



FCC - TEST REPORT

Report Number : **68.950.22.0464.01** Date of Issue: **June 6, 2022**

Model / HVIN : **AP6398S2**

Product Type : Wi-Fi and Bluetooth functionalities module

Applicant : Roboteam Home Technology (Shenzhen) Co., Ltd

Address : 22F, CHANGFU JINMAO BUILDING NO.5 SHIHUA ROAD,
FUTIAN DISTRICT, 518000 SHENZHEN, PEOPLE'S REPUBLIC
OF CHINA

Manufacturer : Roboteam Home Technology (Shenzhen) Co., Ltd

Address : 22F, CHANGFU JINMAO BUILDING NO.5 SHIHUA ROAD,
FUTIAN DISTRICT, 518000 SHENZHEN, PEOPLE'S REPUBLIC
OF CHINA

Test Result : **Positive** **Negative**

Total pages including Appendices : **139**

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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
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Telephone: 86 755 8828 6998

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FCC Registration No.: 514049

FCC Designation Number: CA5009

IC Registration No.: 10320A

3 Description of the Equipment Under Test

Description of the Equipment Under Test

Product:	Wi-Fi and Bluetooth functionalities module
Model no.:	AP6398S2
Brand name:	t e m i
FCC ID:	2ASJLAP6398S2
Options and accessories:	NIL
Rating:	Supplied by 3.3VDC
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:	Intergal antenna
Antenna 1	2.0dBi Max for Ant0 1.5dBi Max for Ant1
Antenna 2	0.5dBi Max for Ant0 0.5dBi Max for Ant1
Description of the EUT:	The Equipment Under Test (EUT) is a Wi-Fi and Bluetooth functionalities module which support Bluetooth function and Wi-Fi operated at 5GHz and 2.4GHz. Only 5GWiFi included in this report.

NOTE 1: The above EUT's information is declared by manufacturer. Please refer to the specifications or user's manual for more detailed description.

NOTE 2: This report contains two kinds of antenna, they are identical only except antenna gain, testing only performed at the antenna support higher gain.

4 Summary of Test Standards

Test Standards	
FCC Part 15 Subpart E, 10-1-2020 Edition	PART 15 - RADIO FREQUENCY DEVICES Subpart E - Unlicensed National Information Infrastructure Devices
FCC Part 15 Subpart C 10-1-2020 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

662911 D01 Multiple Transmitter Output v02r01

ANSI C63.10-2013, American National Standard for Testing Unlicensed Wireless Devices

5 Summary of Test Results

Technical Requirements				
FCC Part 15 Subpart E, FCC Part 15 Subpart C				
Test Condition	Pages	Test Result		
		Pass	Fail	N/A
15.207 Conducted Emission AC Power Port	10	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
15.403(a)(5) Emission bandwidth	13	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
15.407(a)(1) 15.407(a)(3) Maximum Conducted Output Power	18	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
15.407(a)(1) 15.407(a)(3) Peak Power Spectral Density	22	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
15.407(b)(1) 15.407(b)(4) 15.407(b)(6) 15.407(b)(7) 15.209 Unwanted Emissions	26	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Duty Cycle	104	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
15.407(g) Frequencies Stability	106	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
15.407(h) Dynamic Frequency Selection (DFS). ^a	109	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
15.203 Antenna requirement	See NOTE 2	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

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

NOTE 2: The EUT uses an external antenna and manufacturer will stick it down with glue, which gain are 1.5dBi and 2.0dBi. In accordance to §15.203, it is considered sufficiently to comply with the provisions of this section.

6 General Remarks

Remarks

This submittal(s) (test report) is intended for FCC ID: 2ASJLAP6398S2, complies with Section 15.207, 15.209, 15.407 of the FCC Part 15, Subpart E rules.

SUMMARY:

All tests according to the regulations cited on page 5 were

■ - Performed

□ - **Not** Performed

The Equipment Under Test

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

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

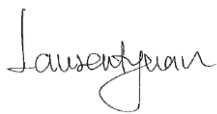
Sample Received Date: April 25, 2022

Testing Start Date: April 27, 2022

Testing End Date: May 17, 2022

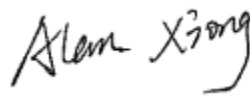
TÜV SÜD Certification and Testing (China) Co., Ltd. Shenzhen Branch –

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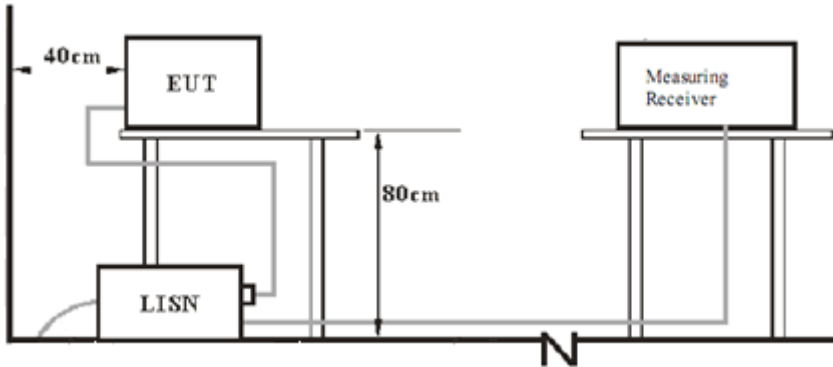


Carry Cai
Test Engineer

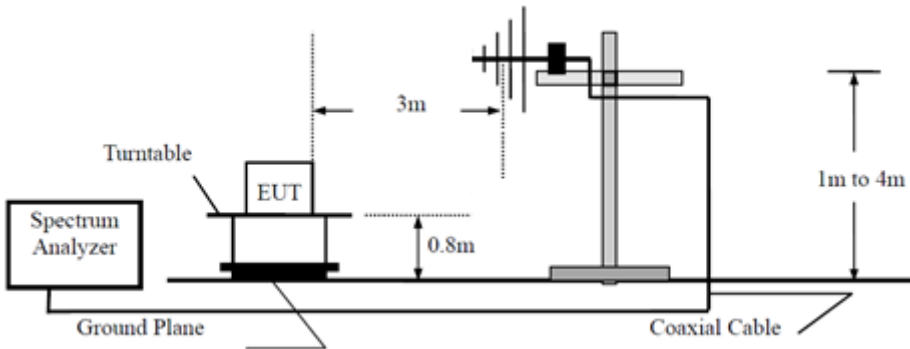


7 Test setups

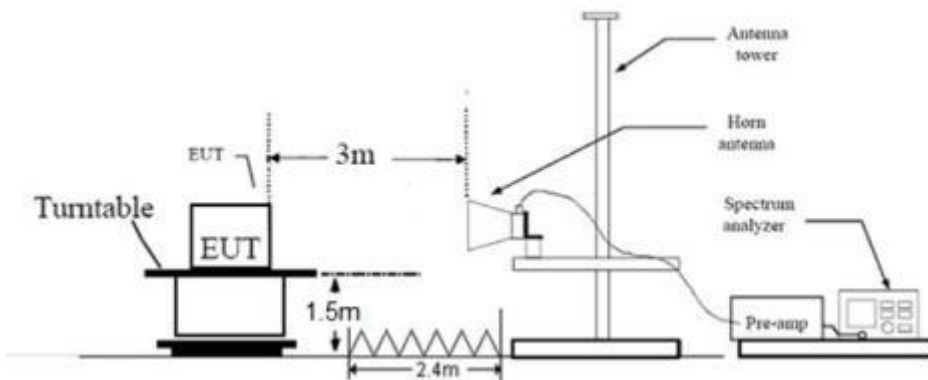
7.1 AC Power Line Conducted Emission test setups



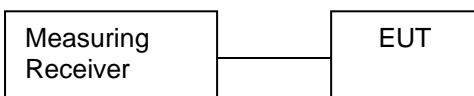
7.2 Radiated test setups Below 1GHz



Above 1GHz



7.3 Conducted RF test setups



8. Systems Test Configuration

Auxiliary Equipment Used during Test:

Description	Manufacturer	Model NO.	S/N
Laptop	Thinkpad	X230	0A72162
Adapter	HOLOTO	ADS-25FSG-12	12VDC, 2.0A

Cables Used During Test:

Cable	Length	Shielded/unshielded	With / without ferrite
USB Cable	1.0m	Shielded	Without ferrite

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

Band	Data Rate
802.11a	6 Mbps
802.11n HT20	MCS0
802.11n HT40	MCS0
802.11ac HT20	MCS0
802.11ac HT40	MCS0
802.11ac HT80	MCS0

the following channels

Modulation	Channel	Frequency (MHz)
802.11a / 802.11n20 / 802.11ac20	36	5180
	44	5220
	48	5240
	52	5260
	60	5300
	64	5320
	100	5500
	116	5580
	140	5700
	144	5720
	149	5745
	157	5785
	165	5825
	802.11n40 / 802.11ac40	38
46		5230
54		5270
62		5310
102		5510
110		5550
134		5670
142		5710
151		5755
802.11ac80	159	5795
	42	5210
	58	5290
	106	5530



	122	5610
	138	5690
	155	5775

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

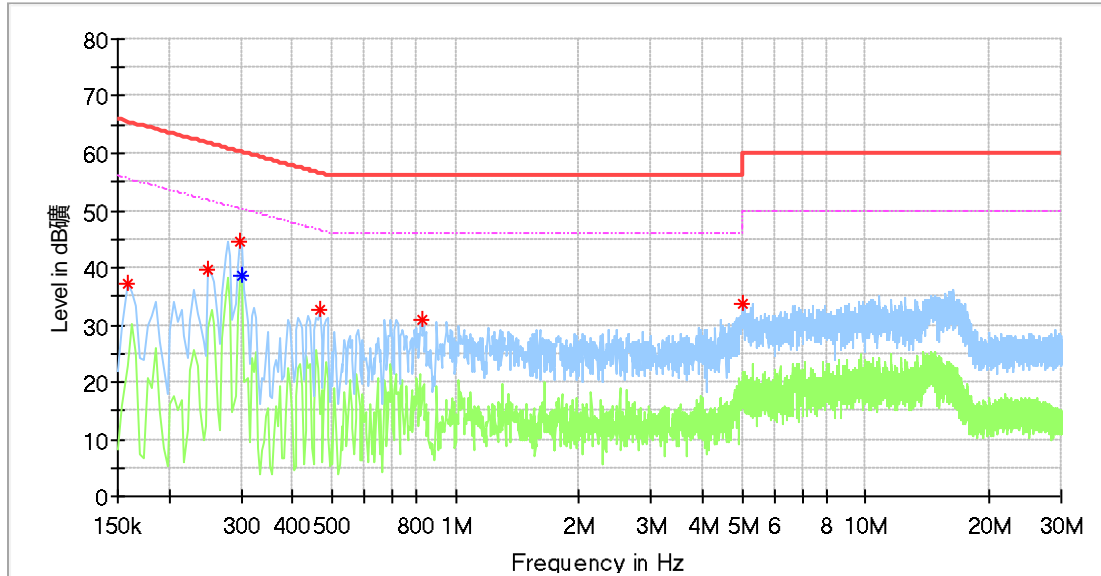
According to §15.207, conducted emissions limit as below:

Frequency MHz	QP Limit dB μ V	AV Limit dB μ V
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

Conducted Emission

Product Type : Wi-Fi and Bluetooth functionalities module
 M/N : AP6398S2
 Operating Condition : Normal Working
 Test Specification : Line
 Comment : AC 120V/60Hz

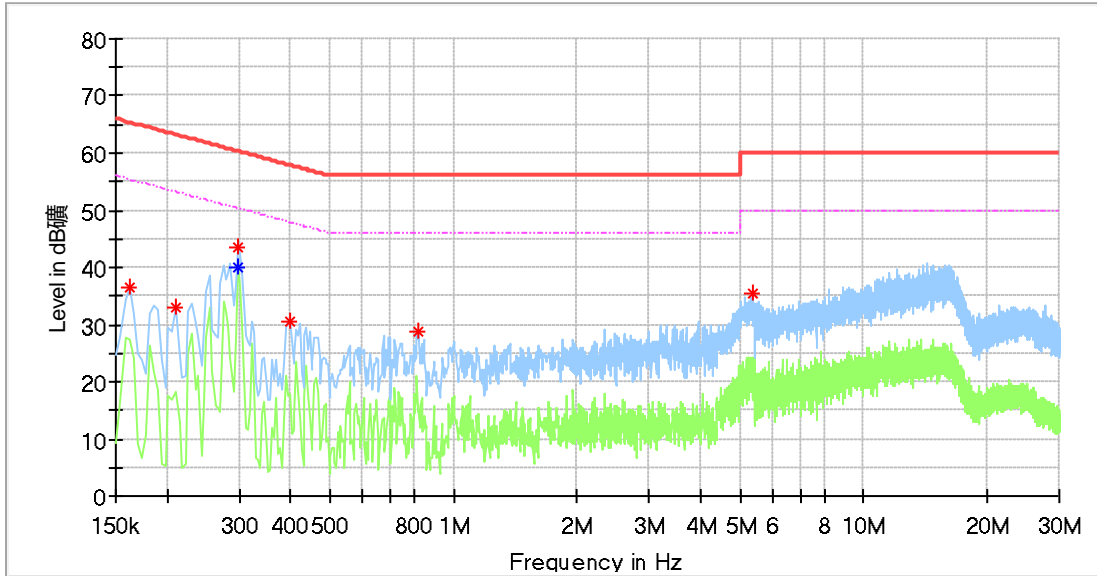


Frequency (MHz)	Max Peak (dBμV)	Average (dBμV)	Limit (dBμV)	Margin (dB)	Line	Corr. (dB)
0.158000	37.26	---	65.57	28.30	L1	9.74
0.250000	39.70	---	61.76	22.06	L1	9.68
0.298000	44.71	---	60.30	15.59	L1	9.66
0.302000	---	38.49	50.19	11.70	L1	9.66
0.466000	32.52	---	56.58	24.07	L1	9.65
0.826000	31.04	---	56.00	24.96	L1	9.66
5.026000	33.59	---	60.00	26.41	L1	9.82

Remark:
 Max Peak= Read level + Corrector factor
 Correct factor=cable loss + LISN factor

Conducted Emission

Product Type : Wi-Fi and Bluetooth functionalities module
 M/N : AP6398S2
 Operating Condition : Normal Working
 Test Specification : Neutral
 Comment : AC 120V/60Hz



Frequency (MHz)	MaxPeak (dBµV)	Average (dBµV)	Limit (dBµV)	Margin (dB)	Line	Corr. (dB)
0.162000	36.51	---	65.36	28.85	N	9.77
0.210000	33.15	---	63.21	30.06	N	9.73
0.298000	---	39.91	50.30	10.39	N	9.70
0.298000	43.58	---	60.30	16.72	N	9.70
0.398000	30.52	---	57.90	27.37	N	9.69
0.822000	28.65	---	56.00	27.35	N	9.69
5.374000	35.37	---	60.00	24.63	N	9.89

Remark:
 Max Peak= Read level + Corrector factor
 Correct factor=cable loss + LISN factor

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) $\geq 3 \times$ 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: ≥ 500 KHz

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 $\geq 3 \cdot$ 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

Test result as below table:

IEEE 802.11a modulation Test Result

Band	Channel	Channel Frequency (MHz)	Measured 99% Bandwidth (MHz)		Measured 26dB Bandwidth (MHz)		Measured 6dB Bandwidth (MHz)	
			Ant0	Ant1	Ant0	Ant1	Ant0	Ant1
U-NII-1	Low	5180	17.982	18.001	21.200	21.220	N/A	N/A
	Middle	5220	18.022	18.011	21.600	21.530	N/A	N/A
	High	5240	17.982	18.020	21.240	21.420	N/A	N/A
U-NII-2A	Low	5260	18.175	18.163	20.920	21.010	N/A	N/A
	Middle	5300	18.022	18.011	21.440	21.450	N/A	N/A
	High	5320	17.982	18.020	21.320	21.230	N/A	N/A
U-NII-2C	Low	5500	17.982	17.991	21.320	21.220	N/A	N/A
	Middle	5600	18.022	17.984	20.960	21.100	N/A	N/A
	High	5700	18.102	18.103	21.360	21.310	N/A	N/A
		5720	18.142	18.151	21.520	21.440	N/A	N/A
		5720_UNII-2C	14.031	14.021	15.6	15.4	N/A	N/A
U-NII-3	Low	5720_UNII-3	4.111	4.200	5.92	6.01	N/A	N/A
	Middle	5745	18.022	18.011	N/A	N/A	16.400	16.320
		5785	17.902	18.020	N/A	N/A	16.360	16.380
	High	5825	17.942	17.895	N/A	N/A	16.360	16.360

IEEE 802.11n-HT20 modulation Test Result

Band	Channel	Channel Frequency (MHz)	Measured 99% Bandwidth (MHz)		Measured 26dB Bandwidth (MHz)		Measured 6dB Bandwidth (MHz)	
			Ant0	Ant1	Ant0	Ant1	Ant0	Ant1
U-NII-1	Low	5180	18.741	18.650	21.840	21.900	N/A	N/A
	Middle	5220	18.861	18.922	21.560	21.620	N/A	N/A
	High	5240	18.821	18.892	22.000	21.860	N/A	N/A
U-NII-2A	Low	5260	18.781	18.761	21.640	21.550	N/A	N/A
	Middle	5300	18.821	18.820	21.600	21.620	N/A	N/A
	High	5320	18.781	18.791	22.040	21.980	N/A	N/A
U-NII-2C	Low	5500	18.741	18.850	21.560	21.680	N/A	N/A
	Middle	5600	18.821	18.846	22.280	22.200	N/A	N/A
	High	5700	18.901	18.896	21.480	21.650	N/A	N/A
		5720	18.941	18.911	22.480	21.440	N/A	N/A
		5720_UNII-2C	14.431	14.467	15.76	15.43	N/A	N/A
U-NII-3	Low	5720_UNII-3	4.51	5.01	6.72	6.33	N/A	N/A
	Middle	5745	18.861	19.022	N/A	N/A	17.400	17.420
		5785	18.781	18.691	N/A	N/A	17.600	17.460
	High	5825	18.781	18.771	N/A	N/A	17.640	17.660

IEEE 802.11n-HT40 modulation Test Result

Band	Channel	Channel Frequency (MHz)	Measured 99% Bandwidth (MHz)		Measured 26dB Bandwidth (MHz)		Measured 6dB Bandwidth (MHz)	
			Ant0	Ant1	Ant0	Ant1	Ant0	Ant1
U-NII-1	Low	5190	37.003	37.110	49.360	49.440	N/A	N/A
	High	5230	37.003	37.050	49.680	49.630	N/A	N/A
U-NII-2A	Low	5270	37.083	37.092	48.960	49.010	N/A	N/A
	High	5310	37.163	37.073	50.360	49.360	N/A	N/A
U-NII-2C	Low	5510	37.083	37.090	49.680	49.430	N/A	N/A
	Middle	5550	37.003	37.010	49.520	49.610	N/A	N/A
	High	5670	37.243	37.289	49.280	49.120	N/A	N/A
		5710	37.083	37.088	49.600	49.330	N/A	N/A
		5710_UNII-2C	33.462	33.510	35.32	36.01	N/A	N/A
U-NII-3	Low	5710_UNII-3	3.621	3.578	14.28	14.33	N/A	N/A
	Middle	5755	37.003	37.101	N/A	N/A	36.480	36.480

	High	5795	36.923	37.003	N/A	N/A	36.480	36.510
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IEEE 802.1ac-VHT20 modulation Test Result

Band	Channel	Channel Frequency (MHz)	Measured 99% Bandwidth (MHz)		Measured 26dB Bandwidth (MHz)		Measured 6dB Bandwidth (MHz)	
			Ant0	Ant1	Ant0	Ant1	Ant0	Ant1
U-NII-1	Low	5180	18.781	18.620	21.720	21.740	N/A	N/A
	Middle	5220	18.861	18.932	21.440	21.540	N/A	N/A
	High	5240	18.821	18.911	21.600	21.610	N/A	N/A
U-NII-2A	Low	5260	18.781	18.810	21.760	21.880	N/A	N/A
	Middle	5300	18.861	18.902	22.480	21.670	N/A	N/A
	High	5320	18.861	18.743	21.720	21.780	N/A	N/A
U-NII-2C	Low	5500	18.781	18.771	21.520	21.770	N/A	N/A
	Middle	5600	18.821	18.231	21.640	21.560	N/A	N/A
	High	5700	18.861	18.902	21.600	21.720	N/A	N/A
		5720	18.861	18.905	21.840	21.750	N/A	N/A
		5720_UNII-2C	14.391	14.332	15.76	15.88	N/A	N/A
U-NII-3	Low	5720_UNII-3	4.471	4.561	6.08	5.98	N/A	N/A
	Middle	5745	18.821	18.021	N/A	N/A	17.640	17.660
		5785	18.781	19.010	N/A	N/A	17.360	17.580
	High	5825	18.741	18.643	N/A	N/A	17.400	17.920

IEEE 802.1ac-VHT40 modulation Test Result

Band	Channel	Channel Frequency (MHz)	Measured 99% Bandwidth (MHz)		Measured 26dB Bandwidth (MHz)		Measured 6dB Bandwidth (MHz)	
			Ant0	Ant1	Ant0	Ant1	Ant0	Ant1
U-NII-1	Low	5190	37.163	37.071	46.800	46.700	N/A	N/A
	High	5230	37.083	37.002	46.640	46.660	N/A	N/A
U-NII-2A	Low	5270	37.083	37.120	51.360	51.021	N/A	N/A
	High	5310	37.163	37.067	51.040	50.980	N/A	N/A
U-NII-2C	Low	5510	36.923	37.102	48.320	49.040	N/A	N/A
	Middle	5550	37.163	37.210	49.200	49.340	N/A	N/A
	High	5670	37.163	37.103	51.120	51.020	N/A	N/A
		5710	37.163	37.006	46.320	46.420	N/A	N/A
		5710_UNII-2C	33.462	33.511	35.48	34.32	N/A	N/A
U-NII-3	Low	5710_UNII-3	3.701	3.621	10.84	10.22	N/A	N/A



	Middle	5755	37.083	37.102	N/A	N/A	36.480	36.900
	High	5795	37.003	37.070	N/A	N/A	36.480	36.670

IEEE 802.1ac-VHT80 modulation Test Result

Band	Channel	Channel Frequency (MHz)	Measured 99% Bandwidth (MHz)		Measured 26dB Bandwidth (MHz)		Measured 6dB Bandwidth (MHz)	
			Ant0	Ant1	Ant0	Ant1	Ant0	Ant1
U-NII-1	Low	5210	76.404	76.503	83.040	83.120	N/A	N/A
U-NII-2A	High	5290	76.563	76.511	83.480	84.020	N/A	N/A
U-NII-2C	Low	5530	76.244	76.389	82.720	82.830	N/A	N/A
	Middle	5610	76.244	76.402	83.680	83.670	N/A	N/A
	High	5690	76.404	76.501	83.360	83.550	N/A	N/A
5690_UNII-2C		73.042	72.988	76.28	77.02	N/A	N/A	
U-NII-3	Low	5690_UNII-3	3.362	3.211	7.08	6.88	N/A	N/A
	High	5775	76.244	76.544	N/A	N/A	76.000	76.340

Remark: "N/A" means "Not Applicable"

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.

Test result as below table

IEEE 802.11a modulation Test Result

Band	Channel	Channel Frequency (MHz)	Maximum Conducted Output Power (dBm)			Power Limit (dBm)
			Ant0	Ant1	SUM	
U-NII-1	Low	5180	13.4	12.8	16.12	24.00
	Middle	5220	13.4	12.8	16.12	24.00
	High	5240	14.4	12.1	16.41	24.00
U-NII-2A	Low	5260	13.4	12.7	16.07	24.00
	Middle	5300	13.2	13.2	16.21	24.00
	High	5320	13.8	12.8	16.34	24.00
U-NII-2C	Low	5500	13.8	12.9	16.38	24.00
	Middle	5580	13.7	12.7	16.24	24.00
	High	5700	14.1	13.4	16.77	24.00
		5720	14.1	13.7	16.91	24.00
U-NII-3	Low	5745	13.7	13.6	16.66	30.00
	Middle	5785	13.8	12.7	16.30	30.00
	High	5825	13.8	13.0	16.43	30.00

$$\text{Power}^{\text{SUM}} = 10 * \text{Log}(10^{(\text{Power}^{\text{Ant0}}/10)} + 10^{(\text{Power}^{\text{Ant1}}/10)})$$

IEEE 802.11n-HT20 modulation Test Result

Band	Channel	Channel Frequency (MHz)	Maximum Conducted Output Power (dBm)			Power Limit (dBm)
			Ant0	Ant1	SUM	
U-NII-1	Low	5180	14.8	13.3	17.12	24.00
	Middle	5220	14.4	13.3	16.90	24.00
	High	5240	15.4	14.3	17.90	24.00
U-NII-2A	Low	5260	15.1	13.4	17.34	24.00
	Middle	5300	14.9	13.1	17.10	24.00
	High	5320	15.3	13.8	17.62	24.00
U-NII-2C	Low	5500	14.7	13.6	17.20	24.00
	Middle	5580	14.6	13.6	17.14	24.00
	High	5700	14.8	14.2	17.52	24.00
		5720	14.7	14.1	17.42	24.00
U-NII-3	Low	5745	13.5	13.7	16.61	30.00
	Middle	5785	13.8	13.9	16.86	30.00
	High	5825	13.7	14.1	16.91	30.00

IEEE 802.11n-HT40 modulation Test Result

Band	Channel	Channel Frequency (MHz)	Maximum Conducted Output Power (dBm)			Power Limit (dBm)
			Ant0	Ant1	SUM	
U-NII-1	Low	5190	13.8	12.0	16.00	24.00
	High	5230	14.6	12.3	16.61	24.00
U-NII-2A	Low	5270	15.0	12.5	16.94	24.00
	High	5310	15.0	12.6	16.97	24.00
U-NII-2C	Low	5510	14.1	13.1	16.64	24.00
	Middle	5550	13.5	13.2	16.36	24.00
	High	5670	13.1	12.9	16.01	24.00
		5710	13.9	13.2	16.57	24.00
U-NII-3	Low	5755	12.6	13.3	15.97	30.00
	High	5795	13.0	13.4	16.21	30.00

IEEE 802.11ac-VHT20 modulation Test Result

Band	Channel	Channel Frequency (MHz)	Maximum Conducted Output Power (dBm)			Power Limit (dBm)
			Ant0	Ant1	SUM	
U-NII-1	Low	5180	14.5	13.0	16.82	24.00
	Middle	5220	14.3	12.8	16.62	24.00
	High	5240	15.4	13.6	17.60	24.00
U-NII-2A	Low	5260	15.1	13.1	17.22	24.00
	Middle	5300	14.9	13.4	17.22	24.00
	High	5320	15.3	13.5	17.50	24.00
U-NII-2C	Low	5500	14.8	13.5	17.21	24.00
	Middle	5580	14.6	13.5	17.10	24.00
	High	5700	14.8	14.1	17.47	24.00
		5720	14.7	14.3	17.51	24.00
U-NII-3	Low	5745	13.5	13.8	16.66	30.00
	Middle	5785	13.7	13.9	16.81	30.00
	High	5825	13.6	13.9	16.76	30.00

IEEE 802.11ac-VHT40 modulation Test Result

Band	Channel	Channel Frequency (MHz)	Maximum Conducted Output Power (dBm)			Power Limit (dBm)
			Ant0	Ant1	SUM	
U-NII-1	Low	5190	13.7	12.0	15.94	24.00
	High	5230	14.1	12.2	16.26	24.00
U-NII-2A	Low	5270	14.8	12.7	16.89	24.00
	High	5310	14.7	12.8	16.86	24.00
U-NII-2C	Low	5510	13.9	12.6	16.31	24.00
	Middle	5550	13.6	12.3	16.01	24.00
	High	5670	13.5	13.0	16.27	24.00
		5710	13.8	13.2	16.52	24.00
U-NII-3	Low	5755	12.5	13.3	15.93	30.00
	High	5795	12.9	13.3	16.11	30.00

IEEE 802.11ac-VHT80 modulation Test Result

Band	Channel	Channel Frequency (MHz)	Maximum Conducted Output Power (dBm)			Power Limit (dBm)
			Ant0	Ant1	SUM	
U-NII-1	42	5210	12.9	11.6	15.31	24.00
U-NII-2A	58	5290	13.3	12.0	15.71	24.00
U-NII-2C	Low	5530	13.0	11.6	15.37	24.00
	Middle	5610	13.2	12.2	15.74	24.00
	High	5690	12.9	12.2	15.57	24.00
U-NII-3	155	5755	13.2	12.6	15.92	30.00

NOTE 1: the 11 dBm + 10 log B is greater than 250mW.

NOTE 2: $Power^{SUM} = 10 * \log(10^{(Power^{Ant0}/10)} + 10^{(Power^{Ant1}/10)})$

NOTE 3: The power of Ant0 is higher than Ant1, so PSD and unwanted emission are performed at Ant0, the final result will add 3dB (10log2) according to the method from KDB 662911 D01.

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 $RBW \geq 1/T$, where T is defined in section II.B.I.a).
- b) Set $VBW \geq 3 RBW$.
- c) If measurement bandwidth of Maximum PSD is specified in 500 kHz, add $10\log(500\text{kHz}/RBW)$ 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 $10\log(1\text{MHz}/RBW)$ 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.



NOTE: The power of Ant0 is higher than Ant1, so PSD are performed at Ant0, the final result will add 3dB (10log2) according to the method from KDB 662911 D01.

IEEE 802.11a modulation Test Result

Band	Channel	Channel Frequency (MHz)	Maximum PSD (dBm/MHz)	PSD Limit (dBm/MHz)
U-NII-1	Low	5180	5.44	11.00
	Middle	5220	5.67	11.00
	High	5240	6.56	11.00
U-NII-2A	Low	5260	6.07	11.00
	Middle	5300	6.14	11.00
	High	5320	6.59	11.00
U-NII-2C	Low	5500	6.31	11.00
	Middle	5580	6.39	11.00
	High	5700	5.98	11.00
		5720_UNII-2C	5.74	11.00
U-NII-3		5720_UNII-3	1.81	30.00
	Low	5745	2.84	30.00
	Middle	5785	2.92	30.00
	High	5825	2.42	30.00

IEEE 802.11n-HT20 modulation Test Result

Band	Channel	Channel Frequency (MHz)	Maximum PSD (dBm/MHz)	PSD Limit (dBm/MHz)
U-NII-1	Low	5180	5.26	11.00
	Middle	5220	5.31	11.00
	High	5240	6.28	11.00
U-NII-2A	Low	5260	6.00	11.00
	Middle	5300	5.93	11.00
	High	5320	6.4	11.00
U-NII-2C	Low	5500	5.88	11.00
	Middle	5580	6.05	11.00
	High	5700	5.93	11.00
		5720_UNII-2C	5.75	11.00
U-NII-3		5720_UNII-3	1.90	30.00
	Low	5745	2.72	30.00



	Middle	5785	2.91	30.00
	High	5825	2.54	30.00

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	1.27	11.00
	High	5230	2.08	11.00
U-NII-2A	Low	5270	2.03	11.00
	High	5310	2.48	11.00
U-NII-2C	Low	5510	1.29	11.00
	Middle	5550	1.17	11.00
	High	5670	1.15	11.00
		5710_UNII-2C	1.01	11.00
U-NII-3	Low	5710_UNII-3	-1.65	11.00
		5755	-2.03	30.00
	High	5795	-1.61	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	5.14	11.00
	Middle	5220	5.53	11.00
	High	5240	6.57	11.00
U-NII-2A	Low	5260	5.84	11.00
	Middle	5300	6.07	11.00
	High	5320	6.45	11.00
U-NII-2C	Low	5500	5.90	11.00
	Middle	5580	6.09	11.00
	High	5700	5.95	11.00
		5720_UNII-2C	5.67	11.00
U-NII-3		5720_UNII-3	1.59	11.00
	Low	5745	2.77	30.00
	Middle	5785	3.02	30.00
	High	5825	2.59	30.00



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	1.24	11.00
	High	5230	2.56	11.00
U-NII-2A	Low	5270	2.56	11.00
	High	5310	2.64	11.00
U-NII-2C	Low	5510	1.63	11.00
	Middle	5550	1.33	11.00
	High	5670	1.60	11.00
5710_UNII-2C		1.35	11.00	
U-NII-3	Low	5710_UNII-3	-1.72	11.00
		5755	-1.81	30.00
	High	5795	-1.86	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	-1.75	11.00
U-NII-2A	58	5290	-1.49	11.00
U-NII-2C	Low	5530	-1.52	11.00
	Middle	5610	-1.65	11.00
	High	5690_UNII-2C	-1.56	11.00
5690_UNII-3		-4.57	11.00	
U-NII-3	155	5775	-4.68	30.00

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.



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

NOTE: The power of Ant0 is higher than Ant1, so unwanted emission are performed at Ant0, the final result will add 3dB (10log2) according to the method from KDB 662911 D01.

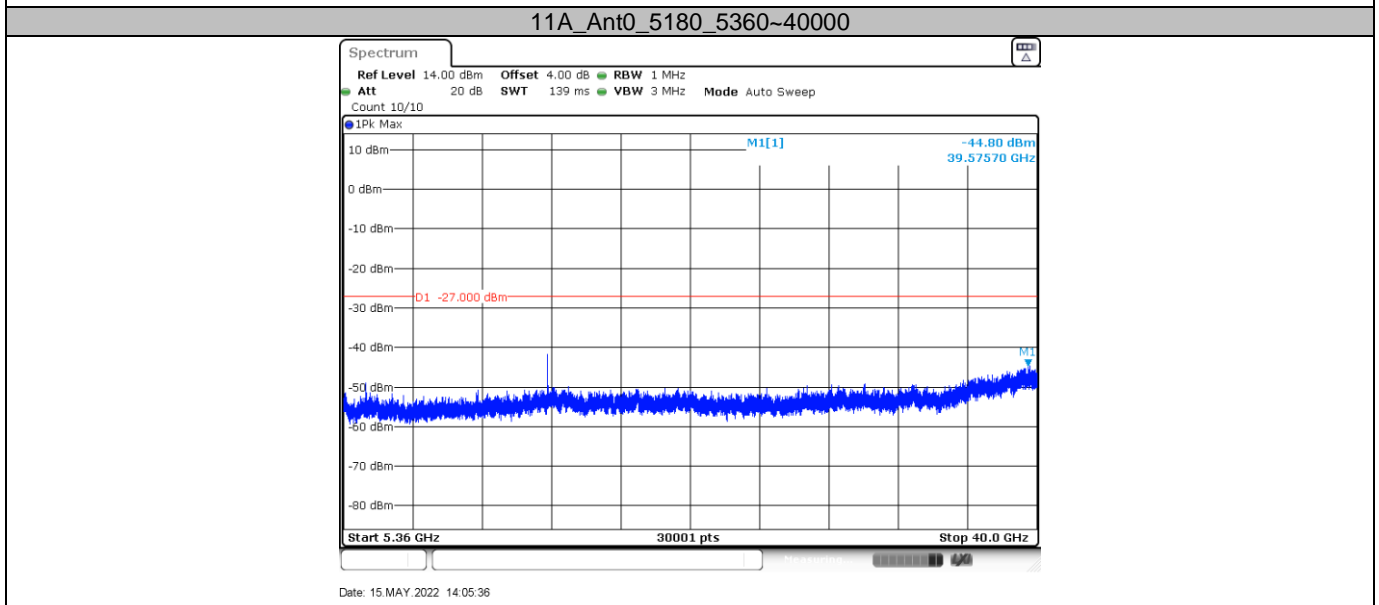
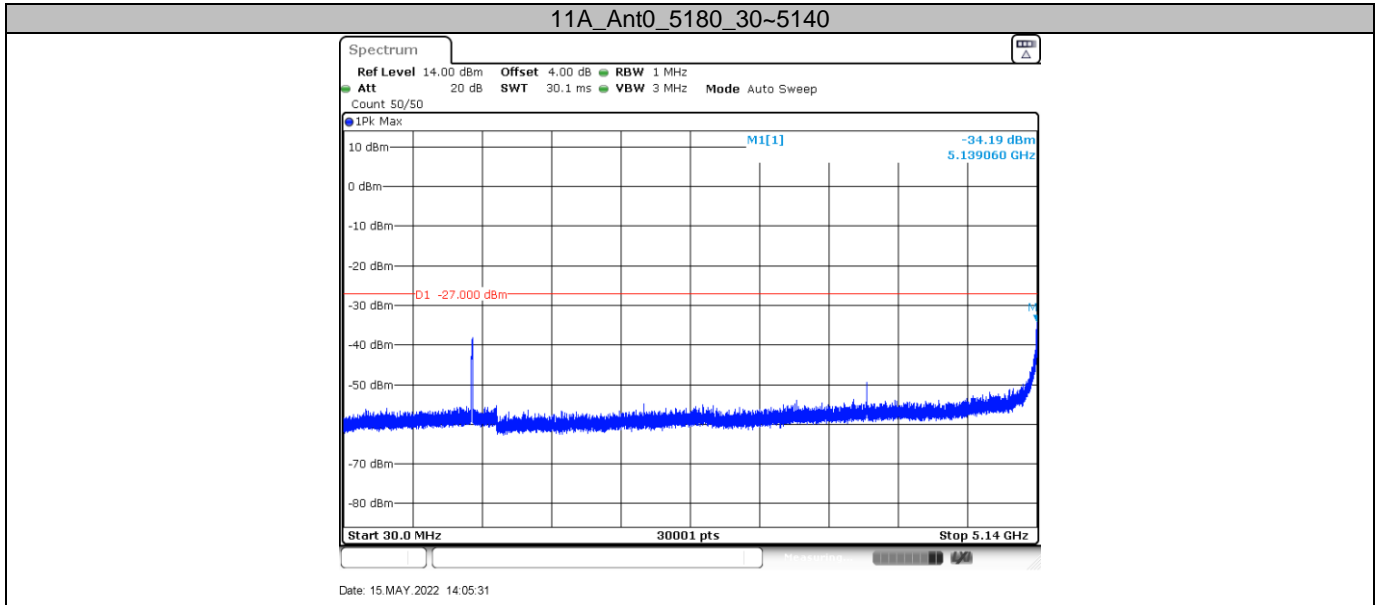
Test Mode	Antenna	Channel (MHz)	Frequency Range (MHz)	Max. Level (dBm)	Limit (dBm)	Verdict
11A	Ant0	5180	30~5140	-34.19	<=-27	PASS
			5360~40000	-44.8	<=-27	PASS
		5200	30~5140	-39.02	<=-27	PASS
			5360~40000	-44.25	<=-27	PASS
		5240	30~5140	-36.75	<=-27	PASS
			5360~40000	-45.52	<=-27	PASS
		5260	30~5140	-38.27	<=-27	PASS
			5360~40000	-44.31	<=-27	PASS
		5280	30~5140	-39.4	<=-27	PASS
			5360~40000	-45.09	<=-27	PASS
		5320	30~5140	-40.82	<=-27	PASS
			5360~40000	-43.53	<=-27	PASS
		5500	30~5460	-41.51	<=-27	PASS
			5735~40000	-44.48	<=-27	PASS
		5580	30~5460	-46.93	<=-27	PASS
			5735~40000	-44.73	<=-27	PASS
		5700	30~5460	-46.45	<=-27	PASS
			5735~40000	-43.58	<=-27	PASS
		5720	30~5460	-47.81	<=-27	PASS
			5925~40000	-44.63	<=-27	PASS
		5745	30~5650	-49.61	<=-27	PASS
			5925~40000	-44.62	<=-27	PASS
		5785	30~5650	-48.99	<=-27	PASS
			5925~40000	-45.42	<=-27	PASS
5825	30~5650	-49.63	<=-27	PASS		
	5925~40000	-44.52	<=-27	PASS		
11N20	Ant0	5180	30~5140	-32.16	<=-27	PASS
			5360~40000	-43.81	<=-27	PASS
		5200	30~5140	-38.82	<=-27	PASS
			5360~40000	-45.78	<=-27	PASS
		5240	30~5140	-39.16	<=-27	PASS
			5360~40000	-44.75	<=-27	PASS
		5260	30~5140	-39.22	<=-27	PASS
			5360~40000	-44.62	<=-27	PASS
		5280	30~5140	-41.92	<=-27	PASS
			5360~40000	-44.9	<=-27	PASS
		5320	30~5140	-41.9	<=-27	PASS
			5360~40000	-41.67	<=-27	PASS
		5500	30~5460	-41.55	<=-27	PASS
			5735~40000	-44.78	<=-27	PASS
		5580	30~5460	-47.03	<=-27	PASS
			5735~40000	-44.96	<=-27	PASS
		5700	30~5460	-48.46	<=-27	PASS
			5735~40000	-43	<=-27	PASS
		5720	30~5460	-46.03	<=-27	PASS
			5925~40000	-44.86	<=-27	PASS
		5745	30~5650	-42.17	<=-27	PASS
			5925~40000	-45.37	<=-27	PASS
		5785	30~5650	-46.78	<=-27	PASS
			5925~40000	-44.48	<=-27	PASS
5825	30~5650	-48.17	<=-27	PASS		
	5925~40000	-44.23	<=-27	PASS		
11N40	Ant0	5190	30~5140	-33.3	<=-27	PASS
			5360~40000	-44.08	<=-27	PASS
		5230	30~5140	-42.13	<=-27	PASS
			5360~40000	-45.1	<=-27	PASS



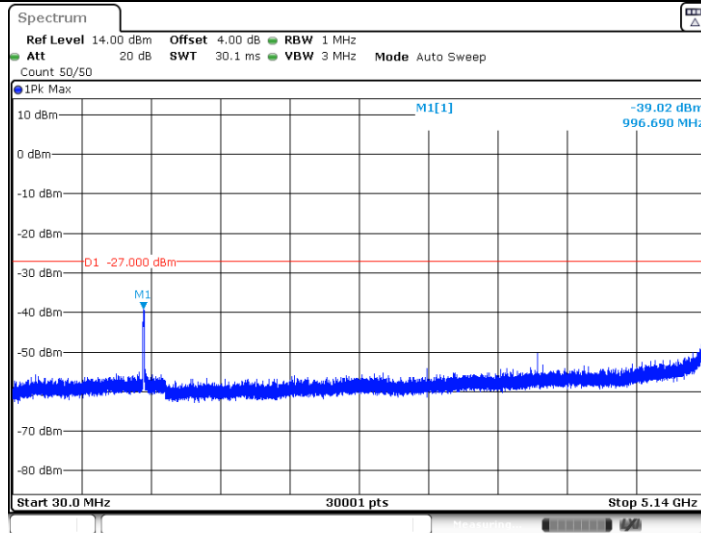
		5270	30~5140	-43.61	<=-27	PASS		
			5360~40000	-44.58	<=-27	PASS		
		5310	30~5140	-45.85	<=-27	PASS		
			5360~40000	-37.34	<=-27	PASS		
		5510	30~5460	-34.23	<=-27	PASS		
			5735~40000	-44.76	<=-27	PASS		
		5550	30~5460	-44.2	<=-27	PASS		
			5735~40000	-44.41	<=-27	PASS		
		5670	30~5460	-48.63	<=-27	PASS		
			5735~40000	-44.22	<=-27	PASS		
		5710	30~5460	-36.97	<=-27	PASS		
			5925~40000	-44.59	<=-27	PASS		
		5755	30~5650	-47.09	<=-27	PASS		
			5925~40000	-44.95	<=-27	PASS		
		5795	30~5650	-45.12	<=-27	PASS		
			5925~40000	-45.05	<=-27	PASS		
		11AC20	Ant0	5180	30~5140	-39.25	<=-27	PASS
					5360~40000	-44.73	<=-27	PASS
5200	30~5140			-38.64	<=-27	PASS		
	5360~40000			-43.8	<=-27	PASS		
5240	30~5140			-39.22	<=-27	PASS		
	5360~40000			-44.79	<=-27	PASS		
5260	30~5140			-40.82	<=-27	PASS		
	5360~40000			-44.5	<=-27	PASS		
5280	30~5140			-39.8	<=-27	PASS		
	5360~40000			-45.35	<=-27	PASS		
5320	30~5140			-41.82	<=-27	PASS		
	5360~40000			-44.84	<=-27	PASS		
5500	30~5460			-40.66	<=-27	PASS		
	5735~40000			-45.36	<=-27	PASS		
5580	30~5460			-47.66	<=-27	PASS		
	5735~40000			-44.48	<=-27	PASS		
5700	30~5460			-46.75	<=-27	PASS		
	5735~40000			-43.29	<=-27	PASS		
5720	30~5460			-47.12	<=-27	PASS		
	5925~40000			-44.3	<=-27	PASS		
5745	30~5650			-48.43	<=-27	PASS		
	5925~40000			-44.75	<=-27	PASS		
5785	30~5650			-49.13	<=-27	PASS		
	5925~40000			-44.63	<=-27	PASS		
5825	30~5650	-48.19	<=-27	PASS				
	5925~40000	-44.46	<=-27	PASS				
11AC40	Ant0	5190	30~5140	-34.46	<=-27	PASS		
			5360~40000	-44.57	<=-27	PASS		
		5230	30~5140	-41.73	<=-27	PASS		
			5360~40000	-44.65	<=-27	PASS		
		5270	30~5140	-44.24	<=-27	PASS		
			5360~40000	-43.95	<=-27	PASS		
		5310	30~5140	-44.37	<=-27	PASS		
			5360~40000	-34.76	<=-27	PASS		
		5510	30~5460	-34.48	<=-27	PASS		
			5735~40000	-44.84	<=-27	PASS		
		5550	30~5460	-43.51	<=-27	PASS		
			5735~40000	-45.1	<=-27	PASS		
		5670	30~5460	-48.49	<=-27	PASS		
			5735~40000	-41.31	<=-27	PASS		
		5710	30~5460	-46.25	<=-27	PASS		
			5925~40000	-45.39	<=-27	PASS		
		5755	30~5650	-47.42	<=-27	PASS		
			5925~40000	-44.99	<=-27	PASS		
		5795	30~5650	-46.94	<=-27	PASS		
			5925~40000	-42.5	<=-27	PASS		
		11AC80	Ant0	5210	30~5140	-29.45	<=-27	PASS
					5360~40000	-44.29	<=-27	PASS



		5290	30~5140	-39.63	<=-27	PASS
			5360~40000	-30.22	<=-27	PASS
		5530	30~5460	-30.3	<=-27	PASS
			5735~40000	-44.24	<=-27	PASS
		5610	30~5460	-44.05	<=-27	PASS
			5735~40000	-42.08	<=-27	PASS
		5690	30~5460	-45.23	<=-27	PASS
			5925~40000	-45.03	<=-27	PASS
		5775	30~5650	-42.2	<=-27	PASS
			5925~40000	-42.58	<=-27	PASS

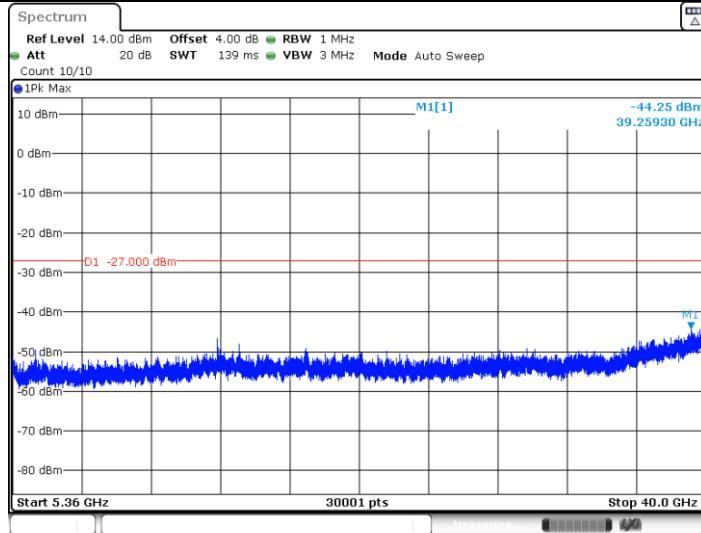


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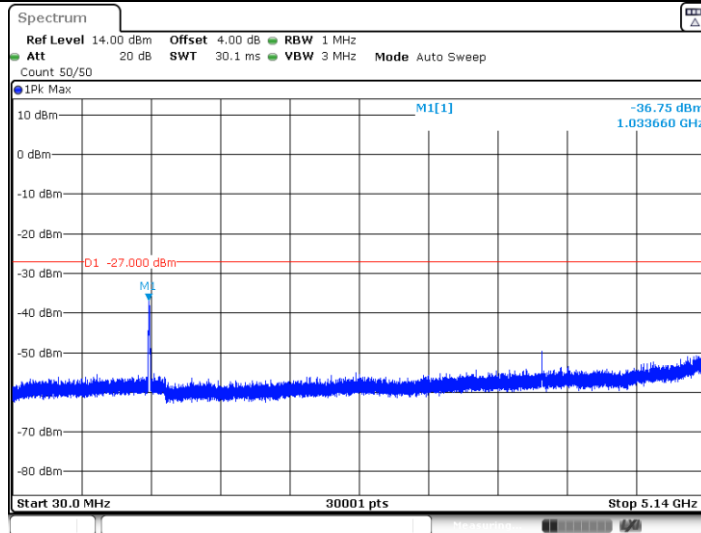
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11A_Ant0_5200_5360~40000



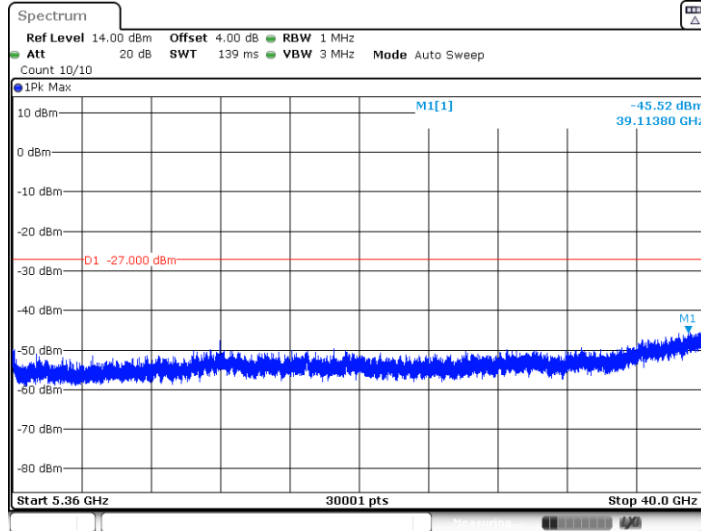
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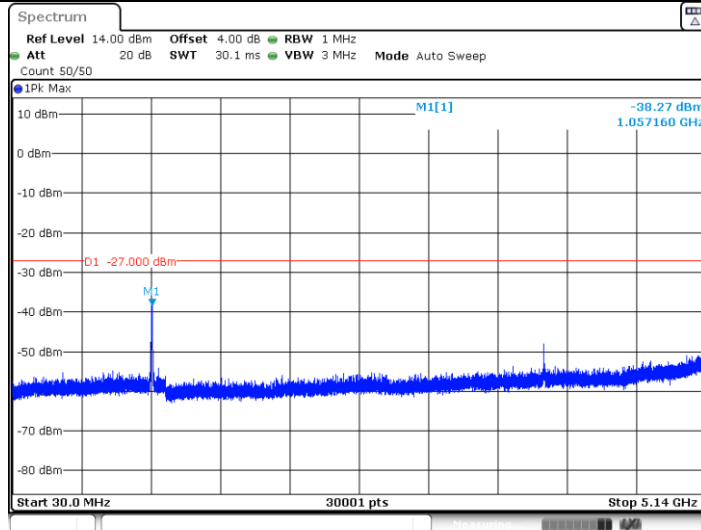
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11A_Ant0_5240_5360~40000



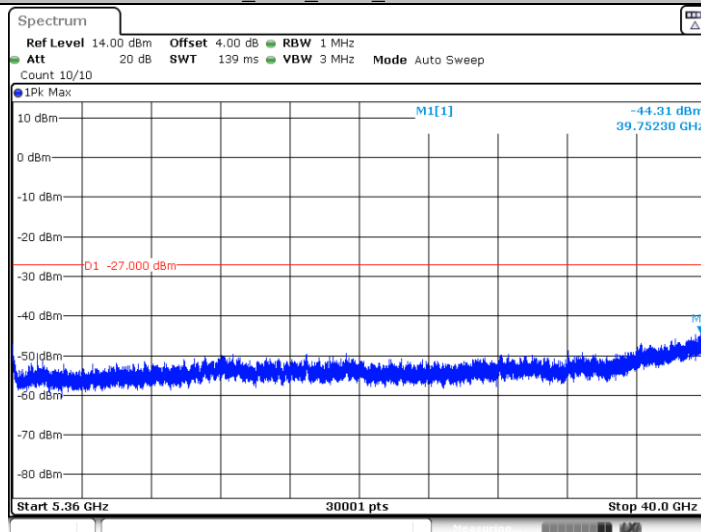
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11A_Ant0_5260_30~5140



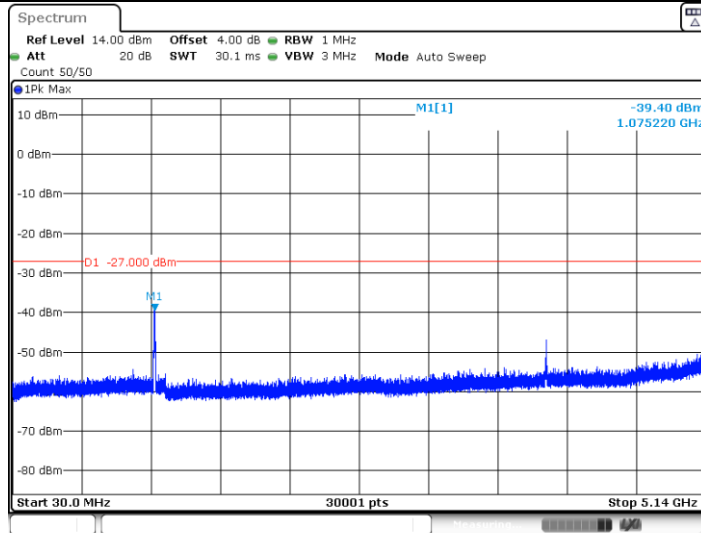
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11A_Ant0_5260_5360~40000



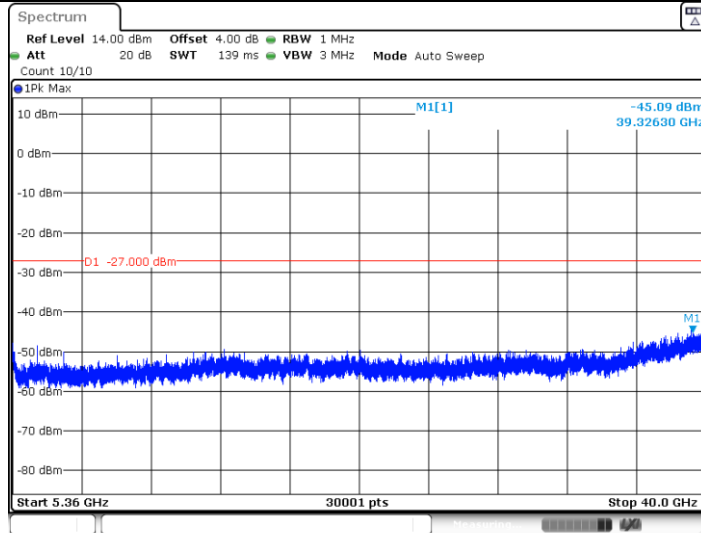
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11A_Ant0_5280_30~5140



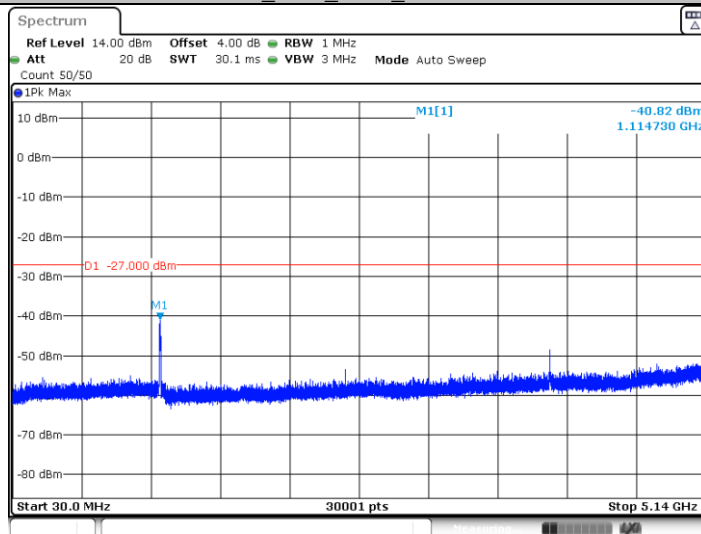
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11A_Ant0_5280_5360~40000



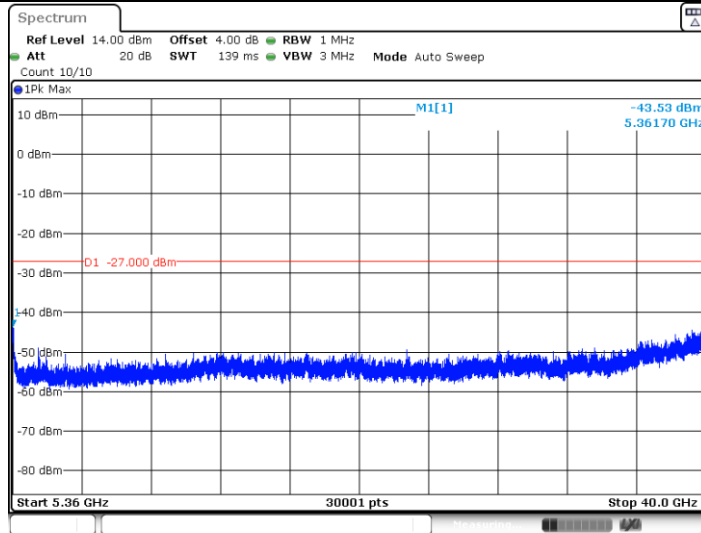
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11A_Ant0_5320_30~5140



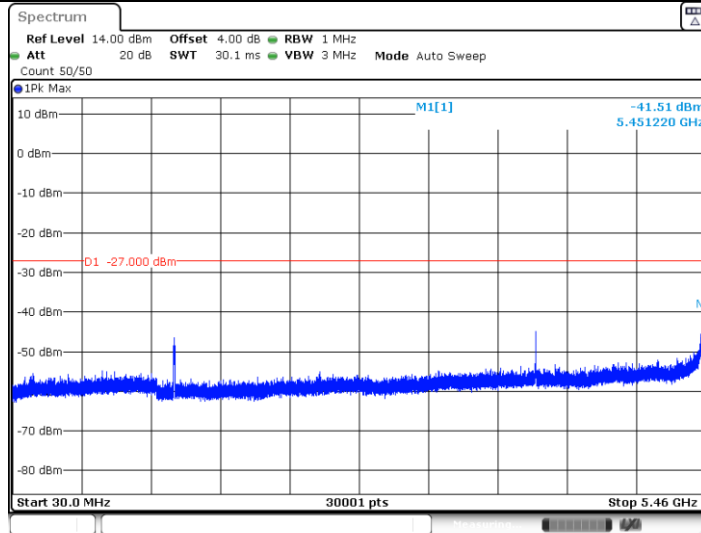
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11A_Ant0_5320_5360~40000



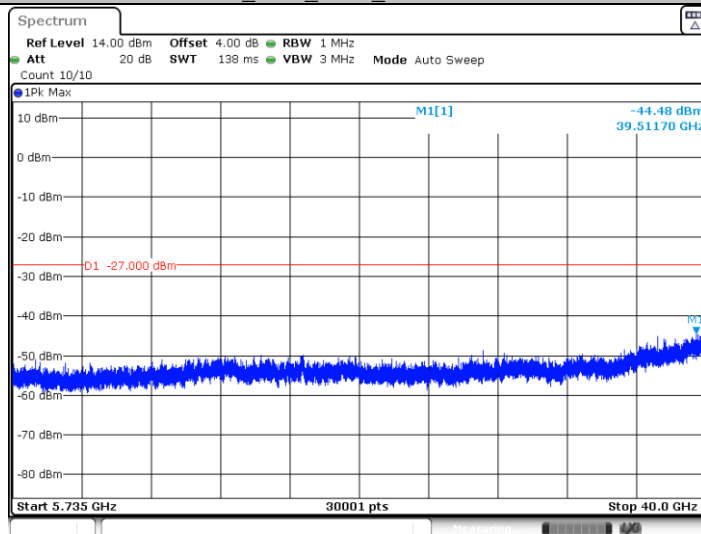
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11A_Ant0_5500_30~5460



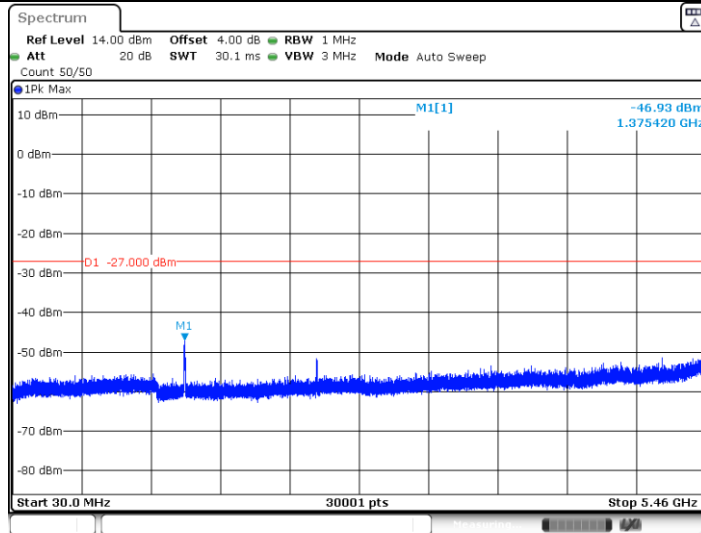
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11A_Ant0_5500_5735~40000



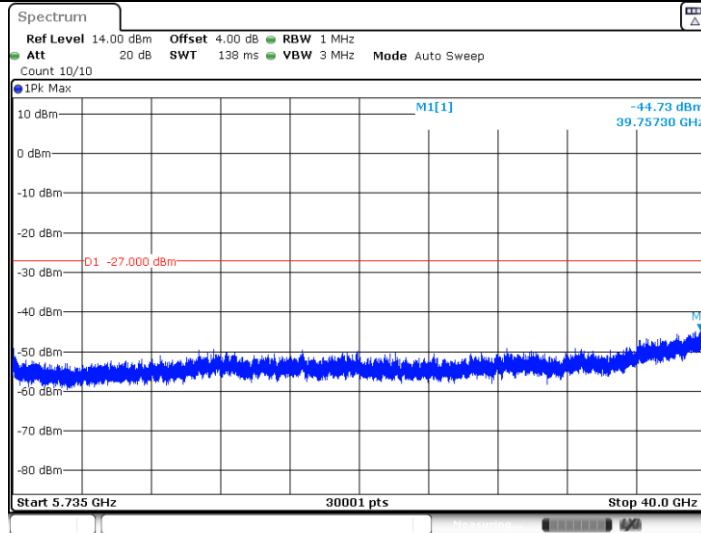
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11A_Ant0_5580_30~5460



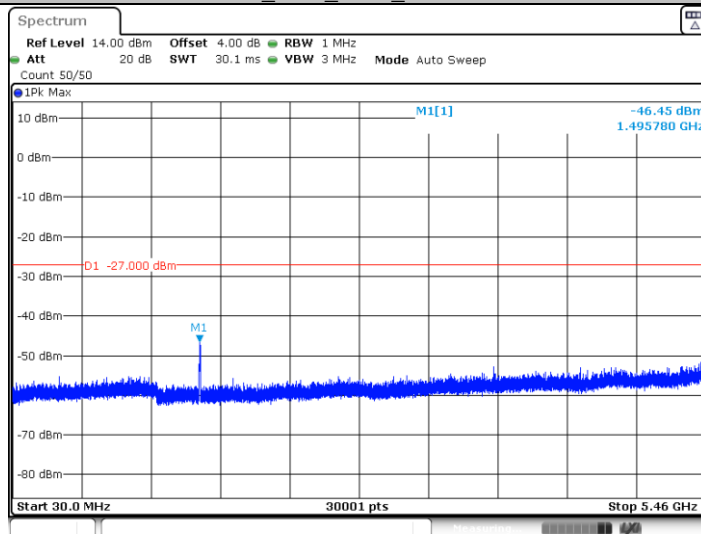
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11A_Ant0_5580_5735~40000



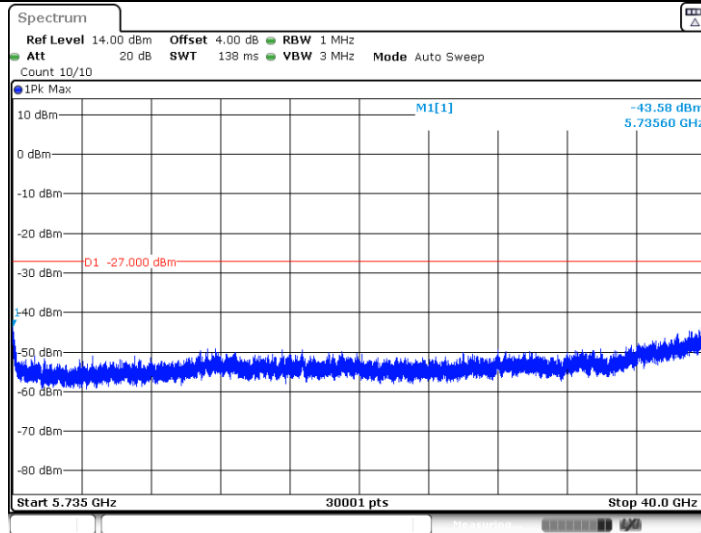
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11A_Ant0_5700_30~5460



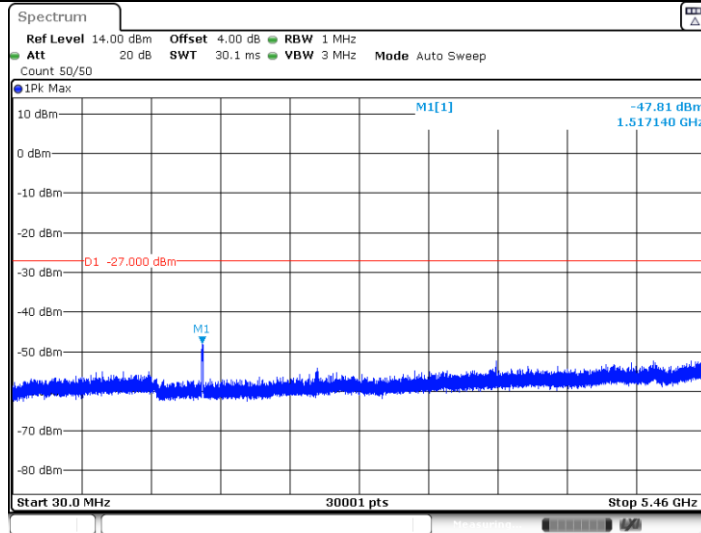
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11A_Ant0_5700_5735~40000



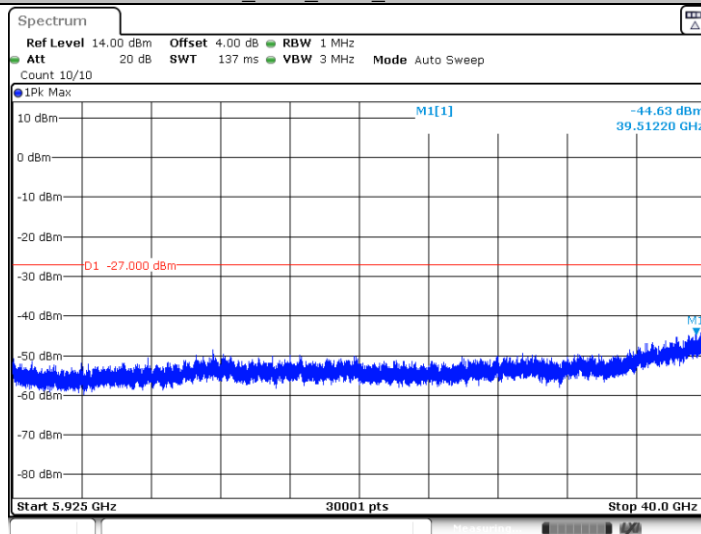
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11A_Ant0_5720_30~5460



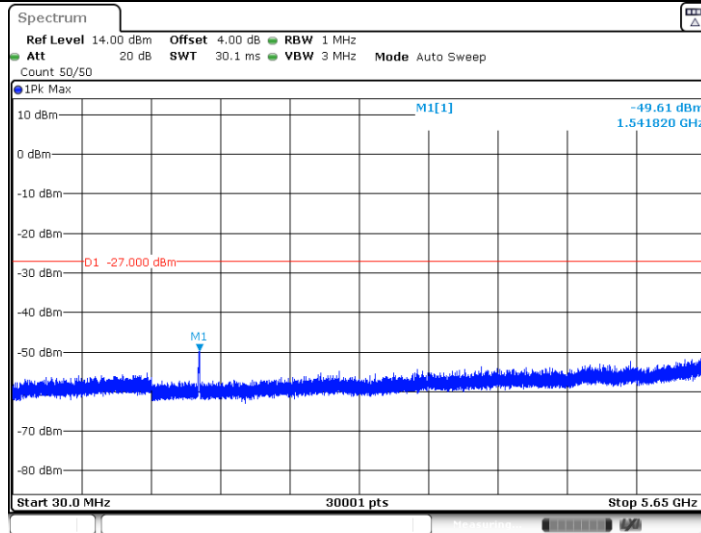
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11A_Ant0_5720_5925~40000



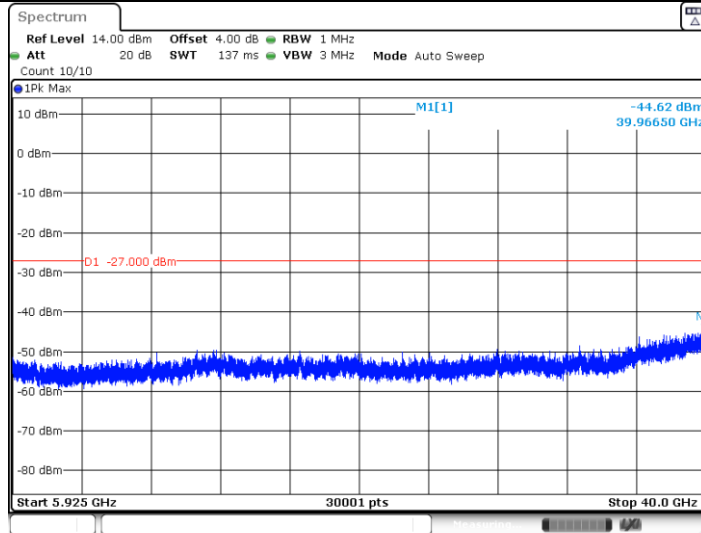
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11A_Ant0_5745_30~5650



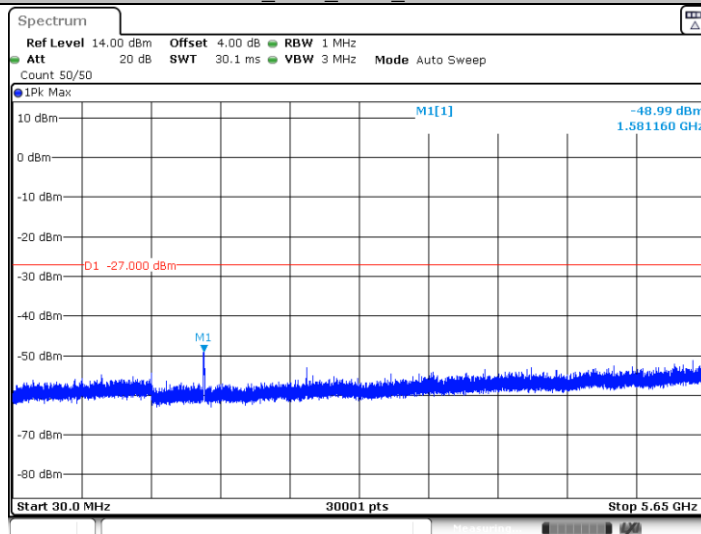
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11A_Ant0_5745_5925~40000



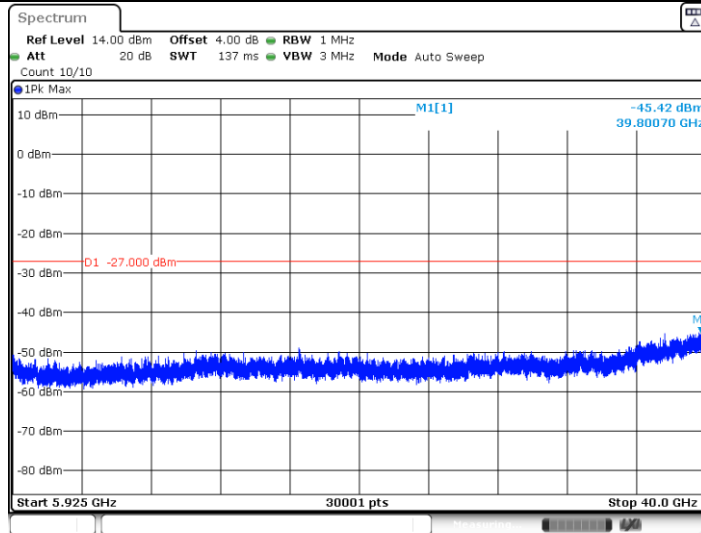
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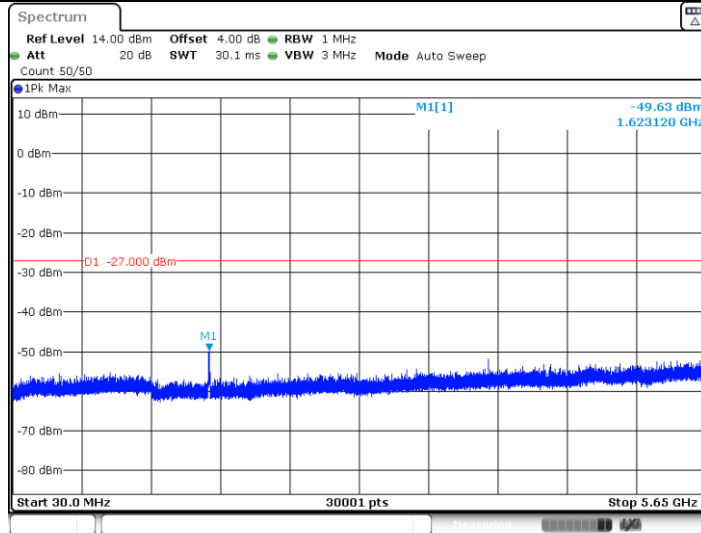
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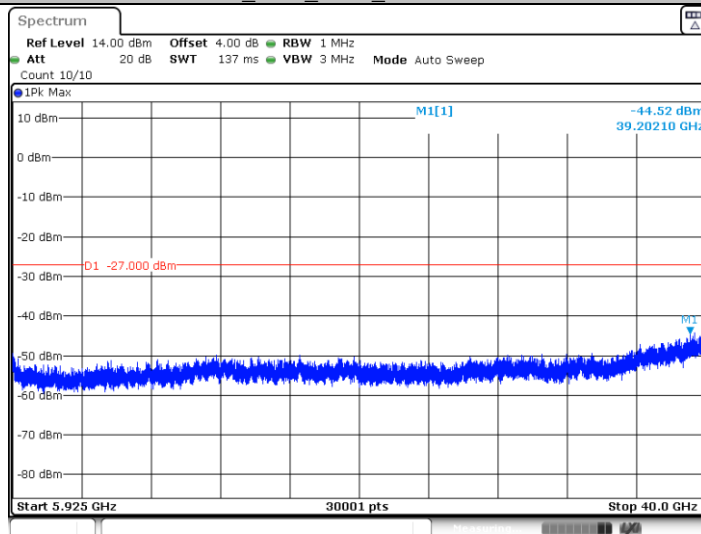
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11A_Ant0_5825_30~5650



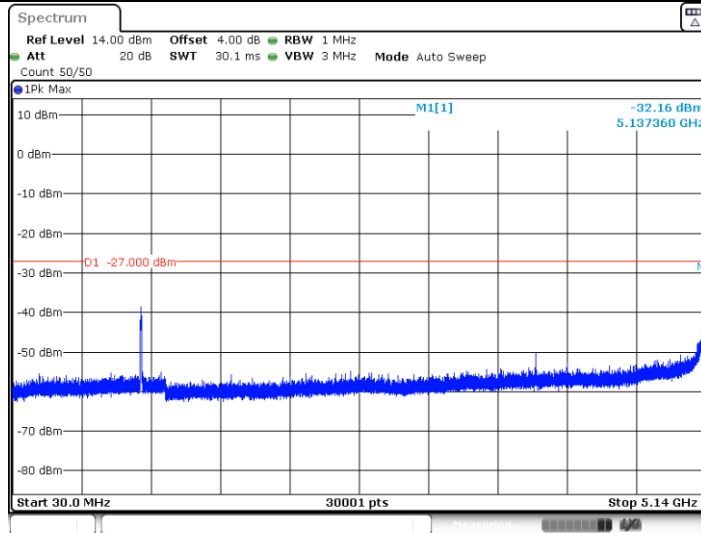
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11A_Ant0_5825_5925~40000



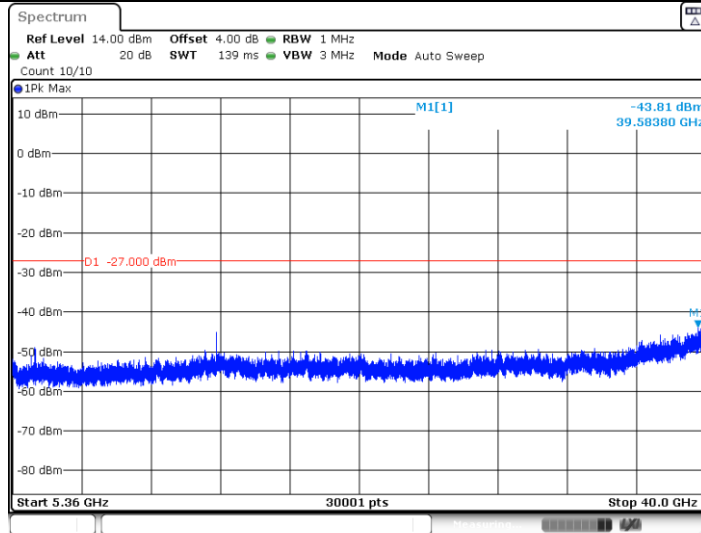
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11N20_Ant0_5180_30~5140



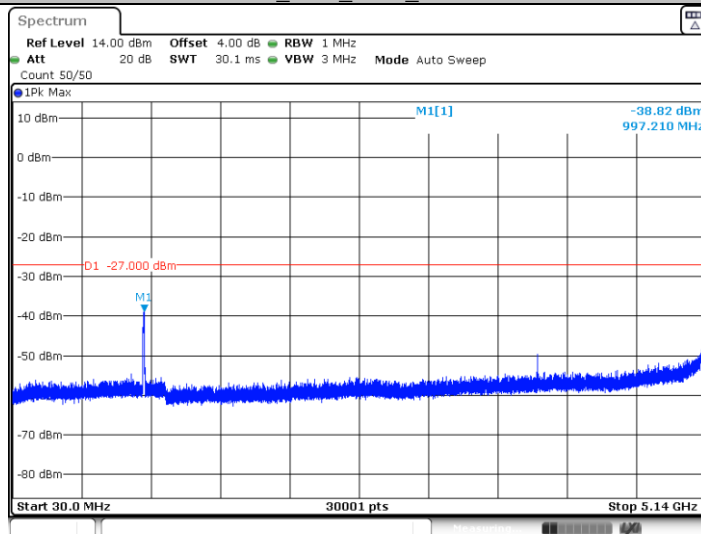
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11N20_Ant0_5180_5360~40000



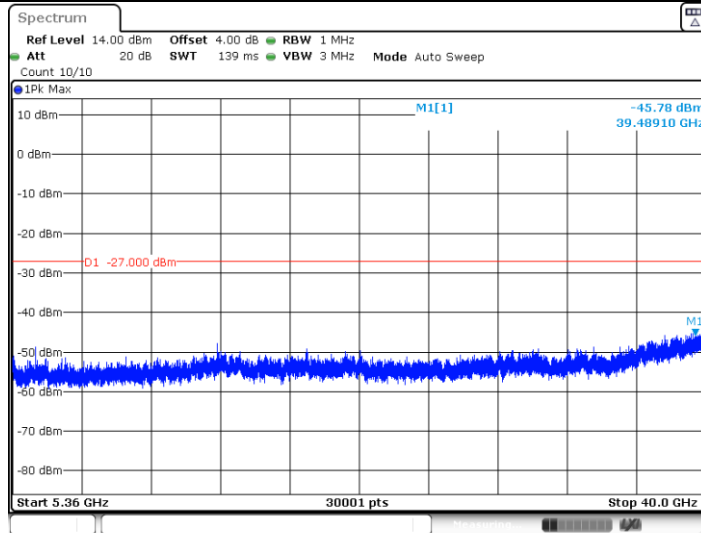
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11N20_Ant0_5200_30~5140



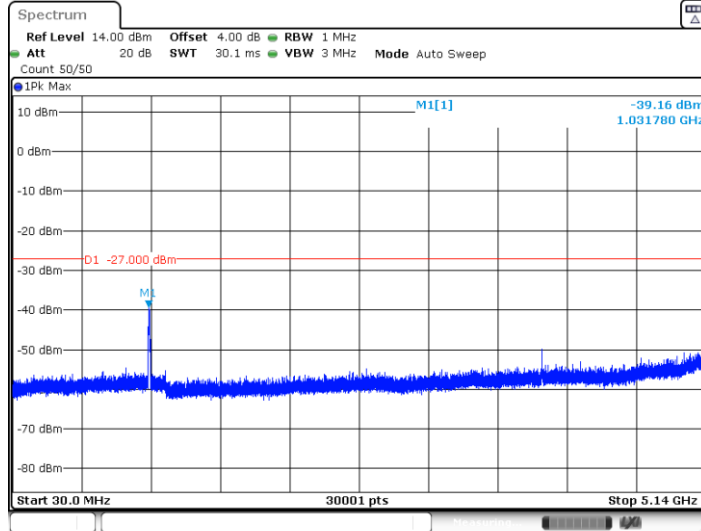
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11N20_Ant0_5200_5360~40000



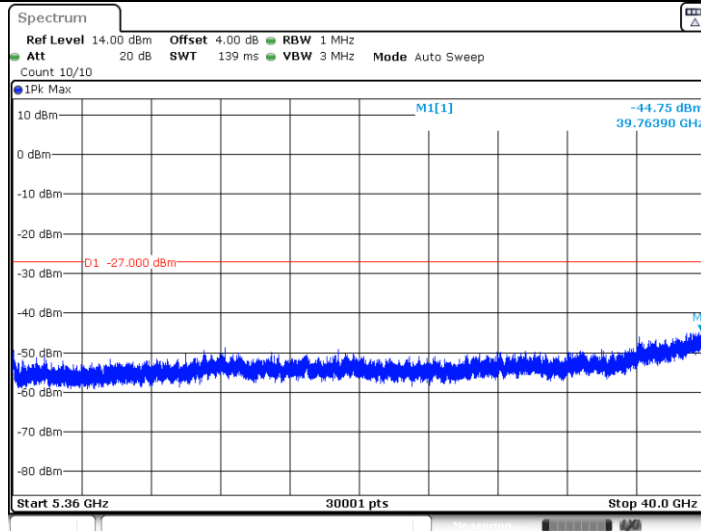
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11N20_Ant0_5240_30~5140



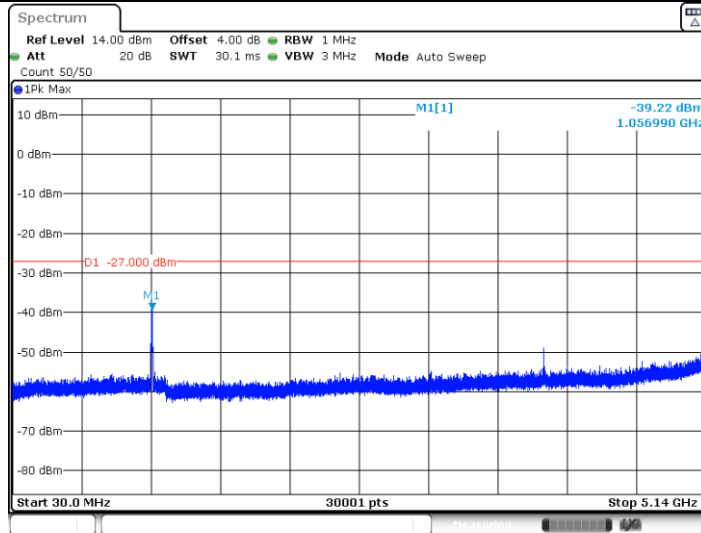
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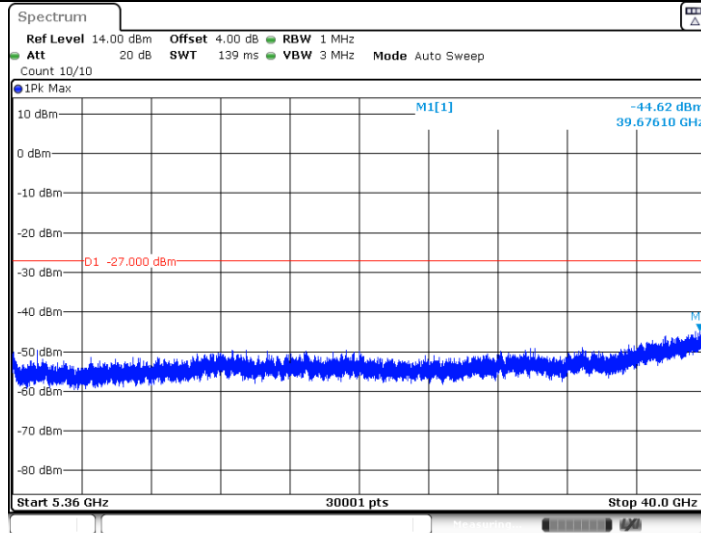
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11N20_Ant0_5260_30~5140



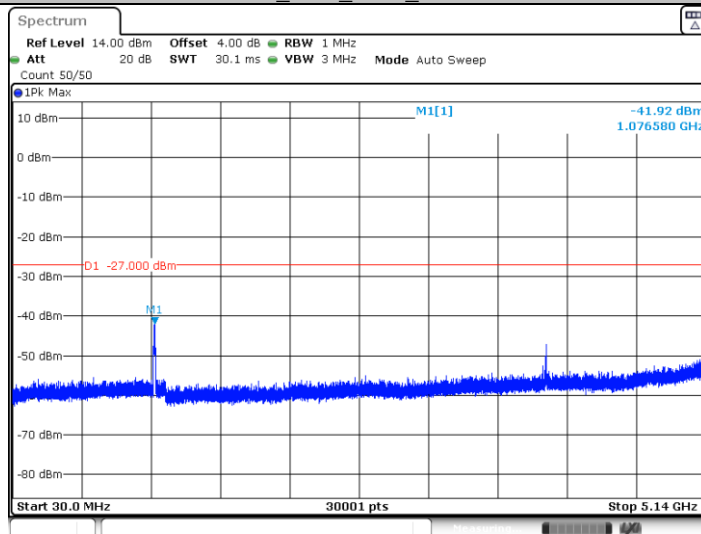
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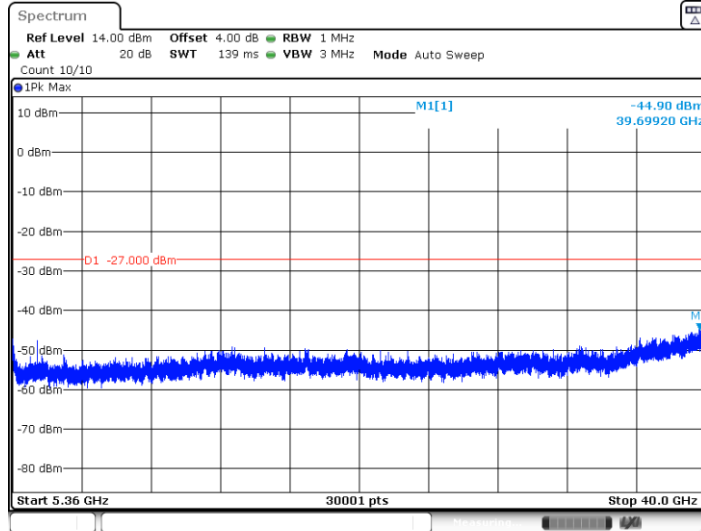
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11N20_Ant0_5280_30~5140



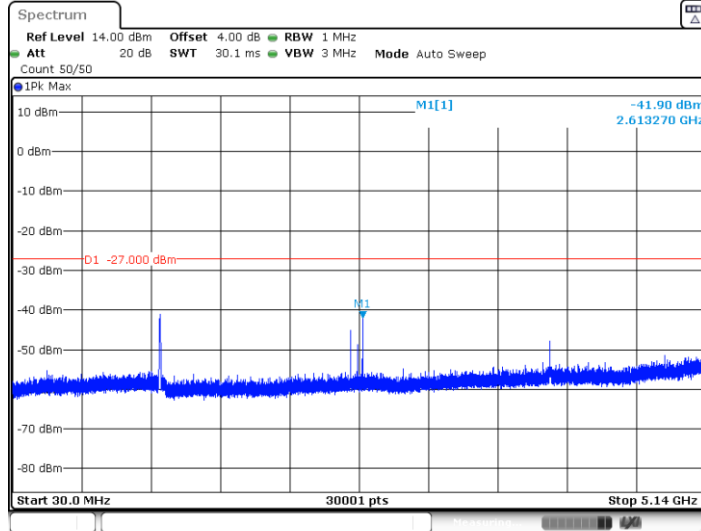
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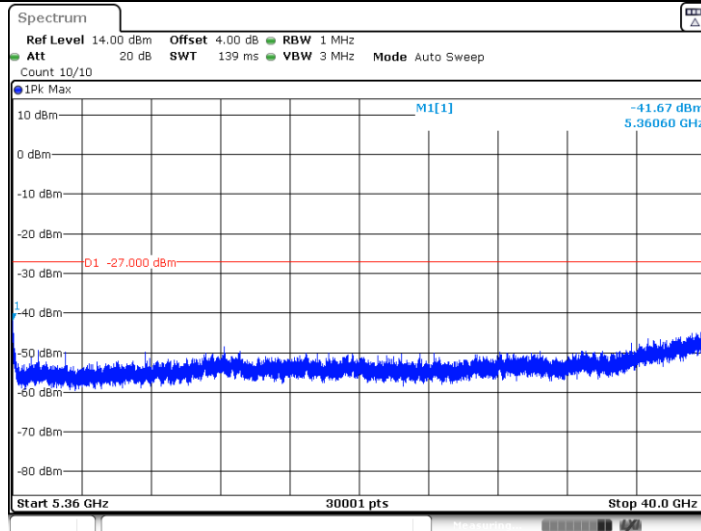
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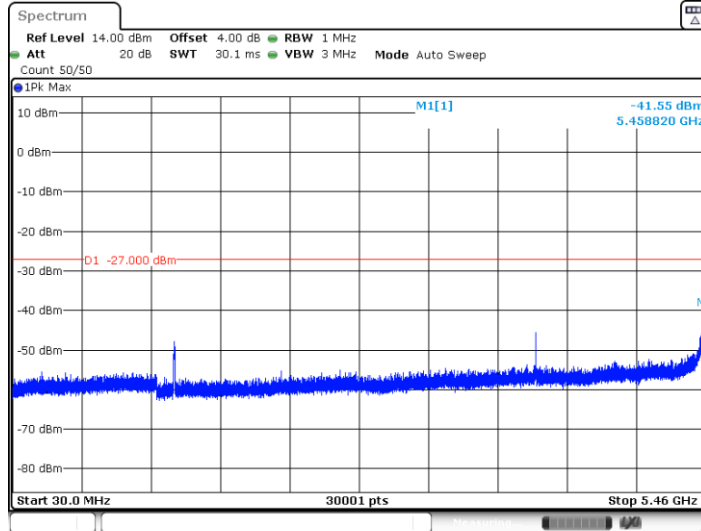
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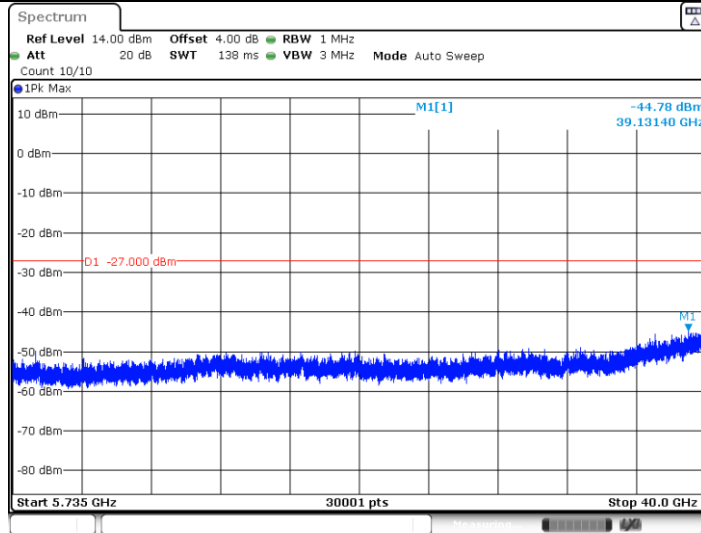
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11N20_Ant0_5500_30-5460



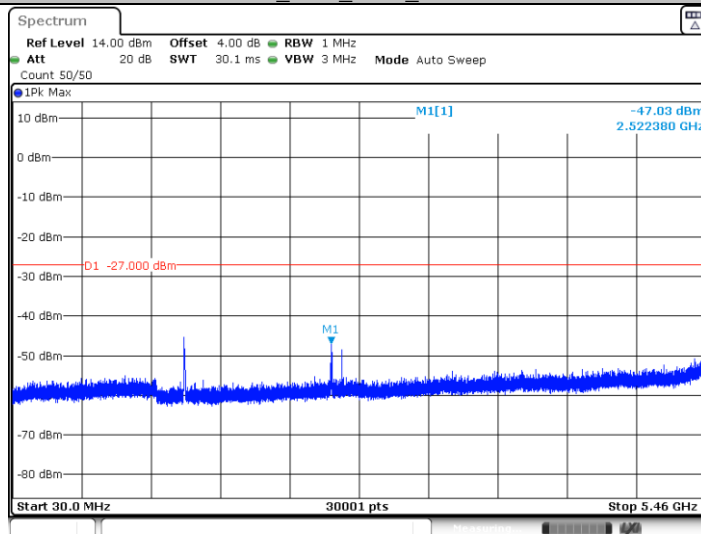
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11N20_Ant0_5500_5735~40000



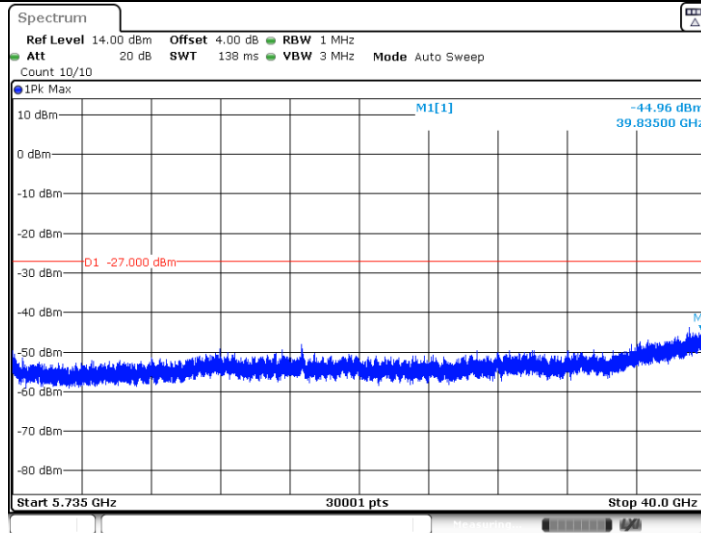
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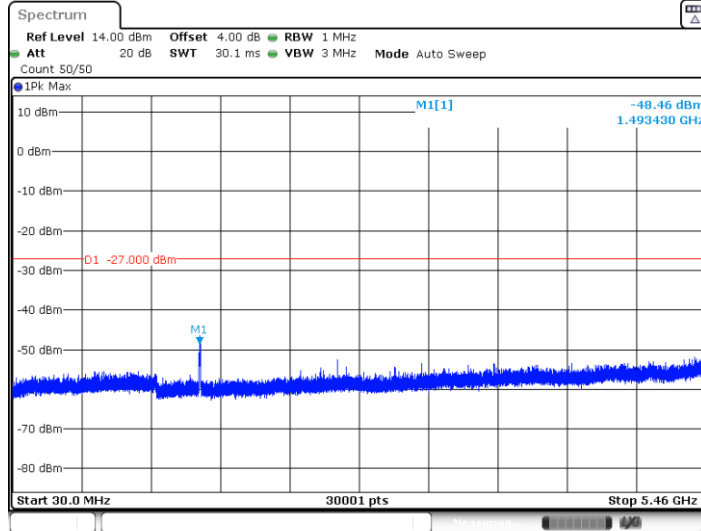
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11N20_Ant0_5580_5735~40000



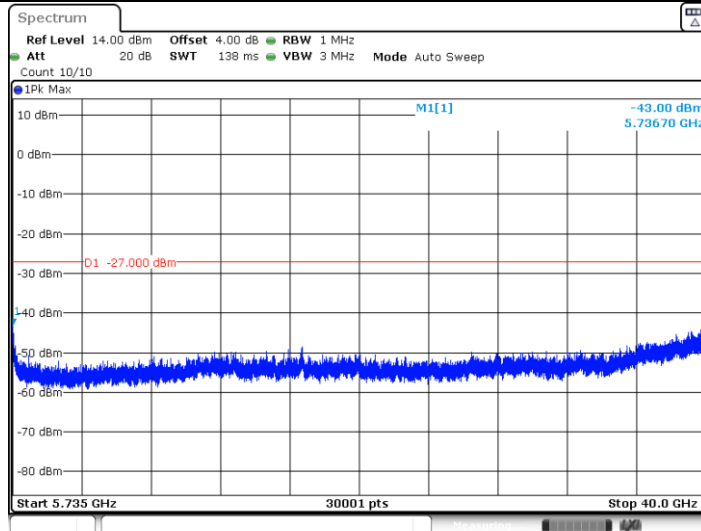
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11N20_Ant0_5700_30-5460



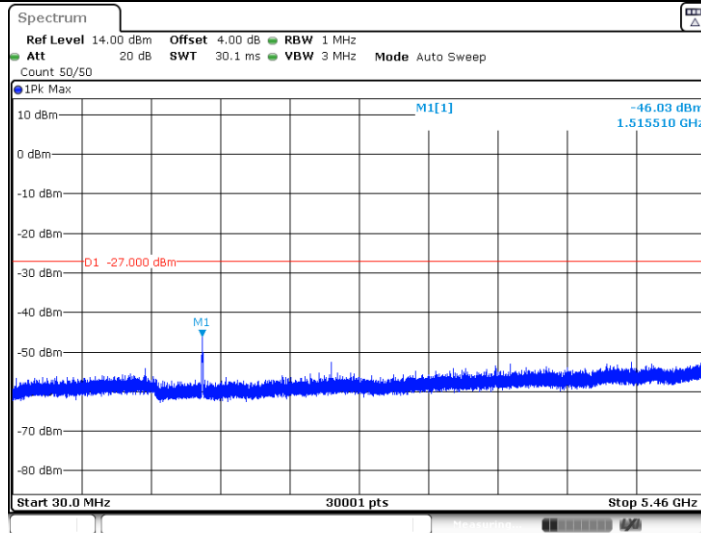
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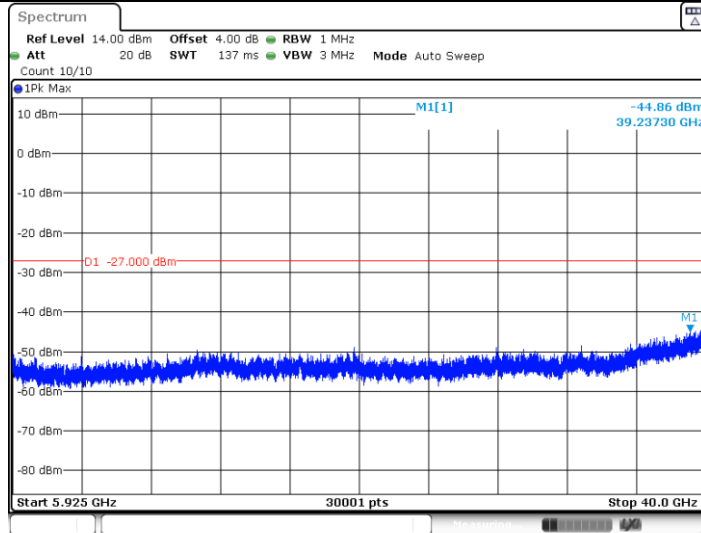
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11N20_Ant0_5720_30-5460



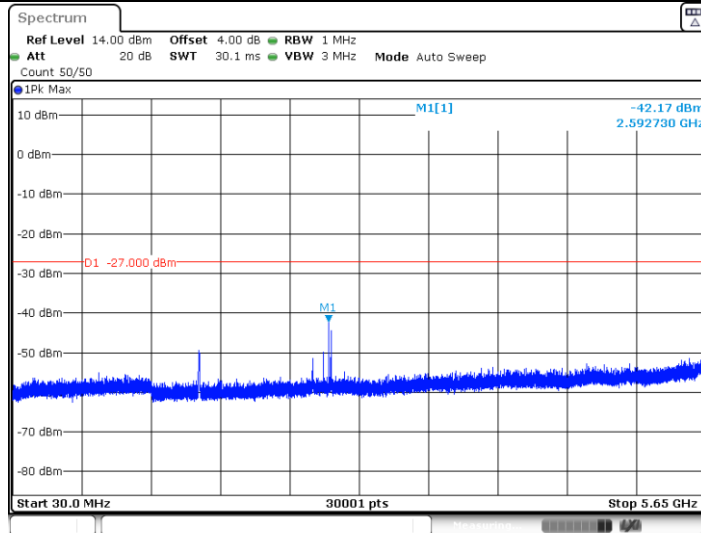
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11N20_Ant0_5720_5925~40000



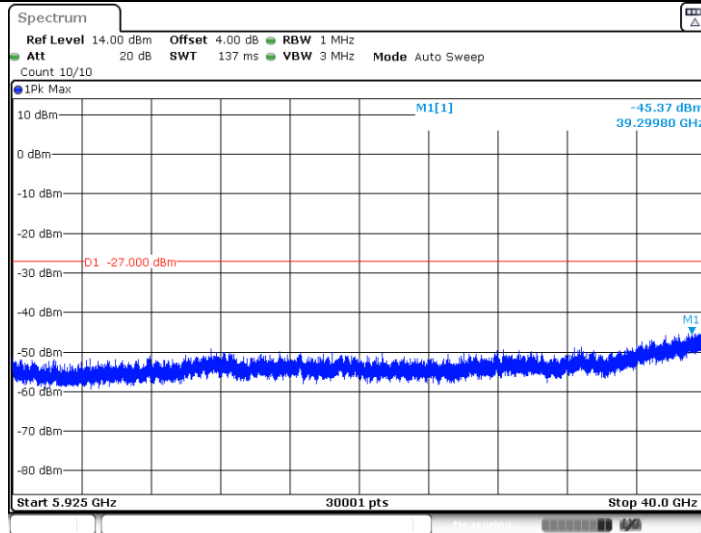
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11N20_Ant0_5745_30~5650



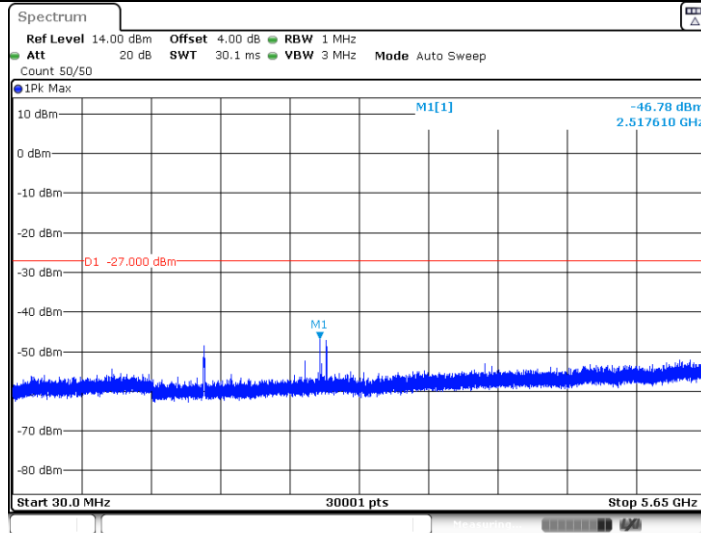
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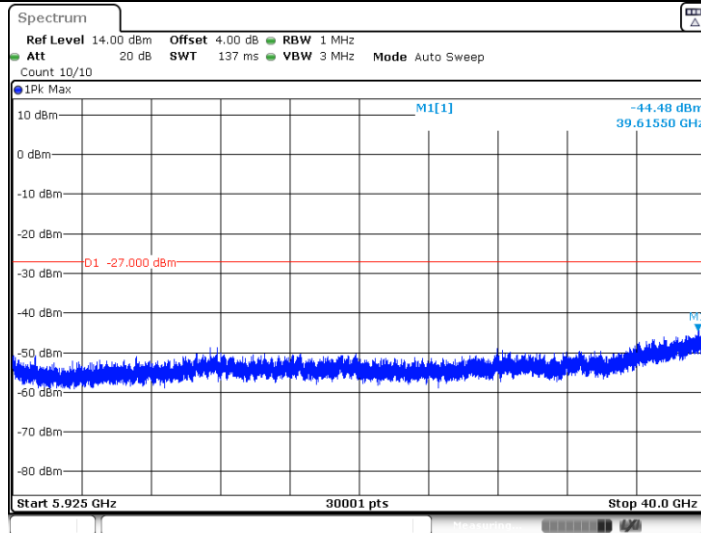
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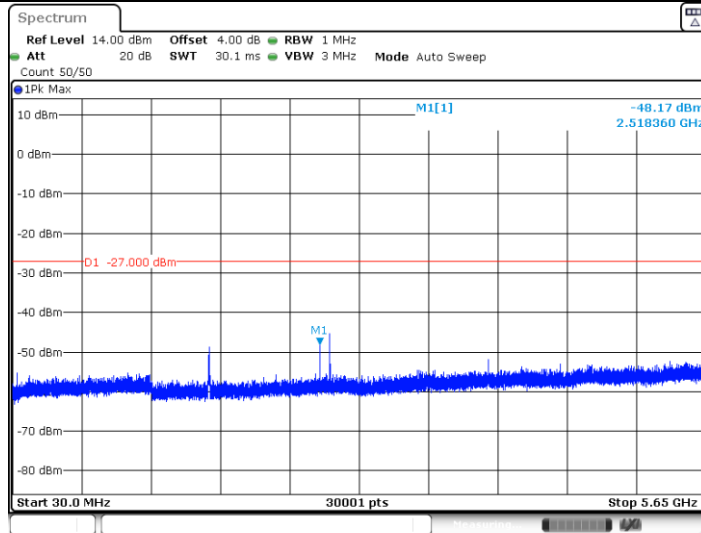
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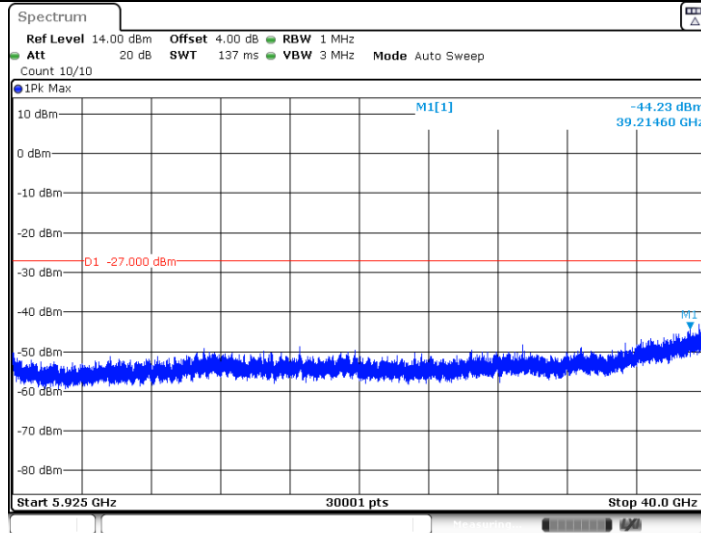
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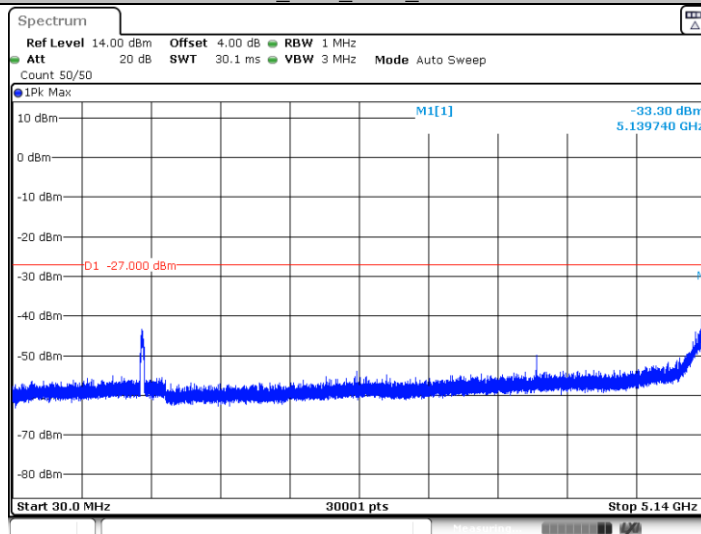
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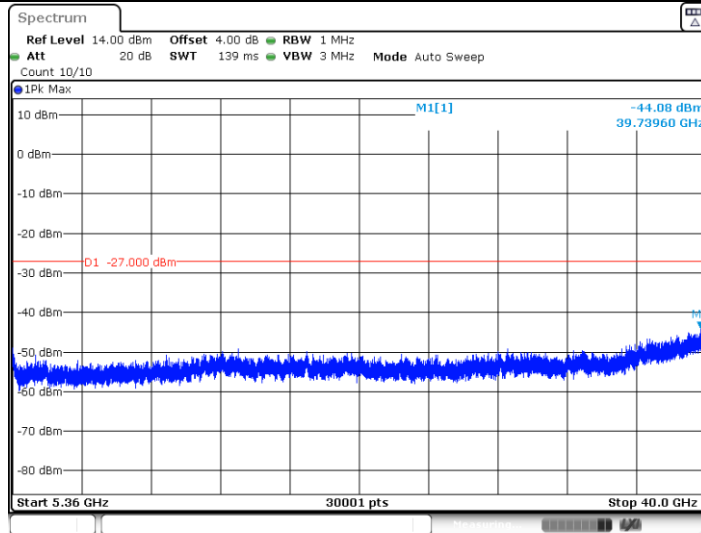
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11N40_Ant0_5190_30~5140



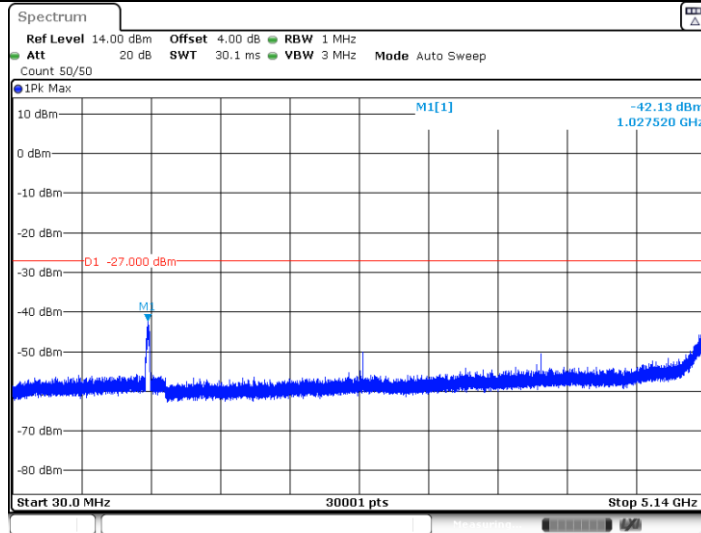
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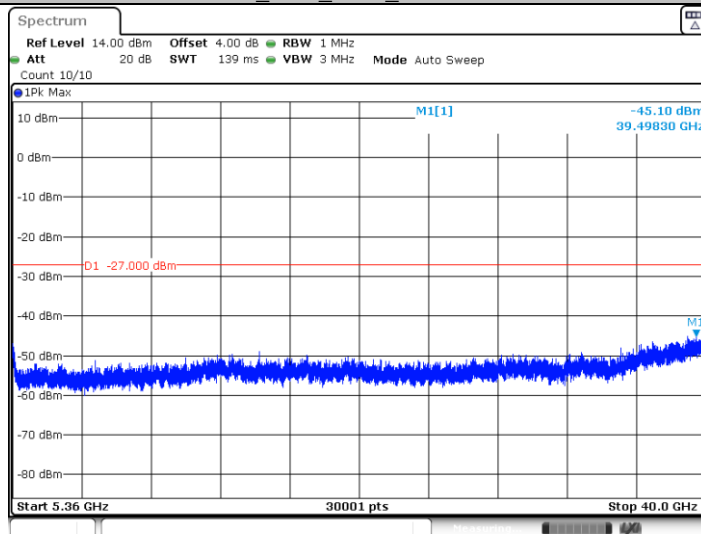
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11N40_Ant0_5230_30-5140



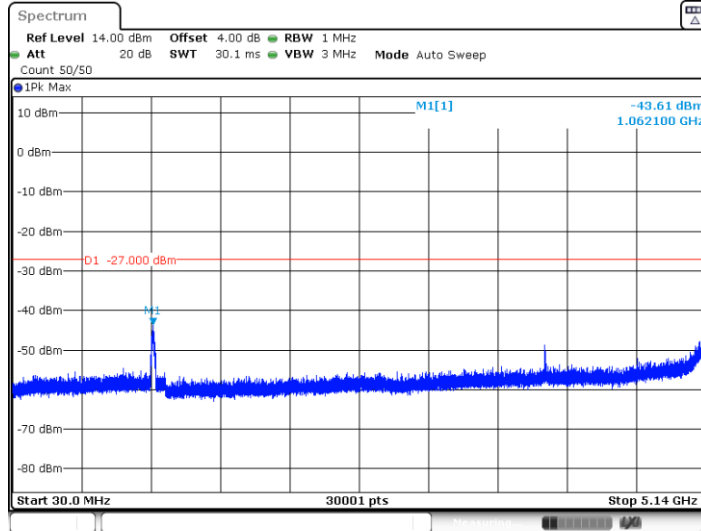
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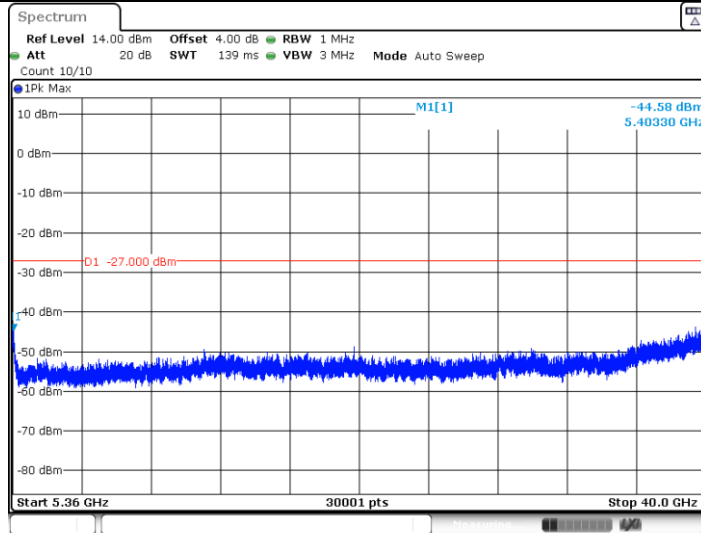
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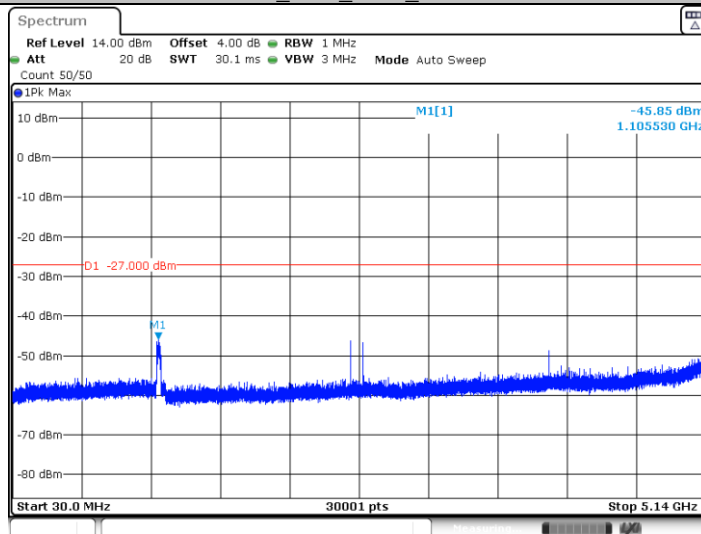
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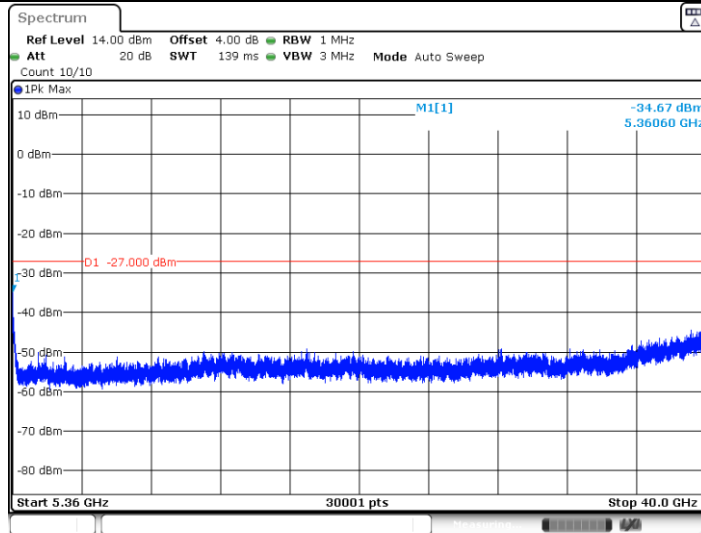
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11N40_Ant0_5310_30~5140



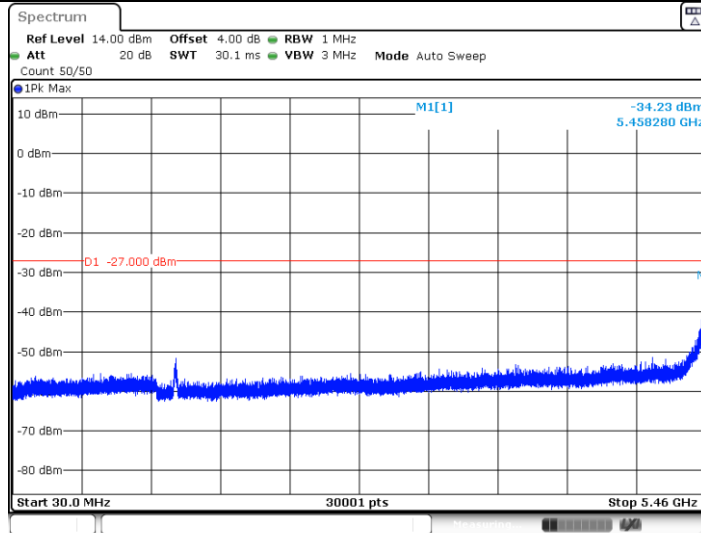
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11N40_Ant0_5310_5360~40000



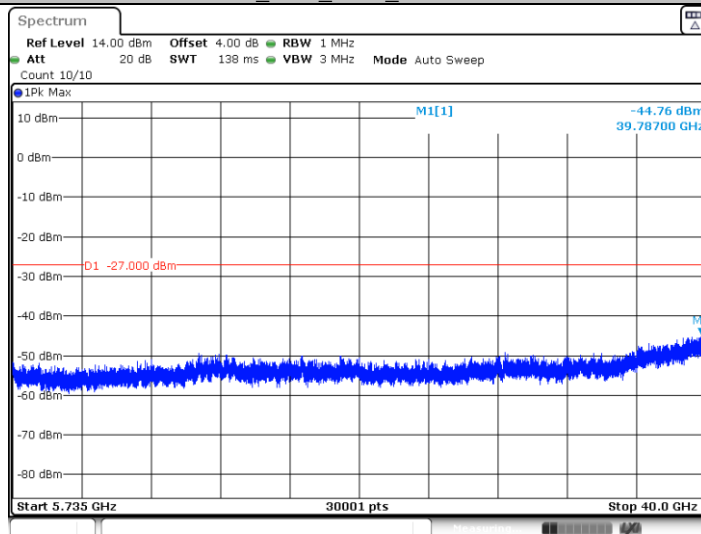
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Date: 15.MAY.2022 15:18:36

11N40_Ant0_5510_5735-40000



Date: 15.MAY.2022 15:18:42

11N40_Ant0_5550_30-5460