



FCC RF Test Report

APPLICANT : TCL Communication Ltd.
EQUIPMENT : GSM/UMTS/LTE Mobile phone
BRAND NAME : TCL
MODEL NAME : T434D
FCC ID : 2ACCJH180
STANDARD : FCC Part 15 Subpart E §15.407
CLASSIFICATION : (NII) Unlicensed National Information Infrastructure
TEST DATE(S) : Oct. 19, 2023 ~ Nov. 10, 2023

We, Sporton International Inc. (ShenZhen), would like to declare that the tested sample has been evaluated in accordance with the test procedures and has been in compliance with the applicable technical standards.

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

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

Jason Jia



Approved by: Jason Jia

Sporton International Inc. (ShenZhen)

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People's Republic of China



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REVISION HISTORY

REPORT NO.	VERSION	DESCRIPTION	ISSUED DATE
FR3O1004D	Rev. 01	Initial issue of report	Nov. 22, 2023



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 3.48 dB at 5363.10 MHz
3.5	15.207	AC Conducted Emission	15.207(a)	15.207(a)	Pass	Under limit 10.70 dB at 0.15 MHz
3.6	15.203 & 15.407(a)	Antenna Requirement	15.203 & 15.407(a)	15.203 & 15.407(a)	Pass	-

Conformity Assessment Condition:

- The test results (PASS/FAIL) with all measurement uncertainty excluded are presented against the regulation limits or in accordance with the requirements stipulated by the applicant/manufacturer who shall bear all the risks of non-compliance that may potentially occur if measurement uncertainty is taken into account.
- 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

TCL Communication Ltd.

5/F, Building 22E, 22 Science Park East Avenue, Hong Kong Science Park, Shatin, NT, Hong Kong

1.2 Manufacturer

TCL Communication Ltd.

5/F, Building 22E, 22 Science Park East Avenue, Hong Kong Science Park, Shatin, NT, Hong Kong

1.3 Product Feature of Equipment Under Test

Product Feature	
Equipment	GSM/UMTS/LTE Mobile phone
Brand Name	TCL
Model Name	T434D
FCC ID	2ACCJH180
IMEI Code	Conducted: 016500000012071 Conduction: 016500000013301 Radiation: 016500000013442
HW Version	02
SW Version	6XS9
EUT Stage	Identical Prototype

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

1.4 Product Specification of Equipment Under Test

Standards-related Product Specification	
Tx/Rx Frequency Range	5180 MHz ~ 5240 MHz; 5260 MHz ~ 5320 MHz 5500 MHz ~ 5720 MHz; 5745 MHz ~ 5825 MHz
Maximum Output Power to Antenna	<p><5180 MHz ~ 5240 MHz> 802.11a : 18.71 dBm / 0.0743 W 802.11n HT20 : 18.39 dBm / 0.0690 W 802.11n HT40 : 17.05 dBm / 0.0507 W 802.11ac VHT80: 16.03 dBm / 0.0401 W</p> <p><5260 MHz ~ 5320 MHz> 802.11a : 18.84 dBm / 0.0766 W 802.11n HT20 : 18.86 dBm / 0.0769 W 802.11n HT40 : 17.84 dBm / 0.0608 W 802.11ac VHT80: 17.14 dBm / 0.0518 W</p> <p><5500 MHz ~ 5720 MHz > 802.11a : 20.28 dBm / 0.1067 W 802.11n HT20 : 18.97 dBm / 0.0789 W 802.11n HT40 : 18.63 dBm / 0.0729 W</p>



	802.11ac VHT80: 17.81 dBm / 0.0604 W <5745 MHz ~ 5825 MHz> 802.11a : 18.88 dBm / 0.0773 W 802.11n HT20 : 18.93 dBm / 0.0782 W 802.11n HT40 : 19.01 dBm / 0.0796 W 802.11ac VHT80: 18.70 dBm / 0.0741 W
99% Occupied Bandwidth	<5180 MHz ~ 5240 MHz> 802.11a : 17.702 MHz 802.11n HT20 : 18.581 MHz 802.11n HT40 : 36.923 MHz 802.11ac VHT80 : 75.924 MHz <5260 MHz ~ 5320 MHz> 802.11a : 17.622 MHz 802.11n HT20 : 18.661 MHz 802.11n HT40 : 36.763 MHz 802.11ac VHT80 : 76.084 MHz <5500 MHz ~ 5720 MHz> 802.11a : 18.062 MHz 802.11n HT20 : 19.181 MHz 802.11n HT40 : 37.243 MHz 802.11ac VHT80 : 75.764 MHz <5745 MHz ~ 5825 MHz> 802.11a : 21.538 MHz 802.11n HT20 : 23.457 MHz 802.11n HT40 : 39.88 MHz 802.11ac VHT80 : 77.043 MHz
Antenna Type / Gain	<5180 MHz ~ 5240 MHz>: FPC Antenna with gain -0.33 dBi <5260 MHz ~ 5320 MHz>: FPC Antenna with gain -0.33 dBi <5500 MHz ~ 5720 MHz>: FPC Antenna with gain -0.33 dBi <5745 MHz ~ 5825 MHz>: FPC Antenna with gain -0.33 dBi
Type of Modulation	802.11a/n : OFDM (BPSK / QPSK / 16QAM / 64QAM) 802.11ac : OFDM (BPSK / QPSK / 16QAM / 64QAM / 256QAM)

Note: The 802.11ac VHT20/VHT40 power are controlled less than 11n HT20/HT40 by manufacturer, thus full test 11n HT20/HT40 to cover 11ac VHT20/VHT40.

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.
	TH01-KS	CN1257	314309

Note: Test data subcontracted: conducted test case in this report.

Sporton International Inc. (ShenZhen) is accredited to ISO/IEC 17025:2017 by American Association for Laboratory Accreditation with Certificate Number 5145.01.

Test Firm	Sporton International Inc. (ShenZhen)		
Test Site Location	1/F, 2/F, Bldg 5, Shiling Industrial Zone, Xinwei Village, Xili, Nanshan, Shenzhen, 518055 People's Republic of China TEL: +86-755-86379589 FAX: +86-755-86379595		
Test Site No.	Sporton Site No.	FCC Designation No.	FCC Test Firm Registration No.
	CO01-SZ	CN1256	421272

Test Firm	Sporton International Inc. (ShenZhen)		
Test Site Location	101, 1st Floor, Block B, Building 1, No. 2, Tengfeng 4th Road, Fenghuang Community, Fuyong Street, Baoan District, Shenzhen City, Guangdong Province 518103 People's Republic of China TEL: +86-755-86066985		
Test Site No.	Sporton Site No.	FCC Designation No.	FCC Test Firm Registration No.
	03CH04-SZ	CN1256	421272



1.7 Test Software

Item	Site	Manufacturer	Name	Version
1.	TH01-KS	Tonscend	JS1120-3 test system China_210602	3.3.10
2.	03CH04-SZ	AUDIX	E3	6.2009-8-24
3.	CO01-SZ	AUDIX	E3	6.120613b

1.8 Applicable Standards

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

- ♦ 47 CFR Part 15 Subpart E
- ♦ FCC KDB 789033 D02 General UNII Test Procedures New Rules v02r01.
- ♦ FCC KDB 662911 D01 Multiple Transmitter Output v02r01.
- ♦ ANSI C63.10-2013

Remark:

1. All test items were verified and recorded according to the standards and without any deviation during the test.
2. This EUT has also been tested and complied with the requirements of FCC Part 15, Subpart B, recorded in a separate test report.



2 Test Configuration of Equipment Under Test

- a. The EUT has been associated with peripherals and configuration operated in a manner tended to maximize its emission characteristics in a typical application. Frequency range investigated: conduction emission (150 kHz to 30 MHz), radiation emission (9 kHz to the 10th harmonic of the highest fundamental frequency or to 40 GHz, whichever is lower). For radiated measurement, pre-scanned in three orthogonal panels, X, Y, Z. The worst cases (Y plane) were recorded in this report.
- b. AC power line Conducted Emission was tested under maximum output power.

2.1 Carrier Frequency and Channel

Frequency Band	Channel	Freq.(MHz)	Channel	Freq. (MHz)
5180-5240 MHz U-NII-1	36	5180	44	5220
	38*	5190	46*	5230
	40	5200	48	5240
	42 [#]	5210	-	-

Frequency Band	Channel	Freq.(MHz)	Channel	Freq. (MHz)
5260-5320 MHz U-NII-2A	52	5260	60	5300
	54*	5270	62*	5310
	56	5280	64	5320
	58 [#]	5290	-	-

Frequency Band	Channel	Freq.(MHz)	Channel	Freq. (MHz)
5500-5720MHz U-NII-2C	100	5500	112	5560
	102*	5510	116	5580
	104	5520	132	5660
	106 [#]	5530	134*	5670
	108	5540	136	5680
	110*	5550	140	5700

Frequency Band	Channel	Freq.(MHz)	Channel	Freq. (MHz)
5745-5825 MHz U-NII-3	149	5745	157	5785
	151*	5755	159*	5795
	153	5765	161	5805
	155 [#]	5775	165	5825



Frequency Band	Channel	Freq.(MHz)	Channel	Freq. (MHz)
TDWR Channel	118*	5590	124	5620
	120	5600	126*	5630
	122 [#]	5610	128	5640

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

Note:

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



2.2 Test Mode

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

SISO Mode

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

AC Conducted Emission	Mode 1 : GSM 850 Idle + WLAN Link (5G) + USB Cable 2(Charging from Adapter 2) + Earphone + Battery 1
Remark:	
1. The worst case of conducted emission is mode 1; only the test data of it was reported.	
2. For Radiated Test Cases, The tests were performance with Adapter 2, Battery 1, Earphone USB Cable 2	

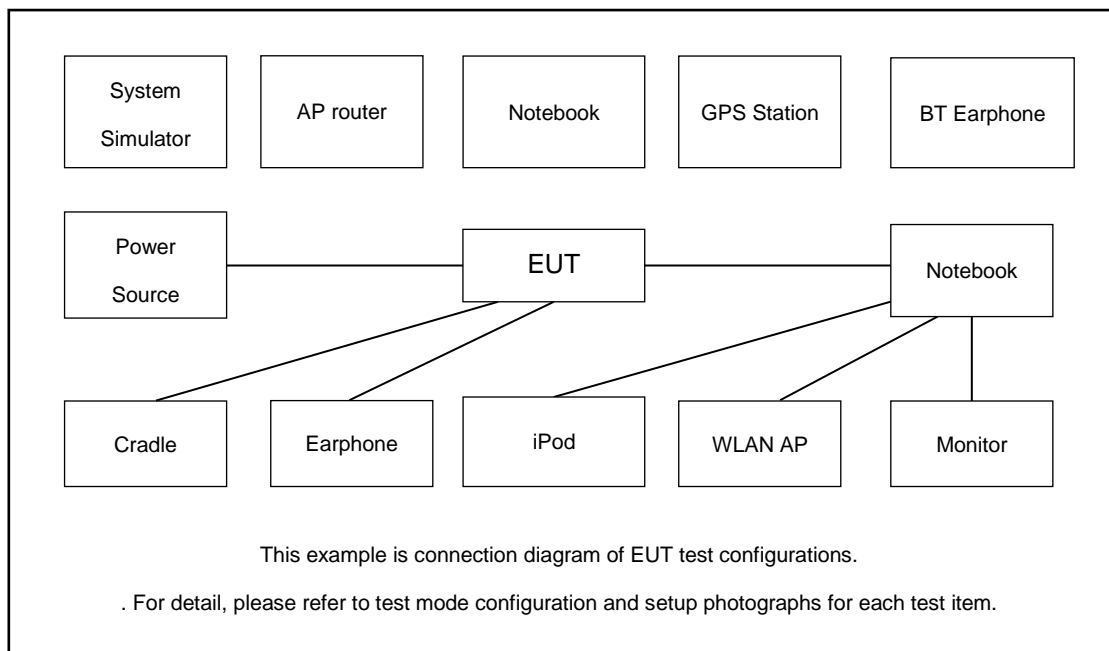
Simultaneous transmission
802. 11ac VHT80_CH58 TX + LTE Band 41 Link

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

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

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

2.3 Connection Diagram of Test System



2.4 Support Unit used in test configuration and system

Item	Equipment	Trade Name	Model Name	FCC ID	Data Cable	Power Cord
1.	Base Station(LTE)	Anritsu	MT8820C	N/A	N/A	Unshielded,1.8m
2.	WLAN AP	Dlink	DIR-820L	KA2IR820LA1	N/A	Unshielded,1.8m
3.	Earphone	apple	DCAY1V-A900FZJW3-000	N/A	N/A	N/A
4.	Bluetooth Earphone	Samsung	EO-MG900	PYAHS-107W	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 1.5 dB and 10dB attenuator.

$$\begin{aligned} \text{Offset(dB)} &= \text{RF cable loss(dB)} + \text{attenuator factor(dB)}. \\ &= 1.5 + 10 = 11.5 \text{ (dB)} \end{aligned}$$



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

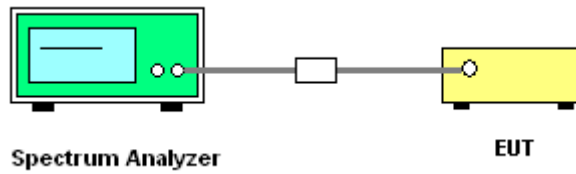
The measuring equipment is listed in the section 4 of this test report.

3.1.3 Test Procedures

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

<input checked="" type="checkbox"/>	Section C) Bandwidth Measurement 1. Emission Bandwidth (EBW) and 99% OBW
	<ol style="list-style-type: none"> 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 to 1%~5% of the OBW and set the Video bandwidth (VBW) ≥ 3 * RBW. Measure and record the results in the test report.
<input checked="" type="checkbox"/>	Section C) Bandwidth Measurement 2. Minimum Emission Bandwidth for the band 5.725 - 5.85 GHz
	<ol style="list-style-type: none"> Set RBW = 100kHz. Set the VBW ≥ 3 x 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 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 $11 \text{ dBm} + 10 \log B$, where B is the 26 dB emission bandwidth in megahertz.

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

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

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

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

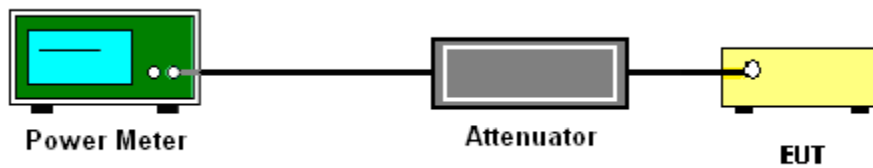
3.2.2 Measuring Instruments

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

3.2.3 Test Procedures

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

3.2.4 Test Setup



3.2.5 Test Result of Maximum Conducted Output Power

Please refer to Appendix A.



3.3 Power Spectral Density Measurement

3.3.1 Limit of Power Spectral Density

<FCC 14-30 CFR 15.407>

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

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

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

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

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

3.3.2 Measuring Instruments

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



3.3.3 Test Procedures

The testing follows FCC KDB 789033 D02 General UNII Test Procedures New Rules v01r04.
Section F) Maximum power spectral density.

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

Method SA-2

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

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

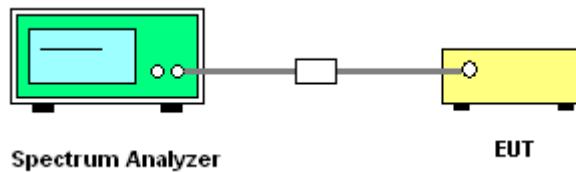
Method SA-2

(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 Part15.205.

3.4.1 Limit of Unwanted Emissions

- (1) For transmitters operating in the 5150-5250 MHz band: all emissions outside of the 5150-5350 MHz band shall not exceed an EIRP of -27dBm/MHz.

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

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

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

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

Table with 3 columns: Frequency (MHz), Field Strength (microvolts/meter), and Measurement Distance (meters). Rows include frequency ranges from 0.009-0.490 MHz to Above 960 MHz.



(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

(4) 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.

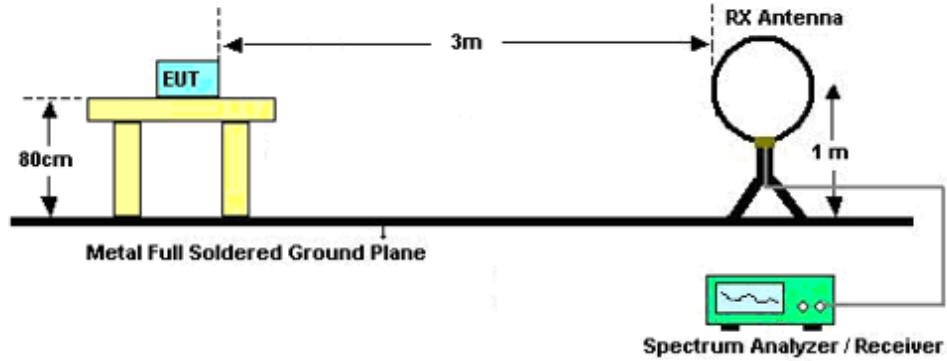


3.4.3 Test Procedures

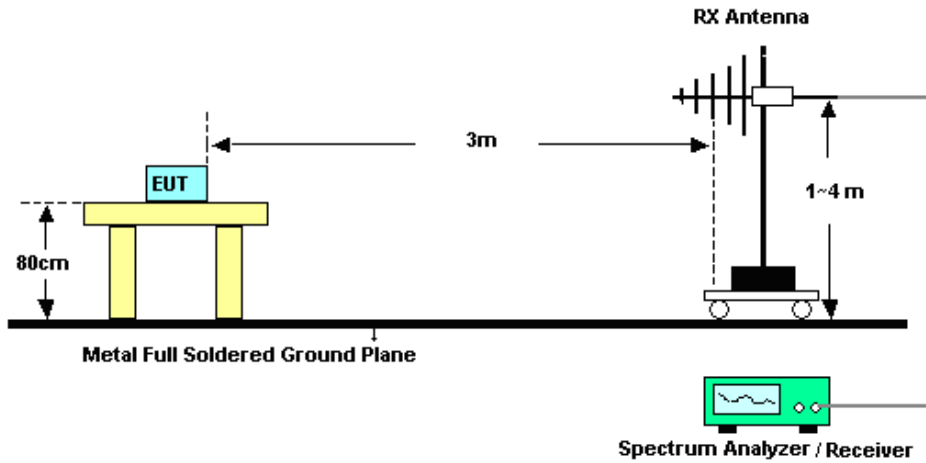
1. The testing follows FCC KDB 789033 D02 General UNII Test Procedures New Rules v01r04. Section G) Unwanted emissions measurement.
 - (1) Procedure for Unwanted Emissions Measurements Below 1000MHz
 - RBW = 120 kHz
 - VBW = 300 kHz
 - Detector = Peak
 - Trace mode = max hold
 - (2) Procedure for Peak 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

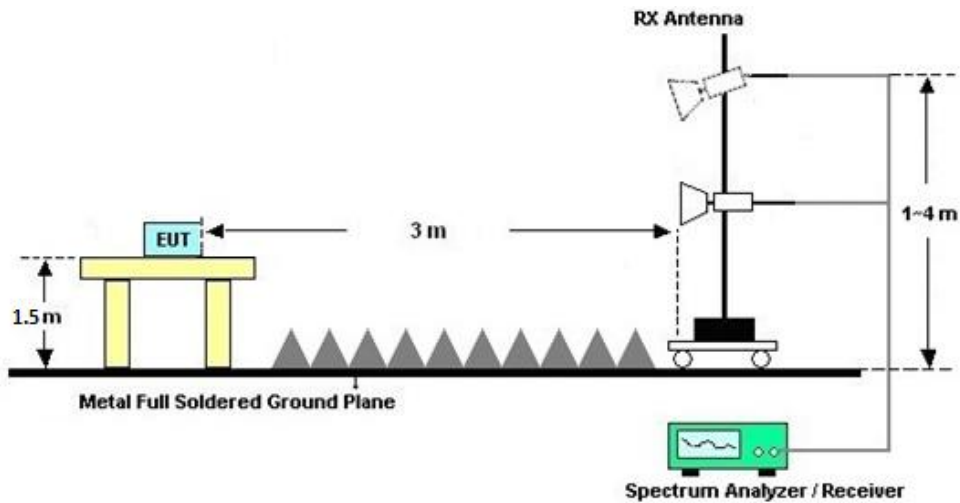
For radiated emissions below 30MHz



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 (dBµV)	
	Quasi-peak	Average
0.15-0.5	66 to 56*	56 to 46*
0.5-5	56	46
5-30	60	50

*Decreases with the logarithm of the frequency.

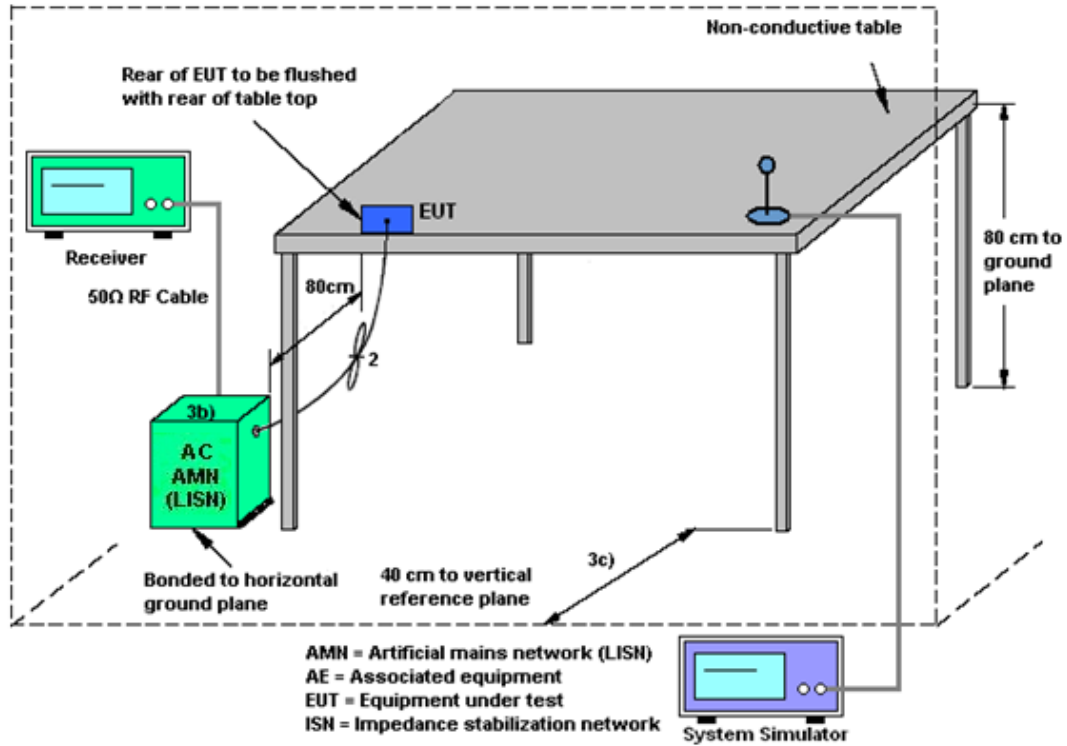
3.5.2 Measuring Instruments

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

3.5.3 Test Procedures

1. The EUT was placed 0.4 meter from the conducting wall of the shielding room was kept at least 80 centimeters from any other grounded conducting surface.
2. Connect EUT to the power mains through a line impedance stabilization network (LISN).
3. All the support units are connecting to the other LISN.
4. The LISN provides 50 ohm coupling impedance for the measuring instrument.
5. The FCC states that a 50 ohm, 50 microhenry LISN should be used.
6. Both sides of AC line were checked for maximum conducted interference.
7. The frequency range from 150 kHz to 30 MHz was searched.
8. Set the test-receiver system to Peak Detect Function and specified bandwidth with Maximum Hold Mode.

3.5.4 Test Setup



3.5.5 Test Result of AC Conducted Emission

Please refer to Appendix B.



3.6 Antenna Requirements

3.6.1 Standard Applicable

According to FCC 47 CFR Section 15.407(a)(1)(2), if transmitting antenna directional gain is greater than 6 dBi, both the peak transmit power and the peak power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

3.6.2 Antenna Anti-Replacement Construction

An embedded-in antenna design is used.

3.6.3 Antenna Gain

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



4 List of Measuring Equipment

Instrument	Manufacturer	Model No.	Serial No.	Characteristics	Calibration Date	Test Date	Due Date	Remark
Spectrum Analyzer	R&S	FSV40	101040	10Hz~40GHz	Oct. 11, 2023	Oct. 20, 2023 ~Nov. 08, 2023	Oct. 10, 2024	Conducted (TH01-KS)
Pulse Power Sensor	Anritsu	MA2411B	0917070	300MHz~40GHz	Jan. 05, 2023	Oct. 20, 2023 ~Nov. 08, 2023	Jan. 04, 2024	Conducted (TH01-KS)
Power Meter	Anritsu	ML2495A	1542004	50MHz Bandwidth	Dec. 27, 2022	Oct. 20, 2023 ~Nov. 08, 2023	Dec. 26, 2023	Conducted (TH01-SZ)
DC Power Supply	TTI	PL330P	290070	Max 32V , 3A	Oct. 16, 2023	Oct. 20, 2023 ~Nov. 08, 2023	Oct. 15, 2024	Conducted (TH01-SZ)
Temperature & humidity chamber	Hongzhan	LP-150U	H201401144 0	-40~+150°C 20%~95%RH	Jul. 06, 2023	Oct. 20, 2023 ~Nov. 08, 2023	Jul. 05, 2024	Conducted (TH01-KS)
EMI Test Receiver	R&S	ESR7	101404	9kHz~7GHz	Oct. 18, 2023	Oct. 19, 2023 ~Nov. 10, 2023	Oct. 17, 2024	Radiation (03CH04-SZ)
EXA Spectrum Analyzer	KEYSIGHT	N9010A	MY5515021 3	10Hz~44GHz	Jul. 07, 2023	Oct. 19, 2023 ~Nov. 10, 2023	Jul. 06, 2024	Radiation (03CH04-SZ)
Loop Antenna	R&S	HFH2-Z2	100354	9kHz~30MHz	Jun. 28, 2022	Oct. 19, 2023 ~Nov. 10, 2023	Jun. 27, 2024	Radiation (03CH04-SZ)
Bilog Antenna	TeseQ	CBL6111D	41909	30MHz~1GHz	May. 14, 2023	Oct. 19, 2023 ~Nov. 10, 2023	May. 13, 2024	Radiation (03CH04-SZ)
Double Ridge Horn Antenna	SCHWARZBECK	BBHA9120D	9120D-1474	1GHz~18GHz	Jul. 07, 2023	Oct. 19, 2023 ~Nov. 10, 2023	Jul. 06, 2024	Radiation (03CH04-SZ)
Horn Antenna	SCHWARZBECK	BBHA9170	9170#679	15GHz~40GHz	Jul. 08, 2023	Oct. 19, 2023 ~Nov. 10, 2023	Jul. 07, 2024	Radiation (03CH04-SZ)
Amplifier	Burgeon	BPA-530	102211	0.01Hz ~3000MHz	Oct. 18, 2023	Oct. 19, 2023 ~Nov. 10, 2023	Oct. 17, 2024	Radiation (03CH04-SZ)
HF Amplifier	MITEQ	AMF-7D-001 01800-30-10 P-R	1943528	1GHz~18GHz	Oct. 18, 2023	Oct. 19, 2023 ~Nov. 10, 2023	Oct. 17, 2024	Radiation (03CH04-SZ)
HF Amplifier	MITEQ	TTA1840-35- HG	1871923	18GHz~40GHz	Jul. 07, 2023	Oct. 19, 2023 ~Nov. 10, 2023	Jul. 06, 2024	Radiation (03CH04-SZ)
Amplifier	Agilent Technologies	83017A	MY5728013 6	500MHz~26.5G Hz	Aug. 21, 2023	Oct. 19, 2023 ~Nov. 10, 2023	Aug. 20, 2024	Radiation (03CH04-SZ)
AC Power Source	APC	AFV-S-600B	F119050019	N/A	Oct. 18, 2023	Oct. 19, 2023 ~Nov. 10, 2023	Oct. 17, 2024	Radiation (03CH04-SZ)
Turn Table	EM	EM1000	N/A	0~360 degree	NCR	Oct. 19, 2023 ~Nov. 10, 2023	NCR	Radiation (03CH04-SZ)
Antenna Mast	EM	EM1000	N/A	1 m~4 m	NCR	Oct. 19, 2023 ~Nov. 10, 2023	NCR	Radiation (03CH04-SZ)
EMI Receiver	R&S	ESR7	101630	9kHz~7GHz;	Jul. 06, 2023	Oct. 30, 2023	Jul. 05, 2024	Conduction (CO01-SZ)
AC LISN	R&S	ENV216	100063	9kHz~30MHz	Aug. 21, 2023	Oct. 30, 2023	Aug. 20, 2024	Conduction (CO01-SZ)
AC LISN (for auxiliary equipment)	EMCO	3816/2SH	00103892	9kHz~30MHz	Oct. 16, 2023	Oct. 30, 2023	Oct. 15, 2024	Conduction (CO01-SZ)
AC Power Source	Chroma	61602	6160200008 91	100Vac~250Vac	Jul. 07, 2023	Oct. 30, 2023	Jul. 06, 2024	Conduction (CO01-SZ)

NCR: No Calibration Required



5 Measurement Uncertainty

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

Uncertainty of Conducted Measurement

Test Item	Uncertainty
Conducted Spurious Emission & Bandedge	±1.34 dB
Occupied Channel Bandwidth	±0.012 MHz
Conducted Power	±1.34 dB
Conducted Power Spectral Density	±1.32 dB
Frequency	±1.3 Hz

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

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

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

Measuring Uncertainty for a Level of Confidence of 95% (U = 2Uc(y))	5.1dB
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Uncertainty of Radiated Emission Measurement (1 GHz ~ 18 GHz)

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

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

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



Appendix A. Conducted Test Results

A1. Conducted Test Results

Test Engineer:	Albert shi	Temperature:	21~25	°C
Test Date:	2023/10/20~2023/11/08	Relative Humidity:	51~54	%

TEST RESULTS DATA
Average Power Table

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
					Ant 2	Ant 2	Ant 2	Ant 2		
11a	6Mbps	1	36	5180	0.16	18.41	24.00	-0.33		Pass
11a	6Mbps	1	44	5220	0.16	18.38	24.00	-0.33		Pass
11a	6Mbps	1	48	5240	0.16	18.71	24.00	-0.33		Pass
HT20	MCS0	1	36	5180	0.14	18.02	24.00	-0.33		Pass
HT20	MCS0	1	44	5220	0.14	17.87	24.00	-0.33		Pass
HT20	MCS0	1	48	5240	0.14	18.39	24.00	-0.33		Pass
HT40	MCS0	1	38	5190	0.28	16.60	24.00	-0.33		Pass
HT40	MCS0	1	46	5230	0.28	17.05	24.00	-0.33		Pass
VHT80	MCS0	1	42	5210	0.58	16.03	24.00	-0.33		Pass

TEST RESULTS DATA
Average Power Table

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
					Ant 2	Ant 2	Ant 2	Ant 2		
11a	6Mbps	1	52	5260	0.16	18.82	23.98	-0.33	30.00	Pass
11a	6Mbps	1	60	5300	0.16	18.44	23.98	-0.33	30.00	Pass
11a	6Mbps	1	64	5320	0.16	18.84	23.98	-0.33	30.00	Pass
HT20	MCS0	1	52	5260	0.14	18.62	23.98	-0.33	30.00	Pass
HT20	MCS0	1	60	5300	0.14	18.86	23.98	-0.33	30.00	Pass
HT20	MCS0	1	64	5320	0.14	18.80	23.98	-0.33	30.00	Pass
HT40	MCS0	1	54	5270	0.28	16.97	23.98	-0.33	30.00	Pass
HT40	MCS0	1	62	5310	0.28	17.84	23.98	-0.33	30.00	Pass
VHT80	MCS0	1	58	5290	0.58	17.14	23.98	-0.33	30.00	Pass

TEST RESULTS DATA
Average Power Table

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
					Ant 2					
11a	6Mbps	1	100	5500	0.16	18.62	23.98	-0.33	30.00	Pass
11a	6Mbps	1	116	5580	0.16	19.29	23.98	-0.33	30.00	Pass
11a	6Mbps	1	140	5700	0.16	19.57	23.98	-0.33	30.00	Pass
HT20	MCS0	1	100	5500	0.14	18.79	23.98	-0.33	30.00	Pass
HT20	MCS0	1	116	5580	0.14	18.96	23.98	-0.33	30.00	Pass
HT20	MCS0	1	140	5700	0.14	18.53	23.98	-0.33	30.00	Pass
HT40	MCS0	1	102	5510	0.28	17.88	23.98	-0.33	30.00	Pass
HT40	MCS0	1	110	5550	0.28	17.31	23.98	-0.33	30.00	Pass
HT40	MCS0	1	134	5670	0.28	18.63	23.98	-0.33	30.00	Pass
VHT80	MCS0	1	106	5530	0.58	17.22	23.98	-0.33	30.00	Pass
VHT80	MCS0	1	122	5610	0.58	17.37	23.98	-0.33	30.00	Pass

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
					Ant 2					
11a	6Mbps	1	144	5720	0.16	20.28	23.98	-0.33	30.00	Pass
HT20	MCS0	1	144	5720	0.14	18.97	23.98	-0.33	30.00	Pass
HT40	MCS0	1	142	5710	0.28	18.46	23.98	-0.33	30.00	Pass
VHT80	MCS0	1	138	5690	0.58	17.81	23.98	-0.33	30.00	Pass

TEST RESULTS DATA
Average Power Table

U-NII-3 single antenna											
Mod.	Data Rate	NTX	CH.	Freq. (MHz)	Average Conducted Power with duty factor (dBm)			FCC Conducted Power Limit	DG (dBi)		Pass/Fail
					Ant 2	Ant 2	SUM		Ant 2	Ant 2	
11a	6Mbps	1	149	5745	0.16	18.88		30.00	-0.33	Pass	
11a	6Mbps	1	157	5785	0.16	18.64		30.00	-0.33	Pass	
11a	6Mbps	1	165	5825	0.16	18.62		30.00	-0.33	Pass	
HT20	MCS0	1	149	5745	0.14	18.93		30.00	-0.33	Pass	
HT20	MCS0	1	157	5785	0.14	18.25		30.00	-0.33	Pass	
HT20	MCS0	1	165	5825	0.14	18.70		30.00	-0.33	Pass	
HT40	MCS0	1	151	5755	0.28	19.01		30.00	-0.33	Pass	
HT40	MCS0	1	159	5795	0.28	18.26		30.00	-0.33	Pass	
VHT80	MCS0	1	155	5775	0.58	18.70		30.00	-0.33	Pass	



Ambient Condition: <u>25</u> °C, <u>45</u> %RH
Test Date: <u>2023.10.20~2023.11.08</u> Test Engineer: <u>Albert shi</u>

Emission Bandwidth

Test Result

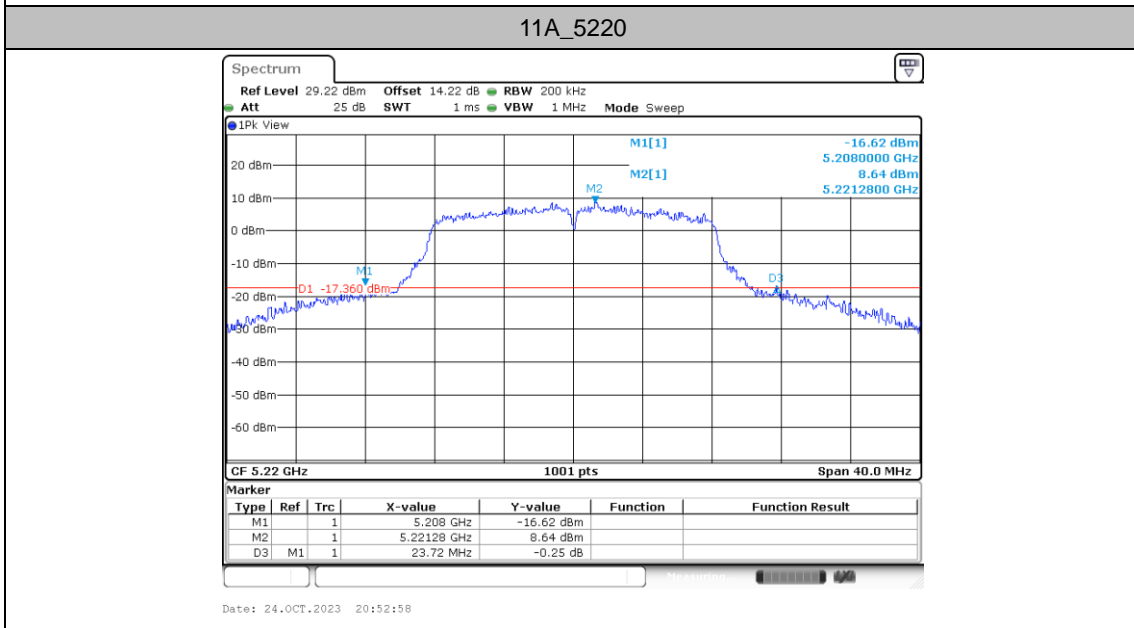
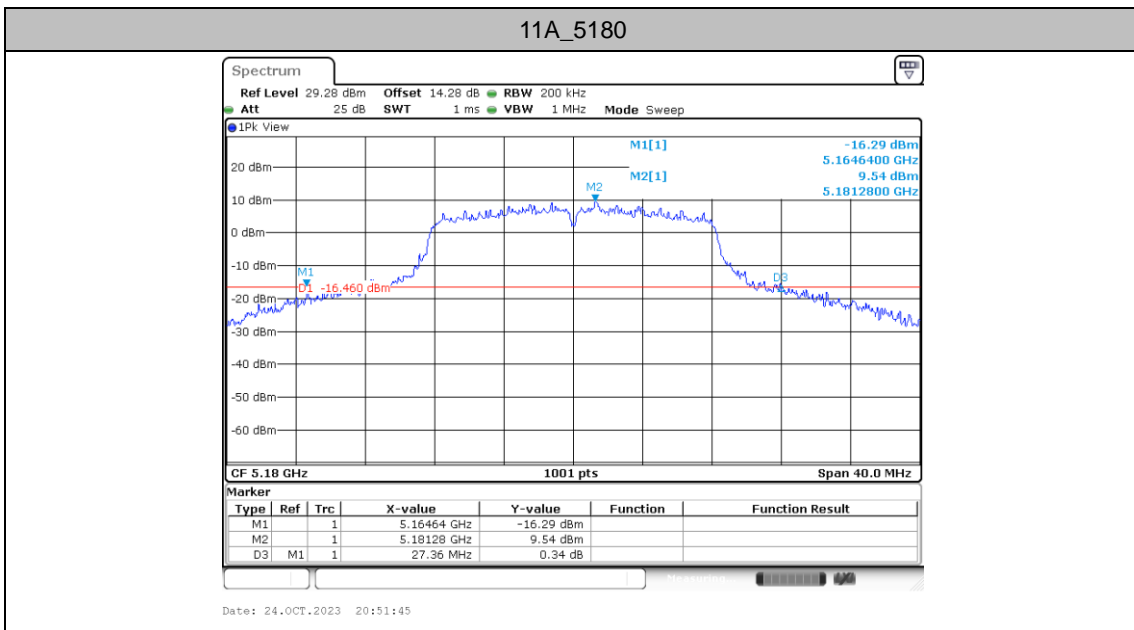
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11A	5180	27.36	5164.64	5192.00
	5220	23.72	5208.00	5231.72
	5240	23.00	5228.56	5251.56
	5260	26.36	5245.88	5272.24
	5300	23.08	5287.84	5310.92
	5320	23.68	5308.12	5331.80
	5500	20.68	5489.64	5510.32
	5580	22.20	5569.00	5591.20
	5700	27.04	5685.84	5712.88
	5720	26.28	5706.04	5732.32
	5745	33.44	5728.68	5762.12
	5785	31.00	5769.36	5800.36
	5825	30.40	5809.96	5840.36
11N20SISO	5180	24.00	5167.40	5191.40
	5220	24.80	5207.24	5232.04
	5240	26.64	5226.52	5253.16
	5260	28.08	5244.60	5272.68
	5300	23.68	5287.76	5311.44
	5320	24.72	5307.84	5332.56
	5500	24.52	5487.40	5511.92
	5580	24.68	5568.28	5592.96
	5700	29.32	5685.08	5714.40
	5720	28.88	5705.24	5734.12
	5745	35.76	5725.60	5761.36
	5785	33.28	5768.64	5801.92
	5825	29.80	5809.64	5839.44
11N40SISO	5190	58.48	5160.64	5219.12
	5230	53.92	5200.80	5254.72
	5270	59.92	5235.04	5294.96
	5310	57.04	5277.84	5334.88

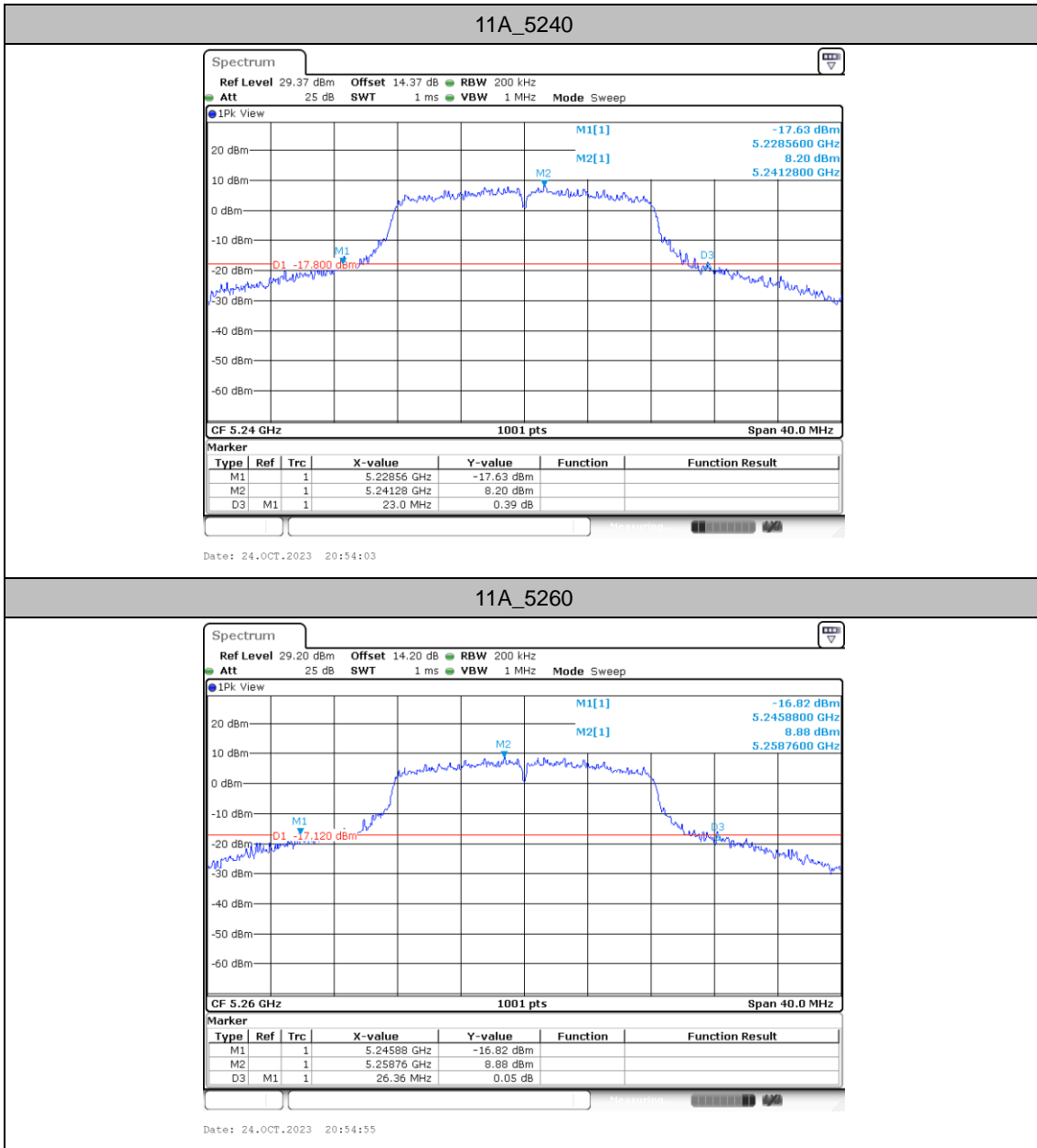


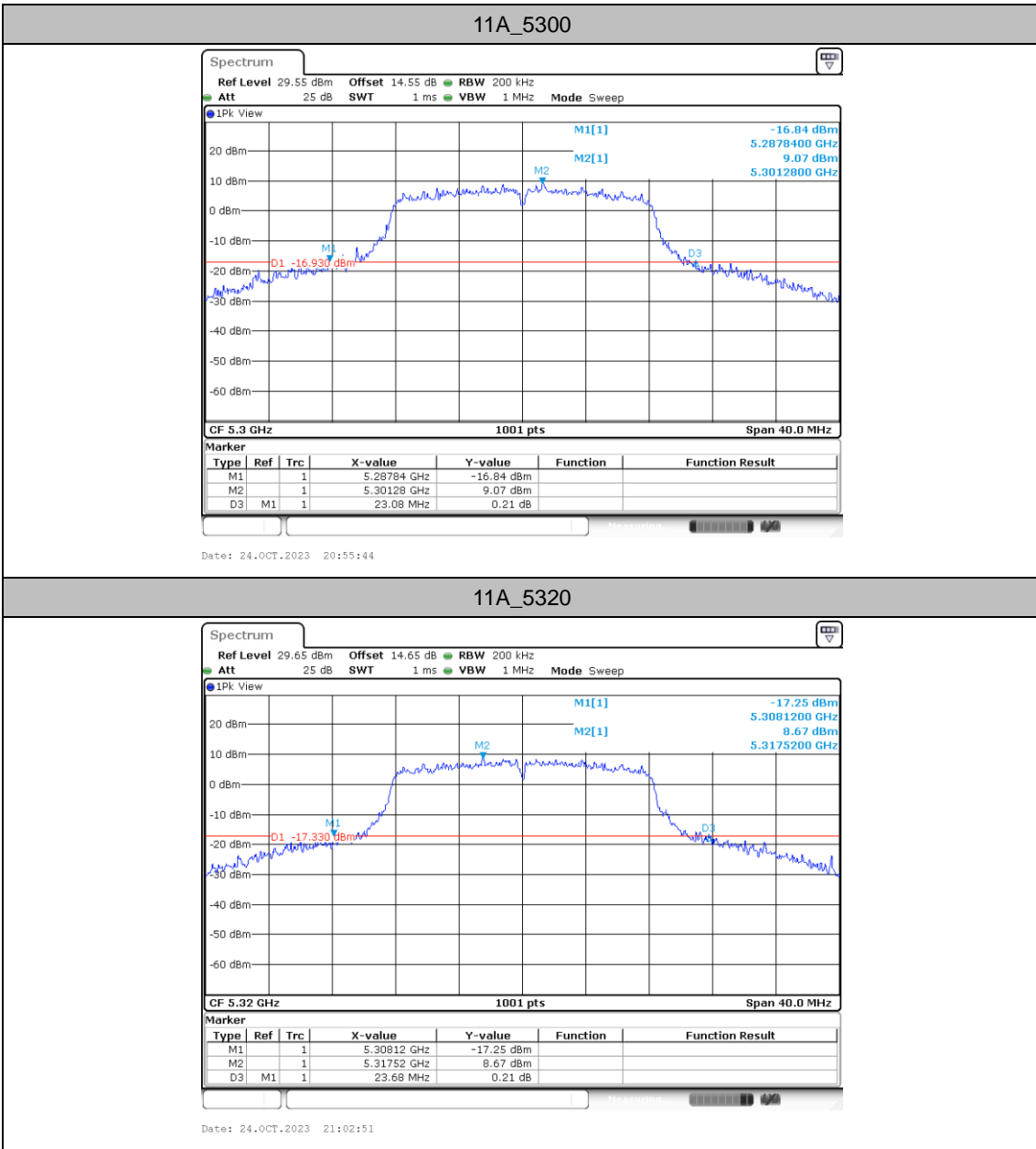
	5510	56.96	5477.84	5534.80
	5550	53.84	5520.80	5574.64
	5670	63.92	5637.68	5701.60
	5710	66.64	5674.88	5741.52
	5755	76.80	5715.16	5791.96
	5795	78.40	5755.08	5833.48
11AC80SISO	5210	109.44	5147.60	5257.04
	5290	110.40	5232.24	5342.64
	5530	96.00	5477.36	5573.36
	5610	92.16	5558.48	5650.64
	5690	123.04	5623.76	5746.80
	5775	140.48	5698.68	5839.16

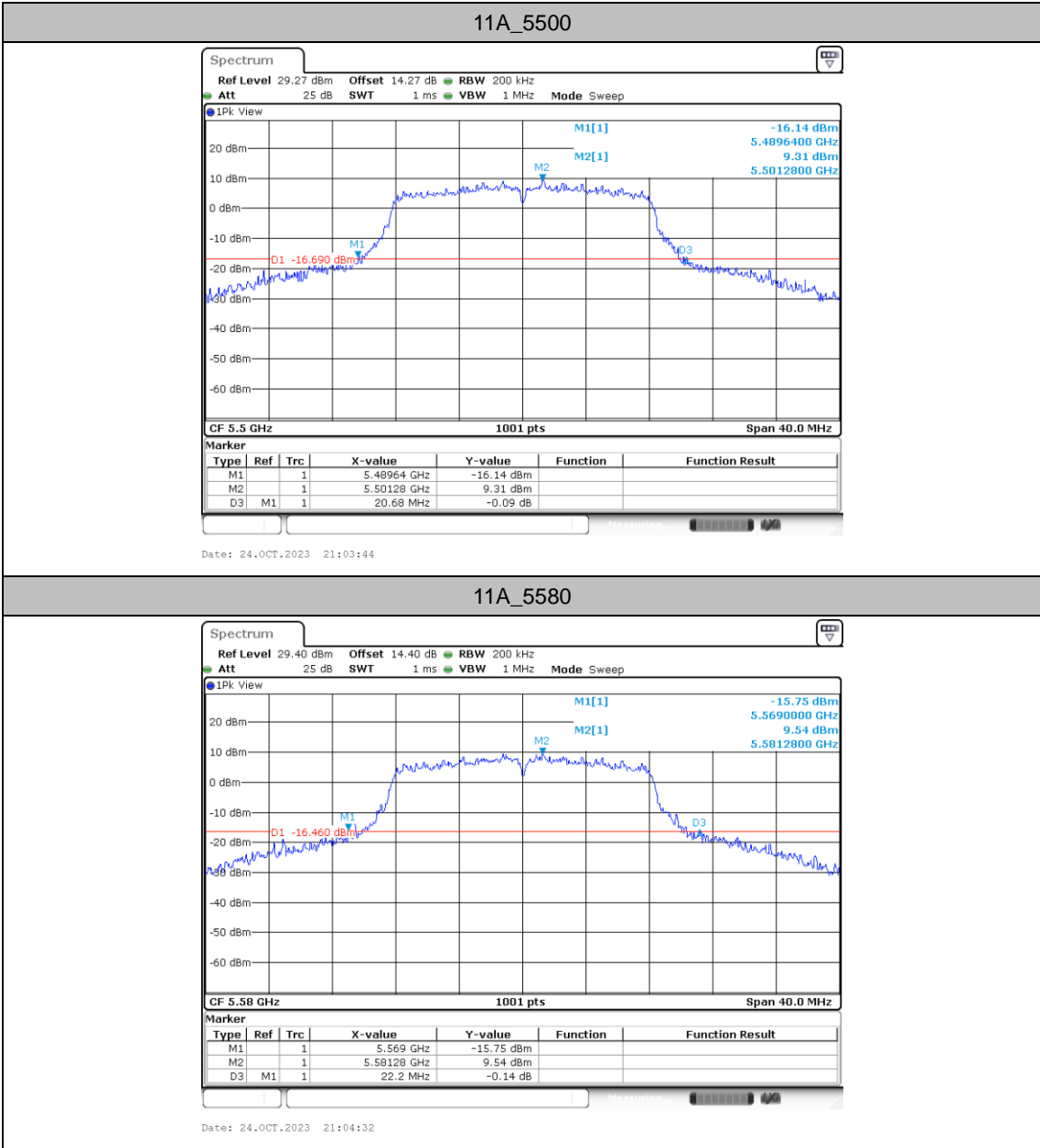


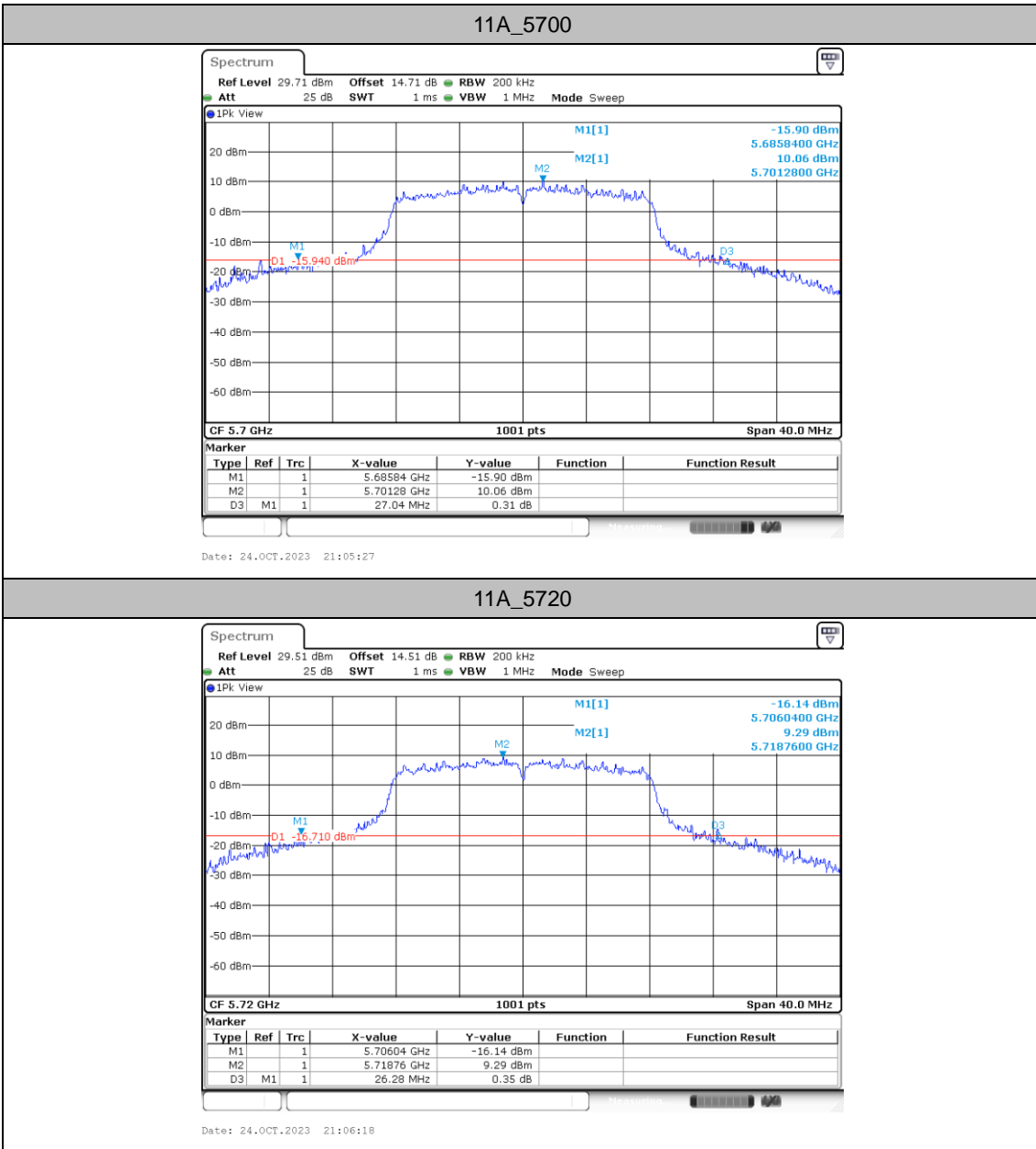
Test Graphs

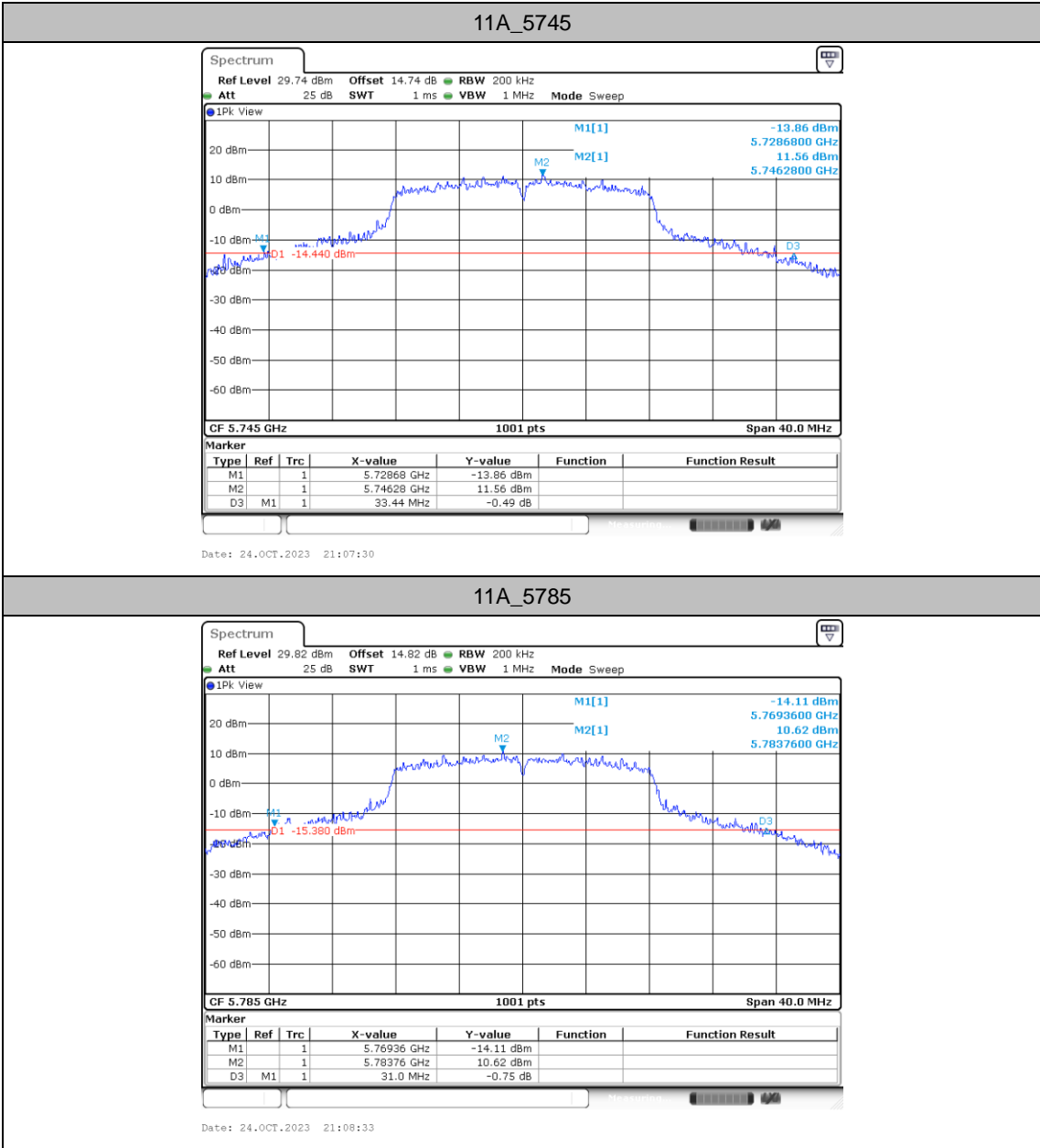


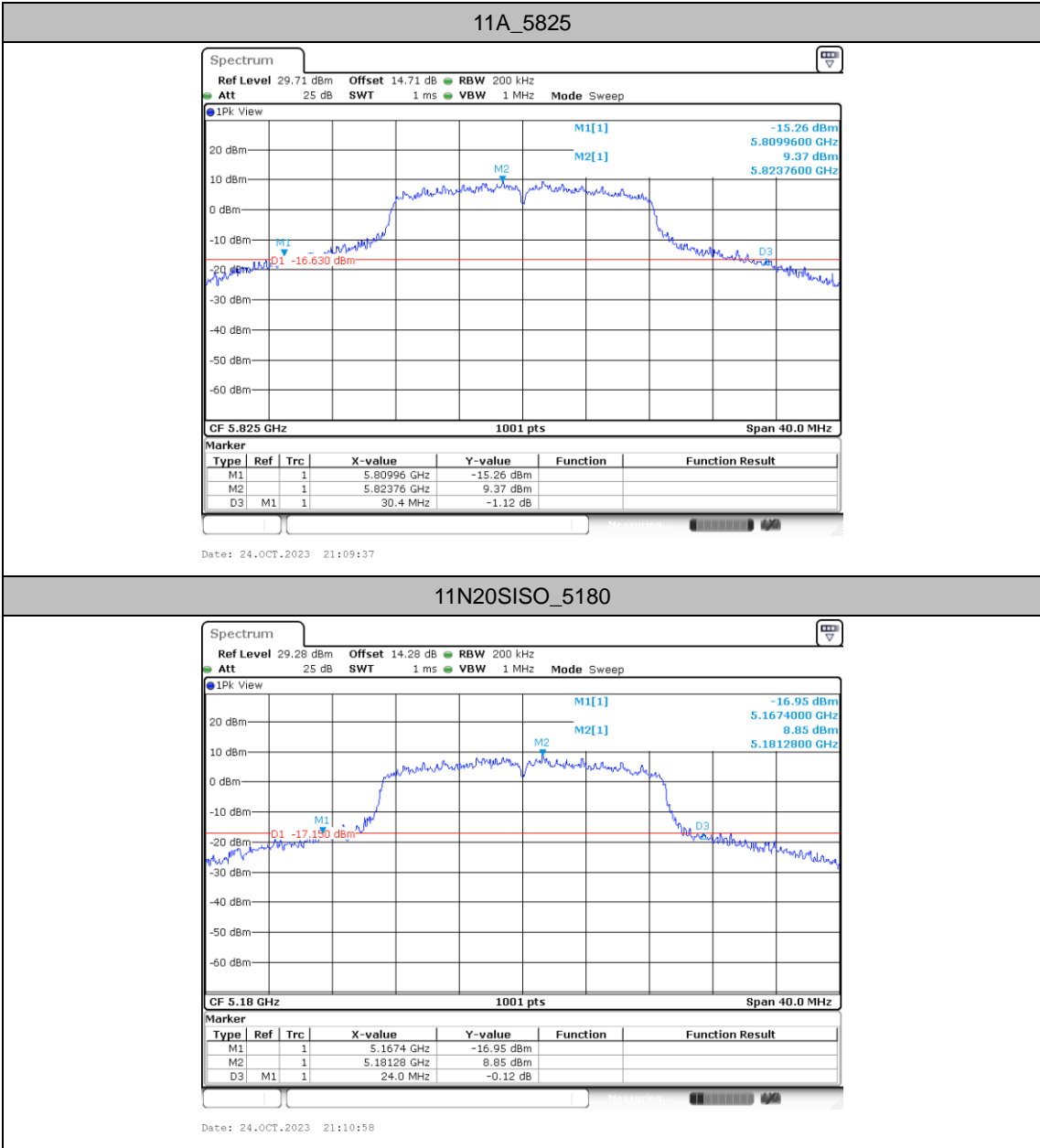


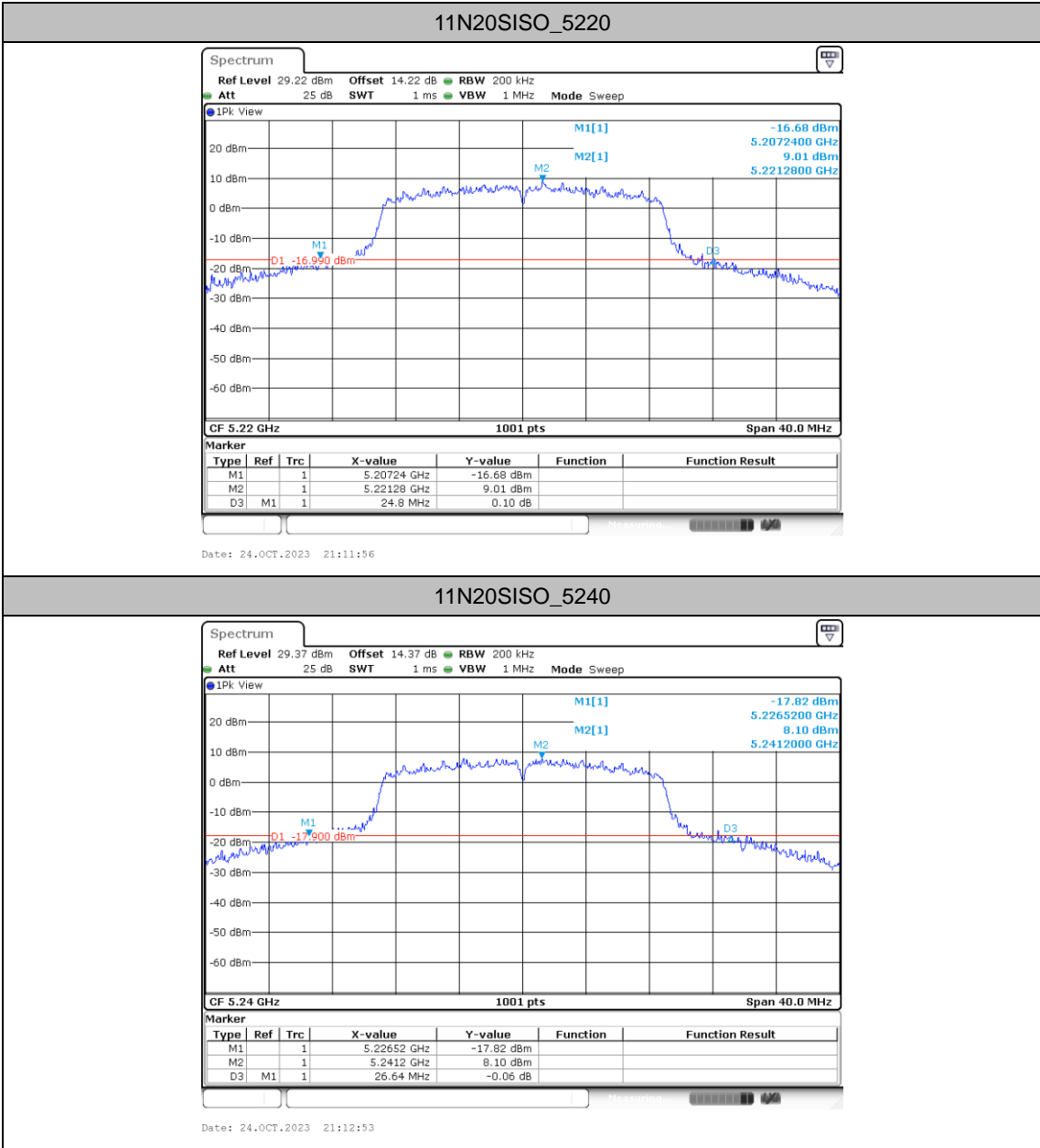


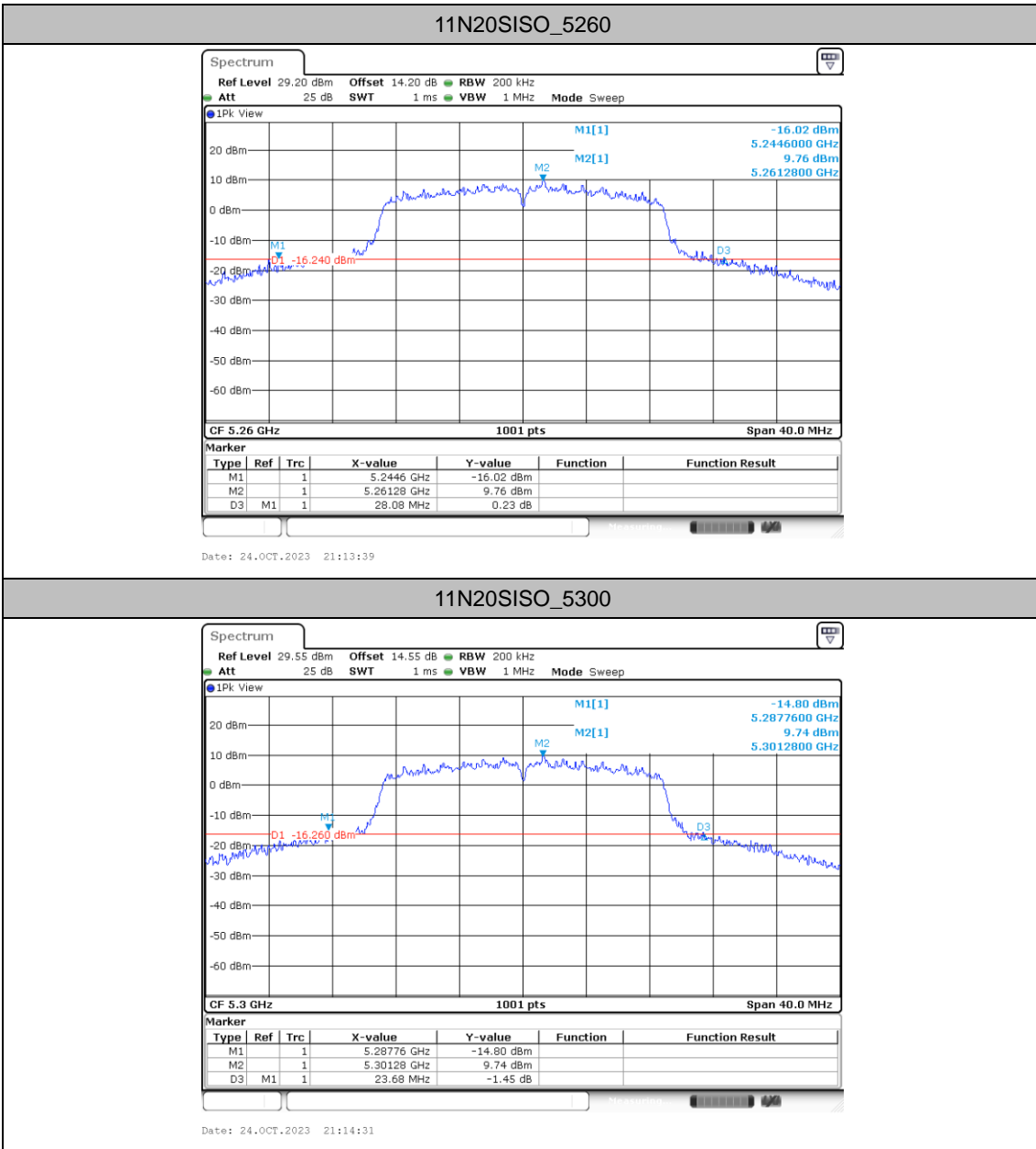


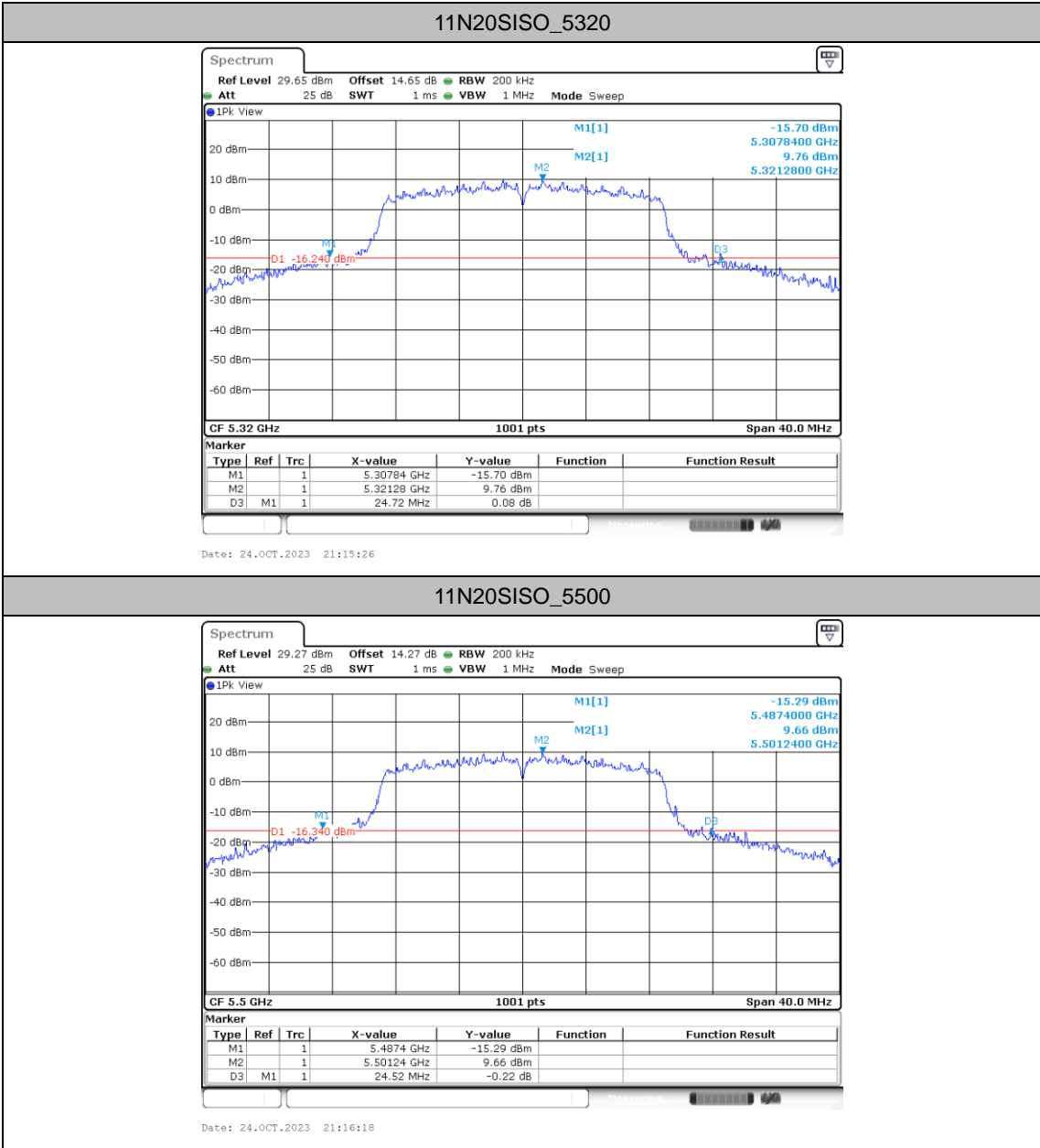


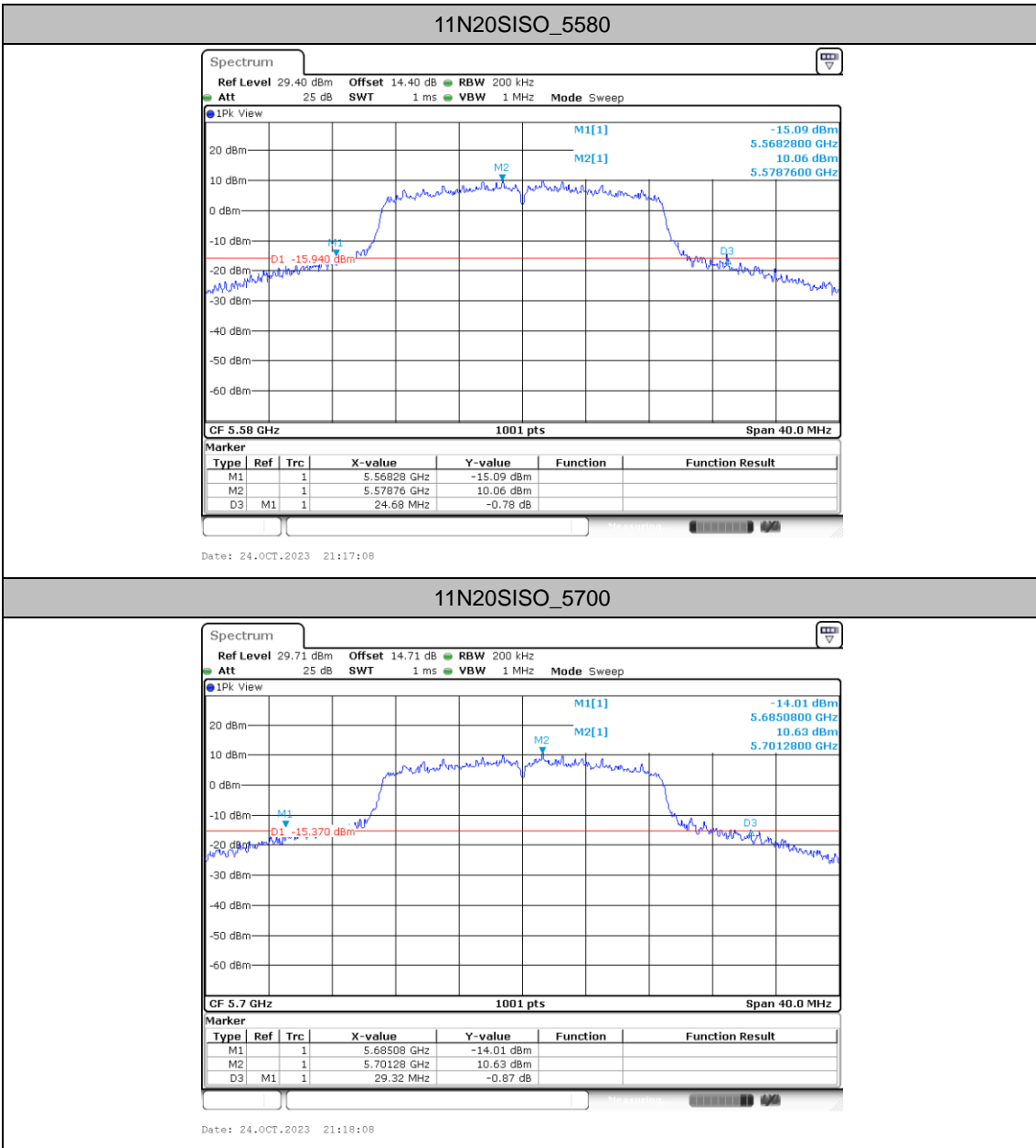


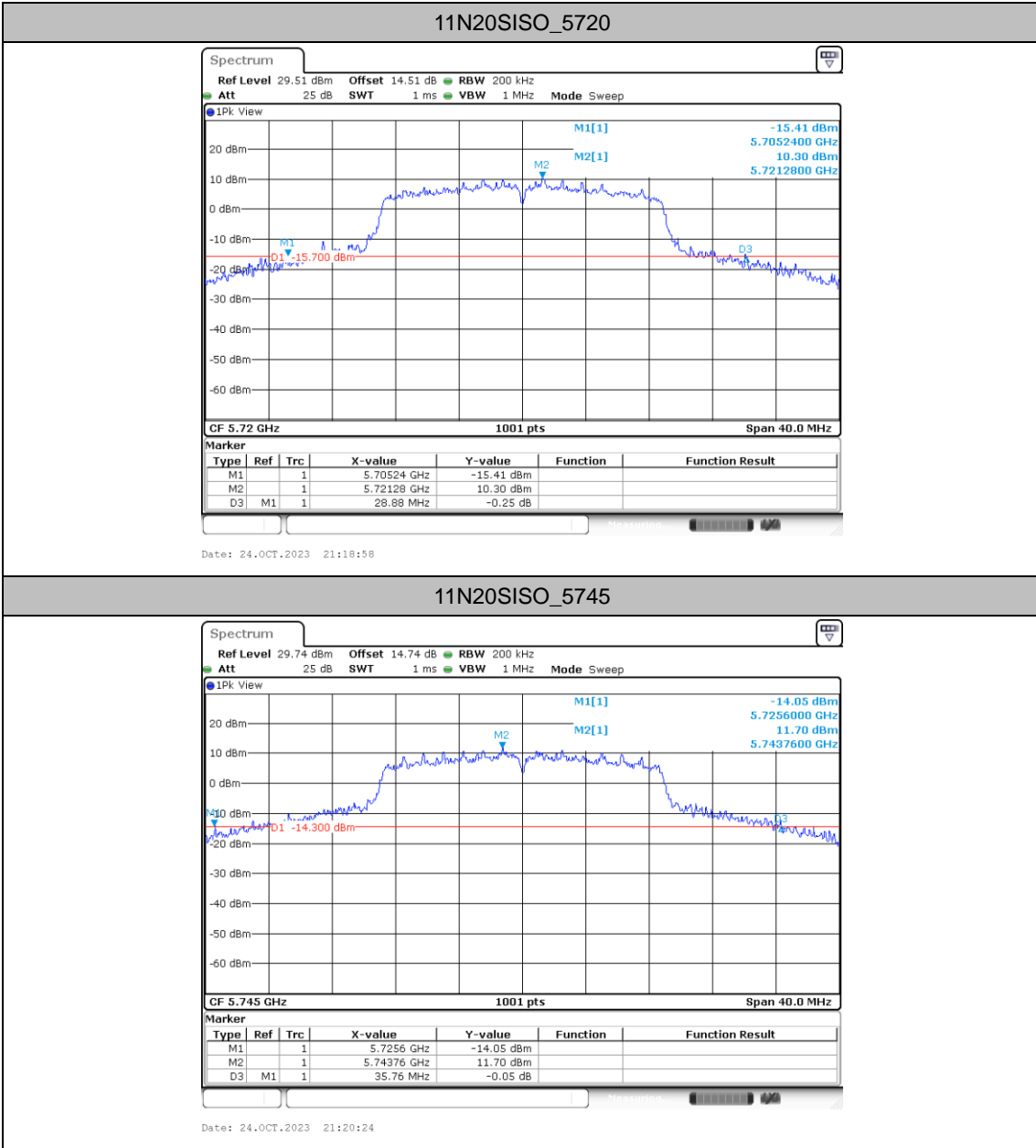


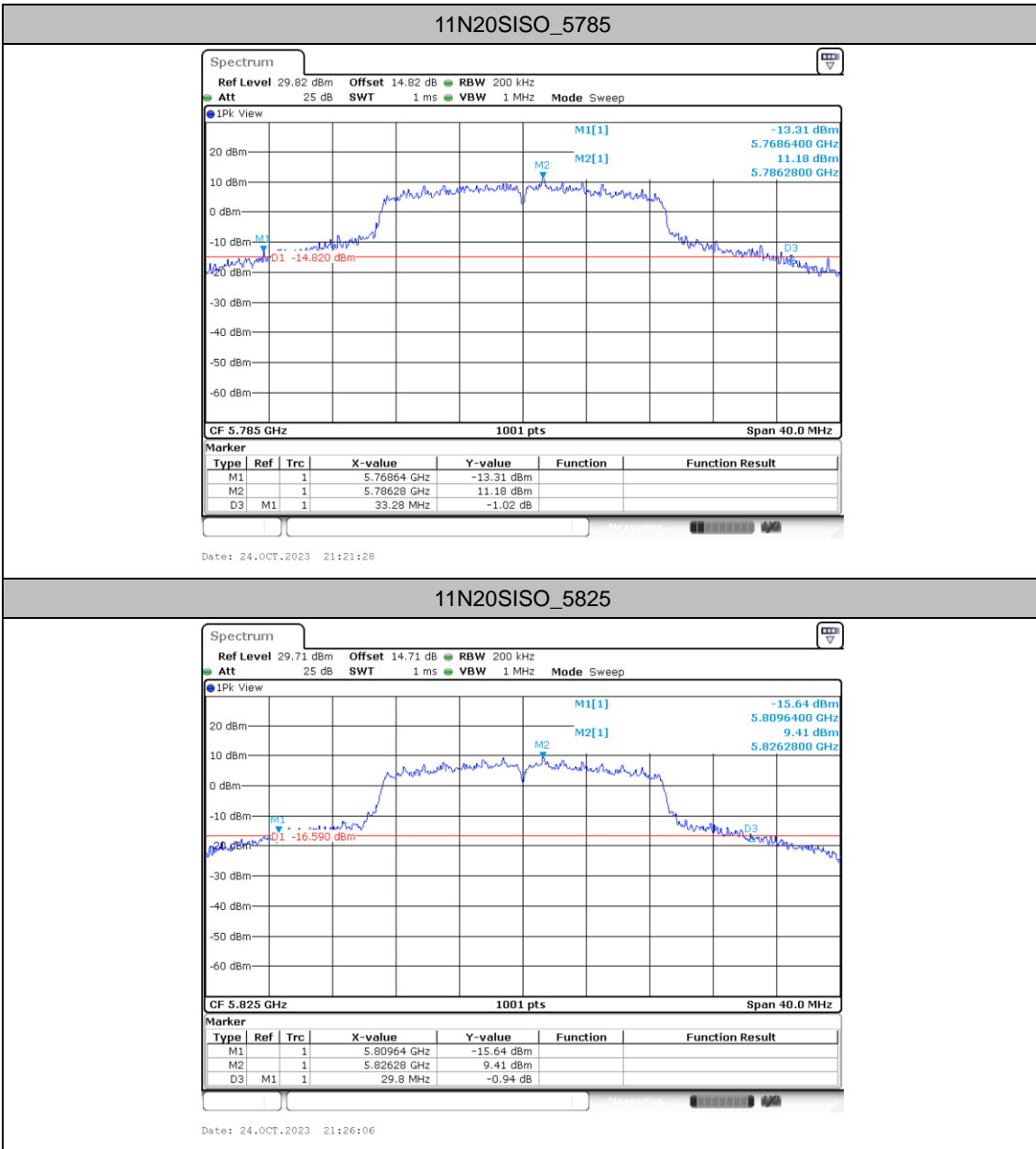


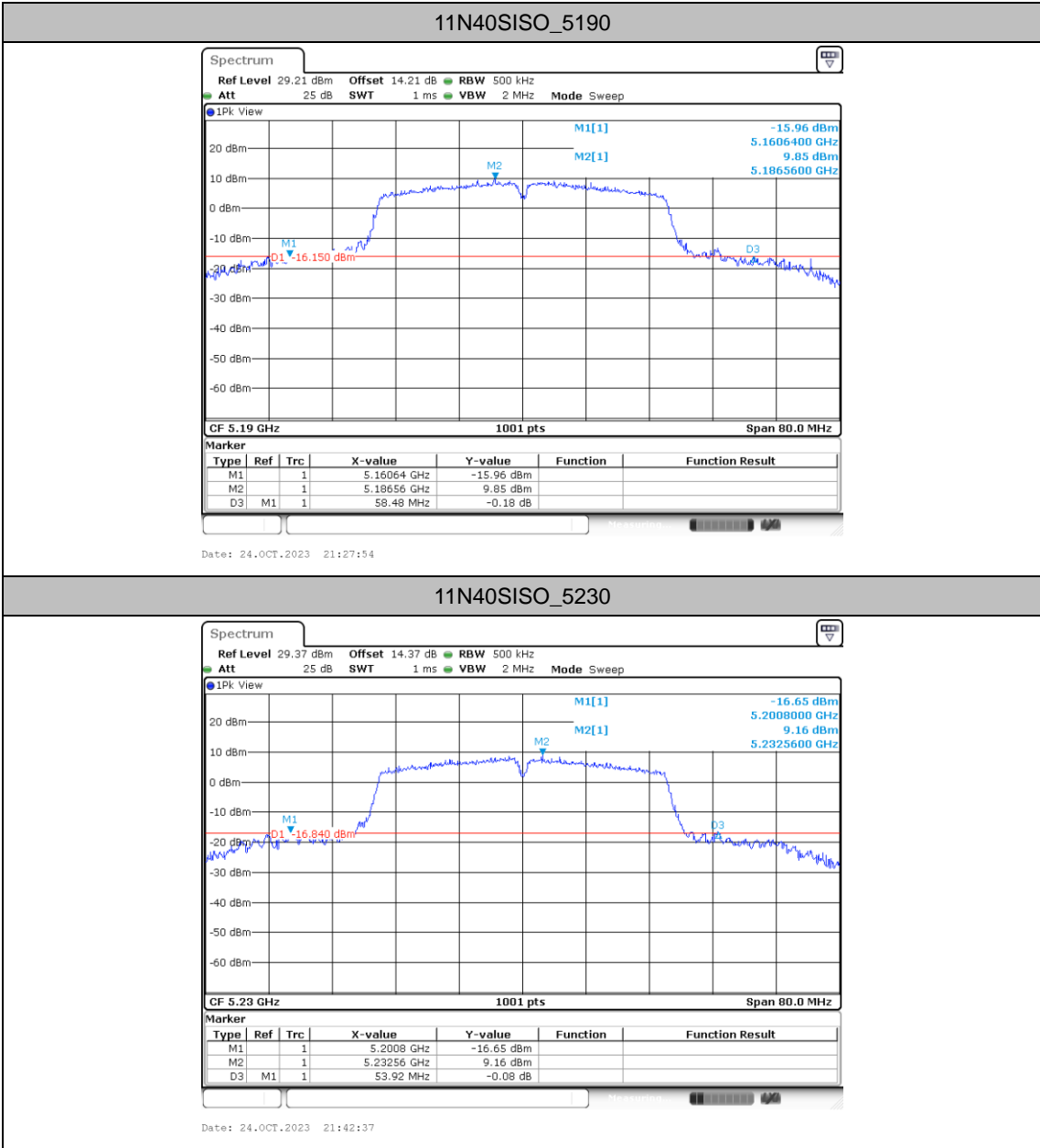


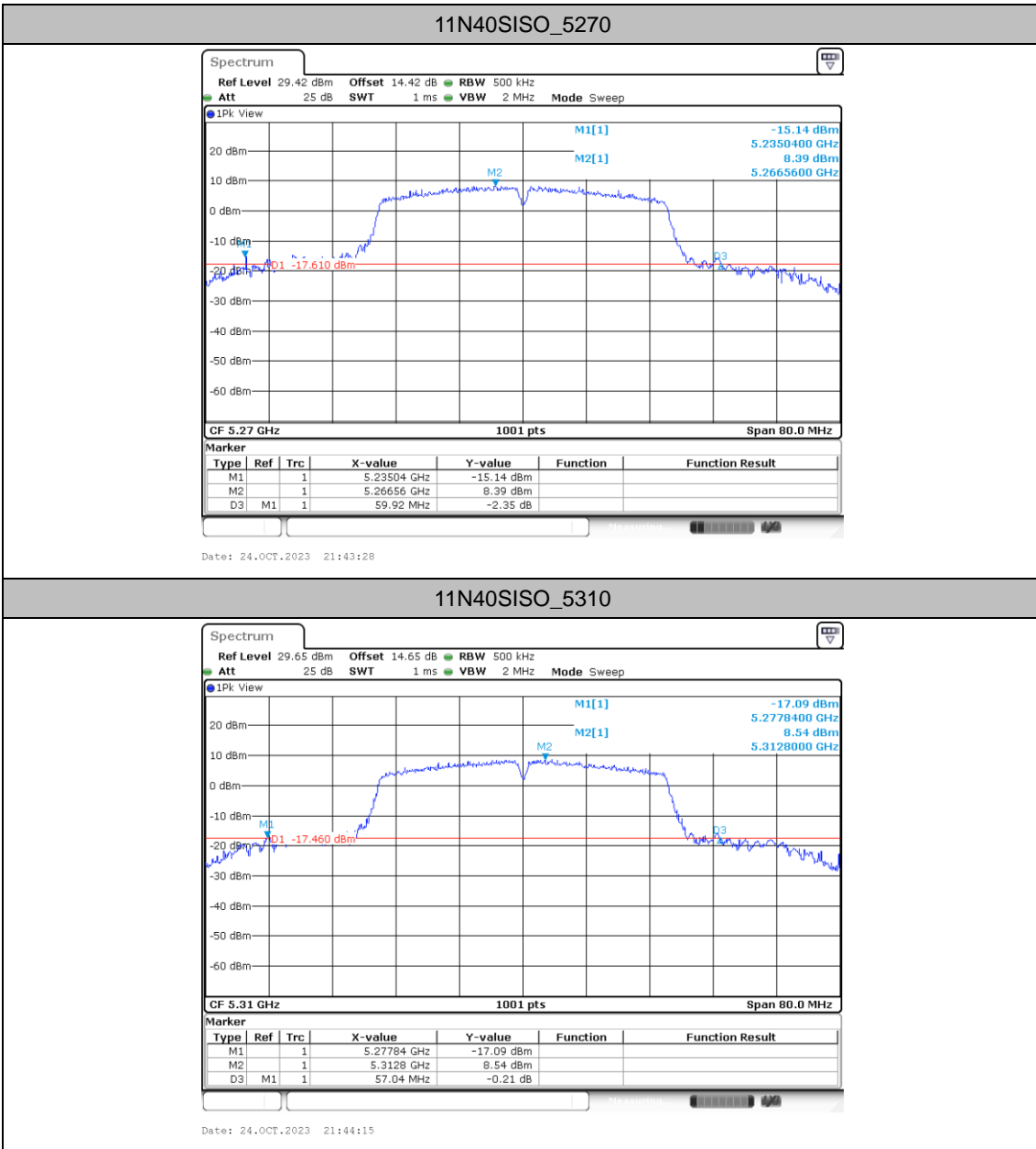


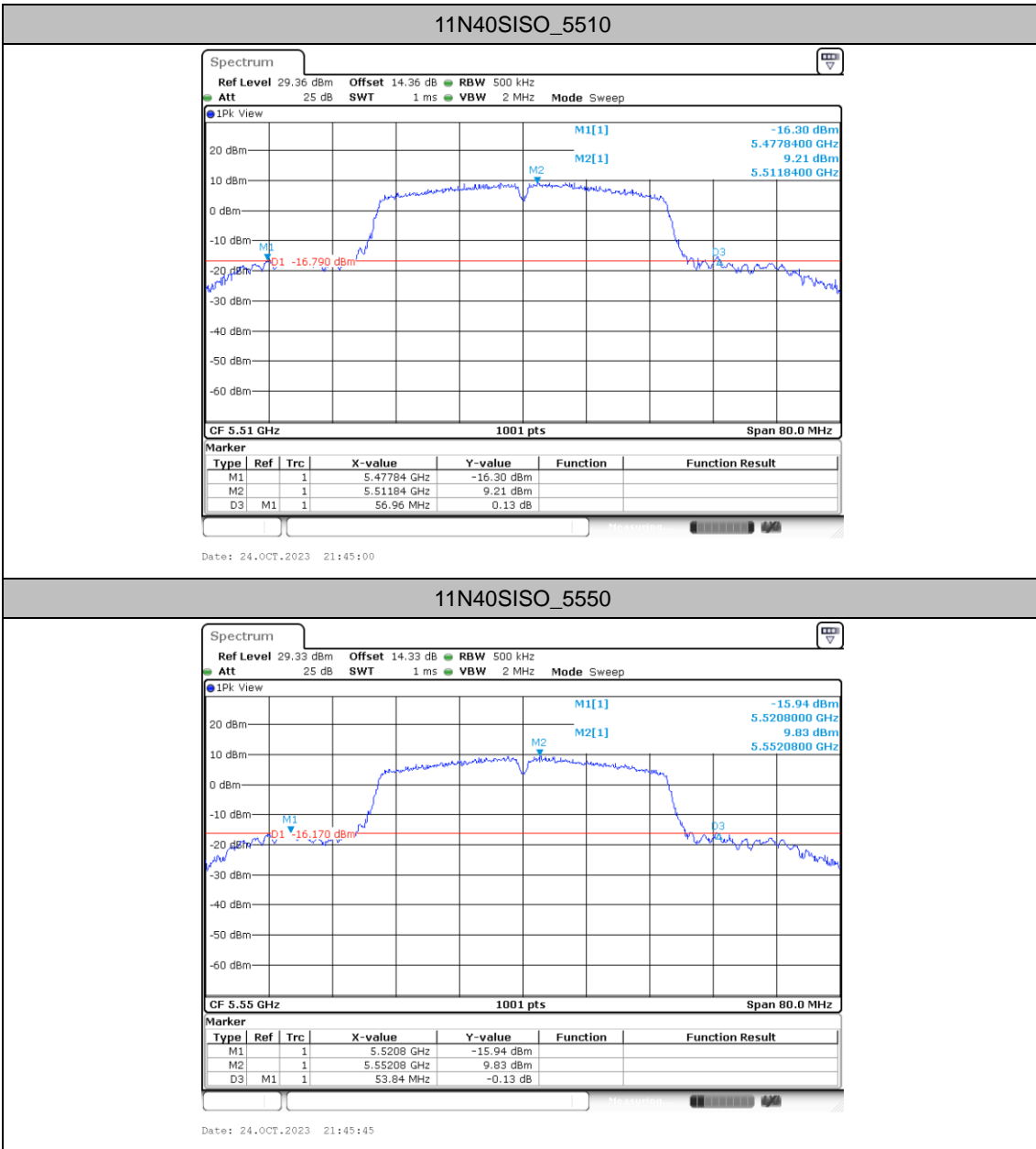


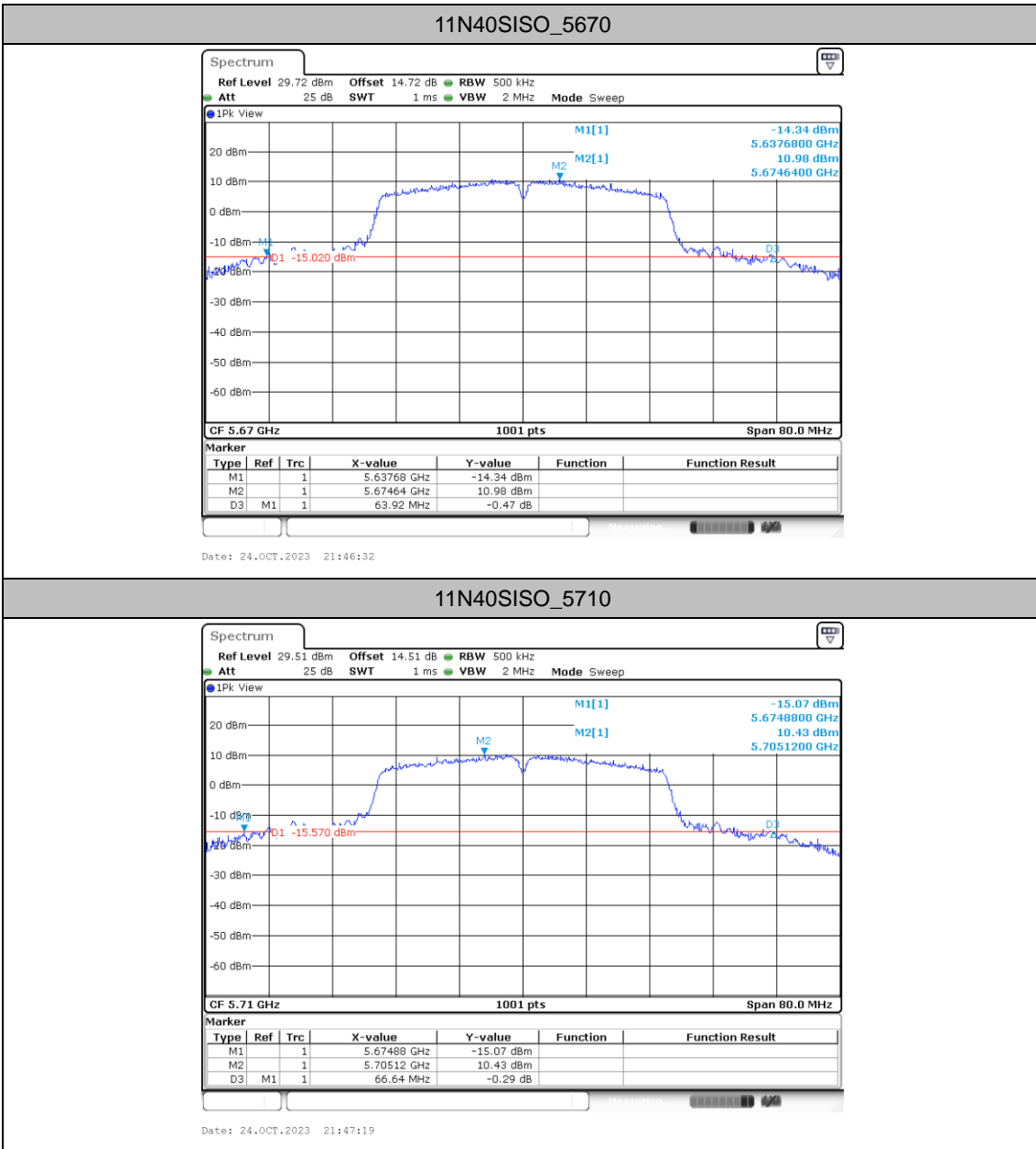


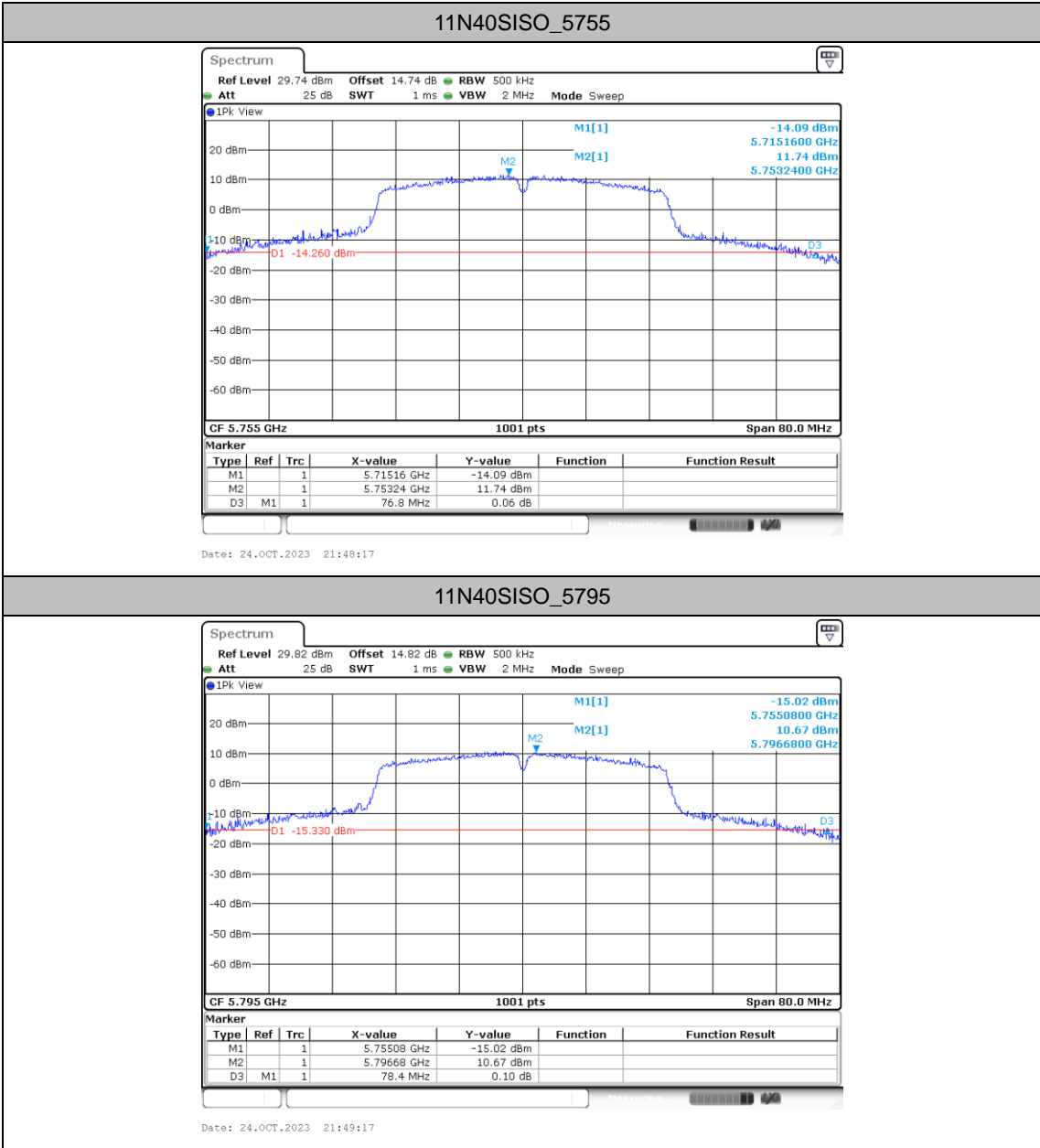






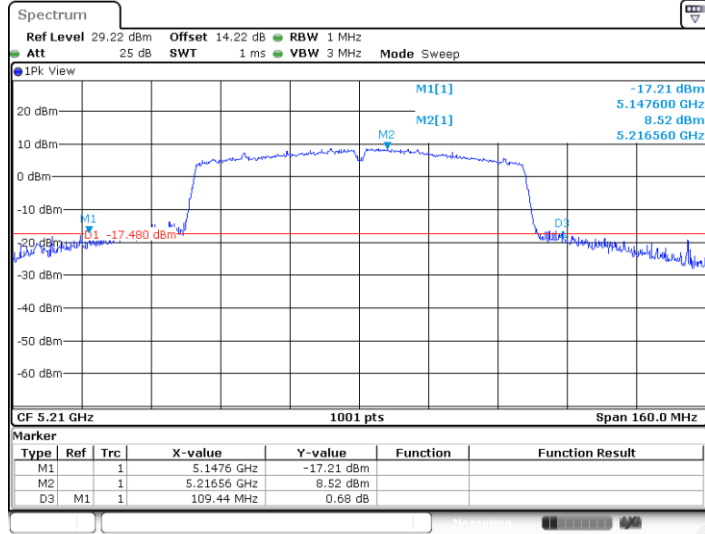




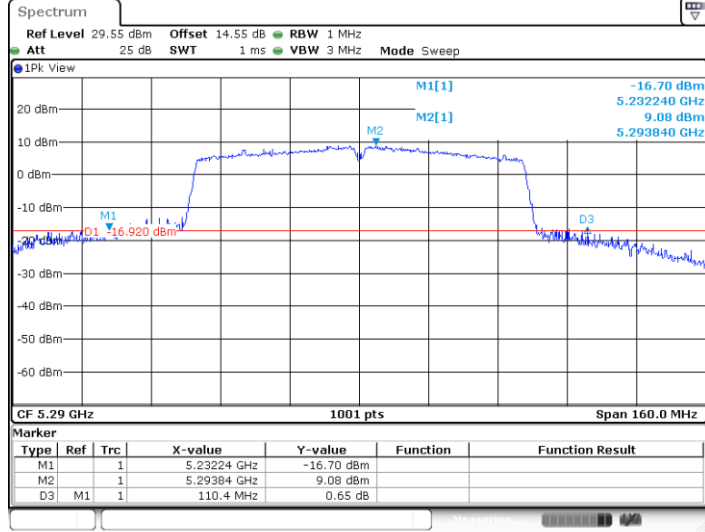


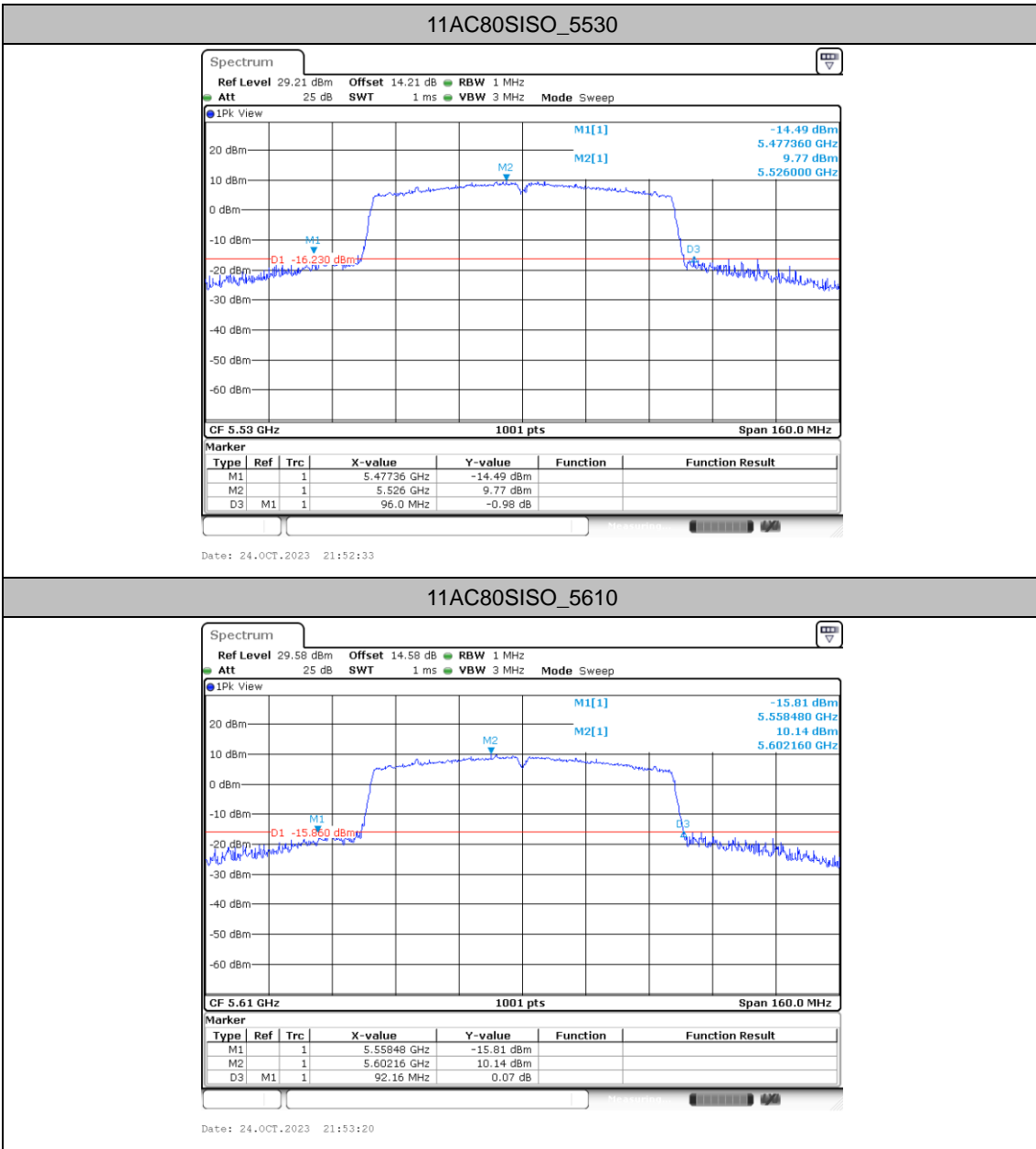


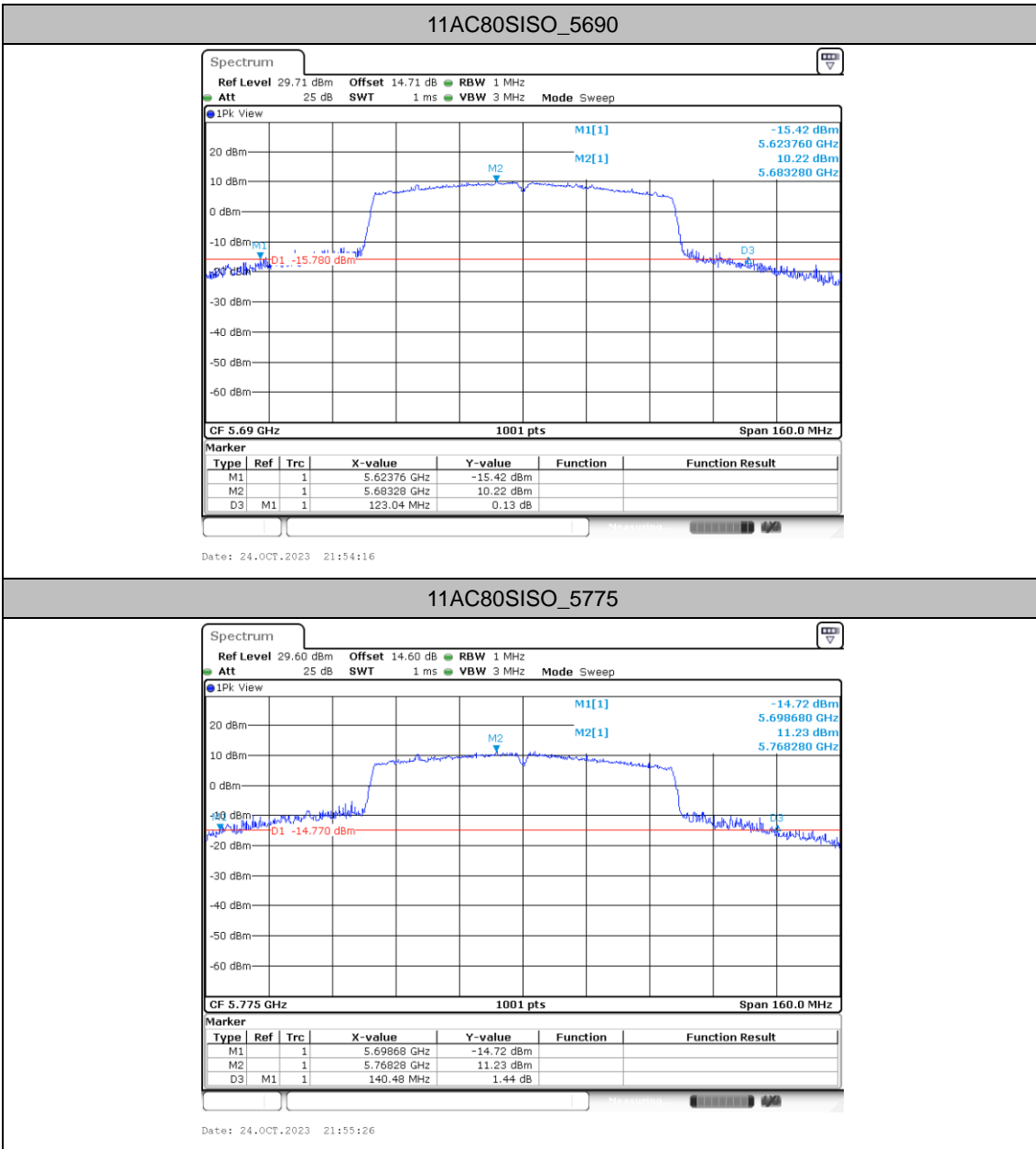
11AC80SISO_5210



11AC80SISO_5290









Occupied channel bandwidth

Test Result

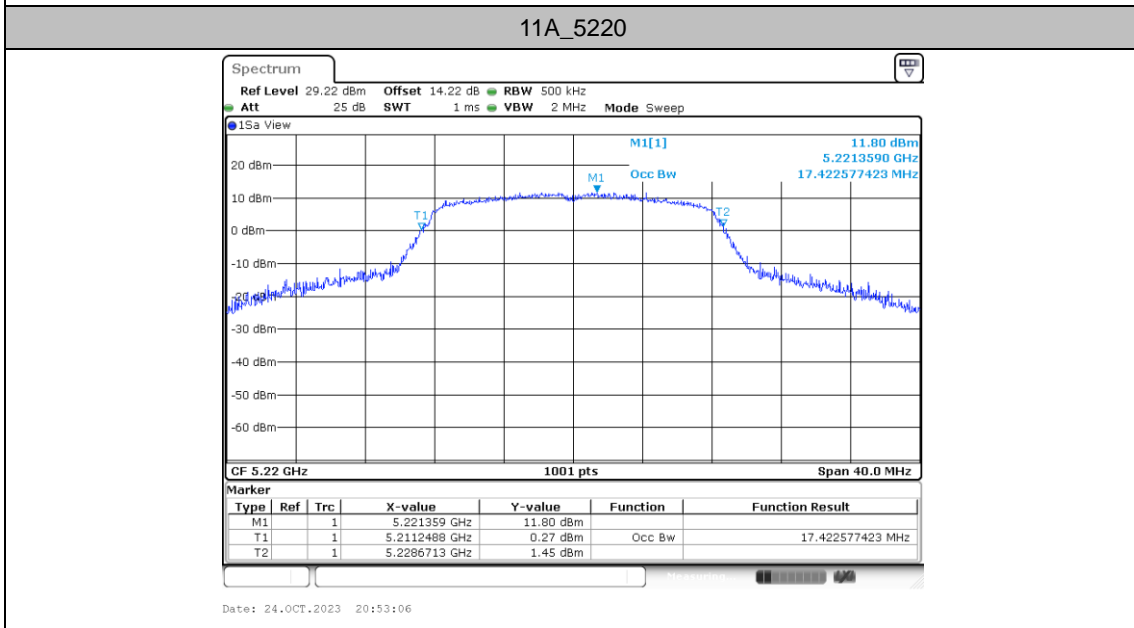
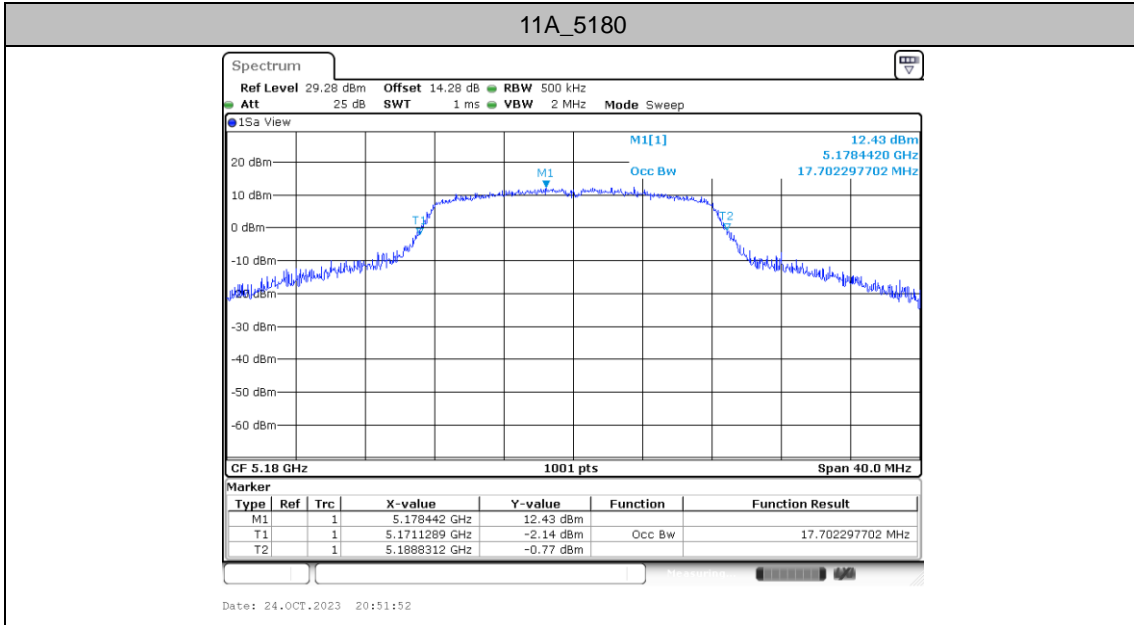
TestMode	Freq(MHz)	OCB [MHz]	FL[MHz]	FH[MHz]
11A	5180	17.702	5171.1289	5188.8312
	5220	17.423	5211.2488	5228.6713
	5240	17.502	5231.2488	5248.7512
	5260	17.622	5251.0889	5268.7113
	5300	17.502	5291.2088	5308.7113
	5320	17.463	5311.2887	5328.7512
	5500	17.463	5491.2488	5508.7113
	5580	17.502	5571.2488	5588.7512
	5700	18.062	5690.9291	5708.9910
	5720	17.782	5710.9690	5728.7512
	5745	21.538	5734.0509	5755.5894
	5785	21.259	5774.0909	5795.3497
	5825	19.021	5815.2498	5834.2707
11N20SISO	5180	18.342	5170.7692	5189.1109
	5220	18.422	5210.7293	5229.1508
	5240	18.581	5230.6494	5249.2308
	5260	18.661	5250.5694	5269.2308
	5300	18.581	5290.6494	5309.2308
	5320	18.501	5310.6893	5329.1908
	5500	18.581	5490.6094	5509.1908
	5580	18.501	5570.6893	5589.1908
	5700	19.181	5690.2498	5709.4306
	5720	18.981	5710.3297	5729.3107
	5745	23.457	5733.0120	5756.4685
	5785	22.298	5773.4915	5795.7892
5825	20.1	5814.6104	5834.7103	
11N40SISO	5190	36.923	5171.5385	5208.4615
	5230	36.523	5211.6983	5248.2218
	5270	36.763	5251.5385	5288.3017
	5310	36.603	5291.6983	5328.3017
	5510	36.683	5491.6184	5528.3017
	5550	36.683	5531.6184	5568.3017
	5670	37.243	5651.2188	5688.4615
	5710	37.243	5691.2188	5728.4615

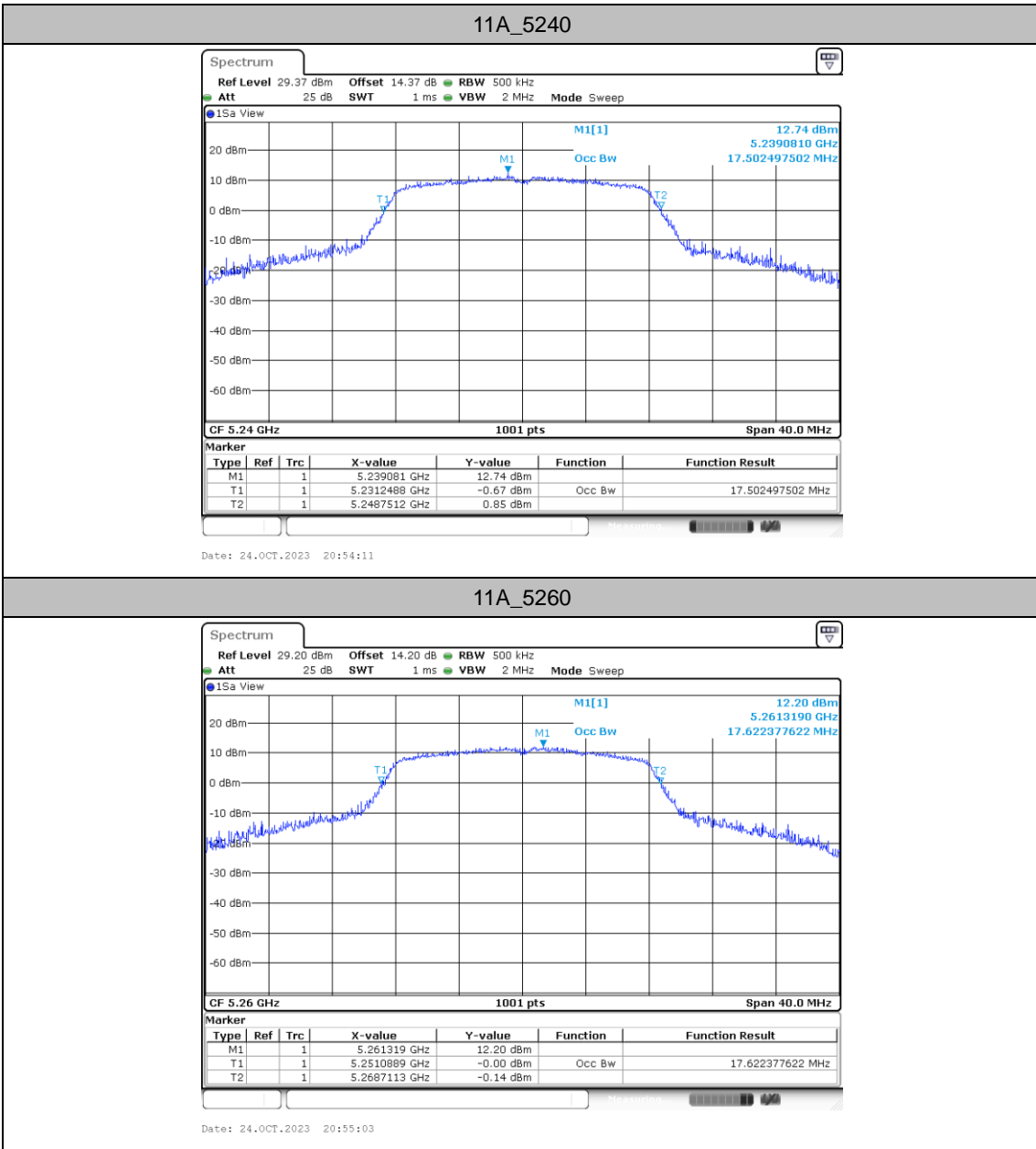


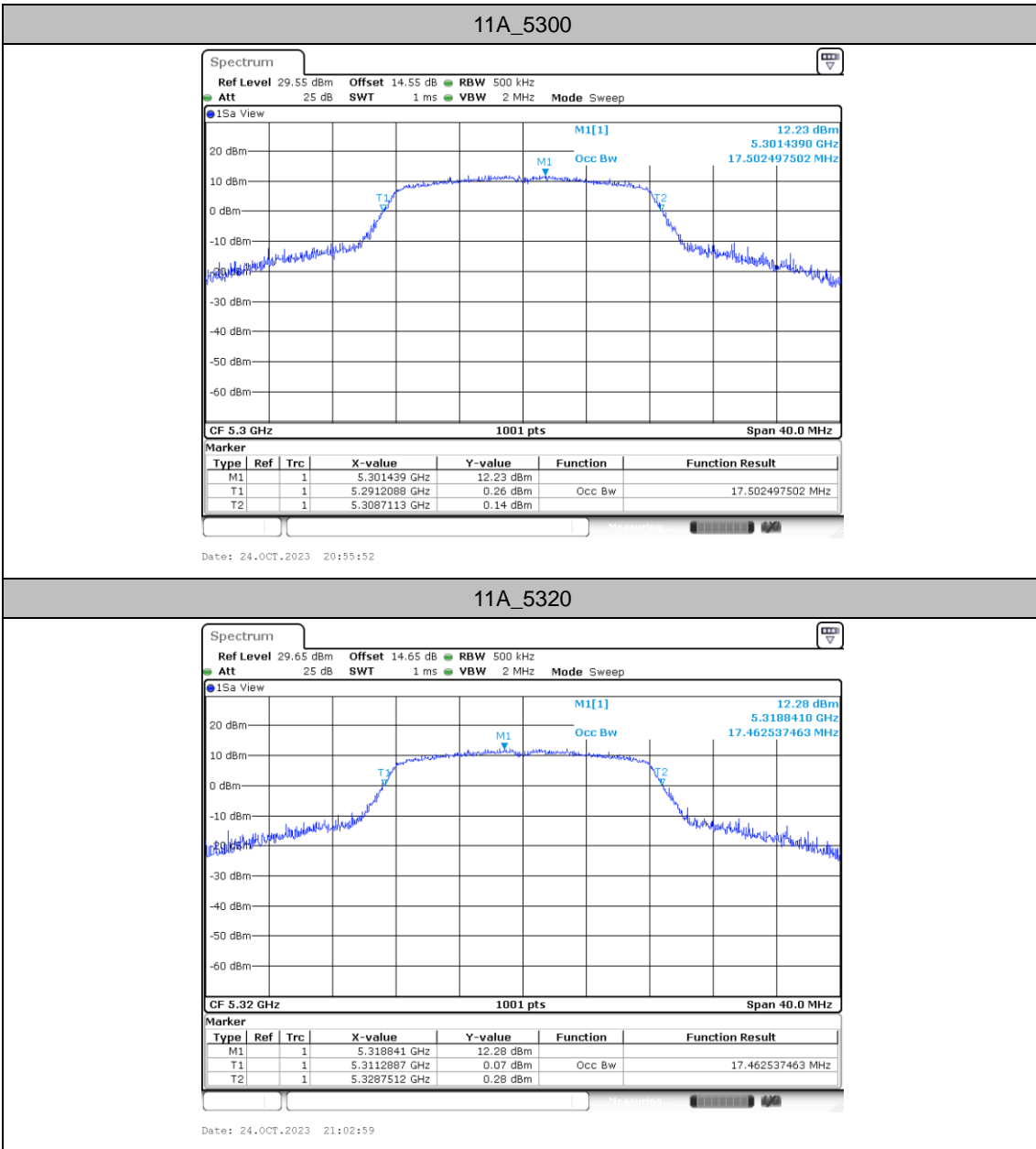
	5755	39.88	5734.0609	5773.9411
	5795	39.64	5774.2208	5813.8611
11AC80SISO	5210	75.924	5171.9580	5247.8821
	5290	76.084	5251.7982	5327.8821
	5530	75.604	5492.1179	5567.7223
	5610	75.604	5572.1179	5647.7223
	5690	75.764	5651.9580	5727.7223
	5775	77.043	5735.9990	5813.0420

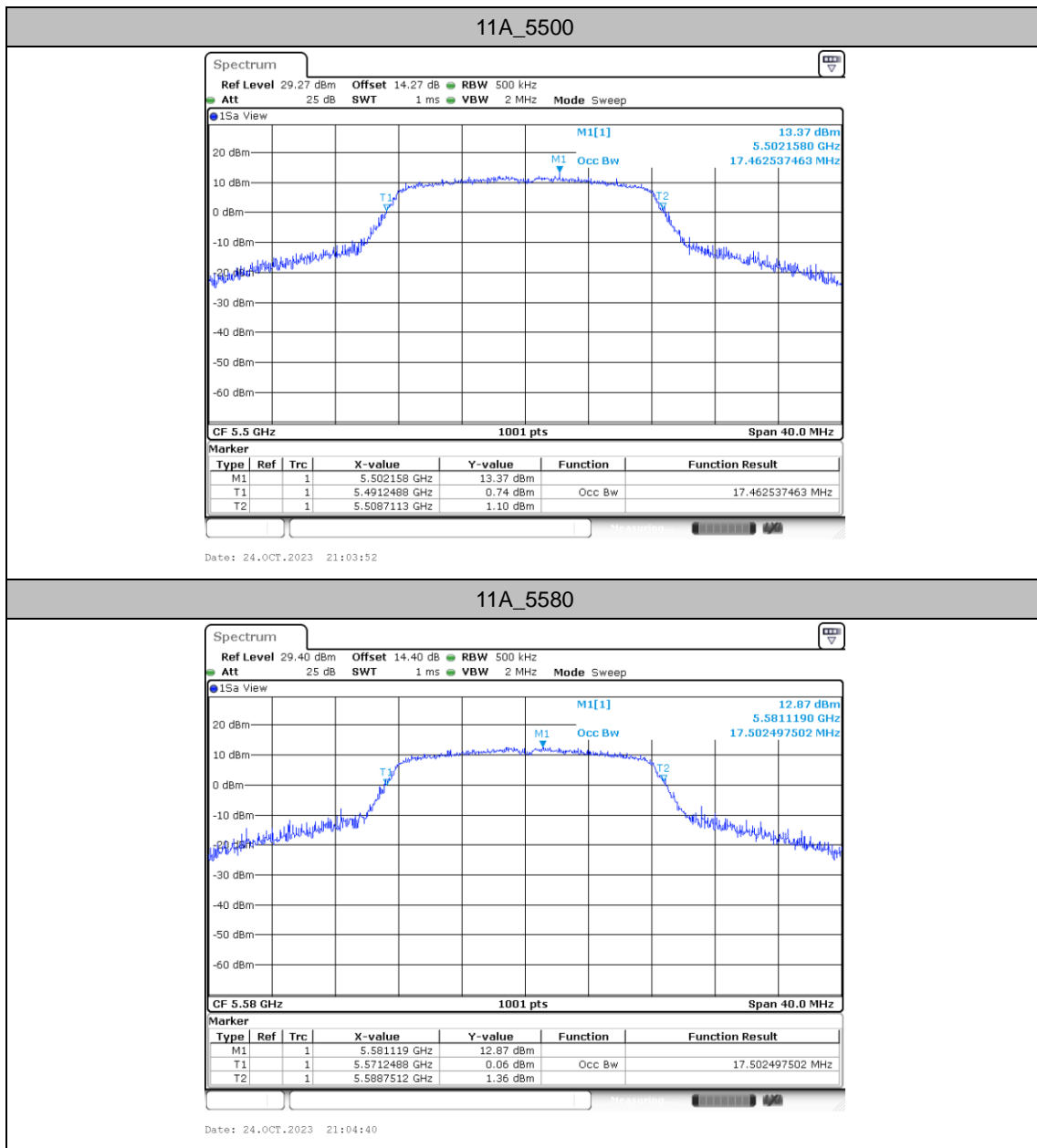


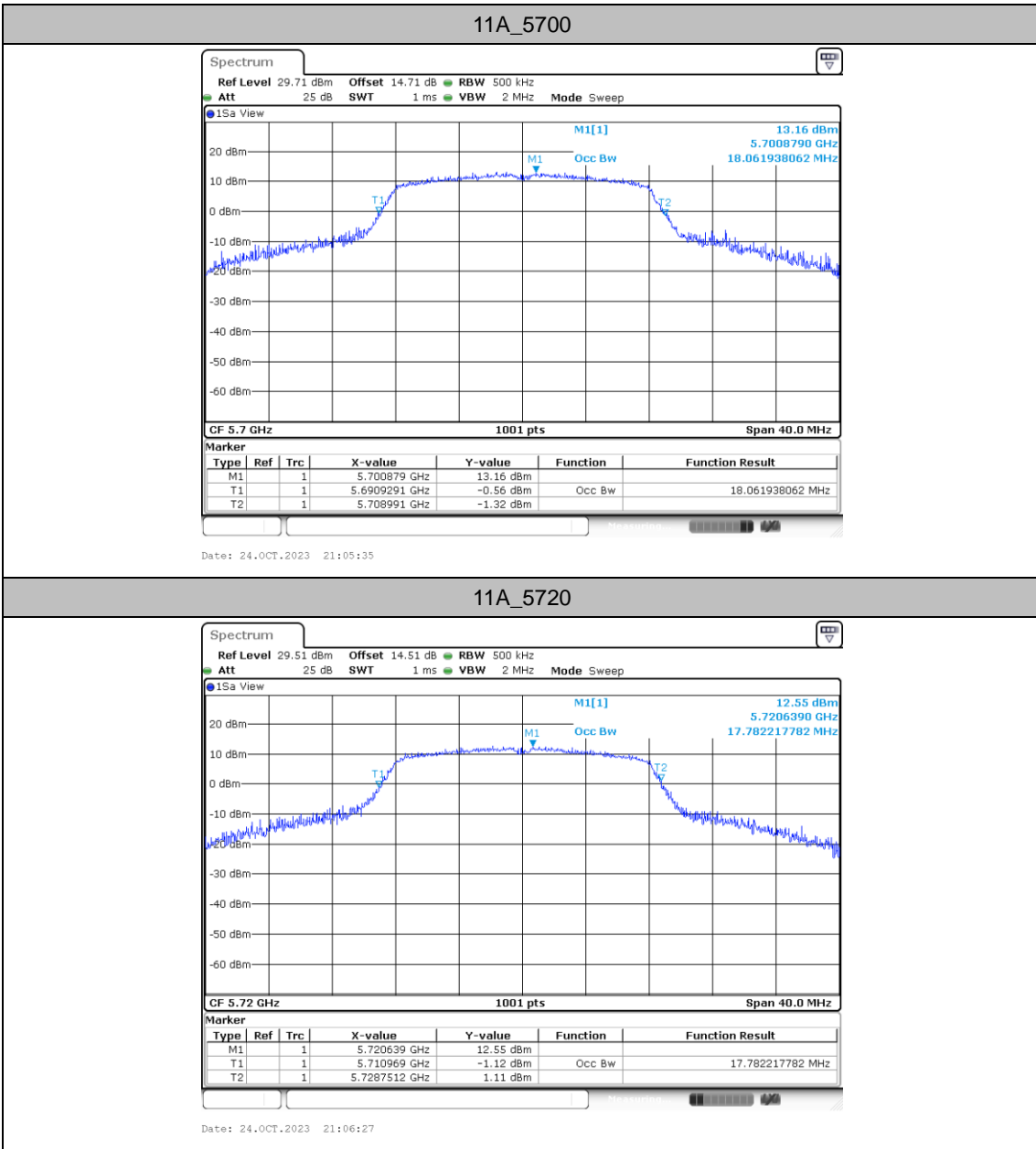
Test Graphs

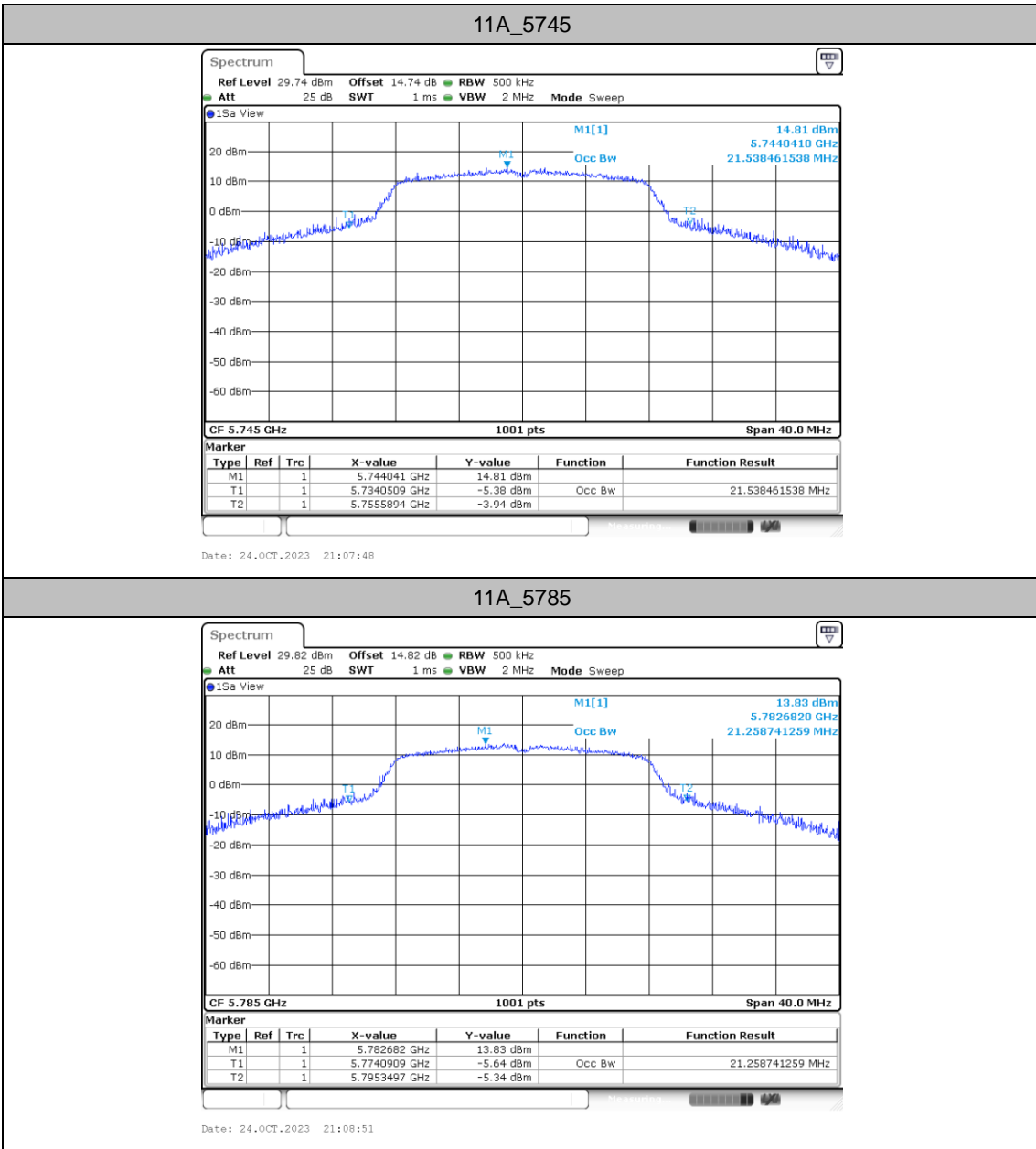


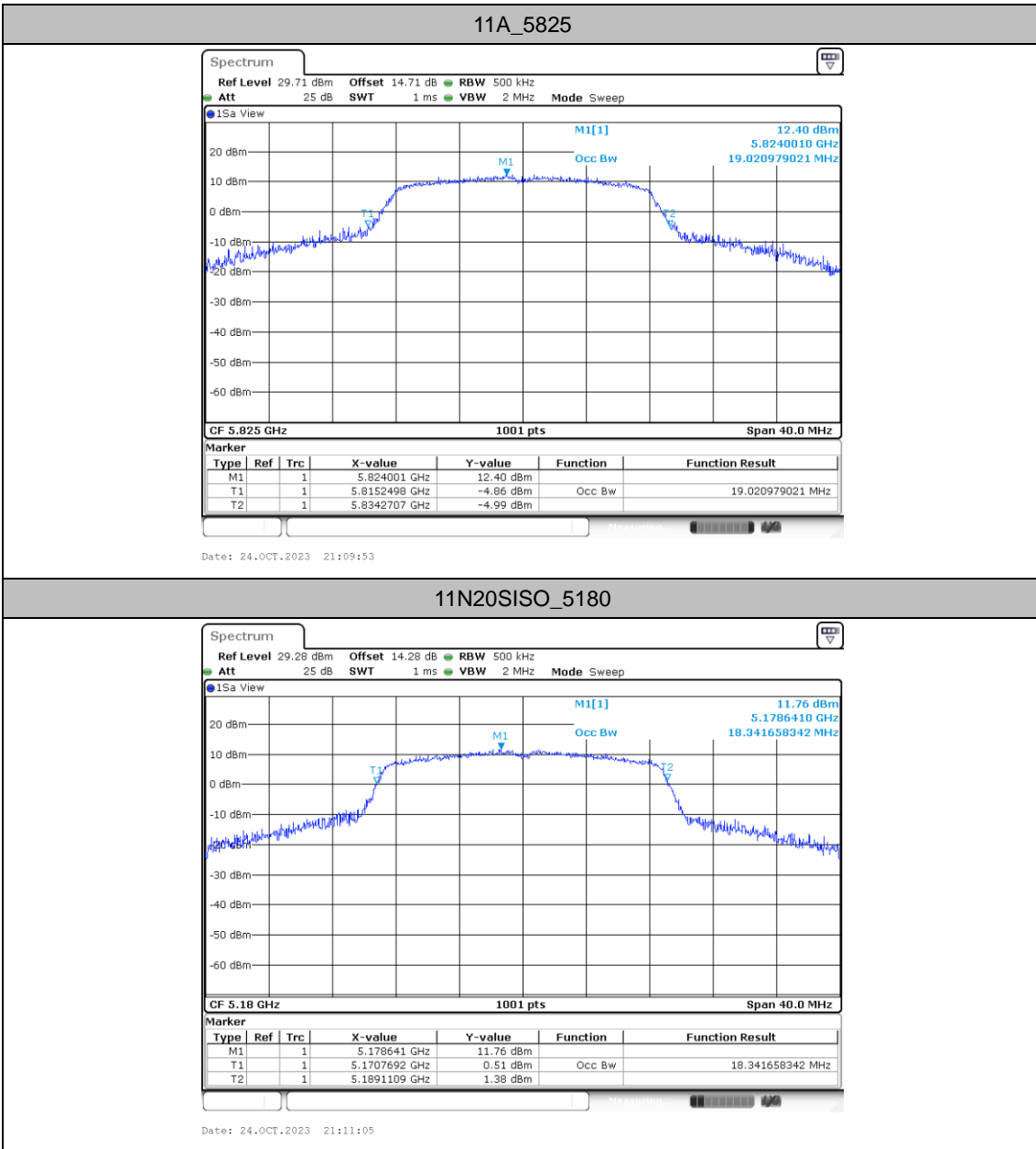


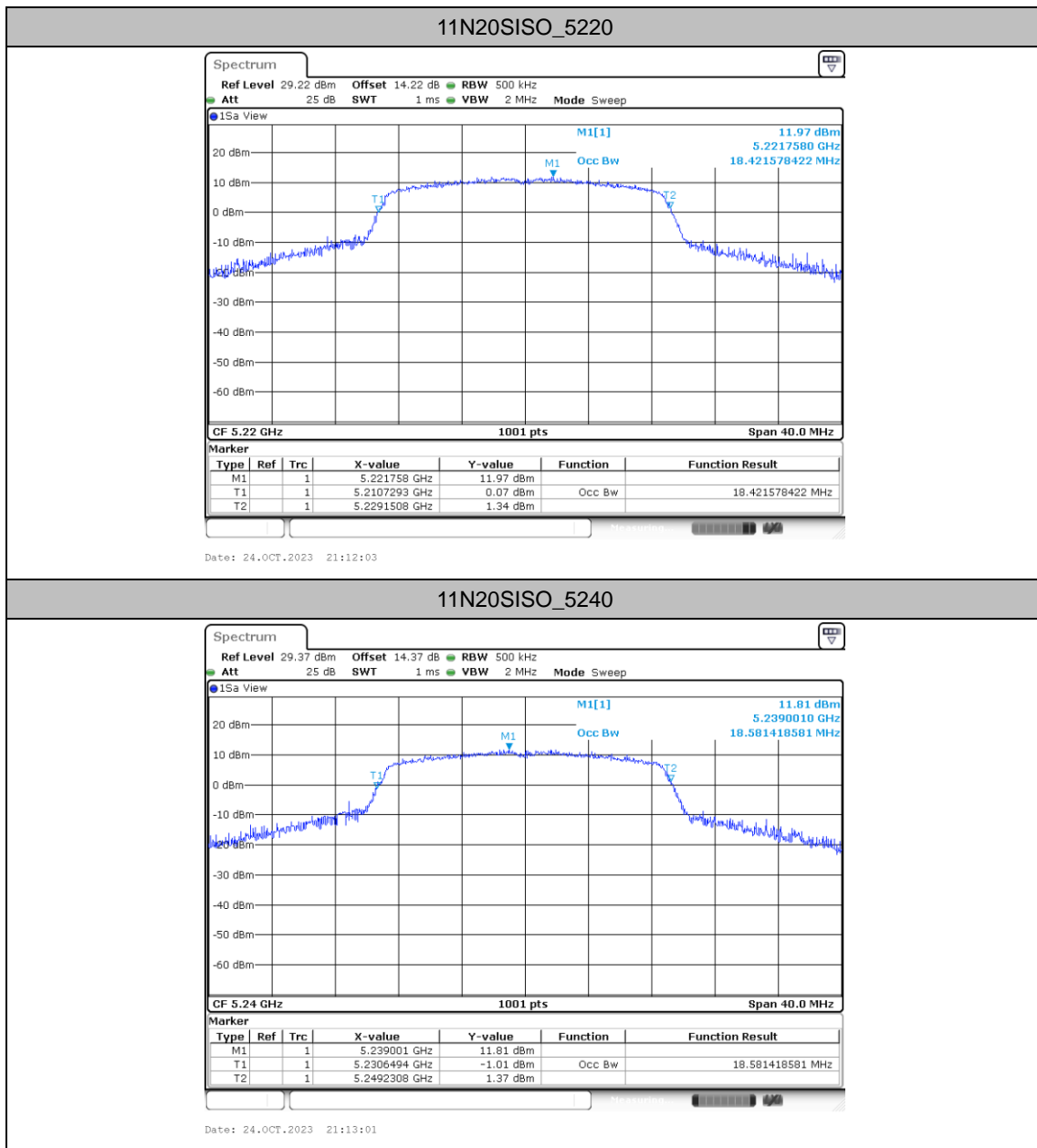


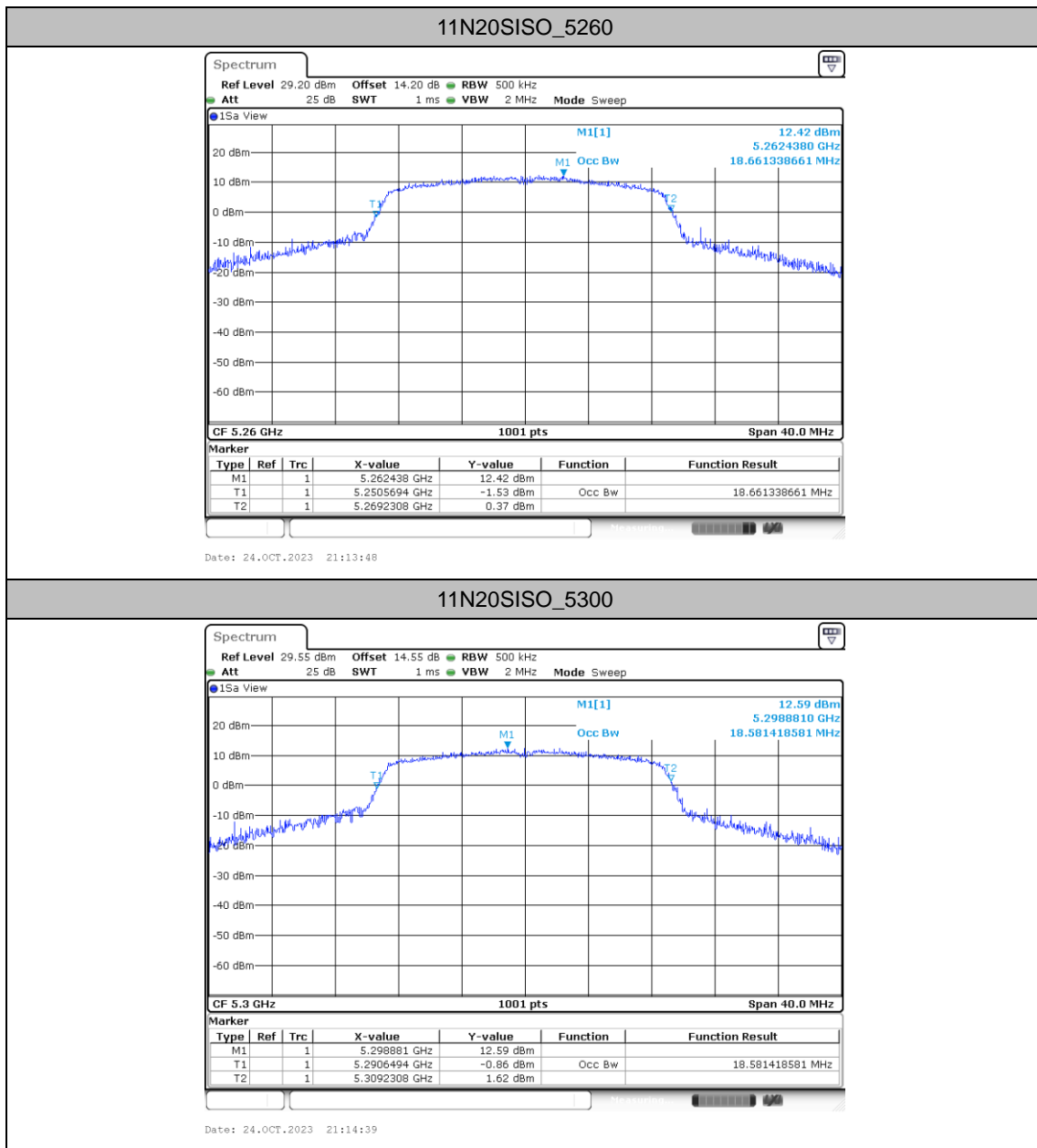

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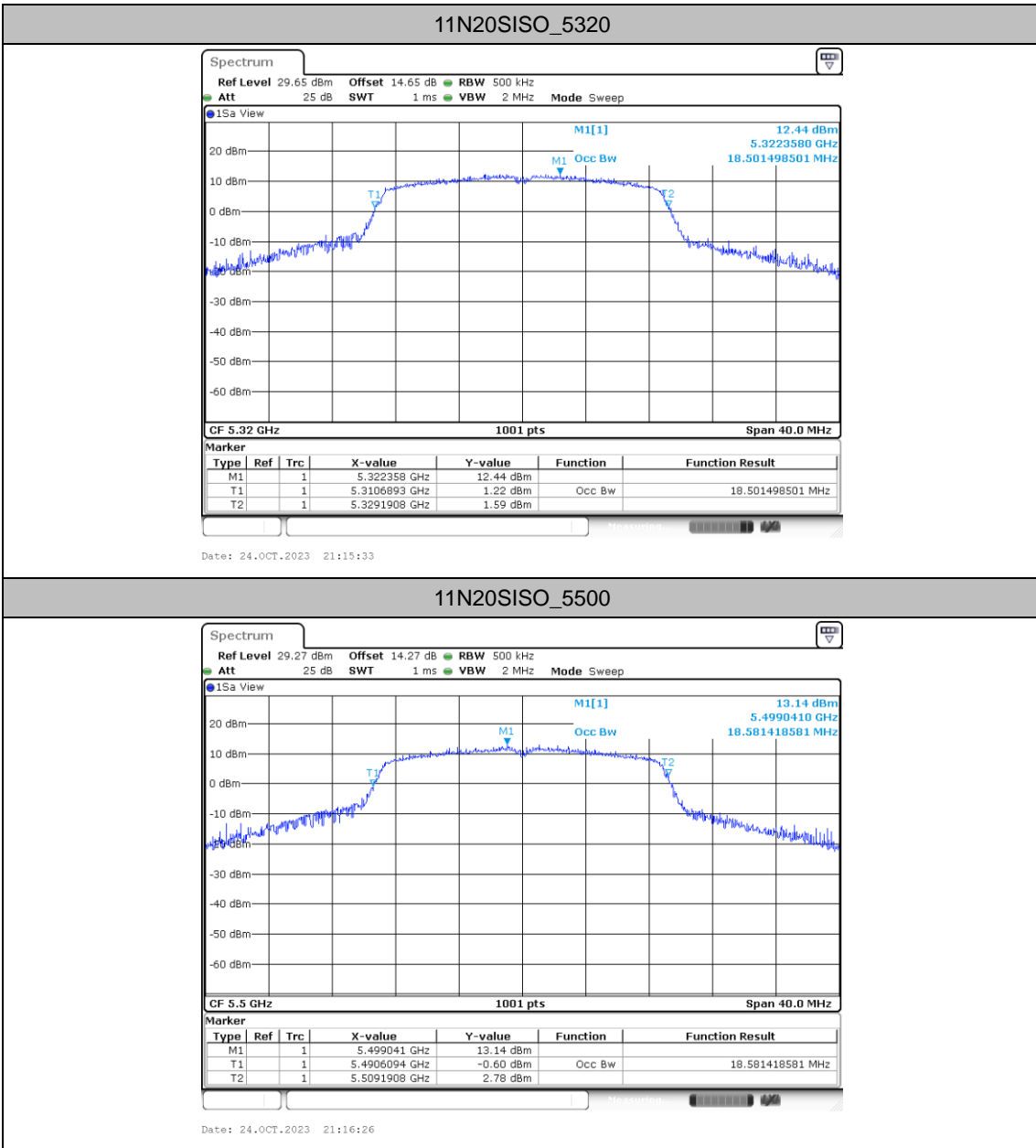


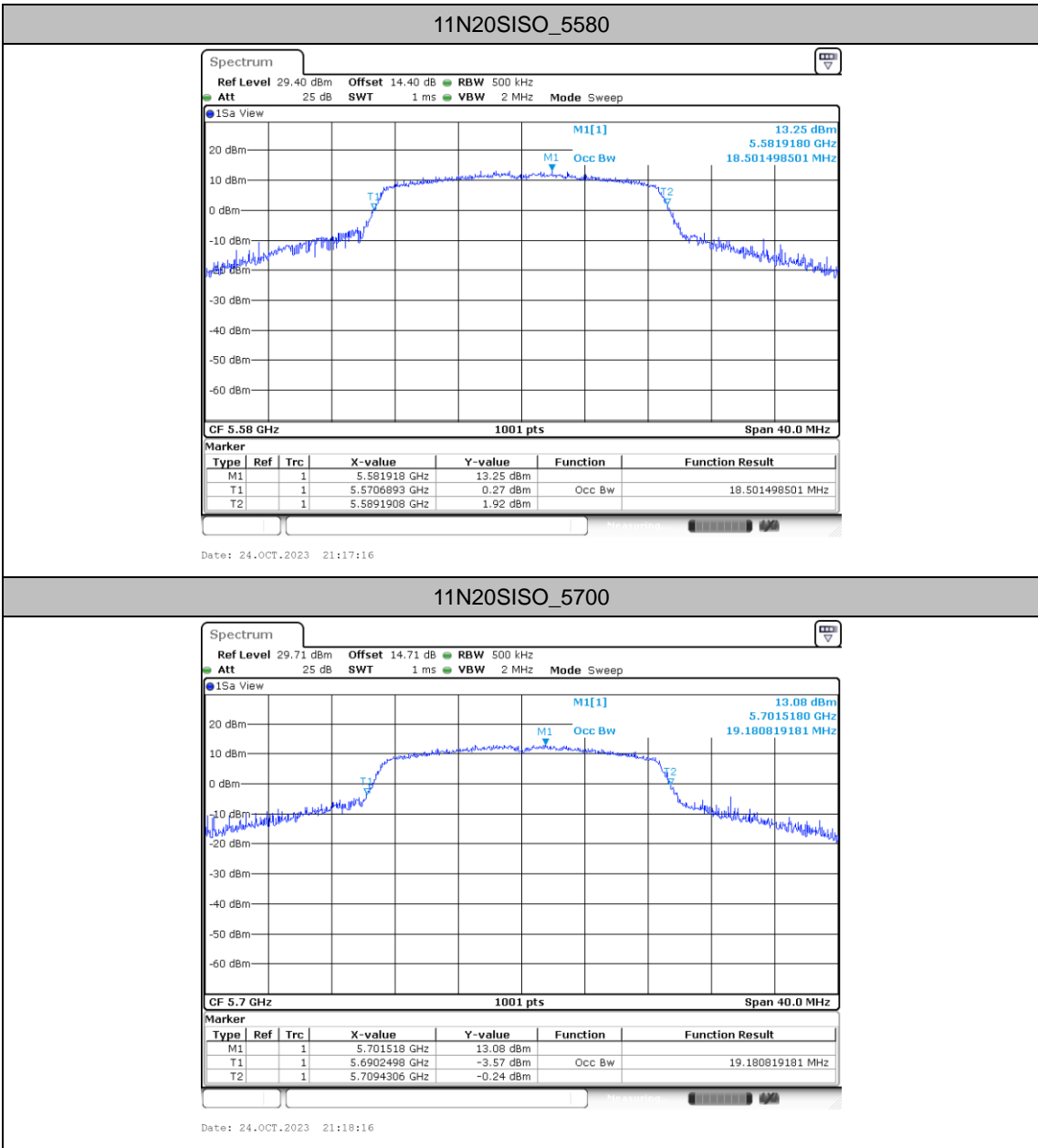


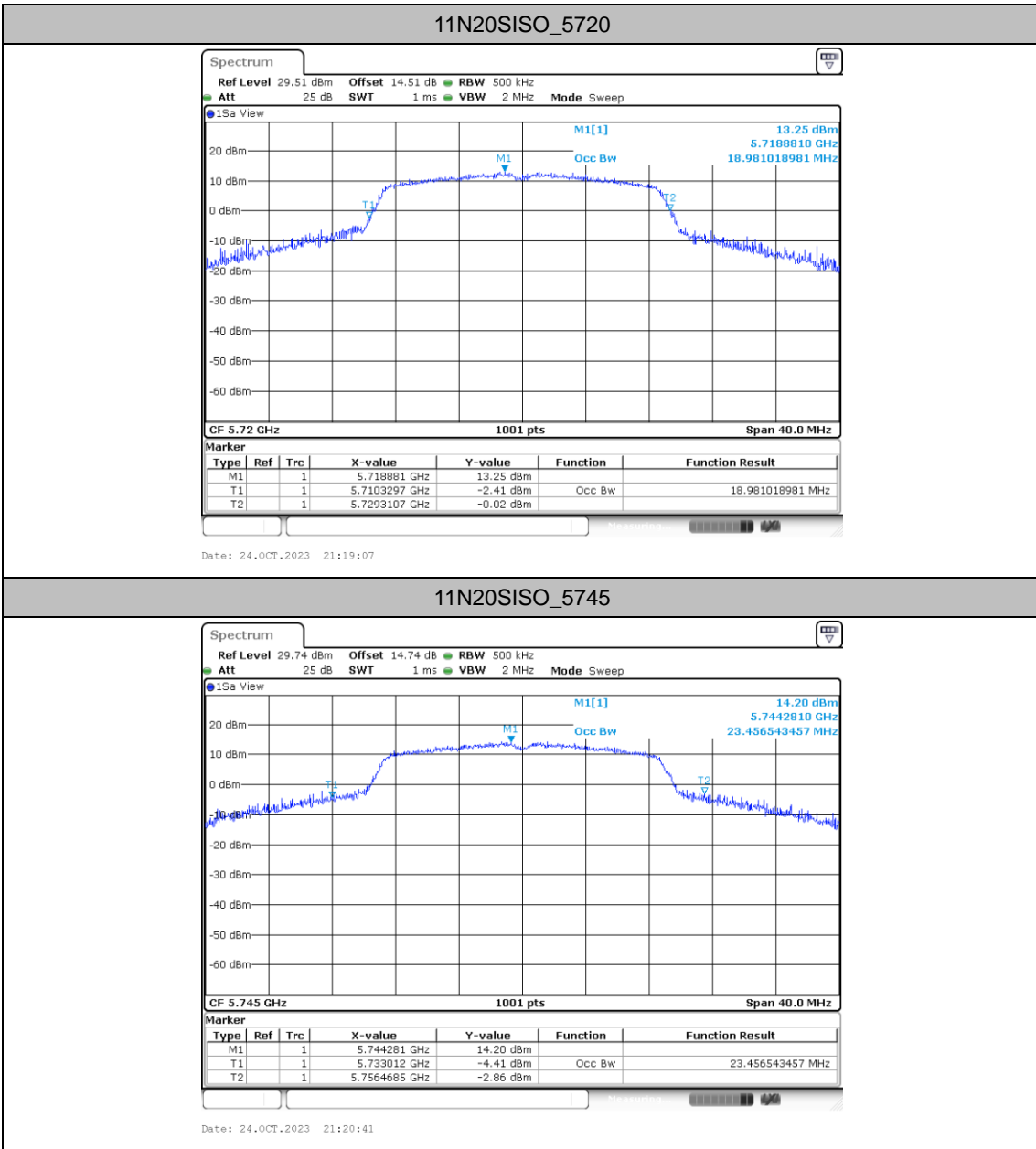


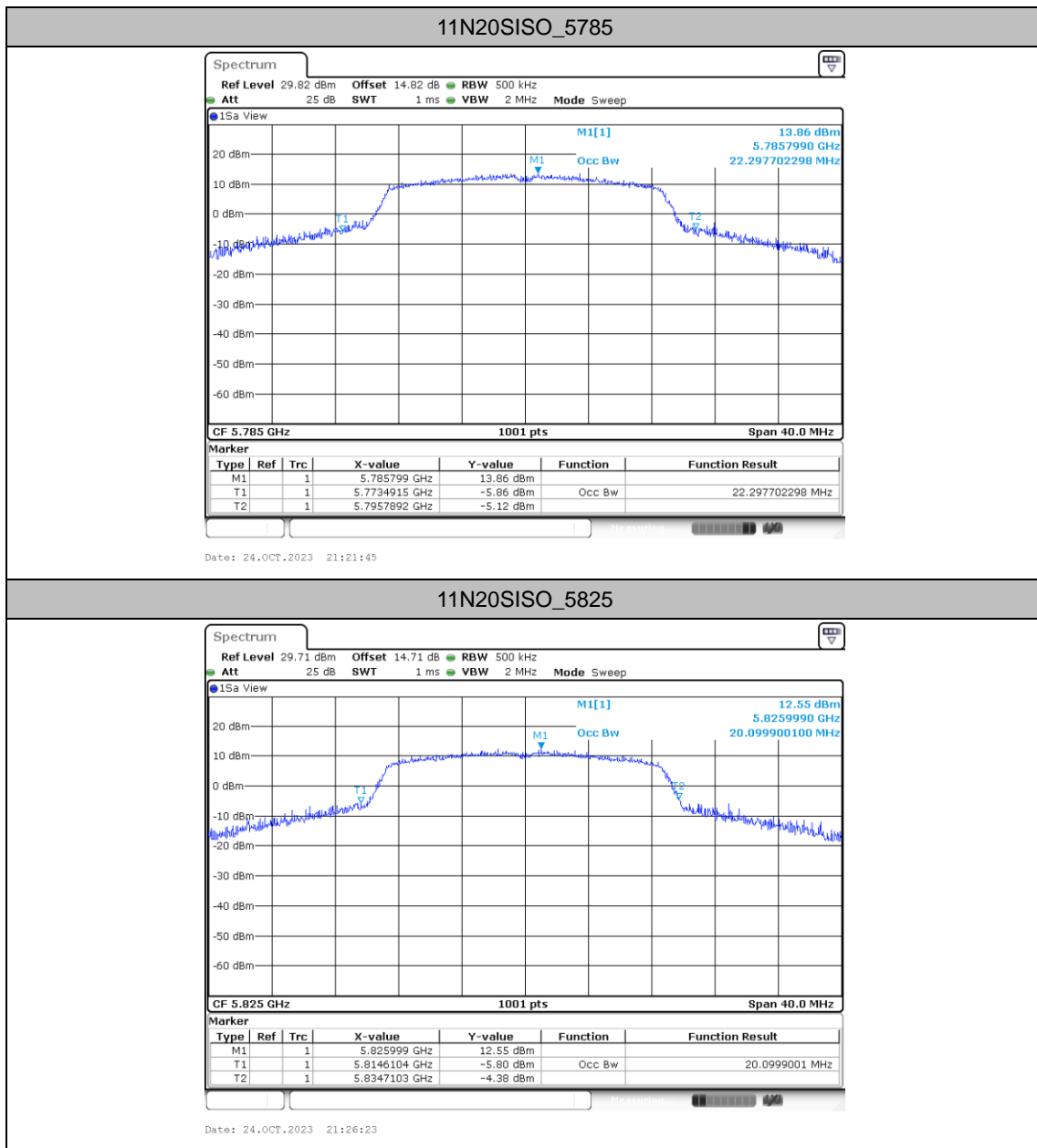


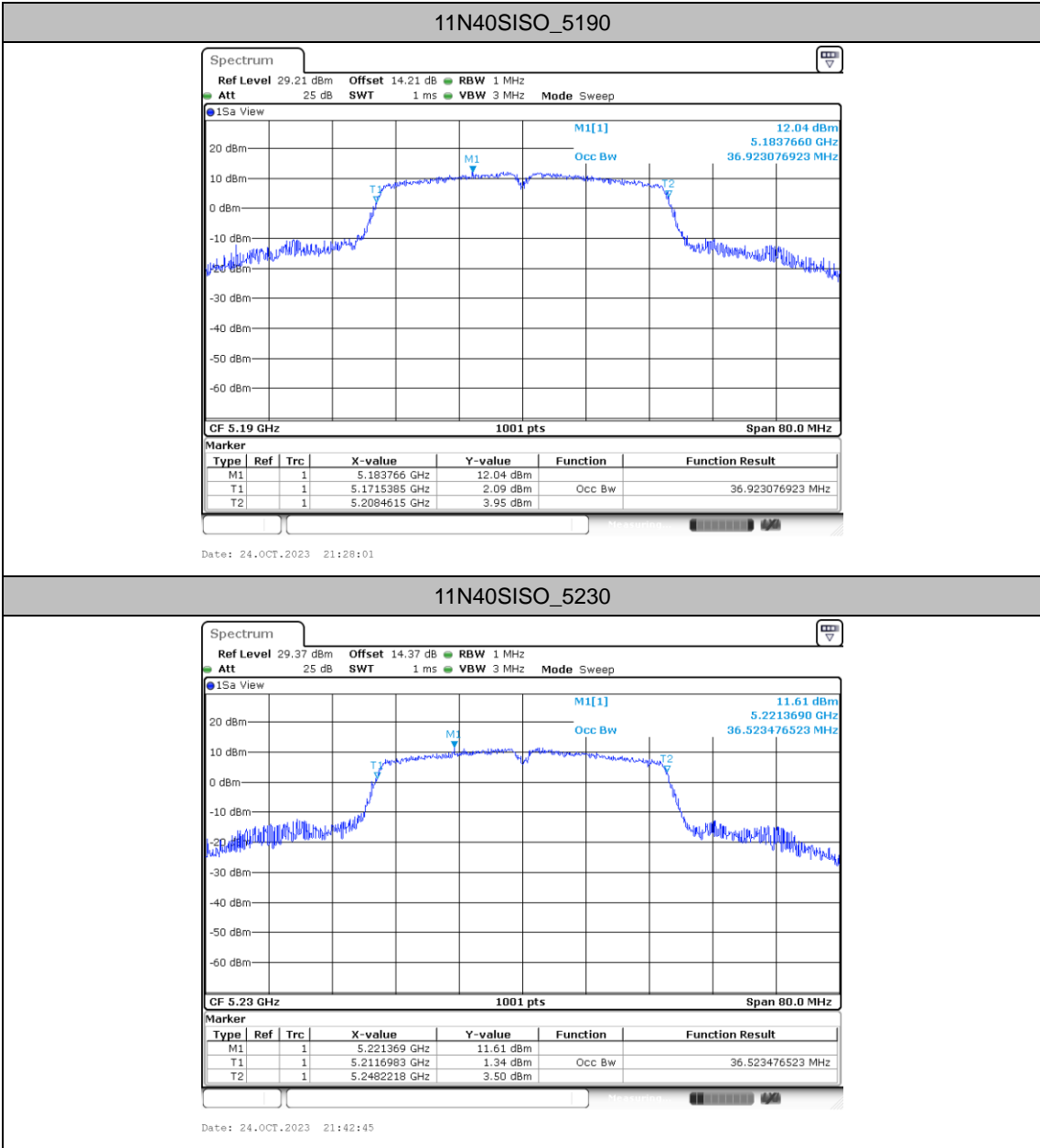


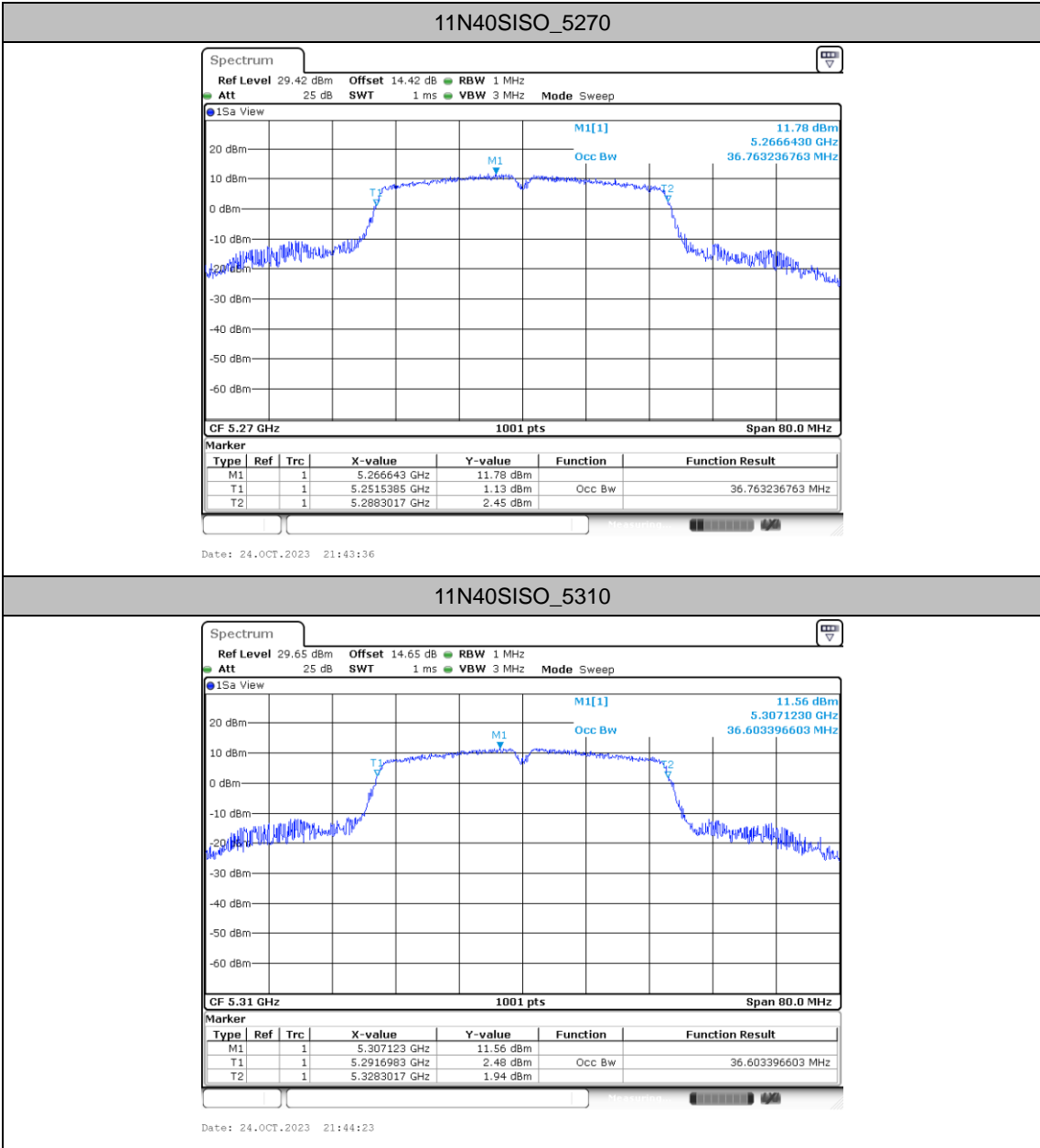






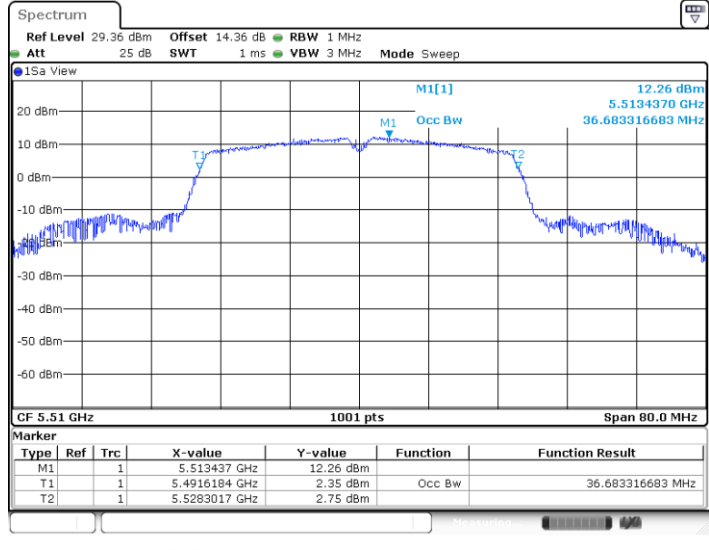








11N40SISO_5510



11N40SISO_5550

