FCC RF Test Report

APPLICANT	:	Xiaomi Communications Co., Ltd.
EQUIPMENT	:	Mobile Phone
BRAND NAME	:	Xiaomi
MODEL NAME	:	23078PND5G
FCC ID	:	2AFZZND5G
STANDARD	:	FCC Part 15 Subpart E §15.407
CLASSIFICATION	:	(NII) Unlicensed National Information Infrastructure
TEST DATE(S)	:	May 21, 2023 ~ Jun. 15, 2023

We, Sporton International Inc. (ShenZhen), would like to declare that the tested sample has been evaluated in accordance with the test procedures and has been in compliance with the applicable technical standards.

The test results in this report apply exclusively to the tested model / sample. Without written approval of Sporton International Inc. (ShenZhen), the test report shall not be reproduced except in full.

Jason Jia

Approved by: Jason Jia

ACCREDITED
Cert #5145.01

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People's Republic of China

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REVISION HISTORY

REPORT NO.	VERSION	DESCRIPTION	ISSUED DATE
FR351205E	Rev. 01	Initial issue of report	Jun. 26, 2023

SUMMARY OF TEST RESULT

Report Section	FCC Rule	Description	Limit for U-NII-1/2A/2C	Limit for U-NII-3	Result	Remark
3.1	2.1049 & 15.403(i)	6dB, 26dB & 99% Bandwidth	-	6dB Bandwidth > 500kHz	Pass	-
3.2	15.407(a)	Maximum Conducted Output Power	≤ 24 dBm	≤ 30 dBm	Pass	-
3.3	15.407(a)	Power Spectral Density	≤ 11 dBm/MHz	≤ 30 dBm/500kHz	Pass	-
3.4	15.407(b)	Unwanted Emissions	15.407(b) & 15.209(a)	15.407(b)(4)(i) &15.209(a)	Pass	Under limit 3.31 dB at 5725.16 MHz
3.5	15.207	AC Conducted Emission	15.207(a)	15.207(a)	Pass	Under limit 15.49 dB at 1.03 MHz
3.6	15.203 & 15.407(a)	Antenna Requirement	15.203 & 15.407(a)	15.203 & 15.407(a)	Pass	-

Conformity Assessment Condition:

1. The test results (PASS/FAIL) with all measurement uncertainty excluded are presented against the regulation limits or in accordance with the requirements stipulated by the applicant/manufacturer who shall bear all the risks of non-compliance that may potentially occur if measurement uncertainty is taken into account.
2. The measurement uncertainty please refer to each test result in the section “Measurement Uncertainty”

Disclaimer:

The product specifications of the EUT presented in the test report that may affect the test assessments are declared by the manufacturer who shall take full responsibility for the authenticity.

1 General Description

1.1 Applicant

Xiaomi Communications Co., Ltd.
#019, 9th Floor, Building 6, 33 Xi'erqi Middle Road, Haidian District, Beijing, China, 100085

1.2 Manufacturer

Xiaomi Communications Co., Ltd.
#019, 9th Floor, Building 6, 33 Xi'erqi Middle Road, Haidian District, Beijing, China, 100085

1.3 Product Feature of Equipment Under Test

Product Feature	
Equipment	Mobile Phone
Brand Name	Xiaomi
Model Name	23078PND5G
FCC ID	2AFZZND5G
IMEI Code	Conducted: 861585060041561/861585060041579 Conduction: 861585060055702/861585060055710 Radiation: 861585060047220/861585060047238 861585060055041/861585060055058
HW Version	P2.0
SW Version	MIUI 14
EUT Stage	Identical Prototype

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

1.4 Product Specification of Equipment Under Test

Standards-related Product Specification	
Tx/Rx Frequency Range	5180 MHz ~ 5240 MHz 5260 MHz ~ 5320 MHz 5500 MHz ~ 5720 MHz 5745 MHz ~ 5825 MHz
Maximum Output Power to Antenna	**MIMO <Ant. 5 + 18>** **<5180 MHz ~ 5240 MHz>** 802.11a : 20.50 dBm / 0.1122W 802.11n HT20 : 20.04 dBm / 0.1009 W 802.11n HT40 : 20.10 dBm / 0.1023 W 802.11ac VHT20: 19.93 dBm / 0.0984 W 802.11ac VHT40: 19.94 dBm / 0.0986 W 802.11ac VHT80: 15.14 dBm / 0.0327 W 802.11ac VHT160: 14.53 dBm / 0.0284 W 802.11ax HE20: 20.64 dBm / 0.1159 W 802.11ax HE40: 20.21 dBm / 0.1050 W 802.11ax HE80: 15.51 dBm / 0.0356 W 802.11ax HE160: 14.63 dBm / 0.0290 W 802.11be EHT20: 20.72 dBm / 0.1180 W 802.11be EHT40: 20.32 dBm / 0.1076 W 802.11be EHT80: 15.74 dBm / 0.0375 W 802.11be EHT160: 14.93 dBm / 0.0311 W **<5260 MHz ~ 5320 MHz>** 802.11a : 20.27 dBm / 0.1064 W 802.11n HT20 : 20.38 dBm / 0.1091 W 802.11n HT40 : 20.50 dBm / 0.1122 W 802.11ac VHT20: 20.26 dBm / 0.1062 W 802.11ac VHT40: 20.34 dBm / 0.1081 W 802.11ac VHT80: 17.94 dBm / 0.0622 W 802.11ax HE20: 20.52 dBm / 0.1127 W 802.11ax HE40: 20.61 dBm / 0.1151 W 802.11ax HE80: 18.31 dBm / 0.0678 W 802.11be EHT20: 21.04 dBm / 0.1271 W 802.11be EHT40: 20.72 dBm / 0.1180 W 802.11be EHT80: 18.54 dBm / 0.0714 W **<5500 MHz ~ 5720 MHz >** 802.11a : 15.69 dBm / 0.0371 W 802.11n HT20 : 15.66 dBm / 0.0368 W 802.11n HT40 : 15.61 dBm / 0.0364 W 802.11ac VHT20: 15.55 dBm / 0.0359 W 802.11ac VHT40: 15.45 dBm / 0.0351 W 802.11ac VHT80: 15.20 dBm / 0.0331 W 802.11ac VHT160: 14.05 dBm / 0.0254 W 802.11ax HE20: 15.81 dBm / 0.0381 W 802.11ax HE40: 15.82 dBm / 0.0382 W 802.11ax HE80: 15.55 dBm / 0.0359 W 802.11ax HE160: 14.13 dBm / 0.0259 W 802.11be EHT20: 15.89 dBm / 0.0388 W 802.11be EHT40: 15.97 dBm / 0.0395 W 802.11be EHT80: 15.64 dBm / 0.0366 W 802.11be EHT160: 14.38 dBm / 0.0274 W **<5745 MHz ~ 5825 MHz>**

	802.11a : 13.41 dBm / 0.0219 W 802.11n HT20 : 13.38 dBm / 0.0218 W 802.11n HT40 : 13.32 dBm / 0.0215 W 802.11ac VHT20: 13.32 dBm / 0.0215 W 802.11ac VHT40: 13.25 dBm / 0.0211 W 802.11ac VHT80: 13.20 dBm / 0.0209 W 802.11ax HE20: 13.42 dBm / 0.0220 W 802.11ax HE40: 13.35 dBm / 0.0216 W 802.11ax HE80: 13.35 dBm / 0.0216 W 802.11be EHT20: 13.54 dBm / 0.0226 W 802.11be EHT40: 13.49 dBm / 0.0223 W 802.11be EHT80: 13.39 dBm / 0.0218 W
99% Occupied Bandwidth	**<5180 MHz ~ 5240 MHz>** 802.11a : 16.943 MHz 802.11be EHT20 : 19.021 MHz 802.11be EHT40 : 37.882 MHz 802.11be EHT80 : 77.363 MHz **<5260 MHz ~ 5320 MHz>** 802.11a : 16.903 MHz 802.11be EHT20 : 19.021 MHz 802.11be EHT40 : 37.962 MHz 802.11be EHT80 : 77.203 MHz 802.11be EHT160 : 157.922 MHz **<5500 MHz ~ 5720 MHz>** 802.11a : 16.663 MHz 802.11be EHT20 : 18.941 MHz 802.11be EHT40 : 37.962 MHz 802.11be EHT80 : 77.842 MHz 802.11be EHT160 : 157.602 MHz **<5745 MHz ~ 5825 MHz>** 802.11a : 16.743 MHz 802.11be EHT20 : 18.941 MHz 802.11be EHT40 : 37.962 MHz 802.11be EHT80 : 77.682 MHz
Antenna Type / Gain	**<5180 MHz ~ 5240 MHz>** <Ant. 5> : Fixed Internal Antenna with gain -1.29 dBi <Ant. 18> : Fixed Internal Antenna with gain -1.60 dBi **<5260 MHz ~ 5320 MHz>** <Ant. 5> : Fixed Internal Antenna with gain -1.36 dBi <Ant. 18> : Fixed Internal Antenna with gain -1.58 dBi **<5500 MHz ~ 5720 MHz>** <Ant. 5> : Fixed Internal Antenna with gain 0.00 dBi <Ant. 18> : Fixed Internal Antenna with gain -1.49 dBi **<5745 MHz ~ 5825 MHz>** <Ant. 5> : Fixed Internal Antenna with gain 0.00 dBi <Ant. 18> : Fixed Internal Antenna with gain -1.29 dBi
Type of Modulation	802.11a/n: OFDM (BPSK / QPSK / 16QAM / 64QAM) 802.11ac: OFDM (BPSK / QPSK / 16QAM / 64QAM / 256QAM) 802.11ax: OFDM (BPSK / QPSK / 16QAM / 64QAM / 256QAM / 1024QAM) 802.11be: OFDM (BPSK / QPSK / 16QAM / 64QAM / 256QAM / 1024QAM / 4096QAM)

Note:

1. For WLAN SISO & MIMO mode, the whole testing has assessed only MIMO mode by referring to the higher normal conducted power.
2. WLAN MIMO only support CDD mode.
3. For 802.11n/11ac/11ax/11be mode, the whole testing have assessed only 802.11be EHT20/ EHT 40/ EHT 80/ EHT 160 by referring to the higher output power.
4. 802.11ax/be support OFDMA full RU tone and partial RU tone, both full RU and partial RU-left (for low CH) and partial RU-right (for high CH) test output power/PSD, the full RU PSD > partial RU, therefore the full RU perform full test to cover partial RU, and partial RU verify Bandedge/Spurious.
5. 802.11be support small size RU, Large size RU and Puncturing modes as below, and these partial RU Power/PSD less than full RU, therefore these partial RU only assess Power Density/RSE.

<Small size RU 52+26 Tone>:

Bandwidth	Tones		Index		For test modes configure
20MHz	26	52	1	38	1
20MHz	52	26	38	4	2
20MHz	52	26	39	7	3

<Small size RU 106+26 Tone>:

Bandwidth	Tones		Index		For test modes configure
20MHz	106	26	53	4	1
20MHz	26	106	4	54	2

<Large size RU 484+242 tone> & <80M BW Puncturing 20MHz>:

Bandwidth	Tones		Index		For test modes configure
80MHz	242	484	62	66	1
80MHz	242	484	61	66	2
80MHz	484	242	65	64	3
80MHz	484	242	65	63	4

<Large size RU 996+484 tone> & <160M BW Puncturing 40MHz>:

Bandwidth	Tones		Index		For test modes configure
160MHz	484-Left	996-Right	66-Left	67-Right	1
160MHz	484-Left	996-Right	65-Left	67-Right	2
160MHz	996-Left	484-Right	67-Left	66-Right	3
160MHz	996-Left	484-Right	67-Left	65-Right	4

<Large size RU 996+484+242 tone> & <160M BW Puncturing 20MHz>:

Bandwidth	Tones			Index			For test modes configure
160MHz	242-Left	484-Left	996-Right	62-Left	66-Left	67-Right	1
160MHz	242-Left	484-Left	996-Right	61-Left	66-Left	67-Right	2
160MHz	484-Left	242-Left	996-Right	65-Left	64-Left	67-Right	3
160MHz	484-Left	242-Left	996-Right	65-Left	63-Left	67-Right	4
160MHz	996-Left	242-Right	484-Right	67-Left	62-Right	66-Right	5
160MHz	996-Left	242-Right	484-Right	67-Left	61-Right	66-Right	6
160MHz	996-Left	484-Right	242-Right	67-Left	65-Right	64-Right	7
160MHz	996-Left	484-Right	242-Right	67-Left	65-Right	63-Right	8

Only the worse cases are shown in this report.

6. The worse cases of RSE for partial RU, Large size RU and small size RU are shown in this report.

1.5 Modification of EUT

No modifications are made to the EUT during all test items.

1.6 Testing Location

Sporton International Inc. (ShenZhen) is accredited to ISO/IEC 17025:2017 by American Association for Laboratory Accreditation with Certificate Number 5145.01.

Test Firm	Sporton International Inc. (ShenZhen)		
Test Site Location	1/F, 2/F, Bldg 5, Shiling Industrial Zone, Xinwei Village, Xili, Nanshan, Shenzhen, 518055 People's Republic of China TEL: +86-755-86379589 FAX: +86-755-86379595		
Test Site No.	**Sporton Site No.**	**FCC Designation No.**	**FCC Test Firm Registration No.**
	CO01-SZ TH01-SZ	CN1256	421272

Test Firm	Sporton International Inc. (ShenZhen)		
Test Site Location	101, 1st Floor, Block B, Building 1, No. 2, Tengfeng 4th Road, Fenghuang Community, Fuyong Street, Baoan District, Shenzhen City Guangdong Province China 518103 TEL: +86-755-33202398		
Test Site No.	**Sporton Site No.**	**FCC Designation No.**	**FCC Test Firm Registration No.**
	03CH04-SZ	CN1256	421272

1.7 Test Software

Item	Site	Manufacturer	Name	Version
1.	03CH04-SZ	AUDIX	E3	6.2009-8-24
2.	CO01-SZ	AUDIX	E3	6.120613b

1.8 Applicable Standards

According to the specifications of the manufacturer, the EUT must comply with the requirements of the following standards:

- 47 CFR Part 15 Subpart E
- FCC KDB 789033 D02 General UNII Test Procedures New Rules v02r01.
- FCC KDB 662911 D01 Multiple Transmitter Output v02r01.
- ANSI C63.10-2013

Remark:

1. All test items were verified and recorded according to the standards and without any deviation during the test.
2. This EUT has also been tested and complied with the requirements of FCC Part 15, Subpart B, recorded in a separate test report.

2 Test Configuration of Equipment Under Test

a. The EUT has been associated with peripherals and configuration operated in a manner tended to maximize its emission characteristics in a typical application. Frequency range investigated: conduction emission (150 kHz to 30 MHz), radiation emission (9 kHz to the 10th harmonic of the highest fundamental frequency or to 40 GHz, whichever is lower). For radiated measurement, pre-scanned in three orthogonal panels, X, Y, Z. The worst cases (Y plane) were recorded in this report.

b. AC power line Conducted Emission was tested under maximum output power.

2.1 Carrier Frequency and Channel

Frequency Band	Channel	Freq. (MHz)	Channel	Freq. (MHz)
5180-5240 MHz U-NII-1	36	5180	44	5220
	38*	5190	46*	5230
	40	5200	48	5240
	42#	5210	-	-

Frequency Band	Channel	Freq.(MHz)	Channel	Freq. (MHz)
5260-5320 MHz U-NII-2A	52	5260	60	5300
	54*	5270	62*	5310
	56	5280	64	5320
	58#	5290	-	-

Frequency Band	Channel	Freq.(MHz)	Channel	Freq. (MHz)
5500-5720MHz U-NII-2C	100	5500	112	5560
	102*	5510	116	5580
	104	5520	132	5660
	106#	5530	134*	5670
	108	5540	136	5680
	110*	5550	140	5700

Frequency Band	Channel	Freq.(MHz)	Channel	Freq. (MHz)
5745-5825 MHz U-NII-3	149	5745	157	5785
	151*	5755	159*	5795
	153	5765	161	5805
	155#	5775	165	5825

Frequency Band	Channel	Freq.(MHz)	Channel	Freq. (MHz)
TDWR Channel	114[2]	5570	124	5620
	118*	5590	126*	5630
	120	5600	128	5640
	122[#]	5610	-	-

Frequency Band	Channel	Freq.(MHz)	Channel	Freq. (MHz)
Straddle Channel	138[#]	5690	144	5720
	142*	5710	50[2]	5250

Note:

1. The above Frequency and Channel in "*" are 40MHz BW channels.
2. The above Frequency and Channel in "#" are 80MHz BW channels.
3. The above Frequency and Channel in "2" are 160MHz BW channels.

2.2 Test Mode

Final test modes are considering the modulation and worse data rates as below table.

MIMO Mode

Modulation	Data Rate
802.11a	**6 Mbps**
802.11be EHT20	**MCS0**
802.11be EHT40	**MCS0**
802.11be EHT80	**MCS0**
802.11be EHT160	**MCS0**

AC Conducted Emission	Mode 1 : GSM 850 Idle + Bluetooth Link + WLAN Link(5G) + USB Cable 1(Charging from Adapter1) + Battery 1

Co-location mode
1. WLAN 2.4G 802.11g CH01 Tx + WLAN 5G 802.11be EHT20 CH140 Tx + LTE Band 48 Link
2. WLAN 2.4G 802.11g CH01 Tx + WLAN 5G 802.11be EHT20 CH140 Tx + BLE(2M) Ch39 Tx + LTE Band 48 Link

Remark:

1. For Radiated Test Cases, the tests were performance with Adapter and USB Cable.
2. RSE co-location modes are assessed from the worst combination of BT/WLAN 2.4G + WLAN 5G + WWAN Link mode.

Ch. #		U-NII-1	U-NII-2A	U-NII-2C	U-NII-3
		802.11a	802.11a	802.11a	802.11a
L	Low	36	52	100	149
M	Middle	44	60	116	157
H	High	48	64	140	165
Straddle		-	-	144	-

Ch. #		U-NII-1	U-NII-2A	U-NII-2C	U-NII-3
		802.11be EHT20	802.11be EHT20	802.11be EHT20	802.11be EHT20
L	Low	36	52	100	149
M	Middle	44	60	116	157
H	High	48	64	140	165
Straddle		-	-	144	-

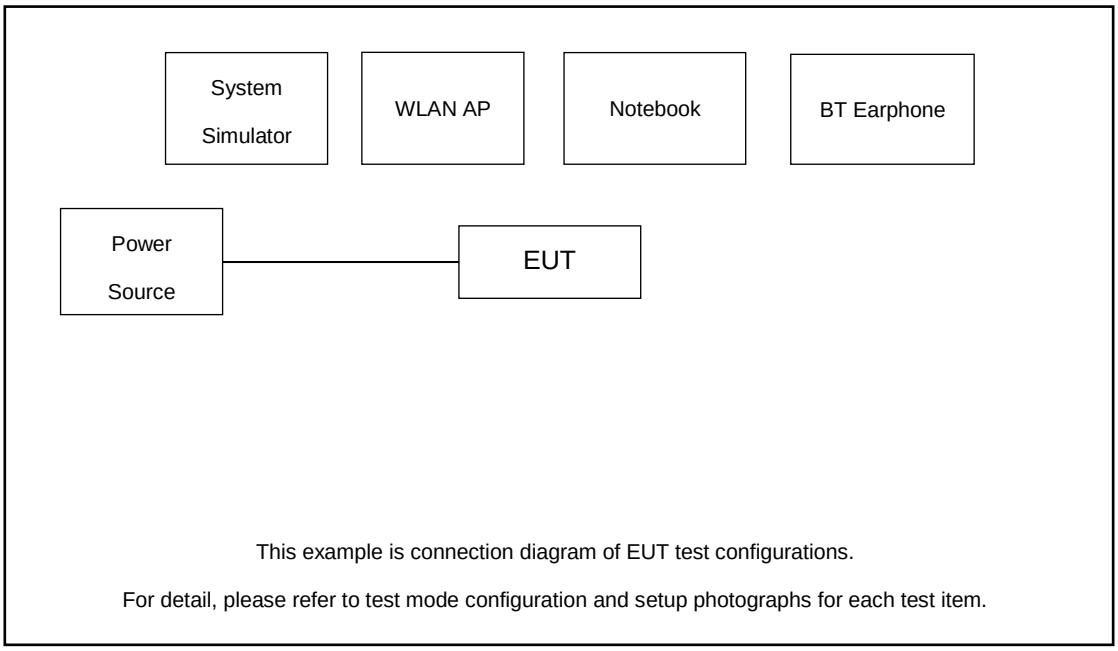
Ch. #		U-NII-1	U-NII-2A	U-NII-2C	U-NII-3
		802.11be EHT40	802.11be EHT40	802.11be EHT40	802.11be EHT40
L	Low	38	54	102	151
M	Middle	-	-	110	-
H	High	46	62	134	159
Straddle		-	-	142	-

Ch. #		U-NII-1	U-NII-2A	U-NII-2C	U-NII-3
		802.11be EHT80	802.11be EHT80	802.11be EHT80	802.11be EHT80
L	Low	-	-	106	-
M	Middle	42	58	-	155
H	High	-	-	122	-
Straddle		-	-	138	-

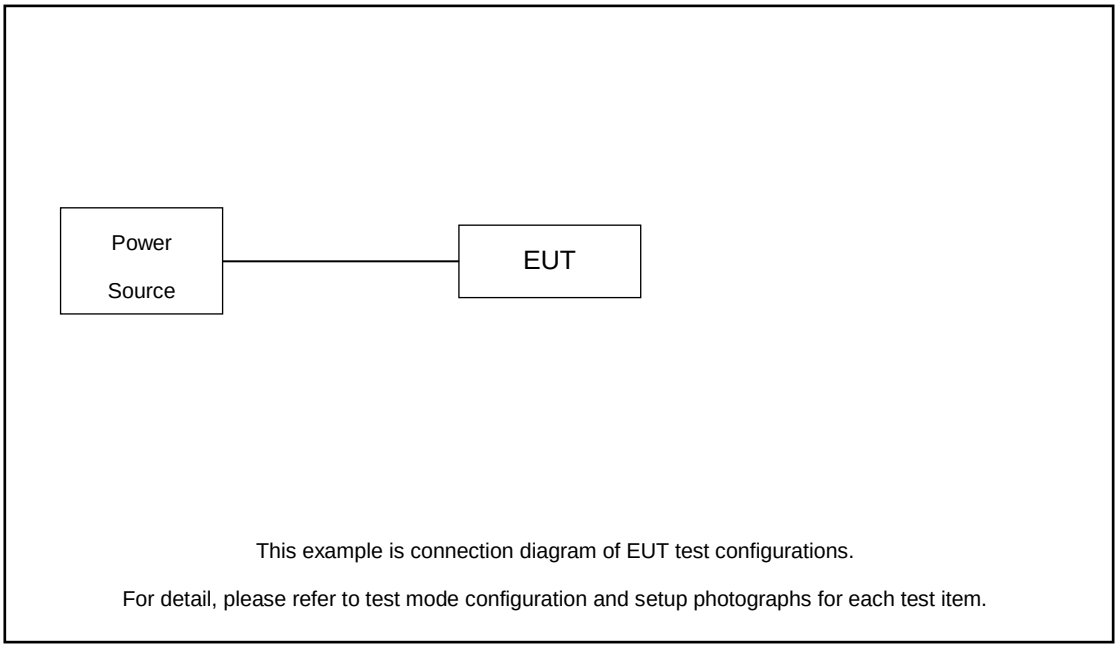
Ch. #		U-NII-1	U-NII-2A	U-NII-2C	U-NII-3
		802.11be EHT160	802.11be EHT160	802.11be EHT160	802.11be EHT160
M	Middle	50		114	-

2.3 Connection Diagram of Test System

For AC Conducted Emission:



For Radiated Emission:



2.4 Support Unit used in test configuration and system

Item	Equipment	Trade Name	Model Name	FCC ID	Data Cable	Power Cord
1.	Base Station(LTE)	Anritsu	MT8820C	N/A	N/A	Unshielded,1.8m
2.	Base Station	Anritsu	MT8821C	N/A	N/A	Unshielded,1.8m
3.	Bluetooth Earphone	Samsung	EO-MG900	PYAHS-107W	N/A	N/A
4.	WLAN AP	Dlink	DIR-820L	KA2IR820LA1	N/A	Unshielded,1.8m

2.5 EUT Operation Test Setup

For WLAN RF test items, an engineering test program was provided and enabled to make EUT continuously transmit.

For AC power line conducted emissions, the EUT was set to connect with the WLAN AP under large package sizes transmission.

2.6 Measurement Results Explanation Example

For all conducted test items:

The offset level is set in the spectrum analyzer to compensate the RF cable loss and attenuator factor between EUT conducted output port and spectrum analyzer. With the offset compensation, the spectrum analyzer reading level is exactly the EUT RF output level.

Example :

The spectrum analyzer offset is derived from RF cable loss and attenuator factor.

Offset = RF cable loss + attenuator factor.

Following shows an offset computation example with cable loss 4.03dB and 10dB attenuator.

Offset(dB) = RF cable loss(dB) + attenuator factor(dB).

= 4.03 + 10 = 14.03 (dB)

3 Test Result

3.1 6dB and 26dB and 99% Occupied Bandwidth Measurement

3.1.1 Description of 6dB and 26dB and 99% Occupied Bandwidth

The minimum 6 dB bandwidth shall be at least 500 kHz.

26dB and 99% Occupied bandwidth are reporting only.

3.1.2 Measuring Instruments

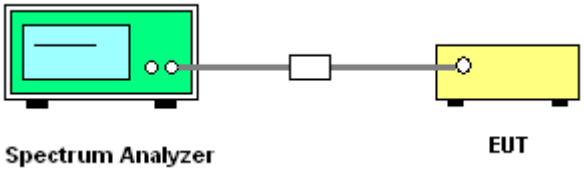
The measuring equipment is listed in the section 4 of this test report.

3.1.3 Test Procedures

1. The testing follows FCC KDB 789033 D02 General UNII Test Procedures New Rules v02r01.

☒	Section C) Bandwidth Measurement 1. Emission Bandwidth (EBW) and 99% OBW
	1. Set RBW = approximately 1% of the emission bandwidth. **2.** Set the VBW > RBW. **3.** Detector = Peak. **4.** Trace mode = max hold **5.** Measure the maximum width of the emission that is 26 dB down from the peak 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%. **6.** For 99% Bandwidth Measurement, the spectrum analyzer's resolution bandwidth (RBW) is set to 1%~5% of the OBW and set the Video bandwidth (VBW) ≥ 3 * RBW. **7.** Measure and record the results in the test report.
☒	Section C) Bandwidth Measurement 2. Minimum Emission Bandwidth for the band 5.725 - 5.85 GHz
	1. Set RBW = 100kHz. **2.** Set the VBW ≥ 3 x RBW. **3.** Detector = Peak. **4.** Trace mode = max hold **5.** Measure the maximum width of the emission that is 6 dB down from the peak of the emission. **6.** Measure and record the results in the test report.

3.1.4 Test Setup



3.1.5 Test Result of 6dB Bandwidth

Please refer to Appendix A.

3.2 Maximum Conducted Output Power Measurement

3.2.1 Limit of Maximum Conducted Output Power

<FCC 14-30 CFR 15.407>

For mobile and portable 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.

For the 5.25–5.725 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 26 dB 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.

For Straddle Channel, According to KDB 789033 D02 General UNII Test Procedures New Rules v02r01, If the power and PSD of the devices are uniform and comply with the lower limits specified for the U-NII-2 bands, a single measurement over the entire emission bandwidth can be performed to show compliance.

If transmitting antennas of directional gain greater than 6 dBi are used, the peak output power shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

Note that U-NII-2 band, devices with a maximum e.i.r.p. greater than 500 mW shall implement TPC in order to have the capability to operate at least 6 dB below the maximum permitted e.i.r.p. of 1 W.

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3.2.2 Measuring Instruments

The measuring equipment is listed in the section 4 of this test report.

3.2.3 Test Procedures

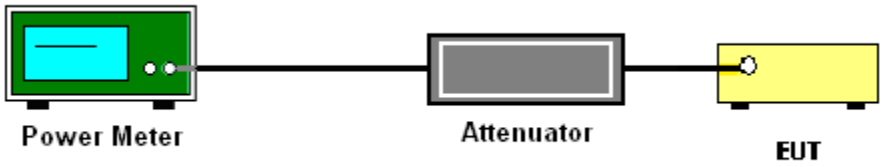
The testing follows Method PM of FCC KDB 789033 D02 General UNII Test Procedures New Rules v02r01.

Method PM (Measurement using an RF average power meter):

1. Measurement is performed using a wideband RF power meter.
2. The EUT is configured to transmit continuously with a consistent duty cycle at its maximum power control level.
3. Measure the average power of the transmitter, and the average power is corrected with duty factor, 10 log(1/x), where x is the duty cycle.
4. For MIMO mode, the measure-and-sum technique should be used for measuring the in-band transmit power of a device.

For Straddle Channel, According to KDB 789033 D02 General UNII Test Procedures New Rules v02r01, If the power and PSD of the devices are uniform and comply with the lower limits specified for the U-NII-2 bands, a single measurement over the entire emission bandwidth can be performed to show compliance.

3.2.4 Test Setup



3.2.5 Test Result of Maximum Conducted Output Power

Please refer to Appendix A.

3.3 Power Spectral Density Measurement

3.3.1 Limit of Power Spectral Density

<FCC 14-30 CFR 15.407>

For mobile and portable client devices in the 5.15–5.25 GHz band, the maximum power spectral density shall not exceed 11dBm in any 1 megahertz band.

For the 5.25–5.725 GHz bands, the maximum power spectral density shall not exceed 11 dBm in any 1 megahertz band.

For the band 5.725–5.85 GHz, the maximum power spectral density shall not exceed 30 dBm in any 500-kHz band.

For Straddle Channel, According to KDB 789033 D02 General UNII Test Procedures New Rules v02r01, If the power and PSD of the devices are uniform and comply with the lower limits specified for the U-NII-2 bands, a single measurement over the entire emission bandwidth can be performed to show compliance.

If transmitting antennas of directional gain greater than 6 dBi are used, the peak output power shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

3.3.2 Measuring Instruments

The measuring equipment is listed in the section 4 of this test report.

3.3.3 Test Procedures

The testing follows FCC KDB 789033 D02 General UNII Test Procedures New Rules v01r04. Section F) Maximum power spectral density.

For devices operating in the bands UNII-1/2A/2C

 # Method SA-2 #

(trace averaging across on and off times of the EUT transmissions, followed by duty cycle correction).

- Measure the duty cycle.
- Set span to encompass the entire emission bandwidth (EBW) of the signal.
- Set RBW = 1 MHz.
- Set VBW ≥ 3 MHz.
- Number of points in sweep ≥ 2 Span / RBW.
- Sweep time = auto.
- Detector = RMS
- Trace average at least 100 traces in power averaging mode.
- Add 10 log(1/x), where x is the duty cycle, to the measured power in order to compute the average power during the actual transmission times. For example, add 10 log(1/0.25) = 6 dB if the duty cycle is 25 percent.

For devices operating in the band UNII-3

 # Method SA-2 #

(trace averaging across on and off times of the EUT transmissions, followed by duty cycle correction).

- Measure the duty cycle.
- Set span to encompass the entire emission bandwidth (EBW) of the signal.
- Set RBW = 500KHz (or 300 kHz if the SA can’t set RBW=500KHz).
- Set VBW ≥ 1 MHz.
- Number of points in sweep ≥ 2 Span / RBW.
- Sweep time = auto.
- Detector = RMS
- Trace average at least 100 traces in power averaging mode.
- If the SA can’t set RBW=500KHz, then add 10 log(500kHz/RBW) to the test result.
- Add 10 log(1/x), where x is the duty cycle, to the measured power in order to compute the average power during the actual transmission times. For example, add 10 log(1/0.25) = 6 dB if the duty cycle is 25 percent.

1. The RF output of EUT was connected to the spectrum analyzer by a low loss cable.
2. Each plot has already offset with cable loss, and attenuator loss. Measure the PPSD and record it.
3. For MIMO mode, calculation method follows FCC KDB 662911 D01 Multiple Transmitter Output v02r01.

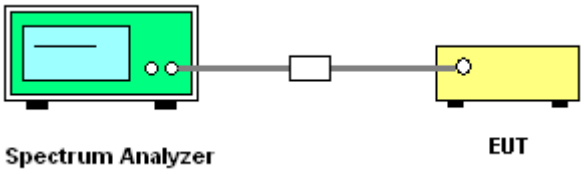
Method (a): Measure and sum the spectra across the outputs (for UNII-1/2A/2C).

The total final Power Spectral Density is the bin-by-bin summation to obtain the combined spectrum. For the device with 2 transmitter outputs. The spectrum measurements of the individual outputs are all performed with the same span and number of points, the spectrum value in the first spectral bin of output 1 is summed with that in the first spectral bin of output 2 to obtain the value for the first frequency bin of the summed spectrum.

Method (b): Measure and sum spectral maxima across the outputs (for UNII-3).

The measurement on each individual output were performed with the same span and number on each individual output. The maximum value (peak) of each spectrum is determined. These maximum values are then summed mathematically in linear power units across the outputs.

3.3.4 Test Setup



3.3.5 Test Result of Power Spectral Density

Please refer to Appendix A.

3.4 Unwanted Emissions Measurement

This section as specified in FCC Part 15.407(b) is to measure unwanted emissions through radiated measurement for band edge spurious emissions and out of band emissions measurement. The unwanted emissions shall comply with 15.407(b)(1) to (6), and restricted bands per FCC Part15.205.

3.4.1 Limit of Unwanted Emissions

(1) For transmitters operating in the 5150-5250 MHz band: all emissions outside of the 5150-5350 MHz band shall not exceed an EIRP of –27dBm/MHz.

For transmitters operating in the 5250-5350 MHz band: all emissions outside of the 5150-5350 MHz band shall not exceed an EIRP of -27 dBm/MHz. Devices operating in the 5250-5350 MHz band that generate emissions in the 5150-5250 MHz band must meet all applicable technical requirements for operation in the 5150-5250 MHz band (including indoor use) or alternatively meet an out-of-band emission EIRP limit of -27 dBm/MHz in the 5150-5250 MHz band.

For transmitters operating in the 5470-5600 MHz and 5650-5725MHz band: all emissions outside of the 5470-5600 MHz and 5650-5725MHz band shall not exceed an EIRP of -27 dBm/MHz.

(2) For transmitters operating in the 5.725-5.85 GHz band:
15.407(b)(4)(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.

(3) Unwanted spurious emissions fallen in restricted bands shall comply with the general field strength limits as below table,

Frequency (MHz)	Field Strength (microvolts/meter)	Measurement Distance (meters)
0.009 – 0.490	2400/F(kHz)	300
0.490 – 1.705	24000/F(kHz)	30
1.705 – 30.0	30	30
30 – 88	100	3
88 – 216	150	3
216 - 960	200	3
Above 960	500	3

(4) EIRP (dBm)	Field Strength at 3m (dBµV/m)
- 27	68.2

Note: The following formula is used to convert the EIRP to field strength.

$$EIRP = E_{Meas} + 20\log(d_{Meas}) - 104.7$$

where

EIRP is the equivalent isotropically radiated power, in dBm

E_{Meas} is the field strength of the emission at the measurement distance, in dBµV/m

d_{Meas} is the measurement distance, in m

(4) ANSI C63.10-2013 clause 12.7.3 note 97

As specified by regulatory requirements, emissions above 1000 MHz that are outside of the restricted bands are subject to a peak emission limit. However, an out-of-band emission that complies with both the average and peak general regulatory limits is not required to satisfy the peak emission limit.

3.4.2 Measuring Instruments

The measuring equipment is listed in the section 4 of this test report.

3.4.3 Test Procedures

1. The testing follows FCC KDB 789033 D02 General UNII Test Procedures New Rules v01r04. Section G) Unwanted emissions measurement.

   (1) Procedure for Unwanted Emissions Measurements Below 1000MHz

   - RBW = 120 kHz
   - VBW = 300 kHz
   - Detector = Peak
   - Trace mode = max hold

   (2) Procedure for Peak Unwanted Emissions Measurements Above 1000 MHz

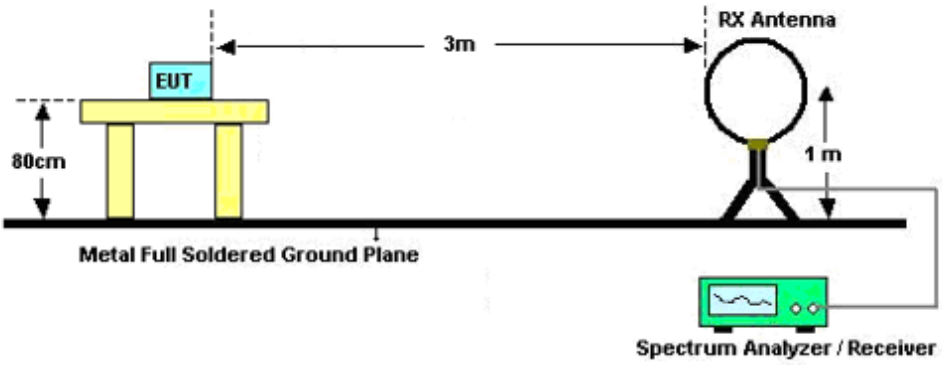
   - RBW = 1 MHz
   - VBW ≥ 3 MHz
   - Detector = Peak
   - Sweep time = auto
   - Trace mode = max hold

   (3) Procedures for Average Unwanted Emissions Measurements Above 1000MHz

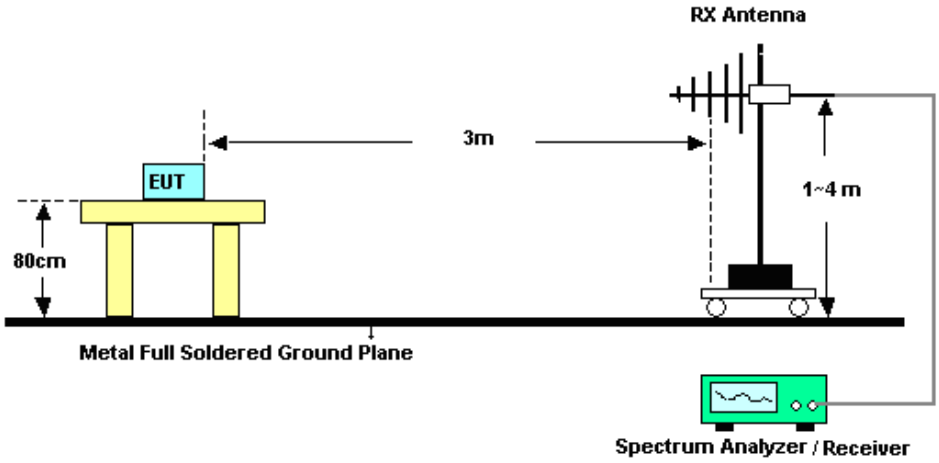
   - RBW = 1 MHz
   - VBW = 10 Hz, when duty cycle is no less than 98 percent.
   - VBW ≥ 1/T, when duty cycle is less than 98 percent where T is the minimum transmission duration over which the transmitter is on.
2. The EUT was placed on a turntable with 0.8 meter for frequency below 1GHz and 1.5 meter for frequency above 1GHz respectively above ground.
3. The EUT was set 3 meters from the interference receiving antenna which was mounted on the top of a variable height antenna tower.
4. The antenna is a broadband antenna and its height is adjusted between one meter and four meters above ground to find the maximum value of the field strength for both horizontal polarization and vertical polarization of the antenna.
5. For each suspected emission, the EUT was arranged to its worst case and then adjust the antenna tower (from 1 m to 4 m) and turntable (from 0 degree to 360 degrees) to find the maximum reading.
6. For testing below 1GHz, if the emission level of the EUT in peak mode was 3 dB lower than the limit specified, then peak values of EUT will be reported, otherwise, the emissions will be repeated one by one using the CISPR quasi-peak method and reported.
7. For testing above 1GHz, the emission level of the EUT in peak mode was 20dB lower than average limit (that means the emission level in average mode also complies with the limit in average mode), then peak values of EUT will be reported, otherwise, the emissions will be measured in average mode again and reported.

3.4.4 Test Setup

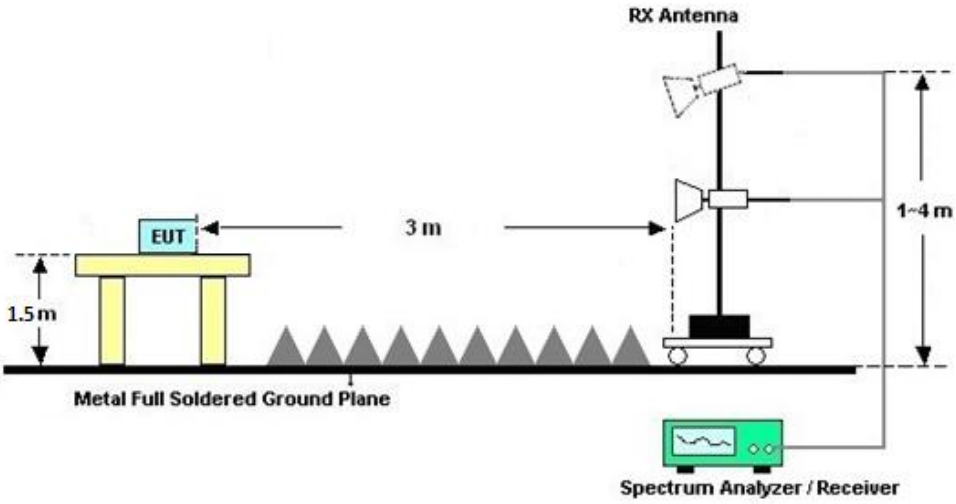
For radiated emissions below 30MHz



For radiated emissions from 30MHz to 1GHz



For radiated emissions above 1GHz



3.4.5 Test Results of Radiated Spurious Emissions (9 kHz ~ 30 MHz)

The low frequency, which started from 9 kHz to 30MHz, was pre-scanned and the result which was 20dB lower than the limit line was not reported.

There is a comparison data of both open-field test site and semi-Anechoic chamber, and the result came out very similar.

3.4.6 Test Result of Radiated Spurious at Band Edges

Please refer to Appendix C.

3.4.7 Duty Cycle

Please refer to Appendix D.

3.4.8 Test Result of Radiated Spurious Emissions (30MHz ~ 10th Harmonic)

Please refer to Appendix C.

3.5 AC Conducted Emission Measurement

3.5.1 Limit of AC Conducted Emission

For equipment that is designed to be connected to the public utility (AC) power line, the radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies within the band 150 kHz to 30 MHz shall not exceed the limits in the following table.

Frequency of emission (MHz)	Conducted limit (dBμV)	
	Quasi-peak	Average
0.15-0.5	66 to 56*	56 to 46*
0.5-5	56	46
5-30	60	50

*Decreases with the logarithm of the frequency.

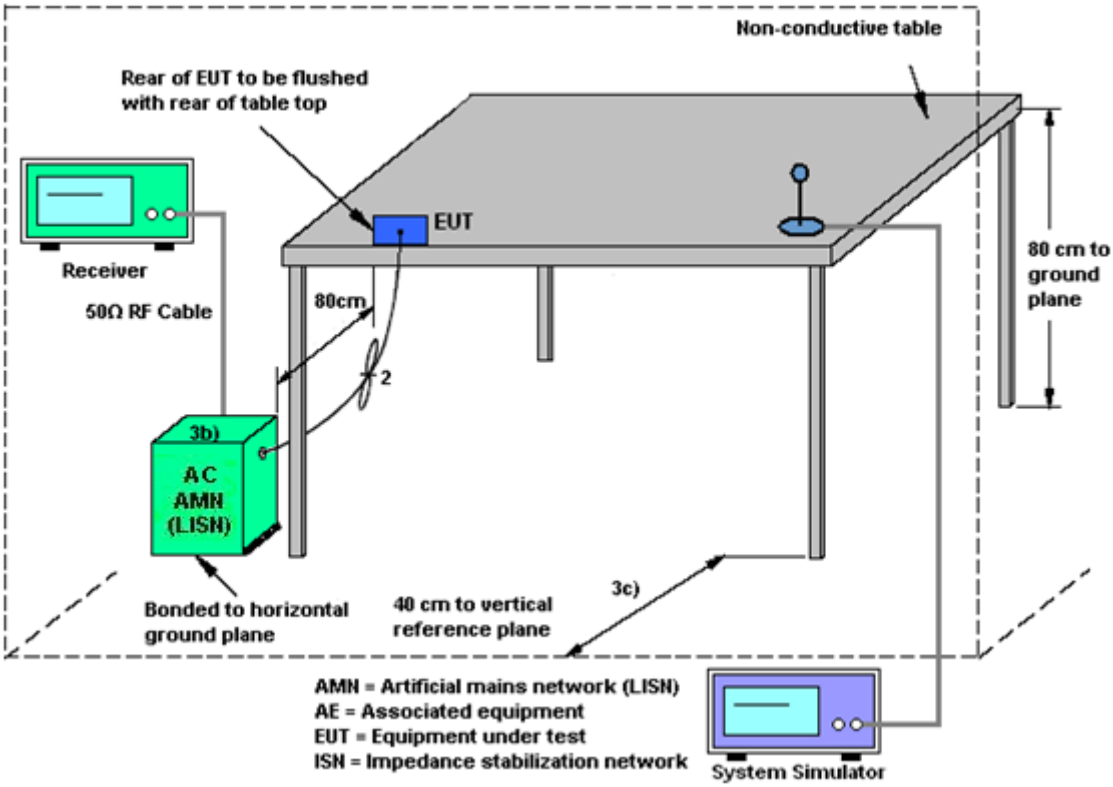
3.5.2 Measuring Instruments

The measuring equipment is listed in the section 4 of this test report.

3.5.3 Test Procedures

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. The FCC states that a 50 ohm, 50 microhenry LISN should be used.
6. Both sides of AC line were checked for maximum conducted interference.
7. The frequency range from 150 kHz to 30 MHz was searched.
8. Set the test-receiver system to Peak Detect Function and specified bandwidth with Maximum Hold Mode.

3.5.4 Test Setup



3.5.5 Test Result of AC Conducted Emission

Please refer to Appendix B.

3.6 Antenna Requirements

3.6.1 Standard Applicable

According to FCC 47 CFR Section 15.407(a)(1)(2) ,if transmitting antenna directional gain is greater than 6 dBi, both the peak transmit power and the peak power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

3.6.2 Antenna Anti-Replacement Construction

An embedded-in antenna design is used.

3.6.3 Antenna Gain

<CDD Modes >

FCC KDB 662911 D01 Multiple Transmitter Output v02r01

For CDD transmissions, directional gain is calculated as

Directional gain = GANT + Array Gain, where Array Gain is as follows.

For power spectral density (PSD) measurements on all devices,

Array Gain = 10 log(NANT/NSS=1) dB.

For power measurements on IEEE 802.11 devices,

Array Gain = 0 dB (i.e., no array gain) for NANT ≤ 4.

Directional gain may be calculated by using the formulas applicable to equal gain antennas with GANT set equal to the gain of the antenna having the highest gain;

The EUT supports CDD mode.

For power, the directional gain GANT is set equal to the antenna having the highest gain, i.e., F)2)f)i).

For PSD, the directional gain calculation is following F)2)f)ii) of KDB 662911 D01 v02r01.

The power and PSD limit should be modified if the directional gain of EUT is over 6 dBi,

The directional gain “DG” is calculated as following table.

<CDD Modes>

	Ant. 5 (dBi)	Ant. 18 (dBi)	DG for Power (dBi)	DG for PSD (dBi)	Power Limit Reduction (dB)	PSD Limit Reduction (dB)
UNII-1	-1.29	-1.60	-1.29	1.57	0.00	0.00
UNII-2A	-1.36	-1.58	-1.36	1.54	0.00	0.00
UNII-2C	0.00	-1.49	0.00	2.30	0.00	0.00
UNII-3	0.00	-1.29	0.00	2.39	0.00	0.00

Power limit reduction = Composite gain – 6dBi, (min = 0)

PSD limit reduction = Composite gain + PSD Array gain – 6dBi, (min = 0)

4 List of Measuring Equipment

Instrument	Manufacturer	Model No.	Serial No.	Characteristics	Calibration Date	Test Date	Due Date	Remark
Spectrum Analyzer	R&S	FSV40	101078	10Hz~40GHz	Apr. 06, 2023	May 21, 2023 ~Jun. 15, 2023	Apr. 05, 2024	Conducted (TH01-SZ)
Pulse Power Senor	Anritsu	MA2411B	1339473	30MHz~40GHz	Dec. 27, 2022	May 21, 2023 ~Jun. 15, 2023	Dec. 26, 2023	Conducted (TH01-SZ)
Power Meter	Anritsu	ML2495A	1542004	50MHz Bandwidth	Dec. 27, 2022	May 21, 2023 ~Jun. 15, 2023	Dec. 26, 2023	Conducted (TH01-SZ)
EMI Test Receiver	R&S	ESR7	101404	9kHz~7GHz	Oct. 19, 2022	May 24, 2023 ~Jun. 15, 2023	Oct. 18, 2023	Radiation (03CH04-SZ)
EXA Spectrum Analyzer	KEYSIGHT	N9010A	MY55150213	10Hz~44GHz	Jul. 07, 2022	May 24, 2023 ~Jun. 15, 2023	Jul. 06, 2023	Radiation (03CH04-SZ)
Loop Antenna	R&S	HFH2-Z2	100354	9kHz~30MHz	Jun. 28, 2022	May 24, 2023 ~Jun. 15, 2023	Jun. 27, 2024	Radiation (03CH04-SZ)
Bilog Antenna	TeseQ	CBL6111D	41909	30MHz~1GHz	May. 14, 2023	May 24, 2023 ~Jun. 15, 2023	May. 13, 2024	Radiation (03CH04-SZ)
Double Ridge Horn Antenna	SCHWARZBECK	BBHA9120D	9120D-1474	1GHz~18GHz	Jul. 07, 2022	May 24, 2023 ~Jun. 15, 2023	Jul. 06, 2023	Radiation (03CH04-SZ)
Horn Antenna	SCHWARZBECK	BBHA9170	9170#679	15GHz~40GHz	Jul. 07, 2022	May 24, 2023 ~Jun. 15, 2023	Jul. 06, 2023	Radiation (03CH04-SZ)
Amplifier	Burgeon	BPA-530	102211	0.01Hz ~3000MHz	Oct. 19, 2022	May 24, 2023 ~Jun. 15, 2023	Oct. 18, 2023	Radiation (03CH04-SZ)
HF Amplifier	MITEQ	AMF-7D-00101800-30-10P-R	1943528	1GHz~18GHz	Oct. 19, 2022	May 24, 2023 ~Jun. 15, 2023	Oct. 18, 2023	Radiation (03CH04-SZ)
Amplifier	Agilent Technologies	83017A	MY57280136	500MHz~26.5GHz	Sep. 30, 2022	May 24, 2023 ~Jun. 15, 2023	Sep. 29, 2023	Radiation (03CH04-SZ)
HF Amplifier	MITEQ	TTA1840-35-HG	1871923	18GHz~40GHz	Jul. 06, 2022	May 24, 2023 ~Jun. 15, 2023	Jul. 05, 2023	Radiation (03CH04-SZ)
AC Power Source	APC	AFV-S-600B	F119050019	N/A	Nov. 10, 2022	May 24, 2023 ~Jun. 15, 2023	Nov. 10, 2023	Radiation (03CH04-SZ)
Turn Table	EM	EM1000	N/A	0~360 degree	NCR	May 24, 2023 ~Jun. 15, 2023	NCR	Radiation (03CH04-SZ)
Antenna Mast	EM	EM1000	N/A	1 m~4 m	NCR	May 24, 2023 ~Jun. 15, 2023	NCR	Radiation (03CH04-SZ)
EMI Receiver	R&S	ESR7	101630	9kHz~7GHz;	Jul. 07, 2022	May 23, 2023	Jul. 06, 2023	Conduction (CO01-SZ)
AC LISN	R&S	ENV216	100063	9kHz~30MHz	Sep. 15, 2022	May 23, 2023	Sep. 14, 2023	Conduction (CO01-SZ)
AC LISN (for auxiliary equipment)	EMCO	3816/2SH	00103892	9kHz~30MHz	Oct. 17, 2022	May 23, 2023	Oct. 16, 2023	Conduction (CO01-SZ)
AC Power Source	Chroma	61602	616020000891	100Vac~250Vac	Jul. 07, 2022	May 23, 2023	Jul. 06, 2023	Conduction (CO01-SZ)

NCR: No Calibration Required.

5 Measurement Uncertainty

The measurement uncertainties shown below were calculated in accordance with the requirements of ANSI 63.10-2013. All the measurement uncertainty value were shown with a coverage K=2 to indicate 95% level of confidence. The measurement data show herein meets or exceeds the CISPR measurement uncertainty values specified in CISPR 16-4-2 and can be compared directly to specified limit to determine compliance.

Uncertainty of Conducted Emission Measurement (150kHz ~ 30MHz)

Measuring Uncertainty for a Level of Confidence of 95% (U = 2Uc(y))	**2.2dB**

Uncertainty of Radiated Emission Measurement (30 MHz ~ 1000 MHz)

Measuring Uncertainty for a Level of Confidence of 95% (U = 2Uc(y))	**5.1dB**

Uncertainty of Radiated Emission Measurement (1000 MHz ~ 18000 MHz)

Measuring Uncertainty for a Level of Confidence of 95% (U = 2Uc(y))	**4.8dB**

Uncertainty of Radiated Emission Measurement (18000 MHz ~ 40000 MHz)

Measuring Uncertainty for a Level of Confidence of 95% (U = 2Uc(y))	**5.1dB**

Appendix A. Conducted Test Results

Appendix A. Test Result of Conducted Test Items

Test Engineer:	Zhang Xue Yi	Temperature:	21~25	°C
Test Date:	2023/5/21~2023/6/15	Relative Humidity:	51~54	%

Report Number : FR351205E

TEST RESULTS DATA
Average Power Table

UNII-1																
Mod.	Data Rate	NTX	CH.	RU Config	Freq. (MHz)	Duty Factor (dB)		Average Conducted Power (dBm)			FCC Conducted Power Limit (dBm)		DG (dBi)			Pass/Fail
						Ant 5	Ant 18	Ant 5	Ant 18	SUM	Ant 5	Ant 18	Ant 5	Ant 18		
HT20	MCS0	2	36	Full	5180	0.20	0.20	16.69	17.06	19.89	24.00		-1.29			Pass
HT20	MCS0	2	44	Full	5220	0.20	0.20	16.89	17.18	20.04	24.00		-1.29			Pass
HT20	MCS0	2	48	Full	5240	0.20	0.20	16.72	17.11	19.93	24.00		-1.29			Pass
HT40	MCS0	2	38	Full	5190	0.39	0.39	14.94	15.36	18.16	24.00		-1.29			Pass
HT40	MCS0	2	46	Full	5230	0.39	0.39	16.94	17.24	20.10	24.00		-1.29			Pass
VHT20	MCS0	2	36	Full	5180	0.16	0.16	16.57	16.94	19.77	24.00		-1.29			Pass
VHT20	MCS0	2	44	Full	5220	0.16	0.16	16.77	17.06	19.93	24.00		-1.29			Pass
VHT20	MCS0	2	48	Full	5240	0.16	0.16	16.60	16.99	19.81	24.00		-1.29			Pass
VHT40	MCS0	2	38	Full	5190	0.32	0.32	14.78	15.20	18.01	24.00		-1.29			Pass
VHT40	MCS0	2	46	Full	5230	0.32	0.32	16.78	17.08	19.94	24.00		-1.29			Pass
VHT80	MCS0	2	42	Full	5210	0.75	0.75	12.16	12.11	15.14	24.00		-1.29			Pass
VHT160	MCS0	2	50	Full	5250	1.25	1.25	11.34	11.70	14.53	24.00		-1.29			Pass
HE20	MCS0	2	36	Full	5180	0.25	0.21	16.85	17.18	20.03	24.00		-1.29			Pass
				26/0		0.25	0.21	9.01	9.39	12.21	24.00		-1.29			Pass
				52/37		0.25	0.21	11.81	12.14	14.99	24.00		-1.29			Pass
				106/53		0.25	0.21	14.99	15.32	18.17	24.00		-1.29			Pass
			44	Full	5220	0.25	0.21	17.50	17.75	20.64	24.00		-1.29			Pass
			48	Full	5240	0.25	0.21	17.33	17.68	20.52	24.00		-1.29			Pass
				26/8		0.25	0.21	9.42	9.50	12.47	24.00		-1.29			Pass
				52/40		0.25	0.21	12.84	12.97	15.92	24.00		-1.29			Pass
				106/54		0.25	0.21	15.44	15.75	18.61	24.00		-1.29			Pass
HE40	MCS0	2	38	Full	5190	0.39	0.39	15.05	15.47	18.28	24.00		-1.29			Pass
			46	Full	5230	0.39	0.39	17.05	17.35	20.21	24.00		-1.29			Pass
HE80	MCS0	2	42	Full	5210	0.84	0.84	12.36	12.63	15.51	24.00		-1.29			Pass
HE160	MCS0	2	50	Full	5250	1.12	1.12	11.44	11.80	14.63	24.00		-1.29			Pass

Report Number : FR351205E

TEST RESULTS DATA
Average Power Table

UNII-1																
Mod.	Data Rate	NTX	CH.	RU Config	Freq. (MHz)	Duty Factor (dB)		Average Conducted Power (dBm)			FCC Conducted Power Limit (dBm)		DG (dBi)			Pass/Fail
						Ant 5	Ant 18	Ant 5	Ant 18	SUM	Ant 5	Ant 18	Ant 5	Ant 18		
11a	6Mbps	2	36	Full	5180	0.15	0.18	17.32	17.65	20.50	24.00		-1.29			Pass
11a	6Mbps	2	44	Full	5220	0.15	0.18	17.32	17.64	20.50	24.00		-1.29			Pass
11a	6Mbps	2	48	Full	5240	0.15	0.18	17.28	17.58	20.45	24.00		-1.29			Pass
EHT20	MCS0	2	36	Full	5180	0.21	0.25	17.03	17.44	20.25	24.00		-1.29			Pass
				26/0		0.21	0.25	9.11	9.49	12.31	24.00		-1.29			Pass
				52/37		0.21	0.25	11.91	12.24	15.09	24.00		-1.29			Pass
				106/53		0.21	0.25	15.09	15.42	18.27	24.00		-1.29			Pass
			44	Full	5220	0.21	0.25	17.53	17.89	20.72	24.00		-1.29			Pass
			48	Full	5240	0.21	0.25	17.37	17.77	20.58	24.00		-1.29			Pass
				26/8		0.21	0.25	9.52	9.60	12.57	24.00		-1.29			Pass
				52/40		0.21	0.25	12.94	13.07	16.02	24.00		-1.29			Pass
				106/54		0.21	0.25	15.54	15.85	18.71	24.00		-1.29			Pass
EHT40	MCS0	2	38	Full	5190	0.38	0.38	15.16	15.58	18.38	24.00		-1.29			Pass
			46	Full	5230	0.38	0.38	17.16	17.46	20.32	24.00		-1.29			Pass
EHT80	MCS0	2	42	Full	5210	0.67	0.82	12.52	12.94	15.74	24.00		-1.29			Pass
EHT160	MCS0	2	50	Full	5250	1.06	1.25	11.63	12.18	14.93	24.00		-1.29			Pass

TEST RESULTS DATA
Average Power Table

UNII-2A														
Mod.	Data Rate	NTX	CH.	RU Config	Freq. (MHz)	Duty Factor (dB)		Average Conducted Power (dBm)			DG (dBi)		EIRP Power Limit (dBm)	Pass/Fail
						Ant 5	Ant 18	Ant 5	Ant 18	SUM	Ant 5	Ant 18		
HT20	MCS0	2	52	Full	5260	0.20	0.20	17.00	17.71	20.38	-1.36		26.99	Pass
HT20	MCS0	2	60	Full	5300	0.20	0.20	17.04	17.37	20.22	-1.36		26.99	Pass
HT20	MCS0	2	64	Full	5320	0.20	0.20	15.74	15.91	18.83	-1.36		26.99	Pass
HT40	MCS0	2	54	Full	5270	0.39	0.39	17.27	17.70	20.50	-1.36		26.99	Pass
HT40	MCS0	2	62	Full	5310	0.39	0.39	14.49	14.72	17.62	-1.36		26.99	Pass
VHT20	MCS0	2	52	Full	5260	0.16	0.16	16.88	17.59	20.26	-1.36		26.99	Pass
VHT20	MCS0	2	60	Full	5300	0.16	0.16	16.92	17.25	20.10	-1.36		26.99	Pass
VHT20	MCS0	2	64	Full	5320	0.16	0.16	15.62	15.79	18.72	-1.36		26.99	Pass
VHT40	MCS0	2	54	Full	5270	0.32	0.32	17.11	17.54	20.34	-1.36		26.99	Pass
VHT40	MCS0	2	62	Full	5310	0.32	0.32	14.33	14.56	17.46	-1.36		26.99	Pass
VHT80	MCS0	2	58	Full	5290	0.75	0.75	14.90	14.97	17.94	-1.36		26.99	Pass
HE20	MCS0	2	52	Full	5260	0.25	0.21	17.16	17.83	20.52	-1.36		26.99	Pass
				26/0		0.25	0.21	9.48	10.01	12.76	-1.36		26.99	Pass
				52/37		0.25	0.21	12.64	13.20	15.94	-1.36		26.99	Pass
				106/53		0.25	0.21	15.31	15.93	18.64	-1.36		26.99	Pass
			60	Full	5300	0.25	0.21	17.20	17.49	20.36	-1.36		26.99	Pass
			64	Full	5320	0.25	0.21	15.90	16.03	18.98	-1.36		26.99	Pass
				26/8		0.25	0.21	7.86	8.01	10.95	-1.36		26.99	Pass
				52/40		0.25	0.21	11.08	11.21	14.16	-1.36		26.99	Pass
				106/54		0.25	0.21	13.37	13.97	16.69	-1.36		26.99	Pass
HE40	MCS0	2	54	Full	5270	0.39	0.39	17.38	17.81	20.61	-1.36		26.99	Pass
			62	Full	5310	0.39	0.39	14.60	14.83	17.73	-1.36		26.99	Pass
HE80	MCS0	2	58	Full	5290	0.84	0.84	15.10	15.48	18.31	-1.36		26.99	Pass

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TEST RESULTS DATA
Average Power Table

UNII-2A																
Mod.	Data Rate	NTX	CH.	RU Config	Freq. (MHz)	Duty Factor (dB)		Average Conducted Power (dBm)			FCC Conducted Power Limit (dBm)		DG (dBi)		EIRP Power Limit (dBm)	Pass/Fail
						Ant 5	Ant 18	Ant 5	Ant 18	SUM	Ant 5	Ant 18	Ant 5	Ant 18		
11a	6Mbps	2	52	Full	5260	0.15	0.18	16.68	17.03	19.87	24.00		-1.36		26.99	Pass
11a	6Mbps	2	60	Full	5300	0.15	0.18	17.15	17.36	20.27	24.00		-1.36		26.99	Pass
11a	6Mbps	2	64	Full	5320	0.15	0.18	16.67	16.76	19.73	24.00		-1.36		26.99	Pass
EHT20	MCS0	2	52	Full	5260	0.21	0.25	17.67	18.37	21.04	24.00		-1.36		26.99	Pass
				26/0		0.21	0.25	10.08	10.61	13.36	24.00		-1.36		26.99	Pass
				52/37		0.21	0.25	13.24	13.80	16.54	24.00		-1.36		26.99	Pass
				106/53		0.21	0.25	15.91	16.53	19.24	24.00		-1.36		26.99	Pass
			60	Full	5300	0.21	0.25	17.71	18.08	20.91	24.00		-1.36		26.99	Pass
			64	Full	5320	0.21	0.25	15.98	16.16	19.08	24.00		-1.36		26.99	Pass
				26/8		0.21	0.25	7.96	8.11	11.05	24.00		-1.36		26.99	Pass
				52/40		0.21	0.25	11.18	11.31	14.26	24.00		-1.36		26.99	Pass
				106/54		0.21	0.25	13.47	14.07	16.79	24.00		-1.36		26.99	Pass
EHT40	MCS0	2	54	Full	5270	0.38	0.38	17.49	17.92	20.72	24.00		-1.36		26.99	Pass
			62	Full	5310	0.38	0.38	14.71	14.94	17.83	24.00		-1.36		26.99	Pass
EHT80	MCS0	2	58	Full	5290	0.67	0.82	15.26	15.79	18.54	24.00		-1.36		26.99	Pass

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TEST RESULTS DATA
Average Power Table

UNII-2C														
Mod.	Data Rate	NTX	CH.	RU Config	Freq. (MHz)	Duty Factor (dB)		Average Conducted Power (dBm)			DG (dBi)		EIRP Power Limit (dBm)	Pass/Fail
						Ant 5	Ant 18	Ant 5	Ant 18	SUM	Ant 5	Ant 18		
HT20	MCS0	2	100	Full	5500	0.20	0.20	12.77	12.46	15.63	0.00		26.99	Pass
HT20	MCS0	2	116	Full	5580	0.20	0.20	12.60	12.41	15.51	0.00		26.99	Pass
HT20	MCS0	2	140	Full	5700	0.20	0.20	12.74	12.57	15.66	0.00		26.99	Pass
HT20	MCS0	2	144	Full	5720	0.20	0.20	12.54	12.45	15.50	0.00		26.99	Pass
HT40	MCS0	2	102	Full	5510	0.39	0.39	12.66	12.33	15.51	0.00		26.99	Pass
HT40	MCS0	2	110	Full	5550	0.39	0.39	12.74	12.46	15.61	0.00		26.99	Pass
HT40	MCS0	2	134	Full	5670	0.39	0.39	12.49	12.37	15.44	0.00		26.99	Pass
HT40	MCS0	2	142	Full	5710	0.39	0.39	12.39	12.42	15.41	0.00		26.99	Pass
VHT20	MCS0	2	100	Full	5500	0.16	0.16	12.65	12.34	15.51	0.00		26.99	Pass
VHT20	MCS0	2	116	Full	5580	0.16	0.16	12.48	12.29	15.40	0.00		26.99	Pass
VHT20	MCS0	2	140	Full	5700	0.16	0.16	12.62	12.45	15.55	0.00		26.99	Pass
VHT20	MCS0	2	144	Full	5720	0.16	0.16	12.42	12.33	15.39	0.00		26.99	Pass
VHT40	MCS0	2	102	Full	5510	0.32	0.32	12.50	12.17	15.35	0.00		26.99	Pass
VHT40	MCS0	2	110	Full	5550	0.32	0.32	12.58	12.30	15.45	0.00		26.99	Pass
VHT40	MCS0	2	134	Full	5670	0.32	0.32	12.33	12.21	15.28	0.00		26.99	Pass
VHT40	MCS0	2	142	Full	5710	0.32	0.32	12.23	12.26	15.26	0.00		26.99	Pass
VHT80	MCS0	2	106	Full	5530	0.75	0.75	12.27	11.75	15.02	0.00		26.99	Pass
VHT80	MCS0	2	122	Full	5610	0.75	0.75	12.22	11.86	15.05	0.00		26.99	Pass
VHT80	MCS0	2	138	Full	5690	0.75	0.75	12.32	12.06	15.20	0.00		26.99	Pass
VHT160	MCS0	2	114	Full	5570	1.25	1.25	11.08	11.00	14.05	0.00		26.99	Pass
HE20	MCS0	2	100	Full	5500	0.25	0.21	12.93	12.58	15.77	0.00		26.99	Pass
				26/0		0.25	0.21	5.24	4.66	7.97	0.00		26.99	Pass
				52/37		0.25	0.21	7.85	7.18	10.54	0.00		26.99	Pass
				106/53		0.25	0.21	10.90	10.61	13.77	0.00		26.99	Pass
			116	Full	5580	0.25	0.21	12.76	12.53	15.66	0.00		26.99	Pass
			140	Full	5700	0.25	0.21	12.90	12.69	15.81	0.00		26.99	Pass
				26/8		0.25	0.21	4.62	4.81	7.73	0.00		26.99	Pass
				52/40		0.25	0.21	7.35	7.63	10.50	0.00		26.99	Pass
				106/54		0.25	0.21	10.46	10.80	13.64	0.00		26.99	Pass
			144	Full	5720	0.25	0.21	12.70	12.57	15.65	0.00		26.99	Pass
				26/8		0.25	0.21	4.49	4.53	7.52	0.00		26.99	Pass
				52/40		0.25	0.21	7.20	7.50	10.36	0.00		26.99	Pass
				106/54		0.25	0.21	10.60	10.79	13.71	0.00		26.99	Pass
HE40	MCS0	2	102	Full	5510	0.39	0.39	12.87	12.54	15.72	0.00		26.99	Pass
			110	Full	5550	0.39	0.39	12.95	12.67	15.82	0.00		26.99	Pass
			134	Full	5670	0.39	0.39	12.70	12.58	15.65	0.00		26.99	Pass
			142	Full	5710	0.39	0.39	12.66	12.64	15.66	0.00		26.99	Pass
HE80	MCS0	2	106	Full	5530	0.84	0.84	12.61	12.09	15.37	0.00		26.99	Pass
			122	Full	5610	0.84	0.84	12.56	12.20	15.40	0.00		26.99	Pass
			138	Full	5690	0.84	0.84	12.66	12.40	15.55	0.00		26.99	Pass
HE160	MCS0	2	114	Full	5570	1.12	1.12	11.16	11.08	14.13	0.00		26.99	Pass

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TEST RESULTS DATA
Average Power Table

UNII-2C																
Mod.	Data Rate	N_{TX}	CH.	RU Config	Freq. (MHz)	Duty Factor (dB)		Average Conducted Power (dBm)			FCC Conducted Power Limit (dBm)		DG (dBi)		EIRP Power Limit (dBm)	Pass/Fail
						Ant 5	Ant 18	Ant 5	Ant 18	SUM	Ant 5	Ant 18	Ant 5	Ant 18		
11a	6Mbps	2	100	Full	5500	0.15	0.18	12.55	12.30	15.44	24.00		0.00		26.99	Pass
11a	6Mbps	2	116	Full	5580	0.15	0.18	12.60	12.65	15.64	24.00		0.00		26.99	Pass
11a	6Mbps	2	140	Full	5700	0.15	0.18	12.51	12.67	15.60	24.00		0.00		26.99	Pass
11a	6Mbps	2	144	Full	5720	0.15	0.18	12.63	12.72	15.69	24.00		0.00		26.99	Pass
EHT20	MCS0	2	100	Full	5500	0.21	0.25	12.98	12.71	15.86	24.00		0.00		26.99	Pass
				26/0		0.21	0.25	5.39	4.81	8.12	24.00		0.00		26.99	Pass
				52/37		0.21	0.25	8.00	7.33	10.69	24.00		0.00		26.99	Pass
				106/53		0.21	0.25	11.05	10.76	13.92	24.00		0.00		26.99	Pass
			116	Full	5580	0.21	0.25	12.81	12.66	15.74	24.00		0.00		26.99	Pass
			140	Full	5700	0.21	0.25	12.95	12.82	15.89	24.00		0.00		26.99	Pass
				26/8		0.21	0.25	4.77	4.96	7.88	24.00		0.00		26.99	Pass
				52/40		0.21	0.25	7.50	7.78	10.65	24.00		0.00		26.99	Pass
				106/54		0.21	0.25	10.61	10.95	13.79	24.00		0.00		26.99	Pass
			144	Full	5720	0.21	0.25	12.75	12.70	15.73	24.00		0.00		26.99	Pass
				26/8		0.21	0.25	4.64	4.68	7.67	24.00		0.00		26.99	Pass
				52/40		0.21	0.25	7.35	7.65	10.51	24.00		0.00		26.99	Pass
				106/54		0.21	0.25	10.75	10.94	13.86	24.00		0.00		26.99	Pass
EHT40	MCS0	2	102	Full	5510	0.38	0.38	13.02	12.69	15.87	24.00		0.00		26.99	Pass
			110	Full	5550	0.38	0.38	13.10	12.82	15.97	24.00		0.00		26.99	Pass
			134	Full	5670	0.38	0.38	12.85	12.73	15.80	24.00		0.00		26.99	Pass
			142	Full	5710	0.38	0.38	12.80	12.71	15.76	24.00		0.00		26.99	Pass
EHT80	MCS0	2	106	Full	5530	0.67	0.82	12.64	12.27	15.47	24.00		0.00		26.99	Pass
			122	Full	5610	0.67	0.82	12.59	12.38	15.49	24.00		0.00		26.99	Pass
			138	Full	5690	0.67	0.82	12.69	12.58	15.64	24.00		0.00		26.99	Pass
EHT160	MCS0	2	114	Full	5570	1.06	1.25	11.30	11.43	14.38	24.00		0.00		26.99	Pass

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TEST RESULTS DATA
Average Power Table

UNII-3																
Mod.	Data Rate	NTX	CH.	RU Config	Freq. (MHz)	Duty Factor (dB)		Average Conducted Power (dBm)			FCC Conducted Power Limit (dBm)		DG (dBi)			Pass/Fail
						Ant 5	Ant 18	Ant 5	Ant 18	SUM	Ant 5	Ant 18	Ant 5	Ant 18		
HT20	MCS0	2	149	Full	5745	0.20	0.20	10.43	10.31	13.38	30.00		0.00			Pass
HT20	MCS0	2	157	Full	5785	0.20	0.20	10.39	10.27	13.34	30.00		0.00			Pass
HT20	MCS0	2	165	Full	5825	0.20	0.20	10.32	10.39	13.36	30.00		0.00			Pass
HT40	MCS0	2	151	Full	5755	0.39	0.39	10.44	10.16	13.31	30.00		0.00			Pass
HT40	MCS0	2	159	Full	5795	0.39	0.39	10.37	10.25	13.32	30.00		0.00			Pass
VHT20	MCS0	2	149	Full	5745	0.16	0.16	10.37	10.25	13.32	30.00		0.00			Pass
VHT20	MCS0	2	157	Full	5785	0.16	0.16	10.33	10.21	13.28	30.00		0.00			Pass
VHT20	MCS0	2	165	Full	5825	0.16	0.16	10.26	10.33	13.31	30.00		0.00			Pass
VHT40	MCS0	2	151	Full	5755	0.32	0.32	10.37	10.09	13.24	30.00		0.00			Pass
VHT40	MCS0	2	159	Full	5795	0.32	0.32	10.30	10.18	13.25	30.00		0.00			Pass
VHT80	MCS0	2	155	Full	5775	0.75	0.75	10.23	10.16	13.20	30.00		0.00			Pass
HE20	MCS0	2	149	Full	5745	0.25	0.21	10.49	10.33	13.42	30.00		0.00			Pass
HE20	MCS0	2	149	26/0	5745	0.25	0.21	2.84	2.58	5.72	30.00		0.00			Pass
HE20	MCS0	2	149	52/37	5745	0.25	0.21	5.47	5.54	8.52	30.00		0.00			Pass
HE20	MCS0	2	149	106/53	5745	0.25	0.21	8.65	8.62	11.65	30.00		0.00			Pass
HE20	MCS0	2	157	Full	5785	0.25	0.21	10.45	10.29	13.38	30.00		0.00			Pass
HE20	MCS0	2	165	Full	5825	0.25	0.21	10.38	10.41	13.41	30.00		0.00			Pass
HE20	MCS0	2	165	26/8	5825	0.25	0.21	2.46	2.69	5.59	30.00		0.00			Pass
HE20	MCS0	2	165	52/40	5825	0.25	0.21	5.24	5.68	8.48	30.00		0.00			Pass
HE20	MCS0	2	165	106/54	5825	0.25	0.21	8.41	8.85	11.65	30.00		0.00			Pass
HE40	MCS0	2	151	Full	5755	0.39	0.39	10.47	10.19	13.34	30.00		0.00			Pass
HE40	MCS0	2	159	Full	5795	0.39	0.39	10.40	10.28	13.35	30.00		0.00			Pass
HE80	MCS0	2	155	Full	5775	0.84	0.84	10.36	10.31	13.35	30.00		0.00			Pass

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TEST RESULTS DATA
Average Power Table

UNII-3																
Mod.	Data Rate	NTX	CH.	RU Config	Freq. (MHz)	Duty Factor (dB)		Average Conducted Power (dBm)			FCC Conducted Power Limit (dBm)		DG (dBi)			Pass/Fail
						Ant 5	Ant 18	Ant 5	Ant 18	SUM	Ant 5	Ant 18	Ant 5	Ant 18		
11a	6Mbps	2	149	Full	5745	0.15	0.18	10.29	10.13	13.22	30.00		0.00			Pass
11a	6Mbps	2	157	Full	5785	0.15	0.18	10.35	10.45	13.41	30.00		0.00			Pass
11a	6Mbps	2	165	Full	5825	0.15	0.18	10.14	10.29	13.23	30.00		0.00			Pass
EHT20	MCS0	2	149	Full	5745	0.21	0.25	10.57	10.49	13.54	30.00		0.00			Pass
EHT20	MCS0	2	149	26/0	5745	0.21	0.25	2.96	2.70	5.84	30.00		0.00			Pass
EHT20	MCS0	2	149	52/37	5745	0.21	0.25	5.59	5.66	8.64	30.00		0.00			Pass
EHT20	MCS0	2	149	106/53	5745	0.21	0.25	8.77	8.74	11.77	30.00		0.00			Pass
EHT20	MCS0	2	157	Full	5785	0.21	0.25	10.53	10.45	13.50	30.00		0.00			Pass
EHT20	MCS0	2	165	Full	5825	0.21	0.25	10.46	10.57	13.52	30.00		0.00			Pass
EHT20	MCS0	2	165	26/8	5825	0.21	0.25	2.58	2.81	5.71	30.00		0.00			Pass
EHT20	MCS0	2	165	52/40	5825	0.21	0.25	5.36	5.80	8.60	30.00		0.00			Pass
EHT20	MCS0	2	165	106/54	5825	0.21	0.25	8.53	8.97	11.77	30.00		0.00			Pass
EHT40	MCS0	2	151	Full	5755	0.38	0.38	10.61	10.33	13.48	30.00		0.00			Pass
EHT40	MCS0	2	159	Full	5795	0.38	0.38	10.54	10.42	13.49	30.00		0.00			Pass
EHT80	MCS0	2	155	Full	5775	0.67	0.82	10.36	10.40	13.39	30.00		0.00			Pass

Emission Bandwidth

Test Result

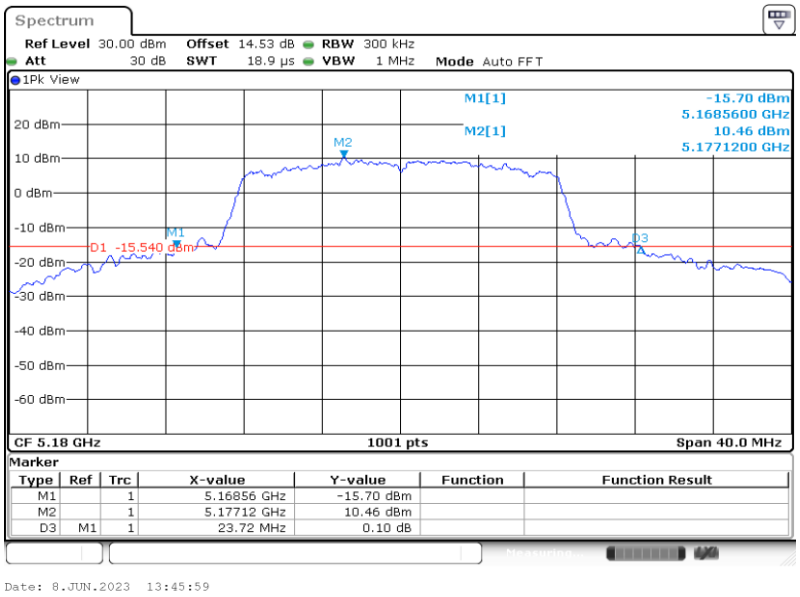
TestMode	Antenna	Freq(MHz)	26dB EBW [MHz]	FL[MHz]	FH[MHz]
11A-CDD	Ant5	5180	23.72	5168.56	5192.28
	Ant18	5180	22.96	5168.52	5191.48
	Ant5	5220	23.56	5209.24	5232.80
	Ant18	5220	19.60	5210.72	5230.32
	Ant5	5240	24.68	5227.68	5252.36
	Ant18	5240	19.12	5230.00	5249.12
	Ant5	5260	22.88	5248.96	5271.84
	Ant18	5260	19.08	5250.80	5269.88
	Ant5	5300	25.80	5287.84	5313.64
	Ant18	5300	22.48	5288.60	5311.08
	Ant5	5320	22.28	5307.44	5329.72
	Ant18	5320	24.88	5307.84	5332.72
	Ant5	5500	23.00	5488.80	5511.80
	Ant18	5500	22.96	5489.20	5512.16
	Ant5	5580	18.48	5570.72	5589.20
	Ant18	5580	18.28	5570.84	5589.12
	Ant5	5700	21.92	5687.88	5709.80
	Ant18	5700	20.40	5689.20	5709.60
	Ant5	5720	18.52	5710.76	5729.28
	Ant18	5720	18.44	5710.72	5729.16
	Ant5	5745	22.48	5734.92	5757.40
	Ant18	5745	20.92	5734.68	5755.60
	Ant5	5785	18.60	5775.64	5794.24
	Ant18	5785	18.52	5775.72	5794.24
	Ant5	5825	18.92	5815.64	5834.56
	Ant18	5825	21.04	5814.32	5835.36
11BE20MIMO	Ant5	5180	21.04	5169.52	5190.56
	Ant18	5180	20.04	5169.92	5189.96
	Ant5	5220	21.88	5208.16	5230.04
	Ant18	5220	20.08	5209.92	5230.00
	Ant5	5240	21.48	5228.52	5250.00
	Ant18	5240	20.04	5229.96	5250.00
	Ant5	5260	21.68	5248.44	5270.12
	Ant18	5260	21.36	5248.64	5270.00

	Ant5	5300	21.76	5289.44	5311.20
	Ant18	5300	22.04	5288.52	5310.56
	Ant5	5320	20.00	5309.96	5329.96
	Ant18	5320	20.12	5309.96	5330.08
	Ant5	5500	20.04	5489.96	5510.00
	Ant18	5500	20.00	5490.00	5510.00
	Ant5	5580	20.04	5569.96	5590.00
	Ant18	5580	20.04	5569.96	5590.00
	Ant5	5700	20.04	5689.92	5709.96
	Ant18	5700	20.00	5689.96	5709.96
	Ant5	5720	20.00	5709.96	5729.96
	Ant18	5720	20.00	5709.96	5729.96
	Ant5	5745	20.04	5734.96	5755.00
	Ant18	5745	20.00	5734.96	5754.96
	Ant5	5785	20.04	5774.96	5795.00
	Ant18	5785	20.04	5774.96	5795.00
	Ant5	5825	20.00	5815.00	5835.00
	Ant18	5825	19.96	5815.00	5834.96
11BE40MIMO	Ant5	5190	39.68	5170.16	5209.84
	Ant18	5190	39.60	5170.16	5209.76
	Ant5	5230	39.84	5210.00	5249.84
	Ant18	5230	40.16	5209.60	5249.76
	Ant5	5270	40.16	5249.68	5289.84
	Ant18	5270	40.16	5249.60	5289.76
	Ant5	5310	49.92	5279.92	5329.84
	Ant18	5310	40.24	5289.60	5329.84
	Ant5	5510	39.84	5490.00	5529.84
	Ant18	5510	39.68	5490.16	5529.84
	Ant5	5550	41.28	5528.48	5569.76
	Ant18	5550	40.16	5529.68	5569.84
	Ant5	5670	40.08	5649.76	5689.84
	Ant18	5670	40.40	5649.60	5690.00
	Ant5	5710	41.44	5688.40	5729.84
	Ant18	5710	40.08	5689.68	5729.76
	Ant5	5755	39.84	5735.08	5774.92
	Ant18	5755	39.76	5735.16	5774.92
	Ant5	5795	39.76	5775.08	5814.84
	Ant18	5795	40.40	5774.52	5814.92
11BE80MIMO	Ant5	5210	80.32	5169.84	5250.16

	Ant18	5210	80.16	5169.84	5250.00
	Ant5	5290	80.32	5249.84	5330.16
	Ant18	5290	80.00	5250.00	5330.00
	Ant5	5530	80.16	5489.84	5570.00
	Ant18	5530	80.32	5489.84	5570.16
	Ant5	5610	80.00	5570.00	5650.00
	Ant18	5610	80.00	5570.00	5650.00
	Ant5	5690	80.32	5649.84	5730.16
	Ant18	5690	80.16	5649.84	5730.00
	Ant5	5775	80.32	5734.84	5815.16
	Ant18	5775	80.32	5734.84	5815.16
11BE160MIMO	Ant5	5250	162.88	5168.40	5331.28
	Ant18	5250	162.88	5168.40	5331.28
	Ant5	5570	162.56	5488.72	5651.28
	Ant18	5570	162.56	5488.72	5651.28

Test Graphs

11A-CDD_Ant5_5180



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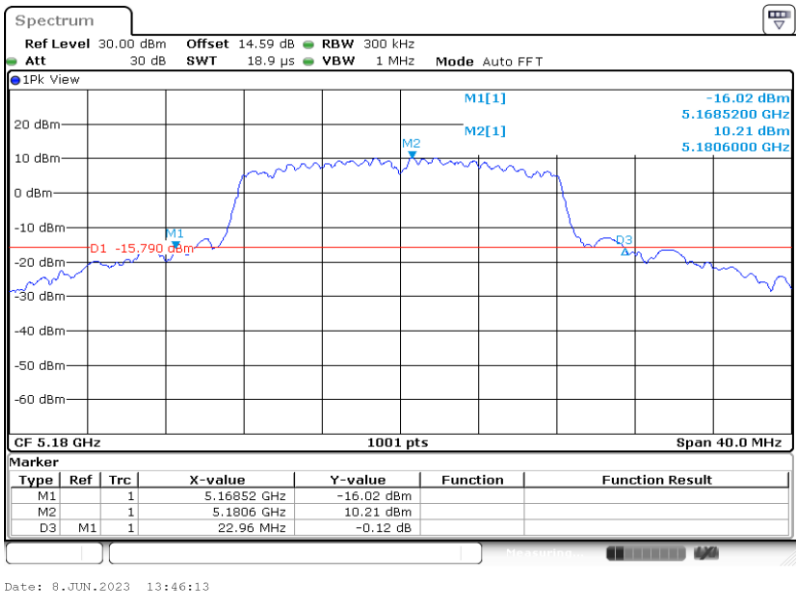

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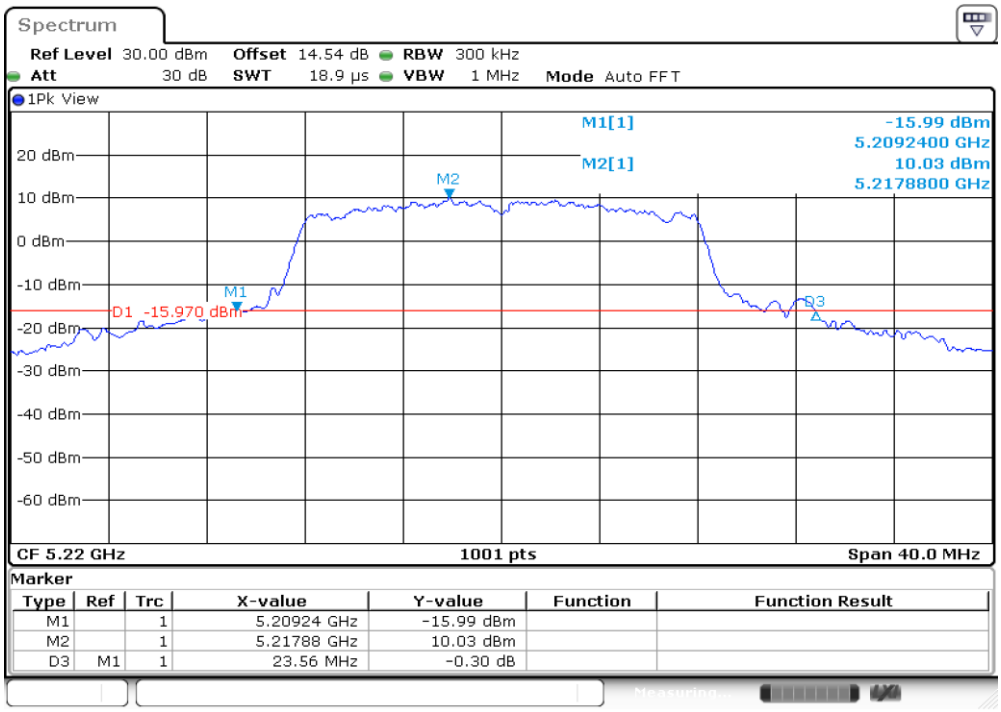

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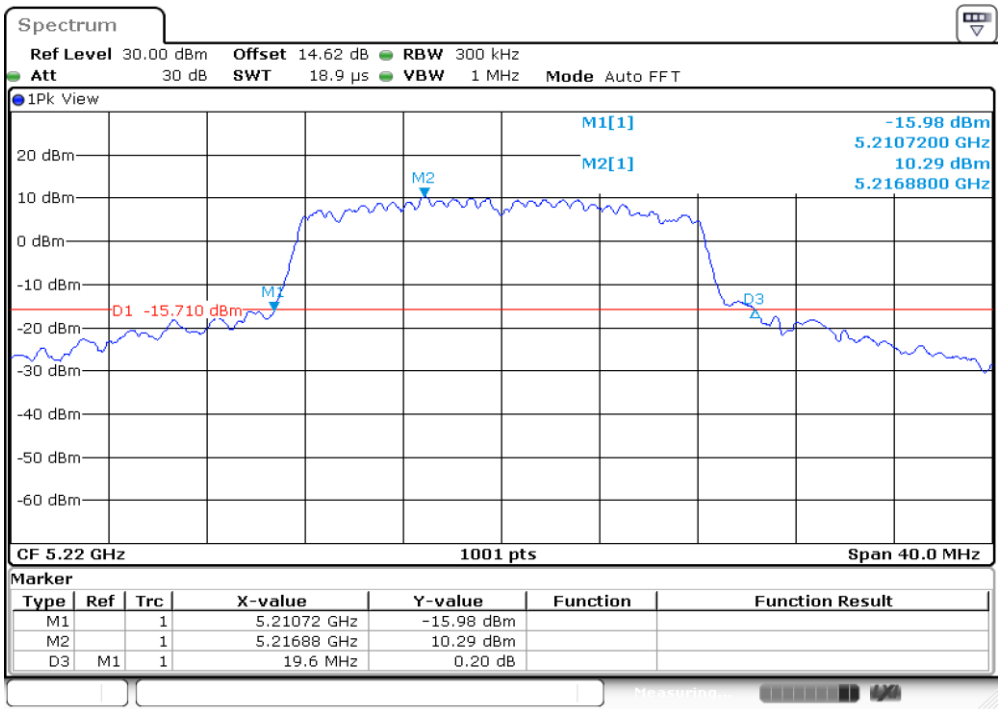

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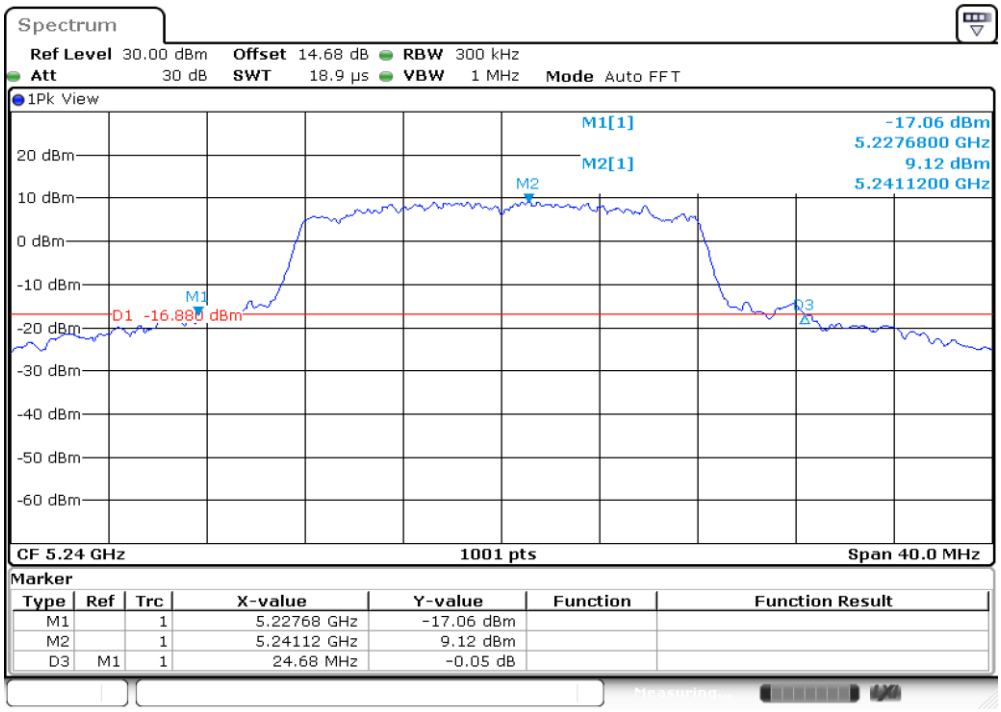

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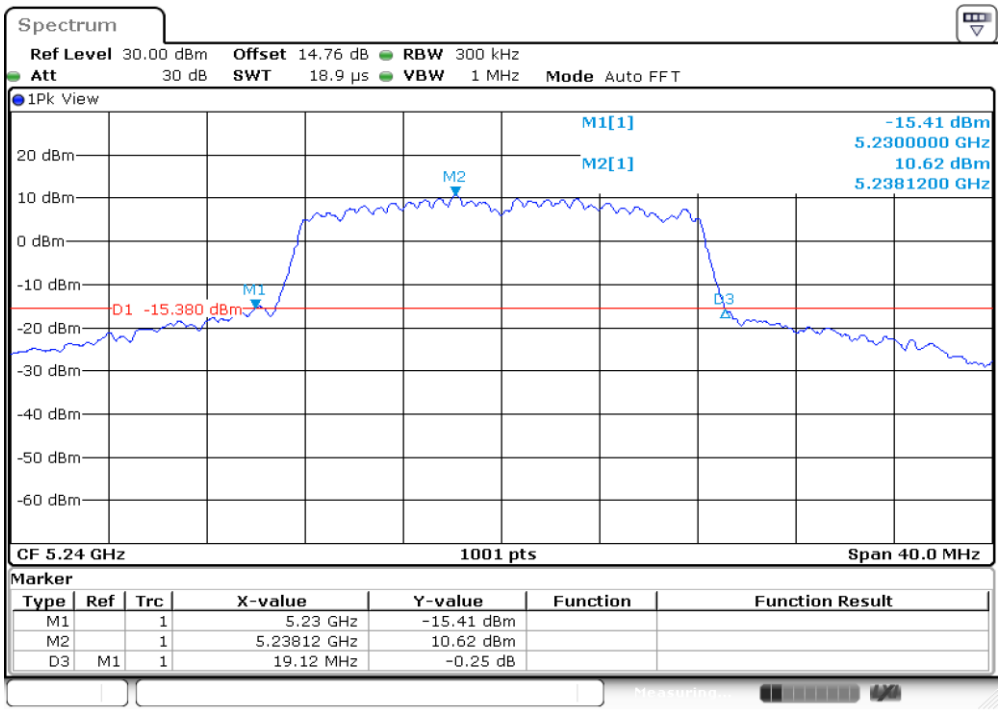

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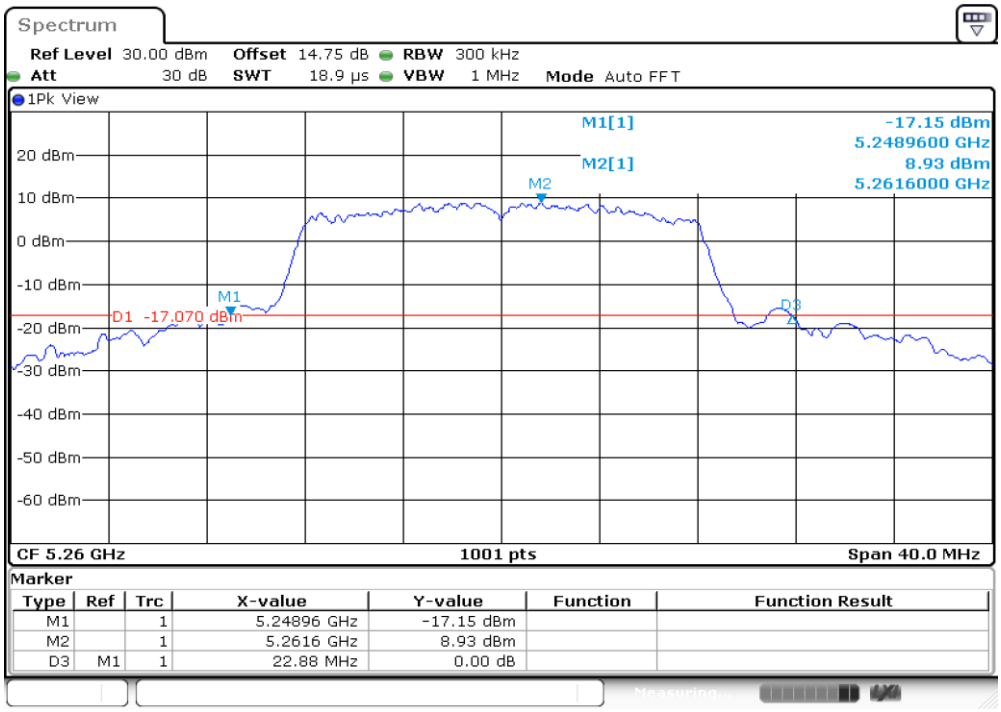

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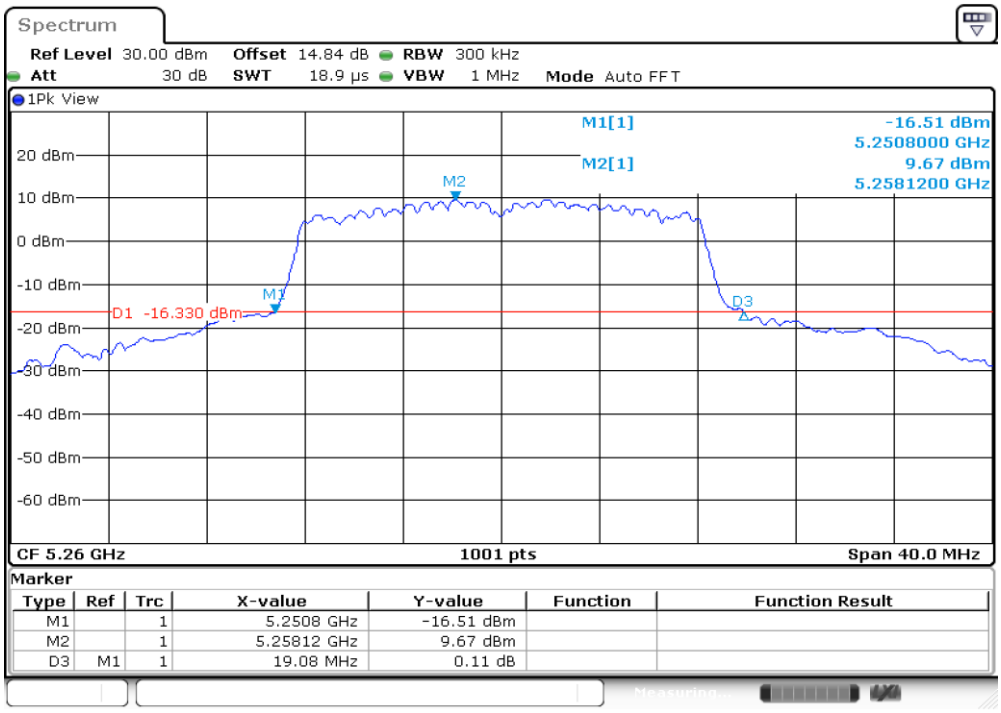

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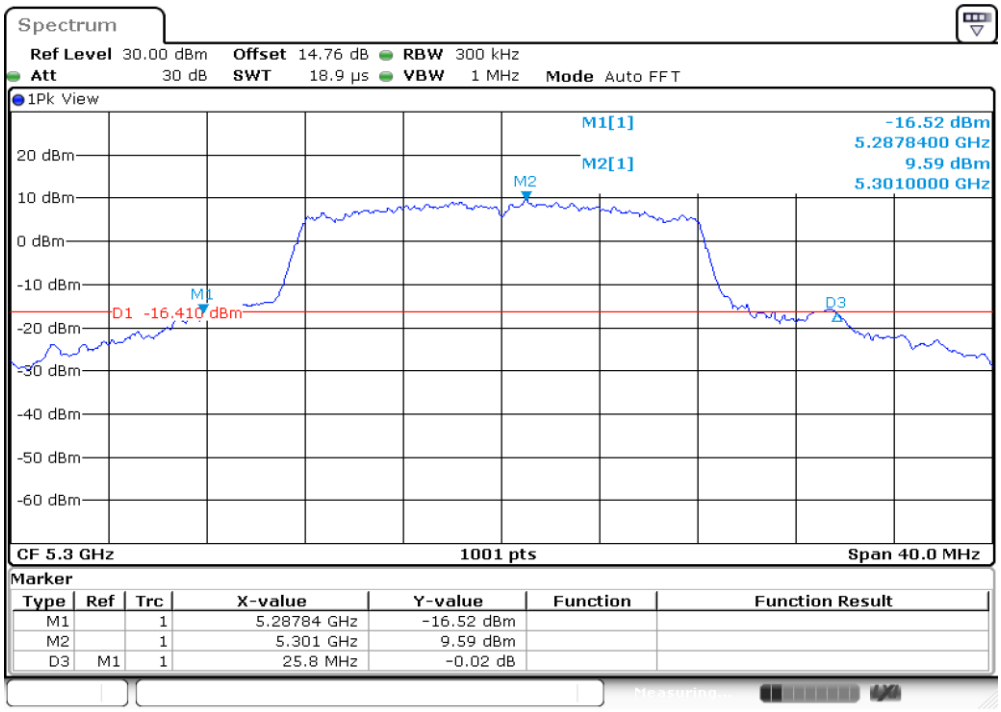

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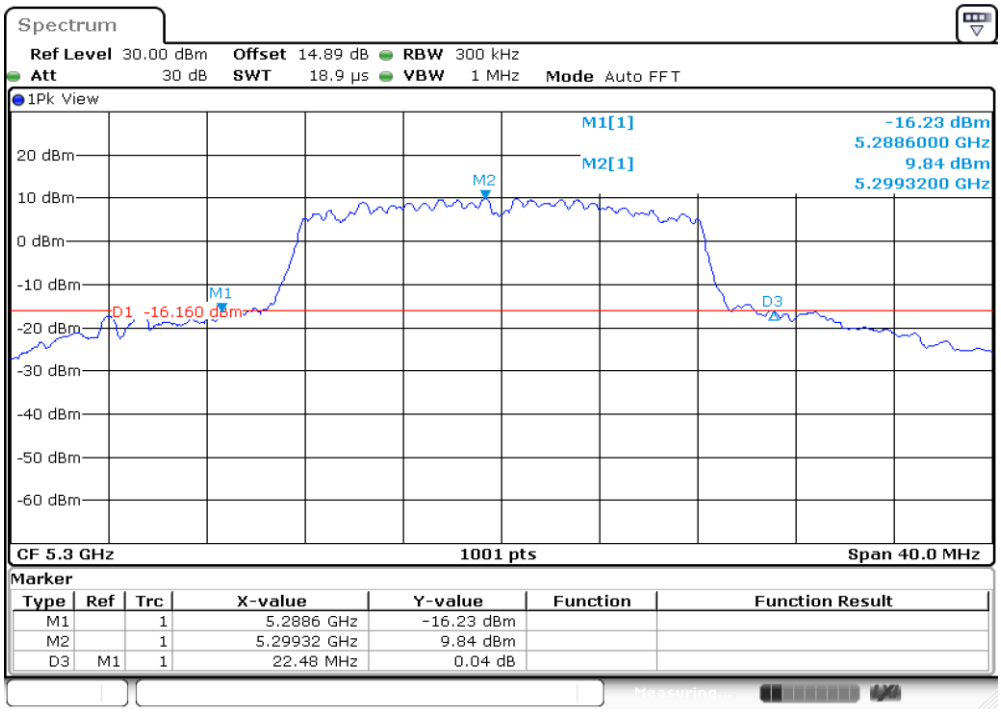

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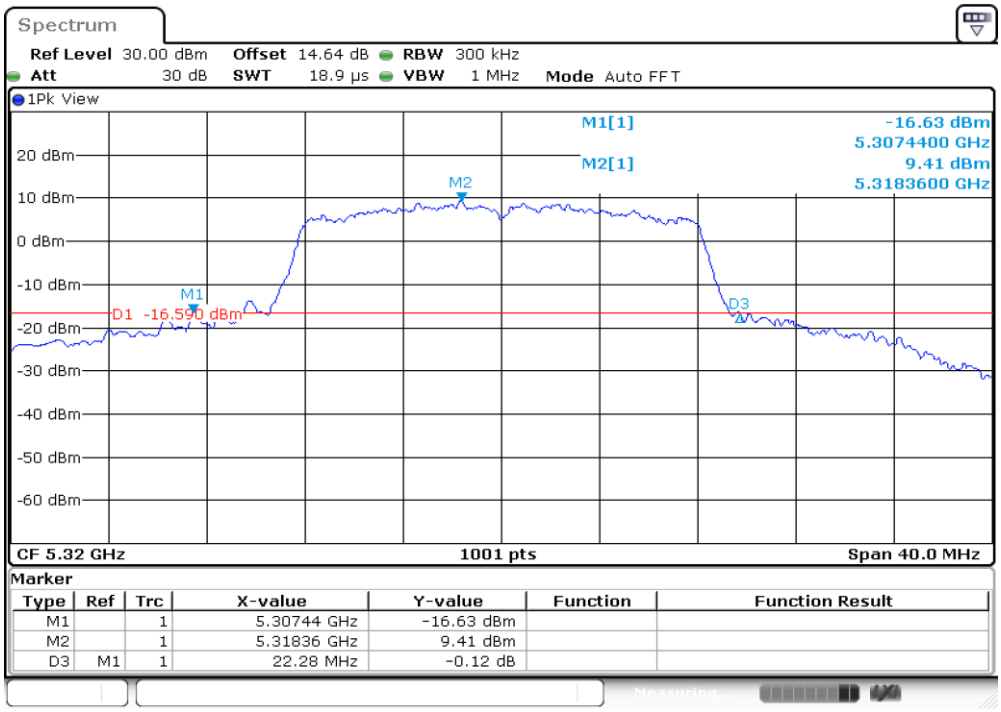

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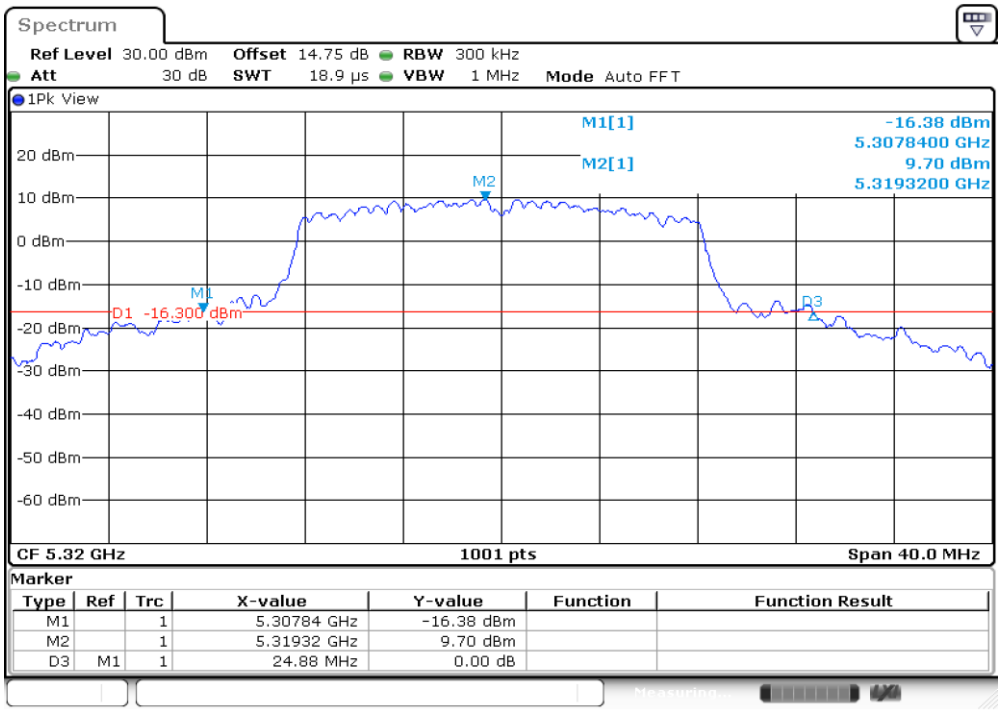

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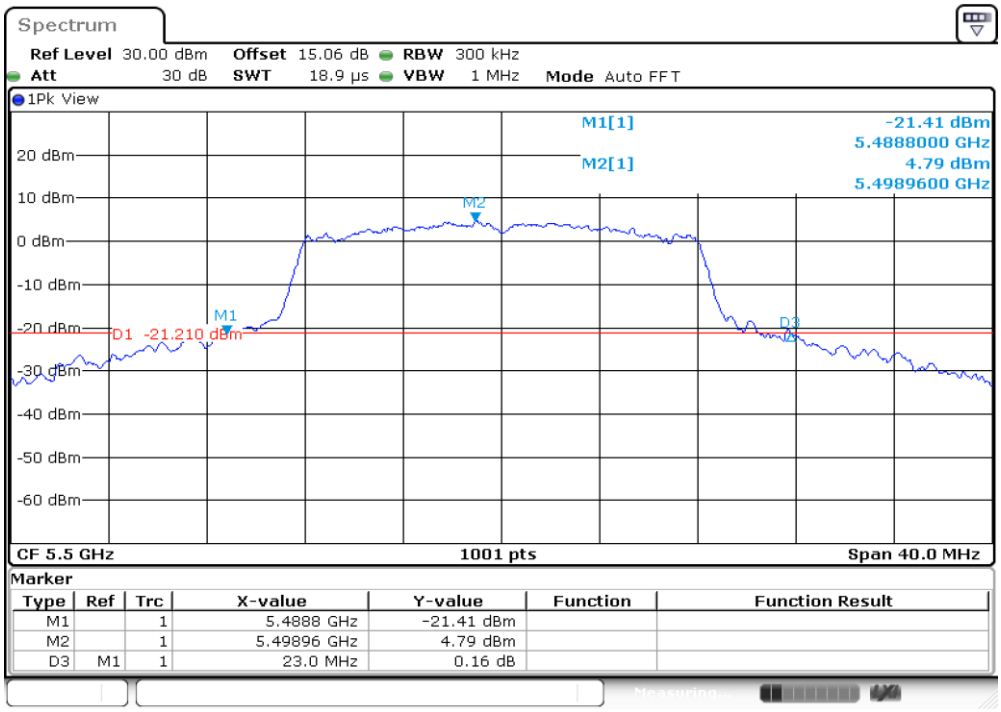

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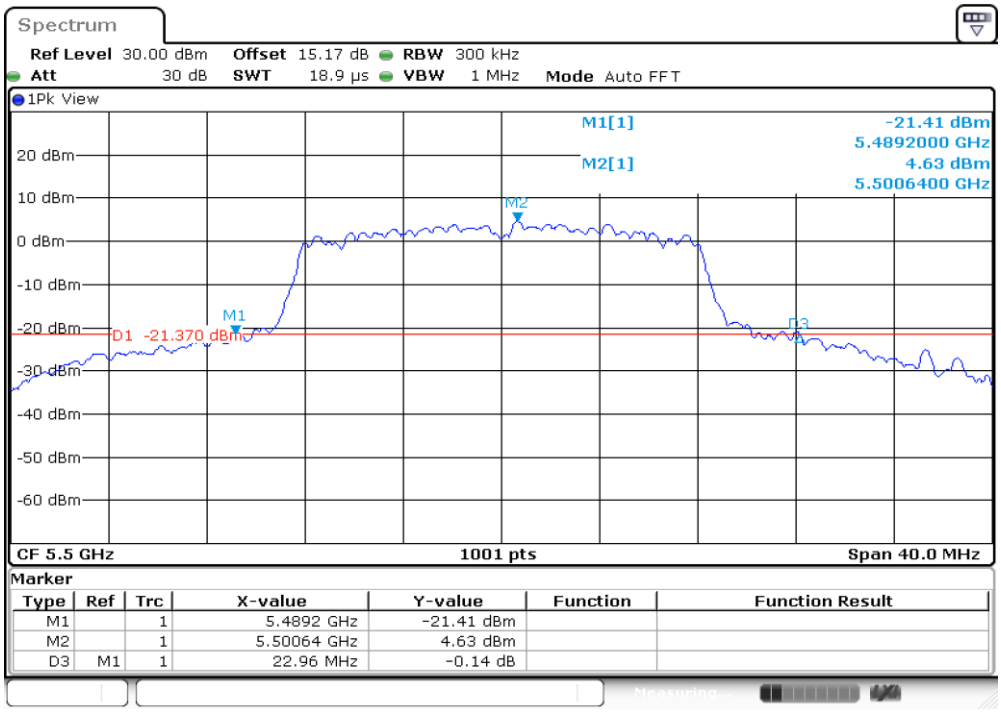

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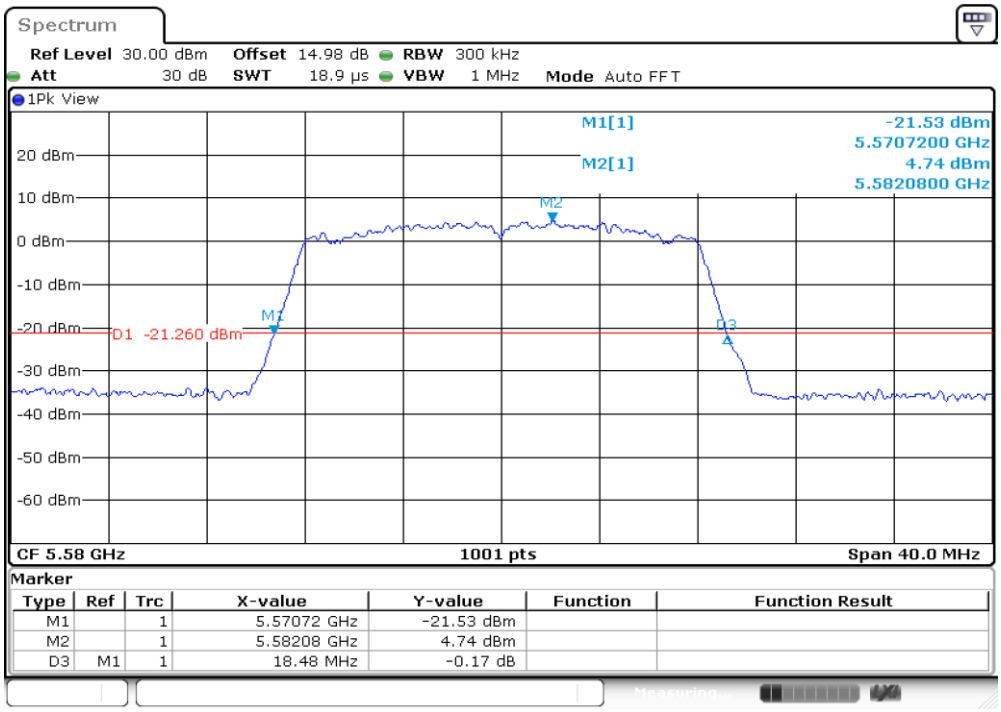

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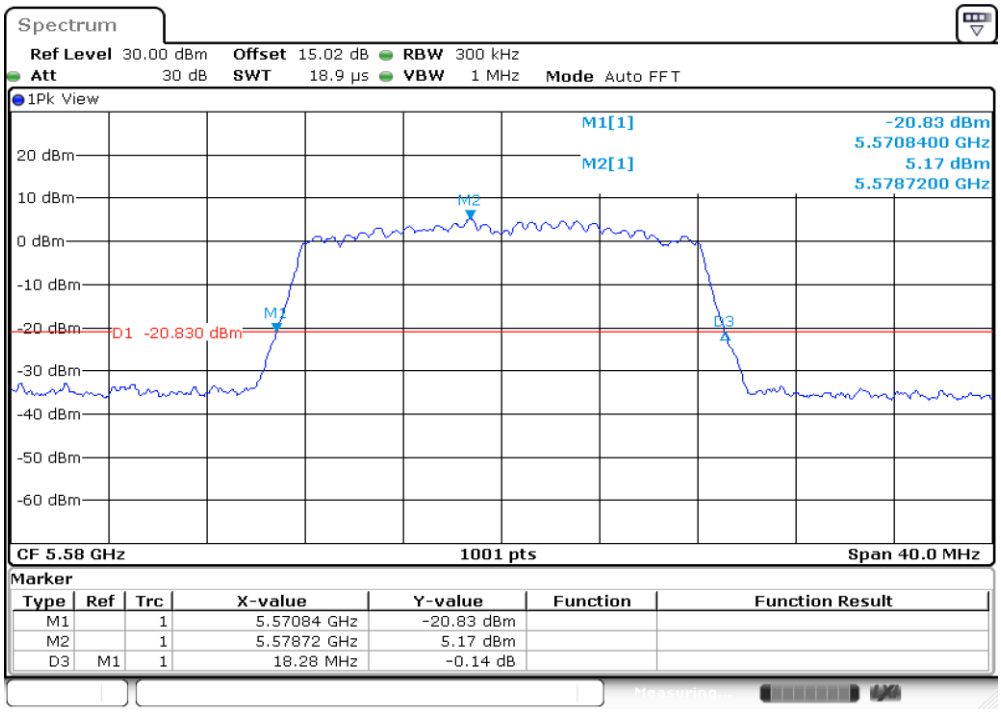

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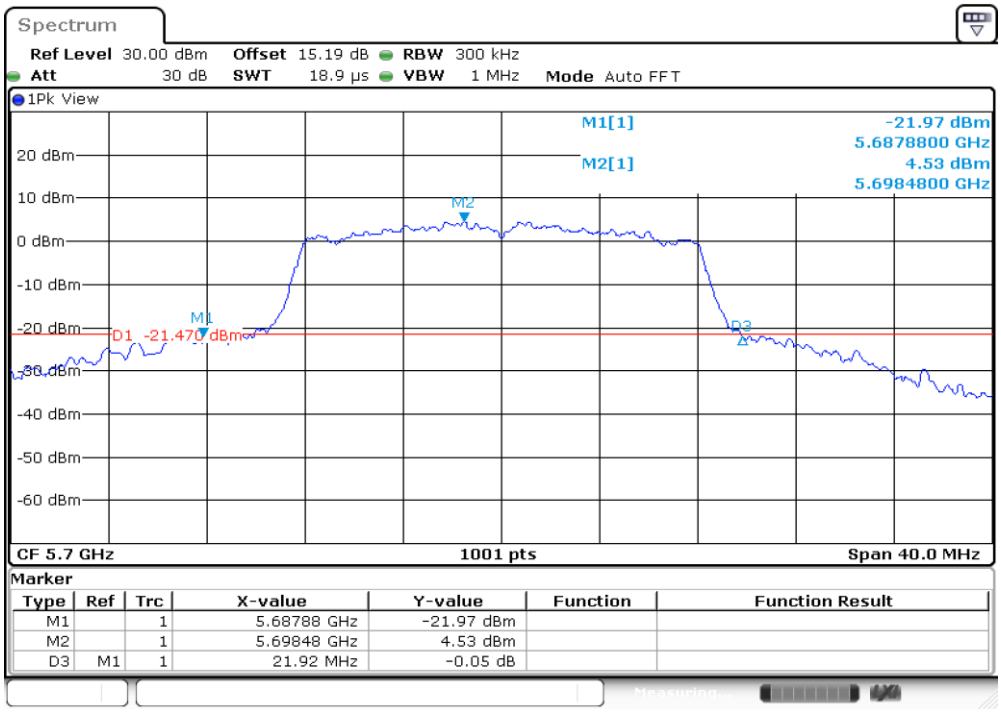

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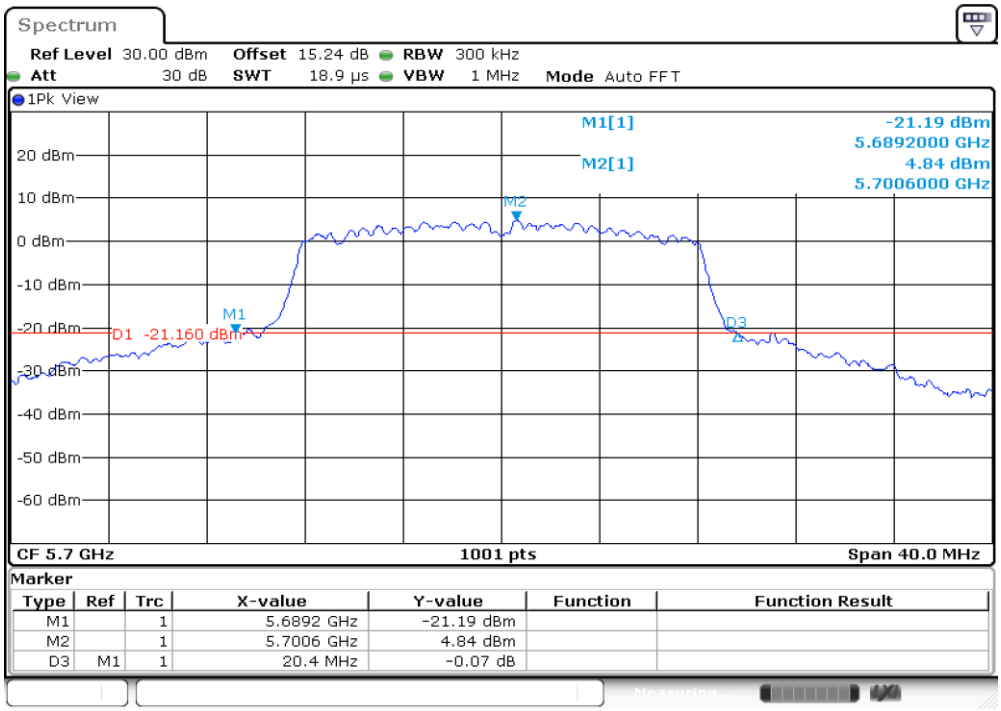

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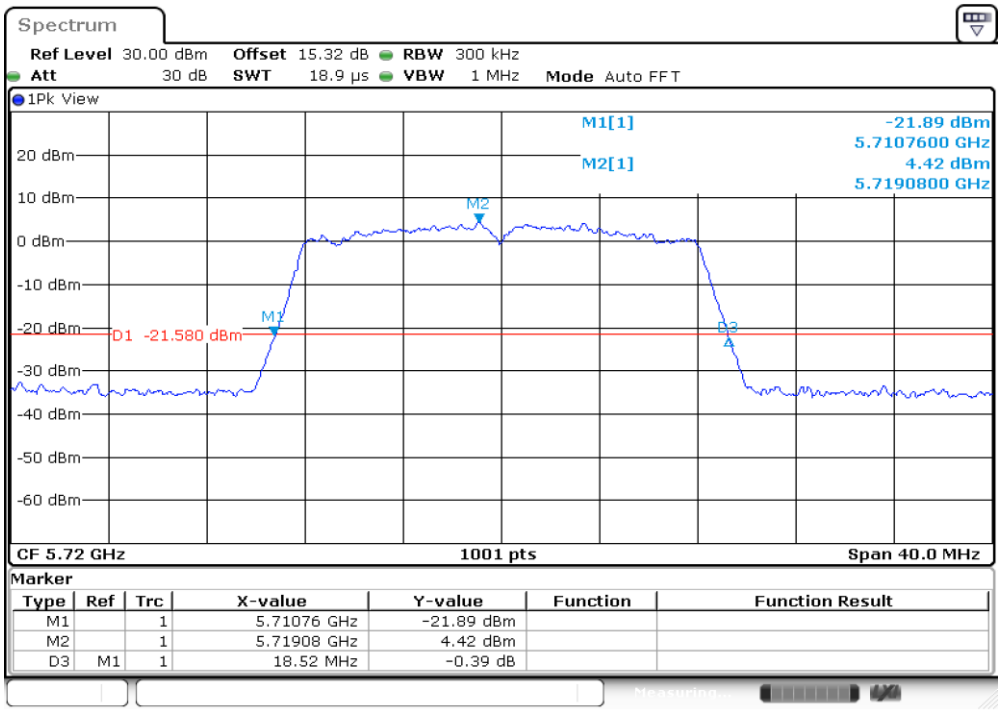

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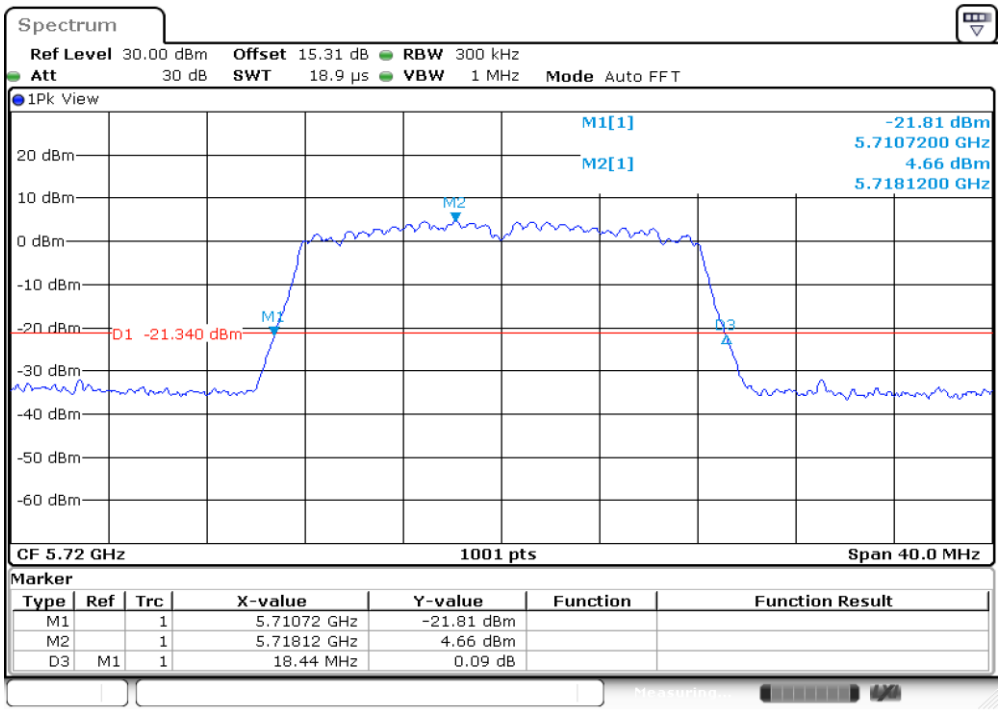

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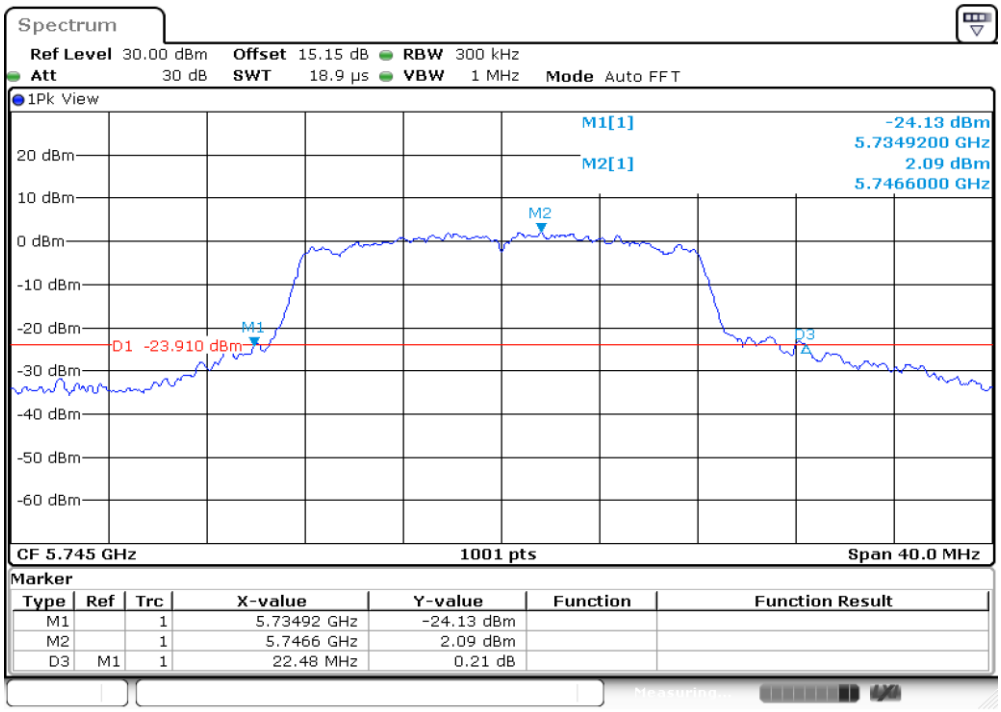

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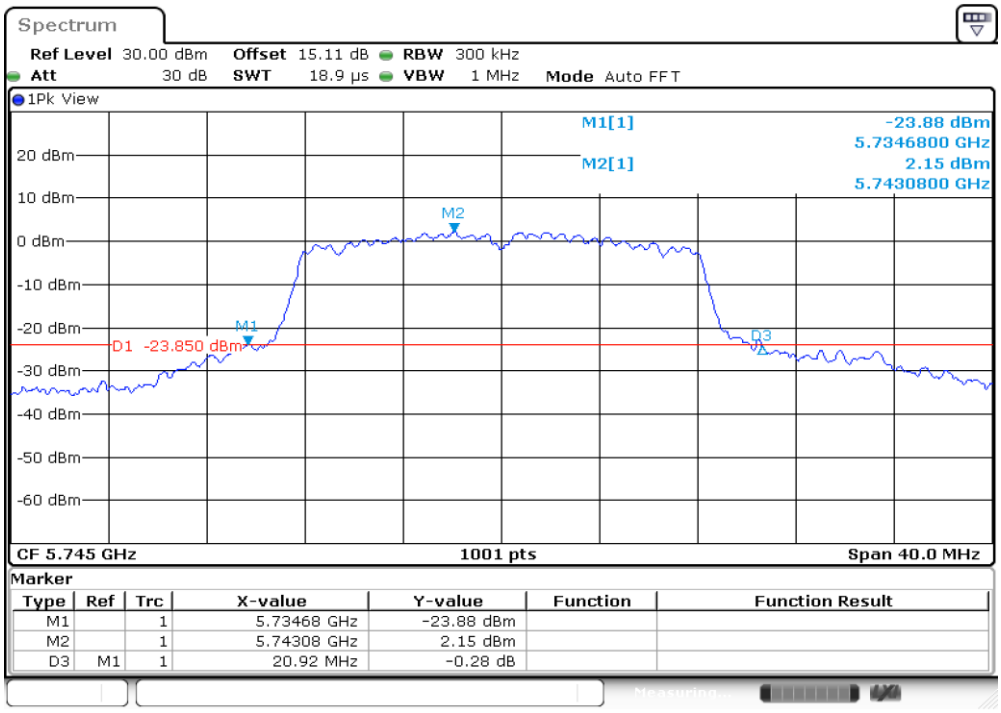

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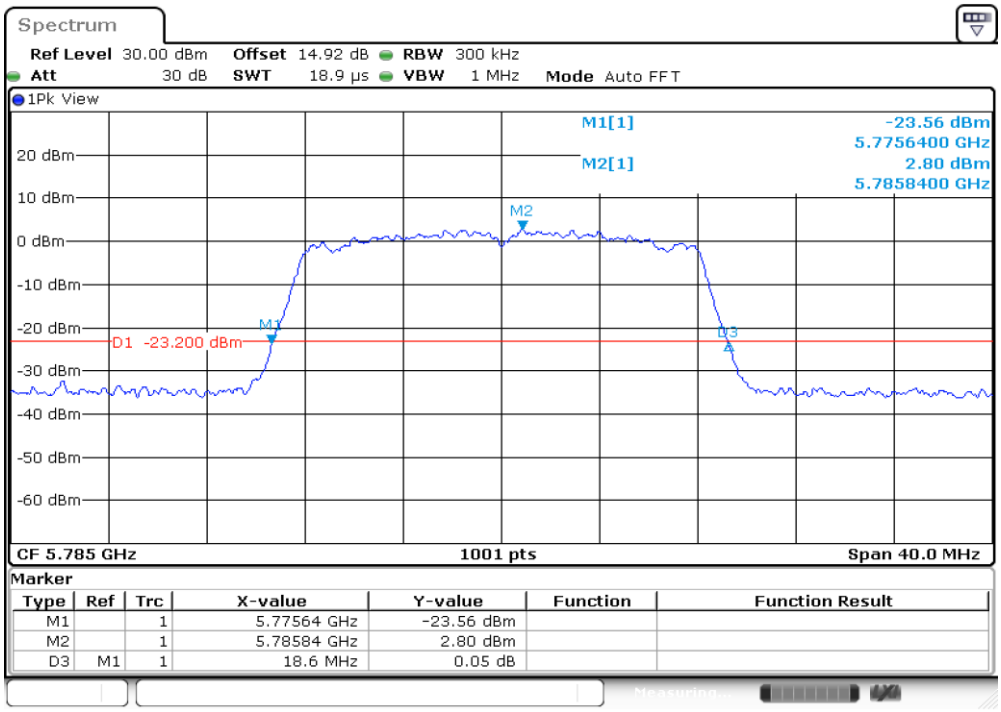

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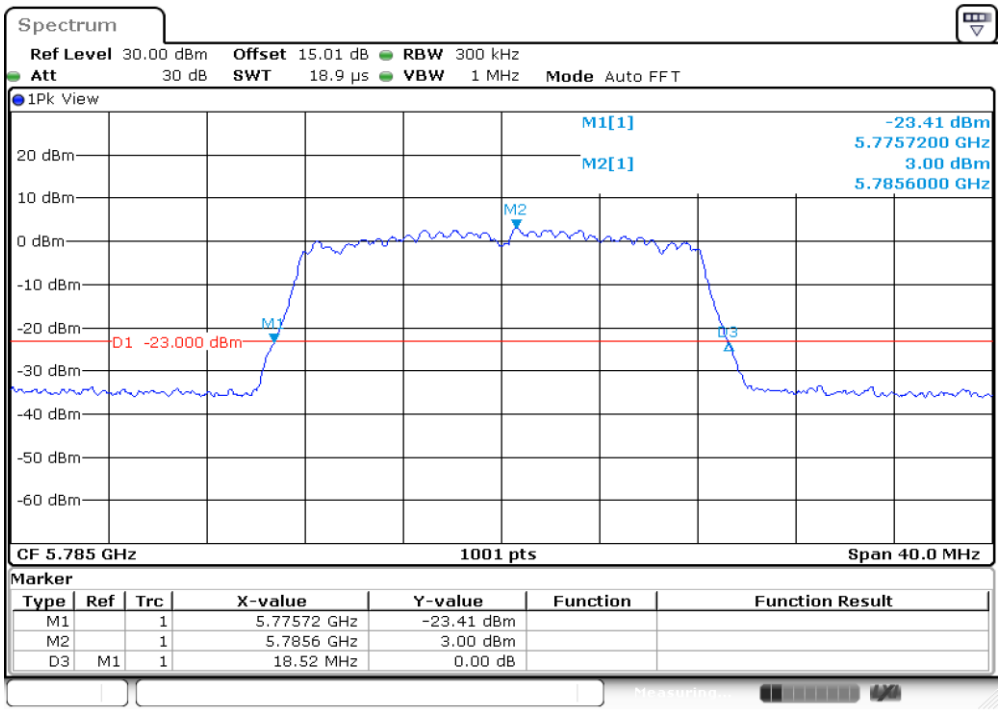

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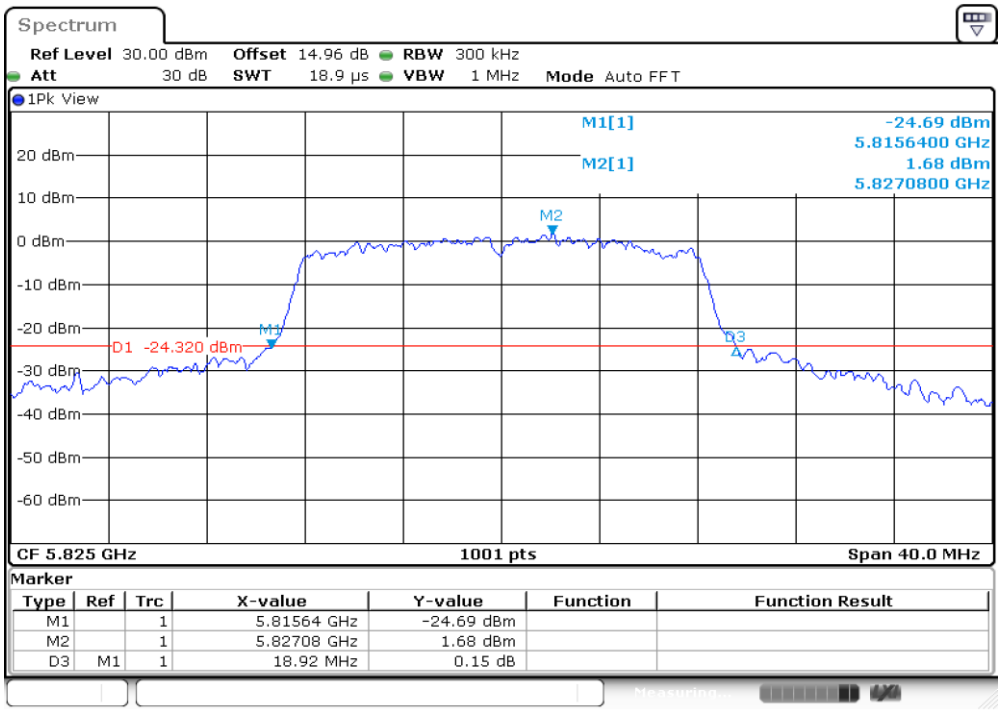

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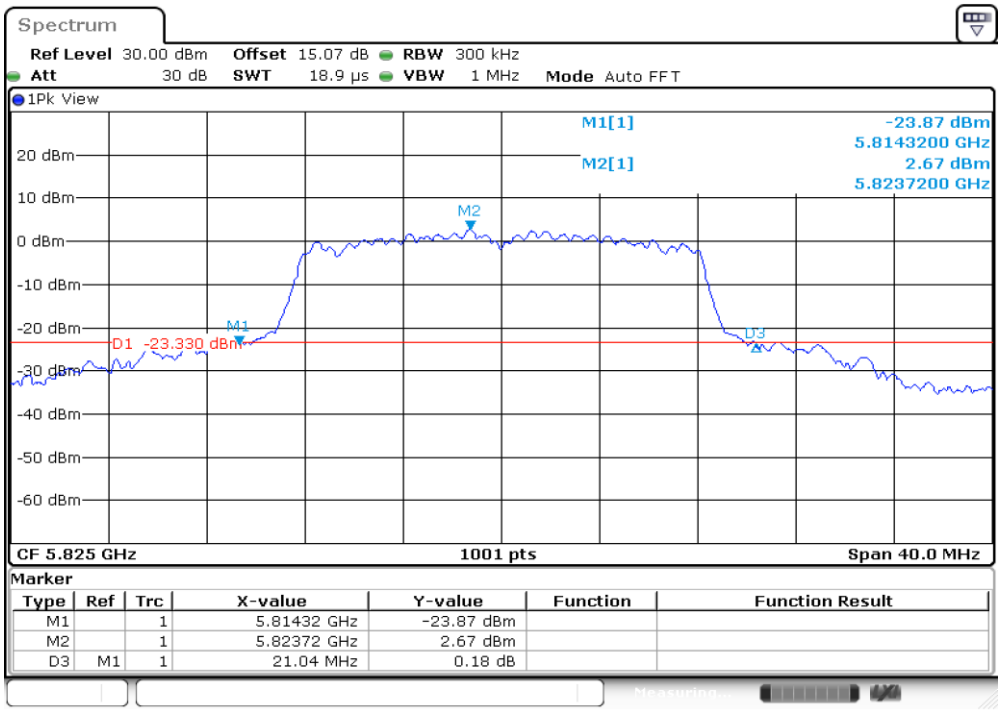

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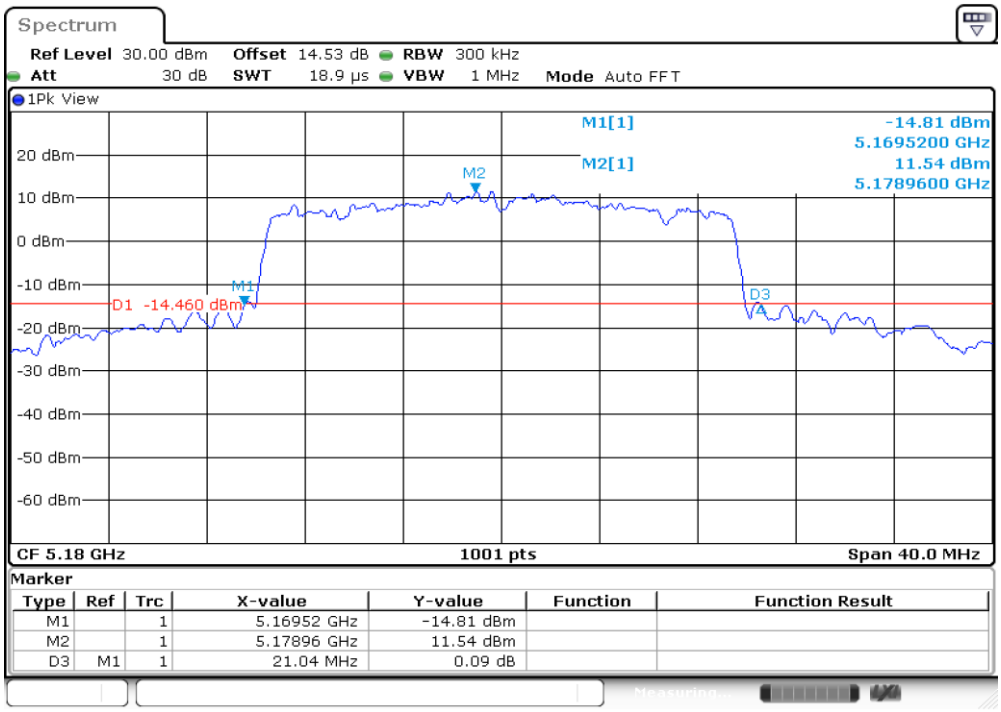

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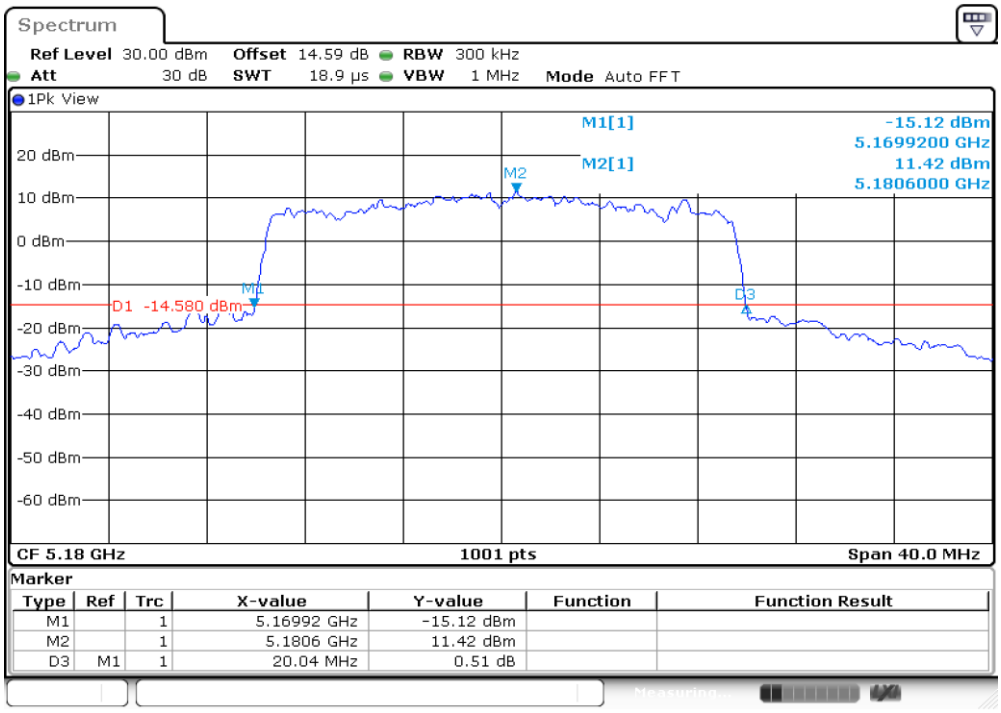

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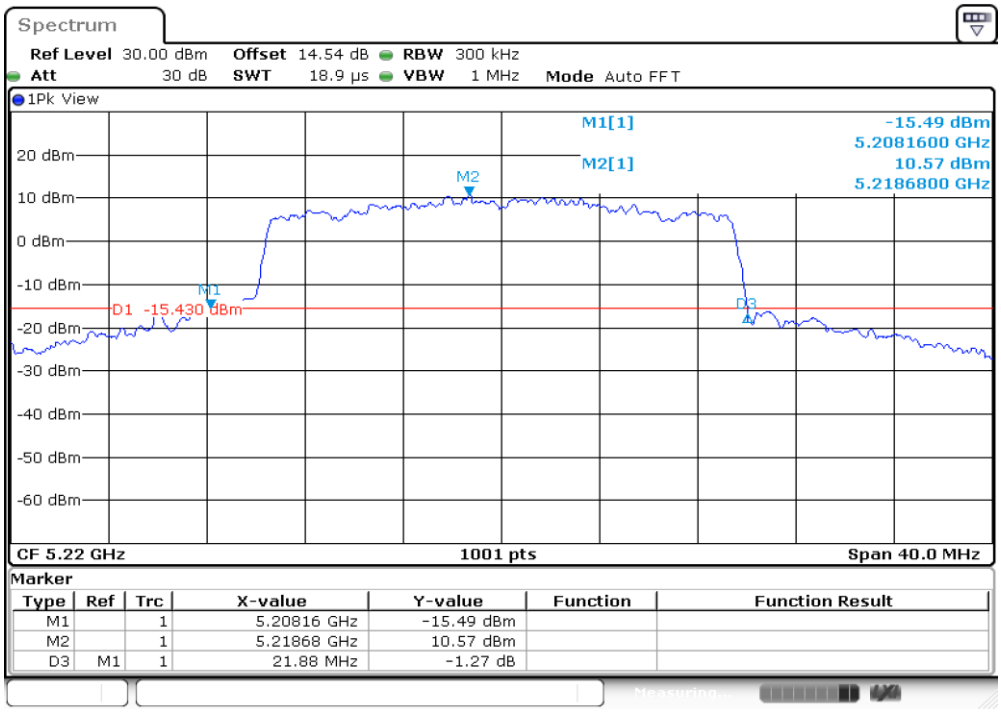

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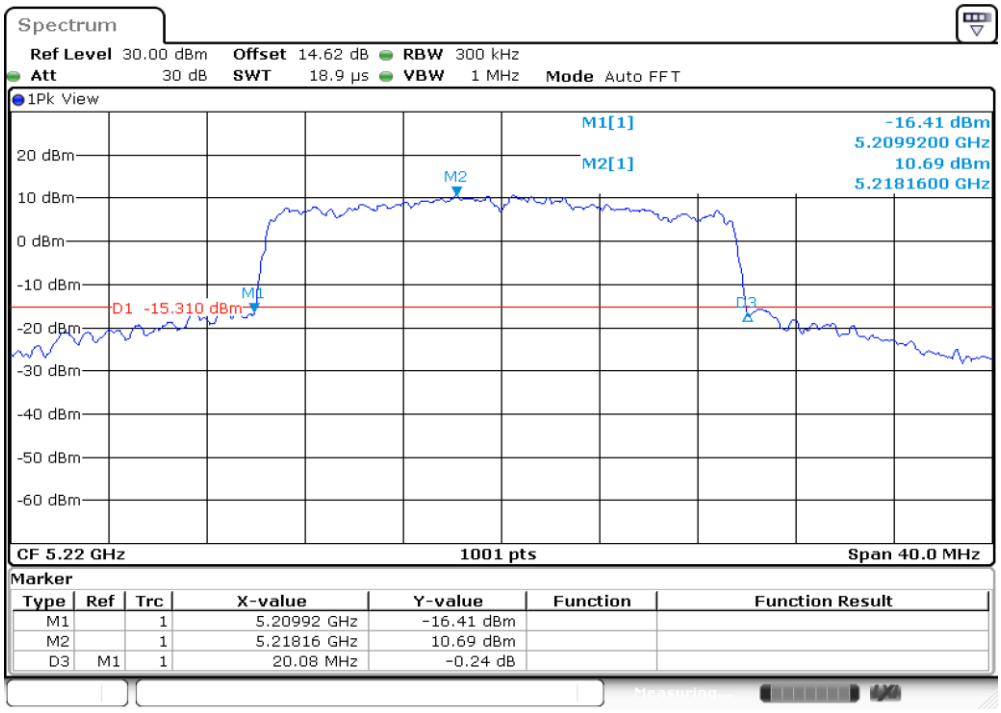

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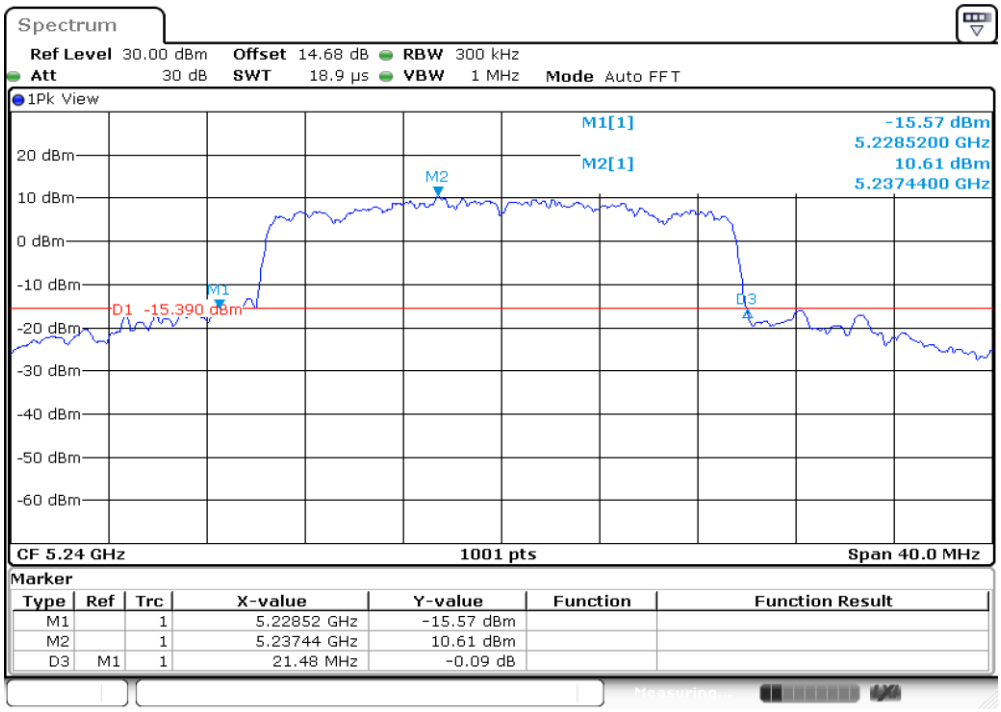

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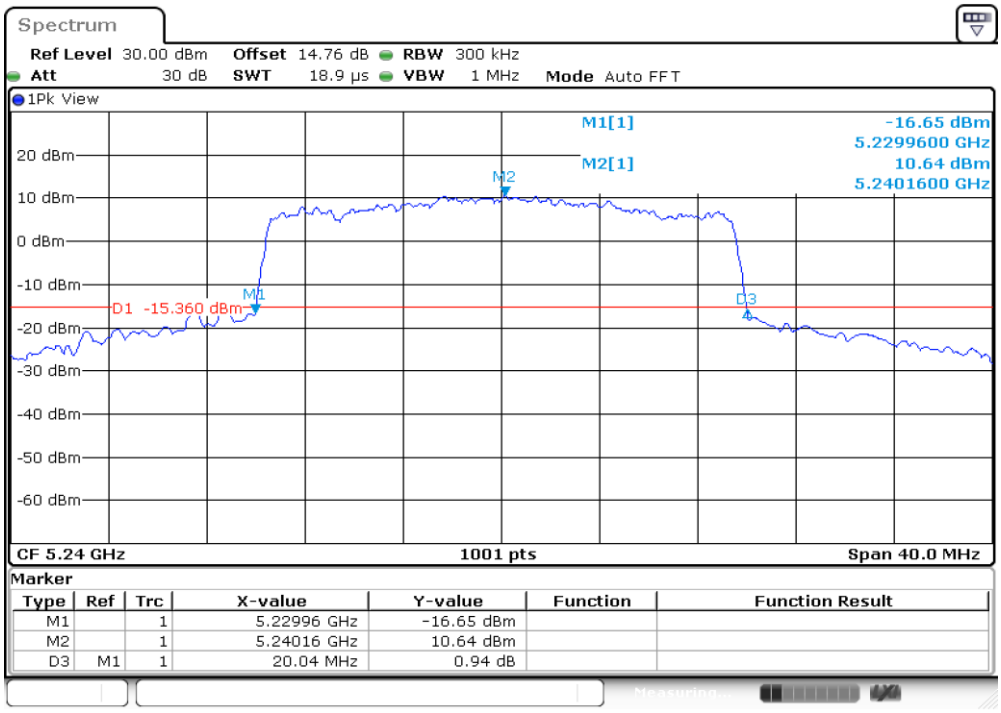

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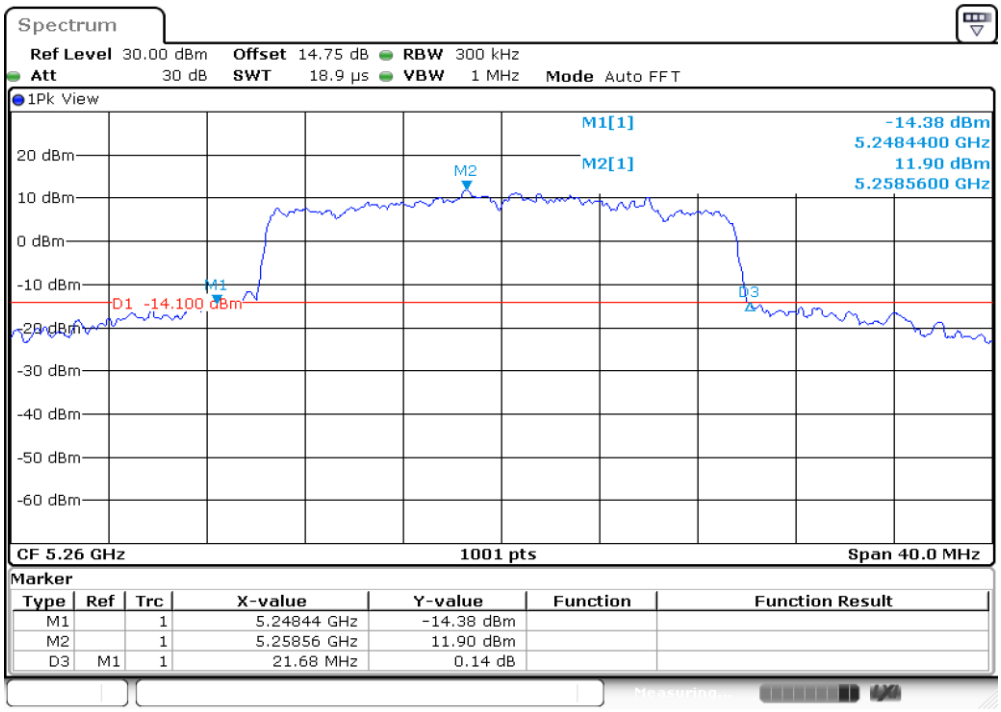

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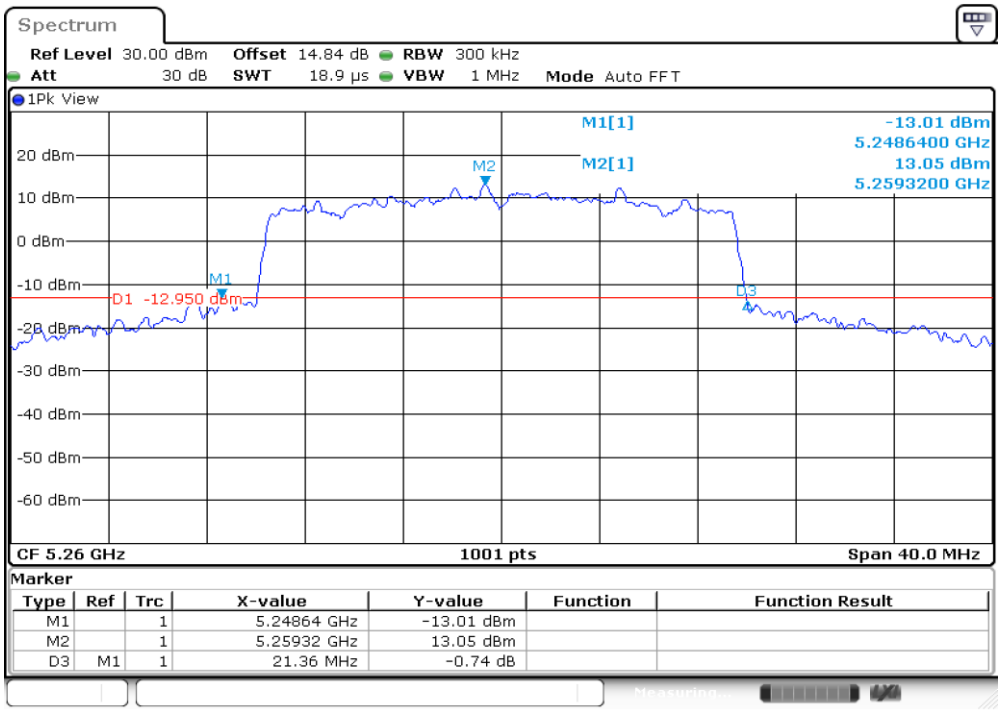

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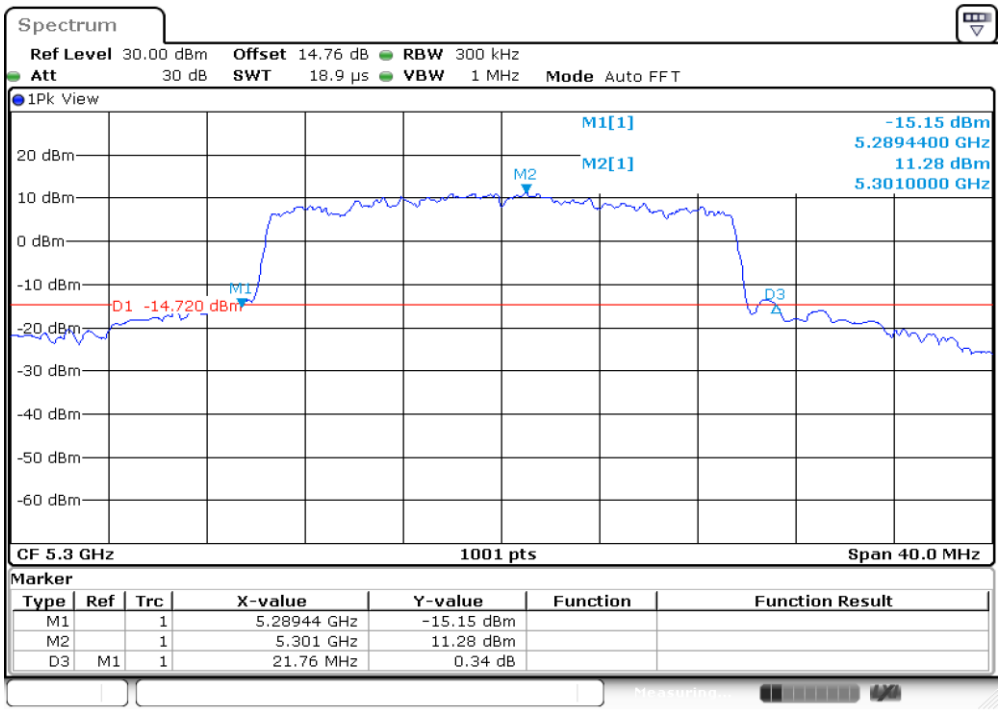

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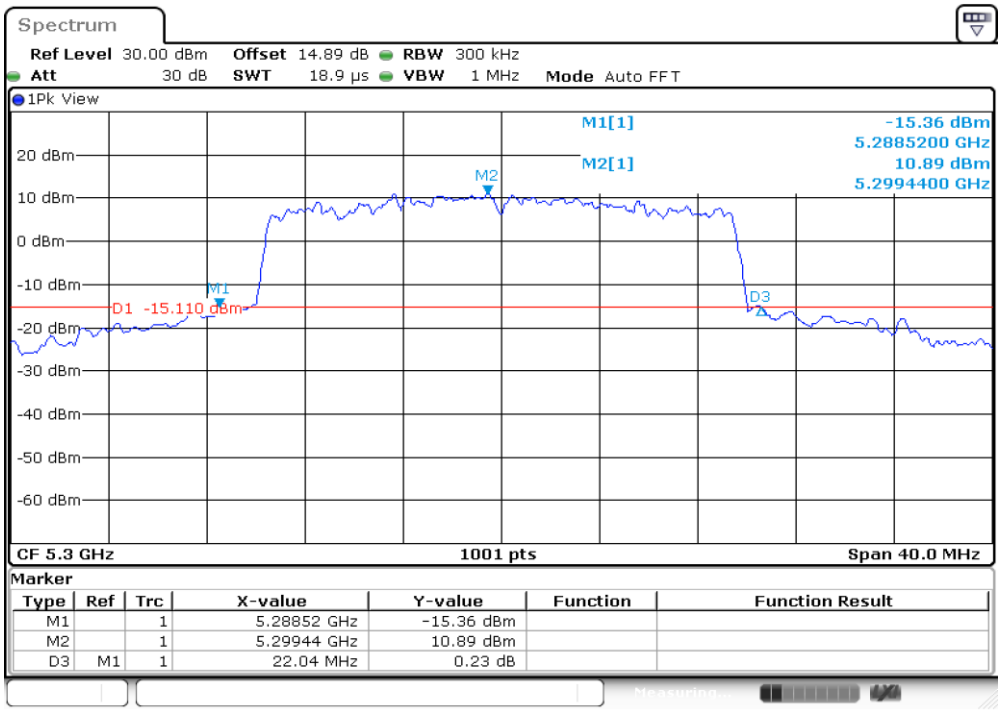

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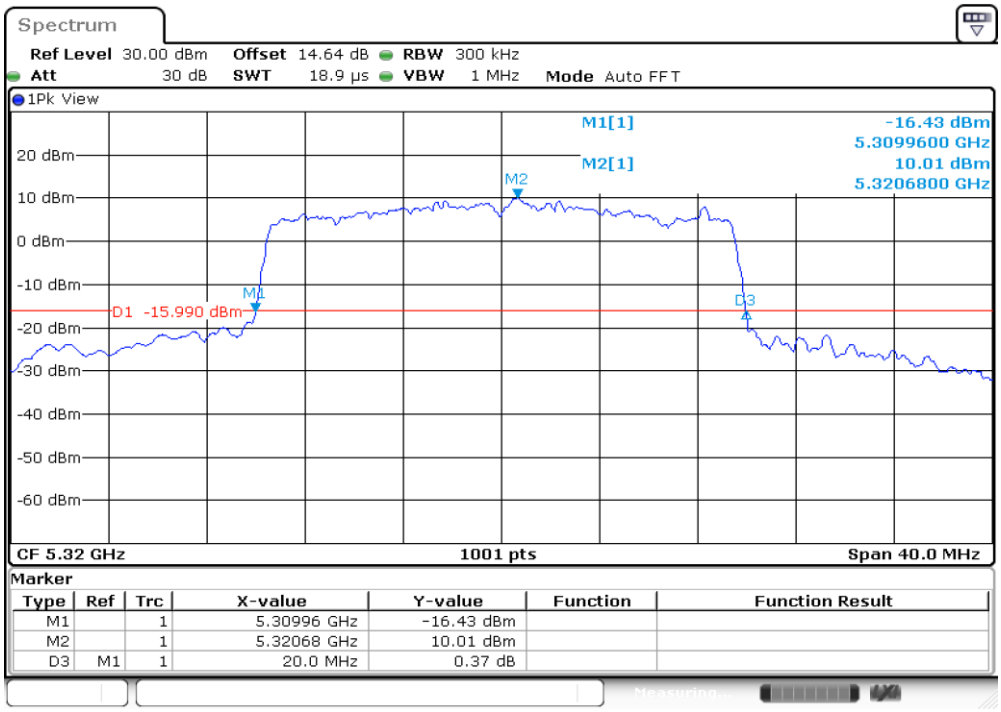

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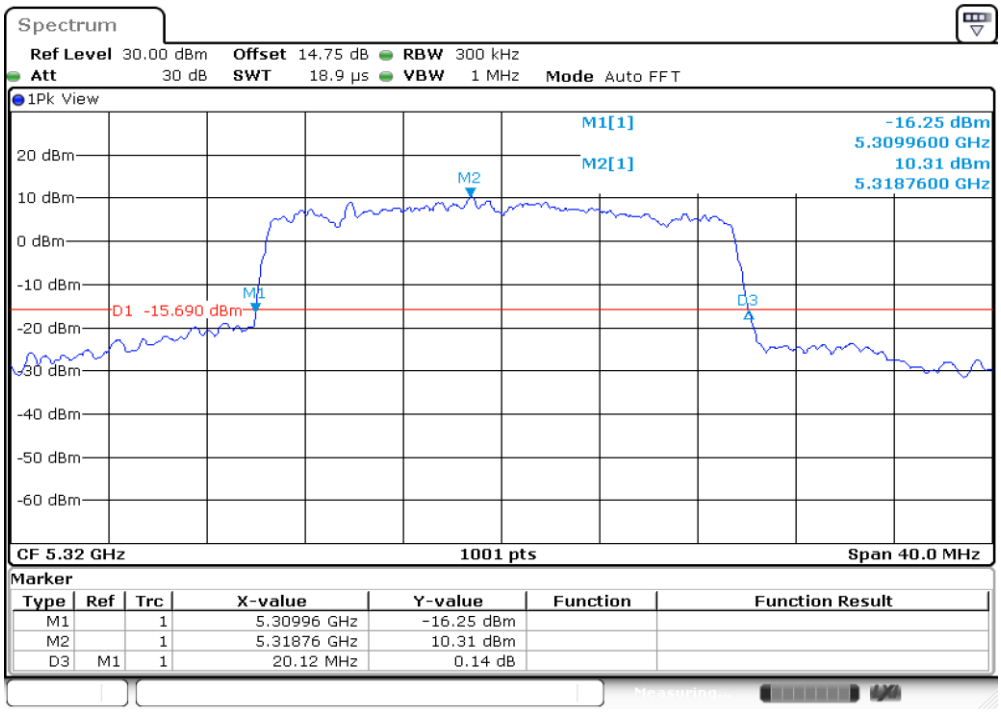

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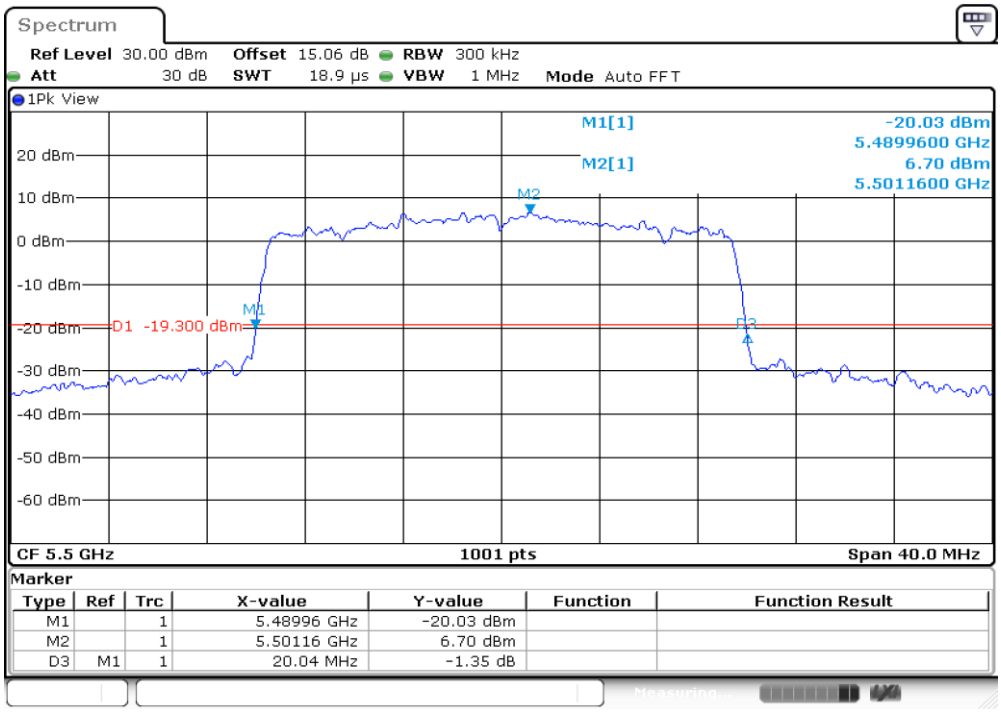

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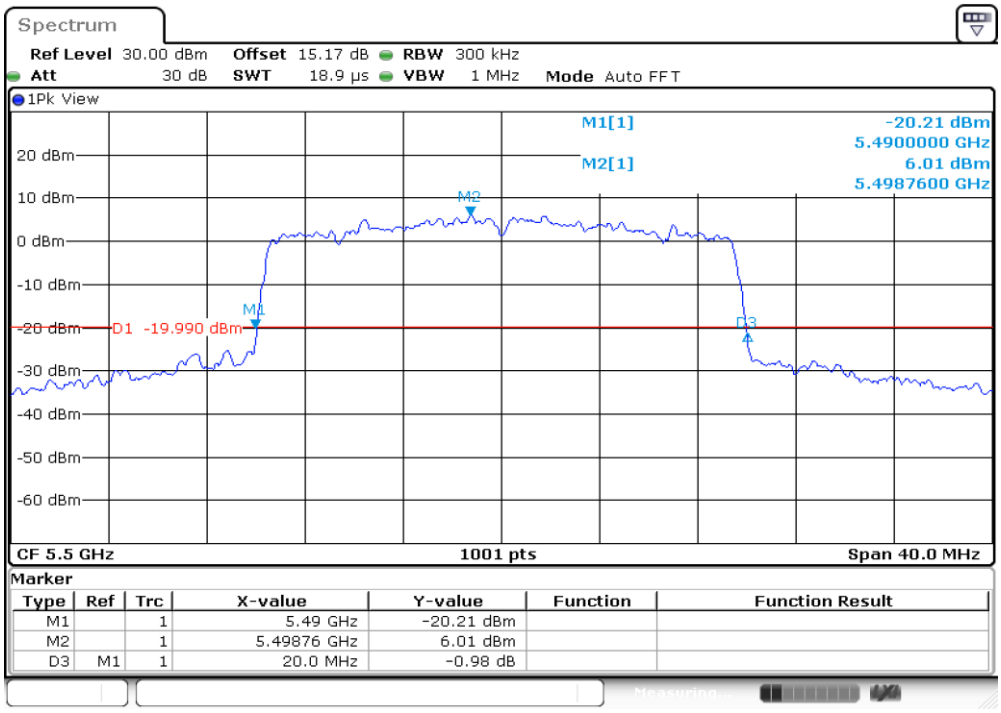

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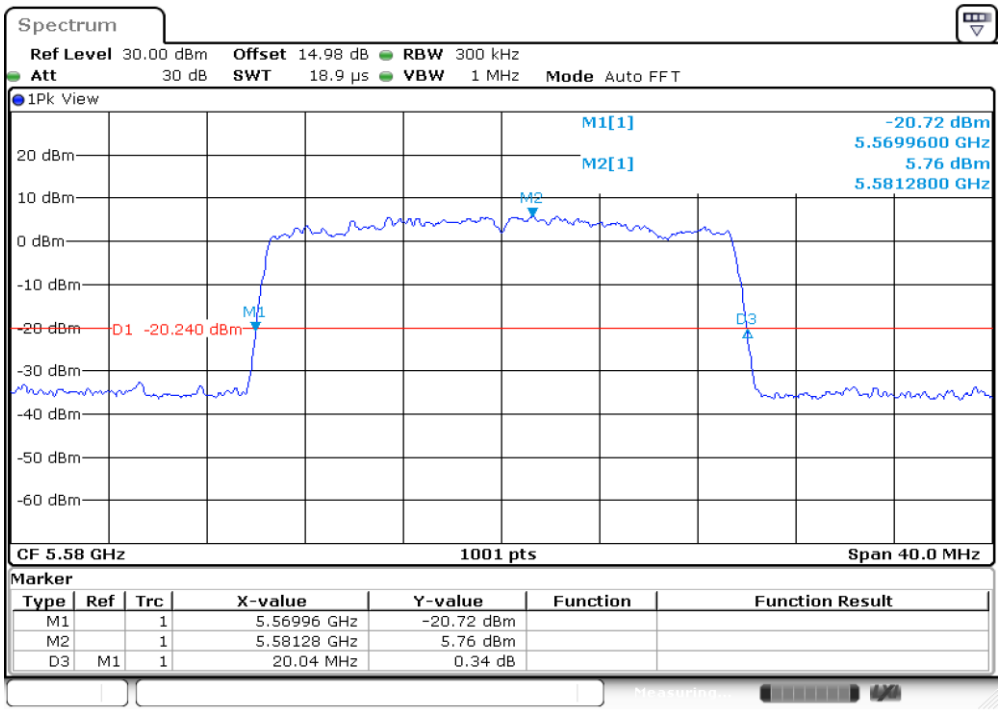
11BE20MIMO_Ant5_5580



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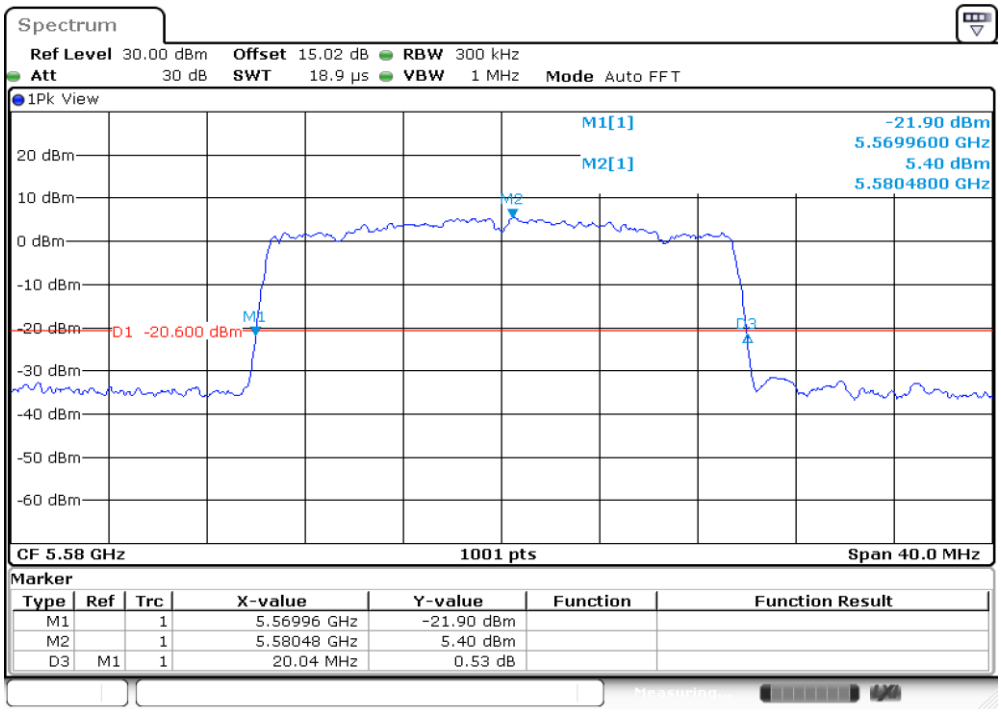

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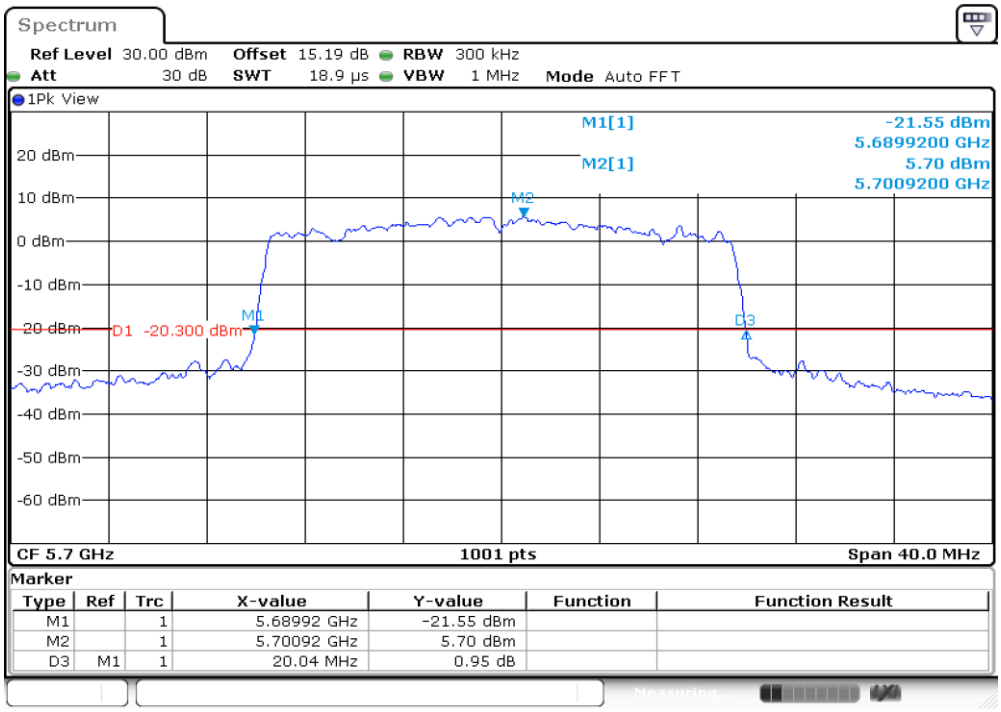

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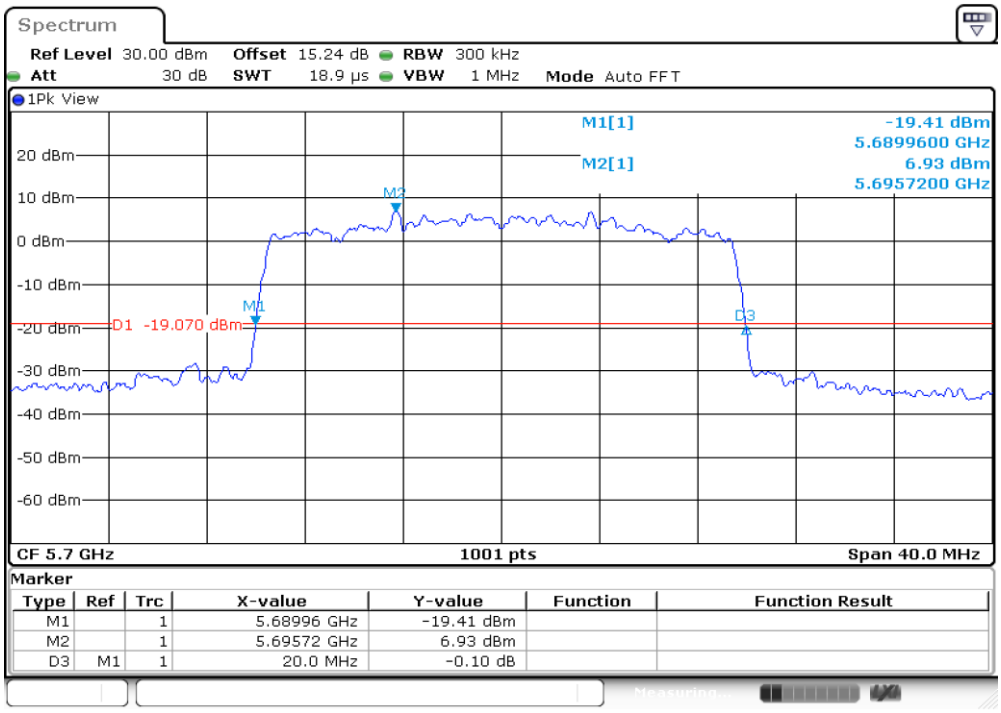

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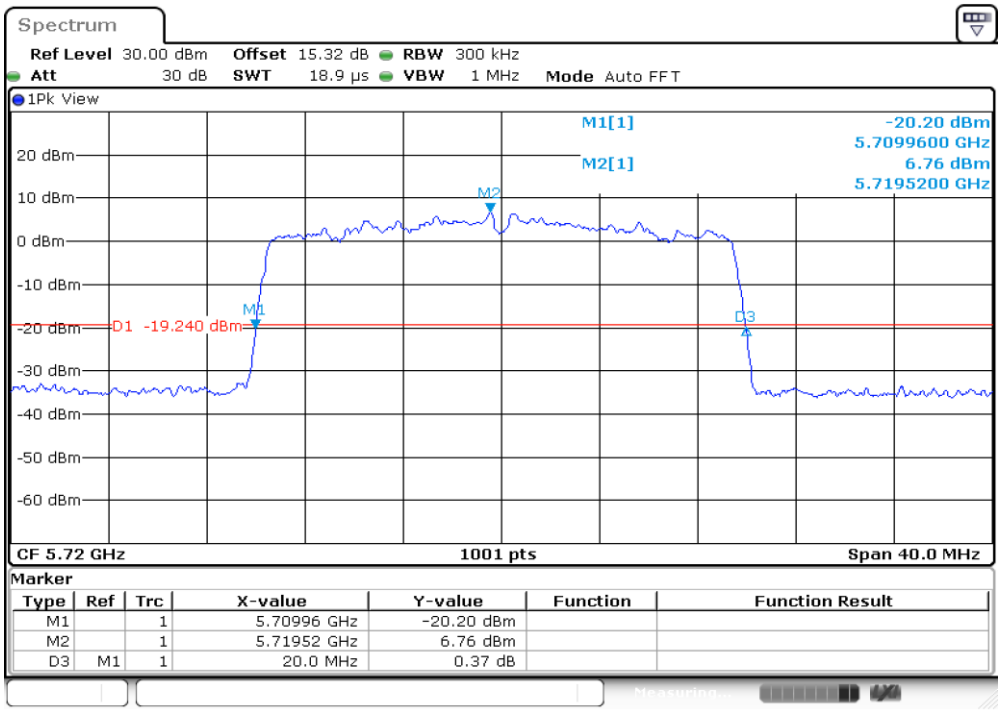

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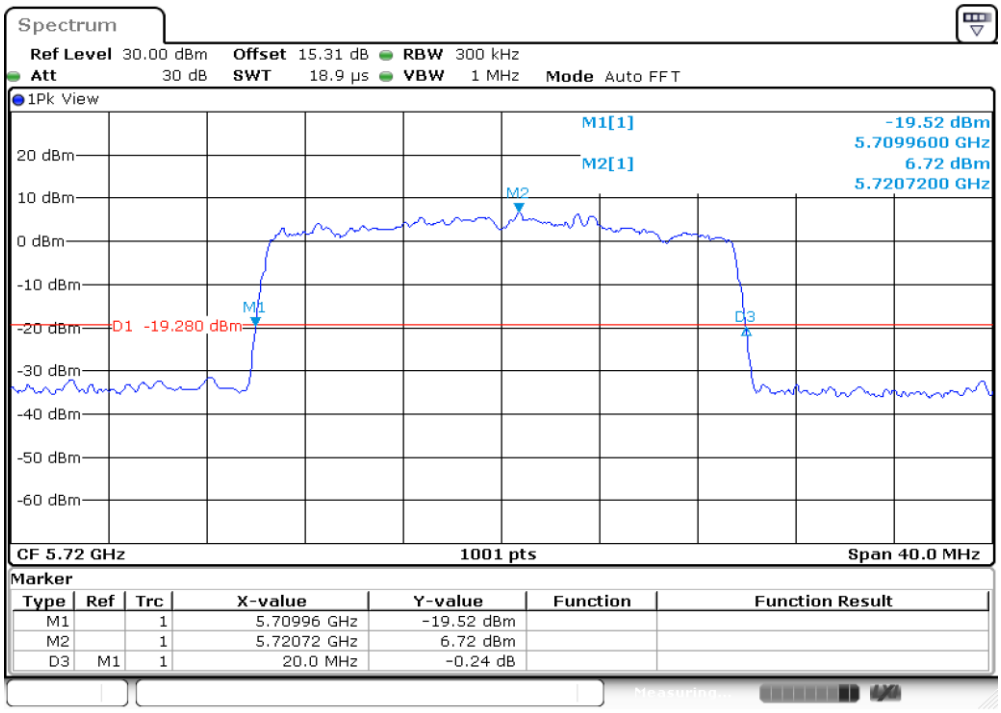

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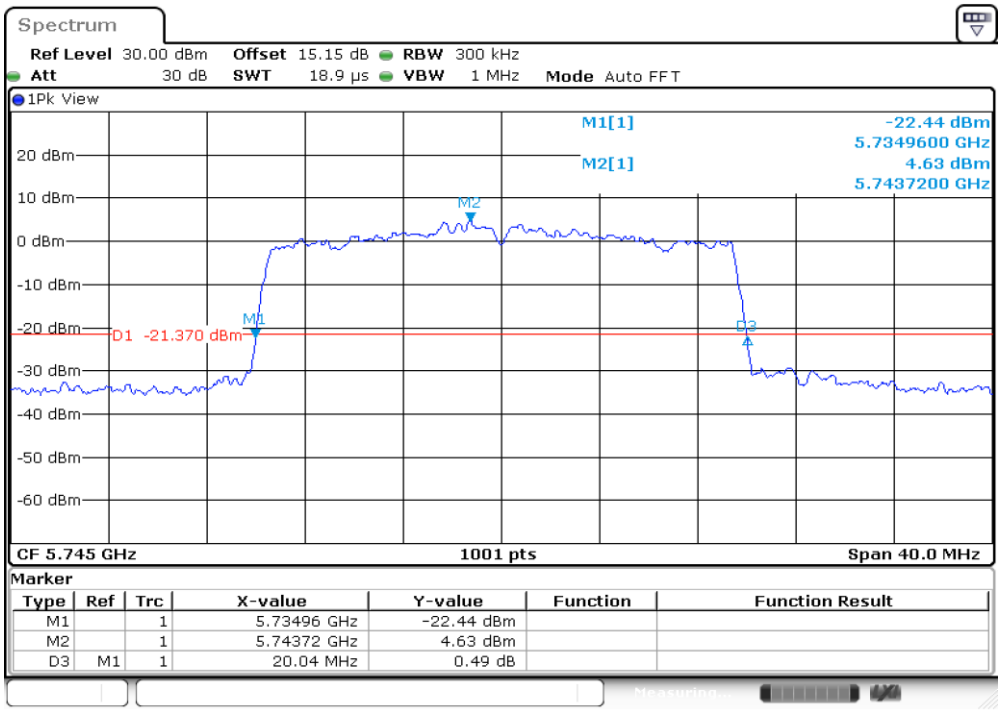

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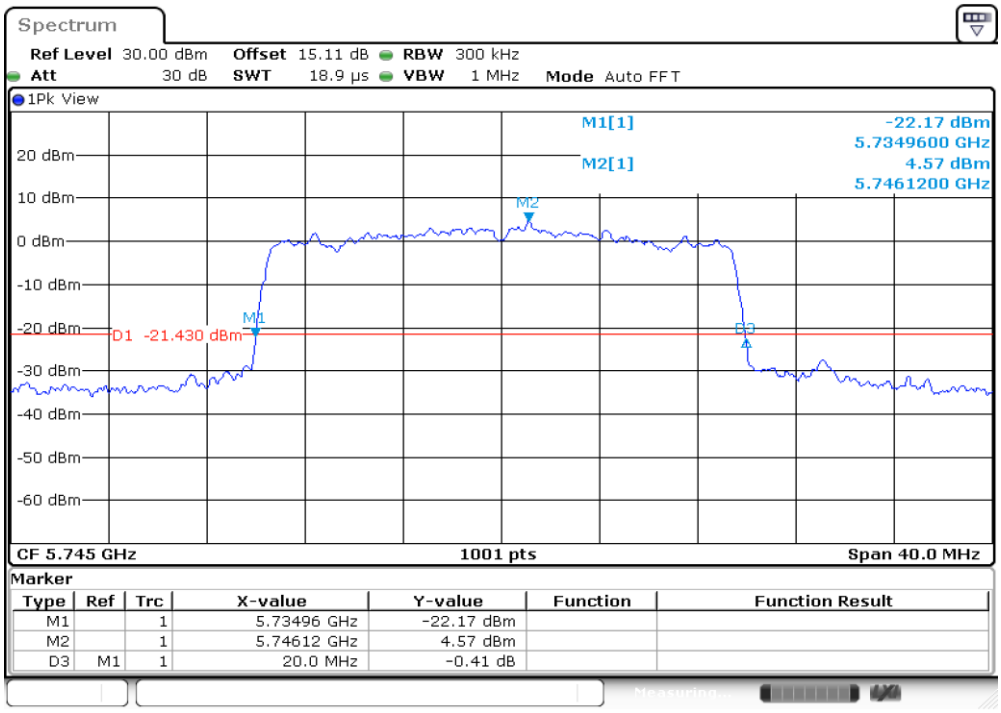

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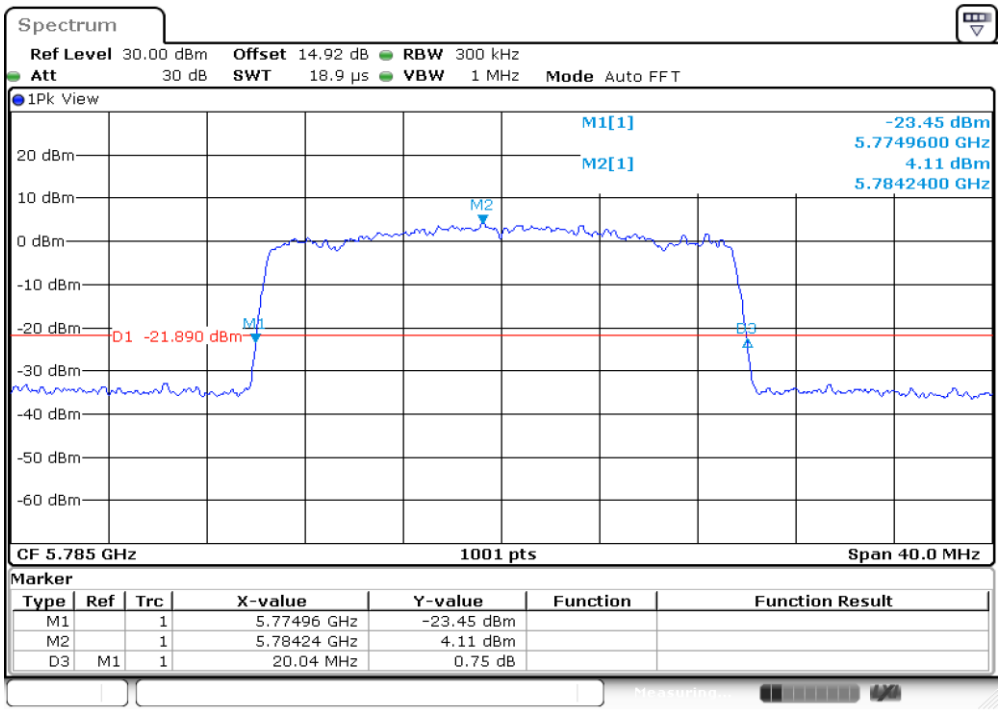

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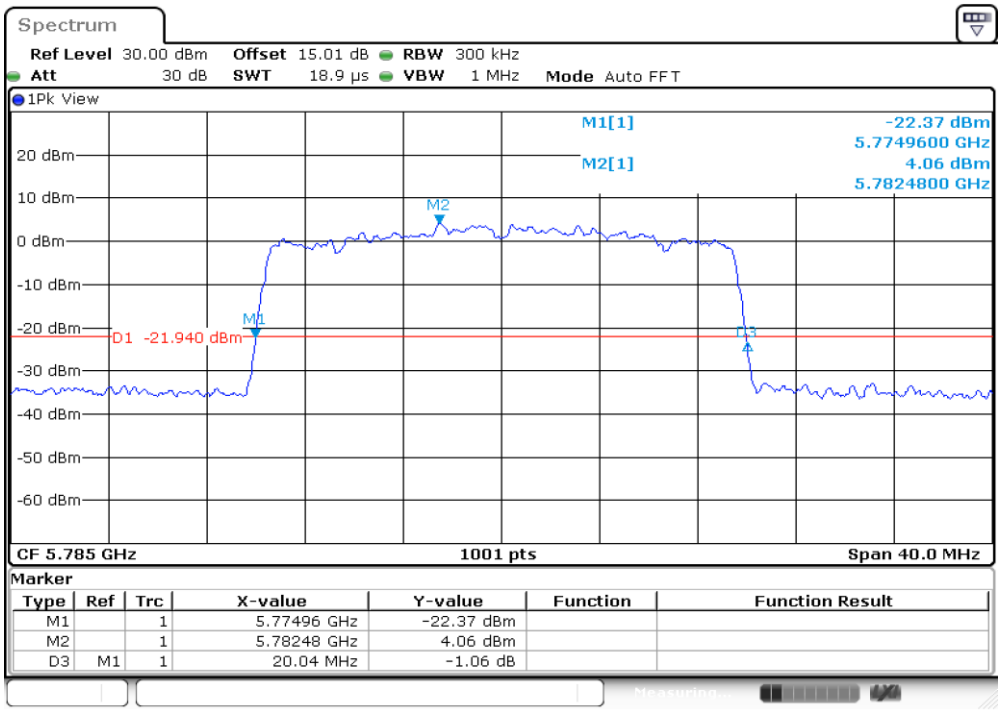

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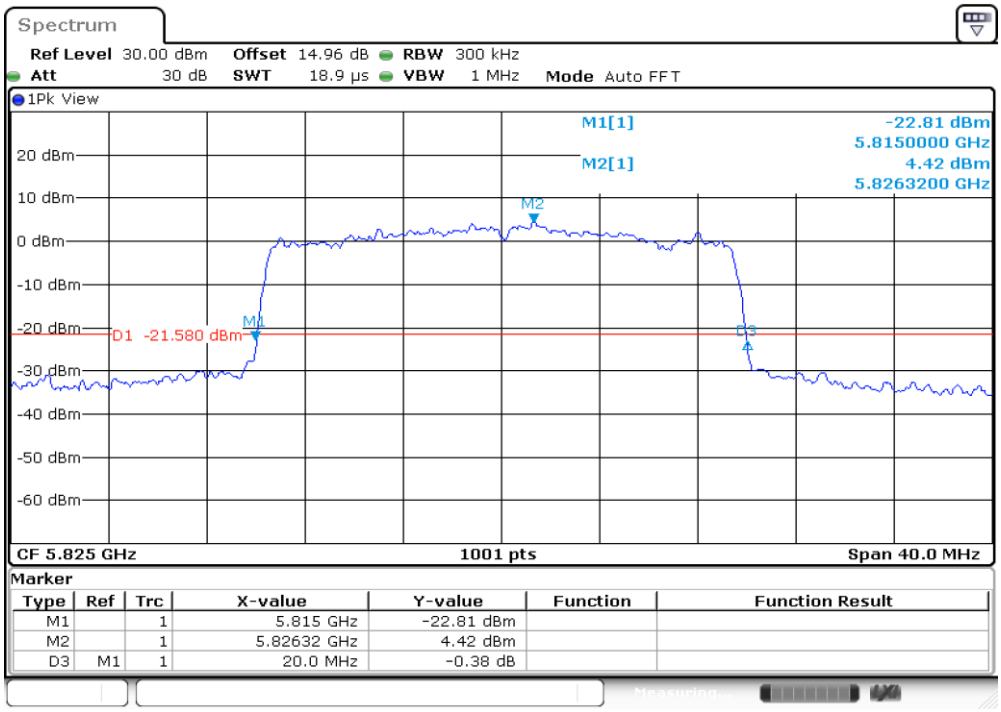

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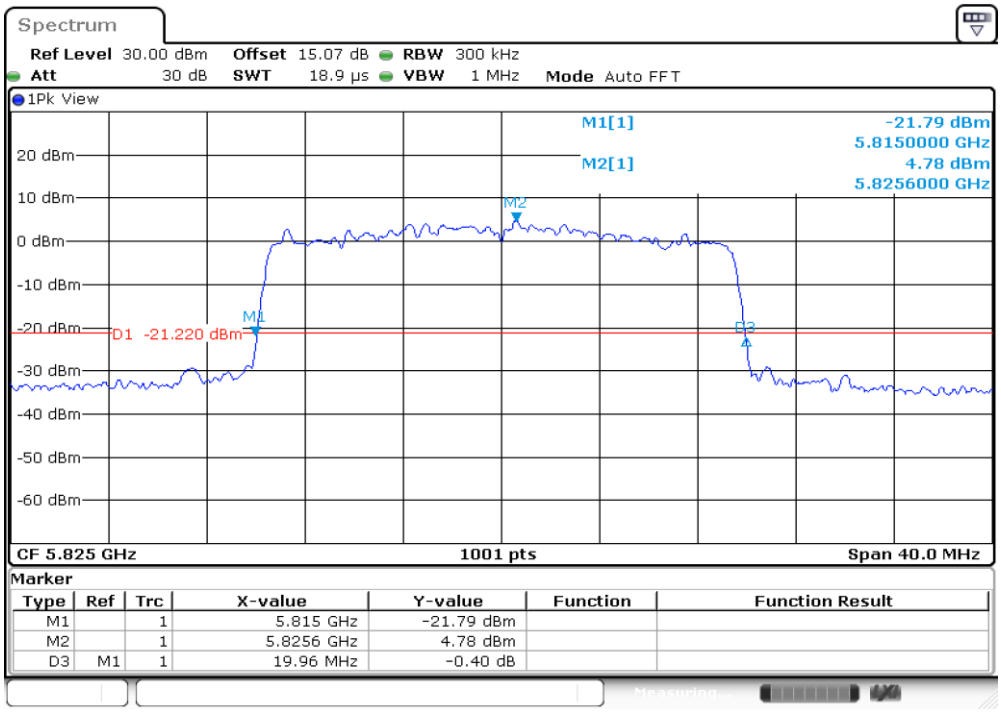

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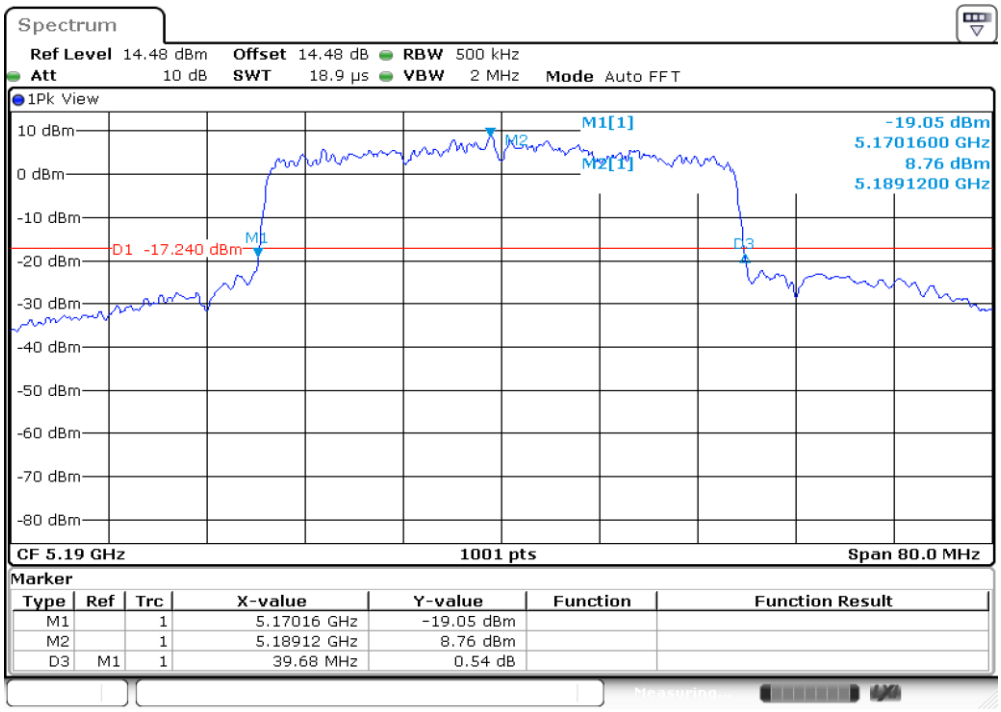

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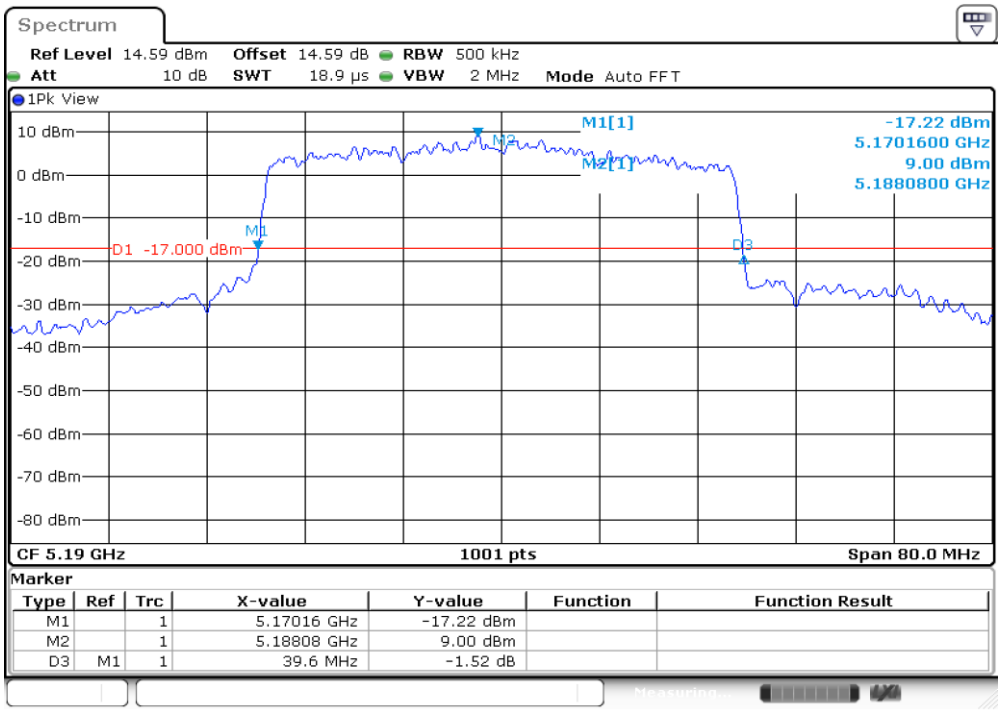

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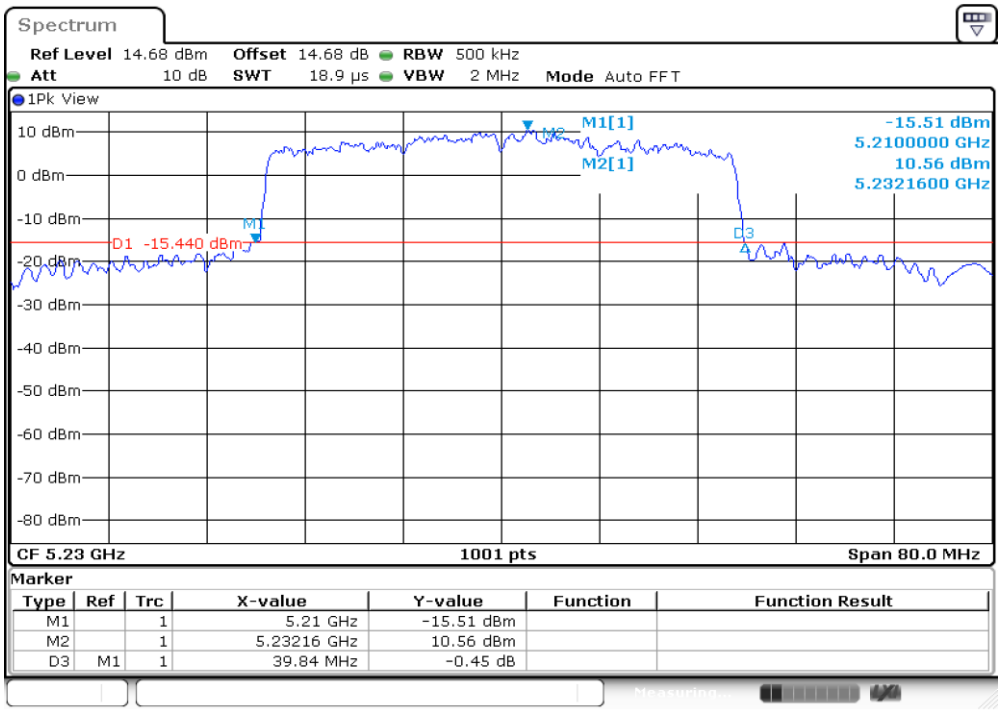

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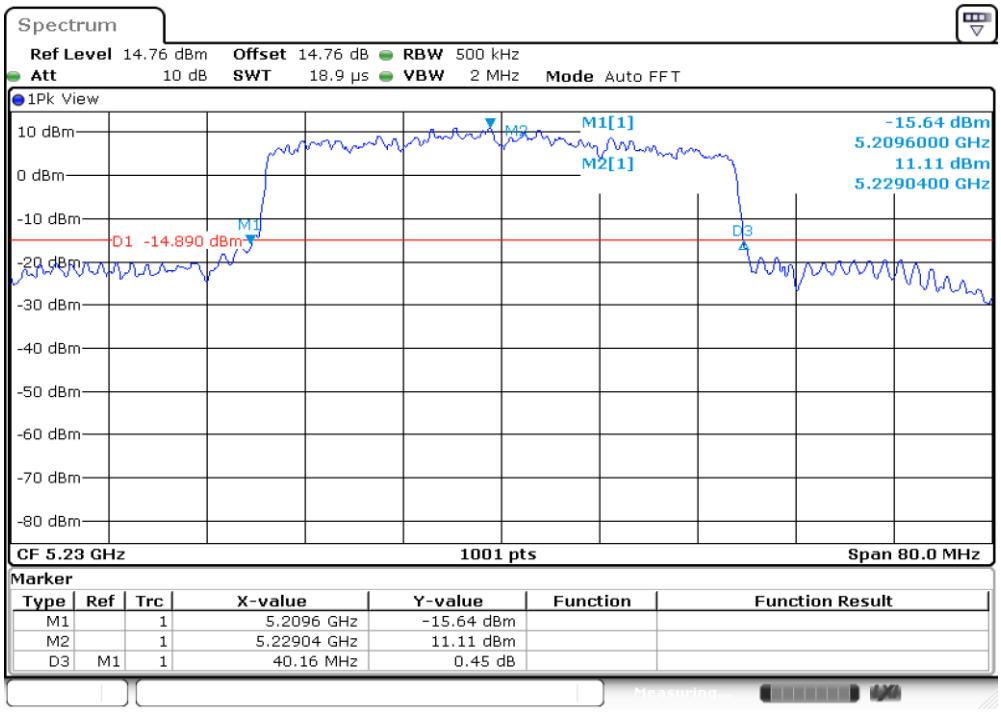

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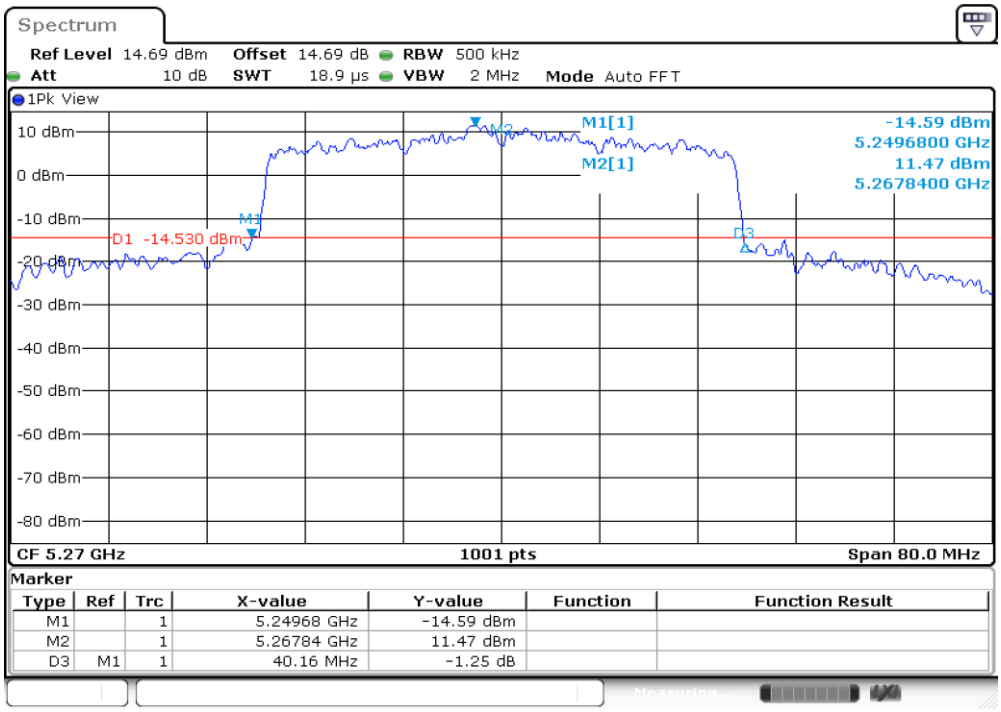

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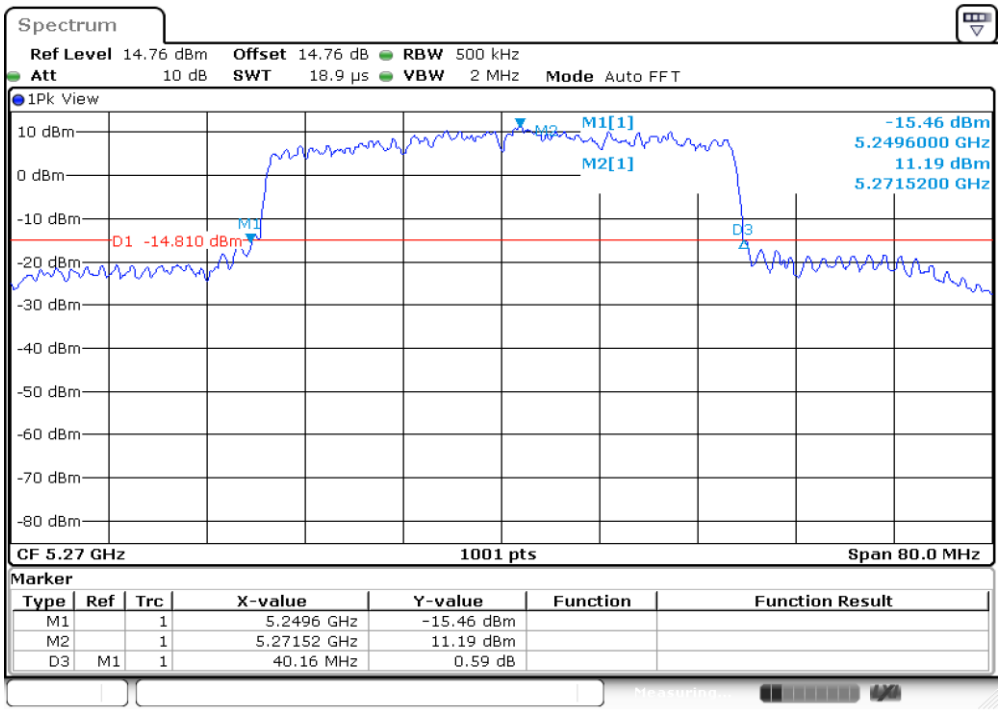

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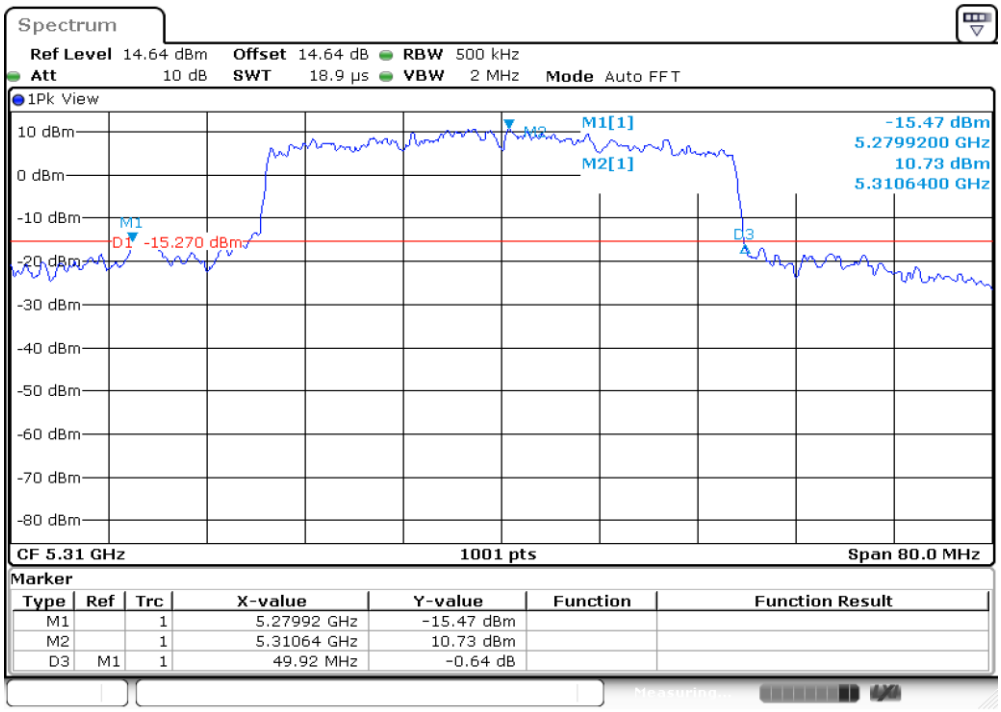
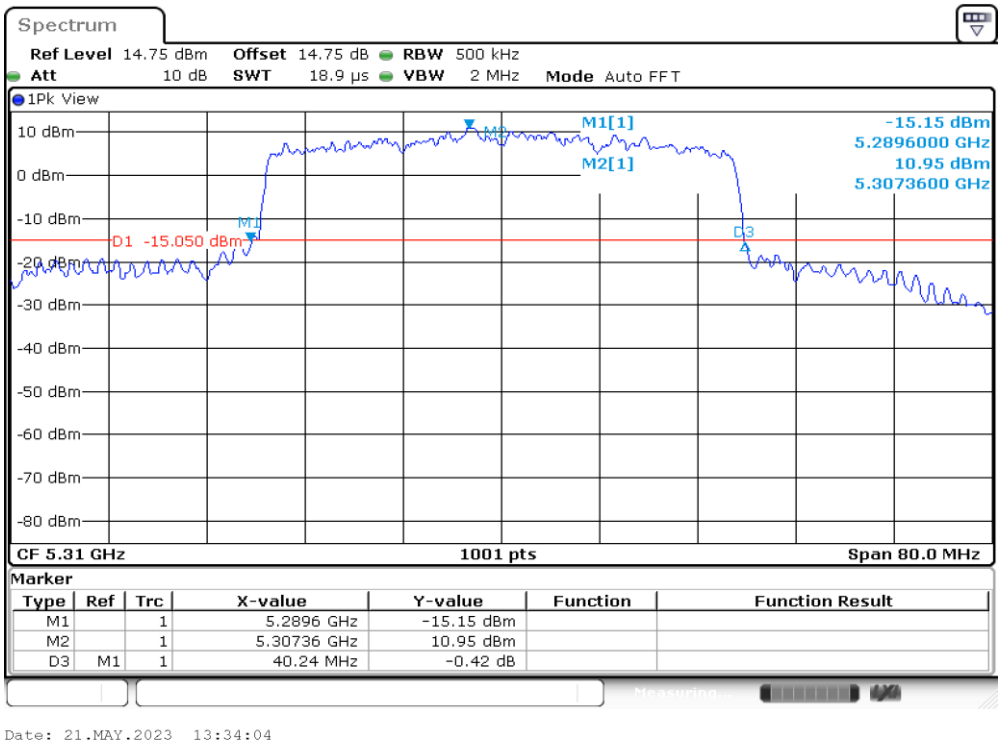
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