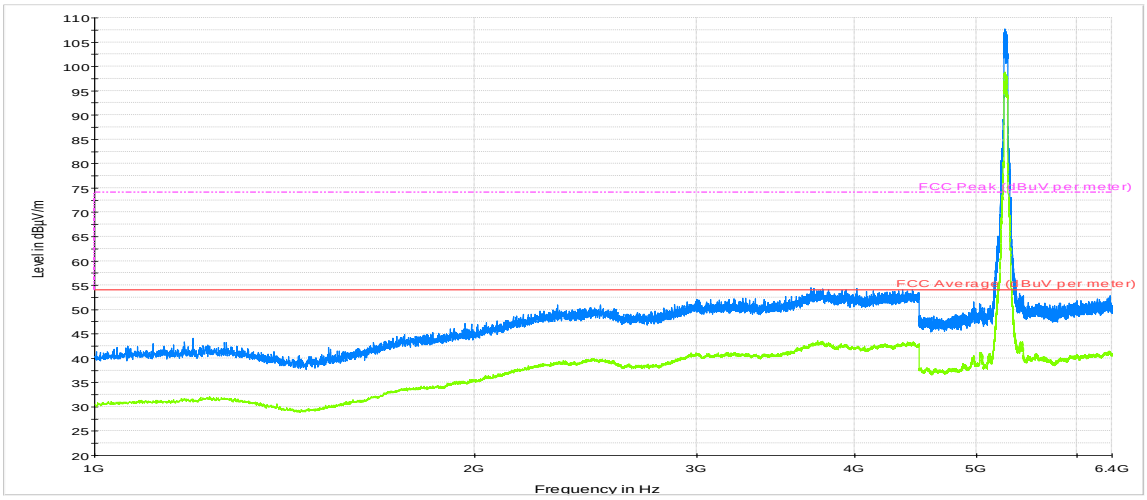


Frequency	MaxPeak	RMS	Limit	Margin
MHz	dBµV/m	dBµV/m	dBµV/m	dB
3752	54.3	---	74	19.7
3752	---	42.8	54	11.2

Printed copies are not controlled documents

802.11n40, HT0 (SISO), Chain A

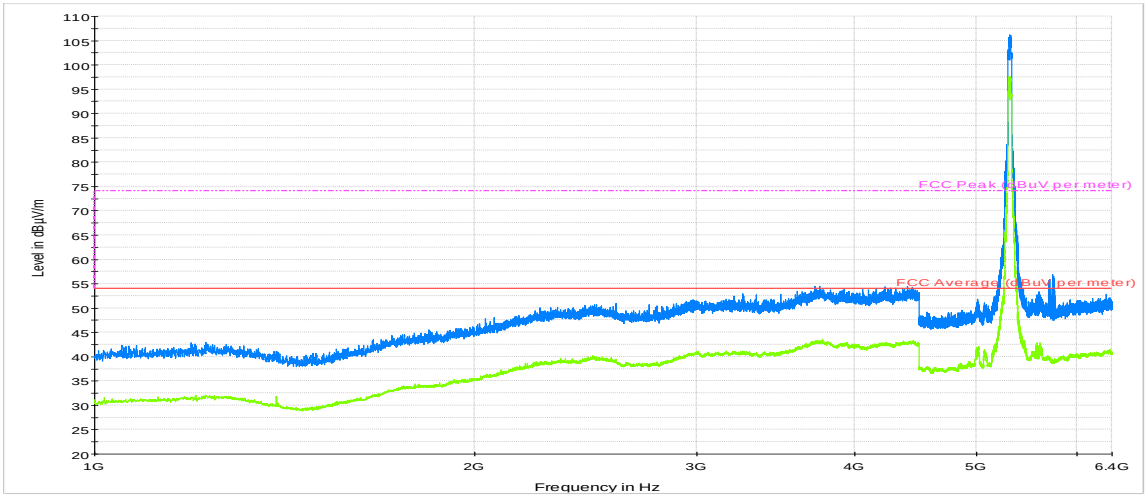
Radiated Spurious – 1GHz – 6.4GHz–CH54F



Frequency	MaxPeak	RMS	Limit	Margin
MHz	dBµV/m	dBµV/m	dBµV/m	dB
3738	53.9	---	74	20.1
3738	---	43.6	54	10.4

Printed copies are not controlled documents

Radiated Spurious – 1GHz – 6.4GHz–CH62F

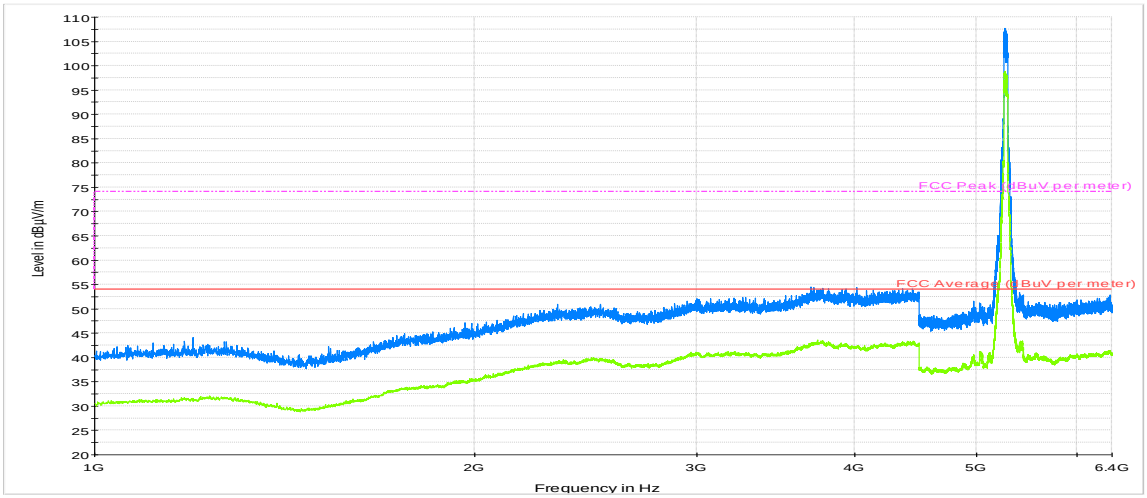


Frequency	MaxPeak	RMS	Limit	Margin
MHz	dBµV/m	dBµV/m	dBµV/m	dB
3756	54.5	---	74	19.5
3756	---	43.1	54	10.9

Printed copies are not controlled documents

802.11n40, HT0 (SISO), Chain B

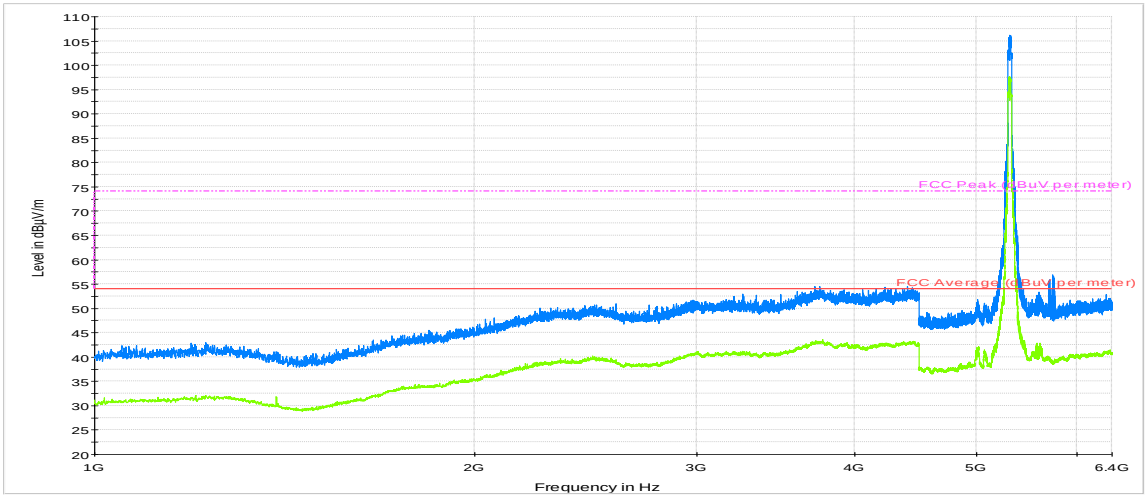
Radiated Spurious – 1GHz – 6.4GHz–CH54F



Frequency	MaxPeak	RMS	Limit	Margin
MHz	dBµV/m	dBµV/m	dBµV/m	dB
4444	55.4	----	74	18.6
4444	----	43.3	54	10.7

Printed copies are not controlled documents

Radiated Spurious – 1GHz – 6.4GHz–CH62F

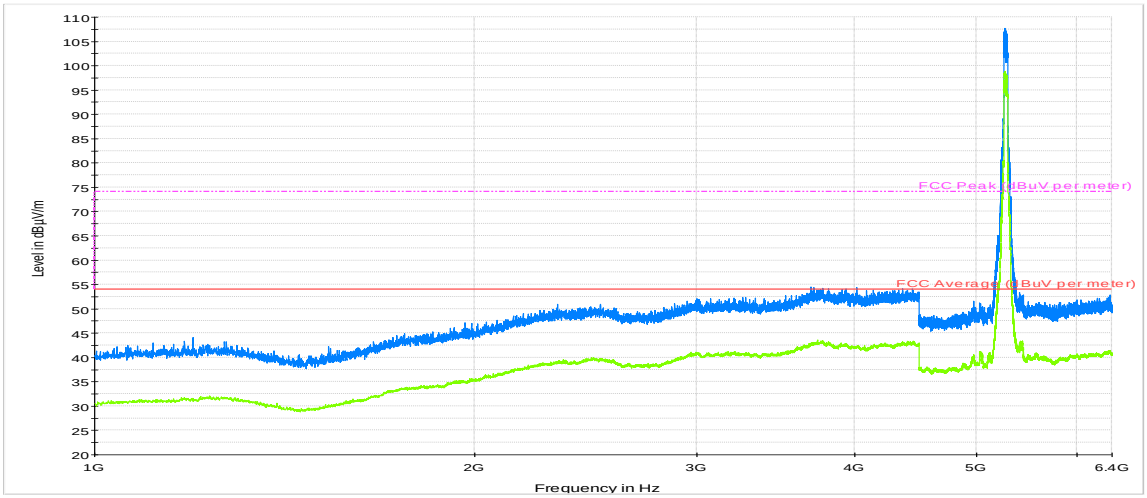


Frequency	MaxPeak	RMS	Limit	Margin
MHz	dBµV/m	dBµV/m	dBµV/m	dB
3751	54.5	---	74	19.5
3751	---	43.0	54	11.0

Printed copies are not controlled documents

802.11n40, HT8 (MIMO), Chain A+B

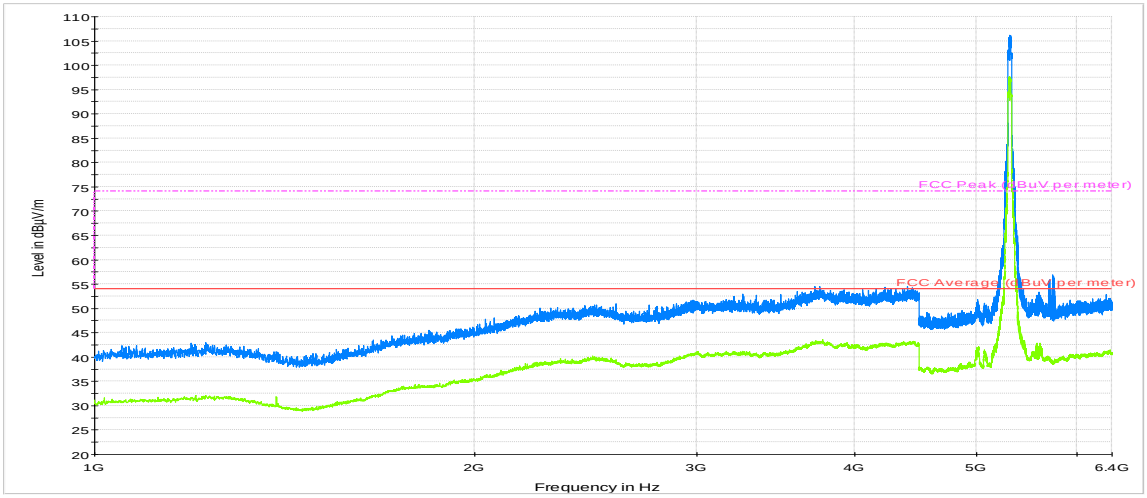
Radiated Spurious – 1GHz – 6.4GHz–CH54F



Frequency	MaxPeak	RMS	Limit	Margin
MHz	dBµV/m	dBµV/m	dBµV/m	dB
3740	54.6	---	74	19.4
3740	---	43.1	54	10.9

Printed copies are not controlled documents

Radiated Spurious – 1GHz – 6.4GHz–CH62F

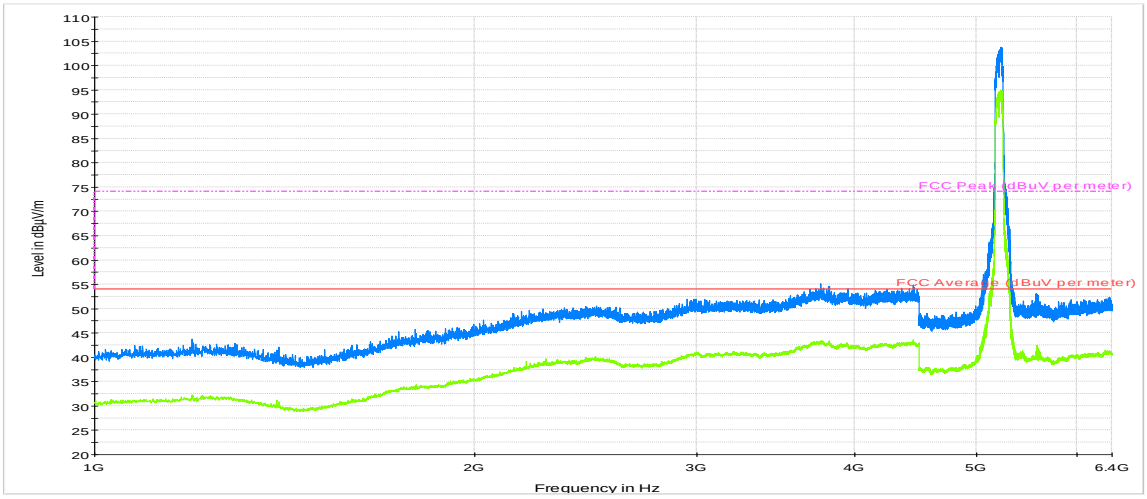


Frequency	MaxPeak	RMS	Limit	Margin
MHz	dBµV/m	dBµV/m	dBµV/m	dB
3746	54.0	---	74	20.0
3746	---	43.1	54	10.9

Printed copies are not controlled documents

802.11ac80, VHT0 (SISO), Chain A

Radiated Spurious – 1GHz – 6.4GHz–CH58ac80

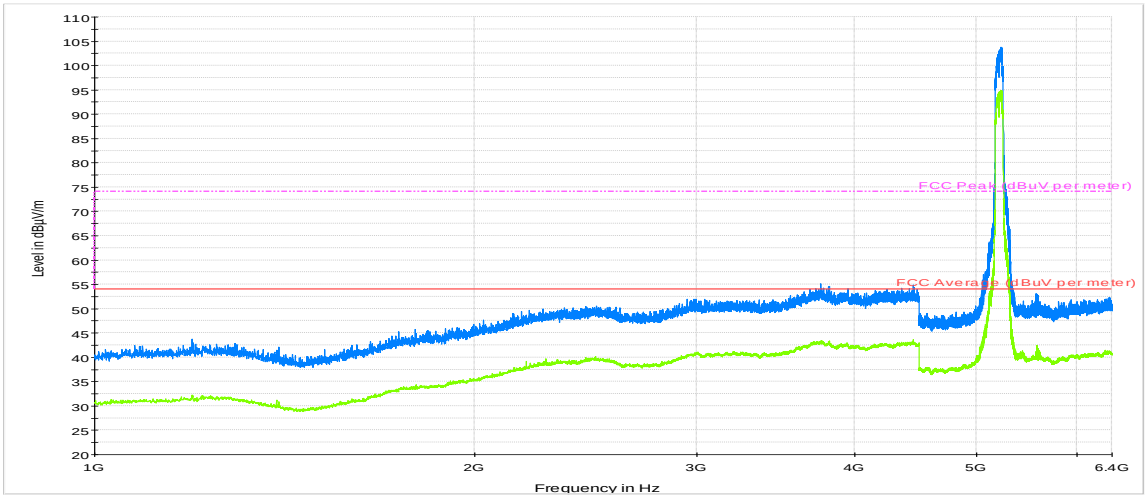


Frequency	MaxPeak	RMS	Limit	Margin
MHz	dBµV/m	dBµV/m	dBµV/m	dB
3749	53.8	---	74	20.2
3749	---	43.2	54	10.8

Printed copies are not controlled documents

802.11ac80, VHT0 (SISO), Chain B

Radiated Spurious – 1GHz – 6.4GHz–CH58ac80

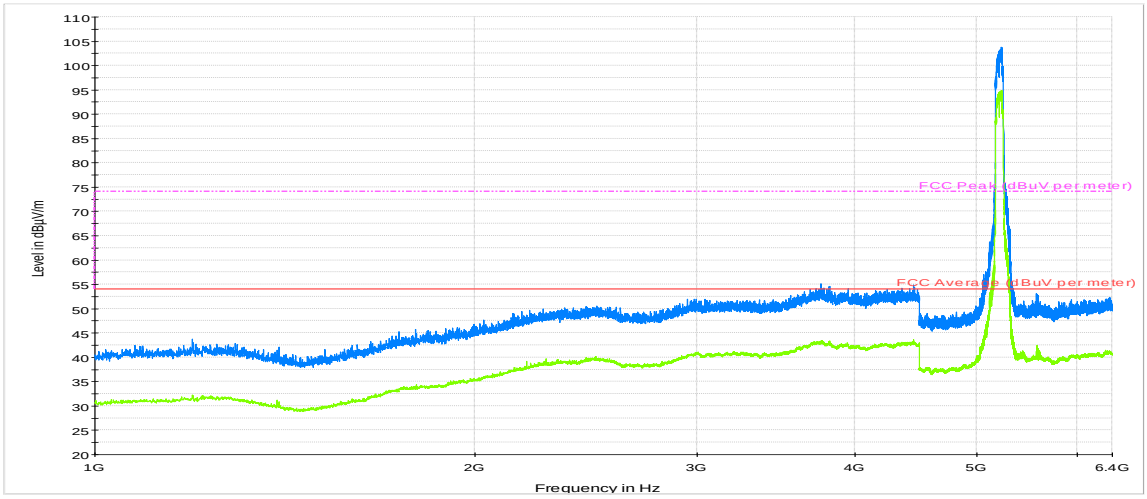


Frequency	MaxPeak	RMS	Limit	Margin
MHz	dBµV/m	dBµV/m	dBµV/m	dB
3737	55.1	---	74	18.9
3737	---	43.1	54	10.9

Printed copies are not controlled documents

802.11ac80, VHT0 (MIMO), Chain A+B

Radiated Spurious – 1GHz – 6.4GHz–CH58ac80



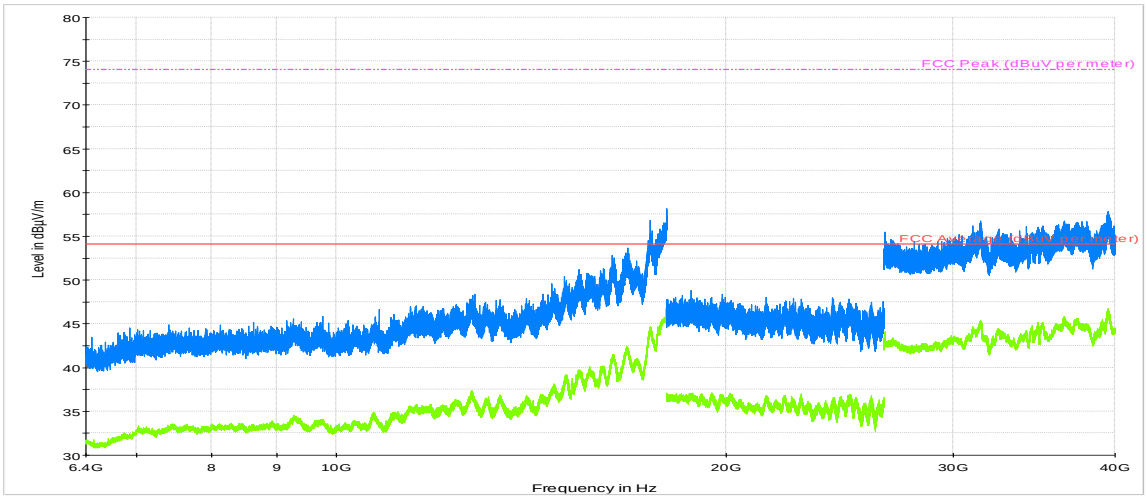
Peak measurements AVG measurements Limit FCC AVG Limit FCC Peak

Frequency	MaxPeak	RMS	Limit	Margin
MHz	dBµV/m	dBµV/m	dBµV/m	dB
3730	53.8	---	74	20.2
3730	---	42.7	54	11.3

Printed copies are not controlled documents

All modes

Radiated Spurious – 6.4GHz – 40GHz



Peak measurements AVG measurements Limit FCC AVG Limit FCC Peak

Frequency	Max Peak	RMS	Limit	Margin
MHz	dBµV/m	dBµV/m	dBµV/m	dB
18000	58.4	---	74	15.6
18000	---	47.2	54	6.8
31300	56.9	--	74	17.1
31300	--	44.6	54	9.4
39500	57.7	---	74	16.3
39500	---	46.5	54	7.5

Note 1: The spurious signals detected do not depend on either the operating channel or the modulation mode.
Note 2: No spurious signals were found in all modulations and channels tested.
Note 3: This plot is valid for both SISO and MIMO modes.

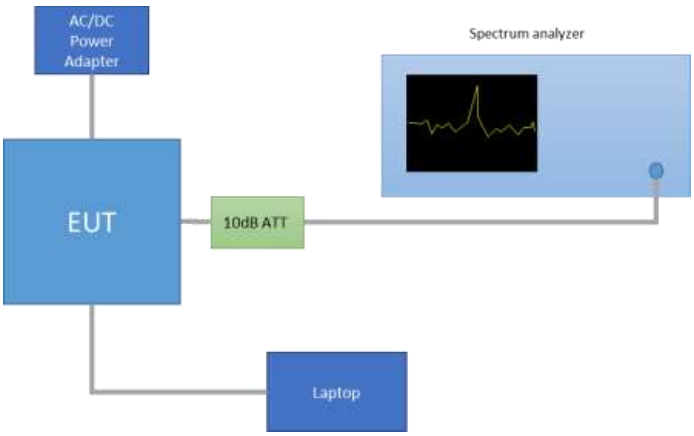
Printed copies are not controlled documents

Annex D. Test Results U-NII-2C

D.1 26dB & 99% Bandwidth

Test procedure:

The setup below was used to measure the 26dB & 99% Bandwidth. 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.



For the overlapped channels between U-NII-2C and U-NII-3, and according to FCC KDB 644545 D03, the boundary frequency between the bands is used as one edge for defining the portion of the 26dB BW that falls within a particular U-NII band. This rule is only applicable for the 26dB BW and for those channels marked as overlapped.

Results tables:

Mode	Rate	Antenna	Channel	Frequency [MHz]	26dB BW [MHz]	99% BW [MHz]
802.11a	6Mbps	SISO CHAIN A	100	5500	26.70	16.96
			120	5600	39.35	25.52
			140	5700	23.55	16.60
		SISO CHAIN B	100	5500	24.65	16.72
			120	5600	41.70	26.88
			140	5700	24.60	16.64
802.11n20	HT0	SISO CHAIN A	100	5500	27.90	18.04
			120	5600	40.85	27.00
			140	5700	24.90	17.72
			144*	5720	28.24	29.76
		SISO CHAIN B	100	5500	25.10	17.72
			120	5600	44.45	27.44
			140	5700	24.65	17.72
			144*	5720	27.13	28.36

Printed copies are not controlled documents

Mode	Rate	Antenna	Channel	Frequency [MHz]	26dB BW [MHz]	99% BW [MHz]
802.11n20	HT8	MIMO CHAIN A	100	5500	25.65	17.88
			120	5600	28.65	18.28
			140	5700	24.55	17.68
			144*	5720	19.13	18.36
		MIMO CHAIN B	100	5500	24.60	17.80
			120	5600	27.35	18.16
			140	5700	24.00	17.64
			144*	5720	19.73	18.92
802.11n40	HT0	SISO CHAIN A	102F	5510	45.72	36.40
			118F	5590	87.48	50.96
			134F	5670	46.44	36.40
			142F*	5670	57.25	53.84
		SISO CHAIN B	102F	5510	46.44	36.40
			118F	5590	85.95	53.92
			134F	5670	46.26	36.40
			142F*	5670	58.05	55.76
	HT8	MIMO CHAIN A	102F	5510	46.44	36.40
			118F	5590	52.56	37.04
			134F	5670	46.71	36.48
			142F*	5670	39.17	36.64
		MIMO CHAIN B	102F	5510	44.01	36.16
			118F	5590	46.35	36.32
			134F	5670	44.64	36.16
			142F*	5670	38.63	36.48
802.11ac80	VHT0	SISO CHAIN A	106ac80	5530	87.02	75.05
			122ac80	5610	87.21	75.24
			138ac80*	5690	120.59	113.43
		SISO CHAIN B	106ac80	5530	86.45	75.05
			122ac80	5610	87.21	75.24
			138ac80*	5690	117.30	115.14
	VHT0	MIMO CHAIN A	106ac80	5530	87.40	75.05
			122ac80	5610	86.45	75.05
			138ac80*	5690	80.31	75.81
		MIMO CHAIN B	106ac80	5530	84.74	75.05
			122ac80	5610	86.26	74.86
			138ac80*	5690	80.50	75.62

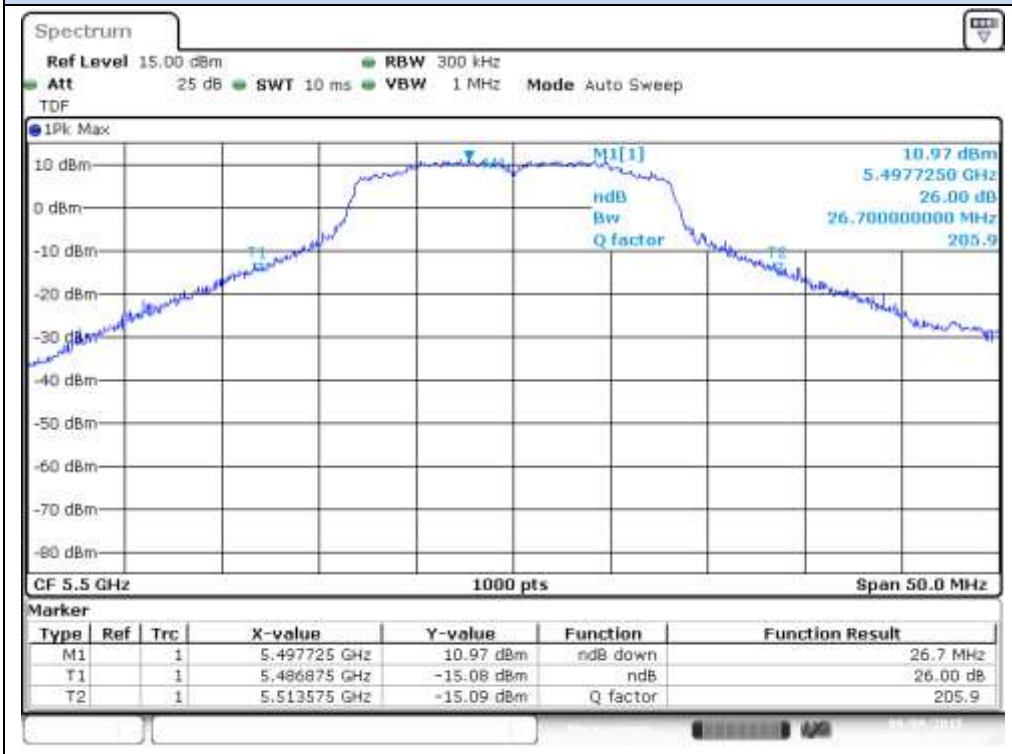
**** Overlapped channels between U-NII-2C and U-NII-3***

Printed copies are not controlled documents

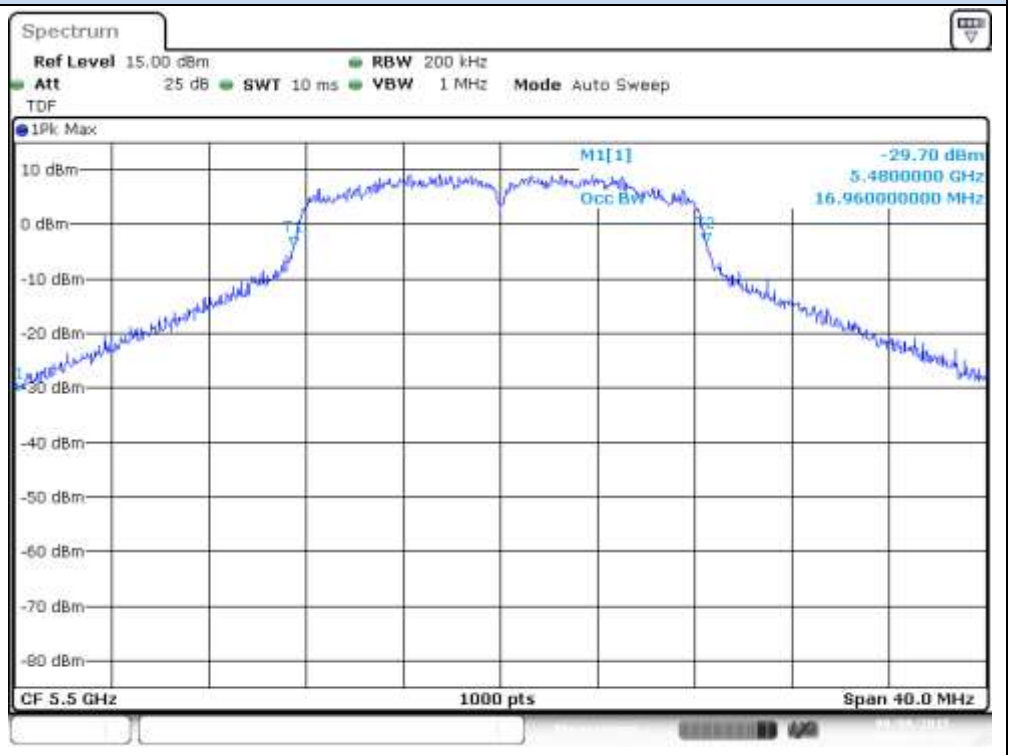
Results screenshot

802.11a, 6Mbps – Chain A

26dB BW – CH100

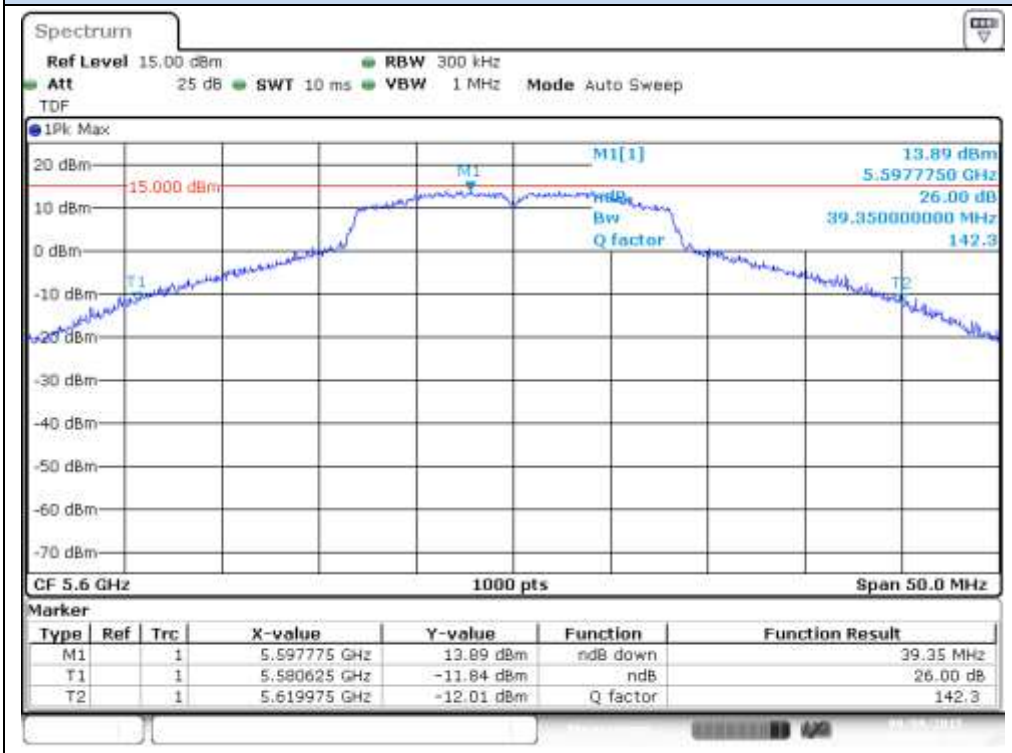


99% BW – CH100

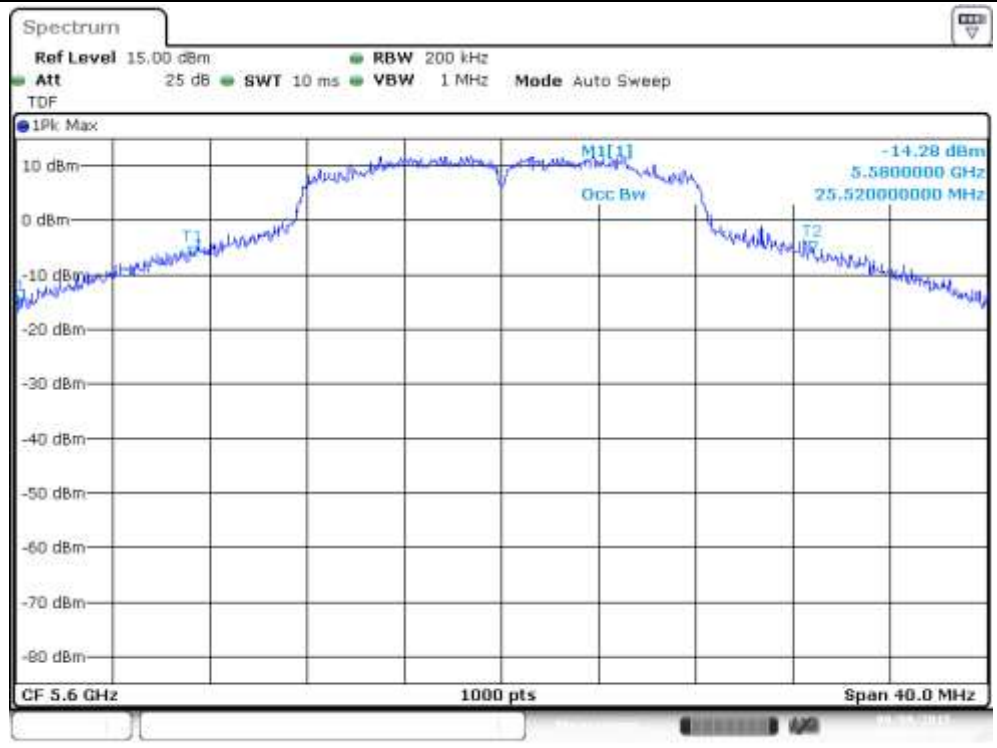


Printed copies are not controlled documents

26dB BW – CH120

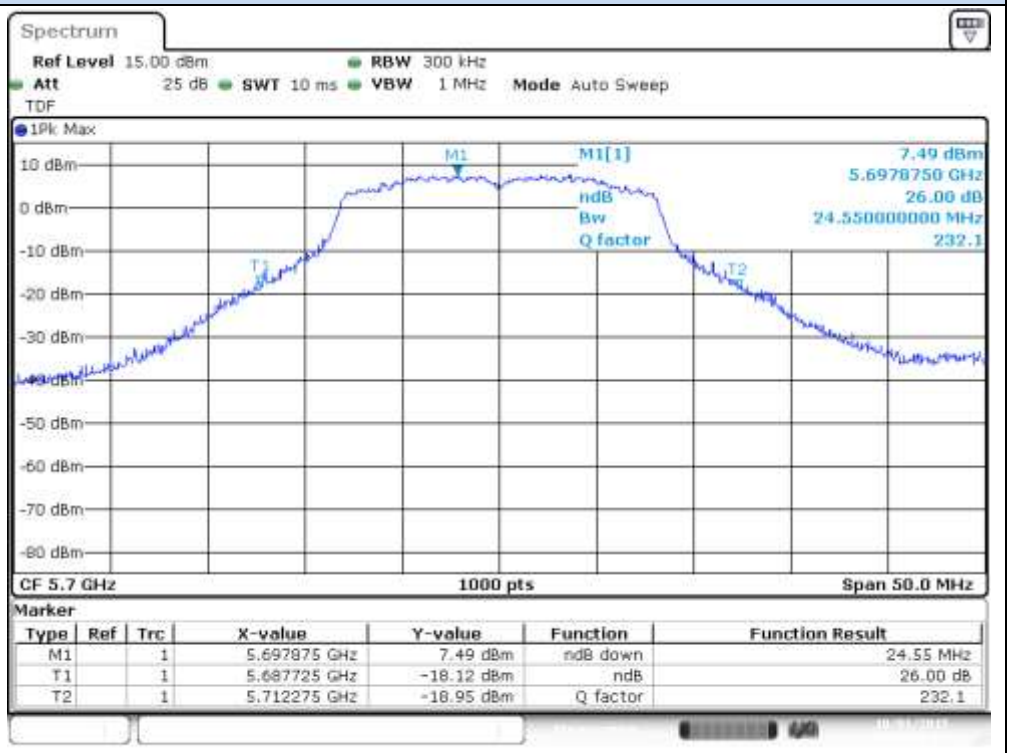


99% BW – CH120

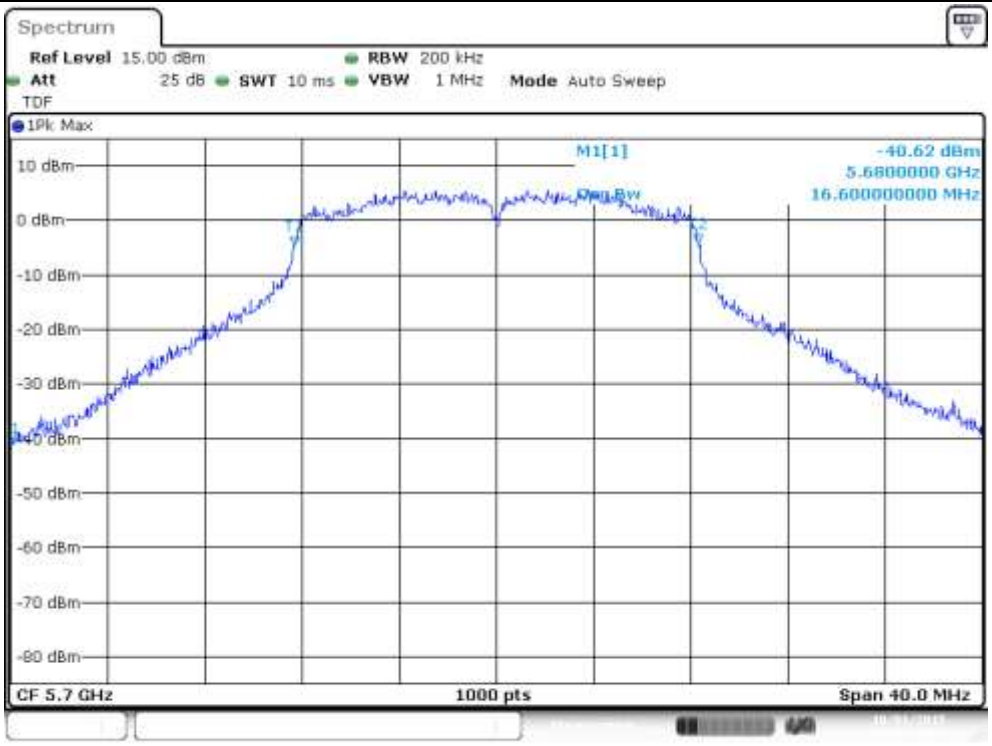


Printed copies are not controlled documents

26dB BW – CH140



99% BW – CH140

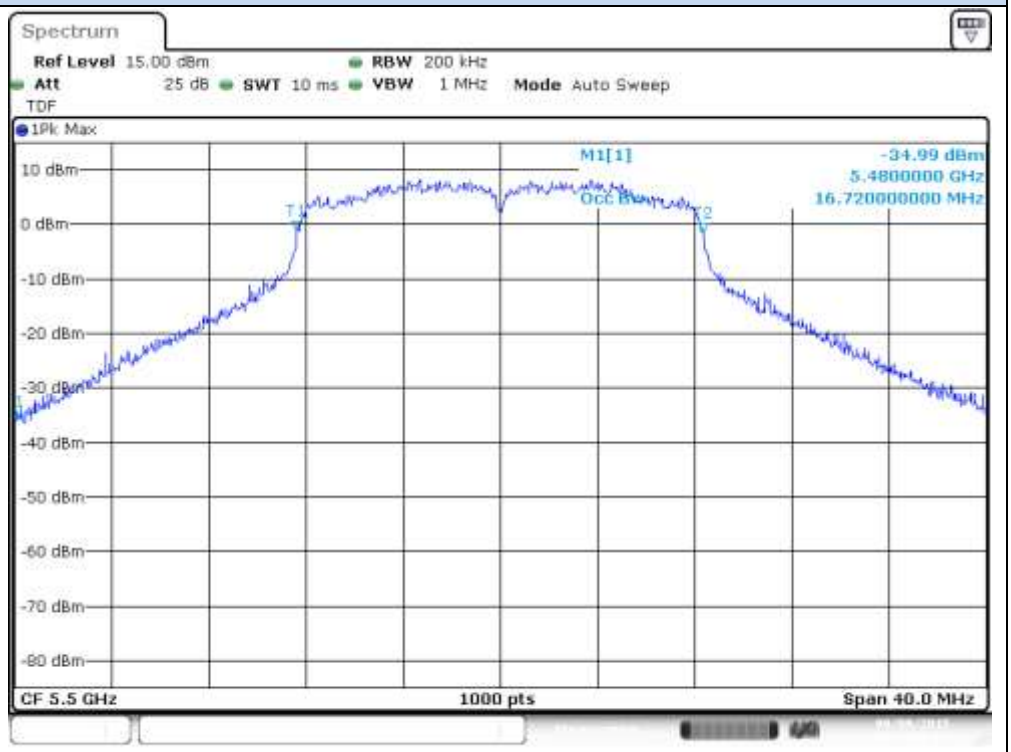


Printed copies are not controlled documents

802.11a, 6Mbps – Chain B

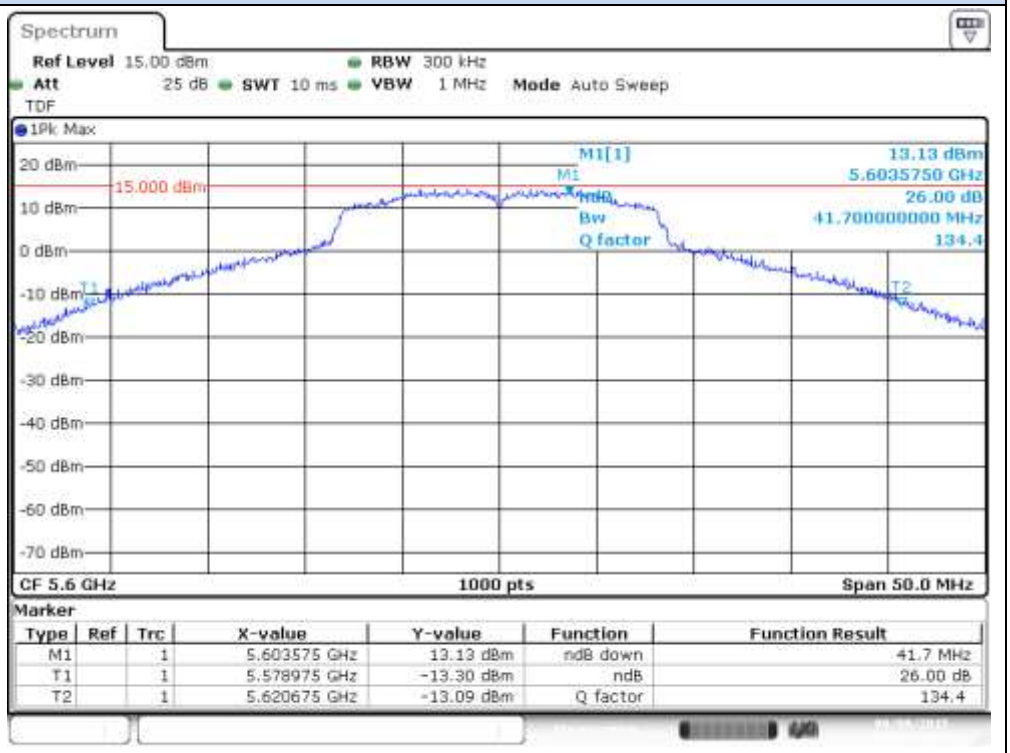
26dB BW – CH100

99% BW – CH100

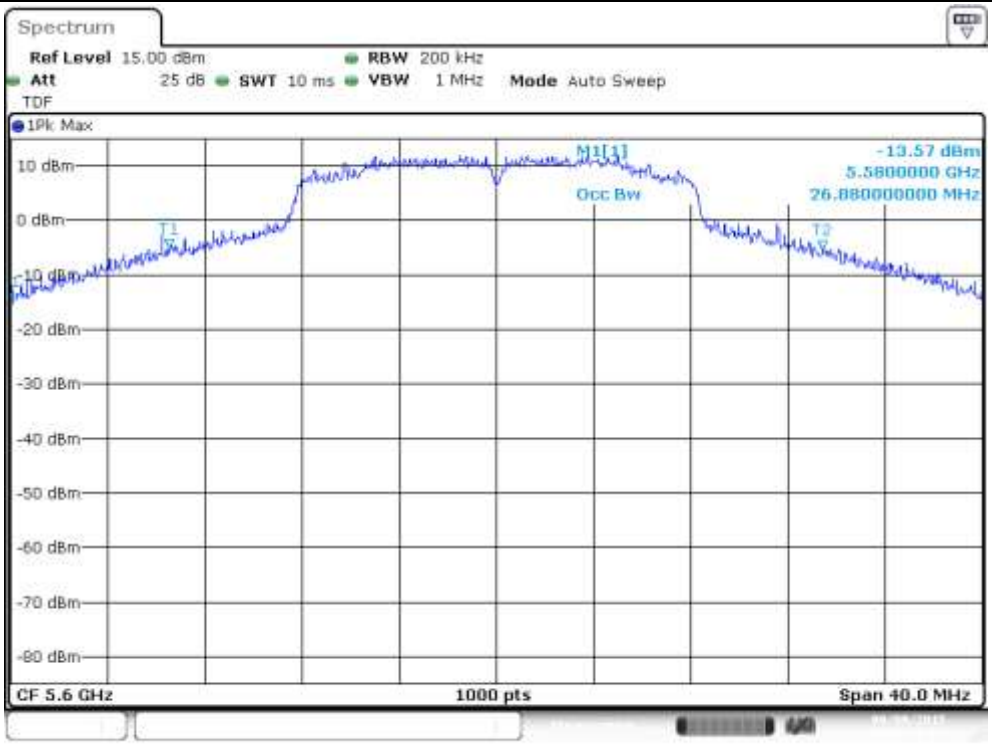


Printed copies are not controlled documents

26dB BW – CH120

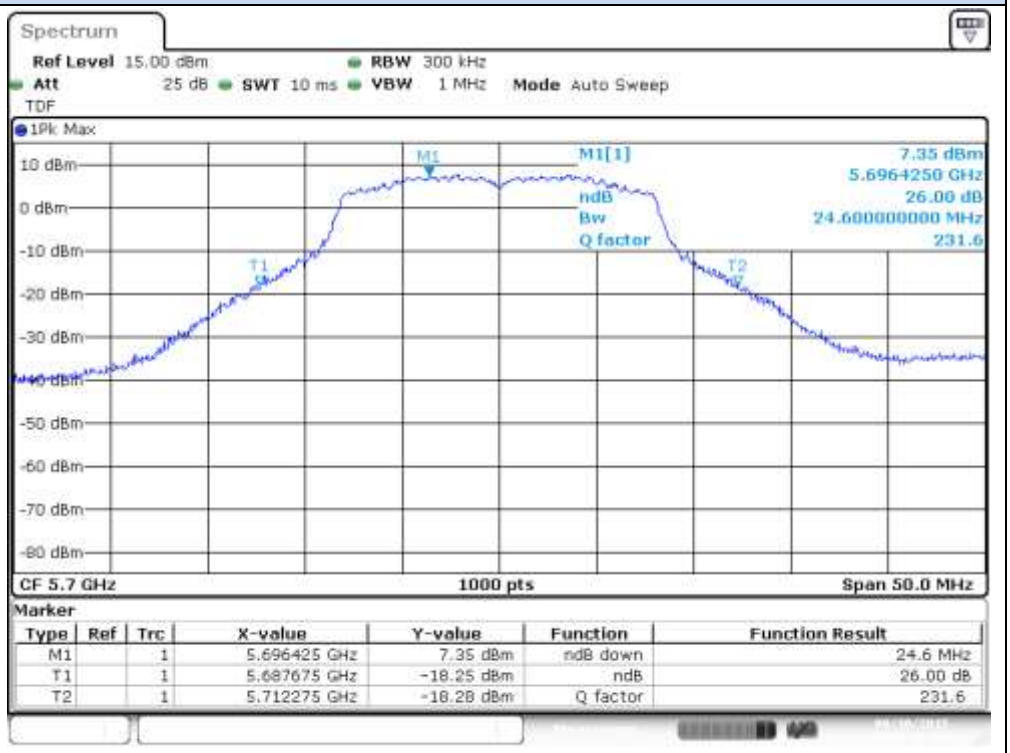


99% BW – CH120

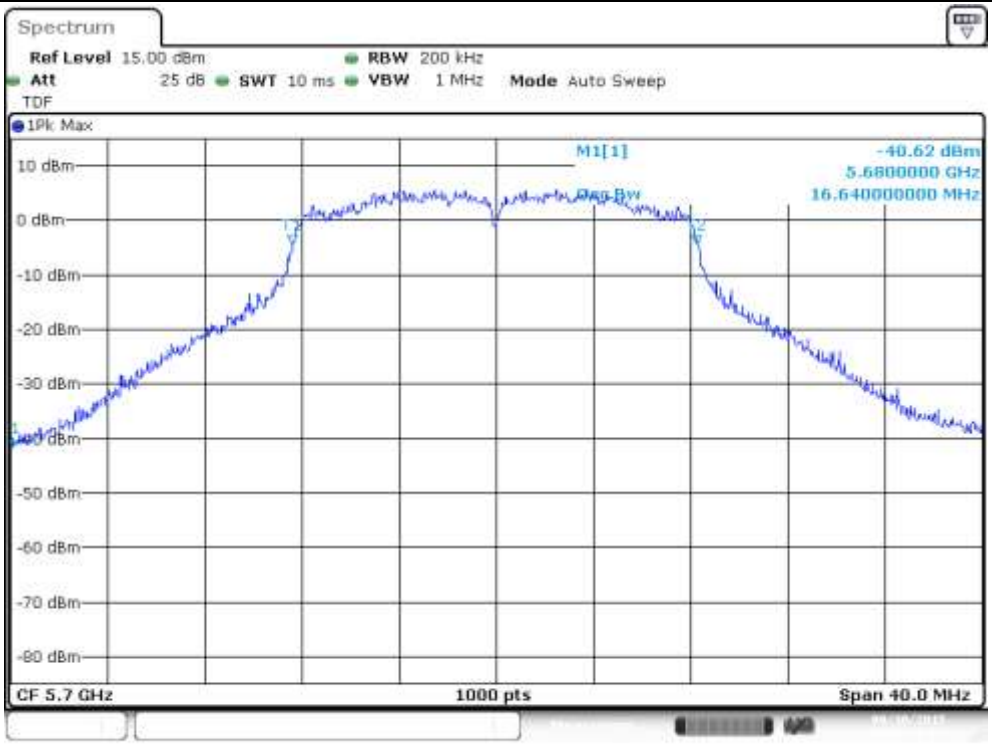


Printed copies are not controlled documents

26dB BW – CH140



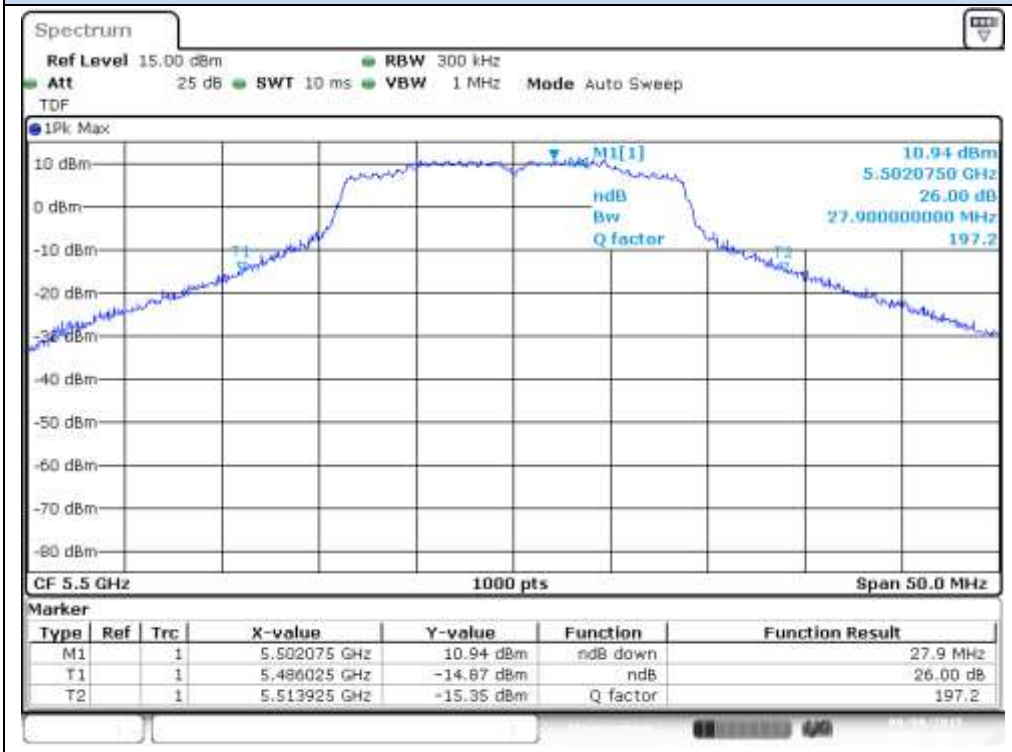
99% BW – CH140



Printed copies are not controlled documents

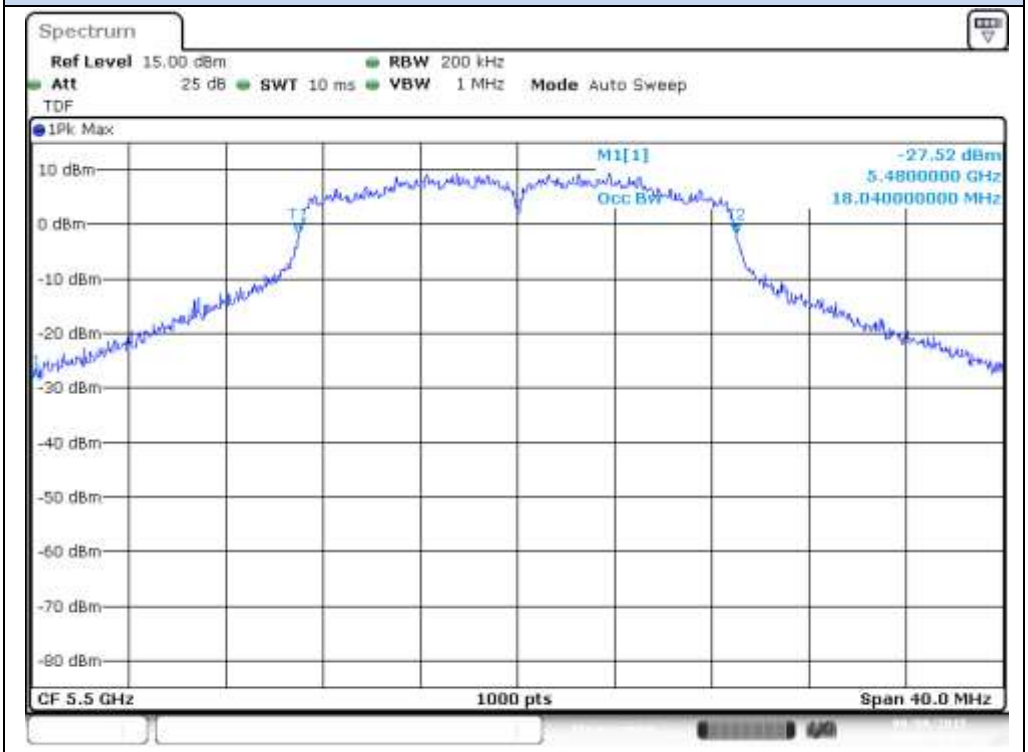
802.11n20, HT0 (SISO) – Chain A

26dB BW – CH100



Date: 9.SEP.2015 14:31:27

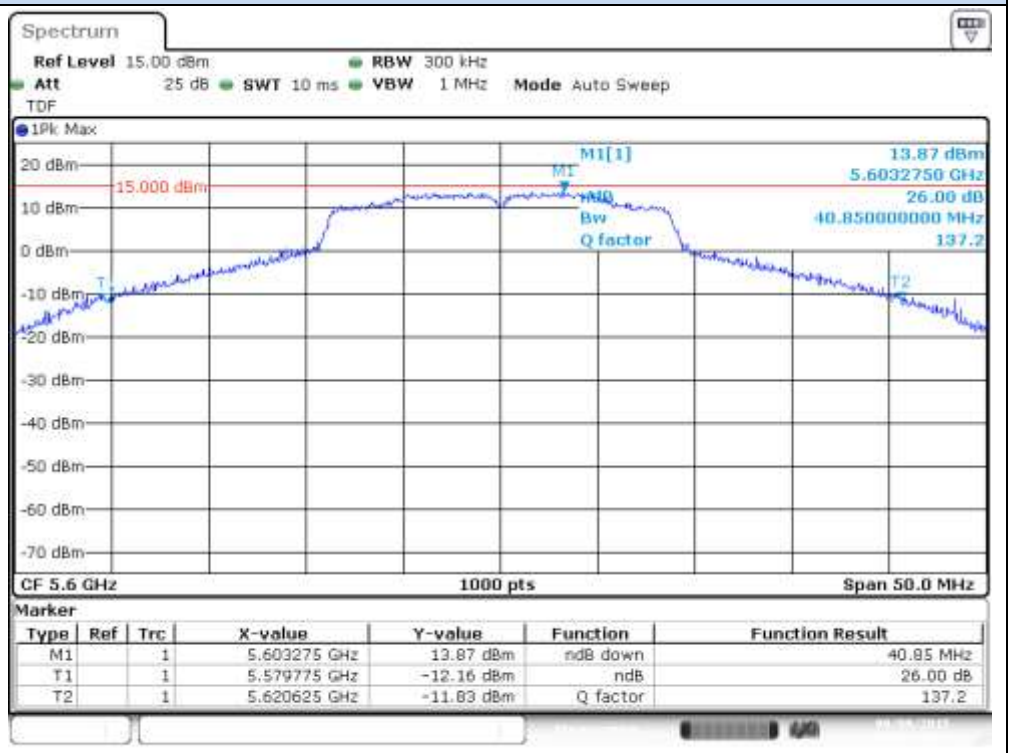
99% BW – CH100



Date: 9.SEP.2015 14:31:58

Printed copies are not controlled documents

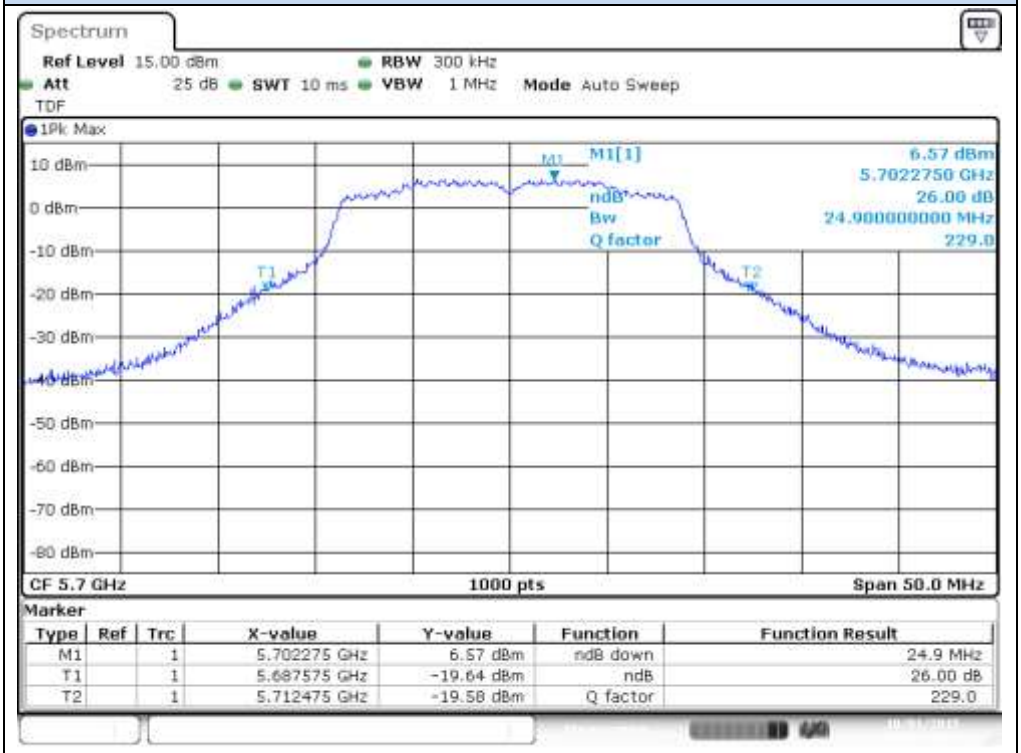
26dB BW – CH120



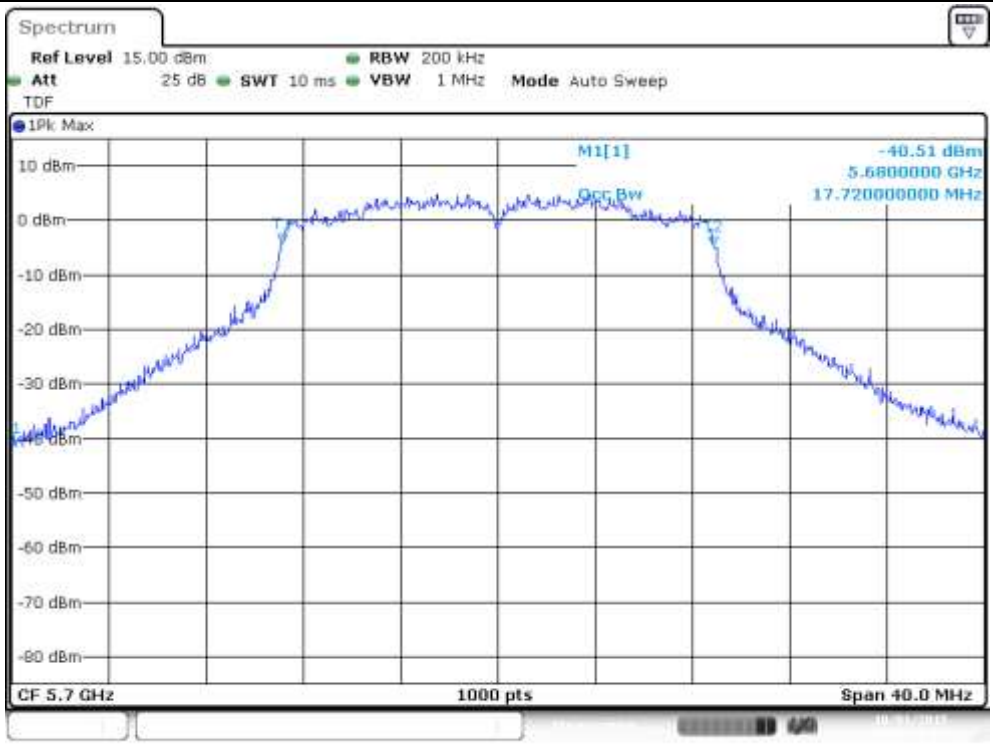
99% BW – CH120

Printed copies are not controlled documents

26dB BW – CH140

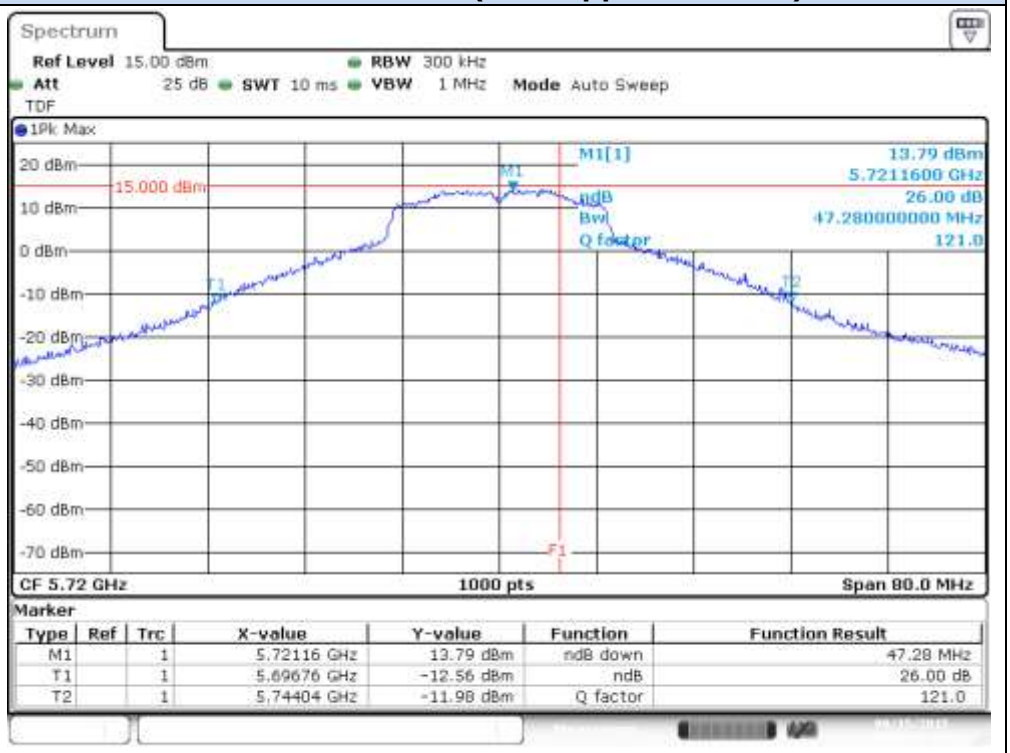


99% BW – CH140

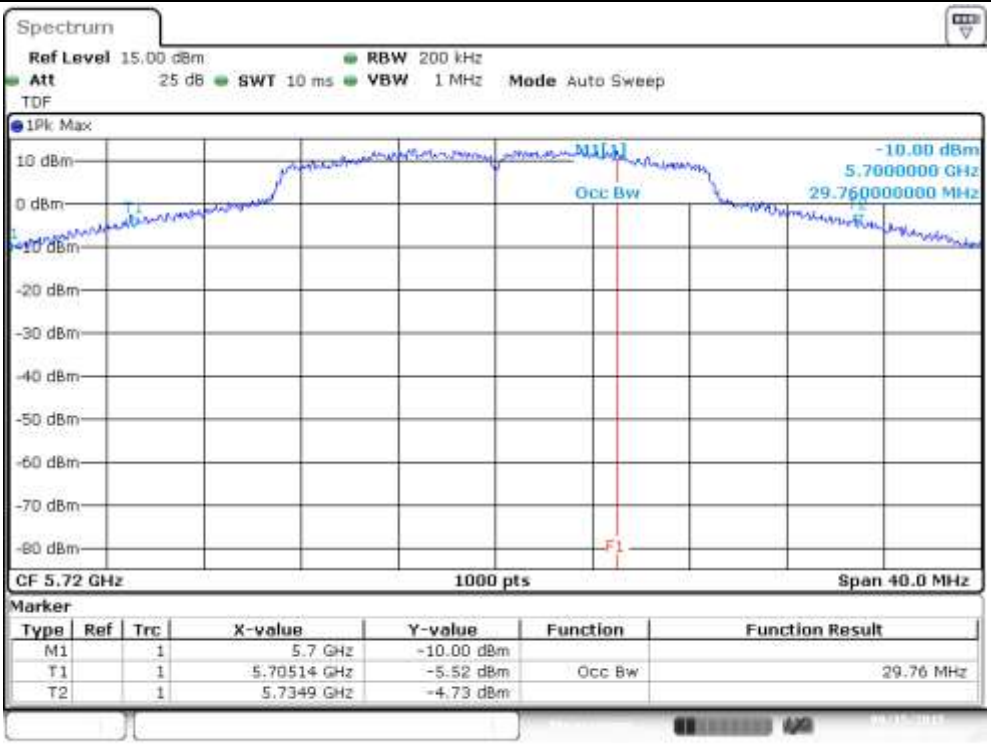


Printed copies are not controlled documents

26dB BW – CH144 (Overlapped Channel)



99% BW – CH144 (Overlapped Channel)

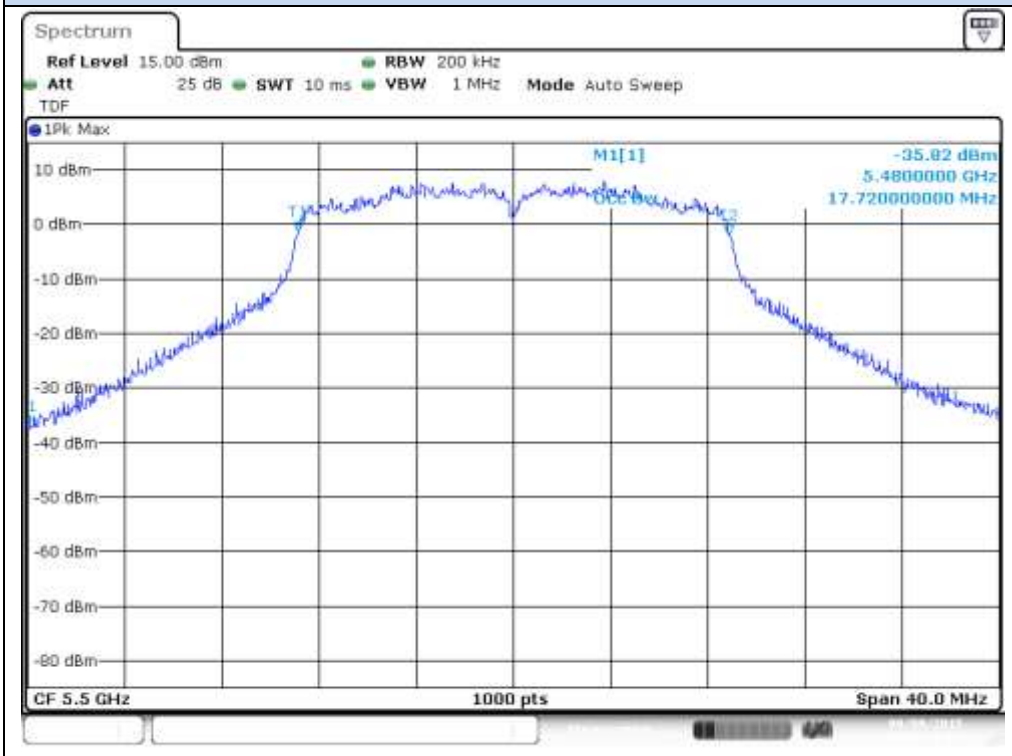


Printed copies are not controlled documents

802.11n20, HT0 (SISO) – Chain B

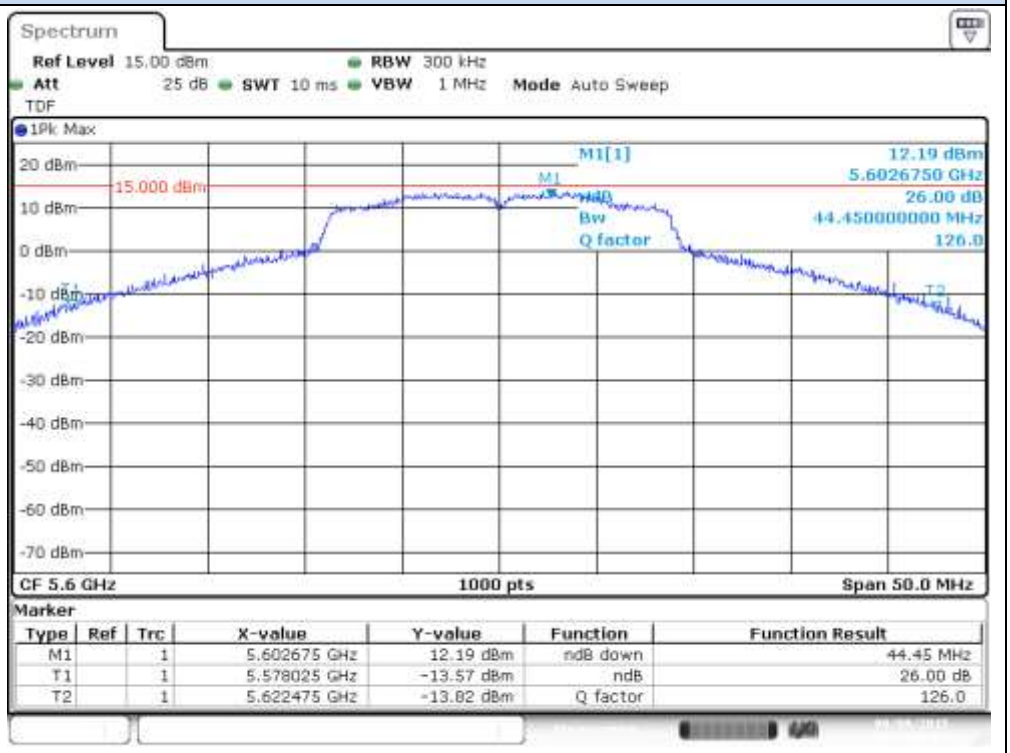
26dB BW – CH100

99% BW – CH100

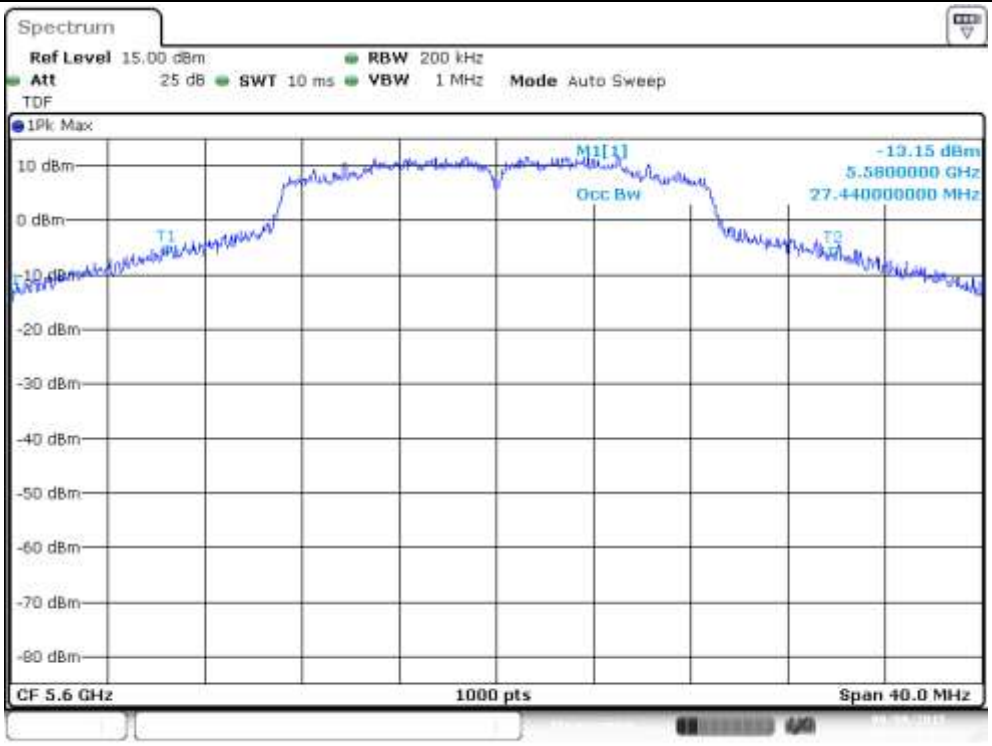


Printed copies are not controlled documents

26dB BW – CH120

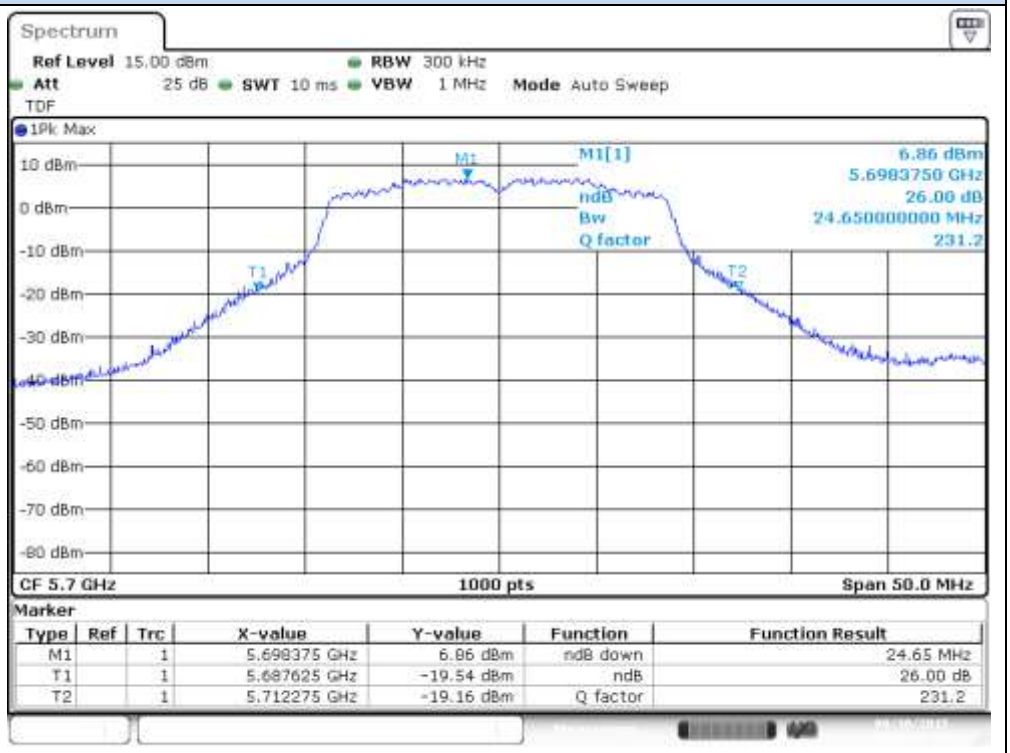


99% BW – CH120



Printed copies are not controlled documents

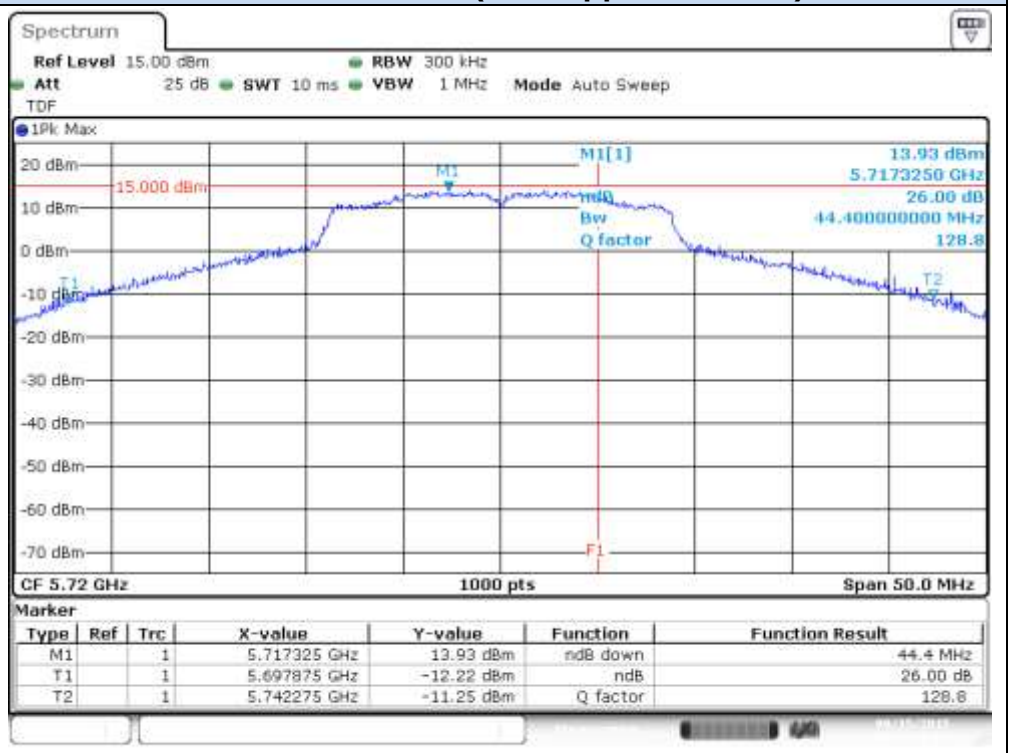
26dB BW – CH140



99% BW – CH140

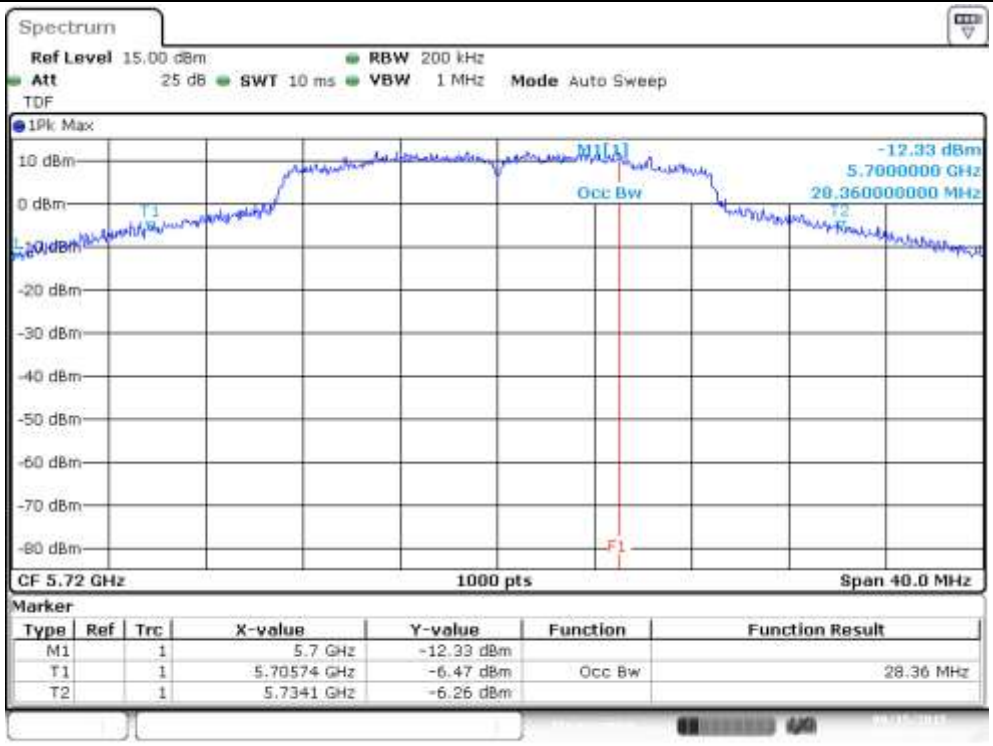
Printed copies are not controlled documents

26dB BW – CH144 (Overlapped Channel)



Date: 15.SEP.2015 14:17:21

99% BW – CH144 (Overlapped Channel)



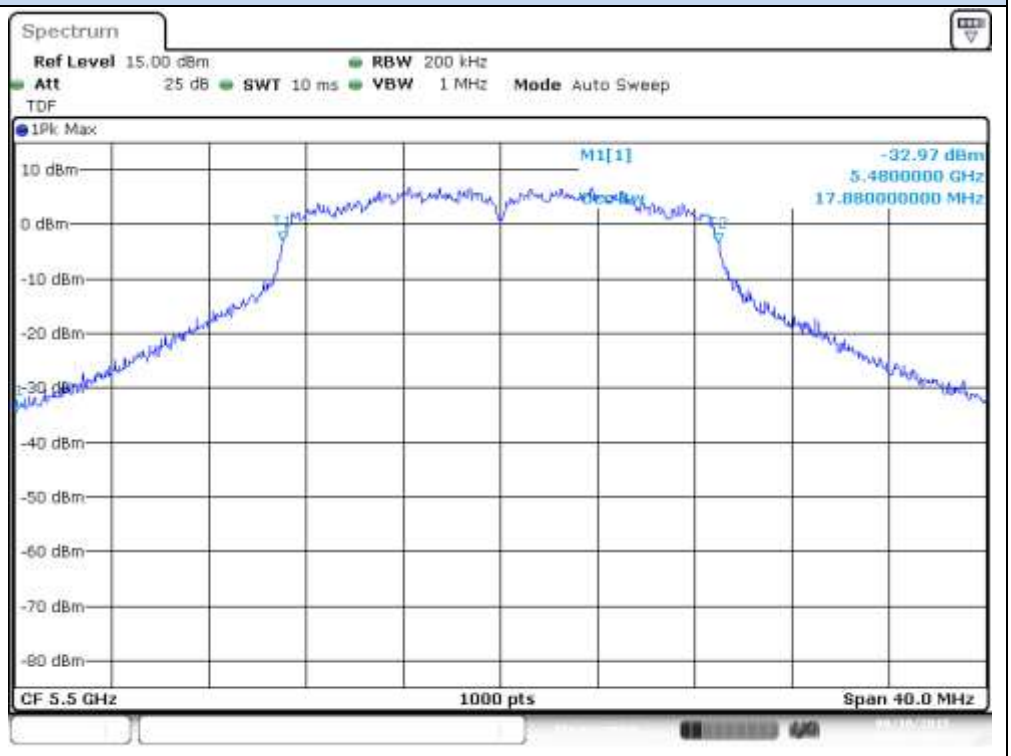
Date: 15.SEP.2015 14:18:33

Printed copies are not controlled documents

802.11n20, HT8 (MIMO) – Chain A

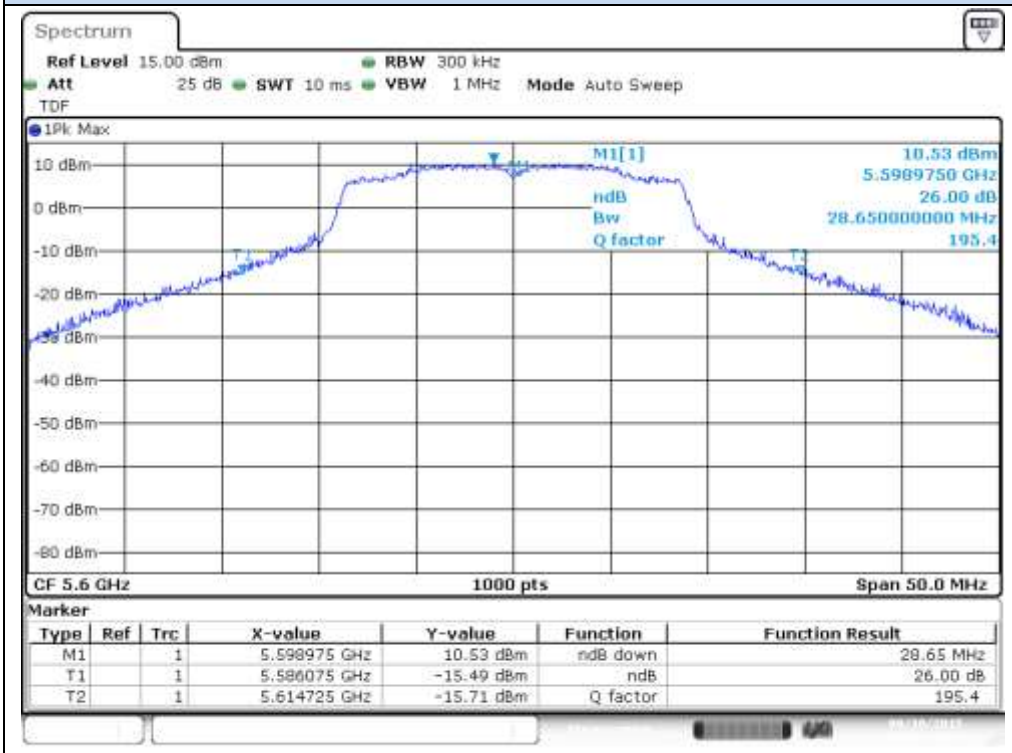
26dB BW – CH100

99% BW – CH100



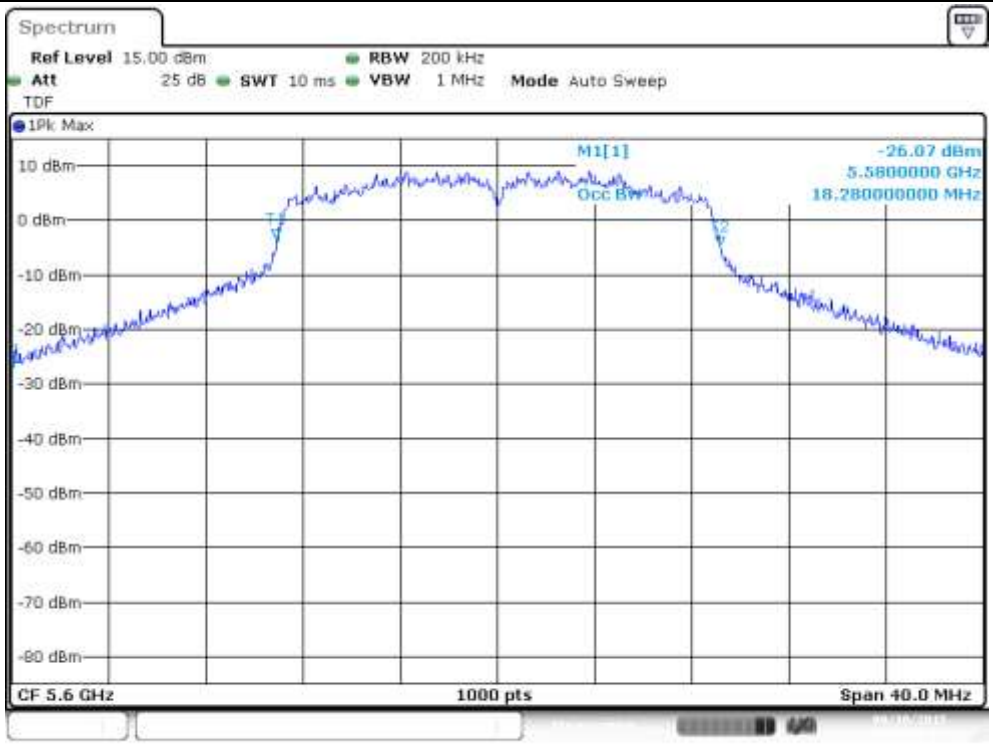
Printed copies are not controlled documents

26dB BW – CH120



Date: 10.SEP.2015 15:08:34

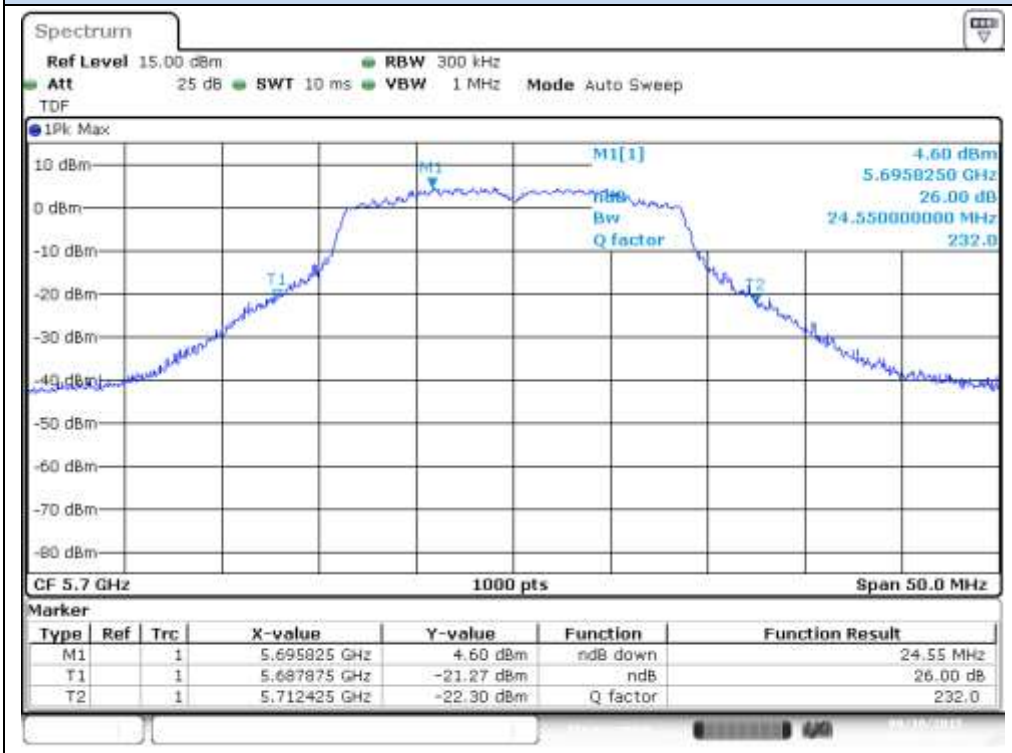
99% BW – CH120



Date: 10.SEP.2015 15:09:00

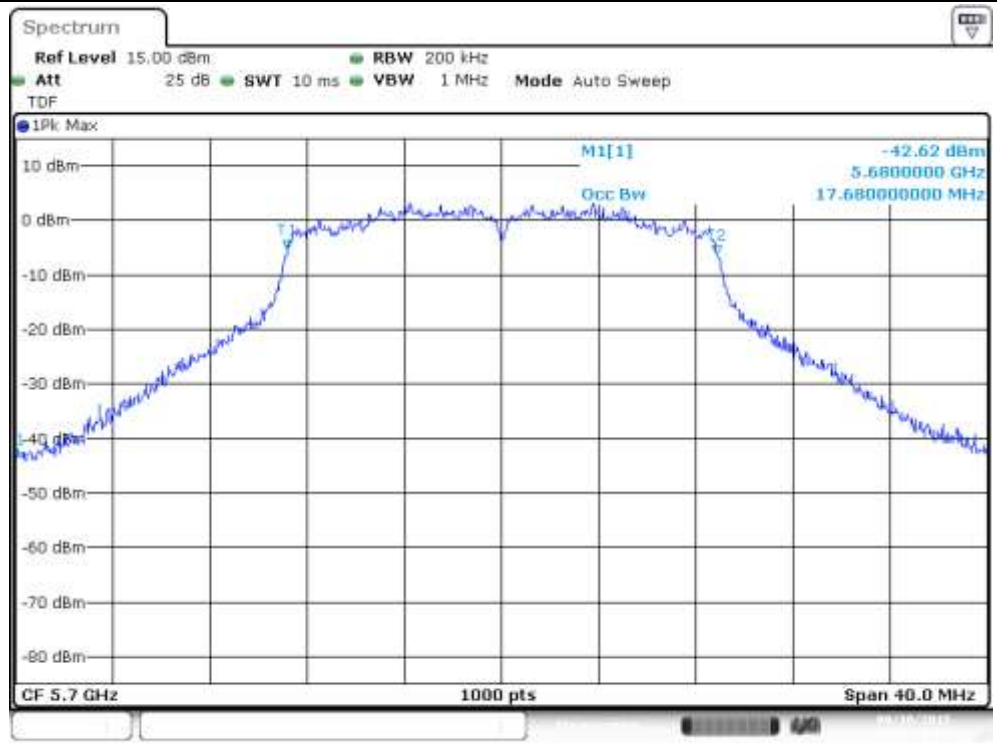
Printed copies are not controlled documents

26dB BW – CH140



Date: 10.SEP.2015 15:20:42

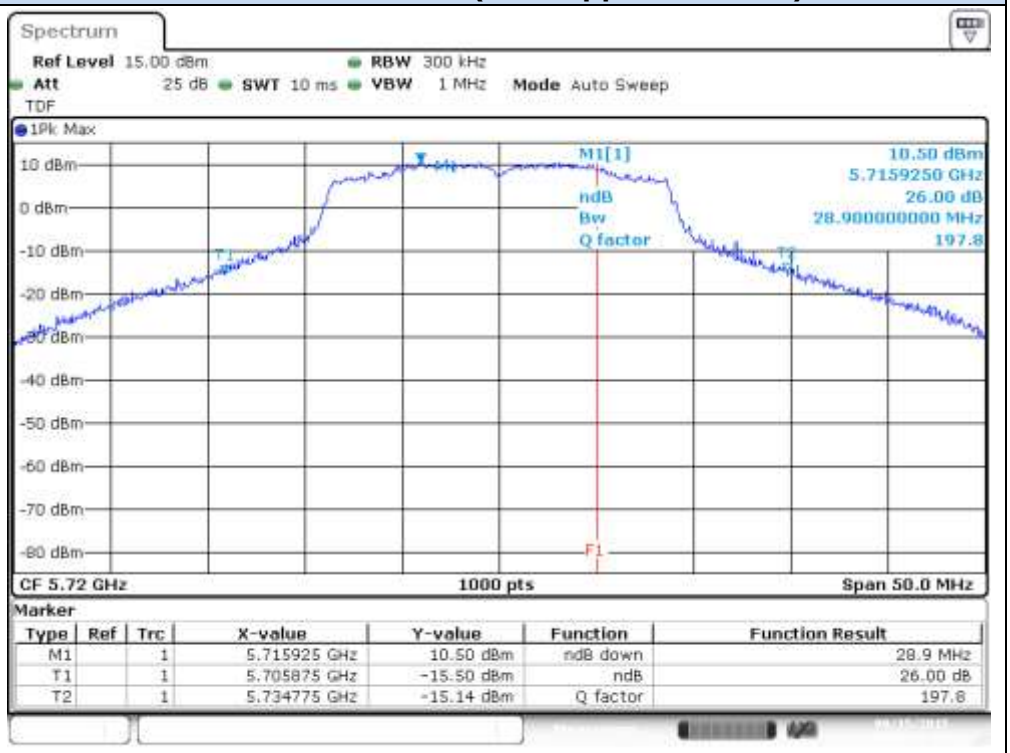
99% BW – CH140



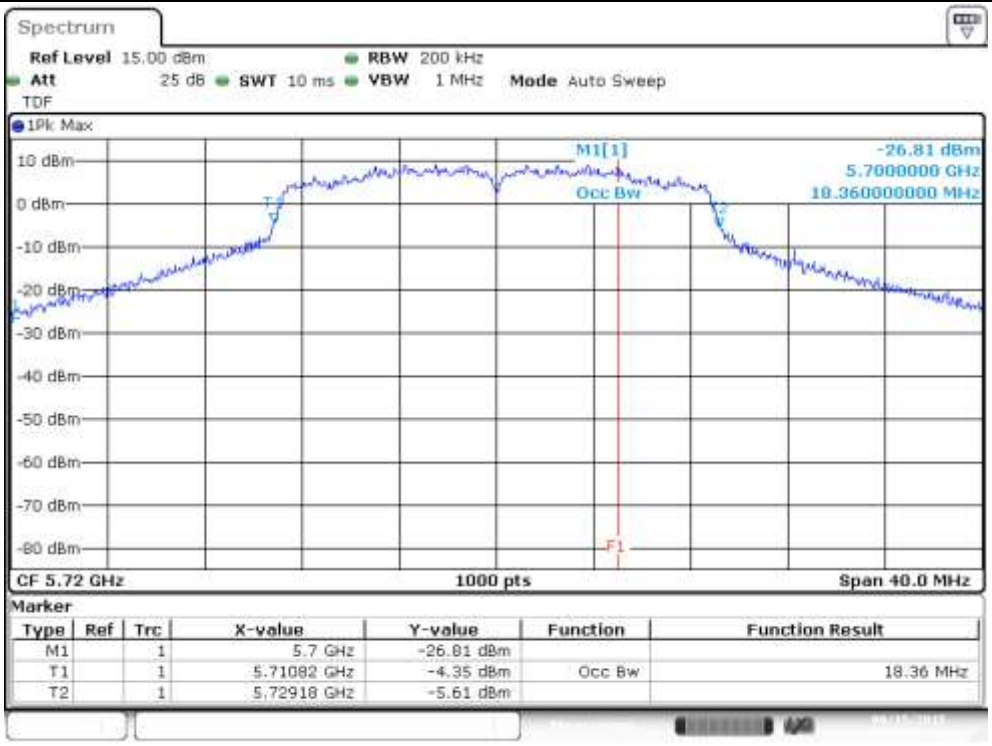
Date: 10.SEP.2015 15:21:20

Printed copies are not controlled documents

26dB BW – CH144 (Overlapped Channel)



99% BW – CH144 (Overlapped Channel)

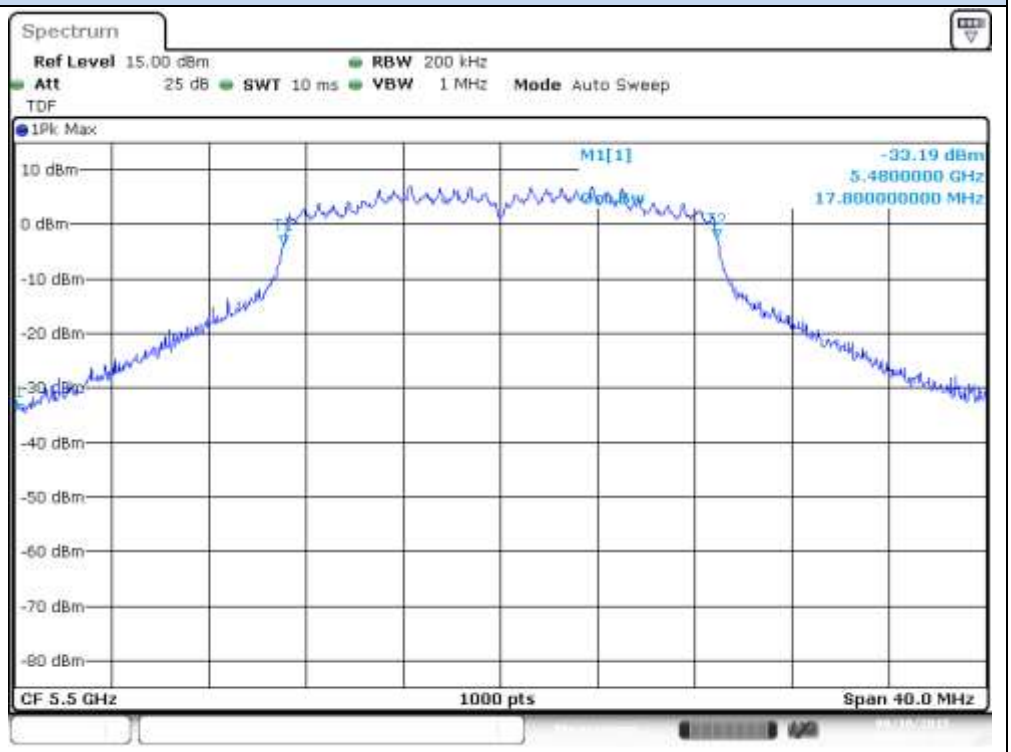


Printed copies are not controlled documents

802.11n20, HT8 (MIMO) – Chain B

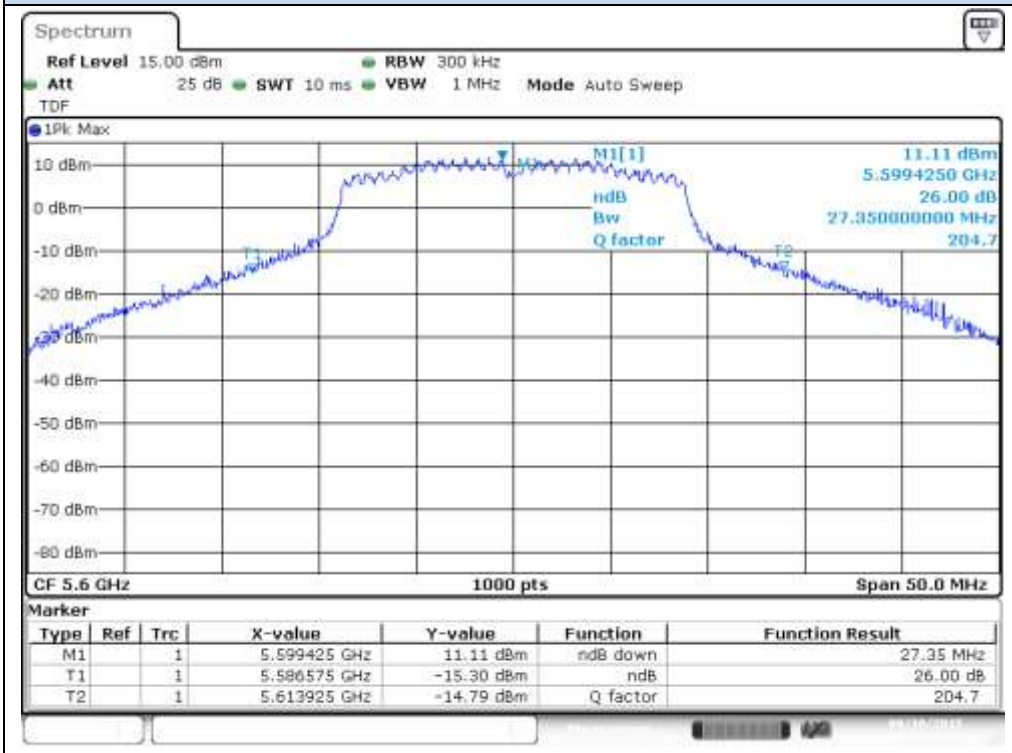
26dB BW – CH100

99% BW – CH100



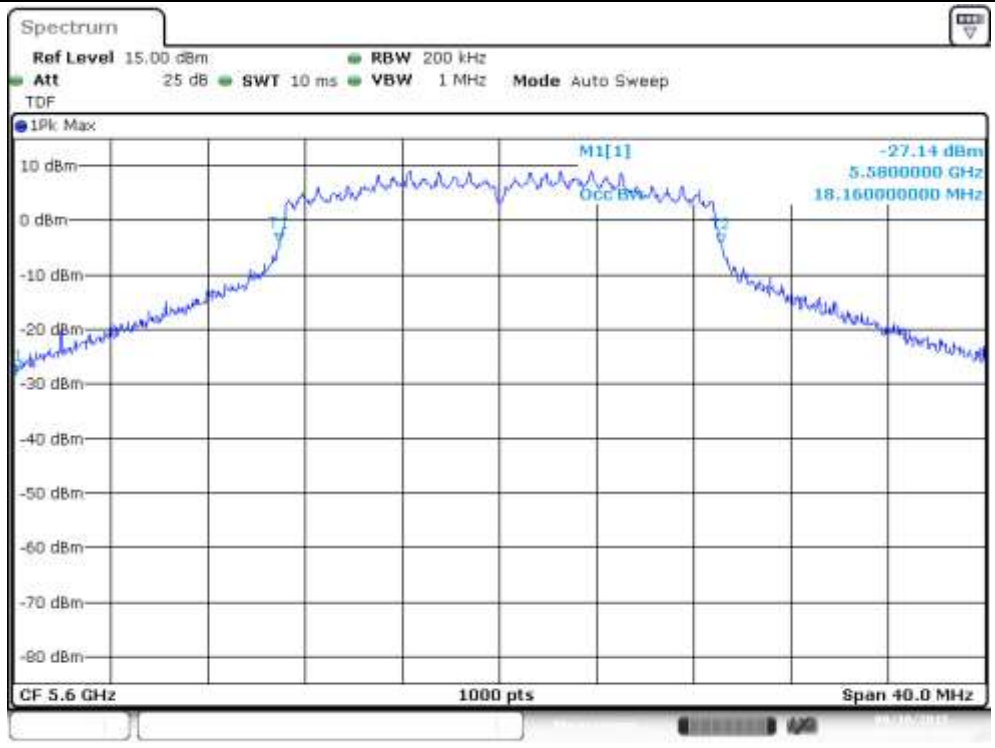
Printed copies are not controlled documents

26dB BW – CH120



Date: 10.SEP.2015 11:21:23

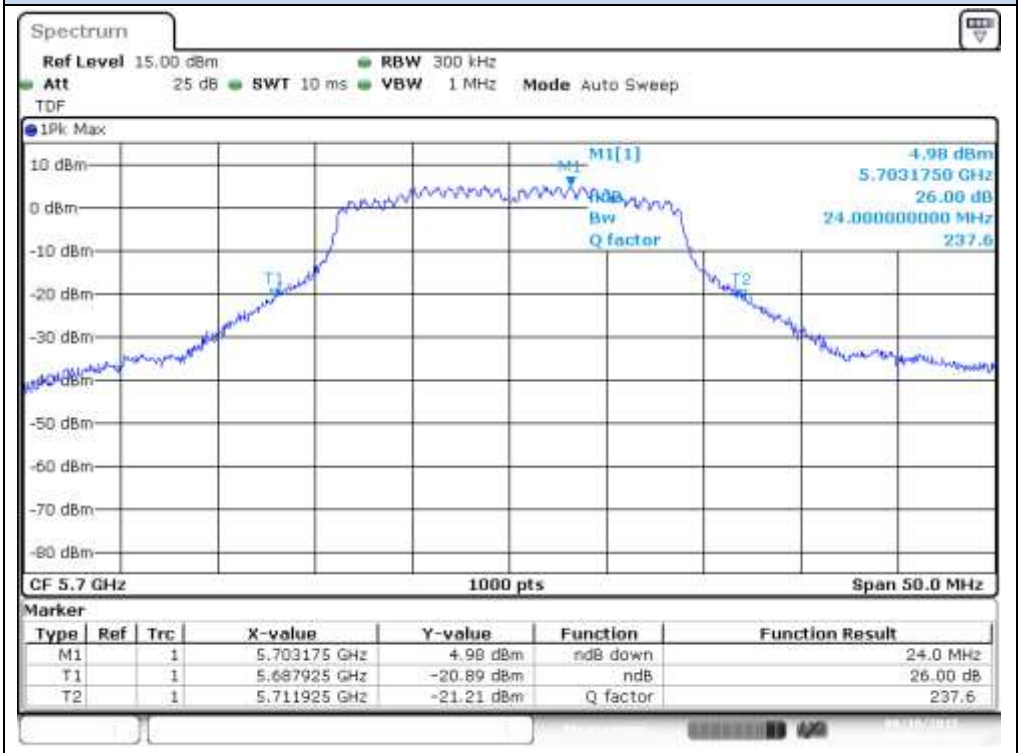
99% BW – CH120



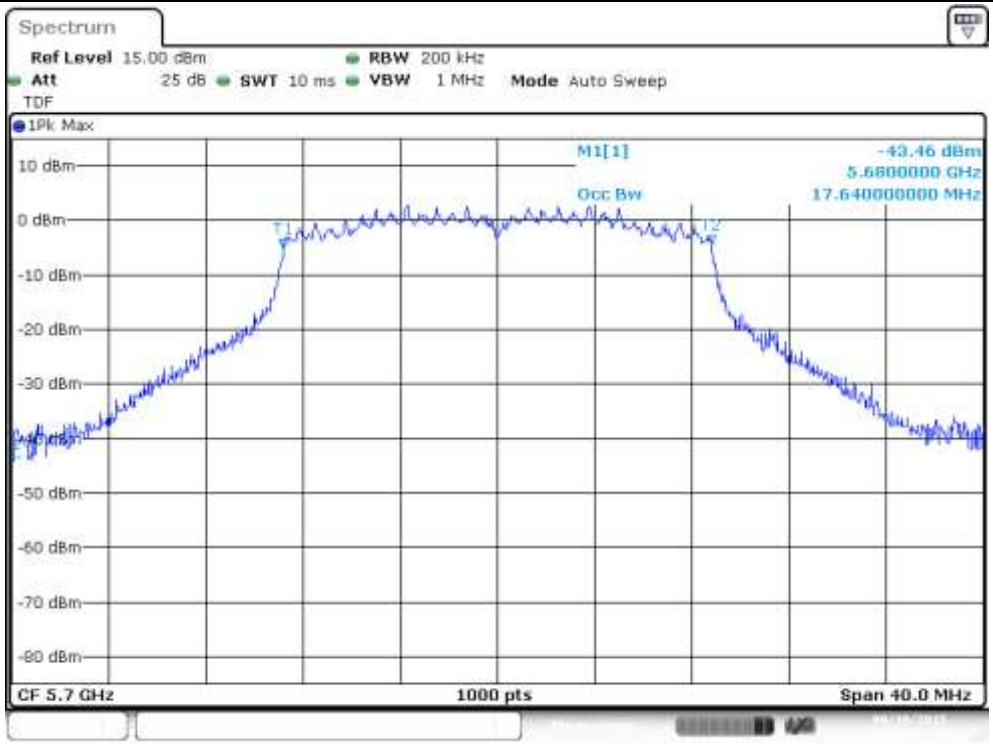
Date: 10.SEP.2015 11:21:54

Printed copies are not controlled documents

26dB BW – CH140

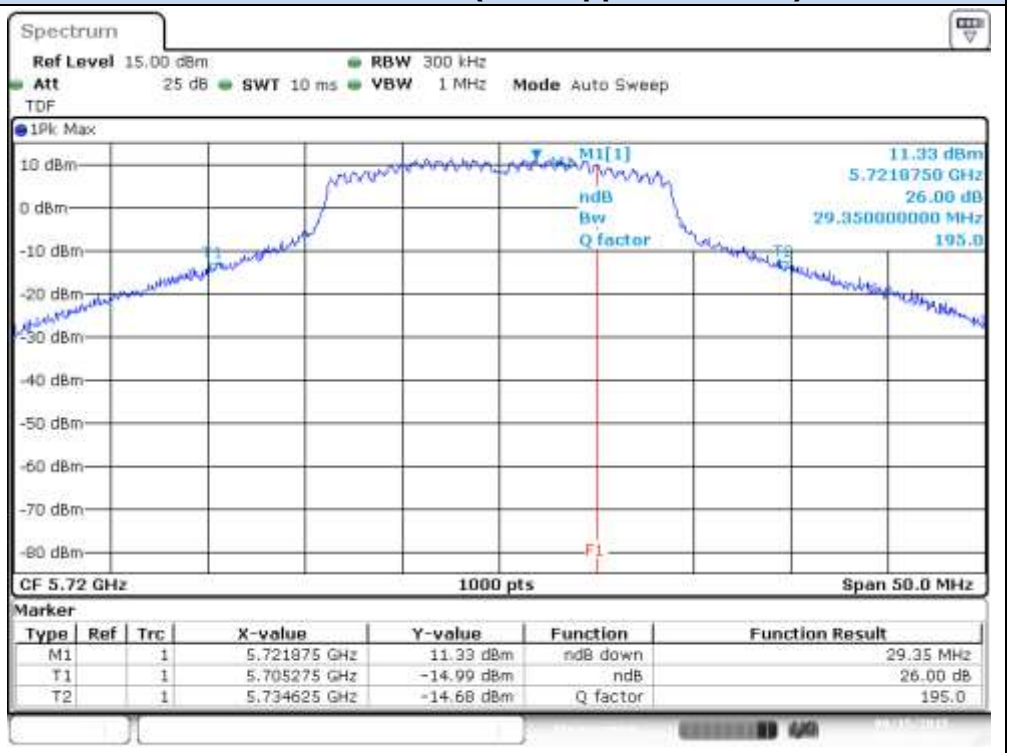


99% BW – CH140

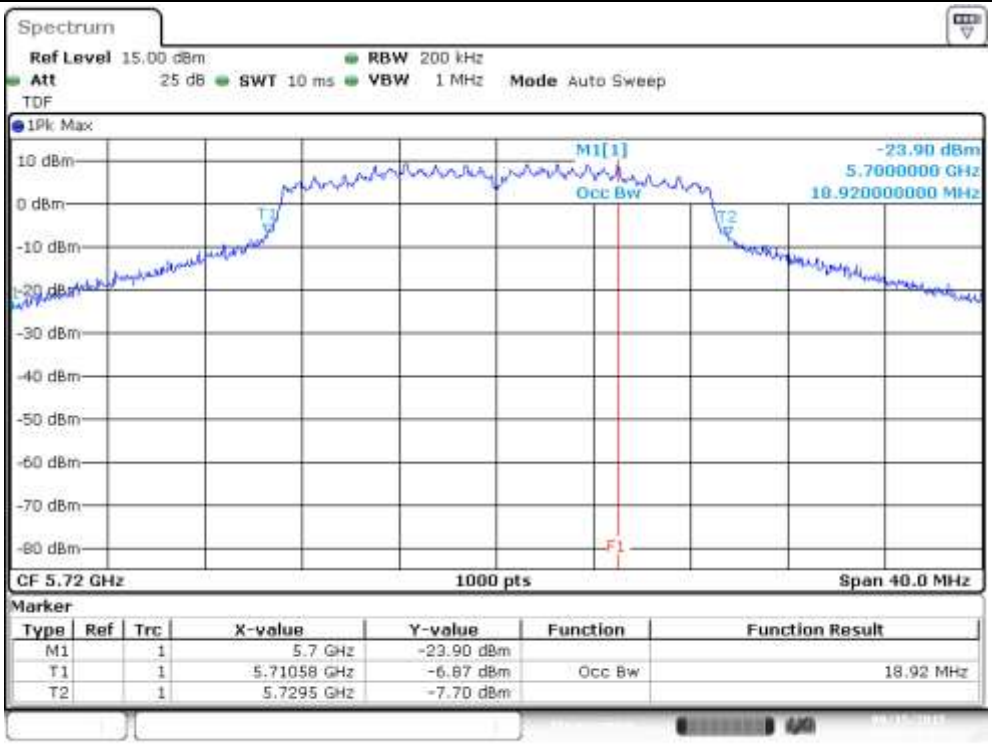


Printed copies are not controlled documents

26dB BW – CH144 (Overlapped Channel)



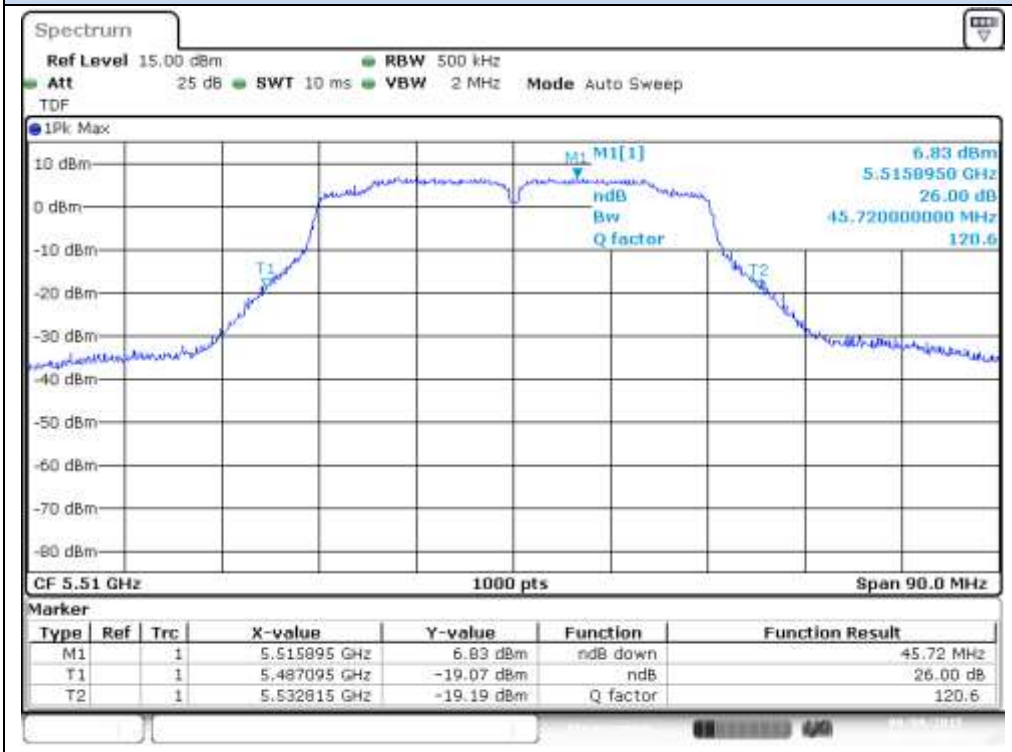
99% BW – CH144 (Overlapped Channel)



Printed copies are not controlled documents

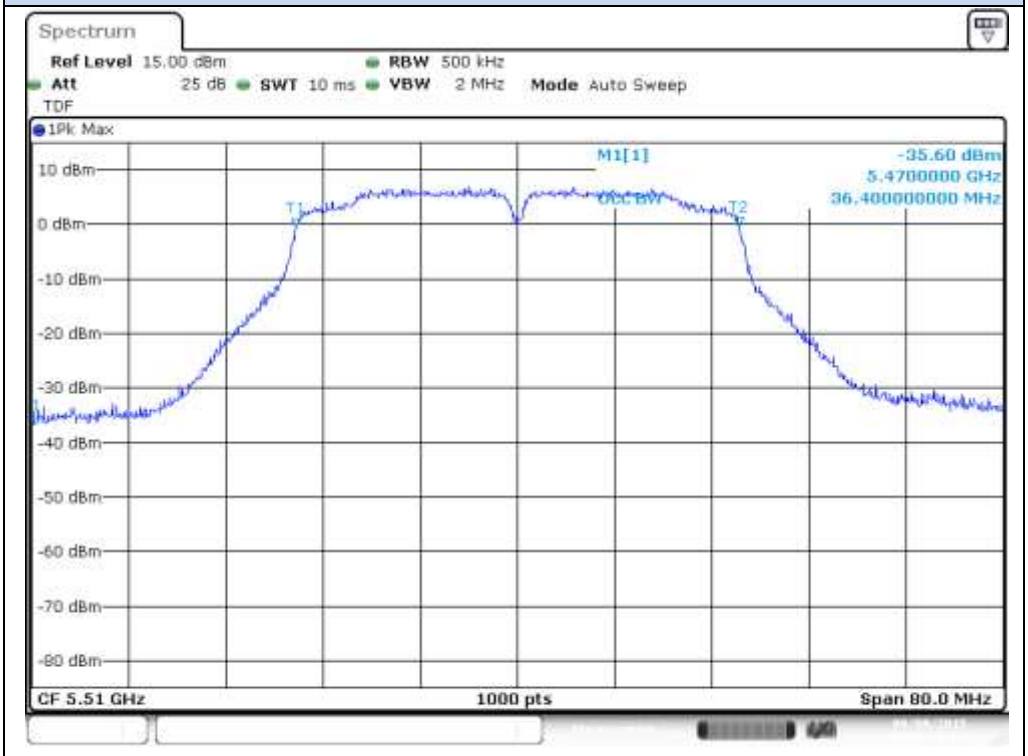
802.11n40, HT0 (SISO) – Chain A

26dB BW – CH102F



Date: 9.SEP.2015 15:24:47

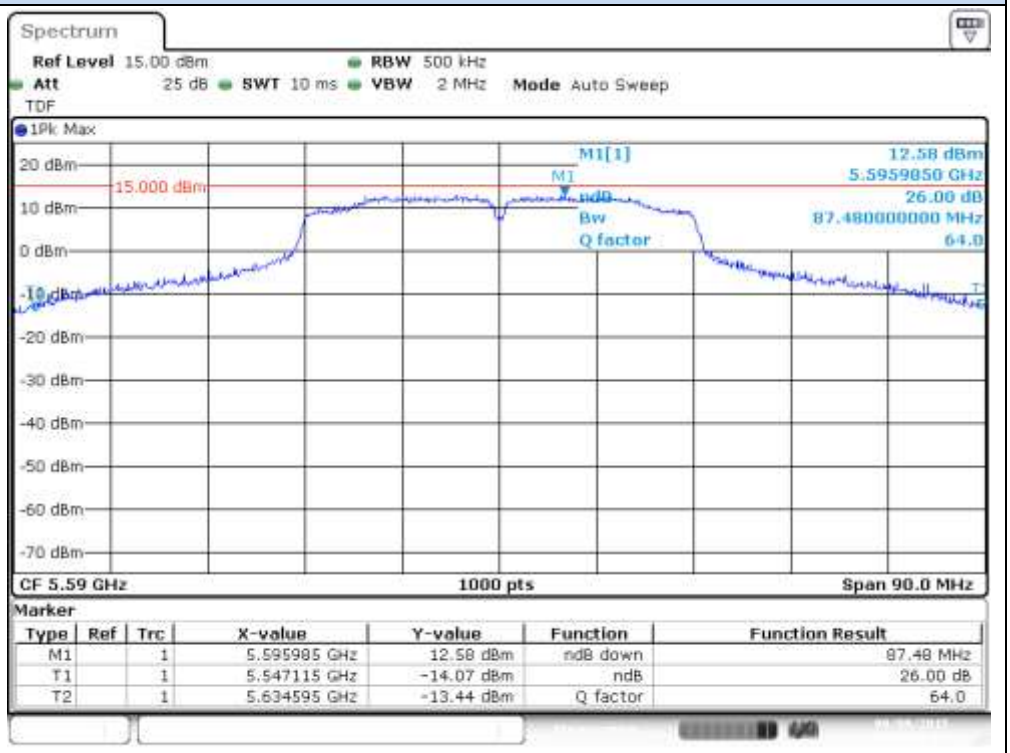
99% BW – CH102F



Date: 9.SEP.2015 15:25:02

Printed copies are not controlled documents

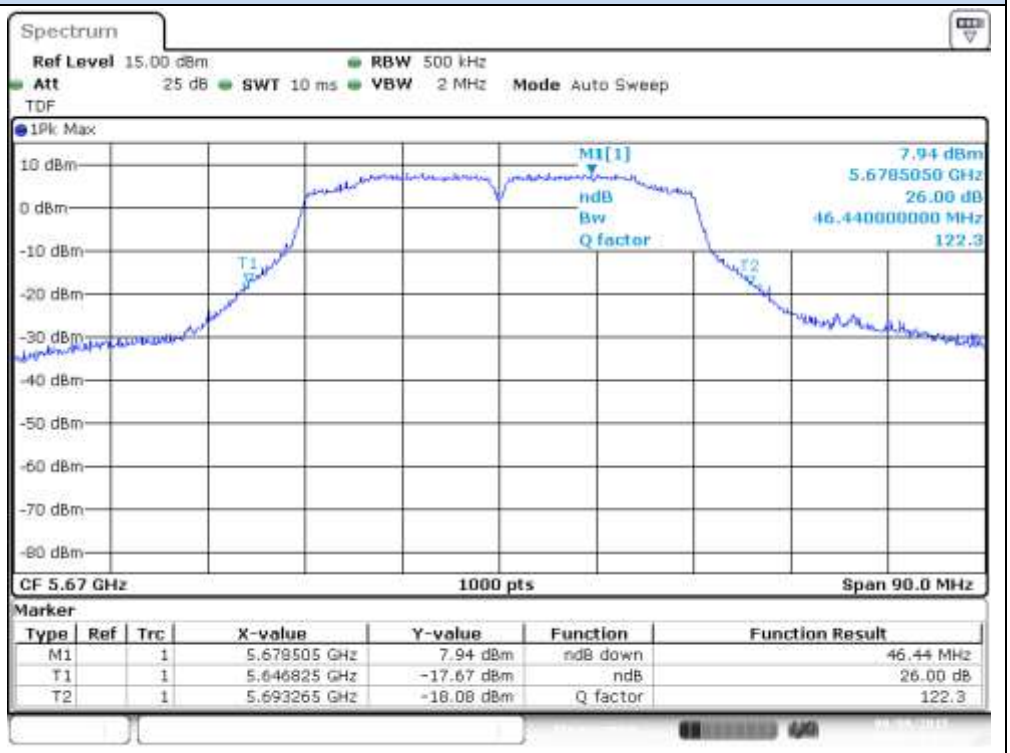
26dB BW – CH118F



99% BW – CH118F

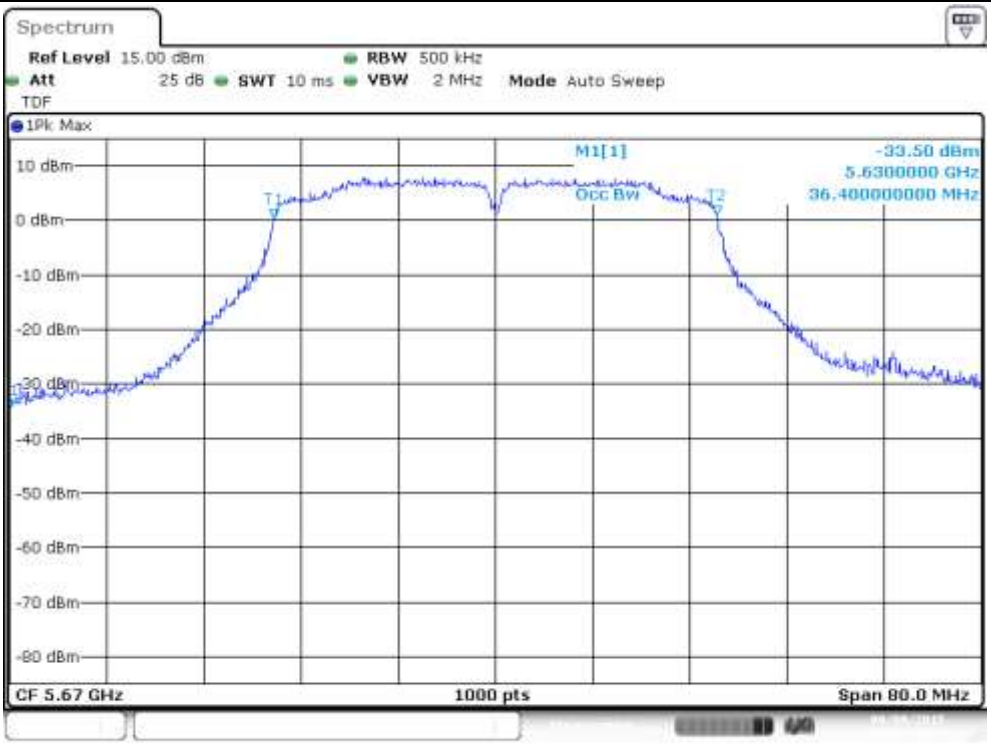
Printed copies are not controlled documents

26dB BW – CH134F



Date: 9.SEP.2015 15:50:26

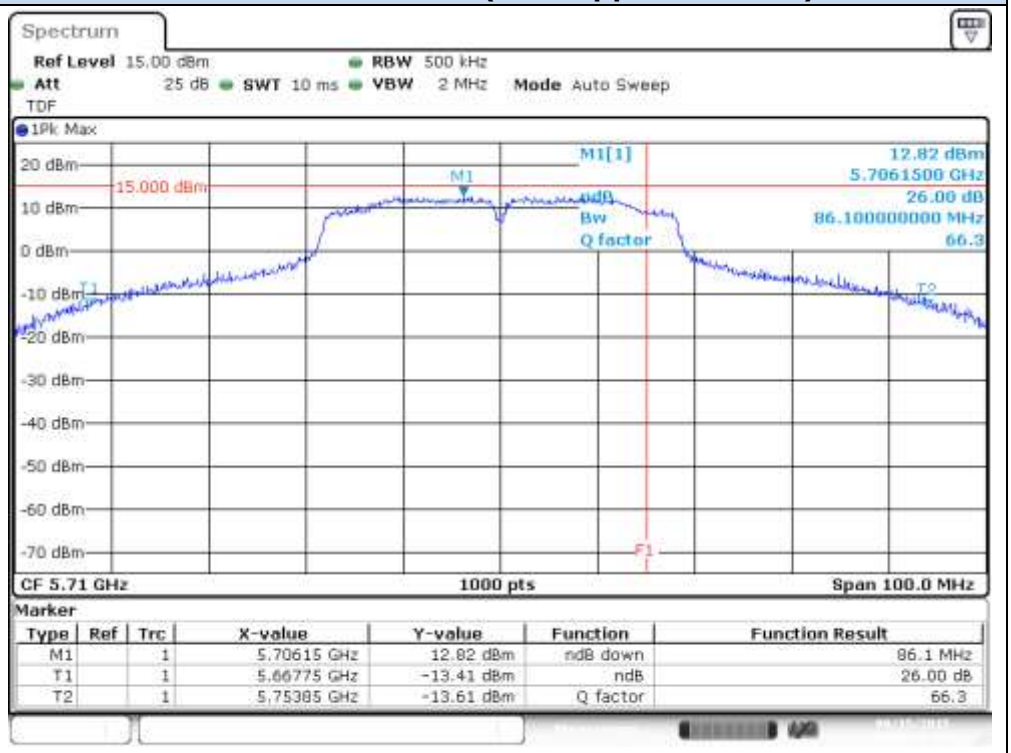
99% BW – CH134F



Date: 9.SEP.2015 15:50:42

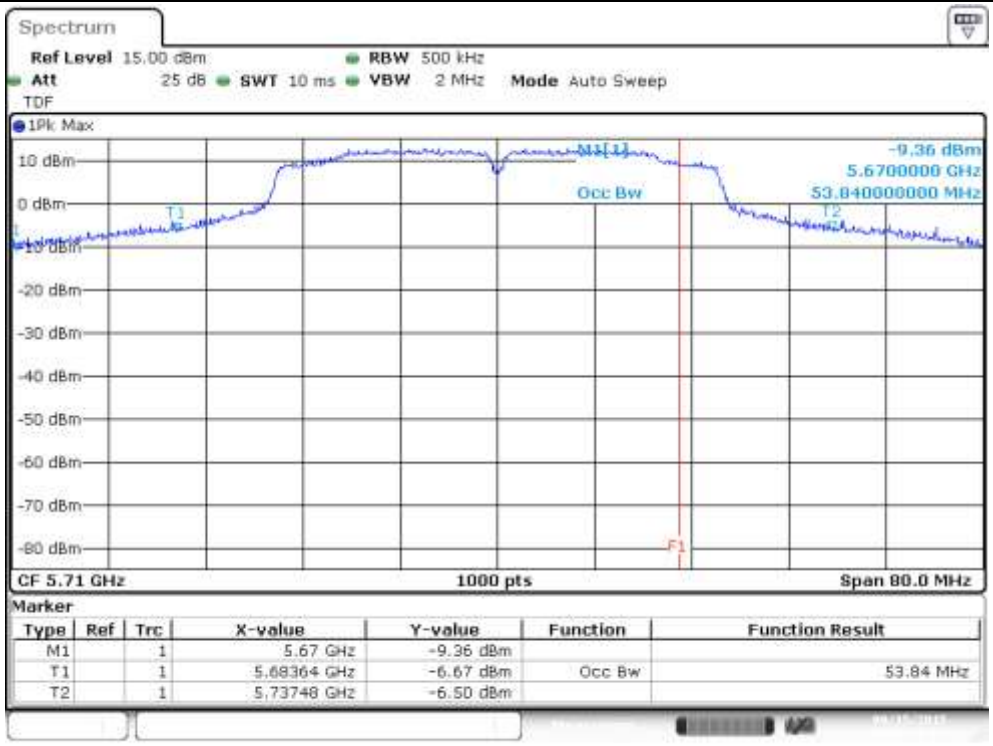
Printed copies are not controlled documents

26dB BW – CH142F (Overlapped Channel)



Date: 15.SEP.2015 11:03:09

99% BW – CH142F (Overlapped Channel)

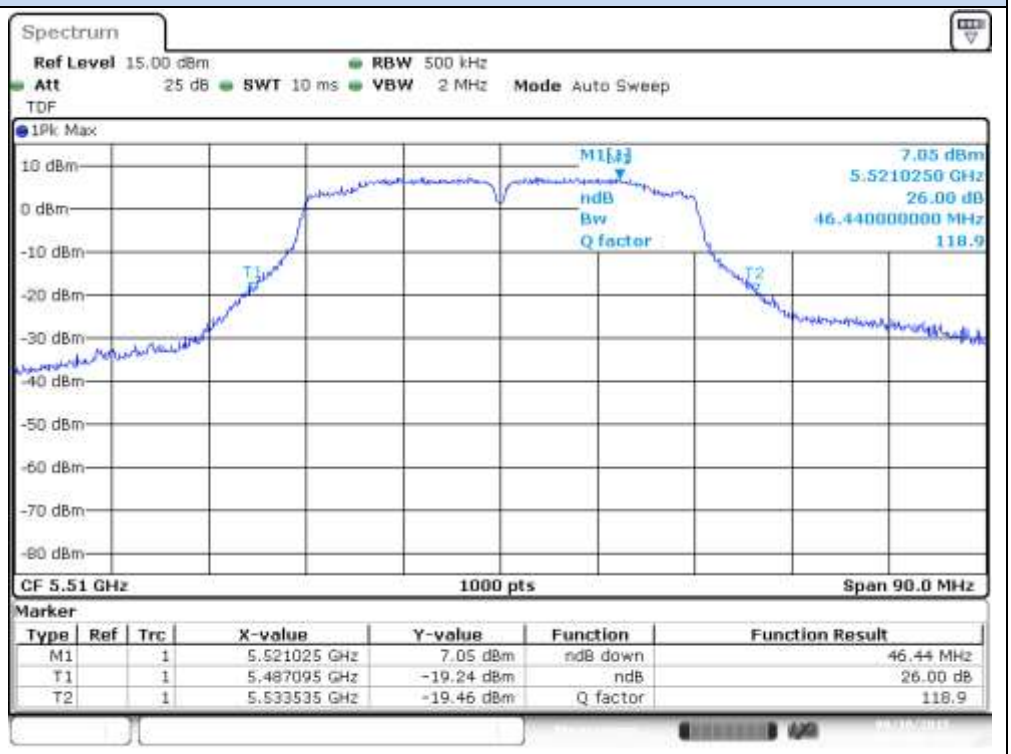


Date: 15.SEP.2015 11:04:31

Printed copies are not controlled documents

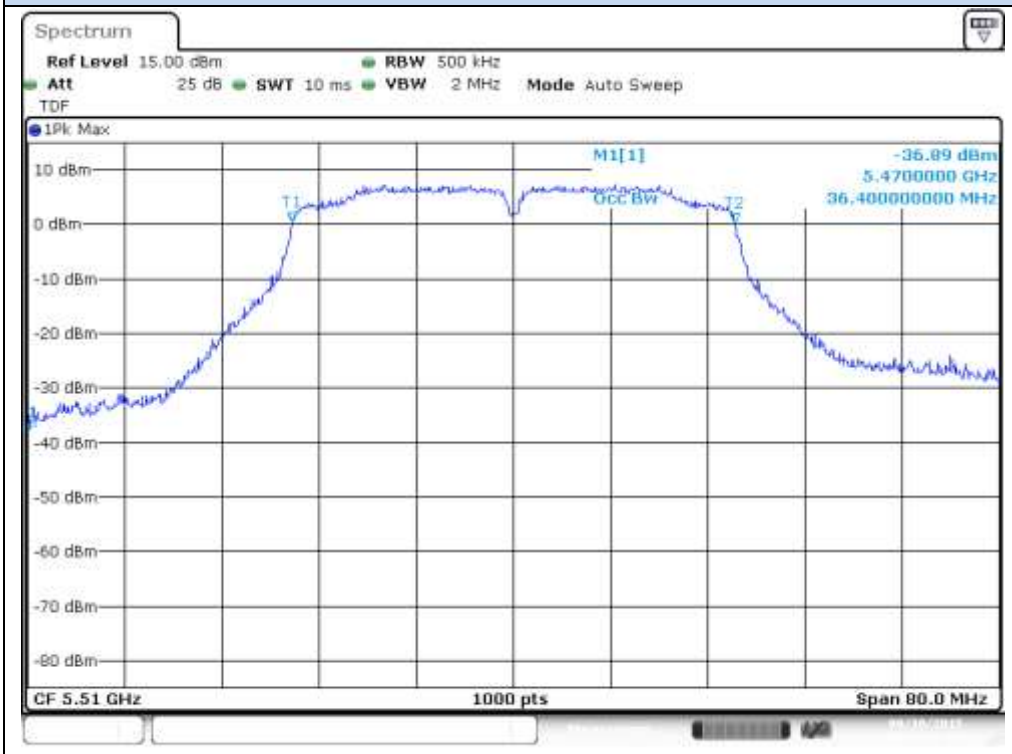
802.11n40, HT0 (SISO) – Chain B

26dB BW – CH102F



Date: 10.SEP.2015 10:17:00

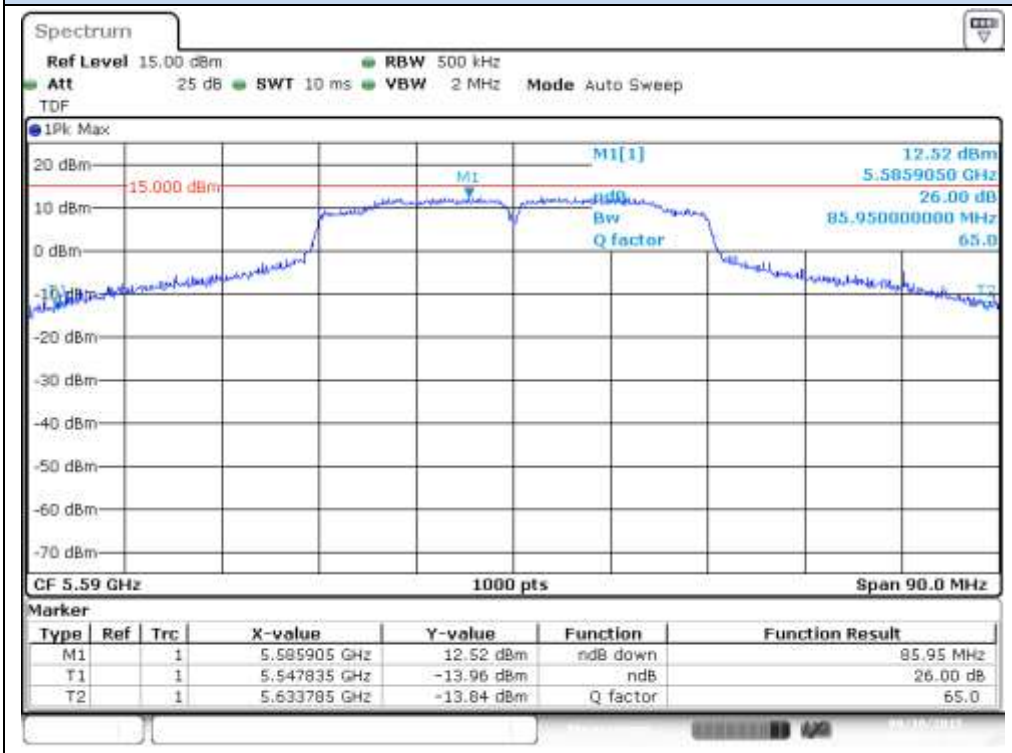
99% BW – CH102F



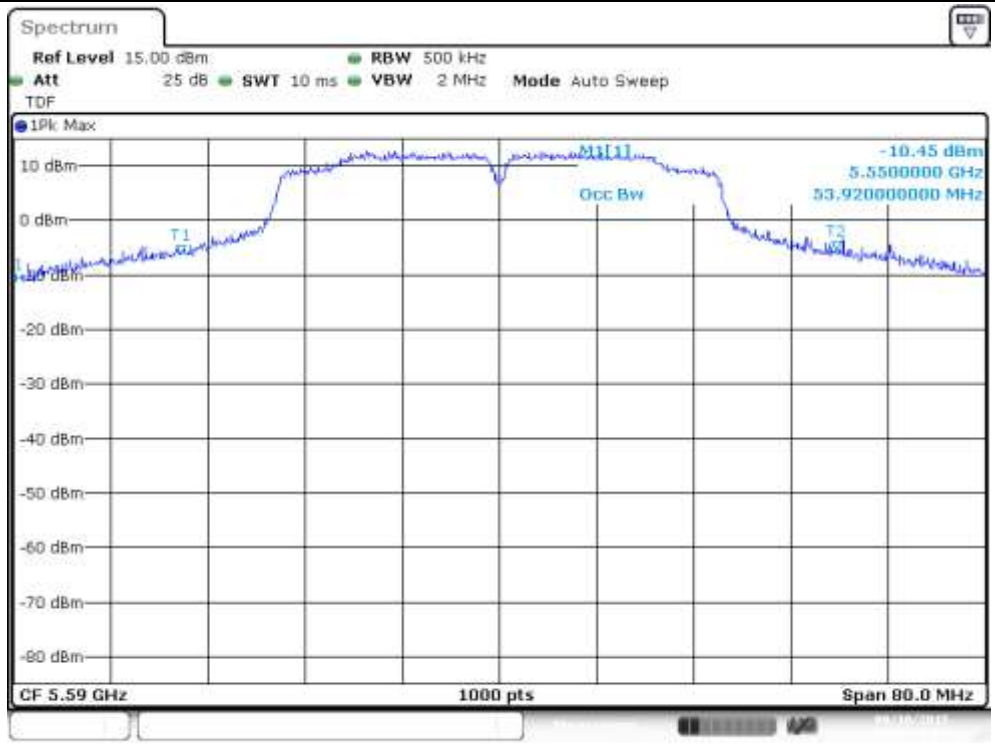
Date: 10.SEP.2015 10:17:23

Printed copies are not controlled documents

26dB BW – CH118F

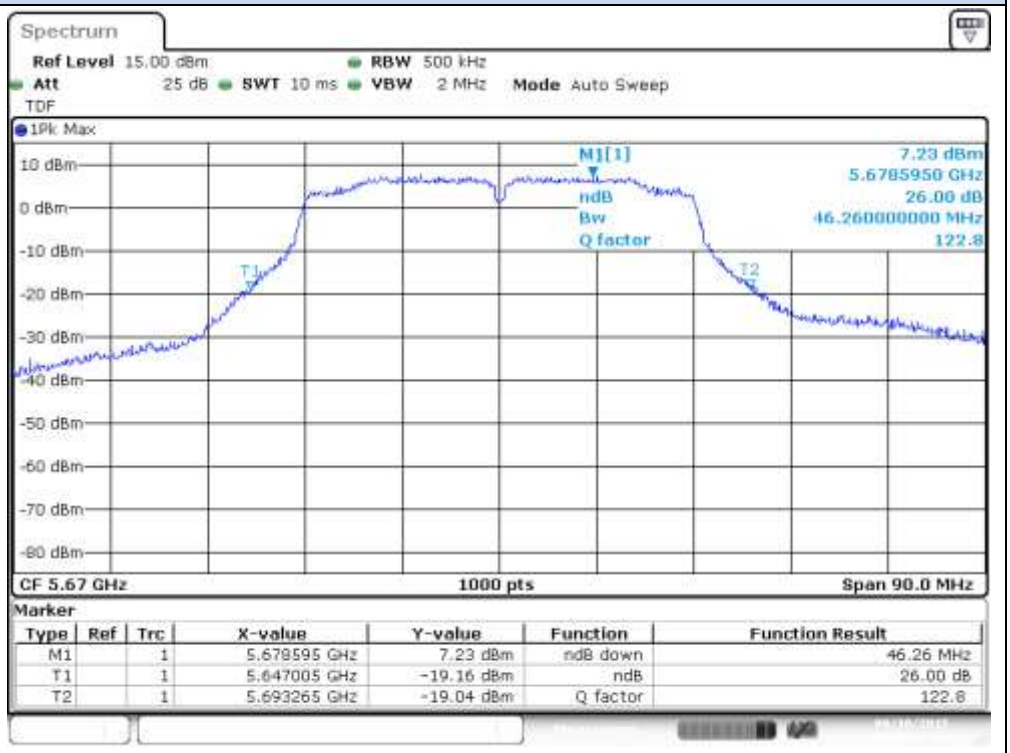


99% BW – CH118F



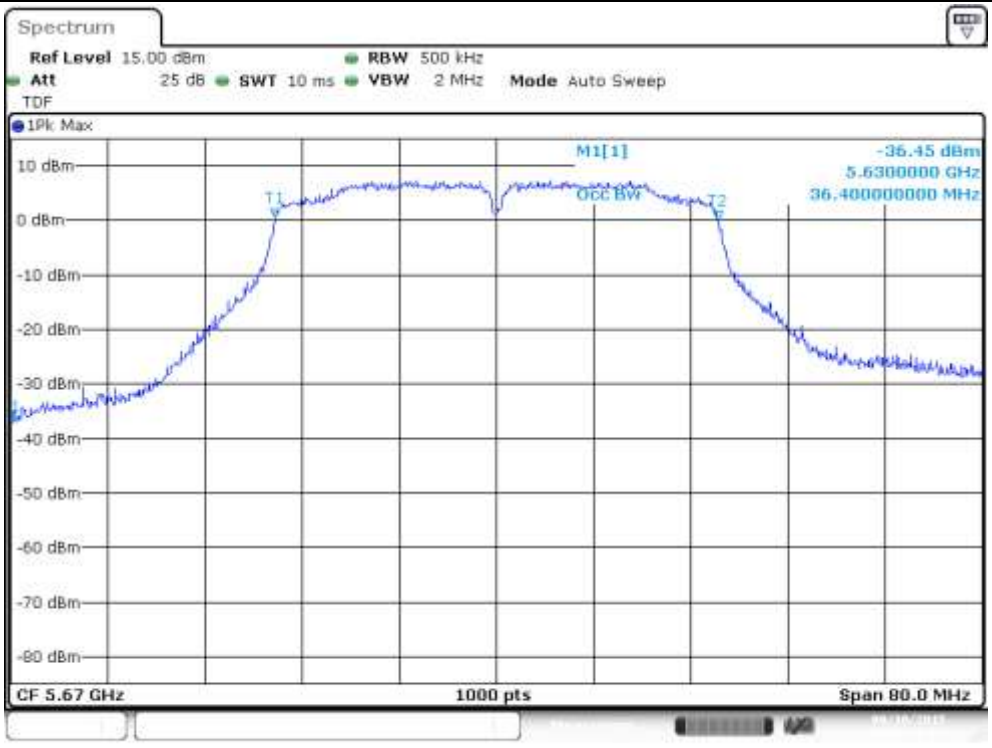
Printed copies are not controlled documents

26dB BW – CH134F



Date: 10.SEP.2015 10:32:16

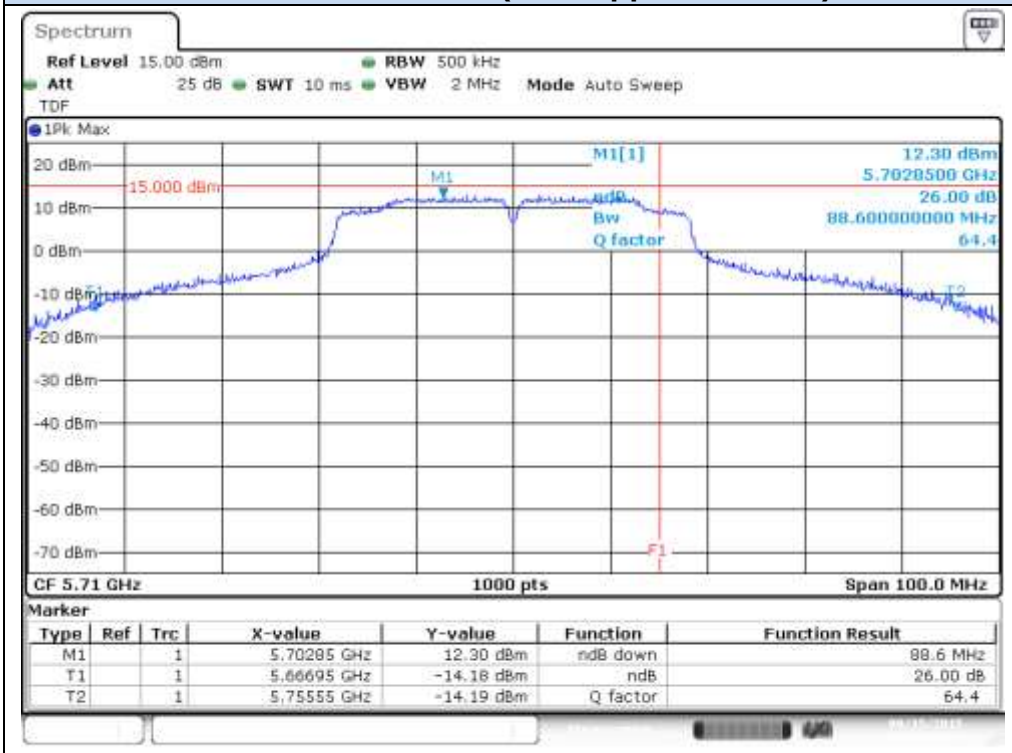
99% BW – CH134F



Date: 10.SEP.2015 10:32:32

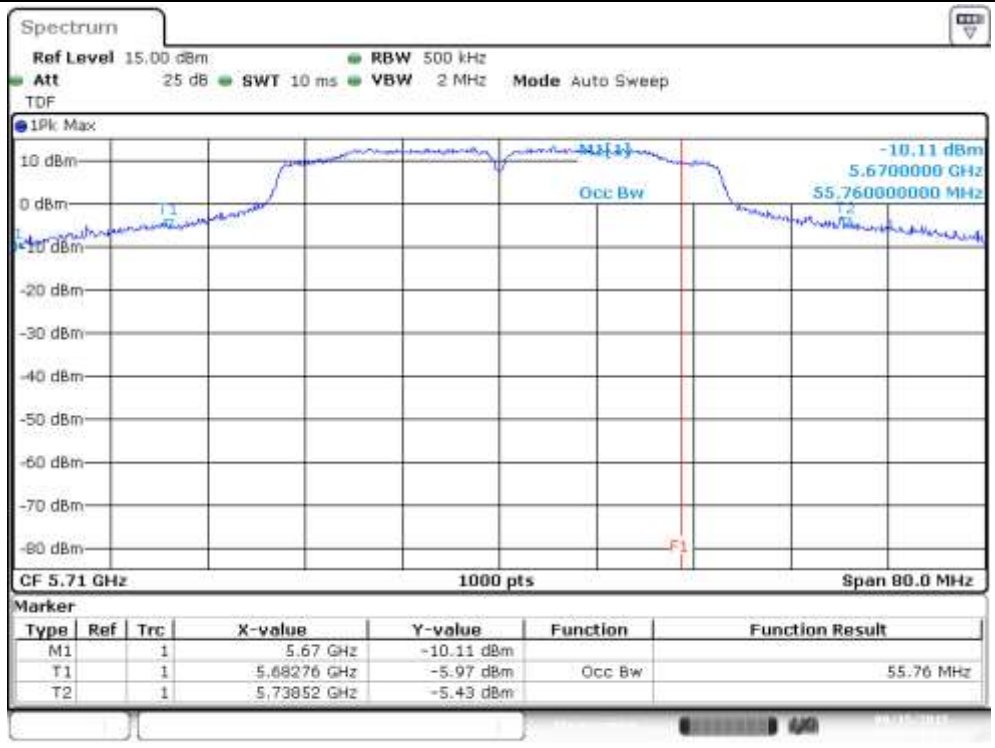
Printed copies are not controlled documents

26dB BW – CH142F (Overlapped Channel)



Date: 15.SEP.2015 14:35:03

99% BW – CH142F (Overlapped Channel)

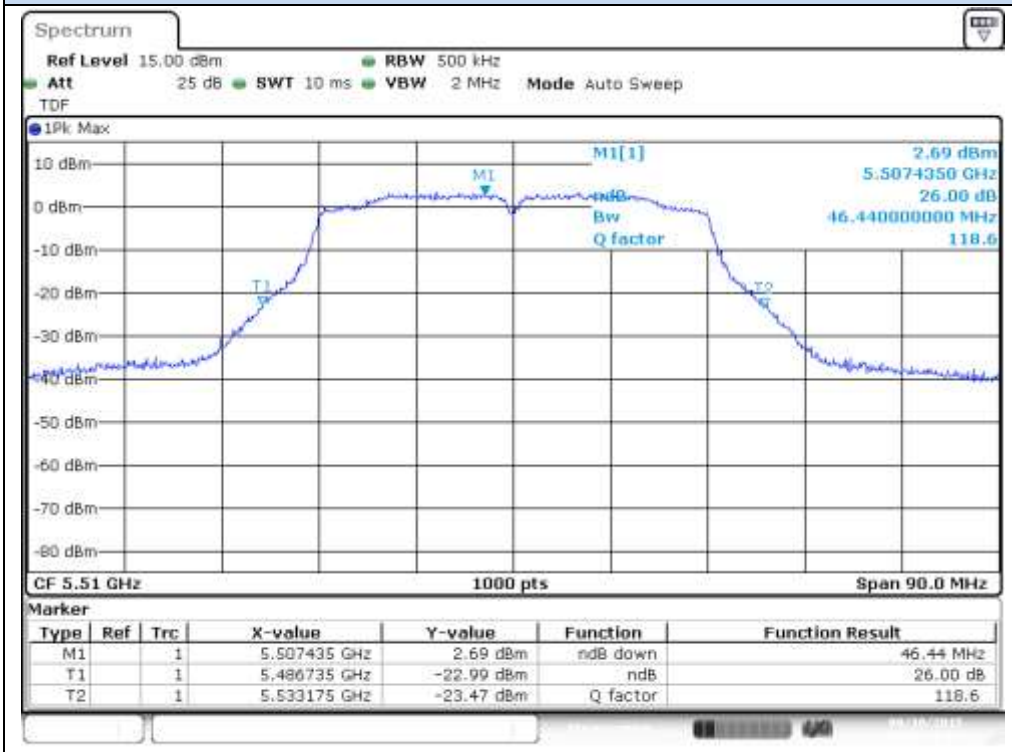


Date: 15.SEP.2015 14:36:29

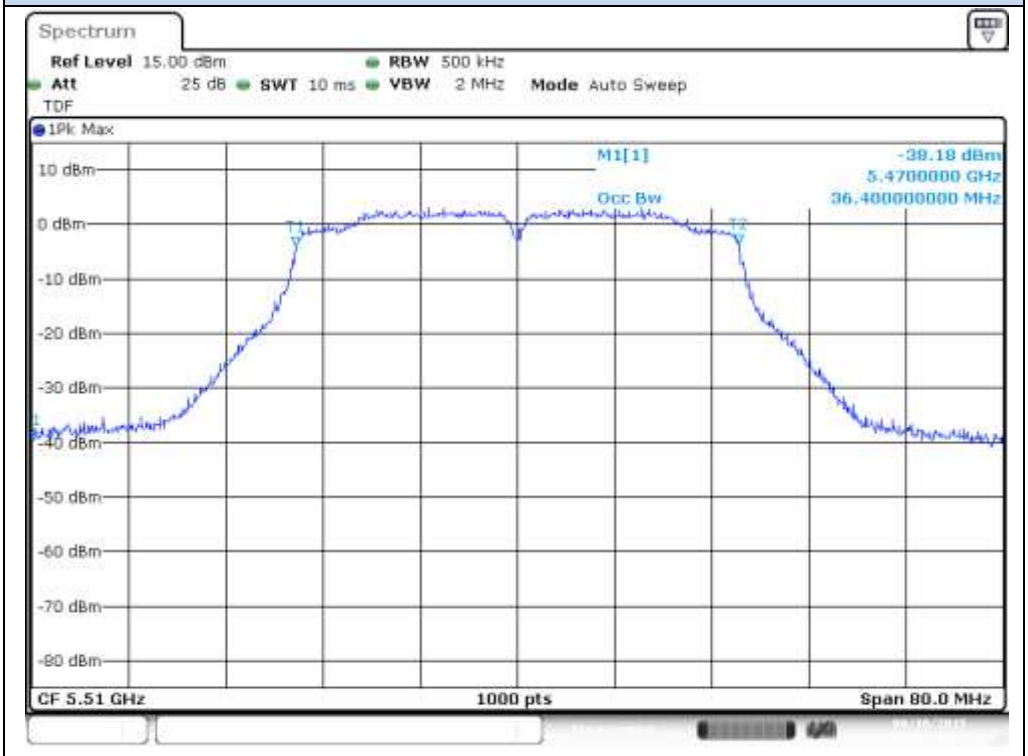
Printed copies are not controlled documents

802.11n40, HT8 (MIMO) – Chain A

26dB BW – CH102F

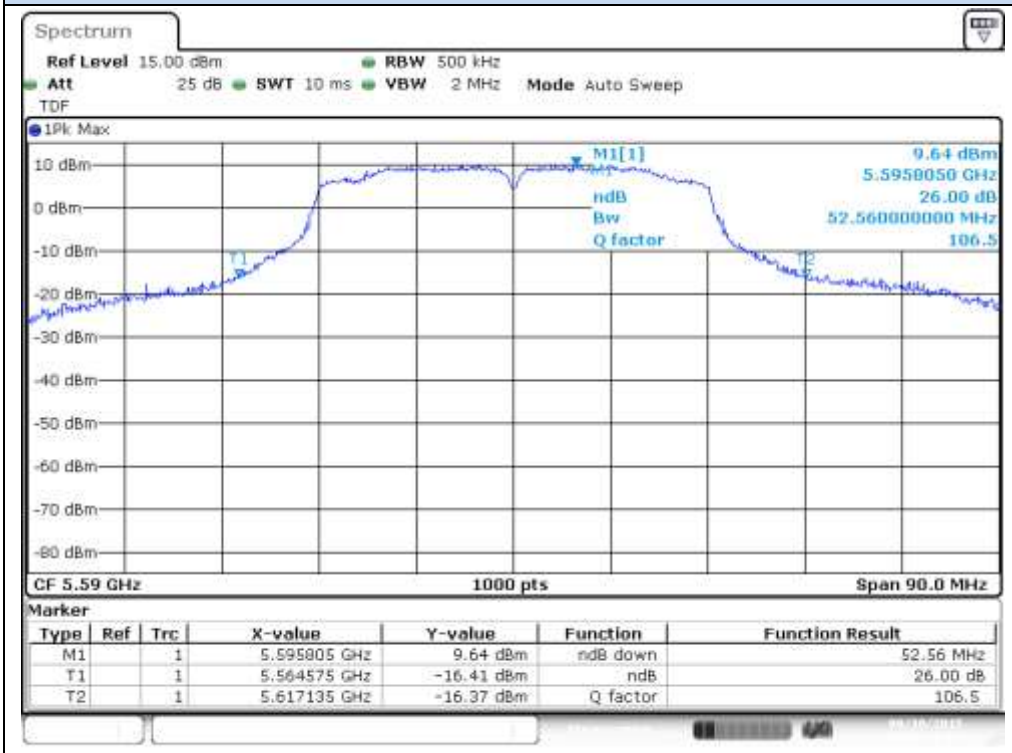


99% BW – CH102F



Printed copies are not controlled documents

26dB BW – CH118F

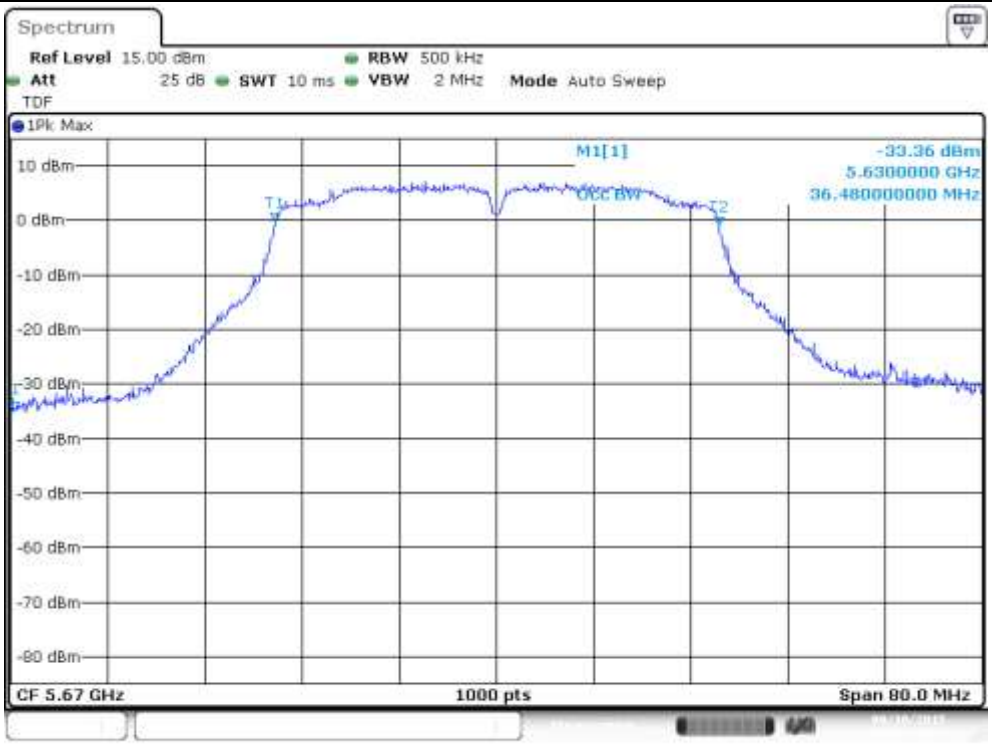


99% BW – CH118F

Printed copies are not controlled documents

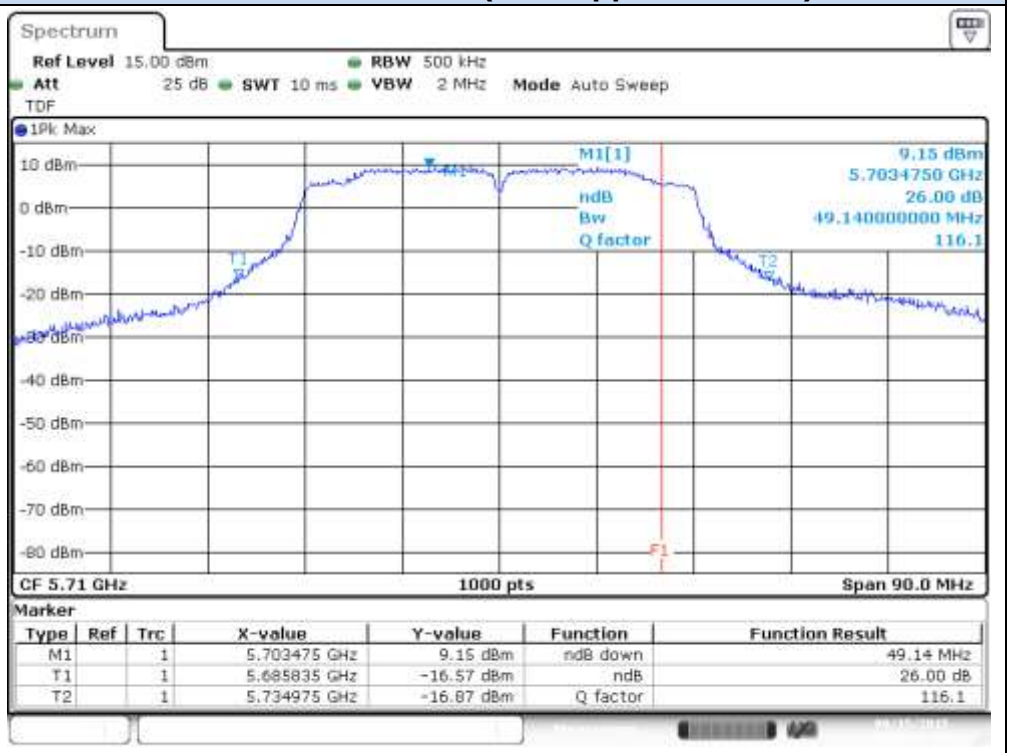
26dB BW – CH134F

99% BW – CH134F

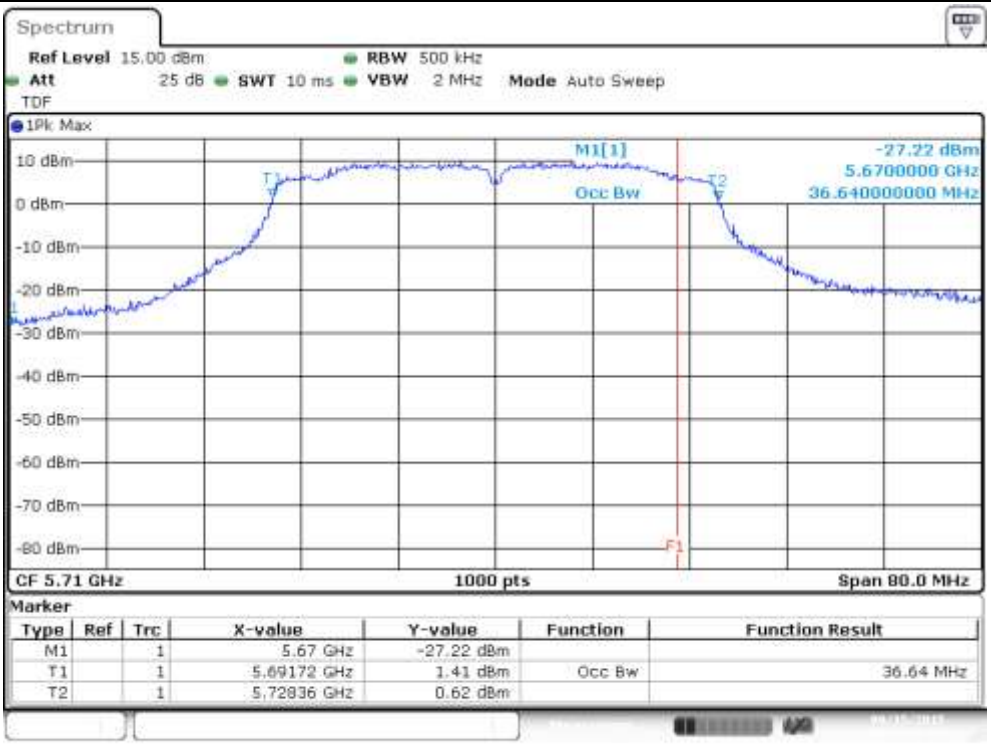


Printed copies are not controlled documents

26dB BW – CH142F (Overlapped Channel)



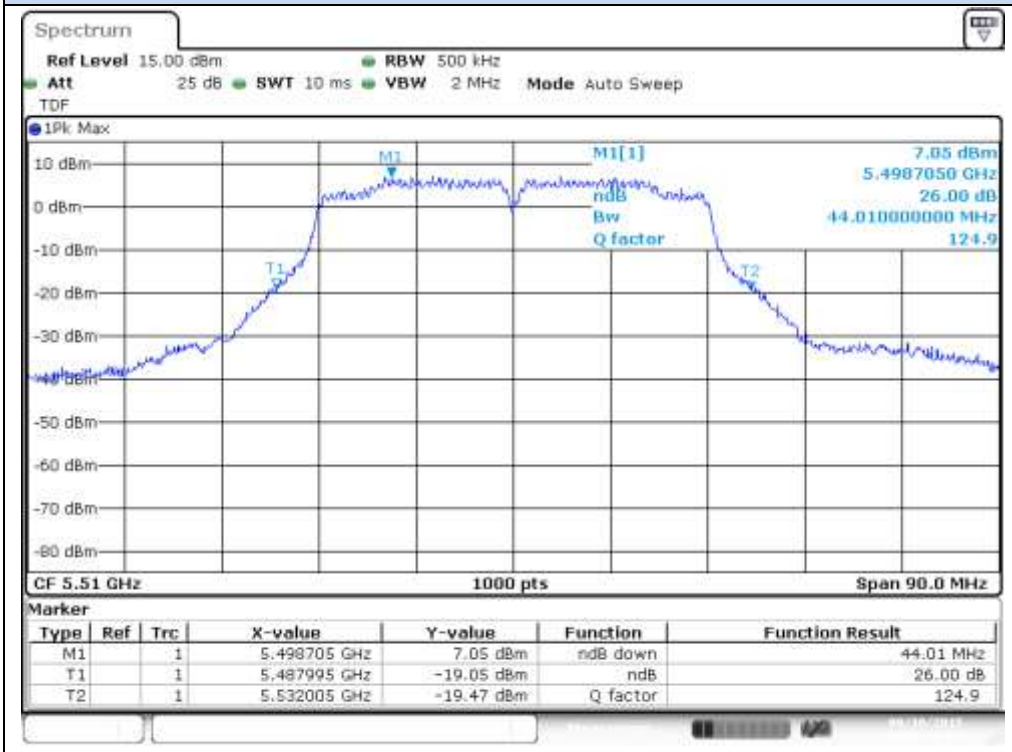
99% BW – CH142F (Overlapped Channel)



Printed copies are not controlled documents

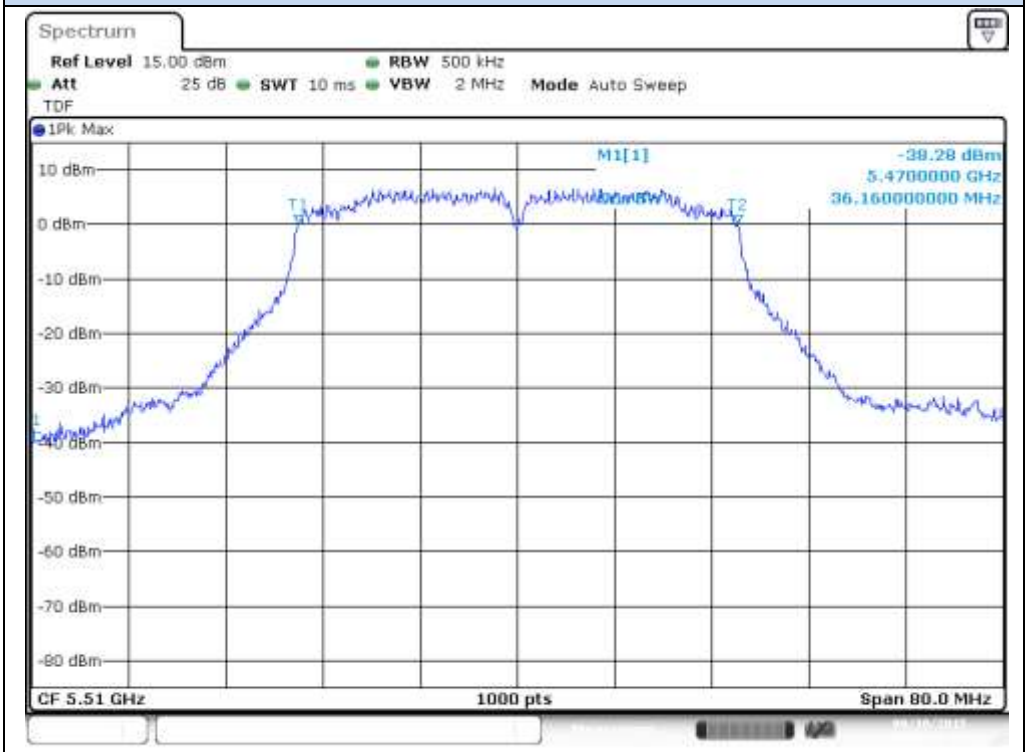
802.11n40, HT8 (MIMO) – Chain B

26dB BW – CH102F



Date: 10.SEP.2015 11:51:41

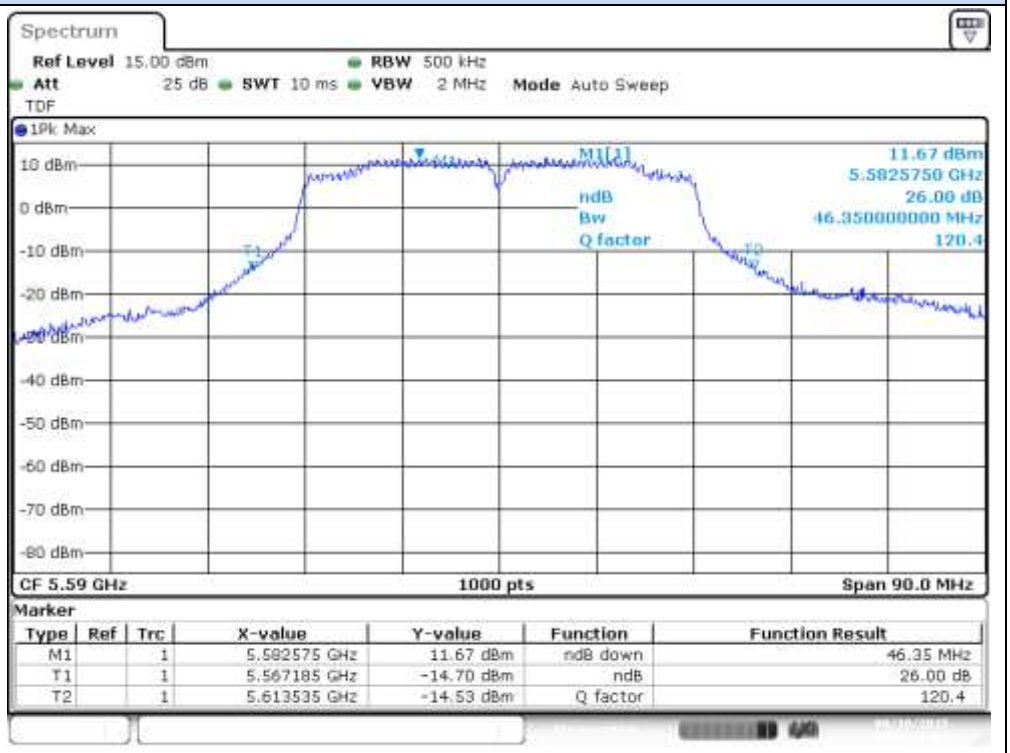
99% BW – CH102F



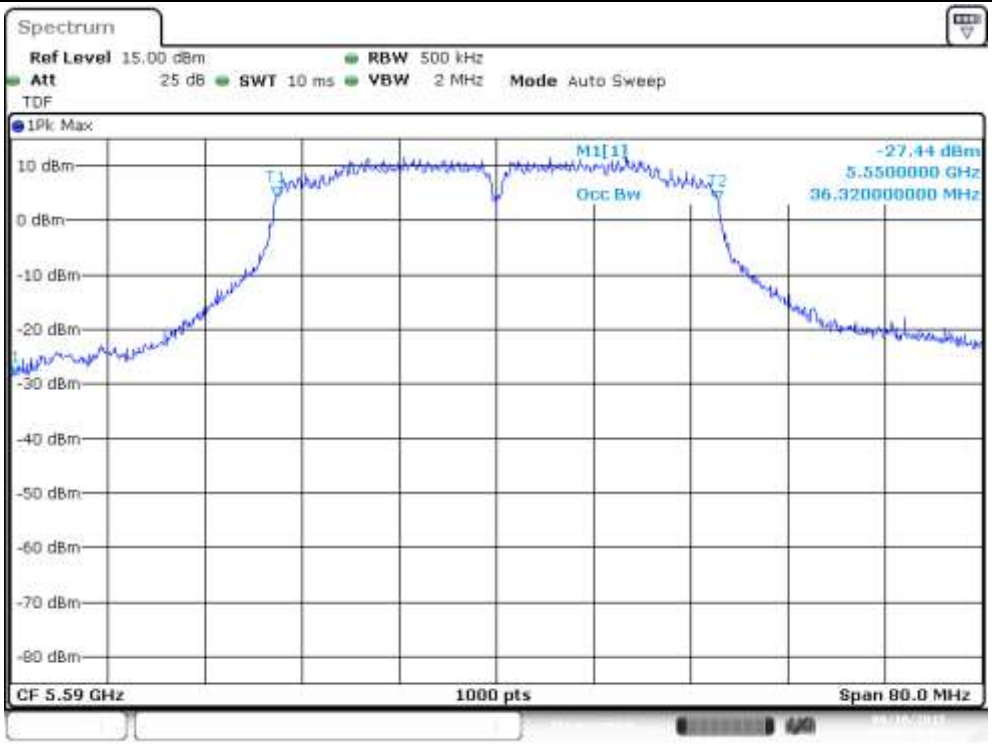
Date: 10.SEP.2015 11:51:56

Printed copies are not controlled documents

26dB BW – CH118F

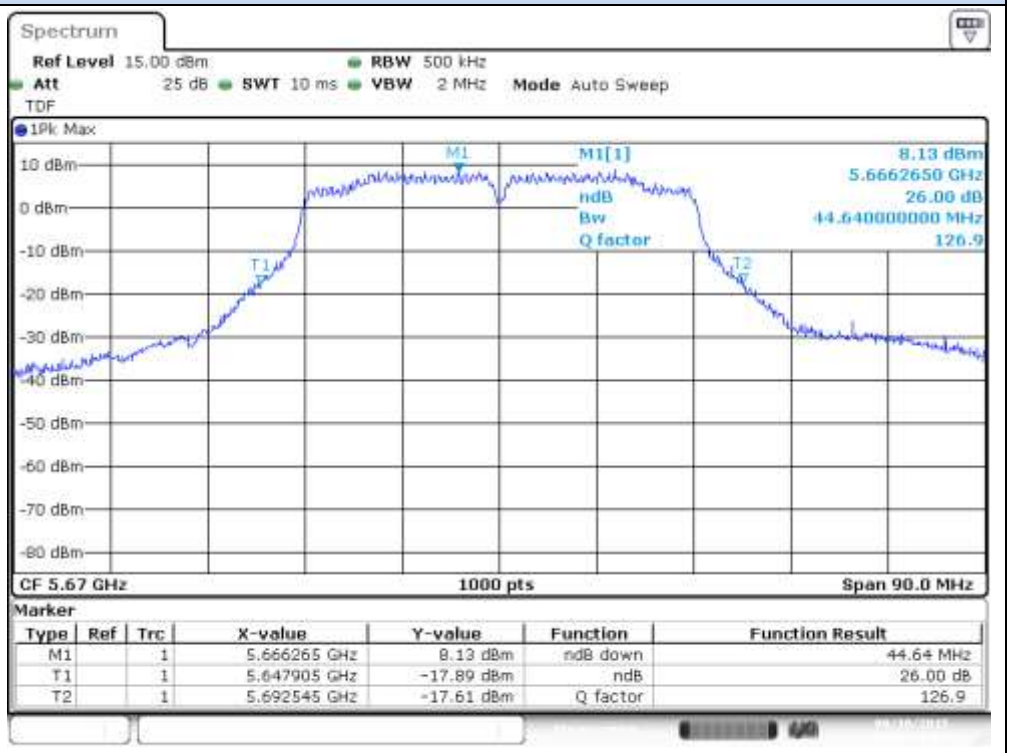


99% BW – CH118F



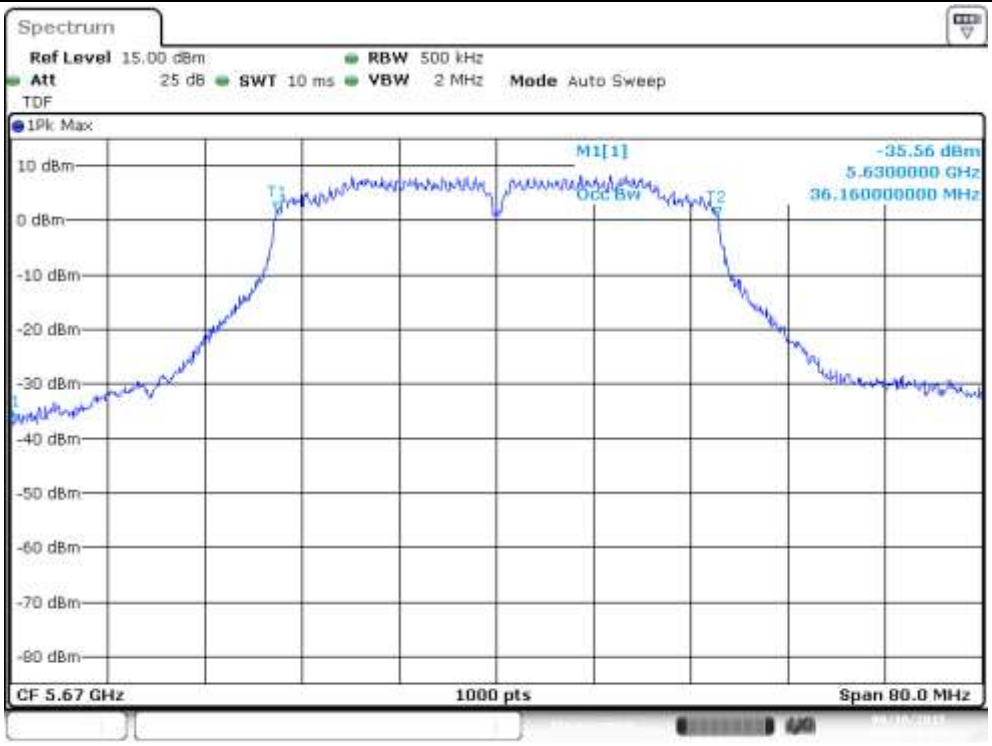
Printed copies are not controlled documents

26dB BW – CH134F



Date: 10.SEP.2015 14:19:25

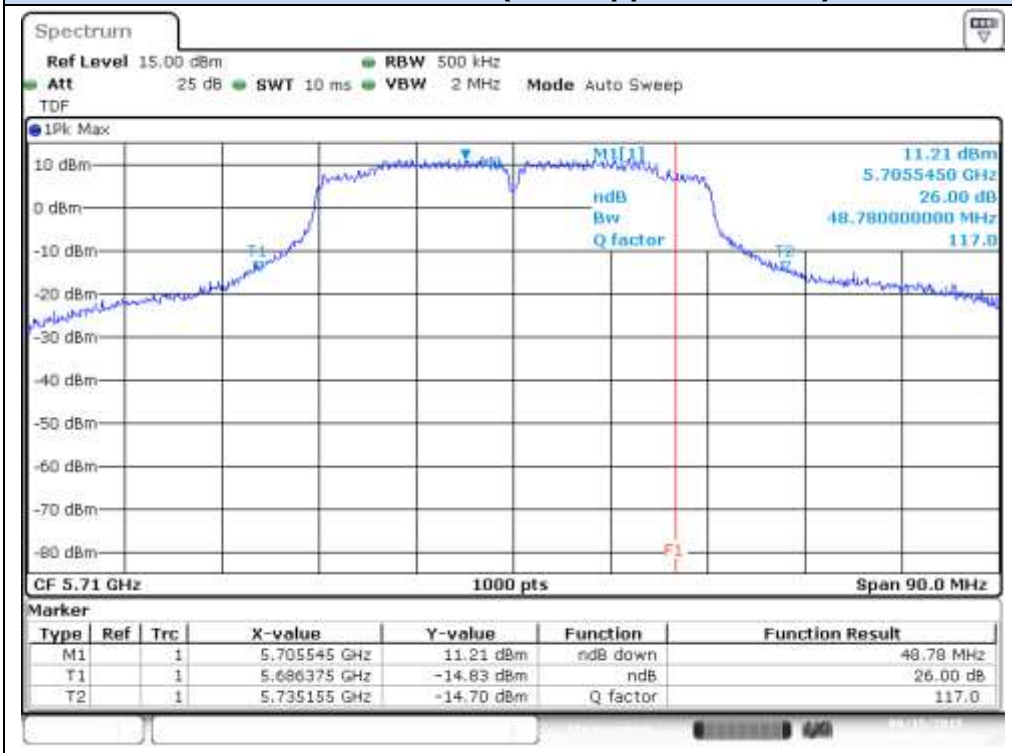
99% BW – CH134F



Date: 10.SEP.2015 14:19:41

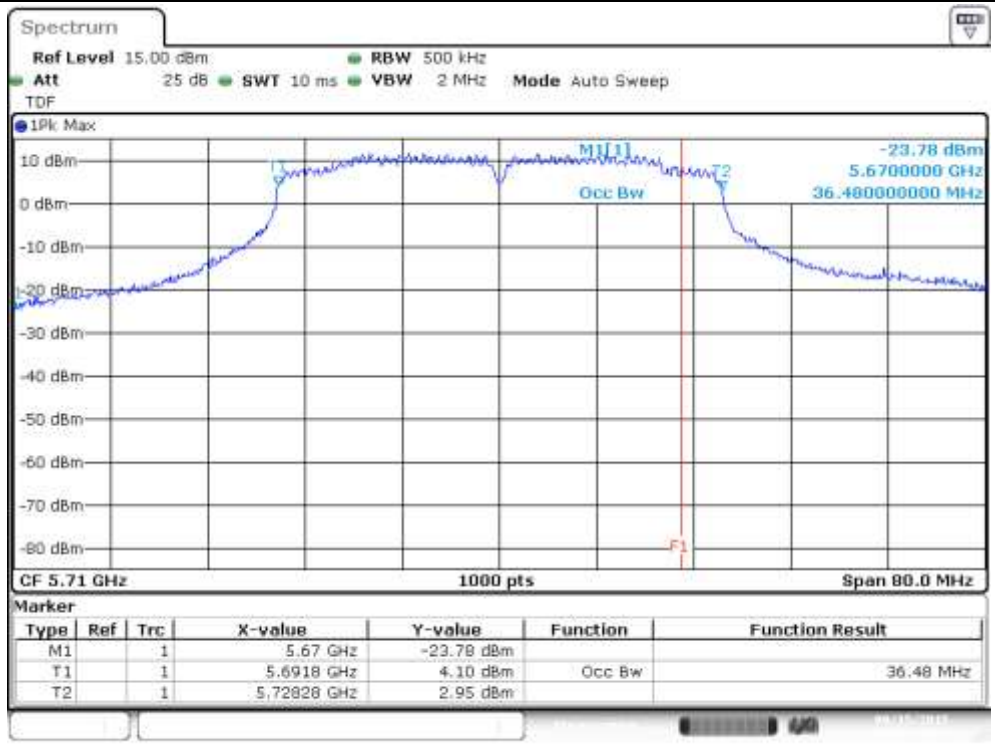
Printed copies are not controlled documents

26dB BW – CH142F (Overlapped Channel)



Date: 15.SEP.2015 14:43:45

99% BW – CH142F (Overlapped Channel)

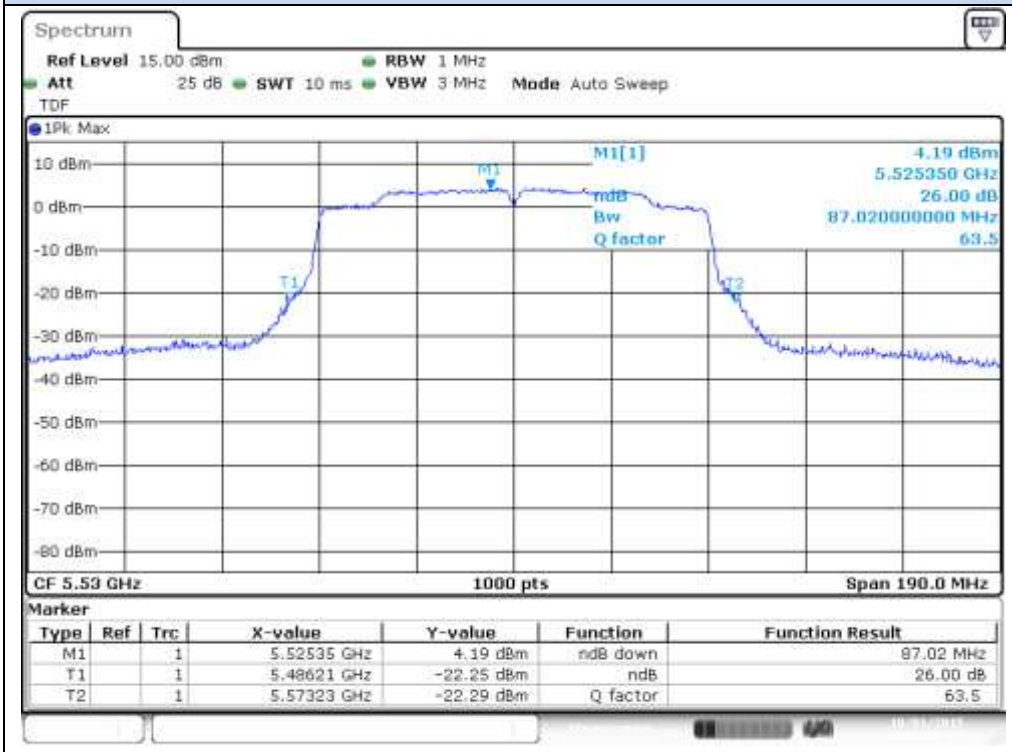


Date: 15.SEP.2015 14:44:23

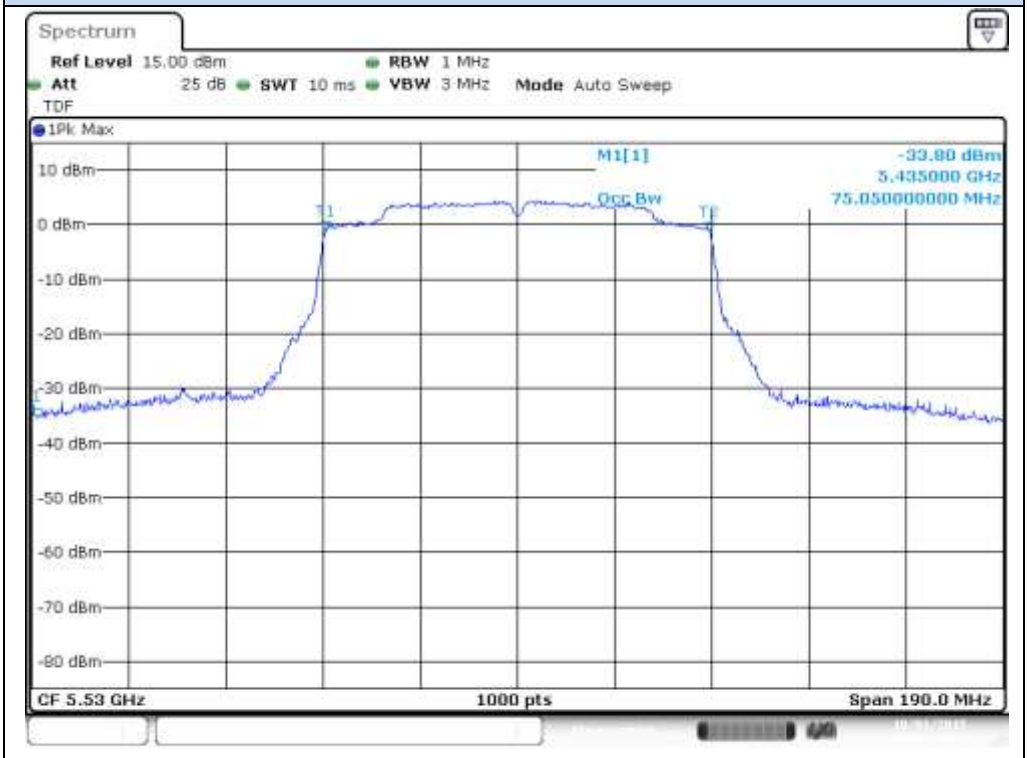
Printed copies are not controlled documents

802.11ac80, VHT0 (SISO) – Chain A

26dB BW – CH106ac80

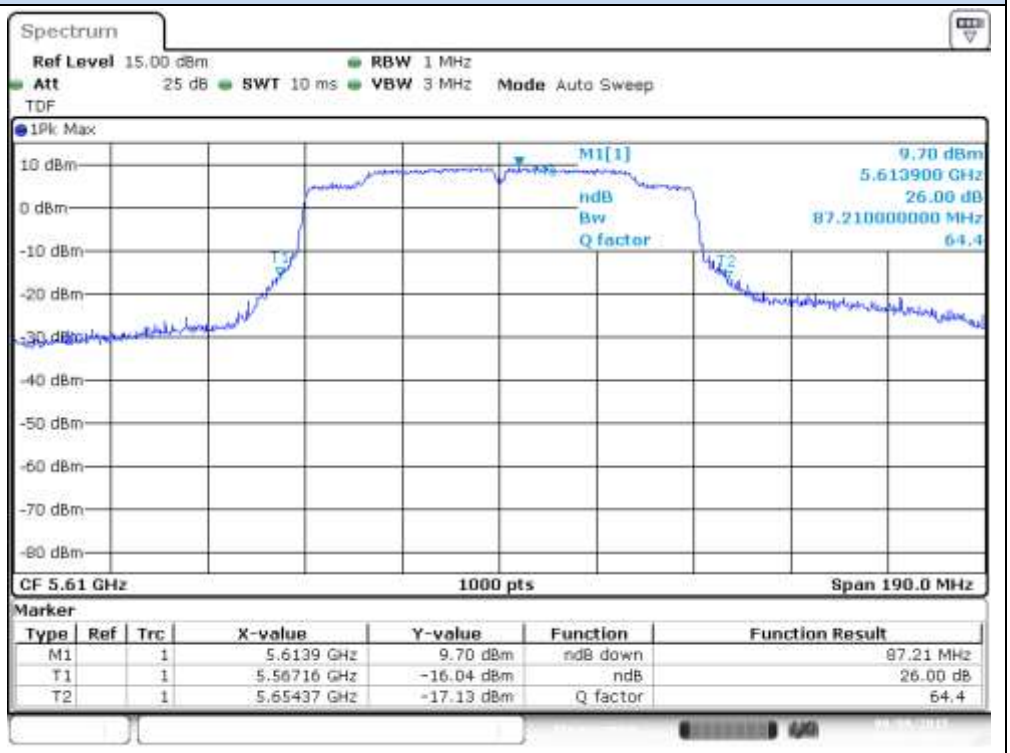


99% BW – CH106ac80

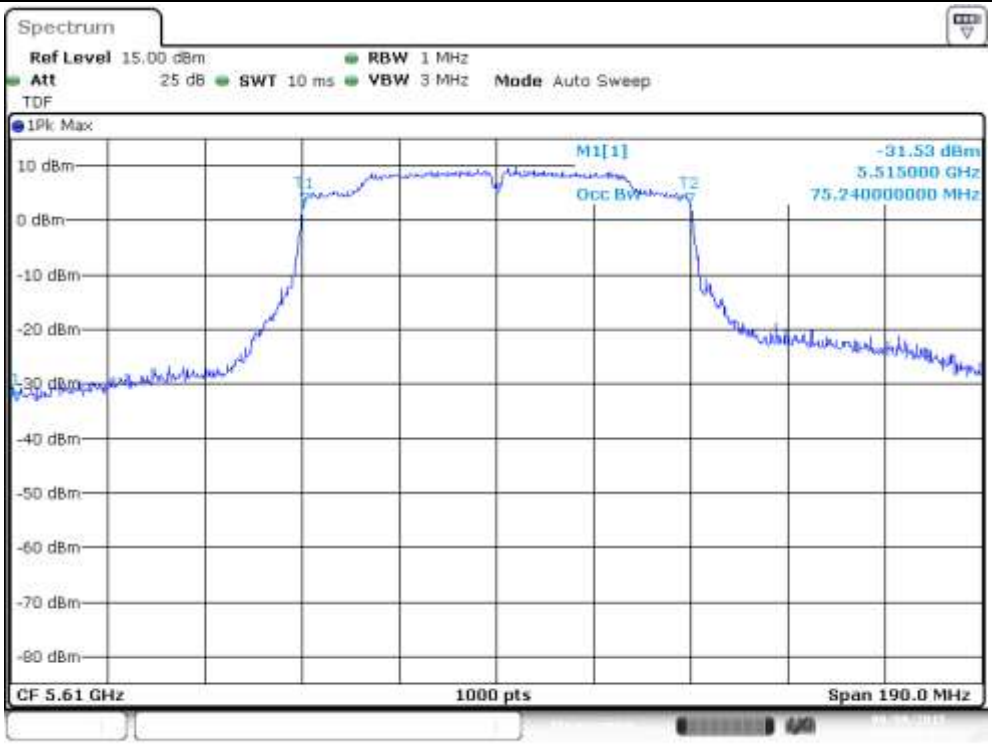


Printed copies are not controlled documents

26dB BW – CH122ac80

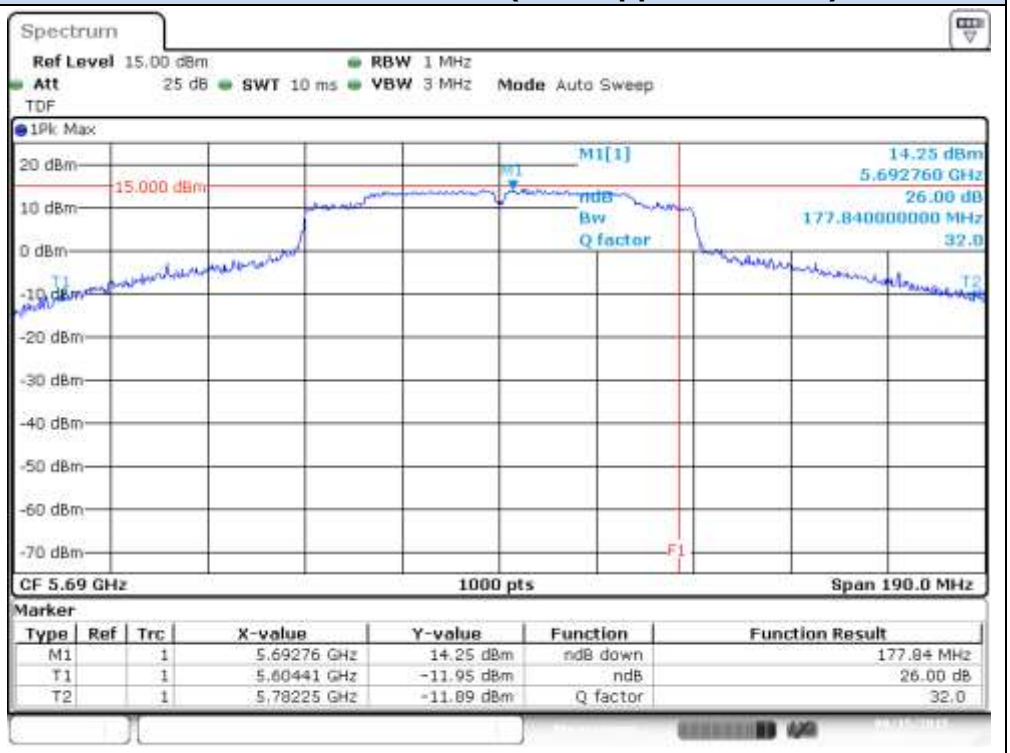


99% BW – CH122ac80

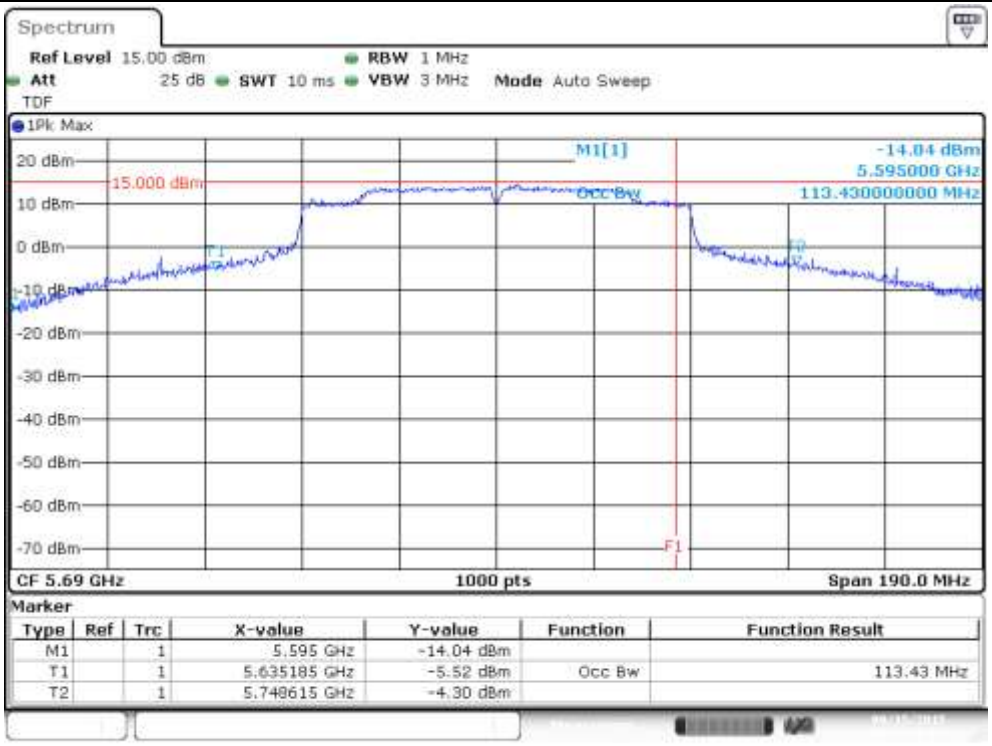


Printed copies are not controlled documents

26dB BW – CH138ac80 (Overlapped Channel)



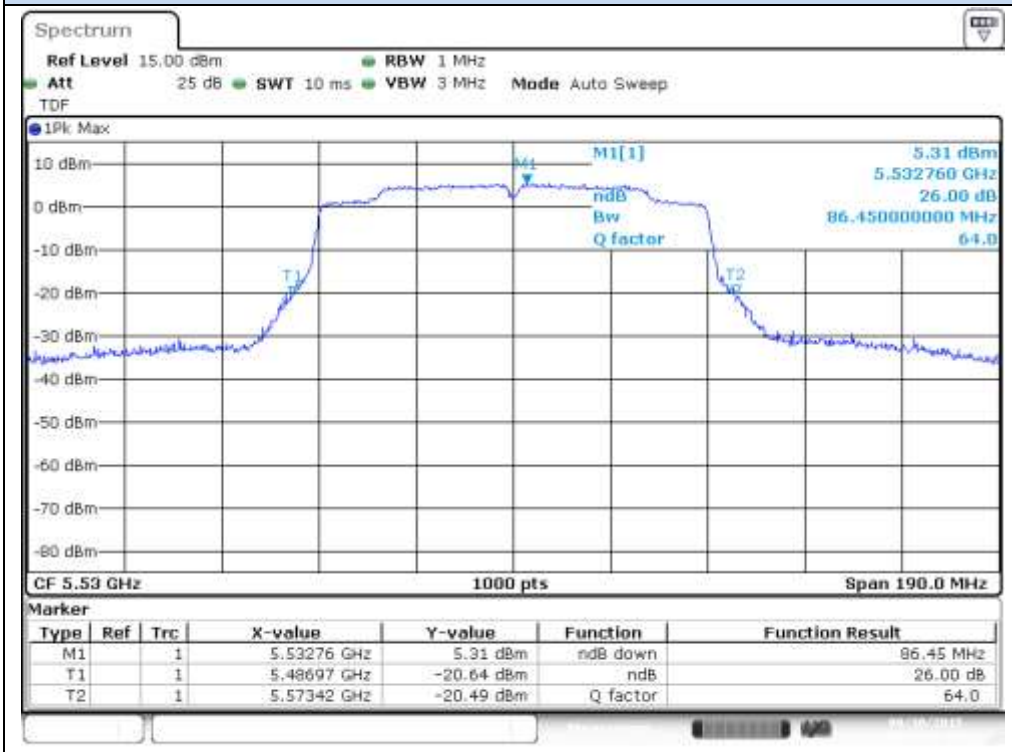
99% BW – CH138ac80 (Overlapped Channel)



Printed copies are not controlled documents

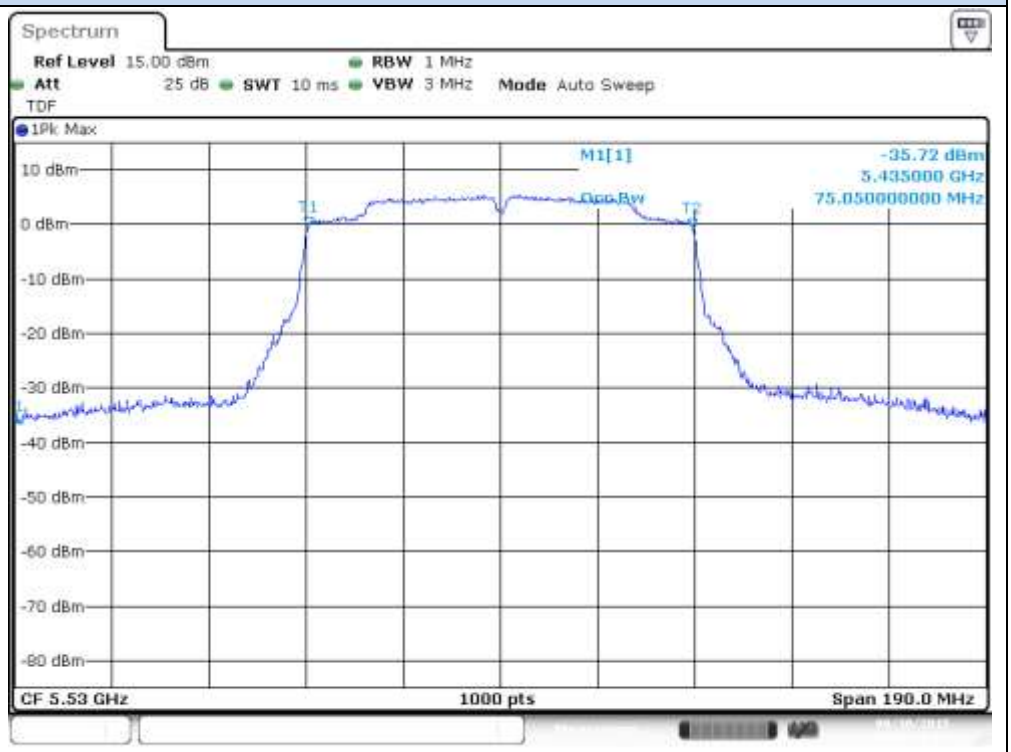
802.11ac80, VHT0 (SISO) – Chain B

26dB BW – CH106ac80



Date: 30.SEP.2015 11:33:07

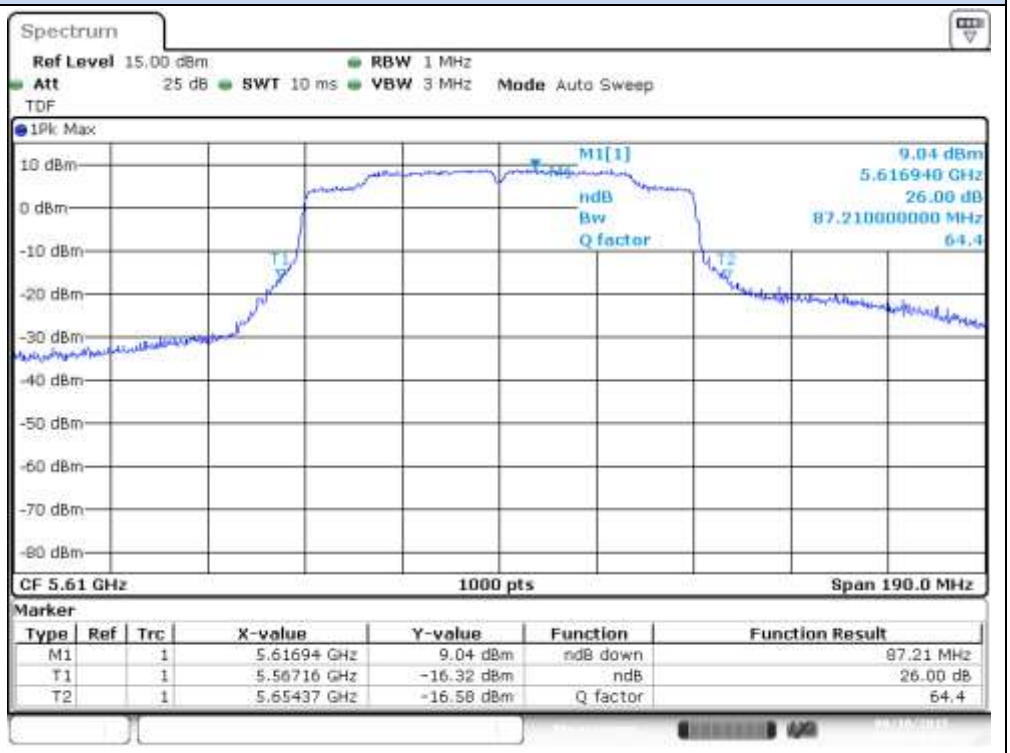
99% BW – CH106ac80



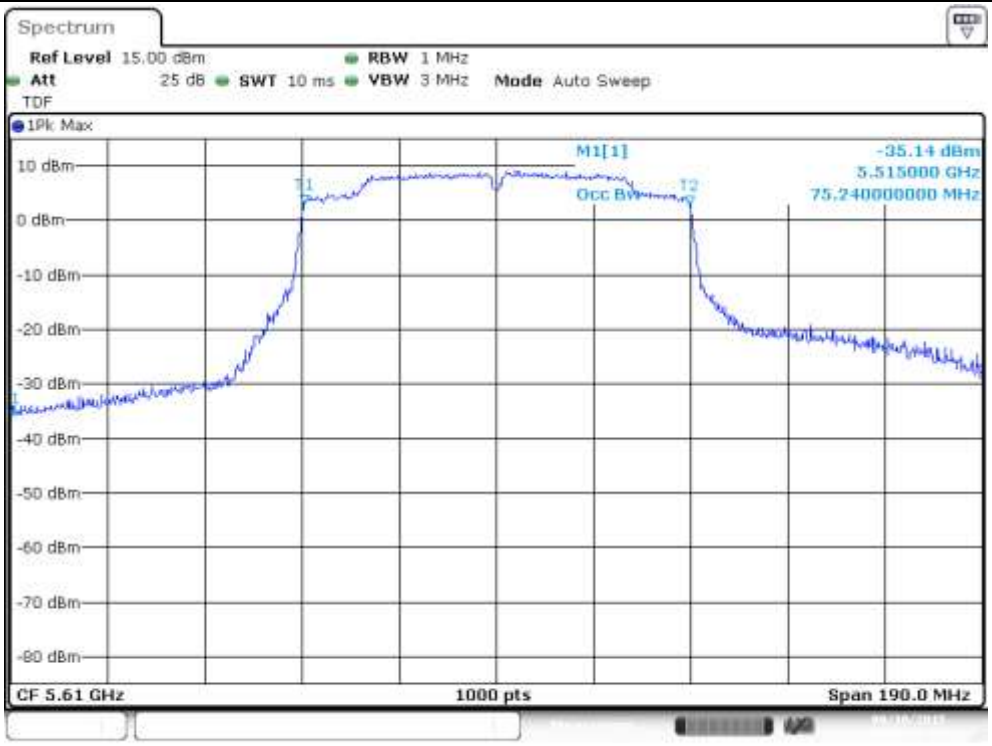
Date: 30.SEP.2015 11:34:14

Printed copies are not controlled documents

26dB BW – CH122ac80

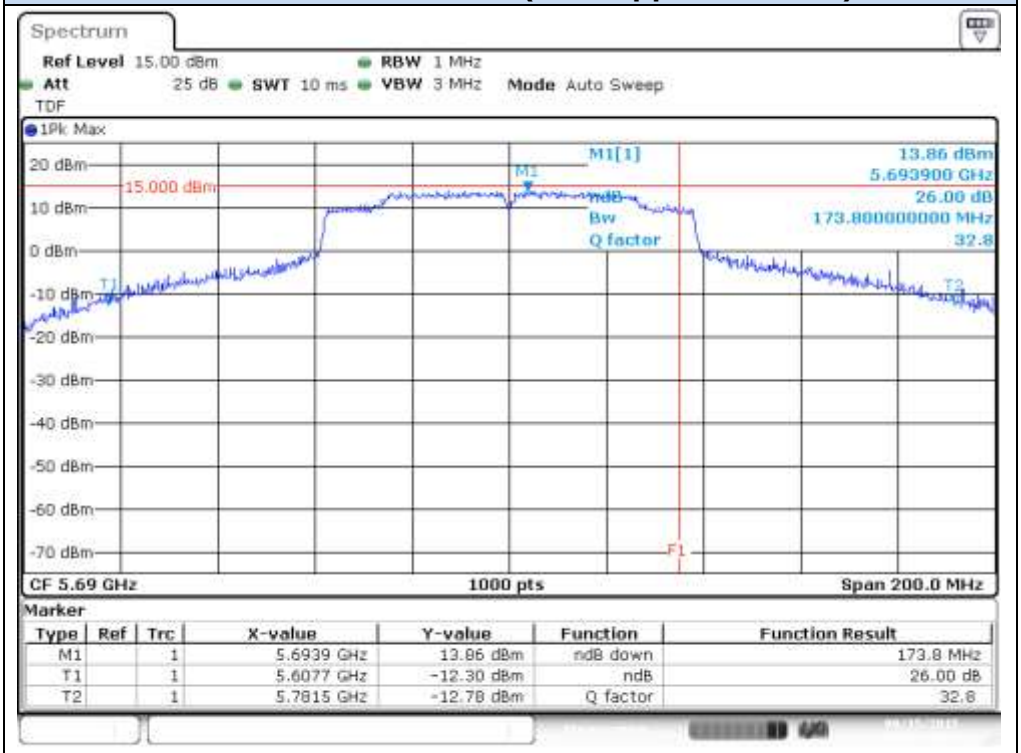


99% BW – CH122ac80

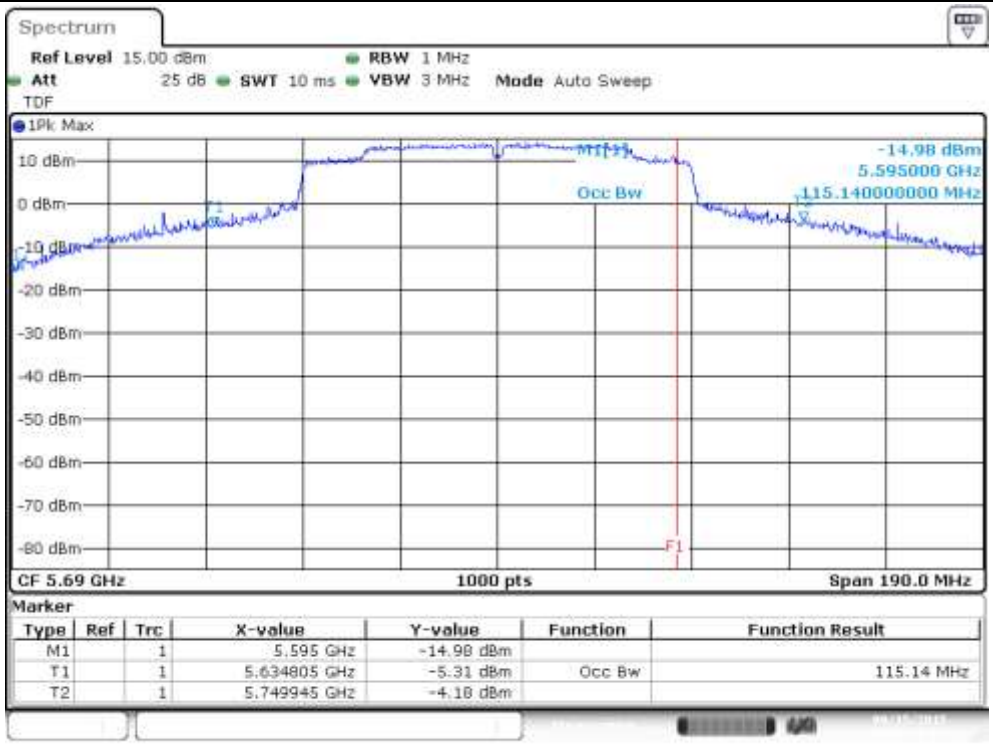


Printed copies are not controlled documents

26dB BW – CH138ac80 (Overlapped Channel)



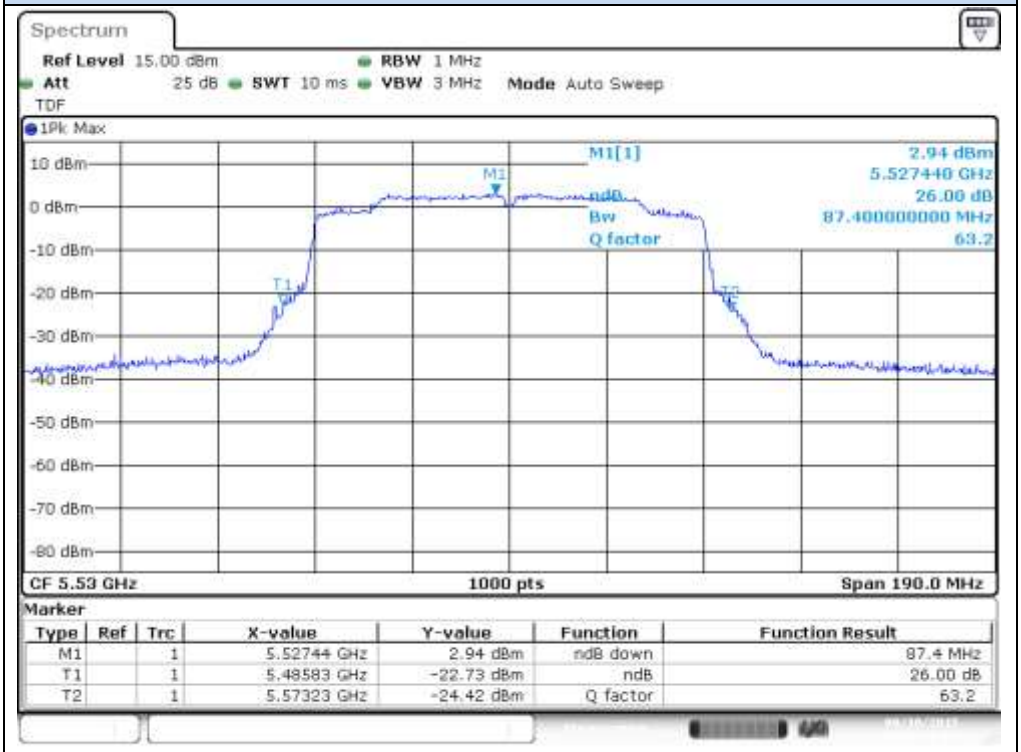
99% BW – CH138ac80 (Overlapped Channel)



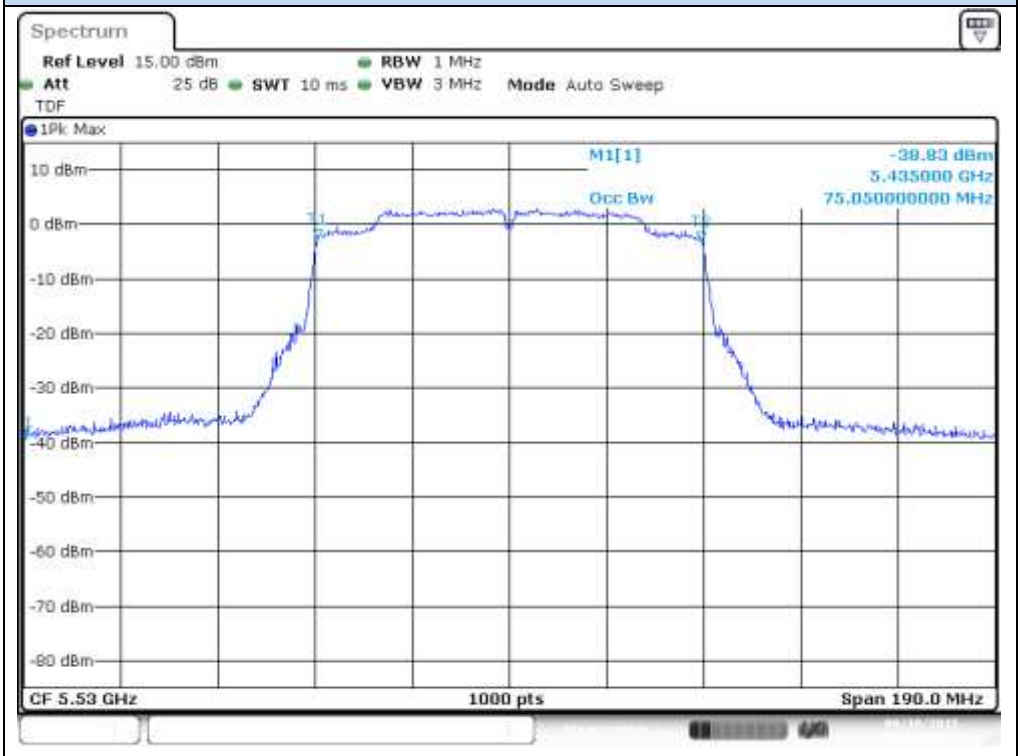
Printed copies are not controlled documents

802.11ac80, VHT0 (MIMO) – Chain A

26dB BW – CH106ac80

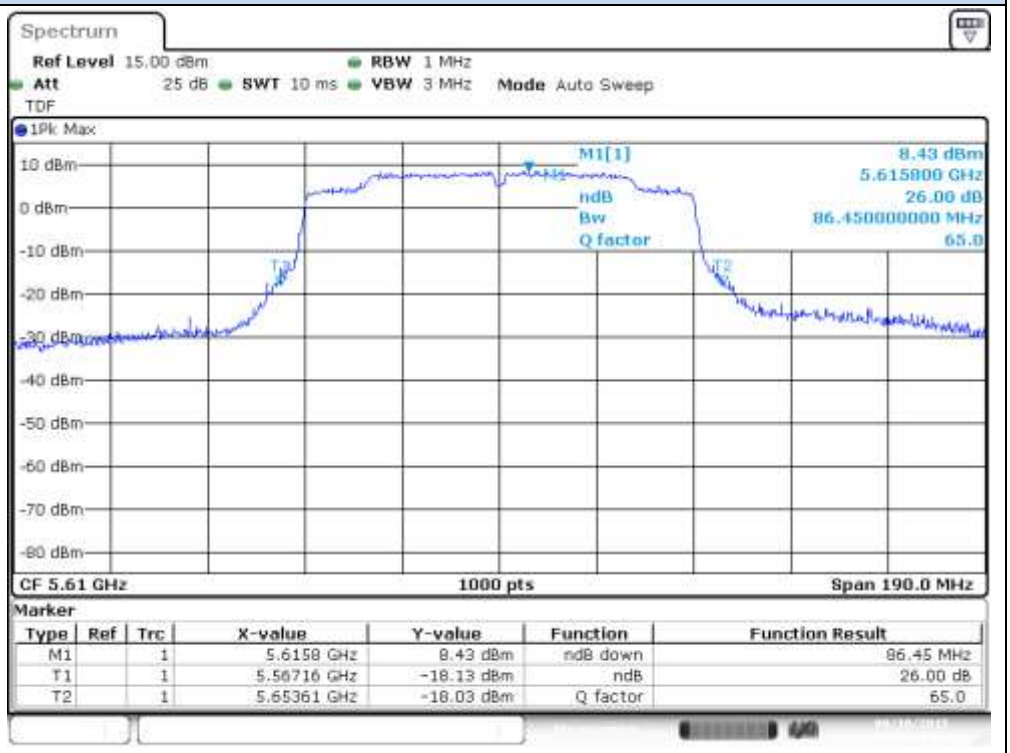


99% BW – CH106ac80

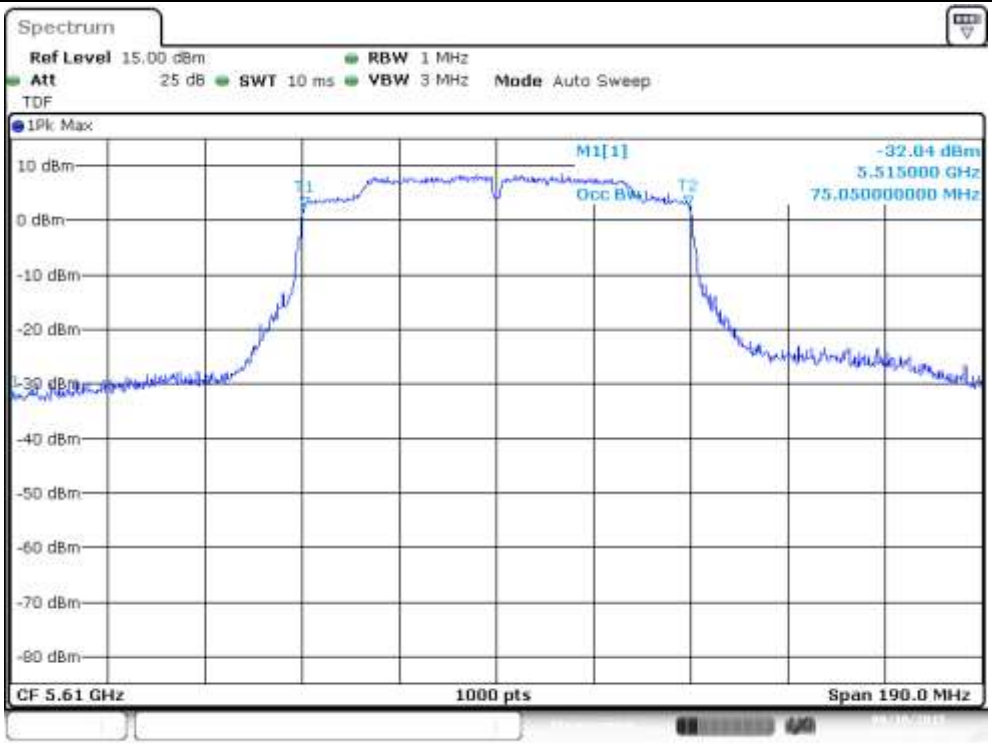


Printed copies are not controlled documents

26dB BW – CH122ac80

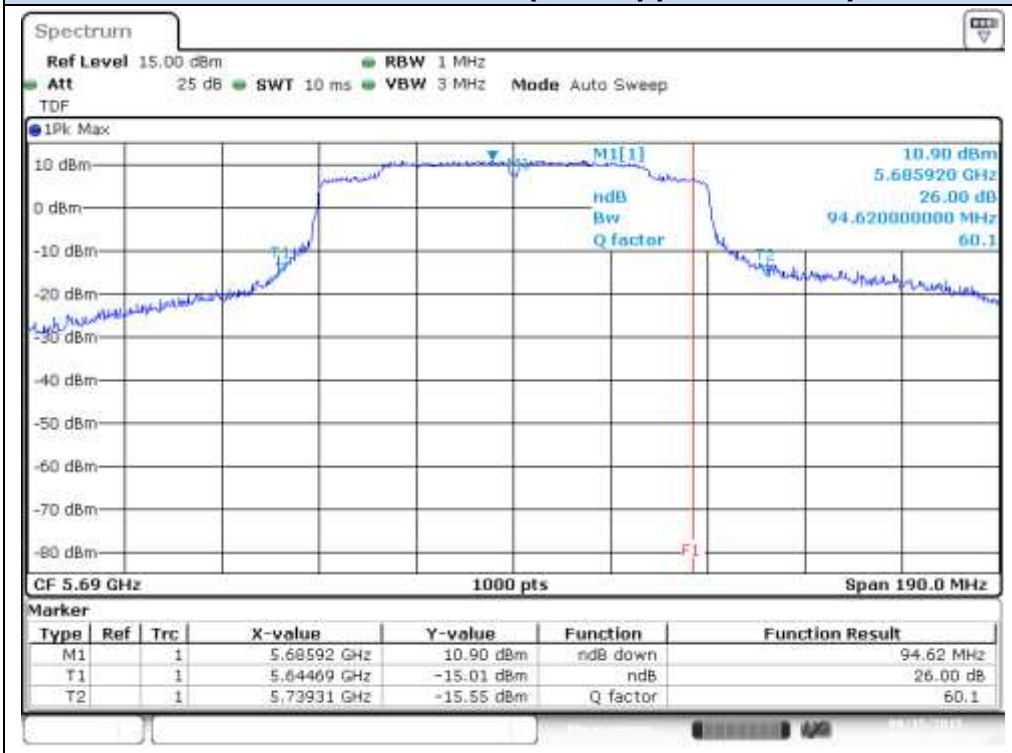


99% BW – CH122ac80



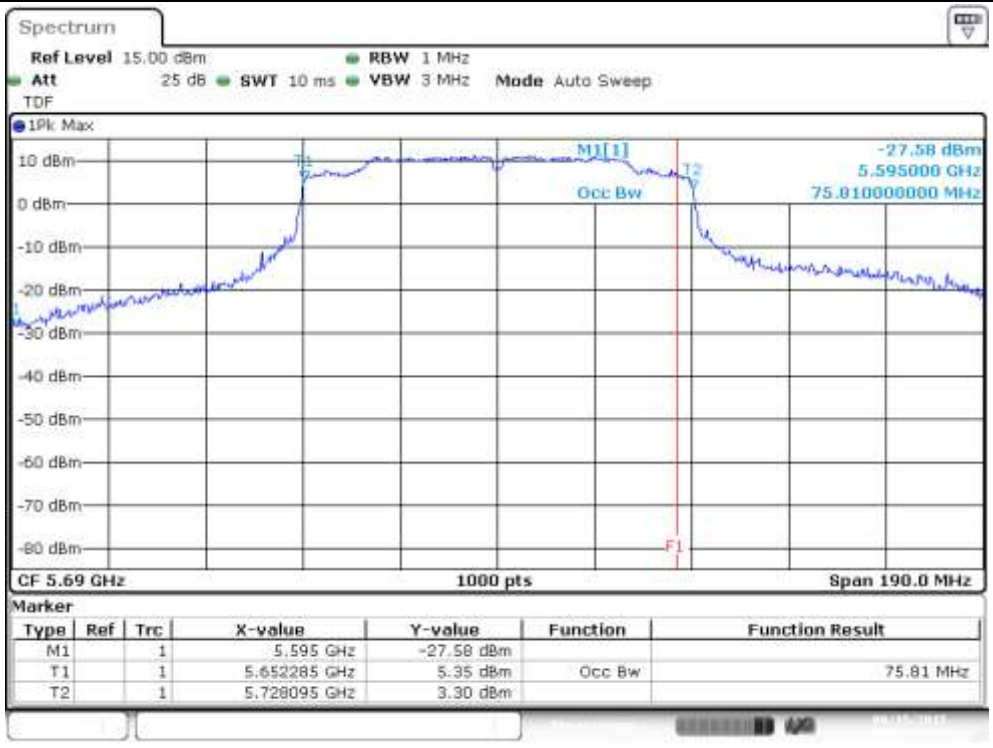
Printed copies are not controlled documents

26dB BW – CH138ac80 (Overlapped Channel)



Date: 15.SEP.2015 11:51:05

99% BW – CH138ac80 (Overlapped Channel)



Date: 15.SEP.2015 11:52:52

Printed copies are not controlled documents