



FCC RF Test Report

APPLICANT : Quectel Wireless Solutions Co., Ltd.
EQUIPMENT : Wi-Fi & Bluetooth Module
BRAND NAME : Quectel
MODEL NAME : FCM962K
FCC ID : XMR2024FCM962K
STANDARD : FCC Part 15 Subpart C §15.247
CLASSIFICATION : (DTS) Digital Transmission System
TEST DATE(S) : Sep. 07, 2024 ~ Dec. 06, 2024

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.

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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
FR481203C	Rev. 01	Initial issue of report	Dec. 18, 2024



SUMMARY OF TEST RESULT

Report Section	FCC Rule	Description	Limit	Result	Remark
3.1	15.247(a)(2)	6dB Bandwidth	$\geq 0.5\text{MHz}$	Pass	-
3.1	-	99% Bandwidth	-	Report Only	-
3.2	15.247(b)	Power Output Measurement	$\leq 30\text{dBm}$	Pass	-
3.3	15.247(e)	Power Spectral Density	$\leq 8\text{dBm}/3\text{kHz}$	Pass	-
3.4	15.247(d)	Conducted Band Edges	$\leq 20\text{dBc}$	Pass	-
		Conducted Spurious Emission		Pass	-
3.5	15.247(d)	Radiated Band Edges and Radiated Spurious Emission	15.209(a) & 15.247(d)	Pass	Under limit 0.71 dB at 2483.79 MHz
3.6	15.207	AC Conducted Emission	15.207(a)	Pass	Under limit 6.86 dB at 0.15 MHz
3.7	15.203 & 15.247(b)	Antenna Requirement	15.203 & 15.247(b)	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

Quectel Wireless Solutions Co., Ltd.

Building 5, Shanghai Business Park Phase III (Area B), No.1016 Tianlin Road, Minhang District,
Shanghai 200233, China

1.2 Manufacturer

Quectel Wireless Solutions Co., Ltd.

Building 5, Shanghai Business Park Phase III (Area B), No.1016 Tianlin Road, Minhang District,
Shanghai 200233, China

1.3 Product Feature of Equipment Under Test

Product Feature	
Equipment	Wi-Fi & Bluetooth Module
Brand Name	Quectel
Model Name	FCM962K
FCC ID	XMR2024FCM962K
SN Code	Conducted: E1M24G50D000071 Radiation /Conduction: E1M24G50D000085
HW Version	R1.0
SW Version	NA
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 Channel Frequency Range	2412 MHz ~ 2462 MHz
Maximum (Peak) Output Power to antenna	802.11b : 20.62 dBm (0.1153 W) 802.11g : 24.78 dBm (0.3006 W) 802.11n HT20 : 24.73 dBm (0.2972 W) 802.11n HT40 : 23.76 dBm (0.2377 W) 802.11ax HE20 : 24.82 dBm (0.3034 W) 802.11ax HE40 : 23.27 dBm (0.2123 W)
99% Occupied Bandwidth	802.11b : 13.467MHz 802.11g : 19.141MHz 802.11n HT20 : 19.900MHz 802.11n HT40 : 37.403MHz 802.11ax HE20 : 19.740MHz 802.11ax HE40 : 38.362MHz
Antenna Type / Gain	Dipole Antenna type with gain 0.20 dBi
Type of Modulation	802.11b : DSSS (DBPSK / DQPSK / CCK) 802.11g/n : OFDM (BPSK / QPSK / 16QAM / 64QAM) 802.11ax : OFDM (BPSK / QPSK / 16QAM / 64QAM / 256QAM / 1024QAM)

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 section 3.1~3.4 of 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	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.
	CO02-SZ ; 03CH01-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.	03CH01-SZ	AUDIX	E3	6.2009-8-24
3.	CO02-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 C §15.247
- ♦ FCC KDB 558074 D01 15.247 Meas Guidance v05r02
- ♦ 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)
2400-2483.5 MHz	1	2412	7	2442
	2	2417	8	2447
	3	2422	9	2452
	4	2427	10	2457
	5	2432	11	2462
	6	2437	-	-

2.2 Test Mode

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

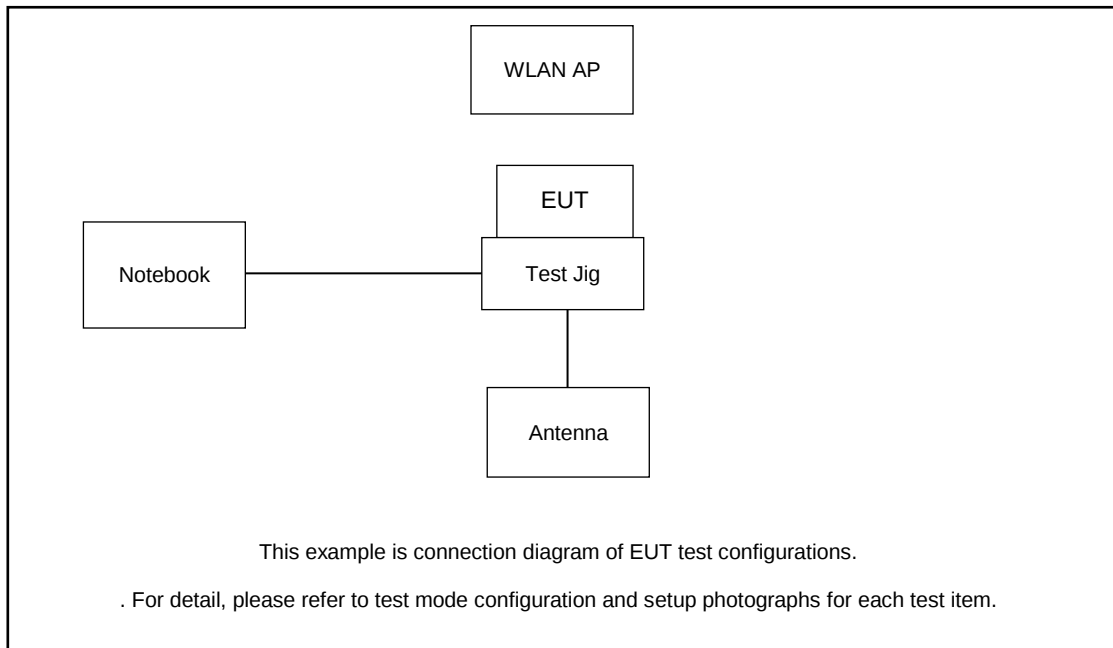
SISO Antenna

Modulation	Data Rate
802.11b	1 Mbps
802.11g	6 Mbps
802.11n HT20	MCS0
802.11n HT40	MCS0
802.11ax HE20	MCS0
802.11ax HE40	MCS0

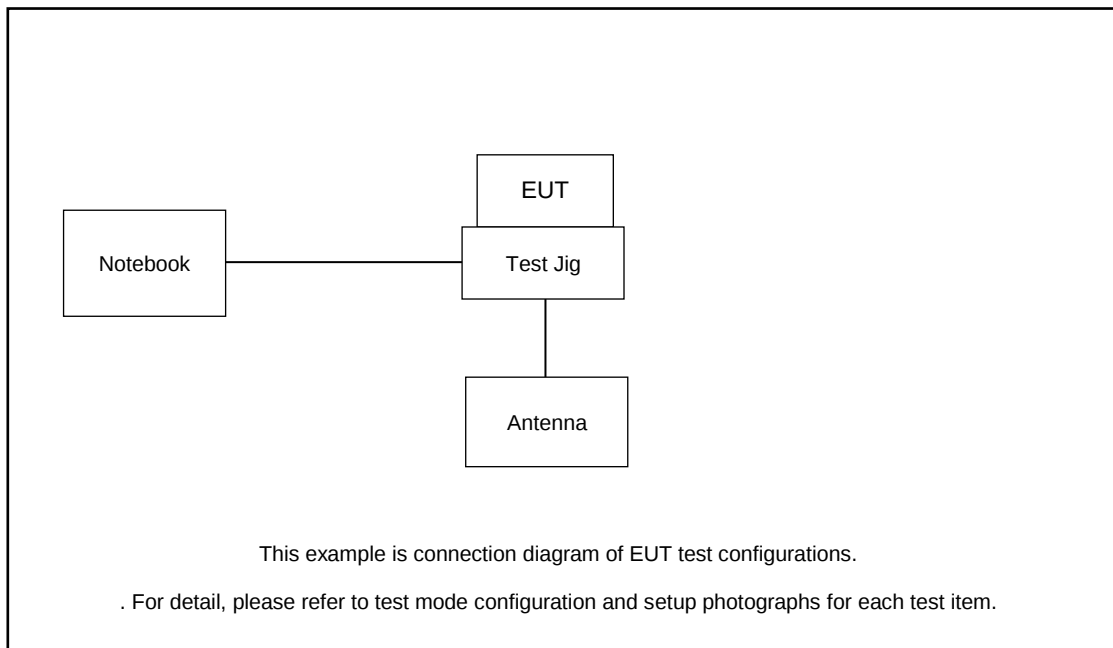
Test Cases	
AC Conducted Emission	Mode 1 :WLAN Link(2.4G) + Charging from NB + Test Jig for sample 1 Mode 2 BT Link + WLAN Link(2.4G) + Charging from NB + Test Jig for sample 2
Remark: 1. The worst case of conducted emission is mode 1; only the test data of it was reported. 2. For Radiated Test Cases, The tests were performance with Notebook	

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.	iPod	Apple	MC525 ZP/A	Fcc DoC	Shielded, 1.0m	N/A
2.	Notebook	Lenovo	E540	FCC DoC	N/A	AC I/P : Unshielded, 1.2m DC O/P : Shielded, 1.8m
3.	Antenna	N/A	N/A	N/A	N/A	N/A
4.	Test Jig	N/A	N/A	N/A	N/A	N/A
5.	WLAN AP	Dlink	DIR-820L	KA2IR820LA1	N/A	Unshielded, 1.8m

2.5 EUT Operation Test Setup

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

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 11.61 dB and 10dB attenuator.

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

= 11.61 + 10 = 21.61 (dB)

3 Test Result

3.1 6dB and 99% Bandwidth Measurement

3.1.1 Limit of 6dB and 99% Bandwidth

The minimum 6 dB bandwidth shall be at least 500 kHz.

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 ANSI C63.10-2013 clause 11.8
2. The RF output of EUT was connected to the spectrum analyzer by RF cable and attenuator. The path loss was compensated to the results for each measurement.
3. Set to the maximum power setting and enable the EUT transmit continuously.
4. Make the measurement with the spectrum analyzer's resolution bandwidth (RBW) = 100 kHz. Set the Video bandwidth (VBW) $\geq 3 \times \text{RBW}$. In order to make an accurate measurement. The 6 dB bandwidth must be greater than 500 kHz.
5. For 99% Bandwidth Measurement, the spectrum analyzer's resolution bandwidth (RBW) = 1%~5% of OBW and set the Video bandwidth (VBW) approximately three times the RBW.
6. Measure and record the results in the test report.

3.1.4 Test Setup



3.1.5 Test Result of 6dB and 99% Occupied Bandwidth

Please refer to Appendix A.

3.2 Output Power Measurement

3.2.1 Limit of Output Power

For systems using digital modulation in the 2400-2483.5MHz, the limit for peak output power is 30dBm. If transmitting antenna with directional gain greater than 6dBi is used, the peak output power from the intentional radiator shall be reduced below the above stated value by the amount in dB that the directional gain of the antenna exceeds 6 dBi. In case of point-to-point operation, the limit has to be reduced by 1dB for every 3dB that the directional gain of the antenna exceeds 6dBi.

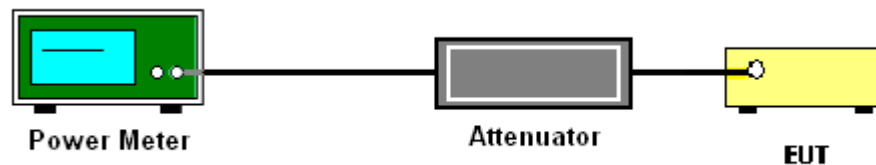
3.2.2 Measuring Instruments

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

3.2.3 Test Procedures

1. The testing follows the Measurement Procedure of ANSI C63.10-2013 clause 11.9.1.3 PKPM1 Peak power meter or ANSI C63.10-2013 clause 11.9.2.3.1 Method AVGPM method.
2. The RF output of EUT was connected to the power meter by RF cable and attenuator. The path loss was compensated to the results for each measurement.
3. Set to the maximum power setting and enable the EUT transmit continuously.
4. Measure the conducted output power and record the results in the test report.

3.2.4 Test Setup





3.2.5 Test Result of Peak Output Power

2.4GHz Band Single Antenna										
Mod.	Data Rate	NTX	CH.	Freq. (MHz)	Peak Conducted Power (dBm)	Conducted Power Limit (dBm)	DG (dBi)	EIRP Power (dBm)	EIRP Power Limit (dBm)	Pass /Fail
					Ant1	Ant1		Ant1	Ant1	
11b	1Mbps	1	1	2412	20.08	30.00	0.20	20.28	36.00	Pass
11b	1Mbps	1	6	2437	20.62	30.00	0.20	20.82	36.00	Pass
11b	1Mbps	1	11	2462	19.55	30.00	0.20	19.75	36.00	Pass
11g	6Mbps	1	1	2412	24.05	30.00	0.20	24.25	36.00	Pass
11g	6Mbps	1	2	2417	24.36	30.00	0.20	24.56	36.00	Pass
11g	6Mbps	1	6	2437	24.78	30.00	0.20	24.98	36.00	Pass
11g	6Mbps	1	10	2457	24.77	30.00	0.20	24.97	36.00	Pass
11g	6Mbps	1	11	2462	24.28	30.00	0.20	24.48	36.00	Pass
HT20	MCS0	1	1	2412	23.18	30.00	0.20	23.38	36.00	Pass
HT20	MCS0	1	2	2417	24.70	30.00	0.20	24.90	36.00	Pass
HT20	MCS0	1	6	2437	24.73	30.00	0.20	24.93	36.00	Pass
HT20	MCS0	1	10	2457	24.26	30.00	0.20	24.46	36.00	Pass
HT20	MCS0	1	11	2462	22.84	30.00	0.20	23.04	36.00	Pass
HT40	MCS0	1	3	2422	23.03	30.00	0.20	23.23	36.00	Pass
HT40	MCS0	1	4	2427	23.31	30.00	0.20	23.51	36.00	Pass
HT40	MCS0	1	6	2437	23.76	30.00	0.20	23.96	36.00	Pass
HT40	MCS0	1	8	2447	22.73	30.00	0.20	22.93	36.00	Pass
HT40	MCS0	1	9	2452	23.32	30.00	0.20	23.52	36.00	Pass



2.4GHz Band Single Antenna											
Mod.	Data Rate	NTX	CH.	Freq. (MHz)	RU Config.	Peak Conducted Power (dBm)	Conducted Power Limit (dBm)	DG (dBi)	EIRP Power (dBm)	EIRP Power Limit (dBm)	Pass /Fail
						Ant1	Ant1	Ant1	Ant1	Ant1	
HE20	MCS0	1	1	2412	Full	23.18	30.00	0.20	23.38	36.00	Pass
HE20	MCS0	1	2	2417	Full	23.91	30.00	0.20	24.11	36.00	Pass
HE20	MCS0	1	6	2437	Full	24.82	30.00	0.20	25.02	36.00	Pass
HE20	MCS0	1	10	2457	Full	23.86	30.00	0.20	24.06	36.00	Pass
HE20	MCS0	1	11	2462	Full	23.23	30.00	0.20	23.43	36.00	Pass
HE40	MCS0	1	3	2422	Full	23.08	30.00	0.20	23.28	36.00	Pass
HE40	MCS0	1	4	2427	Full	22.91	30.00	0.20	23.11	36.00	Pass
HE40	MCS0	1	6	2437	Full	23.27	30.00	0.20	23.47	36.00	Pass
HE40	MCS0	1	8	2447	Full	22.60	30.00	0.20	22.80	36.00	Pass
HE40	MCS0	1	9	2452	Full	22.26	30.00	0.20	22.46	36.00	Pass



3.2.6 Test Result of Average Output Power (Reporting Only)

2.4GHz Band Single Antenna												
Mod.	Data Rate	NTX	CH.	Freq. (MHz)	Duty Factor (dB)	Average Conducted Power with duty factor (dBm)	Conducted Power Limit (dBm)	DG (dBi)	EIRP Power (dBm)	EIRP Power Limit (dBm)	Pass /Fail	Setting
					Ant 1	Ant1	Ant1	Ant1	Ant1	Ant1		Ant 1
11b	1Mbps	1	1	2412	0.07	17.62	30.00	0.20	17.82	36.00	Pass	17.00
11b	1Mbps	1	6	2437	0.07	18.31	30.00	0.20	18.51	36.00	Pass	18.00
11b	1Mbps	1	11	2462	0.07	17.15	30.00	0.20	17.35	36.00	Pass	17.00
11g	6Mbps	1	1	2412	0.11	14.33	30.00	0.20	14.53	36.00	Pass	14.00
11g	6Mbps	1	2	2417	0.11	17.44	30.00	0.20	17.64	36.00	Pass	18.00
11g	6Mbps	1	6	2437	0.11	18.25	30.00	0.20	18.45	36.00	Pass	18.00
11g	6Mbps	1	10	2457	0.11	18.35	30.00	0.20	18.55	36.00	Pass	18.00
11g	6Mbps	1	11	2462	0.11	14.06	30.00	0.20	14.26	36.00	Pass	13.00
HT20	MCS0	1	1	2412	0.03	13.47	30.00	0.20	13.67	36.00	Pass	13.00
HT20	MCS0	1	2	2417	0.03	18.06	30.00	0.20	18.26	36.00	Pass	18.00
HT20	MCS0	1	6	2437	0.03	18.04	30.00	0.20	18.24	36.00	Pass	18.00
HT20	MCS0	1	10	2457	0.03	17.49	30.00	0.20	17.69	36.00	Pass	17.00
HT20	MCS0	1	11	2462	0.03	13.06	30.00	0.20	13.26	36.00	Pass	12.00
HT40	MCS0	1	3	2422	0.03	12.45	30.00	0.20	12.65	36.00	Pass	12.00
HT40	MCS0	1	4	2427	0.03	14.70	30.00	0.20	14.90	36.00	Pass	15.00
HT40	MCS0	1	6	2437	0.03	16.10	30.00	0.20	16.30	36.00	Pass	16.00
HT40	MCS0	1	8	2447	0.03	14.02	30.00	0.20	14.22	36.00	Pass	14.00
HT40	MCS0	1	9	2452	0.03	11.88	30.00	0.20	12.08	36.00	Pass	12.00



2.4GHz Band Single Antenna													
Mod.	Data Rate	NTX	CH.	Freq. (MHz)	RU Config.	Duty Factor (dB)	Average Conducted Power with duty factor (dBm)	Conducted Power Limit (dBm)	DG (dBi)	EIRP Power (dBm)	EIRP Power Limit (dBm)	Pass /Fail	Setting
						Ant1	Ant1	Ant1	Ant1	Ant1	Ant1		Ant 1
HE20	MCS0	1	1	2412	Full	0.04	12.92	30.00	0.20	13.12	36.00	Pass	12.00
HE20	MCS0	1	2	2417	Full	0.04	16.77	30.00	0.20	16.97	36.00	Pass	17.00
HE20	MCS0	1	6	2437	Full	0.04	18.11	30.00	0.20	18.31	36.00	Pass	18.00
HE20	MCS0	1	10	2457	Full	0.04	16.27	30.00	0.20	16.47	36.00	Pass	16.00
HE20	MCS0	1	11	2462	Full	0.04	13.09	30.00	0.20	13.29	36.00	Pass	12.00
HE40	MCS0	1	3	2422	Full	0.06	12.51	30.00	0.20	12.71	36.00	Pass	12.00
HE40	MCS0	1	4	2427	Full	0.06	13.85	30.00	0.20	14.05	36.00	Pass	14.00
HE40	MCS0	1	6	2437	Full	0.06	15.05	30.00	0.20	15.25	36.00	Pass	15.00
HE40	MCS0	1	8	2447	Full	0.06	13.08	30.00	0.20	13.28	36.00	Pass	13.00
HE40	MCS0	1	9	2452	Full	0.06	12.43	30.00	0.20	12.63	36.00	Pass	12.00

3.3 Power Spectral Density Measurement

3.3.1 Limit of Power Spectral Density

The peak power spectral density shall not be greater than 8dBm in any 3kHz band at any time interval of continuous transmission.

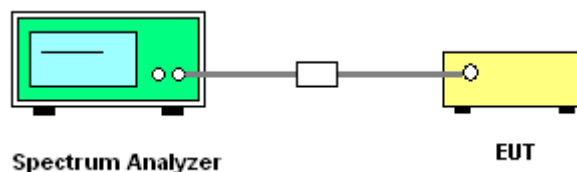
3.3.2 Measuring Instruments

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

3.3.3 Test Procedures

1. The testing follows Measurement Procedure of ANSI C63.10-2013 clause 11.10.2 Method PKPSD.
2. The RF output of EUT was connected to the spectrum analyzer by RF cable and attenuator. The path loss was compensated to the results for each measurement.
3. Set to the maximum power setting and enable the EUT transmit continuously.
4. Make the measurement with the spectrum analyzer's resolution bandwidth (RBW) = 3 kHz. Video bandwidth VBW = 10 kHz In order to make an accurate measurement, set the span to 1.5 times DTS Channel Bandwidth. (6dB BW)
5. Detector = peak, Sweep time = auto couple, Trace mode = max hold, Allow trace to fully stabilize. Use the peak marker function to determine the maximum power level.
6. Measure and record the results in the test report.

3.3.4 Test Setup



3.3.5 Test Result of Power Spectral Density

Please refer to Appendix A.

3.4 Conducted Band Edges and Spurious Emission Measurement

3.4.1 Limit of Conducted Band Edges and Spurious Emission Measurement

In any 100 kHz bandwidth outside of the authorized frequency band, the emissions which fall in the non-restricted bands shall be attenuated at least 20 dB / 30dB relative to the maximum PSD level in 100 kHz by RF conducted measurement.

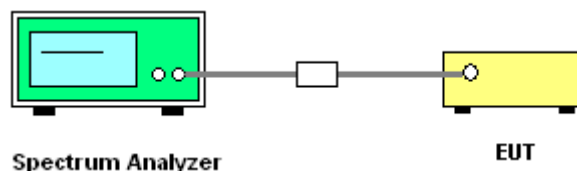
3.4.2 Measuring Instruments

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

3.4.3 Test Procedures

1. The testing follows ANSI C63.10-2013 clause 11.11
2. The RF output of EUT was connected to the spectrum analyzer by RF cable and attenuator. The path loss was compensated to the results for each measurement.
3. Set to the maximum power setting and enable the EUT transmit continuously.
4. Set RBW = 100 kHz, VBW=300 kHz, Peak Detector. Unwanted Emissions measured in any 100 kHz bandwidth outside of the authorized frequency band shall be attenuated by at least 20 dB relative to the maximum in-band peak PSD level in 100 kHz when maximum peak conducted output power procedure is used. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, the attenuation required under this paragraph shall be 30 dB instead of 20 dB per 15.247(d).
5. Measure and record the results in the test report.
6. The RF fundamental frequency should be excluded against the limit line in the operating frequency band.

3.4.4 Test Setup



3.4.5 Test Result of Conducted Band Edges and Spurious Emission

Please refer to Appendix A.



3.5 Radiated Band Edges and Spurious Emission Measurement

3.5.1 Limit of Radiated band edge and Spurious Emission Measurement

In any 100 kHz bandwidth outside the intentional radiator frequency band, all harmonics/spurious must be at least 20 dB below the highest emission level within the authorized band. If the output power of this device was measured by spectrum analyzer, the attenuation under this paragraph shall be 30 dB instead of 20 dB. In addition, radiated emissions which fall in the restricted bands must also comply with the limits as below.

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

3.5.2 Measuring Instruments

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

3.5.3 Test Procedures

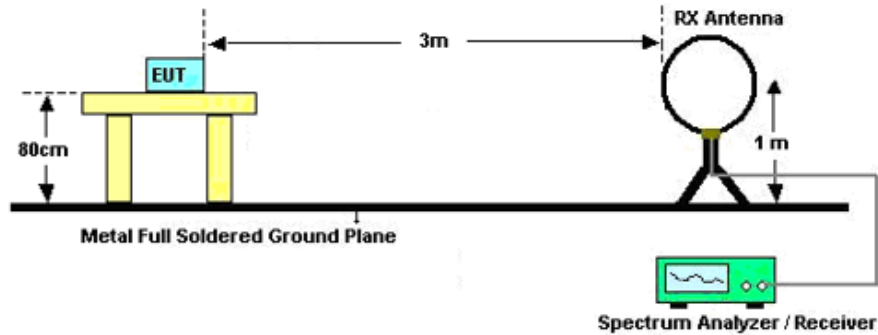
1. The testing follows ANSI C63.10-2013 clause 11.11 & 11.12
2. The EUT was arranged to its worst case and then tune the antenna tower (from 1 m to 4 m) and turntable (from 0 degree to 360 degrees) to find the maximum reading. A pre-amp and a high pass filter are used for the test in order to get better signal level.
3. 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.
4. The EUT was set 3 meters from the interference receiving antenna, which was mounted on the top of a variable height antenna tower.
5. Corrected Reading: Antenna Factor + Cable Loss + Read Level - Preamp Factor = Level
6. For testing below 1GHz, if the emission level of the EUT in peak mode was 3 dB lower than the limit specified, then peak values of EUT will be reported, otherwise, the emissions will be repeated one by one using the CISPR quasi-peak method and reported.
7. For testing above 1GHz, the emission level of the EUT in peak mode was 20dB lower than peak limit (that means the emission level in average mode also complies with the limit in average mode), then peak values of EUT will be reported, otherwise, the emissions will be measured in average mode again and reported.
8. Use the following spectrum analyzer settings:
 - (1) Span shall wide enough to fully capture the emission being measured;
 - (2) Set RBW=100 kHz for $f < 1$ GHz; VBW $\geq$ RBW; Sweep = auto; Detector function = peak; Trace = max hold;
 - (3) Set RBW = 1 MHz, VBW= 3MHz for $f \geq 1$ GHz for peak measurement.

For average measurement:

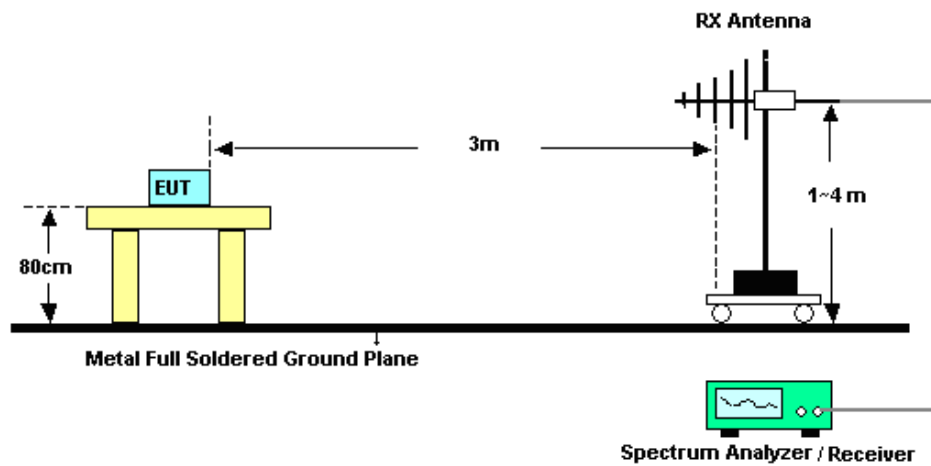
 - VBW = 10 Hz, when duty cycle is no less than 98 percent.
 - VBW $\geq 1/T$, when duty cycle is less than 98 percent where T is the minimum transmission duration over which the transmitter is on and is transmitting at its maximum power control level for the tested mode of operation.

3.5.4 Test Setup

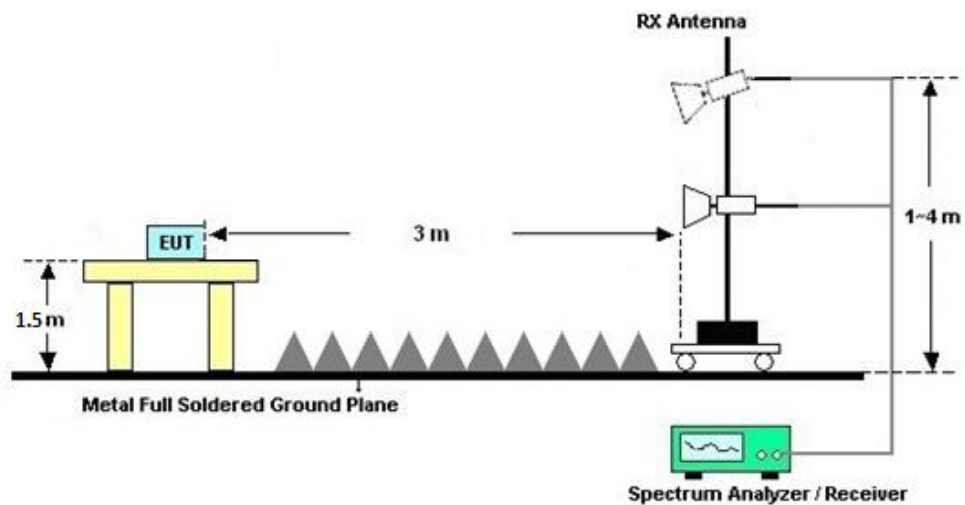
For radiated emissions below 30MHz



For radiated emissions from 30MHz to 1GHz



For radiated emissions above 1GHz



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

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.

3.5.6 Test Result of Radiated Spurious at Band Edges

Please refer to Appendix C.

3.5.7 Duty Cycle

Please refer to Appendix D.

3.5.8 Test Result of Radiated Spurious Emission (30MHz ~ 10th Harmonic or 40GHz, whichever is lower)

Please refer to Appendix C.



3.6 AC Conducted Emission Measurement

3.6.1 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.

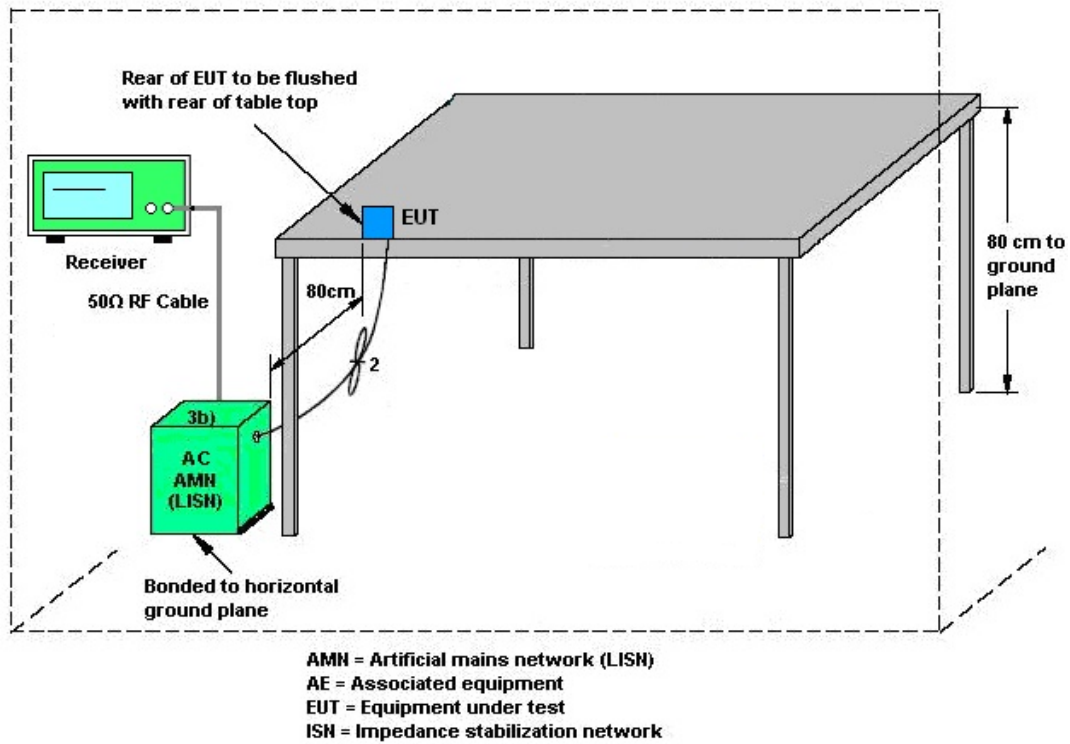
3.6.2 Measuring Instruments

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

3.6.3 Test Procedures

1. The EUT was placed 0.4 meter from the conducting wall of the shielding room, and it 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 (IF bandwidth = 9kHz) with Maximum Hold Mode.

3.6.4 Test Setup



3.6.5 Test Result of AC Conducted Emission

Please refer to Appendix B.



3.7 Antenna Requirements

3.7.1 Standard Applicable

If directional gain of transmitting Antennas is greater than 6dBi, the power shall be reduced by the same level in dB comparing to gain minus 6dBi. The use of a permanently attached Antenna or of an Antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the rule.

3.7.2 Antenna Anti-Replacement Construction

An embedded-in antenna design is used.

3.7.3 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	Dec. 05, 2024~ Dec. 06, 2024	Oct. 09, 2025	Conducted (TH01-KS)
Pulse Power Sensor	Anritsu	MA2411B	0917070	300MHz~40GHz	Jan. 02, 2024	Dec. 05, 2024~ Dec. 06, 2024	Jan. 01, 2025	Conducted (TH01-KS)
Power Meter	Anritsu	ML2495A	1005002	50MHz Bandwidth	Jan. 02, 2024	Dec. 05, 2024~ Dec. 06, 2024	Jan. 01, 2025	Conducted (TH01-KS)
EMI Test Receiver&SA	Agilent	N9038A	MY52260185	20Hz~26.5GHz	Dec. 27, 2023	Sep. 07, 2024~ Nov. 29, 2024	Dec. 26, 2024	Radiation (03CH01-SZ)
EXA Spectrum Analyzer	KEYSIGHT	N9010A	MY55150213	10Hz~44GHz	Jul. 03, 2024	Sep. 07, 2024~ Nov. 29, 2024	Jul. 02, 2025	Radiation (03CH01-SZ)
Loop Antenna	R&S	HFH2-Z2E	101141	9kHz~30MHz	Dec. 29, 2023	Sep. 07, 2024~ Nov. 29, 2024	Dec. 28, 2024	Radiation (03CH01-SZ)
Bilog Antenna	TeseQ	CBL6112D	35407	30MHz~2GHz	Oct. 24, 2023	Sep. 07, 2024~ Nov. 29, 2024	Oct. 23, 2025	Radiation (03CH01-SZ)
Double Ridge Horn Antenna	ETS-Lindgren	3117	00119436	1GHz~18GHz	Jul. 04, 2024	Sep. 07, 2024~ Nov. 29, 2024	Jul. 03, 2025	Radiation (03CH01-SZ)
SHF-EHF Horn	com-power	AH-840	101071	18GHz~40GHz	Apr. 09, 2024	Sep. 07, 2024~ Nov. 29, 2024	Apr. 08, 2025	Radiation (03CH01-SZ)
LF Amplifier	Burgeon	BPA-530	102209	0.01~3000Mhz	Apr. 09, 2024	Sep. 07, 2024~ Nov. 29, 2024	Apr. 08, 2025	Radiation (03CH01-SZ)
HF Amplifier	MITEQ	AMF-7D-0010 1800-30-10P-R	1943528	1GHz~18GHz	Apr. 09, 2024	Sep. 07, 2024~ Nov. 29, 2024	Apr. 08, 2025	Radiation (03CH01-SZ)
HF Amplifier	KEYSIGHT	83017A	MY53270105	0.5GHz~26.5GHz	Apr. 09, 2024	Sep. 07, 2024~ Nov. 29, 2024	Apr. 08, 2025	Radiation (03CH01-SZ)
HF Amplifier	MITEQ	TTA1840-35-HG	1871923	18GHz~40GHz	Jul. 03, 2024	Sep. 07, 2024~ Nov. 29, 2024	Jul. 02, 2025	Radiation (03CH01-SZ)
AC Power Source	Chroma	61601	616010001985	N/A	Jul. 04, 2024	Sep. 07, 2024~ Nov. 29, 2024	Jul. 03, 2025	Radiation (03CH01-SZ)
Turn Table	EM	EM1000	N/A	0~360 degree	NCR	Sep. 07, 2024~ Nov. 29, 2024	NCR	Radiation (03CH01-SZ)
Antenna Mast	EM	EM1000	N/A	1 m~4 m	NCR	Sep. 07, 2024~ Nov. 29, 2024	NCR	Radiation (03CH01-SZ)
EMI Receiver	R&S	ESR7	102297	9kHz~7GHz;	Jul. 03, 2024	Oct. 19, 2024	Jul. 02, 2025	Conduction (CO02-SZ)
AC LISN	R&S	ENV216	101499	9kHz~30MHz	Jul. 03, 2024	Oct. 19, 2024	Jul. 02, 2025	Conduction (CO02-SZ)
AC Power Source	CHROMA	61601	616010002470	100Vac~250Vac	Dec. 25, 2022	Oct. 19, 2024	Dec. 24, 2024	Conduction (CO02-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

Conducted Spurious Emission & Bandedge	±2.26 dB
Occupied Channel Bandwidth	±0.1%
Conducted Power	±0.50 dB
Conducted Power Spectral Density	±0.90 dB
Frequency	±0.04 Hz

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

Measuring Uncertainty for a Level of Confidence of 95% (U = 2Uc(y))	2.5 dB
---	--------

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

Measuring Uncertainty for a Level of Confidence of 95% (U = 2Uc(y))	2.8 dB
---	--------

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

Measuring Uncertainty for a Level of Confidence of 95% (U = 2Uc(y))	4.2 dB
---	--------

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

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

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

Measuring Uncertainty for a Level of Confidence of 95% (U = 2Uc(y))	4.3 dB
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----- THE END -----



Appendix A. Conducted Test Results



Ambient Condition: 25 °C, 45 %RH

Test Date: 2024.12.5~2024.12.6

Test Engineer: Jiang Jun

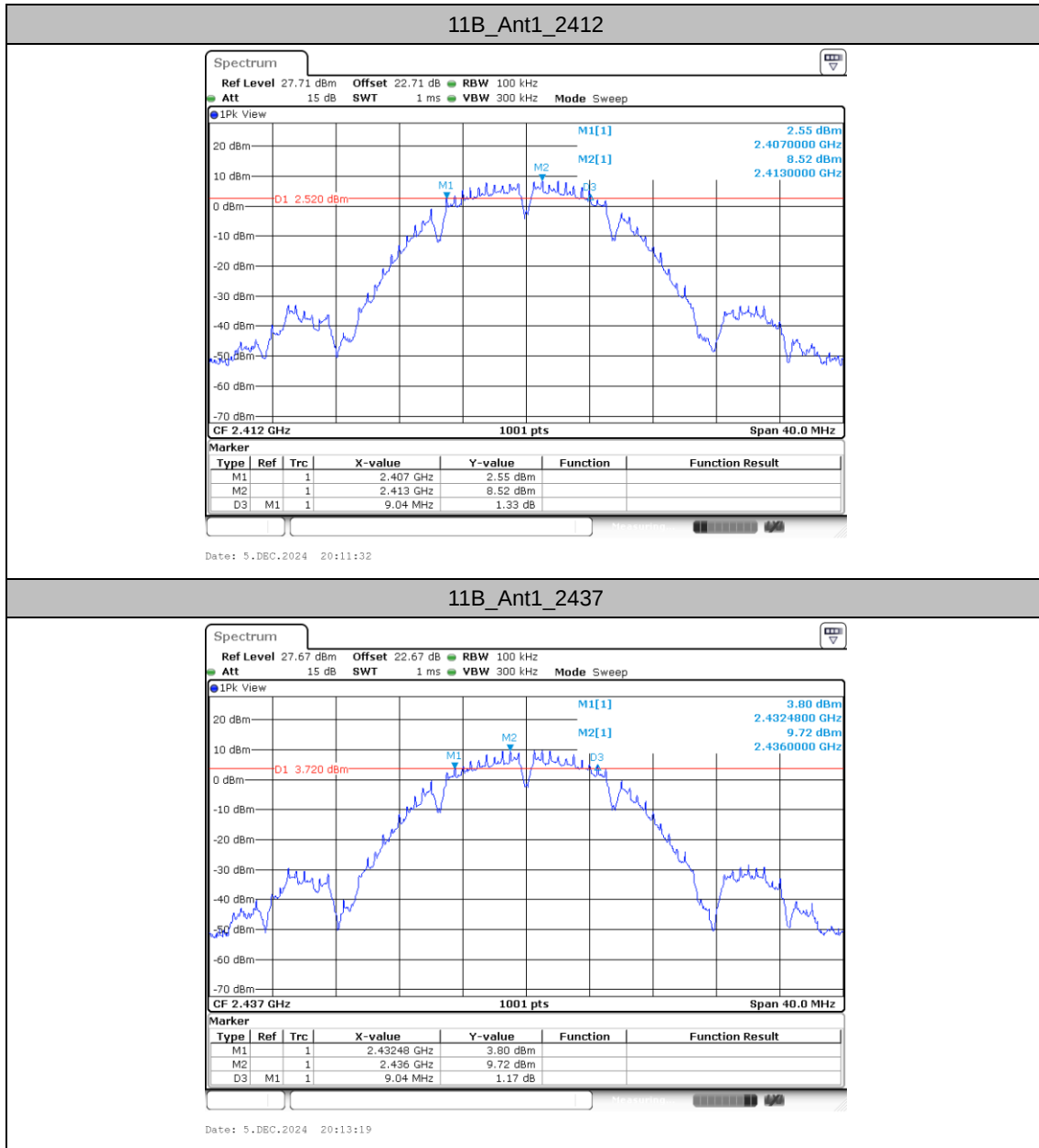
DTS Bandwidth

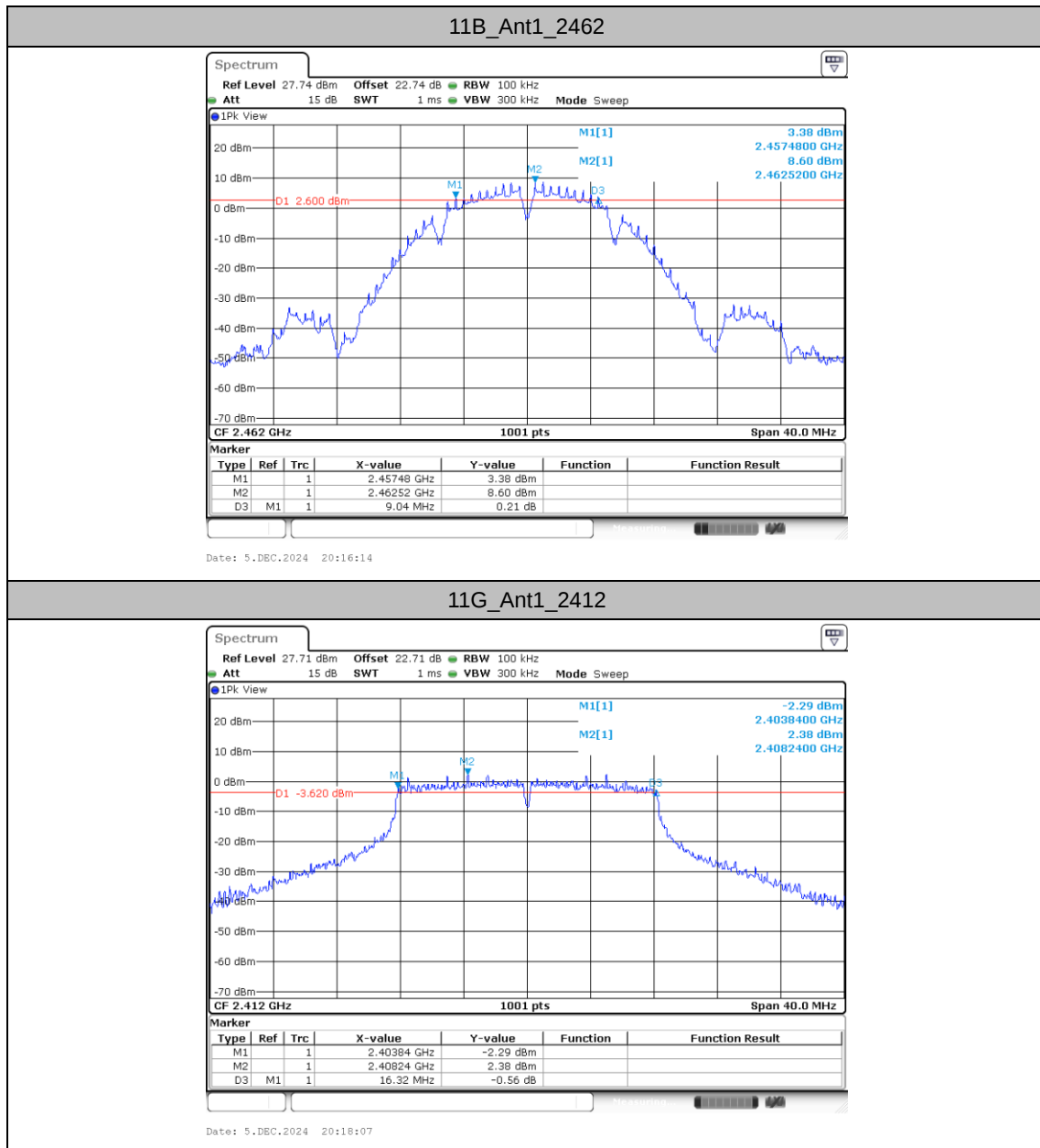
Test Result

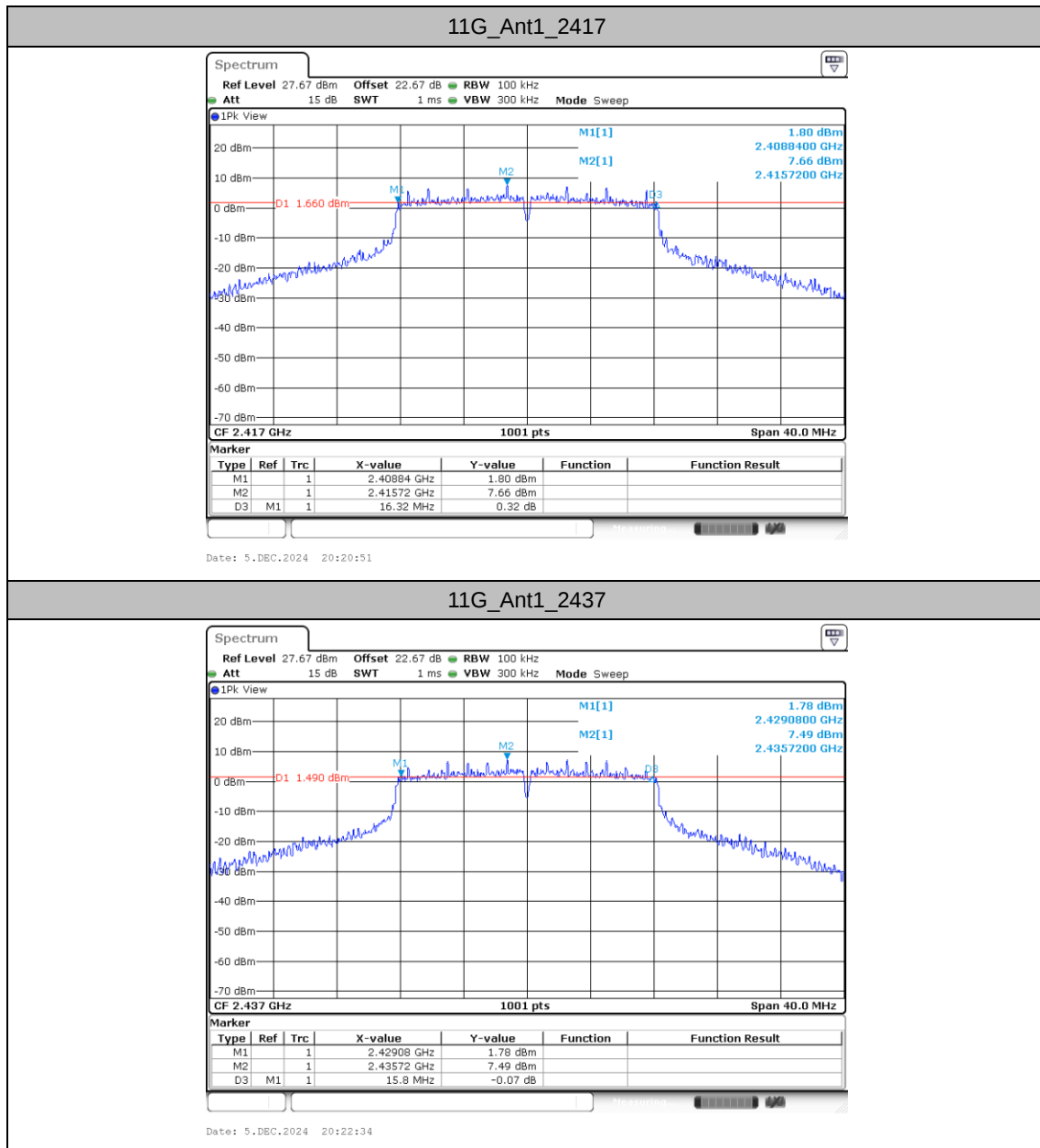
TestMode	Antenna	Freq(MHz)	DTS BW [MHz]	FL[MHz]	FH[MHz]	Limit[MHz]	Verdict
11B	Ant1	2412	9.04	2407.00	2416.04	0.5	PASS
		2437	9.04	2432.48	2441.52	0.5	PASS
		2462	9.04	2457.48	2466.52	0.5	PASS
11G	Ant1	2412	16.32	2403.84	2420.16	0.5	PASS
		2417	16.32	2408.84	2425.16	0.5	PASS
		2437	15.80	2429.08	2444.88	0.5	PASS
		2457	16.04	2448.84	2464.88	0.5	PASS
		2462	16.32	2453.84	2470.16	0.5	PASS
11N20SISO	Ant1	2412	17.52	2403.24	2420.76	0.5	PASS
		2417	16.92	2408.24	2425.16	0.5	PASS
		2437	17.28	2428.24	2445.52	0.5	PASS
		2457	17.56	2448.20	2465.76	0.5	PASS
		2462	17.12	2453.24	2470.36	0.5	PASS
11N40SISO	Ant1	2422	35.52	2404.08	2439.60	0.5	PASS
		2427	35.84	2409.08	2444.92	0.5	PASS
		2437	35.52	2419.08	2454.60	0.5	PASS
		2447	35.12	2429.48	2464.60	0.5	PASS
		2452	35.12	2434.48	2469.60	0.5	PASS
11AX20SISO	Ant1	2412	18.52	2402.56	2421.08	0.5	PASS
		2417	17.72	2408.16	2425.88	0.5	PASS
		2437	18.76	2427.60	2446.36	0.5	PASS
		2457	18.68	2447.68	2466.36	0.5	PASS
		2462	18.84	2452.64	2471.48	0.5	PASS
11AX40SISO	Ant1	2422	37.36	2403.20	2440.56	0.5	PASS
		2427	37.28	2408.36	2445.64	0.5	PASS
		2437	37.04	2418.20	2455.24	0.5	PASS
		2447	37.28	2428.20	2465.48	0.5	PASS
		2452	37.68	2433.04	2470.72	0.5	PASS

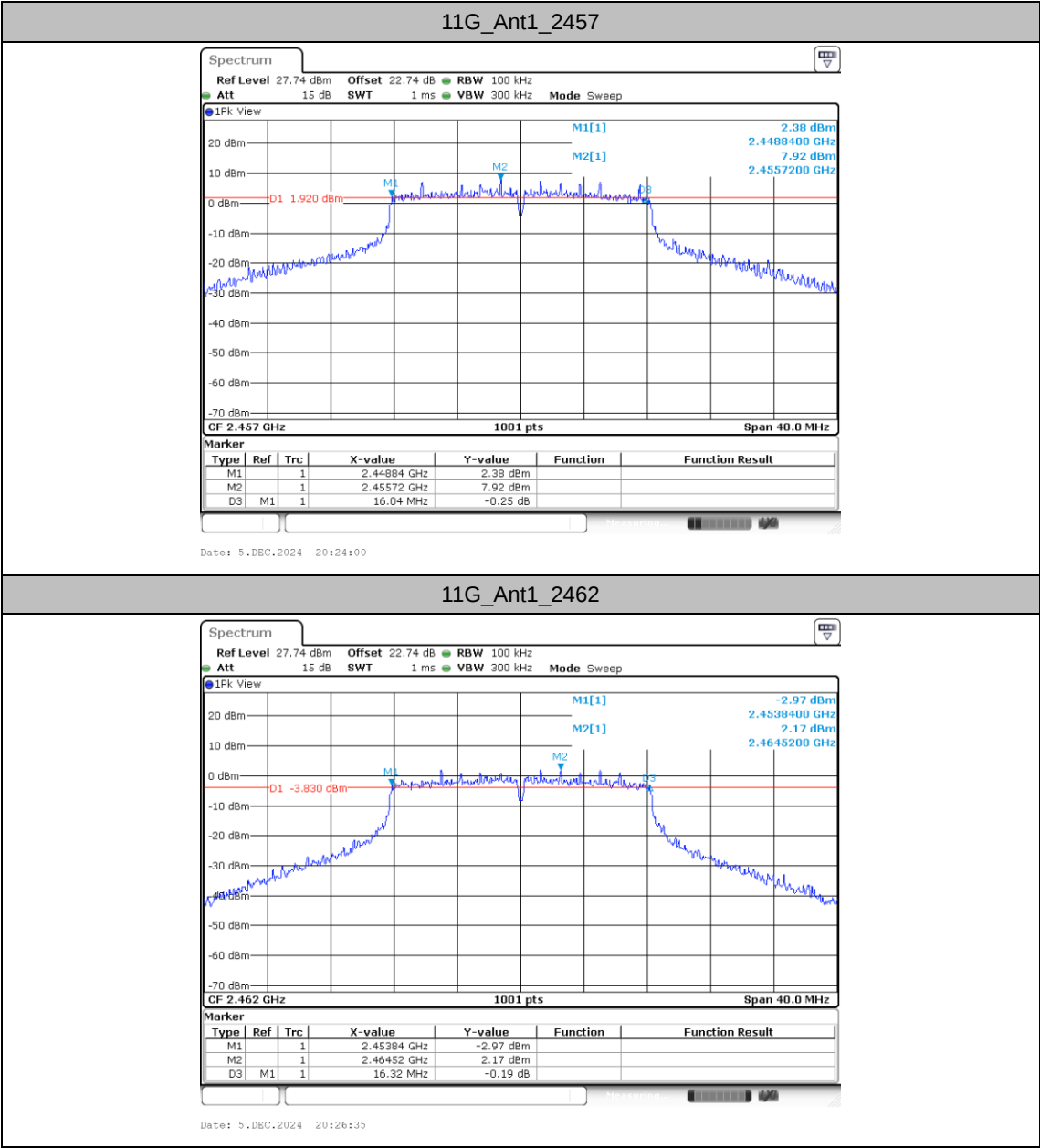


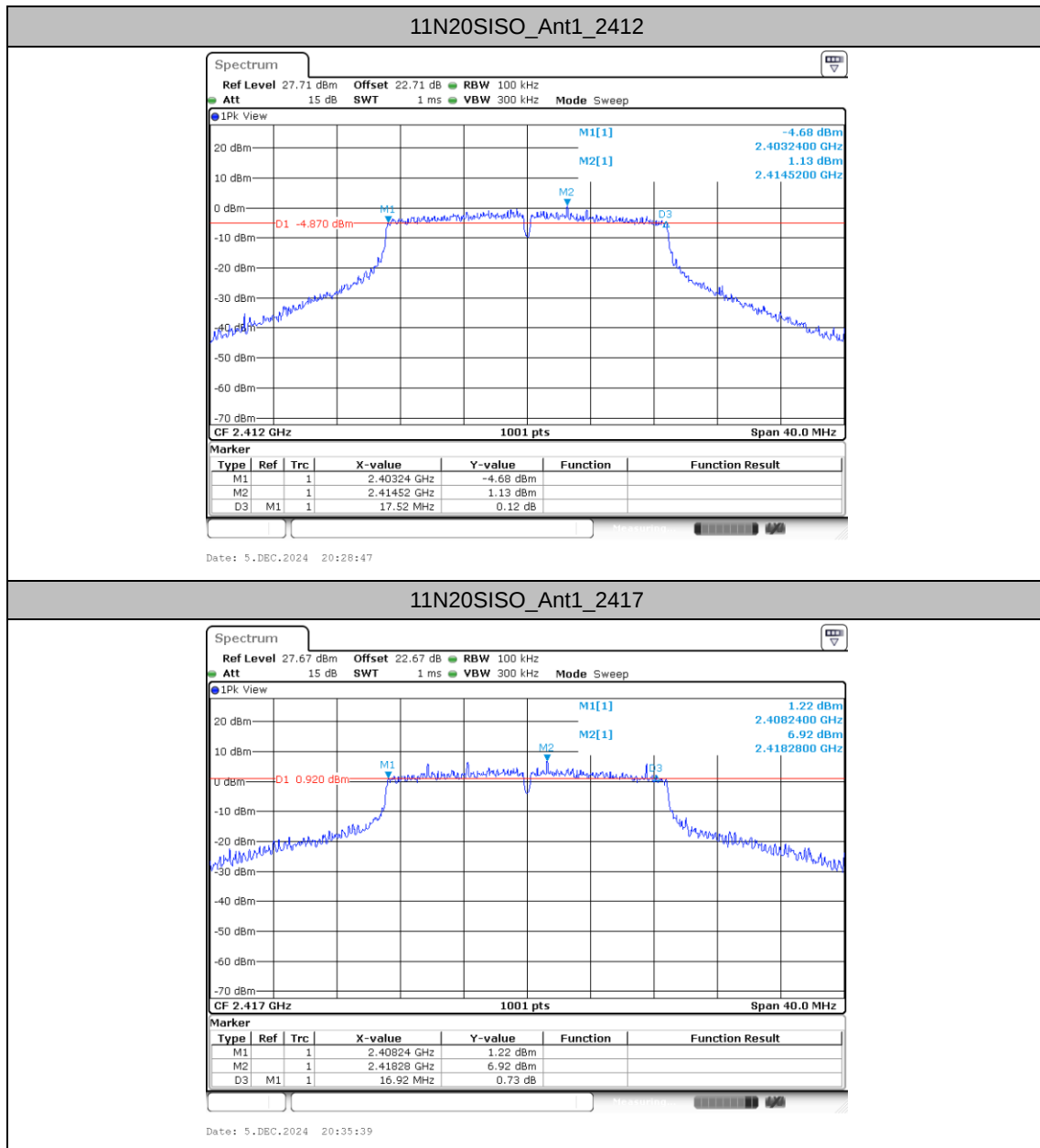
Test Graphs

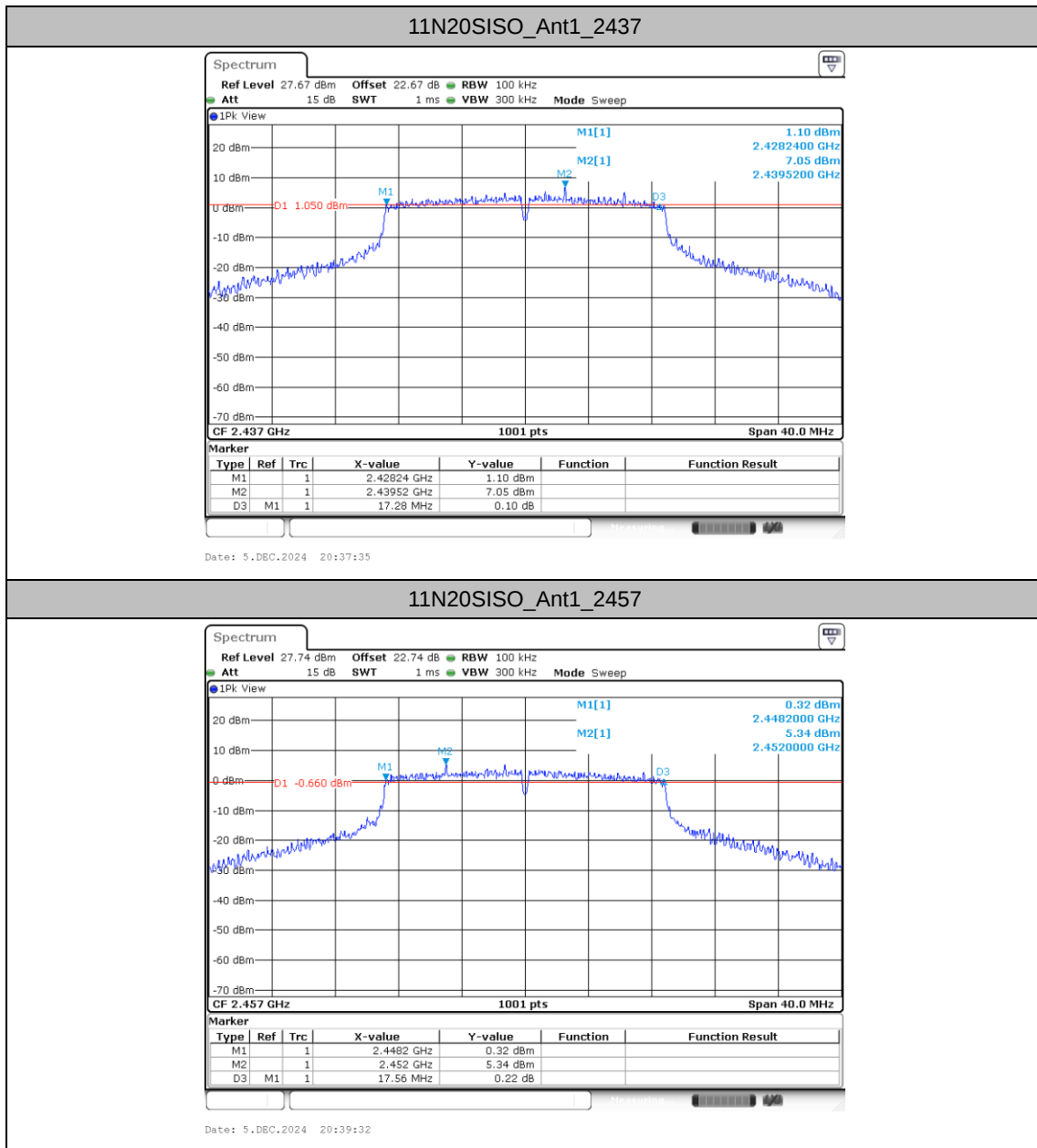


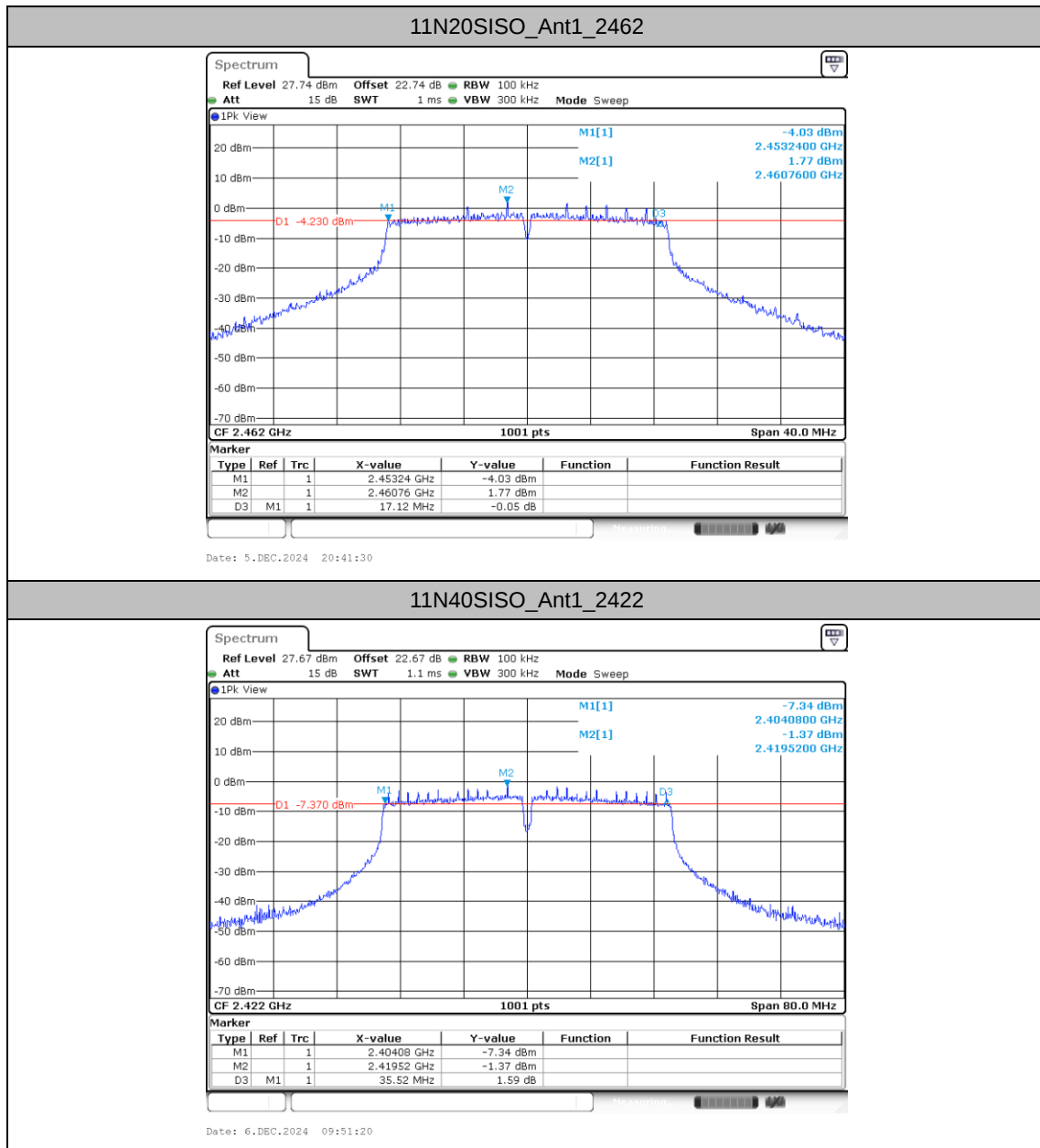


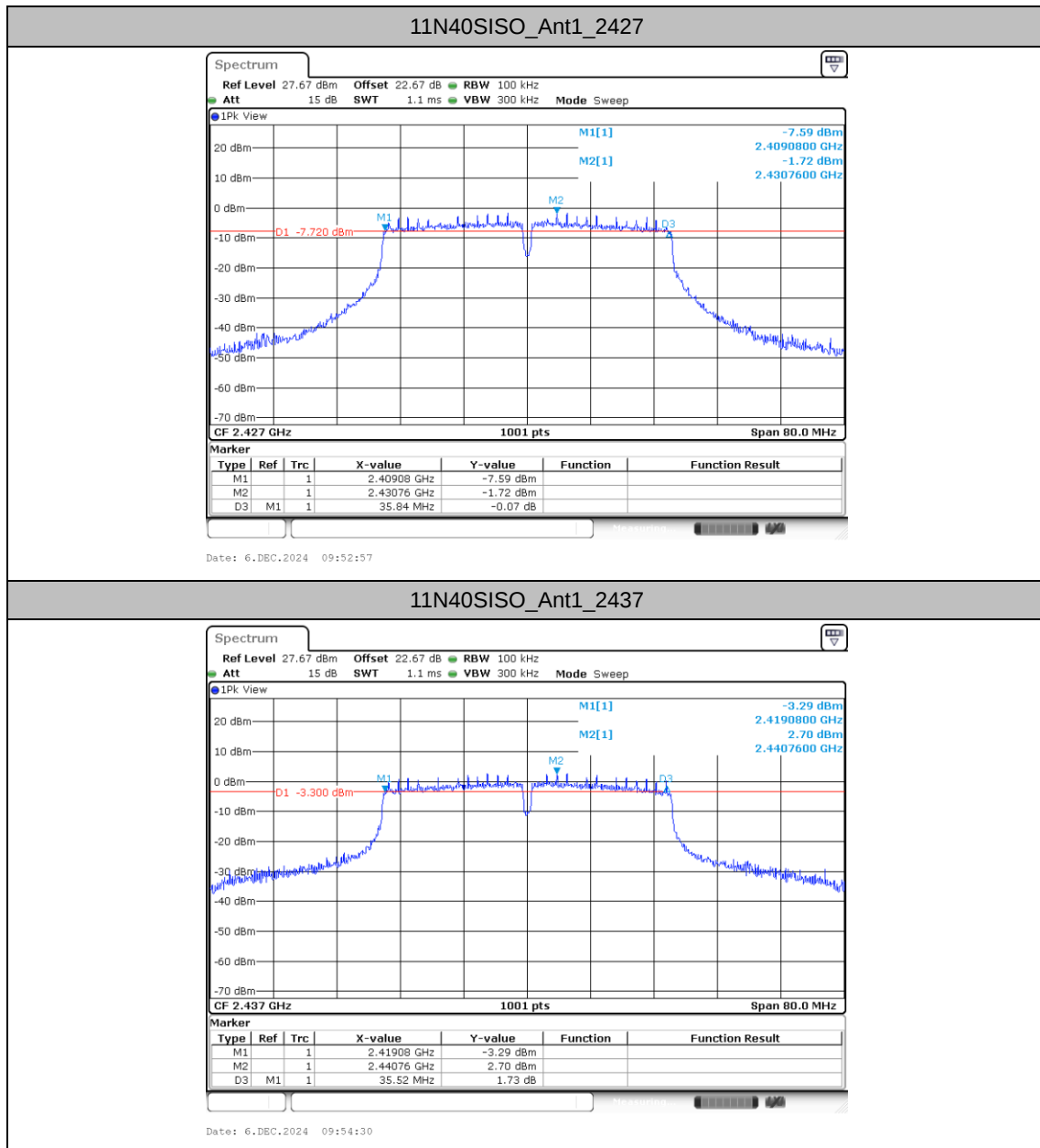


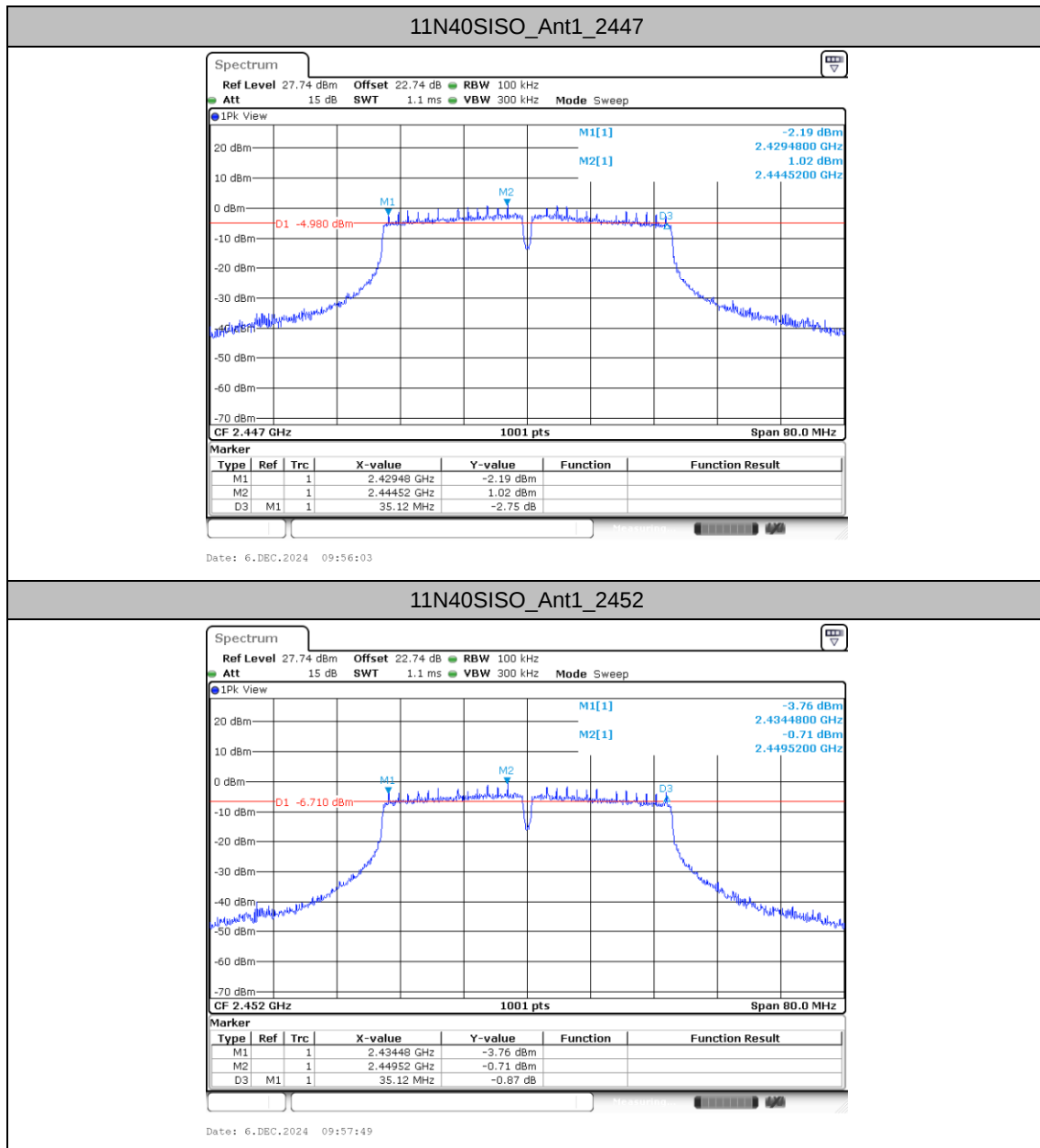


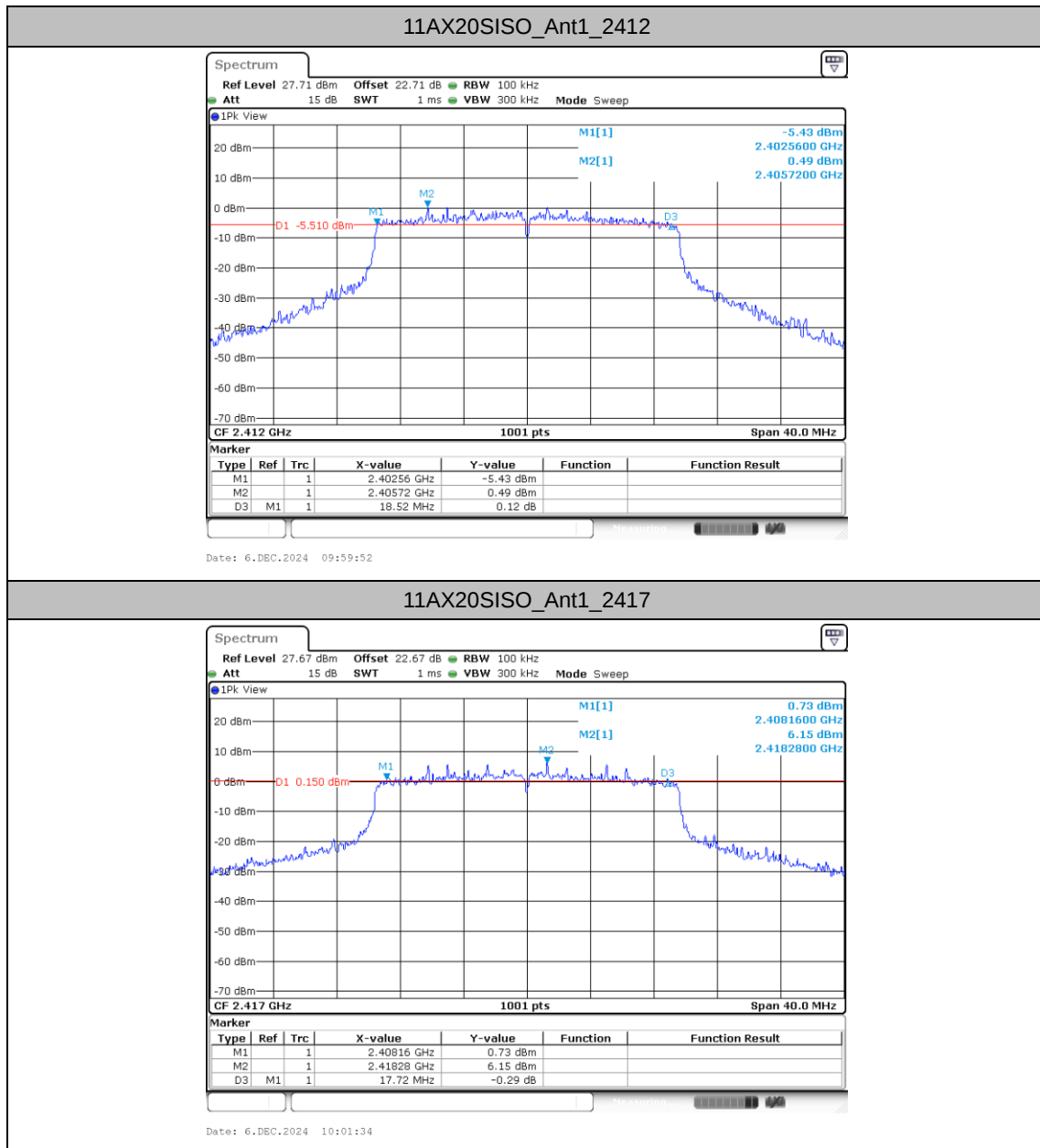


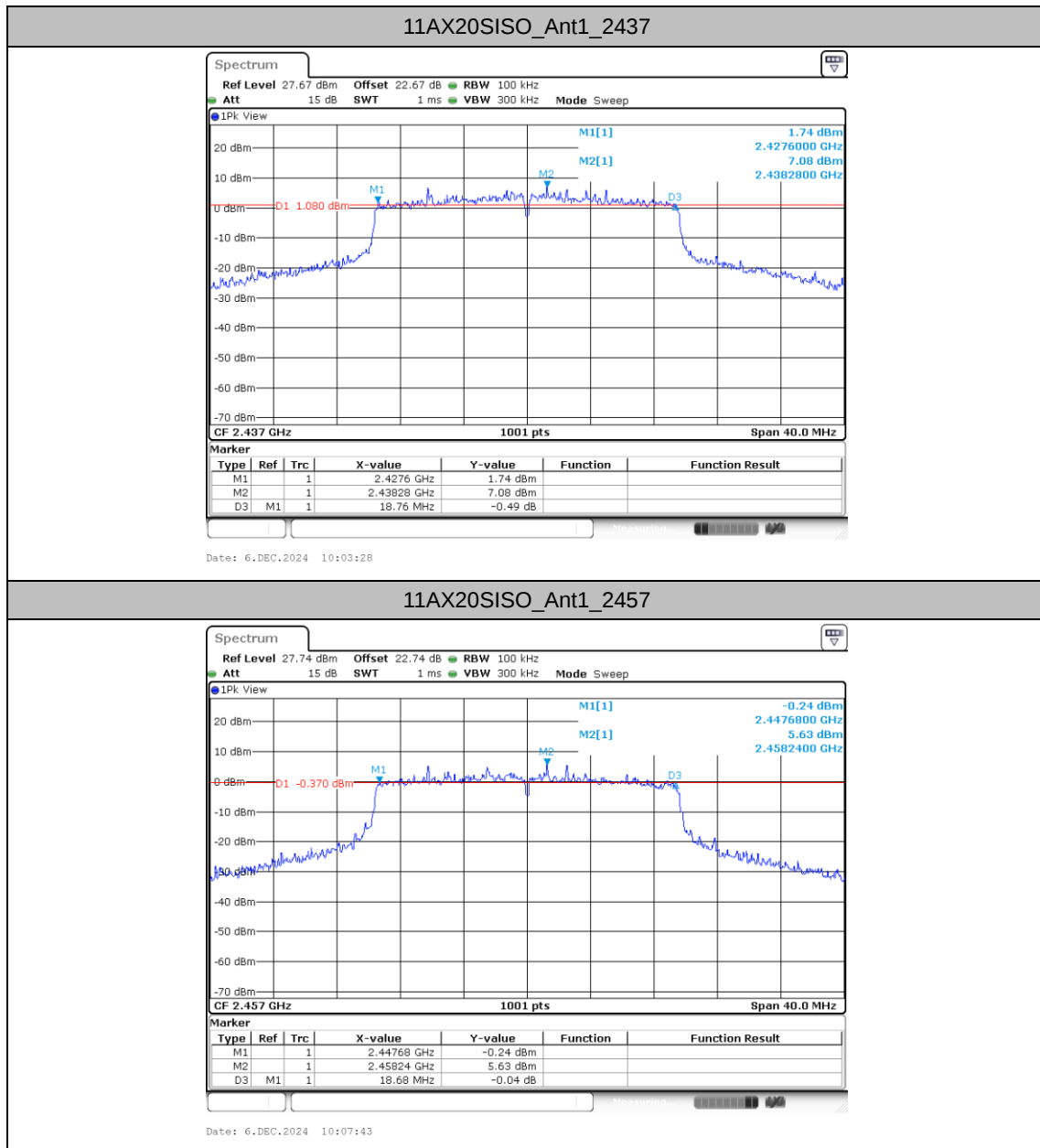


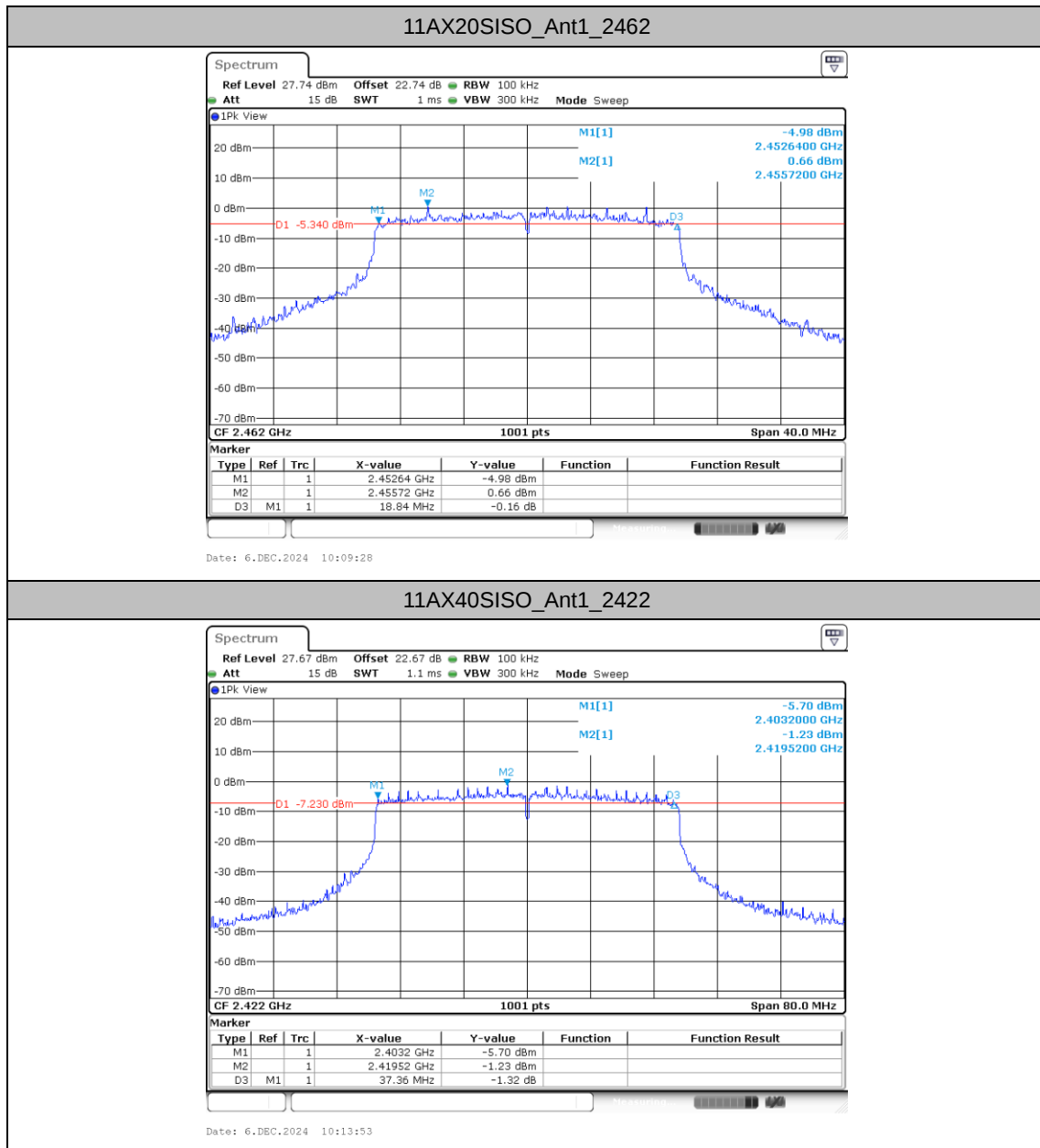






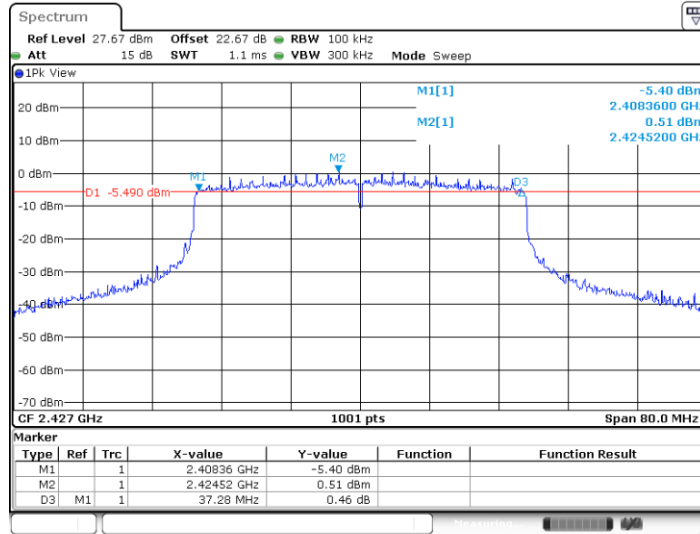






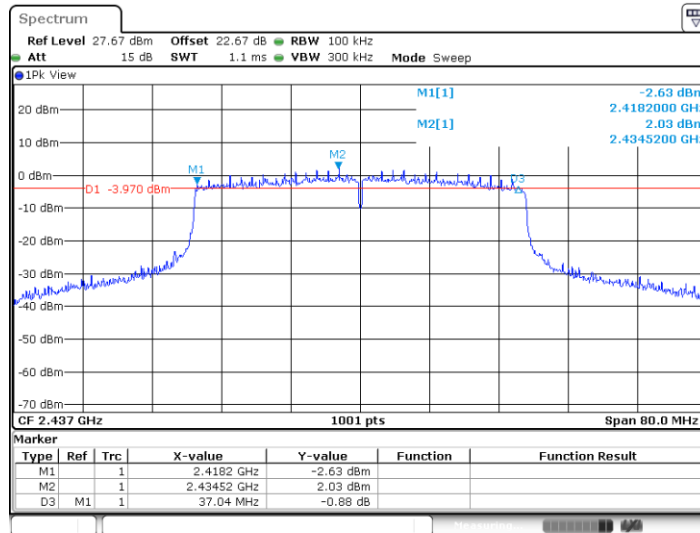


11AX40SISO_Ant1_2427

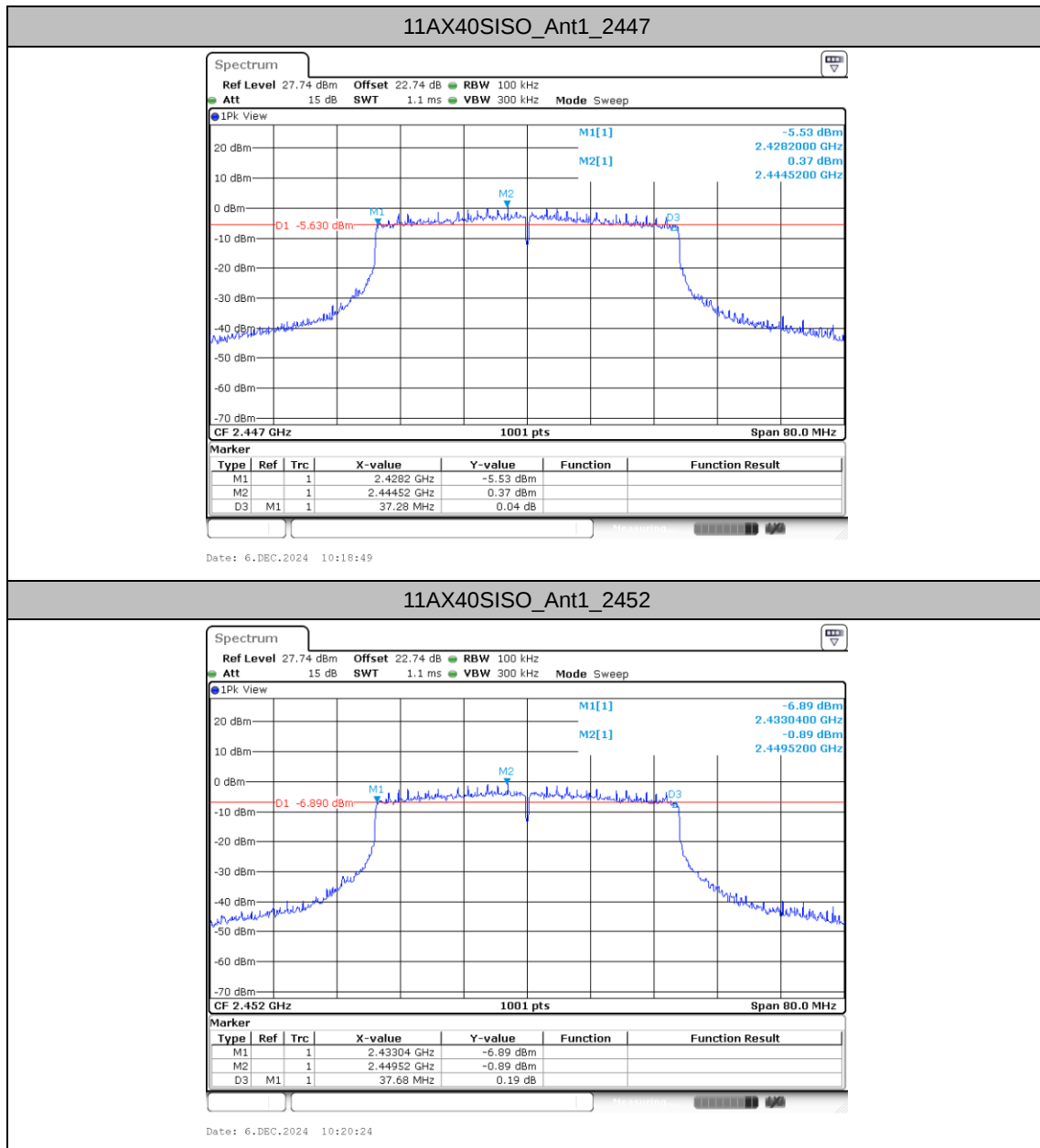


Date: 6.DEC.2024 10:15:35

11AX40SISO_Ant1_2437



Date: 6.DEC.2024 10:17:25





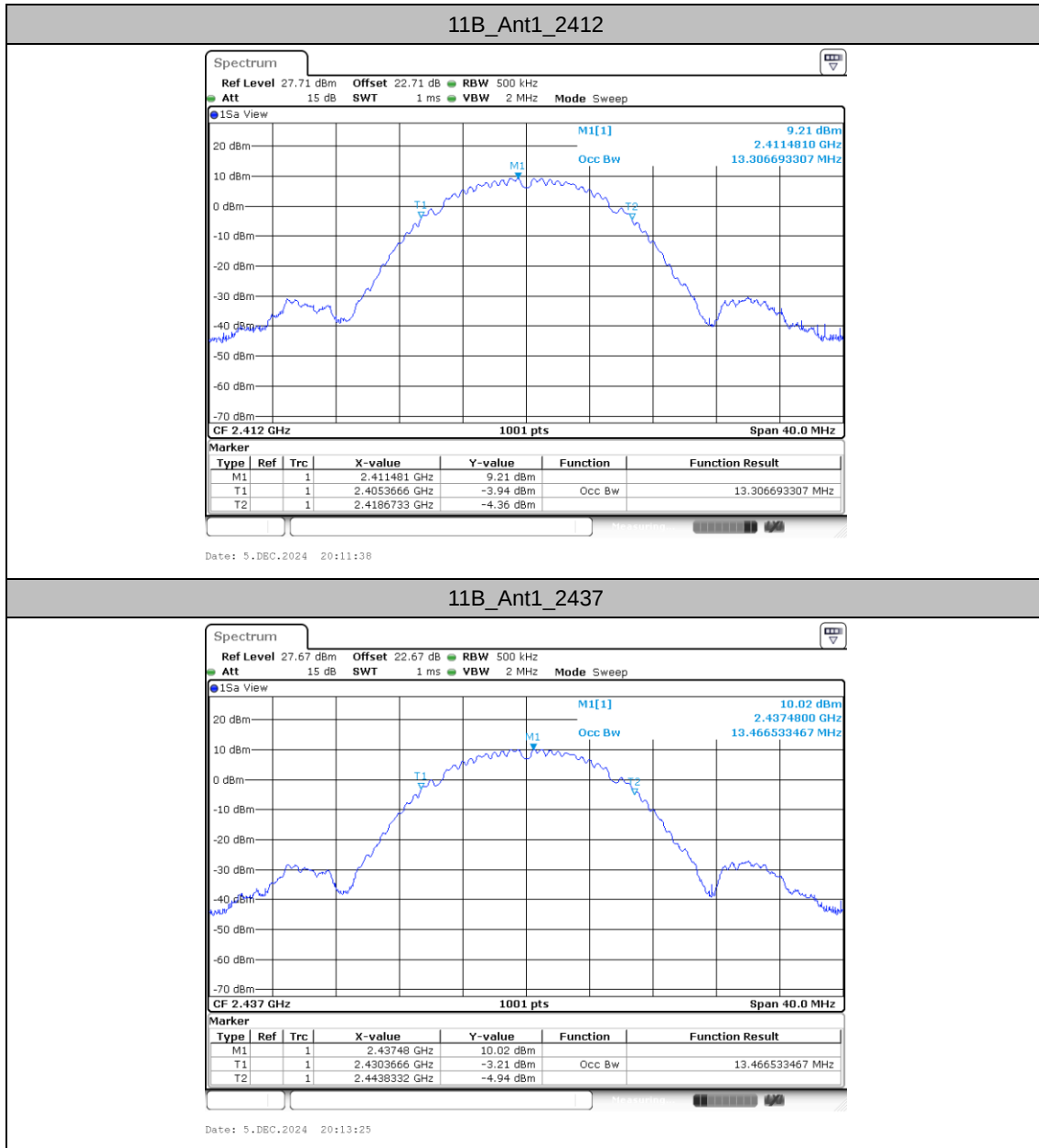
Occupied Channel Bandwidth

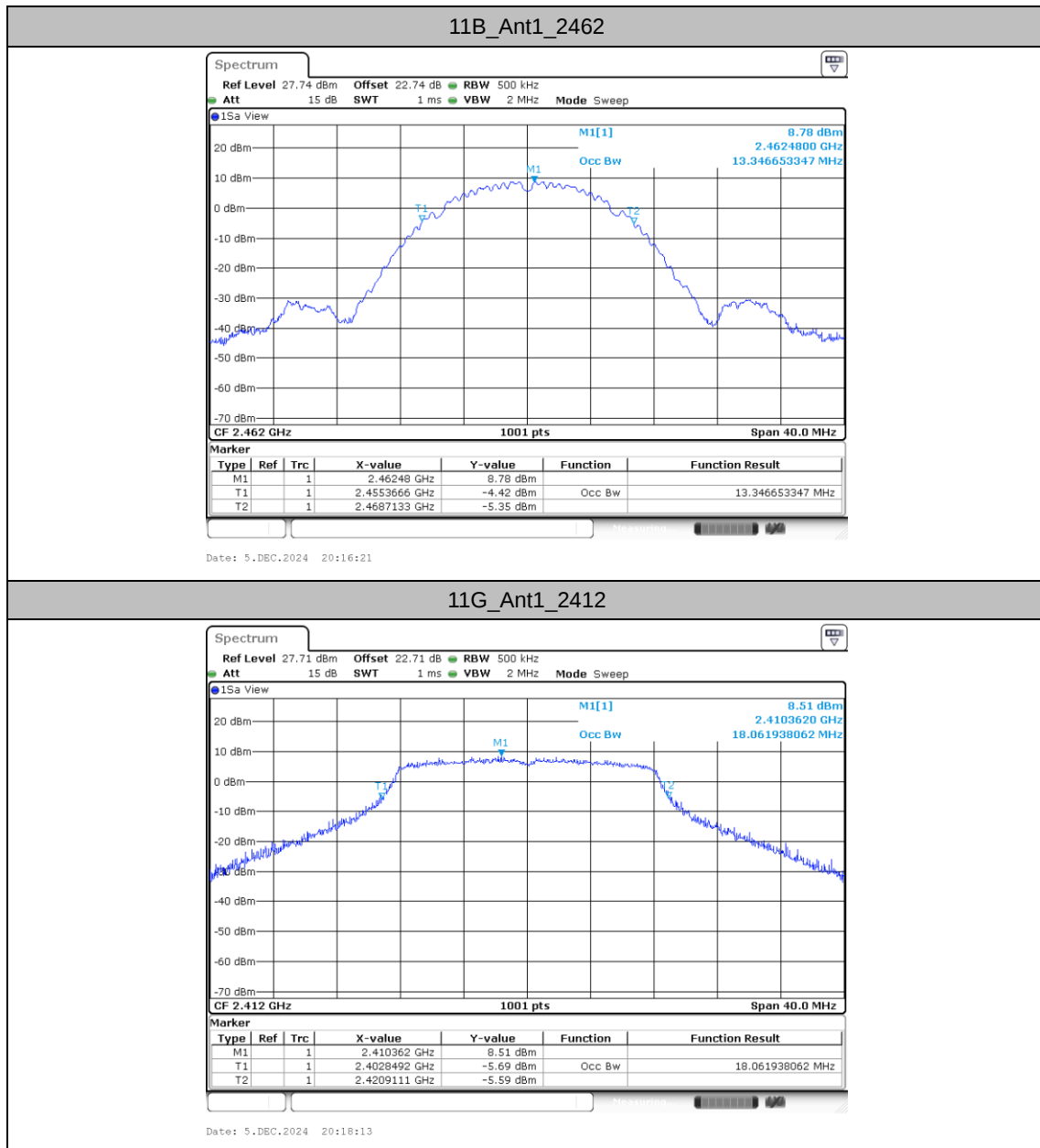
Test Result

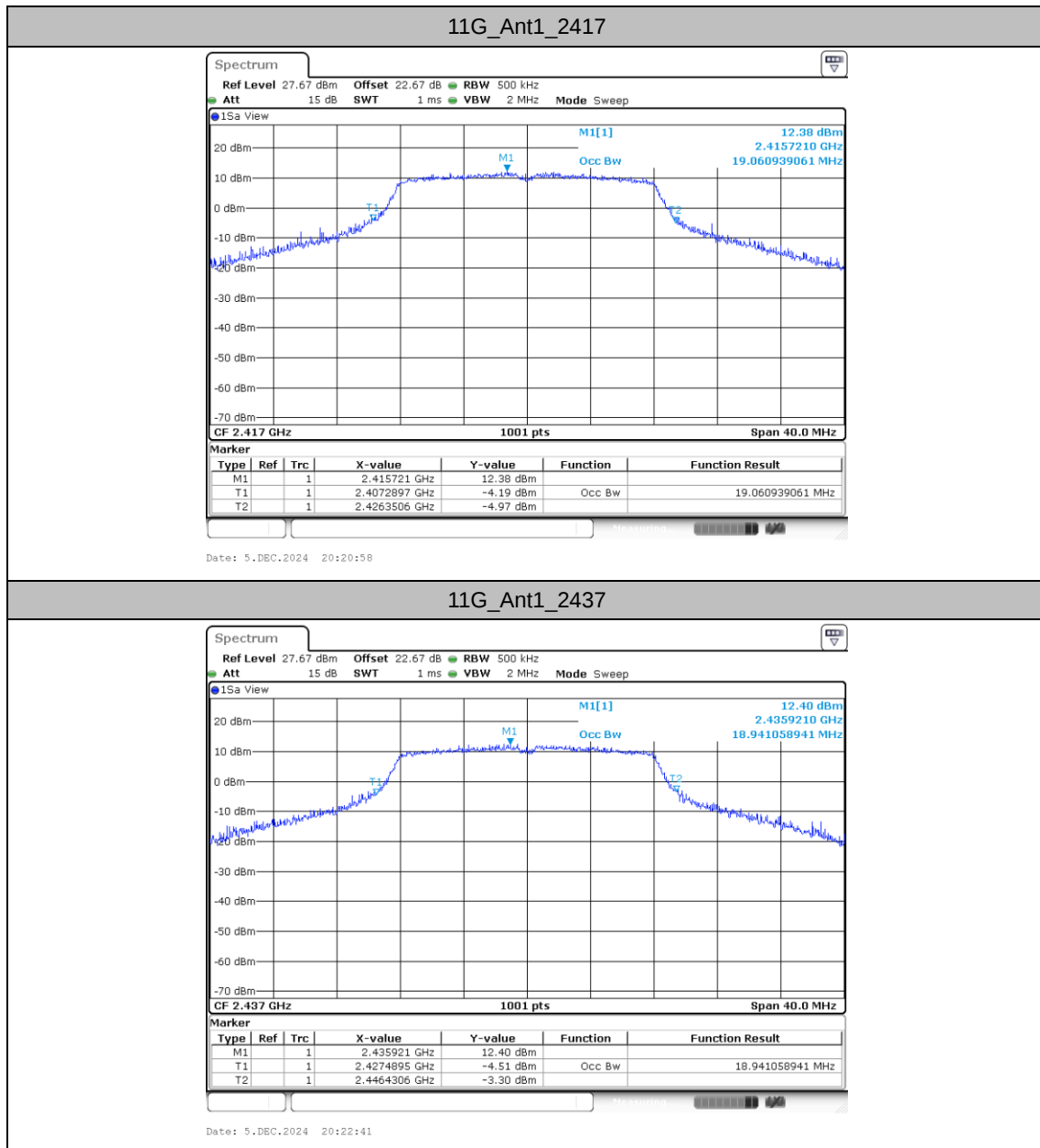
TestMode	Antenna	Freq(MHz)	OCB [MHz]	FL[MHz]	FH[MHz]	Limit[MHz]	Verdict
11B	Ant1	2412	13.307	2405.3666	2418.6733	---	---
		2437	13.467	2430.3666	2443.8332	---	---
		2462	13.347	2455.3666	2468.7133	---	---
11G	Ant1	2412	18.062	2402.8492	2420.9111	---	---
		2417	19.061	2407.2897	2426.3506	---	---
		2437	18.941	2427.4895	2446.4306	---	---
		2457	19.141	2447.2897	2466.4306	---	---
		2462	18.022	2452.8891	2470.9111	---	---
11N20SISO	Ant1	2412	18.981	2402.4496	2421.4306	---	---
		2417	19.9	2406.9700	2426.8701	---	---
		2437	19.86	2427.0500	2446.9101	---	---
		2457	19.66	2447.0899	2466.7502	---	---
		2462	19.141	2452.3696	2471.5105	---	---
11N40SISO	Ant1	2422	37.163	2403.3786	2440.5415	---	---
		2427	37.163	2408.3786	2445.5415	---	---
		2437	37.403	2418.2188	2455.6214	---	---
		2447	37.163	2428.3786	2465.5415	---	---
		2452	37.163	2433.3786	2470.5415	---	---
11AX20SISO	Ant1	2412	19.461	2402.2498	2421.7103	---	---
		2417	19.62	2407.1698	2426.7902	---	---
		2437	19.74	2427.1299	2446.8701	---	---
		2457	19.62	2447.1299	2466.7502	---	---
		2462	19.5	2452.2098	2471.7103	---	---
11AX40SISO	Ant1	2422	38.362	2402.8192	2441.1808	---	---
		2427	38.282	2407.8192	2446.1009	---	---
		2437	38.282	2417.8192	2456.1009	---	---
		2447	38.282	2427.8991	2466.1808	---	---
		2452	38.122	2432.8991	2471.0210	---	---

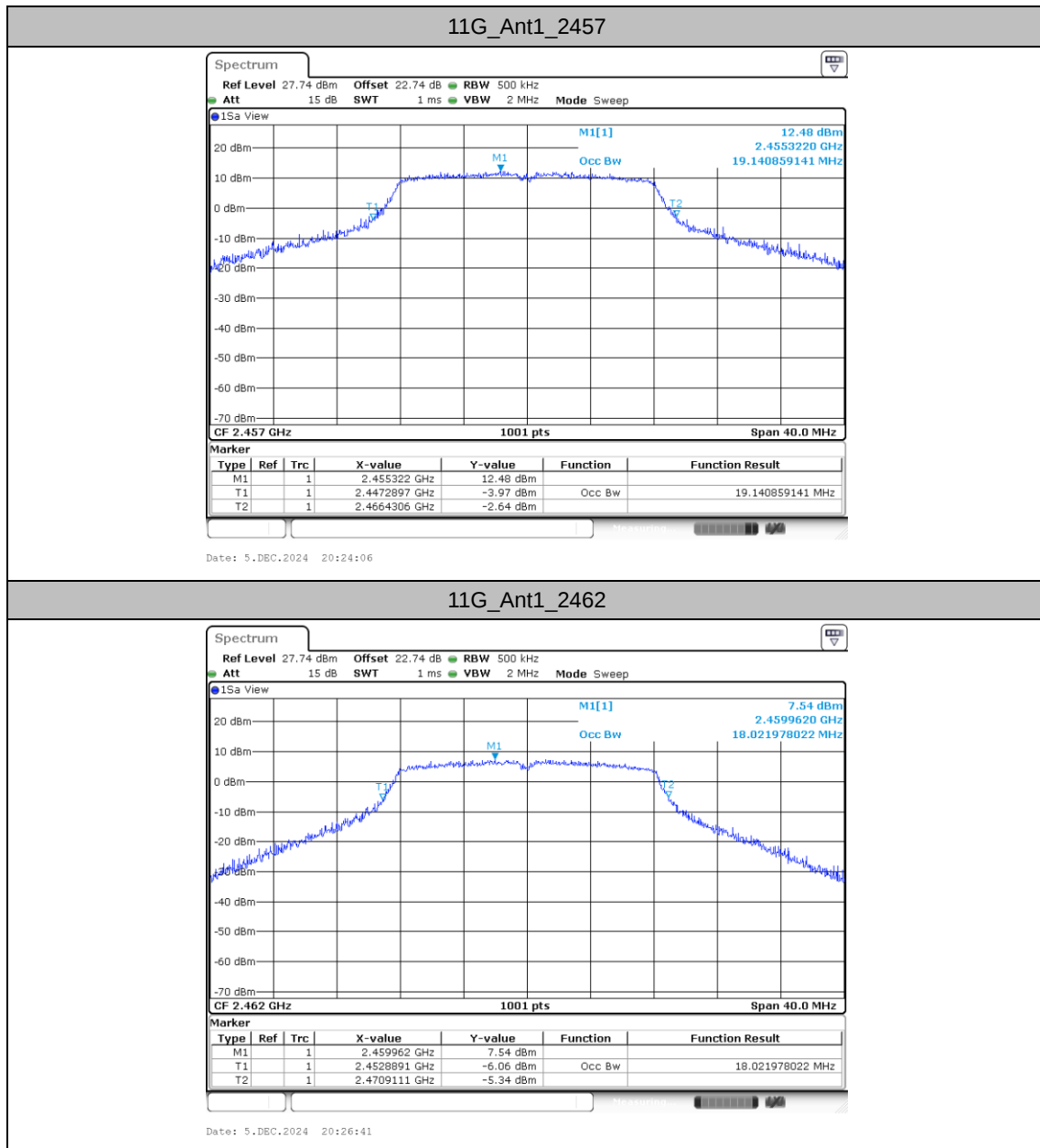


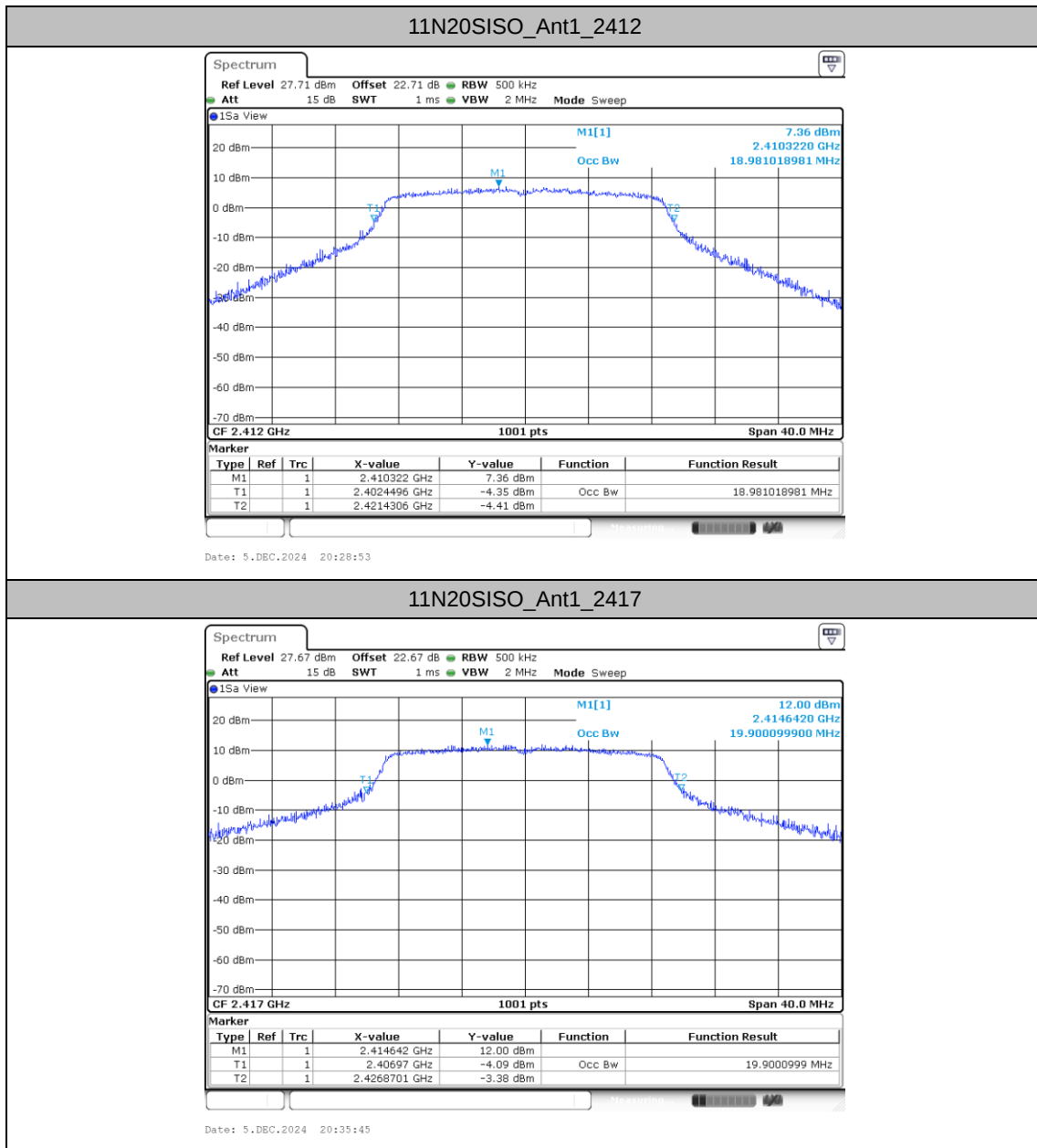
Test Graphs

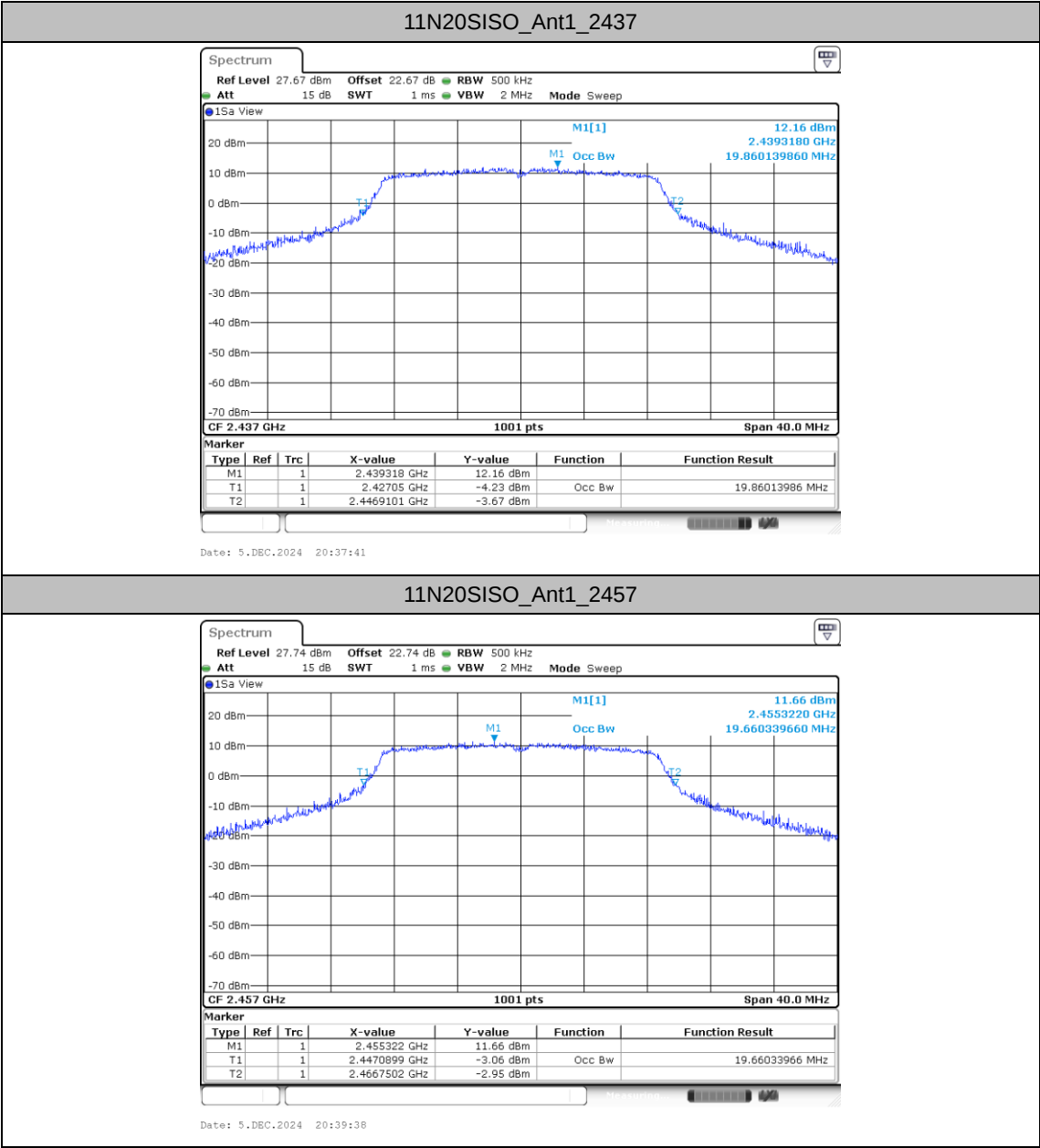


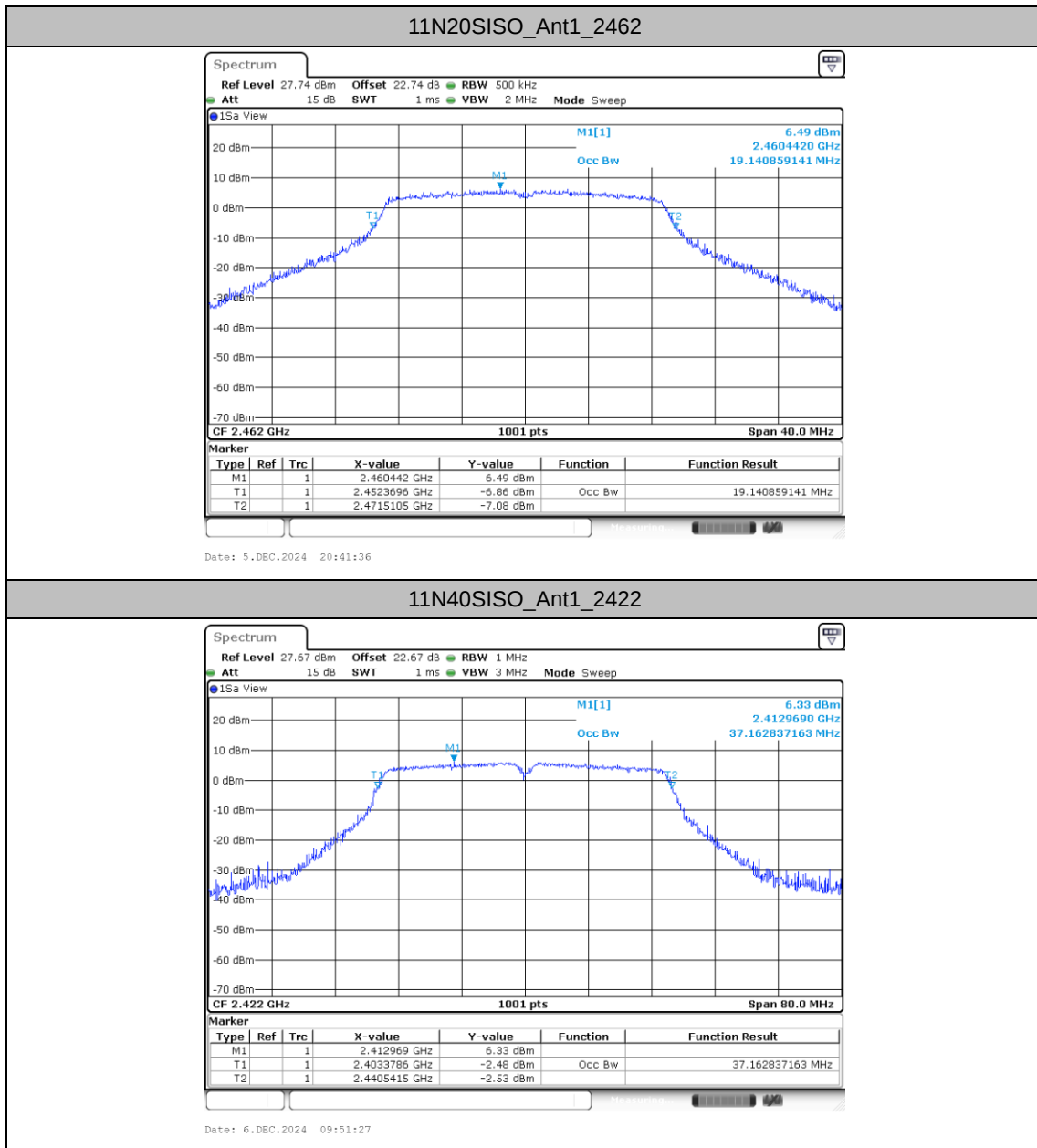


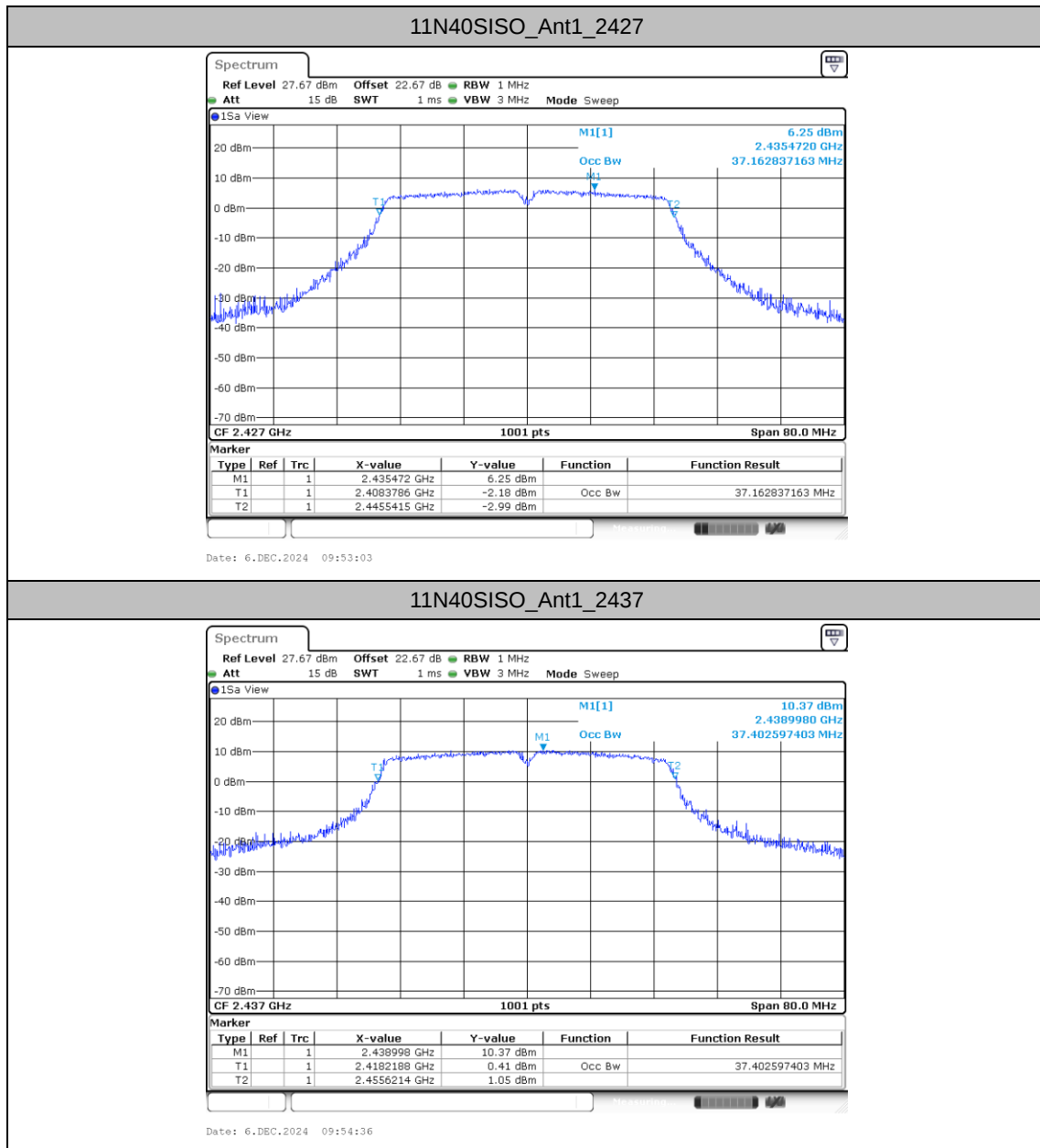


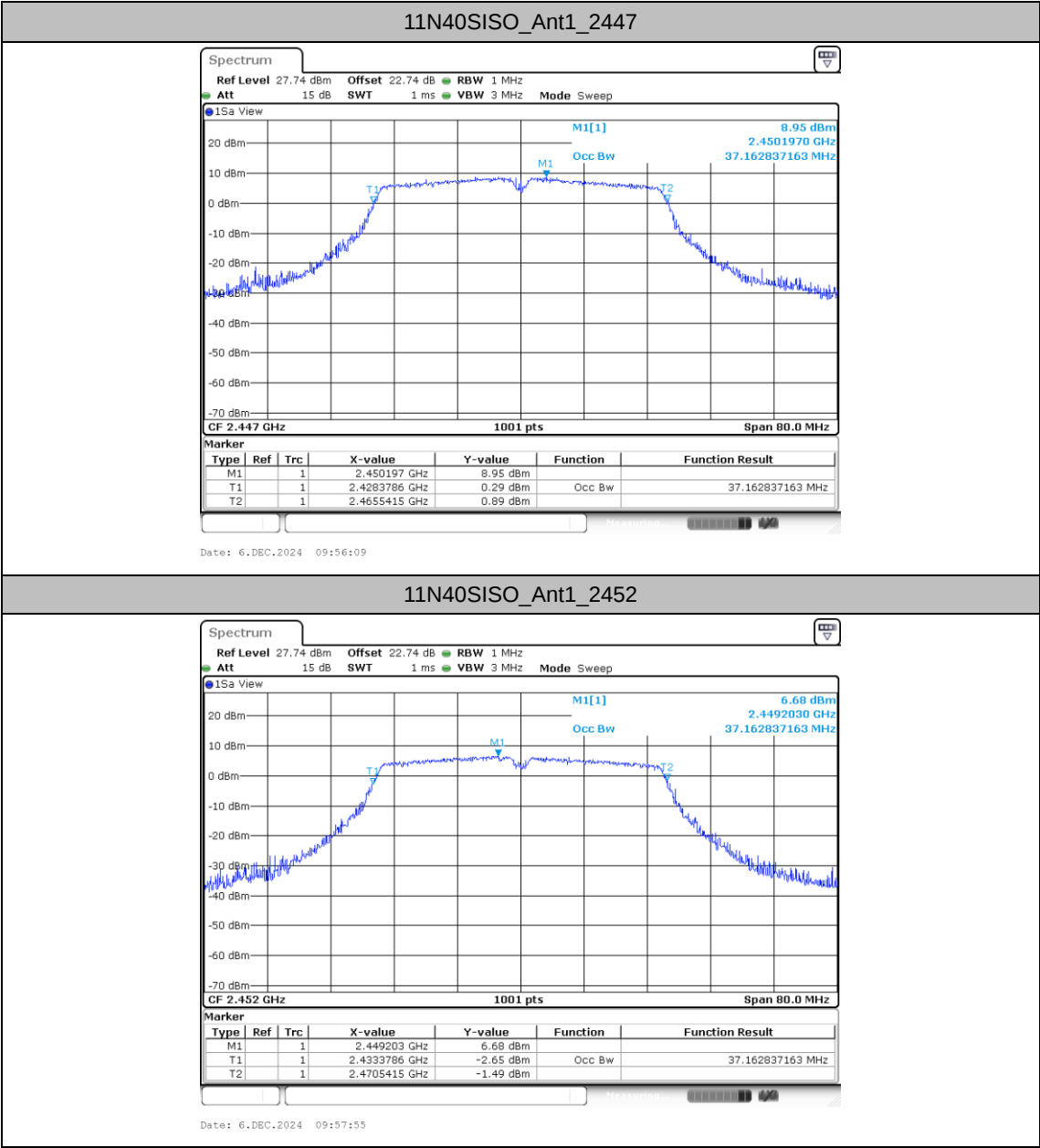


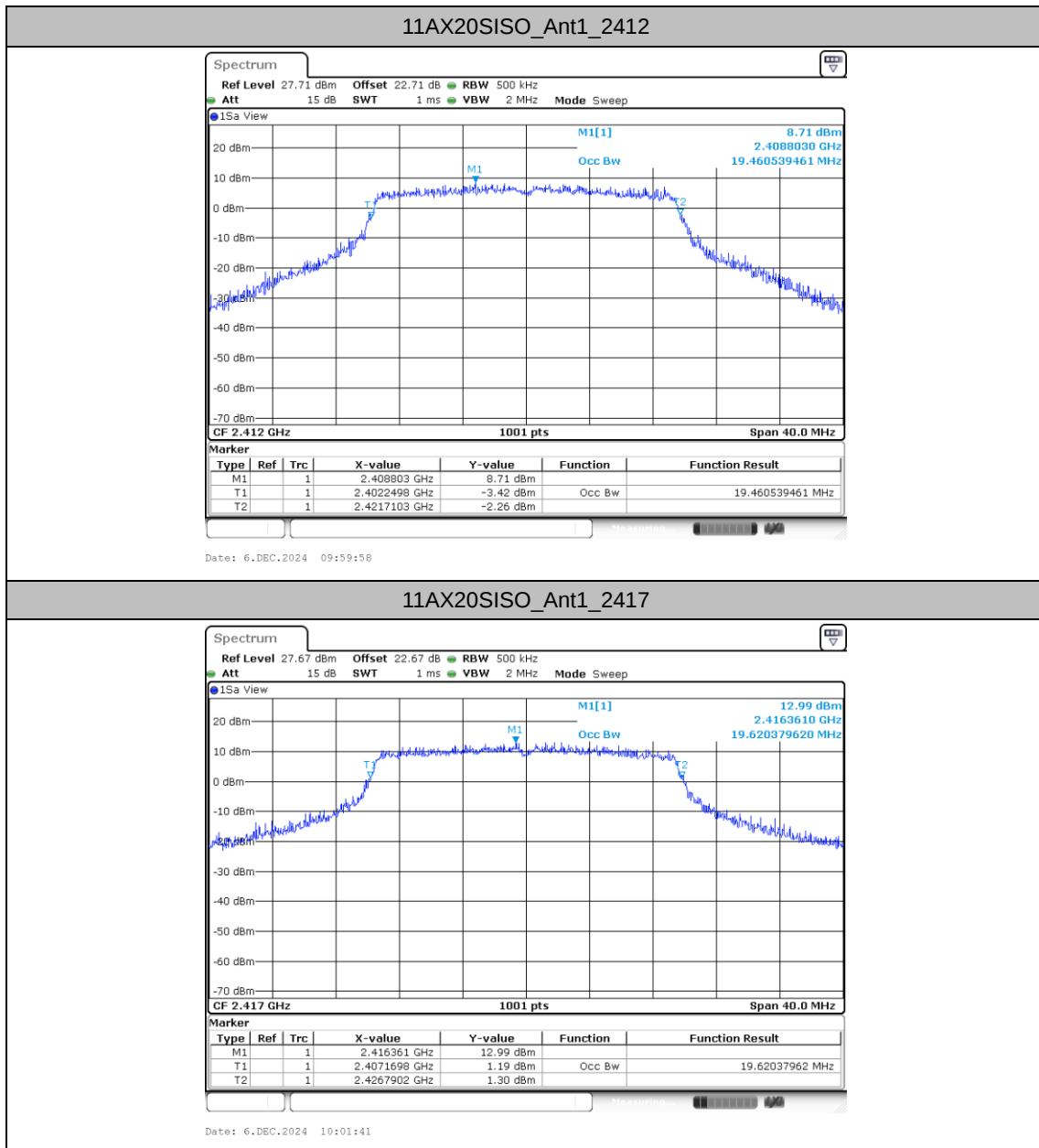


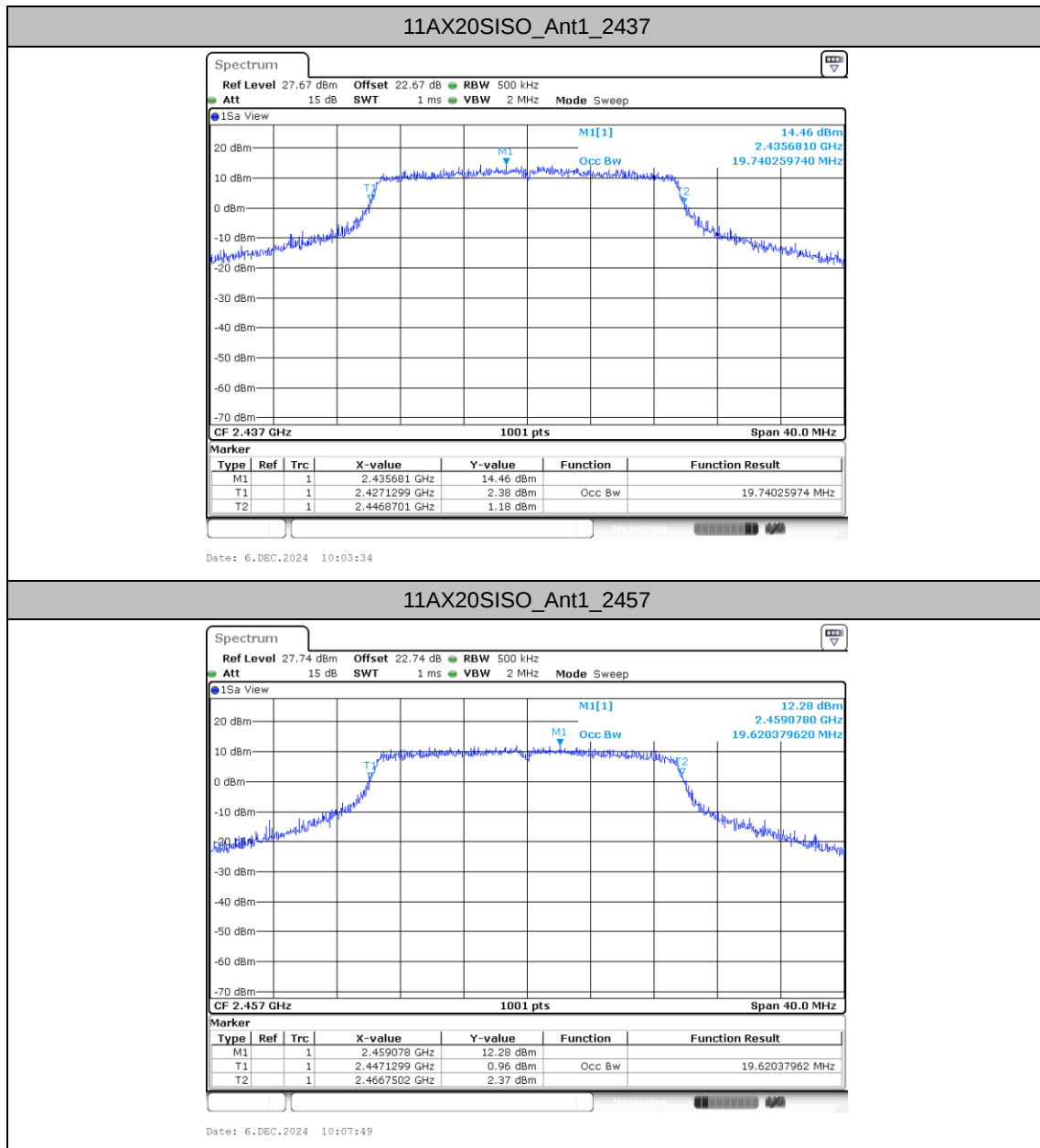


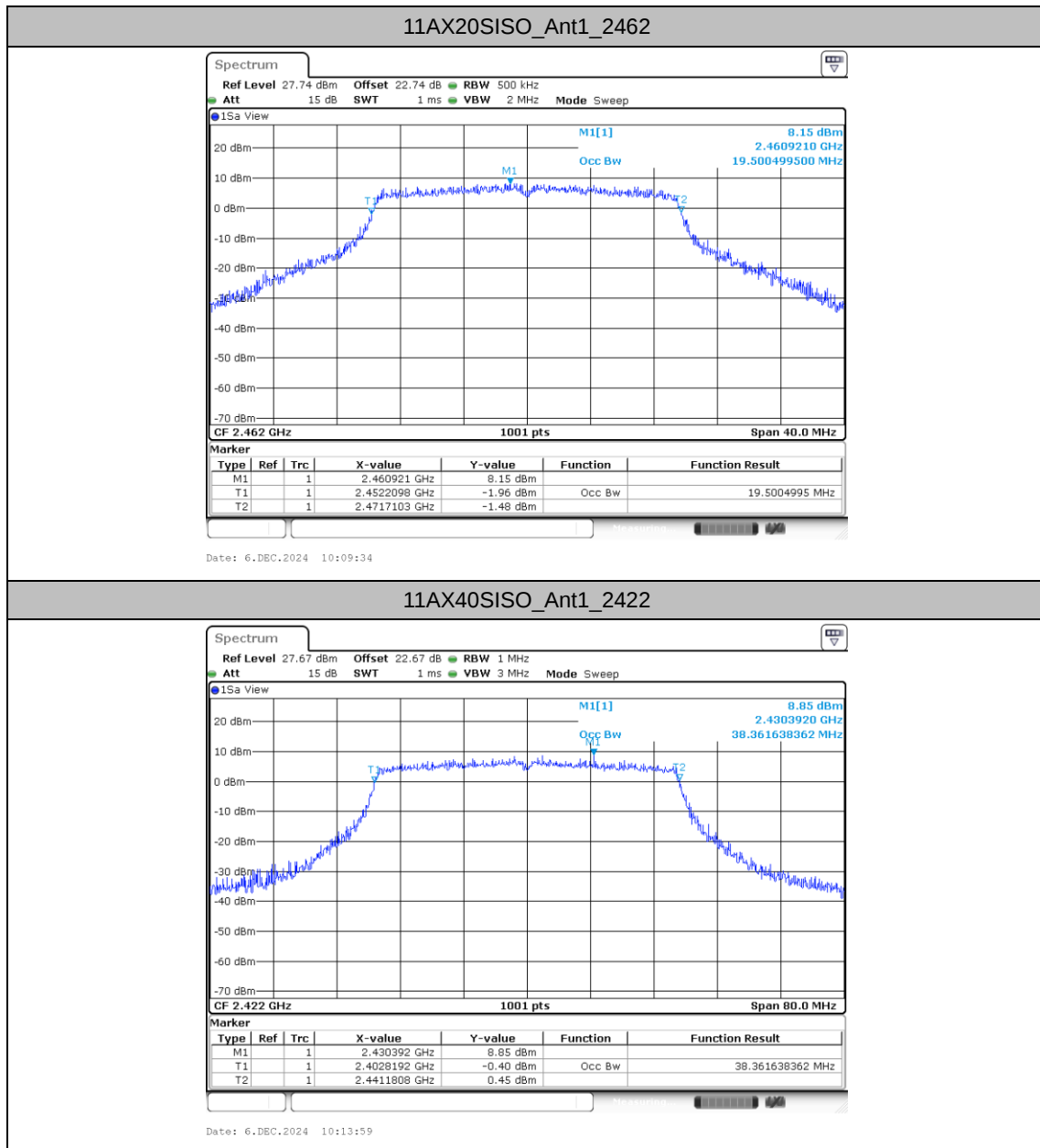


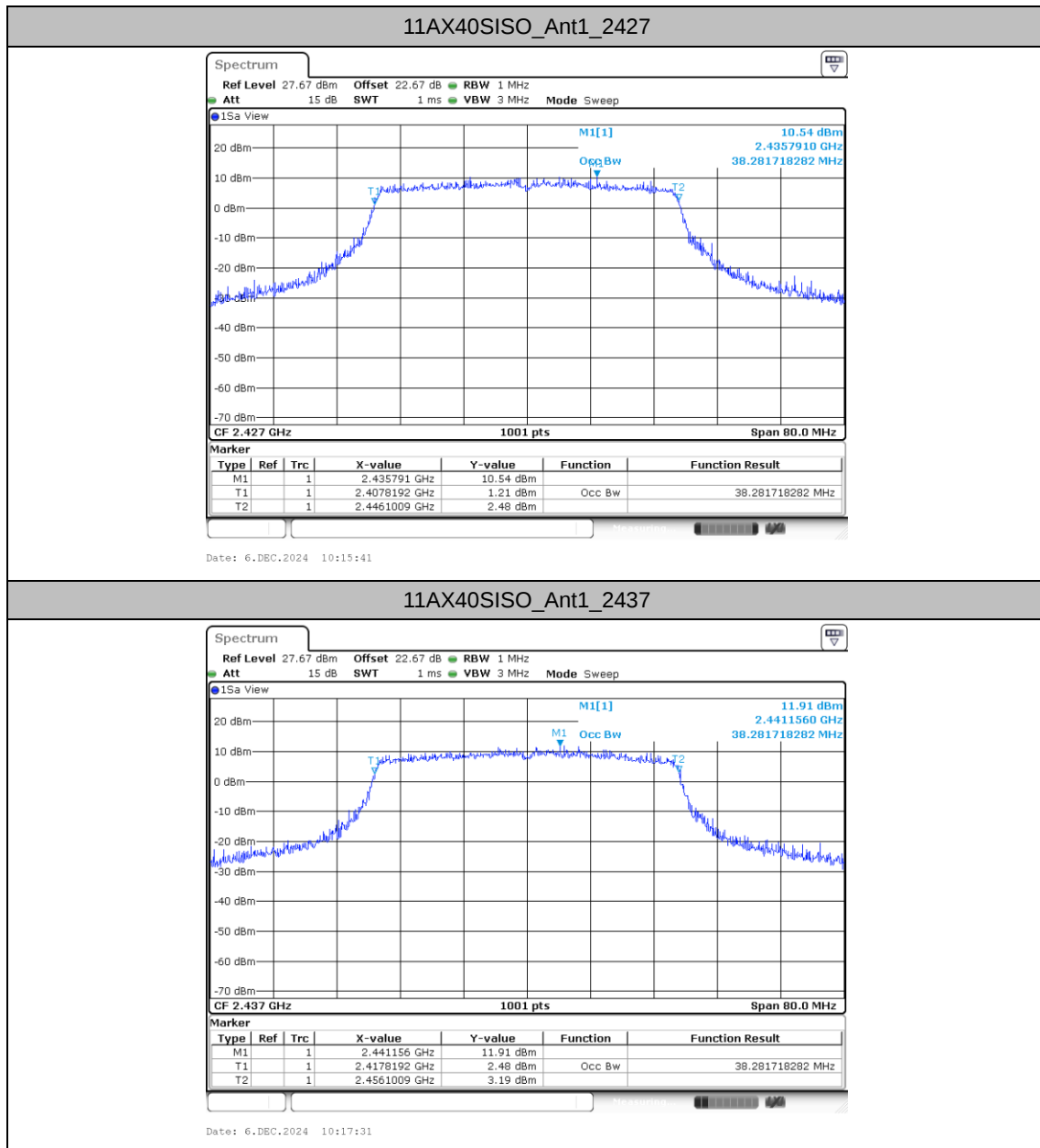


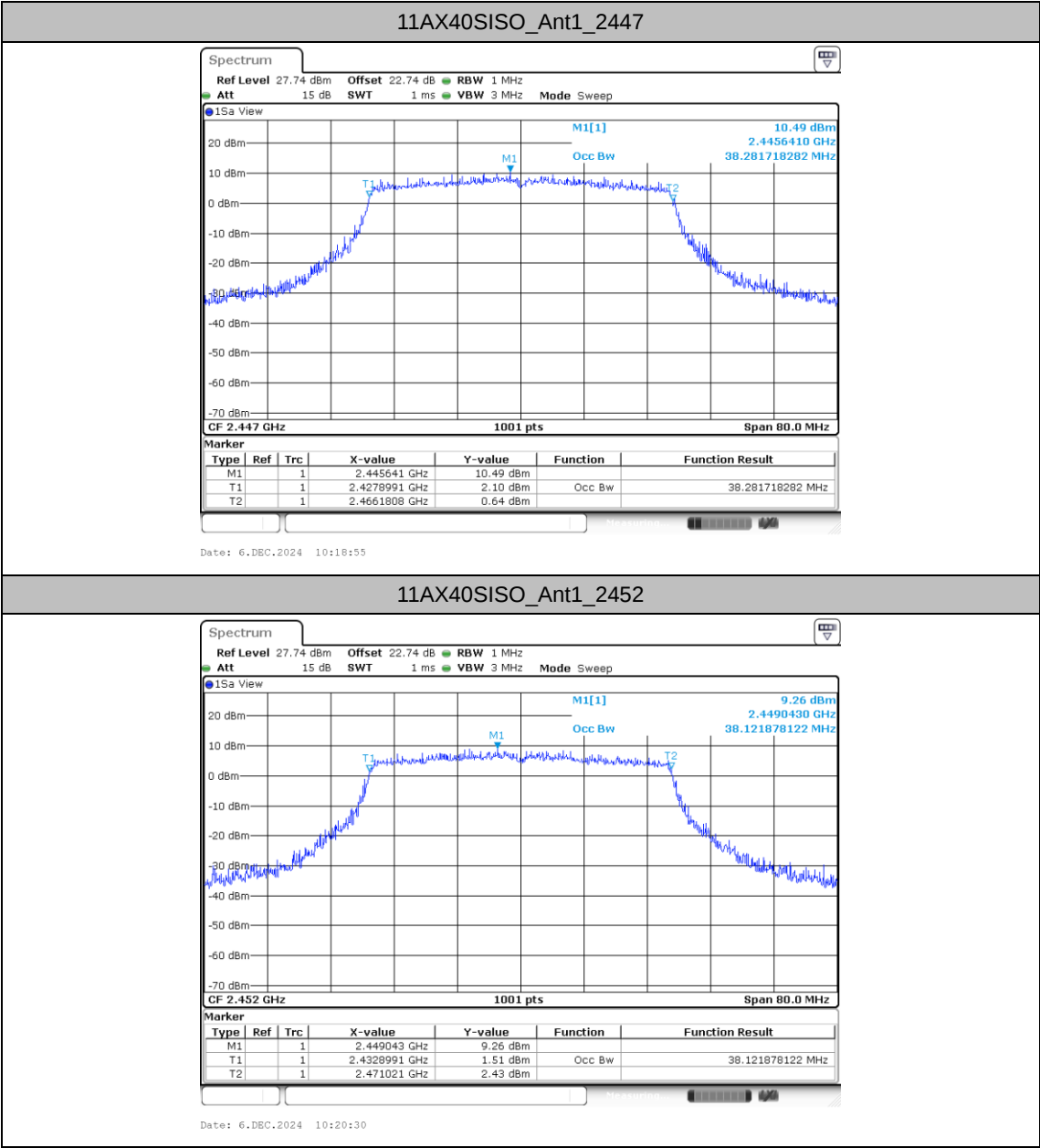














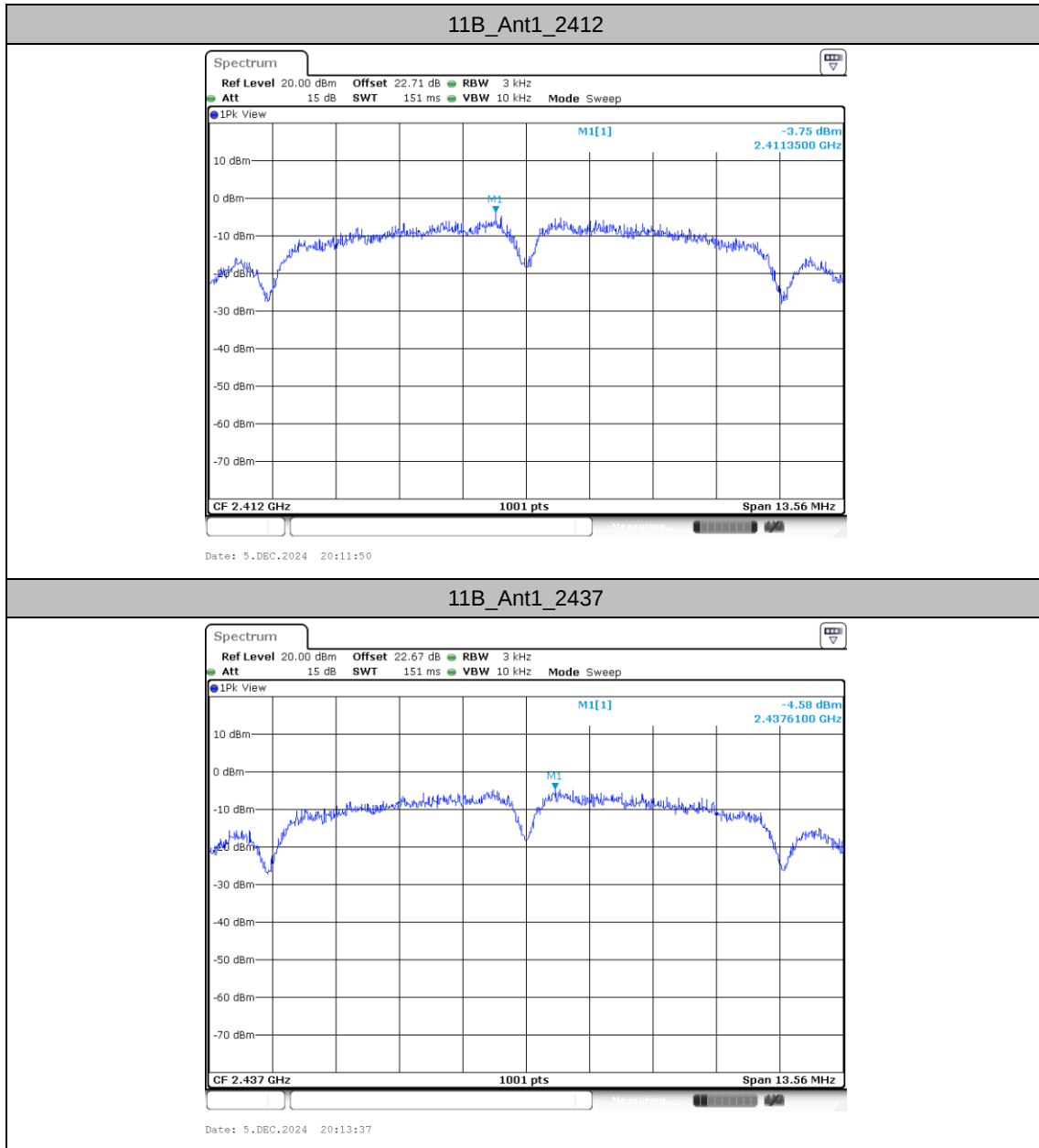
Maximum power spectral density

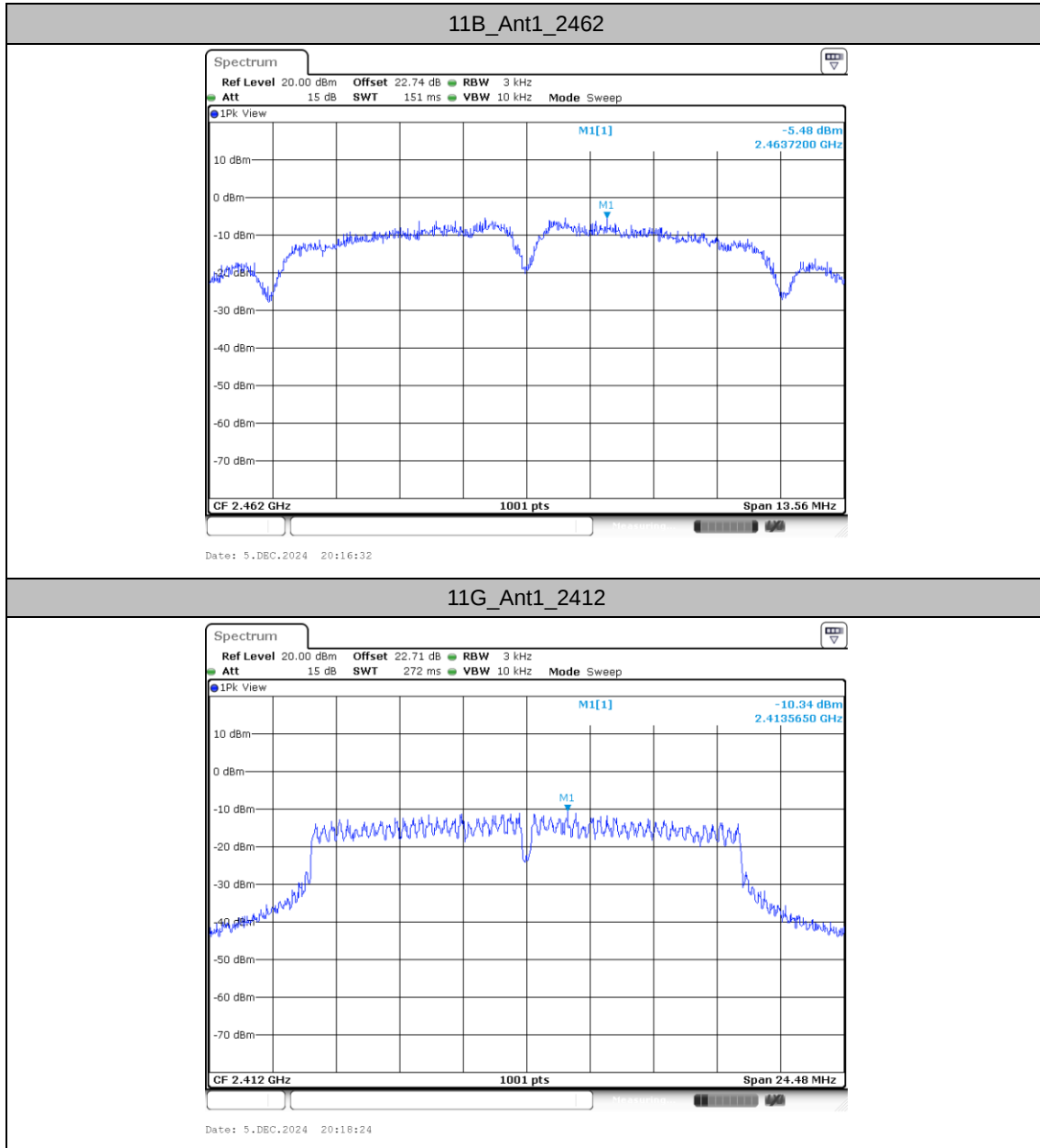
Test Result

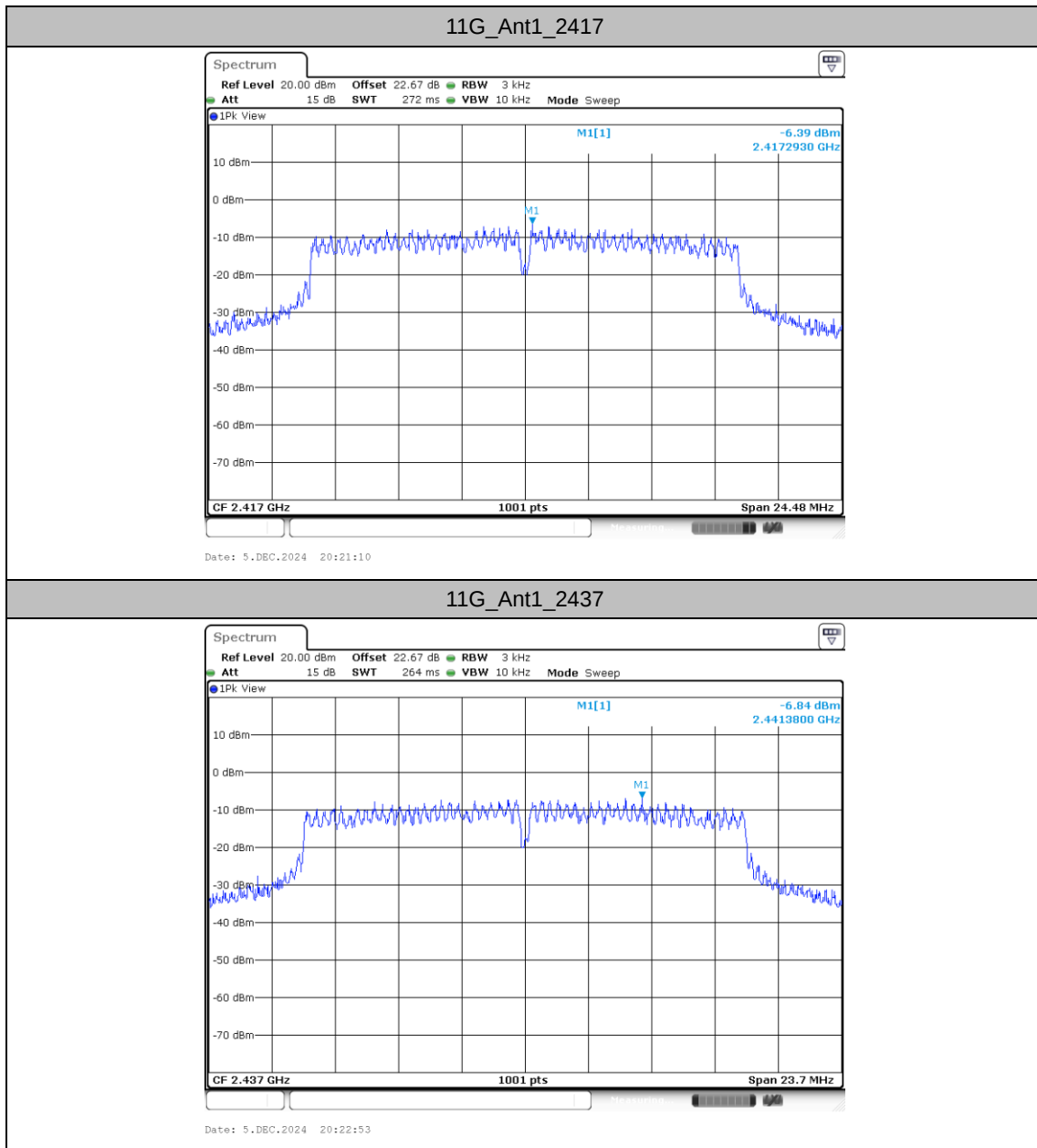
TestMode	Antenna	Freq(MHz)	Result [dBm/3kHz]	Limit [dBm/3kHz]	Verdict
11B	Ant1	2412	-3.75	≤8.00	PASS
		2437	-4.58	≤8.00	PASS
		2462	-5.48	≤8.00	PASS
11G	Ant1	2412	-10.34	≤8.00	PASS
		2417	-6.39	≤8.00	PASS
		2437	-6.84	≤8.00	PASS
		2457	-6.93	≤8.00	PASS
		2462	-11.24	≤8.00	PASS
11N20SISO	Ant1	2412	-12.09	≤8.00	PASS
		2417	-6.26	≤8.00	PASS
		2437	-6.79	≤8.00	PASS
		2457	-7.71	≤8.00	PASS
		2462	-12.63	≤8.00	PASS
11N40SISO	Ant1	2422	-16.37	≤8.00	PASS
		2427	-15.87	≤8.00	PASS
		2437	-11.51	≤8.00	PASS
		2447	-13.6	≤8.00	PASS
		2452	-15.64	≤8.00	PASS
11AX20SISO	Ant1	2412	-13.5	≤8.00	PASS
		2417	-8.23	≤8.00	PASS
		2437	-7.1	≤8.00	PASS
		2457	-9.86	≤8.00	PASS
		2462	-12.21	≤8.00	PASS
11AX40SISO	Ant1	2422	-15.8	≤8.00	PASS
		2427	-15.05	≤8.00	PASS
		2437	-13.17	≤8.00	PASS
		2447	-14.78	≤8.00	PASS
		2452	-15.55	≤8.00	PASS

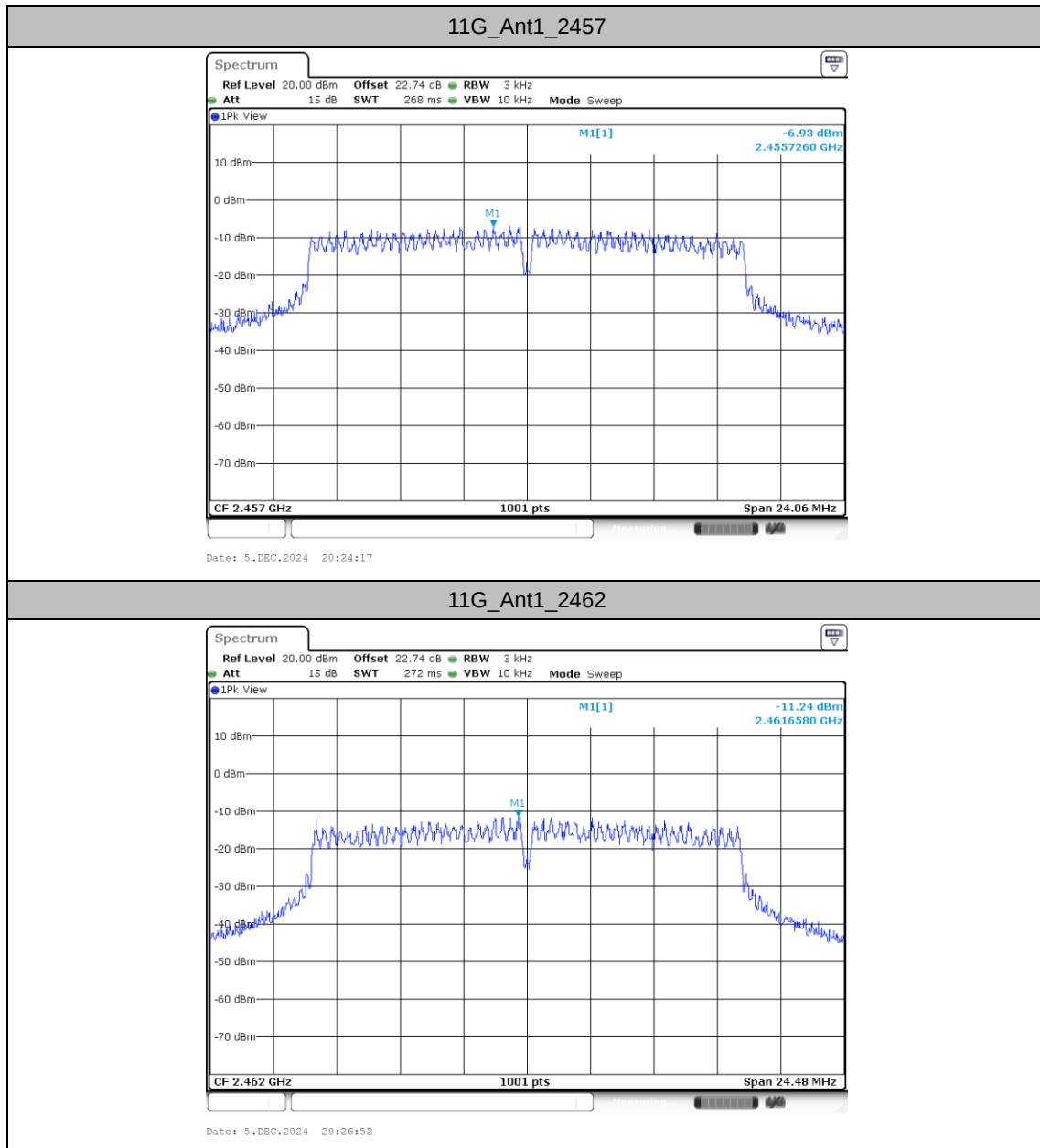


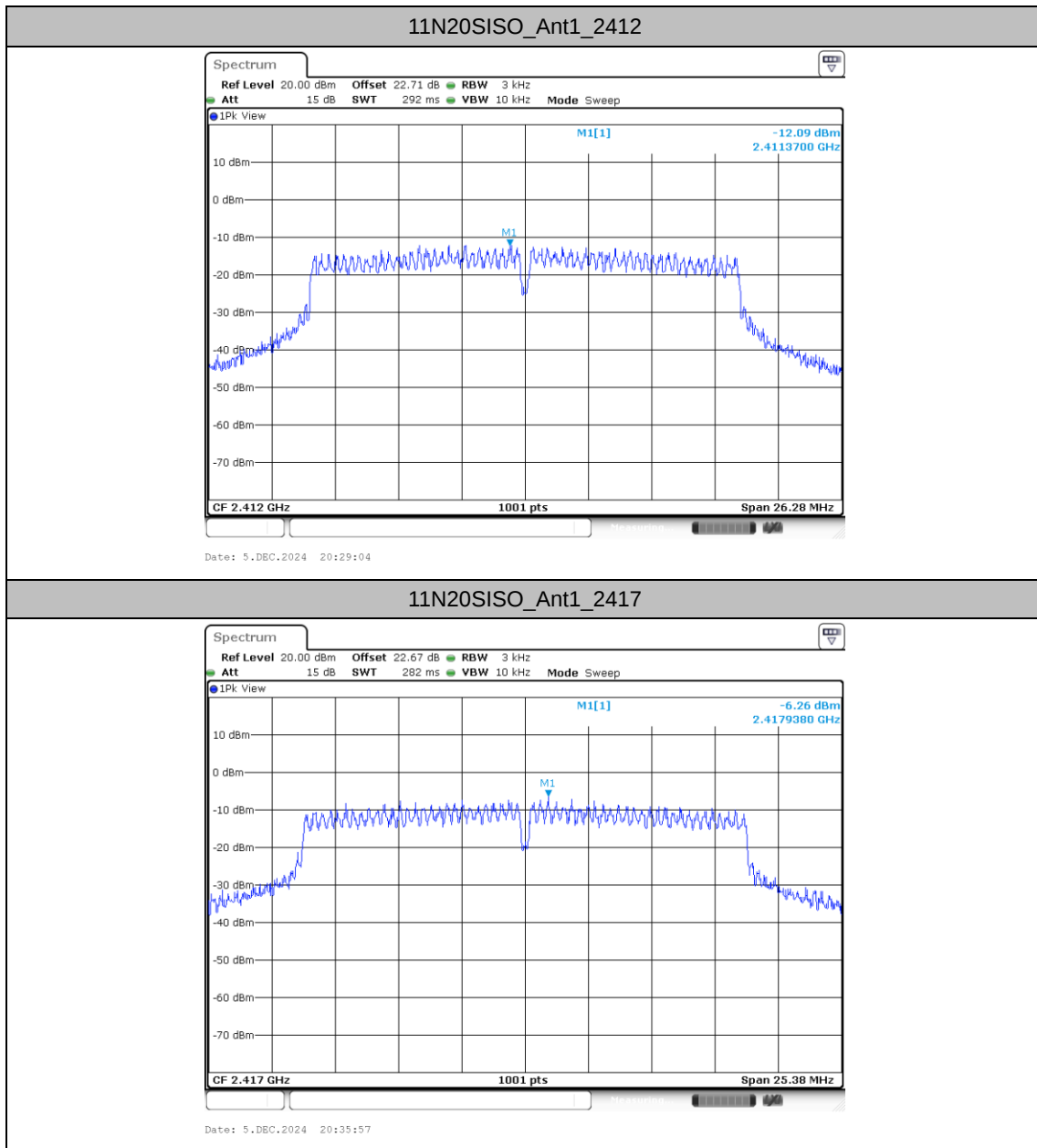
Test Graphs

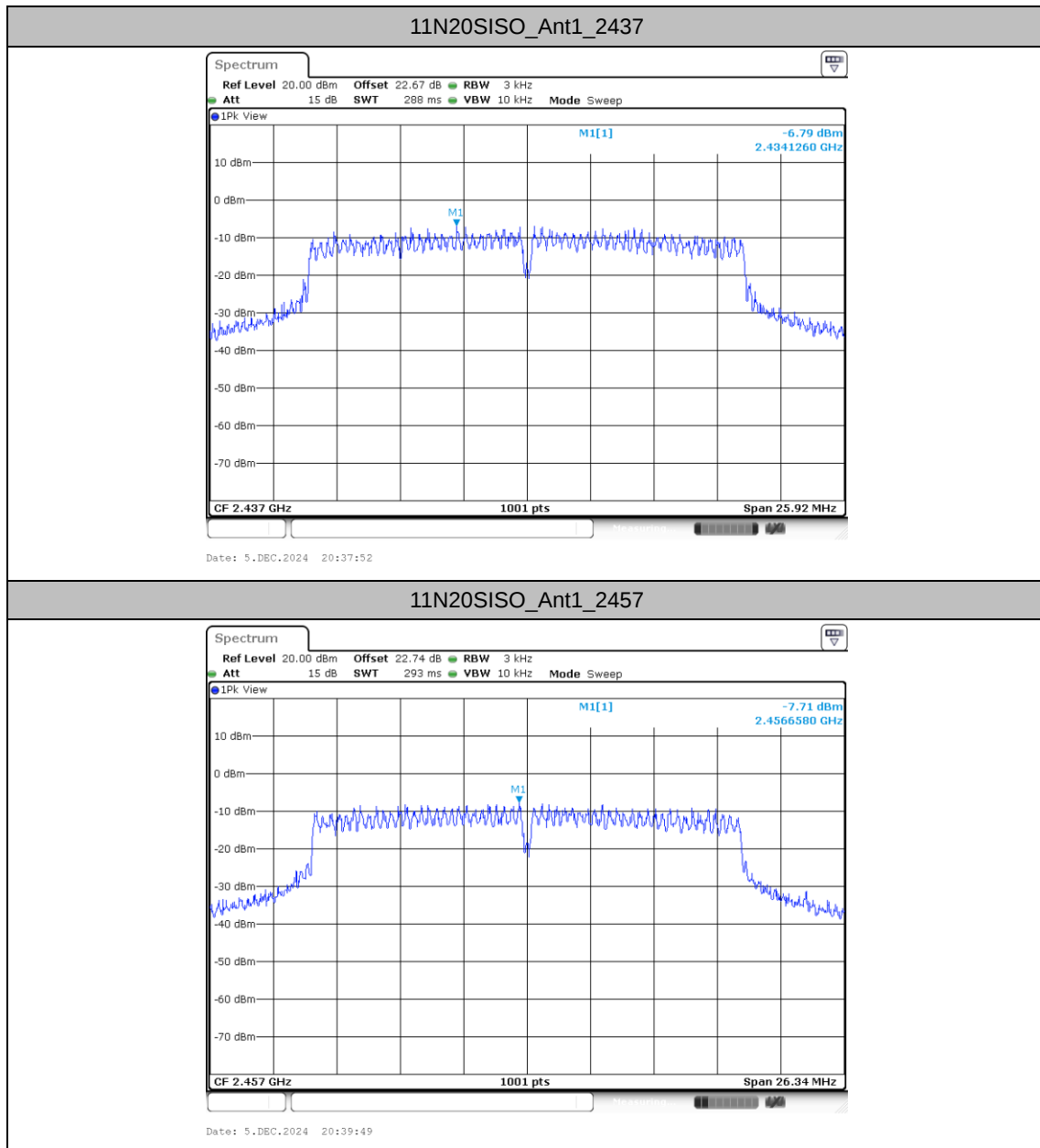


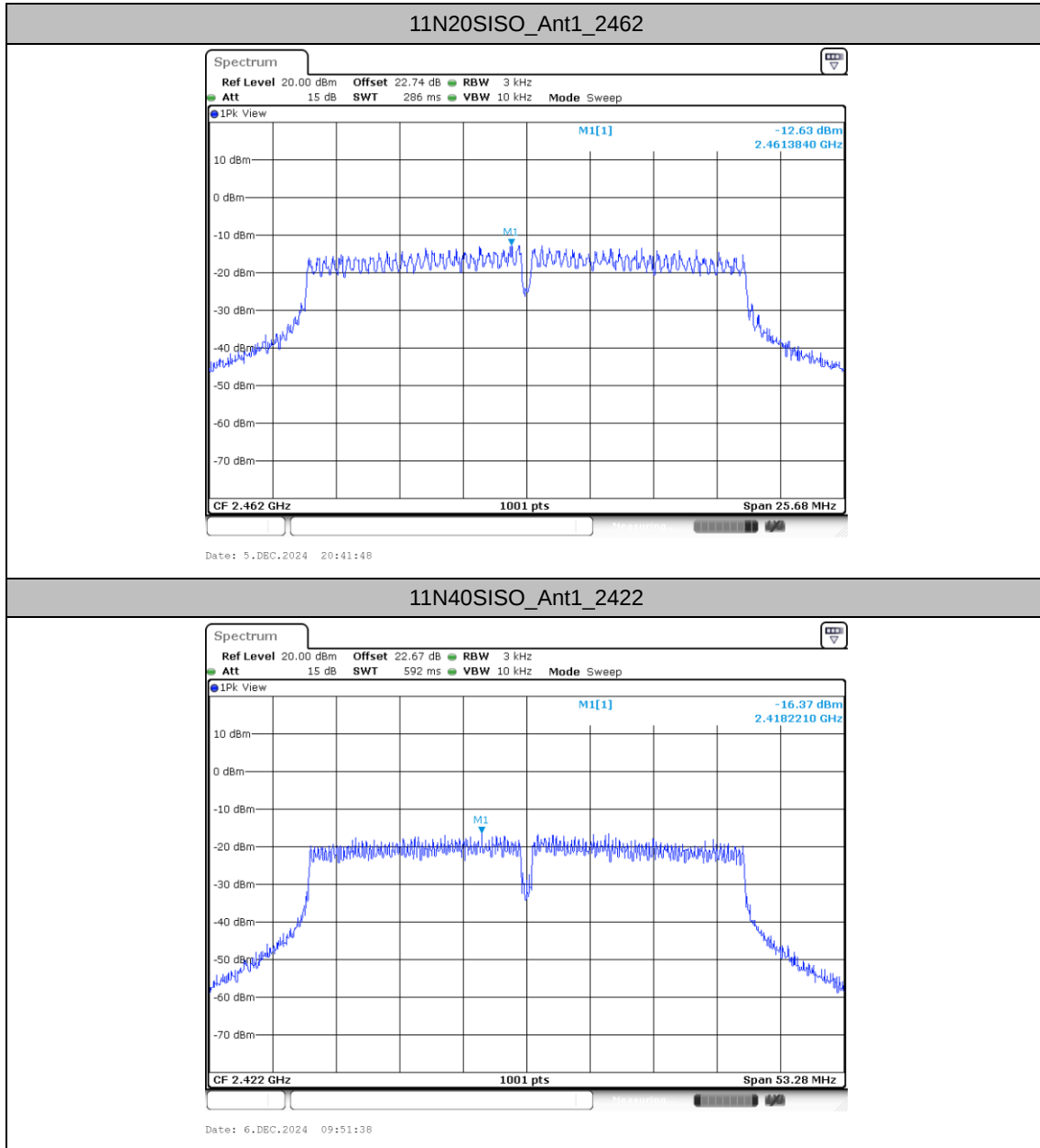


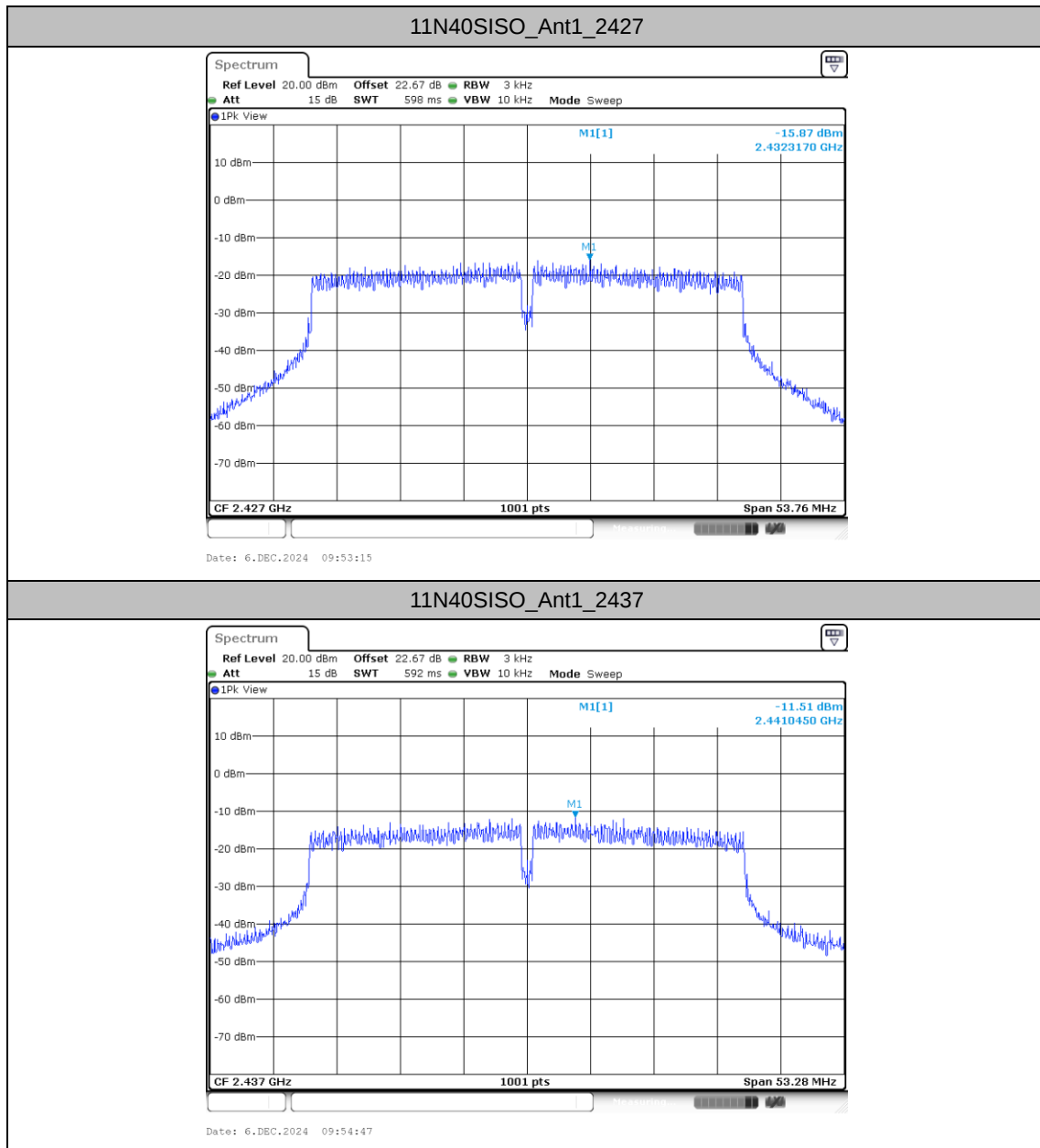


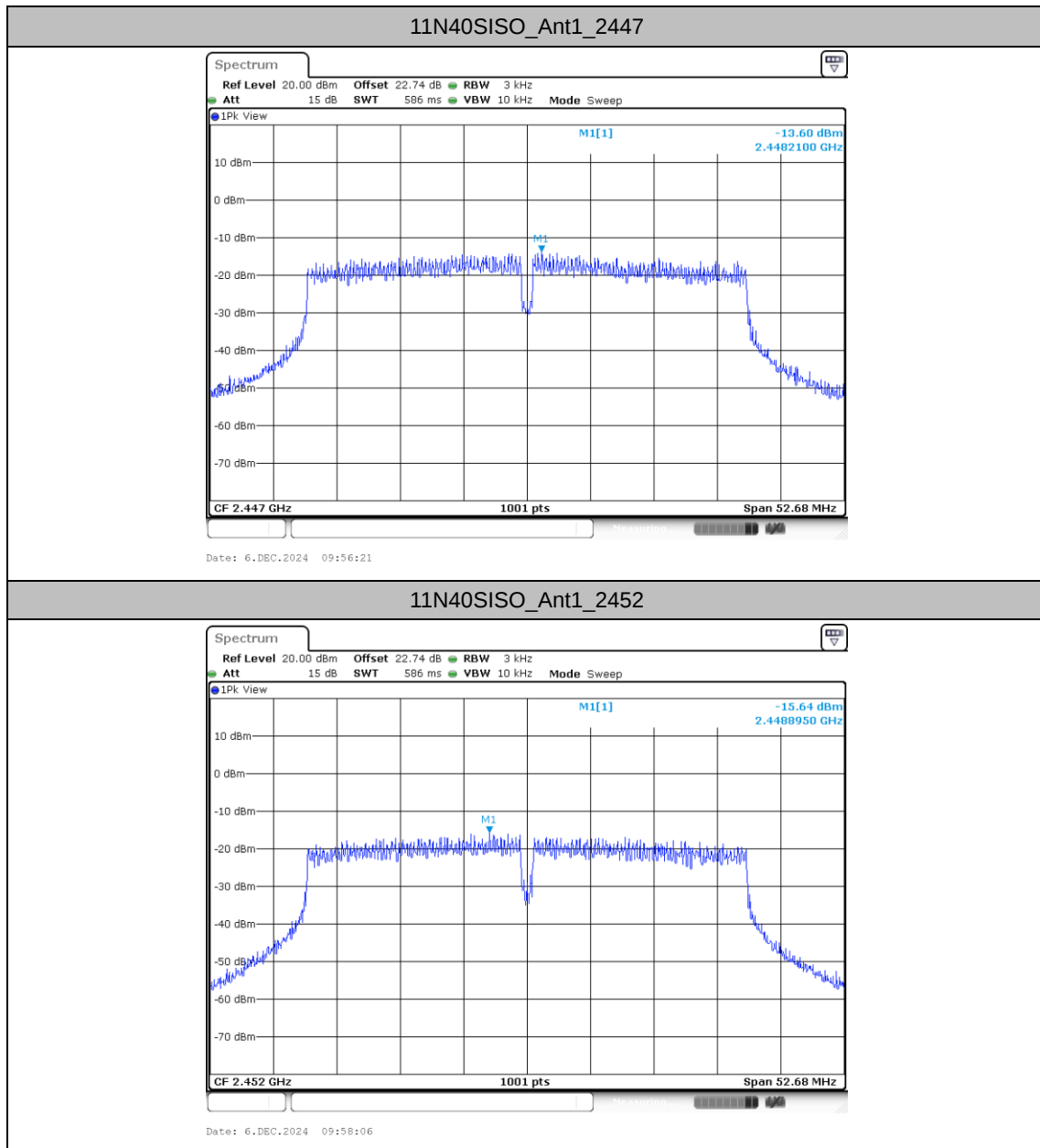


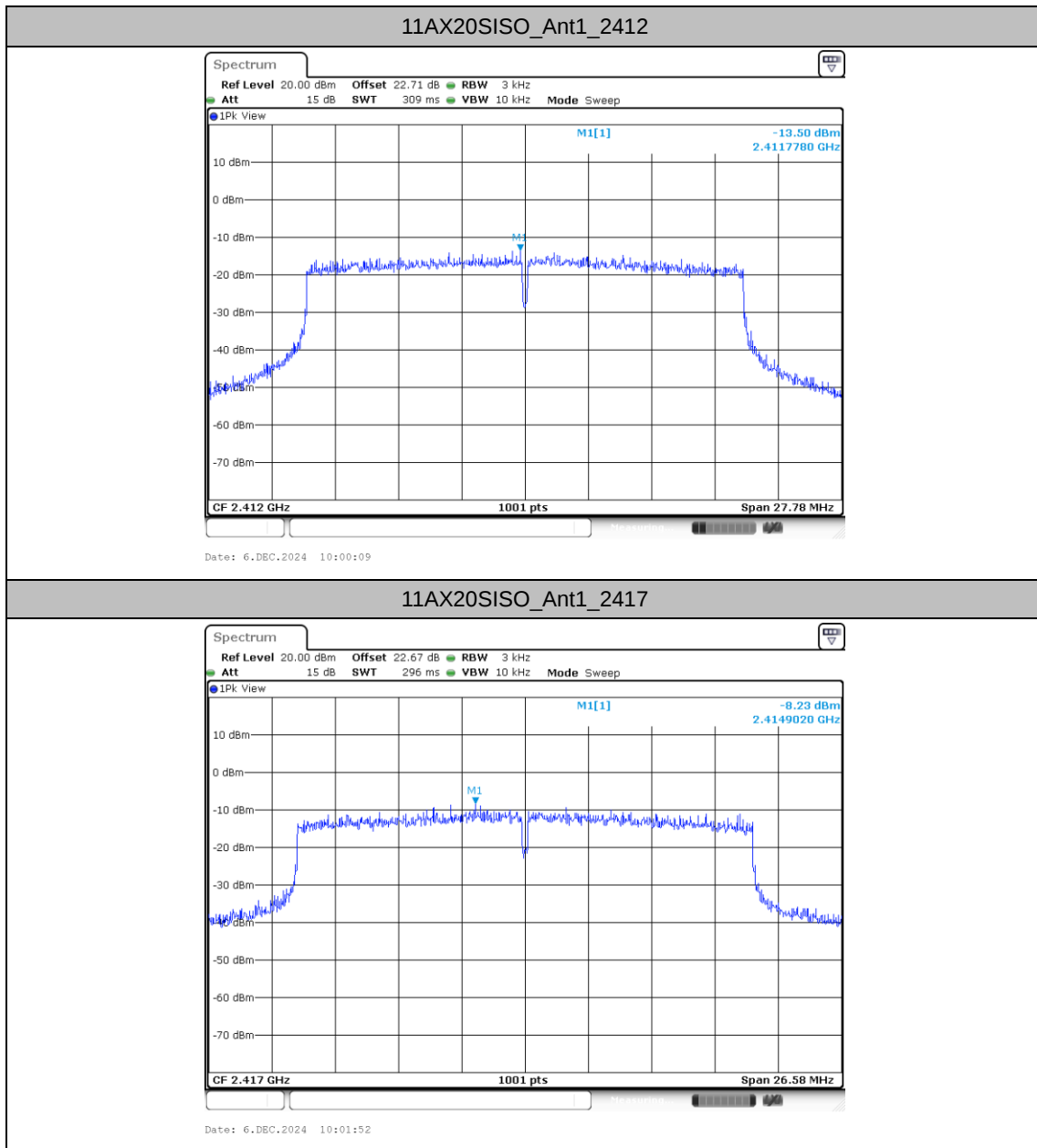


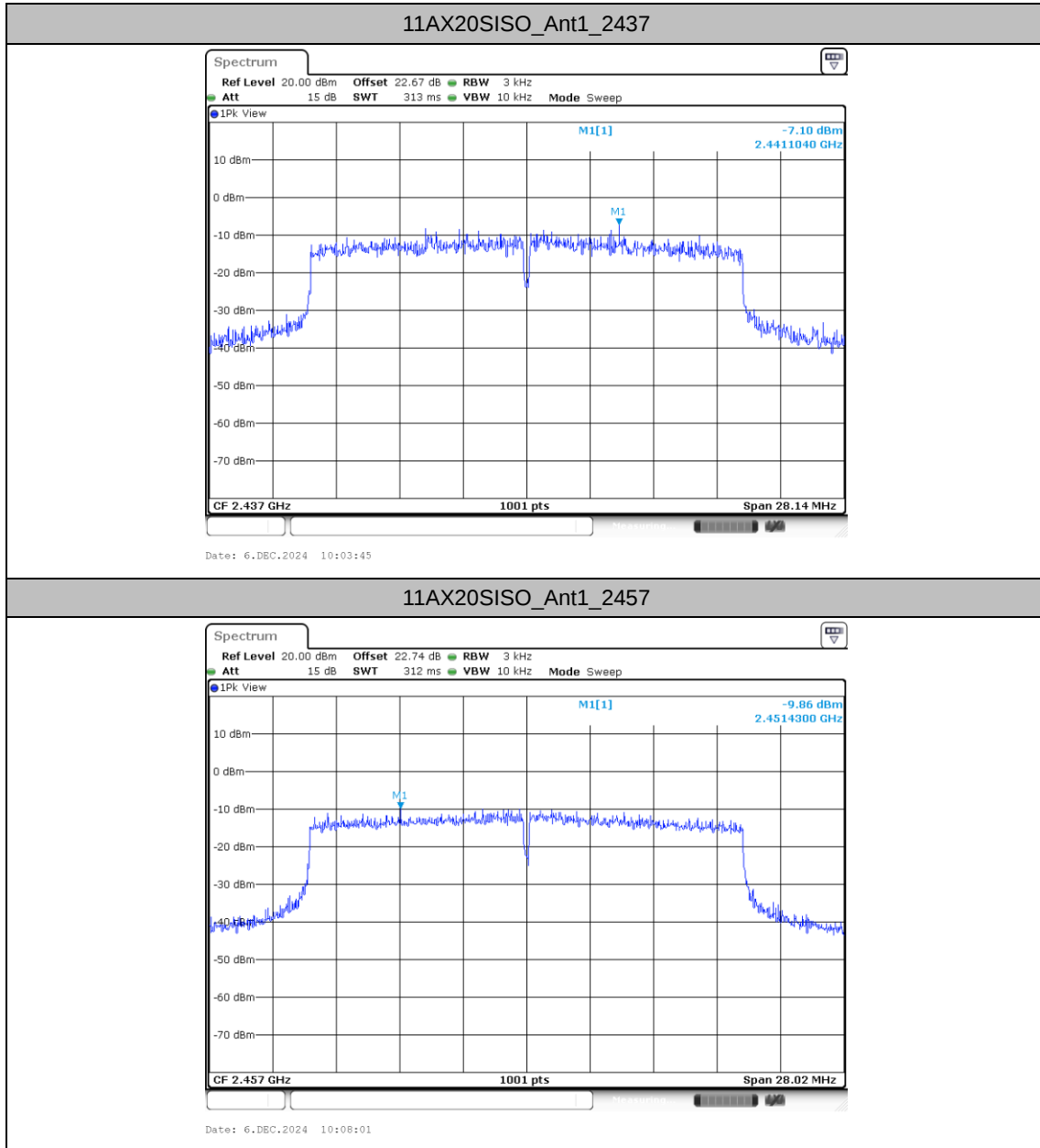


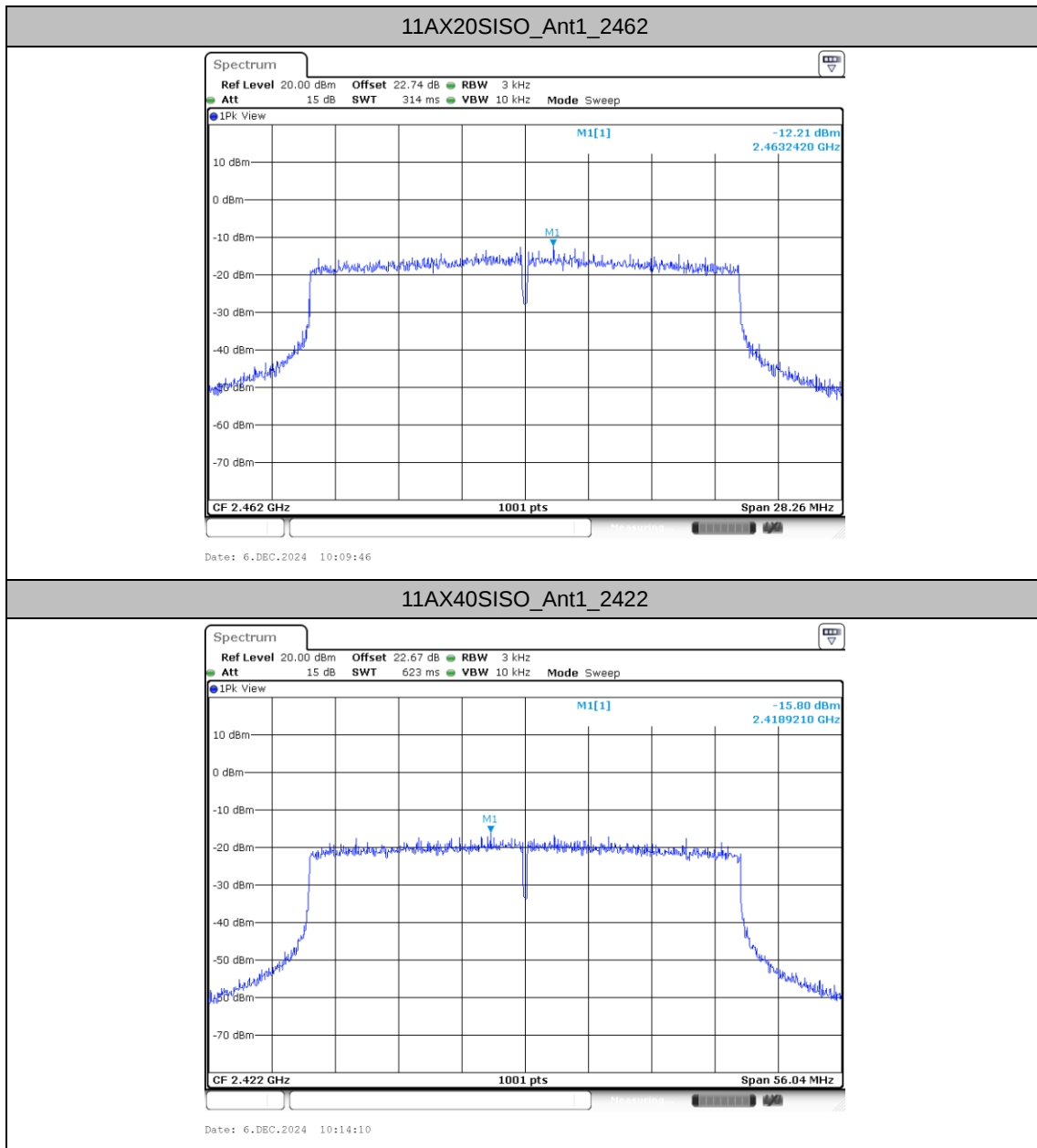


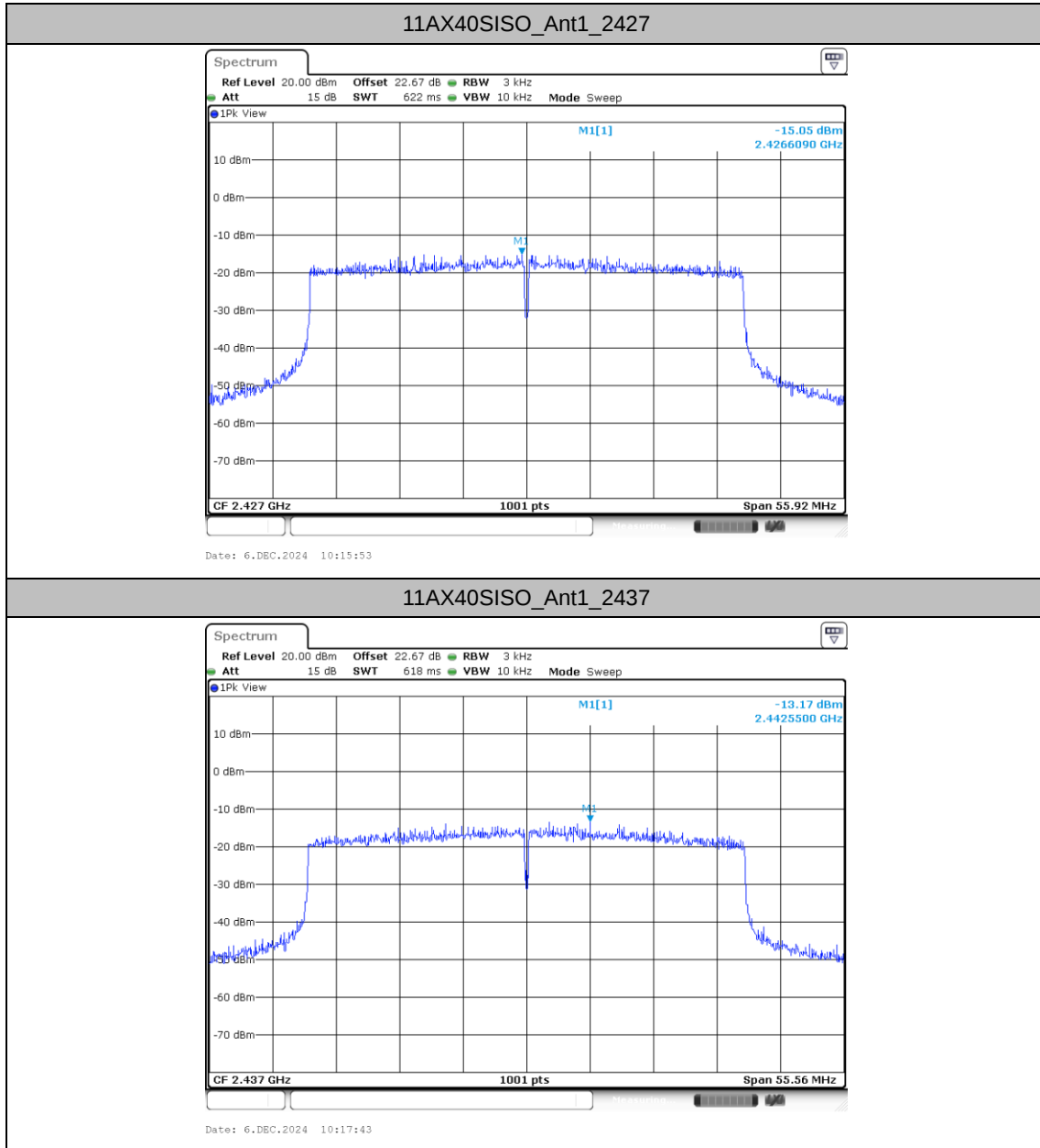


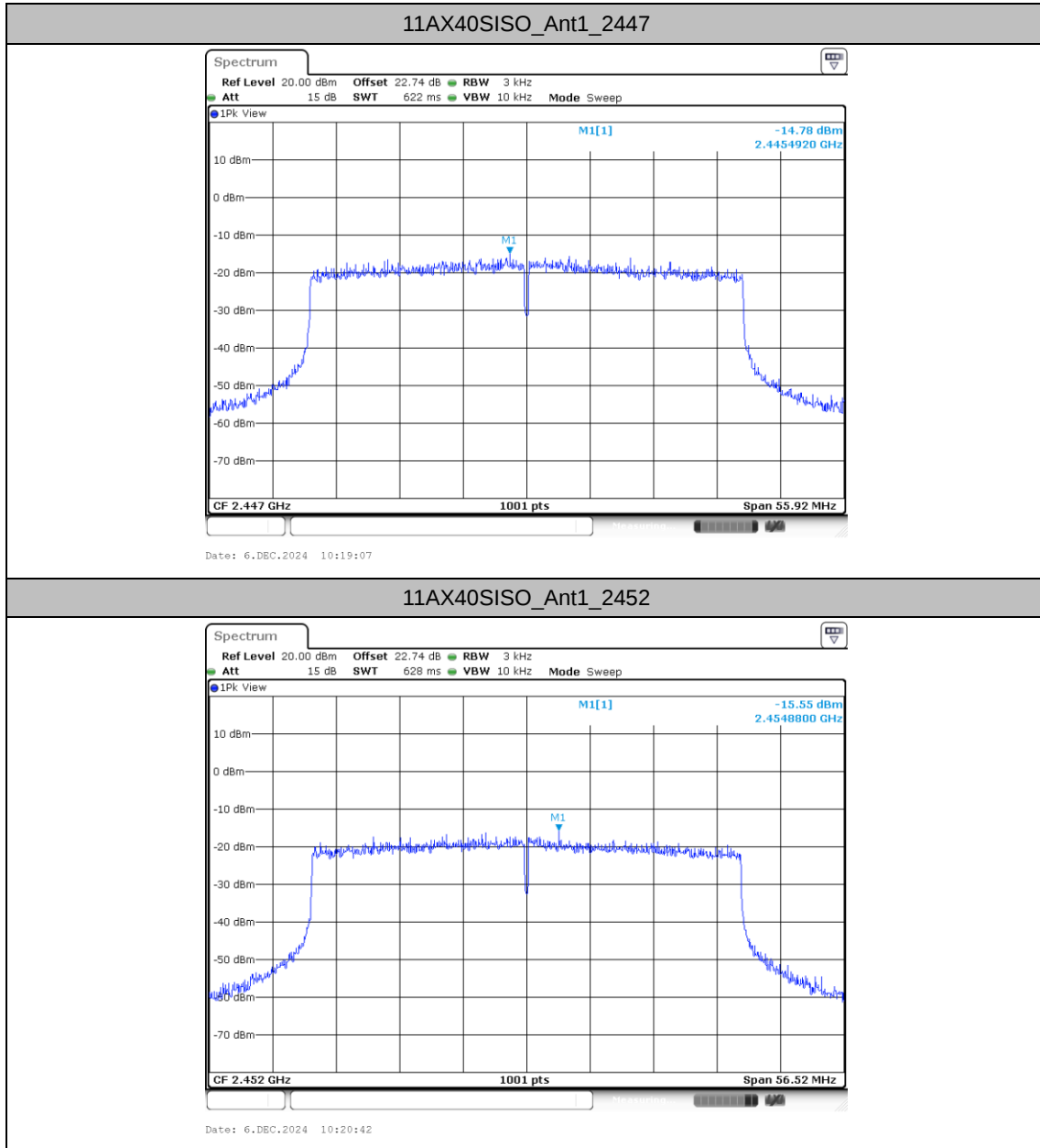














Reference level measurement

Test Result

TestMode	Antenna	Freq(MHz)	Max.Point[MHz]	Result[dBm/100KHz]
11B	Ant1	2412	2411.49	9.09
		2437	2436.49	9.86
		2462	2462.49	8.70
11G	Ant1	2412	2410.73	3.53
		2417	2415.73	7.60
		2437	2435.73	7.82
		2457	2458.25	7.70
		2462	2460.73	2.76
11N20SISO	Ant1	2412	2410.75	2.42
		2417	2419.50	7.15
		2437	2438.24	7.72
		2457	2455.74	6.84
		2462	2457.02	0.57
11N40SISO	Ant1	2422	2419.53	-1.44
		2427	2424.51	-1.43
		2437	2434.53	2.95
		2447	2444.48	1.11
		2452	2449.48	-0.80
11AX20SISO	Ant1	2412	2406.98	0.52
		2417	2418.27	6.26
		2437	2439.48	6.90
		2457	2455.70	5.47
		2462	2460.73	1.46
11AX40SISO	Ant1	2422	2419.49	-1.26
		2427	2424.49	0.48
		2437	2434.51	1.92
		2447	2444.49	0.24
		2452	2449.55	-0.65



Test Graphs

