

TEST REPORT

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Report Number: SZ1240124-05544E-RF-00A
FCC ID: 2BHDCMF67MIFI

Test Standard (s)

FCC PART 15.247

Sample Description

Product Type: 4G LTE Pocket WiFi
Model No.: MF67
Multiple Model(s) No.: N/A
Trade Mark: N/A
Date Received: 2024/01/24
Issue Date: 2024/07/12

Test Result:

Pass▲

▲ In the configuration tested, the EUT complied with the standards above.

Prepared and Checked By:

April Zhang

April Zhang
RF Engineer

Approved By:

Nancy Wang

Nancy Wang
RF Supervisor

Note: The information marked # is provided by the applicant, the laboratory is not responsible for its authenticity and this information can affect the validity of the result in the test report. Customer model name, addresses, names, trademarks etc. are included.

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DOCUMENT REVISION HISTORY

Revision Number	Report Number	Description of Revision	Date of Revision
0	SZ1240124-05544E-RF-00A	Original Report	2024/07/12

GENERAL INFORMATION

Product Description for Equipment under Test (EUT)

Product	4G LTE Pocket WiFi
Tested Model	MF67
Multiple Model(s)	N/A
Frequency Range	2412-2462MHz
Maximum Conducted Peak Output Power	14.23dBm
Modulation Technique	DSSS, OFDM
Antenna Specification [#]	ANT1: 2.84dBi, ANT2: 1.87dBi (provided by the applicant)
Voltage Range	DC 3.7V from battery or DC 5V from Micro USB port
Sample serial number	2H2U-3 for Conducted and Radiated Emissions Test 2H2U-1 for RF Conducted Test (Assigned by BACL, Shenzhen)
Sample/EUT Status	Good condition
Adapter Information	N/A

Objective

This test report is in accordance with Part 2-Subpart J, Part 15-Subparts A and C of the Federal Communication Commission's rules.

The tests were performed in order to determine compliance with FCC Part 15, Subpart C, and section 15.203, 15.205, 15.207, 15.209 and 15.247 rules.

Test Methodology

All measurements contained in this report were conducted with ANSI C63.10-2013, American National Standard of Procedures for Compliance Testing of Unlicensed Wireless Devices.

And KDB 558074 D01 15.247 Meas Guidance v05r02.

All emissions measurement was performed at Bay Area Compliance Laboratories Corp. (Shenzhen). The radiated testing was performed at an antenna-to-EUT distance of 3 meters.

Each test item follows test standards and with no deviation.

Measurement Uncertainty

Parameter		Uncertainty
Occupied Channel Bandwidth		±5%
RF output power, conducted		0.72 dB(k=2, 95% level of confidence)
AC Power Lines Conducted Emissions	9kHz~150 kHz	3.94dB(k=2, 95% level of confidence)
	150 kHz ~30MHz	3.84dB(k=2, 95% level of confidence)
Radiated Emissions	9kHz - 30MHz	3.30dB(k=2, 95% level of confidence)
	30MHz~200MHz (Horizontal)	4.48dB(k=2, 95% level of confidence)
	30MHz~200MHz (Vertical)	4.55dB(k=2, 95% level of confidence)
	200MHz~1000MHz (Horizontal)	4.85dB(k=2, 95% level of confidence)
	200MHz~1000MHz (Vertical)	5.05dB(k=2, 95% level of confidence)
	1GHz - 6GHz	5.35dB(k=2, 95% level of confidence)
	6GHz - 18GHz	5.44dB(k=2, 95% level of confidence)
	18GHz - 40GHz	5.16dB(k=2, 95% level of confidence)
Temperature		±1°C
Humidity		±1%
Supply voltages		±0.4%

Note: The extended uncertainty given in this report is obtained by combining the standard uncertainty times the coverage factor K with the 95% confidence interval. Otherwise required by the applicant or Product Regulations, Decision Rule in this report did not consider the uncertainty.

Test Facility

The Test site used by Bay Area Compliance Laboratories Corp. (Shenzhen) to collect test data is located on the 5F(B-West) , 6F, 7F, the 3rd Phase of Wan Li Industrial Building D, Shihua Rd, FuTian Free Trade Zone, Shenzhen, China.

The lab has been recognized as the FCC accredited lab under the KDB 974614 D01 and is listed in the FCC Public Access Link (PAL) database, FCC Registration No. : 715558, the FCC Designation No. : CN5045.

SYSTEM TEST CONFIGURATION

Description of Test Configuration

For Wi-Fi mode, total 11 channels are provided to testing:

Channel	Frequency (MHz)	Channel	Frequency (MHz)
1	2412	7	2442
2	2417	8	2447
3	2422	9	2452
4	2427	10	2457
5	2432	11	2462
6	2437	/	/

802.11 b, 802.11g and 802.11n-HT20 mode was tested with Channel 1, 6 and 11.

802.11n-HT40 mode was tested with Channel 3, 6 and 9.

Equipment Modifications

No modification was made to the EUT tested.

EUT Exercise Software

“CMD Commands[#]” was used. The Commands and power level was provided by the applicant. The device was tested with the worst case was performed as below:

Test Modes	Test Channels	Test Frequency	Data rate	Power Level Setting [#]	
				ANT 1	ANT 2
802.11b	Lowest	2412	1Mbps	21	21
	Middle	2437	1Mbps	21	21
	Highest	2462	1Mbps	21	21
802.11g	Lowest	2412	6Mbps	21	21
	Middle	2437	6Mbps	21	21
	Highest	2462	6Mbps	21	21
802.11n-HT20	Lowest	2412	MCS0	21	21
	Middle	2437	MCS0	21	21
	Highest	2462	MCS0	21	21
802.11n-HT40	Lowest	2422	MCS0	21	21
	Middle	2437	MCS0	21	21
	Highest	2452	MCS0	21	21

Note:

1. The above are the worst-case data rates, which are determined for each mode based upon investigations by measuring the average power and PSD across all data rates, bandwidths, and modulations.
2. For 802.11 b/g modes, the device only support SISO mode.
3. For 802.11n mode, the device supports SISO and MIMO in all modes, per pretest, the MIMO mode was the worst mode for all the modes.

Duty cycle

Test Result: Compliant. The test data and polots please refer to the Appendix.

Support Equipment List and Details

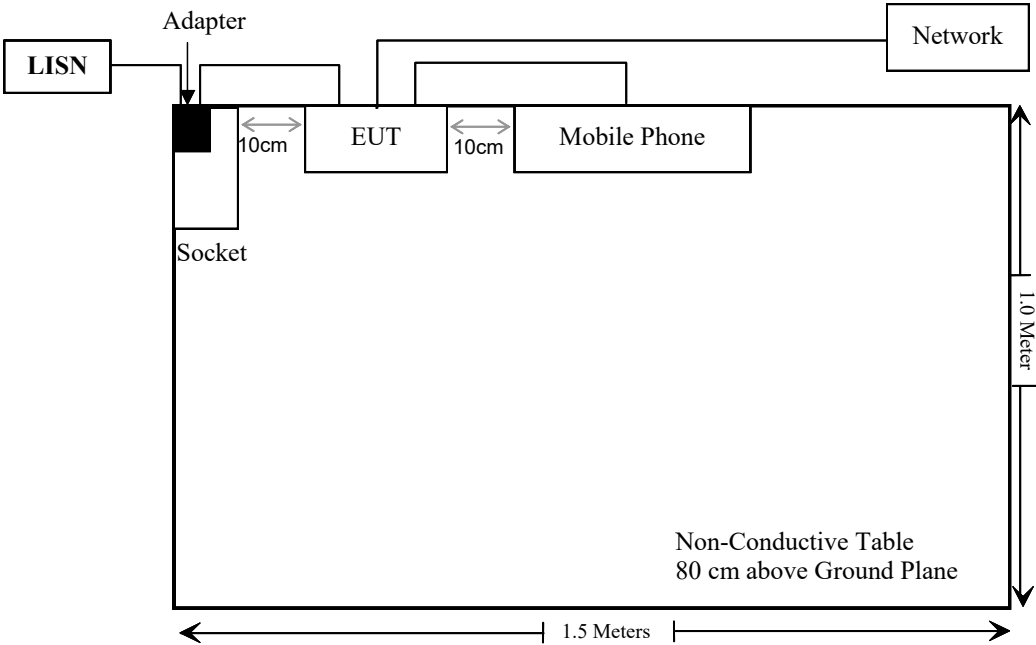
Manufacturer	Description	Model	Serial Number
Infinix	Adapter	U180XSA	BJD07016233522
Infinix	Mobile Phone	X689D	066793311T100003
Bull	Socket	Unknown	Unknown

External I/O Cable

Cable Description	Length (m)	From Port	To
Un-shielding Un-Detachable AC Cable	1.2	Socket	LISN/AC Mains
Un-shielding Detachable USB Cable	0.3	EUT	Adapter
Un-shielding Detachable USB Cable	1.0	EUT	Mobile Phone
Un-shielding Detachable RJ45 Cable	5.0	EUT	Network

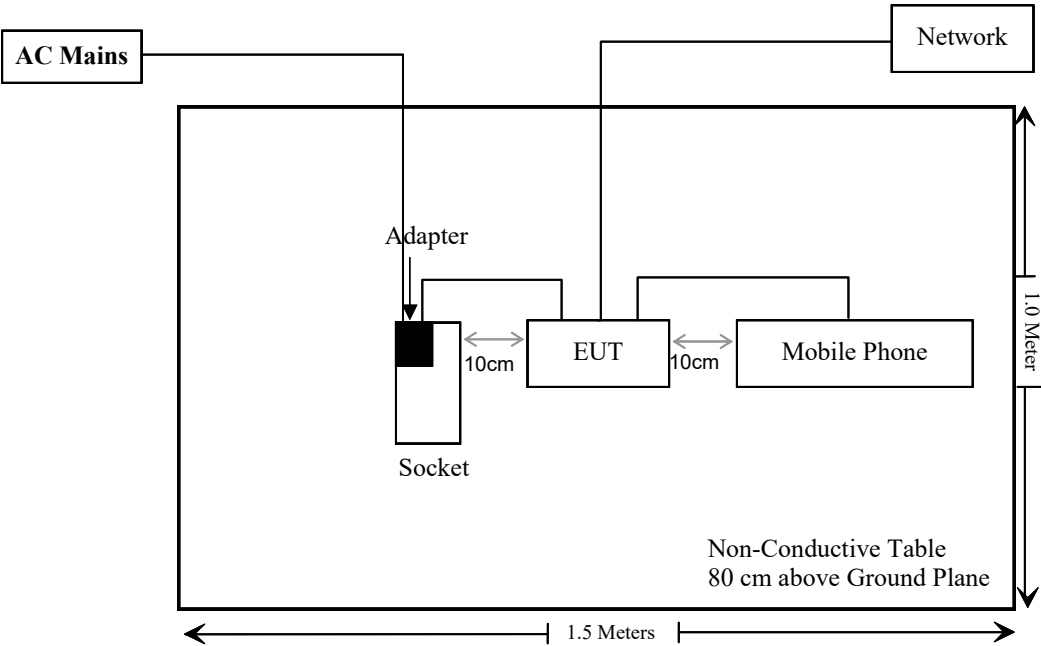
Block Diagram of Test Setup

For Conducted Emissions:

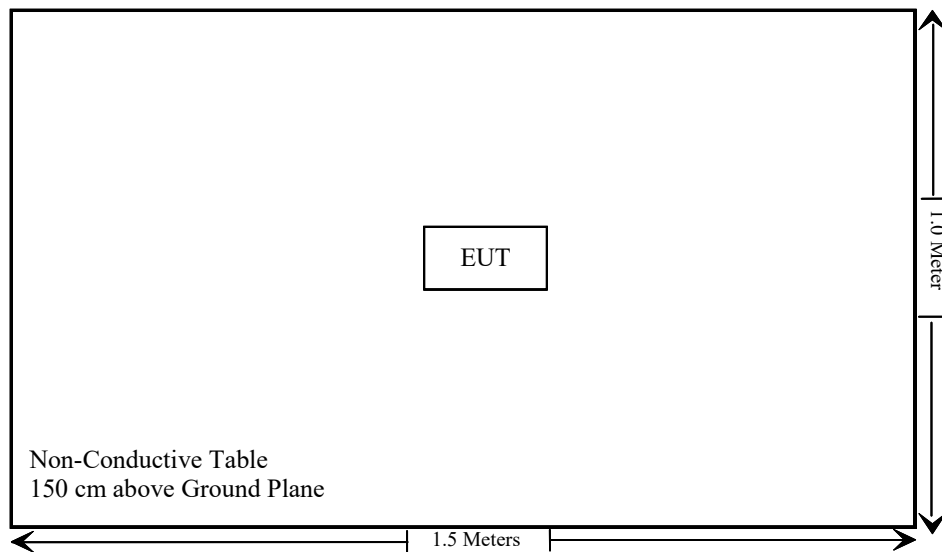


For Radiated Emissions:

Below 1GHz:



Above 1GHz:



SUMMARY OF TEST RESULTS

FCC Rules	Description of Test	Result
§1.1307 (b) (1) & §2.1093	RF Exposure	Compliant
§15.203	Antenna Requirement	Compliant
§15.207 (a)	AC Line Conducted Emissions	Compliant
§15.205, §15.209, §15.247(d)	Spurious Emissions	Compliant
§15.247 (a)(2)	6 dB Emission Bandwidth & Occupied Bandwidth	Compliant
§15.247(b)(3)	Maximum Conducted Output Power	Compliant
§15.247(d)	100 kHz Bandwidth of Frequency Band Edge	Compliant
§15.247(e)	Power Spectral Density	Compliant

TEST EQUIPMENT LIST

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
Conducted Emission Test					
Rohde & Schwarz	EMI Test Receiver	ESCI	101120	2024/01/16	2025/01/15
Rohde & Schwarz	LISN	ENV216	101613	2024/01/16	2025/01/15
Rohde & Schwarz	Transient Limiter	ESH3Z2	DE25985	2023/08/03	2024/08/02
Unknown	CE Cable	CE Cable	UF A210B-1-0720-504504	2023/08/03	2024/08/02
Audix	EMI Test software	E3	191218	NCR	NCR
Radiated Emissions Test					
R&S	EMI Test Receiver	ESR3	102455	2024/01/16	2025/01/15
Sonoma instrument	Pre-amplifier	310 N	186238	2023/06/08	2024/06/07
Sunol Sciences	Broadband Antenna	JB1	A040904-1	2023/07/20	2024/07/19
ETS	Passive Loop Antenna	6512	29604	2023/07/07	2024/07/06
Unknown	Cable	Chamber Cable 1	F-03-EM236	2023/08/03	2024/08/02
Unknown	Cable	Chamber Cable 4	EC-007	2023/08/03	2024/08/02
Audix	EMI Test software	E3	19821b(V9)	NCR	NCR
Rohde & Schwarz	Spectrum Analyzer	FSV40	101605	2023/04/18	2024/04/17
COM-POWER	Pre-amplifier	PA-122	181919	2023/06/29	2024/06/28
Schwarzbeck	Horn Antenna	BBHA9120D (1201)	1143	2023/07/26	2024/07/25
Unknown	RF Cable	KMSE	0735	2023/10/08	2024/10/07
Unknown	RF Cable	UFA147	219661	2023/10/08	2024/10/07
SNSD	2.4G Band Reject filter	BSF2402-2480MN-0898-001	2.4G filter	2023/08/03	2024/08/02
A.H.System	Pre-amplifier	PAM-1840VH	190	2023/08/03	2024/08/02
Electro-Mechanics Co	Horn Antenna	3116	9510-2270	2023/09/18	2026/09/17
Audix	EMI Test software	E3	191218(V9)	NCR	NCR
RF Conducted Test					
Tonscend	RF control Unit	JS0806-2	19D8060154	2023/09/06	2024/09/05
ANRITSU	Microwave peak power sensor	MA24418A	12622	2023/08/08	2024/08/07
Rohde & Schwarz	Signal and Spectrum Analyzer	FSV40	101473	2024/01/16	2025/01/15
MARCONI	10dB Attenuator	6534/3	2942	2023/07/04	2024/07/03

* **Statement of Traceability:** Bay Area Compliance Laboratories Corp. (Shenzhen) attests that all calibrations have been performed in accordance to requirements that traceable to National Primary Standards and International System of Units (SI).

FCC §1.1307 (B) (1) & §2.1093- RF EXPOSURE

Applicable Standard

According to FCC §2.1093 and §1.1307(b) (1), systems operating under the provisions of this section shall be operated in a manner that ensure that the public is not exposed to radio frequency energy level in excess of the Commission's guideline.

Result: Compliant.

Please refer to SAR Report Number: SZ1240124-05544E-20.

FCC §15.203 - ANTENNA REQUIREMENT

Applicable Standard

According to § 15.203, an intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. 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 provisions of this section. The manufacturer may design the unit so that a broken antenna can be replaced by the user, but the user of a standard antenna jack or electrical connector is prohibited. The structure and application of the EUT were analyzed to determine compliance with section §15.203 of the rules. §15.203 state that the subject device must meet the following criteria:

- a. Antenna must be permanently attached to the unit.
 - b. Antenna must use a unique type of connector to attach to the EUT.
- Unit must be professionally installed, and installer shall be responsible for verifying that the correct antenna is employed with the unit.

And according to FCC 47 CFR section 15.247 (b), if the transmitting antennas of directional gain greater than 6dBi are used, the power shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

Antenna Connector Construction

The EUT has two internal antennas arrangement, which were permanently attached and the antenna gain[#] is 2.84dBi for ANT1 and 1.87dBi for ANT2, fulfill the requirement of this section. Please refer to the EUT photos.

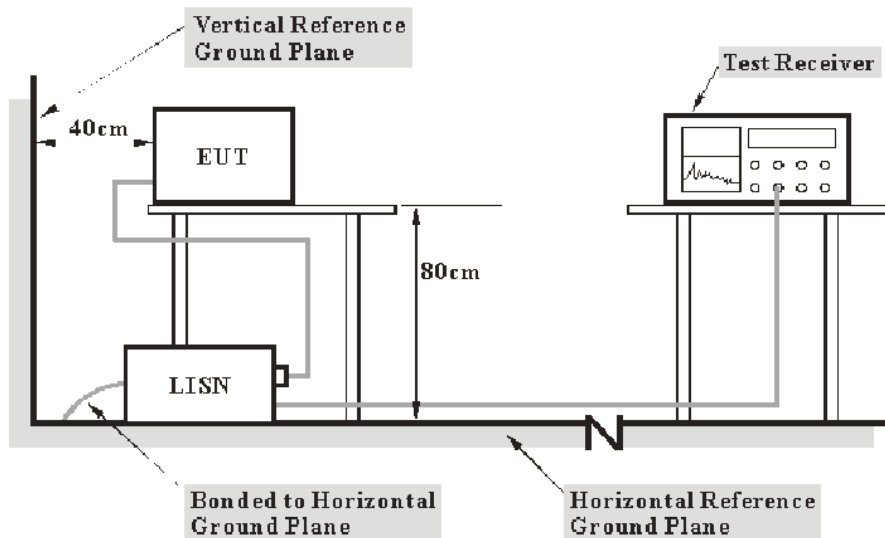
Result: Compliant

FCC §15.207 (a) – AC LINE CONDUCTED EMISSIONS

Applicable Standard

FCC§15.207

EUT Setup



Note: 1. Support units were connected to second LISN.
2. Both of LISNs (AMN) 80 cm from EUT and at the least 80 cm from other units and other metal planes support units.

The setup of EUT is according with per ANSI C63.10-2013 measurement procedure. The specification used was with the FCC Part 15.207 limits.

The spacing between the peripherals was 10 cm.

EMI Test Receiver Setup

The EMI test receiver was set to investigate the spectrum from 150 kHz to 30 MHz.

During the conducted emission test, the EMI test receiver was set with the following configurations:

Frequency Range	IF B/W
150 kHz – 30 MHz	9 kHz

Test Procedure

During the conducted emission test, the device was connected to the outlet of the LISN.

Maximizing procedure was performed on the six (6) highest emissions of the EUT.

All final data was recorded in the Quasi-peak and average detection mode.

Factor & Over Limit Calculation

The factor is calculated by adding LISN VDF (Voltage Division Factor) and Cable Loss. The basic equation is as follows:

$$\text{Factor} = \text{LISN VDF} + \text{Cable Loss}$$

The “**Over Limit**” column of the following data tables indicates the degree of compliance with the applicable limit. For example, an over limit of -7 dB means the emission is 7 dB below the limit. The equation for margin calculation is as follows:

$$\begin{aligned}\text{Over Limit} &= \text{level} - \text{Limit} \\ \text{Level} &= \text{reading level} + \text{Factor}\end{aligned}$$

Note: The term "cable loss" refers to the combination of a cable and a 10dB transient limiter (attenuator).

Test Data

Environmental Conditions

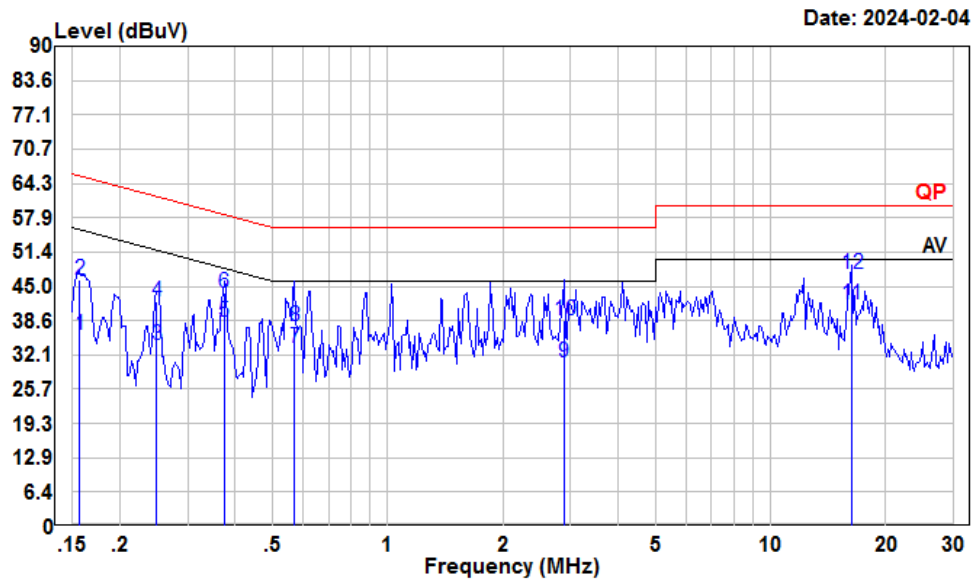
Temperature:	25 °C
Relative Humidity:	64%
ATM Pressure:	101kPa

The testing was performed by Macy Shi on 2024-02-04.

EUT operation mode: Transmitting

Wi-Fi: (Maximum output mode 802.11n-HT20 low Channel)

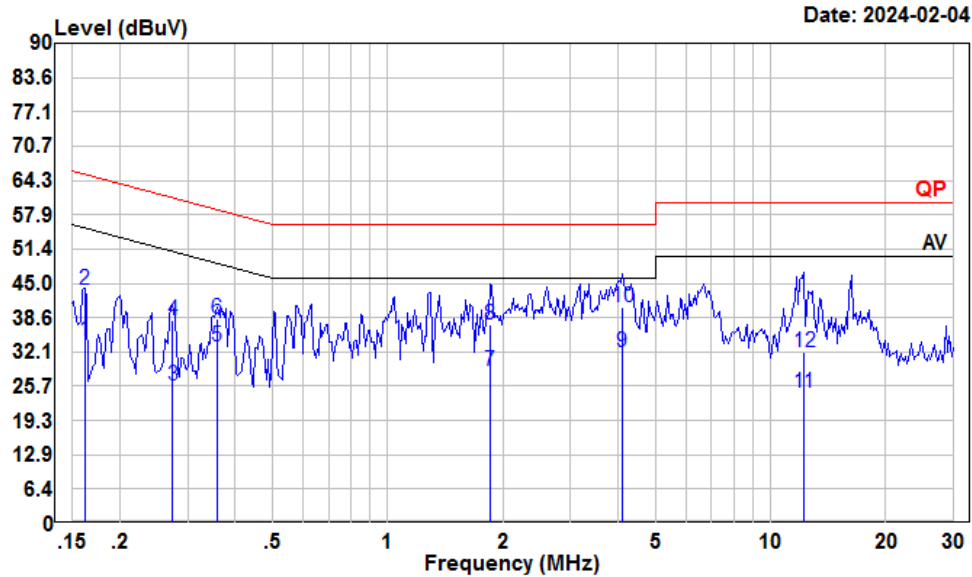
AC 120V/60 Hz, Line



Condition: Line
Project : SZ1240124-05544E-RF
Tester : Macy shi
Note : 802.11n-HT20 low Channel

	Freq	Read Level	LISN Level	Cable Factor	Cable Loss	Limit Line	Over Limit	Remark
	MHz	dBuV	dBuV	dB	dB	dBuV	dB	
1	0.16	14.98	36.02	10.89	10.15	55.65	-19.63	Average
2	0.16	25.21	46.25	10.89	10.15	65.65	-19.40	QP
3	0.25	13.08	34.02	10.73	10.21	51.78	-17.76	Average
4	0.25	21.27	42.21	10.73	10.21	61.78	-19.57	QP
5	0.37	17.48	38.27	10.60	10.19	48.43	-10.16	Average
6	0.37	22.87	43.66	10.60	10.19	58.43	-14.77	QP
7	0.57	12.89	33.59	10.50	10.20	46.00	-12.41	Average
8	0.57	16.90	37.60	10.50	10.20	56.00	-18.40	QP
9	2.88	9.92	30.62	10.44	10.26	46.00	-15.38	Average
10	2.88	17.96	38.66	10.44	10.26	56.00	-17.34	QP
11	16.23	20.82	41.60	10.68	10.10	50.00	-8.40	Average
12	16.23	26.61	47.39	10.68	10.10	60.00	-12.61	QP

AC 120V/60 Hz, Neutral



Condition: Neutral

Project : SZ1240124-05544E-RF

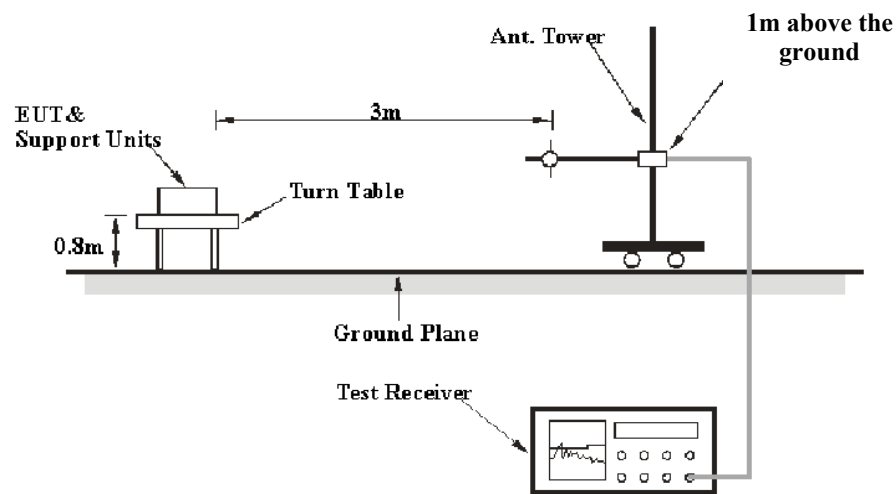
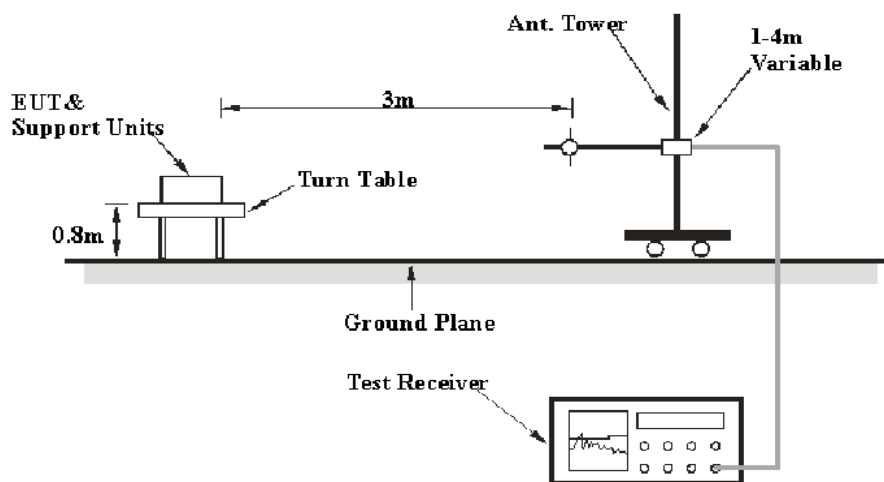
Tester : Macy shi

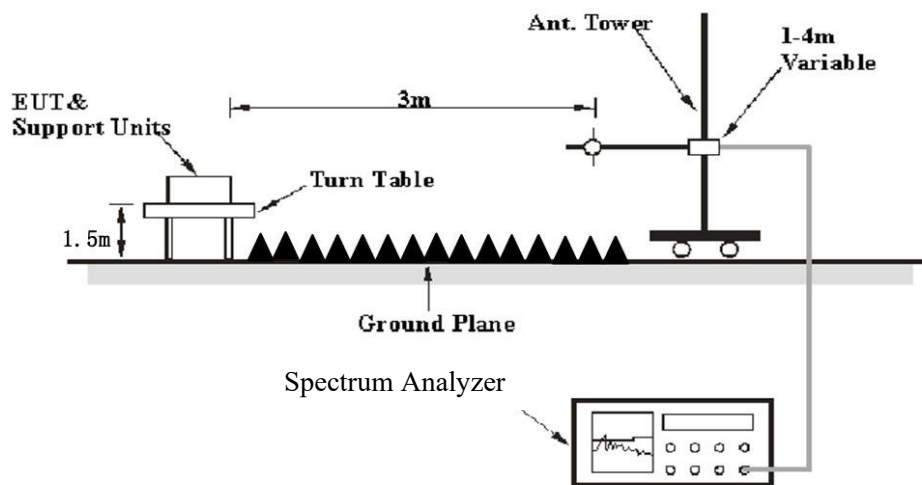
Note : 802.11n-HT20 low Channel

	Freq	Read Level	LISN Level	LISN Factor	Cable Loss	Limit Line	Over Limit	Remark
	MHz	dBuV	dBuV	dB	dB	dBuV	dB	
1	0.16	13.65	34.35	10.55	10.15	55.38	-21.03	Average
2	0.16	23.11	43.81	10.55	10.15	65.38	-21.57	QP
3	0.27	5.11	25.78	10.50	10.17	50.98	-25.20	Average
4	0.27	17.44	38.11	10.50	10.17	60.98	-22.87	QP
5	0.36	12.44	33.20	10.59	10.17	48.78	-15.58	Average
6	0.36	17.58	38.34	10.59	10.17	58.78	-20.44	QP
7	1.85	8.02	28.63	10.46	10.15	46.00	-17.37	Average
8	1.85	16.54	37.15	10.46	10.15	56.00	-18.85	QP
9	4.09	11.33	32.00	10.41	10.26	46.00	-14.00	Average
10	4.09	19.79	40.46	10.41	10.26	56.00	-15.54	QP
11	12.19	3.44	24.43	10.80	10.19	50.00	-25.57	Average
12	12.19	11.08	32.07	10.80	10.19	60.00	-27.93	QP

FCC §15.209, §15.205 & §15.247(d) - SPURIOUS EMISSIONS**Applicable Standard**

FCC §15.247 (d); §15.209; §15.205;

EUT Setup**9 kHz-30MHz:****30MHz-1GHz:**

Above 1GHz:

The radiated emission performed in the 3 meters, using the setup accordance with the ANSI C63.10-2013. The specification used was the FCC 15.209, FCC 15.247 limits.

EMI Test Receiver & Spectrum Analyzer Setup

The system was investigated from 9 kHz to 25 GHz.

During the radiated emission test, the EMI test receiver & Spectrum Analyzer Setup were set with the following configurations:

9 kHz-1GHz:

Frequency Range	RBW	Video B/W	IF B/W	Measurement
9 kHz – 150 kHz	/	/	200 Hz	QP
	300 Hz	1 kHz	/	PK
150 kHz – 30 MHz	/	/	9 kHz	QP
	10 kHz	30 kHz	/	PK
30 MHz – 1000 MHz	/	/	120 kHz	QP
	100 kHz	300 kHz	/	PK

1-25GHz:

Measurement	Duty cycle	RBW	Video B/W
PK	Any	1MHz	3 MHz
AV	>98%	1MHz	10 Hz
	<98%	1MHz	≥1/Ton

Note: Ton is minimum transmission duration

If the maximized peak measured value complies with under the QP/Average limit more than 6dB, then it is unnecessary to perform an QP/Average measurement.

Test Procedure

Maximizing procedure was performed on the highest emissions to ensure that the EUT complied with all installation combinations.

All final data was recorded in Quasi-peak detection mode except for the frequency bands 9–90 kHz, 110–490 kHz and above 1000 MHz, average detection modes for frequency bands 9–90 kHz and 110–490 kHz, peak and average detection modes for frequencies above 1 GHz.

For 9 kHz-30MHz, the report shall list the six emissions with the smallest margin relative to the limit, for each of the three antenna orientations (parallel, perpendicular, and ground-parallel) unless the margin is greater than 20 dB.

All emissions under the average limit and under the noise floor have not recorded in the report.

Factor & Over Limit/Margin Calculation

The Corrected Amplitude is calculated by adding the Antenna Factor and Cable Loss, and subtracting the Amplifier Gain from the Meter Reading. The basic equation is as follows:

$$\text{Corrected Amplitude} = \text{Meter Reading} + \text{Antenna Factor} + \text{Cable Loss} - \text{Amplifier Gain}$$

The “**Over Limit or Margin**” column of the following data tables indicates the degree of compliance with the applicable limit. For example, an over limit/margin of -7dB means the emission is 7dB below the limit. The equation for margin calculation is as follows:

$$\begin{aligned}\text{Margin/Over Limit} &= \text{Corrected Amplitude/Level-Limit} \\ \text{Corrected Amplitude/Level} &= \text{Reading} + \text{Corrected Factor}\end{aligned}$$

Test Data

Environmental Conditions

Temperature:	23~25.3 °C
Relative Humidity:	50~55 %
ATM Pressure:	101kPa

The testing was performed by Warren Huang on 2024-02-20 for below 1GHz and Tyler Wu from 2024-03-27 to 2024-03-29 for above 1GHz.

EUT operation mode: Transmitting

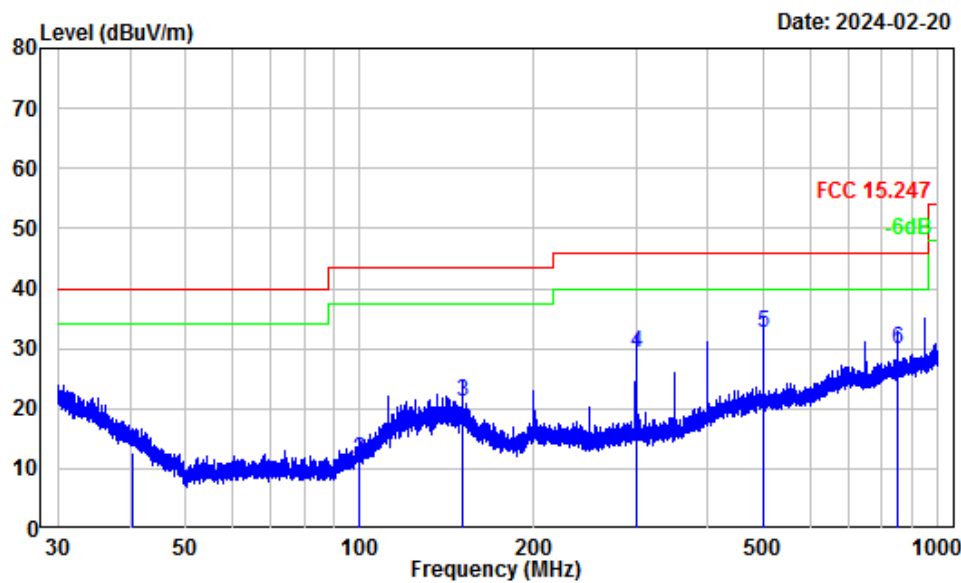
Note: Pre-scan in the X, Y and Z axes of orientation, the worst case z-axis of orientation was recorded.

9 kHz-30MHz: (Maximum output mode 802.11n-HT20, low Channel)

The amplitude of spurious emissions attenuated more than 20 dB below the limit was not recorded.

30MHz-1GHz: (Maximum output mode 802.11n-HT20, low Channel)

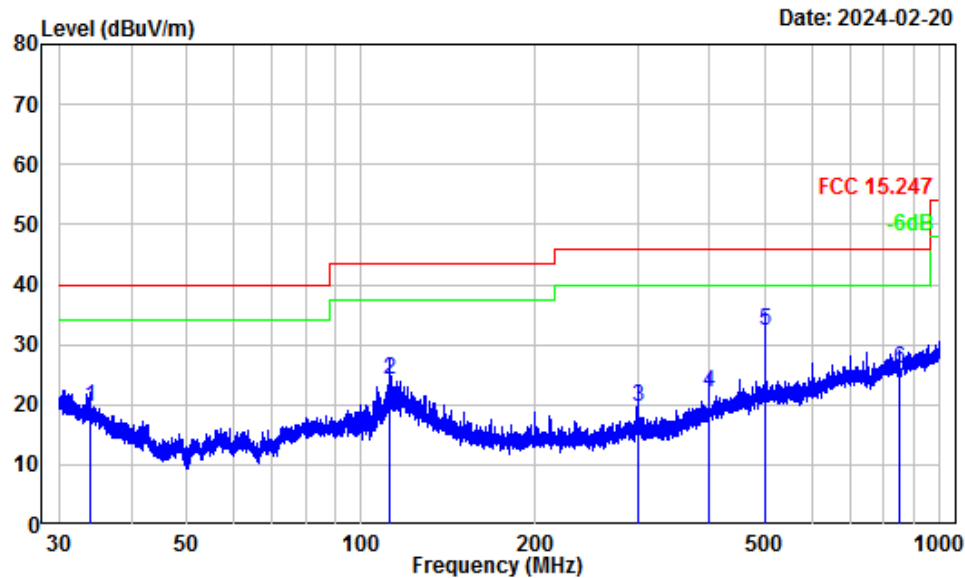
Horizontal



Site : chamber
Condition : 3m Horizontal
Project Number: SZ1240124-05544E-RF
Note : 2.4G WIFI
Tester : Warren Huang

	Freq	Factor	Read Level	Limit Level	Limit Line	Over Limit	Remark
	MHz	dB/m	dBuV	dBuV/m	dBuV/m	dB	
1	40.42	-10.65	23.38	12.73	40.00	-27.27	QP
2	100.01	-13.73	25.12	11.39	43.50	-32.11	QP
3	150.01	-11.35	32.53	21.18	43.50	-22.32	QP
4	299.97	-9.96	39.13	29.17	46.00	-16.83	QP
5	500.08	-5.05	37.64	32.59	46.00	-13.41	QP
6	850.29	0.19	29.80	29.99	46.00	-16.01	QP

Vertical



Site : chamber
Condition : 3m Vertical
Project Number: SZ1240124-05544E-RF
Note : 2.4G WIFI
Tester : Warren Huang

	Freq	Factor	Read Level	Level	Limit Line	Over Limit	Remark
	MHz	dB/m	dBuV	dBuV/m	dBuV/m	dB	
1	33.92	-8.08	27.60	19.52	40.00	-20.48	QP
2	112.08	-12.01	36.22	24.21	43.50	-19.29	QP
3	299.97	-10.36	30.10	19.74	46.00	-26.26	QP
4	400.08	-7.56	29.69	22.13	46.00	-23.87	QP
5	500.08	-5.25	37.66	32.41	46.00	-13.59	QP
6	850.29	-0.11	26.02	25.91	46.00	-20.09	QP

1-25 GHz:

Frequency (MHz)	Receiver		Polar (H/V)	Factor (dB/m)	Corrected Amplitude (dBμV/m)	Limit (dBμV/m)	Margin (dB)
	Reading (dBμV)	PK/Ave					
802.11b (ANT 1)							
Low Channel 2412MHz							
4824.00	50.85	PK	H	2.45	53.30	74	-20.70
4824.00	44.58	AV	H	2.45	47.03	54	-6.97
4824.00	50.13	PK	V	2.45	52.58	74	-21.42
4824.00	44.06	AV	V	2.45	46.51	54	-7.49
Middle Channel 2437MHz							
4874.00	52.95	PK	H	2.56	55.51	74	-18.49
4874.00	48.28	AV	H	2.56	50.84	54	-3.16
4874.00	51.87	PK	V	2.56	54.43	74	-19.57
4874.00	47.53	AV	V	2.56	50.09	54	-3.91
High Channel 2462MHz							
4924.00	52.78	PK	H	2.63	55.41	74	-18.59
4924.00	48.23	AV	H	2.63	50.86	54	-3.14
4924.00	51.34	PK	V	2.63	53.97	74	-20.03
4924.00	47.29	AV	V	2.63	49.92	54	-4.08
802.11b (ANT 2)							
Low Channel 2412MHz							
4824.00	51.02	PK	H	2.45	53.47	74	-20.53
4824.00	43.81	AV	H	2.45	46.26	54	-7.74
4824.00	50.68	PK	V	2.45	53.13	74	-20.87
4824.00	42.15	AV	V	2.45	44.60	54	-9.40
Middle Channel 2437MHz							
4874.00	52.78	PK	H	2.56	55.34	74	-18.66
4874.00	48.14	AV	H	2.56	50.70	54	-3.30
4874.00	51.86	PK	V	2.56	54.42	74	-19.58
4874.00	47.53	AV	V	2.56	50.09	54	-3.91
High Channel 2462MHz							
4924.00	51.95	PK	H	2.63	54.58	74	-19.42
4924.00	47.54	AV	H	2.63	50.17	54	-3.83
4924.00	51.17	PK	V	2.63	53.80	74	-20.20
4924.00	46.39	AV	V	2.63	49.02	54	-4.98

Frequency (MHz)	Receiver		Polar (H/V)	Factor (dB/m)	Corrected Amplitude (dBμV/m)	Limit (dBμV/m)	Margin (dB)
	Reading (dBμV)	PK/Ave					
802.11g (ANT 1)							
Low Channel 2412MHz							
4824.00	48.15	PK	H	2.45	50.60	74	-23.40
4824.00	34.53	AV	H	2.45	36.98	54	-17.02
4824.00	47.64	PK	V	2.45	50.09	74	-23.91
4824.00	33.57	AV	V	2.45	36.02	54	-17.98
Middle Channel 2437MHz							
4874.00	48.32	PK	H	2.56	50.88	74	-23.12
4874.00	35.07	AV	H	2.56	37.63	54	-16.37
4874.00	47.93	PK	V	2.56	50.49	74	-23.51
4874.00	34.25	AV	V	2.56	36.81	54	-17.19
High Channel 2462MHz							
4924.00	48.85	PK	H	2.63	51.48	74	-22.52
4924.00	35.26	AV	H	2.63	37.89	54	-16.11
4924.00	48.12	PK	V	2.63	50.75	74	-23.25
4924.00	34.87	AV	V	2.63	37.50	54	-16.50
802.11g (ANT2)							
Low Channel 2422MHz							
4824.00	48.36	PK	H	2.45	50.81	74	-23.19
4824.00	33.83	AV	H	2.45	36.28	54	-17.72
4824.00	48.07	PK	V	2.45	50.52	74	-23.48
4824.00	33.25	AV	V	2.45	35.70	54	-18.30
Middle Channel 2437MHz							
4874.00	48.57	PK	H	2.56	51.13	74	-22.87
4874.00	34.26	AV	H	2.56	36.82	54	-17.18
4874.00	48.09	PK	V	2.56	50.65	74	-23.35
4874.00	33.31	AV	V	2.56	35.87	54	-18.13
High Channel 2462MHz							
4924.00	48.83	PK	H	2.63	51.46	74	-22.54
4924.00	34.92	AV	H	2.63	37.55	54	-16.45
4924.00	48.17	PK	V	2.63	50.80	74	-23.20
4924.00	33.35	AV	V	2.63	35.98	54	-18.02

Frequency (MHz)	Receiver		Polar (H/V)	Factor (dB/m)	Corrected Amplitude (dBμV/m)	Limit (dBμV/m)	Margin (dB)
	Reading (dBμV)	PK/Ave					
802.11n20							
Low Channel 2412MHz							
4824.00	48.49	PK	H	2.45	50.94	74	-23.06
4824.00	34.51	AV	H	2.45	36.96	54	-17.04
4824.00	47.36	PK	V	2.45	49.81	74	-24.19
4824.00	33.57	AV	V	2.45	36.02	54	-17.98
Middle Channel 2437MHz							
4874.00	49.37	PK	H	2.56	51.93	74	-22.07
4874.00	35.82	AV	H	2.56	38.38	54	-15.62
4874.00	48.41	PK	V	2.56	50.97	74	-23.03
4874.00	34.69	AV	V	2.56	37.25	54	-16.75
High Channel 2462MHz							
4924.00	50.69	PK	H	2.63	53.32	74	-20.68
4924.00	36.45	AV	H	2.63	39.08	54	-14.92
4924.00	49.37	PK	V	2.63	52.00	74	-22.00
4924.00	35.28	AV	V	2.63	37.91	54	-16.09
802.11n40							
Low Channel 2422MHz							
4844.00	46.54	PK	H	2.47	49.01	74	-24.99
4844.00	33.12	AV	H	2.47	35.59	54	-18.41
4844.00	45.73	PK	V	2.47	48.20	74	-25.80
4844.00	32.86	AV	V	2.47	35.33	54	-18.67
Middle Channel 2437MHz							
4874.00	46.37	PK	H	2.56	48.93	74	-25.07
4874.00	33.02	AV	H	2.56	35.58	54	-18.42
4874.00	45.71	PK	V	2.56	48.27	74	-25.73
4874.00	32.79	AV	V	2.56	35.35	54	-18.65
High Channel 2452MHz							
4904.00	46.08	PK	H	2.64	48.72	74	-25.28
4904.00	32.92	AV	H	2.64	35.56	54	-18.44
4904.00	45.65	PK	V	2.64	48.29	74	-25.71
4904.00	32.73	AV	V	2.64	35.37	54	-18.63

Note:

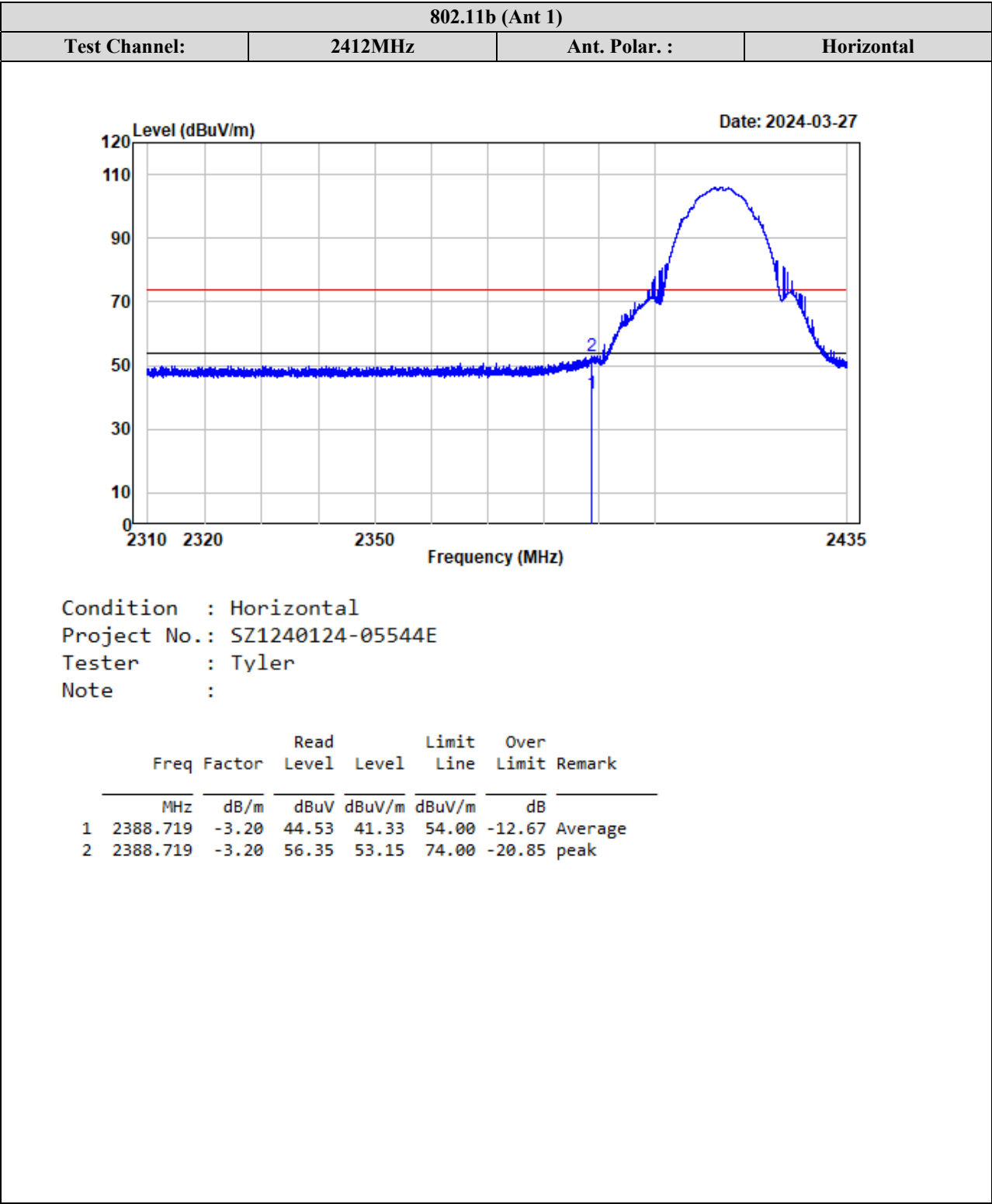
Factor = Antenna factor (RX) + Cable Loss – Amplifier Factor

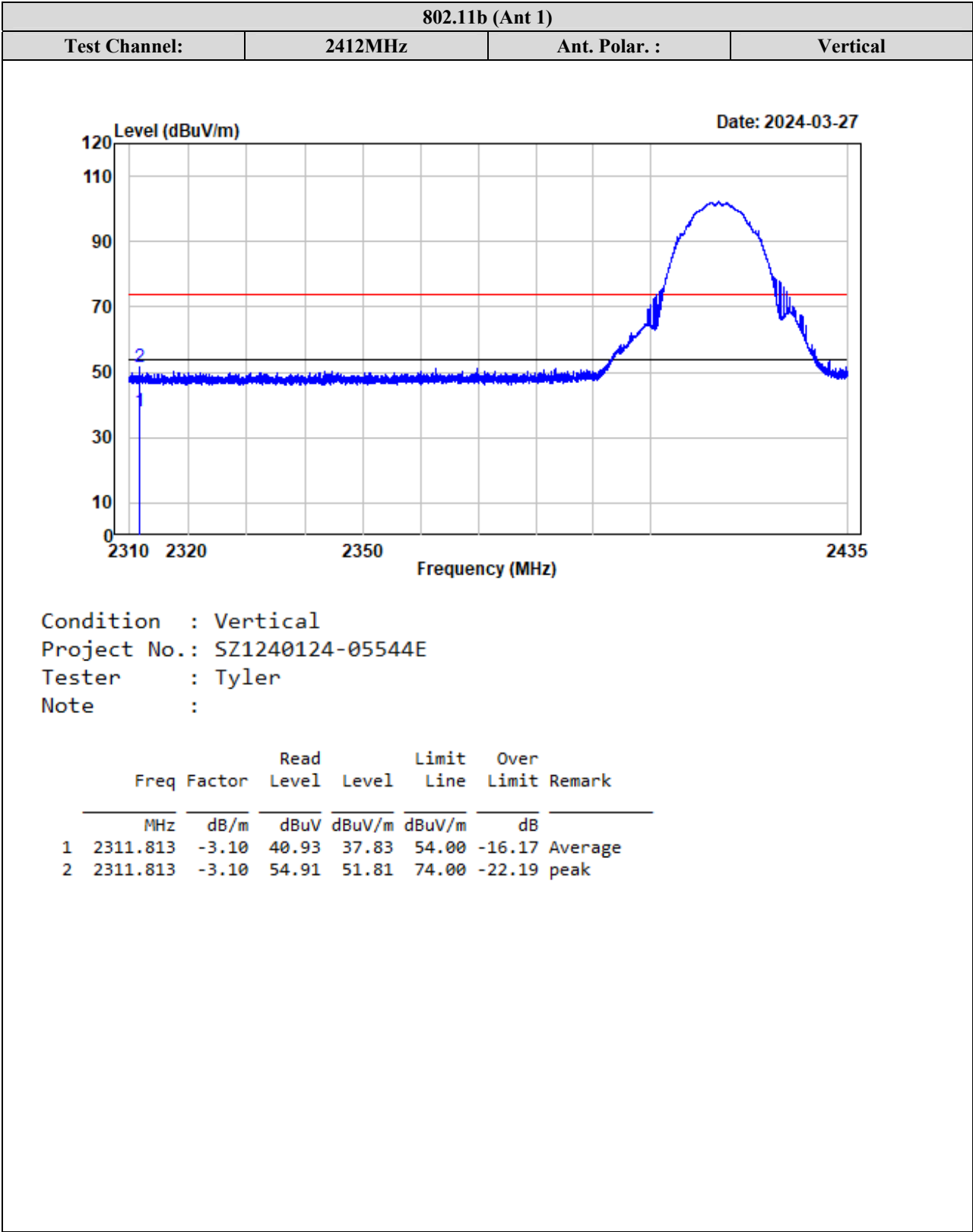
Corrected Amplitude = Factor + Reading

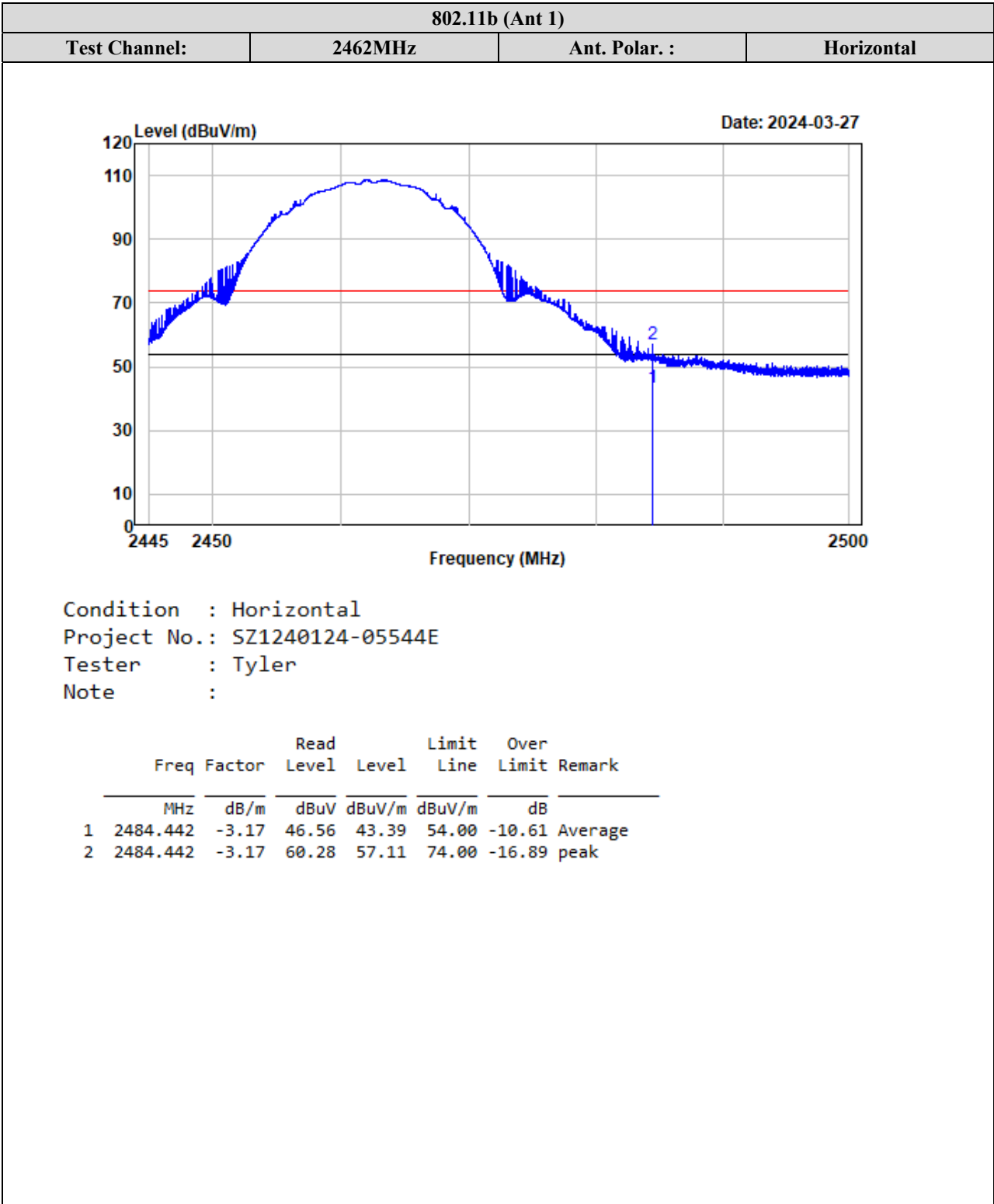
Margin = Corrected. Amplitude - Limit

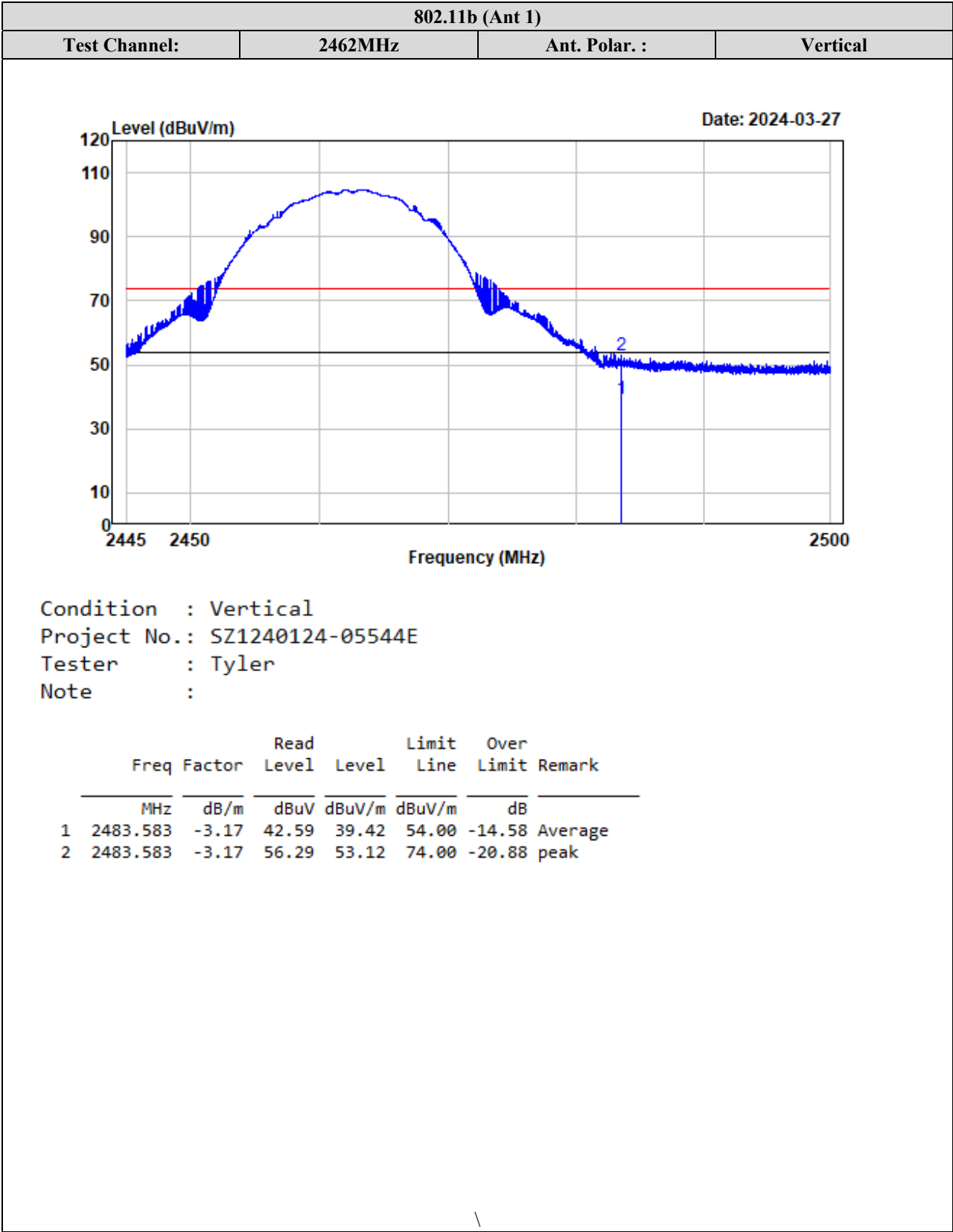
The other spurious emission which is in the noise floor level was not recorded.

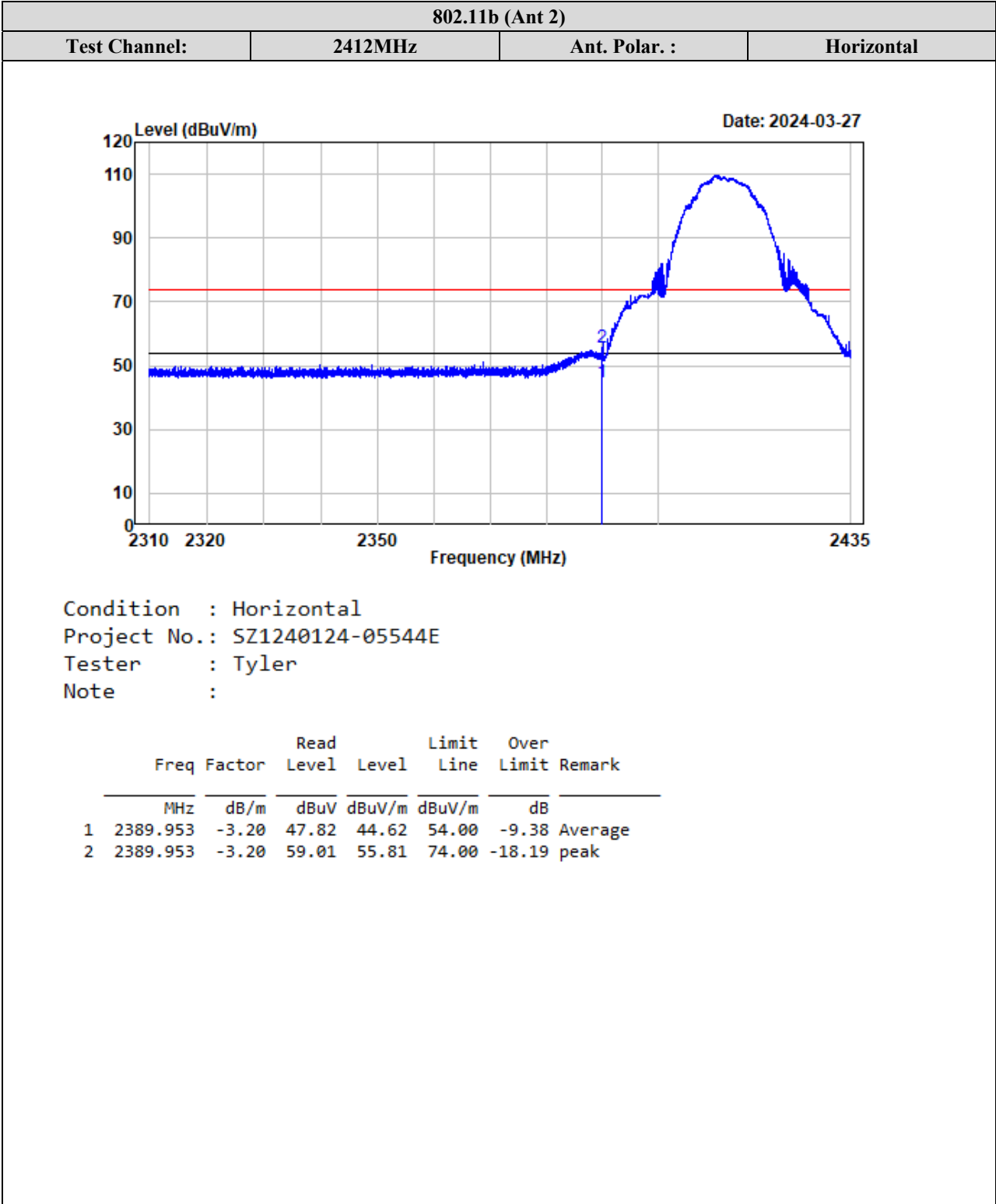
Test plots for Band Edge Measurements (Radiated):

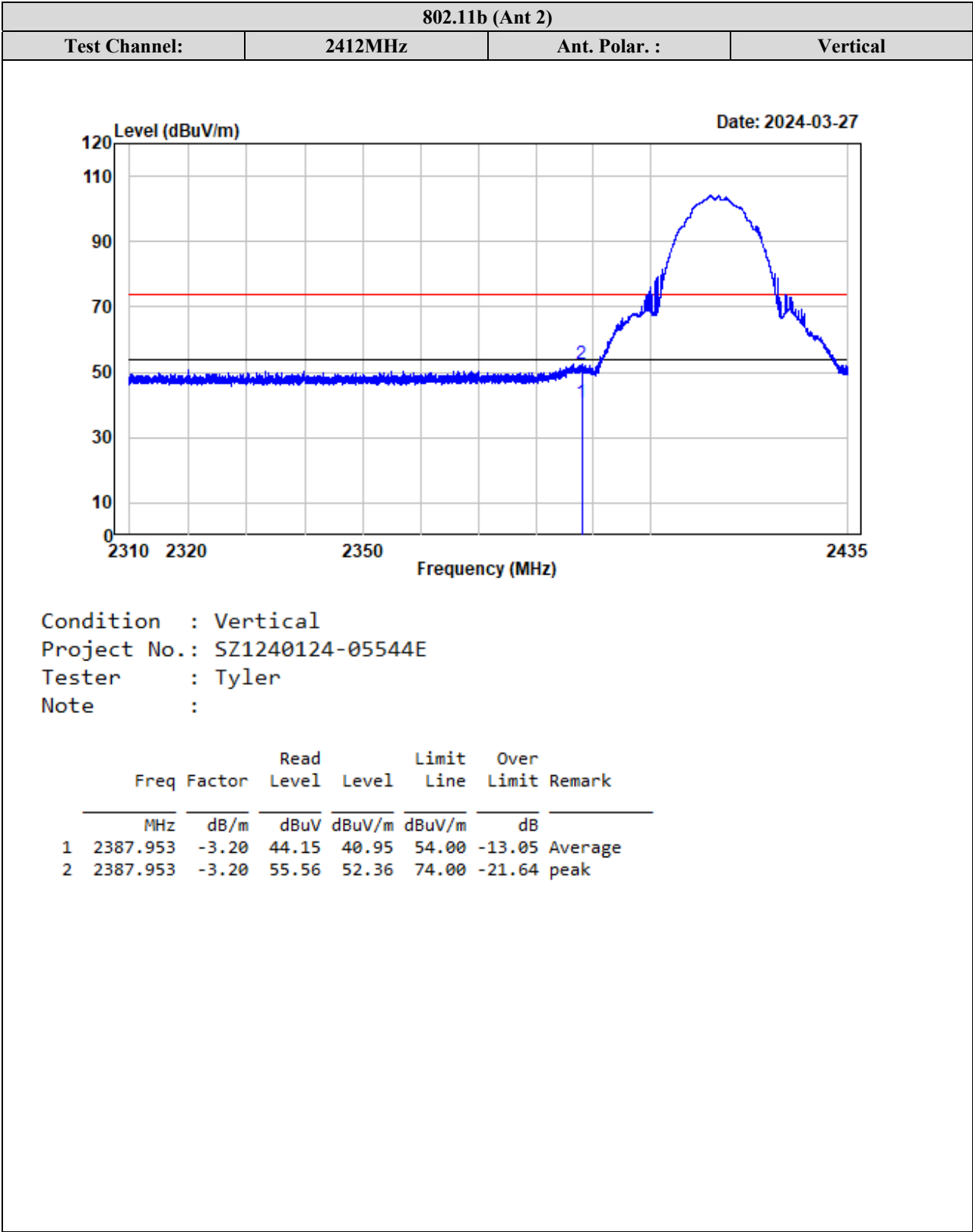


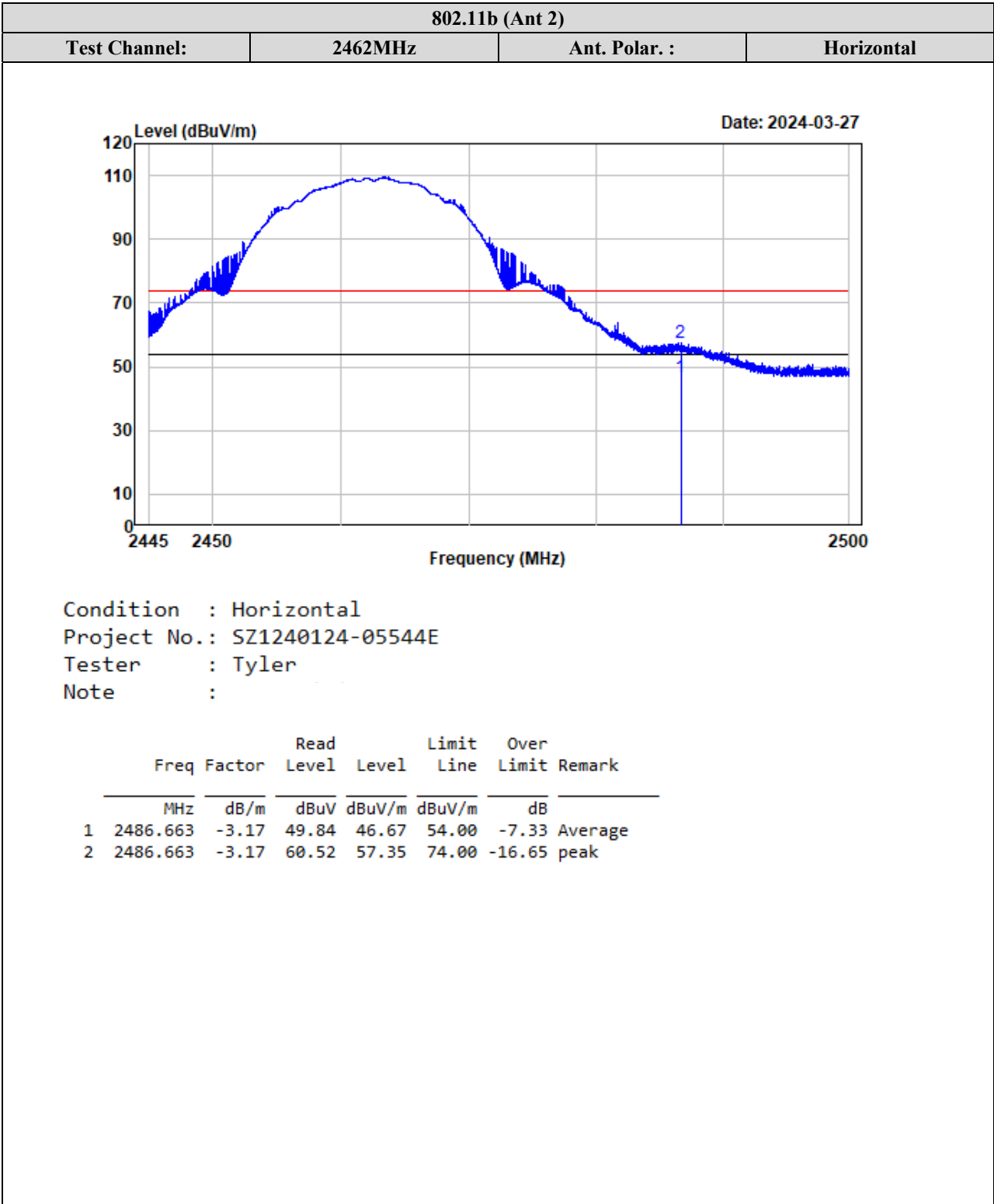


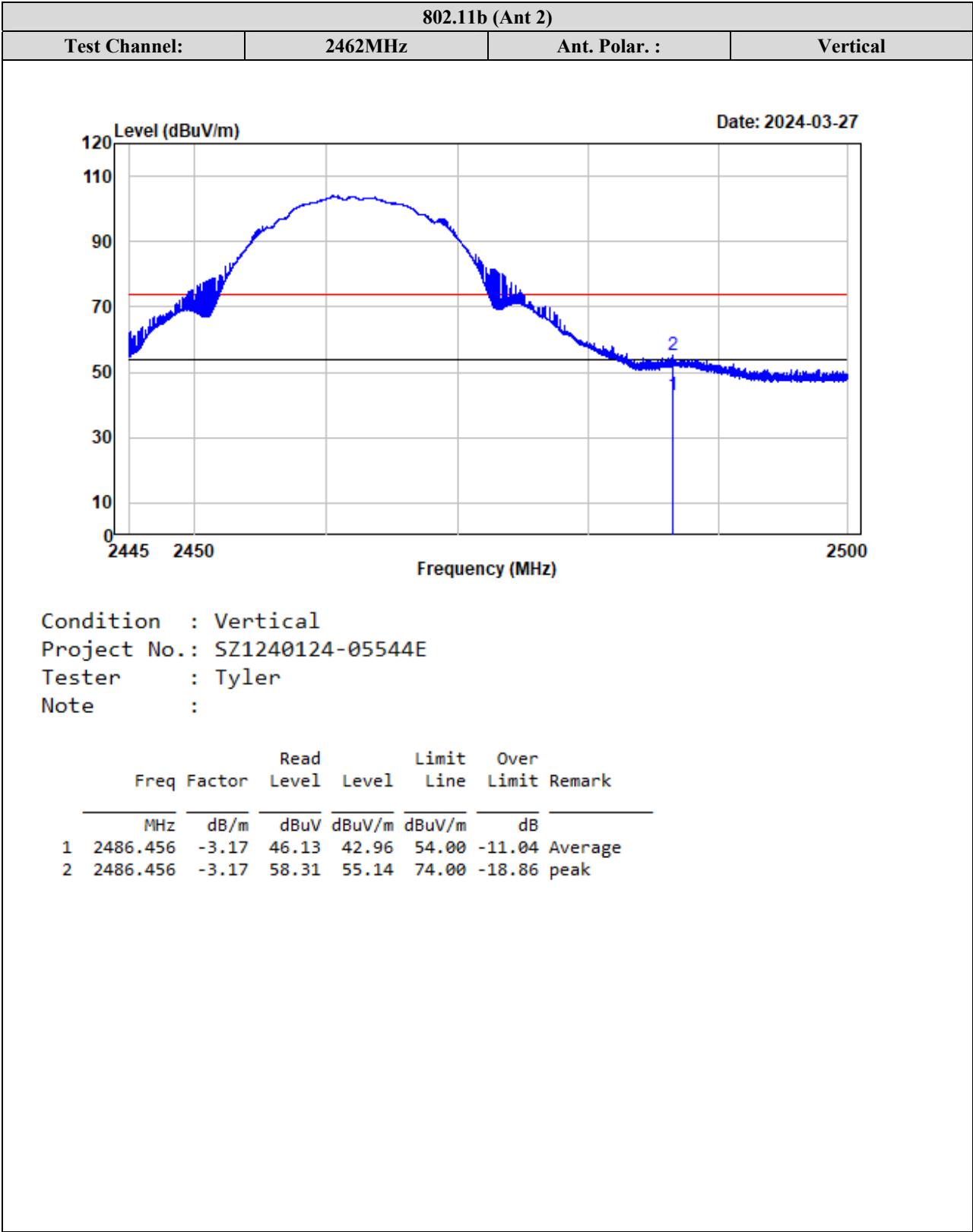


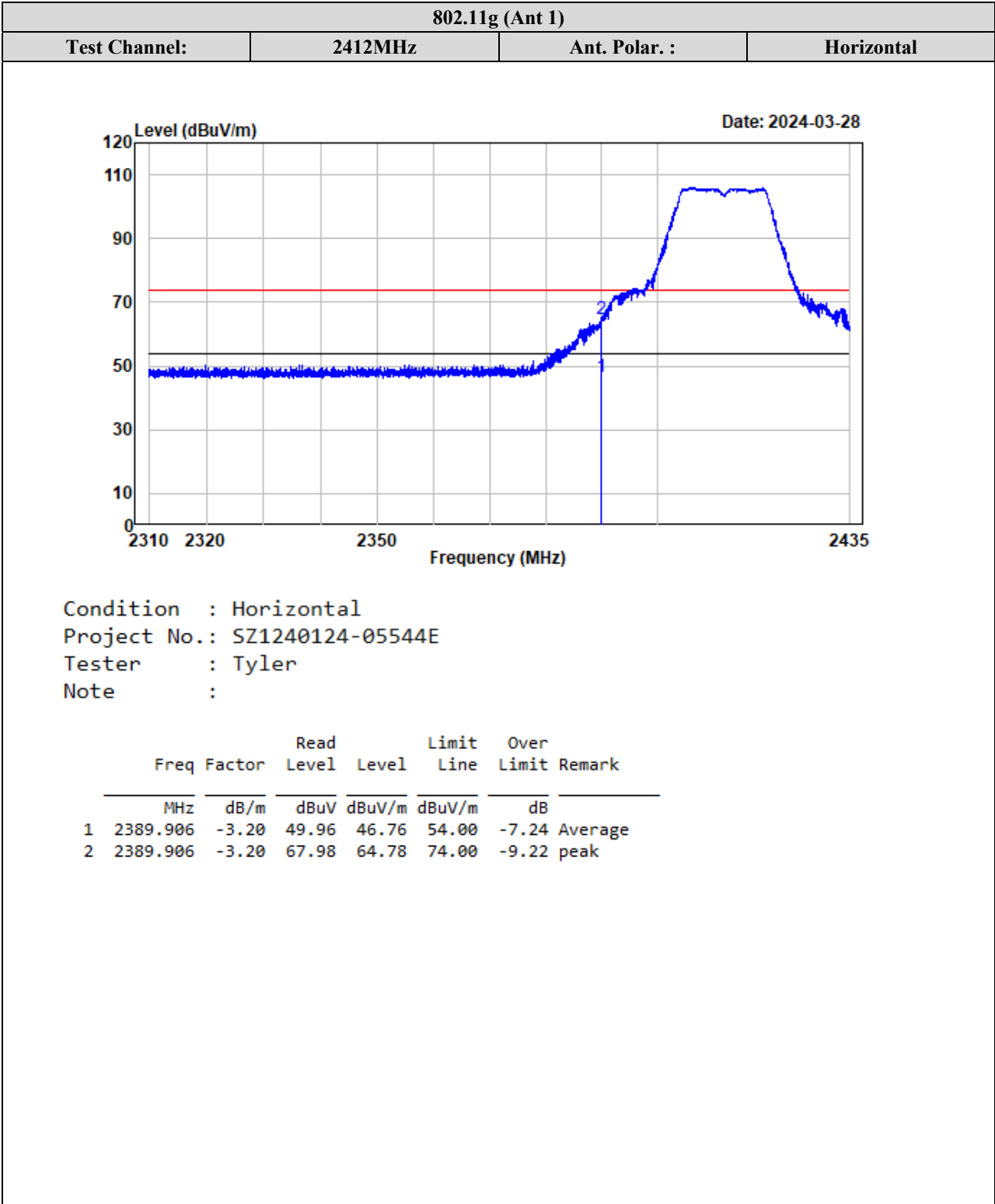


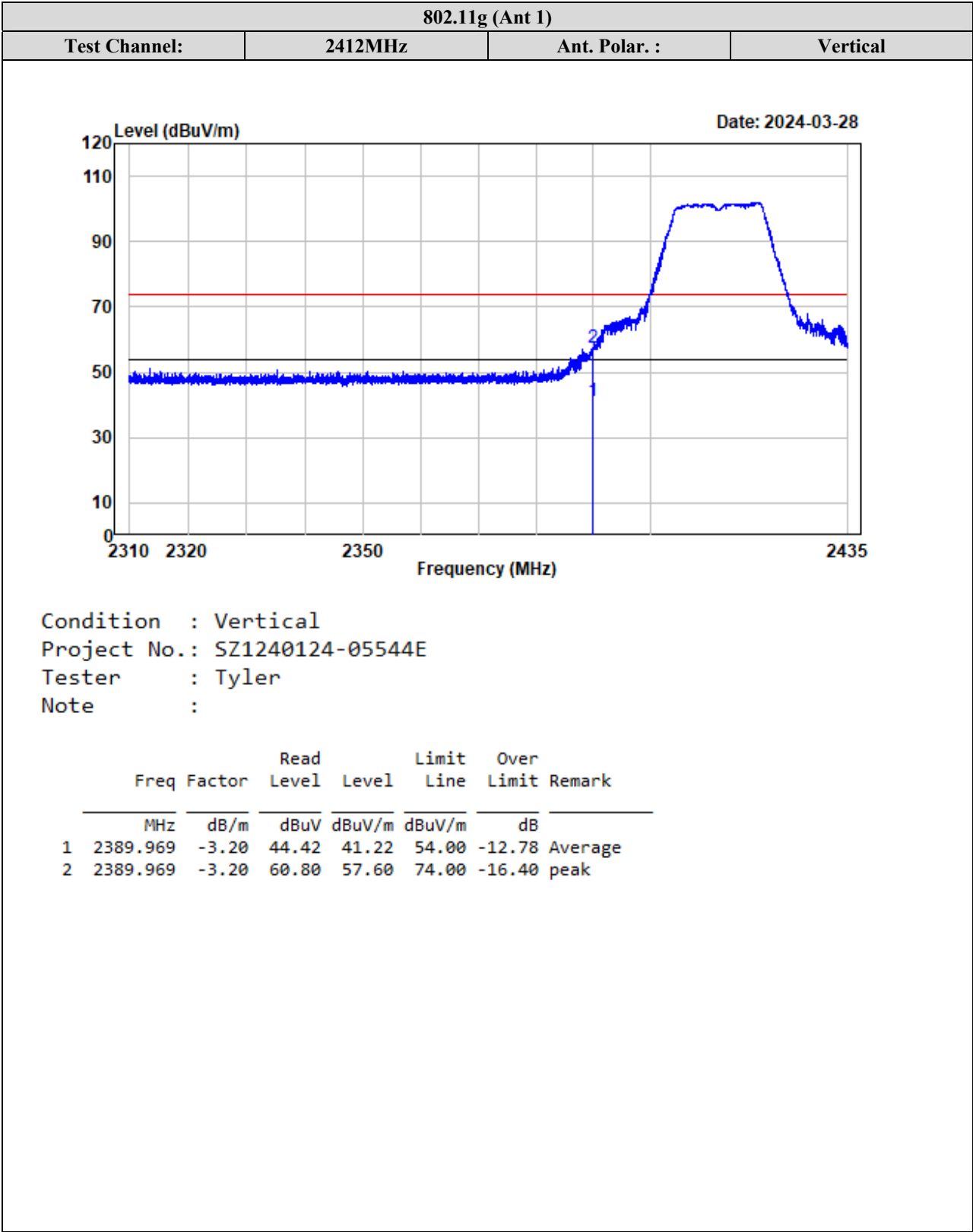


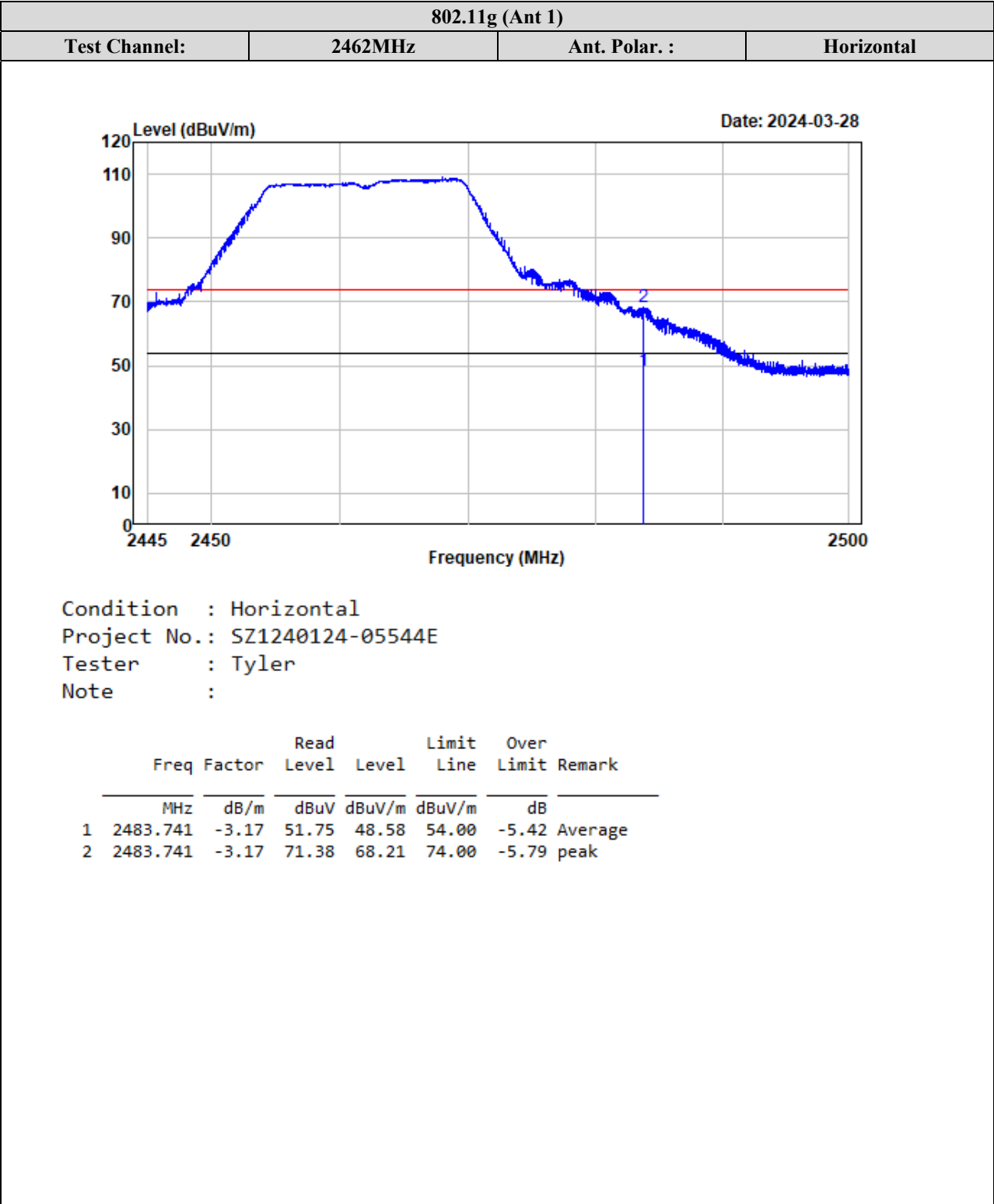


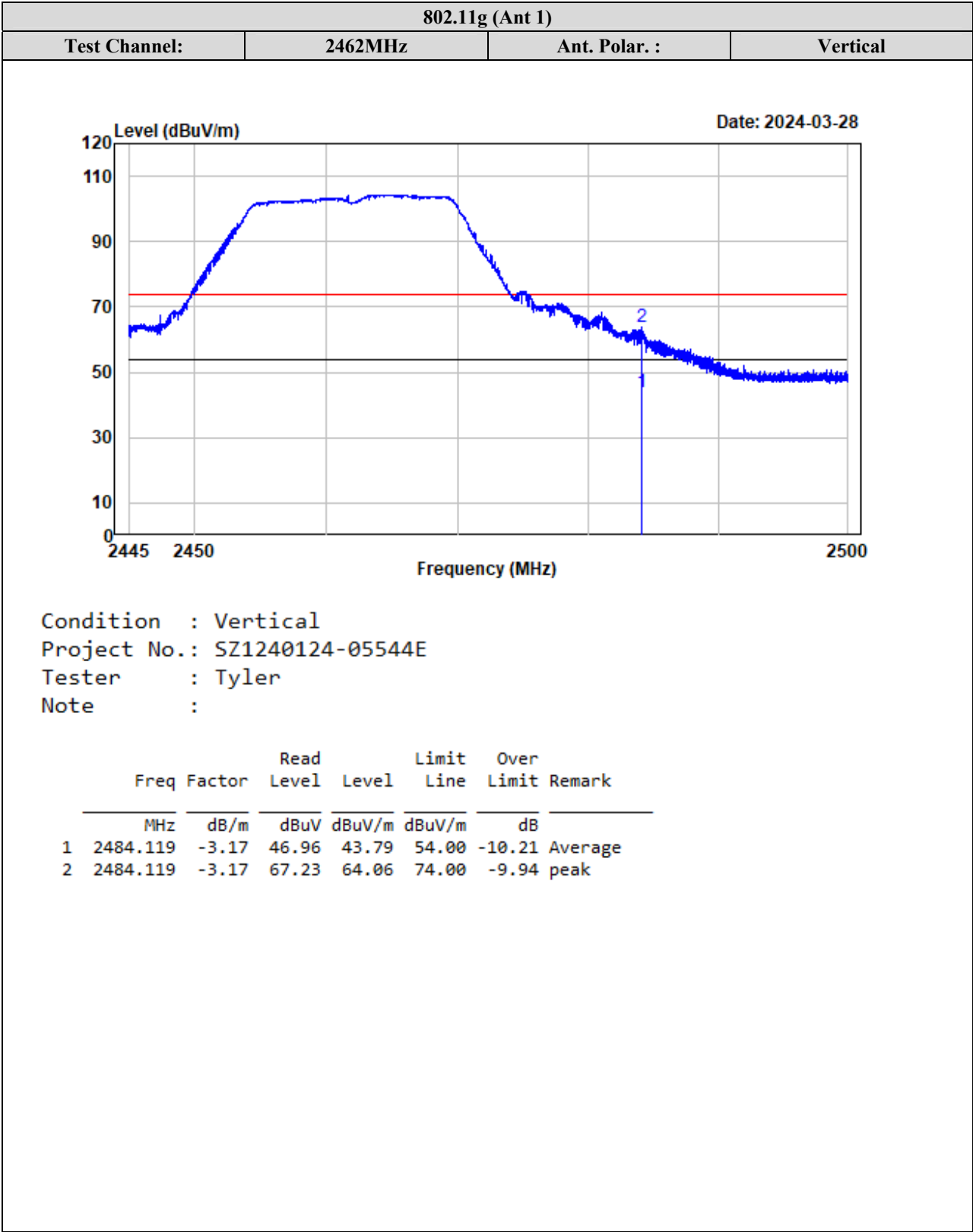


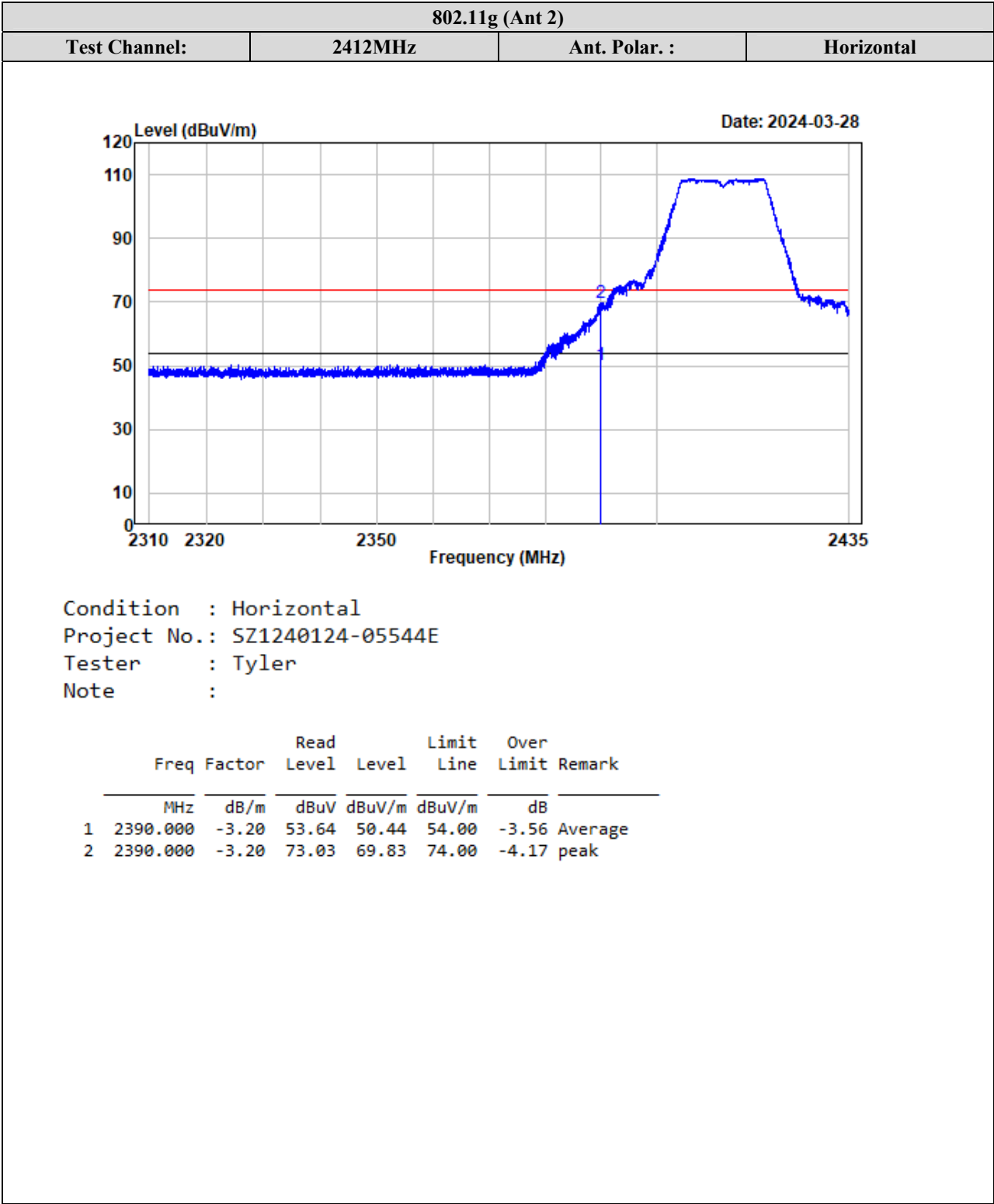


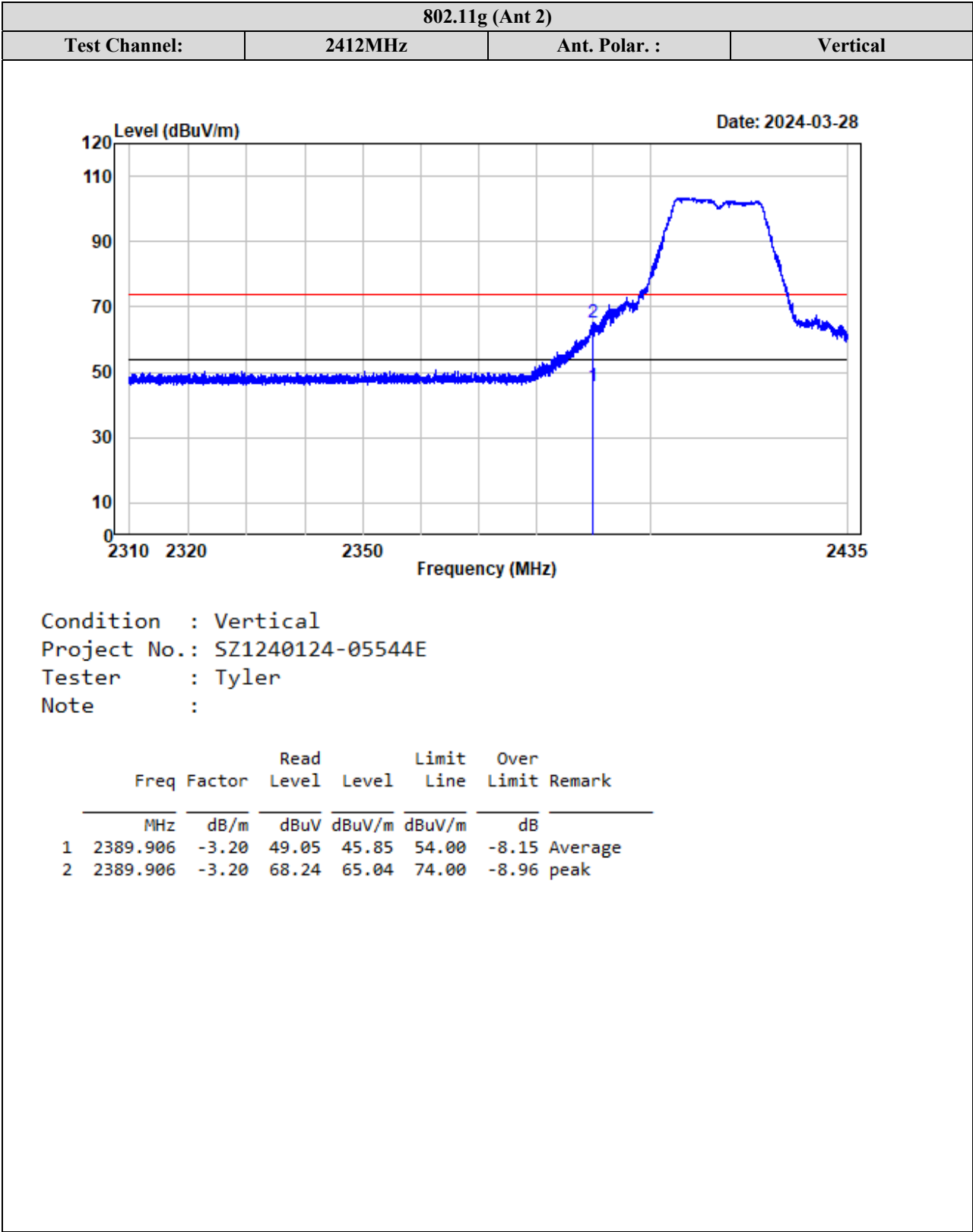


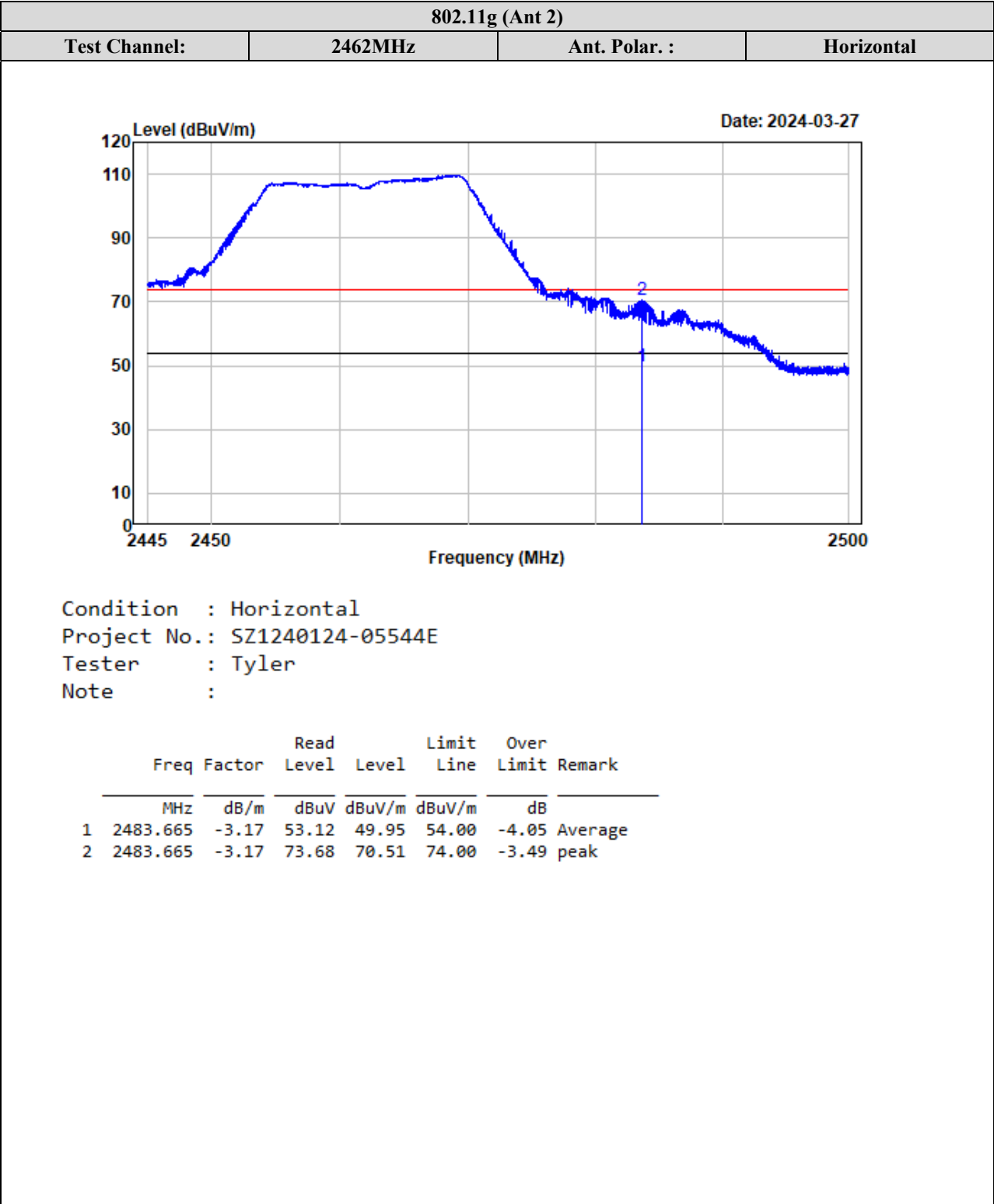


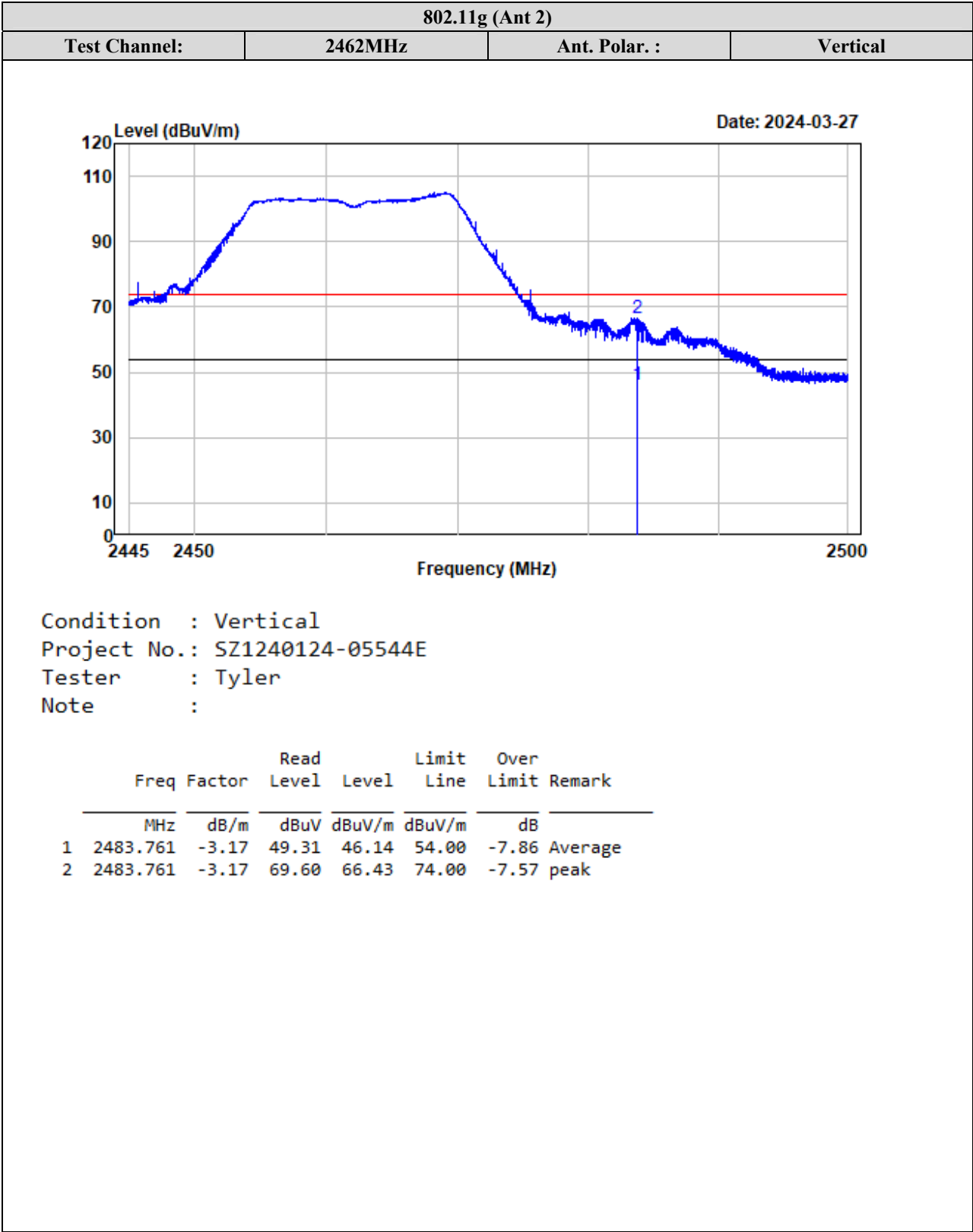


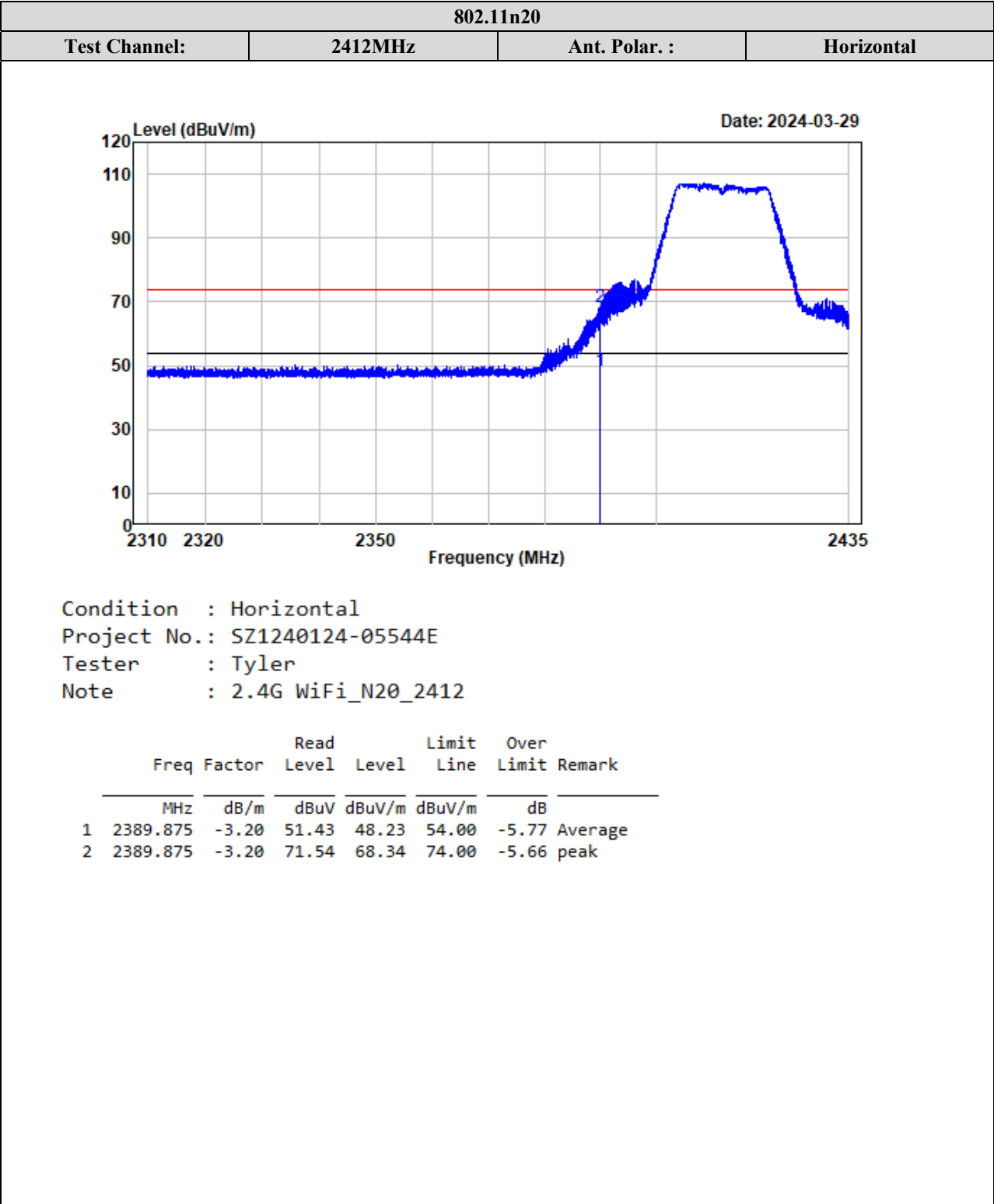


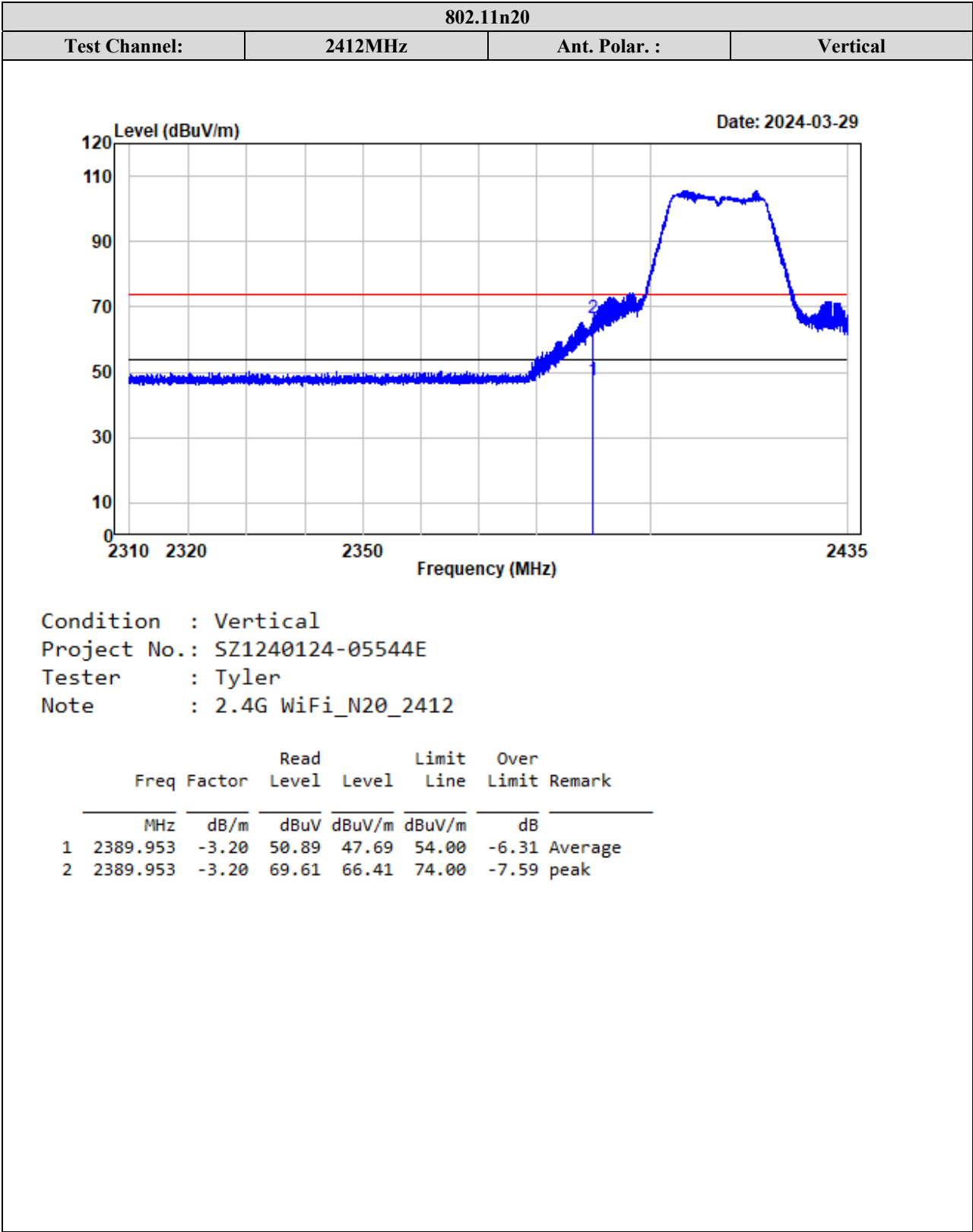








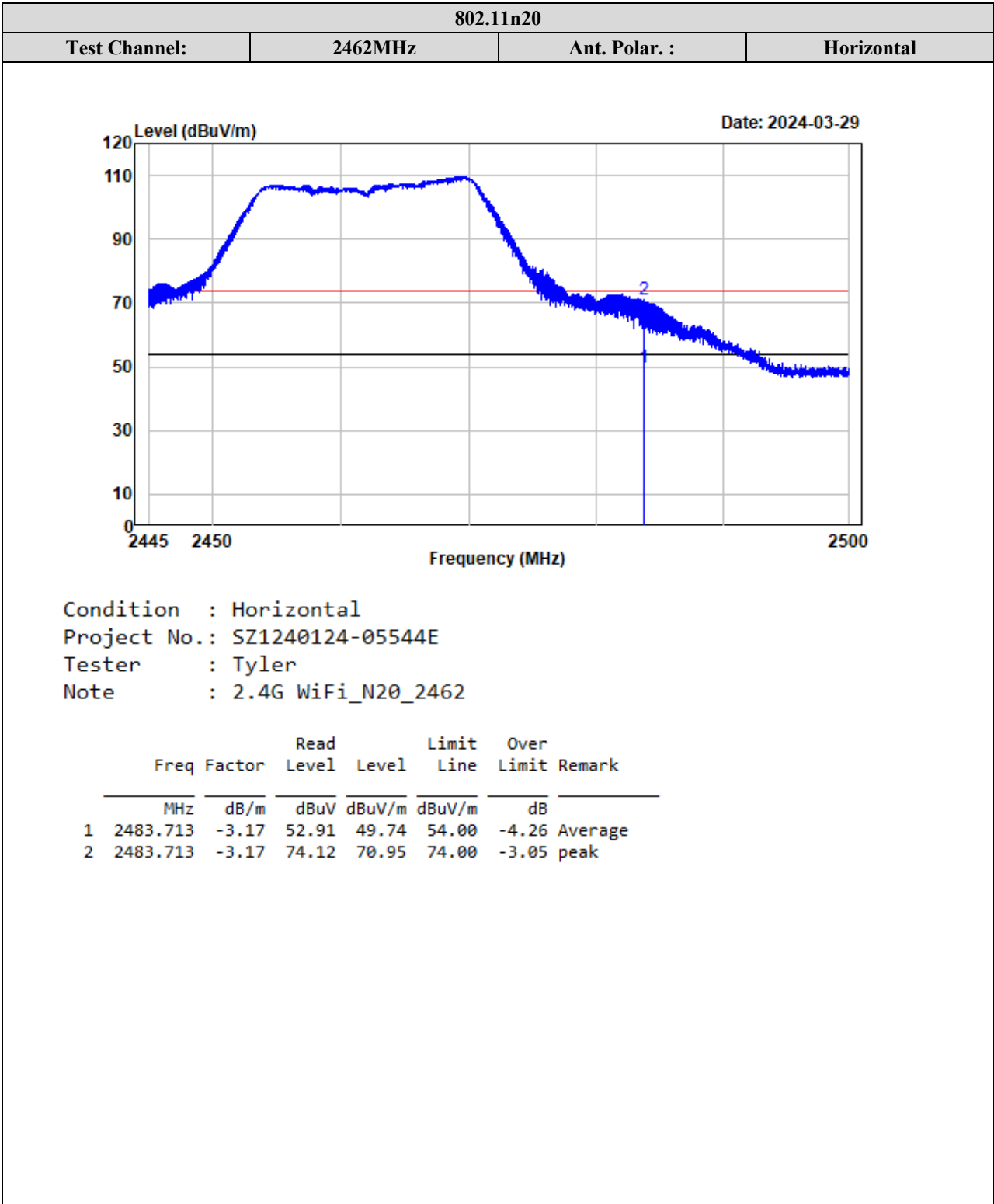


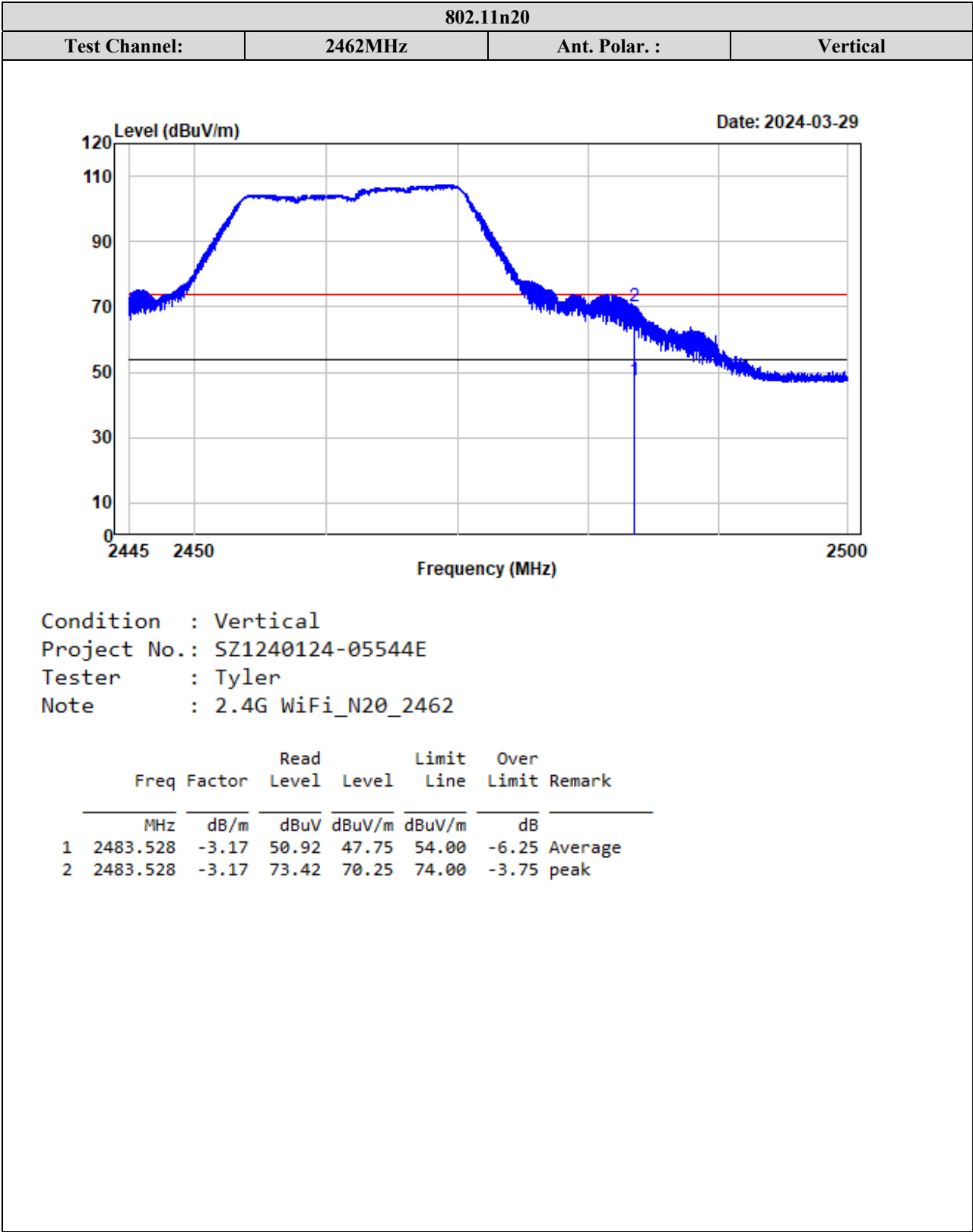


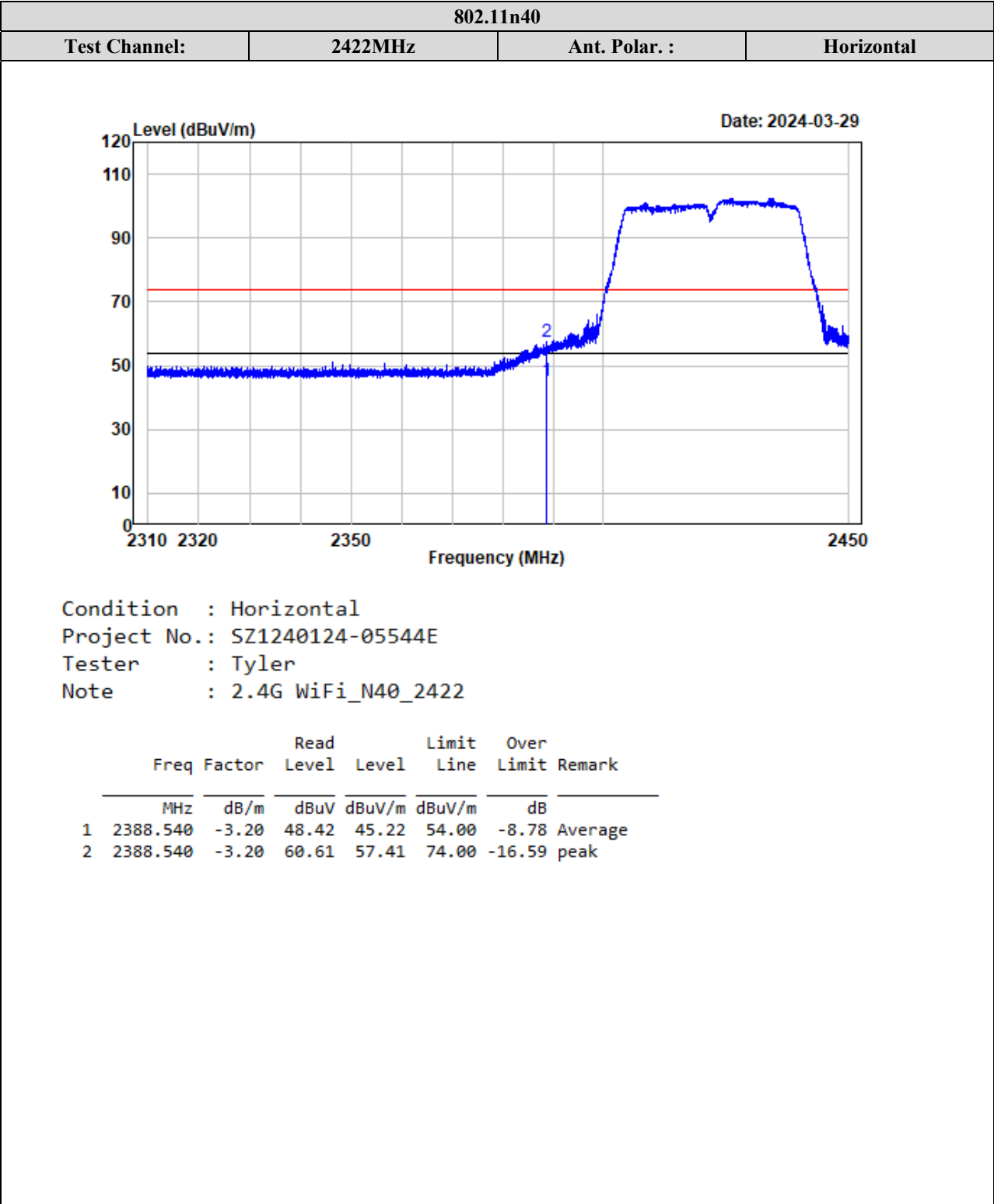
TR-EM-RF004

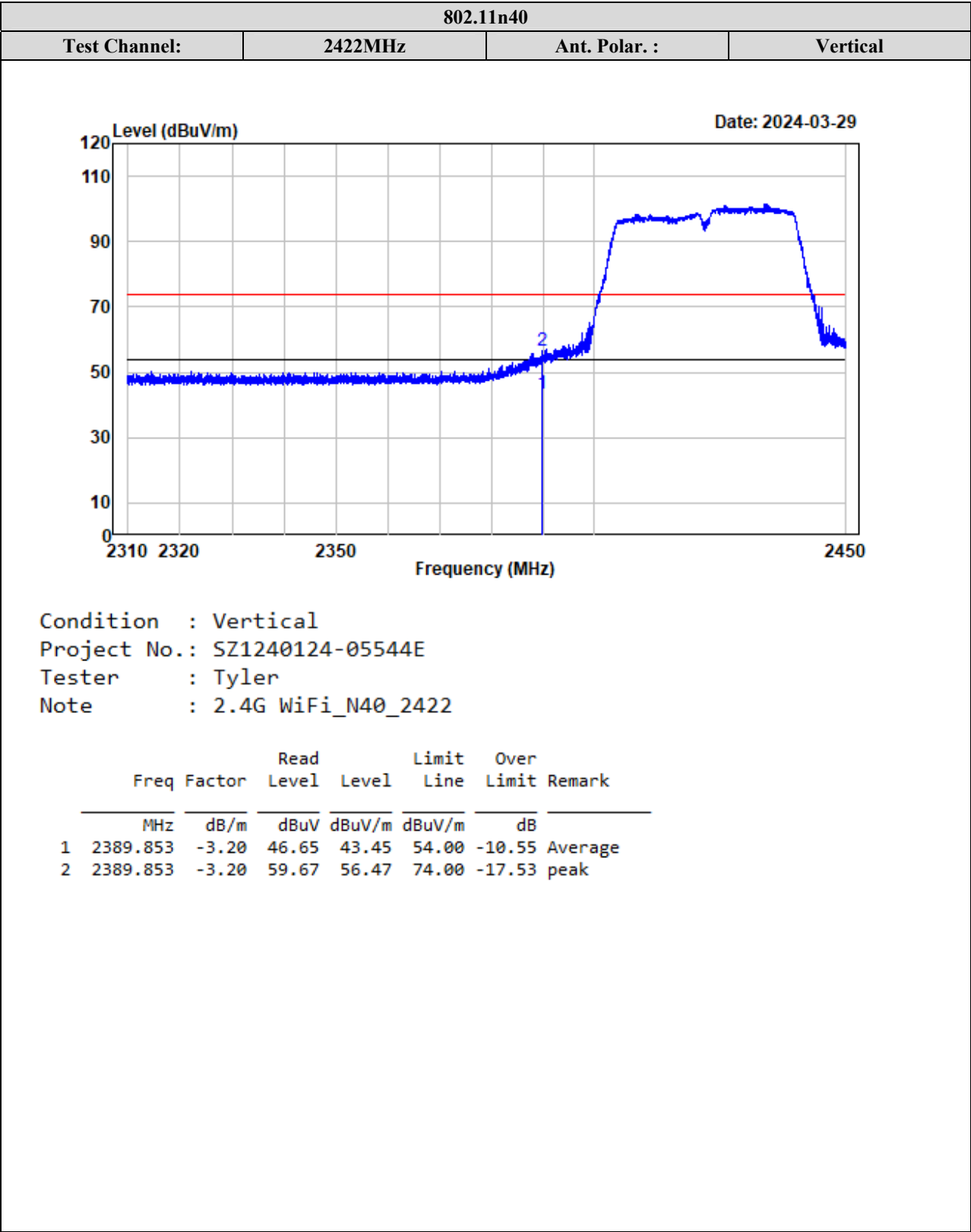
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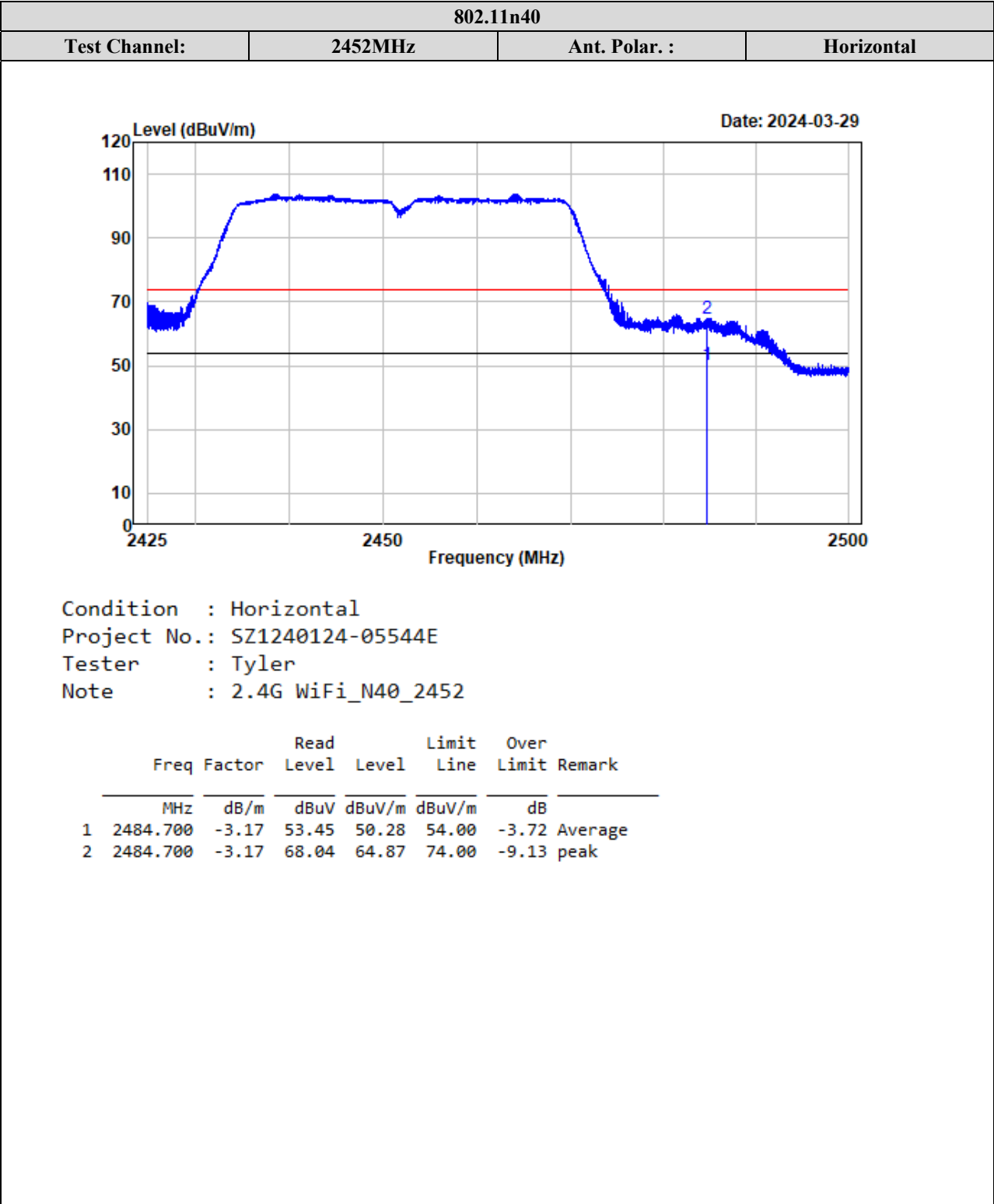
Version 1.0 (2023/10/07)

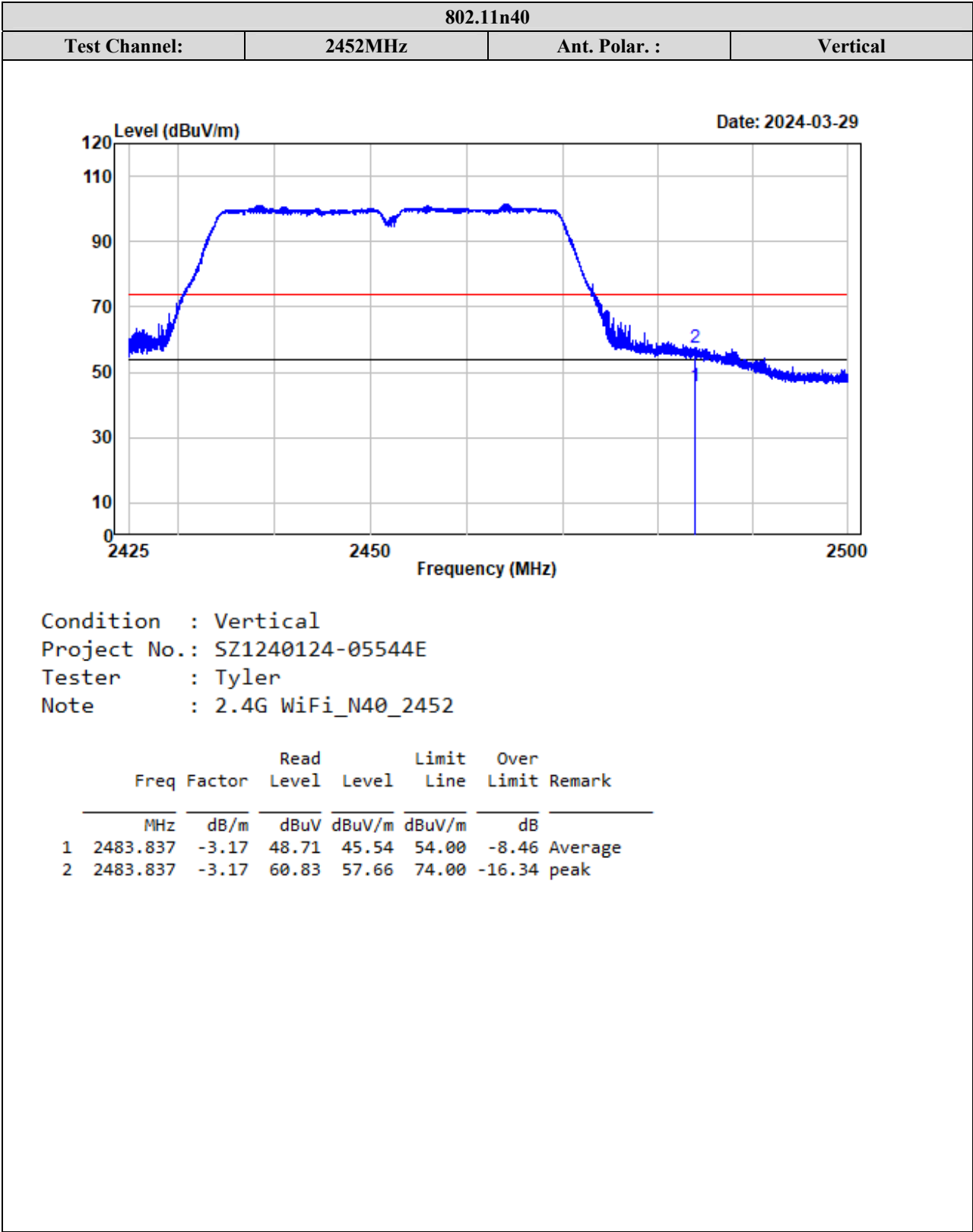




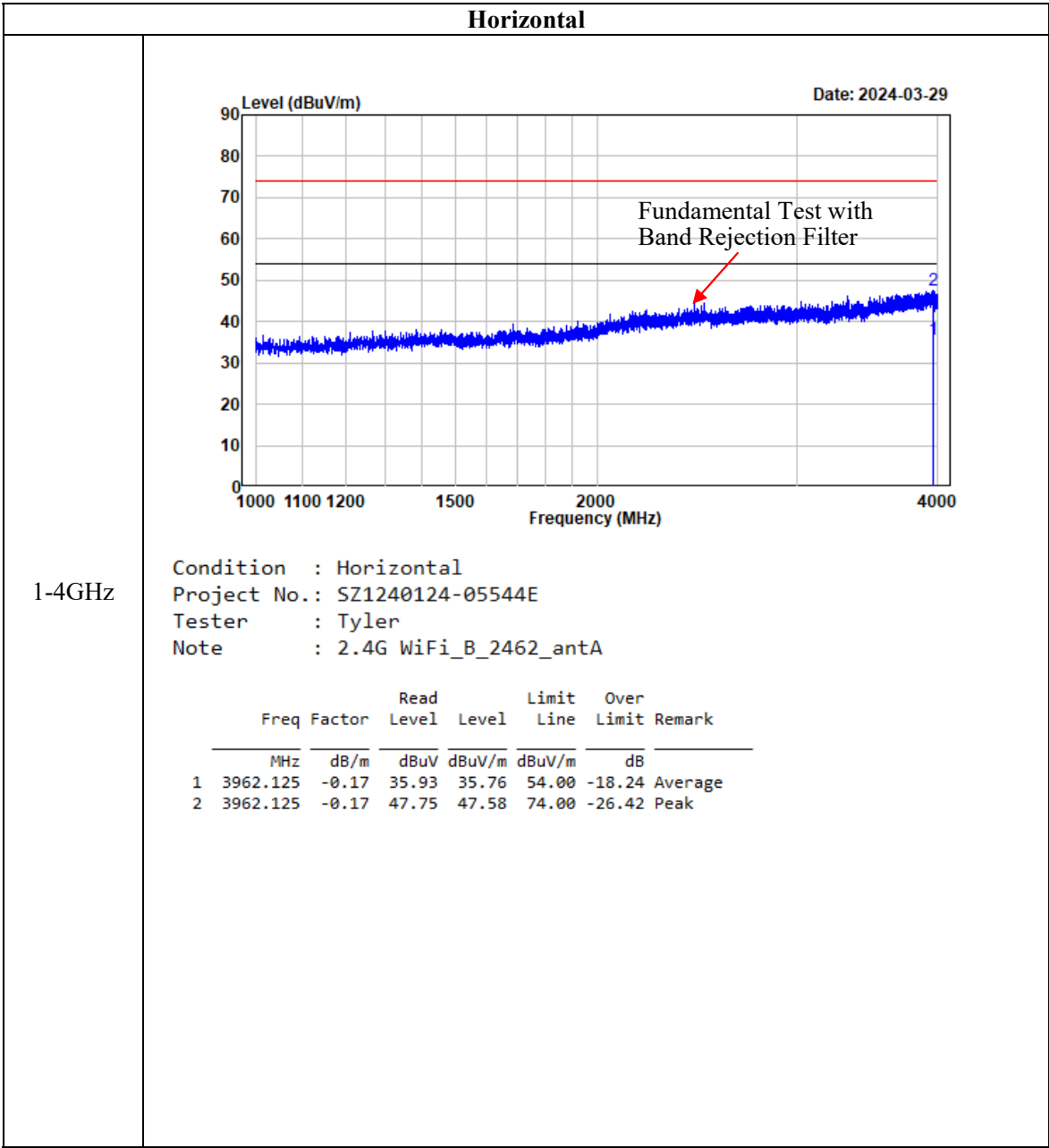


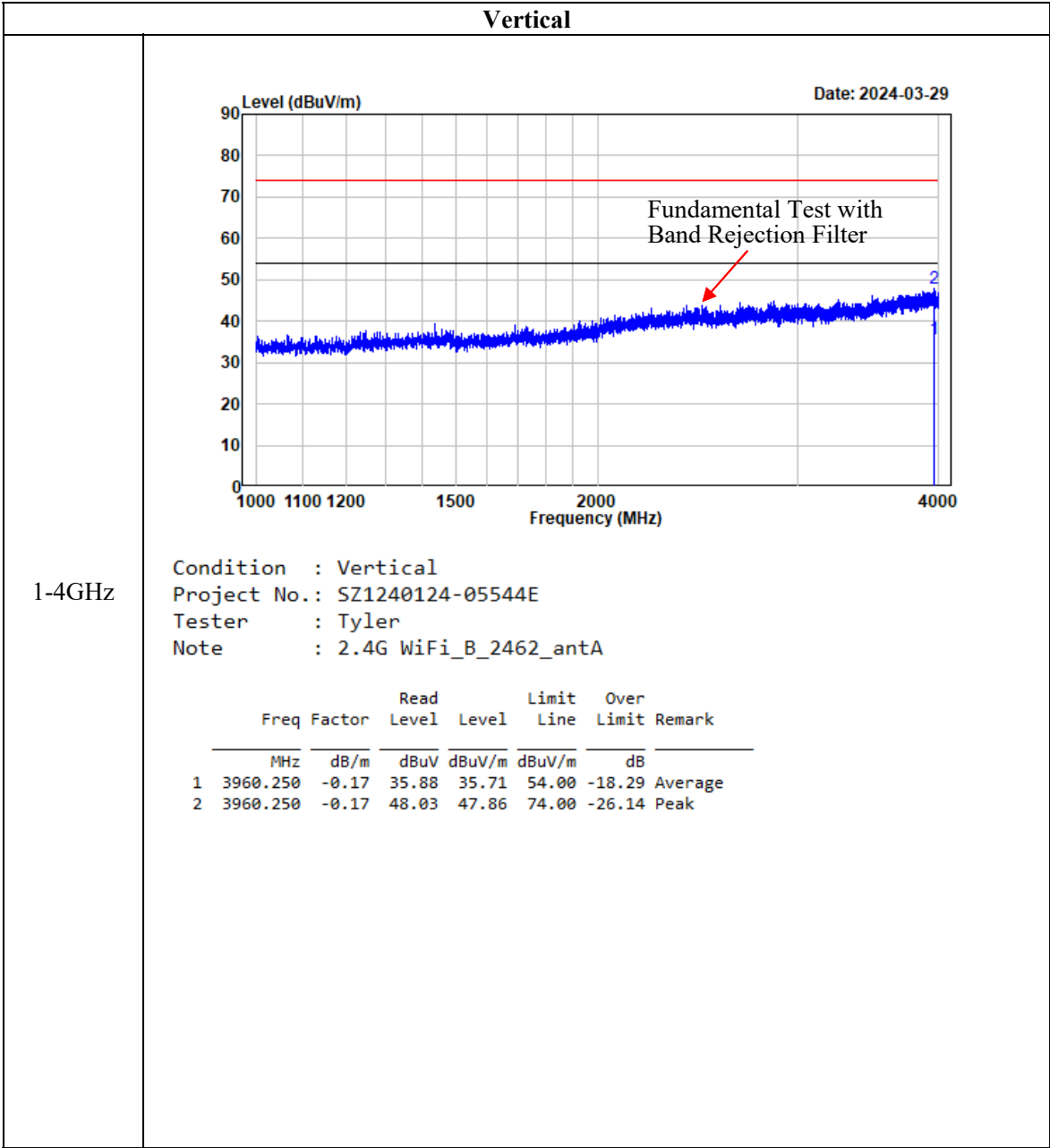


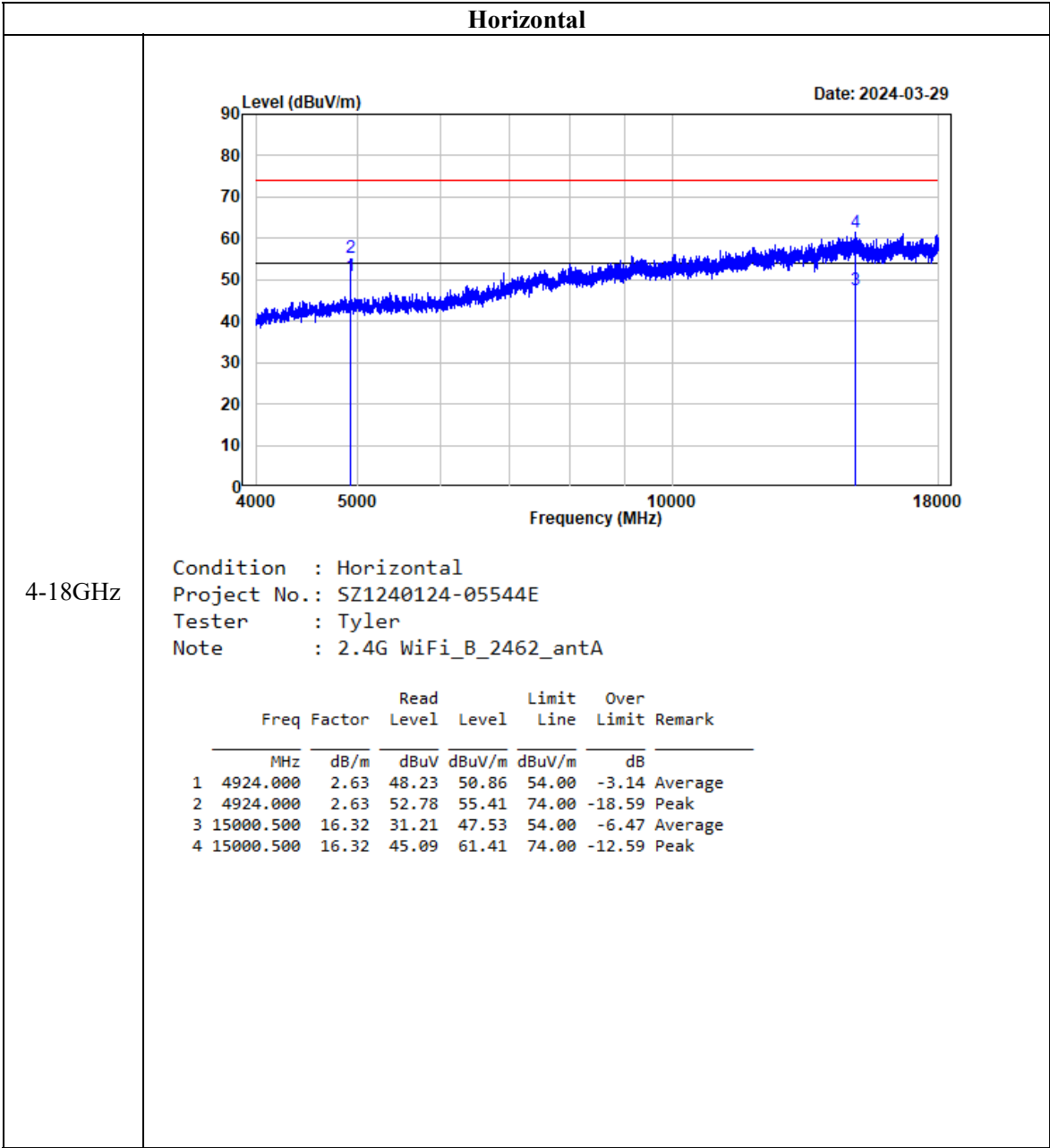


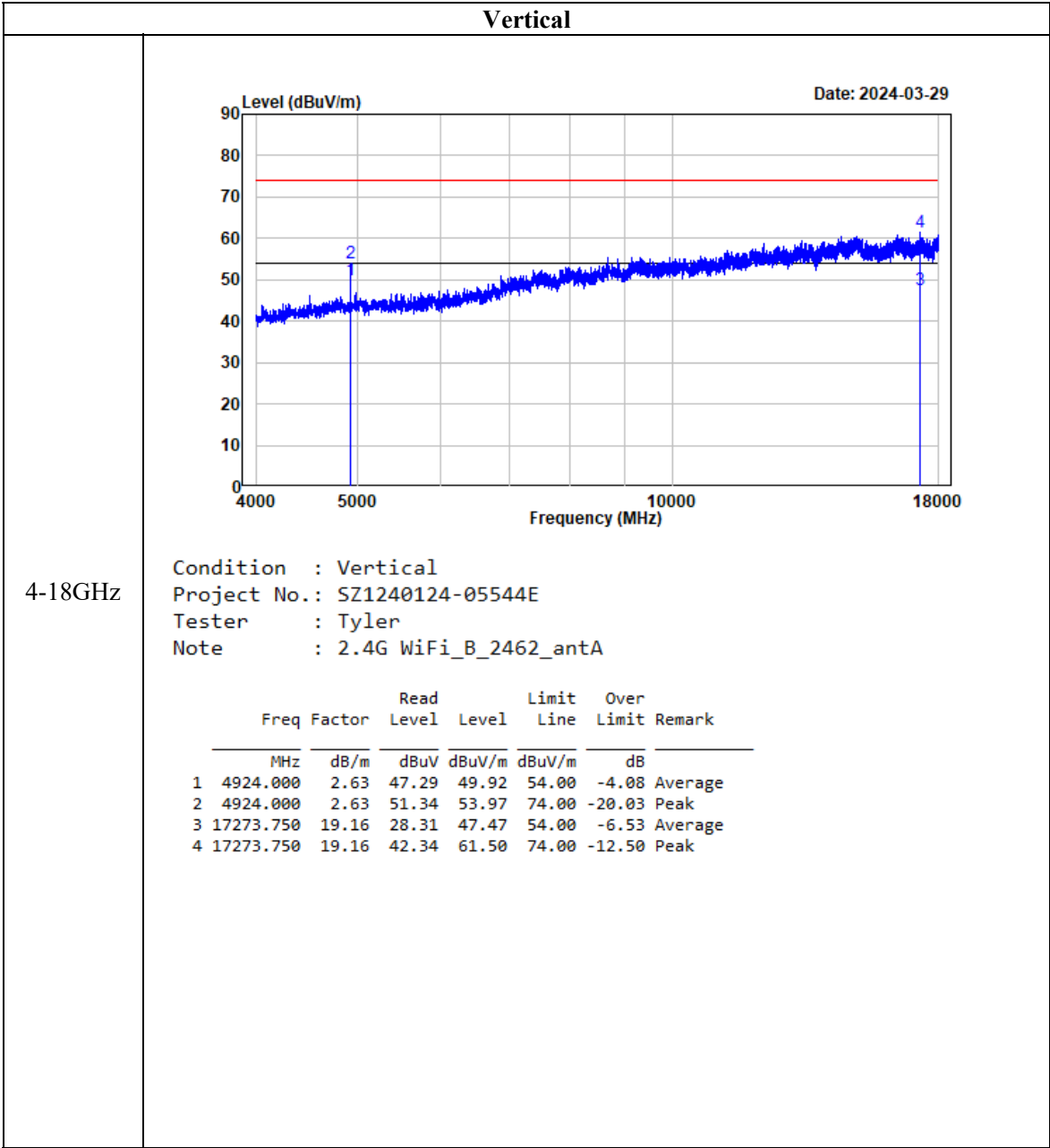


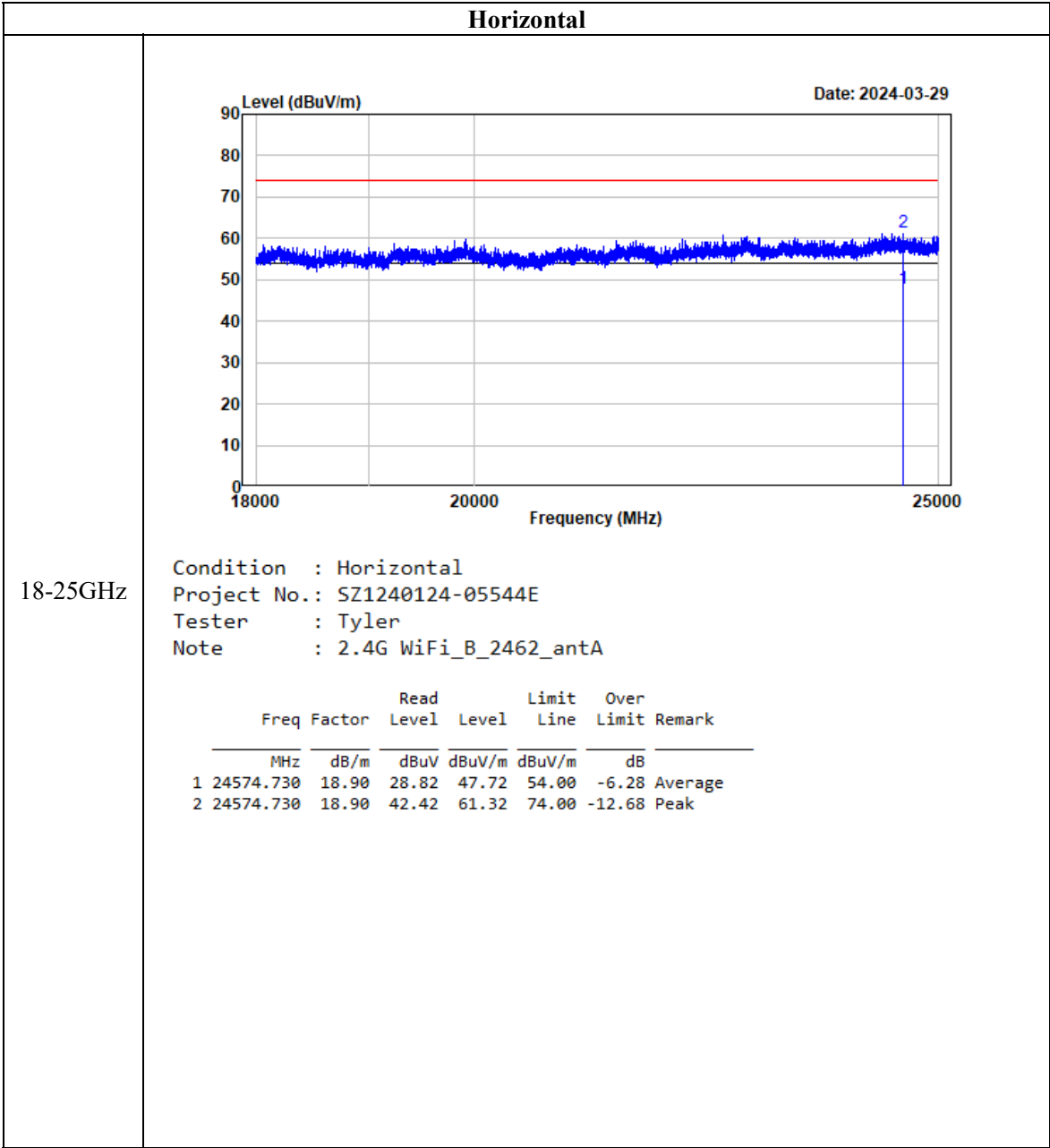
Listed with the worst harmonic margin test plot: 802.11b, ANT1, High Channel

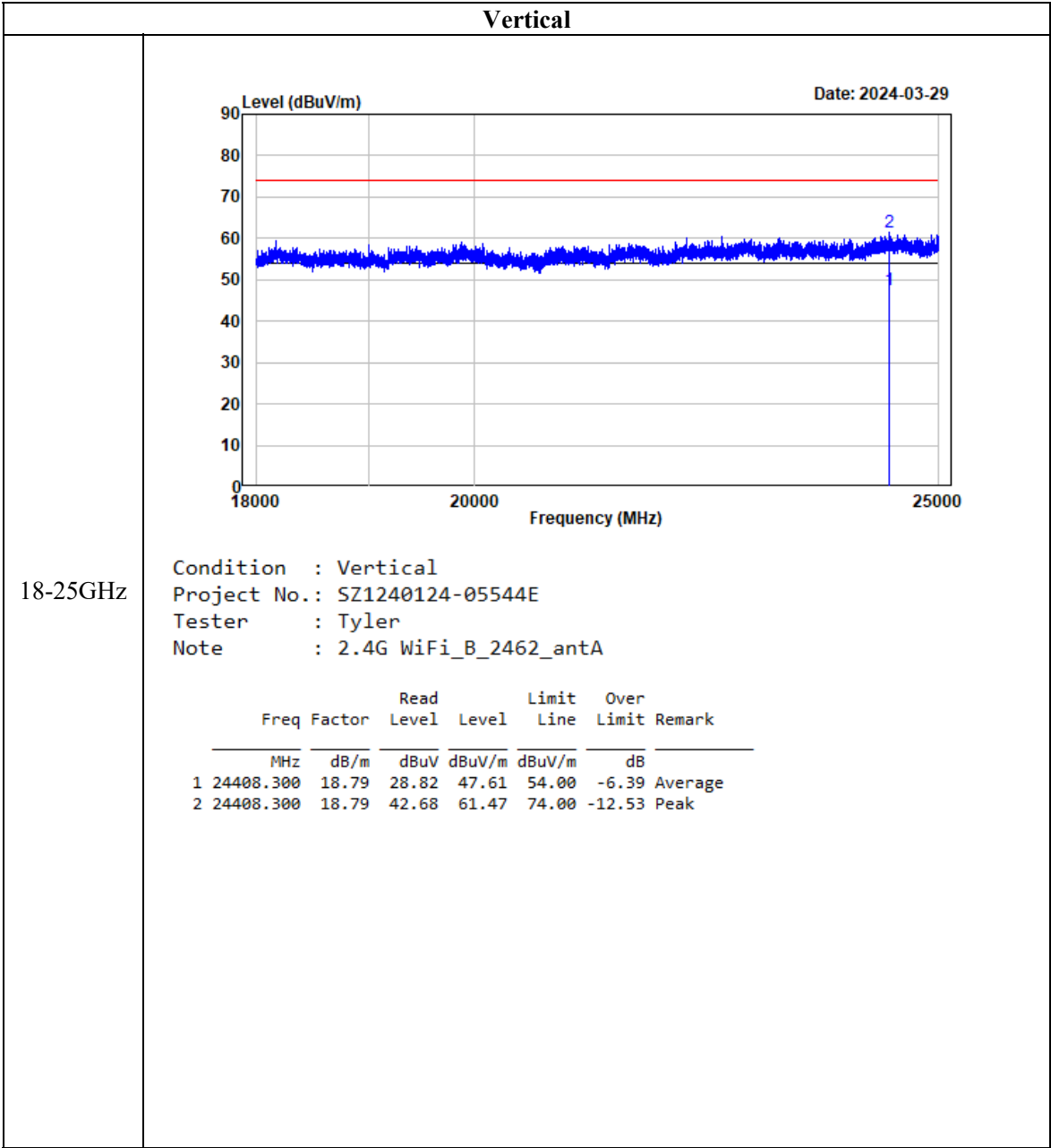












FCC §15.247(a) (2) – 6 dB EMISSION BANDWIDTH

Applicable Standard

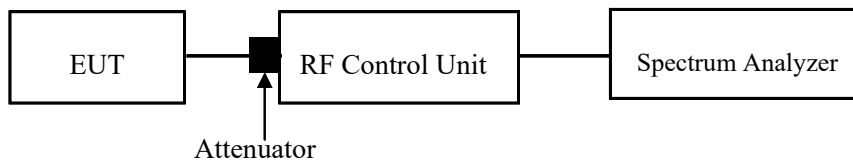
According to FCC §15.247(a) (2)

Systems using digital modulation techniques may operate in the 902–928 MHz, 2400–2483.5 MHz, and 5725–5850 MHz bands. The minimum 6 dB bandwidth shall be at least 500 kHz.

Test Procedure

Test Method: ANSI C63.10-2013 Clause 11.8.1 & Clause 6.9.3

1. Check the calibration of the measuring instrument using either an internal calibrator or a known signal from an external generator.
2. Position the EUT without connection to measurement instrument. Turn on the EUT and connect it to measurement instrument. Then set it to any one convenient frequency within its operating range. Set a reference level on the measuring instrument equal to the highest peak value.
3. Measure the frequency difference of two frequencies that were attenuated 6 dB from the reference level. Record the frequency difference as the emission bandwidth.
4. Repeat above procedures until all frequencies measured were complete.



Test Data

Environmental Conditions

Temperature:	30 °C
Relative Humidity:	50 %
ATM Pressure:	101.2 kPa

The testing was performed by Tom Tan on 2024-04-11.

EUT operation mode: Transmitting

Test Result: Compliant. The test data and polots please refer to the Appendix.

FCC §15.247(b) (3) - MAXIMUM CONDUCTED OUTPUT POWER

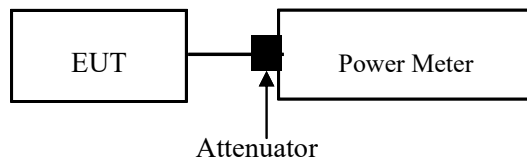
Applicable Standard

According to FCC §15.247(b) (3), for systems using digital modulation in the 902-928 MHz, 2400-2483.5 MHz, and 5725-5850 MHz bands: 1 Watt. As an alternative to a peak power measurement, compliance with the one Watt limit can be based on a measurement of the maximum conducted output power. Maximum Conducted Output Power is defined as the total transmit power delivered to all antennas and antenna elements averaged across all symbols in the signaling alphabet when the transmitter is operating at its maximum power control level. Power must be summed across all antennas and antenna elements. The average must not include any time intervals during which the transmitter is off or is transmitting at a reduced power level. If multiple modes of operation are possible (e.g., alternative modulation methods), the maximum conducted output power is the highest total transmit power occurring in any mode.

Test Procedure

Test Method: ANSI C63.10-2013 Clause 11.9.1.3 & 11.9.2.3

1. Place the EUT on a bench and set it in transmitting mode.
2. Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to one test equipment.
3. Add a correction factor to the display.



Test Data

Environmental Conditions

Temperature:	30 °C
Relative Humidity:	50 %
ATM Pressure:	101.2 kPa

The testing was performed by Tom Tan on 2024-04-11 and 2024-04-12.

EUT operation mode: Transmitting

Test Result: Compliant. The test data and polots please refer to the Appendix.

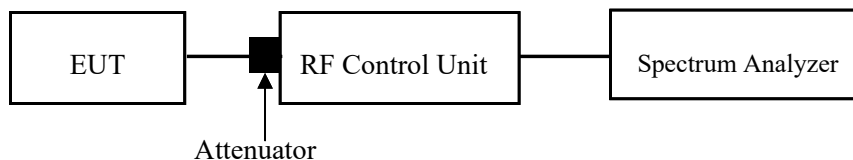
FCC §15.247(d) – 100 kHz BANDWIDTH OF FREQUENCY BAND EDGE**Applicable Standard**

In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under paragraph (b)(3) of this section, the attenuation required under this paragraph shall be 30 dB instead of 20 dB. Attenuation below the general limits specified in §15.209(a) is not required. In addition, radiated emissions which fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emission limits specified in §15.209(a) (see §15.205(c)).

Test Procedure

Test Method: ANSI C63.10-2013 Clause 11.11

1. Check the calibration of the measuring instrument using either an internal calibrator or a known signal from an external generator.
2. Position the EUT without connection to measurement instrument. Turn on the EUT and connect its antenna terminal to measurement instrument via a low loss cable. Then set it to any one measured frequency within its operating range, and make sure the instrument is operated in its linear range.
3. Set RBW to 100 kHz and VBW of spectrum analyzer to 300 kHz with a convenient frequency span including 100 kHz bandwidth from band edge.
4. Measure the highest amplitude appearing on spectral display and set it as a reference level. Plot the graph with marking the highest point and edge frequency.
5. Repeat above procedures until all measured frequencies were complete.

**Test Data****Environmental Conditions**

Temperature:	30 °C
Relative Humidity:	50 %
ATM Pressure:	101.2 kPa

The testing was performed by Tom Tan on 2024-04-11 and 2024-04-12.

EUT operation mode: Transmitting

Test Result: Compliant. The test data and plots please refer to the Appendix.

FCC §15.247(e) - POWER SPECTRAL DENSITY

Applicable Standard

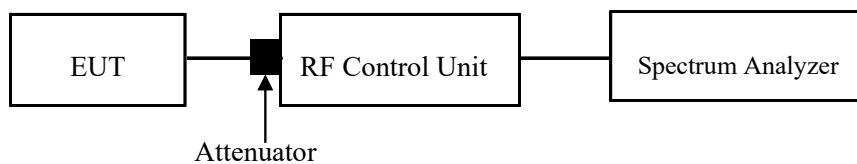
For digitally modulated systems, the power spectral density conducted from the intentional radiator to the antenna shall not be greater than 8 dBm in any 3 kHz band during any time interval of continuous transmission. This power spectral density shall be determined in accordance with the provisions of paragraph (b) of this section. The same method of determining the conducted output power shall be used to determine the power spectral density.

Test Procedure

Test Method: ANSI C63.10-2013 Clause 11.10.2

Use this procedure when the maximum peak conducted output power in the fundamental emission is used to demonstrate compliance.

1. Set the RBW to: $3\text{ kHz} \leq \text{RBW} \leq 100\text{ kHz}$.
2. Set the VBW $\geq 3 \times \text{RBW}$.
3. Set the span to 1.5 times the DTS bandwidth.
4. Detector = peak.
5. Sweep time = auto couple.
6. Trace mode = max hold.
7. Allow trace to fully stabilize.
8. Use the peak marker function to determine the maximum amplitude level within the RBW.
9. If measured value exceeds limit, reduce RBW (no less than 3 kHz) and repeat.



Test Data

Environmental Conditions

Temperature:	30 °C
Relative Humidity:	50 %
ATM Pressure:	101.2 kPa

The testing was performed by Tom Tan on 2024-04-11 and 2024-04-12.

EUT operation mode: Transmitting

Test Result: Compliant. The test data and polots please refer to the Appendix.

EUT PHOTOGRAPHS

Please refer to the attachment SZ1240124-05544E-RF External photo and SZ1240124-05544E-RF Internal photo.

TEST SETUP PHOTOGRAPHS

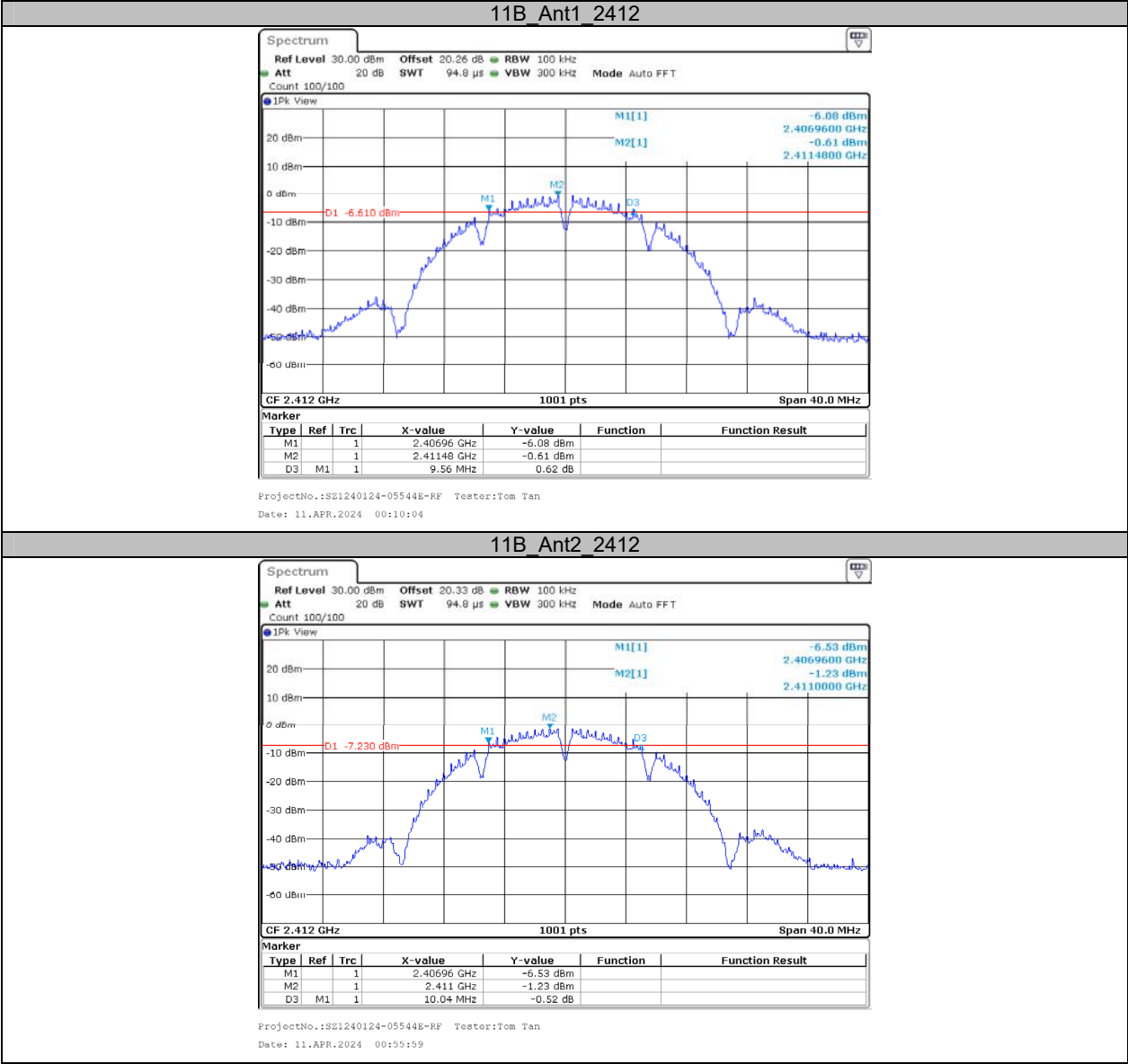
Please refer to the attachment SZ1240124-05544E-RFA Test Setup photo.

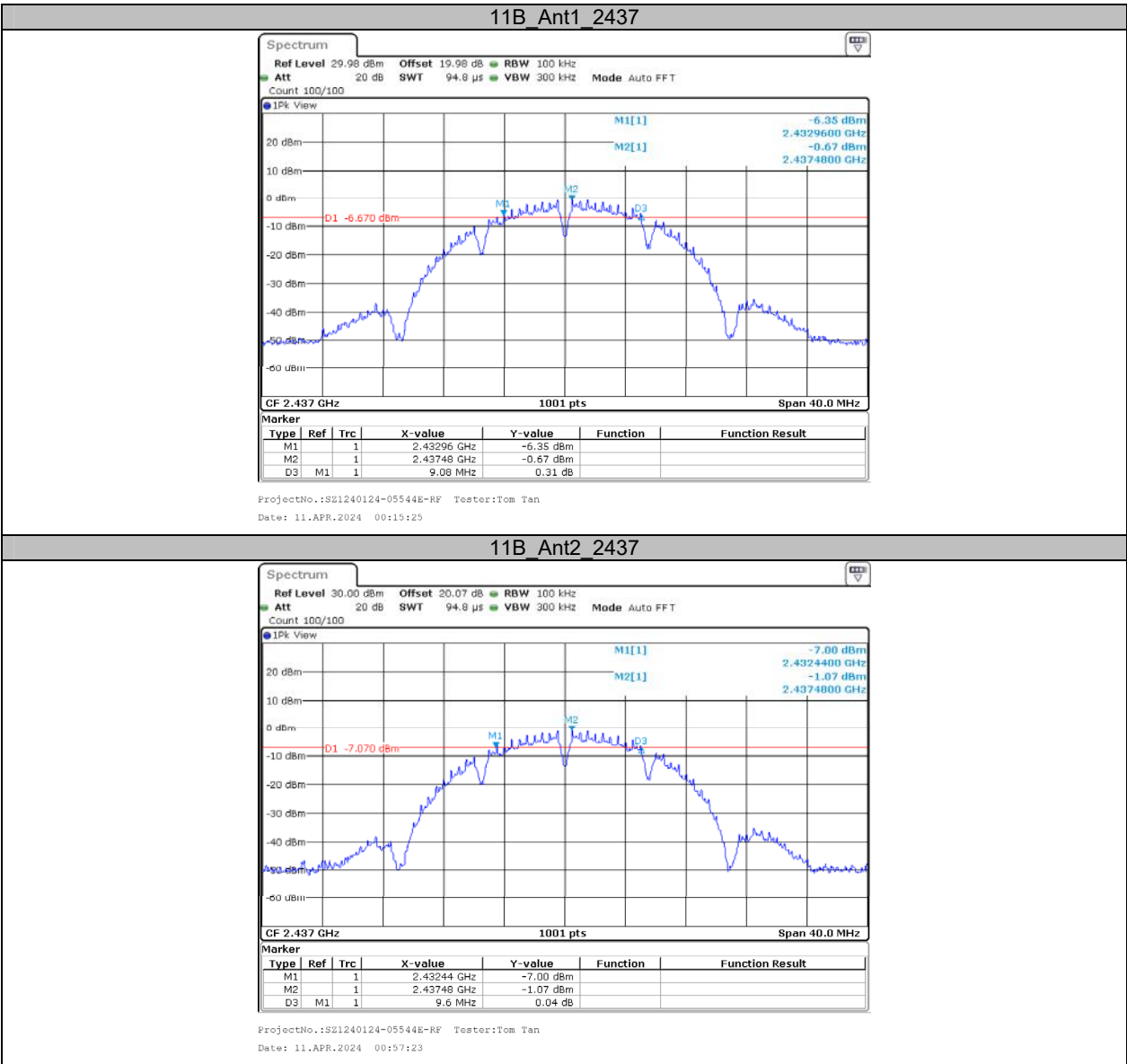
APPENDIX

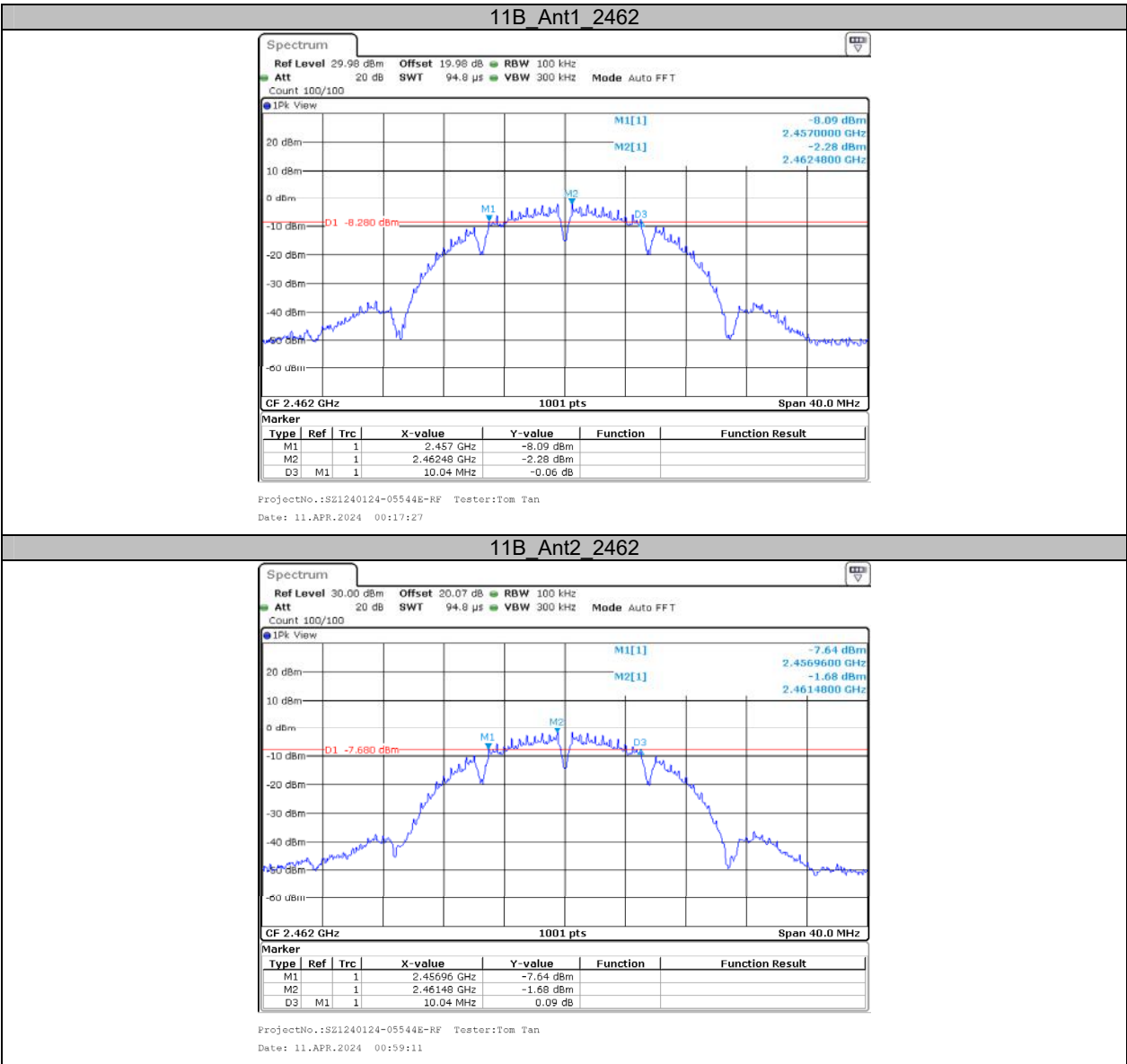
Appendix A: DTS Bandwidth Test Result

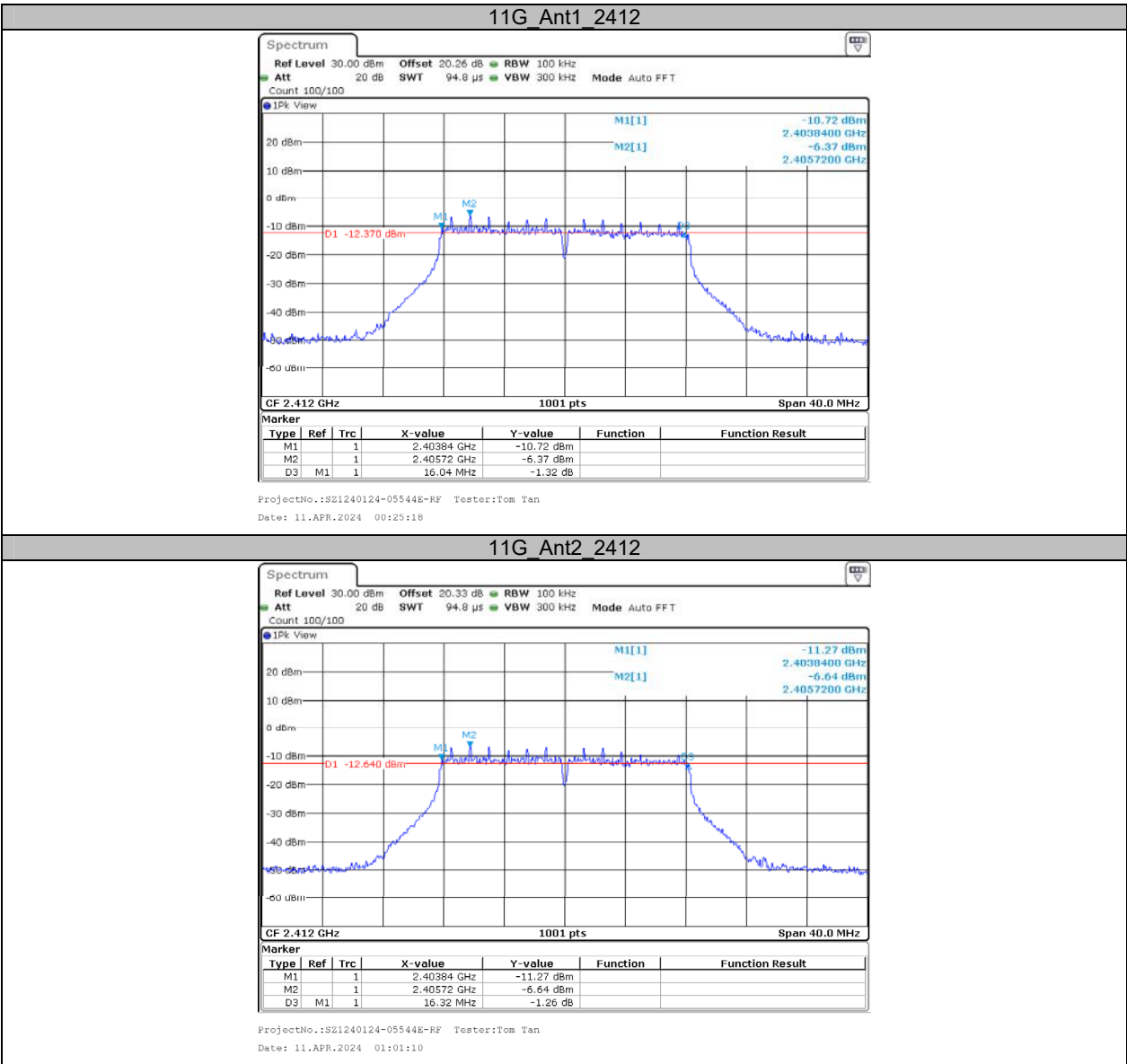
Test Mode	Antenna	Frequency[MHz]	DTS BW [MHz]	FL[MHz]	FH[MHz]	Limit[MHz]	Verdict
11B	Ant1	2412	9.56	2406.96	2416.52	0.5	PASS
	Ant2	2412	10.04	2406.96	2417.00	0.5	PASS
	Ant1	2437	9.08	2432.96	2442.04	0.5	PASS
	Ant2	2437	9.60	2432.44	2442.04	0.5	PASS
	Ant1	2462	10.04	2457.00	2467.04	0.5	PASS
	Ant2	2462	10.04	2456.96	2467.00	0.5	PASS
11G	Ant1	2412	16.04	2403.84	2419.88	0.5	PASS
	Ant2	2412	16.32	2403.84	2420.16	0.5	PASS
	Ant1	2437	16.44	2428.84	2445.28	0.5	PASS
	Ant2	2437	15.64	2429.52	2445.16	0.5	PASS
	Ant1	2462	16.40	2453.80	2470.20	0.5	PASS
	Ant2	2462	16.32	2453.84	2470.16	0.5	PASS
11N20MIMO	Ant1	2412	17.36	2403.16	2420.52	0.5	PASS
	Ant2	2412	17.32	2403.20	2420.52	0.5	PASS
	Ant1	2437	16.36	2429.44	2445.80	0.5	PASS
	Ant2	2437	16.96	2428.84	2445.80	0.5	PASS
	Ant1	2462	17.60	2453.20	2470.80	0.5	PASS
	Ant2	2462	17.56	2453.24	2470.80	0.5	PASS
11N40MIMO	Ant1	2422	36.32	2403.84	2440.16	0.5	PASS
	Ant2	2422	36.32	2403.84	2440.16	0.5	PASS
	Ant1	2437	35.12	2419.48	2454.60	0.5	PASS
	Ant2	2437	35.12	2419.48	2454.60	0.5	PASS
	Ant1	2452	35.12	2434.48	2469.60	0.5	PASS
	Ant2	2452	35.12	2434.48	2469.60	0.5	PASS

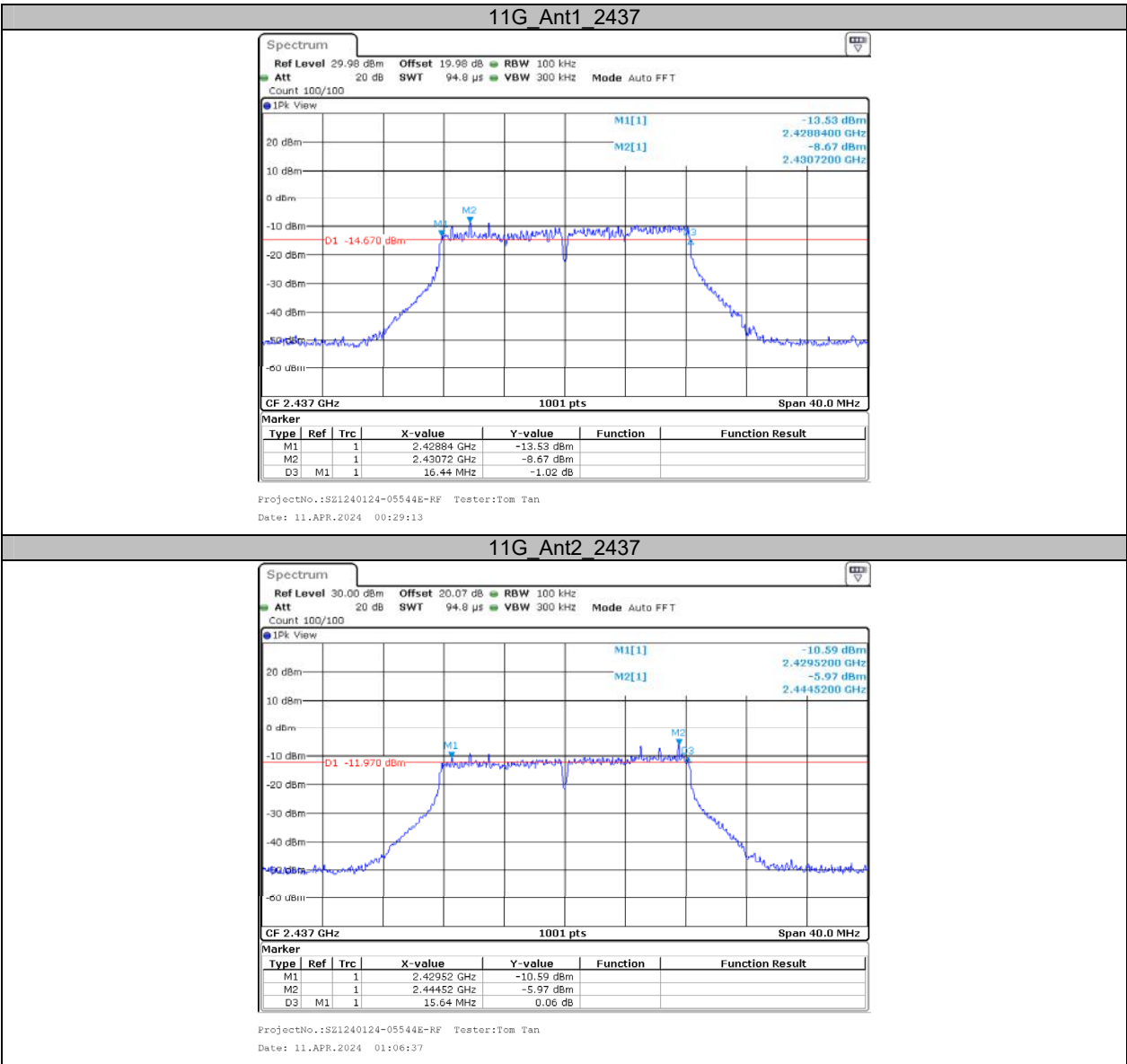
Test Graphs

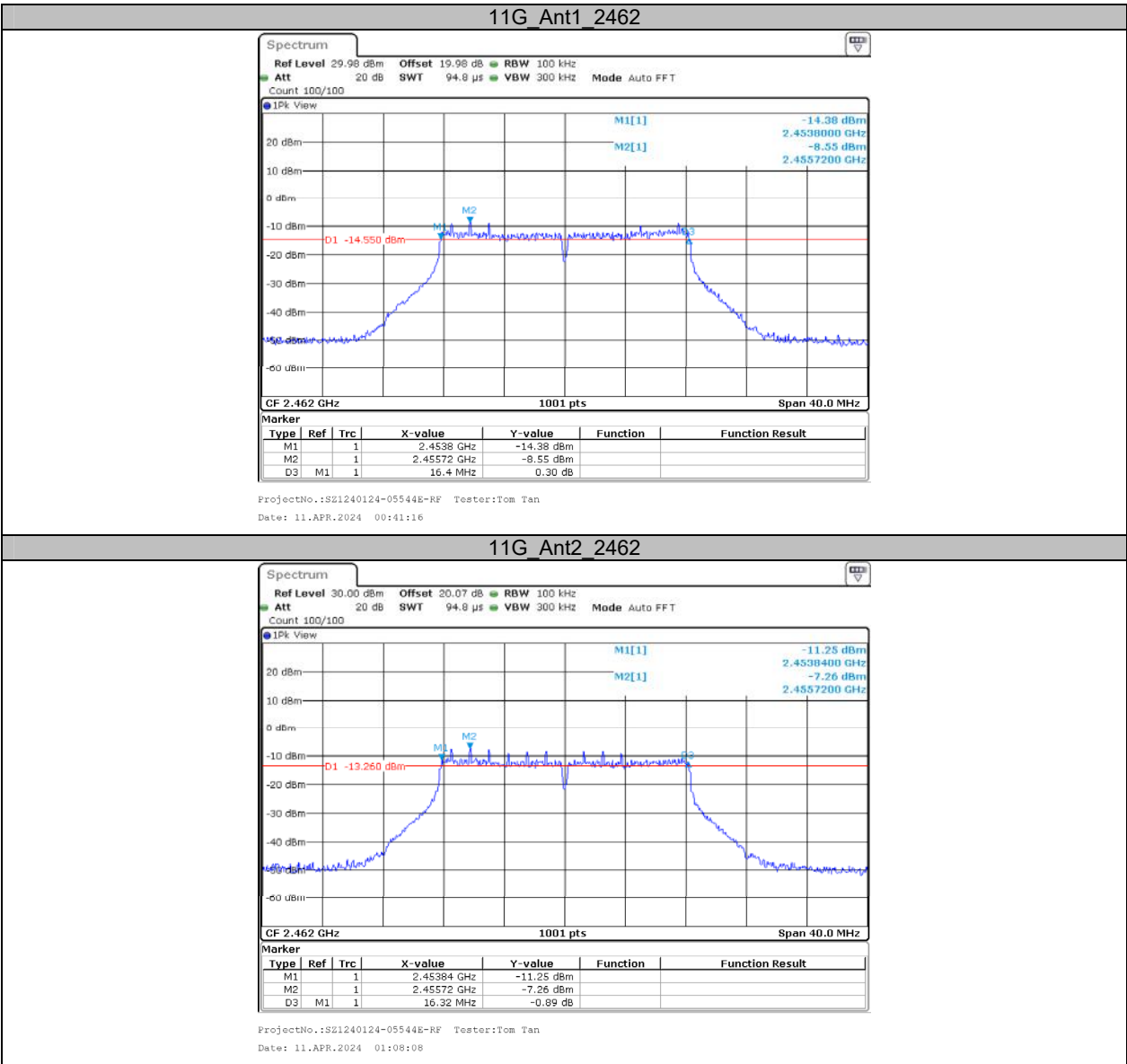


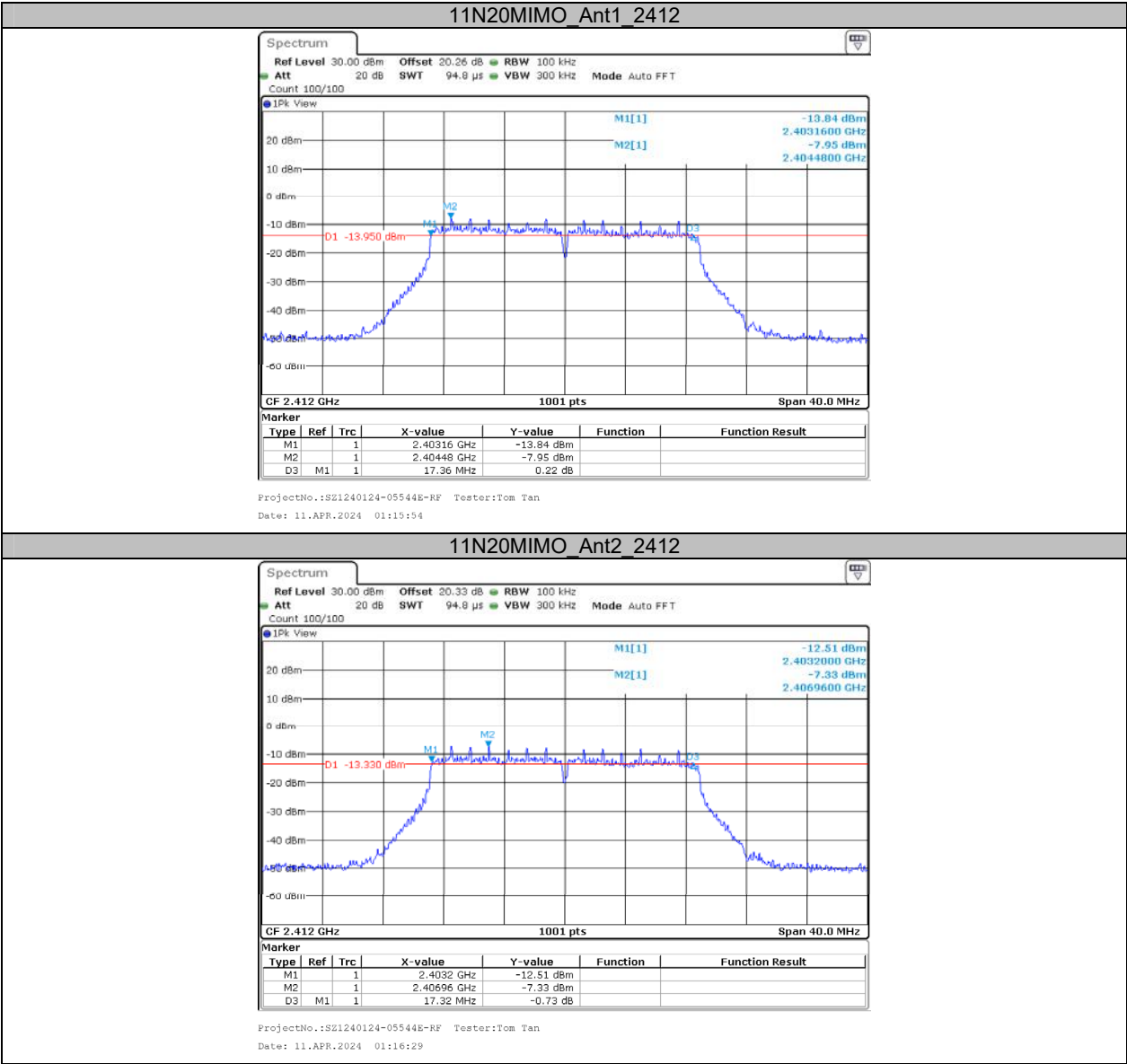


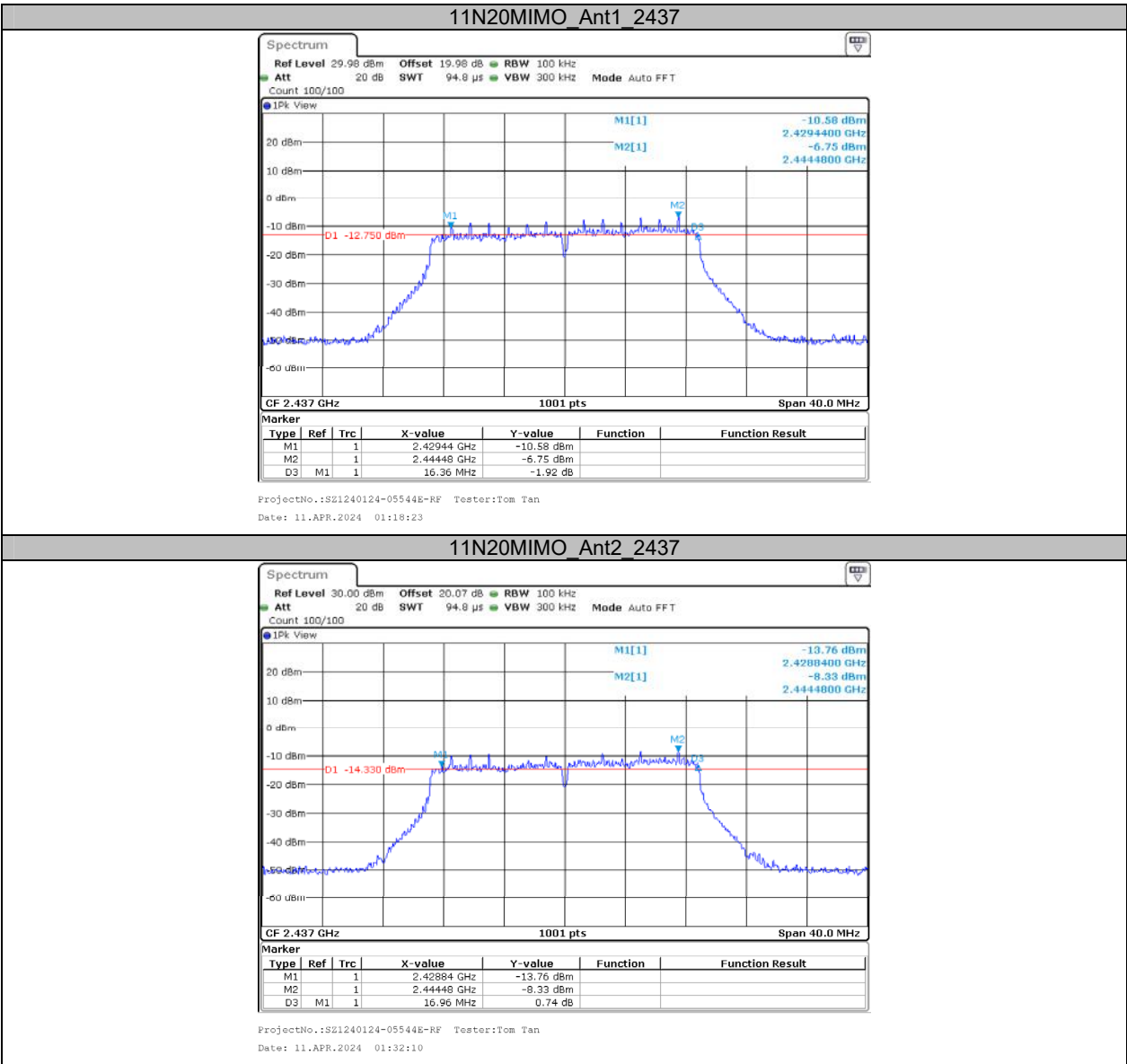


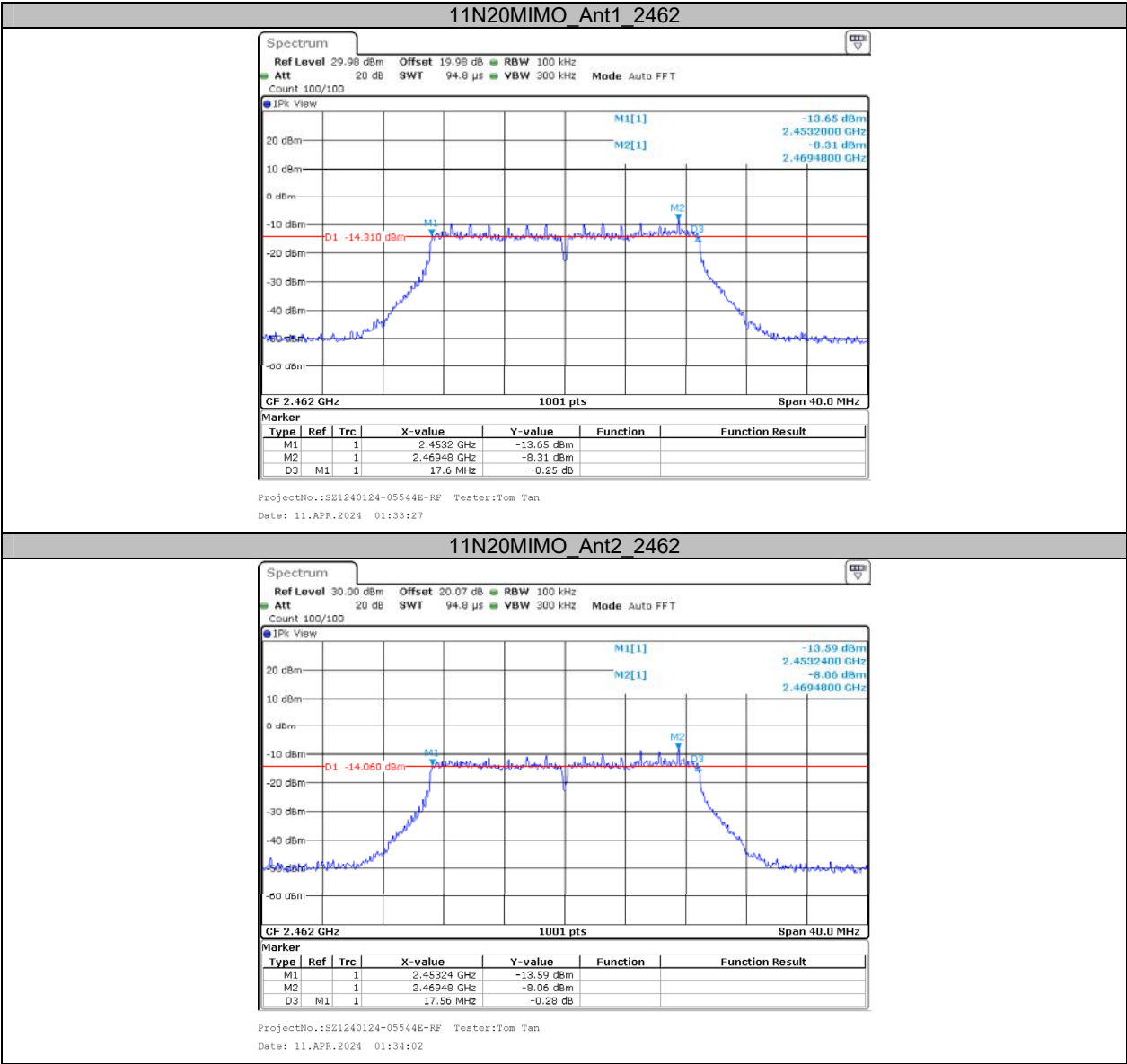


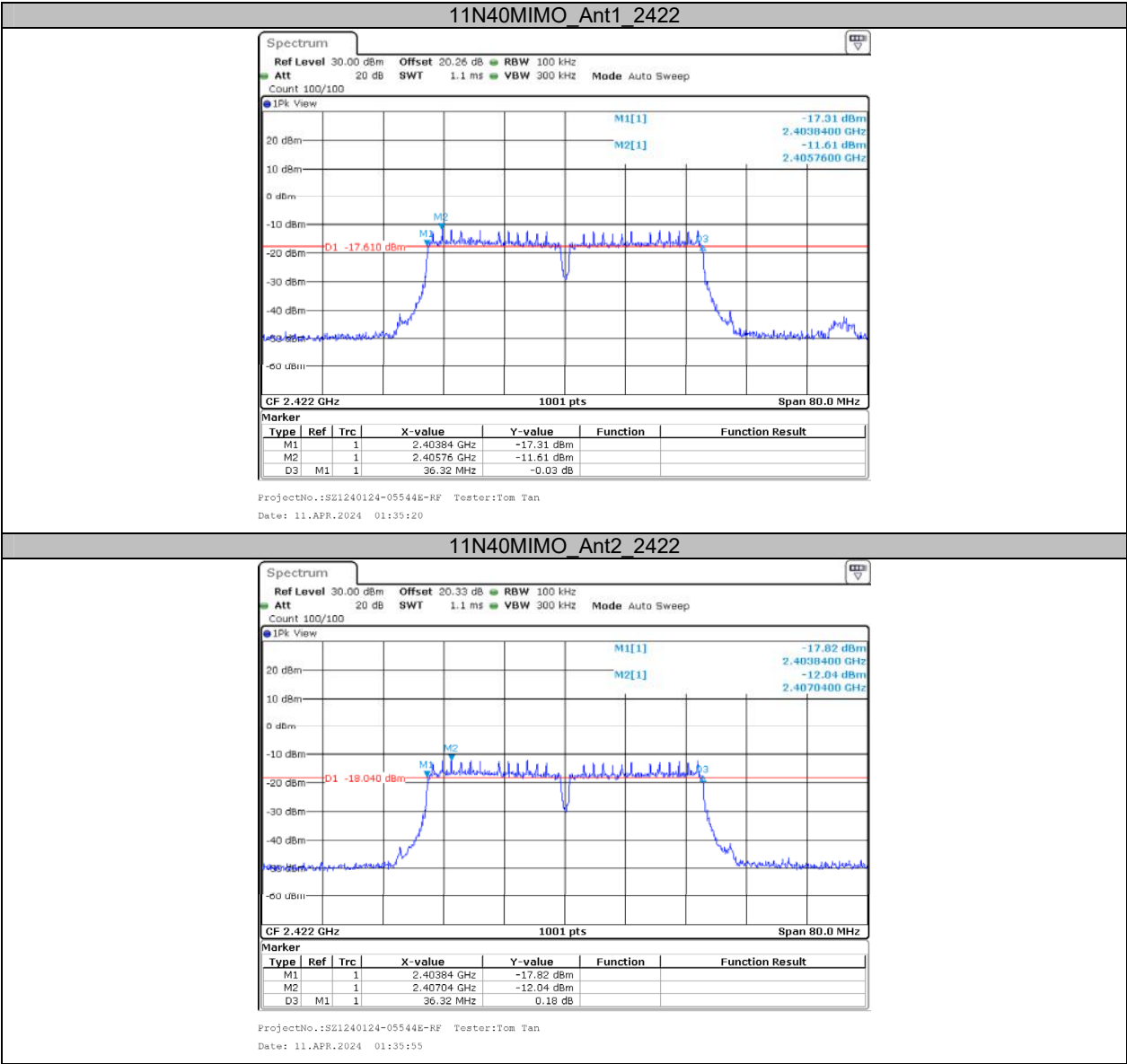


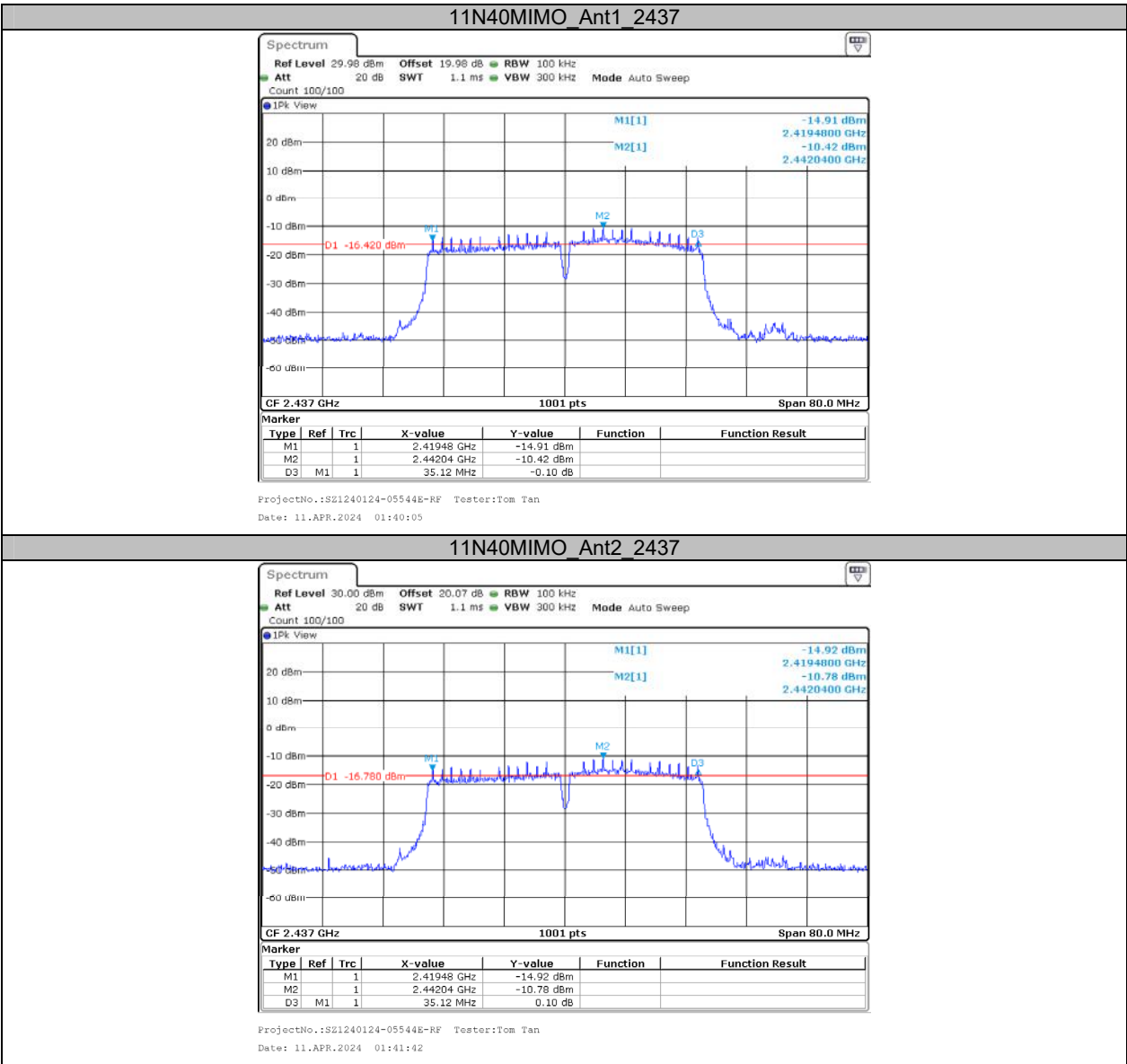


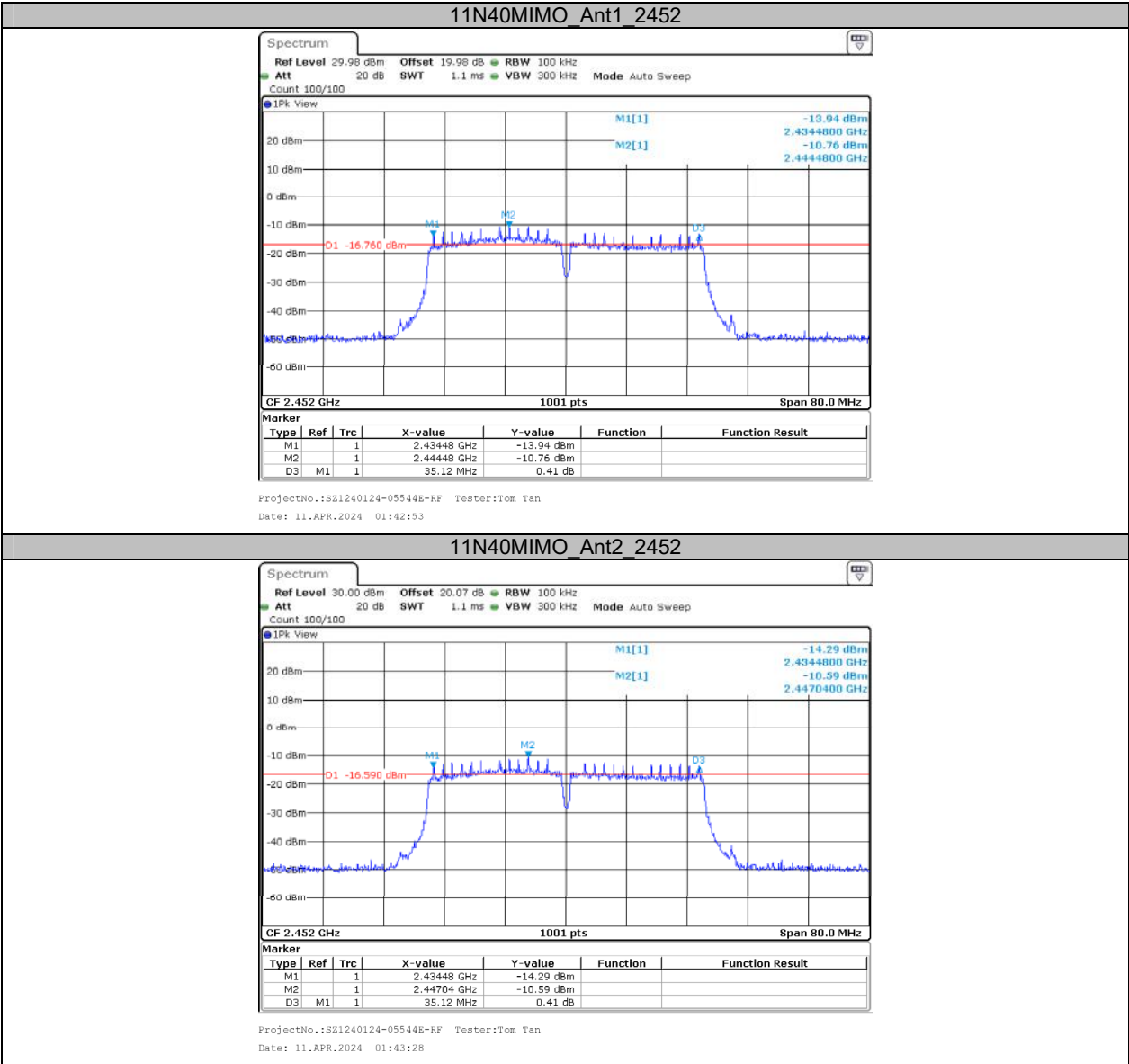








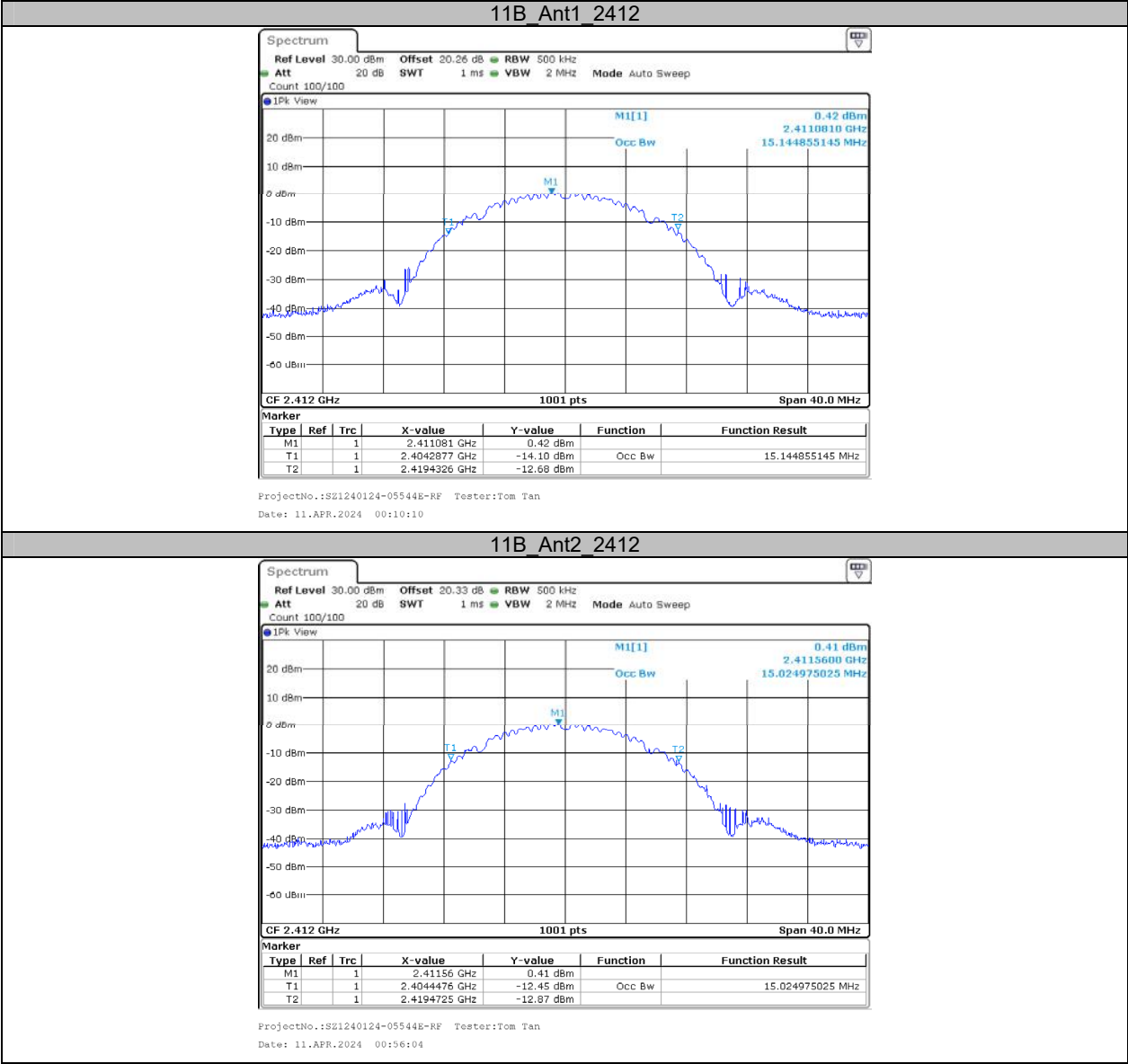


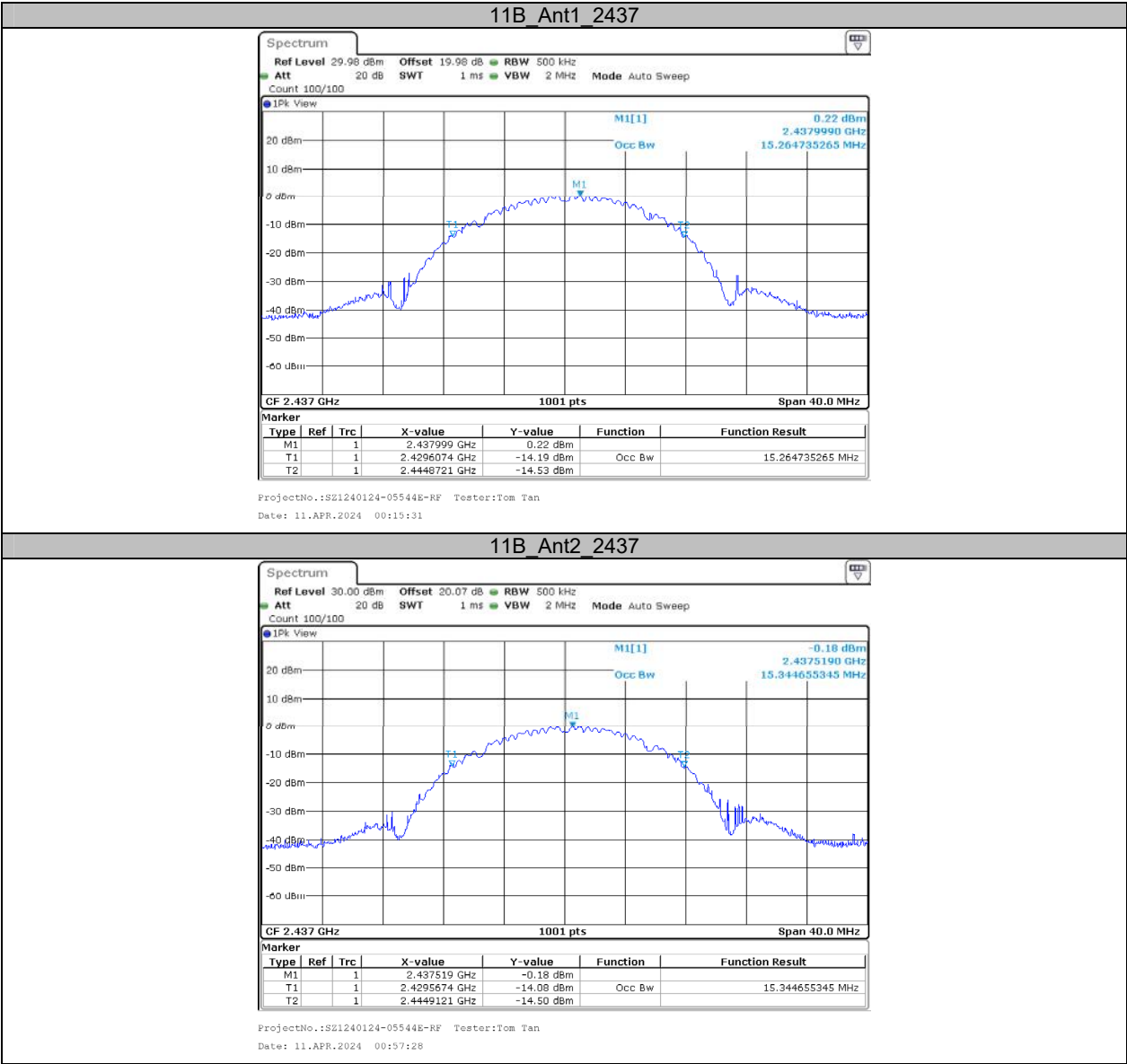


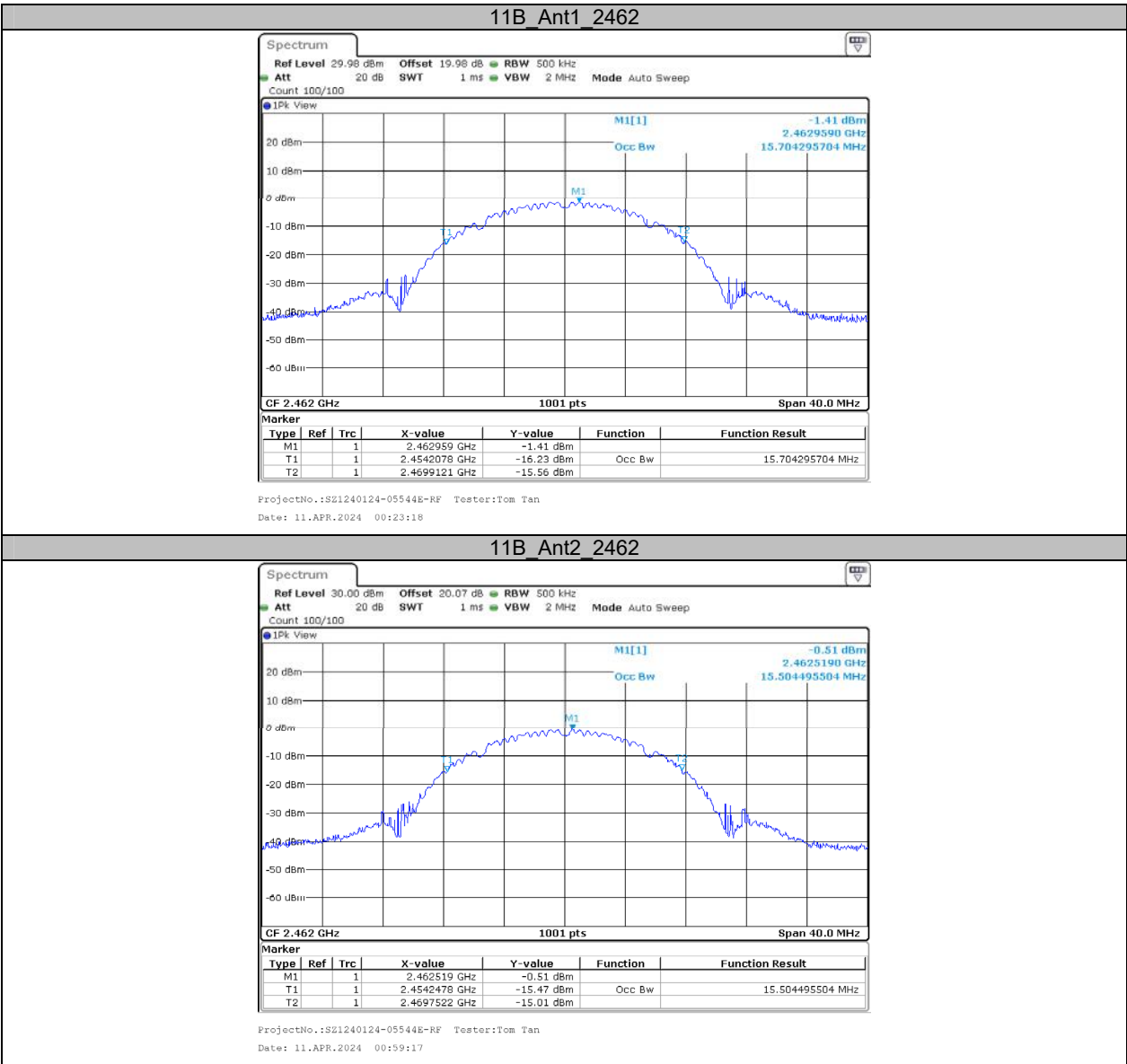
Appendix B: Occupied Channel Bandwidth Test Result

Test Mode	Antenna	Channel Frequency[MHz]	OCB [MHz]	FL[MHz]	FH[MHz]	Limit[MHz]	Verdict
11B	Ant1	2412	15.145	2404.2877	2419.4326	---	---
	Ant2	2412	15.025	2404.4476	2419.4725	---	---
	Ant1	2437	15.265	2429.6074	2444.8721	---	---
	Ant2	2437	15.345	2429.5674	2444.9121	---	---
	Ant1	2462	15.704	2454.2078	2469.9121	---	---
	Ant2	2462	15.504	2454.2478	2469.7522	---	---
11G	Ant1	2412	17.582	2402.9291	2420.5115	---	---
	Ant2	2412	17.463	2403.0889	2420.5514	---	---
	Ant1	2437	17.343	2428.4086	2445.7512	---	---
	Ant2	2437	17.582	2428.2088	2445.7912	---	---
	Ant1	2462	17.942	2452.8492	2470.7912	---	---
	Ant2	2462	17.822	2452.8891	2470.7113	---	---
11N20MIMO	Ant1	2412	18.621	2402.6494	2421.2707	---	---
	Ant2	2412	18.581	2402.6893	2421.2707	---	---
	Ant1	2437	18.661	2427.8492	2446.5105	---	---
	Ant2	2437	18.621	2427.8891	2446.5105	---	---
	Ant1	2462	18.981	2452.6094	2471.5904	---	---
	Ant2	2462	18.941	2452.6094	2471.5504	---	---
11N40MIMO	Ant1	2422	36.843	2403.6184	2440.4615	---	---
	Ant2	2422	36.923	2403.6184	2440.5415	---	---
	Ant1	2437	36.204	2418.9381	2455.1419	---	---
	Ant2	2437	36.364	2418.9381	2455.3017	---	---
	Ant1	2452	36.444	2433.8581	2470.3017	---	---
	Ant2	2452	36.523	2433.8581	2470.3816	---	---

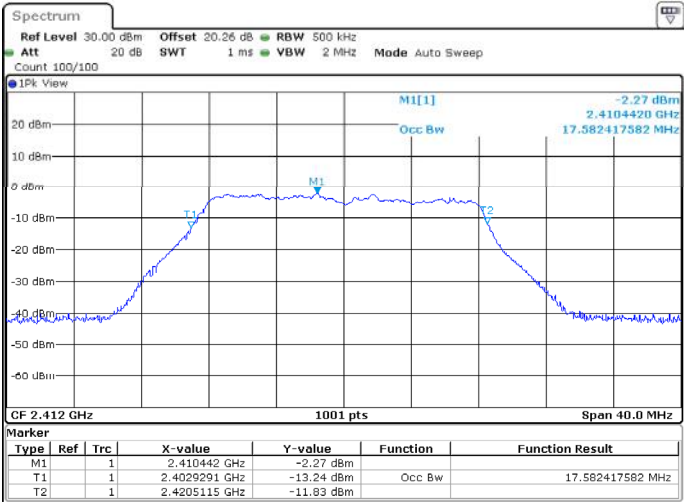
Test Graphs





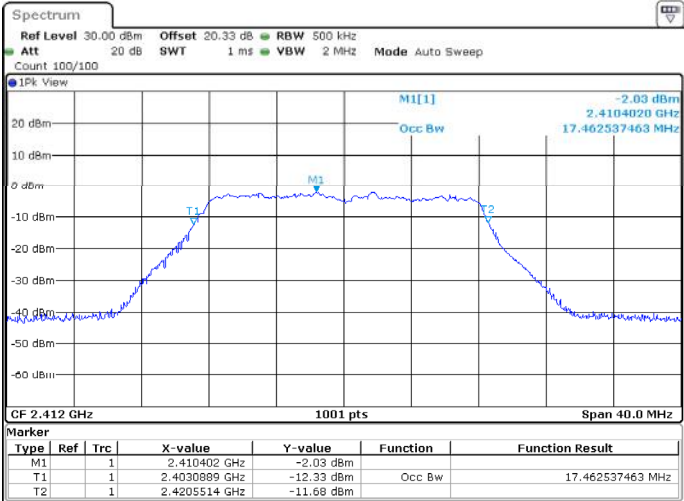


11G Ant1_2412

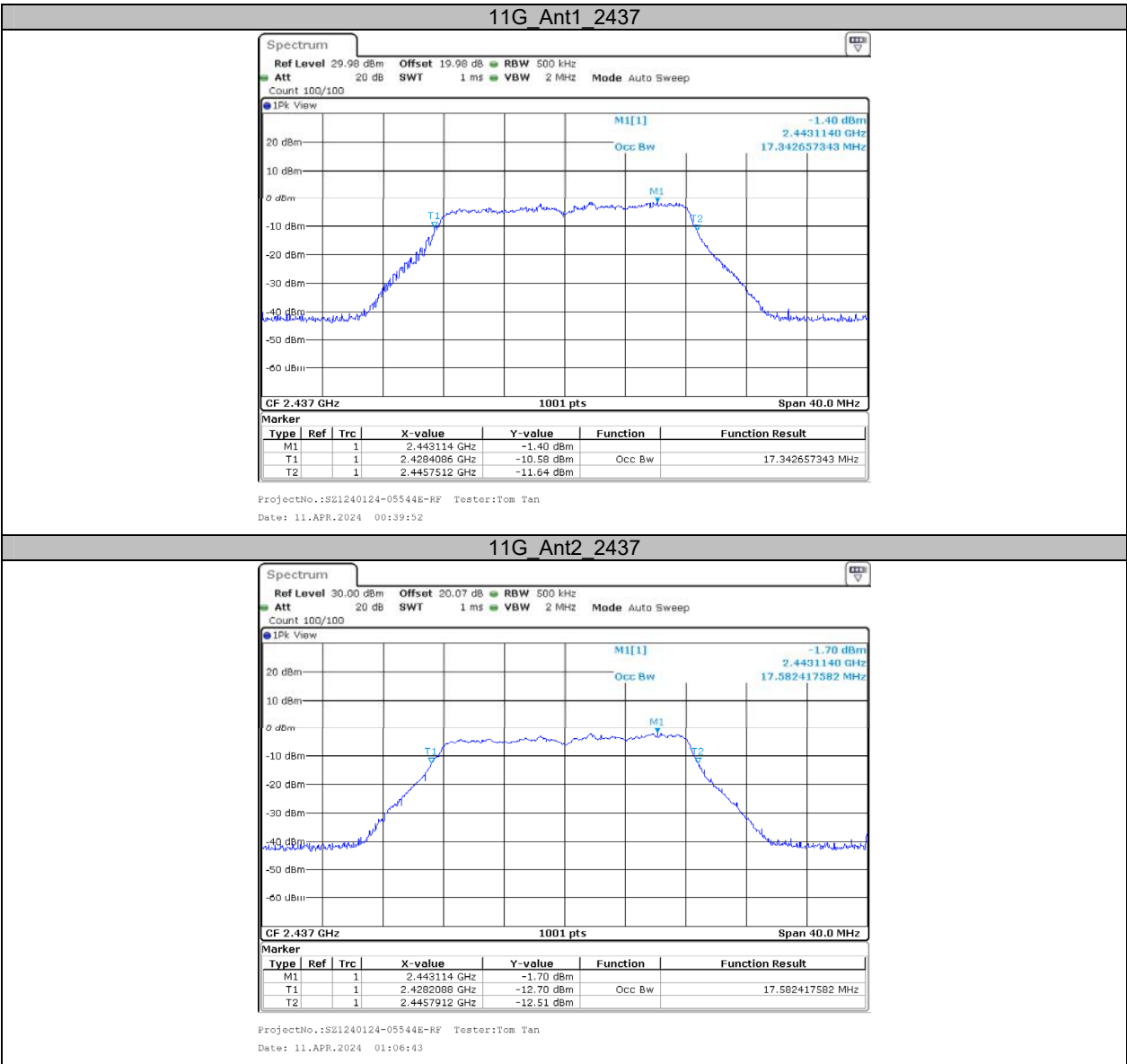


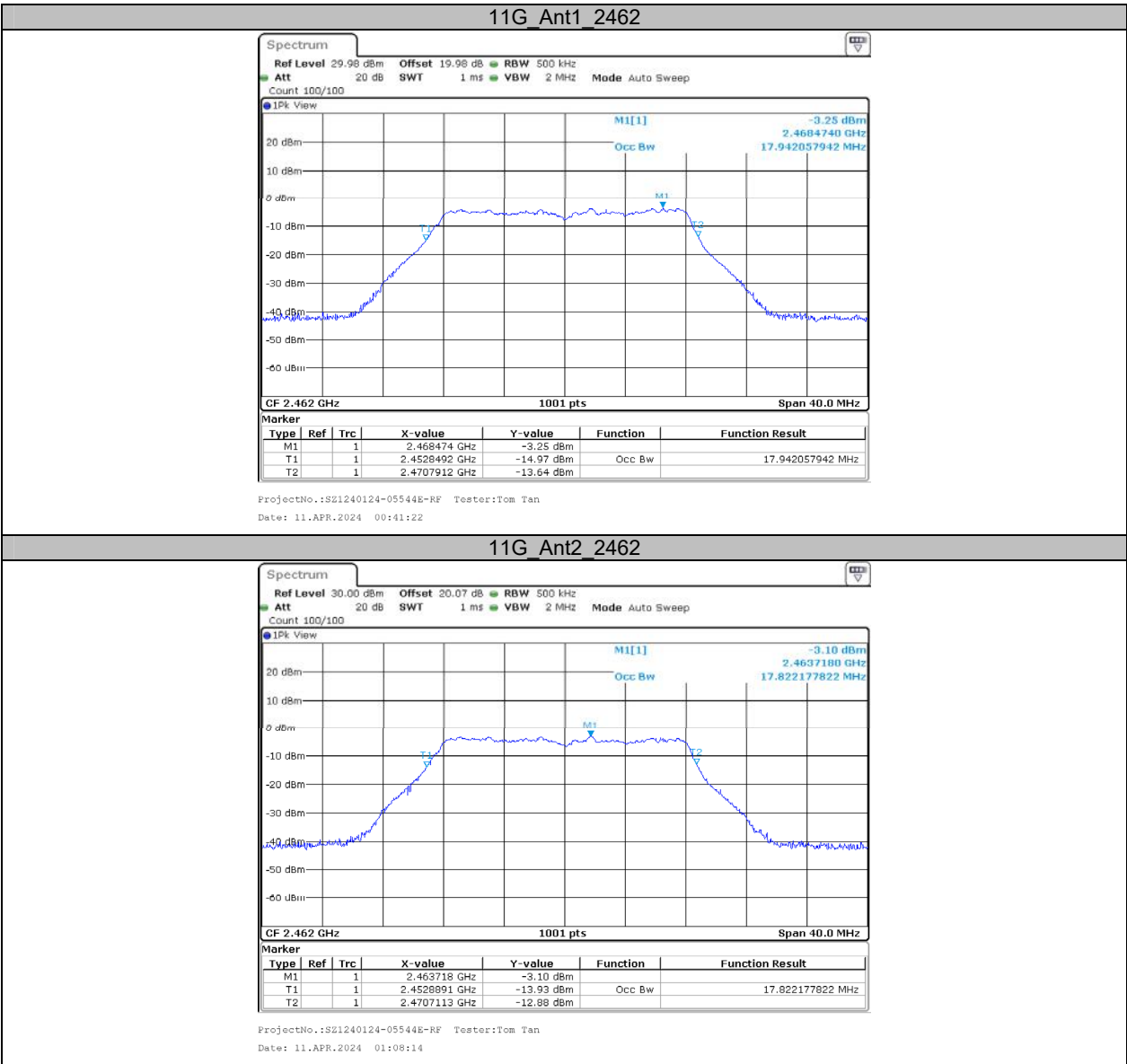
ProjectNo.:SZ1240124-05544E-RF Tester:Tom Tan
Date: 11.APR.2024 00:23:23

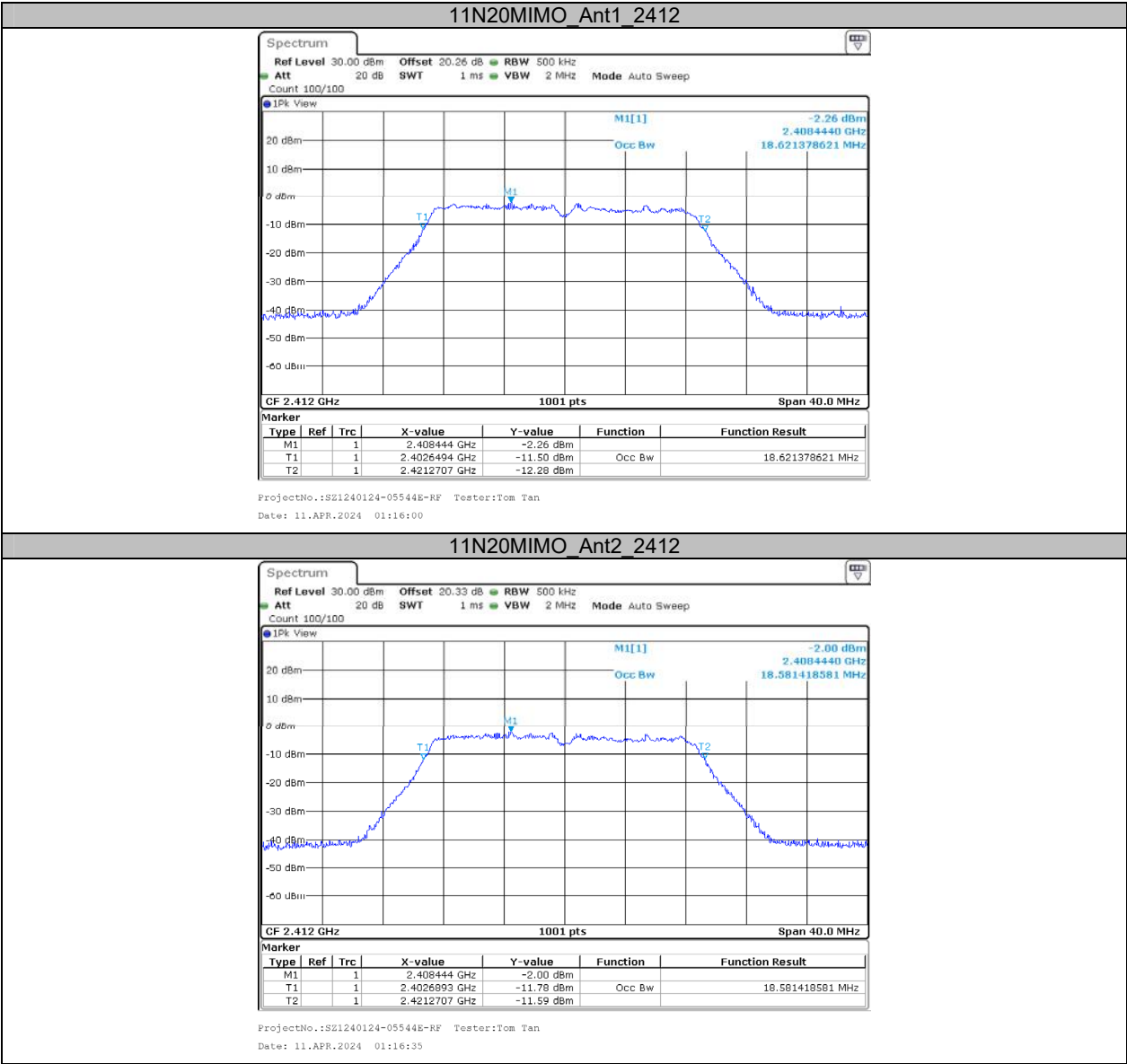
11G Ant2_2412

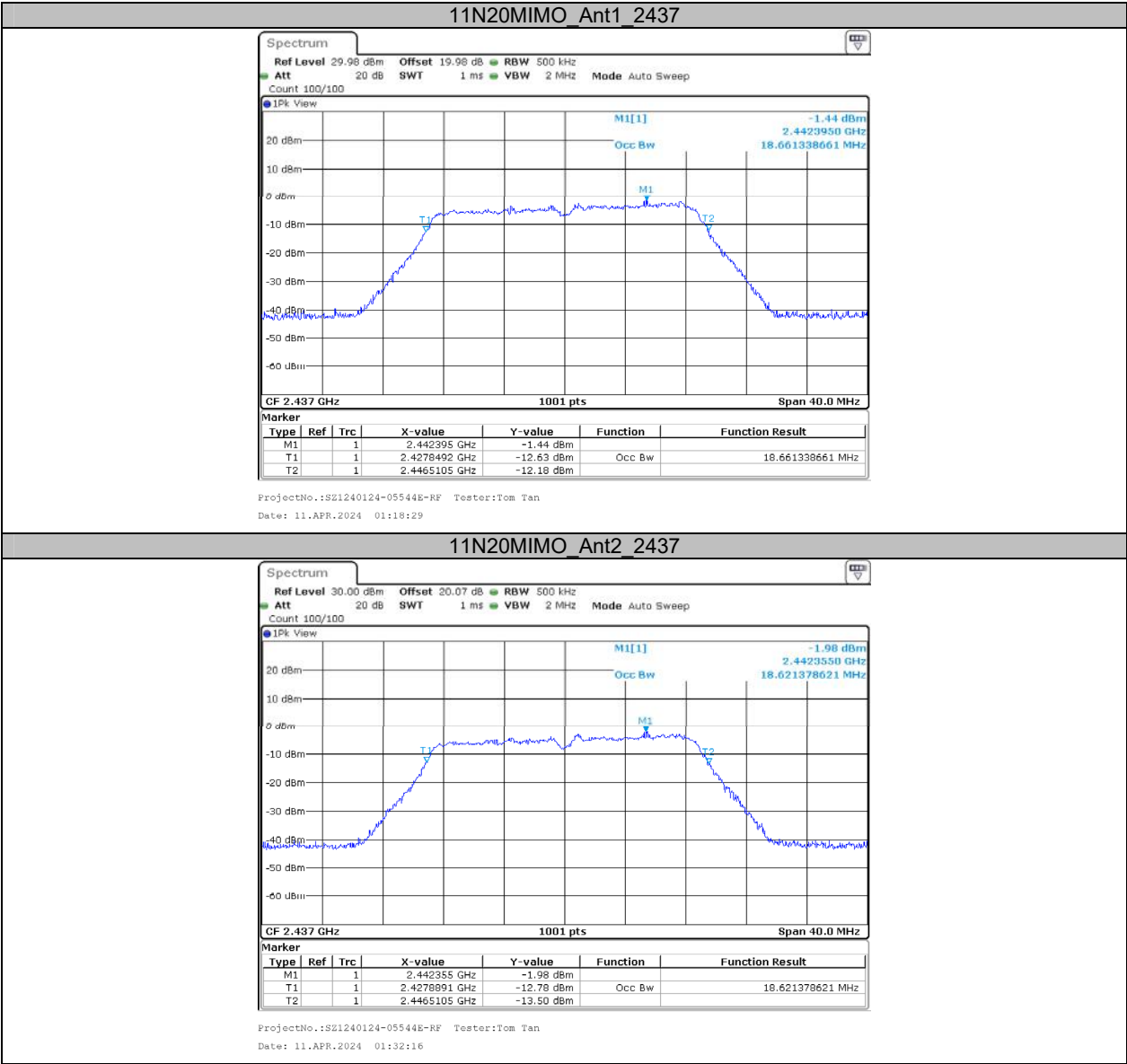


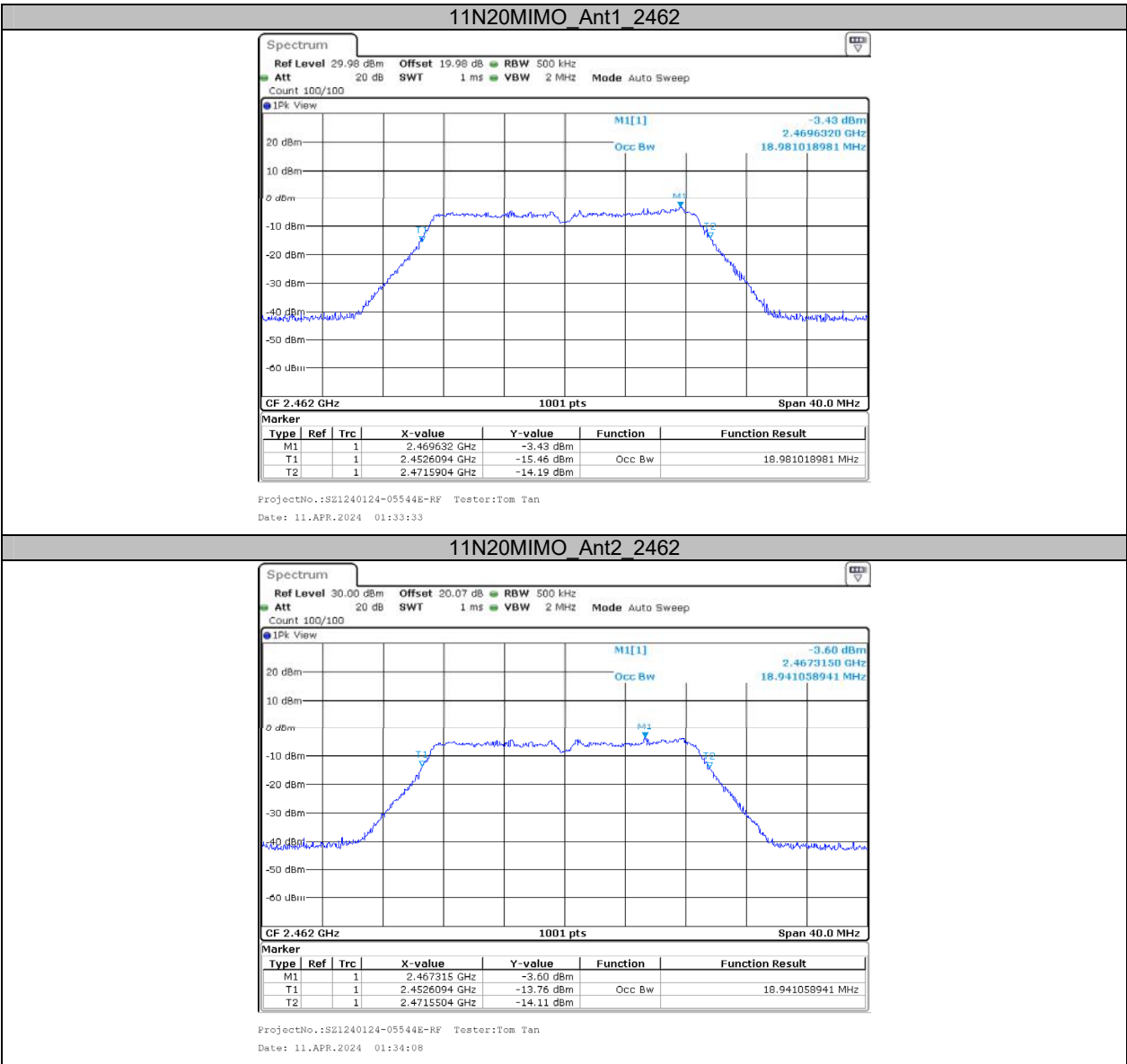
ProjectNo.:SZ1240124-05544E-RF Tester:Tom Tan
Date: 11.APR.2024 01:01:16



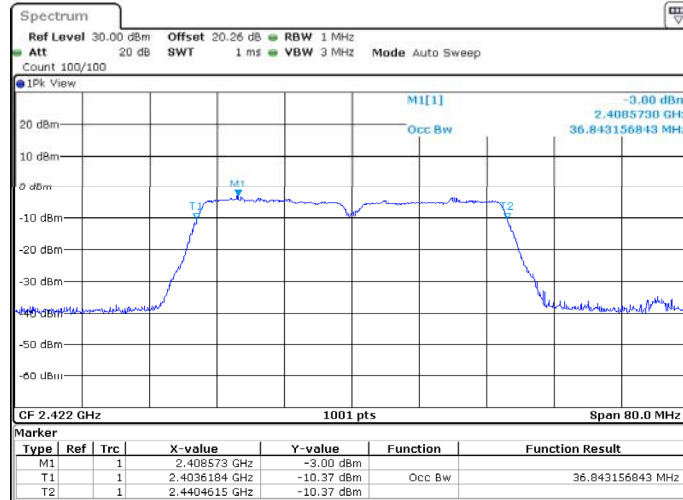






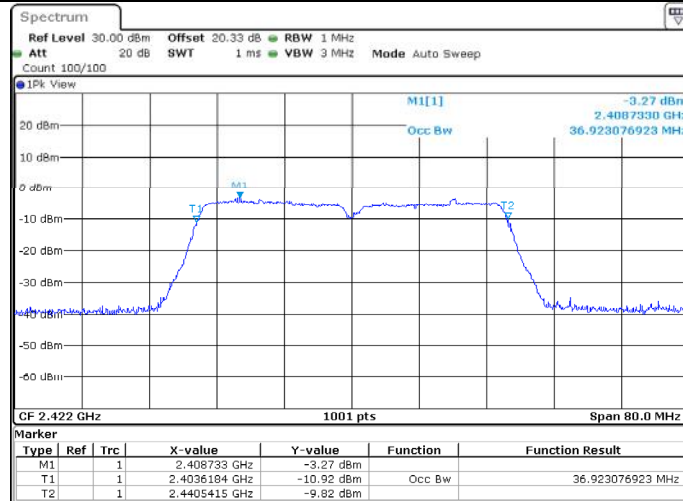


11N40MIMO_Ant1_2422

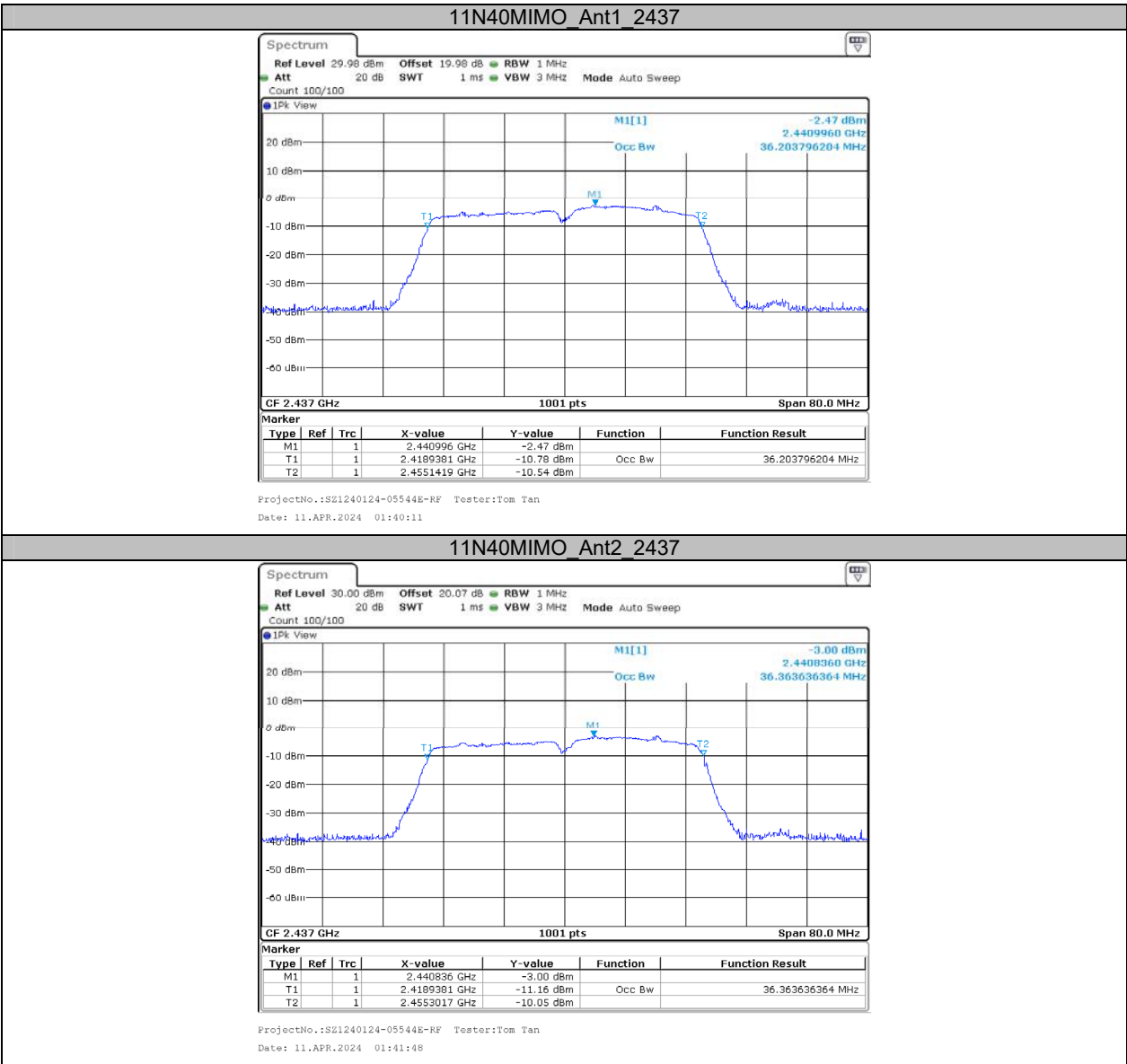


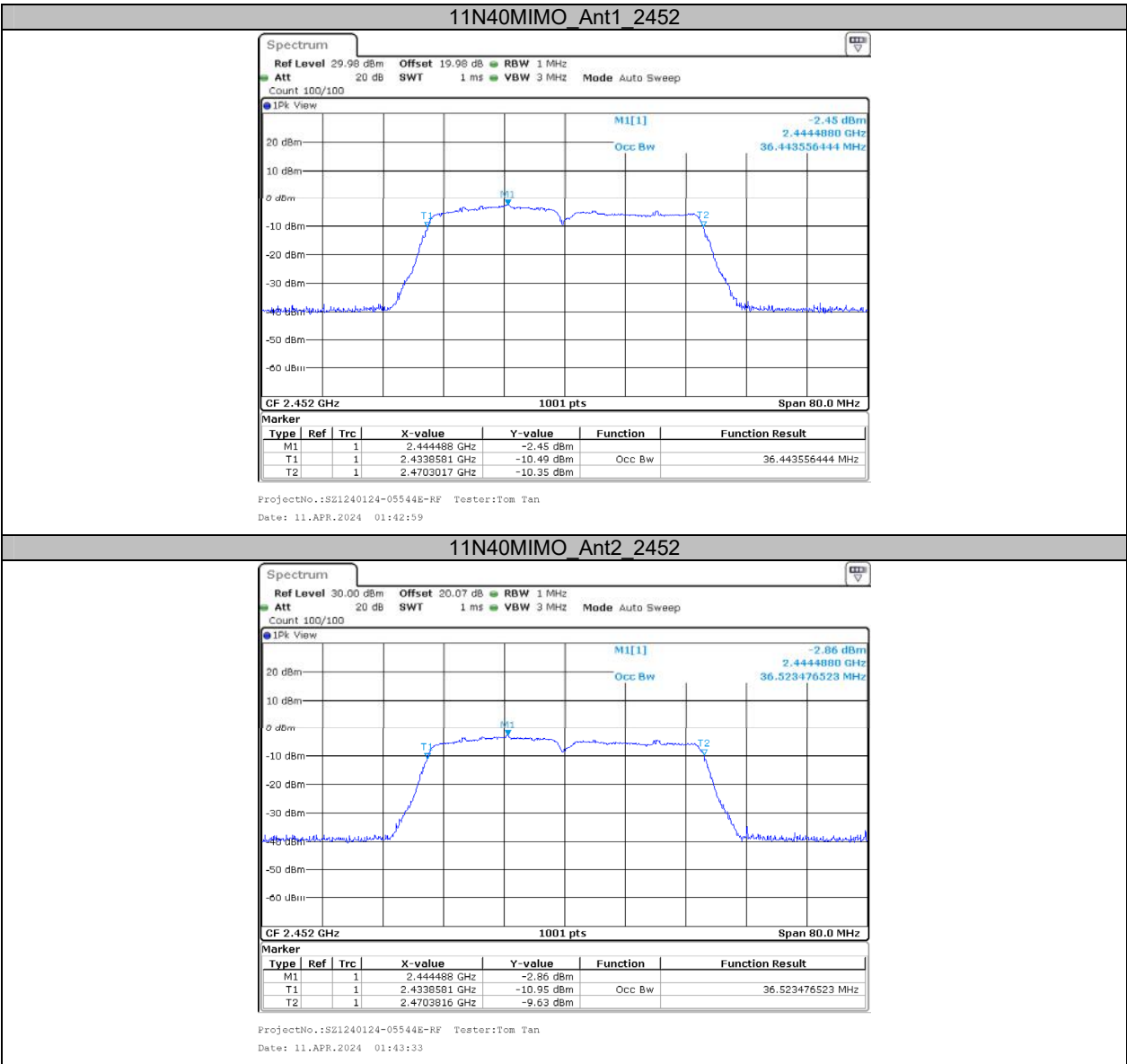
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Date: 11.APR.2024 01:35:26

11N40MIMO_Ant2_2422



ProjectNo.:SZ1240124-05544E-RF Tester:Tom Tan
Date: 11.APR.2024 01:36:00





Appendix C: Maximum conducted output power Test Result

Test Mode	Antenna	Frequency [MHz]	AVG Power [dBm]	Peak Power [dBm]	Conducted Limit[dBm]	Verdict
11B	Ant1	2412	7.02	11.30	≤30.00	PASS
	Ant2	2412	7.46	11.35	≤30.00	PASS
	Ant1	2437	8.13	11.07	≤30.00	PASS
	Ant2	2437	7.38	10.92	≤30.00	PASS
	Ant1	2462	6.94	9.71	≤30.00	PASS
11G	Ant2	2462	6.65	10.33	≤30.00	PASS
	Ant1	2412	3.61	11.68	≤30.00	PASS
	Ant2	2412	3.52	11.95	≤30.00	PASS
	Ant1	2437	3.30	11.50	≤30.00	PASS
	Ant2	2437	3.81	11.52	≤30.00	PASS
11N20MIMO	Ant1	2462	2.56	10.55	≤30.00	PASS
	Ant2	2462	3.28	11.19	≤30.00	PASS
	Ant1	2412	2.67	11.14	≤30.00	PASS
	Ant2	2412	2.92	11.30	≤30.00	PASS
	total	2412	5.81	14.23	≤30.00	PASS
	Ant1	2437	3.37	10.99	≤30.00	PASS
	Ant2	2437	3.23	10.60	≤30.00	PASS
	total	2437	6.31	13.81	≤30.00	PASS
11N40MIMO	Ant1	2462	2.42	9.85	≤30.00	PASS
	Ant2	2462	2.54	9.97	≤30.00	PASS
	total	2462	5.49	12.92	≤30.00	PASS
	Ant1	2422	2.29	9.83	≤30.00	PASS
	Ant2	2422	1.51	9.49	≤30.00	PASS
	total	2422	4.93	12.67	≤30.00	PASS
	Ant1	2437	2.86	9.88	≤30.00	PASS
	Ant2	2437	2.53	9.57	≤30.00	PASS
	total	2437	5.71	12.74	≤30.00	PASS
	Ant1	2452	3.04	9.82	≤30.00	PASS
	Ant2	2452	2.59	9.78	≤30.00	PASS
	total	2452	5.83	12.81	≤30.00	PASS
Note: The device employed Cyclic Delay Diversity (CDD) for 802.11 MIMO transmitting, per KDB 662911 D01 Multiple Transmitter Output v02r01, for power measurements on IEEE 802.11 devices: Array Gain = 0 dB (i.e., no array gain) for $N_{ANT} \leq 4$						
Antenna Gain:		2.84	dB	Directional gain:	2.84	dB

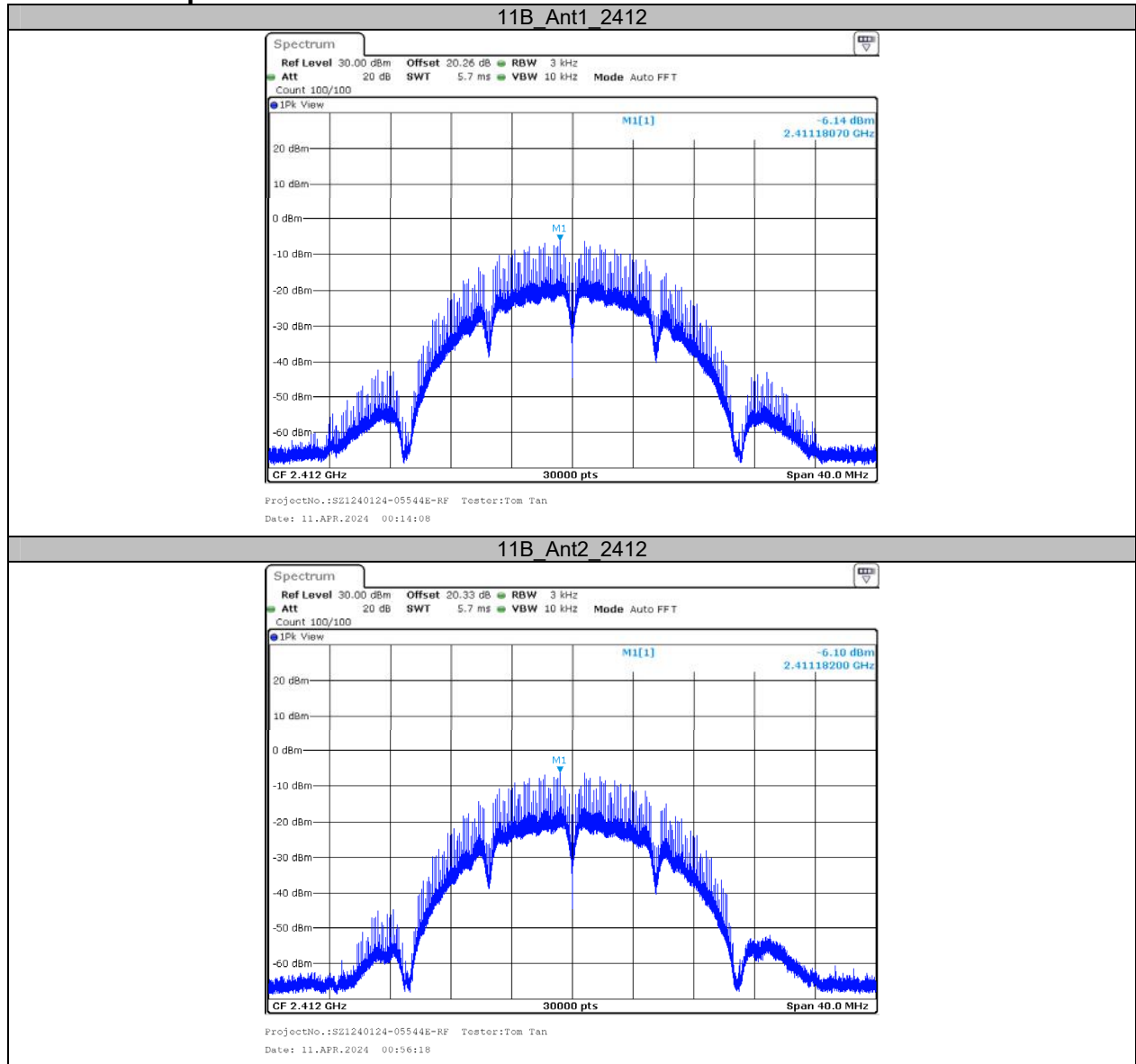
Appendix D: Maximum power spectral density Test Result

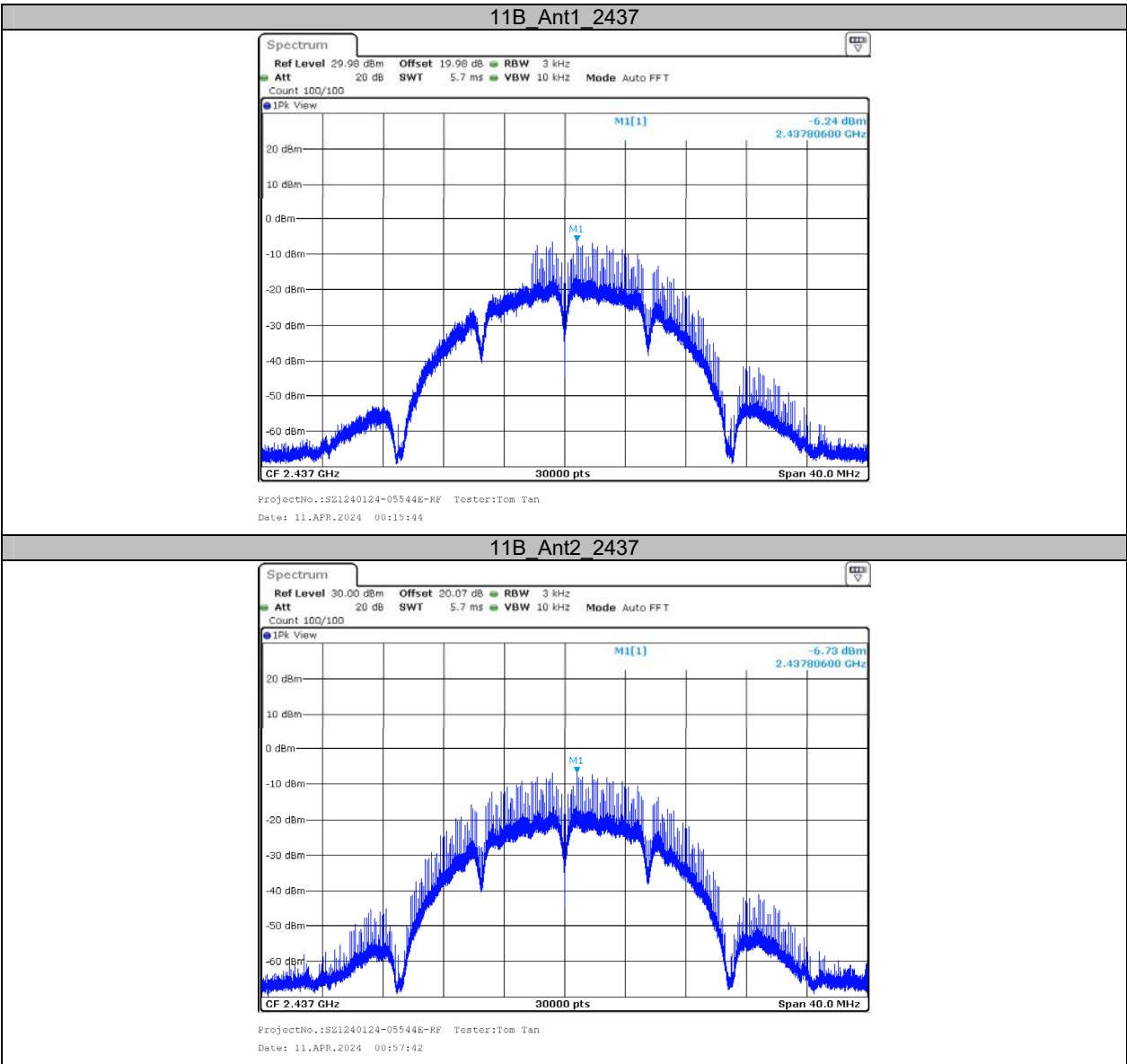
Test Mode	Antenna	Frequency[MHz]	Result[dBm/3kHz]	Limit[dBm/3kHz]	Verdict
11B	Ant1	2412	-6.14	≤8.00	PASS
	Ant2	2412	-6.10	≤8.00	PASS
	Ant1	2437	-6.24	≤8.00	PASS
	Ant2	2437	-6.73	≤8.00	PASS
	Ant1	2462	-8.05	≤8.00	PASS
	Ant2	2462	-7.65	≤8.00	PASS
11G	Ant1	2412	-23.38	≤8.00	PASS
	Ant2	2412	-23.31	≤8.00	PASS
	Ant1	2437	-22.62	≤8.00	PASS
	Ant2	2437	-22.7	≤8.00	PASS
	Ant1	2462	-24.23	≤8.00	PASS
	Ant2	2462	-24.19	≤8.00	PASS
11N20MIMO	Ant1	2412	-23.13	≤8.00	PASS
	Ant2	2412	-22.57	≤8.00	PASS
	total	2412	-19.83	≤8.00	PASS
	Ant1	2437	-22.92	≤8.00	PASS
	Ant2	2437	-23.36	≤8.00	PASS
	total	2437	-20.12	≤8.00	PASS
	Ant1	2462	-23.91	≤8.00	PASS
	Ant2	2462	-24.28	≤8.00	PASS
11N40MIMO	total	2462	-21.08	≤8.00	PASS
	Ant1	2422	-26.84	≤8.00	PASS
	Ant2	2422	-27.07	≤8.00	PASS
	total	2422	-23.94	≤8.00	PASS
	Ant1	2437	-26.29	≤8.00	PASS
	Ant2	2437	-26.97	≤8.00	PASS
	total	2437	-23.61	≤8.00	PASS
	Ant1	2452	-25.88	≤8.00	PASS
	Ant2	2452	-26.42	≤8.00	PASS
	total	2452	-23.13	≤8.00	PASS

Note:
The device employed Cyclic Delay Diversity (CDD) for 802.11 MIMO transmitting, per KDB 662911 D01 Multiple Transmitter Output v02r01, for power spectral density (PSD) measurements on the devices:
Array Gain = $10 \log(N_{ANT}/N_{SS})$ dB

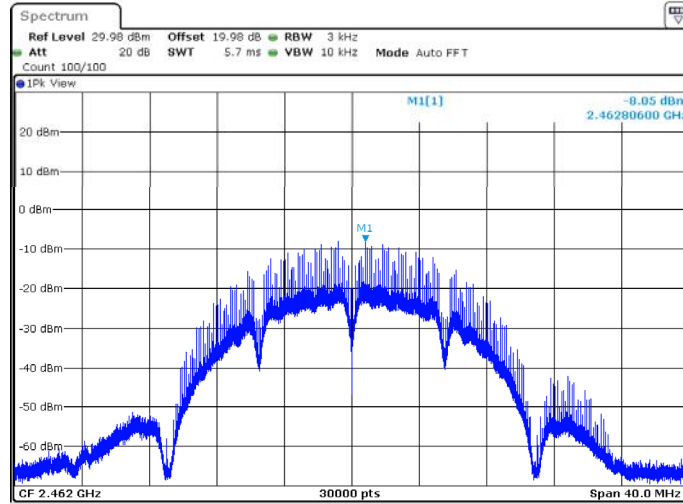
Antenna Gain:	2.84	dBi	Directional gain:	5.84	dBi
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Test Graphs



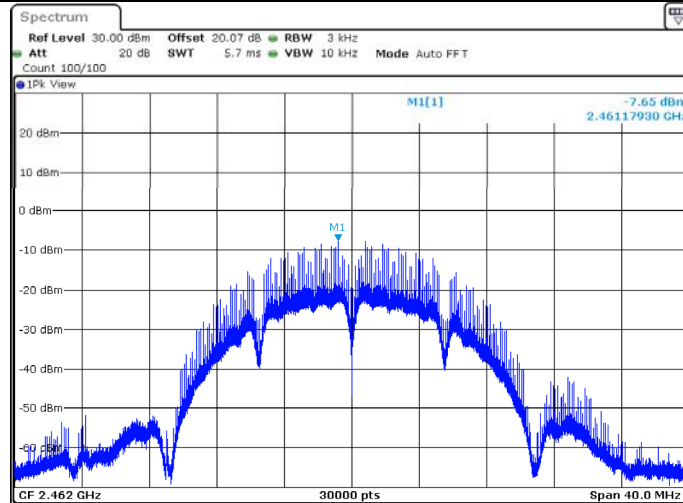


11B_Ant1_2462

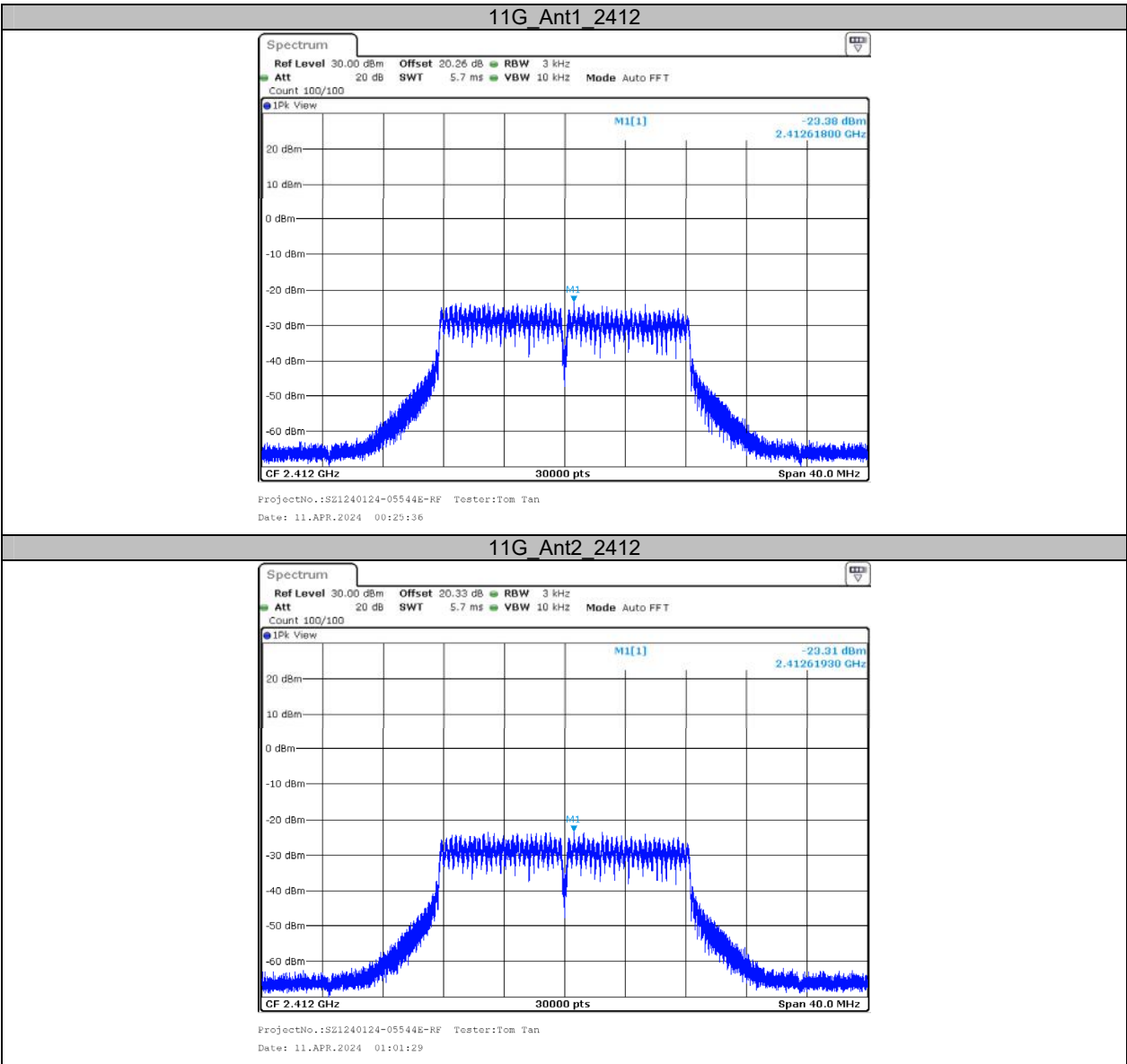


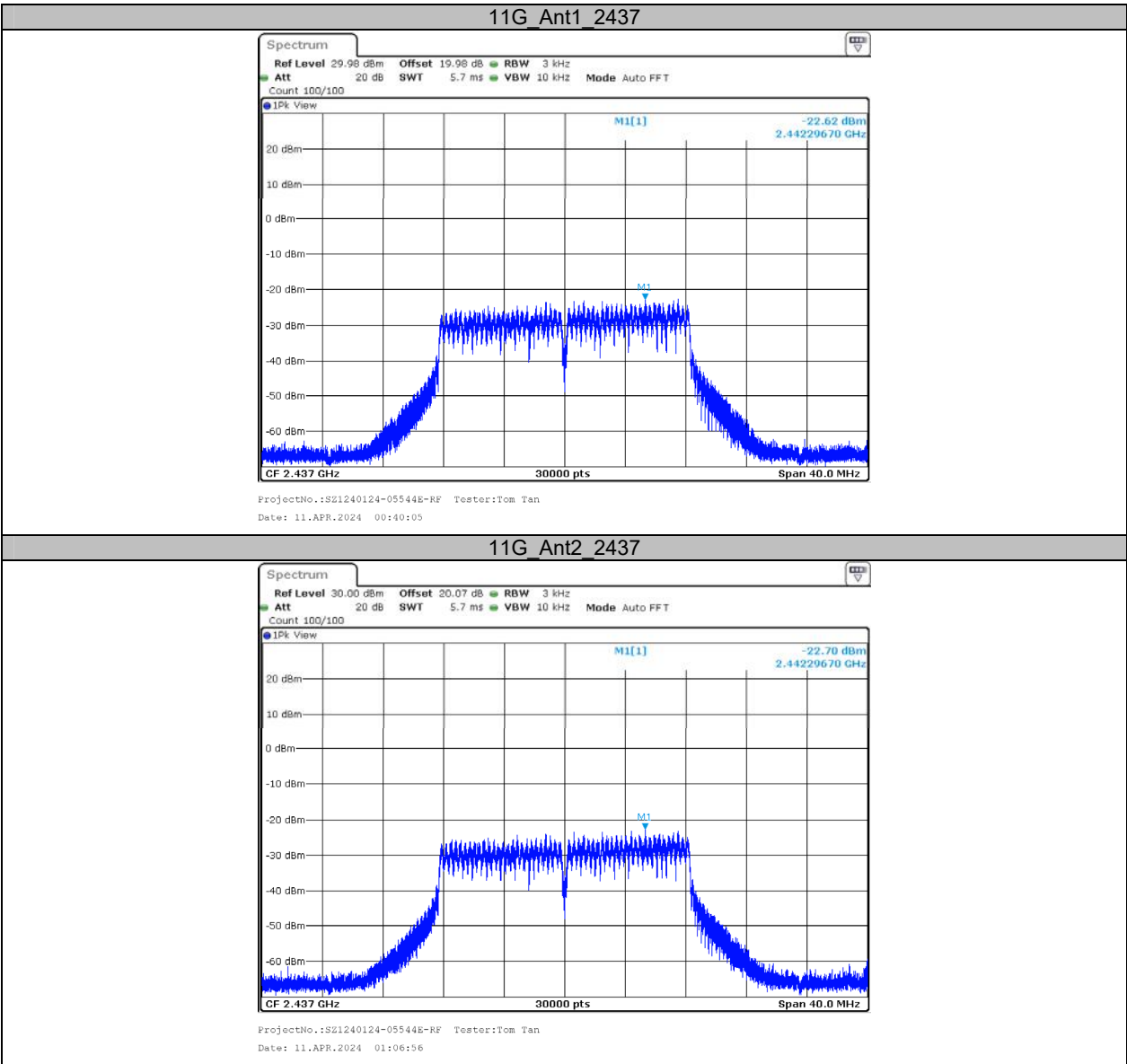
ProjectNo.:SZ1240124-05544E-RF Tester:Tom Tan
Date: 11.APR.2024 00:23:31

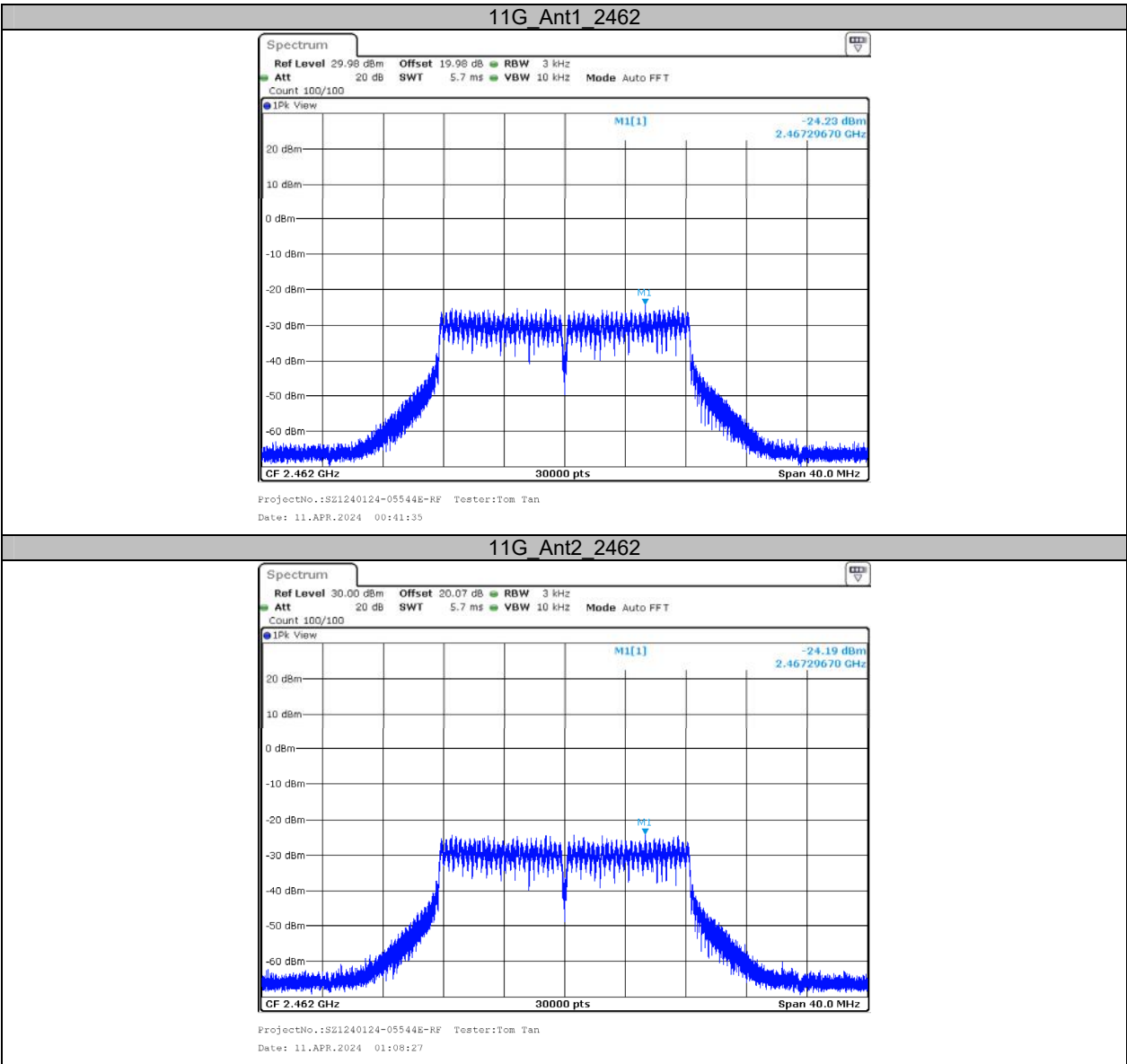
11B_Ant2_2462

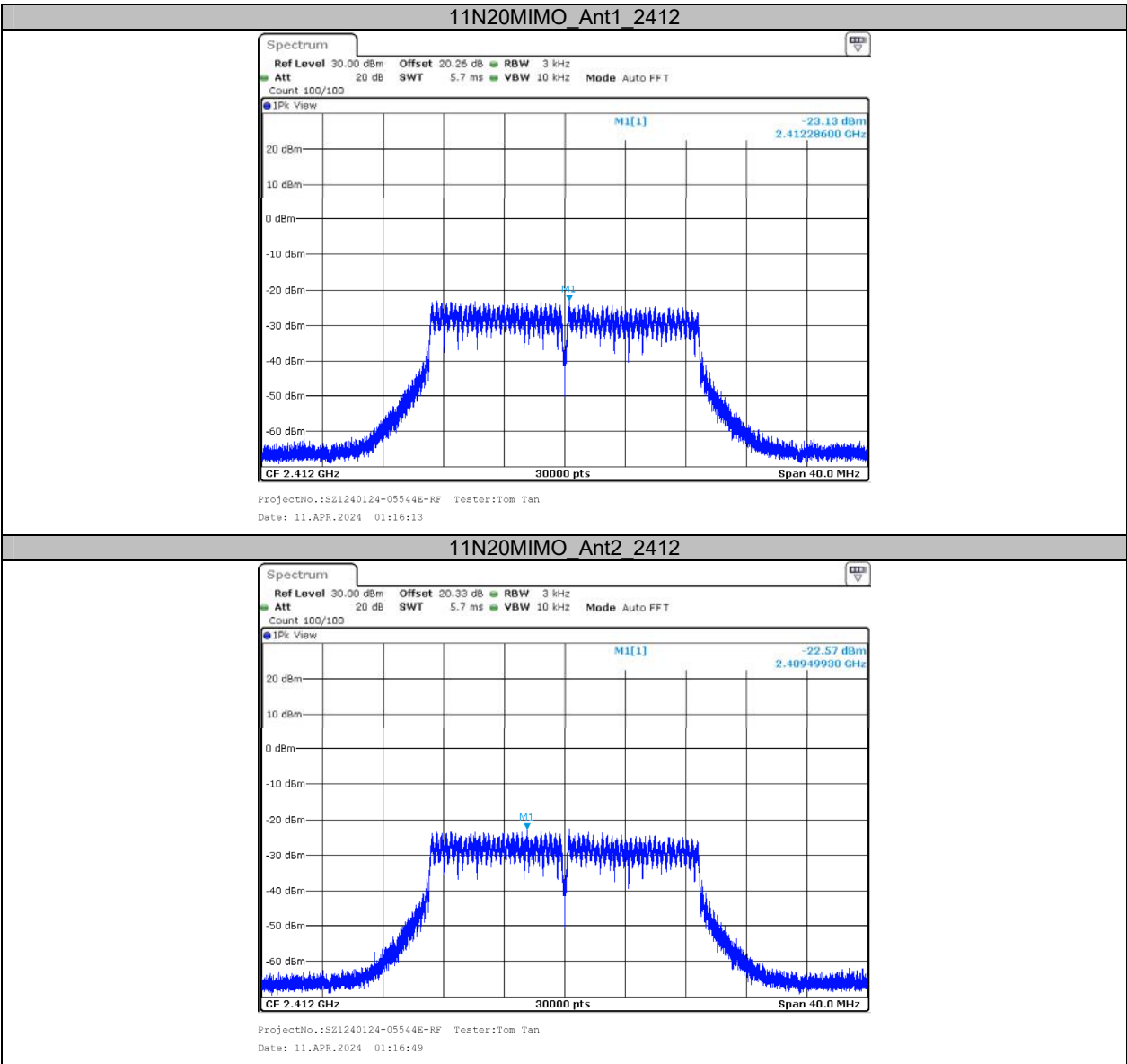


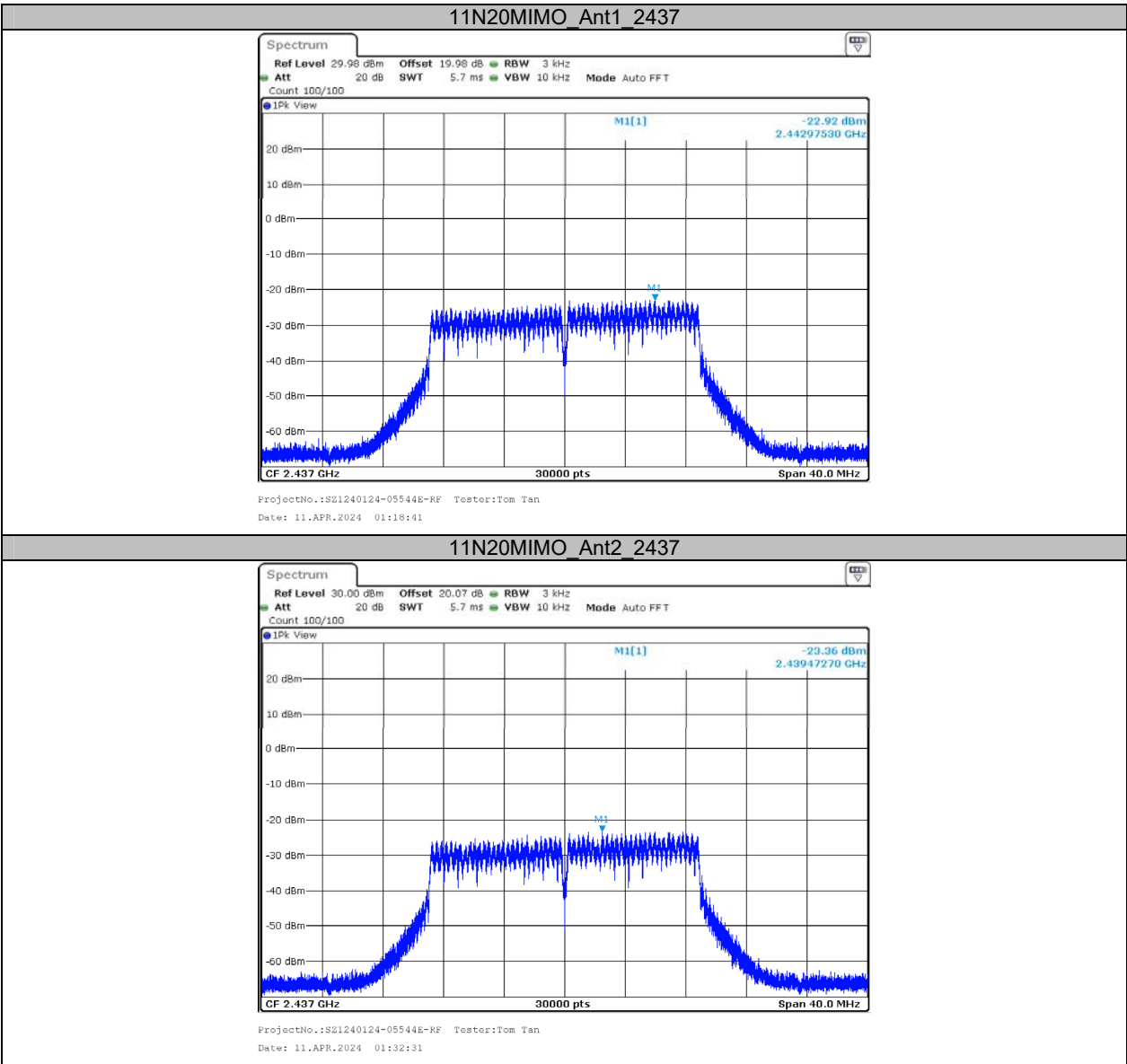
ProjectNo.:SZ1240124-05544E-RF Tester:Tom Tan
Date: 12.APR.2024 23:53:44

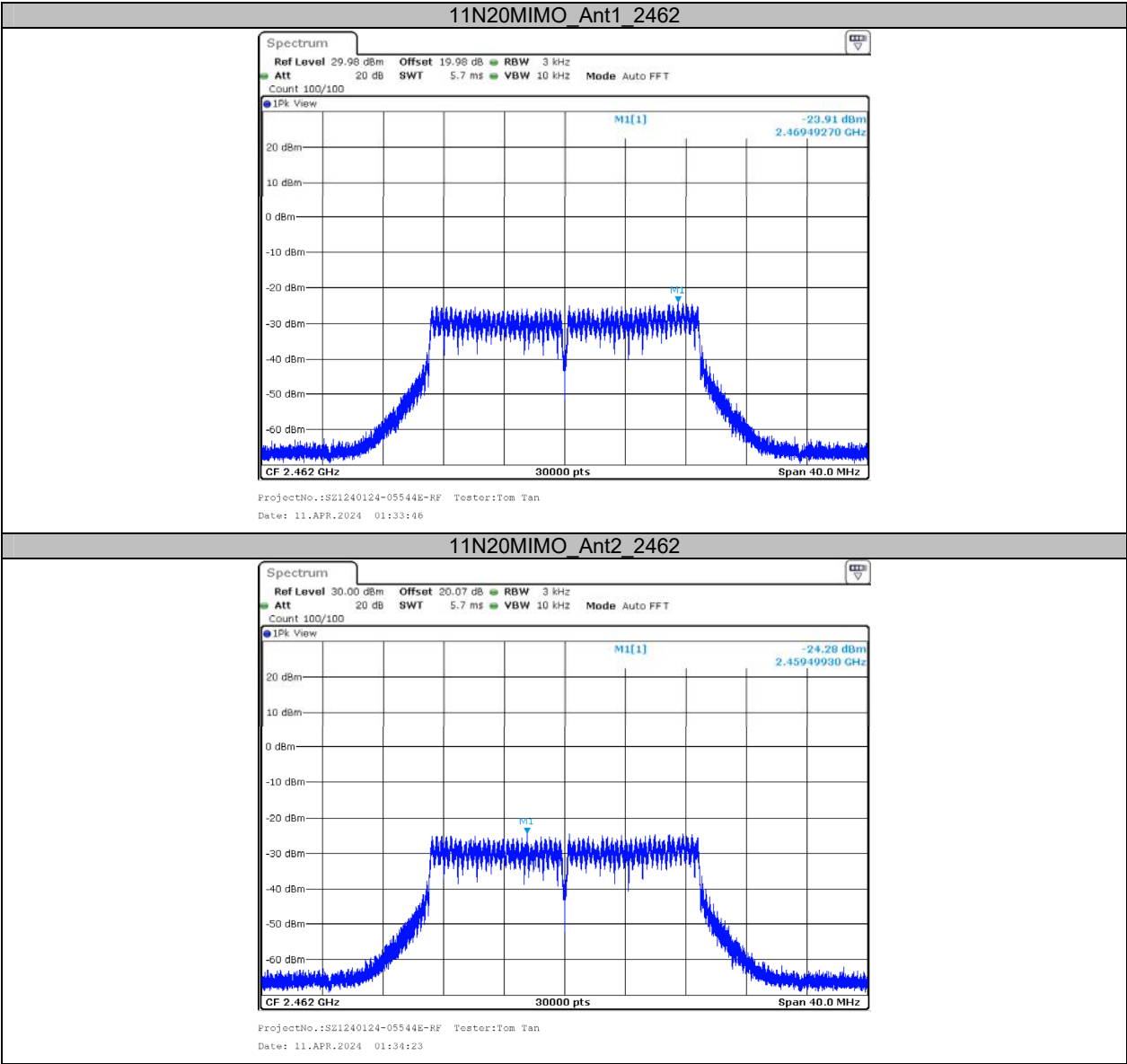




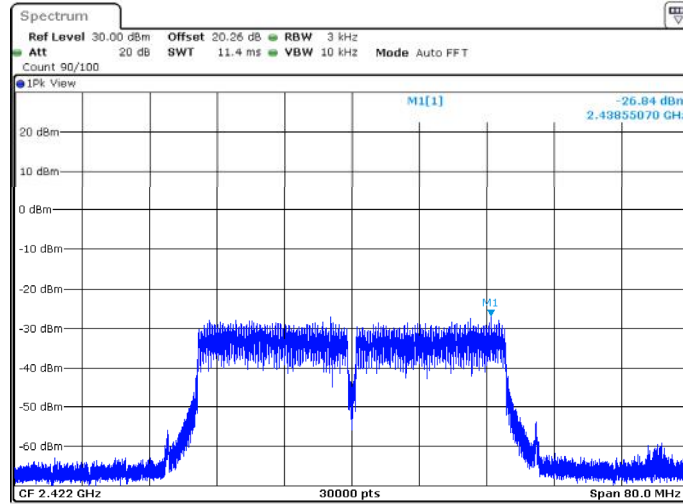






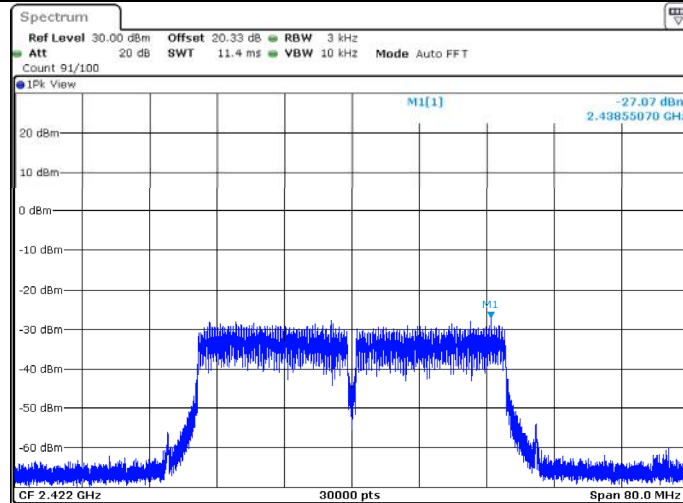


11N40MIMO_Ant1_2422

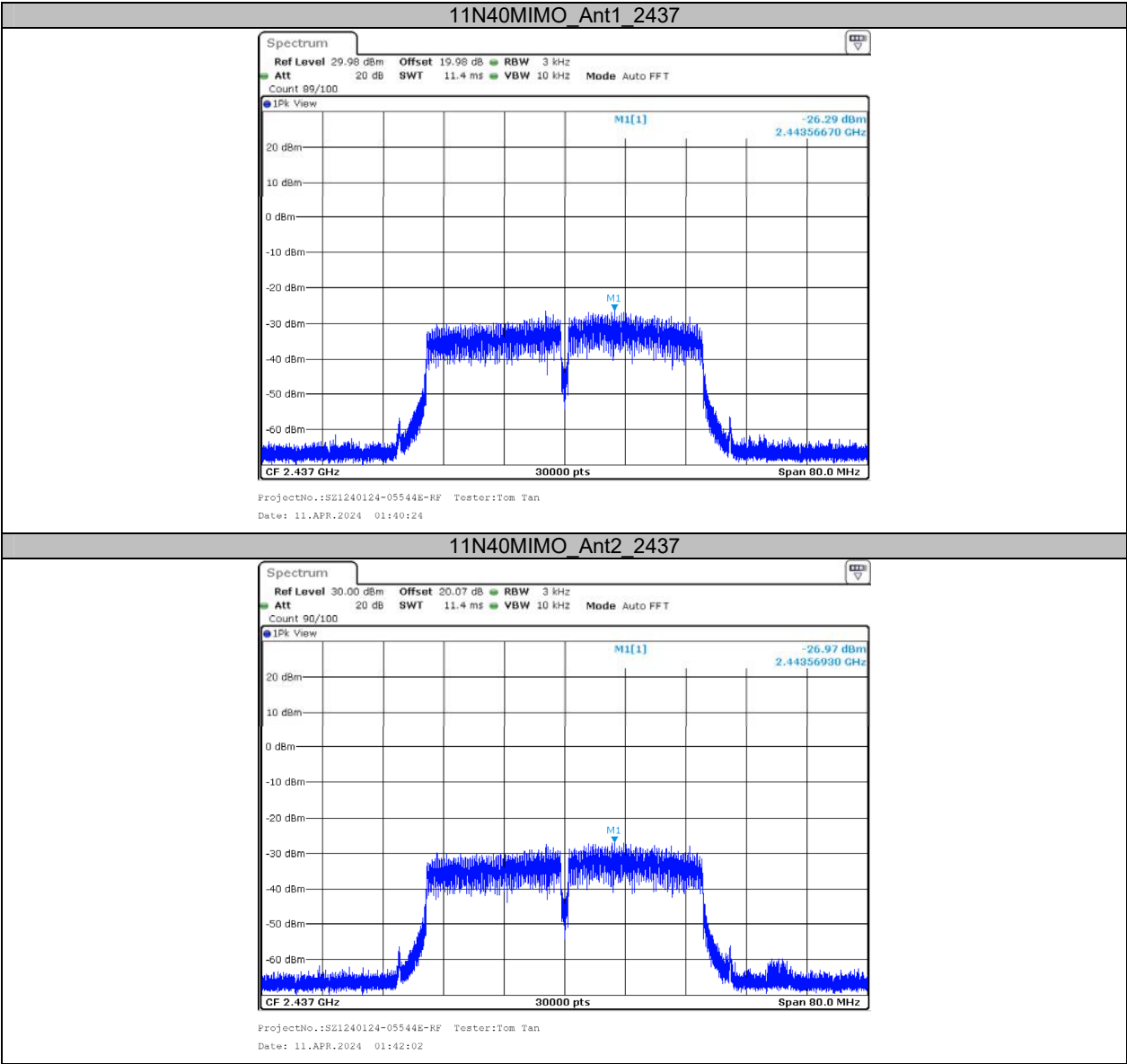


ProjectNo.:SZ1240124-05544E-RF Tester:Tom Tan
Date: 11.APR.2024 01:35:39

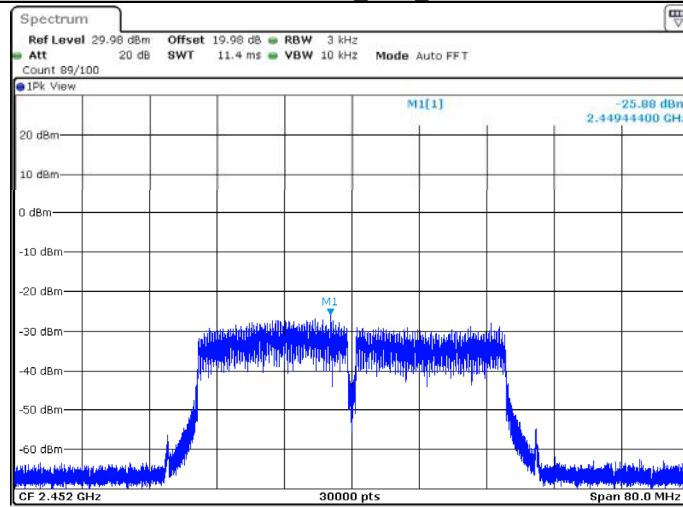
11N40MIMO_Ant2_2422



ProjectNo.:SZ1240124-05544E-RF Tester:Tom Tan
Date: 11.APR.2024 01:36:16

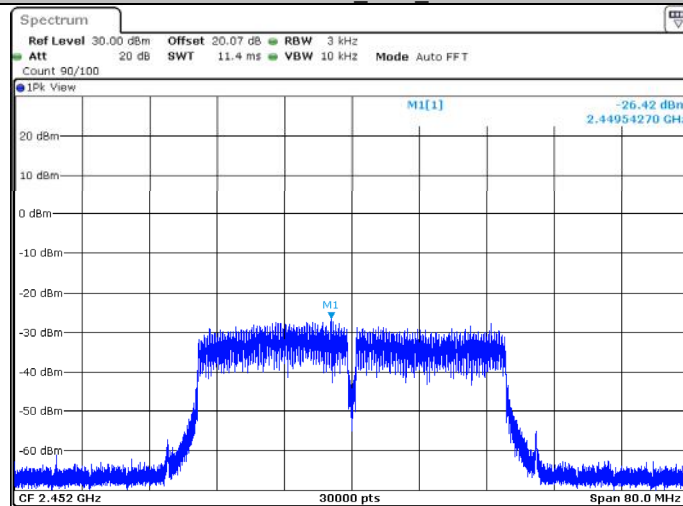


11N40MIMO_Ant1_2452



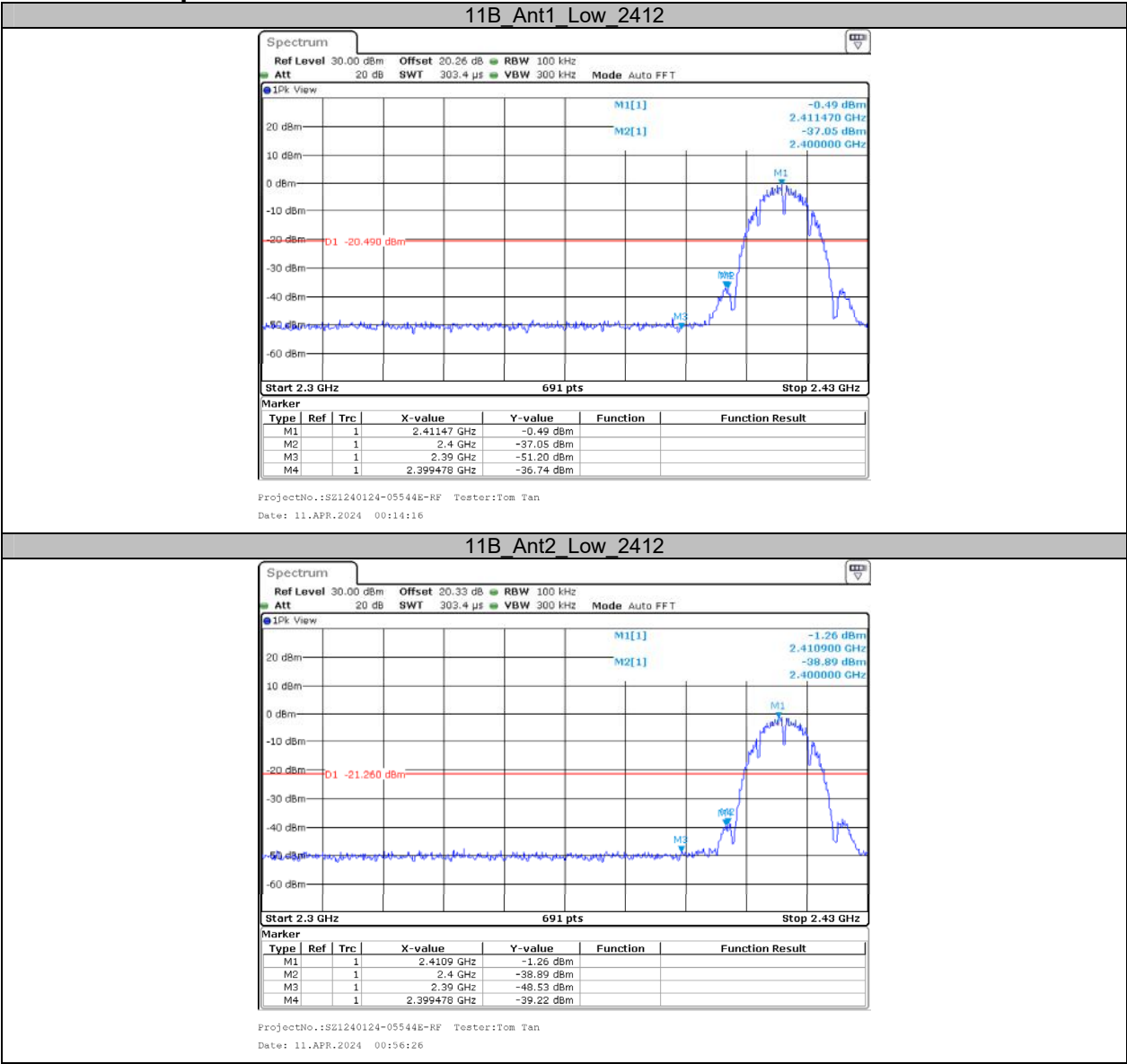
ProjectNo.:SZ1240124-05544E-RF Tester:Tom Tan
Date: 11.APR.2024 01:43:12

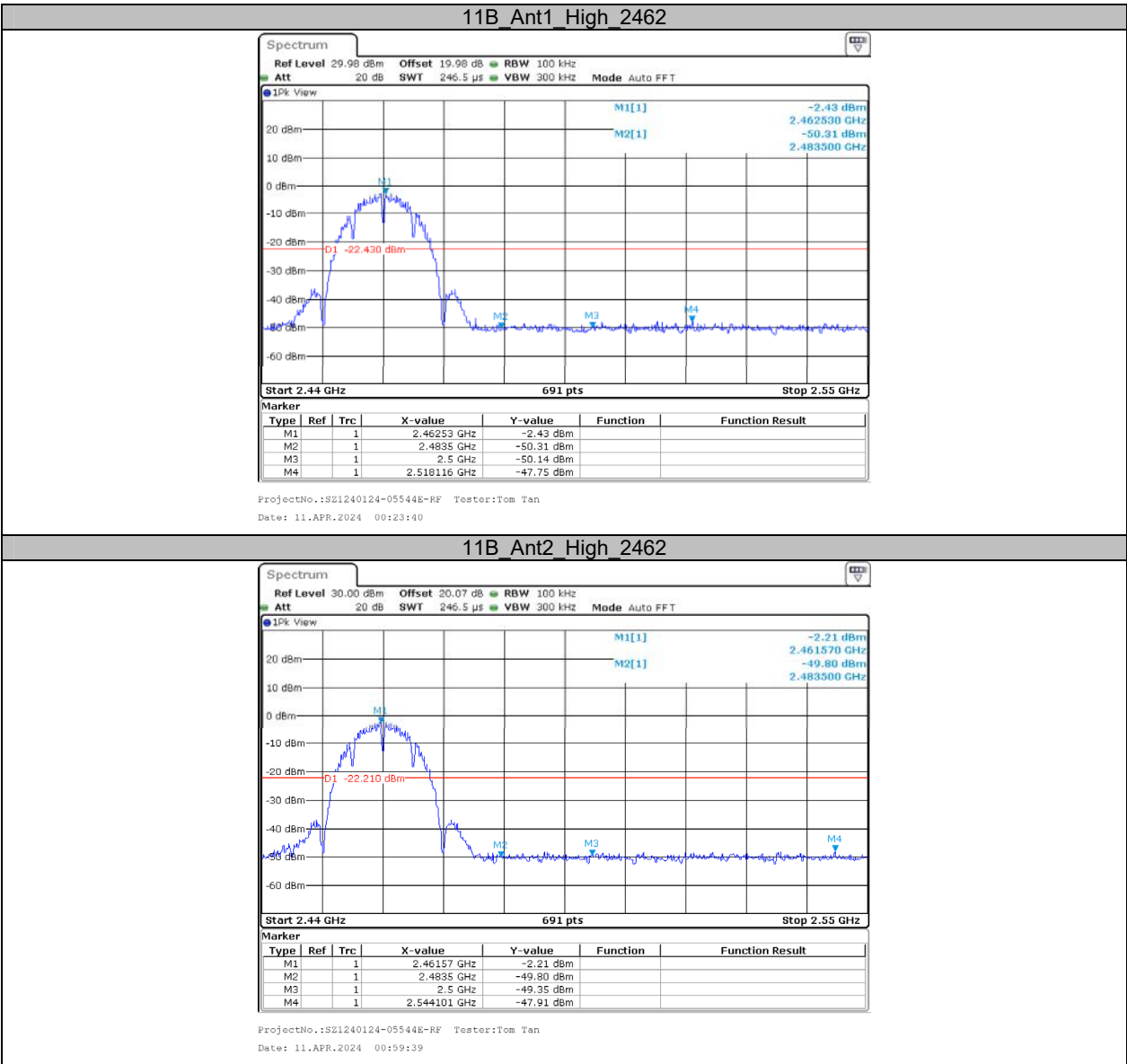
11N40MIMO_Ant2_2452

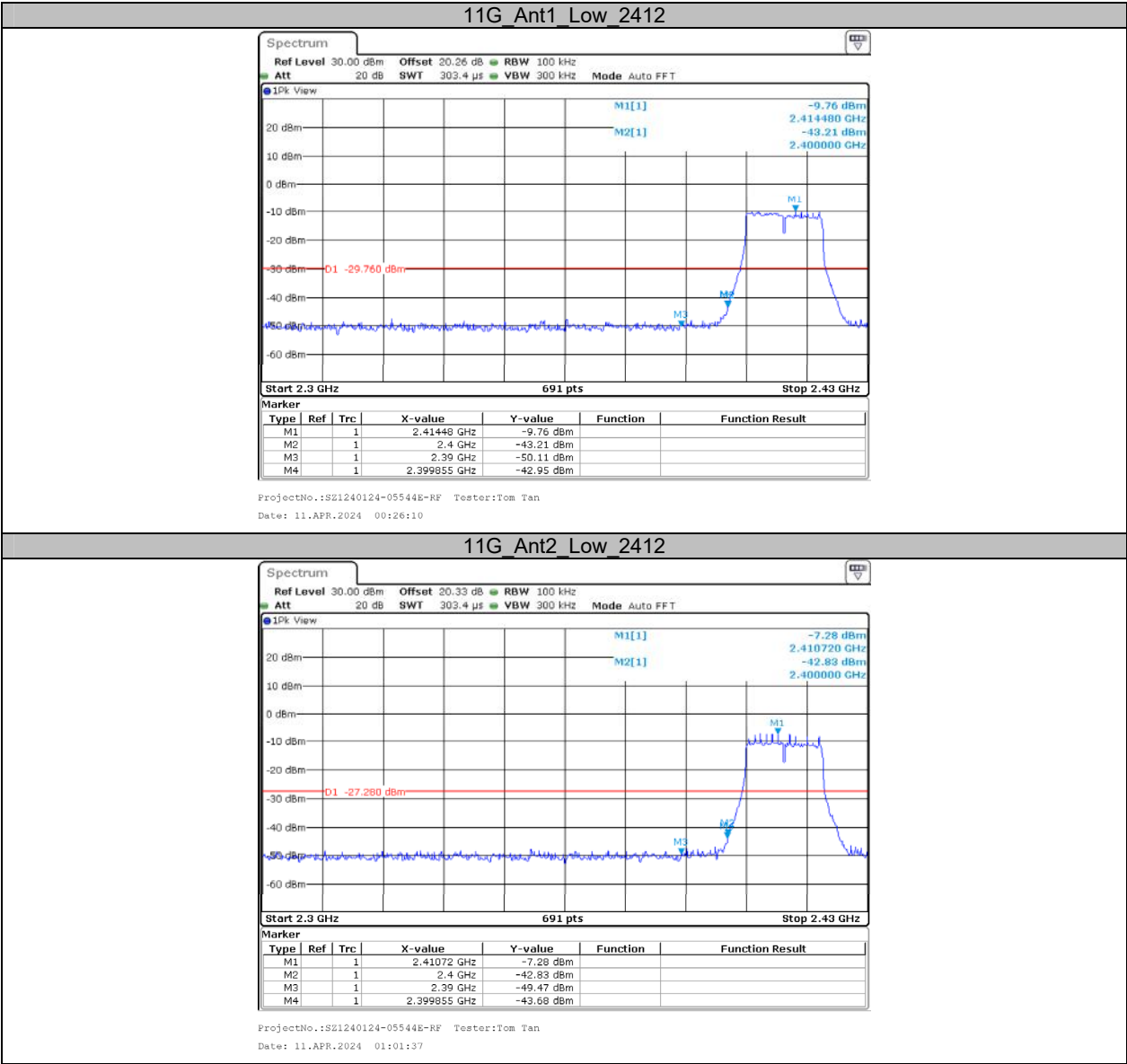


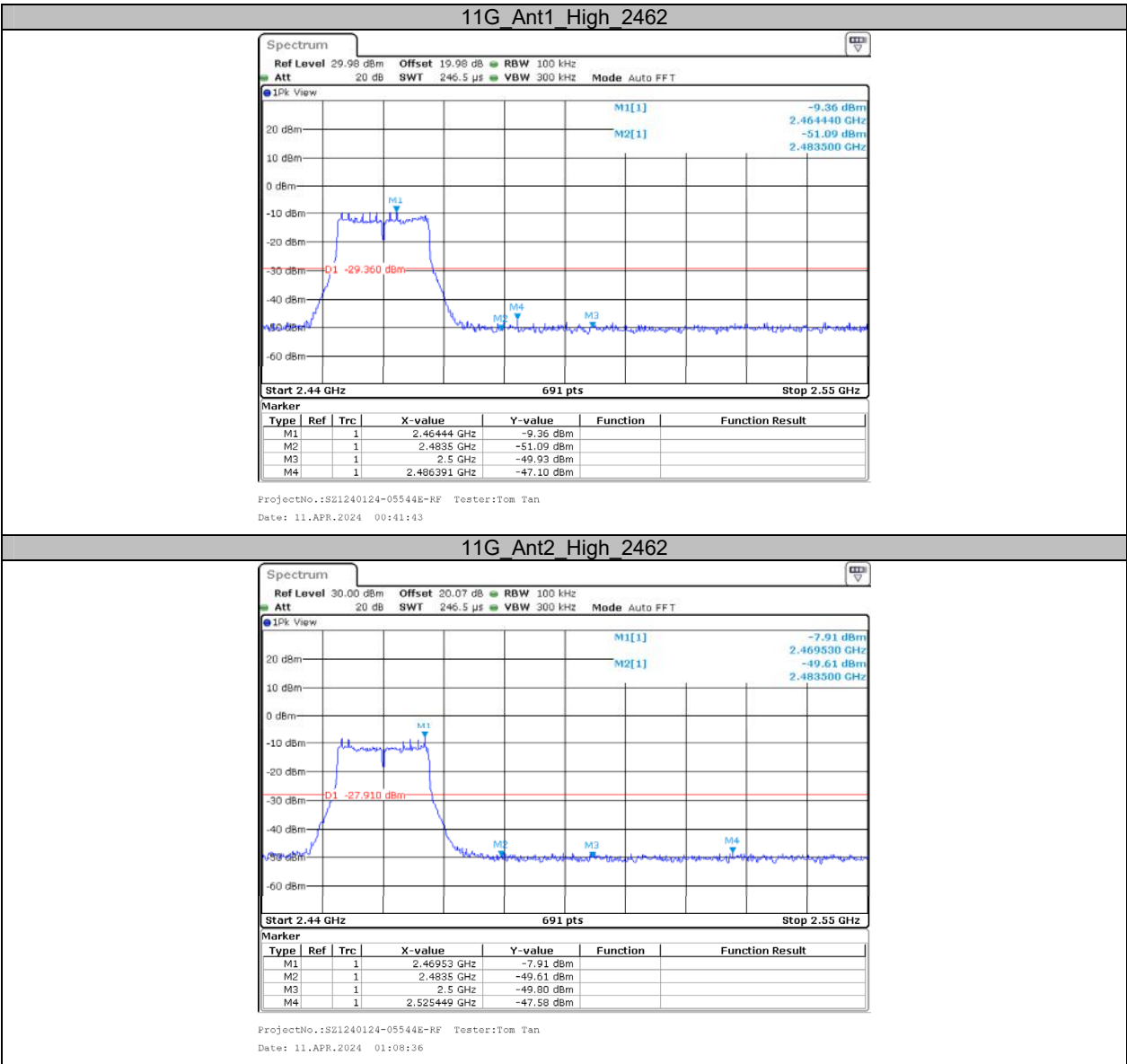
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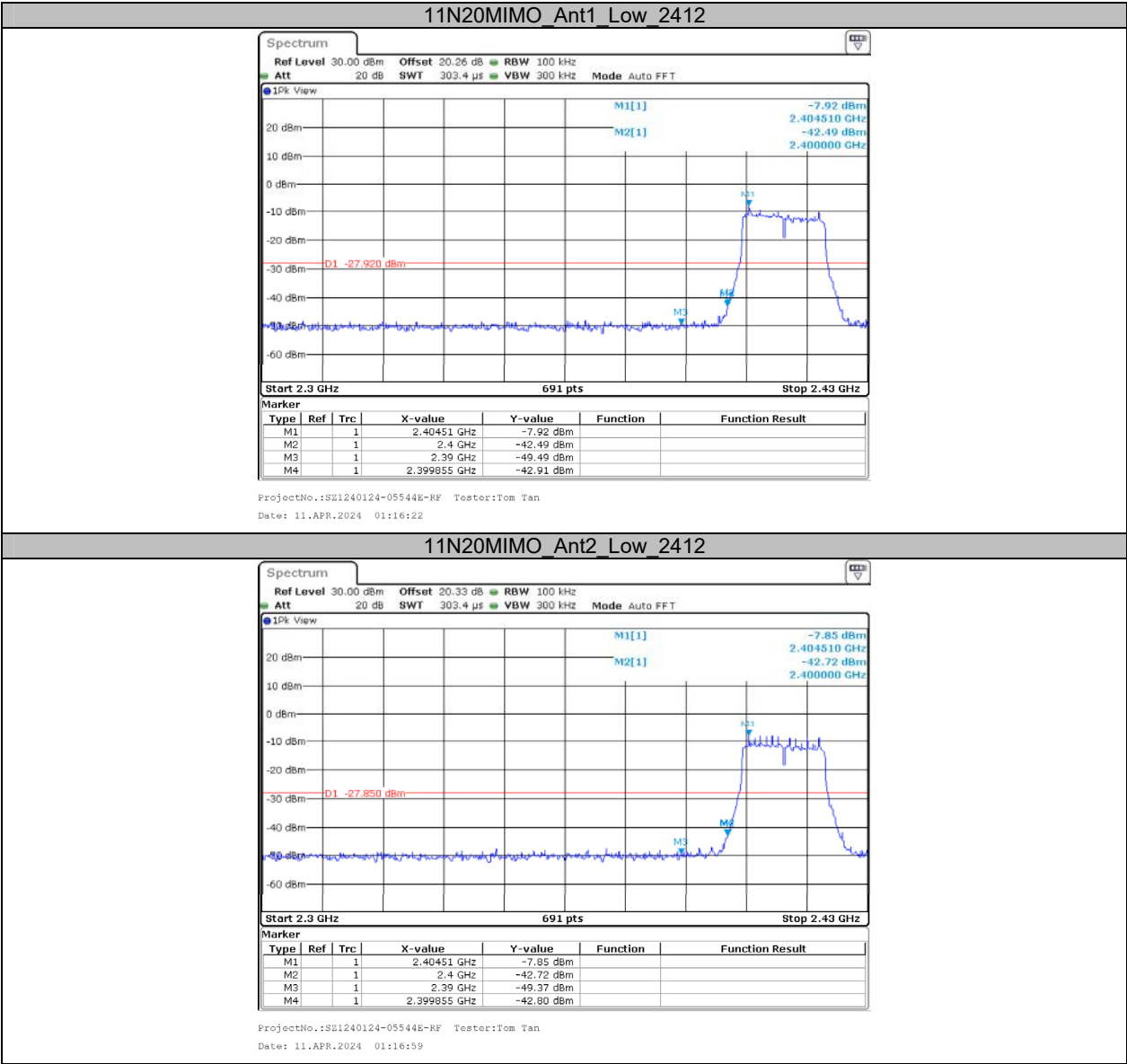
Appendix E: Band edge measurements
Test Graphs

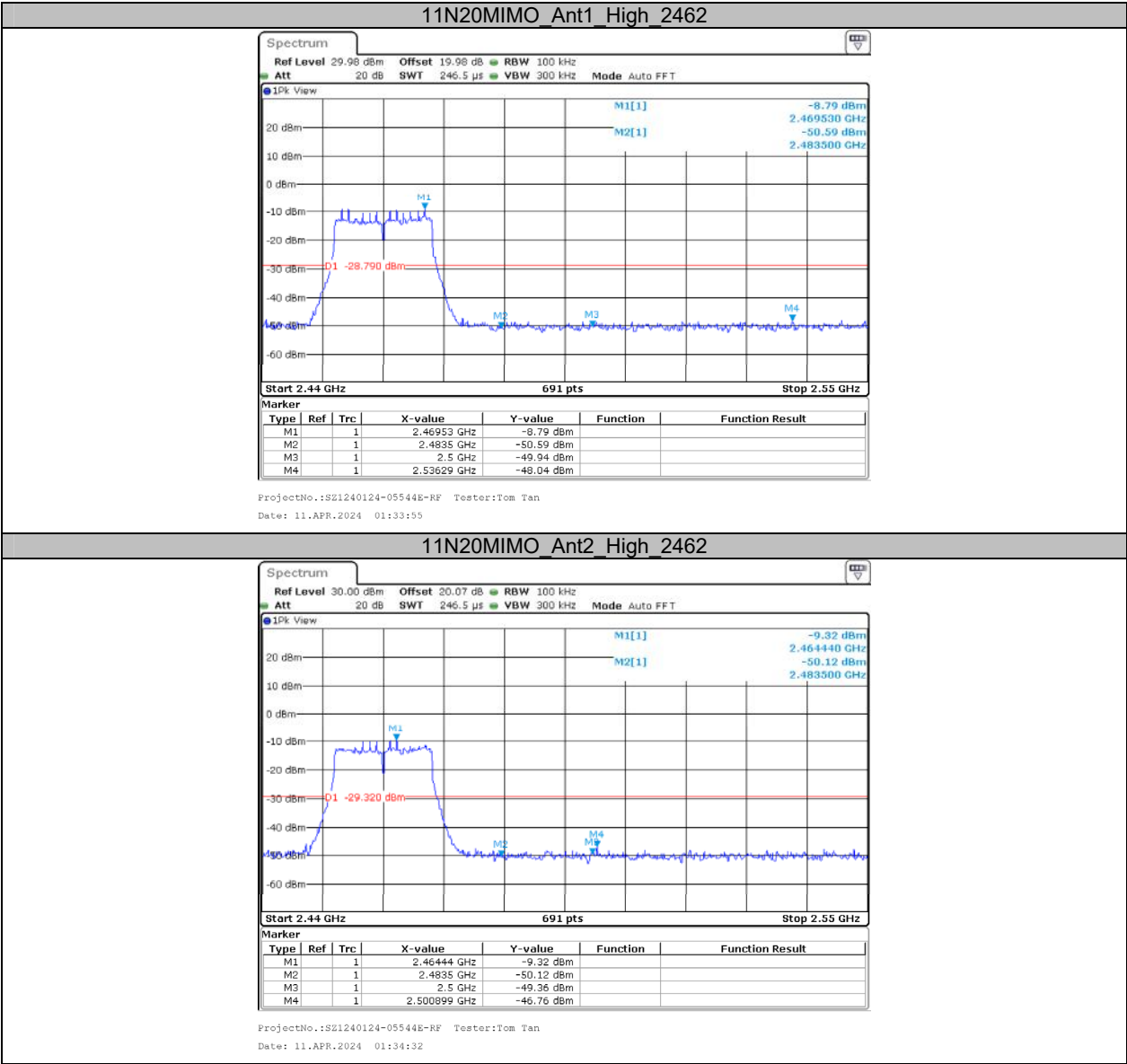


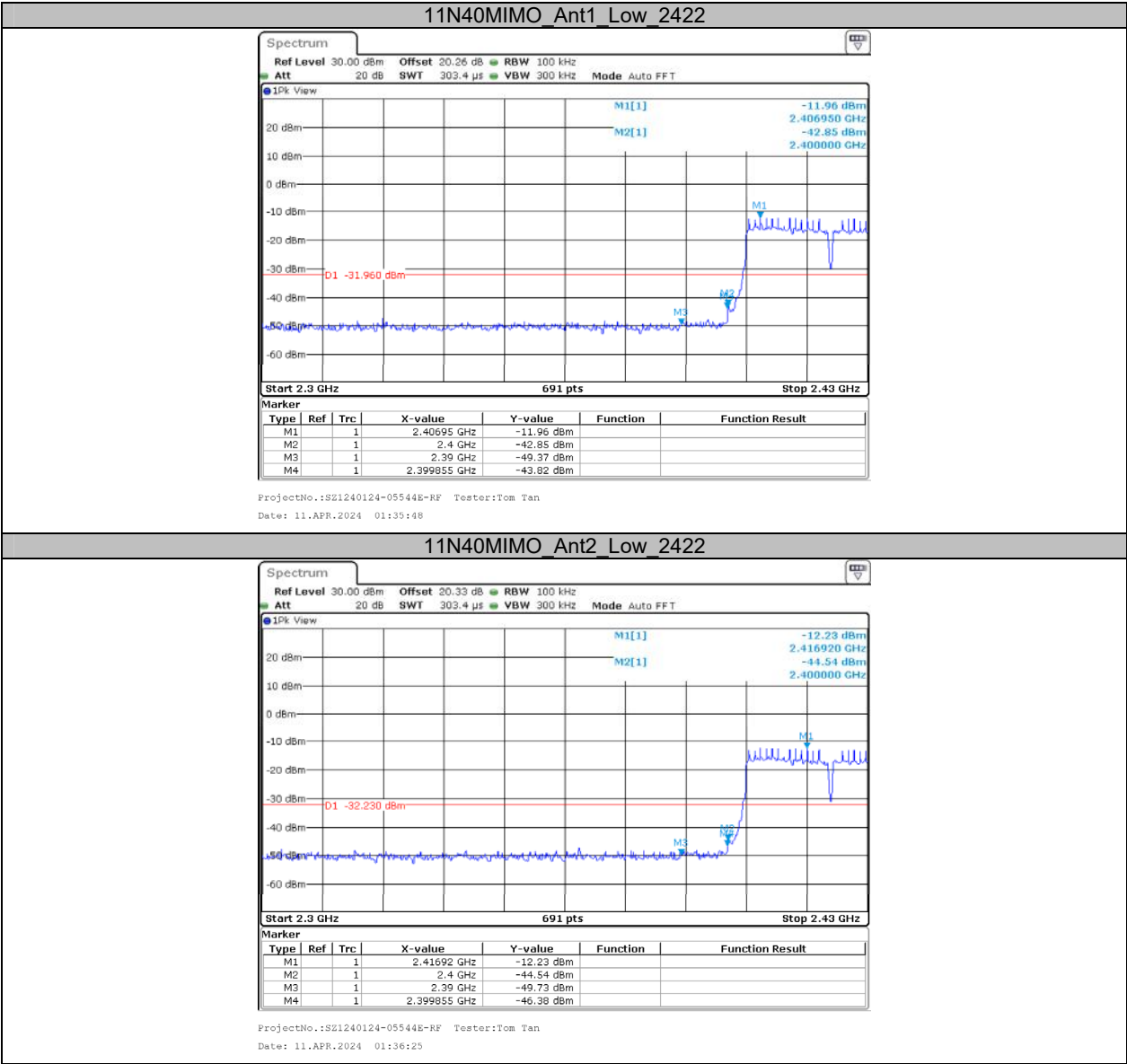


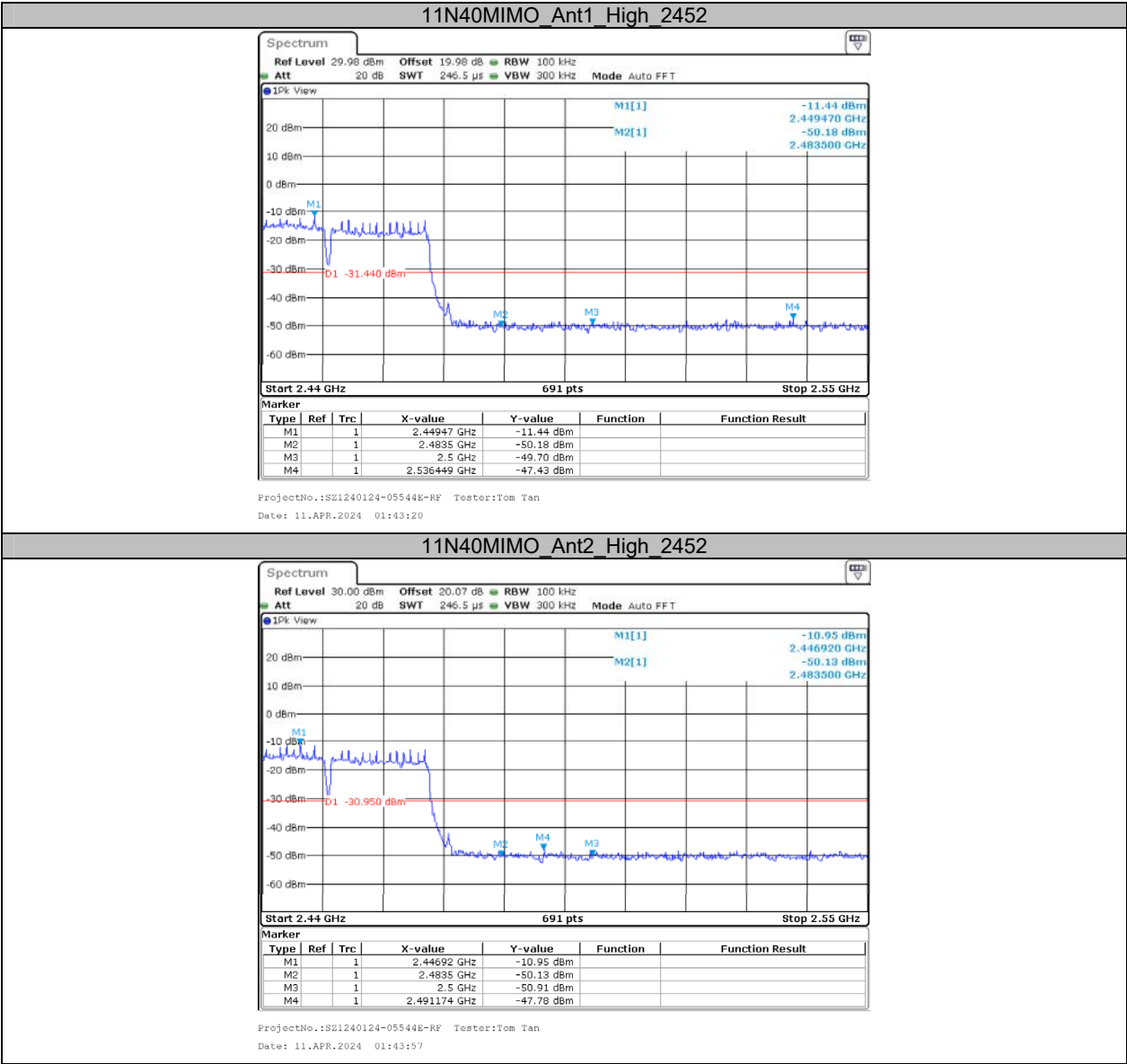








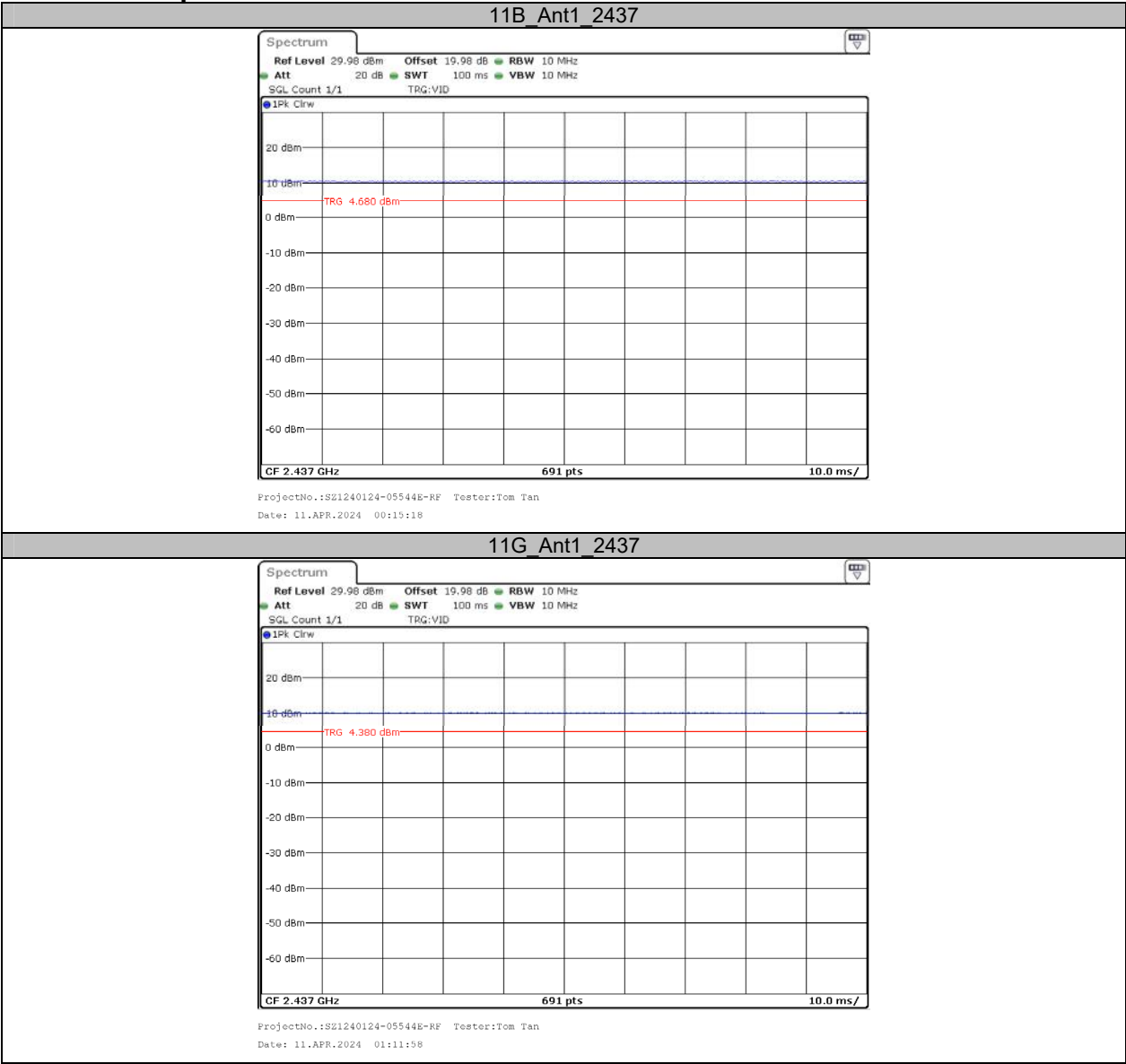


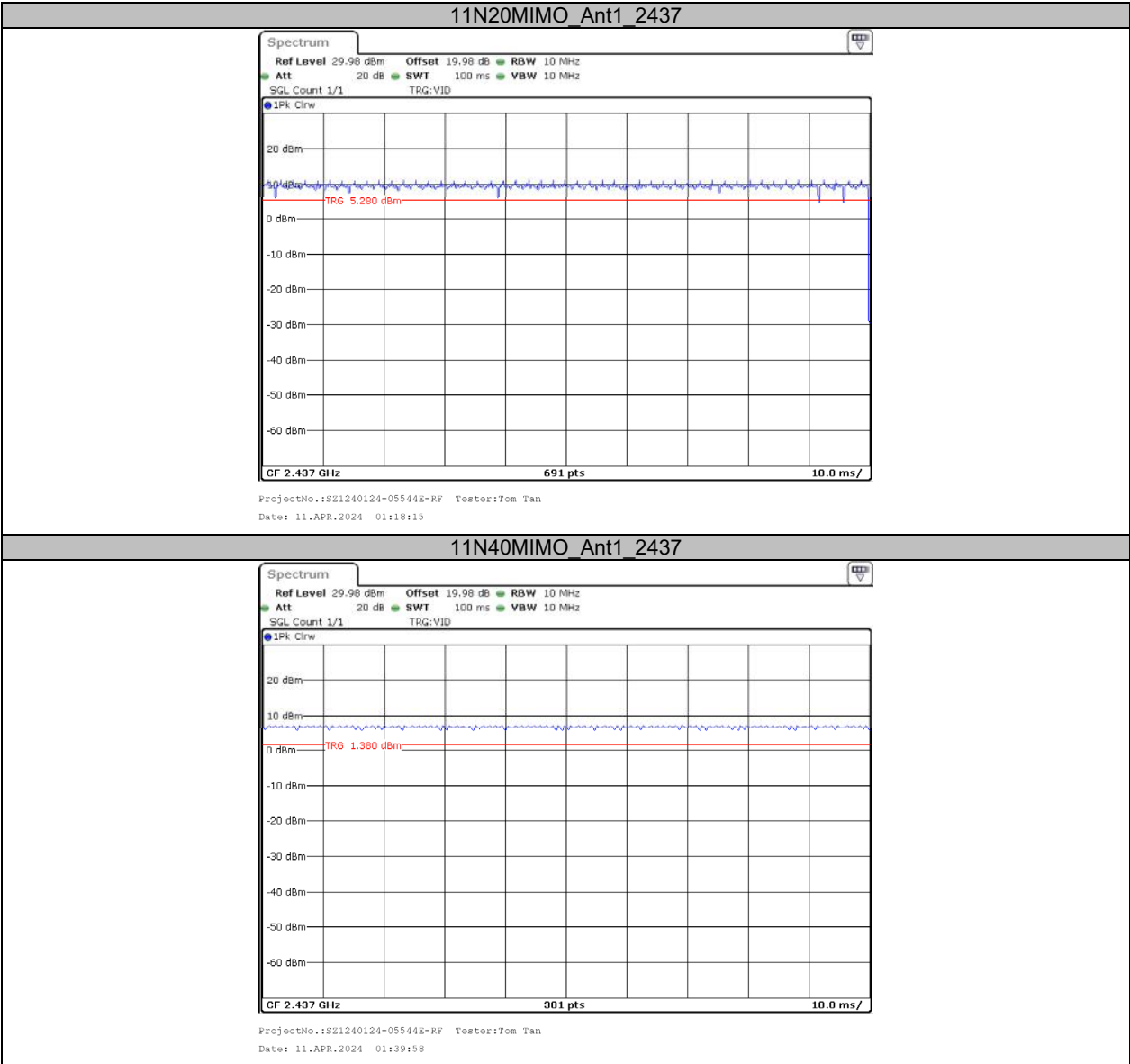


**Appendix F: Duty Cycle
Test Result**

Test Mode	Antenna	Frequency[MHz]	Transmission Duration [ms]	Transmission Period [ms]	Duty Cycle [%]	1/T [Hz]	VBW Setting [Hz]
11B	Ant1	2437	100.00	100.00	100.00	/	10
11G	Ant1	2437	100.00	100.00	100.00	/	10
11N20MIMO	Ant1	2437	100.00	100.00	100.00	/	10
11N40MIMO	Ant1	2437	100.00	100.00	100.00	/	10

Test Graphs





***** END OF REPORT *****