

TEST REPORT

Applicant Name: Shenzhen Sculpfun Technology Co., Ltd.
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Report Number: 2401W69167E-RF-00
FCC ID: 2BF27SF-G9

Test Standard (s)

FCC PART 15.247

Sample Description

Product Type: Sculpfun G9
Model No.: G9
Multiple Model(s) No.: N/A
Trade Mark: SCULPFUN
Date Received: 2024/08/19
Issue Date: 2024/11/20

Test Result:	Pass▲
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▲ In the configuration tested, the EUT complied with the standards above.

Prepared and Checked By:

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Bruce Lin
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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	2401W69167E-RF-00	Original Report	2024/11/20

GENERAL INFORMATION

Product Description for Equipment under Test (EUT)

Product	Sculpfun G9
Tested Model	G9
Multiple Model(s)	N/A
Frequency Range	2412-2462MHz
Maximum Conducted Peak Output Power	802.11b: 15.69dBm 802.11g: 19.43dBm 802.11n20: 19.36dBm 802.11n40: 18.47dBm
Modulation Technique	DSSS,OFDM
Antenna Specification [#]	5dBi (provided by the applicant)
Voltage Range	DC 12V from Adapter
Sample serial number	2Q4F-3 for Conducted and Radiated Emissions Test 2Q4F-4 for RF Conducted Test (Assigned by BACL, Shenzhen)
Sample/EUT Status	Good condition
Adapter Information	Model: K1211-1209000D Input: AC 100-240V, 50/60Hz, 2.5A Output: DC 12V, 9000mA

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	5.34dB(k=2, 95% level of confidence)
	6GHz - 18GHz	5.40dB(k=2, 95% level of confidence)
	18GHz - 40GHz	5.64dB(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	8	2447
2	2417	9	2452
3	2422	10	2457
4	2427	11	2462
5	2432	/	/
6	2437	/	/
7	2442	/	/

802.11 b&802.11g&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

“QATool_Dbg.exe”[#] software was used to test and power level as below:

Mode	Data rate	Power Level [#]		
		Low Channel	Middle Channel	High Channel
802.11b	1Mbps	10	10	10
802.11g	6Mbps	10	10	10
802.11n20	MCS0	10	10	10
802.11n40	MCS0	10	10	10

The software and power level was provided by applicant.

Duty cycle

Please refer to the Appendix.

Support Equipment List and Details

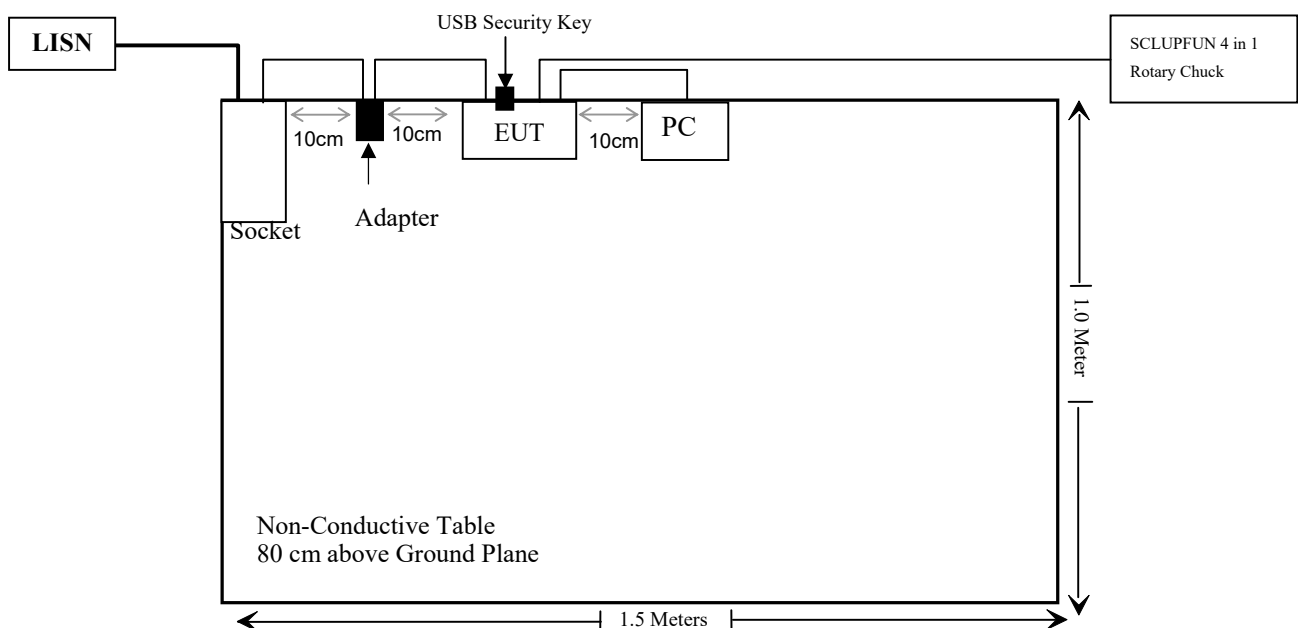
Manufacturer	Description	Model	Serial Number
OUPU	Socket	PDU-OP1606K	6971041358020
Unknown	USB Security Key	Unknown	Unknown
Sculpfun	SCLUPFUN 4 in 1 Rotary Chuck	RA PRO MAX	Unknown
DELL	PC	Latitude E6520	DL0ZCS1

External I/O Cable

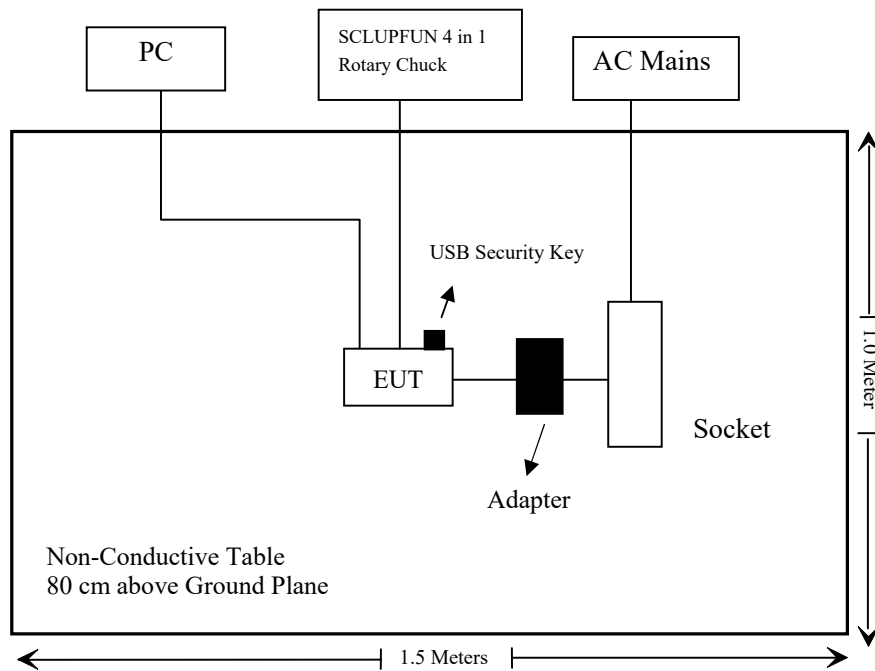
Cable Description	Length (m)	From Port	To
Un-shielding un-Detachable AC Cable	1.2	Socket	LISN/AC Mains
Un-shielding Detachable AC Cable	0.8	Socket	Adapter
Un-shielding un-Detachable DC Cable	1.5	Adapter	EUT
Un-shielding Detachable USB Cable	5.0	EUT	PC
Un-shielding Detachable Data Cable	3.0	EUT	SCLUPFUN 4 in 1 Rotary Chuck

Block Diagram of Test Setup

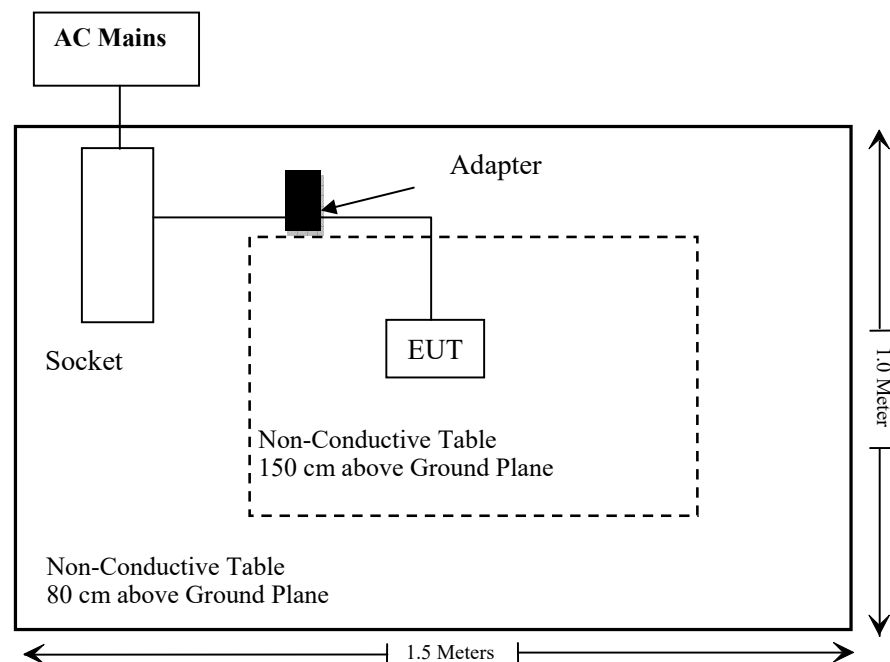
For Conducted Emissions:



For Radiated Emissions below 1GHz:



For Radiated Emissions above 1GHz:



SUMMARY OF TEST RESULTS

FCC Rules	Description of Test	Result
§15.247 (i), §1.1307 (b) & §2.1091	MPE-Based Exemption	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	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	2024/05/21	2025/05/20
Unknown	CE Cable	Unknown	UF A210B-1-0720-504504	2024/05/21	2025/05/20
Audix	EMI Test software	E3	191218(V9)	NCR	NCR
Radiated Emissions Test					
Rohde & Schwarz	EMI Test Receiver	ESR3	102455	2024/01/16	2025/01/15
Sonoma instrument	Pre-amplifier	310 N	186238	2024/05/21	2025/05/20
Sunol Sciences	Broadband Antenna	JB1	A040904-1	2023/07/20	2026/07/19
Unknown	Cable	Chamber A Cable 1	N/A	2024/06/18	2025/06/17
Unknown	Cable	XH500C	J-10M-A	2024/06/18	2025/06/17
BACL	Active Loop Antenna	1313-1A	4031911	2024/05/14	2027/05/13
Unknown	Cable	2Y194	0735	2024/05/21	2025/05/20
Unknown	Cable	PNG214	1354	2024/05/21	2025/05/20
Audix	EMI Test software	E3	19821b(V9)	NCR	NCR
Rohde & Schwarz	Spectrum Analyzer	FSV40	101605	2024/03/27	2025/03/26
COM-POWER	Pre-amplifier	PA-122	181919	2024/06/18	2025/06/17
Schwarzbeck	Horn Antenna	BBHA9120D (1201)	1143	2023/07/26	2026/07/25
Unknown	RF Cable	KMSE	735	2024/06/18	2025/06/17
Unknown	RF Cable	UFA147	219661	2024/06/18	2025/06/17
Unknown	RF Cable	XH750A-N	J-10M	2024/06/18	2025/06/17
JD	Multiplex Switch Test Control Set	DT7220FSU	DQ77926	2024/06/18	2025/06/17
A.H.System	Pre-amplifier	PAM-1840VH	190	2024/06/18	2025/06/17
Electro-Mechanics Co	Horn Antenna	3116	9510-2270	2023/09/18	2026/09/17
UTIFLEX	RF Cable	NO. 13	232308-001	2024/06/18	2025/06/17
Audix	EMI Test software	E3	191218(V9)	NCR	NCR

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
RF Conducted Test					
Tonscend	RF control Unit	JS0806-2	19D8060154	2024/08/06	2025/08/05
ANRITSU	Microwave peak power sensor	MA24418A	12622	2024/05/21	2025/05/20
Rohde & Schwarz	Spectrum Analyzer	FSV40	101473	2024/01/16	2025/01/15
Unknown	10dB Attenuator	Unknown	F-03-EM122	2024/06/27	2025/06/26

* **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 §15.247 (I) & §1.1307 (B) & §2.1091- MPE-BASED EXEMPTION

Applicable Standard

According to subpart 15.247 (i) and subpart 2.1091 systems operating under the provisions of this section shall be operated in a manner that ensures the public is not exposed to RF energy level in excess of the communication guidelines.

According to KDB 447498 D04 Interim General RF Exposure Guidance

MPE-Based Exemption:

General frequency and separation-distance dependent MPE-based effective radiated power (ERP) thresholds are in Table B.1 [Table 1 of § 1.1307(b)(3)(i)(C)] to support an exemption from further evaluation from 300 kHz through 100 GHz.

Table 1 to § 1.1307(b)(3)(i)(C) - Single RF Sources Subject to Routine Environmental Evaluation

RF Source frequency (MHz)	Threshold ERP (watts)
0.3-1.34	$1,920 R^2$.
1.34-30	$3,450 R^2/f^2$.
30-300	$3.83 R^2$.
300-1,500	$0.0128 R^2 f$.
1,500-100,000	$19.2 R^2$.

R is the minimum separation distance in meters

f = frequency in MHz

Result

Mode	Frequency (MHz)	Tune up conducted power [#]	Antenna Gain [#]		ERP		Evaluation Distance (m)	ERP Limit (mW)
		(dBm)	(dBi)	(dBd)	(dBm)	(mW)		
Wi-Fi	2412-2462	19.5	5	2.85	22.35	171.79	0.2	768

Note: The tune up conducted power and antenna gain was declared by the applicant.

To maintain compliance with the FCC's RF exposure guidelines, place the equipment at least 20cm from nearby persons.

Result: Compliant

FCC §15.203 - ANTENNA REQUIREMENT

Applicable Standard

According to FCC § 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 use of a standard antenna jack or electrical connector is prohibited.

Further, this requirement does not apply to intentional radiators that must be professionally installed, such as perimeter protection systems and some field disturbance sensors, or to other intentional radiators which, in accordance with § 15.31(d), must be measured at the installation site. However, the installer shall be responsible for ensuring that the proper antenna is employed so that the limits in this part are not exceeded.

Antenna Connector Construction

The EUT has an external antenna with unique antenna connector and the antenna gain[#] is 5dBi, fulfill the requirement of this section. Please refer to the EUT photos.

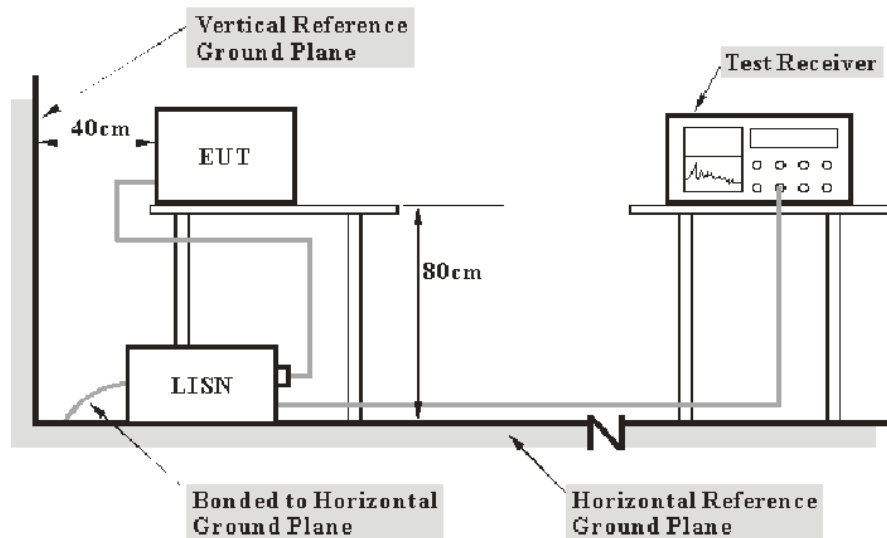
Result: Compliant

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

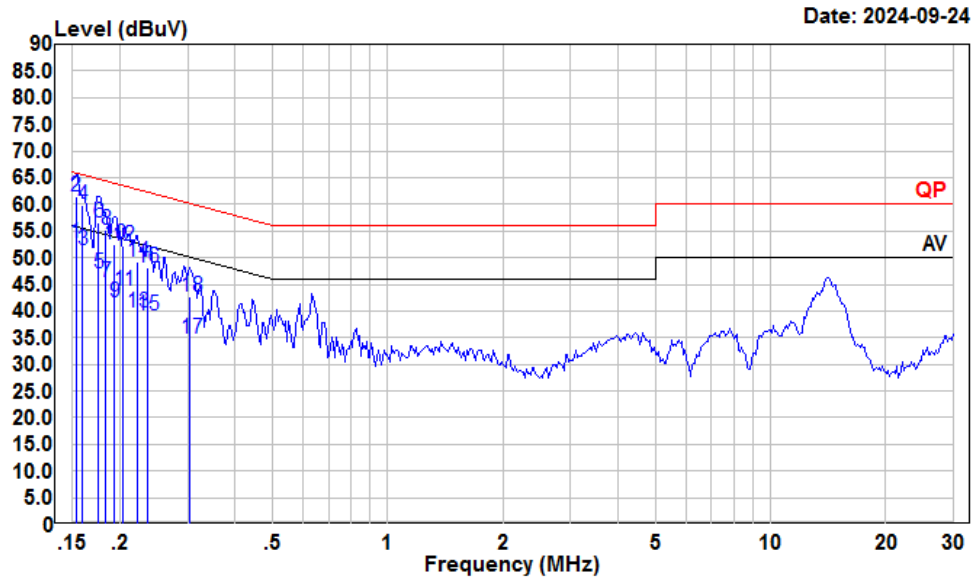
Environmental Conditions

Temperature:	24 °C
Relative Humidity:	68 %
ATM Pressure:	101 kPa

The testing was performed by Macy Shi on 2024-09-24.

EUT operation mode: Transmitting (Maximum output power mode, 802.11g Middle channel)

AC 120V/60 Hz, Line



Condition: Line

Project : 2401W69167E-RF

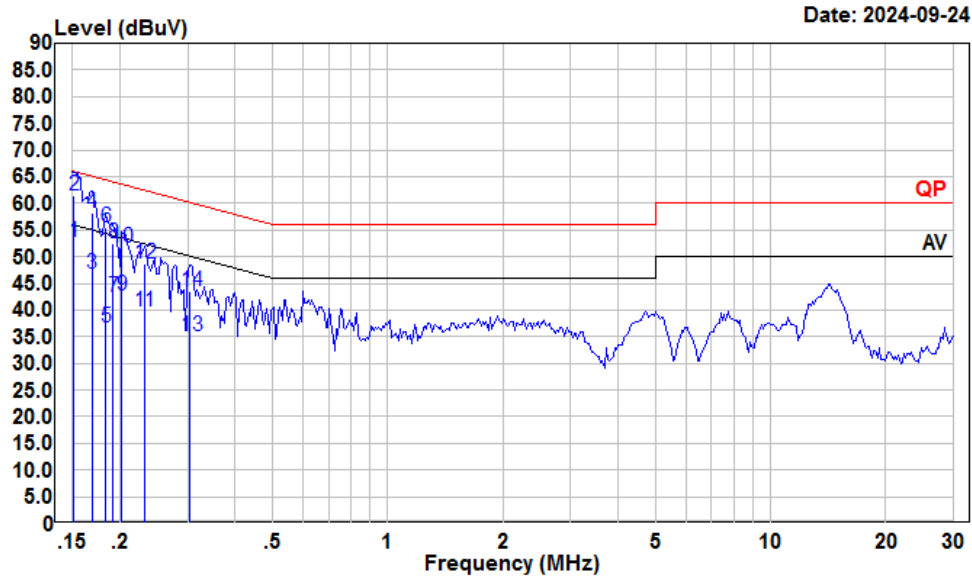
tester : Macy.shi

Note : Transmitting

	Freq	Read Level	Cable Level	Limit Loss	Over Limit	Remark
	MHz	dBuV	dBuV	dB	dBuV	dB
1	0.153	32.20	52.73	10.13	55.82	-3.09 Average
2	0.153	40.92	61.45	10.13	65.82	-4.37 QP
3	0.160	30.80	51.32	10.12	55.47	-4.15 Average
4	0.160	39.20	59.72	10.12	65.47	-5.75 QP
5	0.176	26.50	47.00	10.10	54.68	-7.68 Average
6	0.176	36.10	56.60	10.10	64.68	-8.08 QP
7	0.183	24.90	45.40	10.10	54.33	-8.93 Average
8	0.183	34.60	55.10	10.10	64.33	-9.23 QP
9	0.193	21.20	41.69	10.09	53.89	-12.20 Average
10	0.193	31.90	52.39	10.09	63.89	-11.50 QP
11	0.204	23.24	43.73	10.09	53.45	-9.72 Average
12	0.204	31.83	52.32	10.09	63.45	-11.13 QP
13	0.222	19.29	39.76	10.09	52.74	-12.98 Average
14	0.222	28.69	49.16	10.09	62.74	-13.58 QP
15	0.237	18.71	39.15	10.08	52.22	-13.07 Average
16	0.237	27.71	48.15	10.08	62.22	-14.07 QP

	Freq	Read Level	Level	Cable Loss	Limit Line	Over Limit	Remark
	MHz	dBuV	dBuV	dB	dBuV	dB	
17	0.305	14.46	34.88	10.11	50.10	-15.22	Average
18	0.305	22.39	42.81	10.11	60.10	-17.29	QP

AC 120V/60 Hz, Neutral



Condition: Neutral

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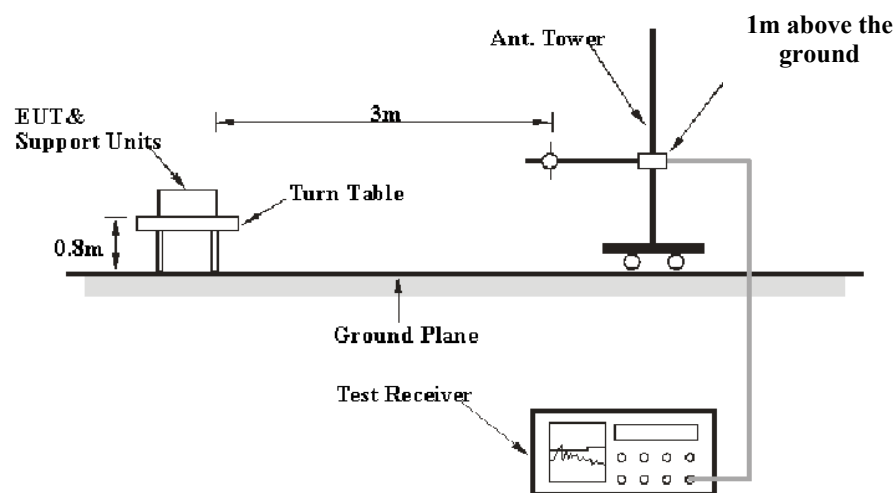
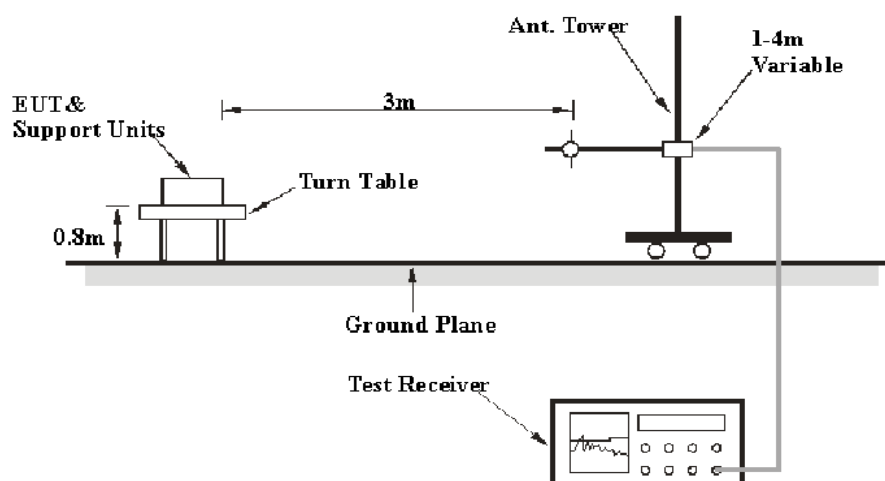
tester : Macy.shi

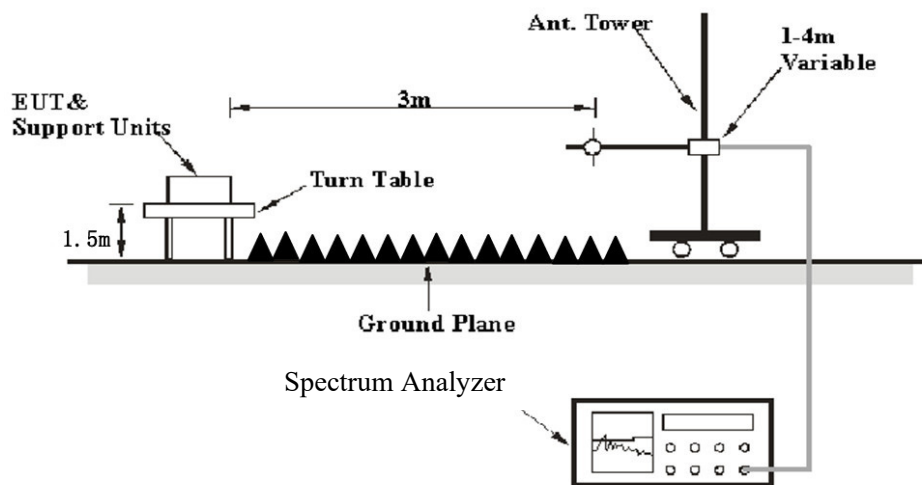
Note : Transmitting

	Freq	Read Level	Cable Level	Cable Loss	Limit Line	Over Limit	Remark
	MHz	dBuV	dBuV	dB	dBuV	dB	
1	0.152	32.53	52.87	10.13	55.91	-3.04	Average
2	0.152	41.06	61.40	10.13	65.91	-4.51	QP
3	0.169	26.40	46.86	10.10	55.03	-8.17	Average
4	0.169	37.60	58.06	10.10	65.03	-6.97	QP
5	0.183	16.10	36.68	10.10	54.33	-17.65	Average
6	0.183	35.00	55.58	10.10	64.33	-8.75	QP
7	0.191	21.90	42.53	10.09	53.98	-11.45	Average
8	0.191	31.90	52.53	10.09	63.98	-11.45	QP
9	0.202	21.95	42.64	10.09	53.54	-10.90	Average
10	0.202	30.96	51.65	10.09	63.54	-11.89	QP
11	0.232	18.91	39.62	10.08	52.39	-12.77	Average
12	0.232	27.91	48.62	10.08	62.39	-13.77	QP
13	0.305	14.26	35.06	10.11	50.10	-15.04	Average
14	0.305	22.58	43.38	10.11	60.10	-16.72	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 Factor is calculated by adding the Antenna Factor and Cable Loss, and subtracting the Amplifier Gain. The basic equation is as follows:

$$\text{Factor} = \text{Antenna Factor} + \text{Cable Loss} - \text{Amplifier Gain}$$

The “**Over Limit/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 calculation is as follows:

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

Test Data

Environmental Conditions

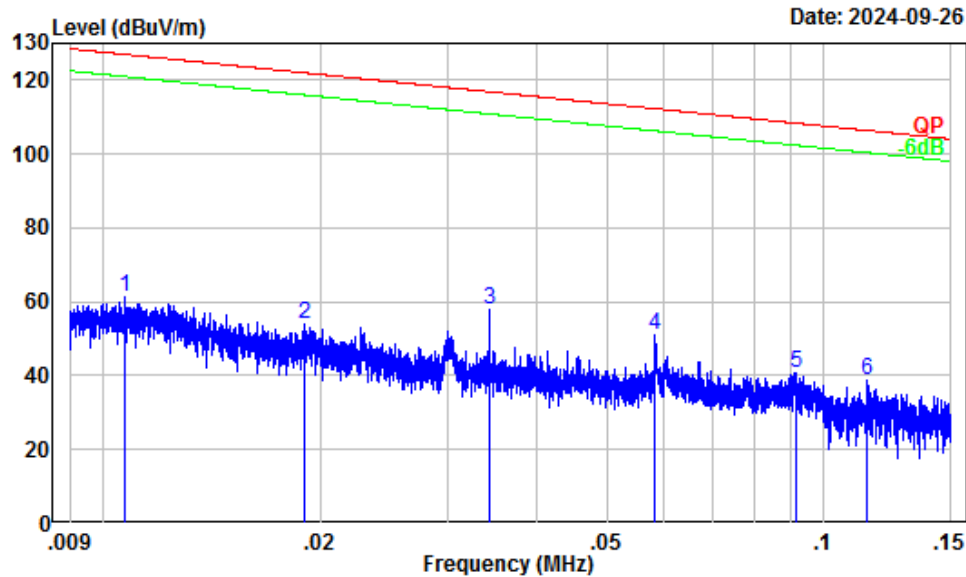
Temperature:	22~25.3 °C
Relative Humidity:	53~54 %
ATM Pressure:	101 kPa

The testing was performed by Anson Su on 2024-09-26 for below 1GHz and Dylan Yang from 2024-11-18 to 2024-11-19 for above 1GHz.

EUT operation mode: Transmitting

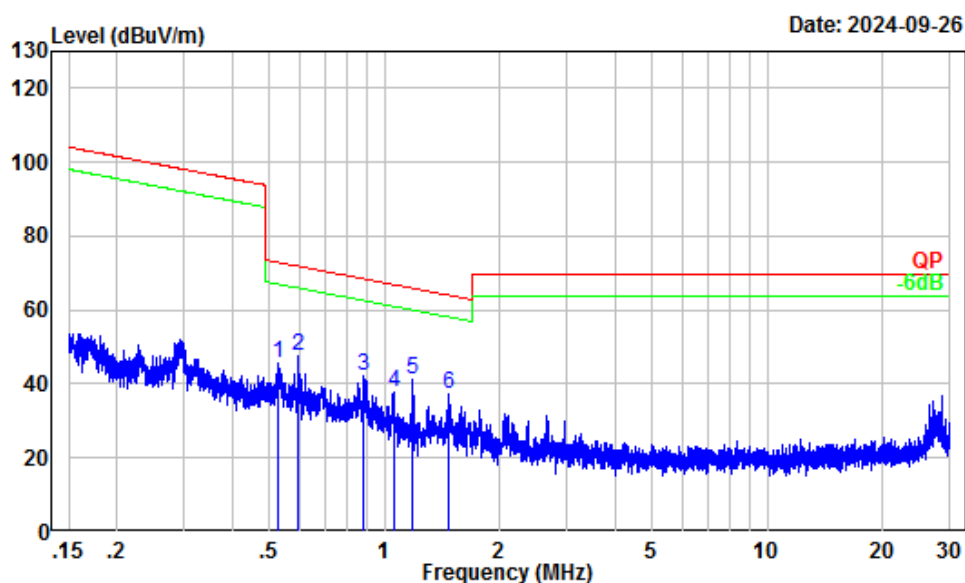
9 kHz-30MHz: (Maximum output power mode, 802.11g Middle channel)

Parallel was the worst case



Site : Chamber A
Condition : 3m
Project Number: 2401W69167E-RF
Test Mode : 2.4G WIFI Transmitting
Tester : Anson Su

	Freq	Factor	Read Level	Level	Limit	Over Limit	Remark
	MHz	dB/m	dBuV	dBuV/m	dBuV/m	dB	
1	0.01	37.32	24.17	61.49	127.00	-65.51	Peak
2	0.02	33.09	20.76	53.85	122.02	-68.17	Peak
3	0.03	26.51	31.44	57.95	116.87	-58.92	Peak
4	0.06	21.94	28.98	50.92	112.28	-61.36	Peak
5	0.09	17.91	23.03	40.94	108.40	-67.46	Peak
6	0.11	16.36	22.36	38.72	106.41	-67.69	Peak

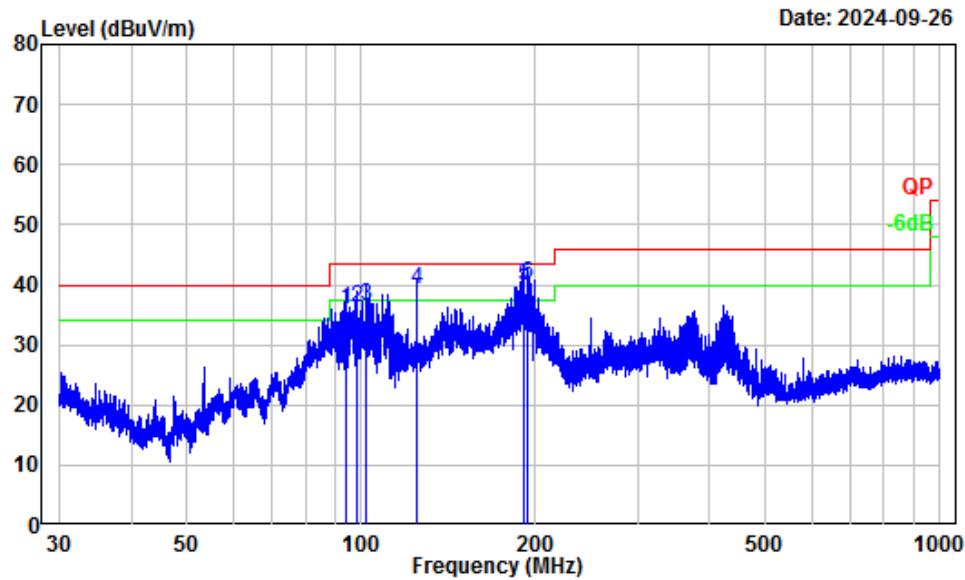


Site : Chamber A
 Condition : 3m
 Project Number: 2401W69167E-RF
 Test Mode : 2.4G WIFI Transmitting
 Tester : Anson Su

	Freq	Factor	Read Level	Level	Limit Line	Over Limit	Remark
	MHz	dB/m	dBuV	dBuV/m	dBuV/m	dB	
1	0.53	3.14	42.30	45.44	73.13	-27.69	Peak
2	0.59	2.36	45.02	47.38	72.09	-24.71	Peak
3	0.88	-0.73	42.84	42.11	68.56	-26.45	Peak
4	1.06	-1.79	39.62	37.83	66.98	-29.15	Peak
5	1.18	-2.23	43.35	41.12	65.98	-24.86	Peak
6	1.48	-3.25	40.38	37.13	64.01	-26.88	Peak

30MHz-1GHz: (Maximum output power mode, 802.11g Middle channel)

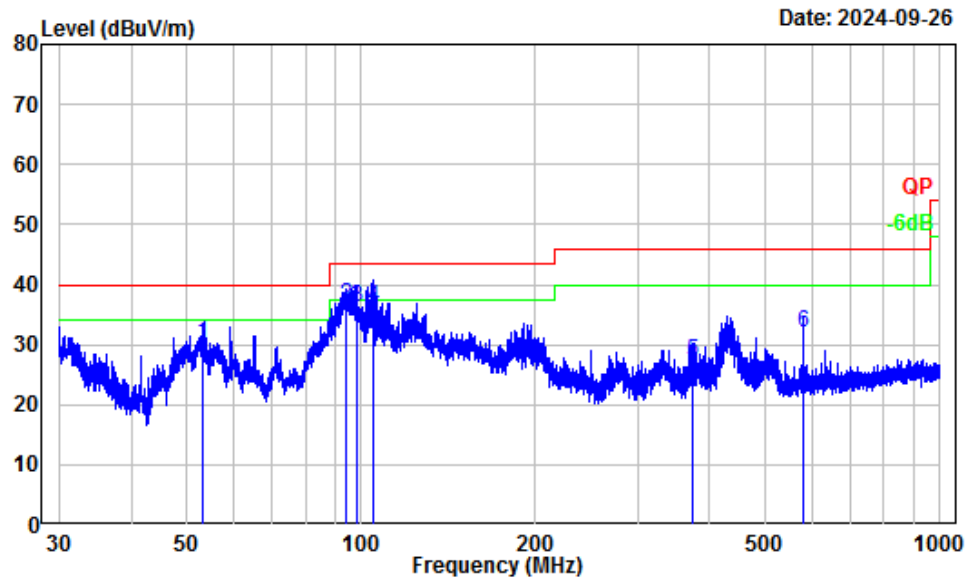
Horizontal



Site : Chamber A
Condition : 3m Horizontal
Project Number: 2401W69167E-RF
Test Mode : 2.4G WIFI Transmitting
Tester : Anson Su

		Read		Limit	Over	Remark
Freq Factor		Level	Level	Line	Limit	
MHz	dB/m	dBuV	dBuV/m	dBuV/m	dB	
1	94.30 -17.47	53.30	35.83	43.50	-7.67	QP
2	98.44 -16.38	52.71	36.33	43.50	-7.17	QP
3	101.91 -15.40	51.80	36.40	43.50	-7.10	QP
4	125.01 -11.12	50.49	39.37	43.50	-4.13	QP
5	191.24 -14.06	54.00	39.94	43.50	-3.56	QP
6	194.03 -13.80	54.00	40.20	43.50	-3.30	QP

Vertical



Site : Chamber A
Condition : 3m Vertical
Project Number: 2401W69167E-RF
Test Mode : 2.4G WIFI Transmitting
Tester : Anson Su

	Freq Factor		Read Level	Level	Limit Line	Over Limit	Remark
	MHz	dB/m	dBuV	dBuV/m	dBuV/m	dB	
1	53.36	-18.32	48.50	30.18	40.00	-9.82	QP
2	94.39	-17.45	53.99	36.54	43.50	-6.96	QP
3	98.40	-16.39	52.62	36.23	43.50	-7.27	QP
4	104.77	-14.49	50.80	36.31	43.50	-7.19	QP
5	374.95	-9.29	36.49	27.20	46.00	-18.80	QP
6	580.19	-5.26	37.19	31.93	46.00	-14.07	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/AV					
802.11b							
Low Channel 2412MHz							
4824.00	52.19	PK	H	2.45	54.64	74	-19.36
4824.00	46.49	AV	H	2.45	48.94	54	-5.06
4824.00	52.15	PK	V	2.45	54.60	74	-19.40
4824.00	47.83	AV	V	2.45	50.28	54	-3.72
Middle Channel 2437MHz							
4874.00	52.47	PK	H	2.56	55.03	74	-18.97
4874.00	46.92	AV	H	2.56	49.48	54	-4.52
4874.00	53.55	PK	V	2.56	56.11	74	-17.89
4874.00	48.28	AV	V	2.56	50.84	54	-3.16
High Channel 2462MHz							
4924.00	53.78	PK	H	2.63	56.41	74	-17.59
4924.00	48.11	AV	H	2.63	50.74	54	-3.26
4924.00	54.98	PK	V	2.63	57.61	74	-16.39
4924.00	48.35	AV	V	2.63	50.98	54	-3.02
802.11g							
Low Channel 2412MHz							
4824.00	54.15	PK	H	2.45	56.60	74	-17.40
4824.00	41.35	AV	H	2.45	43.80	54	-10.20
4824.00	48.96	PK	V	2.45	51.41	74	-22.59
4824.00	36.04	AV	V	2.45	38.49	54	-15.51
Middle Channel 2437MHz							
4874.00	55.03	PK	H	2.56	57.59	74	-16.41
4874.00	41.50	AV	H	2.56	44.06	54	-9.94
4874.00	48.74	PK	V	2.56	51.30	74	-22.70
4874.00	36.79	AV	V	2.56	39.35	54	-14.65
High Channel 2462MHz							
4924.00	55.58	PK	H	2.63	58.21	74	-15.79
4924.00	43.02	AV	H	2.63	45.65	54	-8.35
4924.00	50.06	PK	V	2.63	52.69	74	-21.31
4924.00	37.27	AV	V	2.63	39.90	54	-14.10

Frequency (MHz)	Receiver		Polar (H/V)	Factor (dB/m)	Corrected Amplitude (dBμV/m)	Limit (dBμV/m)	Margin (dB)
	Reading (dBμV)	PK/AV					
802.11n20							
Low Channel 2412MHz							
4824.00	56.88	PK	H	2.45	59.33	74	-14.67
4824.00	47.70	AV	H	2.45	50.15	54	-3.85
4824.00	49.57	PK	V	2.45	52.02	74	-21.98
4824.00	41.56	AV	V	2.45	44.01	54	-9.99
Middle Channel 2437MHz							
4874.00	56.51	PK	H	2.56	59.07	74	-14.93
4874.00	48.22	AV	H	2.56	50.78	54	-3.22
4874.00	50.80	PK	V	2.56	53.36	74	-20.64
4874.00	42.03	AV	V	2.56	44.59	54	-9.41
High Channel 2462MHz							
4924.00	57.92	PK	H	2.63	60.55	74	-13.45
4924.00	48.25	AV	H	2.63	50.88	54	-3.12
4924.00	51.20	PK	V	2.63	53.83	74	-20.17
4924.00	41.93	AV	V	2.63	44.56	54	-9.44
802.11n40							
Low Channel 2422MHz							
4844.00	52.65	PK	H	2.47	55.12	74	-18.88
4844.00	39.13	AV	H	2.47	41.60	54	-12.40
4844.00	46.71	PK	V	2.47	49.18	74	-24.82
4844.00	33.79	AV	V	2.47	36.26	54	-17.74
Middle Channel 2437MHz							
4874.00	52.18	PK	H	2.56	54.74	74	-19.26
4874.00	39.37	AV	H	2.56	41.93	54	-12.07
4874.00	48.24	PK	V	2.56	50.80	74	-23.20
4874.00	35.24	AV	V	2.56	37.80	54	-16.20
High Channel 2452MHz							
4904.00	53.02	PK	H	2.64	55.66	74	-18.34
4904.00	39.89	AV	H	2.64	42.53	54	-11.47
4904.00	48.74	PK	V	2.64	51.38	74	-22.62
4904.00	36.00	AV	V	2.64	38.64	54	-15.36

Note:

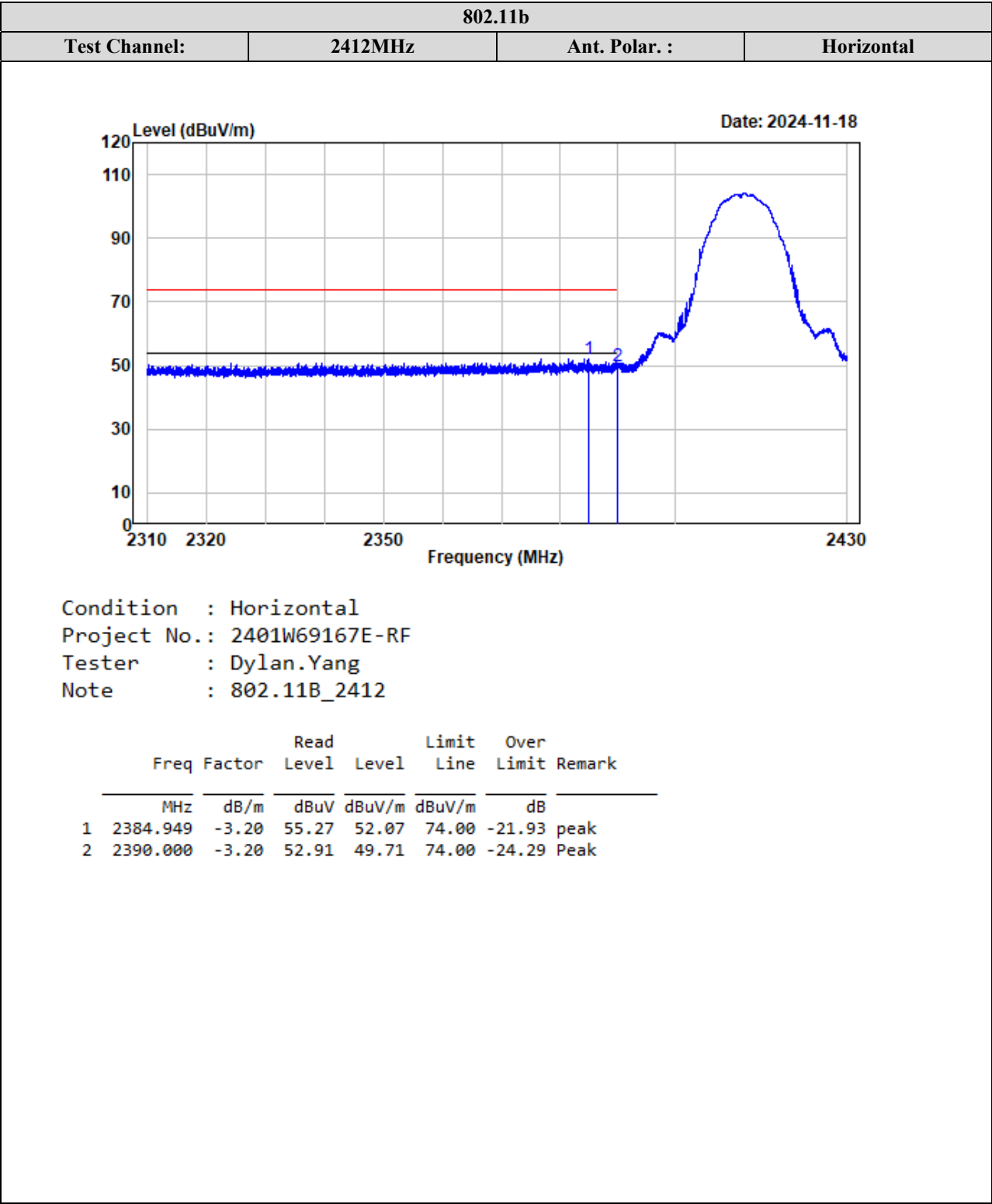
Factor = Antenna factor (RX) + Cable Loss – Amplifier Factor

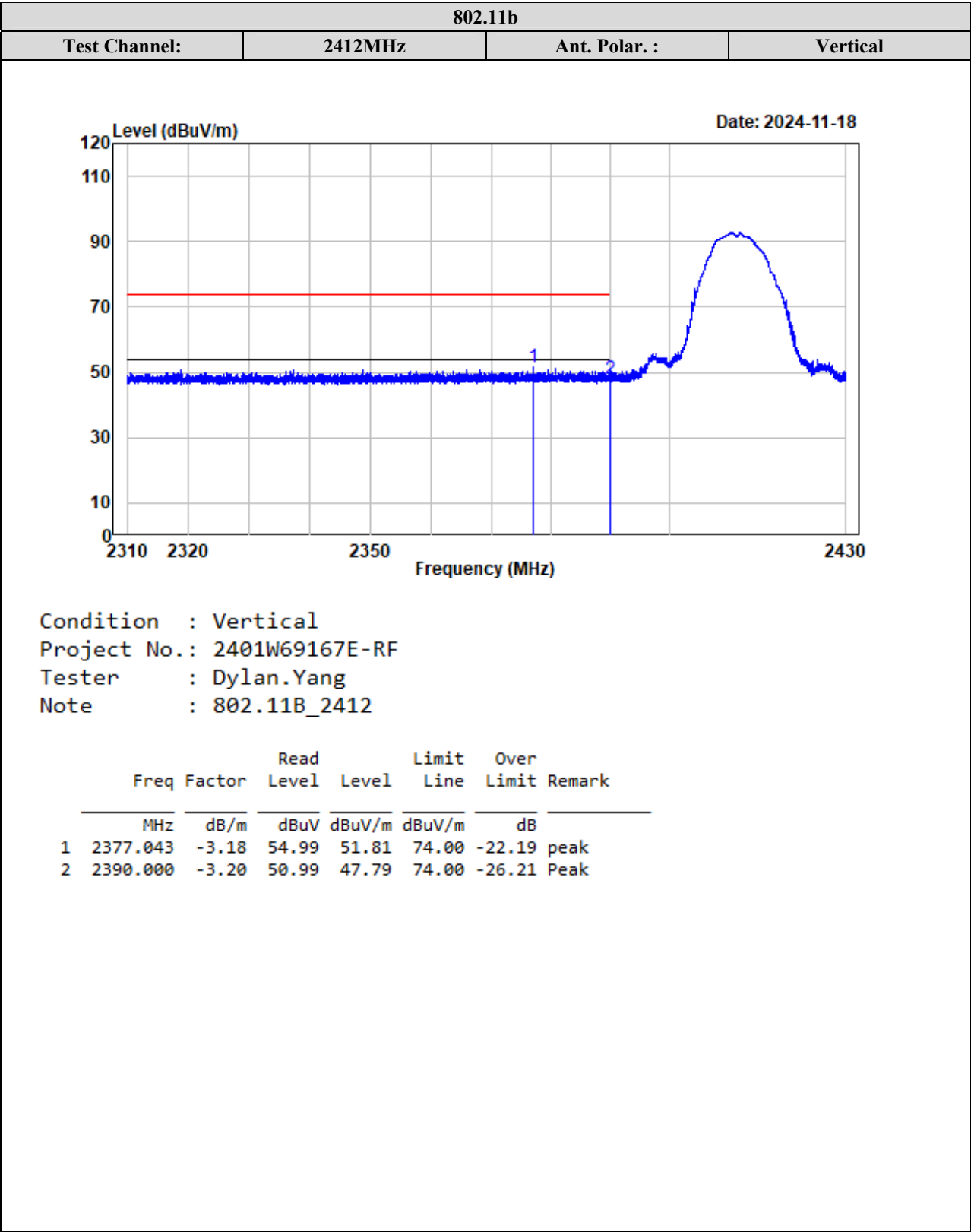
Corrected Amplitude = Factor + Reading

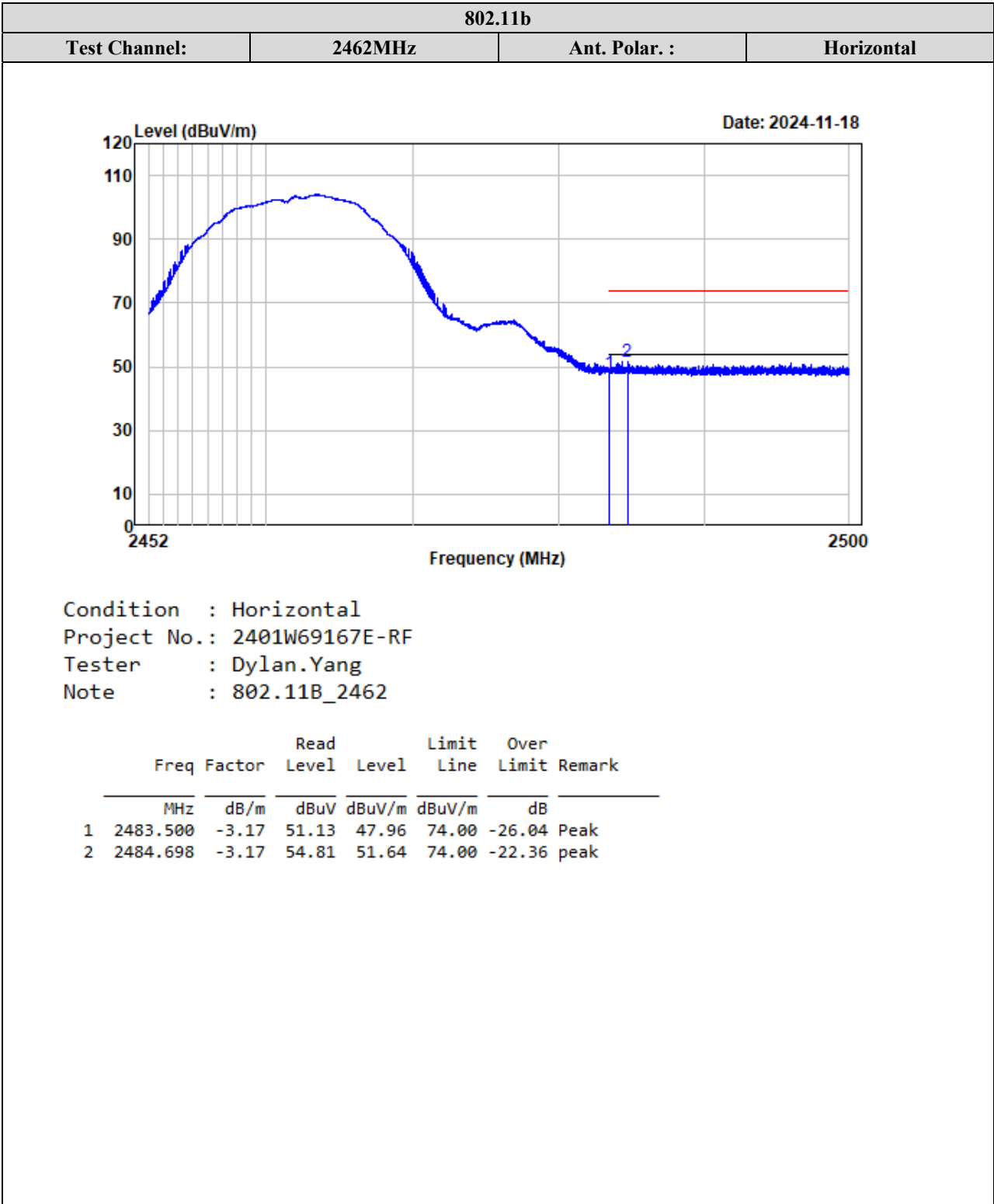
Margin = Corrected. Amplitude - Limit

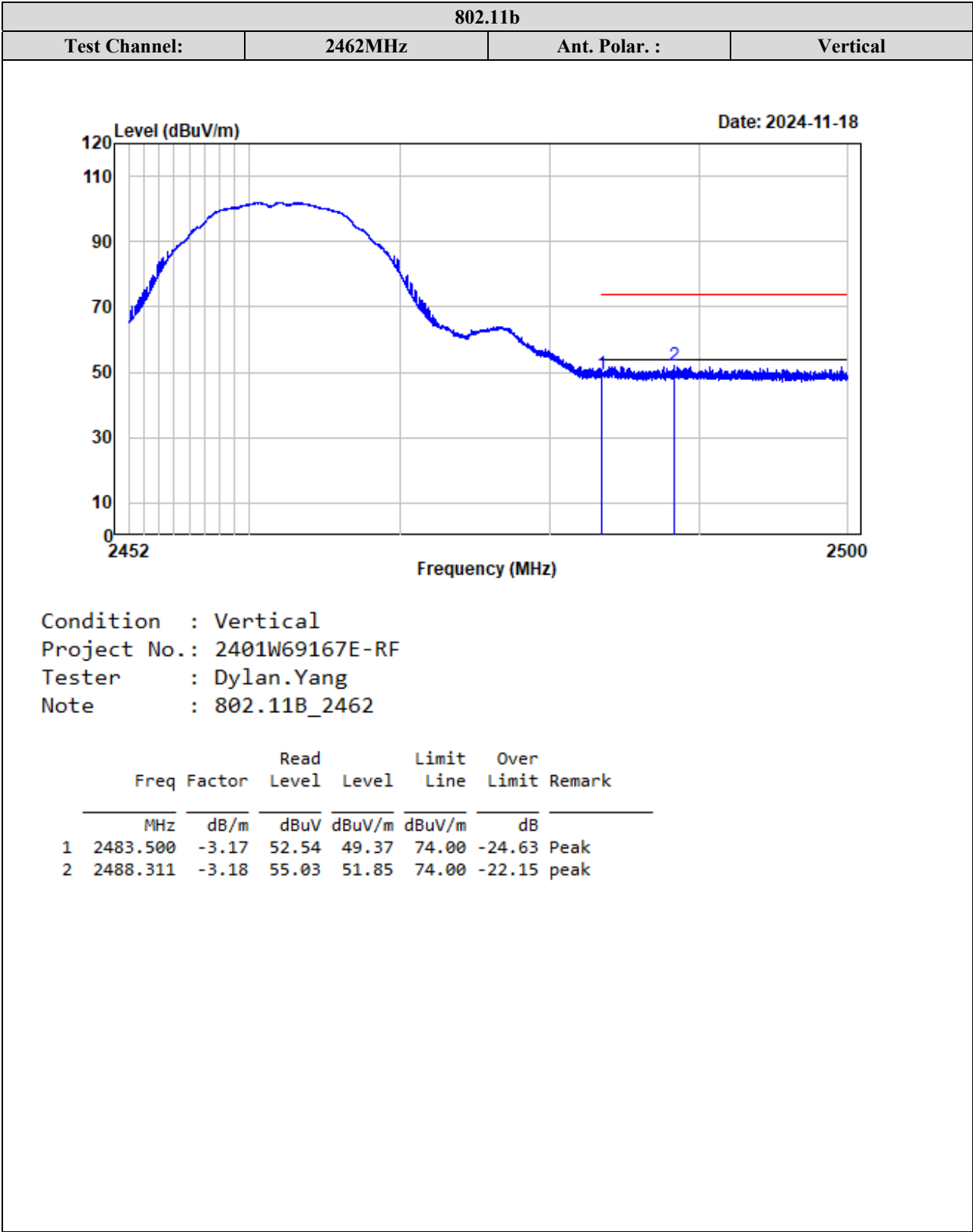
The other spurious emission which is in the noise floor level was not recorded.

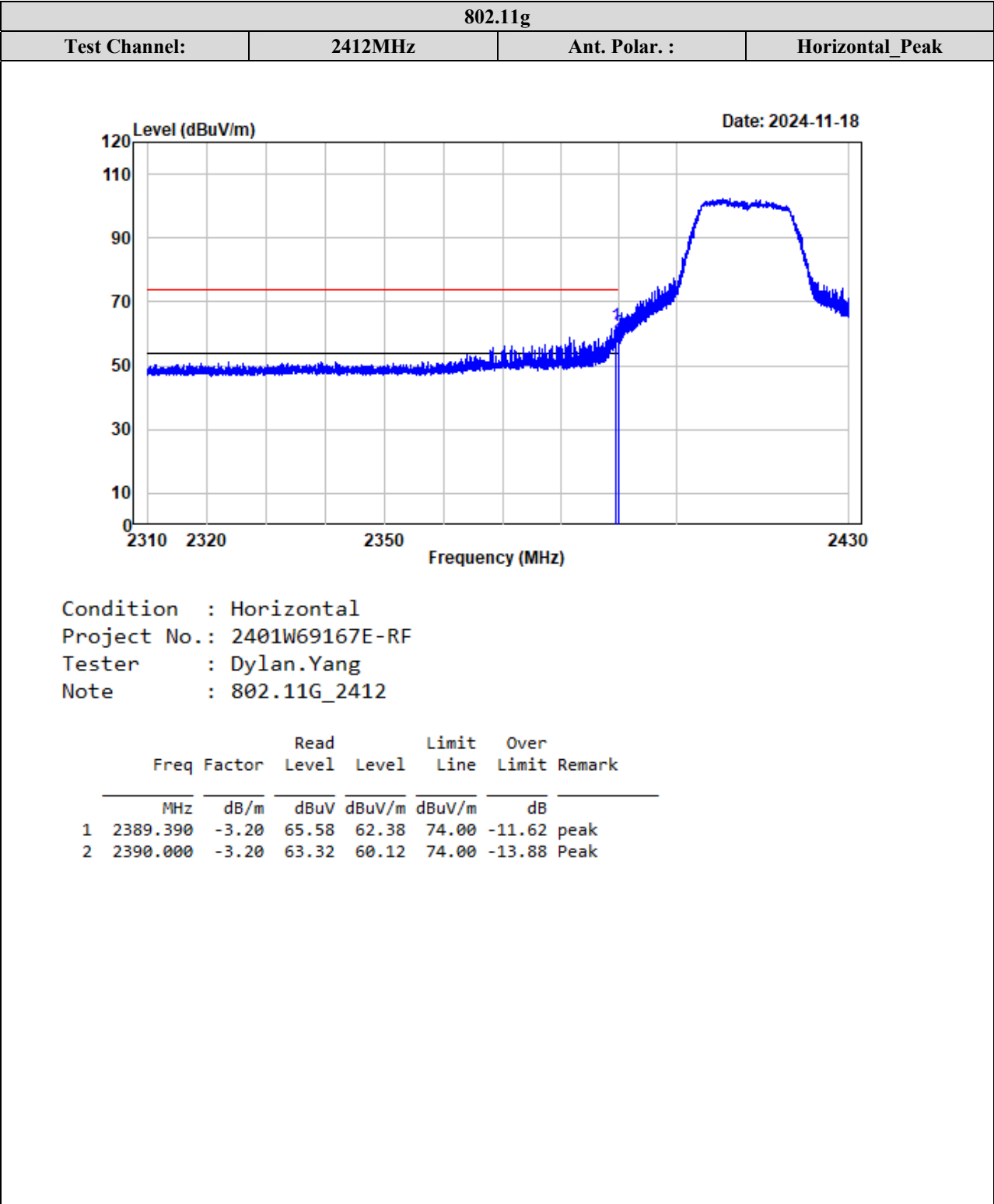
Test plots for Band Edge Measurements (Radiated):

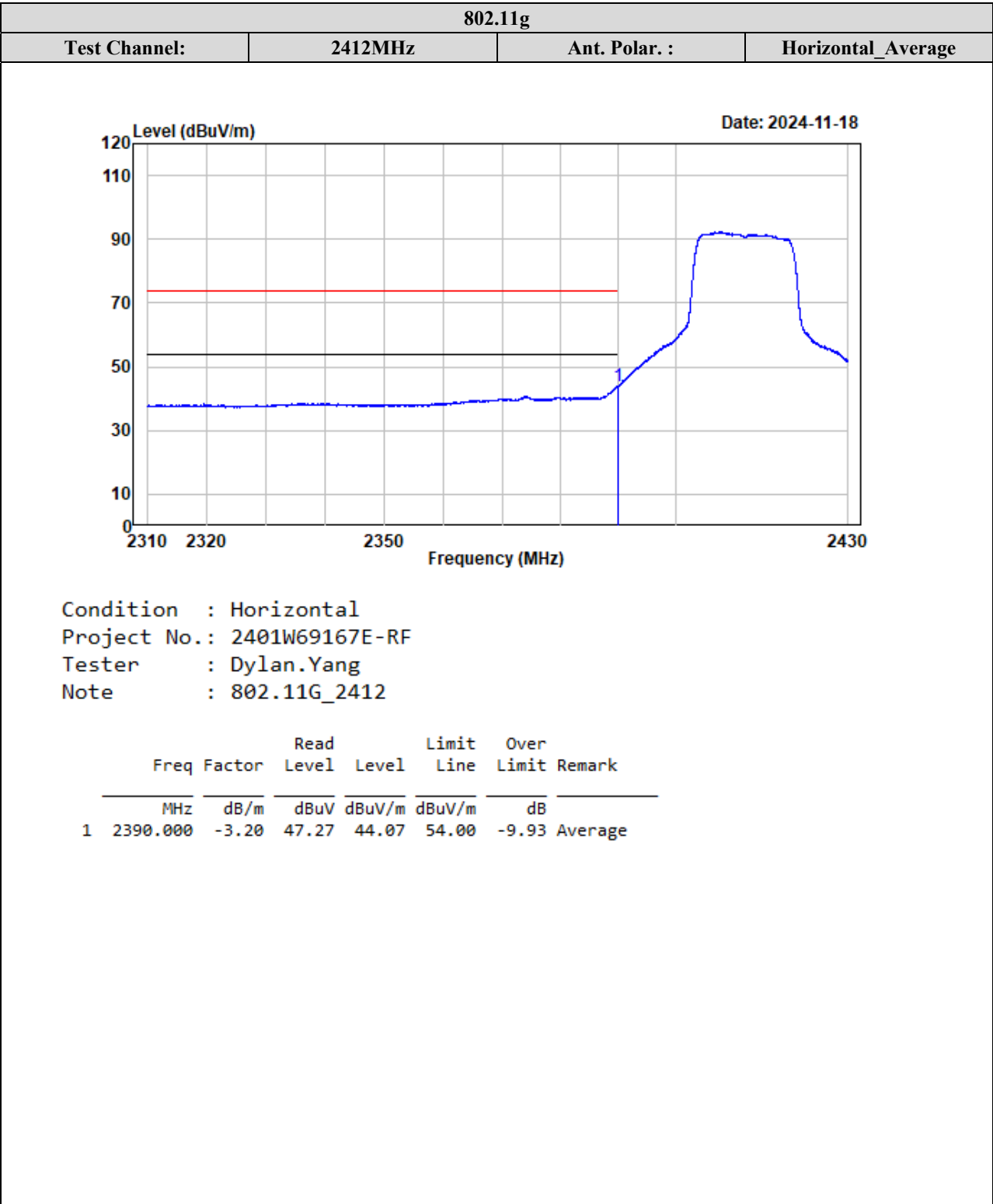


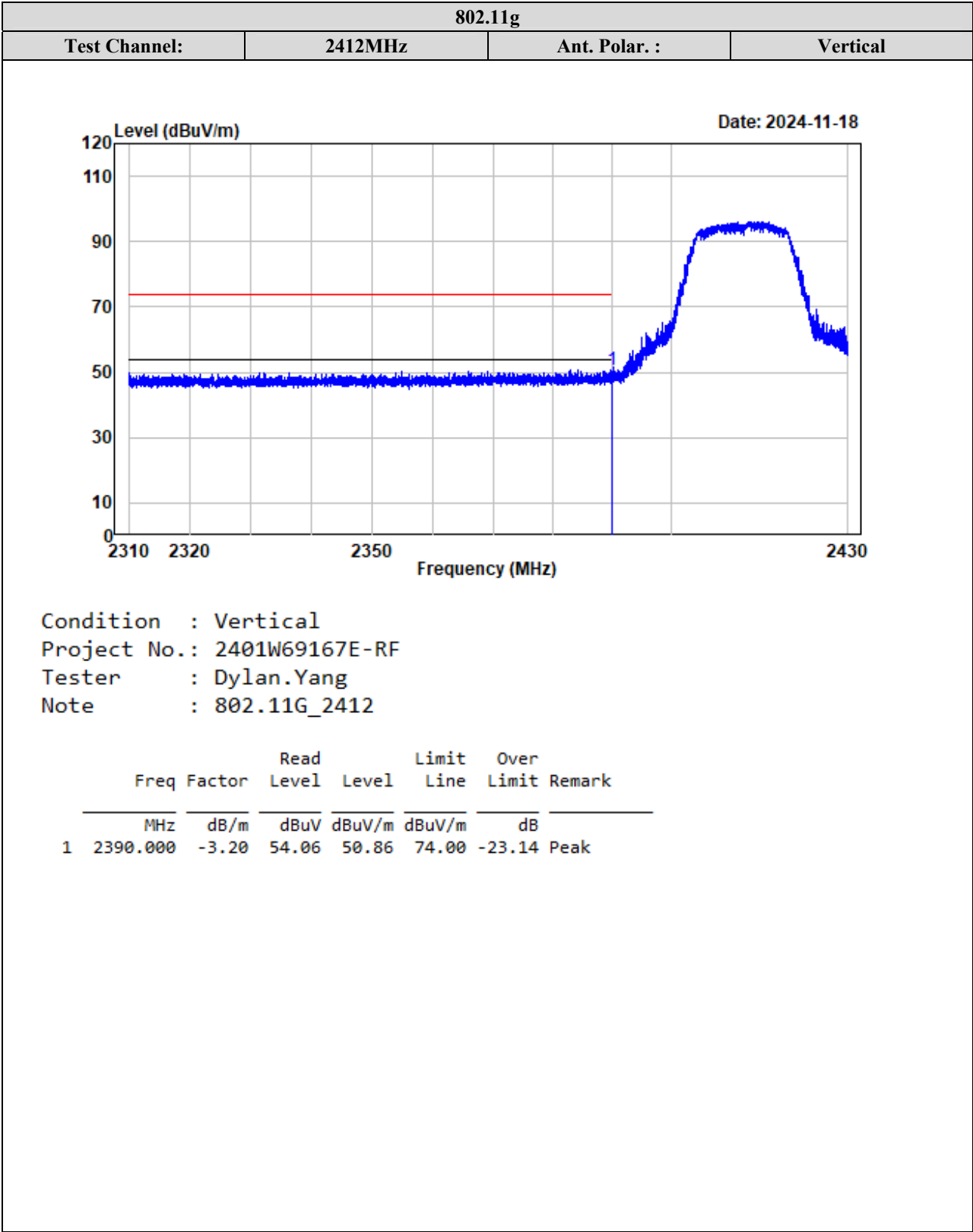


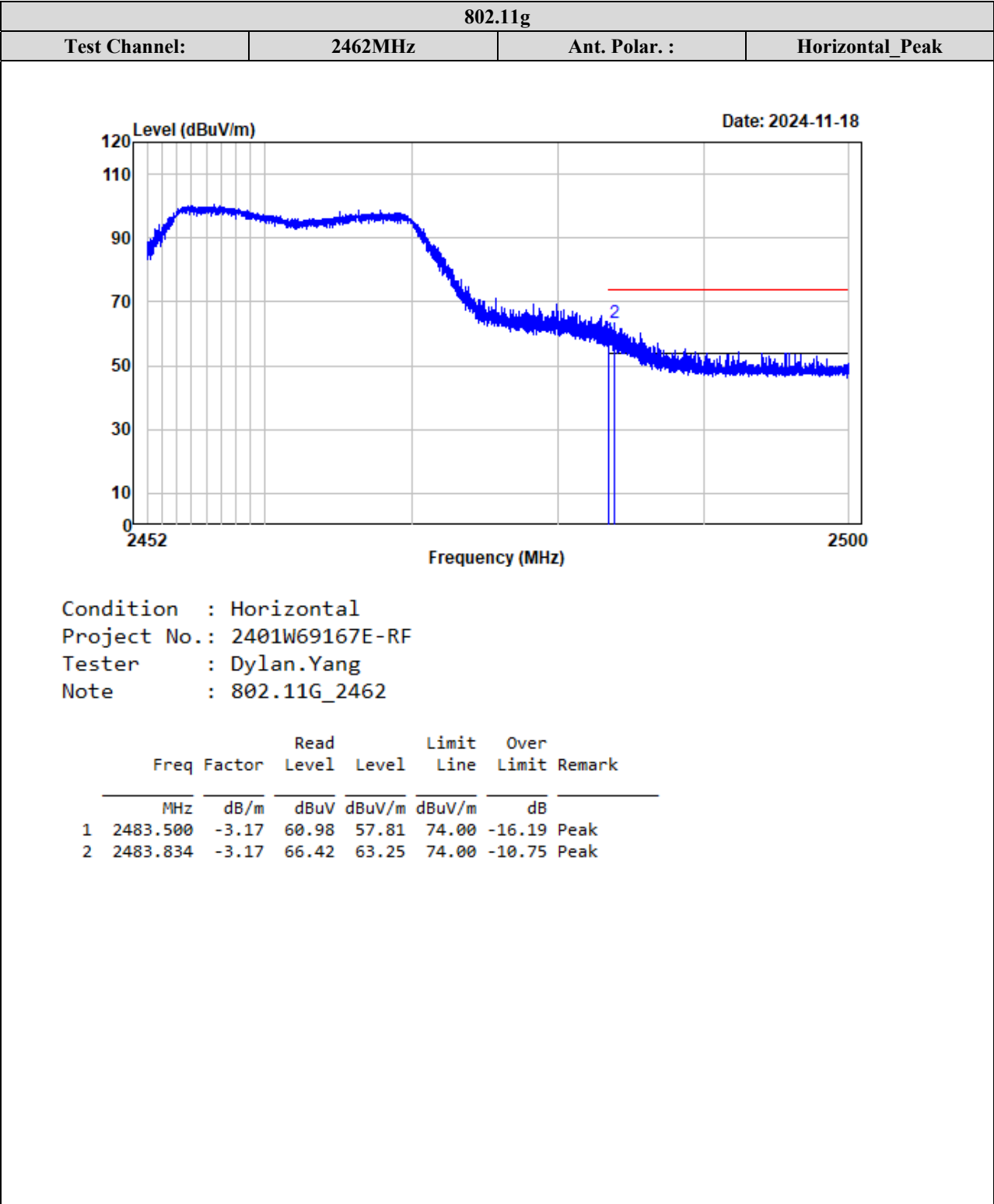


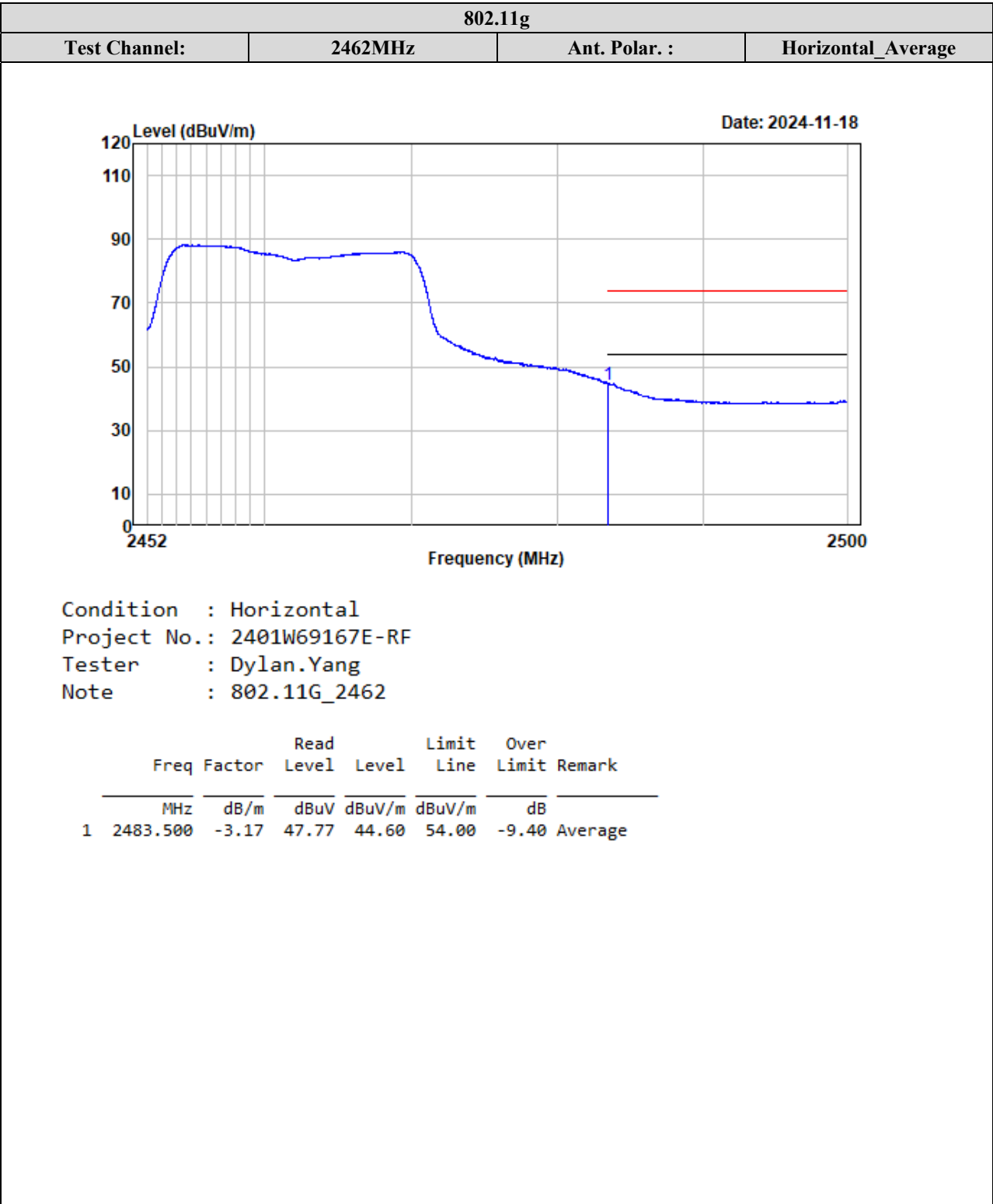


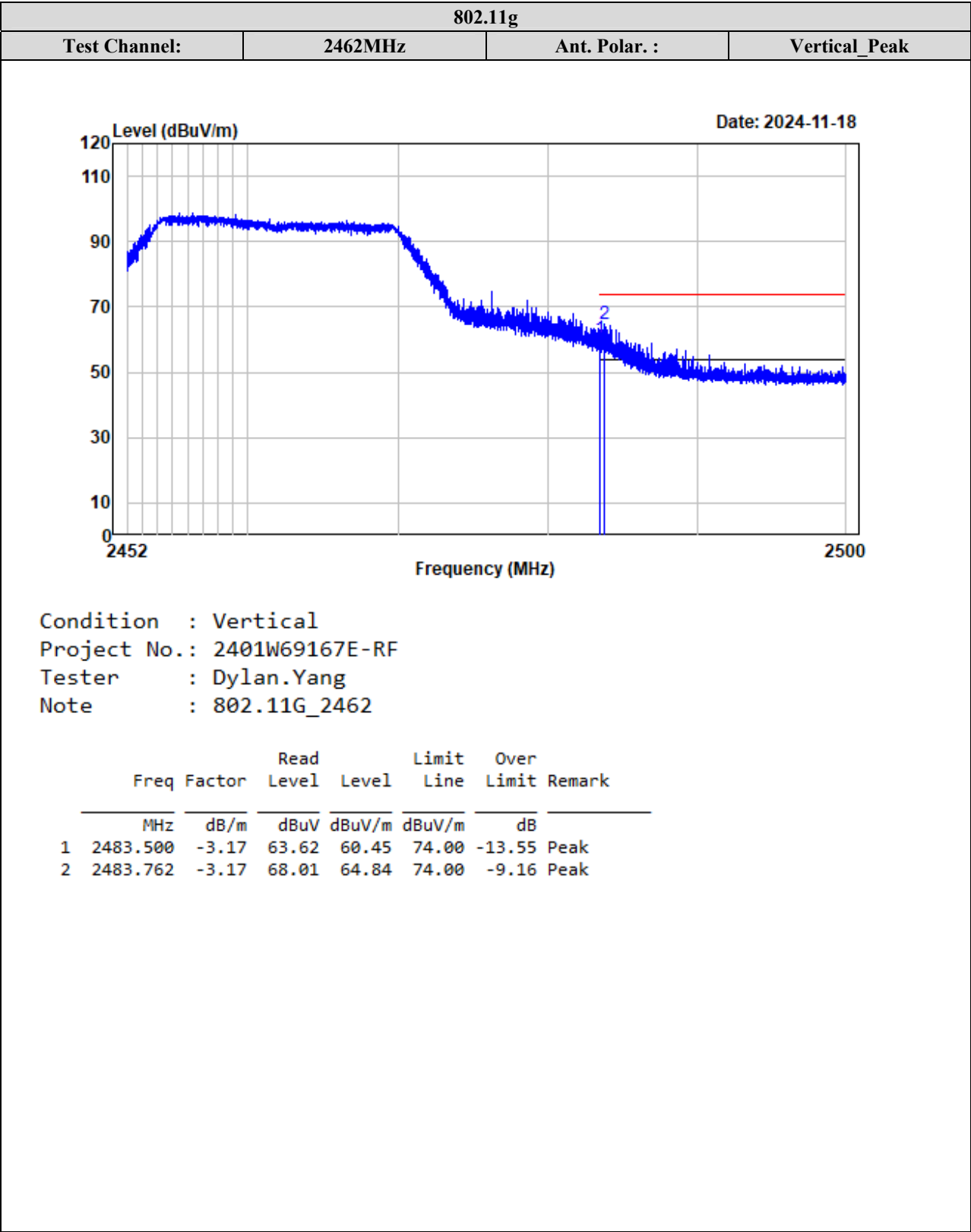


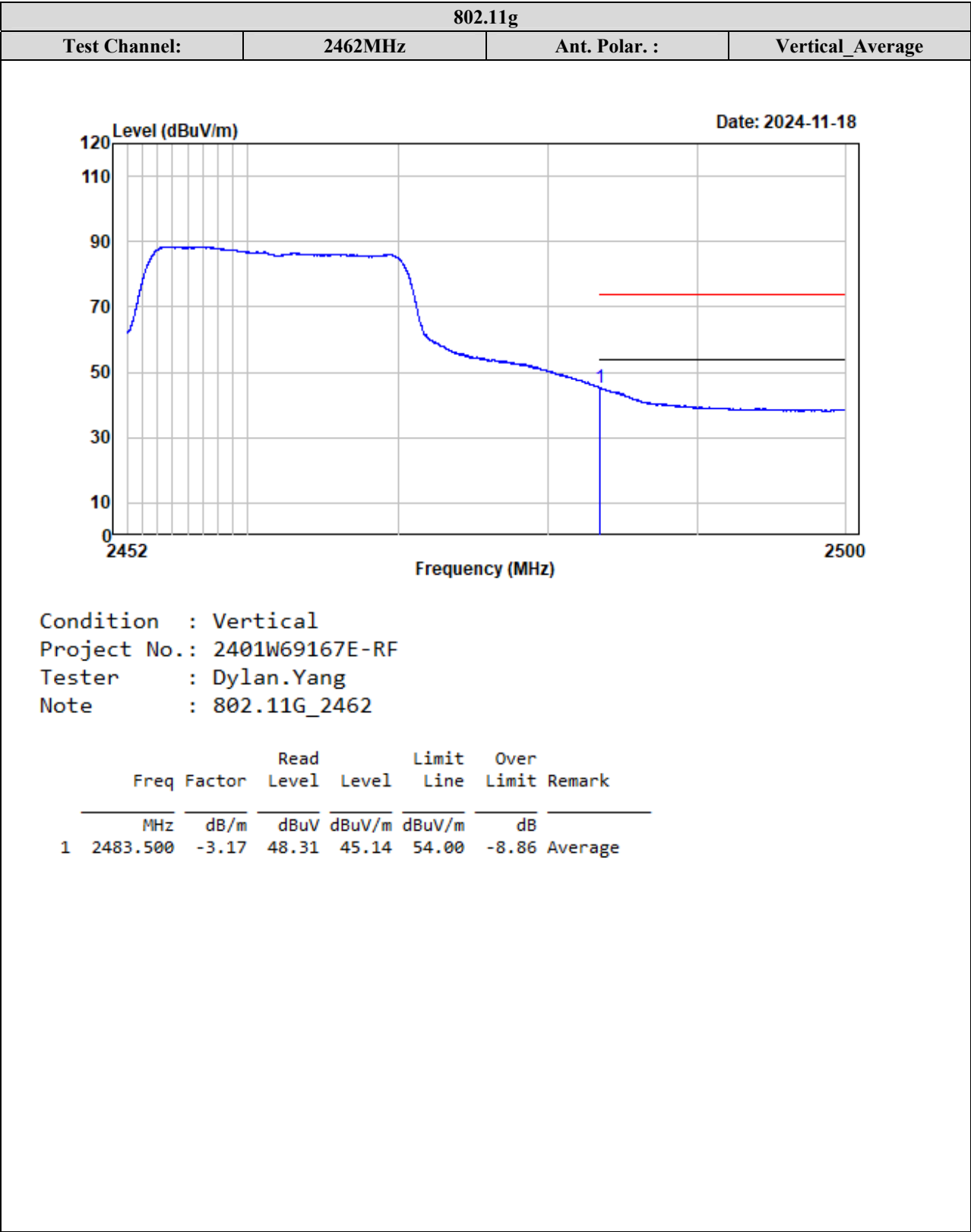


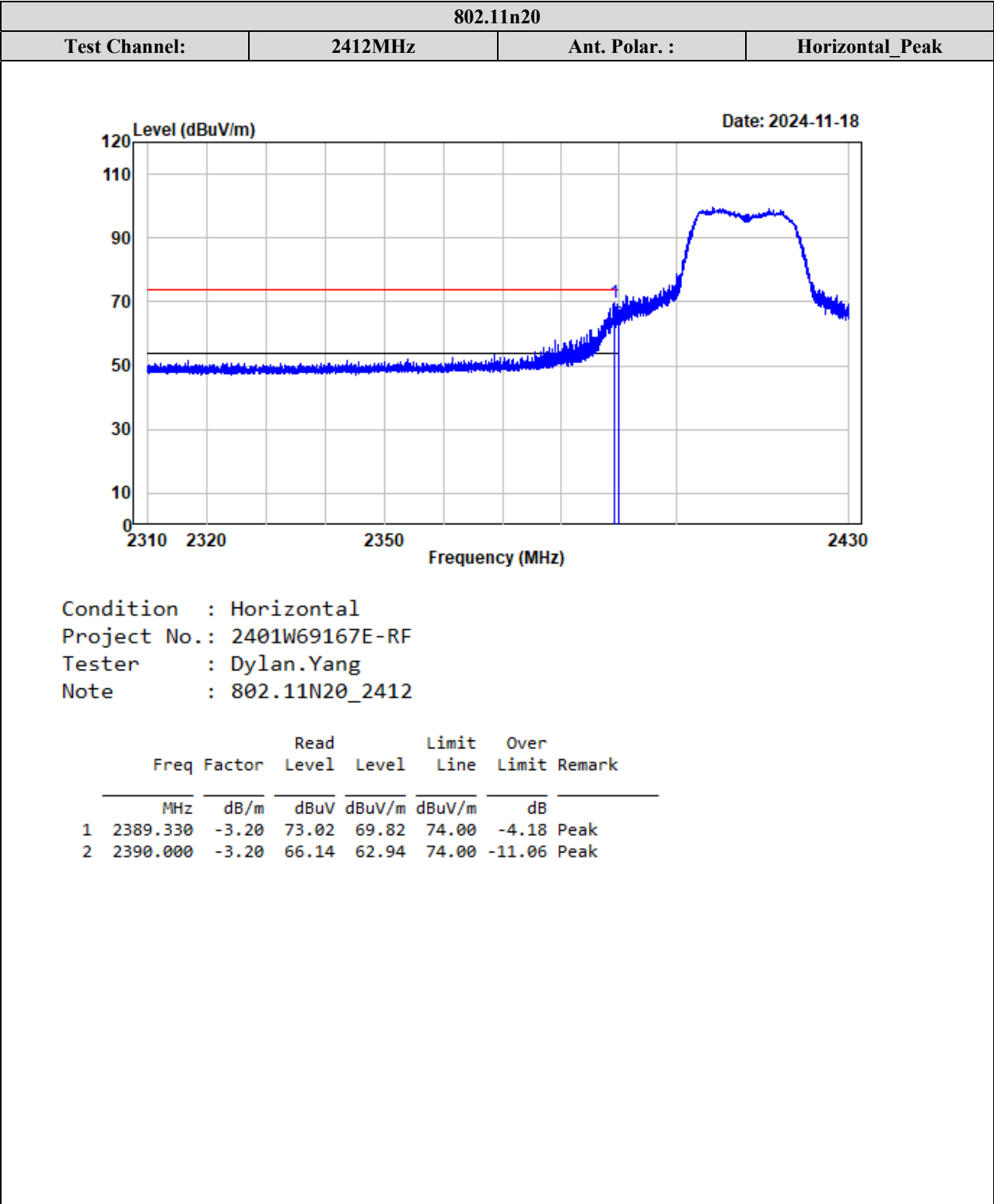


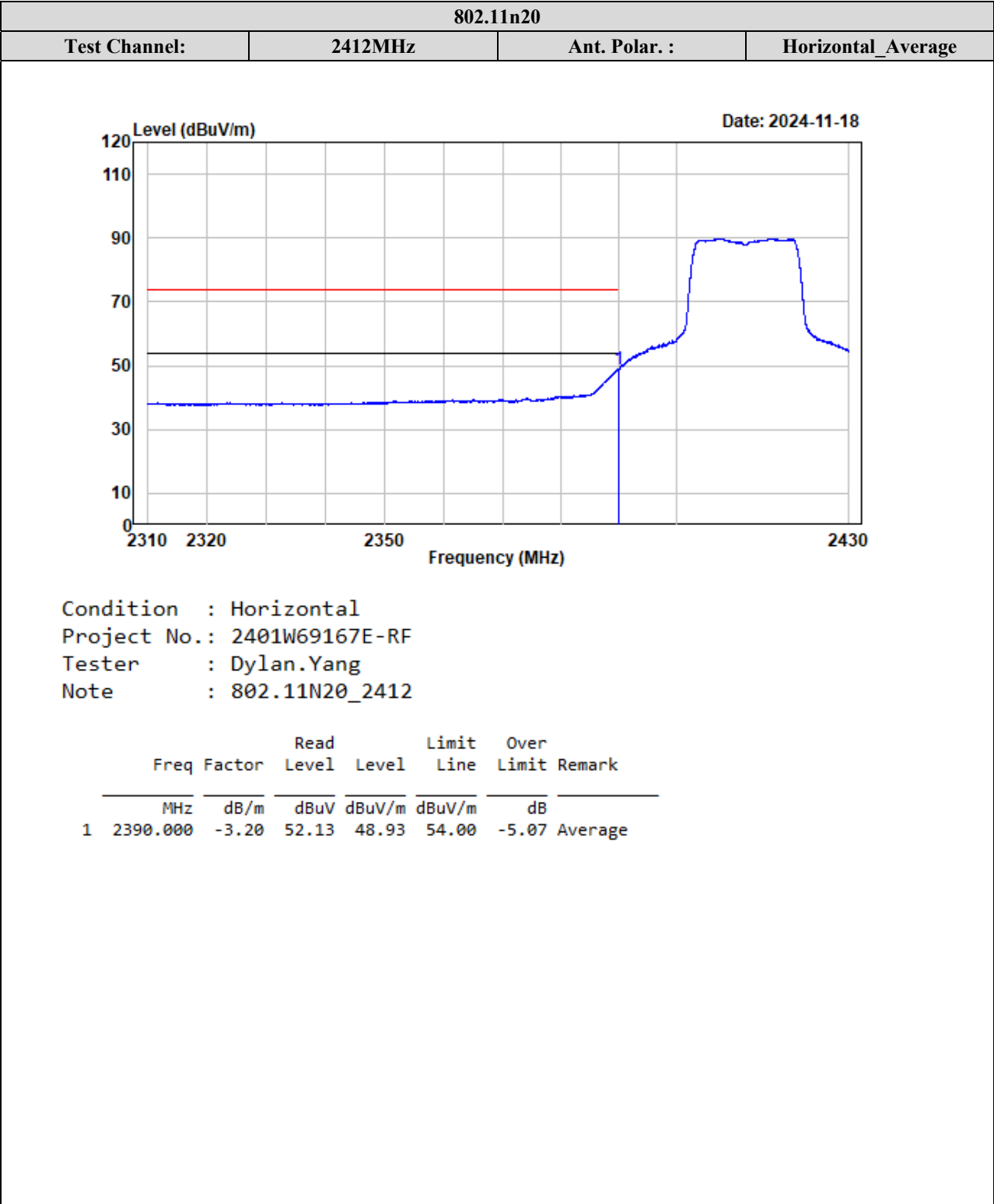


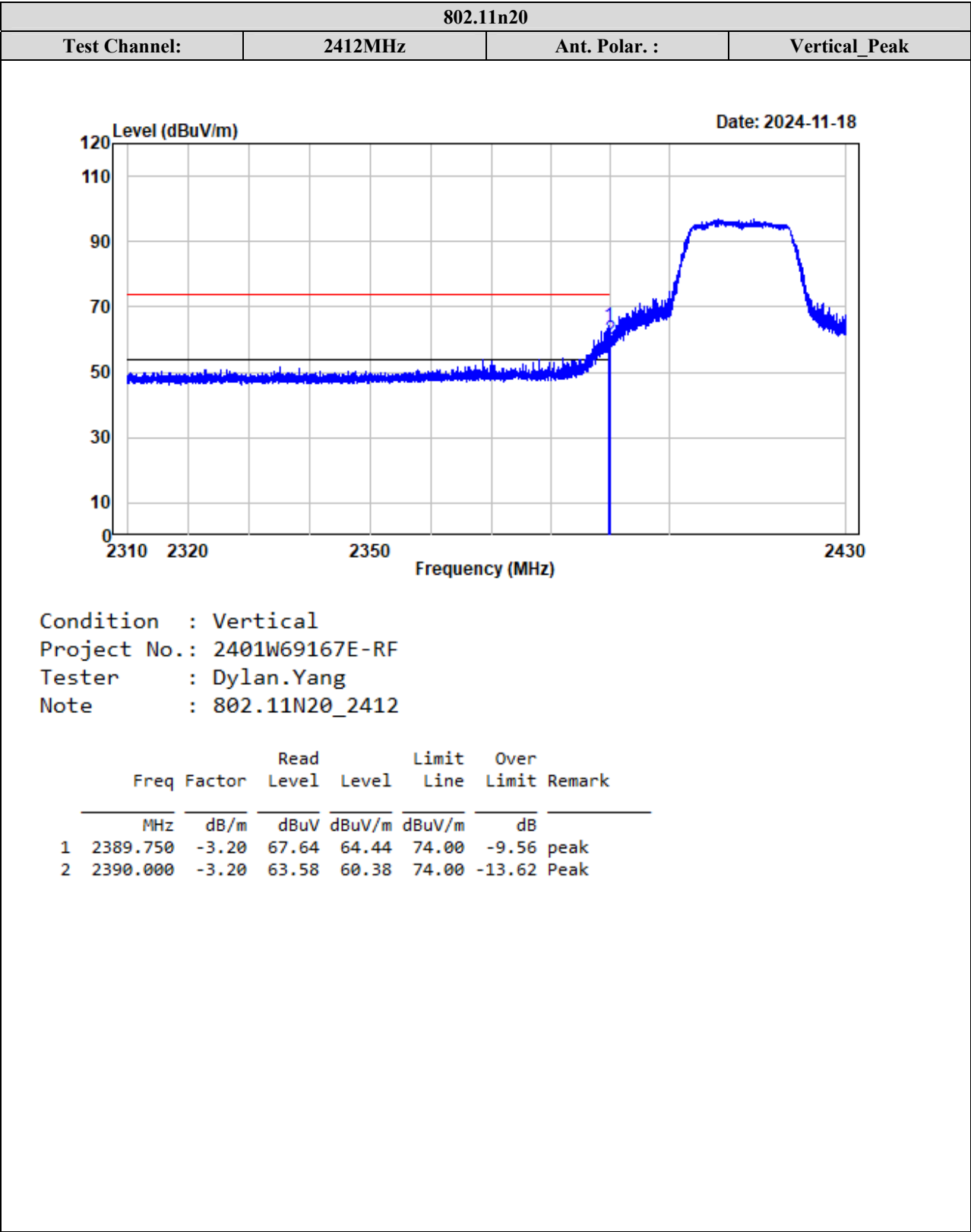


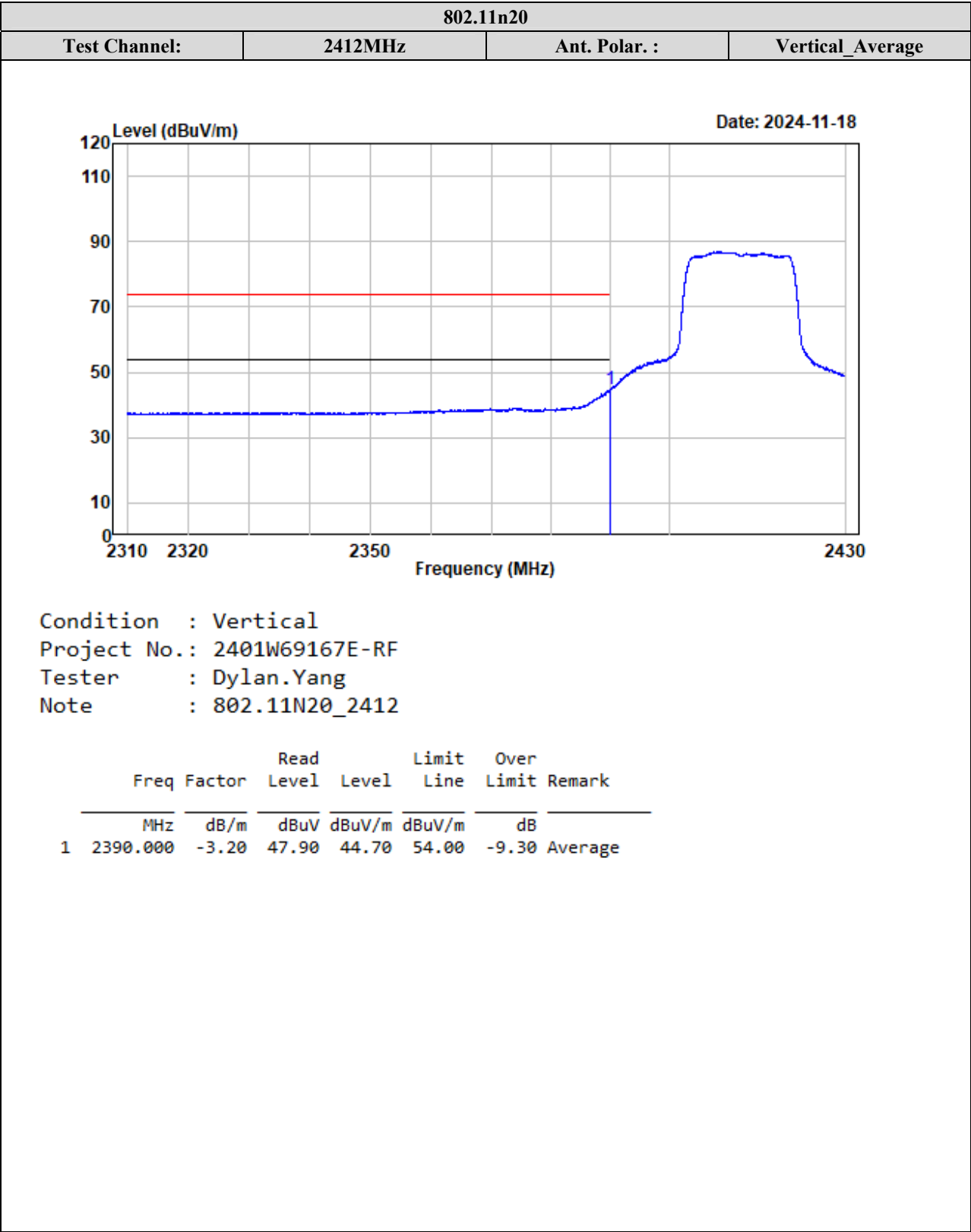


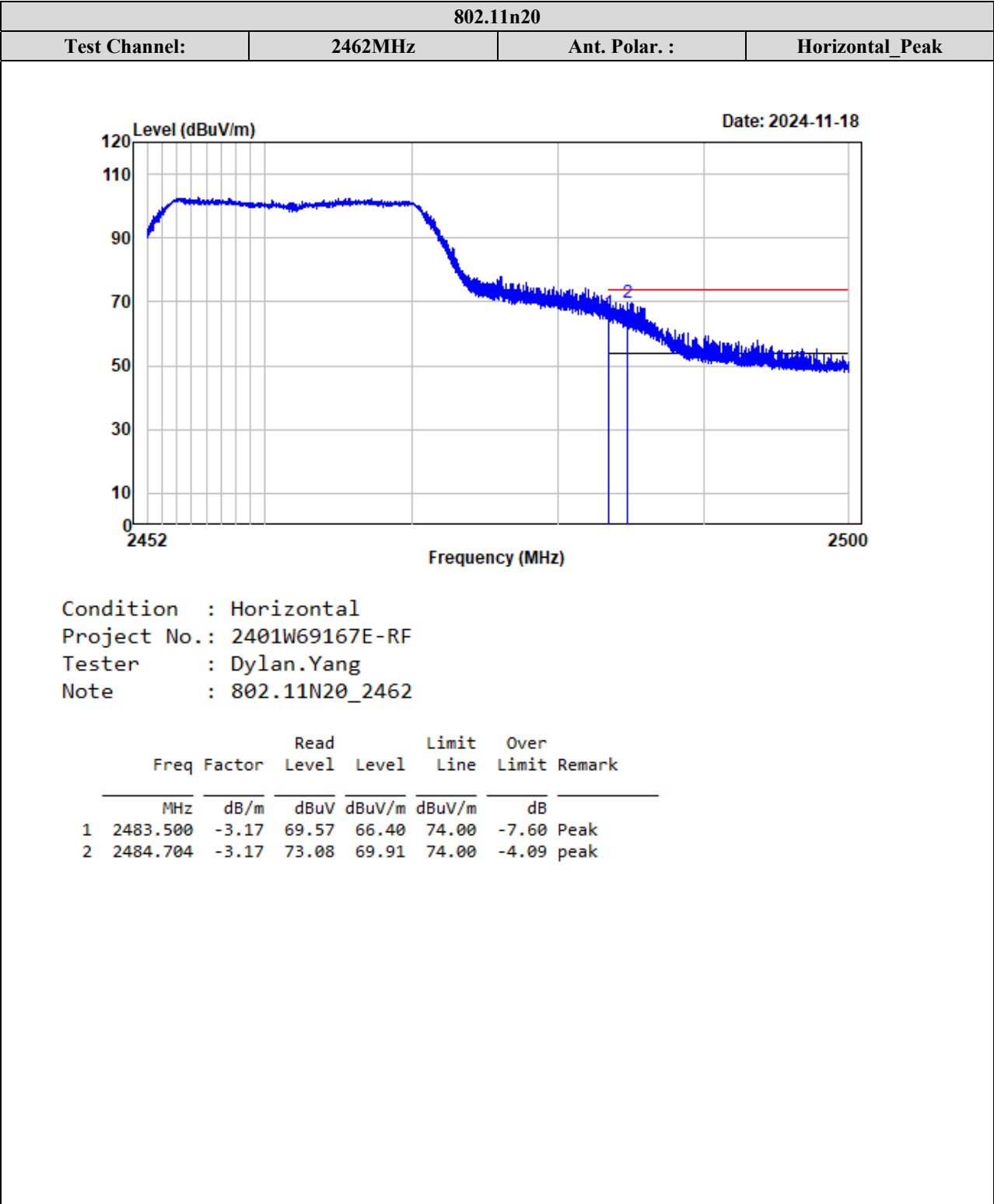


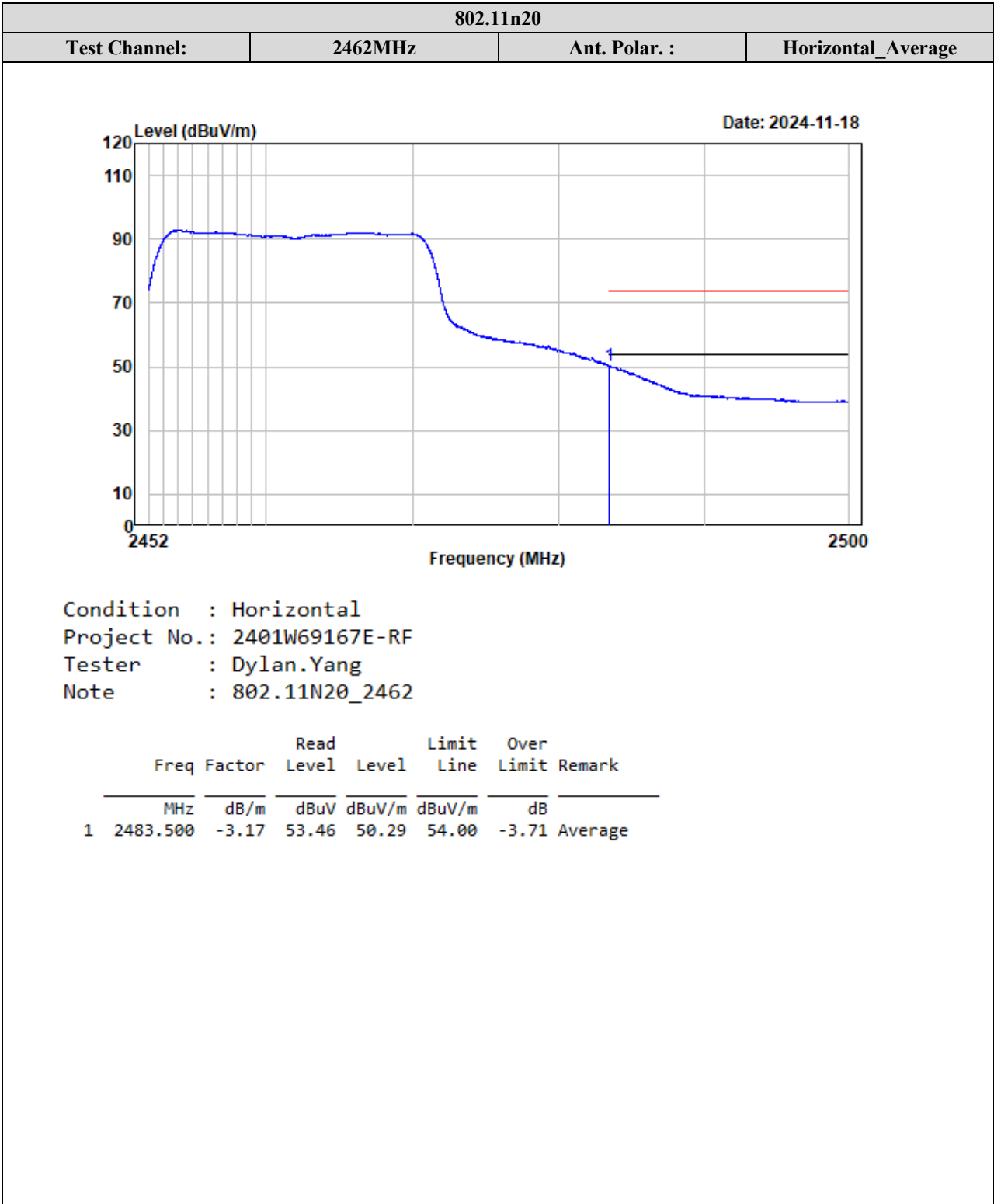


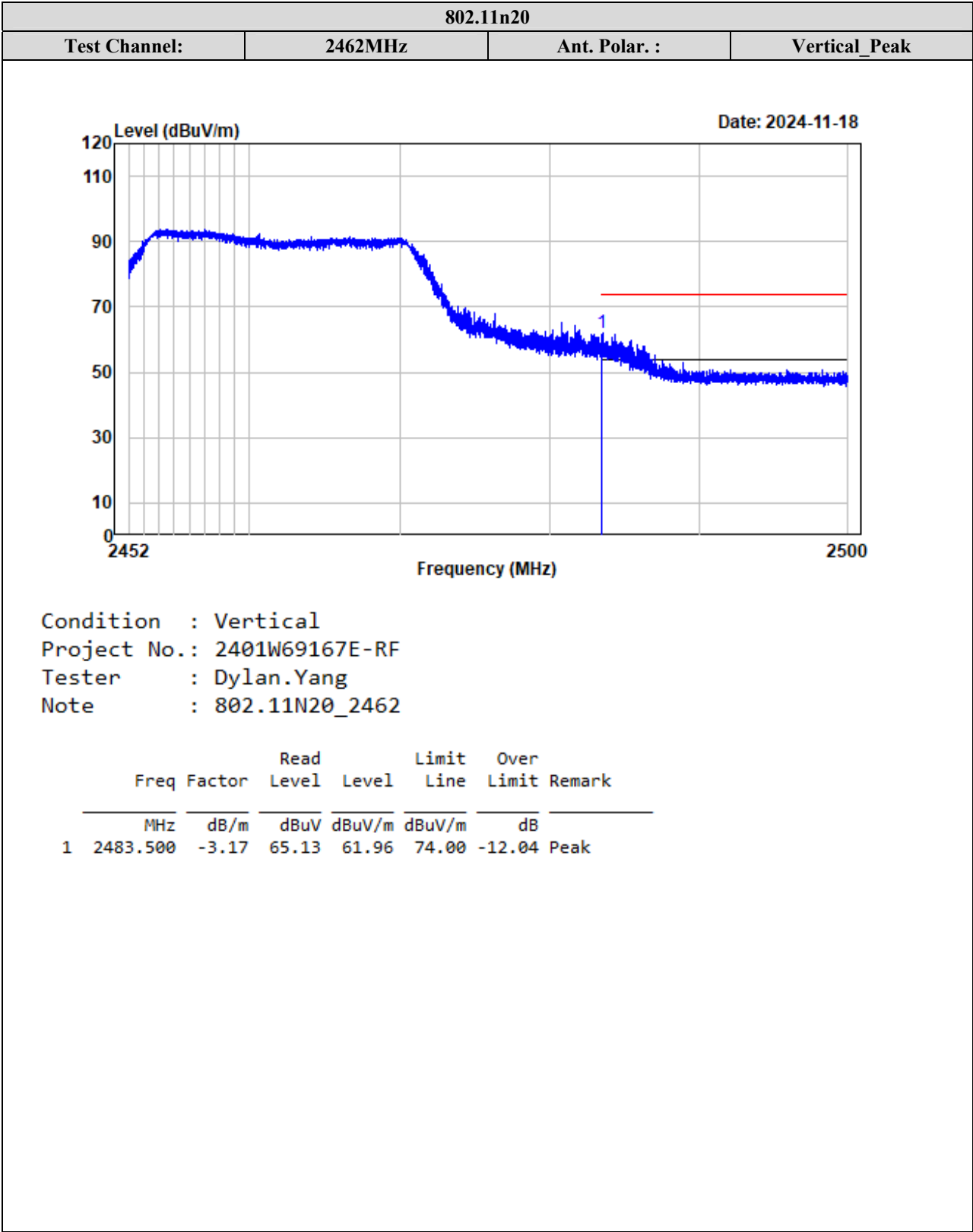


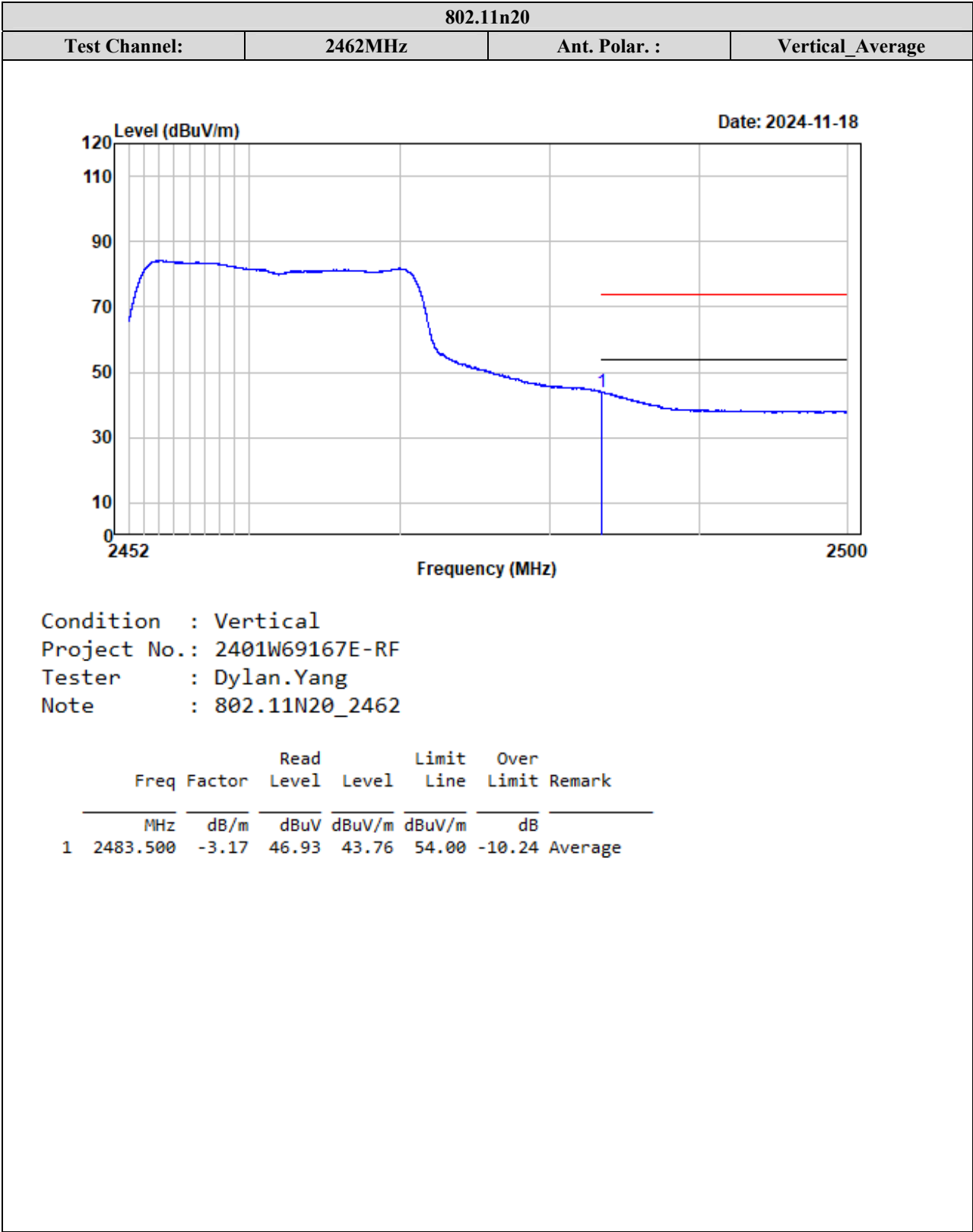


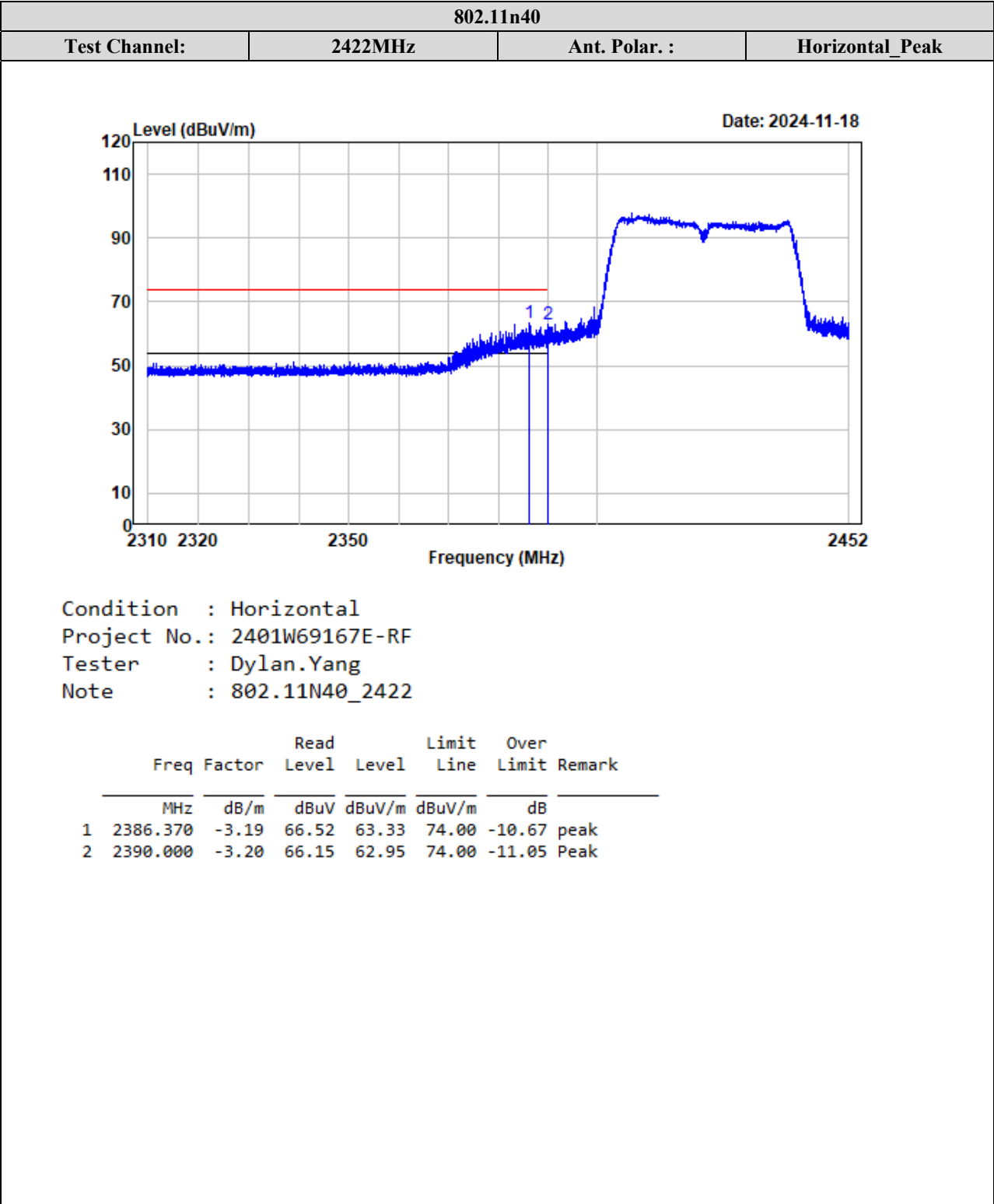


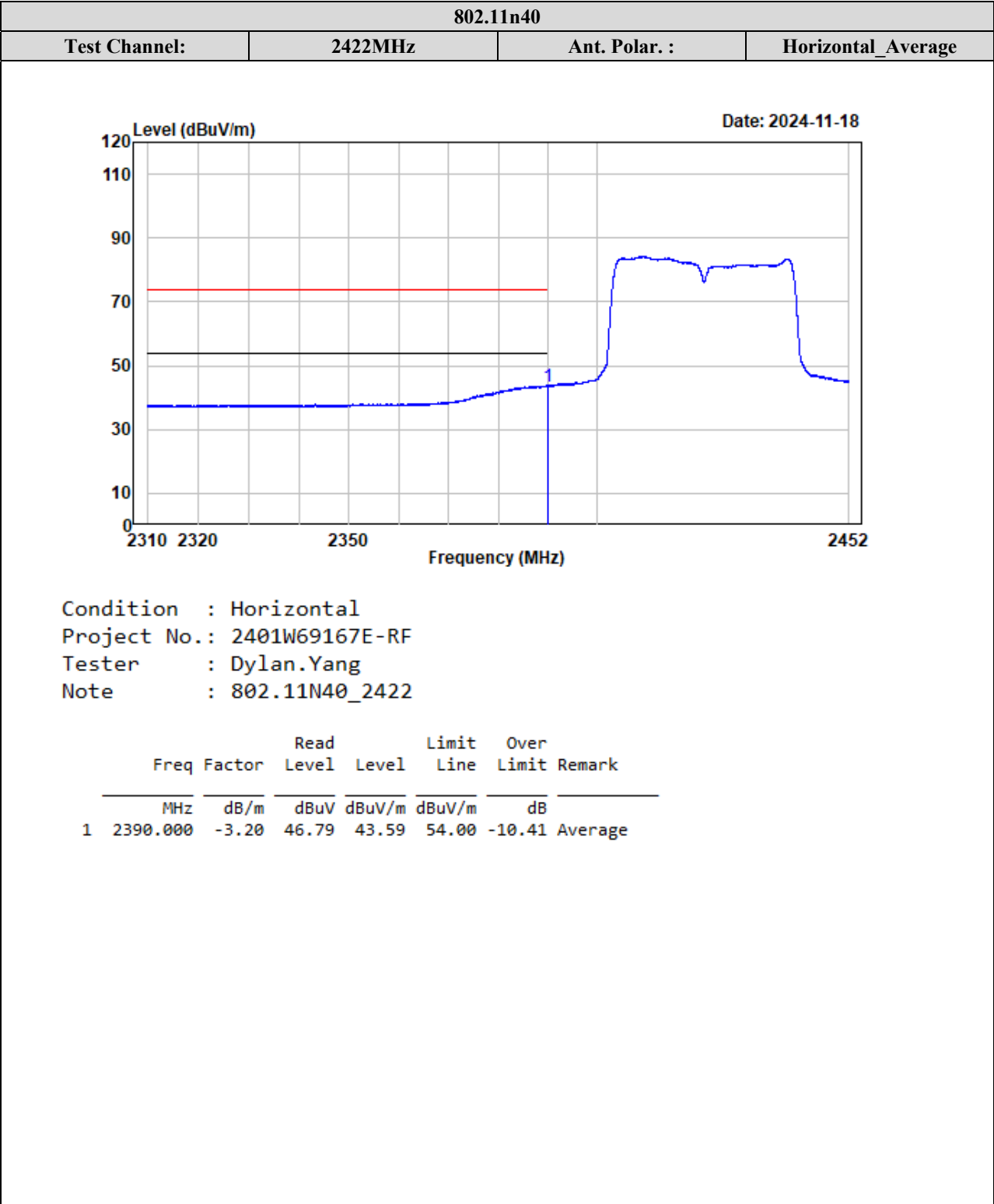


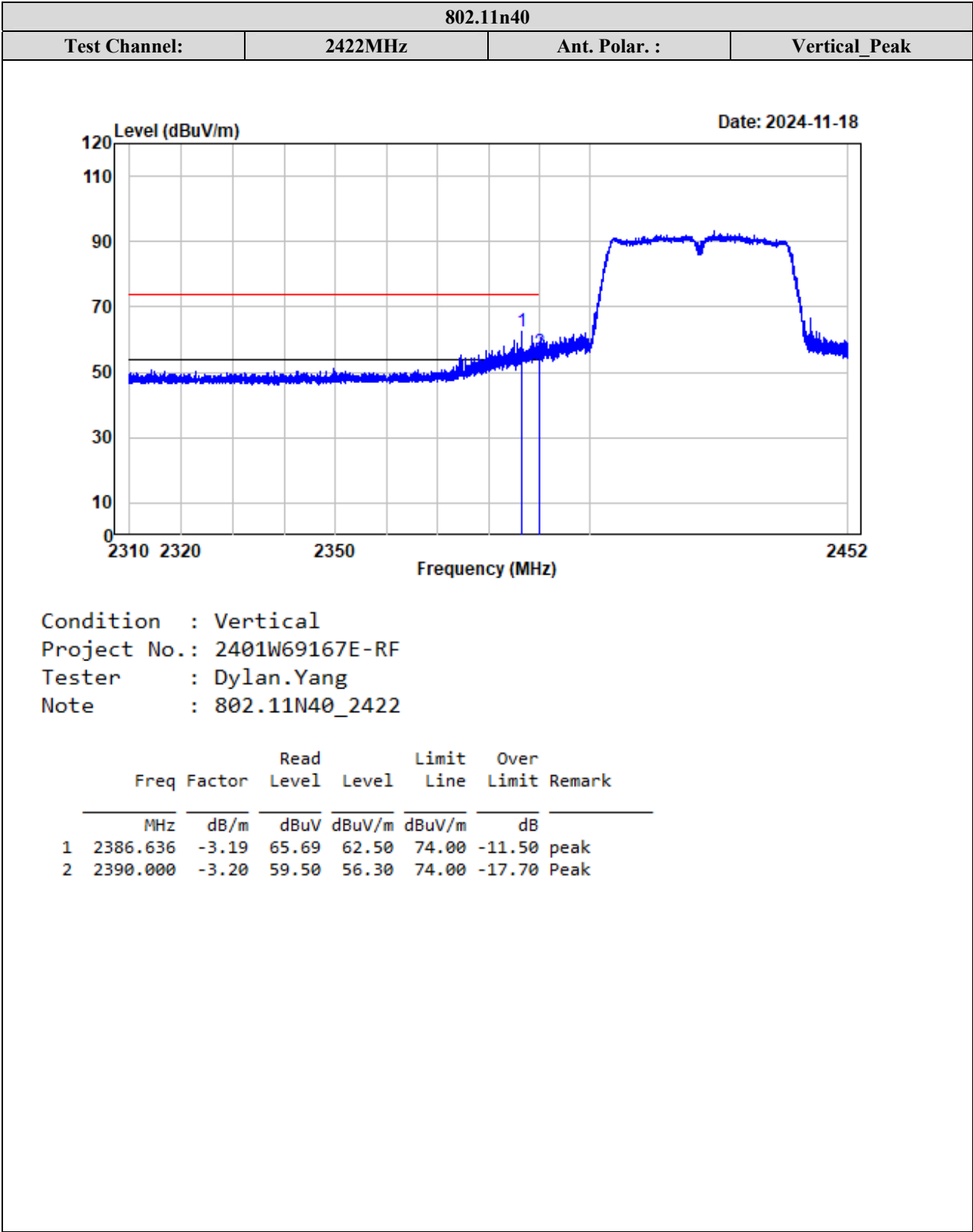


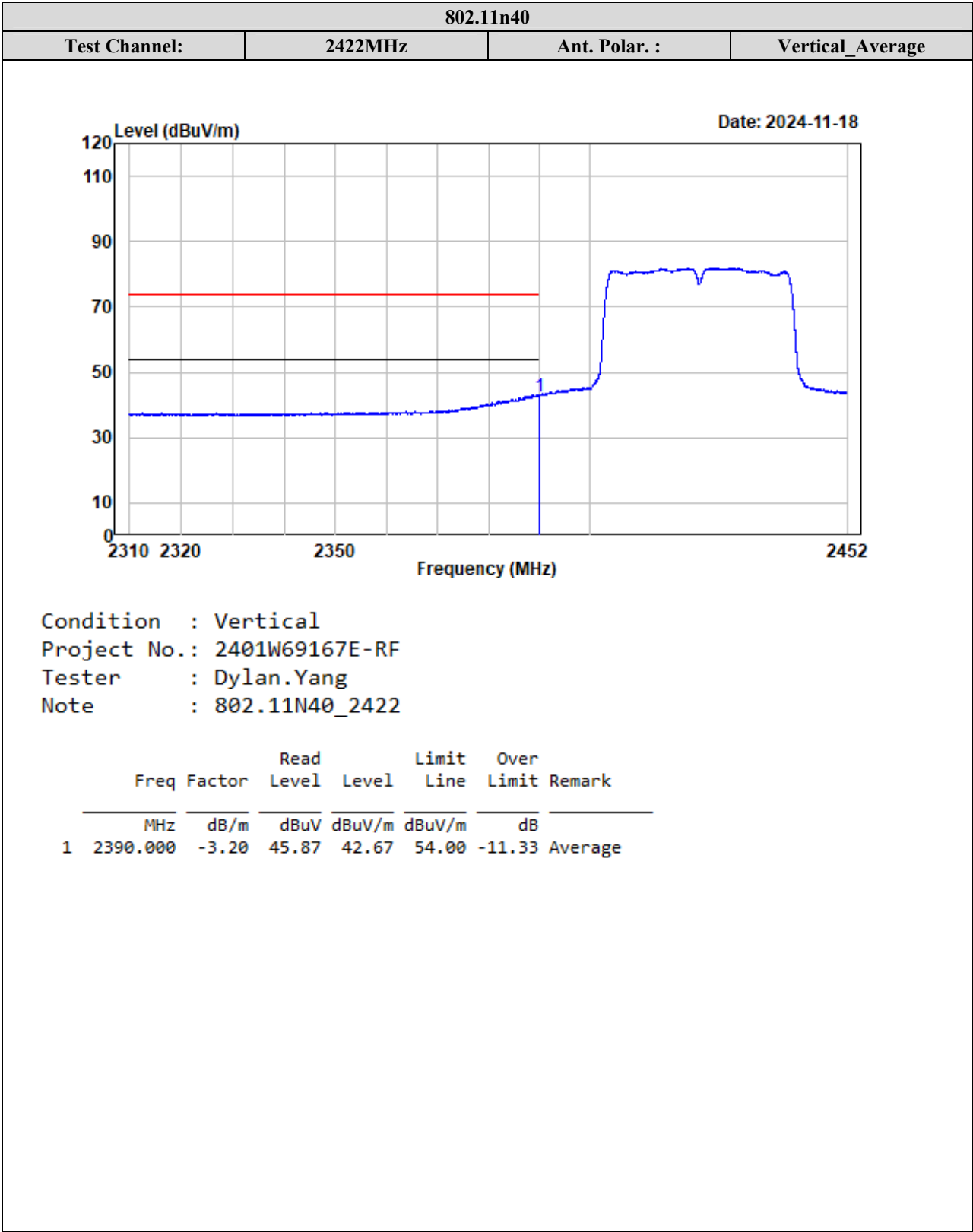


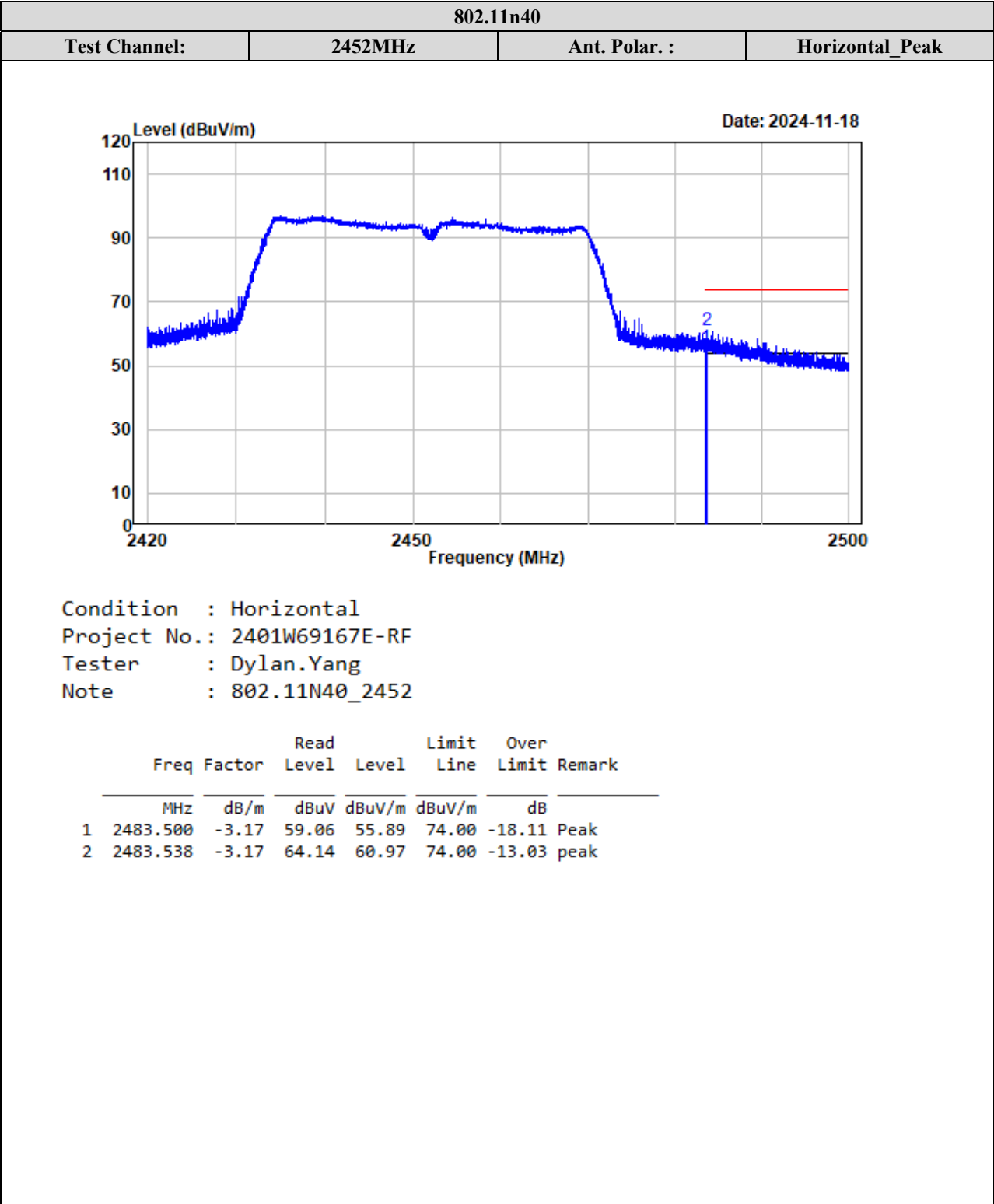


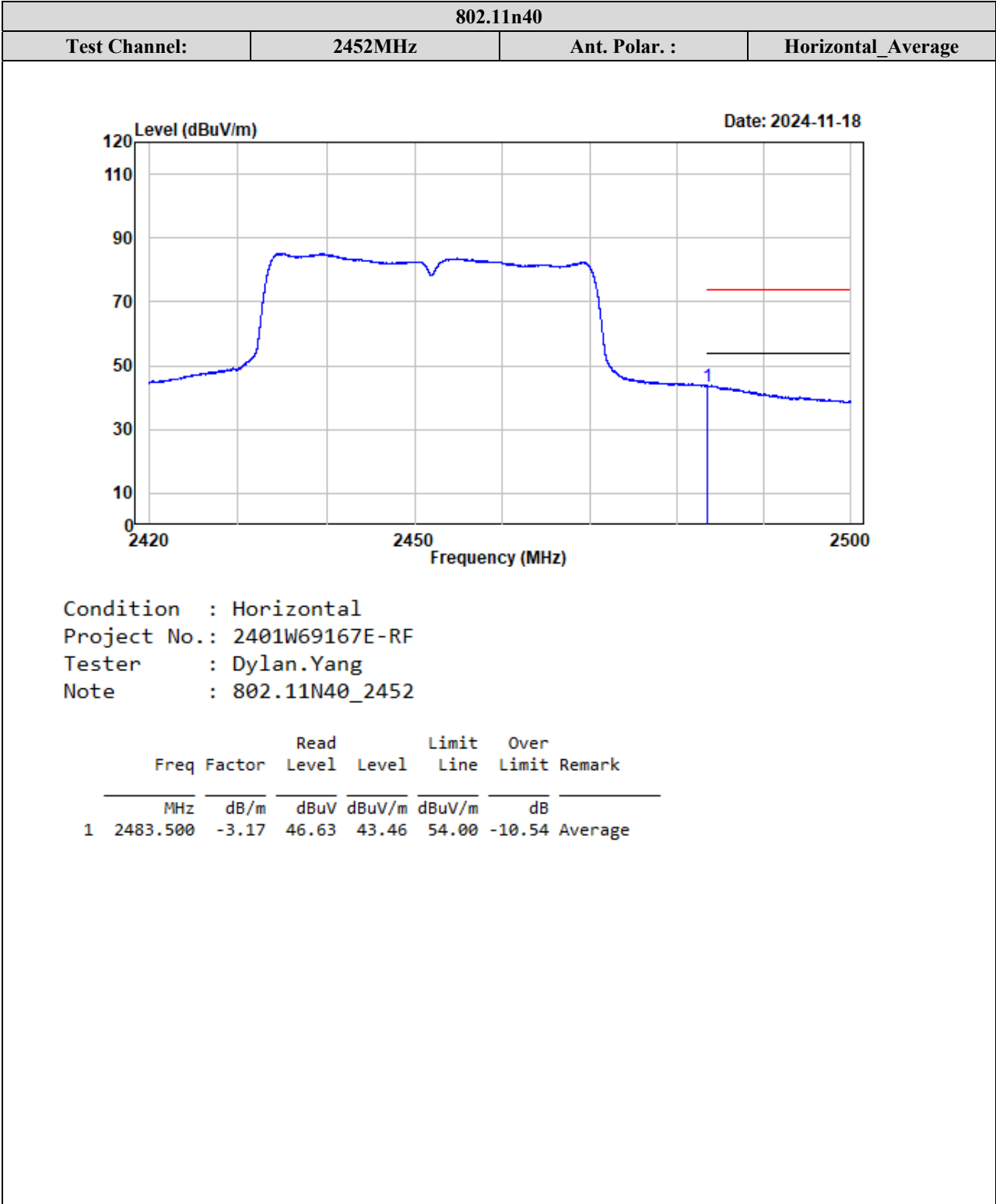


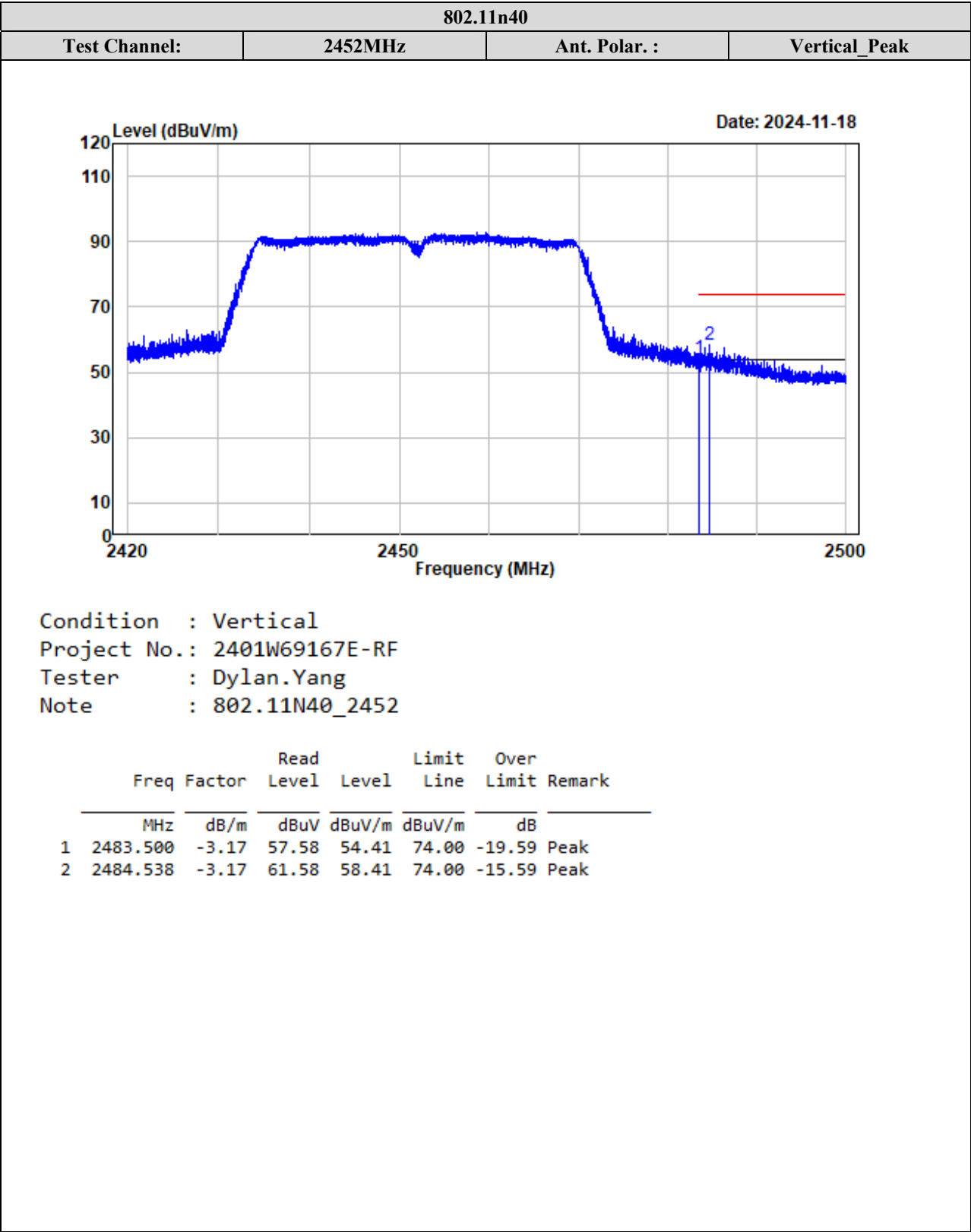


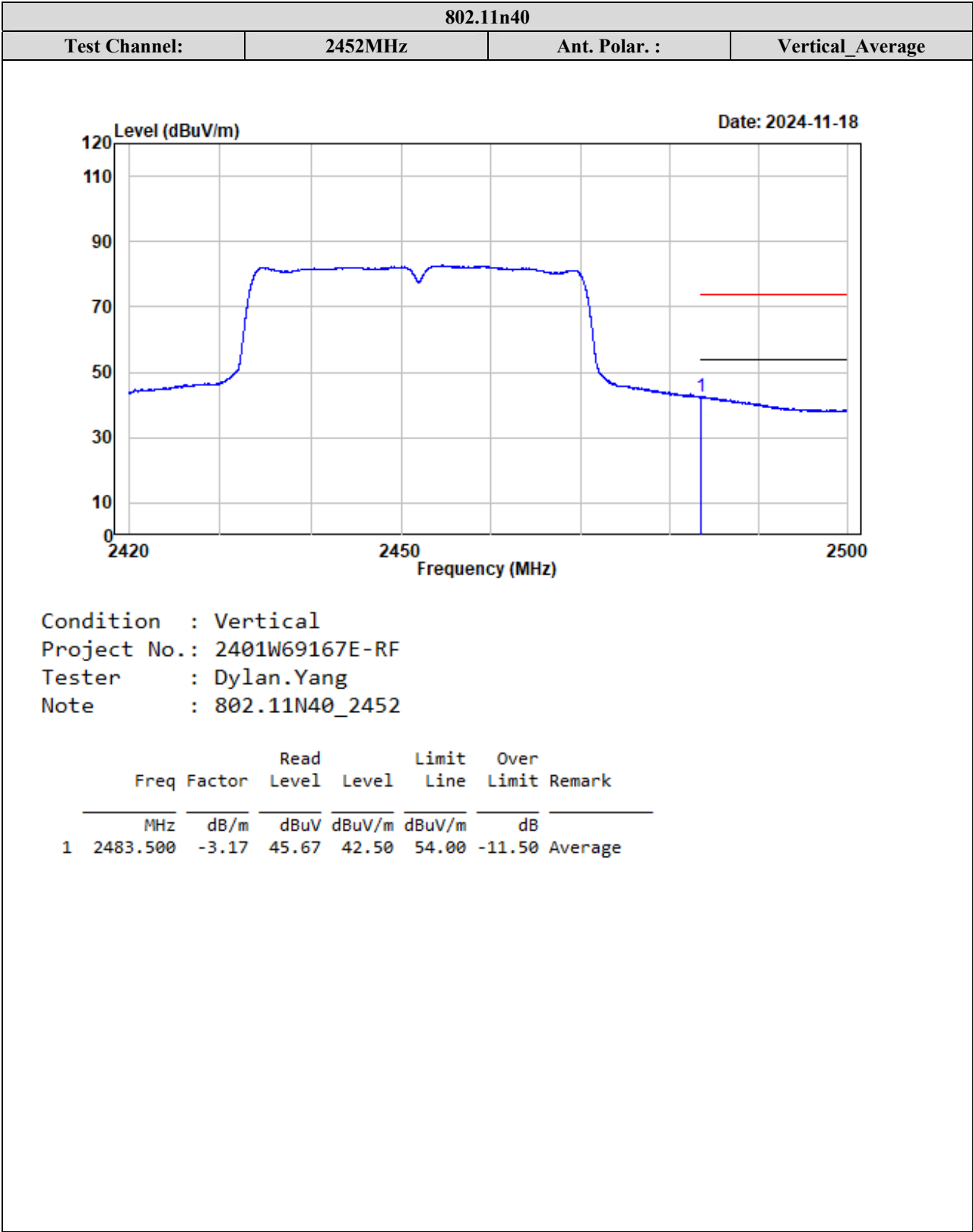






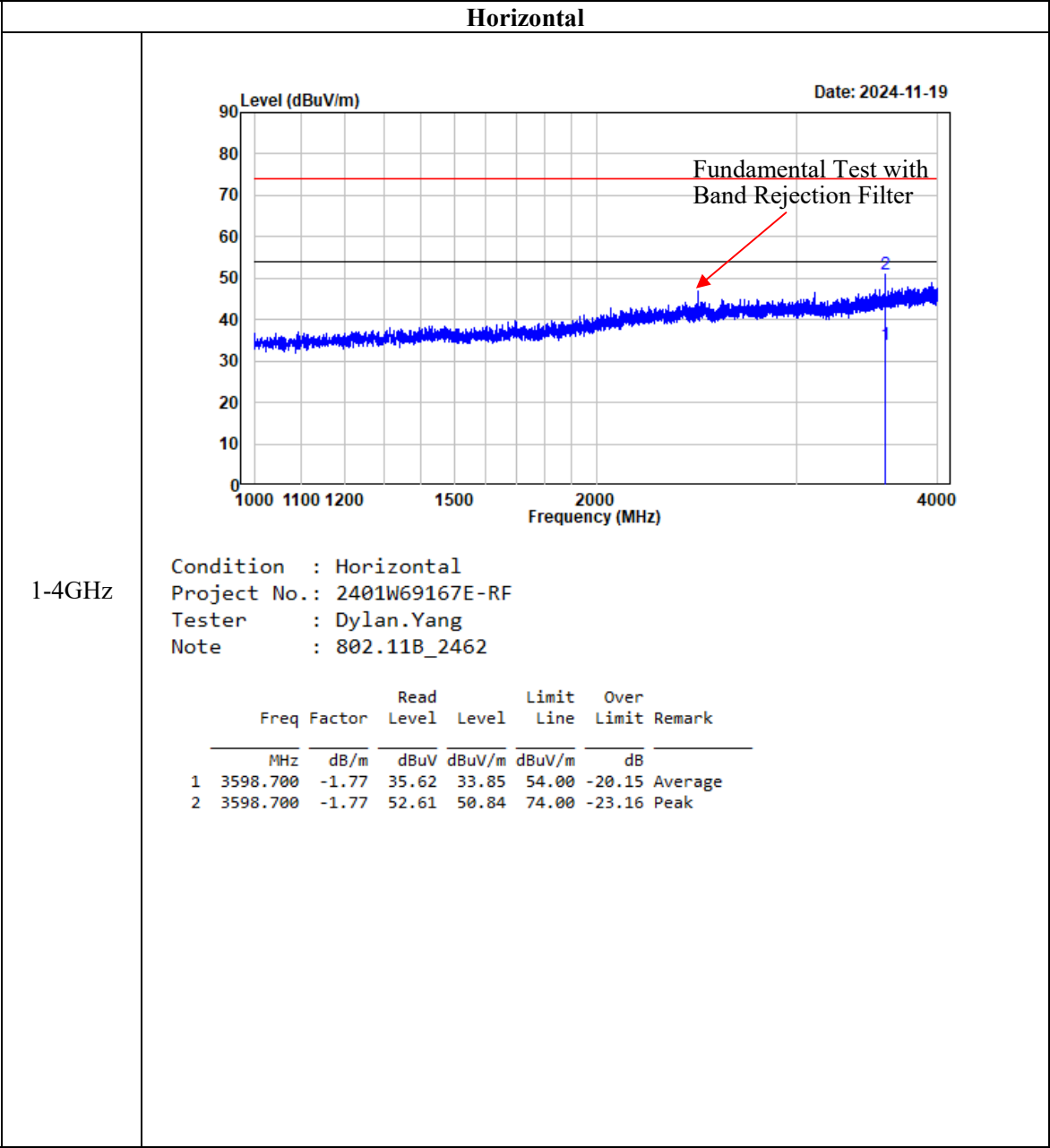




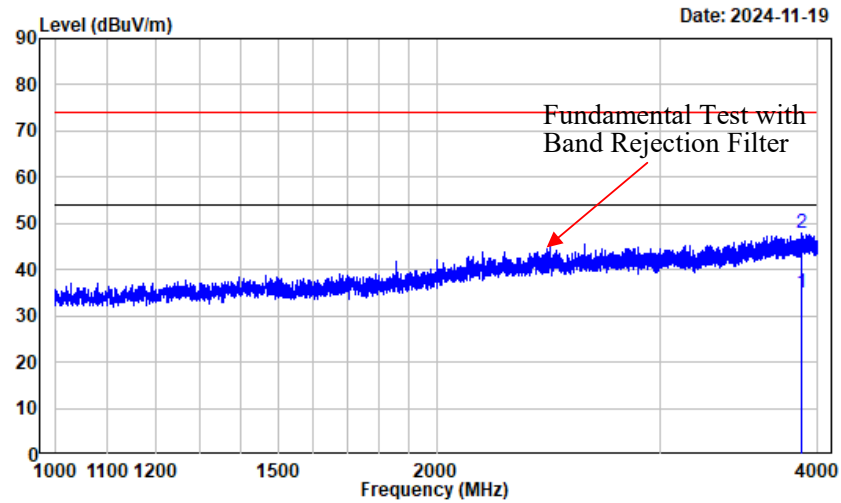


Listed with the worst harmonic margin test plot:

802.11b:



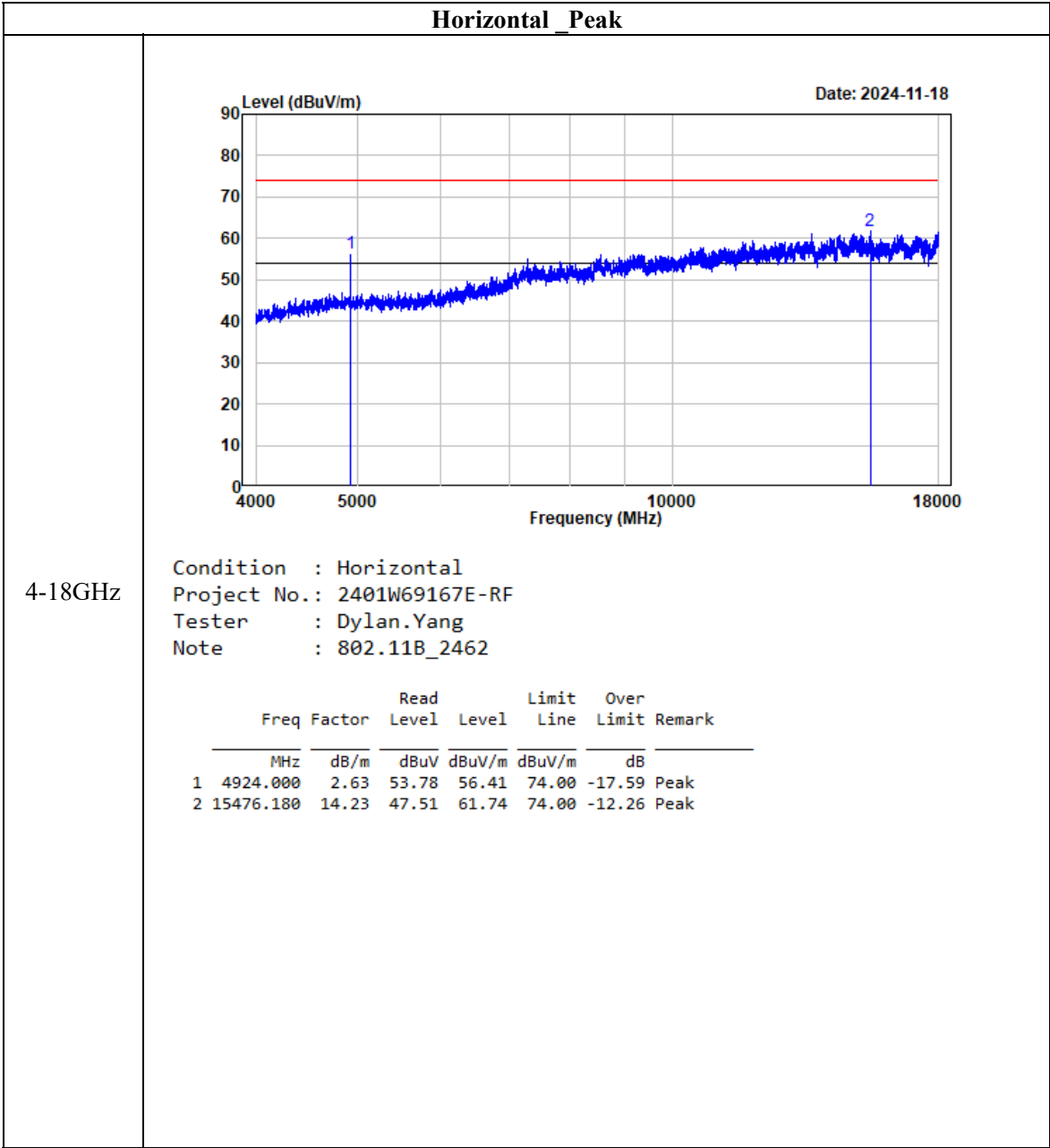
Vertical

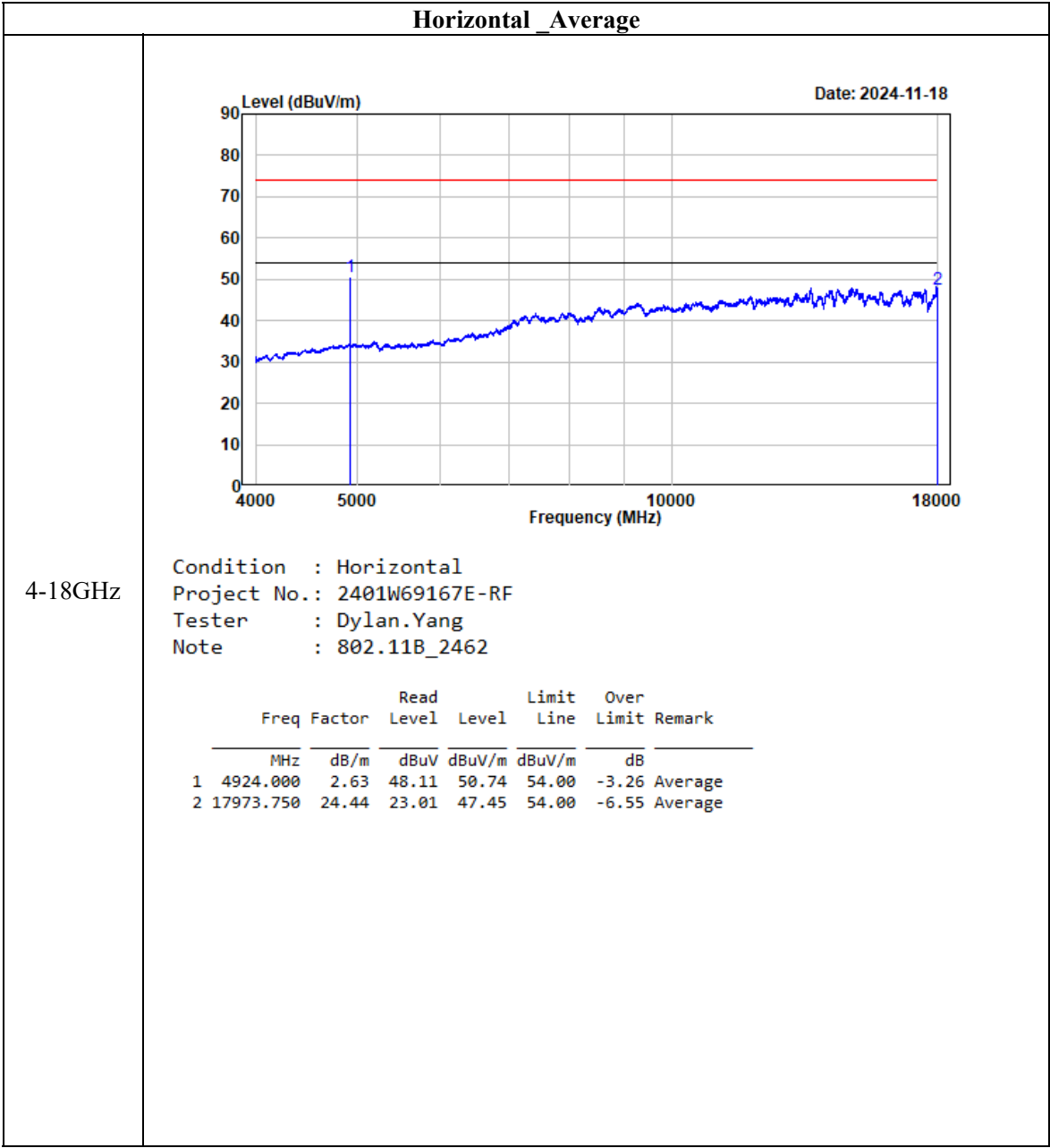


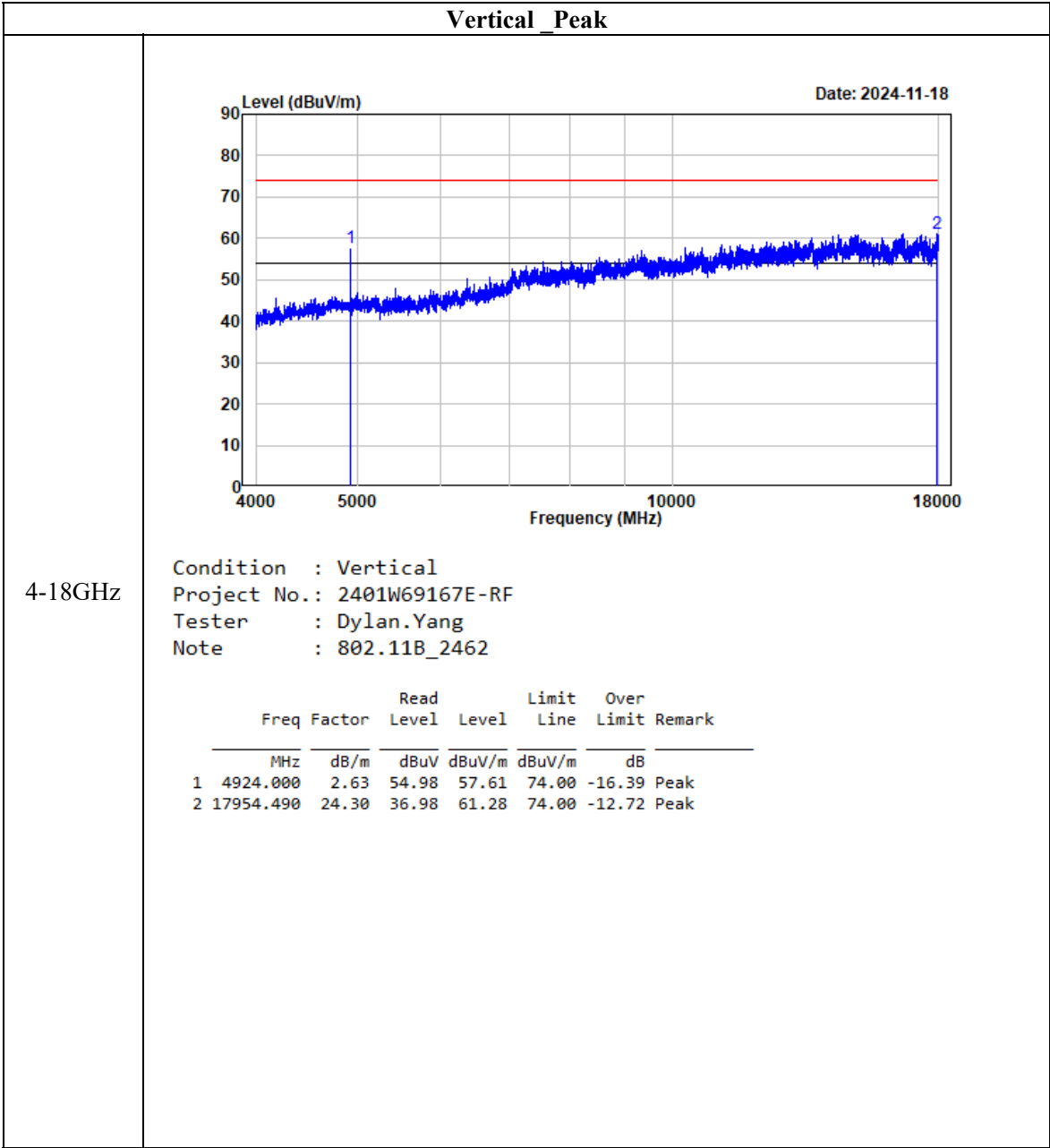
1-4GHz

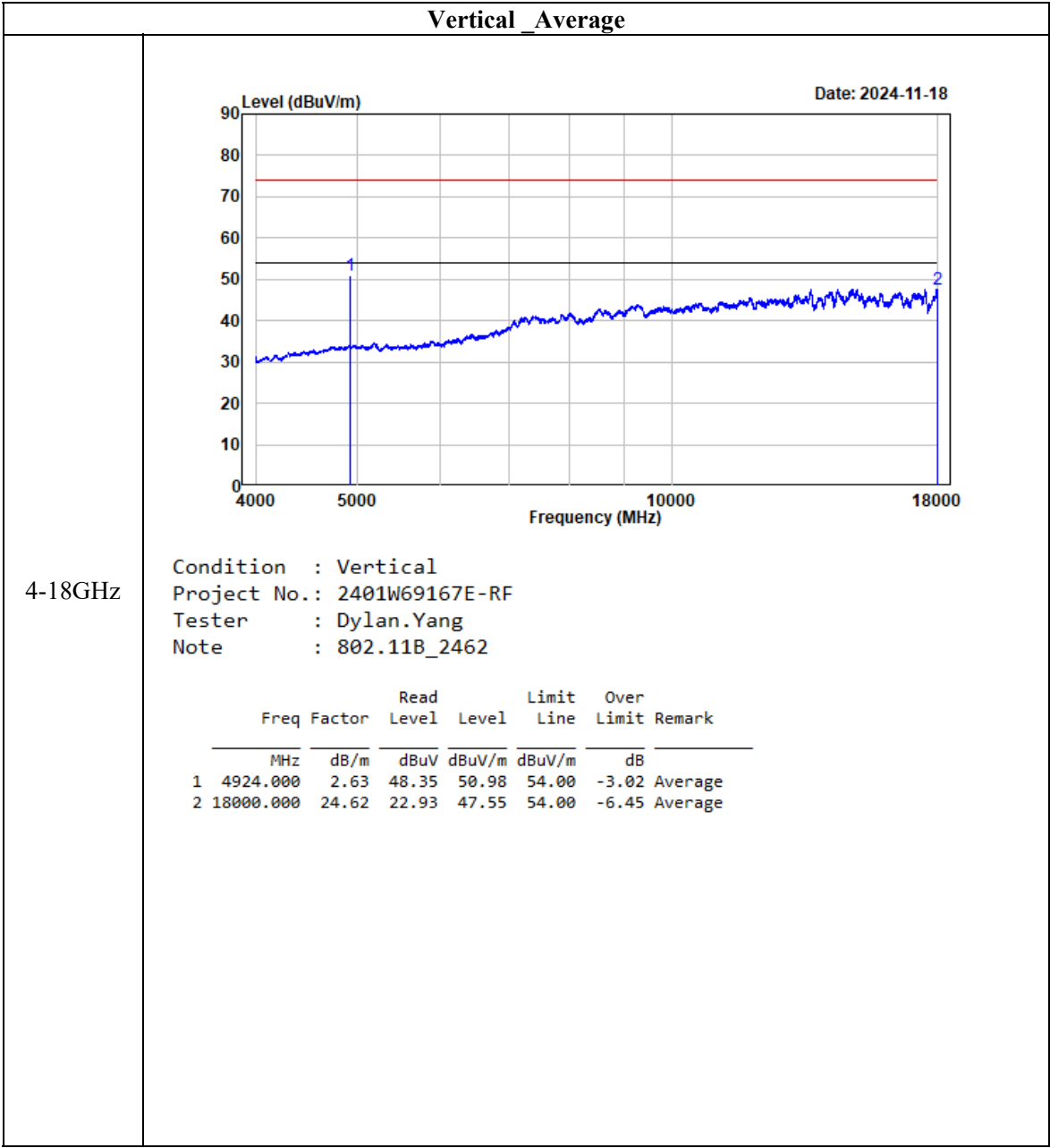
Condition : Vertical
Project No.: 2401W69167E-RF
Tester : Dylan.Yang
Note : 802.11B_2462

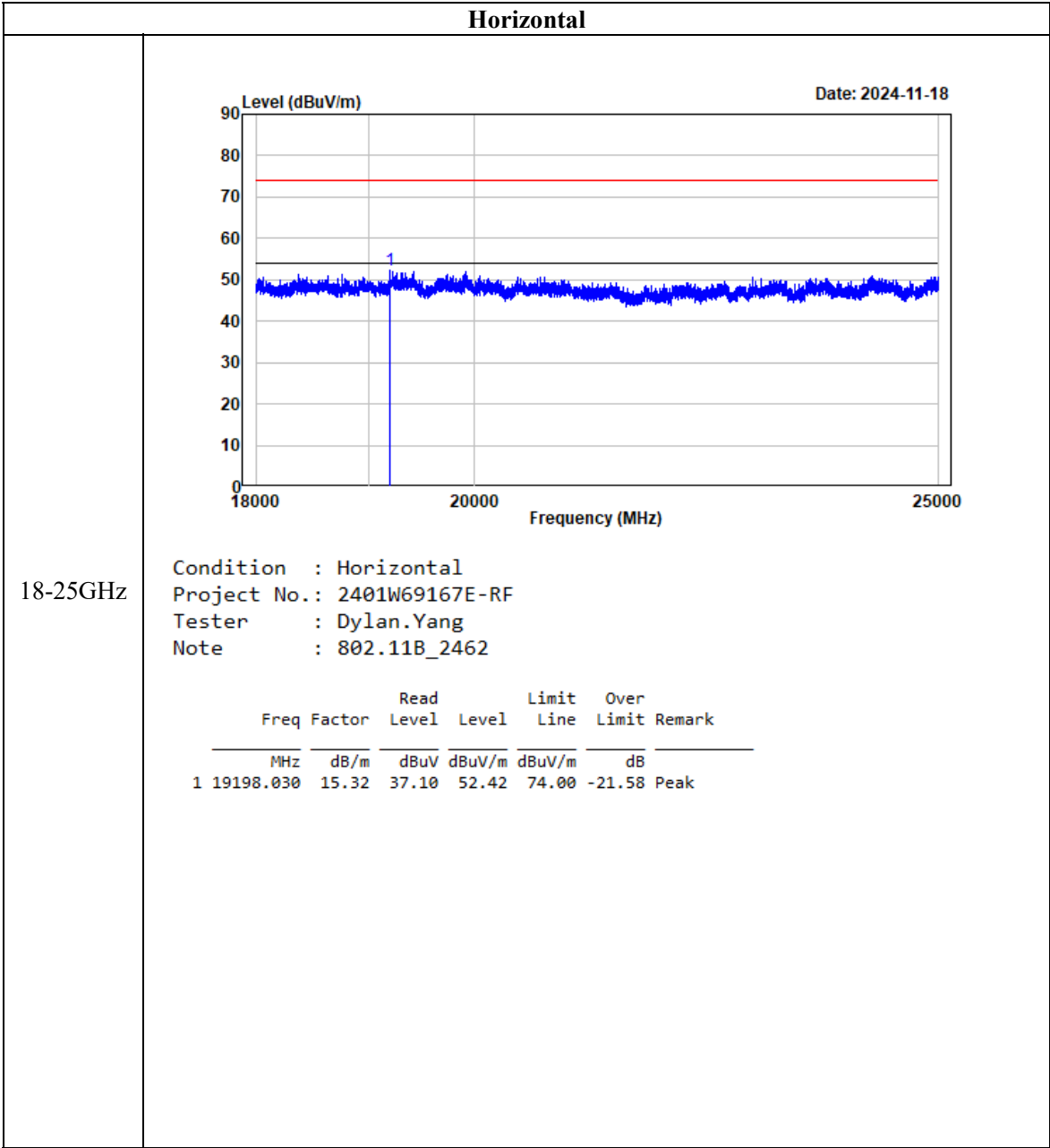
	Freq	Factor	Read Level	Level	Limit Line	Over Limit	Remark
	MHz	dB/m	dBuV	dBuV/m	dBuV/m	dB	
1	3884.111	-0.60	35.67	35.07	54.00	-18.93	Average
2	3884.111	-0.60	48.32	47.72	74.00	-26.28	Peak

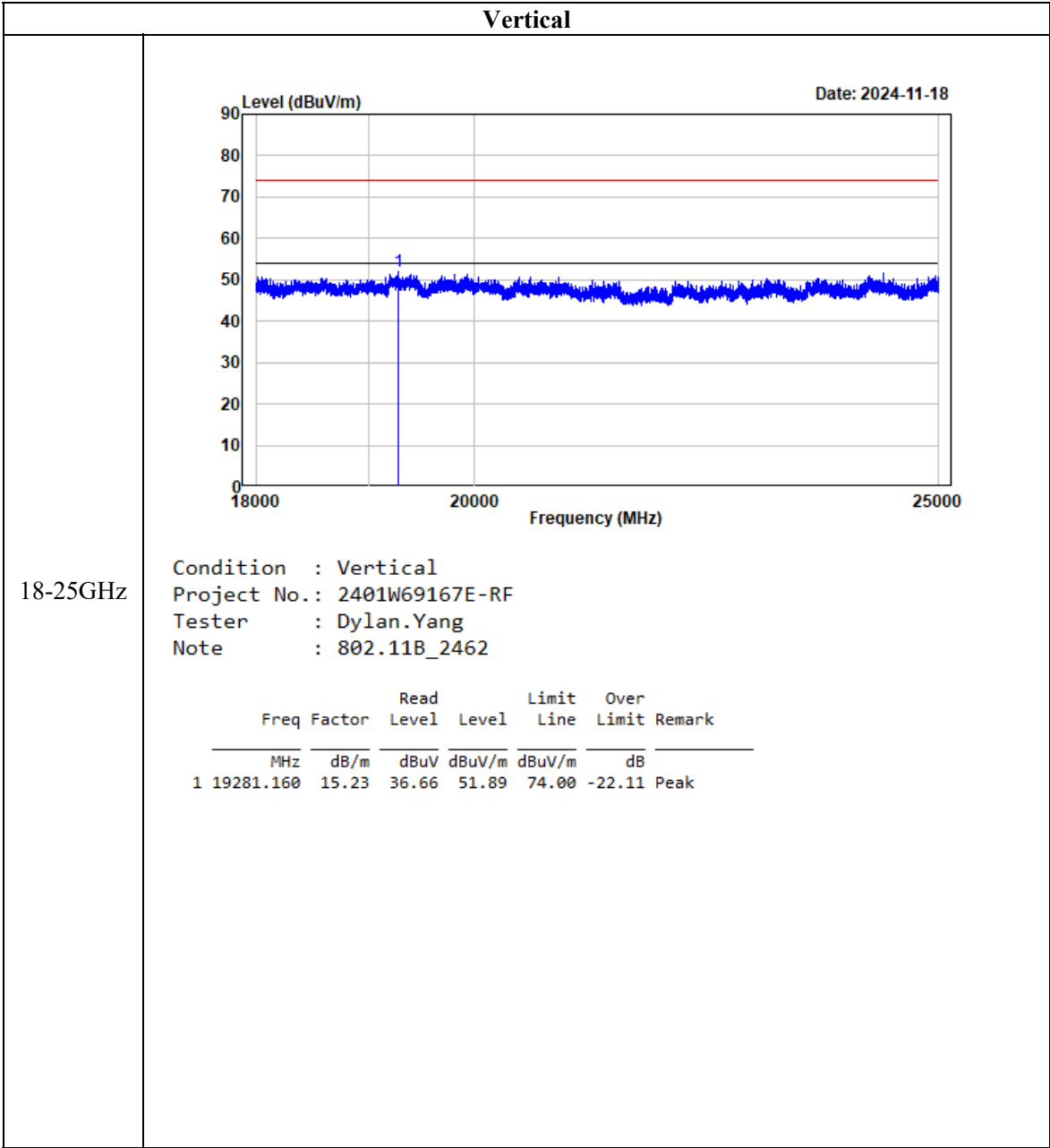




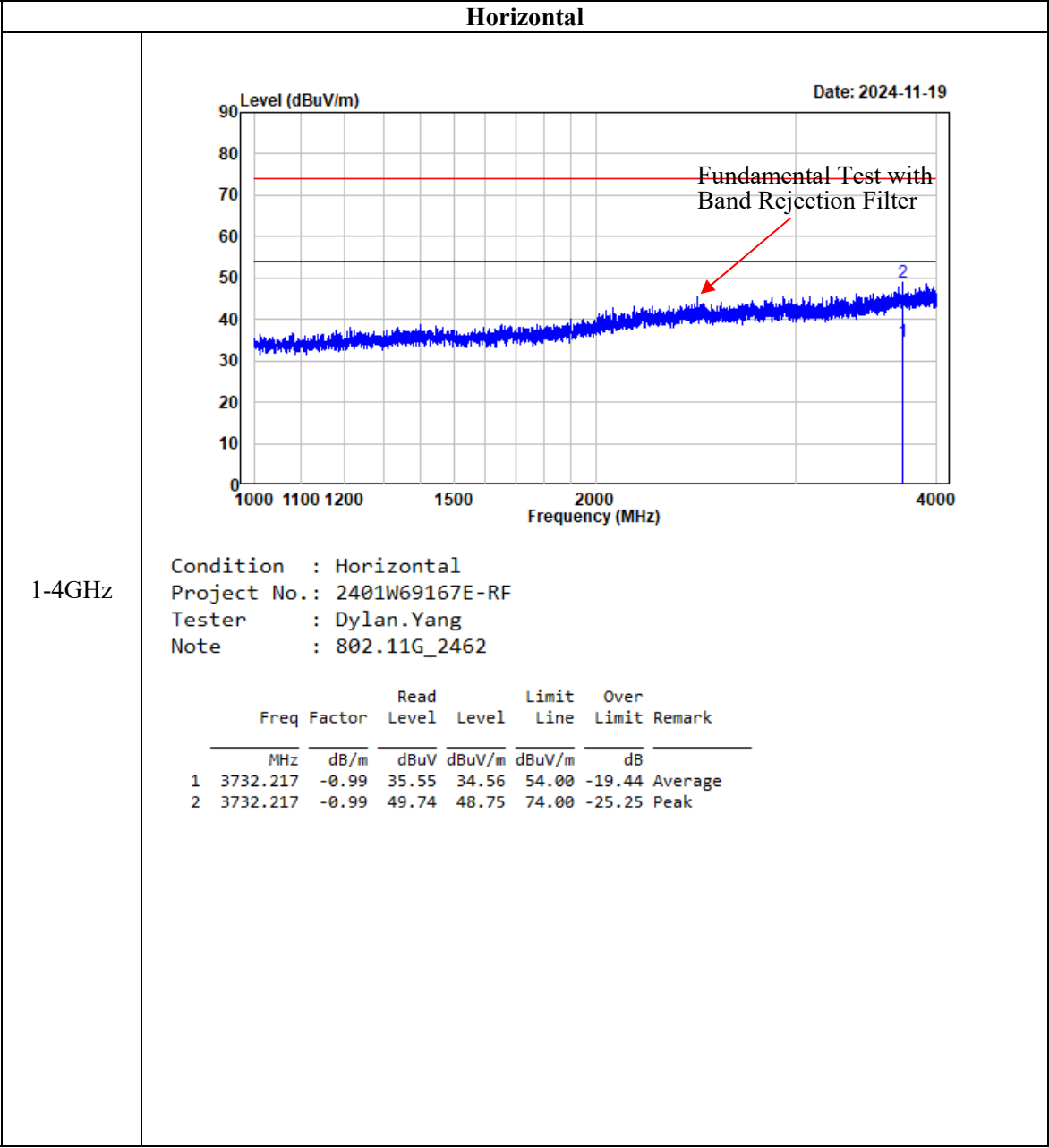




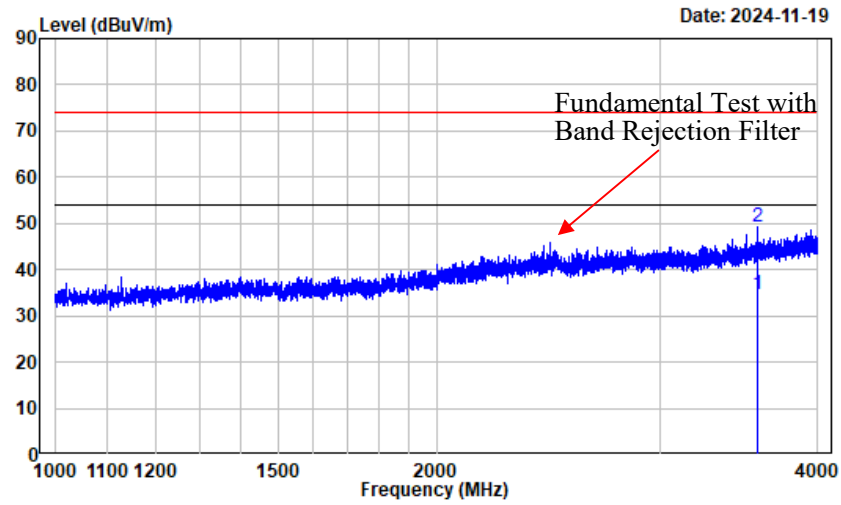




802.11g:



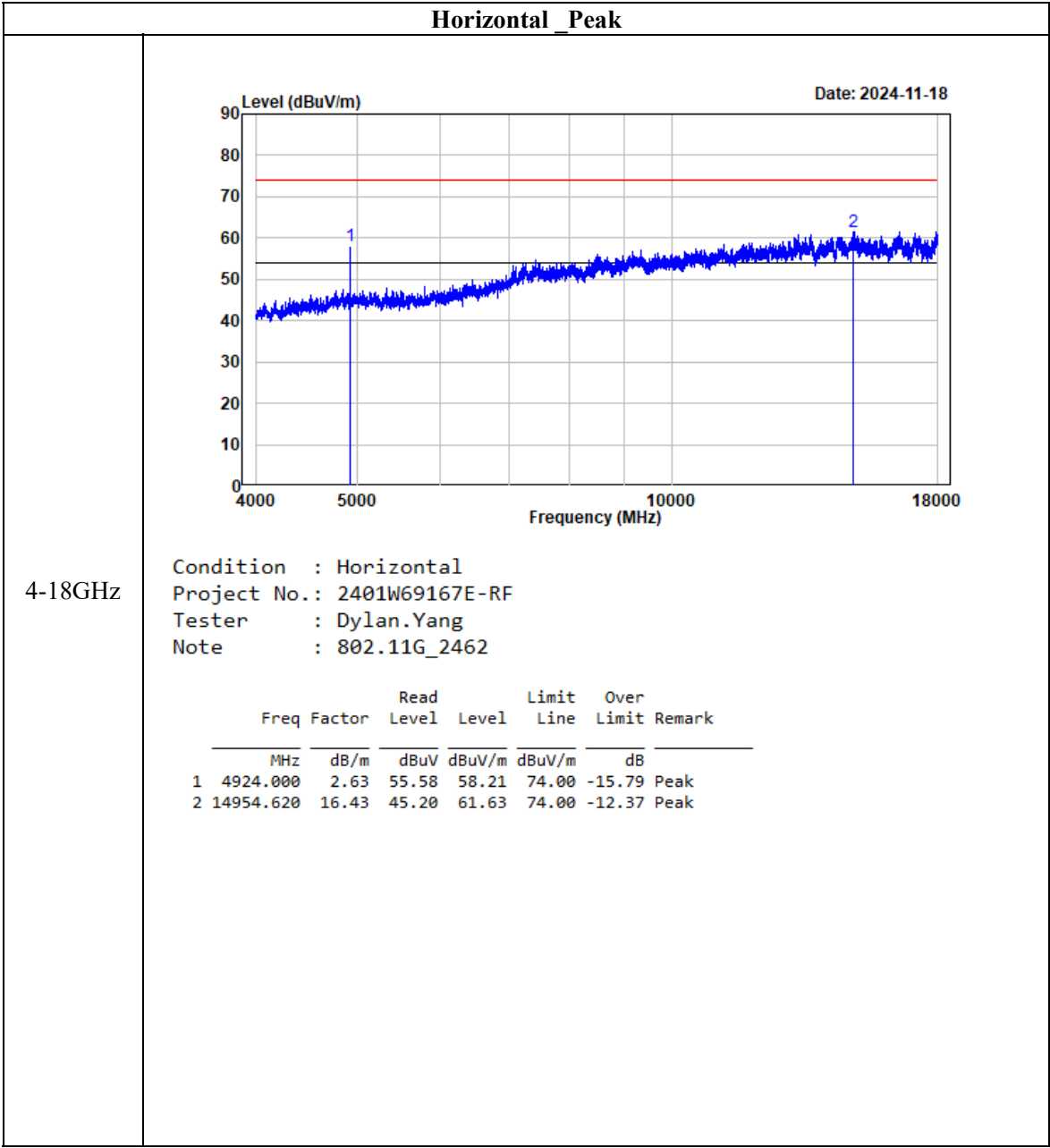
Vertical

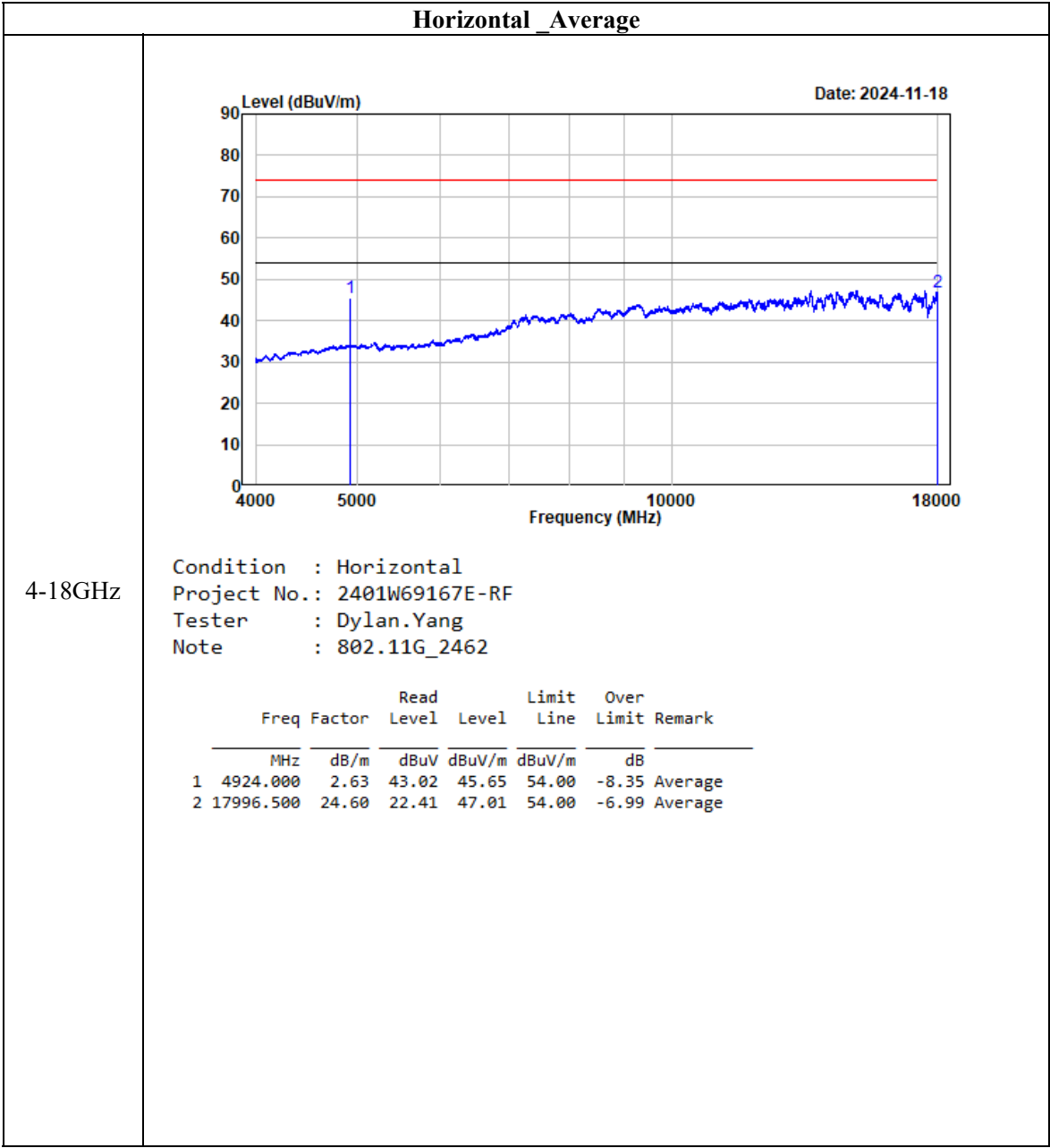


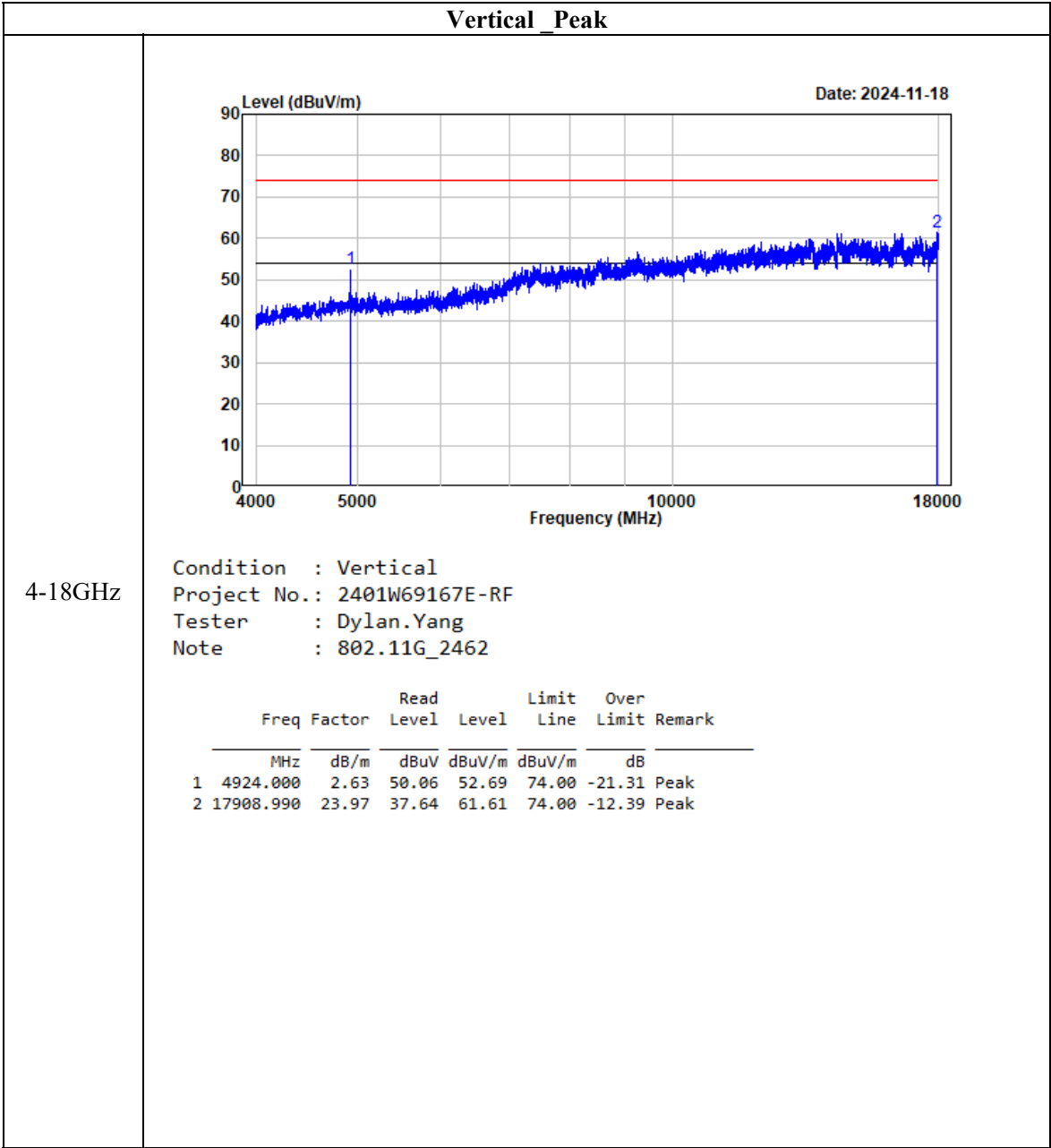
1-4GHz

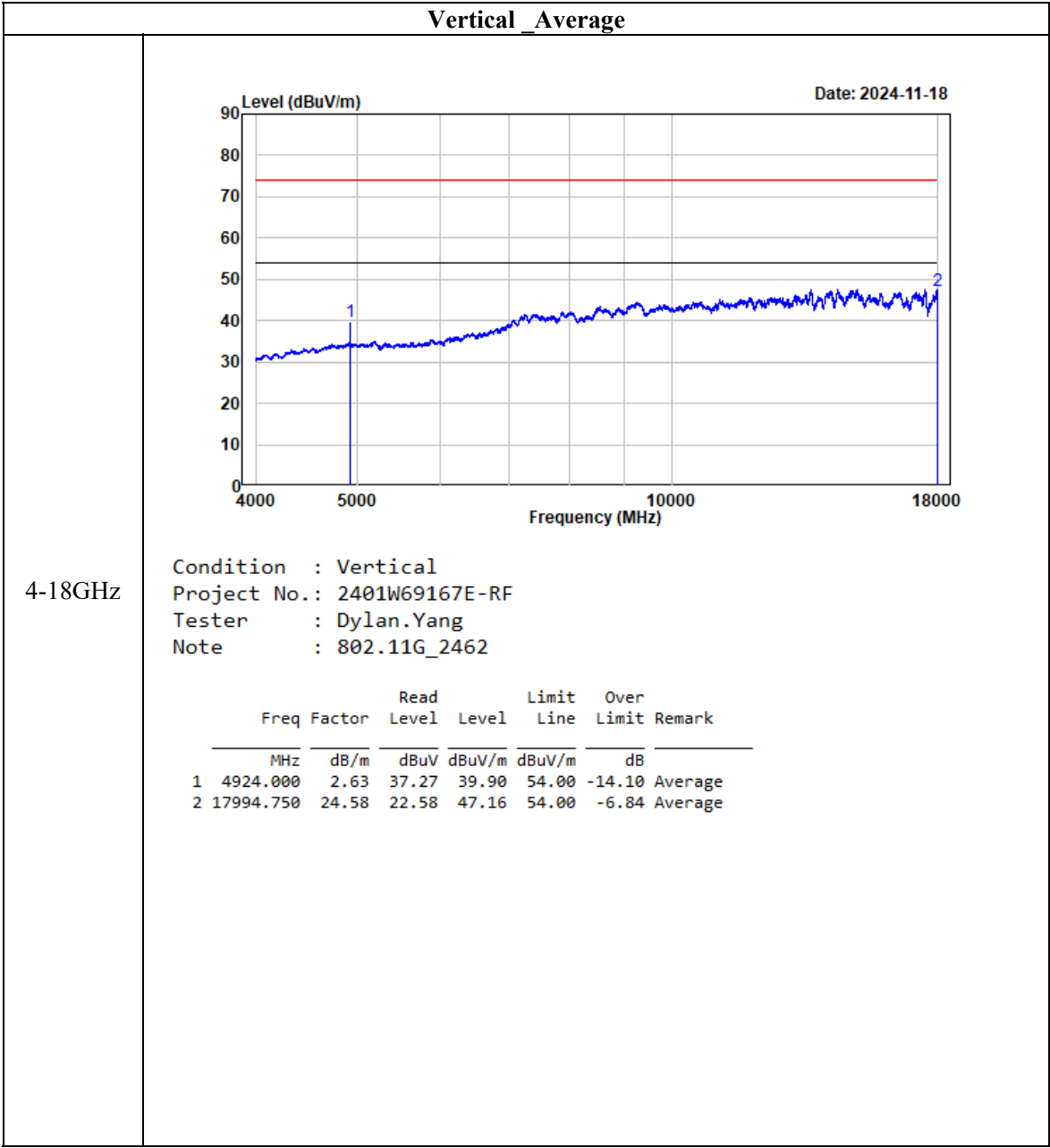
Condition : Vertical
Project No.: 2401W69167E-RF
Tester : Dylan.Yang
Note : 802.11G_2462

	Freq	Factor	Read Level	Level	Limit Line	Over Limit	Remark
	MHz	dB/m	dBuV	dBuV/m	dBuV/m	dB	
1	3587.448	-1.70	36.37	34.67	54.00	-19.33	Average
2	3587.448	-1.70	50.94	49.24	74.00	-24.76	Peak

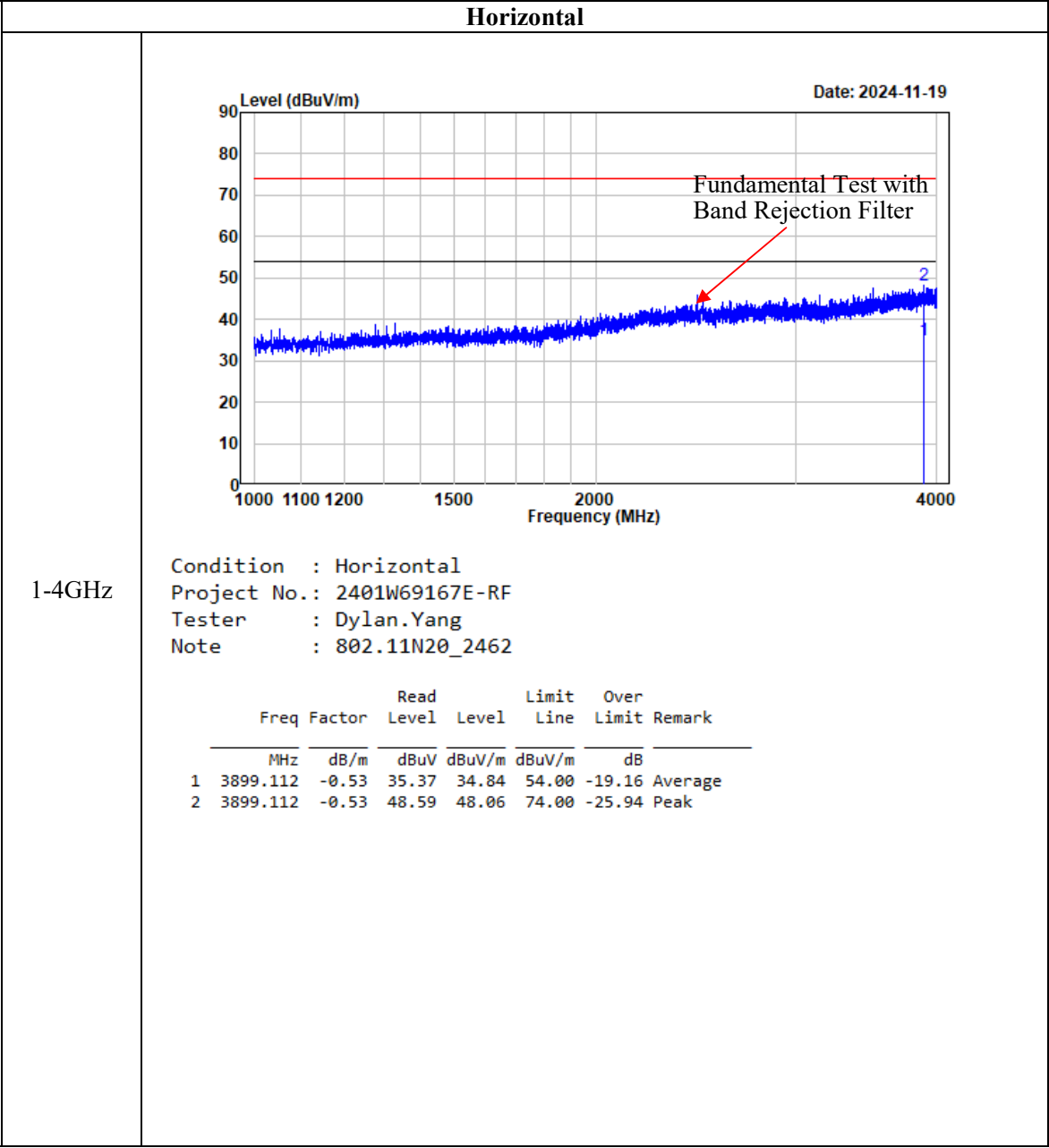


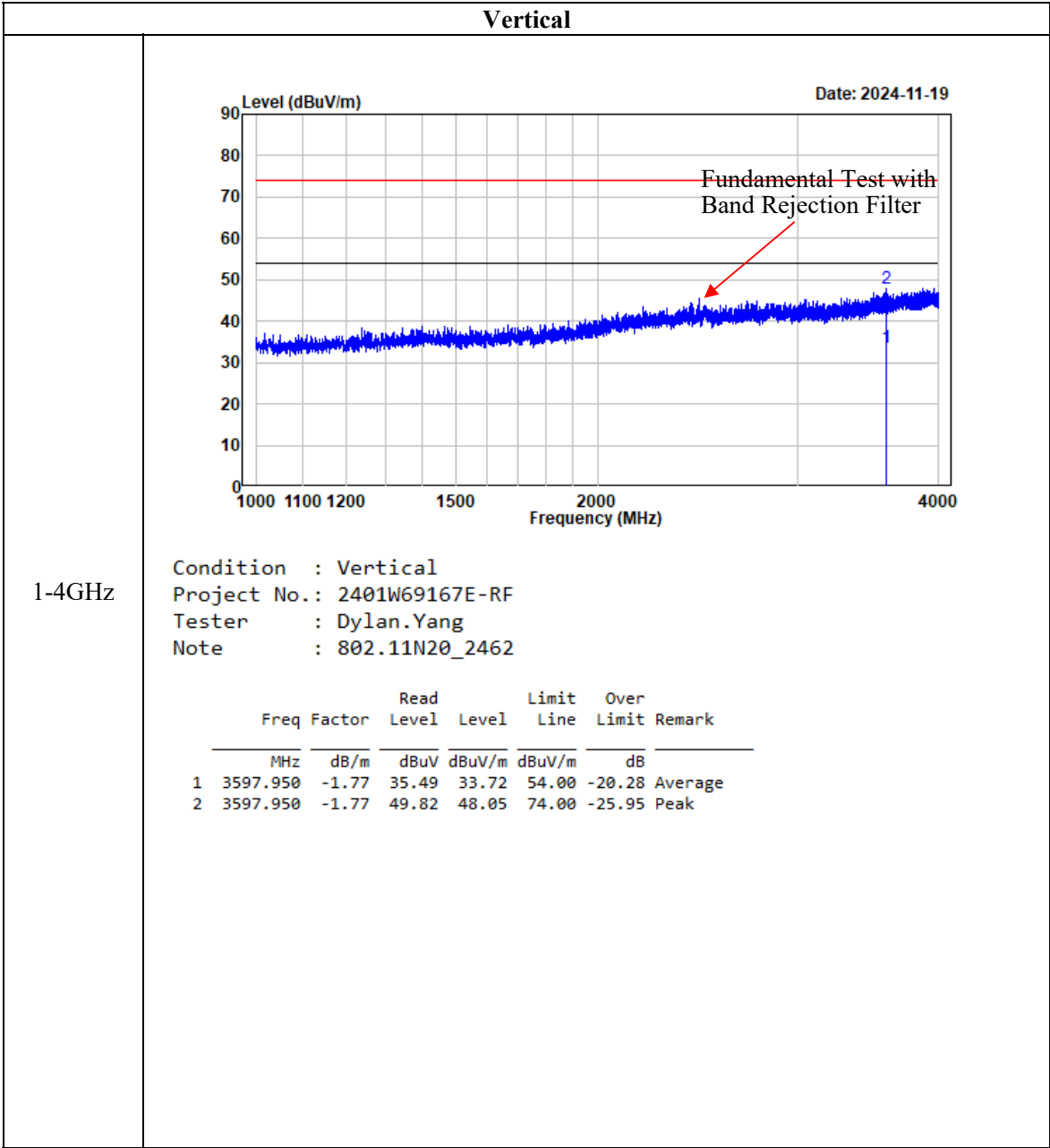






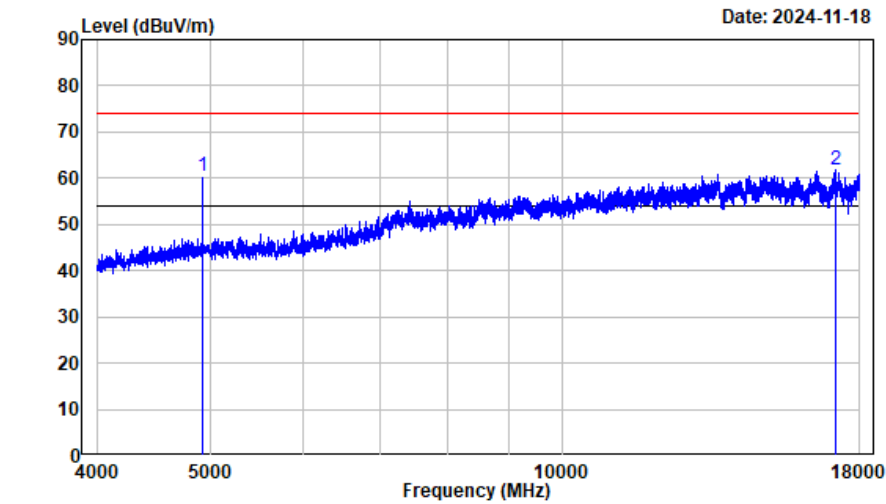
802.11n20:





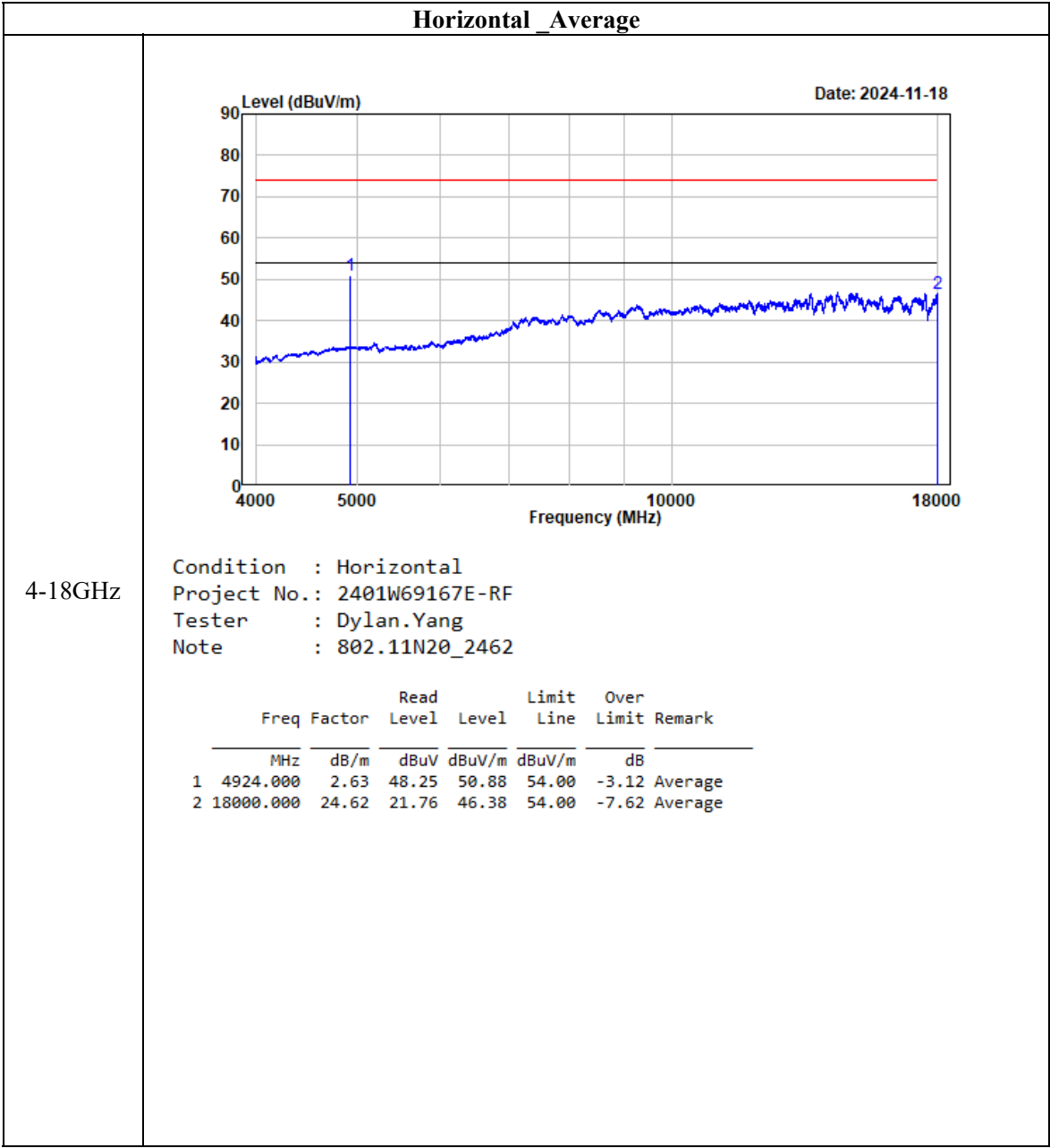
Horizontal_Peak

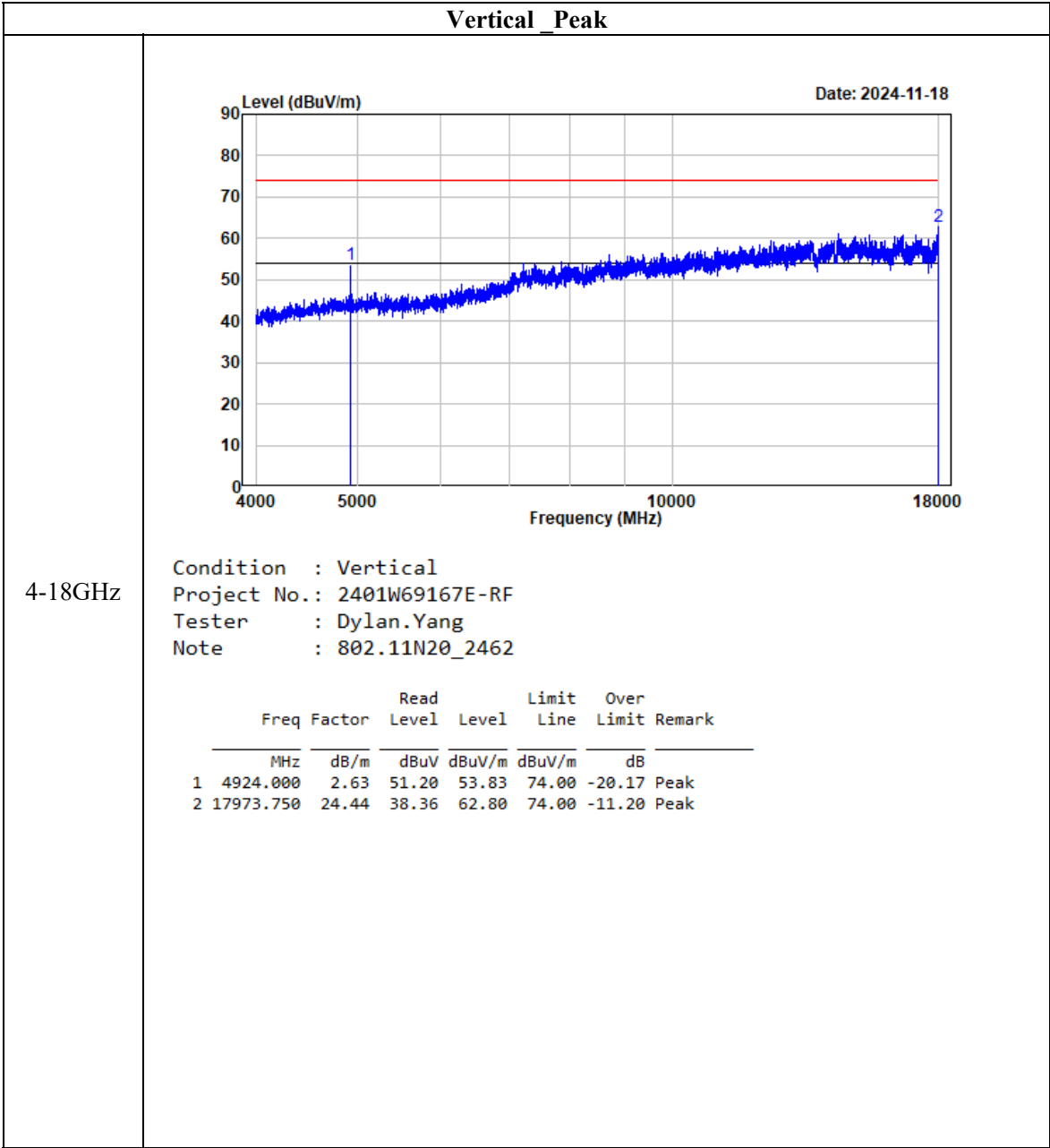
4-18GHz

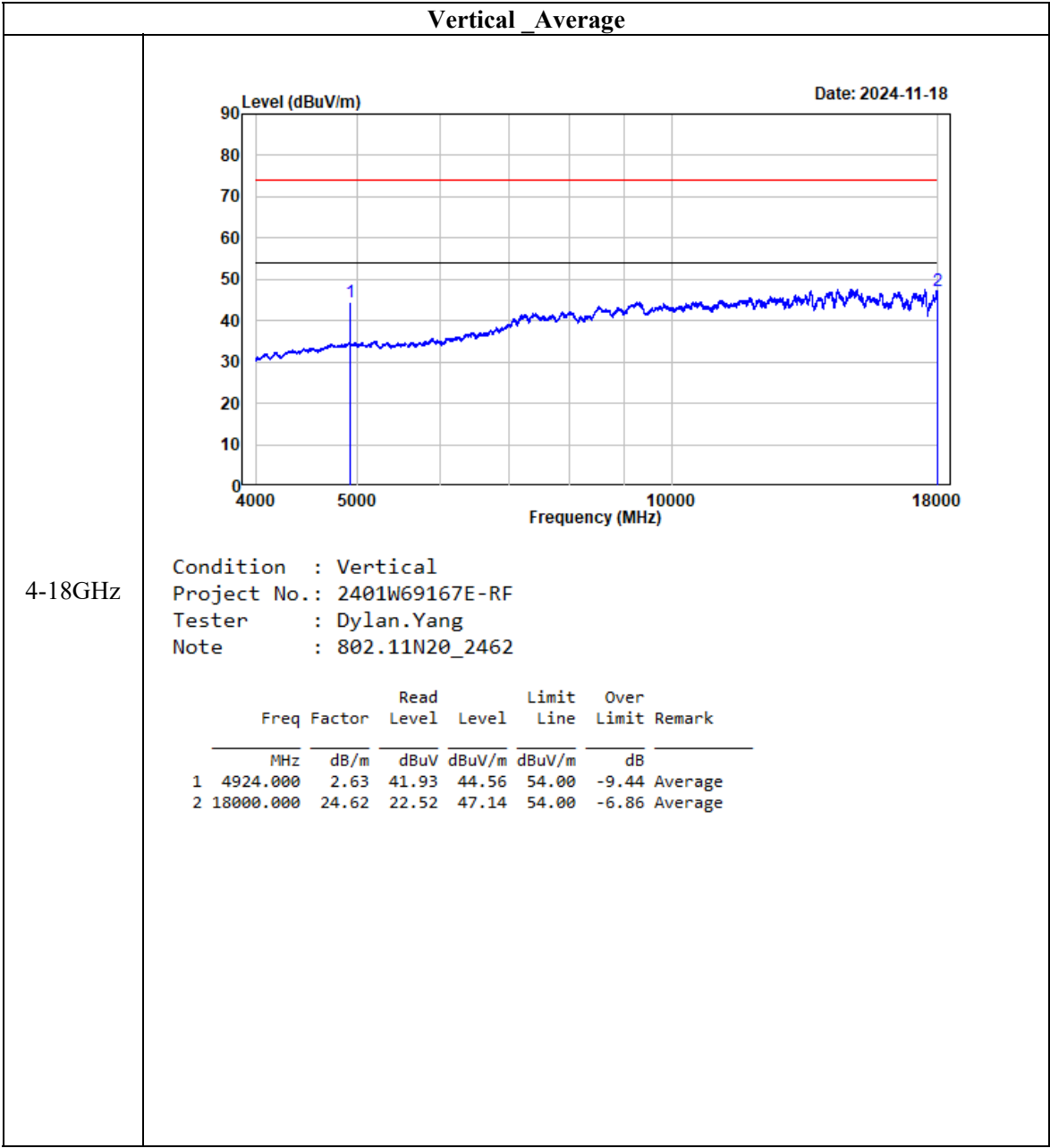


Condition : Horizontal
Project No.: 2401W69167E-RF
Tester : Dylan.Yang
Note : 802.11N20_2462

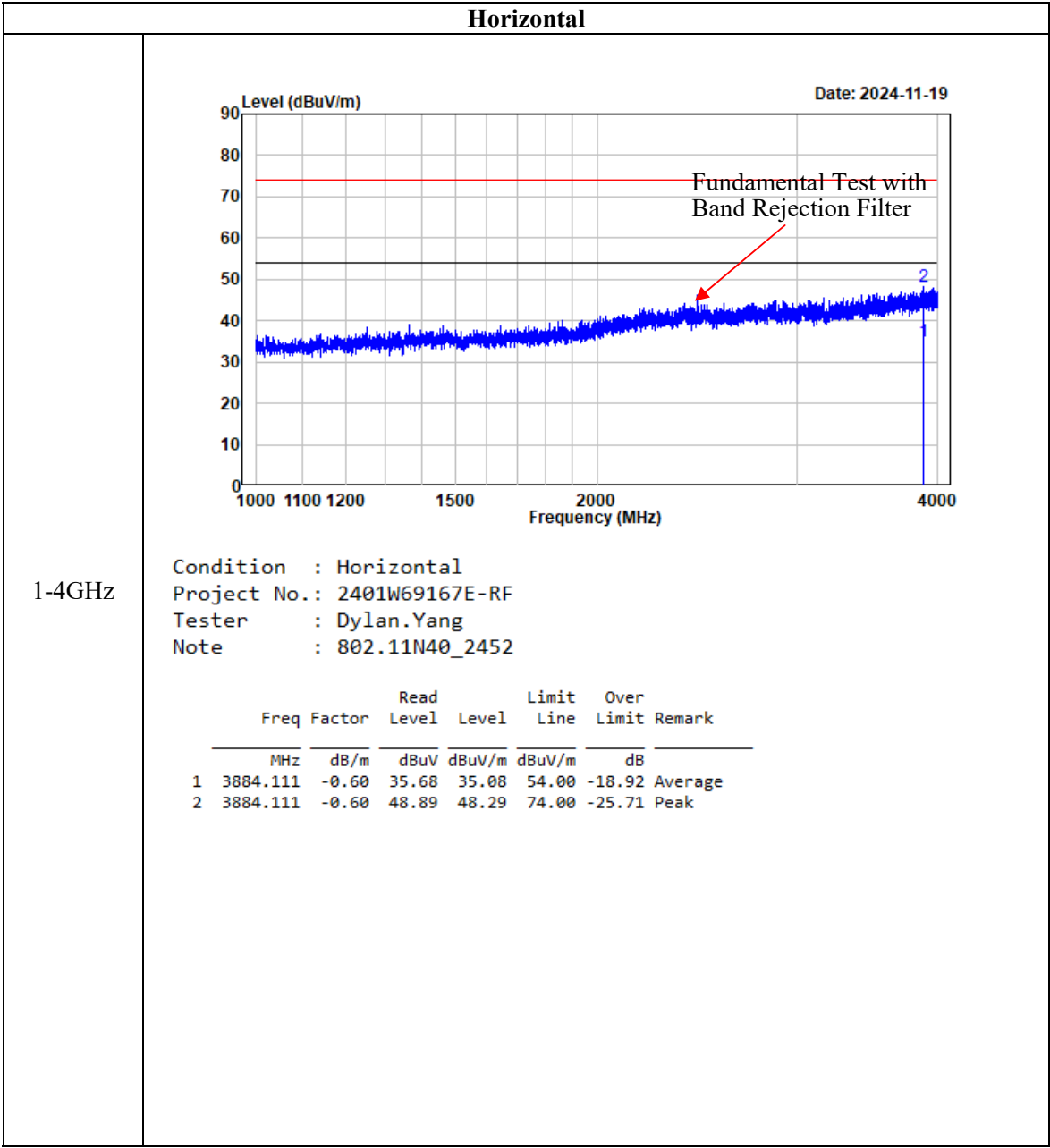
		Read		Limit	Over	Remark
Freq Factor		Level	Level	Line	Limit	
MHz	dB/m	dBuV	dBuV/m	dBuV/m	dB	
1 4924.000	2.63	57.92	60.55	74.00	-13.45	Peak
2 17170.400	18.45	43.47	61.92	74.00	-12.08	Peak

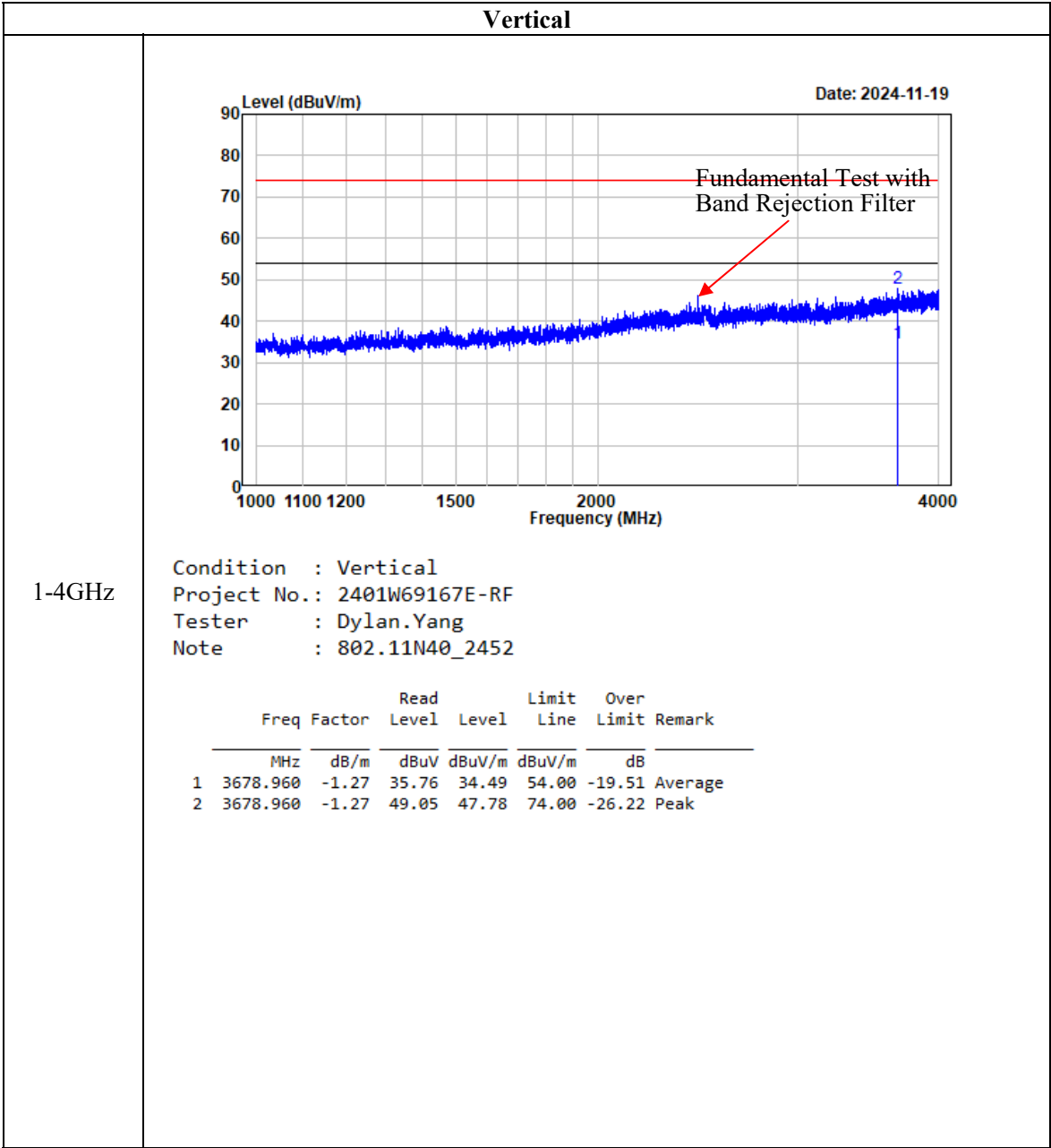


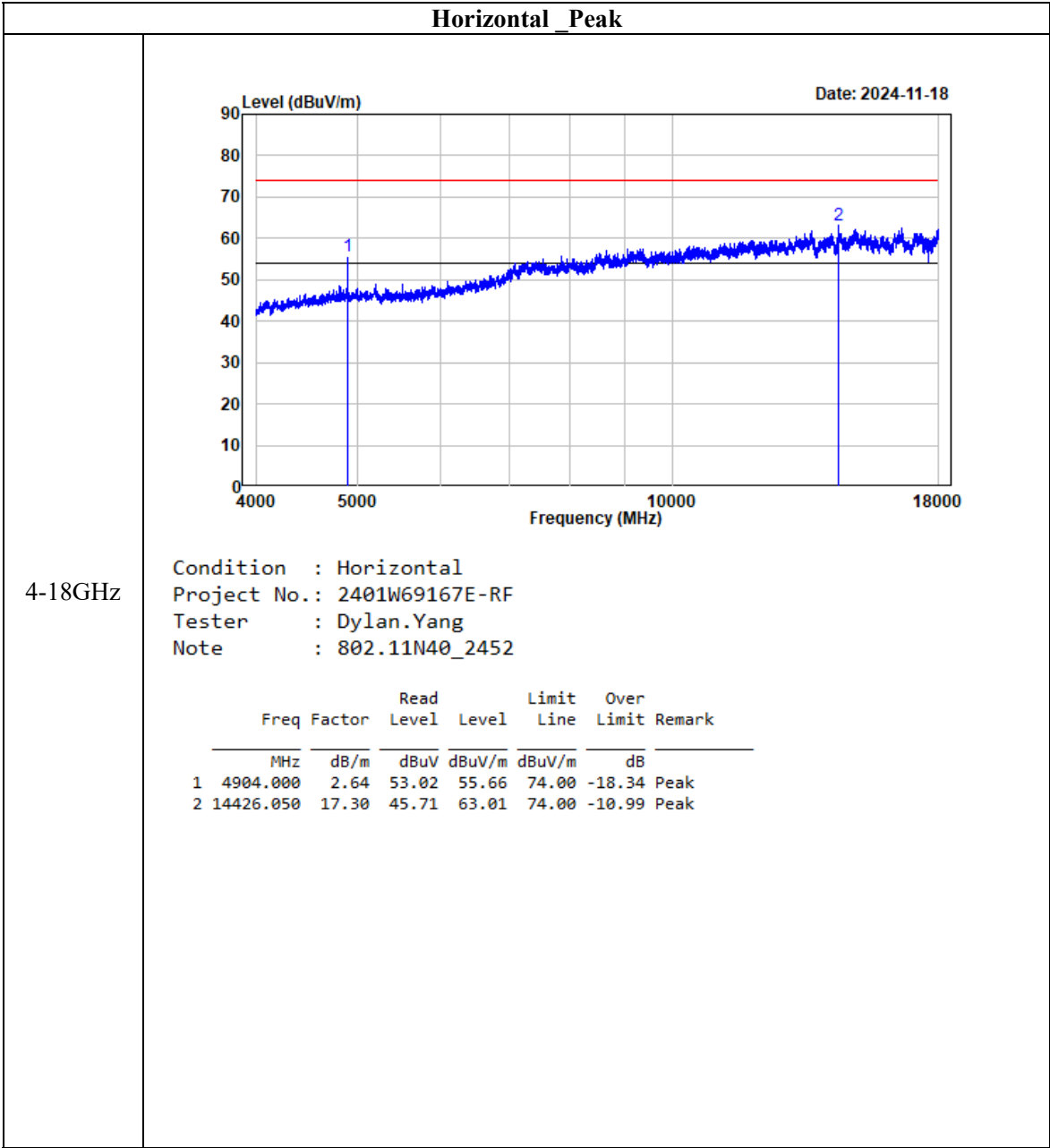


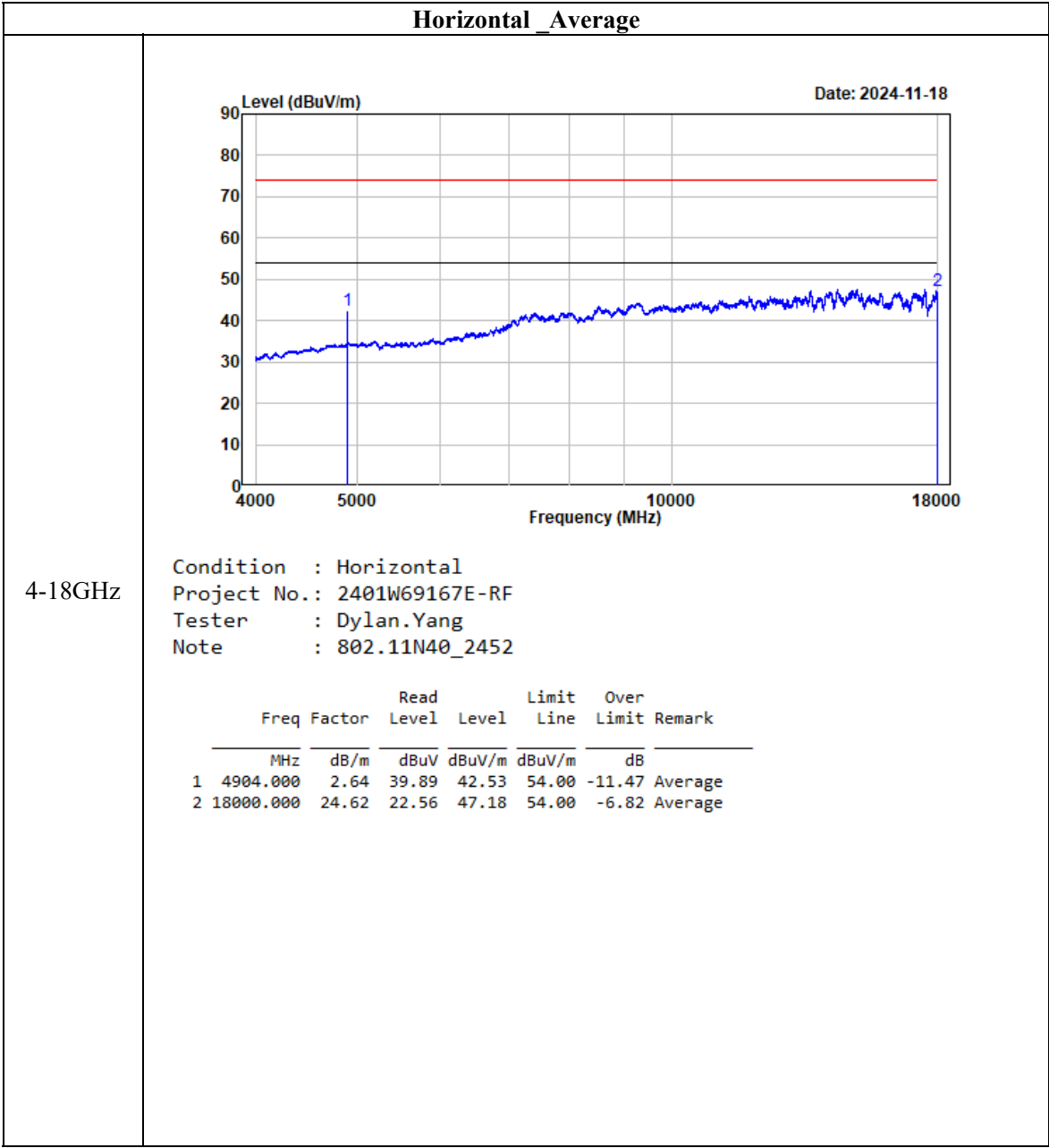


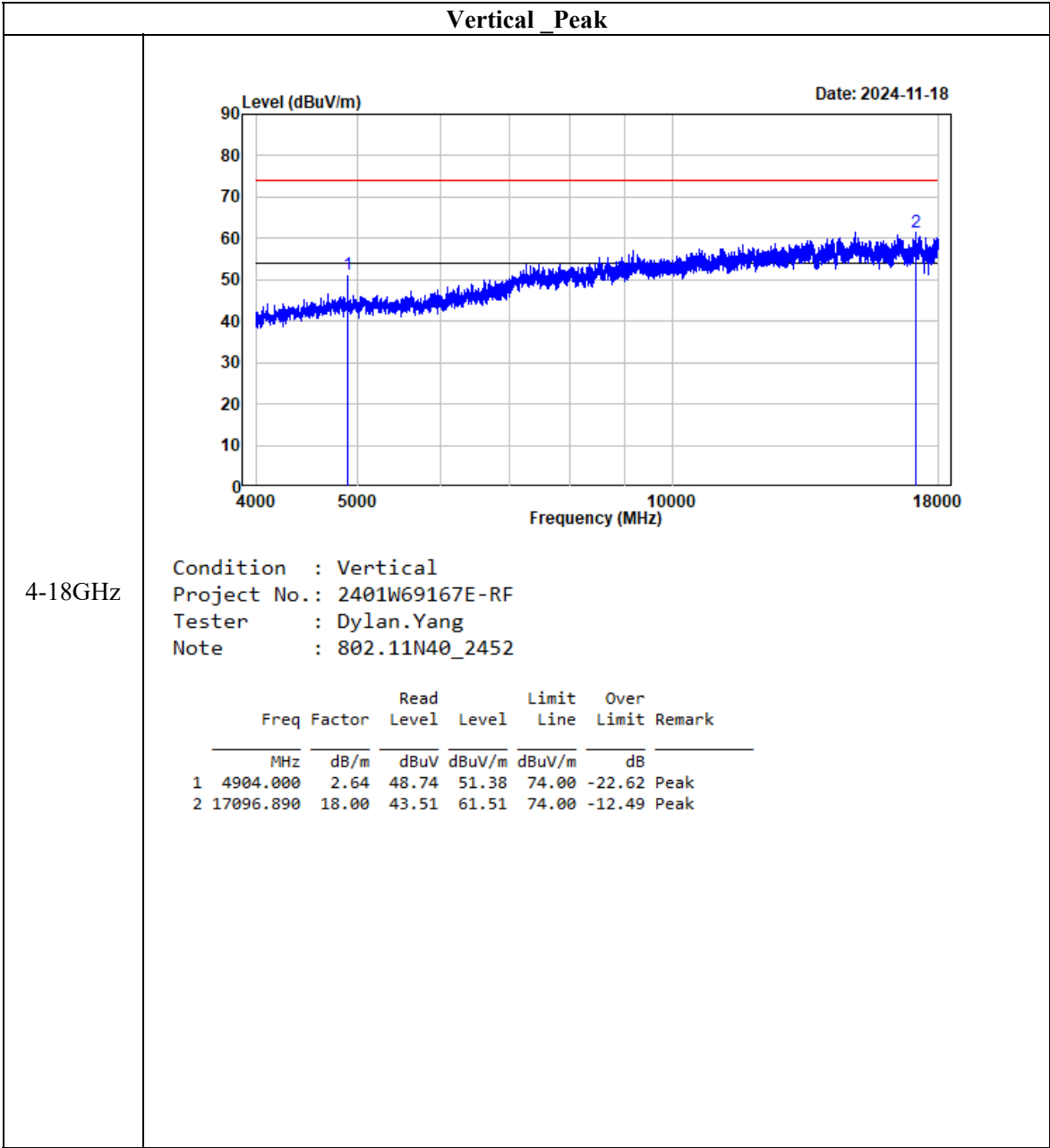
802.11n40:

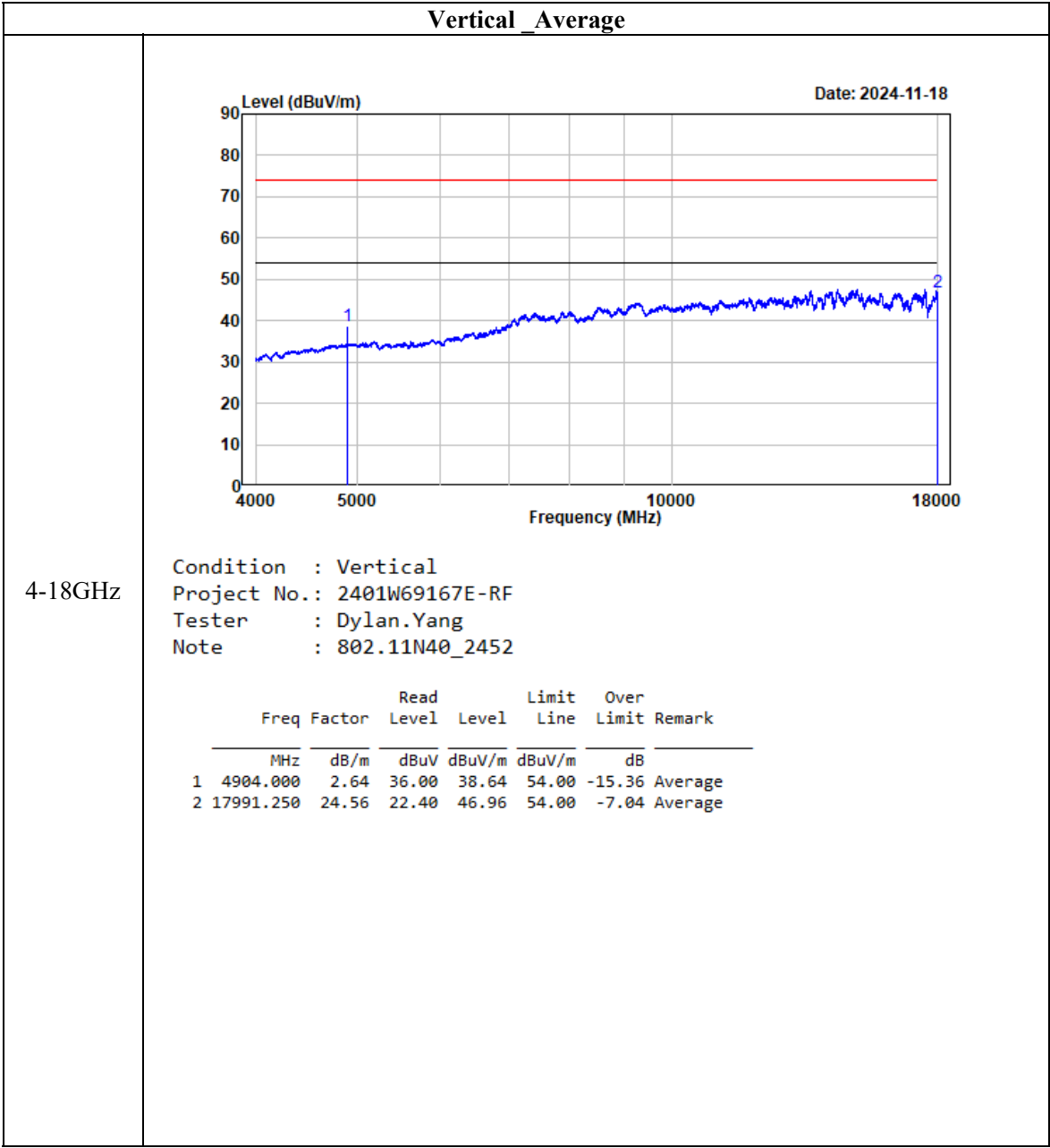












FCC §15.247(a) (2) - 6 dB EMISSION BANDWIDTH

Applicable Standard

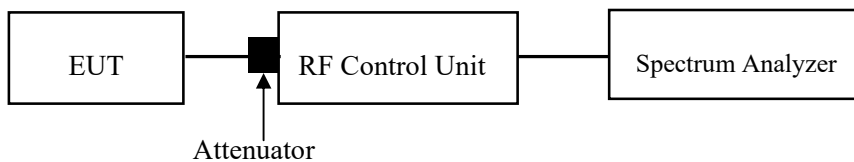
According to FCC §15.247(a) (2)

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:	25°C
Relative Humidity:	53 %
ATM Pressure:	101 kPa

The testing was performed by Tom Tan on 2024-09-24.

EUT operation mode: Transmitting

Test Result: Compliant. Please refer to the Appendix.

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

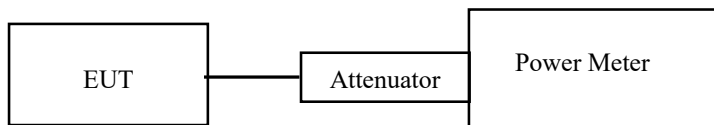
Applicable Standard

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 11.9.2.3 & 11.9.2.3.2

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:	25°C
Relative Humidity:	53 %
ATM Pressure:	101 kPa

The testing was performed by Tom Tan on 2024-09-24.

EUT operation mode: Transmitting

Test Result: Compliant. Please refer to the Appendix.

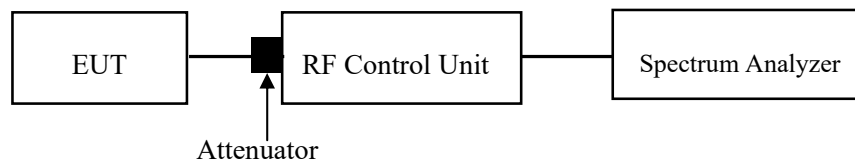
FCC §15.247(d) - 100 kHz BANDWIDTH OF FREQUENCY BAND EDGE**Applicable Standard**

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:	25°C
Relative Humidity:	53 %
ATM Pressure:	101 kPa

The testing was performed by Tom Tan on 2024-09-24.

EUT operation mode: Transmitting

Test Result: Compliant. Please refer to the Appendix.

FCC §15.247(e) - POWER SPECTRAL DENSITY

Applicable Standard

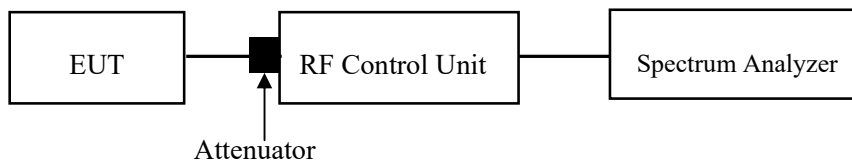
For digitally modulated systems, the power spectral density conducted from the intentional radiator to the antenna shall not be greater than 8 dBm in any 3 kHz band during any time interval of continuous transmission. This power spectral density shall be determined in accordance with the provisions of 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:	25°C
Relative Humidity:	53 %
ATM Pressure:	101 kPa

The testing was performed by Tom Tan on 2024-09-24.

EUT operation mode: Transmitting

Test Result: Compliant. Please refer to the Appendix.

EUT PHOTOGRAPHS

Please refer to the attachment 2401W69167E-RF External photo and 2401W69167E-RF Internal photo.

TEST SETUP PHOTOGRAPHS

Please refer to the attachment 2401W69167E-RF Test Setup photo.

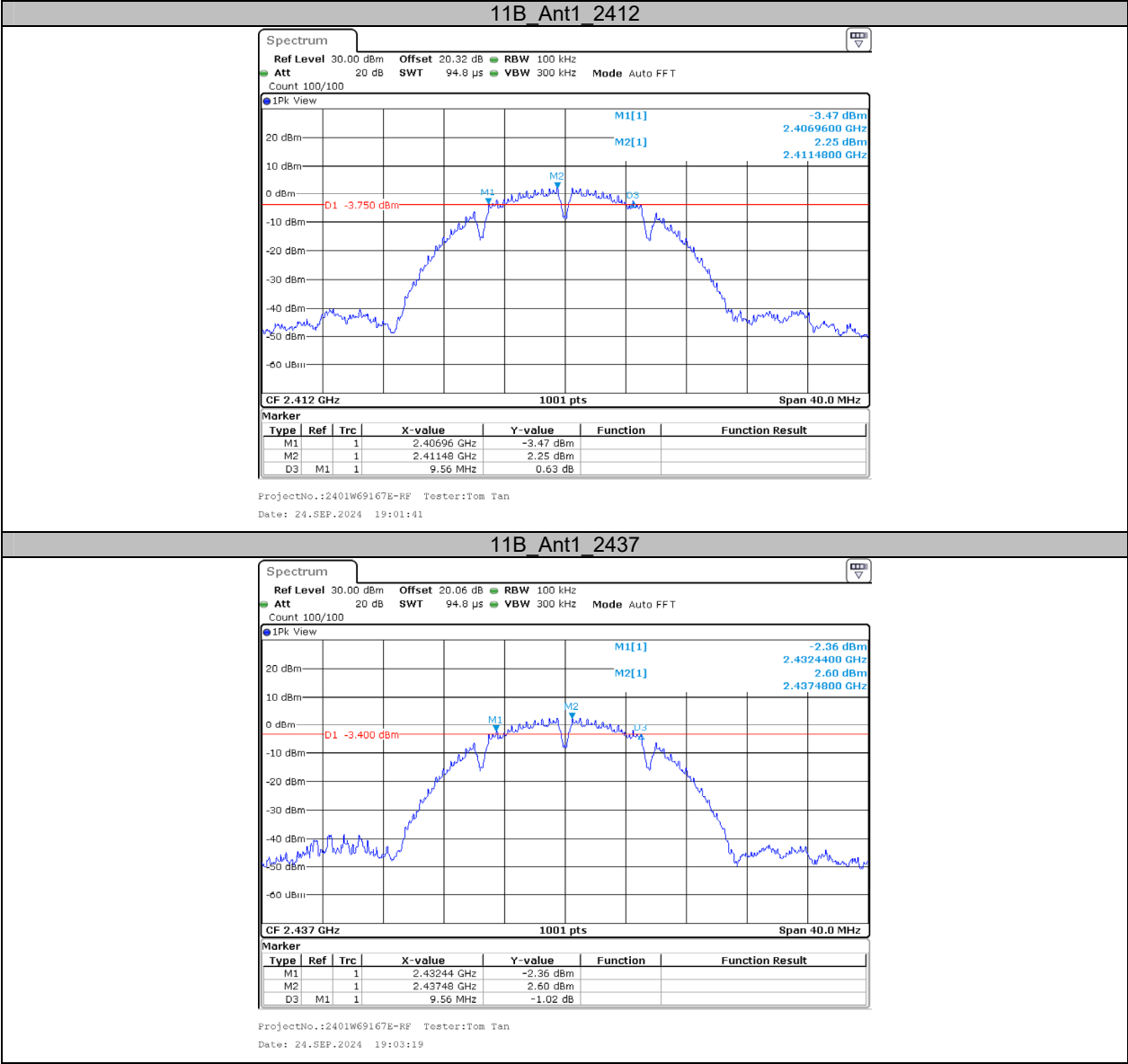
APPENDIX

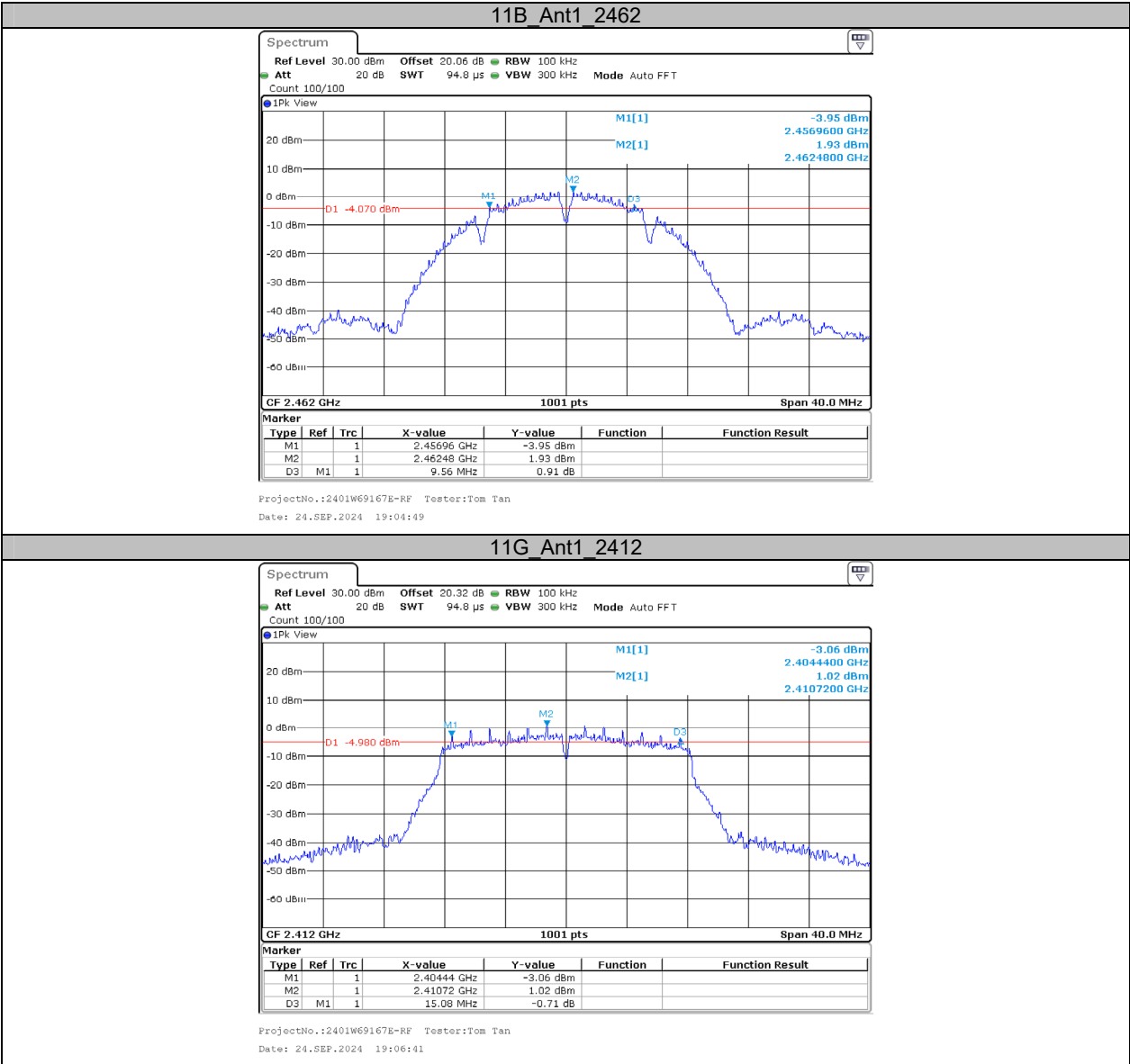
Appendix A: DTS Bandwidth

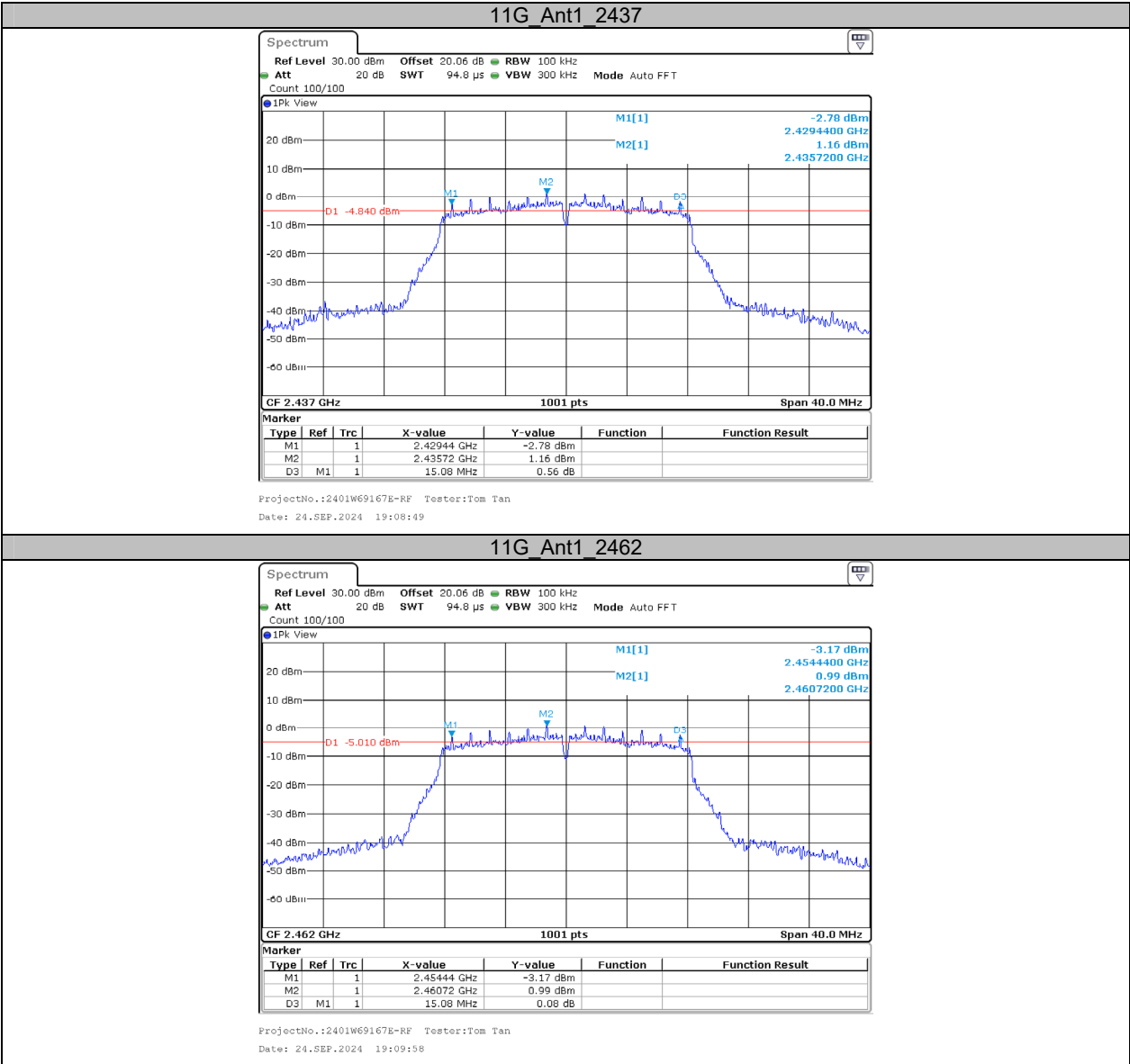
Test Result

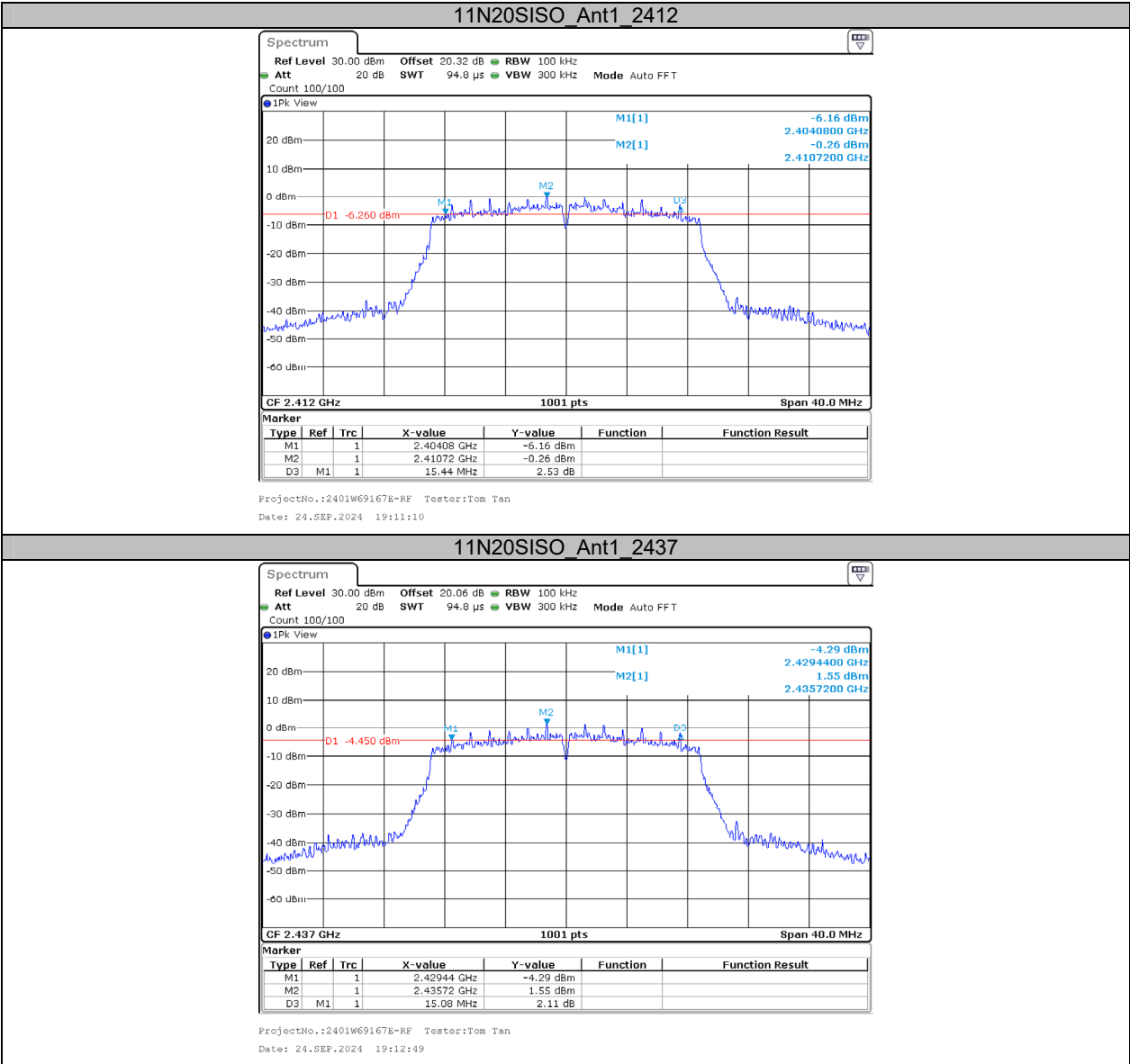
Test Mode	Antenna	Channel	DTS BW [MHz]	Limit[MHz]	Verdict
11B	Ant1	2412	9.56	0.5	PASS
		2437	9.56	0.5	PASS
		2462	9.56	0.5	PASS
11G	Ant1	2412	15.08	0.5	PASS
		2437	15.08	0.5	PASS
		2462	15.08	0.5	PASS
11N20SISO	Ant1	2412	15.44	0.5	PASS
		2437	15.08	0.5	PASS
		2462	15.08	0.5	PASS
11N40SISO	Ant1	2422	35.04	0.5	PASS
		2437	35.04	0.5	PASS
		2452	35.04	0.5	PASS

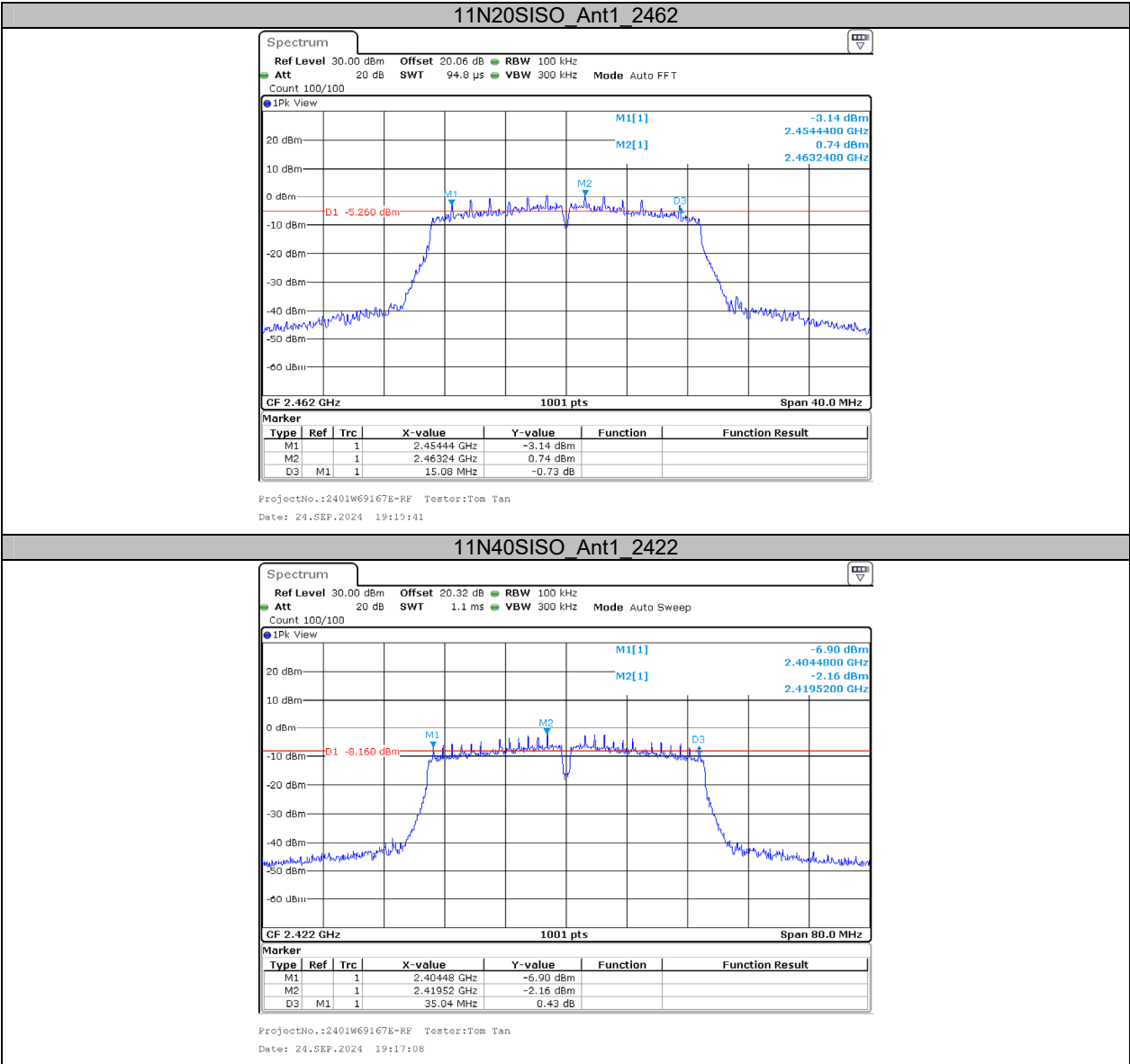
Test Graphs

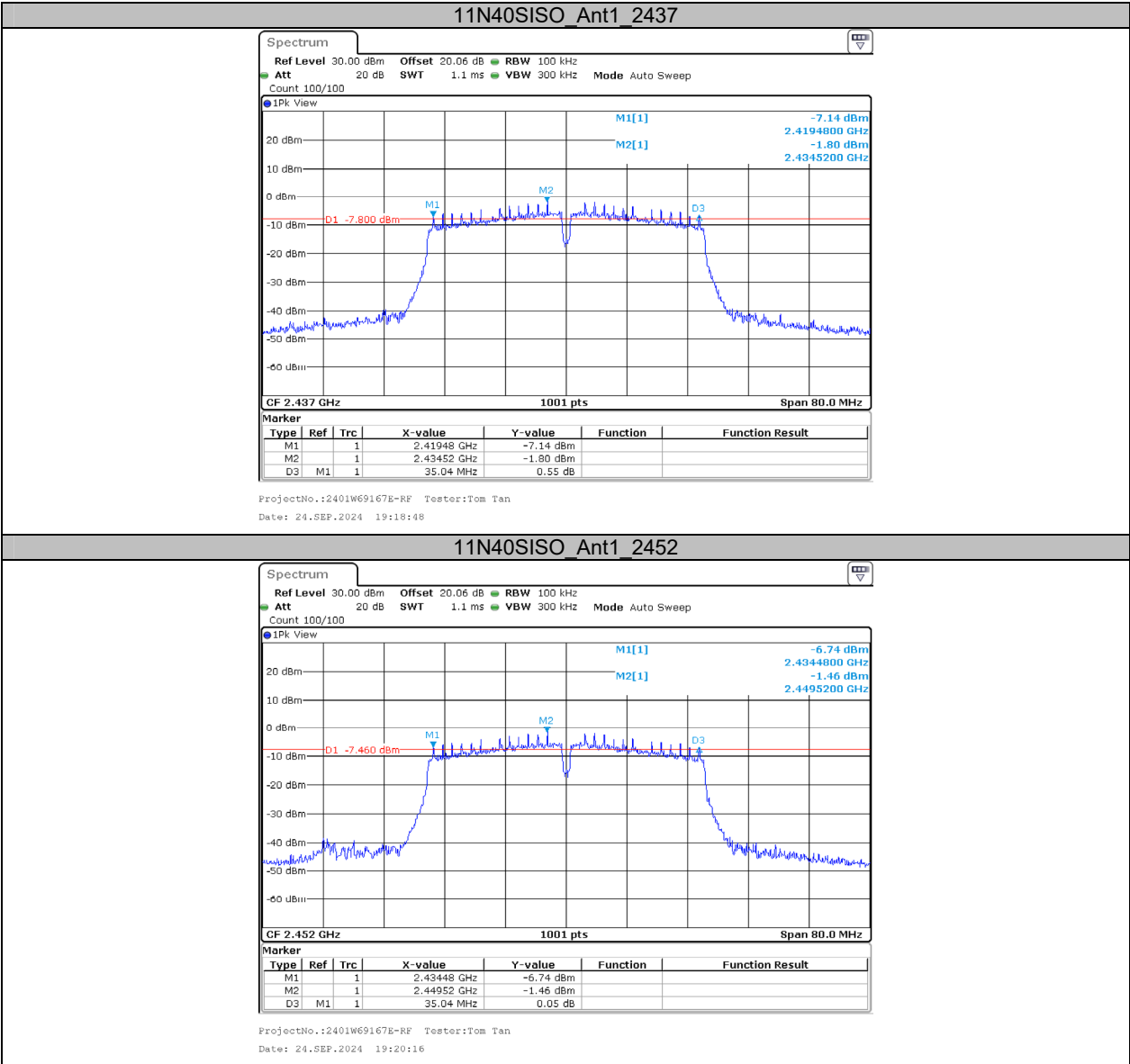








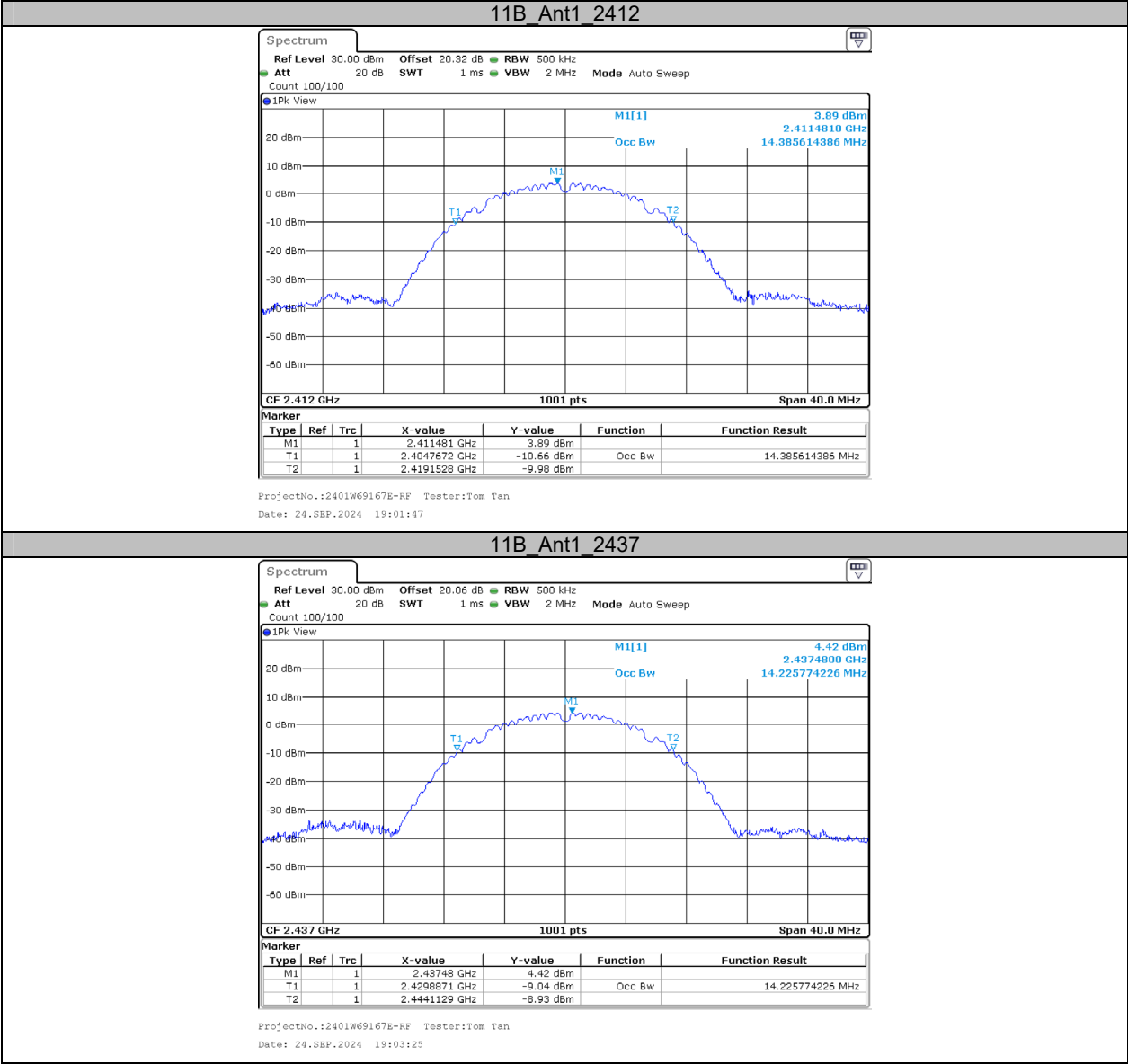


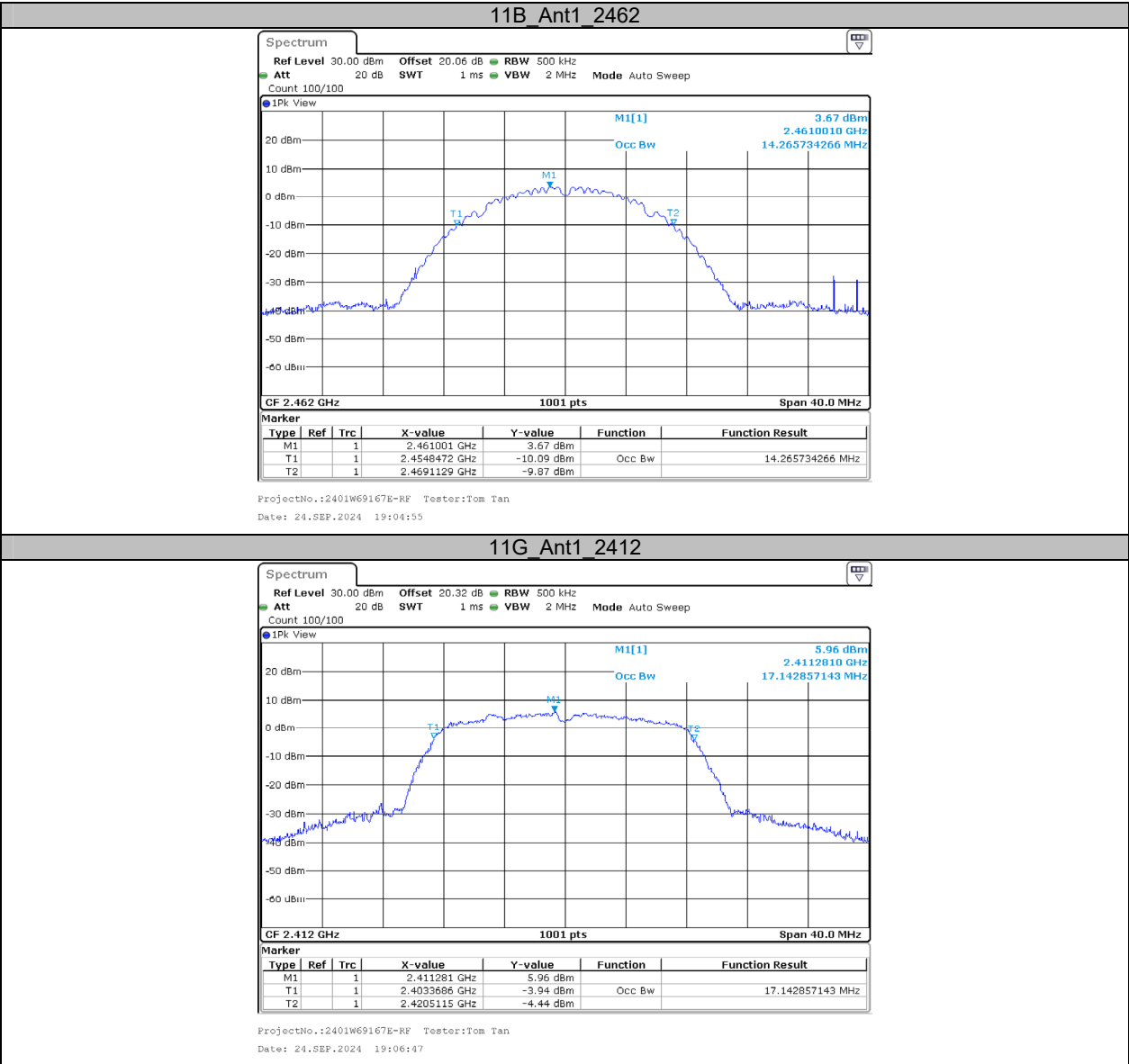


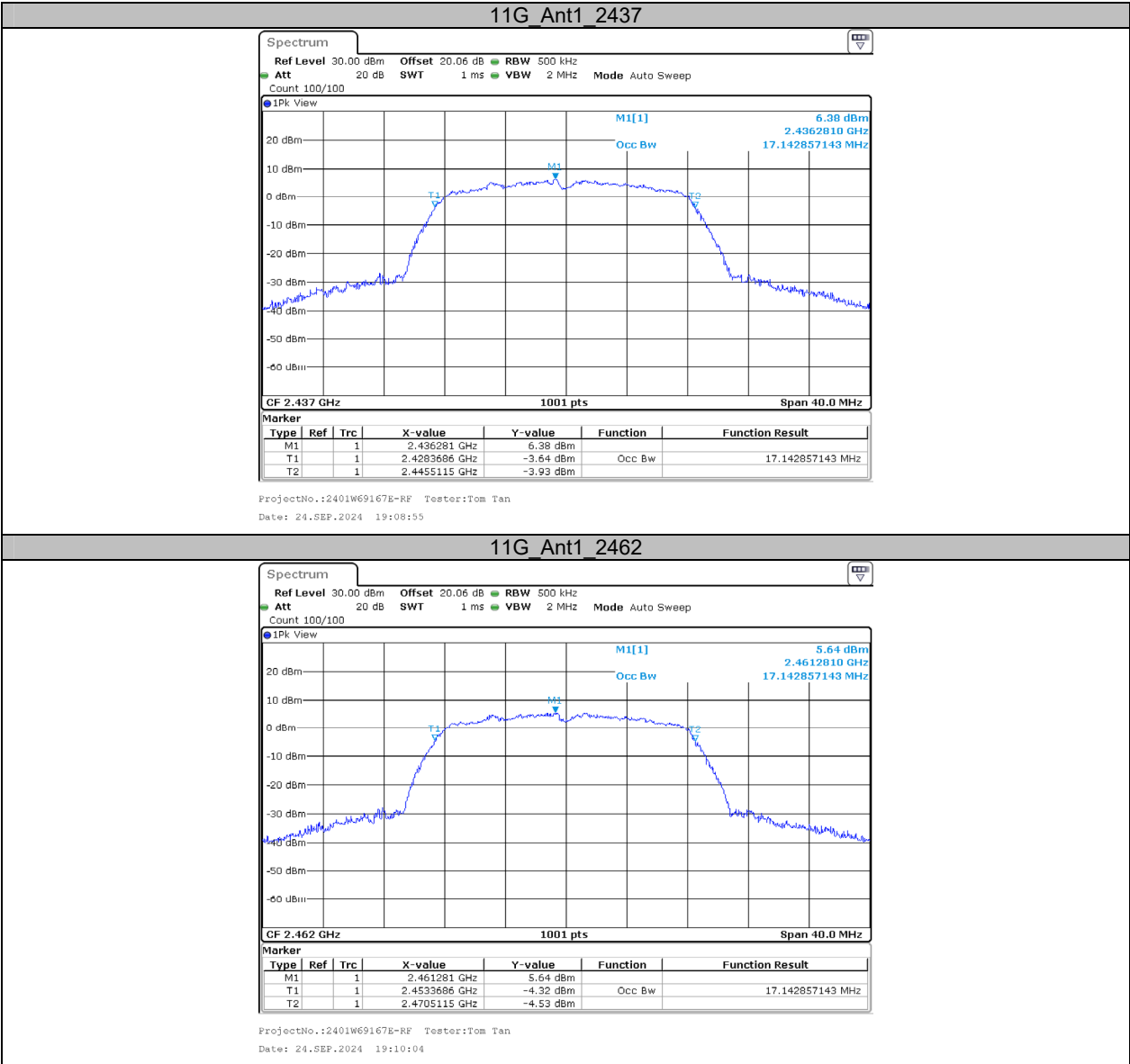
Appendix B: Occupied Channel Bandwidth**Test Result**

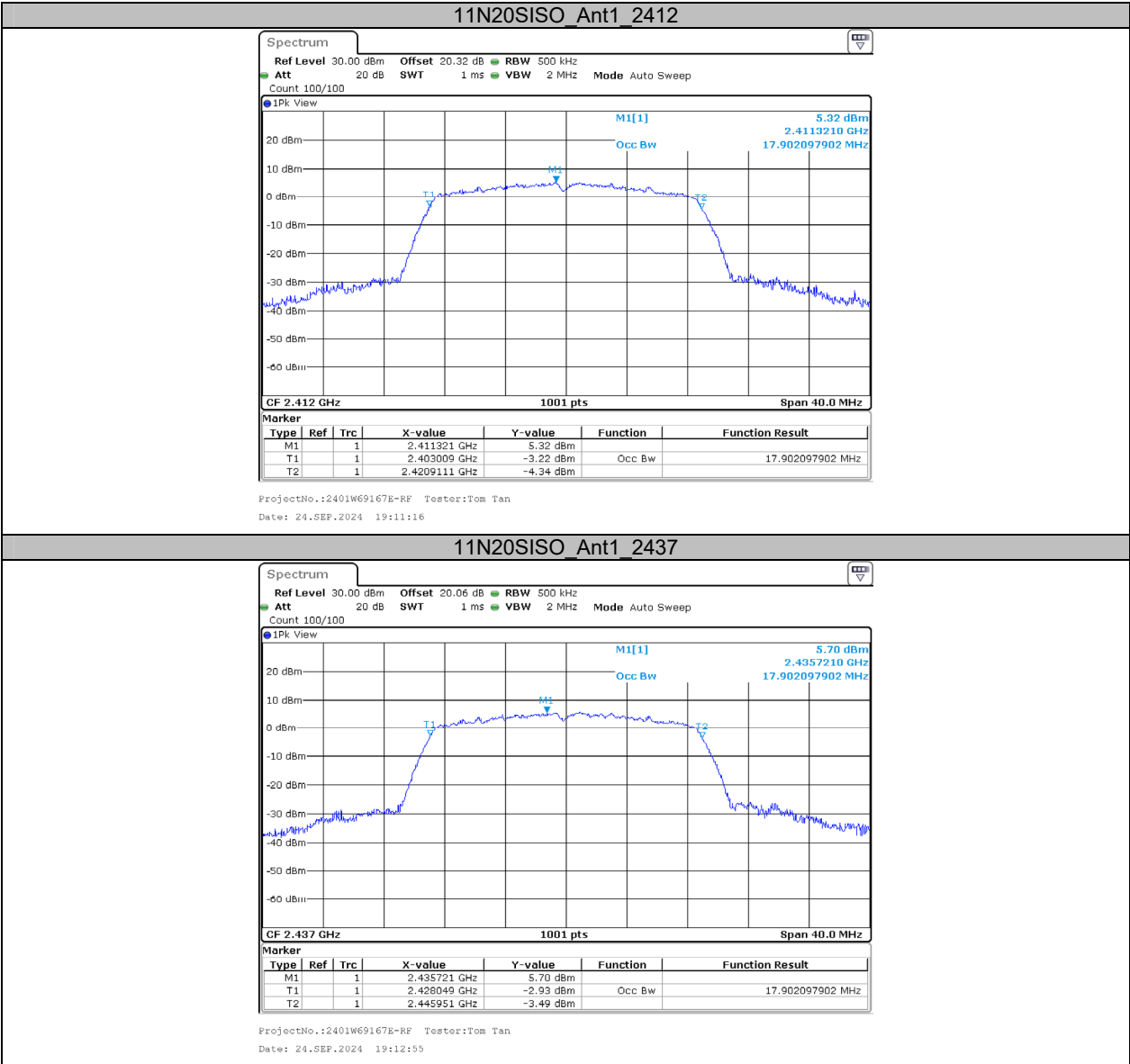
Test Mode	Antenna	Channel	OCB [MHz]	Limit[MHz]	Verdict
11B	Ant1	2412	14.386	---	---
		2437	14.226	---	---
		2462	14.266	---	---
11G	Ant1	2412	17.143	---	---
		2437	17.143	---	---
		2462	17.143	---	---
11N20SISO	Ant1	2412	17.902	---	---
		2437	17.902	---	---
		2462	17.942	---	---
11N40SISO	Ant1	2422	36.124	---	---
		2437	35.964	---	---
		2452	35.964	---	---

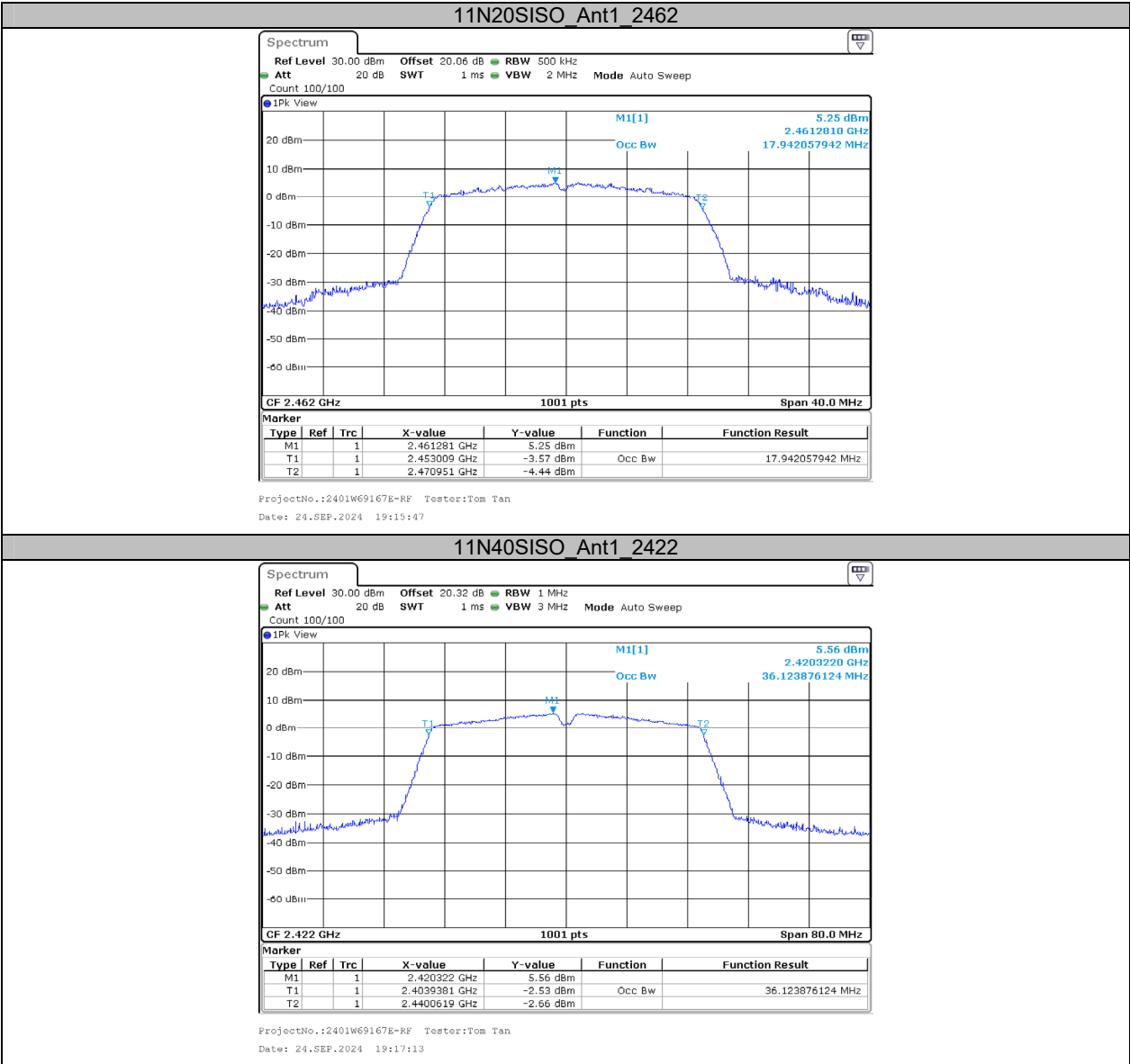
Test Graphs

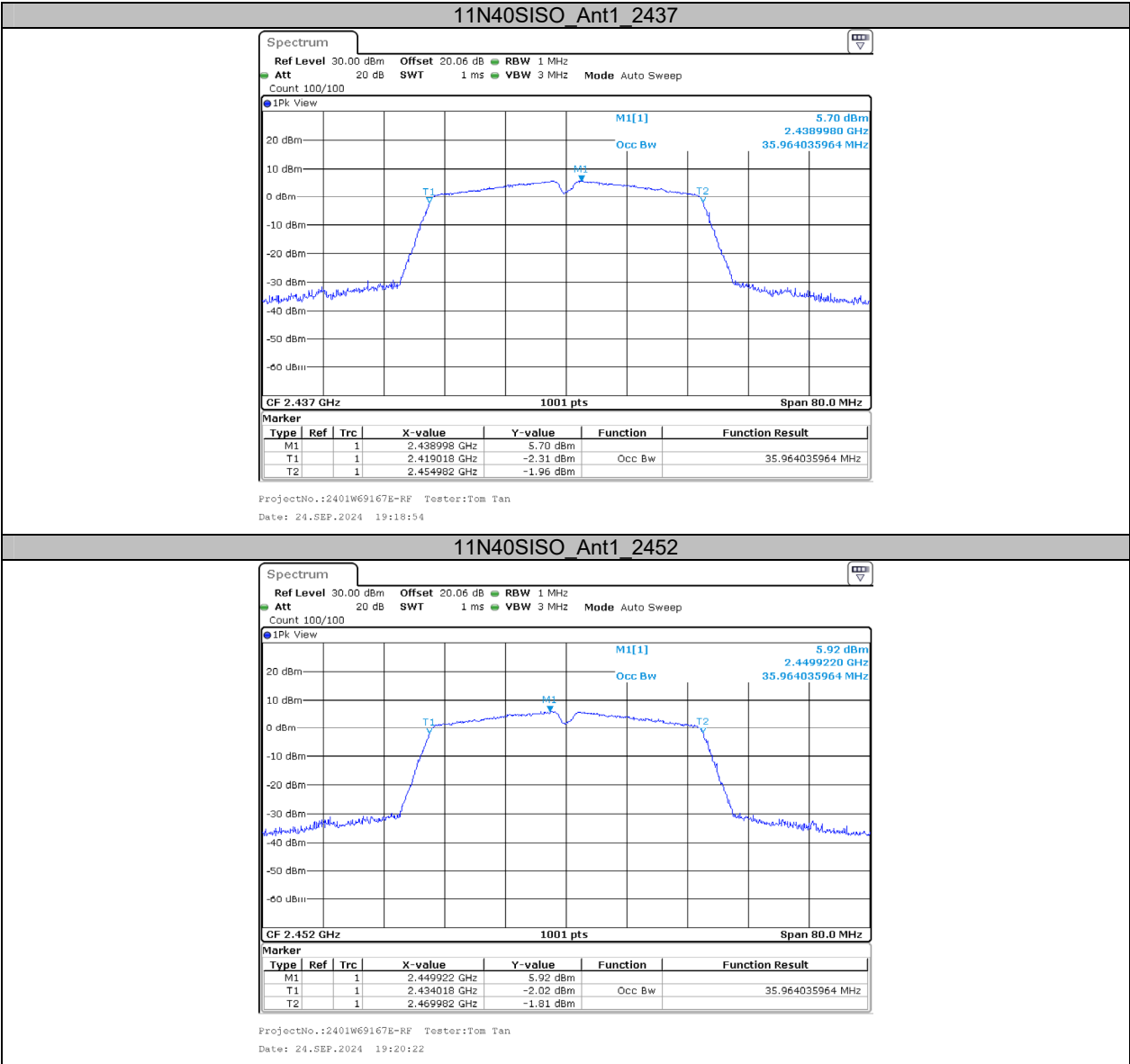












Appendix C: Maximum Conducted Output Power**Test Result Peak**

Test Mode	Antenna	Channel	Result[dBm]	Limit[dBm]	Verdict
11B	Ant1	2412	15.14	≤30.00	PASS
		2437	15.69	≤30.00	PASS
		2462	14.92	≤30.00	PASS
11G	Ant1	2412	19.01	≤30.00	PASS
		2437	19.43	≤30.00	PASS
		2462	18.84	≤30.00	PASS
11N20SISO	Ant1	2412	18.91	≤30.00	PASS
		2437	19.36	≤30.00	PASS
		2462	18.77	≤30.00	PASS
11N40SISO	Ant1	2422	18.03	≤30.00	PASS
		2437	18.36	≤30.00	PASS
		2452	18.47	≤30.00	PASS

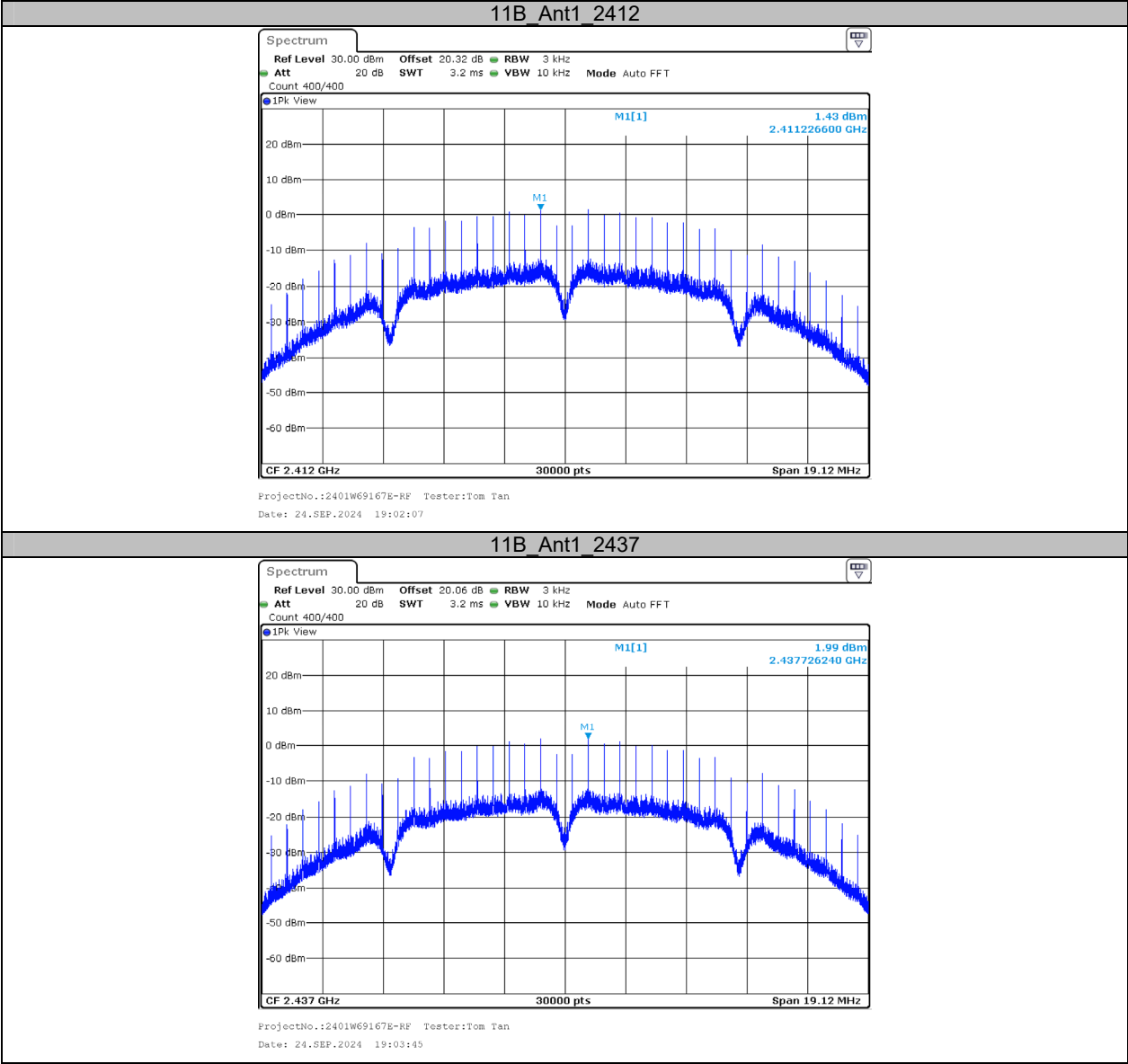
Test Result Average

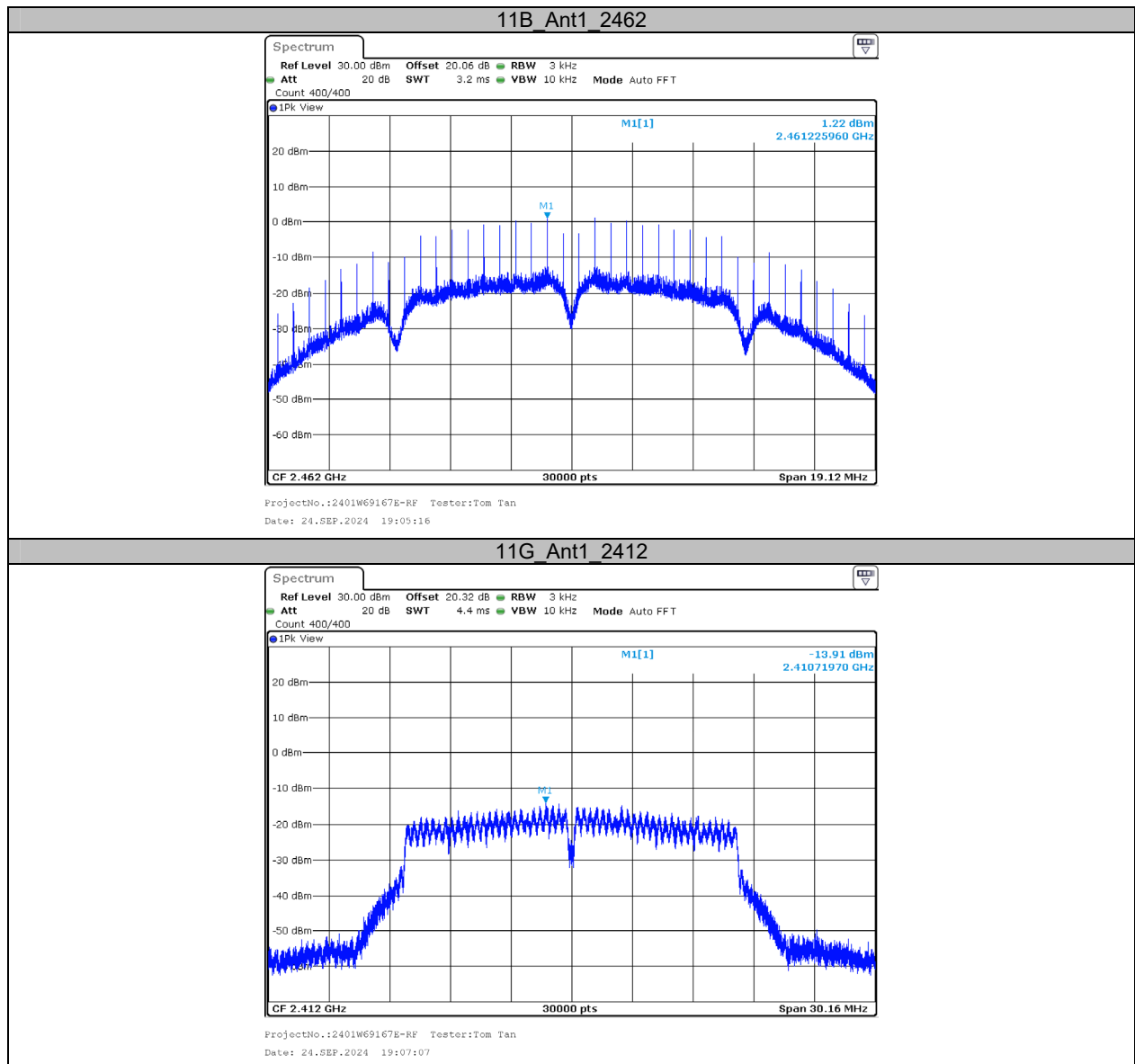
Test Mode	Antenna	Channel	Result[dBm]	Limit[dBm]	Verdict
11B	Ant1	2412	12.29	≤30.00	PASS
		2437	12.53	≤30.00	PASS
		2462	11.96	≤30.00	PASS
11G	Ant1	2412	11.59	≤30.00	PASS
		2437	11.97	≤30.00	PASS
		2462	11.40	≤30.00	PASS
11N20SISO	Ant1	2412	11.07	≤30.00	PASS
		2437	11.73	≤30.00	PASS
		2462	10.90	≤30.00	PASS
11N40SISO	Ant1	2422	10.66	≤30.00	PASS
		2437	10.88	≤30.00	PASS
		2452	11.10	≤30.00	PASS

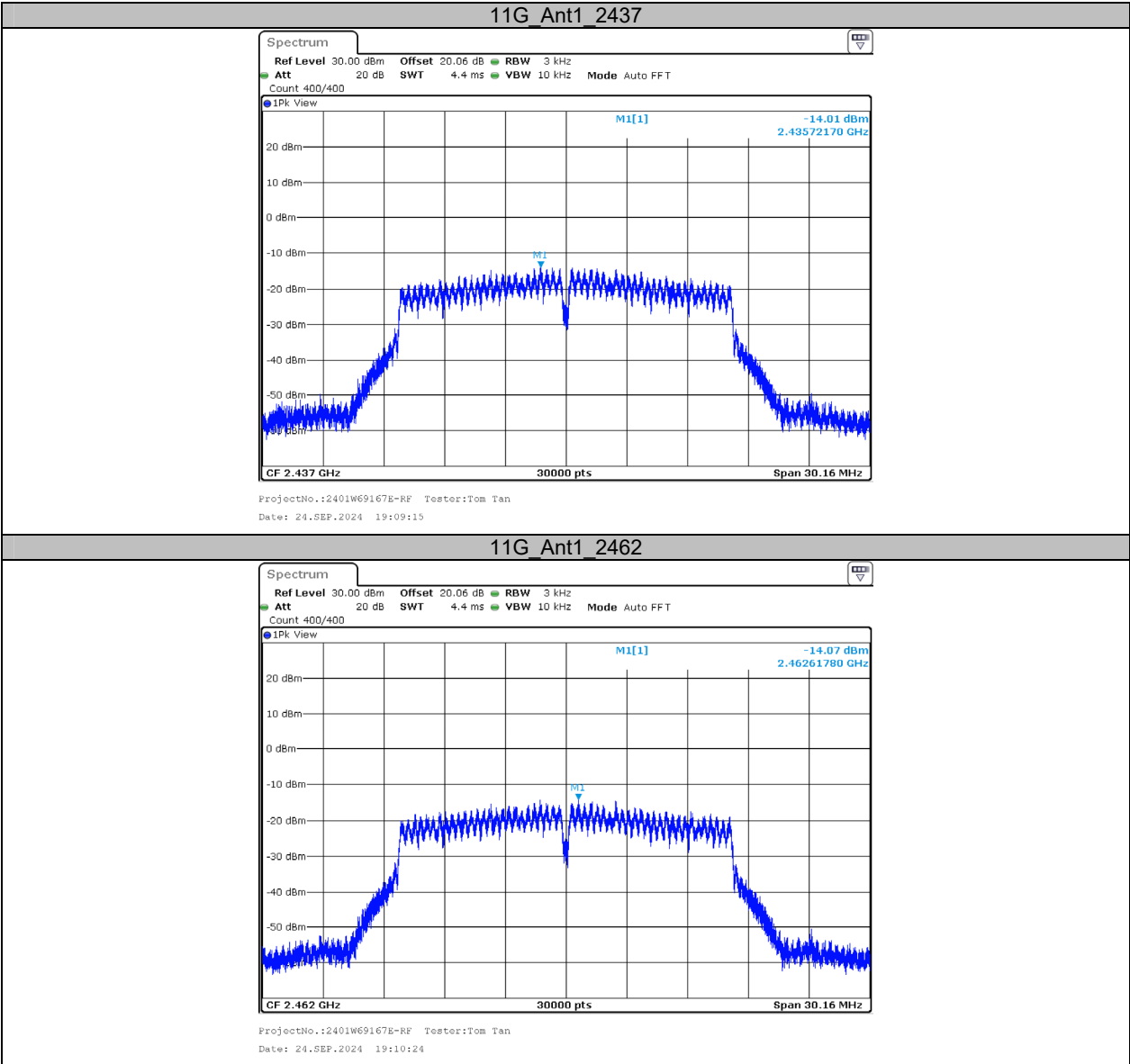
Appendix D: Maximum Power Spectral Density**Test Result**

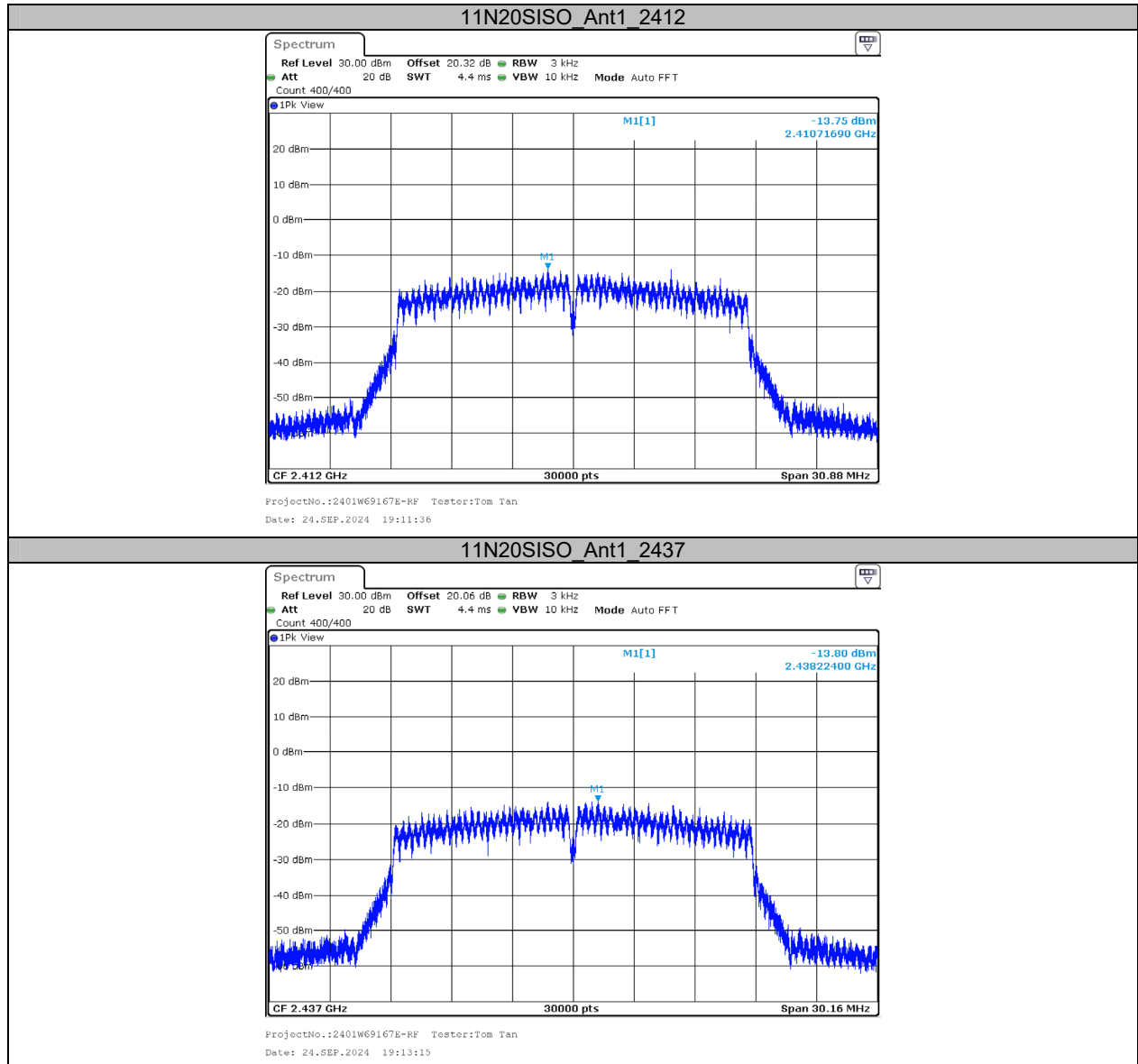
Test Mode	Antenna	Channel	Result[dBm/3kHz]	Limit[dBm/3kHz]	Verdict
11B	Ant1	2412	1.43	≤8.00	PASS
		2437	1.99	≤8.00	PASS
		2462	1.22	≤8.00	PASS
11G	Ant1	2412	-13.91	≤8.00	PASS
		2437	-14.01	≤8.00	PASS
		2462	-14.07	≤8.00	PASS
11N20SISO	Ant1	2412	-13.75	≤8.00	PASS
		2437	-13.80	≤8.00	PASS
		2462	-13.88	≤8.00	PASS
11N40SISO	Ant1	2422	-16.86	≤8.00	PASS
		2437	-17.43	≤8.00	PASS
		2452	-16.84	≤8.00	PASS

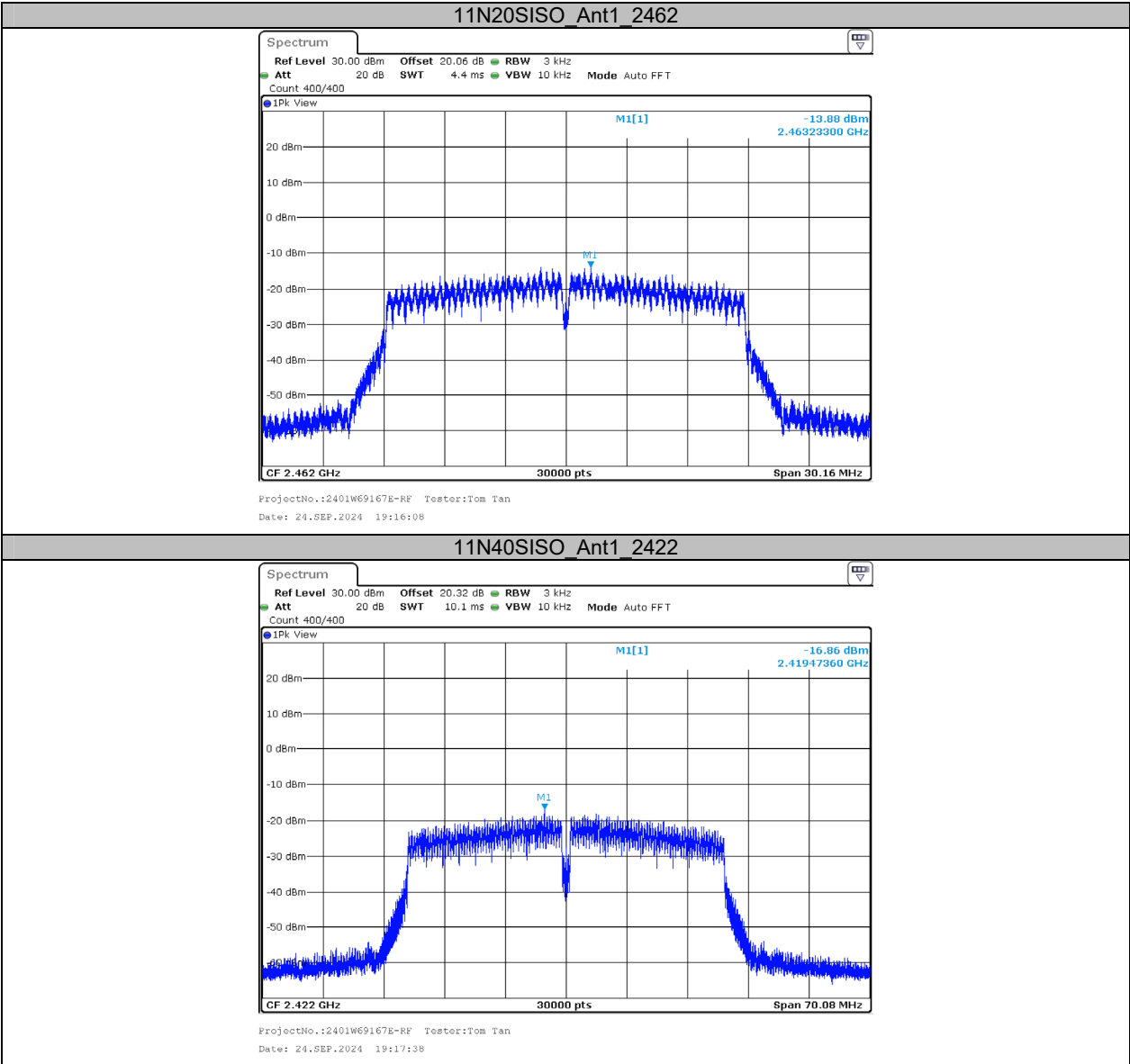
Test Graphs

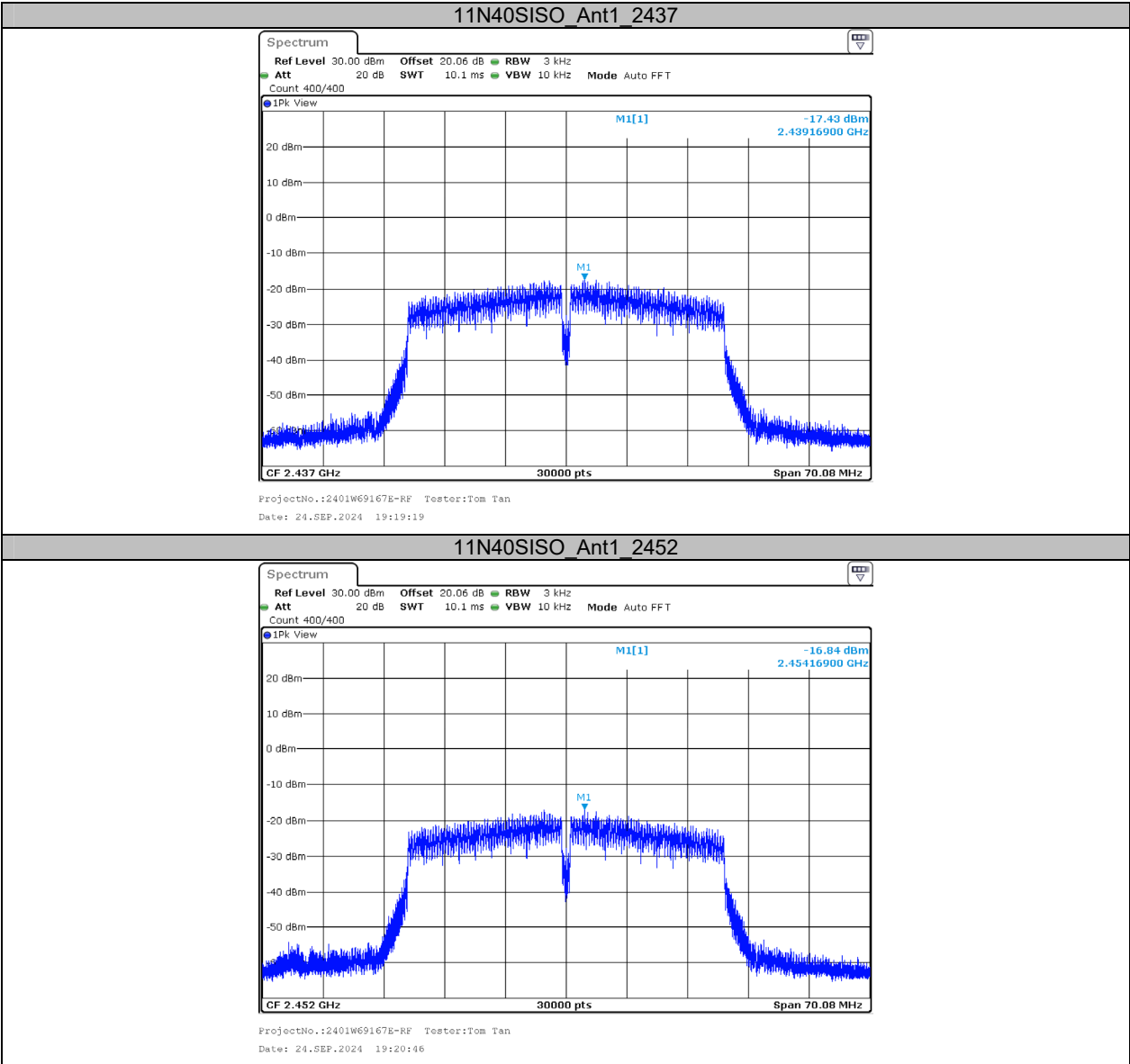






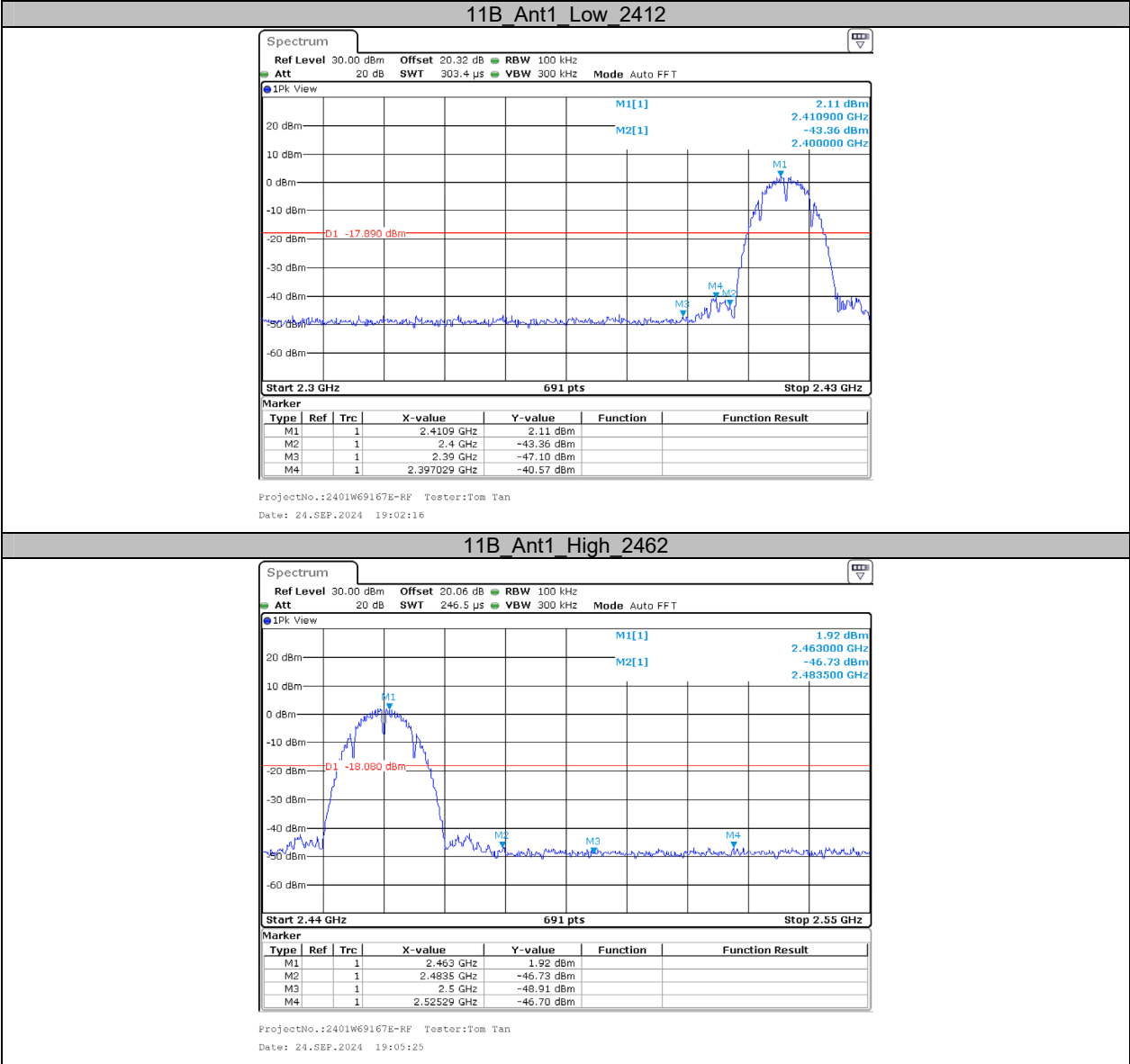


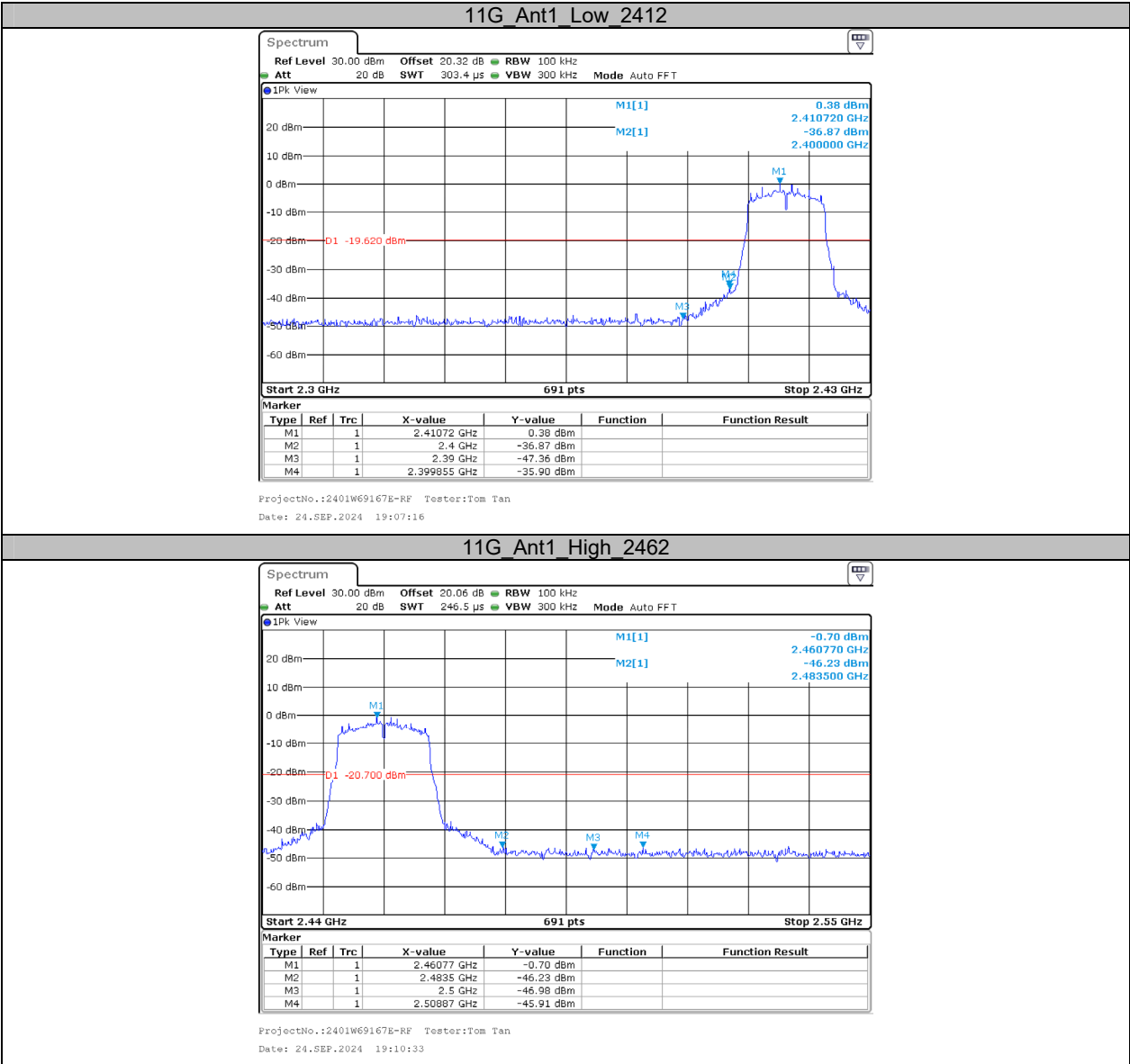


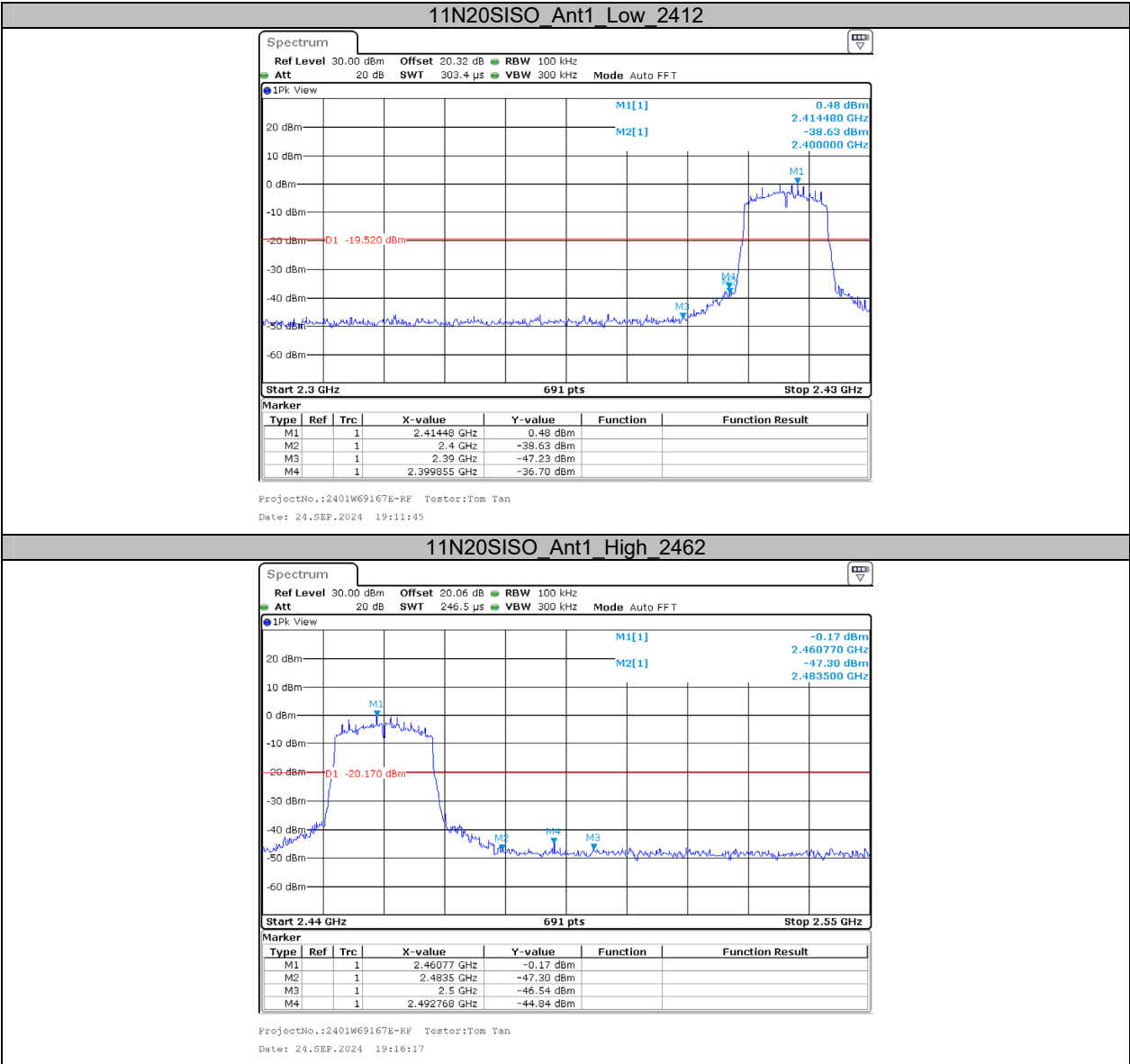


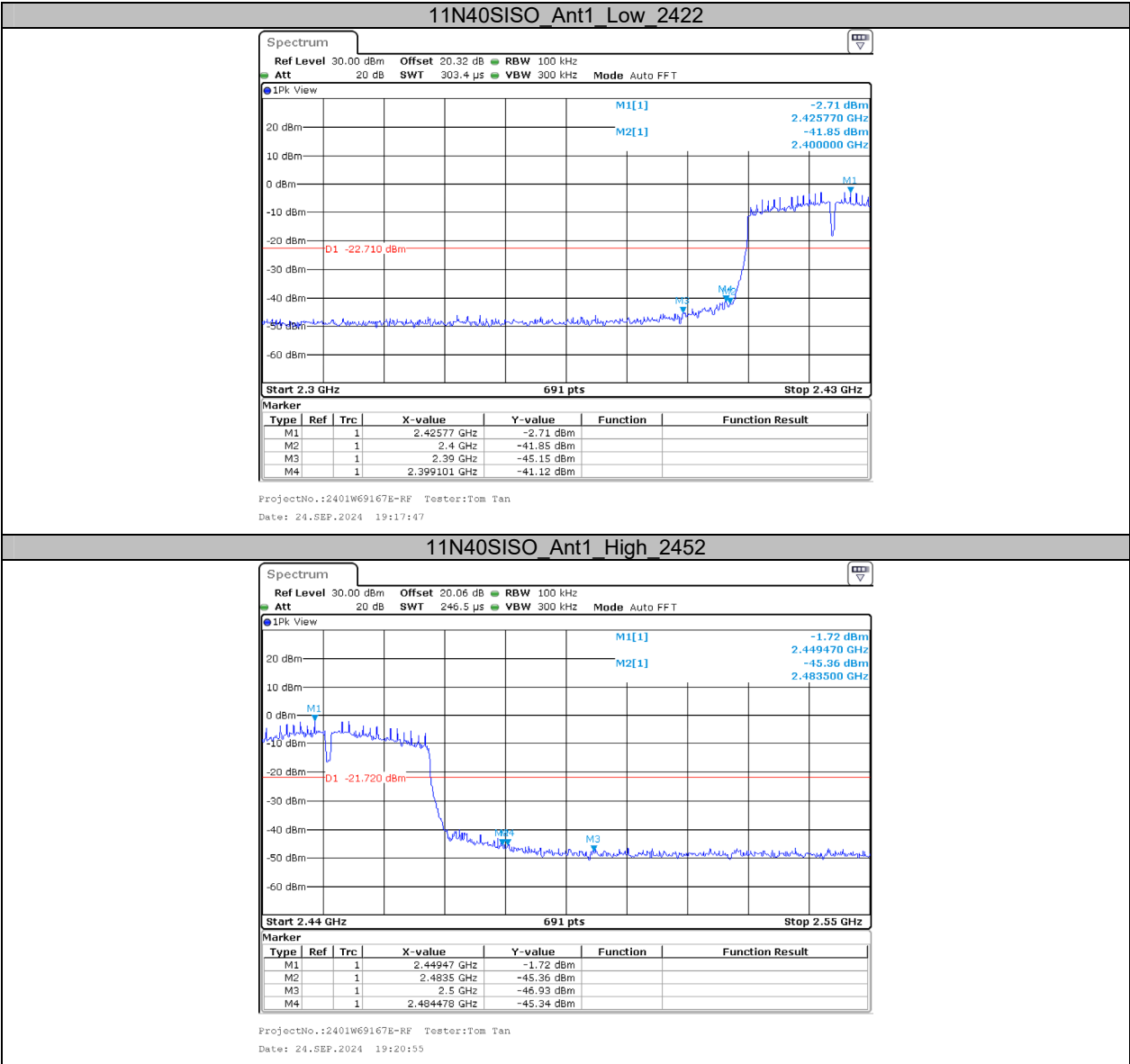
Appendix E: Band Edge Measurements

Test Result









Appendix F: Duty Cycle**Test Result**

Test Mode	Antenna	Channel	Transmission Duration [ms]	Transmission Period [ms]	Duty Cycle [%]	1/T _{ON} (Hz)	VBV Setting (Hz)
11B	Ant1	2437	8.41	8.62	97.56	119	500
11G	Ant1	2437	1.40	1.66	84.34	714	1000
11N20SISO	Ant1	2437	1.31	1.60	81.88	763	1000
11N40SISO	Ant1	2437	0.65	0.93	69.89	1538	3000

Test Graphs