TEST REPORT

Applicant Name :	Seeed Technology Co., Ltd.
Address :	9F, G3 Building, TCL International E City, Zhongshanyuan Road, Nanshan District, Shenzhen, Guangdong Province, P.R.C
Report Number :	SZNS211008-51520E-00C
FCC ID:	Z4T-ODYSSEY-A

Test Standard (s)

FCC PART 15.407

Sample Description

Product:	ODYSSEY-X86i51135	
Trademark:	Seeed Studio	
Tested Model:	ODYSSEY-I51135(64G+512G/z)	
Multiple Product and Model:	ODYSSEY-X86i31115	ODYSSEY-I31115(xx+yy/z)
	ODYSSEY-X86i31125	ODYSSEY-I31125(xx+yy/z)
	ODYSSEY-X86i51135	ODYSSEY-I51135(xx+yy/z)
	(Note: xx: DDR, 8G/16G/32G/64G; yy: SSD, 128G/256G/512G; z: wifi module)	
Date Received:	2021-10-08	
Date of Test:	2021-10-14 to 2021-11-22	
Report Date:	2021-11-24	

Test Result:	Pass*

* In the configuration tested, the EUT complied with the standards above.

Prepared and Checked By:

Black Ding

EMC Engineer

Approved By:

Candy Li

EMC Engineer

Note: This report may contain data that are not covered by the A2LA accreditation and are marked with an asterisk "★ ".

Shenzhen Accurate Technology Co., Ltd. is not responsible for the authenticity of any test data provided by the applicant. Data included from the applicant that may affect test results are marked with an asterisk '*'. Customer model name, addresses, names, trademarks etc. are not considered data.

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GENERAL INFORMATION

Product Description for Equipment under Test (EUT)

Product	ODYSSEY-X86i51135	
Trademark	Seeed Studio	
Tested Model	ODYSSEY-I51135(64G+512G/z)	
Multiple Product and Model	ODYSSEY-X86i31115	ODYSSEY-I31115(xx+yy/z)
	ODYSSEY-X86i31125	ODYSSEY-I31125(xx+yy/z)
	ODYSSEY-X86i51135	ODYSSEY-I51135(xx+yy/z)
	(Note: xx: DDR, 8G/16G/32G/64G; yy: SSD, 128G/256G/512G; z: wifi module)	
Model difference	Please refer to the DoS letter	
Frequency Range	5G Wi-Fi: 5150-5250 MHz; 5725-5850 MHz	
Maximum Average Conducted Output Power	5G Wi-Fi: 5150-5250 MHz 12.70dBm (802.11a), 11.75dBm(802.11n20), 11.60dBm(802.11n40), 12.59dBm (802.11ac20), 11.56dBm (802.11ac40), 11.22dBm (802.11ac80) 5725-5850 MHz: 11.74dBm (802.11a), 11.90dBm(802.11n20), 11.70dBm(802.11n40), 12.12dBm (802.11ac20), 11.68dBm (802.11ac40), 11.38dBm (802.11ac80)	
Modulation Technique	OFDM	
Antenna Specification	External Antenna 1&2: 1.57dBi(5.2G&5.8G) (provided by the applicant)	
Voltage Range	DC 12V from adapter.	
Sample serial number	SZNS211008-51520E-RF-S1	
Sample/EUT Status	Good condition	
Adapter 1 information	Model: HA-1600-12 Input: 100-240V~1.7A 50/60Hz, Output: DC 12V, 5A, 60W	
Adapter 2 information	Model: PA-1061-81 Input: 100-240V~, 50/60Hz 1.6A Output: DC 12V, 5A, 60W	

Objective

This type approval report is in accordance with Part 2-Subpart J, Part 15-Subparts A and E of the Federal Communication Commissions rules.

The tests were performed in order to determine compliance with FCC Part 15, Subpart E, section 15.203, 15.205, 15.207, 15.209 and 15.407 rules.

Test Methodology

All measurements contained in this report were conducted with ANSI C63.10-2013, American National Standard of Procedures for Compliance Testing of Unlicensed Wireless Devices. And KDB789033D02 General U-NII Test Procedures New Rules v02r01.

All emissions measurement was performed at Shenzhen Accurate Technology Co., Ltd.. The radiated testing was performed at an antenna-to-EUT distance of 3 meters.

Measurement Uncertainty

Parameter		Uncertainty
Occupied Channel Bandwidth		5%
RF Frequency		$0.082*10^{-7}$
RF output power, conducted		0.73dB
Unwanted Emission, conducted		1.6dB
AC Power Lines Conducted Emissions		2.72dB
Emissions, Radiated	9kHz - 30MHz	2.66dB
	30MHz - 1GHz	4.28dB
	1GHz - 18GHz	4.98dB
	18GHz - 26.5GHz	5.06dB
	26.5GHz - 40GHz	4.72dB
Temperature		1℃
Humidity		6%
Supply voltages		0.4%

Note: The extended uncertainty given in this report is obtained by combining the standard uncertainty times the coverage factor K with the 95% confidence interval. Otherwise required by the applicant or Product Regulations, Decision Rule in this report did not consider the uncertainty.

Test Facility

The test site used by Shenzhen Accurate Technology Co., Ltd. to collect test data is located on the 1/F., Building A, Changyuan New Material Port, Science & Industry Park, Nanshan District, Shenzhen, Guangdong, P.R. China.

The test site has been approved by the FCC under the KDB 974614 D01 and is listed in the FCC Public Access Link (PAL) database, FCC Registration No.: 708358, the FCC Designation No.: CN1189. Accredited by American Association for Laboratory Accreditation (A2LA) The Certificate Number is 429 7.01.

Listed by Innovation, Science and Economic Development Canada (ISEDC), the Registration Number is 5077A.

SYSTEM TEST CONFIGURATION

Description of Test Configuration

The system was configured for testing in an engineering mode, which was provided by manufacturer.

The device only supports 5G Wi-Fi 802.11a/n20/n40//ac20/ac40/ac80 modes, which was declared by manufacturer.

For 5150-5250MHz Band, 7 channels are provided to testing:

Channel	Frequency (MHz)	Channel	Frequency (MHz)
36	5180	44	5220
38	5190	46	5230
40	5200	48	5240
42	5210	/	/

For 802.11a, 802.11n20 channel 36, 40, 48 were tested;
For 802.11n40 channel 38, 46 were tested.
For 802.11ac80 channel 42 was tested.

For 5725-5850MHz Band, 8 channels are provided to testing:

Channel	Frequency (MHz)	Channel	Frequency (MHz)
149	5745	157	5785
151	5755	159	5795
153	5765	161	5805
155	5775	165	5825

For 802.11a, 802.11n20 channel 149, 157, 165 were tested; For 802.11n40, channel 151, 159 were tested.
For 802.11ac80, channel 155 were tested.

EUT Exercise Software

No software was used to test, “app DRTU”* provided by manufacturer and power level as below:

Mode	Data Rate (Mbps)	Power Level*
802.11 a	6	12.5
802.11 n20/n40/ac20/ac40/ac80	MCS0	12.5

The worse-case data rates are determined to be as above for each mode based upon investigations by measuring the output power and PSD across all data rates, bandwidths and modulations.

The device only supports SISO in all modes for Wi-Fi, per pretest and all the antenna ports have the same power level for SISO modes.

Duty cycle

Please refer to the Appendix.

Equipment Modifications

No modification was made to the EUT tested.

Support Equipment List and Details

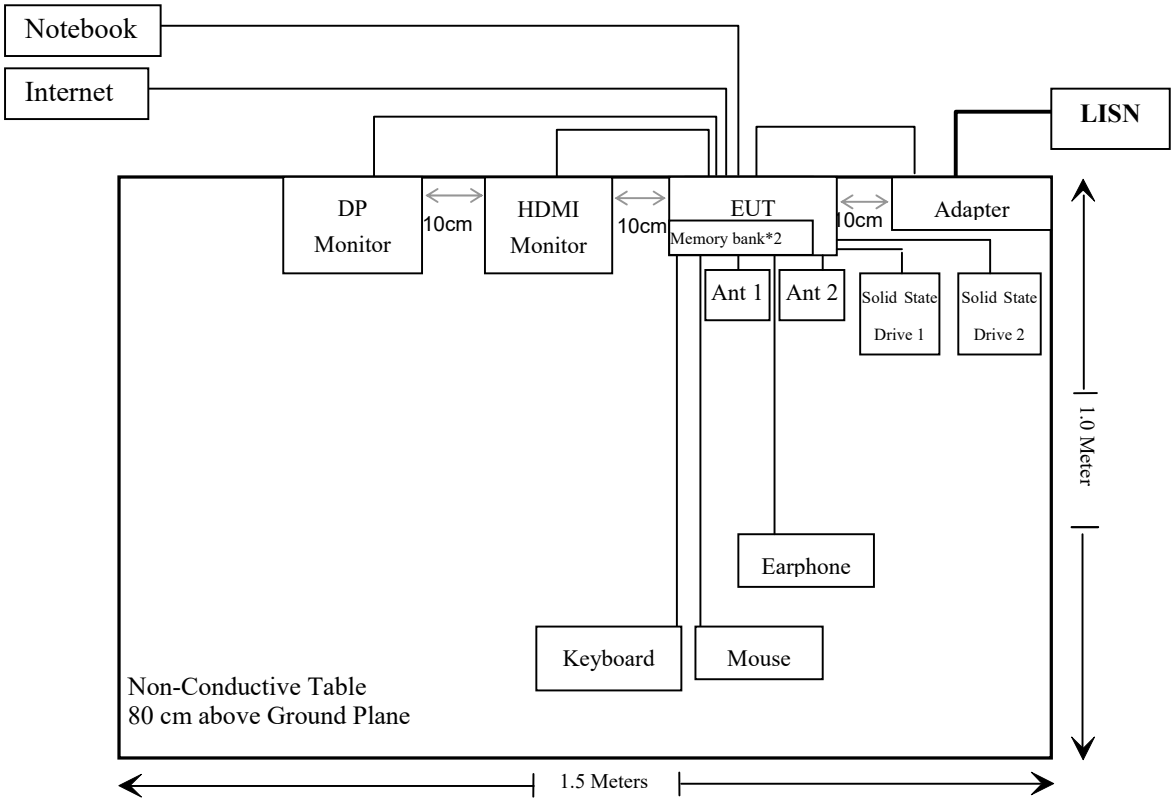
Manufacturer	Description	Model	Serial Number
DELL	Keyboard	L100	CN0RH66658985C018C
DELL	Mouse	MOC5UG	Unknown
PHILIPS	DP Monitor	275M7C	Unknown
DELL	HDMI Monitor	ST2310f	Unknown
ZHIKE	Solid State Drive 1	U300	USA210510105
ZHIKE	Solid State Drive 2	U300	USA210510106
BORY	NVME PCIE SSD	Unknown	800295763
Kingston	Memory bank 1	9905700-E15.AOOG	Unknown
Kingston	Memory bank 2	99P5711-002.AOOG	Unknown
Unknown	M.2 PCI-E	YX-520	2106H520A 128GA 18829
SCI	Earphone	SCRC-130A	Unknown
Lenovo	Notebook	T430	Unknown

External I/O Cable

Cable Description	Length (m)	From Port	To
Unshielded Detachable DC output Cable	1.15	Adapter 1	LISN
Unshielded Detachable DC output Cable	1.0	Adapter2	LISN
Unshielded Detachable AC power Cable	1.0	EUT	Adapter 1
Unshielded Detachable AC power Cable	1.5	EUT	Adapter 2
Shielded Detachable HDMI Cable	1.75	EUT	HDMI Monitor
Shielded Detachable DP Cable	1.75	EUT	DP Monitor
Unshielded Detachable USB Cable	1.5	EUT	Mouse
Unshielded Detachable USB Cable	1.5	EUT	Keyboard
Unshielded Detachable RJ45 Cable 1	3	Internet	EUT
Unshielded Detachable RJ45 Cable 2	3	Notebook	EUT
Unshielded Detachable earphone Cable	0.75	EUT	Earphone

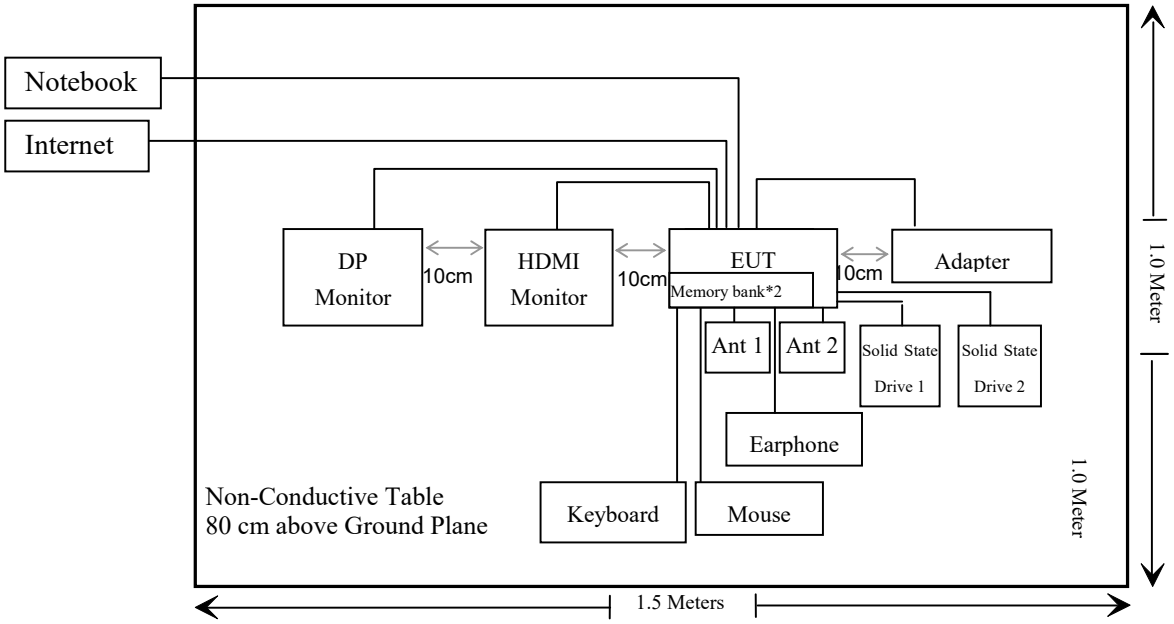
Block Diagram of Test Setup

For conducted emission:

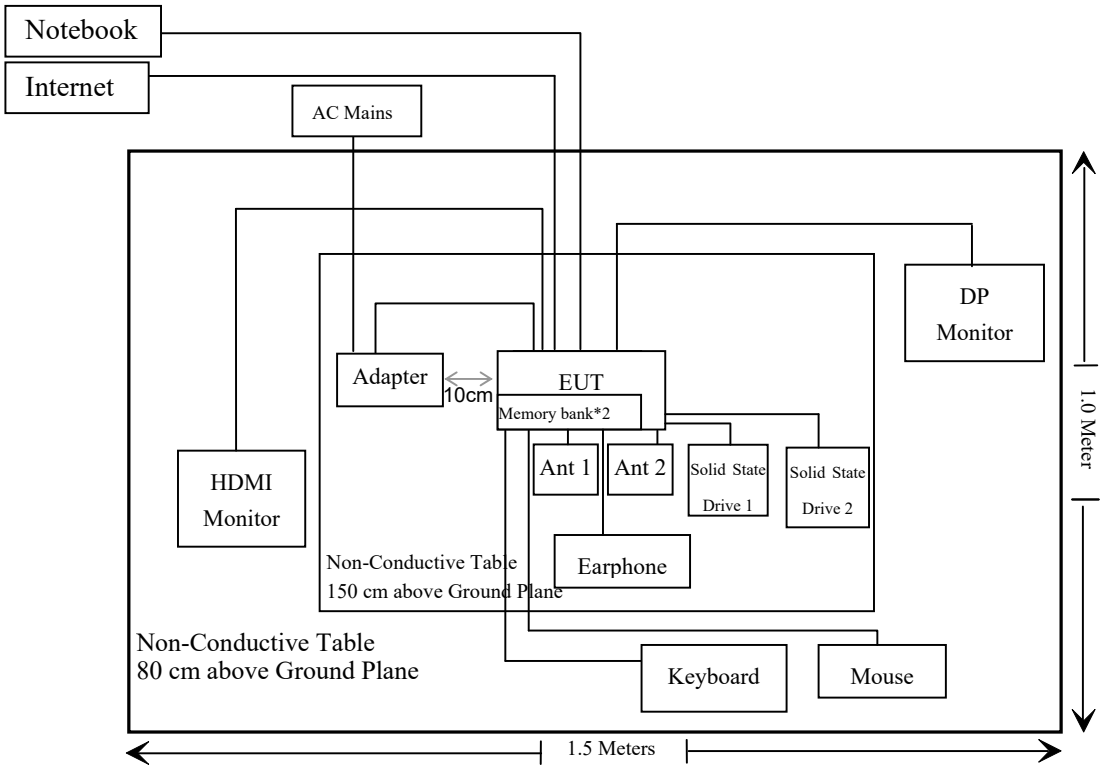


For Radiated Emission:

Below 1GHz:



Above 1GHz:



SUMMARY OF TEST RESULTS

FCC Rules	Description of Test	Result
§1.1307, §2.1093	Maximum Permissible Exposure(MPE)	Compliant
§15.203	Antenna Requirement	Compliant
§15.407(b)(8) & §15.207(a)	Conducted Emissions	Compliant
§15.205 & §15.209 & §15.407(b) (1), (4), (8), (9), (10)	Undesirable Emission& Restricted Bands	Compliant
§15.407(a) (12), (e)	Bandwidth	Compliant
§15.407(a) (1), (3)	Conducted Transmitter Output Power	Compliant
§15.407 (a) (1), (3)	Power Spectral Density	Compliant

Note: Per FCC Part 15B, pre-test for all models with different CPU, and the worst case about maximum emission is model of ODYSSEY-I51135(64G+512G/z), which was recorded in this report.

TEST EQUIPMENT LIST

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
Conducted Emissions Test					
Rohde& Schwarz	EMI Test Receiver	ESCI	100784	2021/02/03	2022/02/02
R & S	L.I.S.N.	ENV216	101314	2020/12/25	2021/12/24
Anritsu Corp	50Ω Coaxial Switch	MP59B	6200506474	2020/12/25	2021/12/24
Unknown	RF Coaxial Cable	N-2m	No.2	2020/12/25	2021/12/24
Conducted Emission Test Software: e3 19821b (V9)					
Radiated Emissions Test					
Rohde& Schwarz	Test Receiver	ESR	102725	2020/12/25	2021/12/24
Rohde&Schwarz	Spectrum Analyzer	FSV40	101949	2021/5/18	2022/5/17
SONOMA INSTRUMENT	Amplifier	310 N	186131	2020/12/25	2021/12/24
A.H. Systems, inc.	Preamplifier	PAM-0118P	531	2021/07/08	2022/07/07
Quinstar	Amplifier	QLW-184055 36-J0	15964001002	2020/11/28	2021/11/27
Anritsu Corp	50 Coaxial Switch	MP59B	6100237248	2020/12/25	2021/12/24
Schwarzbeck	Bilog Antenna	VULB9163	9163-323	2020/01/05	2023/01/04
Schwarzbeck	Horn Antenna	BBHA9120D	9120D-1067	2020/01/05	2023/01/04
Schwarzbeck	HORN ANTENNA	BBHA9170	9170-359	2020/01/05	2023/01/04
Wainwright	High Pass Filter	WHKX3.6/18 G-10SS	5	2020/12/25	2021/12/24
Unknown	RF Coaxial Cable	N-5m	No.3	2020/12/25	2021/12/24
Unknown	RF Coaxial Cable	N-1m	No.5	2020/12/25	2021/12/24
Unknown	RF Coaxial Cable	N-10m	No.7	2020/11/09	2021/11/08
Unknown	RF Coaxial Cable	N-2m	No.8	2020/11/09	2021/11/08
Radiated Emission Test Software: EZ_EMC V 1.1.4.2					
RF Conducted Test					
Rohde&Schwarz	Spectrum Analyzer	FSV40	101495	2020/12/24	2021/12/23
Rohde & Schwarz	Open Switch and Control Unit	OSP120 +OSP -B157	101244 + 100866	2020/12/24	2021/12/23

*** Statement of Traceability:** Shenzhen Accurate Technology Co., Ltd. attests that all calibrations have been performed in accordance to requirements that traceable to National Primary Standards and International System of Units (SI).

§1.1307 & §2.1092- MAXIMUM PERMISSIBLE EXPOSURE (MPE)

Applicable Standard

According to subpart 2.1091 systems operating under the provisions of this section shall be operated in a manner that ensures the public is not exposed to RF energy level in excess of the communication guidelines.

Limits for General Population/Uncontrolled Exposure

Limits for General Population/Uncontrolled Exposure				
Frequency Range (MHz)	**Electric Field Strength (V/m)**	**Magnetic Field Strength (A/m)**	**Power Density (mW/cm^2)**	**Averaging Time (Minutes)**
0.3-1.34	614	1.63	*(100)	30
1.34-30	824/f	2.19/f	*($180/f^2$)	30
30-300	27.5	0.073	0.2	30
300-1500	/	/	f/1500	30
1500-100,000	/	/	1.0	30

f = frequency in MHz
* = Plane-wave equivalent power density

Result

Calculated Formulary:

Predication of MPE limit at a given distance

$$S = \frac{PG}{4\pi R^2}$$

S = power density (in appropriate units, e.g. mW/cm^2)
P = power input to the antenna (in appropriate units, e.g., mW).
G = power gain of the antenna in the direction of interest relative to an isotropic radiator, the power gain factor, is normally numeric gain.
R = distance to the center of radiation of the antenna (appropriate units, e.g., cm)

For worst case:

Frequency (MHz)	Antenna Gain		Tune up conducted power		Evaluation Distance (cm)	Power Density (mW/cm^2)	MPE Limit (mW/cm^2)
	(dBi)	(numeric)	(dBm)	(mW)			
5150-5250	1.57	1.44	13.0	19.95	20	0.0057	1
5725-5850	1.57	1.44	12.5	17.78	20	0.0051	1

Note: 1. The tune up conducted power was declared by the applicant.
2. The BT and Wi-Fi can not transmit at the same time.

To maintain compliance with the FCC's RF exposure guidelines, place the equipment at least 20cm from nearby persons.

Result: Compliant.

FCC §15.203 – ANTENNA REQUIREMENT

Applicable Standard

According to § 15.203, an intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the provisions of this section. The manufacturer may design the unit so that a broken antenna can be replaced by the user, but the user of a standard antenna jack or electrical connector is prohibited. The structure and application of the EUT were analyzed to determine compliance with section §15.203 of the rules. §15.203 state that the subject device must meet the following criteria:

a. Antenna must be permanently attached to the unit.
b. Antenna must use a unique type of connector to attach to the EUT.

Unit must be professionally installed, and installer shall be responsible for verifying that the correct antenna is employed with the unit.

And according to FCC 47 CFR section 15.407 (a), if the transmitting antennas of directional gain greater than 6dBi are used, the transmit power and power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

Antenna Connector Construction

The EUT has two external Antennas arrangement for 5G Wi-Fi, which was used a unique coupling and the antenna gain is 1.57dBi, fulfill the requirement of this section. Please refer to the EUT photos.

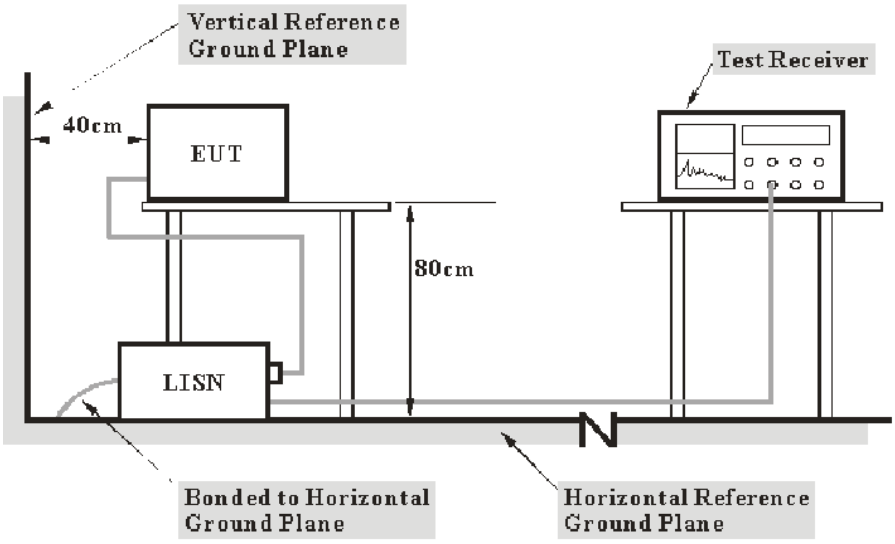
Result: Compliant.

FCC §15.407 (B) (8) §15.207 (A) – CONDUCTED EMISSIONS

Applicable Standard

FCC §15.207, §15.407(b) (8)

EUT Setup



Note: 1. Support units were connected to second LISN.
2. Both of LISNs (AMN) 80 cm from EUT and at the least 80 cm from other units and other metal planes support units.

The setup of EUT is according with per ANSI C63.10-2013 measurement procedure. The specification used was with the FCC Part 15.207 limits.

The spacing between the peripherals was 10 cm.

EMI Test Receiver Setup

The EMI test receiver was set to investigate the spectrum from 150 kHz to 30 MHz.

During the conducted emission test, the EMI test receiver was set with the following configurations:

Frequency Range	IF B/W
150 kHz – 30 MHz	9 kHz

Test Procedure

During the conducted emission test, the adapter was connected to the LISN.

Maximizing procedure was performed on the six (6) highest emissions of the EUT.

All data was recorded in the Quasi-peak and average detection mode.

Transd Factor & Margin Calculation

The Transd factor is calculated by adding LISN VDF (Voltage Division Factor), Cable Loss. The basic equation is as follows:

Transd Factor = LISN VDF + Cable Loss

The "**Over limit**" column of the following data tables indicates the degree of compliance with the applicable limit. For example, an Over limit of -7 dB means the emission is 7 dB below the limit. The equation for calculation is as follows:

Over Limit = Level – Limit
Level = Read Level + Factor

Test Data

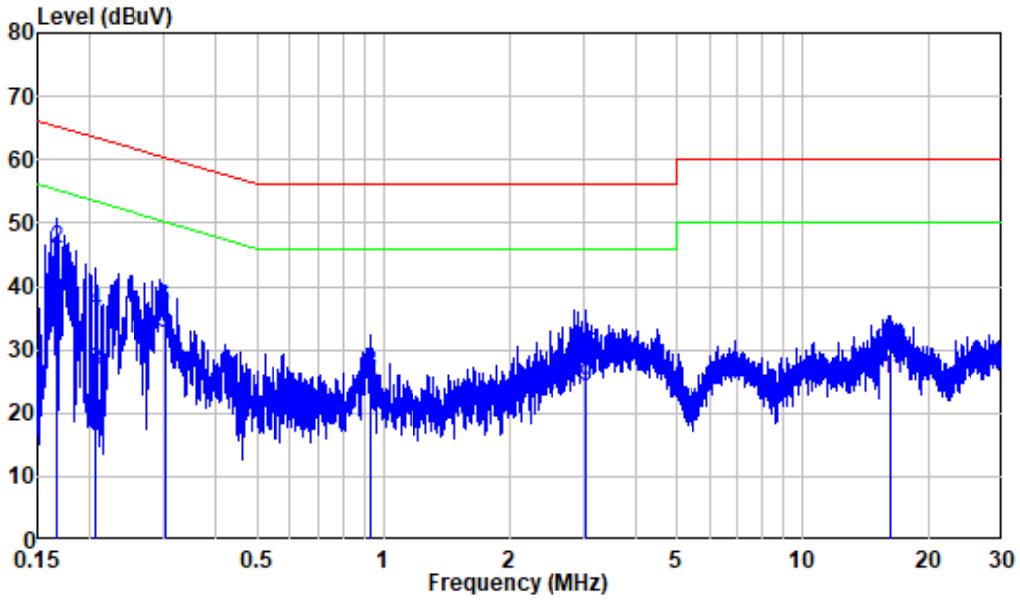
Environmental Conditions

Temperature:	23 ℃
Relative Humidity:	49 %
ATM Pressure:	101.0 kPa

The testing was performed by Black Ding on 2021-11-22

EUT operation mode: 5G Wi-Fi transmitting

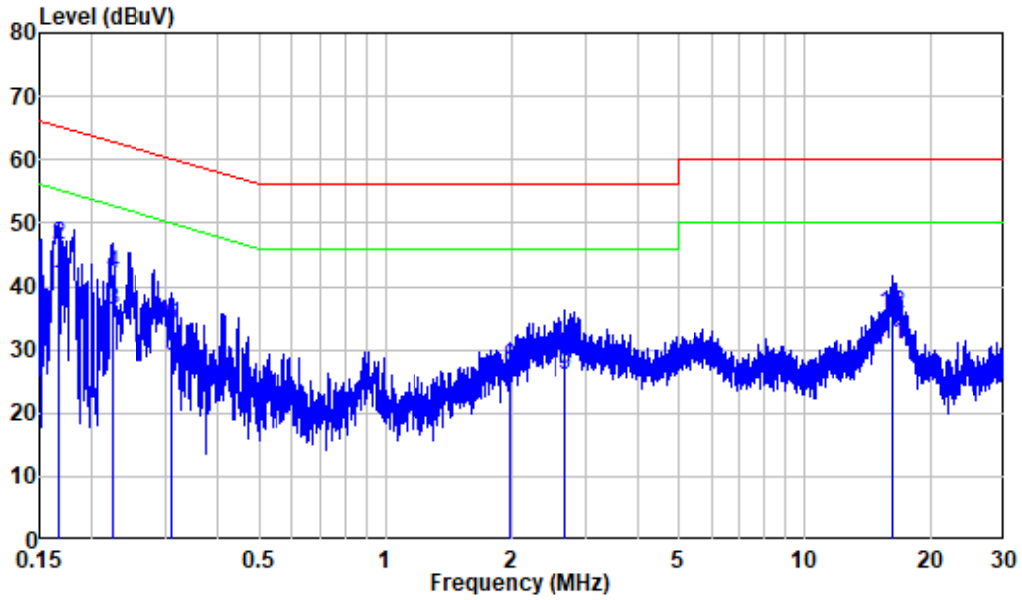
Adapter 1:
AC 120V/60 Hz, Line



Site : Shielding Room
Condition: Line
Mode : 5G WIFI

	Freq	Factor	Read Level	Level	Limit Line	Over Limit	Remark
	MHz	dB	dBuV	dBuV	dBuV	dB	
1	0.167	9.86	29.51	39.37	55.09	-15.72	Average
2	0.167	9.86	35.96	45.82	65.09	-19.27	QP
3	0.205	9.80	16.80	26.60	53.40	-26.80	Average
4	0.205	9.80	26.07	35.87	63.40	-27.53	QP
5	0.301	9.80	22.70	32.50	50.20	-17.70	Average
6	0.301	9.80	26.79	36.59	60.20	-23.61	QP
7	0.934	9.81	12.79	22.60	46.00	-23.40	Average
8	0.934	9.81	16.36	26.17	56.00	-29.83	QP
9	3.035	9.93	14.09	24.02	46.00	-21.98	Average
10	3.035	9.93	19.06	28.99	56.00	-27.01	QP
11	16.236	10.09	15.20	25.29	50.00	-24.71	Average
12	16.236	10.09	20.02	30.11	60.00	-29.89	QP

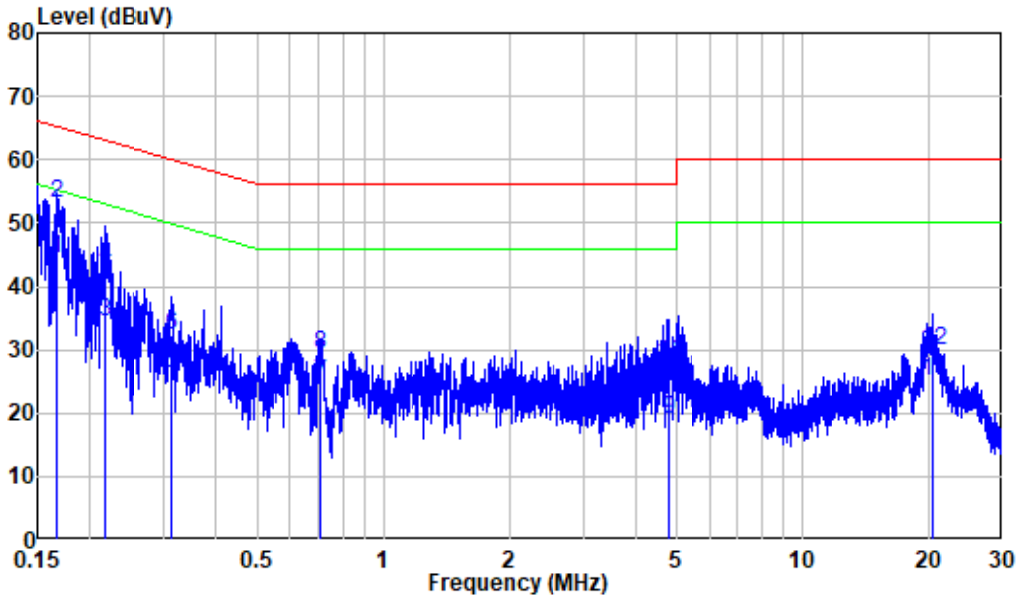
AC 120V/60 Hz, Neutral



Site : Shielding Room
Condition: Neutral
Mode : 5G WIFI

	Freq	Factor	Read Level	Level	Limit Line	Over Limit	Remark
	MHz	dB	dBuV	dBuV	dBuV	dB	
1	0.167	9.94	30.33	40.27	55.11	-14.84	Average
2	0.167	9.94	36.65	46.59	65.11	-18.52	QP
3	0.223	9.99	26.21	36.20	52.72	-16.52	Average
4	0.223	9.99	32.02	42.01	62.72	-20.71	QP
5	0.310	9.95	19.01	28.96	49.98	-21.02	Average
6	0.310	9.95	23.72	33.67	59.98	-26.31	QP
7	1.979	9.92	12.91	22.83	46.00	-23.17	Average
8	1.979	9.92	17.16	27.08	56.00	-28.92	QP
9	2.689	9.97	15.91	25.88	46.00	-20.12	Average
10	2.689	9.97	20.90	30.87	56.00	-25.13	QP
11	16.076	10.08	20.66	30.74	50.00	-19.26	Average
12	16.076	10.08	25.53	35.61	60.00	-24.39	QP

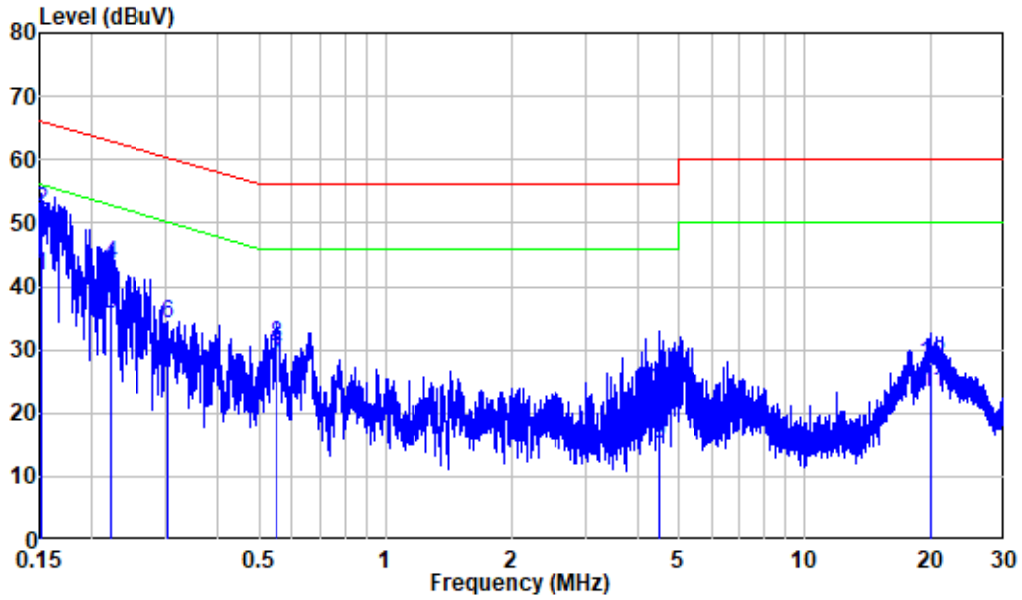
Adapter 2:
AC 120V/60 Hz, Line



Site : Shielding Room
Condition: Line
Mode : 5G WIFI

	Freq	Factor	Read Level	Level	Limit Line	Over Limit	Remark
	MHz	dB	dBuV	dBuV	dBuV	dB	
1	0.167	9.86	34.52	44.38	55.13	-10.75	Average
2	0.167	9.86	43.33	53.19	65.13	-11.94	QP
3	0.217	9.80	24.50	34.30	52.93	-18.63	Average
4	0.217	9.80	33.41	43.21	62.93	-19.72	QP
5	0.311	9.80	16.53	26.33	49.93	-23.60	Average
6	0.311	9.80	22.46	32.26	59.93	-27.67	QP
7	0.712	9.81	14.84	24.65	46.00	-21.35	Average
8	0.712	9.81	19.55	29.36	56.00	-26.64	QP
9	4.765	9.98	9.12	19.10	46.00	-26.90	Average
10	4.765	9.98	17.82	27.80	56.00	-28.20	QP
11	20.270	10.21	14.93	25.14	50.00	-24.86	Average
12	20.270	10.21	19.59	29.80	60.00	-30.20	QP

AC 120V/60 Hz, Neutral



Site : Shielding Room
Condition: Neutral
Mode : 5G WIFI

	Freq	Factor	Read Level	Level	Limit Line	Over Limit	Remark
	MHz	dB	dBuV	dBuV	dBuV	dB	
1	0.151	9.90	31.87	41.77	55.93	-14.16	Average
2	0.151	9.90	42.13	52.03	65.93	-13.90	QP
3	0.222	9.99	25.62	35.61	52.73	-17.12	Average
4	0.222	9.99	33.47	43.46	62.73	-19.27	QP
5	0.302	9.96	18.16	28.12	50.20	-22.08	Average
6	0.302	9.96	24.26	34.22	60.20	-25.98	QP
7	0.552	9.91	18.19	28.10	46.00	-17.90	Average
8	0.552	9.91	20.75	30.66	56.00	-25.34	QP
9	4.510	10.05	4.93	14.98	46.00	-31.02	Average
10	4.510	10.05	13.39	23.44	56.00	-32.56	QP
11	20.016	10.20	13.09	23.29	50.00	-26.71	Average
12	20.016	10.20	17.67	27.87	60.00	-32.13	QP

§15.205 & §15.209 & §15.407(B) (1), (4), (8) , (9), (10) – UNDESIRABLE EMISSION

Applicable Standard

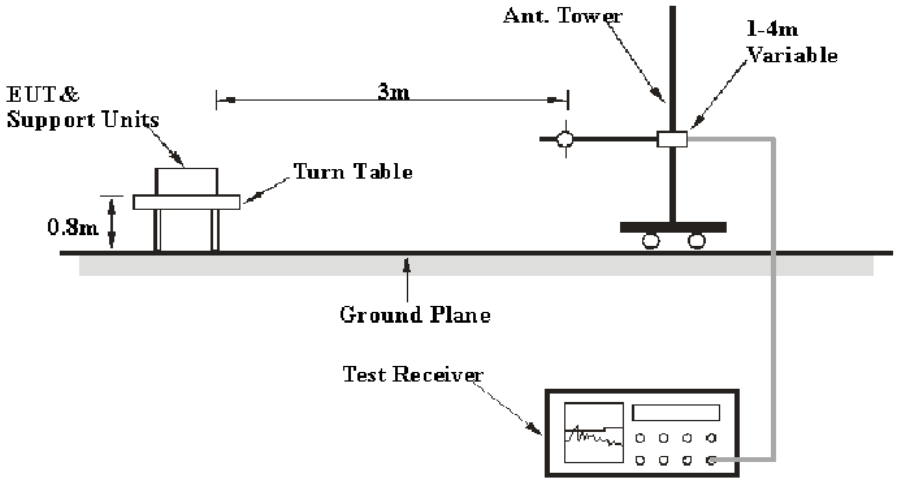
FCC §15.407 (b) (1), (4), (8), (9), (10); §15.209; §15.205;

(b) Undesirable emission limits. Except as shown in paragraph (b) (7) of this section, the maximum emissions outside of the frequency bands of operation shall be attenuated in accordance with the following limits:
(1) 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.
(4) For transmitters operating in the 5.725-5.85 GHz band:
(i) 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.

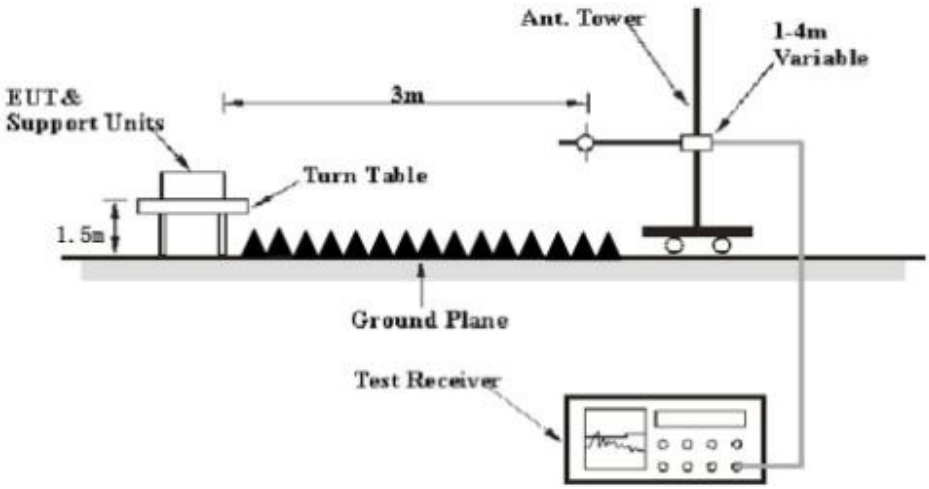
Unwanted emissions below 1 GHz must comply with the general field strength limits set forth in §15.209.

EUT Setup

Below 1 GHz:



Above 1 GHz:



The setup of EUT is according with per ANSI C63.10-2013 measurement procedure. The specification used was with the FCC 15.209 and FCC 15.407 limits.

EMI Test Receiver & Spectrum Analyzer Setup

During the radiated emission test, the EMI test receiver & Spectrum Analyzer Setup were set with the following configurations:

Frequency Range	RBW	Video B/W	IF B/W	Measurement
30 MHz – 1000 MHz	100 kHz	300 kHz	120 kHz	QP
Above 1 GHz	1 MHz	3 MHz	/	PK
	1MHz	10 Hz Note 1	/	Average
	1MHz	＞1/T Note 2	/	Average

Note 1: when duty cycle is no less than 98%
Note 2: when duty cycle is less than 98%

If the maximized peak measured value complies with the limit, then it is unnecessary to perform an QP/Average measurement

Test Procedure

Radiated Spurious Emission

Maximizing procedure was performed on the highest emissions to ensure that the EUT complied with all the installation combinations.

Factor & Margin Calculation

The Factor is calculated by adding the Antenna Factor and Cable Loss, and subtracting the Amplifier Gain. The basic equation is as follows:

Factor = Antenna Factor + Cable Loss - Amplifier Gain

The "**Over Limit/Margin**" column of the following data tables indicates the degree of compliance with the applicable limit. For example, an Over Limit/margin of -7dB means the emission is 7dB below the limit. The equation for calculation is as follows:

Over Limit = Result / Corrected Amplitude – Limit
Result / Corrected Amplitude = Read Level + Factor

Test Data

Environmental Conditions

Temperature:	23~24 ℃
Relative Humidity:	48~49%
ATM Pressure:	101.0 kPa

The testing was performed by Black Ding on 2021-10-21 for below 1GHz and 2021-10-22 for above 1GHz.

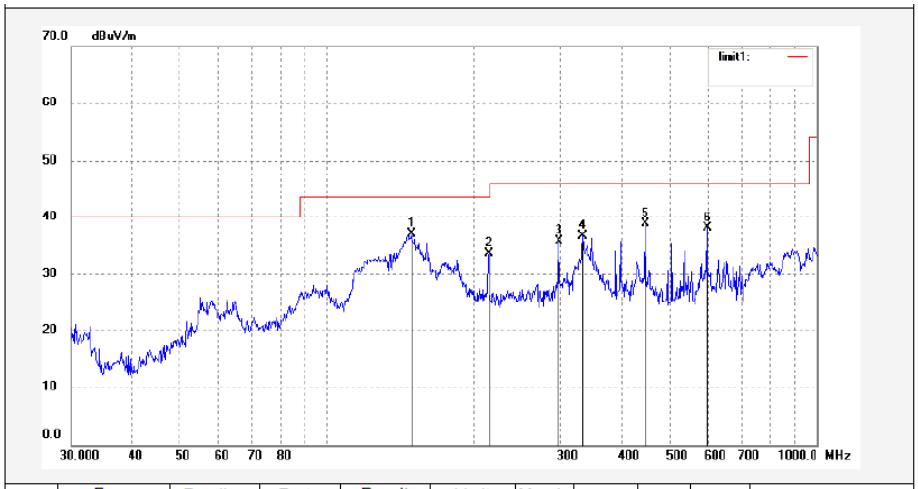
EUT operation mode: Transmitting

(Scan with 802.11a/n20/n40/ac20/ac40/ac80 mode at X axis, Y axis, Z axis, the worst case is at Z axis)

30 MHz~1 GHz: 802.11a 5180MHz antenna 1(Worst case)

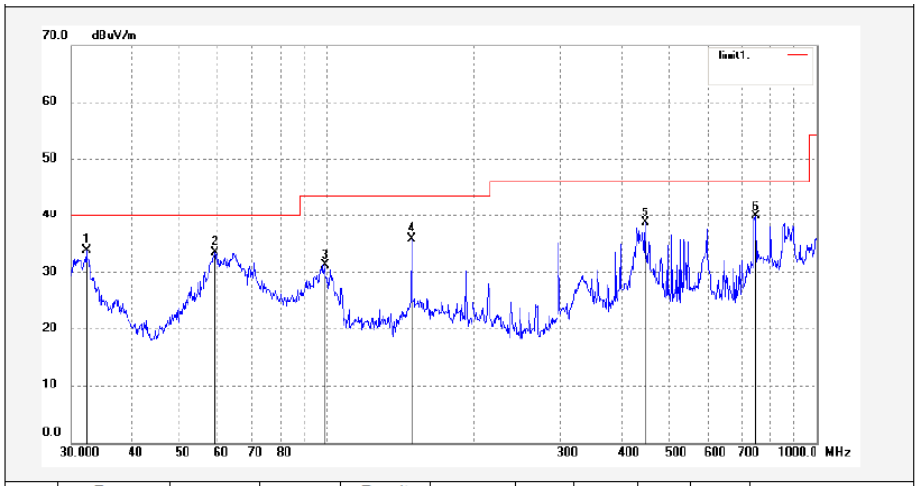
Adapter 1:

Horizontal



No.	Freq. (MHz)	Reading (dBuV)	Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Degree (deg.)	Remark
1	148.4410	57.08	-20.08	37.00	43.50	-6.50	peak			
2	213.7633	50.92	-17.26	33.66	43.50	-9.84	peak			
3	297.2241	50.42	-14.61	35.81	46.00	-10.19	peak			
4	332.5187	50.36	-13.74	36.62	46.00	-9.38	peak			
5	446.4141	49.47	-10.78	38.69	46.00	-7.31	peak			
6	595.1327	46.02	-7.91	38.11	46.00	-7.89	peak			

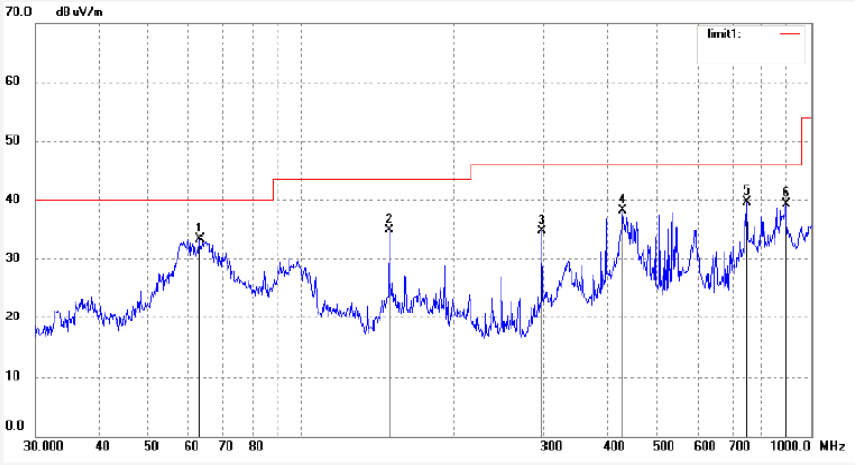
Vertical



No.	Freq. (MHz)	Reading (dBuV)	Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Degree (deg.)	Remark
1	32.1794	48.09	-14.21	33.88	40.00	-6.12	peak			
2	59.0251	51.97	-18.48	33.49	40.00	-6.51	peak			
3	98.8324	49.71	-18.49	31.22	43.50	-12.28	peak			
4	148.4410	55.85	-20.08	35.77	43.50	-7.73	peak			
5	446.4141	49.29	-10.78	38.51	46.00	-7.49	peak			
6	750.1082	45.70	-5.89	39.81	46.00	-6.19	peak			

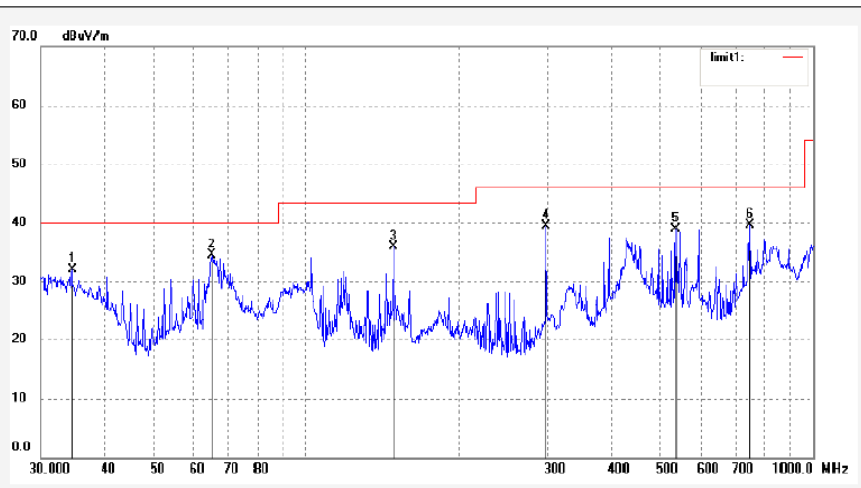
Adapter 2:

Horizontal



No.	Freq. (MHz)	Reading (dBuV)	Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Degree (deg.)	Remark
1	63.0915	53.20	-19.80	33.40	40.00	-6.60	peak			
2	148.4410	54.98	-20.08	34.90	43.50	-8.60	peak			
3	297.2241	49.29	-14.61	34.68	46.00	-11.32	peak			
4	428.0192	49.57	-11.29	38.28	46.00	-7.72	peak			
5	750.1082	45.58	-5.89	39.69	46.00	-6.31	peak			
6	893.8567	42.94	-3.69	39.25	46.00	-6.75	peak			

Vertical



No.	Freq. (MHz)	Reading (dBuV)	Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Degree (deg.)	Remark
1	34.5172	46.99	-14.92	32.07	40.00	-7.93	peak			
2	64.8863	55.09	-20.46	34.63	40.00	-5.37	peak			
3	148.4410	56.09	-20.08	36.01	43.50	-7.49	peak			
4	297.2241	54.01	-14.61	39.40	46.00	-6.60	peak			
5	535.7073	48.45	-9.44	39.01	46.00	-6.99	peak			
6	750.1082	45.61	-5.89	39.72	46.00	-6.28	peak			

1 ~ 40 GHz: Pre-scan with two antennas, and worst case for antenna 1 was recorded.

5150-5250MHz:

Frequency (MHz)	Receiver		Turntable Degree	Rx Antenna		Corrected Factor (dB/m)	Corrected Amplitude (dBμV/m)	Limit (dBμV/m)	Margin (dB)
	Reading (dBμV)	PK/QP/AV		Height (m)	Polar (H/V)				
802.11A BAND1 Low channel									
4500.00	43.32	PK	225	1.20	H	1.89	45.21	74.00	-28.79
4500.00	42.47	PK	31	2.00	V	1.89	44.36	74.00	-29.64
5150.00	45.30	PK	288	1.30	H	3.37	48.67	74.00	-25.33
5150.00	44.34	PK	79	2.20	V	3.37	47.71	74.00	-26.29
10360.00	29.44	PK	328	1.50	H	14.41	43.85	68.20	-24.35
10360.00	30.59	PK	221	1.70	V	14.41	45.00	68.20	-23.20
802.11A BAND1 Middle channel									
10400.00	32.32	PK	258	1.80	H	11.46	43.78	68.20	-24.42
10400.00	33.25	PK	44	1.90	V	11.46	44.71	68.20	-23.49
802.11A BAND1 High channel									
5350.00	45.60	PK	290	1.40	H	3.43	49.03	74.00	-24.97
5350.00	44.54	PK	54	1.30	V	3.43	47.97	74.00	-26.03
5460.00	45.74	PK	70	1.50	H	3.58	49.32	74.00	-24.68
5460.00	46.91	PK	53	1.50	V	3.58	50.49	74.00	-23.51
10480.00	32.10	PK	138	1.60	H	11.53	43.63	68.20	-24.57
10480.00	33.11	PK	351	1.30	V	11.53	44.64	68.20	-23.56
802.11N20 BAND1 Low channel									
4500.00	43.26	PK	310	1.90	H	1.89	45.15	74.00	-28.85
4500.00	42.78	PK	260	1.70	V	1.89	44.67	74.00	-29.33
5150.00	44.95	PK	113	1.20	H	3.37	48.32	74.00	-25.68
5150.00	44.21	PK	268	2.40	V	3.37	47.58	74.00	-26.42
10360.00	27.00	PK	138	2.40	H	14.41	41.41	68.20	-26.79
10360.00	27.25	PK	203	2.10	V	14.41	41.66	68.20	-26.54
802.11N20 BAND1 Middle channel									
10400.00	31.93	PK	286	2.10	H	11.46	43.39	68.20	-24.81
10400.00	32.96	PK	188	1.30	V	11.46	44.42	68.20	-23.78
802.11N20 BAND1 High channel									
5350.00	45.18	PK	177	2.10	H	3.43	48.61	74.00	-25.39
5350.00	44.16	PK	272	1.20	V	3.43	47.59	74.00	-26.41
5460.00	43.88	PK	273	2.00	H	3.58	47.46	74.00	-26.54
5460.00	43.54	PK	78	1.60	V	3.58	47.12	74.00	-26.88
10480.00	31.72	PK	347	2.10	H	11.53	43.25	68.20	-24.95
10480.00	32.76	PK	2	1.90	V	11.53	44.29	68.20	-23.91

802.11N40 BAND1 Low channel									
4500.00	43.77	PK	23	2.10	H	1.89	45.66	74.00	-28.34
4500.00	42.94	PK	158	2.30	V	1.89	44.83	74.00	-29.17
5150.00	45.10	PK	6	1.90	H	3.37	48.47	74.00	-25.53
5150.00	44.14	PK	348	1.10	V	3.37	47.51	74.00	-26.49
10380.00	31.89	PK	357	1.20	H	11.43	43.32	68.20	-24.88
10380.00	32.93	PK	204	1.90	V	11.43	44.36	68.20	-23.84
802.11N40 BAND1 High channel									
5350.00	44.83	PK	20	1.90	H	3.43	48.26	74.00	-25.74
5350.00	43.74	PK	116	1.20	V	3.43	47.17	74.00	-26.83
5460.00	43.63	PK	30	1.60	H	3.58	47.21	74.00	-26.79
5460.00	43.48	PK	208	1.30	V	3.58	47.06	74.00	-26.94
10460.00	31.79	PK	204	1.90	H	11.50	43.29	68.20	-24.91
10460.00	32.83	PK	340	1.10	V	11.50	44.33	68.20	-23.87
802.11AC20 BAND1 Low channel									
4500.00	44.35	PK	225	1.20	H	1.89	46.24	74.00	-27.76
4500.00	43.52	PK	83	1.80	V	1.89	45.41	74.00	-28.59
5150.00	45.47	PK	15	2.50	H	3.37	48.84	74.00	-25.16
5150.00	44.29	PK	115	1.30	V	3.37	47.66	74.00	-26.34
10360.00	29.04	PK	343	2.50	H	14.41	43.45	68.20	-24.75
10360.00	29.95	PK	155	2.30	V	14.41	44.36	68.20	-23.84
802.11AC20 BAND1 Middle channel									
10400.00	31.91	PK	63	1.60	H	11.46	43.37	68.20	-24.83
10400.00	32.78	PK	249	1.80	V	11.46	44.24	68.20	-23.96
802.11AC20 BAND1 High channel									
5350.00	45.43	PK	311	1.30	H	3.43	48.86	74.00	-25.14
5350.00	44.29	PK	241	1.80	V	3.43	47.72	74.00	-26.28
5460.00	43.70	PK	130	2.10	H	3.58	47.28	74.00	-26.72
5460.00	43.85	PK	62	1.30	V	3.58	47.43	74.00	-26.57
10480.00	31.77	PK	245	1.20	H	11.53	43.30	68.20	-24.90
10480.00	32.61	PK	329	2.30	V	11.53	44.14	68.20	-24.06
802.11AC40 BAND1 Low channel									
4500.00	43.34	PK	311	1.90	H	1.89	45.23	74.00	-28.77
4500.00	42.69	PK	186	1.90	V	1.89	44.58	74.00	-29.42
5150.00	44.74	PK	223	1.80	H	3.37	48.11	74.00	-25.89
5150.00	43.92	PK	235	1.70	V	3.37	47.29	74.00	-26.71
10380.00	31.81	PK	258	2.10	H	11.43	43.24	68.20	-24.96
10380.00	32.72	PK	121	1.80	V	11.43	44.15	68.20	-24.05

802.11AC40 BAND1 High channel									
5350.00	45.14	PK	278	1.60	H	3.43	48.57	74.00	-25.43
5350.00	44.26	PK	223	2.40	V	3.43	47.69	74.00	-26.31
5460.00	43.78	PK	95	2.40	H	3.58	47.36	74.00	-26.64
5460.00	43.65	PK	173	2.30	V	3.58	47.23	74.00	-26.77
10460.00	31.82	PK	130	1.30	H	11.50	43.32	68.20	-24.88
10460.00	32.78	PK	295	1.50	V	11.50	44.28	68.20	-23.92
802.11AC80 BAND1									
4500.00	44.17	PK	282	1.20	H	1.89	46.06	74.00	-27.94
4500.00	43.55	PK	344	1.40	V	1.89	45.44	74.00	-28.56
5150.00	44.20	PK	125	1.50	H	3.37	47.57	74.00	-26.43
5150.00	43.04	PK	310	2.40	V	3.37	46.41	74.00	-27.59
5350.00	44.13	PK	218	2.10	H	3.43	47.56	74.00	-26.44
5350.00	43.39	PK	113	1.40	V	3.43	46.82	74.00	-27.18
5460.00	42.77	PK	265	2.00	H	3.58	46.35	74.00	-27.65
5460.00	42.58	PK	160	1.50	V	3.58	46.16	74.00	-27.84
10420.00	31.68	PK	110	2.40	H	11.49	43.17	68.20	-25.03
10420.00	32.55	PK	6	2.10	V	11.49	44.04	68.20	-24.16

5725-5850MHz:

Frequency (MHz)	Receiver		Turntable Degree	Rx Antenna		Corrected Factor (dB/m)	Corrected Amplitude (dBμV/m)	Limit (dBμV/m)	Margin (dB)
	Reading (dBμV)	PK/QP/AV		Height (m)	Polar (H/V)				
802.11A BAND4 Low channel									
5725	48.51	PK	64	1.50	H	3.97	52.48	122.20	-69.72
5725	47.97	PK	68	1.80	V	3.97	51.94	122.20	-70.26
5720	43.28	PK	325	1.50	H	3.95	47.23	110.80	-63.57
5720	42.73	PK	2	1.70	V	3.95	46.68	110.80	-64.12
5700	55.58	PK	94	2.30	H	3.89	59.47	105.20	-45.73
5700	54.80	PK	92	1.80	V	3.89	58.69	105.20	-46.51
5650	45.66	PK	178	1.40	H	3.75	49.41	68.20	-18.79
5650	45.11	PK	262	2.40	V	3.75	48.86	68.20	-19.34
11490	36.00	PK	210	1.10	H	14.74	50.74	74.00	-23.26
11490	36.69	PK	75	2.10	V	14.74	51.43	74.00	-22.57
802.11A BAND4 Middle channel									
11570	35.86	PK	25	1.30	H	14.76	50.62	74.00	-23.38
11570	36.55	PK	11	2.00	V	14.76	51.31	74.00	-22.69
802.11A BAND4 High channel									
5850	49.34	PK	316	1.30	H	4.33	53.67	122.20	-68.53
5850	48.66	PK	50	2.40	V	4.33	52.99	122.20	-69.21
5855	43.70	PK	131	2.10	H	4.35	48.05	110.80	-62.75
5855	43.30	PK	317	1.10	V	4.35	47.65	110.80	-63.15
5875	55.97	PK	98	1.10	H	4.41	60.38	105.20	-44.82
5875	55.48	PK	65	1.40	V	4.41	59.89	105.20	-45.31
5925	45.39	PK	303	2.30	H	4.55	49.94	68.20	-18.26
5925	44.23	PK	86	1.80	V	4.55	48.78	68.20	-19.42
11650	35.84	PK	103	2.50	H	14.79	50.63	74.00	-23.37
11650	36.57	PK	236	1.80	V	14.79	51.36	74.00	-22.64
802.11N20 BAND4 Low channel									
5725	51.95	PK	249	1.20	H	3.97	55.92	122.20	-66.28
5725	49.69	PK	96	2.10	V	3.97	53.66	122.20	-68.54
5720	46.13	PK	300	1.90	H	3.95	50.08	110.80	-60.72
5720	45.36	PK	5	2.20	V	3.95	49.31	110.80	-61.49
5700	59.99	PK	234	1.60	H	3.89	63.88	105.20	-41.32
5700	59.12	PK	11	2.40	V	3.89	63.01	105.20	-42.19
5650	46.78	PK	76	1.80	H	3.75	50.53	68.20	-17.67
5650	46.21	PK	88	1.80	V	3.75	49.96	68.20	-18.24
11490	35.72	PK	339	2.00	H	14.74	50.46	74.00	-23.54
11490	36.45	PK	190	1.80	V	14.74	51.19	74.00	-22.81

802.11N20 BAND4 Middle channel									
11570	35.39	PK	107	2.40	H	14.76	50.15	74.00	-23.85
11570	36.51	PK	194	1.70	V	14.76	51.27	74.00	-22.73
802.11N20 BAND4 High channel									
5850	50.74	PK	212	1.90	H	4.33	55.07	122.20	-67.13
5850	49.63	PK	180	2.20	V	4.33	53.96	122.20	-68.24
5855	45.10	PK	183	1.20	H	4.35	49.45	110.80	-61.35
5855	44.47	PK	310	1.50	V	4.35	48.82	110.80	-61.98
5875	59.00	PK	283	2.30	H	4.41	63.41	105.20	-41.79
5875	58.12	PK	75	1.20	V	4.41	62.53	105.20	-42.67
5925	45.73	PK	198	1.80	H	4.55	50.28	68.20	-17.92
5925	45.10	PK	343	1.90	V	4.55	49.65	68.20	-18.55
11650	35.48	PK	272	1.10	H	14.79	50.27	74.00	-23.73
11650	36.32	PK	12	2.30	V	14.79	51.11	74.00	-22.89
802.11N40 BAND4 Low channel									
5725	50.61	PK	67	1.60	H	3.97	54.58	122.20	-67.62
5725	49.89	PK	149	1.70	V	3.97	53.86	122.20	-68.34
5720	45.28	PK	231	1.60	H	3.95	49.23	110.80	-61.57
5720	44.57	PK	304	1.10	V	3.95	48.52	110.80	-62.28
5700	59.69	PK	191	1.60	H	3.89	63.58	105.20	-41.62
5700	59.00	PK	233	1.50	V	3.89	62.89	105.20	-42.31
5650	46.60	PK	275	2.00	H	3.75	50.35	68.20	-17.85
5650	46.02	PK	129	1.50	V	3.75	49.77	68.20	-18.43
11510	35.44	PK	10	1.40	H	14.75	50.19	74.00	-23.81
11510	36.49	PK	38	1.40	V	14.75	51.24	74.00	-22.76
802.11N40 BAND4 High channel									
5850	53.14	PK	322	1.10	H	4.33	57.47	122.20	-64.73
5850	52.38	PK	186	2.50	V	4.33	56.71	122.20	-65.49
5855	46.34	PK	8	1.60	H	4.35	50.69	110.80	-60.11
5855	45.58	PK	71	2.40	V	4.35	49.93	110.80	-60.87
5875	60.93	PK	109	1.30	H	4.41	65.34	105.20	-39.86
5875	60.54	PK	94	2.20	V	4.41	64.95	105.20	-40.25
5925	46.33	PK	281	1.50	H	4.55	50.88	68.20	-17.32
5925	45.01	PK	332	2.20	V	4.55	49.56	68.20	-18.64
11590	35.64	PK	299	1.60	H	14.77	50.41	74.00	-23.59
11590	36.61	PK	331	1.10	V	14.77	51.38	74.00	-22.62

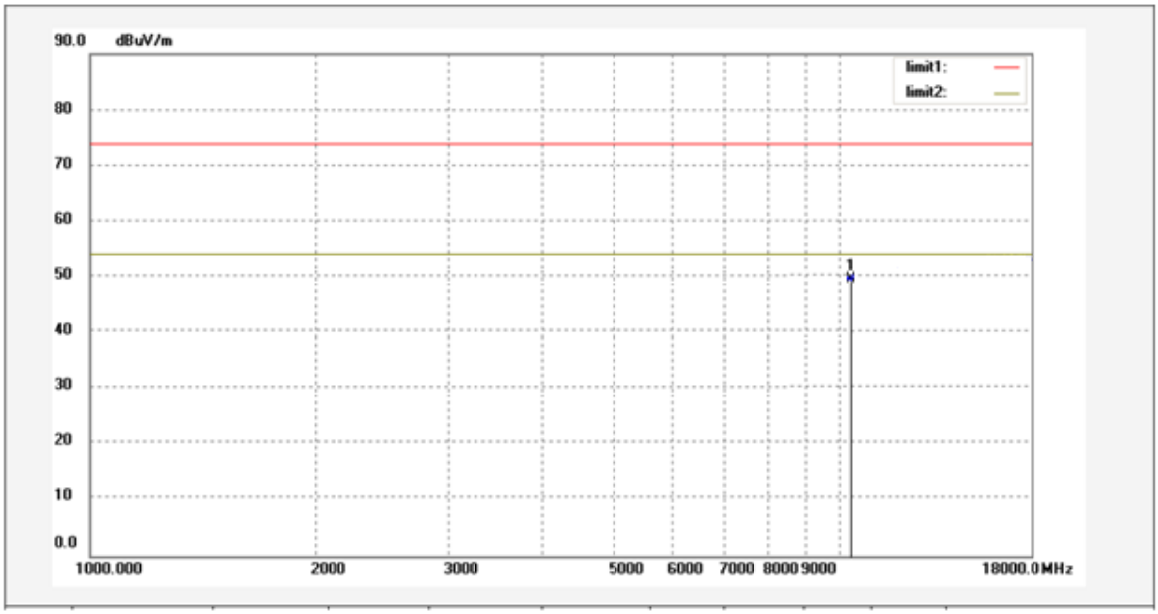
802.11AC20 BAND4 Low channel									
5725	54.02	PK	300	1.70	H	3.97	57.99	122.20	-64.21
5725	53.16	PK	332	2.20	V	3.97	57.13	122.20	-65.07
5720	47.03	PK	206	1.90	H	3.95	50.98	110.80	-59.82
5720	46.41	PK	144	2.20	V	3.95	50.36	110.80	-60.44
5700	61.56	PK	53	2.50	H	3.89	65.45	105.20	-39.75
5700	61.05	PK	283	1.10	V	3.89	64.94	105.20	-40.26
5650	46.52	PK	141	1.80	H	3.75	50.27	68.20	-17.93
5650	45.59	PK	256	1.90	V	3.75	49.34	68.20	-18.86
11490	35.48	PK	115	2.40	H	14.74	50.22	74.00	-23.78
11490	36.43	PK	284	2.30	V	14.74	51.17	74.00	-22.83
802.11AC20 BAND4 Middle channel									
11570	35.33	PK	31	1.40	H	14.76	50.09	74.00	-23.91
11570	36.37	PK	292	2.20	V	14.76	51.13	74.00	-22.87
802.11AC20 BAND4 High channel									
5850	52.23	PK	74	1.40	H	4.33	56.56	122.20	-65.64
5850	51.58	PK	87	1.50	V	4.33	55.91	122.20	-66.29
5855	46.33	PK	136	2.10	H	4.35	50.68	110.80	-60.12
5855	45.10	PK	309	1.60	V	4.35	49.45	110.80	-61.35
5875	60.06	PK	282	1.60	H	4.41	64.47	105.20	-40.73
5875	59.20	PK	142	2.00	V	4.41	63.61	105.20	-41.59
5925	45.81	PK	295	1.50	H	4.55	50.36	68.20	-17.84
5925	44.86	PK	327	1.80	V	4.55	49.41	68.20	-18.79
11650	35.39	PK	45	2.10	H	14.79	50.18	74.00	-23.82
11650	36.25	PK	151	2.10	V	14.79	51.04	74.00	-22.96
802.11AC40 BAND4 Low channel									
5725	55.26	PK	279	1.70	H	3.97	59.23	122.20	-62.97
5725	54.22	PK	261	2.10	V	3.97	58.19	122.20	-64.01
5720	46.10	PK	168	2.50	H	3.95	50.05	110.80	-60.75
5720	45.37	PK	127	1.70	V	3.95	49.32	110.80	-61.48
5700	60.05	PK	104	2.40	H	3.89	63.94	105.20	-41.26
5700	58.48	PK	160	2.10	V	3.89	62.37	105.20	-42.83
5650	46.56	PK	207	1.10	H	3.75	50.31	68.20	-17.89
5650	45.81	PK	215	2.30	V	3.75	49.56	68.20	-18.64
11510	35.38	PK	315	2.10	H	14.75	50.13	74.00	-23.87
11510	36.34	PK	130	1.80	V	14.75	51.09	74.00	-22.91

802.11AC40 BAND4 High channel									
5850	54.42	PK	292	1.70	H	4.33	58.75	122.20	-63.45
5850	53.61	PK	124	2.30	V	4.33	57.94	122.20	-64.26
5855	46.31	PK	322	1.40	H	4.35	50.66	110.80	-60.14
5855	45.13	PK	3	2.30	V	4.35	49.48	110.80	-61.32
5875	59.62	PK	67	2.20	H	4.41	64.03	105.20	-41.17
5875	58.23	PK	235	1.40	V	4.41	62.64	105.20	-42.56
5925	45.89	PK	128	1.40	H	4.55	50.44	68.20	-17.76
5925	45.06	PK	348	1.60	V	4.55	49.61	68.20	-18.59
11590	35.46	PK	24	1.20	H	14.77	50.23	74.00	-23.77
11590	36.38	PK	126	2.30	V	14.77	51.15	74.00	-22.85
802.11AC80 BAND4									
5725	54.45	PK	180	2.20	H	3.97	58.42	122.20	-63.78
5725	54.08	PK	67	1.30	V	3.97	58.05	122.20	-64.15
5720	46.98	PK	227	2.10	H	3.95	50.93	110.80	-59.87
5720	46.42	PK	83	1.70	V	3.95	50.37	110.80	-60.43
5700	60.62	PK	108	2.30	H	3.89	64.51	105.20	-40.69
5700	60.00	PK	215	1.60	V	3.89	63.89	105.20	-41.31
5650	46.50	PK	205	2.40	H	3.75	50.25	68.20	-17.95
5650	45.97	PK	316	1.40	V	3.75	49.72	68.20	-18.48
5850	54.38	PK	96	1.20	H	4.33	58.71	122.20	-63.49
5850	53.64	PK	48	1.10	V	4.33	57.97	122.20	-64.23
5855	46.71	PK	25	2.10	H	4.35	51.06	110.80	-59.74
5855	46.07	PK	44	1.60	V	4.35	50.42	110.80	-60.38
5875	60.34	PK	226	1.40	H	4.41	64.75	105.20	-40.45
5875	59.46	PK	222	2.10	V	4.41	63.87	105.20	-41.33
5925	45.89	PK	161	1.70	H	4.55	50.44	68.20	-17.76
5925	45.41	PK	68	1.70	V	4.55	49.96	68.20	-18.24
11550	35.36	PK	215	1.80	H	14.76	50.12	74.00	-23.88
11550	36.48	PK	208	2.30	V	14.76	51.24	74.00	-22.76

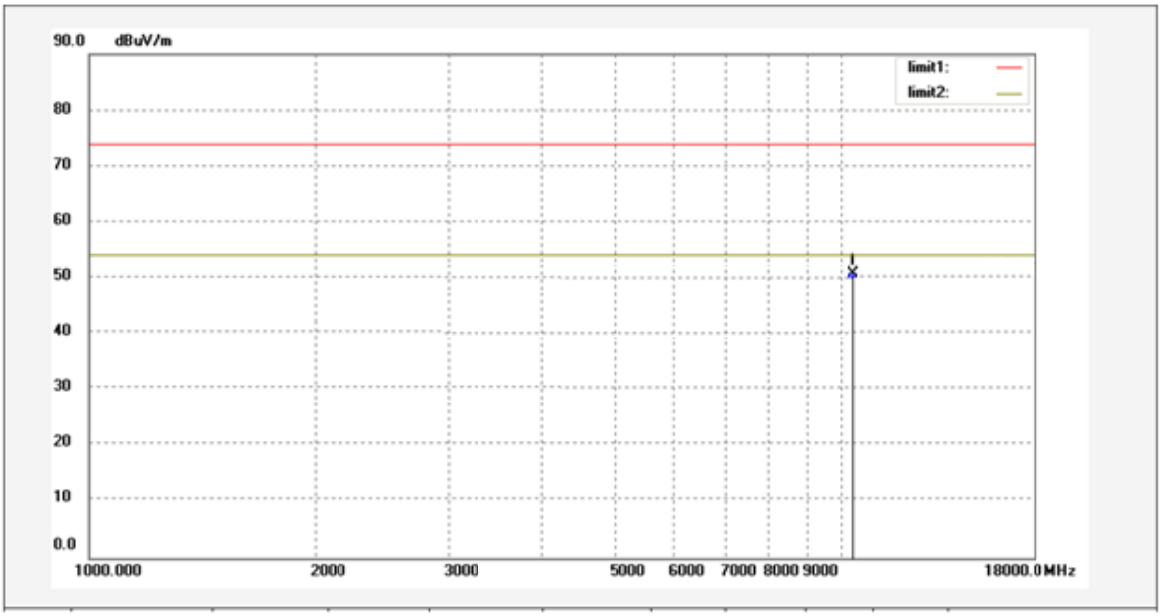
Note:
Corrected Factor = Antenna factor (RX) + Cable Loss – Amplifier Factor
Corrected Amplitude = Corrected Factor + Reading
Margin = Corrected. Amplitude – Limit
The other spurious emission which is in the noise floor level was not recorded.
The test result of peak was less than the limit of average, so just peak values were recorded.

1-18 GHz:

Pre-scan for Peak
802.11a 5180MHz
Horizontal:

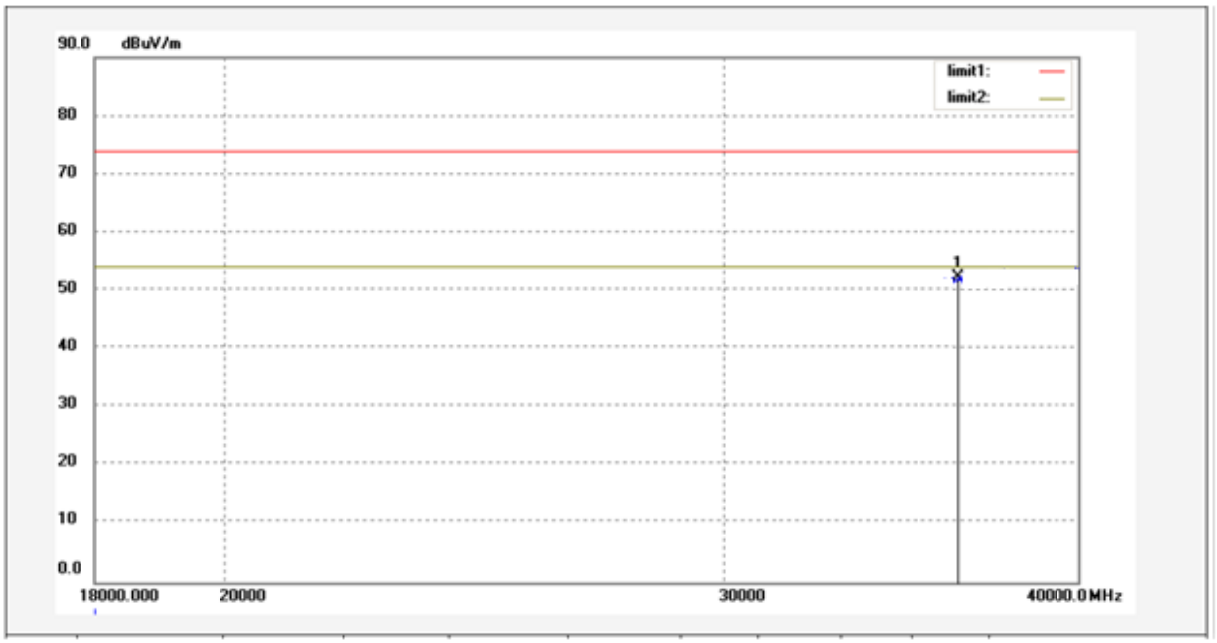


Vertical:

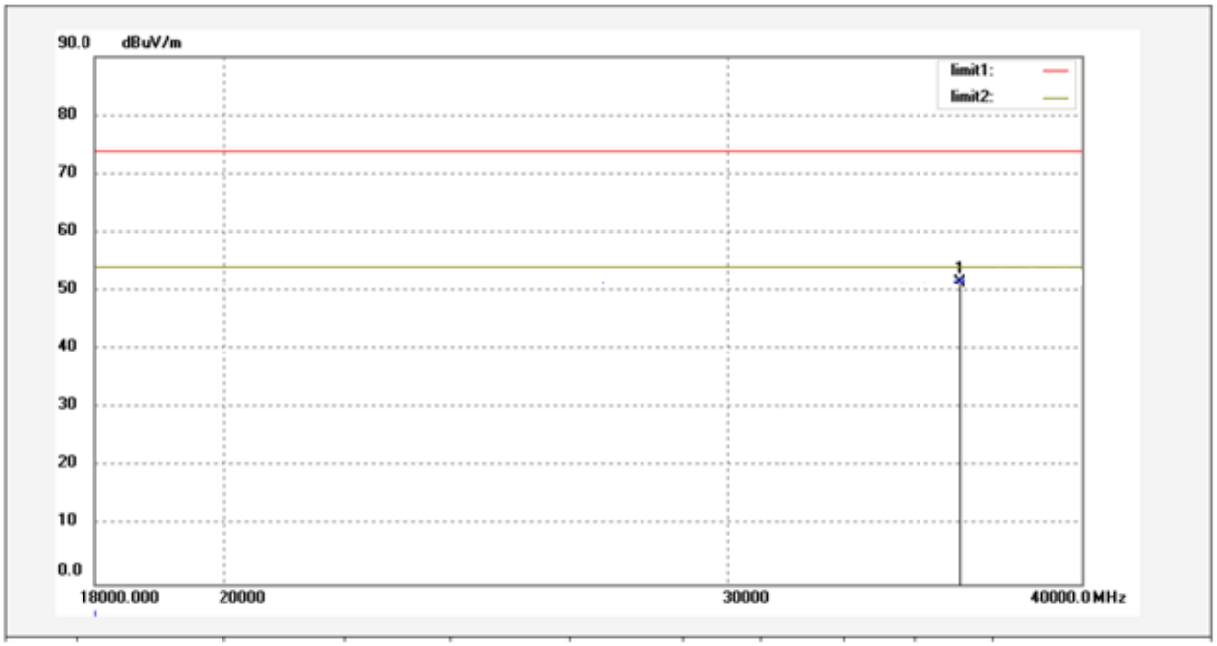


18-40 GHz:

Pre-scan for Peak
802.11a 5180MHz
Horizontal:



Vertical:



FCC §15.407(a)(e) – BANDWIDTH

Applicable Standard

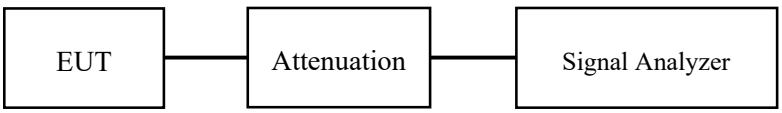
The maximum power spectral density is measured as a conducted emission by direct connection of a calibrated test instrument to the equipment under test. If the device cannot be connected directly, alternative techniques acceptable to the Commission may be used. Measurements in the 5.725-5.85 GHz band are made over a reference bandwidth of 500 kHz or the 26 dB emission bandwidth of the device, whichever is less. Measurements in the 5.15-5.25 GHz, 5.25-5.35 GHz, and the 5.47-5.725 GHz bands are made over a bandwidth of 1 MHz or the 26 dB emission bandwidth of the device, whichever is less. A narrower resolution bandwidth can be used, provided that the measured power is integrated over the full reference bandwidth.

Within the 5.725-5.85 GHz band, the minimum 6 dB bandwidth of U-NII devices shall be at least 500 kHz.

Test Procedure

1. Emission Bandwidth (EBW)
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%.

2. **Minimum Emission Bandwidth for the band 5.725-5.85 GHz**
Section 15.407(e) specifies the minimum 6 dB emission bandwidth of at least 500 KHz for the band 5.715-5.85 GHz. The following procedure shall be used for measuring this bandwidth:
a) Set RBW = 100 kHz.
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.



Test Data

Environmental Conditions

Temperature:	22~26 ℃
Relative Humidity:	48~56%
ATM Pressure:	101.0 kPa

The testing was performed by Black Ding from 2021-10-14 to 2021-11-08.

EUT operation mode: Transmitting

Test Result: Pass; please refer to the Appendix.

FCC §15.407(a) (1) (3) – CONDUCTED TRANSMITTER OUTPUT POWER

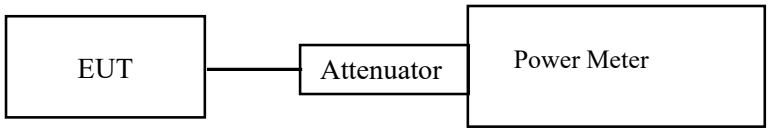
Applicable Standard

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. In addition, the maximum power spectral density shall not exceed 11 dBm in any 1 megahertz band. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

For the band 5.725-5.85 GHz, the maximum conducted output power over the frequency band of operation shall not exceed 1 W. In addition, the maximum power spectral density shall not exceed 30 dBm in any 500-kHz band. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi. However, fixed point-to-point U-NII devices operating in this band may employ transmitting antennas with directional gain greater than 6 dBi without any corresponding reduction in transmitter conducted power. Fixed, point-to-point operations exclude the use of point-to-multipoint systems, omnidirectional applications, and multiple collocated transmitters transmitting the same information. The operator of the U-NII device, or if the equipment is professionally installed, the installer, is responsible for ensuring that systems employing high gain directional antennas are used exclusively for fixed, point-to-point operations.

Test Procedure

1. Place the EUT on a bench and set it in transmitting mode.
2. Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to one test equipment.
3. Add a correction factor to the display.



Test Data

Environmental Conditions

Temperature:	23 ℃
Relative Humidity:	55 %
ATM Pressure:	101.0 kPa

The testing was performed by Black Ding on 2021-10-14.

EUT operation mode: Transmitting

Test Result: Pass

Please refer to the Appendix.

FCC §15.407(a) (1) (3) - POWER SPECTRAL DENSITY

Applicable Standard

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. In addition, the maximum power spectral density shall not exceed 11 dBm in any 1 megahertz band. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

For the band 5.725-5.85 GHz, the maximum conducted output power over the frequency band of operation shall not exceed 1 W. In addition, the maximum power spectral density shall not exceed 30 dBm in any 500-kHz band. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi. However, fixed point-to-point U-NII devices operating in this band may employ transmitting antennas with directional gain greater than 6 dBi without any corresponding reduction in transmitter conducted power. Fixed, point-to-point operations exclude the use of point-to-multipoint systems, omnidirectional applications, and multiple collocated transmitters transmitting the same information. The operator of the U-NII device, or if the equipment is professionally installed, the installer, is responsible for ensuring that systems employing high gain directional antennas are used exclusively for fixed, point-to-point operations.

Test Procedure

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 500 kHz, "provided that the measured power is integrated over the full reference 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.l.a).
b) Set VBW ≥ 3 RBW.
c) If measurement bandwidth of Maximum PSD is specified in 500 kHz, add 10 log (500 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 (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.

Test Data

Environmental Conditions

Temperature:	22~26 ℃
Relative Humidity:	48~56%
ATM Pressure:	101.0 kPa

The testing was performed by Black Ding from 2021-10-14 to 2021-11-08.

EUT operation mode: Transmitting

Test Result: Pass

Please refer to the Appendix.

APPENDIX

Appendix A1: Emission Bandwidth

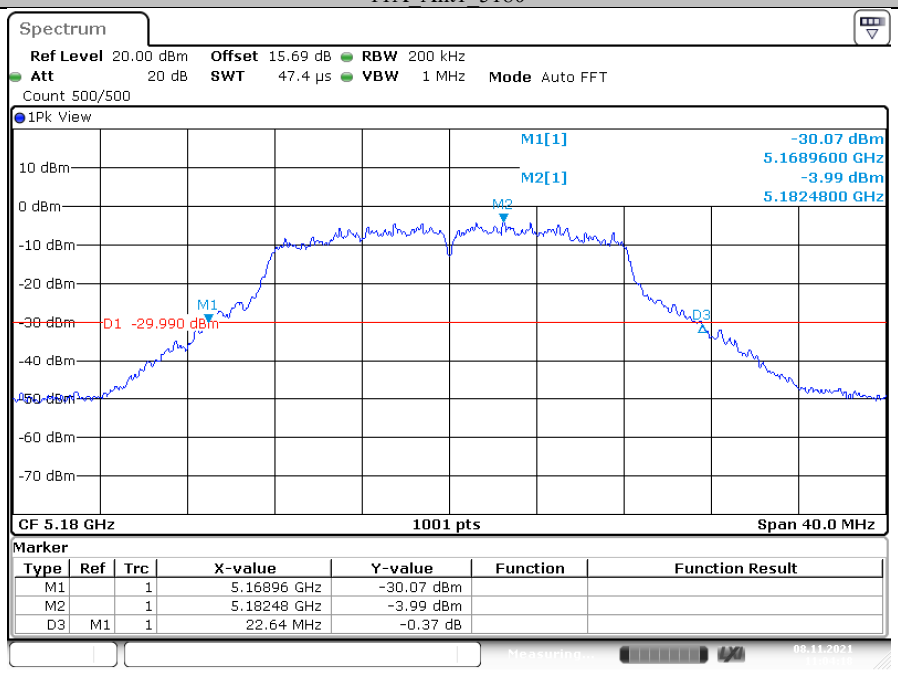
Test Result

TestMode	Antenna	Channel	26db EBW [MHz]	FL[MHz]	FH[MHz]	Limit[MHz]	Verdict
11A	Ant1	5180	22.640	5168.960	5191.600	---	PASS
		5200	23.240	5188.400	5211.640	---	PASS
		5240	22.320	5229.040	5251.360	---	PASS
		5745	23.200	5733.560	5756.760	---	PASS
		5785	22.440	5773.640	5796.080	---	PASS
		5825	22.720	5813.600	5836.320	---	PASS
11N20SISO	Ant1	5180	22.840	5168.680	5191.520	---	PASS
		5200	23.040	5188.280	5211.320	---	PASS
		5240	23.040	5228.720	5251.760	---	PASS
		5745	22.920	5733.440	5756.360	---	PASS
		5785	24.160	5772.560	5796.720	---	PASS
		5825	22.960	5813.720	5836.680	---	PASS
11N40SISO	Ant1	5190	42.640	5168.800	5211.440	---	PASS
		5230	44.640	5207.520	5252.160	---	PASS
		5755	44.240	5733.000	5777.240	---	PASS
		5795	44.400	5772.680	5817.080	---	PASS
11AC20SISO	Ant1	5180	22.400	5169.240	5191.640	---	PASS
		5200	23.080	5188.320	5211.400	---	PASS
		5240	22.520	5229.040	5251.560	---	PASS
		5745	23.320	5733.320	5756.640	---	PASS
		5785	23.200	5773.280	5796.480	---	PASS
		5825	22.960	5813.640	5836.600	---	PASS
11AC40SISO	Ant1	5190	43.440	5168.320	5211.760	---	PASS
		5230	44.160	5207.680	5251.840	---	PASS
		5755	44.000	5732.760	5776.760	---	PASS
		5795	44.960	5772.680	5817.640	---	PASS
11AC80SISO	Ant1	5210	85.280	5167.600	5252.880	---	PASS
		5775	87.200	5731.800	5819.000	---	PASS

TestMode	Antenna	Channel	26db EBW [MHz]	FL[MHz]	FH[MHz]	Limit[MHz]	Verdict
11A	Ant2	5180	22.720	5168.920	5191.640	---	PASS
		5200	22.760	5188.280	5211.040	---	PASS
		5240	22.360	5229.000	5251.360	---	PASS
		5745	22.560	5733.880	5756.440	---	PASS
		5785	22.440	5773.640	5796.080	---	PASS
		5825	22.720	5813.600	5836.320	---	PASS
11N20SISO	Ant2	5180	22.520	5168.920	5191.440	---	PASS
		5200	23.280	5188.360	5211.640	---	PASS
		5240	23.120	5228.440	5251.560	---	PASS
		5745	23.160	5733.400	5756.560	---	PASS
		5785	24.160	5772.560	5796.720	---	PASS
		5825	23.280	5813.400	5836.680	---	PASS
11N40SISO	Ant2	5190	43.520	5168.560	5212.080	---	PASS
		5230	44.800	5207.360	5252.160	---	PASS
		5755	44.320	5733.000	5777.320	---	PASS
		5795	44.880	5772.840	5817.720	---	PASS
11AC20SISO	Ant2	5180	22.760	5168.800	5191.560	---	PASS
		5200	23.160	5188.480	5211.640	---	PASS
		5240	22.680	5229.000	5251.680	---	PASS
		5745	23.040	5733.360	5756.400	---	PASS
		5785	22.960	5773.320	5796.280	---	PASS
		5825	22.680	5813.600	5836.280	---	PASS
11AC40SISO	Ant2	5190	43.360	5168.240	5211.600	---	PASS
		5230	44.720	5208.080	5252.800	---	PASS
		5755	43.760	5733.080	5776.840	---	PASS
		5795	44.800	5772.600	5817.400	---	PASS
11AC80SISO	Ant2	5210	83.840	5168.720	5252.560	---	PASS
		5775	87.040	5732.120	5819.160	---	PASS

Test Graphs

11A_Ant1_5180



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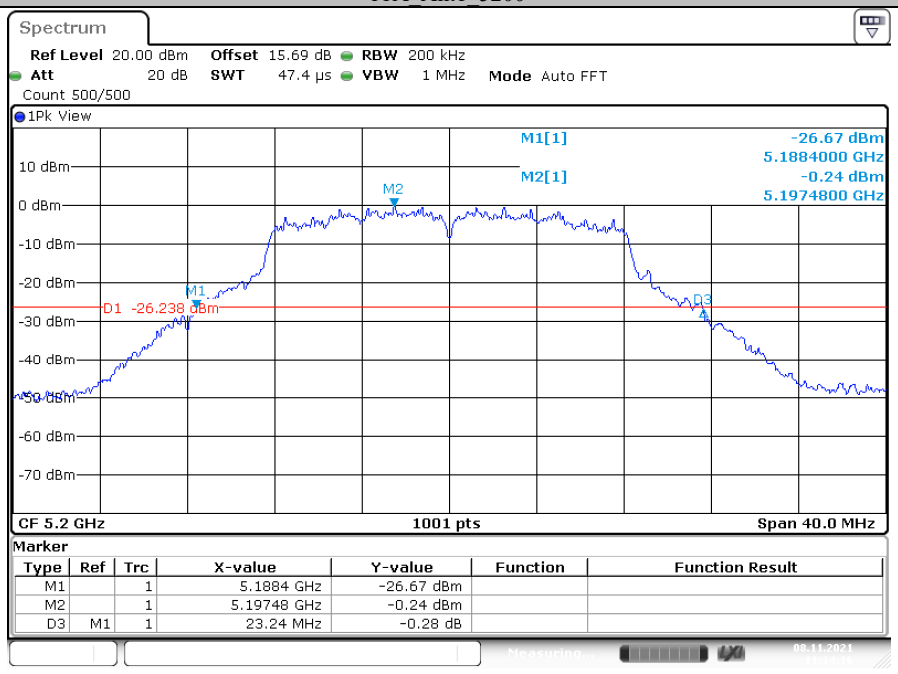
11A_Ant1_5200



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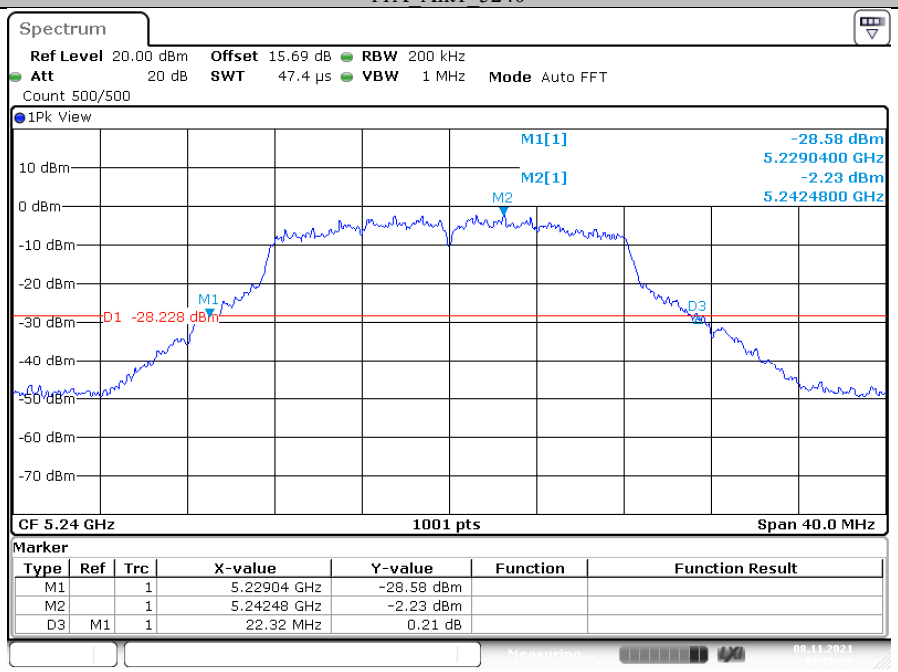

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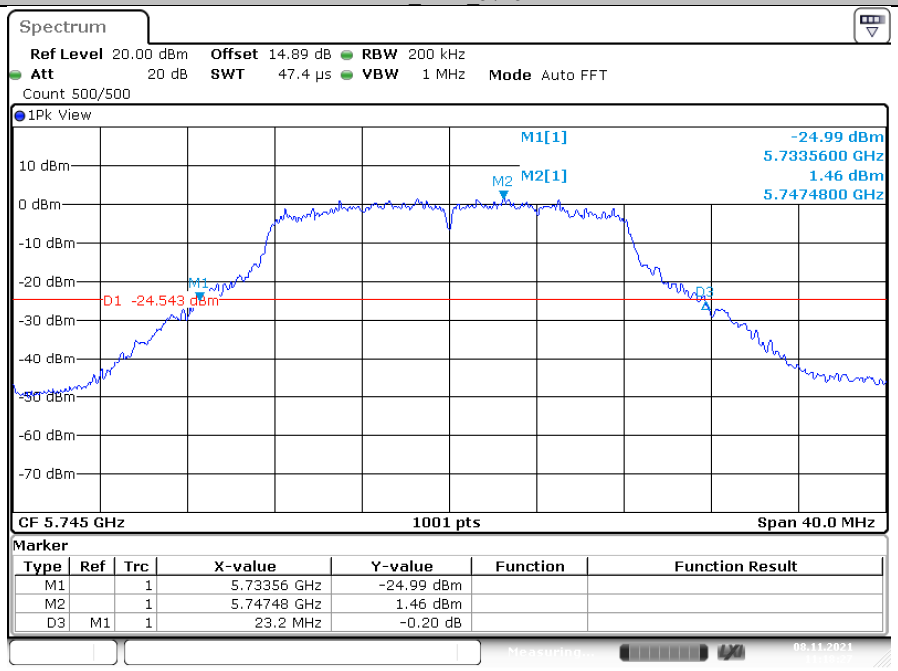

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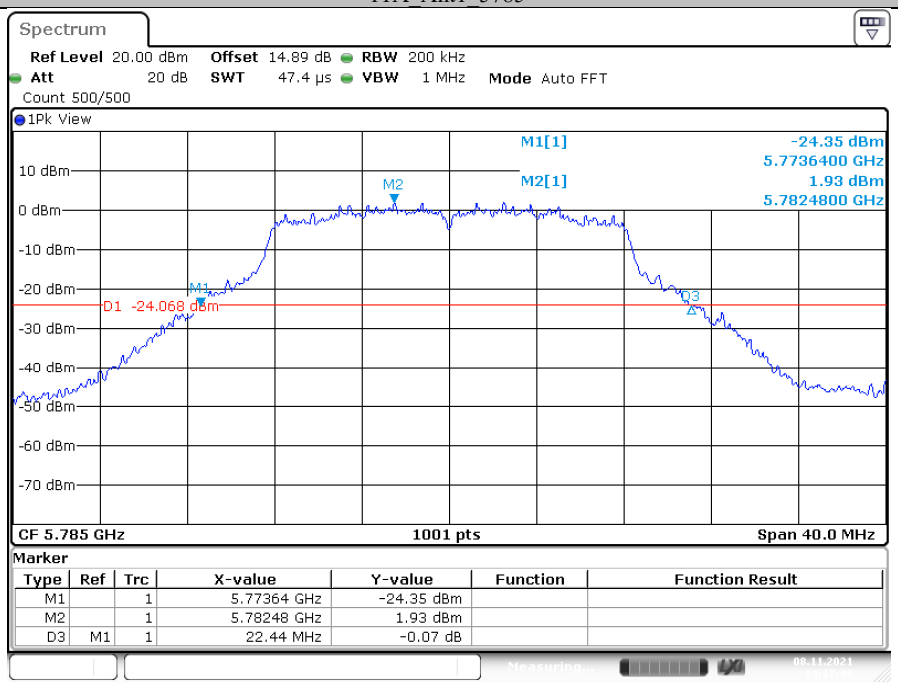
11A_Ant1_5785



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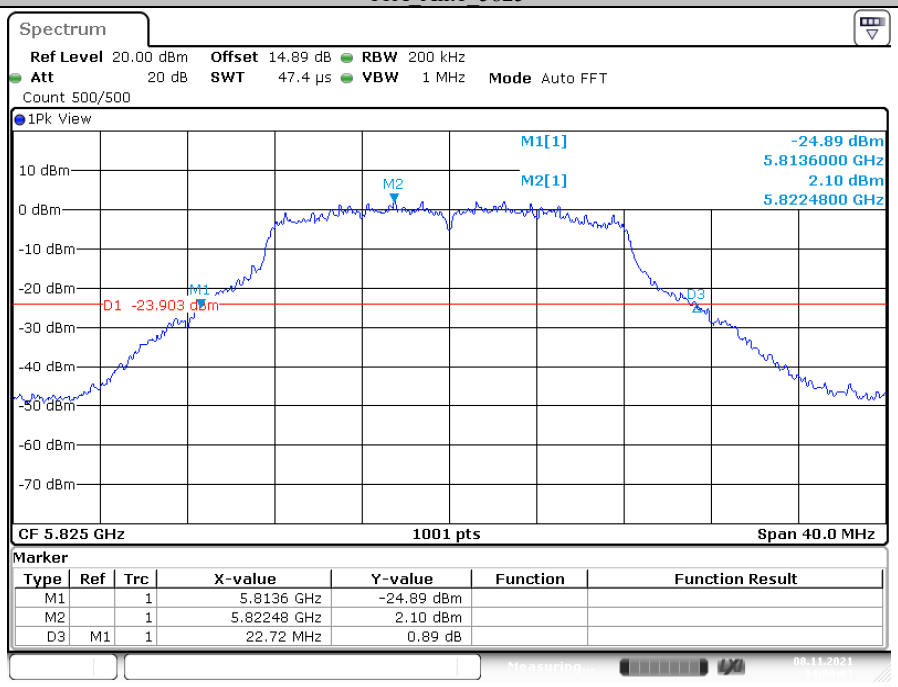

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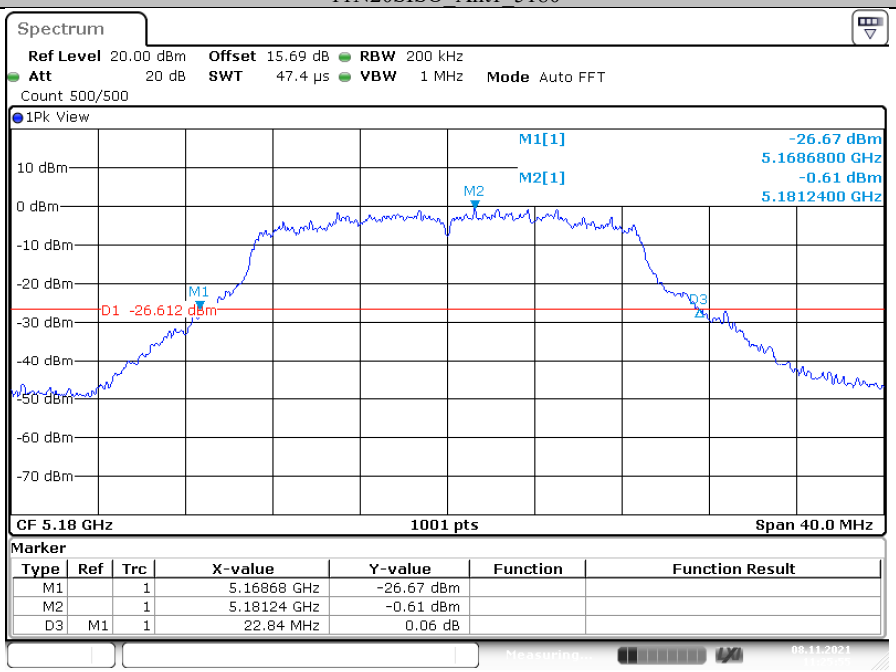

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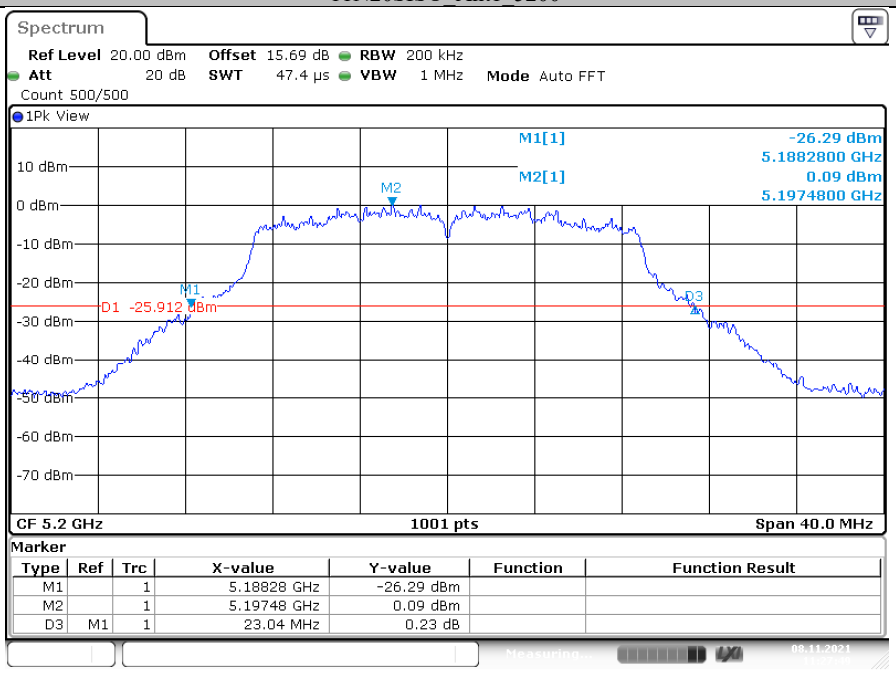

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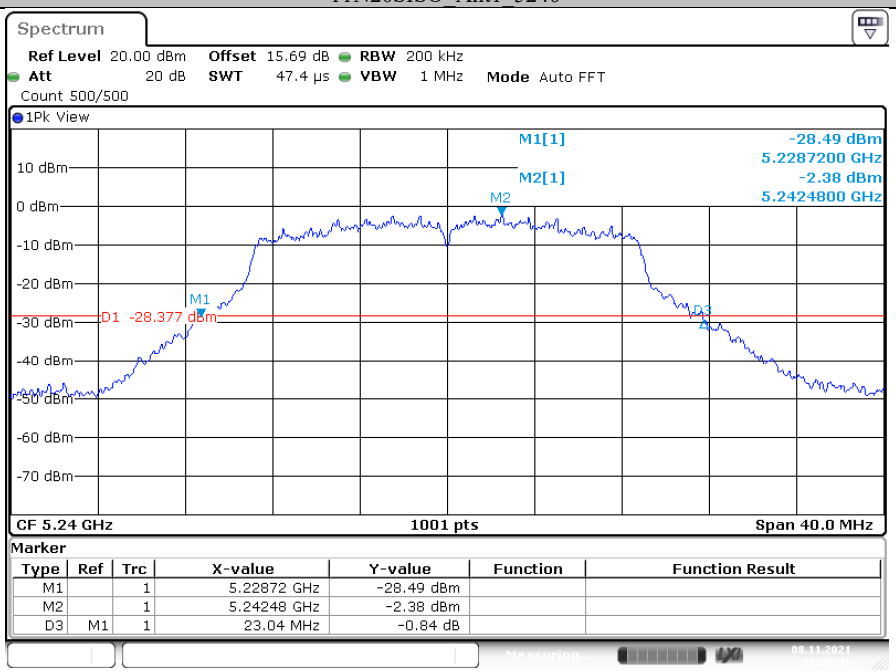

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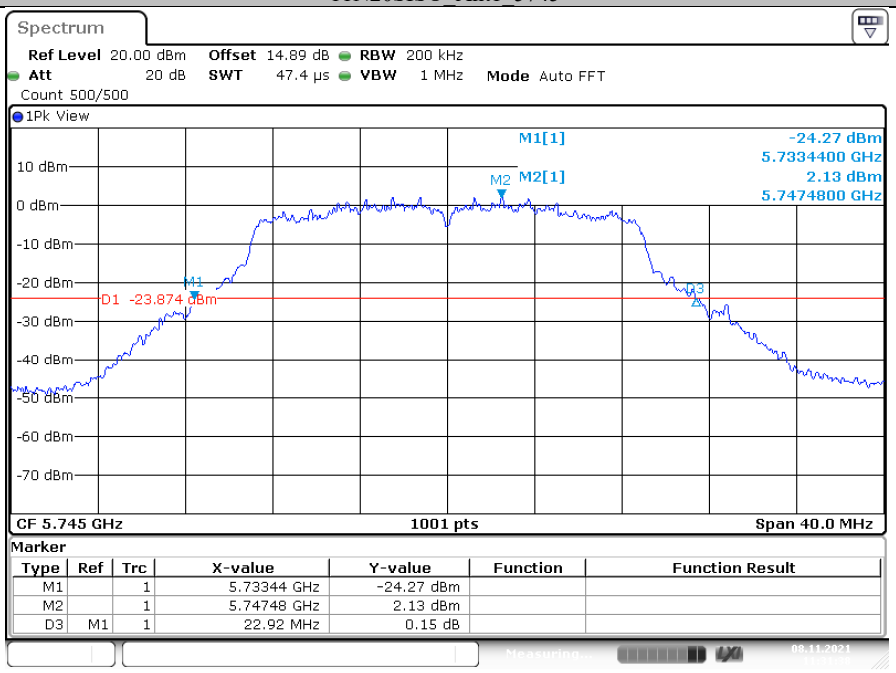

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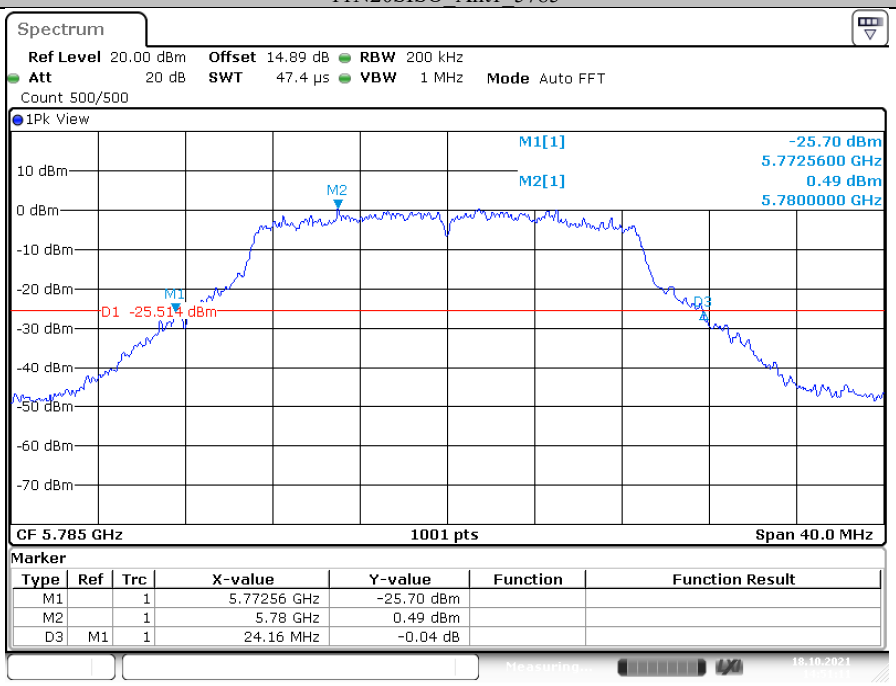

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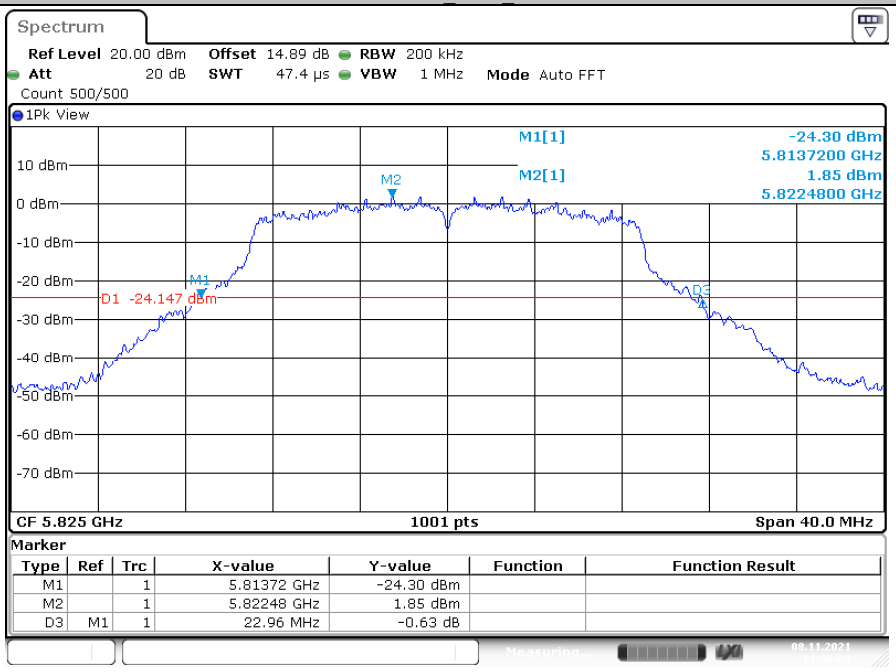

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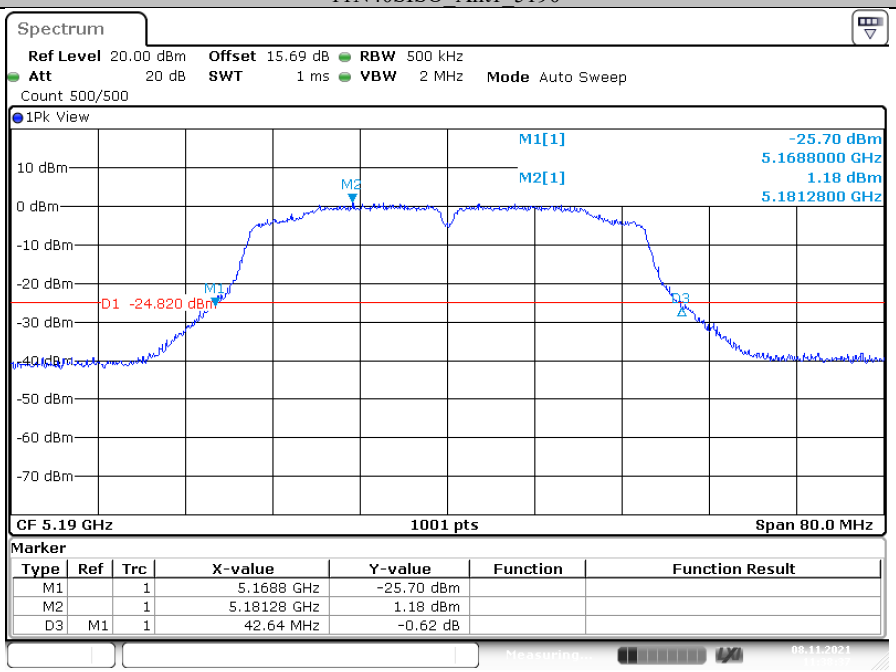

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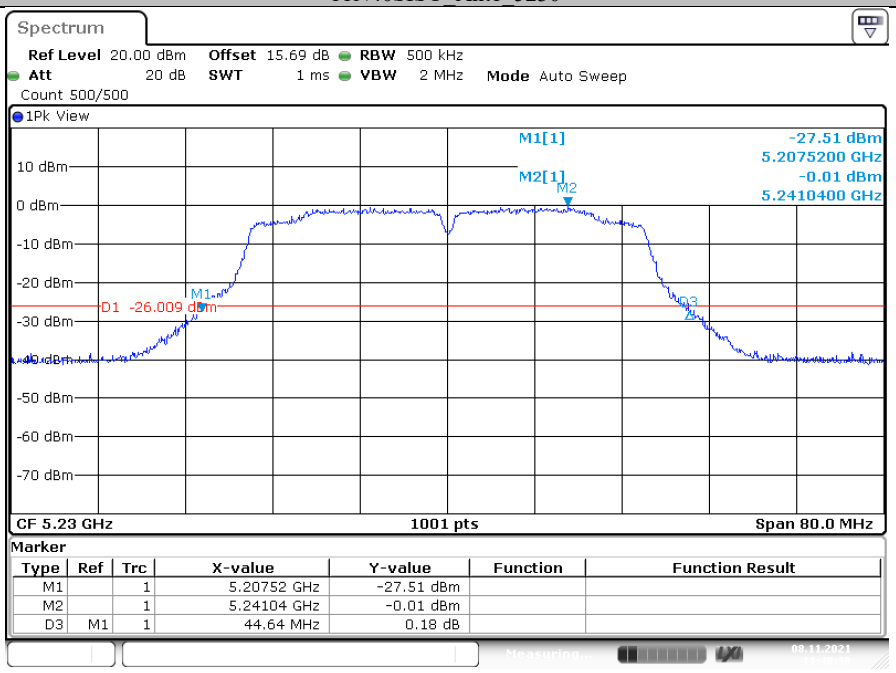

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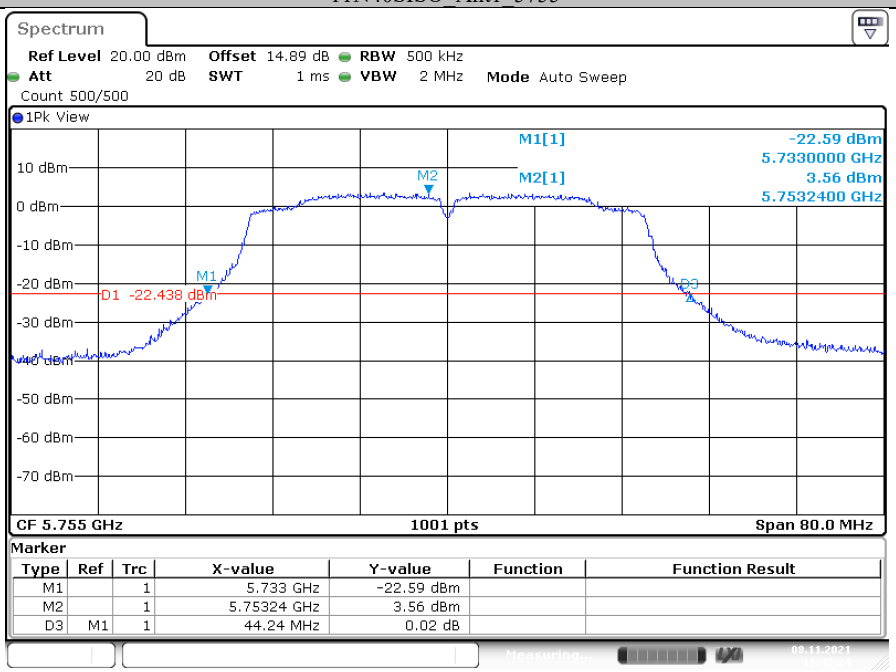

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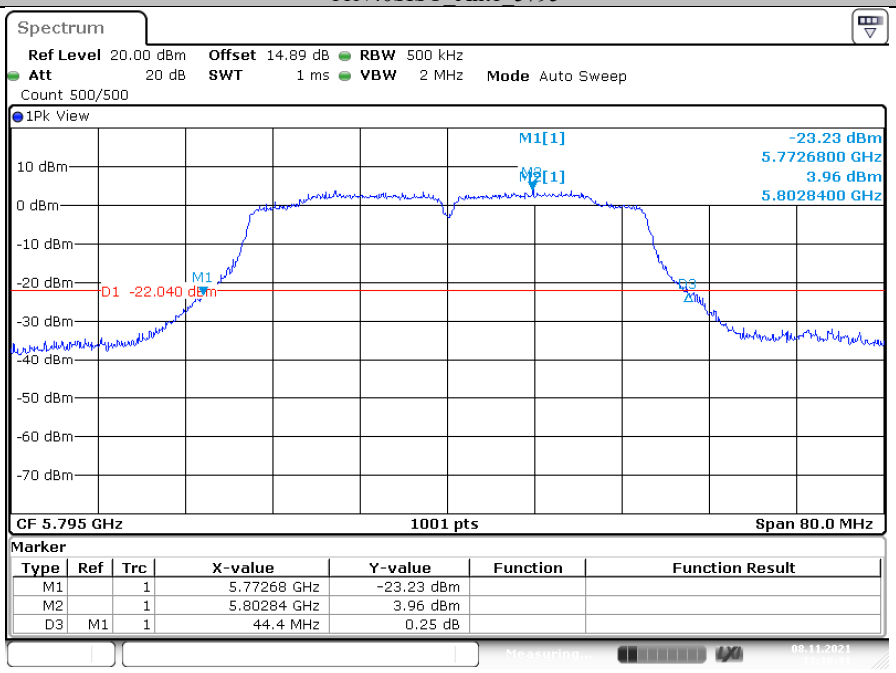

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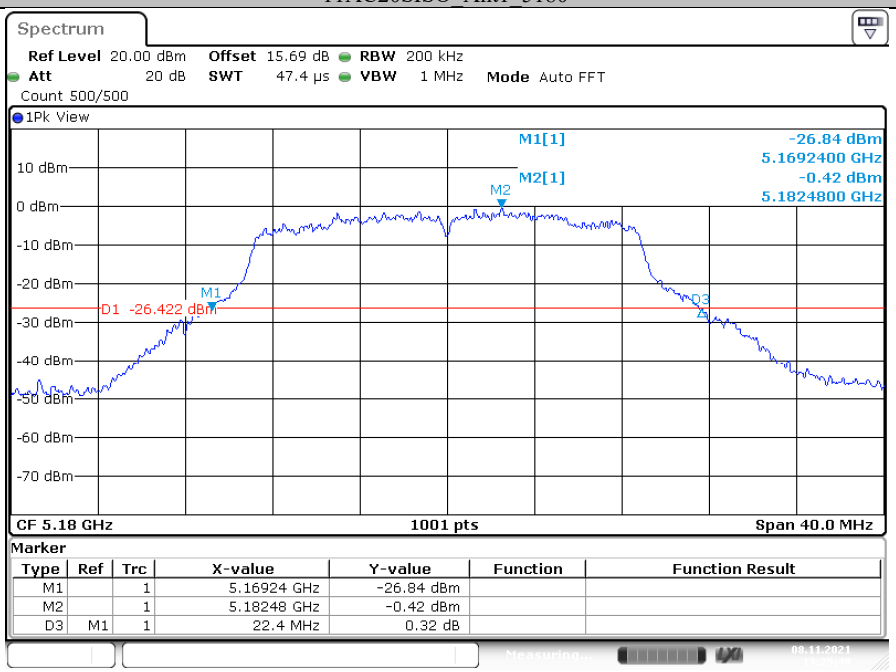

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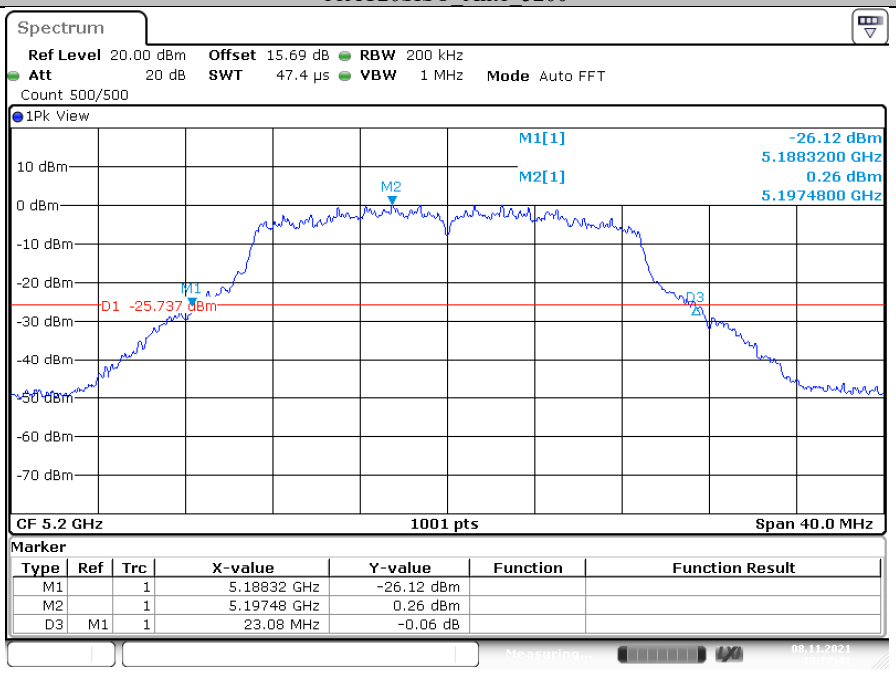

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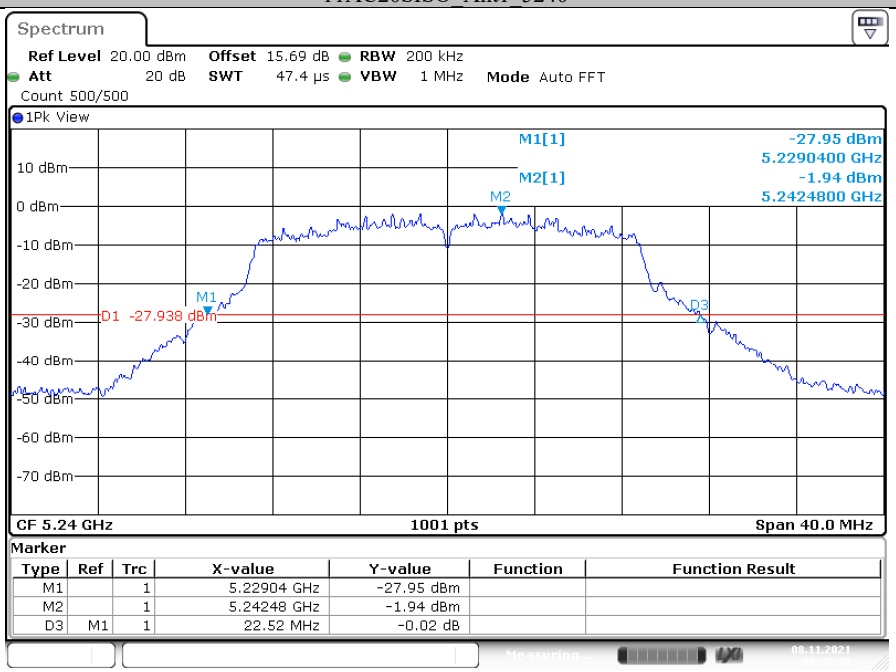

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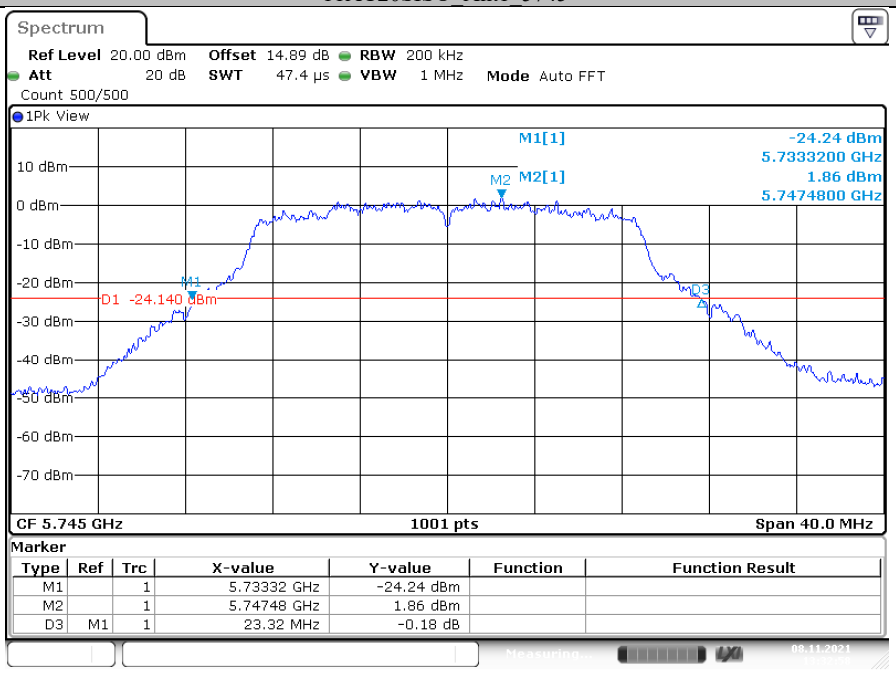

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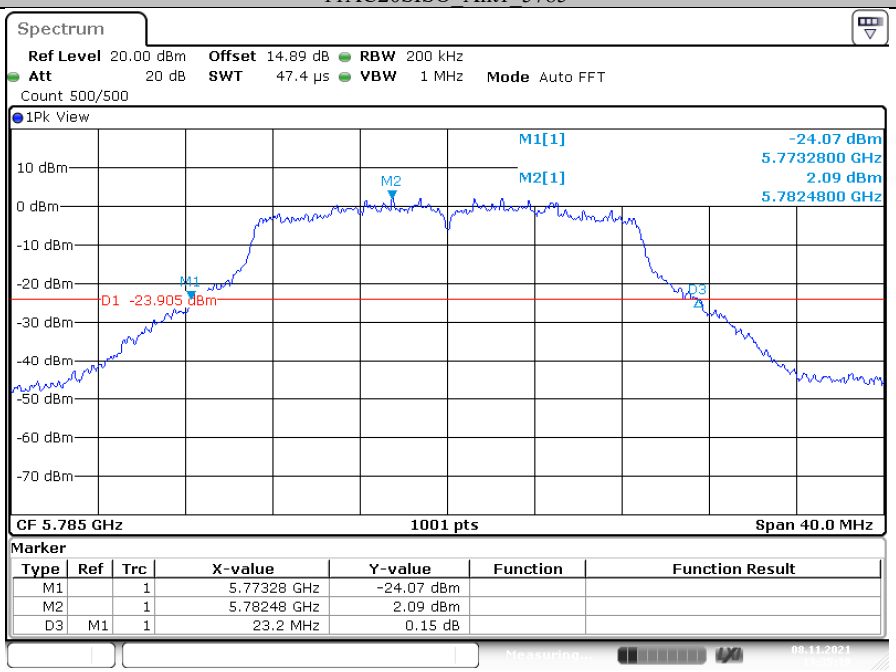

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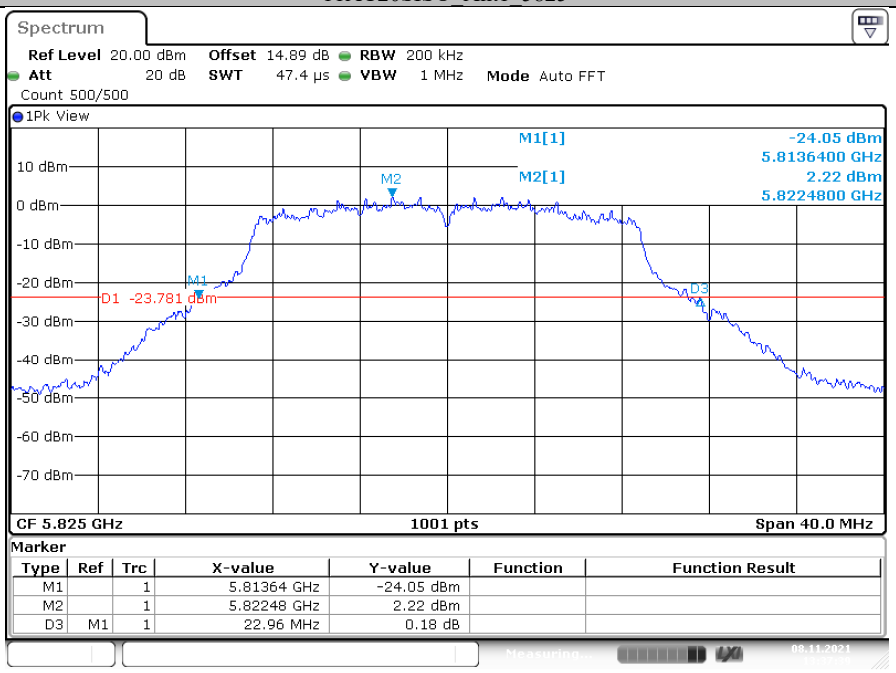

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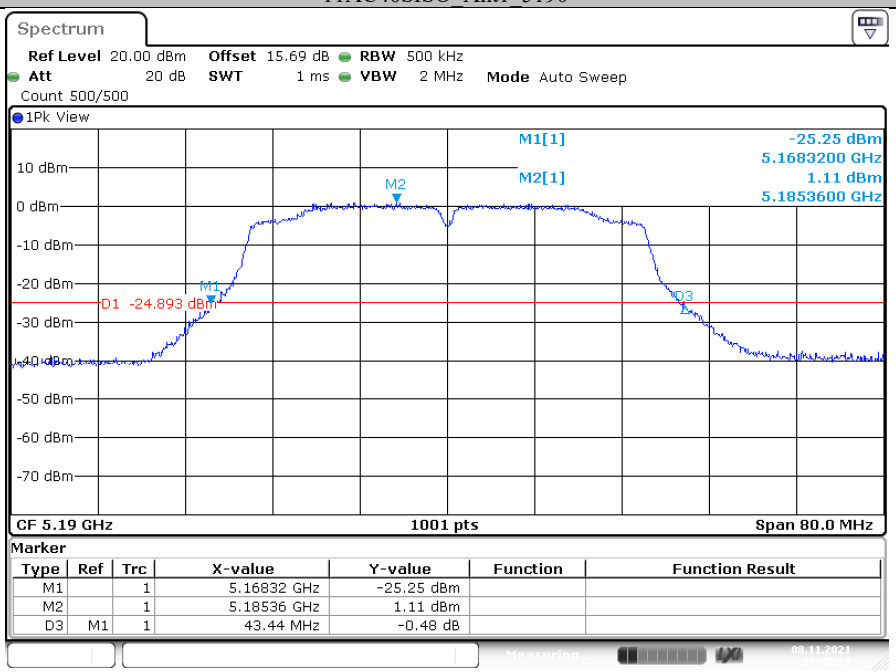

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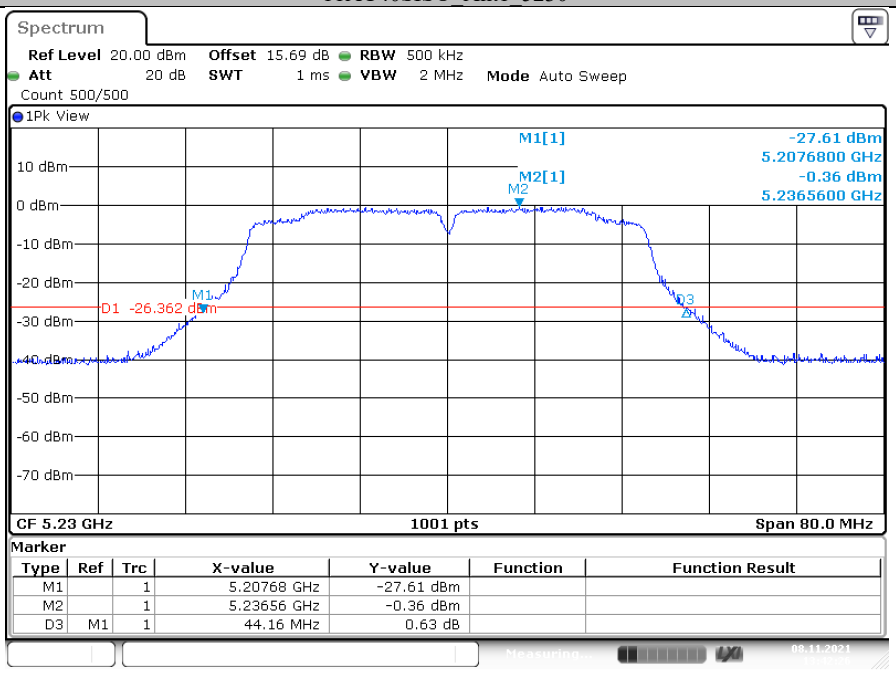

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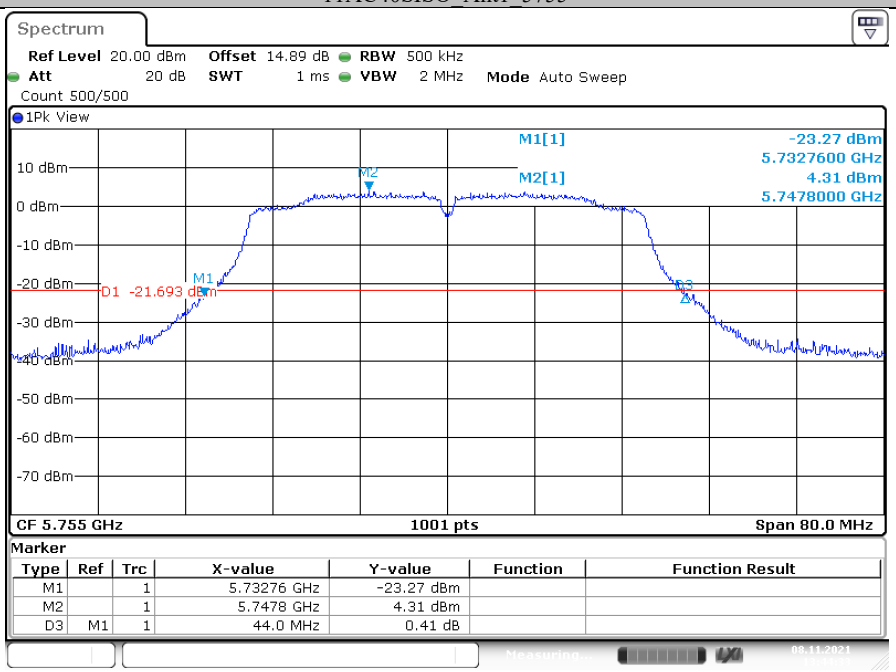

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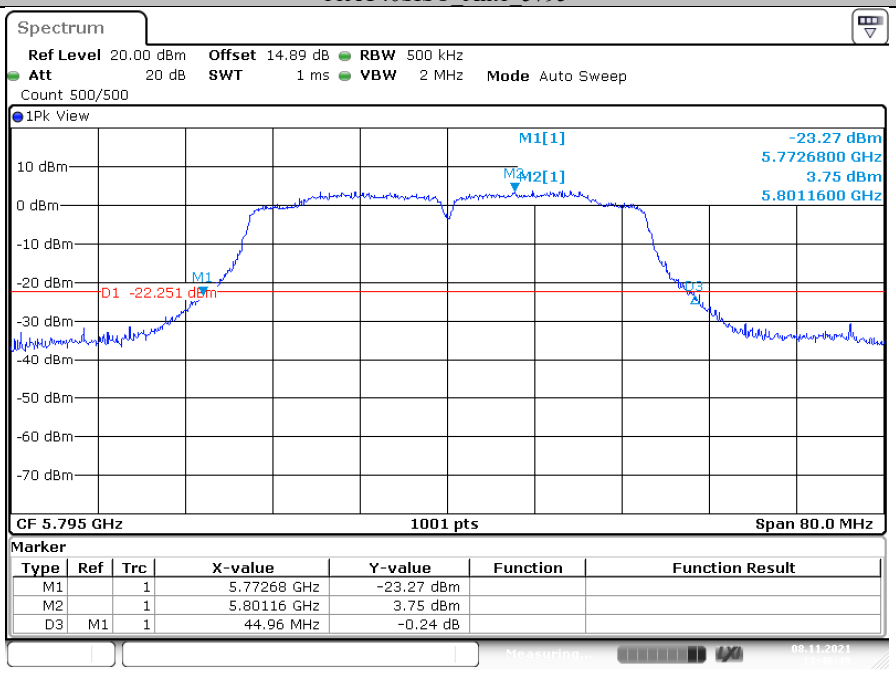

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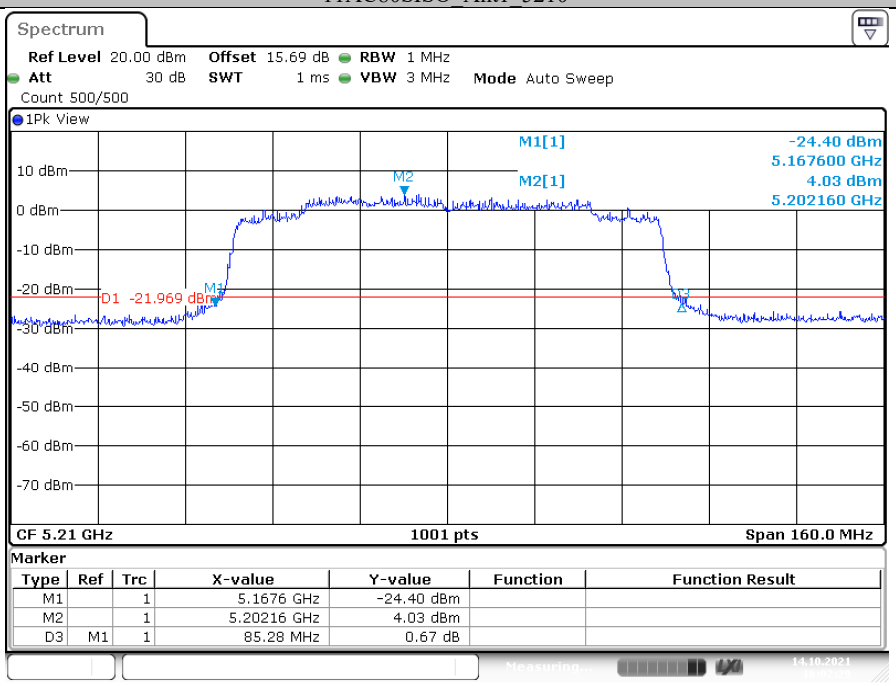

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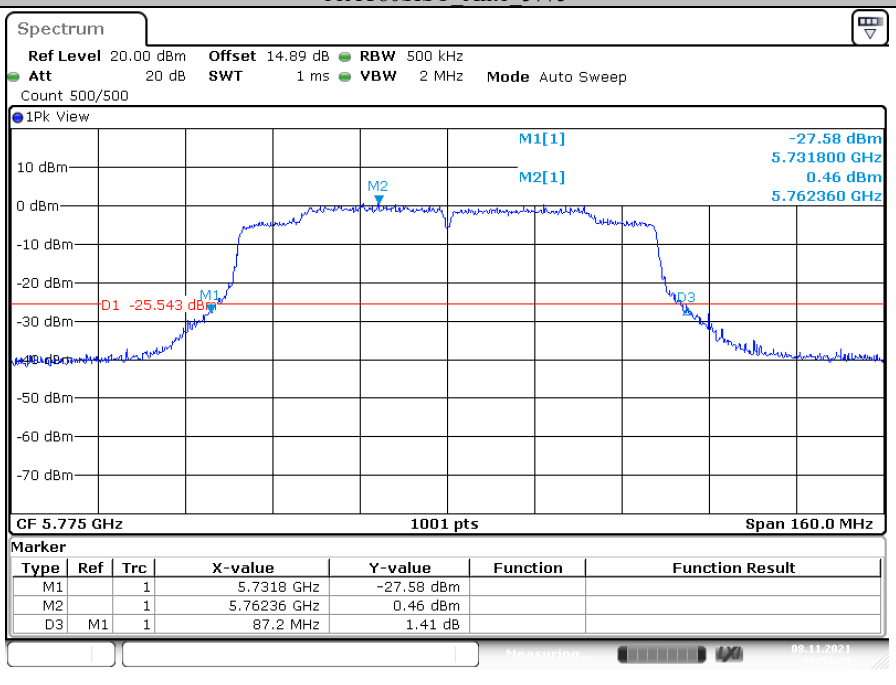

Date: 8.NOV.2021 13:53:25

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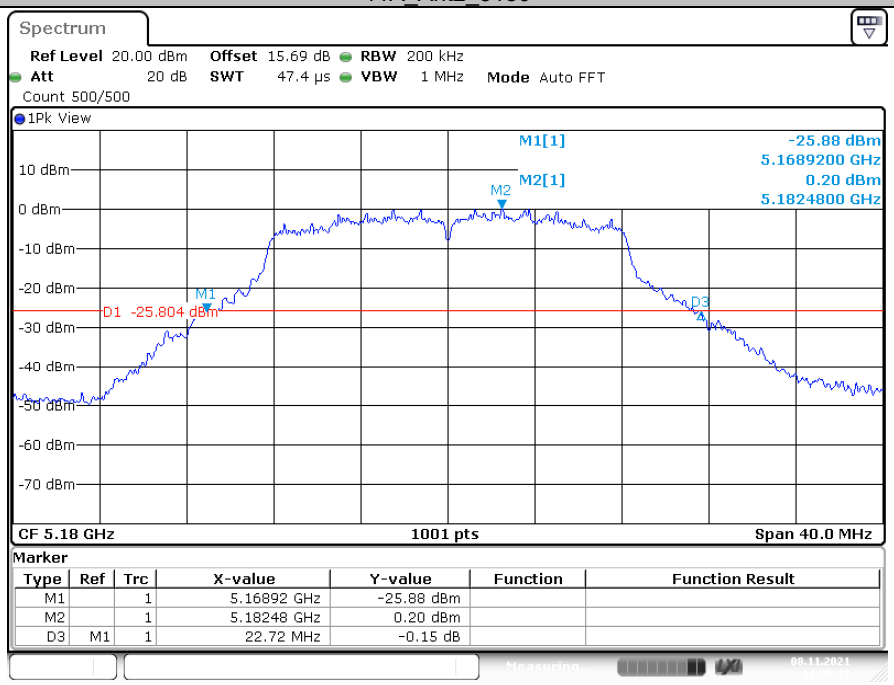

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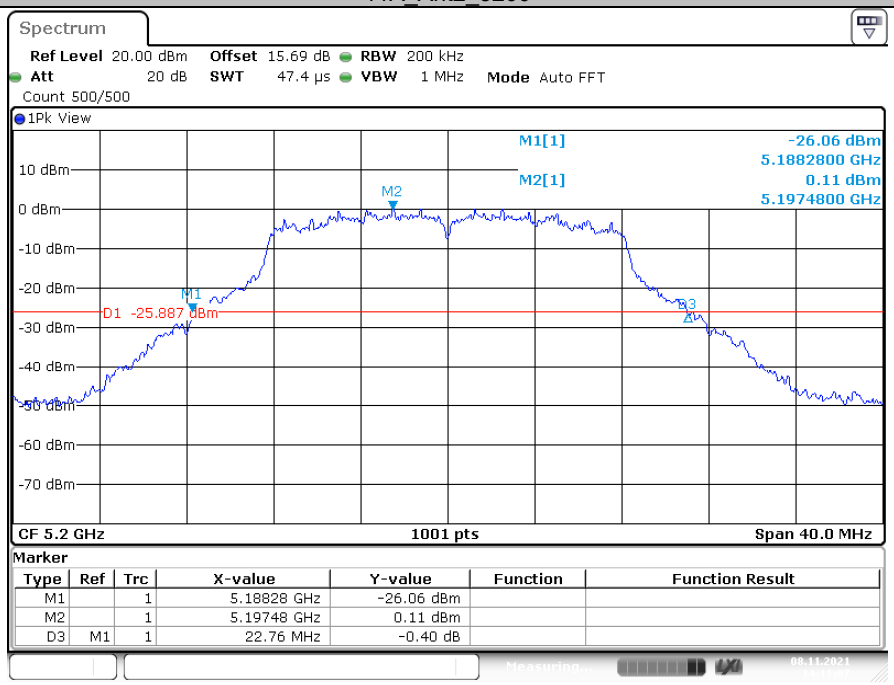

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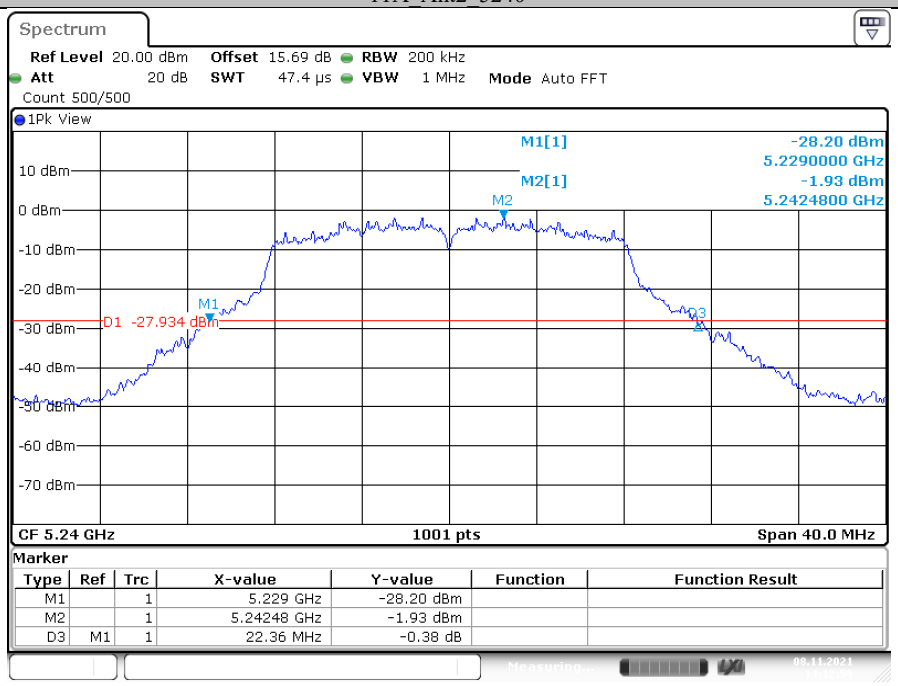

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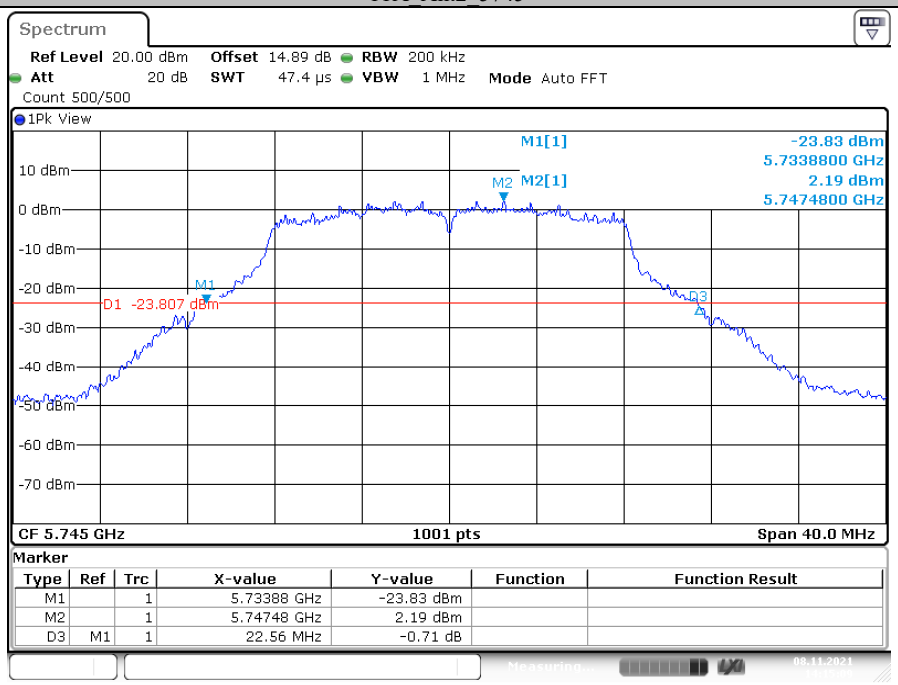

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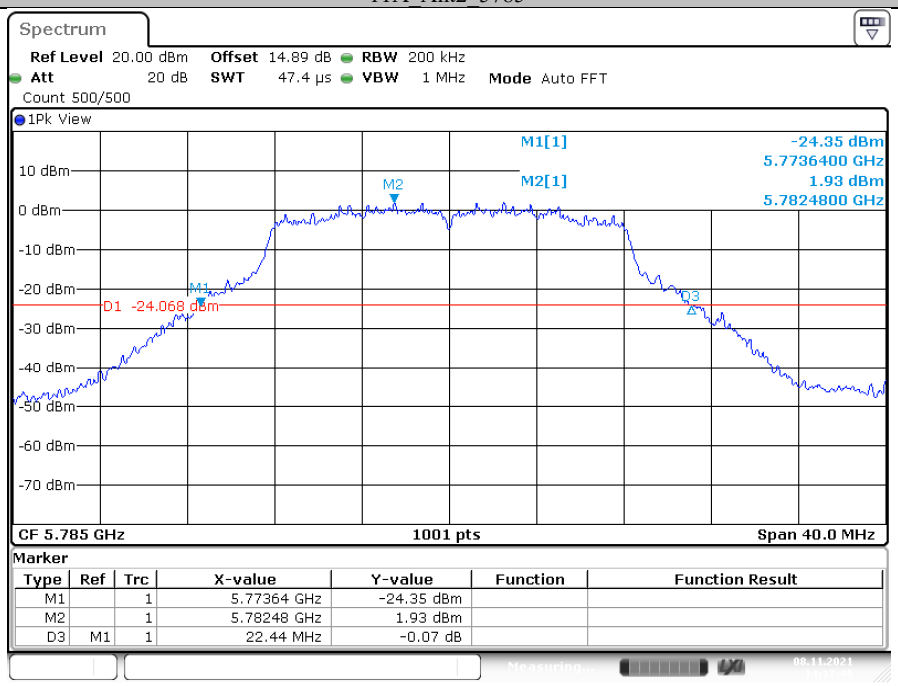
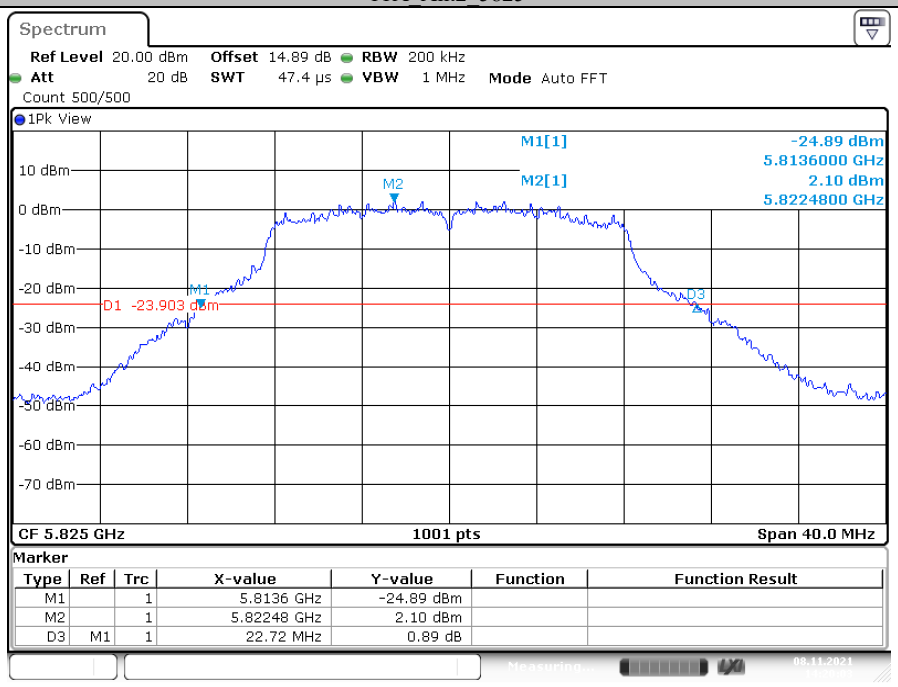


Date: 8.NOV.2021 14:17:50

11A_Ant2_5825



Date: 8.NOV.2021 14:20:03

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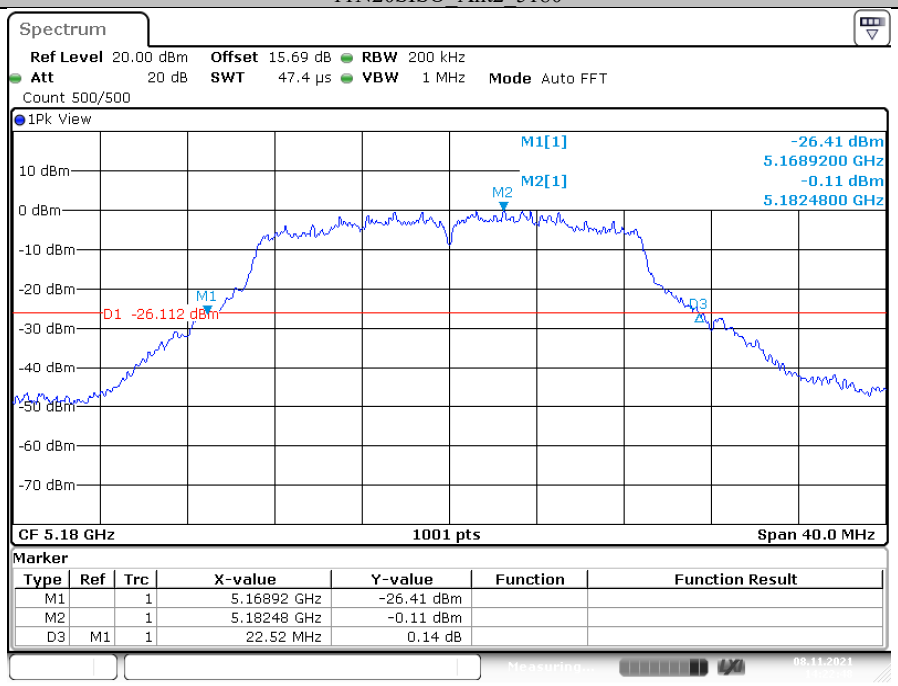

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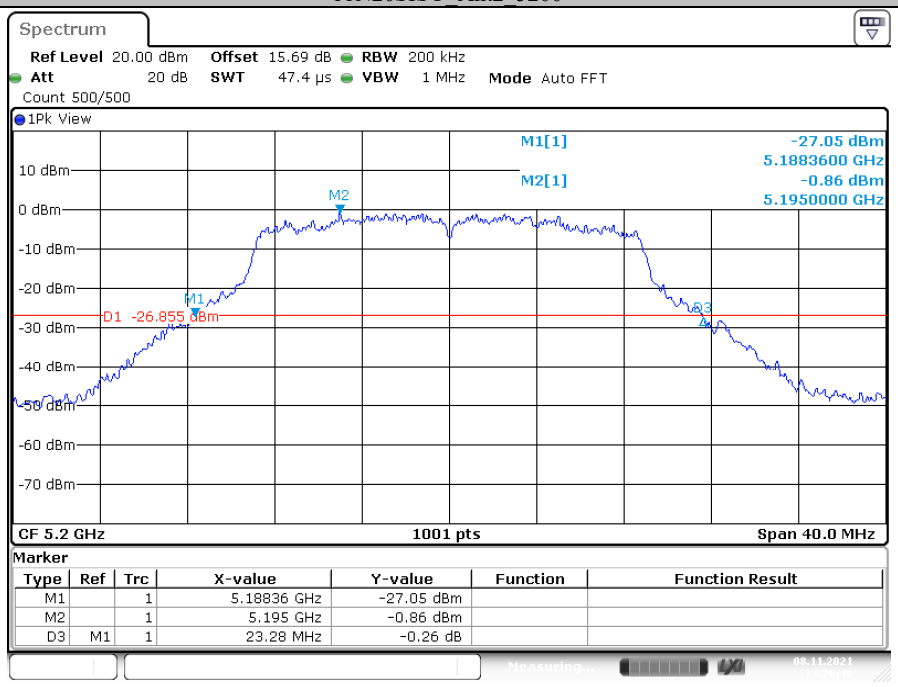

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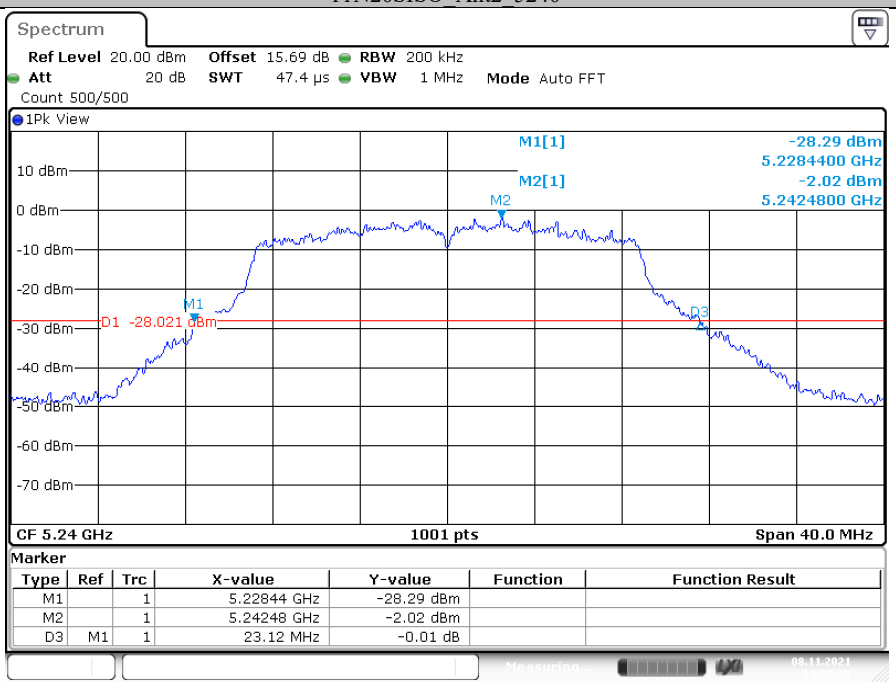

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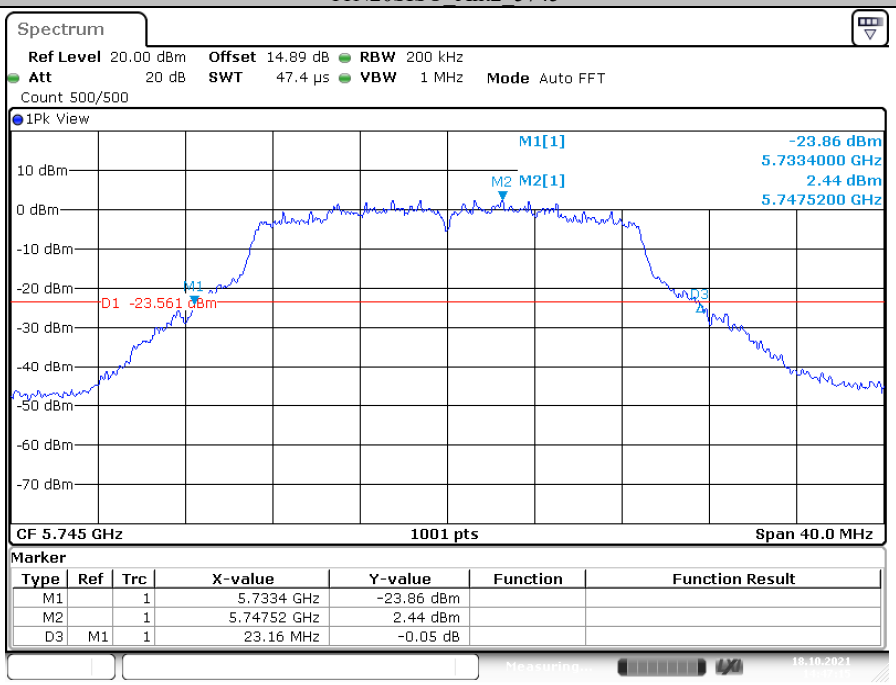

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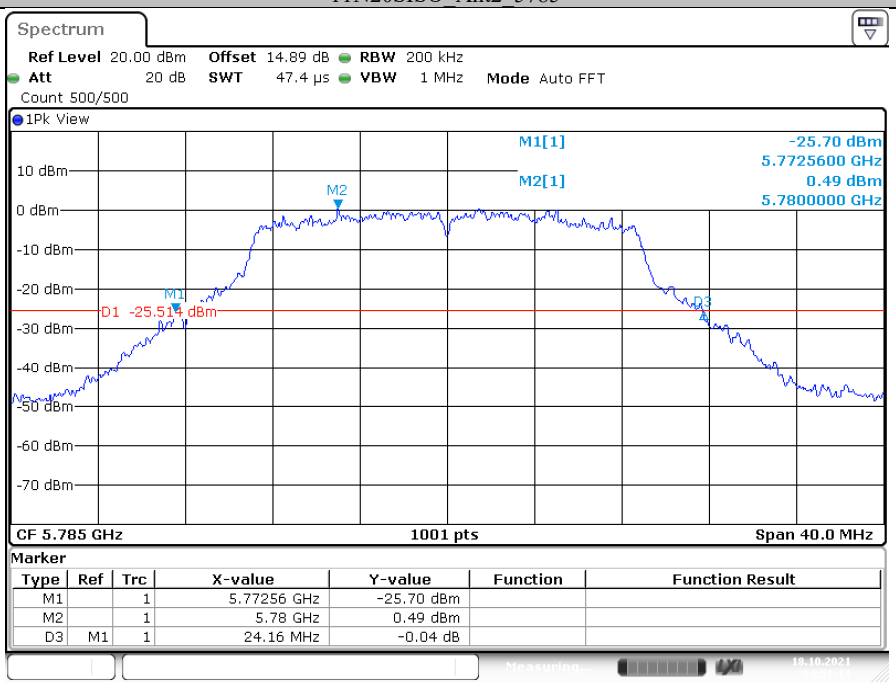

Date: 18.OCT.2021 14:51:11

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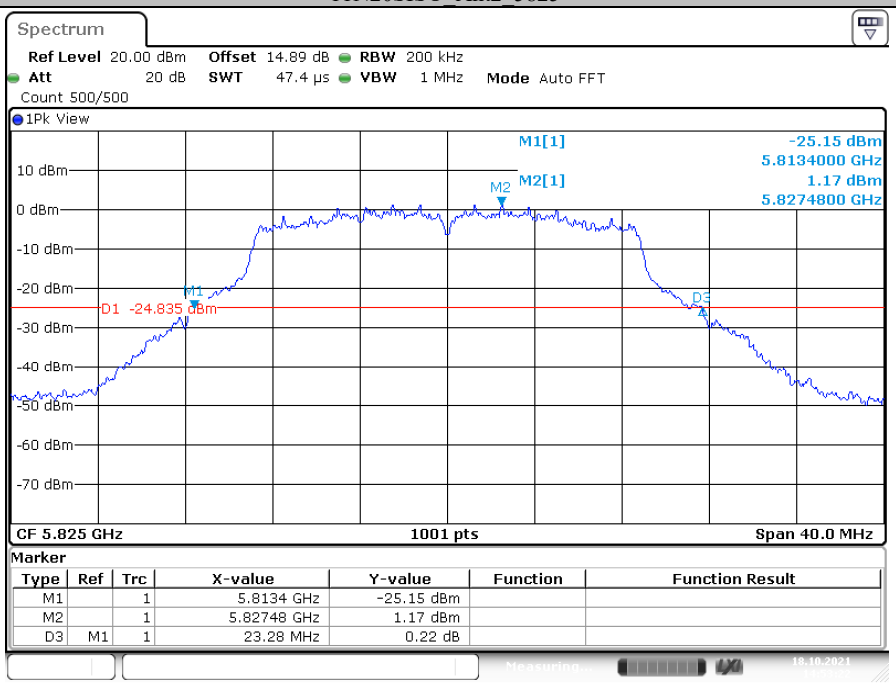

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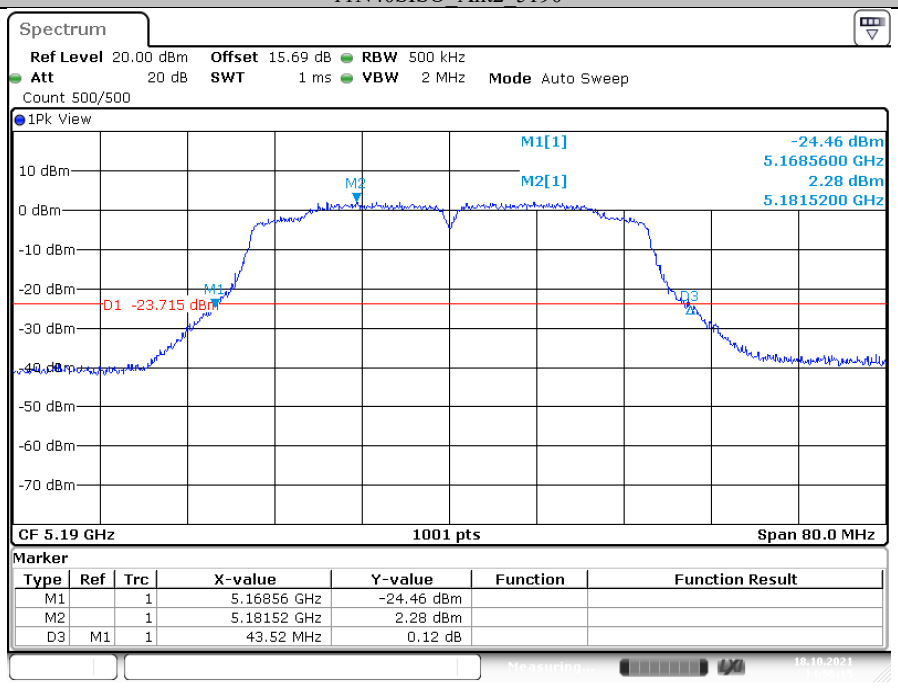

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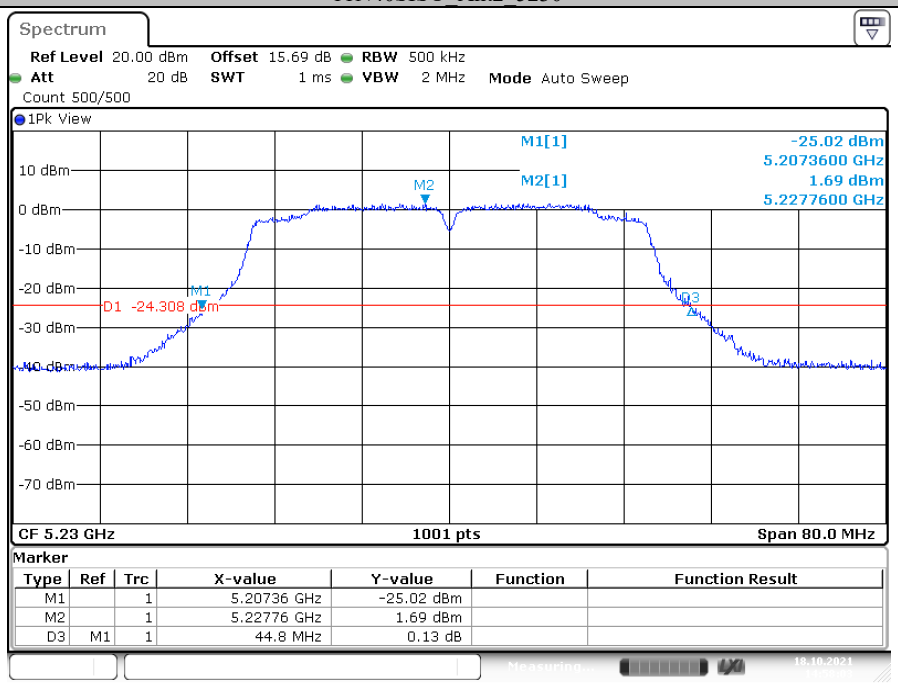

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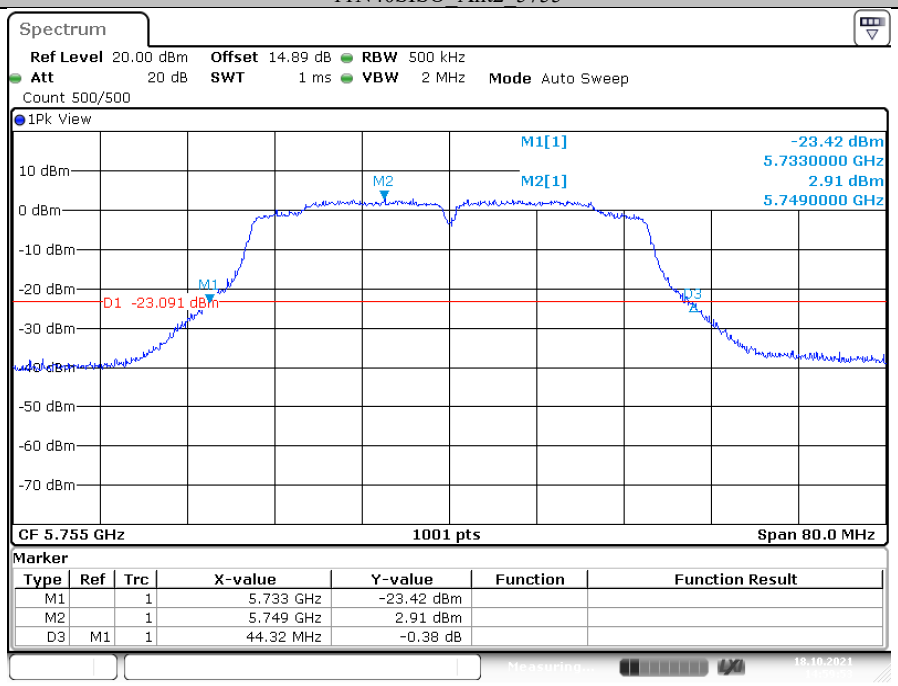

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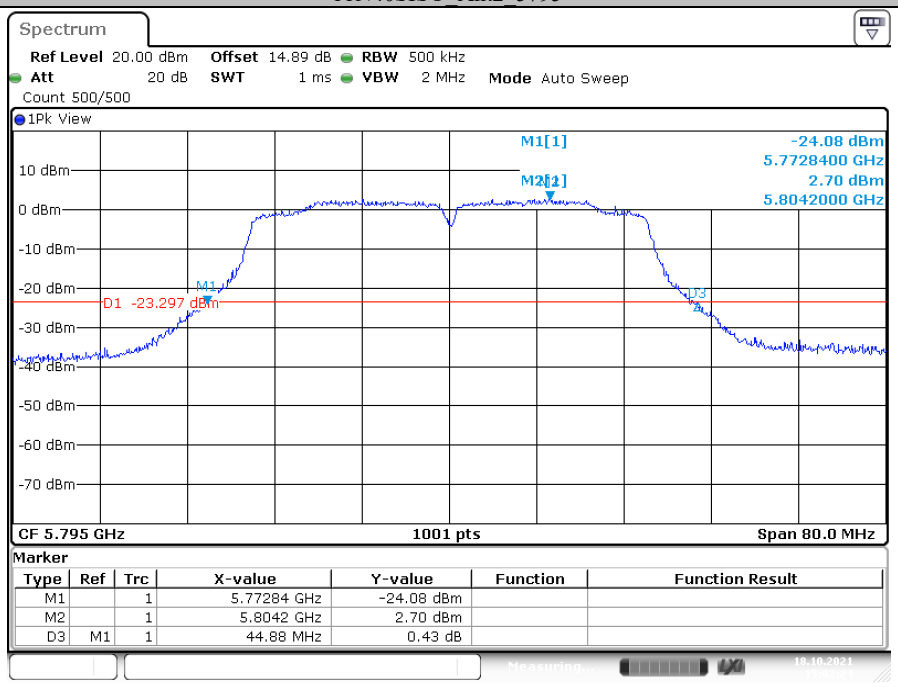

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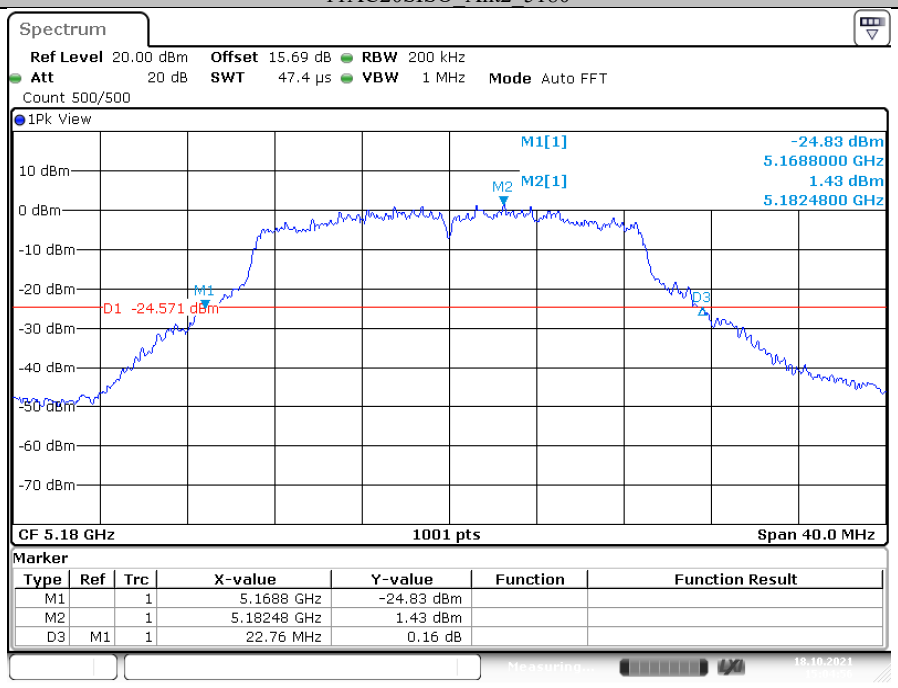

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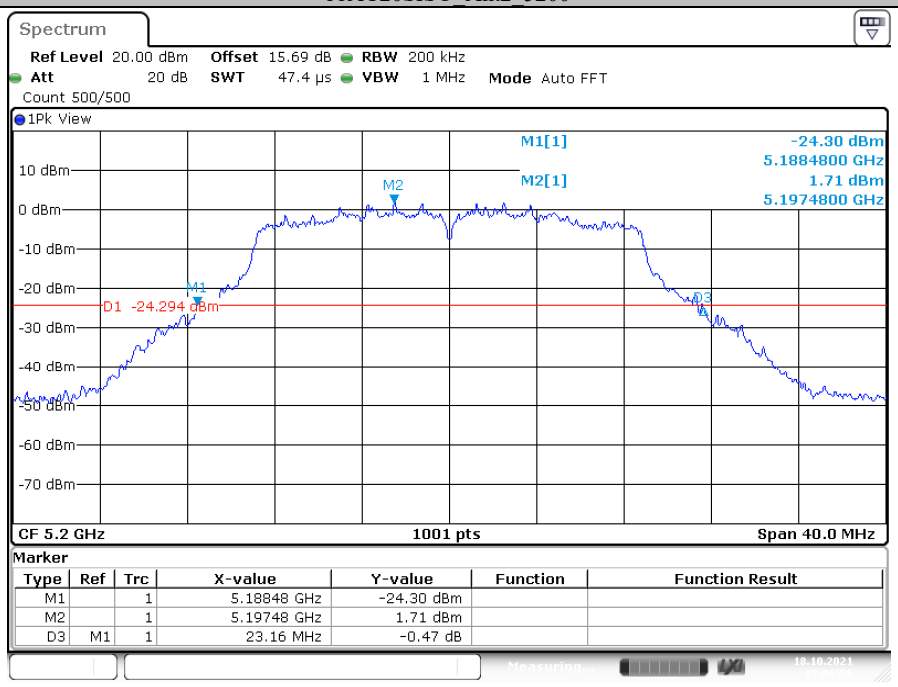

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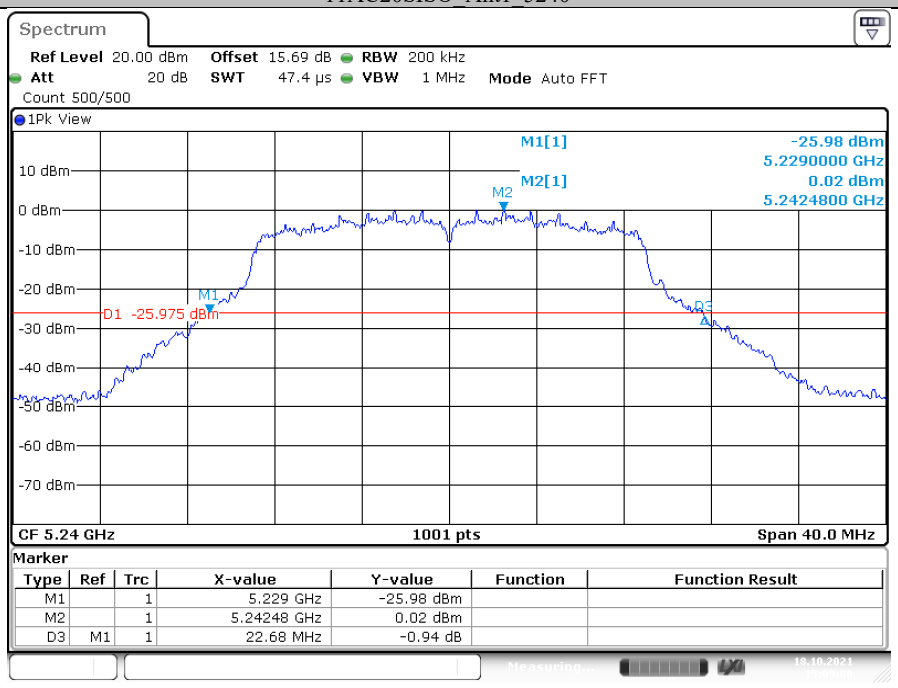

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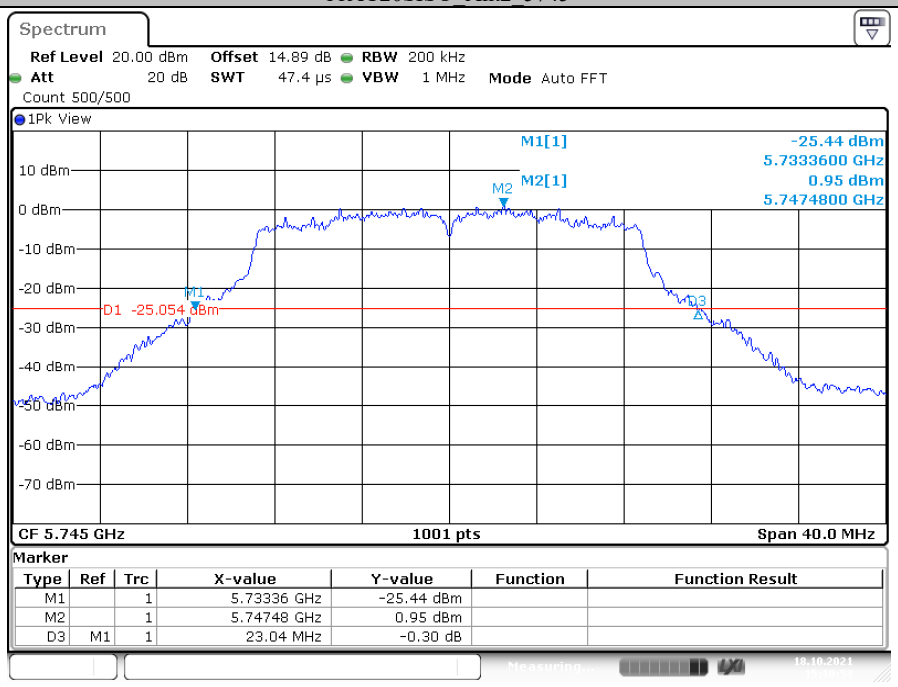

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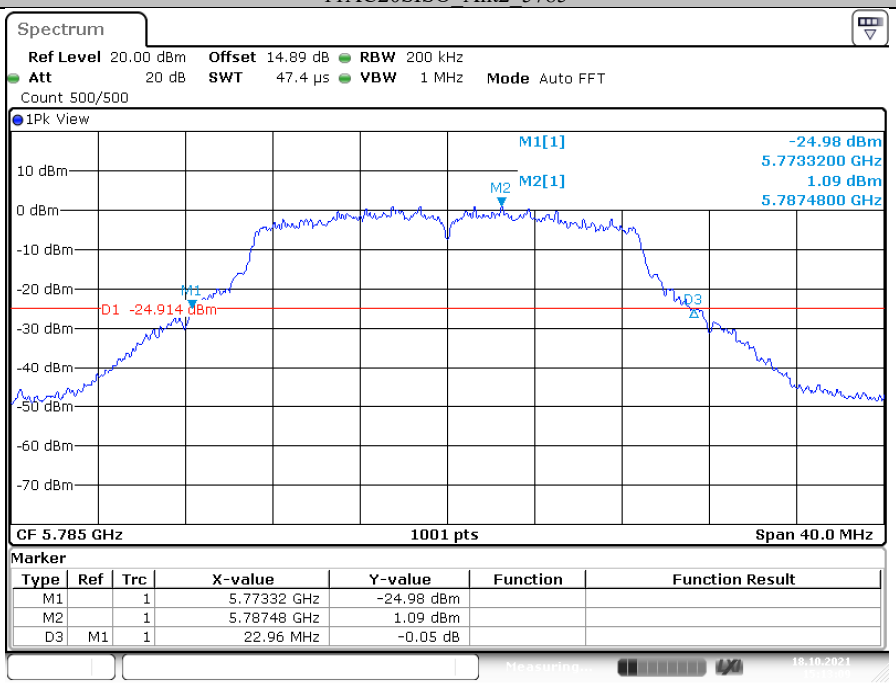

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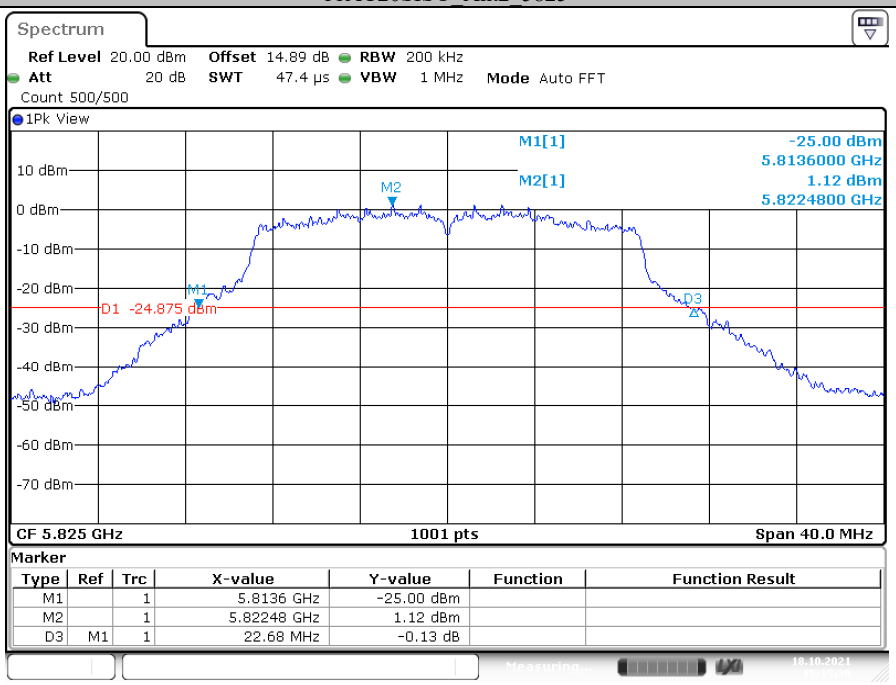

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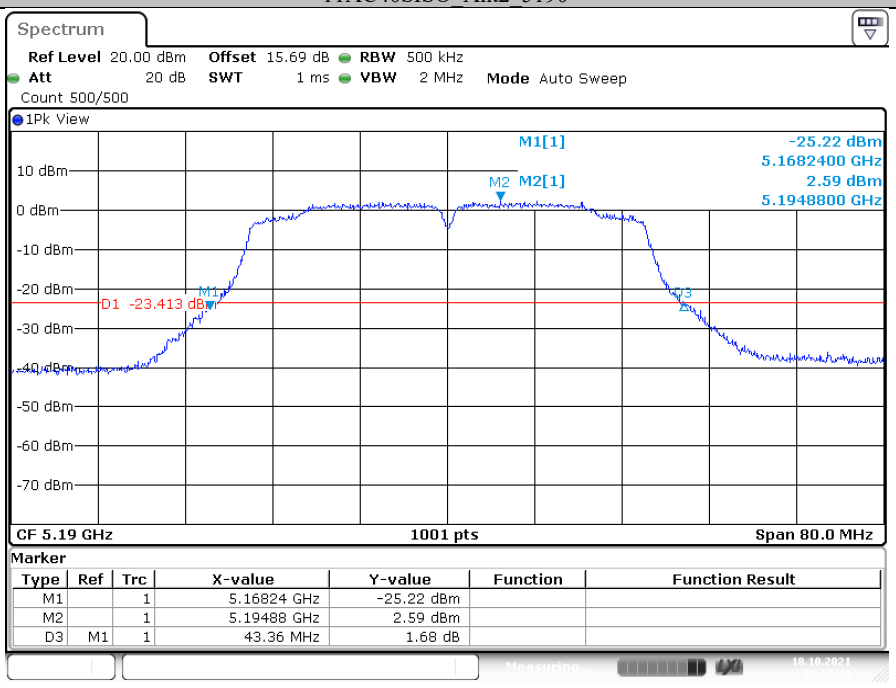

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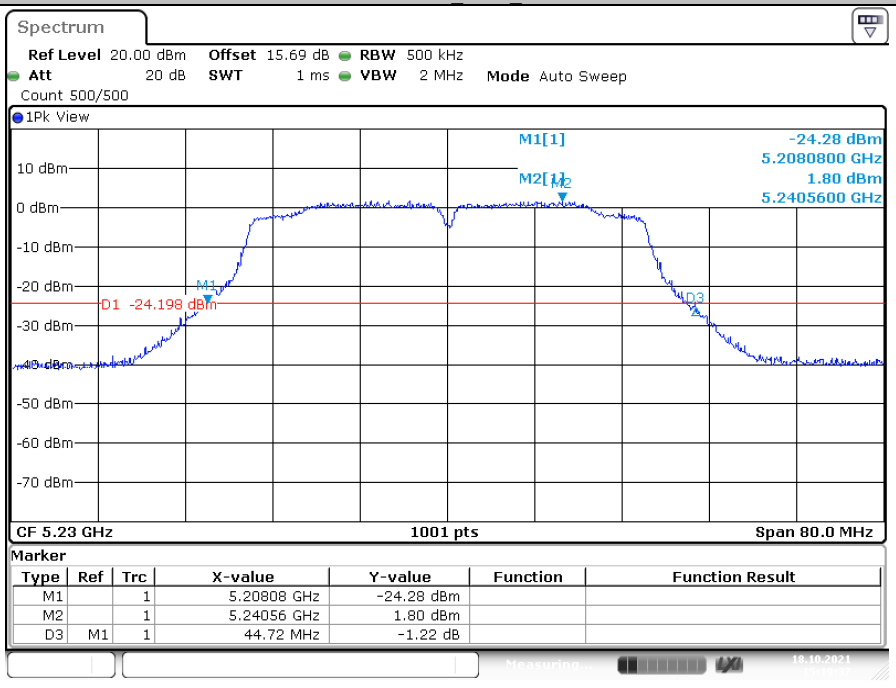

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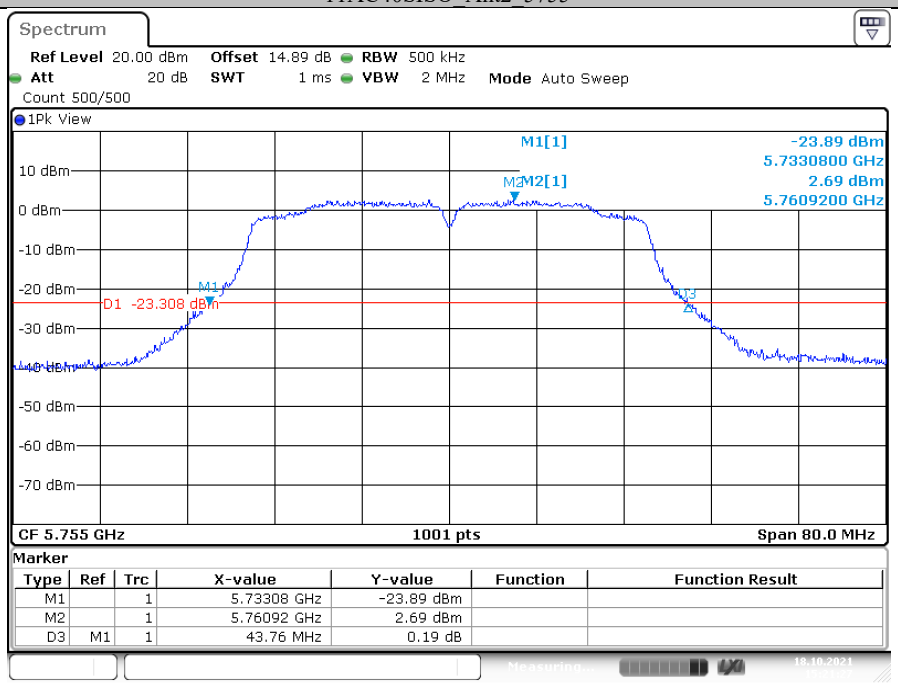

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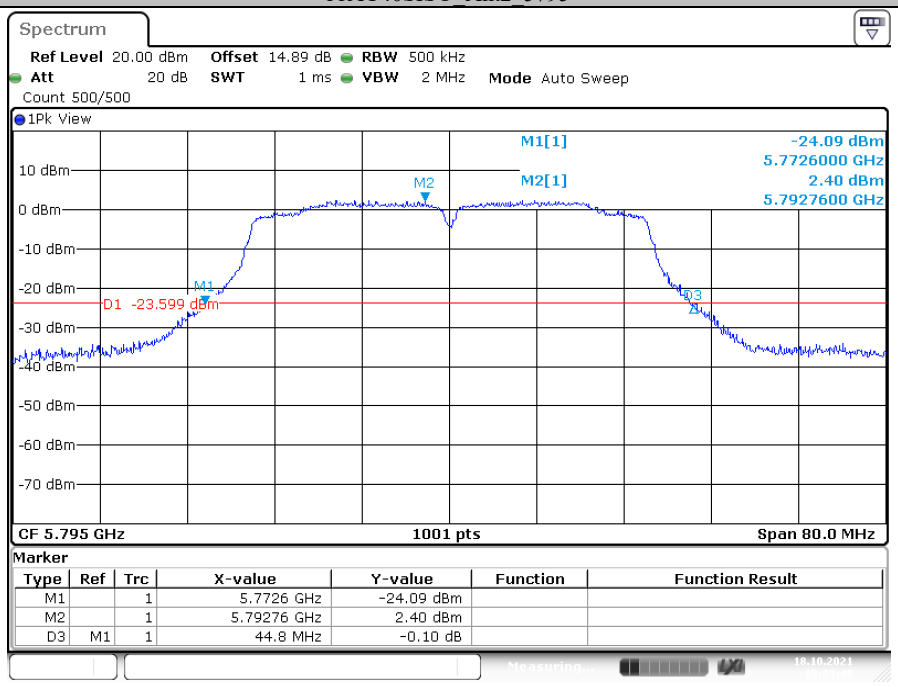

Date: 18.OCT.2021 15:23:50

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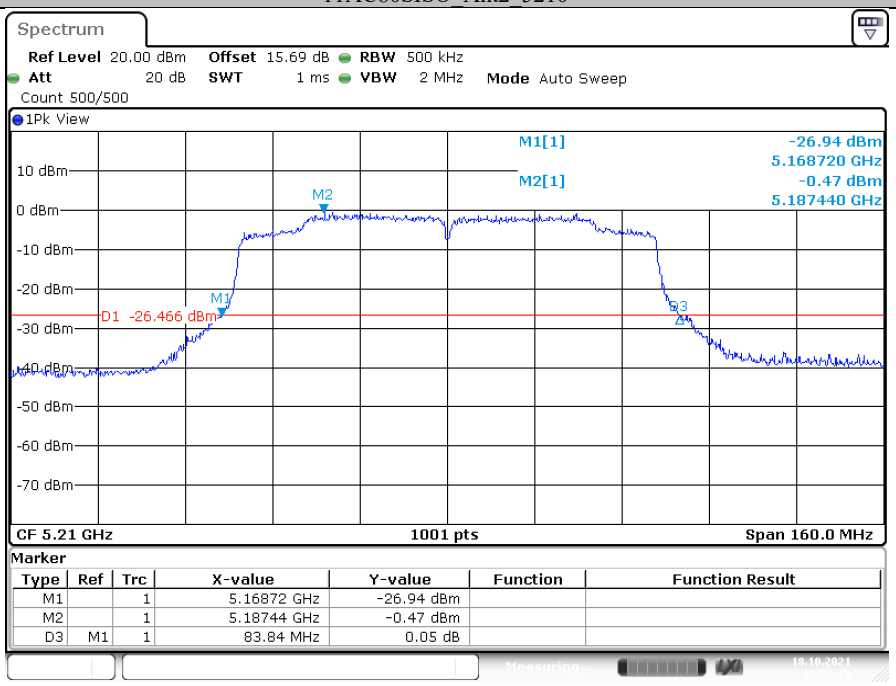

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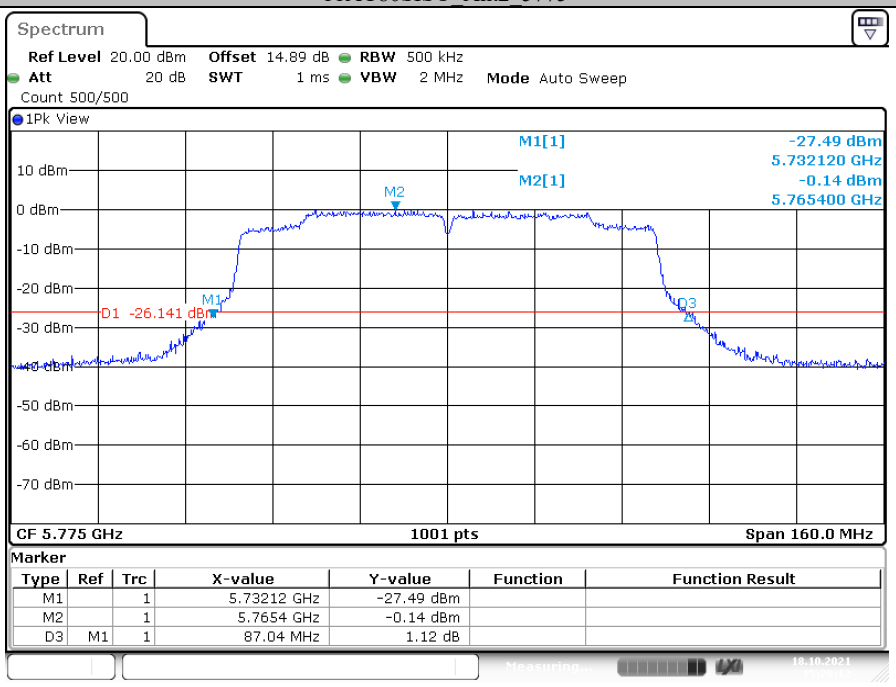


Date: 18.OCT.2021 15:28:12

Appendix A2: Occupied channel bandwidth

Test Result

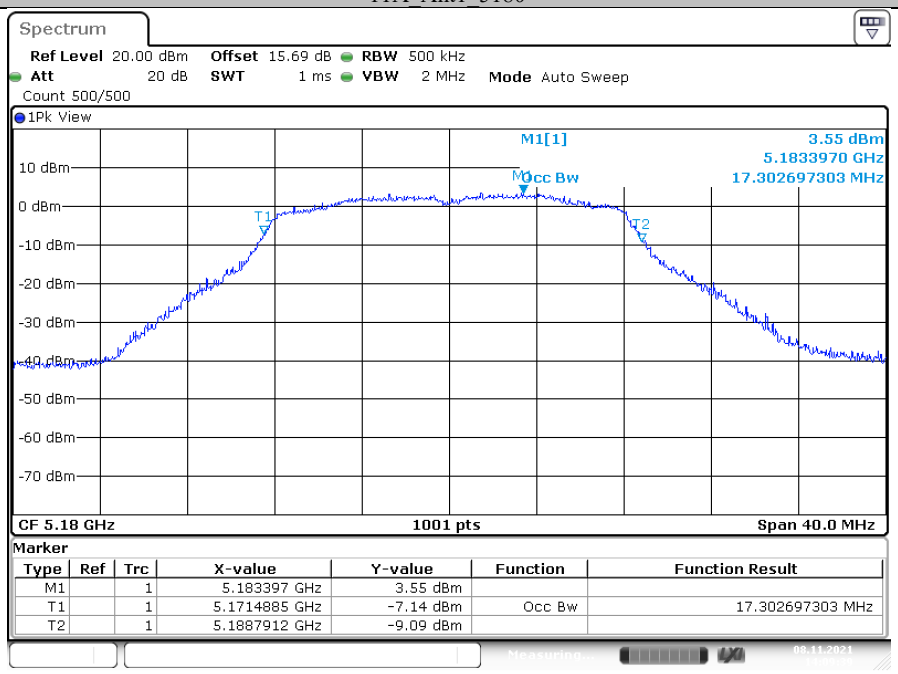
TestMode	Antenna	Channel	OCB [MHz]	FL[MHz]	FH[MHz]	Limit[MHz]	Verdict
11A	Ant1	5180	17.303	5171.489	5188.791	---	PASS
		5200	17.303	5191.289	5208.591	---	PASS
		5240	17.343	5231.409	5248.751	---	PASS
		5745	17.343	5736.369	5753.711	---	PASS
		5785	17.383	5776.289	5793.671	---	PASS
		5825	17.343	5816.289	5833.631	---	PASS
11N20SISO	Ant1	5180	18.382	5170.929	5189.310	---	PASS
		5200	18.342	5190.769	5209.111	---	PASS
		5240	18.262	5230.969	5249.231	---	PASS
		5745	18.302	5735.889	5754.191	---	PASS
		5785	18.342	5775.769	5794.111	---	PASS
		5825	18.302	5815.849	5834.151	---	PASS
11N40SISO	Ant1	5190	36.124	5172.018	5208.142	---	PASS
		5230	36.364	5211.858	5248.222	---	PASS
		5755	36.364	5736.858	5773.222	---	PASS
		5795	36.444	5776.858	5813.302	---	PASS
11AC20SISO	Ant1	5180	18.262	5170.969	5189.231	---	PASS
		5200	18.382	5190.889	5209.271	---	PASS
		5240	18.262	5230.969	5249.231	---	PASS
		5745	18.382	5735.849	5754.231	---	PASS
		5785	18.342	5775.809	5794.151	---	PASS
		5825	18.222	5815.889	5834.111	---	PASS
11AC40SISO	Ant1	5190	36.284	5171.938	5208.222	---	PASS
		5230	36.364	5211.858	5248.222	---	PASS
		5755	36.284	5736.858	5773.142	---	PASS
		5795	36.523	5776.778	5813.302	---	PASS
11AC80SISO	Ant1	5210	77.043	5171.638	5248.681	---	PASS
		5775	75.285	5737.597	5812.882	---	PASS

TestMode	Antenna	Channel	OCB [MHz]	FL[MHz]	FH[MHz]	Limit[MHz]	Verdict
11A	Ant2	5180	17.383	5171.369	5188.751	---	PASS
		5200	17.423	5191.369	5208.791	---	PASS
		5240	17.502	5231.329	5248.831	---	PASS
		5745	17.343	5736.329	5753.671	---	PASS
		5785	17.423	5776.329	5793.751	---	PASS
		5825	17.383	5816.249	5833.631	---	PASS
11N20SISO	Ant2	5180	18.382	5170.849	5189.231	---	PASS
		5200	18.422	5190.809	5209.231	---	PASS
		5240	18.501	5230.809	5249.311	---	PASS
		5745	18.302	5735.849	5754.151	---	PASS
		5785	18.342	5775.849	5794.191	---	PASS
		5825	18.302	5815.769	5834.071	---	PASS
11N40SISO	Ant2	5190	36.444	5171.858	5208.302	---	PASS
		5230	36.284	5211.938	5248.222	---	PASS
		5755	36.284	5736.858	5773.142	---	PASS
		5795	36.364	5776.938	5813.302	---	PASS
11AC20SISO	Ant2	5180	18.262	5170.929	5189.191	---	PASS
		5200	18.262	5190.929	5209.191	---	PASS
		5240	18.302	5230.889	5249.191	---	PASS
		5745	18.302	5735.849	5754.151	---	PASS
		5785	18.342	5775.849	5794.191	---	PASS
		5825	18.342	5815.769	5834.111	---	PASS
11AC40SISO	Ant2	5190	36.444	5171.858	5208.302	---	PASS
		5230	36.284	5211.938	5248.222	---	PASS
		5755	36.284	5736.858	5773.142	---	PASS
		5795	36.284	5776.938	5813.222	---	PASS
11AC80SISO	Ant2	5210	75.125	5172.597	5247.722	---	PASS
		5775	75.125	5737.597	5812.722	---	PASS

Note: OBW for U-NII-1 and U-NII-3 bands will not within frequency range for U-NII-2A and U-NII-2C bands.

Test Graphs

11A_Ant1_5180



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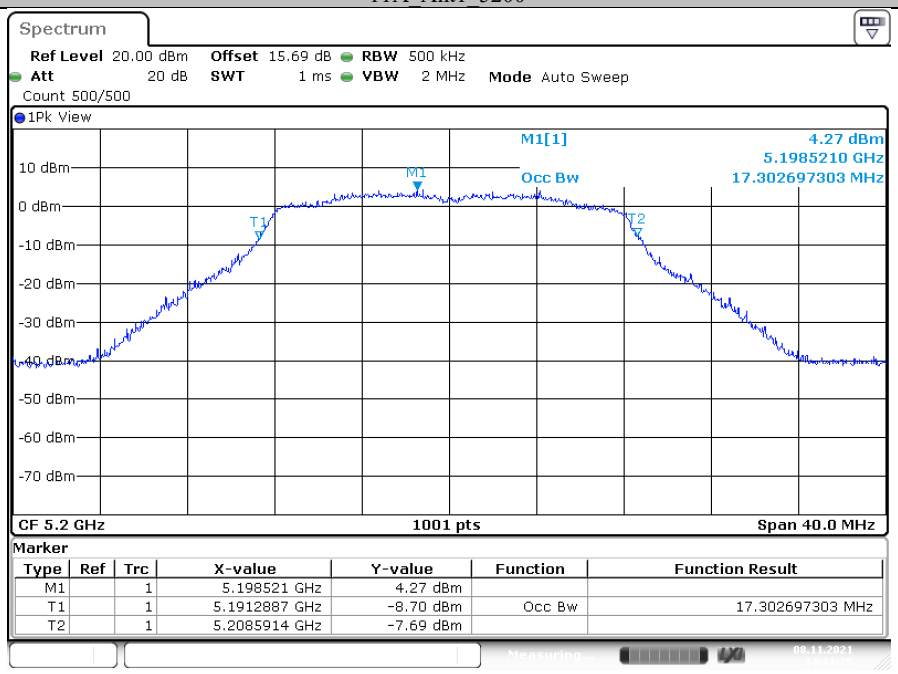

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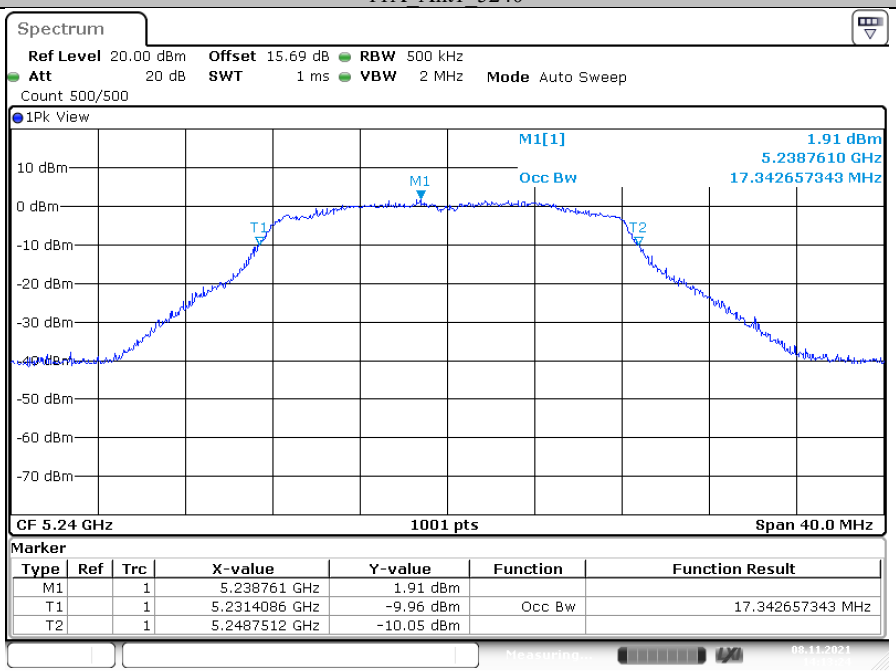

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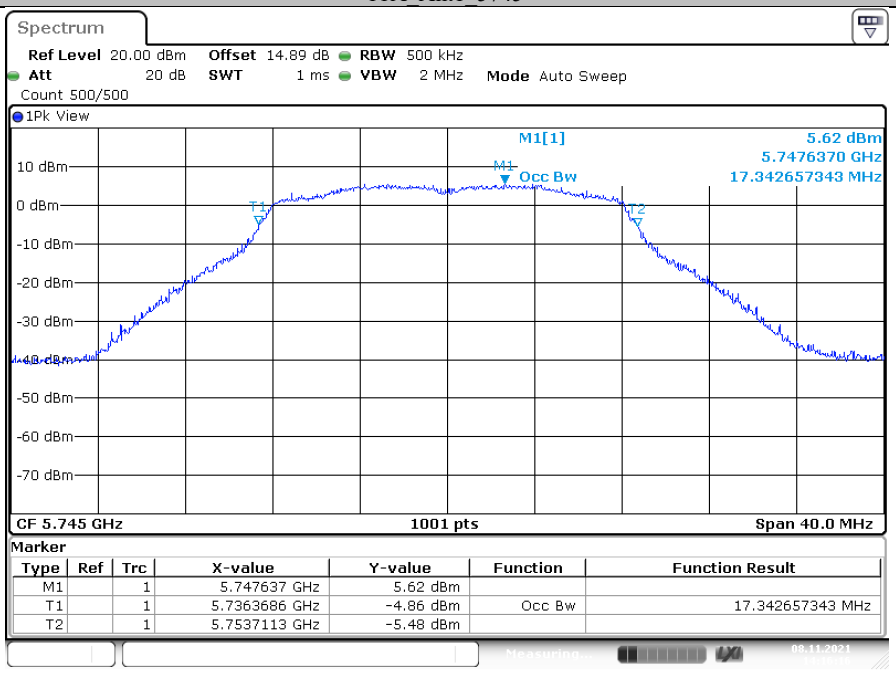

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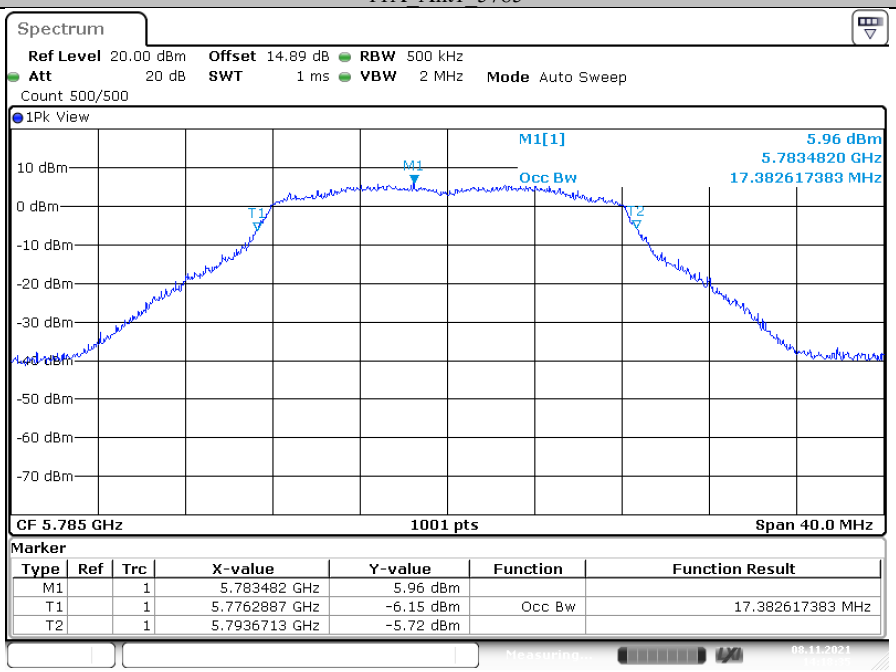

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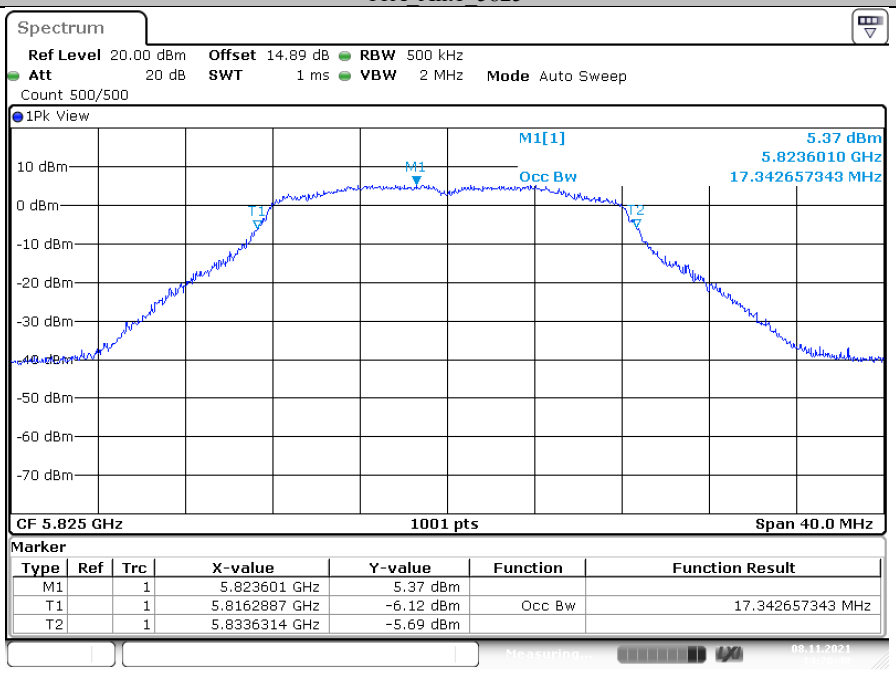

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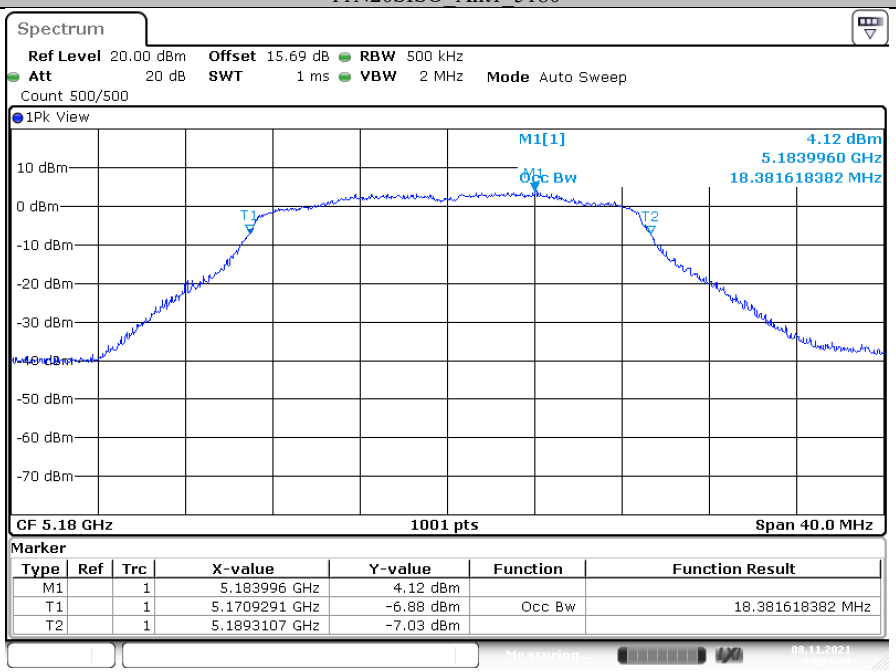

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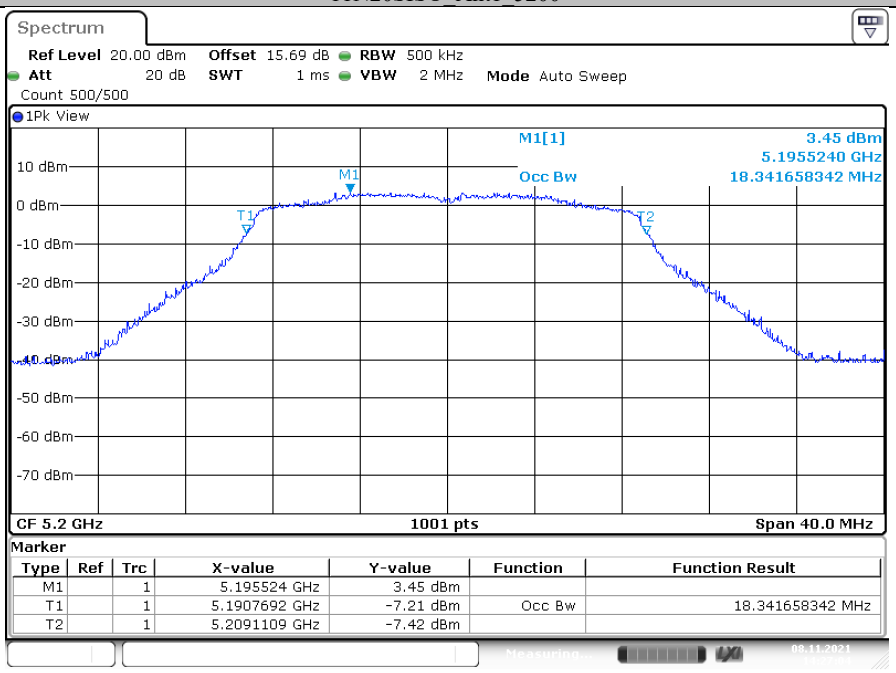

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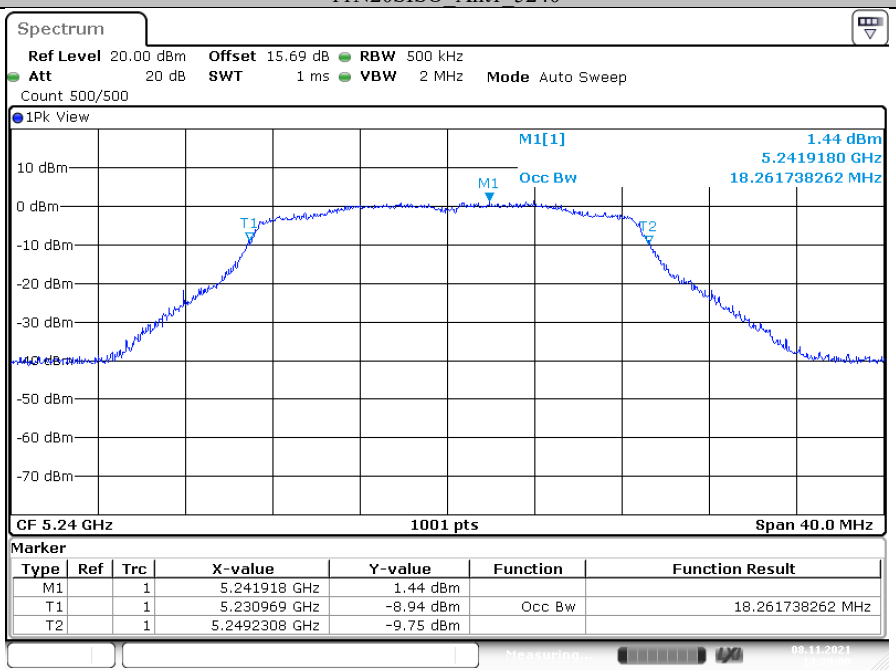

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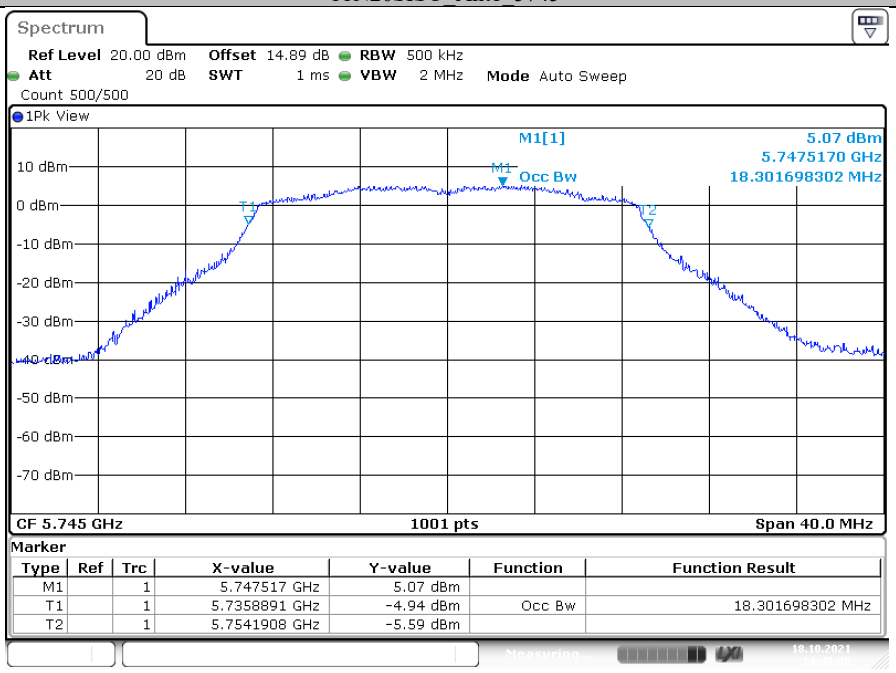

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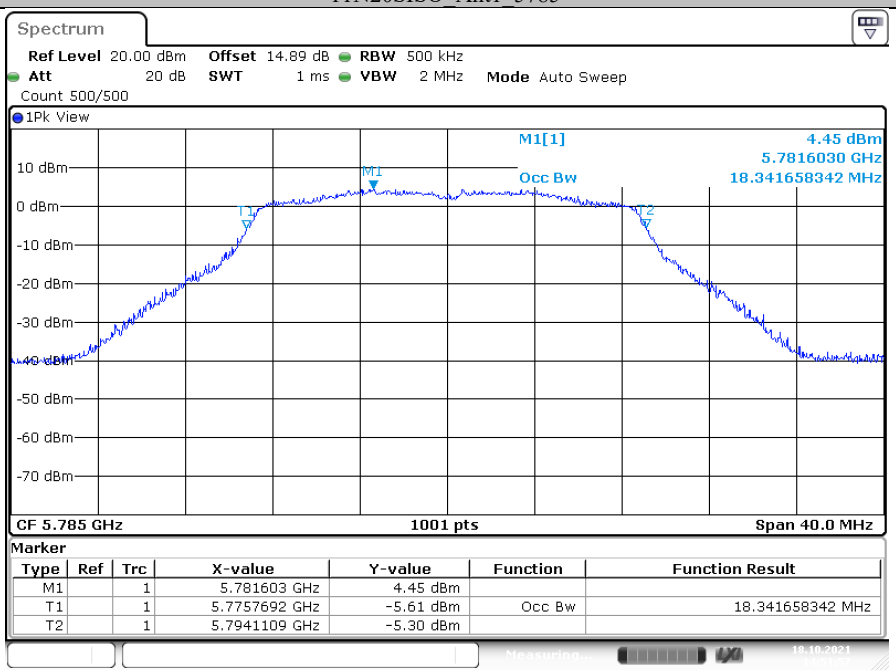

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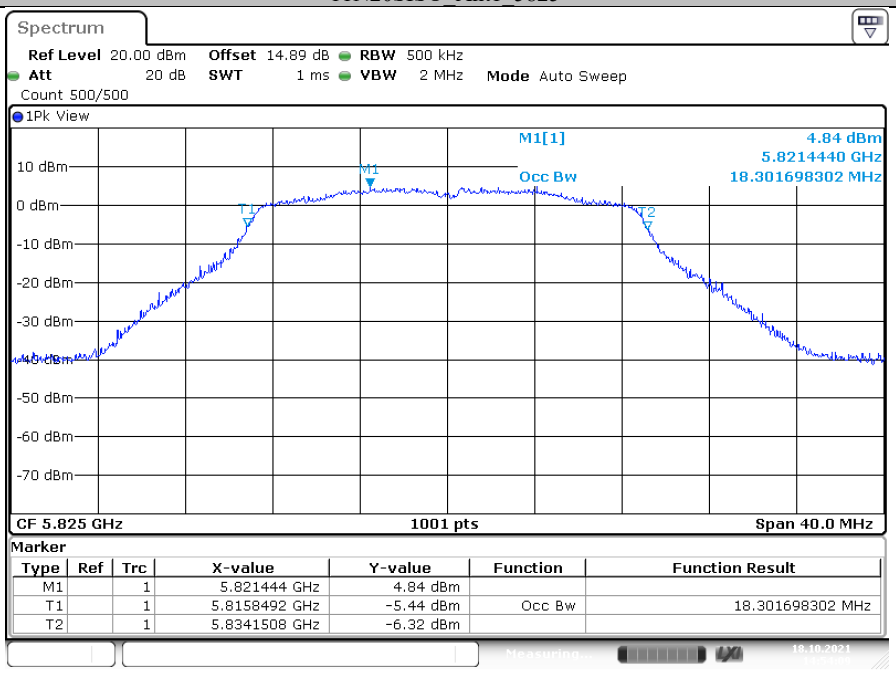

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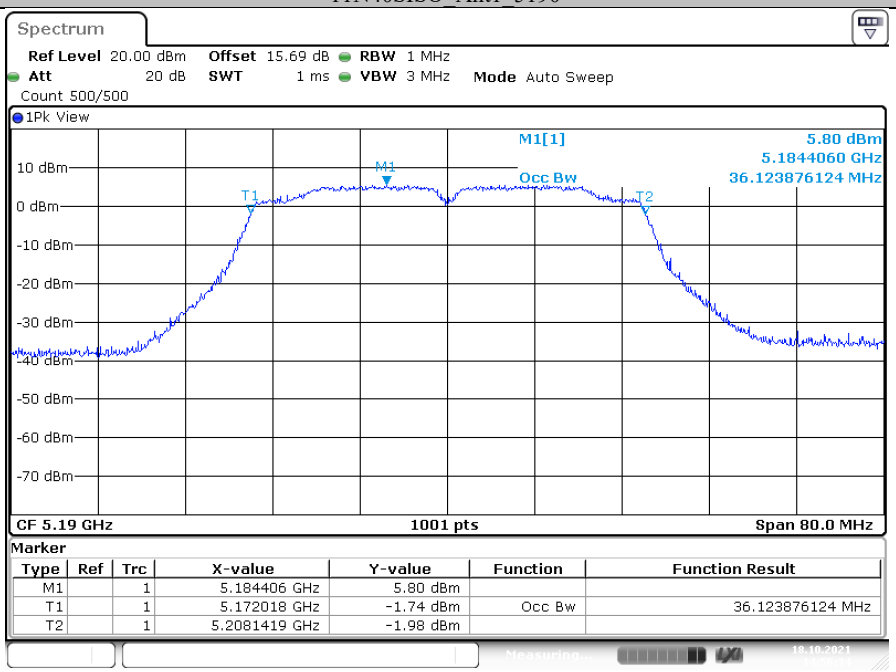

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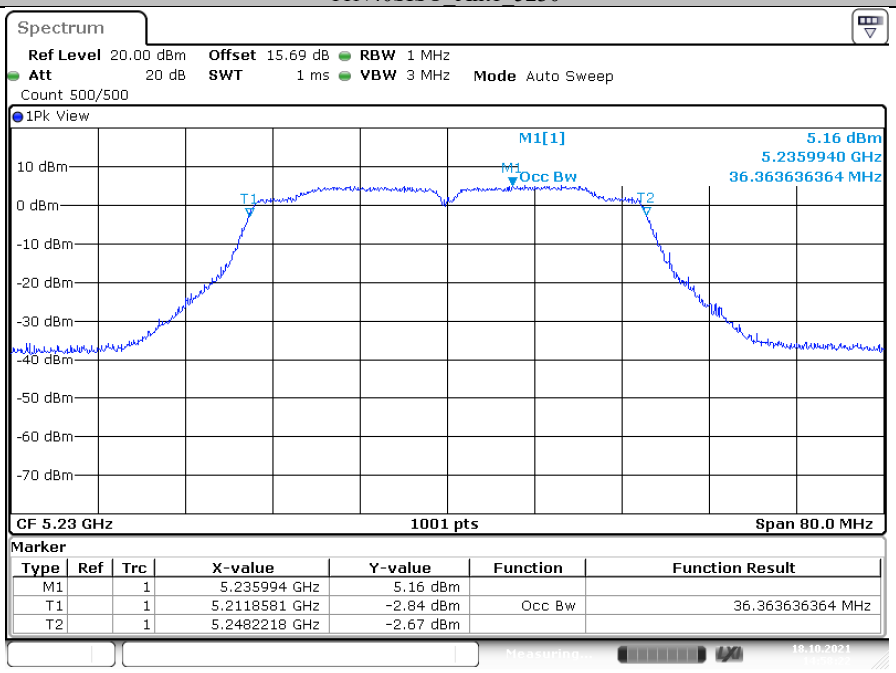

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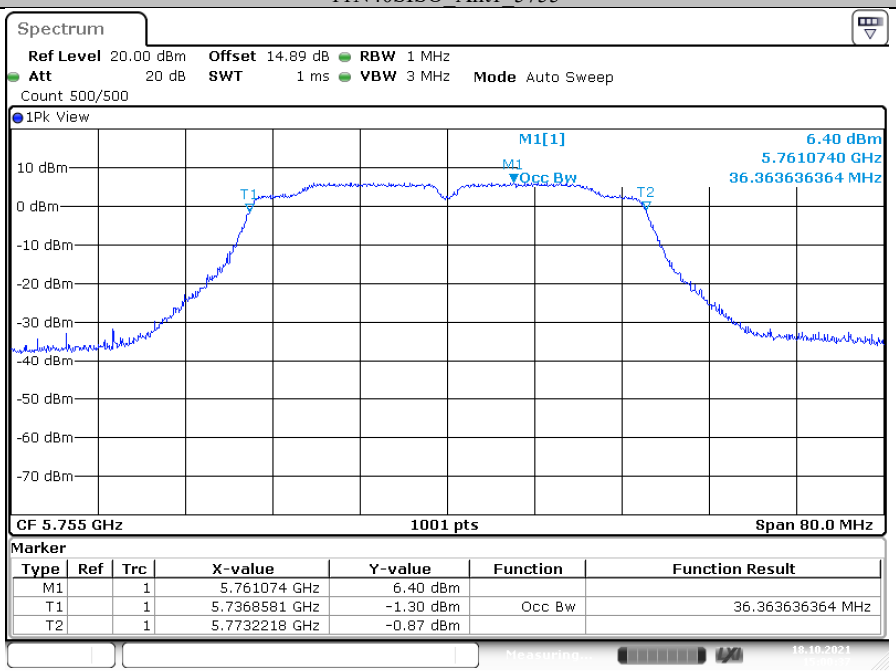

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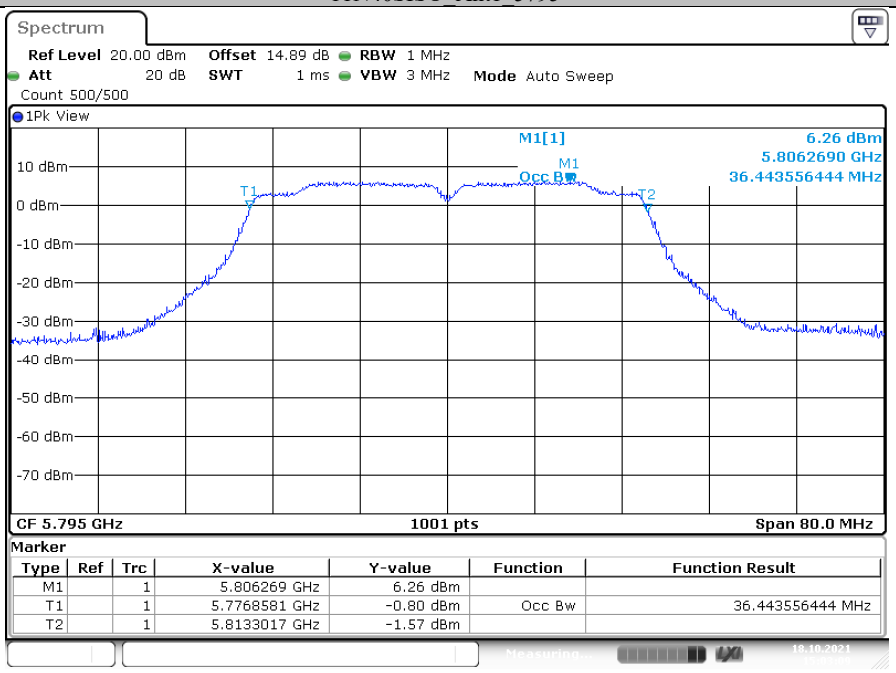

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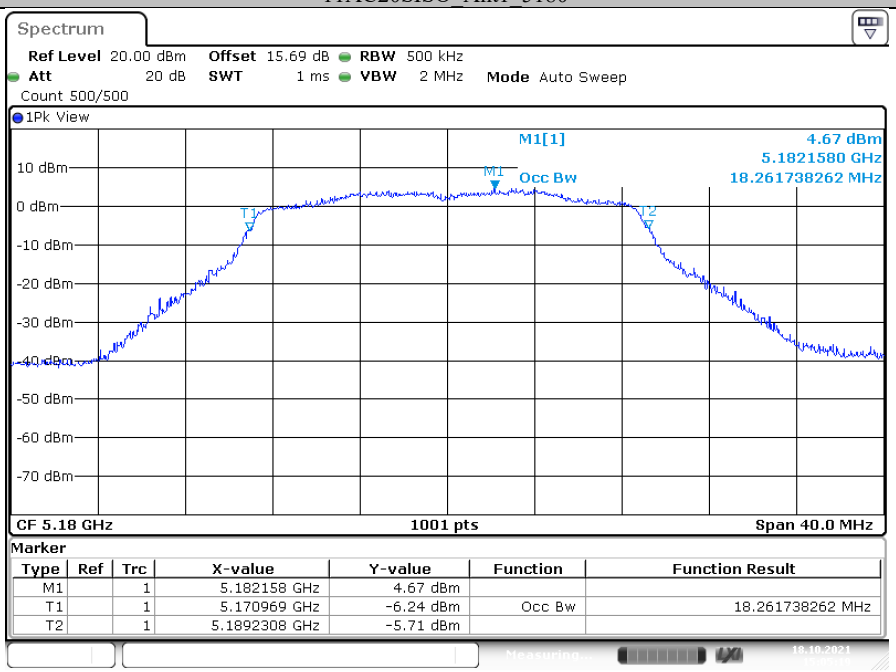

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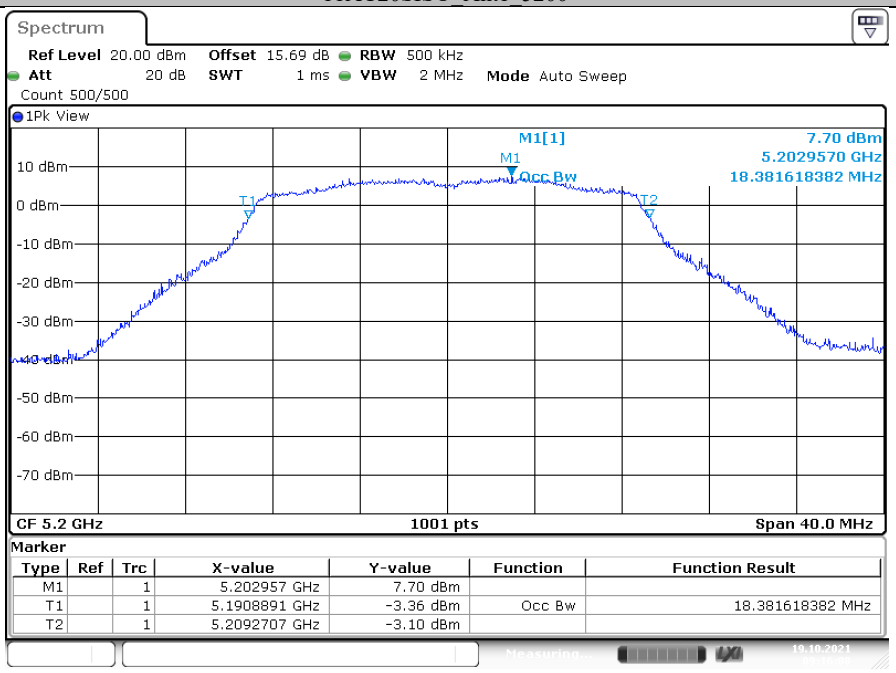

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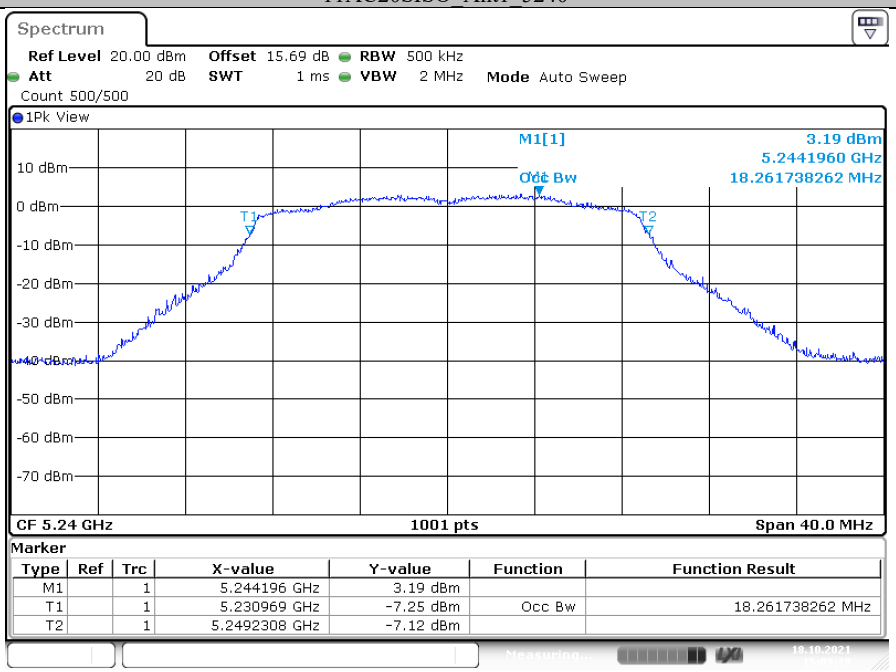

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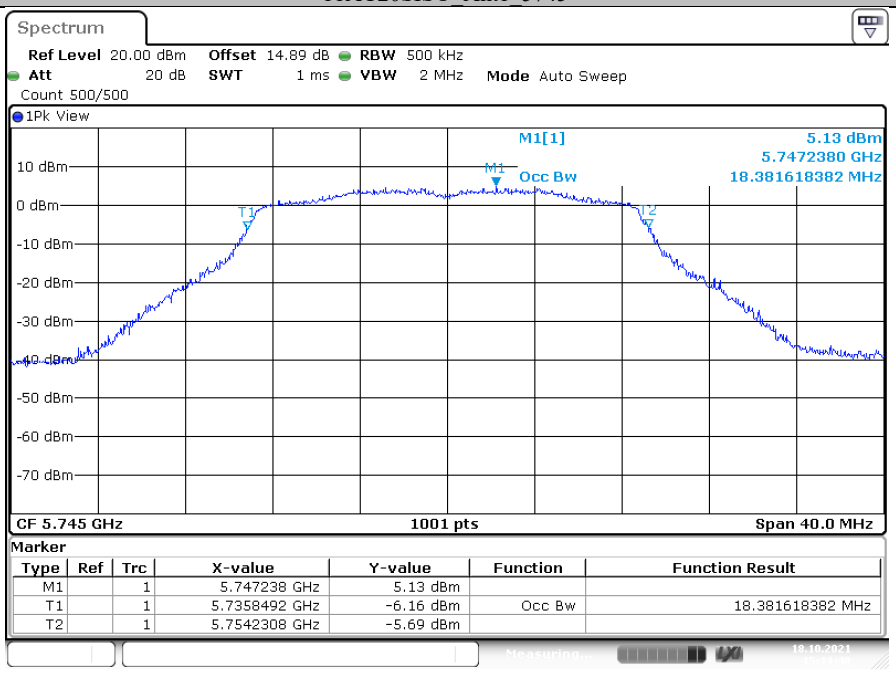

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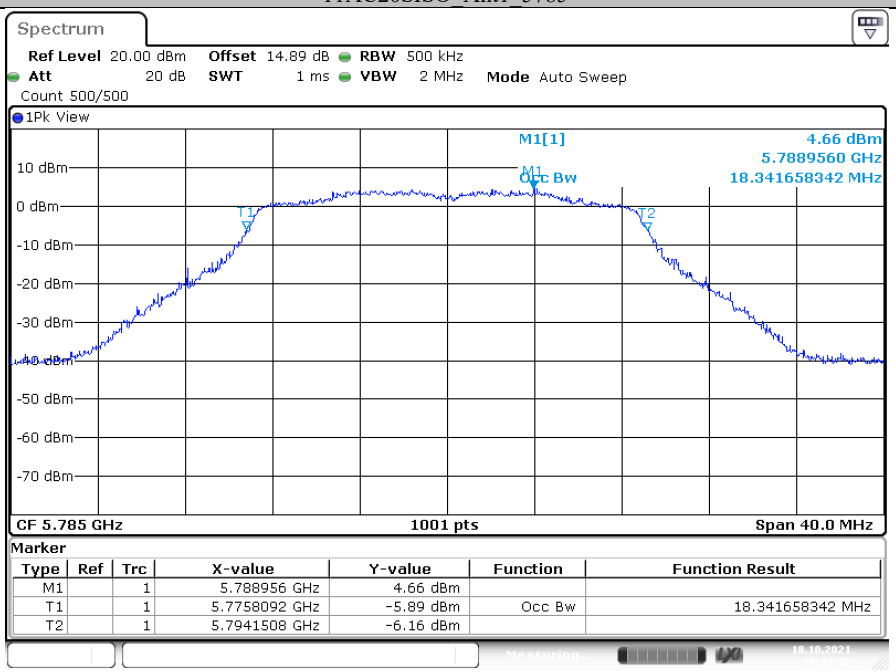

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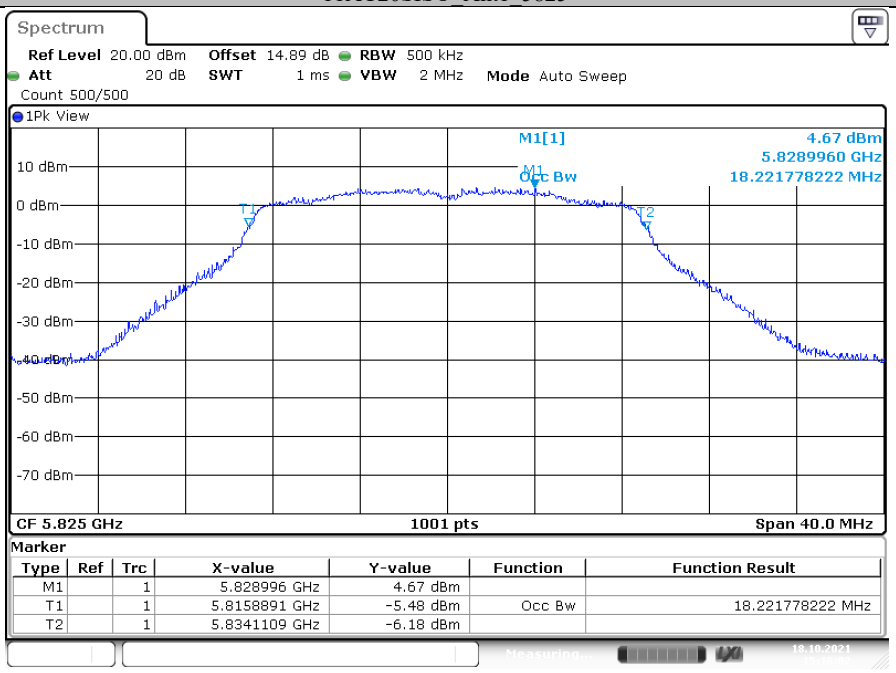

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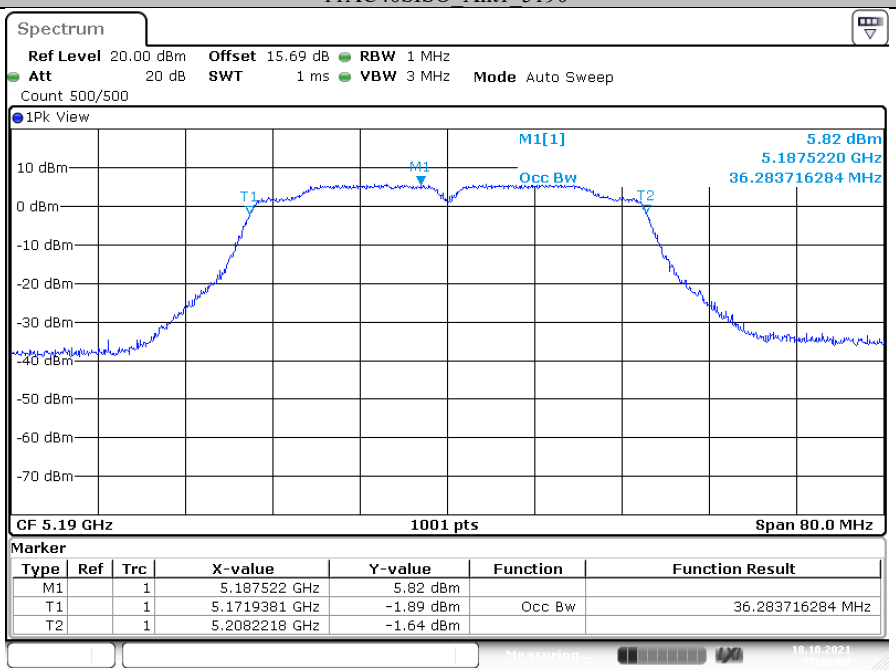

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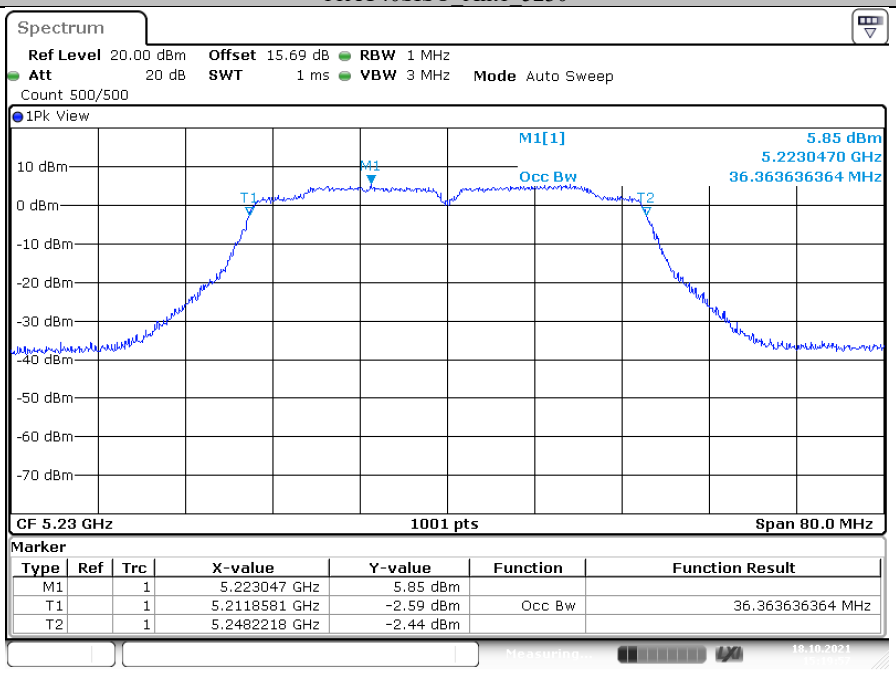

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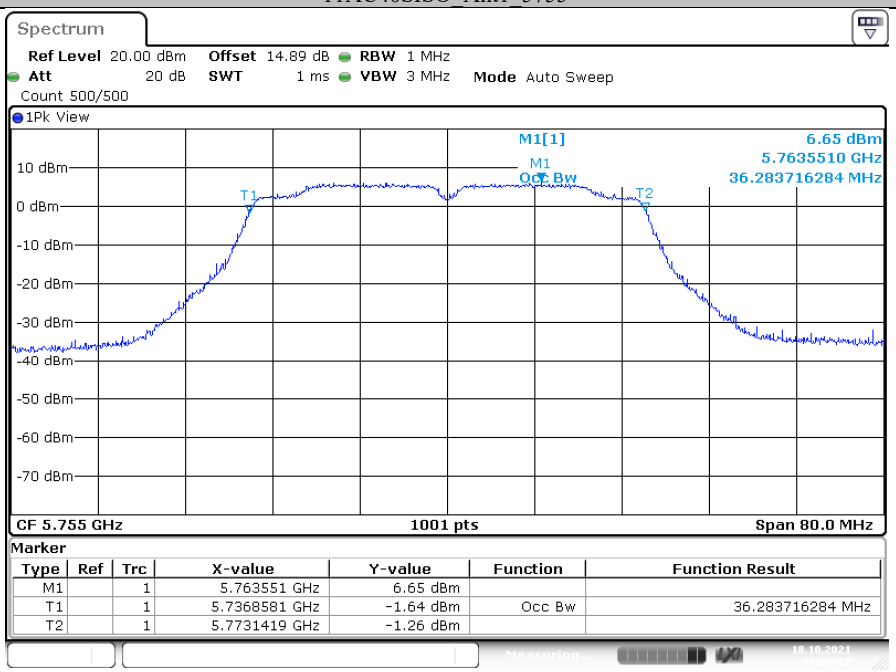

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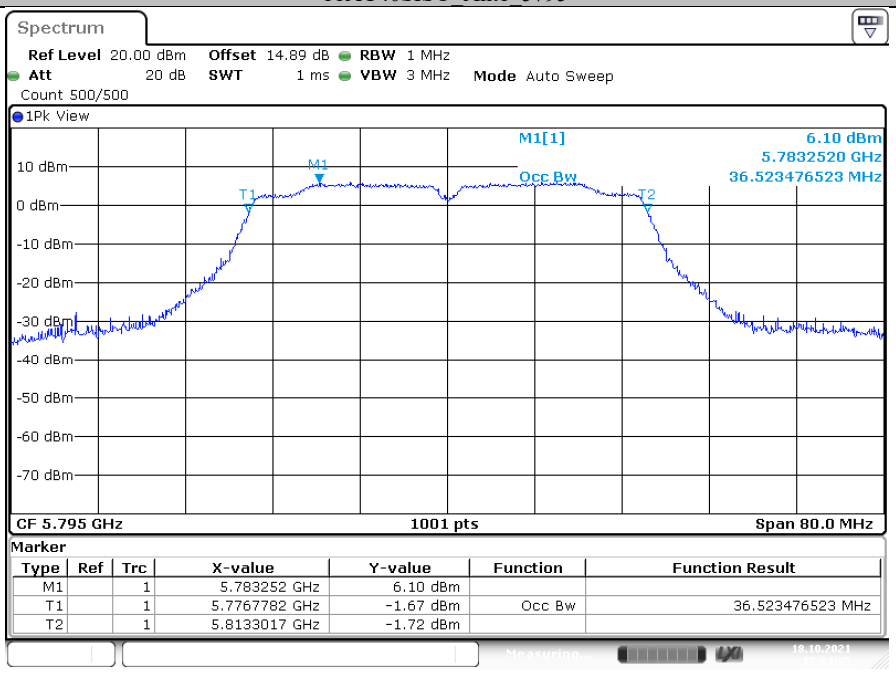

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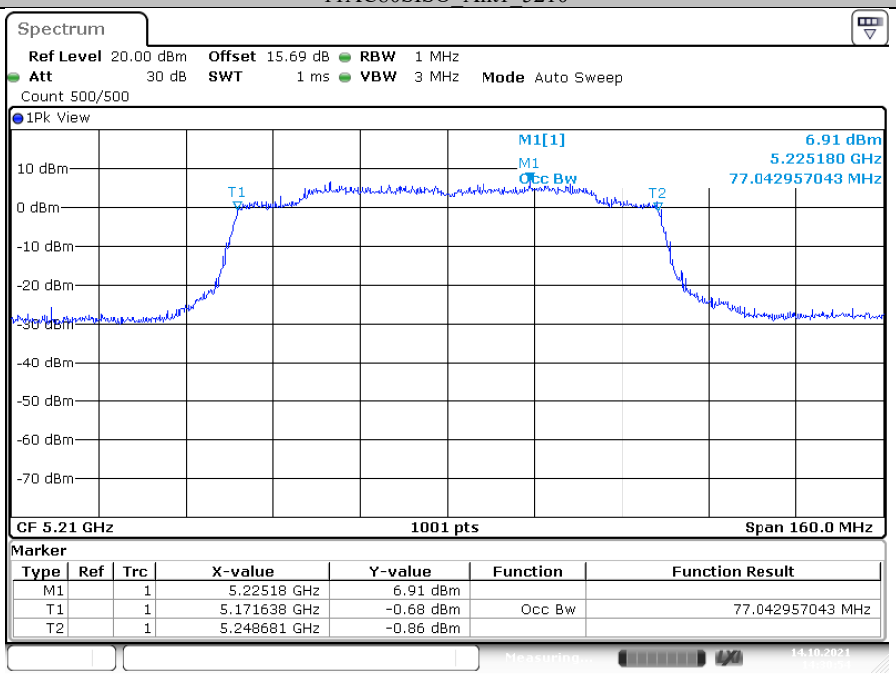

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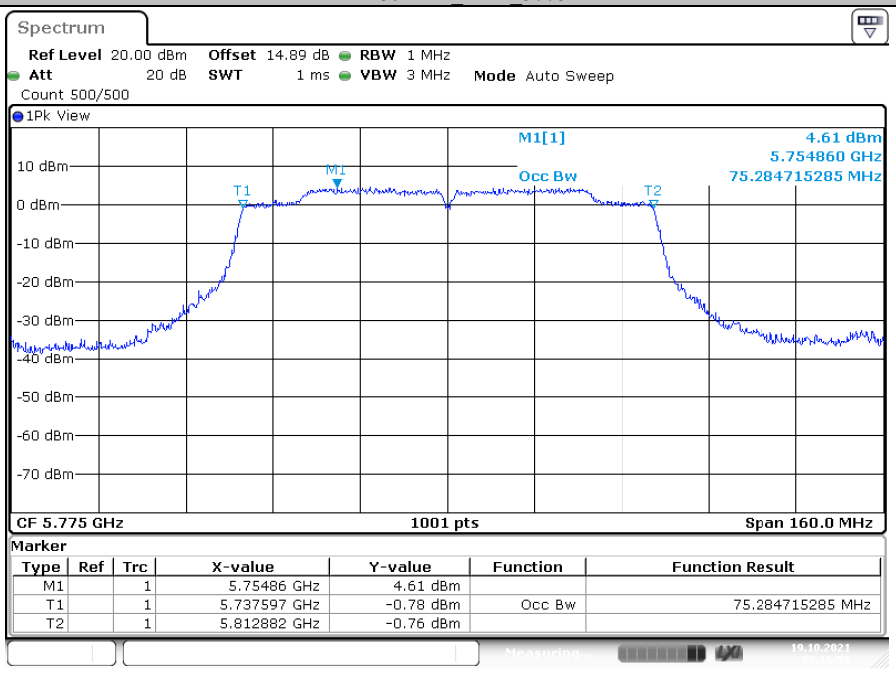

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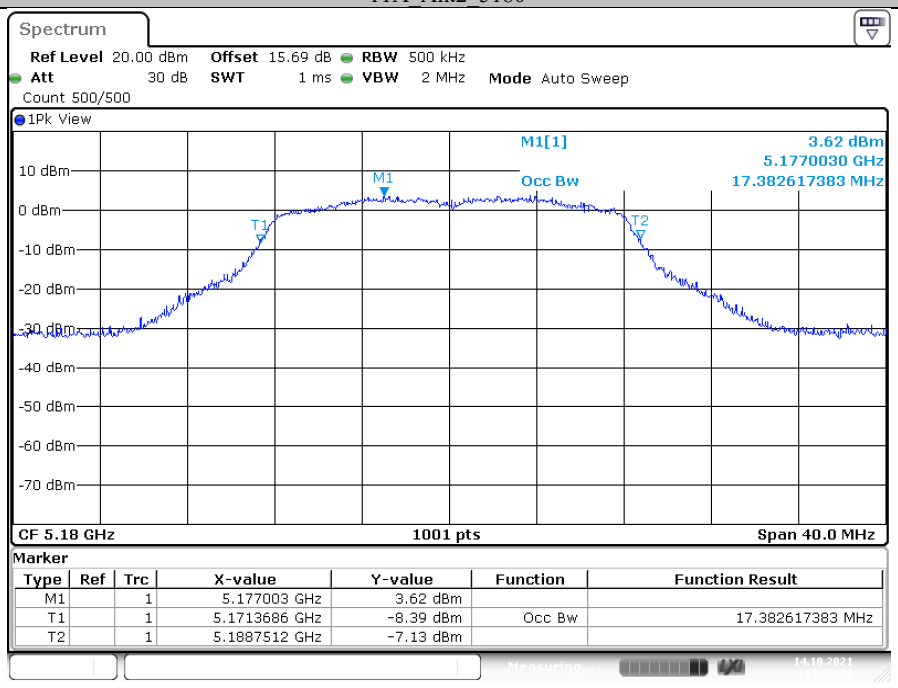

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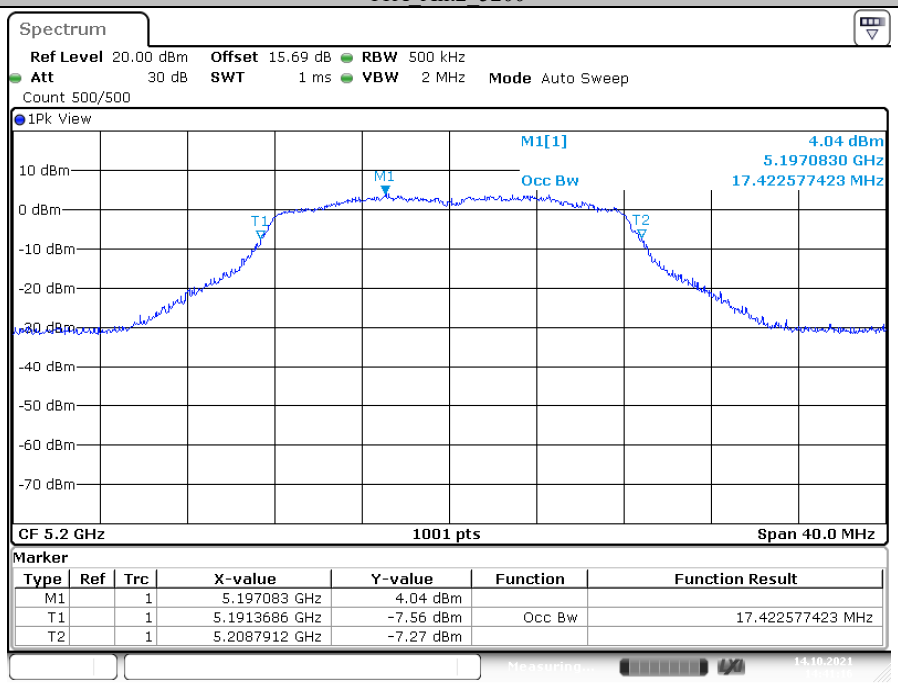

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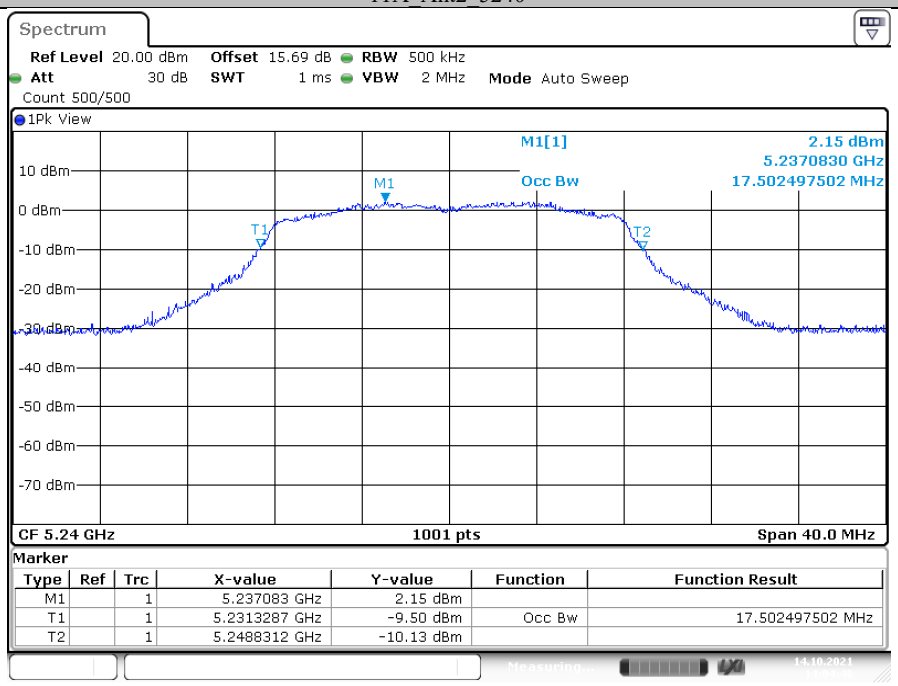

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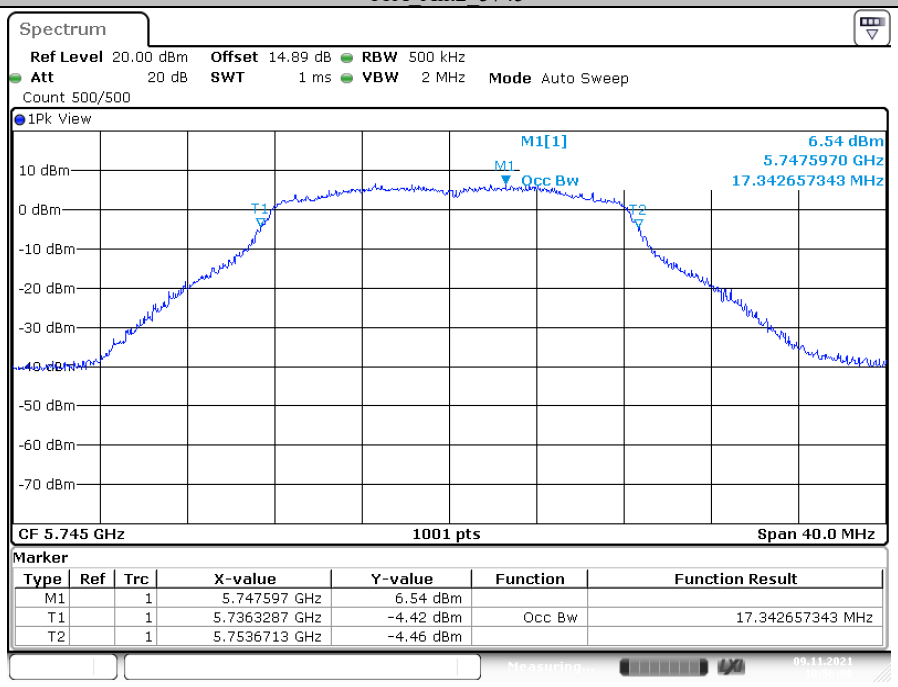

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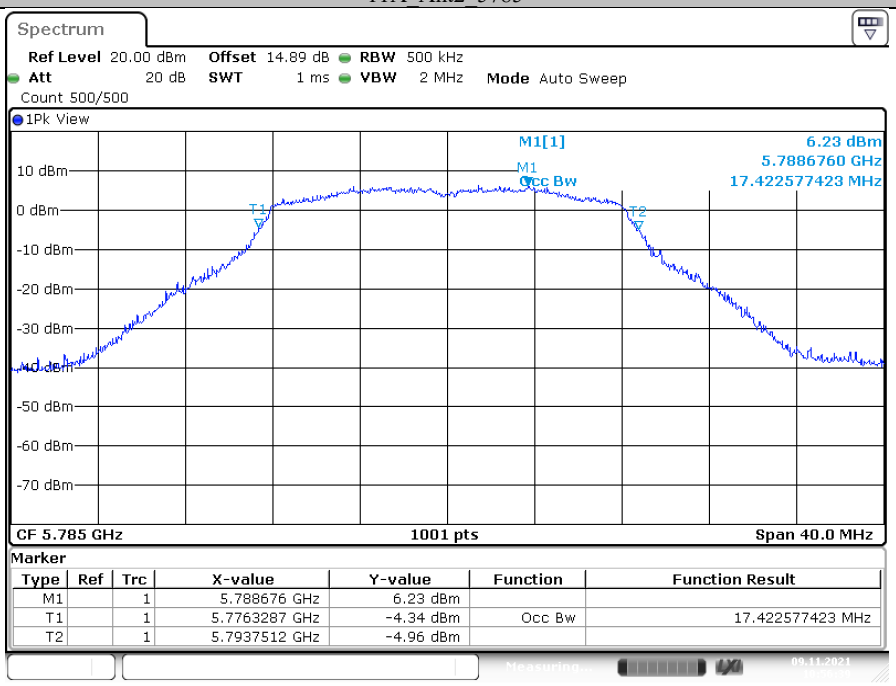

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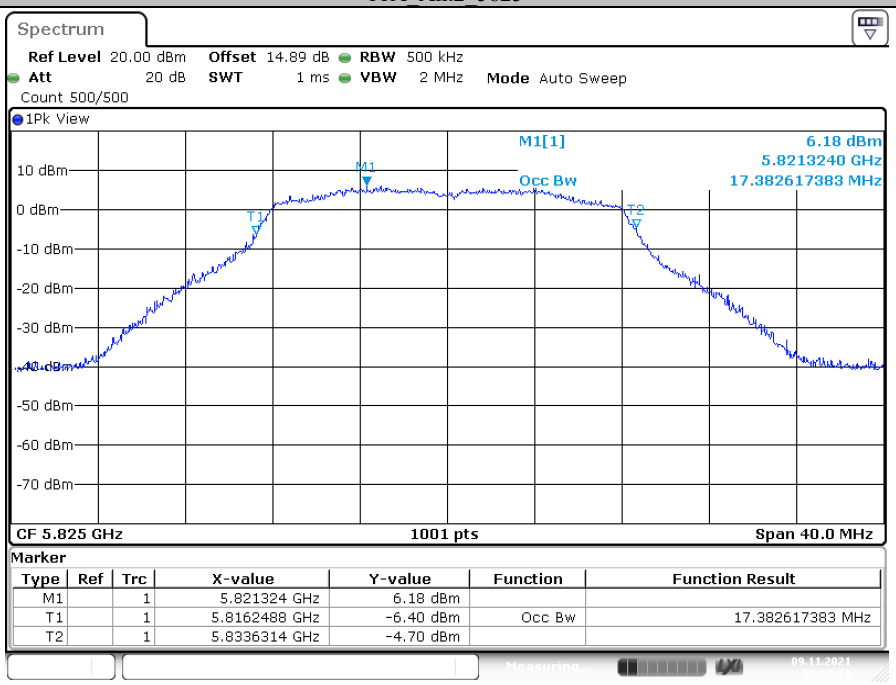

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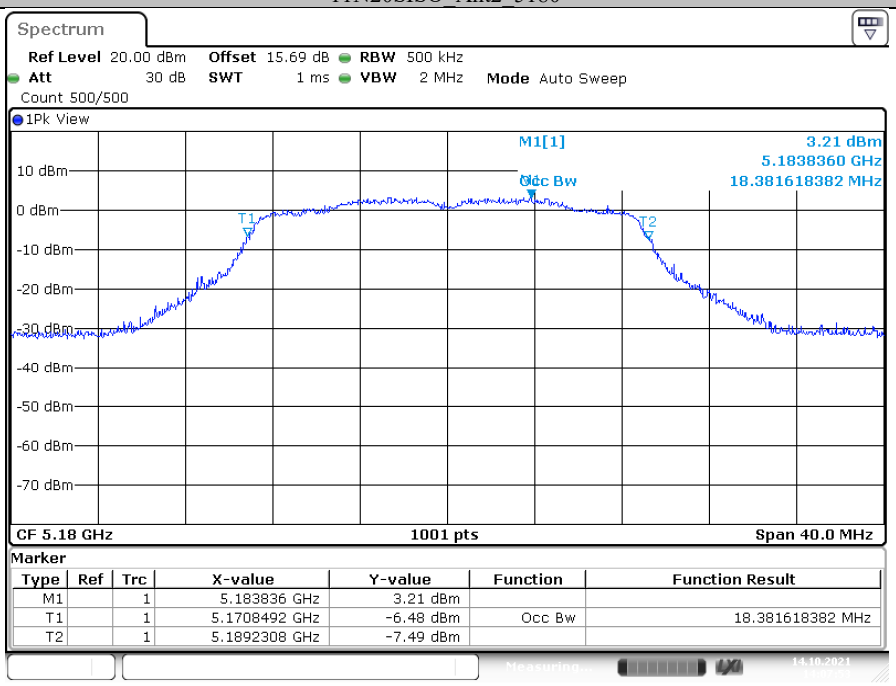

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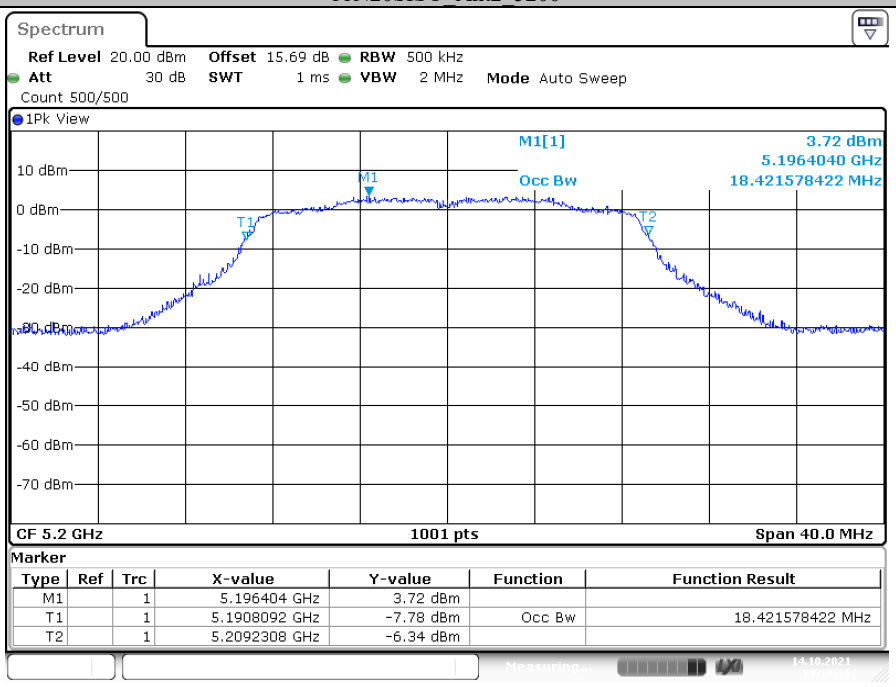

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