FCC RF Test Report

APPLICANT	:	vivo Mobile Communication Co., Ltd.
EQUIPMENT	:	Mobile Phone
BRAND NAME	:	vivo
MODEL NAME	:	V2349
FCC ID	:	2AUCY-V2349
STANDARD	:	FCC Part 15 Subpart E §15.407
CLASSIFICATION	:	(NII) Unlicensed National Information Infrastructure
TEST DATE(S)	:	Jan. 04, 2024 ~ Jan. 22, 2024

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

Sporton International Inc. (ShenZhen)
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People's Republic of China

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REVISION HISTORY

REPORT NO.	VERSION	DESCRIPTION	ISSUED DATE
FR3D0709D	Rev. 01	Initial issue of report	Feb. 05, 2024

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 6.54 dB at 5149.91 MHz
3.5	15.207	AC Conducted Emission	15.207(a)	15.207(a)	Pass	Under limit 17.34 dB at 0.15 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

vivo Mobile Communication Co., Ltd.
No.1, vivo Road, Chang'an, Dongguan, Guangdong, China

1.2 Manufacturer

vivo Mobile Communication Co., Ltd.
No.1, vivo Road, Chang'an, Dongguan, Guangdong, China

1.3 Product Feature of Equipment Under Test

Product Feature	
Equipment	Mobile Phone
Brand Name	vivo
Model Name	V2349
FCC ID	2AUCY-V2349
IMEI Code	Conducted: 865264079977969/865264079977977 Conduction: 865264079978165/865264079978173 Radiation: 865264079978645/865264079978652
HW Version	MP_0.1
SW Version	PD2341EF_EX_A_14.0.6.16.W30
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	**<5180 MHz ~ 5240 MHz>** 802.11a : 18.49 dBm / 0.0706 W 802.11n HT20 : 18.13 dBm / 0.0650 W 802.11n HT40 : 17.07 dBm / 0.0509 W 802.11ac VHT80: 9.08 dBm / 0.0081 W **<5260 MHz ~ 5320 MHz>** 802.11a : 18.26 dBm / 0.0670 W 802.11n HT20 : 18.37 dBm / 0.0687 W 802.11n HT40 : 17.58 dBm / 0.0573 W 802.11ac VHT80: 8.94 dBm / 0.0078 W **<5500 MHz ~ 5720 MHz >** 802.11a : 18.37 dBm / 0.0687 W 802.11n HT20 : 17.97 dBm / 0.0627 W 802.11n HT40 : 16.71 dBm / 0.0469 W 802.11ac VHT80: 16.01 dBm / 0.0399 W **<5745 MHz ~ 5825 MHz>** 802.11a : 18.19 dBm / 0.0659 W 802.11n HT20 : 17.81 dBm / 0.0604 W 802.11n HT40 : 17.20 dBm / 0.0525 W 802.11ac VHT80: 15.84 dBm / 0.0384 W
99% Occupied Bandwidth	**<5180 MHz ~ 5240 MHz>** 802.11a : 18.382 MHz 802.11n HT20 : 20.699 MHz 802.11n HT40 : 36.763 MHz 802.11ac VHT80 : 75.604 MHz **<5260 MHz ~ 5320 MHz>** 802.11a : 22.178 MHz 802.11n HT20 : 21.658 MHz 802.11n HT40 : 37.163 MHz 802.11ac VHT80 : 75.604 MHz **<5500 MHz ~ 5720 MHz>** 802.11a : 18.581 MHz 802.11n HT20 : 20.739 MHz 802.11n HT40 : 36.843 MHz 802.11ac VHT80 : 76.404 MHz **<5745 MHz ~ 5825 MHz>** 802.11a : 21.738 MHz 802.11n HT20 : 21.139 MHz 802.11n HT40 : 37.483 MHz 802.11ac VHT80 : 76.404 MHz

Antenna Type / Gain	**<5180 MHz ~ 5240 MHz>** IFA Antenna Type with gain -0.39 dBi **<5260 MHz ~ 5320 MHz>** IFA Antenna Type with gain -0.83 dBi **<5500 MHz ~ 5720 MHz>** IFA Antenna Type with gain 1.67 dBi **<5745 MHz ~ 5825 MHz>** IFA Antenna Type with gain 1.76 dBi
Type of Modulation	802.11a/n : OFDM (BPSK / QPSK / 16QAM / 64QAM) 802.11ac : OFDM (BPSK / QPSK / 16QAM / 64QAM / 256QAM)

Note: For 802.11n HT20 /VHT20 and 802.11n HT40 /VHT40 mode, the VHT20/VHT40 power are set less than HT20/HT40 mode, thus only full test 802.11n HT20/HT40.

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 518103 People's Republic of China TEL: +86-755-86066985		
Test Site No.	**Sporton Site No.**	**FCC Designation No.**	**FCC Test Firm Registration No.**
	03CH03-SZ	CN1256	421272

1.7 Test Software

Item	Site	Manufacturer	Name	Version
1.	03CH03-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.
- 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 (X / Z 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	118*	5590	124	5620
	120	5600	126*	5630
	122#	5610	128	5640
	-	-	-	-

Frequency Band	Channel	Freq. (MHz)	Channel	Freq. (MHz)
Straddle Channel	138#	5690	144	5720
	142*	5710	-	-

Note:

1. The above Frequency and Channel in "*" are 40MHz bandwidth.
2. The above Frequency and Channel in "#" are 80MHz bandwidth.

2.2 Test Mode

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

SISO Mode

Modulation	Data Rate
802.11a	6 Mbps
802.11n HT20	MCS0
802.11n HT40	MCS0
802.11ac VHT80	MCS0

AC Conducted Emission	Mode 1 : GSM850 Idle + WLAN Link(5G) + Adapter 1 + USB Cable + Battery 1
Remark: For Radiated Test Cases, The tests were performance with Adapter 1 and USB Cable 1.	

RSE Co-location
802.11n HT40_CH38 + LTE Band13 Link

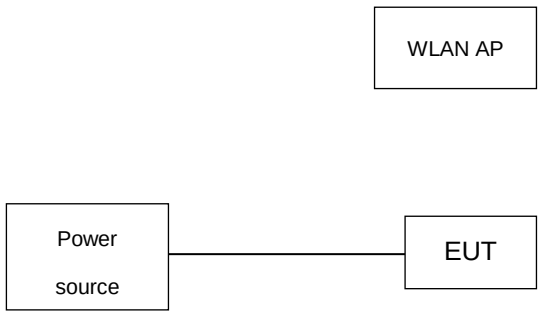
Ch. #		U-NII-1	U-NII-2A	U-NII-2C	U-NII-3
		20M BW	20M BW	20M BW	20M BW
L	Low	36	52	100	149
M	Middle	44	60	116	157
H	High	48	64	140	165
Straddle		-	-	144	-

Ch. #		U-NII-1	U-NII-2A	U-NII-2C	U-NII-3
		40M BW	40M BW	40M BW	40M BW
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
		80M BW	80M BW	80M BW	80M BW
L	Low	-	-	106	-
M	Middle	42	58	122	155
H	High	-	-	-	-
Straddle		-	-	138	-

2.3 Connection Diagram of Test System

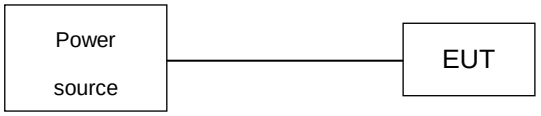
AC Conducted Emission:



This example is connection diagram of EUT test configurations.

. For detail, please refer to test mode configuration and setup photographs for each test item.

Radiated Emission:



This example is connection diagram of EUT test configurations.

. For detail, please refer to test mode configuration and setup photographs for each test item.

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.	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 4.53 dB and 10dB attenuator.

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

= 4.53 + 10 = 14.53 (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

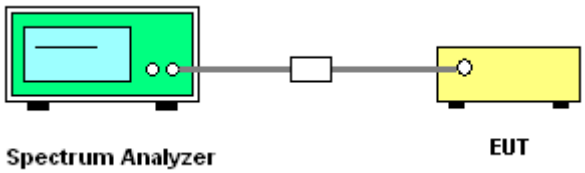
The measuring equipment is listed in the section 4 of this test report.

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 $\log_{10}$ 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.

3.2.2 Measuring Instruments

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

3.2.3 Test Procedures

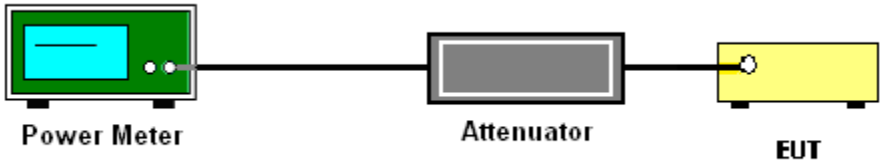
The testing follows Method PM of FCC KDB 789033 D02 General UNII Test Procedures New Rules v02r01.

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.

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

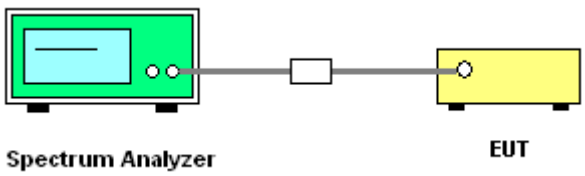
 # Method SA-2 #

(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.

3.3.4 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

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

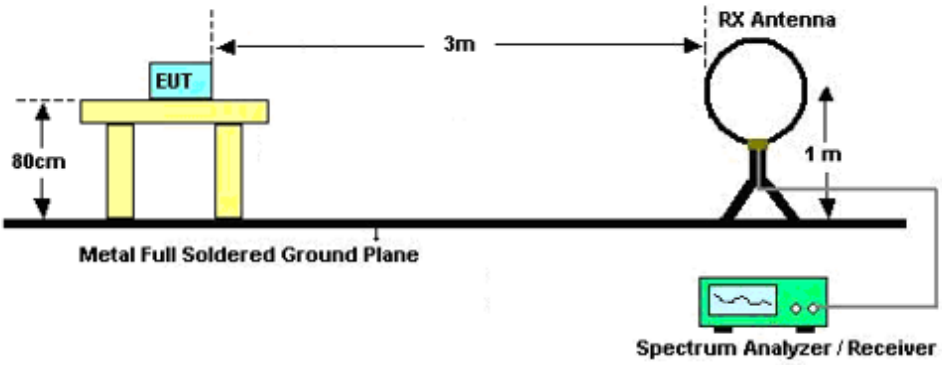
   - RBW = 1 MHz
   - VBW ≥ 3 MHz
   - Detector = Peak
   - Sweep time = auto
   - Trace mode = max hold

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

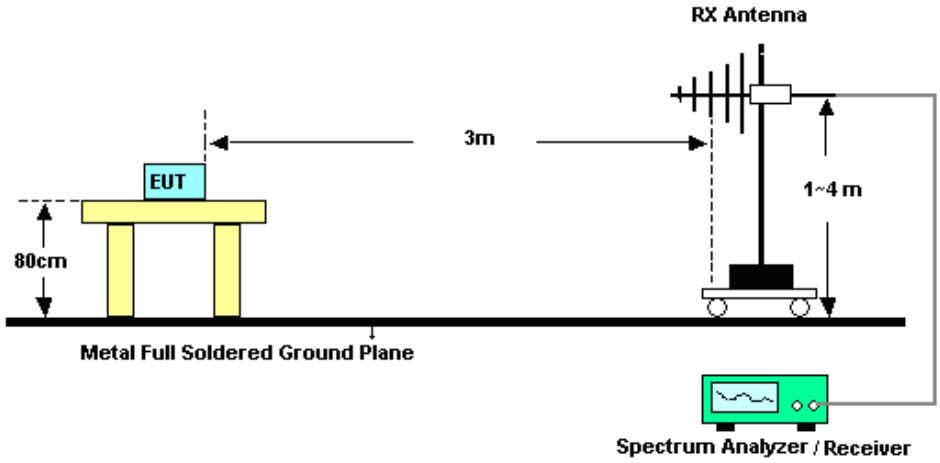
   - RBW = 1 MHz
   - VBW = 10 Hz, when duty cycle is no less than 98 percent.
   - VBW ≥ 1/T, when duty cycle is less than 98 percent where T is the minimum transmission duration over which the transmitter is on.
2. The EUT was placed on a turntable with 0.8 meter for frequency below 1GHz and 1.5 meter 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

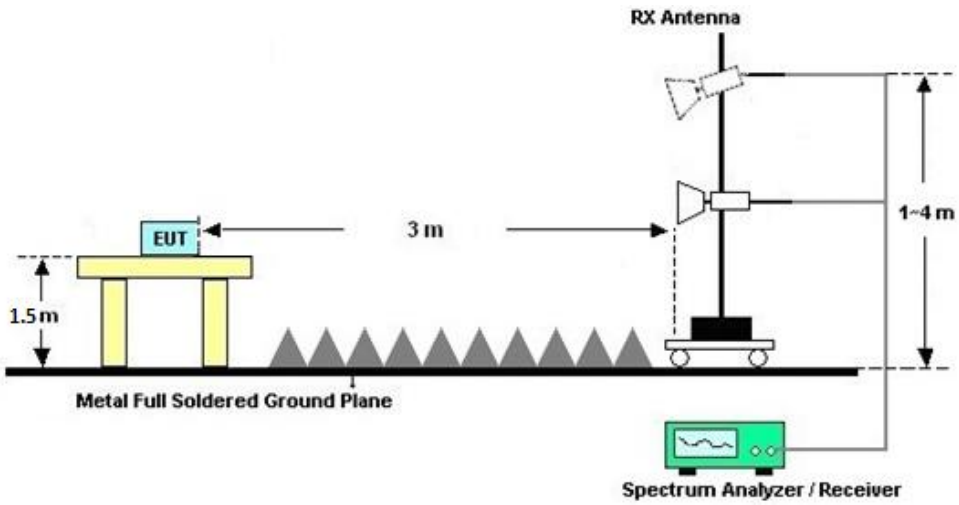
For radiated emissions below 30MHz



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.

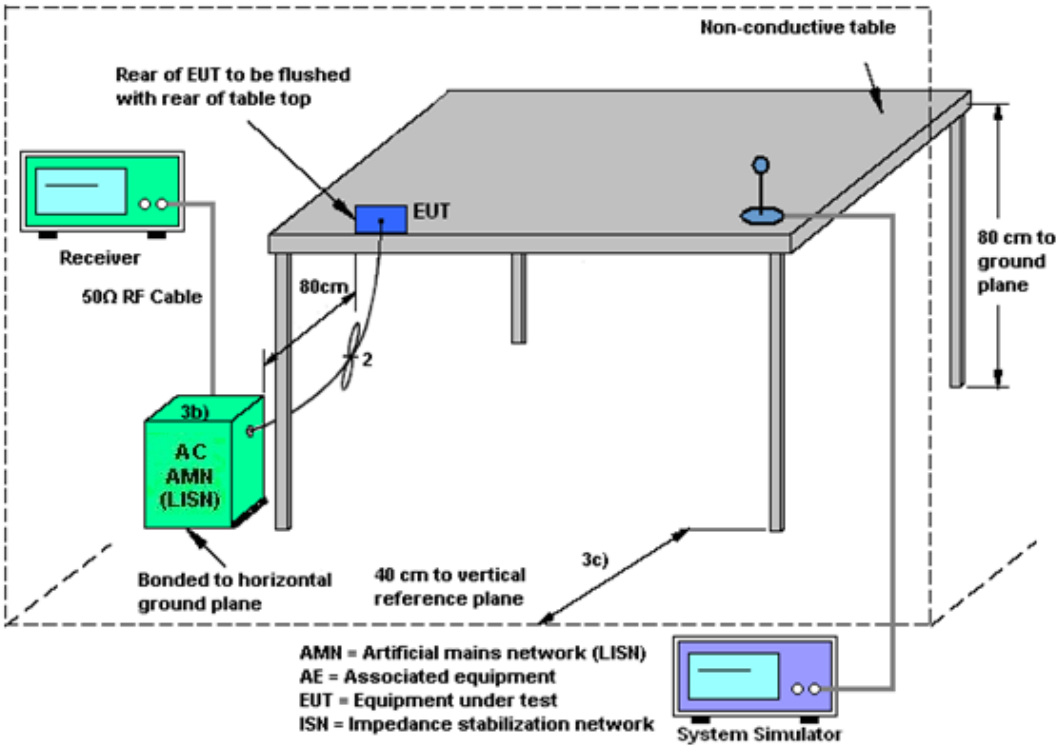
3.5.2 Measuring Instruments

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

The antenna peak gain of EUT is less than 6 dBi. Therefore, it is not necessary to reduce maximum peak output power limit.

4 List of Measuring Equipment

Instrument	Manufacturer	Model No.	Serial No.	Characteristics	Calibration Date	Test Date	Due Date	Remark
EMI Test Receiver&SA	KEYSIGHT	N9038A	MY54450083	20Hz~8.4GHz	Apr. 04, 2023	Jan. 12, 2024~ Jan. 15, 2024	Apr. 03, 2024	Radiation (03CH03-SZ)
EXA Spectrum Anaiyzer	KEYSIGHT	N9010A	MY55150246	10Hz~44GHz;	Apr. 04, 2023	Jan. 12, 2024~ Jan. 15, 2024	Apr. 03, 2024	Radiation (03CH03-SZ)
Loop Antenna	R&S	HFH2-Z2	100354	9kHz~30MHz	Jul. 28, 2022	Jan. 12, 2024~ Jan. 15, 2024	Jul. 27, 2024	Radiation (03CH03-SZ)
Bilog Antenna	TeseQ	CBL6112D	35408	30MHz-2GHz	Aug. 20, 2023	Jan. 12, 2024~ Jan. 15, 2024	Aug. 19, 2025	Radiation (03CH03-SZ)
Double Ridge Horn Antenna	SCHWARZBECK	BBHA9120D	9120D-1355	1GHz~18GHz	Apr. 08, 2023	Jan. 12, 2024~ Jan. 15, 2024	Apr. 07, 2024	Radiation (03CH03-SZ)
HF Amplifier	MITEQ	TTA1840-35-HG	1871923	18GHz~40GHz	Jul. 07, 2023	Jan. 12, 2024~ Jan. 15, 2024	Jul.06, 2024	Radiation (03CH03-SZ)
SHF-EHF Horn	com-power	AH-840	101071	18Ghz-40GHz	Apr. 08, 2023	Jan. 12, 2024~ Jan. 15, 2024	Apr. 07, 2024	Radiation (03CH03-SZ)
Amplifier	Burgeon	BPA-530	102211	0.01Hz ~3000MHz	Oct. 18, 2023	Jan. 12, 2024~ Jan. 15, 2024	Oct. 17, 2024	Radiation (03CH03-SZ)
HF Amplifier	MITEQ	AMF-7D-00101800-30-10P-R	1943528	1GHz~18GHz	Oct. 18, 2023	Jan. 12, 2024~ Jan. 15, 2024	Oct. 17, 2024	Radiation (03CH03-SZ)
Amplifier	Agilent Technologies	83017A	MY39501302	500MHz~26.5GHz	Dec. 27, 2023	Jan. 12, 2024~ Jan. 15, 2024	Dec. 26, 2024	Radiation (03CH03-SZ)
AC Power Source	Chroma	61601	616010002729	N/A	Oct. 18, 2023	Jan. 12, 2024~ Jan. 15, 2024	Oct. 17, 2024	Radiation (03CH03-SZ)
Turn Table	EM	EM1000	N/A	0~360 degree	NCR	Jan. 12, 2024~ Jan. 15, 2024	NCR	Radiation (03CH03-SZ)
Antenna Mast	EM	EM1000	N/A	1 m~4 m	NCR	Jan. 12, 2024~ Jan. 15, 2024	NCR	Radiation (03CH03-SZ)
Thermo meter	Anymetre	JR593	#11	- 10℃ ~ 50℃ 10%RH~99%RH	Oct. 19, 2023	Jan. 13, 2024	Oct. 18, 2024	Radiation (03CH03-SZ)
EMI Receiver	R&S	ESR7	101630	9kHz~7GHz;	Jul. 06, 2023	Jan. 04, 2024	Jul. 05, 2024	Conduction (CO01-SZ)
AC LISN	R&S	ENV216	100063	9kHz~30MHz	Aug. 21, 2023	Jan. 04, 2024	Aug. 20, 2024	Conduction (CO01-SZ)
AC LISN (for auxiliary equipment)	EMCO	3816/2SH	00103892	9kHz~30MHz	Oct. 16, 2023	Jan. 04, 2024	Oct. 15, 2024	Conduction (CO01-SZ)
AC Power Source	Chroma	61602	616020000891	100Vac~250Vac	Jul. 07, 2023	Jan. 04, 2024	Jul. 06, 2024	Conduction (CO01-SZ)
Thermo meter	Anymetre	JR593	#5	- 10℃ ~ 50℃ 10%RH~99%RH	Apr. 08, 2023	Jan. 24, 2024	Apr. 07, 2024	Conduction (CO01-SZ)
Spectrum Analyzer	R&S	FSV40	101078	10Hz~40GHz	Apr. 06, 2023	Jan. 16, 2024~ Jan. 22, 2024	Apr. 05, 2024	Conducted (TH01-SZ)
Pulse Power Senor	Anritsu	MA2411B	1339473	30MHz~40GHz	Dec. 29, 2023	Jan. 16, 2024~ Jan. 22, 2024	Dec. 28, 2024	Conducted (TH01-SZ)
DC Power Supply	TTI	PL330P	290070	Max 32V , 3A	Oct. 16, 2023	Jan. 16, 2024~ Jan. 22, 2024	Oct. 15, 2024	Conducted (TH01-SZ)
Thermal Chamber	Ten Billion Hongzhangroup	LP-150U	H2014081803	-40~+150°C	Jul. 05, 2023	Jan. 16, 2024~ Jan. 22, 2024	Jul. 04, 2024	Conducted (TH01-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 Measurement

Test Item	Uncertainty
Conducted Spurious Emission & Bandedge	±1.34 dB
Occupied Channel Bandwidth	±0.1 MHz
Conducted Power	±1.34 dB
Conducted Power Spectral Density	±1.32 dB
Frequency	±1.3 Hz

Uncertainty of AC Conducted Emission Measurement (0.15 MHz ~ 30 MHz)

Measuring Uncertainty for a Level of Confidence of 95% (U = 2Uc(y))	2.7 dB

Uncertainty of Radiated Emission Measurement (9 KHz ~ 30 MHz)

Measuring Uncertainty for a Level of Confidence of 95% (U = 2Uc(y))	5.0 dB

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

Measuring Uncertainty for a Level of Confidence of 95% (U = 2Uc(y))	5.0 dB

Uncertainty of Radiated Emission Measurement (1 GHz ~ 18 GHz)

Measuring Uncertainty for a Level of Confidence of 95% (U = 2Uc(y))	4.9 dB

Uncertainty of Radiated Emission Measurement (18 GHz ~ 40 GHz)

Measuring Uncertainty for a Level of Confidence of 95% (U = 2Uc(y))	5.0 dB

---------- THE END ----------

Appendix A. Conducted Test Results

Appendix A. Test Result of Conducted Test Items

Test Engineer:	Zhang Xue Yi	Temperature:	21~25	°C
Test Date:	2024/1/16~2024/1/22	Relative Humidity:	51~54	%

Report Number : FR3D0709D

TEST RESULTS DATA
Average Power Table

FCC <5180 MHz ~ 5240 MHz>											
Mod.	Data Rate	NTX	CH.	Freq. (MHz)	Duty Factor (dB)	Average Conducted Power (dBm)	FCC Conducted Power Limit (dBm)	DG (dBi)		Pass/Fail	Power Setting
11a	6Mbps	1	36	5180	0.06	15.12	23.98	-0.39		Pass	17
11a	6Mbps	1	40	5200	0.06	18.27	23.98	-0.39		Pass	17
11a	6Mbps	1	44	5220	0.06	18.49	23.98	-0.39		Pass	17
11a	6Mbps	1	48	5240	0.06	18.08	23.98	-0.39		Pass	17
HT20	MCS0	1	36	5180	0.09	15.10	23.98	-0.39		Pass	14
HT20	MCS0	1	44	5220	0.09	17.66	23.98	-0.39		Pass	16.5
HT20	MCS0	1	48	5240	0.09	18.13	23.98	-0.39		Pass	16.5
HT40	MCS0	1	38	5190	0.13	10.72	23.98	-0.39		Pass	8.5
HT40	MCS0	1	46	5230	0.13	17.07	23.98	-0.39		Pass	15.5
VHT80	MCS0	1	42	5210	0.36	9.08	23.98	-0.39		Pass	7.5

Report Number : FR3D0709D

TEST RESULTS DATA
Average Power Table

FCC<5260 MHz ~ 5320 MHz>											
Mod.	Data Rate	NTX	CH.	Freq. (MHz)	Duty Factor (dB)	Average Conducted Power (dBm)	FCC Conducted Power Limit (dBm)	DG (dBi)	EIRP Power Limit (dBm)	Pass/Fail	Power Setting
11a	6M bps	1	52	5260	0.06	18.26	23.98	-0.83	26.99	Pass	17
11a	6M bps	1	60	5300	0.06	18.09	23.98	-0.83	26.99	Pass	17
11a	6M bps	1	64	5320	0.06	13.74	23.98	-0.83	26.99	Pass	12
HT20	MCS 0	1	52	5260	0.09	18.37	23.98	-0.83	26.99	Pass	16.5
HT20	MCS 0	1	60	5300	0.09	17.64	23.98	-0.83	26.99	Pass	16.5
HT20	MCS 0	1	64	5320	0.09	13.80	23.98	-0.83	26.99	Pass	12
HT40	MCS 0	1	54	5270	0.13	17.58	23.98	-0.83	26.99	Pass	15.5
HT40	MCS 0	1	62	5310	0.13	10.94	23.98	-0.83	26.99	Pass	8.5
VHT80	MCS 0	1	58	5290	0.36	8.94	23.98	-0.83	26.99	Pass	6.5

Report Number : FR3D0709D

TEST RESULTS DATA
Average Power Table

FCC <5500 MHz ~ 5720 MHz >											
Mod.	Data Rate	NTX	CH.	Freq. (MHz)	Duty Factor (dB)	Average Conducted Power (dBm)	FCC Conducted Power Limit (dBm)	DG (dBi)	EIRP Power Limit (dBm)	Pass/Fail	Power Setting
11a	6M bps	1	100	5500	0.06	17.59	23.98	1.67	26.99	Pass	16.5
11a	6M bps	1	116	5580	0.06	18.37	23.98	1.67	26.99	Pass	17
11a	6M bps	1	140	5700	0.06	16.14	23.98	1.67	26.99	Pass	15
11a	6M bps	1	144	5720	0.06	18.11	23.98	1.67	26.99	Pass	17
HT20	MCS 0	1	100	5500	0.09	16.21	23.98	1.67	26.99	Pass	15
HT20	MCS 0	1	116	5580	0.09	17.97	23.98	1.67	26.99	Pass	16.5
HT20	MCS 0	1	140	5700	0.09	15.11	23.98	1.67	26.99	Pass	14
HT20	MCS 0	1	144	5720	0.09	17.62	23.98	1.67	26.99	Pass	16.5
HT40	MCS 0	1	102	5510	0.13	10.91	23.98	1.67	26.99	Pass	8.5
HT40	MCS 0	1	110	5550	0.13	16.71	23.98	1.67	26.99	Pass	15.5
HT40	MCS 0	1	134	5670	0.13	16.40	23.98	1.67	26.99	Pass	14
HT40	MCS 0	1	142	5710	0.13	16.56	23.98	1.67	26.99	Pass	15.5
VHT80	MCS 0	1	106	5530	0.36	9.41	23.98	1.67	26.99	Pass	7
VHT80	MCS 0	1	122	5610	0.36	16.01	23.98	1.67	26.99	Pass	14.5
VHT80	MCS 0	1	138	5690	0.36	15.98	23.98	1.67	26.99	Pass	14.5

Report Number : FR3D0709D

TEST RESULTS DATA
Average Power Table

<5745 MHz ~ 5825 MHz>											
Mod.	Data Rate	NTx	CH.	Freq. (MHz)	Duty Factor (dB)	Average Conducted Power (dBm)	FCC Conducted Power Limit (dBm)	DG (dBi)		Pass/Fail	Setting
11a	6M bps	1	149	5745	0.06	18.19	30.00	1.76		Pass	17
11a	6Mbps	1	157	5785	0.06	18.17	30.00	1.76		Pass	17
11a	6Mbps	1	165	5825	0.06	18.09	30.00	1.76		Pass	17
HT20	MCS 0	1	149	5745	0.09	17.81	30.00	1.76		Pass	16.5
HT20	MCS 0	1	157	5785	0.09	17.73	30.00	1.76		Pass	16.5
HT20	MCS 0	1	165	5825	0.09	17.68	30.00	1.76		Pass	16.5
HT40	MCS 0	1	151	5755	0.13	17.19	30.00	1.76		Pass	15.5
HT40	MCS 0	1	159	5795	0.13	17.20	30.00	1.76		Pass	15.5
VHT80	MCS 0	1	155	5775	0.36	15.84	30.00	1.76		Pass	14.5

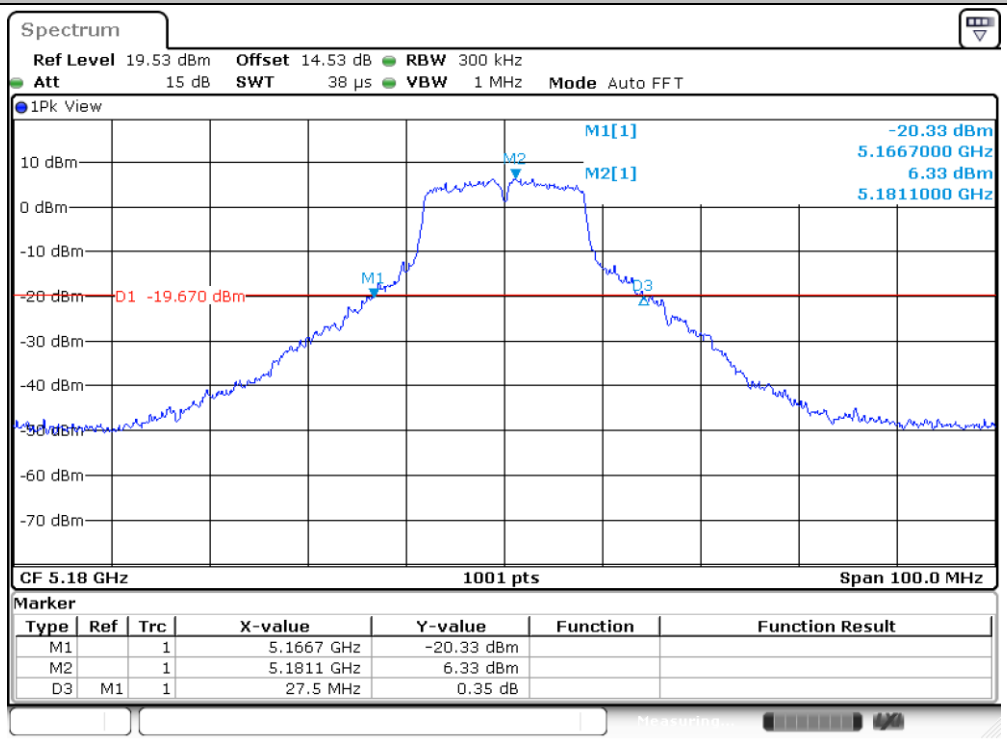
Emission Bandwidth

Test Result

TestMode	Antenna	Freq(MHz)	26dB EBW [MHz]	FL[MHz]	FH[MHz]
11A	Ant22	5180	27.50	5166.70	5194.20
		5220	33.80	5203.00	5236.80
		5240	34.60	5224.90	5259.50
		5260	35.50	5243.20	5278.70
		5300	39.40	5281.60	5321.00
		5320	25.40	5307.30	5332.70
		5500	33.40	5484.00	5517.40
		5580	33.20	5563.30	5596.50
		5700	28.50	5686.00	5714.50
		5720	36.70	5701.90	5738.60
		5745	36.80	5726.90	5763.70
		5785	37.70	5766.90	5804.60
		5825	39.10	5805.10	5844.20
11N20SISO	Ant22	5180	29.50	5165.00	5194.50
		5220	38.40	5202.40	5240.80
		5240	36.90	5223.30	5260.20
		5260	38.90	5241.40	5280.30
		5300	37.70	5281.00	5318.70
		5320	26.90	5306.80	5333.70
		5500	29.90	5485.60	5515.50
		5580	41.70	5559.30	5601.00
		5700	29.00	5685.70	5714.70
		5720	33.50	5703.60	5737.10
		5745	36.30	5727.80	5764.10
		5785	36.50	5767.60	5804.10
		5825	36.90	5805.90	5842.80
11N40SISO	Ant22	5190	41.40	5169.40	5210.80
		5230	77.20	5198.60	5275.80
		5270	76.40	5235.20	5311.60
		5310	41.60	5289.00	5330.60
		5510	41.80	5489.00	5530.80
		5550	58.20	5522.20	5580.40
		5670	58.40	5641.80	5700.20
		5710	59.80	5681.80	5741.60
		5755	66.80	5722.80	5789.60
		5795	70.60	5762.40	5833.00
11AC80SISO	Ant22	5210	83.60	5168.40	5252.00
		5290	82.40	5249.20	5331.60
		5530	82.00	5488.80	5570.80
		5610	125.20	5548.00	5673.20
		5690	121.60	5628.40	5750.00
		5775	124.80	5712.60	5837.40

Test Graphs

11A_5180



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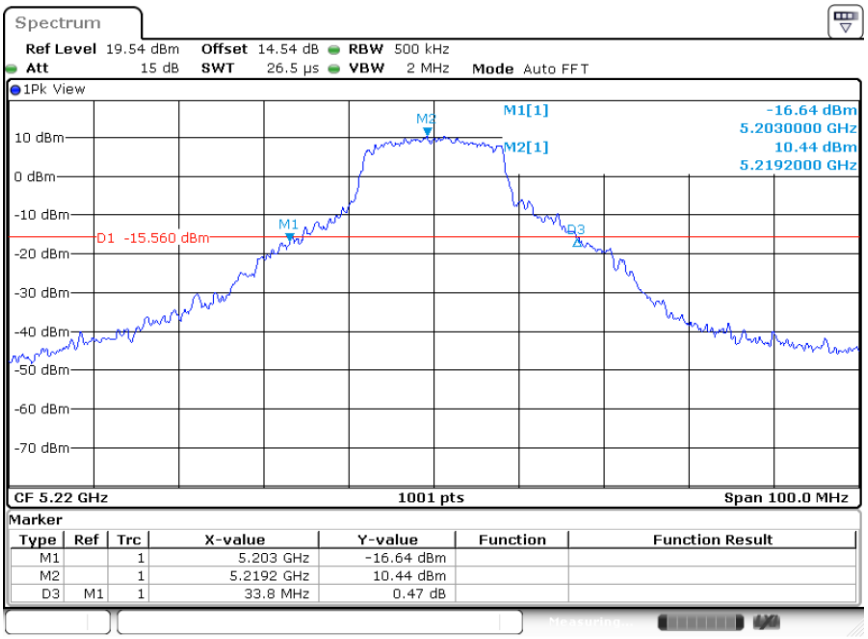

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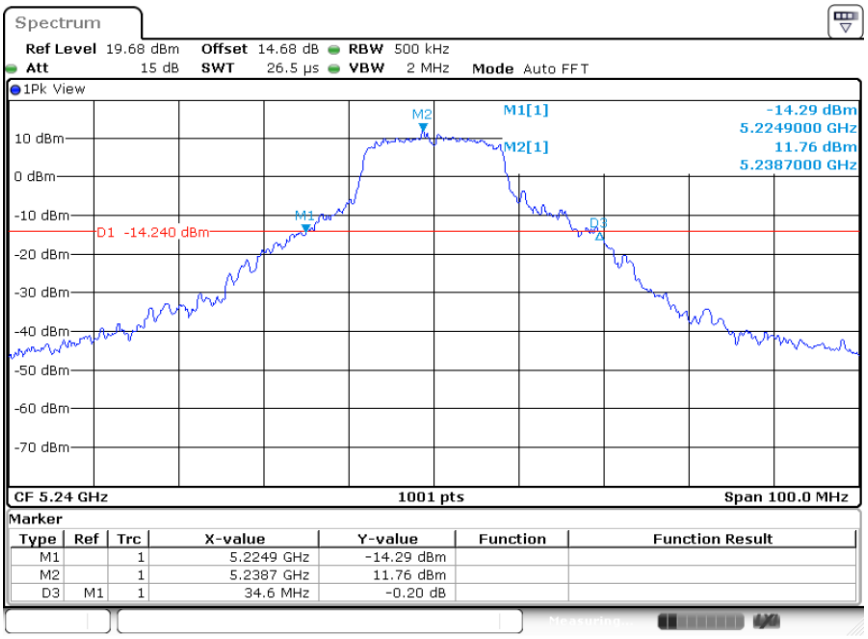

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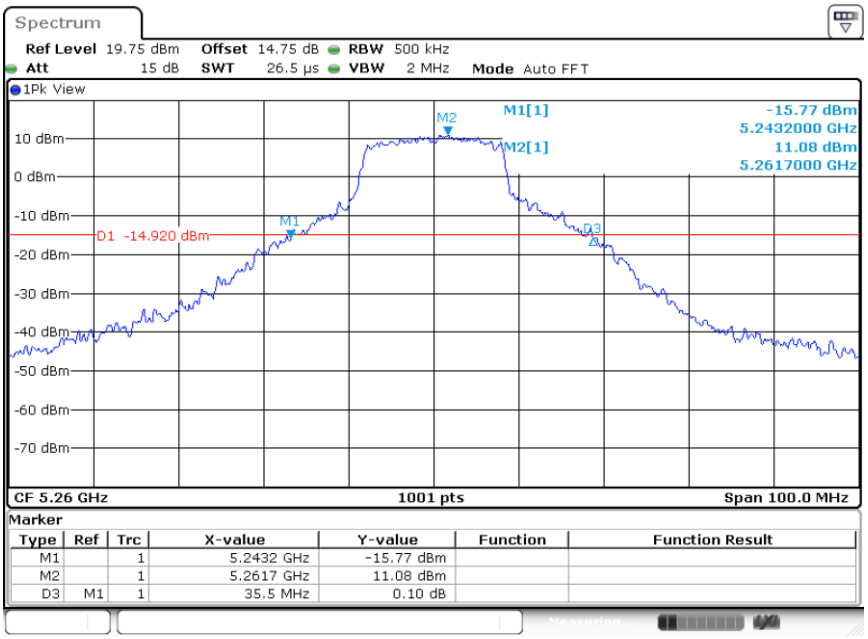

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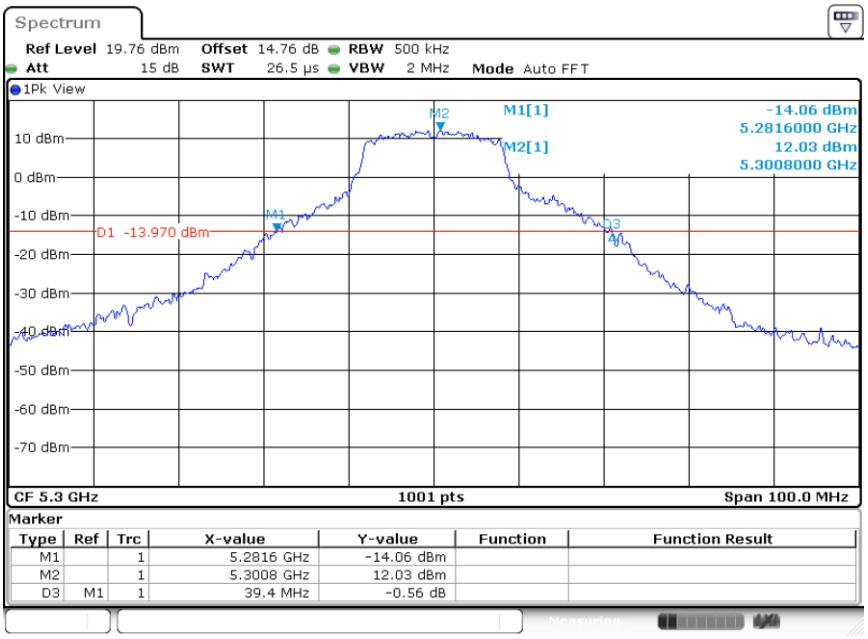

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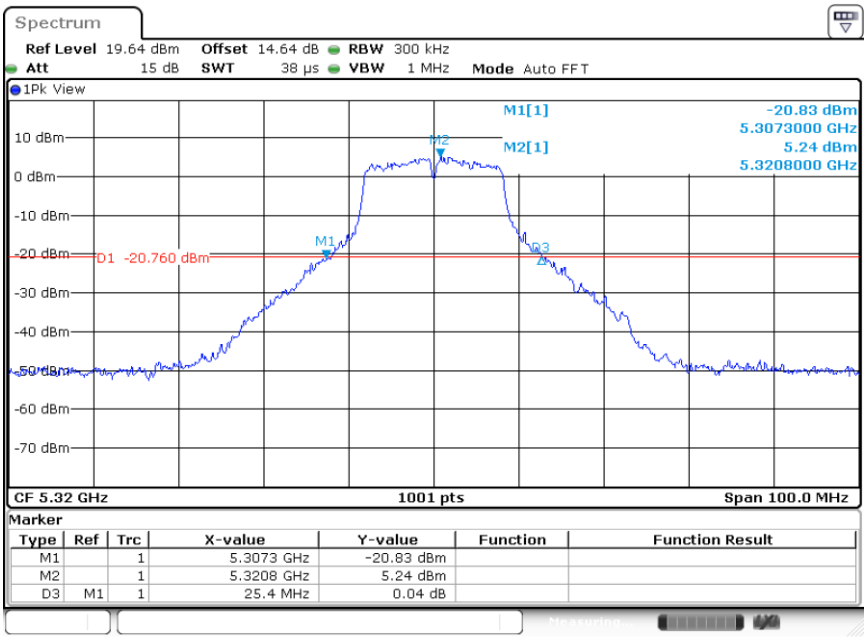

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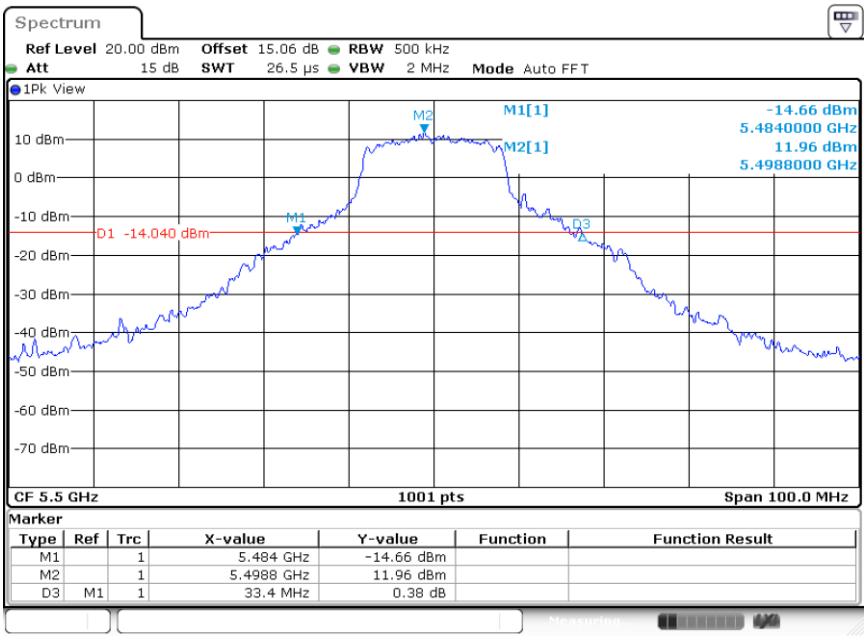

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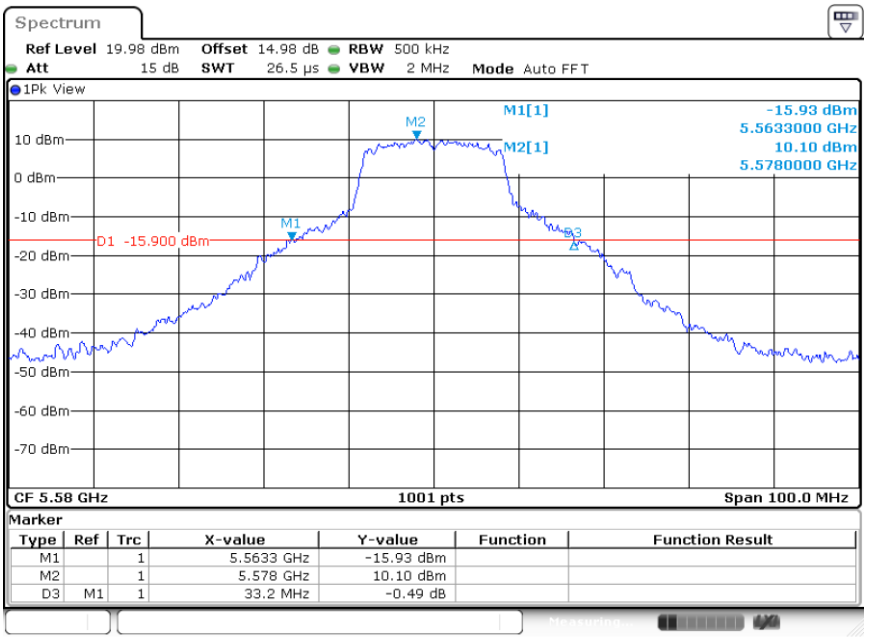

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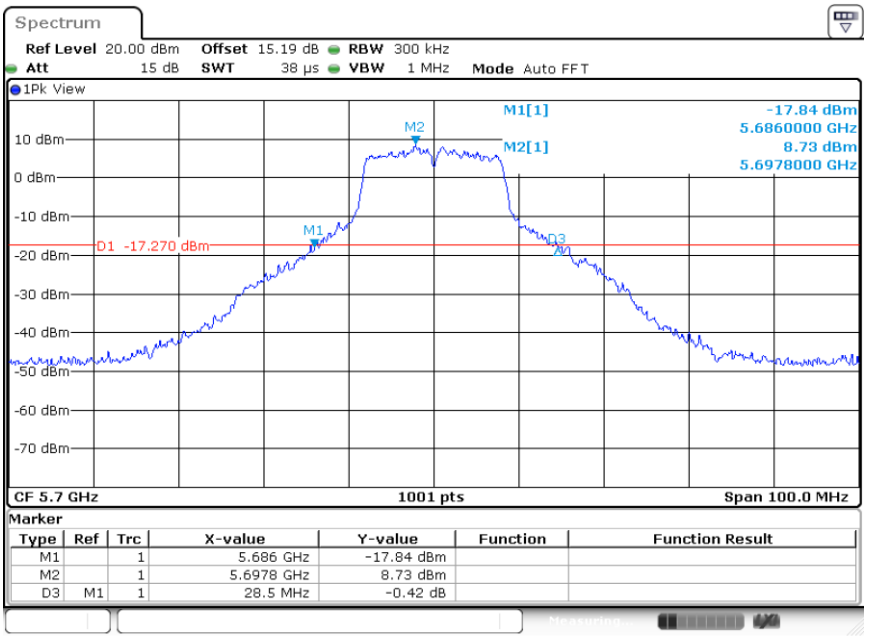

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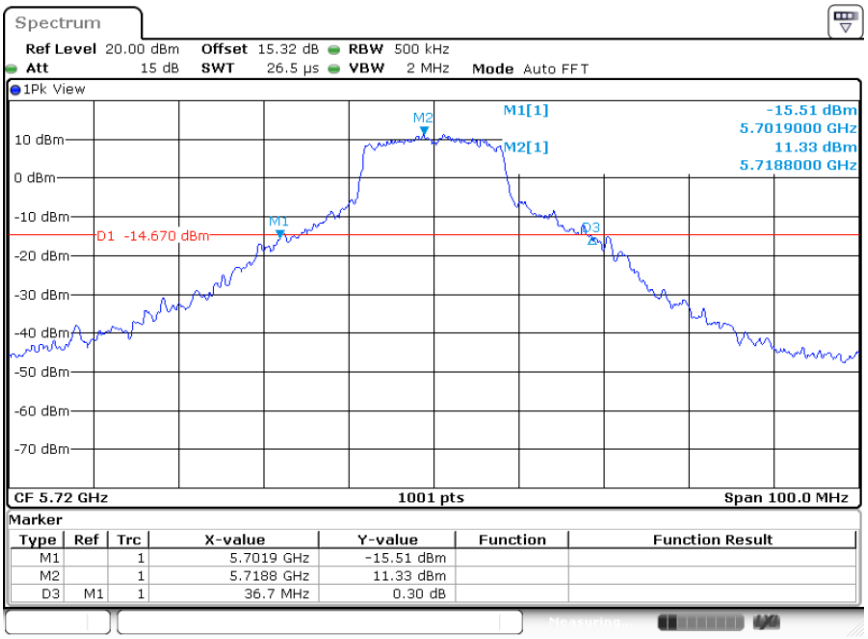

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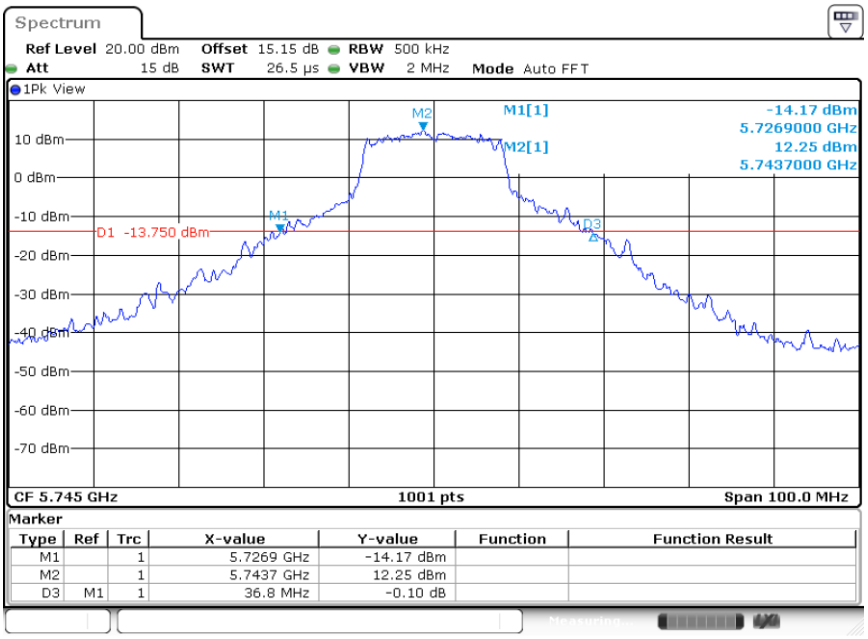

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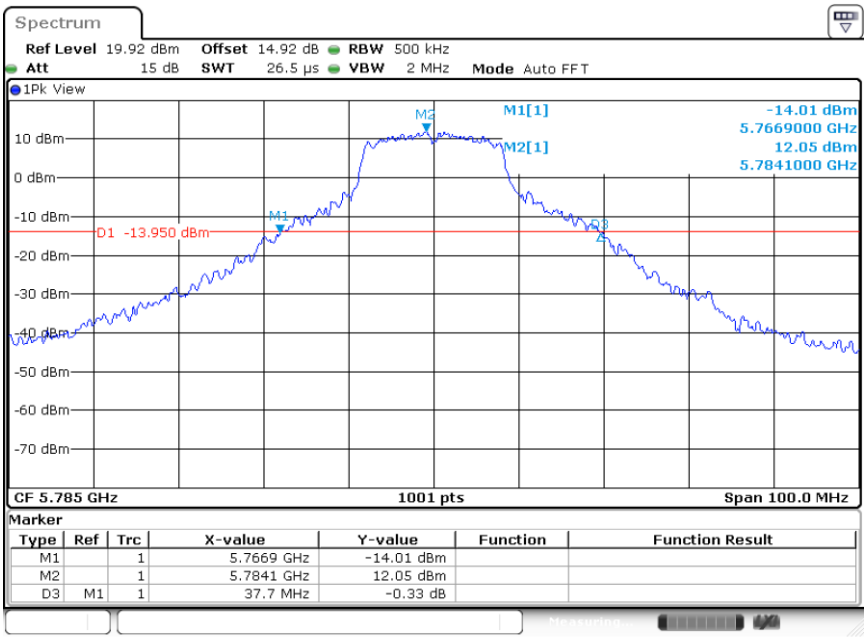

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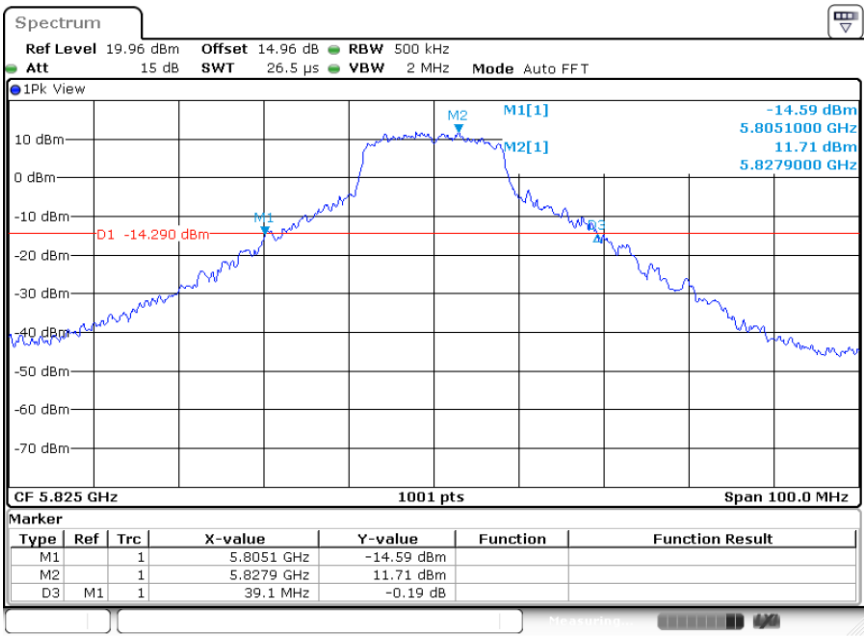

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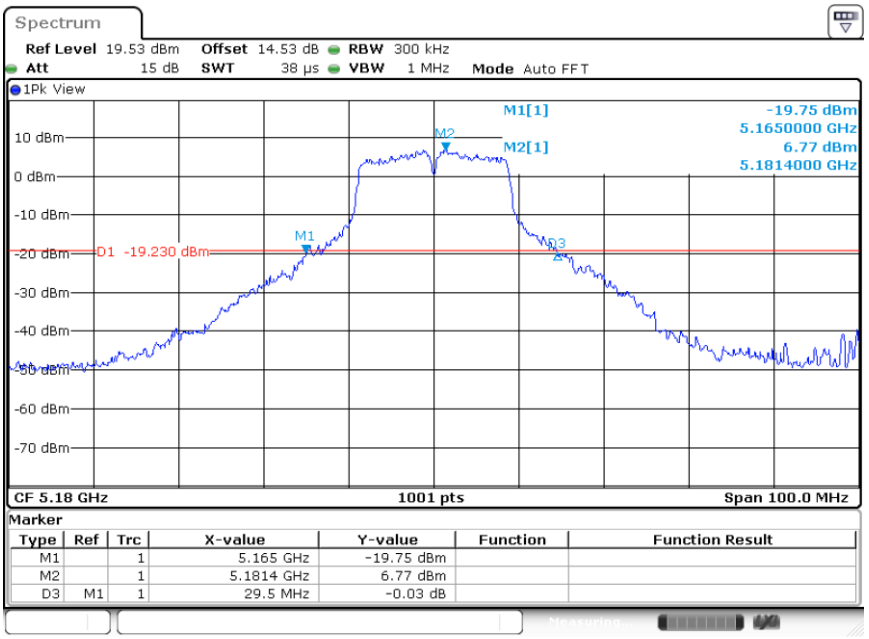
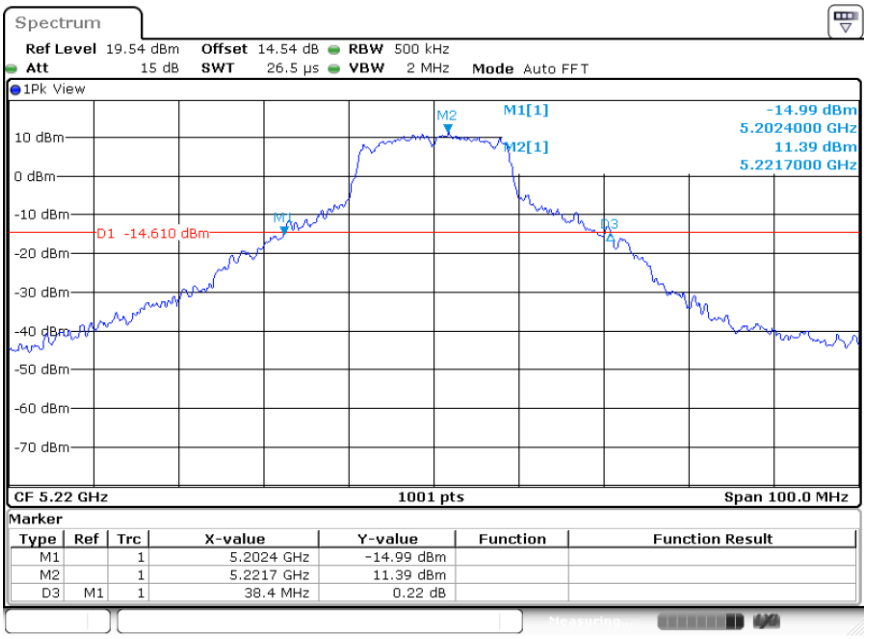
11N20SISO_5180



Date: 18.JAN.2024 15:51:35

11N20SISO_5220



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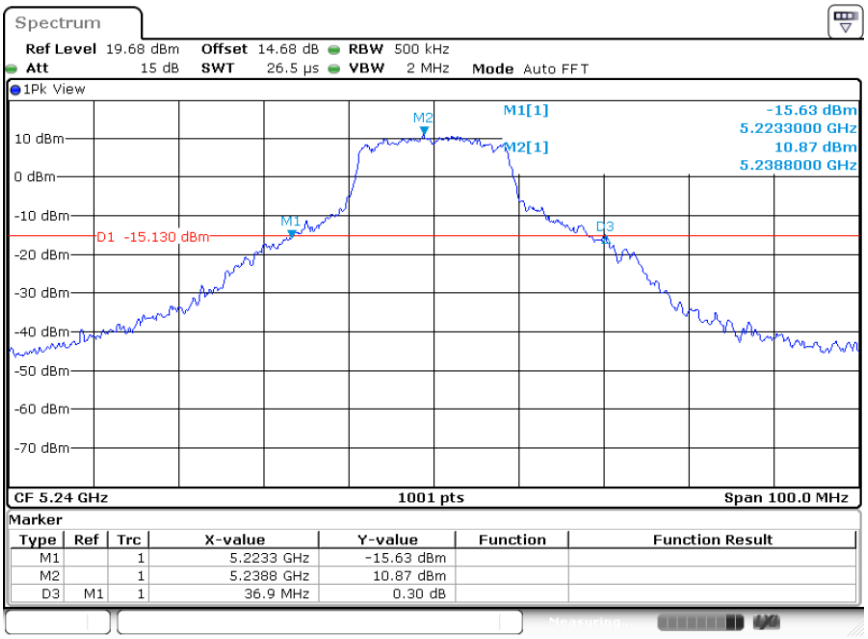

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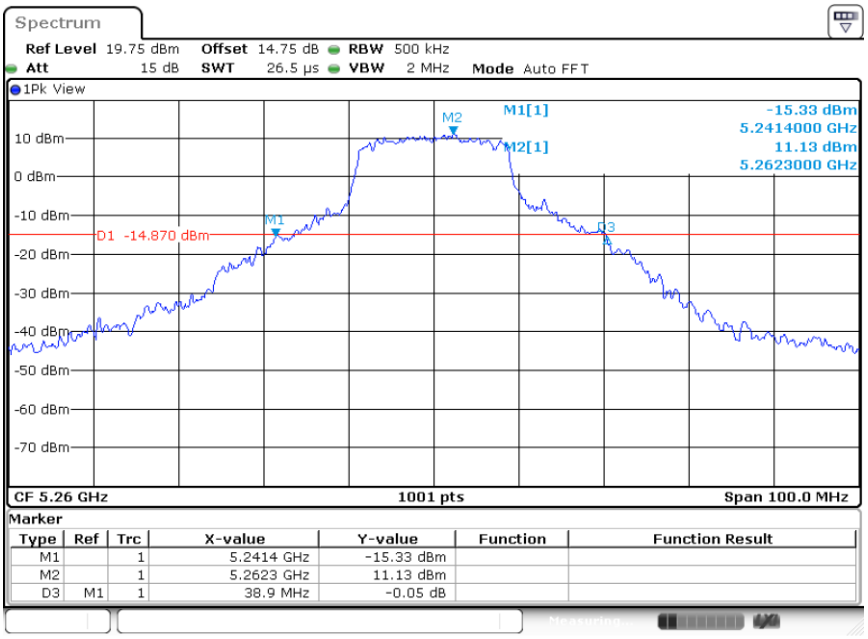

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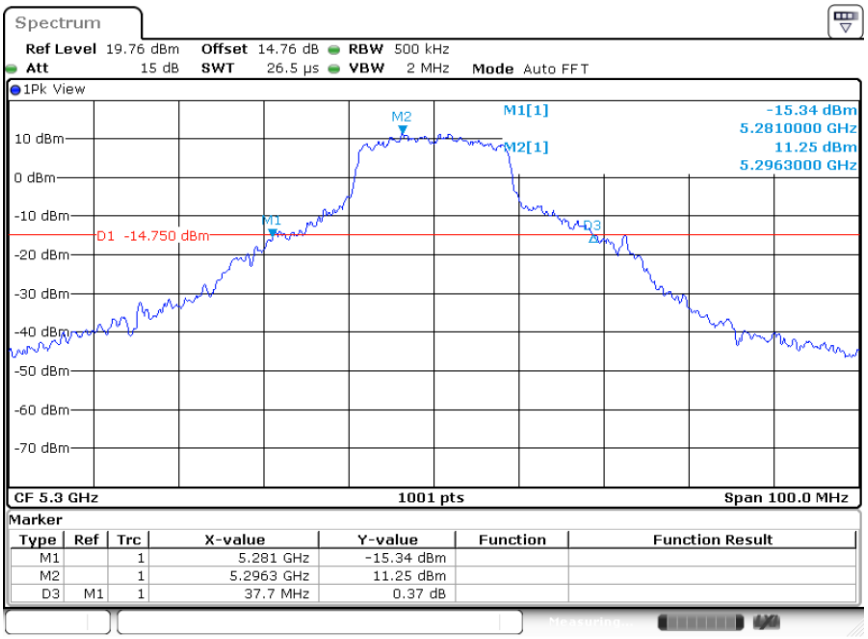
11N20SISO_5300



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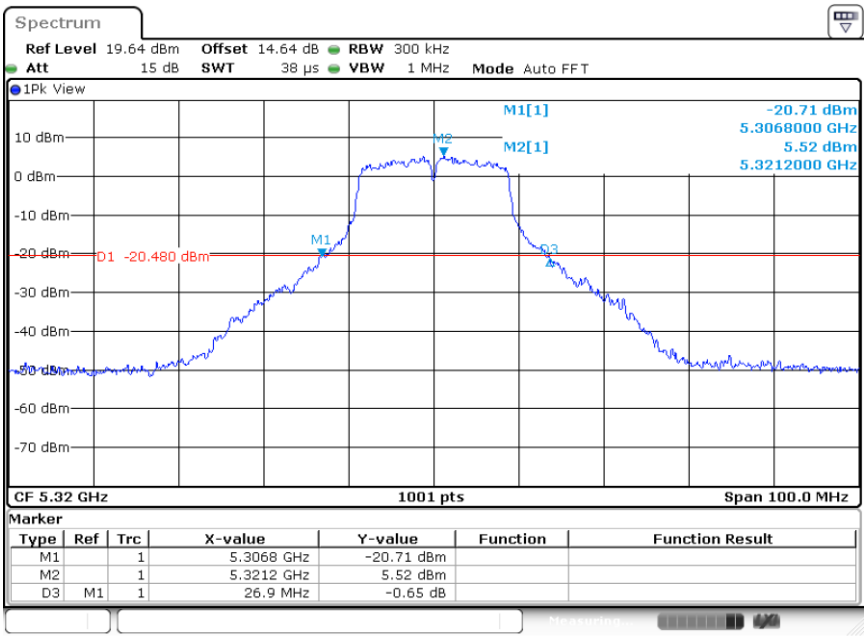

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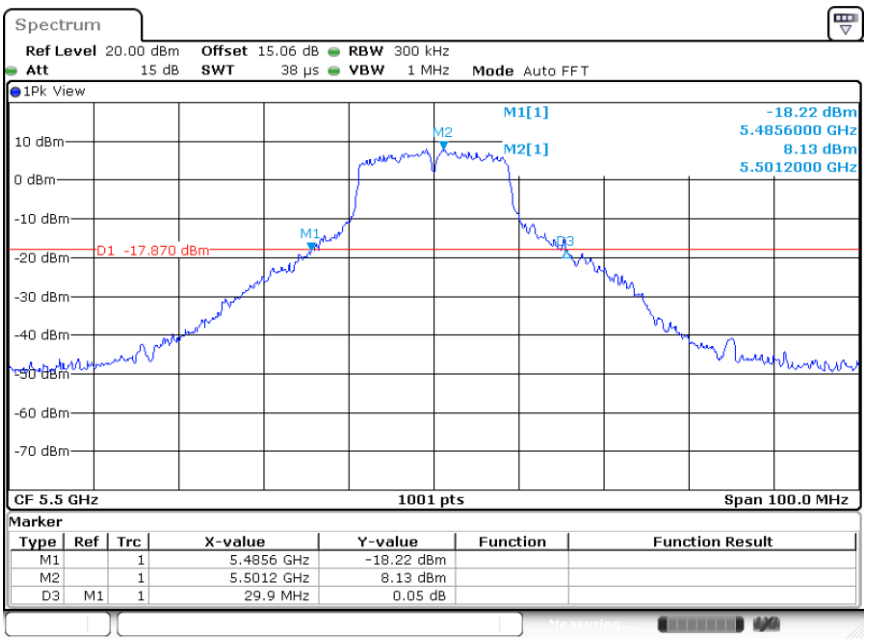

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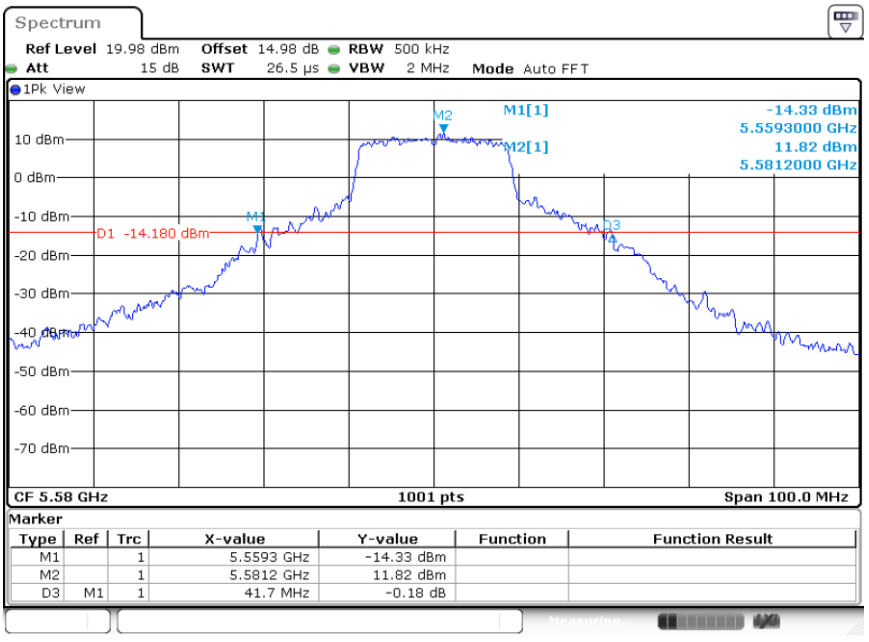

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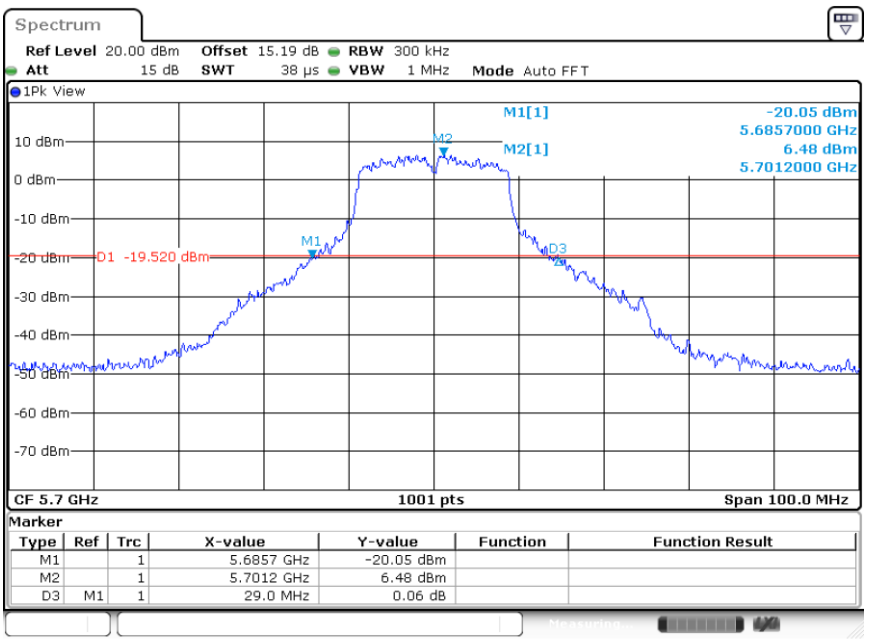

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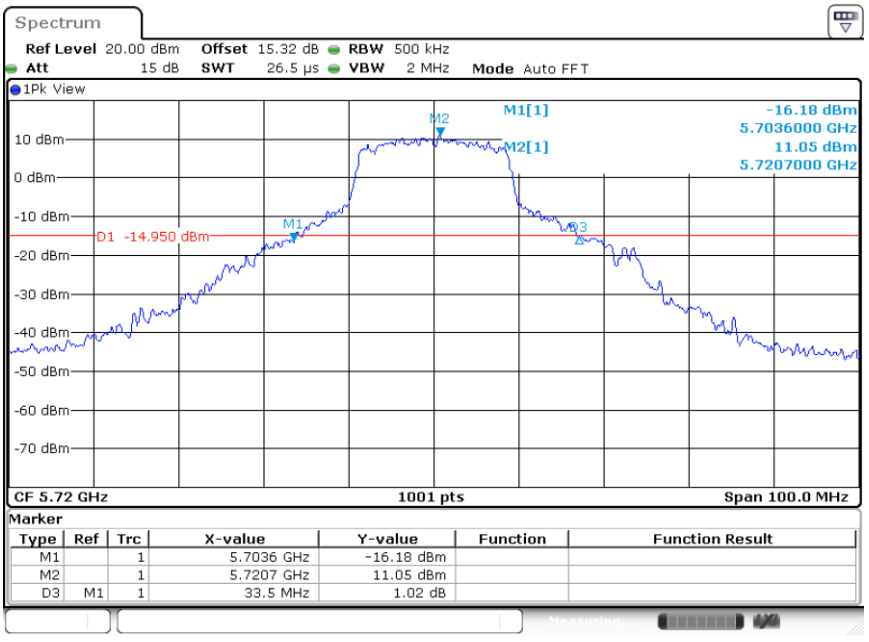

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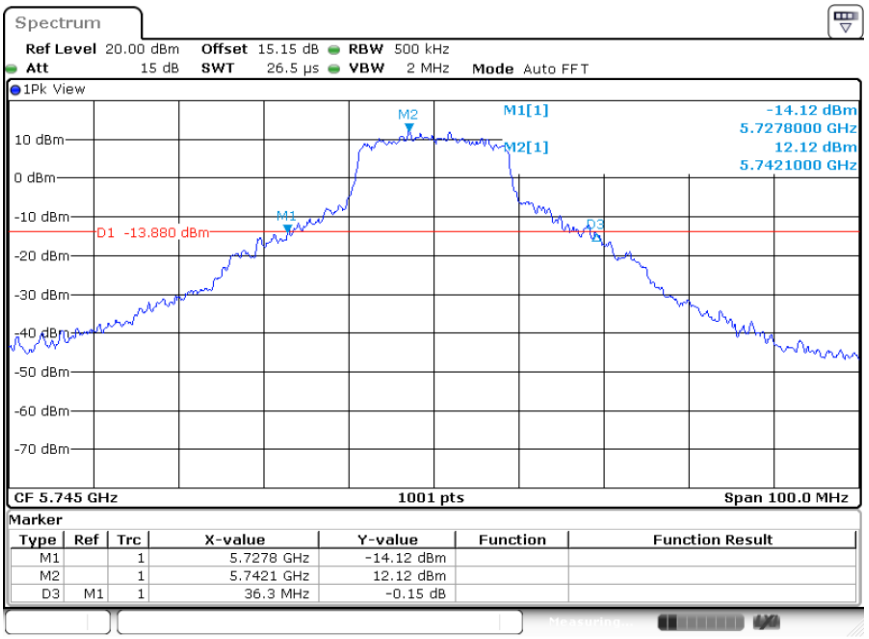

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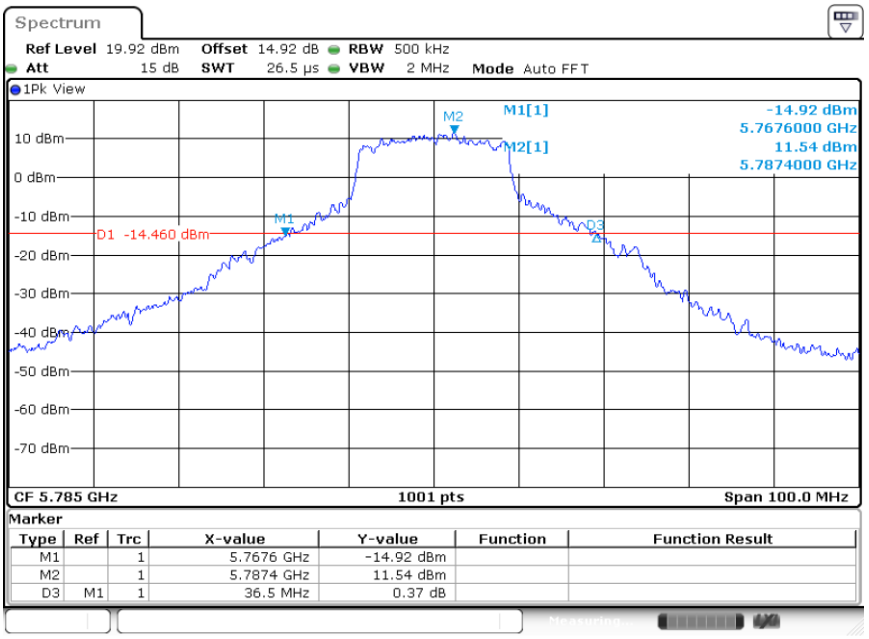

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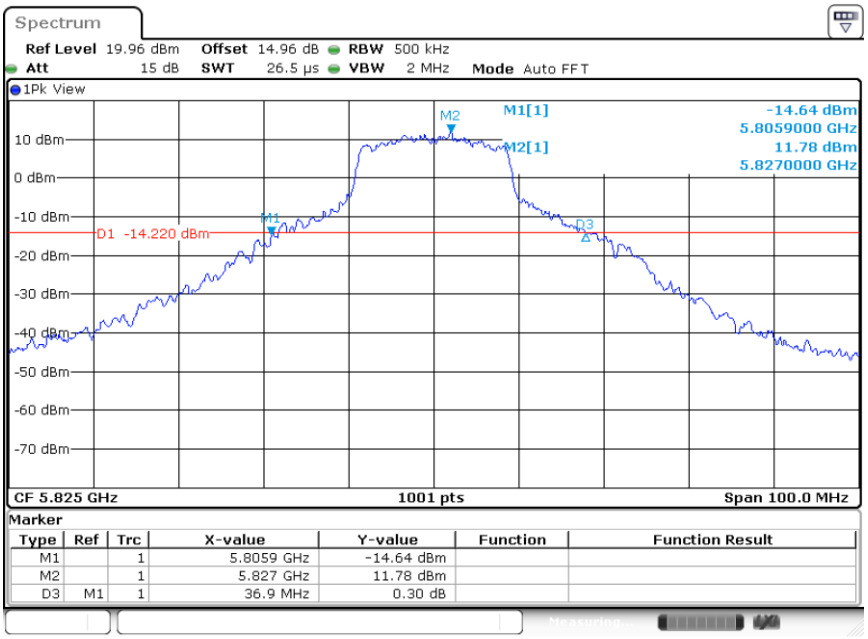

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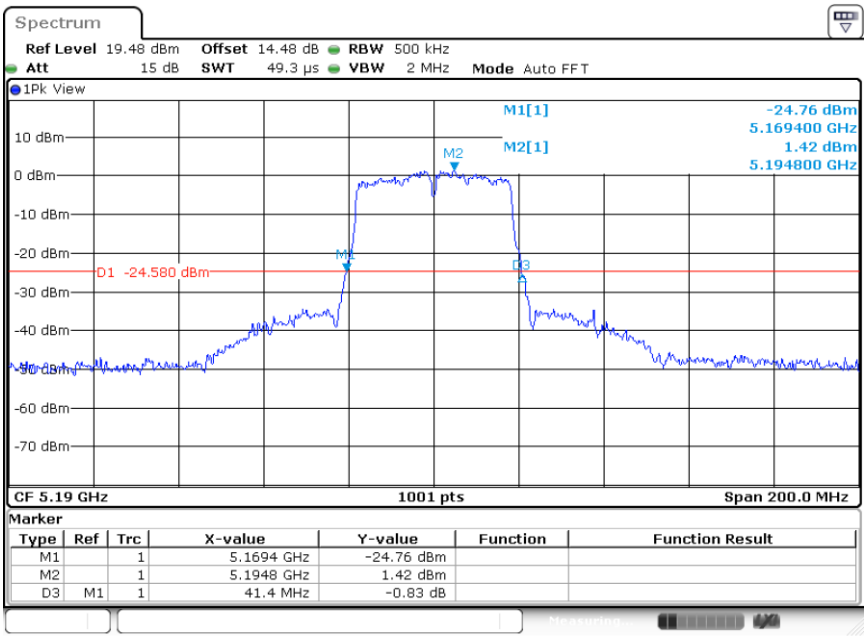

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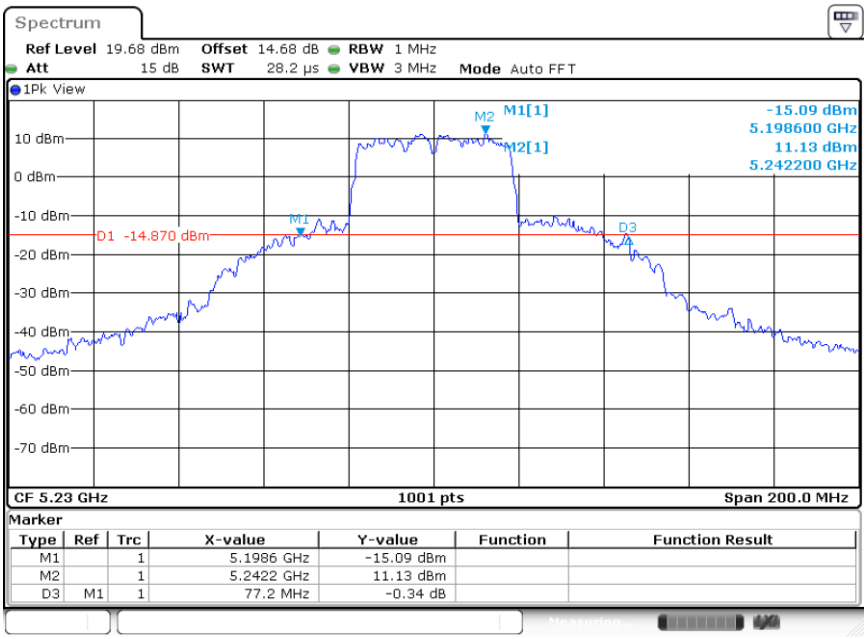

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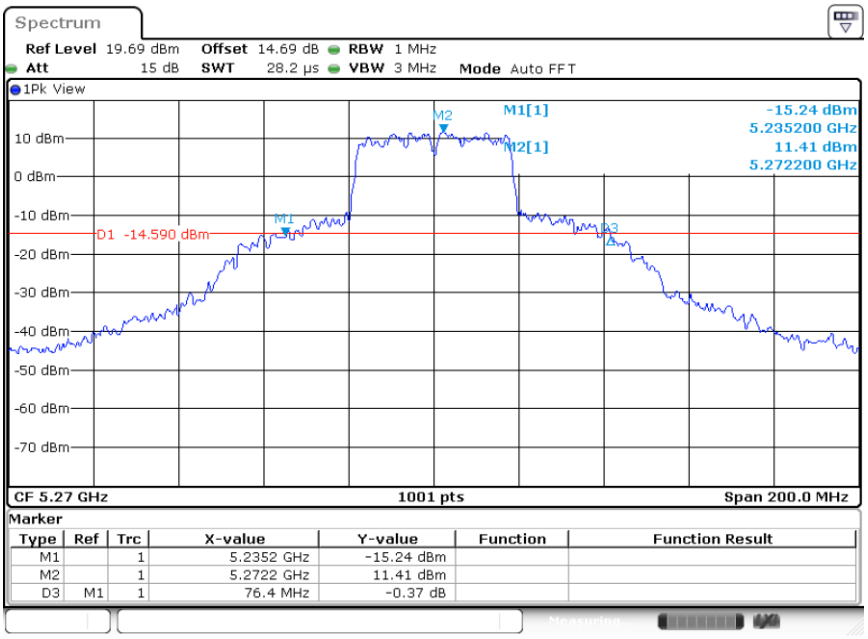

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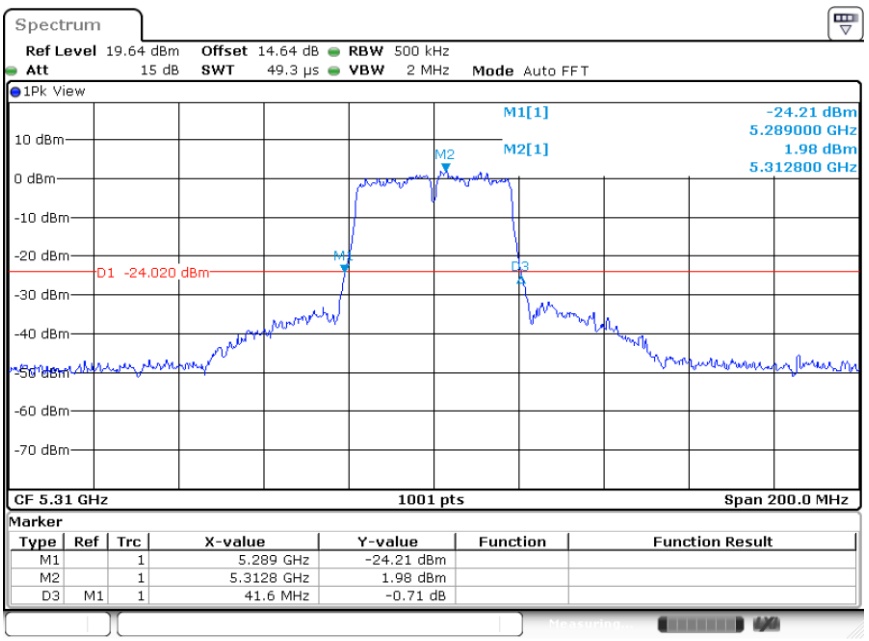

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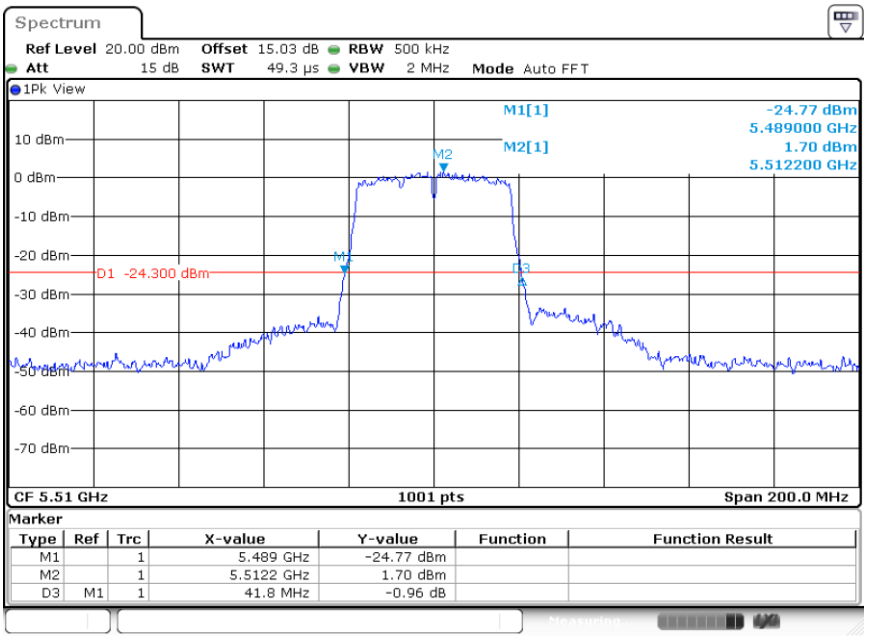

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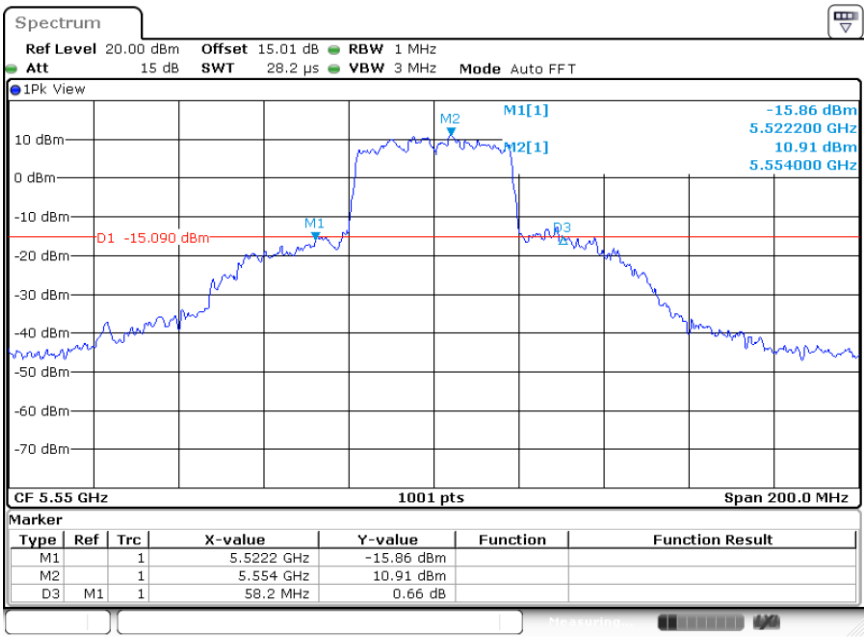

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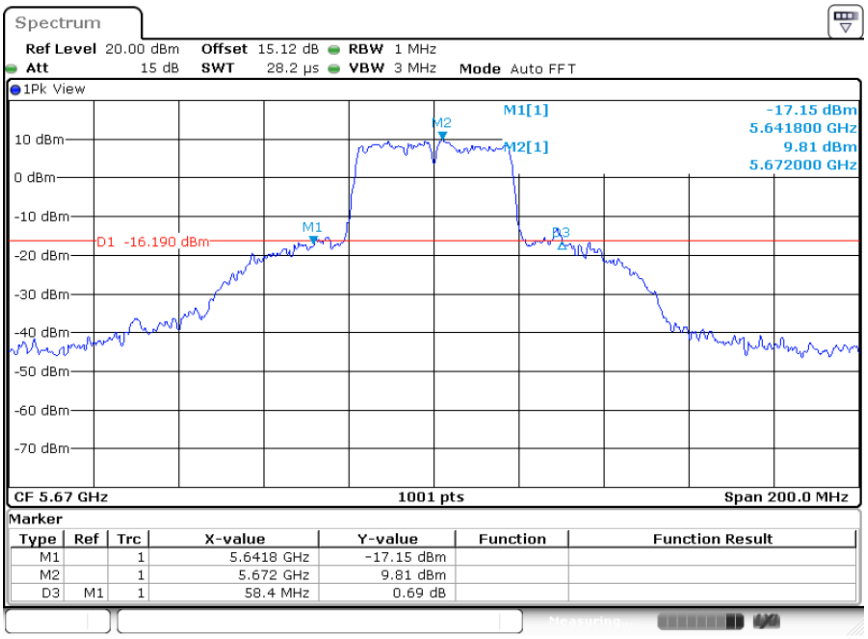

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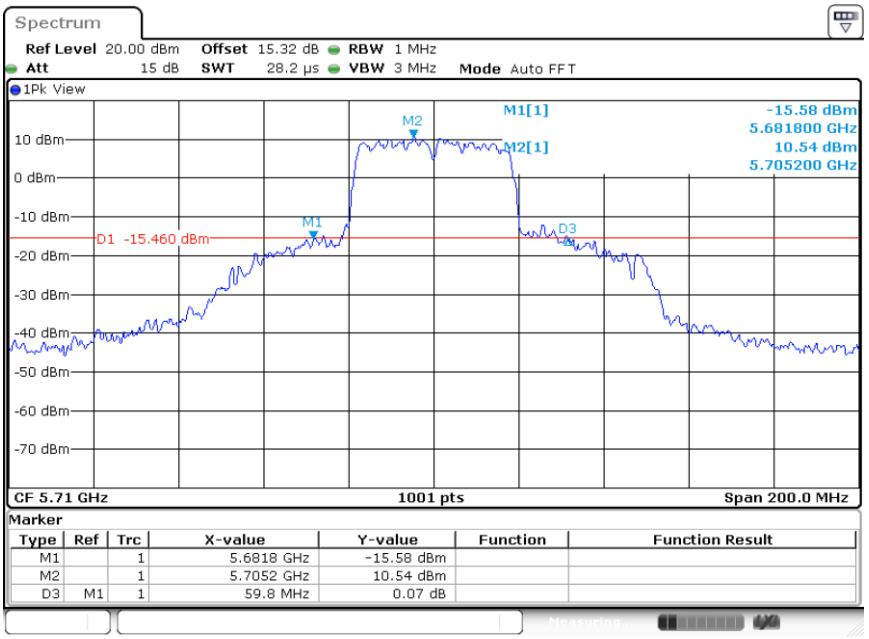

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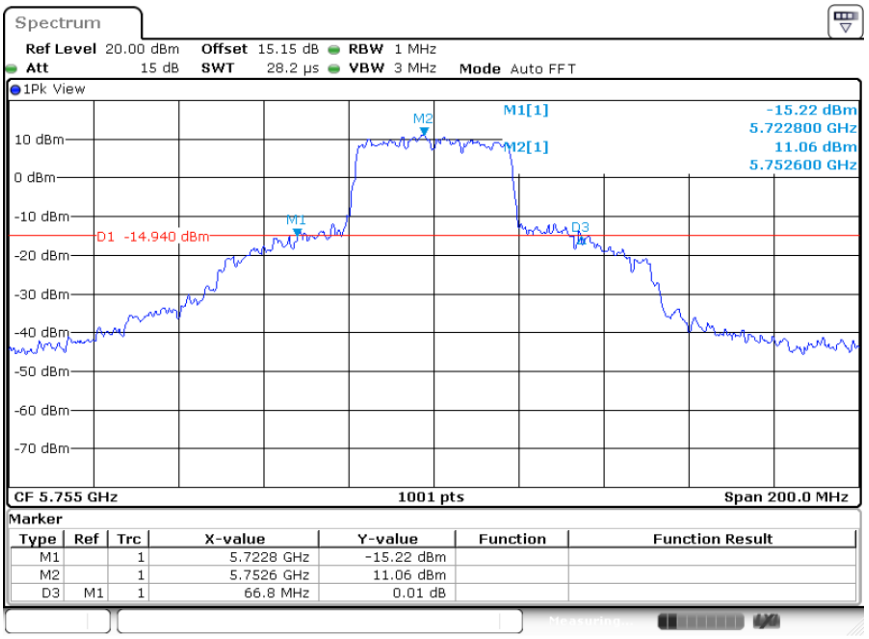

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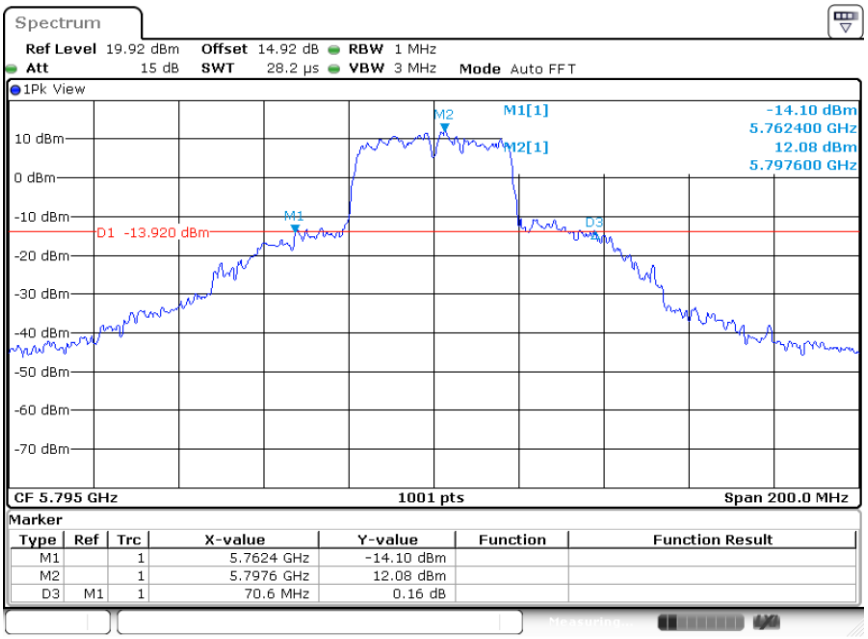

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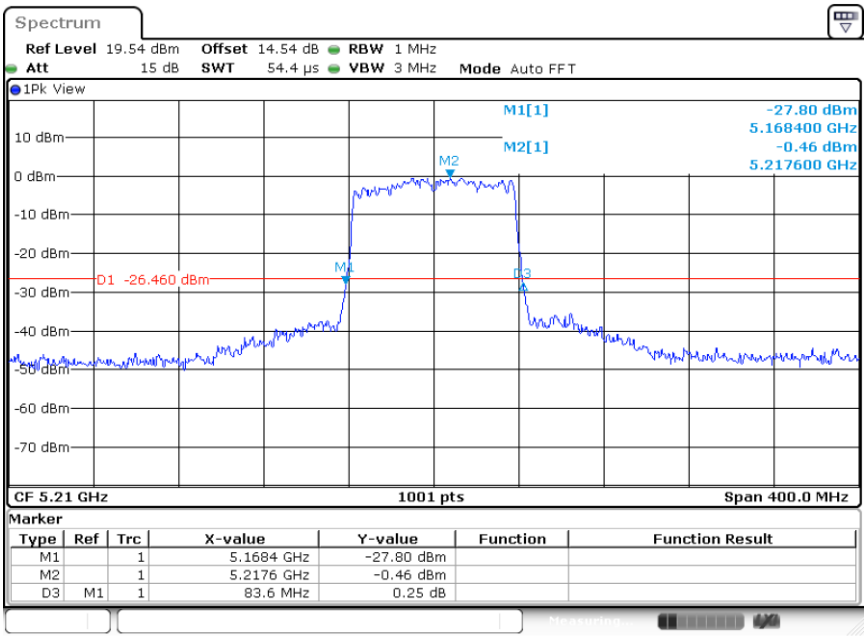

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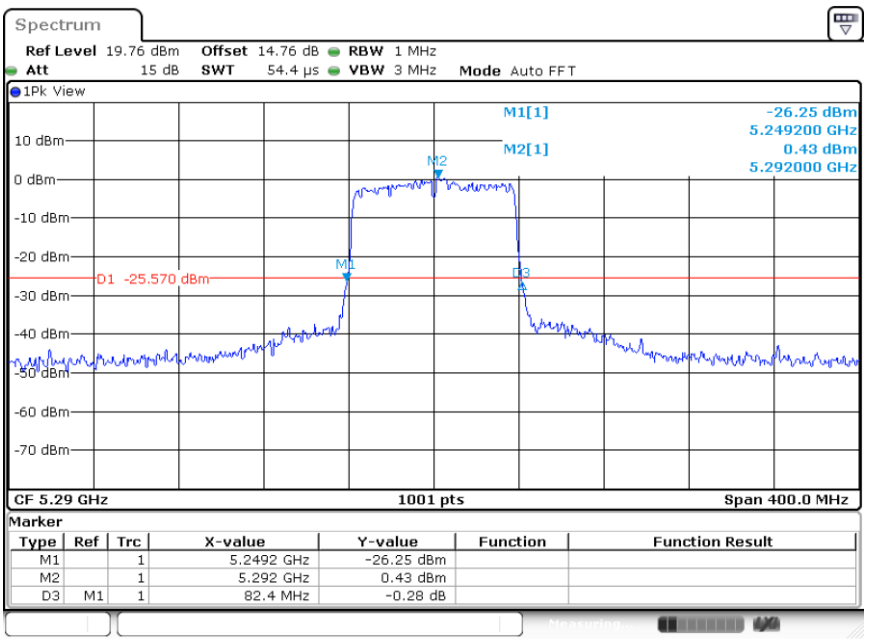

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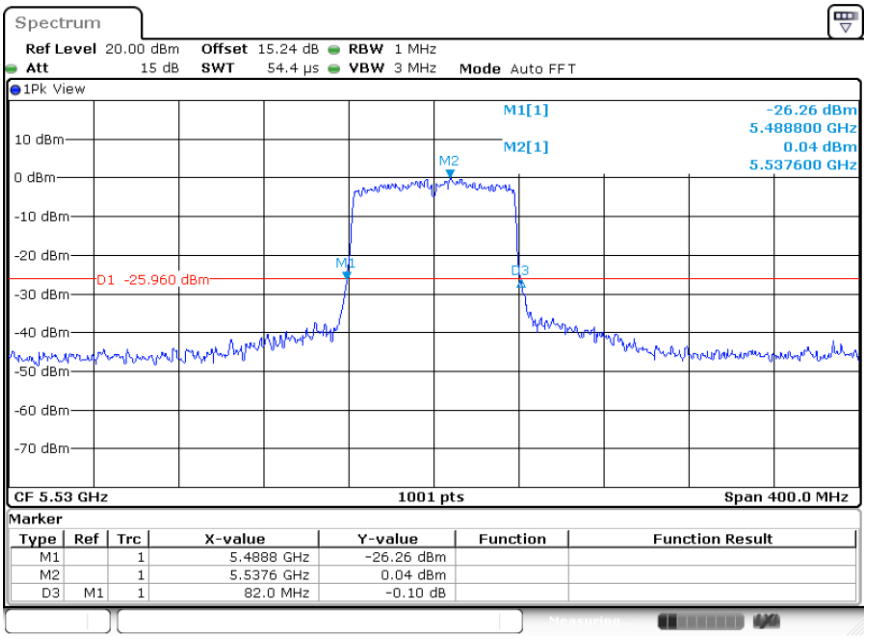

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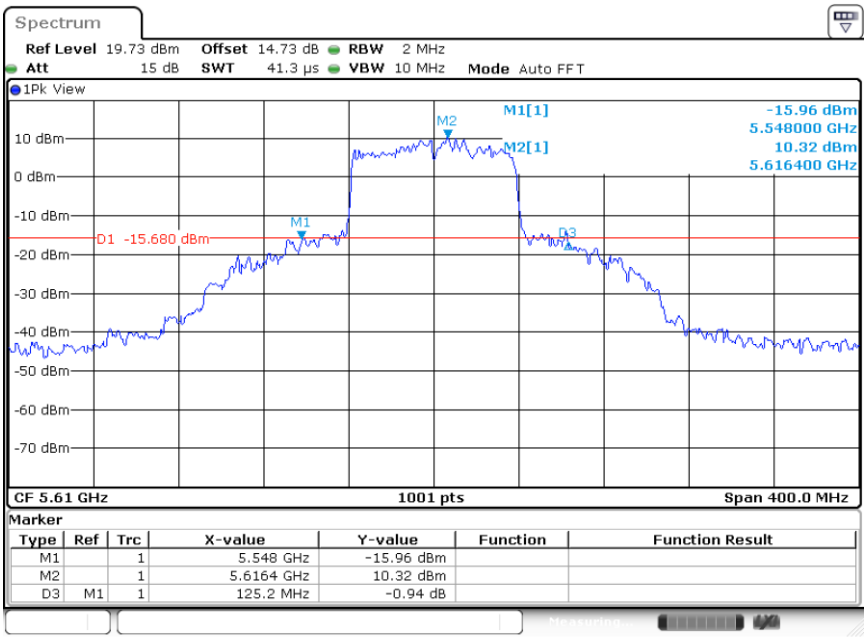

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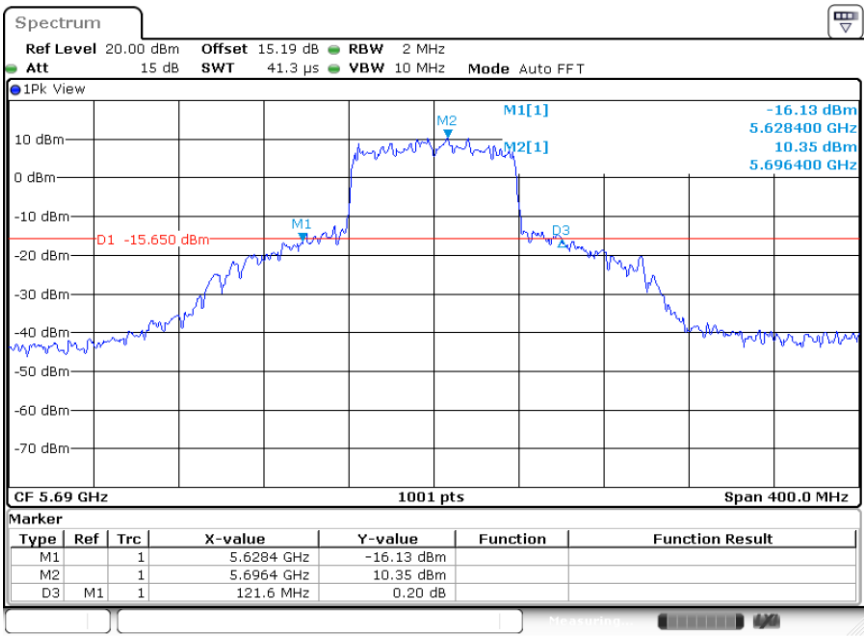

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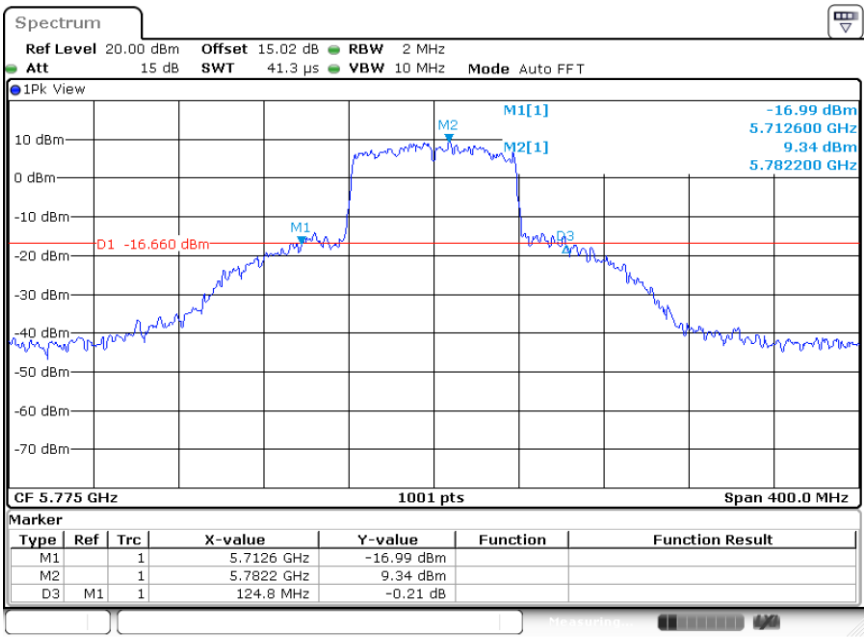


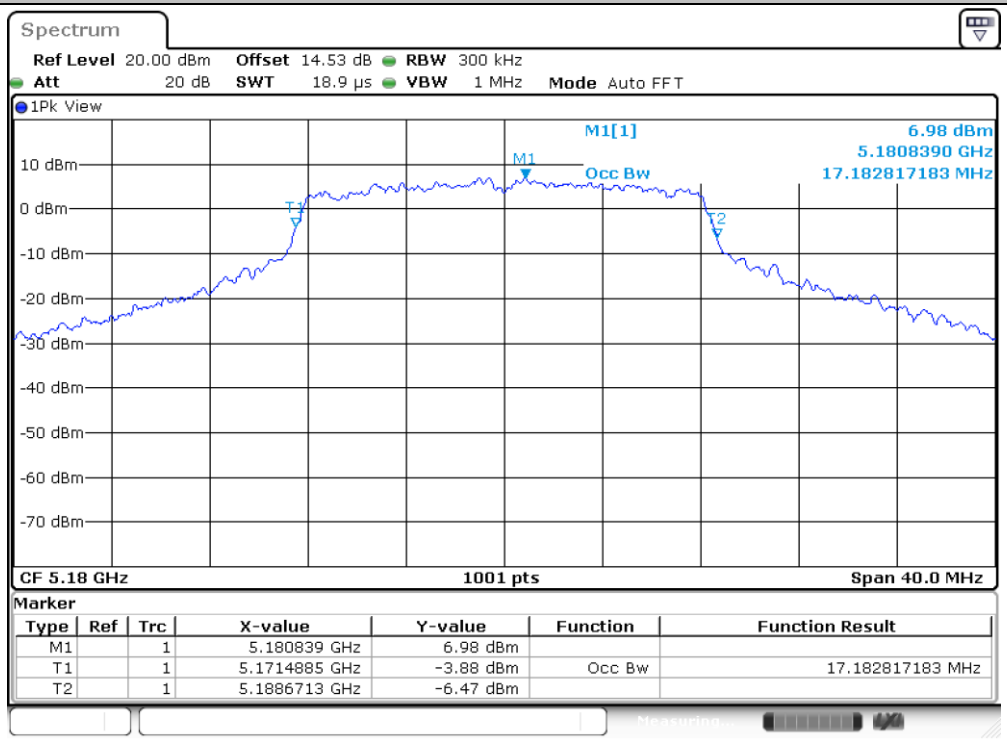
Occupied channel bandwidth

Test Result

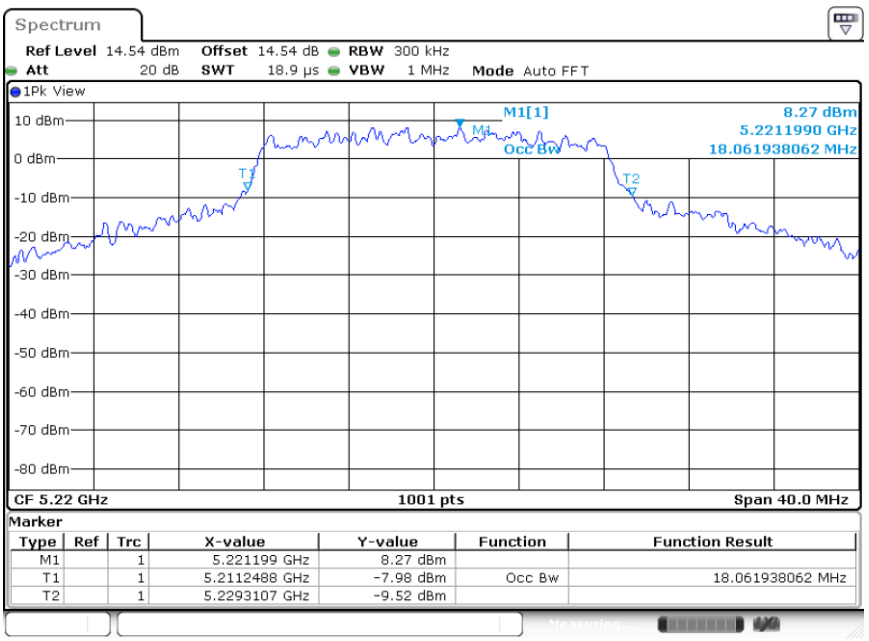
TestMode	Antenna	Freq(MHz)	OCB [MHz]	FL[MHz]	FH[MHz]
11A	Ant22	5180	17.183	5171.4885	5188.6713
		5220	18.062	5211.2488	5229.3107
		5240	18.382	5231.2088	5249.5904
		5260	18.422	5251.2088	5269.6304
		5300	22.178	5289.5704	5311.7483
		5320	17.063	5311.4885	5328.5514
		5500	18.581	5490.9291	5509.5105
		5580	18.142	5571.2088	5589.3506
		5700	17.742	5691.1688	5708.9111
		5720	18.222	5710.9690	5729.1908
		5745	20.34	5735.3696	5755.7093
		5785	20.699	5774.9301	5795.6294
		5825	21.738	5814.6503	5836.3886
11N20SISO	Ant22	5180	18.382	5170.8891	5189.2707
		5220	20.699	5210.2098	5230.9091
		5240	19.141	5230.6893	5249.8302
		5260	21.658	5249.7702	5271.4286
		5300	19.341	5290.7293	5310.0699
		5320	18.182	5310.9291	5329.1109
		5500	18.741	5490.6893	5509.4306
		5580	20.739	5569.8501	5590.5894
		5700	18.501	5690.7293	5709.2308
		5720	18.861	5710.6494	5729.5105
		5745	20.539	5735.2897	5755.8292
		5785	20.779	5774.7702	5795.5495
		5825	21.139	5814.5704	5835.7093
11N40SISO	Ant22	5190	36.364	5171.8581	5208.2218
		5230	36.763	5211.6983	5248.4615
		5270	37.163	5251.4585	5288.6214
		5310	36.364	5291.7782	5328.1419
		5510	36.284	5491.7782	5528.0619
		5550	36.843	5531.6184	5568.4615
		5670	36.763	5651.6184	5688.3816
		5710	36.683	5691.6184	5728.3017
		5755	37.003	5736.4585	5773.4615
		5795	37.483	5776.3786	5813.8611
11AC80SISO	Ant22	5210	75.604	5172.2777	5247.8821
		5290	75.604	5252.2777	5327.8821
		5530	75.604	5492.2777	5567.8821
		5610	76.084	5571.7982	5647.8821
		5690	76.404	5651.7982	5728.2018
		5775	76.404	5736.7982	5813.2018

Test Graphs

11A_5180



11A_5220



Date: 16.JAN.2024 11:24:21

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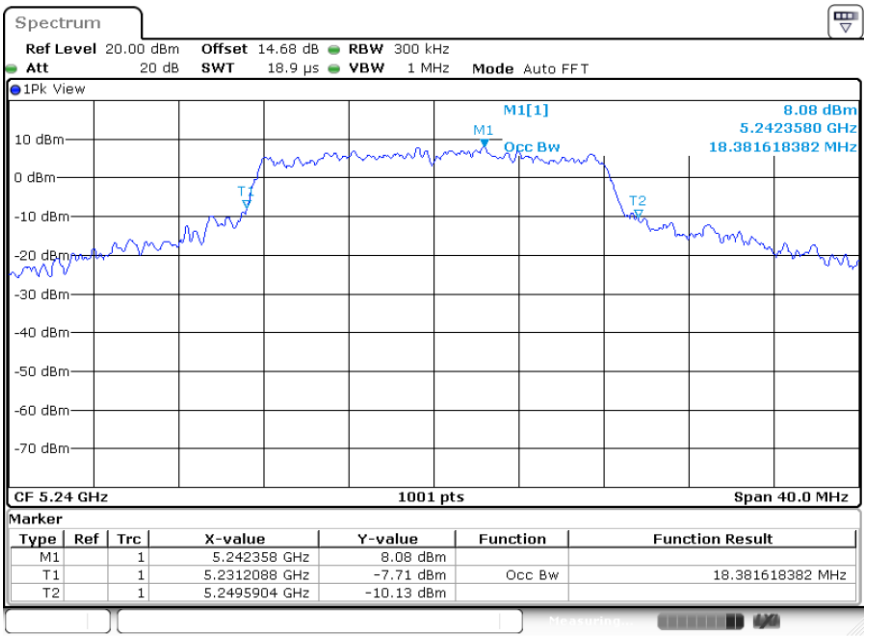

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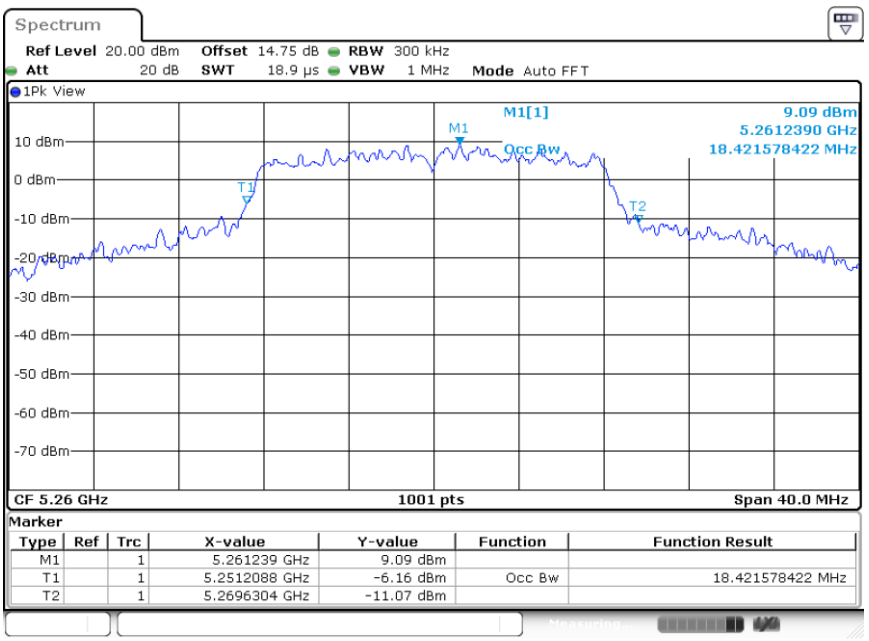

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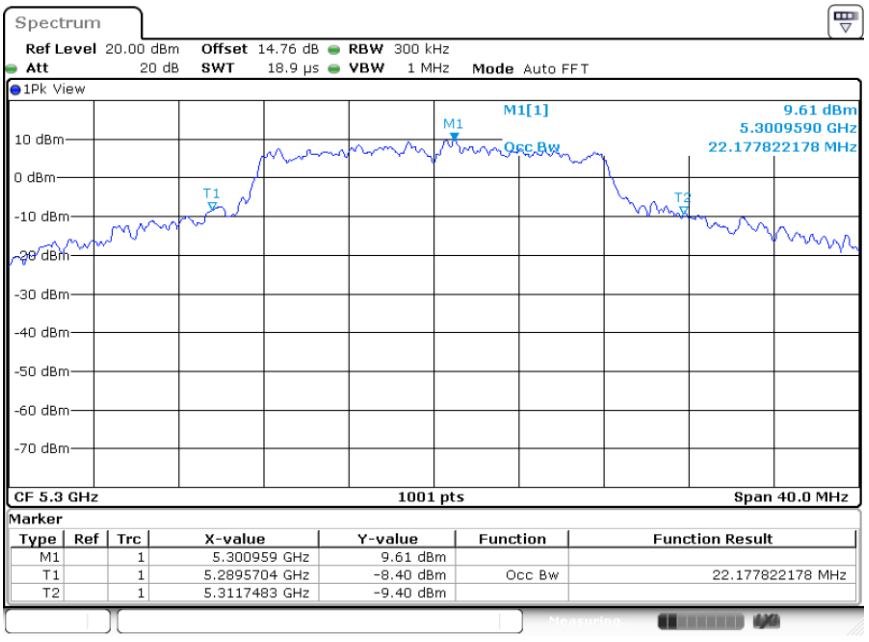

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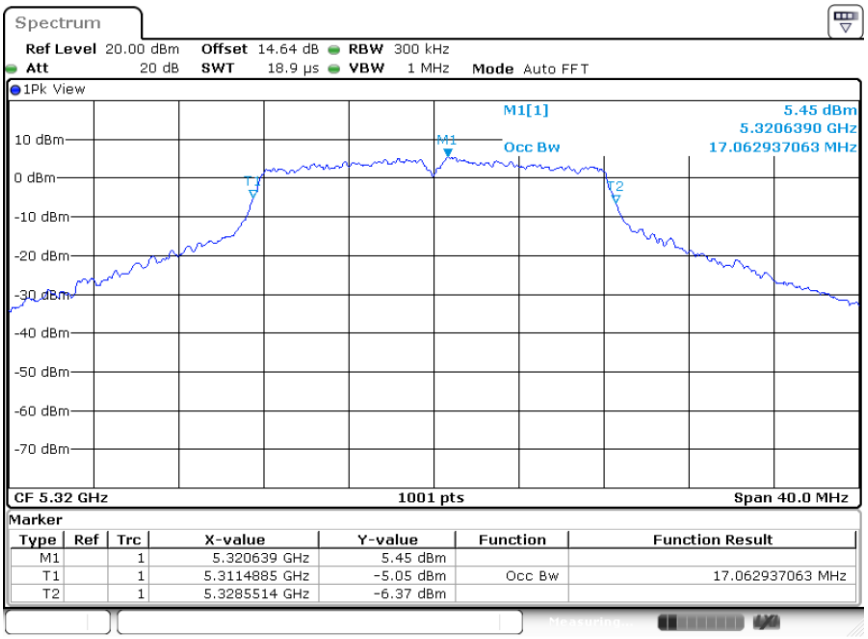

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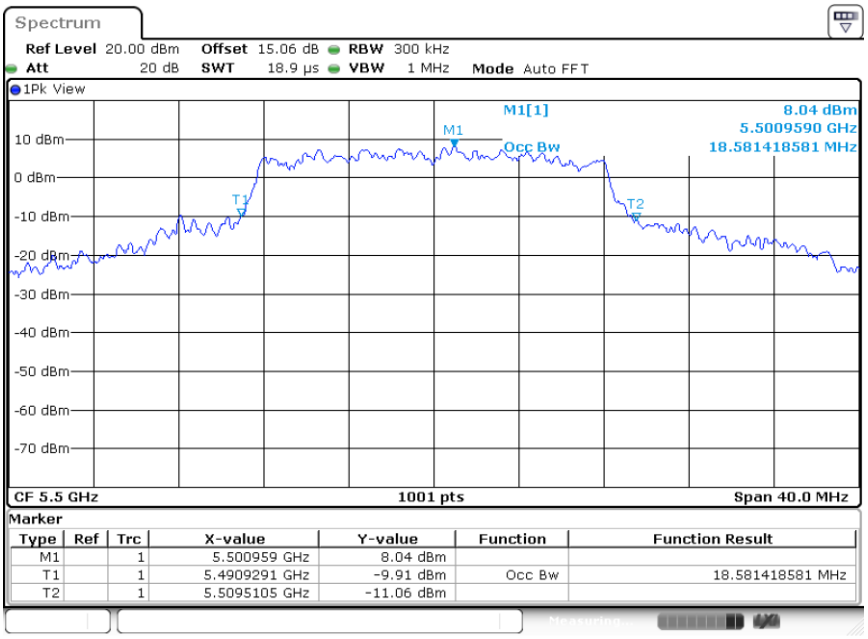

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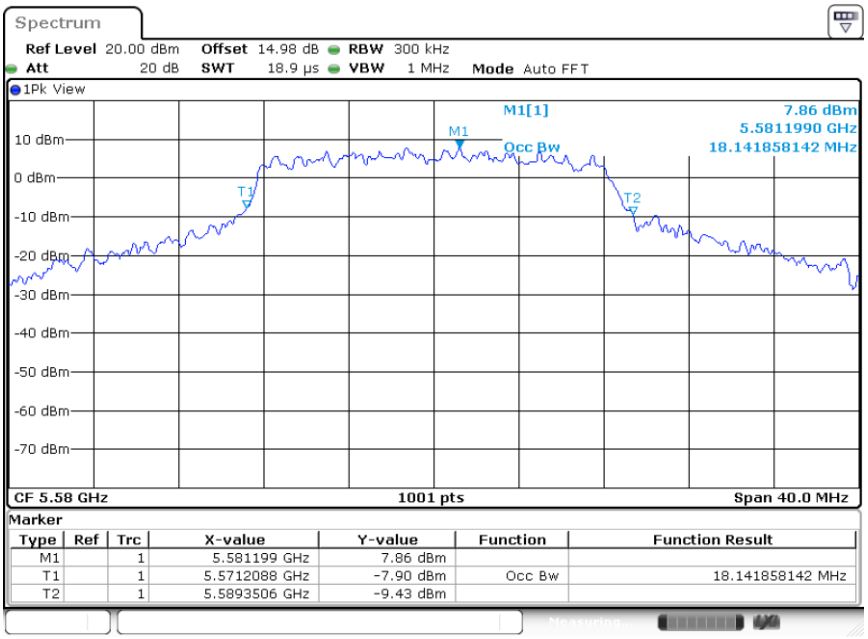

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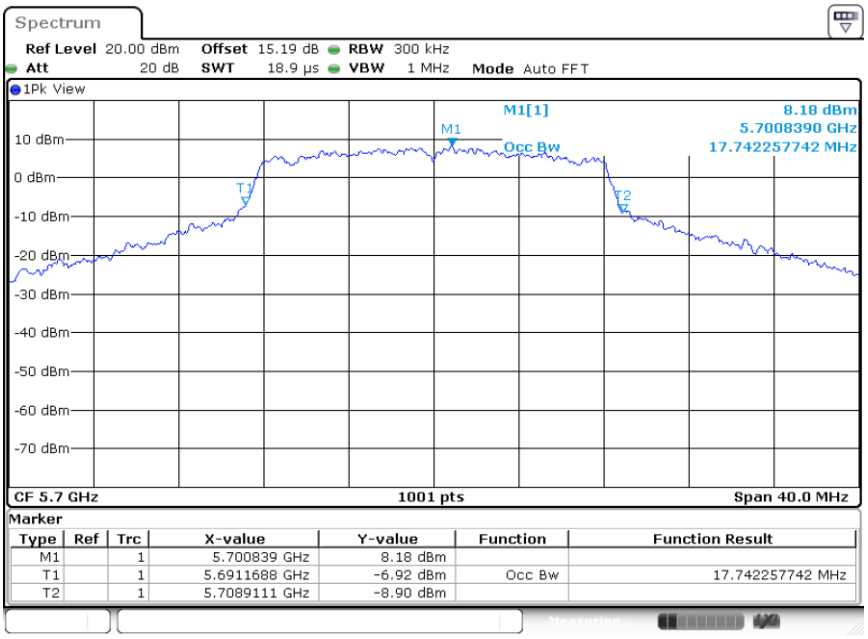
11A_5700



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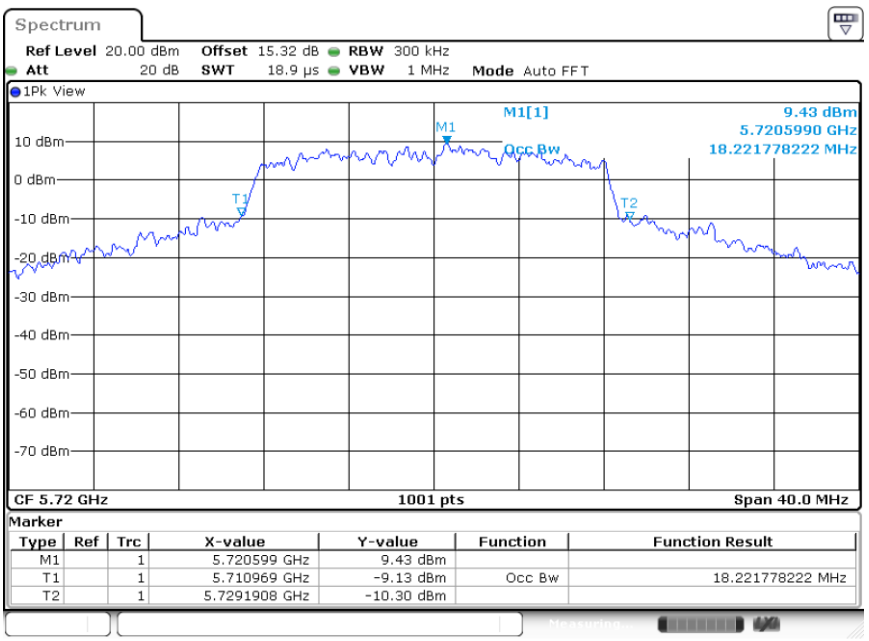

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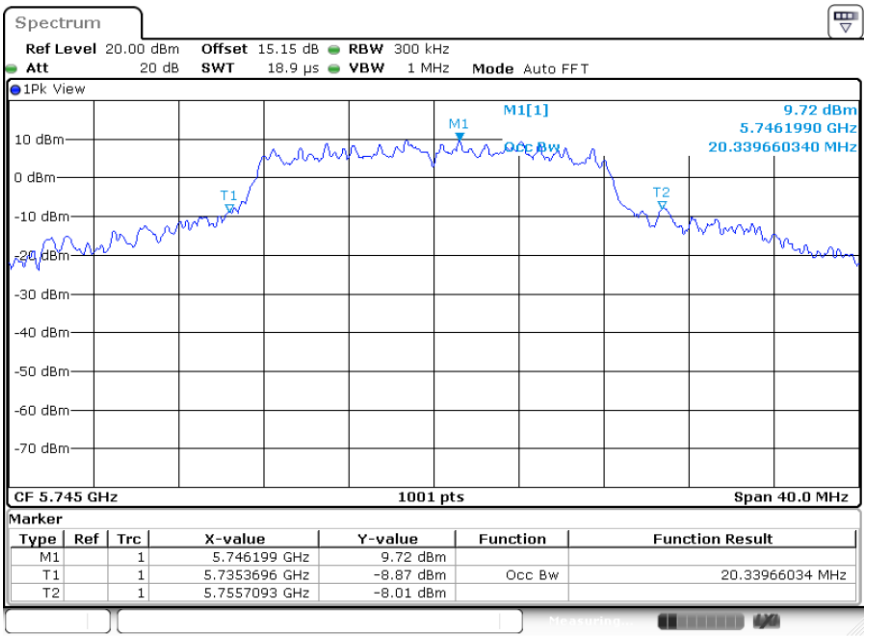

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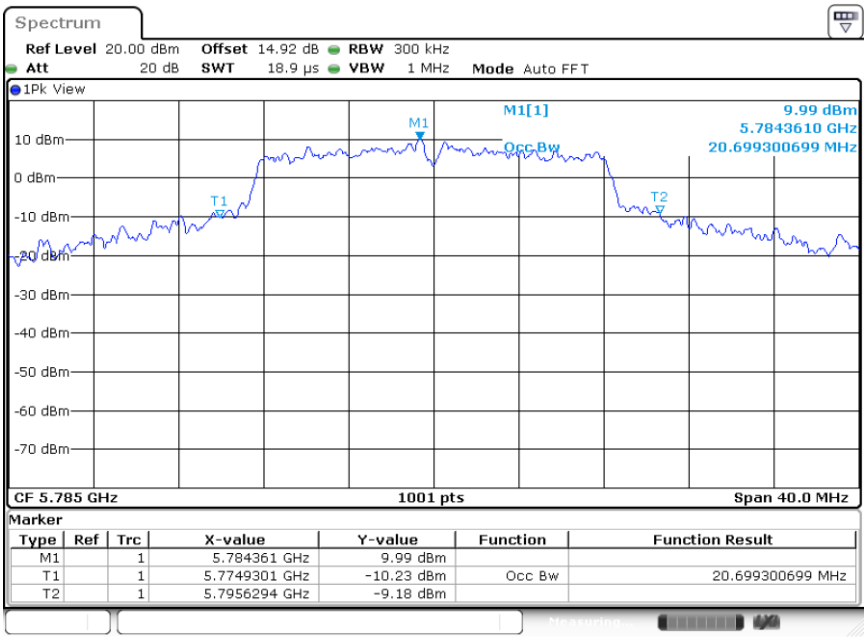
11A_5785



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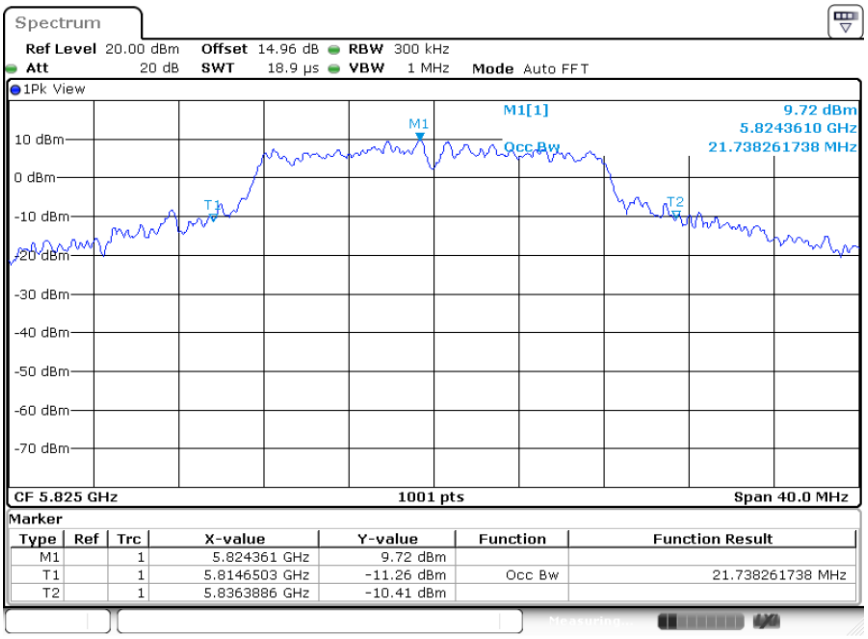
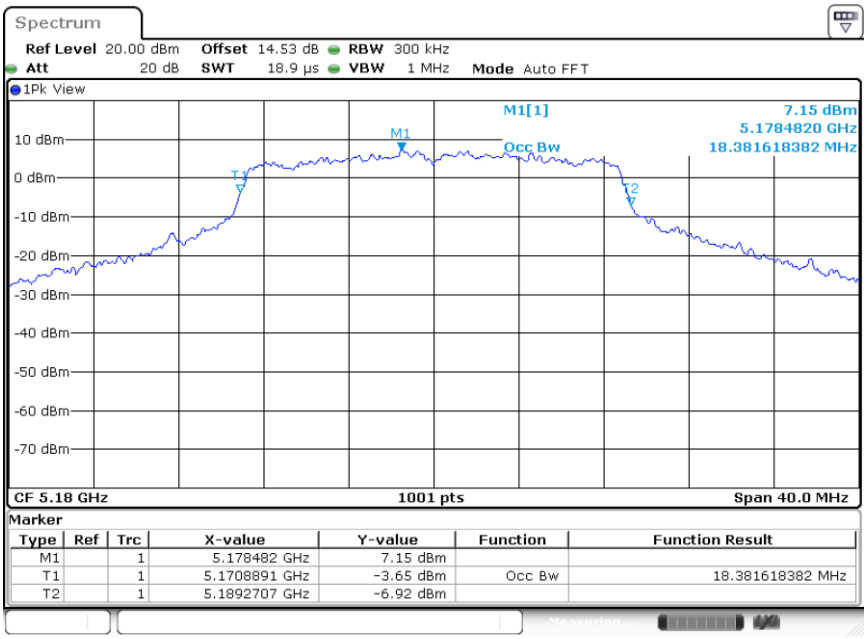
11A_5825



Date: 18.JAN.2024 15:50:57

11N20SISO_5180



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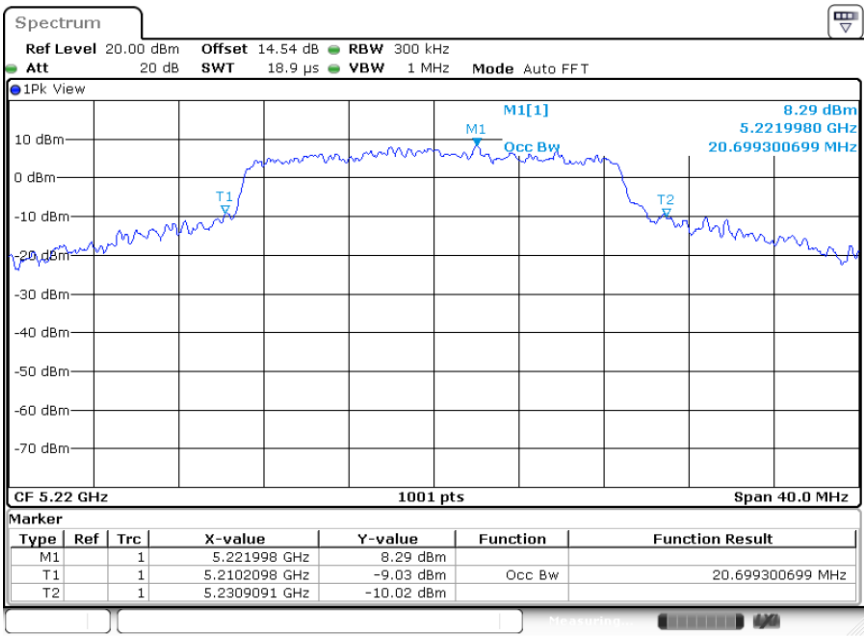

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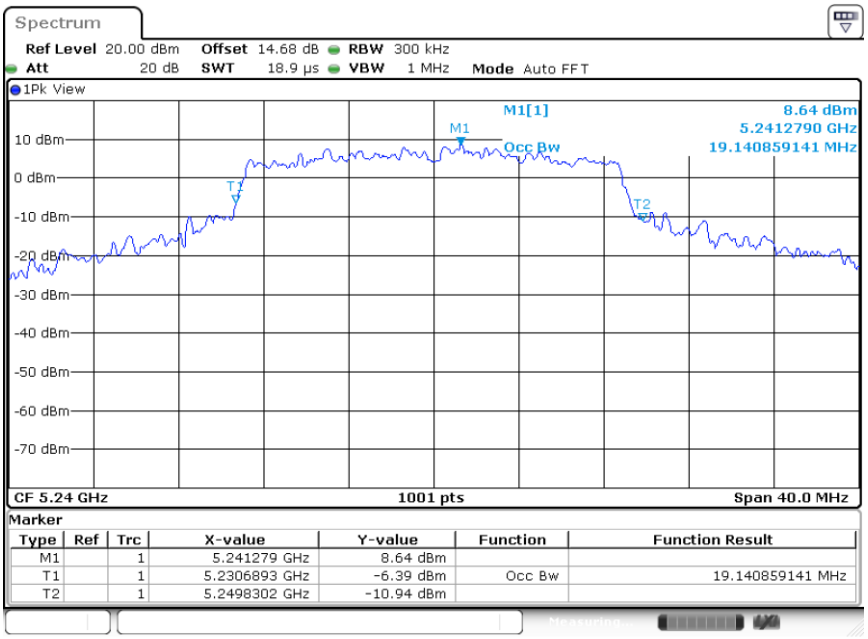

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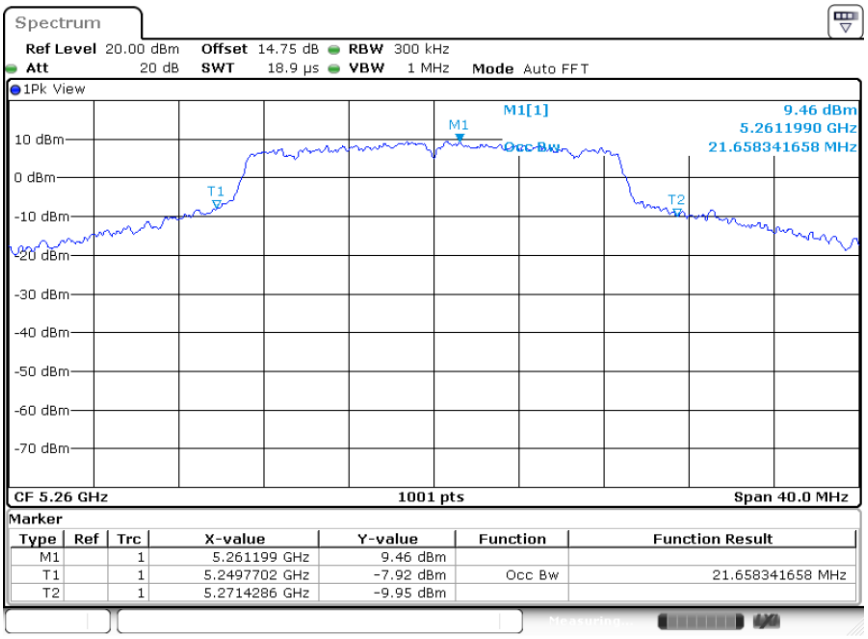

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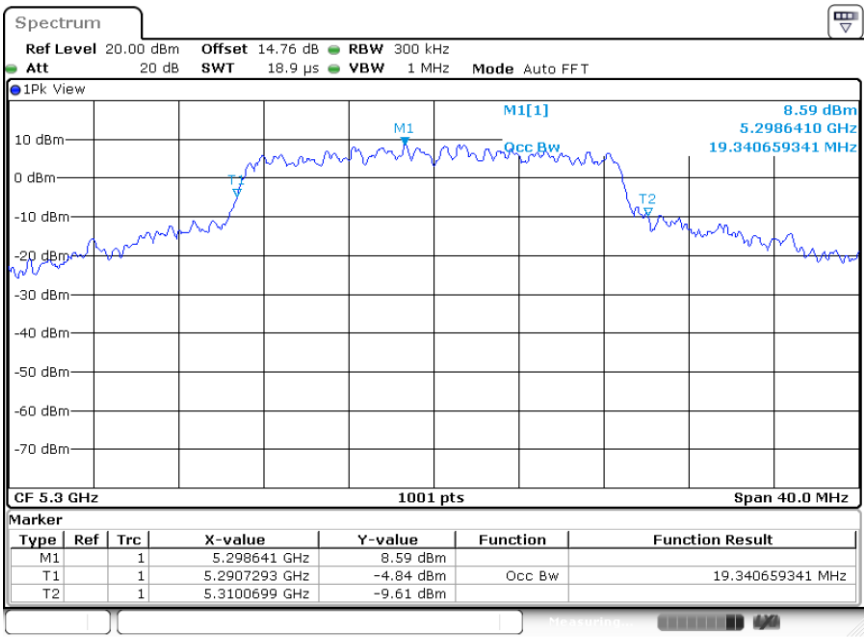
11N20SISO_5300



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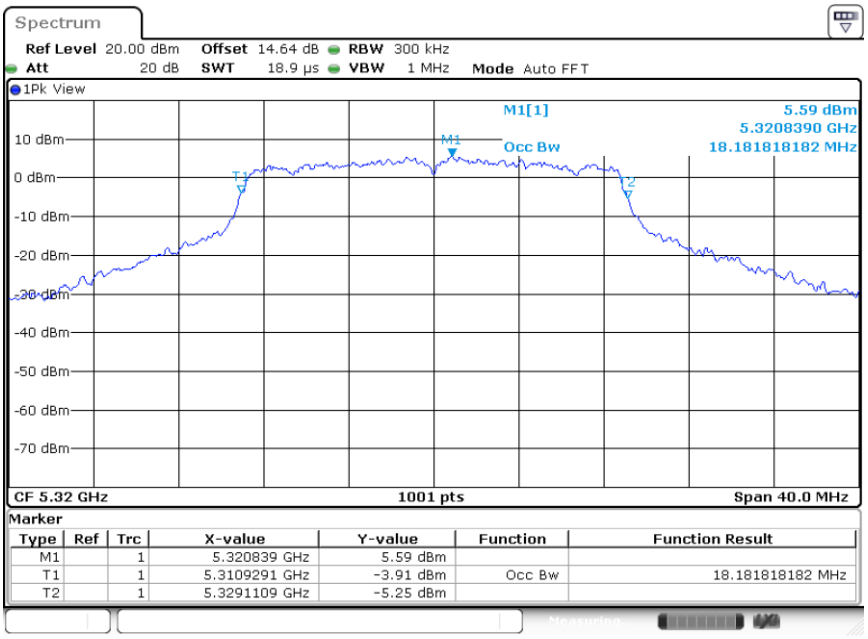

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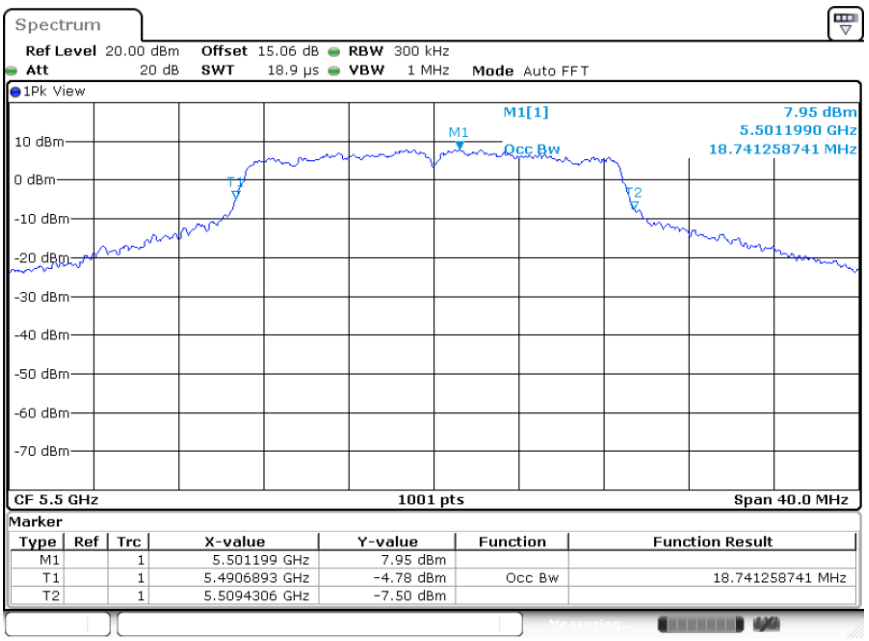

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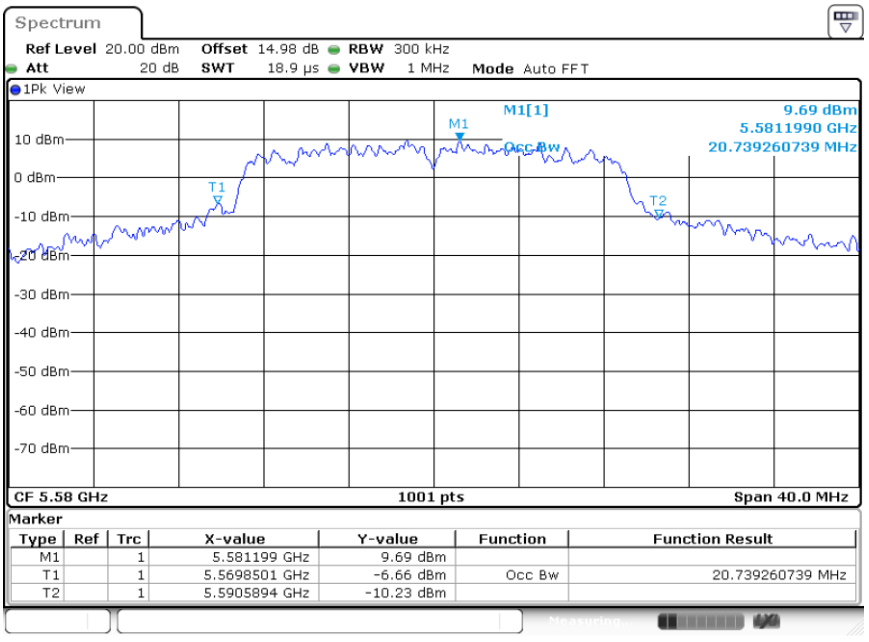

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