



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



Sporton International Inc. (Kunshan)

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People's Republic of China



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REVISION HISTORY

REPORT NO.	VERSION	DESCRIPTION	ISSUED DATE
FR192411-04C	Rev. 01	Initial issue of report	Jul. 12, 2022



SUMMARY OF TEST RESULT

Report Section	FCC Rule	Description	Limit for U-NII-1	Limit for U-NII-3	Result	Remark
3.1	2.1049 & 15.403(i)	6dB, 26dB & 99% 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	≤ 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 4.00 dB at 5141.120 MHz
3.5	15.207	AC Conducted Emission	15.207(a)	15.207(a)	Pass	Under limit 26.69 dB at 0.431 MHz
3.6	15.203 & 15.407(a)	Antenna Requirement	N/A	N/A	Pass	-

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	2AG0Z-J93
SW Version	QCAHLSWMTPLZ-1.473021.1
EUT Stage	Identical Prototype

Remark:

1. The above EUT's information was declared by manufacturer. Please refer to the specifications or user's manual for more detailed description.
2. The sample 1 is Antenna with no glue, the sample 2 is Antenna with UV glue, Stylus magnet tip, and second source memory supplier and the sample 3 is Antenna with no glue, alternate source antenna vendor (same design, another vendor), LED Flex S-bend design, integrated shield can. According to the difference, we choose the sample 1 to full test and the sample 3 is verified for harmonic and the sample 2 is verified worse cases between sample 1 and sample 3.

1.3 Product Specification of Equipment Under Test

Standards-related Product Specification	
Tx/Rx Frequency Range	5180 MHz ~ 5240 MHz 5745 MHz ~ 5825 MHz
Maximum Output Power to Antenna	<5180 MHz ~ 5240 MHz> 802.11a : 9.36 dBm / 0.0086 W 802.11n HT20 : 9.26 dBm / 0.0084 W 802.11n HT40 : 9.36 dBm / 0.0086 W 802.11ac VHT20: 9.19 dBm / 0.0083 W 802.11ac VHT40: 9.33 dBm / 0.0086 W 802.11ac VHT80: 9.28 dBm / 0.0085 W <5745 MHz ~ 5825 MHz> 802.11a : 8.61 dBm / 0.0073 W 802.11n HT20 : 8.47 dBm / 0.0070 W 802.11n HT40 : 8.60 dBm / 0.0072 W 802.11ac VHT20: 8.42 dBm / 0.0070 W 802.11ac VHT40: 8.56 dBm / 0.0072 W 802.11ac VHT80: 8.23 dBm / 0.0067 W
99% Occupied Bandwidth	<5180 MHz ~ 5240 MHz> 802.11a : 17.303 MHz 802.11n HT20 : 18.382 MHz 802.11n HT40 : 36.683 MHz 802.11ac VHT80 : 76.244 MHz <5745 MHz ~ 5825 MHz> 802.11a : 17.303 MHz 802.11n HT20 : 18.422 MHz 802.11n HT40 : 36.683 MHz 802.11ac VHT80 : 76.244 MHz
Antenna Type / Gain	<5180 MHz ~ 5240 MHz> FPC antenna with gain 2.49 dBi <5745 MHz ~ 5825 MHz> FPC antenna with gain 3.09 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 802.11n HT20/ HT40 by referring to their higher 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 TH01-KS	CN1257	314309

1.6 Test Software

Item	Site	Manufacturer	Name	Version
1.	03CH07-KS	AUDIX	E3	6.2009-8-24al
2.	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)
5745-5825 MHz U-NII-3	149	5745	157	5785
	151*	5755	159*	5795
	153	5765	161	5805
	155 [#]	5775	165	5825

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

AC Conducted Emission	Mode 1 : nRF Tx+WLAN Tx(5G)+USB Cable 1(Charging from Adapter)
Simultaneous transmission	
802.11ac VHT80 CH42 Tx + nRF Bypss Mode CH38 Tx	
Remark: For Radiated Test Cases, The tests were performed with Adapter.	

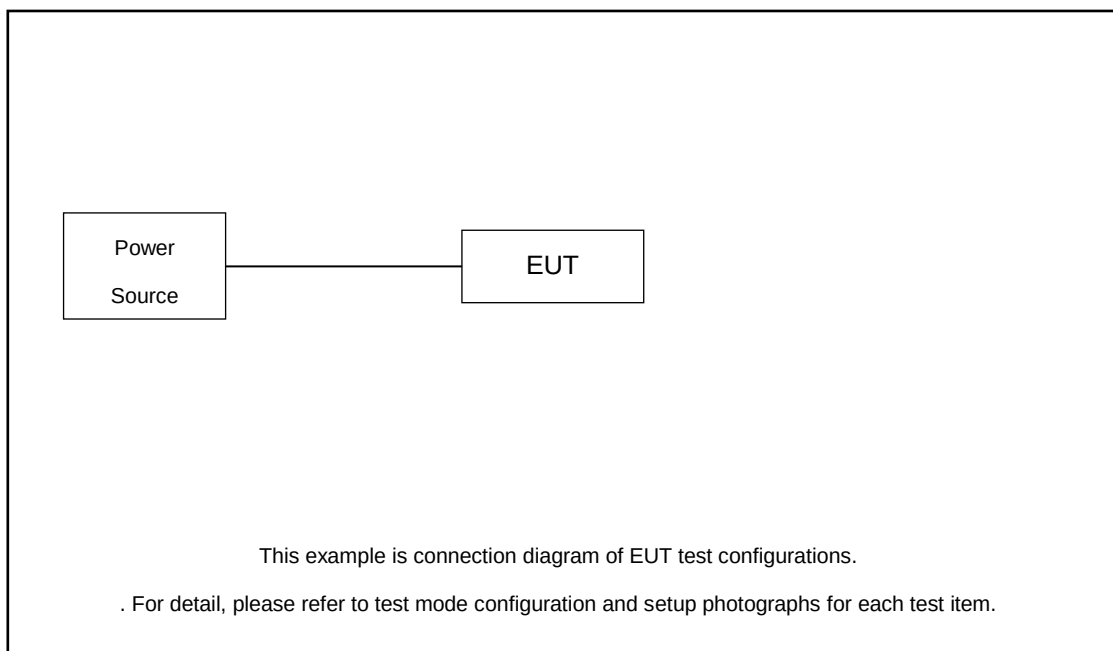
Ch. #		U-NII-1 5180-5240 MHz	U-NII-3 5745-5825 MHz
		802.11a	802.11a
L	Low	36	149
M	Middle	44	157
H	High	48	165

Ch. #		U-NII-1 5180-5240 MHz	U-NII-3 5745-5825 MHz
		802.11n HT20	802.11n HT20
L	Low	36	149
M	Middle	44	157
H	High	48	165

Ch. #		U-NII-1 5180-5240 MHz	U-NII-3 5745-5825 MHz
		802.11n HT40	802.11n HT40
L	Low	38	151
M	Middle	-	-
H	High	46	159

Ch. #		U-NII-1 5180-5240 MHz	U-NII-3 5745-5825 MHz
		802.11ac VHT80	802.11ac VHT80
L	Low	-	-
M	Middle	42	155
H	High	-	-

2.3 Connection Diagram of Test System



2.4 EUT Operation Test Setup

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

2.5 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 6.75 dB and 10dB attenuator.

$$\begin{aligned}\text{Offset(dB)} &= \text{RF cable loss(dB)} + \text{attenuator factor(dB)} \\ &= 6.75 + 10 = 16.75 \text{ (dB)}\end{aligned}$$

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

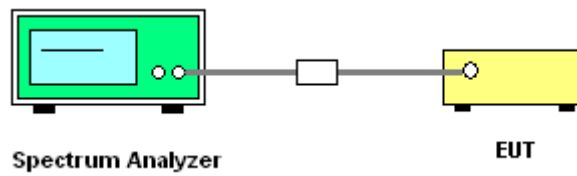
The measuring equipment is listed in the section 4 of this test report.

3.1.3 Test Procedures

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

☒	Section C) Bandwidth Measurement 1. Emission Bandwidth (EBW)
	- Set RBW = approximately 1% of the emission bandwidth. - Set the VBW > RBW. - Detector = Peak. - Trace mode = max hold - 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%. - For 99% Bandwidth Measurement, the spectrum analyzer's resolution bandwidth (RBW) is set 1MHz and set the Video bandwidth (VBW) $\geq 3 * RBW$. - 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
	- Set RBW = 100kHz. - Set the VBW $\geq 3 \times RBW$. - Detector = Peak. - Trace mode = max hold - Measure the maximum width of the emission that is 6 dB down from the peak of the emission. - 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 band 5.725–5.85 GHz, the maximum conducted output power over the frequency band of operation shall not exceed 1 W.

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.

3.2.2 Measuring Instruments

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

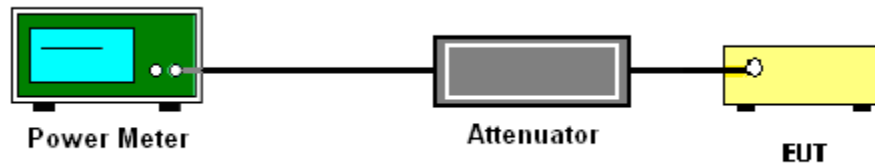
3.2.3 Test Procedures

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.

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

If transmitting antennas of directional gain greater than 6 dBi are used, 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 5.15 - 5.25

Method SA-2

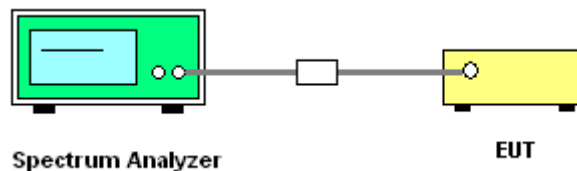
(trace averaging across on and off times of the EUT transmissions, followed by duty cycle correction).

- Measure the duty cycle.
- Set span to encompass the entire emission bandwidth (EBW) of the signal.
- Set RBW = 1 MHz.
- Set VBW $\geq$ 3 MHz.
- Number of points in sweep $\geq$ 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 5.725 - 5.85 GHz**# 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 = 500 kHz.
 - 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.
 - 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 Part 15.205.

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.
- (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	68.3

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

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

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 $\geq$ 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 $\geq$ 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.

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

- RBW = 1 MHz
- VBW = 3 MHz
- Detector = power averaging (rms), set span/(# of points in sweep) $\geq$ RBW/2.
- Averaging type = power averaging(RMS)
- The correction factor shall be offset is 10 log (1/x), where x is the duty cycle.

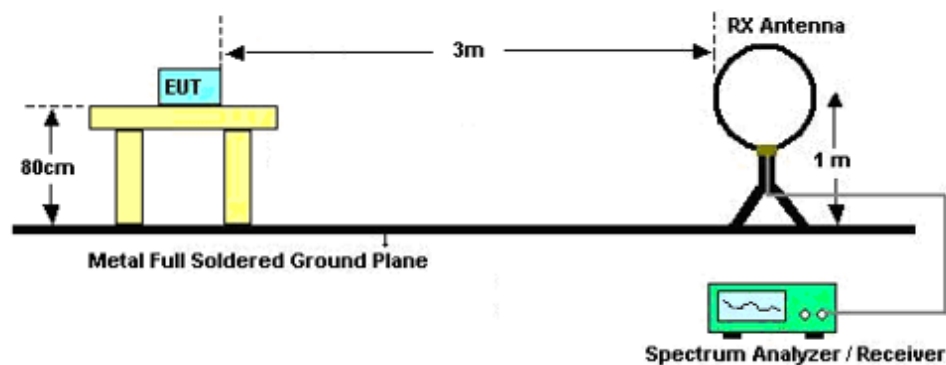
2. The EUT was placed on a turntable with 0.8 meter for frequency below 1GHz and 1.5 meter for frequency above 1GHz respectively above ground.
3. The EUT was set 3 meters from the interference receiving antenna which was mounted on the top of a variable height antenna tower.
4. The antenna is a broadband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

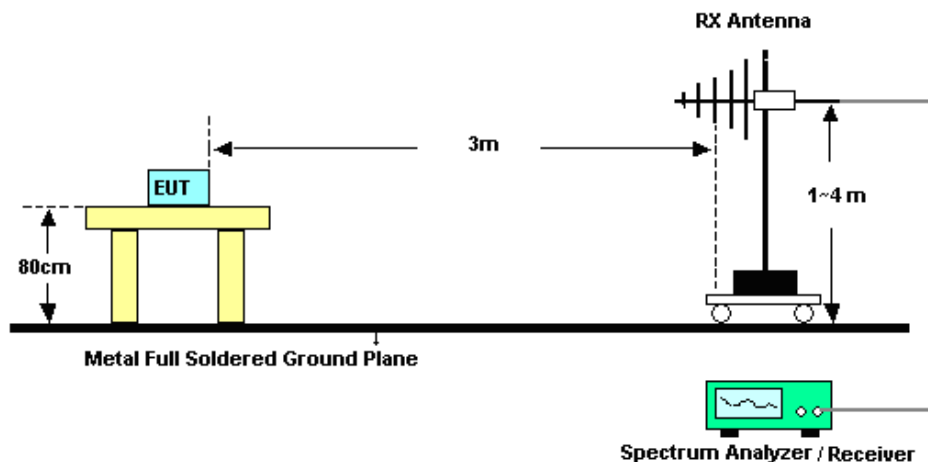
5. For each suspected emission, the EUT was arranged to its worst case and then adjust the antenna tower (from 1 m to 4 m) and turntable (from 0 degree to 360 degrees) to find the maximum reading.
6. For testing below 1GHz, if the emission level of the EUT in peak mode was 3 dB lower than the limit specified, 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





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 (dB μ V)	
	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.

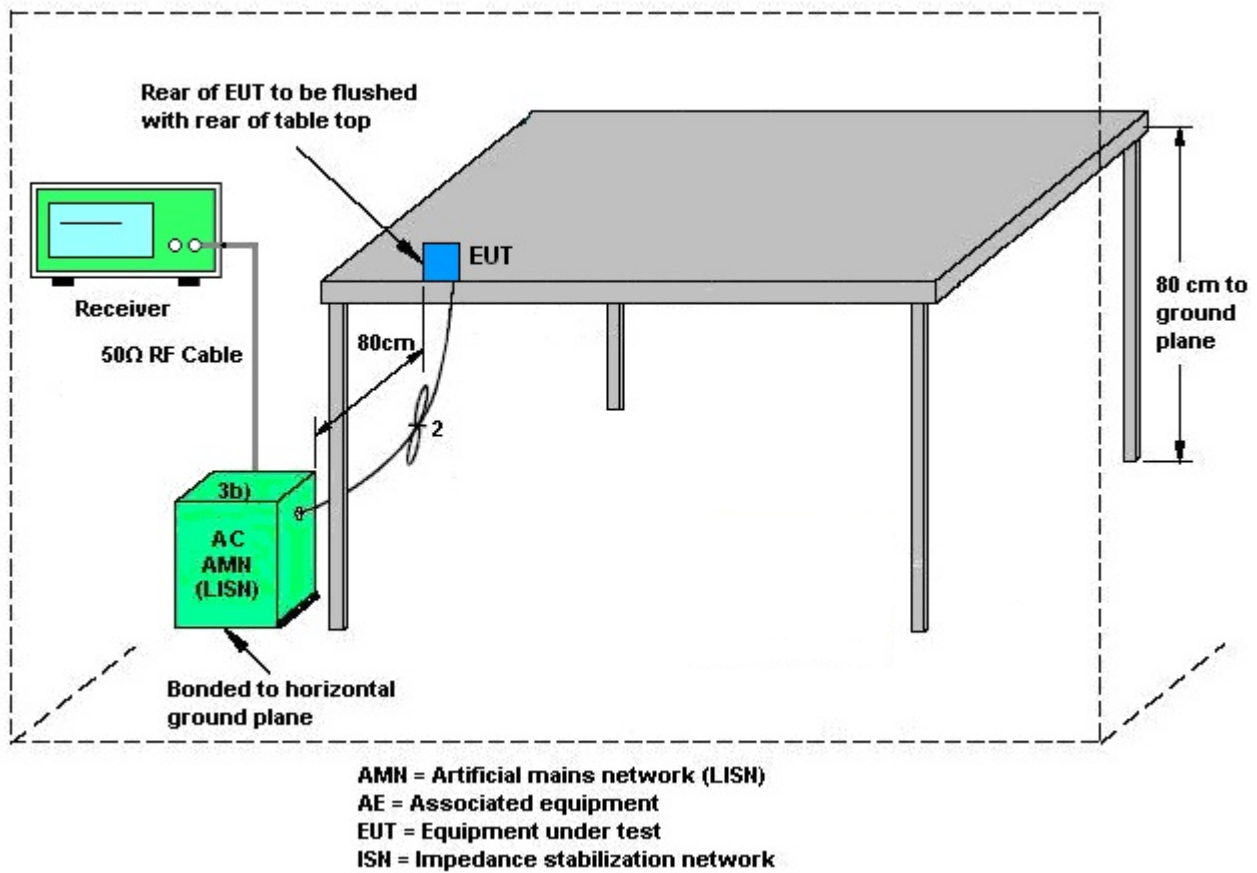
3.5.2 Measuring Instruments

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
Spectrum Analyzer	R&S	FSV40	101040	10Hz~40GHz	Oct. 14, 2021	Feb. 03, 2022	Oct. 13, 2022	Conducted (TH01-KS)
Pulse Power Sensor	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)
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	R&S	ENV216	100334	9kHz~30MHz	Oct. 14, 2021	Jun. 11, 2022	Oct. 13, 2022	Conduction (CO01-KS)
AC Power Source	Chroma	61602	ABP000000811	AC 0V~300V, 45Hz~1000Hz	Oct. 14, 2021	Jun. 11, 2022	Oct. 13, 2022	Conduction (CO01-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	44483	30MHz~1GHz	Dec. 22, 2021	May 24, 2022	Dec. 21, 2022	Radiation (03CH07-KS)
Double Ridge Horn Antenna	ETS-Lindgren	3117	75957	1GHz~18GHz	Oct. 30, 2021	May 24, 2022	Oct. 29, 2022	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)
Amplifier	SONOMA	310N	413741	9KHz~1GHz	Jan. 05, 2022	May 24, 2022	Jan. 04, 2023	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	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)

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% ($U = 2Uc(y)$)	2.94 dB
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Uncertainty of Radiated Emission Measurement (30 MHz ~ 1000 MHz)

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

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

Measuring Uncertainty for a Level of Confidence of 95% ($U = 2Uc(y)$)	5.0 dB
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Uncertainty of Radiated Emission Measurement (18000 MHz ~ 40000 MHz)

Measuring Uncertainty for a Level of Confidence of 95% ($U = 2Uc(y)$)	5.0 dB
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Appendix A. Conducted Test Results

Report Number : FR192411-04C

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

TEST RESULTS DATA
Average Power Table

U-NII-1											
Mod.	Data Rate	NTX	CH.	Freq. (MHz)	Duty Factor (dB)	Average Conducted Power (dBm)	FCC Conducted Power Limit (dBm)	DG (dBi)			Pass/Fail
11a	6Mbps	1	36	5180	0.08	9.36	24.00	2.49			Pass
11a	6Mbps	1	44	5220	0.08	9.35	24.00	2.49			Pass
11a	6Mbps	1	48	5240	0.08	9.29	24.00	2.49			Pass
HT20	MCS0	1	36	5180	0.08	9.26	24.00	2.49			Pass
HT20	MCS0	1	44	5220	0.08	9.22	24.00	2.49			Pass
HT20	MCS0	1	48	5240	0.08	9.07	24.00	2.49			Pass
HT40	MCS0	1	38	5190	0.17	9.36	24.00	2.49			Pass
HT40	MCS0	1	46	5230	0.17	9.34	24.00	2.49			Pass
VHT20	MCS0	1	36	5180	0.08	9.19	24.00	2.49			Pass
VHT20	MCS0	1	44	5220	0.08	9.18	24.00	2.49			Pass
VHT20	MCS0	1	48	5240	0.08	9.04	24.00	2.49			Pass
VHT40	MCS0	1	38	5190	0.17	9.33	24.00	2.49			Pass
VHT40	MCS0	1	46	5230	0.17	9.31	24.00	2.49			Pass
VHT80	MCS0	1	42	5210	0.36	9.28	24.00	2.49			Pass

TEST RESULTS DATA
Average Power Table

U-NII-3										
Mod.	Data Rate	N _{TX}	CH.	Freq. (MHz)	Duty Factor (dB)	Average Conducted Power (dBm)	FCC Conducted Power Limit (dBm)	DG (dBi)		Pass/Fail
11a	6M bps	1	149	5745	0.08	8.61	30.00	3.09		Pass
11a	6Mbps	1	157	5785	0.08	8.29	30.00	3.09		Pass
11a	6Mbps	1	165	5825	0.08	8.04	30.00	3.09		Pass
HT20	MCS 0	1	149	5745	0.08	8.47	30.00	3.09		Pass
HT20	MCS 0	1	157	5785	0.08	8.13	30.00	3.09		Pass
HT20	MCS 0	1	165	5825	0.08	7.93	30.00	3.09		Pass
HT40	MCS 0	1	151	5755	0.17	8.60	30.00	3.09		Pass
HT40	MCS 0	1	159	5795	0.17	8.26	30.00	3.09		Pass
VHT20	MCS 0	1	149	5745	0.08	8.42	30.00	3.09		Pass
VHT20	MCS 0	1	157	5785	0.08	8.10	30.00	3.09		Pass
VHT20	MCS 0	1	165	5825	0.08	7.86	30.00	3.09		Pass
VHT40	MCS 0	1	151	5755	0.17	8.56	30.00	3.09		Pass
VHT40	MCS 0	1	159	5795	0.17	8.24	30.00	3.09		Pass
VHT80	MCS 0	1	155	5775	0.36	8.23	30.00	3.09		Pass



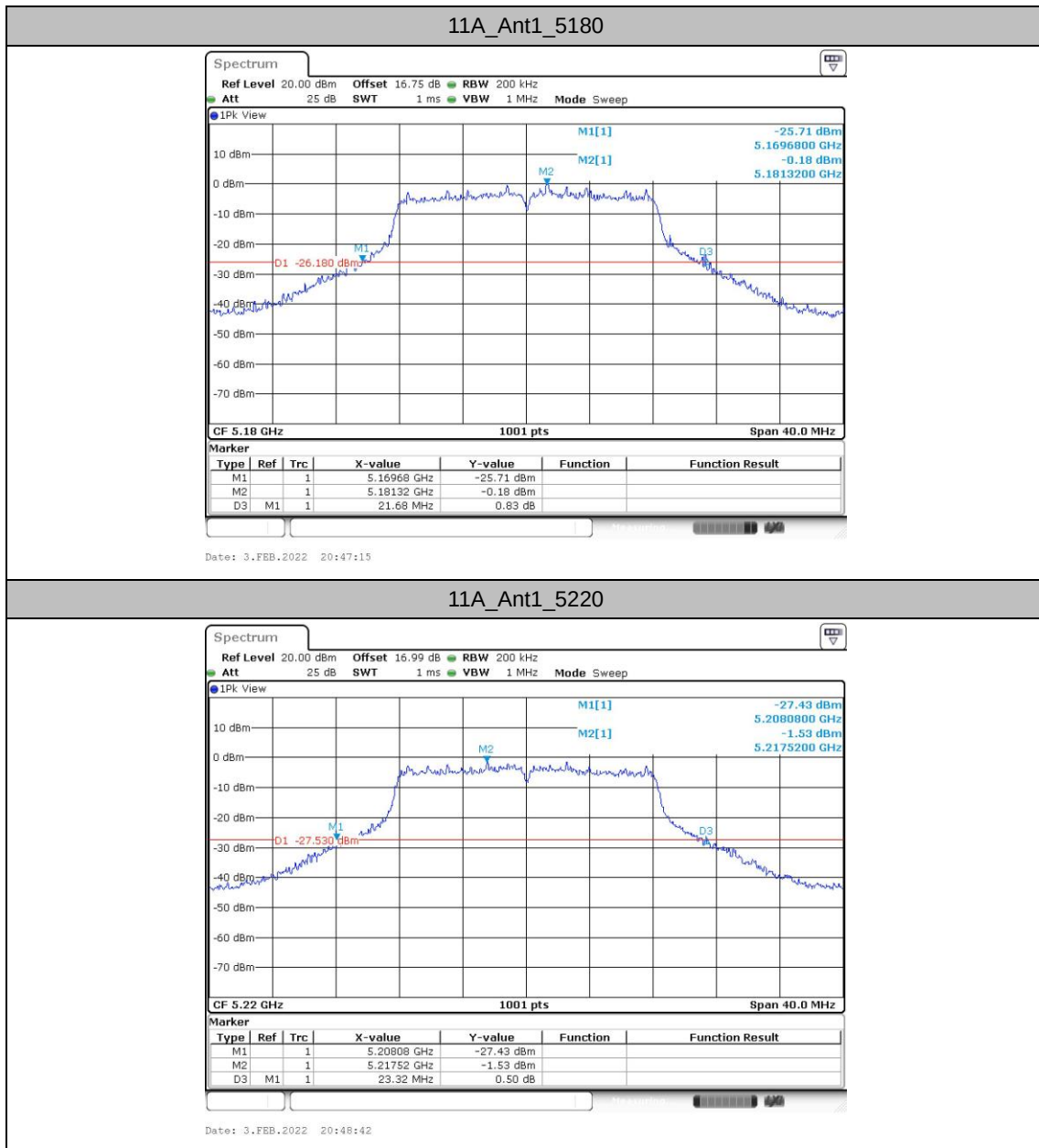
Emission Bandwidth

Test Result

TestMode	Antenna	Frequency[MHz]	26db EBW [MHz]	FL[MHz]	FH[MHz]	Limit[MHz]	Verdict
11A	Ant1	5180	21.68	5169.68	5191.36	---	---
		5220	23.32	5208.08	5231.40	---	---
		5240	22.28	5229.08	5251.36	---	---
		5745	21.60	5734.20	5755.80	---	---
		5785	22.28	5774.08	5796.36	---	---
		5825	22.60	5814.00	5836.60	---	---
11N20SISO	Ant1	5180	22.32	5169.04	5191.36	---	---
		5220	22.36	5209.00	5231.36	---	---
		5240	23.00	5228.80	5251.80	---	---
		5745	23.60	5733.08	5756.68	---	---
		5785	22.92	5773.64	5796.56	---	---
		5825	23.84	5813.68	5837.52	---	---
11N40SISO	Ant1	5190	41.60	5169.28	5210.88	---	---
		5230	42.16	5209.12	5251.28	---	---
		5755	41.92	5733.96	5775.88	---	---
		5795	42.16	5773.96	5816.12	---	---
11AC80SISO	Ant1	5210	83.68	5168.72	5252.40	---	---
		5775	83.68	5732.92	5816.60	---	---

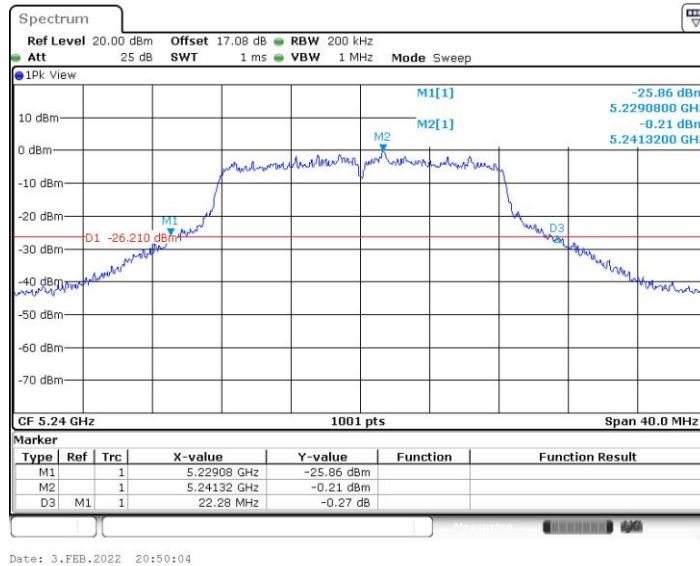


Test Graphs

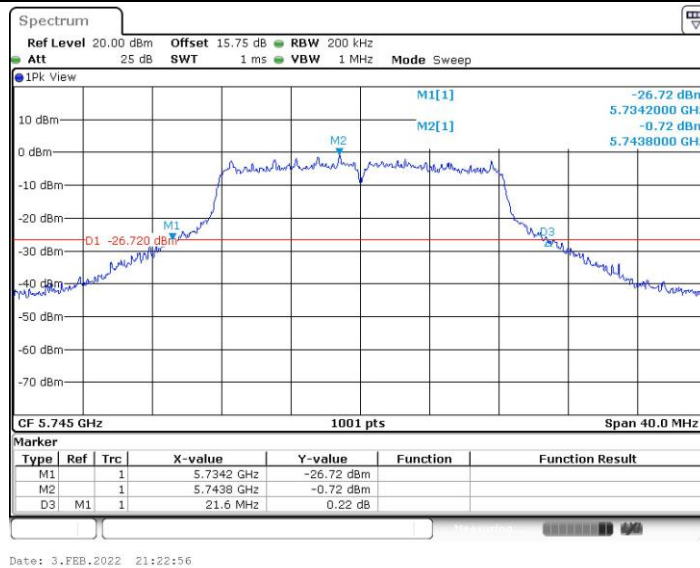




11A_Ant1_5240

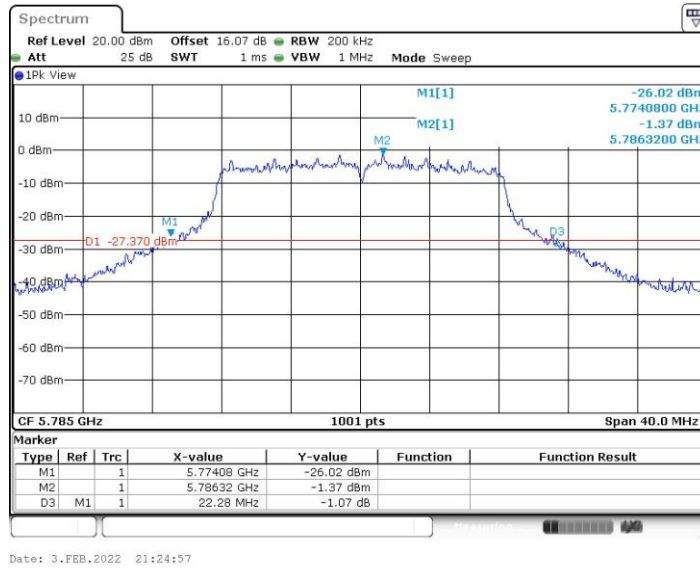


11A_Ant1_5745

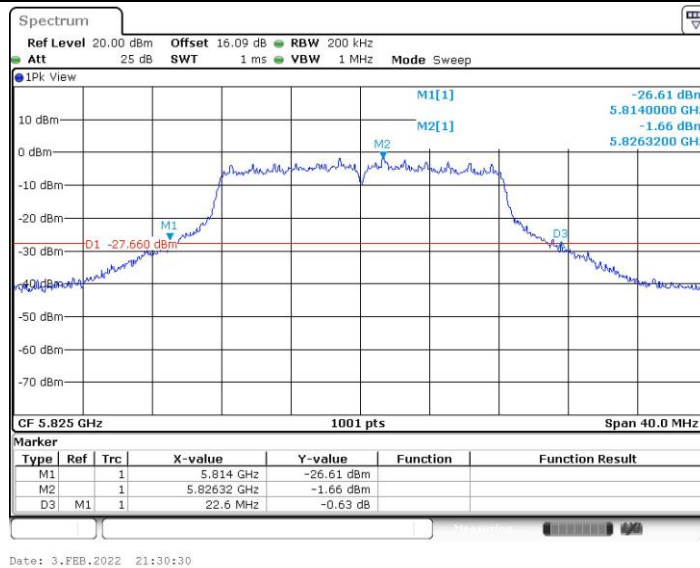




11A_Ant1_5785

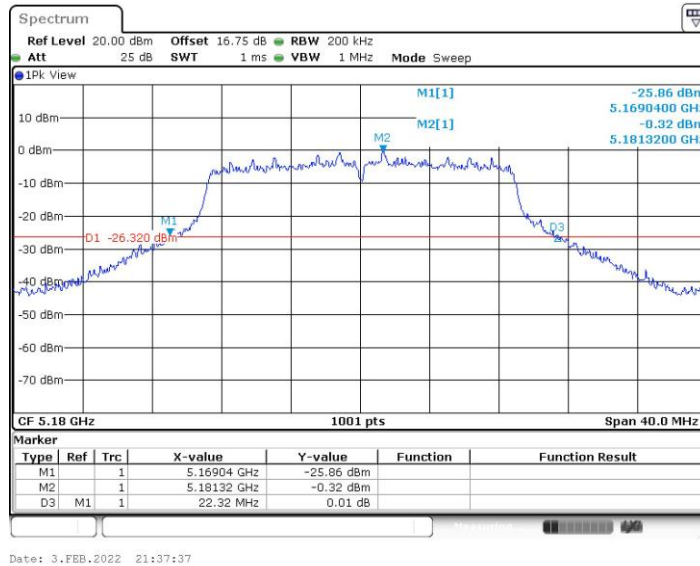


11A_Ant1_5825

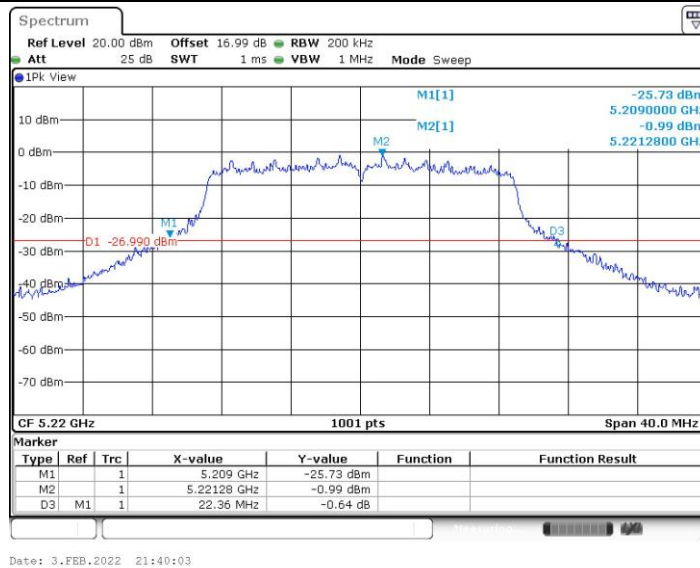




11N20SISO_Ant1_5180

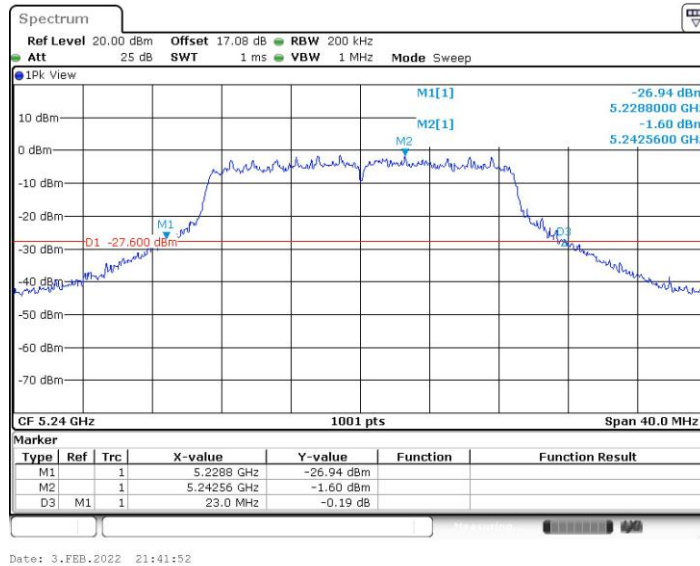


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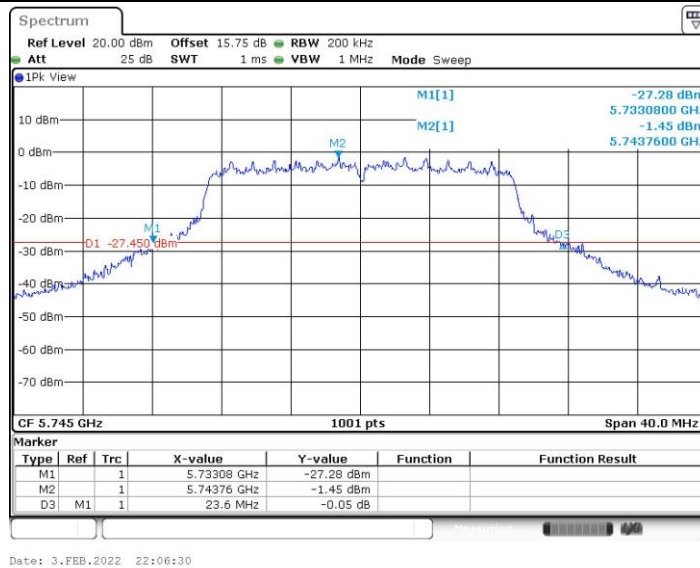




11N20SISO_Ant1_5240

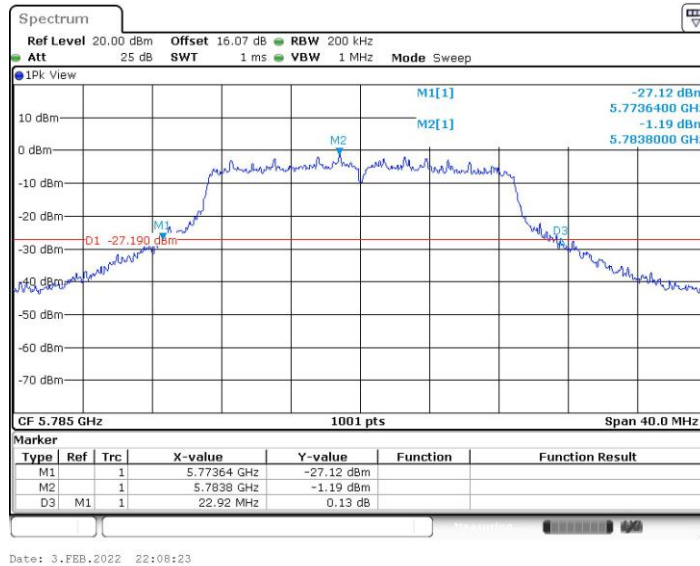


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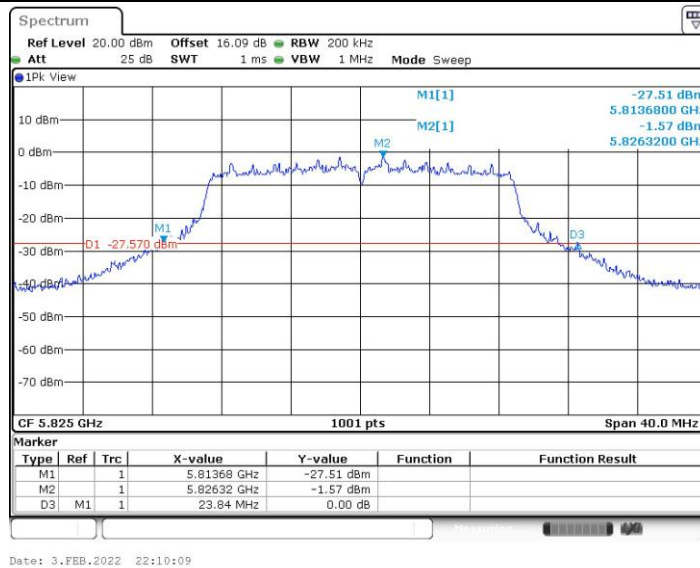




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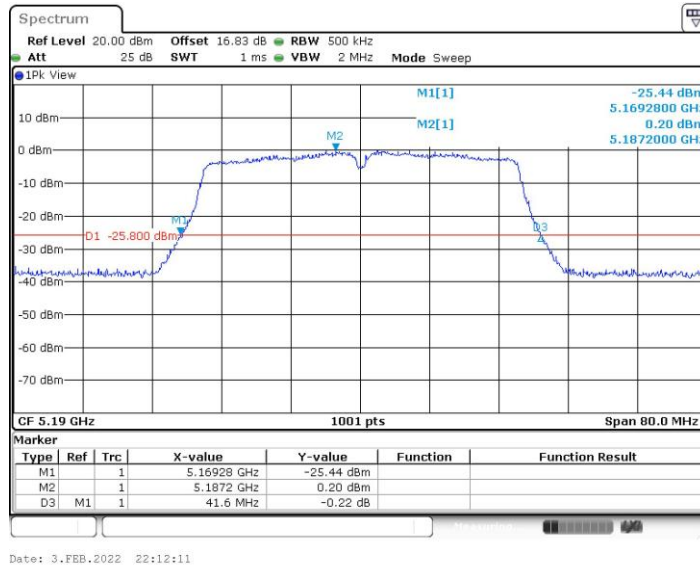


11N20SISO_Ant1_5825

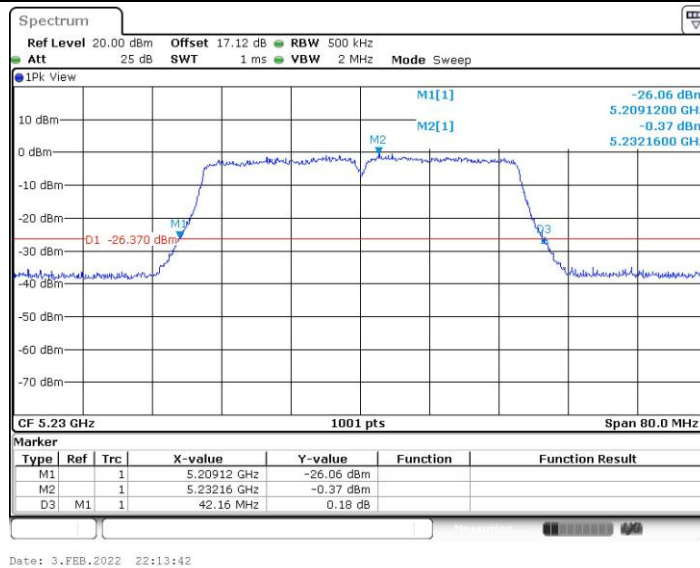




11N40SISO_Ant1_5190

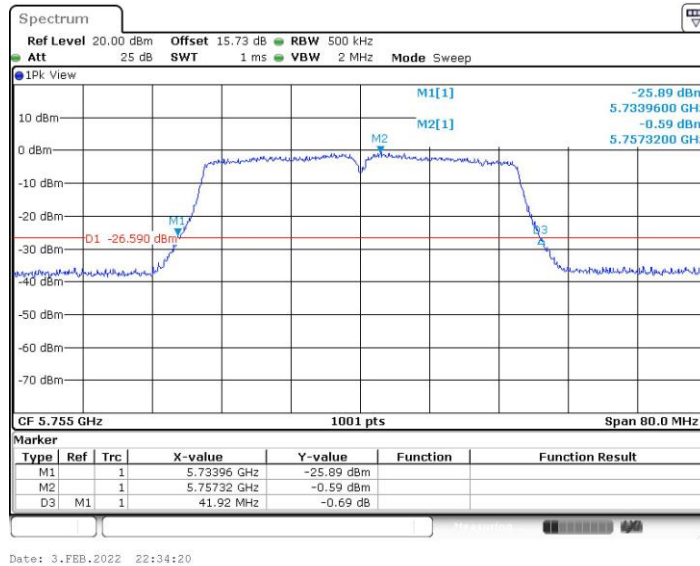


11N40SISO_Ant1_5230

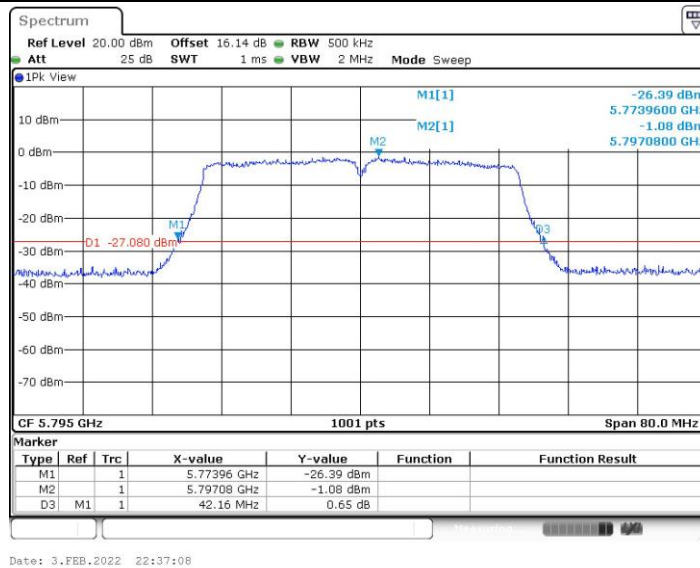


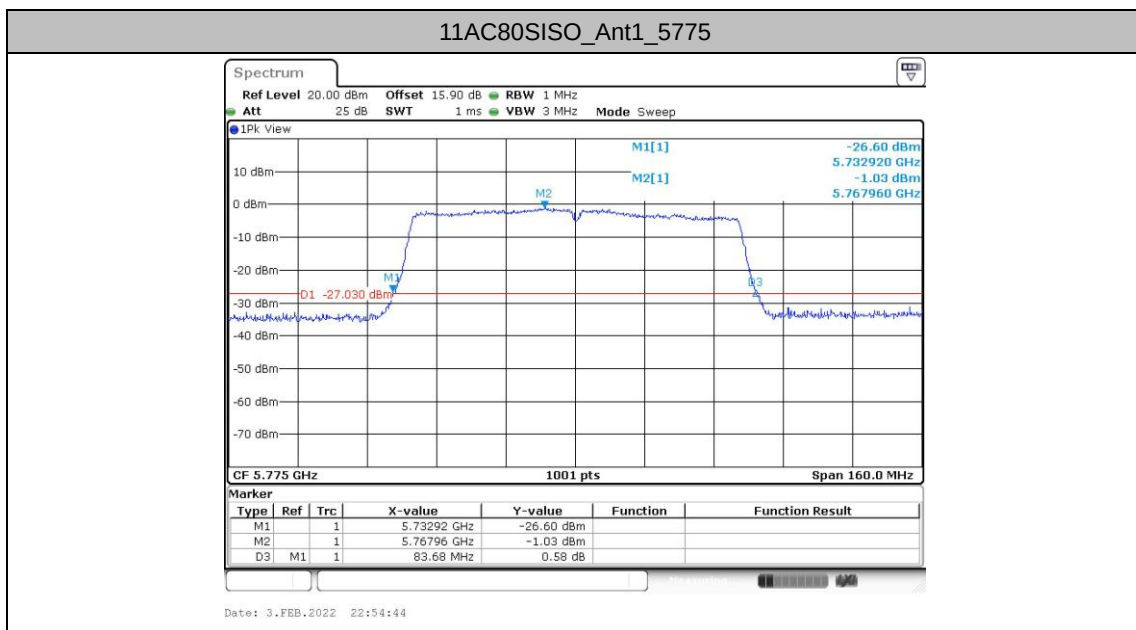
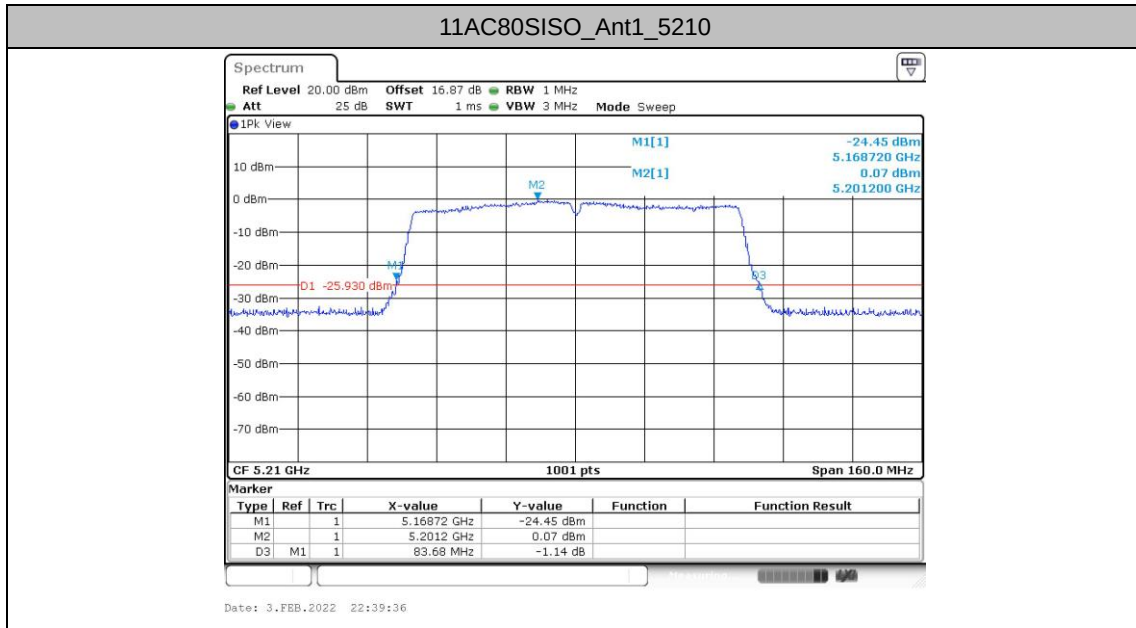


11N40SISO_Ant1_5755



11N40SISO_Ant1_5795







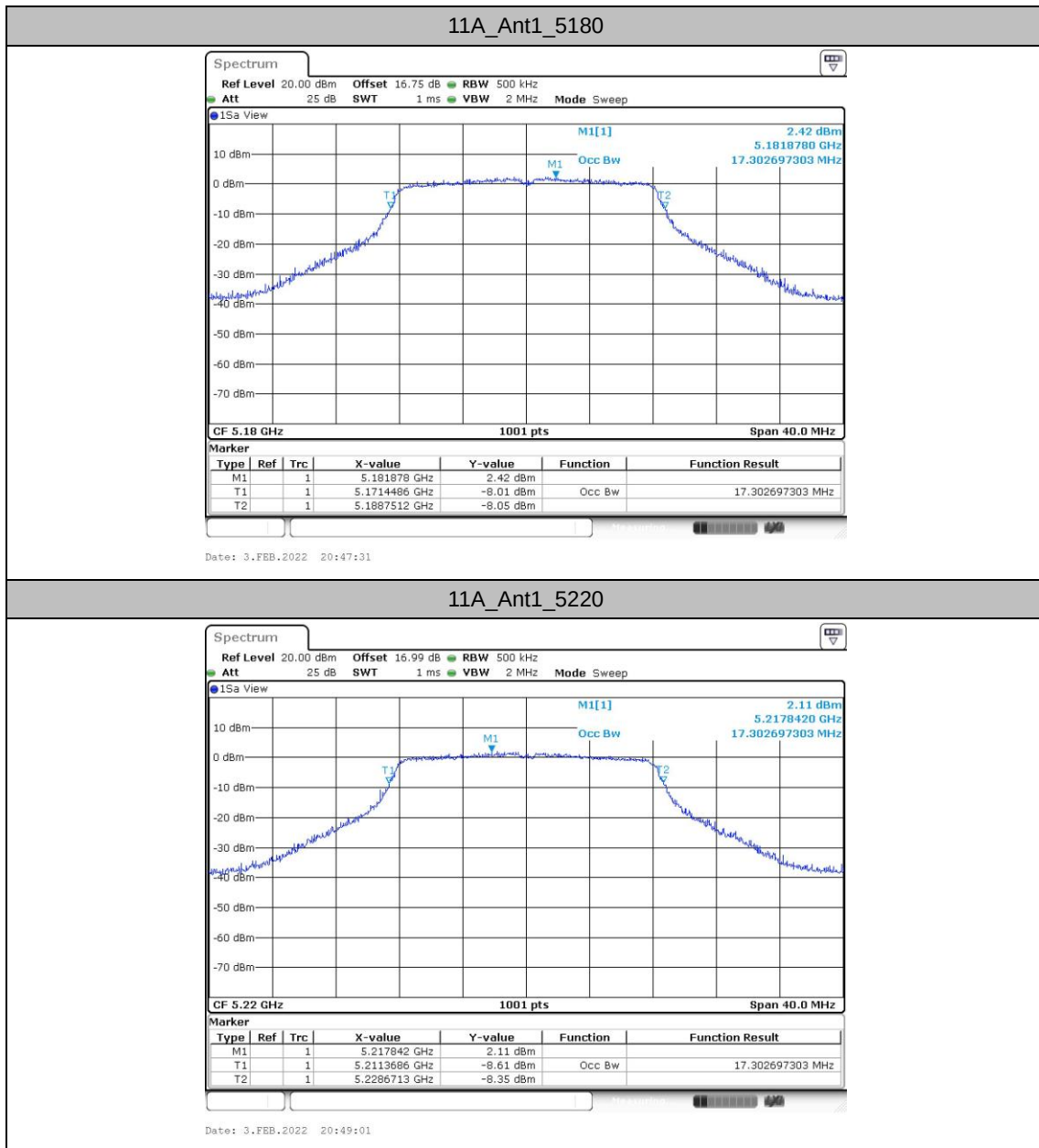
Occupied channel bandwidth

Test Result

TestMode	Antenna	Frequency[MHz]	OCB [MHz]	FL[MHz]	FH[MHz]	Limit[MHz]	Verdict
11A	Ant1	5180	17.303	5171.449	5188.751	---	---
		5220	17.303	5211.369	5228.671	---	---
		5240	17.223	5231.528	5248.751	---	---
		5745	17.263	5736.409	5753.671	---	---
		5785	17.303	5776.329	5793.631	---	---
		5825	17.303	5816.409	5833.711	---	---
11N20SISO	Ant1	5180	18.342	5170.929	5189.271	---	---
		5220	18.382	5210.809	5229.191	---	---
		5240	18.342	5230.929	5249.271	---	---
		5745	18.382	5735.849	5754.231	---	---
		5785	18.422	5775.769	5794.191	---	---
		5825	18.382	5815.849	5834.231	---	---
11N40SISO	Ant1	5190	36.444	5171.858	5208.302	---	---
		5230	36.683	5211.778	5248.462	---	---
		5755	36.523	5736.698	5773.222	---	---
		5795	36.683	5776.618	5813.302	---	---
11AC80SISO	Ant1	5210	76.244	5172.118	5248.362	---	---
		5775	76.244	5736.798	5813.042	---	---



Test Graphs

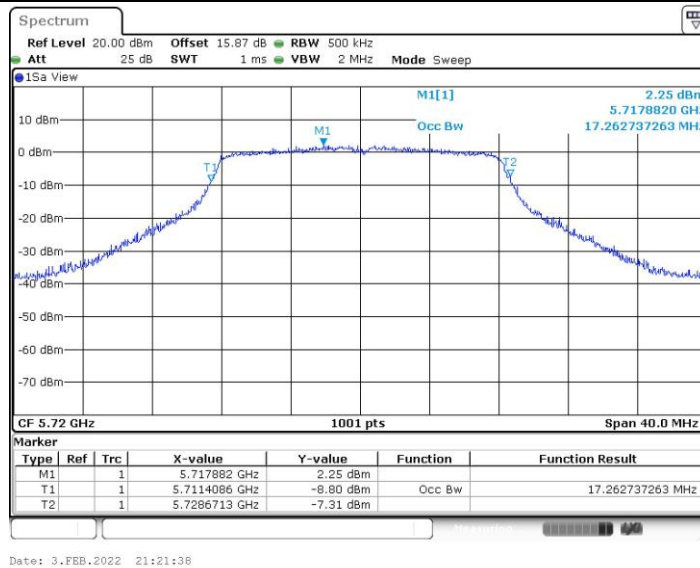




11A_Ant1_5240

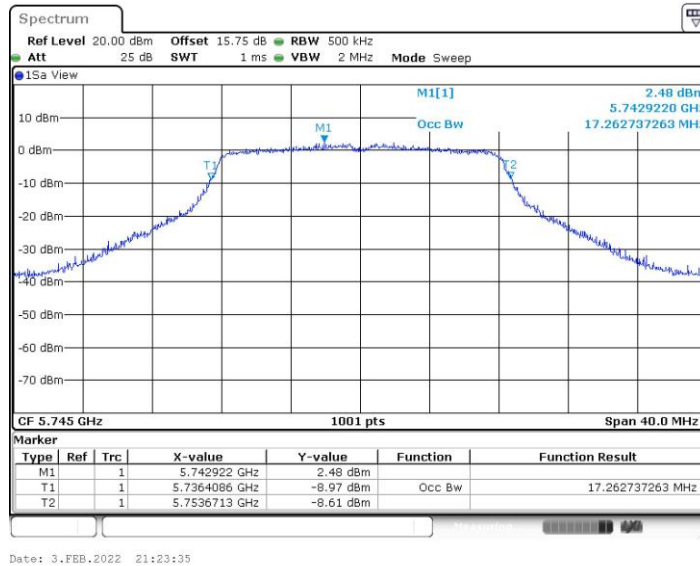


11A_Ant1_5720

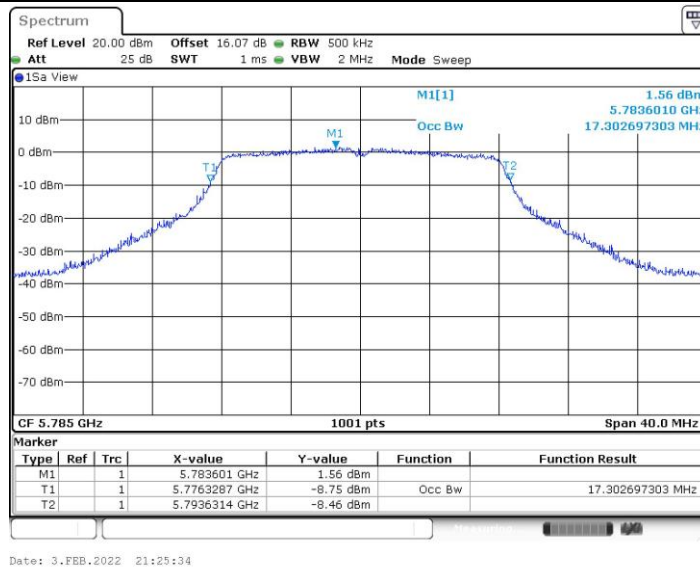




11A_Ant1_5745

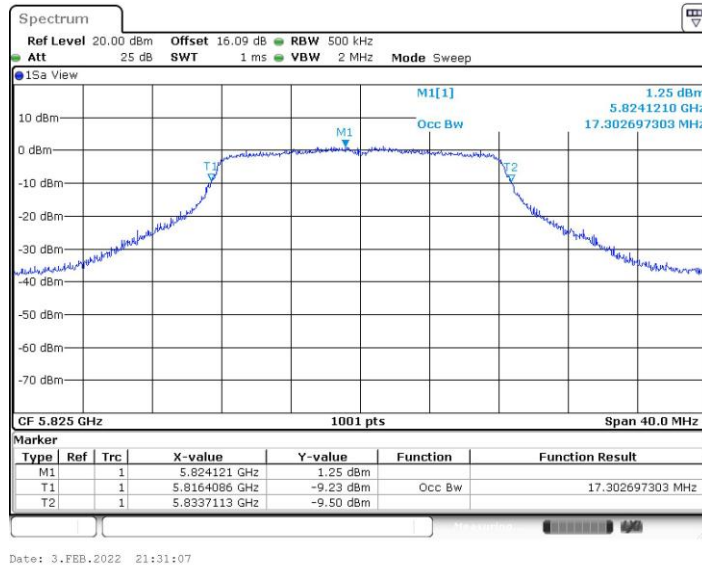


11A_Ant1_5785

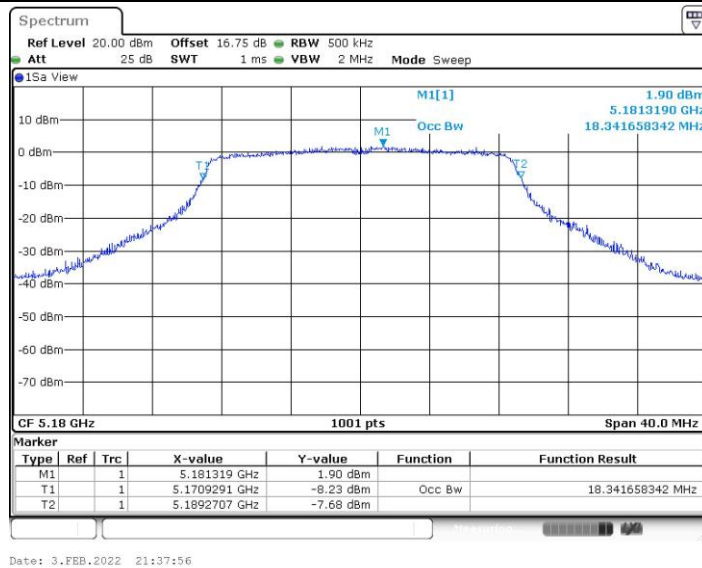




11A_Ant1_5825

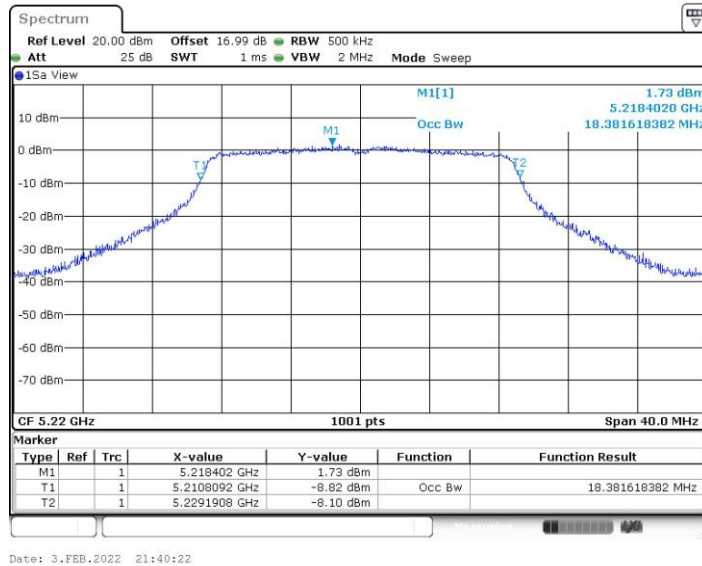


11N20SISO_Ant1_5180

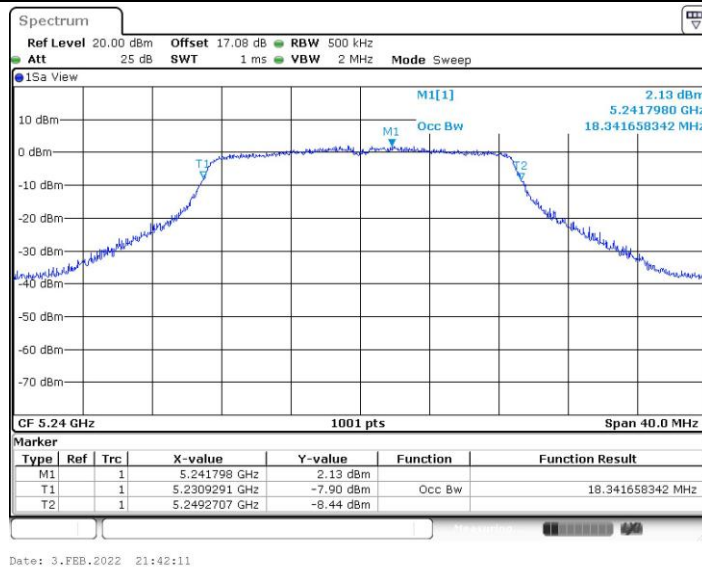




11N20SISO_Ant1_5220

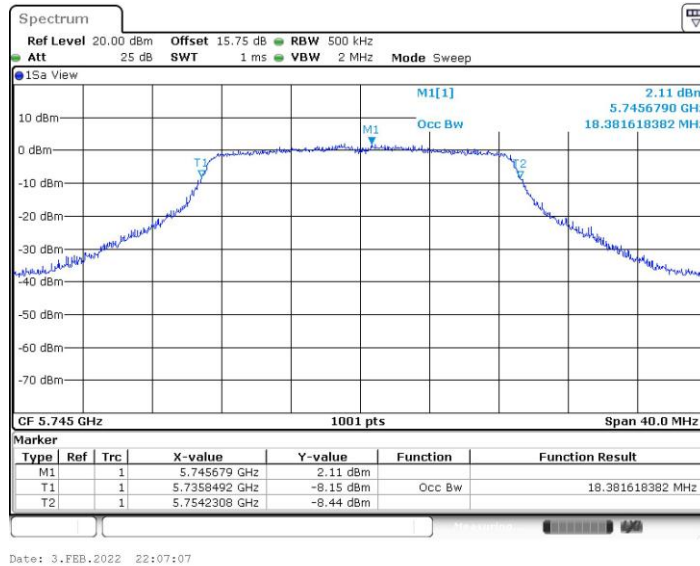


11N20SISO_Ant1_5240



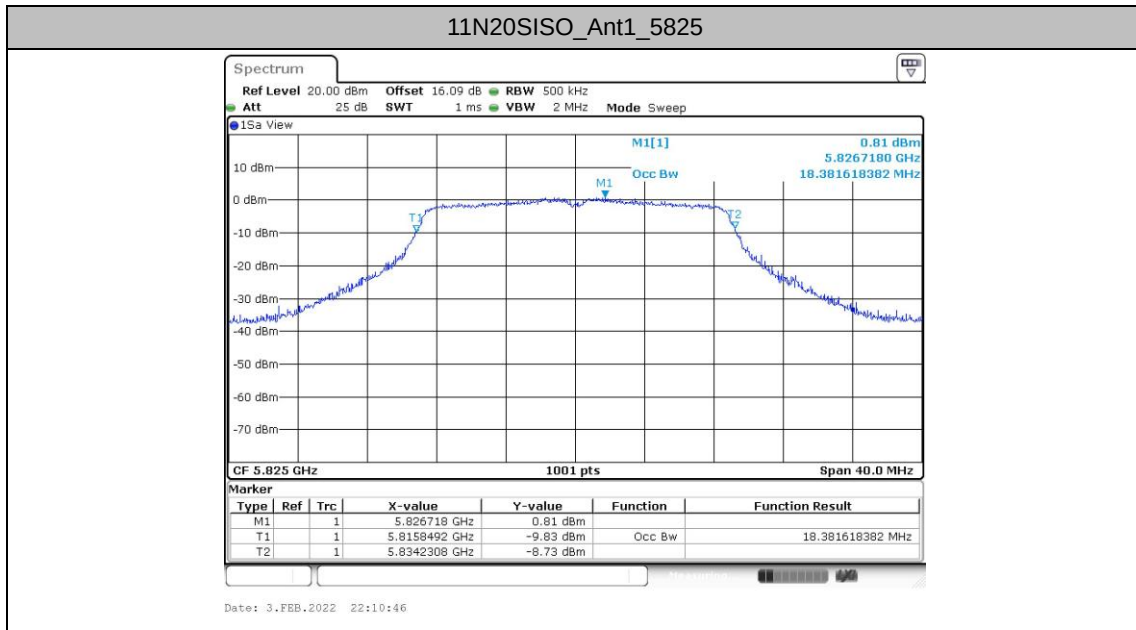


11N20SISO_Ant1_5745



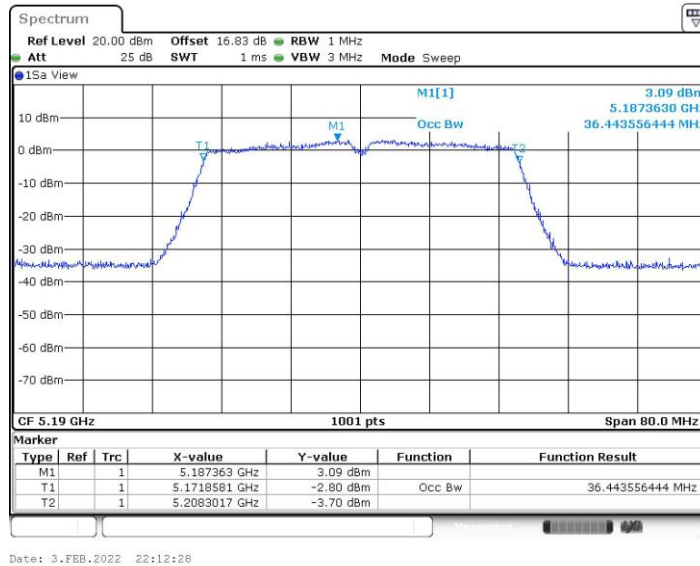
11N20SISO_Ant1_5785



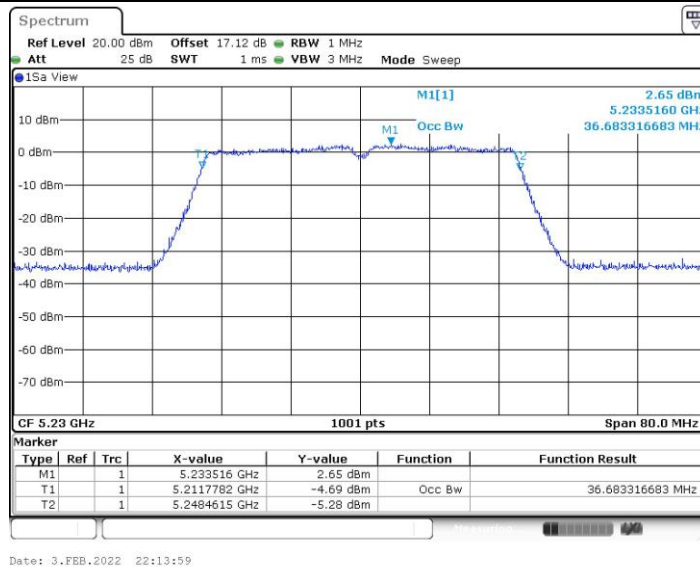




11N40SISO_Ant1_5190

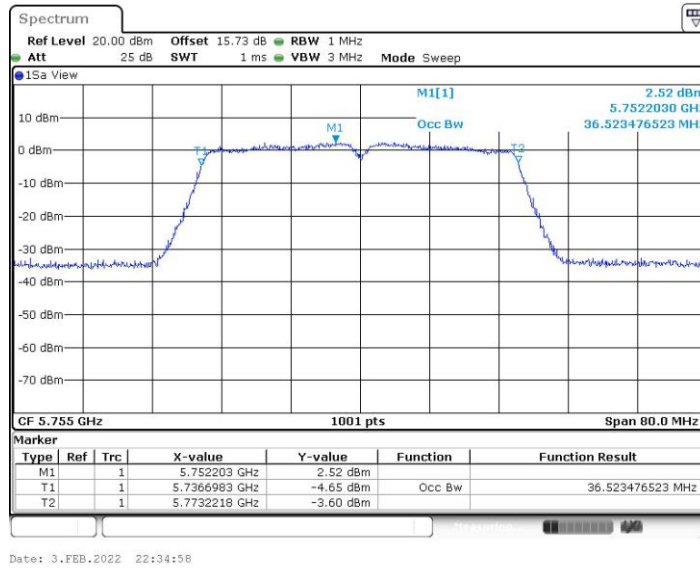


11N40SISO_Ant1_5230

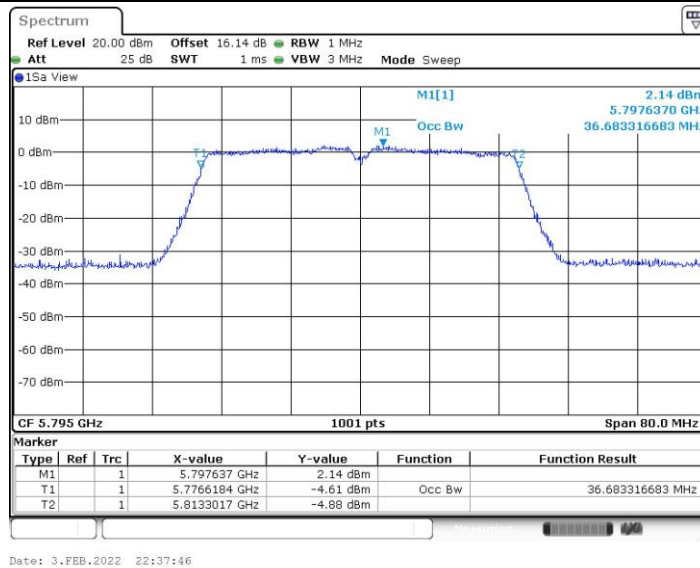




11N40SISO_Ant1_5755

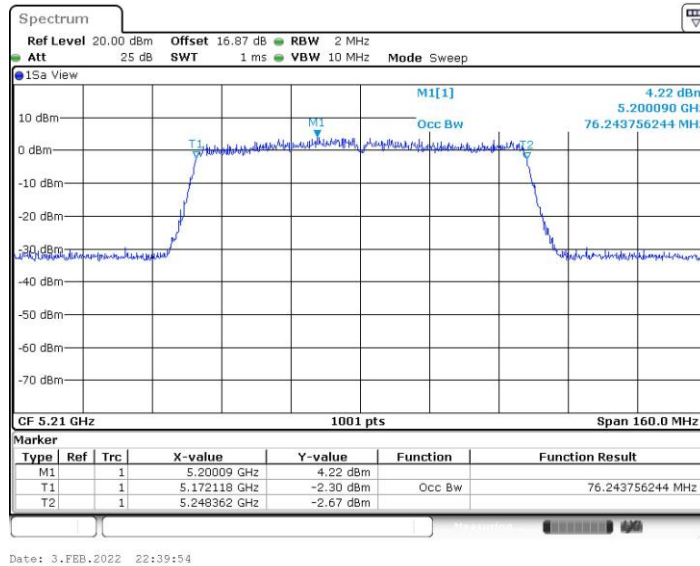


11N40SISO_Ant1_5795

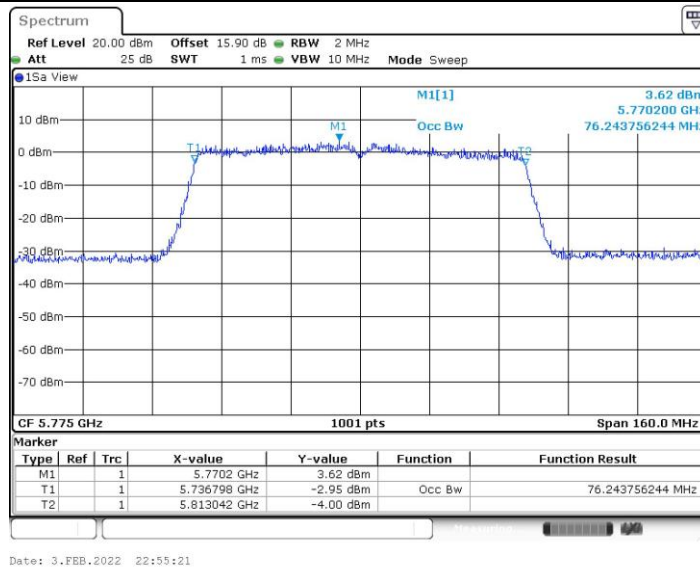




11AC80SISO_Ant1_5210



11AC80SISO_Ant1_5775

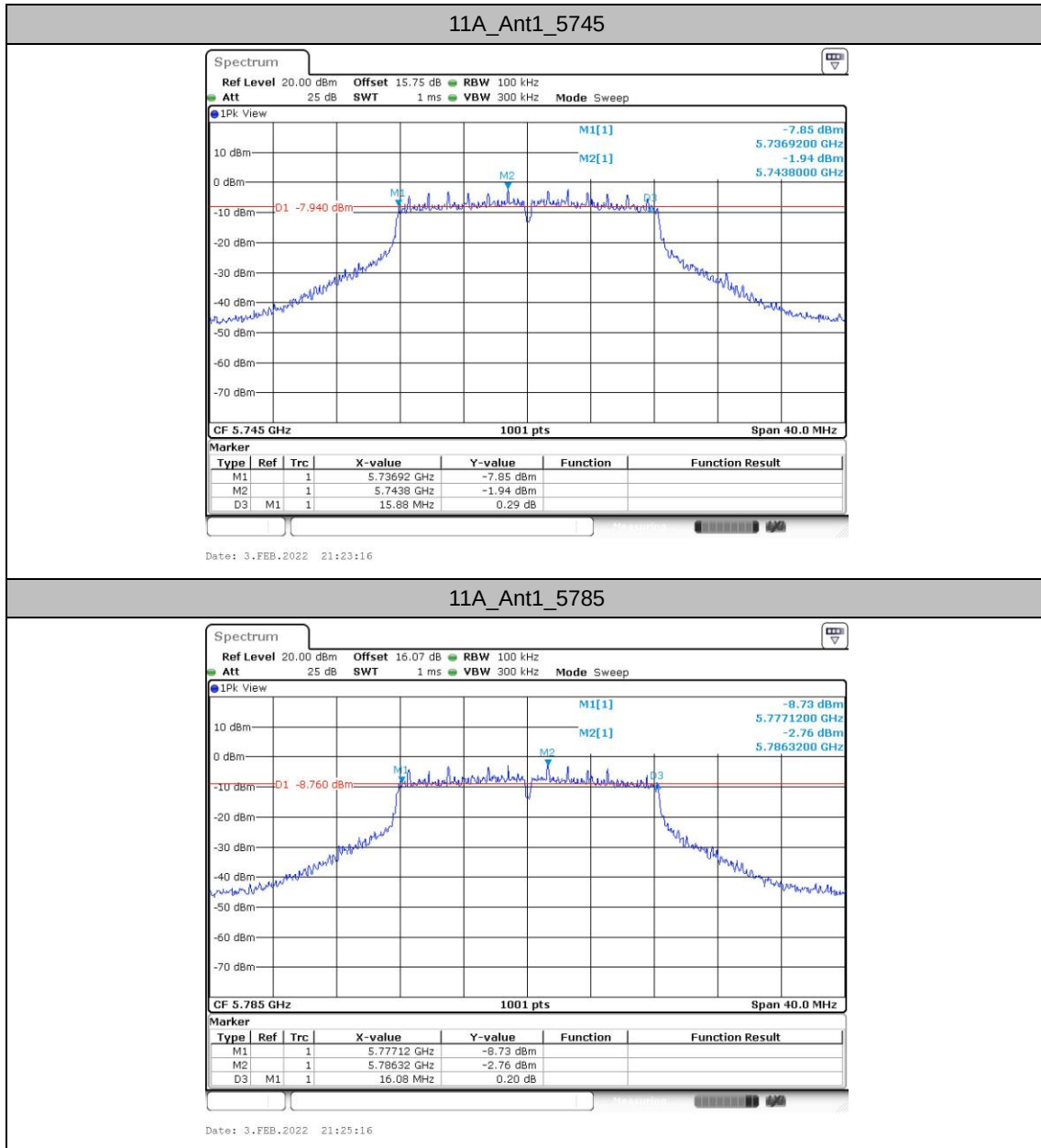


**6dB bandwidth****Test Result U-NII-3**

TestMode	Antenna	Frequency[MHz]	6db EBW [MHz]	FL[MHz]	FH[MHz]	Limit[MHz]	Verdict
11A	Ant1	5745	15.88	5736.92	5752.80	0.5	PASS
		5785	16.08	5777.12	5793.20	0.5	PASS
		5825	15.36	5817.28	5832.64	0.5	PASS
11N20SISO	Ant1	5745	15.36	5737.28	5752.64	0.5	PASS
		5785	16.00	5776.64	5792.64	0.5	PASS
		5825	16.04	5817.16	5833.20	0.5	PASS
11N40SISO	Ant1	5755	35.44	5737.16	5772.60	0.5	PASS
		5795	35.68	5776.92	5812.60	0.5	PASS
11AC80SISO	Ant1	5775	75.20	5737.40	5812.60	0.5	PASS

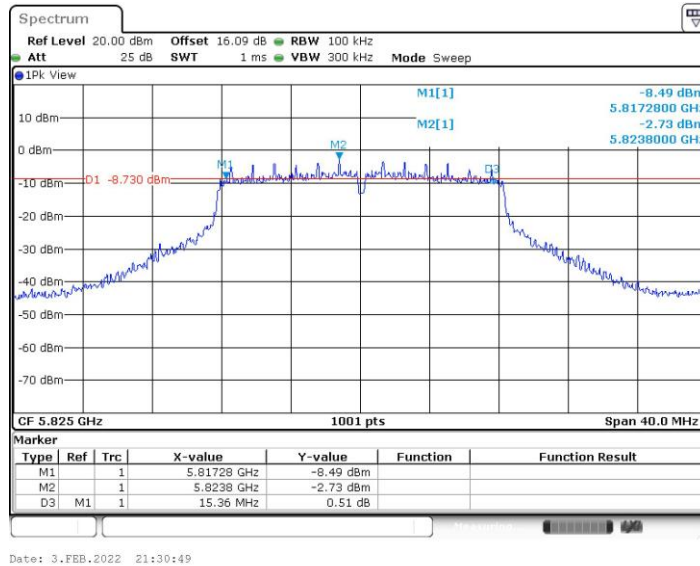


Test Graphs U-NII-3

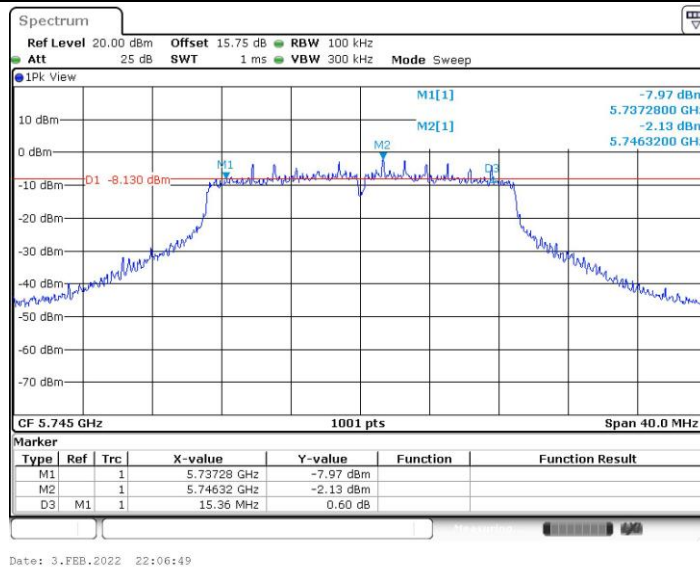




11A_Ant1_5825

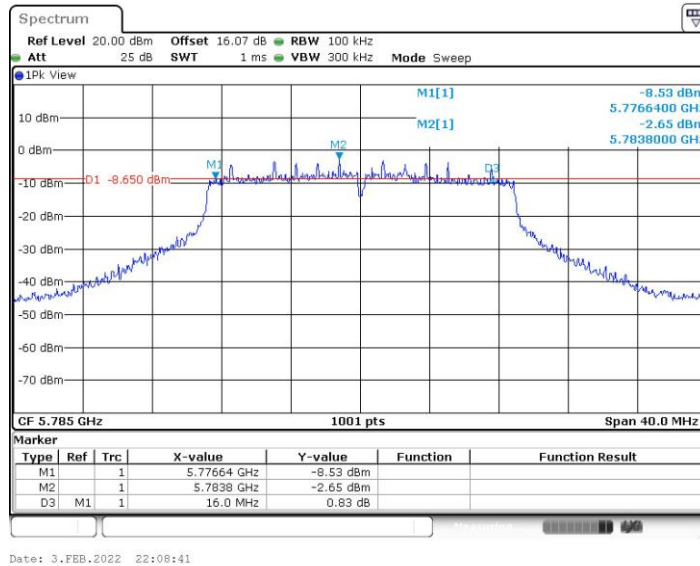


11N20SISO_Ant1_5745

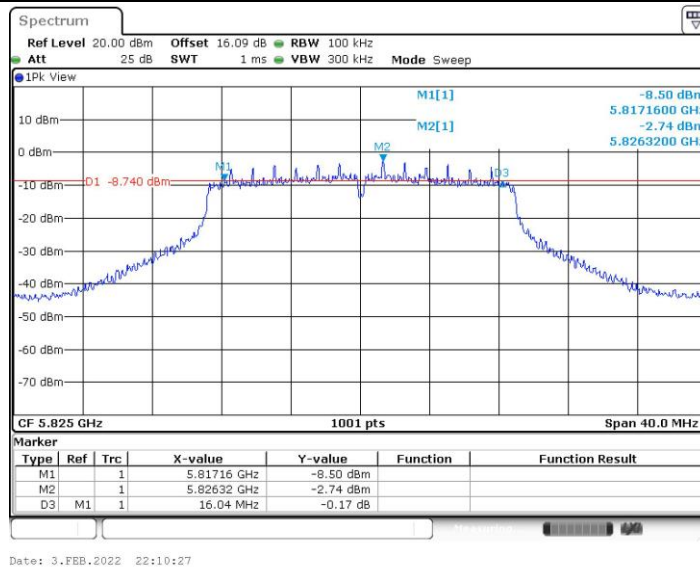




11N20SISO_Ant1_5785

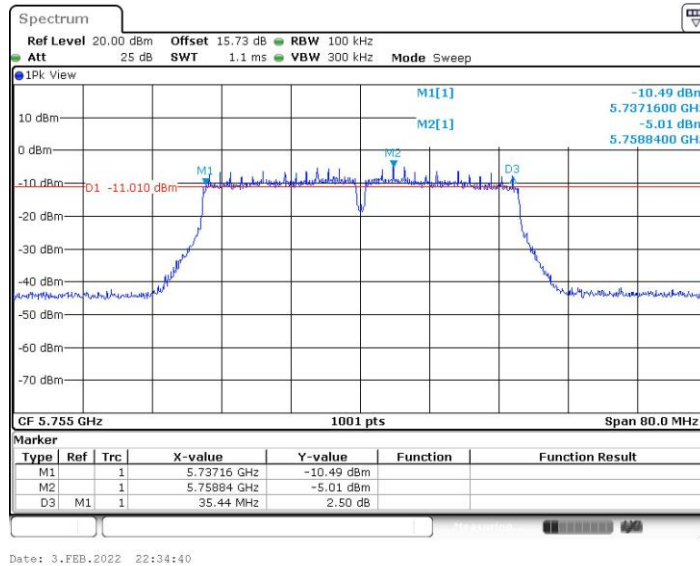


11N20SISO_Ant1_5825

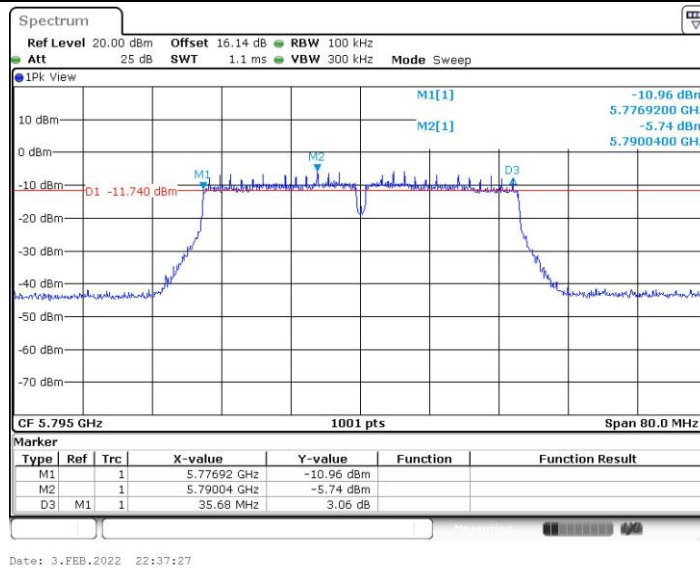


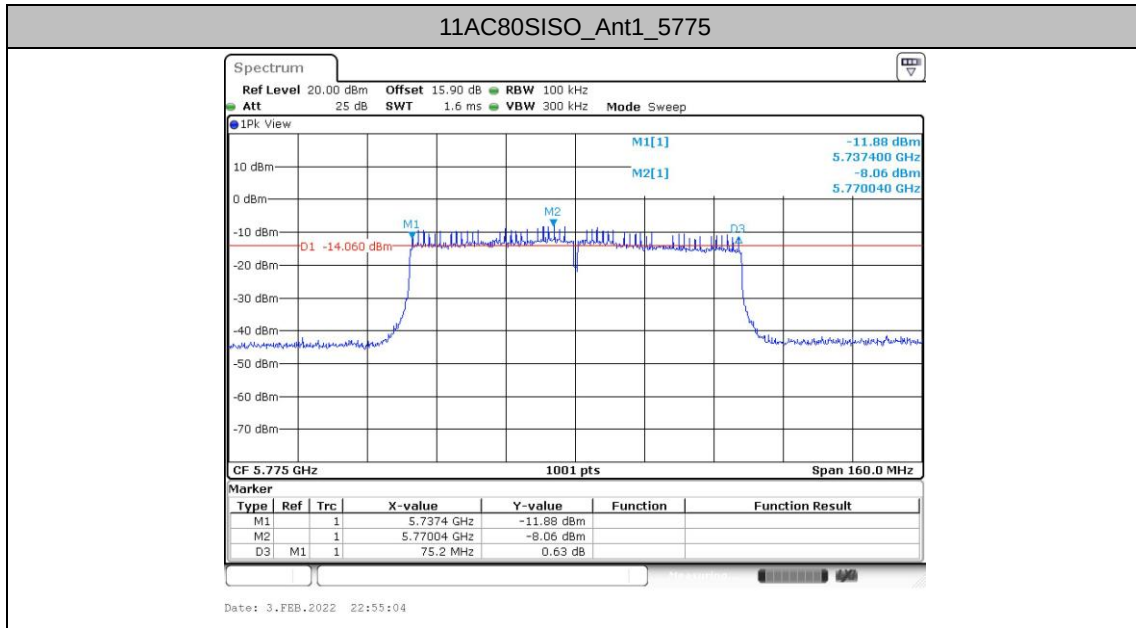


11N40SISO_Ant1_5755



11N40SISO_Ant1_5795







Power spectral density

Test Result

TestMode	Antenna	Frequency[MHz]	Result [dBm/MHz]	Limit[dBm/MHz]	Verdict
11A	Ant1	5180	-2.91	≤11.00	PASS
		5220	-3.34	≤11.00	PASS
		5240	-2.92	≤11.00	PASS
11N20SISO	Ant1	5180	-3.42	≤11.00	PASS
		5220	-3.89	≤11.00	PASS
		5240	-3.33	≤11.00	PASS
11N40SISO	Ant1	5190	-5.44	≤11.00	PASS
		5230	-6.44	≤11.00	PASS
11AC80SISO	Ant1	5210	-9.03	≤11.00	PASS

TestMode	Antenna	Frequency[MHz]	Result [dBm/500kHz]	Limit[dBm/500kHz]	Verdict
11A	Ant1	5745	-6.02	≤30.00	PASS
		5785	-6.55	≤30.00	PASS
		5825	-6.95	≤30.00	PASS
11N20SISO	Ant1	5745	-6.51	≤30.00	PASS
		5785	-6.91	≤30.00	PASS
		5825	-7.35	≤30.00	PASS
11N40SISO	Ant1	5755	-9.22	≤30.00	PASS
		5795	-9.9	≤30.00	PASS
11AC80SISO	Ant1	5775	-12.52	≤30.00	PASS

Note: 1. The Result and Limit Unit is dBm/500 kHz in the band 5.725–5.85 GHz.

2. The Duty Cycle Factor and RBW Factor is compensated in the graph.

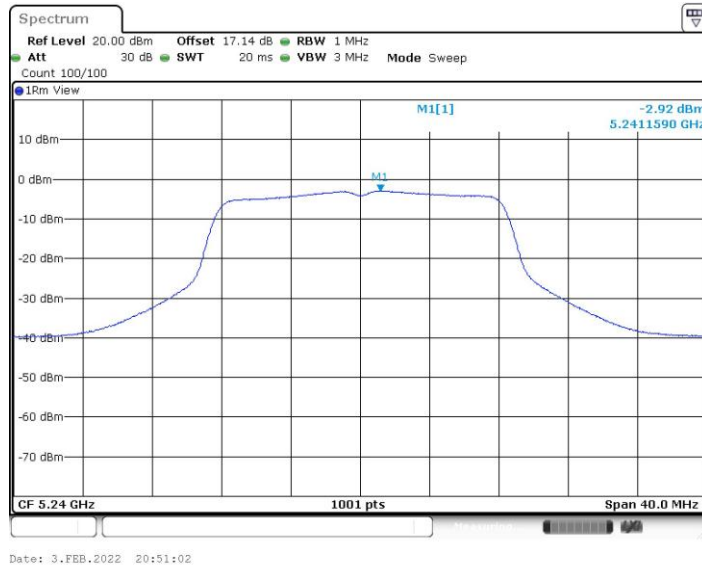


Test Graphs

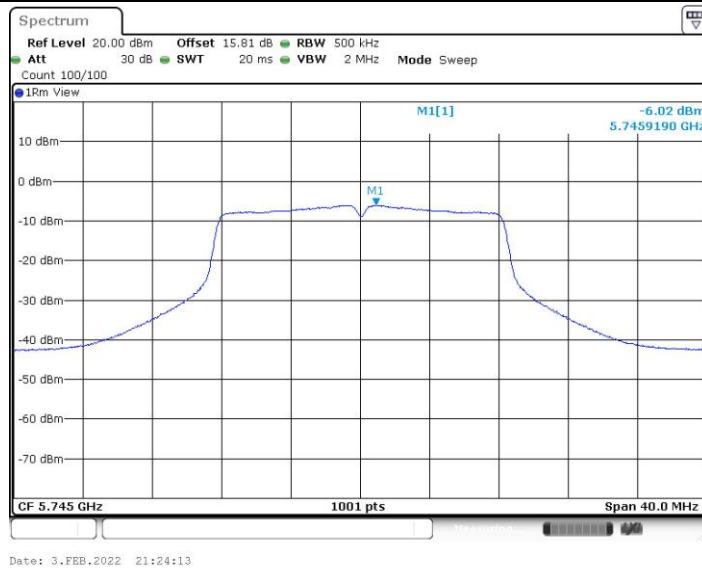




11A_Ant1_5240

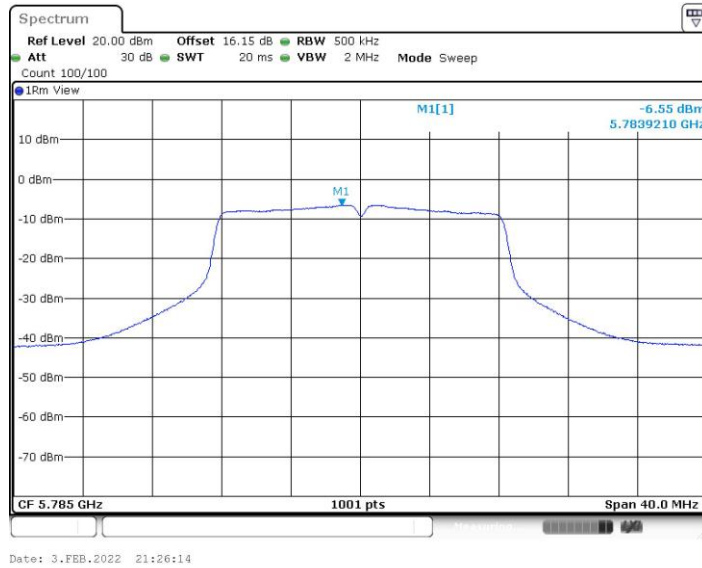


11A_Ant1_5745

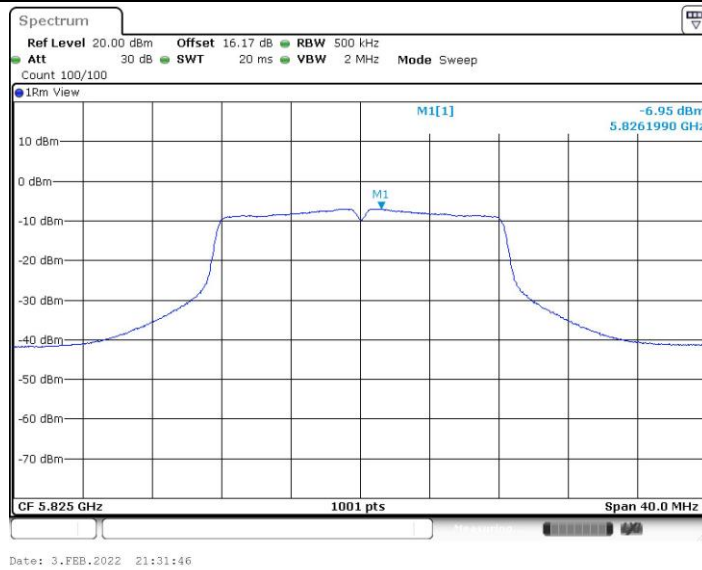




11A_Ant1_5785

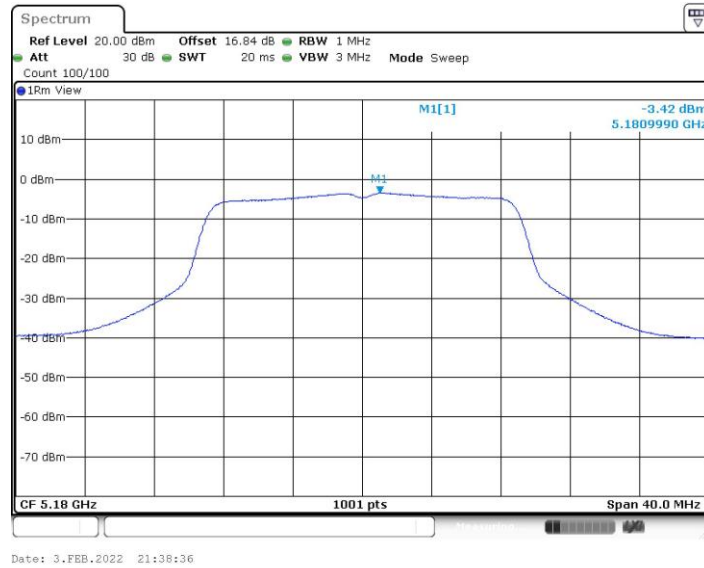


11A_Ant1_5825

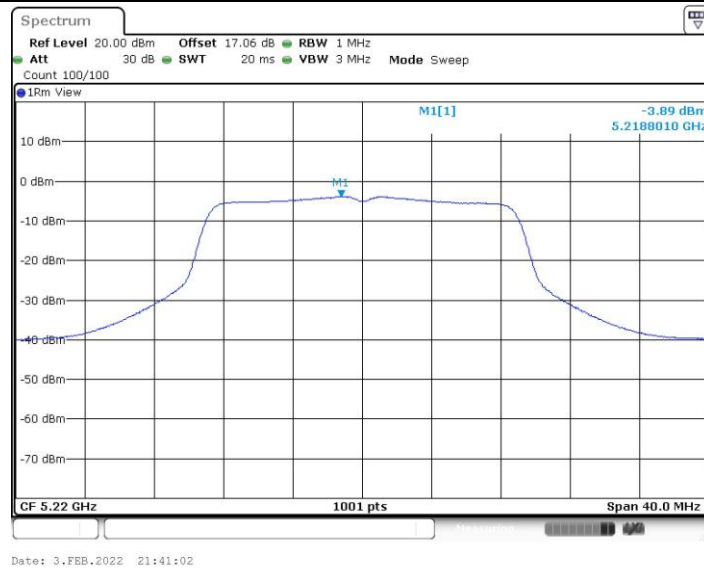




11N20SISO_Ant1_5180

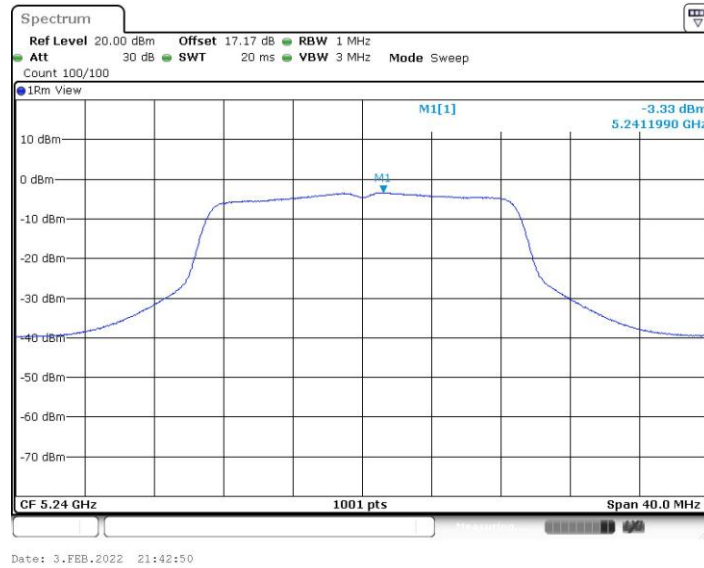


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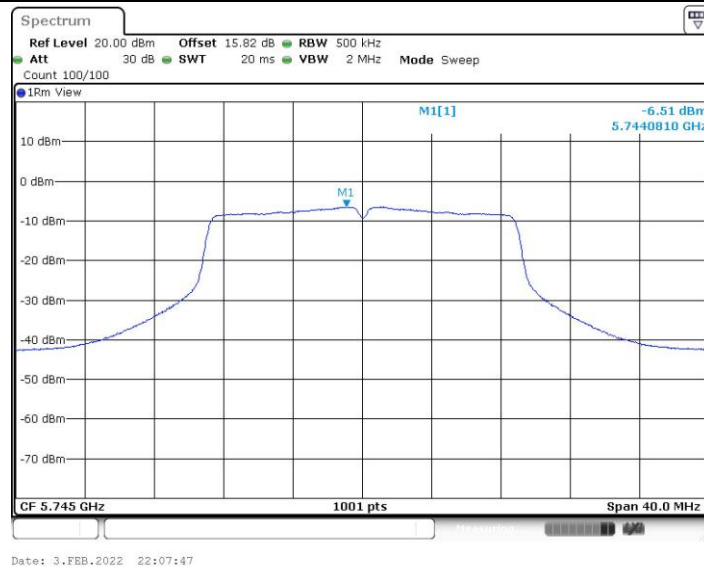




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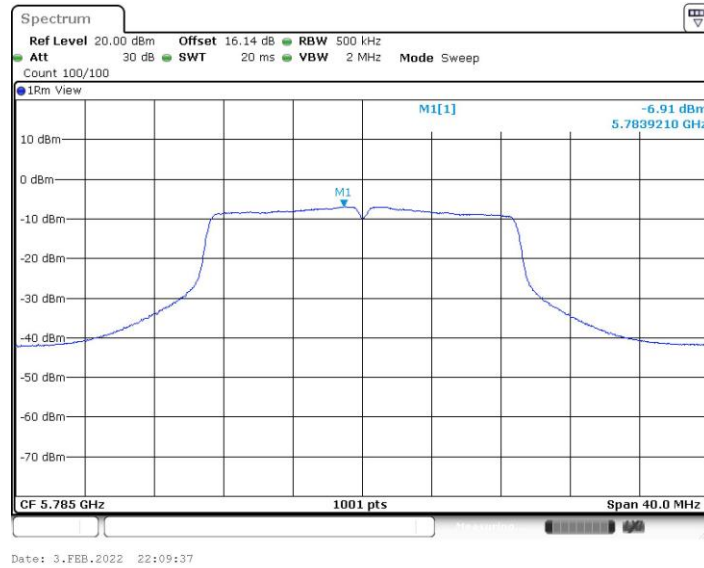


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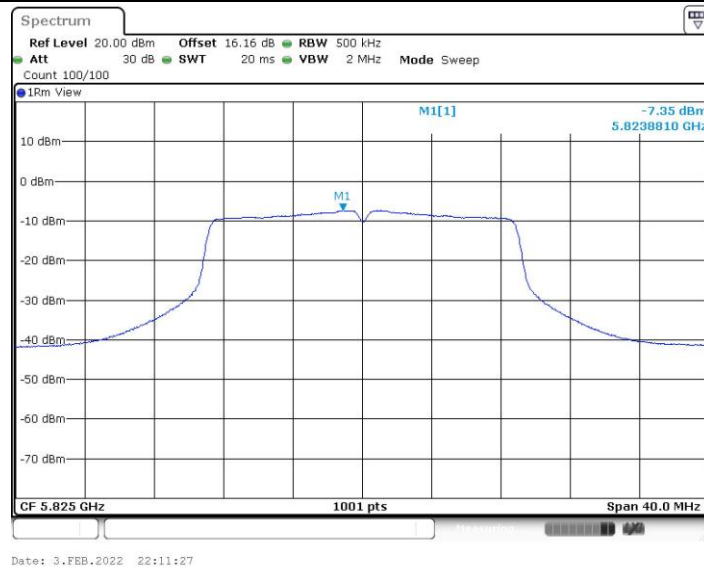




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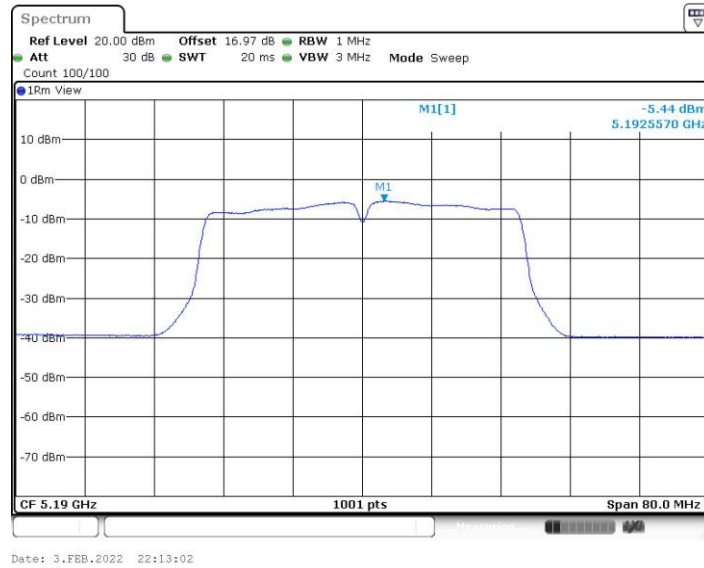


11N20SISO_Ant1_5825





11N40SISO_Ant1_5190



11N40SISO_Ant1_5230





11N40SISO_Ant1_5755



11N40SISO_Ant1_5795

