



FCC RF Test Report

APPLICANT : Motorola Mobility LLC
EQUIPMENT : Mobile Cellular Phone
BRAND NAME : Motorola
MODEL NAME : XT2205-1, XT2205-2
FCC ID : IHDT56AE7
STANDARD : FCC Part 15 Subpart C §15.247
CLASSIFICATION : (DTS) Digital Transmission System
TEST DATE(S) : Apr. 24, 2022 ~ May 12, 2022

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

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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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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 3.03 dB at 2483.50 MHz
3.6	15.207	AC Conducted Emission	15.207(a)	Pass	Under limit 15.54 dB at 0.165 MHz
3.7	15.203 & 15.247(b)	Antenna Requirement	15.203 & 15.247(b)	Pass	-

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



1 General Description

1.1 Applicant

Motorola Mobility LLC
222 W,Merchandise Mart Plaza, Chicago IL 60654 USA

1.2 Manufacturer

Motorola Mobility LLC
222 W,Merchandise Mart Plaza, Chicago IL 60654 USA

1.3 Product Feature of Equipment Under Test

Product Feature	
Equipment	Mobile Cellular Phone
Brand Name	Motorola
Model Name	XT2205-1, XT2205-2
FCC ID	IHDT56AE7
IMEI Code	Conducted: 357910940014128 Conduction: 357910940014755 Radiation: 351910940014250
HW Version	DVT2
SW Version	S2ST32.48
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	MIMO <Ant.1+2> 802.11b : 24.82 dBm (0.3034 W) 802.11g : 28.65 dBm (0.7328 W) 802.11n HT20 : 28.59 dBm (0.7228 W) 802.11n HT40 : 28.25 dBm (0.6683 W) 802.11ac VHT20 : 28.34 dBm (0.6823 W) 802.11ac VHT40 : 27.65 dBm (0.5821 W) 802.11ax HE20 : 28.62 dBm (0.7278 W) 802.11ax HE40 : 27.76 dBm (0.5970 W)						
99% Occupied Bandwidth	802.11b : 13.87 MHz 802.11g : 17.62 MHz 802.11n HT20 : 18.38 MHz 802.11n HT40 : 37.56 MHz 802.11ax HE20 : 19.46 MHz 802.11ax HE20 : 38.20 MHz						
Antenna Type / Gain	Ant.1: Loop Antenna type with gain -4.0 dBi Ant 2: ILA Antenna type with gain -7.0 dBi						
Type of Modulation	802.11b : DSSS (DBPSK / DQPSK / CCK) 802.11g/n/ac/ax : OFDM (BPSK / QPSK / 16QAM / 64QAM / 256QAM / 1024QAM)						
Antenna Function Description	<table border="1"> <thead> <tr> <th></th> <th>Ant. 1</th> <th>Ant. 2</th> </tr> </thead> <tbody> <tr> <td>802.11 b/g/n/ac/ax MIMO</td> <td>V</td> <td>V</td> </tr> </tbody> </table>		Ant. 1	Ant. 2	802.11 b/g/n/ac/ax MIMO	V	V
	Ant. 1	Ant. 2					
802.11 b/g/n/ac/ax MIMO	V	V					

1. For 802.11n HT20/HT40 & 802.11ac VHT20/VHT40 mode, the whole testing have assessed only 802.11n HT20/HT40 by referring to the higher output power.
2. 802.11ax support OFDMA full RU tone and partial RU tone, both full RU and partial RU-left (for low CH) and partial RU-right (for high CH) test output power/PSD/RSE, the full RU power > partial RU, therefor the full RU perform full test and Partial RU verified power/PSD/RSE.
3. WIFI MIMO only support STBC by manufacturer declared.
4. Ant. 1/2 corresponds to ant. 2/9 in the EP report respectively.

1.5 Modification of EUT

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



1.6 Specification of Accessory

Specification of Accessory				
AC Adapter 1	Brand Name	Motorola(Salom)	Model Name	MC-301
AC Adapter 2	Brand Name	Motorola(Acbel)	Model Name	MC-301
Battery	Brand Name	Motorola(ATL)	Model Name	NF50
USB Cable 1	Brand Name	Motorola(Saibao)	Model Name	SC18D13215
USB Cable 2	Brand Name	Motorola(Cabletech)	Model Name	SC18D13216
USB Cable 3	Brand Name	Motorola(Luxshare)	Model Name	SC18D13217

1.7 Testing Location

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

Test Firm	Sporton International Inc. (Kunshan)		
Test Site Location	No. 1098, Pengxi North Road, Kunshan Economic Development Zone Jiangsu Province 215300 People's Republic of China TEL : +86-512-57900158 FAX : +86-512-57900958		
Test Site No.	Sporton Site No.	FCC Designation No.	FCC Test Firm Registration No.
	CO01-KS 03CH06-KS	CN1257	314309

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.
	TH01-SZ	CN1256	421272

Test data subcontracted: conducted test case in section 3.1~3.4 of this report



1.8 Test Software

Item	Site	Manufacturer	Name	Version
1.	03CH06-KS	AUDIX	E3	6.2009-8-24al
2.	CO01-KS	AUDIX	E3	6.2009-8-24

1.9 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
- ♦ 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 (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)
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.

MIMO Antenna

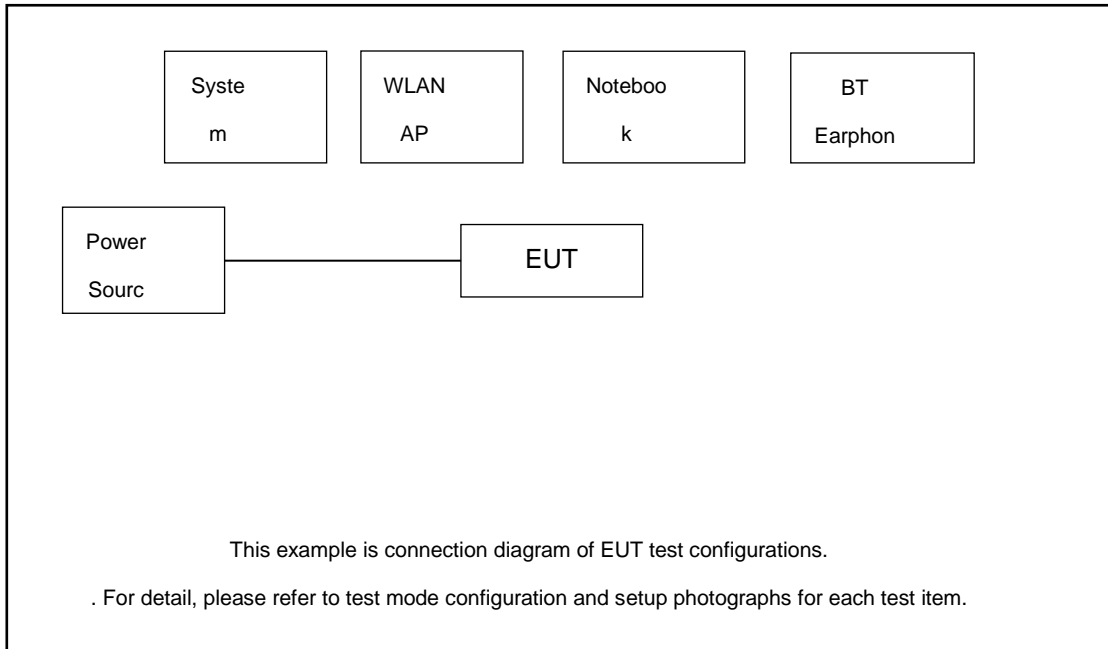
Modulation	Data Rate
802.11b	1 Mbps
802.11g	6 Mbps
802.11n HT20	MCS0
802.11n HT40	MCS0
802.11ax HE20	MCS0
802.11ax HE40	MCS0

RSE Co-location Mode:
WIFI 802. 11ax(HE20)_Tx_Ch11 RU106_Right + LTE_B30_BW_10M

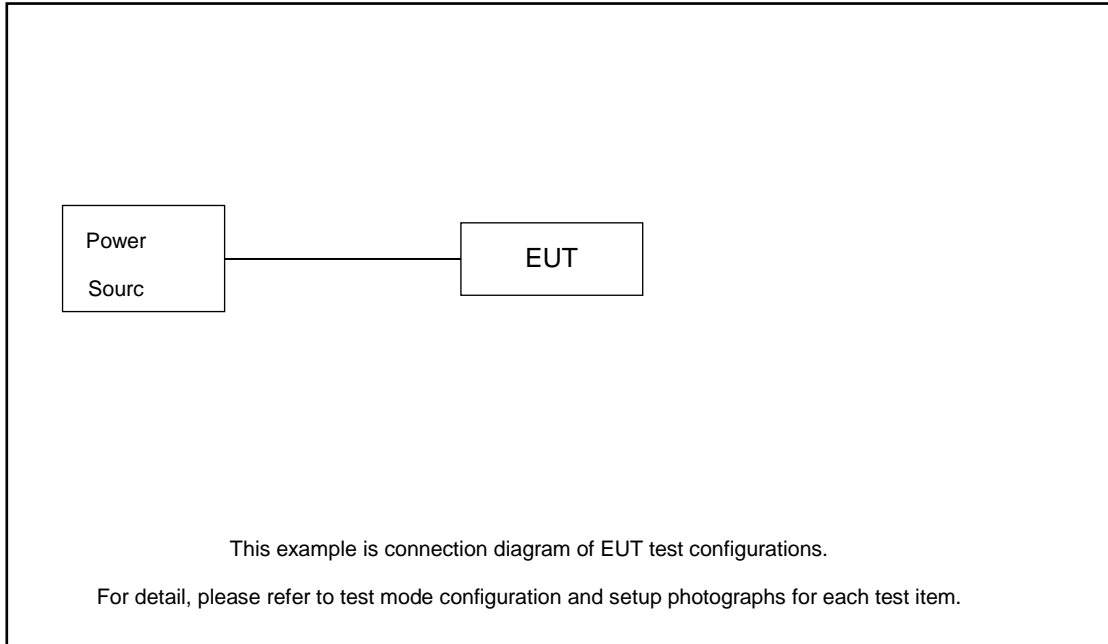
Test Cases	
AC Conducted Emission	Mode 1 :GSM 850 Idle + Bluetooth Link + WLAN Link (2.4G) + USB Cable 1(Charging from Adapter 1)
Remark:	
<ol style="list-style-type: none"> 1. The AC Conduction and RSE are tested with accessories from the worst case of Part 15B report. 2. RSE Co-location mode are combination from the worst WLAN TX mode and WWAN Link mode. 	

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.	System Simulator	Anritus	MT8821C	N/A	N/A	Unshielded, 1.8m
2.	BT Base Station	R&S	CBT	N/A	N/A	Unshielded, 1.8m
3.	WLAN AP	D-link	DIR-655	KA21R655B1	N/A	Unshielded, 1.8m
4.	Notebook	Lenovo	G480	QDS-BRCM1050I	N/A	AC I/P: Unshielded, 1.8 m DC O/P: Shielded, 1.8 m
5.	Bluetooth Earphone	Lenovo	LBH308	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 continuous transmit.

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

2.6 Measurement Results Explanation Example

For all conducted test items:

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

Example:

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

Offset = RF cable loss + attenuator factor.

Following shows an offset computation example with cable loss 2.12 dB and 20dB attenuator.

$$\begin{aligned} \text{Offset}(dB) &= \text{RF cable loss}(dB) + \text{attenuator factor}(dB). \\ &= 2.12 + 20 = 22.12 \text{ (dB)} \end{aligned}$$

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.

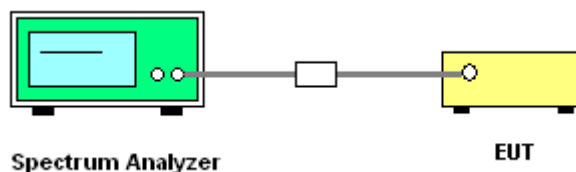
3.1.2 Measuring Instruments

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) = 300 kHz. 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) = 1MHz and set the Video bandwidth (VBW) = 3MHz.
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.

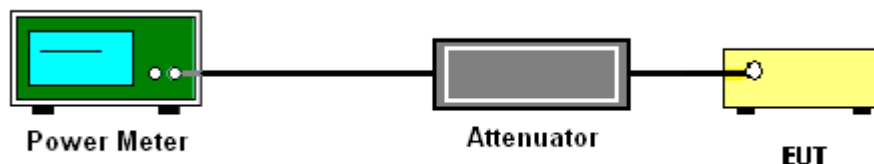
3.2.2 Measuring Instruments

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.
5. For MIMO mode, calculation method follows FCC KDB 662911 D01 Multiple Transmitter Output v02r01.

3.2.4 Test Setup



3.2.5 Test Result of Peak Output Power

Please refer to Appendix A.

3.2.6 Test Result of Average Output Power (Reporting Only)

Please refer to Appendix A.



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.
7. For MIMO mode, calculation method follows FCC KDB 662911 D01 Multiple Transmitter Output v02r01.

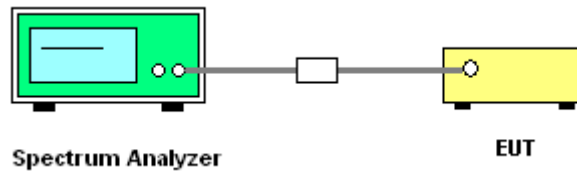
If measurements performed using method (2) plus $10 \log(N)$ exceeds the emission limit, the test should choose method (1) before declaring that the device fails the emission limit.

Method (1): Measure and sum the spectra across the outputs.

The total final Power Spectral Density is from a device with 2 transmitter outputs. The spectrum measurements of the individual outputs are all performed with the same span and number of points, the spectrum value in the first spectral bin of output 1 is summed with that in the first spectral bin of output 2 to obtain the value for the first frequency bin of the summed spectrum.

Method (2): Measure and add $10 \log(N)$ dB, where N is the number of outputs. (N=2)

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.

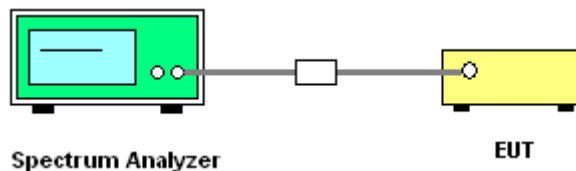
3.4.2 Measuring Instruments

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 11.13
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.

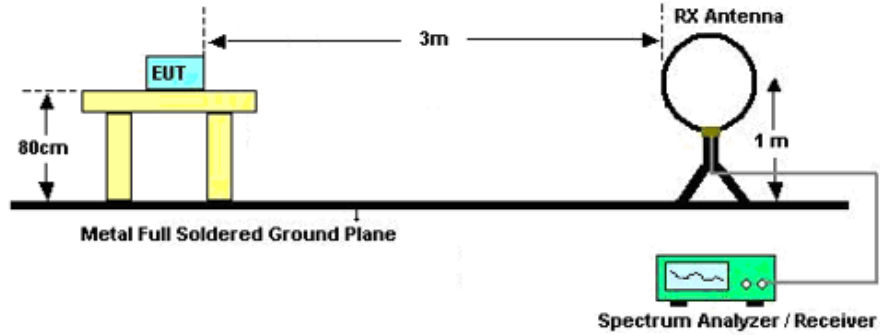


3.5.3 Test Procedures

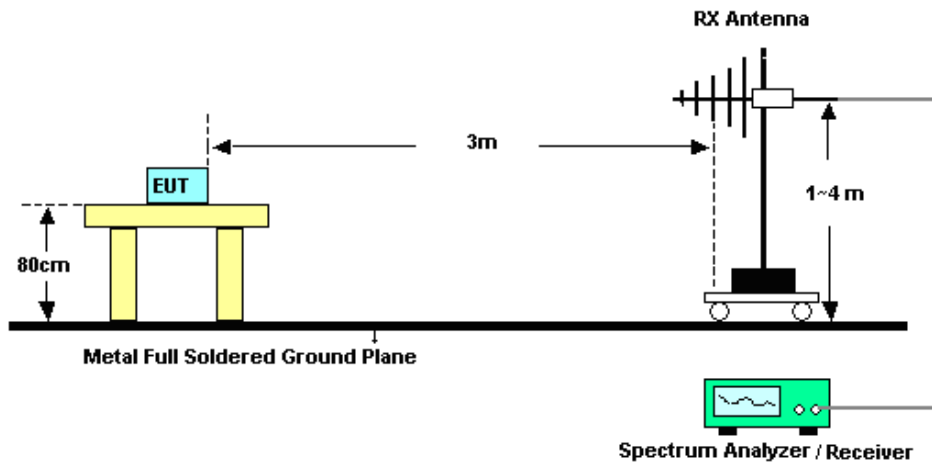
1. The testing follows ANSI C63.10-2013 clause 11.11 & 11.12
2. The EUT was arranged to its worst case and then tune the antenna tower (from 1 m to 4 m) and turntable (from 0 degree to 360 degrees) to find the maximum reading. A pre-amp and a high pass filter are used for the test in order to get better 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

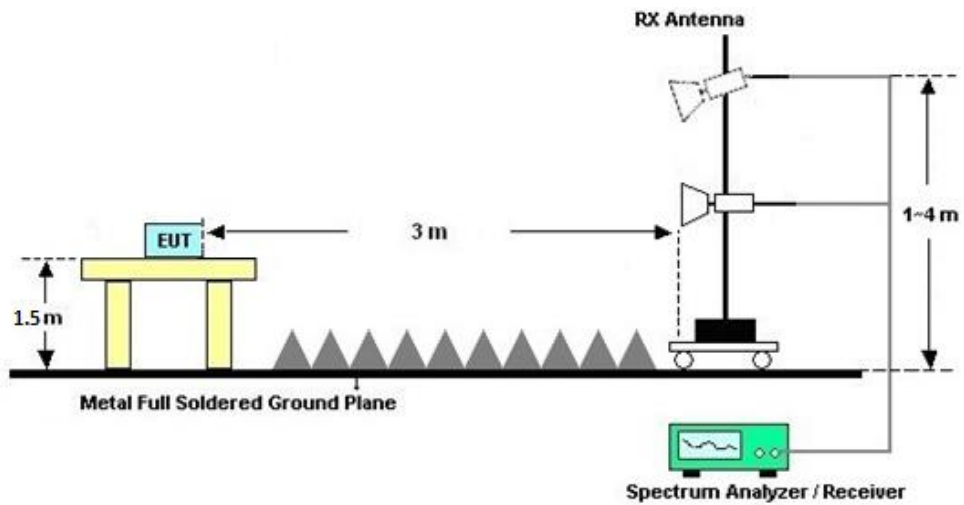
For radiated emissions below 30MHz



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 (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.

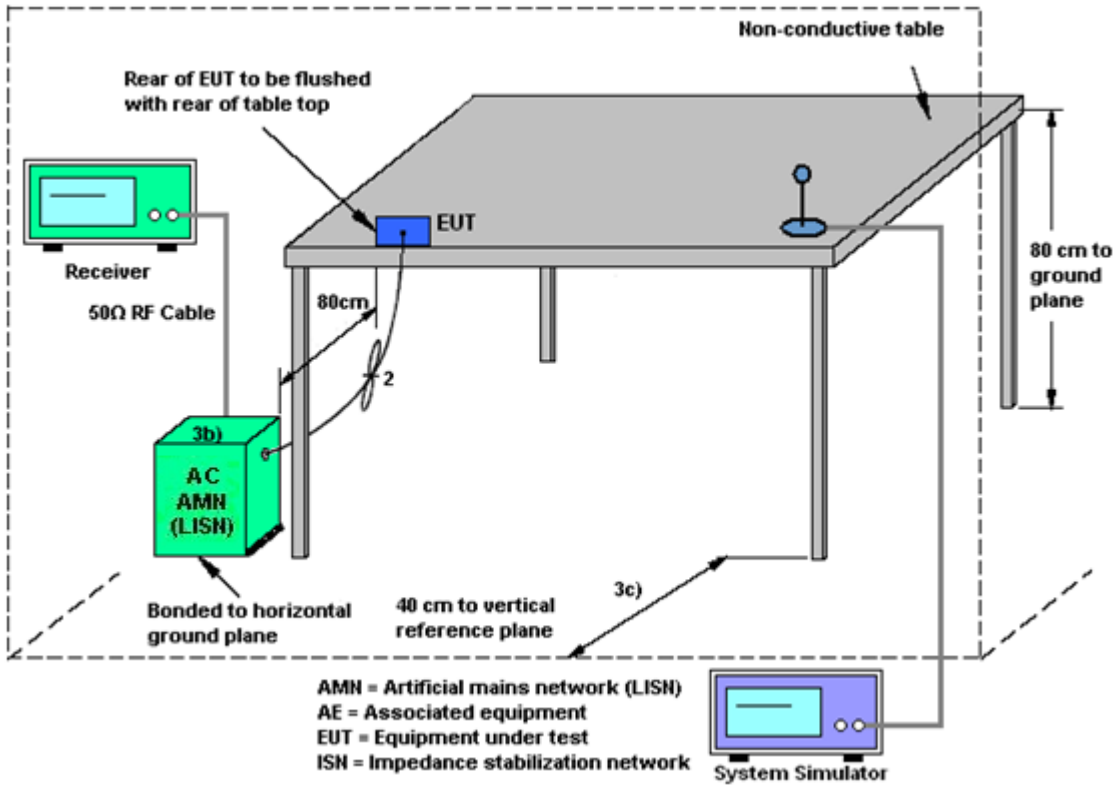
3.6.2 Measuring Instruments

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

<STBC Modes>

FCC KDB 662911 D01 Multiple Transmitter Output v02r01

Basic methodology with NANT transmit antennas, each with the same directional gain GANT dBi, being driven by NANT transmitter outputs of equal power, and If antenna gains are not equal and each transmit antenna can be driven by more than one spatial stream, directional gain may be calculated by either of the following two formulas:

Directional gain = GANT MAX + 10 log(NANT/Nss) dBi, where NANT=2, Nss =2.

<STBC Modes>						
	Ant. 1 (dBi)	Ant. 2 (dBi)	DG for Power (dBi)	DG for PSD (dBi)	Power Limit Reduction (dB)	PSD Limit Reduction (dB)
2.4 GHz	-4.00	-7.00	-4.00	-4.00	0.00	0.00

$Power\ Limit\ Reduction = DG(Power) - 6dBi, (min = 0)$

$PSD\ Limit\ Reduction = DG(PSD) - 6dBi, (min = 0)$



4 List of Measuring Equipment

Instrument	Manufacturer	Model No.	Serial No.	Characteristics	Calibration Date	Test Date	Due Date	Remark
Spectrum Analyzer	R&S	FSV40	101078	10Hz~40GHz	Apr. 07, 2022	Apr. 24, 2022~ May 11, 2022	Apr. 06, 2023	Conducted (TH01-SZ)
Power Meter	Anritsu	ML2495A	1542004	50MHz Bandwidth	Dec. 28, 2021	Apr. 24, 2022~ May 11, 2022	Dec. 27, 2022	Conducted (TH01-SZ)
Power Sensor	Anritsu	MA24440A	11707	50MHz~40GHz	Jun. 04, 2021	Apr. 24, 2022~ May 11, 2022	Jun.03, 2022	Conducted (TH01-SZ)
EMI Test Receiver	Keysight	N9038A	MY564000 04	3Hz~8.5GHz;M ax 30dBm	Oct. 16, 2021	May 12, 2022	Oct. 15, 2022	Radiation (03CH06-KS)
EXA Spectrum Analyzer	Keysight	N9010B	MY602421 26	10Hz-44GHz	Oct. 26, 2021	May 12, 2022	Oct. 25, 2022	Radiation (03CH06-KS)
Loop Antenna	R&S	HFH2-Z2	100321	9kHz~30MHz	Oct. 30, 2021	May 12, 2022	Oct. 29, 2022	Radiation (03CH06-KS)
Bilog Antenna	TeseQ	CBL6111D	49921	30MHz-1GHz	May 27, 2021	May 12, 2022	May 26, 2022	Radiation (03CH06-KS)
Double Ridge Horn Antenna	ETS-Lindgren	3117	00240138	1GHz~18GHz	Jul. 19, 2021	May 12, 2022	Jul. 18, 2022	Radiation (03CH06-KS)
SHF-EHF Horn	Com-power	AH-840	101093	18GHz~40GHz	Jan. 05, 2022	May 12, 2022	Jan. 04, 2023	Radiation (03CH06-KS)
Amplifier	SONOMA	310N	380827	9KHz ~1GHZ	Jul. 30, 2021	May 12, 2022	Jul. 29, 2022	Radiation (03CH06-KS)
Amplifier	MITEQ	EM18G40GG A	060728	18~40GHz	Jan. 05, 2022	May 12, 2022	Jan. 04, 2023	Radiation (03CH06-KS)
high gain Amplifier	MITEQ	AMF-7D-0010 1800-30-10P	2025788	1Ghz-18Ghz	Jul. 30, 2021	May 12, 2022	Jul. 29, 2022	Radiation (03CH06-KS)
Amplifier	Keysight	83017A	MY532703 19	500MHz~26.5G Hz	Oct. 14, 2021	May 12, 2022	Oct. 13, 2022	Radiation (03CH06-KS)
AC Power Source	Chroma	61601	F1040900 04	N/A	NCR	May 12, 2022	NCR	Radiation (03CH06-KS)
Turn Table	ChamPro	EM 1000-T	060762-T	0~360 degree	NCR	May 12, 2022	NCR	Radiation (03CH06-KS)
Antenna Mast	ChamPro	EM 1000-A	060762-A	1 m~4 m	NCR	May 12, 2022	NCR	Radiation (03CH06-KS)
EMI Receiver	R&S	ESCI7	100768	9kHz~7GHz;	Apr. 20, 2022	May 05, 2022	Apr. 19, 2023	Conduction (CO01-KS)
AC LISN (for auxiliary equipment)	MessTec	AN3016	060103	9kHz~30MHz	Oct. 14, 2021	May 05, 2022	Oct. 13, 2022	Conduction (CO01-KS)
AC LISN	R&S	ENV216	100334	9kHz~30MHz	Oct. 14, 2021	May 05, 2022	Oct. 13, 2022	Conduction (CO01-KS)
AC Power Source	Chroma	61602	ABP00000 0811	AC 0V~300V, 45Hz~1000Hz	Oct. 14, 2021	May 05, 2022	Oct. 13, 2022	Conduction (CO01-KS)

NCR: No Calibration Required



5 Uncertainty of Evaluation

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

Uncertainty of Conducted Measurement

Test Item	Uncertainty
Conducted Power	1.34 dB
Conducted Emissions	1.34 dB
Occupied Channel Bandwidth	0.012 MHz
Conducted Power Spectral Density	1.32 dB

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

Measuring Uncertainty for a Level of Confidence of 95% (U = 2Uc(y))	2.94dB
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Uncertainty of Radiated Emission Measurement (30 MHz ~ 1000 MHz)

Measuring Uncertainty for a Level of Confidence of 95% (U = 2Uc(y))	5.0dB
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Uncertainty of Radiated Emission Measurement (1000 MHz ~ 18000 MHz)

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

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



Appendix A. Conducted Test Results

Conducted Test Results

Test Engineer:	Tang ZhaoYang	Temperature:	21~25	°C
Test Date:	2022/04/24~2022/05/11	Relative Humidity:	51~54	%

TEST RESULTS DATA
Peak Output Power

2.4GHz Band MIMO																
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
					Ant0	Ant1	SUM	Ant0	Ant1	Ant0	Ant1	Ant0	Ant1	Ant0	Ant1	
11b	1Mbps	2	1	2412	21.66	21.35	24.52	30.00		-4.00		20.52		36.00	Pass	
11b	1Mbps	2	6	2437	21.82	21.79	24.82	30.00		-4.00		20.82		36.00	Pass	
11b	1Mbps	2	11	2462	21.36	20.85	24.12	30.00		-4.00		20.12		36.00	Pass	
11g	6Mbps	2	1	2412	25.57	24.52	28.09	30.00		-4.00		24.09		36.00	Pass	
11g	6Mbps	2	6	2437	25.95	25.31	28.65	30.00		-4.00		24.65		36.00	Pass	
11g	6Mbps	2	11	2462	25.26	24.63	27.97	30.00		-4.00		23.97		36.00	Pass	
HT20	MCS0	2	1	2412	25.42	24.34	27.92	30.00		-4.00		23.92		36.00	Pass	
HT20	MCS0	2	6	2437	25.90	25.23	28.59	30.00		-4.00		24.59		36.00	Pass	
HT20	MCS0	2	10	2457	25.36	24.83	28.11	30.00		-4.00		24.11		36.00	Pass	
HT20	MCS0	2	11	2462	25.01	24.22	27.64	30.00		-4.00		23.64		36.00	Pass	
HT40	MCS0	2	3	2422	25.68	24.74	28.25	30.00		-4.00		24.25		36.00	Pass	
HT40	MCS0	2	6	2437	25.49	24.95	28.24	30.00		-4.00		24.24		36.00	Pass	
HT40	MCS0	2	7	2442	25.27	24.83	28.07	30.00		-4.00		24.07		36.00	Pass	
HT40	MCS0	2	8	2447	24.06	24.24	27.16	30.00		-4.00		23.16		36.00	Pass	
HT40	MCS0	2	9	2452	24.89	23.14	27.11	30.00		-4.00		23.11		36.00	Pass	
VHT20	MCS0	2	1	2412	25.13	24.16	27.68	30.00		-4.00		23.68		36.00	Pass	
VHT20	MCS0	2	6	2437	25.65	24.99	28.34	30.00		-4.00		24.34		36.00	Pass	
VHT20	MCS0	2	10	2457	25.12	24.67	27.91	30.00		-4.00		23.91		36.00	Pass	
VHT20	MCS0	2	11	2462	24.79	23.85	27.36	30.00		-4.00		23.36		36.00	Pass	
VHT40	MCS0	2	3	2422	24.82	24.46	27.65	30.00		-4.00		23.65		36.00	Pass	
VHT40	MCS0	2	6	2437	24.88	24.39	27.65	30.00		-4.00		23.65		36.00	Pass	
VHT40	MCS0	2	7	2442	24.78	23.96	27.40	30.00		-4.00		23.40		36.00	Pass	
VHT40	MCS0	2	8	2447	23.65	23.29	26.48	30.00		-4.00		22.48		36.00	Pass	
VHT40	MCS0	2	9	2452	24.19	22.56	26.46	30.00		-4.00		22.46		36.00	Pass	

Note: Measured power (dBm) has offset with cable loss.

TEST RESULTS DATA
Average Output Power

2.4GHz Band MIMO											
Mod.	Data Rate	NTX	CH.	Freq. (MHz)	Average Conducted Power (dBm)			DG (dBi)		EIRP Power (dBm)	
					Ant0	Ant1	SUM	Ant0	Ant1	Ant0	Ant1
11b	1Mbps	2	1	2412	19.80	19.70	22.76	-4.00		18.76	
11b	1Mbps	2	6	2437	20.00	19.90	22.96	-4.00		18.96	
11b	1Mbps	2	11	2462	19.10	18.70	21.91	-4.00		17.91	
11g	6Mbps	2	1	2412	18.40	18.40	21.41	-4.00		17.41	
11g	6Mbps	2	6	2437	18.70	18.60	21.66	-4.00		17.66	
11g	6Mbps	2	11	2462	16.80	15.90	19.38	-4.00		15.38	
HT20	MCS0	2	1	2412	17.00	17.00	20.01	-4.00		16.01	
HT20	MCS0	2	6	2437	18.70	18.50	21.61	-4.00		17.61	
HT20	MCS0	2	10	2457	18.10	17.50	20.82	-4.00		16.82	
HT20	MCS0	2	11	2462	14.50	13.60	17.08	-4.00		13.08	
HT40	MCS0	2	3	2422	15.80	15.90	18.86	-4.00		14.86	
HT40	MCS0	2	6	2437	16.10	16.00	19.06	-4.00		15.06	
HT40	MCS0	2	7	2442	14.50	14.60	17.56	-4.00		13.56	
HT40	MCS0	2	8	2447	12.20	12.10	15.16	-4.00		11.16	
HT40	MCS0	2	9	2452	13.40	12.00	15.77	-4.00		11.77	
VHT20	MCS0	2	1	2412	17.00	16.90	19.96	-4.00		15.96	
VHT20	MCS0	2	6	2437	18.40	18.20	21.31	-4.00		17.31	
VHT20	MCS0	2	10	2457	17.90	17.30	20.62	-4.00		16.62	
VHT20	MCS0	2	11	2462	14.30	13.50	16.93	-4.00		12.93	
VHT40	MCS0	2	3	2422	15.50	15.80	18.66	-4.00		14.66	
VHT40	MCS0	2	6	2437	15.90	16.00	18.96	-4.00		14.96	
VHT40	MCS0	2	7	2442	14.40	14.50	17.46	-4.00		13.46	
VHT40	MCS0	2	8	2447	12.20	12.00	15.11	-4.00		11.11	
VHT40	MCS0	2	9	2452	13.10	11.70	15.47	-4.00		11.47	

Note: Measured power (dBm) has offset with cable loss.

TEST RESULTS DATA
Peak Output Power

2.4GHz Band MIMO																	
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
						Ant0	Ant1	SUM	Ant0	Ant1	Ant0	Ant1	Ant0	Ant1	Ant0	Ant1	
HE20	MCS0	2	1	2412	Full	24.57	23.72	27.18	30.00		-4.00	23.18		36.00		Pass	
HE20	MCS0	2	1	2412	26/0	15.15	16.32	18.78	30.00		-4.00	14.78		36.00		Pass	
HE20	MCS0	2	1	2412	52/37	19.44	20.17	22.83	30.00		-4.00	18.83		36.00		Pass	
HE20	MCS0	2	1	2412	106/53	22.25	22.79	25.54	30.00		-4.00	21.54		36.00		Pass	
HE20	MCS0	2	2	2417	Full	25.53	24.38	28.00	30.00		-4.00	24.00		36.00		Pass	
HE20	MCS0	2	6	2437	Full	25.93	25.27	28.62	30.00		-4.00	24.62		36.00		Pass	
HE20	MCS0	2	10	2457	Full	25.02	24.71	27.88	30.00		-4.00	23.88		36.00		Pass	
HE20	MCS0	2	11	2462	Full	23.51	22.81	26.18	30.00		-4.00	22.18		36.00		Pass	
HE20	MCS0	2	11	2462	26/8	14.66	13.73	17.23	30.00		-4.00	13.23		36.00		Pass	
HE20	MCS0	2	11	2462	52/40	18.41	17.56	21.02	30.00		-4.00	17.02		36.00		Pass	
HE20	MCS0	2	11	2462	106/54	21.19	20.41	23.83	30.00		-4.00	19.83		36.00		Pass	
HE40	MCS0	2	3	2422	Full	24.45	23.62	27.07	30.00		-4.00	23.07		36.00		Pass	
HE40	MCS0	2	3	2422	242/61	20.86	21.23	24.06	30.00		-4.00	20.06		36.00		Pass	
HE40	MCS0	2	6	2437	Full	24.94	24.55	27.76	30.00		-4.00	23.76		36.00		Pass	
HE40	MCS0	2	7	2442	Full	24.77	24.43	27.61	30.00		-4.00	23.61		36.00		Pass	
HE40	MCS0	2	8	2447	Full	23.24	23.53	26.40	30.00		-4.00	22.40		36.00		Pass	
HE40	MCS0	2	9	2452	Full	23.98	22.39	26.27	30.00		-4.00	22.27		36.00		Pass	
HE40	MCS0	2	9	2452	242/62	19.52	19.05	22.30	30.00		-4.00	18.30		36.00		Pass	

Note: Measured power (dBm) has offset with cable loss.

TEST RESULTS DATA
Average Output Power

2.4GHz Band MIMO												
Mod.	Data Rate	NTX	CH.	Freq. (MHz)	RU Config.	Average Conducted Power (dBm)			DG (dBi)		EIRP Power (dBm)	
						Ant0	Ant1	SUM	Ant0	Ant1	Ant0	Ant1
HE20	MCS0	2	1	2412	Full	14.90	15.10	18.01	-4.00		14.01	
HE20	MCS0	2	1	2412	26/0	5.14	5.79	8.49	-4.00		4.49	
HE20	MCS0	2	1	2412	52/37	7.85	8.63	11.27	-4.00		7.27	
HE20	MCS0	2	1	2412	106/53	11.71	12.07	14.90	-4.00		10.90	
HE20	MCS0	2	2	2417	Full	18.20	18.30	21.26	-4.00		17.26	
HE20	MCS0	2	6	2437	Full	19.00	18.90	21.96	-4.00		17.96	
HE20	MCS0	2	10	2457	Full	16.30	16.00	19.16	-4.00		15.16	
HE20	MCS0	2	11	2462	Full	13.60	12.50	16.10	-4.00		12.10	
HE20	MCS0	2	11	2462	26/8	3.46	1.74	5.26	-4.00		1.26	
HE20	MCS0	2	11	2462	52/40	6.90	5.30	9.18	-4.00		5.18	
HE20	MCS0	2	11	2462	106/54	9.73	8.45	12.15	-4.00		8.15	
HE40	MCS0	2	3	2422	Full	14.20	14.30	17.26	-4.00		13.26	
HE40	MCS0	2	3	2422	242/61	10.25	10.55	13.41	-4.00		9.41	
HE40	MCS0	2	6	2437	Full	15.50	15.60	18.56	-4.00		14.56	
HE40	MCS0	2	7	2442	Full	14.30	14.20	17.26	-4.00		13.26	
HE40	MCS0	2	8	2447	Full	12.00	12.20	15.11	-4.00		11.11	
HE40	MCS0	2	9	2452	Full	14.10	12.60	16.42	-4.00		12.42	
HE40	MCS0	2	9	2452	242/62	9.96	8.16	12.16	-4.00		8.16	

Note: Measured power (dBm) has offset with cable loss.



DTS Bandwidth

Test Result

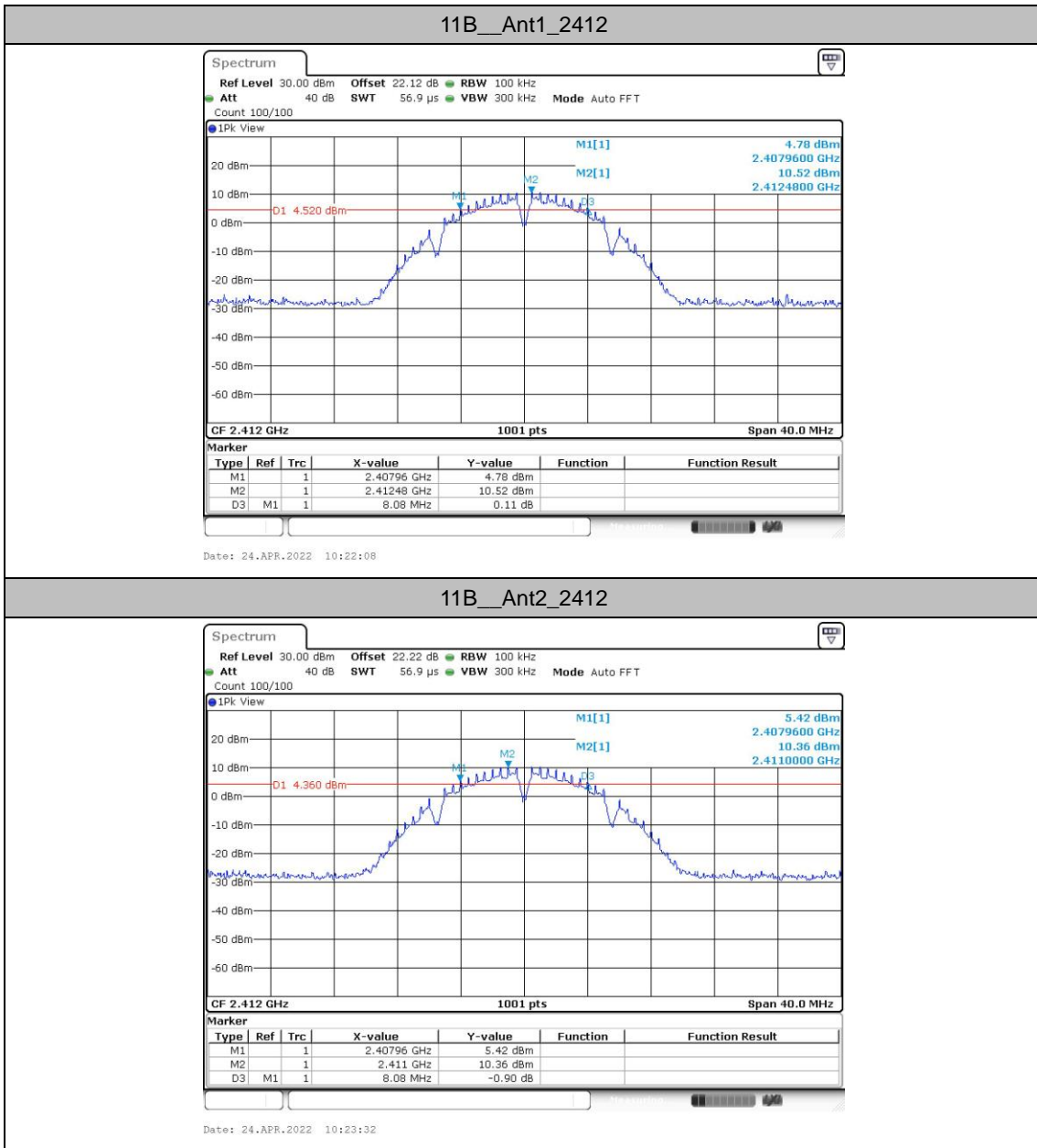
TestMode	Antenna	Freq(MHz)	DTS BW [MHz]	FL[MHz]	FH[MHz]	Limit[MHz]	Verdict
11B	Ant1	2412	8.08	2407.96	2416.04	0.5	PASS
	Ant2	2412	8.08	2407.96	2416.04	0.5	PASS
	Ant1	2437	8.04	2432.96	2441.00	0.5	PASS
	Ant2	2437	8.04	2432.96	2441.00	0.5	PASS
	Ant1	2462	8.04	2457.96	2466.00	0.5	PASS
	Ant2	2462	8.04	2457.96	2466.00	0.5	PASS
11G	Ant1	2412	15.32	2404.44	2419.76	0.5	PASS
	Ant2	2412	16.32	2403.84	2420.16	0.5	PASS
	Ant1	2437	15.68	2429.44	2445.12	0.5	PASS
	Ant2	2437	16.32	2428.84	2445.16	0.5	PASS
	Ant1	2462	16.04	2454.08	2470.12	0.5	PASS
	Ant2	2462	16.32	2453.84	2470.16	0.5	PASS
11N20MIMO	Ant1	2412	16.08	2404.44	2420.52	0.5	PASS
	Ant2	2412	17.52	2403.24	2420.76	0.5	PASS
	Ant1	2437	16.52	2428.60	2445.12	0.5	PASS
	Ant2	2437	16.92	2428.84	2445.76	0.5	PASS
	Ant1	2462	16.92	2453.48	2470.40	0.5	PASS
	Ant2	2462	17.60	2453.20	2470.80	0.5	PASS
11N40MIMO	Ant1	2422	35.76	2404.40	2440.16	0.5	PASS
	Ant2	2422	35.76	2404.40	2440.16	0.5	PASS
	Ant1	2437	35.20	2419.40	2454.60	0.5	PASS
	Ant2	2437	35.36	2419.40	2454.76	0.5	PASS
	Ant1	2452	35.20	2434.40	2469.60	0.5	PASS
	Ant2	2452	35.76	2433.84	2469.60	0.5	PASS

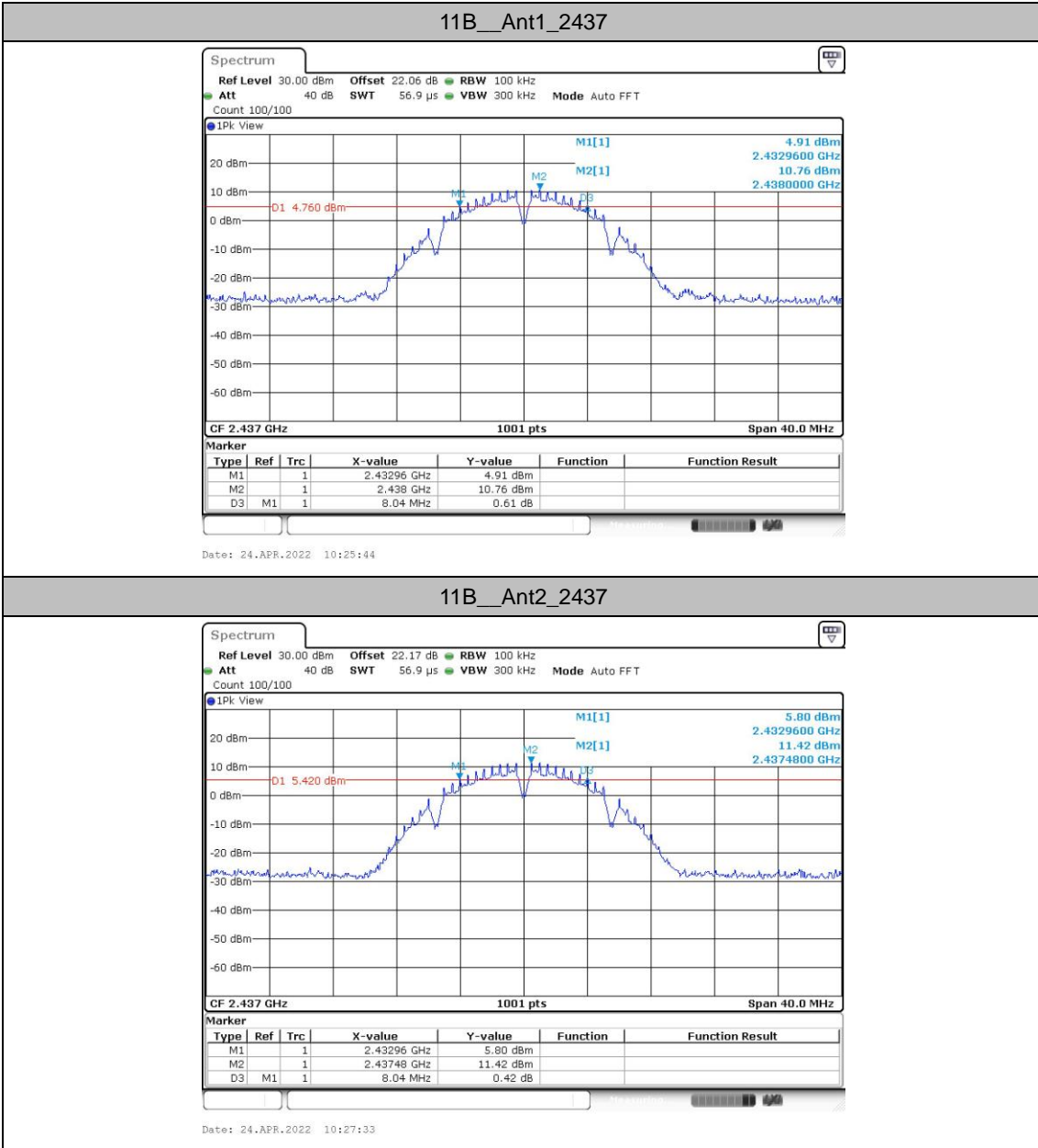


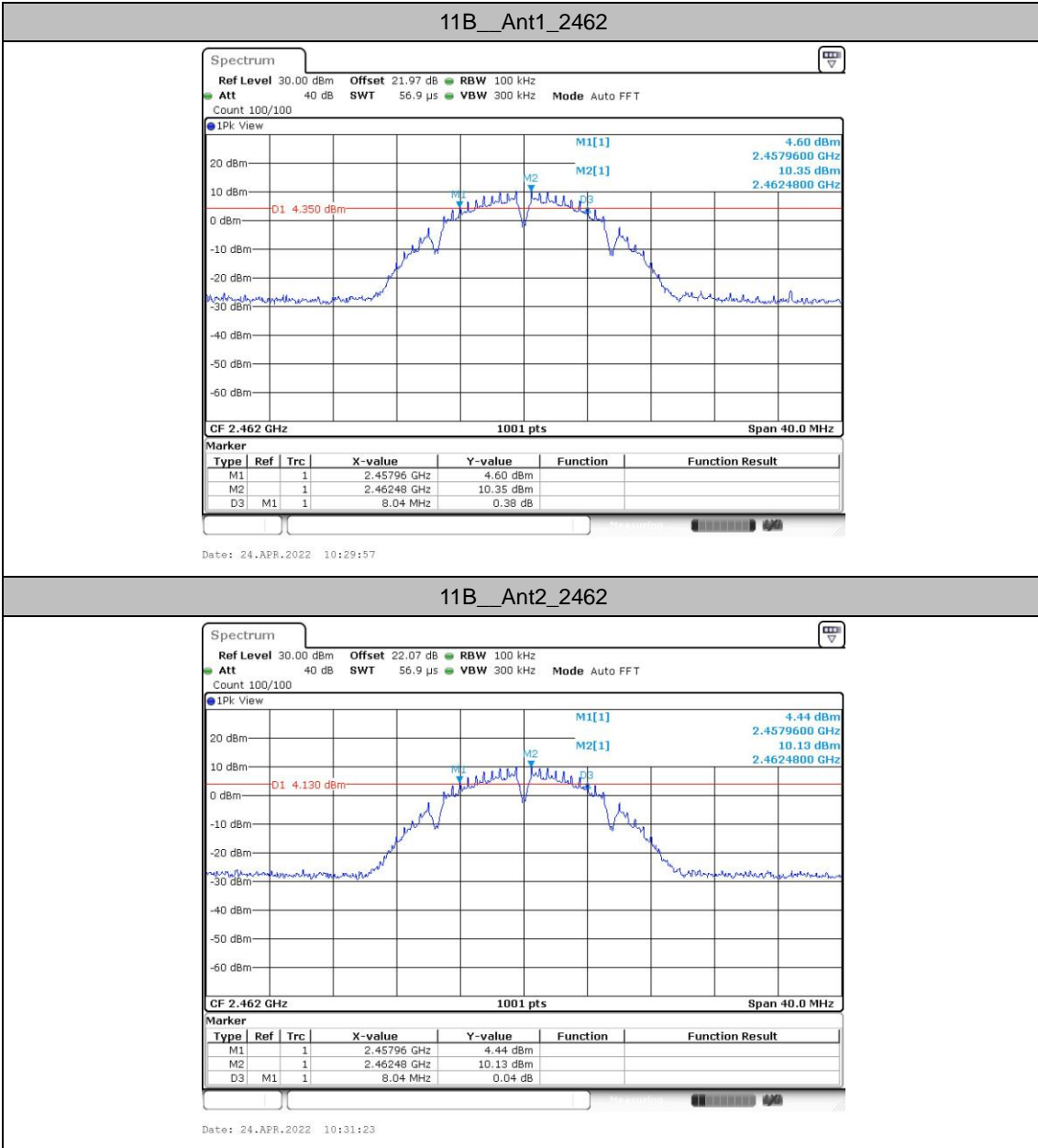
11AX20MIMO	Ant1	2412	17.52	2403.52	2421.04	0.5	PASS
	Ant2	2412	18.28	2402.96	2421.24	0.5	PASS
	Ant1	2437	16.84	2429.20	2446.04	0.5	PASS
	Ant2	2437	18.00	2428.20	2446.20	0.5	PASS
	Ant1	2462	18.56	2452.72	2471.28	0.5	PASS
	Ant2	2462	18.28	2452.72	2471.00	0.5	PASS
11AX40MIMO	Ant1	2422	36.56	2404.40	2440.96	0.5	PASS
	Ant2	2422	37.12	2403.76	2440.88	0.5	PASS
	Ant1	2437	35.20	2419.40	2454.60	0.5	PASS
	Ant2	2437	35.20	2419.40	2454.60	0.5	PASS
	Ant1	2452	36.88	2433.04	2469.92	0.5	PASS
	Ant2	2452	35.28	2434.40	2469.68	0.5	PASS

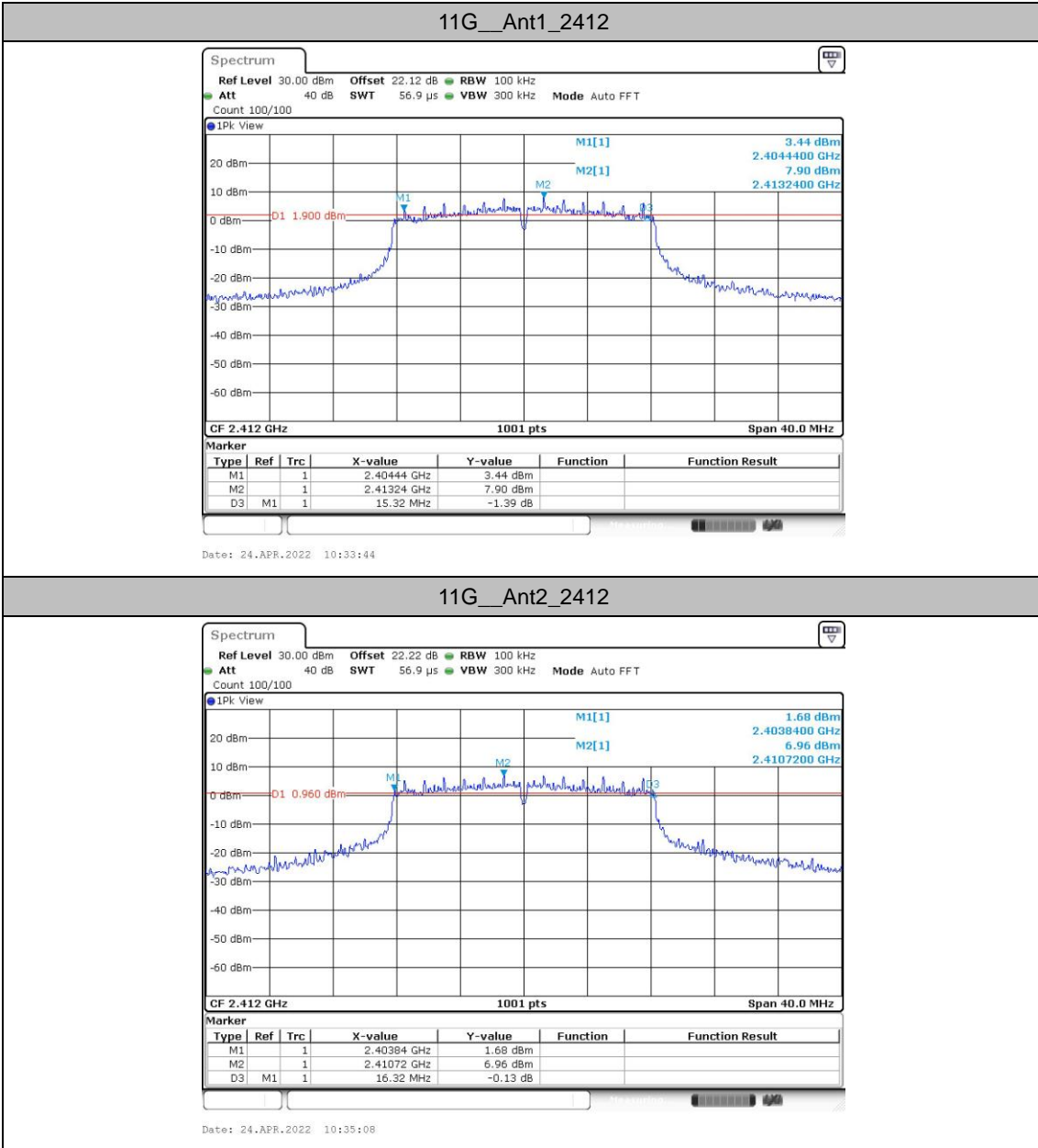


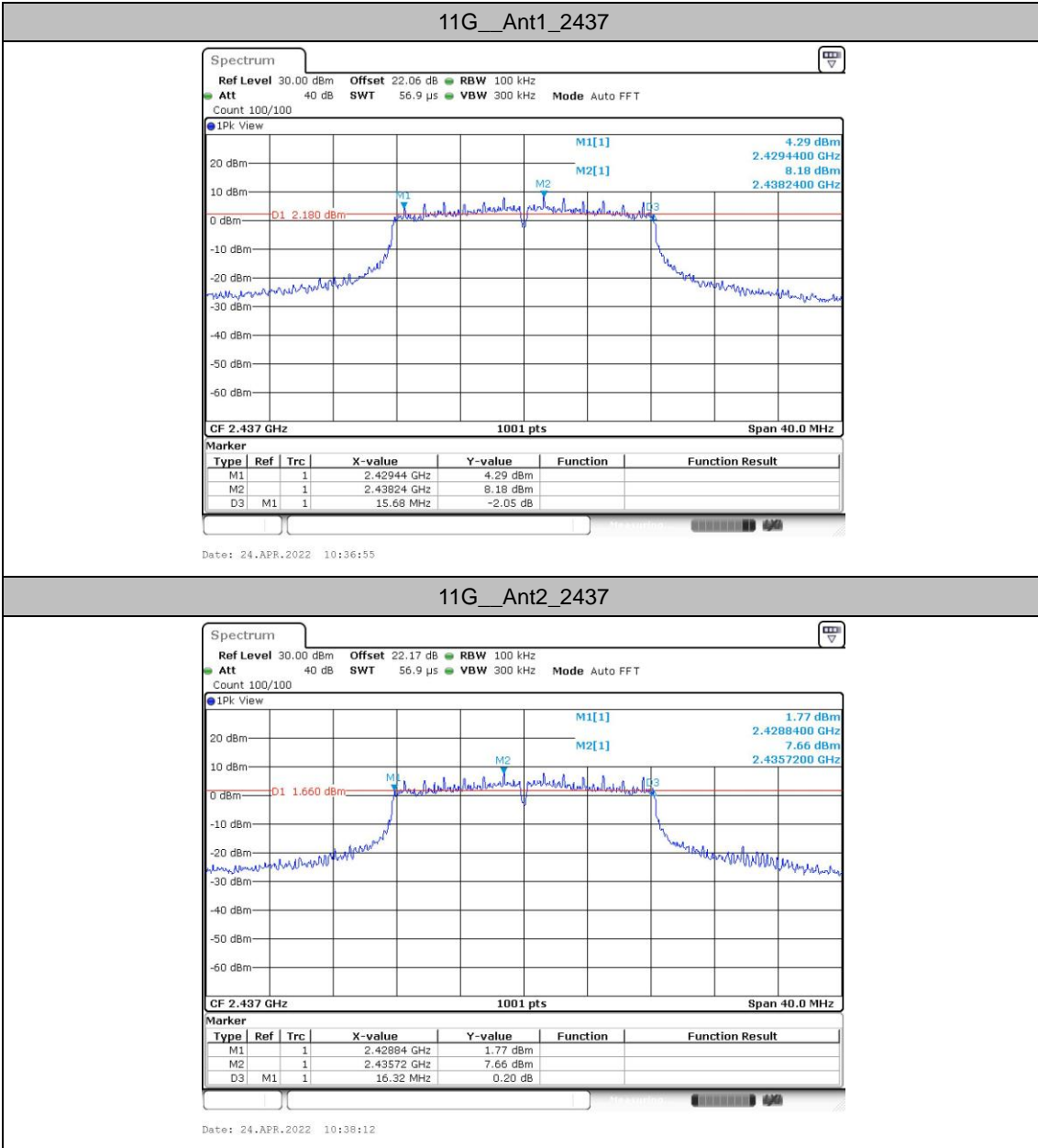
Test Graphs

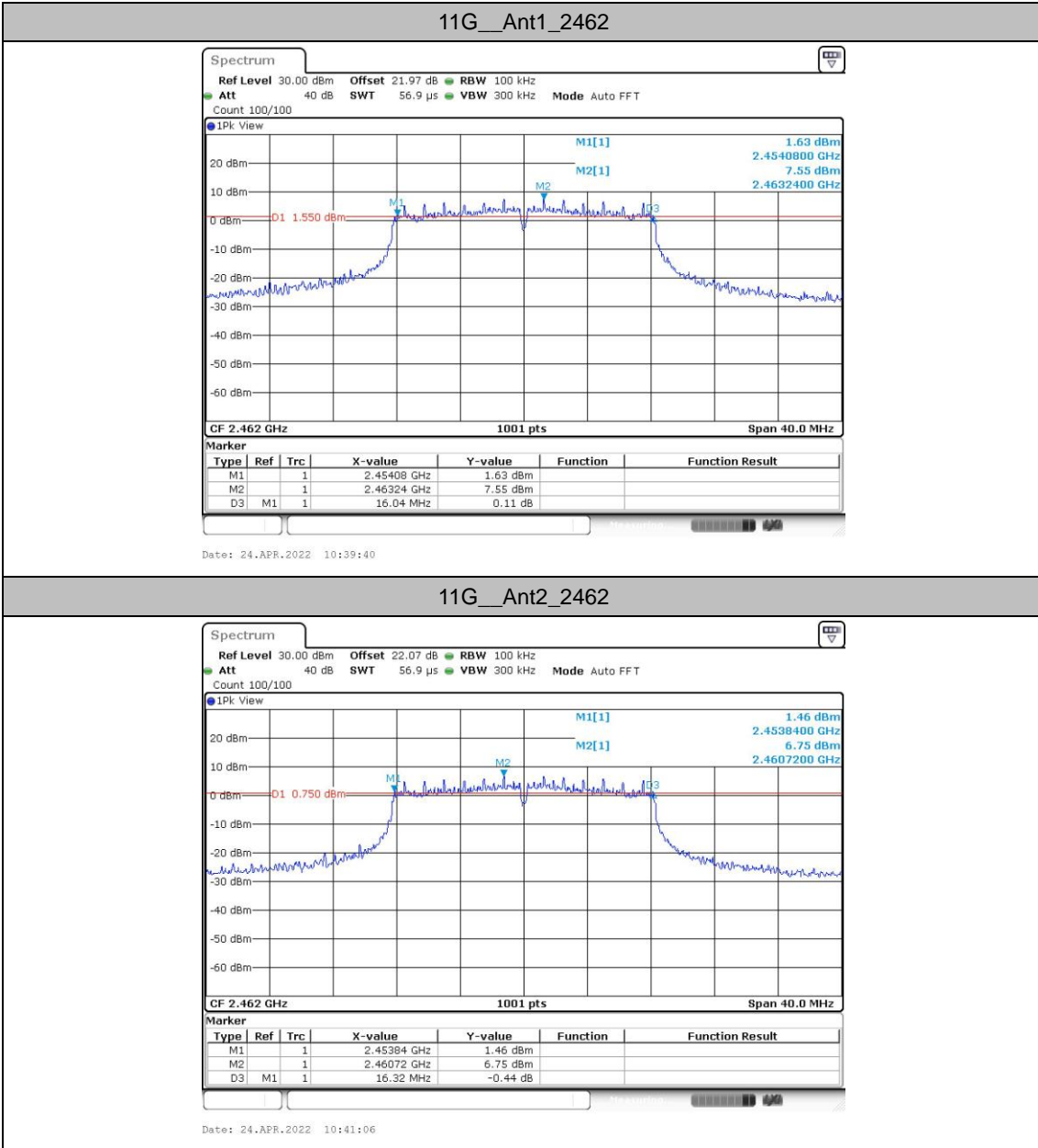


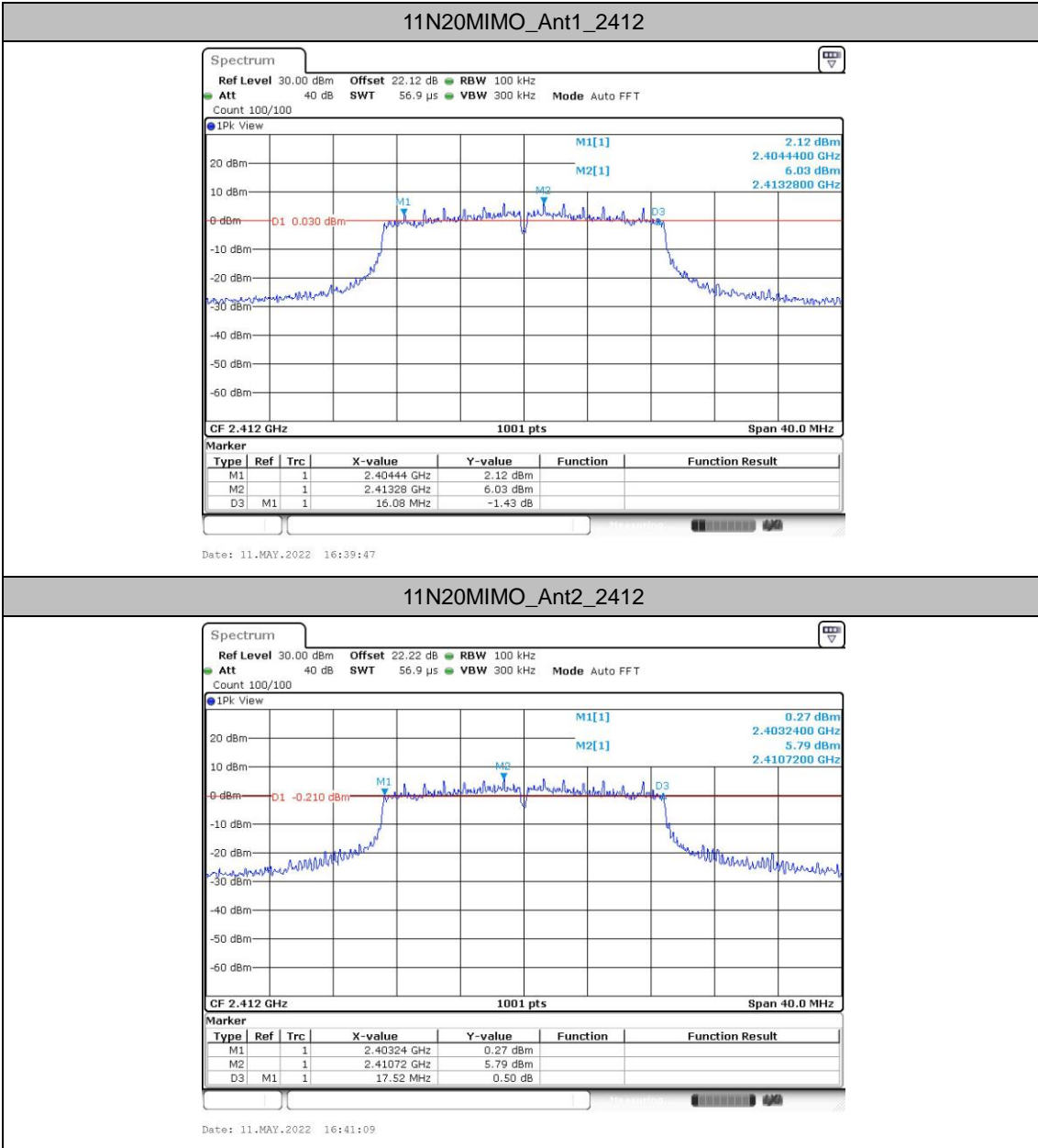


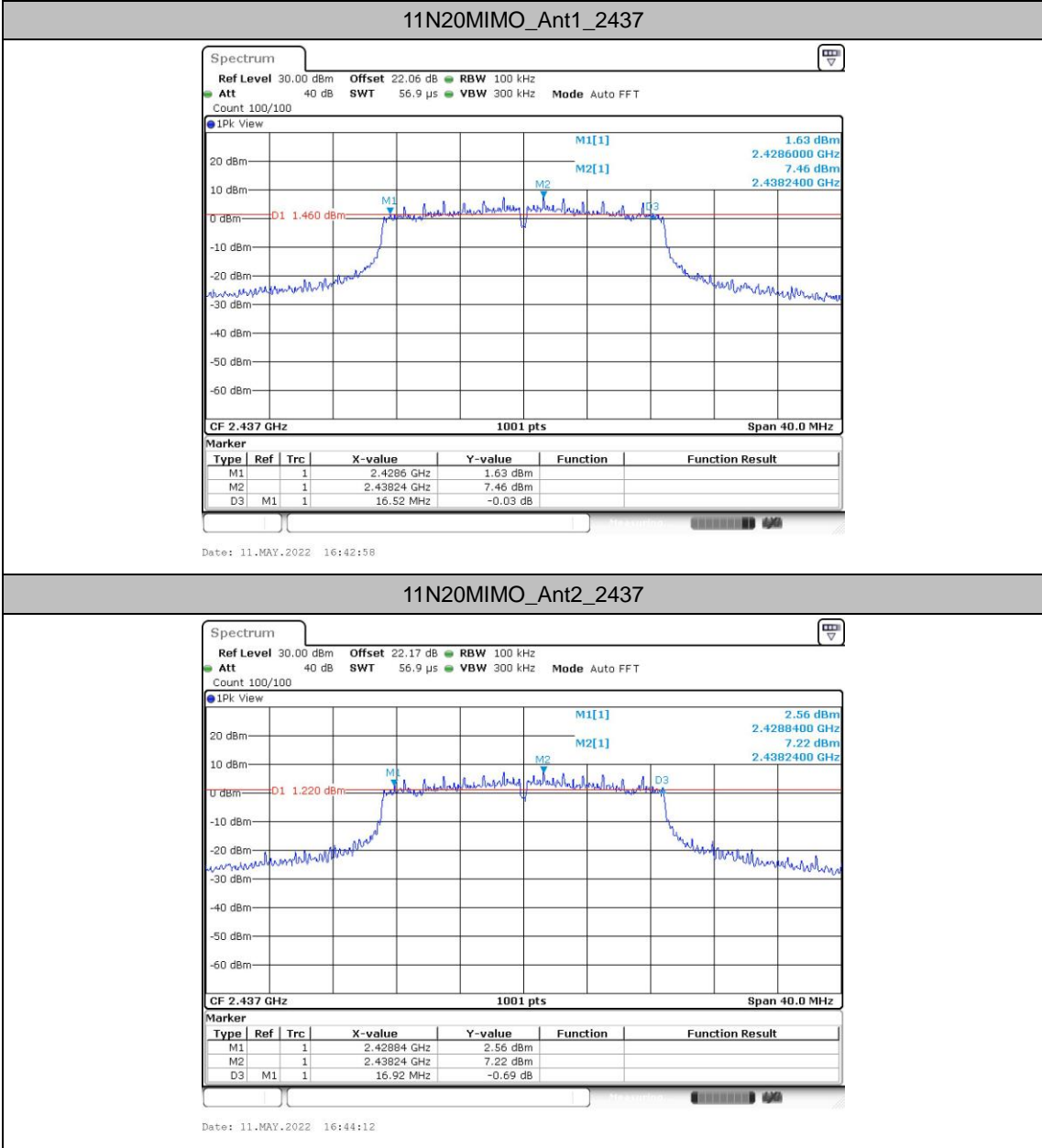


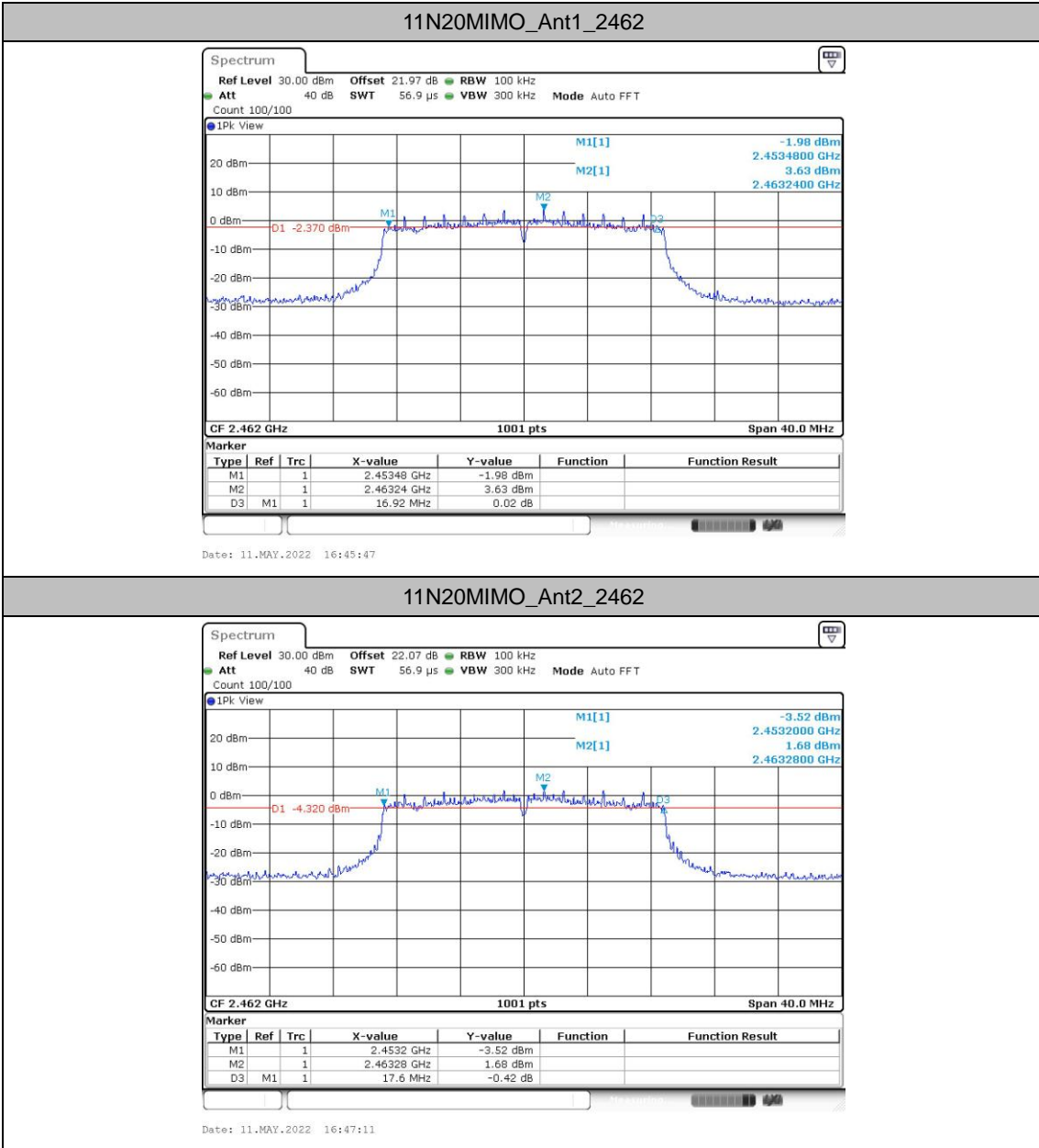


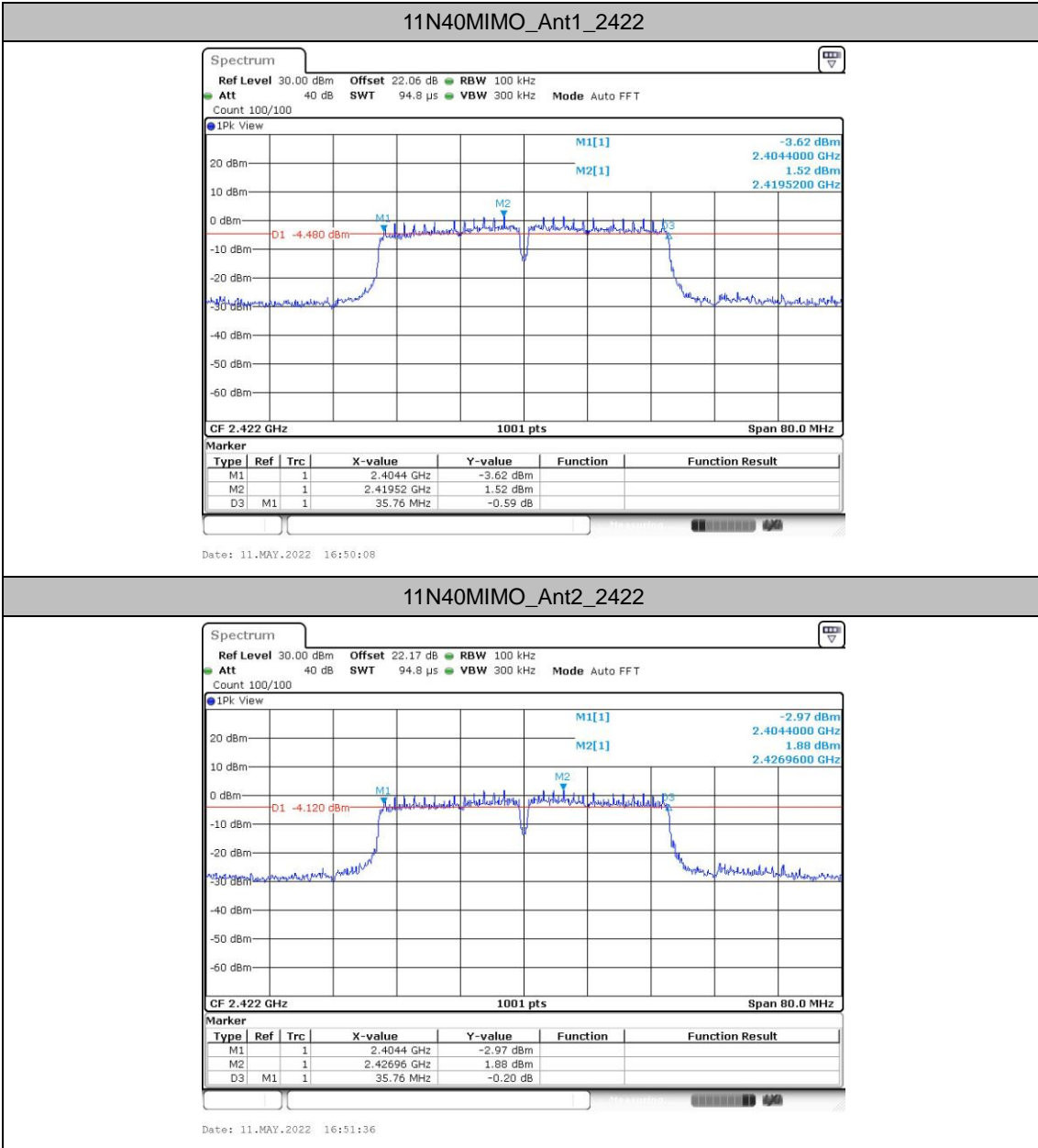


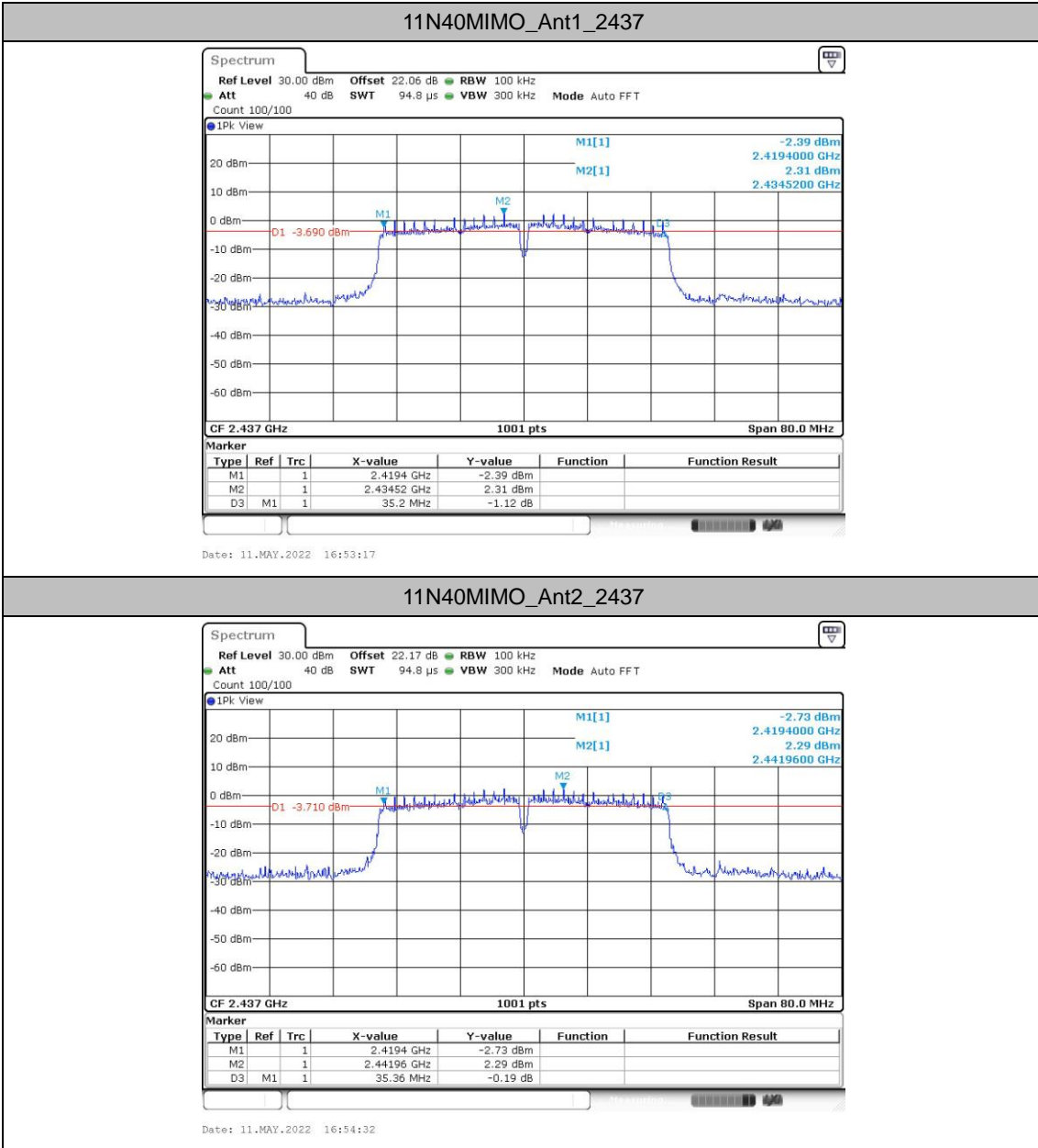


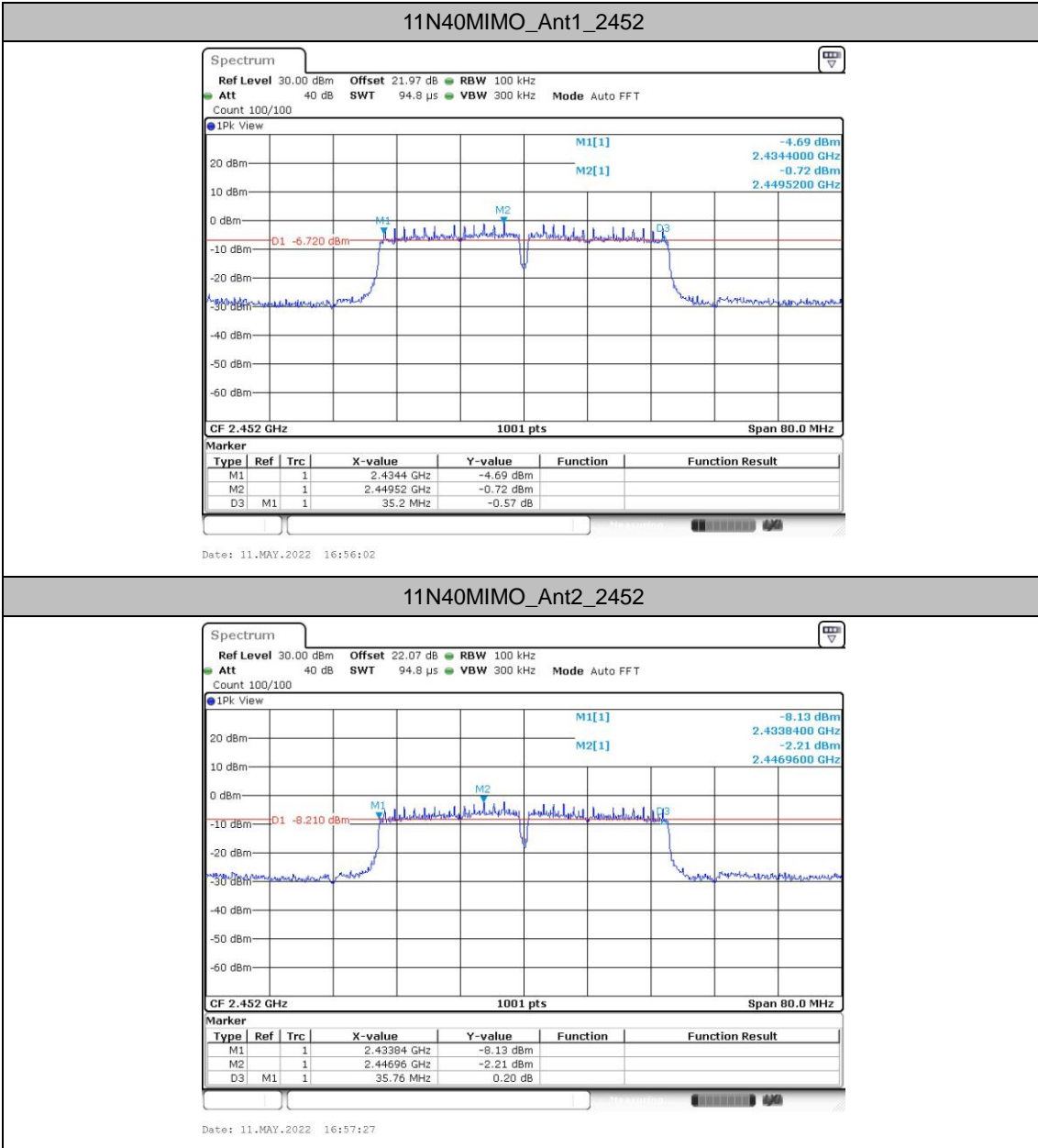


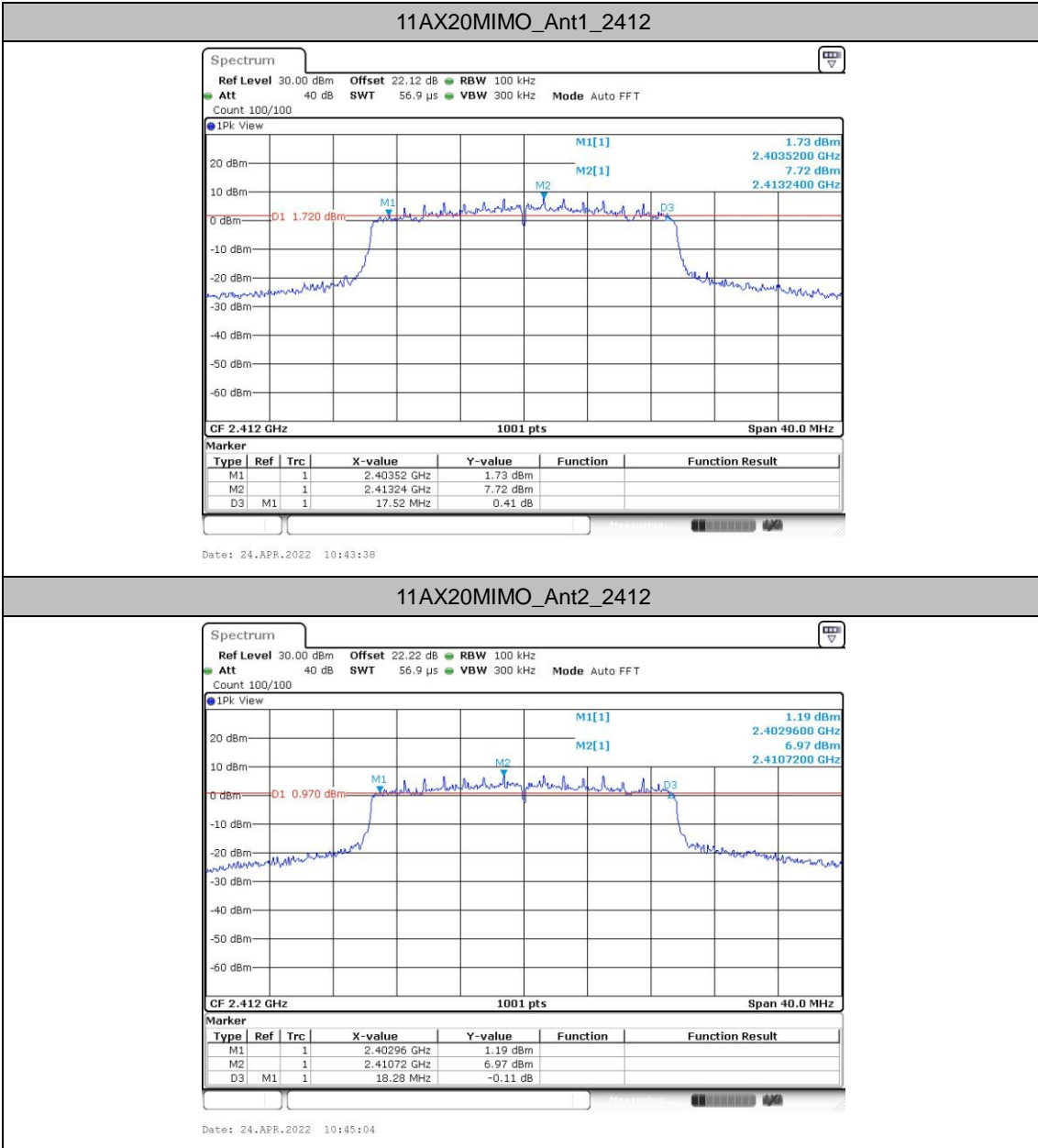


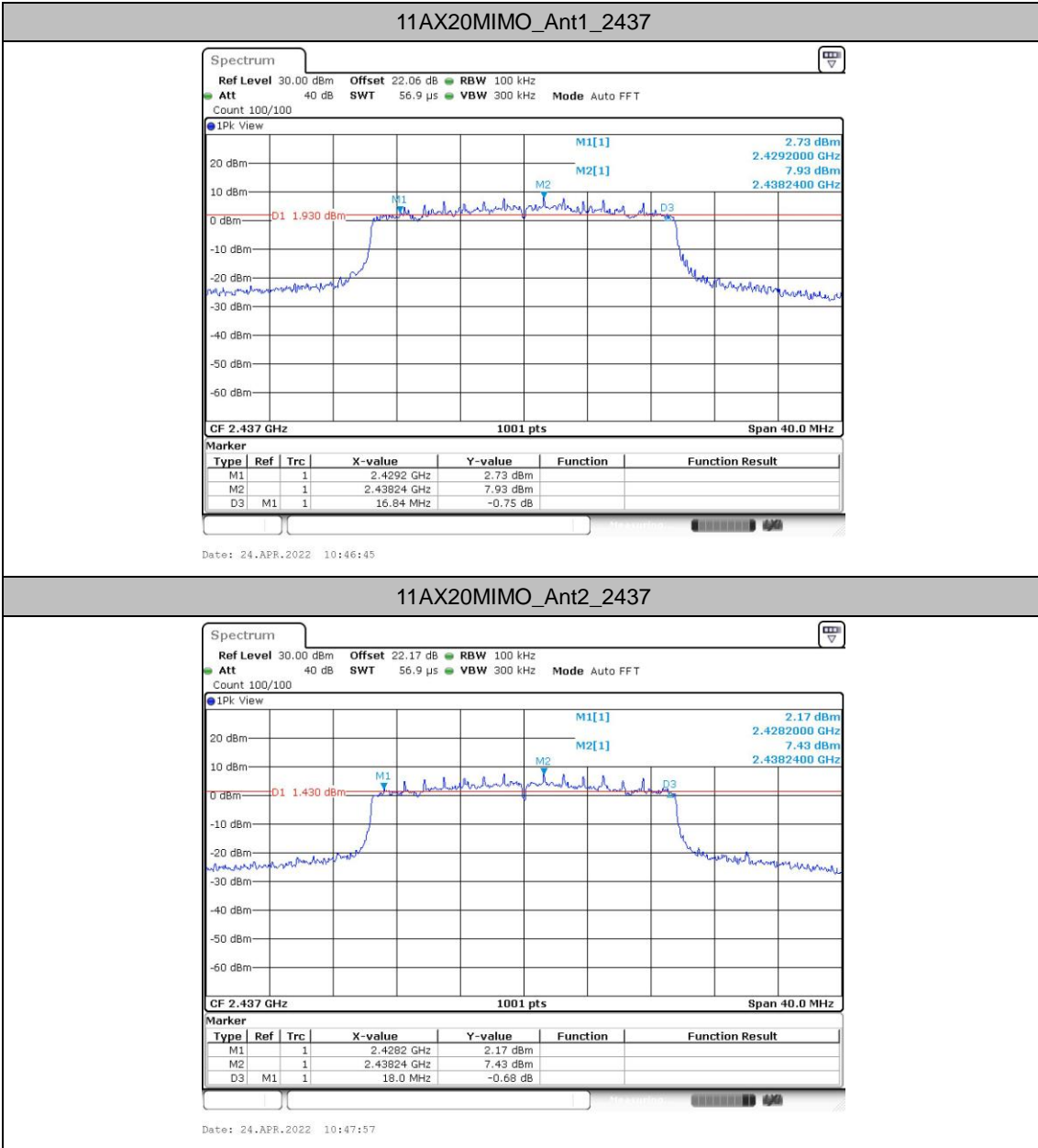


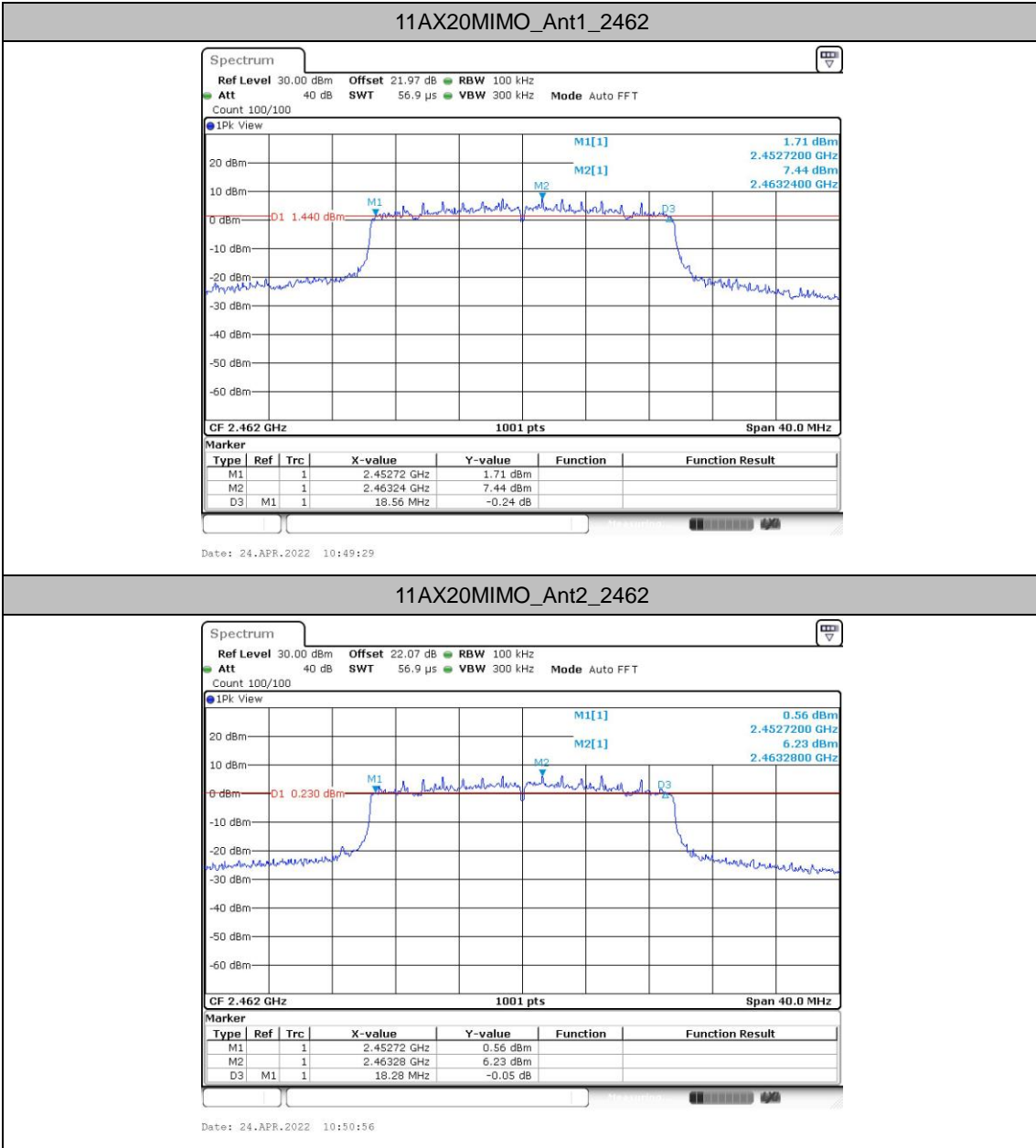


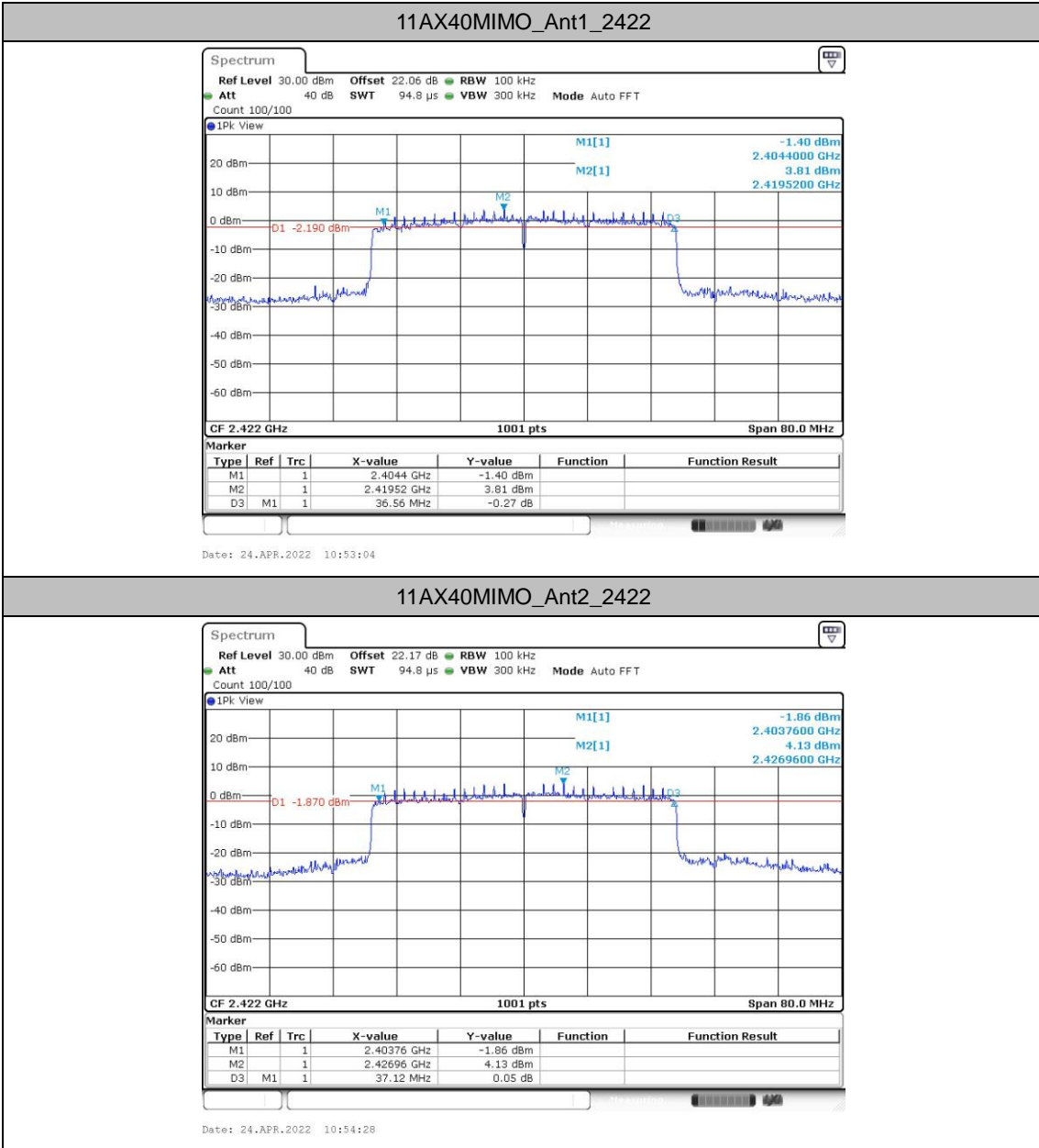


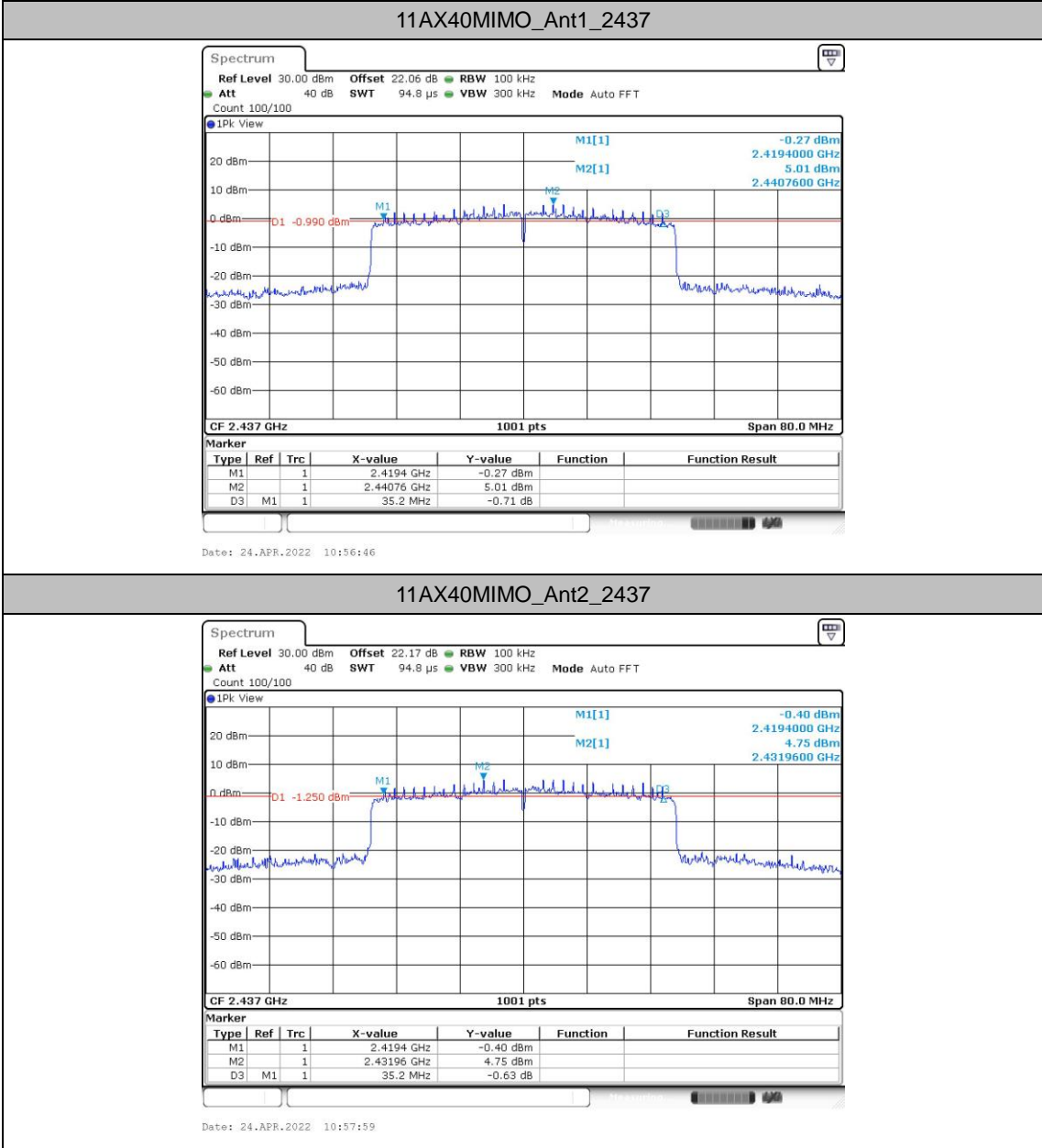


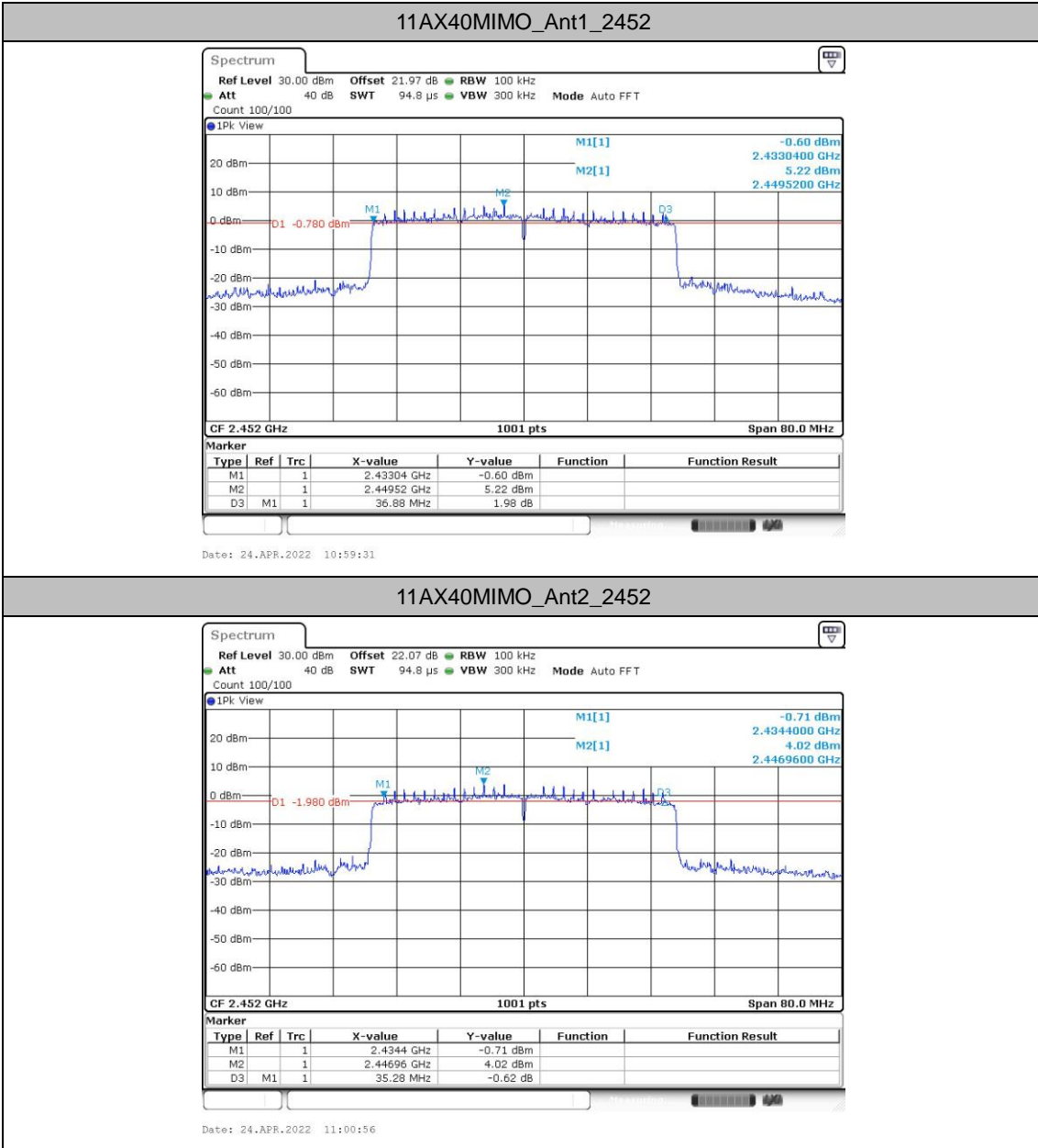














Occupied Channel Bandwidth

Test Result

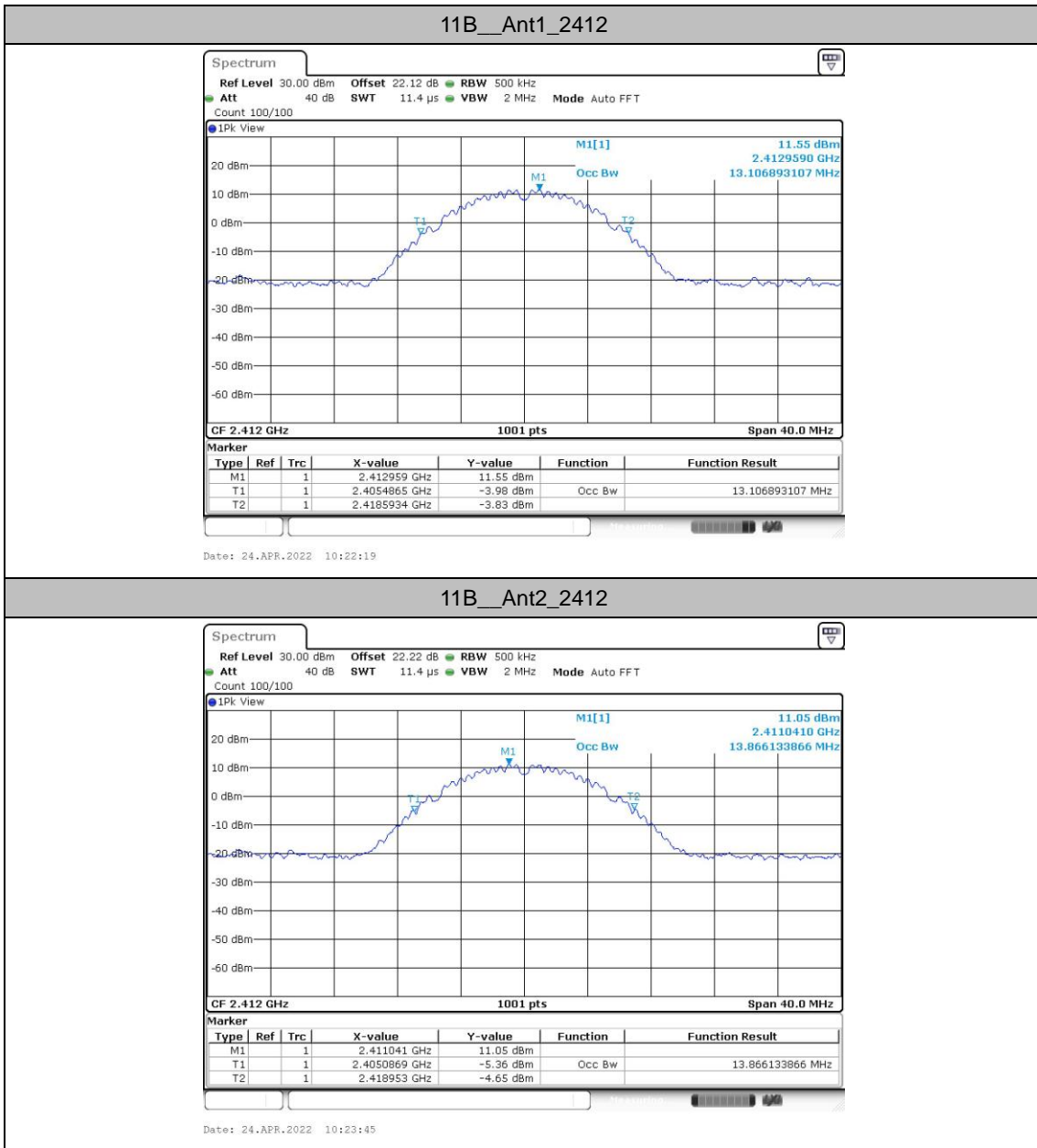
TestMode	Antenna	Freq(MHz)	OCB [MHz]	FL[MHz]	FH[MHz]	Limit[MHz]	Verdict
11B_	Ant1	2412	13.107	2405.487	2418.593	---	---
	Ant2	2412	13.866	2405.087	2418.953	---	---
	Ant1	2437	12.947	2430.566	2443.513	---	---
	Ant2	2437	13.187	2430.447	2443.633	---	---
	Ant1	2462	13.467	2455.327	2468.793	---	---
	Ant2	2462	13.706	2455.167	2468.873	---	---
11G_	Ant1	2412	17.423	2403.249	2420.671	---	---
	Ant2	2412	17.622	2403.329	2420.951	---	---
	Ant1	2437	17.343	2428.369	2445.711	---	---
	Ant2	2437	17.223	2428.449	2445.671	---	---
	Ant1	2462	17.582	2453.169	2470.751	---	---
	Ant2	2462	17.103	2453.369	2470.472	---	---
11N20MIMO	Ant1	2412	18.382	2402.809	2421.191	---	---
	Ant2	2412	18.222	2402.809	2421.031	---	---
	Ant1	2437	18.382	2427.809	2446.191	---	---
	Ant2	2437	18.142	2427.969	2446.111	---	---
	Ant1	2462	18.342	2452.769	2471.111	---	---
	Ant2	2462	18.022	2452.969	2470.991	---	---
11N40MIMO	Ant1	2422	36.923	2403.618	2440.541	---	---
	Ant2	2422	36.843	2403.698	2440.541	---	---
	Ant1	2437	36.683	2418.538	2455.222	---	---
	Ant2	2437	36.843	2418.698	2455.541	---	---
	Ant1	2452	37.243	2433.538	2470.781	---	---
	Ant2	2452	37.562	2433.299	2470.861	---	---
11AX20MIMO	Ant1	2412	19.061	2402.490	2421.550	---	---
	Ant2	2412	19.381	2402.370	2421.750	---	---
	Ant1	2437	19.421	2427.130	2446.550	---	---
	Ant2	2437	19.421	2427.130	2446.550	---	---
	Ant1	2462	19.461	2452.130	2471.590	---	---
	Ant2	2462	19.301	2452.290	2471.590	---	---

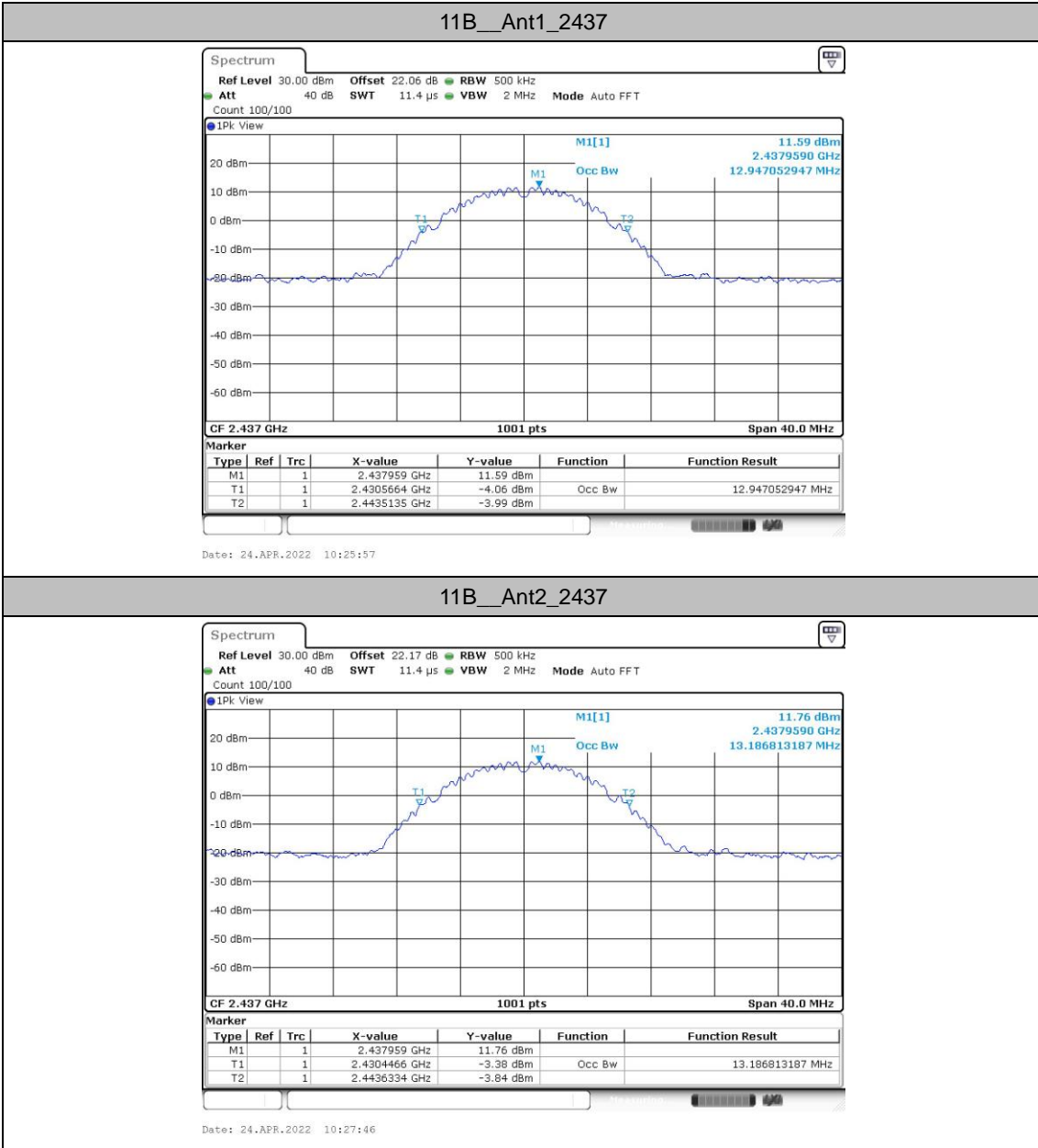


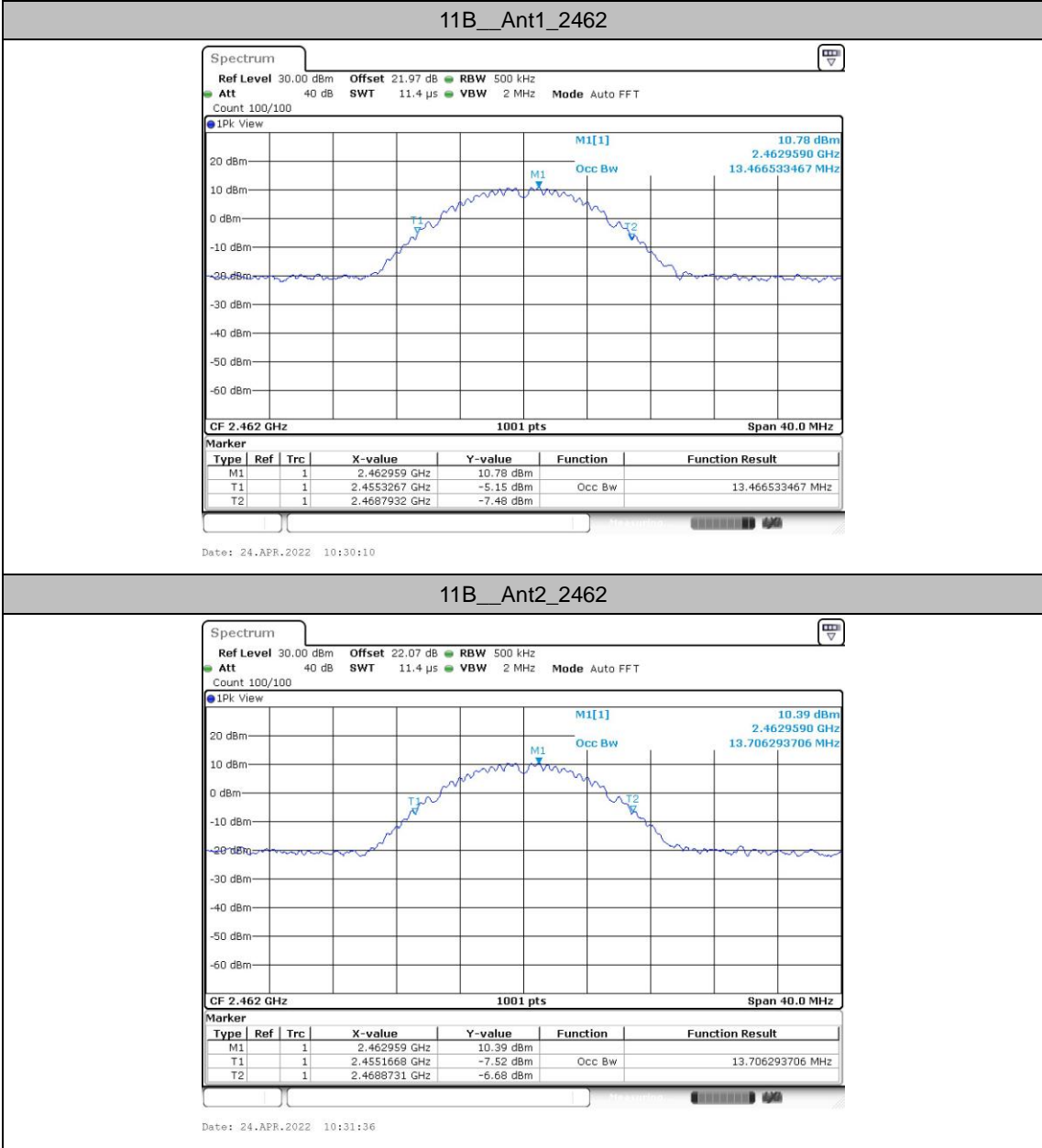
11AX40MIMO	Ant1	2422	38.042	2403.059	2441.101	---	---
	Ant2	2422	38.202	2402.979	2441.181	---	---
	Ant1	2437	37.962	2418.059	2456.021	---	---
	Ant2	2437	38.122	2417.899	2456.021	---	---
	Ant1	2452	38.122	2432.899	2471.021	---	---
	Ant2	2452	38.042	2432.979	2471.021	---	---



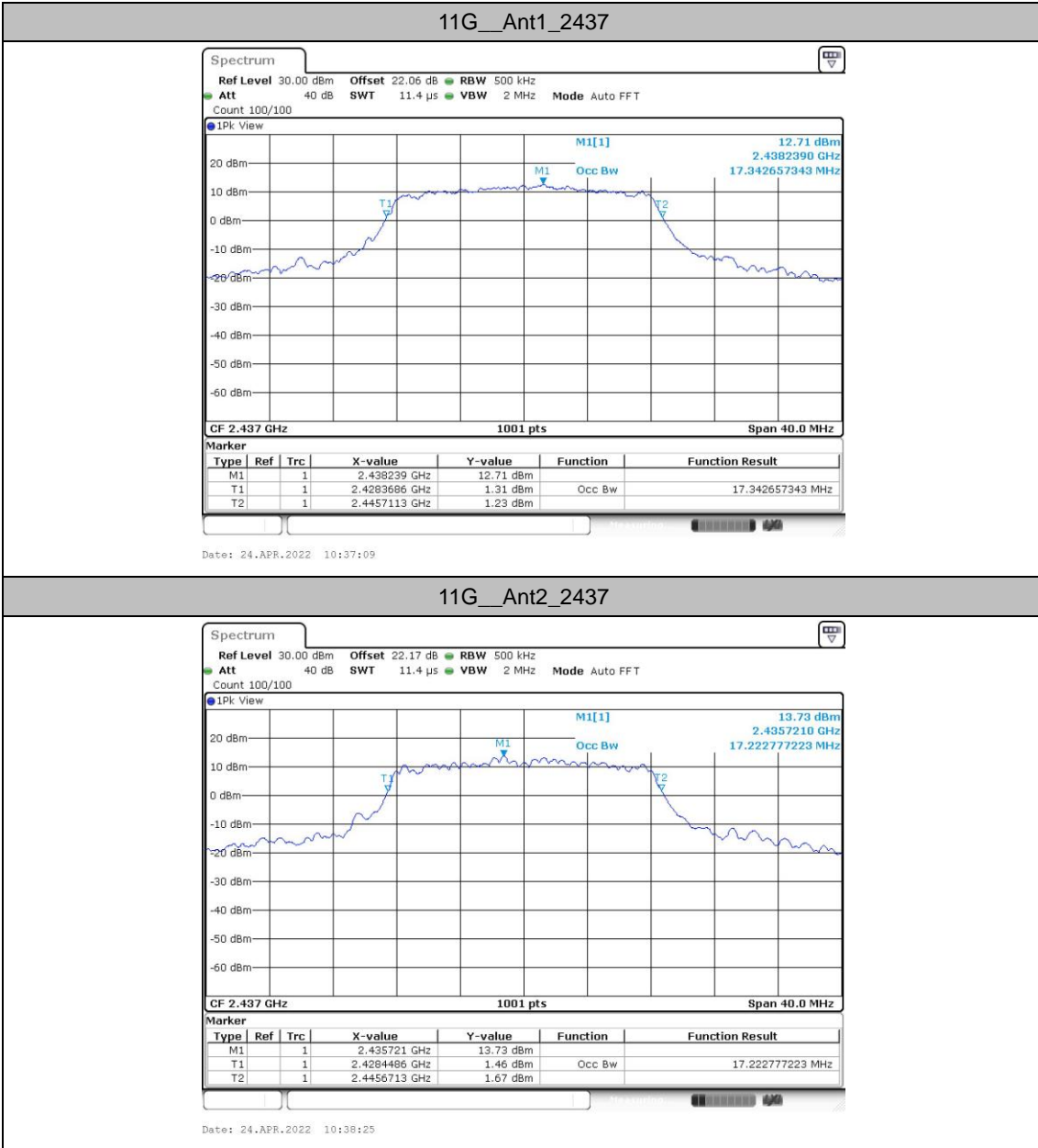
Test Graphs

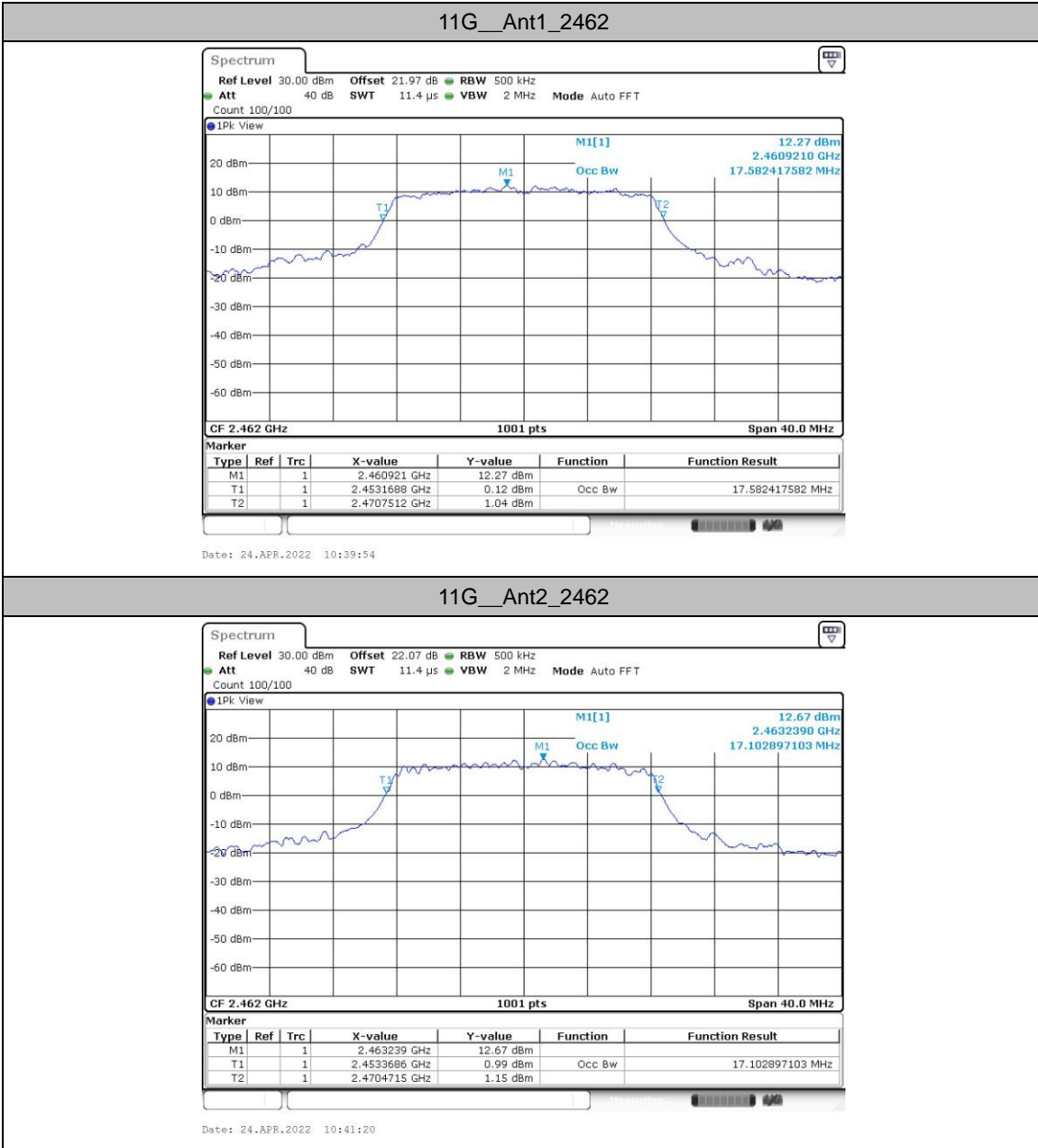



11B_Ant2_2437






11G_Ant2_2437


11G_Ant2_2462

