FCC RF Test Report

APPLICANT	:	FCNT LLC.
EQUIPMENT	:	Mobile cellular phone
BRAND NAME	:	Raku-Raku smartphone a
MODEL NAME	:	A401FC
FCC ID	:	2BEPUFMP198
STANDARD	:	FCC Part 15 Subpart E §15.407
CLASSIFICATION	:	(NII) Unlicensed National Information Infrastructure
TEST DATE(S)	:	May 04, 2024 ~ Jun. 14, 2024

We, Sporton International Inc. (Kunshan), 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.

This report contains data that were produced under subcontract by Sporton International Inc. (Shenzhen)

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

Jason Jia

Approved by: Jason Jia

ACCREDITED
Cert #5145.02

Sporton International Inc. (Kunshan)
No. 1098, Pengxi North Road, Kunshan Economic Development Zone Jiangsu Province 215300 People's Republic of China

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REVISION HISTORY

REPORT NO.	VERSION	DESCRIPTION	ISSUED DATE
FR422914E	Rev. 01	Initial issue of report	Jul. 18, 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 8.44 dB at 42.61 MHz
3.5	15.207	AC Conducted Emission	15.207(a)	15.207(a)	Pass	Under limit 14.45 dB at 0.747 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

FCNT LLC.
Sanki Yamato Bldg. 3F, 7-10-1, Chuorinkan, Yamato-shi, Kanagawa, 242-0007, Japan

1.2 Manufacturer

FCNT LLC.
Sanki Yamato Bldg. 3F, 7-10-1, Chuorinkan, Yamato-shi, Kanagawa, 242-0007, Japan

1.3 Product Feature of Equipment Under Test

Product Feature	
Equipment	Mobile cellular phone
Brand Name	Raku-Raku smartphone a
Model Name	A401FC
FCC ID	2BEPUFMP198
IMEI Code	Conducted: 354401310025244/354401310025251 Conduction: 354401310039864/354401310039872 Radiation: 354401310040268/354401310040276
HW Version	V4
SW Version	FAC V006
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 : 10.56 dBm / 0.0114 W 802.11n HT20 : 10.56 dBm / 0.0114 W 802.11n HT40 : 10.53 dBm / 0.0113 W 802.11ac VHT20: 10.57 dBm / 0.0114 W 802.11ac VHT40: 10.55 dBm / 0.0114 W 802.11ac VHT80: 10.53 dBm / 0.0113 W **<5260 MHz ~ 5320 MHz>** 802.11a : 10.60 dBm / 0.0115 W 802.11n HT20 : 10.55 dBm / 0.0114 W 802.11n HT40 : 10.53 dBm / 0.0113 W 802.11ac VHT20: 10.64 dBm / 0.0116 W

	802.11ac VHT40: 10.56 dBm / 0.0114 W 802.11ac VHT80: 10.51 dBm / 0.0112 W **<5500 MHz ~ 5720 MHz >** 802.11a : 10.84 dBm / 0.0121 W 802.11n HT20 : 10.60 dBm / 0.0115 W 802.11n HT40 : 10.72 dBm / 0.0118 W 802.11ac VHT20: 10.68 dBm / 0.0117 W 802.11ac VHT40: 10.83 dBm / 0.0121 W 802.11ac VHT80: 10.70 dBm / 0.0117 W **<5745 MHz ~ 5825 MHz>** 802.11a : 10.58 dBm / 0.0114 W 802.11n HT20 : 10.53 dBm / 0.0113 W 802.11n HT40 : 10.54 dBm / 0.0113 W 802.11ac VHT20: 10.56 dBm / 0.0114 W 802.11ac VHT40: 10.57 dBm / 0.0114 W 802.11ac VHT80: 10.51 dBm / 0.0112 W
99% Occupied Bandwidth	**<5180 MHz ~ 5240 MHz>** 802.11a : 17.143 MHz 802.11ac VHT20 : 17.982 MHz 802.11ac VHT40 : 36.204 MHz 802.11ac VHT80 : 75.445 MHz **<5260 MHz ~ 5320 MHz>** 802.11a : 17.103 MHz 802.11ac VHT20 : 18.022 MHz 802.11ac VHT40 : 36.204 MHz 802.11ac VHT80 : 75.445 MHz **<5500 MHz ~ 5720 MHz>** 802.11a : 17.103 MHz 802.11ac VHT20 : 17.982 MHz 802.11ac VHT40 : 36.284 MHz 802.11ac VHT80 : 75.445 MHz **<5745 MHz ~ 5825 MHz>** 802.11a : 17.143 MHz 802.11ac VHT20 : 18.022 MHz 802.11ac VHT40 : 36.284 MHz 802.11ac VHT80 : 75.445 MHz
Antenna Type / Gain	**<5180 MHz ~ 5240 MHz>** PIFA Antenna with gain -2.09 dBi **<5260 MHz ~ 5320 MHz>** PIFA Antenna with gain -1.52 dBi **<5500 MHz ~ 5720 MHz>** PIFA Antenna with gain -1.53 dBi **<5745 MHz ~ 5825 MHz>** PIFA Antenna with gain -1.59 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 / ac VHT20 and 802.11n HT40 / ac VHT40 mode, the whole testing has assessed only 802.11ac VHT20/ VHT40 by referring to their higher output power.

1.5 Modification of EUT

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

1.6 Testing Location

Sporton International Inc. (Kunshan) is accredited to ISO/IEC 17025:2017 by American Association for Laboratory Accreditation with Certificate Number 5145.02.

Test Firm	Sporton International Inc. (Kunshan)		
Test Site Location	No. 1098, Pengxi North Road, Kunshan Economic Development Zone Jiangsu Province 215300 People's Republic of China TEL : +86-512-57900158		
Test Site No.	**Sporton Site No.**	**FCC Designation No.**	**FCC Test Firm Registration No.**
	CO01-KS TH01-KS	CN1257	314309

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	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.**
	03CH04-SZ	CN1256	421272

Note: Test data subcontracted: Radiated Spurious Emission test case in section 3.4 of this report.

1.7 Test Software

Item	Site	Manufacturer	Name	Version
1.	TH01-KS	Tonscend	JS1120-3 test system China_210602	3.3.10
2.	CO01-KS	AUDIX	E3	6.2009-8-24
3.	03CH04-SZ	AUDIX	E3	6.2009-8-24

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 (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	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**
802.11ac VHT20	**MCS0**
802.11ac VHT40	**MCS0**
802.11ac VHT80	**MCS0**

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

RSE Co-location mode
WLAN5G 802.11ac VHT80 CH58_TX + Bluetooth BR CH00_TX + LTE Band 41 Link

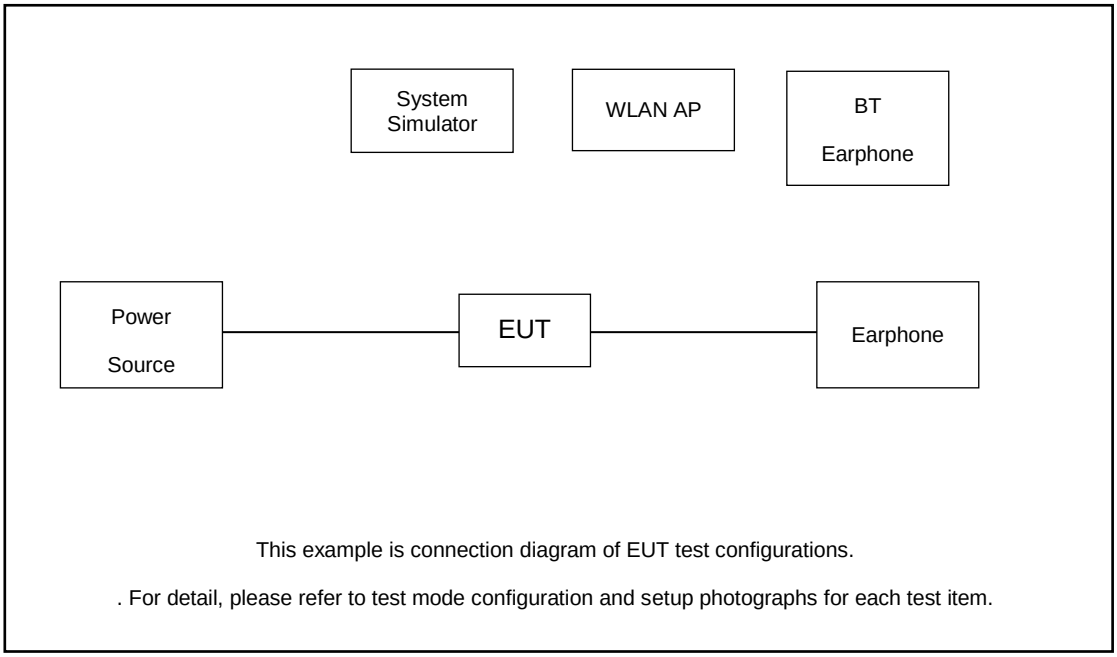
Ch. #		U-NII-1	U-NII-2A	U-NII-2C	U-NII-3
		20M BW	20M BW	20M BW	20M BW
L	Low	36	52	100	149
M	Middle	44	60	116	157
H	High	48	64	140	165
Straddle		-	-	144	-

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	-

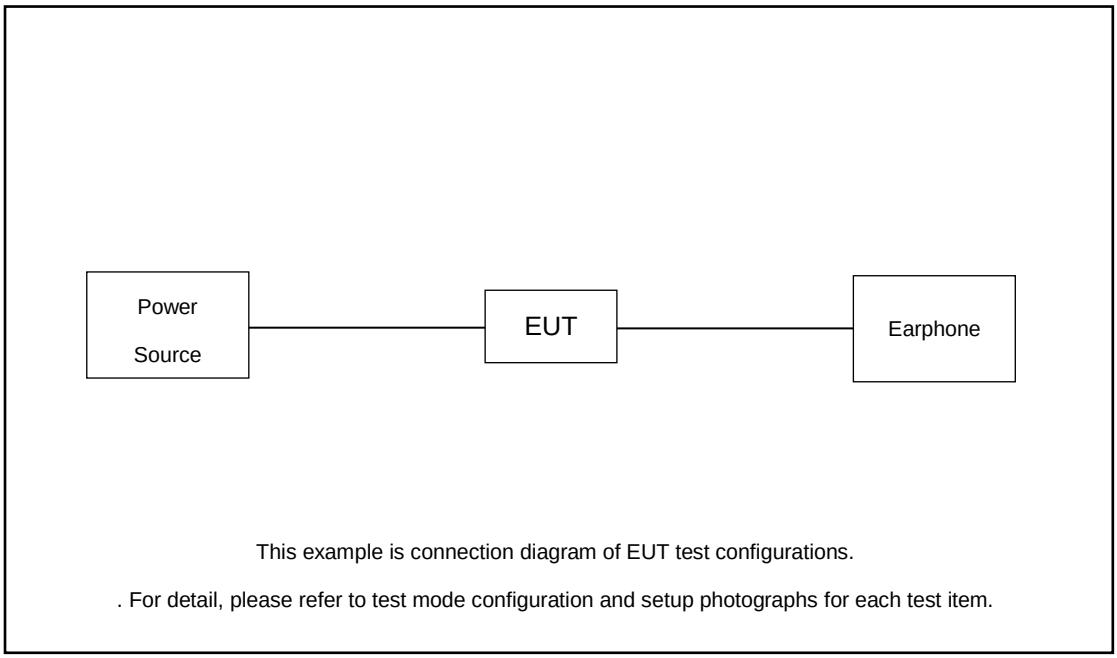
Ch. #		U-NII-1	U-NII-2A	U-NII-2C	U-NII-3
		80M BW	80M BW	80M BW	80M BW
L	Low	-	-	106	-
M	Middle	42	58	-	155
H	High	-	-	122	-
Straddle		-	-	138	-

2.3 Connection Diagram of Test System

AC Conducted Emission:



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.	LTE Base Station	Anritus	MT8821C	N/A	N/A	Unshielded,1.8m
2.	Base Station	Anritsu	MT8820	N/A	N/A	N/A
3.	Notebook	Lenovo	G480	QDS-BRCM1050I	N/A	shielded cable DC O/P 1.8m , Unshielded AC I/P cable 1.8m
4.	WLAN AP	D-link	DIR-655	KA21R655B1	N/A	Unshielded,1.8m
5.	Bluetooth Earphone	Lenovo	thinkplus-BH3	N/A	N/A	N/A
6.	Adapter	Lenovo	N/A	N/A	N/A	N/A
7.	USB Cable	Lenovo	N/A	N/A	Shielded, 1.2m	N/A
8.	Earphone	Moto	N/A	N/A	Un-Shielded, 1.2m	N/A

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 4.28 dB and 10dB attenuator.

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

= 4.28 + 10 = 14.28 (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

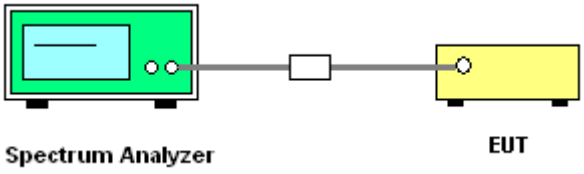
The measuring equipment is listed in the section 4 of this test report.

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

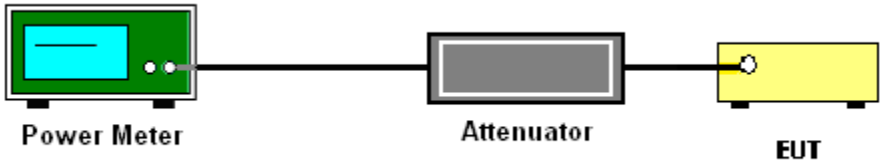
The testing follows Method PM of FCC KDB 789033 D02 General UNII Test Procedures New Rules v02r01.

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

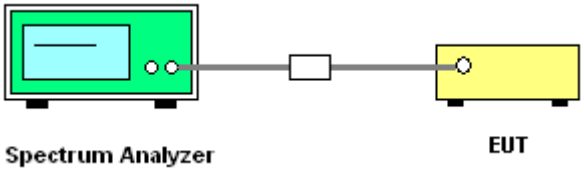
 # Method SA-2 #

(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

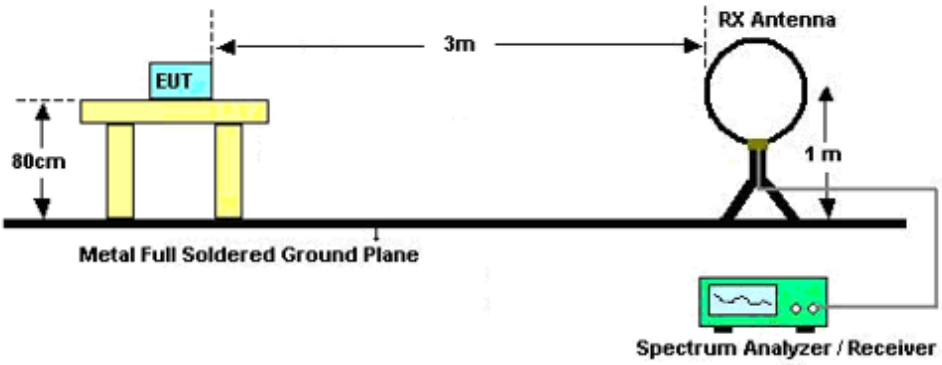
   - RBW = 1 MHz
   - VBW ≥ 3 MHz
   - Detector = Peak
   - Sweep time = auto
   - Trace mode = max hold

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

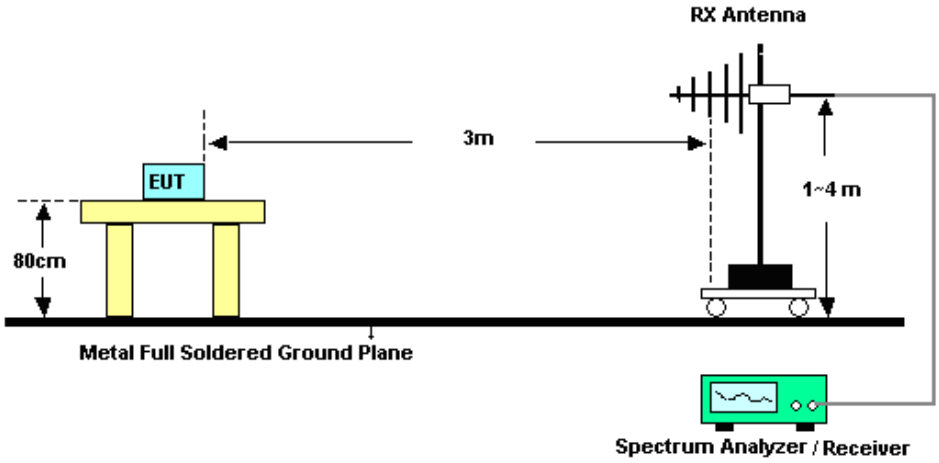
   - RBW = 1 MHz
   - VBW = 10 Hz, when duty cycle is no less than 98 percent.
   - VBW ≥ 1/T, when duty cycle is less than 98 percent where T is the minimum transmission duration over which the transmitter is on.
2. The EUT was placed on a turntable with 0.8 meter for frequency below 1GHz and 1.5 meter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

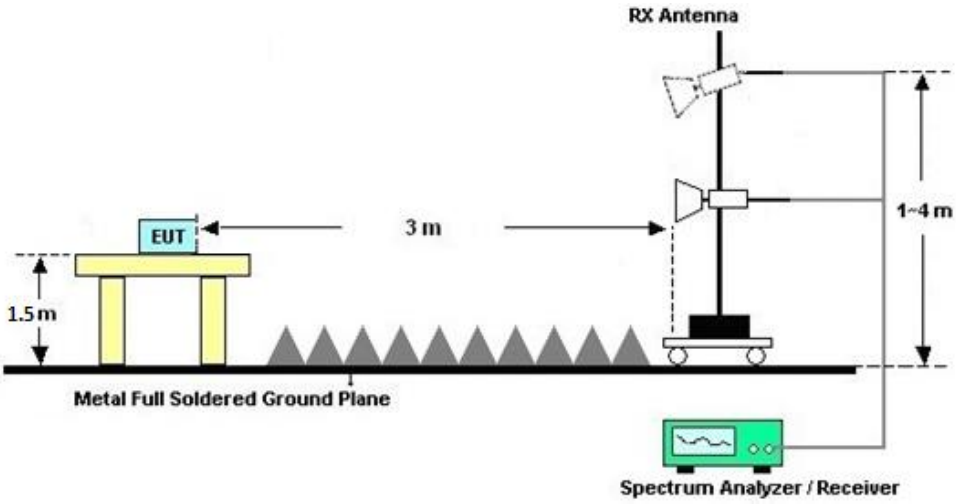
For radiated emissions below 30MHz



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.

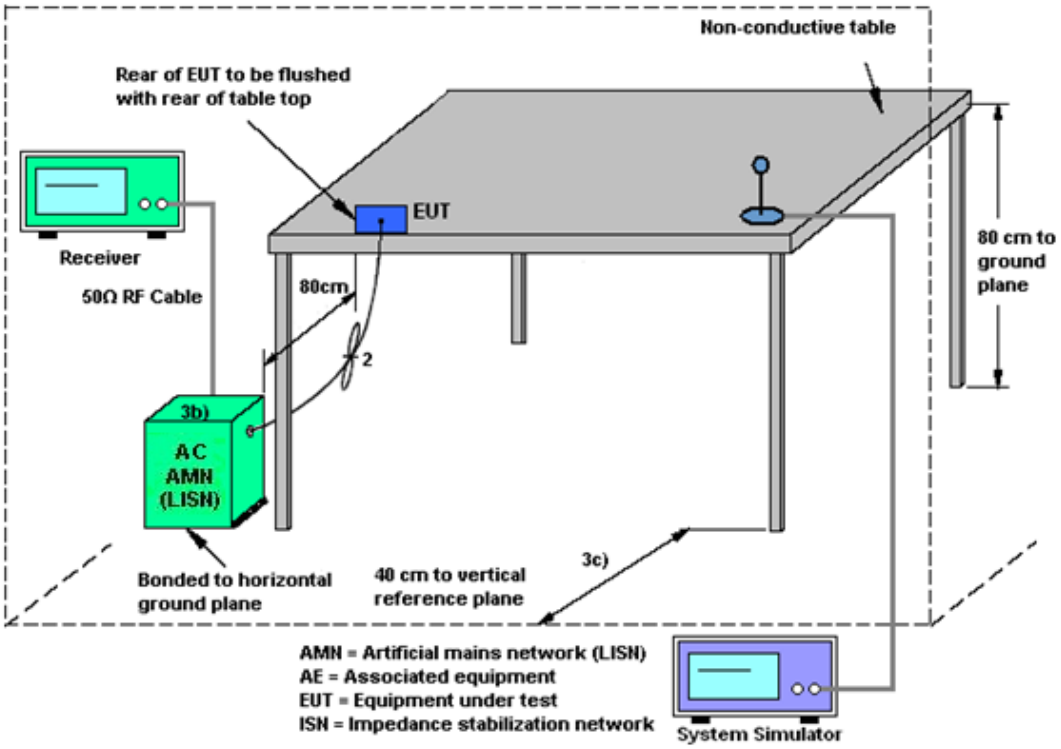
3.5.2 Measuring Instruments

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	R&S	ESR7	101404	9kHz~7GHz	Oct. 18, 2023	Jun. 01, 2024~ Jun. 06, 2024	Oct. 17, 2024	Radiation (03CH04-SZ)
EXA Spectrum Analyzer	KEYSIGHT	N9010A	MY55150213	10Hz~44GHz	Jul. 07, 2023	Jun. 01, 2024~ Jun. 06, 2024	Jul. 06, 2024	Radiation (03CH04-SZ)
Loop Antenna	R&S	HFH2-Z2	100354	9kHz~30MHz	Jun. 28, 2022	Jun. 01, 2024~ Jun. 06, 2024	Jun. 27, 2024	Radiation (03CH04-SZ)
Log-periodic Antenna	SCHWARZBEC K	VULB 9168	01001	20MHz~1.5GHz	Jul. 08, 2023	Jun. 01, 2024~ Jun. 06, 2024	Jul. 07, 2024	Radiation (03CH04-SZ)
Double Ridge Horn Antenna	SCHWARZBEC K	BBHA9120D	9120D-1474	1GHz~18GHz	Jul. 07, 2023	Jun. 01, 2024~ Jun. 06, 2024	Jul. 06, 2024	Radiation (03CH04-SZ)
Horn Antenna	SCHWARZBEC K	BBHA9170	9170#679	15GHz~40GHz	Jul. 08, 2023	Jun. 01, 2024~ Jun. 06, 2024	Jul. 07, 2024	Radiation (03CH04-SZ)
Amplifier	Burgeon	BPA-530	102211	0.01Hz ~3000MHz	Oct. 18, 2023	Jun. 01, 2024~ Jun. 06, 2024	Oct. 17, 2024	Radiation (03CH04-SZ)
HF Amplifier	MITEQ	AMF-7D-00101 800-30-10P-R	1943528	1GHz~18GHz	Oct. 18, 2023	Jun. 01, 2024~ Jun. 06, 2024	Oct. 17, 2024	Radiation (03CH04-SZ)
HF Amplifier	MITEQ	TTA1840-35-H G	1871923	18GHz~40GHz	Jul. 07, 2023	Jun. 01, 2024~ Jun. 06, 2024	Jul. 06, 2024	Radiation (03CH04-SZ)
Amplifier	Agilent Technologies	83017A	MY57280136	500MHz~26.5G Hz	Aug. 21, 2023	Jun. 01, 2024~ Jun. 06, 2024	Aug. 20, 2024	Radiation (03CH04-SZ)
AC Power Source	APC	AFV-S-600B	F119050019	N/A	Oct. 18, 2023	Jun. 01, 2024~ Jun. 06, 2024	Oct. 17, 2024	Radiation (03CH04-SZ)
Turn Table	EM	EM1000	N/A	0~360 degree	NCR	Jun. 01, 2024~ Jun. 06, 2024	NCR	Radiation (03CH04-SZ)
Antenna Mast	EM	EM1000	N/A	1 m~4 m	NCR	Jun. 01, 2024~ Jun. 06, 2024	NCR	Radiation (03CH04-SZ)
EMI Receiver	R&S	ESCI7	100768	9kHz~7GHz;	Apr. 18, 2024	Jun. 14, 2024	Apr. 17, 2025	Conduction (CO01-KS)
AC LISN (for auxiliary equipment)	MessTec	AN3016	060103	9kHz~30MHz	Oct. 11, 2023	Jun. 14, 2024	Oct. 10, 2024	Conduction (CO01-KS)
AC LISN	MessTec	AN3016	060105	9kHz~30MHz	Apr. 18, 2024	Jun. 14, 2024	Apr. 17, 2025	Conduction (CO01-KS)
AC Power Source	Chroma	61602	ABP000000811	AC 0V~300V, 45Hz~1000Hz	Oct. 11, 2023	Jun. 14, 2024	Oct. 10, 2024	Conduction (CO01-KS)
Spectrum Analyzer	R&S	FSV40	101040	10Hz~40GHz	Oct. 11, 2023	May 04, 2024	Oct. 10, 2024	Conducted (TH01-KS)
Pulse Power Senor	Anritsu	MA2411B	0917070	300MHz~40GHz	Jan. 02, 2024	May 04, 2024	Jan. 01, 2025	Conducted (TH01-KS)
Power Meter	Anritsu	ML2495A	1005002	50MHz Bandwidth	Jan. 02, 2024	May 04, 2024	Jan. 01, 2025	Conducted (TH01-KS)
Temperature & humidity chamber	Hongzhan	LP-150U	H2014011440	-40~+150°C 20%~95%RH	Jul. 06, 2023	May 04, 2024	Jul. 05, 2024	Conducted (TH01-KS)

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

Conducted Spurious Emission & Bandedge	**±2.26 dB**
Occupied Channel Bandwidth	**±0.1%**
Conducted Power	**±0.46 dB**
Conducted Power Spectral Density	**±0.88 dB**
Frequency	**±0.4 Hz**

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

Measuring Uncertainty for a Level of Confidence of 95% (U = 2Uc(y))	**2.84 dB**

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

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

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

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

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

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

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

Appendix A. Conducted Test Results

Ambient Condition: 25 ℃, 45 %RH	
According Standard: ■Part15E	
Test Date: 2024.5.4	**Test Engineer:** Jiang Jun

Maximum Conducted Output Power

FCC<5180 MHz ~ 5240 MHz> single antenna									
Mod.	Data Rate	NTX	CH.	Freq. (MHz)	Duty Factor (dB)	Average Conducted Power with duty factor (dBm)	FCC Conducted Power Limit (dBm)	DG (dBi)	Pass/Fail
					Ant 8	Ant 8	Ant 8	Ant 8	
11a	6Mbps	1	36	5180	0.11	10.56	24.00	-2.09	Pass
11a	6Mbps	1	44	5220	0.11	10.51	24.00	-2.09	Pass
11a	6Mbps	1	48	5240	0.11	10.52	24.00	-2.09	Pass
HT20	MCS0	1	36	5180	0.12	10.53	24.00	-2.09	Pass
HT20	MCS0	1	44	5220	0.12	10.53	24.00	-2.09	Pass
HT20	MCS0	1	48	5240	0.12	10.56	24.00	-2.09	Pass
HT40	MCS0	1	38	5190	0.23	10.53	24.00	-2.09	Pass
HT40	MCS0	1	46	5230	0.23	10.52	24.00	-2.09	Pass
VHT20	MCS0	1	36	5180	0.12	10.54	24.00	-2.09	Pass
VHT20	MCS0	1	44	5220	0.12	10.55	24.00	-2.09	Pass
VHT20	MCS0	1	48	5240	0.12	10.57	24.00	-2.09	Pass
VHT40	MCS0	1	38	5190	0.23	10.55	24.00	-2.09	Pass
VHT40	MCS0	1	46	5230	0.23	10.54	24.00	-2.09	Pass
VHT80	MCS0	1	42	5210	0.84	10.53	24.00	-2.09	Pass

FCC <5260 MHz ~ 5320 MHz>single antenna										
Mod.	Data Rate	NTX	CH.	Freq. (MHz)	Duty Factor (dB)	Average Conducted Power with duty factor (dBm)	FCC Conducted Power Limit (dBm)	DG (dBi)	EIRP Power Limit (dBm)	Pass/Fail
					Ant 8	Ant 8	Ant 8	Ant 8		
11a	6Mbps	1	52	5260	0.11	10.60	23.95	-1.52	26.99	Pass
11a	6Mbps	1	60	5300	0.11	10.54	23.89	-1.52	26.99	Pass
11a	6Mbps	1	64	5320	0.11	10.52	23.91	-1.52	26.99	Pass
HT20	MCS0	1	52	5260	0.12	10.54	23.98	-1.52	26.99	Pass
HT20	MCS0	1	60	5300	0.12	10.55	23.98	-1.52	26.99	Pass
HT20	MCS0	1	64	5320	0.12	10.54	23.98	-1.52	26.99	Pass
HT40	MCS0	1	54	5270	0.23	10.52	23.98	-1.52	26.99	Pass
HT40	MCS0	1	62	5310	0.23	10.53	23.98	-1.52	26.99	Pass
VHT20	MCS0	1	52	5260	0.12	10.64	23.98	-1.52	26.99	Pass
VHT20	MCS0	1	60	5300	0.12	10.56	23.98	-1.52	26.99	Pass
VHT20	MCS0	1	64	5320	0.12	10.57	23.98	-1.52	26.99	Pass
VHT40	MCS0	1	54	5270	0.23	10.56	23.98	-1.52	26.99	Pass
VHT40	MCS0	1	62	5310	0.23	10.55	23.98	-1.52	26.99	Pass
VHT80	MCS0	1	58	5290	0.84	10.51	23.98	-1.52	26.99	Pass

FCC <5500 MHz ~ 5720 MHz >single antenna										
Mod.	Data Rate	NTX	CH.	Freq. (MHz)	Duty Factor (dB)	Average Conducted Power with duty factor (dBm)	FCC Conducted Power Limit (dBm)	DG (dBi)	EIRP Power Limit (dBm)	Pass/Fail
					Ant 8	Ant 8	Ant 8	Ant 8		
11a	6Mbps	1	100	5500	0.11	10.52	23.98	-1.53	26.99	Pass
11a	6Mbps	1	116	5580	0.11	10.59	23.91	-1.53	26.99	Pass
11a	6Mbps	1	140	5700	0.11	10.84	23.90	-1.53	26.99	Pass
HT20	MCS0	1	100	5500	0.12	10.54	23.98	-1.53	26.99	Pass
HT20	MCS0	1	116	5580	0.12	10.53	23.98	-1.53	26.99	Pass
HT20	MCS0	1	140	5700	0.12	10.60	23.98	-1.53	26.99	Pass
HT40	MCS0	1	102	5510	0.23	10.51	23.98	-1.53	26.99	Pass
HT40	MCS0	1	110	5550	0.23	10.53	23.98	-1.53	26.99	Pass
HT40	MCS0	1	134	5670	0.23	10.72	23.98	-1.53	26.99	Pass
VHT20	MCS0	1	100	5500	0.12	10.56	23.98	-1.53	26.99	Pass
VHT20	MCS0	1	116	5580	0.12	10.55	23.98	-1.53	26.99	Pass
VHT20	MCS0	1	140	5700	0.12	10.68	23.98	-1.53	26.99	Pass
VHT40	MCS0	1	102	5510	0.23	10.54	23.98	-1.53	26.99	Pass
VHT40	MCS0	1	110	5550	0.23	10.55	23.98	-1.53	26.99	Pass
VHT40	MCS0	1	134	5670	0.23	10.83	23.98	-1.53	26.99	Pass
VHT80	MCS0	1	106	5530	0.84	10.53	23.98	-1.53	26.99	Pass
VHT80	MCS0	1	122	5610	0.84	10.51	23.98	-1.53	26.99	Pass

FCC <5500 MHz ~ 5720 MHz > straddle channel single antenna										
Mod.	Data Rate	NTX	CH.	Freq. (MHz)	Duty Factor (dB)	Average Conducted Power with duty factor (dBm)	FCC Conducted Power Limit (dBm)	DG (dBi)	EIRP Power Limit (dBm)	Pass/Fail
					Ant 8	Ant 8	Ant 8	Ant 8		
11a	6Mbps	1	144	5720	0.11	10.67	23.95	-1.53	26.99	Pass
HT20	MCS0	1	144	5720	0.12	10.50	23.98	-1.53	26.99	Pass
HT40	MCS0	1	142	5710	0.23	10.64	23.98	-1.53	26.99	Pass
VHT20	MCS0	1	144	5720	0.12	10.58	23.98	-1.53	26.99	Pass
VHT40	MCS0	1	142	5710	0.23	10.75	23.98	-1.53	26.99	Pass
VHT80	MCS0	1	138	5690	0.84	10.70	23.98	-1.53	26.99	Pass

<5745 MHz ~ 5825 MHz> single antenna									
Mod.	Data Rate	NTX	CH.	Freq. (MHz)	Duty Factor (dB)	Average Conducted Power with duty factor (dBm)	FCC Conducted Power Limit (dBm)	DG (dBi)	Pass/Fail
					Ant 8	Ant 8	Ant 8	Ant 8	
11a	6Mbps	1	149	5745	0.11	10.58	30.00	-1.59	Pass
11a	6Mbps	1	157	5785	0.11	10.52	30.00	-1.59	Pass
11a	6Mbps	1	165	5825	0.11	10.53	30.00	-1.59	Pass
HT20	MCS0	1	149	5745	0.12	10.52	30.00	-1.59	Pass
HT20	MCS0	1	157	5785	0.12	10.53	30.00	-1.59	Pass
HT20	MCS0	1	165	5825	0.12	10.52	30.00	-1.59	Pass
HT40	MCS0	1	151	5755	0.23	10.51	30.00	-1.59	Pass
HT40	MCS0	1	159	5795	0.23	10.54	30.00	-1.59	Pass
VHT20	MCS0	1	149	5745	0.12	10.55	30.00	-1.59	Pass
VHT20	MCS0	1	157	5785	0.12	10.56	30.00	-1.59	Pass
VHT20	MCS0	1	165	5825	0.12	10.54	30.00	-1.59	Pass
VHT40	MCS0	1	151	5755	0.23	10.54	30.00	-1.59	Pass
VHT40	MCS0	1	159	5795	0.23	10.57	30.00	-1.59	Pass
VHT80	MCS0	1	155	5775	0.84	10.51	30.00	-1.59	Pass

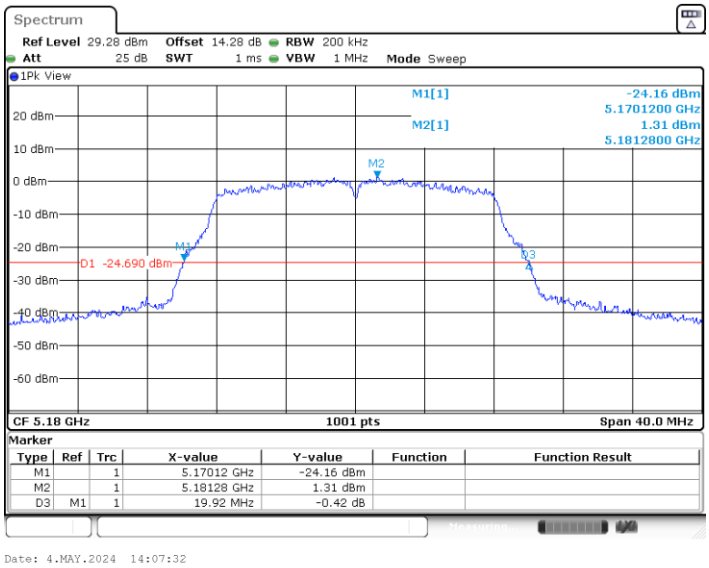
Emission Bandwidth

Test Result

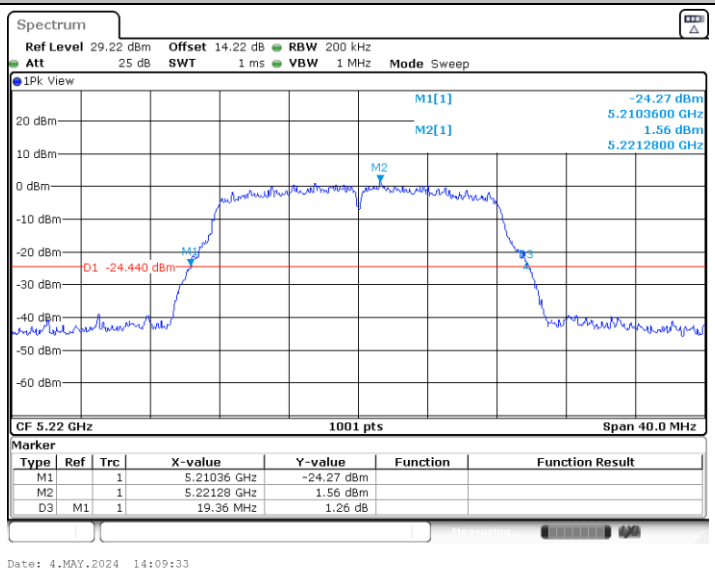
TestMode	Antenna	Freq(MHz)	26dB EBW [MHz]	FL[MHz]	FH[MHz]
11A	Ant8	5180	19.92	5170.12	5190.04
		5220	19.36	5210.36	5229.72
		5240	19.60	5230.16	5249.76
		5260	19.72	5250.12	5269.84
		5300	19.44	5290.28	5309.72
		5320	19.56	5310.24	5329.80
		5500	19.88	5490.12	5510.00
		5580	19.56	5570.16	5589.72
		5700	19.48	5690.24	5709.72
		5720	19.72	5710.20	5729.92
		5745	19.52	5735.28	5754.80
		5785	19.68	5775.28	5794.96
		5825	19.68	5815.24	5834.92
11AC20SISO	Ant8	5180	19.84	5170.08	5189.92
		5220	19.96	5210.08	5230.04
		5240	20.16	5230.08	5250.24
		5260	19.96	5250.04	5270.00
		5300	20.04	5290.00	5310.04
		5320	20.20	5309.96	5330.16
		5500	19.84	5490.16	5510.00
		5580	20.08	5570.00	5590.08
		5700	19.84	5690.12	5709.96
		5720	19.92	5710.08	5730.00
		5745	19.84	5735.08	5754.92
		5785	20.12	5774.96	5795.08
		5825	20.04	5814.96	5835.00
11AC40SISO	Ant8	5190	41.12	5169.44	5210.56
		5230	40.88	5209.68	5250.56
		5270	40.64	5249.76	5290.40
		5310	40.64	5289.76	5330.40
		5510	40.80	5489.60	5530.40
		5550	40.88	5529.44	5570.32
		5670	40.56	5649.68	5690.24
		5710	40.64	5689.76	5730.40
		5755	41.12	5734.36	5775.48
		5795	40.96	5774.68	5815.64
11AC80SISO	Ant8	5210	80.48	5169.84	5250.32
		5290	80.96	5249.52	5330.48
		5530	80.96	5489.52	5570.48
		5610	80.96	5569.52	5650.48
		5690	80.96	5649.52	5730.48
		5775	81.28	5734.52	5815.80

Test Graphs

11A_5180



11A_5220



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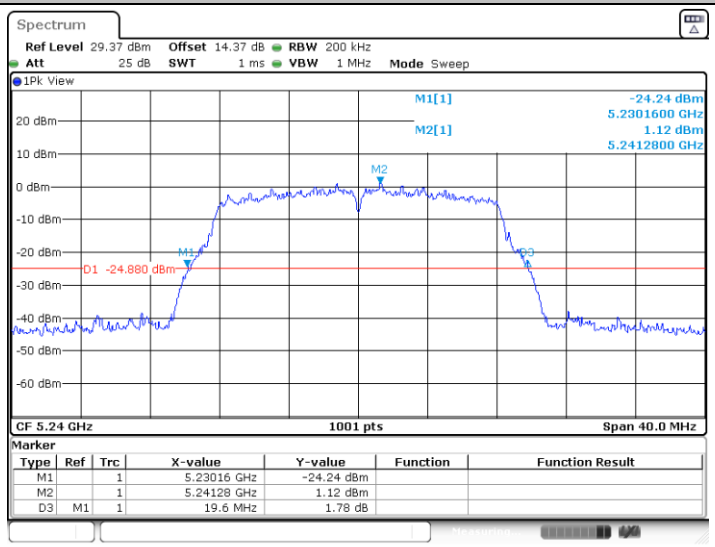

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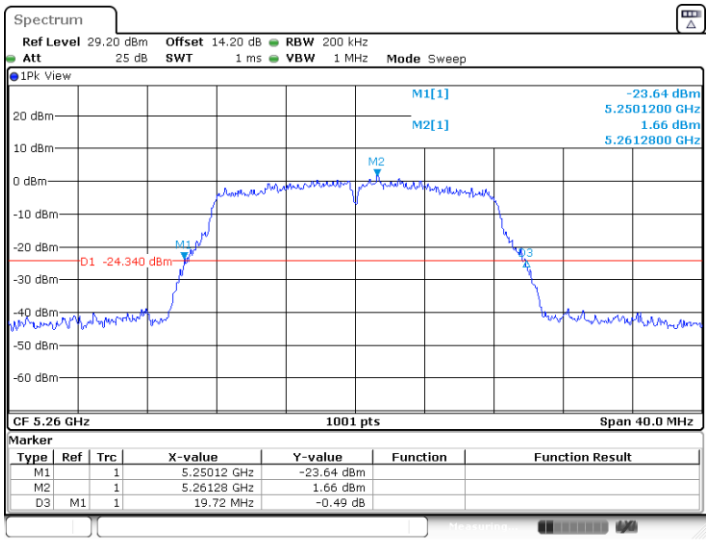
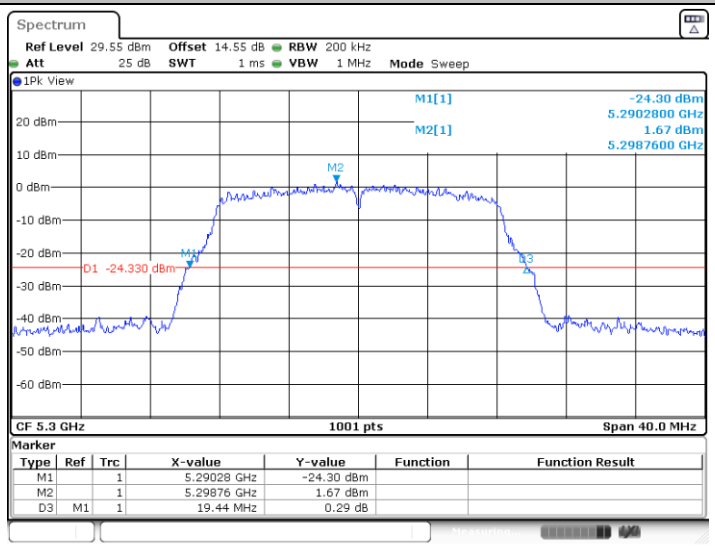
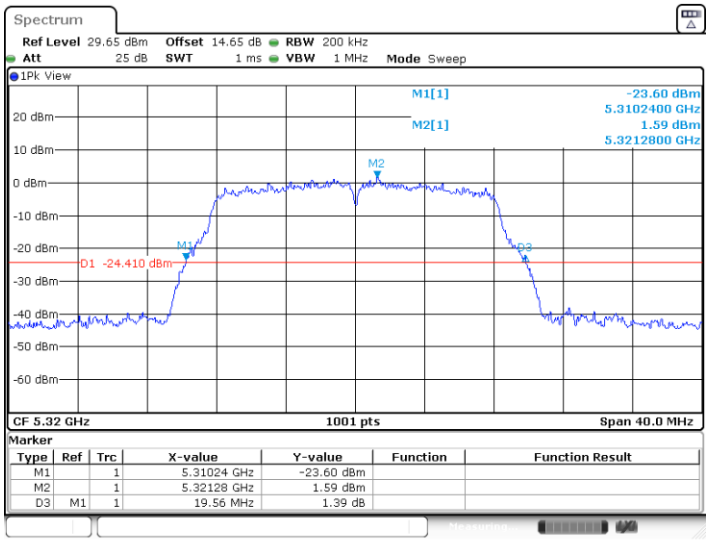


11A_5300



11A_5320



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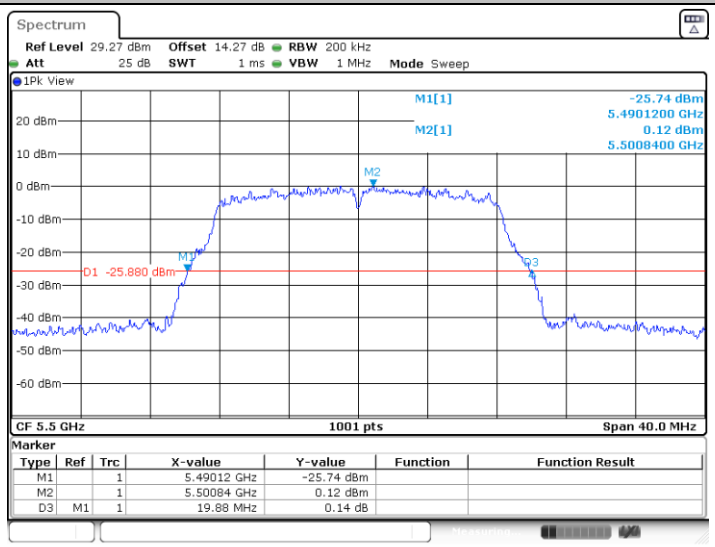

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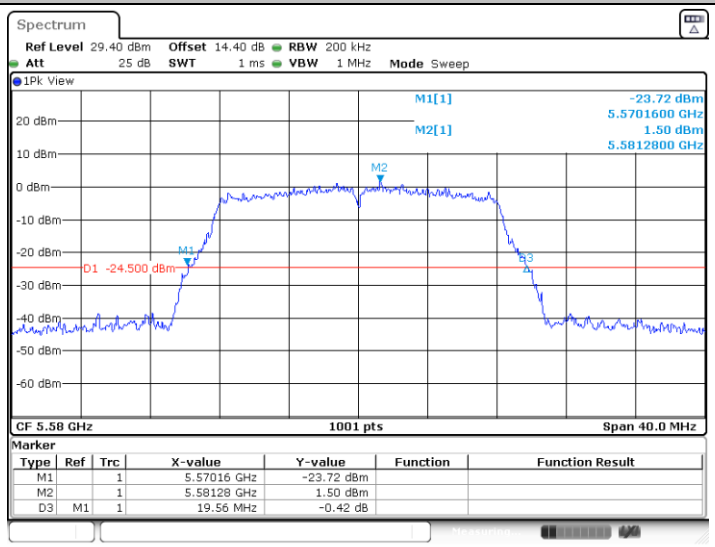

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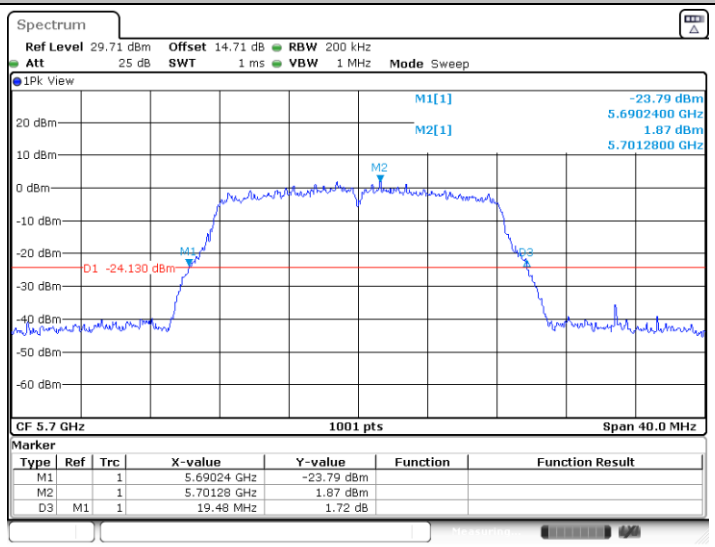

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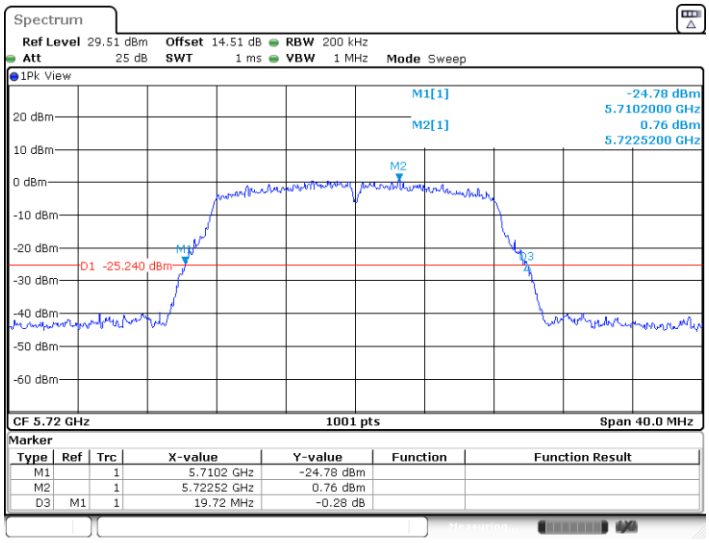

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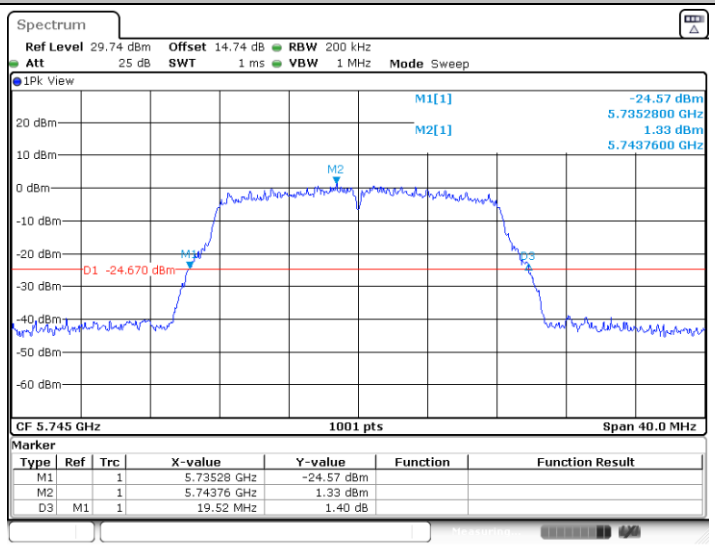

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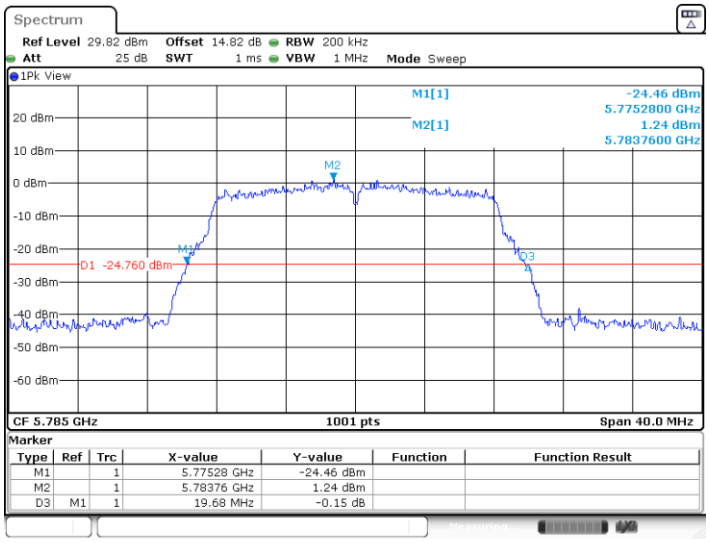

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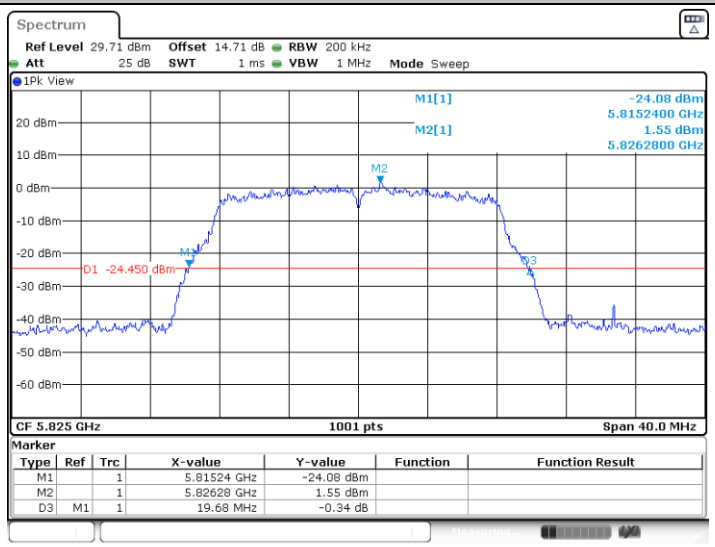

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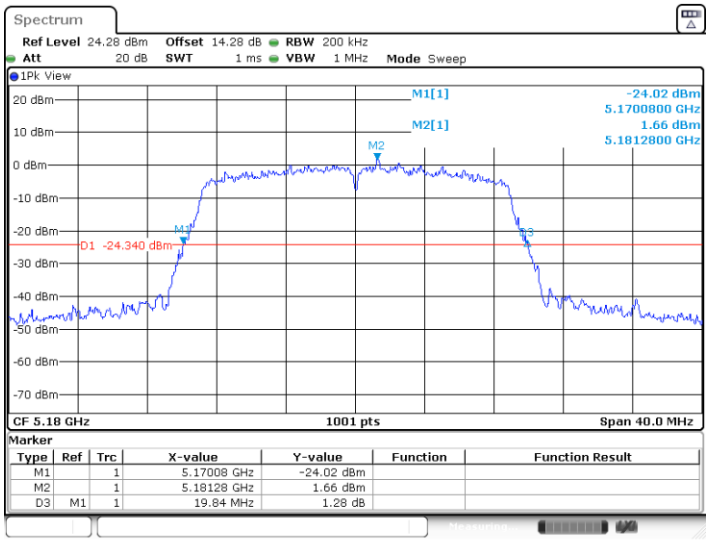

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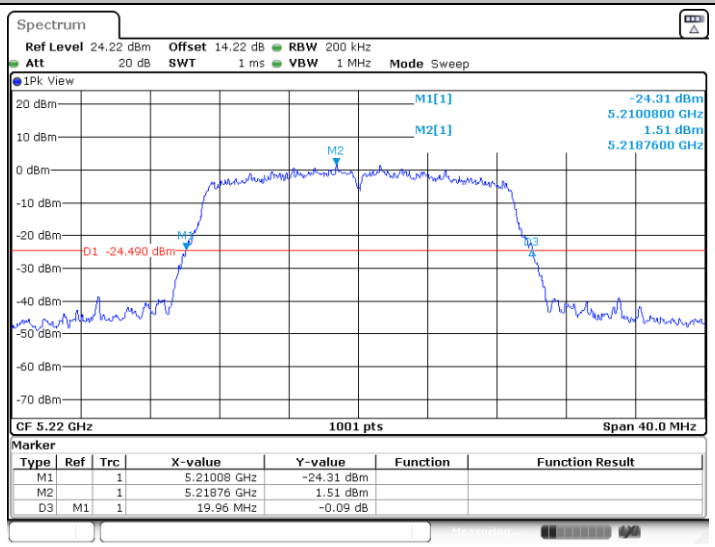

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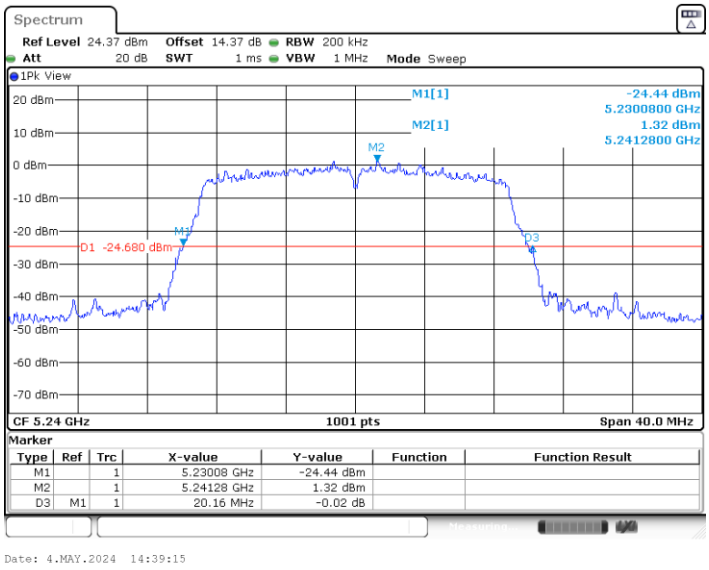

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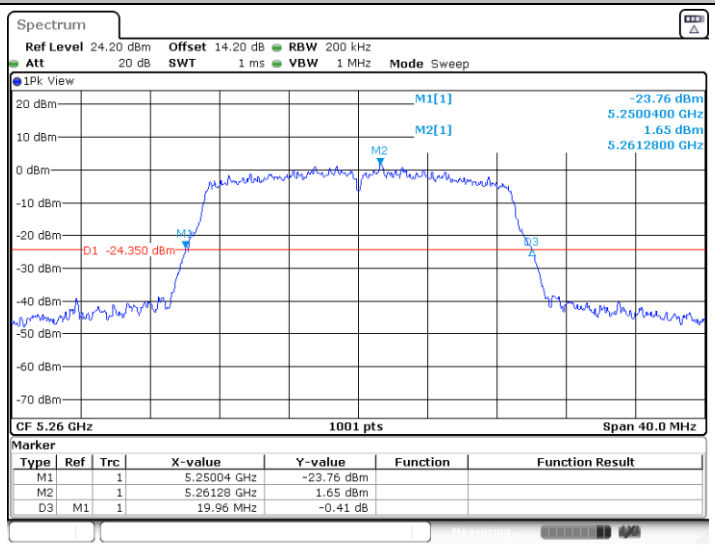

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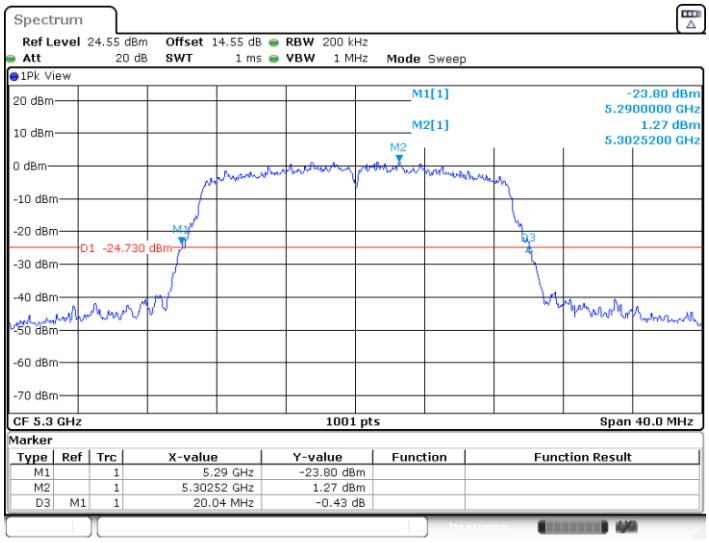

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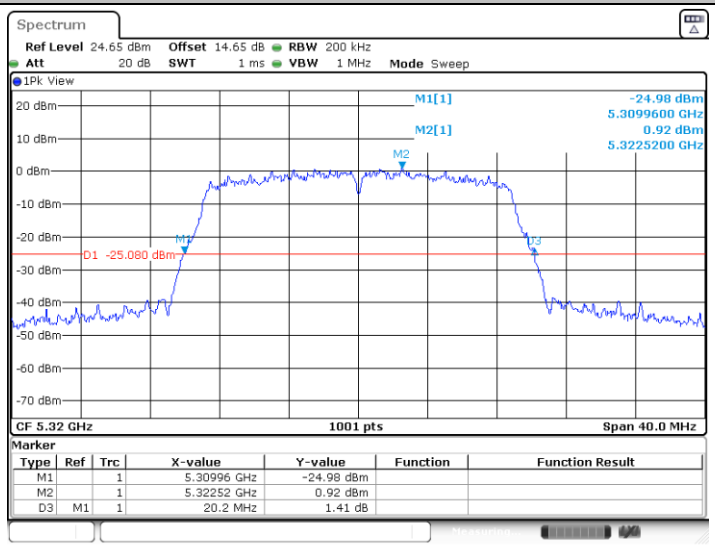

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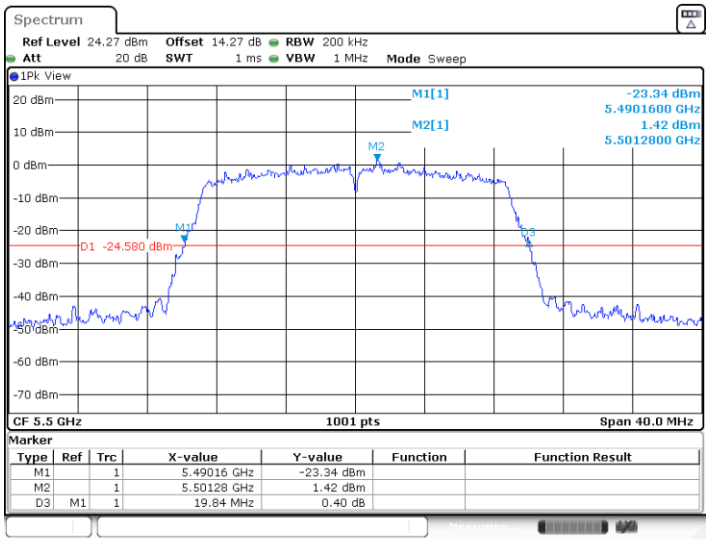

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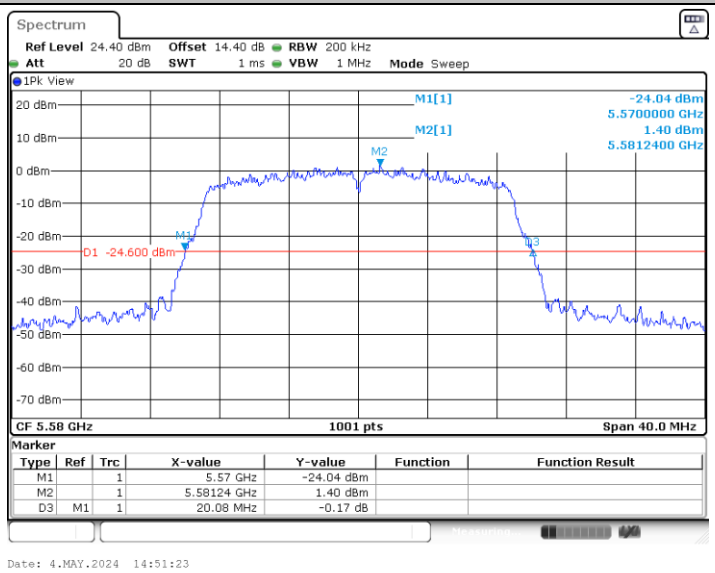

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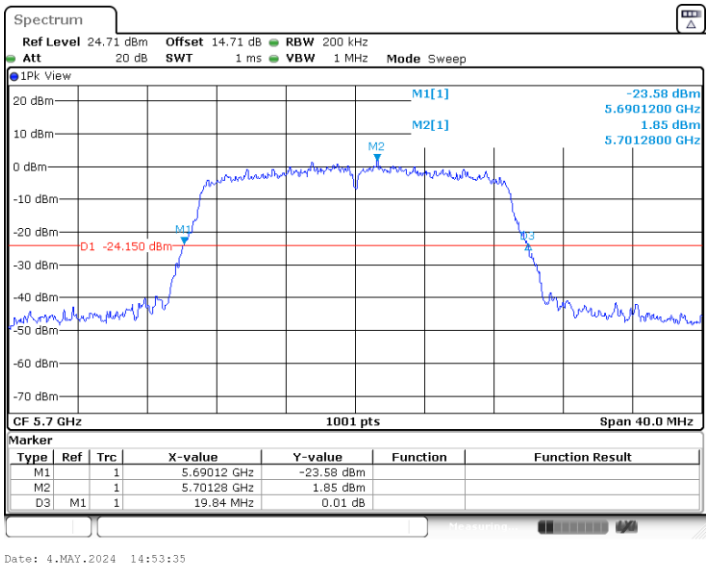

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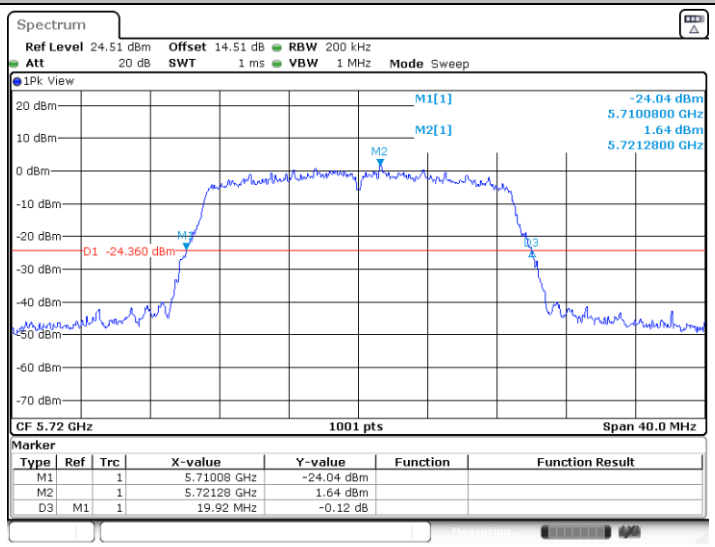

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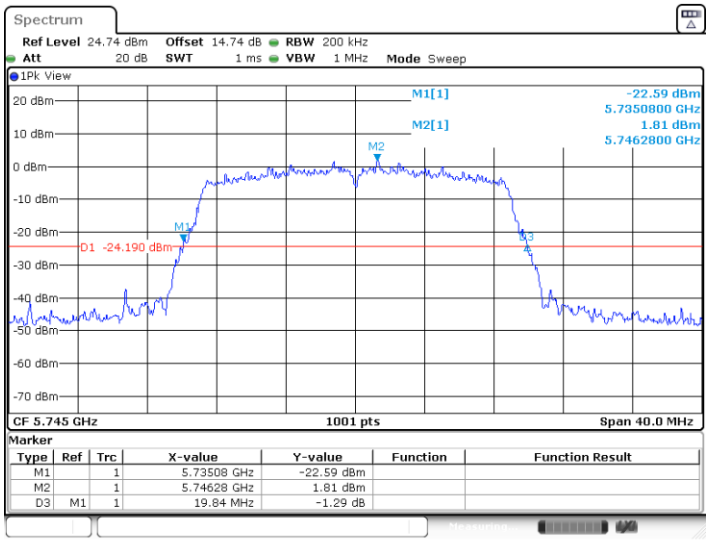

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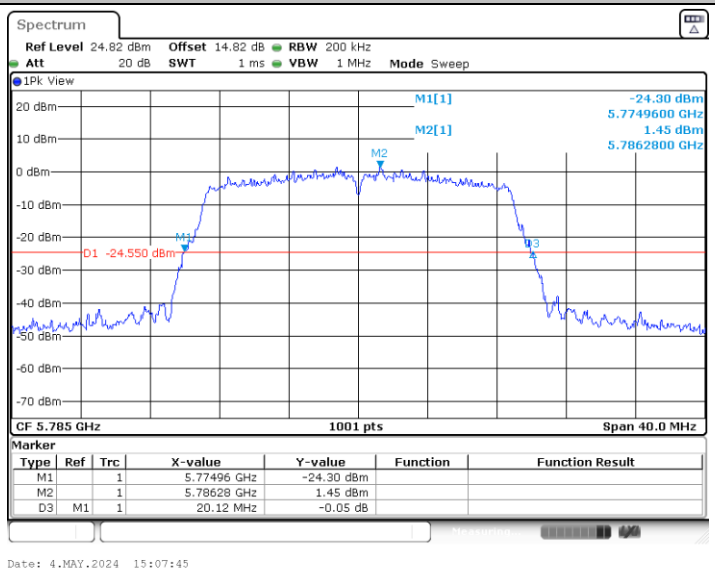

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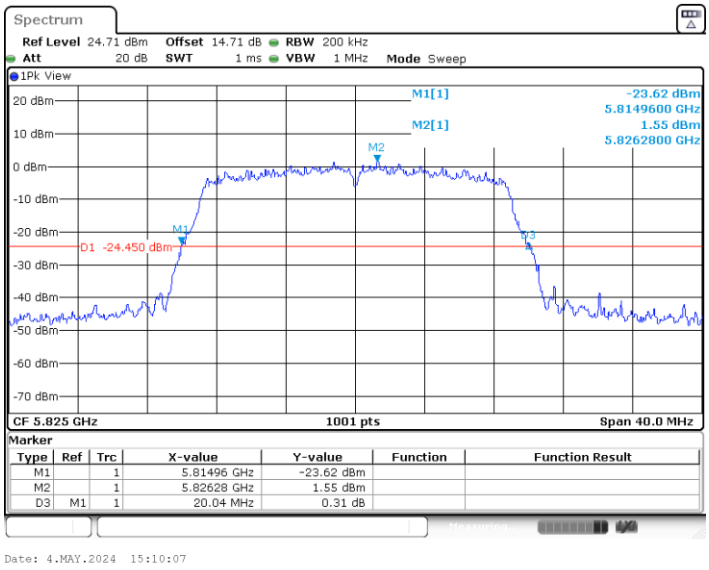

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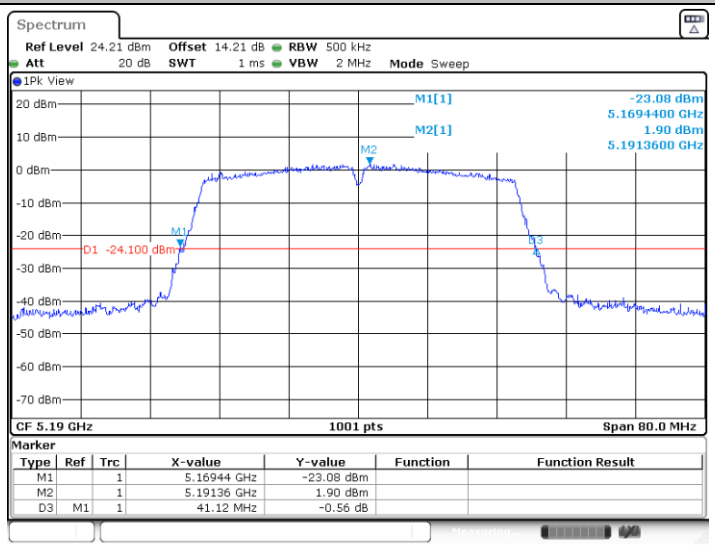

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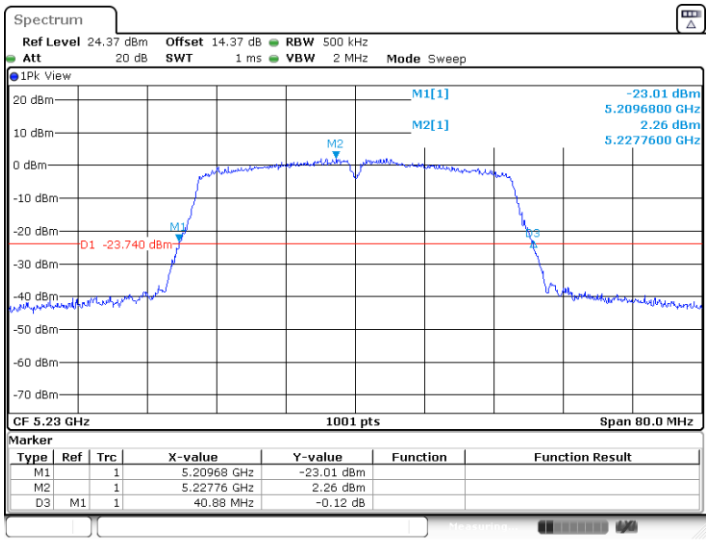

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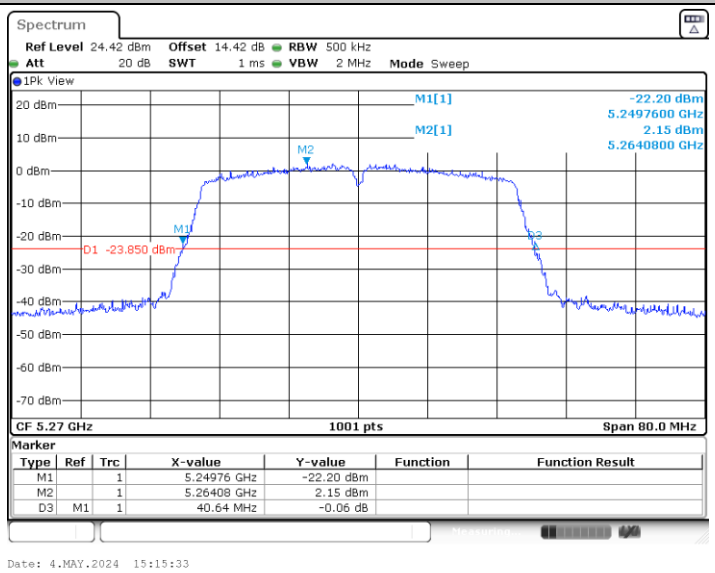

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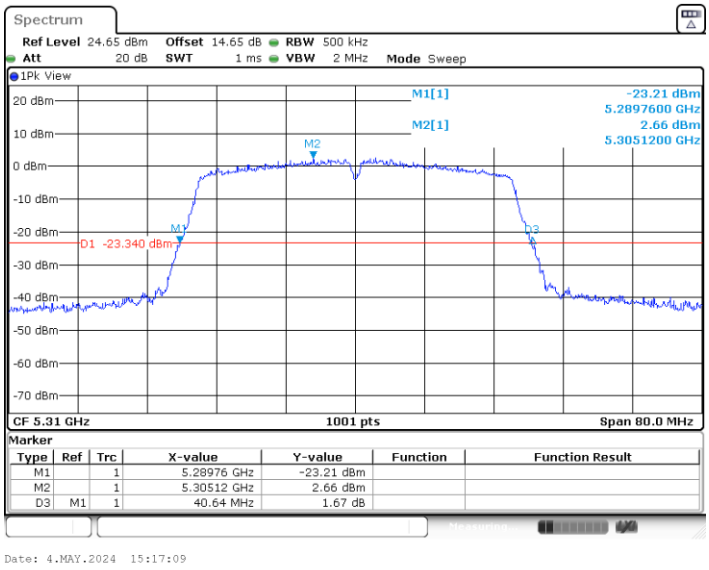

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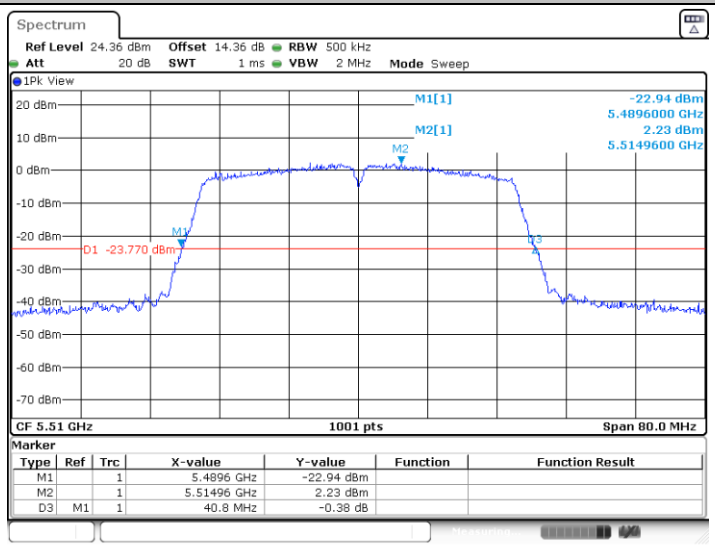

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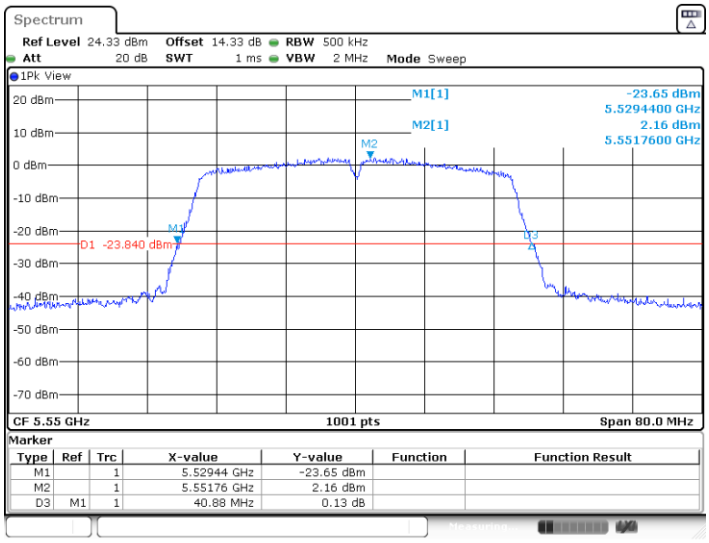

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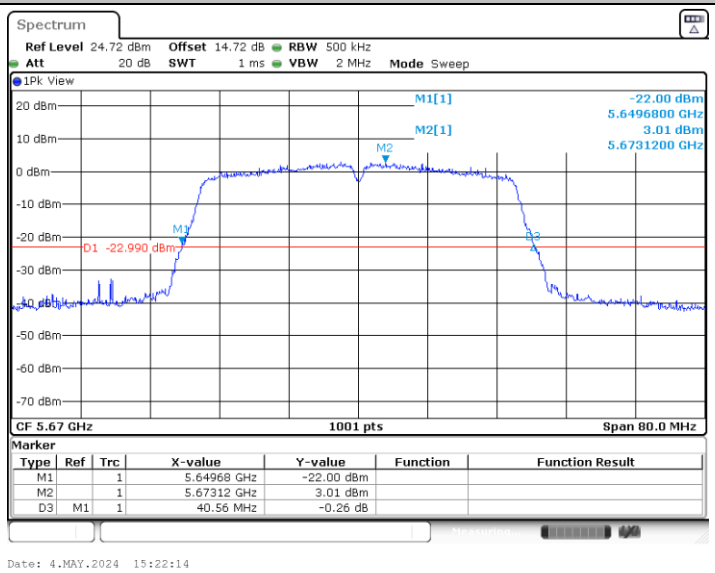

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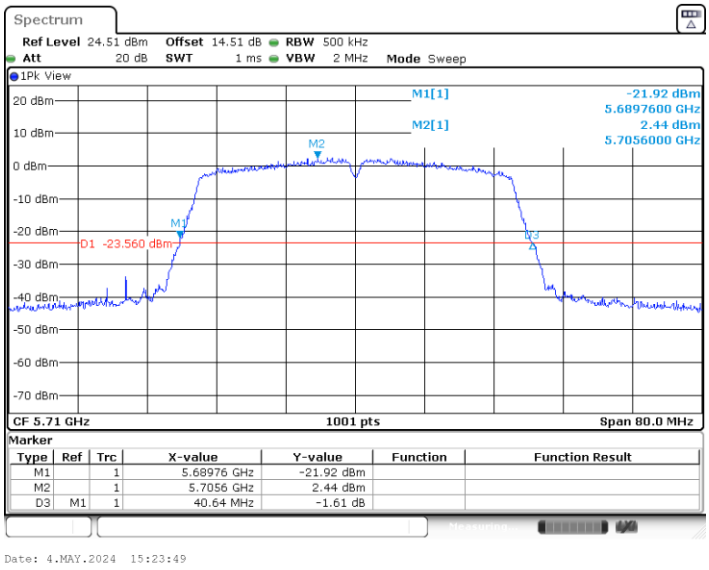

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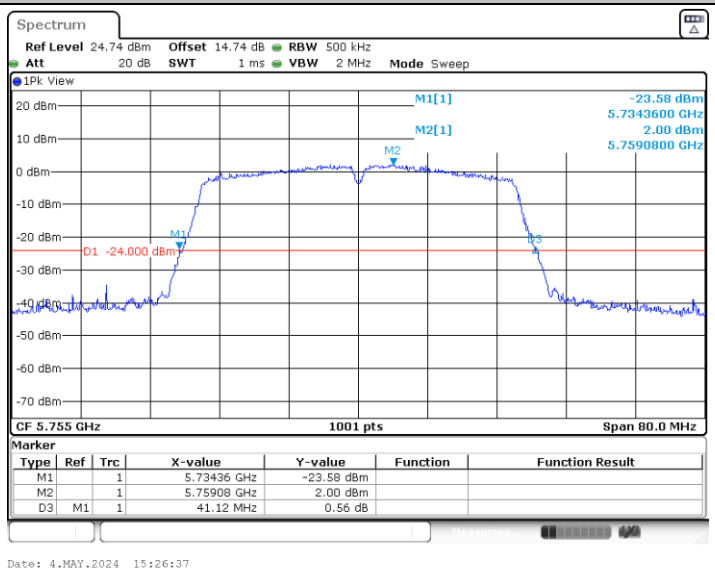

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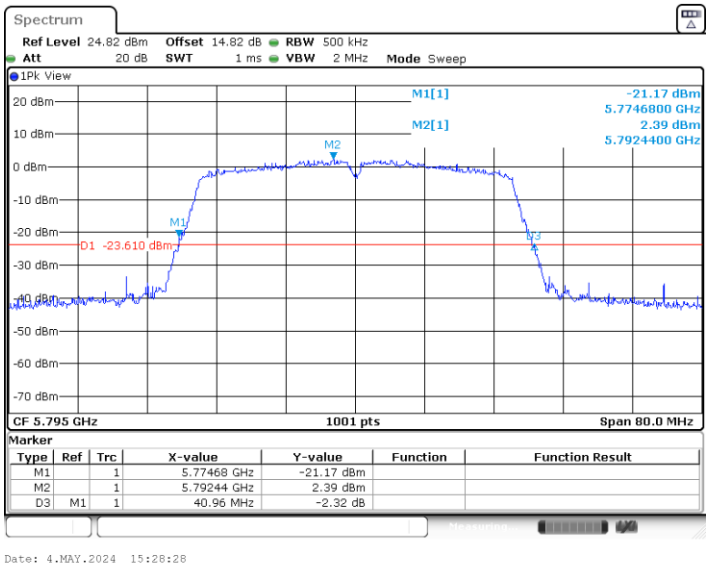

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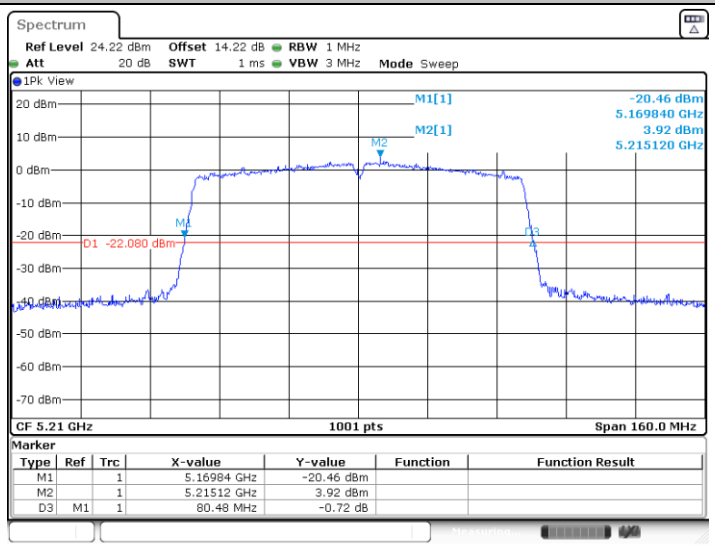

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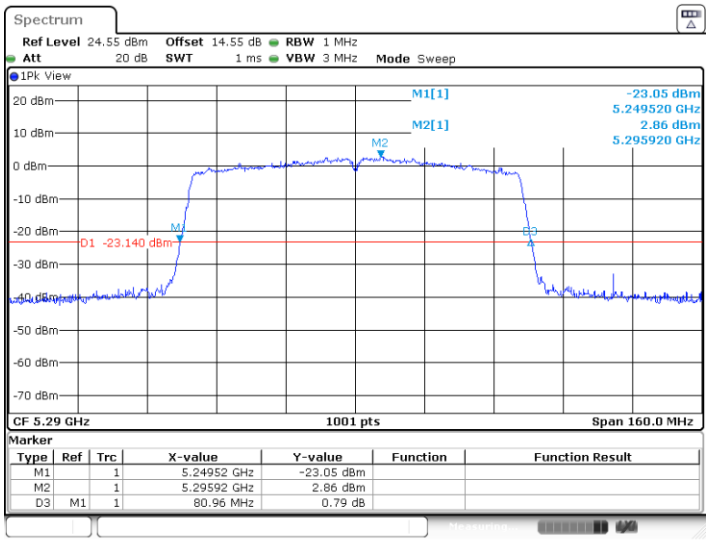

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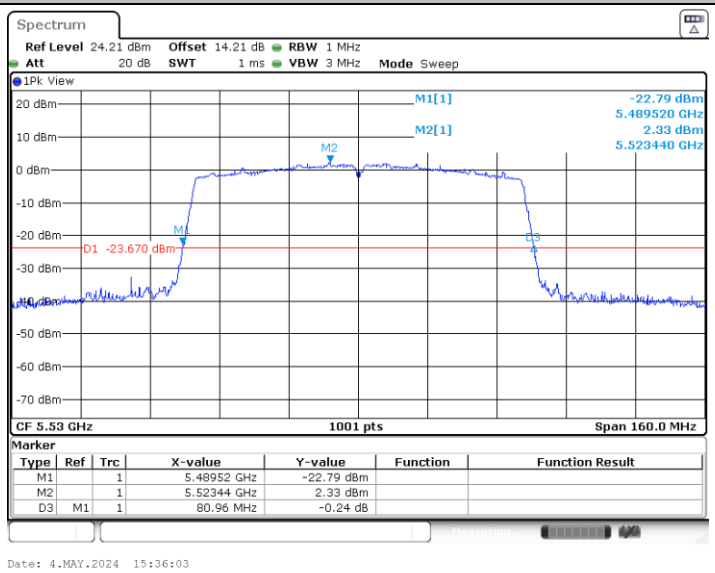

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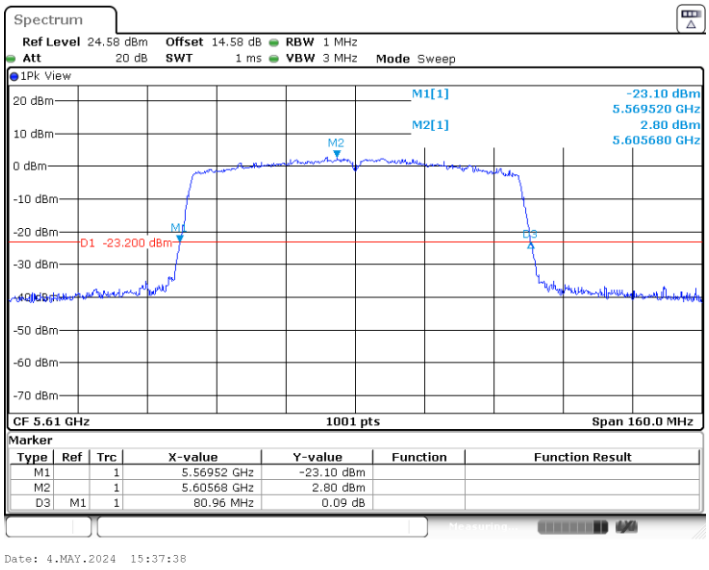

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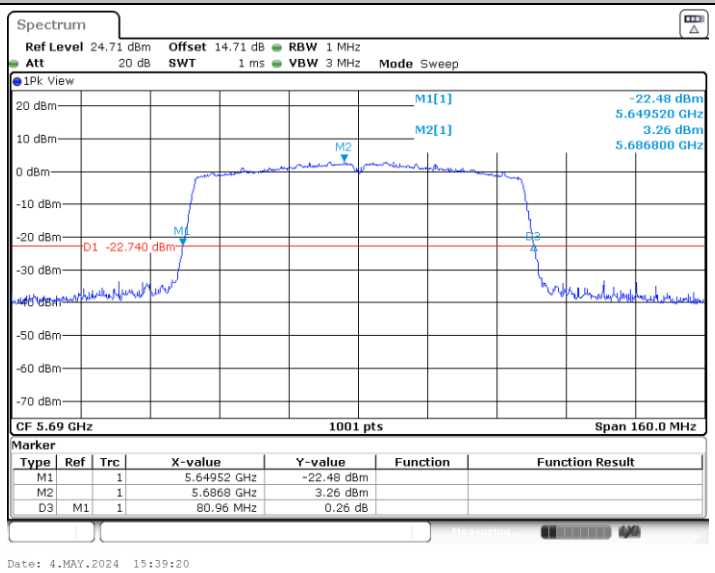

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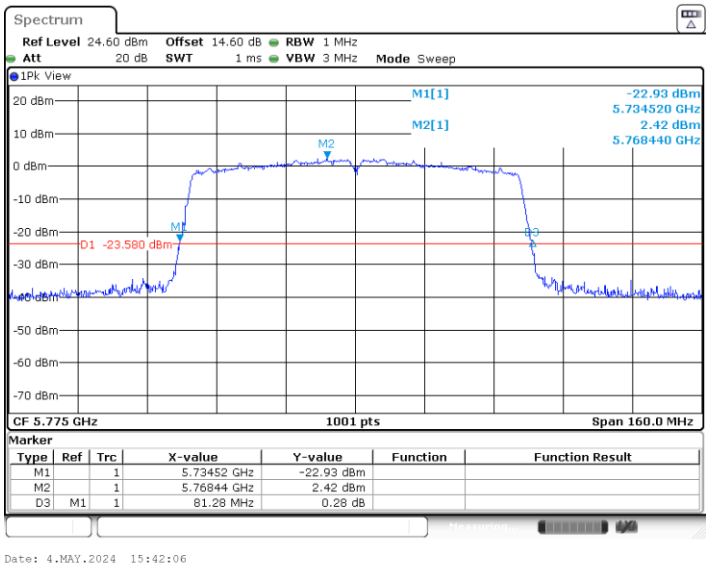


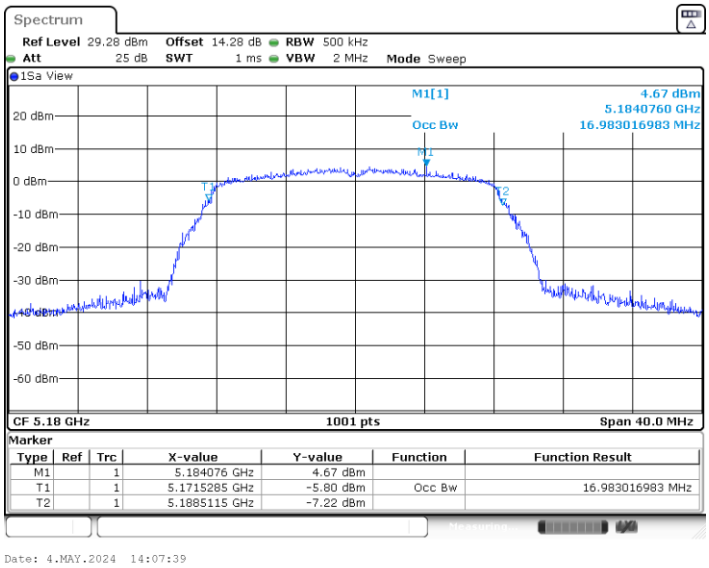
Occupied channel bandwidth

Test Result

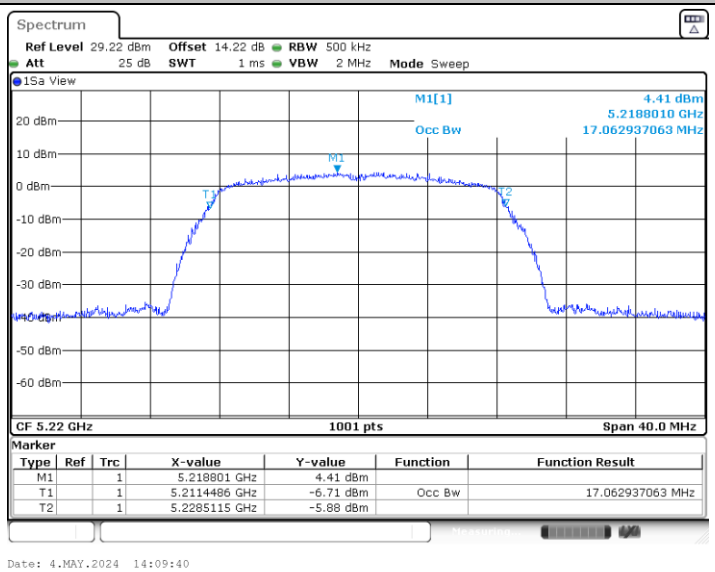
TestMode	Antenna	Freq(MHz)	OCB [MHz]	FL[MHz]	FH[MHz]
11A	Ant8	5180	16.983	5171.5285	5188.5115
		5220	17.063	5211.4486	5228.5115
		5240	17.143	5231.4486	5248.5914
		5260	17.063	5251.4486	5268.5115
		5300	17.063	5291.4486	5308.5115
		5320	17.103	5311.4486	5328.5514
		5500	17.103	5491.4486	5508.5514
		5580	17.063	5571.4885	5588.5514
		5700	17.063	5691.4885	5708.5514
		5720	17.103	5711.4086	5728.5115
		5745	17.143	5736.4486	5753.5914
		5785	17.103	5776.4486	5793.5514
		5825	17.103	5816.4486	5833.5514
11AC20SISO	Ant8	5180	17.982	5171.0090	5188.9910
		5220	17.982	5211.0090	5228.9910
		5240	17.942	5231.0490	5248.9910
		5260	18.022	5250.9690	5268.9910
		5300	17.942	5291.0490	5308.9910
		5320	17.982	5311.0090	5328.9910
		5500	17.942	5491.0490	5508.9910
		5580	17.942	5571.0490	5588.9910
		5700	17.982	5691.0090	5708.9910
		5720	17.982	5710.9690	5728.9510
		5745	18.022	5735.9690	5753.9910
		5785	17.982	5776.0090	5793.9910
		5825	17.982	5816.0090	5833.9910
11AC40SISO	Ant8	5190	36.204	5171.9381	5208.1419
		5230	36.124	5211.9381	5248.0619
		5270	36.204	5251.9381	5288.1419
		5310	36.124	5291.9381	5328.0619
		5510	36.204	5491.8581	5528.0619
		5550	36.284	5531.8581	5568.1419
		5670	36.204	5651.9381	5688.1419
		5710	36.124	5691.9381	5728.0619
		5755	36.284	5736.8581	5773.1419
		5795	36.204	5776.9381	5813.1419
11AC80SISO	Ant8	5210	75.445	5172.2777	5247.7223
		5290	75.445	5252.2777	5327.7223
		5530	75.445	5492.1179	5567.5624
		5610	75.285	5572.2777	5647.5624
		5690	75.285	5652.2777	5727.5624
		5775	75.445	5737.2777	5812.7223

Test Graphs

11A_5180



11A_5220



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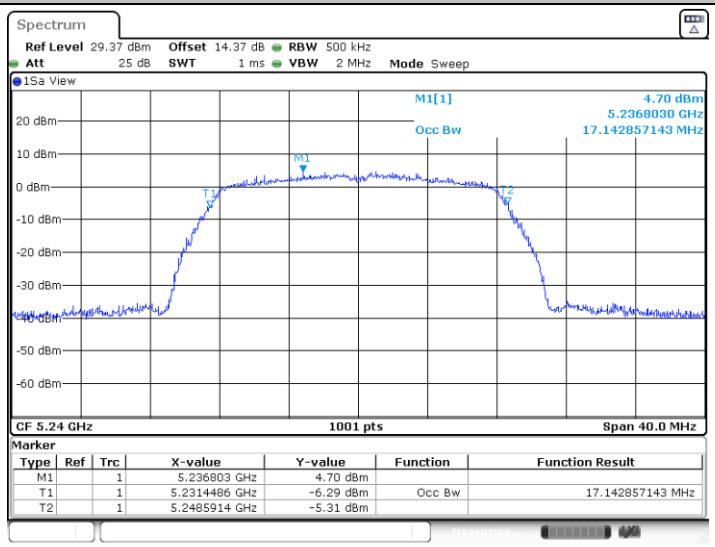

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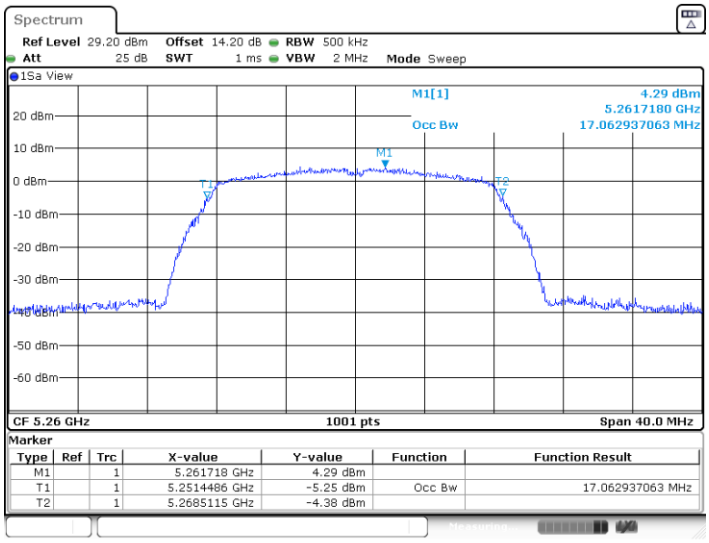

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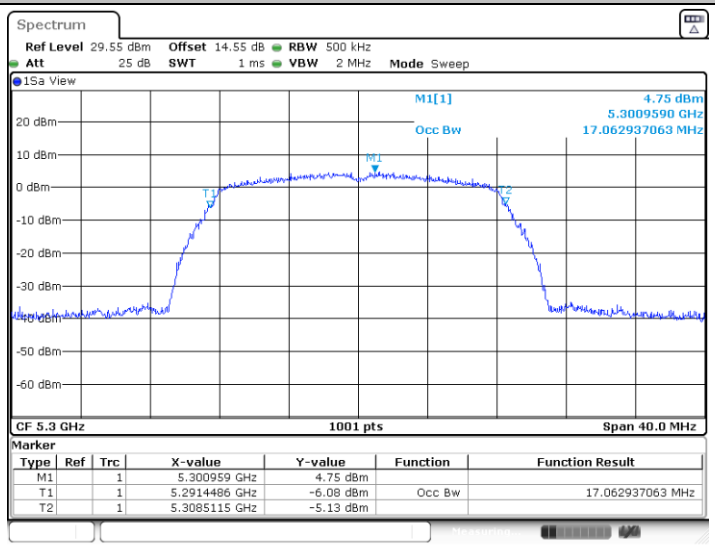

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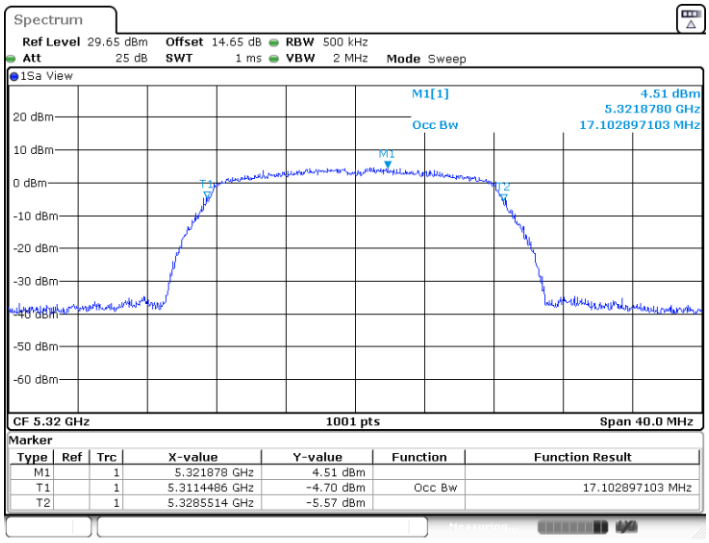

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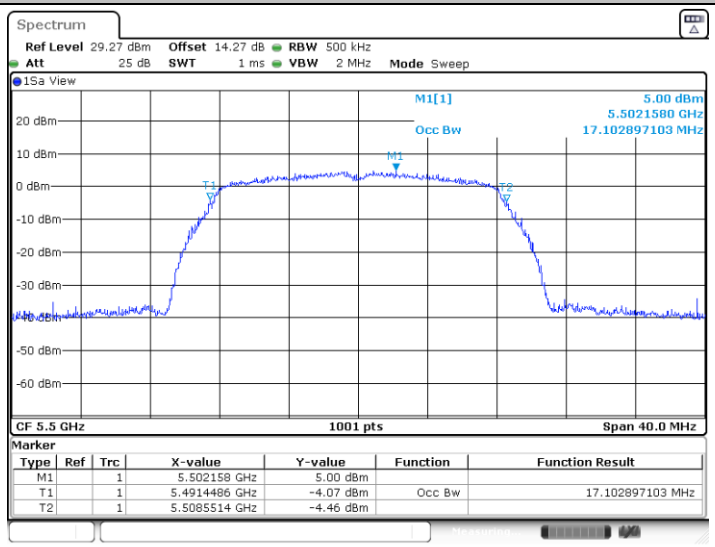

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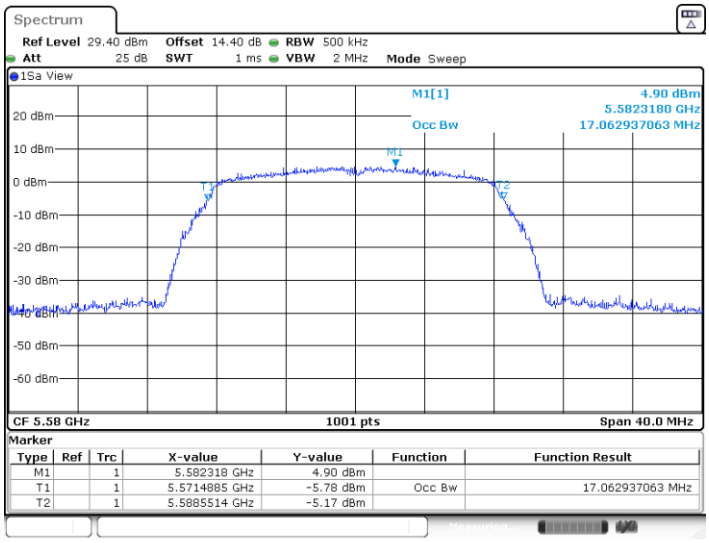

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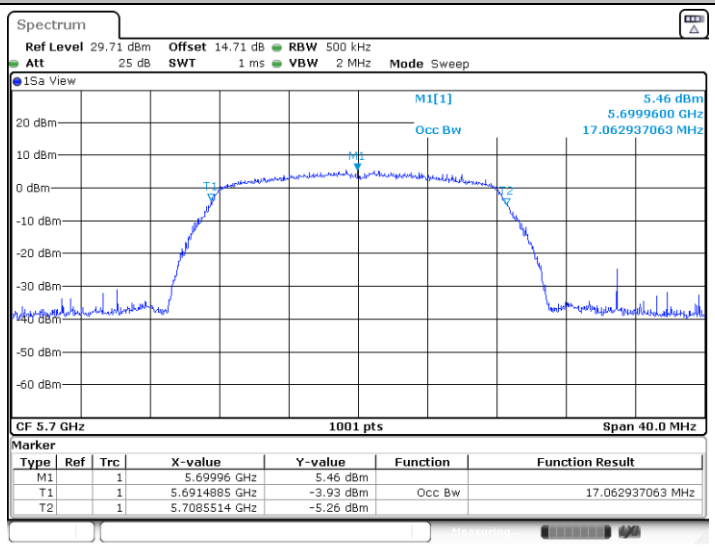

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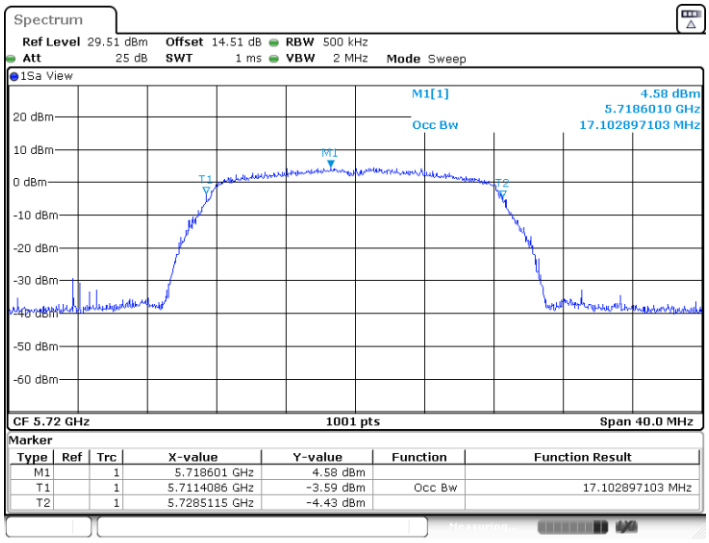
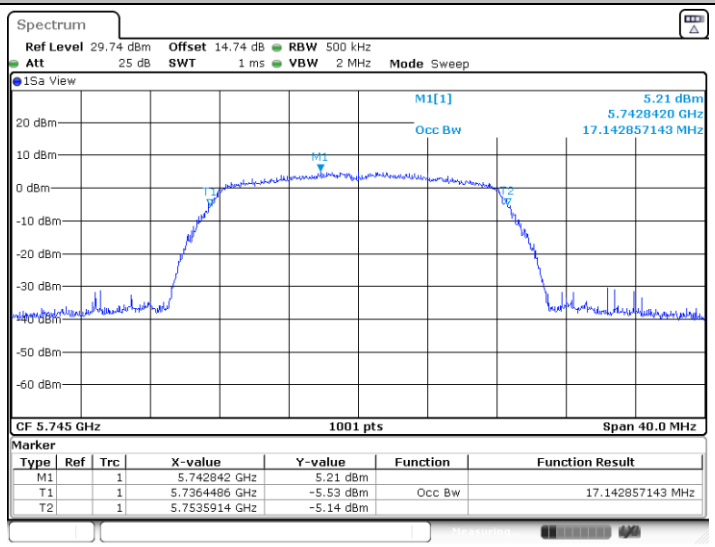


11A_5745



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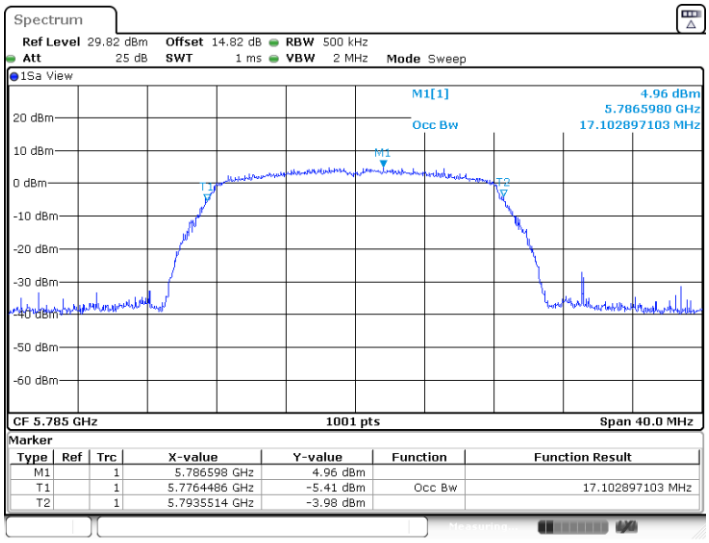

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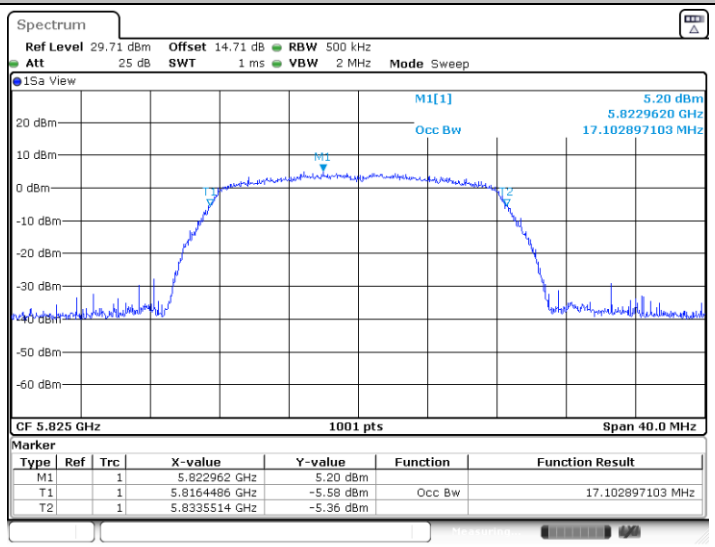

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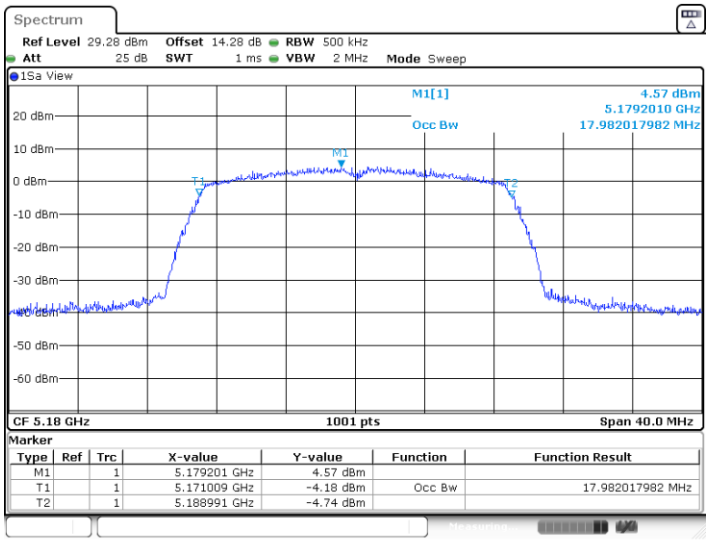

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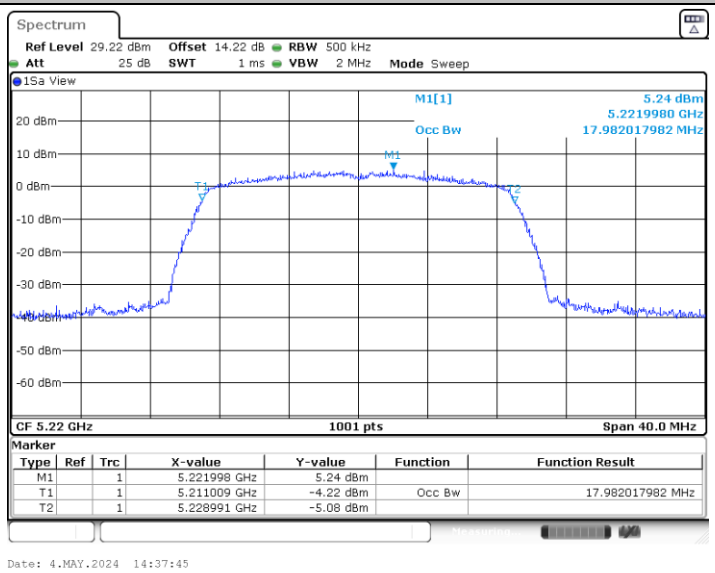

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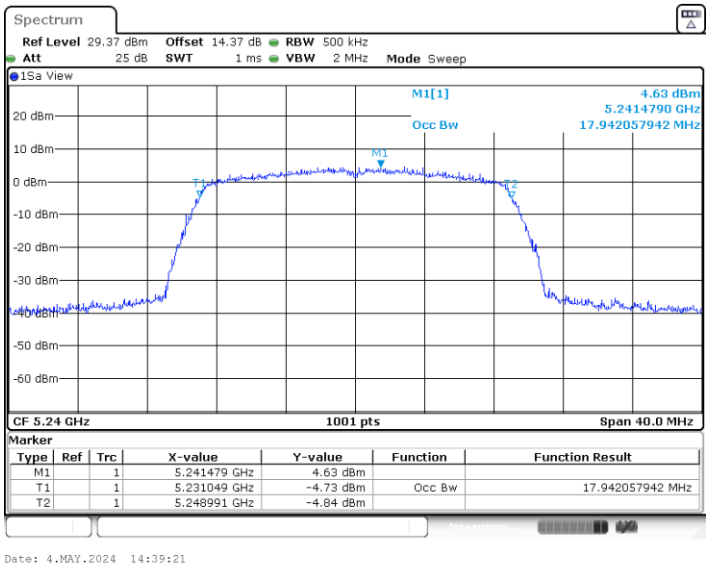

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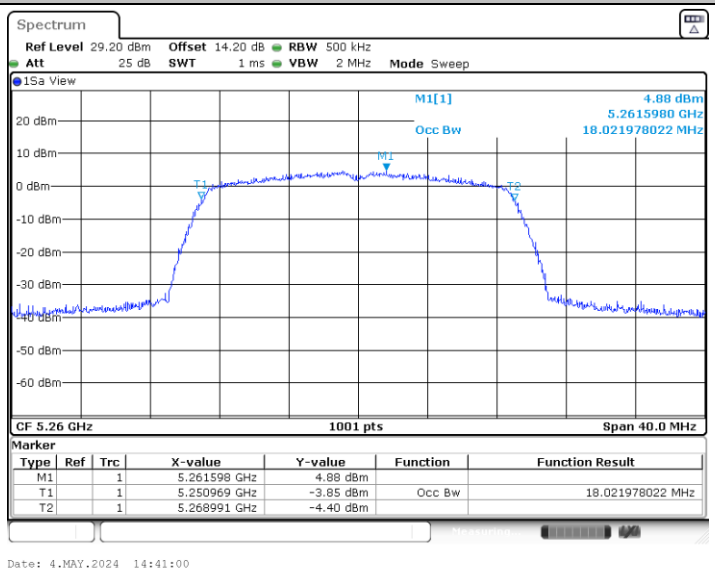

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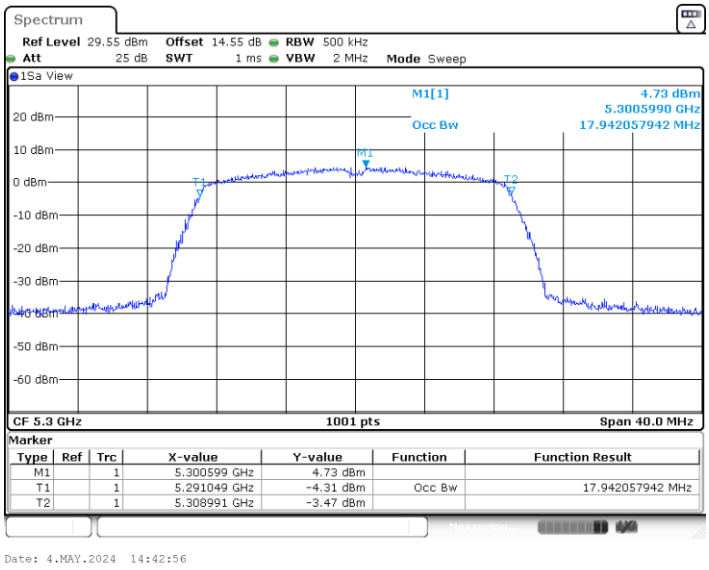

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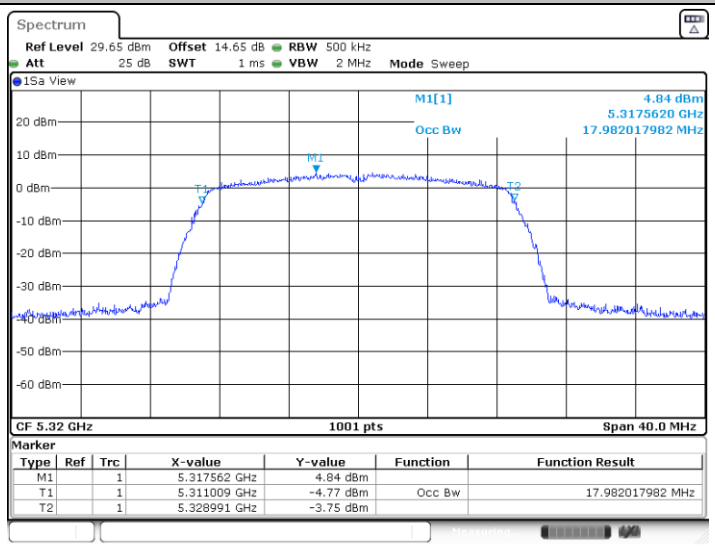

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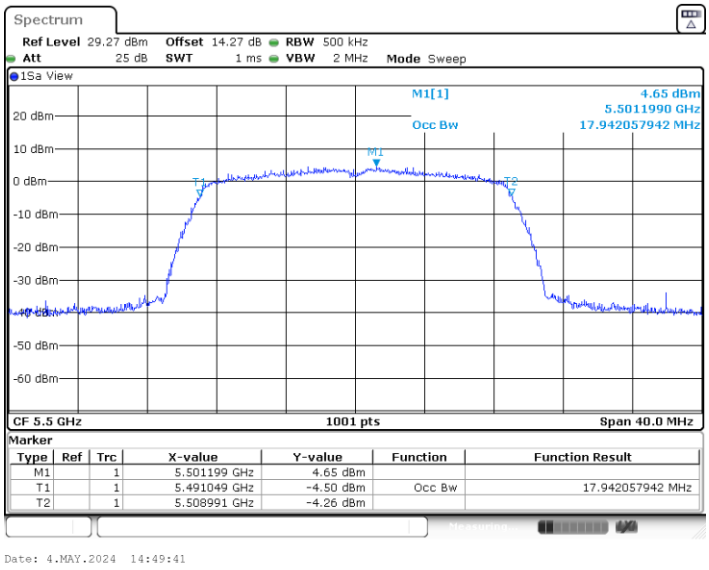

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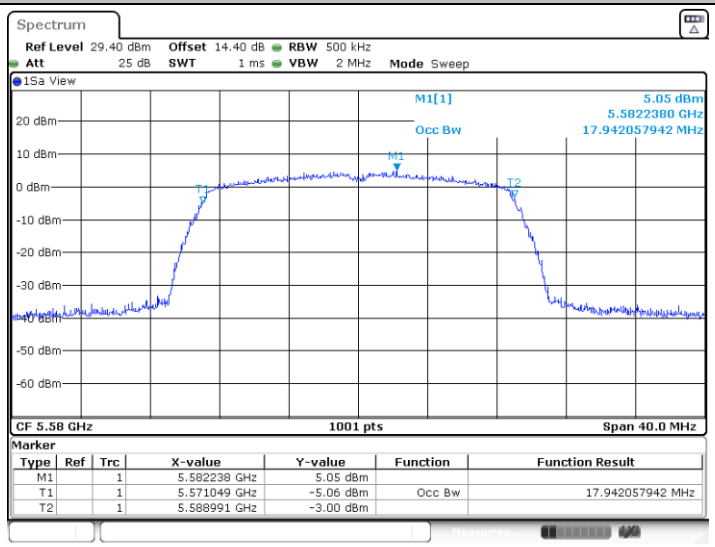

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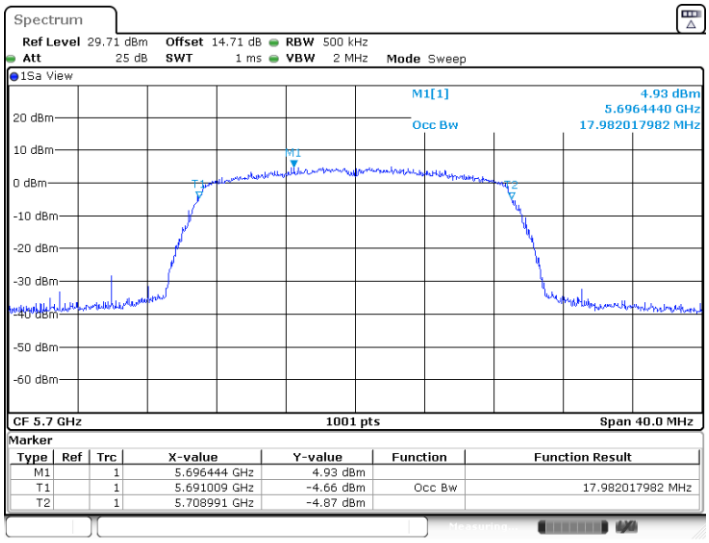

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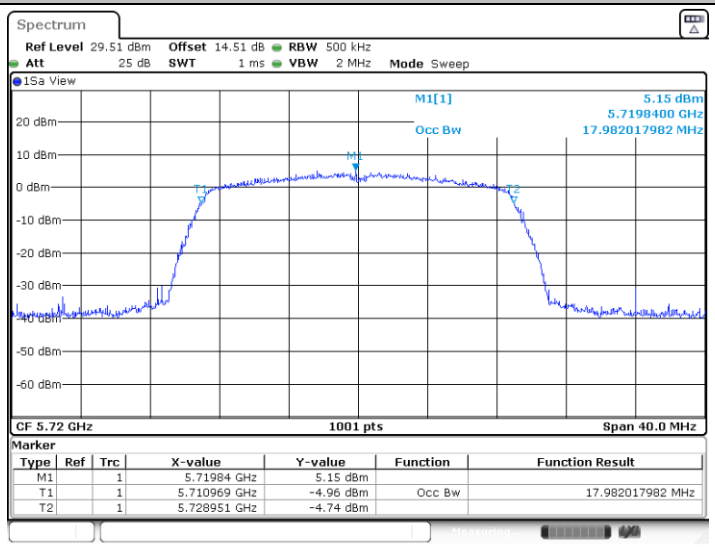

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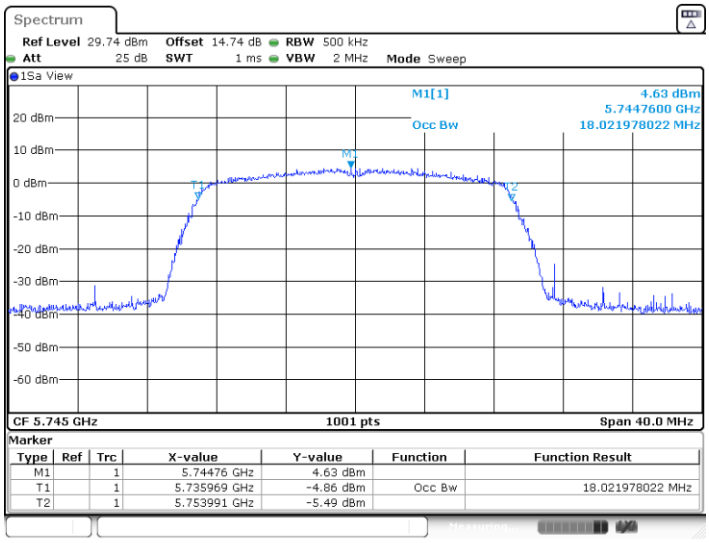

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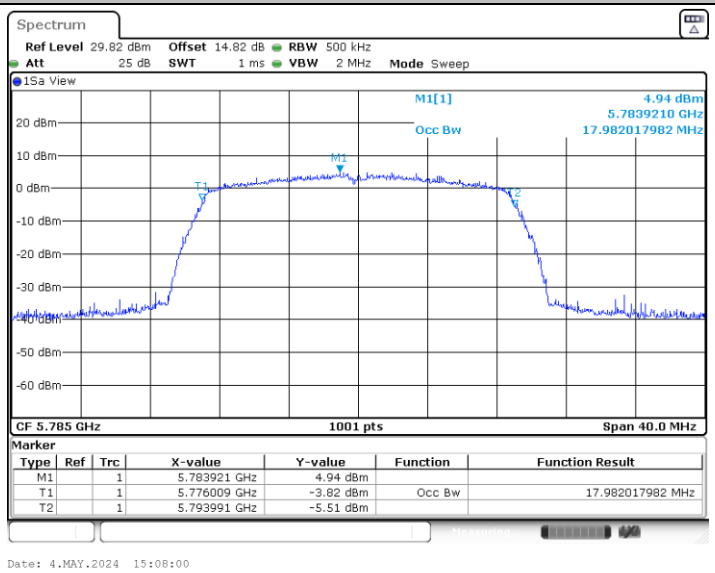

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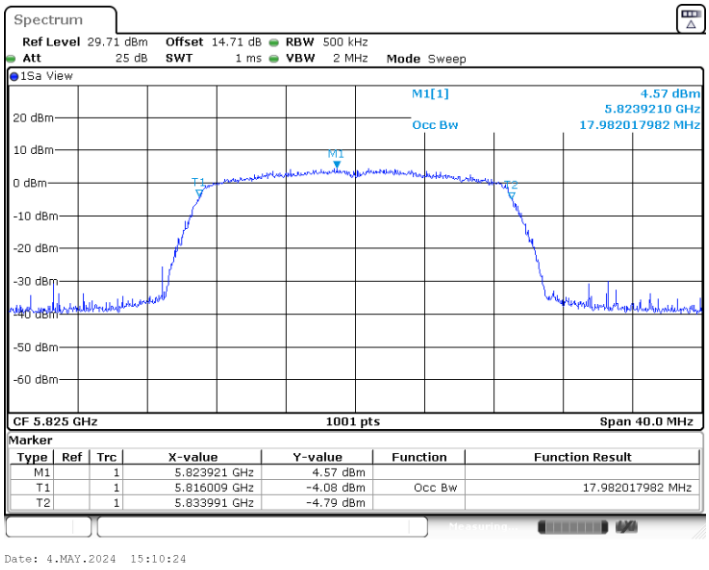

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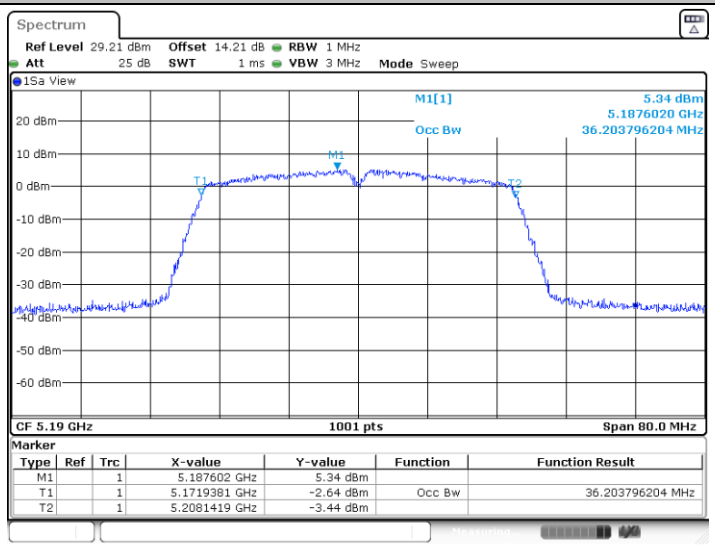

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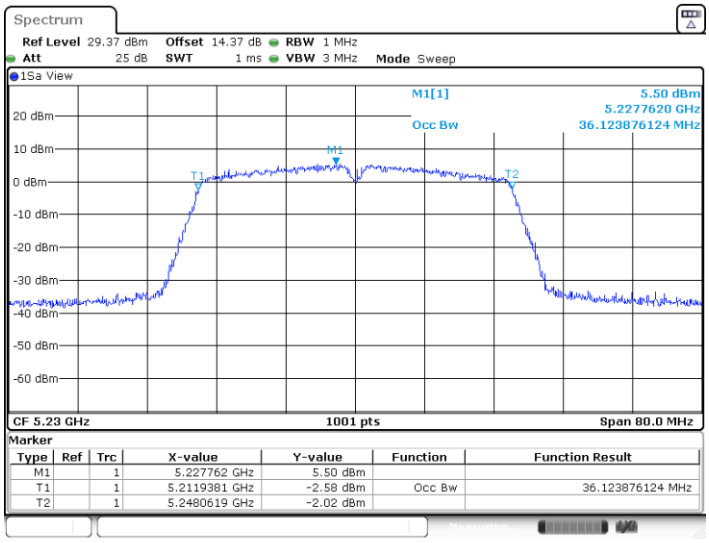

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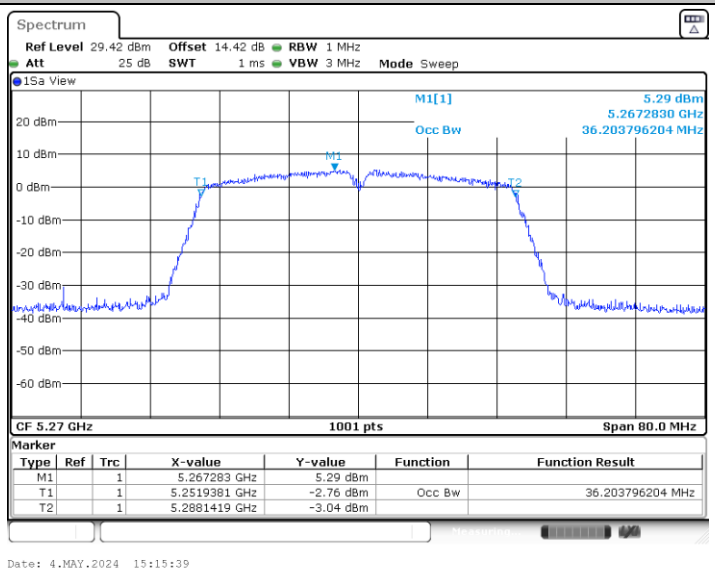

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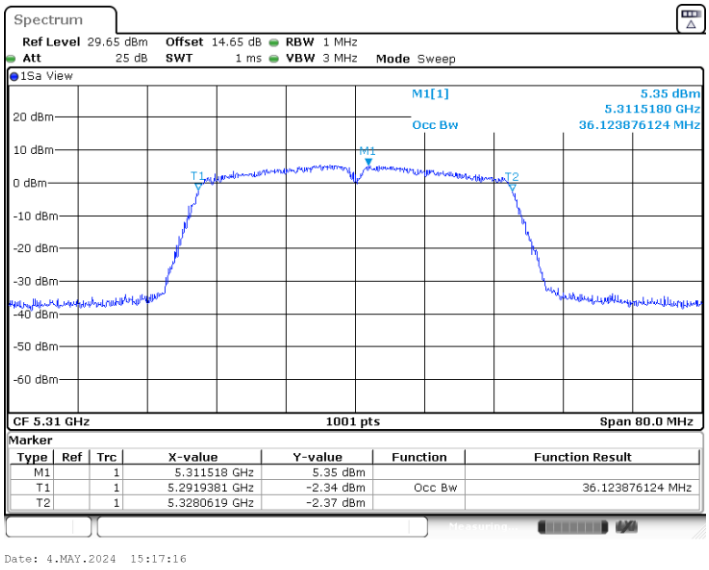

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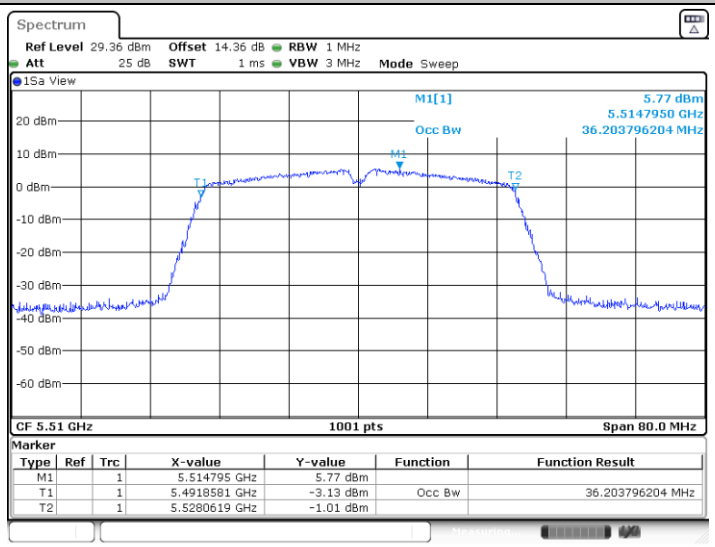

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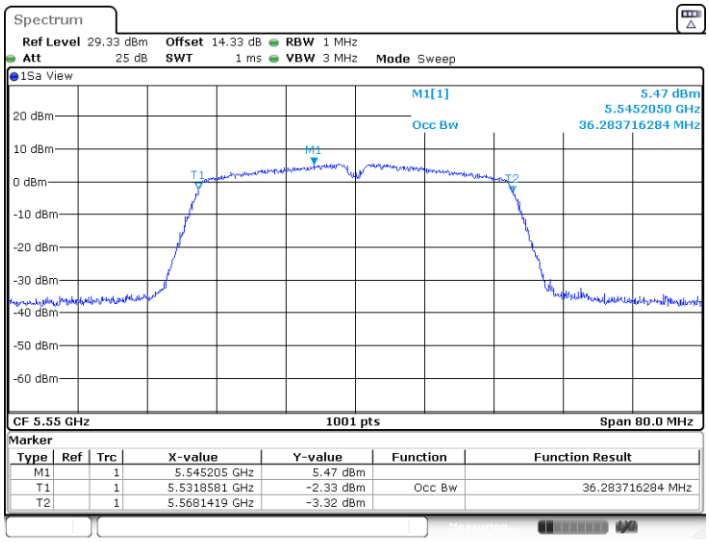

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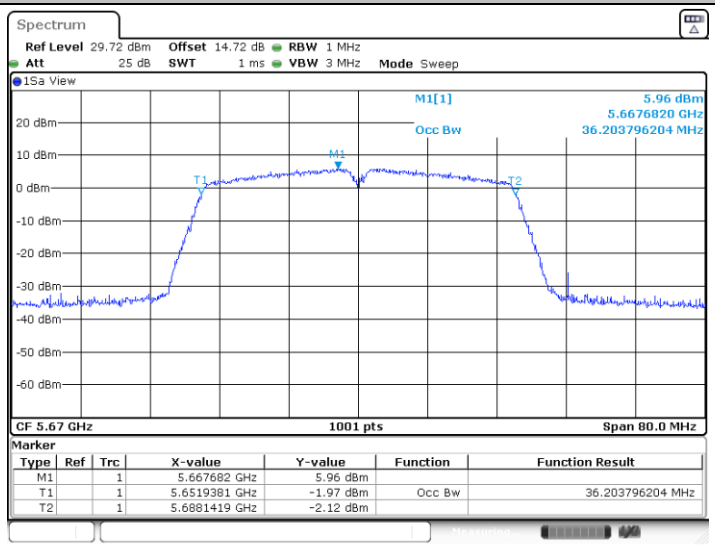

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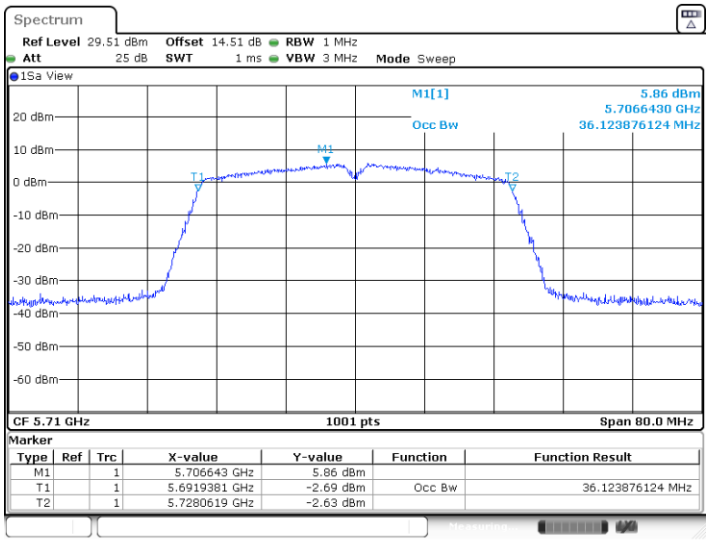

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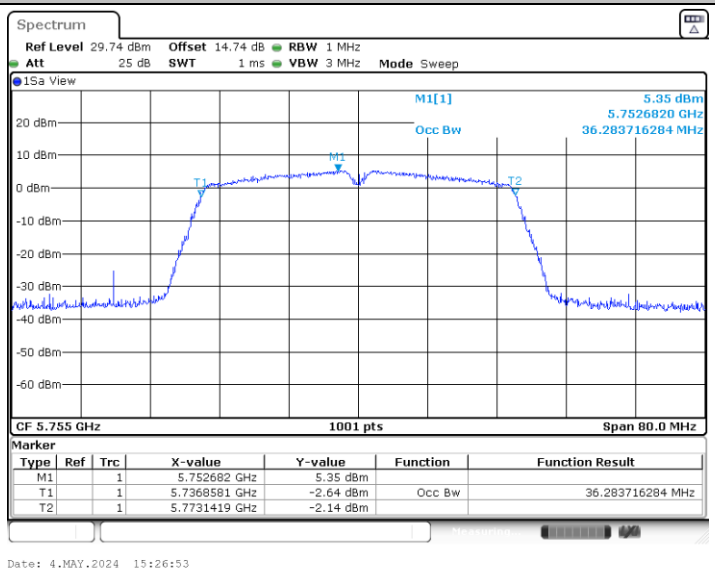

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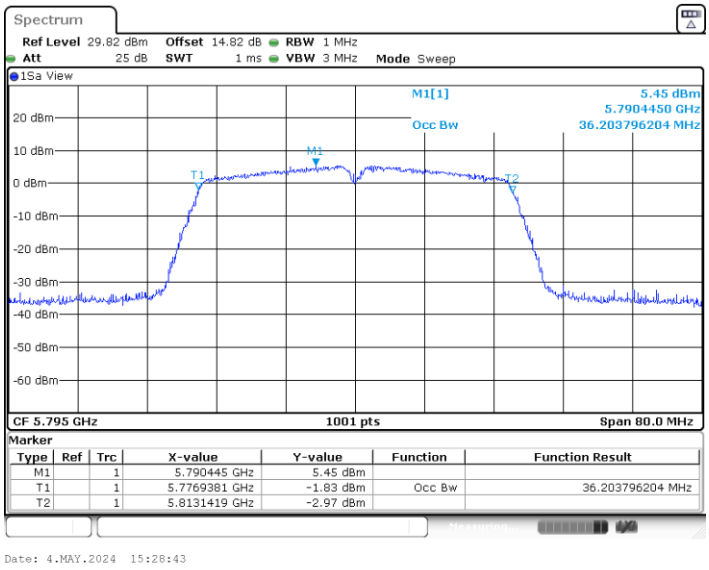

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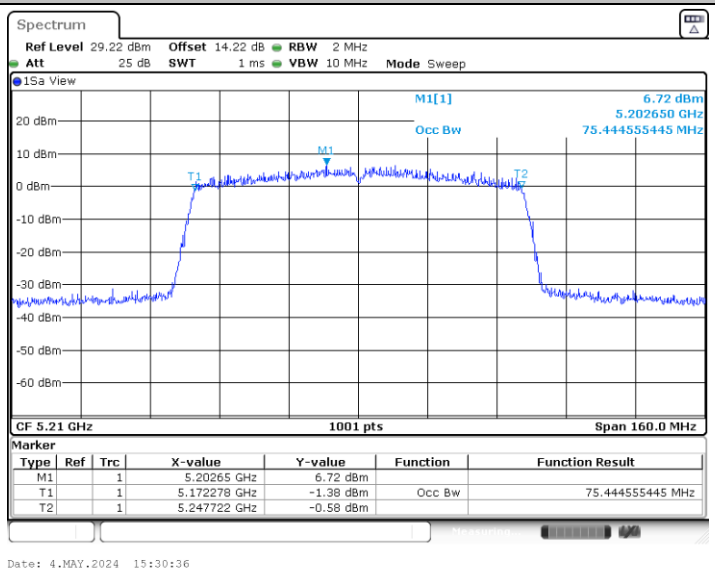

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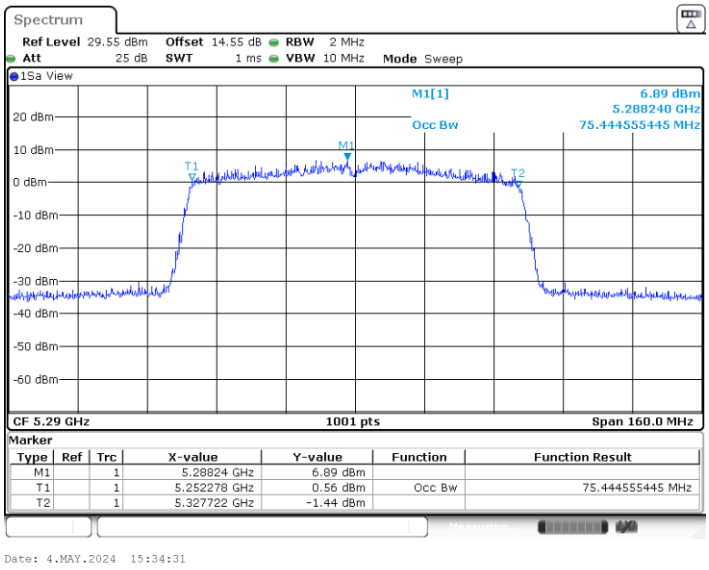

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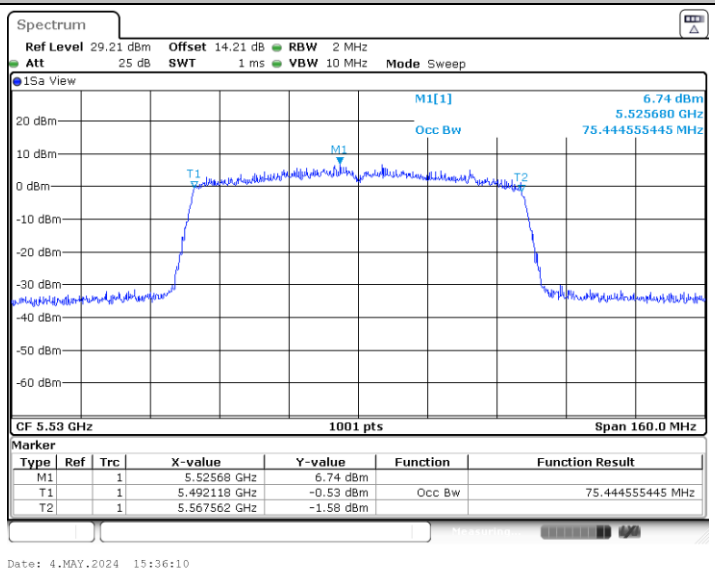
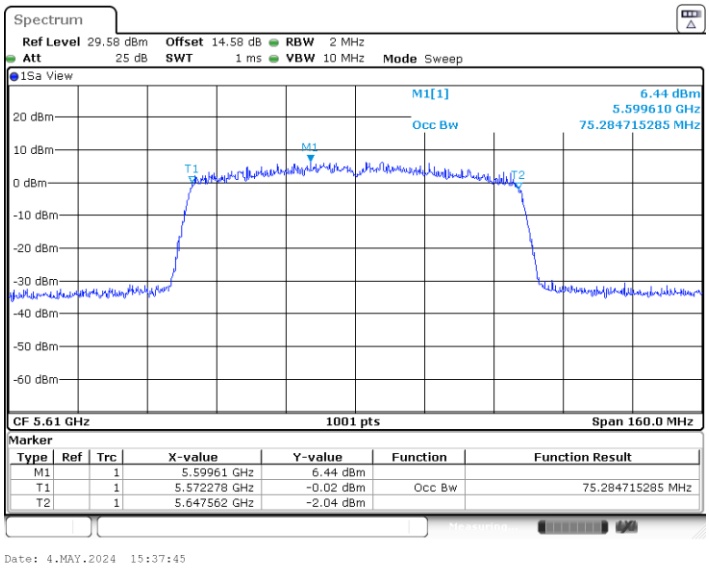
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