FCC - TEST REPORT

Report Number	:	**68.950.19.0648.01**	Date of Issue:	**Oct 25, 2019**
Model	:	**NFC7YWW01161024, NFC5YWW018512**		
Product Type	:	Notebook		
Applicant	:	Zhangzhou Wanlida Technology Co., Ltd.		
Address	:	Nanjing Wanlida Industrial Zone, Zhang Zhou, Fujian, China		
Manufacturer	:	Zhangzhou Wanlida Technology Co., Ltd.		
Address	:	Nanjing Wanlida Industrial Zone, Zhang Zhou, Fujian, China		
Test Result	:	■ **Positive** ☐ **Negative**		
Total pages including Appendices	:	**134**		

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2 Details about the Test Laboratory

Details about the Test Laboratory

Test Site 1

Company name:	TÜV SÜD Certification and Testing (China) Co., Ltd. Shenzhen Branch Building 12&13, Zhiheng Wisdomland Business Park, Nantou Checkpoint Road 2, Nanshan District, Shenzhen City, 518052, P. R. China
FCC Registration Number:	502708
FCC Registration No.:	514049
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3 Description of the Equipment Under Test

Description of the Equipment Under Test

Product:	Notebook
Model no.:	NFC7YWW01161024, NFC5YWW018512
FCC ID:	2ARB5-ULTRAONE
Rating:	7.6VDC, 6000mAh, (Supplied by Rechargeable Lithium-ion Battery) or 20VDC (Supplied by external adapter for Charging rechargeable battery) Adapter Model: FSP060-A1UR Input:100-240VAC 50/60Hz, 1.5A, Output:5VDC,2A or 9V 2A or 12V 2A or 15V 3A or 20V 3A Manufacturer: FSP GROUP INC
RF Transmission Frequency:	5.150GHz~5.250GHz; 5.250GHz~5.350GHz; 5.470GHz~5.725GHz; 5.725GHz~5.850GHz
Modulation:	802.11a: BPSK, QPSK, 16QAM, 64QAM 802.11n: BPSK, QPSK, 16QAM, 64QAM 802.11ac: BPSK, QPSK, 16QAM, 64QAM, 128QAM, 256QAM
Antenna Type:	Integral Antenna
Antenna Gain:	ANT1: 3.6dBi max for 5GHz ANT2: 1.8dBi max for 5GHz
Description of the EUT:	The Equipment Under Test (EUT) is a Notebook supports 2.4GHz Bluetooth/WIFI, 5GHz WIFI functions.

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4 Summary of Test Standards

Test Standards	
FCC Part 15 Subpart E, 10-1-2018 Edition	PART 15 - RADIO FREQUENCY DEVICES Subpart E - Unlicensed National Information Infrastructure Devices
FCC Part 15 Subpart C 10-1-2018 Edition	PART 15 - RADIO FREQUENCY DEVICES Subpart C - Intentional Radiators

Test Method:
FCC KDB 558074 D01 15.247 Meas Guidance v05r02
KDB 789033 D02 General UNII Test Procedures New Rules v02r01
KDB 905462 D02 UNII DFS Compliance Procedures New Rules v02
ANSI C63.10-2013, American National Standard for Testing Unlicensed Wireless Devices
KDB 662911 D01 Multiple Transmitter Output v02r01

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5 Summary of Test Results

Technical Requirements			
FCC Part 15 Subpart E, FCC Part 15 Subpart C			
Test Condition	Test Result		
	Pass	Fail	N/A
15.207 Conducted Emission AC Power Port	☒	☐	☐
15.403(a)(5) Emission bandwidth	☒	☐	☐
15.407(a)(1) 15.407(a)(3) Maximum Conducted Output Power	☒	☐	☐
15.407(a)(1) 15.407(a)(3) Peak Power Spectral Density	☒	☐	☐
15.407(b)(1) 15.407(b)(4) 15.407(b)(6) 15.407(b)(7) 15.209 Unwanted Emissions	☒	☐	☐
Duty Cycle	☒	☐	☐
15.407(g) Frequencies Stability	☒	☐	☐
15.407(h) Dynamic Frequency Selection (DFS).[a]	☒	☐	☐

NOTE 1"[a]": This result include in this report is only the DFS client without radar detection Mode part of the product.

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6 General Remarks

Remarks

This submittal(s) (test report) is intended for FCC ID: 2ARB5-ULTRAONE, complies with Section 15.207, 15.209, 15.205, 15.247 of the FCC Part 15, Subpart C.
The Model: NFC7YWW01161024 supports 2.4GHz Bluetooth/WIFI, 5GHz WIFI function. The TX and RX range is 2402MHz-2480MHz for Bluetooth, 2412MHz – 2462MHz for 2.4GHzWIFI, 5180MHz – 5320MHz, 5500MHz – 5700MHz, 5745MHz – 5825MHz for 5GHzWIFI.
NFC5YWW018512 is identical with model: NFC7YWW01161024 except model name, CPU, internal storage and SSD, unless otherwise Specification the model NFC7YWW01161024 was choose as representative model to perform all test items, and model: NFC5YWW018512 was deemed to fulfil relevant requirements without further testing.

Model	CPU	internal storage	SSD
NFC5YWW018512	i5-8200Y	8G	512GB
NFC7YWW01161024	i7-8500Y	16G	1024GB

This report is for the 5GHz WIFI part.

SUMMARY:

All tests according to the regulations cited on page 6 were

■ - Performed

☐ - **Not** Performed

The Equipment Under Test

■ - **Fulfills** the general approval requirements.

☐ - **Does not** fulfill the general approval requirements.

Sample Received Date: June 26, 2019

Testing Start Date: June 26, 2019

Testing End Date: Oct 22, 2019

- TÜV SÜD Certification and Testing (China) Co., Ltd. Shenzhen Branch –

Reviewed by:	Prepared by:	Tested by:
John Zhi	Joe Gu	Tree Zhan
Project Manager	Project Engineer	Test Engineer

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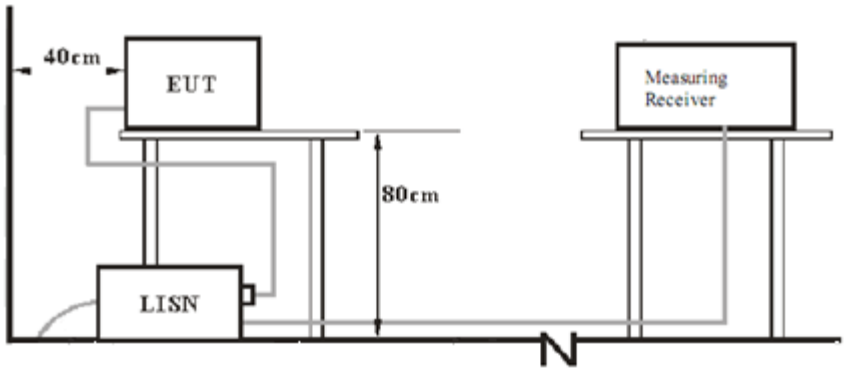
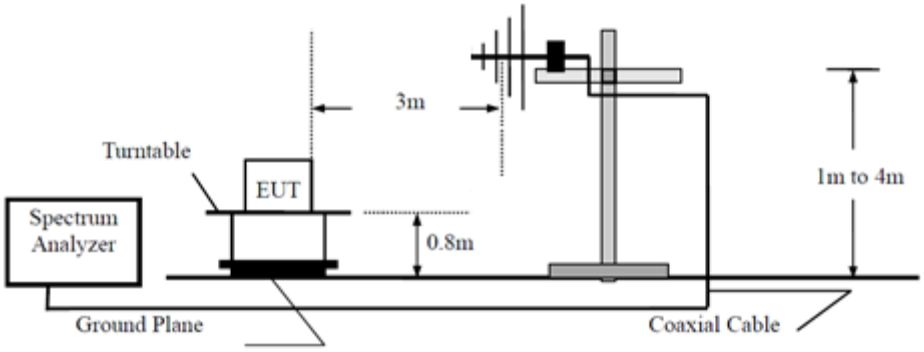
7 Test setups

7.1 AC Power Line Conducted Emission test setups

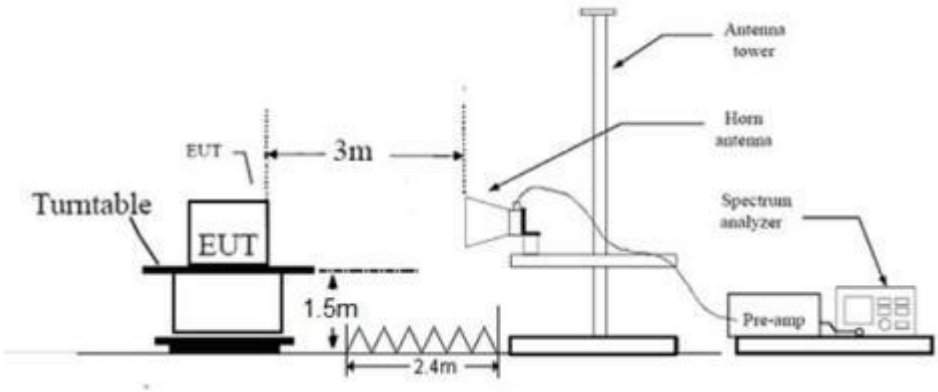


7.2 Radiated test setups

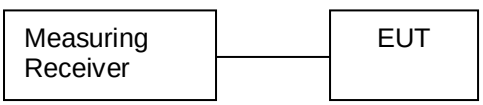
Below 1GHz



Above 1GHz



7.3 Conducted RF test setups



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8. Systems test configuration

Auxiliary Equipment Used during Test:

DESCRIPTION	MANUFACTURER	MODEL NO.(SHIELD)	S/N(LENGTH)
---	---	---	---

In order to find the worst case condition, pre-tests are needed at the presence of different date rate. Preliminary tests have been done on all the configuration for confirming worst case. Date rate below means worst-case rate of each test item.

Band	Data Rate
802.11a	11g 6 Mbps
802.11n HT20	MCS0 6.5 Mbps
802.11n HT40	MCS0 13.5 Mbps
802.11ac HT20	11ac NGI 6.5 Mbps
802.11ac HT40	11ac NGI 13.5 Mbps
802.11ac HT80	11ac NGI 29.3 Mbps

The system was configured to the following channels

Modulation	Channel	Frequency (MHz)
802.11a / 802.11n20 / 802.11ac20	36	5180
	44	5200
	48	5240
	52	5260
	56	5280
	64	5320
	100	5500
	116	5580
	140	5700
	144	5720
	149	5745
	157	5785
	165	5825
802.11n40 / 802.11ac40	38	5190
	46	5230
	54	5270
	62	5310
	102	5510
	110	5550
	134	5670
	142	5710
	151	5755
	159	5795
802.11ac80	42	5210
	58	5290
	106	5530
	138	5690
	155	5775

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9 Technical Requirement

9.1 Conducted Emission

Test Method

1. The EUT was placed 0.4 meter from the conducting wall of the shielding room was kept at least 80 centimeters from any other grounded conducting surface.
2. Connect EUT to the power mains through a line impedance stabilization network (LISN).
3. All the support units are connecting to the other LISN.
4. The LISN provides 50 ohm coupling impedance for the measuring instrument.
5. Both sides of AC line were checked for maximum conducted interference.
6. The frequency range from 150 kHz to 30 MHz was searched.
7. Set the test-receiver system to Peak Detect Function and specified bandwidth (IF Bandwidth = 9kHz) with Maximum Hold Mode. Then measurement is also conducted by Average Detector and Quasi-Peak Detector Function respectively.

Limit

According to §15.207 & RSS-GEN 8.8, conducted emissions limit as below:

Frequency MHz	QP Limit dBµV	AV Limit dBµV
0.150-0.500	66-56*	56-46*
0.500-5	56	46
5-30	60	50

Remark: “*” Decreasing linearly with logarithm of the frequency

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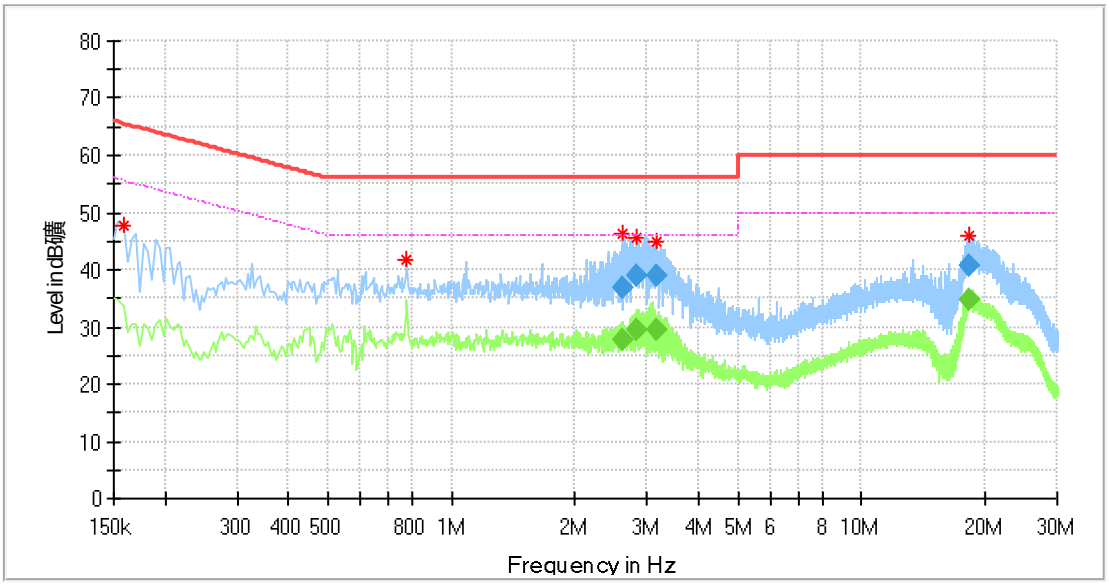
Conducted Emission

Product Type	:	Notebook
M/N	:	NFC7YWW01161024
Operating Condition	:	Charging + TX
Test Specification	:	Line
Comment	:	AC 120V/60Hz



Critical_Freqs

Frequency (MHz)	MaxPeak* (dBµV)	Average* (dBµV)	Limit (dBµV)	Margin (dB)	Line	Corr.** (dB)
0.158000	47.87	---	65.57	17.70	L1	10.2
0.778000	41.77	---	56.00	14.23	L1	10.3
2.605500	46.45	---	56.00	9.55	L1	10.3
2.834500	45.74	---	56.00	10.26	L1	10.3
3.161500	45.05	---	56.00	10.95	L1	10.4
18.261500	46.02	---	60.00	13.98	L1	10.9

Final_Result

Frequency (MHz)	QuasiPeak* (dBµV)	Average* (dBµV)	Limit (dBµV)	Margin (dB)	Line	Corr.** (dB)
2.605500	---	27.83	46.00	18.17	L1	10.3
2.605500	36.90	---	56.00	19.10	L1	10.3
2.834500	---	29.35	46.00	16.65	L1	10.3
2.834500	38.97	---	56.00	17.03	L1	10.3
3.161500	---	29.61	46.00	16.39	L1	10.4
3.161500	38.83	---	56.00	17.17	L1	10.4
18.261500	---	34.72	50.00	15.28	L1	10.9
18.261500	40.59	---	60.00	19.41	L1	10.9

Remark：
*Level=Reading Level + Correction Factor
**Correction Factor=Cable Loss + LISN Factor
(The Reading Level is recorded by software which is not shown in the sheet)

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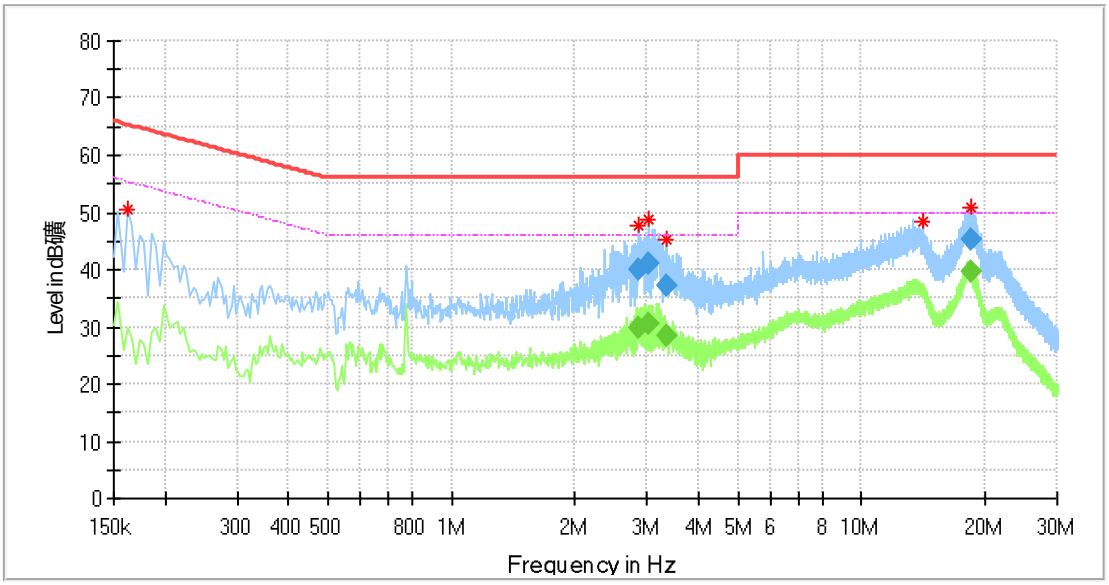
Conducted Emission

Product Type	:	Notebook
M/N	:	NFC7YWW01161024
Operating Condition	:	Charging + TX
Test Specification	:	Neutral
Comment	:	AC 120V/60Hz



Critical_Freqs

Frequency (MHz)	MaxPeak* (dBµV)	Average* (dBµV)	Limit (dBµV)	Margin (dB)	Line	Corr.** (dB)
0.162000	50.55	---	65.36	14.81	N	10.2
2.869500	47.61	---	56.00	8.39	N	10.4
3.009500	48.74	---	56.00	7.26	N	10.4
3.334500	45.12	---	56.00	10.88	N	10.4
14.066000	48.27	---	60.00	11.73	N	10.8
18.393500	50.81	---	60.00	9.19	N	11.1

Final_Result

Frequency (MHz)	QuasiPeak* (dBµV)	Average* (dBµV)	Limit (dBµV)	Margin (dB)	Line	Corr.** (dB)
2.869500	---	29.70	46.00	16.30	N	10.4
2.869500	39.85	---	56.00	16.15	N	10.4
3.009500	---	30.40	46.00	15.60	N	10.4
3.009500	40.97	---	56.00	15.03	N	10.4
3.334500	---	28.31	46.00	17.69	N	10.4
3.334500	37.26	---	56.00	18.74	N	10.4
18.393500	---	39.57	50.00	10.43	N	11.1
18.393500	45.36	---	60.00	14.64	N	11.1

Remark：
*Level=Reading Level + Correction Factor
**Correction Factor=Cable Loss + LISN Factor
(The Reading Level is recorded by software which is not shown in the sheet)

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9.2 Emission bandwidth

1、Test Method of 26dB Bandwidth

According to KDB789033 D02

a) Set RBW = approximately 1% of the emission bandwidth.
b) Set the VBW > RBW.
c) Detector = Peak.
d) Trace mode = max hold.
e) Measure the maximum width of the emission that is 26 dB down from the maximum of the emission. Compare this with the RBW setting of the analyzer. Readjust RBW and repeat measurement as needed until the RBW/EBW ratio is approximately 1%.

Limit: No limit

2、Test Method of 6dB Bandwidth

According to KDB789033 D02

a) Set RBW = 100KHz
b) Set the video bandwidth (VBW) ≥ 3 × RBW
c) Detector = Peak.
d) Trace mode = max hold.
e) Sweep = auto couple.
f) Allow the trace to stabilize.
g) Measure the maximum width of the emission that is constrained by the frequencies associated with the two outermost amplitude points (upper and lower frequencies) that are attenuated by 6 dB relative to the maximum level measured in the fundamental emission.

Limit: ≥500KHz

3、Test Method of 99% Bandwidth

According to KDB789033 D02

a) Set center frequency to the nominal EUT channel center frequency
b) Set span = 1.5 times to 5.0 times the OBW.
c) Set RBW = 1 % to 5 % of the OBW
d) Set VBW ≥ 3 · RBW
e) Video averaging is not permitted. Where practical, a sample detection and single sweep mode shall be used. Otherwise, peak detection and max hold mode (until the trace stabilizes) shall be used.
f) Use the 99 % power bandwidth function of the instrument (if available).
g) If the instrument does not have a 99 % power bandwidth function, the trace data points are recovered and directly summed in power units. The recovered amplitude data points, beginning at the lowest frequency, are placed in a running sum until 0.5 % of the total is reached; that frequency is recorded as the lower frequency. The process is repeated until 99.5 % of the total is reached; that frequency is recorded as the upper frequency. The 99% occupied bandwidth is the difference between these two frequencies.

Limit: No limit

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Test result as below table:

26dB Bandwidth Test result:

Test Mode	Antenna	Channel	26db EBW [MHz]	FL[MHz]	FH[MHz]	Limit [MHz]	Verdict
11A	Ant1	5180	22.240	5169.240	5191.480	---	PASS
	Ant2	5180	22.920	5168.920	5191.840	---	PASS
	Ant1	5200	23.600	5188.040	5211.640	---	PASS
	Ant2	5200	23.240	5188.440	5211.680	---	PASS
	Ant1	5240	23.000	5228.320	5251.320	---	PASS
	Ant2	5240	23.080	5228.360	5251.440	---	PASS
	Ant1	5260	23.320	5248.320	5271.640	---	PASS
	Ant2	5260	23.560	5248.280	5271.840	---	PASS
	Ant1	5280	22.360	5268.320	5290.680	---	PASS
	Ant2	5280	24.240	5267.440	5291.680	---	PASS
	Ant1	5320	22.600	5308.440	5331.040	---	PASS
	Ant2	5320	26.280	5305.440	5331.720	---	PASS
	Ant1	5500	25.520	5487.360	5512.880	---	PASS
	Ant2	5500	26.400	5486.480	5512.880	---	PASS
	Ant1	5580	24.160	5568.280	5592.440	---	PASS
	Ant2	5580	26.480	5567.000	5593.480	---	PASS
	Ant1	5700	25.800	5687.120	5712.920	---	PASS
	Ant2	5700	26.520	5686.600	5713.120	---	PASS
	Ant1	5720	22.840	5708.360	5731.200	---	PASS
	Ant2	5720	27.720	5706.120	5733.840	---	PASS
	Ant1	5720_UNII-2C	16.64	5708.360	5725	---	PASS
	Ant2	5720_UNII-2C	18.88	5706.120	5725	---	PASS
	Ant1	5720_UNII-3	6.2	5725	5731.200	---	PASS
	Ant2	5720_UNII-3	8.84	5725	5733.840	---	PASS
	Ant1	5745	23.440	5733.280	5756.720	---	PASS
	Ant2	5745	26.640	5731.560	5758.200	---	PASS
	Ant1	5785	25.120	5772.640	5797.760	---	PASS
	Ant2	5785	24.680	5772.000	5796.680	---	PASS
	Ant1	5825	25.880	5812.080	5837.960	---	PASS
	Ant2	5825	23.760	5813.000	5836.760	---	PASS
11N20MIMO	Ant1+ANT2	5180	17.982	5171.329	5189.311	---	PASS
		5200	18.462	5190.849	5209.311	---	PASS
		5240	17.782	5231.169	5248.951	---	PASS
		5260	18.382	5250.809	5269.191	---	PASS
		5280	18.422	5270.889	5289.311	---	PASS
		5320	18.661	5310.410	5329.071	---	PASS
		5500	16.863	5491.449	5508.312	---	PASS
		5580	18.541	5570.849	5589.391	---	PASS
		5700	18.422	5690.769	5709.191	---	PASS
		5720	18.422	5710.849	5729.271	---	PASS
		5720_UNII-2C	14.151	5710.849	5725	---	PASS
		5720_UNII-3	4.271	5725	5729.271	---	PASS
		5745	19.9	5734.730	5754.630	---	PASS
		5785	18.501	5775.729	5794.231	---	PASS
		5825	16.703	5816.648	5833.352	---	PASS
11N40 MIMO	Ant1+ANT2	5190	36.603	5171.778	5208.382	---	PASS
		5230	36.444	5211.858	5248.302	---	PASS
		5270	36.523	5251.938	5288.462	---	PASS
		5310	36.364	5291.618	5327.982	---	PASS
		5510	37.003	5491.219	5528.222	---	PASS
		5550	36.843	5531.938	5568.781	---	PASS
		5670	36.284	5652.018	5688.302	---	PASS
		5710	36.683	5691.778	5728.462	---	PASS
		5710_UNII-2C	33.222	5691.778	5725	---	PASS
		5710_UNII-3	3.462	5725	5728.462	---	PASS

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		5755	36.923	5736.299	5773.222	---	PASS
		5795	36.923	5776.778	5813.701	---	PASS
11AC20 MIMO	Ant1+ANT2	5180	20.360	5169.760	5190.120	---	PASS
		5200	25.040	5189.200	5214.240	---	PASS
		5240	20.560	5229.520	5250.080	---	PASS
		5260	22.400	5248.960	5271.360	---	PASS
		5280	21.800	5269.520	5291.320	---	PASS
		5320	21.560	5308.600	5330.160	---	PASS
		5500	20.480	5489.160	5509.640	---	PASS
		5580	21.480	5569.480	5590.960	---	PASS
		5700	20.880	5689.520	5710.400	---	PASS
		5720	21.160	5709.360	5730.520	---	PASS
		5720_UNII-2C	15.64	5709.360	5725	---	PASS
		5720_UNII-3	5.52	5725	5730.520	---	PASS
		5745	22.080	5733.280	5755.360	---	PASS
		5785	22.520	5773.600	5796.120	---	PASS
		5825	21.760	5814.480	5836.240	---	PASS
11AC40 MIMO	Ant1+ANT2	5190	46.720	5166.880	5213.600	---	PASS
		5230	43.760	5208.400	5252.160	---	PASS
		5270	44.960	5247.680	5292.640	---	PASS
		5310	42.160	5288.160	5330.320	---	PASS
		5510	44.720	5486.640	5531.360	---	PASS
		5550	46.960	5528.240	5575.200	---	PASS
		5670	46.720	5647.840	5694.560	---	PASS
		5710	45.520	5687.600	5733.120	---	PASS
		5710_UNII-2C	37.4	5687.600	5725	---	PASS
		5710_UNII-3	8.12	5725	5733.120	---	PASS
		5755	46.080	5731.800	5777.880	---	PASS
		5795	46.560	5772.440	5819.000	---	PASS
11AC80 MIMO	Ant1+ANT2	5210	79.200	5170.640	5249.840	---	PASS
		5290	80.320	5249.840	5330.160	---	PASS
		5530	94.880	5485.520	5580.400	---	PASS
		5690	88.640	5648.080	5736.720	---	PASS
		5690_UNII-2C	76.92	5648.080	5725	---	PASS
		5690_UNII-3	11.72	5725	5736.720	---	PASS
		5775	88.800	5731.000	5819.800	---	PASS

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99% Bandwidth Test Result

Test Mode	Antenna	Channel	OCB [MHz]	FL[MHz]	FH[MHz]	Limit [MHz]	Verdict
11A	Ant1	5180	17.263	5171.409	5188.671	---	PASS
	Ant2	5180	17.223	5171.449	5188.671	---	PASS
	Ant1	5200	17.862	5191.089	5208.951	---	PASS
	Ant2	5200	17.502	5191.289	5208.791	---	PASS
	Ant1	5240	17.303	5231.369	5248.671	---	PASS
	Ant2	5240	17.502	5231.289	5248.791	---	PASS
	Ant1	5260	17.343	5251.329	5268.671	---	PASS
	Ant2	5260	17.502	5251.249	5268.751	---	PASS
	Ant1	5280	17.423	5271.249	5288.671	---	PASS
	Ant2	5280	17.463	5271.249	5288.711	---	PASS
	Ant1	5320	17.383	5311.249	5328.631	---	PASS
	Ant2	5320	17.622	5311.129	5328.751	---	PASS
	Ant1	5500	17.742	5491.129	5508.871	---	PASS
	Ant2	5500	18.581	5490.689	5509.271	---	PASS
	Ant1	5580	17.702	5571.209	5588.911	---	PASS
	Ant2	5580	18.382	5570.889	5589.271	---	PASS
	Ant1	5700	17.942	5691.009	5708.951	---	PASS
	Ant2	5700	19.221	5690.490	5709.710	---	PASS
	Ant1	5720	17.463	5711.209	5728.671	---	PASS
	Ant2	5720	18.022	5710.969	5728.991	---	PASS
	Ant1	5720_UNII-2C	13.791	5711.209	5725	---	PASS
	Ant2	5720_UNII-2C	14.031	5710.969	5725	---	PASS
	Ant1	5720_UNII-3	3.671	5725	5728.671	---	PASS
	Ant2	5720_UNII-3	3.991	5725	5728.991	---	PASS
	Ant1	5745	17.463	5736.249	5753.711	---	PASS
	Ant2	5745	17.822	5736.009	5753.831	---	PASS
	Ant1	5785	17.702	5776.049	5793.751	---	PASS
	Ant2	5785	17.862	5775.929	5793.791	---	PASS
	Ant1	5825	17.902	5816.049	5833.951	---	PASS
	Ant2	5825	17.942	5815.969	5833.911	---	PASS
11N20 MIMO	Ant1+ANT2	5180	17.982	5171.329	5189.311	---	PASS
		5200	18.462	5190.849	5209.311	---	PASS
		5240	17.782	5231.169	5248.951	---	PASS
		5260	18.382	5250.809	5269.191	---	PASS
		5280	18.422	5270.889	5289.311	---	PASS
		5320	18.661	5310.410	5329.071	---	PASS
		5500	16.863	5491.449	5508.312	---	PASS
		5580	18.541	5570.849	5589.391	---	PASS
		5700	18.422	5690.769	5709.191	---	PASS
		5720	18.422	5710.849	5729.271	---	PASS
		5720_UNII-2C	14.151	5710.849	5725	---	PASS
		5720_UNII-3	4.271	5725	5729.271	---	PASS
		5745	19.9	5734.730	5754.630	---	PASS
		5785	18.501	5775.729	5794.231	---	PASS
		5825	16.703	5816.648	5833.352	---	PASS
11N40 MIMO	Ant1+ANT2	5190	36.603	5171.778	5208.382	---	PASS
		5230	36.444	5211.858	5248.302	---	PASS
		5270	36.523	5251.938	5288.462	---	PASS
		5310	36.364	5291.618	5327.982	---	PASS
		5510	37.003	5491.219	5528.222	---	PASS
		5550	36.843	5531.938	5568.781	---	PASS
		5670	36.284	5652.018	5688.302	---	PASS
		5710	36.683	5691.778	5728.462	---	PASS

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		5710_UNII-2C	33.222	5691.778	5725	---	PASS
		5710_UNII-3	3.462	5725	5728.462	---	PASS
		5755	36.923	5736.299	5773.222	---	PASS
		5795	36.923	5776.778	5813.701	---	PASS
11AC20 MIMO	Ant1+ANT2	5180	18.102	5170.929	5189.031	---	PASS
		5200	18.262	5190.929	5209.191	---	PASS
		5240	18.142	5230.929	5249.071	---	PASS
		5260	18.182	5250.969	5269.151	---	PASS
		5280	18.062	5271.049	5289.111	---	PASS
		5320	18.222	5310.729	5328.951	---	PASS
		5500	18.182	5490.729	5508.911	---	PASS
		5580	18.022	5571.049	5589.071	---	PASS
		5700	18.062	5690.969	5709.031	---	PASS
		5720	18.102	5710.969	5729.071	---	PASS
		5720_UNII-2C	14.031	5710.969	5725	---	PASS
		5720_UNII-3	4.071	5725	5729.071	---	PASS
		5745	18.302	5735.689	5753.991	---	PASS
		5785	18.262	5775.929	5794.191	---	PASS
		5825	18.062	5815.969	5834.031	---	PASS
11AC40 MIMO	Ant1+ANT2	5190	36.523	5171.858	5208.382	---	PASS
		5230	36.284	5211.938	5248.222	---	PASS
		5270	36.523	5251.858	5288.382	---	PASS
		5310	36.284	5291.618	5327.902	---	PASS
		5510	36.603	5491.379	5527.982	---	PASS
		5550	36.683	5531.938	5568.621	---	PASS
		5670	36.444	5651.938	5688.382	---	PASS
		5710	36.523	5691.778	5728.302	---	PASS
		5710_UNII-2C	33.222	5691.778	5725	---	PASS
		5710_UNII-3	3.302	5725	5728.302	---	PASS
		5755	36.683	5736.379	5773.062	---	PASS
		5795	36.843	5776.778	5813.621	---	PASS
11AC80 MIMO	Ant1+ANT2	5210	75.285	5172.597	5247.882	---	PASS
		5290	74.006	5252.757	5326.763	---	PASS
		5530	76.563	5491.798	5568.362	---	PASS
		5690	75.285	5652.597	5727.882	---	PASS
		5690_UNII-2C	72.403	5652.597	5725	---	PASS
		5690_UNII-3	2.882	5725	5727.882	---	PASS
		5775	75.924	5736.958	5812.882	---	PASS

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6dB Bandwidth Test Result

Test Mode	Antenna	Channel	6db EBW [MHz]	FL[MHz]	FH[MHz]	Limit [MHz]	Verdict
11A	Ant1	5745	15.200	5737.360	5752.560	≥0.5	PASS
	Ant2	5745	15.200	5737.360	5752.560	≥0.5	PASS
	Ant1	5785	15.160	5777.360	5792.520	≥0.5	PASS
	Ant2	5785	15.400	5777.160	5792.560	≥0.5	PASS
	Ant1	5825	15.200	5817.360	5832.560	≥0.5	PASS
	Ant2	5825	15.400	5817.160	5832.560	≥0.5	PASS
11N20 MIMO	Ant1+ANT2	5745	13.640	5737.040	5750.680	≥0.5	PASS
		5785	14.760	5777.760	5792.520	≥0.5	PASS
		5825	15.200	5817.360	5832.560	≥0.5	PASS
11N40 MIMO	Ant1+ANT2	5755	35.200	5737.320	5772.520	≥0.5	PASS
		5795	35.280	5777.400	5812.680	≥0.5	PASS
11AC20 MIMO	Ant1+ANT2	5745	11.480	5738.600	5750.080	≥0.5	PASS
		5785	13.920	5778.600	5792.520	≥0.5	PASS
		5825	15.200	5817.360	5832.560	≥0.5	PASS
11AC40 MIMO	Ant1+ANT2	5755	35.200	5737.320	5772.520	≥0.5	PASS
		5795	35.280	5777.400	5812.680	≥0.5	PASS
11AC80 MIMO	Ant1+ANT2	5775	71.680	5738.520	5810.200	≥0.5	PASS

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9.3 Maximum conducted output power

Test Method
According to KDB789033 D02

Limits: For client devices in the 5.15-5.25 GHz band, the maximum conducted output power over the frequency band of operation shall not exceed 250 mW provided the maximum antenna gain does not exceed 6 dBi.
For the 5.25-5.35 GHz and 5.47-5.725 GHz bands, the maximum conducted output power over the frequency bands of operation shall not exceed the lesser of 250 mW or 11 dBm + 10 log B, where B is the 26dB emission bandwidth in megahertz.
For the band 5.725-5.85 GHz, the maximum conducted output power over the frequency band of operation shall not exceed 1 W.
Note:
1. Maximum Conducted Output Power=Conducted Output Power + Correction Factor

Test result as below table

IEEE 802.11a_SISO modulation Test Result

Band	Channel	Channel Frequency (MHz)	Maximum Conducted Output Power (dBm)		Power Limit (dBm)
			Ant1	Ant2	
U-NII-1	Low	5180	17.80	15.26	24.00
	Middle	5200	19.20	16.40	24.00
	High	5240	18.51	16.22	24.00
U-NII-2A	Low	5260	18.76	17.11	24.00
	Middle	5280	18.66	17.12	24.00
	High	5320	17.11	16.62	24.00
U-NII-2C	Low	5500	17.61	16.63	24.00
	Middle	5580	18.54	17.22	24.00
	High	5700	17.62	17.34	24.00
		5720	17.56	17.28	24.00
U-NII-3	Low	5745	17.67	17.27	30.00
	Middle	5785	19.01	18.07	30.00
	High	5825	19.04	18.33	30.00

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IEEE 802.11n-HT20_MIMO modulation Test Result

Band	Channel	Channel Frequency (MHz)	Maximum Conducted Output Power (dBm)			Power Limit (dBm)
			Ant1	Ant2	SUM	
U-NII-1	Low	5180	15.59	14.48	18.95	24.00
	Middle	5200	17.11	15.92	20.30	24.00
	High	5240	17.20	15.40	19.97	24.00
U-NII-2A	Low	5260	17.17	16.27	20.03	24.00
	Middle	5280	16.79	16.47	20.02	24.00
	High	5320	17.06	16.31	20.03	24.00
U-NII-2C	Low	5500	15.92	15.19	19.01	24.00
	Middle	5580	16.84	16.06	20.15	24.00
	High	5700	16.96	16.19	20.76	24.00
		5720	16.10	15.32	19.49	24.00
U-NII-3	Low	5745	17.18	16.36	20.58	30.00
	Middle	5785	17.91	16.84	21.50	30.00
	High	5825	18.82	17.92	21.80	30.00

IEEE 802.11n-HT40_MIMO modulation Test Result

Band	Channel	Channel Frequency (MHz)	Maximum Conducted Output Power (dBm)			Power Limit (dBm)
			Ant1	Ant2	SUM	
U-NII-1	Low	5190	15.15	14.67	18.55	24.00
	High	5230	16.10	15.05	19.67	24.00
U-NII-2A	Low	5270	16.02	15.12	19.50	24.00
	High	5310	15.24	14.95	18.58	24.00
U-NII-2C	Low	5510	16.43	15.32	19.25	24.00
	Middle	5550	15.64	14.46	19.06	24.00
	High	5670	13.99	13.11	17.72	24.00
		5710	15.98	15.41	19.10	24.00
U-NII-3	Low	5755	16.85	15.98	20.11	30.00
	High	5795	17.95	17.23	21.03	30.00

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IEEE 802.11ac-VHT20_MIMO modulation Test Result

Band	Channel	Channel Frequency (MHz)	Maximum Conducted Output Power (dBm)			Power Limit (dBm)
			Ant1	Ant2	SUM	
U-NII-1	Low	5180	14.98	14.11	18.45	24.00
	Middle	5200	16.22	15.01	19.91	24.00
	High	5240	16.03	15.23	19.58	24.00
U-NII-2A	Low	5260	16.21	15.33	19.65	24.00
	Middle	5280	15.79	14.12	19.57	24.00
	High	5320	16.96	16.54	20.01	24.00
U-NII-2C	Low	5500	14.94	13.98	18.26	24.00
	Middle	5580	16.10	15.09	19.56	24.00
	High	5700	15.90	15.28	19.04	24.00
		5720	16.21	15.18	19.05	24.00
U-NII-3	Low	5745	16.29	16.04	19.99	30.00
	Middle	5785	17.80	17.93	21.13	30.00
	High	5825	17.81	17.13	21.45	30.00

IEEE 802.11ac-VHT40_MIMO modulation Test Result

Band	Channel	Channel Frequency (MHz)	Maximum Conducted Output Power (dBm)			Power Limit (dBm)
			Ant1	Ant2	SUM	
U-NII-1	Low	5190	16.43	16.03	19.59	24.00
	High	5230	15.84	15.17	19.75	24.00
U-NII-2A	Low	5270	15.92	15.06	19.54	24.00
	High	5310	15.14	15.43	18.62	24.00
U-NII-2C	Low	5510	16.43	16.54	19.72	24.00
	Middle	5550	15.84	14.88	19.04	24.00
	High	5670	16.91	16.19	20.51	24.00
		5710	15.95	15.20	19.20	24.00
U-NII-3	Low	5755	16.85	16.20	20.27	30.00
	High	5795	18.06	16.89	21.14	30.00

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IEEE 802.11ac-VHT80_MIMO modulation Test Result

Band	Channel	Channel Frequency (MHz)	Maximum Conducted Output Power (dBm)			Power Limit (dBm)
			Ant1	Ant2	SUM	
U-NII-1	42	5210	8.94	7.84	12.50	24.00
U-NII-2A	58	5290	6.92	6.88	10.58	24.00
U-NII-2C	Low	5530	16.94	16.40	19.72	24.00
	High	5690	16.97	15.77	20.21	24.00
U-NII-3	155	5755	16.88	15.99	20.18	30.00

Remark: the 11 dBm + 10 log B is greater than 250mW.

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9.4 Maximum power spectral density

Test Method

According to KDB789033 D02

For devices operating in the bands 5.15-5.25 GHz, 5.25-5.35 GHz, and 5.47-5.725 GHz, the above procedures make use of 1 MHz RBW to satisfy directly the 1 MHz reference bandwidth specified in § 15.407(a)(5). For devices operating in the band 5.725-5.85 GHz, the rules specify a measurement bandwidth of 500 kHz. Many spectrum analyzers do not have 500 kHz RBW, thus a narrower RBW may need to be used. The rules permit the use of a RBWs less than 1 MHz, or bandwidth" to show the total power over the specified measurement bandwidth (i.e., 1 MHz, or 500 kHz). If measurements are performed using a reduced resolution bandwidth (< 1 MHz, or < 500 kHz) and integrated over 1 MHz, or 500 KHz bandwidth, the following adjustments to the procedures apply:

a) Set RBW ≥ 1/T, where T is defined in section II.B.I.a).

b) Set VBW ≥ 3 RBW.

c) If measurement bandwidth of Maximum PSD is specified in 500 kHz, add 10log(500kHz/RBW) to the measured result, whereas RBW (< 500 KHz) is the reduced resolution bandwidth of the spectrum analyzer set during measurement.

d) If measurement bandwidth of Maximum PSD is specified in 1 MHz, add 10log(1MHz/RBW) to the measured result, whereas RBW (< 1 MHz) is the reduced resolution bandwidth of spectrum analyzer set during measurement.

e) Care must be taken to ensure that the measurements are performed during a period of continuous transmission or are corrected upward for duty cycle.

Note: As a practical matter, it is recommended to use reduced RBW of 100 KHz for the sections 5.c) and 5.d) above, since RBW=100 KHZ is available on nearly all spectrum analyzers.

Limit: The maximum power spectral density shall not exceed 11dBm for the 5.15-5.25GHz, 5.25-5.35GHz, 5.47-5.725 GHz Band and 30dBm for the 5.8GHz Band in any 1 megahertz band.

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IEEE 802.11a_SISO modulation Test Result

Band	Channel	Channel Frequency (MHz)	Maximum PSD (dBm/MHz)		PSD Limit (dBm/MHz)
			Ant1	Ant2	
U-NII-1	Low	5180	5.16	5.29	11.00
	Middle	5200	7.15	7.08	11.00
	High	5240	5.91	6.79	11.00
U-NII-2A	Low	5260	5.96	6.86	11.00
	Middle	5280	8.06	6.95	11.00
	High	5320	5.57	6.88	11.00
U-NII-2C	Low	5500	5.53	6.79	11.00
	Middle	5580	5.71	6.19	11.00
	High	5700	5.34	5.86	11.00
		5720_UNII-2C	5.44	6.3	11.00
U-NII-3		5720_UNII-3	2.14	3.5	30.00
	Low	5745	3.48	4.31	30.00
	Middle	5785	3.74	3.96	30.00
	High	5825	4.3	4.68	30.00

IEEE 802.11n-HT20_MIMO modulation Test Result

Band	Channel	Channel Frequency (MHz)	Maximum PSD (dBm/MHz)	PSD Limit (dBm/MHz)
U-NII-1	Low	5180	6.23	11.00
	Middle	5200	9.9	11.00
	High	5240	8.04	11.00
U-NII-2A	Low	5260	9.53	11.00
	Middle	5280	10.64	11.00
	High	5320	10.52	11.00
U-NII-2C	Low	5500	7.21	11.00
	Middle	5580	10.66	11.00
	High	5700	7.75	11.00
		5720_UNII-2C	10.58	11.00
U-NII-3		5720_UNII-3	6.99	11.00
	Low	5745	9.58	30.00
	Middle	5785	8.09	30.00
	High	5825	8.74	30.00

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IEEE 802.11n-HT40_MIMO modulation Test Result

Band	Channel	Frequency (MHz)	Maximum PSD (dBm/MHz)	PSD Limit (dBm/MHz)
U-NII-1	Low	5190	6.45	11.00
	High	5230	8.75	11.00
U-NII-2A	Low	5270	7.82	11.00
	High	5310	7.7	11.00
U-NII-2C	Low	5510	5.34	11.00
	Middle	5550	6.8	11.00
	High	5670	5.04	11.00
		5710_UNII-2C	4.56	11.00
U-NII-3	Low	5710_UNII-3	-1.4	11.00
		5755	3.75	30.00
	High	5795	3.27	30.00

IEEE 802.11ac-VHT20_MIMO modulation Test Result

Band	Channel	Channel Frequency (MHz)	Maximum PSD (dBm/MHz)	PSD Limit (dBm/MHz)
U-NII-1	Low	5180	8.33	11.00
	Middle	5200	9.95	11.00
	High	5240	9.55	11.00
U-NII-2A	Low	5260	9.32	11.00
	Middle	5280	10.1	11.00
	High	5320	10.08	11.00
U-NII-2C	Low	5500	9.51	11.00
	Middle	5580	10.48	11.00
	High	5700	5.37	11.00
		5720_UNII-2C	9.7	11.00
U-NII-3		5720_UNII-3	7.8	11.00
	Low	5745	9.52	30.00
	Middle	5785	7.54	30.00
	High	5825	11.45	30.00

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IEEE 802.11ac-VHT40_MIMO modulation Test Result

Band	Channel	Frequency (MHz)	Maximum PSD (dBm/MHz)	PSD Limit (dBm/MHz)
U-NII-1	Low	5190	5.55	11.00
	High	5230	8.14	11.00
U-NII-2A	Low	5270	6.83	11.00
	High	5310	7.00	11.00
U-NII-2C	Low	5510	9.45	11.00
	Middle	5550	5.86	11.00
	High	5670	6.44	11.00
		5710_UNII-2C	6.07	11.00
U-NII-3	Low	5710_UNII-3	0.42	11.00
		5755	5.31	30.00
	High	5795	5.72	30.00

IEEE 802.11ac-VHT80_MIMO modulation Test Result

Band	Channel	Frequency (MHz)	Maximum PSD (dBm/MHz)	PSD Limit (dBm/MHz)
U-NII-1	42	5210	-1.61	11.00
U-NII-2A	58	5290	-2.30	11.00
U-NII-2C	Low	5530	3.98	11.00
	High	5690_UNII-2C	4.78	11.00
		5690_UNII-3	0.18	11.00
U-NII-3	155	5775	-1.23	30.00

NOTE: According to the test results of output power, Ant1 is considered to have the highest power, so PSD for Multiple mode are performed with this antenna and add 3dBi factor, this factor has been compensated in the test.

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9.5 Unwanted emissions

Test Method
According to KBD789033 D02

Limits:
For transmitters operating in the 5.15-5.25 GHz band: All emissions outside of the 5.15-5.35 GHz band shall not exceed an e.i.r.p. of −27 dBm/MHz.
For transmitters operating in the 5.25-5.35 GHz band: All emissions outside of the 5.15-5.35 GHz band shall not exceed an e.i.r.p. of −27 dBm/MHz.
For transmitters operating in the 5.47-5.725 GHz band: All emissions outside of the 5.47-5.725 GHz band shall not exceed an e.i.r.p. of −27 dBm/MHz.
For transmitters operating in the 5.725-5.85 GHz band: All emissions shall be limited to a level of −27 dBm/MHz at 75 MHz or more above or below the band edge increasing linearly to 10 dBm/MHz at 25 MHz above or below the band edge, and from 25 MHz above or below the band edge increasing linearly to a level of 15.6 dBm/MHz at 5 MHz above or below the band edge, and from 5 MHz above or below the band edge increasing linearly to a level of 27 dBm/MHz at the band edge.

Unwanted emissions below 1 GHz must comply with the general field strength limits set forth in §15.209. Further, any U-NII devices using an AC power line are required to comply also with the conducted limits set forth in §15.207.
The provisions of §15.205 apply to intentional radiators operating under this section.

Test Data as below:

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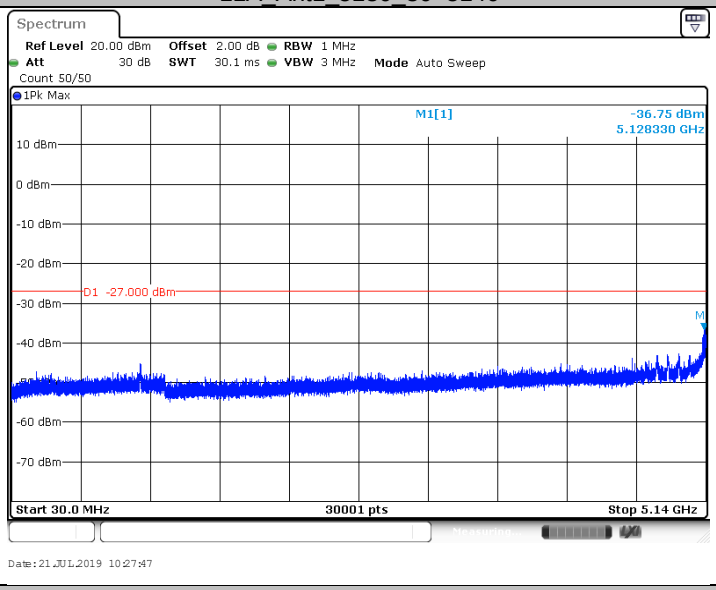
Transmitting spurious emission test result as below (Conducted Mode):

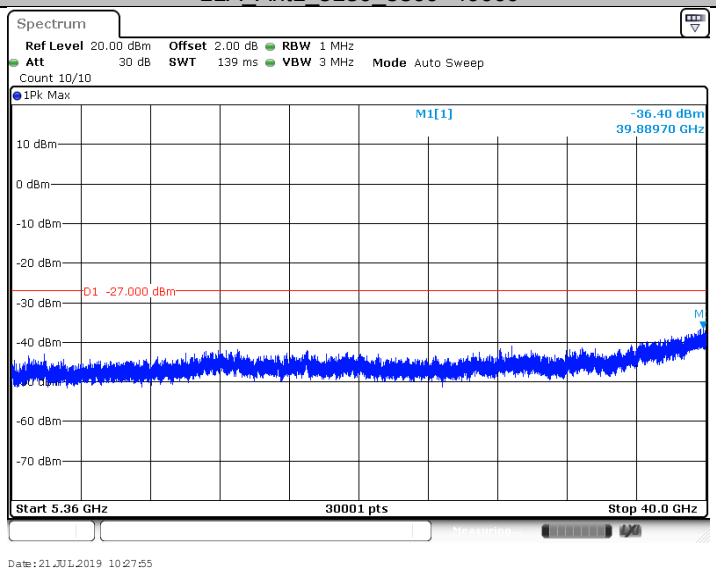
NOTE: According to the test results of output power, Ant1 is considered to have the highest power, so conducted emission for Multiple mode are performed with this antenna and add 3dBi factor, this factor has been compensated in the test.

IEEE 802.11a modulation Test Result

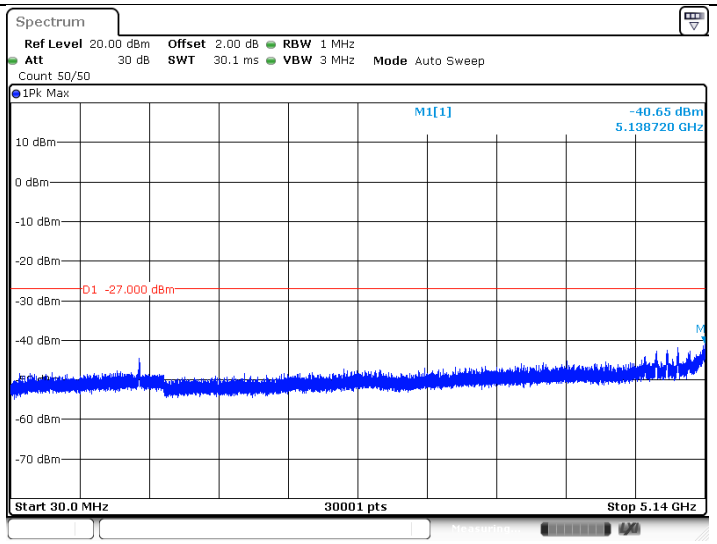
11A_Ant1_5180_30~5140



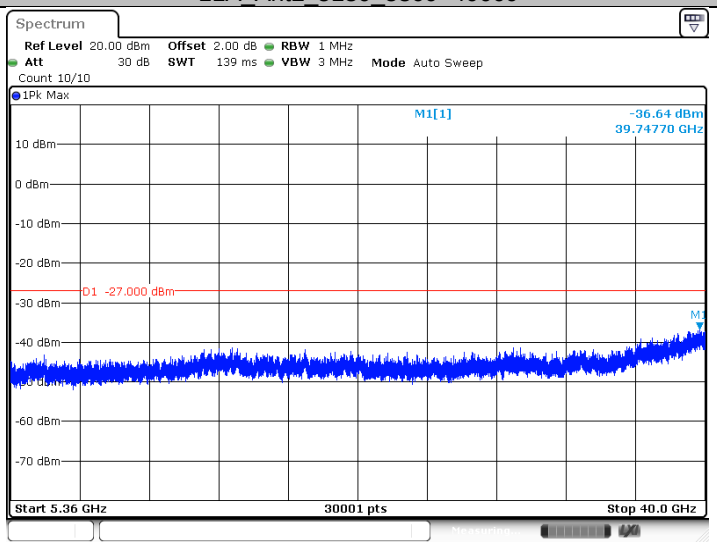
11A_Ant1_5180_5360~40000



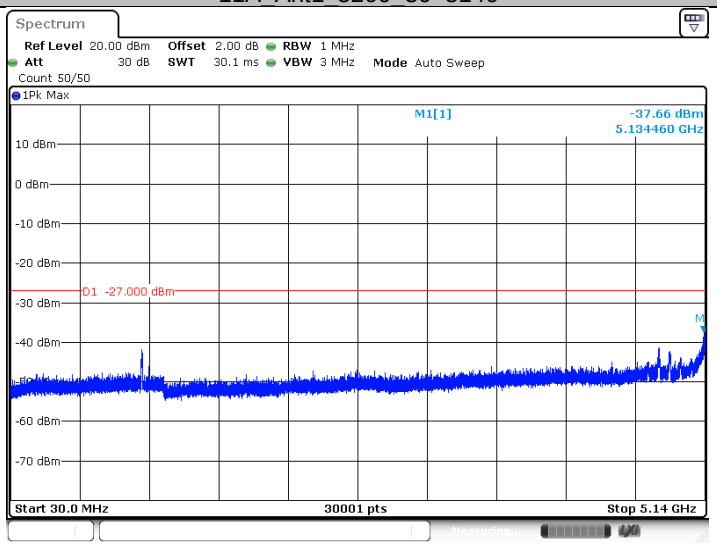
11A_Ant2_5180_30~5140



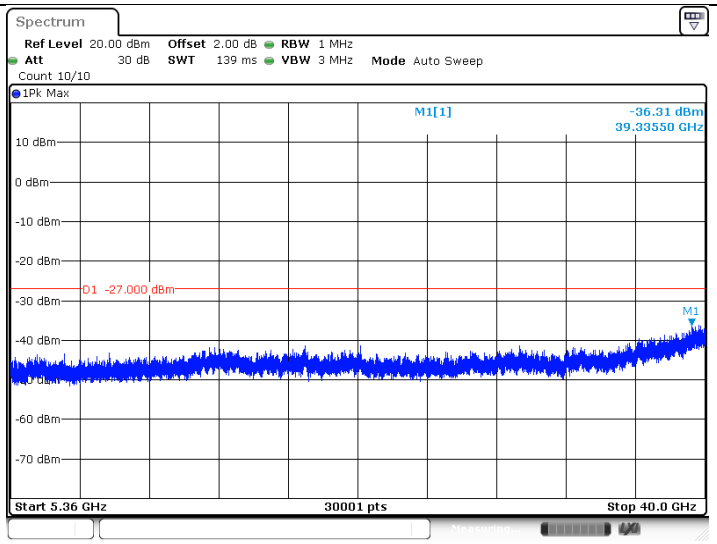
11A_Ant2_5180_5360~40000



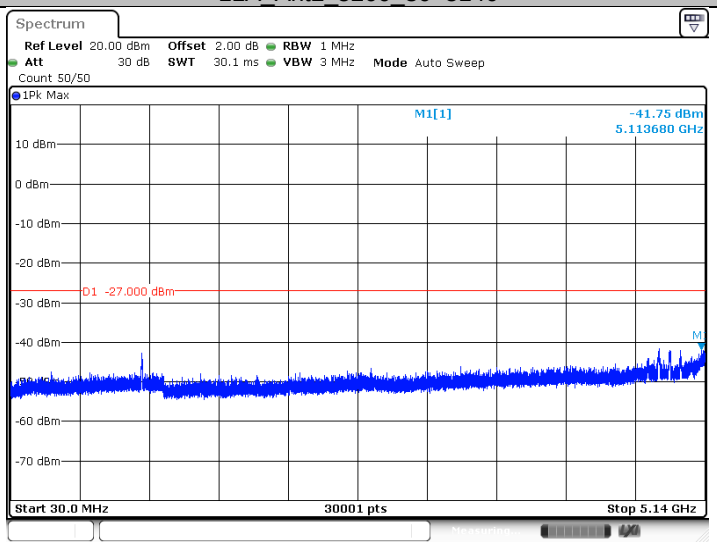
11A_Ant1_5200_30~5140



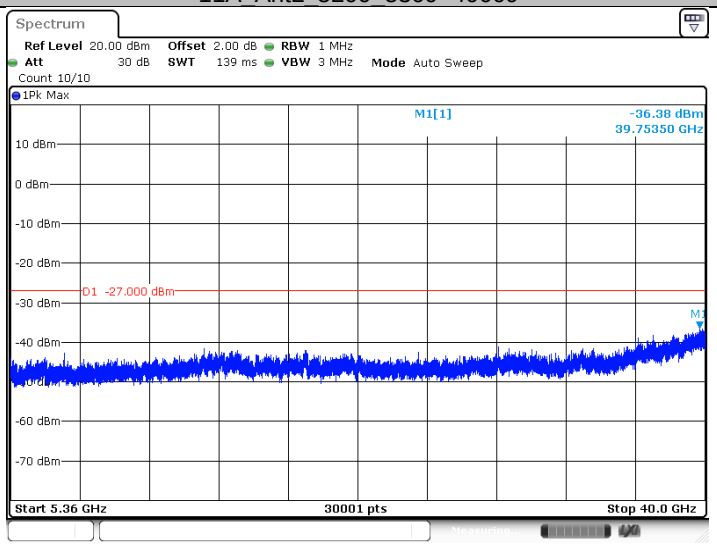
11A_Ant1_5200_5360~40000



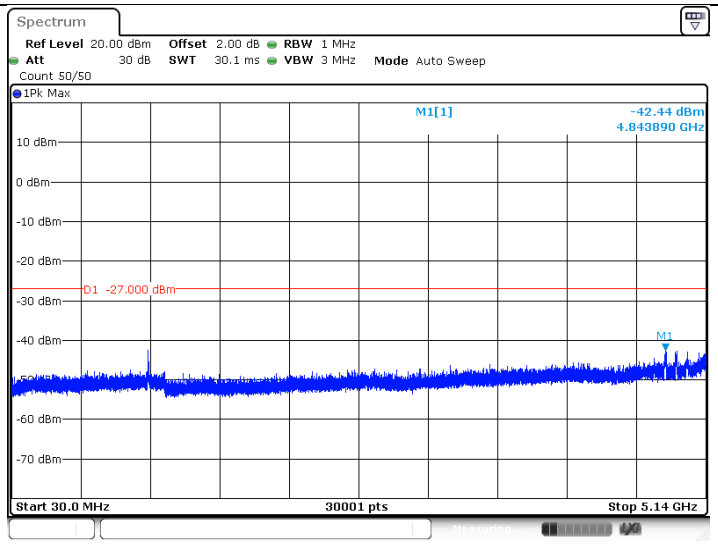
11A_Ant2_5200_30~5140



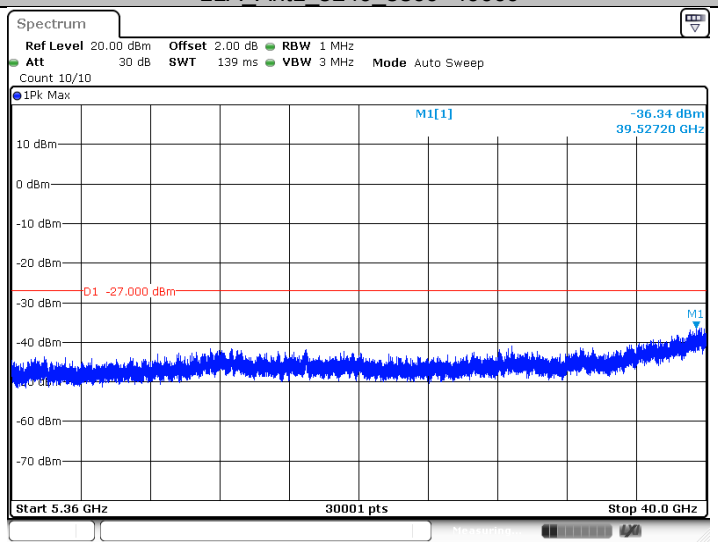
11A_Ant2_5200_5360~40000



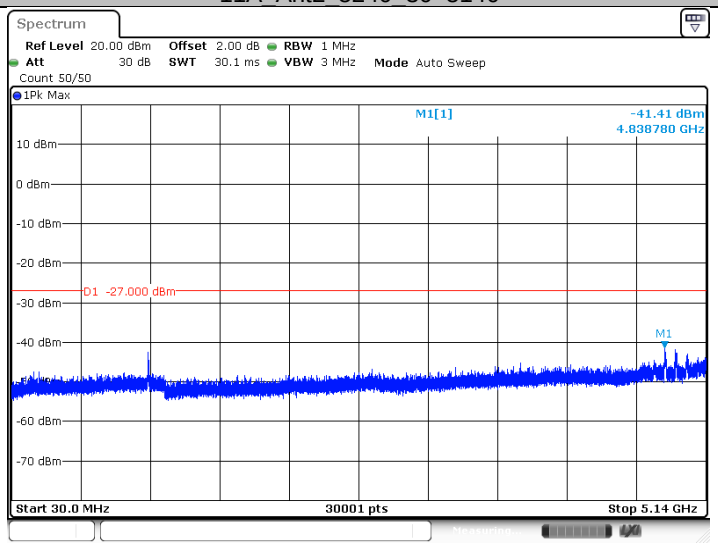
11A_Ant1_5240_30~5140



11A_Ant1_5240_5360~40000



11A_Ant2_5240_30~5140



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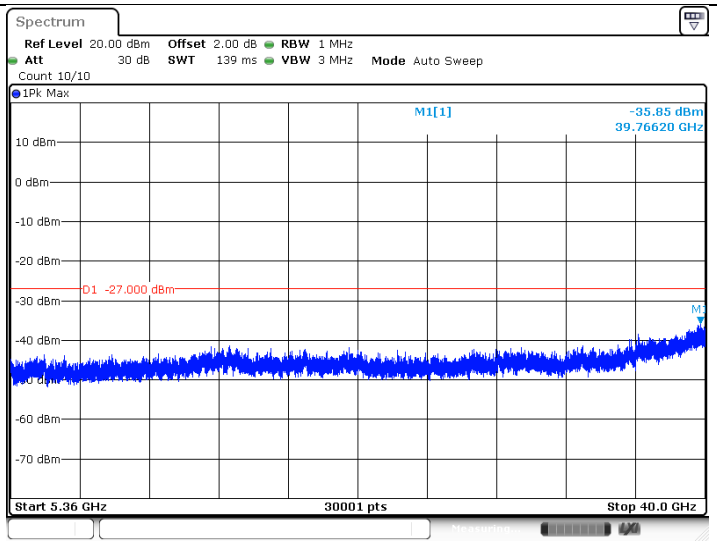
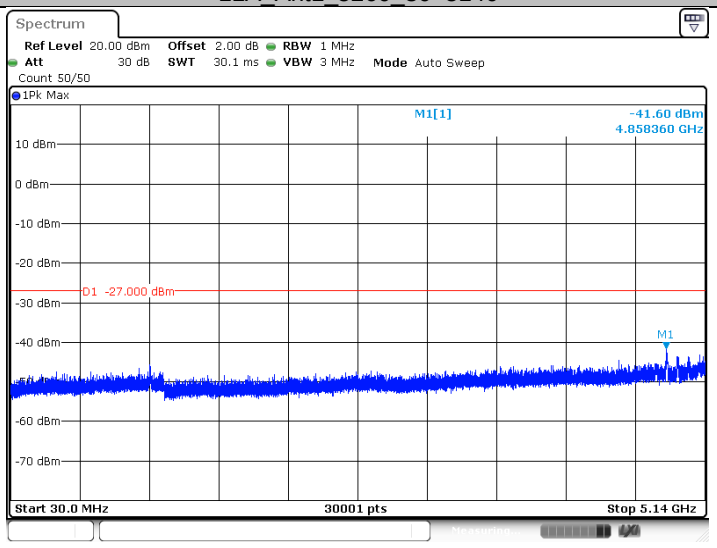
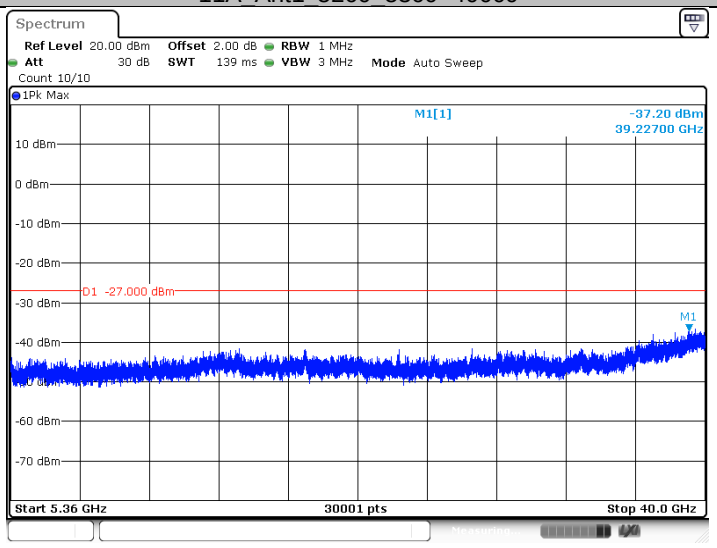


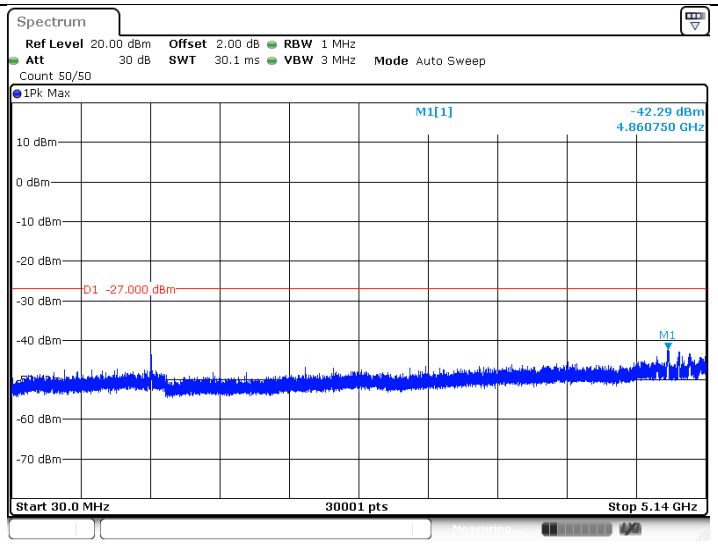
11A_Ant1_5260_30~5140



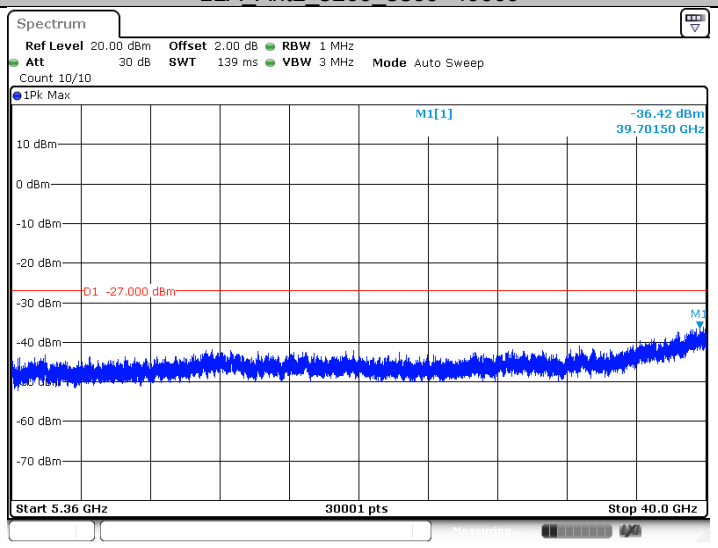
11A_Ant1_5260_5360~40000



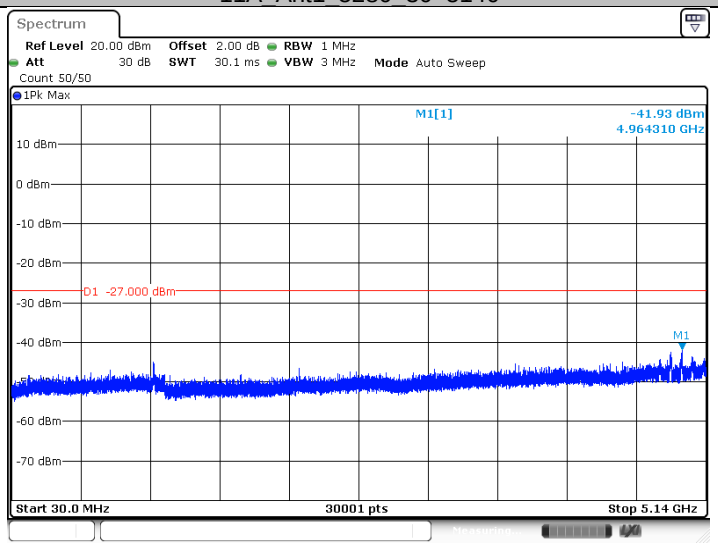
11A_Ant2_5260_30~5140



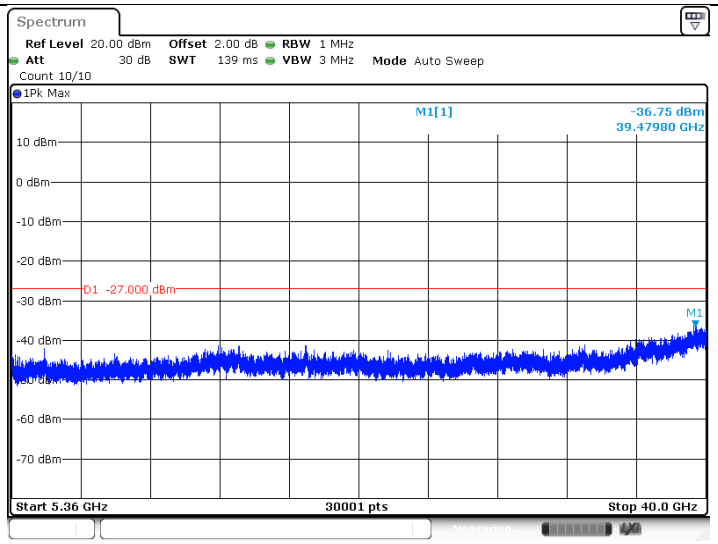
11A_Ant2_5260_5360~40000



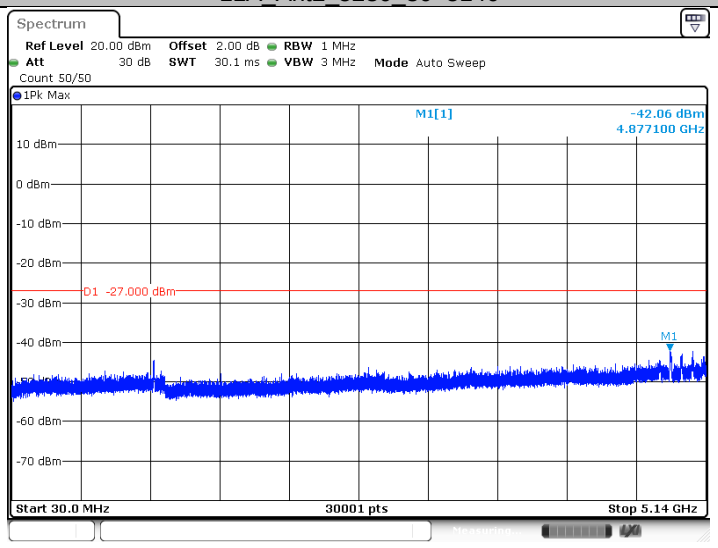
11A_Ant1_5280_30~5140



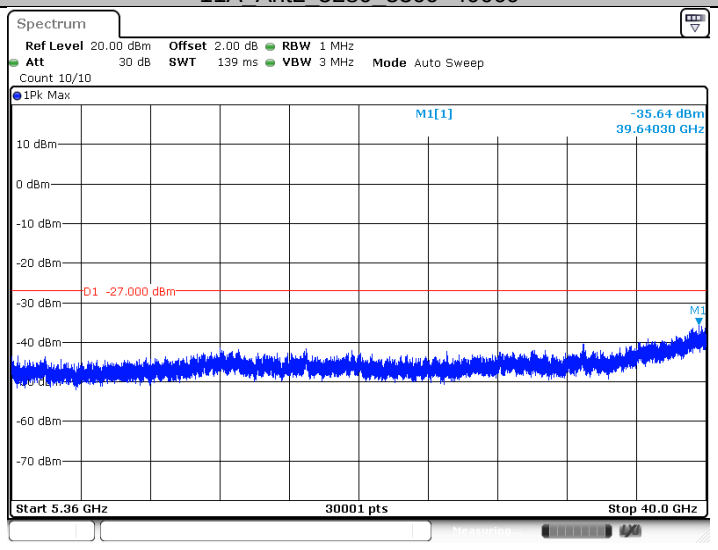
11A_Ant1_5280_5360~40000



11A_Ant2_5280_30~5140



11A_Ant2_5280_5360~40000



11A_Ant1_5320_30~5140

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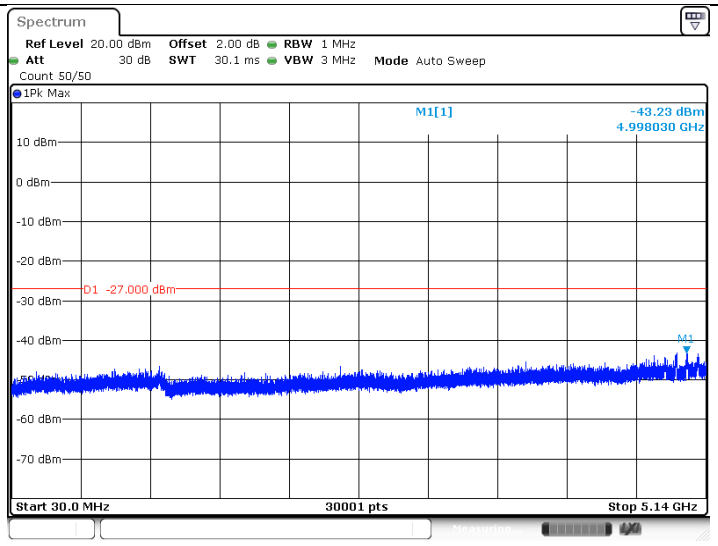
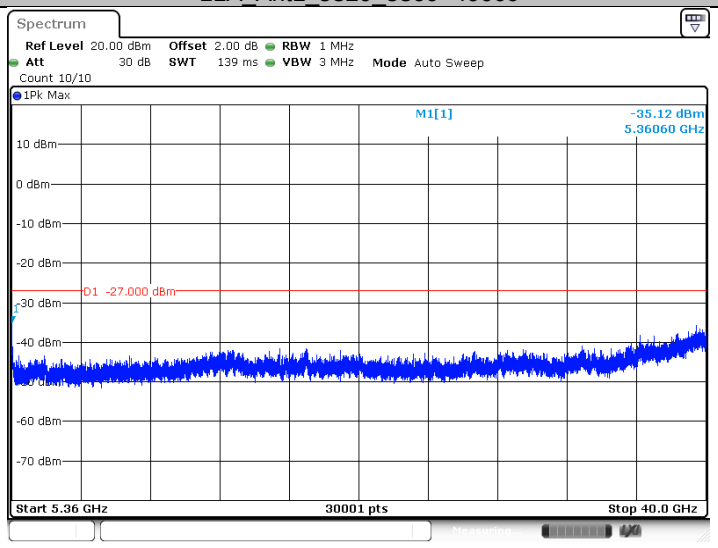
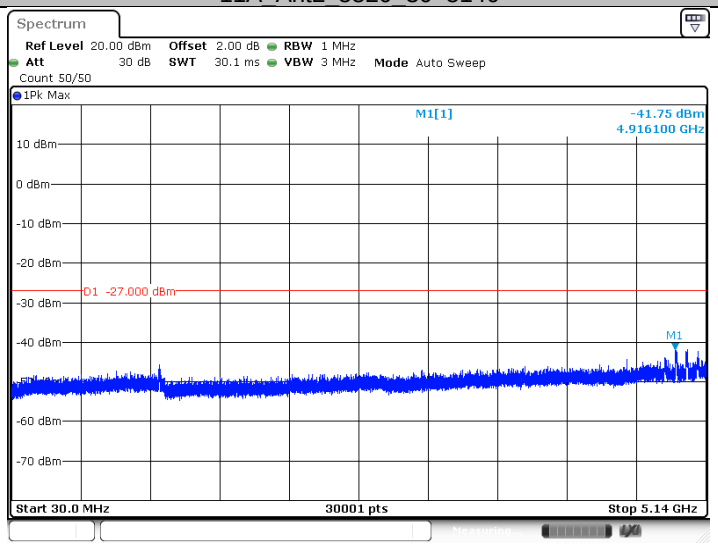


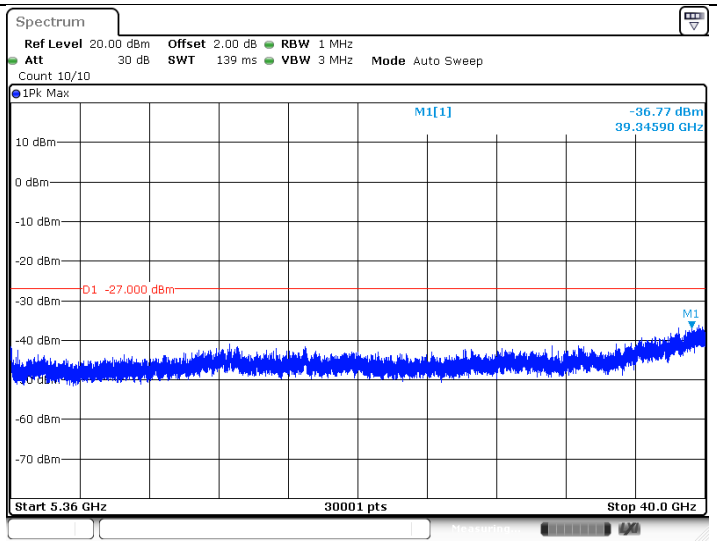
11A_Ant1_5320_5360~40000



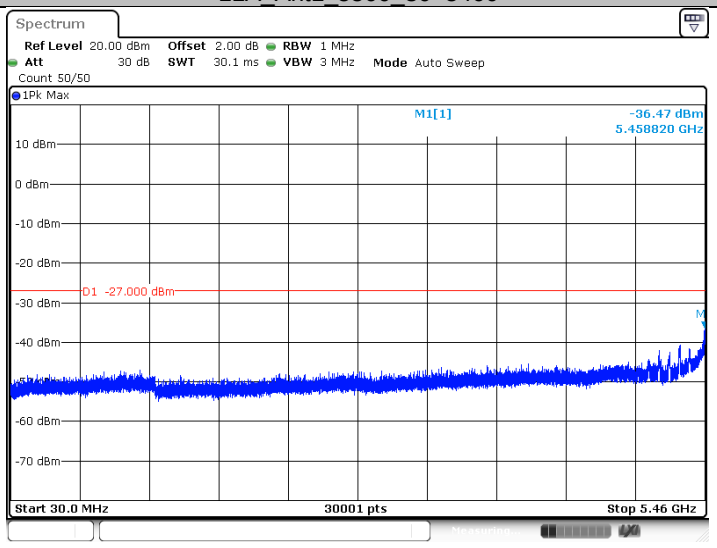
11A_Ant2_5320_30~5140



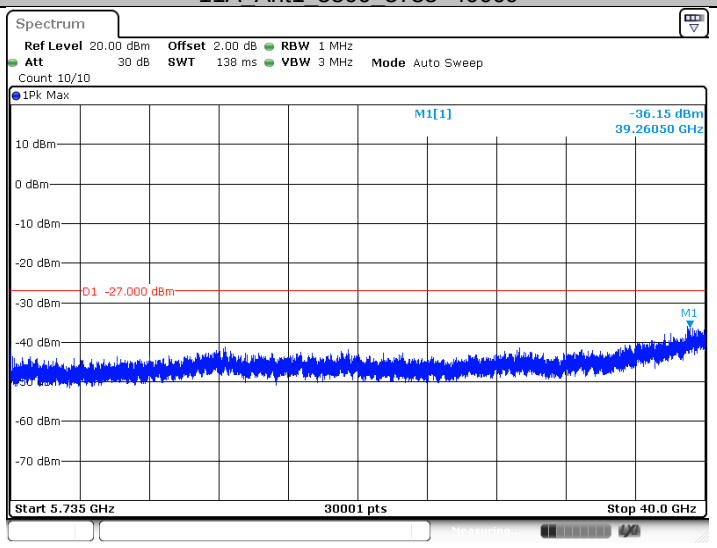
11A_Ant2_5320_5360~40000



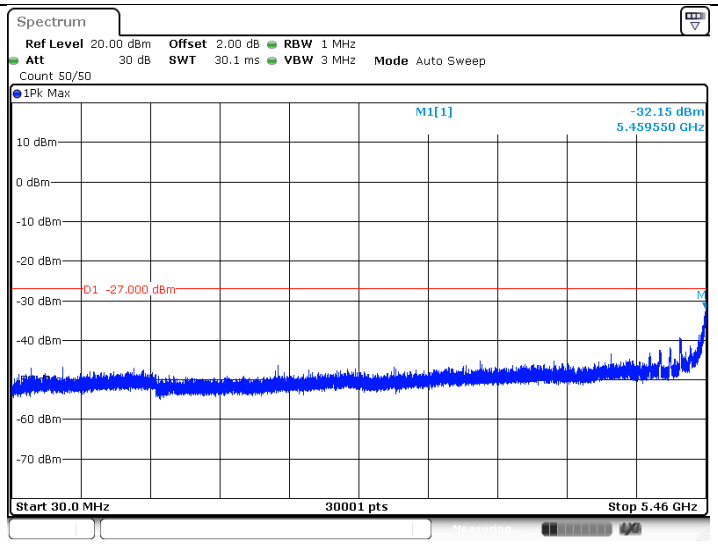
11A_Ant1_5500_30~5460



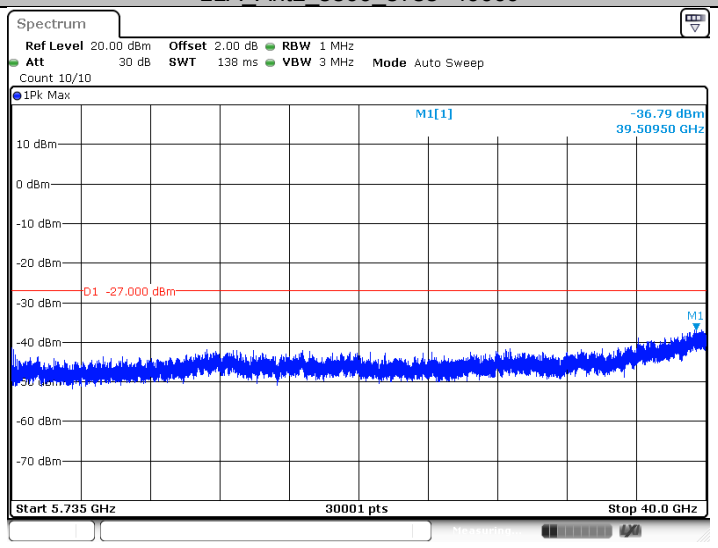
11A_Ant1_5500_5735~40000



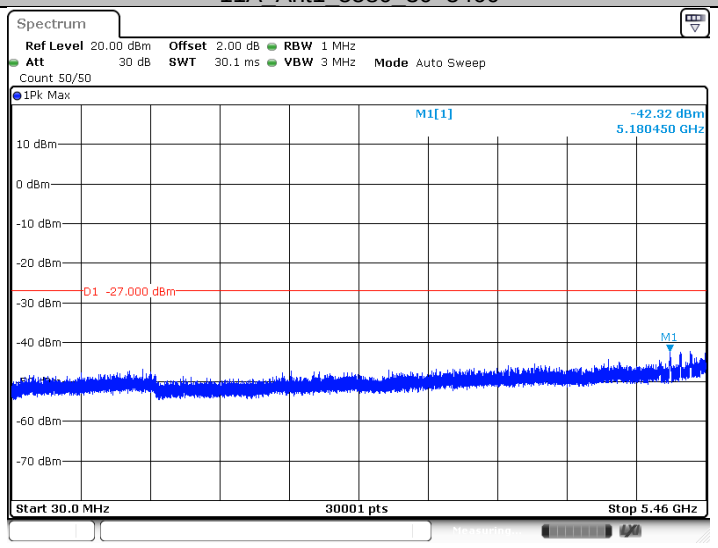
11A_Ant2_5500_30~5460



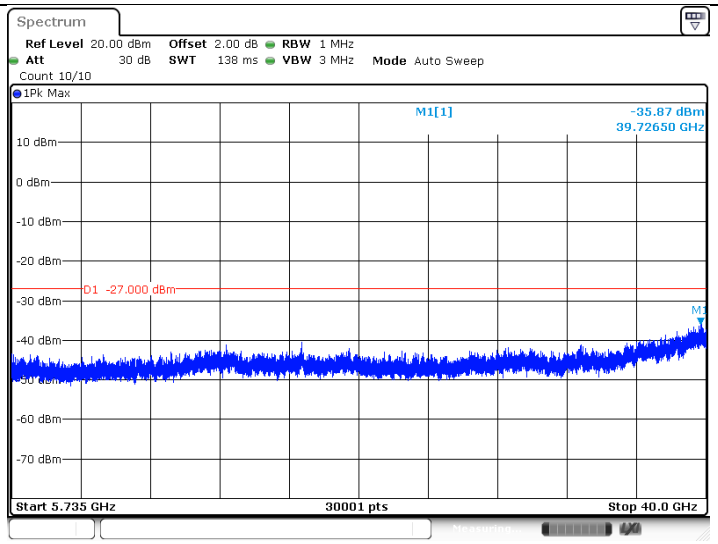
11A_Ant2_5500_5735~40000



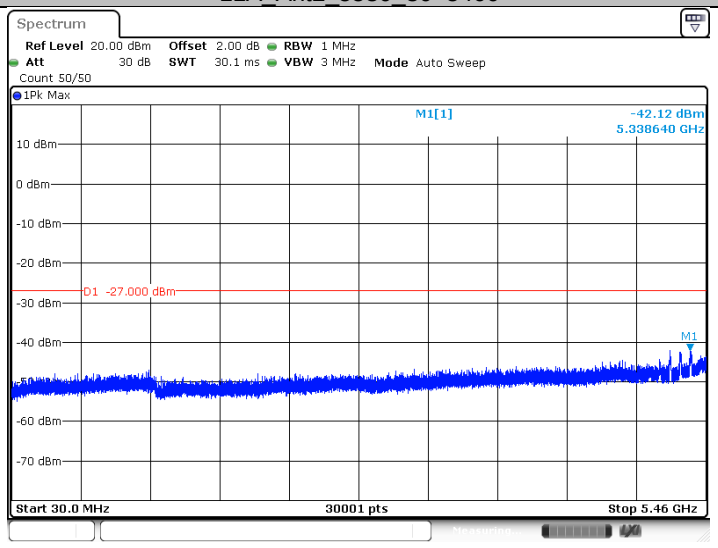
11A_Ant1_5580_30~5460



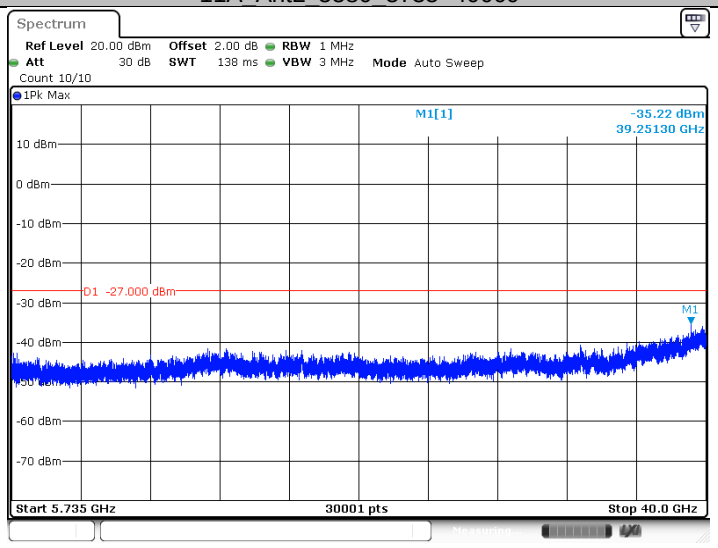
11A_Ant1_5580_5735~40000



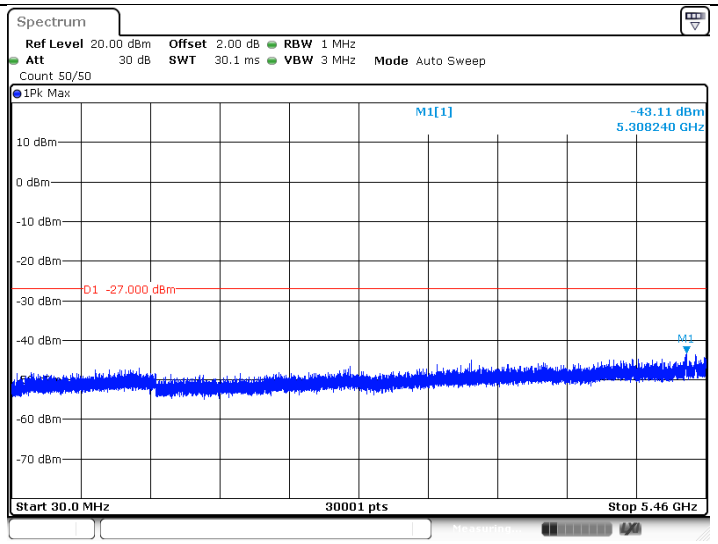
11A_Ant2_5580_30~5460



11A_Ant2_5580_5735~40000



11A_Ant1_5700_30~5460



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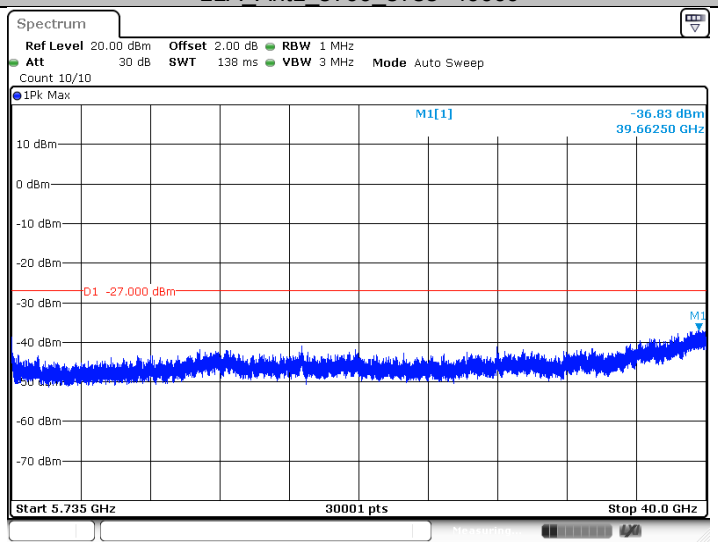
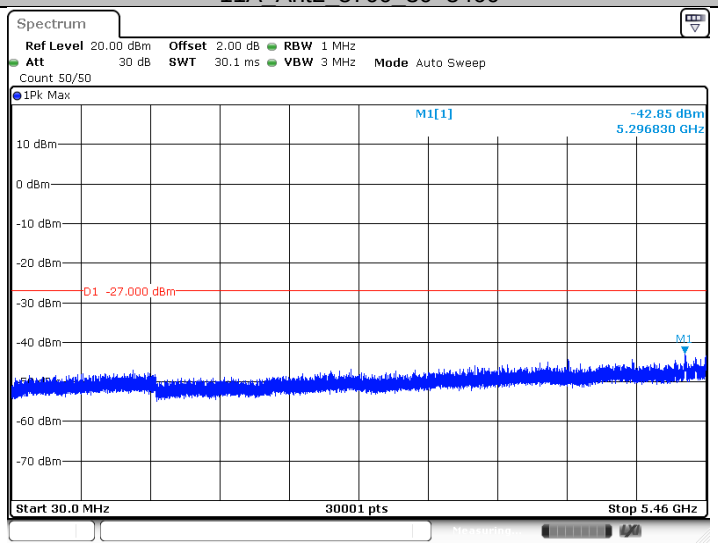
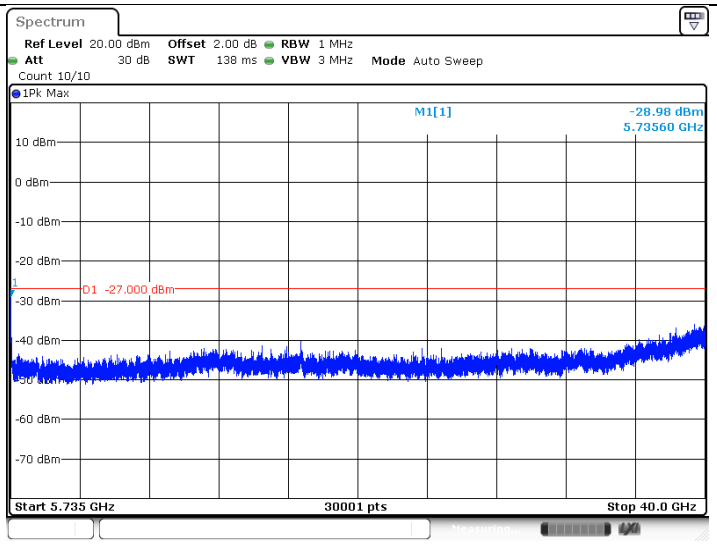


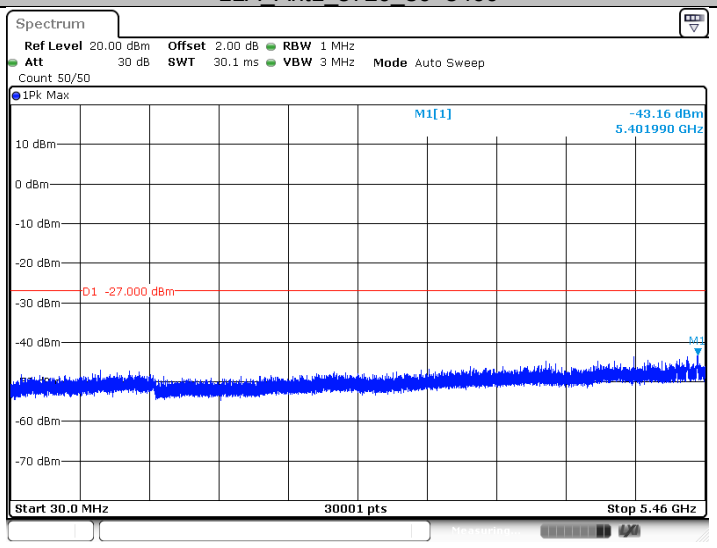
11A_Ant2_5700_30~5460



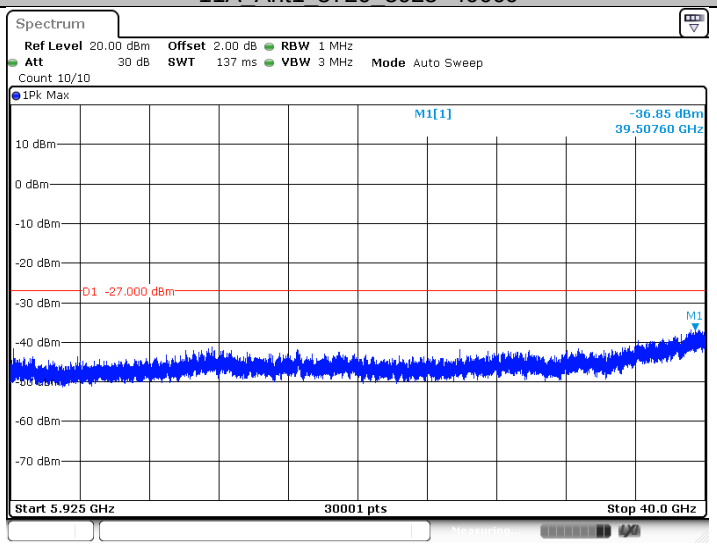
11A_Ant2_5700_5735~40000



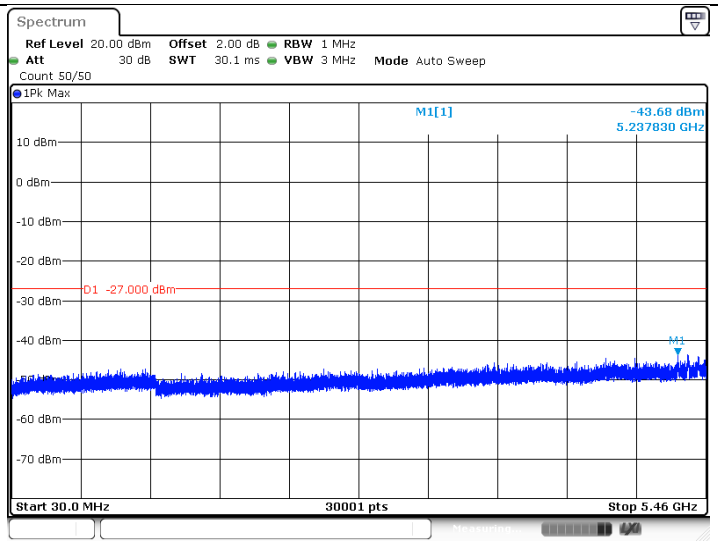
11A_Ant1_5720_30~5460



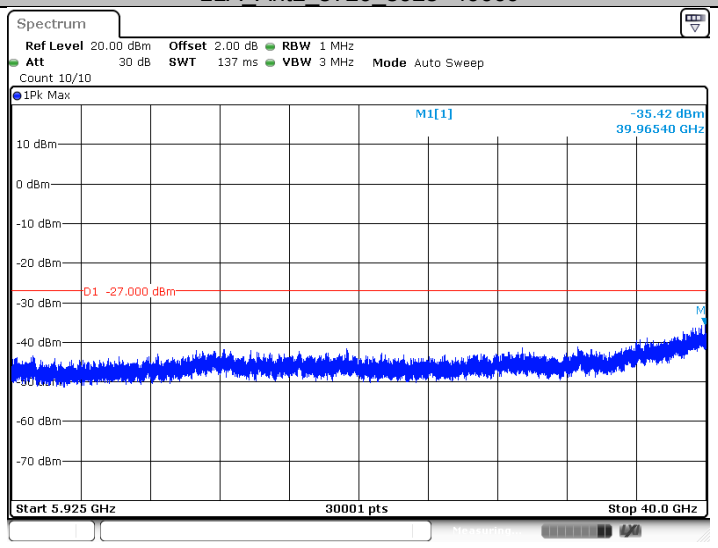
11A_Ant1_5720_5925~40000



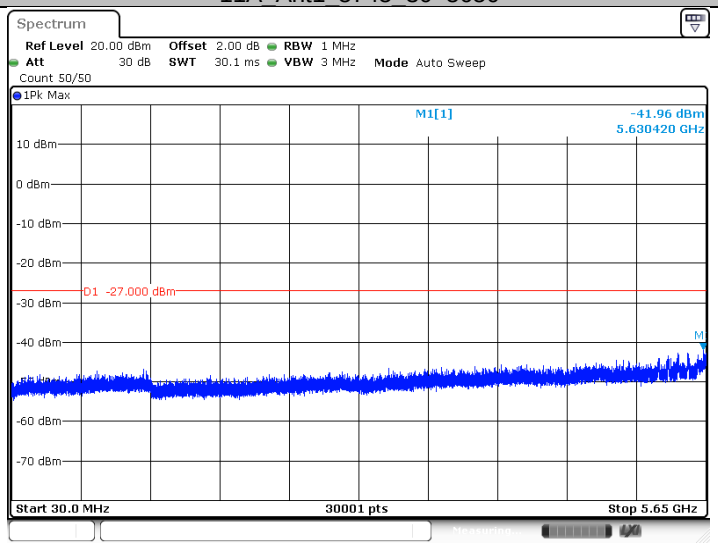
11A_Ant2_5720_30~5460



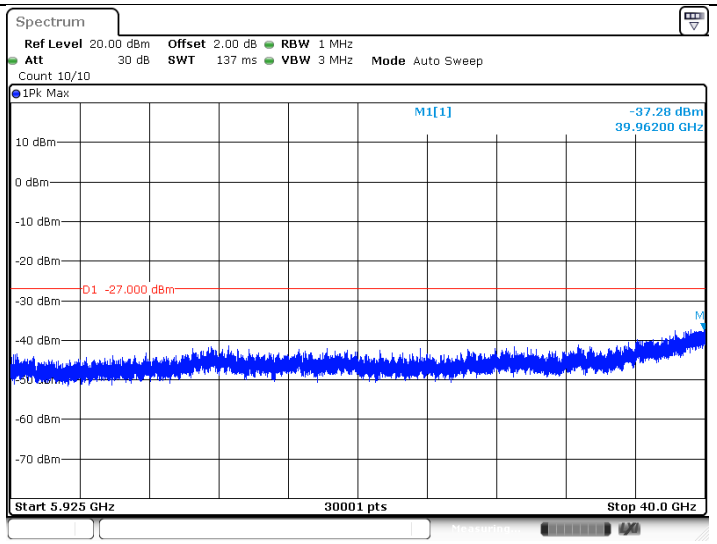
11A_Ant2_5720_5925~40000



11A_Ant1_5745_30~5650



11A_Ant1_5745_5925~40000



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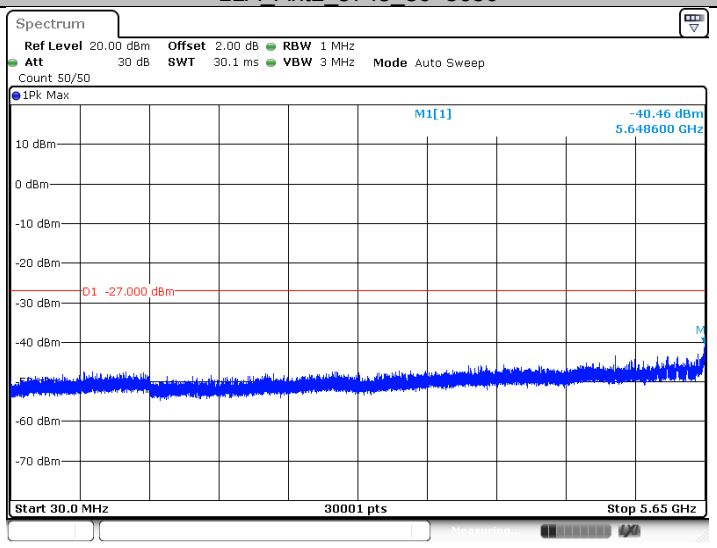
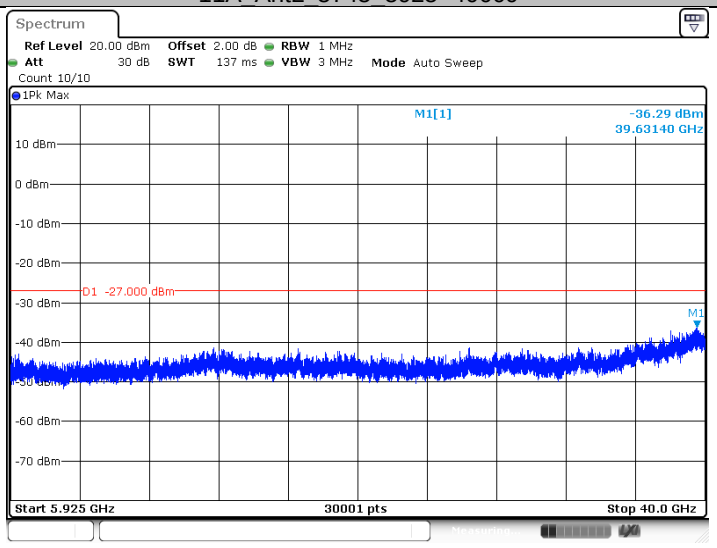
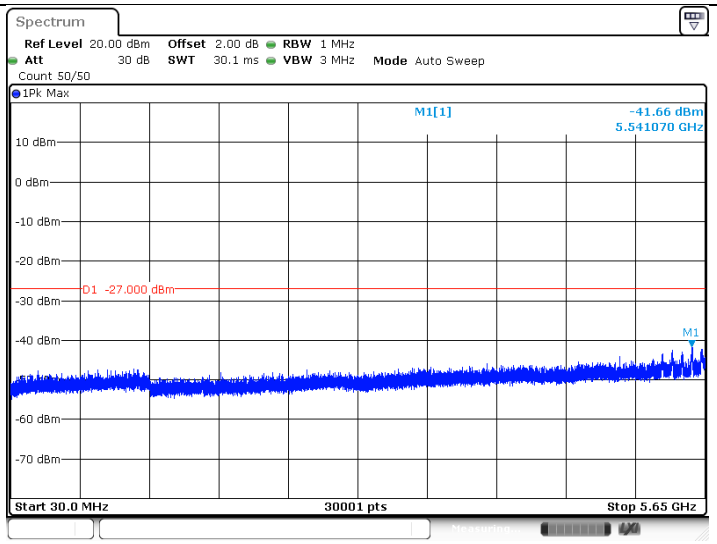


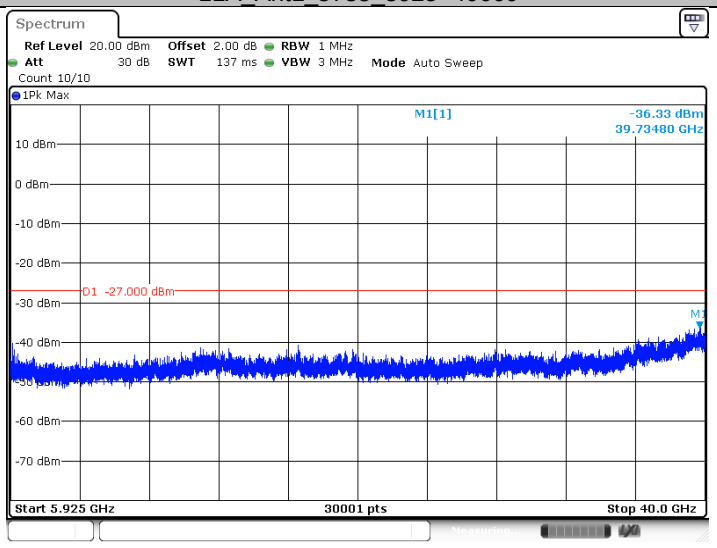
11A_Ant2_5745_5925~40000



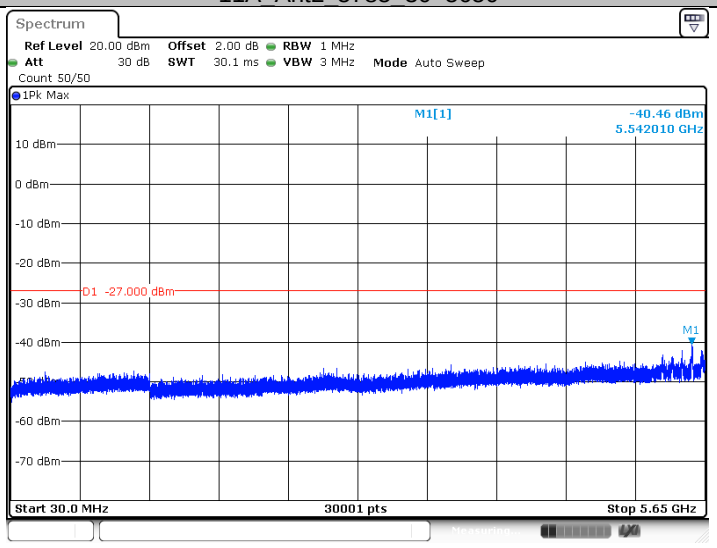
11A_Ant1_5785_30~5650



11A_Ant1_5785_5925~40000



11A_Ant2_5785_30~5650



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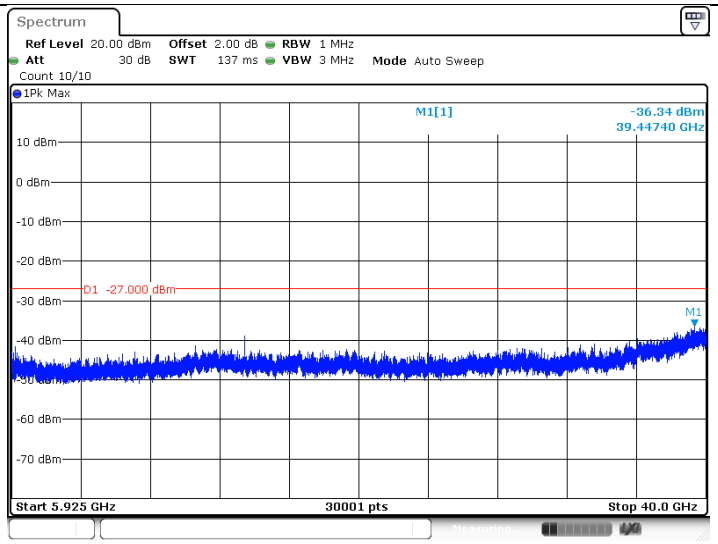

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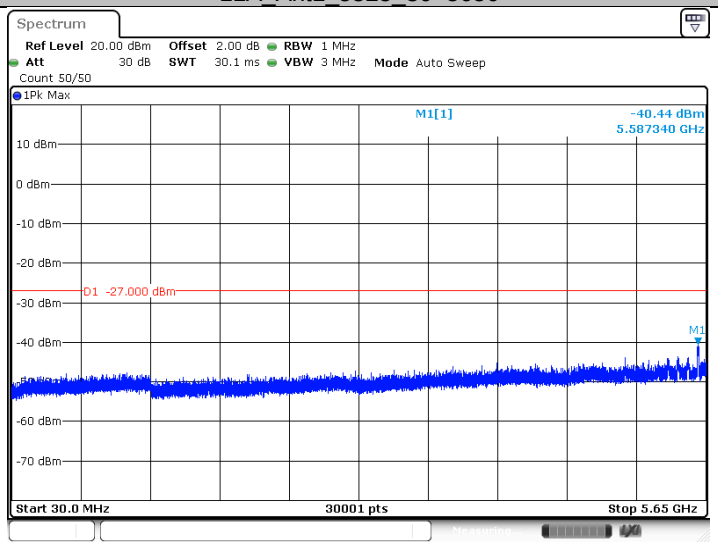
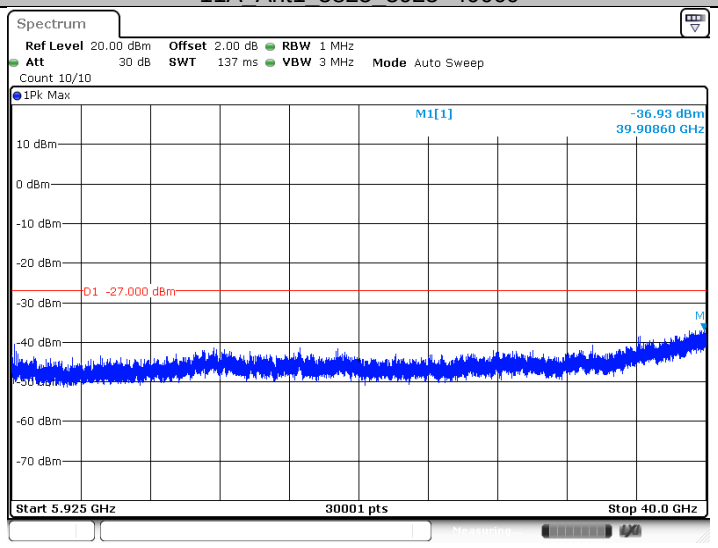
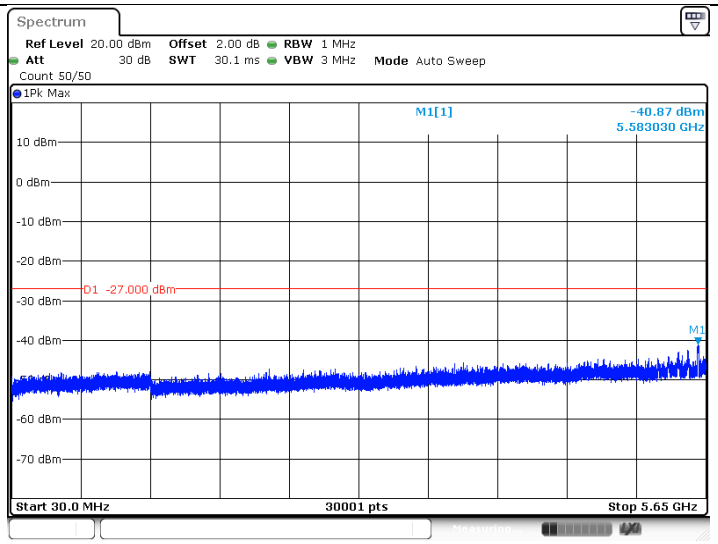


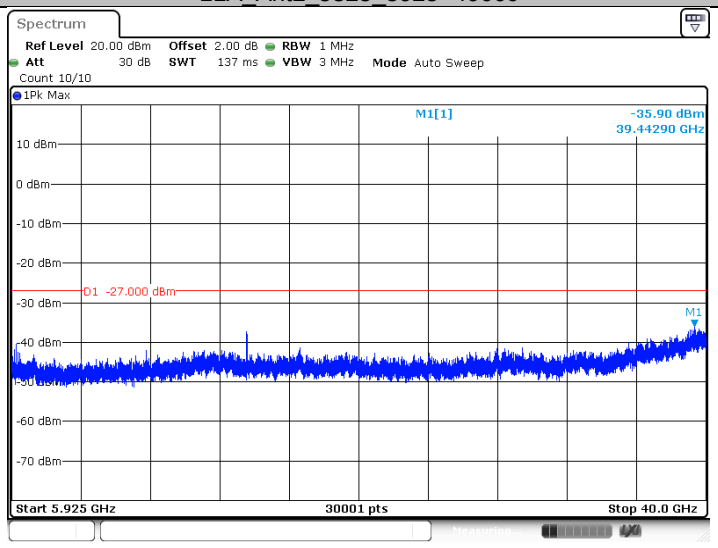
11A_Ant1_5825_5925~40000



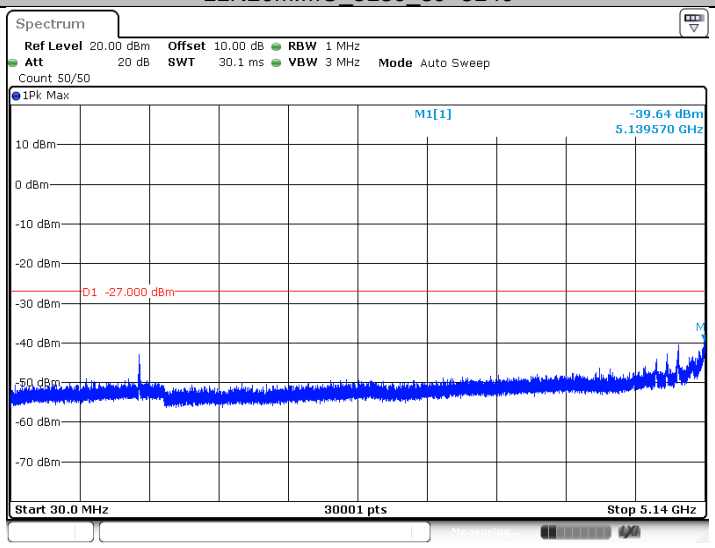
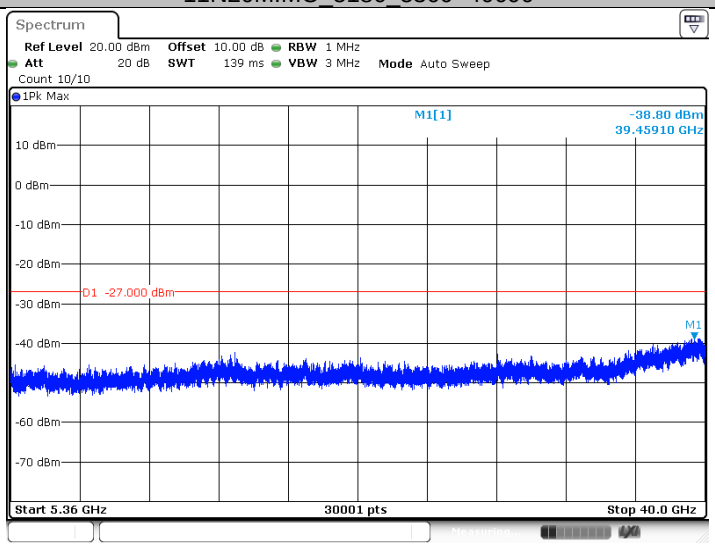
11A_Ant2_5825_30~5650



11A_Ant2_5825_5925~40000



IEEE 802.11n_MIMO modulation Test Result

11N20MIMO_5180_30~5140

11N20MIMO_5180_5360~40000

11N20MIMO_5200_30~5140

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Building 12&13, Zhiheng Wisdomland Business Park, Nantou Checkpoint Road 2,
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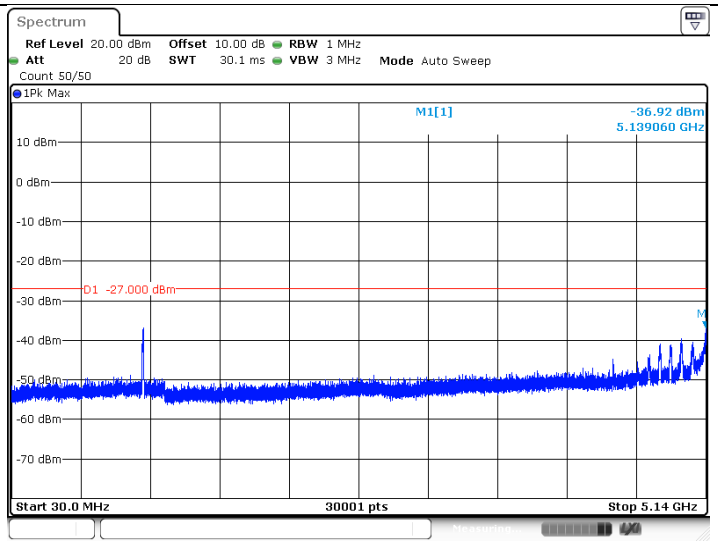
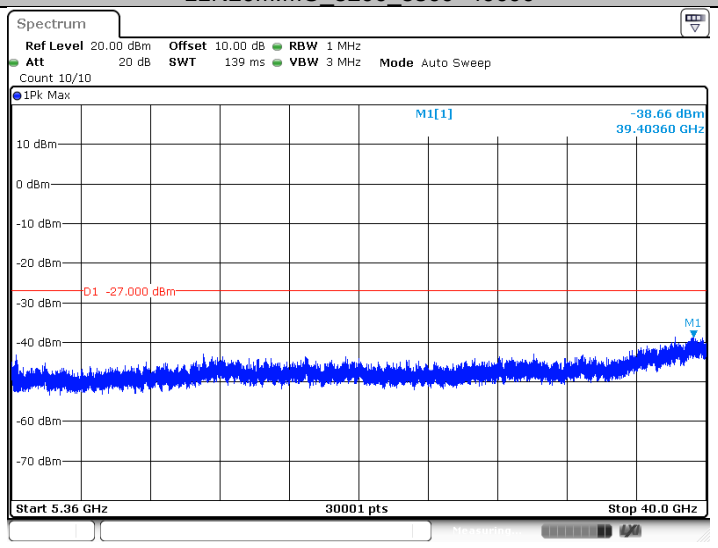
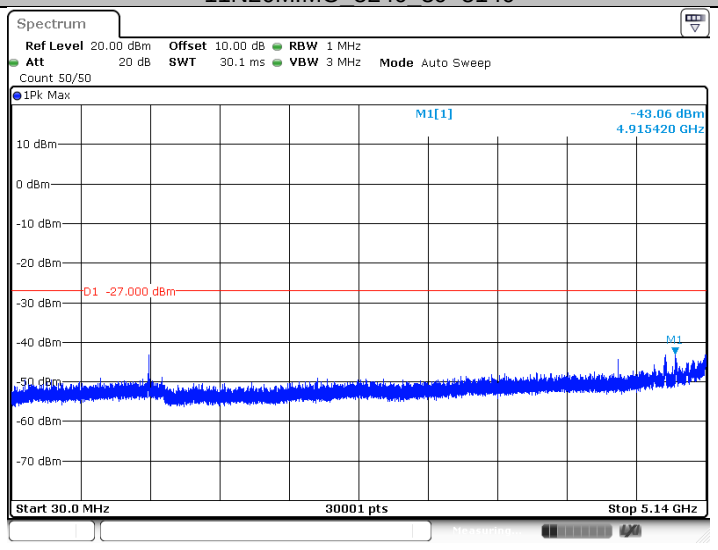


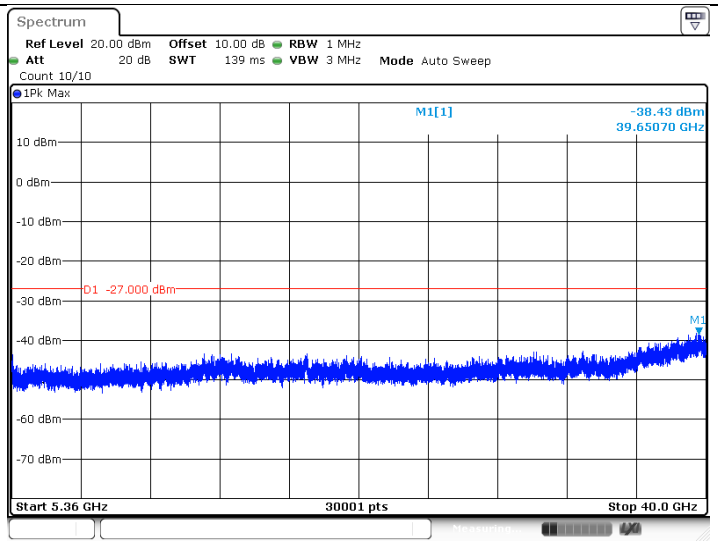
11N20MIMO_5200_5360~40000



11N20MIMO_5240_30~5140



11N20MIMO_5240_5360~40000



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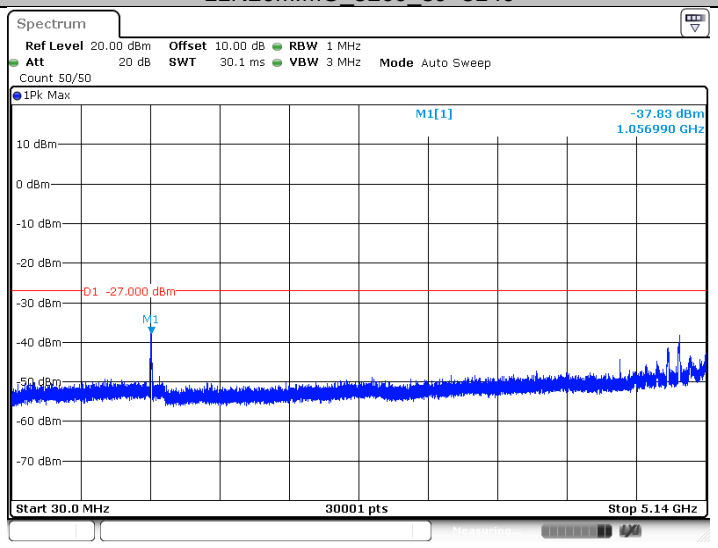
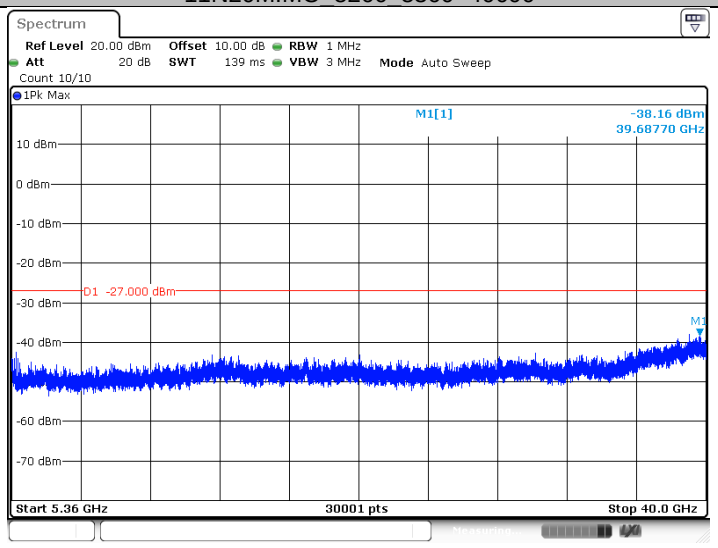
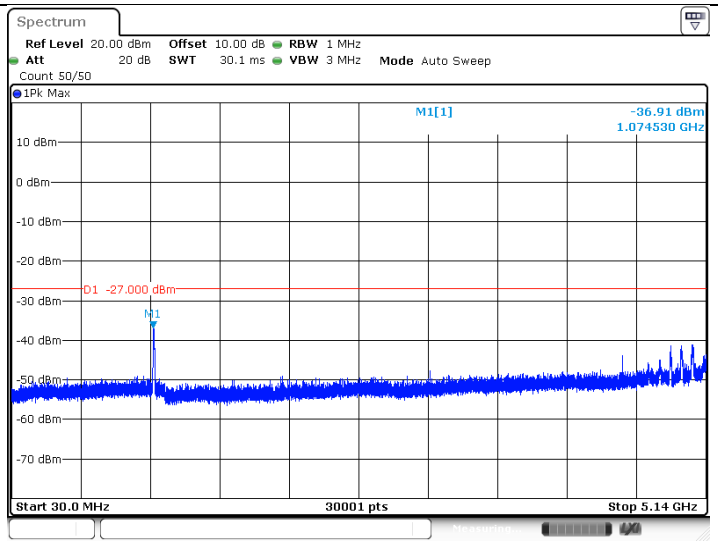


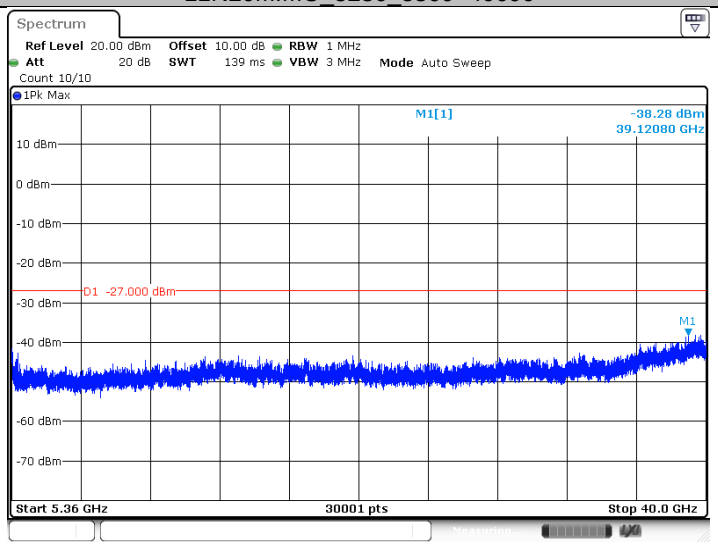
11N20MIMO_5260_5360~40000



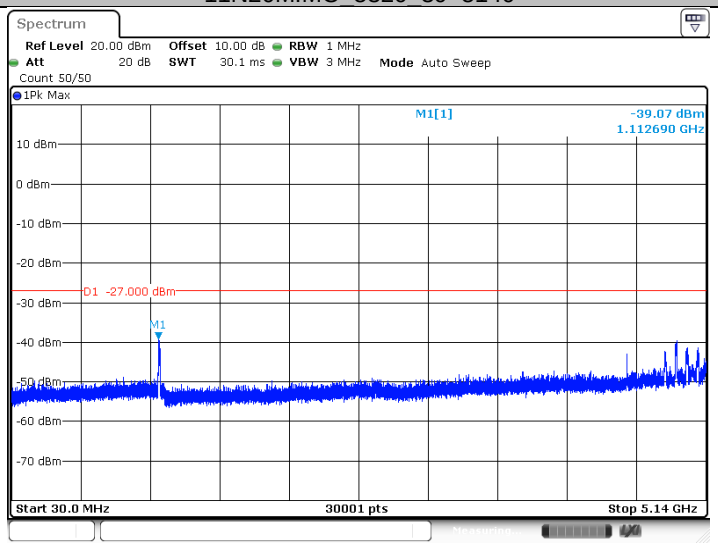
11N20MIMO_5280_30~5140



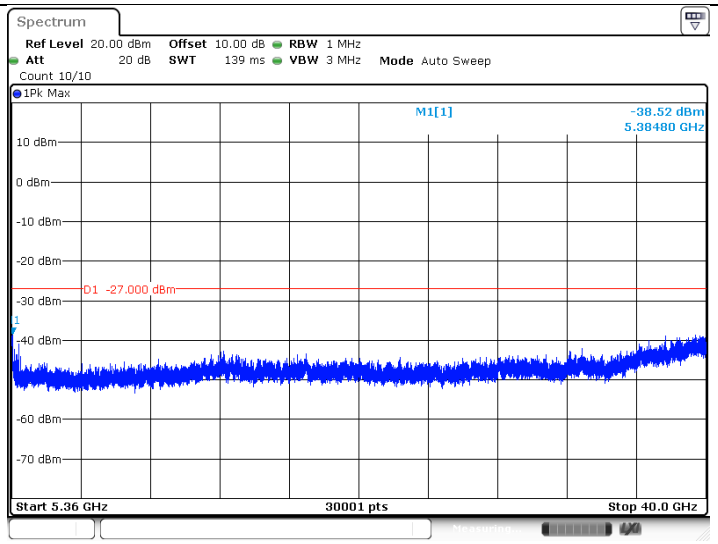
11N20MIMO_5280_5360~40000



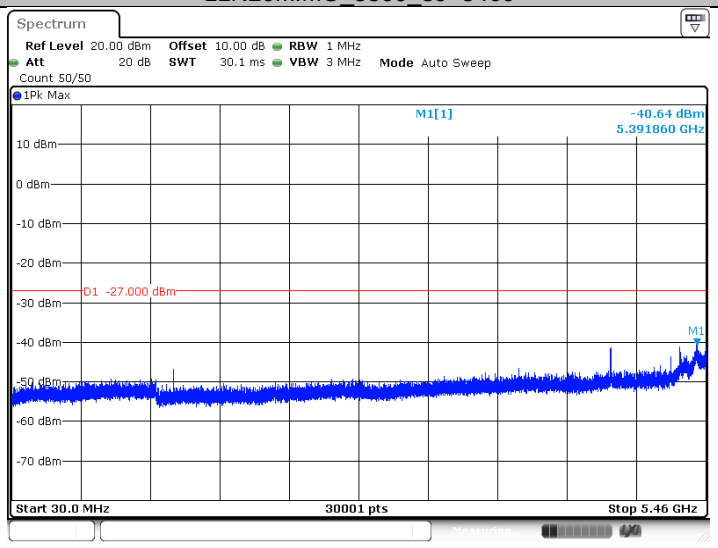
11N20MIMO_5320_30~5140



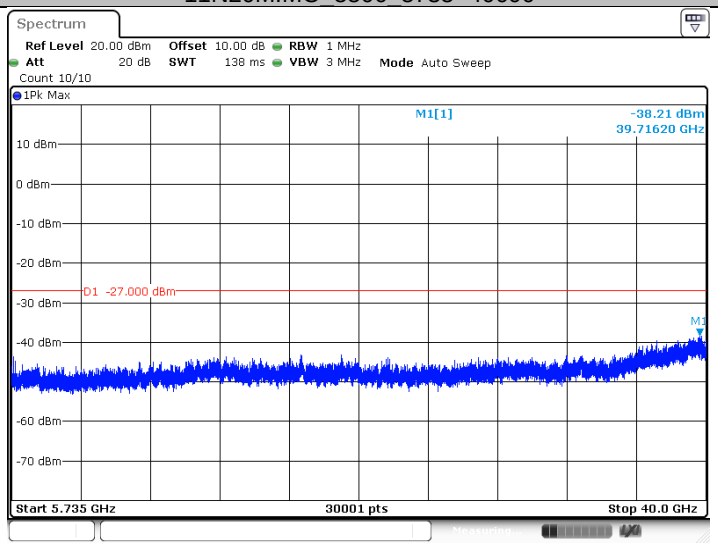
11N20MIMO_5320_5360~40000



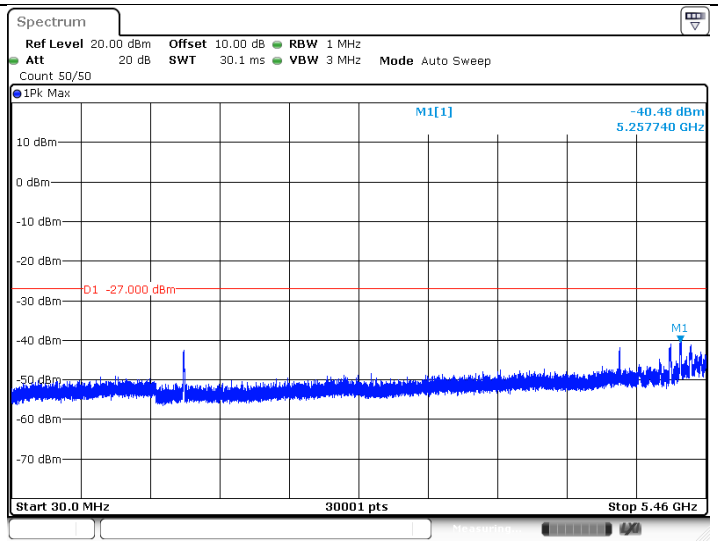
11N20MIMO_5500_30~5460



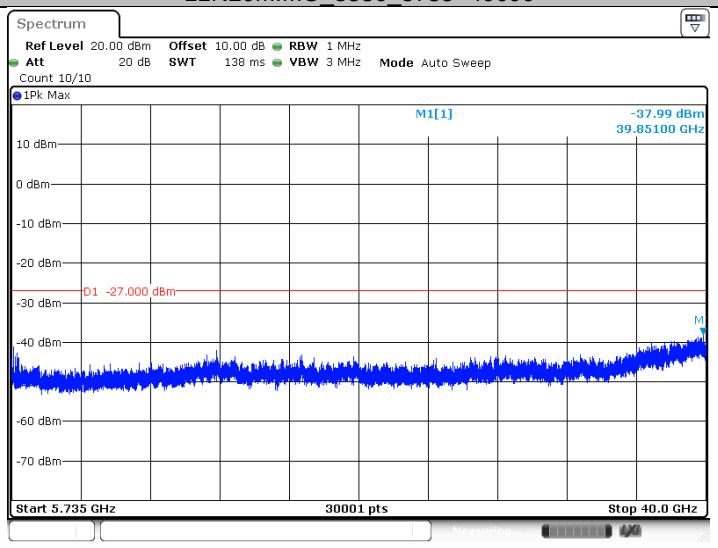
11N20MIMO_5500_5735~40000



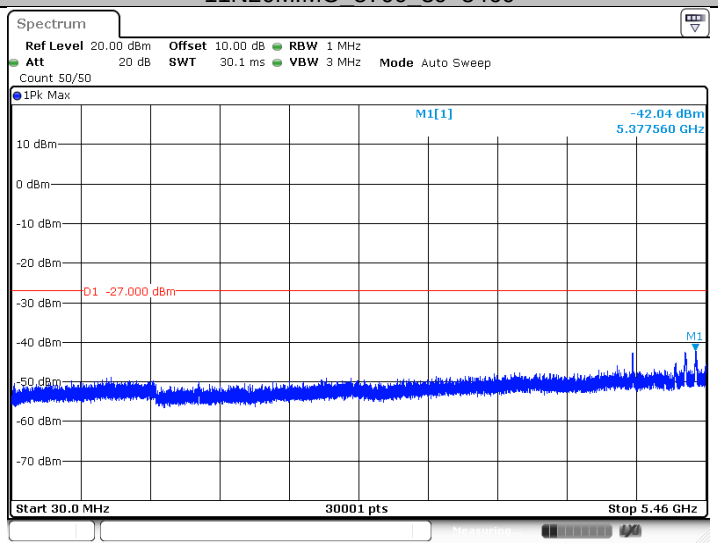
11N20MIMO_5580_30~5460



11N20MIMO_5580_5735~40000



11N20MIMO_5700_30~5460



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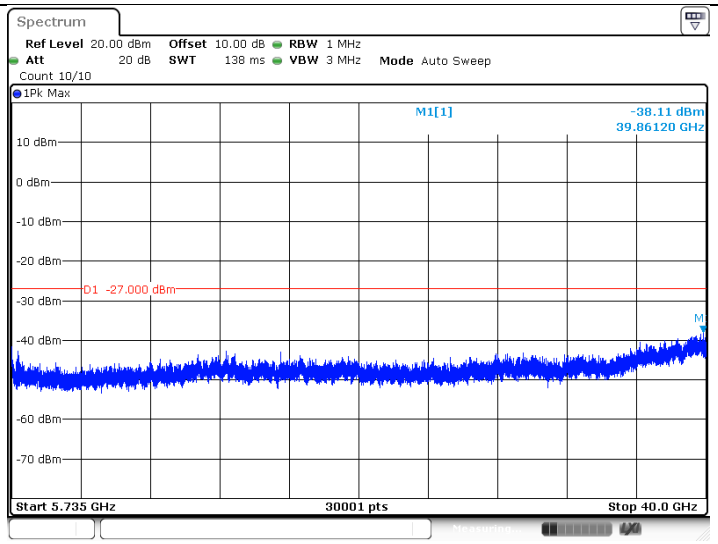

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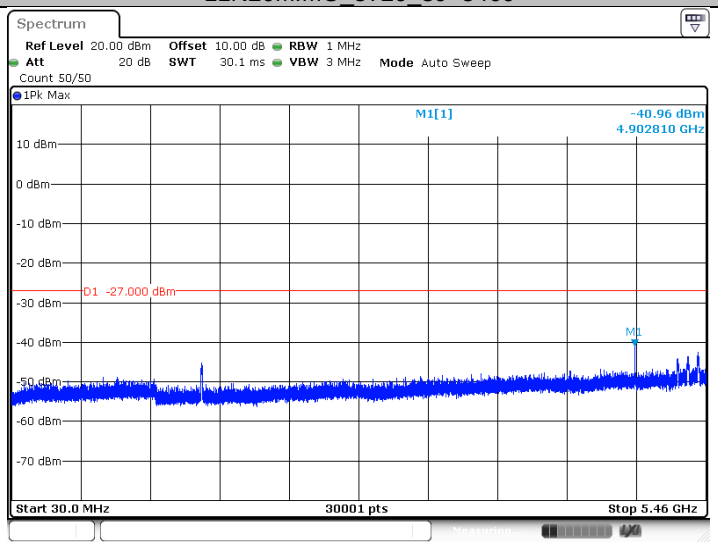
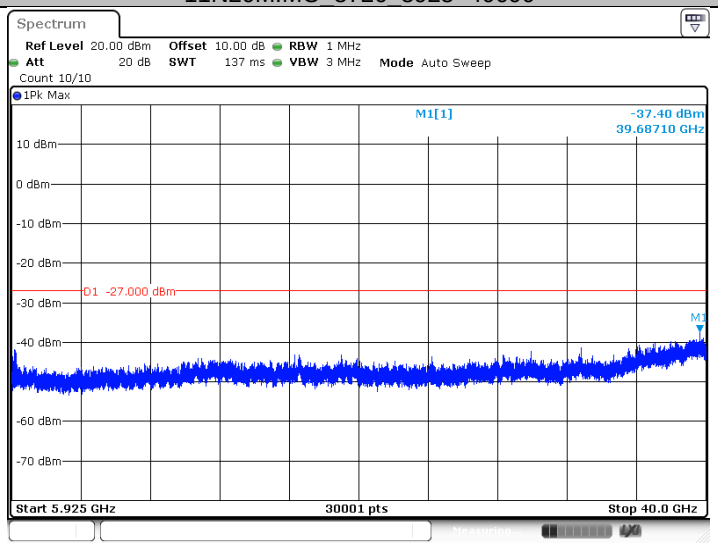
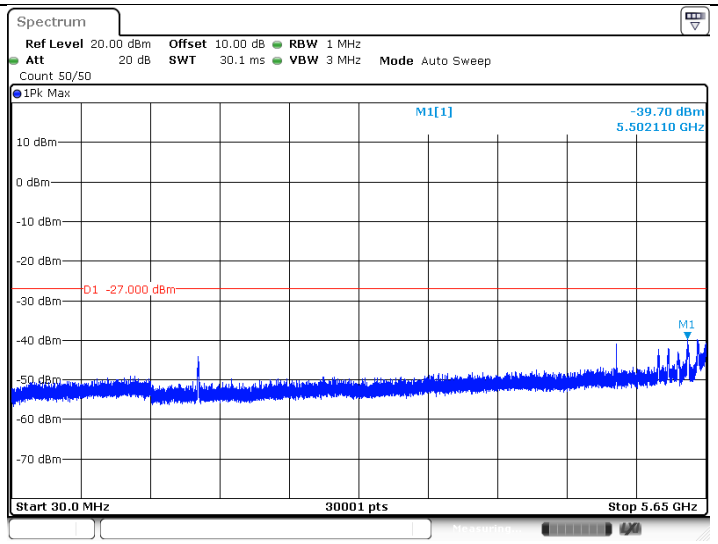


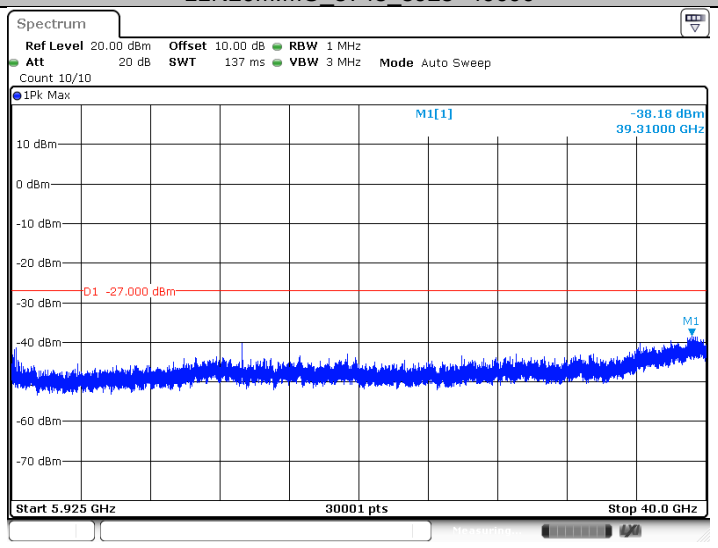
11N20MIMO_5720_5925~40000



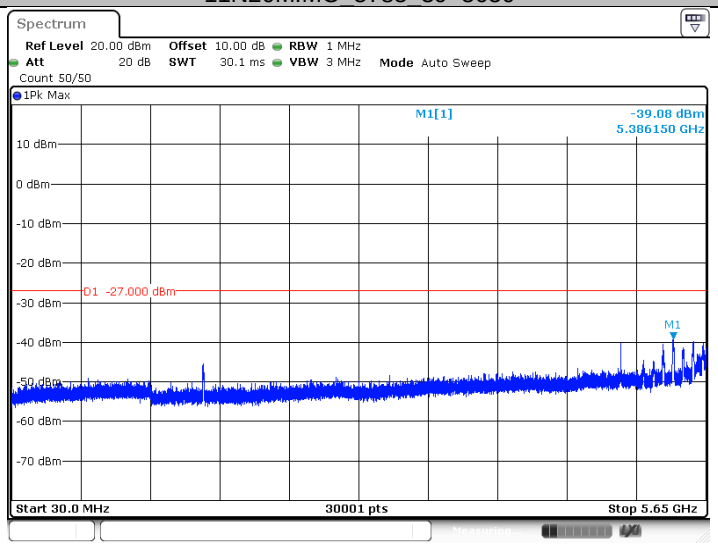
11N20MIMO_5745_30~5650



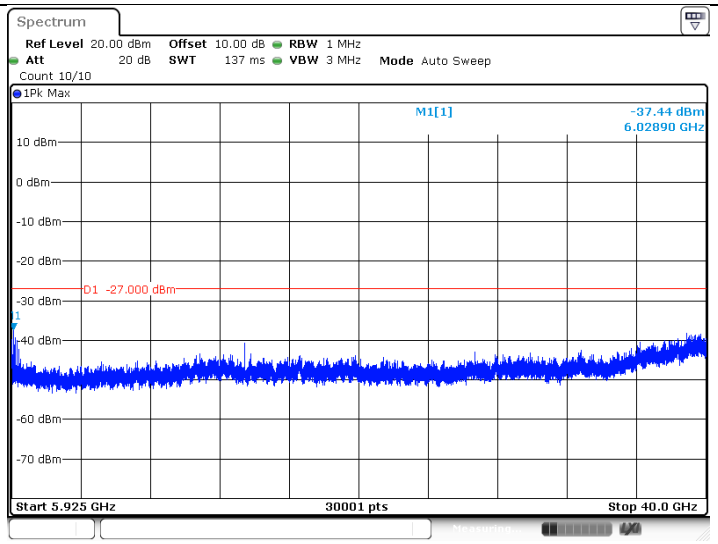
11N20MIMO_5745_5925~40000



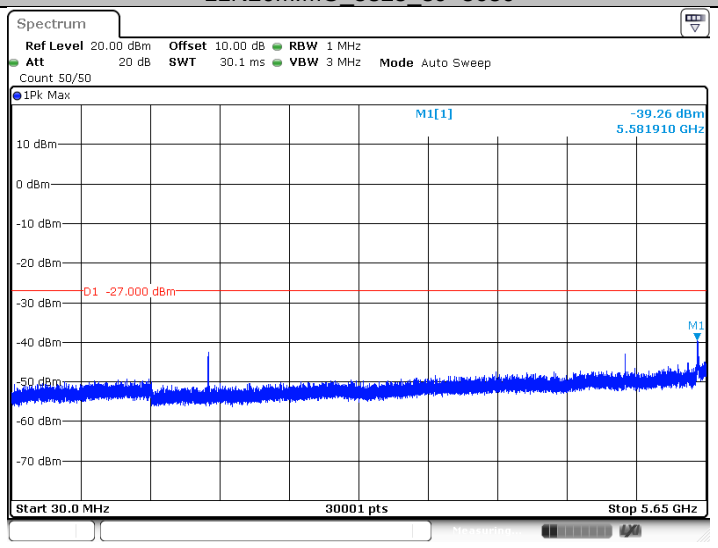
11N20MIMO_5785_30~5650



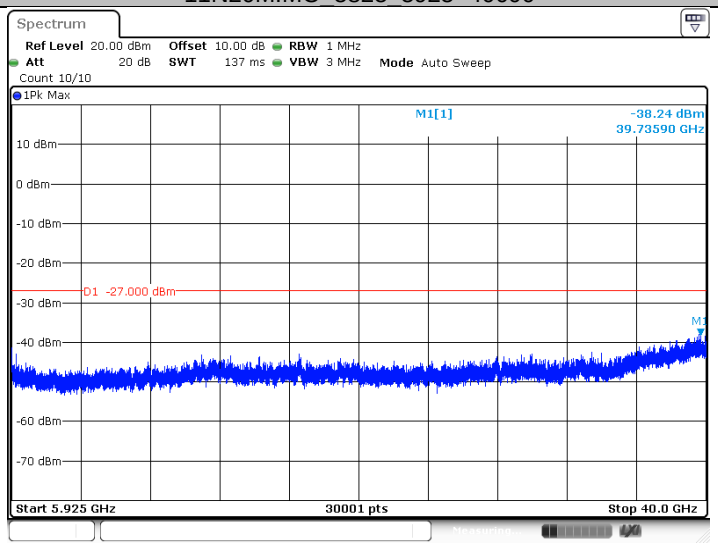
11N20MIMO_5785_5925~40000



11N20MIMO_5825_30~5650



11N20MIMO_5825_5925~40000



11N40MIMO_5190_30~5140

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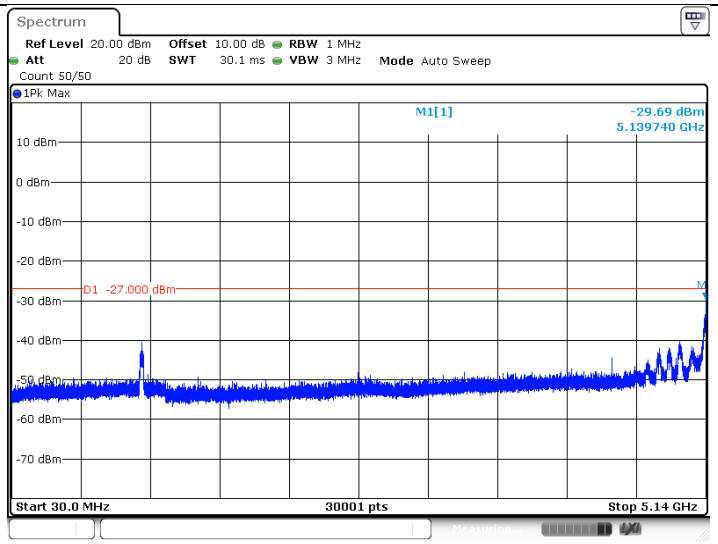
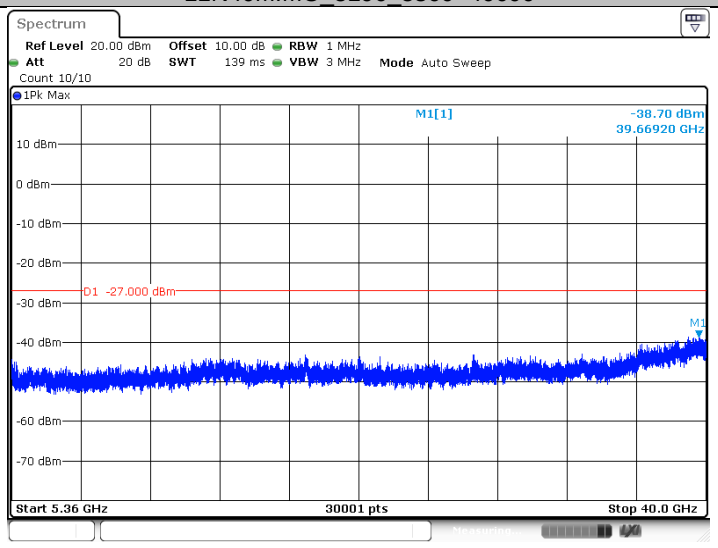
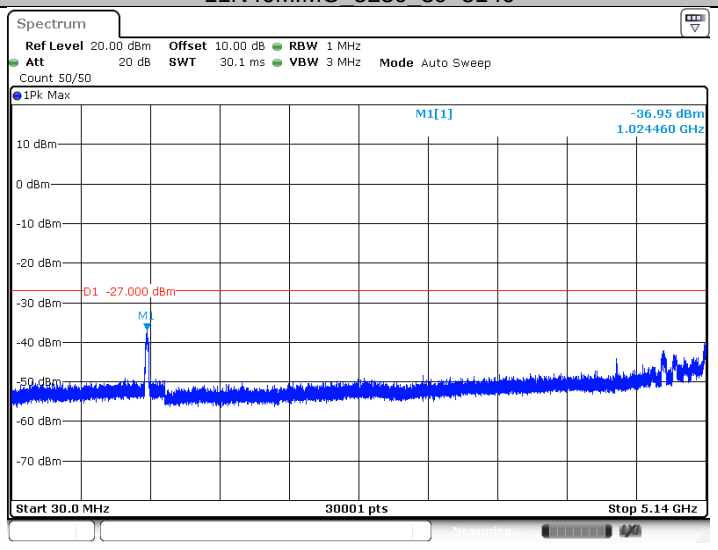


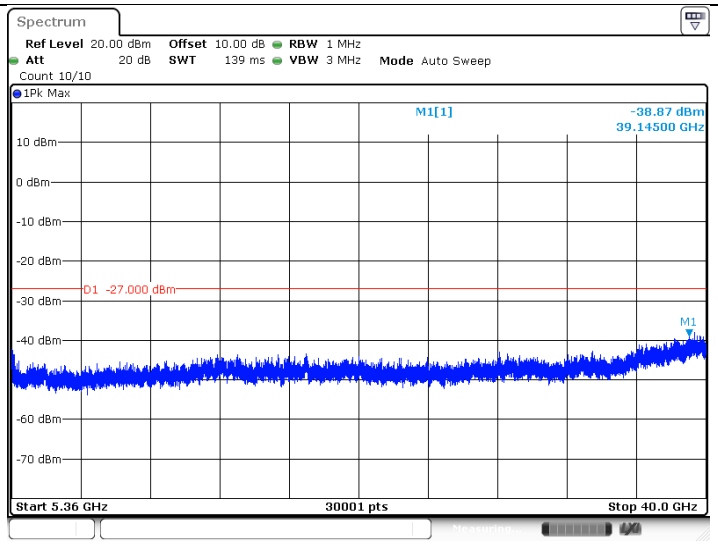
11N40MIMO_5190_5360~40000



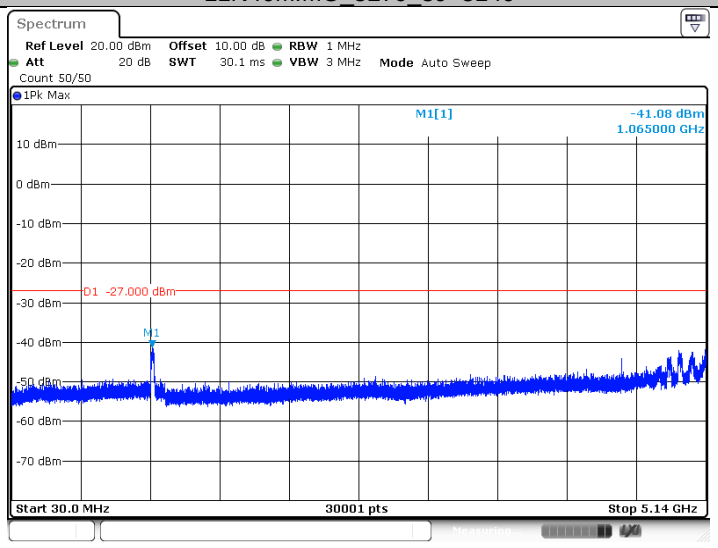
11N40MIMO_5230_30~5140



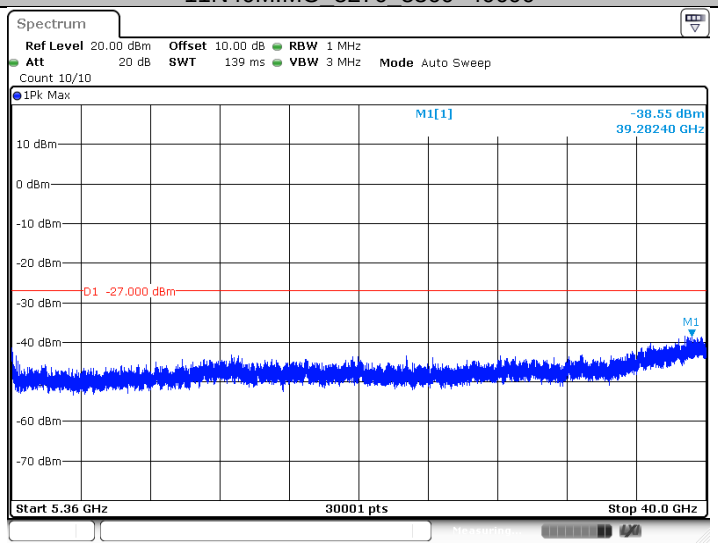
11N40MIMO_5230_5360~40000



11N40MIMO_5270_30~5140



11N40MIMO_5270_5360~40000



11N40MIMO_5310_30~5140

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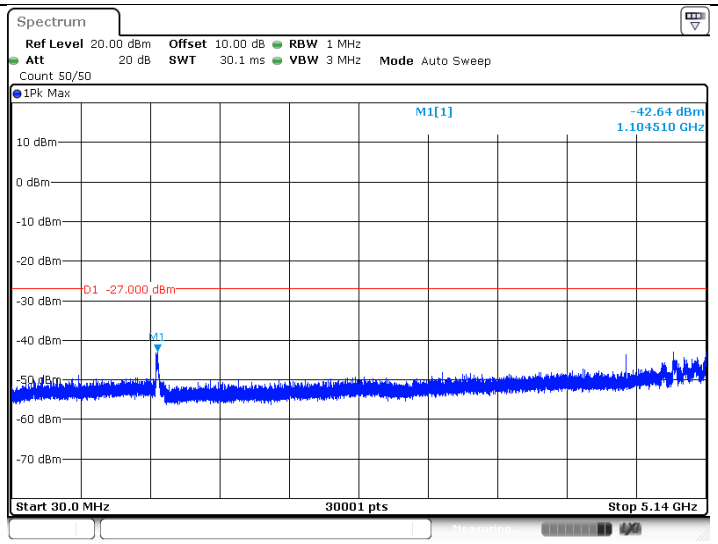
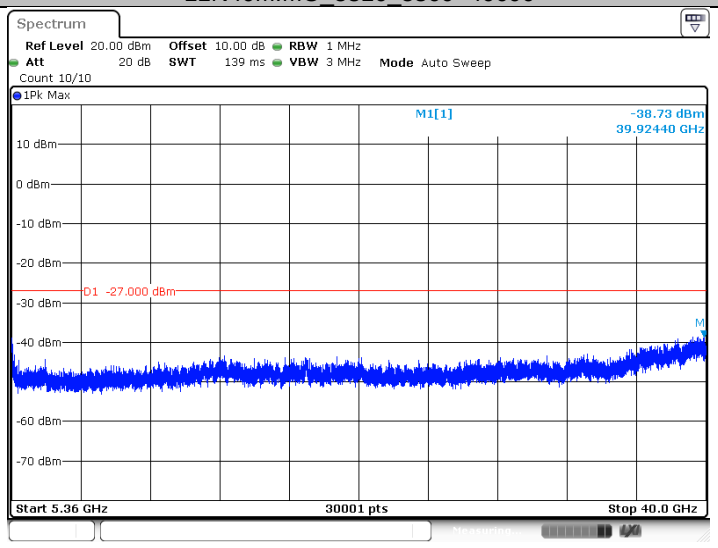
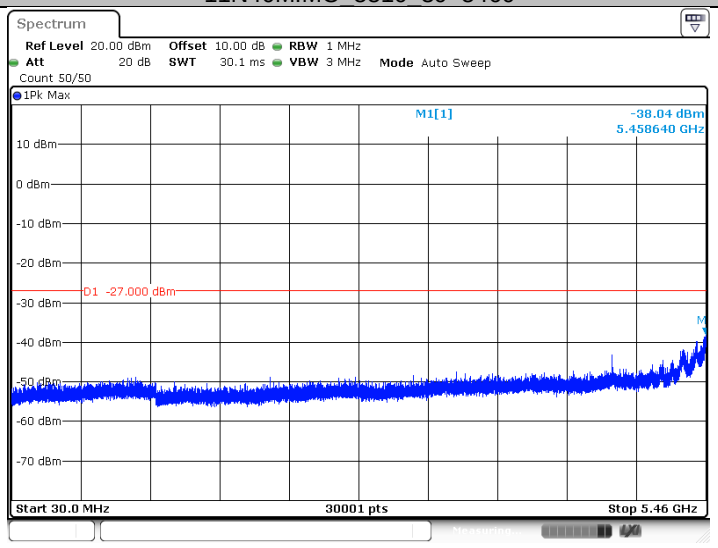


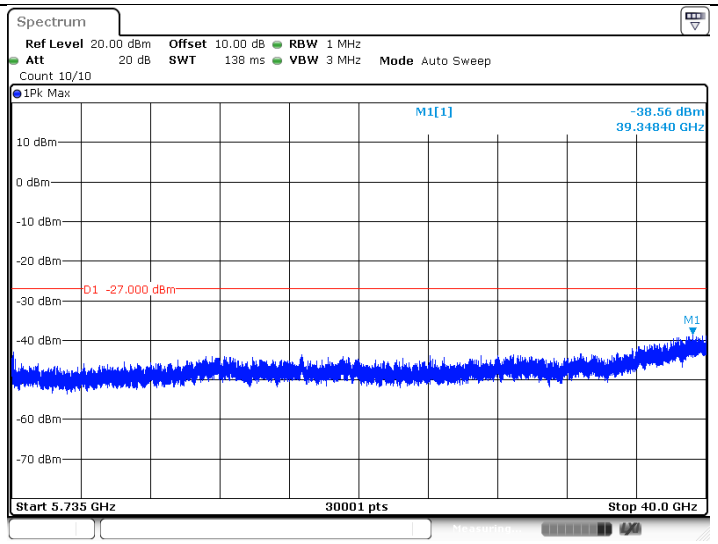
11N40MIMO_5310_5360~40000



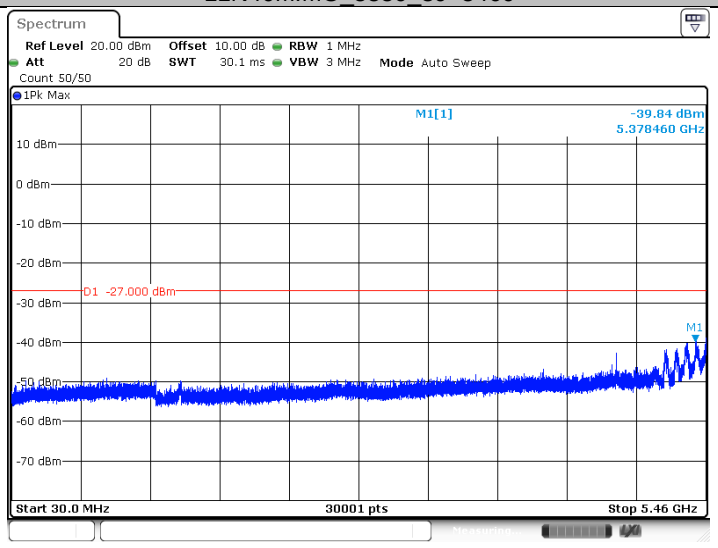
11N40MIMO_5510_30~5460



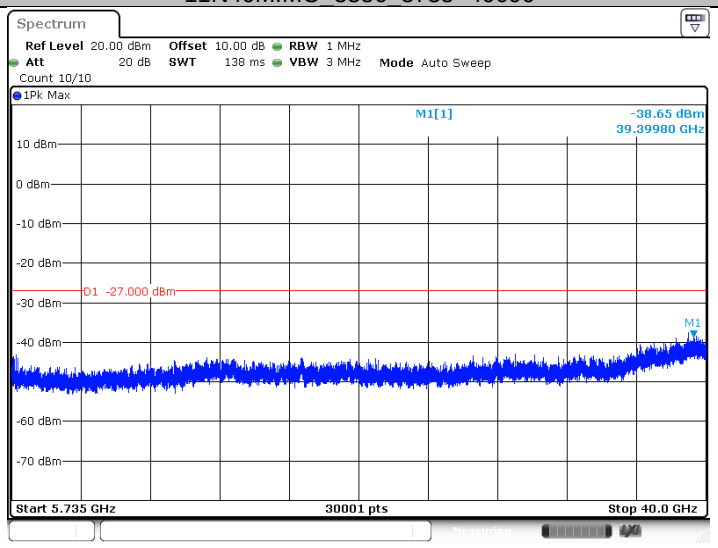
11N40MIMO_5510_5735~40000



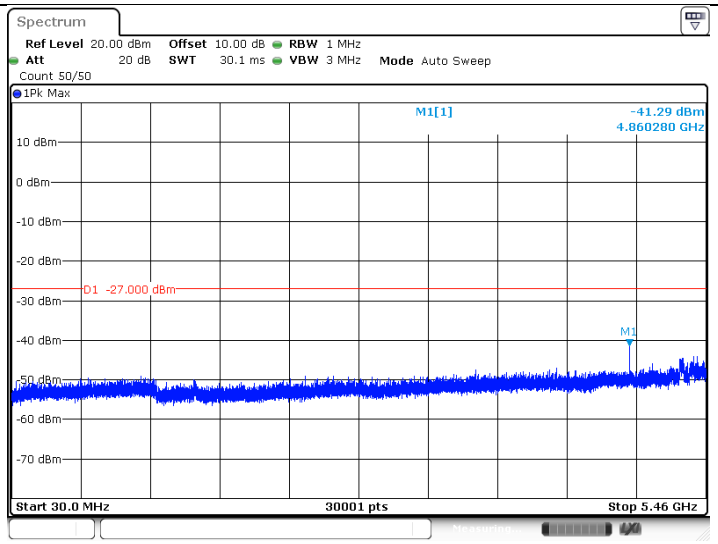
11N40MIMO_5550_30~5460



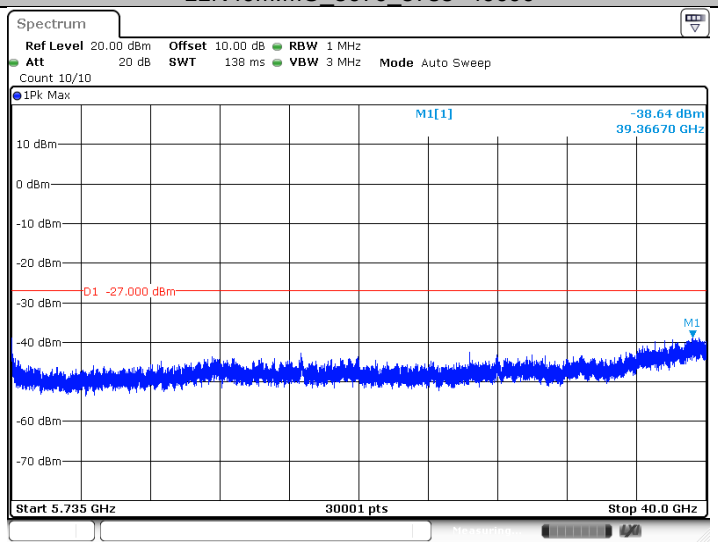
11N40MIMO_5550_5735~40000



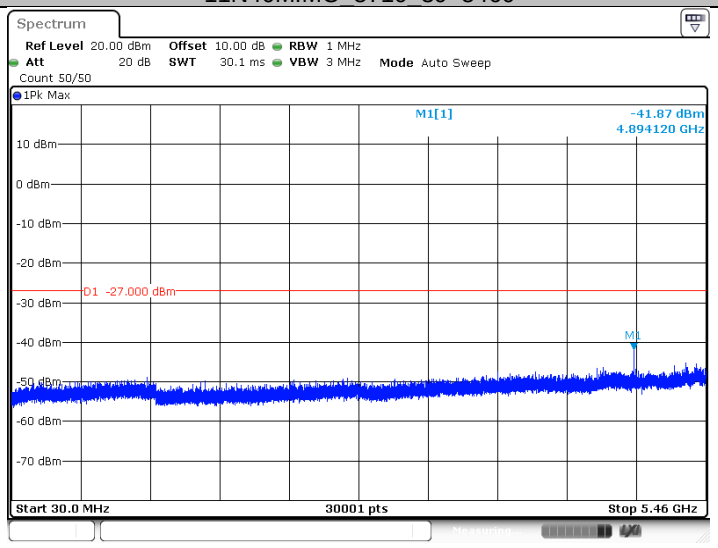
11N40MIMO_5670_30~5460



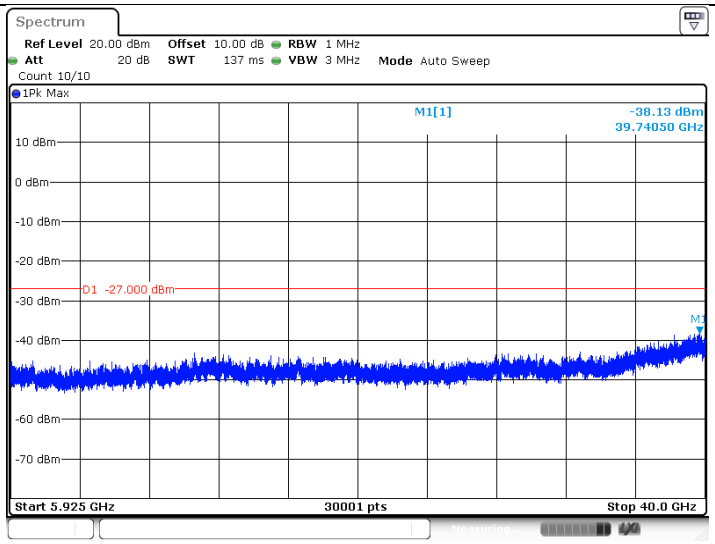
11N40MIMO_5670_5735~40000



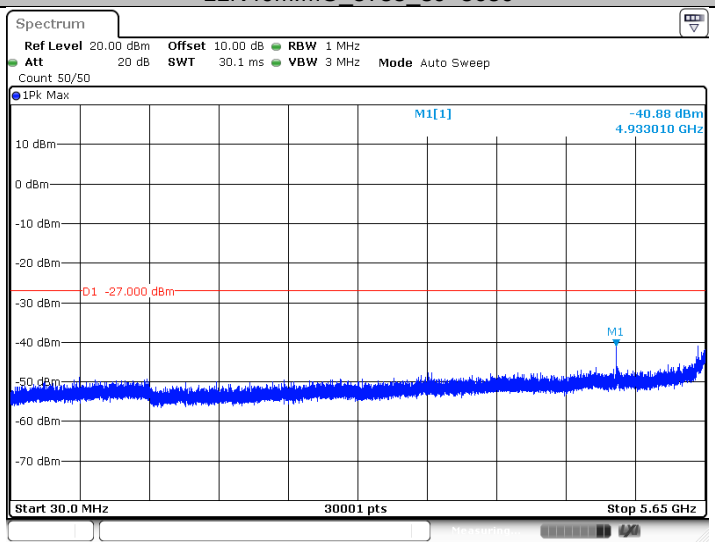
11N40MIMO_5710_30~5460



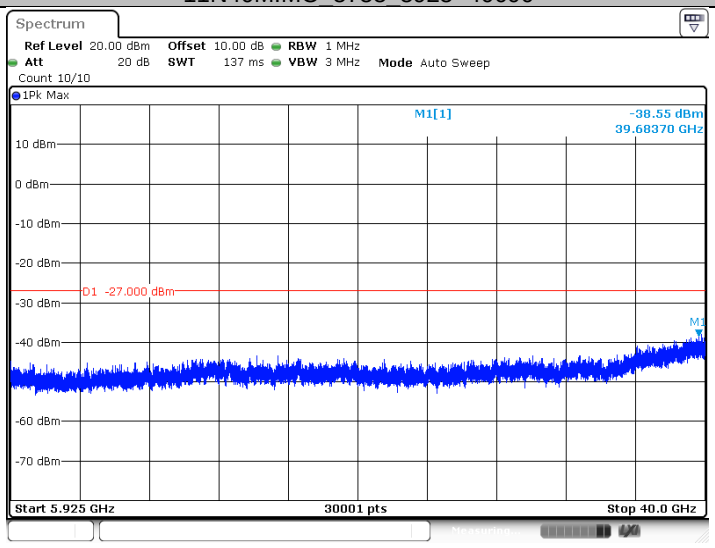
11N40MIMO_5710_5925~40000



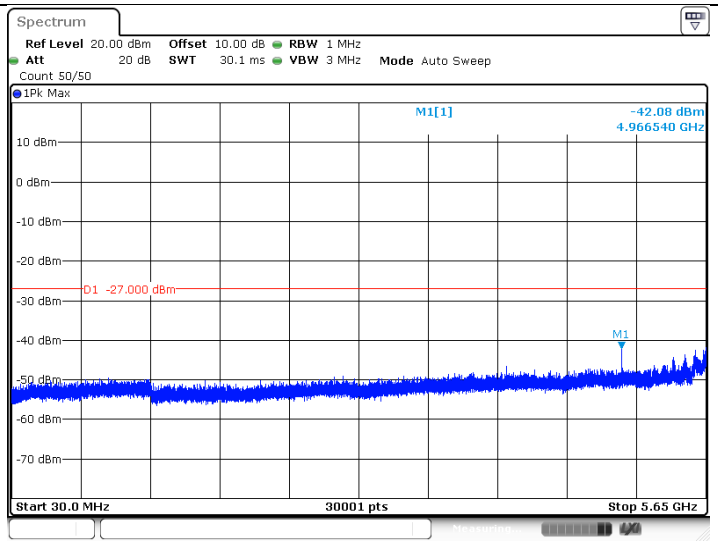
11N40MIMO_5755_30~5650



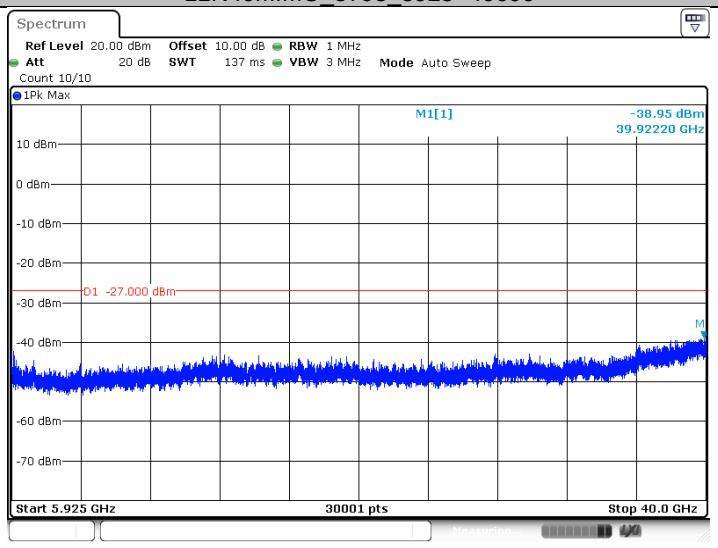
11N40MIMO_5755_5925~40000



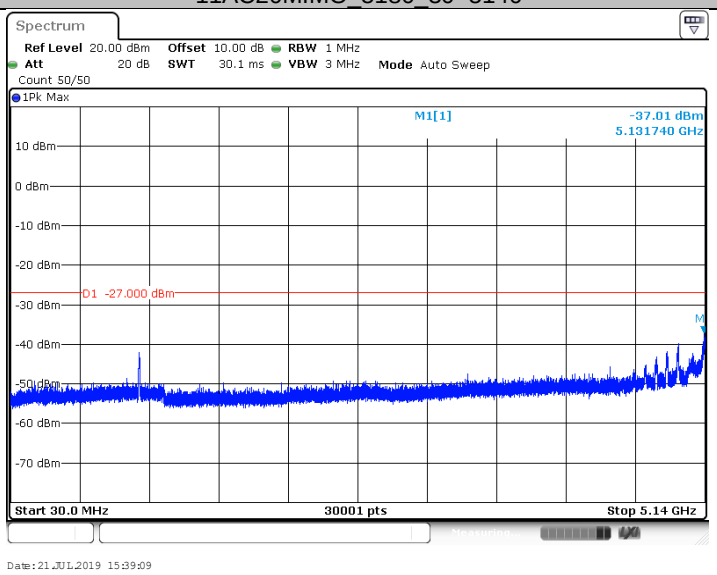
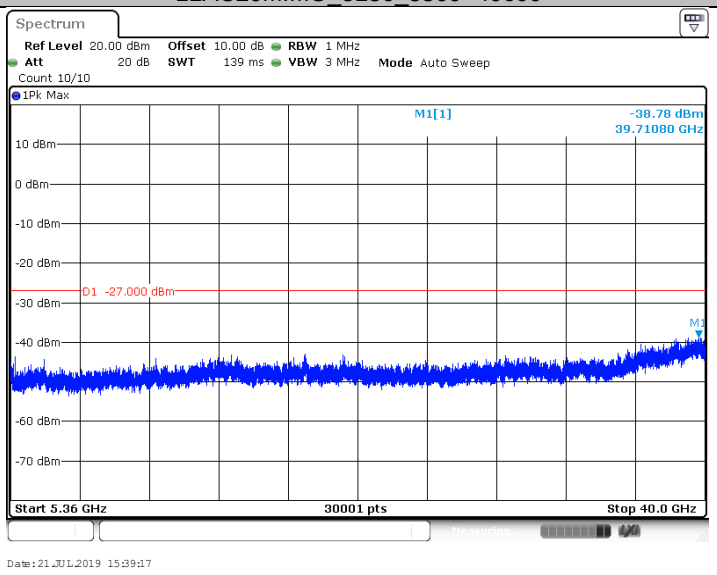
11N40MIMO_5795_30~5650



11N40MIMO_5795_5925~40000



IEEE 802.11ac_MIMO modulation Test Result

11AC20MIMO_5180_30~5140

11AC20MIMO_5180_5360~40000

11AC20MIMO_5200_30~5140

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Nanshan District, Shenzhen City, 518052, P. R. China
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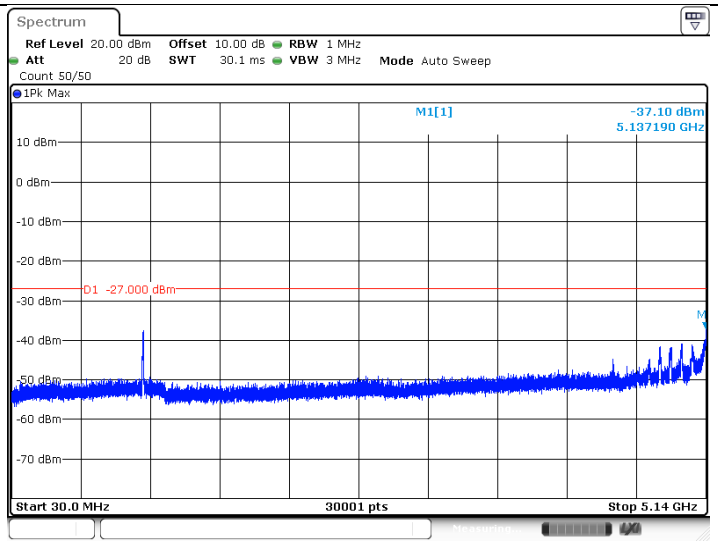
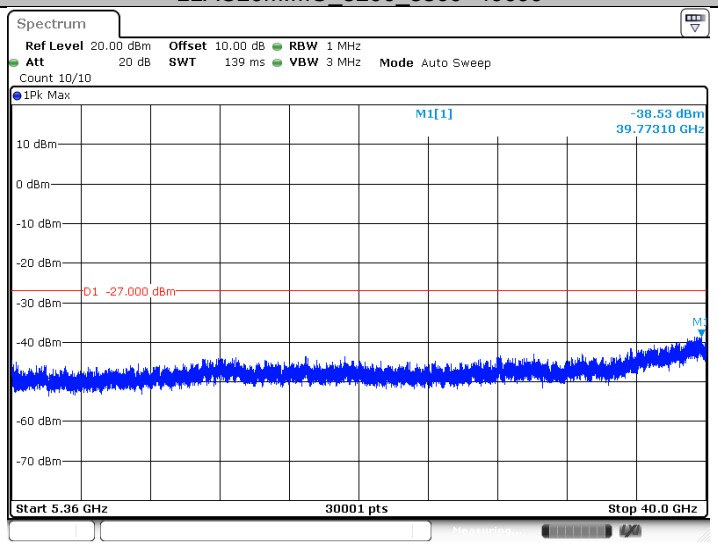
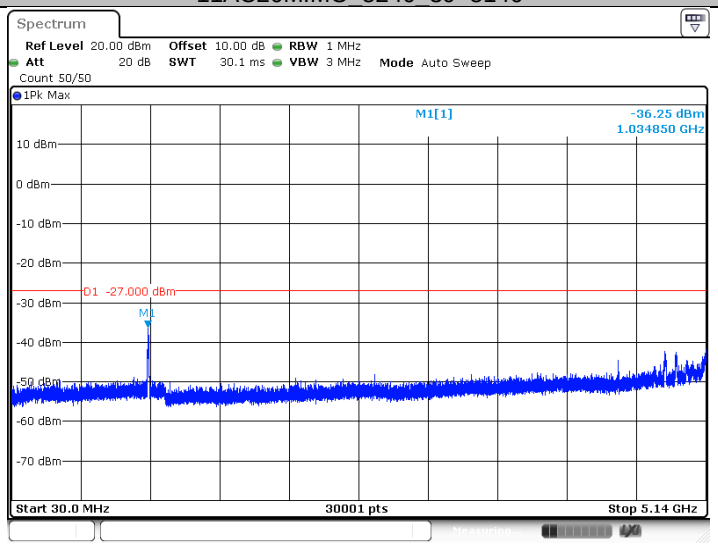


11AC20MIMO_5200_5360~40000



11AC20MIMO_5240_30~5140



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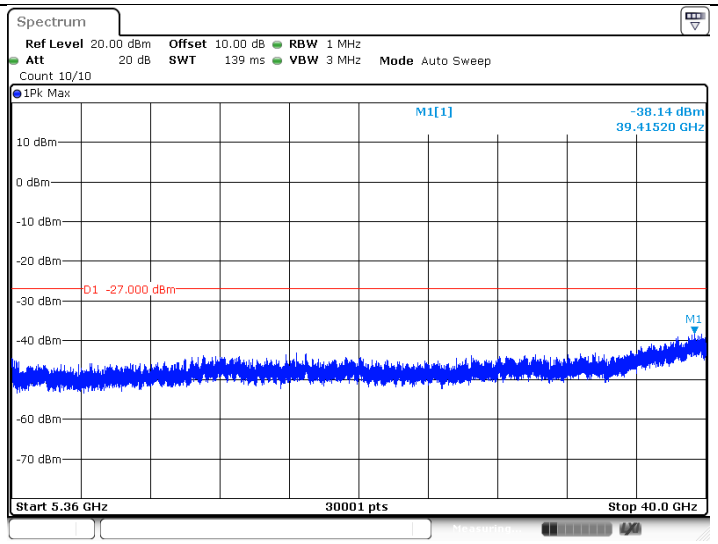

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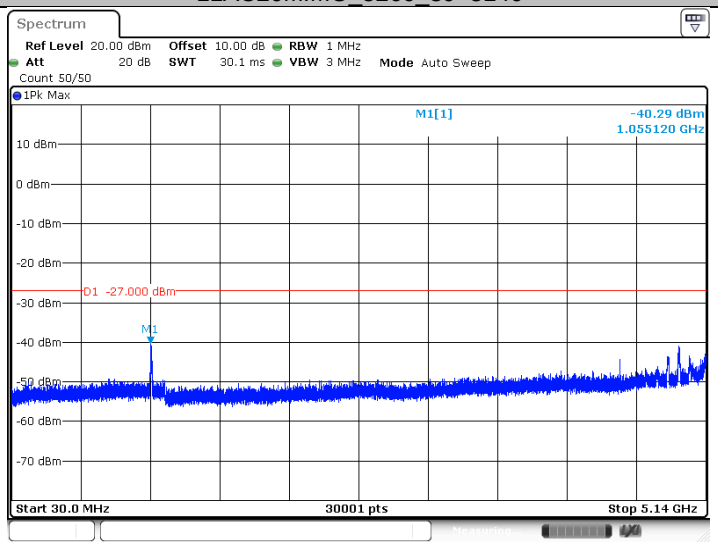

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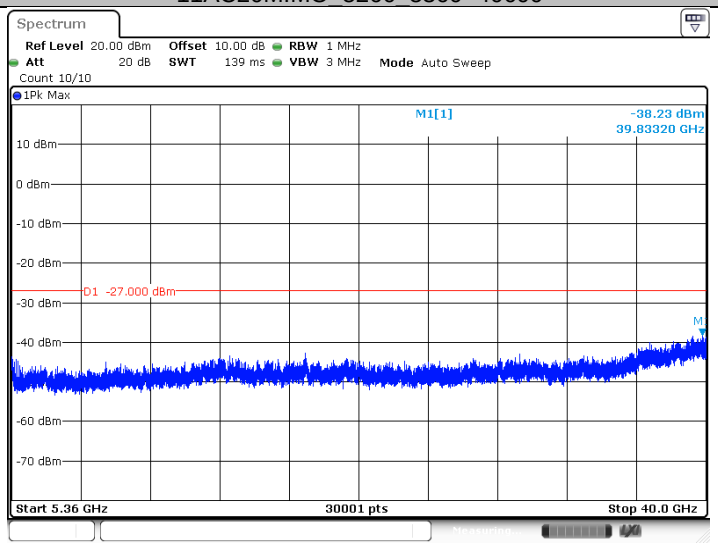

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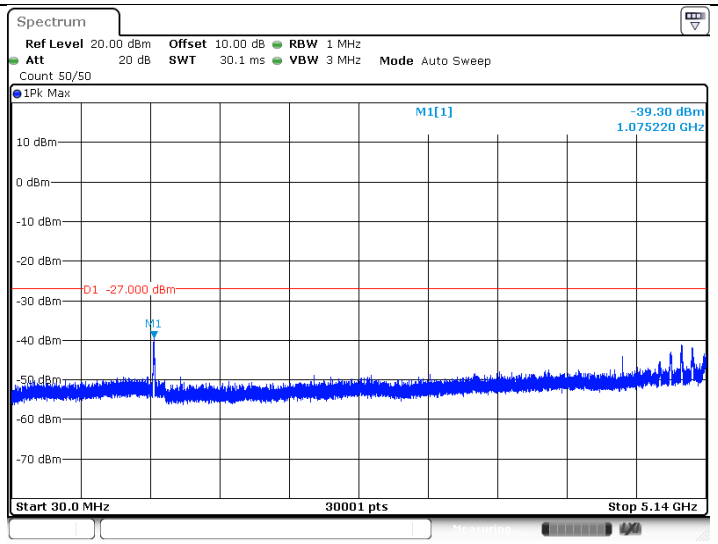

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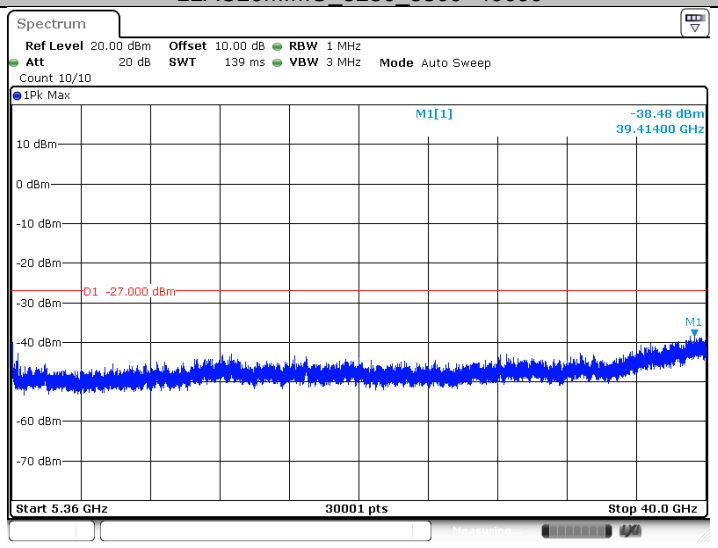

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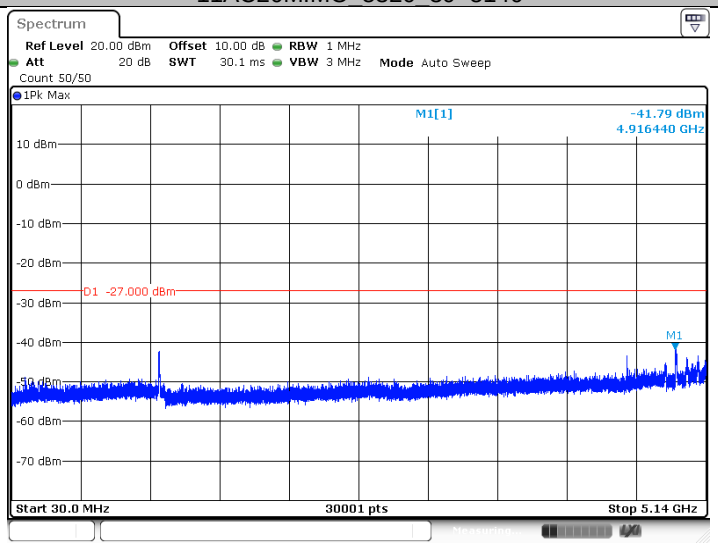
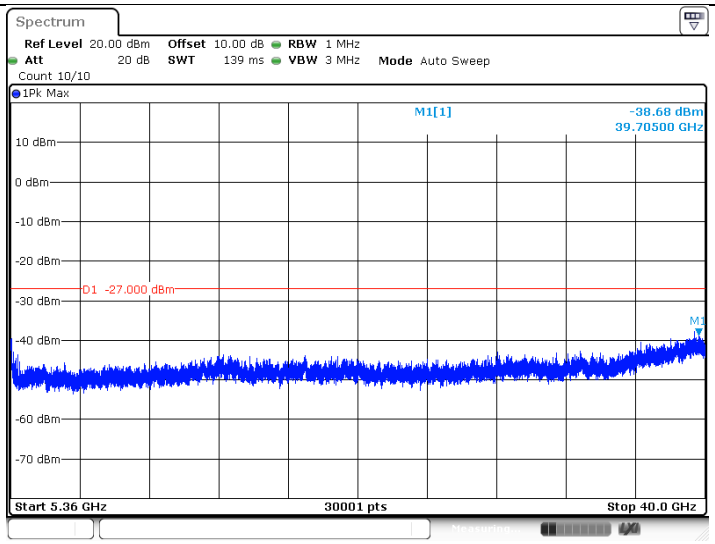
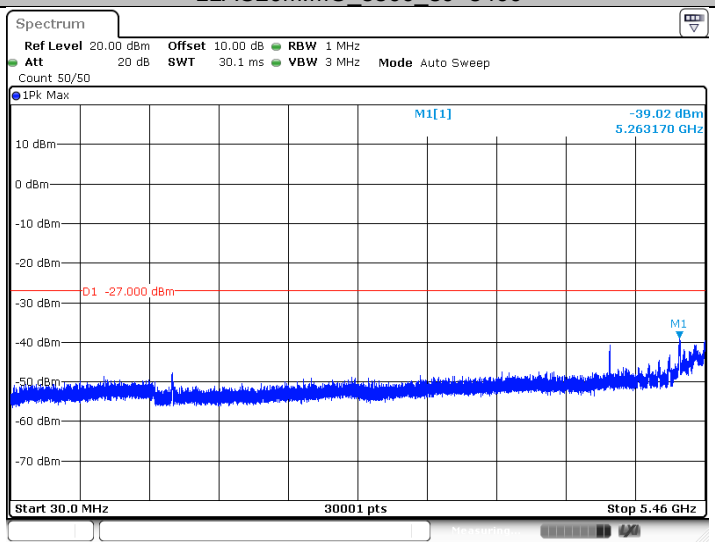


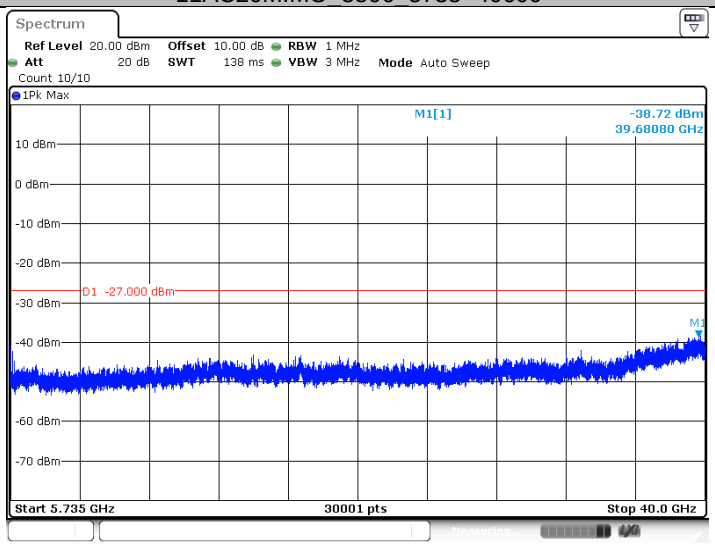
11AC20MIMO_5320_5360~40000



11AC20MIMO_5500_30~5460



11AC20MIMO_5500_5735~40000



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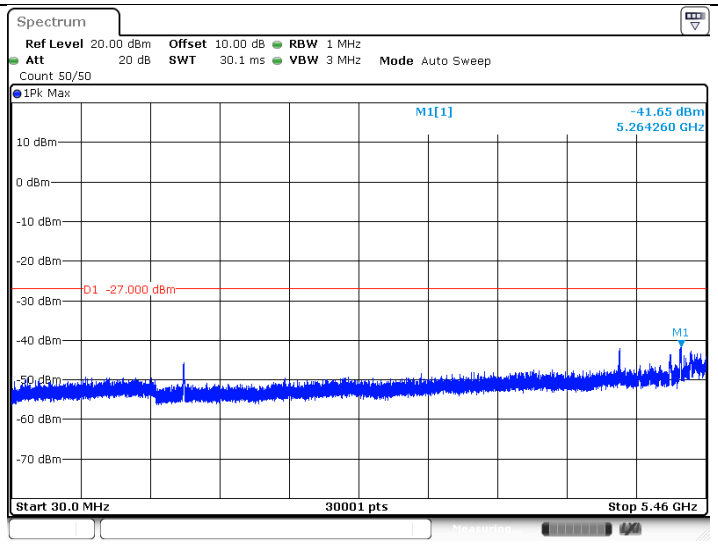

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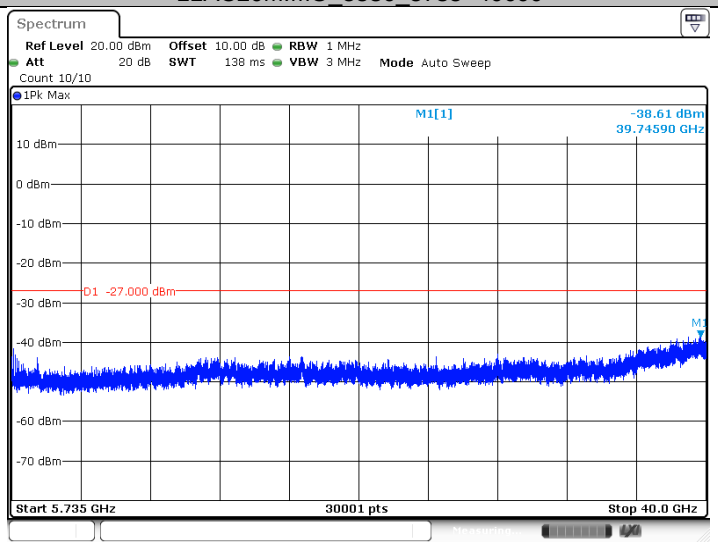

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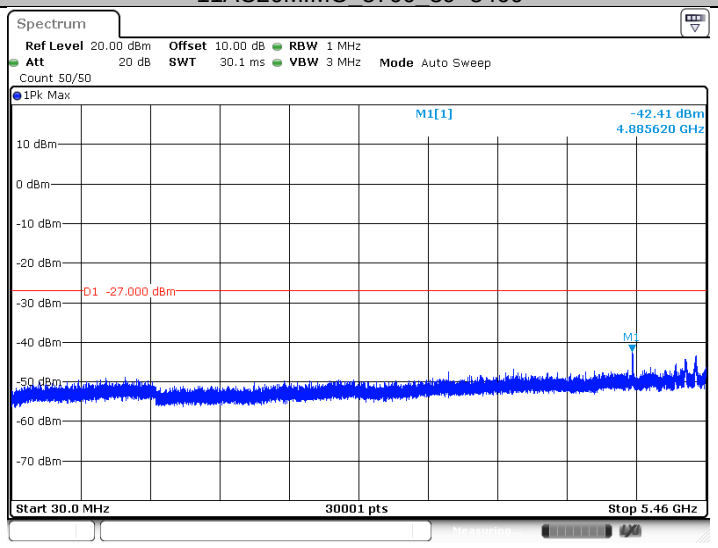

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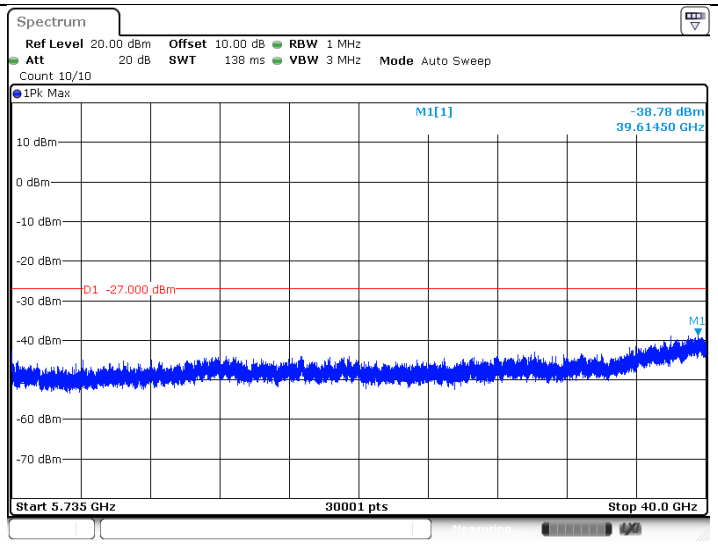

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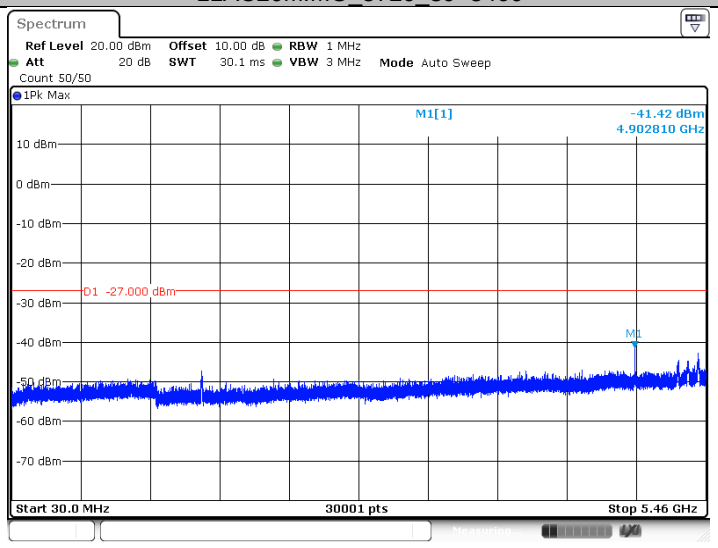

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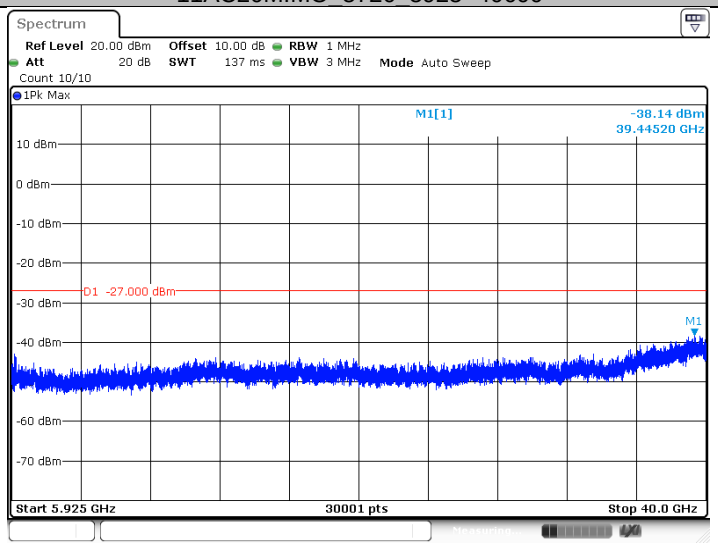

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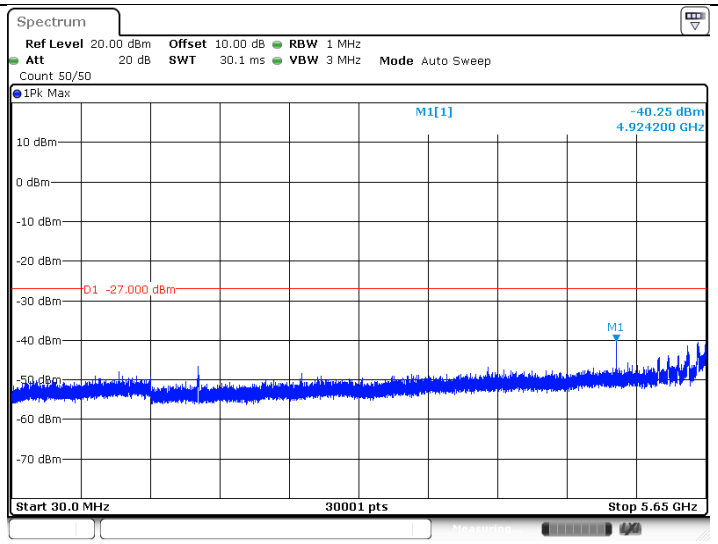

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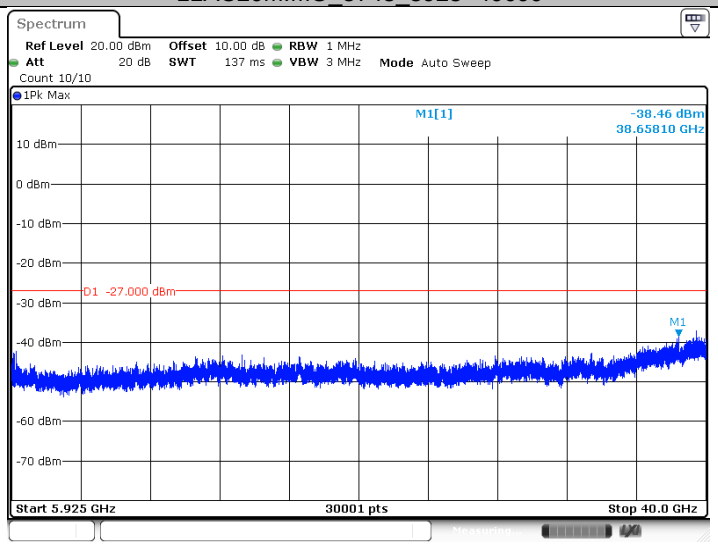

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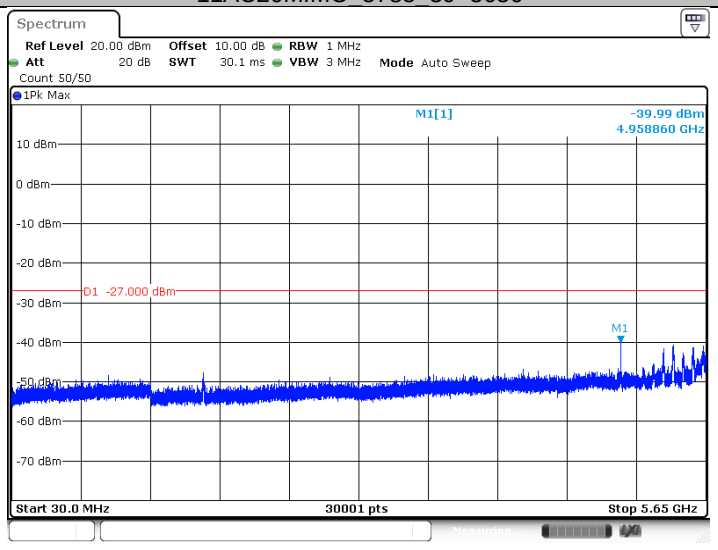

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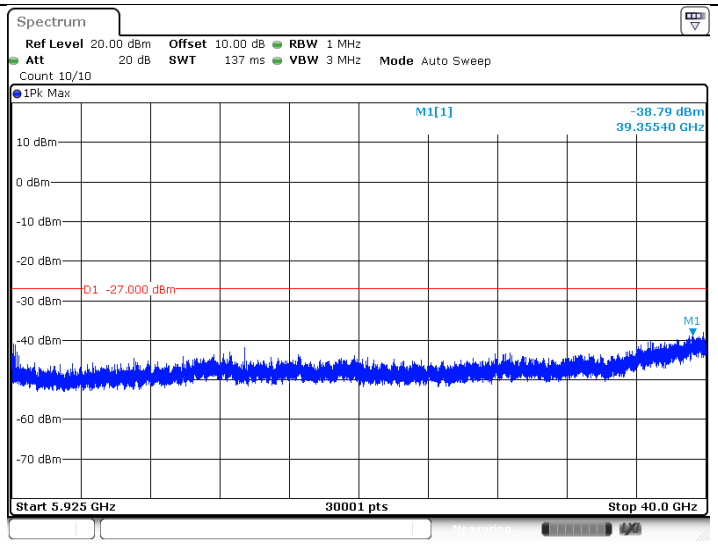

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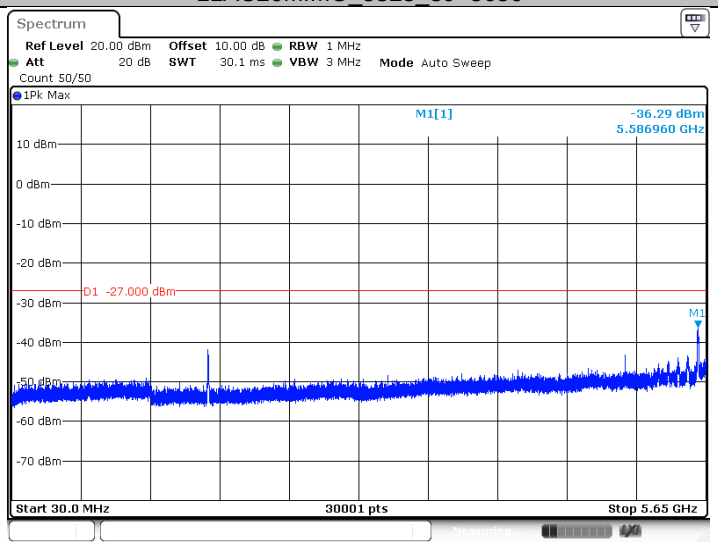

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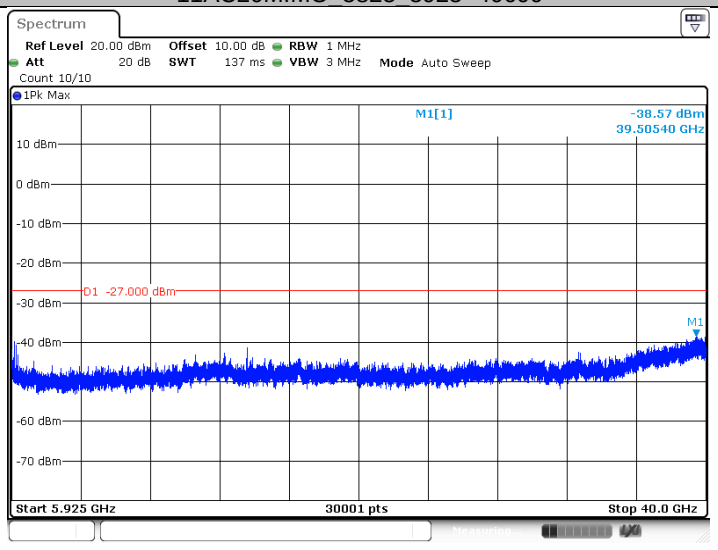

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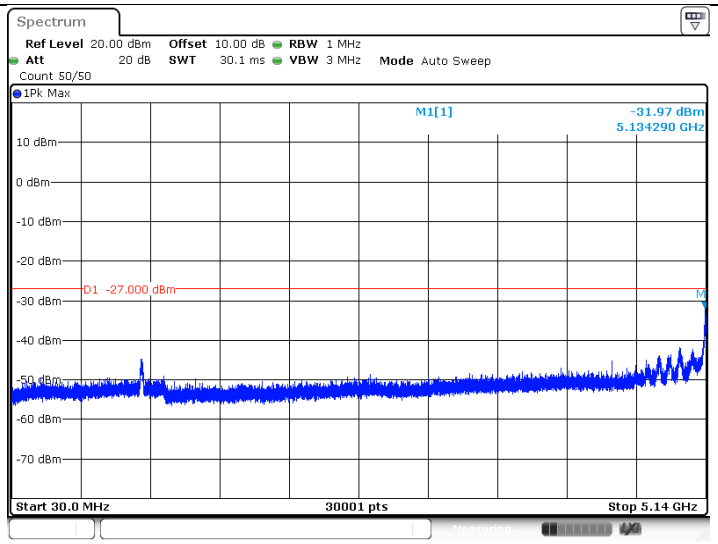

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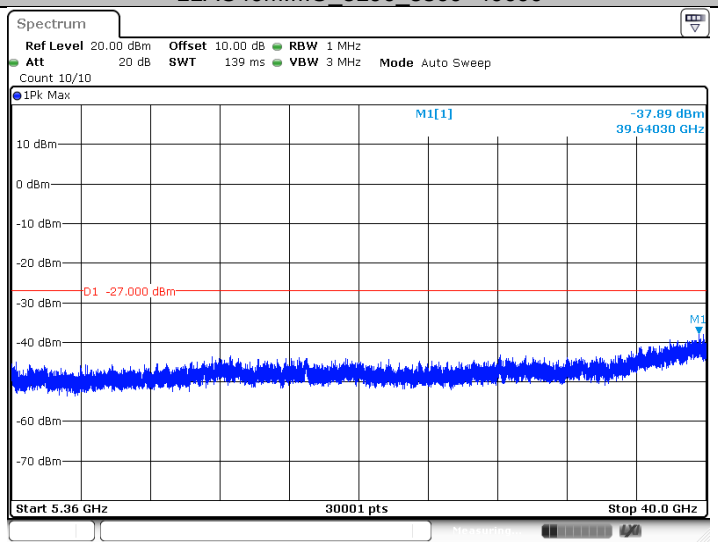

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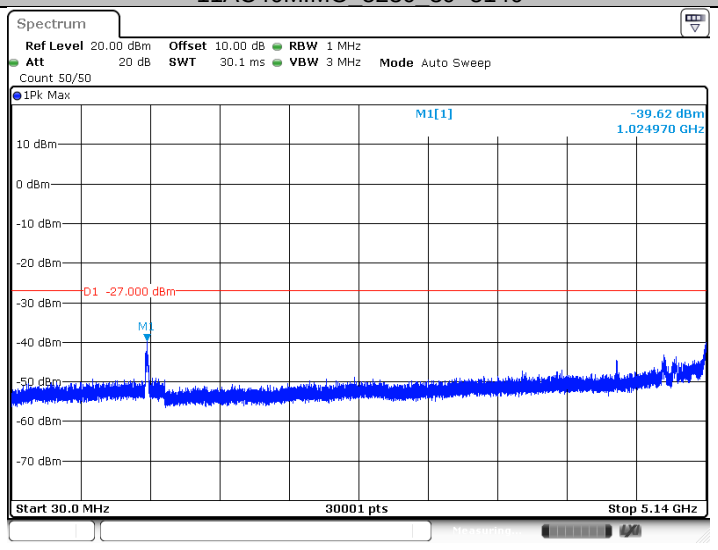

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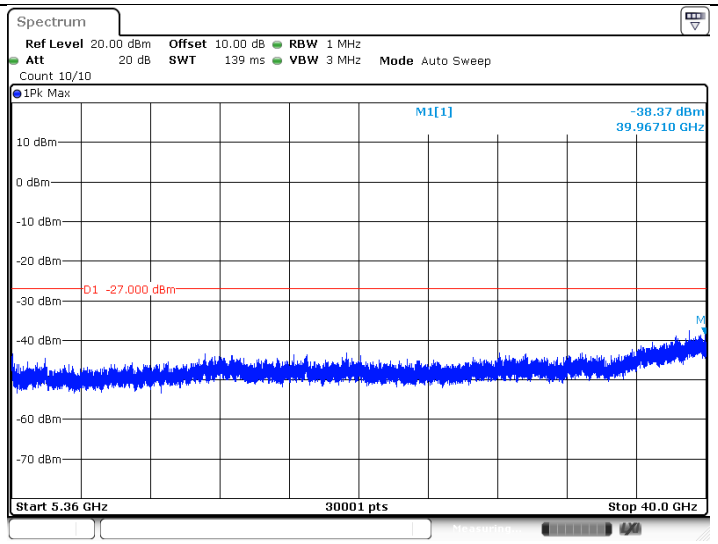

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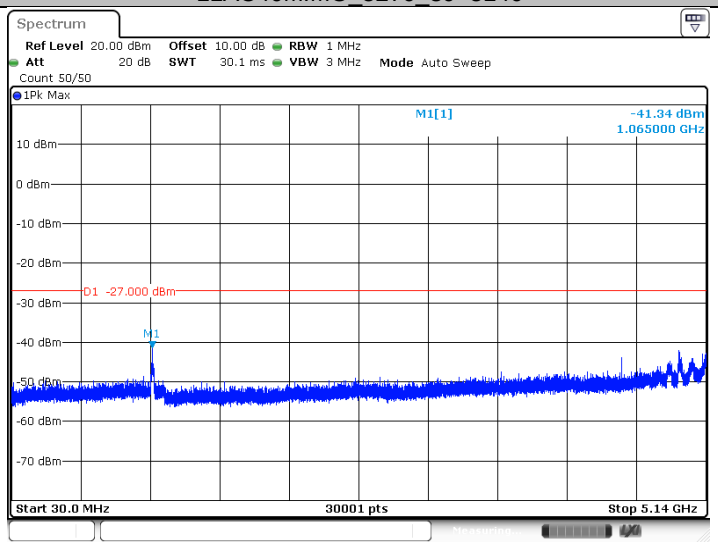

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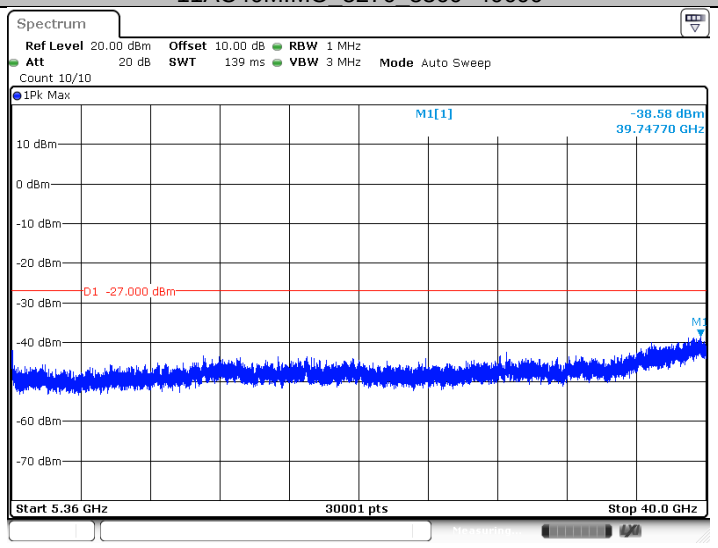

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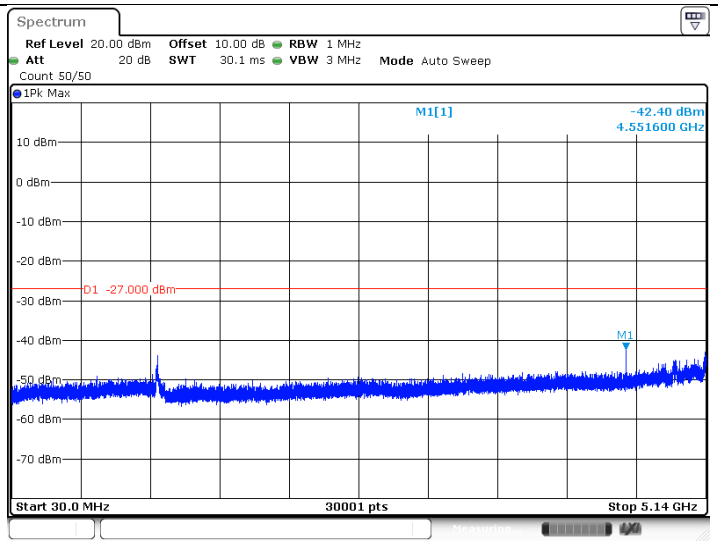

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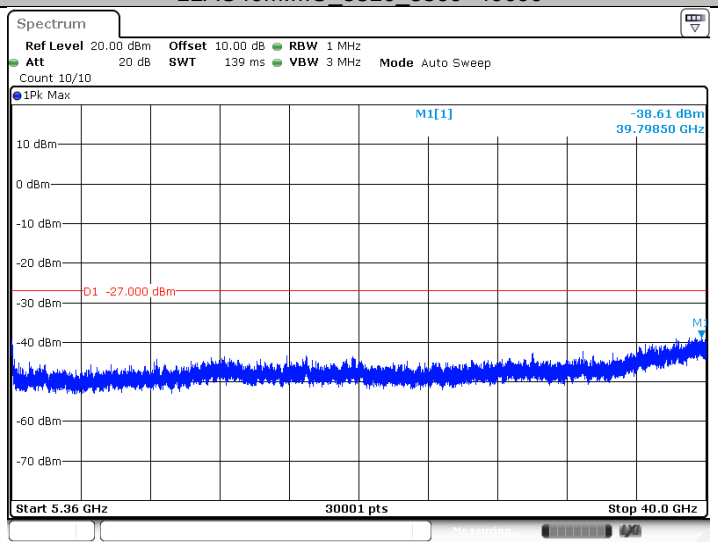

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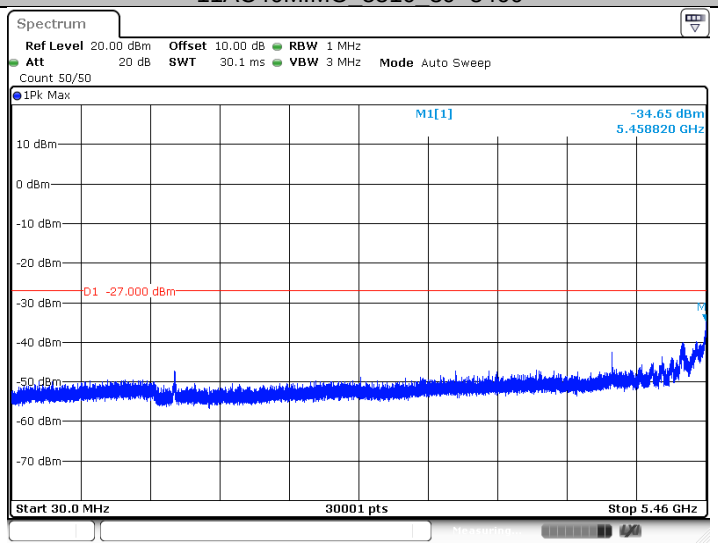

11AC40MIMO_5510_5735~40000

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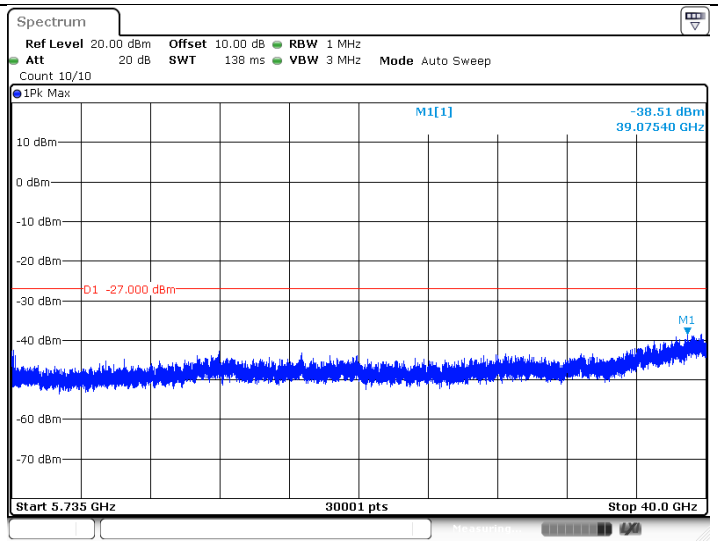

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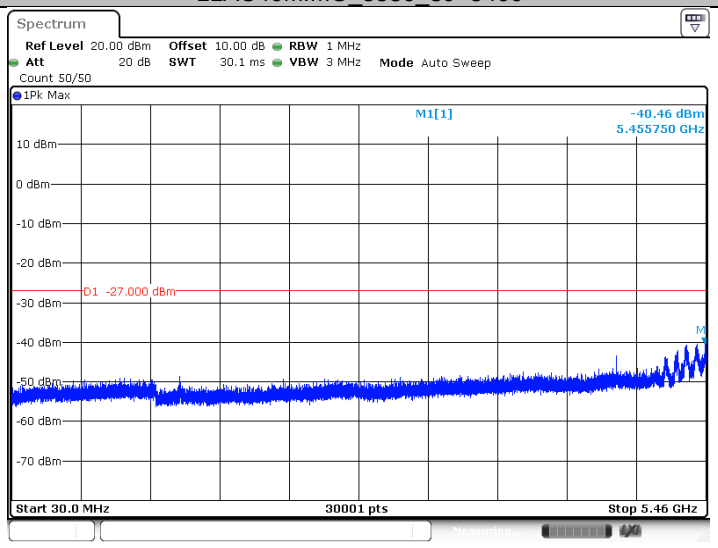

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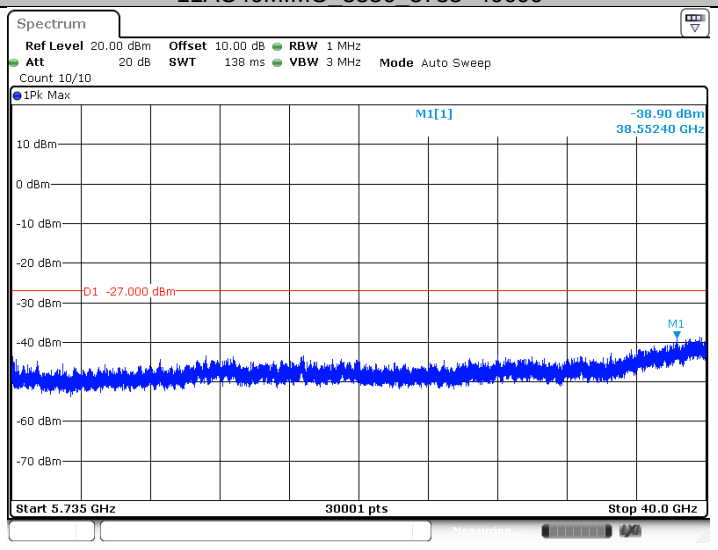

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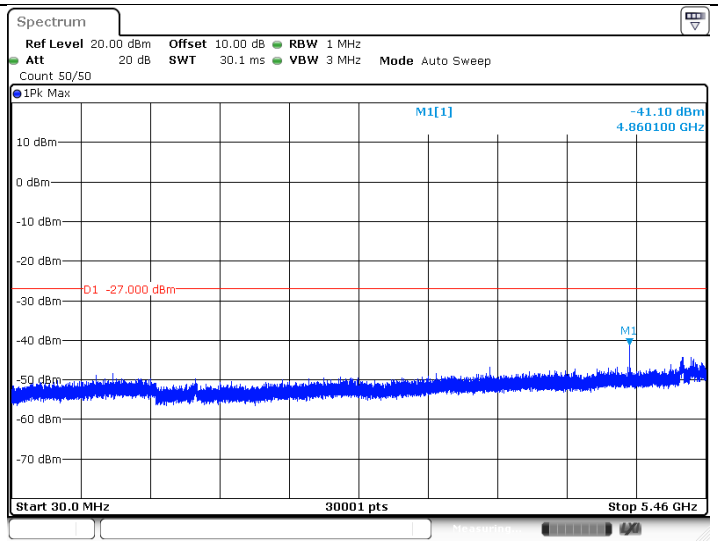

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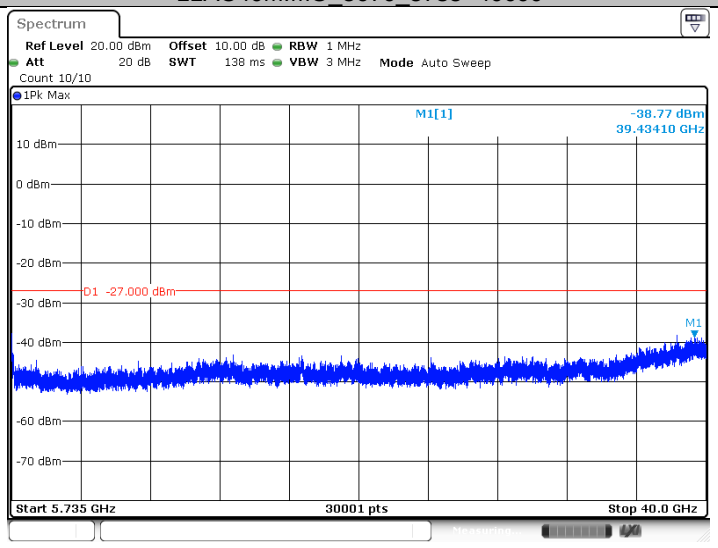

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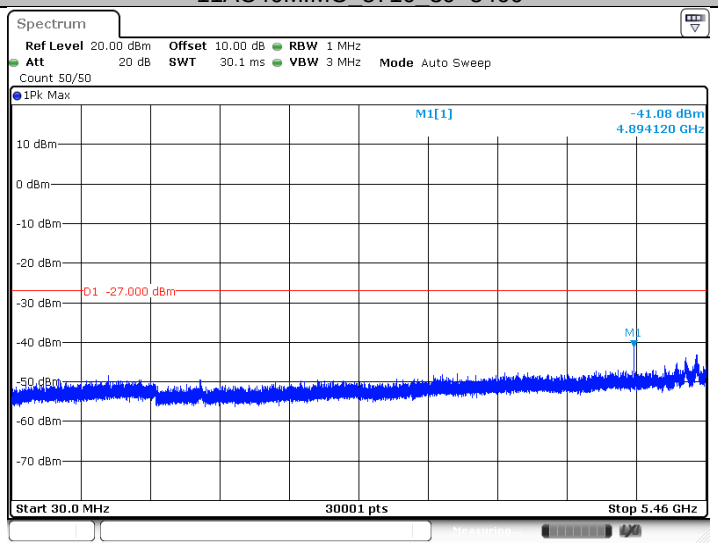

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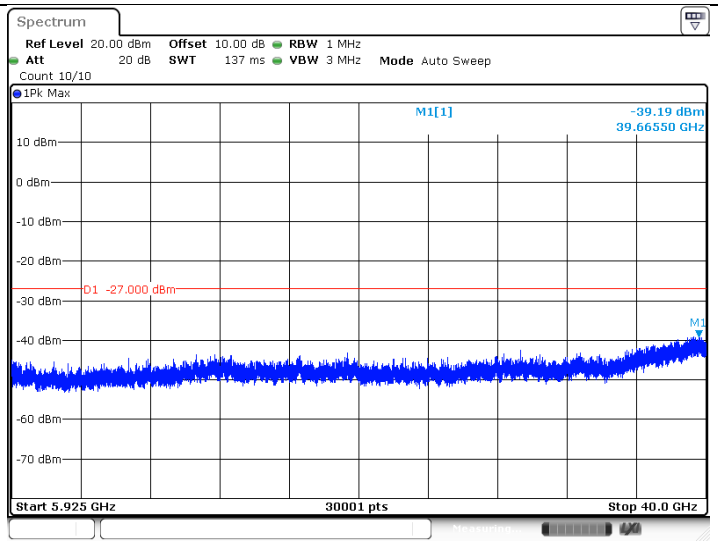

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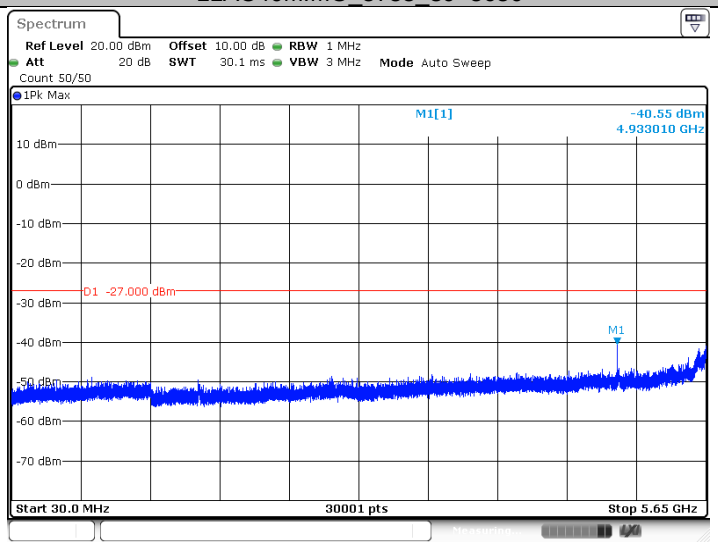

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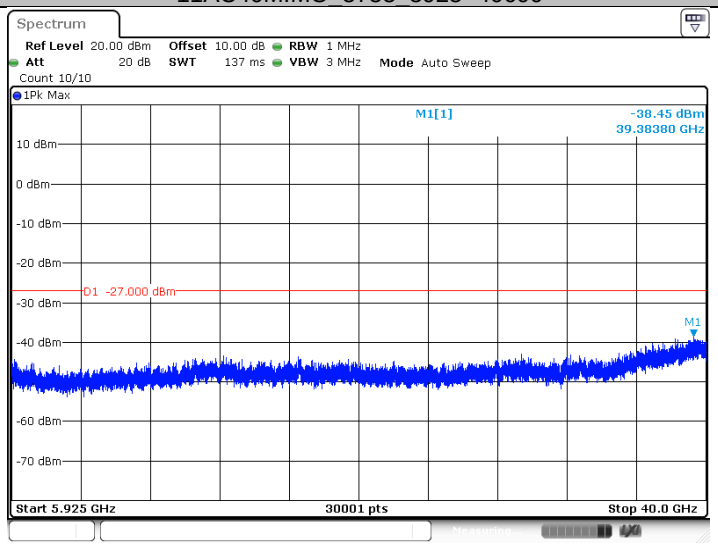

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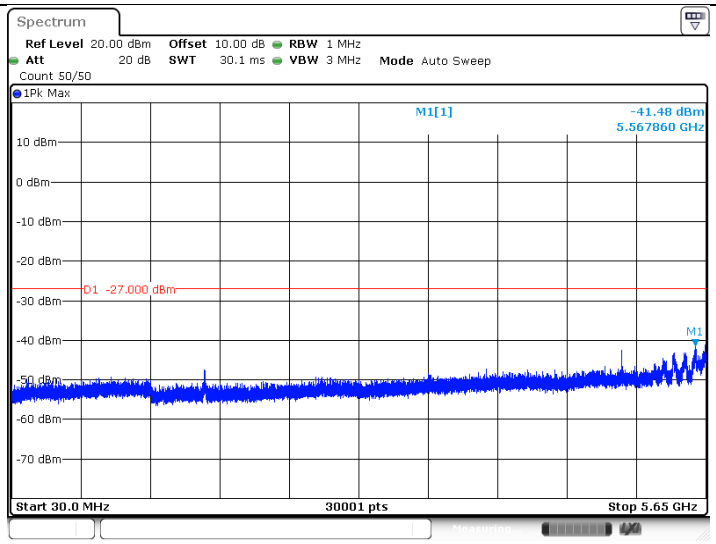

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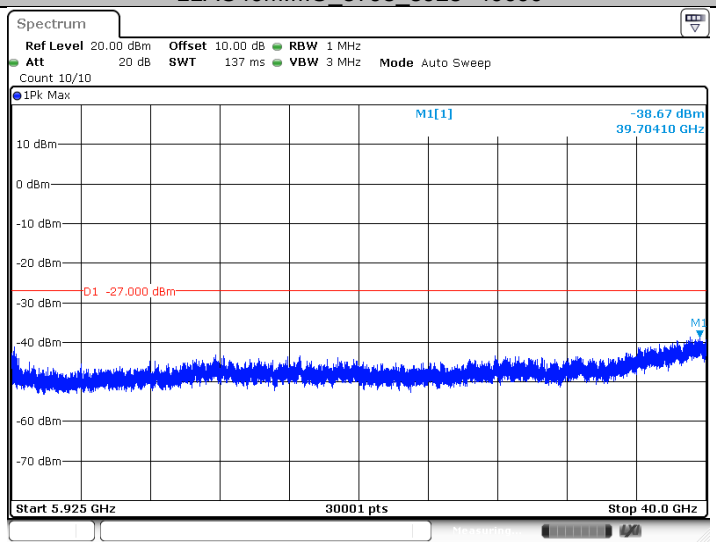

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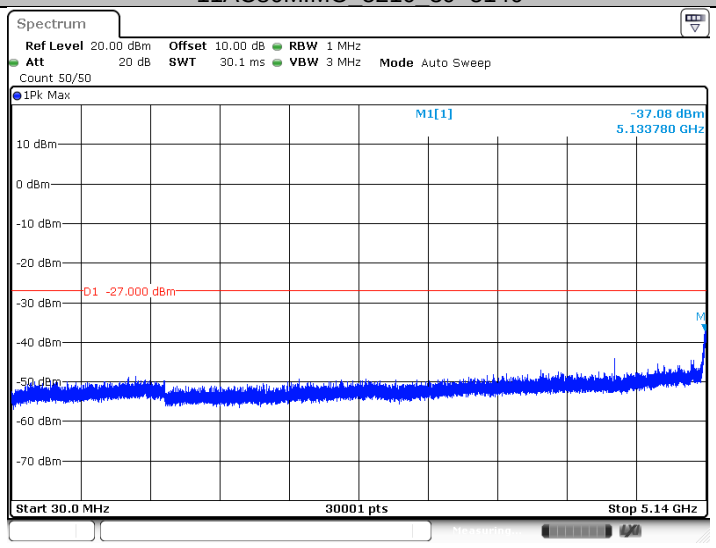

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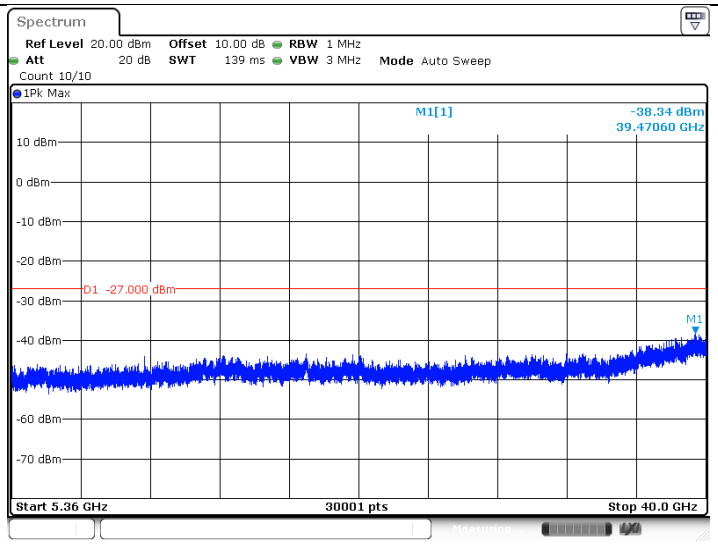

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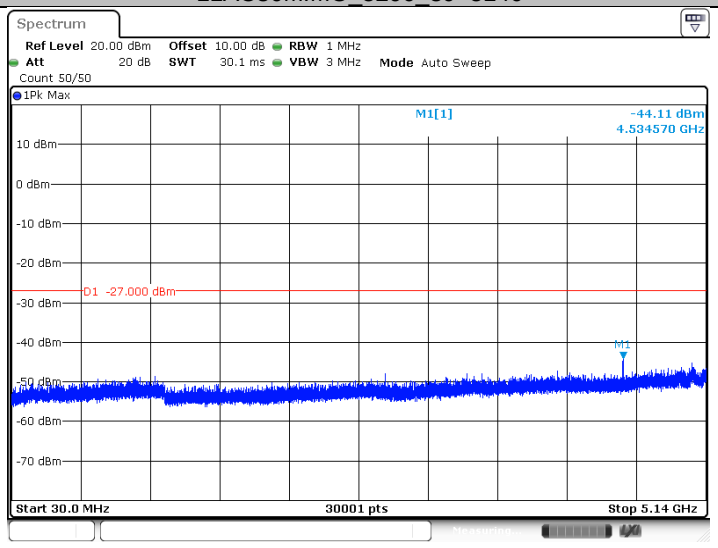
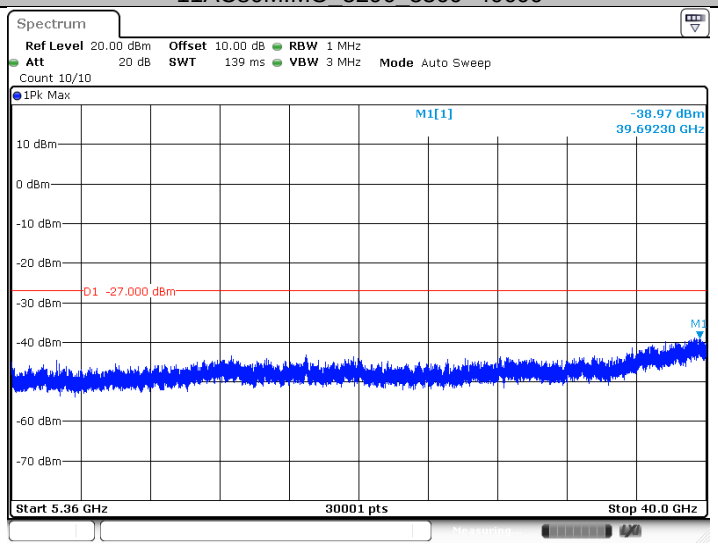
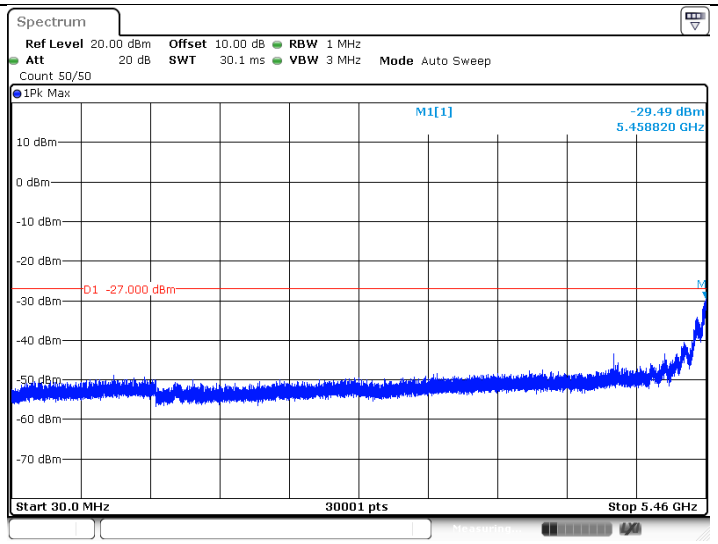


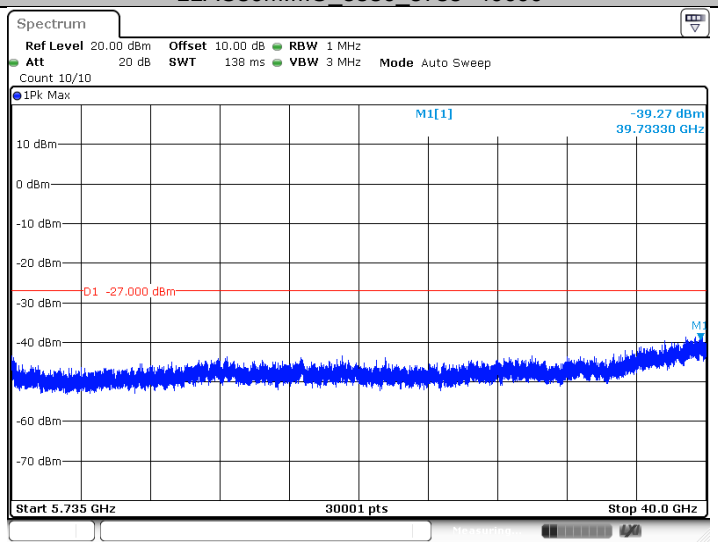
11AC80MIMO_5290_5360~40000



11AC80MIMO_5530_30~5460



11AC80MIMO_5530_5735~40000



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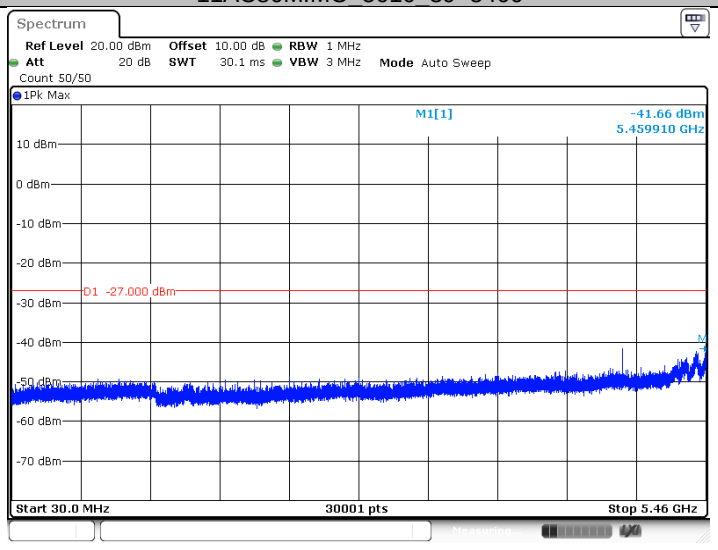

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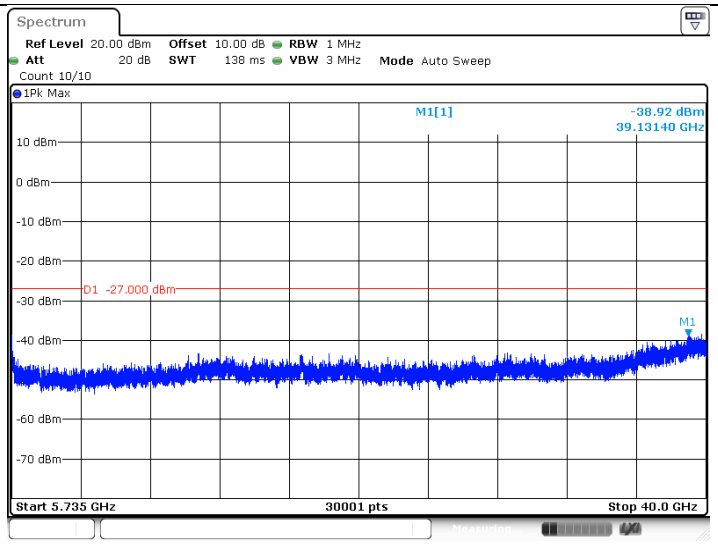

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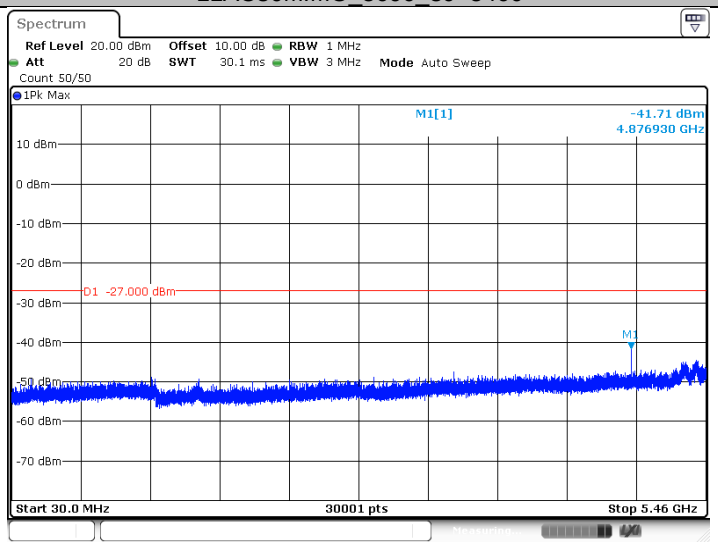
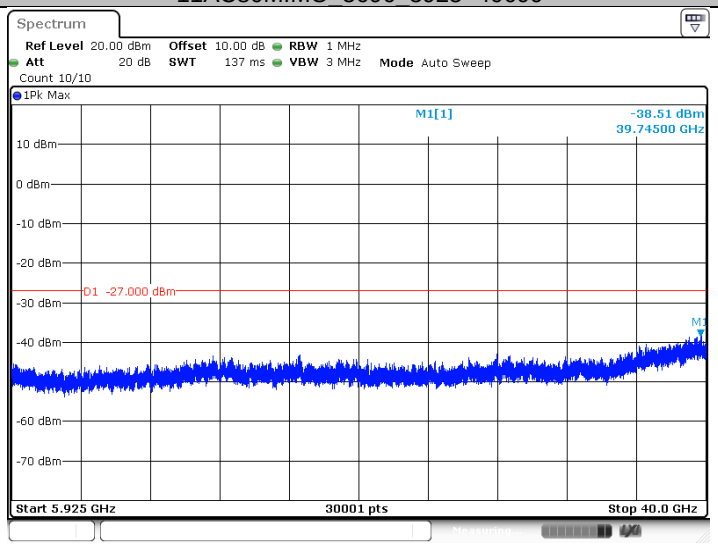


11AC80MIMO_5690_5925~40000



11AC80MIMO_5775_30~5650

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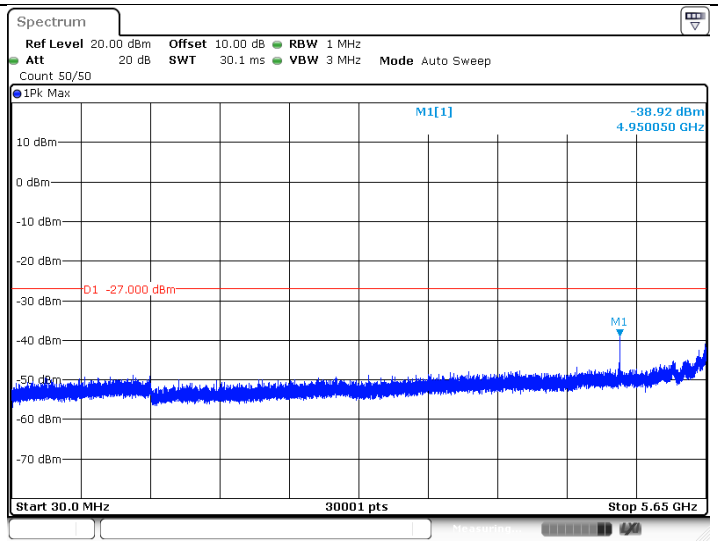
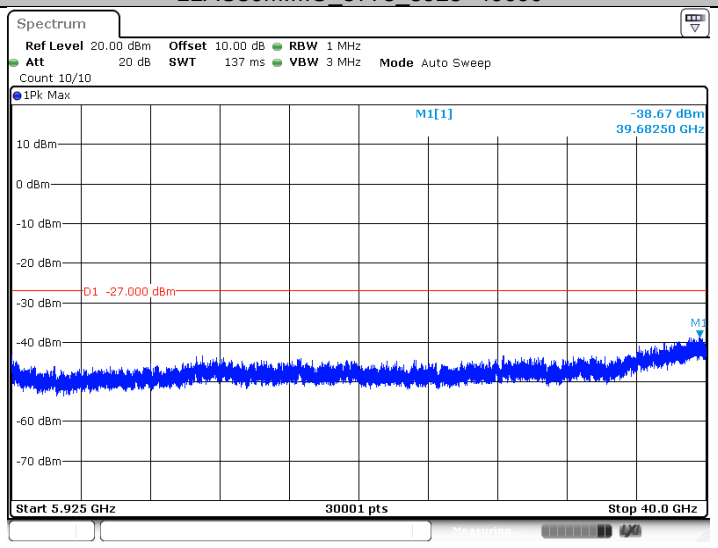


11AC80MIMO_5775_5925~40000

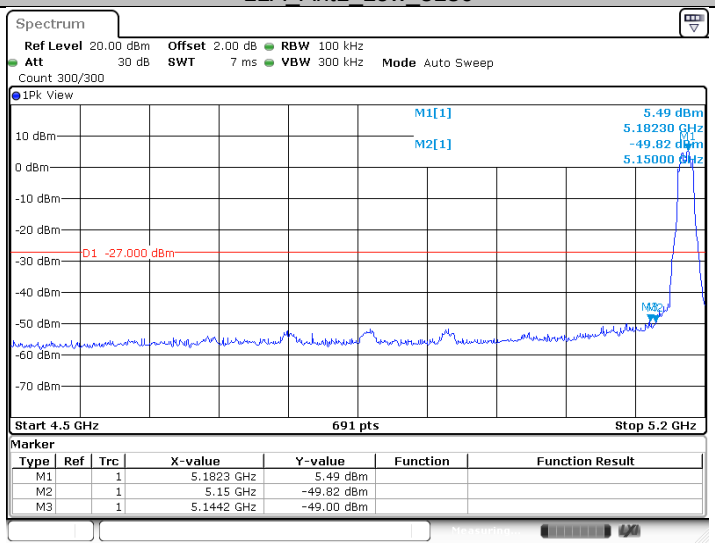


Transmitting spurious emission test result as below (Band edge measurements):

NOTE: According to the test results of output power, Ant0 is considered to have the highest power, so band edge testing for Multiple mode are performed with this antenna and add 3dBi factor, this factor has been compensated in the test.

IEEE 802.11a modulation Test Result

11A_Ant1_Low_5180



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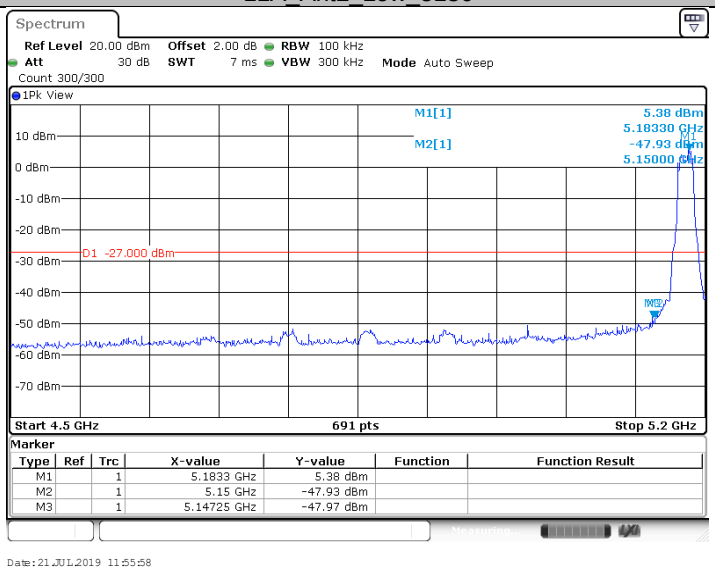
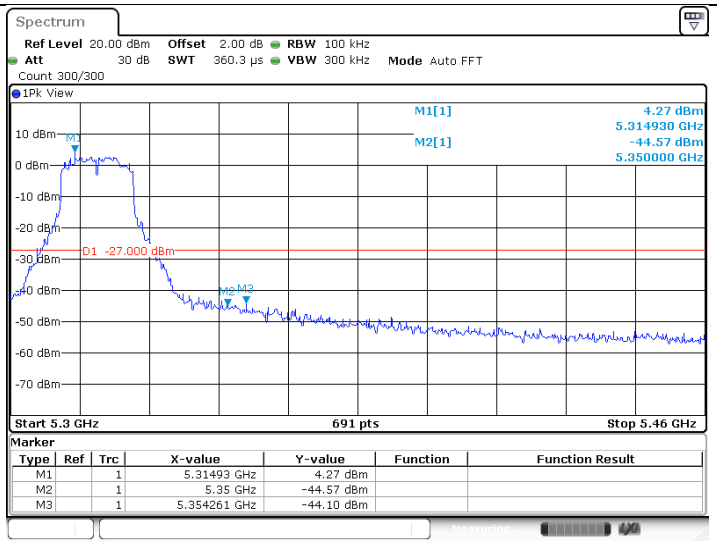


11A_Ant1_High_5320



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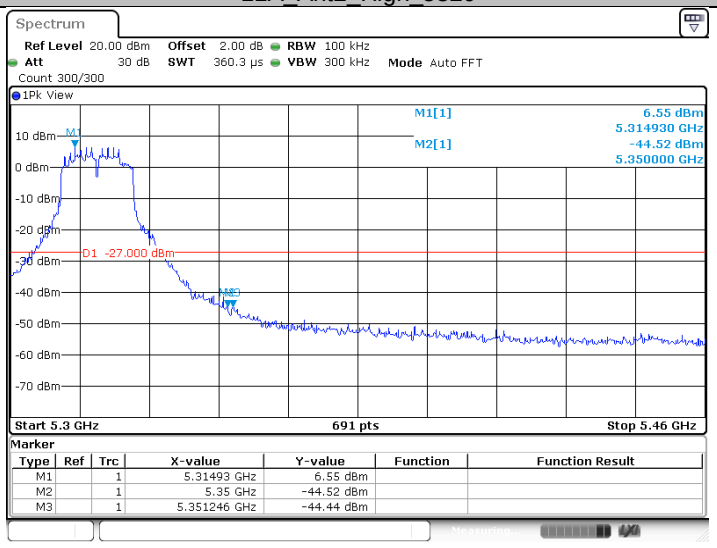
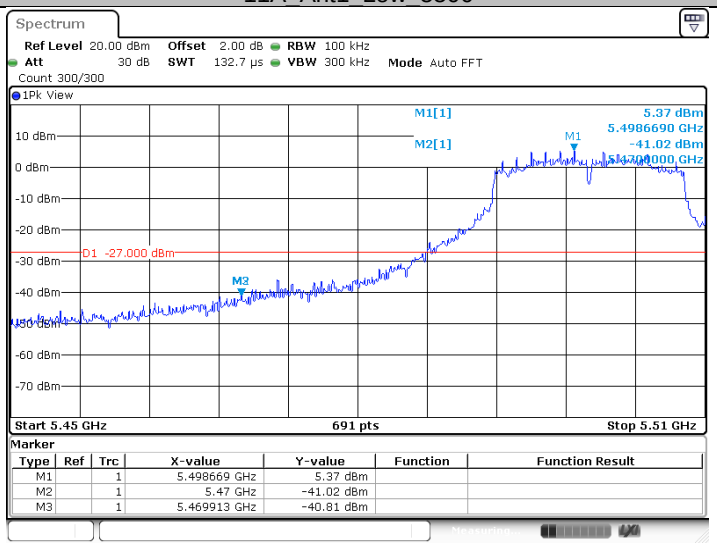


11A_Ant1_Low_5500



11A_Ant2_Low_5500

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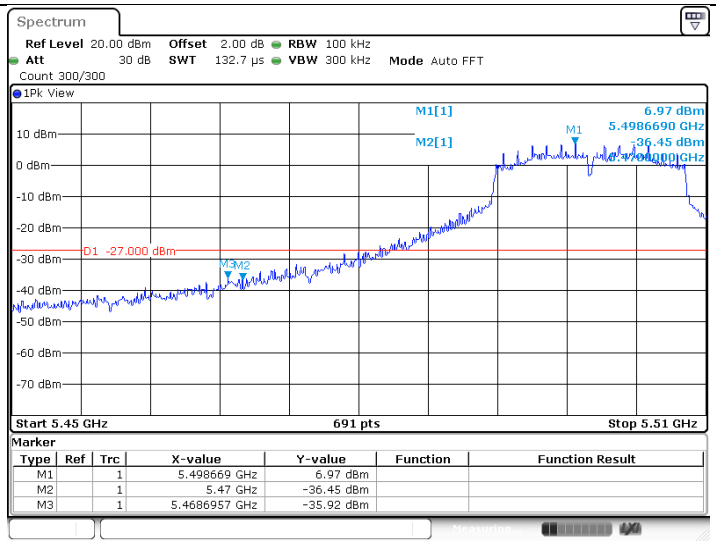
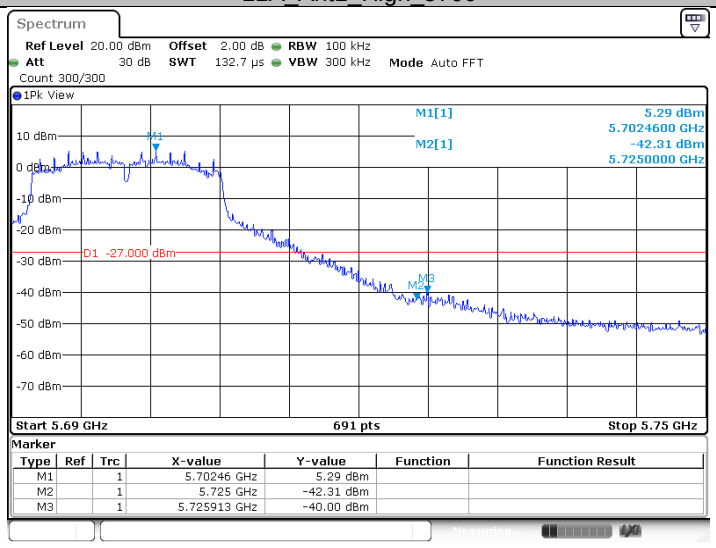
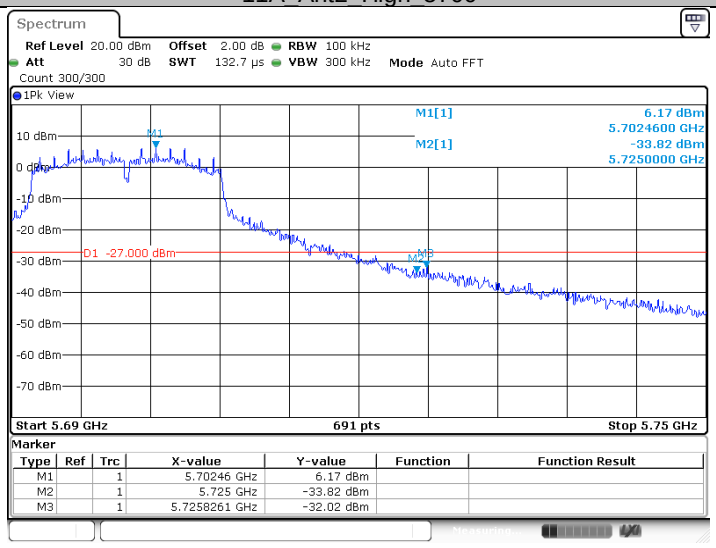


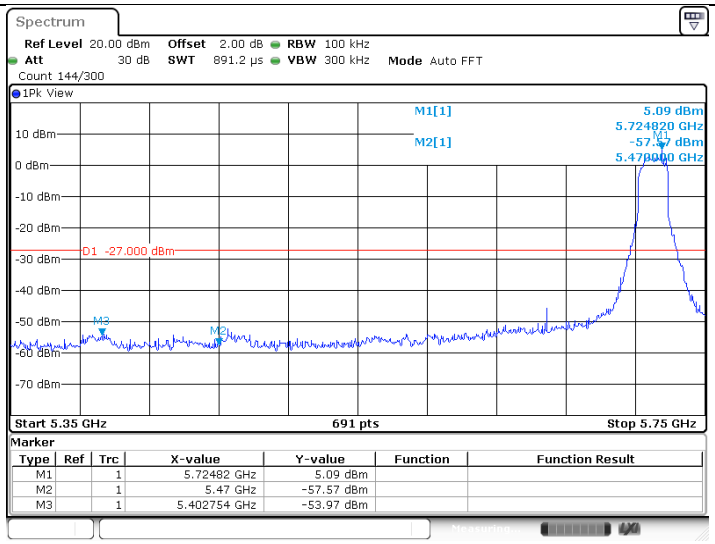
11A_Ant1_High_5700



11A_Ant2_High_5700



11A_Ant1_Low_5720



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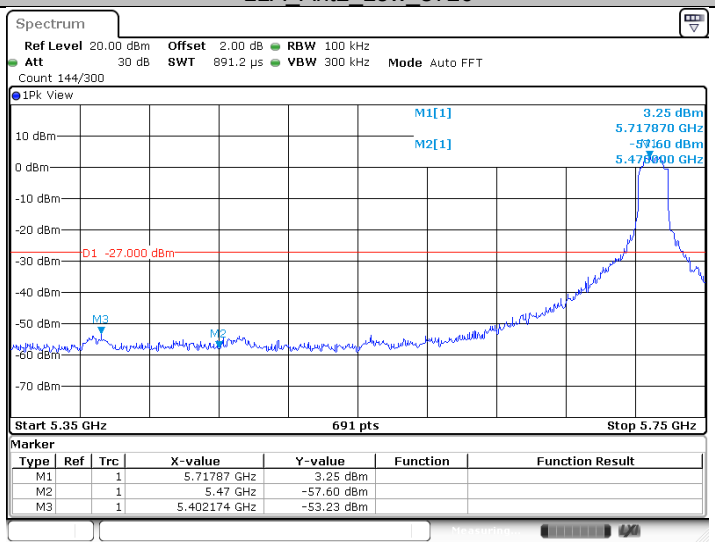

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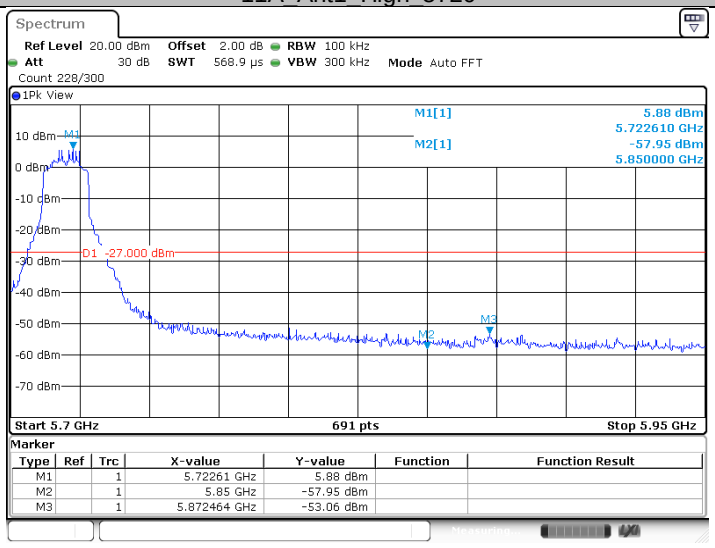

11A_Ant2_High_5720

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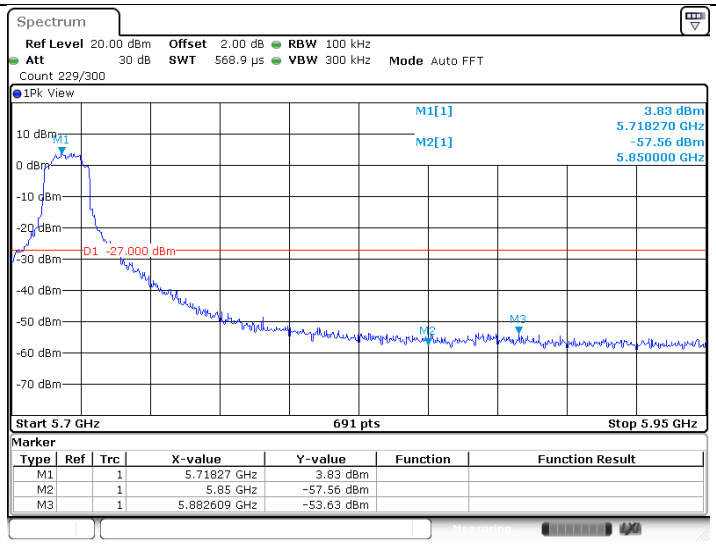
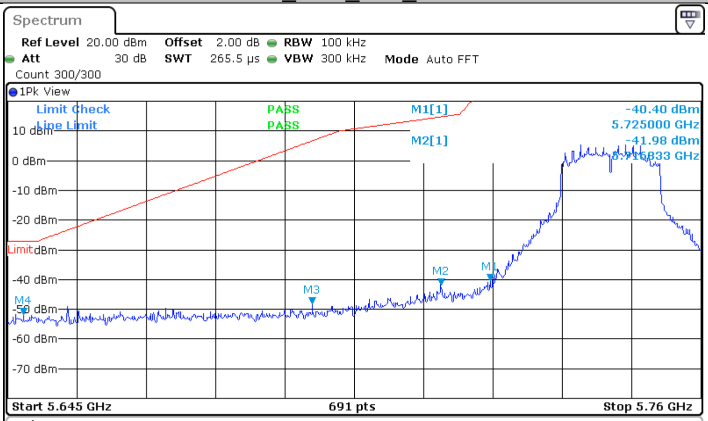

Spectrum
Ref Level 20.00 dBm Offset 2.00 dB RBW 100 kHz
Att 30 dB SWT 568.9 µs VBW 300 kHz Mode Auto FFT
Count 229/300
1Pk View
M1[1] 3.83 dBm
5.718270 GHz
M2[1] -57.56 dBm
5.850000 GHz
10 dBm
0 dBm
-10 dBm
-20 dBm
-30 dBm
-40 dBm
-50 dBm
-60 dBm
-70 dBm
D1 -27.000 dBm
M1
M2
M3
Start 5.7 GHz
691 pts
Stop 5.95 GHz
Marker
Type Ref Trc X-value Y-value Function Function Result
M1 1 5.71827 GHz 3.83 dBm
M2 1 5.85 GHz -57.56 dBm
M3 1 5.882609 GHz -53.63 dBm
Date:21.JUL.2019 12:13:45

11A_Ant1_Low_5745

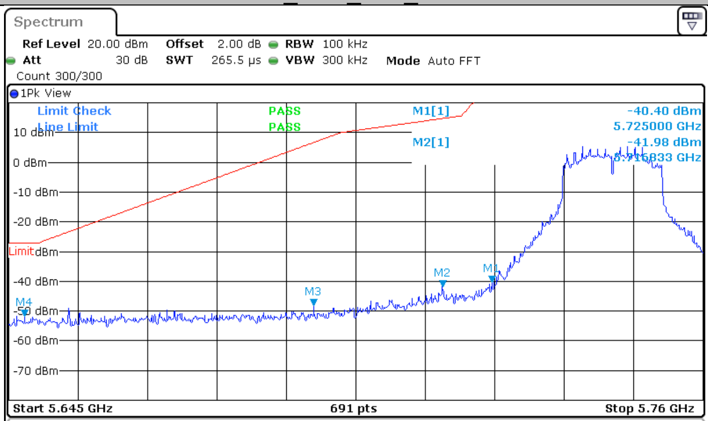


Marker

Type	Ref	Trc	X-value	Y-value	Function	Function Result
M1		1	5.725 GHz	-40.40 dBm		
M2		1	5.716833 GHz	-41.98 dBm		
M3		1	5.6955 GHz	-48.27 dBm		
M4		1	5.647667 GHz	-51.88 dBm		

Date: 21.JUL.2019 10:53:43

11A_Ant1_Low_5745

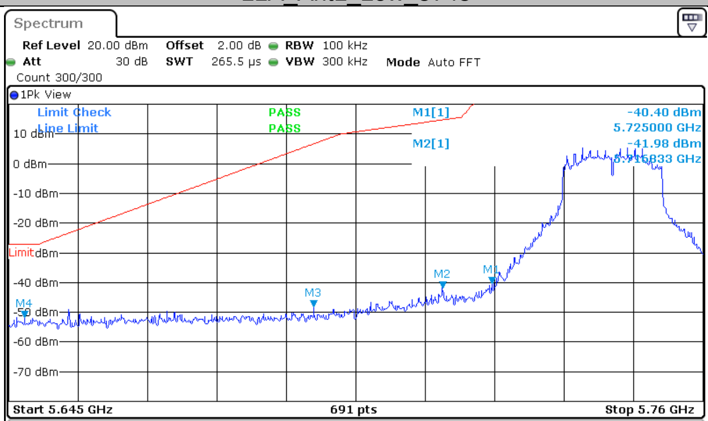


Marker

Type	Ref	Trc	X-value	Y-value	Function	Function Result
M1		1	5.725 GHz	-40.40 dBm		
M2		1	5.716833 GHz	-41.98 dBm		
M3		1	5.6955 GHz	-48.27 dBm		
M4		1	5.647667 GHz	-51.88 dBm		

Date: 21.JUL.2019 10:53:43

11A_Ant1_Low_5745

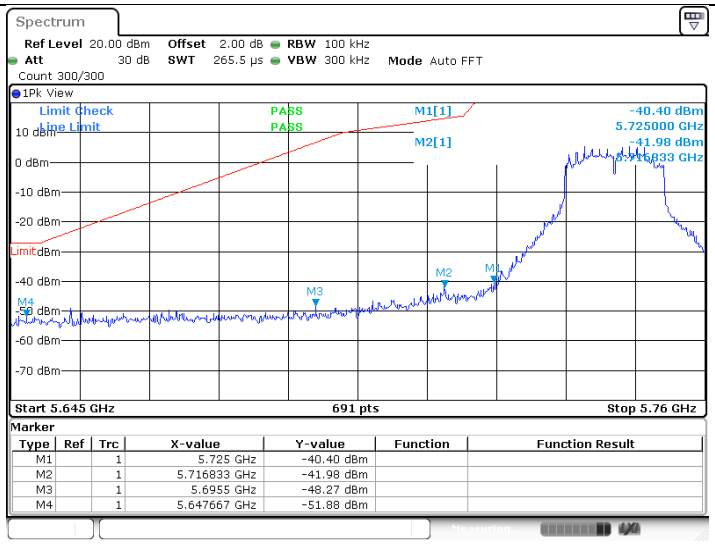


Marker

Type	Ref	Trc	X-value	Y-value	Function	Function Result
M1		1	5.725 GHz	-40.40 dBm		
M2		1	5.716833 GHz	-41.98 dBm		
M3		1	5.6955 GHz	-48.27 dBm		
M4		1	5.647667 GHz	-51.88 dBm		

Date: 21.JUL.2019 10:53:43

11A_Ant1_Low_5745



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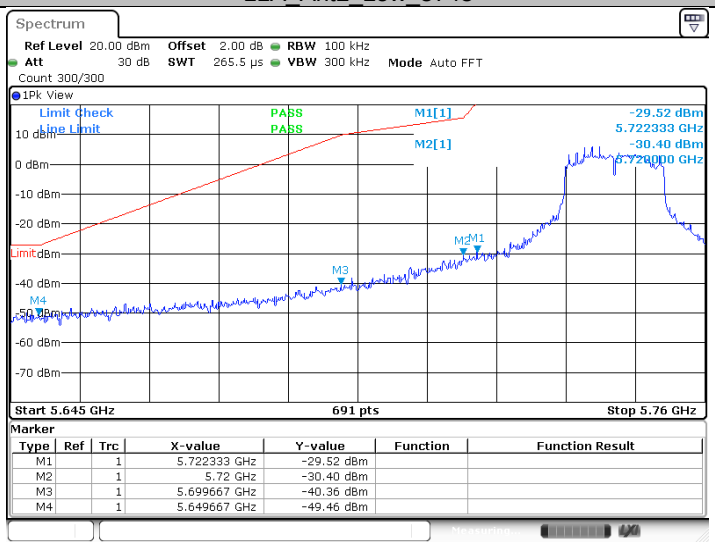
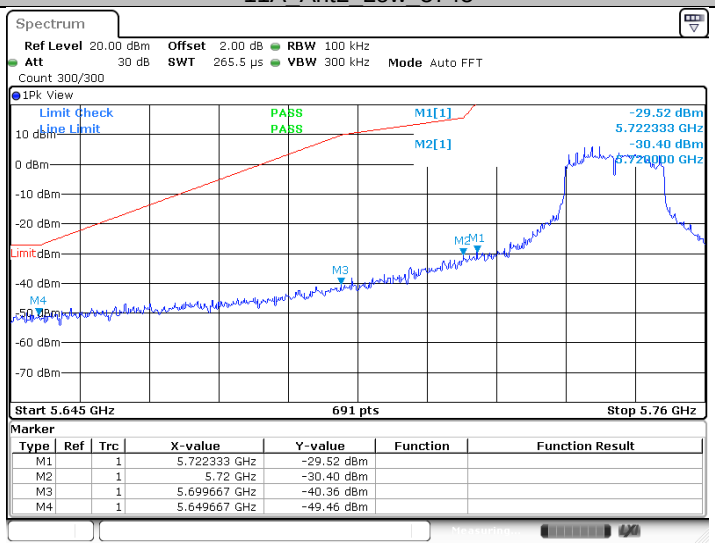


11A_Ant2_Low_5745



11A_Ant2_Low_5745

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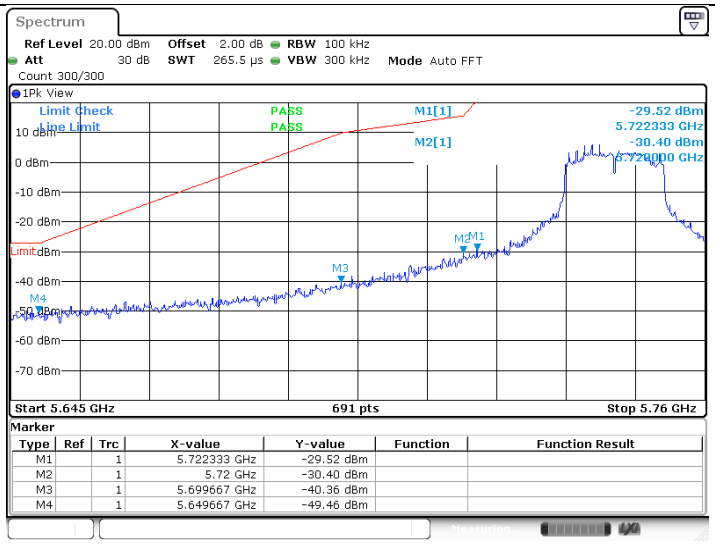

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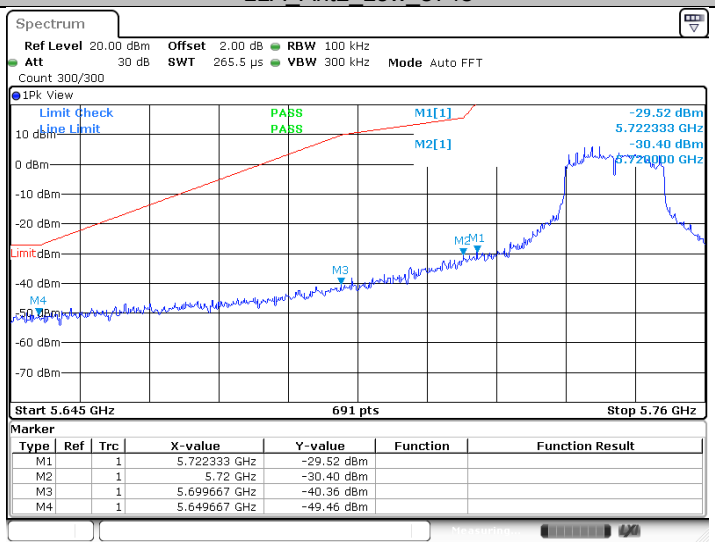
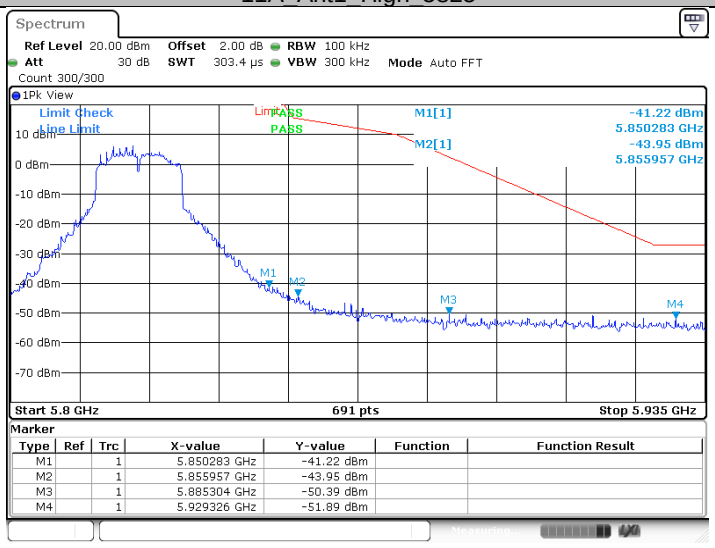


11A_Ant1_High_5825



11A_Ant1_High_5825

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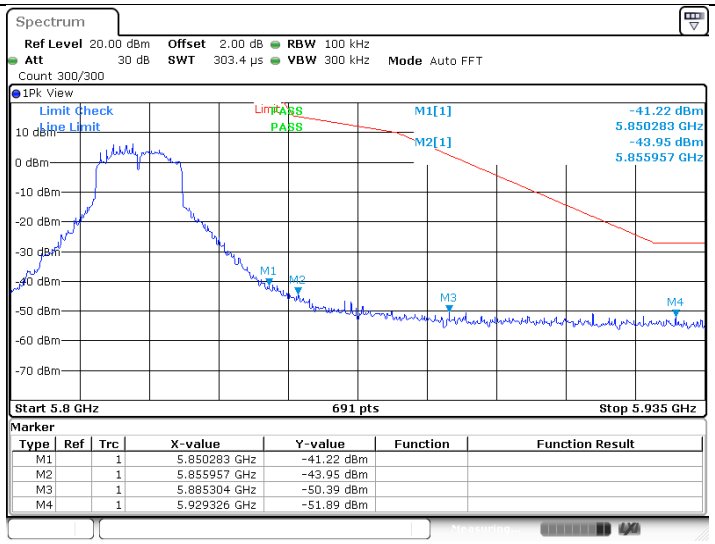

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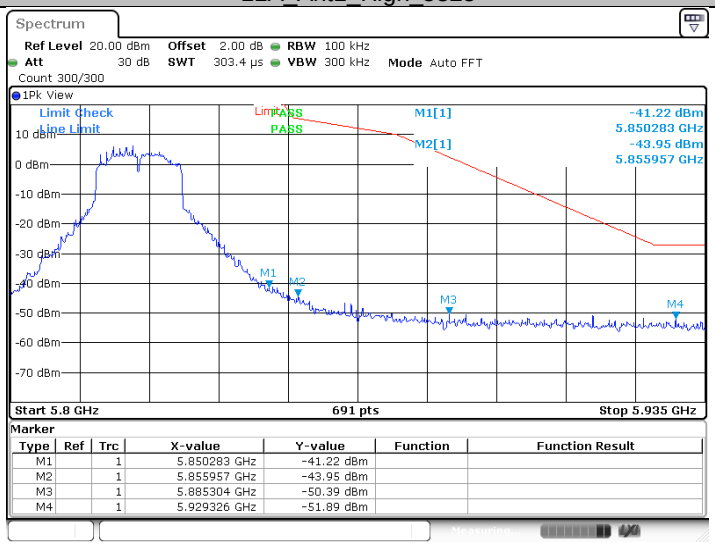

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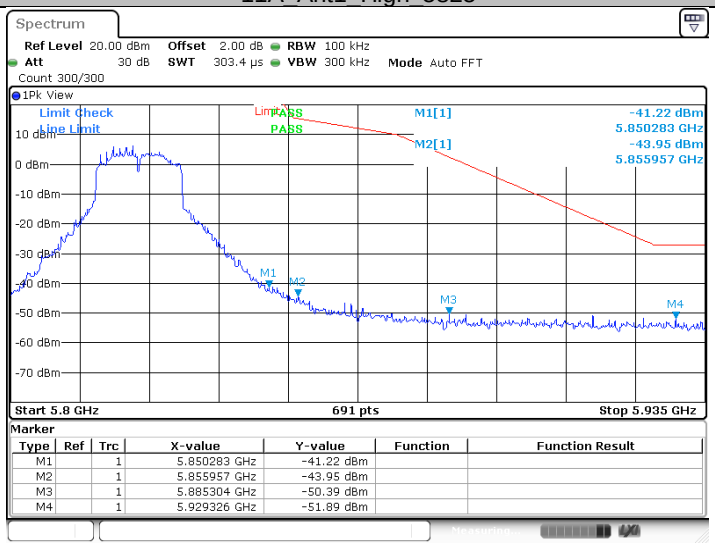

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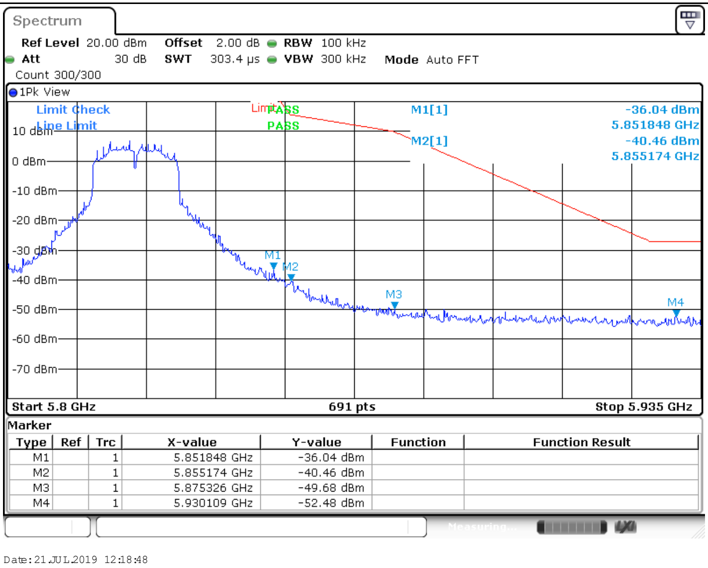

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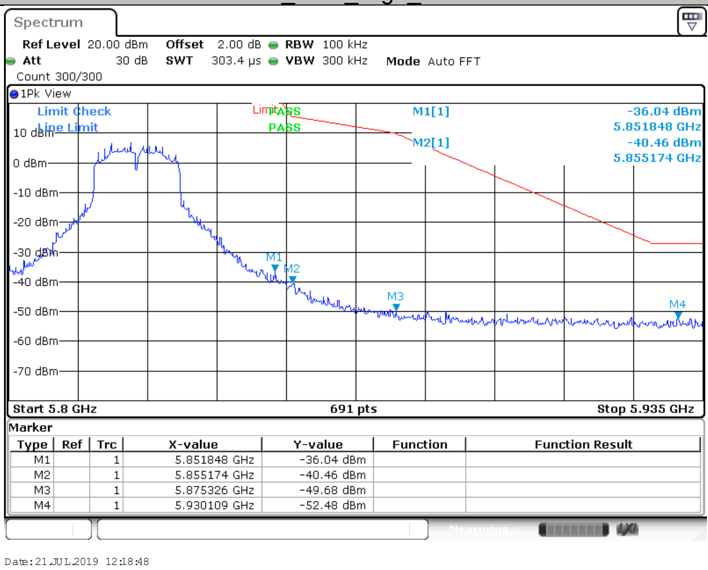

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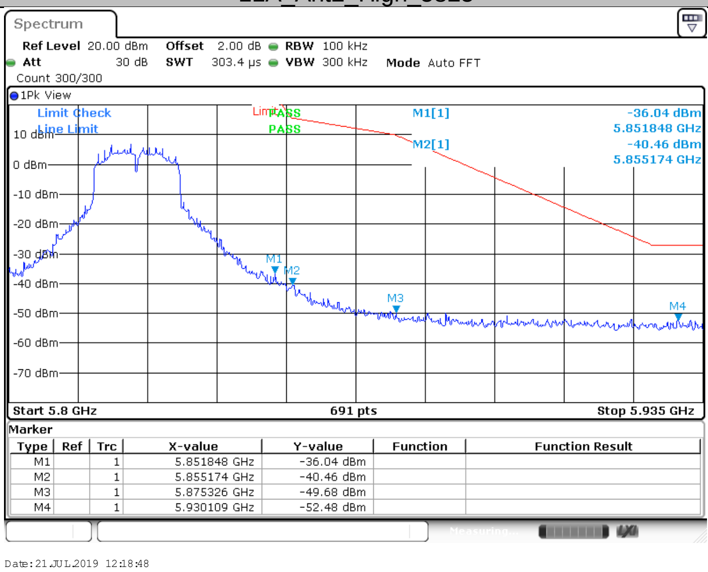

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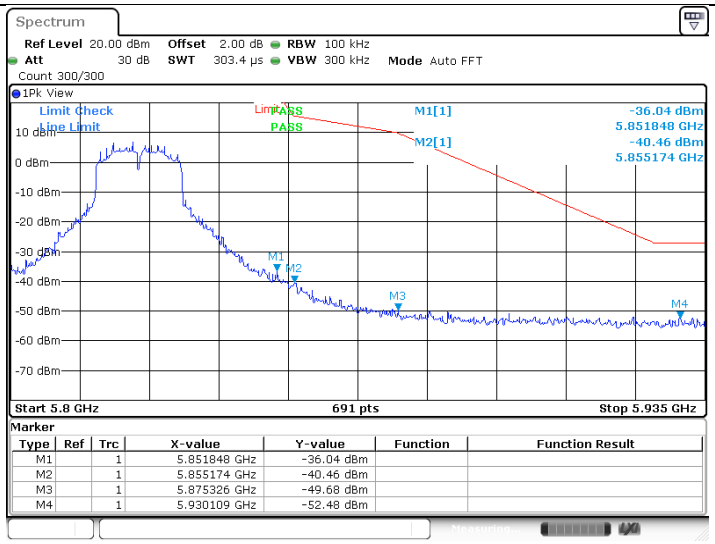

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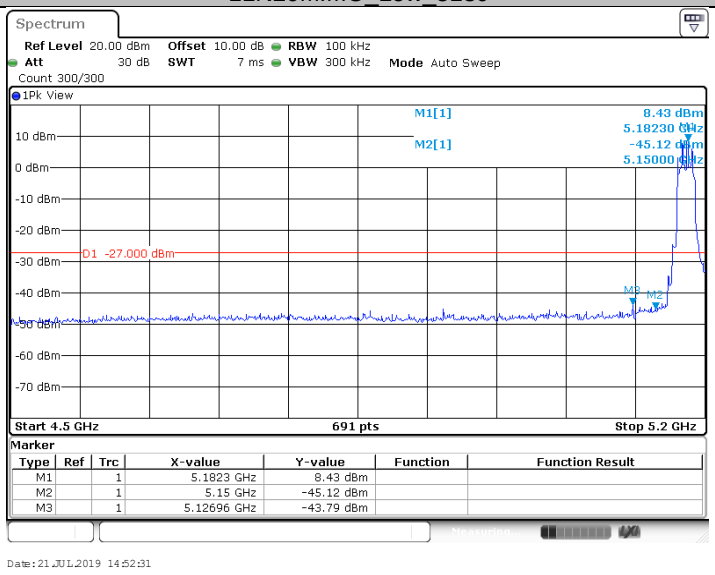
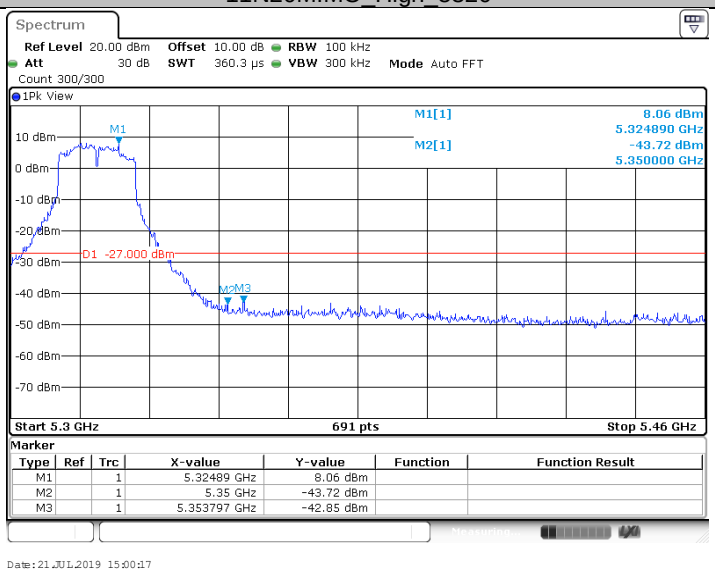
IEEE 802.11n_MIMO modulation Test Result

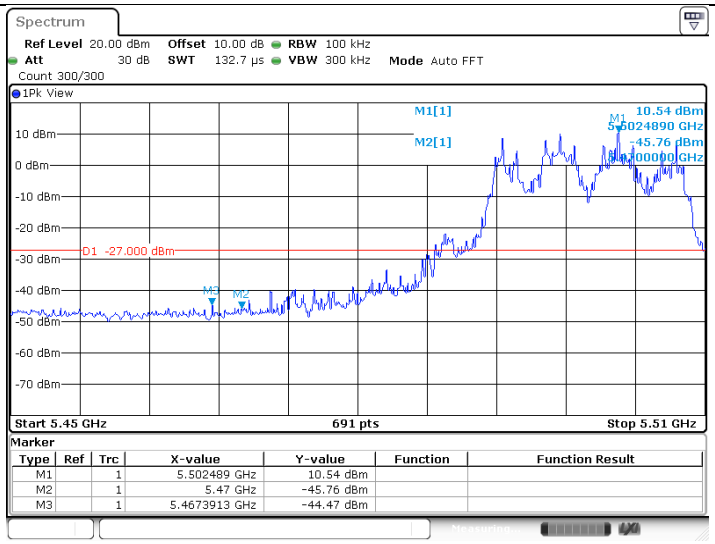
11N20MIMO_Low_5180



11N20MIMO_High_5320



11N20MIMO_Low_5500



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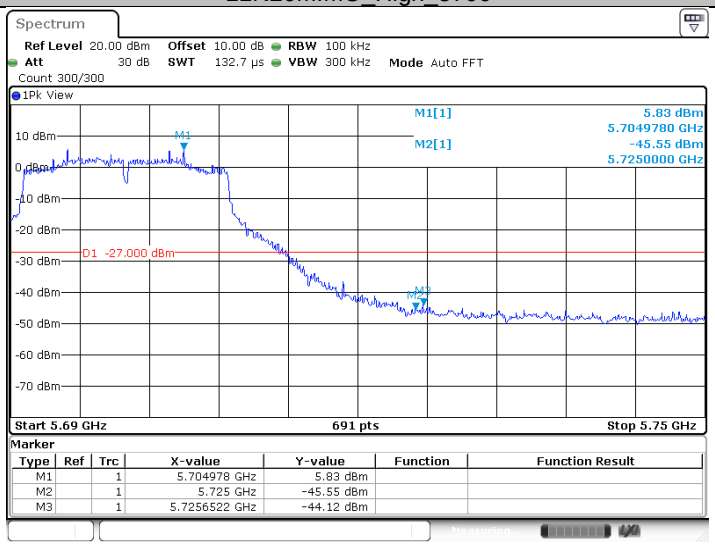

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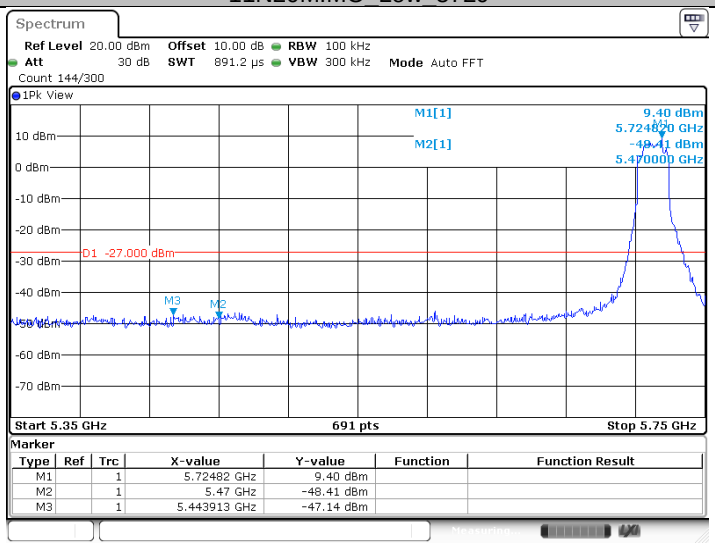

11N20MIMO_High_5720

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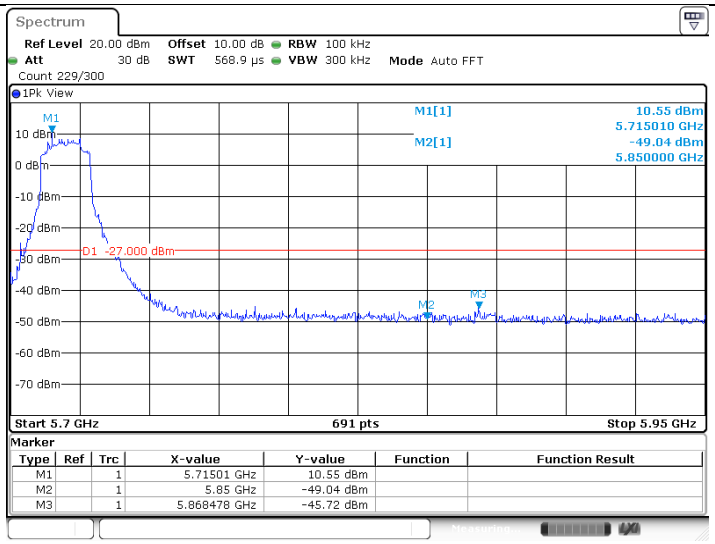
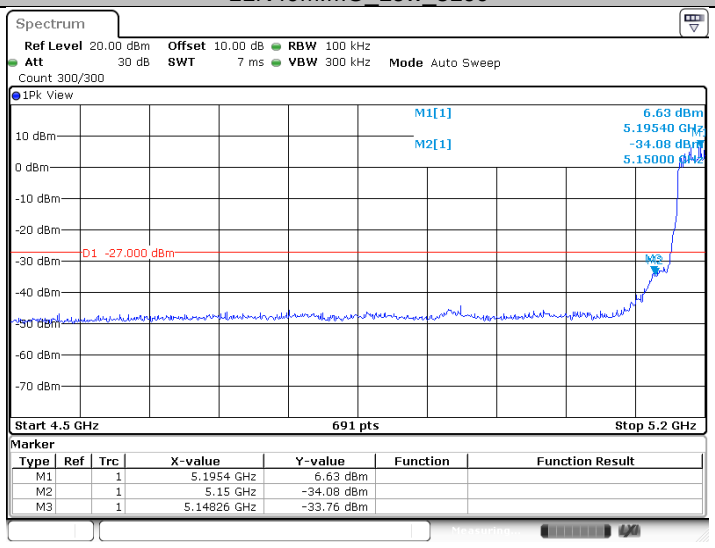
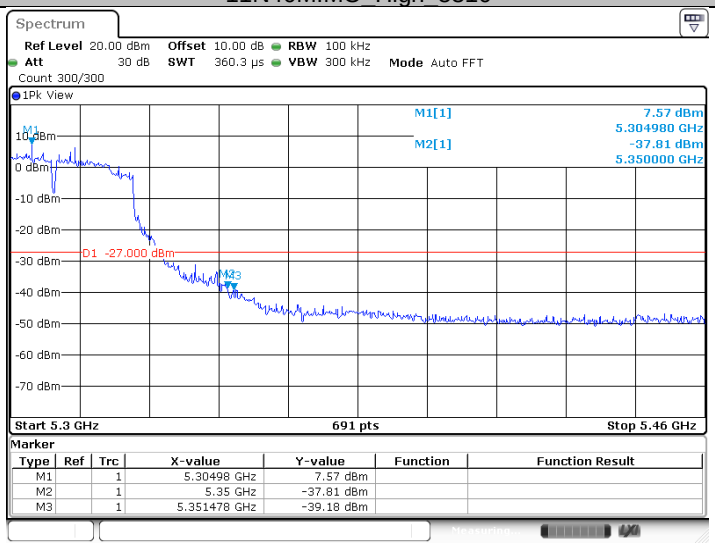


11N40MIMO_Low_5190

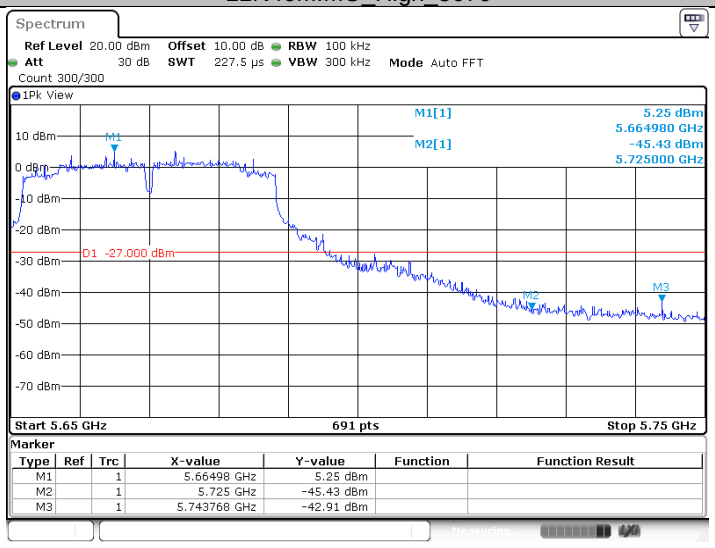


11N40MIMO_High_5310

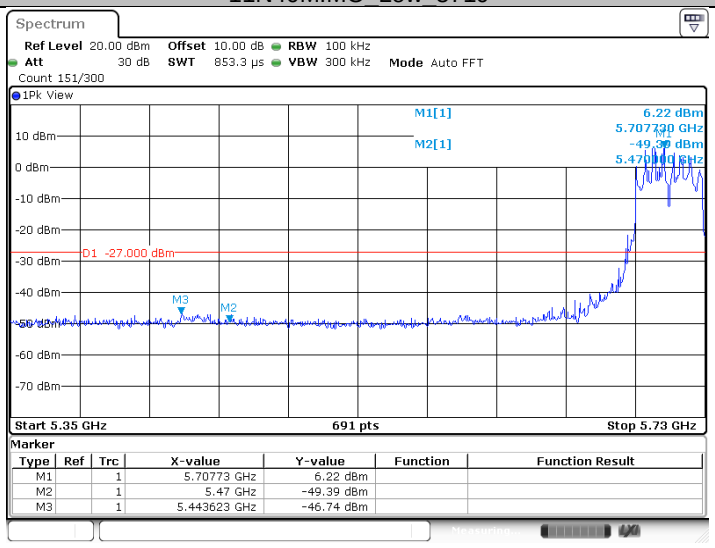


11N40MIMO_Low_5510

11N40MIMO_High_5670



11N40MIMO_Low_5710



11N40MIMO_High_5710

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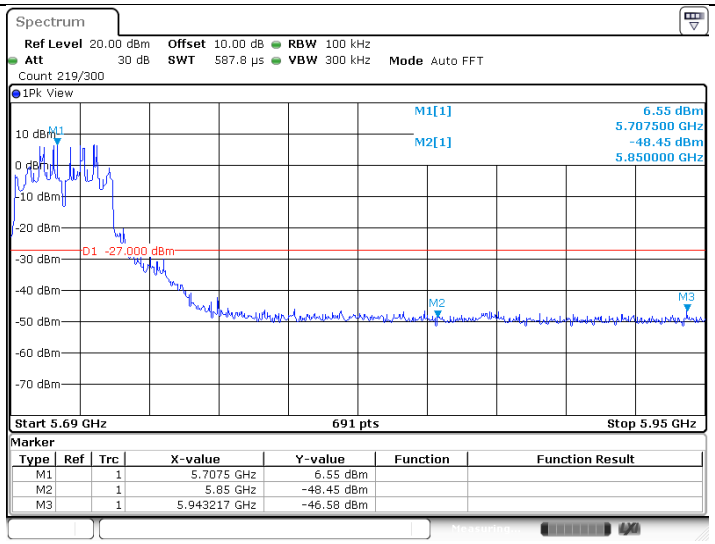
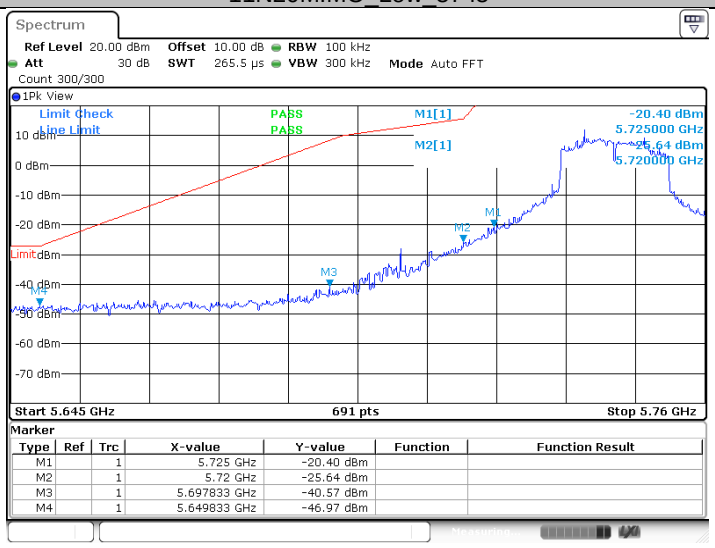
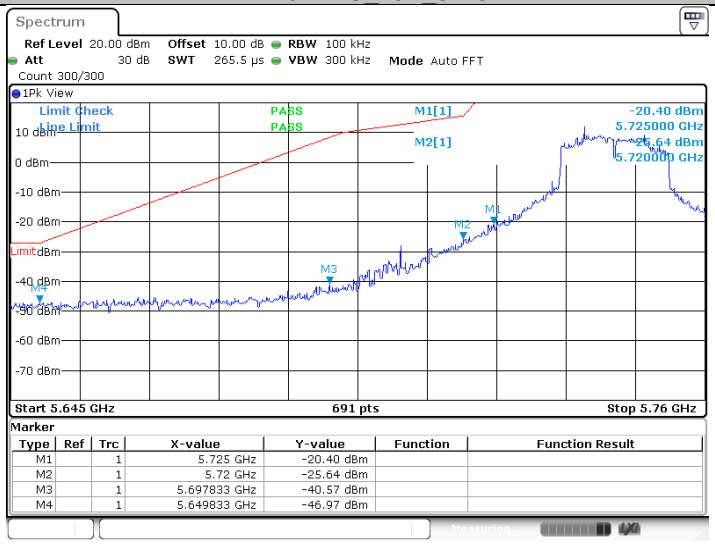


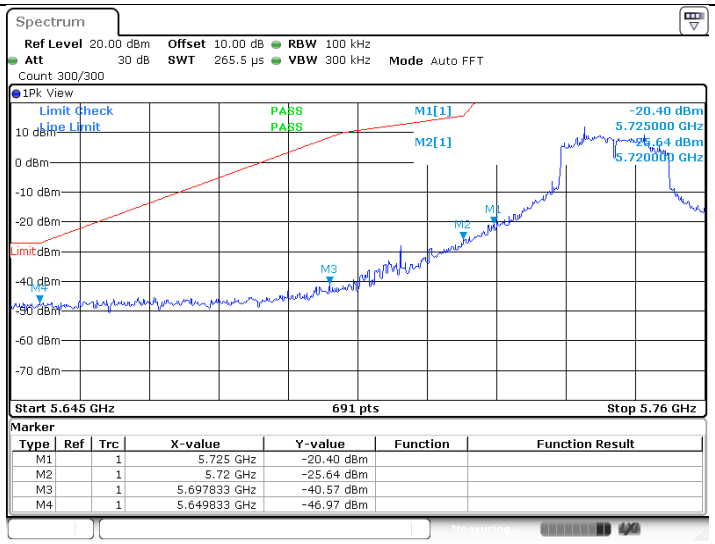
11N20MIMO_Low_5745



11N20MIMO_Low_5745



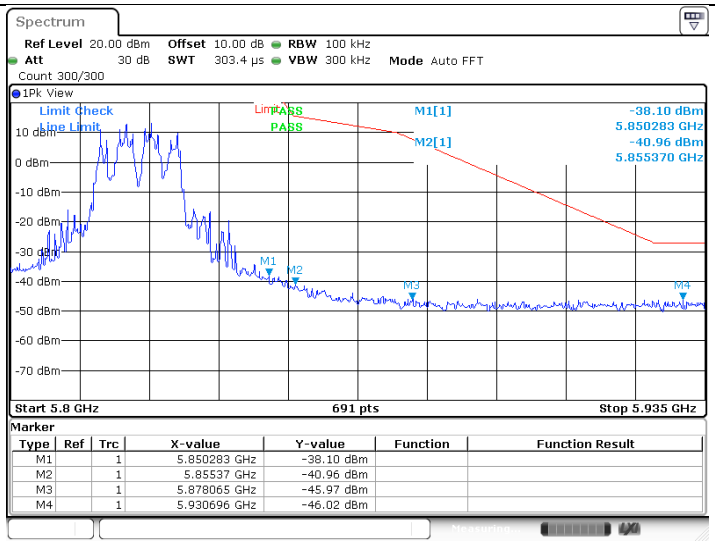
11N20MIMO_Low_5745



11N20MIMO_Low_5745

11N20MIMO_High_5825

11N20MIMO_High_5825



11N20MIMO_High_5825

11N20MIMO_High_5825

11N40MIMO_Low_5755

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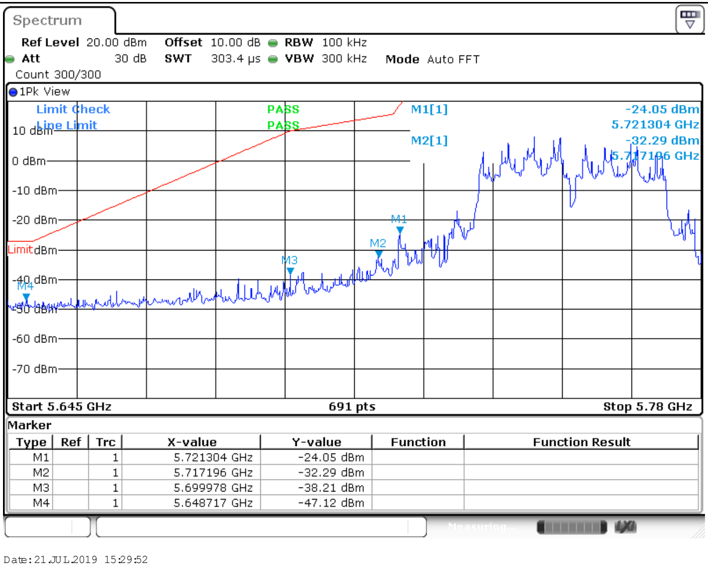

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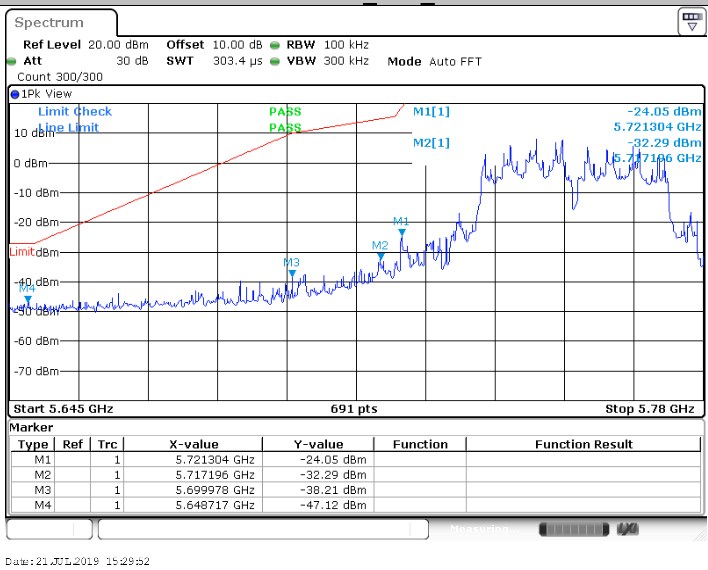

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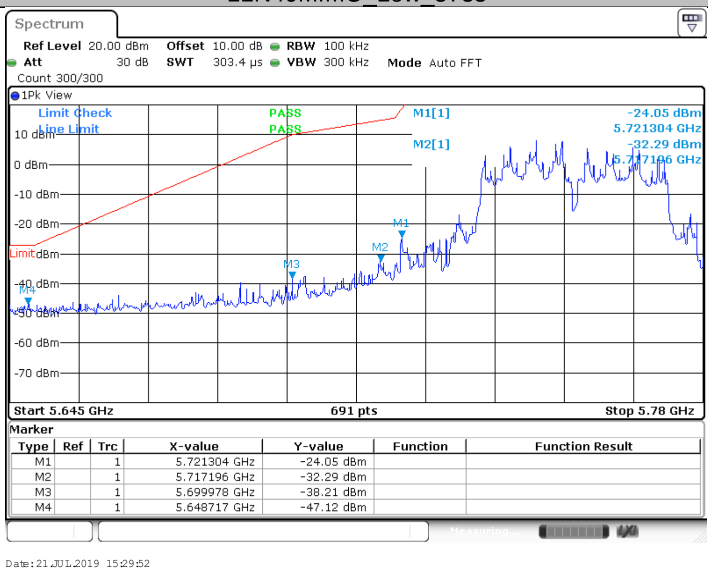

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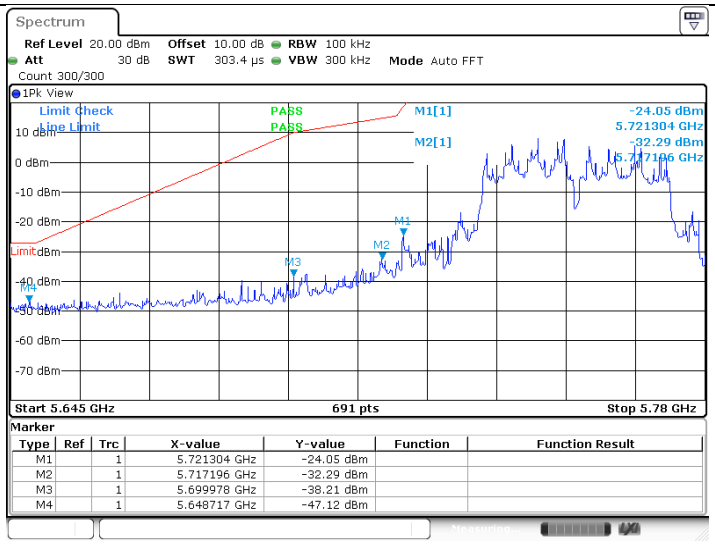
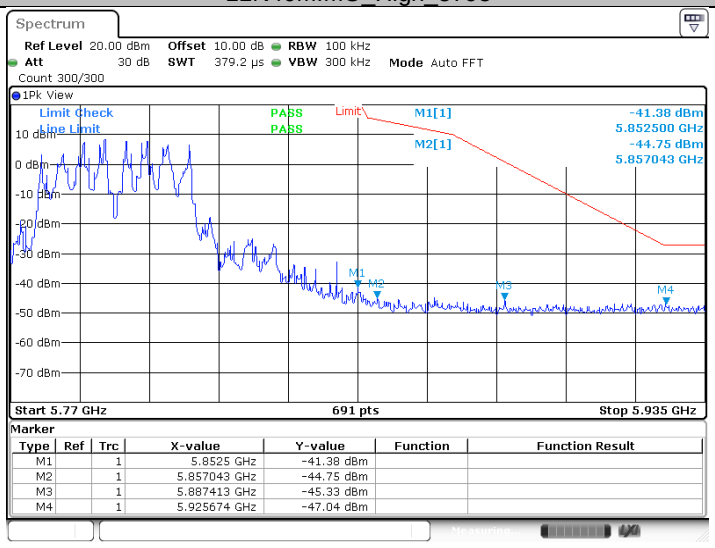


11N40MIMO_High_5795



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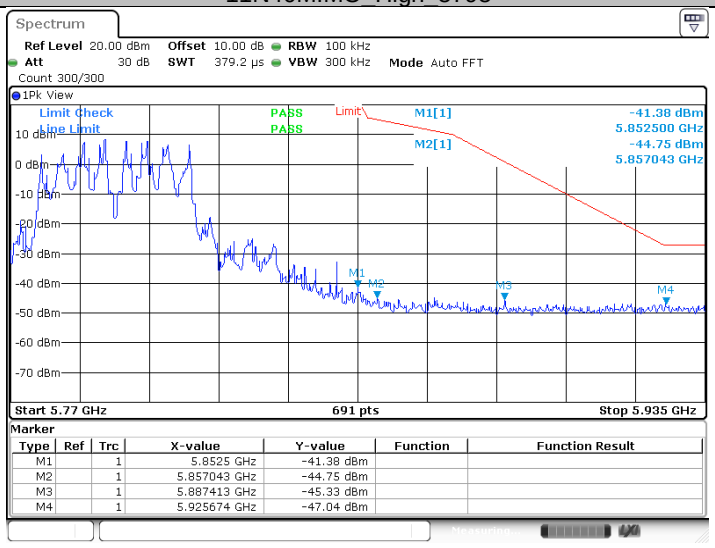

11N40MIMO_High_5795

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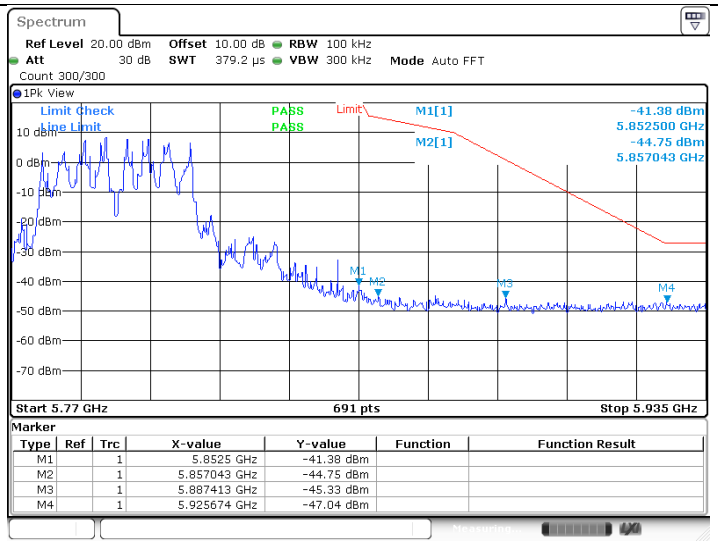

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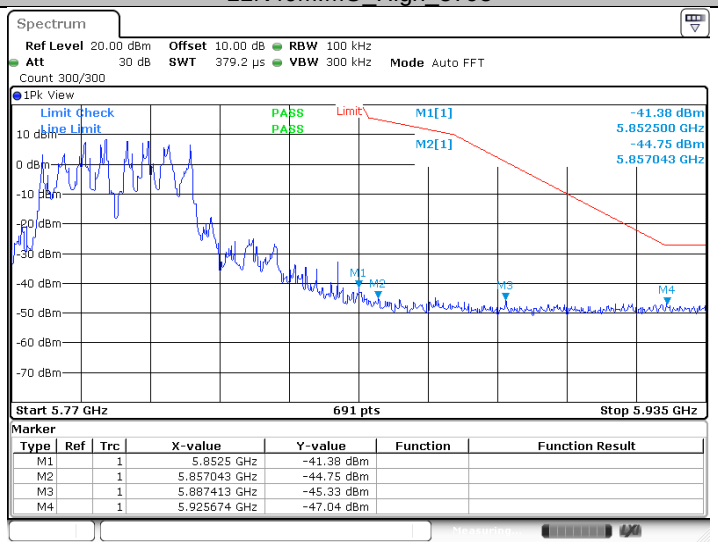

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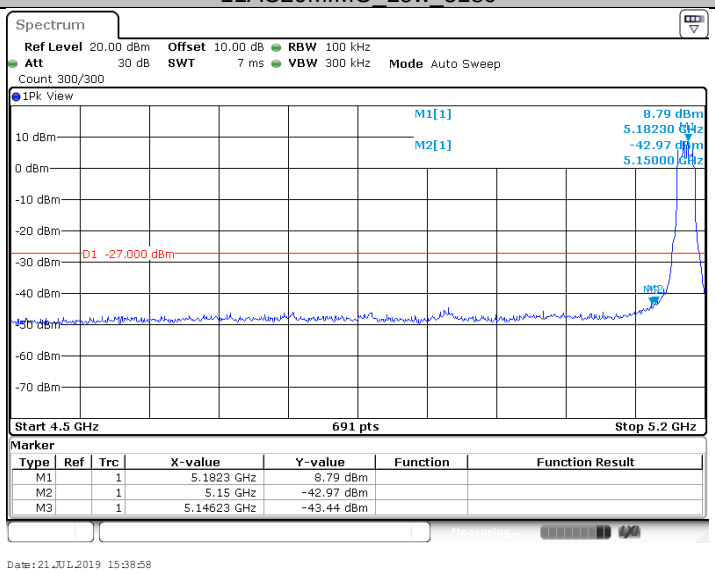
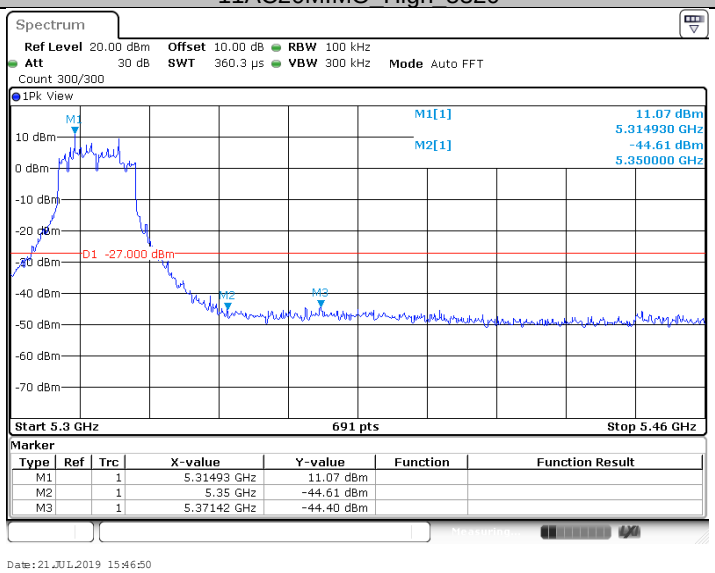
IEEE 802.11ac_MIMO modulation Test Result

11AC20MIMO_Low_5180


11AC20MIMO_High_5320


11AC20MIMO_Low_5500

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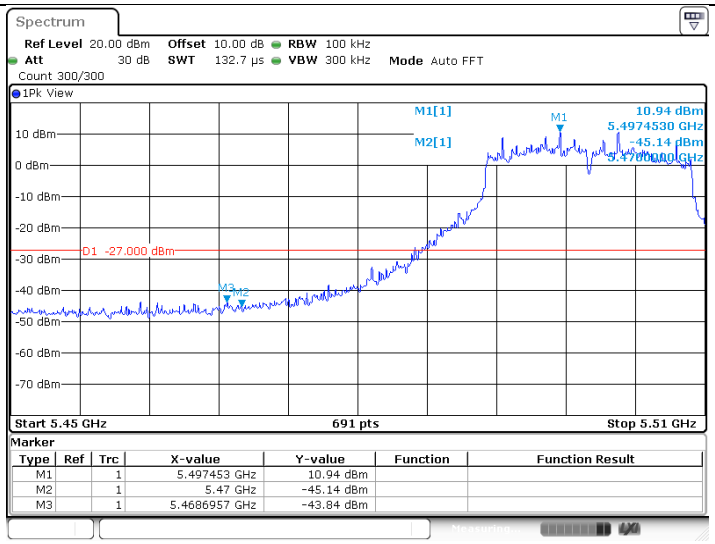

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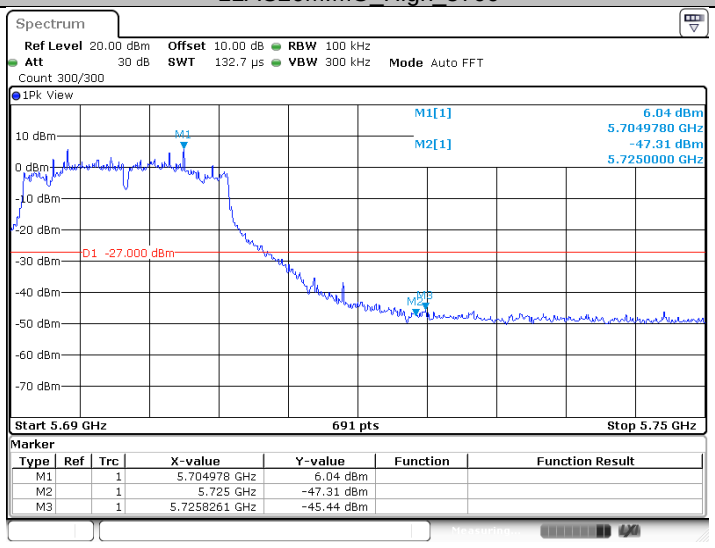
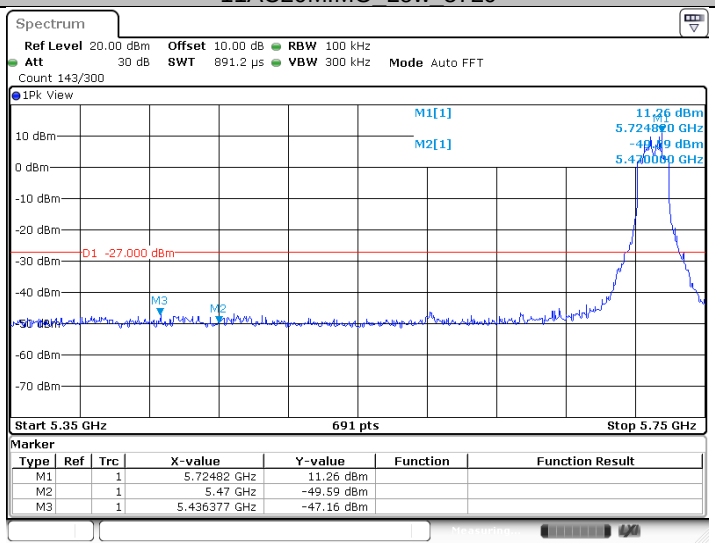


11AC20MIMO_Low_5720



11AC20MIMO_High_5720

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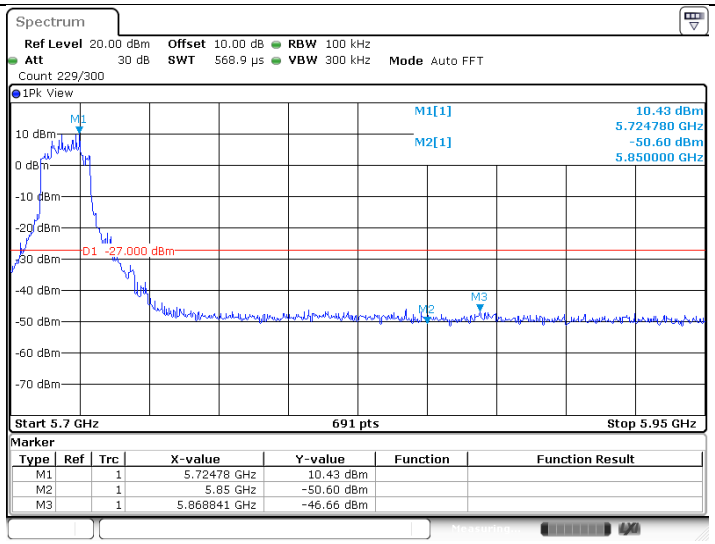

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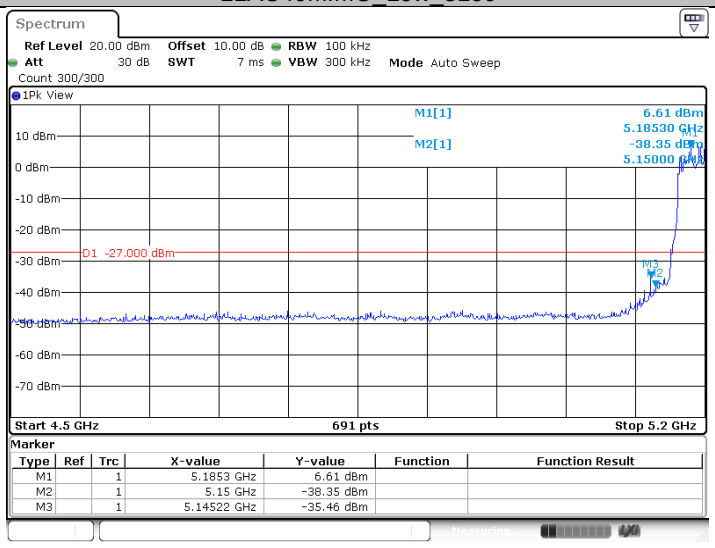
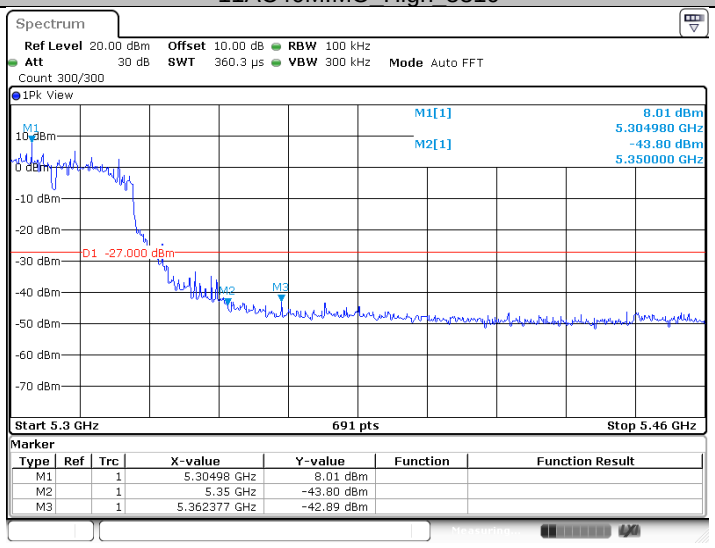
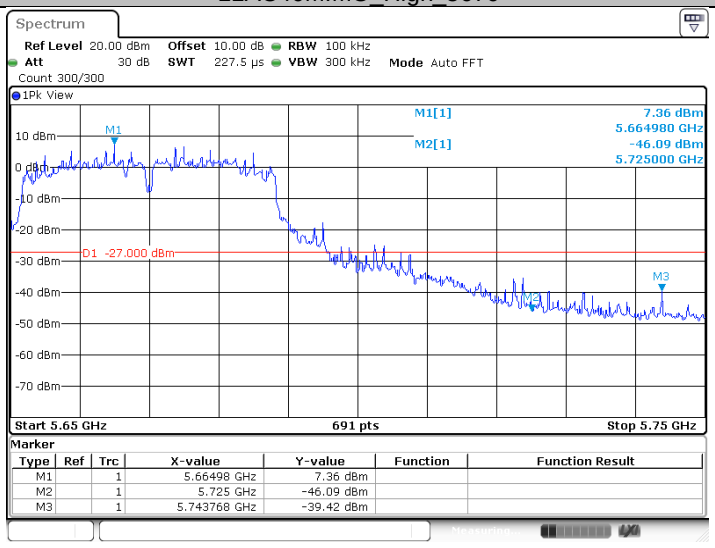


11AC40MIMO_High_5310



11AC40MIMO_Low_5510

11AC40MIMO_High_5670



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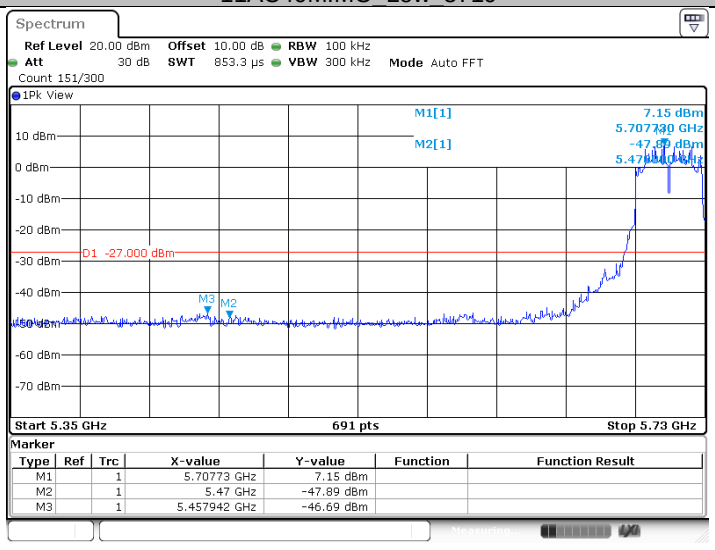

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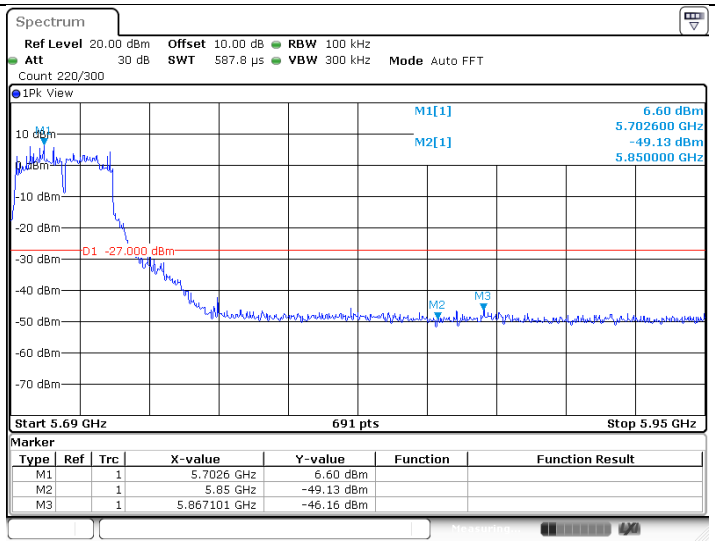
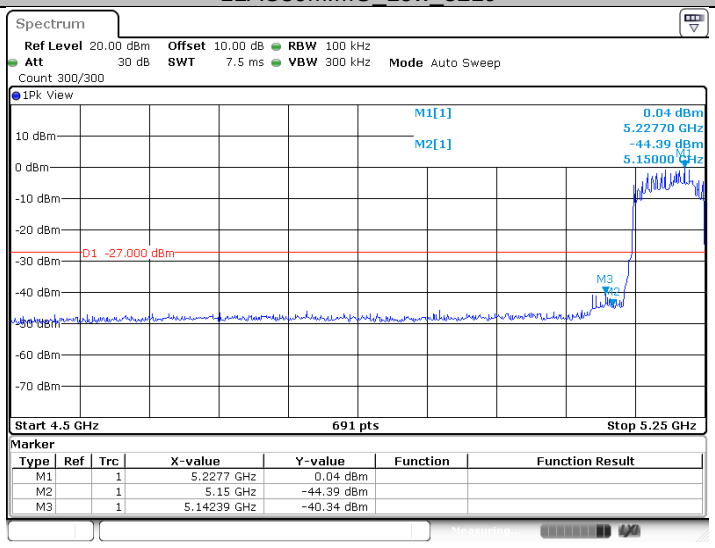


11AC80MIMO_Low_5210



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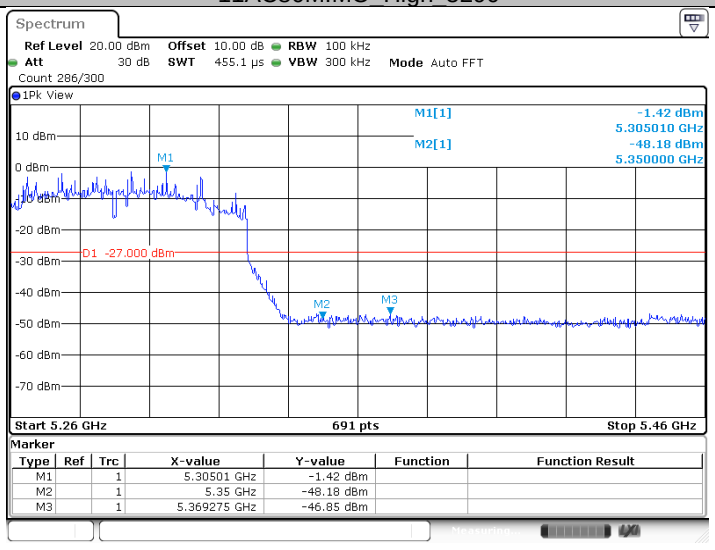
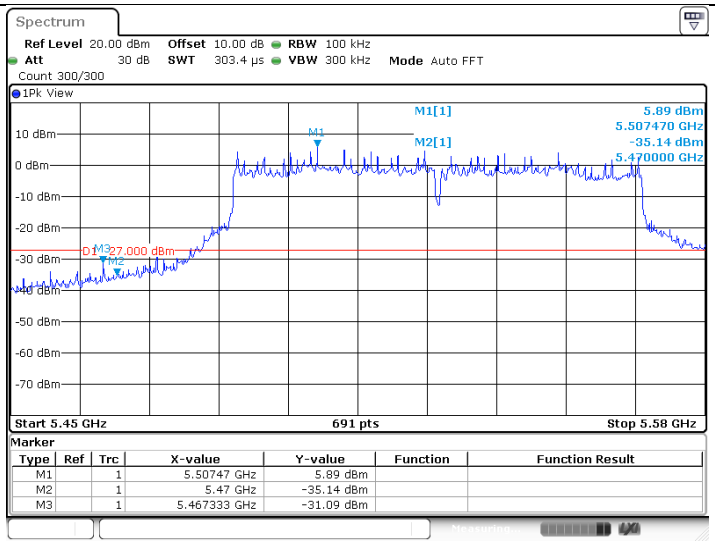
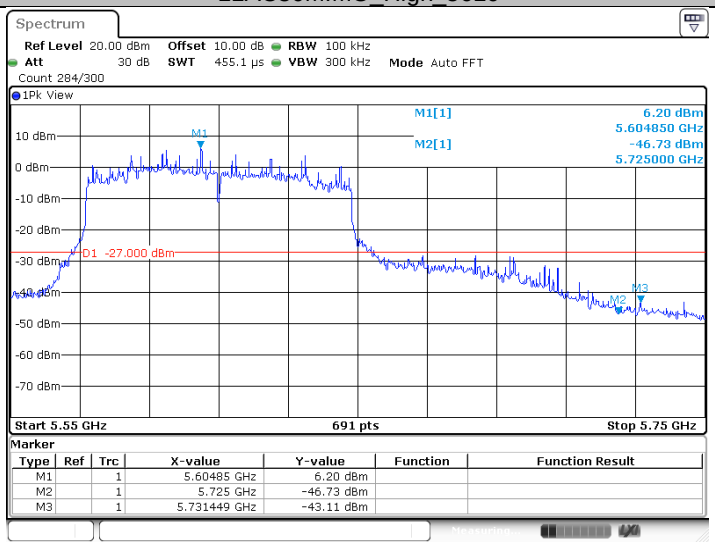


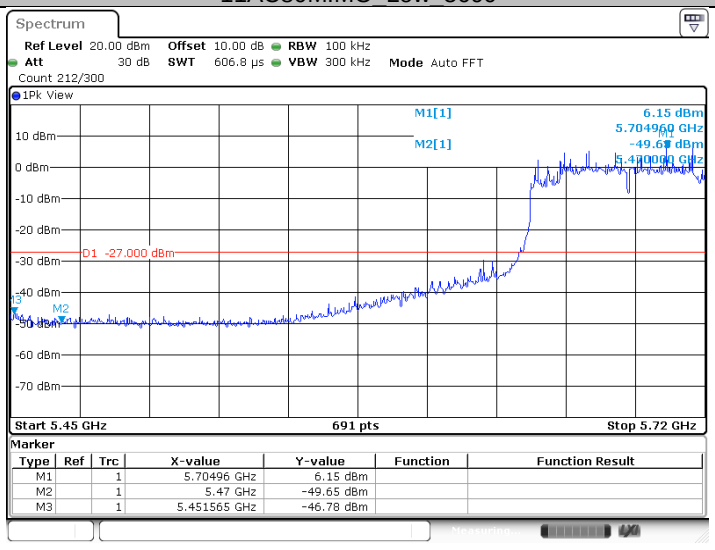
11AC80MIMO_Low_5530



11AC80MIMO_High_5610



11AC80MIMO_Low_5690



11AC80MIMO_High_5690

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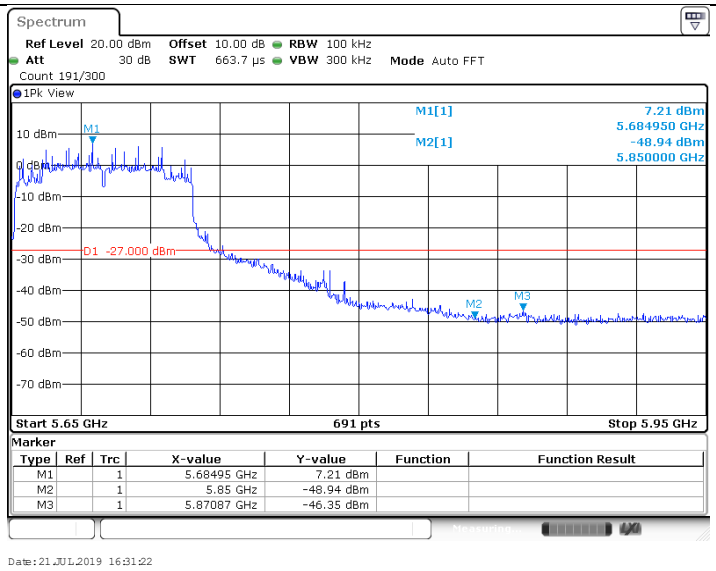

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11AC20MIMO_Low_5745

Type	Ref	Trc	X-value	Y-value	Function	Function Result
M1		1	5.725 GHz	-23.98 dBm		
M2		1	5.719667 GHz	-34.04 dBm		
M3		1	5.682667 GHz	-44.46 dBm		
M4		1	5.649333 GHz	-47.81 dBm		

Date: 21.JUL.2019 15:55:15

11AC20MIMO_Low_5745

Type	Ref	Trc	X-value	Y-value	Function	Function Result
M1		1	5.725 GHz	-23.98 dBm		
M2		1	5.719667 GHz	-34.04 dBm		
M3		1	5.682667 GHz	-44.46 dBm		
M4		1	5.649333 GHz	-47.81 dBm		

Date: 21.JUL.2019 15:55:15

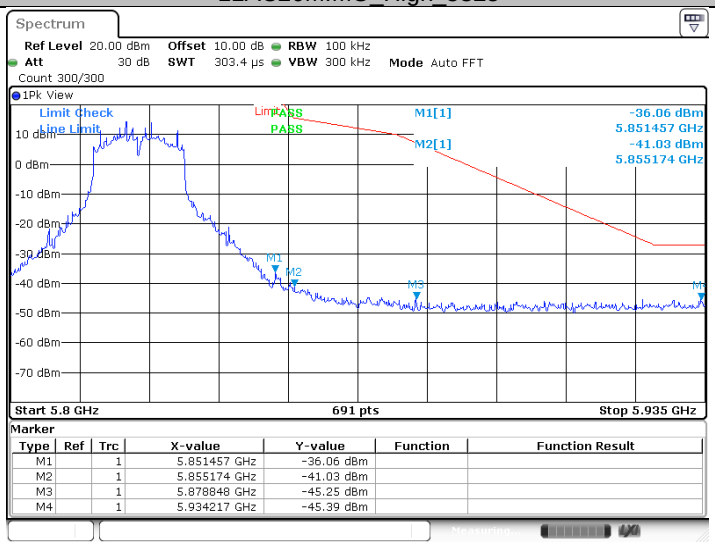
11AC20MIMO_Low_5745

Type	Ref	Trc	X-value	Y-value	Function	Function Result
M1		1	5.725 GHz	-23.98 dBm		
M2		1	5.719667 GHz	-34.04 dBm		
M3		1	5.682667 GHz	-44.46 dBm		
M4		1	5.649333 GHz	-47.81 dBm		

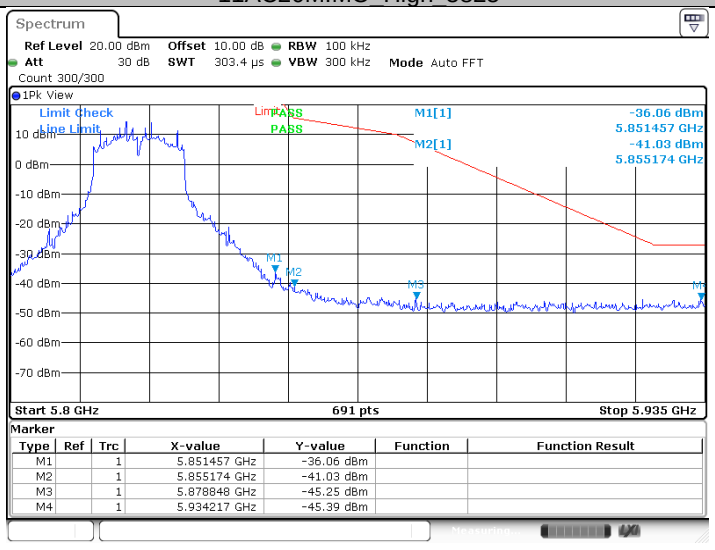
Date: 21.JUL.2019 15:55:15

11AC20MIMO_Low_5745

11AC20MIMO_High_5825

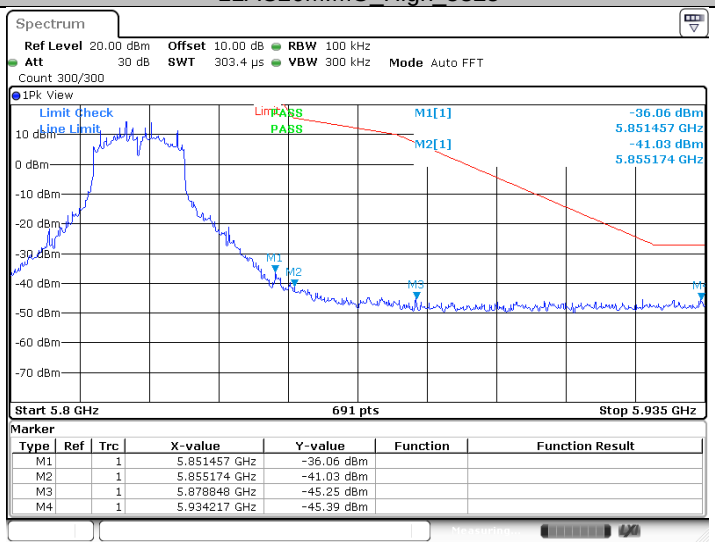


11AC20MIMO_High_5825



11AC20MIMO_High_5825

11AC20MIMO_High_5825



11AC40MIMO_Low_5755

11AC40MIMO_Low_5755

11AC40MIMO_Low_5755

11AC40MIMO_Low_5755

11AC40MIMO_High_5795

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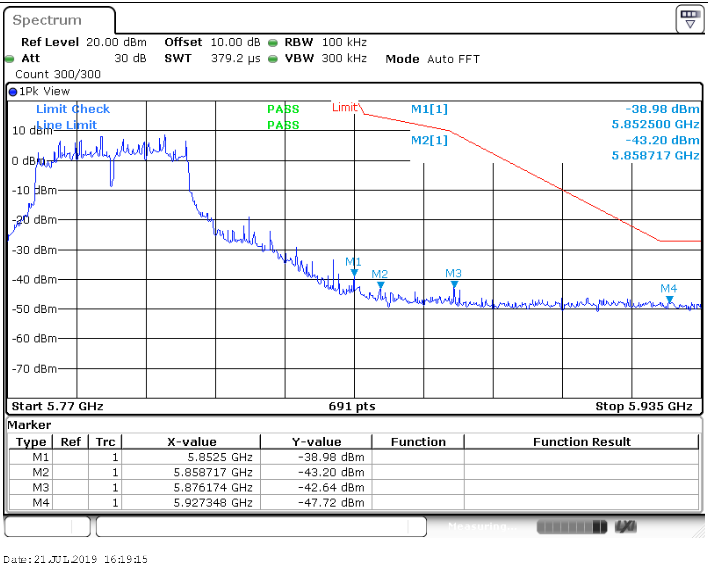

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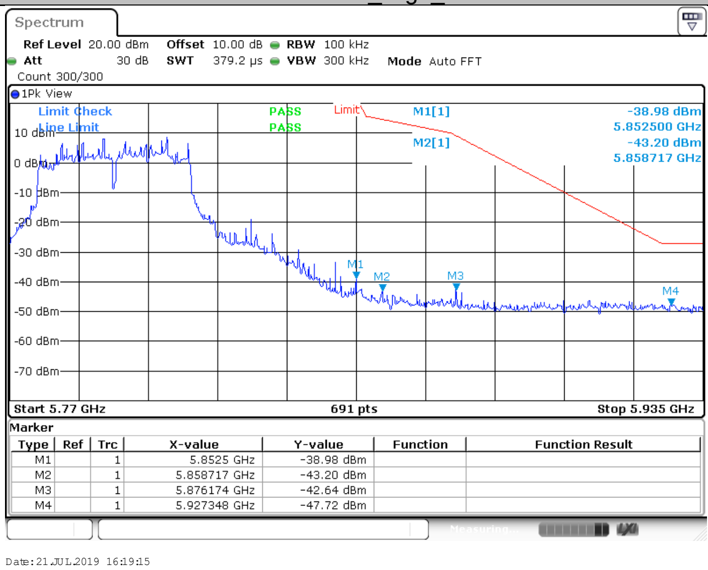

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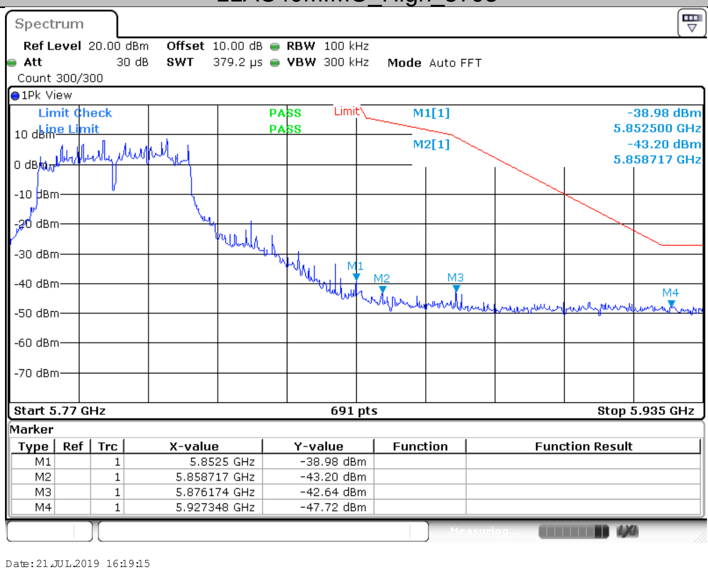

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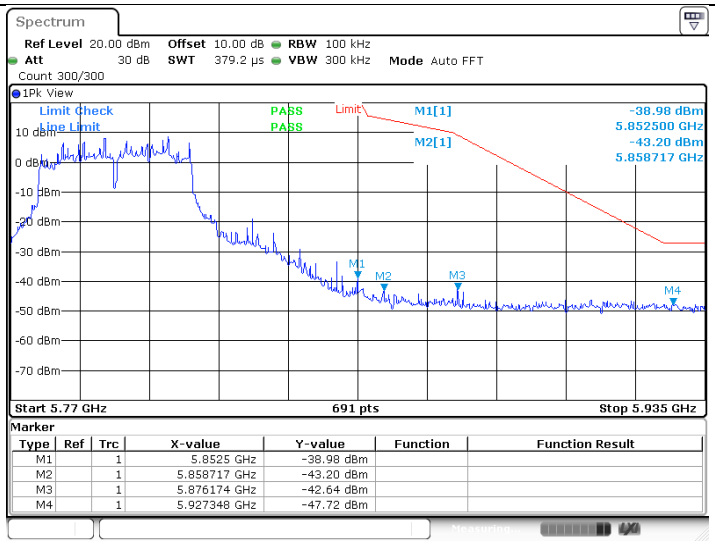


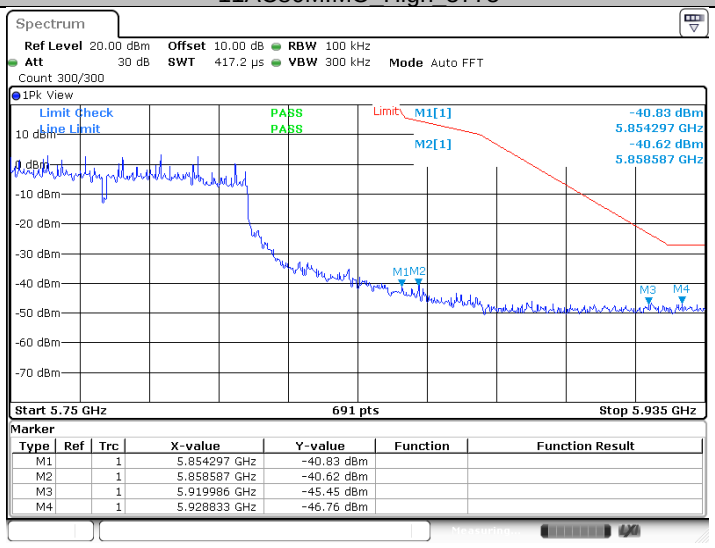
11AC80MIMO_Low_5775

11AC80MIMO_Low_5775

11AC80MIMO_Low_5775

11AC80MIMO_Low_5775

11AC80MIMO_High_5775



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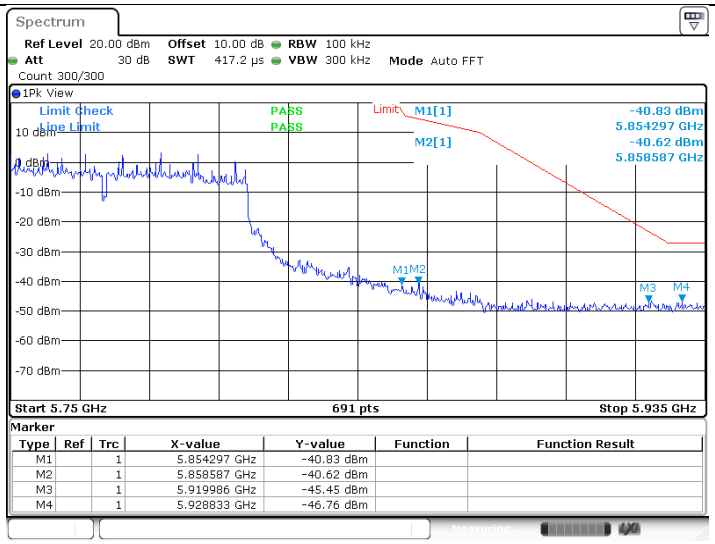

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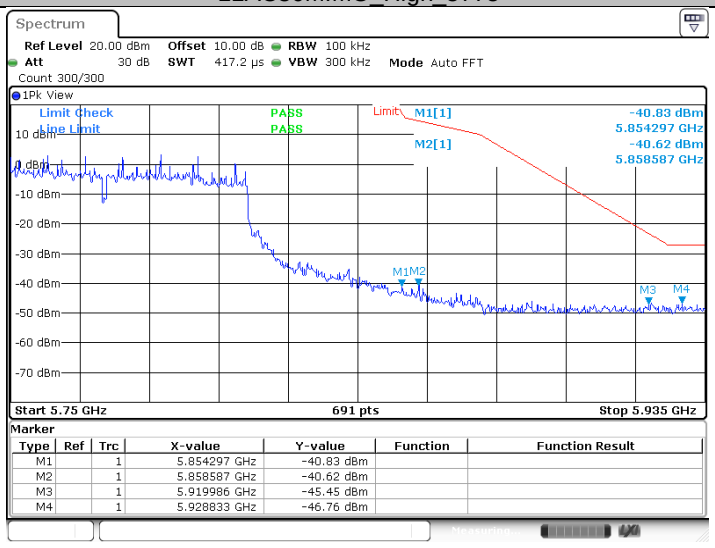

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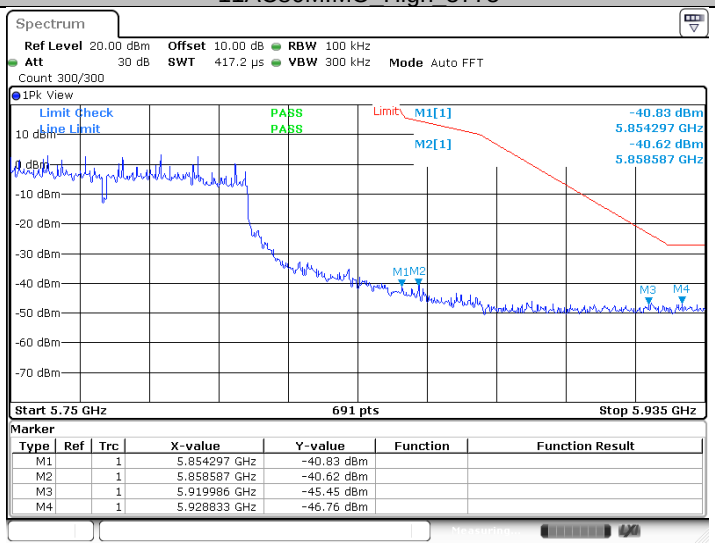

Transmitting spurious emission test result as below (Radiated Mode):

Test Method

1. The EUT was place on a turn table which is 1.5m above ground plane for above 1GHz and 0.8m above ground for below 1GHz at 3meter chamber room for test. The table was
   rotated 360 degrees to determine the position of the highest radiation.
2. The EUT was set 3 meters away from the interference – receiving antenna, which was mounted on the top of a variable – height antenna tower.
3. The height of antenna is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.
4. For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters and the rotatable table was turned
5. Use the following spectrum analyzer settings According to C63.10:
   For Above 1GHz
   Span = wide enough to capture the peak level of the in-band emission and all spurious
   RBW = 1MHz, VBW≥RBW for peak measurement and VBW = 10Hz for average measurement, Sweep = auto, Detector function = peak, Trace = max hold.
   For Below 1GHz
   Use the following spectrum analyzer settings:
   Span = wide enough to capture the peak level of the in-band emission and all spurious
   RBW = 100 KHz, VBW≥RBW for peak measurement, Sweep = auto, Detector function =
   peak, Trace = max hold.

Note:

1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120 KHz for Quasi-peak detection (QP) at frequency below 1GHz.
2. The resolution bandwidth of test receiver/spectrum analyzer is 1MHz and the video bandwidth is 3MHz for peak detection (PK) at frequency above 1GHz.
3. The resolution bandwidth of test receiver/spectrum analyzer is 1MHz and the video bandwidth is 3MHz for RMS Average ((duty cycle < 98%) for Average detection (AV) at frequency above 1GHz, then the measurement results was added to a correction factor (20log(1/duty cycle)).
4. The resolution bandwidth of test receiver/spectrum analyzer is 1MHz and the video bandwidth is 10Hz (duty cycle > 98%) for Average detection (AV) at frequency above 1GHz.

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Limit

According to part 15.247(d), the radio emission outside the operating frequency band shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power. Radiated emissions which fall in the restricted bands, as defined in section15.205, must comply with the radiated emission limits specified in section 15.209.

Frequency MHz	Field Strength uV/m	Field Strength dBµV/m	Detector
30-88	100	40	QP
88-216	150	43.5	QP
216-960	200	46	QP
960-1000	500	54	QP
Above 1000	500	54	AV
Above 1000	5000	74	PK

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According to C63.10, if the peak (or quasi-peak) measured value complies with the average limit, it is unnecessary to perform an average measurement, so AV emission value did not show in below table if the peak value complies with average limit.

The only worse case (802.11ac20_ MIMO modulation) test result is listed in the report.

Transmitting spurious emission test result as below:

802.11ac20_ MIMO modulation 5180MHz Test Result

Frequency	Emission Level	Polarization	Limit	Margin	Corr. Factor	Detector	Result
MHz	dBuV/m		dBµV/m	dB	dB		
420.21	25.72	Horizontal	46.00	20.28	-23.5	QP	Pass
869.59	33.43	Horizontal	46.00	12.57	-16.1	QP	Pass
752.33	28.88	Vertical	46.00	17.12	-17.4	QP	Pass
943.26	34.87	Vertical	46.00	11.13	-15.3	QP	Pass
11746.16*	41.48	Horizontal	74.00	32.52	9.4	PK	Pass
15832.31*	48.54	Horizontal	74.00	25.46	18.2	PK	Pass
17801.31*	49.87	Horizontal	74.00	24.13	21.3	PK	Pass
10715.25*	39.36	Vertical	74.00	34.64	8.5	PK	Pass
12981.59	43.03	Vertical	74.00	30.97	13.4	PK	Pass
17580.63	49.08	Vertical	74.00	24.92	21.2	PK	Pass

802.11ac20_ MIMO modulation 5320MHz Test Result

Frequency	Emission Level	Polarization	Limit	Margin	Corr. Factor	Detector	Result
MHz	dBuV/m		dBµV/m	dB	dB		
10698.41*	39.34	Horizontal	74	34.66	8.5	PK	Pass
13198.50	43.07	Horizontal	74	30.93	14.0	PK	Pass
17611.56	48.76	Horizontal	74	25.24	21.2	PK	Pass
10135.34	40.17	Vertical	74	33.83	8.6	PK	Pass
13162.41	42.83	Vertical	74	31.17	13.9	PK	Pass
17065.69	49.04	Vertical	74	24.96	20.2	PK	Pass

802.11ac20_ MIMO modulation 5500MHz Test Result

Frequency	Emission Level	Polarization	Limit	Margin	Corr. Factor	Detector	Result
MHz	dBuV/m		dBµV/m	dB	dB		
10135.00	40.02	Horizontal	74	33.98	8.6	PK	Pass
13119.43	44.93	Horizontal	74	29.07	13.8	PK	Pass
17704.03*	49.24	Horizontal	74	24.76	21.3	PK	Pass
10773.00*	39.85	Vertical	74	34.15	8.3	PK	Pass
13826.53	41.72	Vertical	74	32.28	13.1	PK	Pass
17683.06	48.57	Vertical	74	25.43	21.3	PK	Pass

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802.11ac20_ MIMO modulation 5700MHz Test Result

Frequency	Emission Level	Polarization	Limit	Margin	Corr. Factor	Detector	Result
MHz	dBuV/m		dBµV/m	dB	dB		
10636.18*	39.24	Horizontal	74	34.76	8.5	PK	Pass
13151.06	42.71	Horizontal	74	31.29	13.9	PK	Pass
17815.75*	49.28	Horizontal	74	24.72	21.4	PK	Pass
10694.62*	39.22	Vertical	74	34.78	8.5	PK	Pass
14457.61	44.63	Vertical	74	29.37	15.7	PK	Pass
17497.43	49.08	Vertical	74	24.92	21.0	PK	Pass

802.11ac20_ MIMO modulation 5825MHz Test Result

Frequency	Emission Level	Polarization	Limit	Margin	Corr. Factor	Detector	Result
MHz	dBuV/m		dBµV/m	dB	dB		
11107.13*	39.53	Horizontal	74	34.47	8.0	PK	Pass
14404.03	44.89	Horizontal	74	29.11	15.4	PK	Pass
17780.00*	48.73	Horizontal	74	25.27	21.3	PK	Pass
11881.59*	40.92	Vertical	74	33.08	10.4	PK	Pass
13153.47	43.93	Vertical	74	30.07	13.9	PK	Pass
17715.72*	49.38	Vertical	74	24.62	21.3	PK	Pass

Remark:

(1) Corrected Amplitude = Read level + Corrector factor
Above 1GHz: Corrector factor = Antenna Factor + Cable Loss- Amplifier Gain
Below 1GHz: Corrector factor = Antenna Factor + Cable Loss
(The Reading Level is recorded by software which is not shown in the sheet)

(2) "*" means the emission(s) appear within the restrict bands shall follow the requirement of section 15.205.

(3) We test all modes and only the worst case (802.11ac20_ MIMO modulation) recorded in the report.

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9.6 Duty Cycle

Test Method

1. The RF output of EUT was connected to the spectrum analyzer by RF cable. The path loss was compensated to the results for each measurement.
2. Use the following spectrum analyzer settings:
   Span = 0, RBW = 100 kHz, VBW≥RBW, Sweep = auto, Detector function = peak, Trace = max hold
3. Allow the trace to stabilize. Mark the OFF time and ON time. and the duty cycle is $T_{on} / T_{on}+T_{off}$
4. Repeat above procedures until all frequencies measured were complete.

TestMode	Antenna	Channel	Duty Cycle [%]
11A	Ant1	5180	94.64
	Ant2	5180	94.65
	Ant1	5200	94.64
	Ant2	5200	94.59
	Ant1	5240	94.64
	Ant2	5240	94.65
	Ant1	5260	94.64
	Ant2	5260	94.64
	Ant1	5280	94.64
	Ant2	5280	94.65
	Ant1	5320	94.59
	Ant2	5320	94.65
	Ant1	5500	94.64
	Ant2	5500	94.65
	Ant1	5580	94.59
	Ant2	5580	94.64
	Ant1	5700	94.64
	Ant2	5700	94.64
	Ant1	5720	94.70
	Ant2	5720	94.64
	Ant1	5745	94.64
	Ant2	5745	94.64
	Ant1	5785	94.64
	Ant2	5785	94.64
	Ant1	5825	94.64
	Ant2	5825	94.65
11N20MIMO	Ant1+ Ant2	5180	95.40
		5200	95.34
		5240	95.34
		5260	95.40
		5280	95.40
		5320	95.34
		5500	95.34
		5580	95.34
		5700	95.40
		5720	95.34
		5745	95.34
		5785	95.34
		5825	95.34
11N40MIMO	Ant1+ Ant2	5190	84.03
		5230	84.05
		5270	83.94
		5310	83.94
		5510	83.94
		5550	84.03
		5670	83.94

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		5710	84.14
		5755	84.03
		5795	83.94
11AC20MIMO	Ant1+ Ant2	5180	84.05
		5200	84.14
		5240	84.16
		5260	84.16
		5280	84.25
		5320	84.14
		5500	84.14
		5580	84.14
		5700	84.25
		5720	84.14
		5745	84.14
		5785	84.25
		5825	84.14
11AC40MIMO	Ant1+ Ant2	5190	83.26
		5230	83.05
		5270	83.26
		5310	83.23
		5510	50.00
		5550	83.23
		5670	83.26
		5710	83.26
		5755	83.26
		5795	83.23
11AC80MIMO	Ant1+ Ant2	5210	81.38
		5290	81.71
		5530	81.38
		5610	81.71
		5690	81.78
		5775	81.45

9.7 Frequencies Stability

Test Method

1. Connect the UUT to the spectrum analyzer
2. Set Centre Frequency of the channel under test.
3. Set Detector PEAK
4. Set RBW: 10KHz, VBW: 3RBW
5. Set Span: Encompass the entire emissions bandwidth (EBW) of the signal.
6. Allow the trace to stabilize, find the peak value of the power envelope and record the frequency, then calculated the frequency drift.

The test extreme voltage is to change the primary supply voltage from 85 to 115 percent of the nominal value.
User manual temperature is 5℃ to 30℃

Limit: 20ppm
Test Results (All conditions and all modes were performed, only list Worst-Case in the report)

Voltage								
TestMode	Antenna	Channel	Voltage [Vdc]	Temperature (℃)	Deviation (Hz)	Deviation (ppm)	Limit (ppm)	Verdict
11AC40MIMO	Ant1+ANT2	5190	NV	NT	-37000	-7.129094	20	PASS
		5190	LV	NT	-36000	-6.936416	20	PASS
		5190	HV	NT	-36000	-6.936416	20	PASS
		5230	NV	NT	-34000	-6.500956	20	PASS
		5230	LV	NT	-34000	-6.500956	20	PASS
		5230	HV	NT	-33000	-6.309751	20	PASS
		5270	NV	NT	-32000	-6.072106	20	PASS
		5270	LV	NT	-33000	-6.26186	20	PASS
		5270	HV	NT	-33000	-6.26186	20	PASS
		5310	NV	NT	-33000	-6.214689	20	PASS
		5310	LV	NT	-33000	-6.214689	20	PASS
		5310	HV	NT	-33000	-6.214689	20	PASS
		5510	NV	NT	-34000	-6.170599	20	PASS
		5510	LV	NT	-34000	-6.170599	20	PASS
		5510	HV	NT	-34000	-6.170599	20	PASS
		5550	NV	NT	-34000	-6.126126	20	PASS
		5550	LV	NT	-34000	-6.126126	20	PASS
		5550	HV	NT	-34000	-6.126126	20	PASS
		5670	NV	NT	-34000	-5.996473	20	PASS
		5670	LV	NT	-34000	-5.996473	20	PASS
		5670	HV	NT	-35000	-6.17284	20	PASS
		5710	NV	NT	-35000	-6.129597	20	PASS
		5710	LV	NT	-35000	-6.129597	20	PASS
		5710	HV	NT	-35000	-6.129597	20	PASS
		5755	NV	NT	-35000	-6.081668	20	PASS
		5755	LV	NT	-35000	-6.081668	20	PASS
		5755	HV	NT	-35000	-6.081668	20	PASS
		5795	NV	NT	-35000	-6.039689	20	PASS
		5795	LV	NT	-36000	-6.212252	20	PASS
		5795	HV	NT	-35000	-6.039689	20	PASS
11AC80MIMO	Ant1+ANT2	5210	NV	NT	-31000	-5.950096	20	PASS
		5210	LV	NT	-32000	-6.142035	20	PASS
		5210	HV	NT	-32000	-6.142035	20	PASS
		5290	NV	NT	-32000	-6.049149	20	PASS
		5290	LV	NT	-32000	-6.049149	20	PASS
		5290	HV	NT	-32000	-6.049149	20	PASS
		5530	NV	NT	-33000	-5.96745	20	PASS

		5530	LV	NT	-34000	-6.148282	20	PASS
		5530	HV	NT	-34000	-6.148282	20	PASS
		5610	NV	NT	-34000	-6.060606	20	PASS
		5610	LV	NT	-34000	-6.060606	20	PASS
		5610	HV	NT	-34000	-6.060606	20	PASS
		5690	NV	NT	-35000	-6.151142	20	PASS
		5690	LV	NT	-35000	-6.151142	20	PASS
		5690	HV	NT	-35000	-6.151142	20	PASS
		5775	NV	NT	-35000	-6.060606	20	PASS
		5775	LV	NT	-35000	-6.060606	20	PASS
		5775	HV	NT	-35000	-6.060606	20	PASS

Temperature								
TestMode	Antenna	Channel	Voltage [Vdc]	Temperature (℃)	Deviation (Hz)	Deviation (ppm)	Limit (ppm)	Verdict
11AC40MIMO	Ant1+ANT2	5190	NV	5	-35000	-6.743738	20	PASS
		5190	NV	15	-35000	-6.743738	20	PASS
		5190	NV	25	-35000	-6.743738	20	PASS
		5190	NV	30	-34000	-6.55106	20	PASS
		5230	NV	5	-34000	-6.500956	20	PASS
		5230	NV	15	-33000	-6.309751	20	PASS
		5230	NV	25	-33000	-6.309751	20	PASS
		5230	NV	30	-34000	-6.500956	20	PASS
		5270	NV	5	-33000	-6.26186	20	PASS
		5270	NV	15	-33000	-6.26186	20	PASS
		5270	NV	25	-33000	-6.26186	20	PASS
		5270	NV	30	-33000	-6.26186	20	PASS
		5310	NV	5	-33000	-6.214689	20	PASS
		5310	NV	15	-33000	-6.214689	20	PASS
		5310	NV	25	-33000	-6.214689	20	PASS
		5310	NV	30	-33000	-6.214689	20	PASS
		5510	NV	5	-34000	-6.170599	20	PASS
		5510	NV	15	-34000	-6.170599	20	PASS
		5510	NV	25	-34000	-6.170599	20	PASS
		5510	NV	30	-34000	-6.170599	20	PASS
		5550	NV	5	-34000	-6.126126	20	PASS
		5550	NV	15	-34000	-6.126126	20	PASS
		5550	NV	25	-34000	-6.126126	20	PASS
		5550	NV	30	-34000	-6.126126	20	PASS
		5670	NV	5	-35000	-6.17284	20	PASS
		5670	NV	15	-35000	-6.17284	20	PASS
		5670	NV	25	-35000	-6.17284	20	PASS
		5670	NV	30	-35000	-6.17284	20	PASS
		5710	NV	5	-35000	-6.129597	20	PASS
		5710	NV	15	-35000	-6.129597	20	PASS
		5710	NV	25	-35000	-6.129597	20	PASS
		5710	NV	30	-35000	-6.129597	20	PASS
		5755	NV	5	-35000	-6.081668	20	PASS
		5755	NV	15	-35000	-6.081668	20	PASS
		5755	NV	25	-35000	-6.081668	20	PASS
		5755	NV	30	-35000	-6.081668	20	PASS
		5795	NV	5	-35000	-6.039689	20	PASS
		5795	NV	15	-35000	-6.039689	20	PASS
		5795	NV	25	-35000	-6.039689	20	PASS
		5795	NV	30	-35000	-6.039689	20	PASS
11AC80MIMO	Ant1+ANT2	5210	NV	5	-32000	-6.142035	20	PASS
		5210	NV	15	-32000	-6.142035	20	PASS
		5210	NV	25	-32000	-6.142035	20	PASS
		5210	NV	30	-32000	-6.142035	20	PASS
		5290	NV	5	-32000	-6.049149	20	PASS
		5290	NV	15	-32000	-6.049149	20	PASS
		5290	NV	25	-32000	-6.049149	20	PASS
		5290	NV	30	-32000	-6.049149	20	PASS

		5530	NV	5	-34000	-6.148282	20	PASS
		5530	NV	15	-34000	-6.148282	20	PASS
		5530	NV	25	-34000	-6.148282	20	PASS
		5530	NV	30	-34000	-6.148282	20	PASS
		5610	NV	5	-34000	-6.060606	20	PASS
		5610	NV	15	-34000	-6.060606	20	PASS
		5610	NV	25	-34000	-6.060606	20	PASS
		5610	NV	30	-34000	-6.060606	20	PASS
		5690	NV	5	-35000	-6.151142	20	PASS
		5690	NV	15	-35000	-6.151142	20	PASS
		5690	NV	25	-35000	-6.151142	20	PASS
		5690	NV	30	-35000	-6.151142	20	PASS
		5775	NV	5	-35000	-6.060606	20	PASS
		5775	NV	15	-36000	-6.233766	20	PASS
		5775	NV	25	-35000	-6.060606	20	PASS
		5775	NV	30	-35000	-6.060606	20	PASS

9.8 Dynamic Frequency Selection (DFS)

1、General Test Condition

Parameteers of EUT	
Frequency	5250 – 5350 MHz & 5470 – 5725 MHz
Operational Mode	Slave
Modulation:	OFDM
Channel Bandwidth:	20 MHz , 40 MHz，80 MHz

Note: This device was functioned as a Slave device during the DFS

2、Test requirement

The manufacturer shall whether the EUT is capable of operating as a master and a client. Id the EUT is capable of operating in more than one operating mode then each operating mode shall be tested separately.

DFS Applicability

Requirement	Operational Mode		
	Master	Client Without Radar Detection	**Client With Radar Detection**
Non-Occupancy Period	Yes	Not required	Yes
DFS Detection Threshold	Yes	Not required	Yes
Channel Availability Check Time	Yes	Not required	Not required
Uniform Spreading	Yes	Not required	Not required
U-NII Detection Bandwidth	Yes	Not required	Yes

DFS Applicability During Normal Operation

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

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3、Test Limited

According to KDB 905462 D02 Table 4 DFS Response Requirement Values

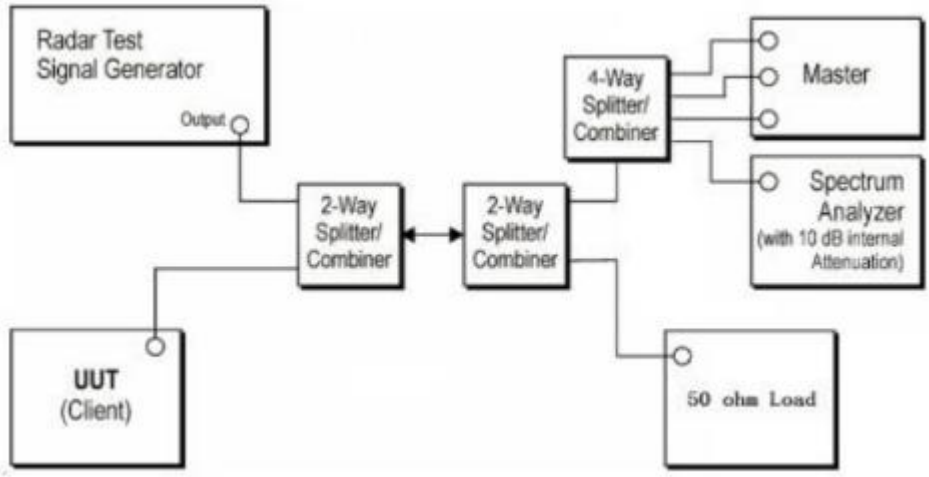
Parameter	Value
Non-occupancy period	Minimum 30 minutes
Channel Availability Check Time	60 seconds
Channel Move Time	10 seconds See Note 1.
Channel Closing Transmission Time	200 milliseconds + an aggregate of 60 milliseconds over remaining 10 second period. See Notes 1 and 2.
U-NII Detection Bandwidth	Minimum 100% of the U-NII 99% transmission power bandwidth. See Note 3.

Note 1: *Channel Move Time* and the *Channel Closing Transmission Time* should be performed with Radar Type 0. The measurement timing begins at the end of the Radar Type 0 burst.
Note 2: The *Channel Closing Transmission Time* is comprised of 200 milliseconds starting at the beginning of the *Channel Move Time* plus any additional intermittent control signals required to facilitate a *Channel* move (an aggregate of 60 milliseconds) during the remainder of the 10 second period. The aggregate duration of control signals will not count quiet periods in between transmissions.
Note 3: During the *U-NII Detection Bandwidth* detection test, radar type 0 should be used. For each frequency step the minimum percentage of detection is 90 percent. Measurements are performed with no data traffic.

4、Calibration of Radar Waveform

(1) A 50ohm load is connected in place of the spectrum analyzer, and the spectrum analyzer is connected to place of the master.
(2) The interference Radar Detection Threshold Level is -62dBm+3.7dB+1.5dB=-55.8dBm that had been taken into account the output power range and antenna gain.
(3) The following equipment setup was used to calibrate the conducted radar waveform. A vector signal generator was utilized to establish the test signal level for radar type 0. During this process there were no transmissions by either the master or client device. The spectrum analyzer was switched to the zero spans (time domain) at the frequency of the radar waveform generator. Peak detection was used. The spectrum analyzer resolution bandwidth (RBW) and video bandwidth (VBW) were set to 3MHz. The spectrum analyzer had offset -1.5dB to compensate RF cable loss 1.5dB.
(4) The vector signal generator amplitude was set so that the power level measured at the spectrum analyzer was -62dBm+3.7dB+1.5dB=-55.8dBm. Capture the spectrum analyzer plots on short pulse radar waveform.

Conducted Calibration Setup:

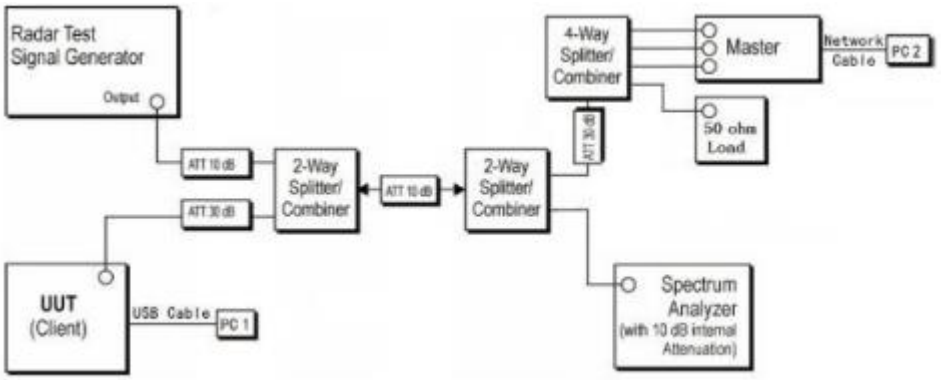


Channel Closing Transmission Time, Channel Move Time and Non-Occupancy Period.

Block Diagram of test setup test procedure.

(1) The Radar Pulse generator is setup to provide a pulse at frequency that the master and client are operating, A type 0 radar pulse with a 1us pulse width and a 1428us PRI is used for the testing.
(2) The vector signal generator is adjusted to provide the radar burst (18 pulses) at the level of approximately -55.8dBm at the antenna of the master device.
(3) A trigger is provided from the pulse generator to the DFS monitoring system in order to capture the traffic and the occurrence of the radar pulse.
(4) EUT will associate with the master at channel. The file “iperf.exe” specified by the FCC is streamed from the PC 2 through the master and the client device to the PC 1 and played in full motion video using test software in order to properly load the network for the entire period of the test.
(5) When radar burst with a Level equal to the DFS Detection Threshold +1dB is generated on the operating channel of the U-NII device. At time T0 the radar waveform generator sends a burst of pulse of the radar waveform at Detection threshold +1dB.
(6) Observer the transmissions of the EUT at the end of the radar Burst on the Operating channel. Measure and record the transmissions form the UUT during The observation time (channel move time). One 15 seconds plot is reported for the short pulse radar type 0. The plot for the short pulse radar burst. The channel move time will be calculated based on the zoom in 600ms plot of the short pulse radar type.
(7) Measurement of the aggregate duration of the channel closed transmission time method. With the spectrum analyzer set to zero span tuned to the center frequency of the EUT operating channel at the radar simulated frequency, peak detection, and max hold, the dwell time per bin is given by: Dwell (3.0)=S(12000ms)/B(4000); where dwell time per spectrum analyzer sampling bin, S is sweep time and B is the number of spectrum analyzer sampling bins. An upper bound of the aggregate duration of the intermittent control signals of channel closing transmission time is calculated by: C(ms)=N X Dwell (0.3ms); where C is the closing time, N is the number of spectrum analyzer sampling bins (intermittent control signals) showing a U-NII transmission and dwell is the dwell time per bin.
(8) Measurement the EUT for more than 30 minutes following the channel move time to verify that no transmission or beacons occur on this channel.

Test Setup:
Setup for client with injection at the master.



5、Test Result

Clause	Test Parameter	Remarks	Pass/Fail
15.407	DFS Detection Threshold	No Applicable	N/A
15.407	Channel Availability Check time	No Applicable	N/A
15.407	Channel Move time	Applicable	Pass
15.407	Channel Closing Transmission Time	Applicable	Pass
15.407	Non-Occupancy Period	Applicable	Pass
15.407	Uniform Spreading	No Applicable	N/A
15.407	U-NII Detection Bandwidth	No Applicable	N/A

TestMode	Channel	CCT[ms]	Limit[ms]	CMT[ms]	Limit[ms]	Verdict
11AC80MIMO	5290	9.03	60	448.06	10000	PASS
	5530	30.1	60	452.79	10000	PASS

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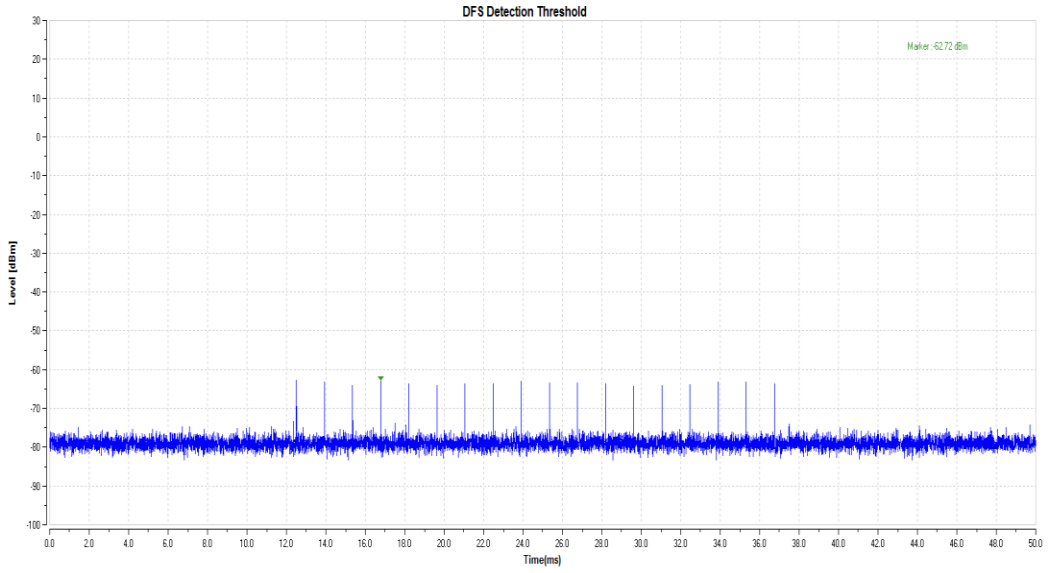
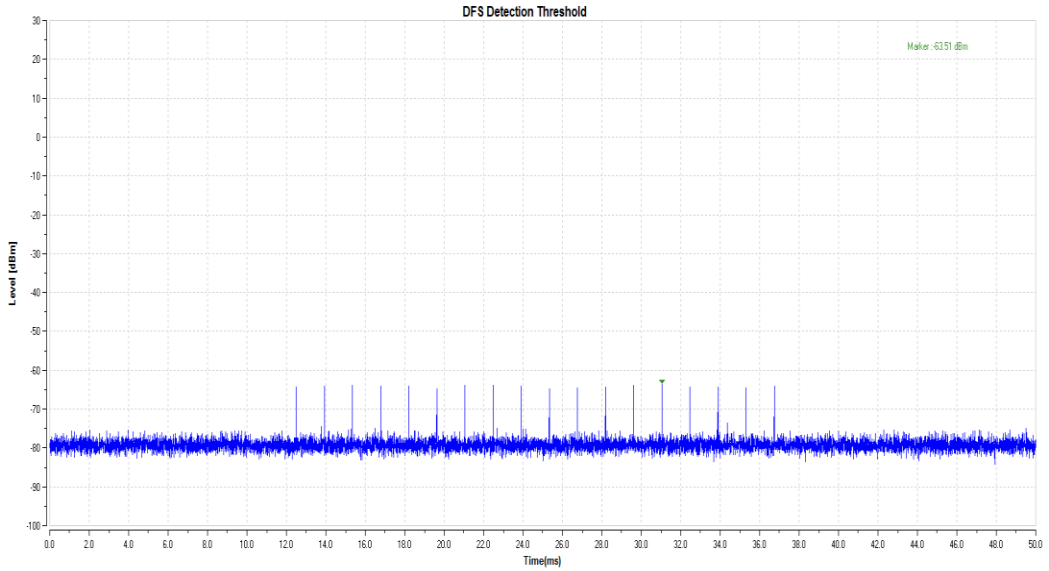
11AC80SISO_5290



11AC80SISO_5530



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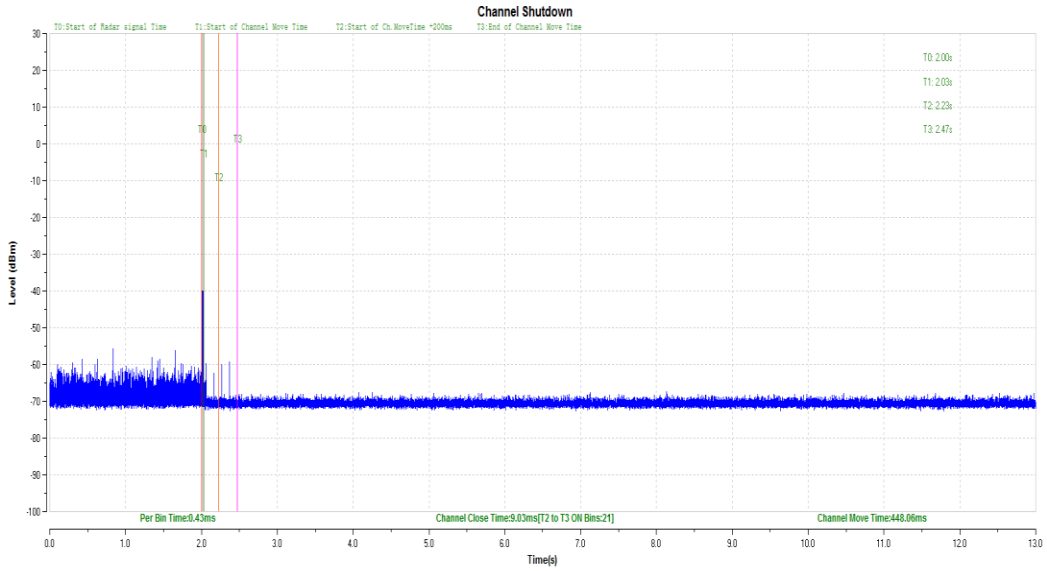
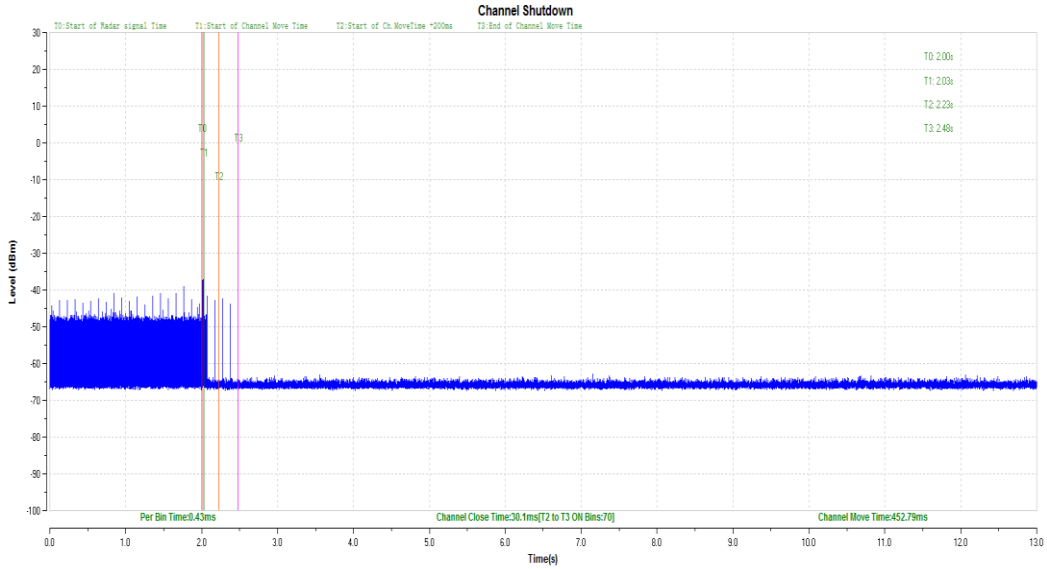
11AC80SISO_5290



11AC80SISO_5530



10 Test Equipment List

Conducted Emission Test

Description	Manufacturer	Model no.	Serial no.	cal. due date
EMI Test Receiver	Rohde & Schwarz	ESR 3	101782	2020-6-28
LISN	Rohde & Schwarz	ENV4200	100249	2020-6-28
Attenuator	Shanghai Huaxiang	TS2-26-3	080928189	2020-6-28
Test software	Rohde & Schwarz	EMC32	Version9.15.00	N/A

Radiated Emission Test

DESCRIPTION	MANUFACTURER	MODEL NO.	SERIAL NO.	CAL. DUE DATE
EMI Test Receiver	Rohde & Schwarz	ESR 26	101269	2020-6-28
Trilog Super Broadband Test Antenna	Schwarzbeck	VULB 9163	707	2020-6-29
Horn Antenna	Rohde & Schwarz	HF907	102295	2020-6-22
Wideband Horn Antenna	Q-PAR	QWH-SL-18-40-K-SG	12827	2020-7-12
Pre-amplifier	Rohde & Schwarz	SCU 18	102230	2020-6-28
Attenuator	Agilent	8491A	MY39264334	2020-6-28
3m Semi-anechoic chamber	TDK	9X6X6	----	2020-7-7
Test software	Rohde & Schwarz	EMC32	Version 9.15.00	N/A

RF conducted test

DESCRIPTION	MANUFACTURER	MODEL NO.	SERIAL NO.	CAL. DUE DATE
Signal Analyzer	Rohde & Schwarz	FSV40	101030	2020-6-28
RF Switch Module	Rohde & Schwarz	OSP120/OSP-B157	101226/100851	2020-6-28
Power Splitter	Weinschel	1580	SC319	2020-7-7
Test software	Tonscend	System for BT/WIFI	Version 2.6	N/A

DESCRIPTION	MANUFACTURER	MODEL NO.	SERIAL NO.	CAL. DUE DATE
Vector Signal Generator	Rohde & Schwarz	SMBV100A	262825	2020-7-6
Signal Analyzer	Rohde & Schwarz	FSV40	101030	2020-6-28
RF Switch Module	Rohde & Schwarz	OSP120/OSP-B157	101226/100851	2020-6-28
Power Splitter	Weinschel	1580	SC319	2020-7-7
10dB Attenuator	Weinschel	4M-10	43152	2020-7-6
10dB Attenuator	R&S	DNF	DNF-001	2020-7-6
10dB Attenuator	R&S	DNF	DNF-002	2020-7-6
10dB Attenuator	R&S	DNF	DNF-003	2020-7-6
10dB Attenuator	R&S	DNF	DNF-004	2020-7-6
Test software	Rohde & Schwarz	EMC32	Version 10.38.00	N/A
Test software	Tonscend	System for BT/WIFI	Version 2.6	N/A

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11 System Measurement Uncertainly

For a 95% confidence level, the measurement expanded uncertainties for defined systems, in accordance with the recommendations of ISO 17025 were:

System Measurement Uncertainty	
Test Items	Extended Uncertainty
Uncertainty for Conducted Emission 150kHz-30MHz	3.21dB
Uncertainty for Radiated Emission 25MHz-3000MHz	Horizontal: 4.81dB; Vertical: 4.89dB;
Uncertainty for Radiated Emission 3000MHz-18000MHz	Horizontal: 4.69dB; Vertical: 4.68dB;
Uncertainty for Radiated Emission 18000MHz-40000MHz	Horizontal: 4.89dB; Vertical: 4.87dB;
Uncertainty for Conducted RF test with TS 8997	Power level test involved: 1.16dB Frequency test involved: 0.6×10^{-7}

---THE END OF REPORT---

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