



FCC RF Test Report

APPLICANT : Hangzhou Tuya Information Technology Co., Ltd
EQUIPMENT : Wi-Fi and Bluetooth Module
MODEL NAME : WR11-2S
FCC ID : 2ANDL-WR112S
STANDARD : FCC Part 15 Subpart E §15.407
CLASSIFICATION : (NII) Unlicensed National Information Infrastructure
TEST DATE(S) : May 20, 2025 ~ Jun. 07, 2025

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
FR542204C	Rev. 01	Initial issue of report	Jun. 20, 2025

SUMMARY OF TEST RESULT

Report Section	FCC Rule	Description	Limit for U-NII-1/2A/2C	Limit for U-NII-3	Result	Remark
3.1	2.1049 & 15.403(i)	6dB, 26dB & 99% Bandwidth	-	6dB Bandwidth > 500kHz	Pass	-
3.2	15.407(a)	Maximum Conducted Output Power	≤ 24 dBm	≤ 30 dBm	Pass	-
3.3	15.407(a)	Power Spectral Density	≤ 11 dBm/MHz	≤ 30 dBm/500kHz	Pass	-
3.4	15.407(b)	Unwanted Emissions	15.407(b) & 15.209(a)	15.407(b)(4)(i) & 15.209(a)	Pass	Under limit 2.02 dB at 15540.00 MHz
3.5	15.207	AC Conducted Emission	15.207(a)	15.207(a)	Pass	Under limit 10.92 dB at 0.529 MHz
3.6	15.203 & 15.407(a)	Antenna Requirement	15.203 & 15.407(a)	15.203 & 15.407(a)	Pass	-

Conformity Assessment Condition:

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

Disclaimer:

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



1 General Description

1.1 Applicant

Hangzhou Tuya Information Technology Co., Ltd

Room 301,Building 1,Huace Center,Xihu District,Hangzhou City,Zhejiang Province, China

1.2 Manufacturer

Hangzhou Tuya Information Technology Co., Ltd

Room 301,Building 1,Huace Center,Xihu District,Hangzhou City,Zhejiang Province, China

1.3 Product Feature of Equipment Under Test

Product Feature	
Equipment	Wi-Fi and Bluetooth Module
Model Name	WR11-2S
FCC ID	2ANDL-WR112S
HW Version	V1.0.1
SW Version	V3.5.0
EUT Stage	Production Unit

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

1.4 Product Specification of Equipment Under Test

Standards-related Product Specification	
Tx/Rx Frequency Range	5180 MHz ~ 5240 MHz 5260 MHz ~ 5320 MHz 5500 MHz ~ 5720 MHz 5745 MHz ~ 5825 MHz
Maximum Output Power to Antenna	<5180 MHz ~ 5240 MHz> 802.11a : 17.35 dBm / 0.0543 W 802.11n HT20 : 18.91 dBm / 0.0778 W 802.11n HT40 : 18.95 dBm / 0.0785 W <5260 MHz ~ 5320 MHz> 802.11a : 17.01 dBm / 0.0502 W 802.11n HT20 : 17.23 dBm / 0.0528 W 802.11n HT40 : 18.85 dBm / 0.0767 W <5500 MHz ~ 5720 MHz > 802.11a : 18.92 dBm / 0.0780 W 802.11n HT20 : 18.95 dBm / 0.0785 W 802.11n HT40 : 18.96 dBm / 0.0787 W <5745 MHz ~ 5825 MHz> 802.11a : 18.97 dBm / 0.0789 W 802.11n HT20 : 18.93 dBm / 0.0782 W 802.11n HT40 : 18.91 dBm / 0.0778 W

99% Occupied Bandwidth	<5180 MHz ~ 5240 MHz> 802.11a : 19.295 MHz 802.11n HT20 : 20.248 MHz 802.11n HT40 : 36.571 MHz <5260 MHz ~ 5320 MHz> 802.11a : 19.295 MHz 802.11n HT20 : 19.448 MHz 802.11n HT40 : 36.648 MHz <5500 MHz ~ 5720 MHz> 802.11a : 18.114 MHz 802.11n HT20 : 19.010 MHz 802.11n HT40 : 36.381 MHz <5745 MHz ~ 5825 MHz> 802.11a : 18.629 MHz 802.11n HT20 : 19.295 MHz 802.11n HT40 : 36.305 MHz
Antenna Type / Gain	<5180 MHz ~ 5240 MHz> Onboard PCB Antenna with gain 0.70 dBi <5260 MHz ~ 5320 MHz> Onboard PCB Antenna with gain -0.25 dBi <5500 MHz ~ 5720 MHz> Onboard PCB Antenna with gain -0.82 dBi <5745 MHz ~ 5825 MHz> Onboard PCB Antenna with gain -0.44 dBi
Type of Modulation	802.11a/n : OFDM (BPSK / QPSK / 16QAM / 64QAM)

1.5 Modification of EUT

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

1.6 Testing Location

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

Test Firm	Sporton International Inc. (Kunshan)		
Test Site Location	No. 1098, Pengxi North Road, Kunshan Economic Development Zone Jiangsu Province 215300 People's Republic of China TEL : +86-512-57900158		
Test Site No.	Sporton Site No.	FCC Designation No.	FCC Test Firm Registration No.
	CO01-KS TH01-KS 03CH05-KS	CN1257	314309

1.7 Test Software

Item	Site	Manufacturer	Name	Version
1.	TH01-KS	Tonscend	JS1120-3 test system China_210602	3.3.10
2.	03CH05-KS	AUDIX	E3	210616
3.	CO01-KS	AUDIX	E3	6.2009-8-24

1.8 Applicable Standards

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

- ♦ 47 CFR Part 15 Subpart E
- ♦ FCC KDB 789033 D02 General UNII Test Procedures New Rules v02r01.
- ♦ ANSI C63.10-2013

Remark: All test items were verified and recorded according to the standards and without any deviation during the test.

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
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
Frequency Band	Channel	Freq.(MHz)	Channel	Freq. (MHz)
5500-5720MHz U-NII-2C	100	5500	116	5580
	102*	5510	132	5660
	104	5520	134*	5670
	108	5540	136	5680
	110*	5550	140	5700
	112	5560	-	-
Frequency Band	Channel	Freq.(MHz)	Channel	Freq. (MHz)
5745-5825 MHz U-NII-3	149	5745	159*	5795
	151*	5755	161	5805
	153	5765	165	5825
	157	5785	-	-

Frequency Band	Channel	Freq.(MHz)	Channel	Freq. (MHz)
TDWR Channel	118*	5590	126*	5630
	120	5600	128	5640
	124	5620	-	-

Frequency Band	Channel	Freq. (MHz)	Channel	Freq. (MHz)
Straddle Channel	142*	5710	144	5720

Note: The above Frequency and Channel in "*" are 40MHz bandwidth.

2.2 Test Mode

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

SISO Mode

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

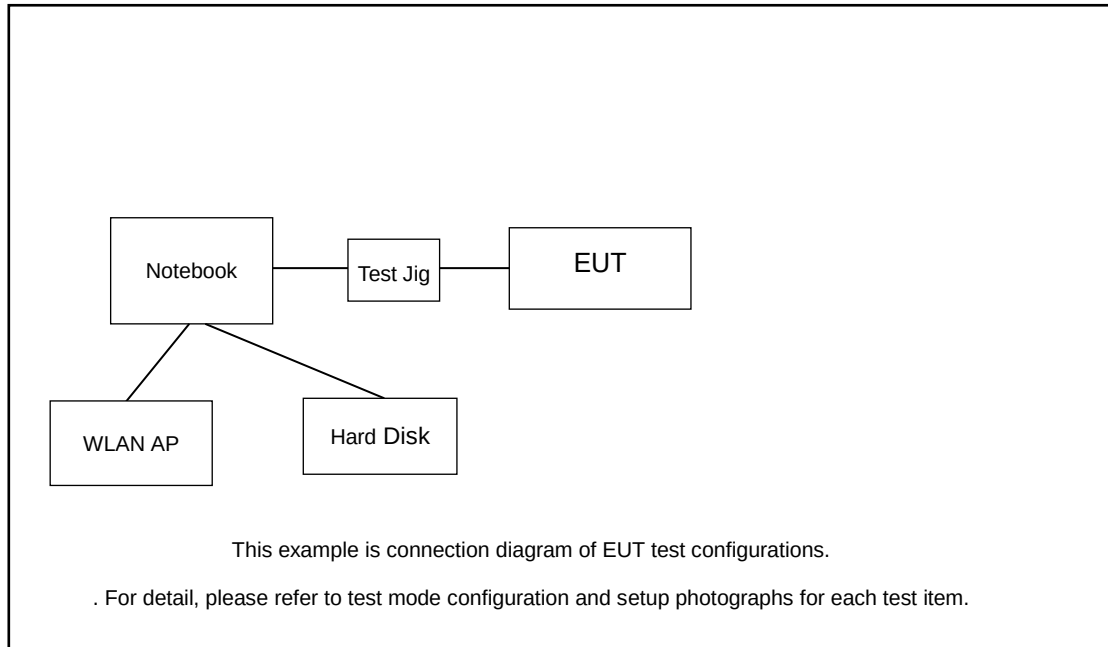
AC Conducted Emission	Mode 1 : WLAN Link(5G) + Charging from Notebook
Remark: For Radiated Test Cases, The tests were performance with Notebook.	

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

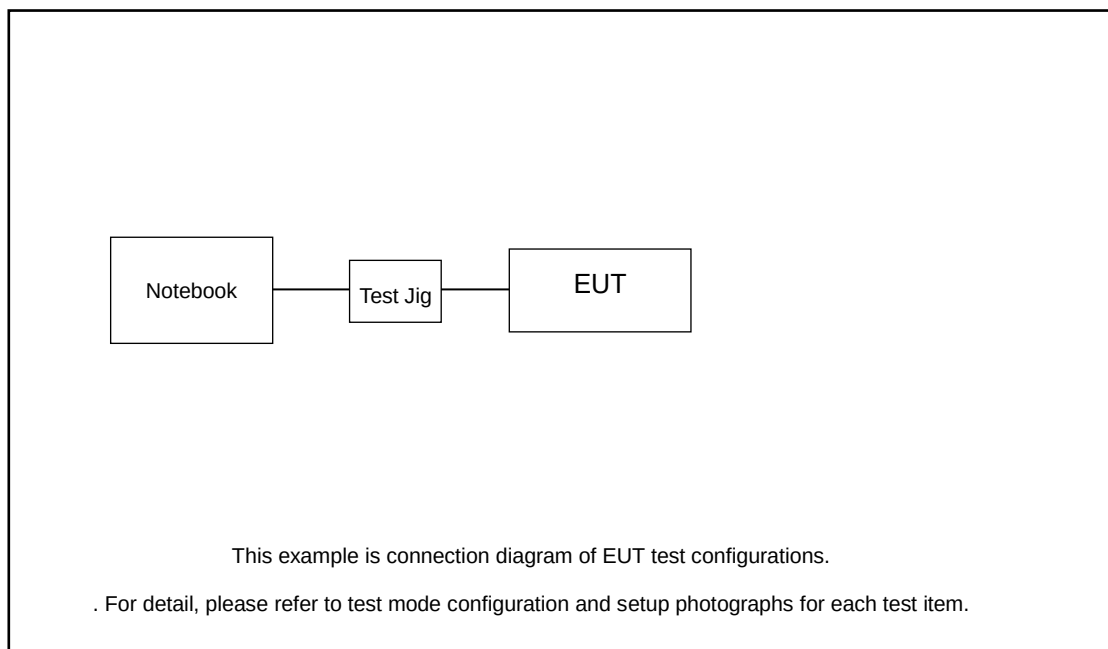
Ch. #		U-NII-1	U-NII-2A	U-NII-2C	U-NII-3
		40M BW	40M BW	40M BW	40M BW
L	Low	38	54	102	151
M	Middle	-	-	110	-
H	High	46	62	134	159
Straddle		-	-	142	-

2.3 Connection Diagram of Test System

AC Conducted Emission:



Radiated Emission:



2.4 Support Unit used in test configuration and system

Item	Equipment	Trade Name	Model Name	FCC ID	Data Cable	Power Cord
1.	WLAN AP	D-link	DIR-655	KA21R655B1	N/A	Unshielded, 1.8 m
2.	Notebook	Lenovo	G480	QDS-BRCM1050I	N/A	Shielded cable DC O/P 1.8m, Unshielded AC I/P cable 1.8m
3.	Hard Disk	Lenovo	F310	DoC	Shielded, 1.2m	N/A
4.	Test Jig	N/A	N/A	N/A	N/A	N/A

2.5 EUT Operation Test Setup

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

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

2.6 Measurement Results Explanation Example

For all conducted test items:

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

Example :

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

Offset = RF cable loss + attenuator factor.

Following shows an offset computation example with cable loss 3.88 dB and 20dB attenuator.

$$\begin{aligned}\text{Offset(dB)} &= \text{RF cable loss(dB)} + \text{attenuator factor(dB)} \\ &= 3.88 + 20 = 23.88 \text{ (dB)}\end{aligned}$$



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

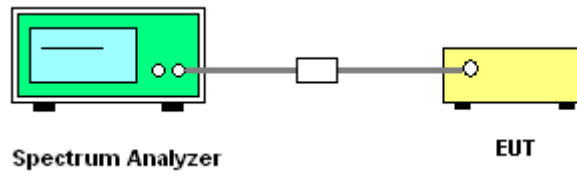
The measuring equipment is listed in the section 4 of this test report.

3.1.3 Test Procedures

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

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

3.1.4 Test Setup



3.1.5 Test Result of 6dB and 26dB and 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 log₁₀ B, where B is the 26 dB emission bandwidth in megahertz.

For the band 5.725–5.85 GHz, the maximum conducted output power over the frequency band of operation shall not exceed 1 W.

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

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

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

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3.2.2 Measuring Instruments

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

3.2.3 Test Procedures

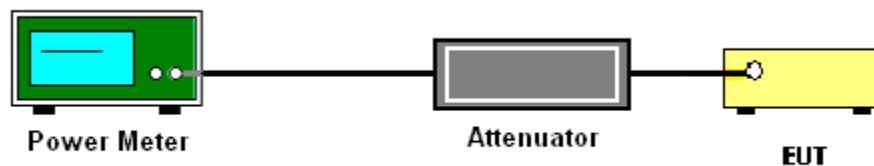
The testing follows Method PM of FCC KDB 789033 D02 General UNII Test Procedures New Rules v02r01.

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

1. Measurement is performed using a wideband RF power meter.
2. The EUT is configured to transmit continuously with a consistent duty cycle at its maximum power control level.
3. Measure the average power of the transmitter, and the average power is corrected with duty factor, $10 \log(1/x)$, where x is the duty cycle.

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

FCC U-NII-1 single antenna										
Mod.	Data Rate	NTX	CH.	Freq. (MHz)	Duty Factor (dB)	Average Conducted Power with duty factor (dBm)	FCC Conducted Power Limit (dBm)	DG (dBi)	Pass/Fail	Power Setting
					Ant 1	Ant 1	Ant 1	Ant 1		Ant 1
11a	6Mbps	1	36	5180	0.00	17.35	24.00	0.70	Pass	98
11a	6Mbps	1	44	5220	0.00	16.04	24.00	0.70	Pass	90
11a	6Mbps	1	48	5240	0.00	16.71	24.00	0.70	Pass	93
HT20	MCS0	1	36	5180	0.00	18.91	24.00	0.70	Pass	107
HT20	MCS0	1	44	5220	0.00	17.65	24.00	0.70	Pass	98
HT20	MCS0	1	48	5240	0.00	18.89	24.00	0.70	Pass	104
HT40	MCS0	1	38	5190	0.00	17.58	24.00	0.70	Pass	99
HT40	MCS0	1	46	5230	0.00	18.95	24.00	0.70	Pass	105

FCC U-NII-2A single antenna											
Mod.	Data Rate	NTX	CH.	Freq. (MHz)	Duty Factor (dB)	Average Conducted Power with duty factor (dBm)	FCC Conducted Power Limit (dBm)	DG (dBi)	EIRP Power Limit (dBm)	Pass/Fail	Power Setting
					Ant 1	Ant 1	Ant 1	Ant 1			
11a	6Mbps	1	52	5260	0.00	16.10	23.94	-0.25	30	Pass	87
11a	6Mbps	1	60	5300	0.00	16.35	23.97	-0.25	30	Pass	88
11a	6Mbps	1	64	5320	0.00	17.01	23.98	-0.25	30	Pass	92
HT20	MCS0	1	52	5260	0.00	17.08	23.98	-0.25	30	Pass	91
HT20	MCS0	1	60	5300	0.00	16.87	23.98	-0.25	30	Pass	90
HT20	MCS0	1	64	5320	0.00	17.23	23.98	-0.25	30	Pass	93
HT40	MCS0	1	54	5270	0.00	18.85	23.98	-0.25	30	Pass	101
HT40	MCS0	1	62	5310	0.00	18.81	23.98	-0.25	30	Pass	102



FCC U-NII-2C single antenna											
Mod.	Data Rate	NTX	CH.	Freq. (MHz)	Duty Factor (dB)	Average Conducted Power with duty factor (dBm)	FCC Conducted Power Limit (dBm)	DG (dBi)	EIRP Power Limit (dBm)	Pass/Fail	Power Setting
					Ant 1	Ant 1	Ant 1	Ant 1			Ant 1
11a	6Mbps	1	100	5500	0.00	18.84	23.98	-0.82	30	Pass	92
11a	6Mbps	1	116	5580	0.00	18.82	23.98	-0.82	30	Pass	94
11a	6Mbps	1	140	5700	0.00	18.82	23.98	-0.82	30	Pass	92
HT20	MCS0	1	100	5500	0.00	18.95	23.98	-0.82	30	Pass	93
HT20	MCS0	1	116	5580	0.00	18.89	23.98	-0.82	30	Pass	94
HT20	MCS0	1	140	5700	0.00	18.85	23.98	-0.82	30	Pass	93
HT40	MCS0	1	102	5510	0.00	18.87	23.98	-0.82	30	Pass	96
HT40	MCS0	1	110	5550	0.00	18.89	23.98	-0.82	30	Pass	96
HT40	MCS0	1	134	5670	0.00	18.93	23.98	-0.82	30	Pass	95

FCC U-NII-2C straddle channel single antenna											
Mod.	Data Rate	NTX	CH.	Freq. (MHz)	Duty Factor (dB)	Average Conducted Power with duty factor (dBm)	FCC Conducted Power Limit (dBm)	DG (dBi)	EIRP Power Limit (dBm)	Pass/Fail	Power Setting
					Ant 1	Ant 1	Ant 1	Ant 1			Ant 1
11a	6Mbps	1	144	5720	0.00	18.92	23.98	-0.82	30	Pass	11a
HT20	MCS0	1	144	5720	0.00	18.81	23.98	-0.82	30	Pass	HT20
HT40	MCS0	1	142	5710	0.00	18.96	23.98	-0.82	30	Pass	HT40

U-NII-3 single antenna										
Mod.	Data Rate	NTX	CH.	Freq. (MHz)	Duty Factor (dB)	Average Conducted Power with duty factor (dBm)	FCC Conducted Power Limit (dBm)	DG (dBi)	Pass/Fail	Power Setting
					Ant 1	Ant 1	Ant 1	Ant 1		Ant 1
11a	6Mbps	1	149	5745	0.00	18.86	30.00	-0.44	Pass	98
11a	6Mbps	1	157	5785	0.00	18.89	30.00	-0.44	Pass	99
11a	6Mbps	1	165	5825	0.00	18.97	30.00	-0.44	Pass	99
HT20	MCS0	1	149	5745	0.00	18.93	30.00	-0.44	Pass	99
HT20	MCS0	1	157	5785	0.00	18.81	30.00	-0.44	Pass	99
HT20	MCS0	1	165	5825	0.00	18.75	30.00	-0.44	Pass	99
HT40	MCS0	1	151	5755	0.00	18.78	30.00	-0.44	Pass	100
HT40	MCS0	1	159	5795	0.00	18.91	30.00	-0.44	Pass	102

3.3 Power Spectral Density Measurement

3.3.1 Limit of Power Spectral Density

<FCC 14-30 CFR 15.407>

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

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

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

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

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

3.3.2 Measuring Instruments

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

3.3.3 Test Procedures

The testing follows FCC KDB 789033 D02 General UNII Test Procedures New Rules v01r04.

Section F) Maximum power spectral density.

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

Method SA-2

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

- Measure the duty cycle.
- Set span to encompass the entire emission bandwidth (EBW) of the signal.
- Set RBW = 1 MHz.
- Set VBW $\geq$ 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.

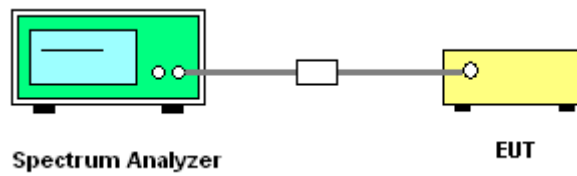
For devices operating in the band UNII-3

Method SA-2

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

- Measure the duty cycle.
 - Set span to encompass the entire emission bandwidth (EBW) of the signal.
 - Set RBW = 500KHz (or 300 kHz if the SA can't set RBW=500KHz).
 - Set VBW $\geq$ 1 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.
 - If the SA can't set RBW=500KHz, then add $10 \log(500\text{kHz}/\text{RBW})$ to the test result.
 - Add $10 \log(1/x)$, where x is the duty cycle, to the measured power in order to compute the average power during the actual transmission times. For example, add $10 \log(1/0.25) = 6$ dB if the duty cycle is 25 percent.
1. The RF output of EUT was connected to the spectrum analyzer by a low loss cable.
 2. Each plot has already offset with cable loss, and attenuator loss. Measure the PPSD and record it.

3.3.4 Test Setup



3.3.5 Test Result of Power Spectral Density

Please refer to Appendix A.



3.4 Unwanted Emissions Measurement

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

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

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

- (2) For transmitters operating in the 5.725-5.85 GHz band:
- 15.407(b)(4)(i) All emissions shall be limited to a level of -27 dBm/MHz at 75 MHz or more above or below the band edge increasing linearly to 10 dBm/MHz at 25 MHz above or below the band edge, and from 25 MHz above or below the band edge increasing linearly to a level of 15.6 dBm/MHz at 5 MHz above or below the band edge, and from 5 MHz above or below the band edge increasing linearly to a level of 27 dBm/MHz at the band edge.

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

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

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

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

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

where

EIRP is the equivalent isotropically radiated power, in dBm

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

d_{Meas} is the measurement distance, in m

3.4.2 Measuring Instruments

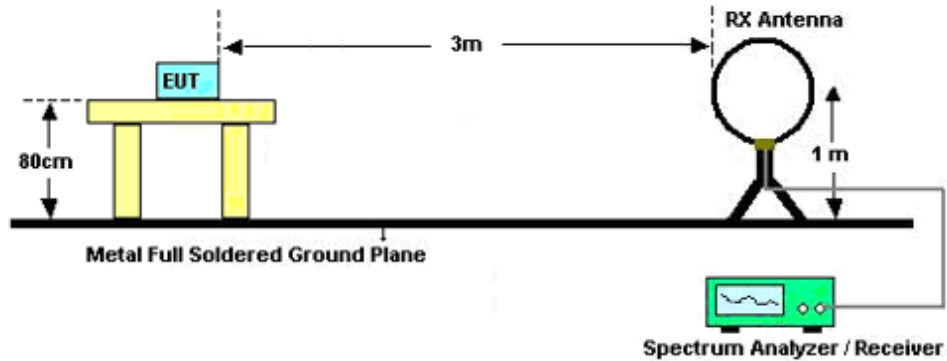
The measuring equipment is listed in the section 4 of this test report.

3.4.3 Test Procedures

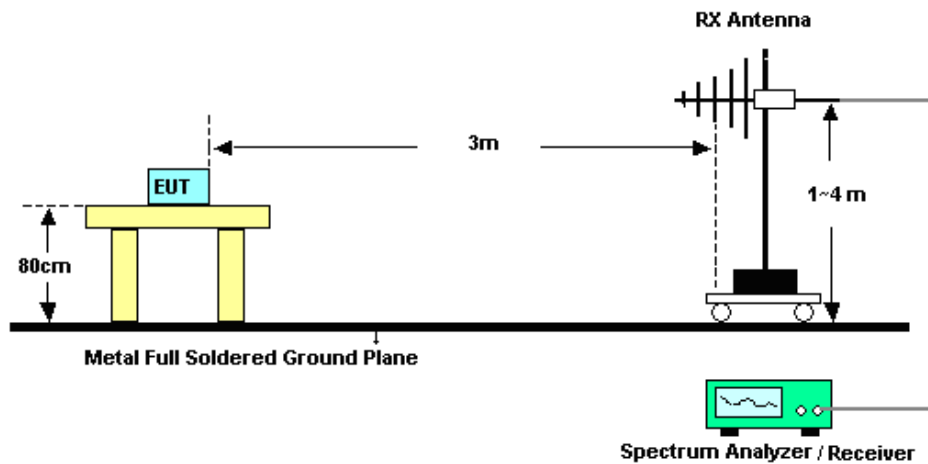
1. The testing follows FCC KDB 789033 D02 General UNII Test Procedures New Rules v01r04.
Section G) Unwanted emissions measurement.
(1) Procedure for Unwanted Emissions Measurements Below 1000MHz
 - RBW = 120 kHz
 - VBW = 300 kHz
 - Detector = Peak
 - Trace mode = max hold(2) Procedure for Peak Unwanted Emissions Measurements Above 1000 MHz
 - RBW = 1 MHz
 - VBW $\geq$ 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.
2. The EUT was placed on a turntable with 0.8 meter for frequency below 1GHz and 1.5 meter for frequency above 1GHz respectively above ground.
3. The EUT was set 3 meters from the interference receiving antenna which was mounted on the top of a variable height antenna tower.
4. The antenna is a broadband antenna and its height is adjusted between one meter and four meters above ground to find the maximum value of the field strength for both horizontal polarization and vertical polarization of the antenna.
5. For each suspected emission, the EUT was arranged to its worst case and then adjust the antenna tower (from 1 m to 4 m) and turntable (from 0 degree to 360 degrees) to find the maximum reading.
6. For testing below 1GHz, if the emission level of the EUT in peak mode was 3 dB lower than the limit specified, then peak values of EUT will be reported, otherwise, the emissions will be repeated one by one using the CISPR quasi-peak method and reported.
7. For testing above 1GHz, the emission level of the EUT in peak mode was 20dB lower than average limit (that means the emission level in average mode also complies with the limit in average mode), then peak values of EUT will be reported, otherwise, the emissions will be measured in average mode again and reported.

3.4.4 Test Setup

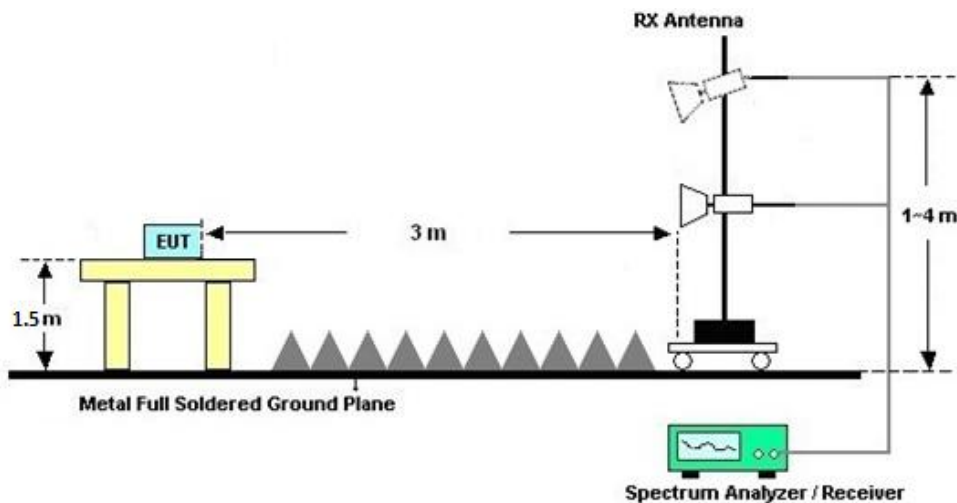
For radiated emissions below 30MHz



For radiated emissions from 30MHz to 1GHz



For radiated emissions above 1GHz





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

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

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

3.4.6 Test Result of Radiated Spurious at Band Edges

Please refer to Appendix C.

3.4.7 Duty Cycle

Please refer to Appendix D.

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

Please refer to Appendix C.

3.5 AC Conducted Emission Measurement

3.5.1 Limit of AC Conducted Emission

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

Frequency of emission (MHz)	Conducted limit (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.

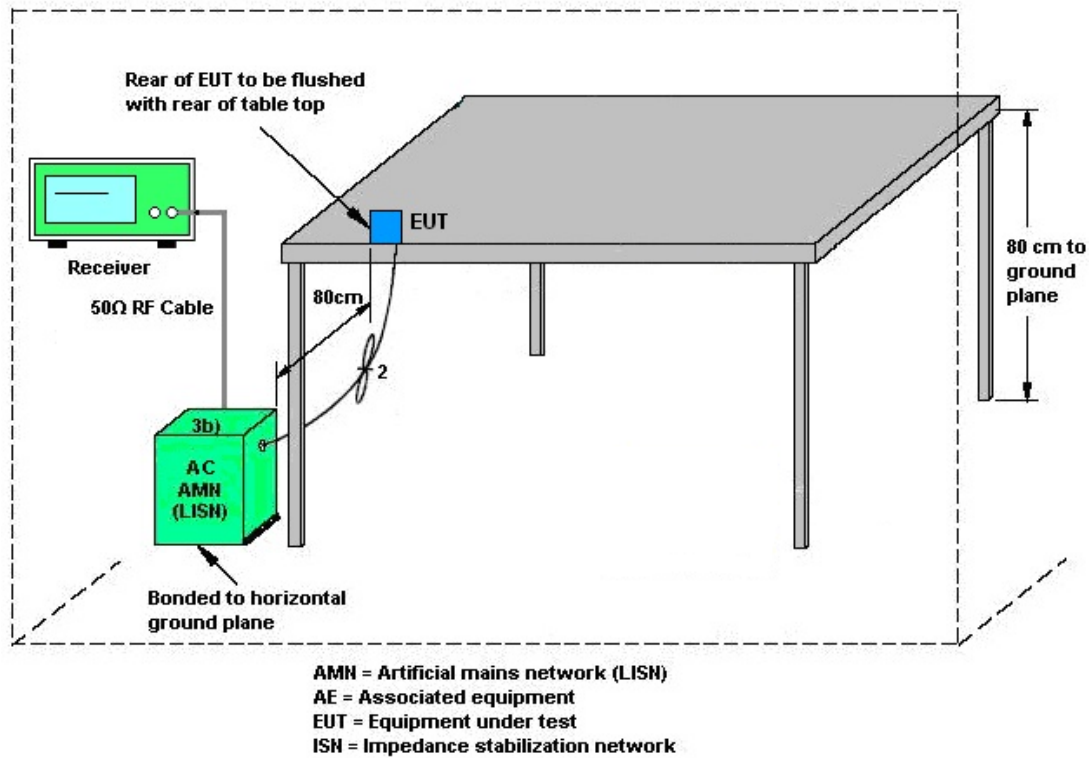
3.5.2 Measuring Instruments

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. 10, 2024	May 20, 2025~ May 26, 2025	Oct. 09, 2025	Conducted (TH01-KS)
Pulse Power Sensor	Anritsu	MA2411B	0917070	300MHz~40GHz	Jan. 02, 2025	May 20, 2025~ May 26, 2025	Jan. 01, 2026	Conducted (TH01-KS)
Power Meter	Anritsu	ML2495A	1005002	50MHz Bandwidth	Jan. 02, 2025	May 20, 2025~ May 26, 2025	Jan. 01, 2026	Conducted (TH01-KS)
EMI Test Receiver	Keysight	N9038A	MY572901 51	3Hz~8.5GHz;Ma x 30dBm	Jul. 04, 2024	Jun. 07, 2025	Jul. 03, 2025	Radiation (03CH05-KS)
EXA Spectrum Analyzer	Keysight	N9010B	MY602421 26	10Hz~44G,MAX 30dB	Oct. 10, 2024	Jun. 07, 2025	Oct. 09, 2025	Radiation (03CH05-KS)
Loop Antenna	R&S	HFH2-Z2E	101125	9kHz~30MHz	Sep. 08, 2024	Jun. 07, 2025	Sep. 07, 2025	Radiation (03CH05-KS)
Bilog Antenna	TeseQ	CBL6111D	49921	30MHz~1GHz	Mar. 24, 2025	Jun. 07, 2025	Mar. 23, 2026	Radiation (03CH05-KS)
Double Ridge Horn Antenna	ETS-Lindgren	3117	00251982	1GHz~18GHz	Aug. 16, 2024	Jun. 07, 2025	Aug. 15, 2025	Radiation (03CH05-KS)
SHF-EHF Horn	Com-power	AH-840	101116	18GHz~40GHz	Oct. 22, 2024	Jun. 07, 2025	Oct. 21, 2025	Radiation (03CH05-KS)
Amplifier	SONOMA	310N	380826	9KHz~1GHz	Jul. 03, 2024	Jun. 07, 2025	Jul. 02, 2025	Radiation (03CH05-KS)
Amplifier	EM	EM18G40GA	060851	18~40GHz	Jan. 02, 2025	Jun. 07, 2025	Jan. 01, 2026	Radiation (03CH05-KS)
high gain Amplifier	EM	EM01G18GA	060843	1Ghz~18Ghz	Jan. 02, 2025	Jun. 07, 2025	Jan. 01, 2026	Radiation (03CH05-KS)
Amplifier	EM	EM01G18GA	060833	1Ghz~18Ghz	Jan. 02, 2025	Jun. 07, 2025	Jan. 01, 2026	Radiation (03CH05-KS)
AC Power Source	Chroma	61601	F1040900 04	N/A	NCR	Jun. 07, 2025	NCR	Radiation (03CH05-KS)
Turn Table	ChamPro	EM 1000-T	060762-T	0~360 degree	NCR	Jun. 07, 2025	NCR	Radiation (03CH05-KS)
Antenna Mast	ChamPro	EM 1000-A	060762-A	1 m~4 m	NCR	Jun. 07, 2025	NCR	Radiation (03CH05-KS)
EMI Receiver	R&S	ESCI7	100768	9kHz~7GHz;	Apr. 18, 2025	May 21, 2025	Apr. 17, 2026	Conduction (CO01-KS)
AC LISN (for auxiliary equipment)	MessTec	AN3016	060103	9kHz~30MHz	Aug. 20, 2024	May 21, 2025	Aug. 19, 2025	Conduction (CO01-KS)
AC LISN	MessTec	AN3016	060105	9kHz~30MHz	Apr. 18, 2025	May 21, 2025	Apr. 17, 2026	Conduction (CO01-KS)
AC Power Source	Chroma	61602	ABP00000 0811	AC 0V~300V, 45Hz~1000Hz	Oct. 09, 2024	May 21, 2025	Oct. 08, 2025	Conduction (CO01-KS)

NCR: No Calibration Required

5 Measurement Uncertainty

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

Uncertainty of Conducted Measurement

Conducted Spurious Emission & Bandedge	±2.22 dB
Occupied Channel Bandwidth	±0.1%
Conducted Power	±0.50 dB
Conducted Power Spectral Density	±0.90 dB
Frequency	±0.04ppm

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

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

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

Measuring Uncertainty for a Level of Confidence of 95% (U = 2Uc(y))	3.30 dB
---	---------

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

Measuring Uncertainty for a Level of Confidence of 95% (U = 2Uc(y))	6.02 dB
---	---------

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

Measuring Uncertainty for a Level of Confidence of 95% (U = 2Uc(y))	5.22 dB
---	---------

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

Measuring Uncertainty for a Level of Confidence of 95% (U = 2Uc(y))	5.34 dB
---	---------

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



Appendix A. Conducted Test Results



Ambient Condition: 25 °C, 45 %RH

Test Date: 2025.5.20~2025.5.26

Test Engineer: Zhu Chong

Emission Bandwidth

Test Result

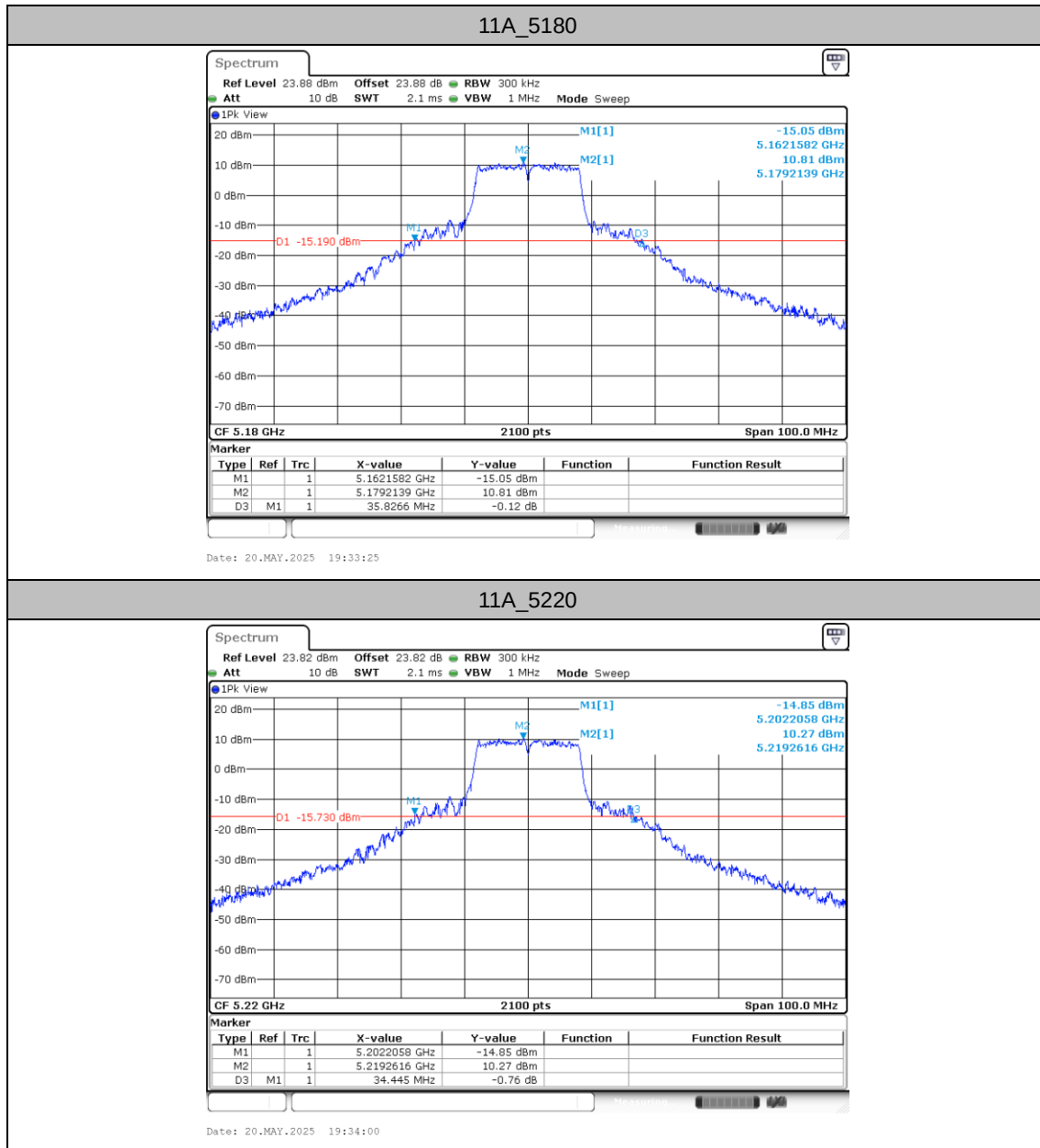
TestMode	Antenna	Freq(MHz)	26dB EBW [MHz]	FL[MHz]	FH[MHz]	Limit[MHz]	Verdict
11A	Ant1	5180	35.83	5162.16	5197.98	---	---
		5220	34.44	5202.21	5236.65	---	---
		5240	34.30	5222.21	5256.51	---	---
		5260	34.35	5242.21	5276.56	---	---
		5300	34.11	5282.21	5316.32	---	---
		5320	34.35	5302.21	5336.56	---	---
		5500	32.63	5483.64	5516.27	---	---
		5580	29.49	5565.06	5594.55	---	---
		5700	32.83	5683.54	5716.36	---	---
		5720	32.78	5703.54	5736.32	---	---
		5720_UNII-2C	21.46	5703.54	5725	---	---
		5720_UNII-3	11.32	5725	5736.32	---	---
		5745	32.59	5728.64	5761.22	---	---
		5785	32.59	5768.59	5801.17	---	---
		5825	32.97	5808.40	5841.36	---	---
11N20SISO	Ant1	5180	39.54	5159.63	5199.18	---	---
		5220	37.21	5201.68	5238.89	---	---
		5240	37.40	5221.73	5259.13	---	---
		5260	37.73	5241.25	5278.99	---	---
		5300	36.02	5282.54	5318.56	---	---
		5320	37.07	5301.73	5338.79	---	---
		5500	32.02	5484.40	5516.41	---	---
		5580	31.54	5564.64	5596.17	---	---
		5700	32.54	5684.02	5716.56	---	---
		5720	32.30	5704.21	5736.51	---	---
		5720_UNII-2C	20.79	5704.21	5725	---	---
		5720_UNII-3	11.51	5725	5736.51	---	---

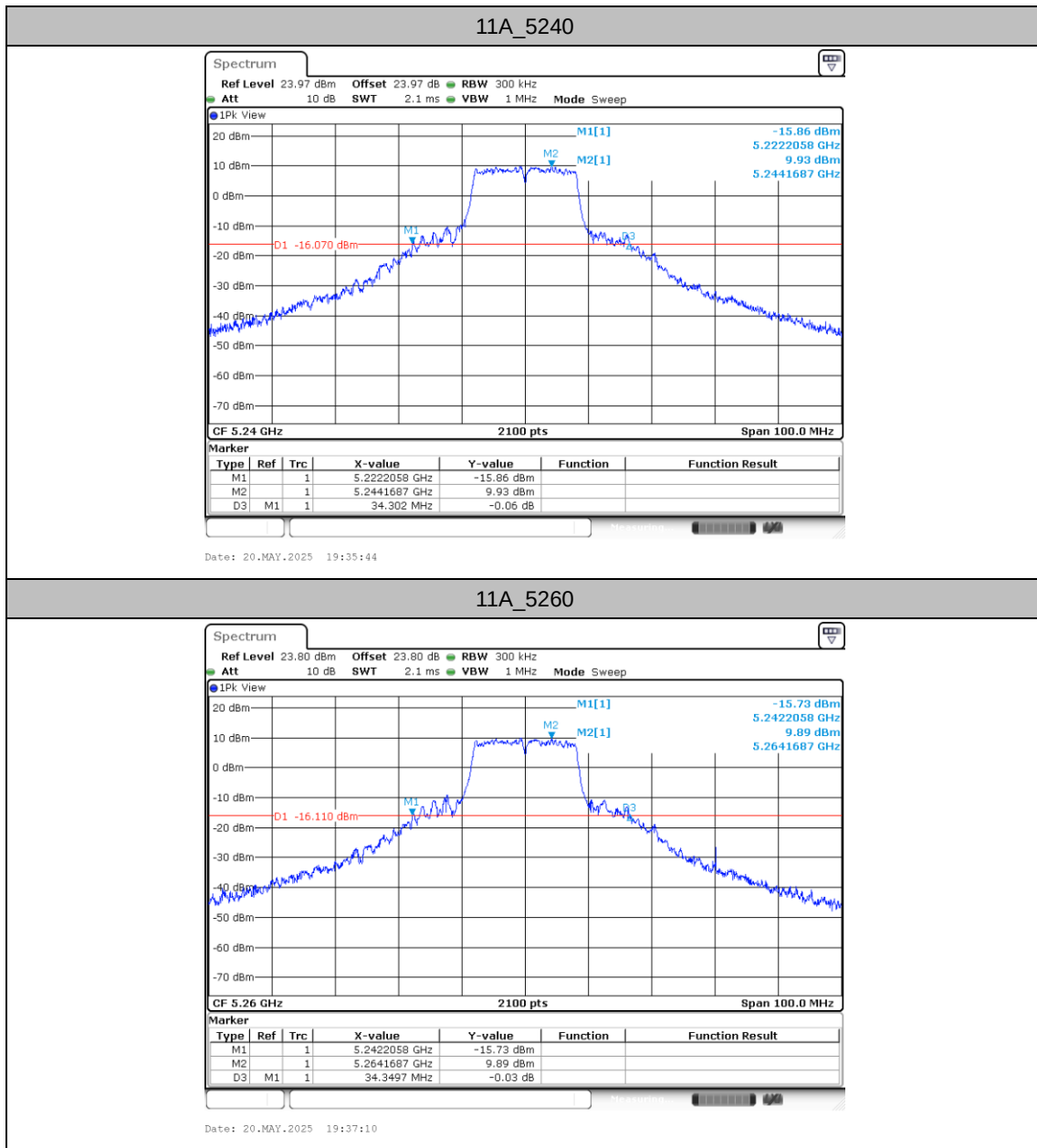


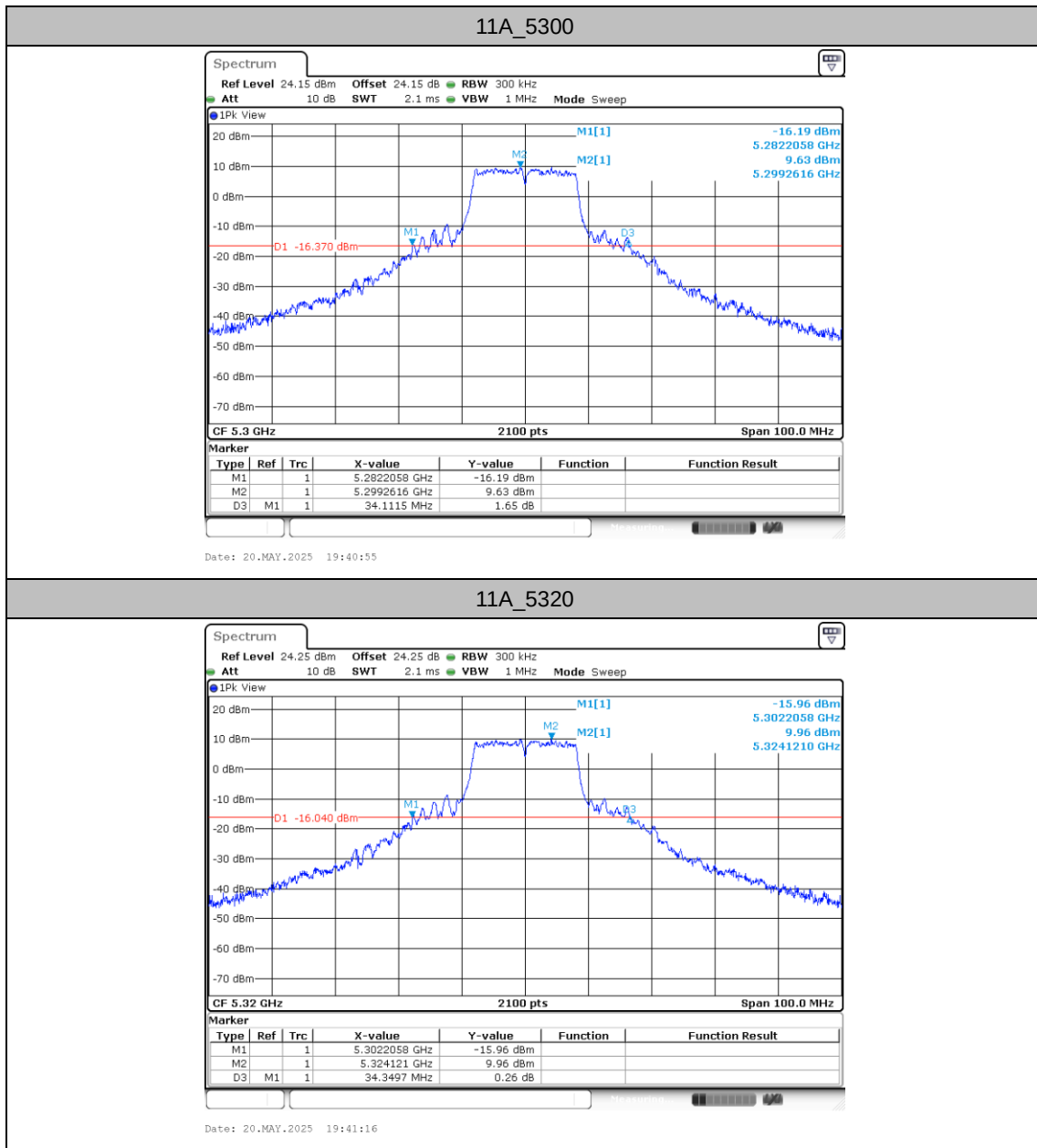
		5745	31.87	5729.40	5761.27	---	---
		5785	31.40	5769.54	5800.94	---	---
		5825	32.35	5809.16	5841.51	---	---
11N40SISO	Ant1	5190	72.80	5153.46	5226.26	---	---
		5230	73.65	5192.70	5266.35	---	---
		5270	73.94	5232.70	5306.64	---	---
		5310	77.08	5270.12	5347.21	---	---
		5510	72.22	5473.55	5545.78	---	---
		5550	59.93	5517.37	5577.30	---	---
		5670	72.32	5633.74	5706.06	---	---
		5710	72.42	5673.74	5746.16	---	---
		5710_UNII-2C	51.26	5673.74	5725	---	---
		5710_UNII-3	21.16	5725	5746.16	---	---
		5755	68.99	5718.74	5787.73	---	---
		5795	65.36	5761.32	5826.68	---	---

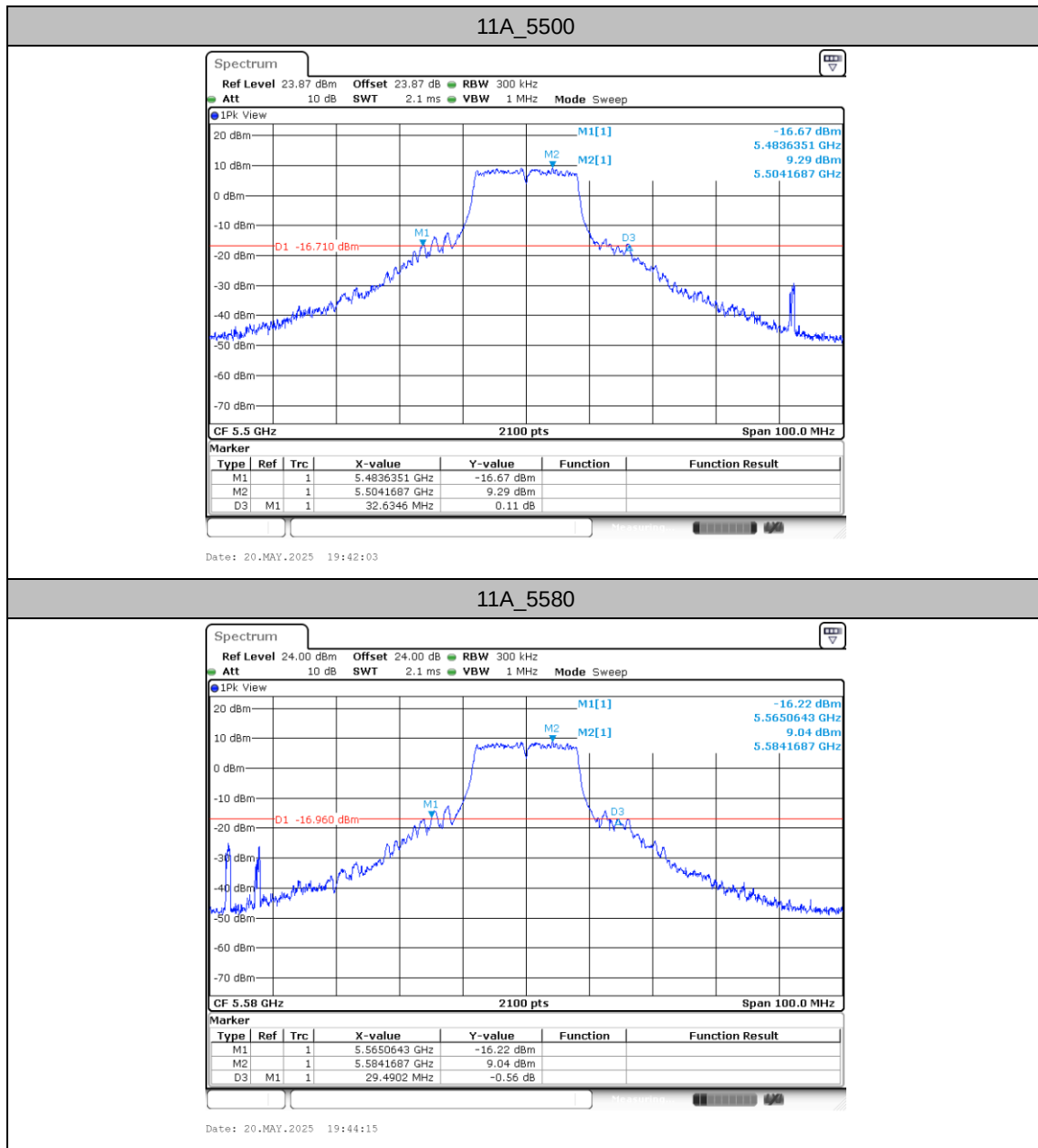


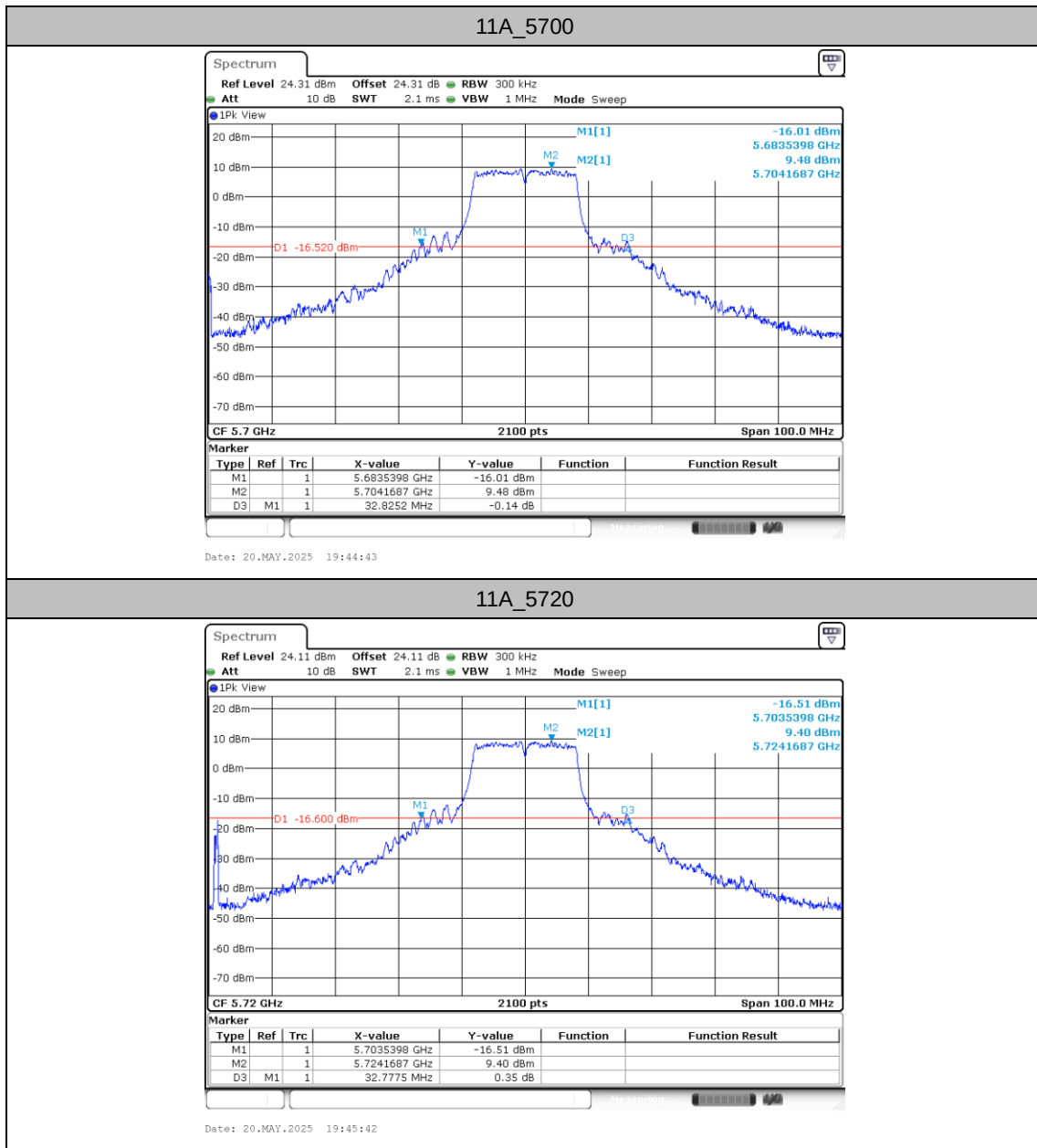
Test Graphs

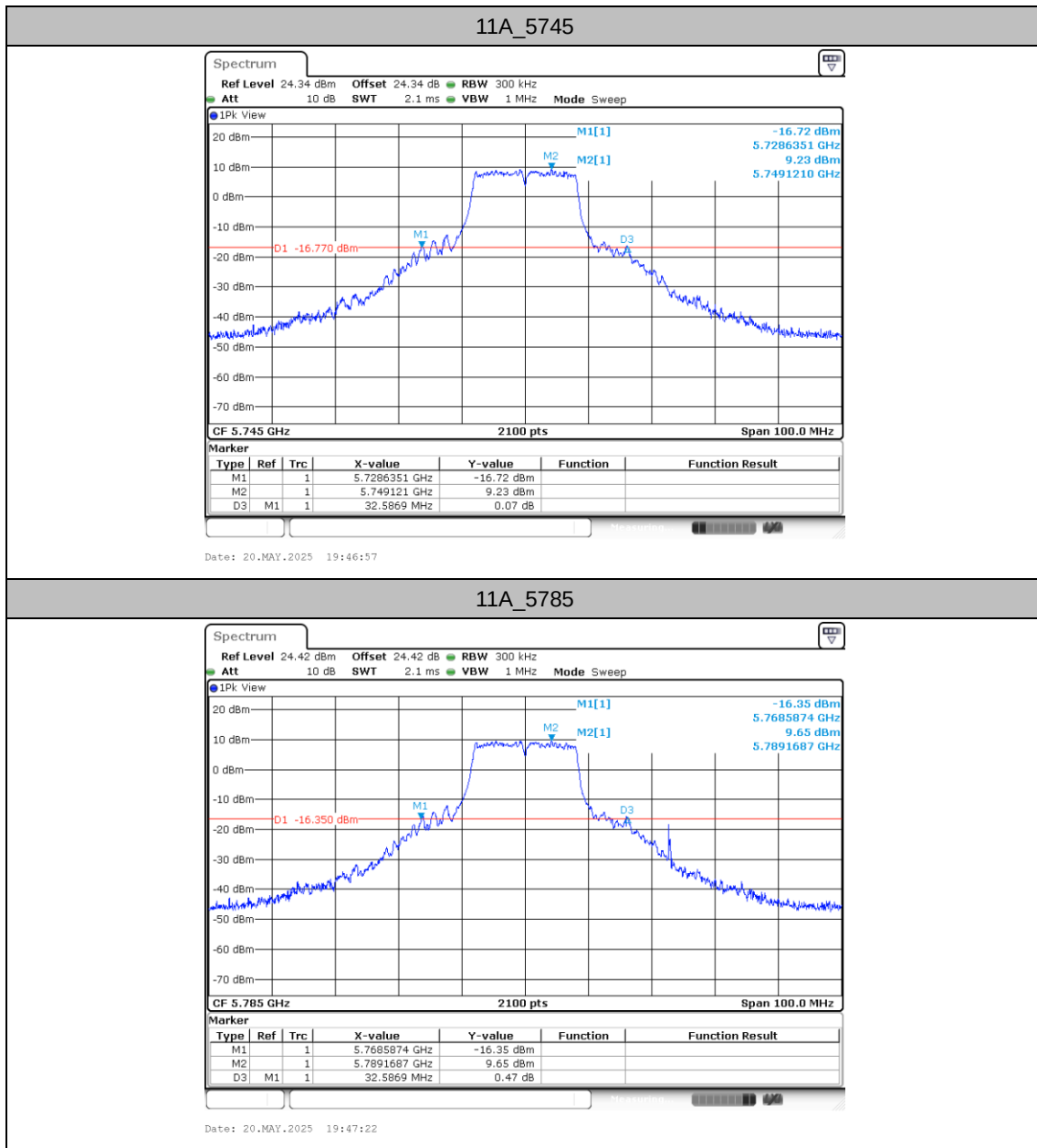


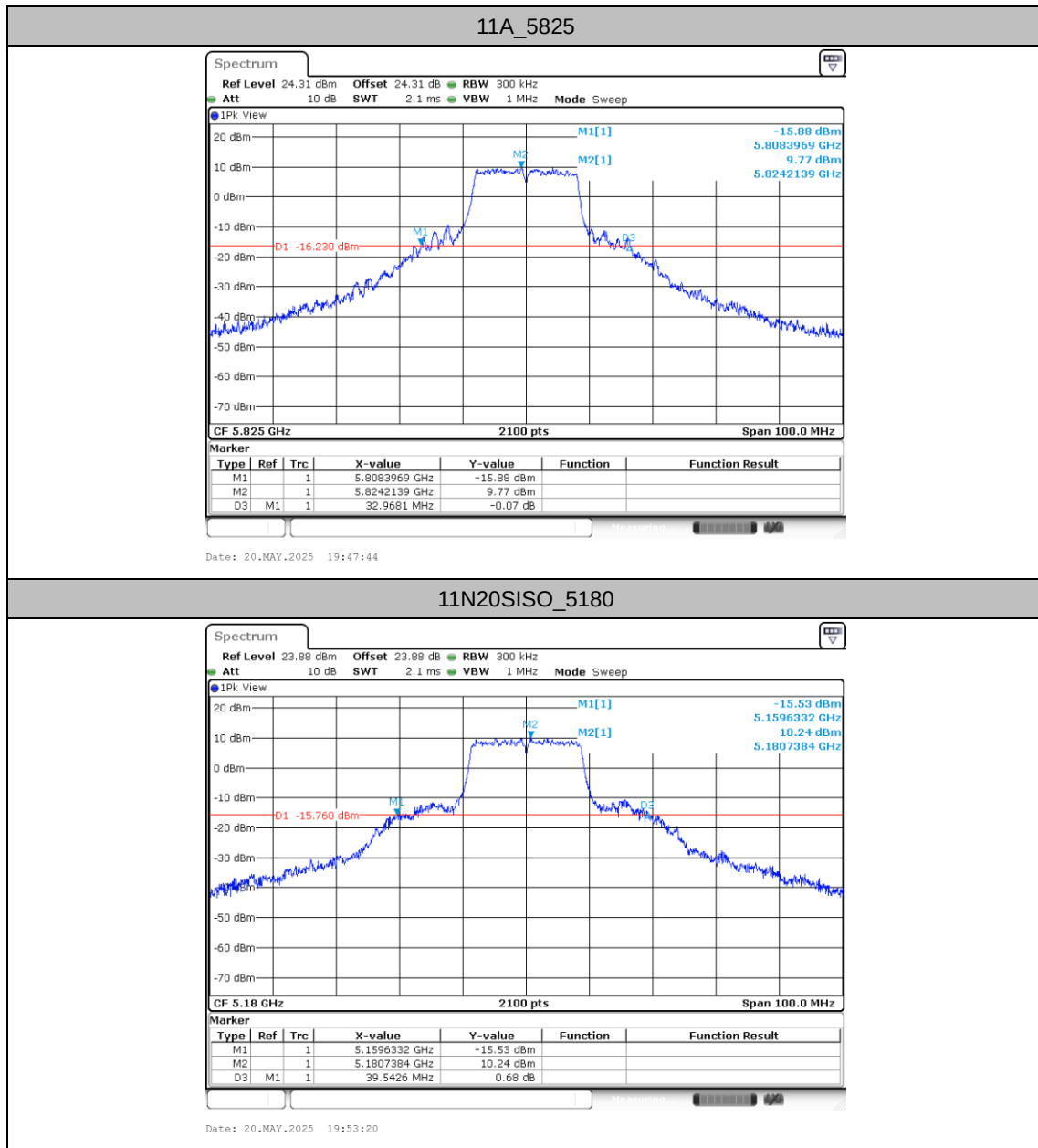


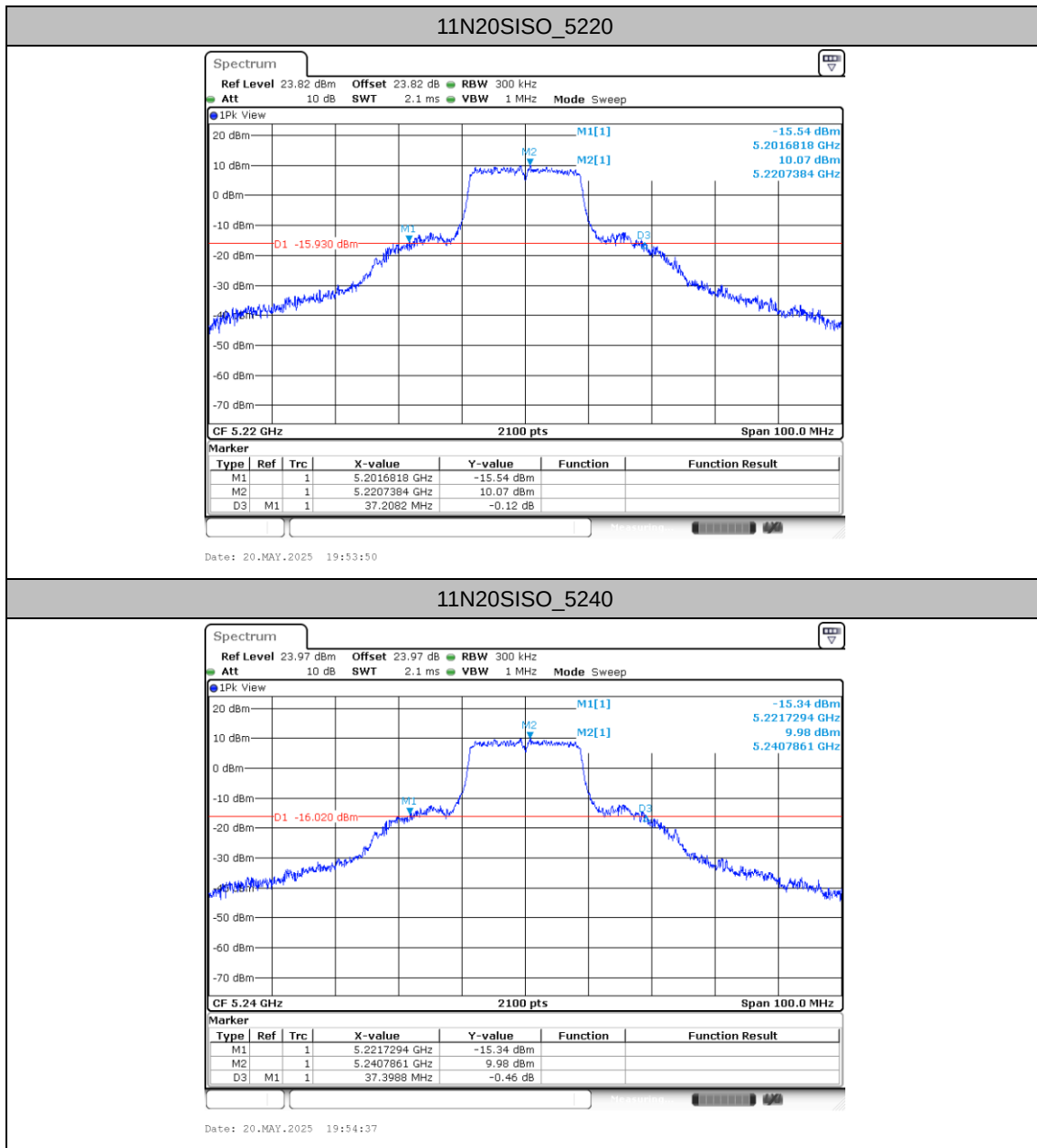


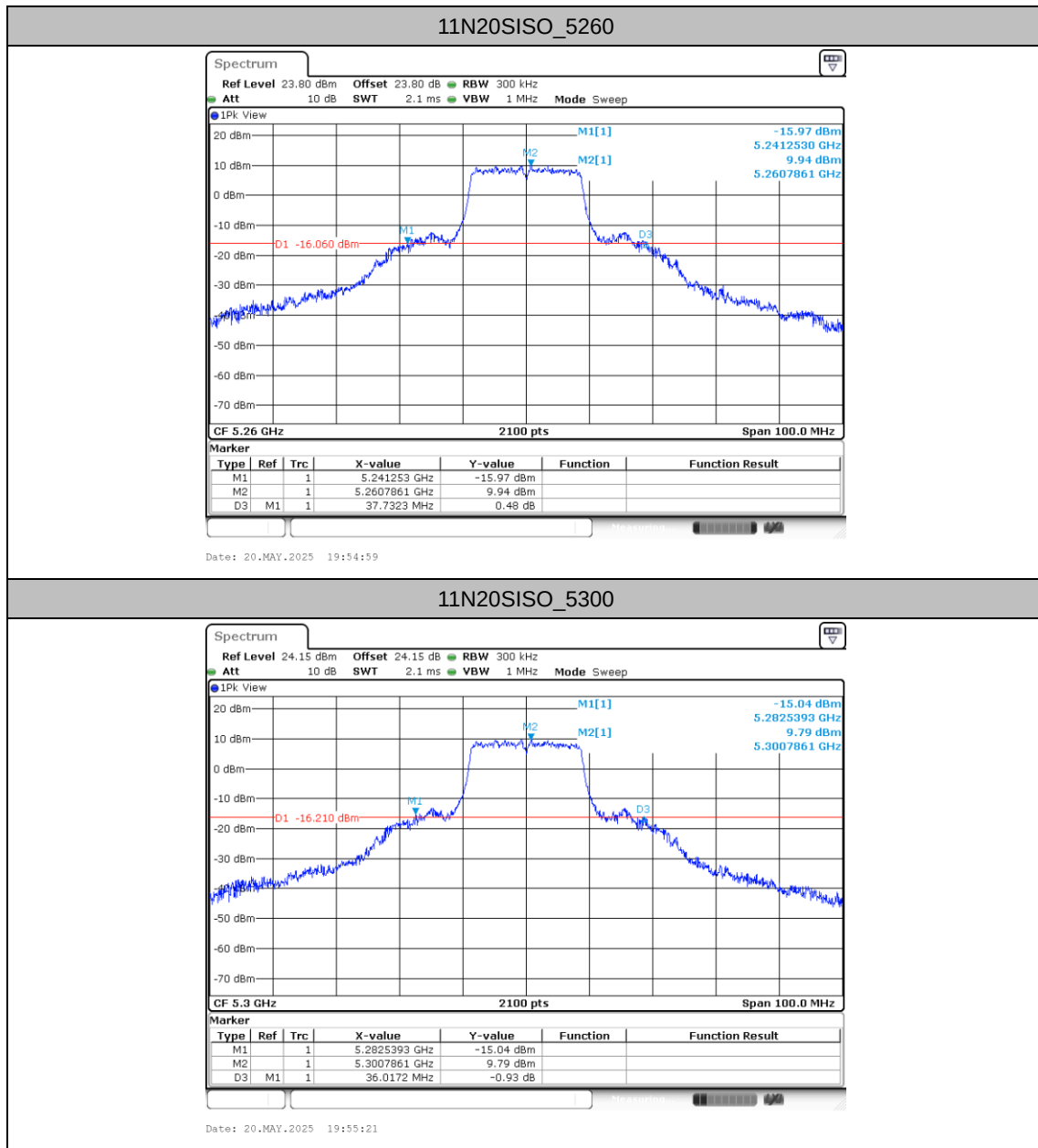


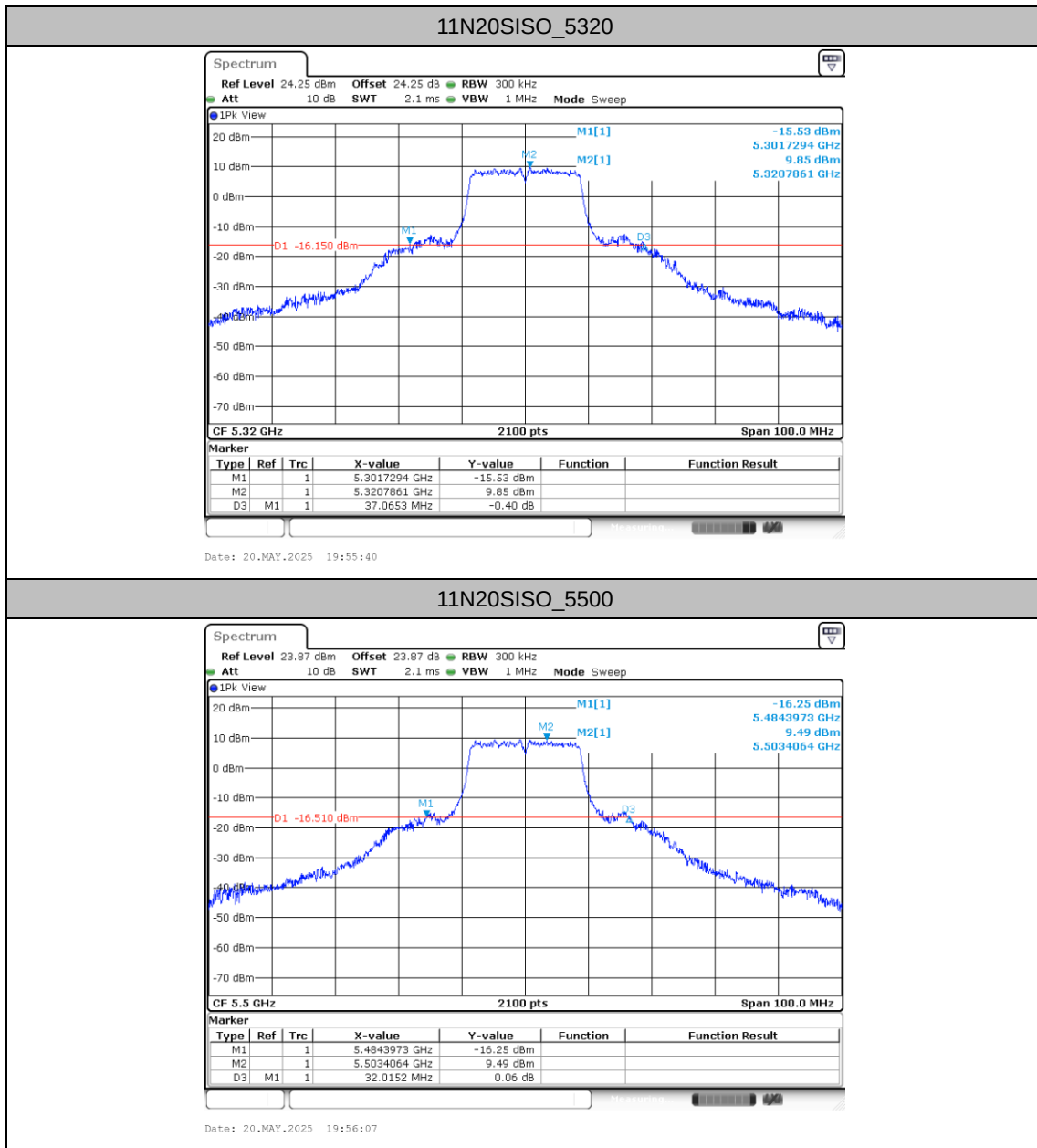


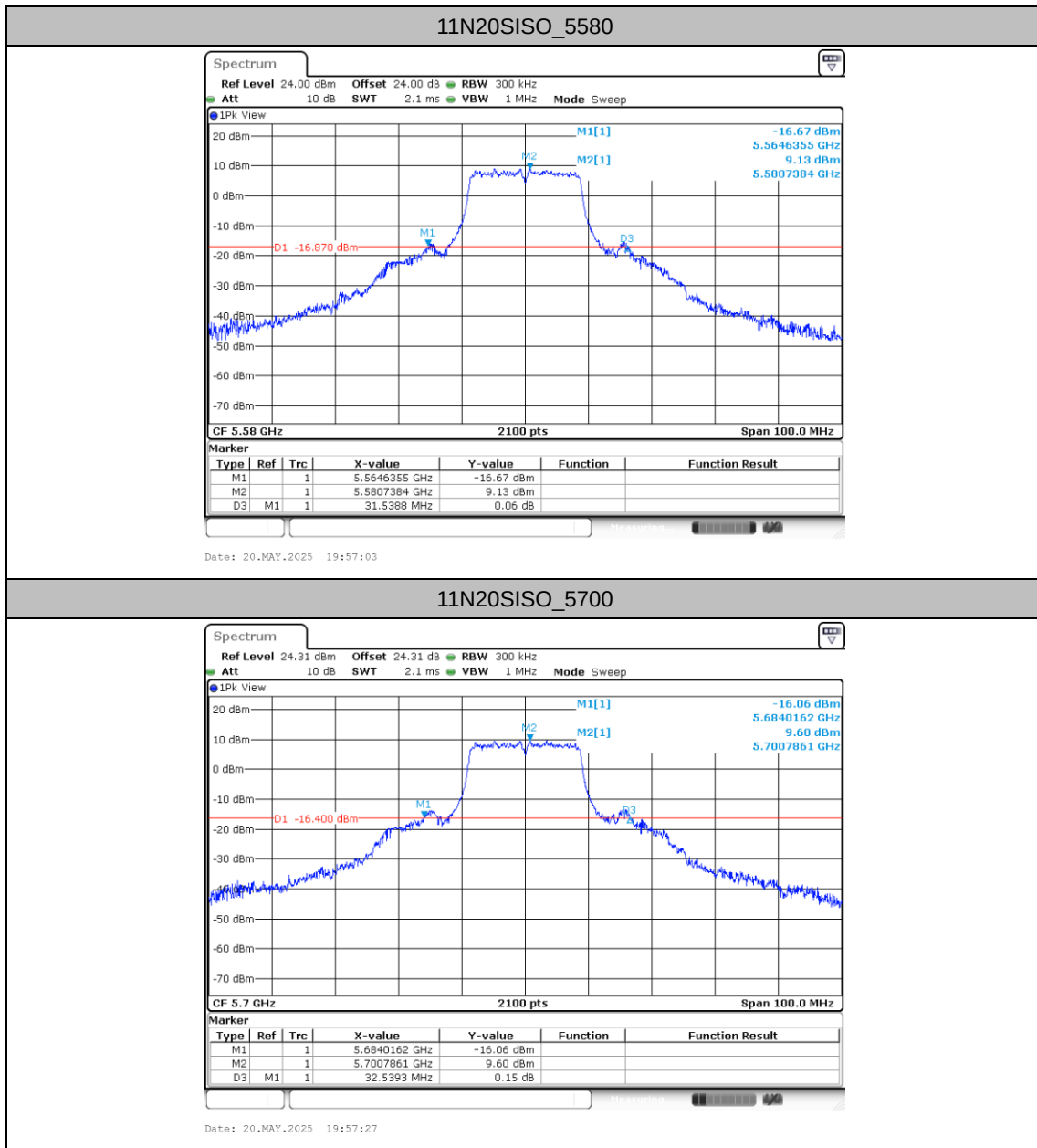


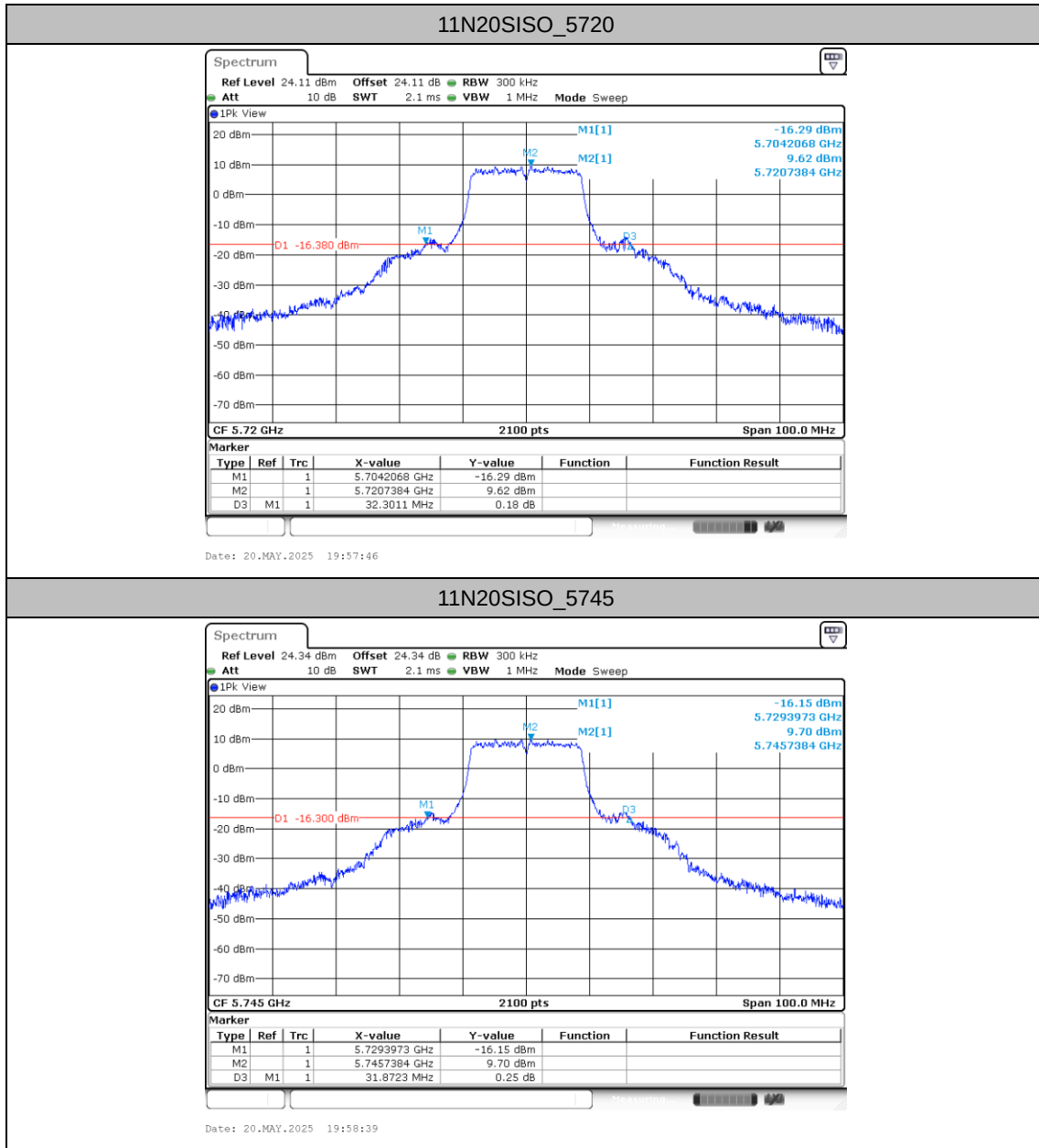


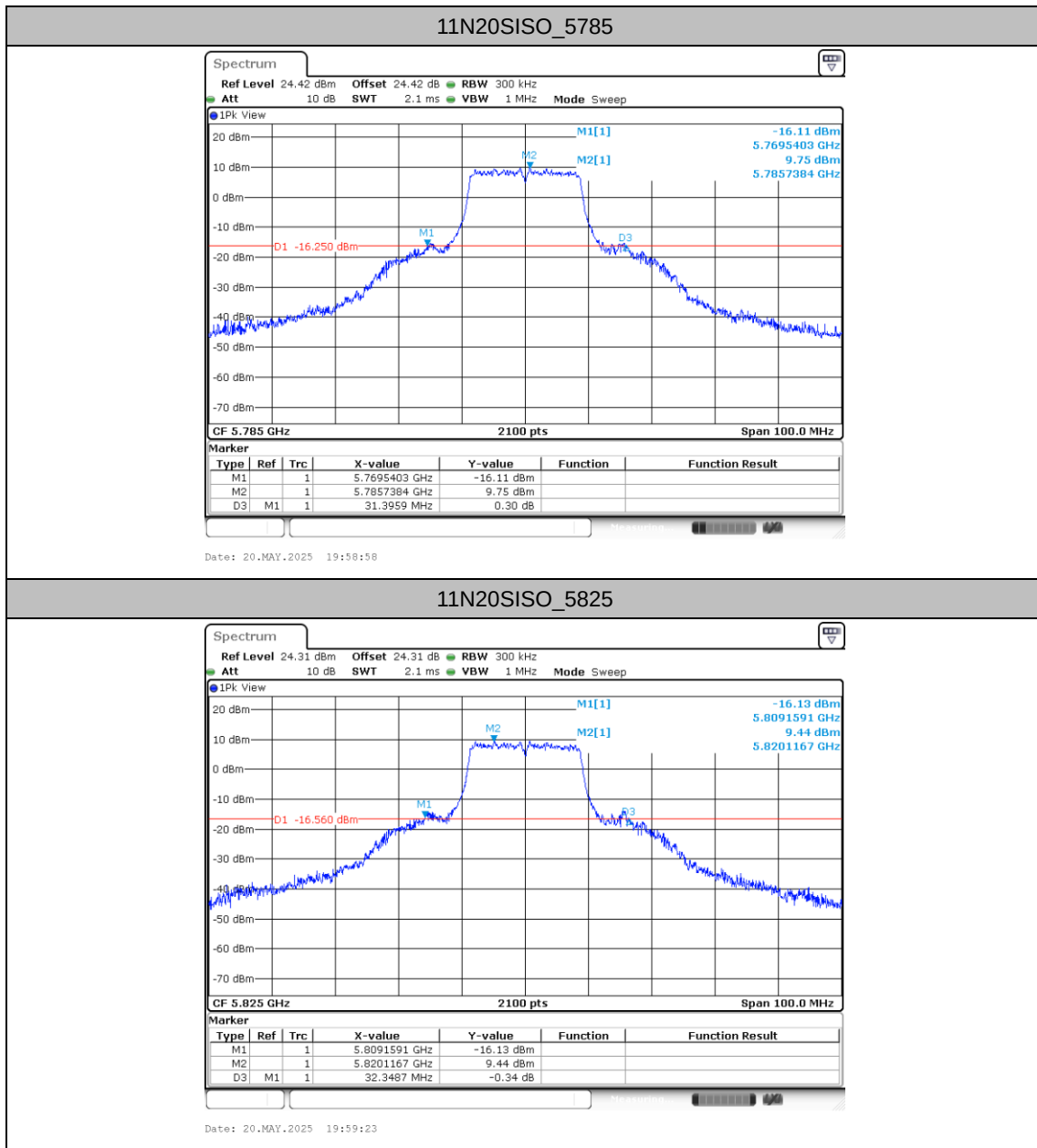


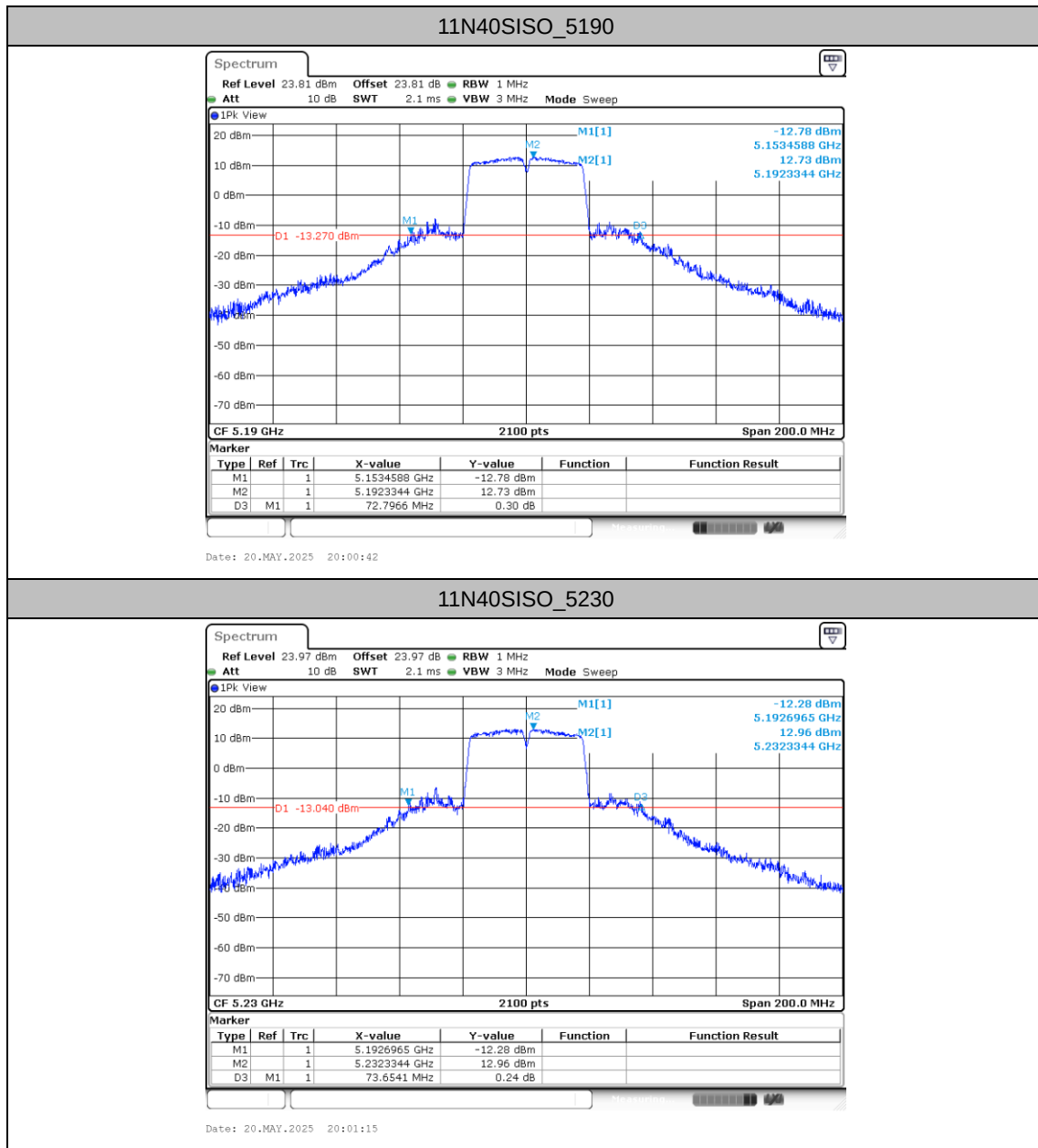


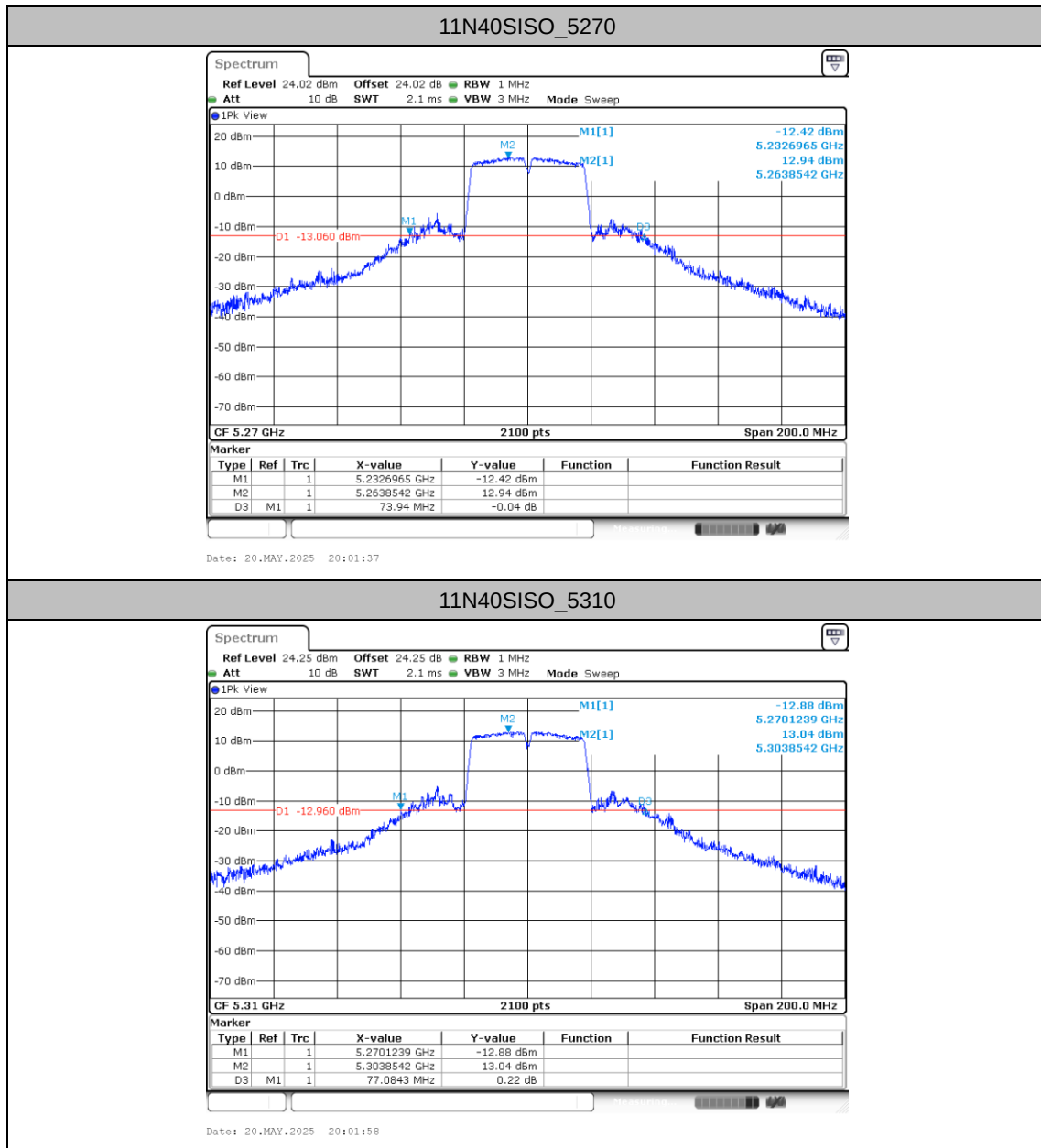


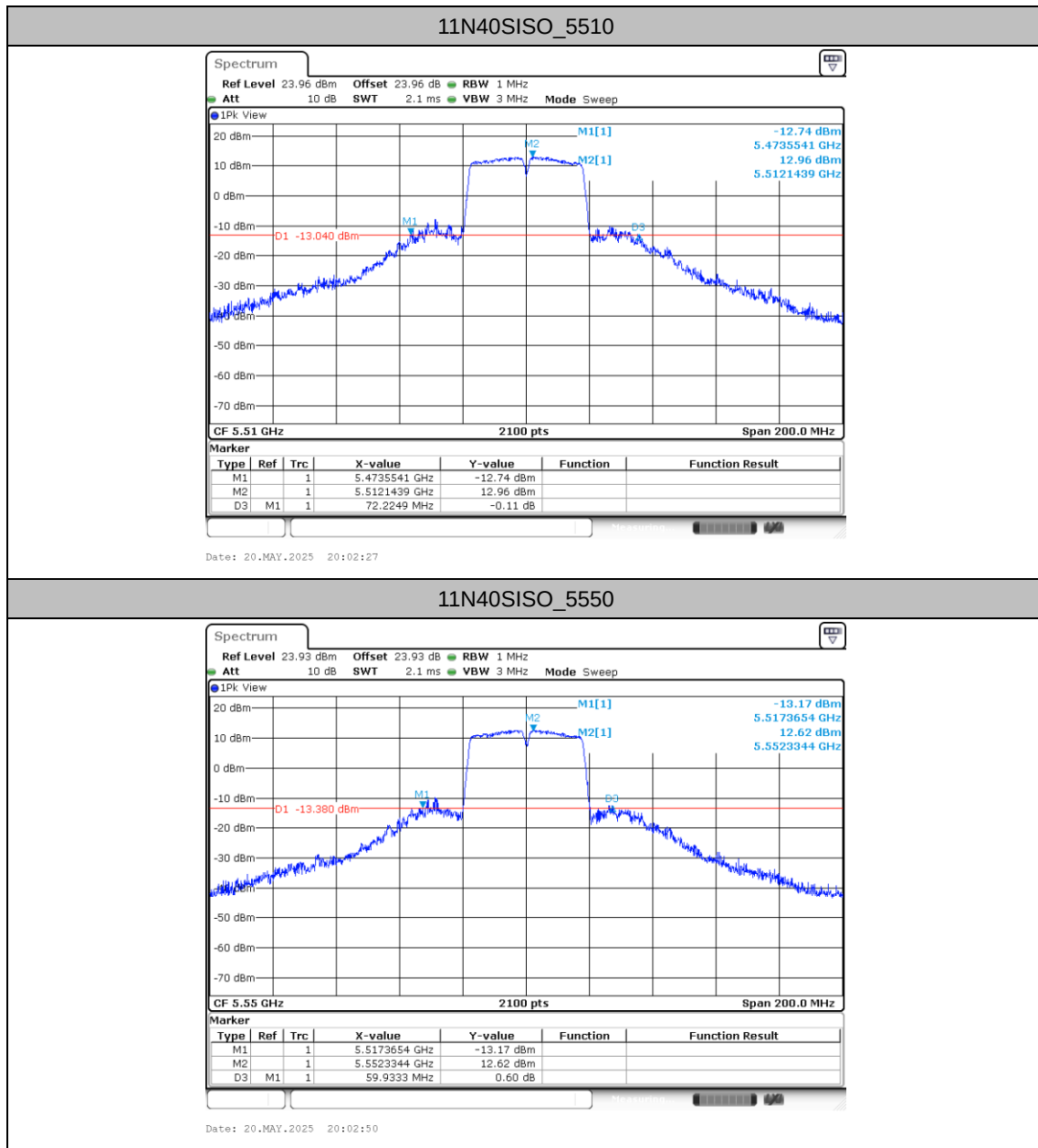


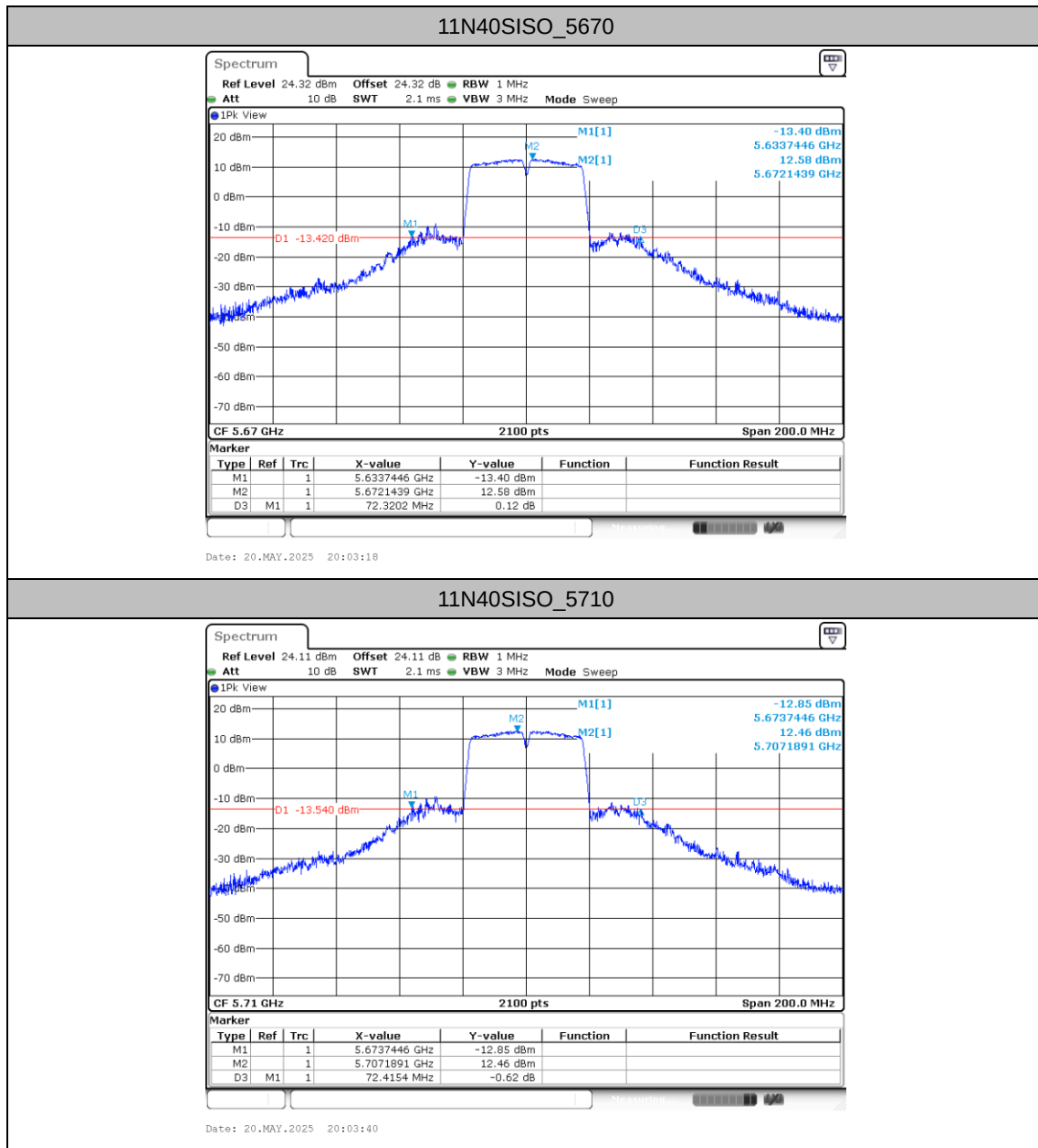


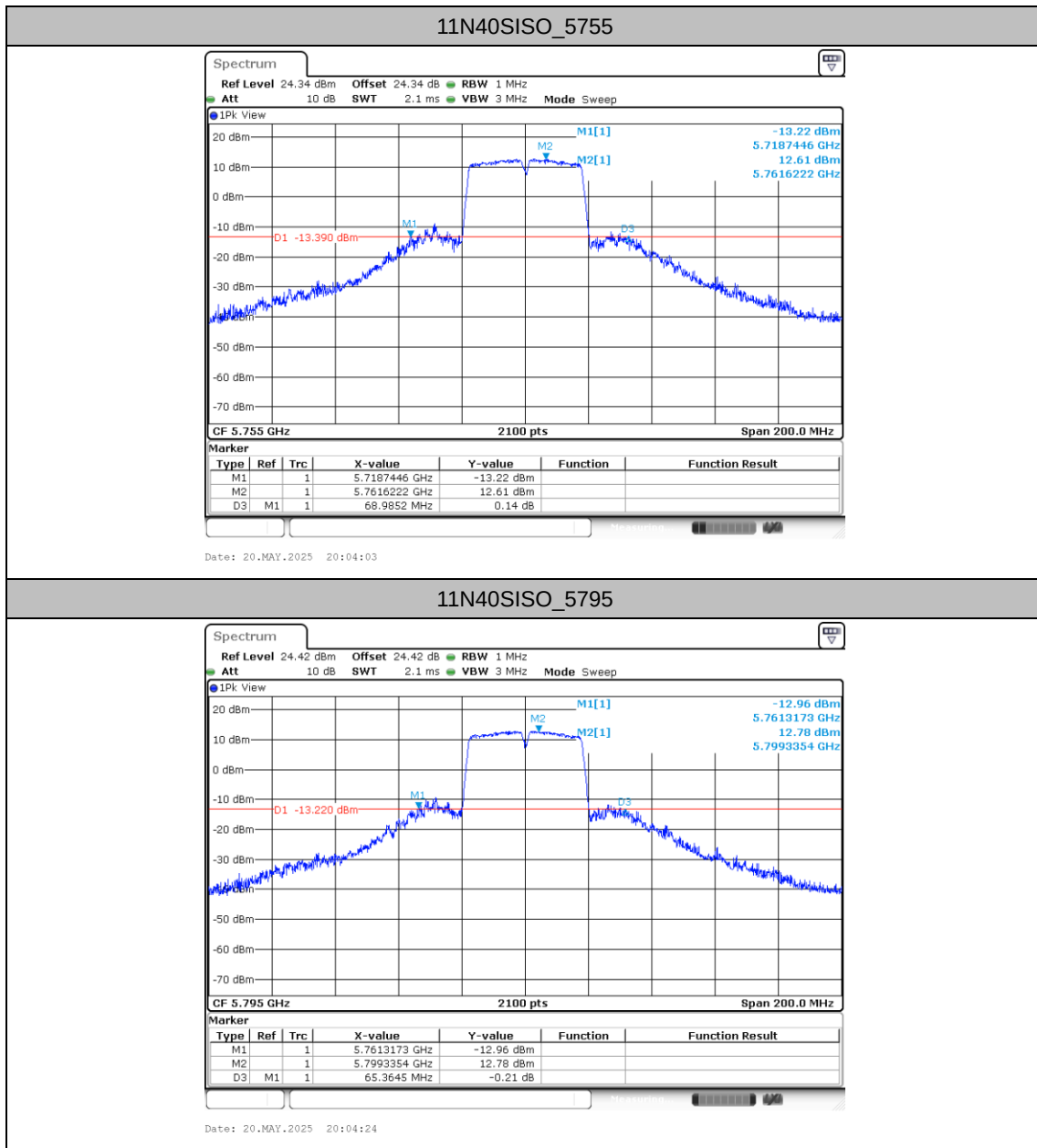














Occupied channel bandwidth

Test Result

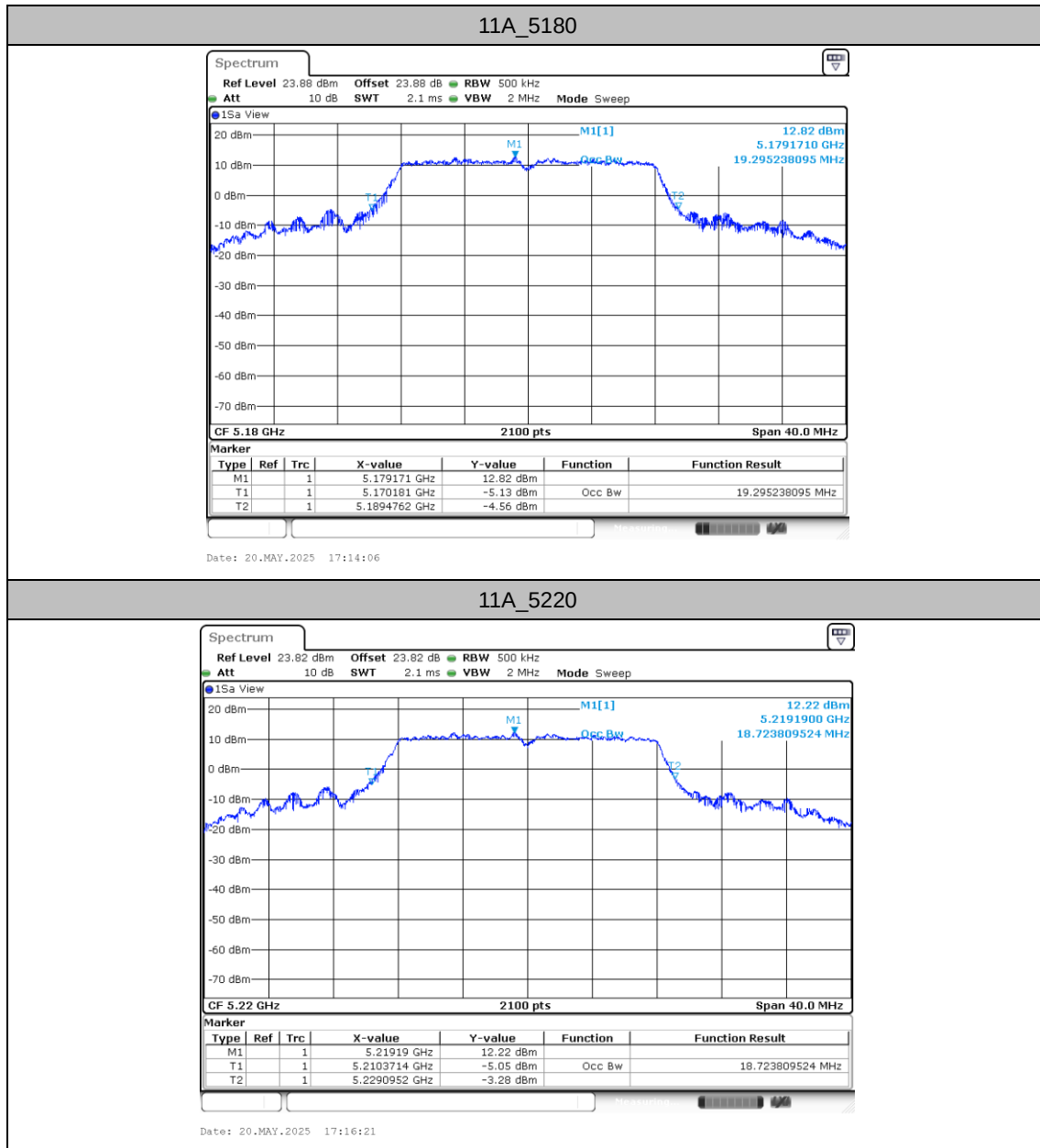
TestMode	Antenna	Freq(MHz)	OCB [MHz]	FL[MHz]	FH[MHz]	Limit[MHz]	Verdict
11A	Ant1	5180	19.295	5170.1810	5189.4762	---	---
		5220	18.724	5210.3714	5229.0952	---	---
		5240	18.476	5230.4857	5248.9619	---	---
		5260	18.971	5250.1238	5269.0952	---	---
		5300	19.143	5290.2000	5309.3429	---	---
		5320	19.295	5310.3905	5329.6857	---	---
		5500	17.962	5490.7905	5508.7524	---	---
		5580	18.114	5570.8476	5588.9619	---	---
		5700	17.924	5690.8095	5708.7333	---	---
		5720	17.905	5710.8476	5728.7524	---	---
		5720_UNII-2C	14.152	5710.8476	5725	---	---
		5720_UNII-3	3.752	5725	5728.7524	---	---
		5745	17.886	5735.8286	5753.7143	---	---
		5785	18.038	5775.6571	5793.6952	---	---
		5825	18.629	5815.3143	5833.9429	---	---
11N20SISO	Ant1	5180	20.248	5169.9524	5190.2000	---	---
		5220	19.505	5210.2190	5229.7238	---	---
		5240	19.924	5229.9905	5249.9143	---	---
		5260	19.448	5250.2190	5269.6667	---	---
		5300	19.124	5290.3714	5309.4952	---	---
		5320	19.448	5310.2762	5329.7238	---	---
		5500	18.971	5490.4667	5509.4381	---	---
		5580	18.857	5570.5238	5589.3810	---	---
		5700	19.01	5690.4857	5709.4952	---	---
		5720	18.914	5710.5048	5729.4190	---	---
		5720_UNII-2C	14.495	5710.5048	5725	---	---
		5720_UNII-3	4.419	5725	5729.4190	---	---
		5745	19.086	5735.4476	5754.5333	---	---
		5785	19.295	5775.5048	5794.8000	---	---
		5825	19.143	5815.3333	5834.4762	---	---

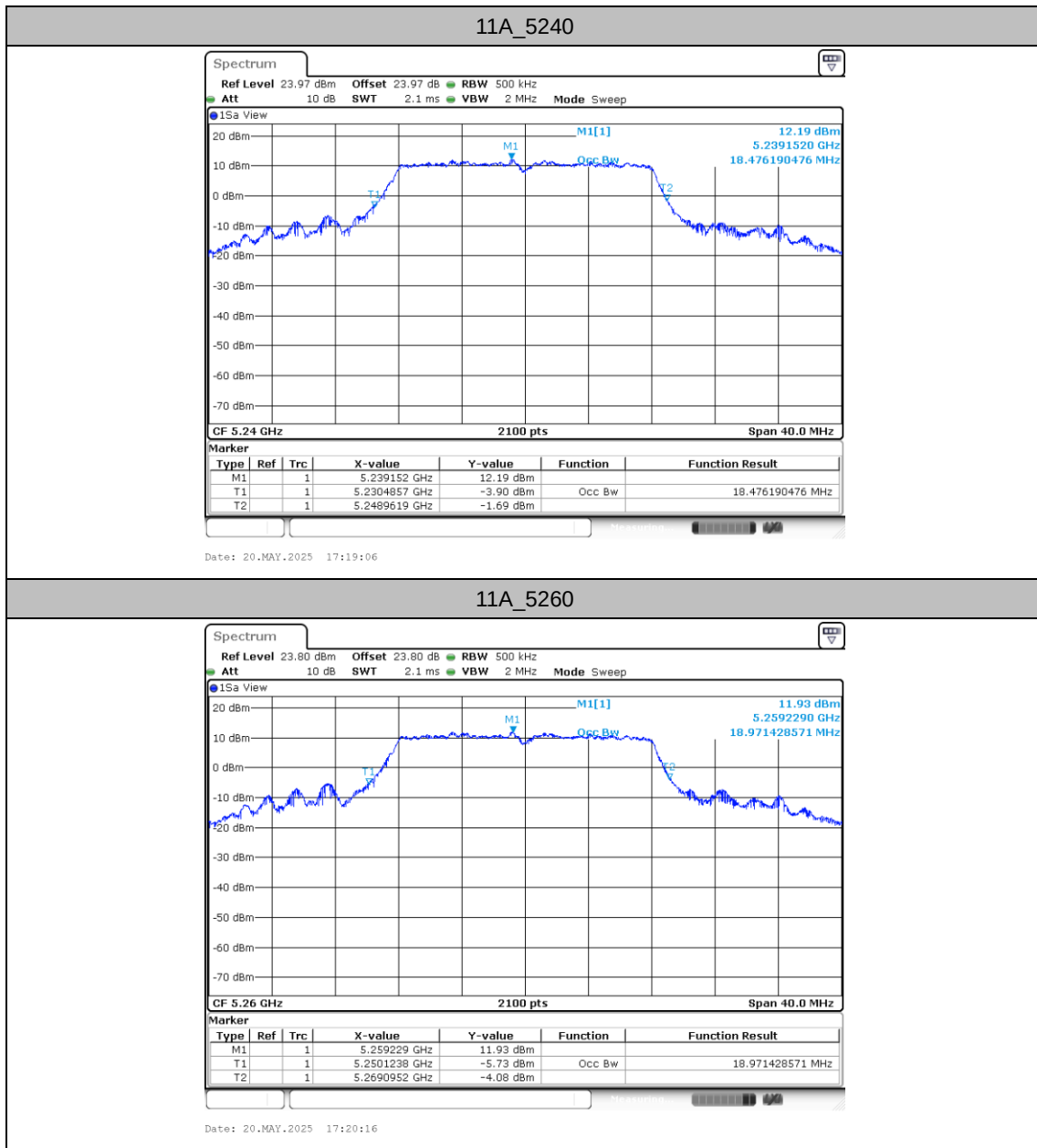


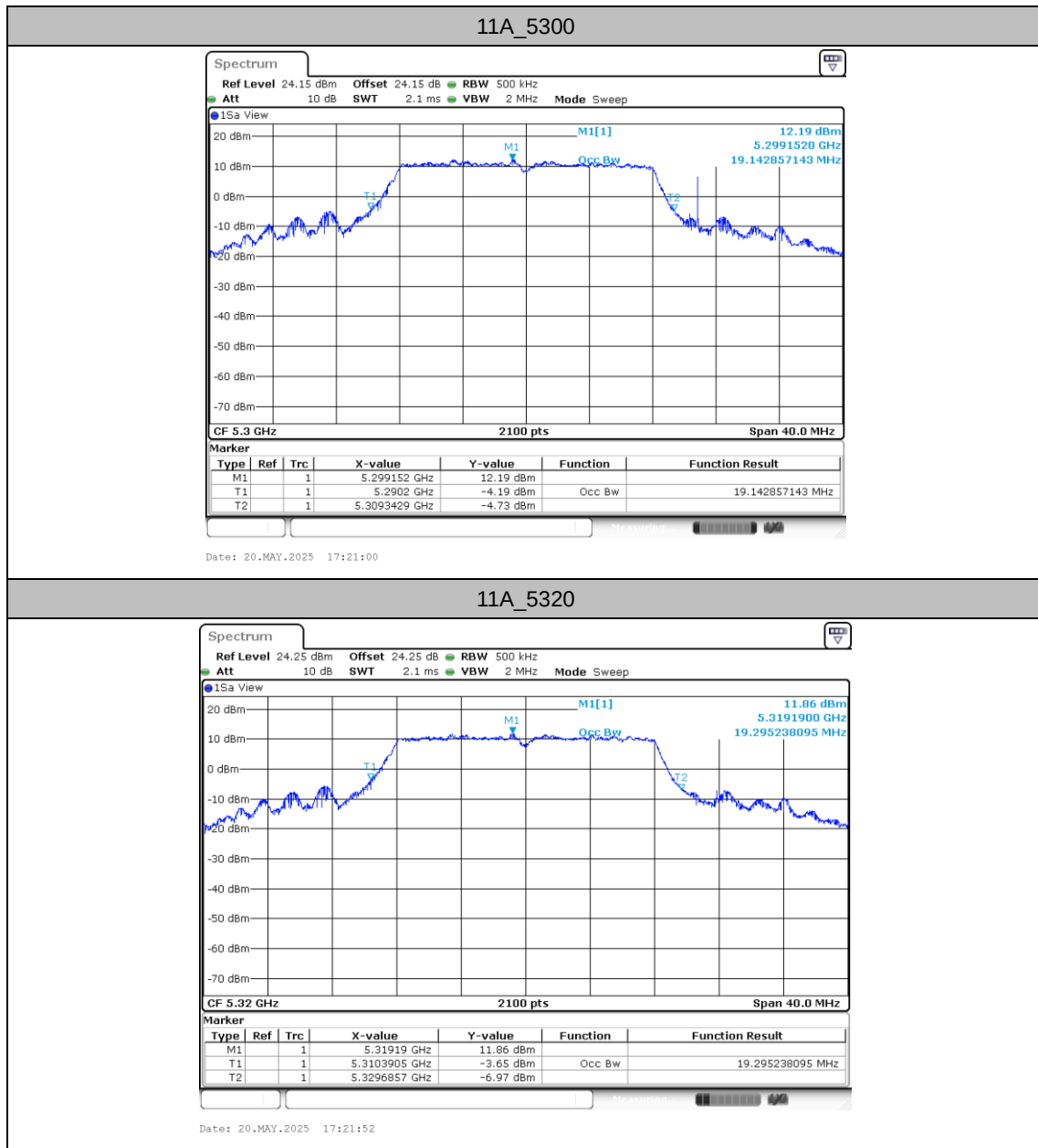
11N40SISO	Ant1	5190	36.571	5171.6952	5208.2667	---	---
		5230	36.419	5211.7714	5248.1905	---	---
		5270	36.571	5251.6952	5288.2667	---	---
		5310	36.648	5291.6571	5328.3048	---	---
		5510	36.381	5491.7714	5528.1524	---	---
		5550	36.229	5531.8476	5568.0762	---	---
		5670	36.305	5651.8095	5688.1143	---	---
		5710	36.343	5691.8095	5728.1524	---	---
		5710_UNII-2C	33.19	5691.8095	5725	---	---
		5710_UNII-3	3.152	5725	5728.1524	---	---
		5755	36.305	5736.8476	5773.1524	---	---
		5795	36.305	5776.8095	5813.1143	---	---

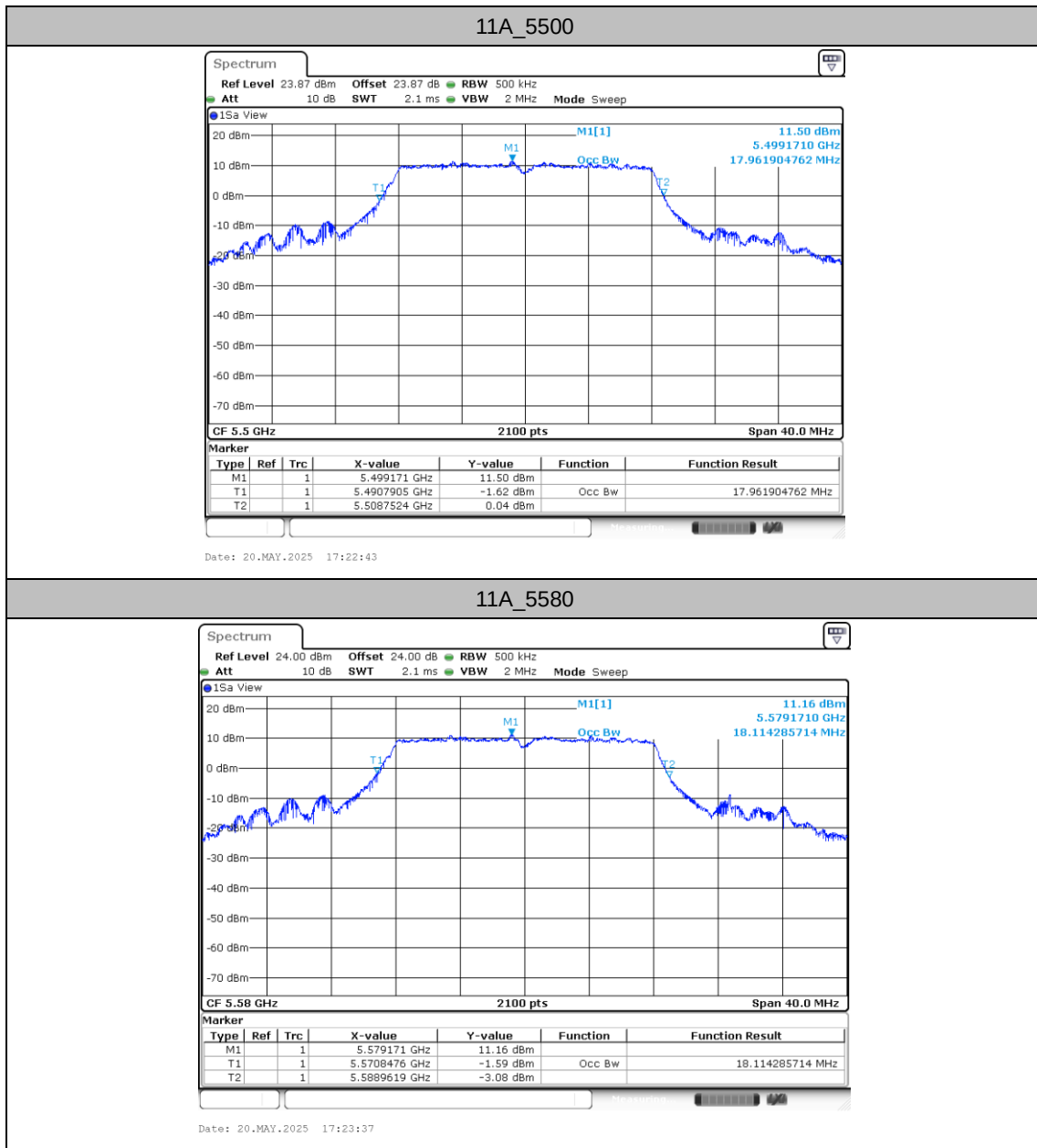


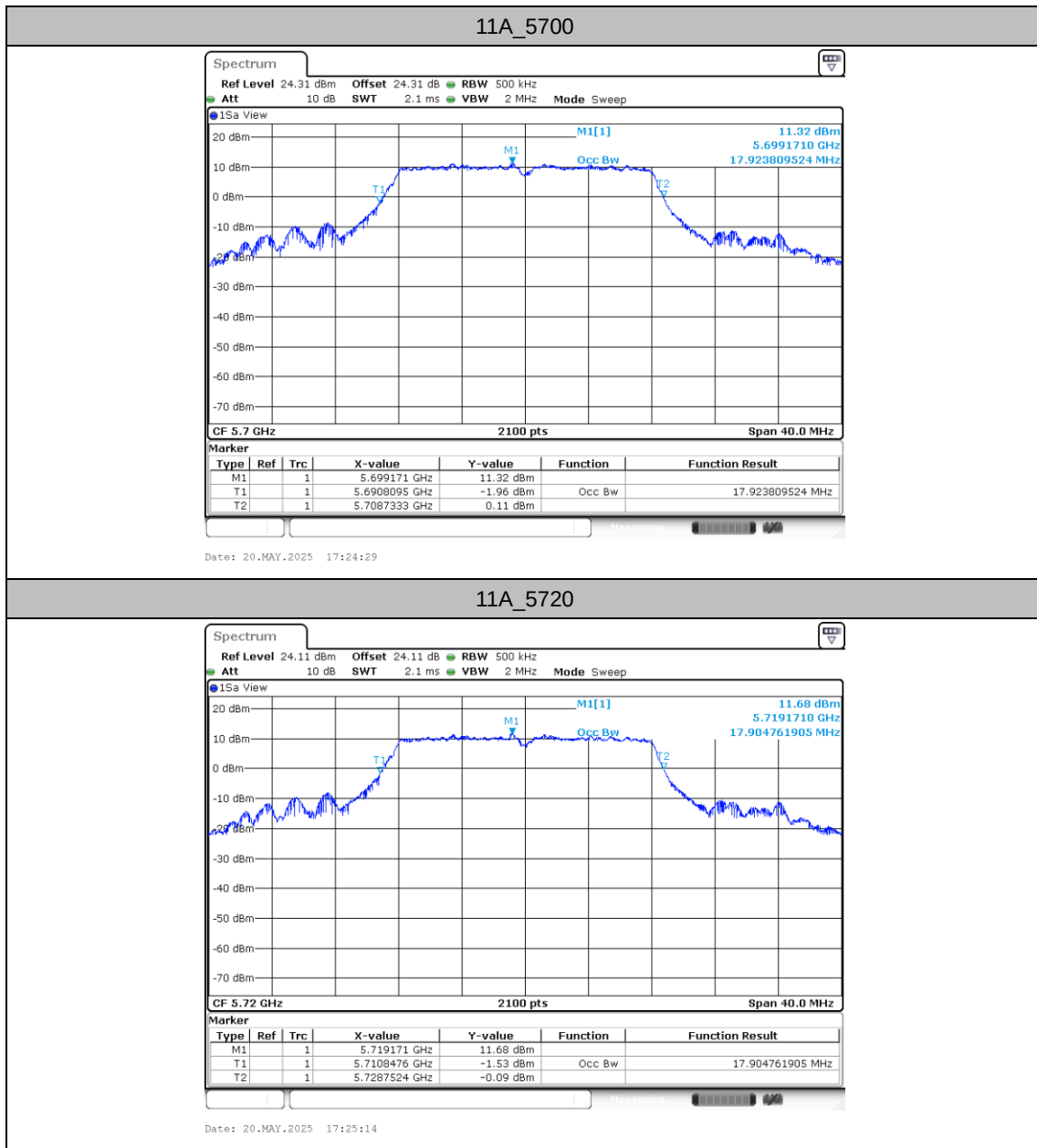
Test Graphs

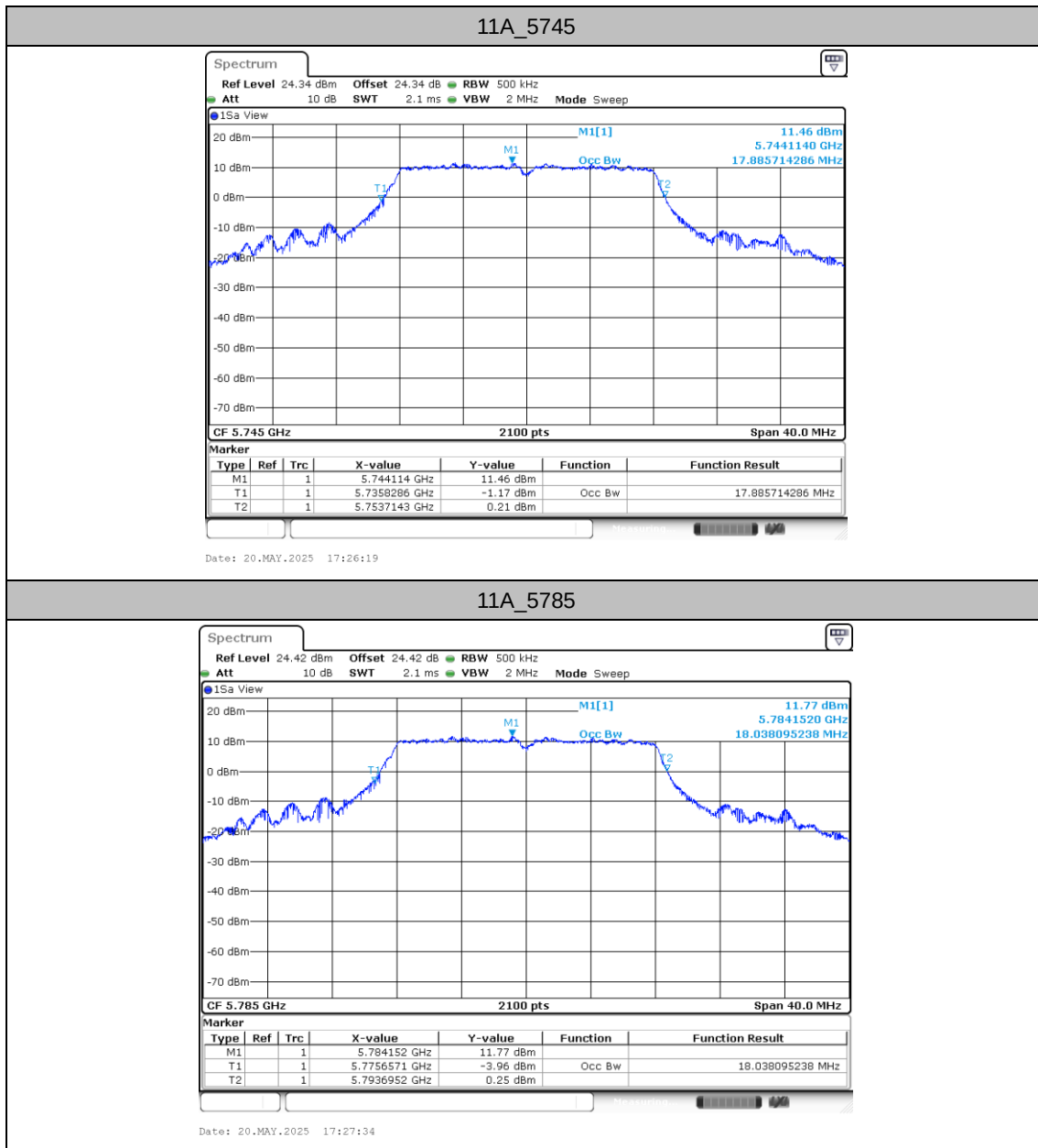


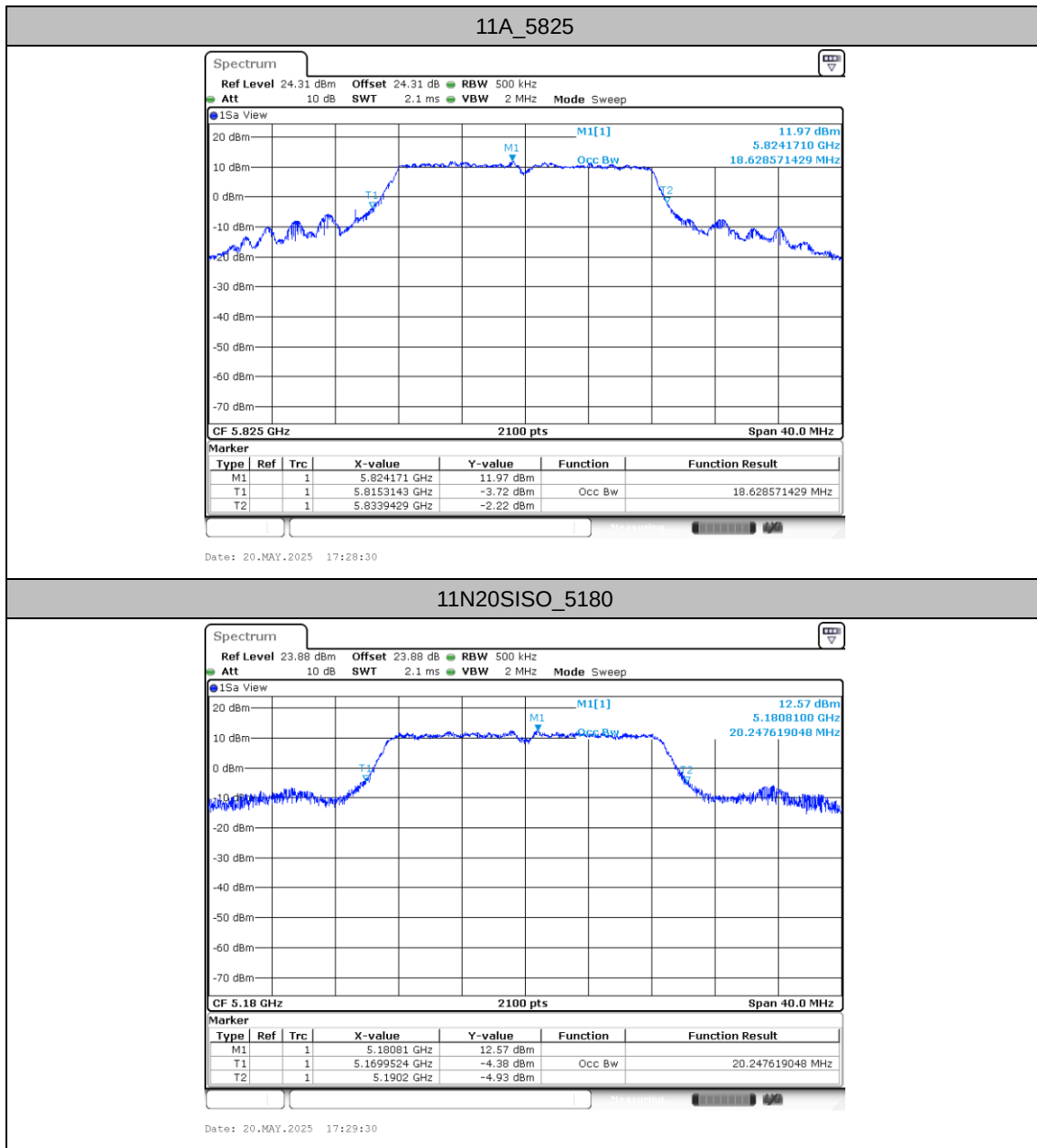


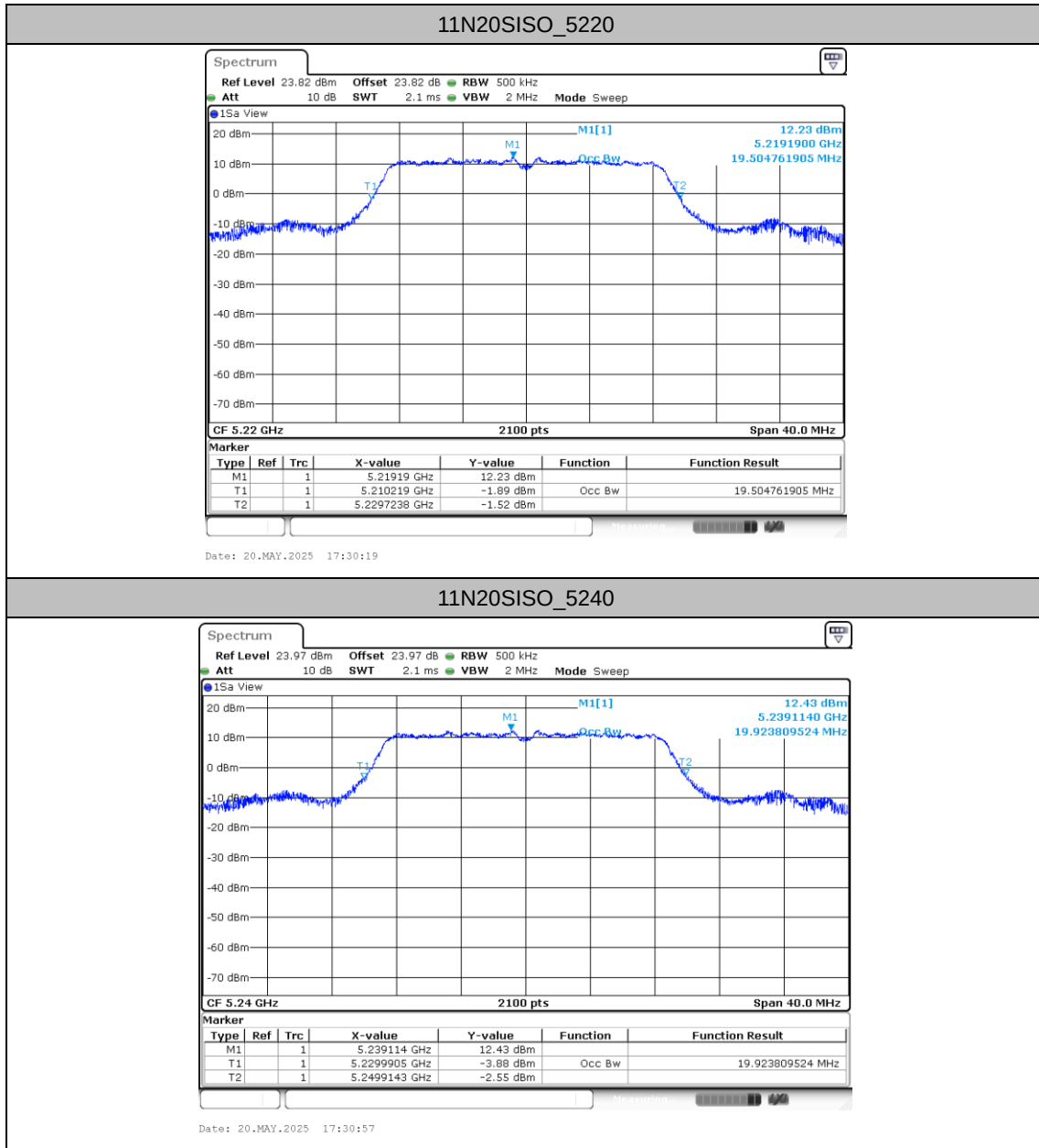


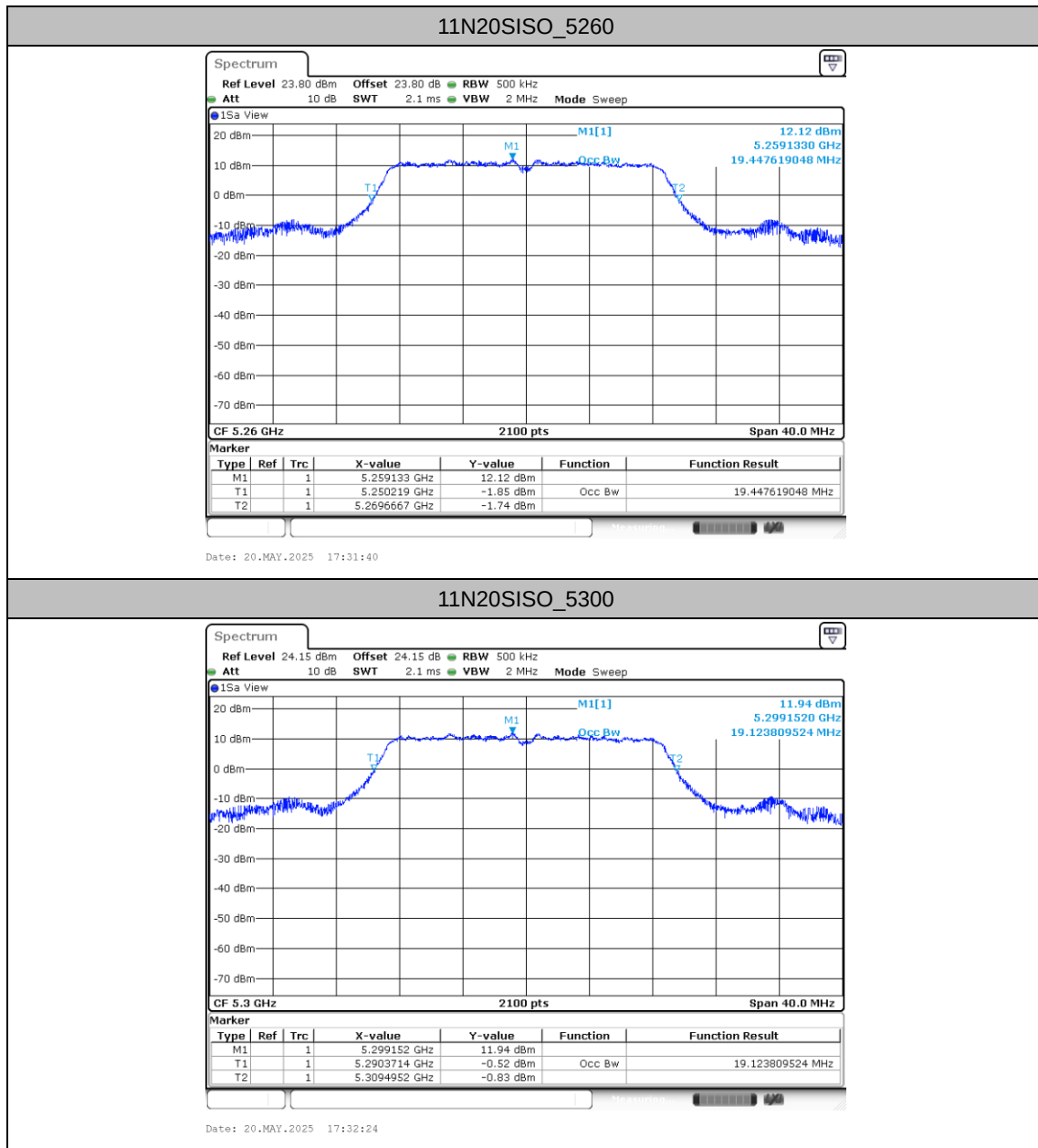


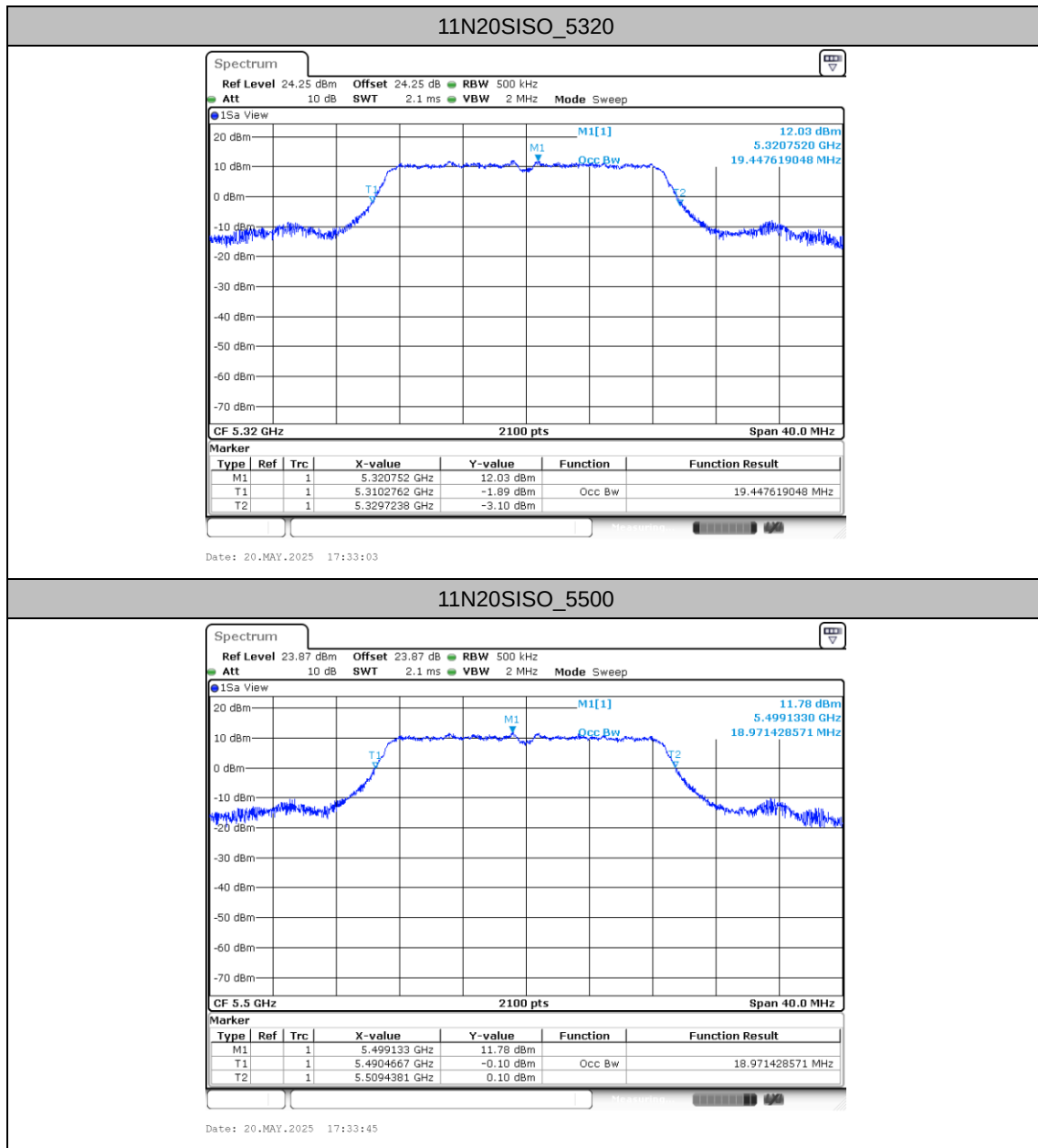


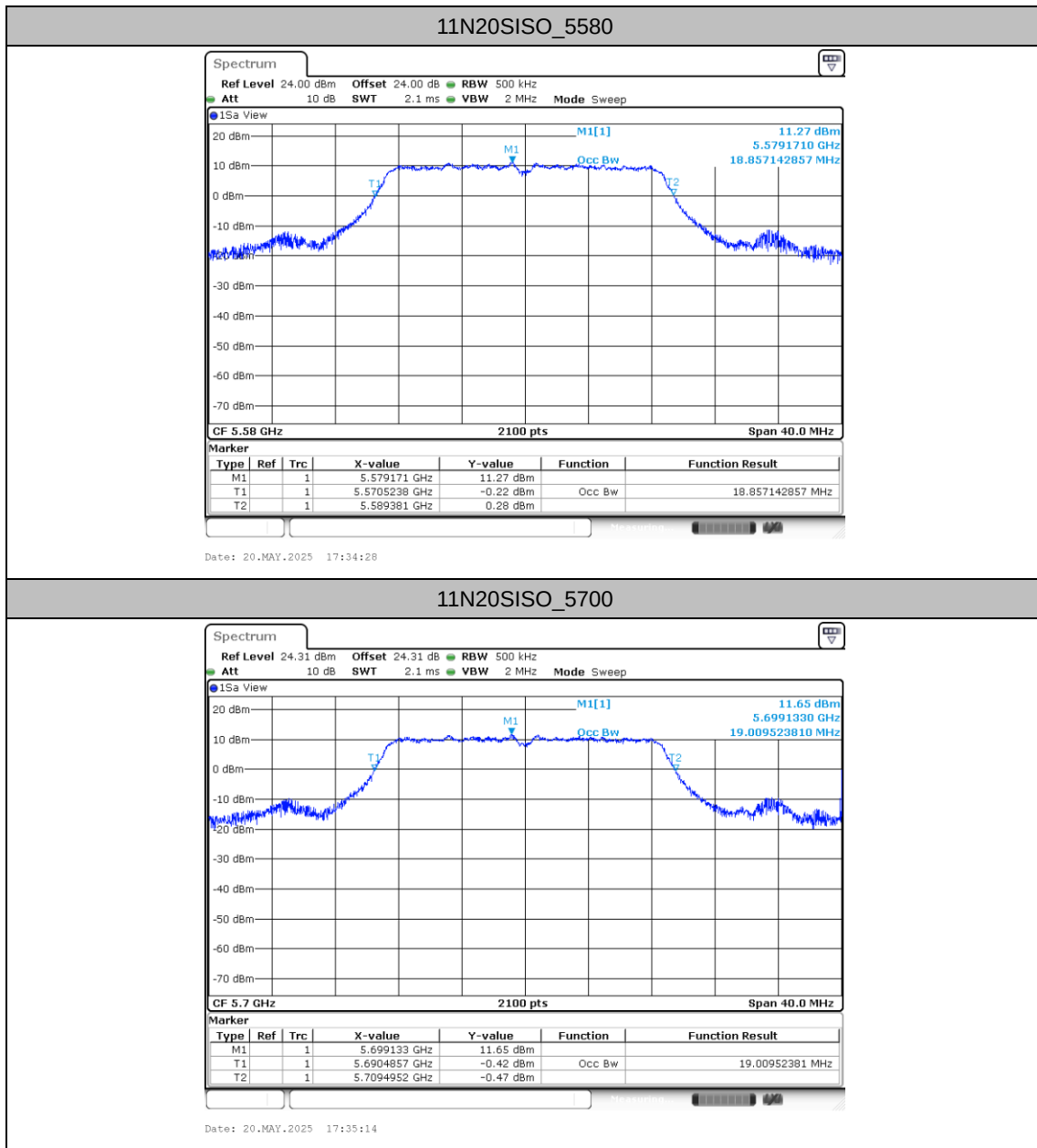


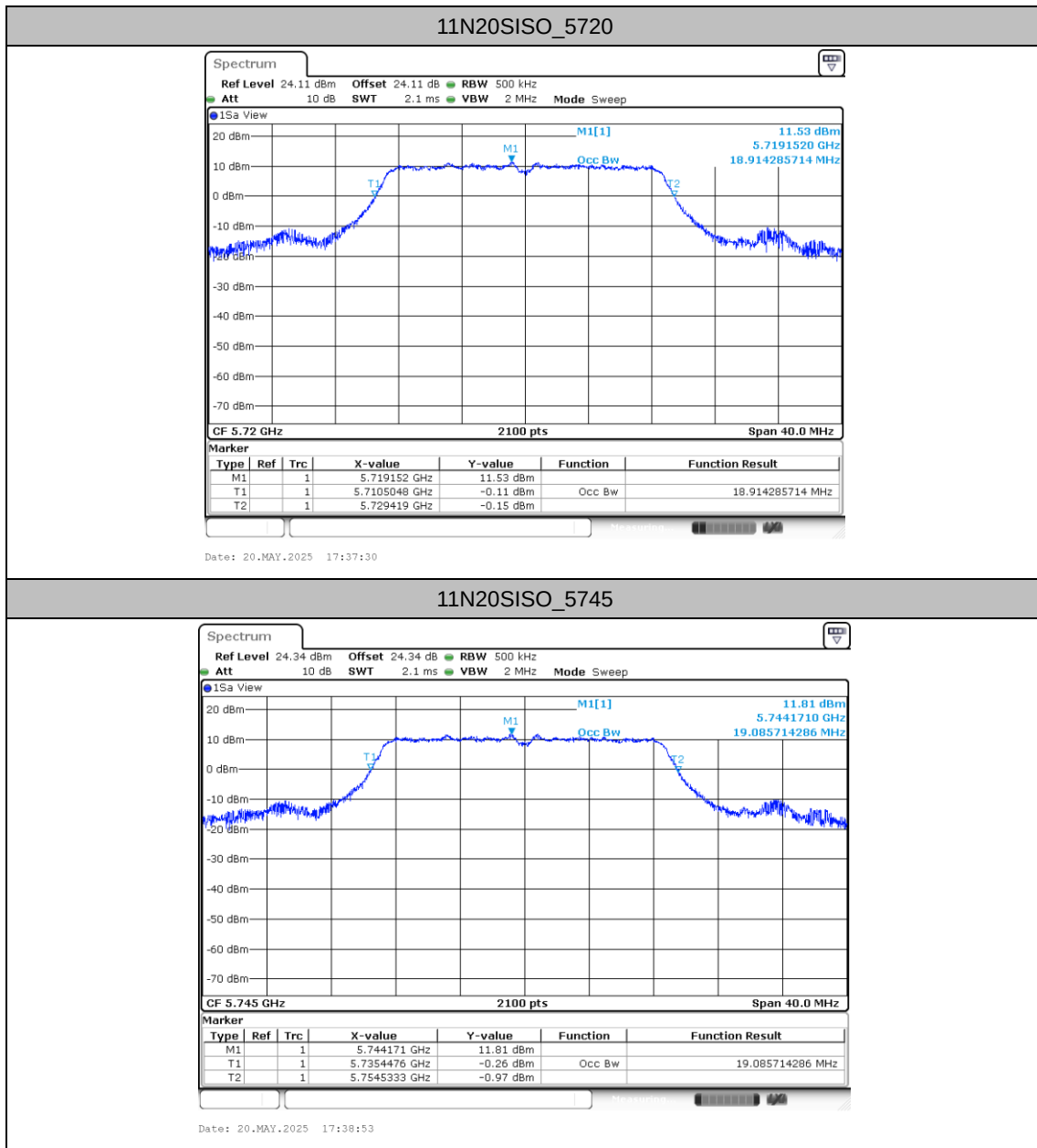


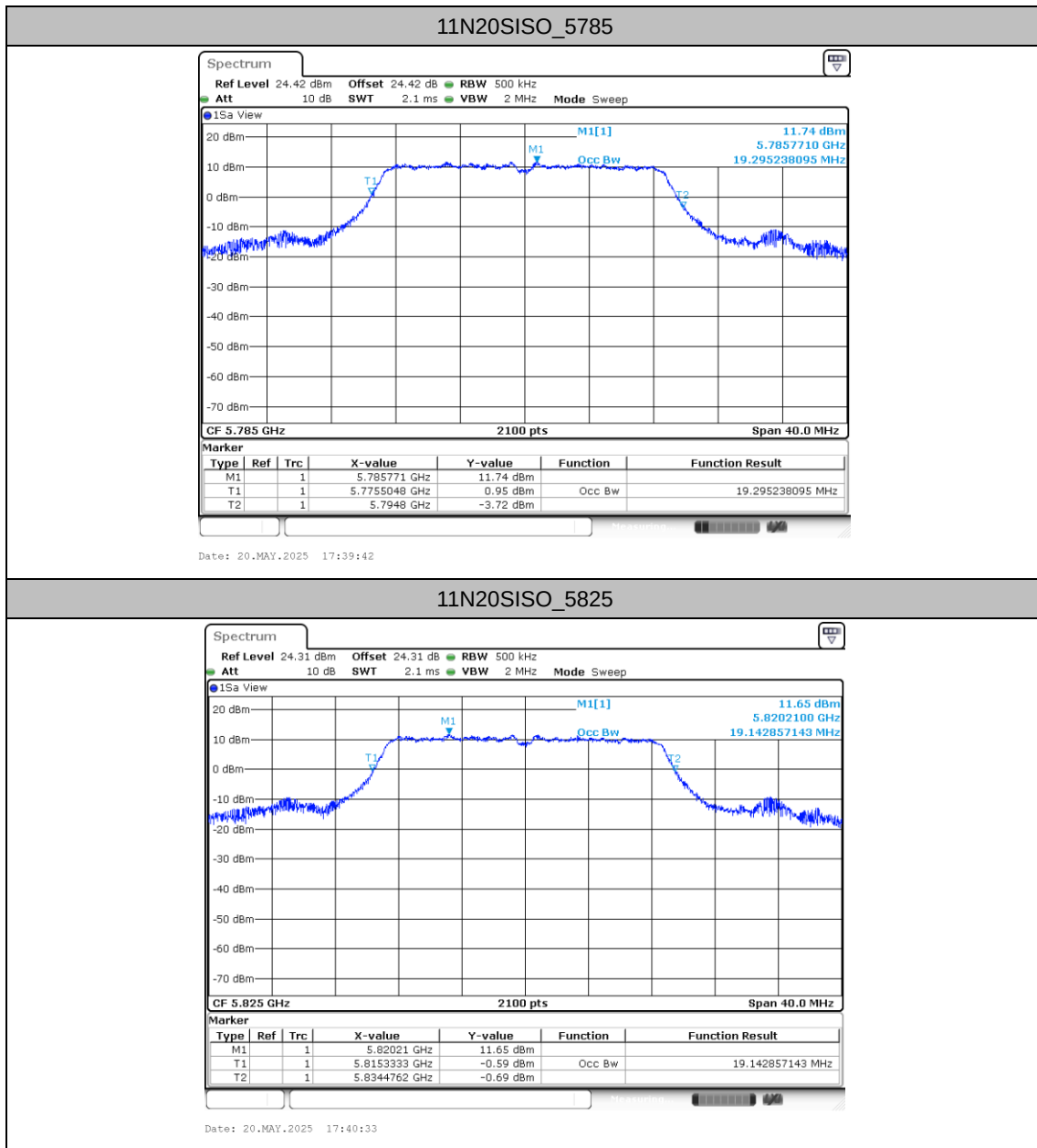


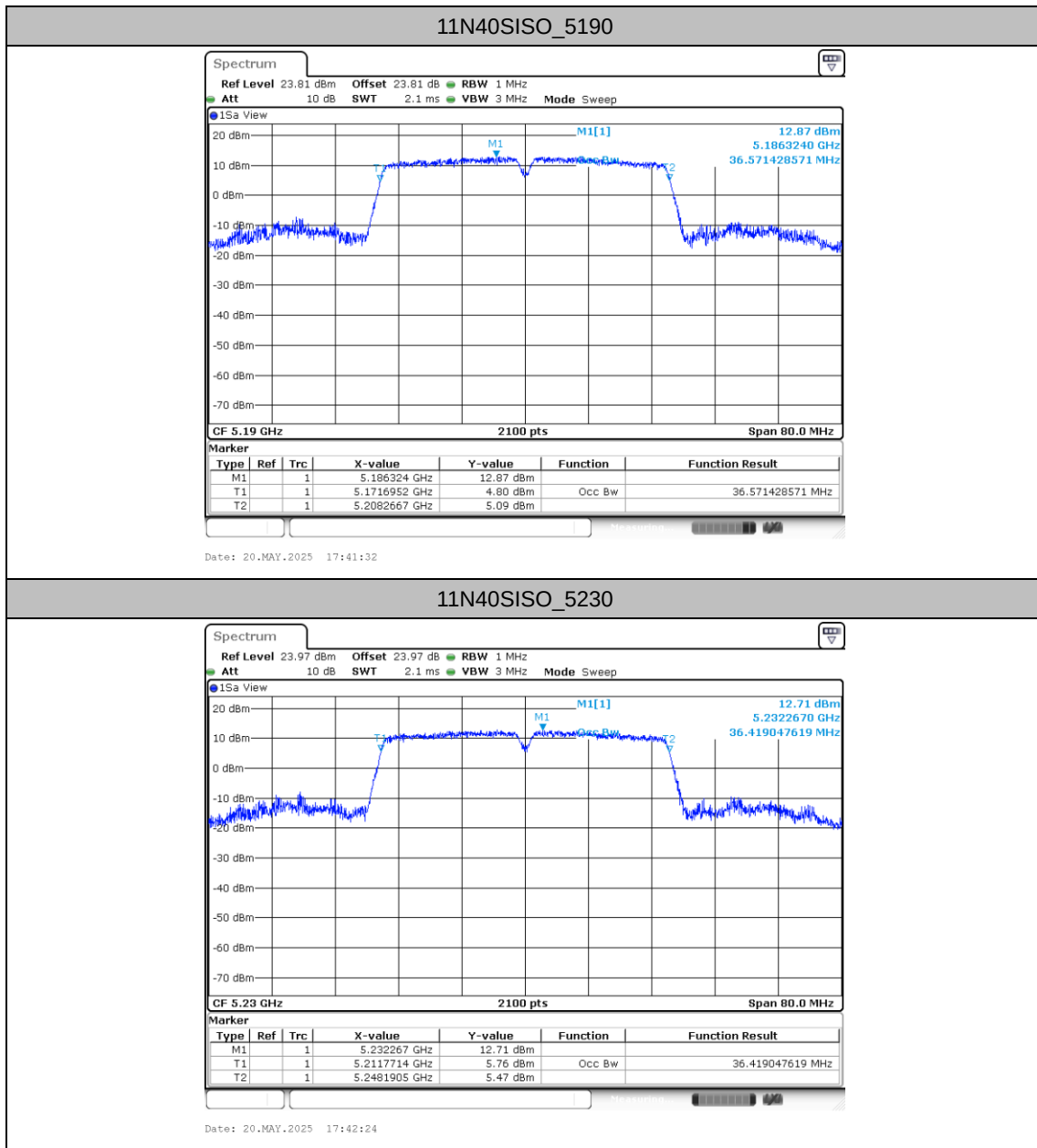


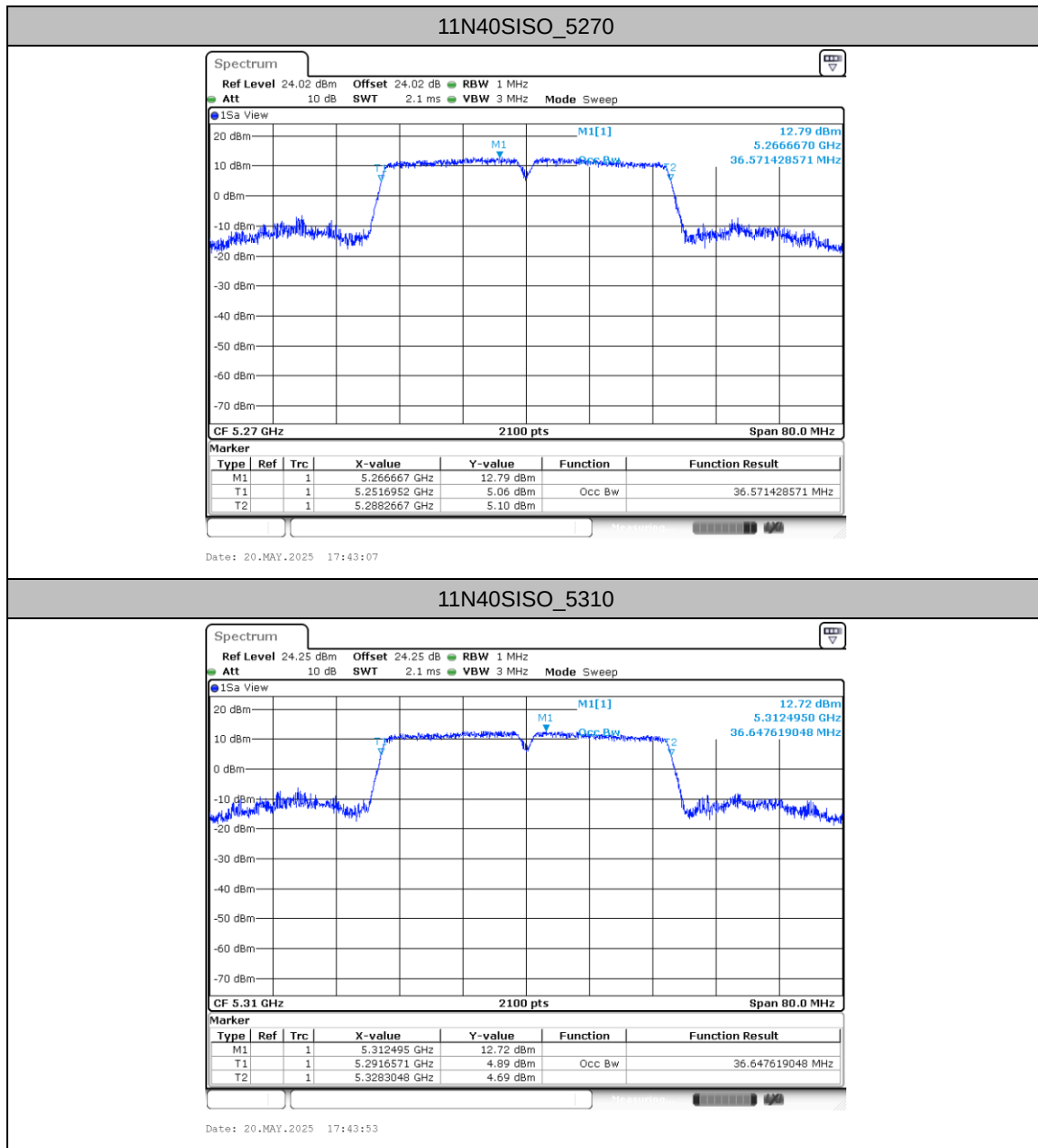


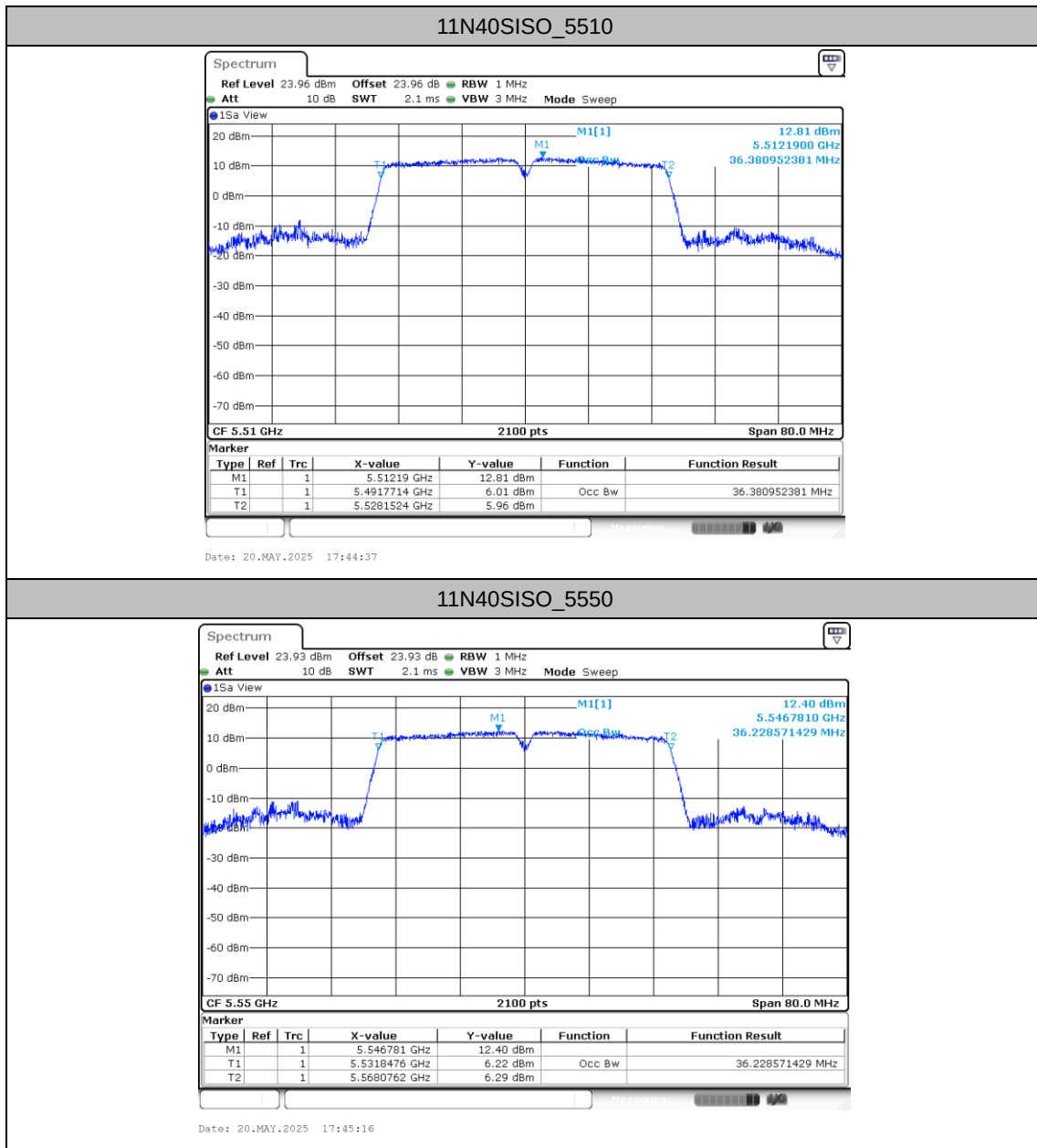


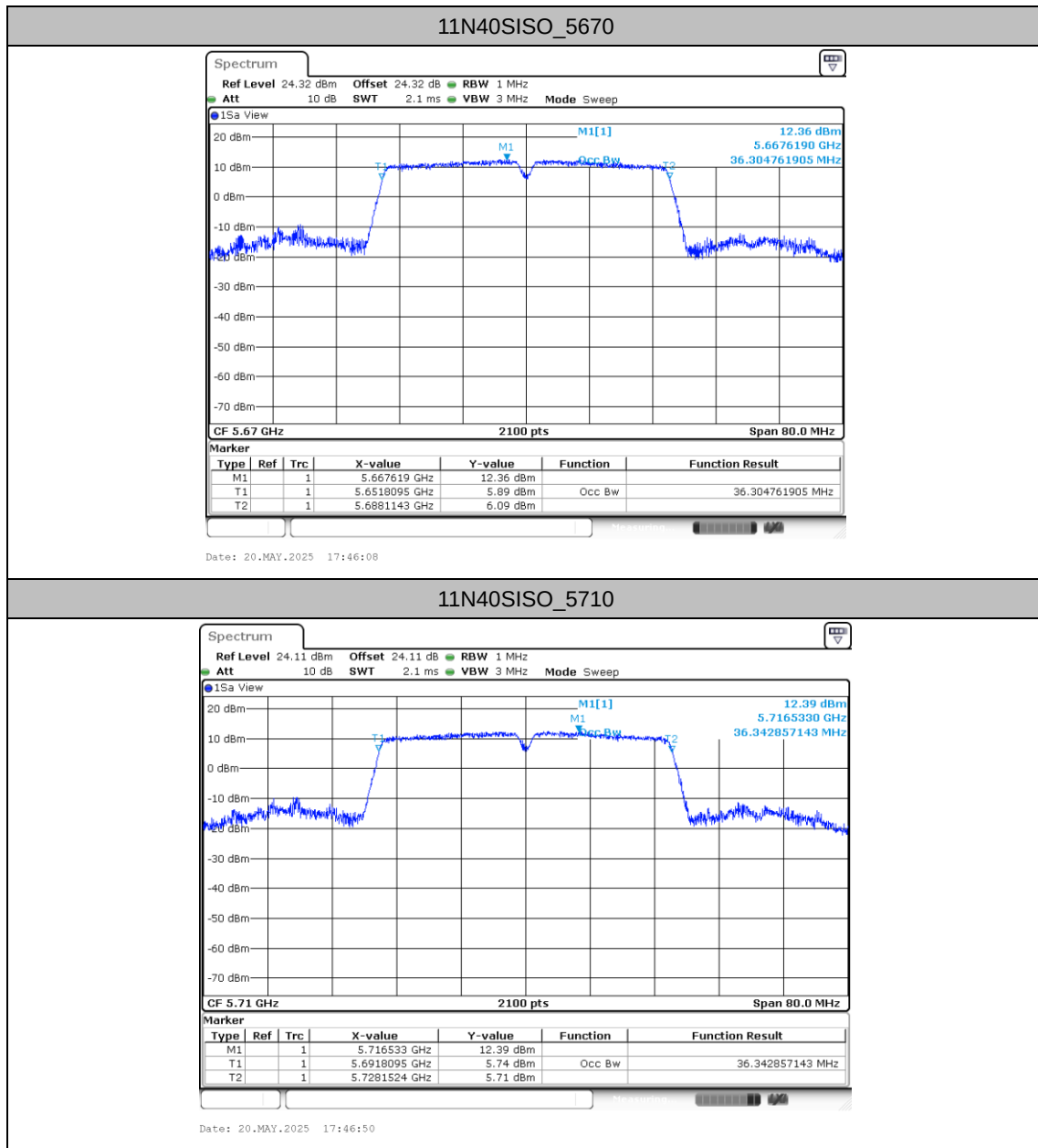


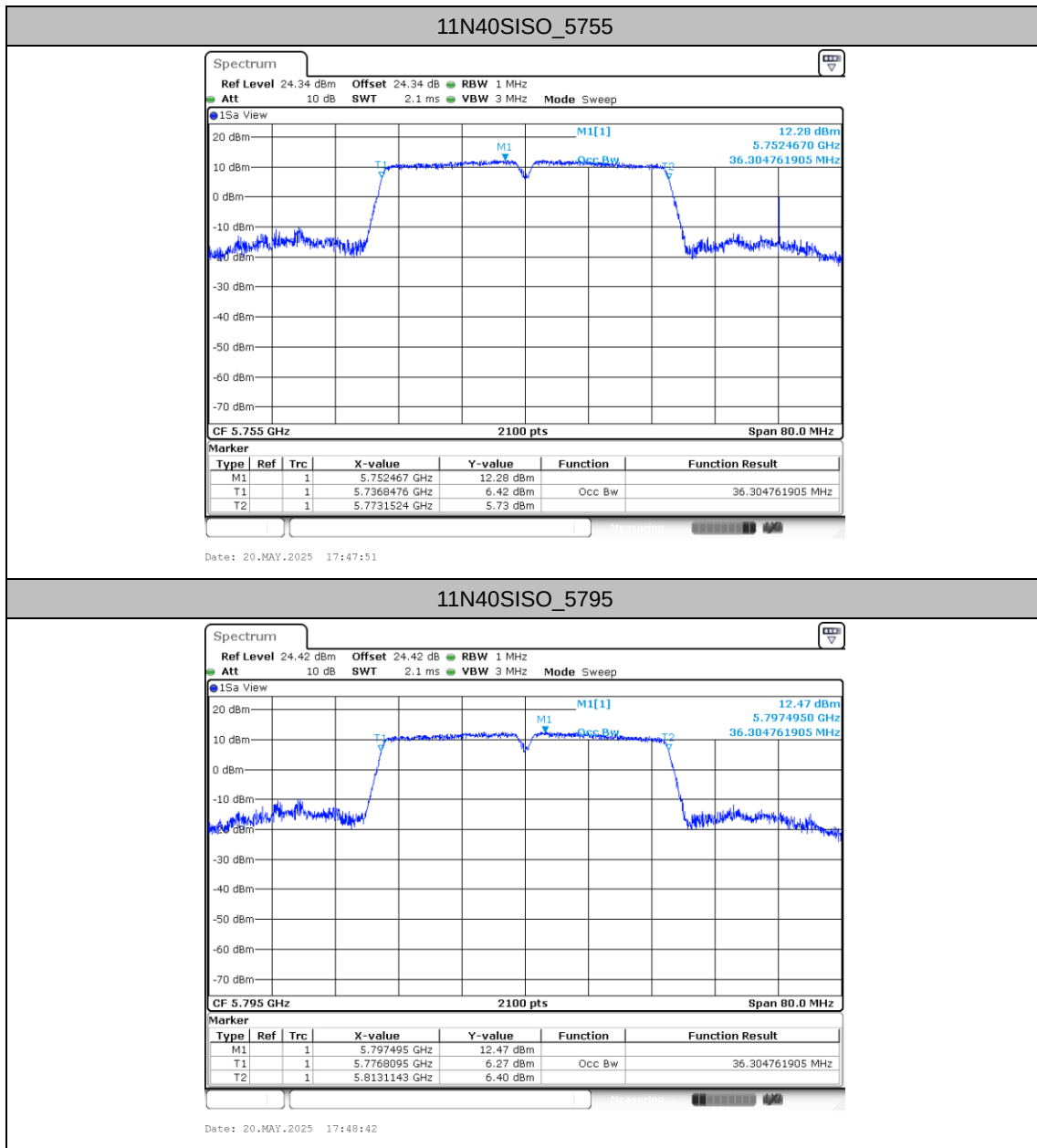














Min emission bandwidth

Test Result

TestMode	Antenna	Freq(MHz)	6dB EBW [MHz]	FL[MHz]	FH[MHz]	Limit[MHz]	Verdict
11A	Ant1	5745	16.56	5736.68	5753.24	0.5	PASS
		5785	16.56	5776.70	5793.26	0.5	PASS
		5825	16.56	5816.70	5833.26	0.5	PASS
11N20SISO	Ant1	5745	17.80	5736.09	5753.89	0.5	PASS
		5785	17.78	5776.09	5793.87	0.5	PASS
		5825	17.78	5816.09	5833.87	0.5	PASS
11N40SISO	Ant1	5755	36.36	5736.80	5773.16	0.5	PASS
		5795	36.36	5776.80	5820.40	0.5	PASS



Test Graphs

