FCC RF Test Report

APPLICANT	:	Meta Platforms Technologies, LLC.
EQUIPMENT	:	Handheld controller
BRAND NAME	:	META PLATFORMS TECHNOLOGIES, LLC
MODEL NAME	:	VM4
FCC ID	:	2AGOZ-J93
STANDARD	:	FCC Part 15 Subpart E §15.407
CLASSIFICATION	:	(NII) Unlicensed National Information Infrastructure
TEST DATE(S)	:	Feb. 03, 2022 ~ Jun. 11, 2022

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.

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
FR192411-06	Rev. 01	Initial issue of report	Aug. 17, 2022

SUMMARY OF TEST RESULT

Report Section	FCC Rule	Description	Limit	Result	Remark
3.1	2.1049 & 15.403(i)	26dB & 99% Bandwidth	-	Report only	-
3.2	15.407(a)	Maximum Conducted Output Power	≤ 24 dBm	Pass	-
3.3	15.407(a)	Power Spectral Density	≤ 11 dBm	Pass	-
3.4	15.407(b)	Unwanted Emissions	15.407(b) & 15.209(a)	Pass	Under limit 5.86 dB at 5123.040 MHz
3.5	15.207	AC Conducted Emission	15.207(a)	Pass	Under limit 26.69 dB at 0.431 MHz
3.6	15.203 & 15.407(a)	Antenna Requirement	15.203 & 15.407(a)	Pass	-
Remark: Not required means after assessing, test items are not necessary to carry out.					

Declaration of Conformity:
The test results with all measurement uncertainty excluded are presented in accordance with the regulation limits or requirements declared by manufacturers.
Comments and Explanations:
The declared of product specification for EUT presented in the report are provided by the manufacturer, and the manufacturer takes all the responsibilities for the accuracy of product specification.

1 General Description

1.1 Applicant

Meta Platforms Technologies, LLC.
1 Hacker Way, Menlo Park, CA 94025, USA

1.2 Product Feature of Equipment Under Test

Product Feature	
Equipment	Handheld controller
Brand Name	META PLATFORMS TECHNOLOGIES, LLC
Model Name	VM4
FCC ID	2AGOZ-J93
HW Version	EVT3
SW Version	QCAHLSWMTPLZ-1.473021.1
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.

1.3 Product Specification of Equipment Under Test

Standards-related Product Specification	
Tx/Rx Frequency Range	5260 MHz ~ 5320 MHz 5500 MHz ~ 5720 MHz
Maximum Output Power to Antenna	**<5260 MHz ~ 5320 MHz>** 802.11a : 9.27 dBm / 0.0085 W 802.11n HT20 : 9.05 dBm / 0.0080 W 802.11n HT40 : 9.28 dBm / 0.0085 W 802.11ac VHT20 : 9.03 dBm / 0.0080 W 802.11ac VHT40 : 9.25 dBm / 0.0084 W 802.11ac VHT80 : 9.11 dBm / 0.0081 W **<5500 MHz ~ 5720 MHz >** 802.11a : 8.81 dBm / 0.0076 W 802.11n HT20 : 8.66 dBm / 0.0073 W 802.11n HT40 : 8.83 dBm / 0.0076 W 802.11ac VHT20 : 8.64 dBm / 0.0073 W 802.11ac VHT40 : 8.76 dBm / 0.0075 W 802.11ac VHT80 : 8.61 dBm / 0.0073 W
99% Occupied Bandwidth	**<5260 MHz ~ 5320 MHz>** 802.11a : 17.26 MHz 802.11n HT20 : 18.34 MHz 802.11n HT40 : 36.68 MHz 802.11ac VHT80 : 75.92 MHz **<5500 MHz ~ 5720 MHz >** 802.11a : 17.26 MHz 802.11n HT20 : 18.38 MHz 802.11n HT40 : 36.603 MHz 802.11ac VHT80 : 76.24 MHz

Antenna Type / Gain	**<5260 MHz ~ 5320 MHz>** FPC Antenna with gain 2.96 dBi **<5500 MHz ~ 5720 MHz>** FPC Antenna with gain 2.83 dBi
Type of Modulation	802.11a/n : OFDM (BPSK / QPSK / 16QAM / 64QAM) 802.11ac : OFDM (BPSK / QPSK / 16QAM / 64QAM / 256QAM)

Note:

1. Note: For 802.11n HT20 / ac VHT20 and 802.11n HT40 / ac VHT40 mode, the whole testing have assessed only 802.11n HT20/HT40 by referring to their maximum conducted power.

1.4 Modification of EUT

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

1.5 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 FAX : +86-512-57900958		
Test Site No.	**Sporton Site No.**	**FCC Designation No.**	**FCC Test Firm Registration No.**
	CO01-KS 03CH07-KS 03CH08-KS TH01-KS	CN1257	314309

1.6 Test Software

Item	Site	Manufacturer	Name	Version
1.	03CH07-KS	AUDIX	E3	6.2009-8-24al
2.	03CH08-KS	AUDIX	E3	6.2009-8-24al
3.	CO01-KS	AUDIX	E3	6.2009-8-24

1.7 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 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- 5720 MHz MHz 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)
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 "*" were 802.11n HT40 and 802.11ac VHT40.
2. The above Frequency and Channel in "#" were 802.11ac VHT80.

2.2 Test Mode

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

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

Test Cases	
AC Conducted Emission	Mode 1 : nRF Tx + WLAN Tx(5G) + USB Cable 1(Charging from Adapter)
Remark:	
1. For Radiated Test Cases, The tests were performance with Adapter.	

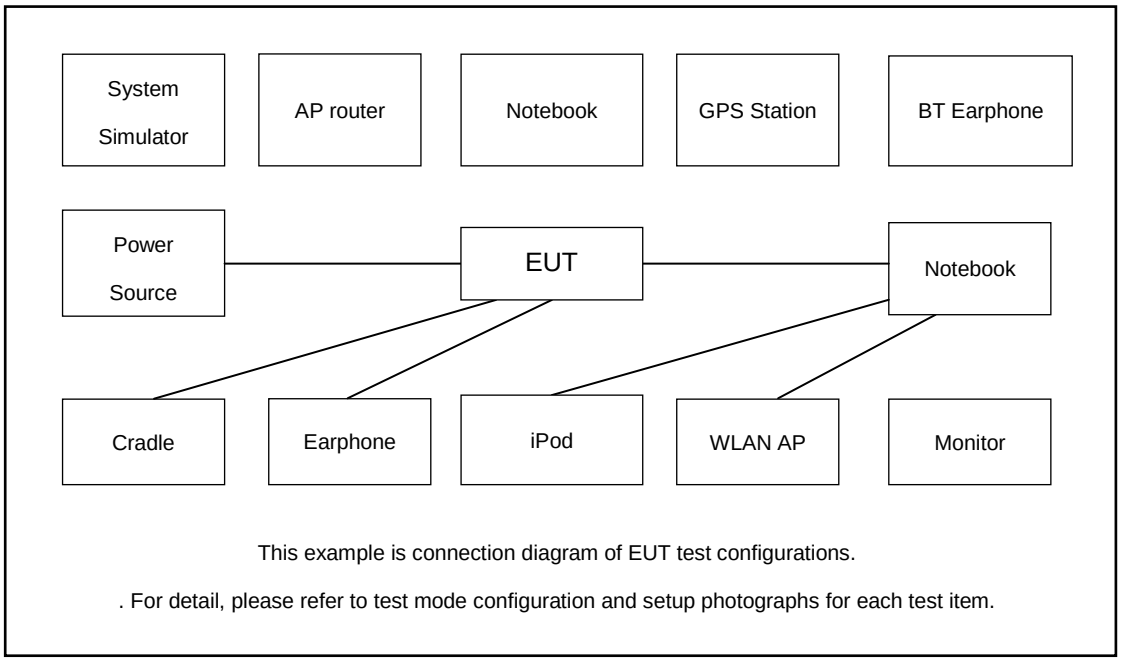
Ch. #		U-NII-1：5180-5240 MHz	U-NII-2A：5260-5320 MHz	U-NII-2C：5500- 5720 MHz
		802.11a	802.11a	802.11a
L	Low	36	52	100
M	Middle	44	60	116
H	High	48	64	140
Straddle		-	-	144

Ch. #		U-NII-1：5180-5240 MHz	U-NII-2A：5260-5320 MHz	U-NII-2C：5500- 5720 MHz
		802.11n HT20	802.11n HT20	802.11n HT20
L	Low	36	52	100
M	Middle	44	60	116
H	High	48	64	140
Straddle		-	-	144

Ch. #		U-NII-1：5180-5240 MHz	U-NII-2A：5260-5320 MHz	U-NII-2C：5500- 5720 MHz
		802.11n HT40	802.11n HT40	802.11n HT40
L	Low	38	54	102
M	Middle	-	-	110
H	High	46	62	134
Straddle		-	-	142

Ch. #		U-NII-1：5180-5240 MHz	U-NII-2A：5260-5320 MHz	U-NII-2C：5500- 5720 MHz
		802.11ac VHT80	802.11ac VHT80	802.11ac VHT80
L	Low	-	-	106
M	Middle	42	58	-
H	High	-	-	122
Straddle		-	-	138

2.3 Connection Diagram of Test System



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.	WLAN AP	D-link	DIR-655	KA21R655B1	N/A	Unshielded,1.8m
2.	Notebook	Lenovo	V130-15IKB005	N/A	N/A	AC I/P: Unshielded, 1.8 m DC O/P: Shielded, 1.8 m

2.5 EUT Operation Test Setup

For WLAN RF test items, an engineering test program was provided and enabled to make EUT continuous 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 6.7 dB and 10dB attenuator.

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

= 6.7 + 10 = 16.7 (dB)

3 Test Result

3.1 26dB & 99% Occupied Bandwidth Measurement

3.1.1 Description of 26dB & 99% Occupied Bandwidth

This section is for reporting purpose only.

There is no restriction limits for bandwidth.

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.

3.1.2 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) Emission bandwidth
2. Set RBW = approximately 1% of the emission bandwidth.
3. Set the VBW > RBW.
4. Detector = Peak.
5. Trace mode = max hold
6. 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%.
7. For 99% Bandwidth Measurement, the spectrum analyzer's resolution bandwidth (RBW) is set 1% to 5% of the OBW and set the Video bandwidth (VBW) ≥ 3 * RBW.
8. Measure and record the results in the test report.

3.1.4 Test Setup

3.1.5 Test Result of 26dB & 99% Occupied 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 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

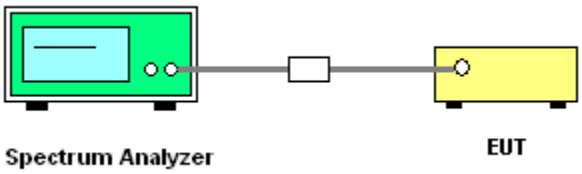
The testing follows Method PM of FCC KDB 789033 D02 General UNII Test Procedures New Rules v02r01.

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 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 v02r01.
Section F) Maximum power spectral density.

 # 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.

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 is to measure unwanted emissions through radiated measurement for band edge spurious emissions and out of band emissions measurement.

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 5470-5725 MHz band: all emissions outside of the 5470-5725 MHz band shall not exceed an EIRP of -27 dBm/MHz.

(2) 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

EIRP (dBm)	Field Strength at 3m (dBμV/m)
- 27	68.3

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

$$EIRP = E_{Meas} + 20\log(d_{Meas}) - 104.77$$

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) ANSI C63.10-2013 clause 12.7.3 note 97

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

3.4.2 Measuring Instruments

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

3.4.3 Test Procedures

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

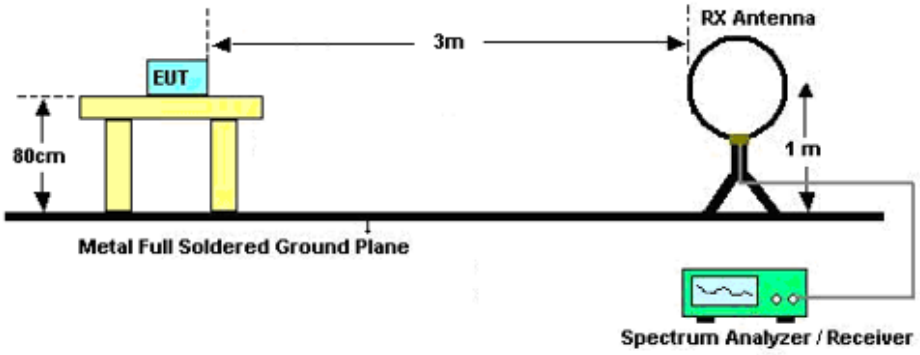
   (3) Procedures for Average Unwanted Emissions Measurements Above 1000MHz

   - 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 and is transmitting at its maximum power control level for the tested mode of operation.

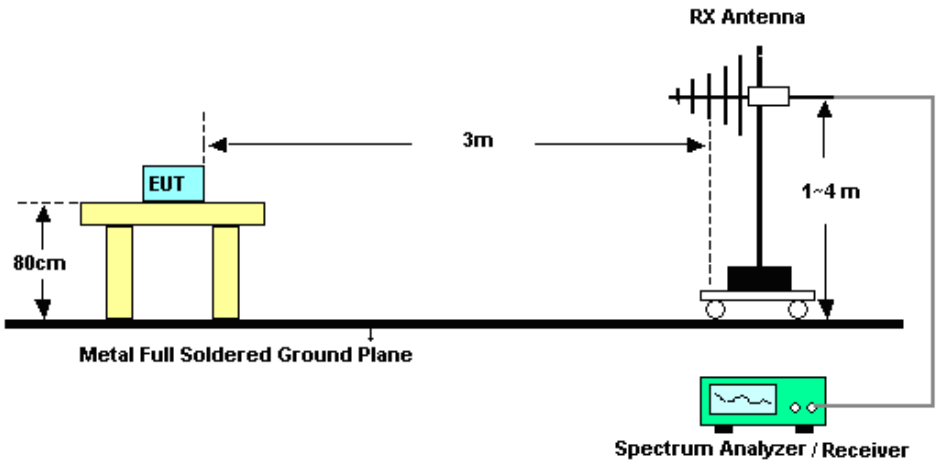
2. The EUT was placed on a turntable with 0.8 meter for frequency below 1GHz and 1.5 meter for frequency above 1GHz respectively above ground.
3. The EUT was set 3 meters from the interference receiving antenna which was mounted on the top of a variable height antenna tower.
4. The antenna is a broadband 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 peak 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

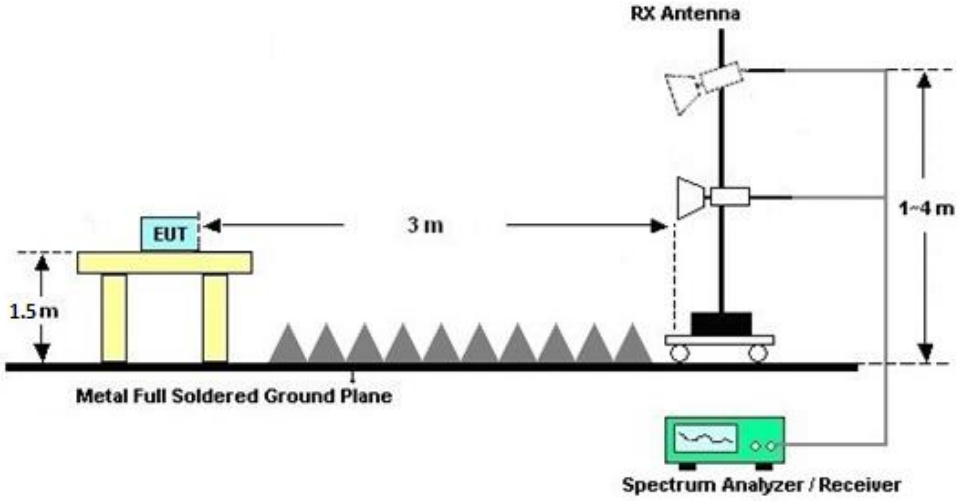
For radiated emissions below 30MHz



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 or 40GHz, whichever is lower)

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.

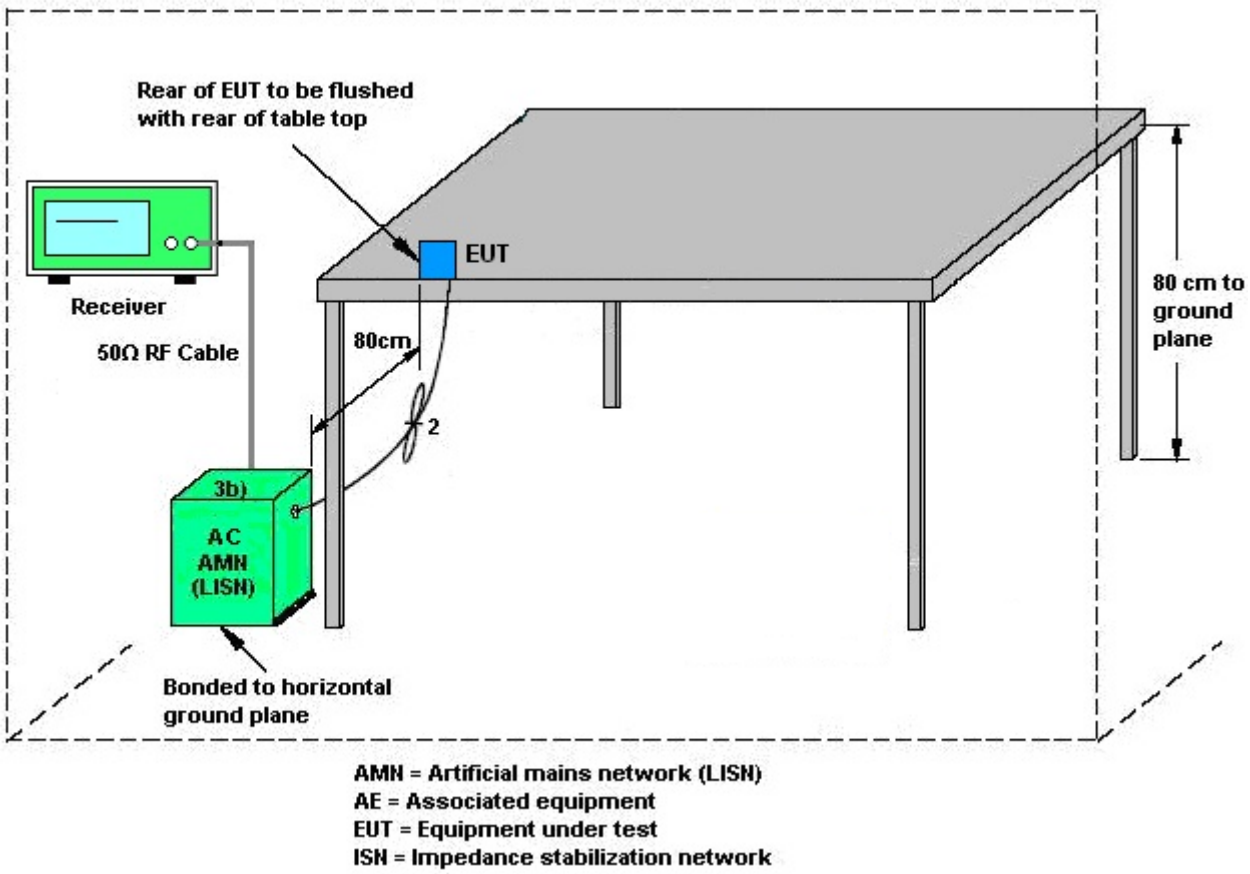
3.5.2 Measuring Instruments

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

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
Spectrum Analyzer	R&S	FSV40	101040	10Hz~40GHz	Oct. 14, 2021	Feb. 03, 2022	Oct. 13, 2022	Conducted (TH01-KS)
Pulse Power Senor	Anritsu	MA2411B	0917070	300MHz~40GHz	Jan. 05, 2022	Feb. 03, 2022	Jan. 04, 2023	Conducted (TH01-KS)
Power Meter	Anritsu	ML2495A	1005002	50MHz Bandwidth	Jan. 05, 2022	Feb. 03, 2022	Jan. 04, 2023	Conducted (TH01-KS)
Temperature &humidity chamber	Hongzhan	LP-150U	H20140114 40	-40~+150°C 20%~95%RH	Jul. 15, 2021	Feb. 03, 2022	Jul. 14, 2022	Conducted (TH01-KS)
EMI Test Receiver	R&S	ESR7	101403	9kHz~7GHz;Max 30dBm	Oct. 16, 2021	May 24, 2022	Oct. 15, 2022	Radiation (03CH07-KS)
EXA Spectrum Analyzer	Keysight	N9010A	MY55370528	10Hz-44G,MAX 30dB	Oct. 16, 2021	May 24, 2022	Oct. 15, 2022	Radiation (03CH07-KS)
Loop Antenna	R&S	HFH2-Z2	100321	9kHz~30MHz	Oct. 30, 2021	May 24, 2022	Oct. 29, 2022	Radiation (03CH07-KS)
Bilog Antenna	TeseQ	CBL6111D	59913	30MHz-1GHz	Sep. 07, 2021	May 24, 2022	Sep. 06, 2022	Radiation (03CH07-KS)
Double Ridge Horn Antenna	ETS-Lindgren	3117	00218652	1GHz~18GHz	Apr. 06, 2022	May 24, 2022	Apr. 05, 2023	Radiation (03CH07-KS)
high gain Amplifier	MITEQ	AMF-7D-00101800-30-10P	2025788	1Ghz-18Ghz	Jul. 30, 2021	May 24, 2022	Jul. 29, 2022	Radiation (03CH07-KS)
SHF-EHF Horn	Com-power	AH-840	101070	18GHz~40GHz	Jan. 05, 2022	May 24, 2022	Jan. 04, 2023	Radiation (03CH07-KS)
Amplifier	SONOMA	310N	413740	9KHz-1GHz	Jan. 05, 2022	May 24, 2022	Jan. 04, 2023	Radiation (03CH07-KS)
Amplifier	Keysight	83017A	MY53270316	500MHz~26.5GHz	Oct. 16, 2021	May 24, 2022	Oct. 15, 2022	Radiation (03CH07-KS)
Amplifier	MITEQ	EM18G40GGA	060728	18~40GHz	Jan. 05, 2022	May 24, 2022	Jan. 04, 2023	Radiation (03CH07-KS)
AC Power Source	Chroma	61601	616010002473	N/A	NCR	May 24, 2022	NCR	Radiation (03CH07-KS)
Turn Table	MF	MF7802	N/A	0~360 degree	NCR	May 24, 2022	NCR	Radiation (03CH07-KS)
Antenna Mast	MF	MF7802	N/A	1 m~4 m	NCR	May 24, 2022	NCR	Radiation (03CH07-KS)
EMI Test Receiver	R&S	ESR7	101403	9kHz~7GHz;Max 30dBm	Oct. 16, 2021	May 24, 2022	Oct. 15, 2022	Radiation (03CH08-KS)
Spectrum Analyzer	R&S	FSV40	101932	10kHz~40GHz; Max 30dBm	Nov. 03, 2021	May 24, 2022	Nov. 02, 2022	Radiation (03CH08-KS)
Loop Antenna	R&S	HFH2-Z2	100321	9kHz~30MHz	Oct. 30, 2021	May 24, 2022	Oct. 29, 2022	Radiation (03CH08-KS)
Bilog Antenna	TESEQ& VGT	CBL 61110	59915	30MHz-1GHz	Sep. 02, 2021	May 24, 2022	Sep. 01, 2022	Radiation (03CH08-KS)
Double Ridge Horn Antenna	ETS-Lindgren	3117	75959	1GHz~18GHz	Dec. 24, 2021	May 24, 2022	Dec. 23, 2022	Radiation (03CH08-KS)
high gain Amplifier	EM	EM01G18GA	060845	1Ghz-18Ghz	Jan. 05, 2022	May 24, 2022	Jan. 04, 2023	Radiation (03CH08-KS)
SHF-EHF Horn	Com-power	AH-840	101070	18GHz~40GHz	Jan. 05, 2022	May 24, 2022	Jan. 04, 2023	Radiation (03CH08-KS)
Amplifier	SONOMA	310N	413741	9KHz-1GHz	Jan. 05, 2022	May 24, 2022	Jan. 04, 2023	Radiation (03CH08-KS)
Amplifier	EM	EM01G18GA	060834	1Ghz-18Ghz	Jan. 05, 2022	May 24, 2022	Jan. 04, 2023	Radiation (03CH08-KS)
Amplifier	MITEQ	EM18G40GGA	060728	18~40GHz	Jan. 05, 2022	May 24, 2022	Jan. 04, 2023	Radiation (03CH08-KS)
AC Power Source	Chroma	61601	616010002473	N/A	NCR	May 24, 2022	NCR	Radiation (03CH08-KS)
Turn Table	MF	MF7802	N/A	0~360 degree	NCR	May 24, 2022	NCR	Radiation (03CH08-KS)
Antenna Mast	MF	MF7802	N/A	1 m~4 m	NCR	May 24, 2022	NCR	Radiation (03CH08-KS)
EMI Receiver	R&S	ESCI7	100768	9kHz~7GHz;	May 24, 2022	Jun. 11, 2022	May 23, 2023	Conduction (CO01-KS)

AC LISN (for auxiliary equipment)	MessTec	AN3016	060103	9kHz~30MHz	Oct. 14, 2021	Jun. 11, 2022	Oct. 13, 2022	Conduction (CO01-KS)
AC LISN	MessTec	AN3016	060105	9kHz~30MHz	May 24, 2022	Jun. 11, 2022	May 23, 2023	Conduction (CO01-KS)
AC Power Source	Chroma	61602	ABP00000 0811	AC 0V~300V, 45Hz~1000Hz	Oct. 14, 2021	Jun. 11, 2022	Oct. 13, 2022	Conduction (CO01-KS)

NCR: No Calibration Required

5 Uncertainty of Evaluation

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 Power	±0.56 dB
Conducted Emissions	±0.92 dB
Occupied Channel Bandwidth	±0.03 %
Conducted Power Spectral Density	±0.54 dB

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

Measuring Uncertainty for a Level of Confidence of 95% (U = 2Uc(y))	2.94dB

03CH07:

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

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

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

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

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

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

03CH08:

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

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

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

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

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

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

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

Appendix A. Conducted Test Results

Report Number : FR192411-06

Test Engineer:	Gene Wang	Temperature:	21~25	°C
Test Date:	2022/2/3	Relative Humidity:	51~54	%

Report Number : FR192411-06

TEST RESULTS DATA
Average Power Table

FCC U-NII-2A										
Mod.	Data Rate	N_{TX}	CH.	Freq. (MHz)	Duty Factor (dB)	Average Conducted Power (dBm)	FCC Conducted Power Limit (dBm)	DG (dBi)	EIRP Power Limit (dBm)	Pass/Fail
11a	6M bps	1	52	5260	0.08	9.19	23.98	2.96	26.99	Pass
11a	6M bps	1	60	5300	0.08	9.27	23.98	2.96	26.99	Pass
11a	6M bps	1	64	5320	0.08	8.99	23.98	2.96	26.99	Pass
HT20	MCS 0	1	52	5260	0.08	9.03	23.98	2.96	26.99	Pass
HT20	MCS 0	1	60	5300	0.08	9.05	23.98	2.96	26.99	Pass
HT20	MCS 0	1	64	5320	0.08	8.96	23.98	2.96	26.99	Pass
HT40	MCS 0	1	54	5270	0.17	9.28	23.98	2.96	26.99	Pass
HT40	MCS 0	1	62	5310	0.17	9.21	23.98	2.96	26.99	Pass
VHT20	MCS 0	1	52	5260	0.08	9.00	23.98	2.96	26.99	Pass
VHT20	MCS 0	1	60	5300	0.08	9.03	23.98	2.96	26.99	Pass
VHT20	MCS 0	1	64	5320	0.08	8.91	23.98	2.96	26.99	Pass
VHT40	MCS 0	1	54	5270	0.17	9.25	23.98	2.96	26.99	Pass
VHT40	MCS 0	1	62	5310	0.17	9.15	23.98	2.96	26.99	Pass
VHT80	MCS 0	1	58	5290	0.36	9.11	23.98	2.96	26.99	Pass

Report Number : FR192411-06

TEST RESULTS DATA
Average Power Table

FCC U-NII-2C										
Mod.	Data Rate	N_{TX}	CH.	Freq. (MHz)	Duty Factor (dB)	Average Conducted Power (dBm)	FCC Conducted Power Limit (dBm)	DG (dBi)	EIRP Power Limit (dBm)	Pass/Fail
11a	6M bps	1	100	5500	0.08	8.56	23.98	2.83	26.99	Pass
11a	6M bps	1	116	5580	0.08	8.39	23.98	2.83	26.99	Pass
11a	6M bps	1	140	5700	0.08	8.81	23.98	2.83	26.99	Pass
11a	6Mbps	1	144	5720	0.08	8.80	23.98	2.83	26.99	Pass
HT20	MCS 0	1	100	5500	0.08	8.44	23.98	2.83	26.99	Pass
HT20	MCS 0	1	116	5580	0.08	8.38	23.98	2.83	26.99	Pass
HT20	MCS 0	1	140	5700	0.08	8.62	23.98	2.83	26.99	Pass
HT20	MCS0	1	144	5720	0.08	8.66	23.98	2.83	26.99	Pass
HT40	MCS 0	1	102	5510	0.17	8.62	23.98	2.83	26.99	Pass
HT40	MCS 0	1	110	5550	0.17	8.45	23.98	2.83	26.99	Pass
HT40	MCS 0	1	134	5670	0.17	8.83	23.98	2.83	26.99	Pass
HT40	MCS0	1	142	5710	0.17	8.76	23.98	2.83	26.99	Pass
VHT20	MCS 0	1	100	5500	0.08	8.41	23.98	2.83	26.99	Pass
VHT20	MCS 0	1	116	5580	0.08	8.34	23.98	2.83	26.99	Pass
VHT20	MCS 0	1	140	5700	0.08	8.61	23.98	2.83	26.99	Pass
VHT20	MCS0	1	144	5720	0.08	8.64	23.98	2.83	26.99	Pass
VHT40	MCS 0	1	102	5510	0.17	8.58	23.98	2.83	26.99	Pass
VHT40	MCS 0	1	110	5550	0.17	8.37	23.98	2.83	26.99	Pass
VHT40	MCS 0	1	134	5670	0.17	8.76	23.98	2.83	26.99	Pass
VHT40	MCS0	1	142	5710	0.17	8.71	23.98	2.83	26.99	Pass
VHT80	MCS 0	1	106	5530	0.36	8.40	23.98	2.83	26.99	Pass
VHT80	MCS 0	1	122	5610	0.36	8.28	23.98	2.83	26.99	Pass
VHT80	MCS0	1	138	5690	0.36	8.61	23.98	2.83	26.99	Pass

Ambient Condition: 25 ℃, 45 %RH,	
Test Date: 2022.2.3	**Test Engineer:** Gene Wang

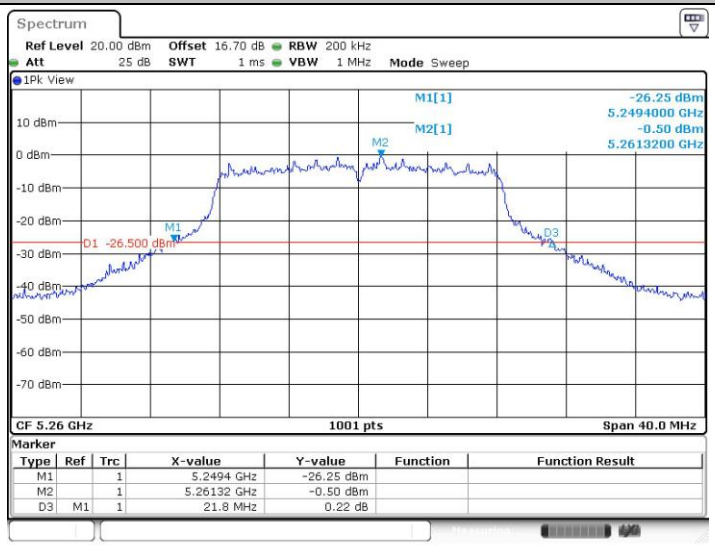
Appendix A: Emission Bandwidth

Test Result

TestMode	Antenna	Frequency[MHz]	26db EBW [MHz]	FL[MHz]	FH[MHz]	Limit[MHz]	Verdict
11A	Ant1	5260	21.80	5249.40	5271.20	---	---
		5300	22.08	5289.00	5311.08	---	---
		5320	22.24	5308.84	5331.08	---	---
		5500	21.96	5489.40	5511.36	---	---
		5580	22.32	5568.76	5591.08	---	---
		5700	21.92	5689.36	5711.28	---	---
		5720	22.24	5709.04	5731.28	---	---
11N20SISO	Ant1	5260	23.08	5248.76	5271.84	---	---
		5300	22.20	5288.88	5311.08	---	---
		5320	22.96	5308.40	5331.36	---	---
		5500	23.12	5488.44	5511.56	---	---
		5580	22.32	5569.04	5591.36	---	---
		5700	23.48	5688.16	5711.64	---	---
		5720	22.80	5708.96	5731.76	---	---
11N40SISO	Ant1	5270	41.68	5249.28	5290.96	---	---
		5310	42.00	5289.04	5331.04	---	---
		5510	41.52	5489.36	5530.88	---	---
		5550	41.84	5529.04	5570.88	---	---
		5670	41.76	5649.12	5690.88	---	---
		5710	41.76	5689.12	5730.88	---	---
11AC80SISO	Ant1	5290	83.68	5248.56	5332.24	---	---
		5530	83.36	5488.56	5571.92	---	---
		5610	84.00	5568.56	5652.56	---	---
		5690	83.84	5648.40	5732.24	---	---

Test Graphs

11A_Ant1_5260



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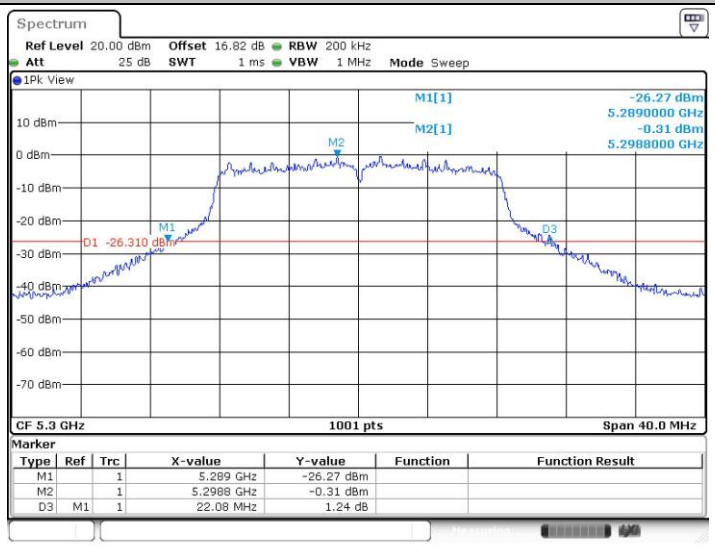

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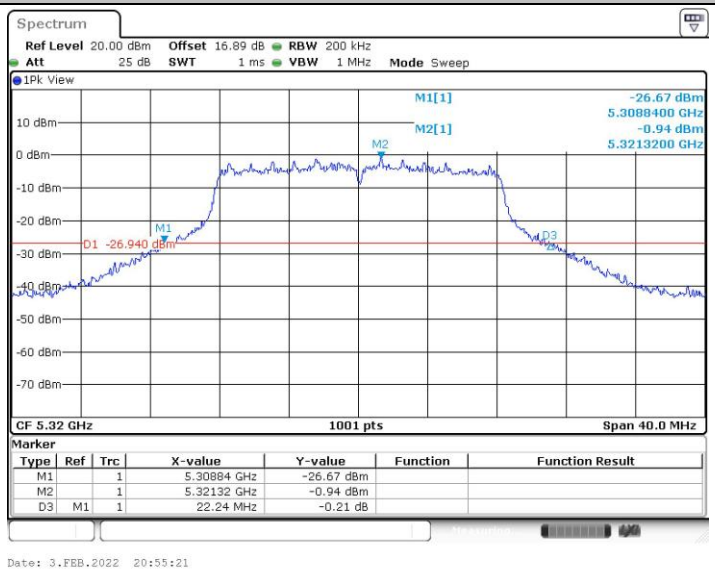

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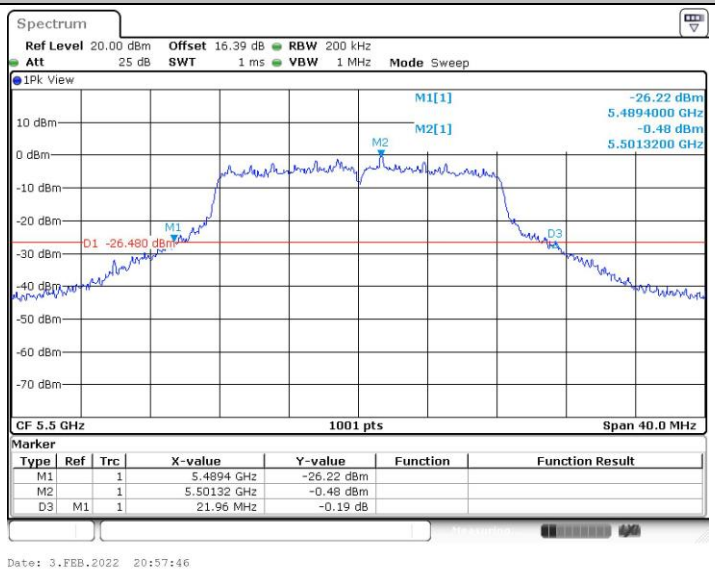

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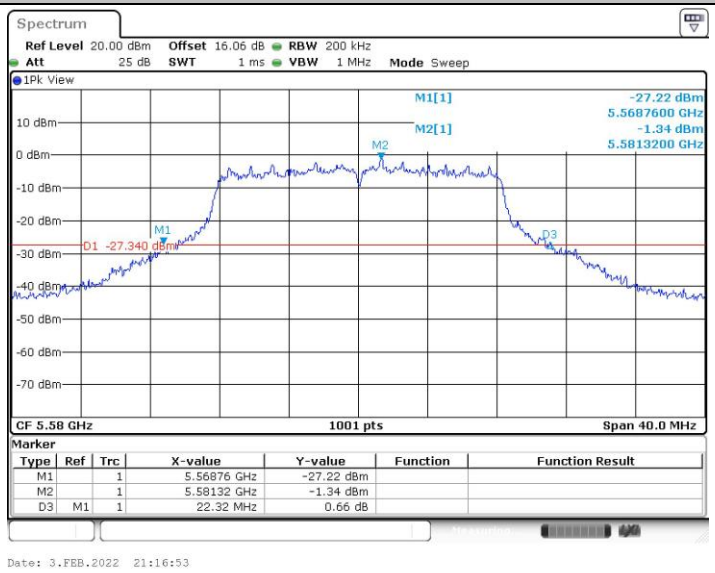

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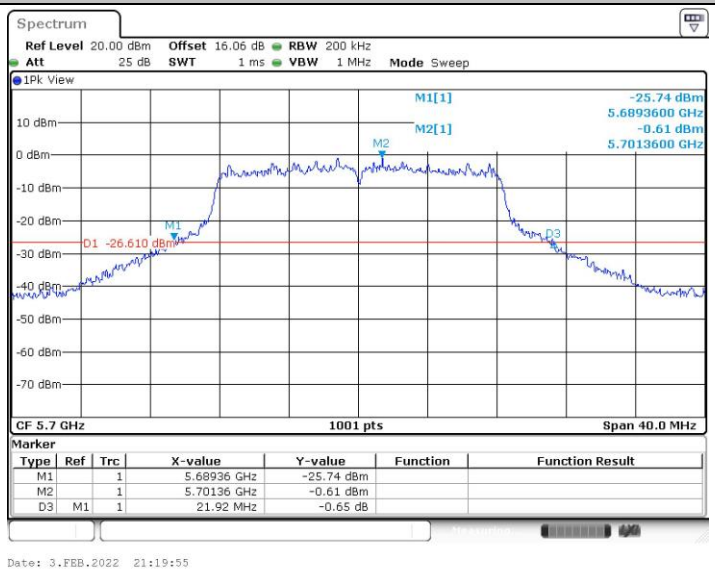

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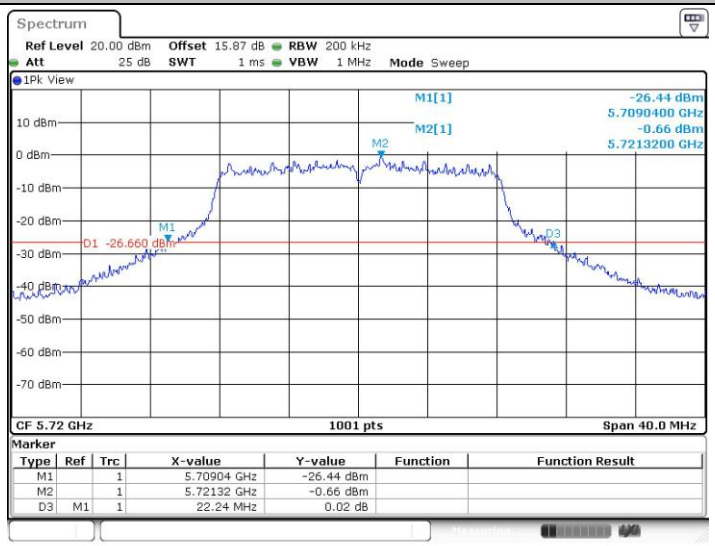

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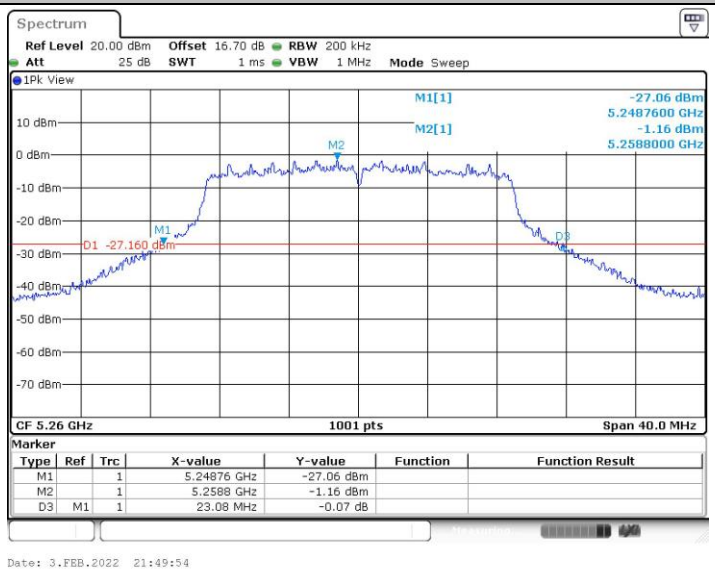

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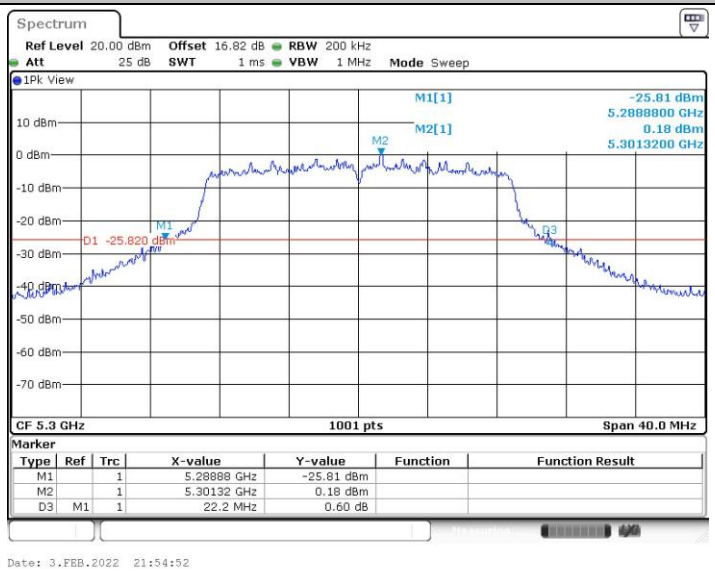

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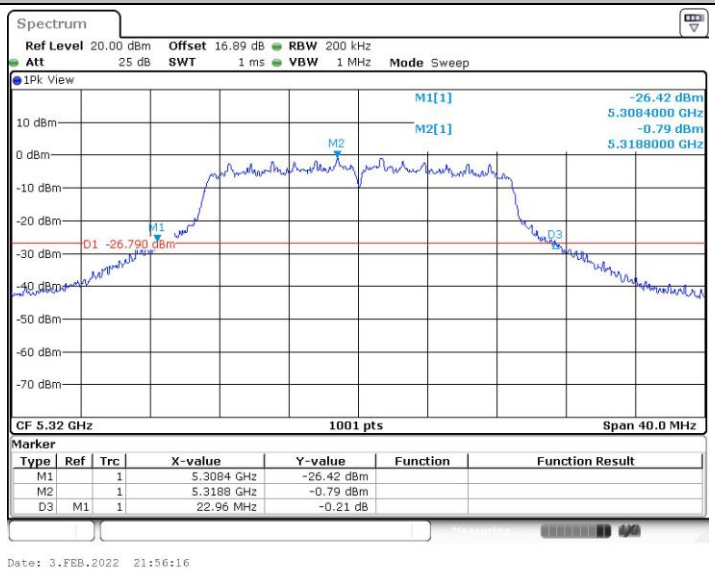

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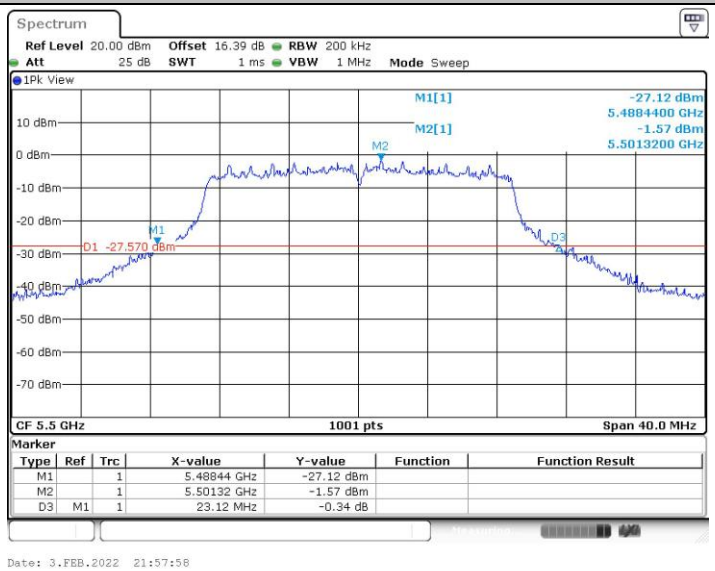

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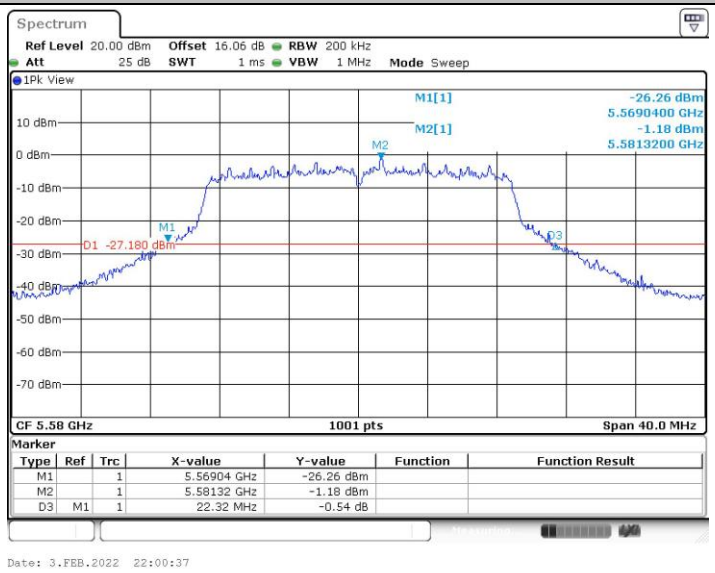

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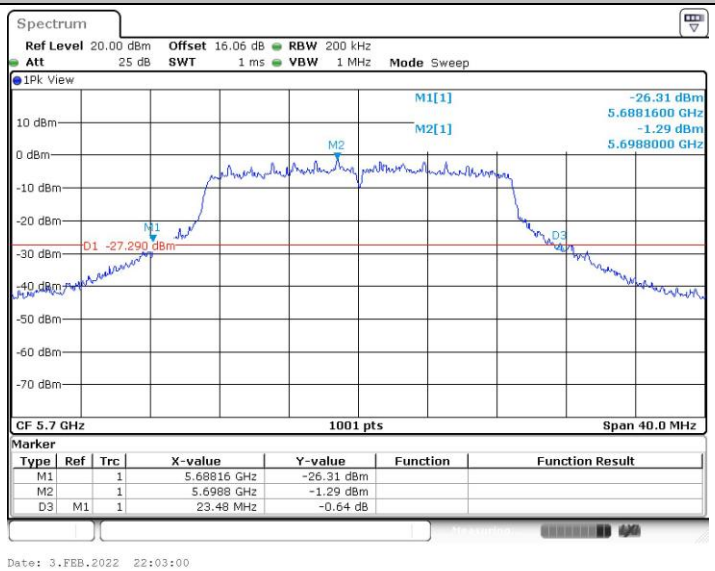

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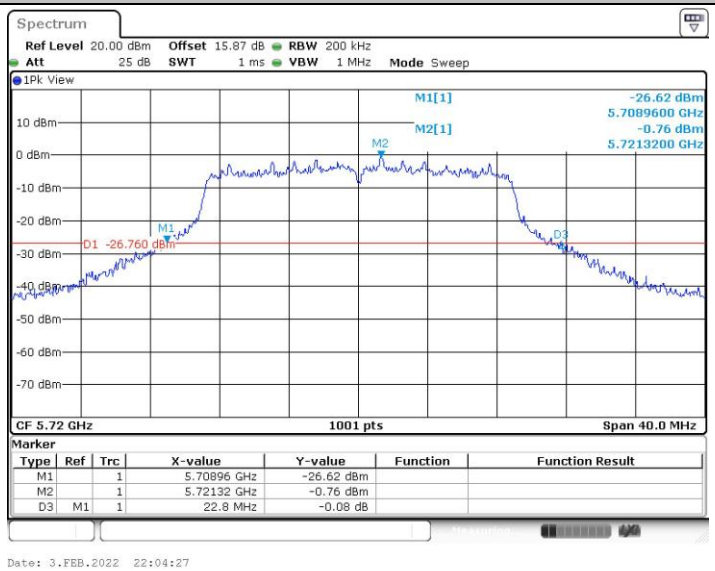

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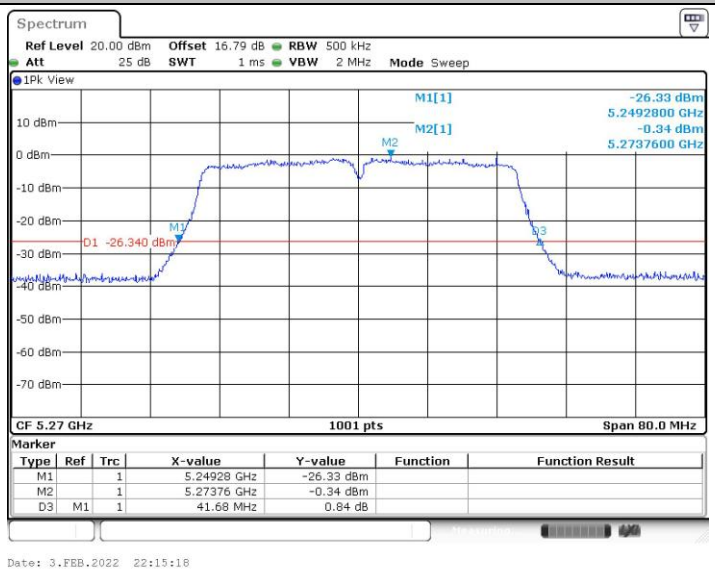

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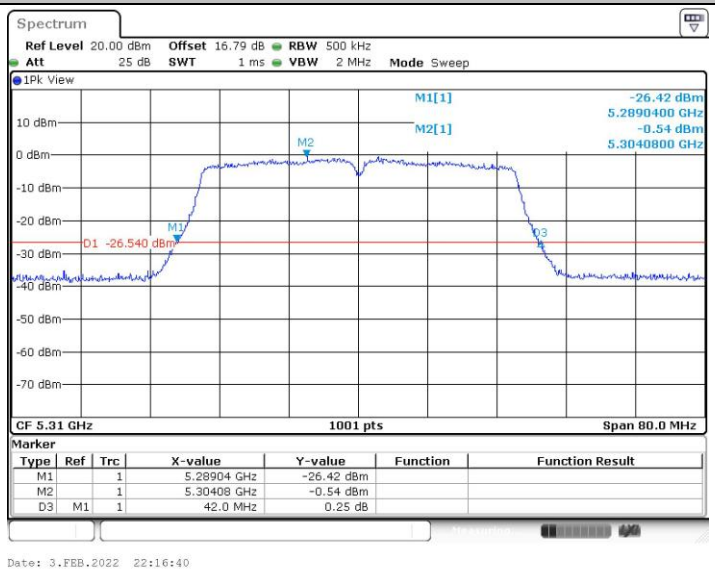

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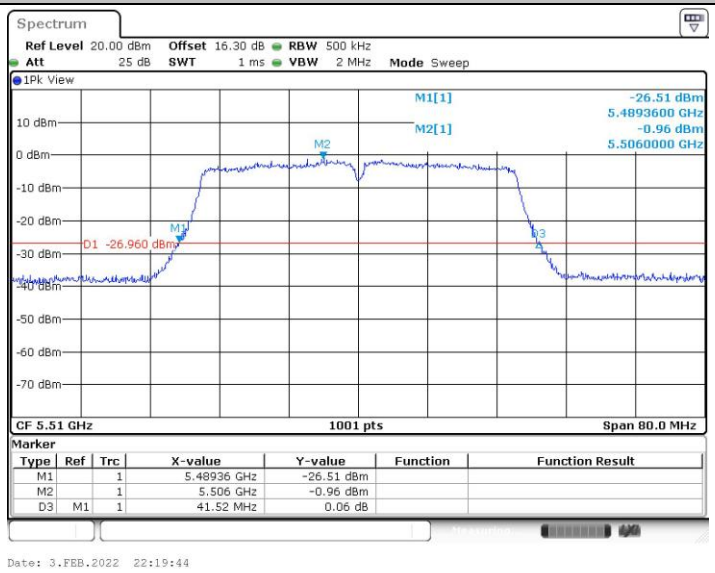

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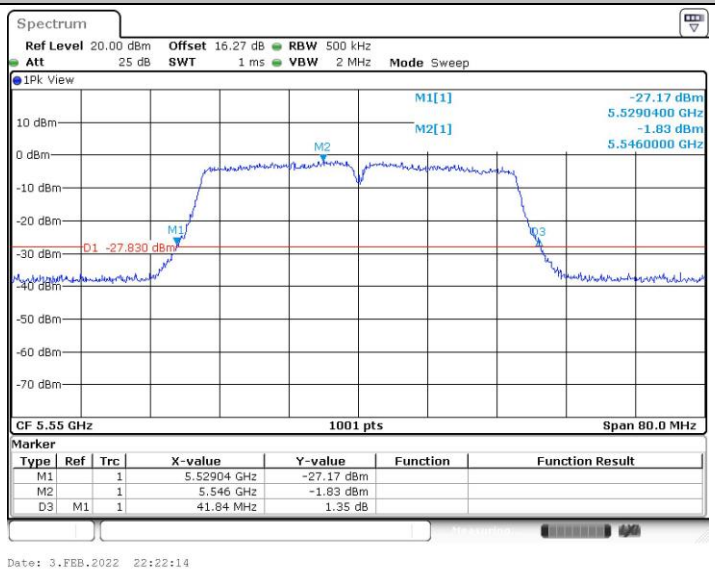

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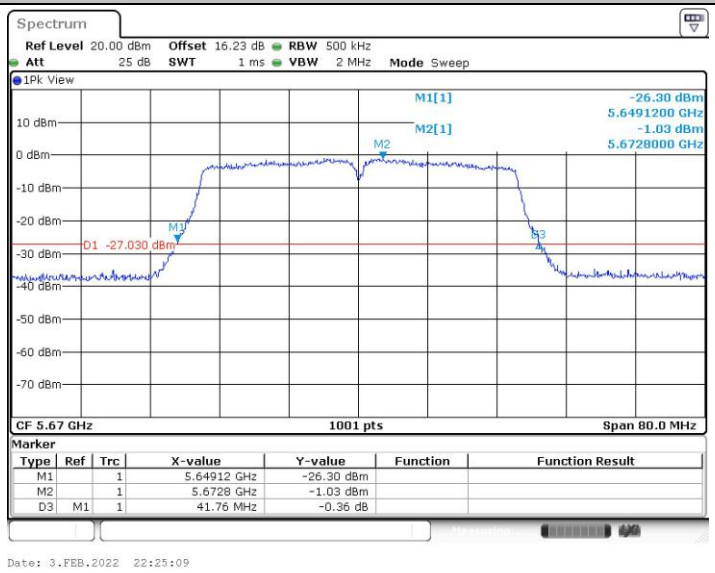

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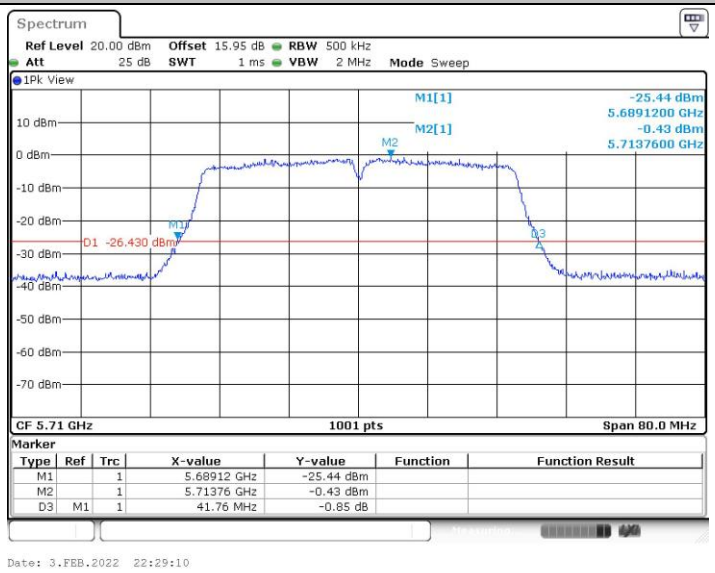

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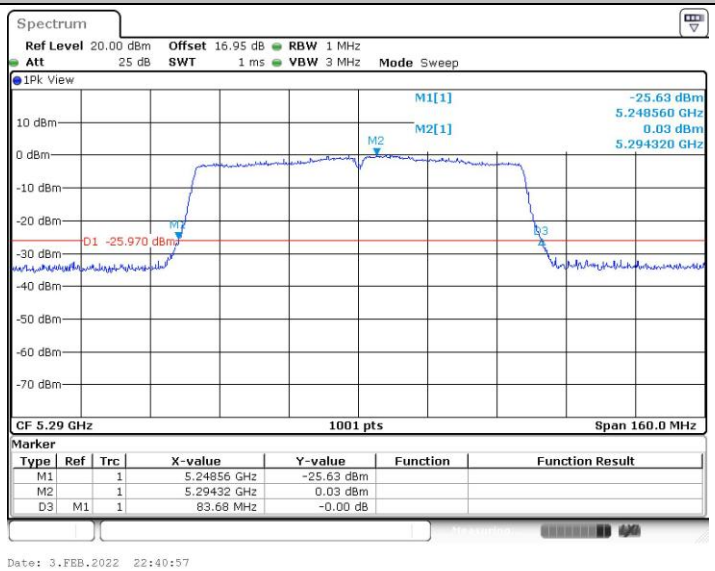

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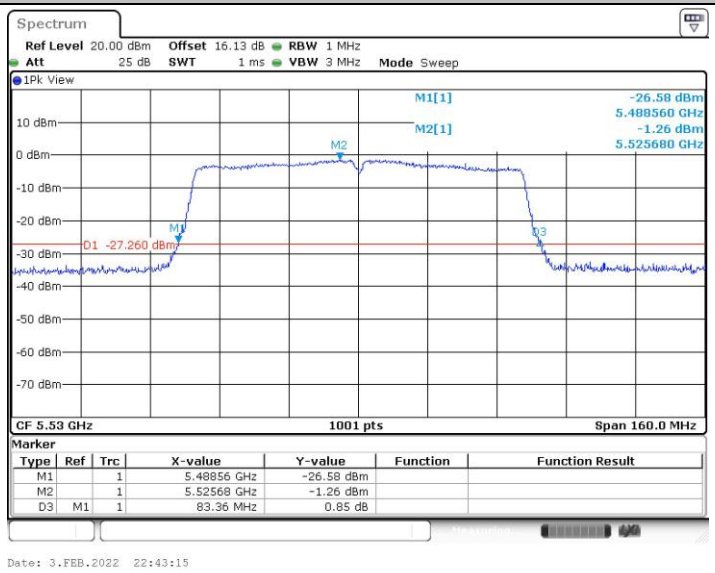

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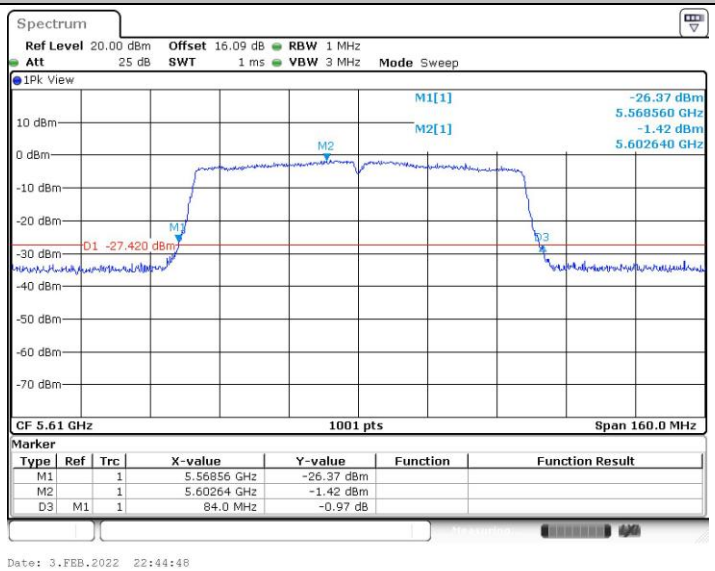

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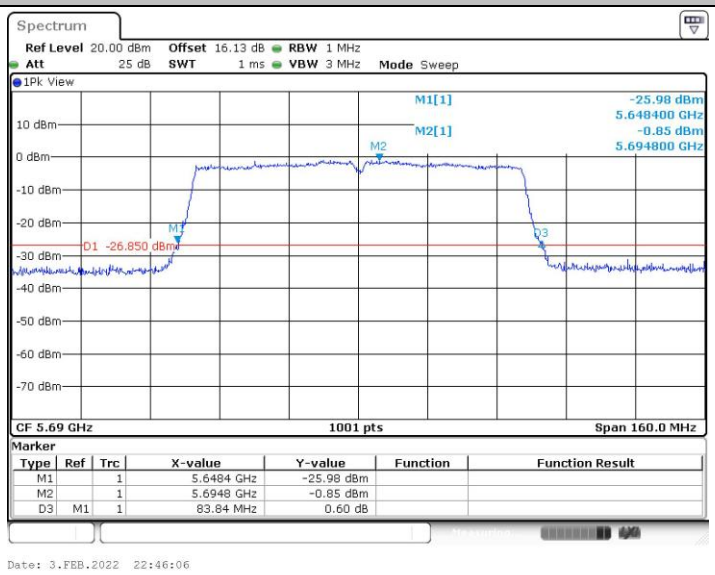


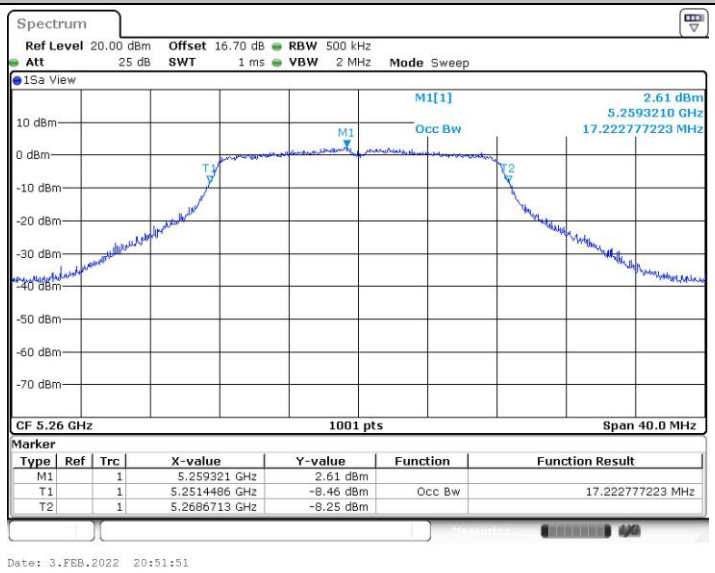
Occupied channel bandwidth

Test Result

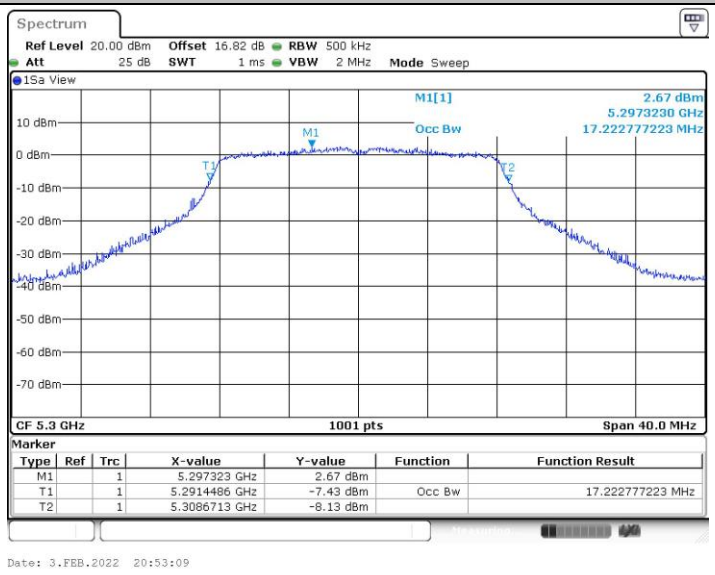
TestMode	Antenna	Frequency[MHz]	OCB [MHz]	FL[MHz]	FH[MHz]	Limit[MHz]	Verdict
11A	Ant1	5260	17.223	5251.449	5268.671	---	---
		5300	17.223	5291.449	5308.671	---	---
		5320	17.263	5311.369	5328.631	---	---
		5500	17.223	5491.449	5508.671	---	---
		5580	17.223	5571.449	5588.671	---	---
		5700	17.263	5691.449	5708.711	---	---
		5720	17.263	5711.409	5728.671	---	---
11N20SISO	Ant1	5260	18.302	5250.889	5269.191	---	---
		5300	18.302	5290.889	5309.191	---	---
		5320	18.342	5310.849	5329.191	---	---
		5500	18.382	5490.849	5509.231	---	---
		5580	18.382	5570.889	5589.271	---	---
		5700	18.382	5690.889	5709.271	---	---
		5720	18.342	5710.849	5729.191	---	---
11N40SISO	Ant1	5270	36.683	5251.778	5288.462	---	---
		5310	36.603	5291.698	5328.302	---	---
		5510	36.523	5491.778	5528.302	---	---
		5550	36.603	5531.698	5568.302	---	---
		5670	36.523	5651.778	5688.302	---	---
		5710	36.603	5691.778	5728.382	---	---
11AC80SISO	Ant1	5290	75.924	5252.118	5328.042	---	---
		5530	76.084	5491.958	5568.042	---	---
		5610	76.084	5571.958	5648.042	---	---
		5690	76.244	5651.958	5728.202	---	---

Test Graphs

11A_Ant1_5260



11A_Ant1_5300



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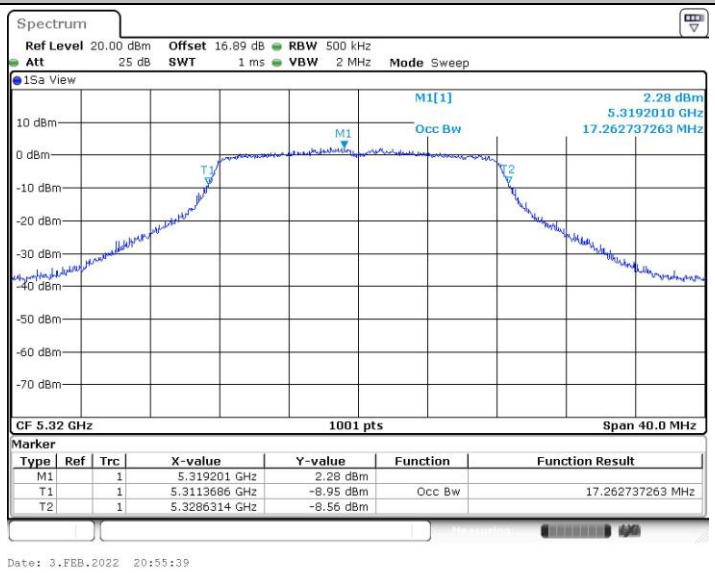

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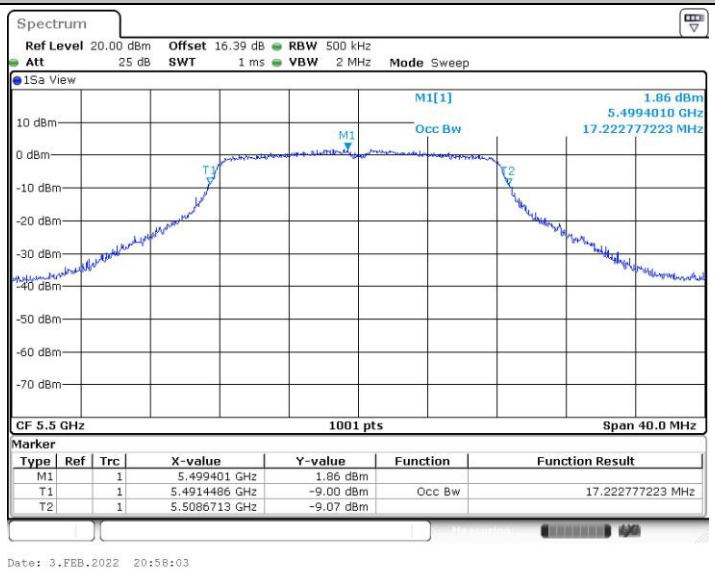

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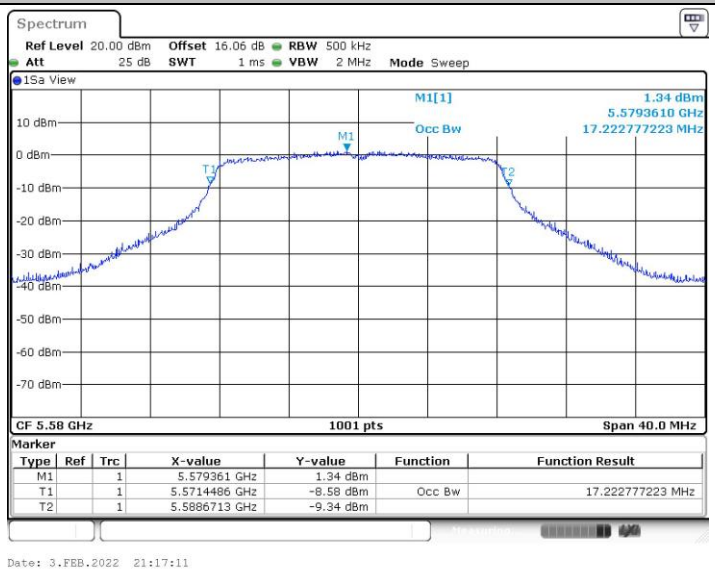

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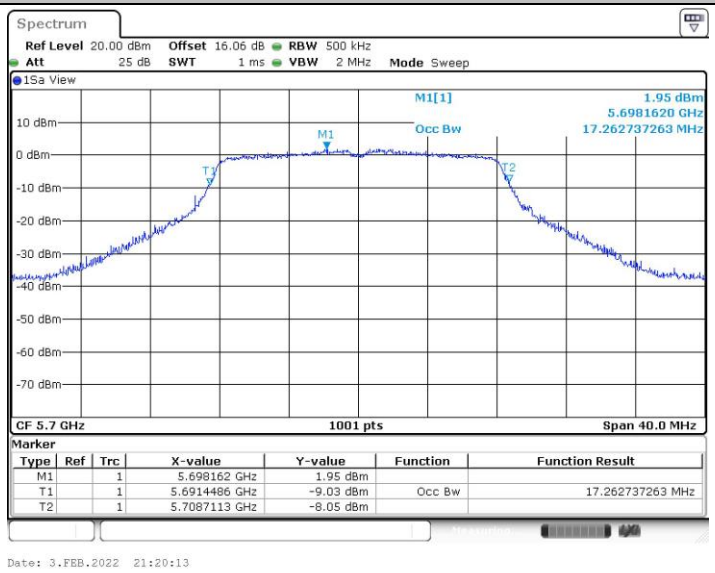

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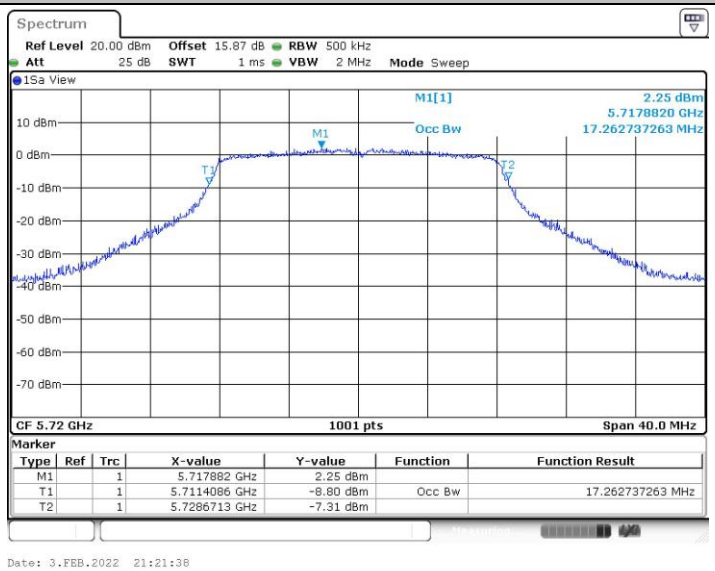

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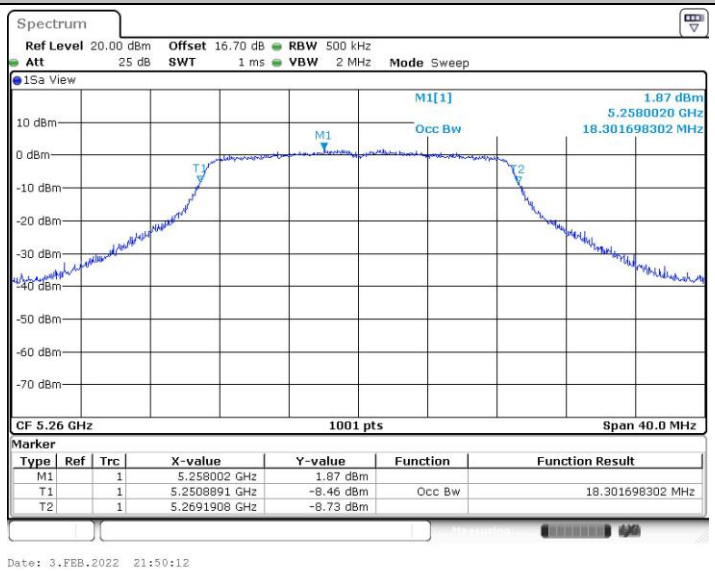

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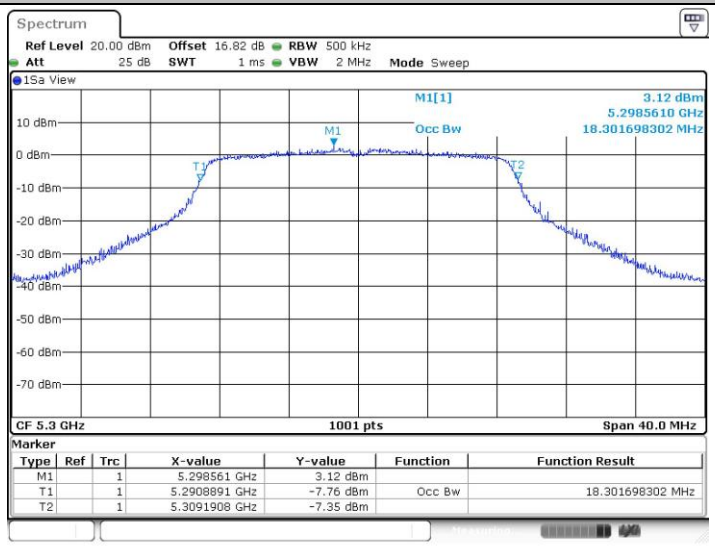

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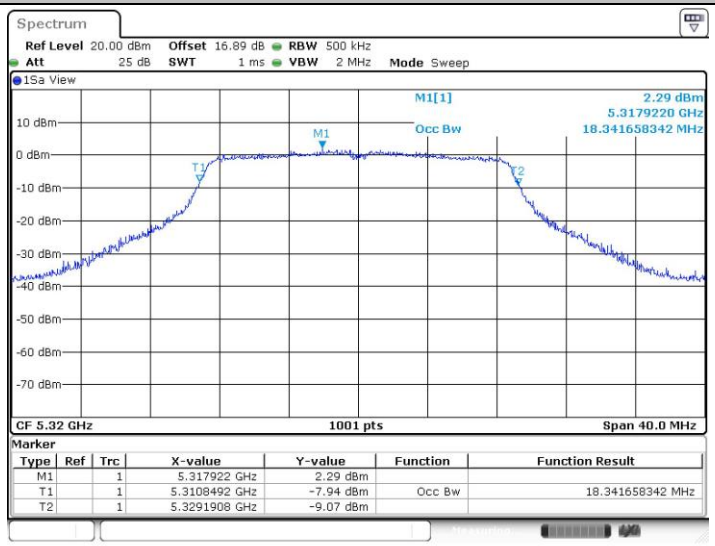

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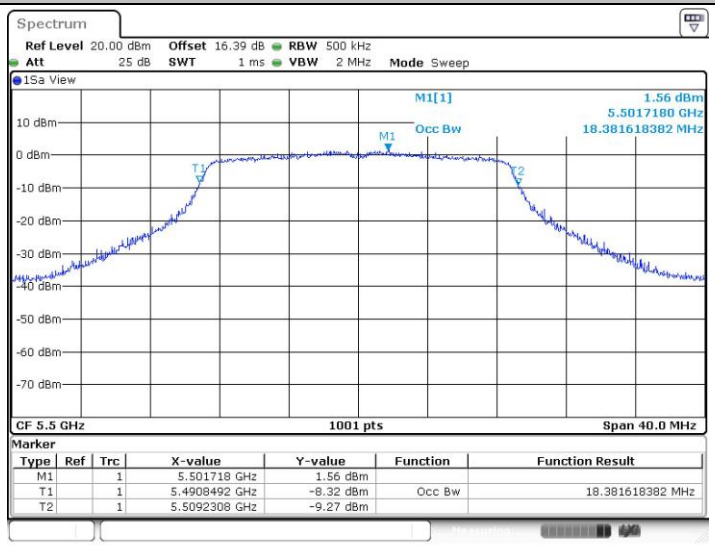

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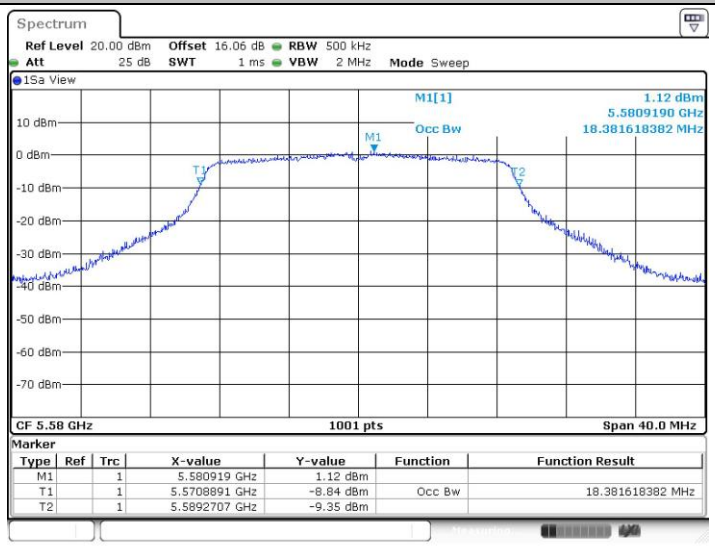

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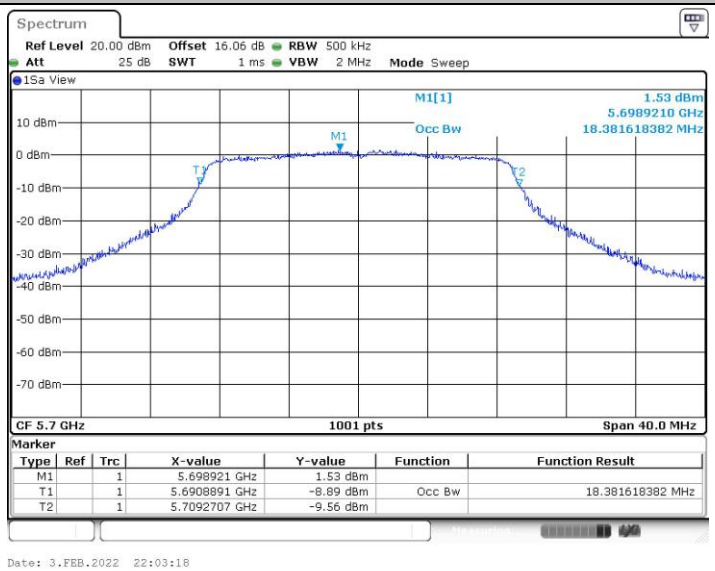

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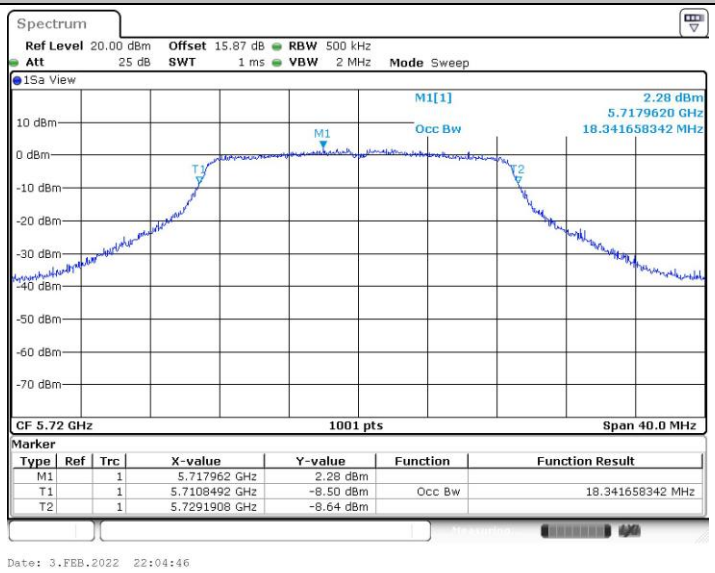

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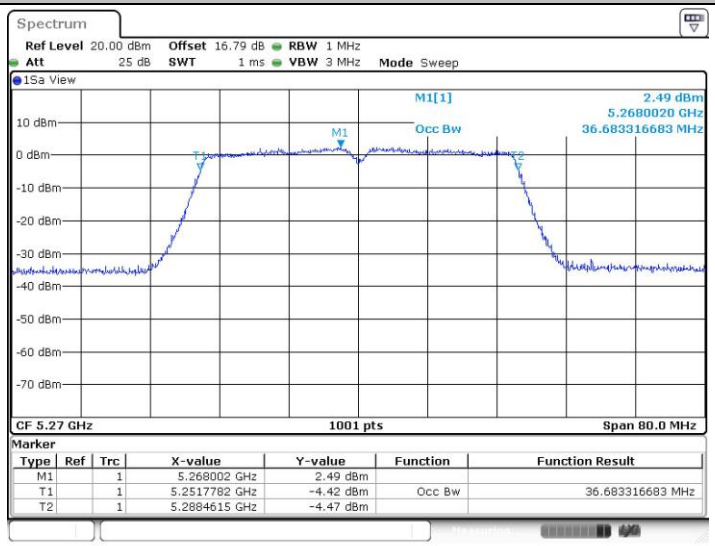

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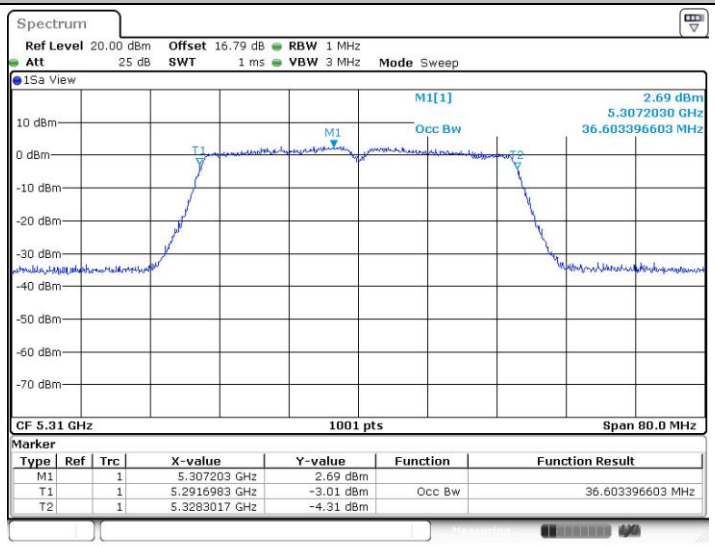

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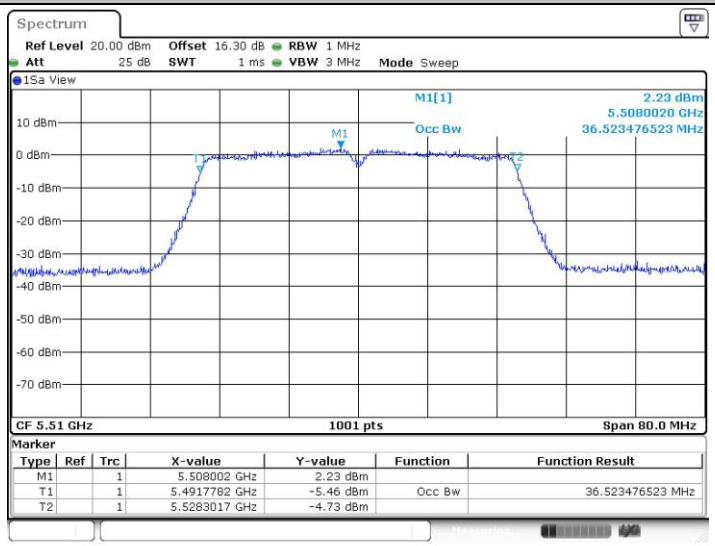

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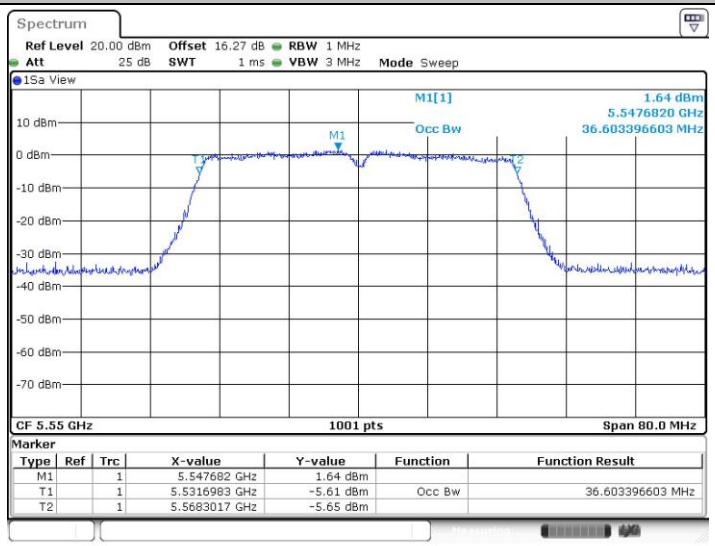

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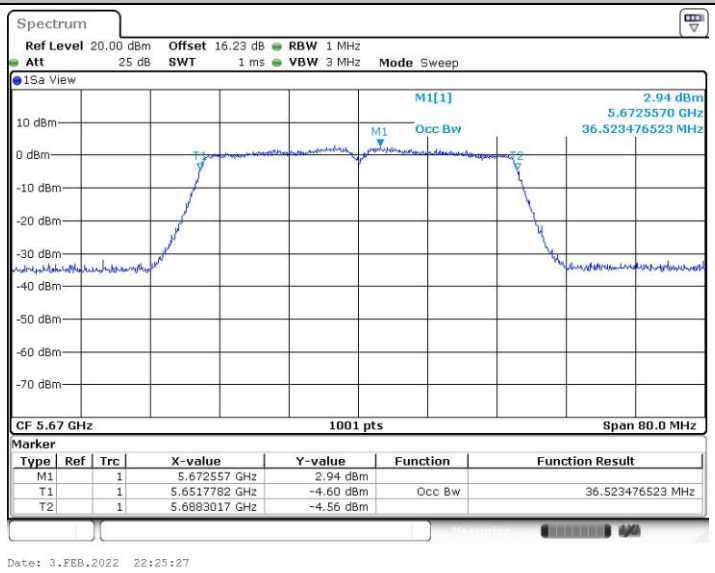

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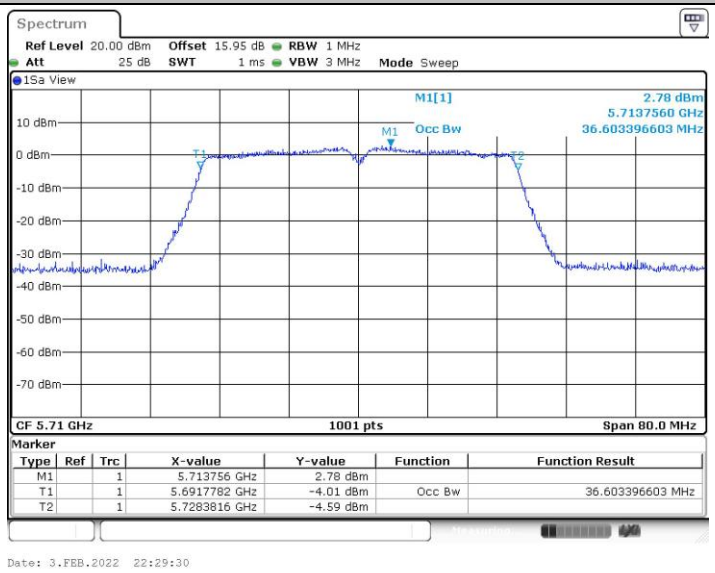

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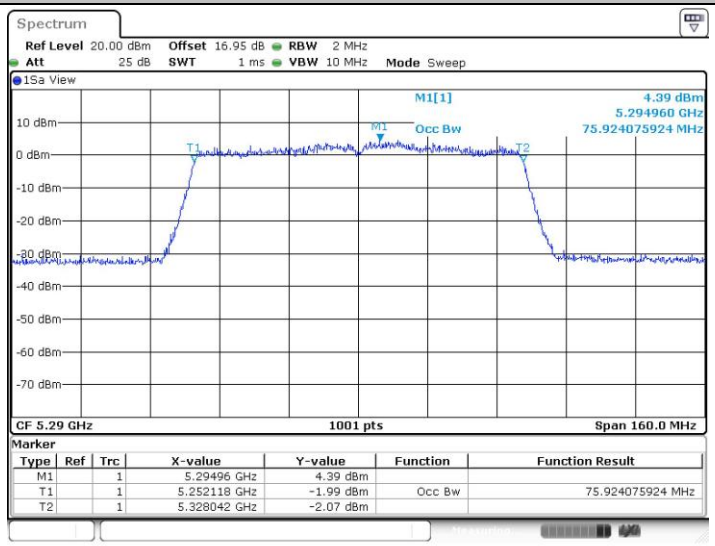

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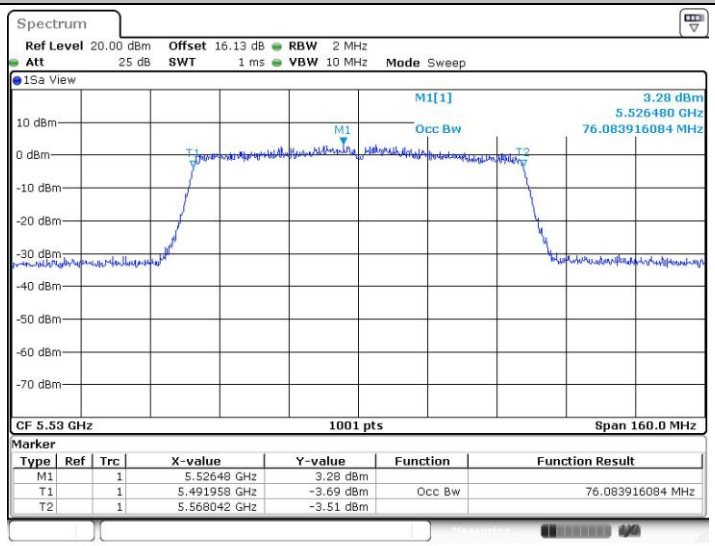

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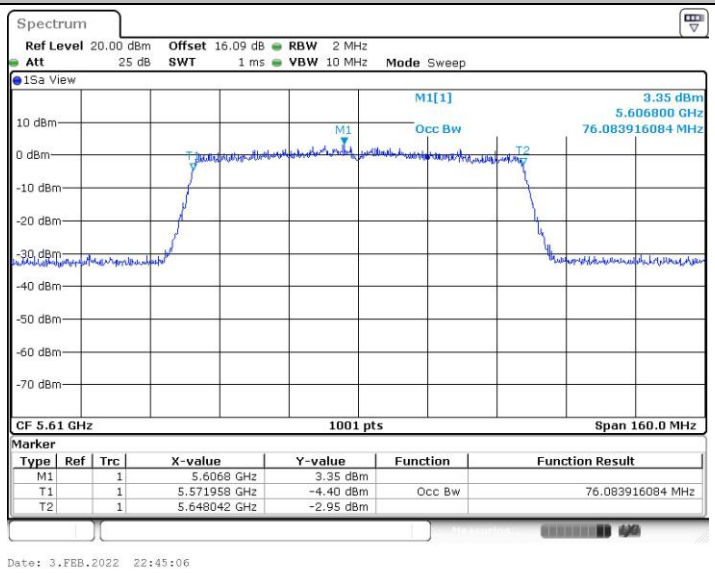

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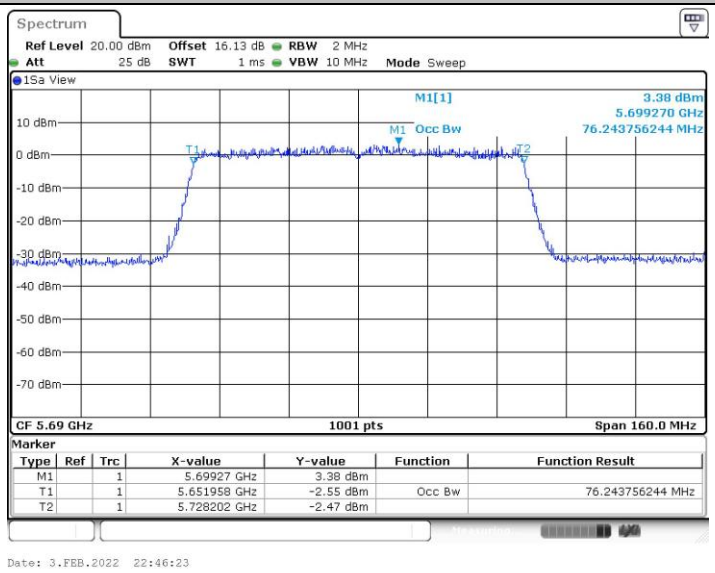
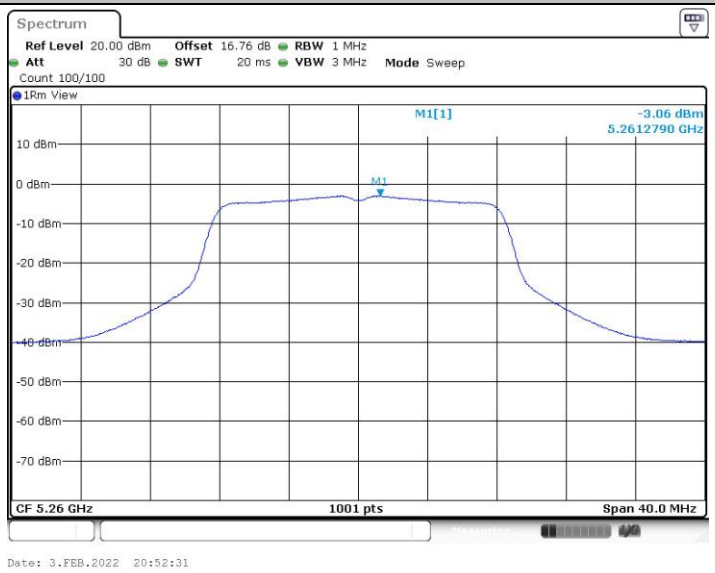


Maximum power spectral density

Test Result

TestMode	Antenna	Frequency[MHz]	Result [dBm/MHz]	Limit[dBm/MHz]	Verdict
11A	Ant1	5260	-3.06	≤11.00	PASS
		5300	-2.67	≤11.00	PASS
		5320	-3.3	≤11.00	PASS
		5500	-3.49	≤11.00	PASS
		5580	-3.99	≤11.00	PASS
		5700	-3.32	≤11.00	PASS
		5720_UNII-2C	-3.1	≤11.00	PASS
		5720_UNII-3	-7.52	≤11.00	PASS
11N20SISO	Ant1	5260	-3.52	≤11.00	PASS
		5300	-3.16	≤11.00	PASS
		5320	-3.8	≤11.00	PASS
		5500	-3.93	≤11.00	PASS
		5580	-4.33	≤11.00	PASS
		5700	-3.69	≤11.00	PASS
		5720_UNII-2C	-3.55	≤11.00	PASS
		5720_UNII-3	-7.91	≤11.00	PASS
11N40SISO	Ant1	5270	-6.35	≤11.00	PASS
		5310	-6.2	≤11.00	PASS
		5510	-6.76	≤11.00	PASS
		5550	-7.12	≤11.00	PASS
		5670	-6.32	≤11.00	PASS
		5710_UNII-2C	-6.37	≤11.00	PASS
		5710_UNII-3	-11.25	≤11.00	PASS
11AC80SISO	Ant1	5290	-8.76	≤11.00	PASS
		5530	-10.06	≤11.00	PASS
		5610	-10.19	≤11.00	PASS
		5690_UNII-2C	-9.88	≤11.00	PASS
		5690_UNII-3	-14.15	≤11.00	PASS

Test Graphs

11A_Ant1_5260

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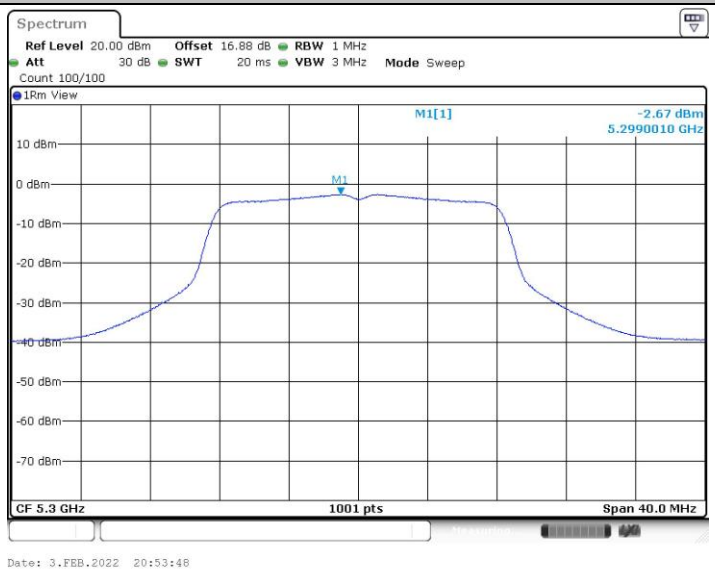

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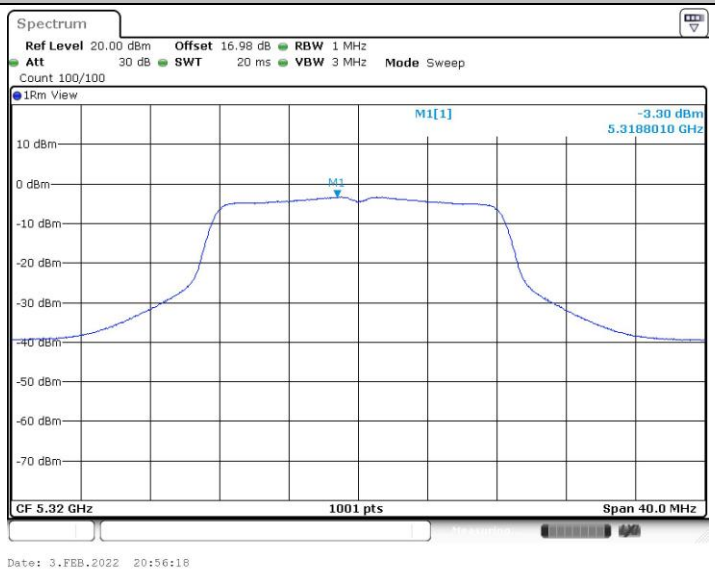

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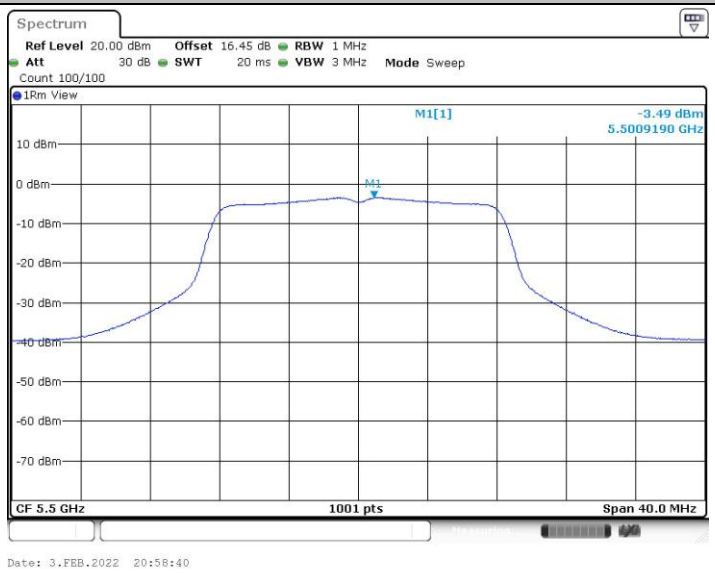

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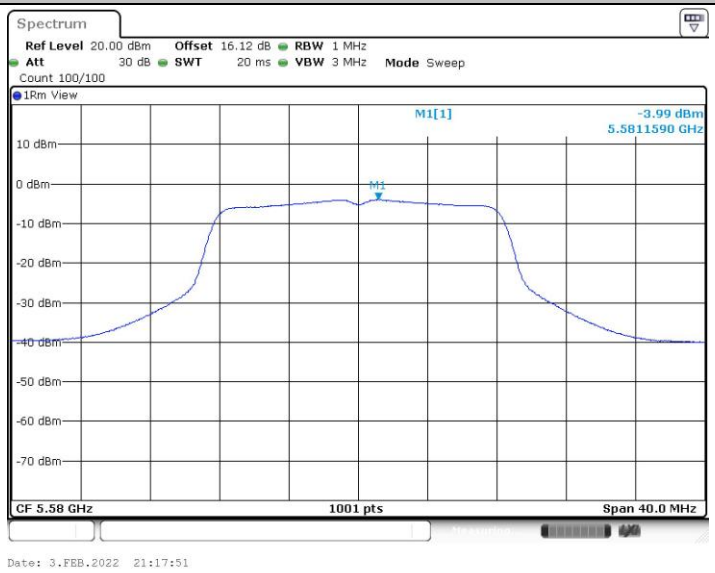

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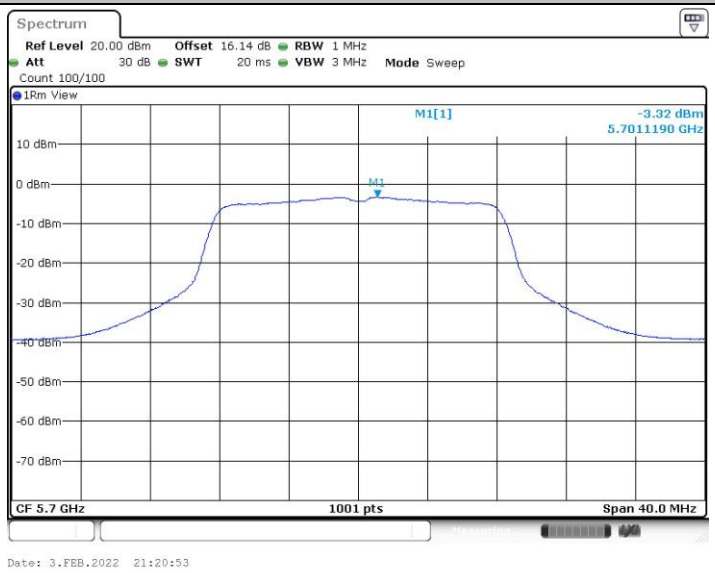

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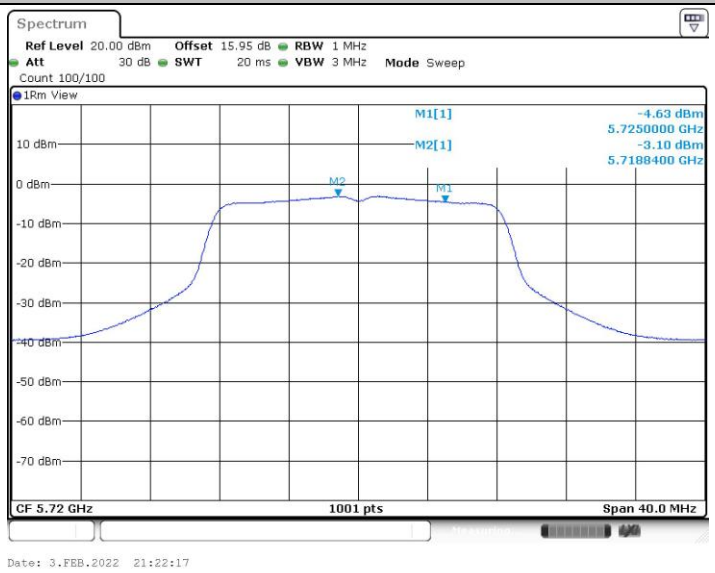

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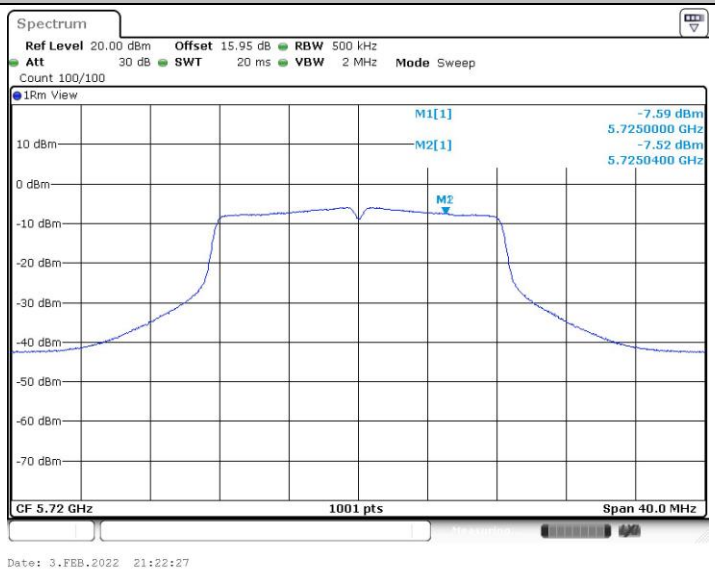

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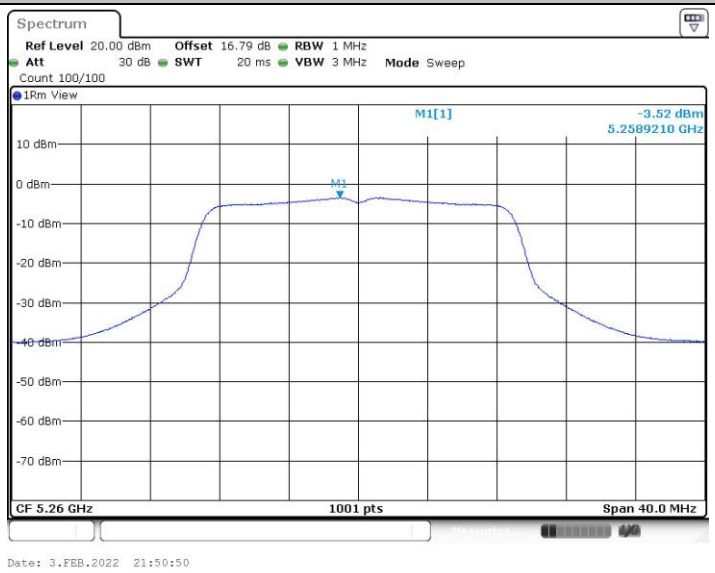

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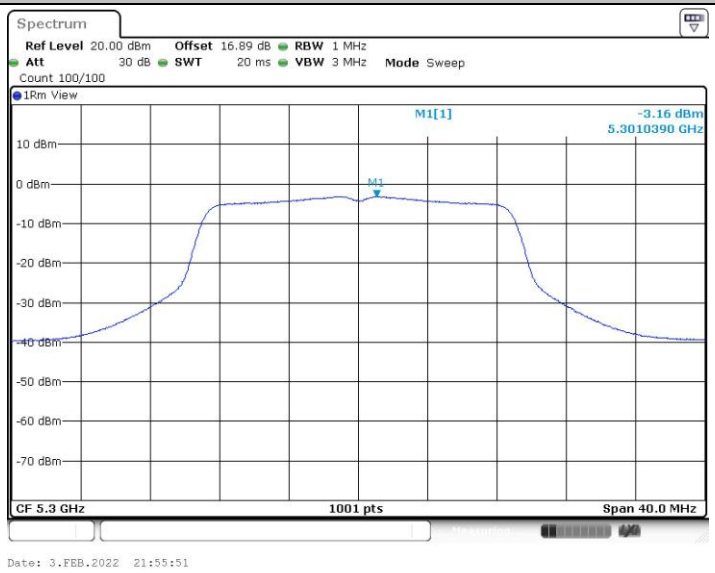

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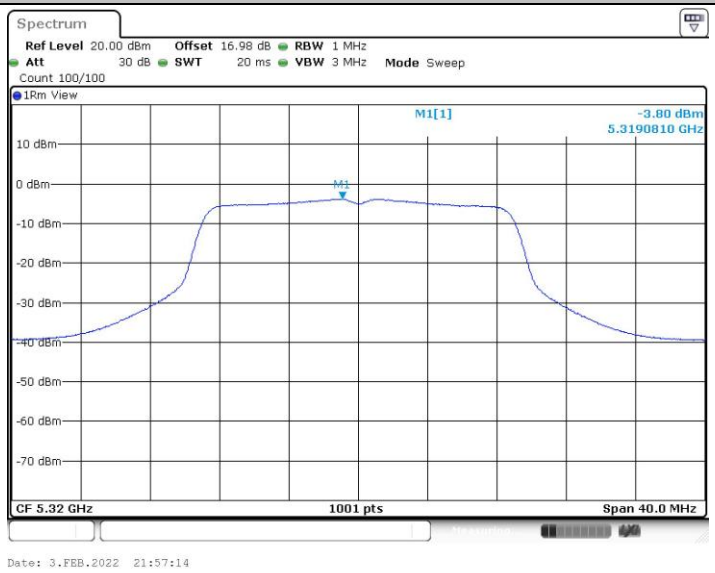

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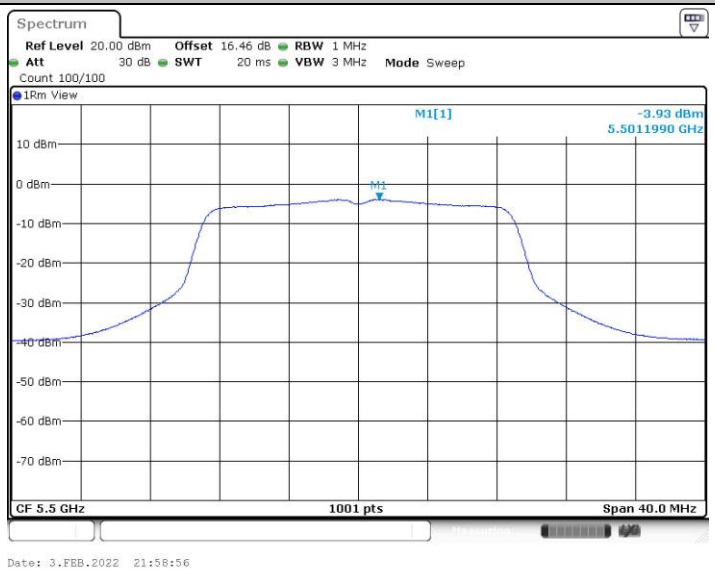

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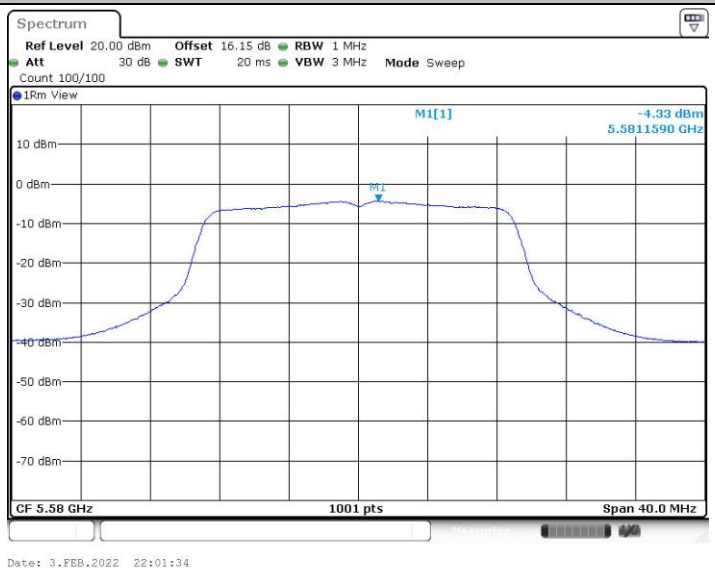

11N20SISO_Ant1_5700