

TEST REPORT

Applicant Name: Fanvil Link Technology Co.,LTD
Address: Room 1517, Building G, Hualian City Panorama.27 Region,
Bao'an District; Shenzhen, China
Report Number: SZ1231214-75461E-RF-00A
FCC ID: 2BCUQ-RC10

Test Standard (s)
FCC PART 15.407

Sample Description

Product Type: All-in-one Conference Solution
Model No.: RC10
Multiple Model(s) No.: CA400; CA400-RC10
Trade Mark: **LINKVIL**
Date Received: 2023/12/14
Report Date: 2024/02/05

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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Andy Yu
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Approved By:

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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	SZ1231214-75461E-RF-00A	Original Report	2024/02/05

GENERAL INFORMATION

Product Description for Equipment under Test (EUT)

Product	All-in-one Conference Solution
Tested Model	RC10
Multiple Model(s)	CA400; CA400-RC10 (Please refer to the DoS [#] provided by the applicant)
Frequency Range	5G Wi-Fi: 5150-5250MHz; 5250-5350MHz; 5470-5725MHz; 5725-5850MHz
Mode	802.11a/n20/n40/ac20/ac40/ac80
Maximum Conducted Average Output Power	5150-5250MHz: 16.50dBm 5250-5350MHz: 13.58dBm 5470-5725MHz: 15.55dBm 5725-5850MHz: 15.78dBm
Modulation Technique	OFDM
Antenna Specification [#]	5.3dBi (provided by the applicant)
Voltage Range	DC5V from adapter
Sample serial number	2FBD-1 for Conducted and Radiated Emissions Test 2FBD-2 for RF Conducted Test (Assigned by BACL, Shenzhen)
Sample/EUT Status	Good condition
Adapter Information	Model: AS1201A-0502000USL Input: AC 100-240V 50/60Hz 0.35A MAX Output: DC 5V 2000mA

Objective

This test report is in accordance with Part 2-Subpart J, Part 15-Subparts A and E of the Federal Communication Commissions rules.

The tests were performed in order to determine compliance with FCC Part 15, Subpart E, section 15.203, 15.205, 15.207, 15.209 and 15.407 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 KDB789033 D02 General U-NII Test Procedures New Rules v02r01.

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 Frequency		213.55 Hz(k=2, 95% level of confidence)
RF output power, conducted		0.72 dB(k=2, 95% level of confidence)
Unwanted Emission, conducted		1.75 dB(k=2, 95% level of confidence)
AC Power Lines Conducted Emissions	9kHz-150kHz	3.94dB(k=2, 95% level of confidence)
	150kHz-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

The system was configured for testing in an engineering mode, which was provided by manufacturer.

The system support 802.11a/n ht20/n ht40/ac vht20/ac vht40/ac vht80, the 802.11 n ht20/n ht40 were reduced since the identical parameters with 802.11ac vht20 and vht40.

For 5150-5250MHz Band, 7 channels are provided to testing:

Channel	Frequency (MHz)	Channel	Frequency (MHz)
36	5180	44	5220
38	5190	46	5230
40	5200	48	5240
42	5210	/	/

For 802.11a/ac20 mode: channel 36, 40, 48 were tested;

For 802.11ac40 mode: channel 38, 46 were tested;

For 802.11ac80 mode, channel 42 was tested.

For 5250-5350MHz Band, 7 channels are provided to testing:

Channel	Frequency (MHz)	Channel	Frequency (MHz)
52	5260	60	5300
54	5270	62	5310
56	5280	64	5320
58	5290	/	/

For 802.11a, 802.11n20/ac20 mode: channel 52, 56, 64 were tested;

For 802.11n40/ac40 mode: channel 54, 62 were tested;

For 802.11ac80 mode, channel 58 was tested.

For 5470-5725MHz Band, 21 channels are provided to testing:

Channel	Frequency (MHz)	Channel	Frequency (MHz)
100	5500	124	5620
102	5510	126	5630
104	5520	128	5640
106	5530	132	5660
108	5540	134	5670
110	5550	136	5680
112	5560	138	5690
116	5580	140	5700
118	5590	142	5710
120	5600	144	5720
122	5610	/	/

For 802.11a, 802.11n20/ac20 mode: channel 100, 116, 140, 144 were tested;

For 802.11n40/ac40 mode: channel 102, 110, 134, 142 were tested;

For 802.11ac80 mode, channel 106, 122, 138 was tested.

For 5725-5850MHz Band, 8 channels are provided to testing:

Channel	Frequency (MHz)	Channel	Frequency (MHz)
149	5745	157	5785
151	5755	159	5795
153	5765	161	5805
155	5775	165	5825

For 802.11a/ac20 mode: channel 149, 157, 165 were tested;

For 802.11ac40 mode: channel 151, 159 were tested;

For 802.11ac80 mode, channel 155 was tested.

EUT Exercise Software

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

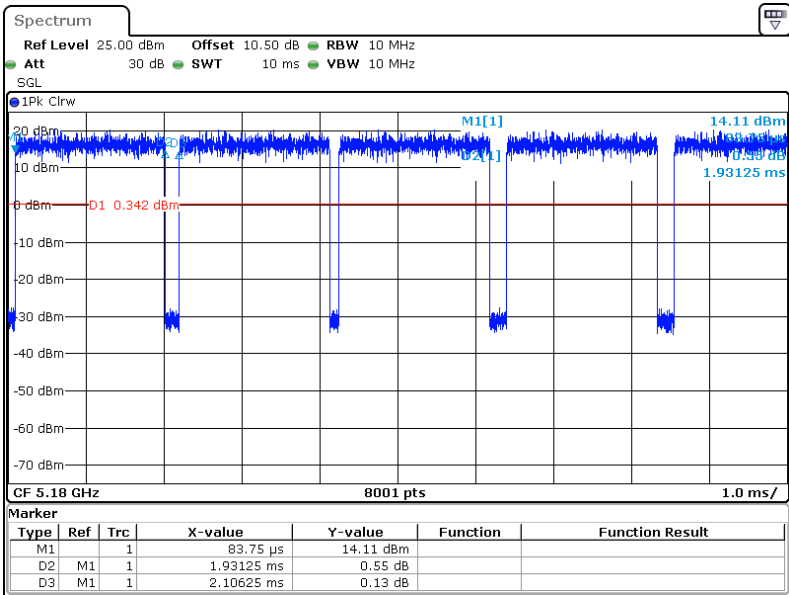
5150-5250 MHz Band:					
Test Modes	Test Channels	Test Frequency (MHz)	Data rate	Power Level Setting[#]	
				ANT 1	ANT 2
802.11a	Lowest	5180	6Mbps	Default	Default
	Middle	5200	6Mbps	Default	Default
	Highest	5240	6Mbps	Default	Default
802.11ac vht20	Lowest	5180	MCS0	Default	Default
	Middle	5200	MCS0	Default	Default
	Highest	5240	MCS0	Default	Default
802.11ac vht40	Lowest	5190	MCS0	Default	Default
	Highest	5230	MCS0	Default	Default
802.11ac vht80	Middle	5210	MCS0	Default	Default
5250-5350 MHz Band:					
Test Modes	Test Channels	Test Frequency (MHz)	Data rate	Power Level Setting[#]	
				ANT 1	ANT 2
802.11a	Lowest	5260	6Mbps	Default	Default
	Middle	5280	6Mbps	Default	Default
	Highest	5320	6Mbps	Default	Default
802.11ac vht20	Lowest	5260	MCS0	Default	Default
	Middle	5280	MCS0	Default	Default
	Highest	5320	MCS0	Default	Default
802.11ac vht40	Lowest	5270	MCS0	Default	Default
	Highest	5310	MCS0	Default	Default
802.11ac vht80	Middle	5290	MCS0	Default	Default

5470-5725 MHz Band:					
Test Modes	Test Channels	Test Frequency (MHz)	Data rate	Power Level Setting [#]	
				ANT 1	ANT 2
802.11a	Lowest	5500	6Mbps	Default	Default
	Middle	5580	6Mbps	Default	Default
	Highest	5700	6Mbps	Default	Default
	Cross	5720	6Mbps	Default	Default
802.11ac vht20	Lowest	5500	MCS0	Default	Default
	Middle	5580	MCS0	Default	Default
	Highest	5700	MCS0	Default	Default
	Cross	5720	MCS0	Default	Default
802.11ac vht40	Lowest	5510	MCS0	Default	Default
	Middle	5550	MCS0	Default	Default
	Highest	5670	MCS0	Default	Default
	Cross	5710	MCS0	Default	Default
802.11ac vht80	Lowest	5530	MCS0	Default	Default
	Highest	5610	MCS0	Default	Default
	Cross	5690	MCS0	Default	Default
5725-5850 MHz Band:					
Test Modes	Test Channels	Test Frequency (MHz)	Data rate	Power Level Setting [#]	
				ANT 1	ANT 2
802.11a	Lowest	5745	6Mbps	Default	Default
	Middle	5785	6Mbps	Default	Default
	Highest	5825	6Mbps	Default	Default
802.11ac vht20	Lowest	5745	MCS0	Default	Default
	Middle	5785	MCS0	Default	Default
	Highest	5825	MCS0	Default	Default
802.11ac vht40	Lowest	5755	MCS0	Default	Default
	Highest	5795	MCS0	Default	Default
802.11ac vht80	Middle	5775	MCS0	Default	Default
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 a mode, the device only support SISO mode. 3. For 802.11n/ac modes, the device supports SISO and MIMO in all modes, per pretest, the MIMO mode was the worst mode for all the modes.					

Duty cycle

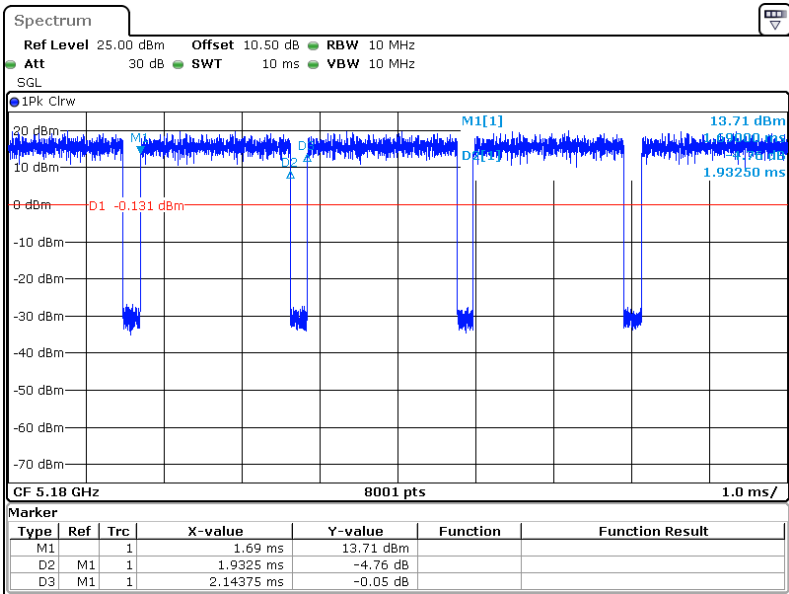
Test Modes	Ton (ms)	Ton+off (ms)	Duty Cycle (%)	Duty Cycle Factor (dB)	1/T (Hz)	VBW Setting (Hz)
802.11a	1.931	2.106	91.69	0.38	518	1000
802.11ac vht20	1.933	2.144	90.16	0.45	517	1000
802.11ac vht40	0.951	1.199	79.32	1.01	1052	2000
802.11ac vht80	0.459	0.608	75.49	1.22	2179	3000

802.11a



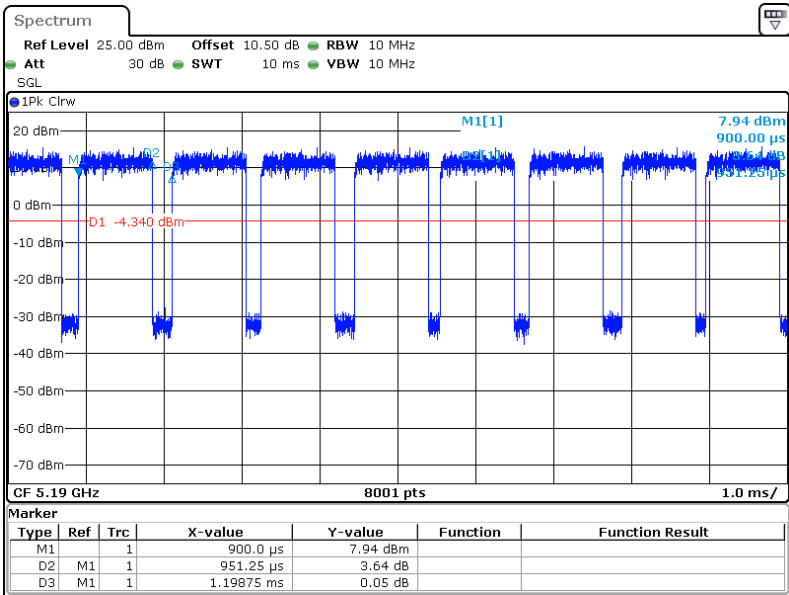
ProjectNo.:SZ1231214-75461E Tester:Leo Jin
Date: 21.JAN.2024 05:44:24

802.11ac 20



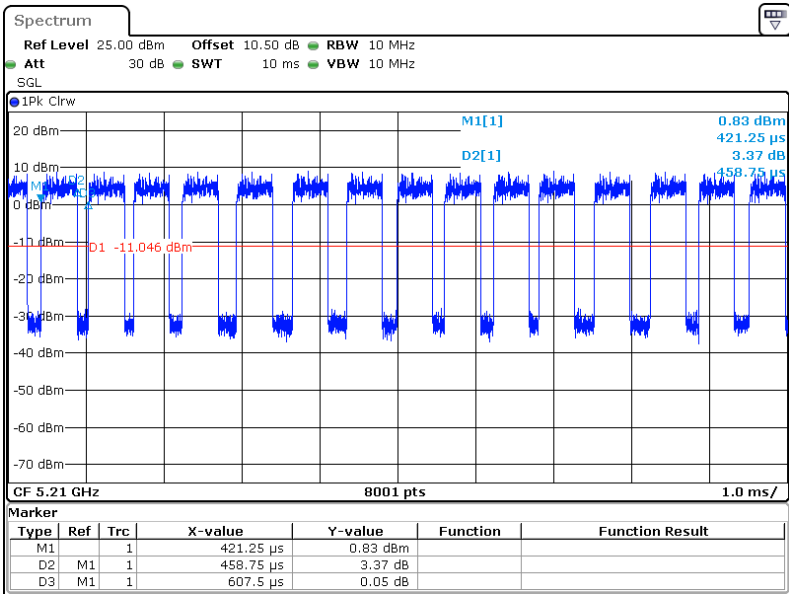
ProjectNo.:SZ1231214-75461E Tester:Leo Jin
Date: 21.JAN.2024 07:43:44

802.11ac 40



ProjectNo.:SZ1231214-75461E Tester:Leo Jin
Date: 21.JAN.2024 05:45:22

802.11ac 80



ProjectNo.:SZ1231214-75461E Tester:Leo Jin
Date: 21.JAN.2024 05:46:09

Equipment Modifications

No modification was made to the EUT tested.

Support Equipment List and Details

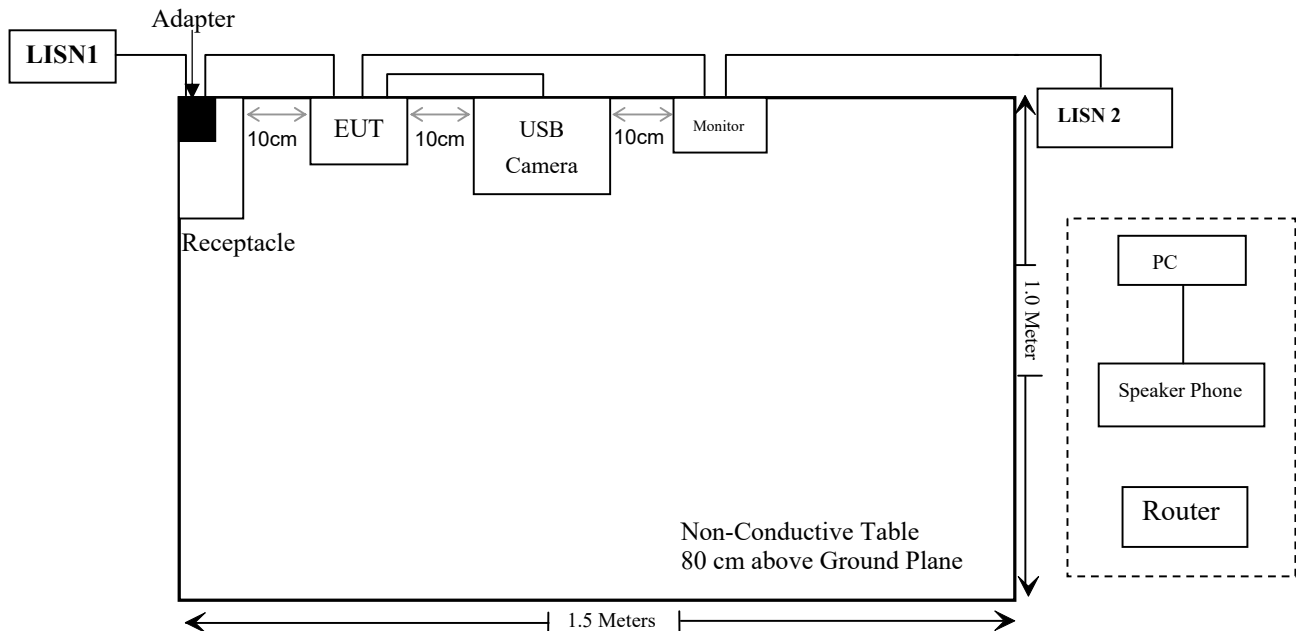
Manufacturer	Description	Model	Serial Number
DELL	PC	Latitude E5430	JG3NLV1
LINKVIL	USB camera	CM70	Unknown
Redmi	Monitor	RMMNT238NF	Unknown
LINKVIL	Speaker phone	MS10	Unknown
HUAWEI	Router	WS5100	A4933FEF1D01

External I/O Cable

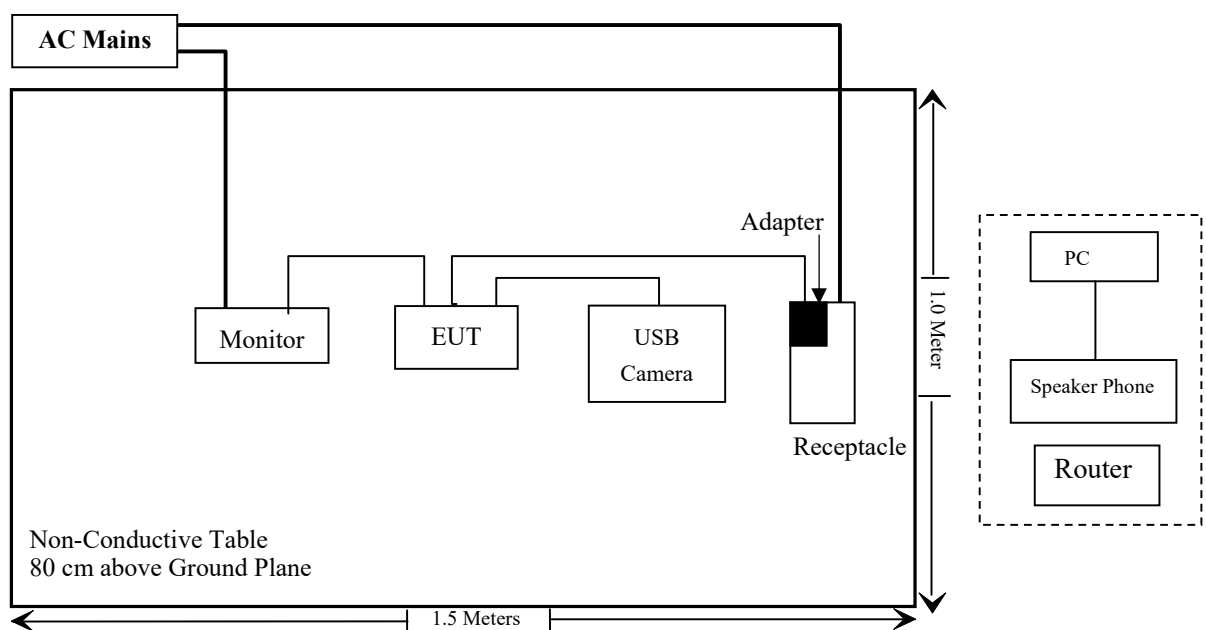
Cable Description	Length (m)	From Port	To
Unshielded un-detachable AC cable	1.2	LISN1/ AC Mains	Receptacle
Unshielded un-detachable DC cable	1.5	Adapter	EUT
Unshielded detachable USB cable	1.2	EUT	USB camera
Unshielded detachable HDMI cable	1.2	EUT	Monitor
Unshielded un-detachable AC cable	1.5	AC Mains/LISN2	Monitor
Unshielded un-detachable USB cable	0.6	Speaker phone	PC

Block Diagram of Test Setup

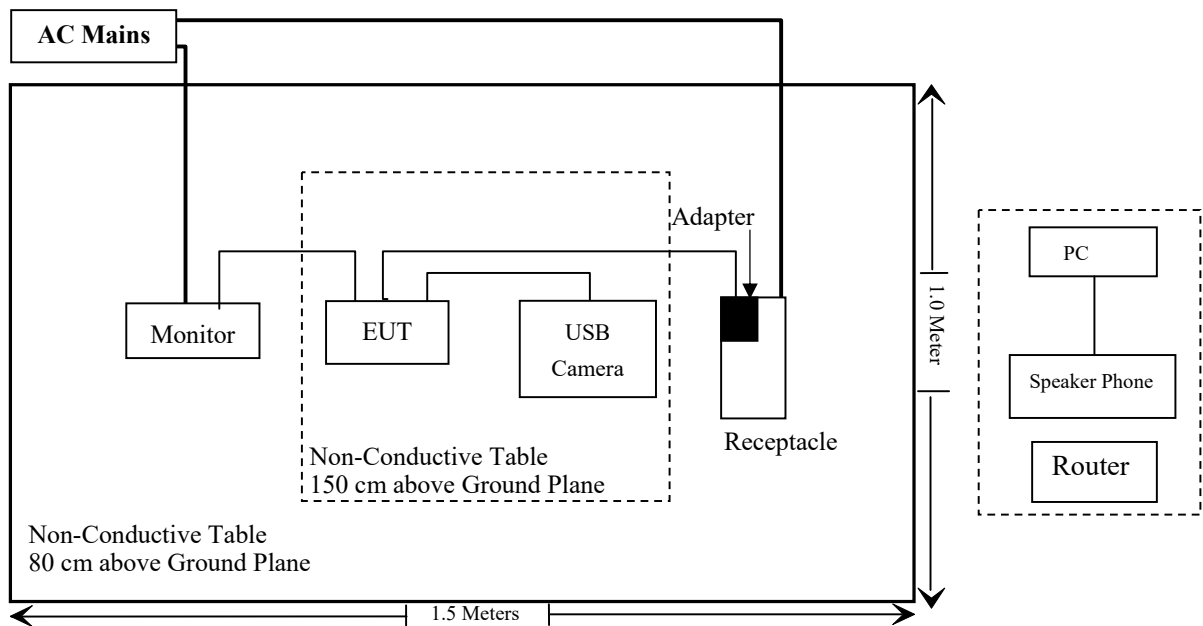
For Conducted Emissions



For Radiated Emissions (Below 1GHz):



For Radiated Emissions (Above 1GHz):



SUMMARY OF TEST RESULTS

FCC Rules	Description of Test	Result
§1.1307 (b) & §2.1091	MPE-Based Exemption	Compliant
§15.203	Antenna Requirement	Compliant
§15.407(b)(9)& §15.207(a)	Conducted Emissions	Compliant
§15.205& §15.209 &§15.407(b)	Undesirable Emission& Restricted Bands	Compliant
§15.407(a) (e)	26 dB Emission Bandwidth & 6dB Bandwidth	Compliant
§15.407(a)	Conducted Transmitter Output Power	Compliant
§15.407 (a)	Power Spectral Density	Compliant
§15.407 (h)	Transmit Power Control (TPC)	Not Applicable
§15.407 (h)	Dynamic Frequency Selection (DFS)	Compliant*

Compliant*: Please refer to the DFS report SZ1231214-75461E-RF-00B.

Not Applicable –The supplier declared that the equipment has no this function.

TEST EQUIPMENT LIST

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
Conducted Emissions Test					
Rohde & Schwarz	EMI Test Receiver	ESCI	101120	2023/02/08	2024/02/07
Rohde & Schwarz	LISN	ENV216	101613	2023/02/08	2024/02/07
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
Narda	LISN	L3-100	210WT600902	2023/02/08	2024/02/07
Radiated Emissions Test					
R&S	EMI Test Receiver	ESR3	102455	2023/02/08	2024/02/07
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
Unknown	RF Cable	XH750A-N	J-10M	2023/10/08	2024/10/07
SNSD	5G Band Reject filter	BSF5150-5850MN-0899-004	5G 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
UTIFLEX	RF Cable	NO. 13	232308-001	2023/08/03	2024/08/02

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
RF Conducted Test					
Agilent	USB wideband power sensor	U2021XA	MY52350001	2023/06/08	2024/06/07
Rohde & Schwarz	Signal and Spectrum Analyzer	FSV40	101473	2023/02/08	2024/02/07
MARCONI	10dB Attenuator	6534/3	2942	2023/07/04	2024/07/03
Micro-Tronics	RF Cable	8082135	W1113	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) & §2.1091- MPE-BASED EXEMPTION

Applicable Standard

According to 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)(1)(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)		
5.2G Wi-Fi	5180-5240	17.0	5.3	3.15	20.15	103.51	0.2	768
5.3G Wi-Fi	5260-5320	14.0	5.3	3.15	17.15	51.88	0.2	768
5.6G Wi-Fi	5500-5720	16.0	5.3	3.15	19.15	82.22	0.2	768
5.8G Wi-Fi	5745-5825	16.0	5.3	3.15	19.15	82.22	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 § 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.
- c. 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 15.407 (a), if the transmitting antennas of directional gain greater than 6dBi are used, the transmit power and power spectral density 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 which was permanently attached, and the maximum antenna gain[#] is 5.3dBi, fulfill the requirement of this section. Please refer to the EUT photos.

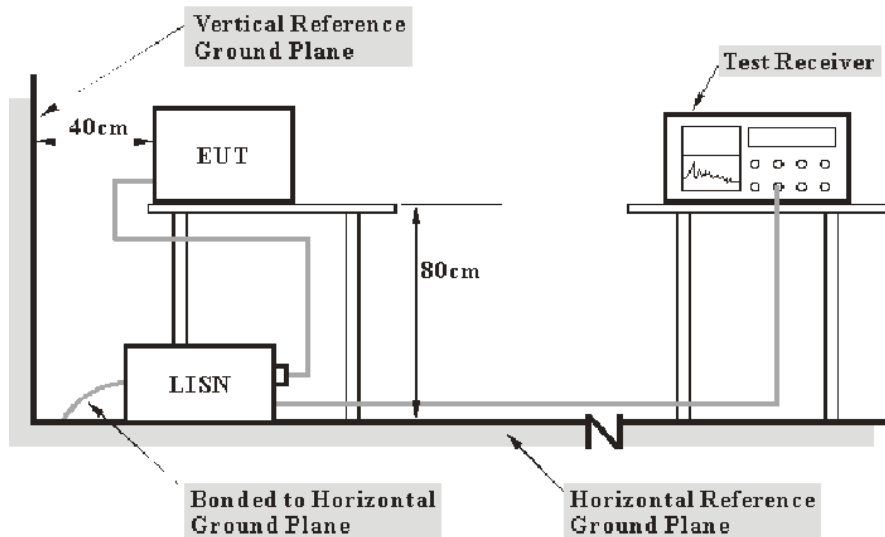
Result: Compliant

FCC §15.407 (b) (6) §15.207 (a) – CONDUCTED EMISSIONS

Applicable Standard

FCC §15.207, §15.407(b) (6)

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 adapter was connected to the LISN.

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

All 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 calculation is as follows:

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

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

Test Data

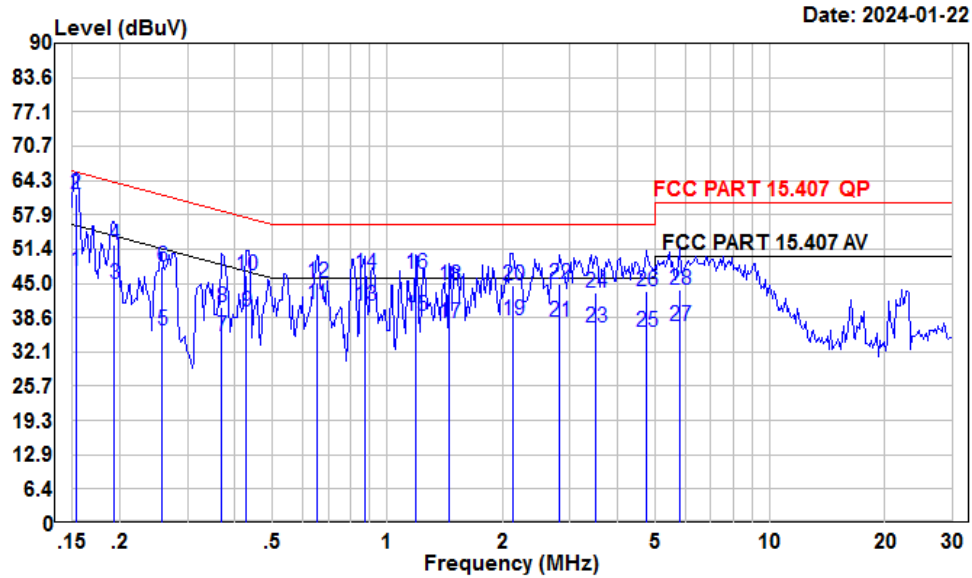
Environmental Conditions

Temperature:	25 °C
Relative Humidity:	50 %
ATM Pressure:	101 kPa

The testing was performed by Macy Shi on 2024-01-22.

EUT operation mode: Transmitting (Maximum output power mode, 802.11 ac 80 5210MHz MIMO)

AC 120V/60 Hz, Line



Condition: Line

Project : SZ1231214-75461E-RF

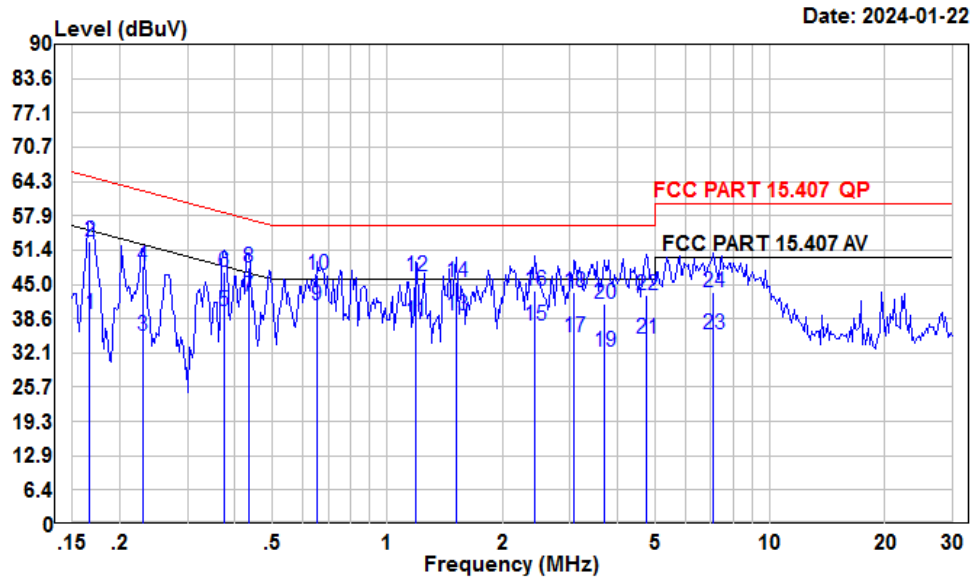
Tester : Macy shi

Note : 5G WIFI

	Freq	Read Level	LISN Level	LISN Factor	Cable Loss	Limit Line	Over Limit	Remark
	MHz	dBuV	dBuV	dB	dB	dBuV	dB	
1	0.15	26.84	47.19	10.20	10.15	55.82	-8.63	Average
2	0.15	41.46	61.81	10.20	10.15	65.82	-4.01	QP
3	0.19	24.60	44.90	10.20	10.10	53.89	-8.99	Average
4	0.19	31.80	52.10	10.20	10.10	63.89	-11.79	QP
5	0.26	15.77	36.17	10.20	10.20	51.51	-15.34	Average
6	0.26	27.77	48.17	10.20	10.20	61.51	-13.34	QP
7	0.37	14.80	35.18	10.20	10.18	48.52	-13.34	Average
8	0.37	20.20	40.58	10.20	10.18	58.52	-17.94	QP
9	0.43	19.27	39.67	10.20	10.20	47.29	-7.62	Average
10	0.43	26.16	46.56	10.20	10.20	57.29	-10.73	QP
11	0.65	20.42	40.99	10.36	10.21	46.00	-5.01	Average
12	0.65	24.56	45.13	10.36	10.21	56.00	-10.87	QP
13	0.87	20.30	40.75	10.28	10.17	46.00	-5.25	Average
14	0.87	26.30	46.75	10.28	10.17	56.00	-9.25	QP
15	1.18	18.50	38.76	10.20	10.06	46.00	-7.24	Average
16	1.18	26.60	46.86	10.20	10.06	56.00	-9.14	QP

	Freq	Read Level	LISN Level	Factor	Cable Loss	Limit Line	Over Limit	Remark
	MHz	dBuV	dBuV	dB	dB	dBuV	dB	
17	1.45	17.30	37.56	10.20	10.06	46.00	-8.44	Average
18	1.45	24.40	44.66	10.20	10.06	56.00	-11.34	QP
19	2.12	17.80	38.20	10.21	10.19	46.00	-7.80	Average
20	2.12	24.20	44.60	10.21	10.19	56.00	-11.40	QP
21	2.82	17.20	37.70	10.25	10.25	46.00	-8.30	Average
22	2.82	24.30	44.80	10.25	10.25	56.00	-11.20	QP
23	3.49	16.10	36.65	10.28	10.27	46.00	-9.35	Average
24	3.49	22.80	43.35	10.28	10.27	56.00	-12.65	QP
25	4.75	15.49	35.96	10.24	10.23	46.00	-10.04	Average
26	4.75	23.06	43.53	10.24	10.23	56.00	-12.47	QP
27	5.81	16.55	36.94	10.17	10.22	50.00	-13.06	Average
28	5.81	23.27	43.66	10.17	10.22	60.00	-16.34	QP

AC 120V/60 Hz, Neutral



Condition: Neutral
Project : SZ1231214-75461E-RF
Tester : Macy shi
Note : 5G WIFI

	Freq	Read Level	LISN Level	Cable Factor	Cable Loss	Limit Line	Over Limit	Remark
	MHz	dBuV	dBuV	dB	dB	dBuV	dB	
1	0.17	19.07	39.46	10.24	10.15	55.12	-15.66	Average
2	0.17	32.65	53.04	10.24	10.15	65.12	-12.08	QP
3	0.23	14.84	35.29	10.29	10.16	52.48	-17.19	Average
4	0.23	27.94	48.39	10.29	10.16	62.48	-14.09	QP
5	0.37	19.53	39.95	10.23	10.19	48.43	-8.48	Average
6	0.37	26.85	47.27	10.23	10.19	58.43	-11.16	QP
7	0.43	22.19	42.61	10.22	10.20	47.20	-4.59	Average
8	0.43	27.59	48.01	10.22	10.20	57.20	-9.19	QP
9	0.65	20.70	41.19	10.28	10.21	46.00	-4.81	Average
10	0.65	26.40	46.89	10.28	10.21	56.00	-9.11	QP
11	1.18	17.90	38.21	10.25	10.06	46.00	-7.79	Average
12	1.18	26.30	46.61	10.25	10.06	56.00	-9.39	QP
13	1.51	18.72	39.10	10.32	10.06	46.00	-6.90	Average
14	1.51	24.97	45.35	10.32	10.06	56.00	-10.65	QP
15	2.44	16.60	37.15	10.34	10.21	46.00	-8.85	Average
16	2.44	23.30	43.85	10.34	10.21	56.00	-12.15	QP

	Freq	Read Level	Level	LISN Factor	Cable Loss	Limit Line	Over Limit	Remark
	MHz	dBuV	dBuV	dB	dB	dBuV	dB	
17	3.07	14.60	35.15	10.28	10.27	46.00	-10.85	Average
18	3.07	23.00	43.55	10.28	10.27	56.00	-12.45	QP
19	3.68	12.01	32.49	10.22	10.26	46.00	-13.51	Average
20	3.68	20.91	41.39	10.22	10.26	56.00	-14.61	QP
21	4.75	14.35	34.78	10.20	10.23	46.00	-11.22	Average
22	4.75	22.55	42.98	10.20	10.23	56.00	-13.02	QP
23	7.10	15.21	35.63	10.20	10.22	50.00	-14.37	Average
24	7.10	23.08	43.50	10.20	10.22	60.00	-16.50	QP

§15.205 & §15.209 & §15.407(B)– UNDESIRABLE EMISSION

Applicable Standard

FCC §15.407 (b); §15.209; §15.205;

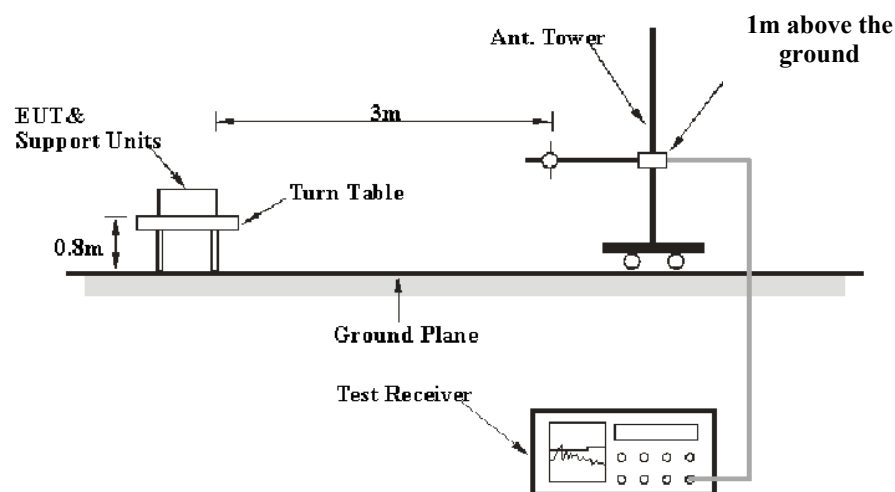
(b) Undesirable emission limits. Except as shown in paragraph (b)(7) of this section, the maximum emissions outside of the frequency bands of operation shall be attenuated in accordance with the following limits:

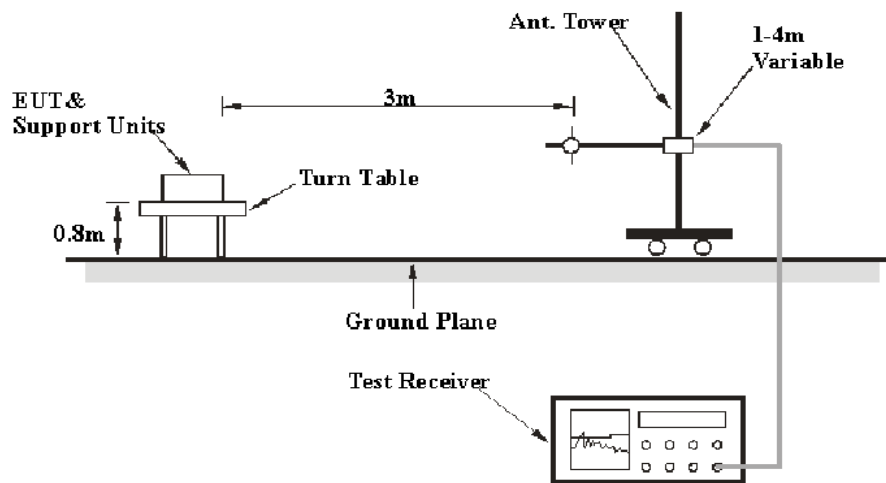
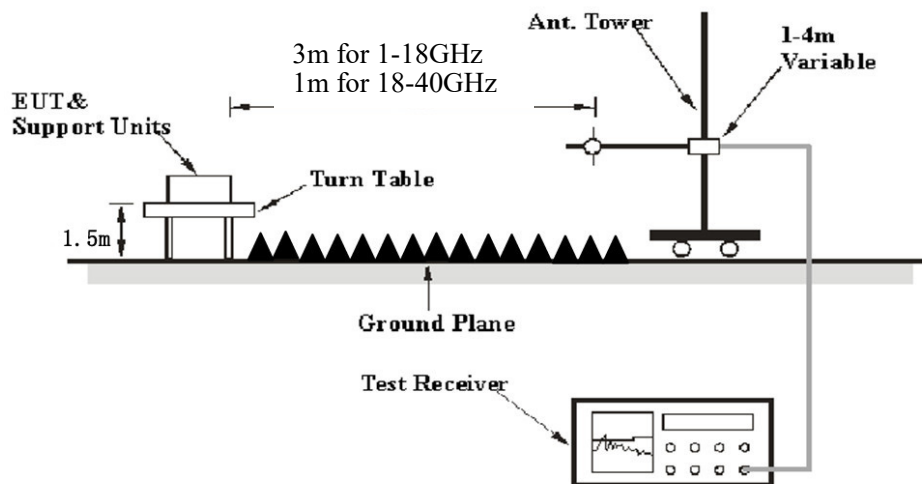
- (1) For transmitters operating in the 5.15-5.25 GHz band: All emissions outside of the 5.15-5.35 GHz band shall not exceed an e.i.r.p. of -27 dBm/MHz.
- (2) For transmitters operating in the 5.25-5.35 GHz band: All emissions outside of the 5.15-5.35 GHz band shall not exceed an e.i.r.p. of -27 dBm/MHz.
- (3) For transmitters operating in the 5.47-5.725 GHz band: All emissions outside of the 5.47-5.725 GHz band shall not exceed an e.i.r.p. of -27 dBm/MHz.
- (4) For transmitters operating in the 5.725-5.85 GHz band:
 - (i) All emissions shall be limited to a level of -27 dBm/MHz at 75 MHz or more above or below the band edge increasing linearly to 10 dBm/MHz at 25 MHz above or below the band edge, and from 25 MHz above or below the band edge increasing linearly to a level of 15.6 dBm/MHz at 5 MHz above or below the band edge, and from 5 MHz above or below the band edge increasing linearly to a level of 27 dBm/MHz at the band edge.

Unwanted emissions below 1 GHz must comply with the general field strength limits set forth in §15.209.

EUT Setup

9 kHz-30MHz:



30MHz-1GHz:**Above 1 GHz:**

The setup of EUT is according with per ANSI C63.10-2013 measurement procedure. The specification used was with the FCC 15.209 and FCC 15.407 limits.

The external I/O cables were draped along the test table and formed a bundle 30 to 40 cm long in the middle.

EMI Test Receiver & Spectrum Analyzer Setup

The system was investigated from 9 kHz to 40 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

1-40GHz:

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

Note: T 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

Radiated Spurious Emission

During the radiated emission test, the adapter was connected to the AC floor outlet.

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

Data was recorded in Quasi-peak detection mode for frequency range of 9 kHz-1GHz, peak and Average detection modes for frequencies above 1GHz.

According to ANSI C63.10-2013,9.4: For field strength measurements made at other than the distance at which the applicable limit is specified, extrapolate the measured field strength to the field strength at the distance specified by the limit using an inverse distance correction factor (20 dB/decade of distance). In some cases, a different distance correction factor may be required;

$$E_{\text{SpecLimit}} = E_{\text{Meas}} + 20 \log \left(\frac{d_{\text{Meas}}}{d_{\text{SpecLimit}}} \right)$$

where

$E_{\text{SpecLimit}}$	is the field strength of the emission at the distance specified by the limit, in dB μ V/m
E_{Meas}	is the field strength of the emission at the measurement distance, in dB μ V/m
d_{Meas}	is the measurement distance, in m
$d_{\text{SpecLimit}}$	is the distance specified by the limit, in m

So the extrapolation factor of 1m is $20 \cdot \log(1/3) = -9.5$ dB, for 18-40GHz range, the limit of 1m distance was added by 9.5dB from limit of 3m to compared with the result measurement at 1m distance.

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:	23~25.1 °C
Relative Humidity:	50~55 %
ATM Pressure:	101 kPa

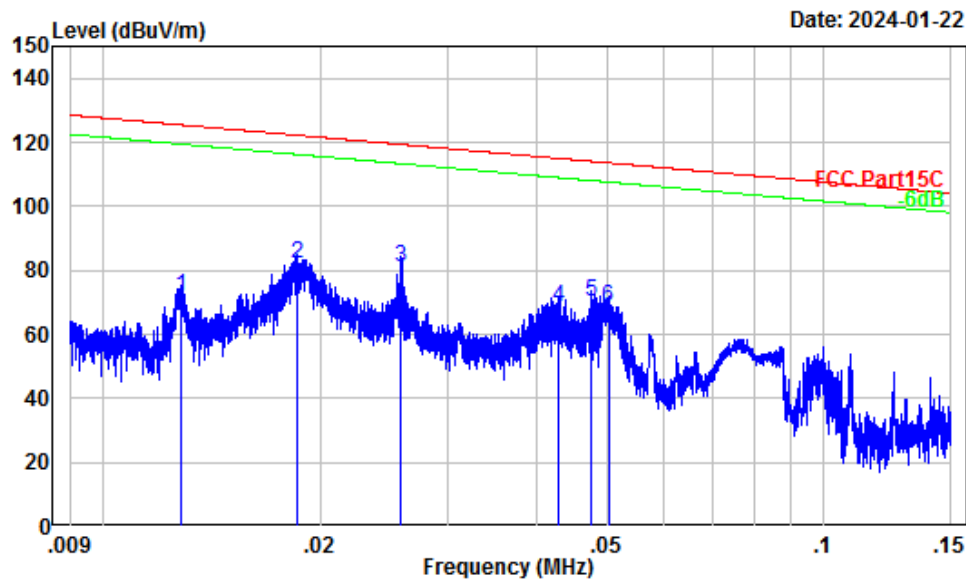
The testing was performed by Warren Huang on 2024-01-22 for below 1GHz and Tyler Wu and Zenos Qiao from 2024-01-22 to 2024-02-02 for above 1GHz.

EUT operation mode: Transmitting

Note: After pre-scan in the X, Y and Z axes of orientation, the worst case is below.

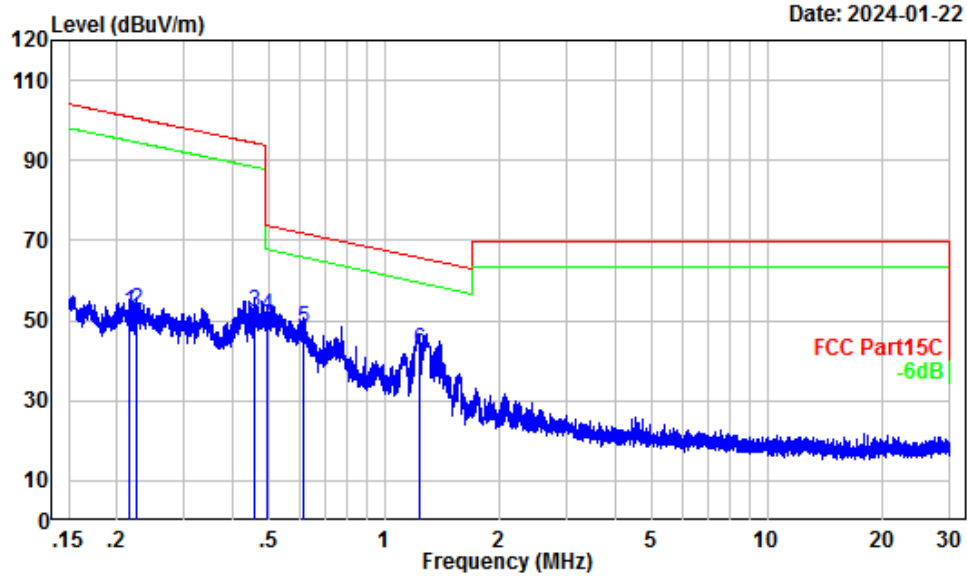
9 kHz-30MHz: (Maximum output power mode, 802.11 ac 80 5210MHz MIMO)

Parallel:



Site : chamber
Condition : 3m
Project Number: SZ1231214-75461E-RF
Note : 5G WIFI
Tester : Warren Huang

	Freq	Factor	Read Level	Level	Limit	Over Limit	Remark
	MHz	dB/m	dBuV	dBuV/m	dBuV/m	dB	
1	0.01	52.44	19.60	72.04	125.44	-53.40	QP
2	0.02	50.65	31.46	82.11	122.19	-40.08	QP
3	0.03	48.41	32.50	80.91	119.33	-38.42	QP
4	0.04	43.19	25.44	68.63	114.95	-46.32	QP
5	0.05	41.79	28.35	70.14	114.08	-43.94	QP
6	0.05	40.97	27.33	68.30	113.58	-45.28	QP

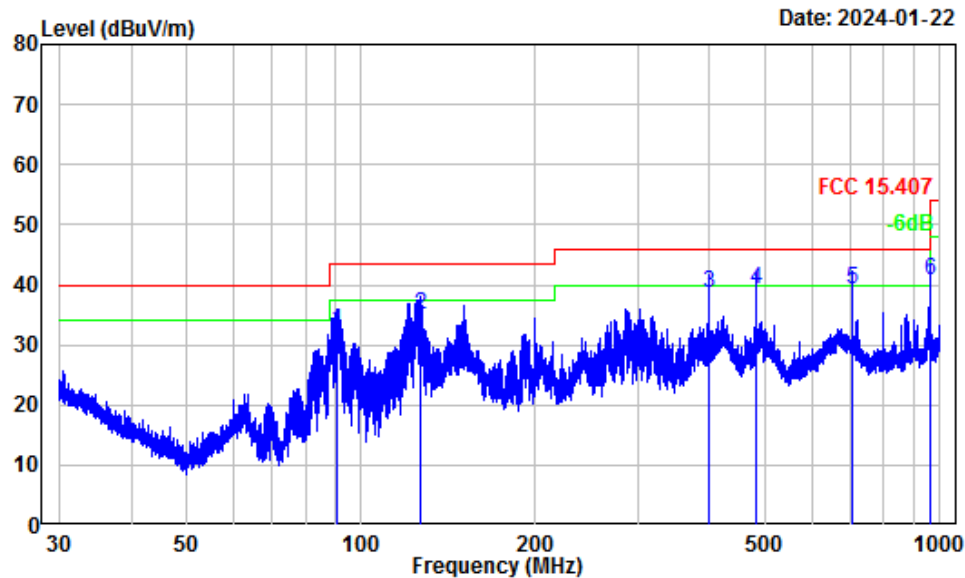


Site : chamber
 Condition : 3m
 Project Number: SZ1231214-75461E-RF
 Note : 5G WIFI
 Tester : Warren Huang

	Freq	Factor	Read Level	Level	Limit Line	Over Limit	Remark
	MHz	dB/m	dBuV	dBuV/m	dBuV/m	dB	
1	0.22	28.41	23.55	51.96	100.91	-48.95	QP
2	0.23	28.06	24.51	52.57	100.52	-47.95	QP
3	0.46	21.52	30.68	52.20	94.37	-42.17	QP
4	0.49	21.03	30.11	51.14	73.73	-22.59	QP
5	0.61	19.48	28.55	48.03	71.79	-23.76	QP
6	1.23	14.31	28.33	42.64	65.64	-23.00	QP

30 MHz–1 GHz: (Maximum output power mode, 802.11 ac 80 5210MHz MIMO)

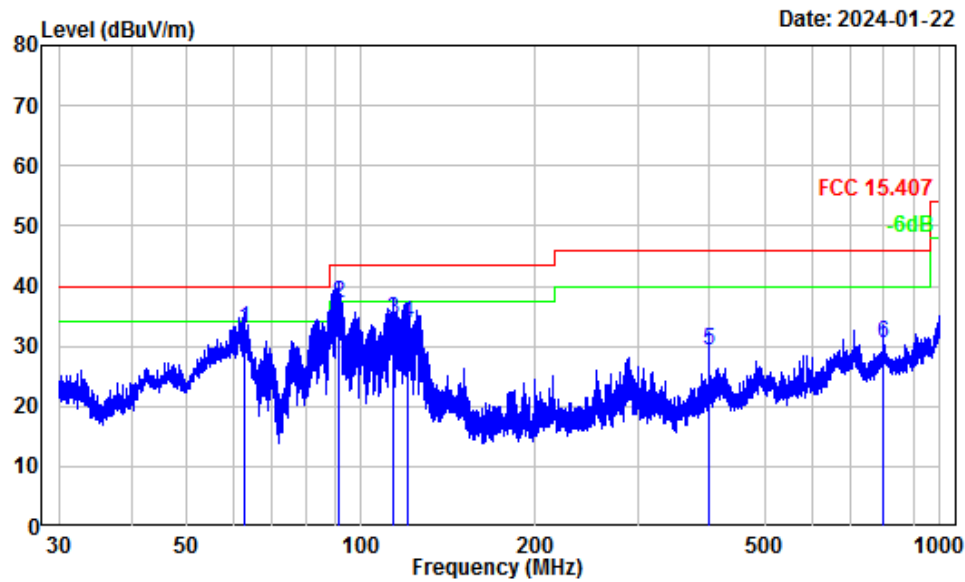
Horizontal



Site : chamber
Condition : 3m Horizontal
Project Number: SZ1231214-75461E-RF
Note : 5G WIFI
Tester : Warren Huang

Freq Factor		Read Level	Level	Limit Line	Over Limit	Remark
MHz	dB/m	dBuV	dBuV/m	dBuV/m	dB	
1	90.70	-16.36	48.72	32.36	43.50	-11.14 QP
2	126.38	-10.31	45.36	35.05	43.50	-8.45 QP
3	400.08	-7.36	45.95	38.59	46.00	-7.41 QP
4	480.11	-5.28	44.42	39.14	46.00	-6.86 QP
5	704.23	-1.52	40.81	39.29	46.00	-6.71 QP
6	960.06	2.00	38.80	40.80	54.00	-13.20 QP

Vertical



Site : chamber
Condition : 3m Vertical
Project Number: SZ1231214-75461E-RF
Note : 5G WIFI
Tester : Warren Huang

		Read		Limit	Over	Remark
Freq Factor		Level	Level	Line	Limit	
MHz	dB/m	dBuV	dBuV/m	dBuV/m	dB	
1	62.87	-17.50	50.29	32.79	40.00	-7.21 QP
2	91.41	-17.06	54.19	37.13	43.50	-6.37 QP
3	113.61	-11.77	46.22	34.45	43.50	-9.05 QP
4	120.01	-10.75	44.62	33.87	43.50	-9.63 QP
5	400.08	-7.56	36.79	29.23	46.00	-16.77 QP
6	798.28	-0.70	31.21	30.51	46.00	-15.49 QP

Above 1GHz:**5150-5250 MHz:**

Frequency (MHz)	Receiver		Rx Antenna	Factor (dB/m)	Corrected Amplitude (dBμV/m)	Limit (dBμV/m)	Margin (dB)
	Reading (dBμV)	PK/Ave	Polar (H/V)				
802.11a (ANT 1)							
5180MHz							
10360.00	45.36	PK	H	13.07	58.43	68.2	-9.77
10360.00	44.37	PK	V	13.07	57.44	68.2	-10.76
5200MHz							
10400.00	45.83	PK	H	13.12	58.95	68.2	-9.25
10400.00	46.12	PK	V	13.12	59.24	68.2	-8.96
5240MHz							
10480.00	46.71	PK	H	13.07	59.78	68.2	-8.42
10480.00	47.06	PK	V	13.07	60.13	68.2	-8.07
802.11a (ANT 2)							
5180MHz							
10360.00	44.59	PK	H	13.07	57.66	68.2	-10.54
10360.00	44.94	PK	V	13.07	58.01	68.2	-10.19
5200MHz							
10400.00	45.03	PK	H	13.12	58.15	68.2	-10.05
10400.00	45.26	PK	V	13.12	58.38	68.2	-9.82
5240MHz							
10480.00	45.24	PK	H	13.07	58.31	68.2	-9.89
10480.00	45.88	PK	V	13.07	58.95	68.2	-9.25
802.11ac20							
5180MHz							
10360.00	45.83	PK	H	13.07	58.90	68.2	-9.30
10360.00	46.12	PK	V	13.07	59.19	68.2	-9.01
5200MHz							
10400.00	45.62	PK	H	13.12	58.74	68.2	-9.46
10400.00	46.07	PK	V	13.12	59.19	68.2	-9.01
5240MHz							
10480.00	45.43	PK	H	13.07	58.50	68.2	-9.70
10480.00	45.08	PK	V	13.07	58.15	68.2	-10.05

Frequency (MHz)	Receiver		Rx Antenna	Factor (dB/m)	Corrected Amplitude (dBμV/m)	Limit (dBμV/m)	Margin (dB)
	Reading (dBμV)	PK/Ave	Polar (H/V)				
802.11ac40							
5190MHz							
10380.00	44.81	PK	H	13.09	57.90	68.2	-10.30
10380.00	44.53	PK	V	13.09	57.62	68.2	-10.58
5230MHz							
10460.00	45.29	PK	H	13.09	58.38	68.2	-9.82
10460.00	44.91	PK	V	13.09	58.00	68.2	-10.20
802.11AC80							
5210MHz							
10420.00	44.92	PK	H	13.12	58.04	68.2	-10.16
10420.00	45.26	PK	V	13.12	58.38	68.2	-9.82

5250-5350MHz:

Frequency (MHz)	Receiver		Rx Antenna	Factor (dB/m)	Corrected Amplitude (dBμV/m)	Limit (dBμV/m)	Margin (dB)
	Reading (dBμV)	PK/Ave	Polar (H/V)				
802.11a (ANT 1)							
5260MHz							
10520.00	45.24	PK	H	13.05	58.29	68.2	-9.91
10520.00	46.05	PK	V	13.05	59.10	68.2	-9.10
5280MHz							
10560.00	47.64	PK	H	13.02	60.66	68.2	-7.54
10560.00	48.85	PK	V	13.02	61.87	68.2	-6.33
5320MHz							
10640.00	50.86	PK	H	13.19	64.05	74	-9.95
10640.00	36.15	AV	H	13.19	49.34	54	-4.66
10640.00	51.12	PK	V	13.19	64.31	74	-9.69
10640.00	37.07	AV	V	13.19	50.26	54	-3.74
802.11a (ANT 2)							
5260MHz							
10520.00	45.68	PK	H	13.05	58.73	68.2	-9.47
10520.00	45.37	PK	V	13.05	58.42	68.2	-9.78
5280MHz							
10560.00	45.47	PK	H	13.02	58.49	68.2	-9.71
10560.00	45.49	PK	V	13.02	58.51	68.2	-9.69
5320MHz							
10640.00	46.16	PK	H	13.19	59.35	74	-14.65
10640.00	32.54	AV	H	13.19	45.73	54	-8.27
10640.00	46.92	PK	V	13.19	60.11	74	-13.89
10640.00	33.27	AV	V	13.19	46.46	54	-7.54
802.11ac20							
5260MHz							
10520.00	46.53	PK	H	13.05	59.58	68.2	-8.62
10520.00	47.67	PK	V	13.05	60.72	68.2	-7.48
5280MHz							
10560.00	45.44	PK	H	13.02	58.46	68.2	-9.74
10560.00	45.32	PK	V	13.02	58.34	68.2	-9.86
5320MHz							
10640.00	46.17	PK	H	13.19	59.36	74	-14.64
10640.00	32.54	AV	H	13.19	45.73	54	-8.27
10640.00	46.59	PK	V	13.19	59.78	74	-14.22

10640.00	33.32	AV	V	13.19	46.51	54	-7.49
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Frequency (MHz)	Receiver		Rx Antenna	Factor (dB/m)	Corrected Amplitude (dBμV/m)	Limit (dBμV/m)	Margin (dB)
	Reading (dBμV)	PK/Ave	Polar (H/V)				
802.11ac40							
5270MHz							
10520.00	45.24	PK	H	13.05	58.29	68.2	-9.91
10520.00	46.05	PK	V	13.05	59.10	68.2	-9.10
5310MHz							
10620.00	45.02	PK	H	13.09	58.11	74	-15.89
10620.00	32.51	AV	H	13.09	45.60	54	-8.40
10620.00	45.93	PK	V	13.09	59.02	74	-14.98
10620.00	32.89	AV	V	13.09	45.98	54	-8.02
802.11AC80							
5290MHz							
10580.00	45.03	PK	H	13.00	58.03	68.2	-10.17
10580.00	44.91	PK	V	13.00	57.91	68.2	-10.29

5470-5725MHz:

Frequency (MHz)	Receiver		Rx Antenna	Factor (dB/m)	Corrected Amplitude (dBμV/m)	Limit (dBμV/m)	Margin (dB)
	Reading (dBμV)	PK/Ave	Polar (H/V)				
802.11a (ANT 1)							
5500MHz							
11000.00	46.78	PK	H	13.98	60.76	74	-13.24
11000.00	33.25	AV	H	13.98	47.23	54	-6.77
11000.00	47.54	PK	V	13.98	61.52	74	-12.48
11000.00	34.02	AV	V	13.98	48.00	54	-6.00
5580MHz							
11160.00	46.96	PK	H	13.62	60.58	74	-13.42
11160.00	33.43	AV	H	13.62	47.05	54	-6.95
11160.00	47.78	PK	V	13.62	61.40	74	-12.60
11160.00	34.25	AV	V	13.62	47.87	54	-6.13
5700MHz							
11400.00	47.27	PK	H	14.08	61.35	74	-12.65
11400.00	33.76	AV	H	14.08	47.84	54	-6.16
11400.00	48.03	PK	V	14.08	62.11	74	-11.89
11400.00	34.49	AV	V	14.08	48.57	54	-5.43
5720MHz							
11440.00	47.45	PK	H	14.08	61.53	74	-12.47
11440.00	34.12	AV	H	14.08	48.20	54	-5.80
11440.00	48.39	PK	V	14.08	62.47	74	-11.53
11440.00	34.68	AV	V	14.08	48.76	54	-5.24

Frequency (MHz)	Receiver		Rx Antenna	Factor (dB/m)	Corrected Amplitude (dBμV/m)	Limit (dBμV/m)	Margin (dB)
	Reading (dBμV)	PK/Ave	Polar (H/V)				
802.11a (ANT 2)							
5500MHz							
11000.00	45.69	PK	H	13.98	59.67	74	-14.33
11000.00	31.24	AV	H	13.98	45.22	54	-8.78
11000.00	45.92	PK	V	13.98	59.90	74	-14.10
11000.00	31.45	AV	V	13.98	45.43	54	-8.57
5580MHz							
11160.00	45.87	PK	H	13.62	59.49	74	-14.51
11160.00	31.48	AV	H	13.62	45.10	54	-8.90
11160.00	46.13	PK	V	13.62	59.75	74	-14.25
11160.00	31.66	AV	V	13.62	45.28	54	-8.72
5700MHz							
11400.00	46.33	PK	H	14.08	60.41	74	-13.59
11400.00	31.76	AV	H	14.08	45.84	54	-8.16
11400.00	46.57	PK	V	14.08	60.65	74	-13.35
11400.00	31.98	AV	V	14.08	46.06	54	-7.94
5720MHz							
11440.00	46.69	PK	H	14.08	60.77	74	-13.23
11440.00	32.04	AV	H	14.08	46.12	54	-7.88
11440.00	47.05	PK	V	14.08	61.13	74	-12.87
11440.00	32.57	AV	V	14.08	46.65	54	-7.35

Frequency (MHz)	Receiver		Rx Antenna	Factor (dB/m)	Corrected Amplitude (dBμV/m)	Limit (dBμV/m)	Margin (dB)
	Reading (dBμV)	PK/Ave	Polar (H/V)				
802.11ac20							
5500MHz							
11000.00	45.45	PK	H	13.98	59.43	74	-14.57
11000.00	31.37	AV	H	13.98	45.35	54	-8.65
11000.00	45.89	PK	V	13.98	59.87	74	-14.13
11000.00	31.91	AV	V	13.98	45.89	54	-8.11
5580MHz							
11160.00	45.84	PK	H	13.62	59.46	74	-14.54
11160.00	31.98	AV	H	13.62	45.60	54	-8.40
11160.00	46.35	PK	V	13.62	59.97	74	-14.03
11160.00	32.56	AV	V	13.62	46.18	54	-7.82
5700MHz							
11400.00	46.39	PK	H	14.08	60.47	74	-13.53
11400.00	32.78	AV	H	14.08	46.86	54	-7.14
11400.00	46.96	PK	V	14.08	61.04	74	-12.96
11400.00	33.47	AV	V	14.08	47.55	54	-6.45
5720MHz							
11440.00	47.21	PK	H	14.08	61.29	74	-12.71
11440.00	33.09	AV	H	14.08	47.17	54	-6.83
11440.00	47.68	PK	V	14.08	61.76	74	-12.24
11440.00	33.75	AV	V	14.08	47.83	54	-6.17

Frequency (MHz)	Receiver		Rx Antenna	Factor (dB/m)	Corrected Amplitude (dBμV/m)	Limit (dBμV/m)	Margin (dB)
	Reading (dBμV)	PK/Ave	Polar (H/V)				
802.11ac40							
5510MHz							
11020.00	45.47	PK	H	13.89	59.36	74	-14.64
11020.00	31.54	AV	H	13.89	45.43	54	-8.57
11020.00	45.83	PK	V	13.89	59.72	74	-14.28
11020.00	31.78	AV	V	13.89	45.67	54	-8.33
5550MHz							
11100.00	45.89	PK	H	13.53	59.42	74	-14.58
11100.00	31.92	AV	H	13.53	45.45	54	-8.55
11100.00	46.18	PK	V	13.53	59.71	74	-14.29
11100.00	32.23	AV	V	13.53	45.76	54	-8.24
5670MHz							
11340.00	46.43	PK	H	13.99	60.42	74	-13.58
11340.00	32.31	AV	H	13.99	46.30	54	-7.70
11340.00	46.62	PK	V	13.99	60.61	74	-13.39
11340.00	32.55	AV	V	13.99	46.54	54	-7.46
5710MHz							
11420.00	46.87	PK	H	14.08	60.95	74	-13.05
11420.00	32.63	AV	H	14.08	46.71	54	-7.29
11420.00	47.18	PK	V	14.08	61.26	74	-12.74
11420.00	32.96	AV	V	14.08	47.04	54	-6.96

Frequency (MHz)	Receiver		Rx Antenna	Factor (dB/m)	Corrected Amplitude (dBμV/m)	Limit (dBμV/m)	Margin (dB)
	Reading (dBμV)	PK/Ave	Polar (H/V)				
802.11AC80							
5530MHz							
11060.00	45.24	PK	H	13.71	58.95	74	-15.05
11060.00	32.31	AV	H	13.71	46.02	54	-7.98
11060.00	45.49	PK	V	13.71	59.20	74	-14.80
11060.00	32.53	AV	V	13.71	46.24	54	-7.76
5610MHz							
11220.00	46.14	PK	H	13.73	59.87	74	-14.13
11220.00	32.68	AV	H	13.73	46.41	54	-7.59
11220.00	46.47	PK	V	13.73	60.20	74	-13.80
11220.00	32.95	AV	V	13.73	46.68	54	-7.32
5690MHz							
11380.00	46.52	PK	H	13.99	60.51	74	-13.49
11380.00	32.94	AV	H	13.99	46.93	54	-7.07
11380.00	46.89	PK	V	13.99	60.88	74	-13.12
11380.00	33.27	AV	V	13.99	47.26	54	-6.74

5725-5850 MHz:

Frequency (MHz)	Receiver		Rx Antenna	Factor (dB/m)	Corrected Amplitude (dBμV/m)	Limit (dBμV/m)	Margin (dB)
	Reading (dBμV)	PK/Ave	Polar (H/V)				
802.11a (ANT 1)							
5745MHz							
11490.00	45.86	PK	H	14.31	60.17	74	-13.83
11490.00	30.73	AV	H	14.31	45.04	54	-8.96
11490.00	45.57	PK	V	14.31	59.88	74	-14.12
11490.00	30.59	AV	V	14.31	44.90	54	-9.10
5785MHz							
11570.00	46.09	PK	H	14.05	60.14	74	-13.86
11570.00	31.25	AV	H	14.05	45.30	54	-8.70
11570.00	45.87	PK	V	14.05	59.92	74	-14.08
11570.00	31.12	AV	V	14.05	45.17	54	-8.83
5825MHz							
11650.00	46.48	PK	H	13.83	60.31	74	-13.69
11650.00	31.65	AV	H	13.83	45.48	54	-8.52
11650.00	46.24	PK	V	13.83	60.07	74	-13.93
11650.00	31.52	AV	V	13.83	45.35	54	-8.65
802.11a (ANT 2)							
5745MHz							
11490.00	45.71	PK	H	14.31	60.02	74	-13.98
11490.00	30.67	AV	H	14.31	44.98	54	-9.02
11490.00	45.48	PK	V	14.31	59.79	74	-14.21
11490.00	30.55	AV	V	14.31	44.86	54	-9.14
5785MHz							
11570.00	45.94	PK	H	14.05	59.99	74	-14.01
11570.00	31.05	AV	H	14.05	45.10	54	-8.90
11570.00	45.72	PK	V	14.05	59.77	74	-14.23
11570.00	30.91	AV	V	14.05	44.96	54	-9.04
5825MHz							
11650.00	46.15	PK	H	13.83	59.98	74	-14.02
11650.00	31.53	AV	H	13.83	45.36	54	-8.64
11650.00	45.89	PK	V	13.83	59.72	74	-14.28
11650.00	31.42	AV	V	13.83	45.25	54	-8.75

Frequency (MHz)	Receiver		Rx Antenna	Factor (dB/m)	Corrected Amplitude (dBμV/m)	Limit (dBμV/m)	Margin (dB)
	Reading (dBμV)	PK/Ave	Polar (H/V)				
802.11ac20							
5745MHz							
11490.00	45.36	PK	H	14.31	59.67	74	-14.33
11490.00	31.01	AV	H	14.31	45.32	54	-8.68
11490.00	45.14	PK	V	14.31	59.45	74	-14.55
11490.00	30.88	AV	V	14.31	45.19	54	-8.81
5785MHz							
11570.00	45.78	PK	H	14.05	59.83	74	-14.17
11570.00	31.45	AV	H	14.05	45.50	54	-8.50
11570.00	45.56	PK	V	14.05	59.61	74	-14.39
11570.00	31.31	AV	V	14.05	45.36	54	-8.64
5825MHz							
11650.00	46.29	PK	H	13.83	60.12	74	-13.88
11650.00	31.87	AV	H	13.83	45.70	54	-8.30
11650.00	46.05	PK	V	13.83	59.88	74	-14.12
11650.00	31.73	AV	V	13.83	45.56	54	-8.44
802.11ac40							
5755MHz							
11510.00	45.71	PK	H	14.29	60.00	74	-14.00
11510.00	32.06	AV	H	14.29	46.35	54	-7.65
11510.00	45.94	PK	V	14.29	60.23	74	-13.77
11510.00	32.15	AV	V	14.29	46.44	54	-7.56
5795MHz							
11590.00	46.12	PK	H	13.97	60.09	74	-13.91
11590.00	32.28	AV	H	13.97	46.25	54	-7.75
11590.00	46.35	PK	V	13.97	60.32	74	-13.68
11590.00	32.43	AV	V	13.97	46.40	54	-7.60
802.11AC80							
5775MHz							
11550.00	45.64	PK	H	14.13	59.77	74	-14.23
11550.00	32.77	AV	H	14.13	46.90	54	-7.10
11550.00	45.89	PK	V	14.13	60.02	74	-13.98
11550.00	32.92	AV	V	14.13	47.05	54	-6.95

Note:

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

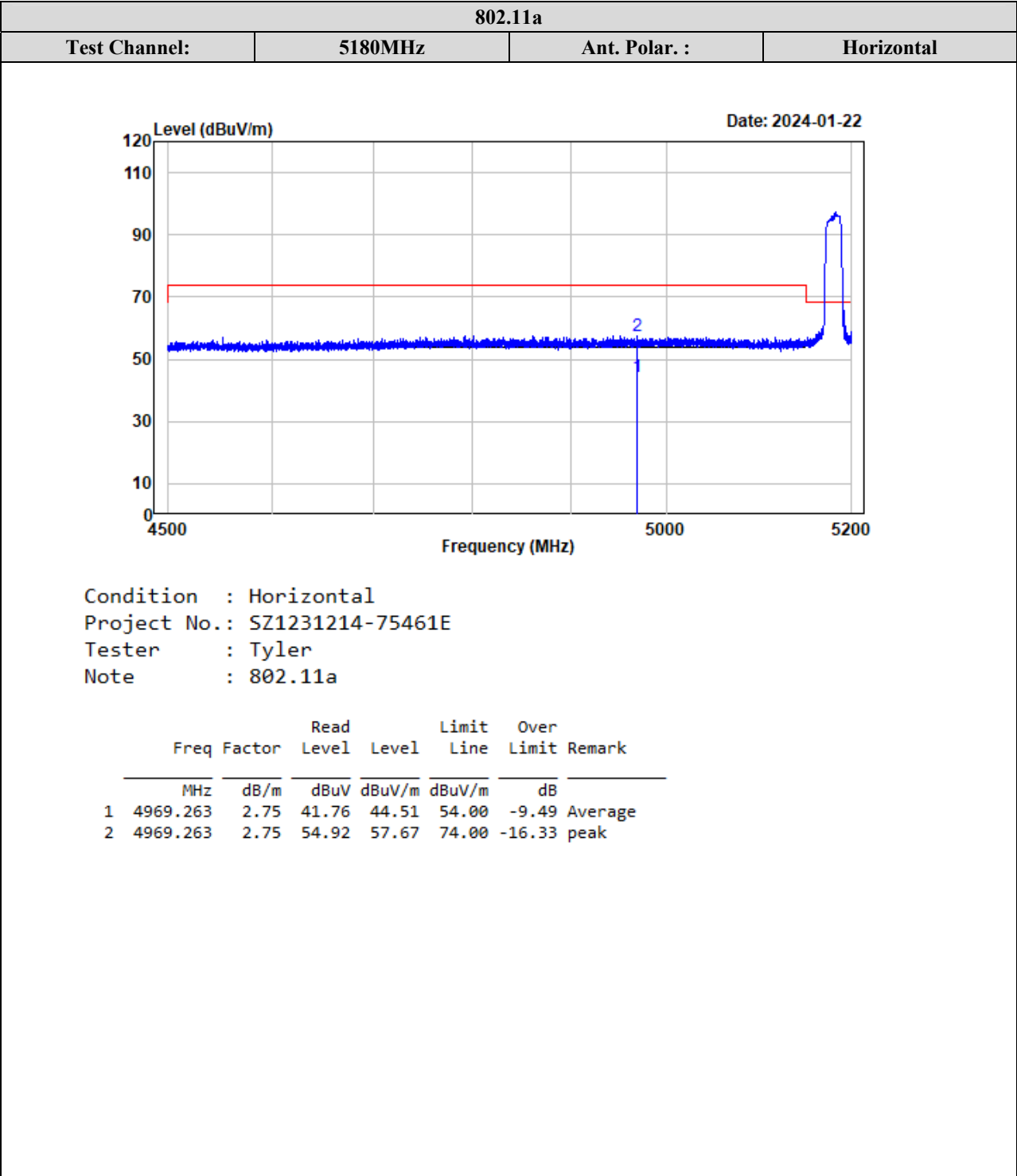
Corrected Amplitude = Factor + Reading

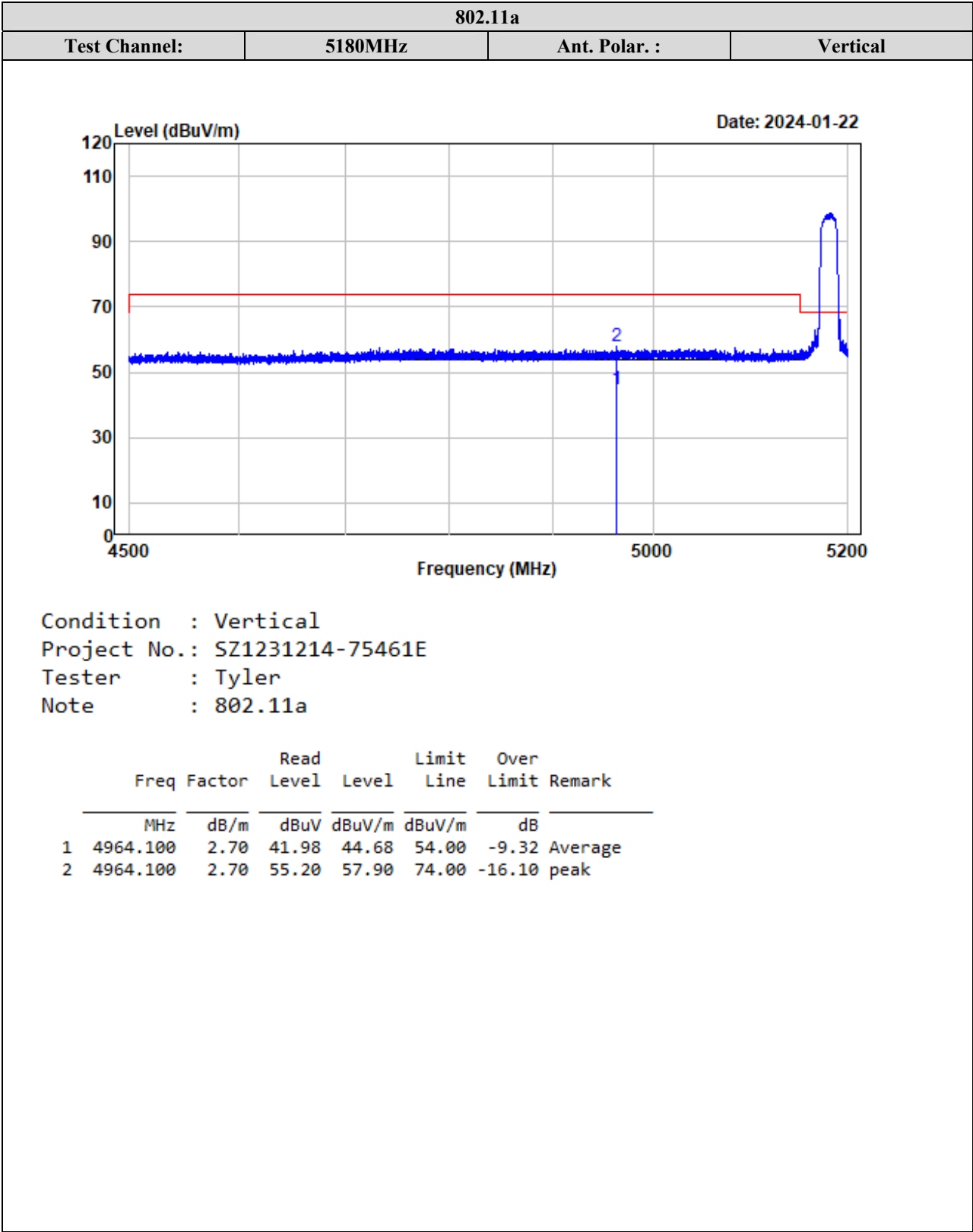
Margin = Corrected. Amplitude - Limit

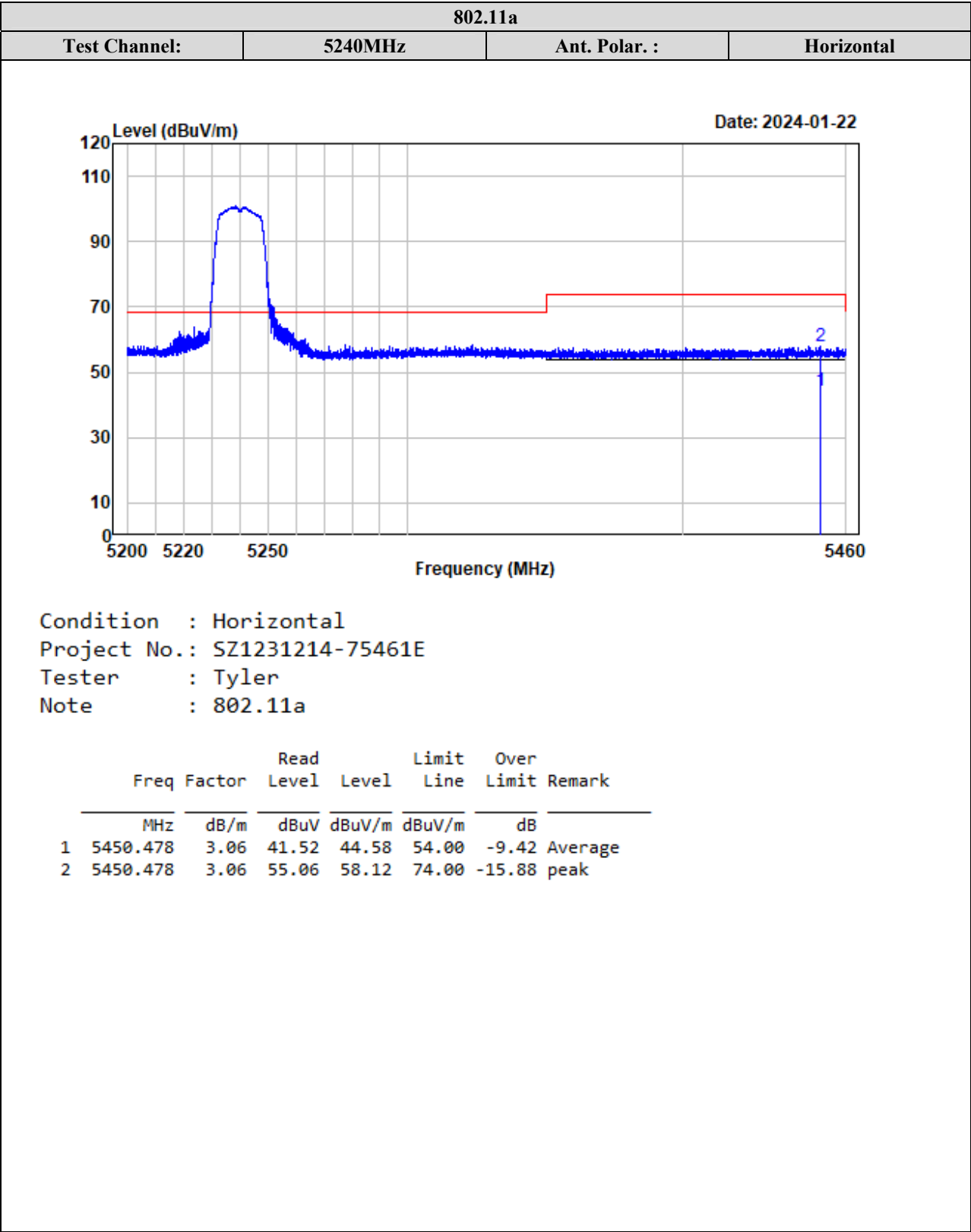
The other spurious emission which is in the noise floor level was not recorded.

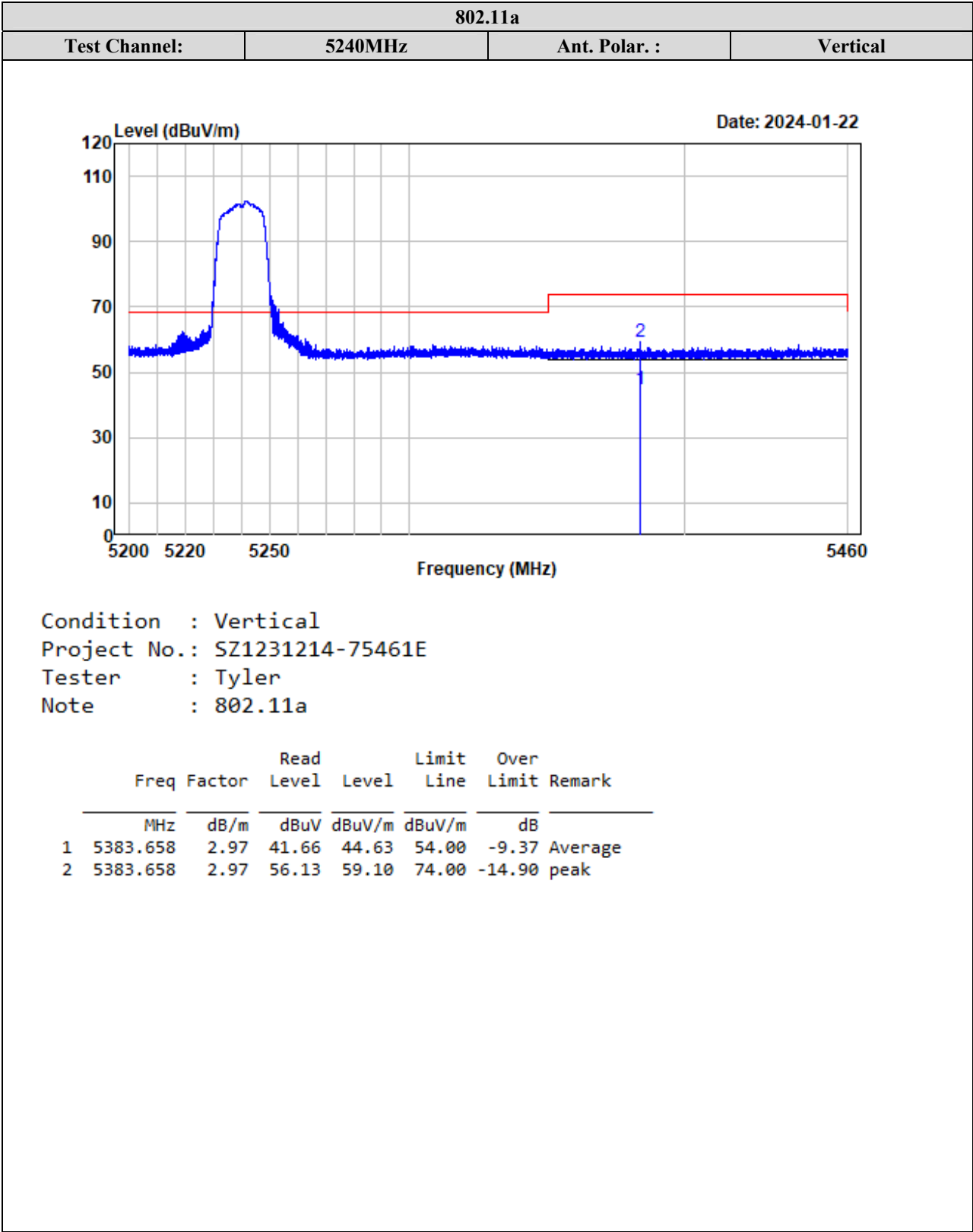
Test plots for Band Edge Measurements (Radiated)

5150-5250MHz:
ANT 1

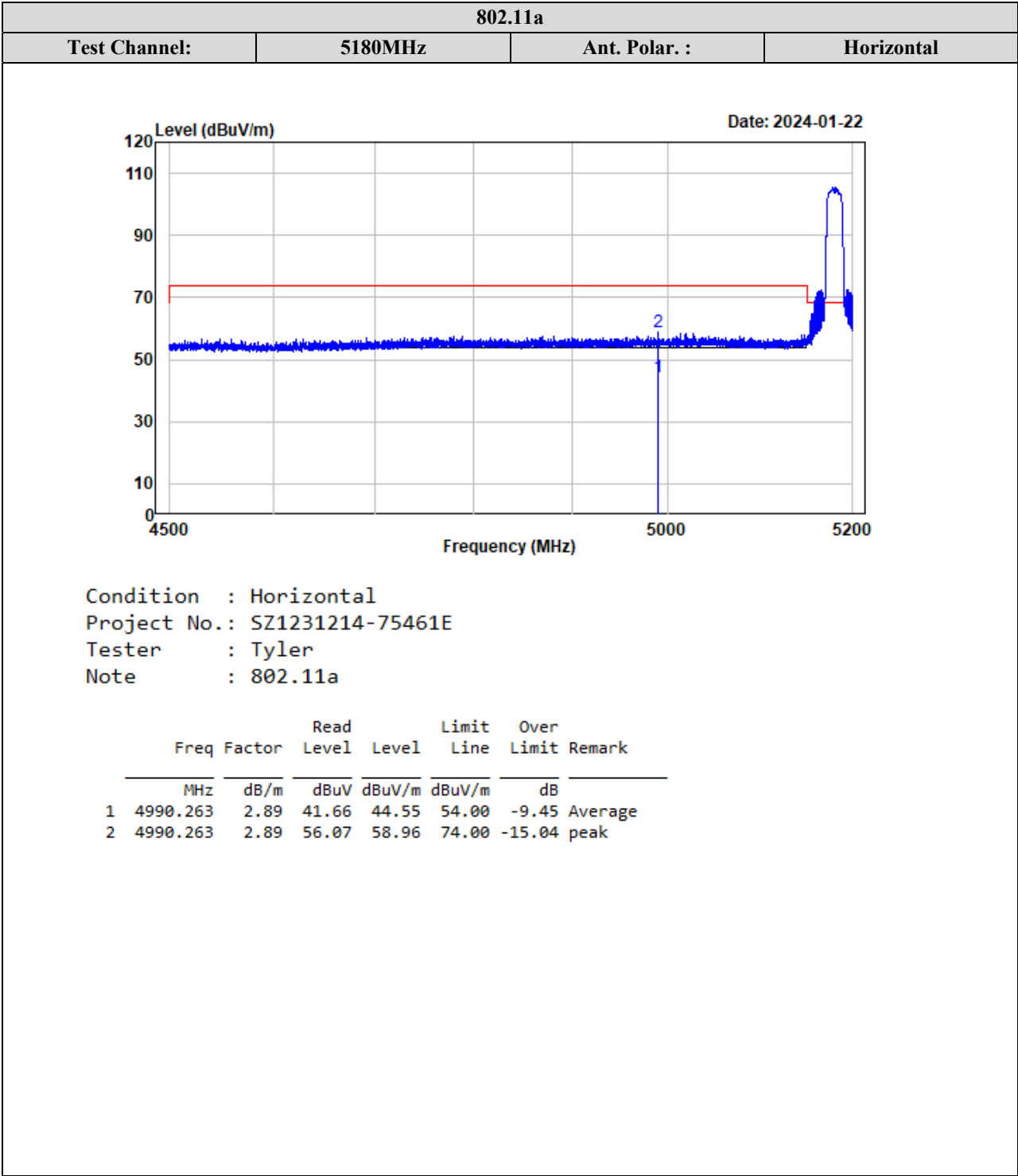


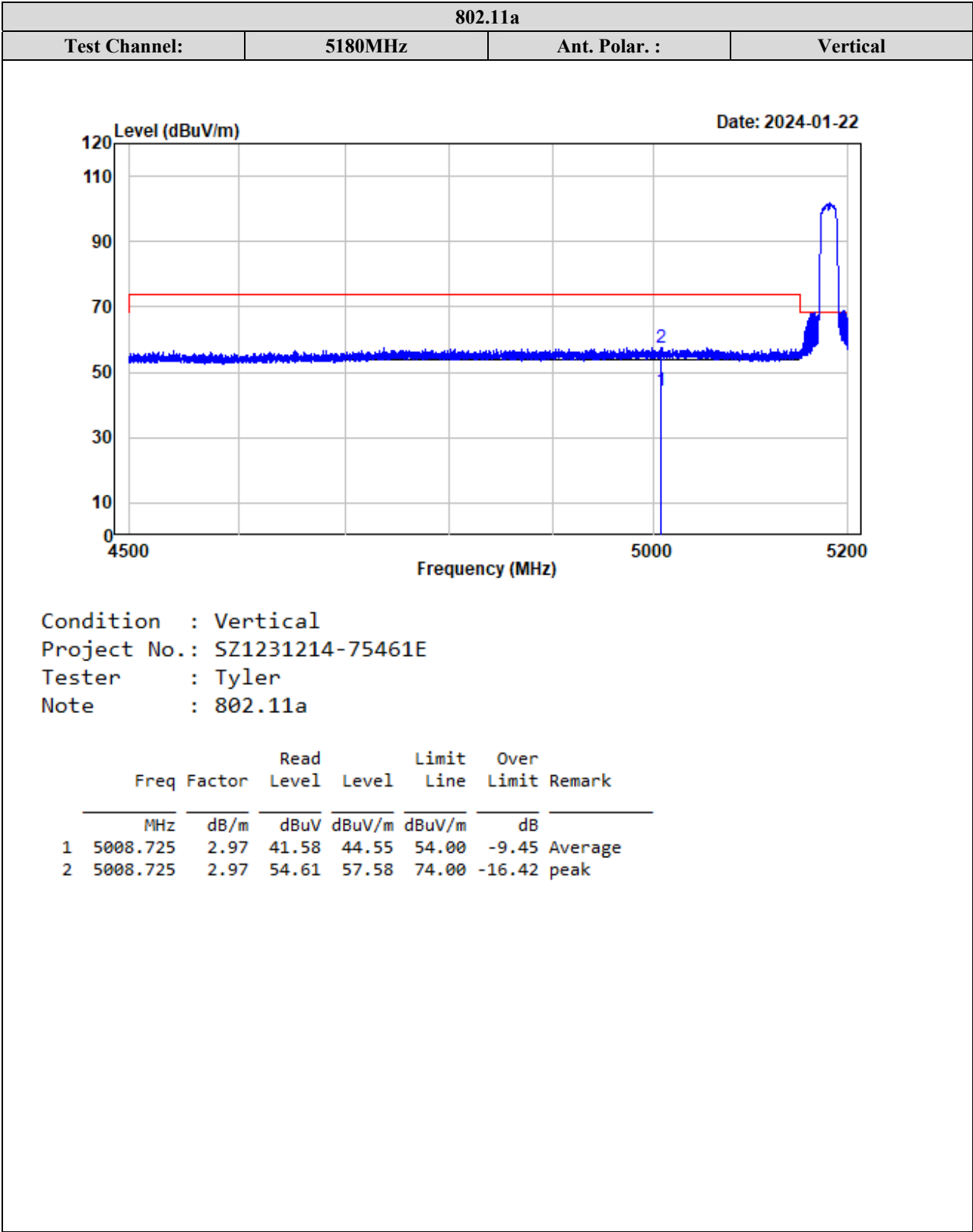


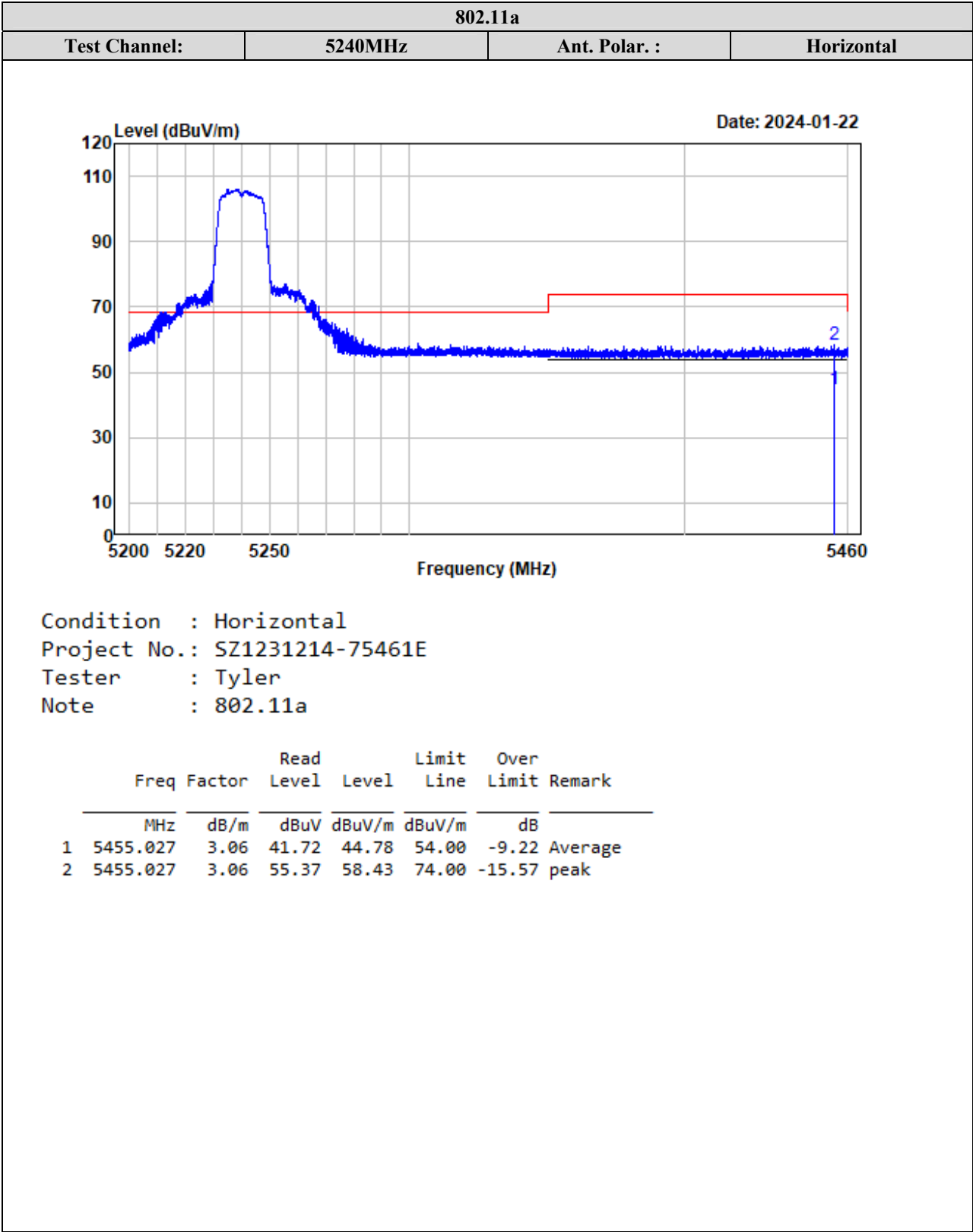


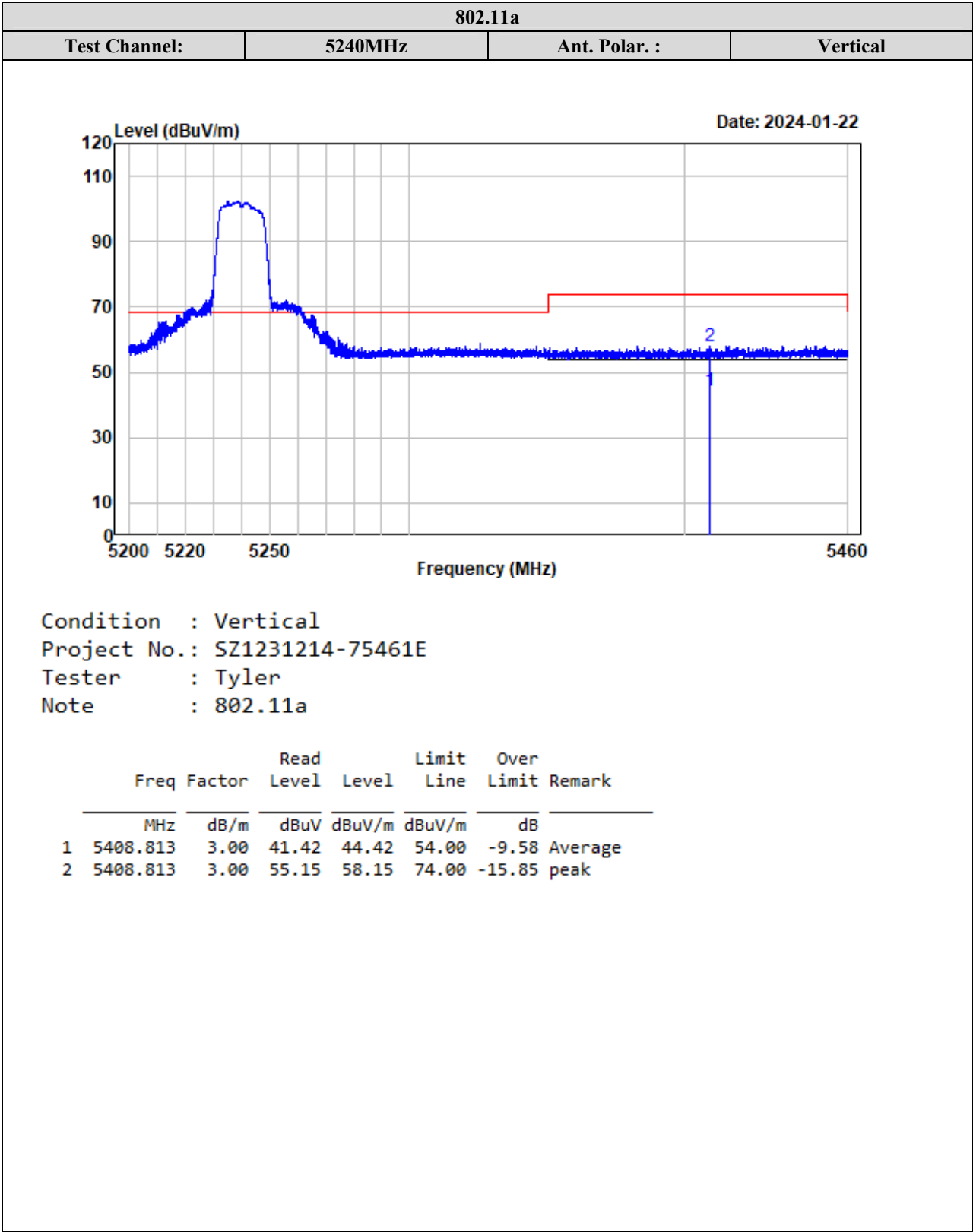


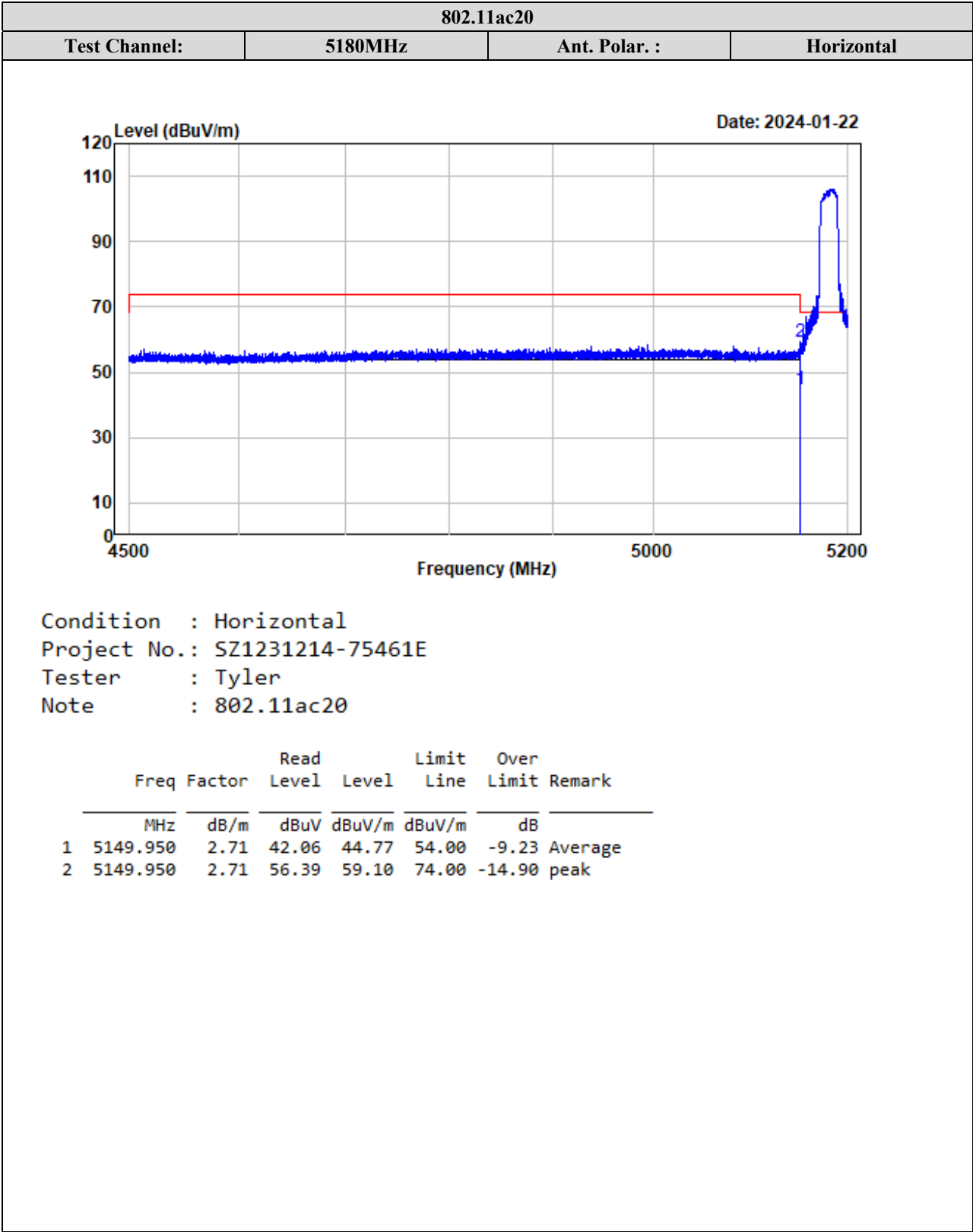
ANT 2

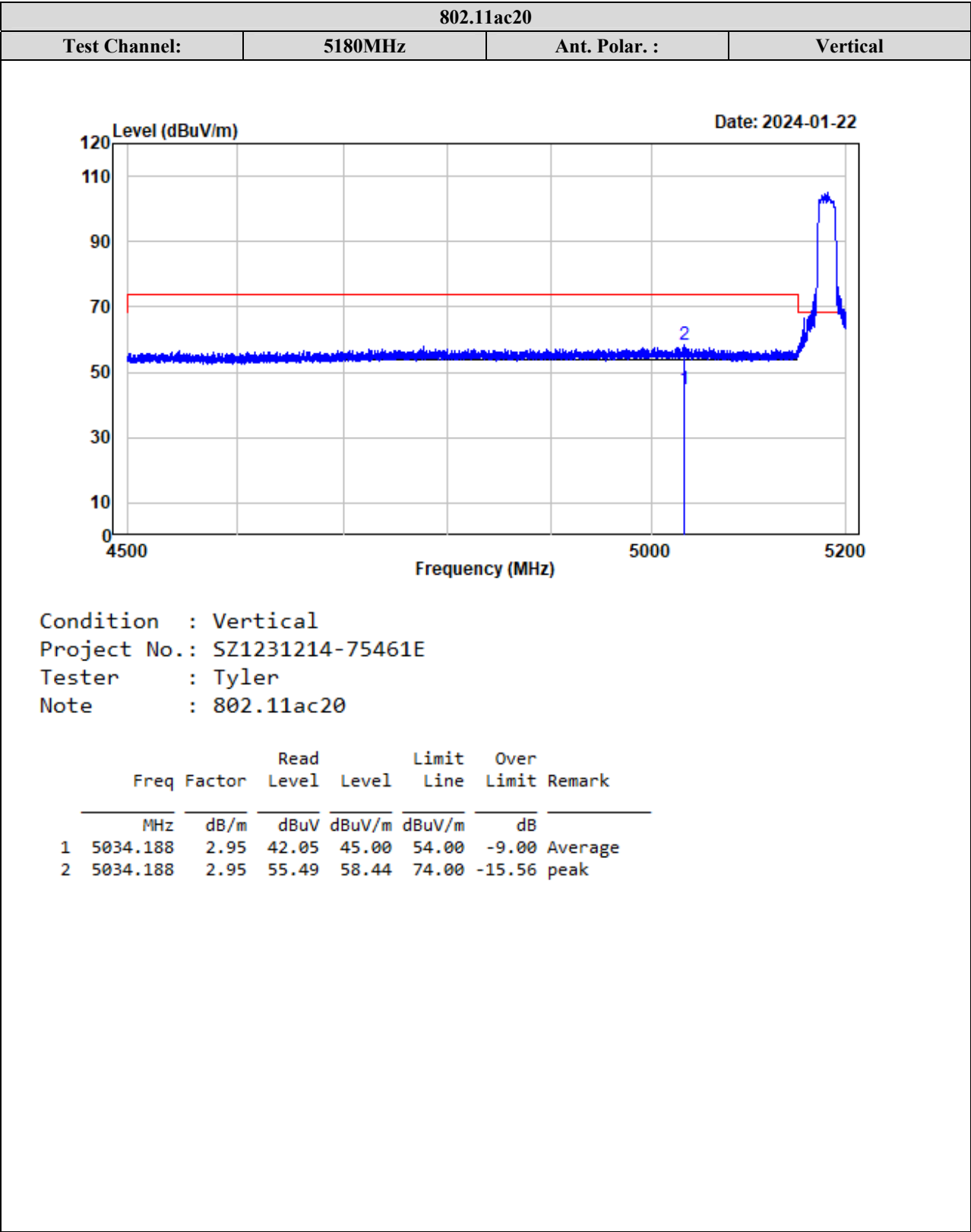


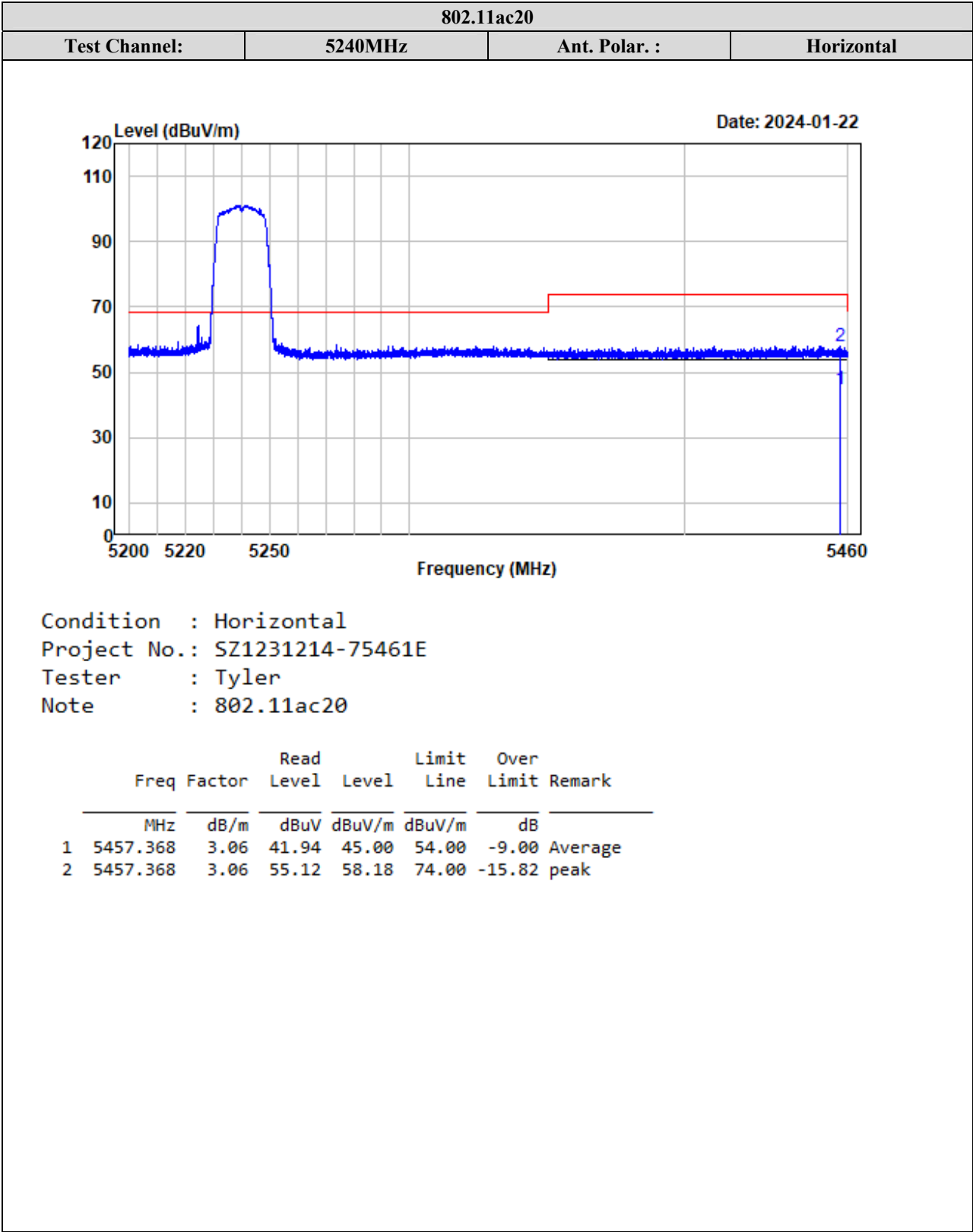


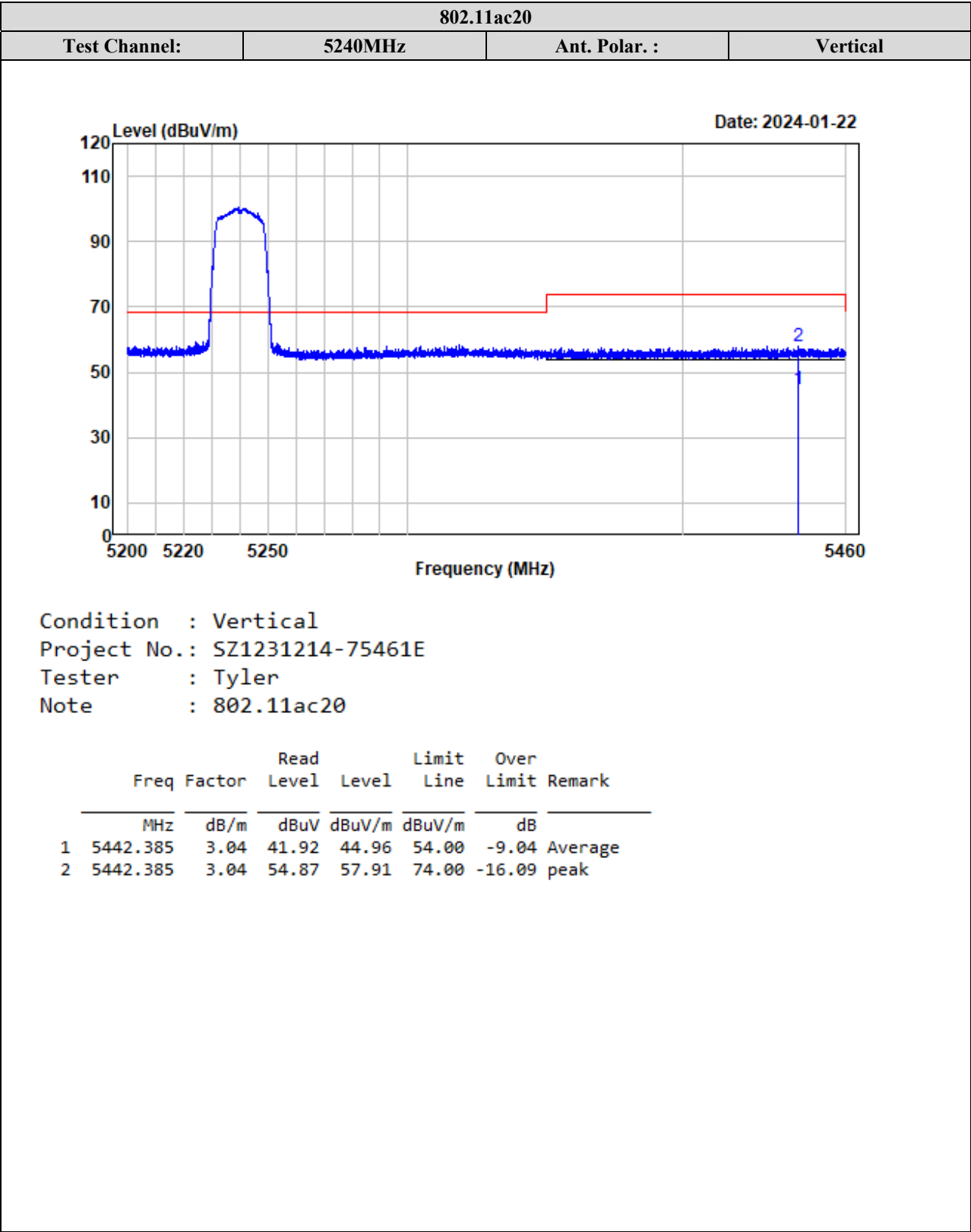


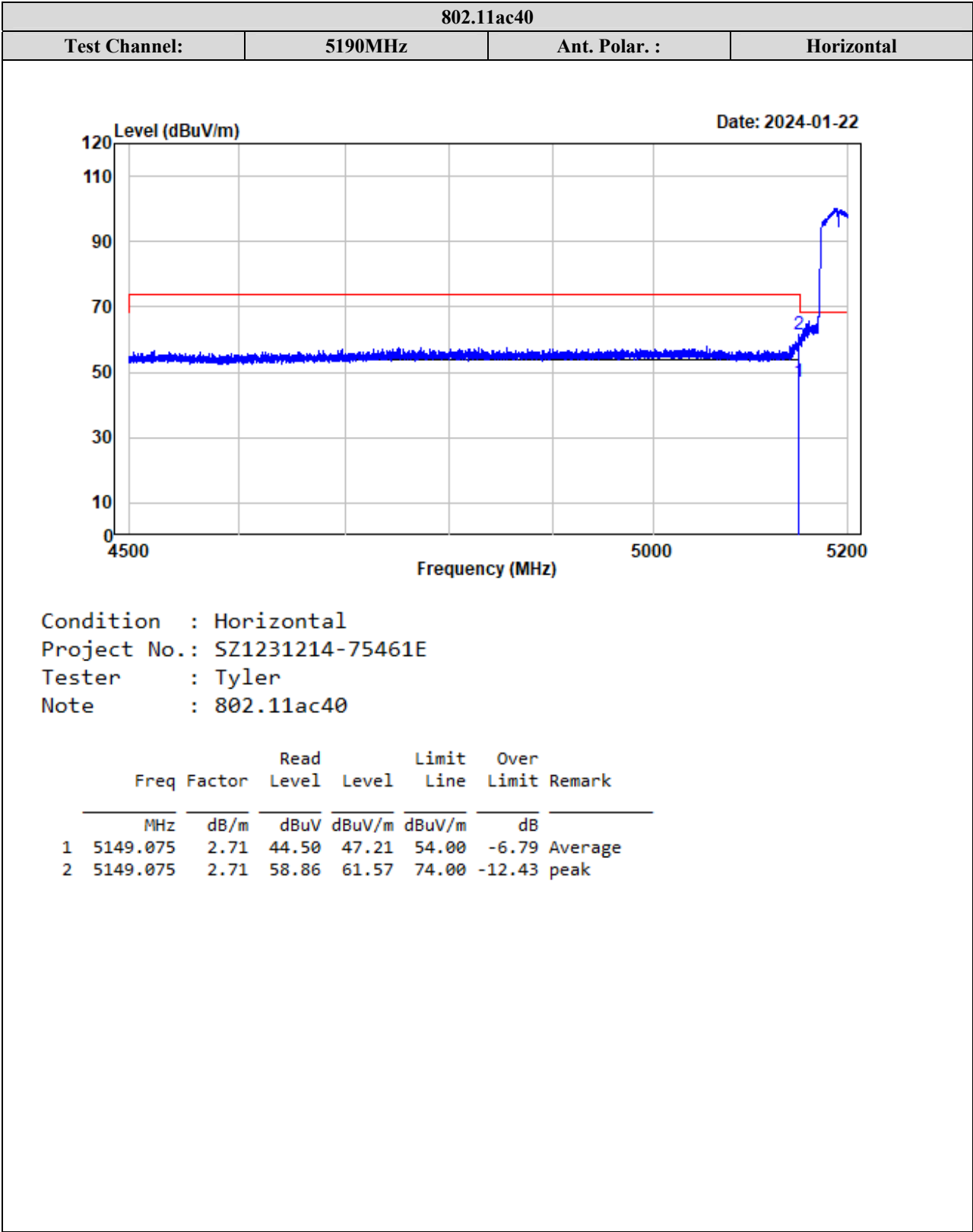


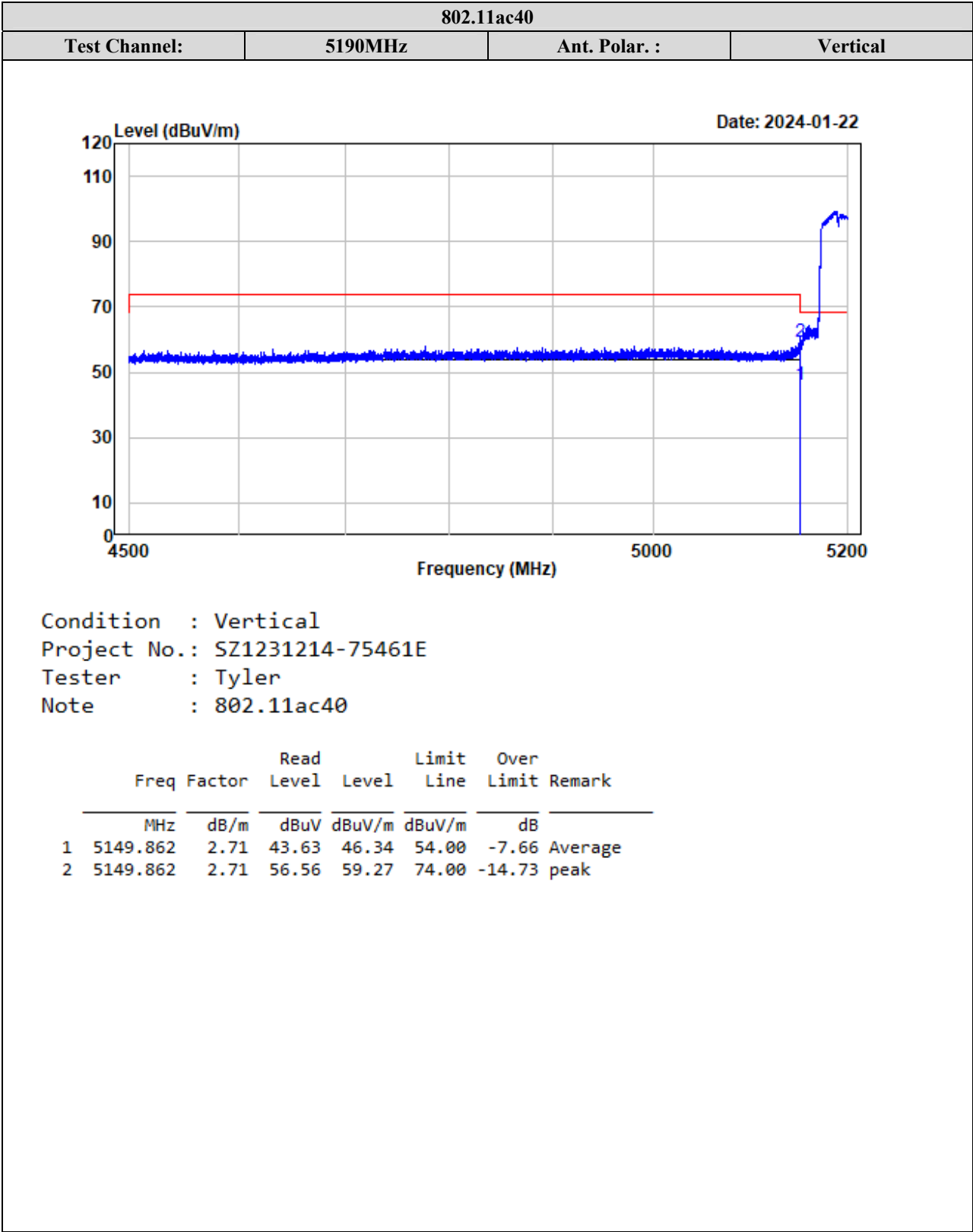


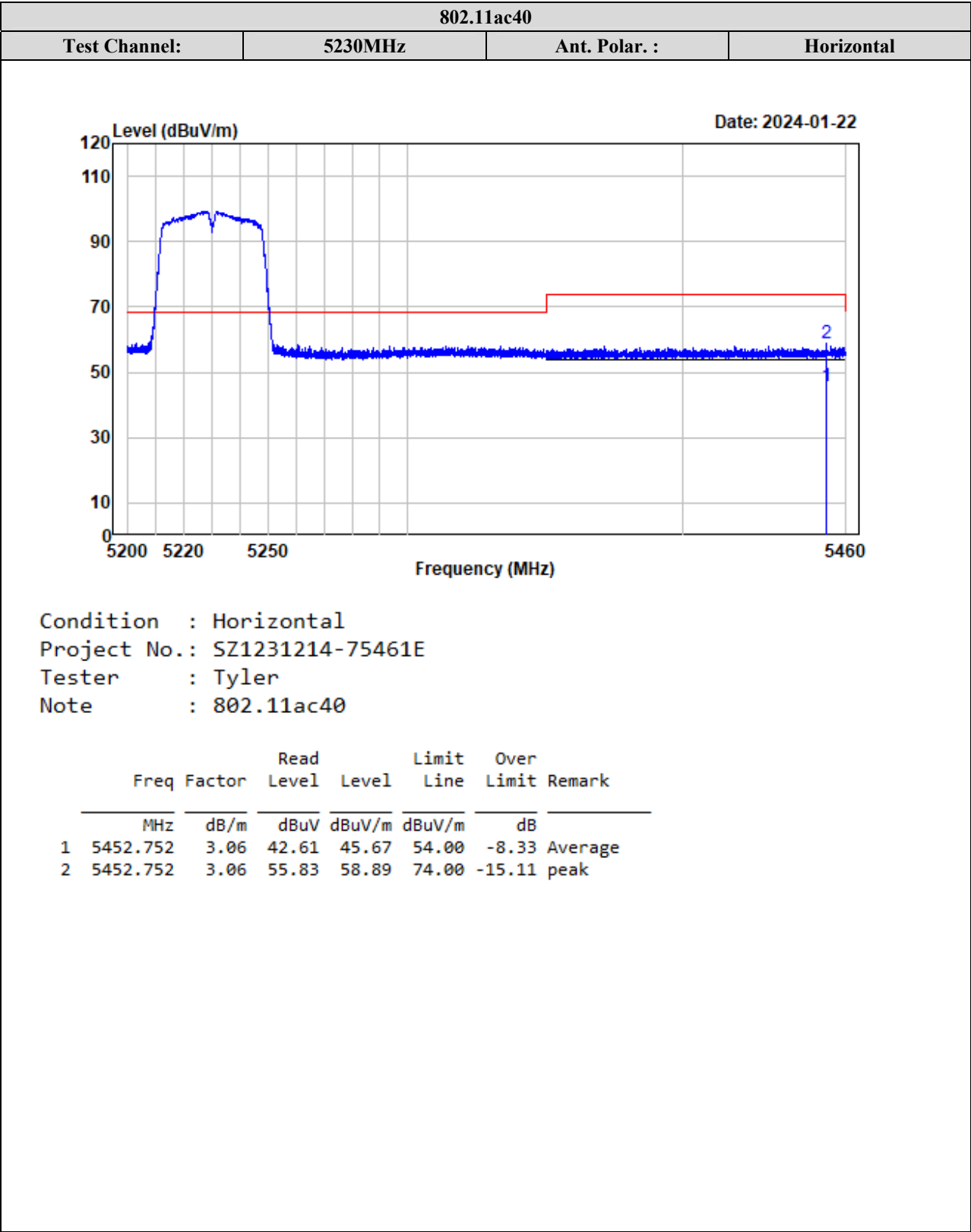


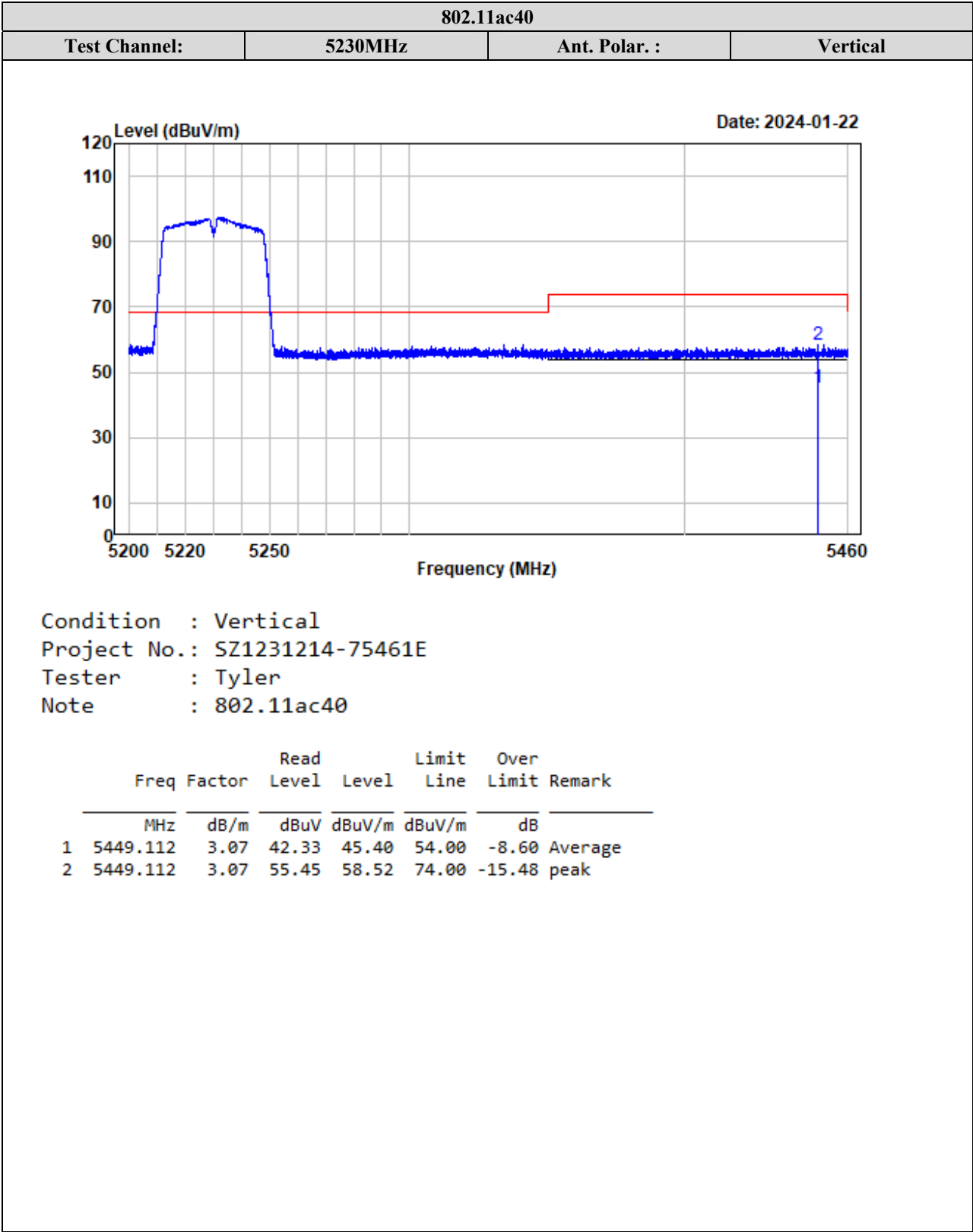


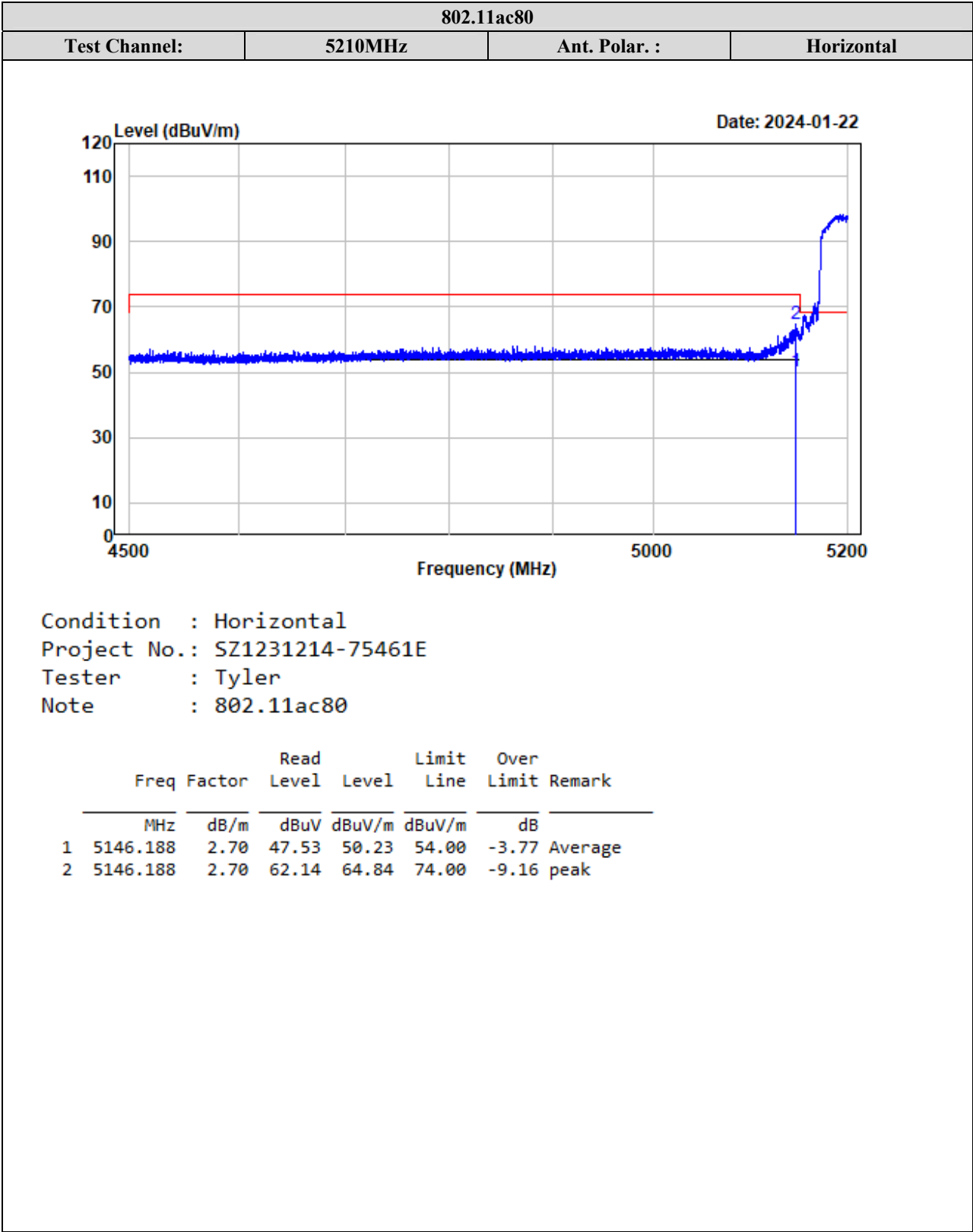


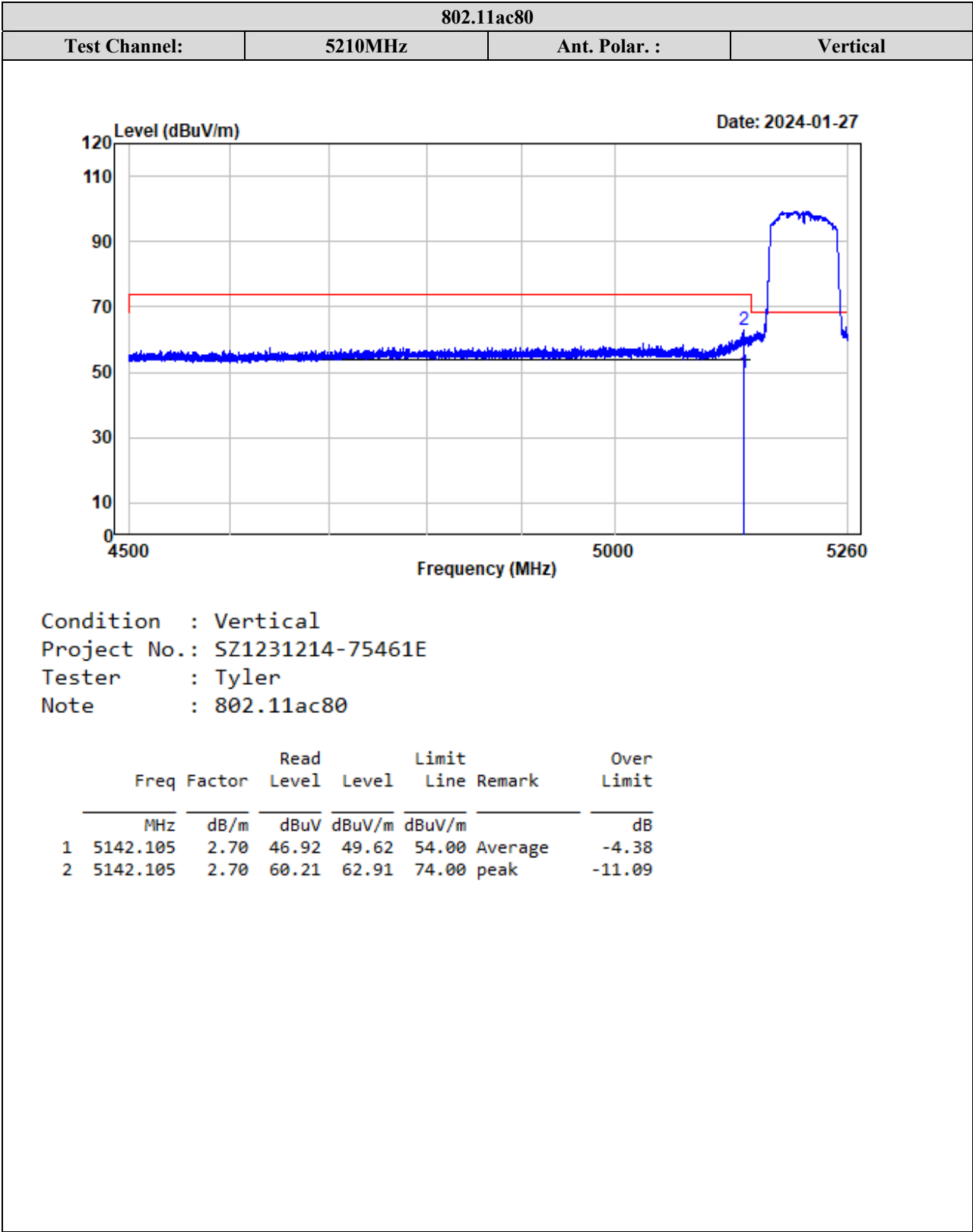


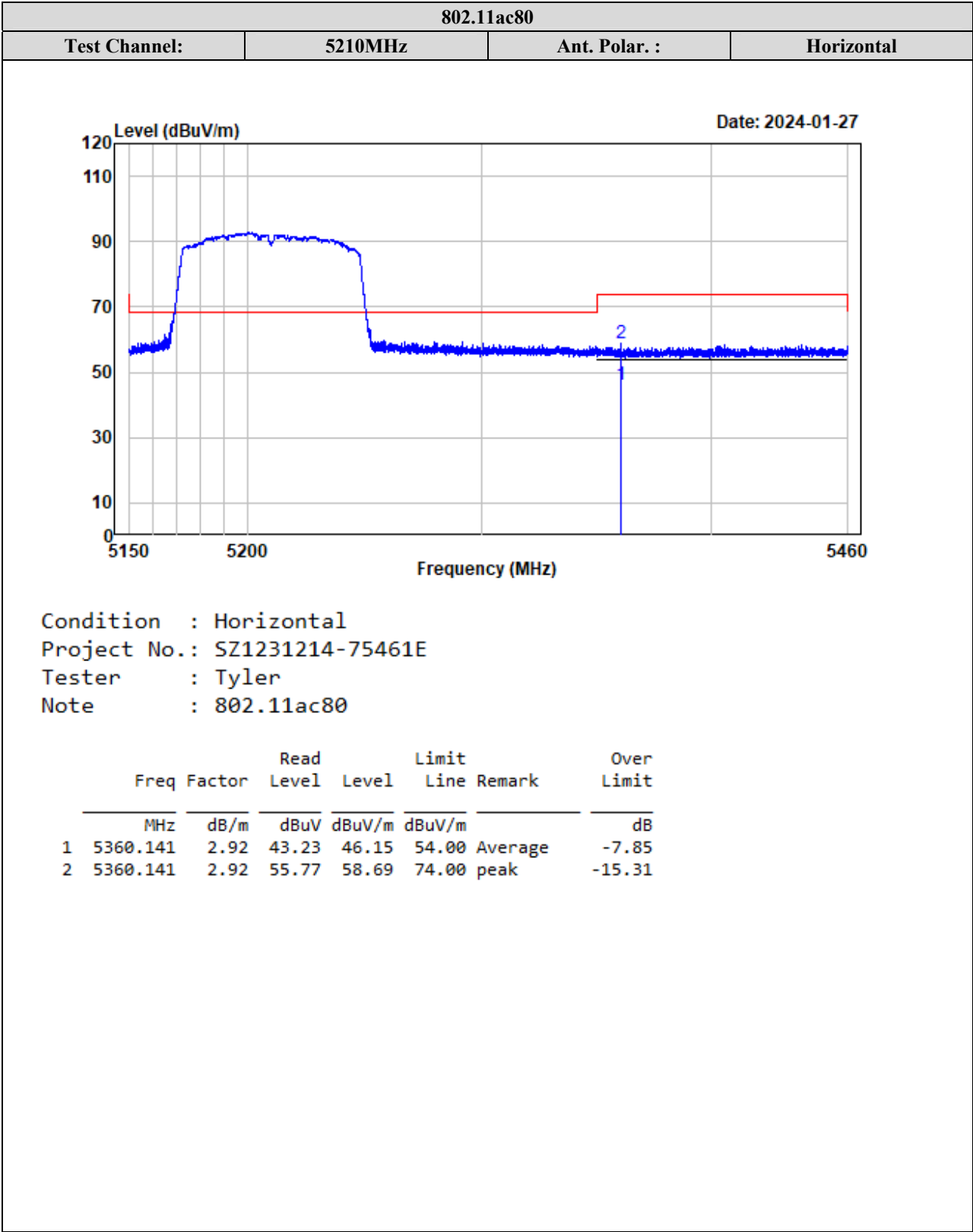


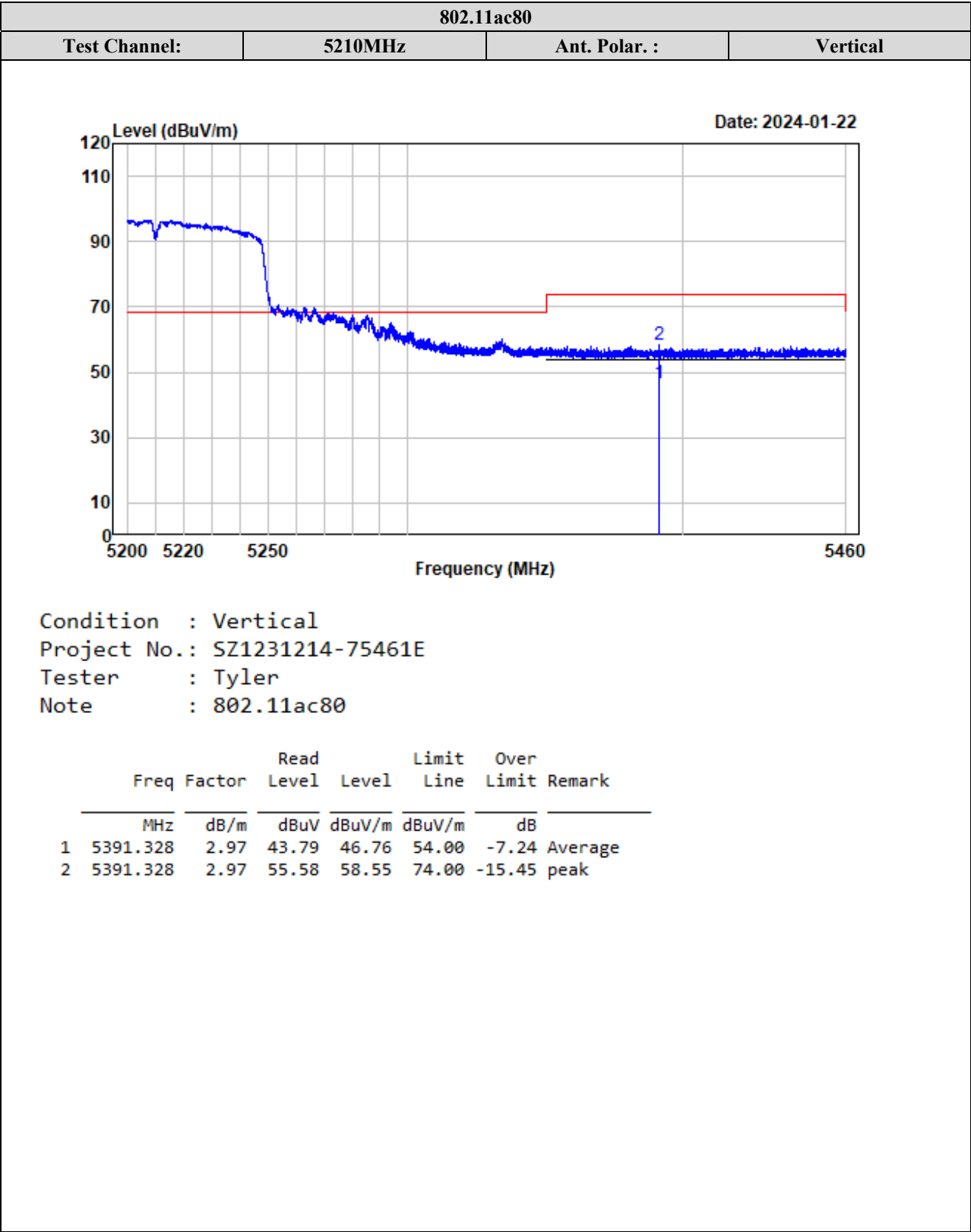




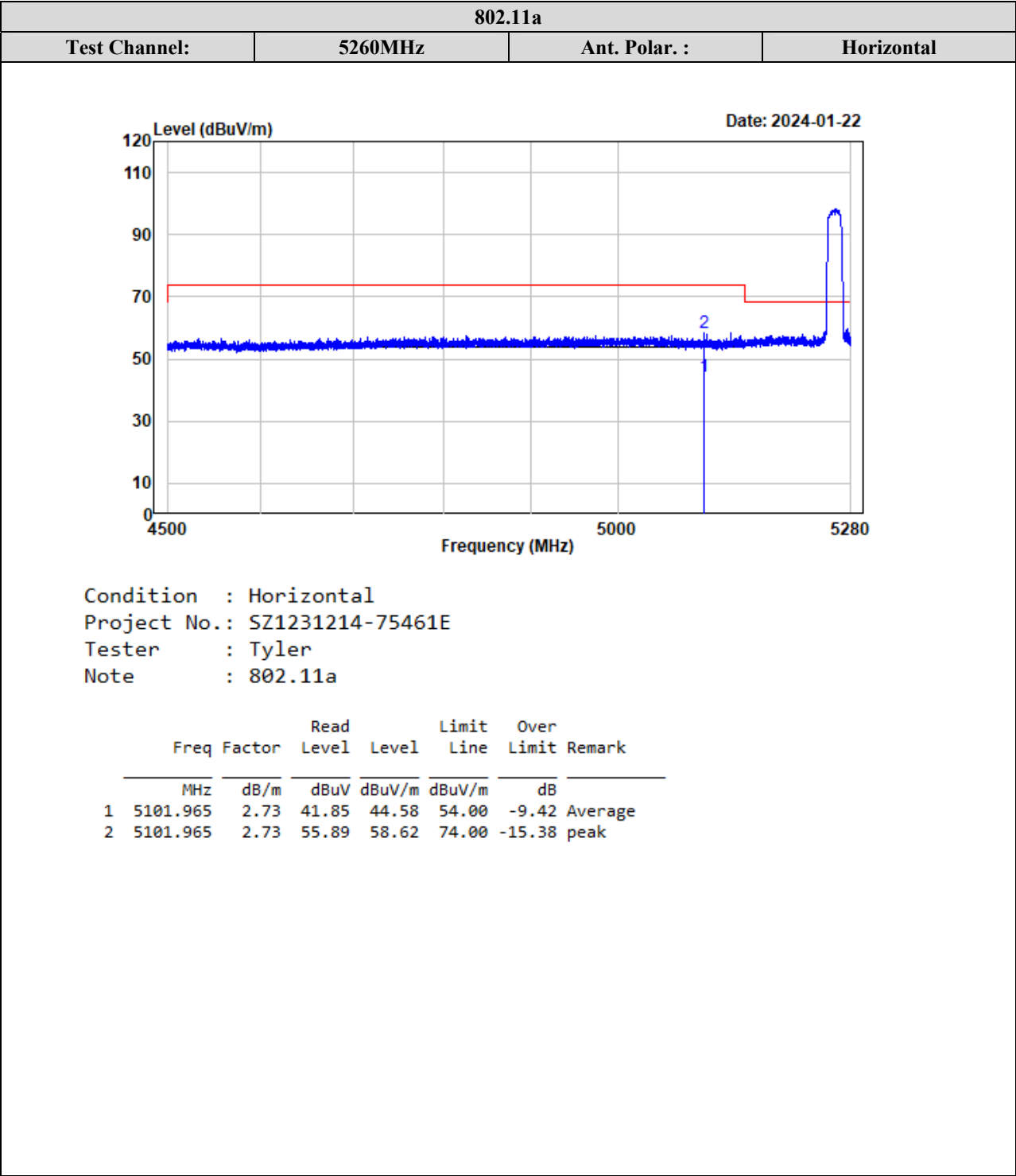


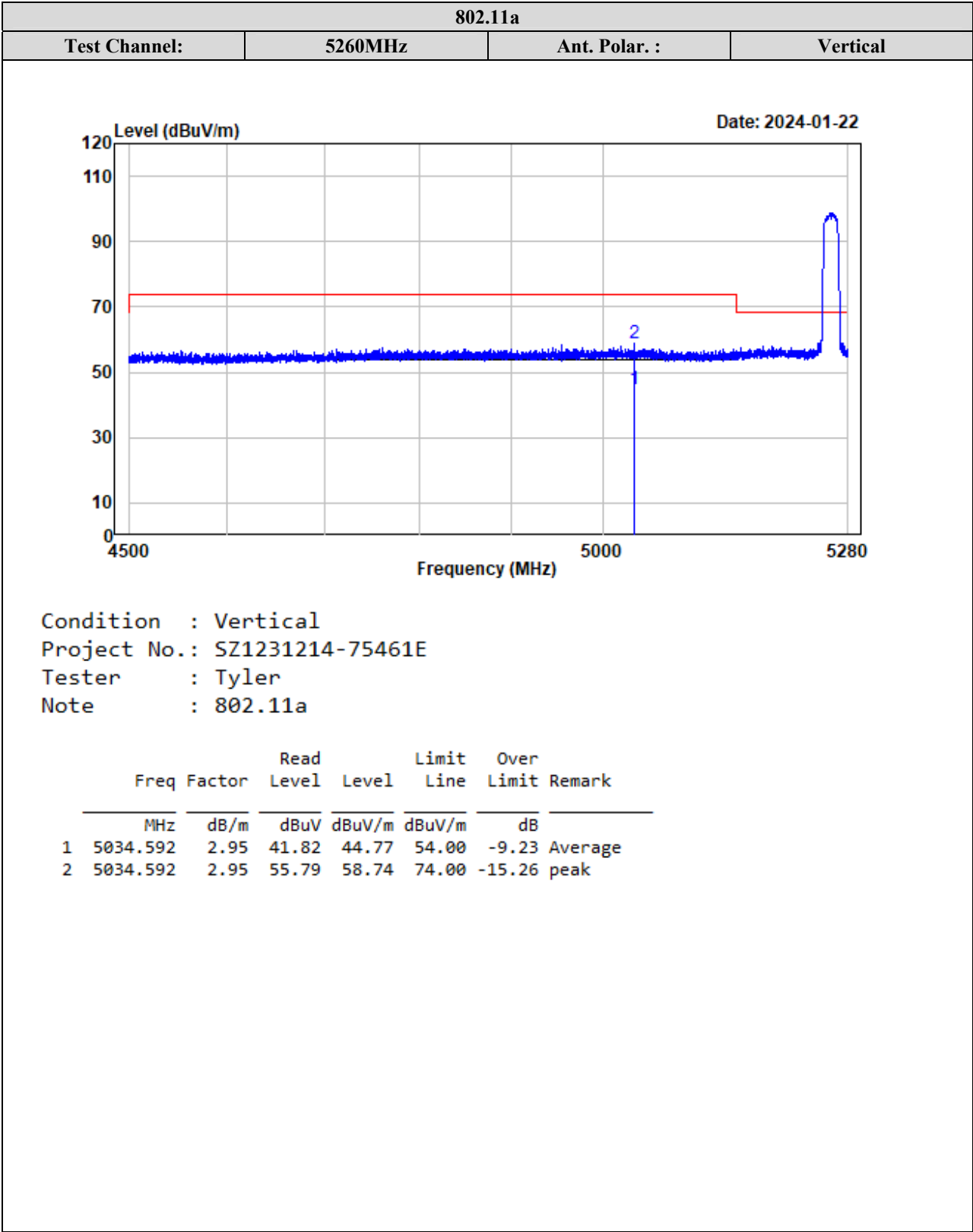


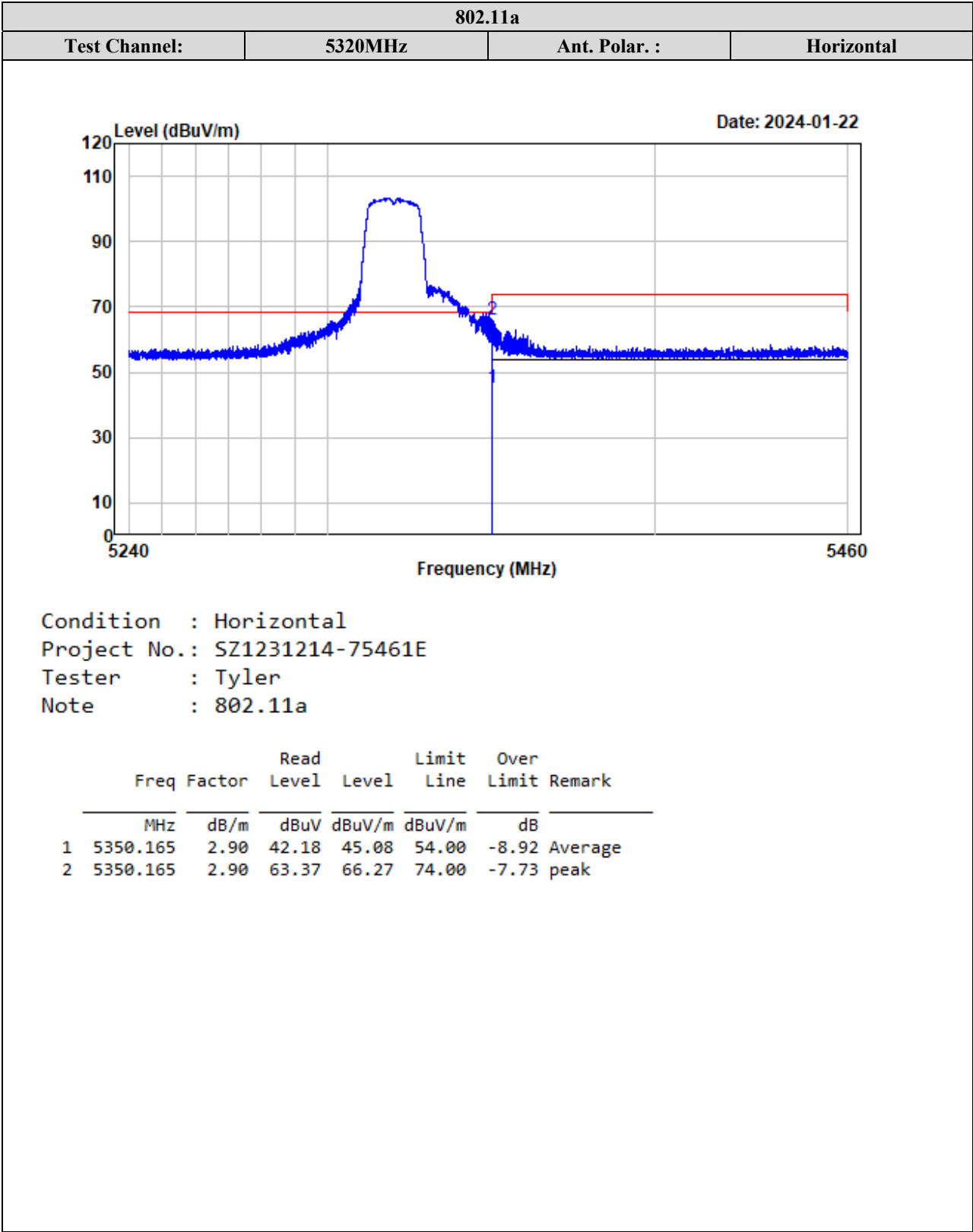


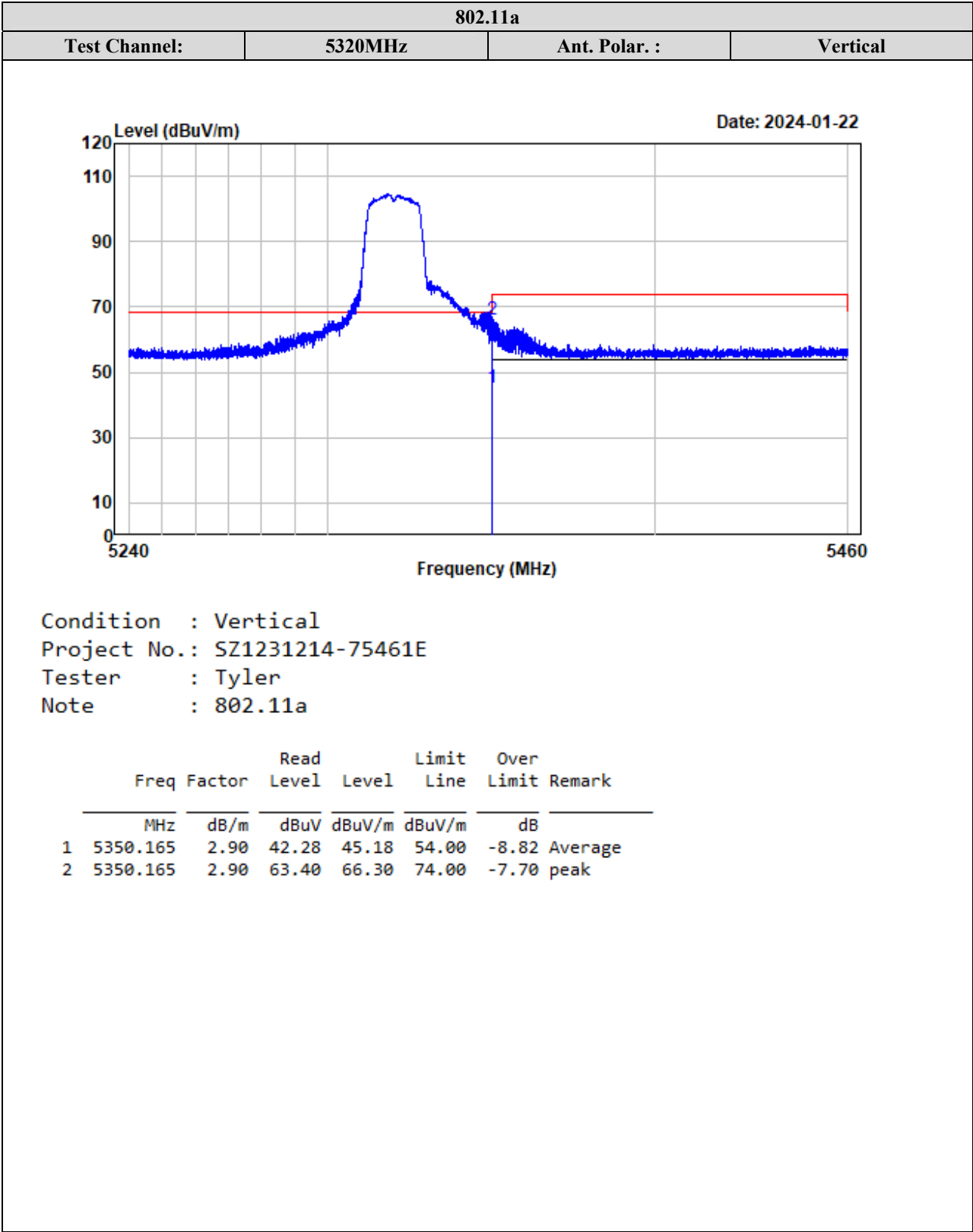


5250-5350MHz:
ANT 1

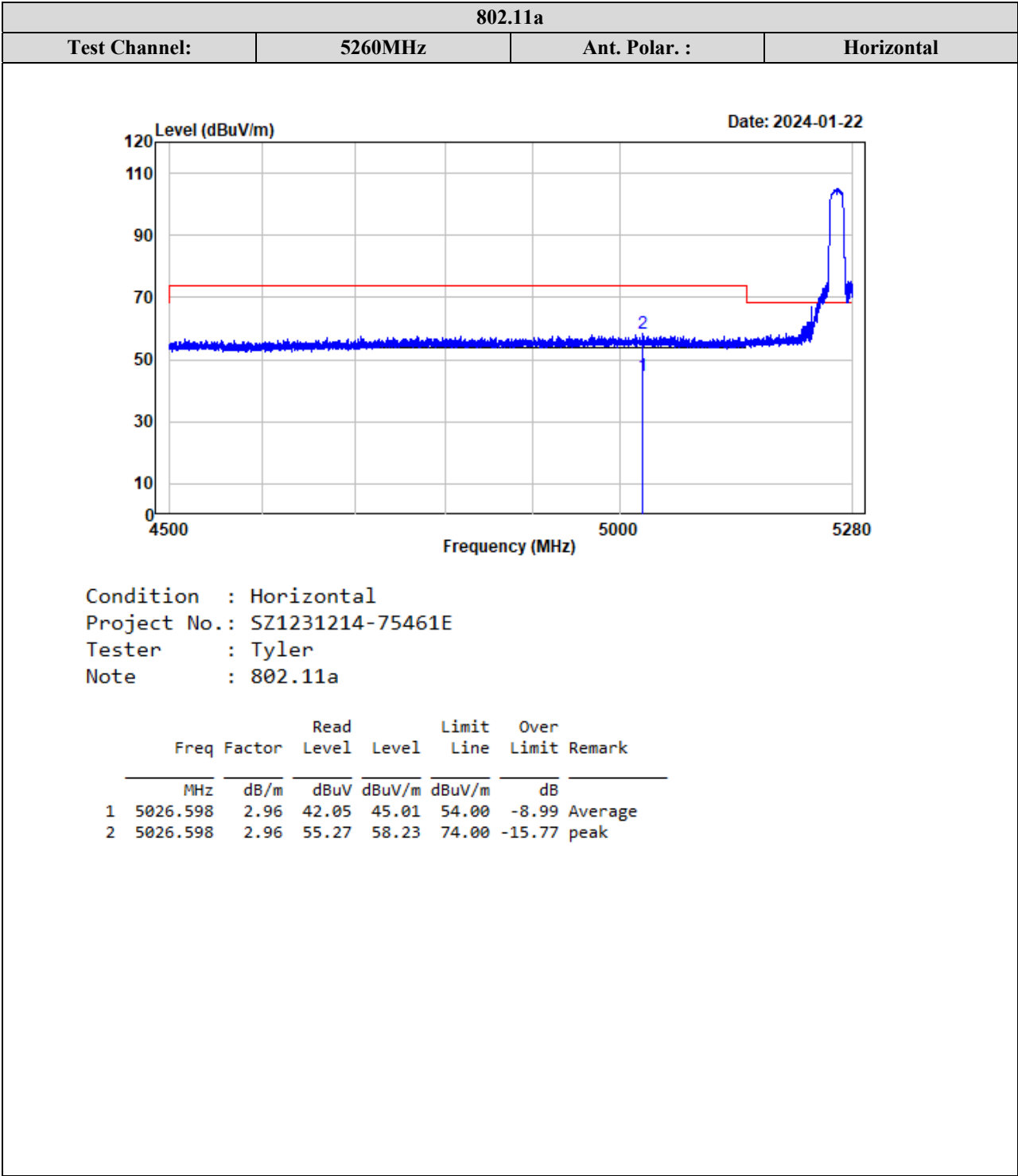


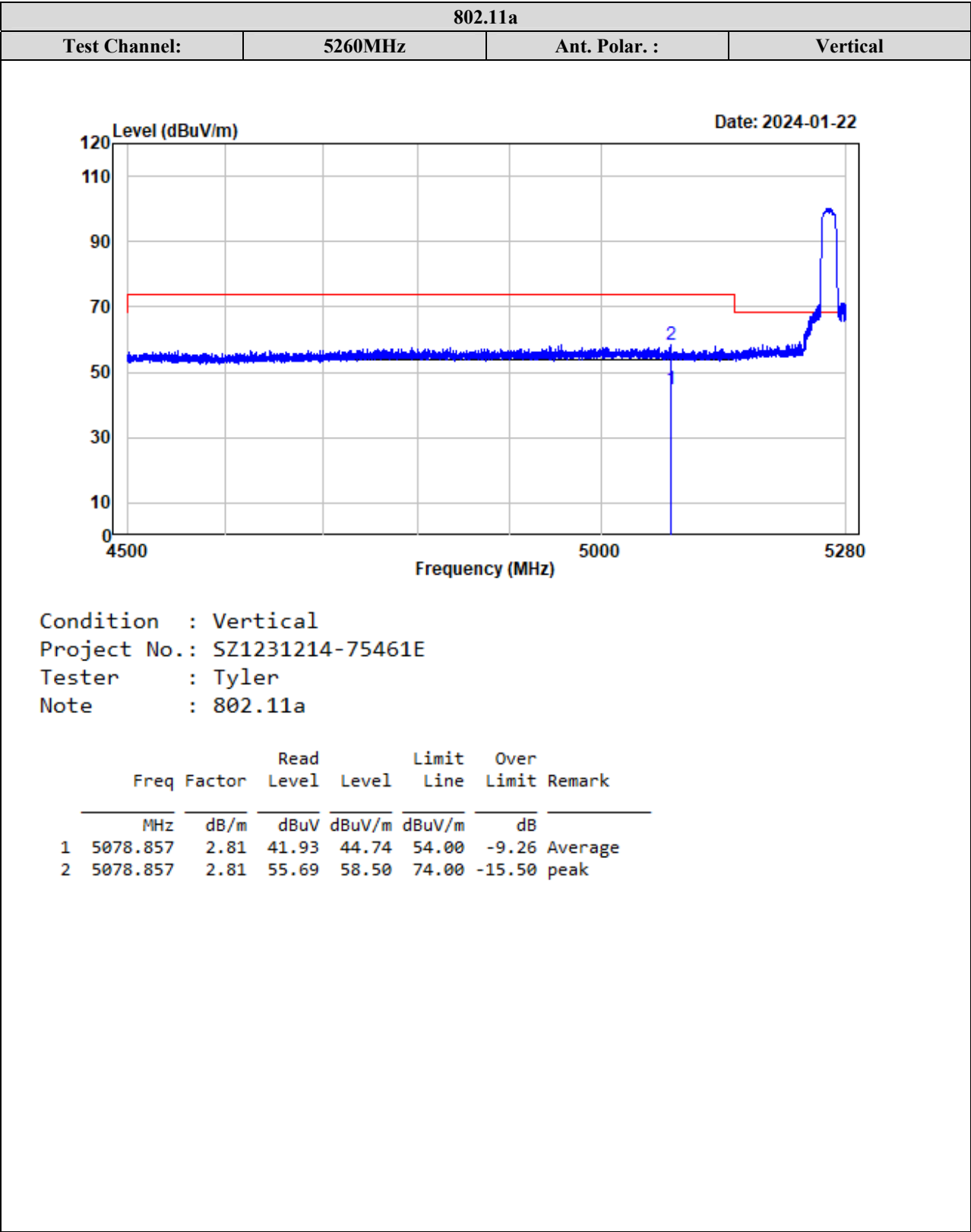


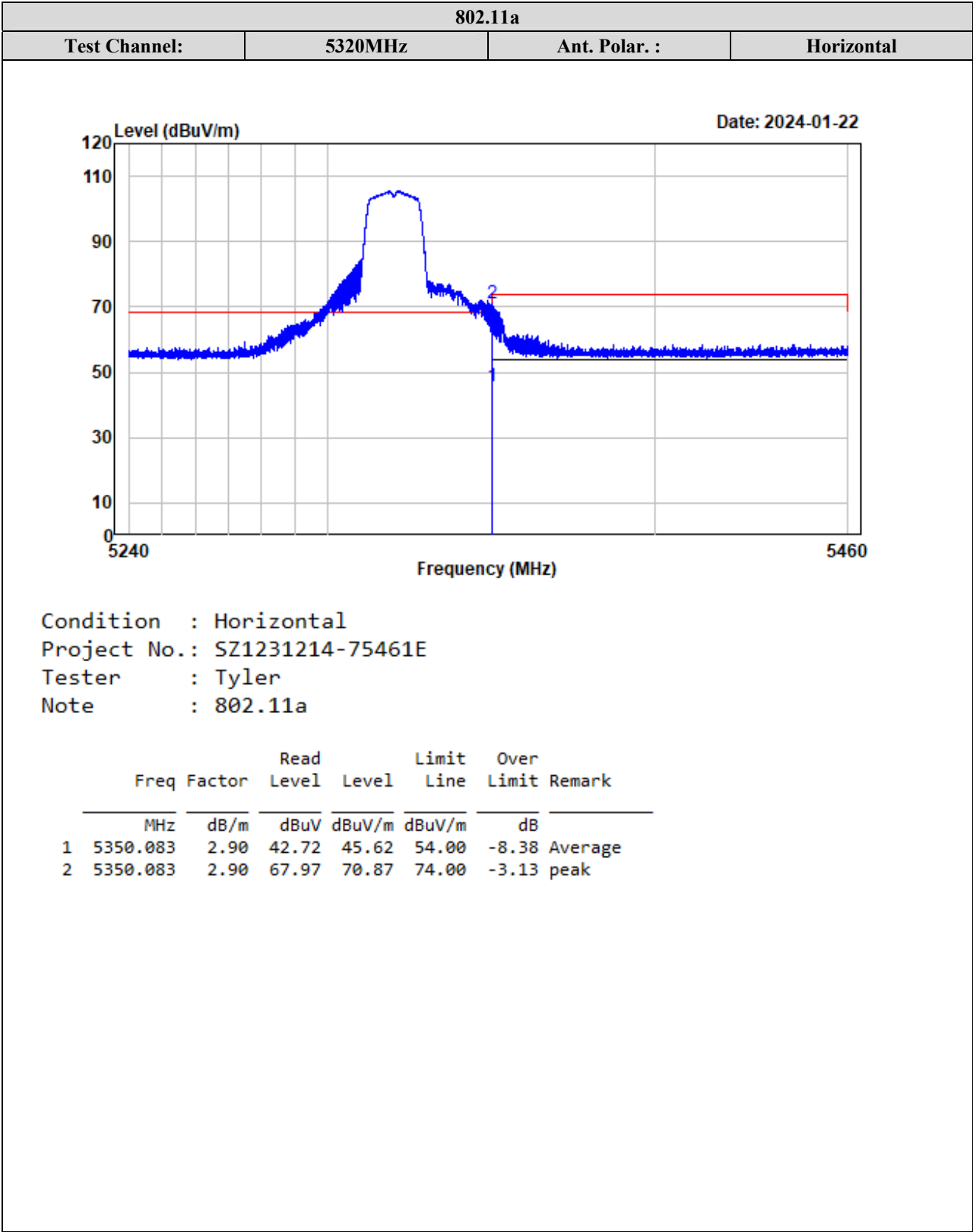


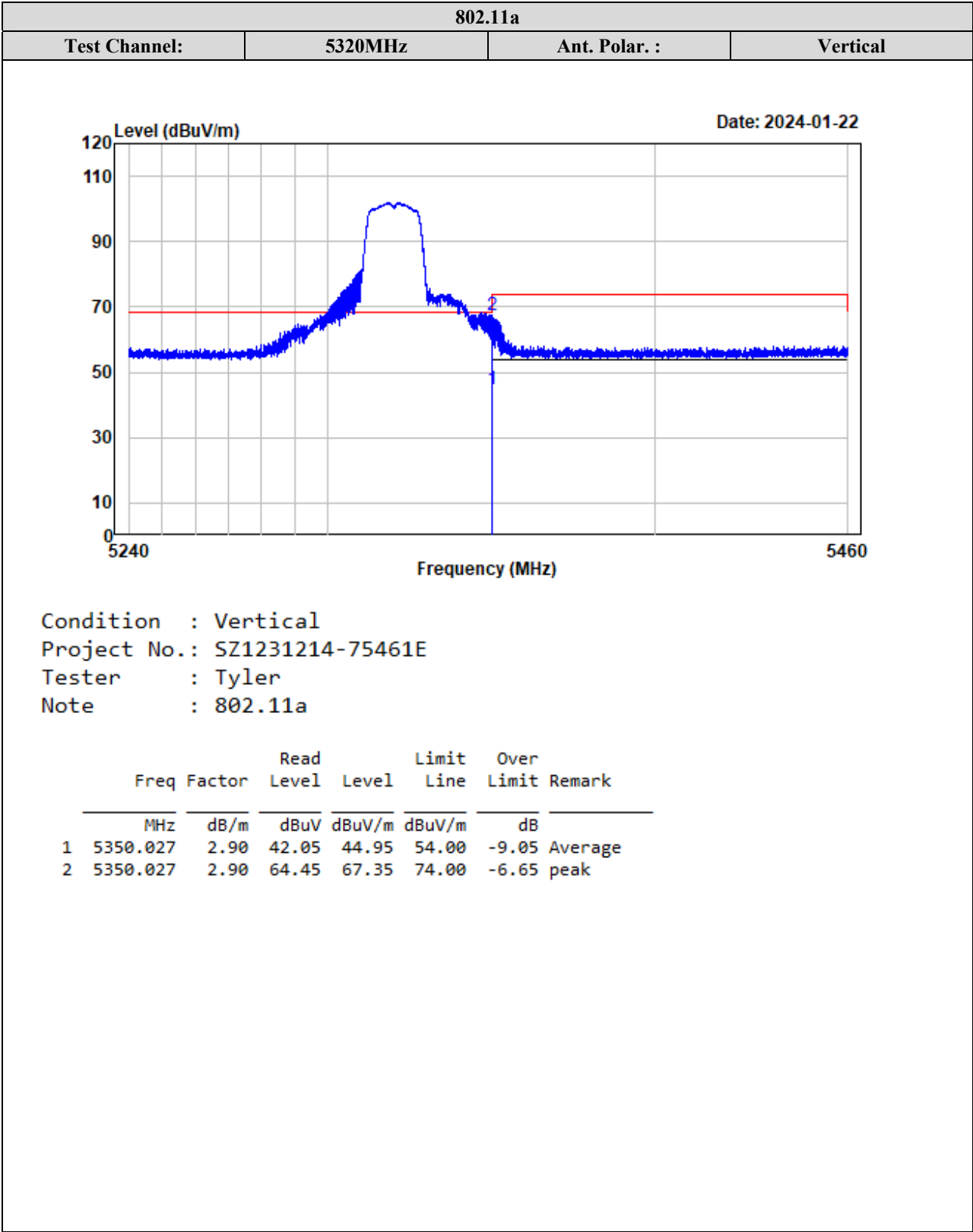


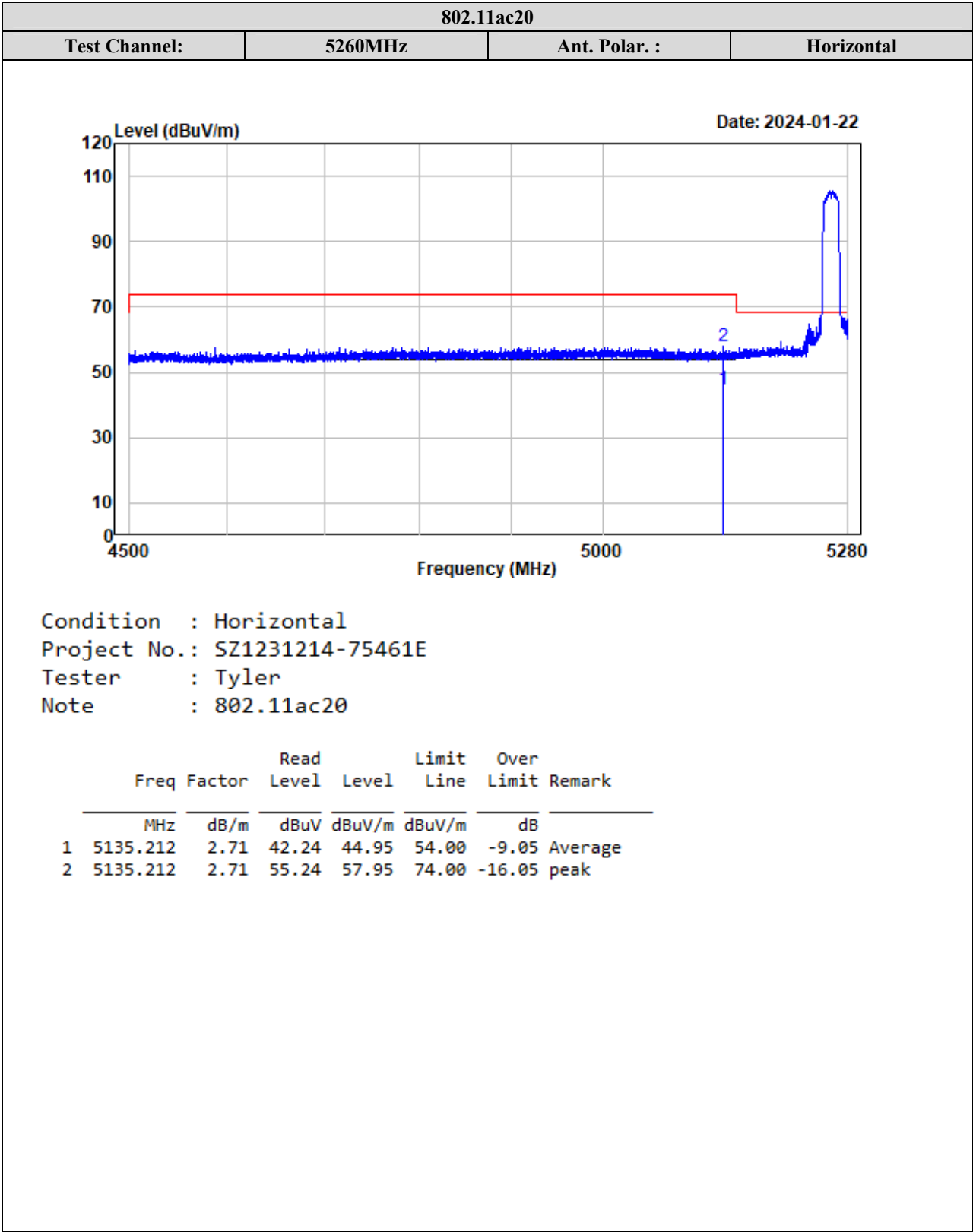
ANT 2

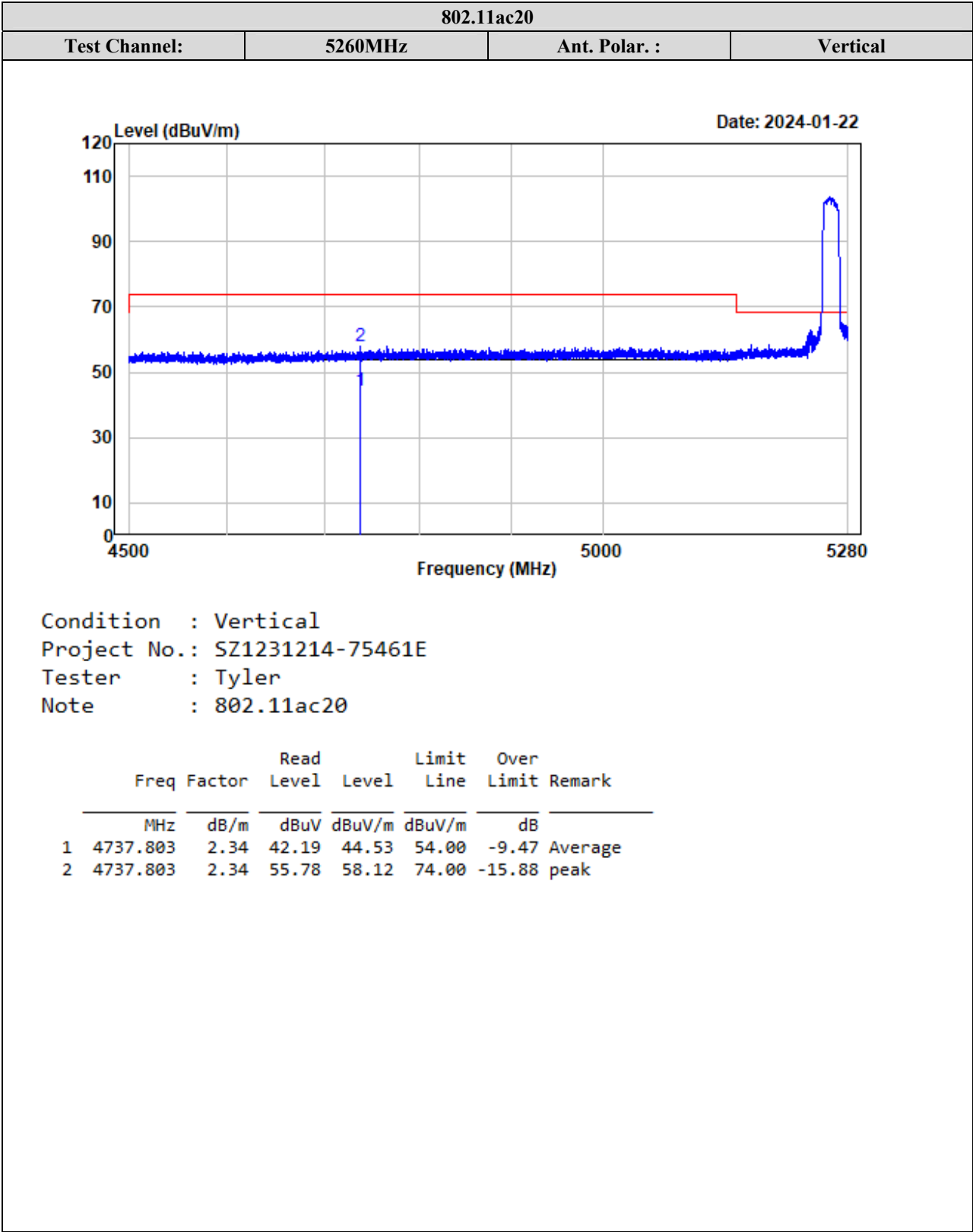


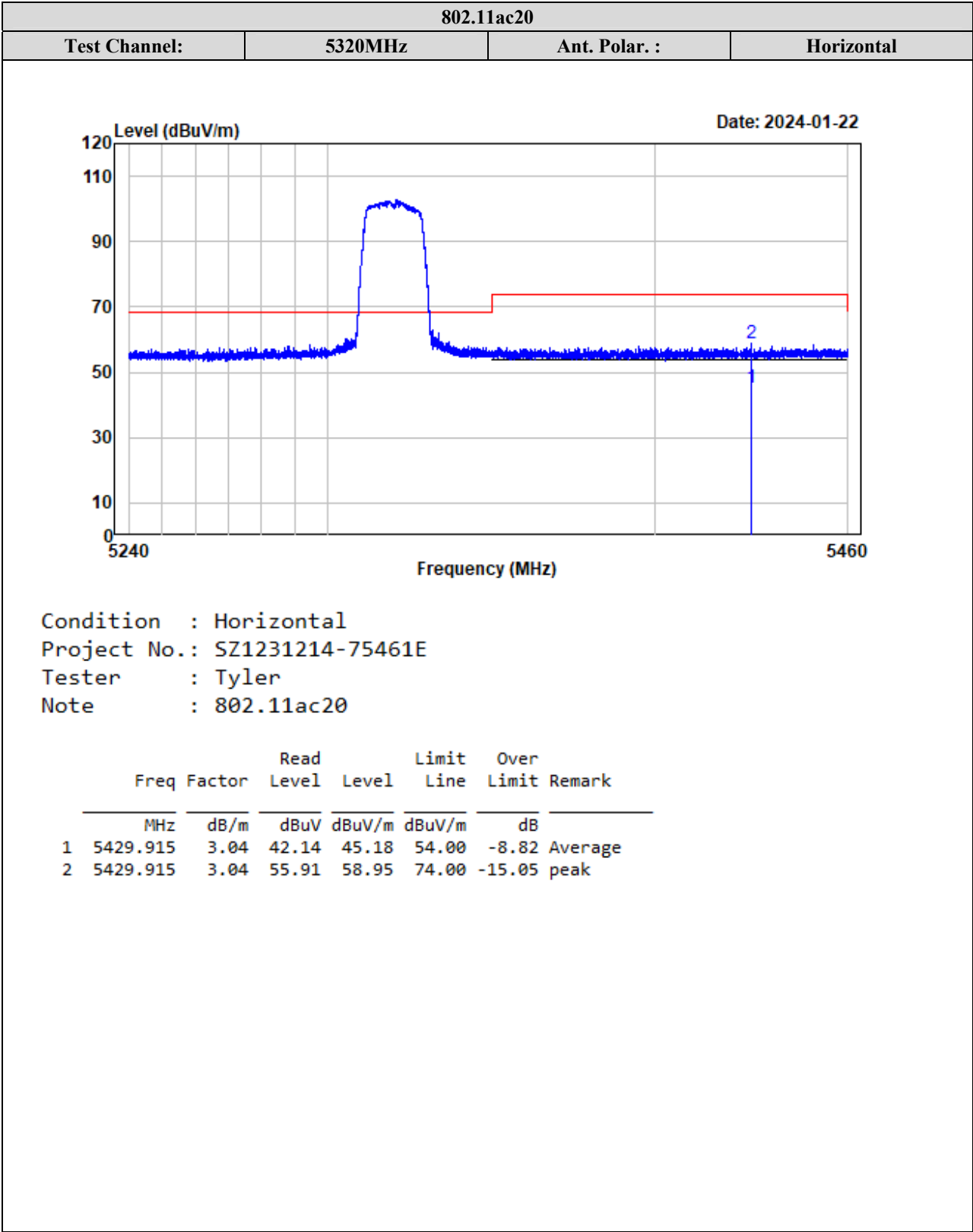


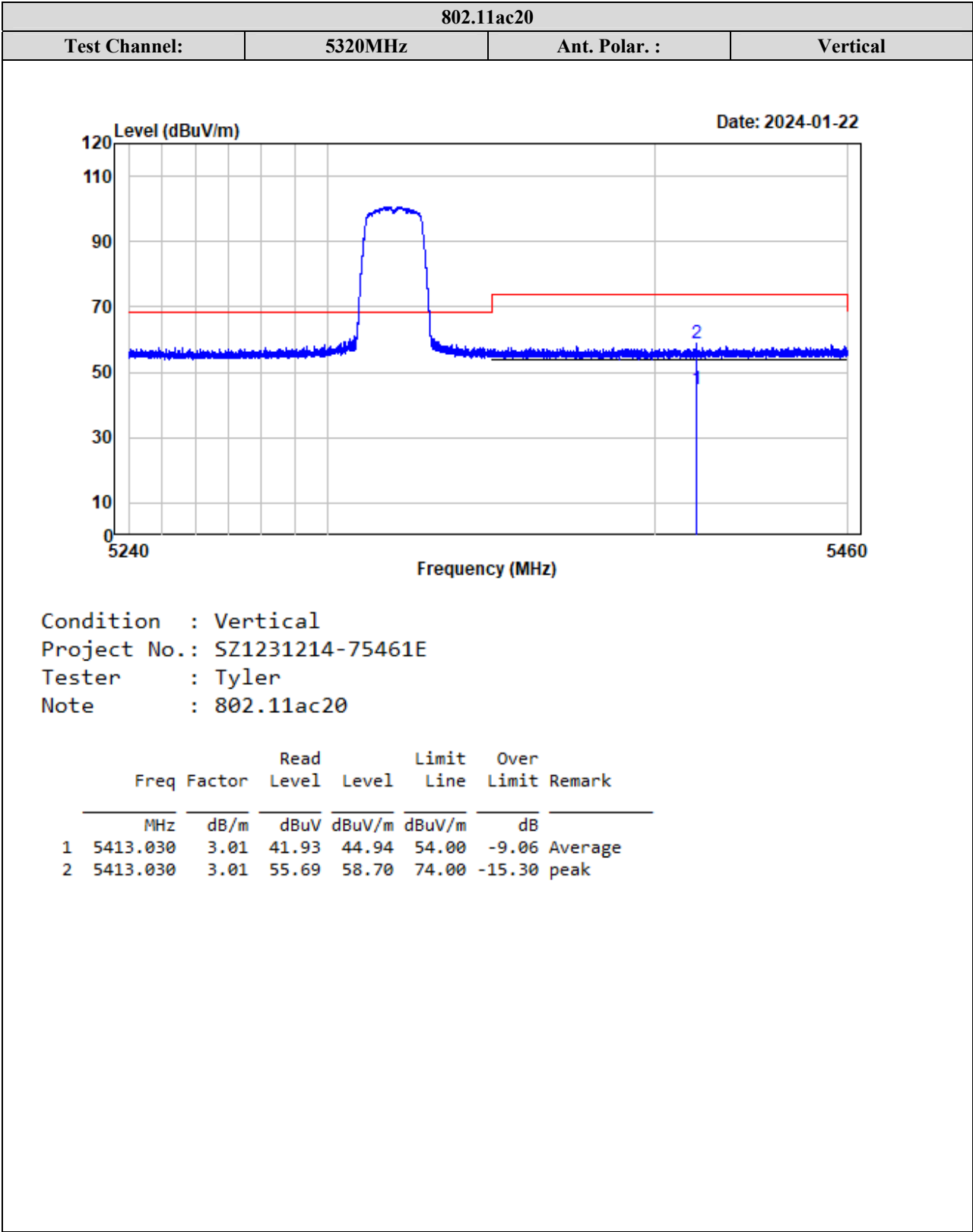


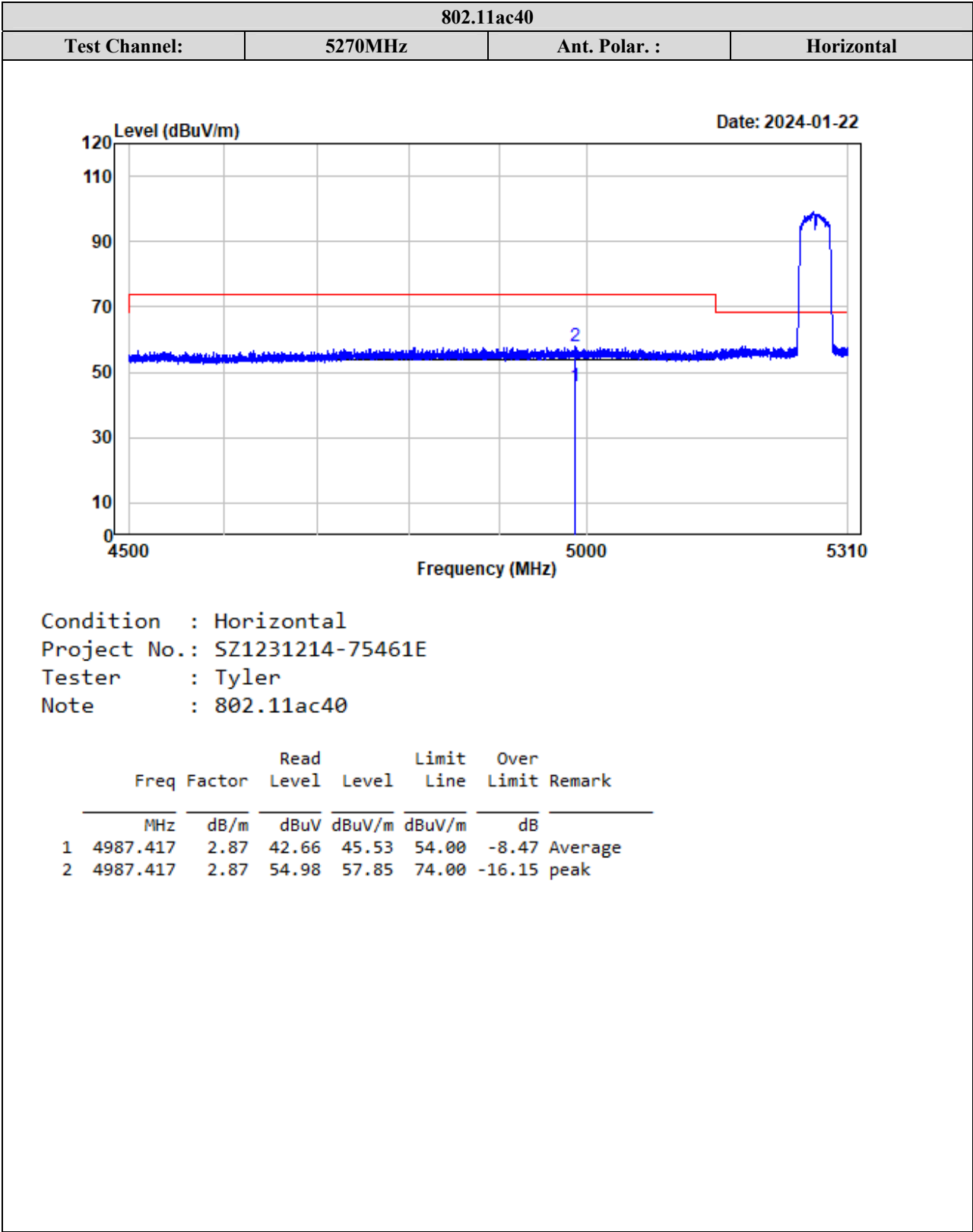


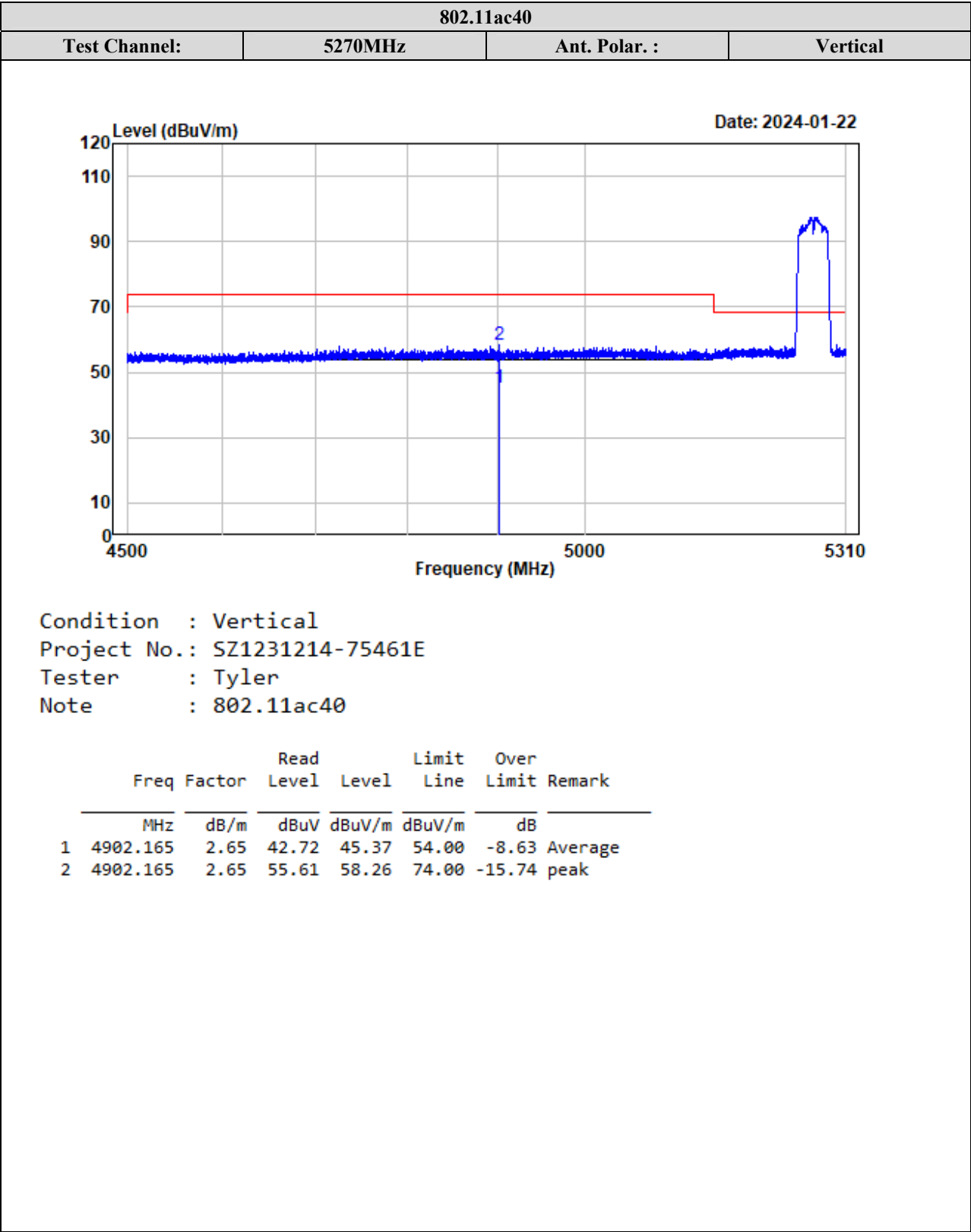


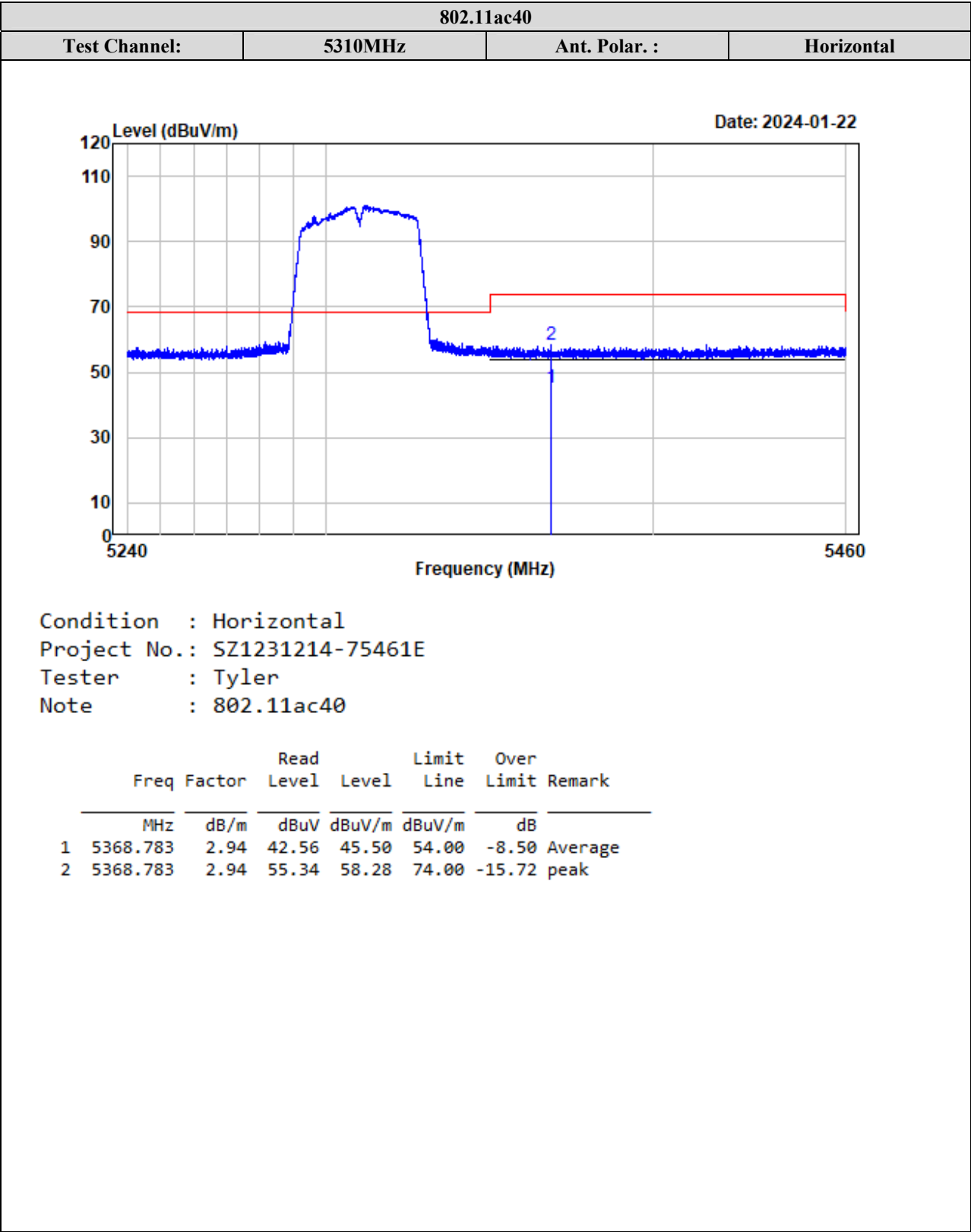


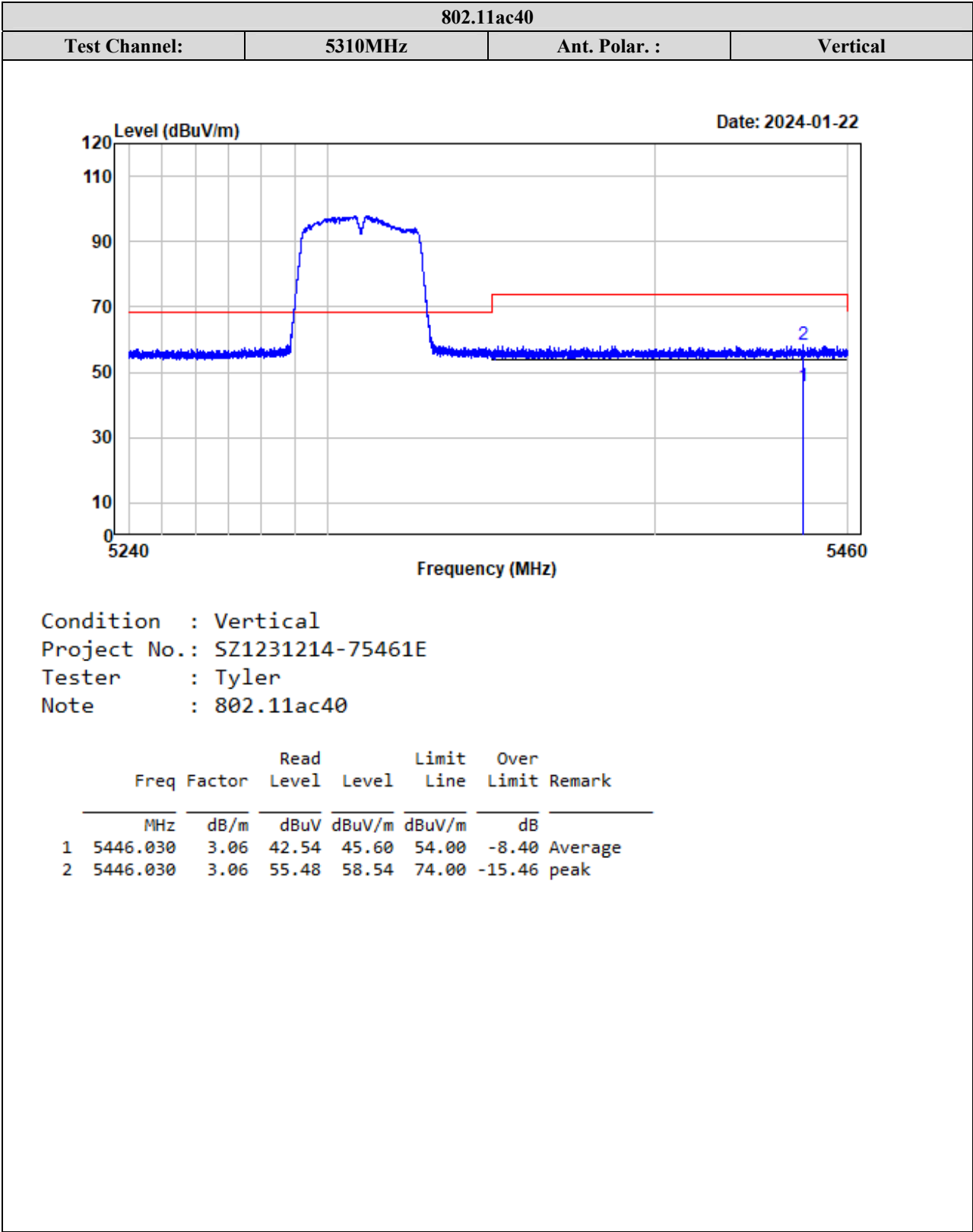


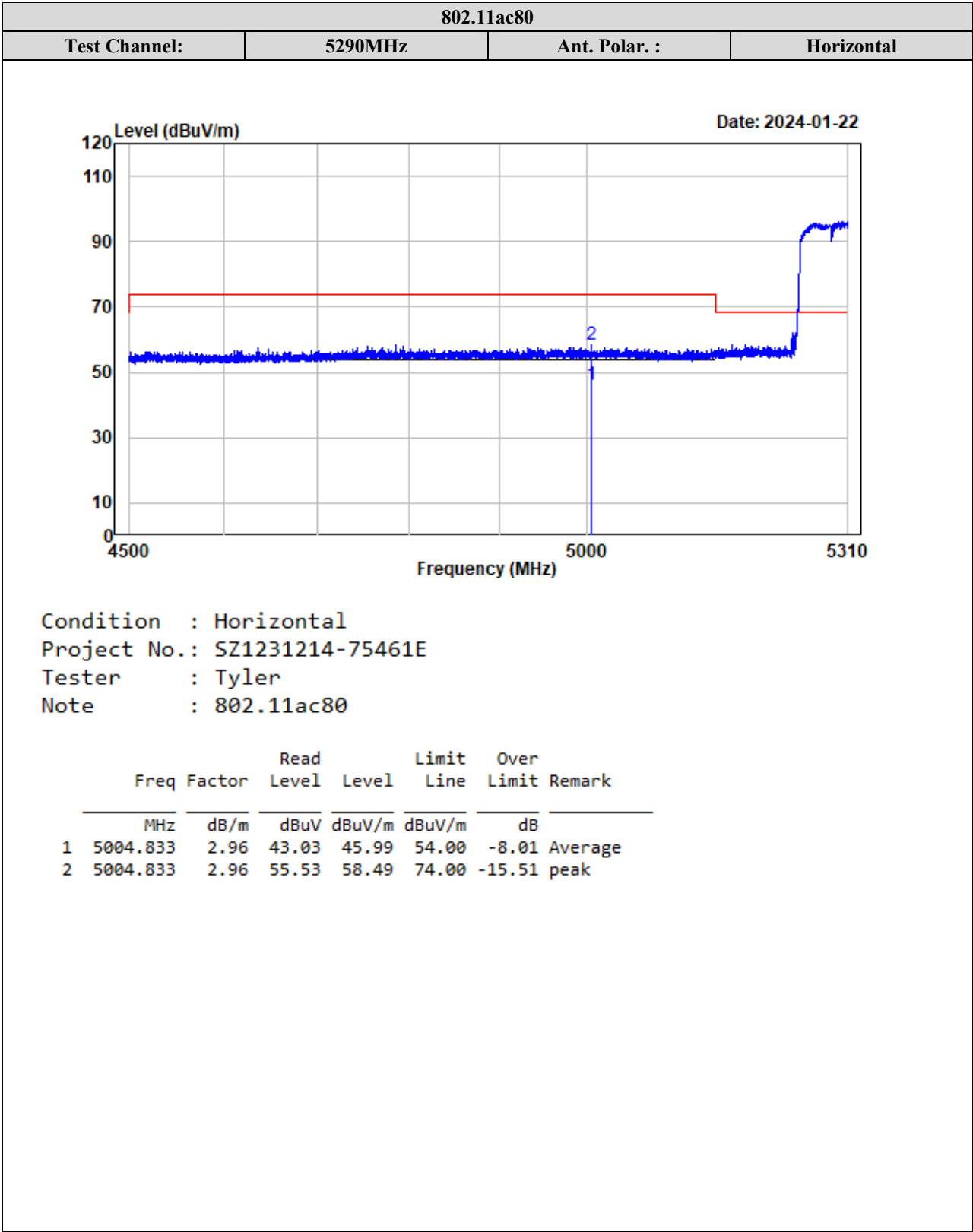


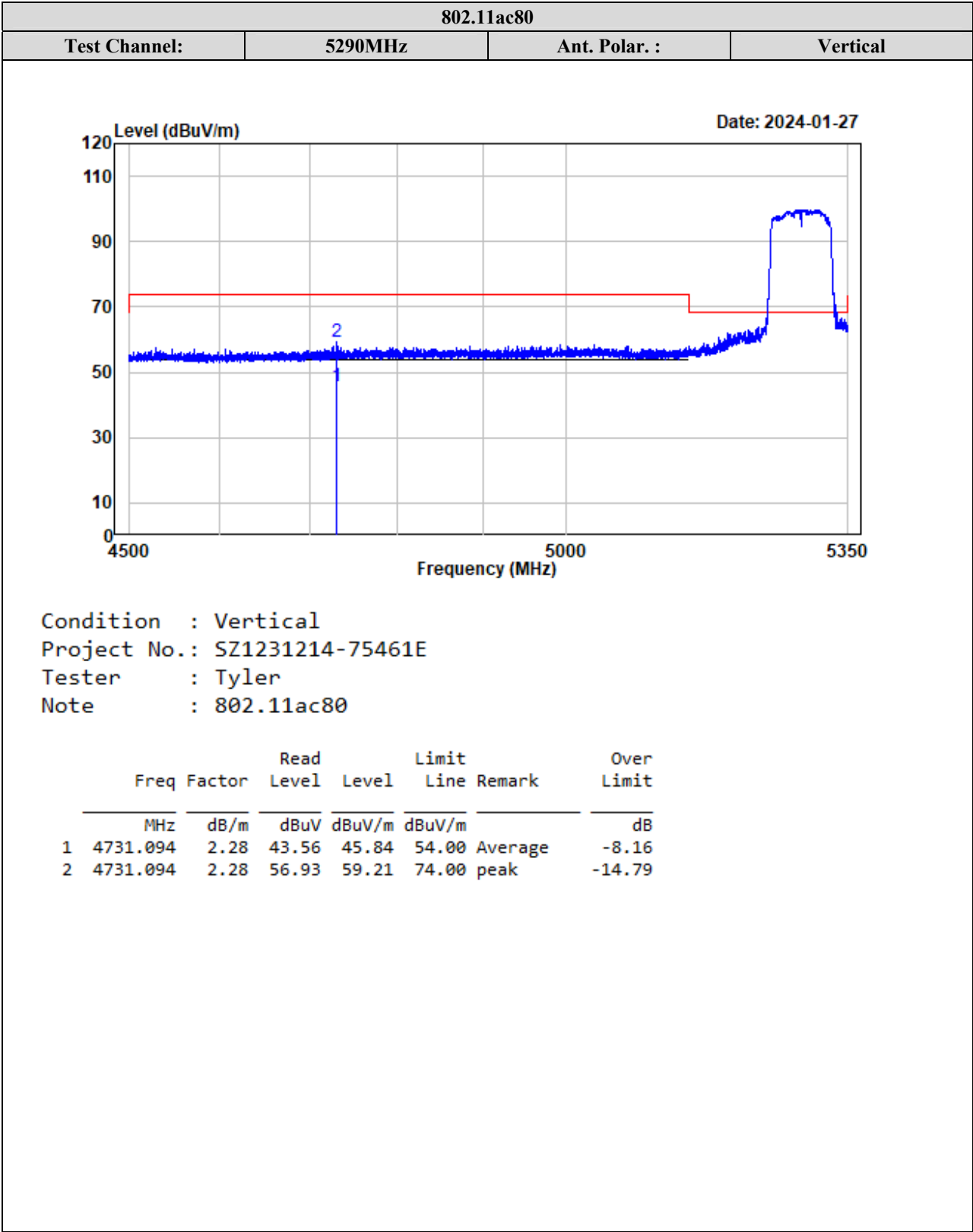


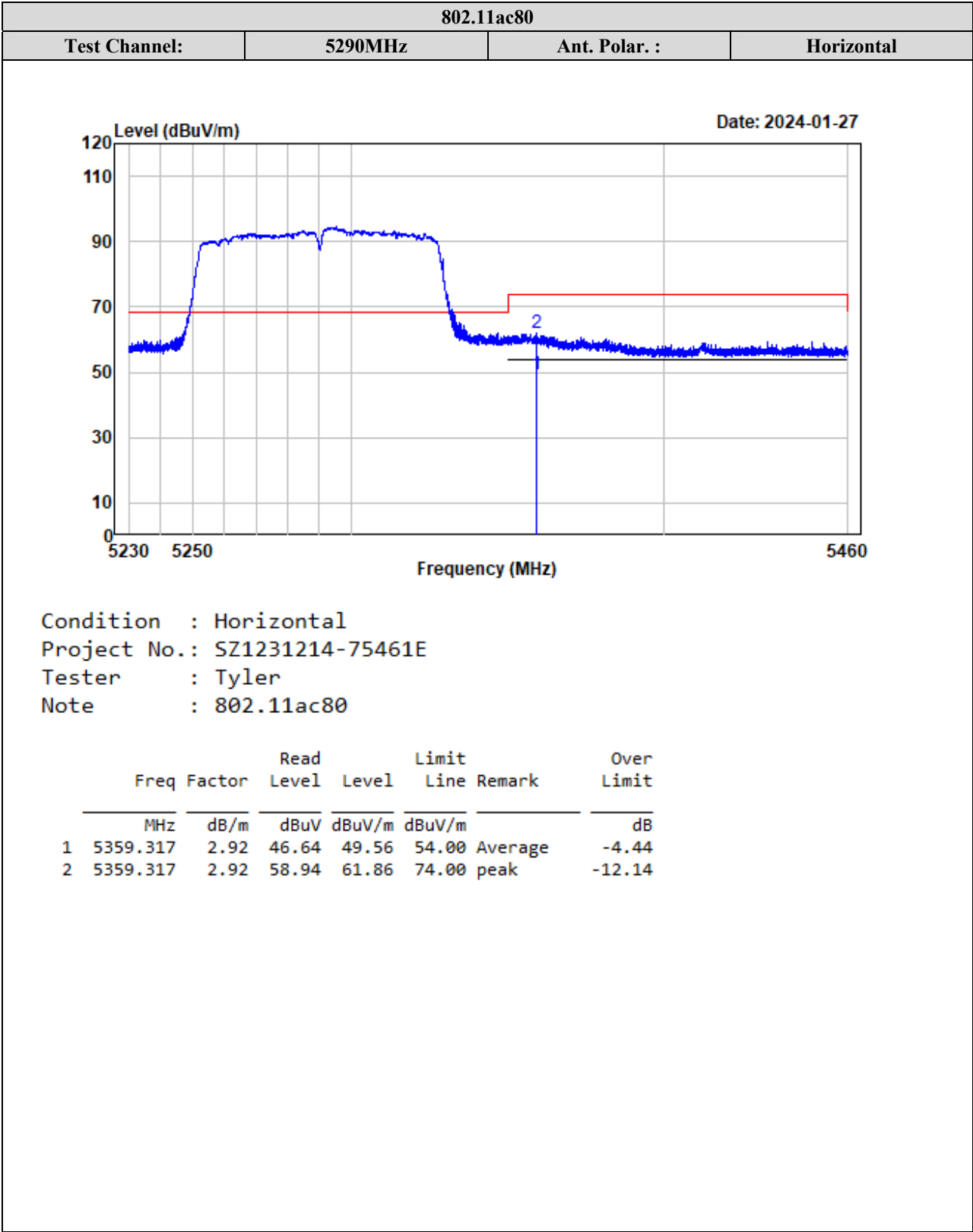


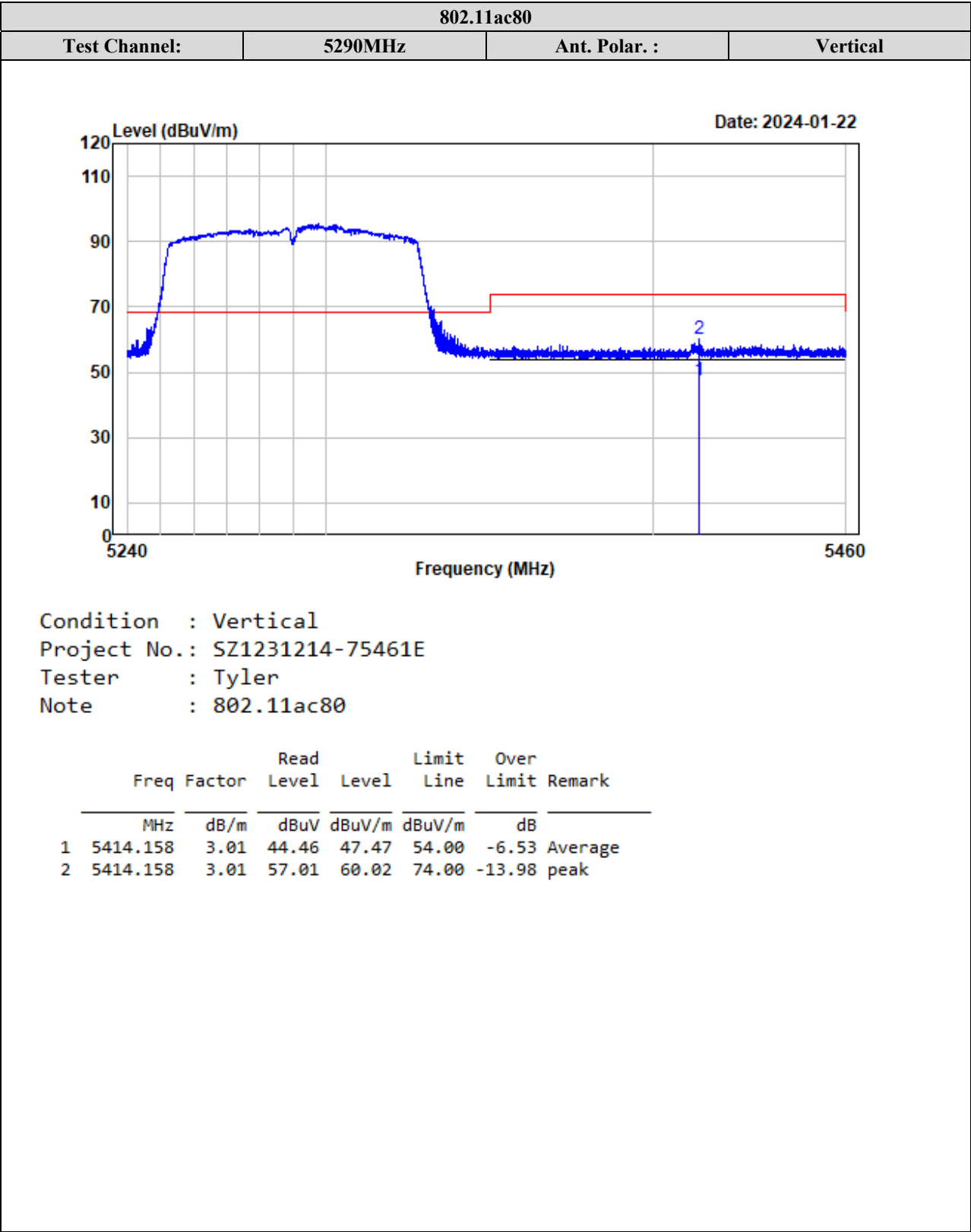




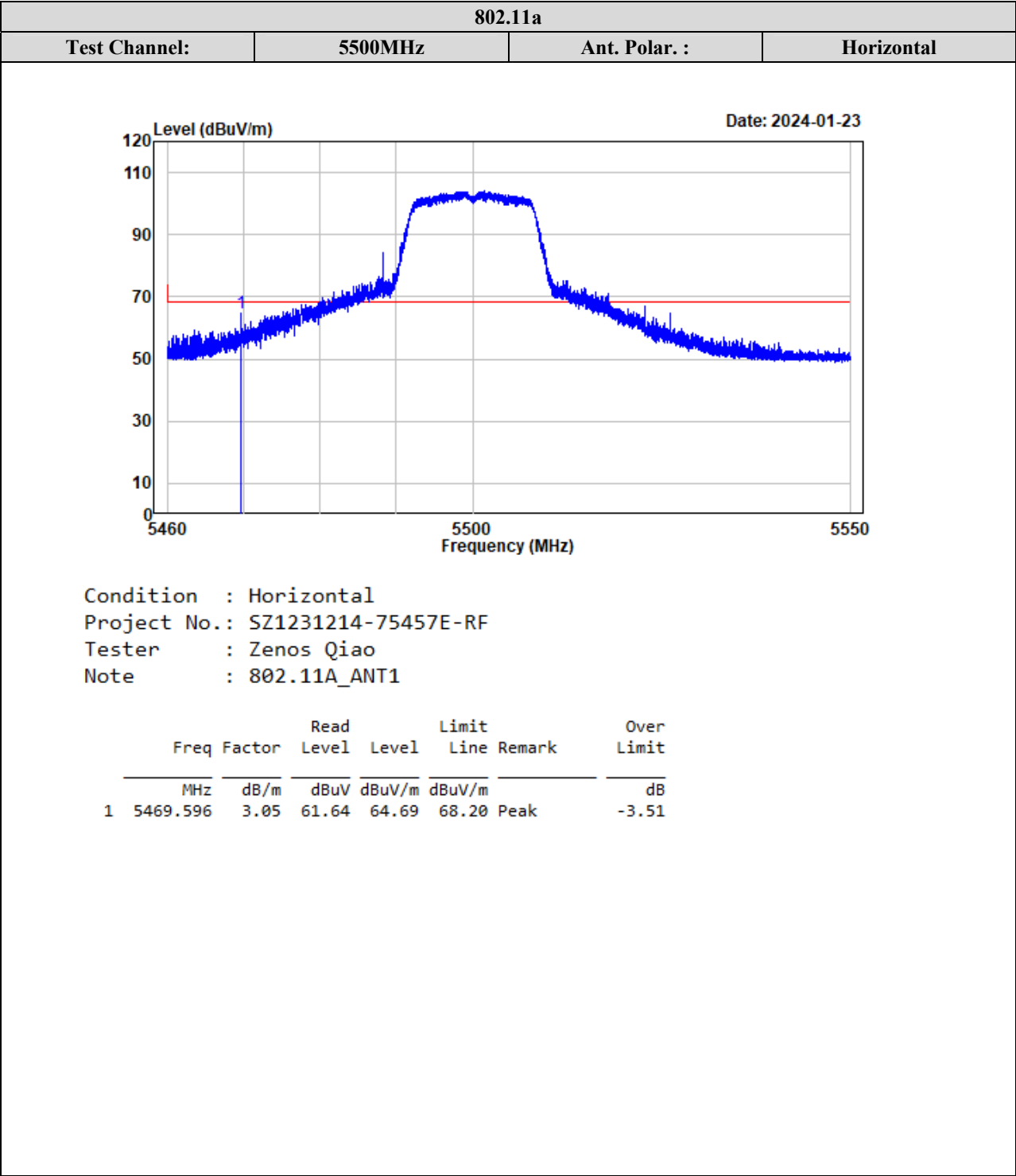


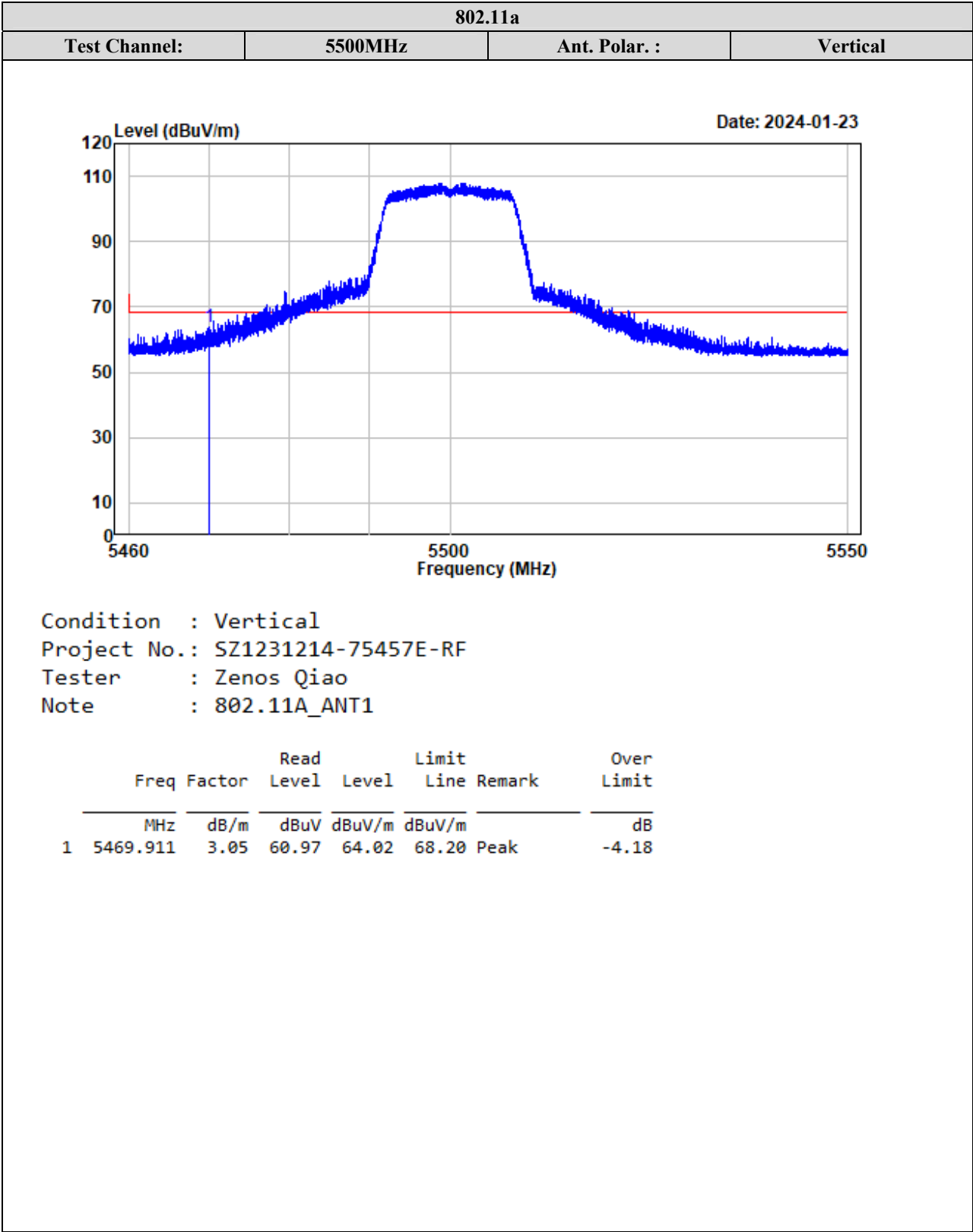


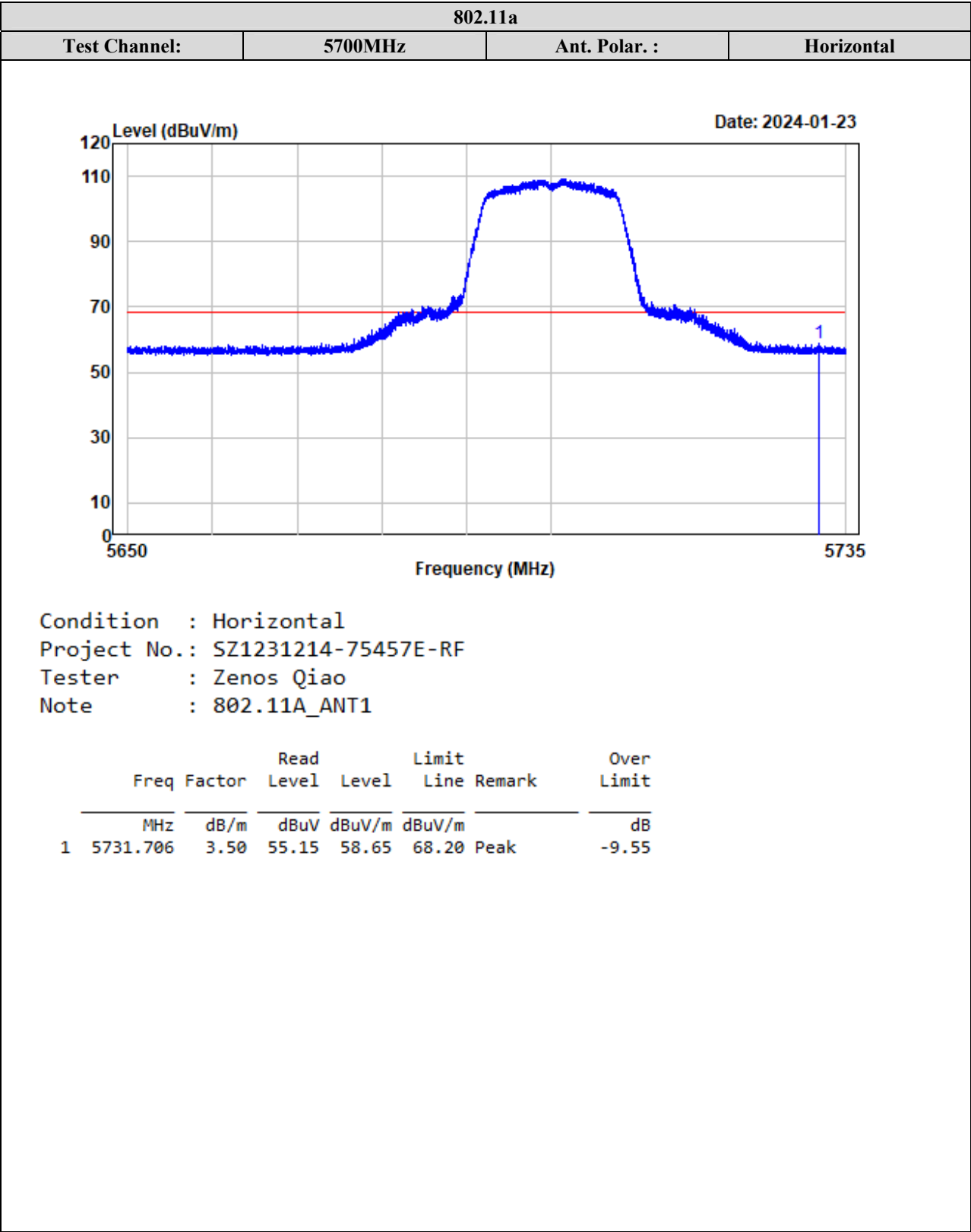


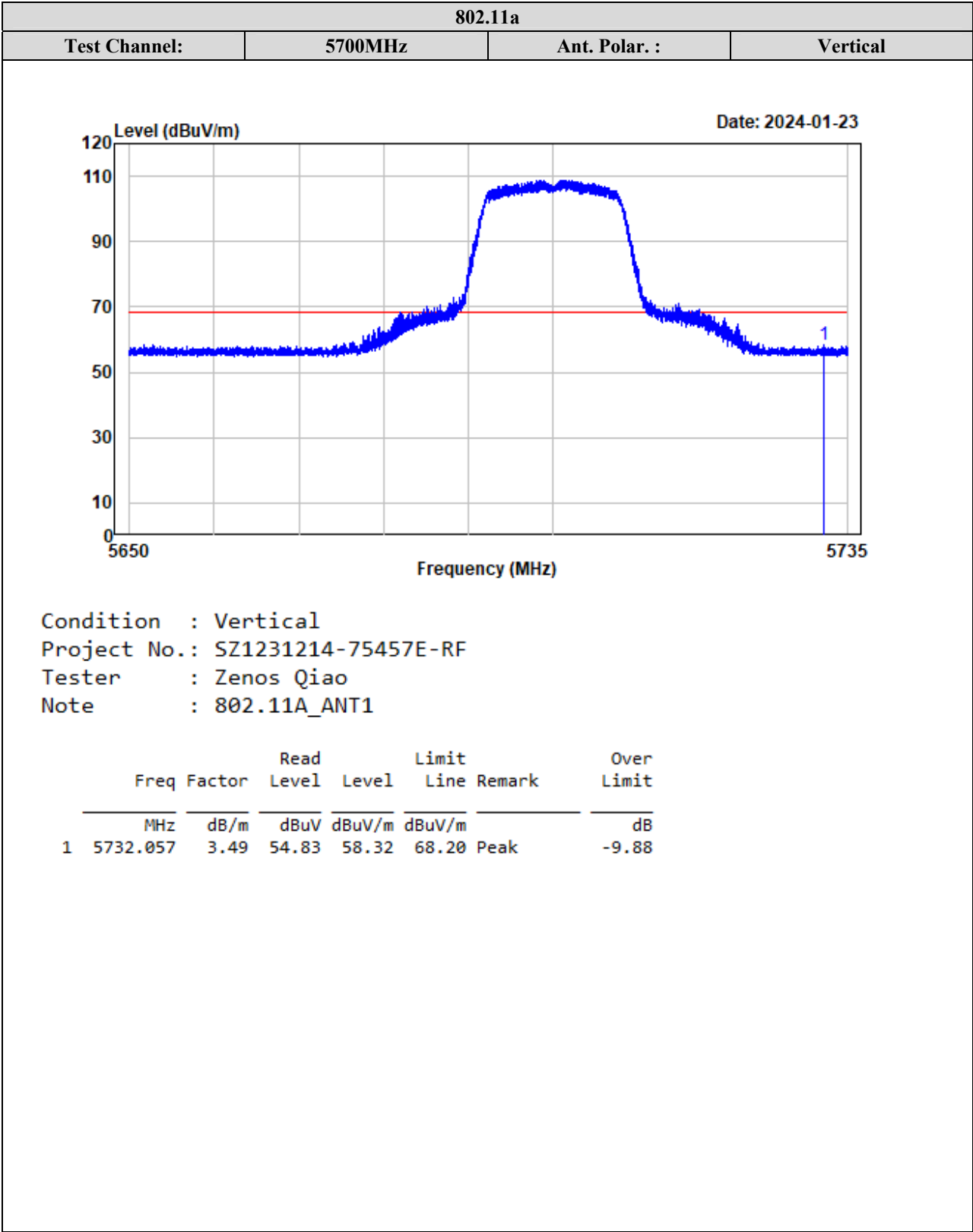


5470-5725MHz:
ANT 1

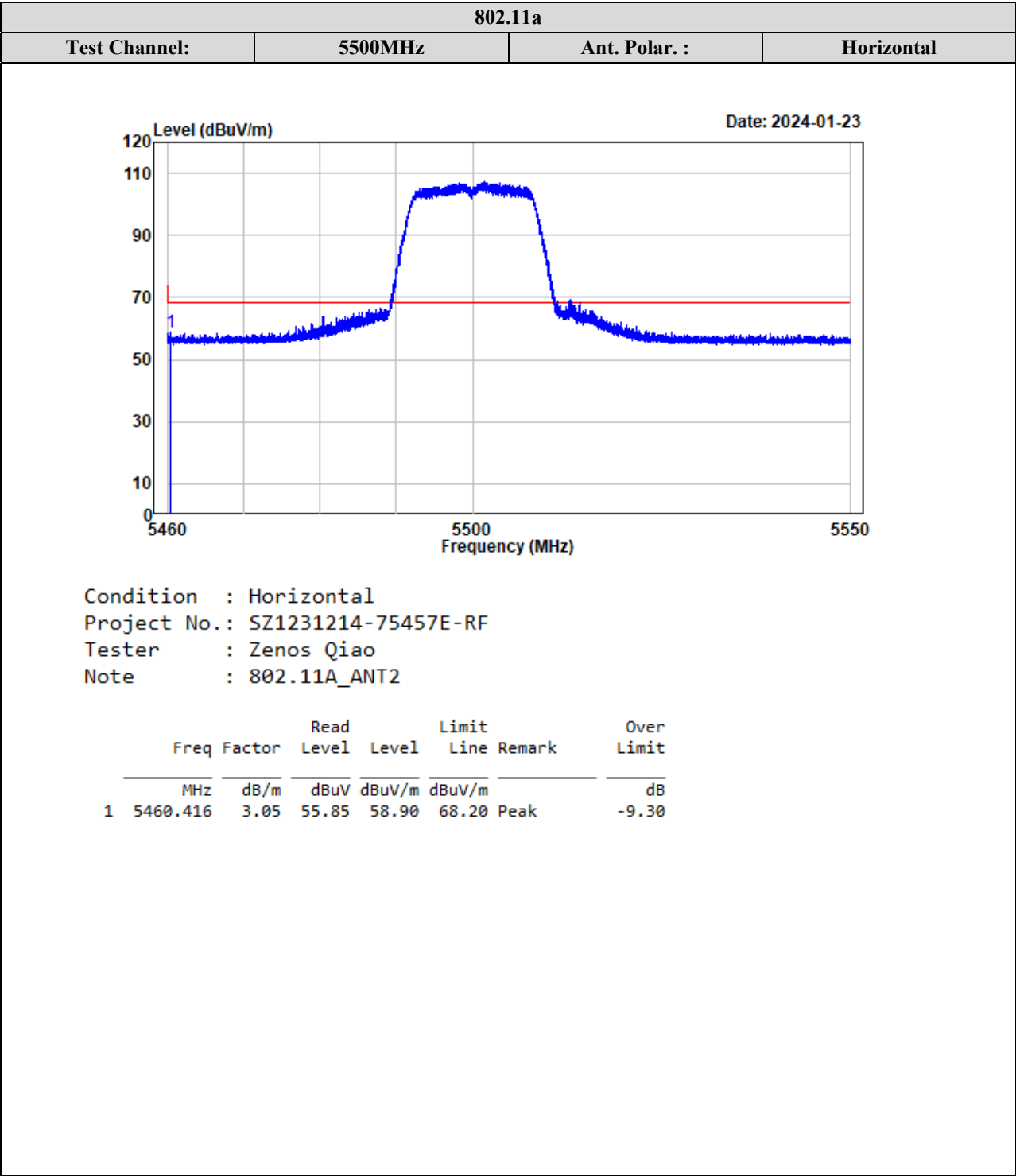


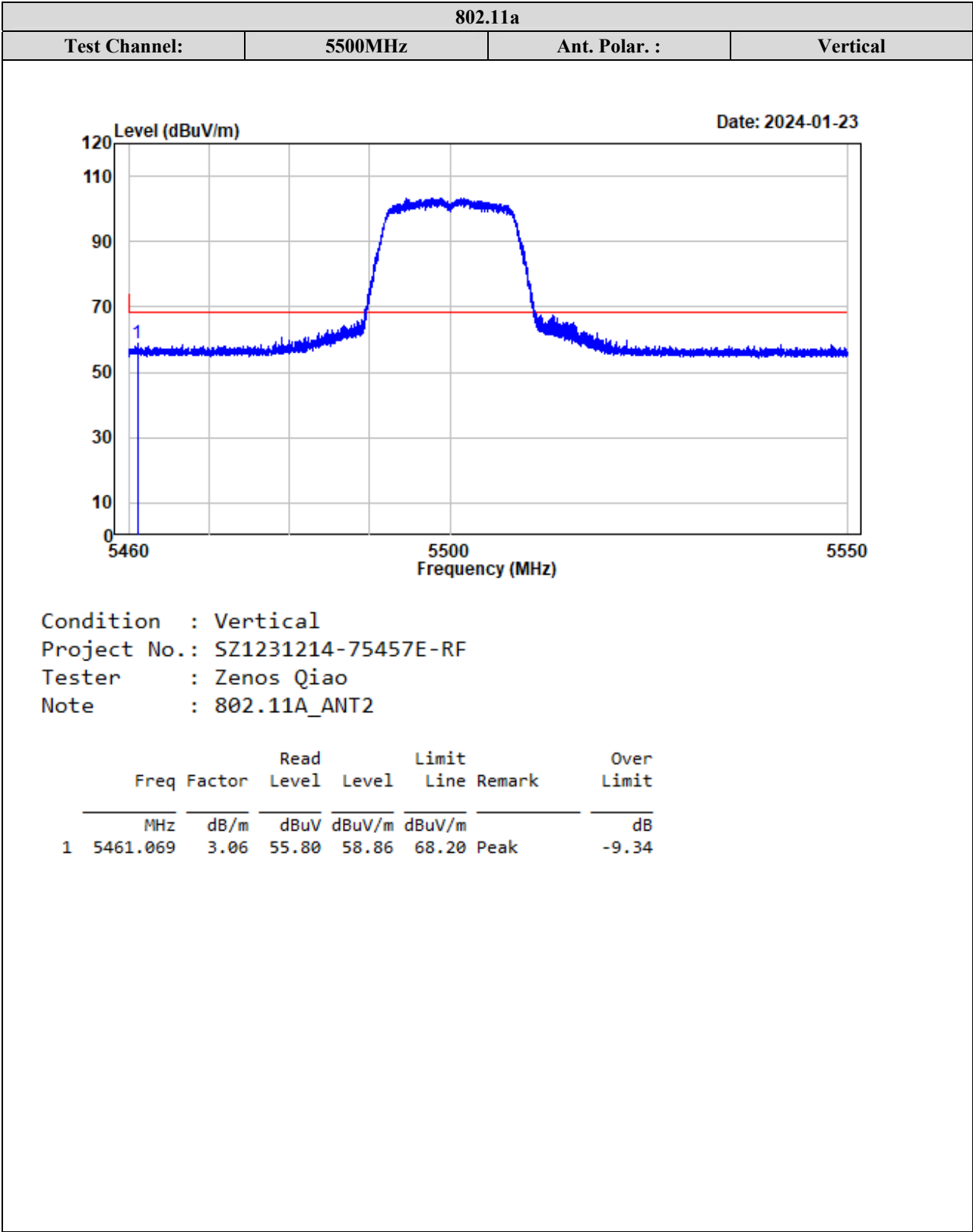


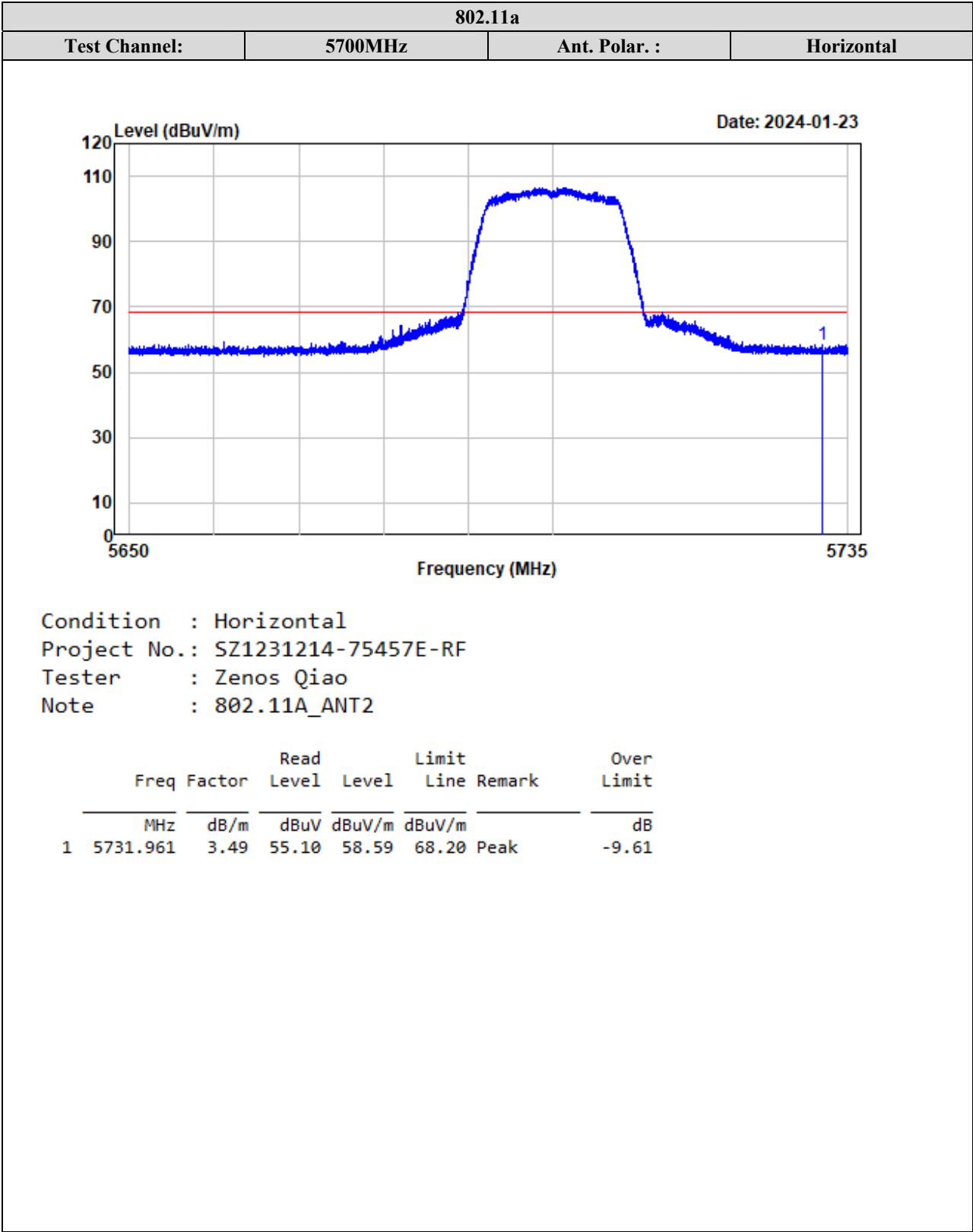


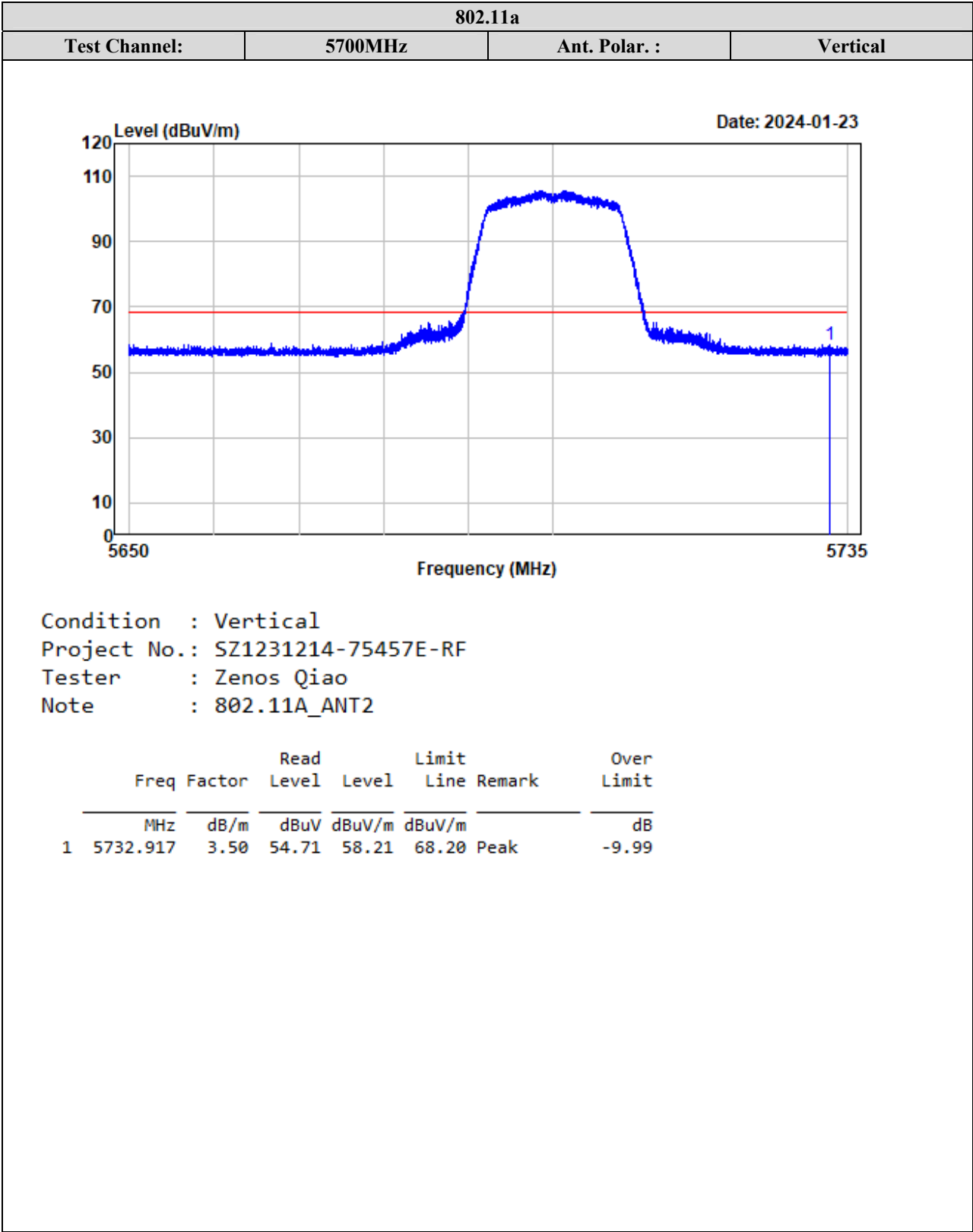


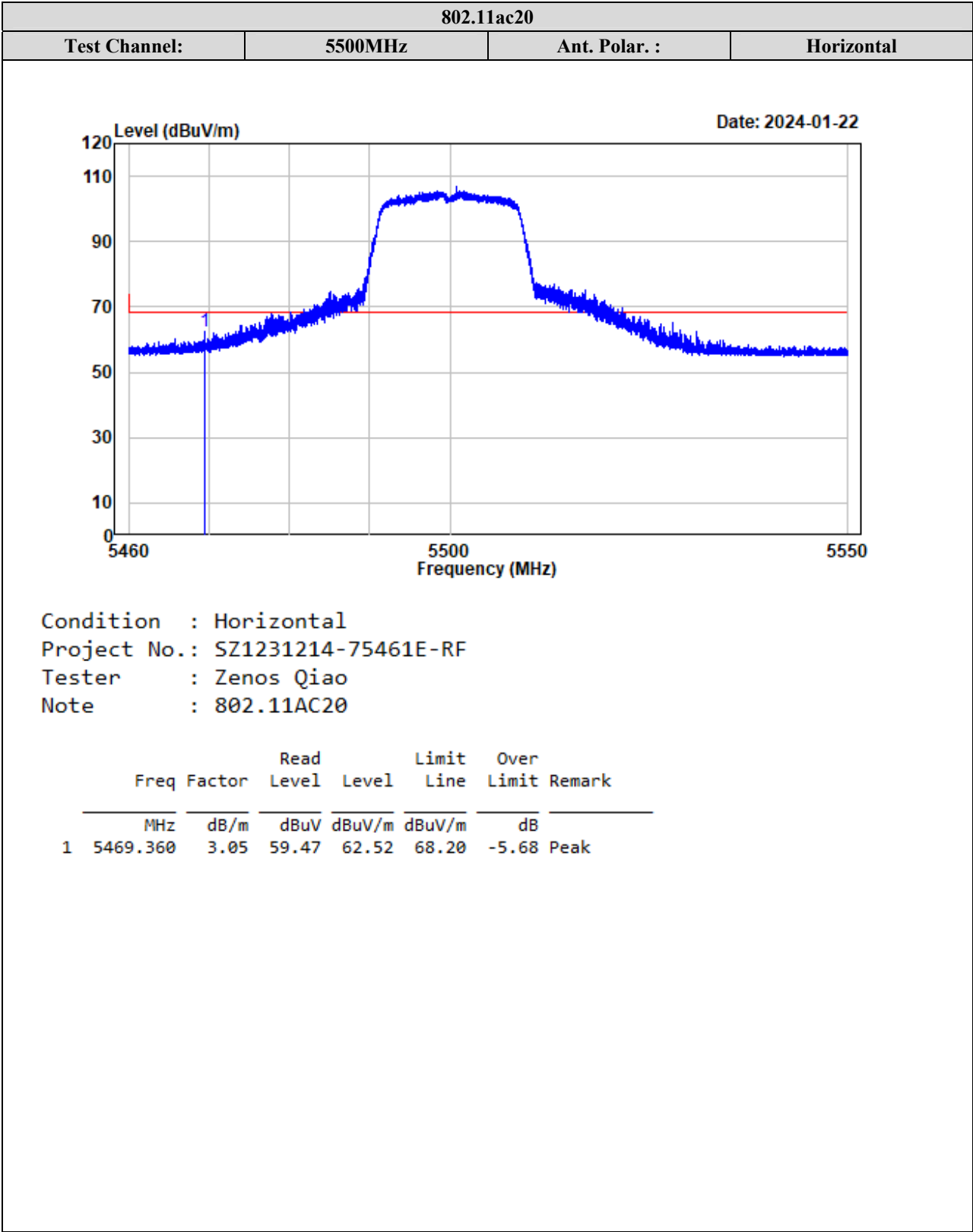
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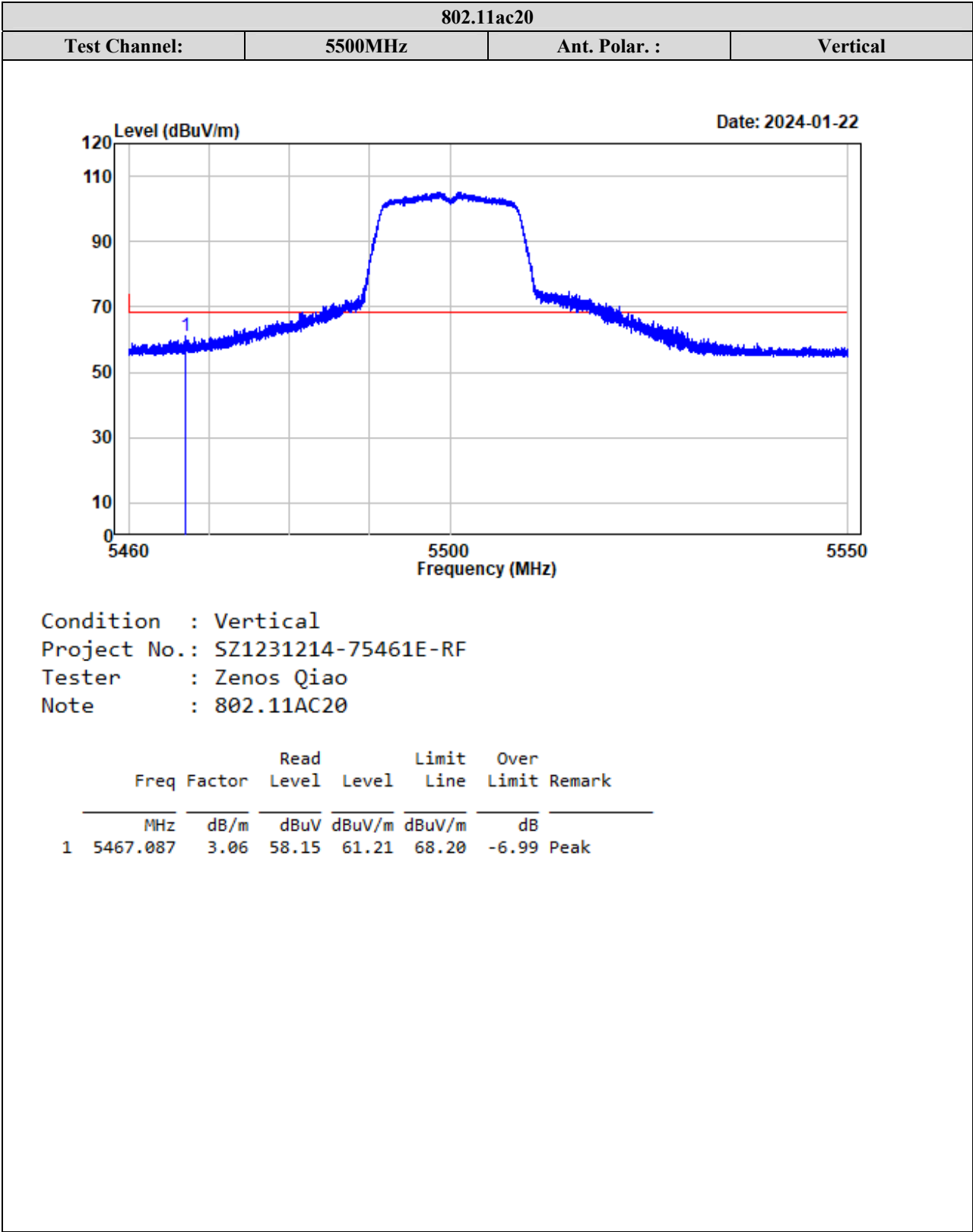


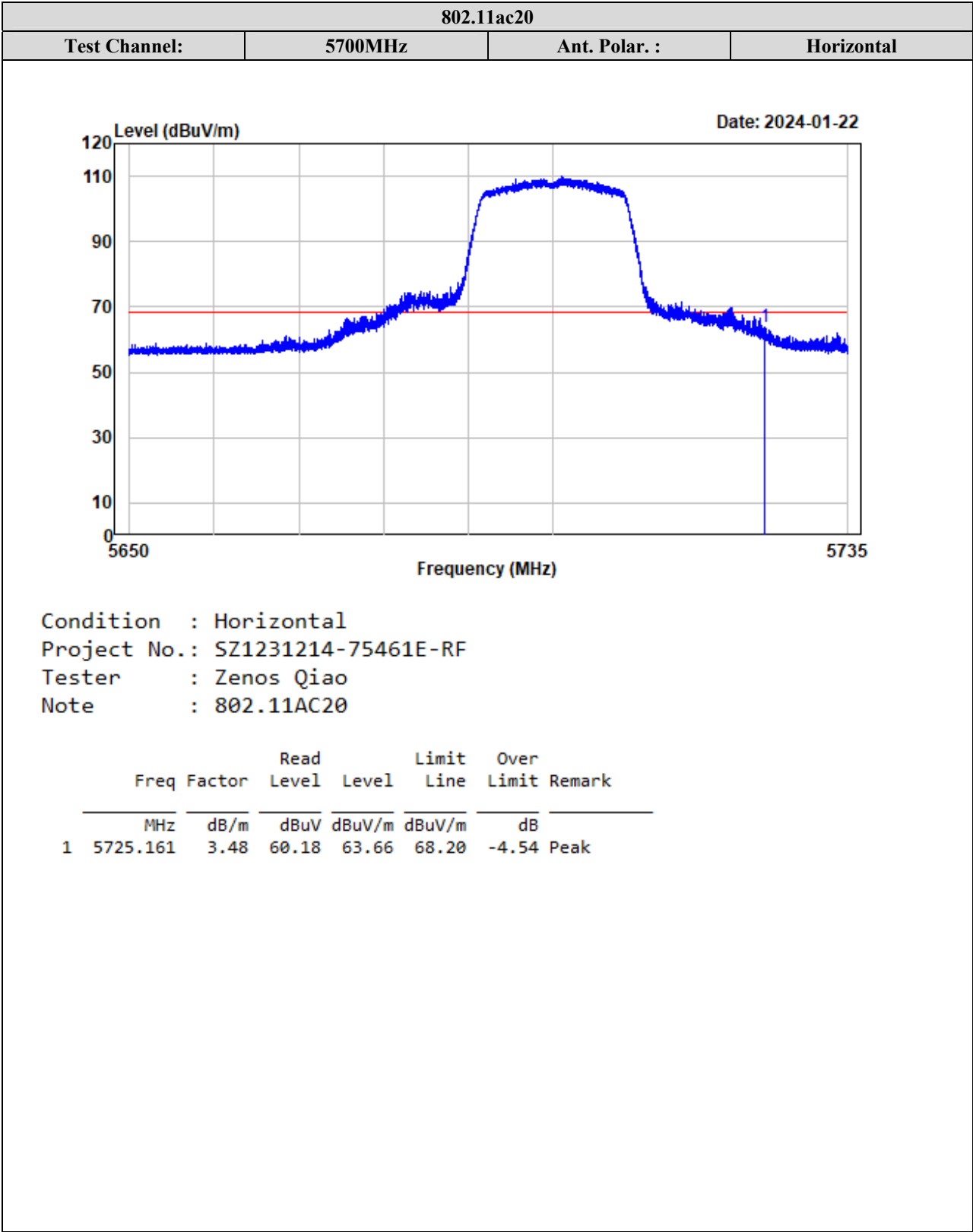


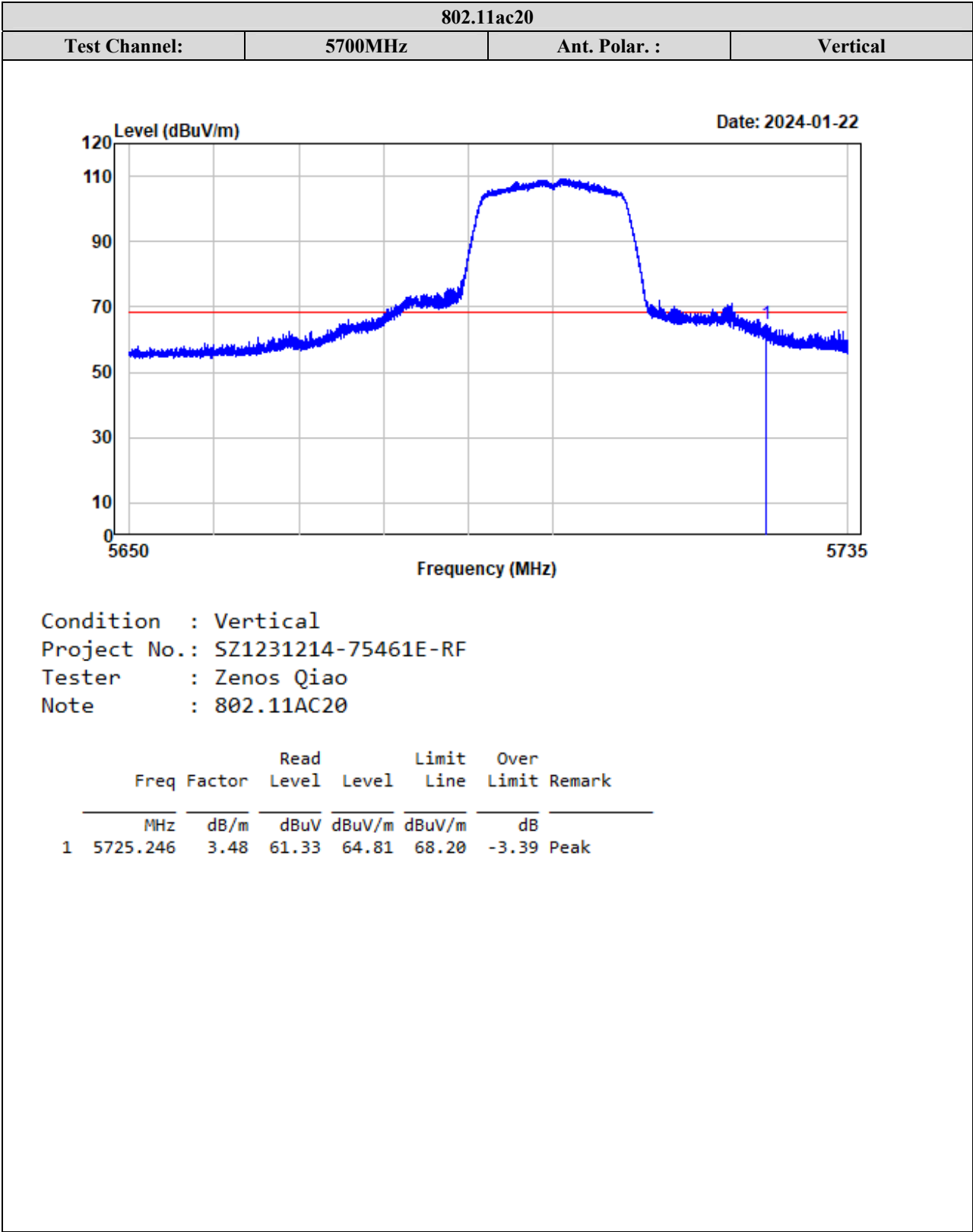


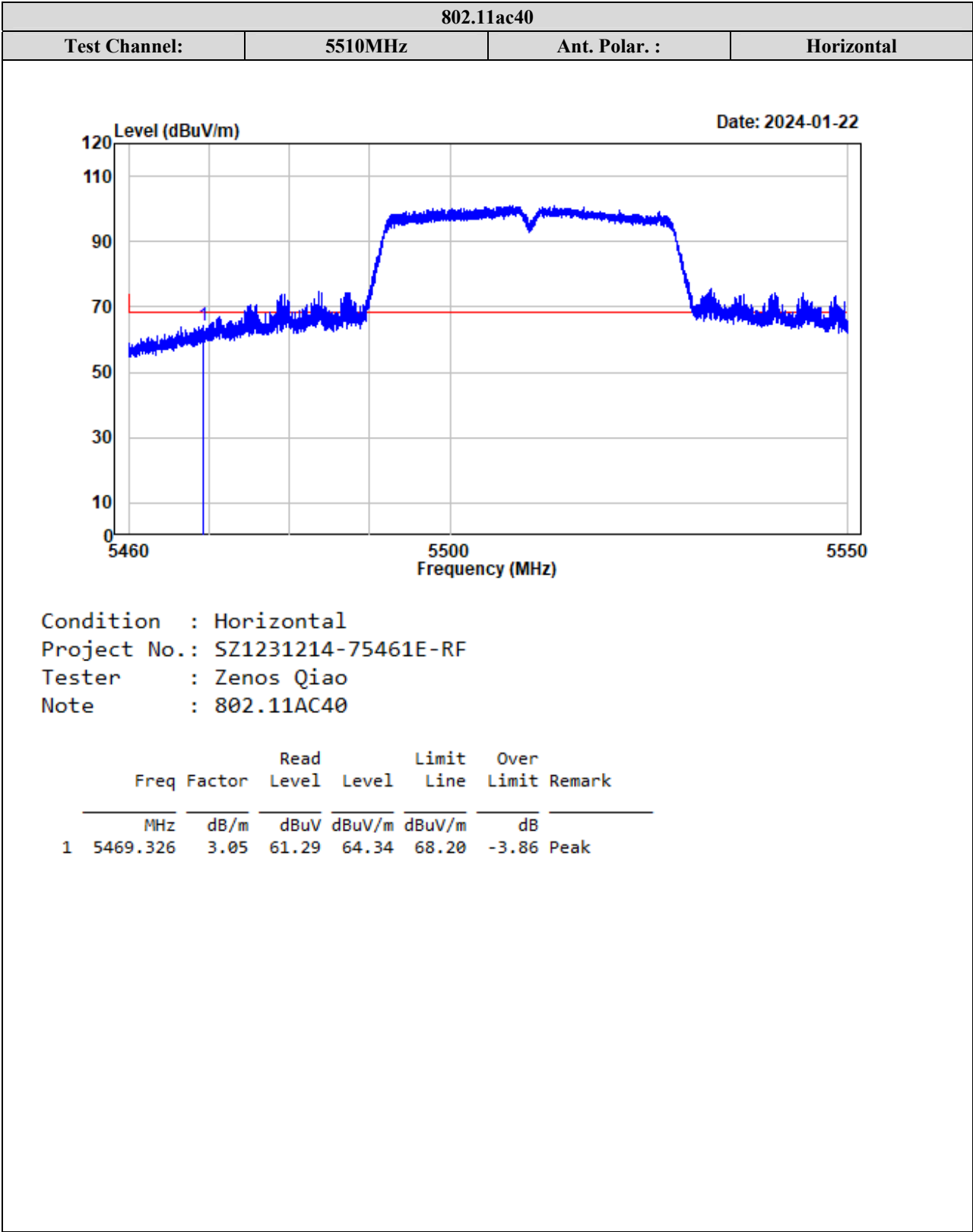


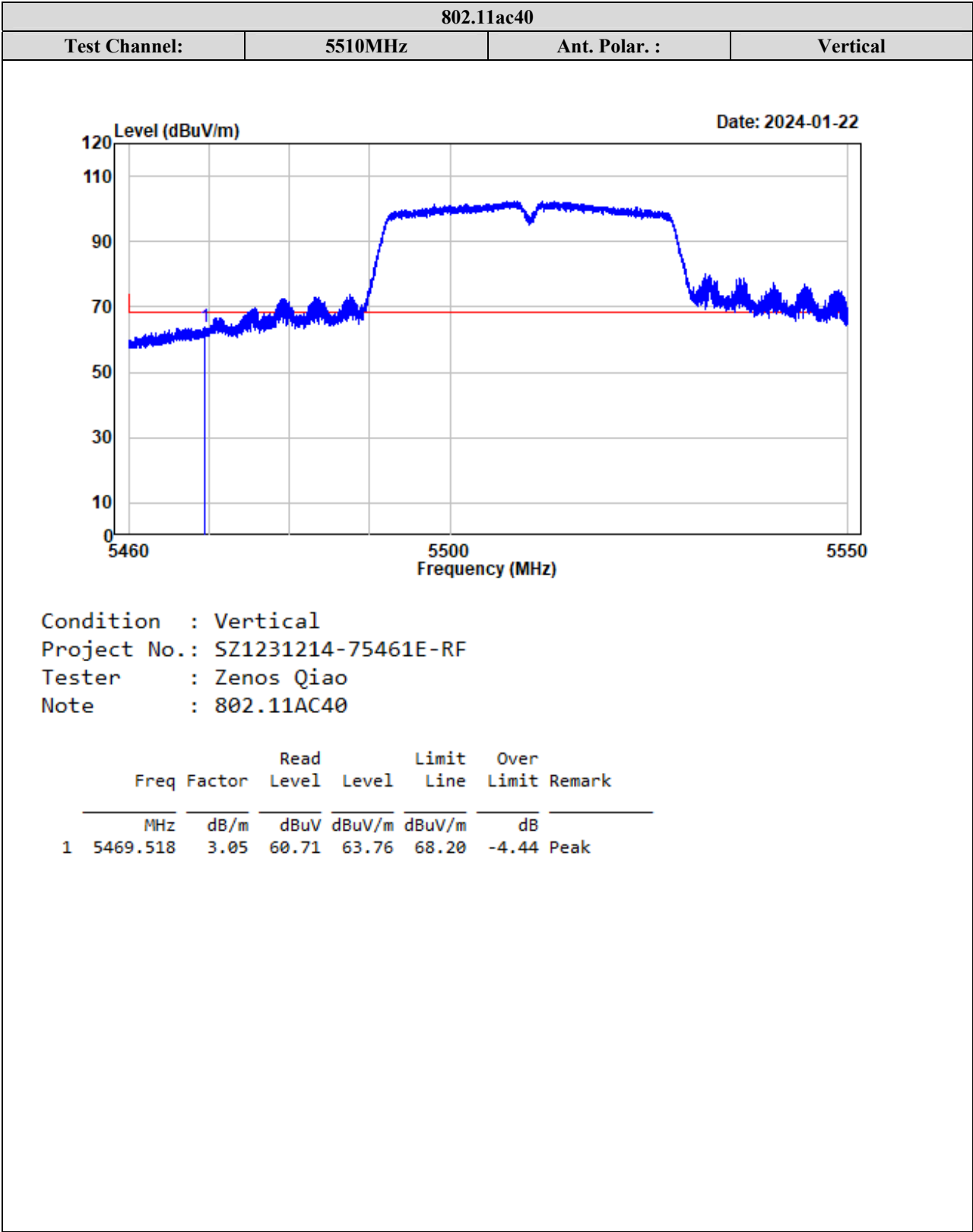


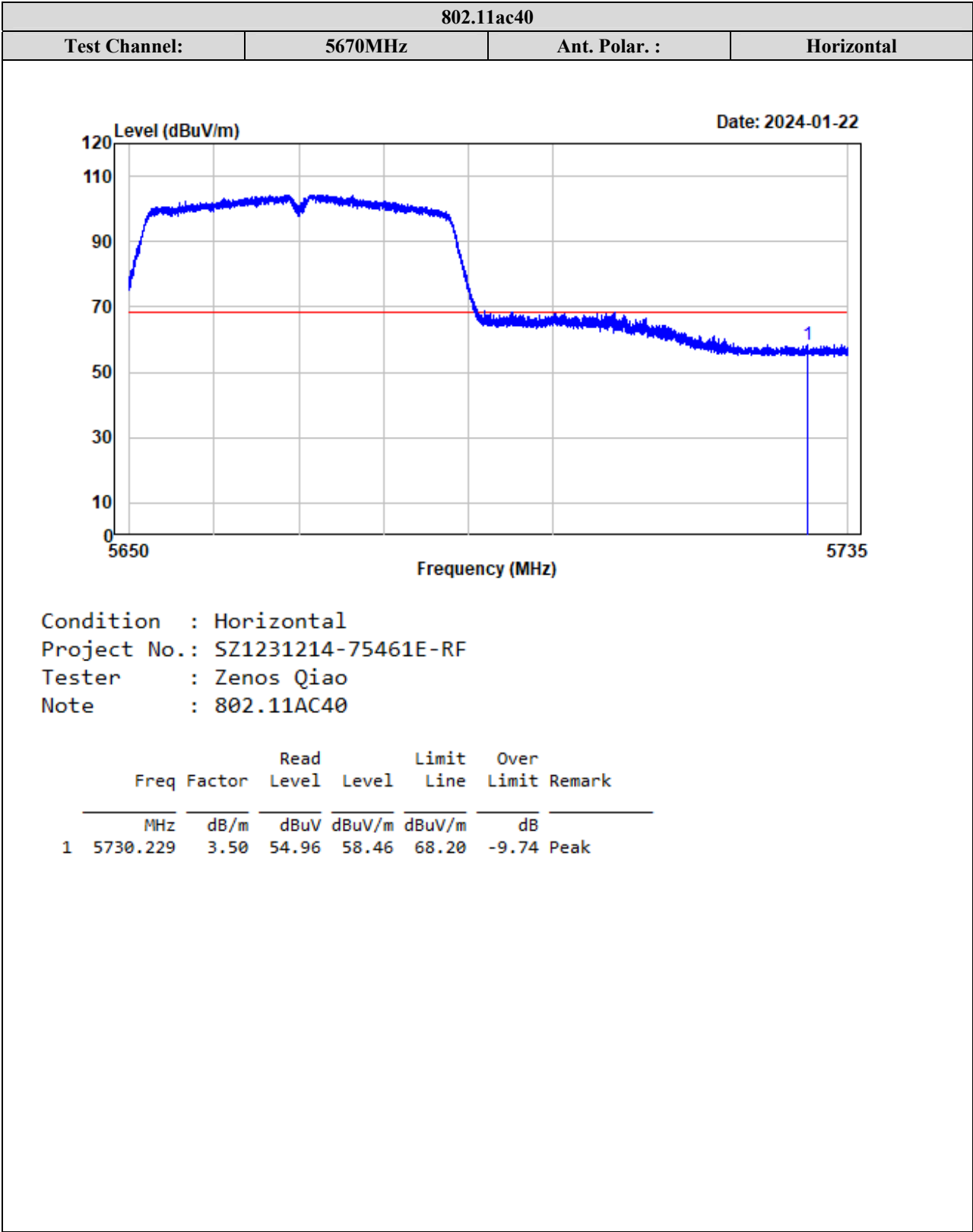


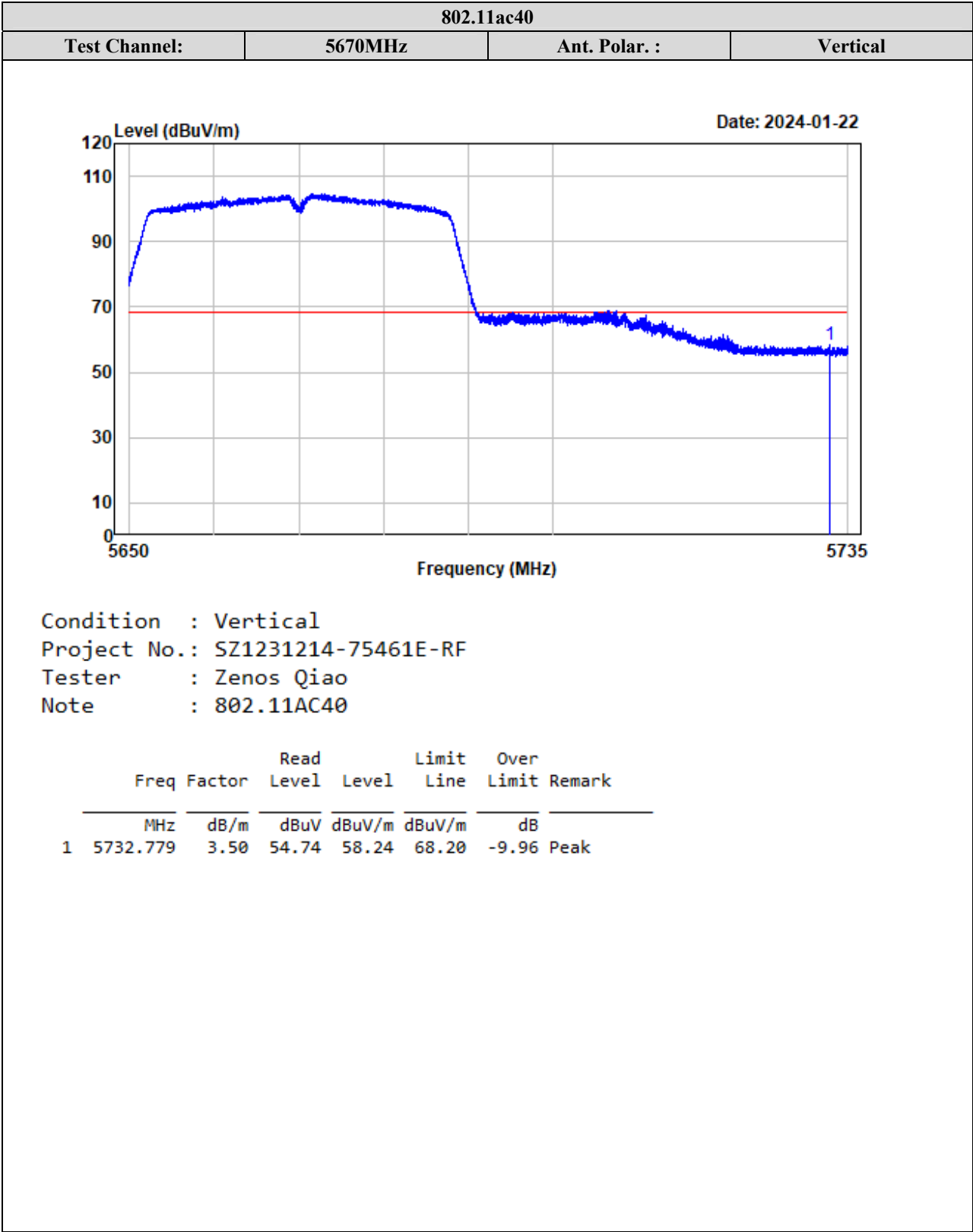


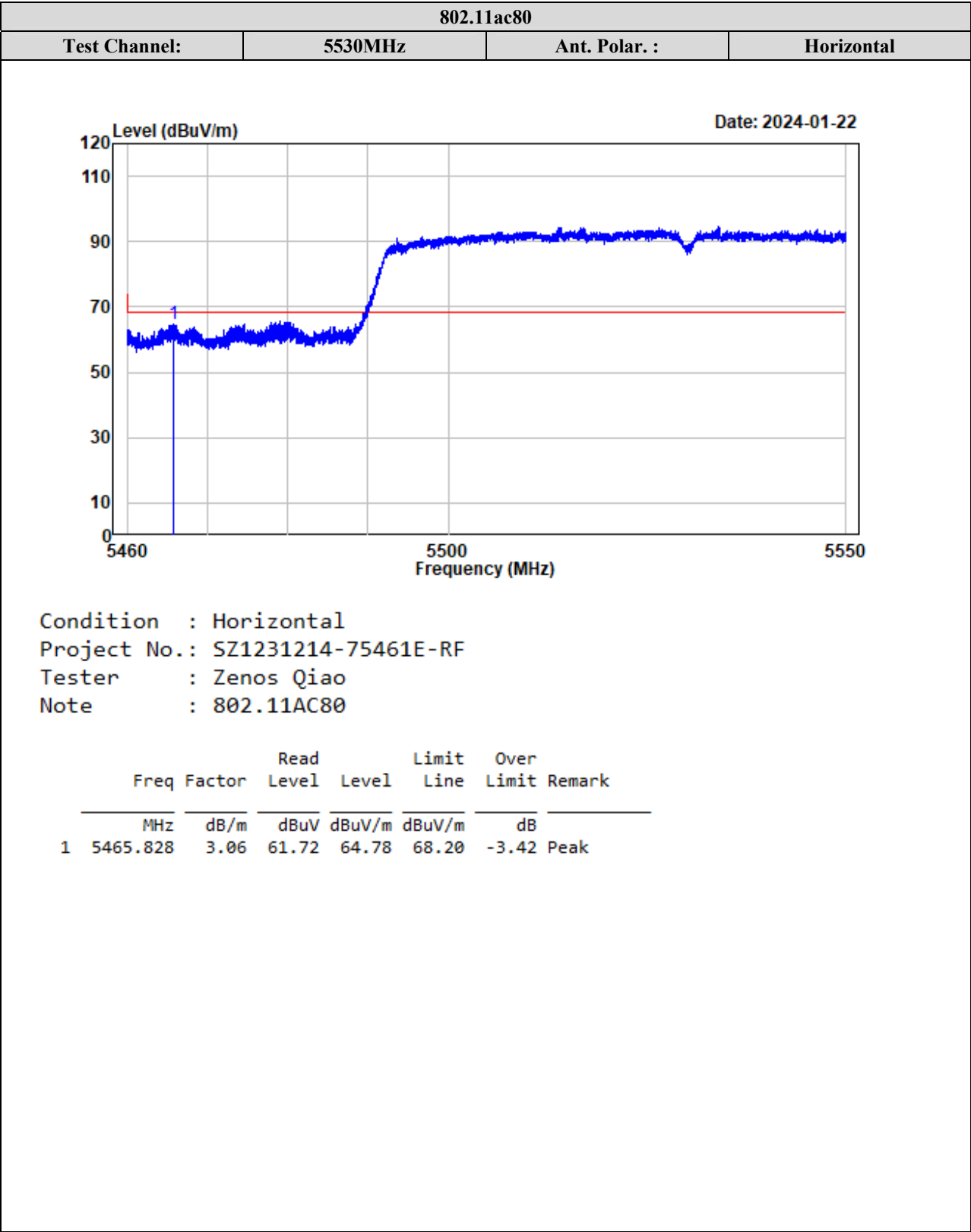


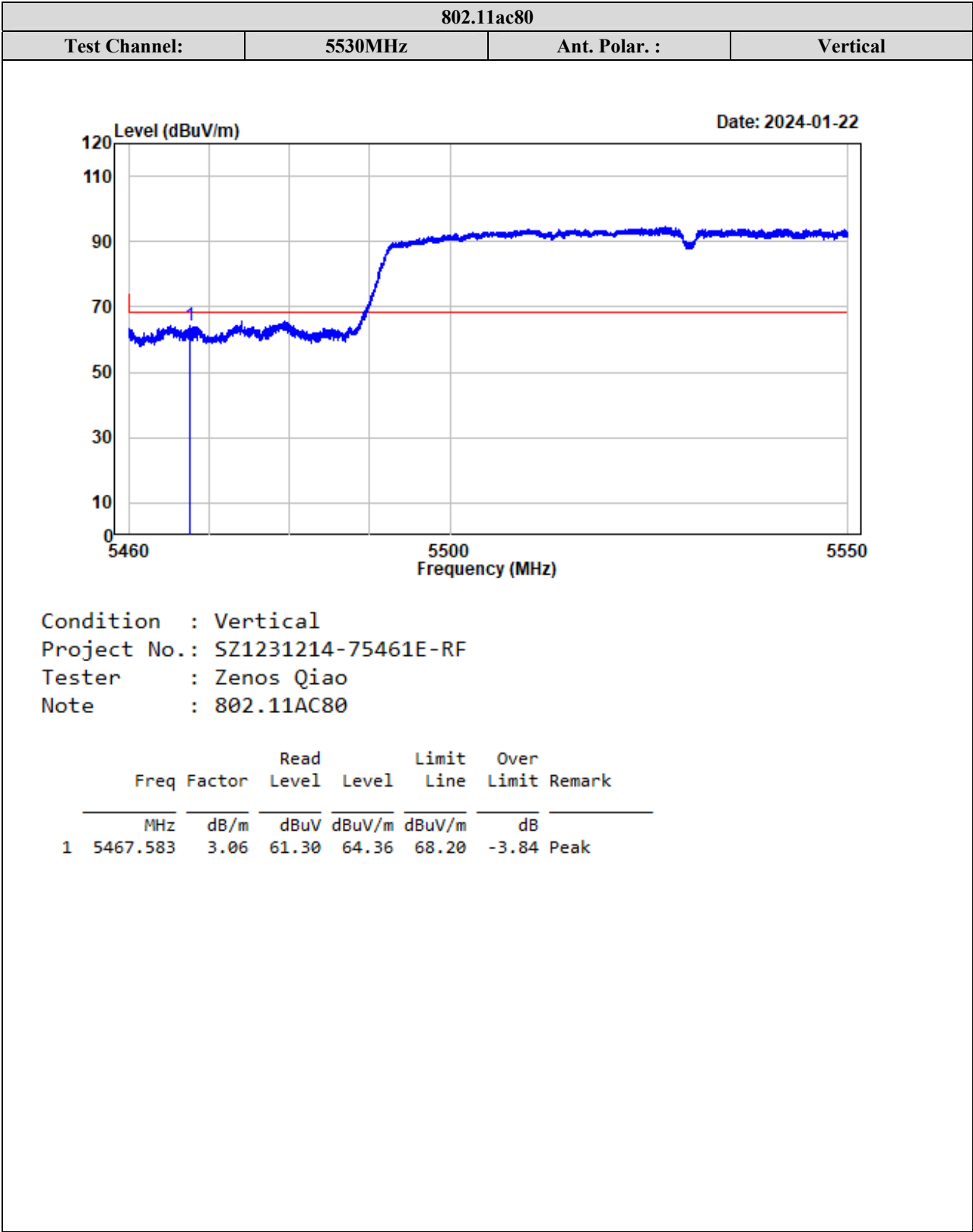


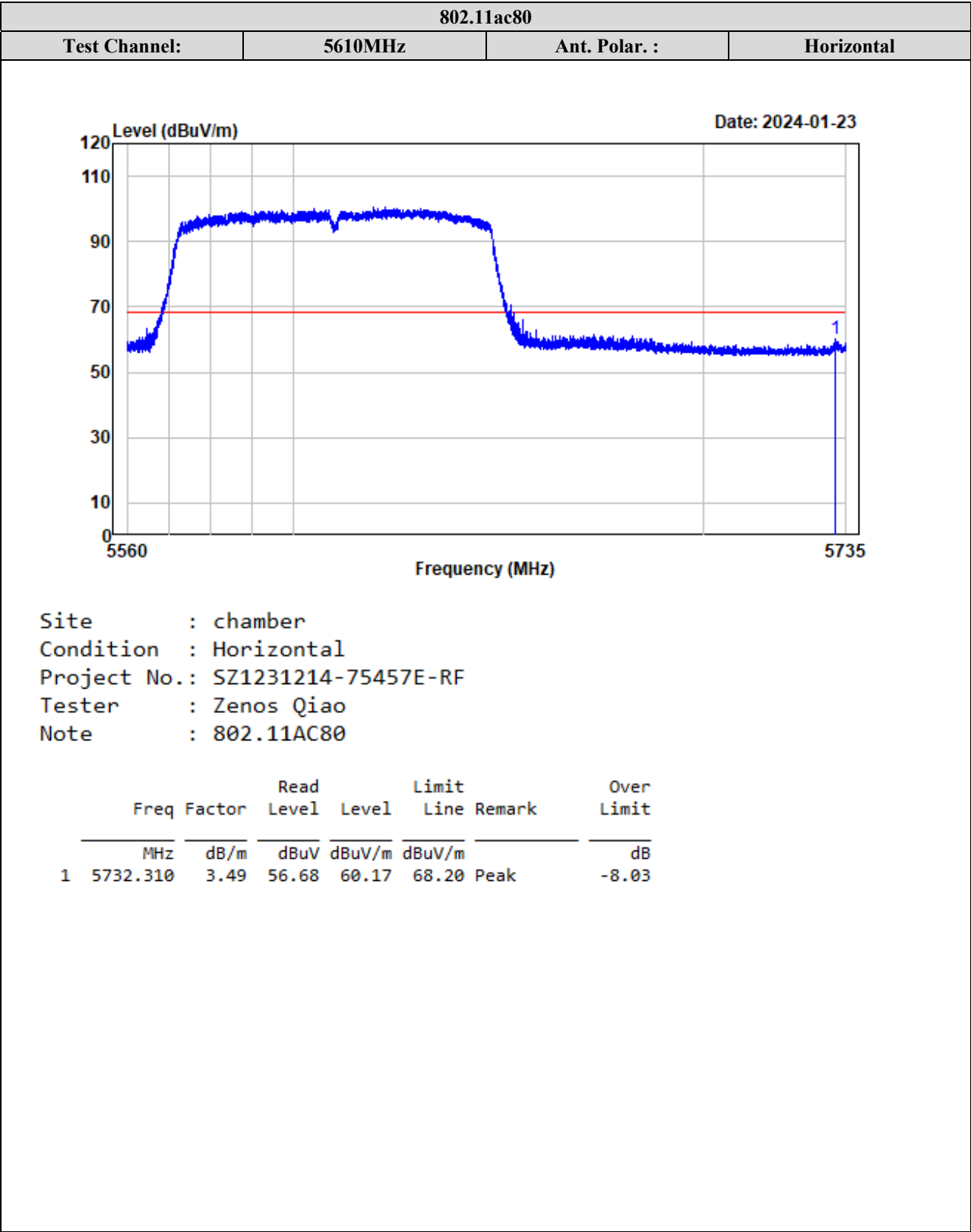


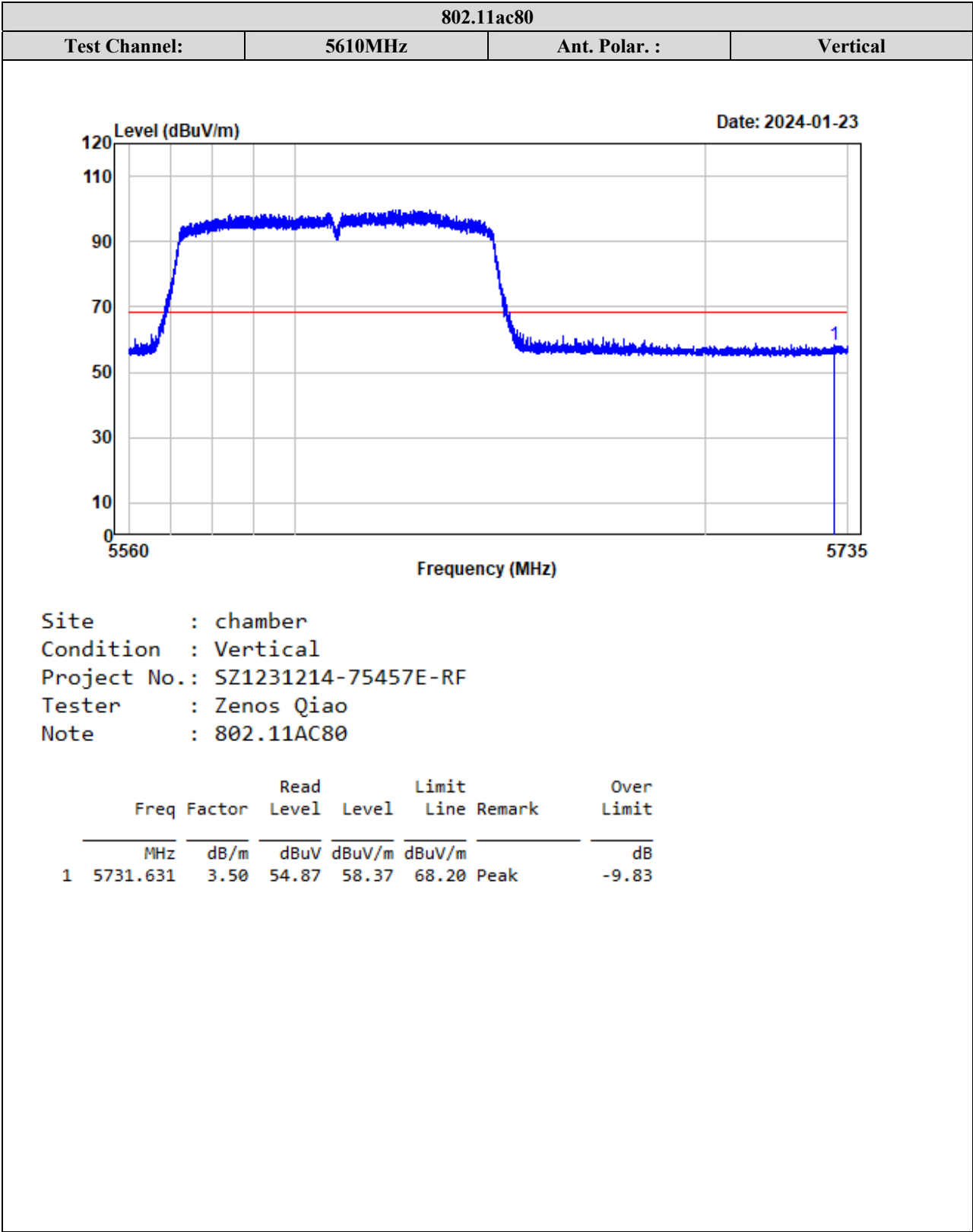




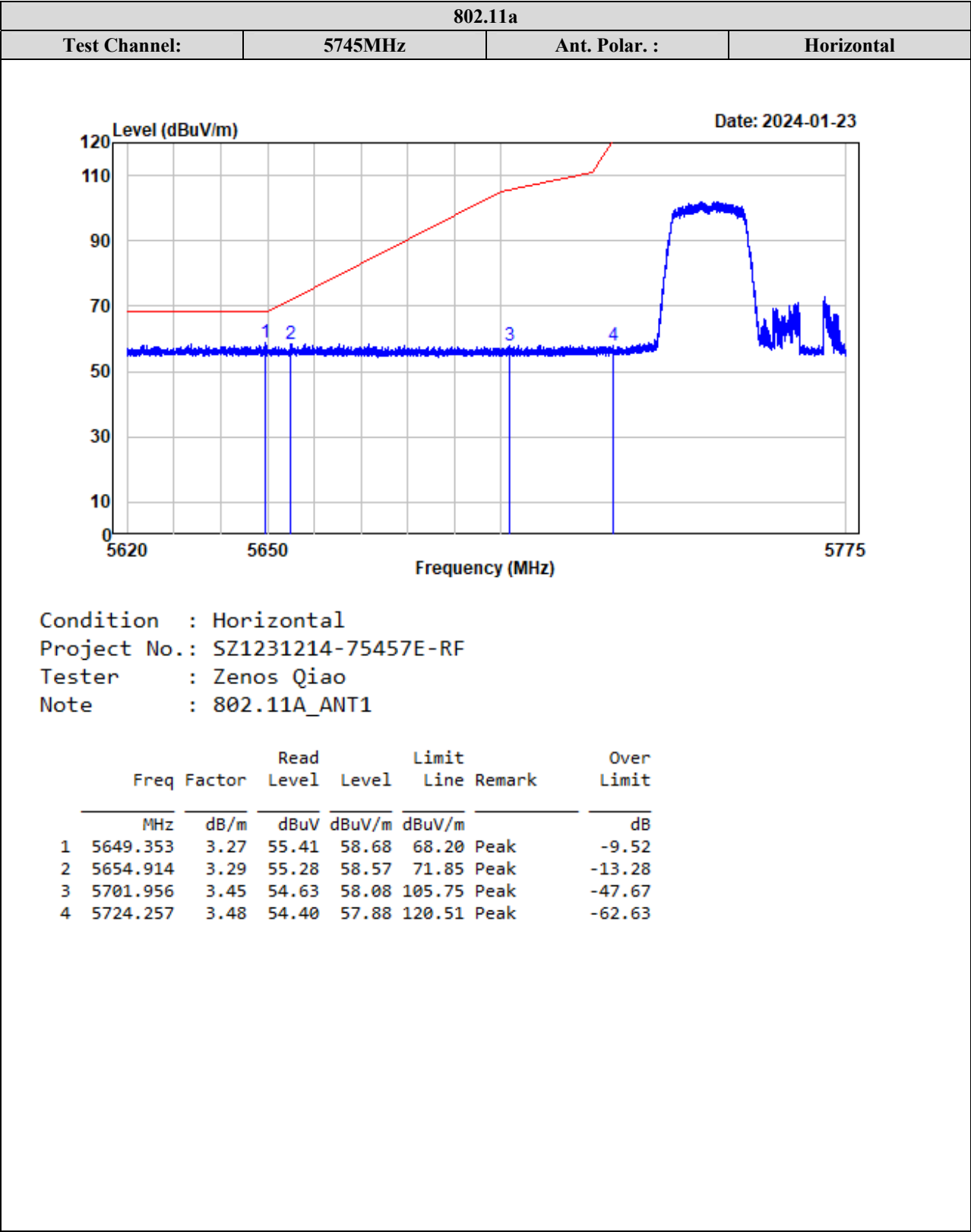


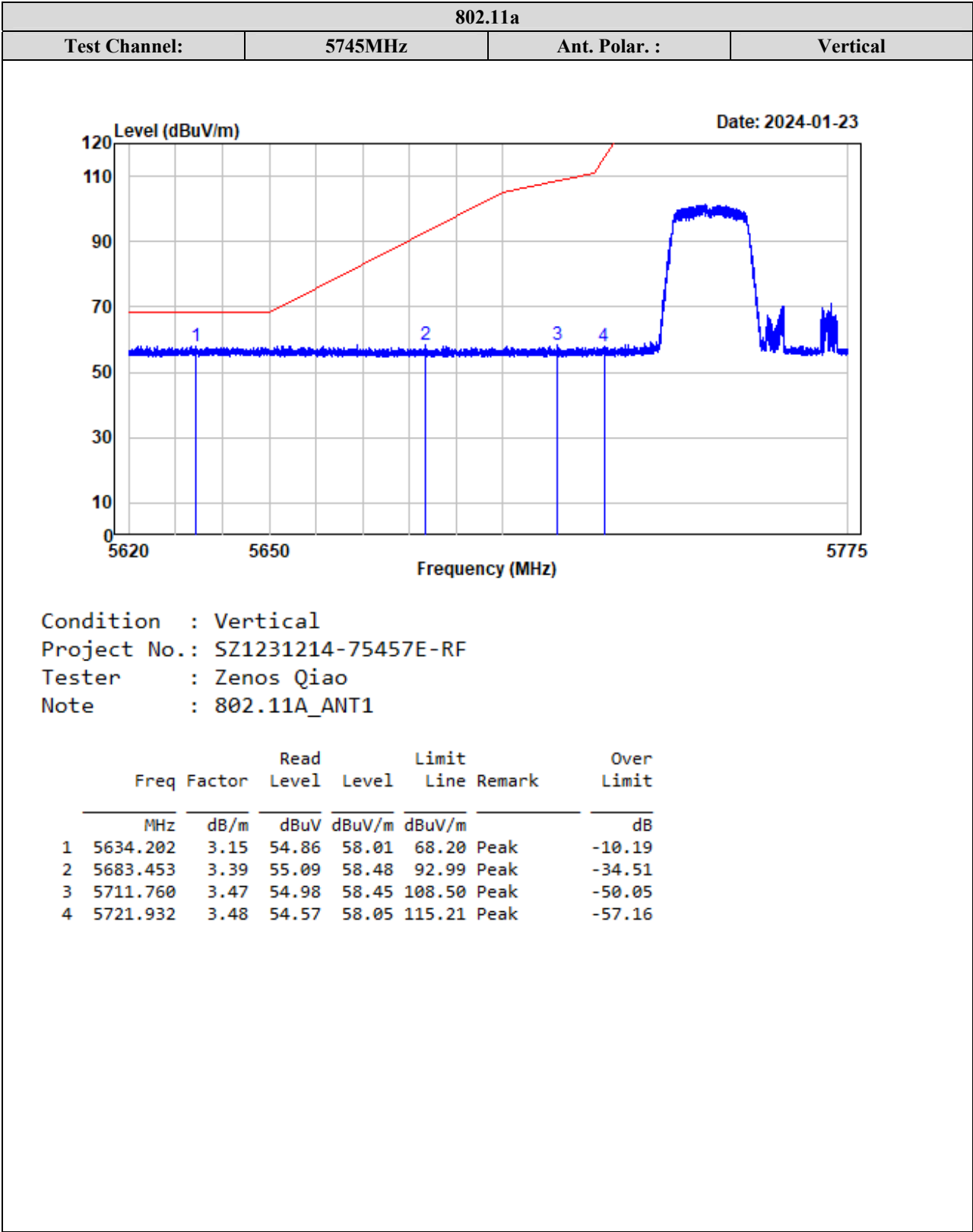


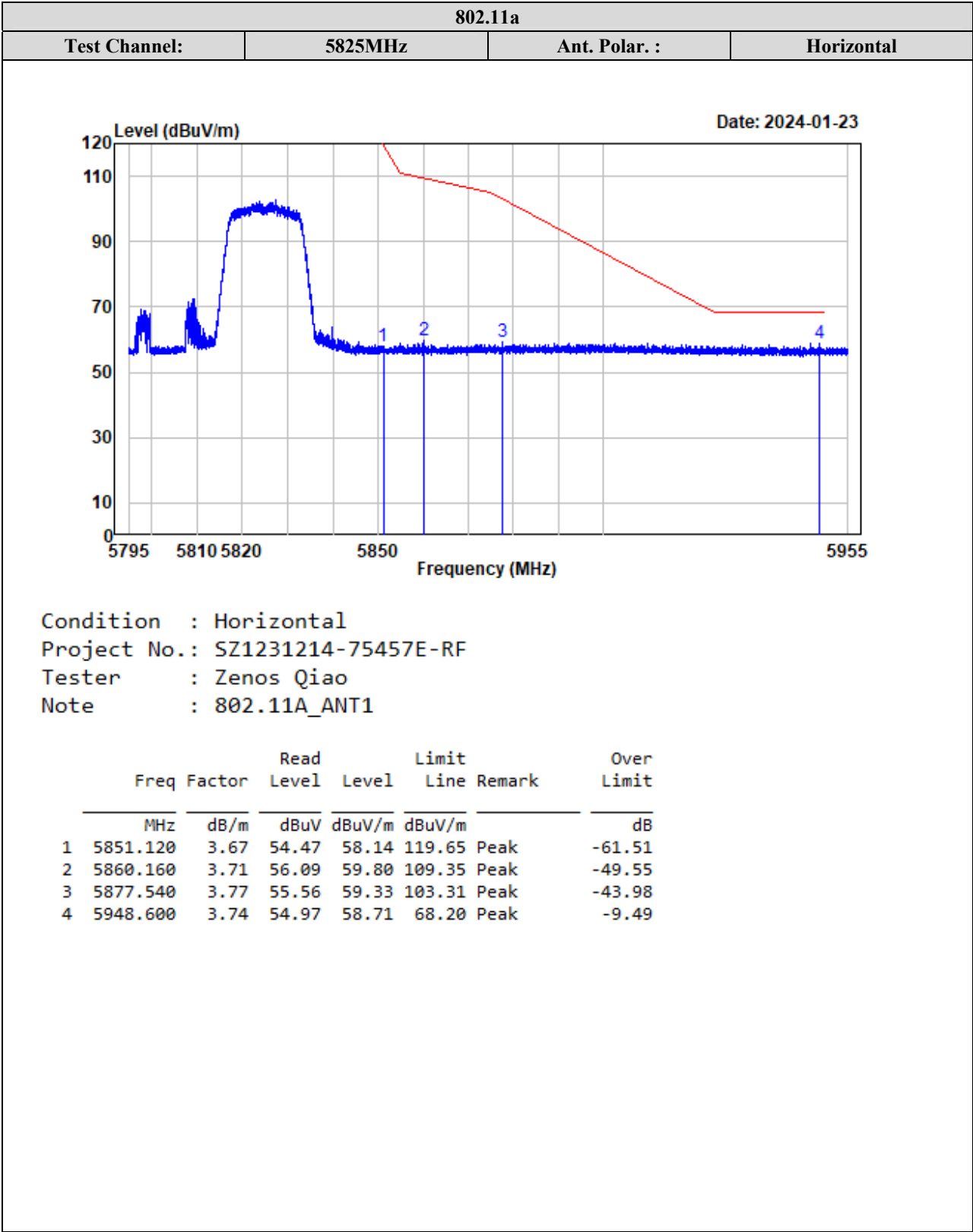


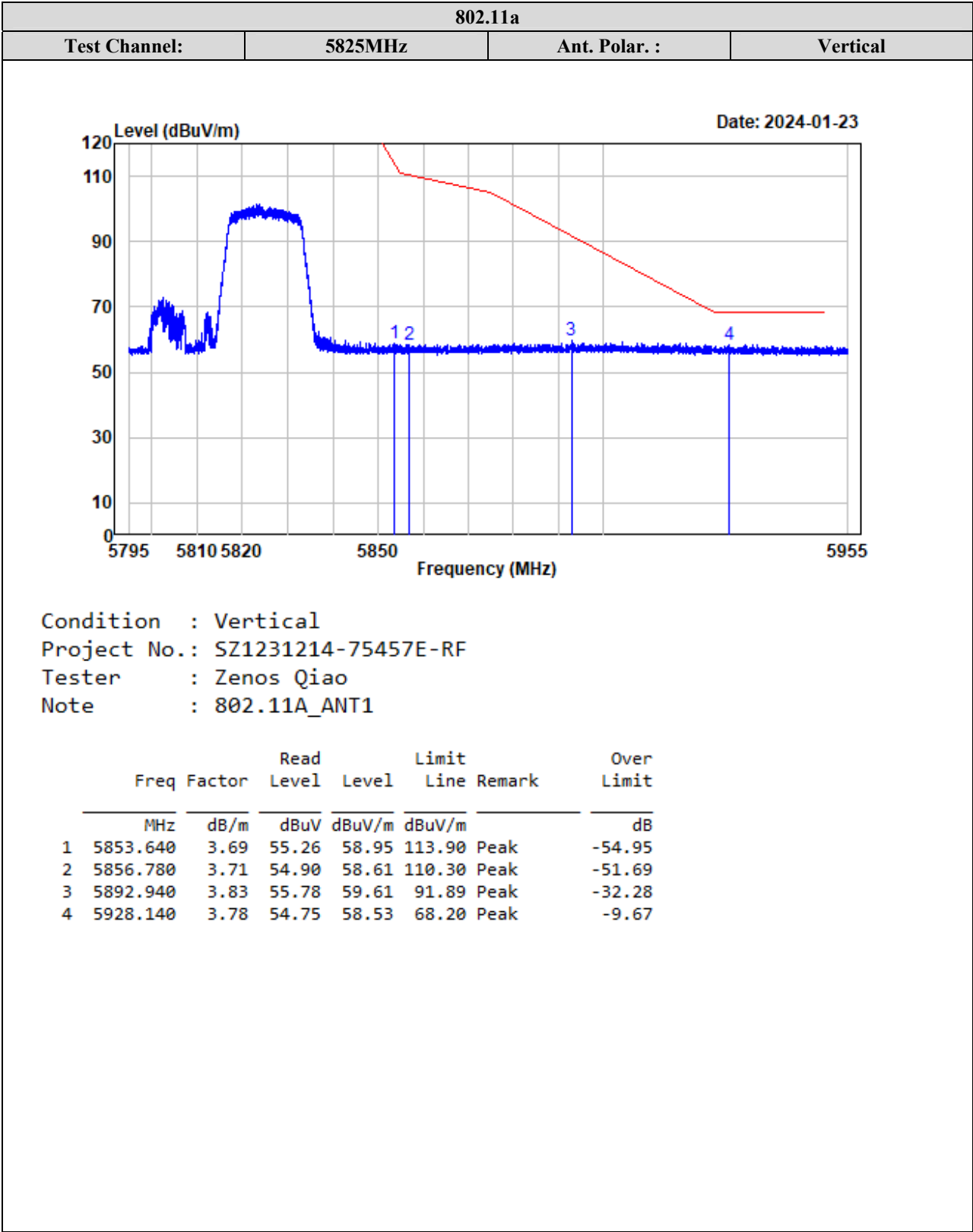


5725-5850MHz:
ANT 1







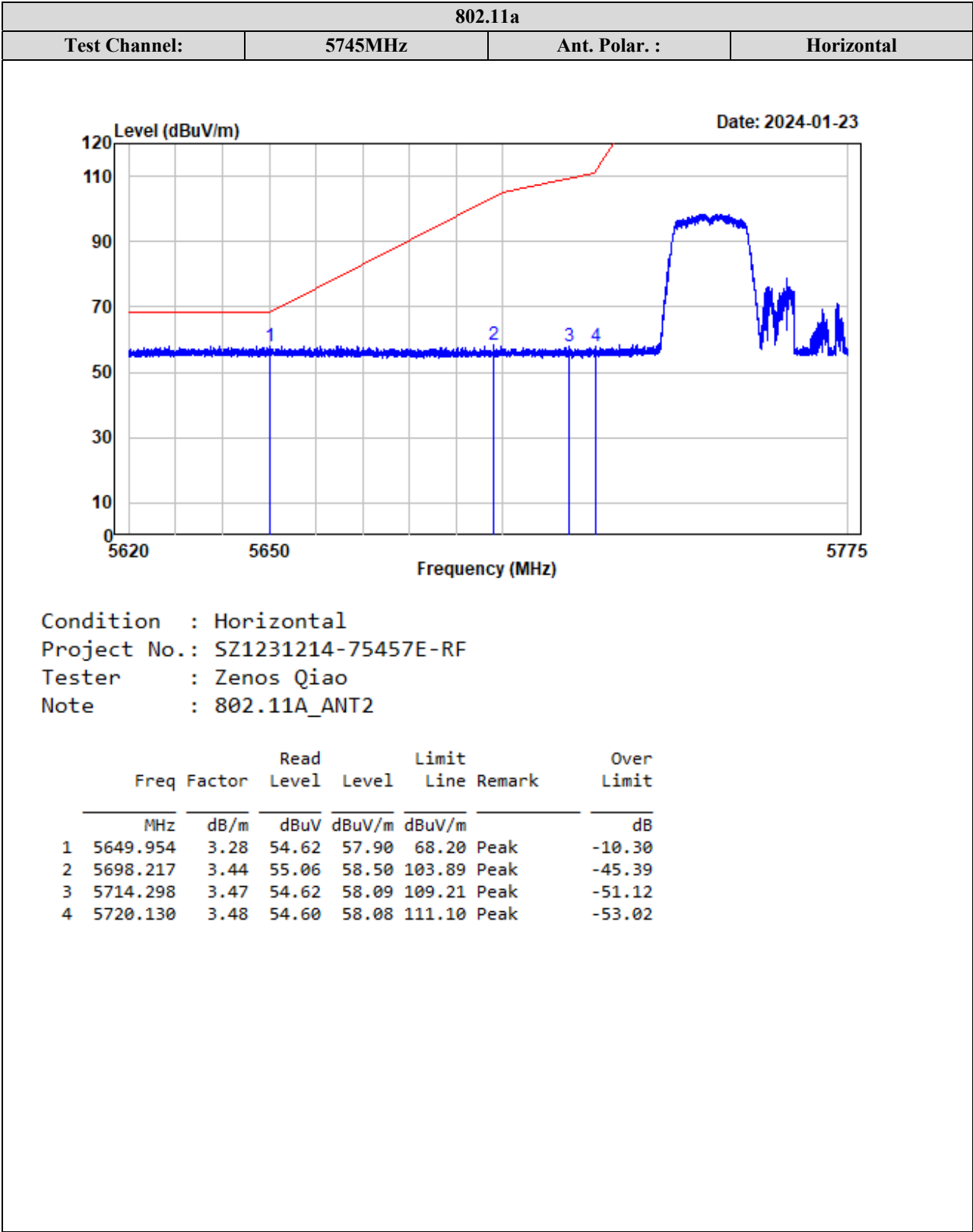


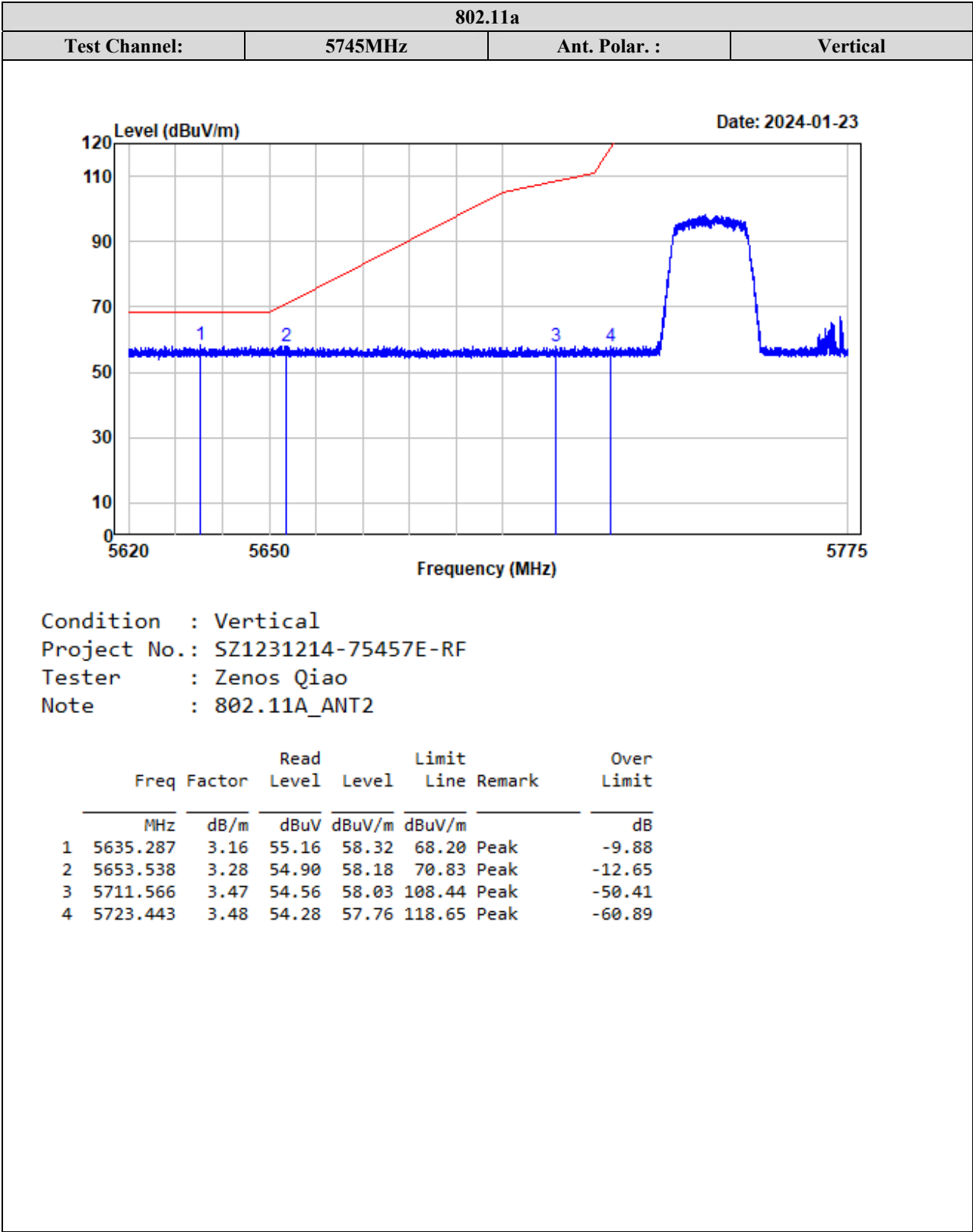
TR-EM-RF015

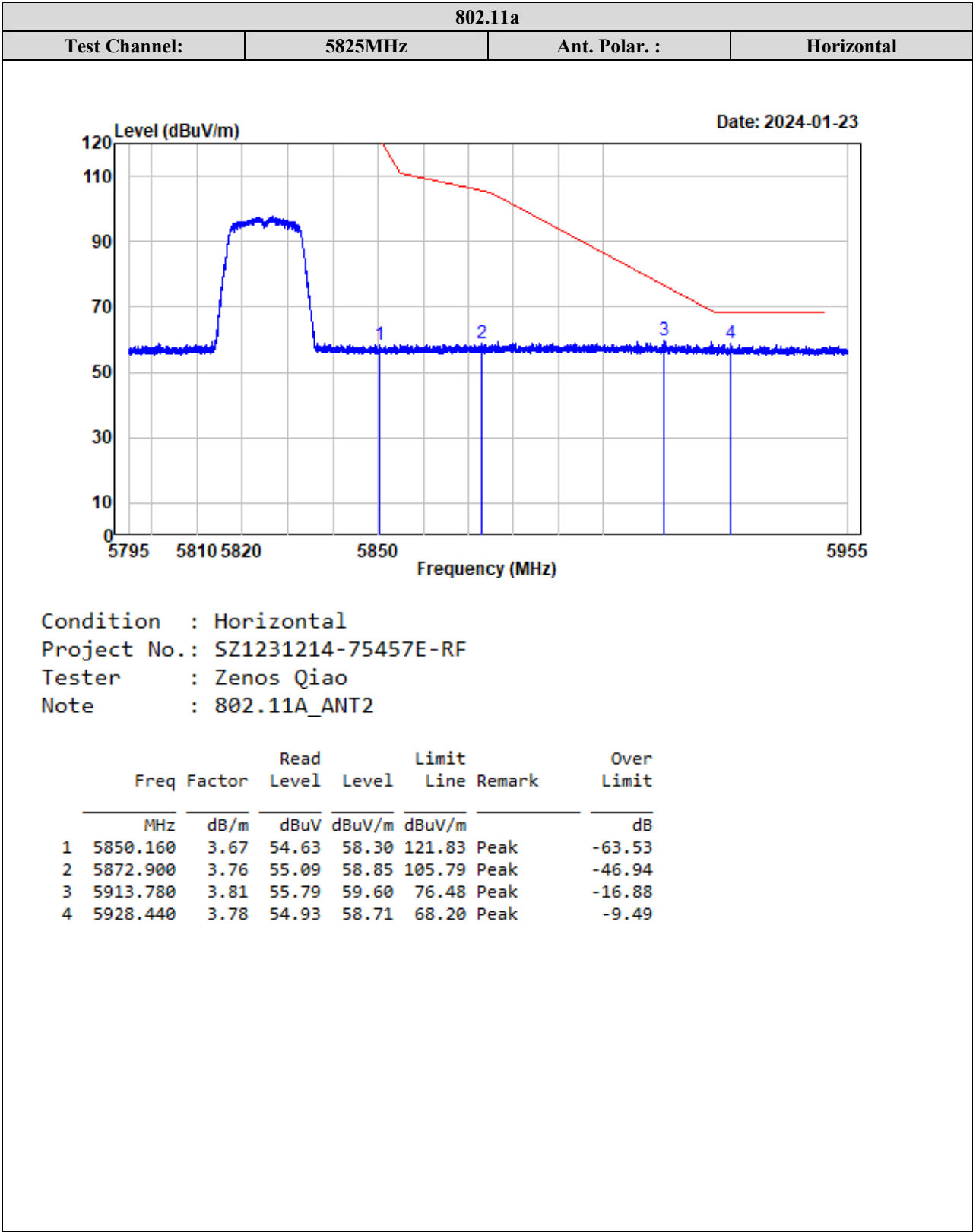
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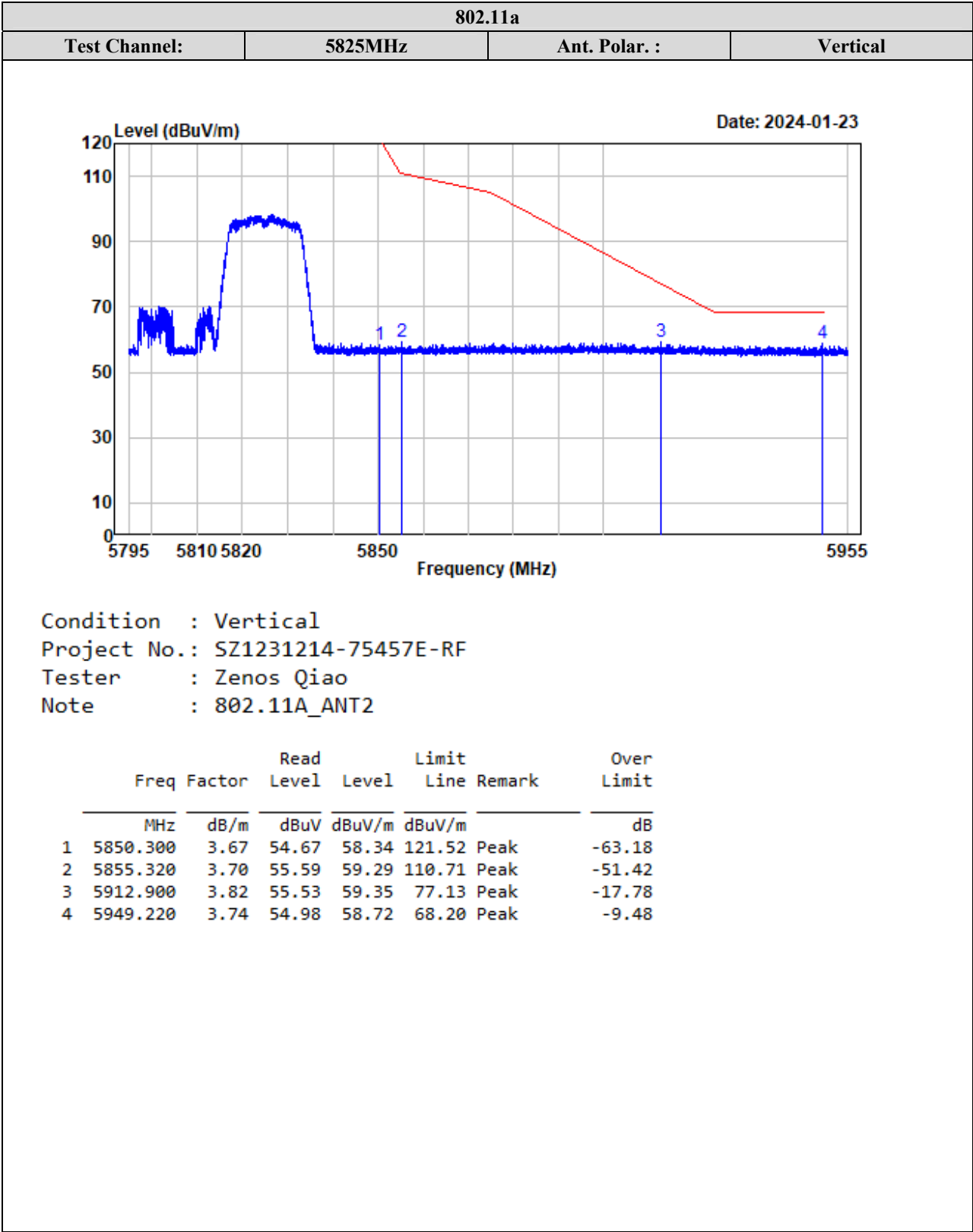
Version 1.0 (2023/10/07)

ANT 2





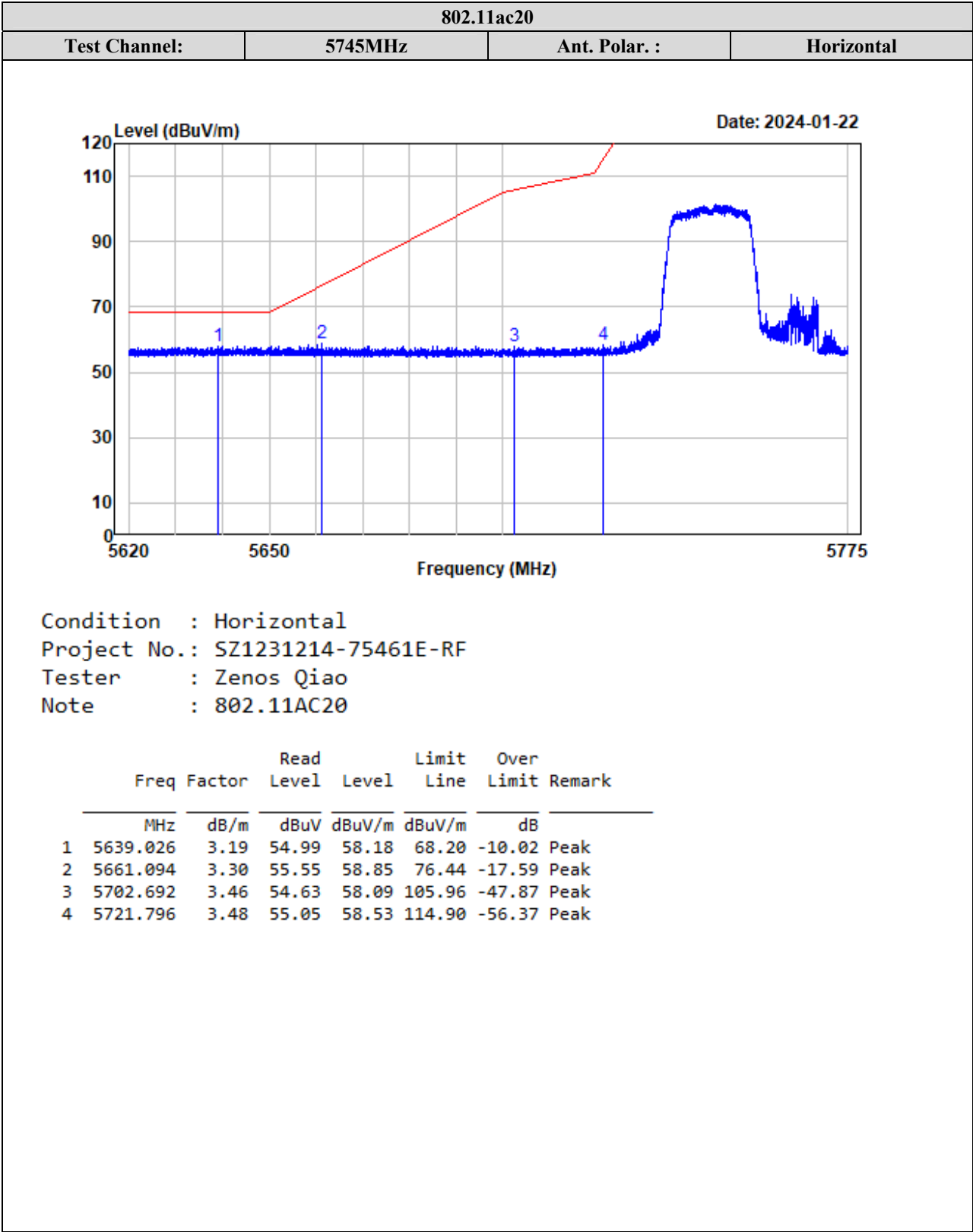


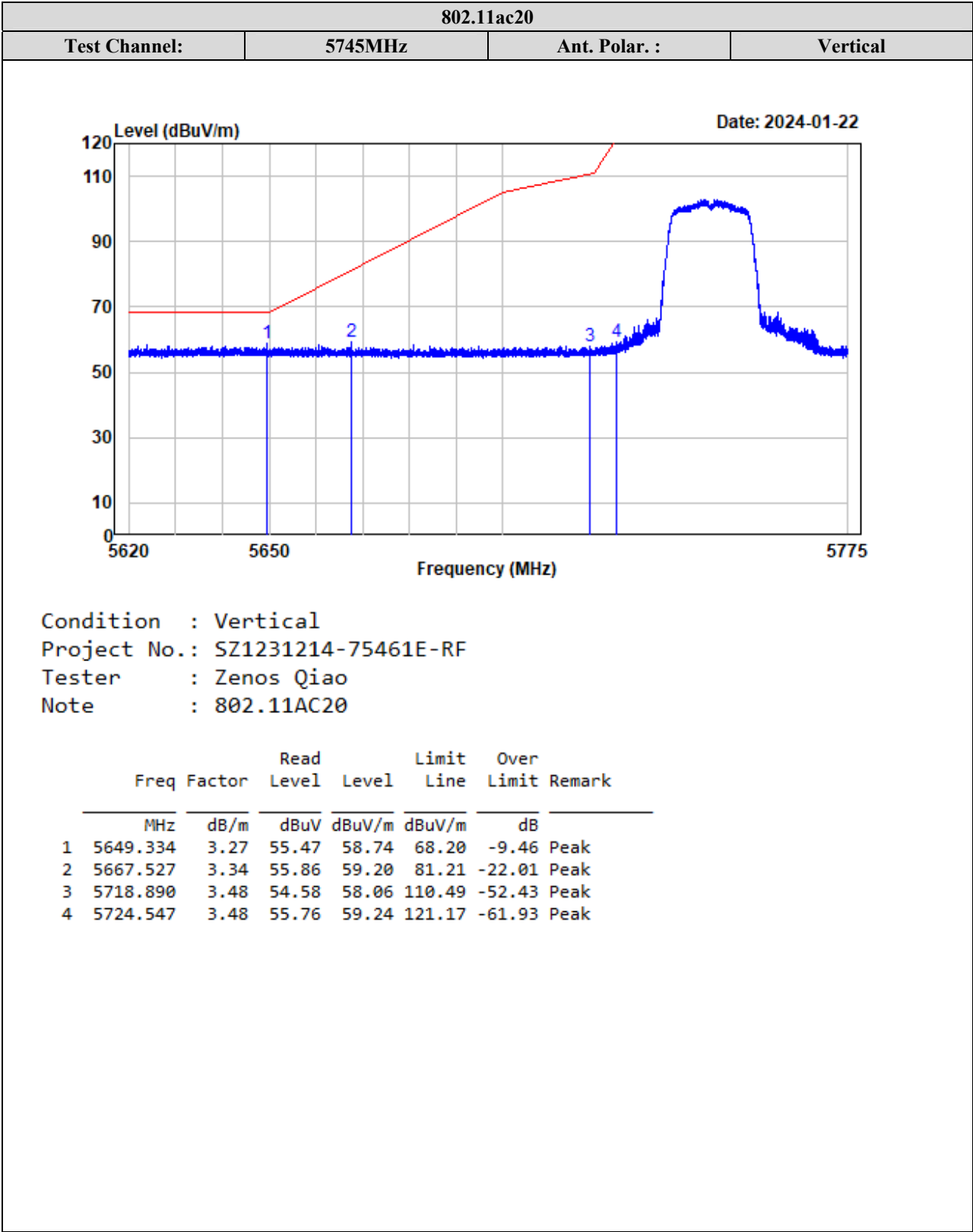


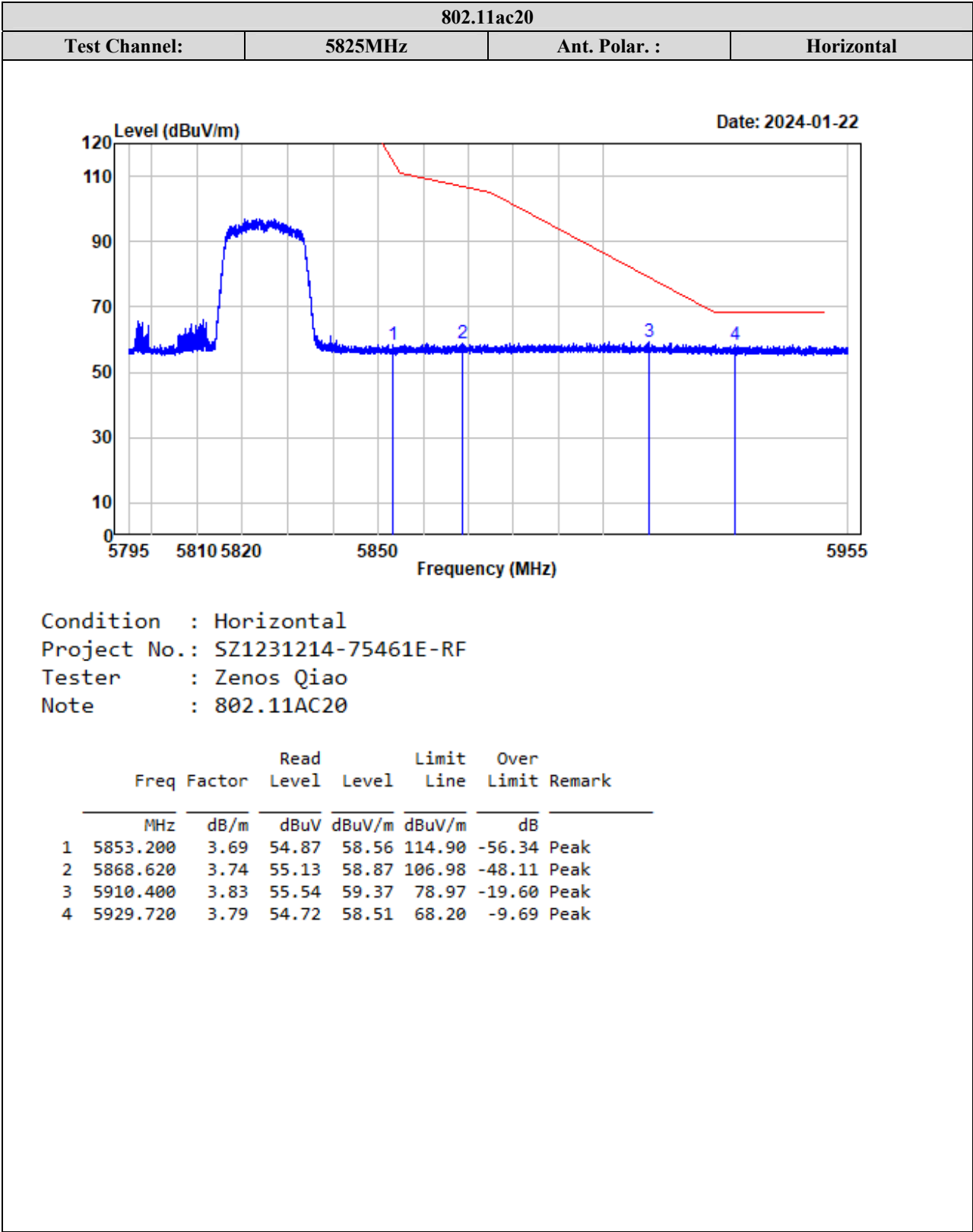
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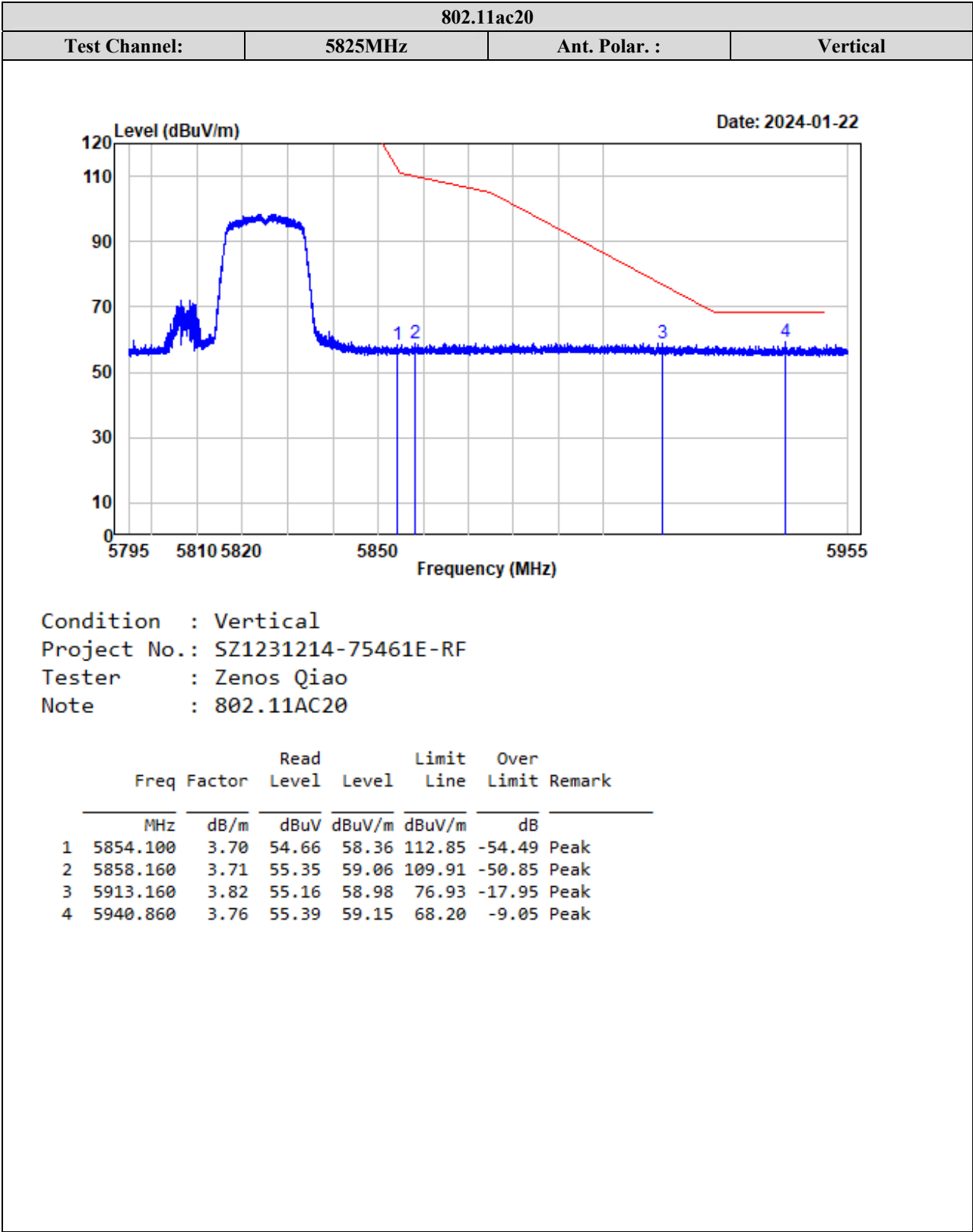
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Version 1.0 (2023/10/07)





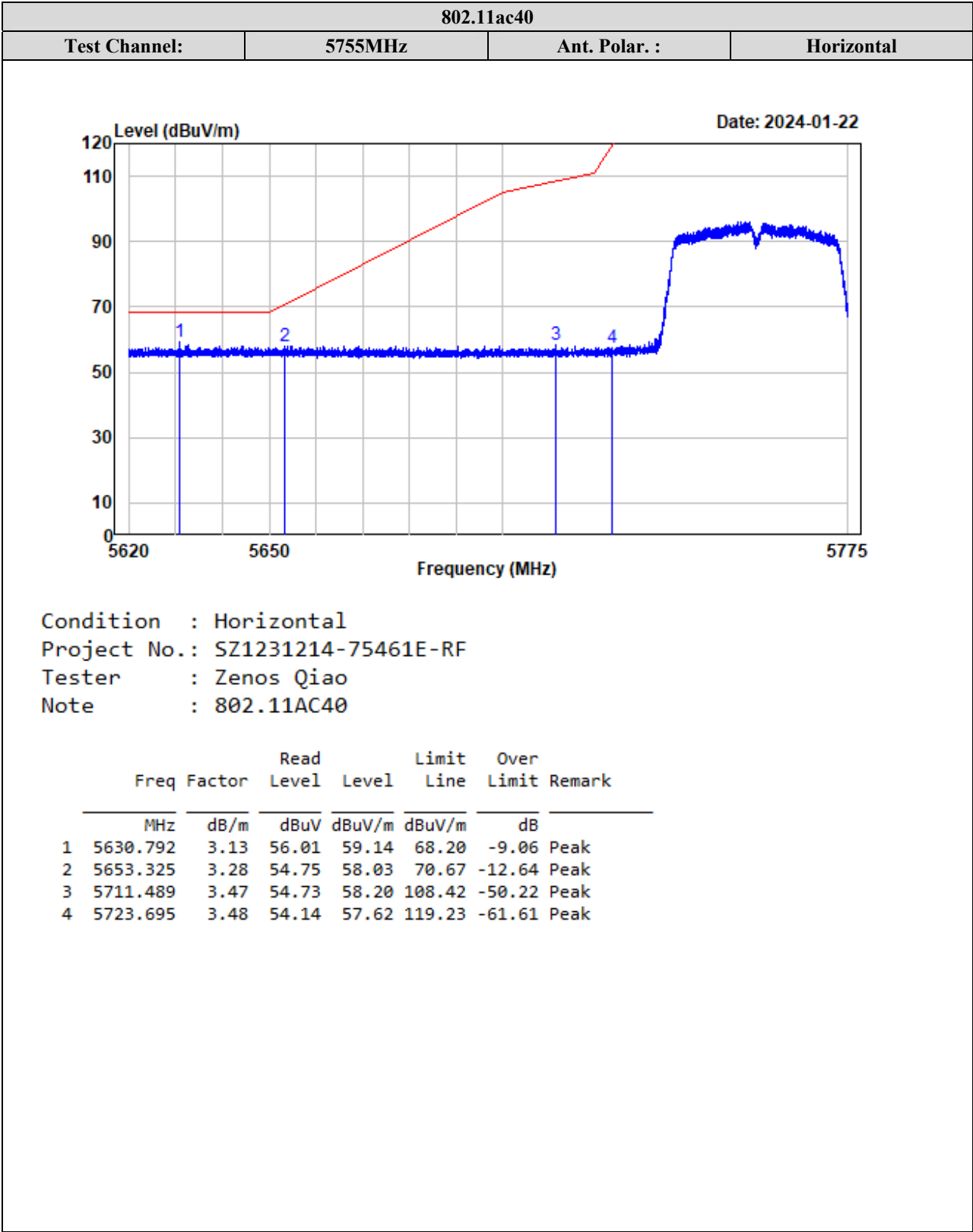


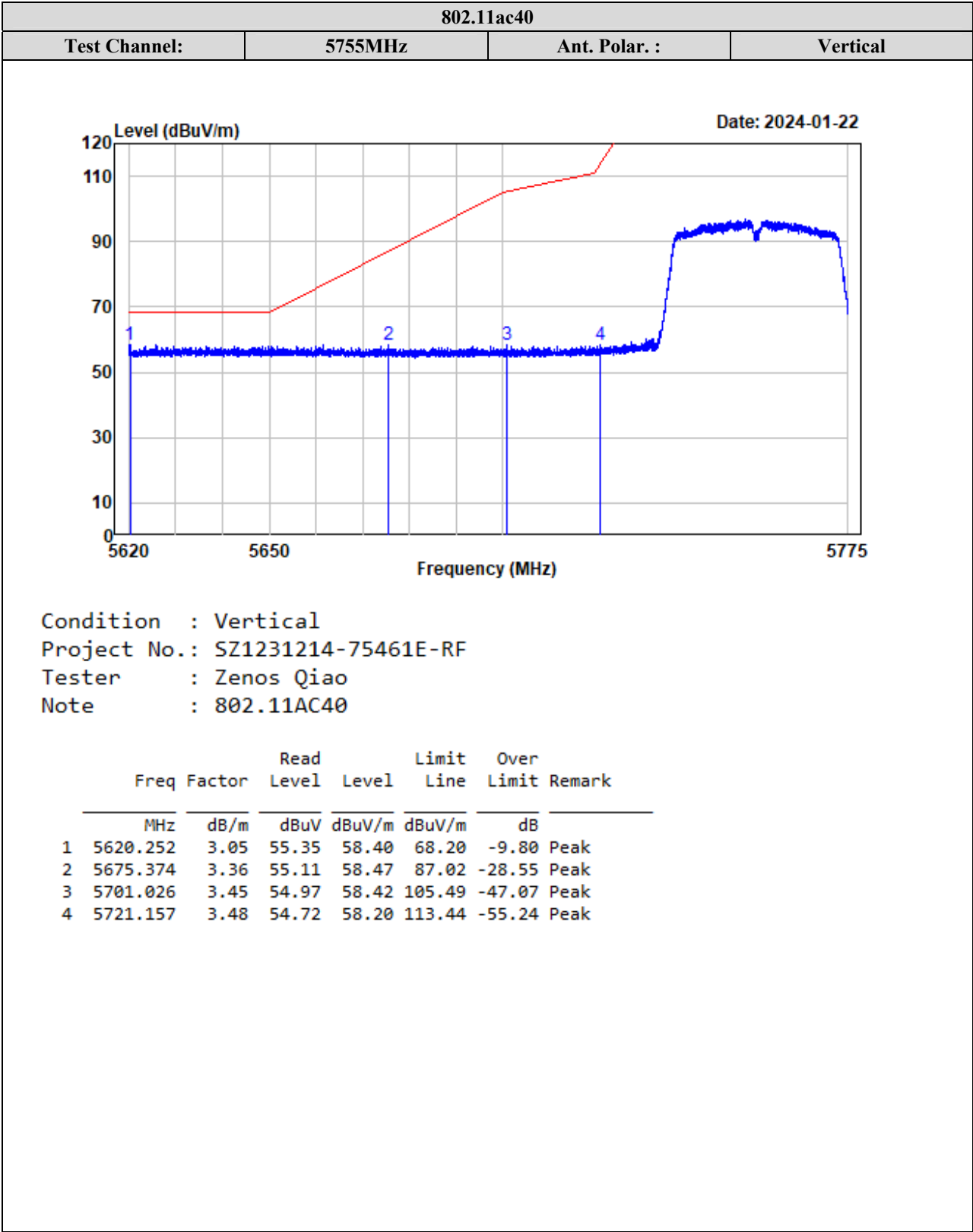


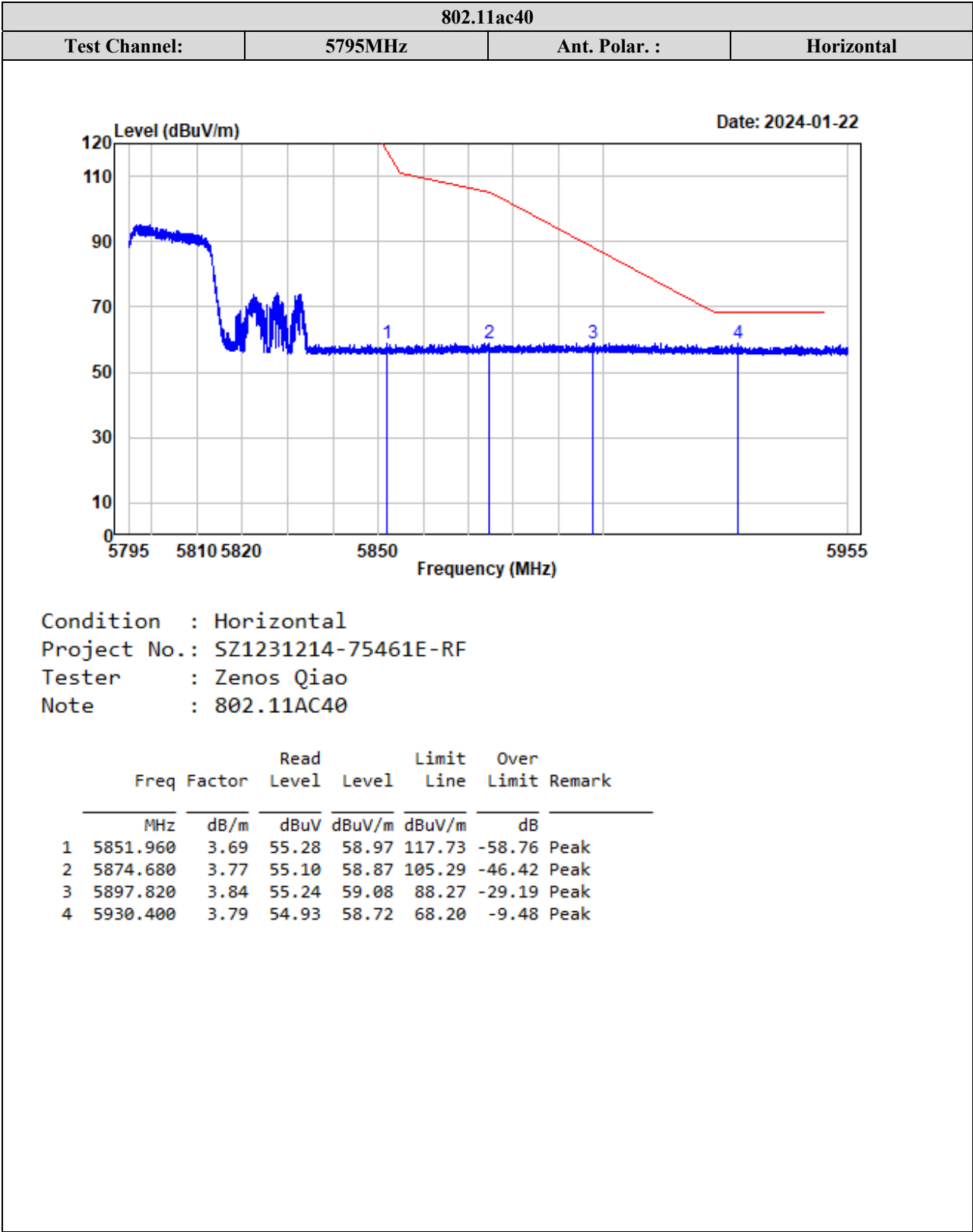
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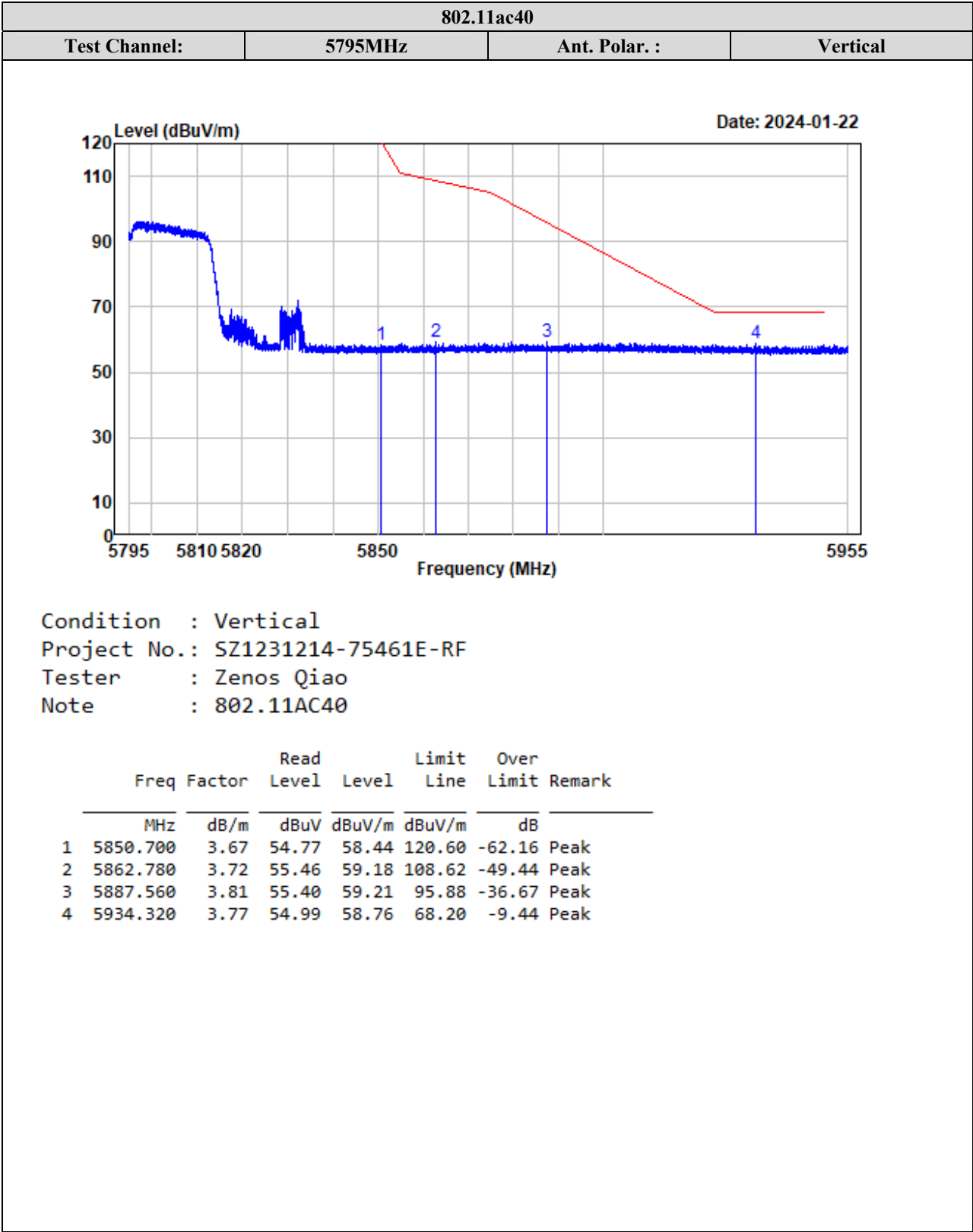
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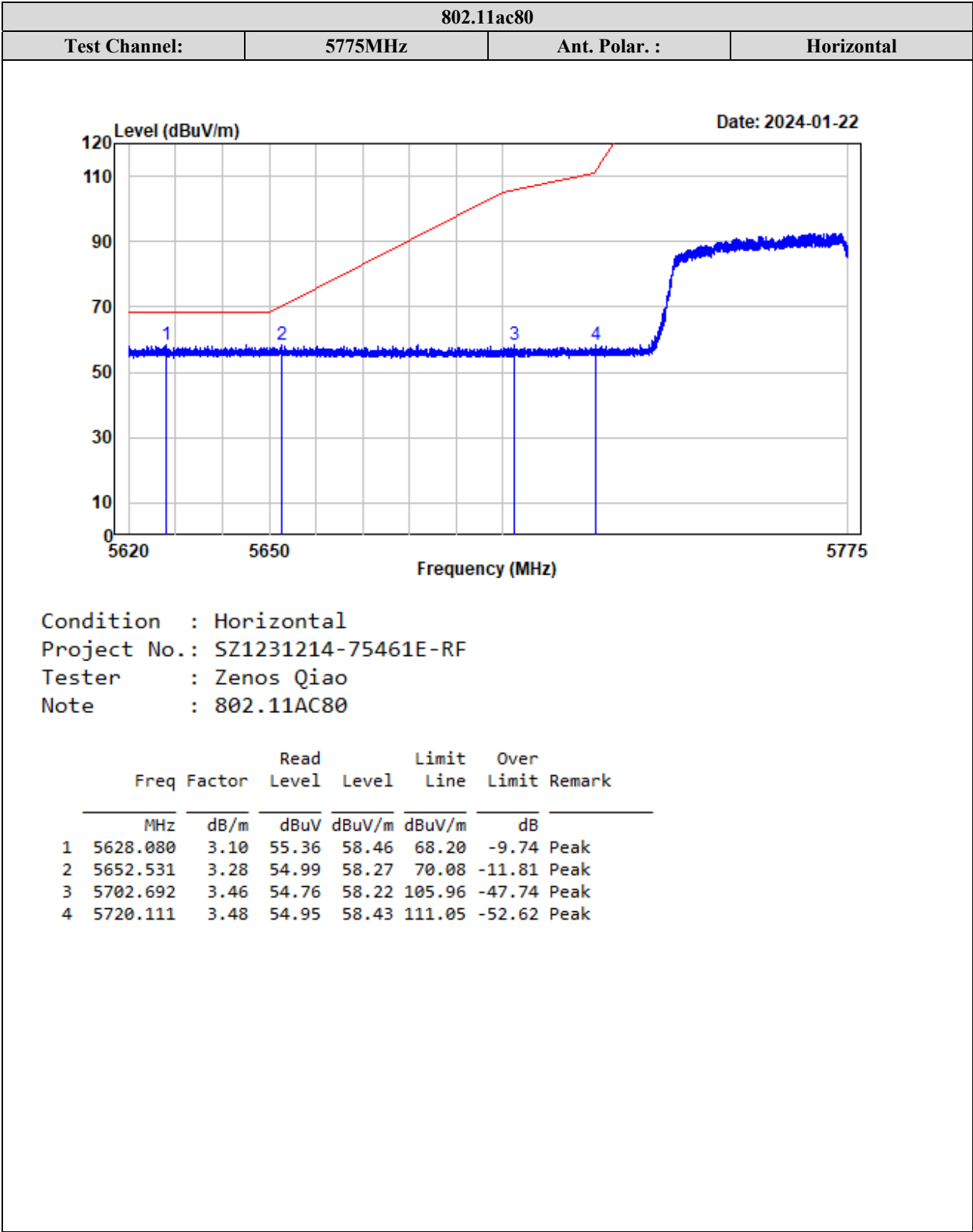
Version 1.0 (2023/10/07)

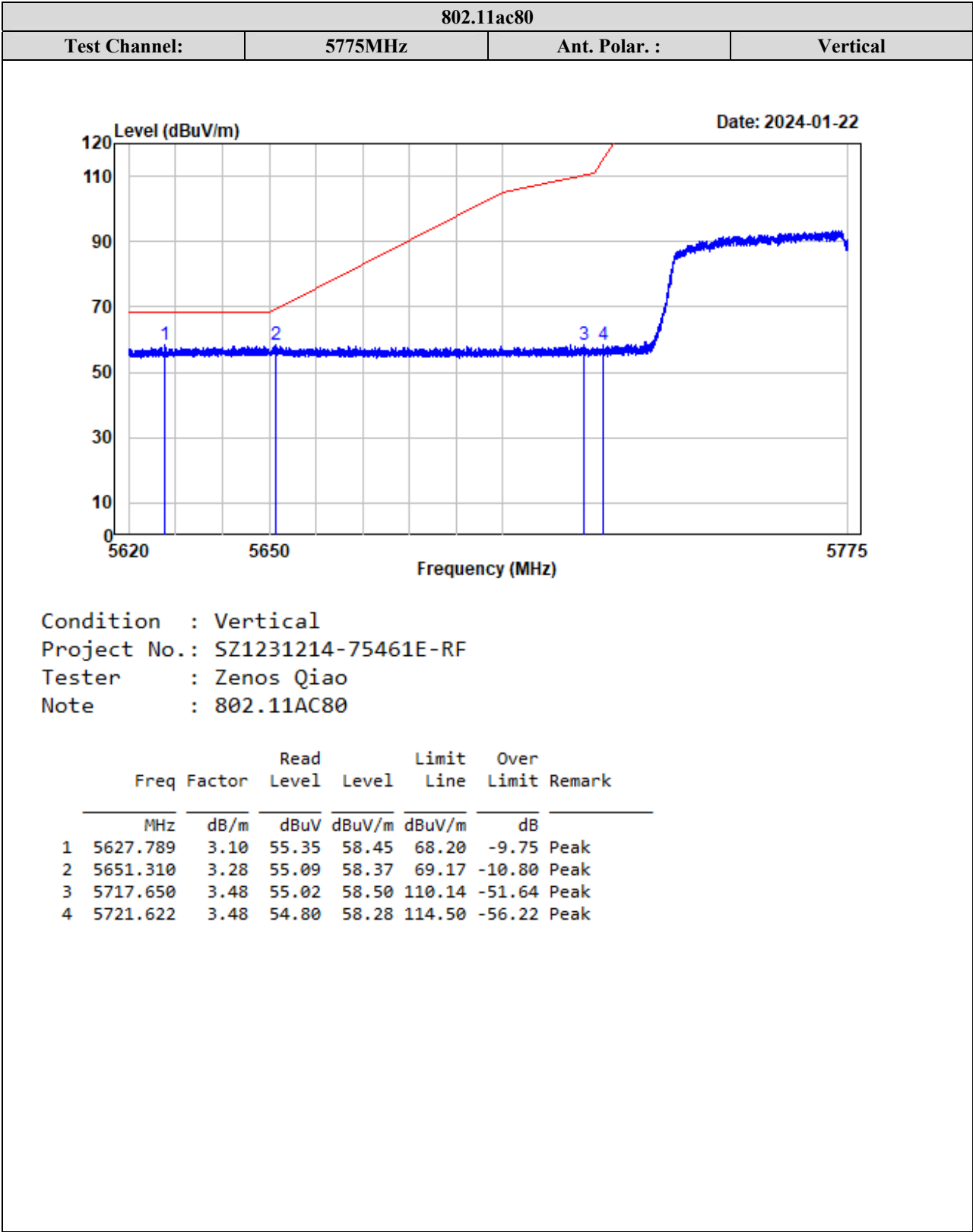


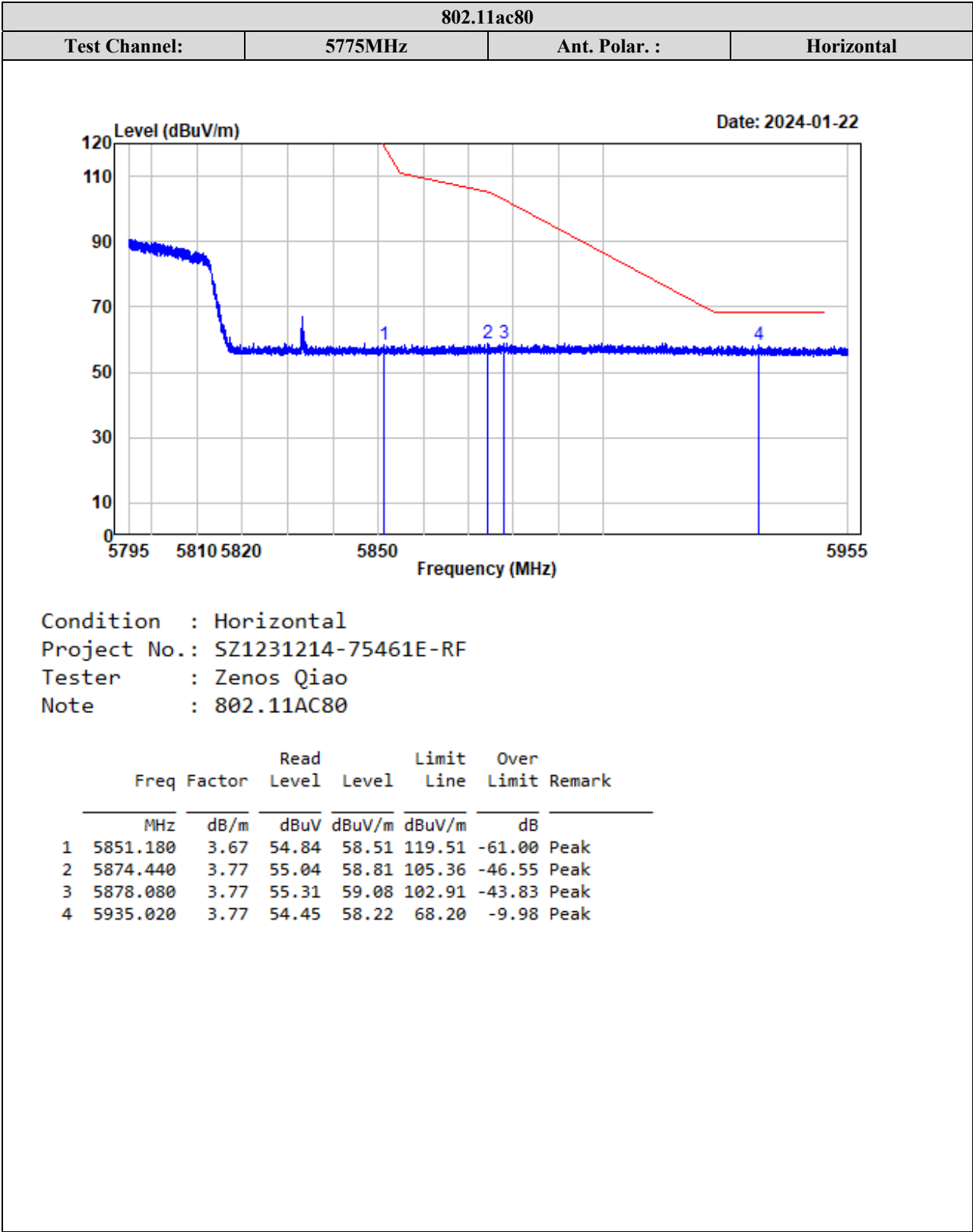


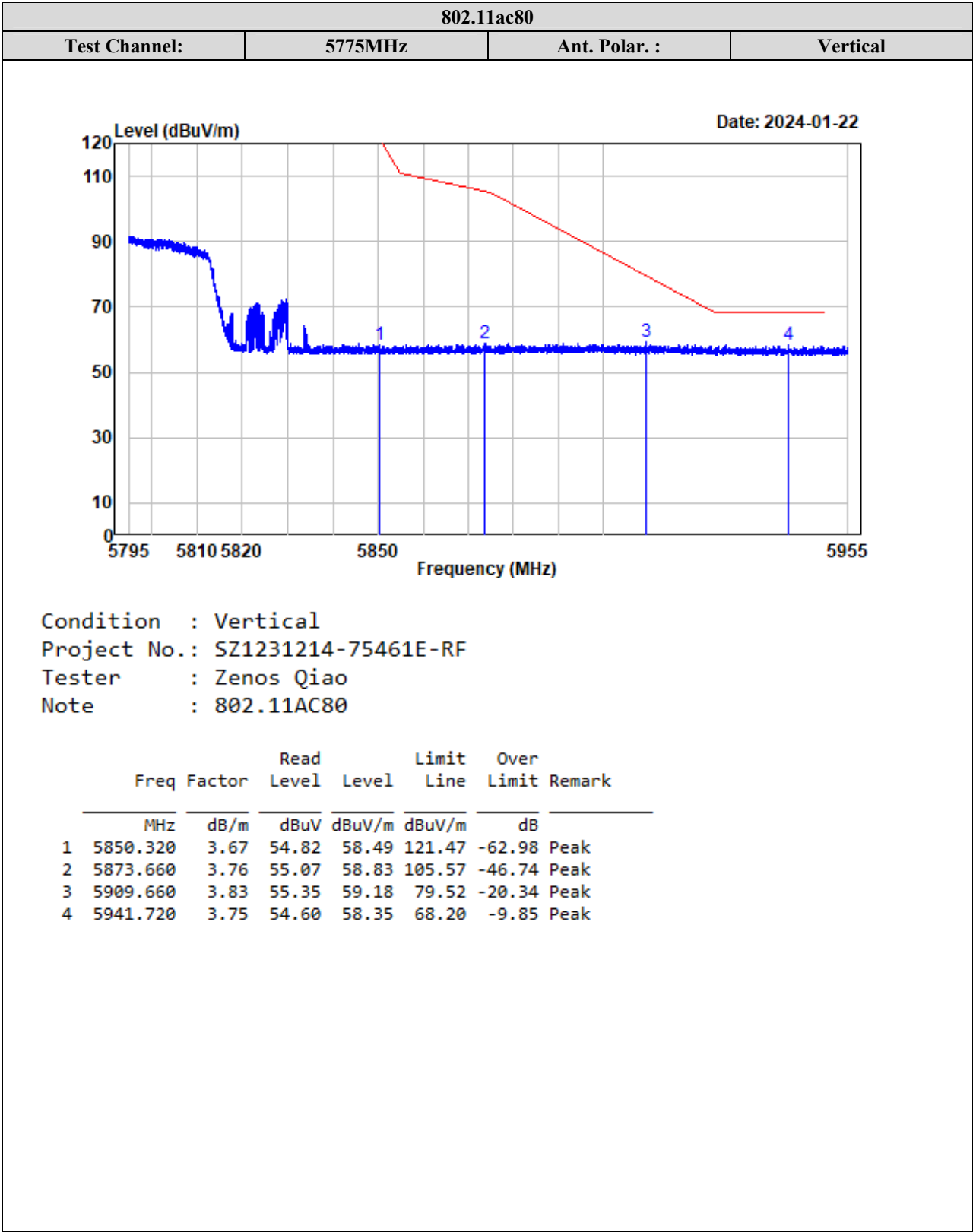




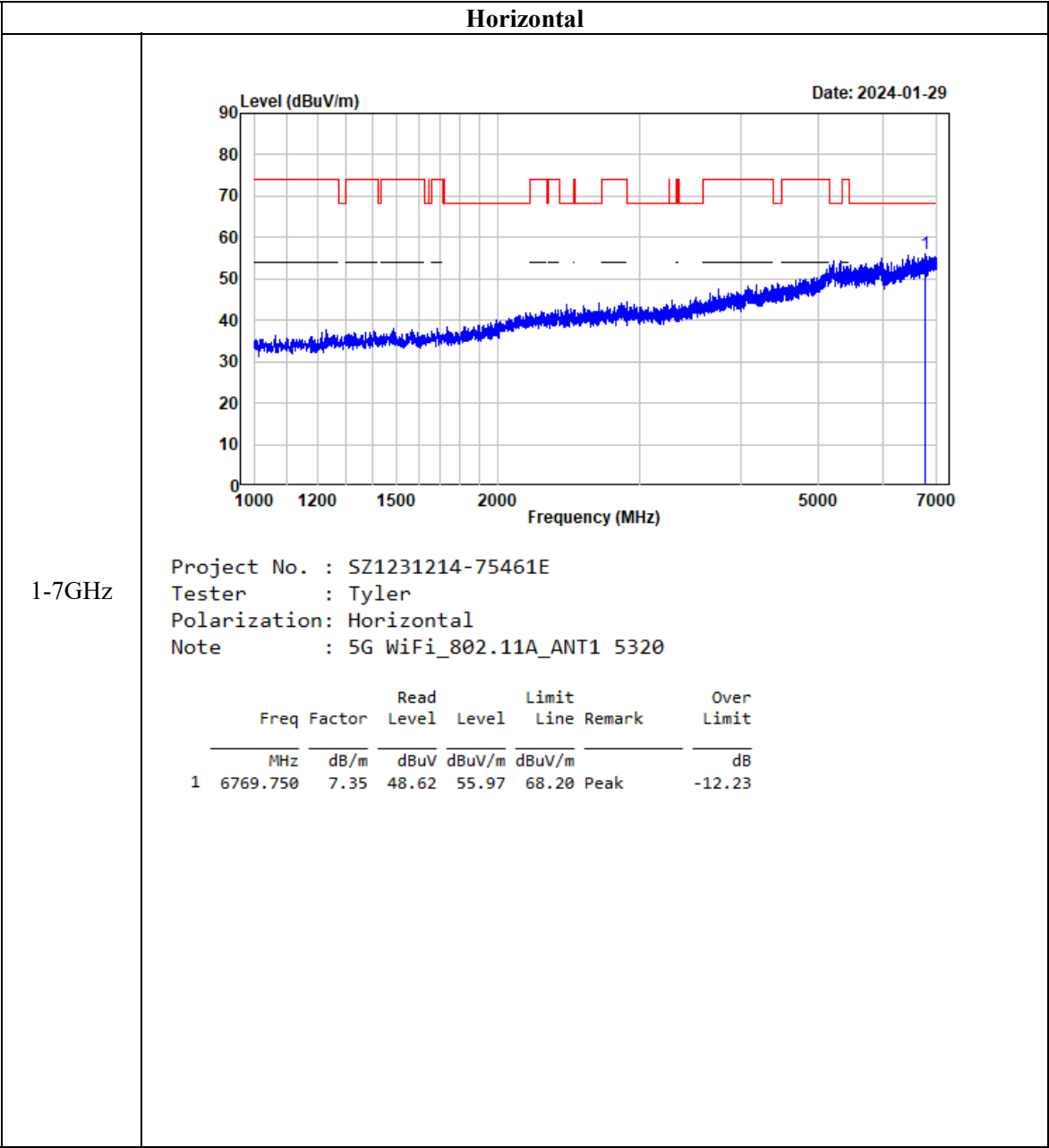


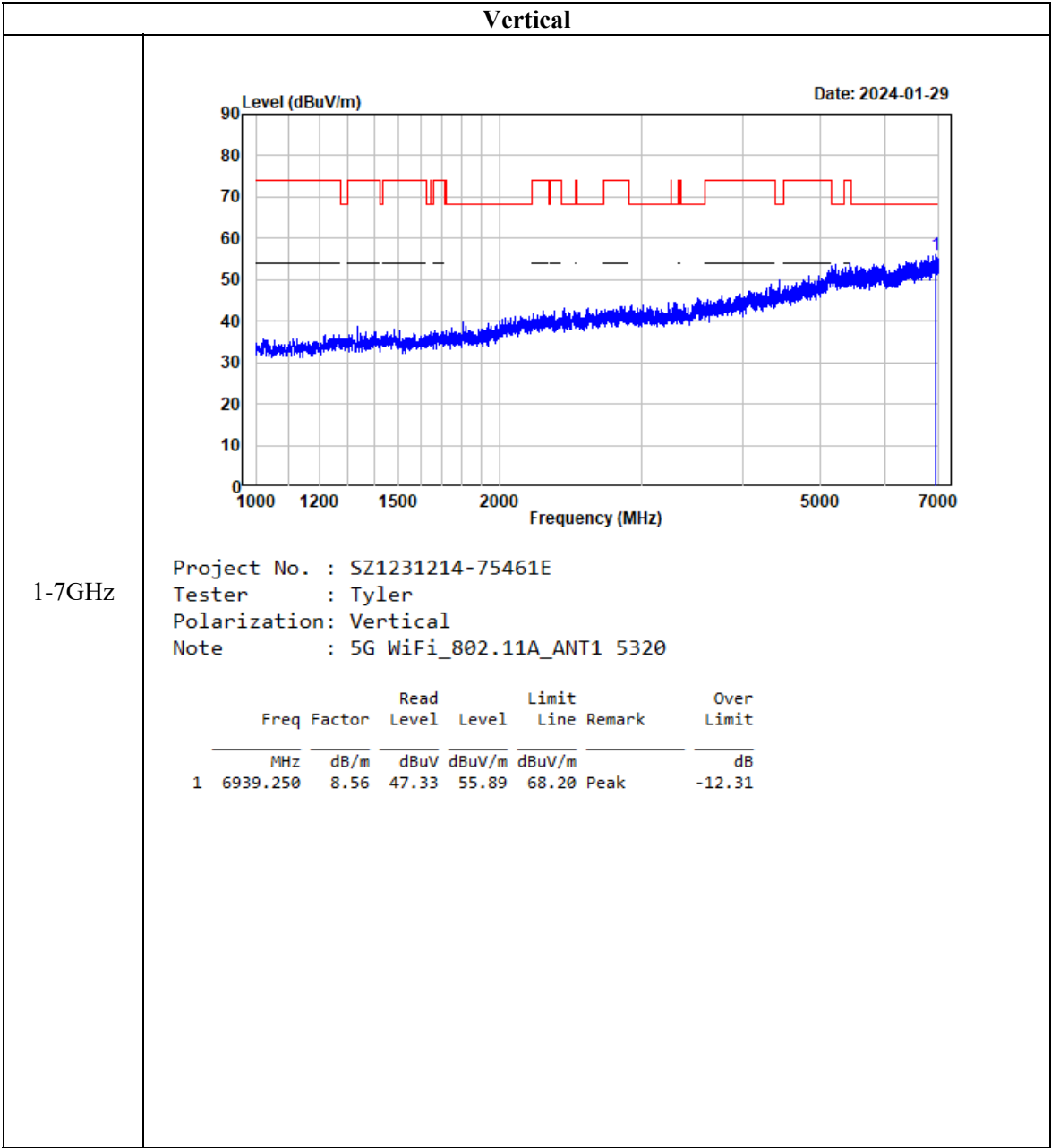


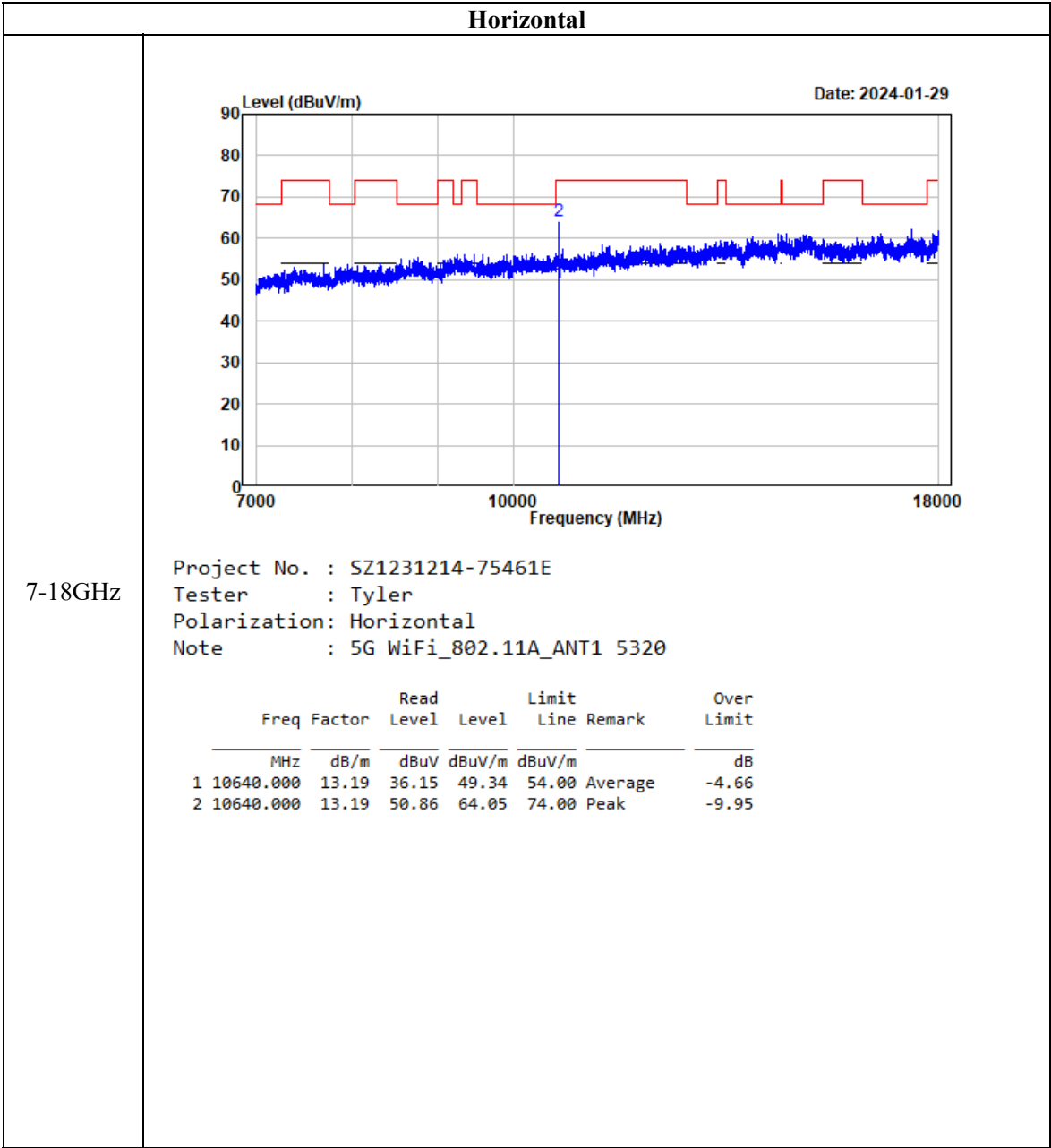


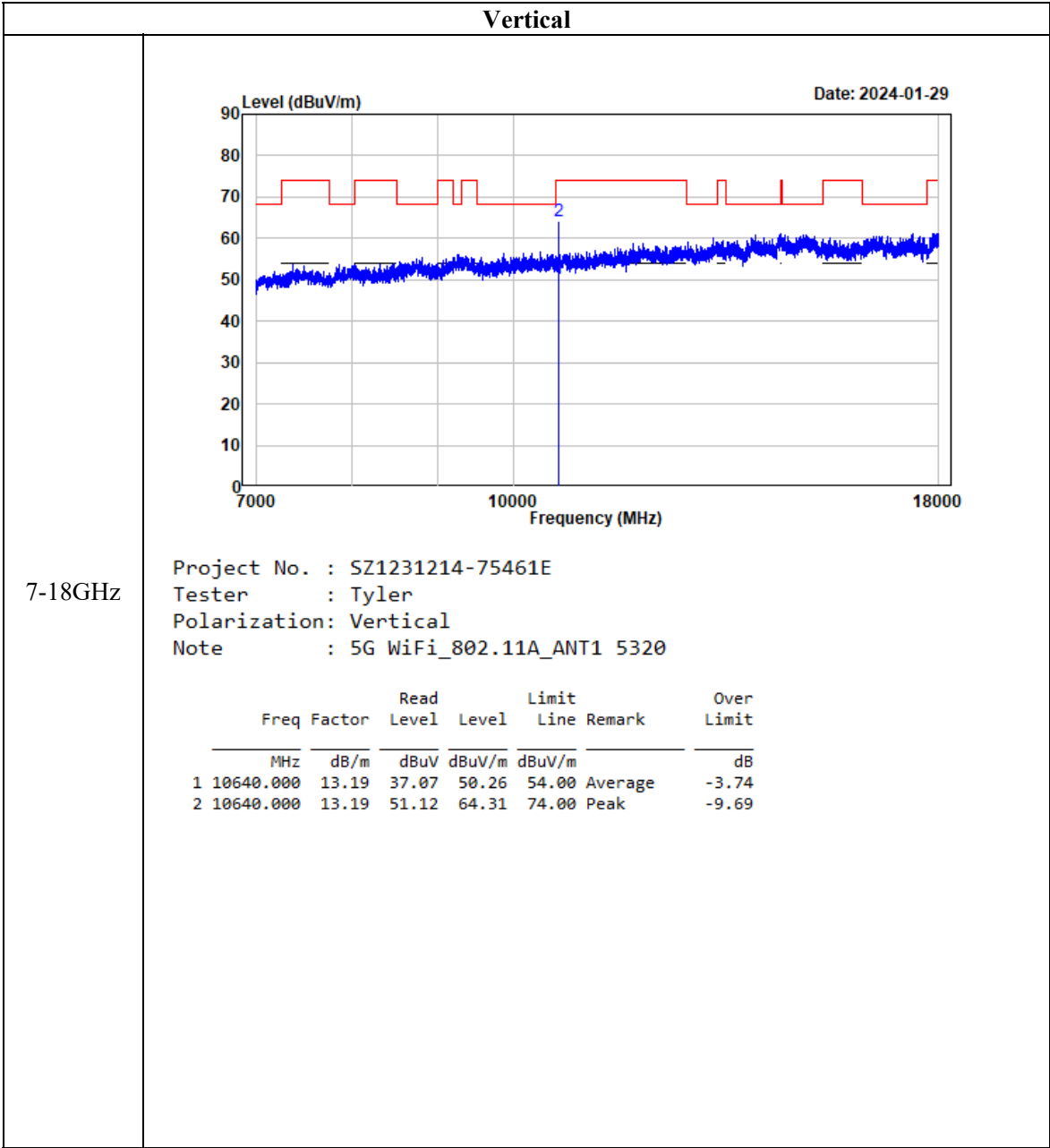


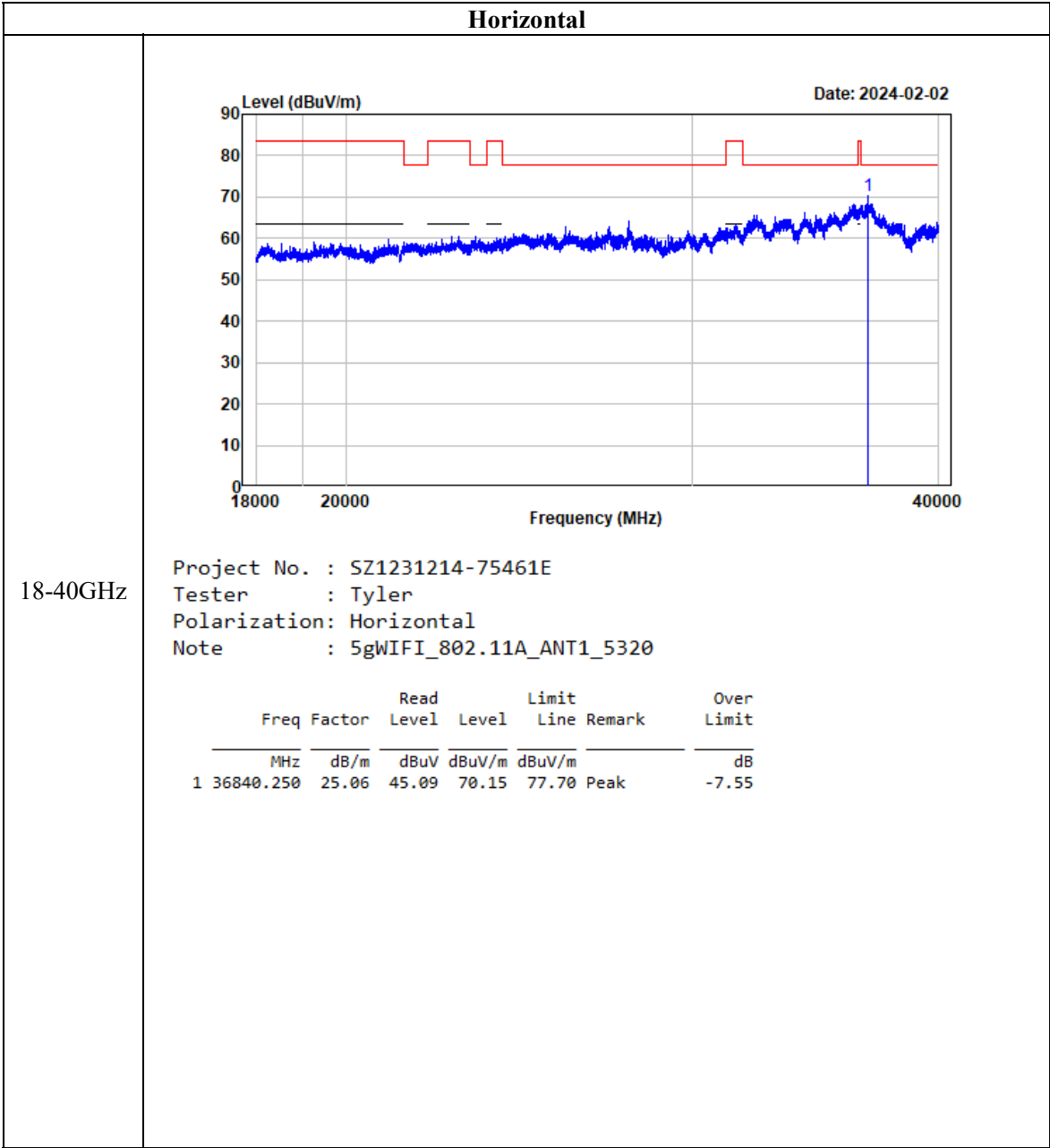
Listed with the worst harmonic margin test plot (802.11a, ANT1, 5320MHz)

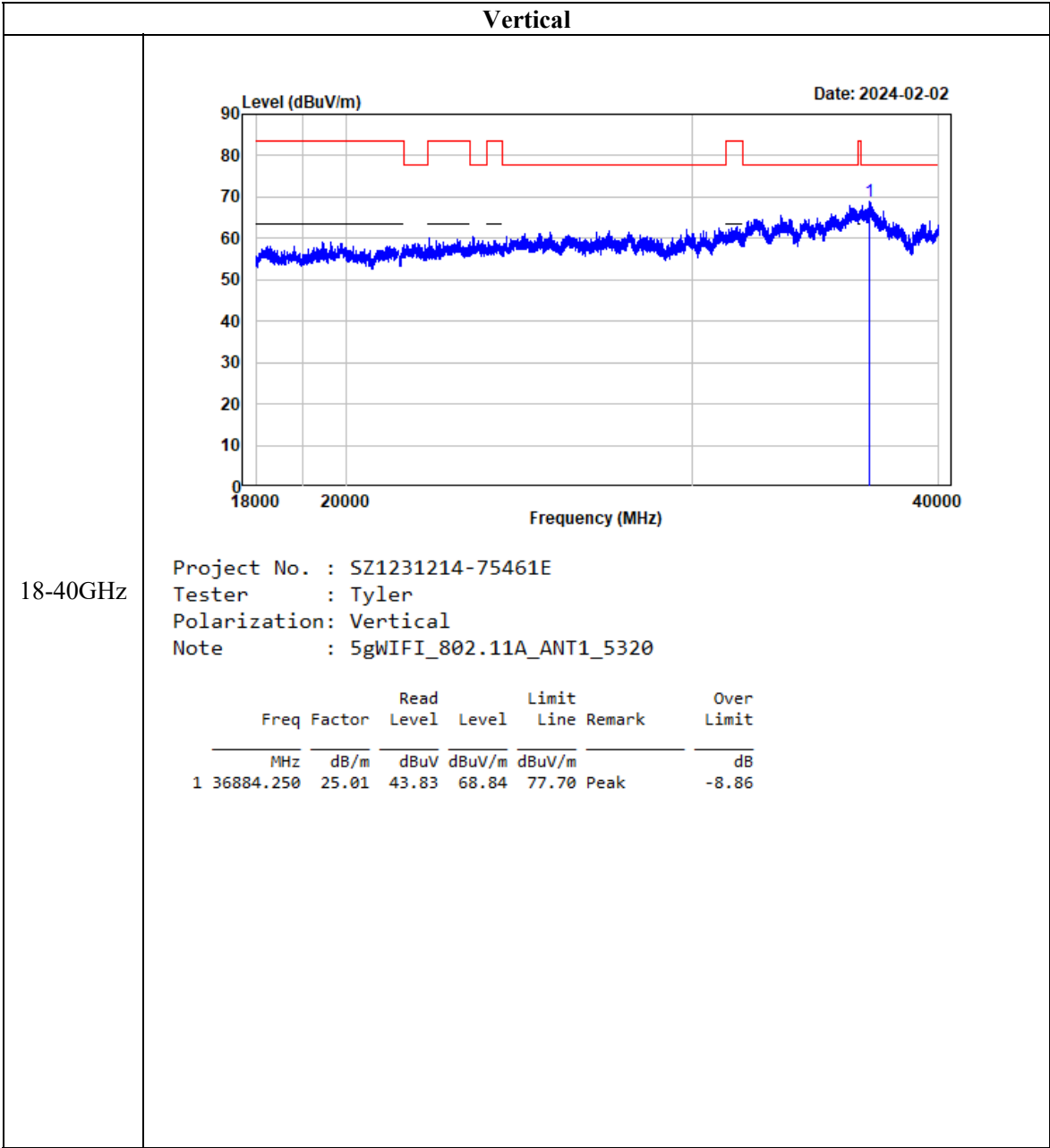












FCC §15.407(a), (e) – 26 dB & 6dB EMISSION BANDWIDTH

Applicable Standard

The maximum power spectral density is measured as a conducted emission by direct connection of a calibrated test instrument to the equipment under test. If the device cannot be connected directly, alternative techniques acceptable to the Commission may be used. Measurements in the 5.725-5.85 GHz band are made over a reference bandwidth of 500 kHz or the 26 dB emission bandwidth of the device, whichever is less. Measurements in the 5.15-5.25 GHz, 5.25-5.35 GHz, and the 5.47-5.725 GHz bands are made over a bandwidth of 1 MHz or the 26 dB emission bandwidth of the device, whichever is less. A narrower resolution bandwidth can be used, provided that the measured power is integrated over the full reference bandwidth.

Within the 5.725-5.85 GHz band, the minimum 6 dB bandwidth of U-NII devices shall be at least 500 kHz.

Test Procedure

According to KDB789033 D02 section II.C and section II.D

1. Emission Bandwidth (EBW)

- a) Set RBW = approximately 1% of the emission bandwidth.
- b) Set the VBW > RBW.
- c) Detector = Peak.
- d) Trace mode = max hold.
- e) Measure the maximum width of the emission that is 26 dB down from the maximum of the emission. Compare this with the RBW setting of the analyzer. Readjust RBW and repeat measurement as needed until the RBW/EBW ratio is approximately 1%.

2. Minimum Emission Bandwidth for the band 5.725-5.85 GHz

Section 15.407(e) specifies the minimum 6 dB emission bandwidth of at least 500 KHz for the band 5.725-5.85 GHz. The following procedure shall be used for measuring this bandwidth:

- a) Set RBW = 100 kHz.
- b) Set the video bandwidth (VBW) $\geq 3 \times$ RBW.
- c) Detector = Peak.
- d) Trace mode = max hold.
- e) Sweep = auto couple.
- f) Allow the trace to stabilize.
- g) Measure the maximum width of the emission that is constrained by the frequencies associated with the two outermost amplitude points (upper and lower frequencies) that are attenuated by 6 dB relative to the maximum level measured in the fundamental emission.

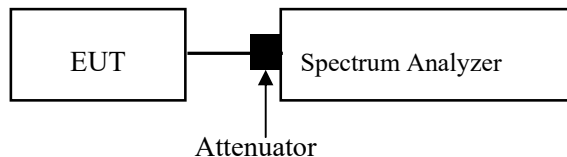
3. 99% Occupied Bandwidth:

According to ANSI C63.10-2013 Section 12.4.2&6.9.3

The occupied bandwidth is the frequency bandwidth such that, below its lower and above its upper frequency limits, the mean powers are each equal to 0.5% of the total mean power of the given emission. The following procedure shall be used for measuring 99% power bandwidth:

- a) The instrument center frequency is set to the nominal EUT channel center frequency. The frequency span for the spectrum analyzer shall be between 1.5 times and 5.0 times the OBW.
- b) The nominal IF filter bandwidth (3 dB RBW) shall be in the range of 1% to 5% of the OBW, and VBW shall be approximately three times the RBW, unless otherwise specified by the applicable requirement.

- c) Set the reference level of the instrument as required, keeping the signal from exceeding the maximum input mixer level for linear operation. In general, the peak of the spectral envelope shall be more than $[10 \log (\text{OBW/RBW})]$ below the reference level. Specific guidance is given in 4.1.5.2.
- d) Step a) through step c) might require iteration to adjust within the specified range.
- e) Video averaging is not permitted. Where practical, a sample detection and single sweep mode shall be used. Otherwise, peak detection and max hold mode (until the trace stabilizes) shall be used.
- f) Use the 99% power bandwidth function of the instrument (if available) and report the measured bandwidth.
- g) If the instrument does not have a 99% power bandwidth function, then the trace data points are recovered and directly summed in linear power terms. The recovered amplitude data points, beginning at the lowest frequency, are placed in a running sum until 0.5% of the total is reached; that frequency is recorded as the lower frequency. The process is repeated until 99.5% of the total is reached; that frequency is recorded as the upper frequency. The 99% power bandwidth is the difference between these two frequencies.
- h) The occupied bandwidth shall be reported by providing plot(s) of the measuring instrument display; the plot axes and the scale units per division shall be clearly labeled. Tabular data may be reported in addition to the plot(s).



Test Data

Environmental Conditions

Temperature:	25.2~26 °C
Relative Humidity:	39~46 %
ATM Pressure:	101 kPa

The testing was performed by Leo Jin on 2024-01-21 and 2024-02-04.

EUT operation mode: Transmitting

Test Result: Compliant.

5150-5250MHz:

Test Modes	Test Frequency (MHz)	26 dB Bandwidth (MHz)	99% Occupied Bandwidth (MHz)
802.11a	5180	18.840	16.304
	5200	19.150	16.344
	5240	18.720	16.304
802.11ac vht20	5180	19.600	17.463
	5200	19.750	17.502
	5240	19.700	17.463
802.11ac vht40	5190	39.680	35.964
	5230	39.780	36.044
802.11ac vht80	5210	82.450	74.805
Note: Test only was performed at ANT 1. The 99% Occupied Bandwidth have not fall into the band 5250-5350MHz, please refer to the test plots of 99% Occupied Bandwidth			

5250-5350MHz:

Test Modes	Test Frequency (MHz)	26 dB Bandwidth (MHz)	99% Occupied Bandwidth (MHz)
802.11a	5260	18.720	16.264
	5280	18.800	16.304
	5320	18.840	16.304
802.11ac vht20	5260	18.800	16.304
	5280	18.560	16.304
	5320	18.800	16.304
802.11ac vht40	5270	39.600	35.964
	5310	39.440	35.964
802.11ac vht80	5290	83.680	75.125
Note: Test only was performed at ANT 1.			

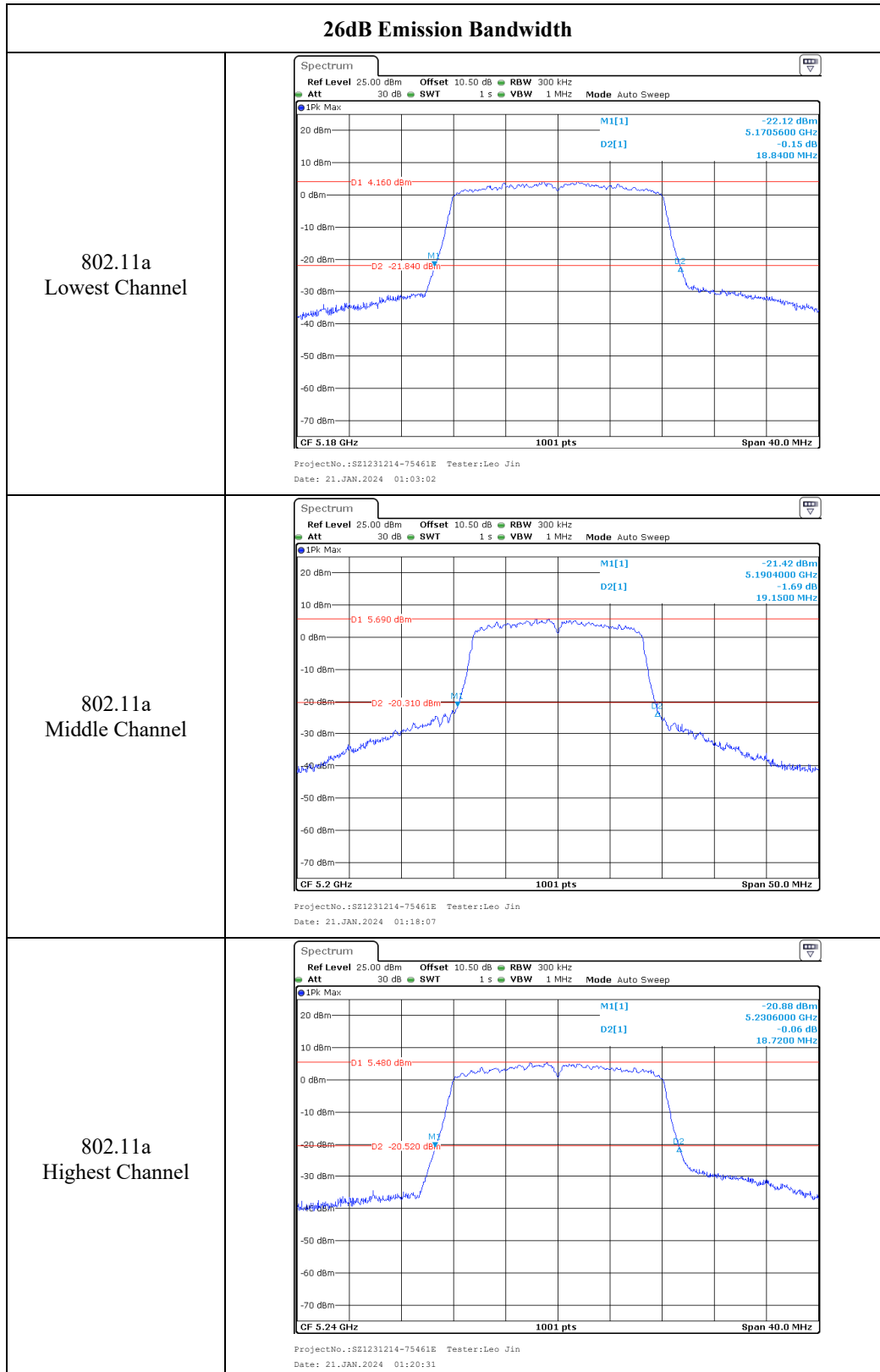
5470-5725MHz:

Test Modes	Test Frequency (MHz)	26 dB Bandwidth (MHz)	99% Occupied Bandwidth (MHz)
802.11a	5500	28.680	17.063
	5580	30.800	17.702
	5700	23.360	16.464
	5720	21.040	16.384
802.11ac vht20	5500	19.600	17.463
	5580	20.200	17.542
	5700	19.680	17.383
	5720	20.000	17.542
802.11ac vht40	5510	39.520	35.964
	5550	39.440	35.964
	5670	39.360	35.884
	5710	39.520	35.884
802.11ac vht80	5530	82.240	74.805
	5610	82.200	75.764
	5690	91.680	74.965
Note: Test only was performed at ANT 1.			

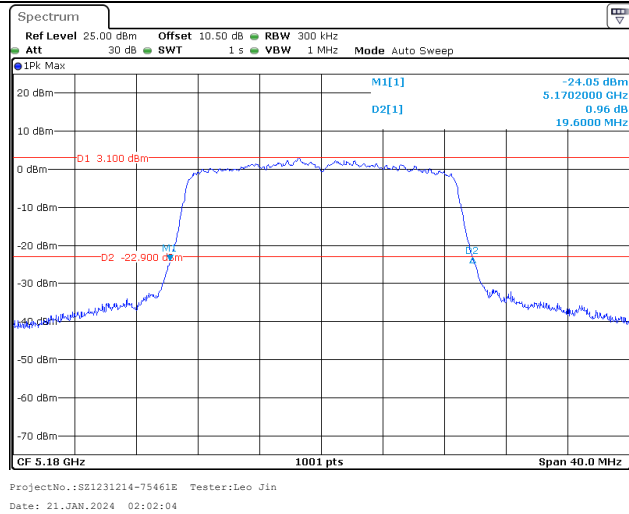
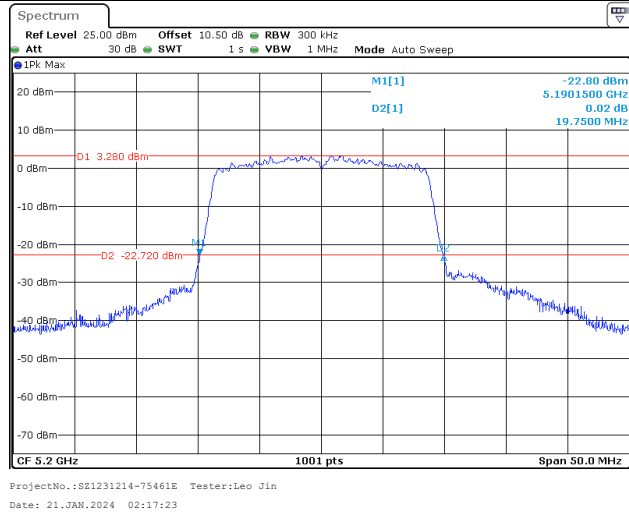
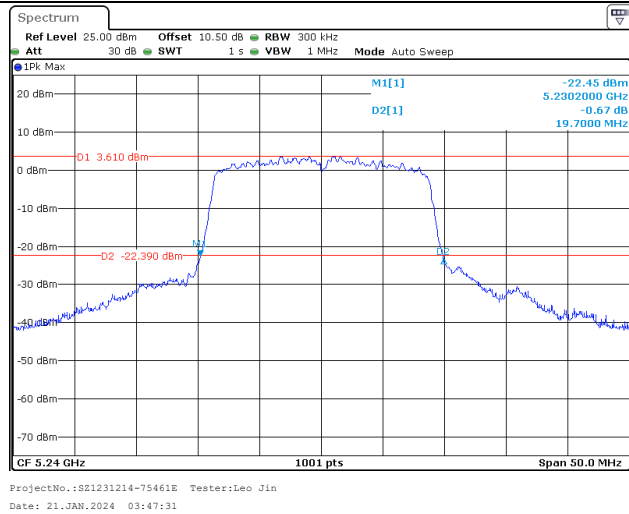
5725-5850MHz:

Test Modes	Test Frequency (MHz)	6 dB Bandwidth (MHz)	99% Occupied Bandwidth (MHz)
802.11a	5745	15.440	17.143
	5785	15.640	19.221
	5825	15.600	19.700
802.11ac vht20	5745	16.000	17.822
	5785	16.040	17.782
	5825	16.760	19.620
802.11ac vht40	5755	35.280	36.284
	5795	35.360	36.523
802.11ac vht80	5775	75.480	75.764
Note: Test only was performed at ANT 1. 6dB Emission Bandwidth Limit: ≥ 0.5 MHz The 99% Occupied Bandwidth have not fall into the band 5470-5725MHz, please refer to the test plots of 99% Occupied Bandwidth.			

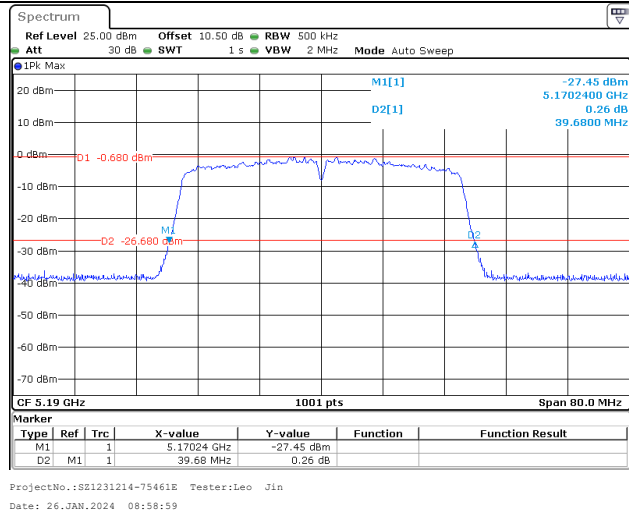
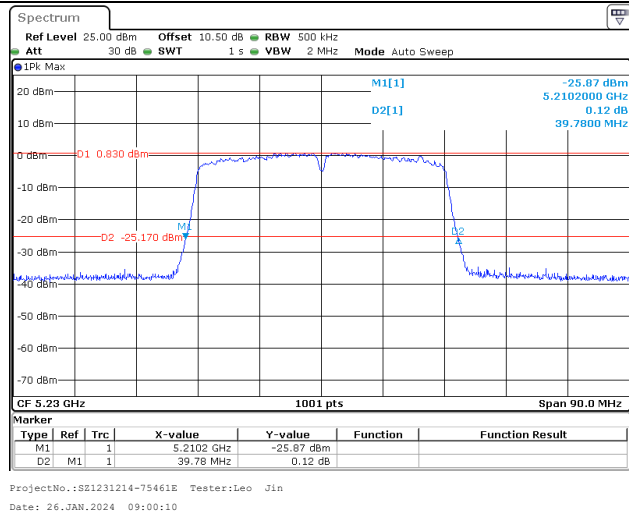
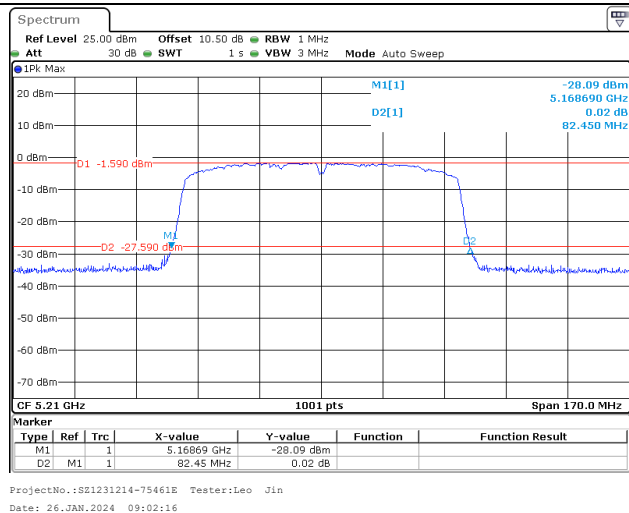
5150-5250MHz:

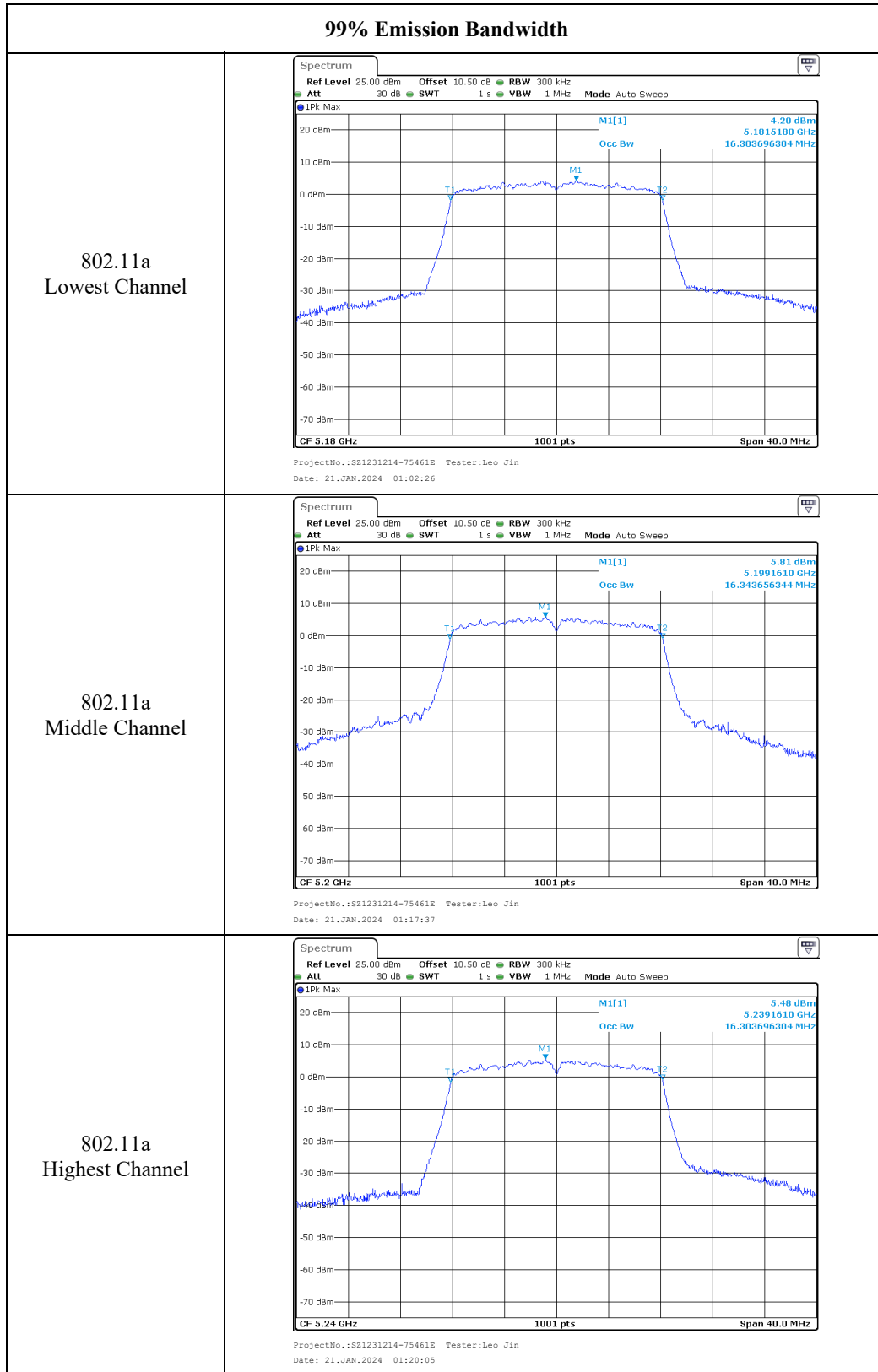


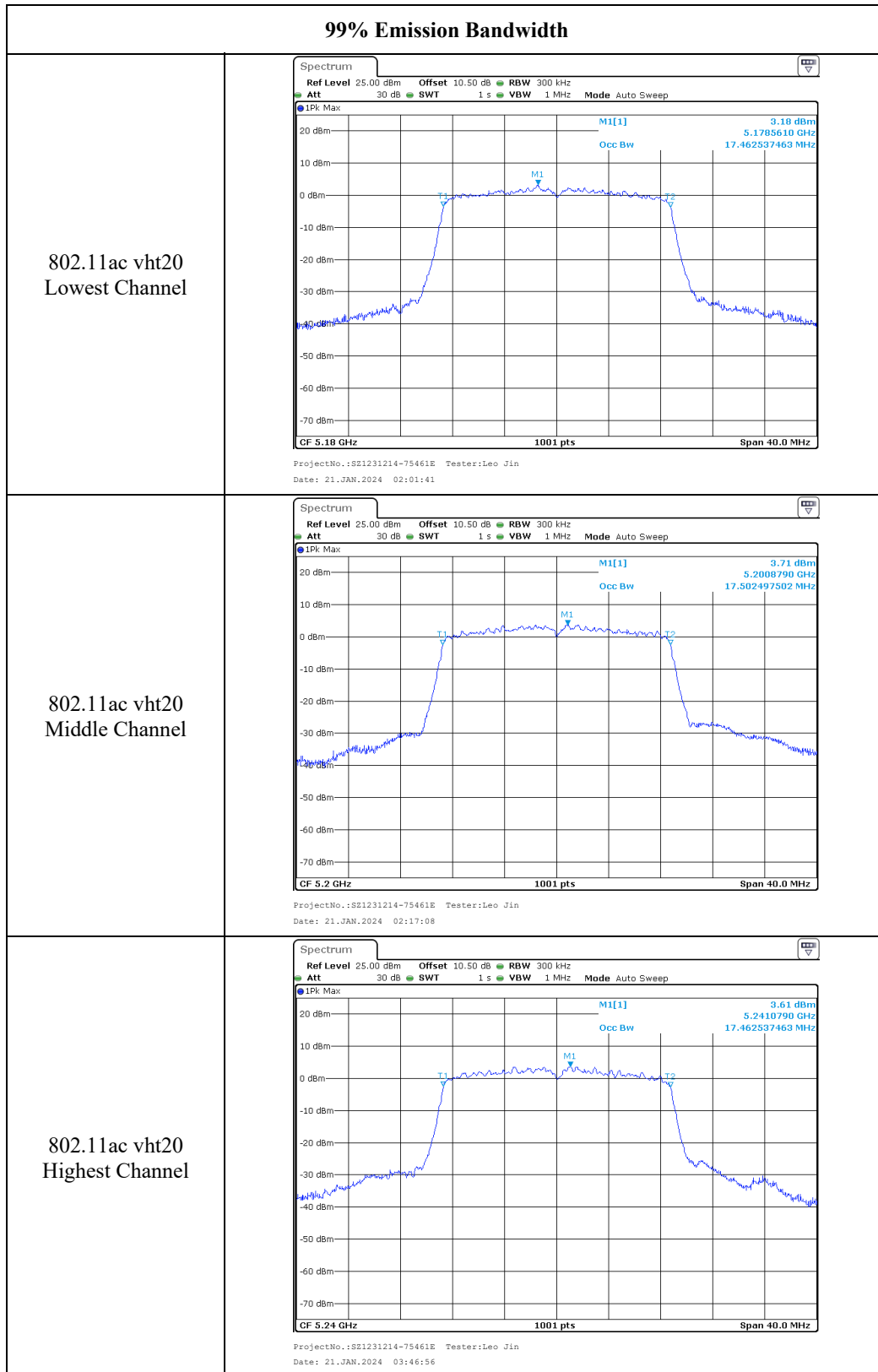
26dB Emission Bandwidth

802.11ac vht20
Lowest Channel802.11ac vht20
Middle Channel802.11ac vht20
Highest Channel

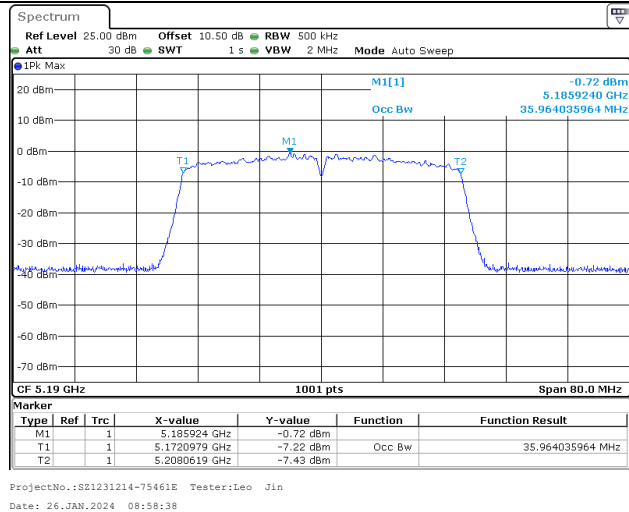
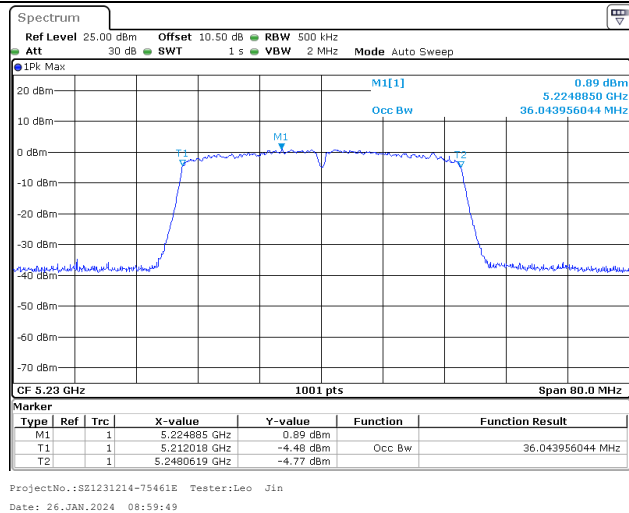
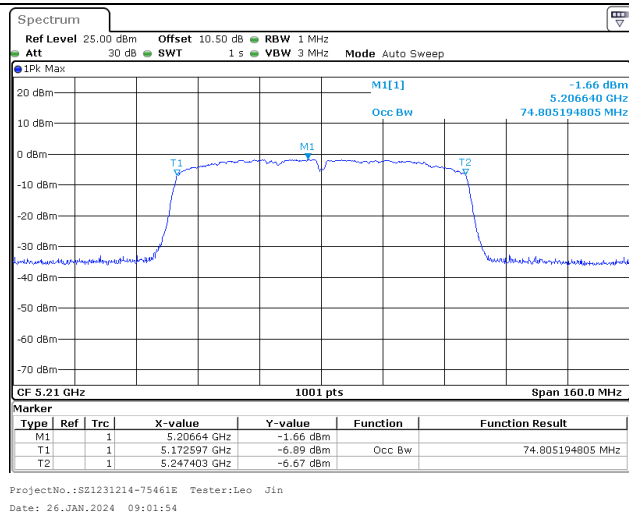
26dB Emission Bandwidth

802.11ac vht40
Lowest Channel802.11ac vht40
Highest Channel802.11ac vht80
Middle Channel

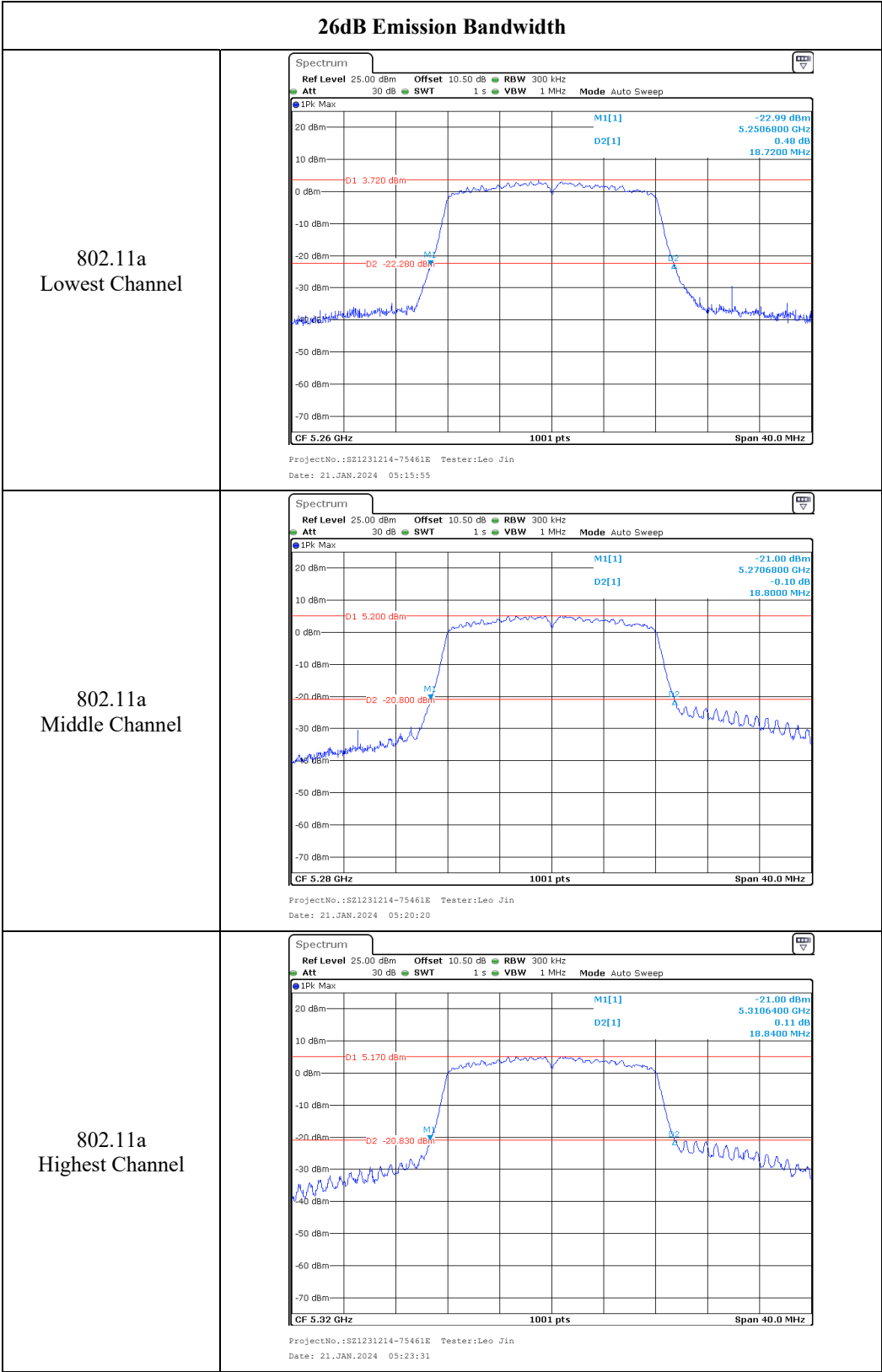




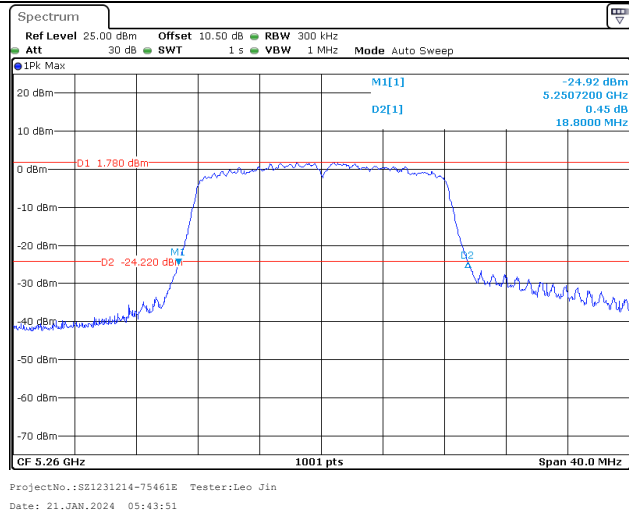
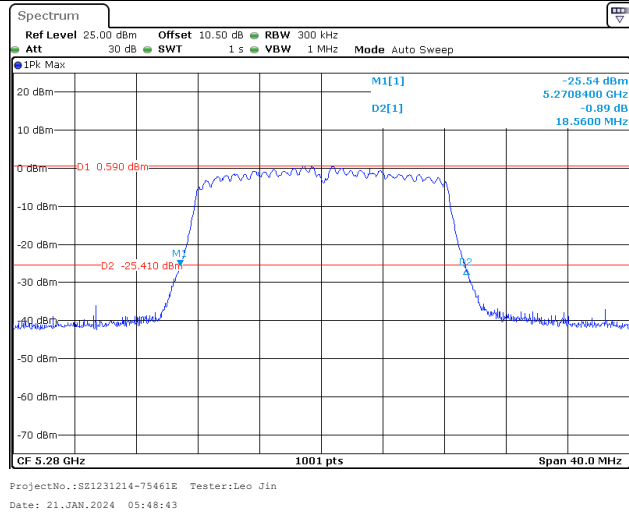
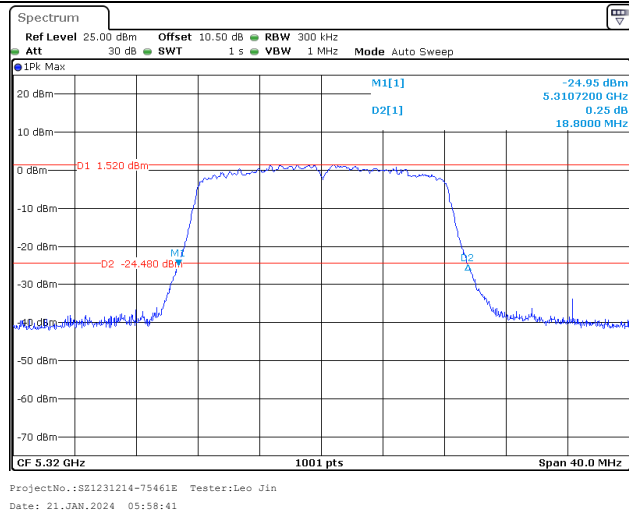
99% Emission Bandwidth

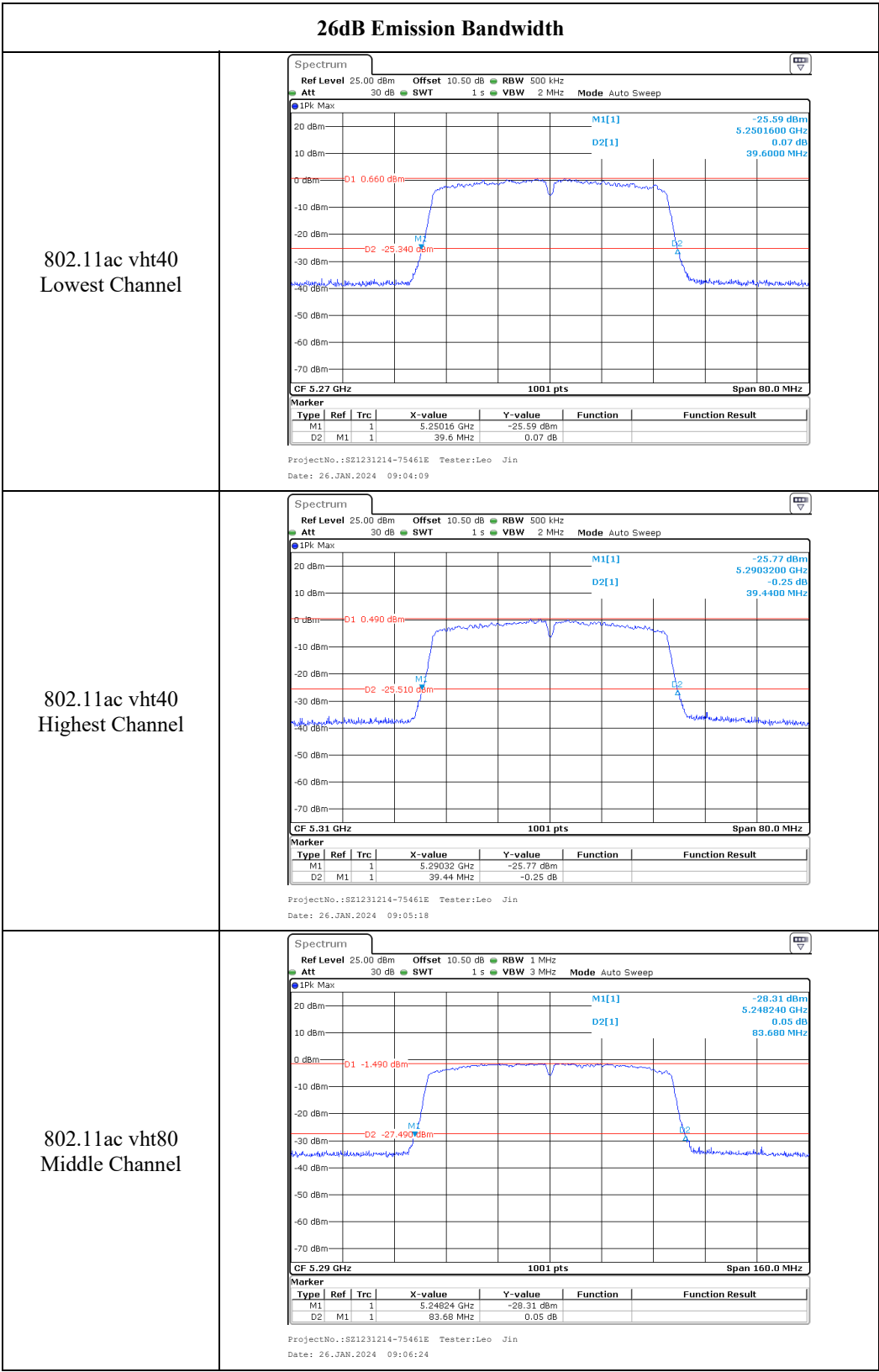
802.11ac vht40
Lowest Channel802.11ac vht40
Highest Channel802.11ac vht80
Middle Channel

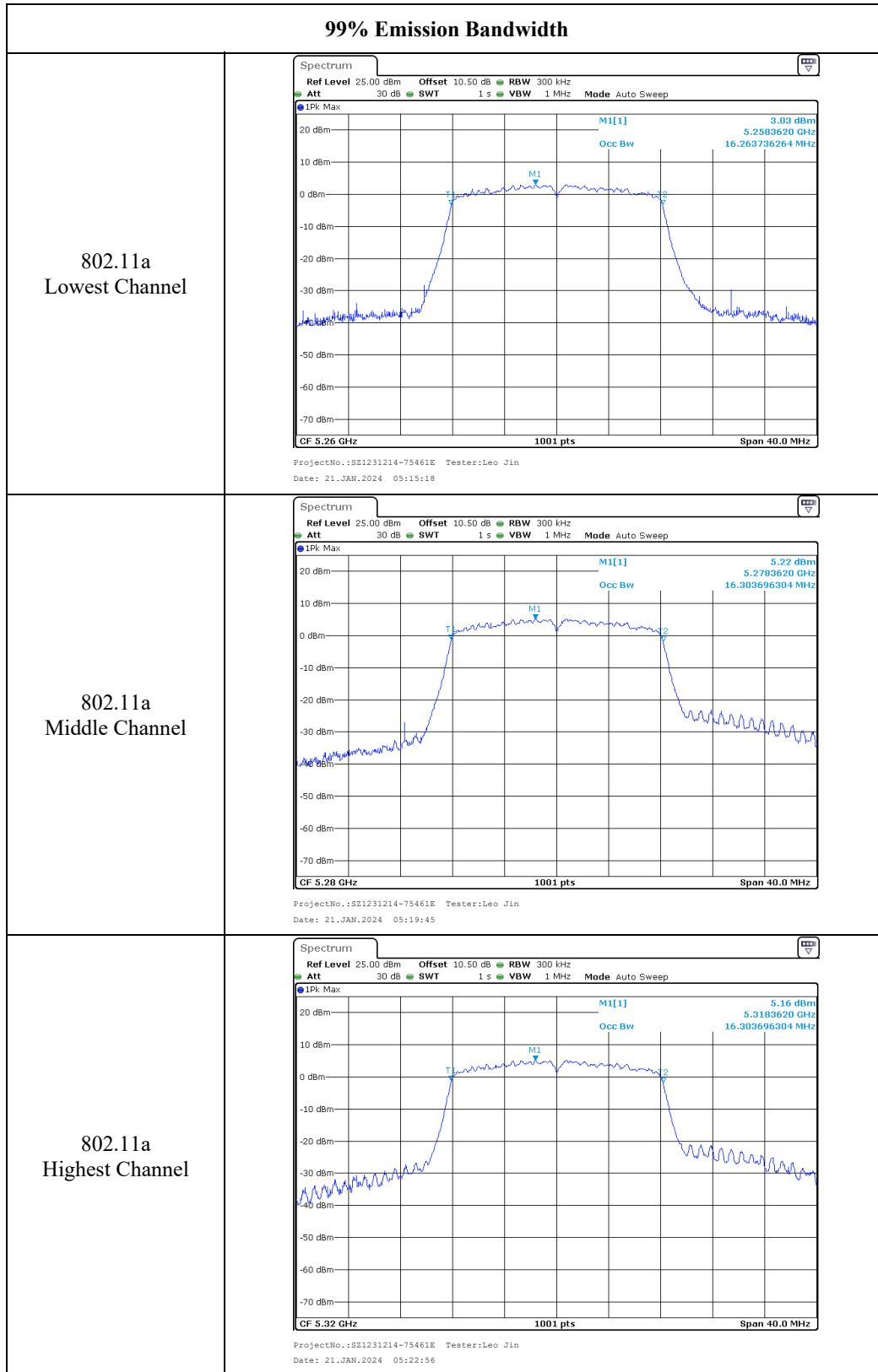
5250-5350MHz:

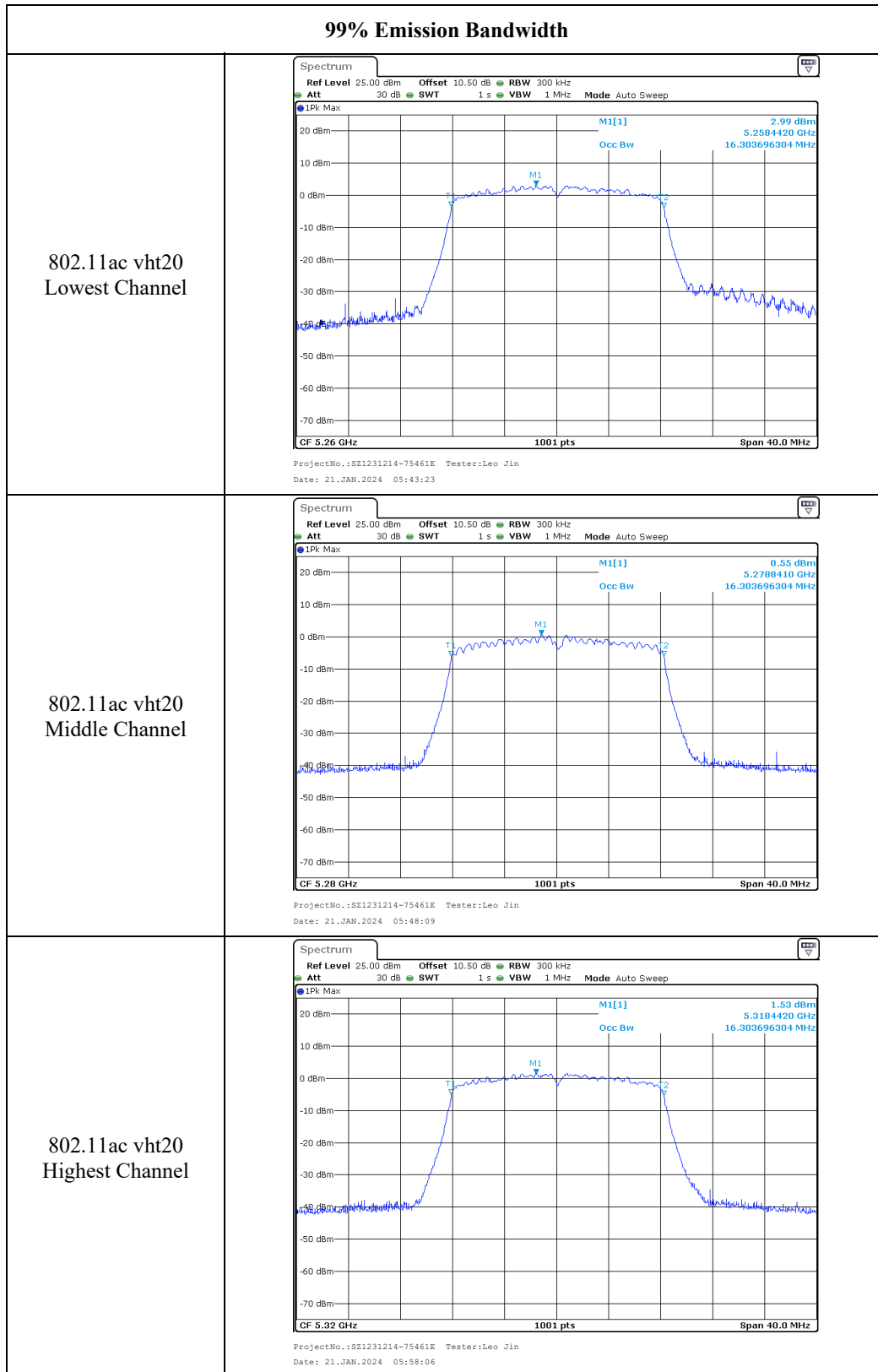


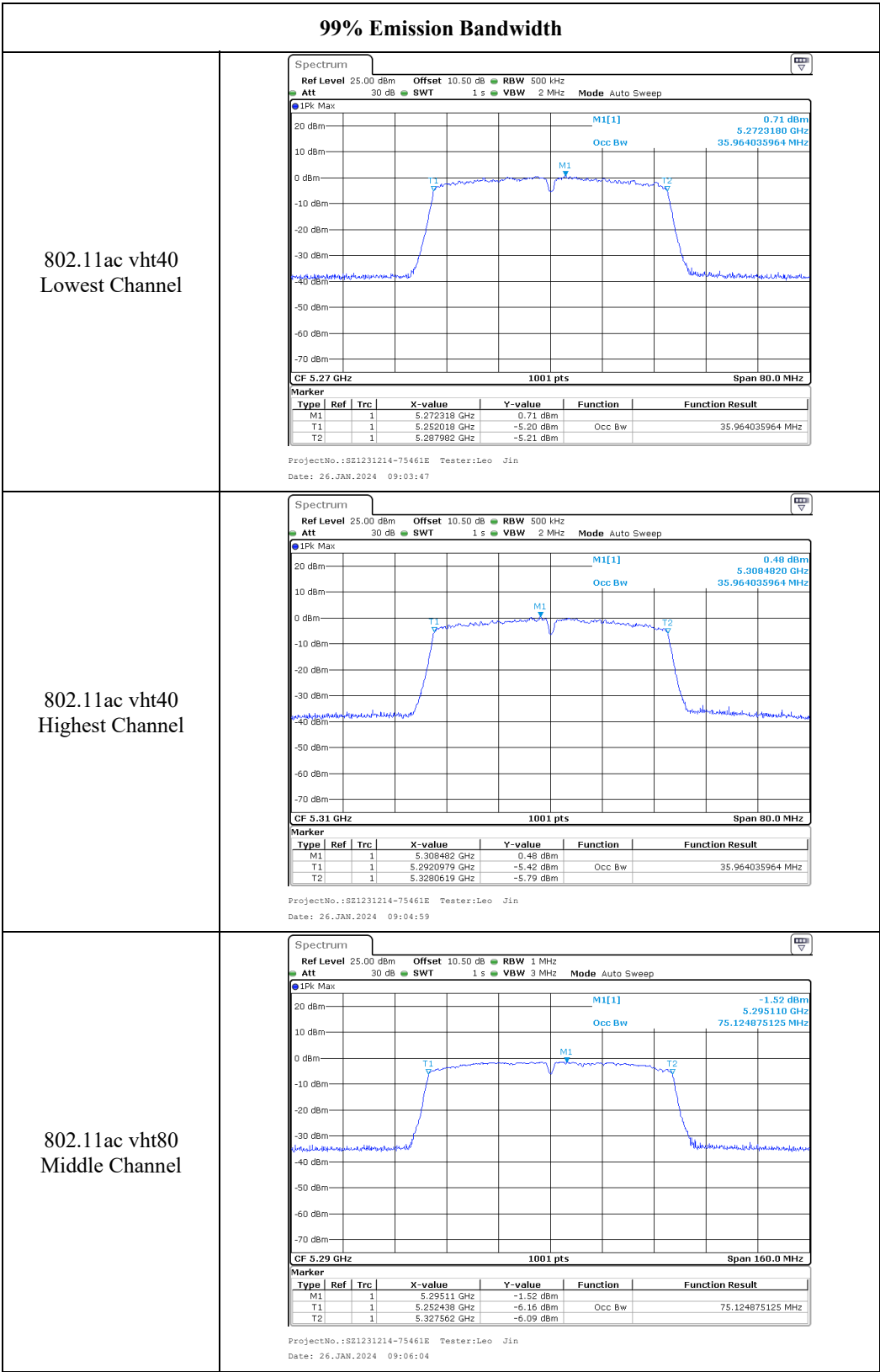
26dB Emission Bandwidth

802.11ac vht20
Lowest Channel802.11ac vht20
Middle Channel802.11ac vht20
Highest Channel

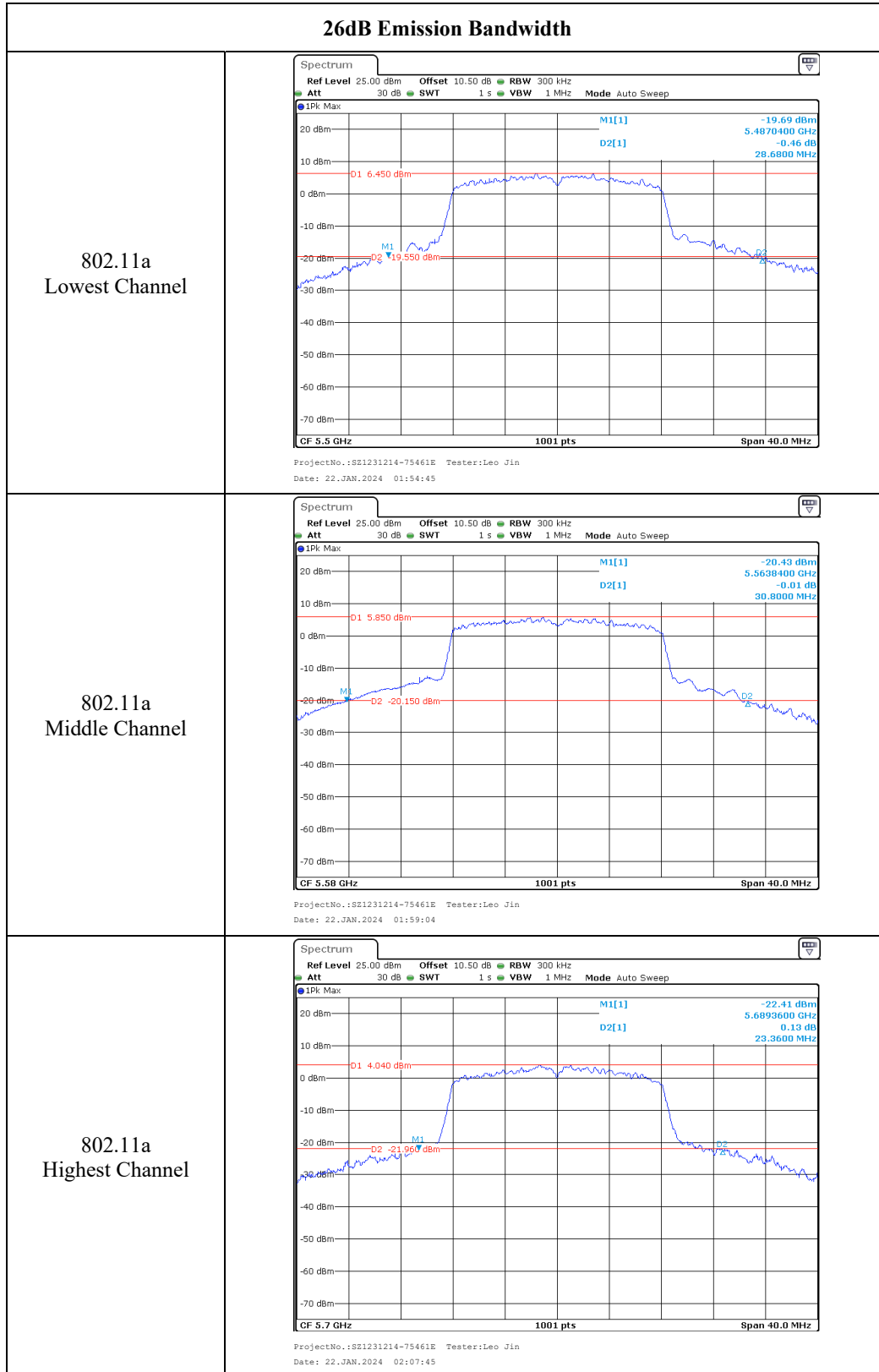




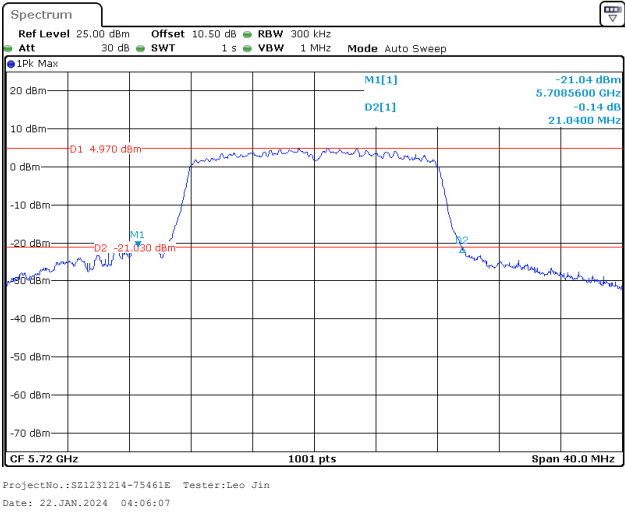




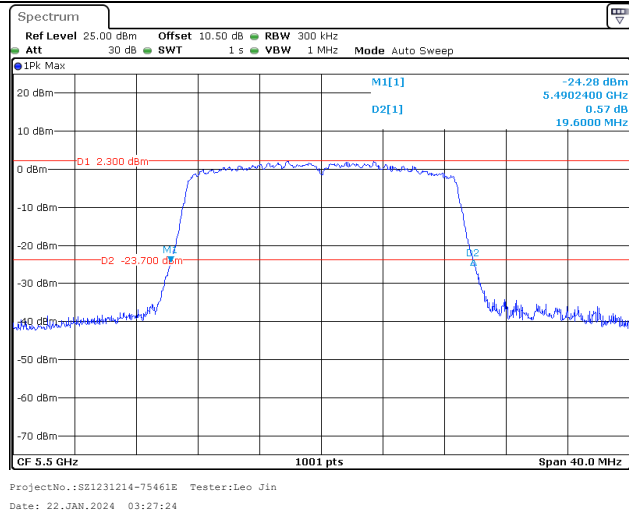
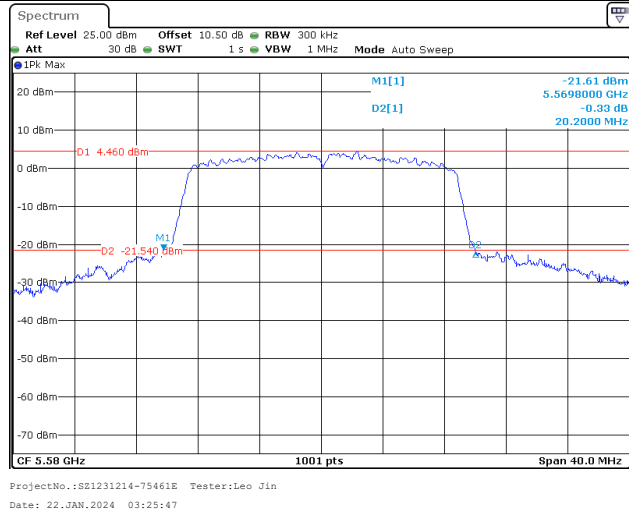
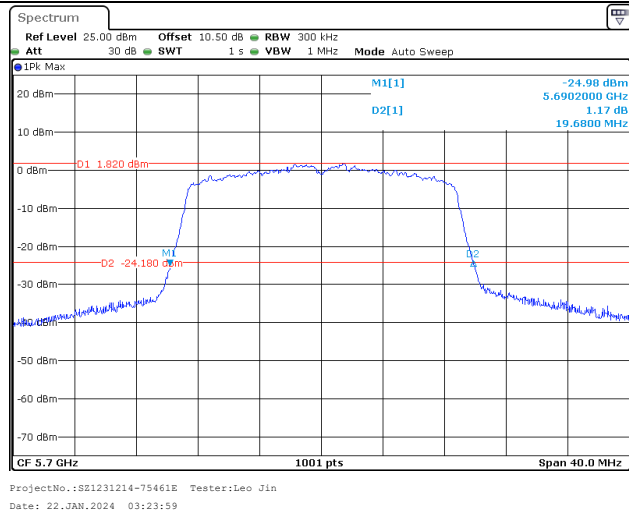
5470-5725MHz:



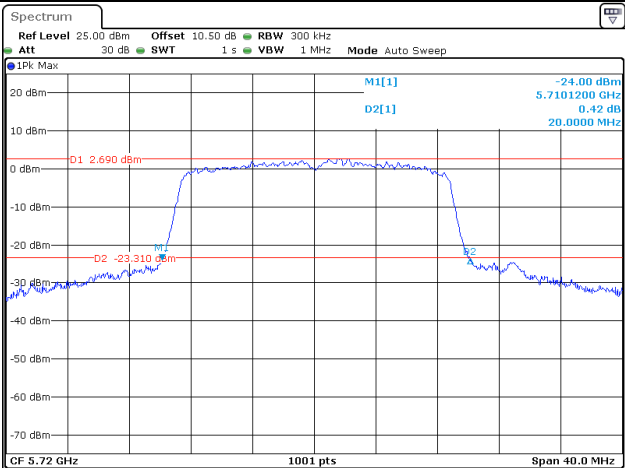
802.11a
Cross Channel



26dB Emission Bandwidth

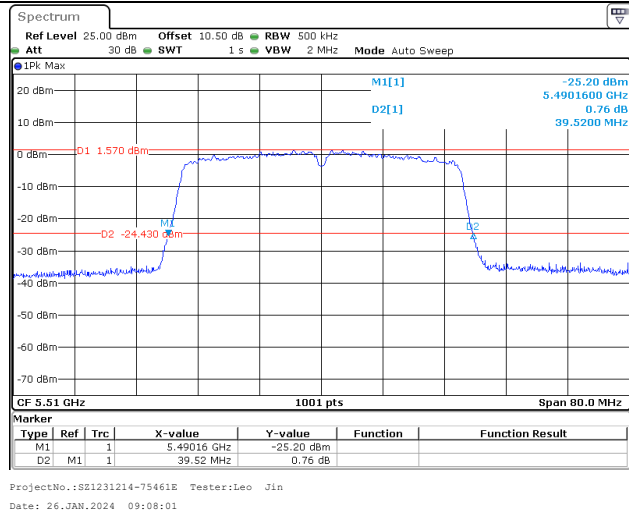
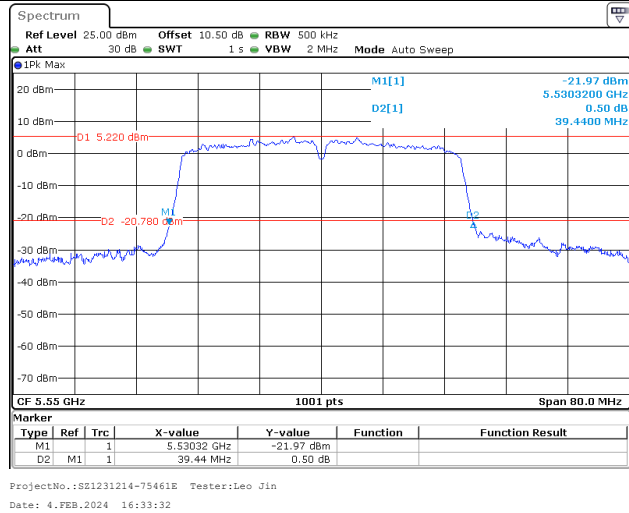
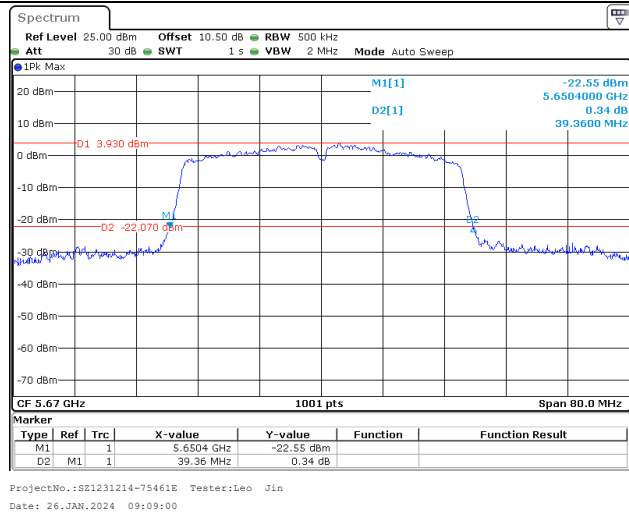
802.11ac vht20
Lowest Channel802.11ac vht20
Middle Channel802.11ac vht20
Highest Channel

802.11ac vht20
Cross Channel

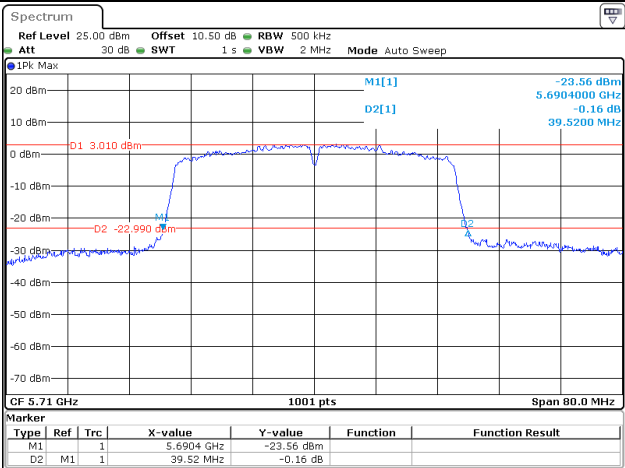


ProjectNo.:SZ1231214-75461E Tester:Leo Jin
Date: 22.JAN.2024 03:57:14

26dB Emission Bandwidth

802.11ac vht40
Lowest Channel802.11ac vht40
Middle Channel802.11ac vht40
Highest Channel

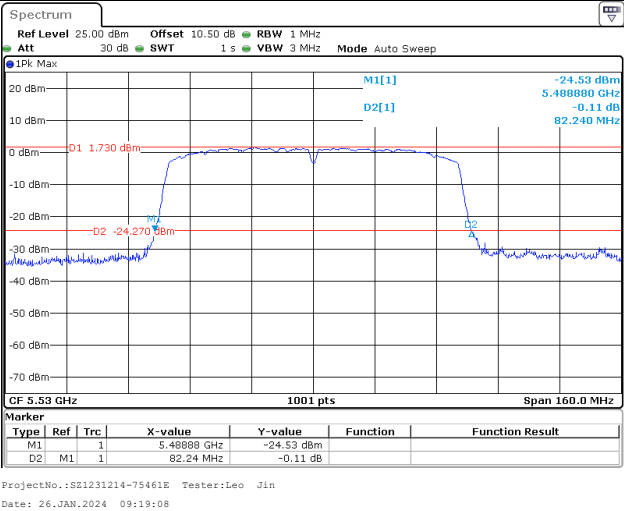
802.11ac vht40
Cross Channel



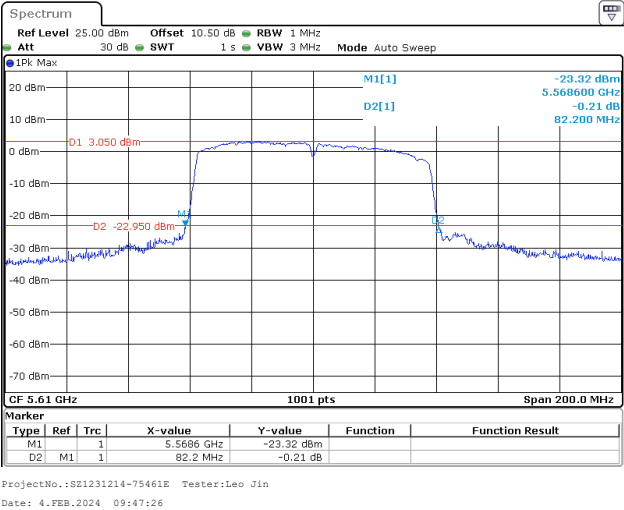
ProjectNo.:SZ1231214-75461E Tester:Leo Jin
Date: 26.JAN.2024 09:11:33

26dB Emission Bandwidth

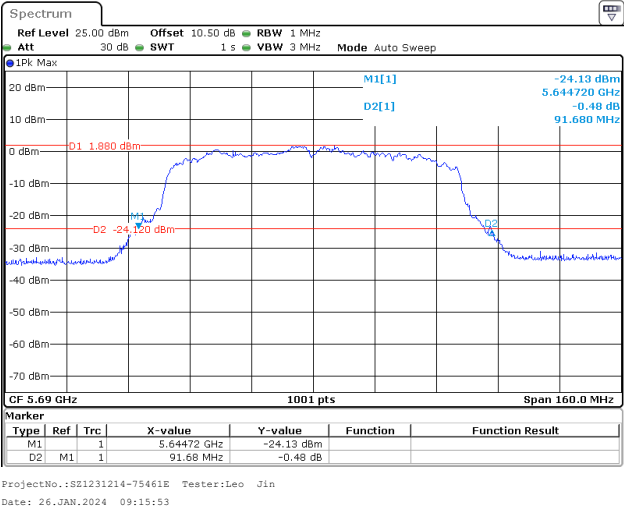
802.11ac vht80
Lowest Channel



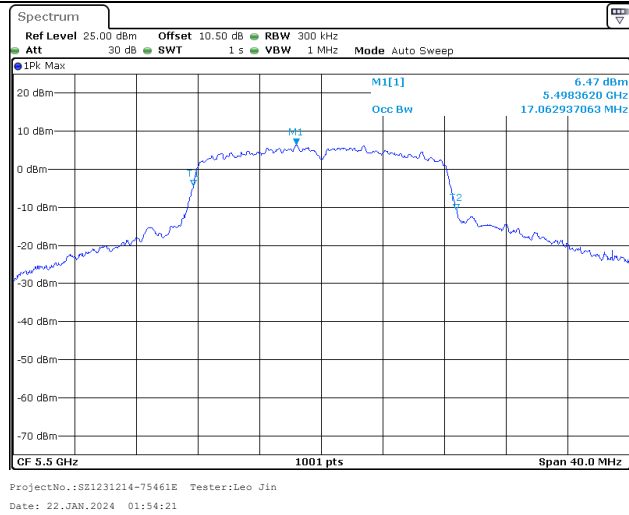
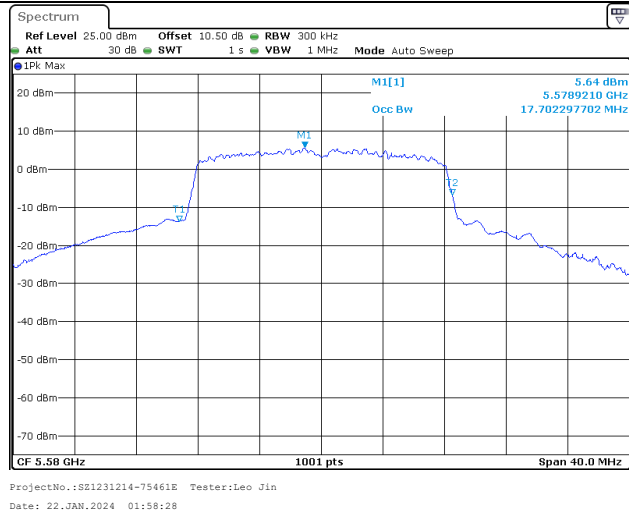
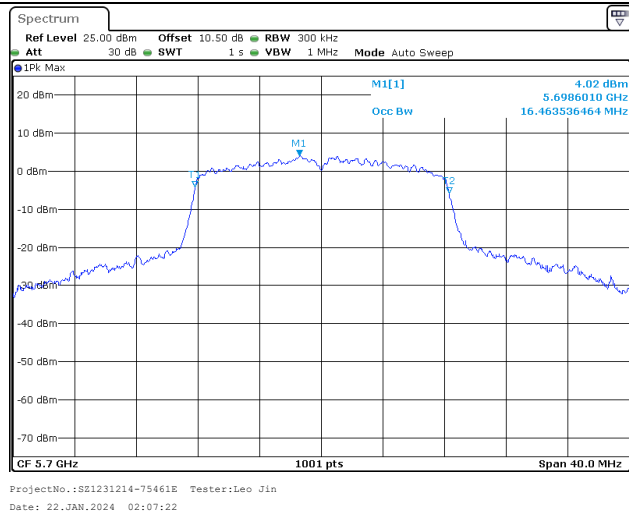
802.11ac vht80
Highest Channel



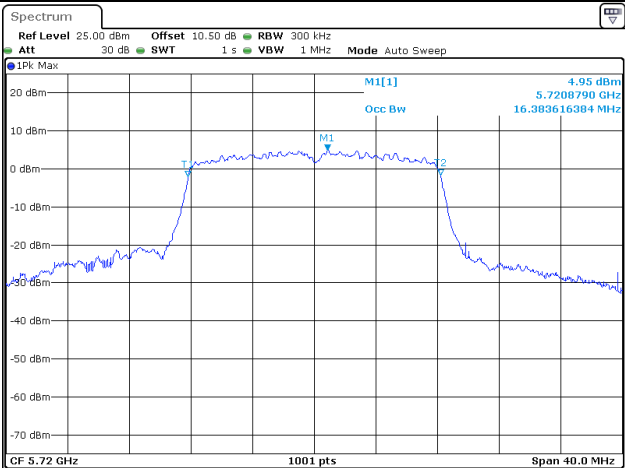
802.11ac vht80
Cross Channel



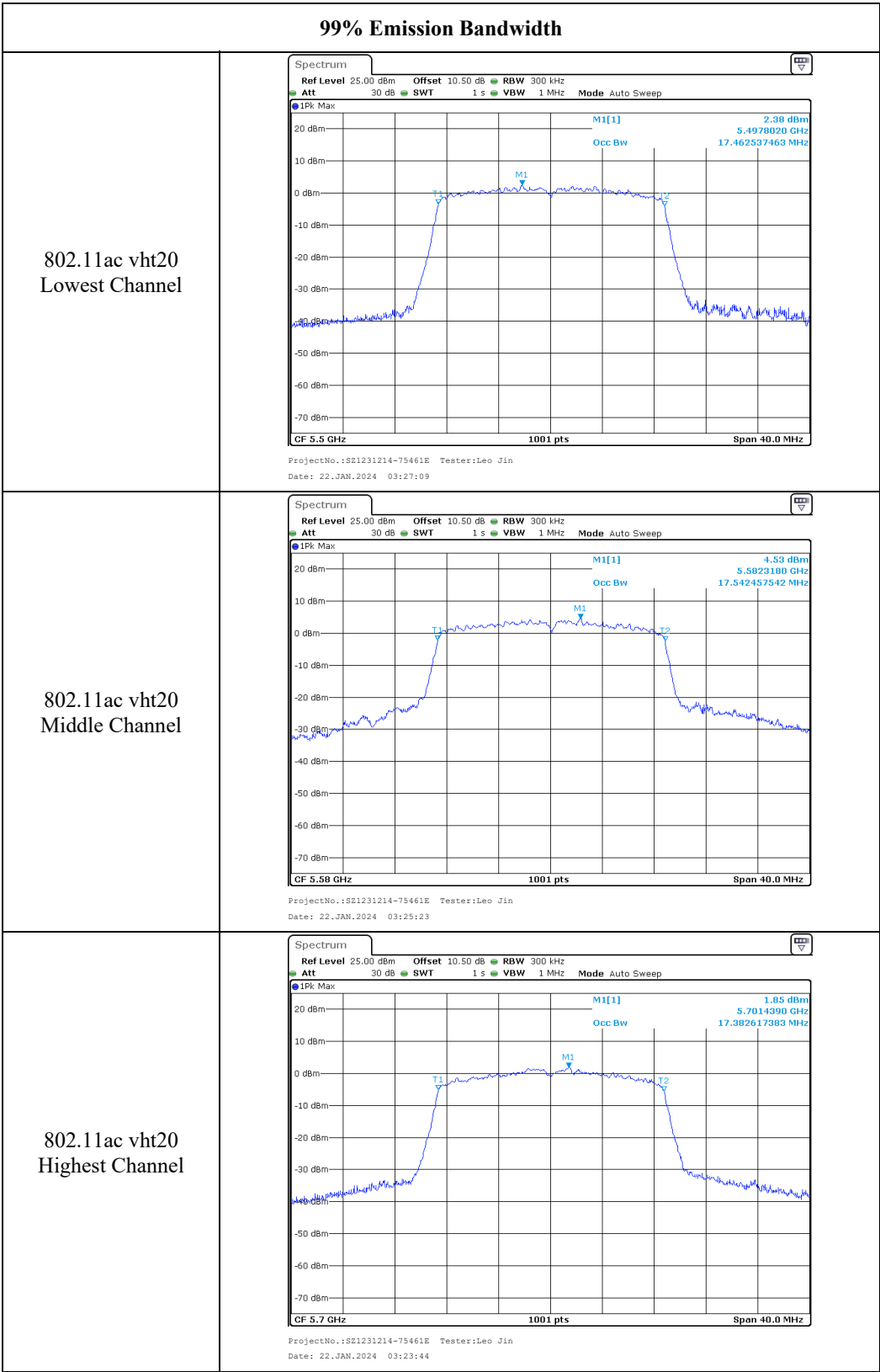
99% Emission Bandwidth

802.11a
Lowest Channel802.11a
Middle Channel802.11a
Highest Channel

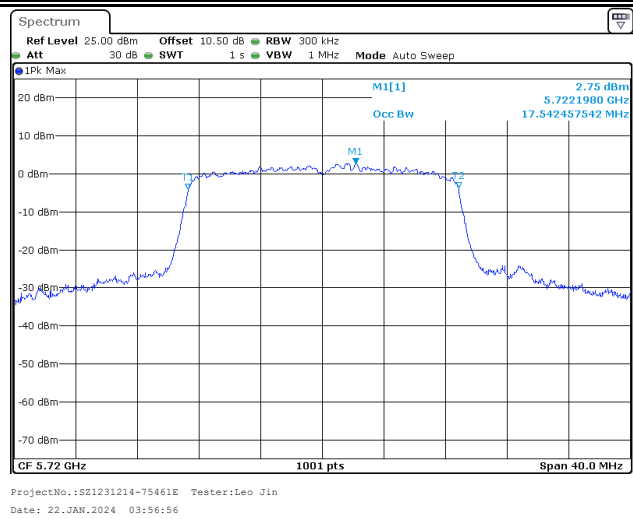
802.11a
Cross Channel



ProjectNo.:SZ1231214-75461E Tester:Leo Jin
Date: 22.JAN.2024 04:05:43

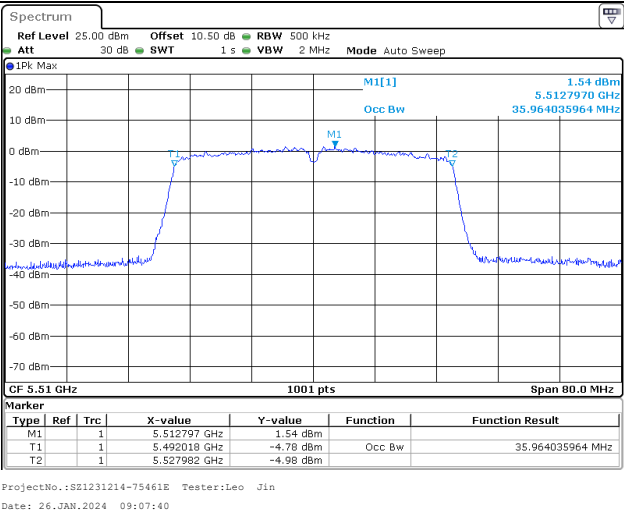


802.11ac vht20
Cross Channel

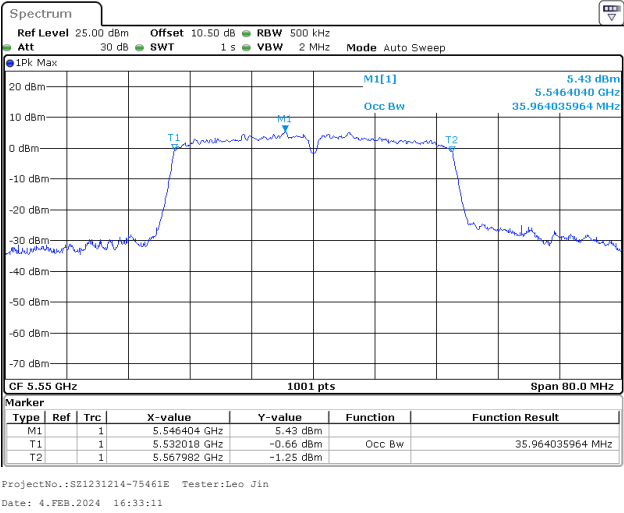


99% Emission Bandwidth

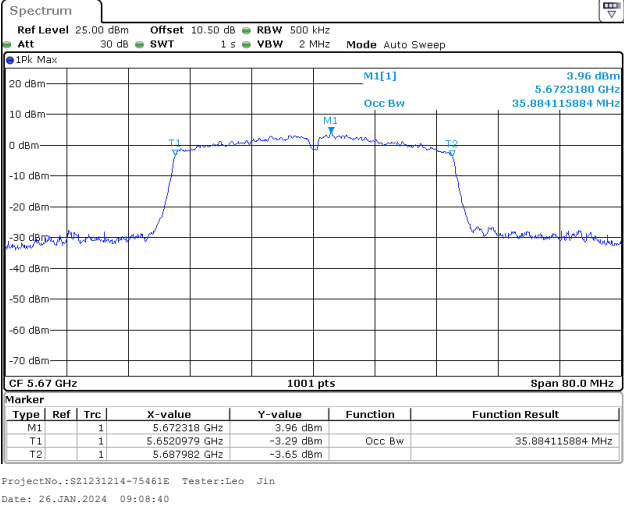
802.11ac vht40
Lowest Channel



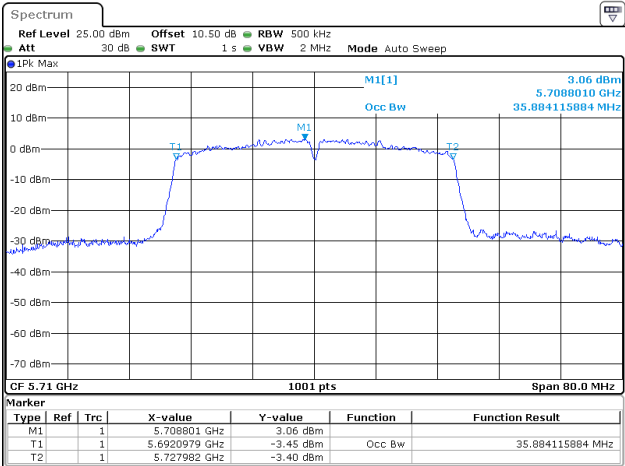
802.11ac vht40
Middle Channel



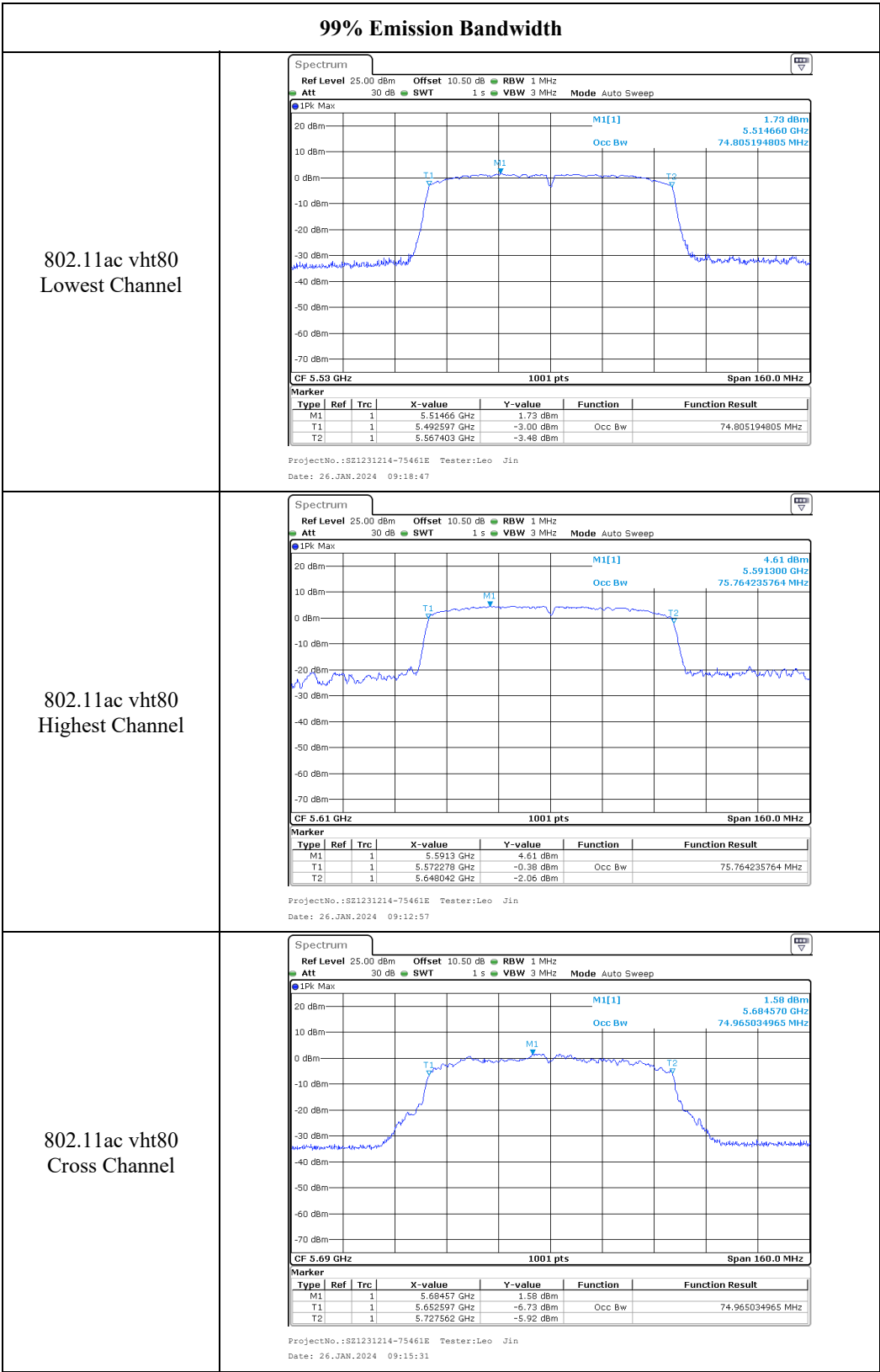
802.11ac vht40
Highest Channel



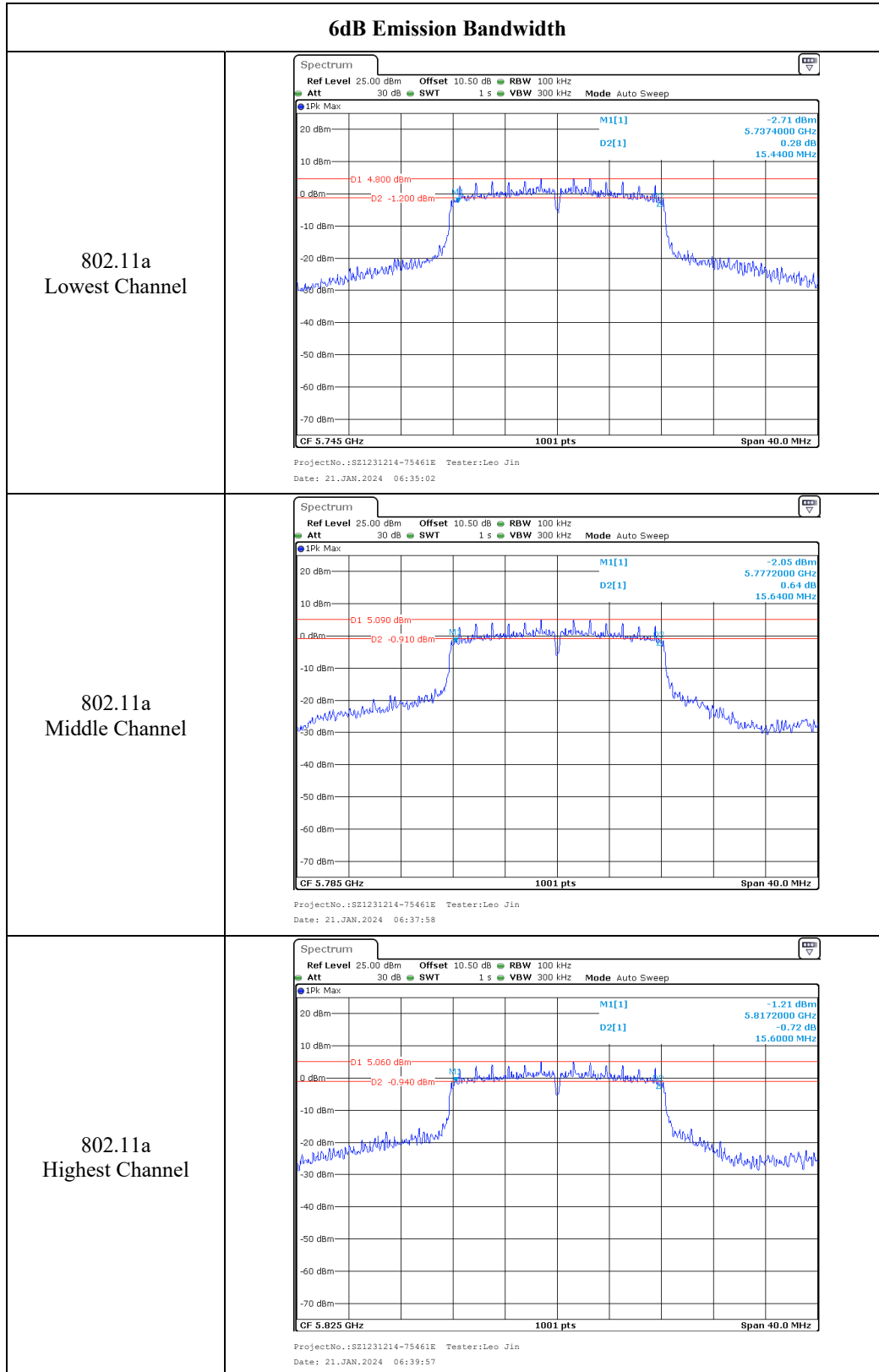
802.11ac vht40
Cross Channel

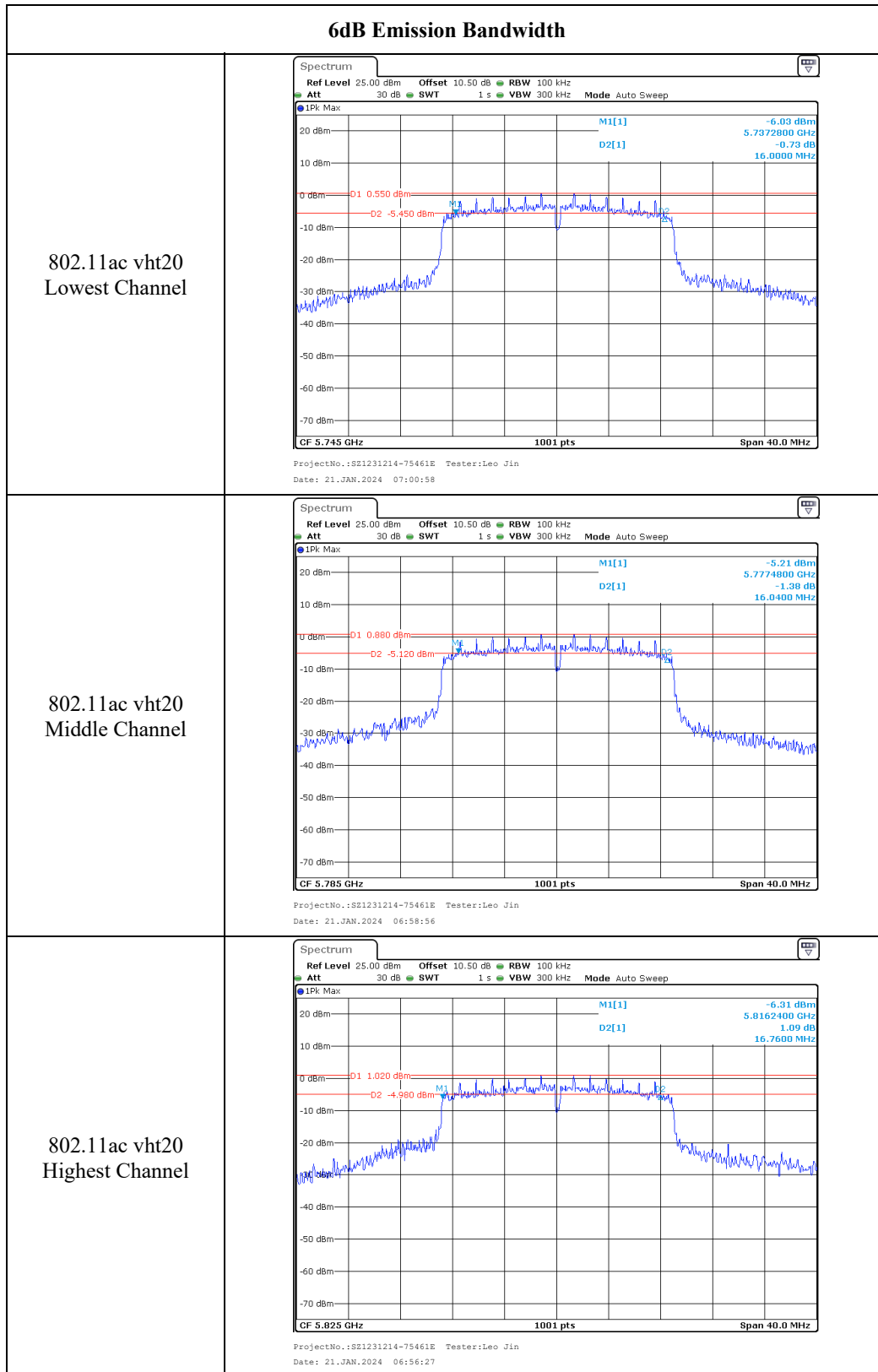


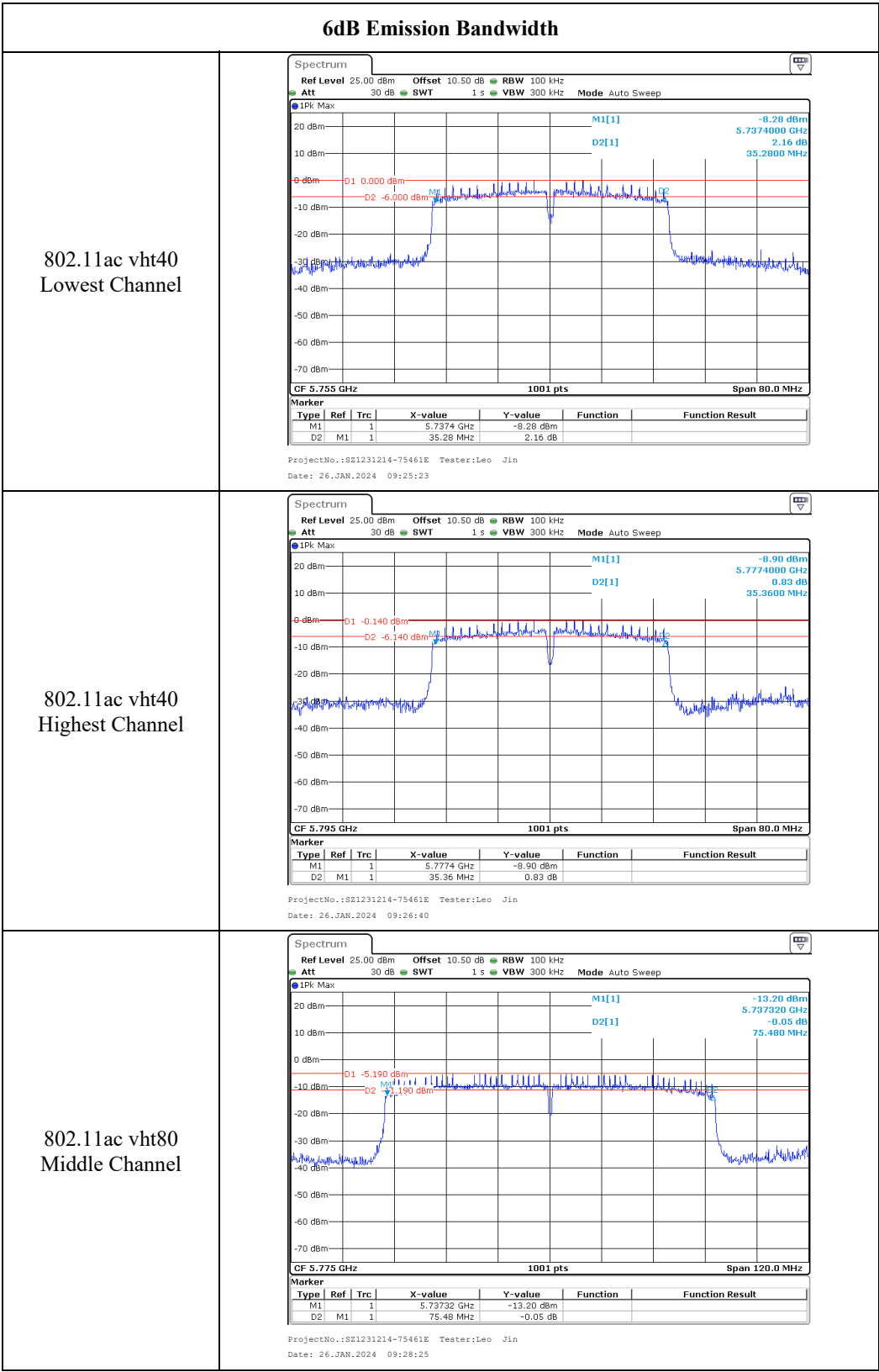
ProjectNo.:SZ1231214-75461E Tester:Leo Jin
Date: 26.JAN.2024 09:11:12

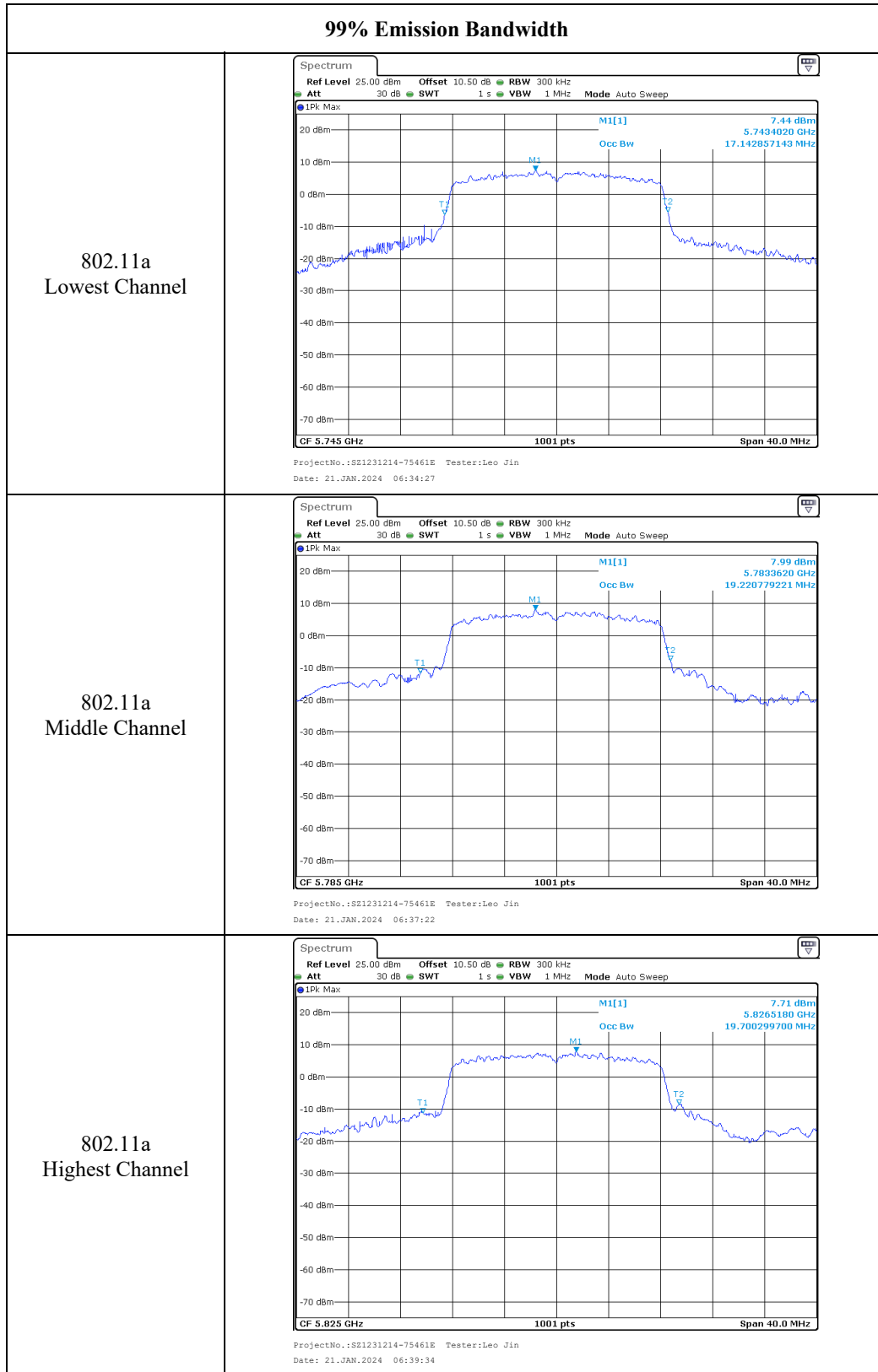


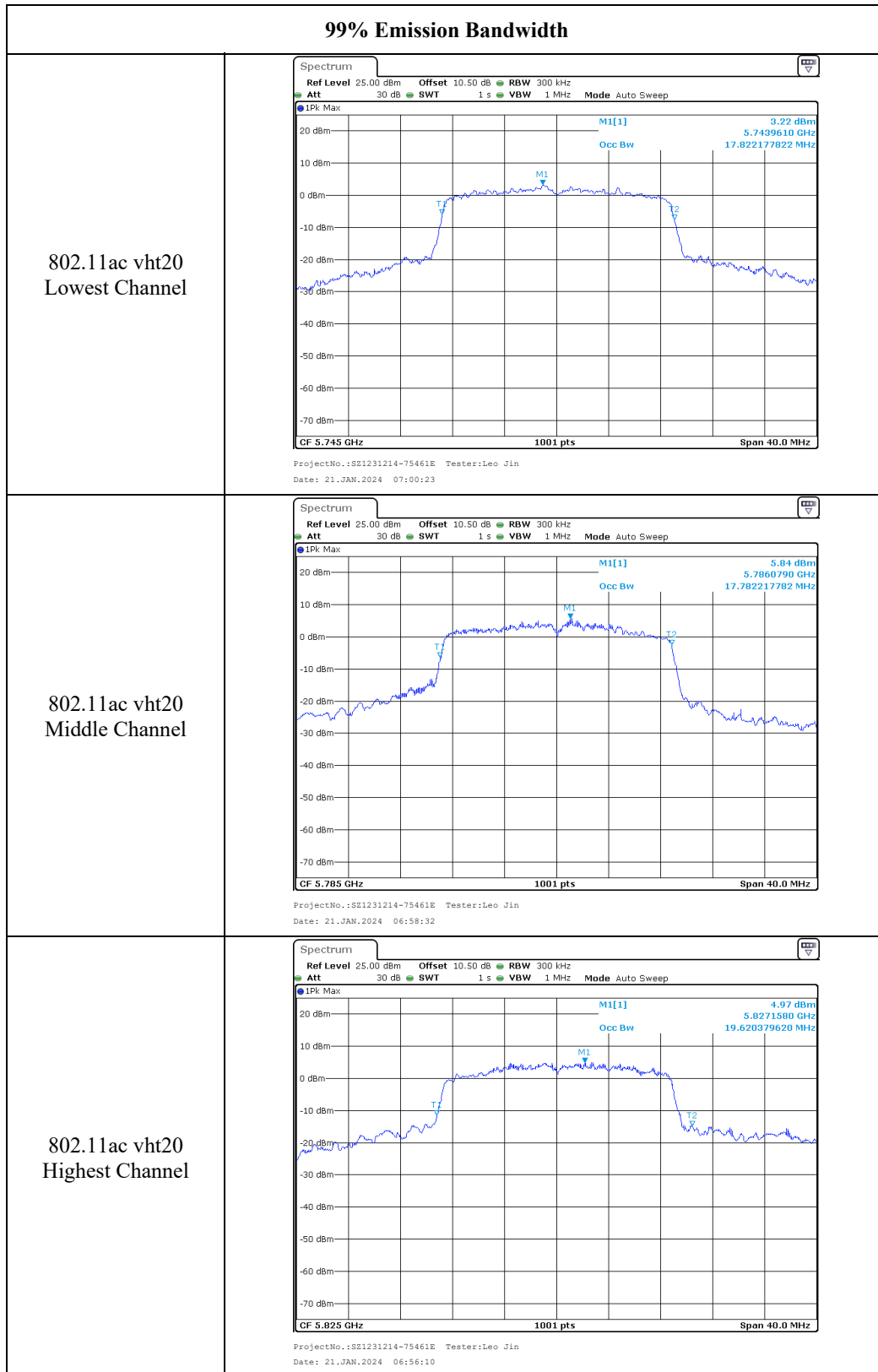
5725-5850MHz:

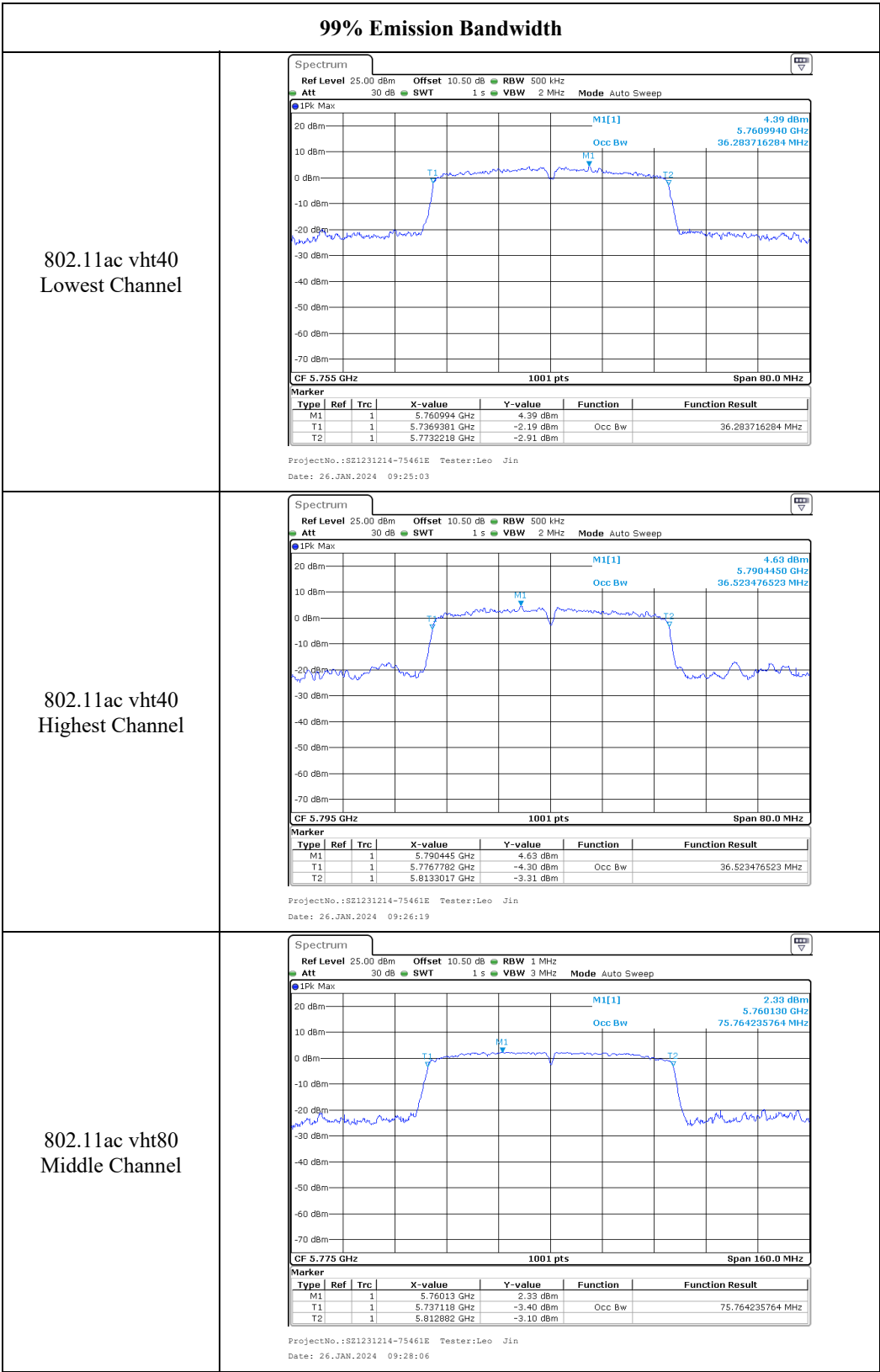












FCC §15.407(a) – CONDUCTED TRANSMITTER OUTPUT POWER

Applicable Standard

For an indoor access point operating in the band 5.15-5.25 GHz, the maximum conducted output power over the frequency band of operation shall not exceed 1 W provided the maximum antenna gain does not exceed 6 dBi. In addition, the maximum power spectral density shall not exceed 17 dBm in any 1 megahertz band. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

For client devices in the 5.15-5.25 GHz band, the maximum conducted output power over the frequency band of operation shall not exceed 250 mW provided the maximum antenna gain does not exceed 6 dBi. In addition, the maximum power spectral density shall not exceed 11 dBm in any 1 megahertz band. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

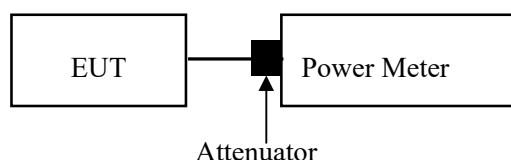
For the 5.25-5.35 GHz and 5.47-5.725 GHz bands, the maximum conducted output power over the frequency bands of operation shall not exceed the lesser of 250 mW or $11 \text{ dBm} + 10 \log B$, where B is the 26 dB emission bandwidth in megahertz. In addition, the maximum power spectral density shall not exceed 11 dBm in any 1 megahertz band. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

For the band 5.725-5.85 GHz, the maximum conducted output power over the frequency band of operation shall not exceed 1 W. In addition, the maximum power spectral density shall not exceed 30 dBm in any 500-kHz band. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi. However, fixed point-to-point U-NII devices operating in this band may employ transmitting antennas with directional gain greater than 6 dBi without any corresponding reduction in transmitter conducted power. Fixed, point-to-point operations exclude the use of point-to-multipoint systems, omnidirectional applications, and multiple collocated transmitters transmitting the same information. The operator of the U-NII device, or if the equipment is professionally installed, the installer, is responsible for ensuring that systems employing high gain directional antennas are used exclusively for fixed, point-to-point operations.

Test Procedure

According to KDB 789033 D02 General UNII Test Procedures New Rules v02r01 Method PM-G should be applied

- Place the EUT on a bench and set it in transmitting mode.
- Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to one test equipment.



Test Data

Environmental Conditions

Temperature:	25.2~26 °C
Relative Humidity:	39~46 %
ATM Pressure:	101 kPa

The testing was performed by Leo Jin on 2024-01-21 and 2024-02-04.

EUT operation mode: Transmitting

Test Result: Compliant.

5150-5250 MHz:

Test Modes	Test Frequency (MHz)	Max. Conducted Average Output Power (dBm)			
		ANT 1	ANT 2	Total	Limit
802.11a	5180	12.74	12.02	/	24
	5200	12.63	12.32	/	24
	5240	13.38	13.03	/	24
802.11ac vht20	5180	10.16	10.96	13.59	24
	5200	12.28	11.82	15.07	24
	5240	11.46	11.57	14.53	24
802.11ac vht40	5190	7.42	6.76	10.11	24
	5230	9.35	9.27	12.32	24
802.11ac vht80	5210	13.24	13.73	16.50	24
Note: The device is a client unit. 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:	5.3	dBi	Directional gain:	5.3	dBi

5250-5350 MHz:

Test Modes	Test Frequency (MHz)	Max. Conducted Average Output Power (dBm)			
		ANT 1	ANT 2	Total	Limit
802.11a	5260	13.42	13.21	/	23.72
	5280	13.21	13.58	/	23.74
	5320	13.16	12.97	/	23.75
802.11ac vht20	5260	9.66	8.70	12.22	23.74
	5280	8.56	8.98	11.79	23.69
	5320	9.50	9.68	12.60	23.74
802.11ac vht40	5270	8.51	9.39	11.98	24
	5310	6.47	5.59	9.06	24
802.11ac vht80	5290	6.11	5.60	8.87	24
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 $N_{\text{ANT}} \leq 4$					
Antenna Gain:	5.3	dBi	Directional gain:	5.3	dBi

5470-5725 MHz:

Test Modes	Test Frequency (MHz)	Max. Conducted Average Output Power (dBm)			
		ANT 1	ANT 2	Total	Limit
802.11a	5500	15.04	14.28	/	24
	5580	15.55	15.03	/	24
	5700	15.41	15.23	/	24
	5720	13.68	14.49	/	24
802.11ac vht20	5500	11.36	11.05	14.22	23.92
	5580	11.24	10.78	14.03	24
	5700	9.68	9.52	12.61	23.94
	5720	10.90	10.98	13.95	24
802.11ac vht40	5510	6.96	7.05	10.02	24
	5550	9.05	9.21	12.14	24
	5670	8.60	8.65	11.64	24
	5710	8.78	8.97	11.89	24
802.11ac vht80	5530	3.46	3.21	6.35	24
	5610	6.85	6.71	9.79	24
	5690	3.86	3.45	6.67	24
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 $N_{\text{ANT}} \leq 4$					
Antenna Gain:	5.3	dBi	Directional gain:	5.3	dBi

5725-5850 MHz:

Test Modes	Test Frequency (MHz)	Max. Conducted Average Output Power (dBm)			
		ANT 1	ANT 2	Total	Limit
802.11a	5745	15.78	15.65	/	30
	5785	15.43	15.44	/	30
	5825	15.45	15.59	/	30
802.11ac vht20	5745	10.91	11.72	14.34	30
	5785	11.25	11.96	14.63	30
	5825	11.27	12.40	14.88	30
802.11ac vht40	5755	12.45	12.67	15.57	30
	5795	12.41	12.02	15.23	30
802.11ac vht80	5775	11.39	11.63	14.52	30
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:	5.3	dBi	Directional gain:	5.3	dBi

FCC §15.407(a) - POWER SPECTRAL DENSITY

For client devices in the 5.15-5.25 GHz band, the maximum conducted output power over the frequency band of operation shall not exceed 250 mW provided the maximum antenna gain does not exceed 6 dBi. In addition, the maximum power spectral density shall not exceed 11 dBm in any 1 megahertz band. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

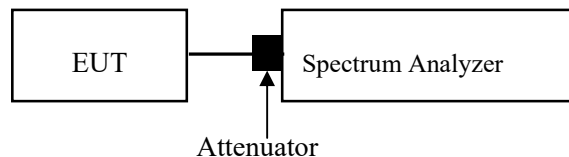
For the 5.25-5.35 GHz and 5.47-5.725 GHz bands, the maximum conducted output power over the frequency bands of operation shall not exceed the lesser of 250 mW or $11 \text{ dBm} + 10 \log B$, where B is the 26 dB emission bandwidth in megahertz. In addition, the maximum power spectral density shall not exceed 11 dBm in any 1 megahertz band. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

For the band 5.725-5.85 GHz, the maximum conducted output power over the frequency band of operation shall not exceed 1 W. In addition, the maximum power spectral density shall not exceed 30 dBm in any 500-kHz band. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi. However, fixed point-to-point U-NII devices operating in this band may employ transmitting antennas with directional gain greater than 6 dBi without any corresponding reduction in transmitter conducted power. Fixed, point-to-point operations exclude the use of point-to-multipoint systems, omnidirectional applications, and multiple collocated transmitters transmitting the same information. The operator of the U-NII device, or if the equipment is professionally installed, the installer, is responsible for ensuring that systems employing high gain directional antennas are used exclusively for fixed, point-to-point operations.

Test Procedure

According to KDB 789033 D02 General UNII Test Procedures New Rules v02r01 Method SA-2 should be applied

- a) Set span to encompass the entire EBW(or, alternatively, the entire 99% occupied Bandwidth) of the signal.
- b) Set sweep trigger to “free run.”
- c) Set RBW=1MHz or 500kHz Set VBW>3 MHz or 2MHz.
- d) Number of points in sweep>2 x span/RBW.(This ensures that bin-to-bin spacing is <RBW/2. so that narrowband signals are not lost between frequency bins.)
- e) Sweep time = auto.
- f) Detector = power averaging (rms), if available. Otherwise, use sample detector mode.
- g) Trace mode = max hold.
- h) Do not use sweep triggering. Allow the sweep to “free run.”
- i) Trace average at least 100 traces in power averaging (rms) mode; however, the number of traces to be averaged shall be increased above 100 as needed to ensure that the average accurately represents the true average over the on and off periods of the transmitter.
- j) Add $10 \log (1/x)$, where x is the duty cycle, to the measured power in order to compute the average power during the actual transmission times (because the measurement represents an average over both the on and off times of the transmission).



Test Data

Environmental Conditions

Temperature:	25.2~26 °C
Relative Humidity:	39~55 %
ATM Pressure:	101 kPa

The testing was performed by Leo Jin from 2024-01-21 to 2024-02-04.

EUT operation mode: Transmitting

Test Result: Compliant.

5150-5250 MHz:

Test Modes	Test Frequency (MHz)	Reading (dBm/MHz)		Duty Cycle Factor (dB)	Maximum Power Spectral Density with duty factor(dBm/MHz)			
		ANT 1	ANT 2		ANT 1	ANT 2	Total	Limit
802.11a	5180	2.76	2.47	0.38	3.14	2.85	/	11
	5200	2.68	3.06	0.38	3.06	3.44	/	11
	5240	2.45	2.75	0.38	2.83	3.13	/	11
802.11ac vht20	5180	-1.06	-0.20	0.45	-0.61	0.25	2.85	8.7
	5200	1.07	0.87	0.45	1.52	1.32	4.43	8.7
	5240	0.57	0.12	0.45	1.02	0.57	3.81	8.7
802.11ac vht40	5190	-6.09	-6.75	1.01	-5.08	-5.74	-2.39	8.7
	5230	-4.07	-4.33	1.01	-3.06	-3.32	-0.18	8.7
802.11ac vht80	5210	-7.05	-6.88	1.22	-5.83	-5.66	-2.73	8.7
Note: The device is a client. Method SA-2 in KDB 789033 D02 General UNII Test Procedures New Rules v02r01 was used for PSD test, and the duty cycle factor was added into the result. 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:	5.3	dBi		Directional gain:	8.30	dBi		

5250-5350 MHz:

Test Modes	Test Frequency (MHz)	Reading (dBm/MHz)		Duty Cycle Factor (dB)	Maximum Power Spectral Density with duty factor(dBm/MHz)			
		ANT 1	ANT 2		ANT 1	ANT 2	Total	Limit
802.11a	5260	2.82	2.56	0.38	3.20	2.94	/	11
	5280	2.97	3.54	0.38	3.35	3.92	/	11
	5320	2.79	2.26	0.38	3.17	2.64	/	11
802.11ac vht20	5260	-1.08	-1.52	0.45	-0.63	-1.07	2.17	8.7
	5280	-1.38	-1.26	0.45	-0.93	-0.81	2.14	8.7
	5320	-1.66	-1.48	0.45	-1.21	-1.03	1.89	8.7
802.11ac vht40	5270	-4.69	-3.84	1.01	-3.68	-2.83	-0.22	8.7
	5310	-6.20	-6.80	1.01	-5.19	-5.79	-2.47	8.7
802.11ac vht80	5290	-10.27	-11.14	1.22	-9.05	-9.92	-6.45	8.7
Method SA-2 in KDB 789033 D02 General UNII Test Procedures New Rules v02r01 was used for PSD test, and the duty cycle factor was added into the result. 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 = $10 \log(N_{\text{ANT}}/N_{\text{SS}})$ dB								
Antenna Gain:	5.3	dBi		Directional gain:	8.30	dBi		

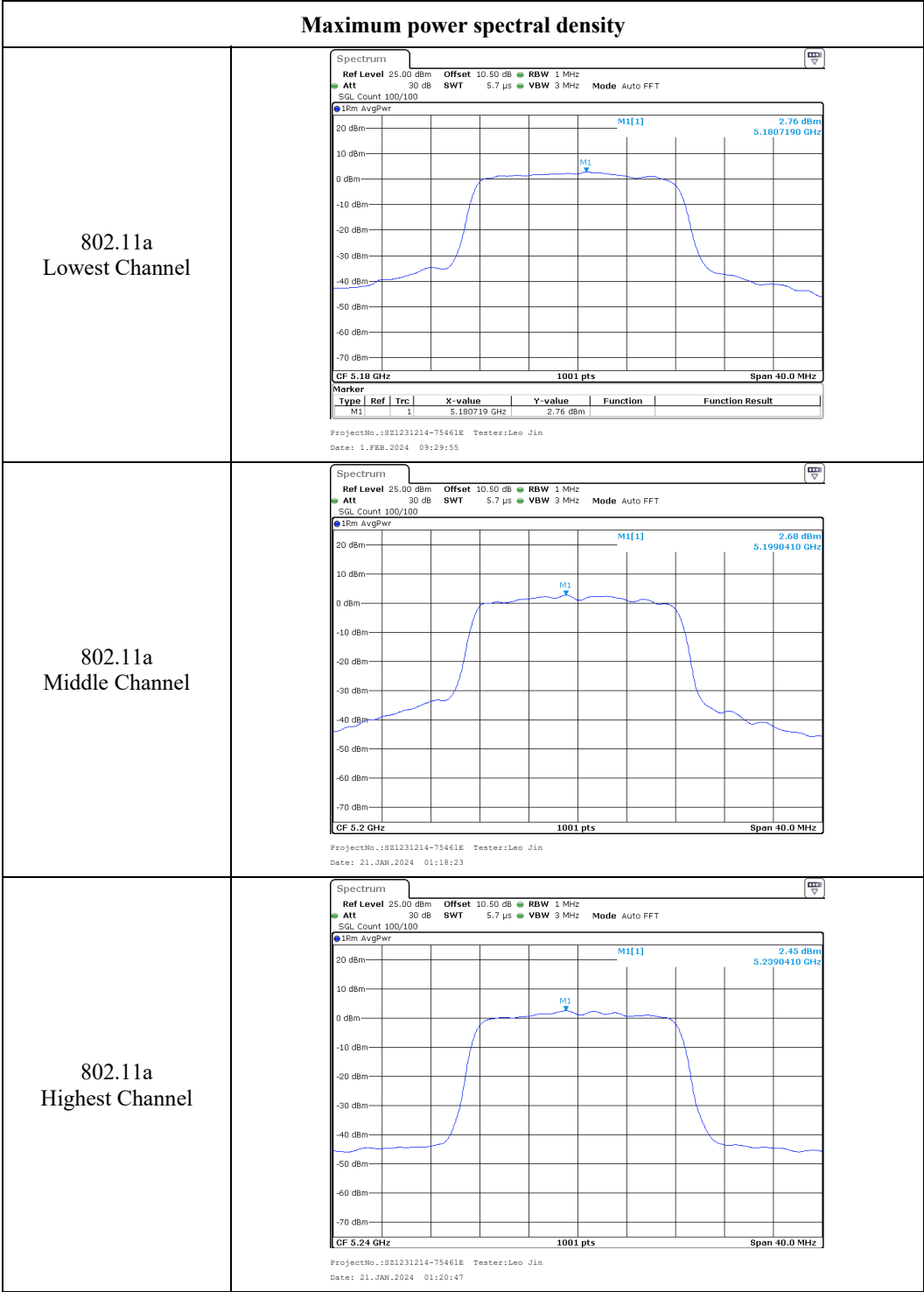
5470-5725 MHz:

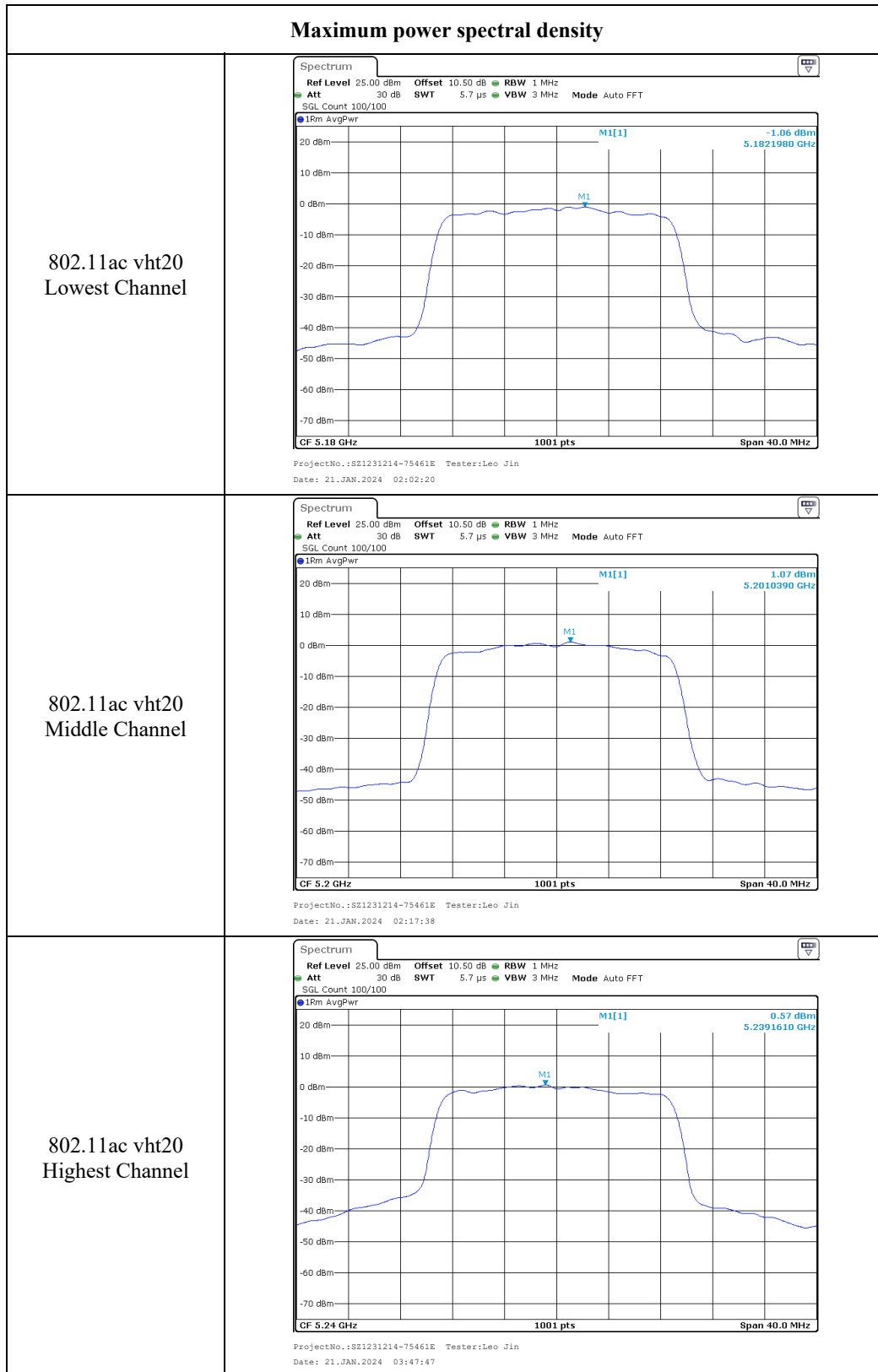
Test Modes	Test Frequency (MHz)	Reading (dBm/MHz)		Duty Cycle Factor (dB)	Maximum Power Spectral Density with duty factor(dBm/MHz)			
		ANT 1	ANT 2		ANT 1	ANT 2	Total	Limit
802.11a	5500	4.30	3.43	0.38	4.68	3.81	/	11
	5580	4.82	4.30	0.38	5.20	4.68	/	11
	5700	4.63	4.33	0.38	5.01	4.71	/	11
	5720	2.39	3.12	0.38	2.77	3.50	/	11
802.11ac vht20	5500	0.73	0.61	0.45	1.18	1.06	4.13	8.7
	5580	0.70	0.38	0.45	1.15	0.83	4.00	8.7
	5700	-0.99	-1.08	0.45	-0.54	-0.63	2.43	8.7
	5720	0.51	0.58	0.45	0.96	1.03	4.01	8.7
802.11ac vht40	5510	-4.33	-4.18	1.01	-3.32	-3.17	-0.23	8.7
	5550	-1.92	-1.85	1.01	-0.91	-0.84	2.14	8.7
	5670	-2.22	-2.12	1.01	-1.21	-1.11	1.85	8.7
	5710	-2.02	-2.01	1.01	-1.01	-1.00	2.01	8.7
802.11ac vht80	5530	-8.20	-8.67	1.22	-6.98	-7.45	-4.20	8.7
	5610	-4.72	-4.80	1.22	-3.50	-3.58	-0.53	8.7
	5690	-7.85	-8.20	1.22	-6.63	-6.98	-3.79	8.7
Method SA-2 in KDB 789033 D02 General UNII Test Procedures New Rules v02r01 was used for PSD test, and the duty cycle factor was added into the result. 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 = $10 \log(N_{\text{ANT}}/N_{\text{SS}})$ dB								
Antenna Gain:	5.3	dBi		Directional gain:	8.30	dBi		

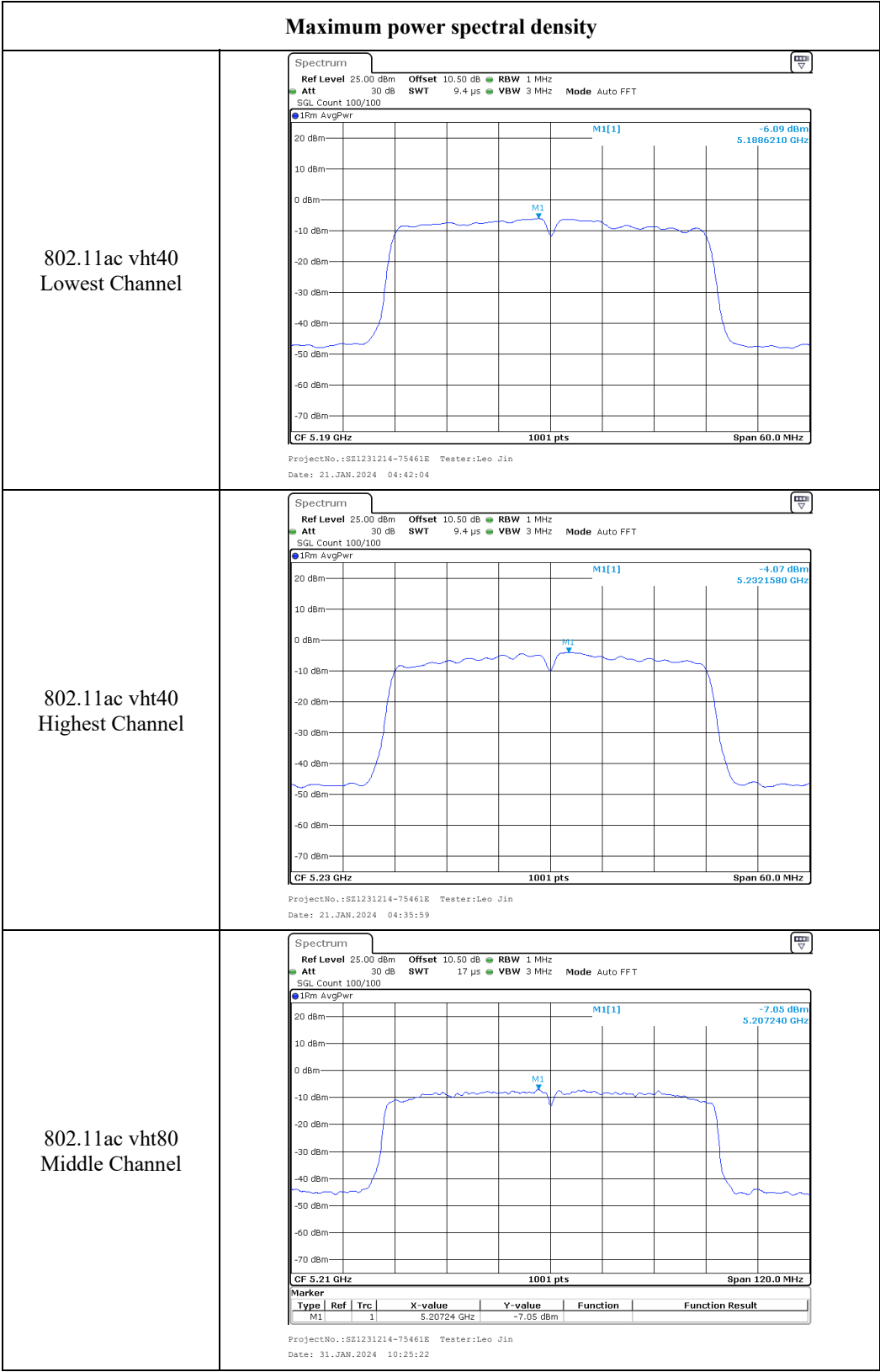
5725-5850 MHz:

Test Modes	Test Frequency (MHz)	Reading (dBm/500kHz)		Duty Cycle Factor (dB)	Maximum Power Spectral Density with duty factor(dBm/500kHz)			
		ANT 1	ANT 2		ANT 1	ANT 2	Total	Limit
802.11a	5745	2.78	2.58	0.38	3.16	2.96	/	30
	5785	1.92	2.20	0.38	2.30	2.58	/	30
	5825	2.25	2.31	0.38	2.63	2.69	/	30
802.11ac vht20	5745	-2.55	-2.14	0.45	-2.10	-1.69	1.12	27.7
	5785	-2.05	-1.97	0.45	-1.60	-1.52	1.45	27.7
	5825	-2.03	-1.23	0.45	-1.58	-0.78	1.85	27.7
802.11ac vht40	5755	-3.77	-3.42	1.01	-2.76	-2.41	0.43	27.7
	5795	-3.84	-4.27	1.01	-2.83	-3.26	-0.03	27.7
802.11ac vht80	5775	-9.22	-9.15	1.22	-8.00	-7.93	-4.95	27.7
Method SA-2 in KDB 789033 D02 General UNII Test Procedures New Rules v02r01 was used for PSD test, and the duty cycle factor was added into the result. 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 = $10 \log(N_{\text{ANT}}/N_{\text{SS}})$ dB								
Antenna Gain:	5.3	dBi		Directional gain:	8.30	dBi		

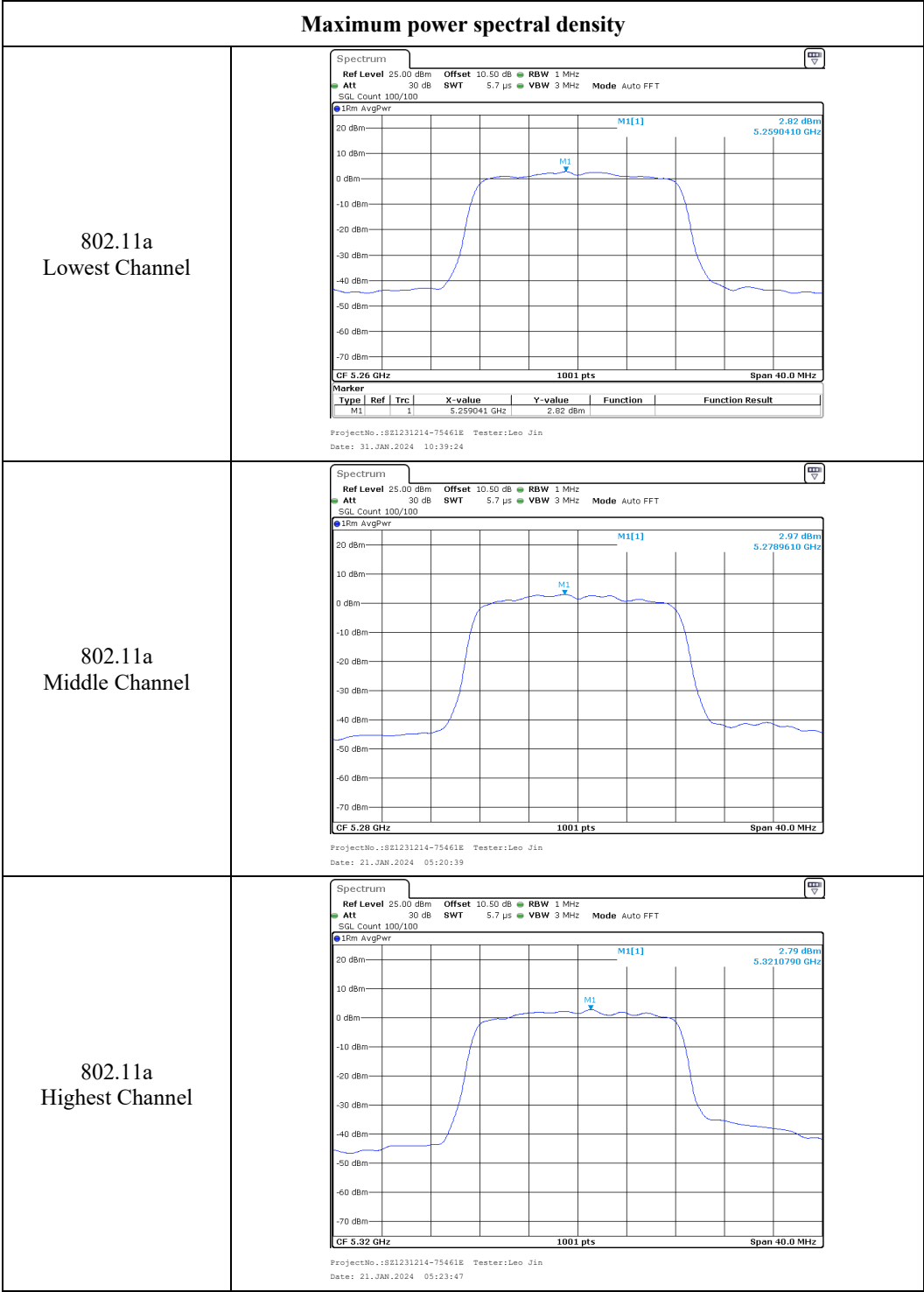
ANT 1
5150-5250MHz:

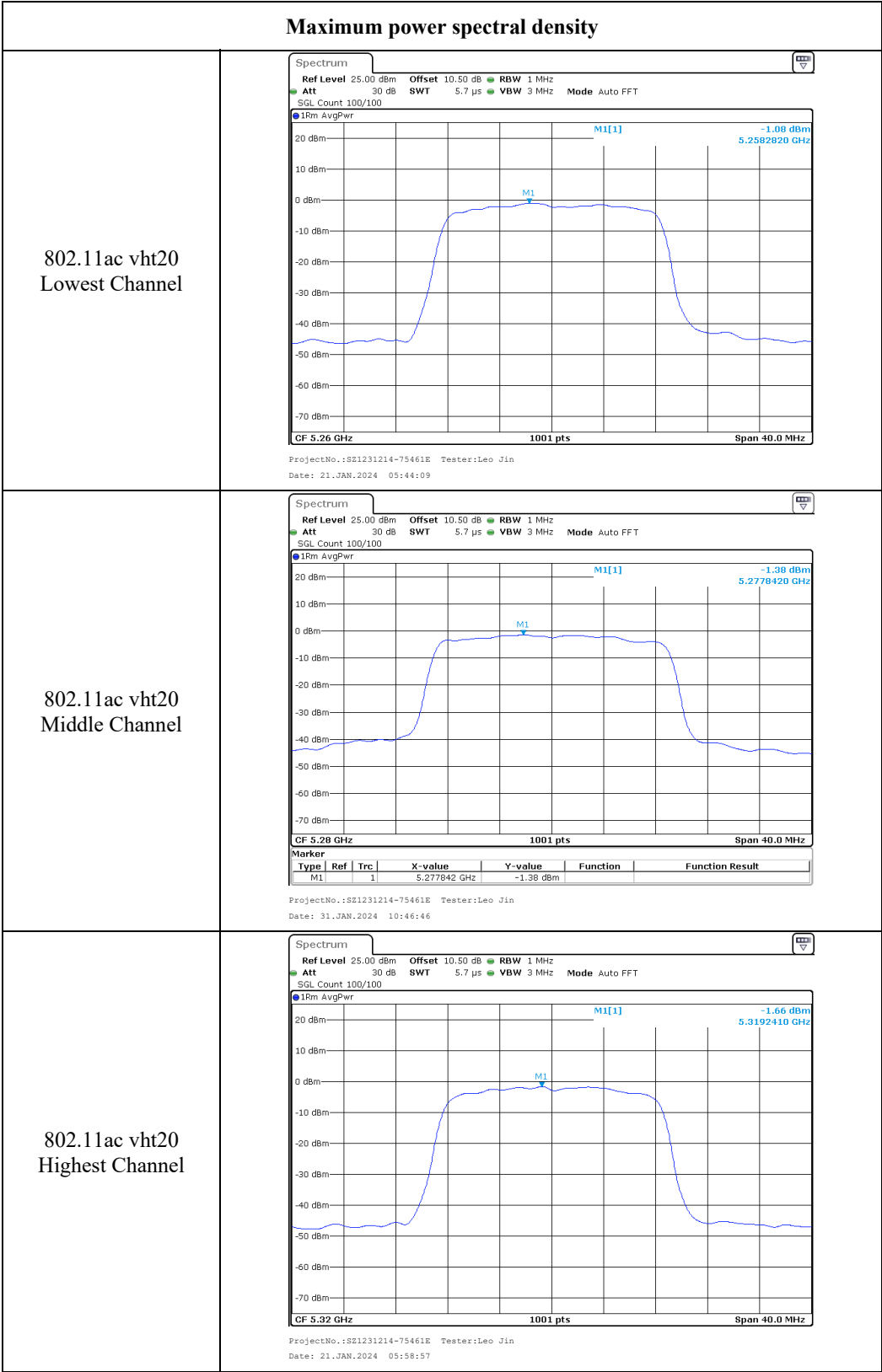


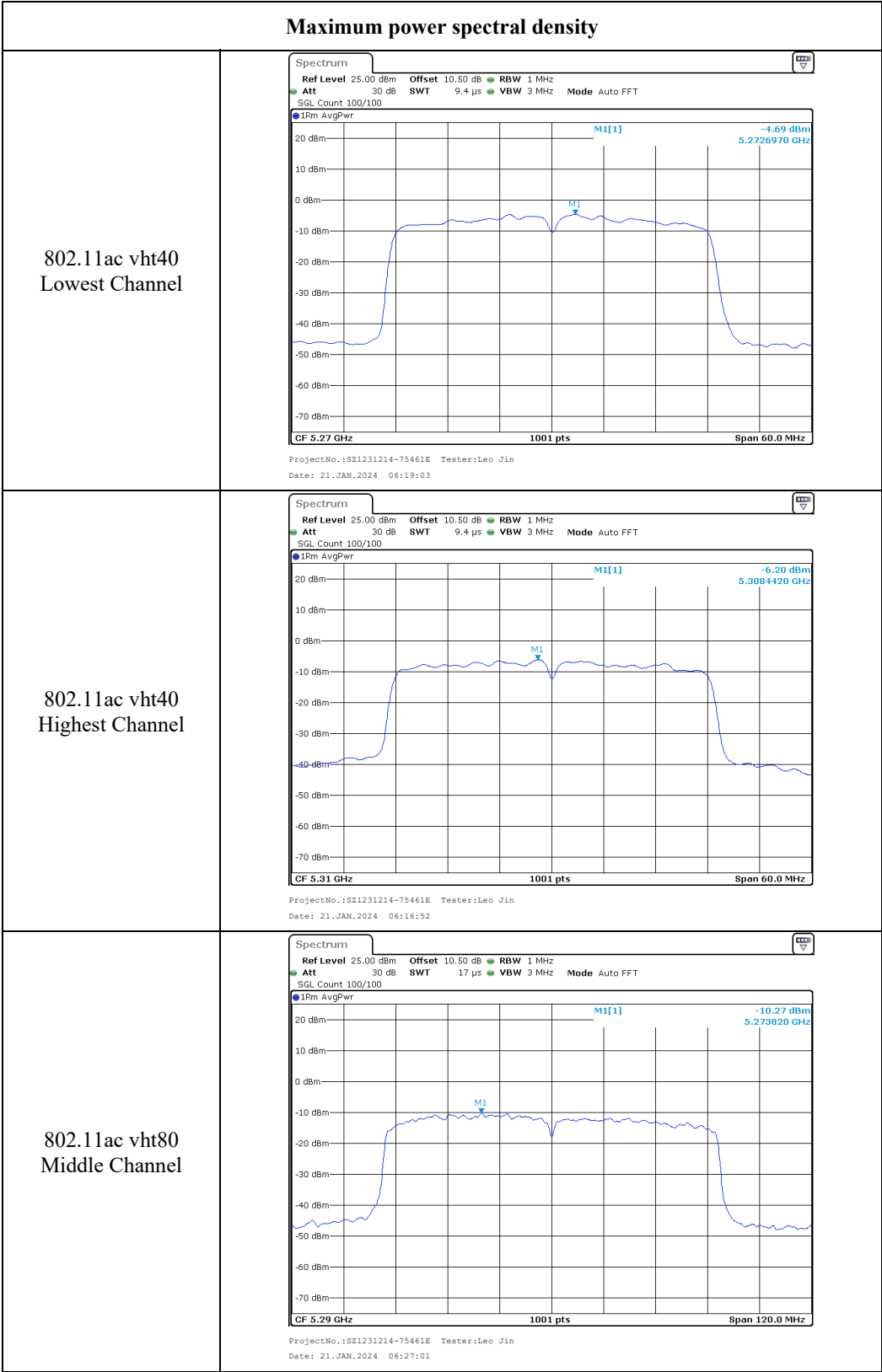




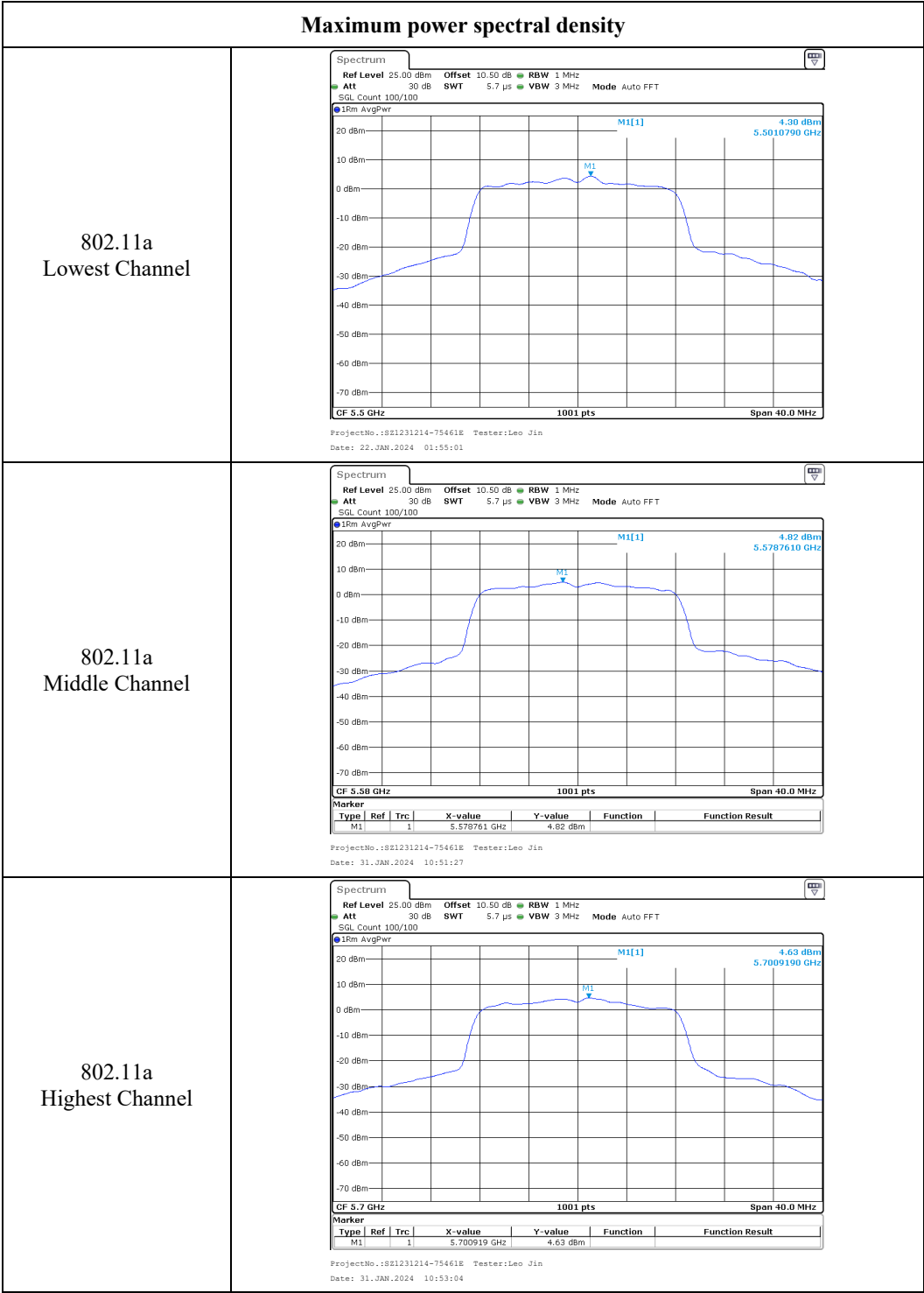
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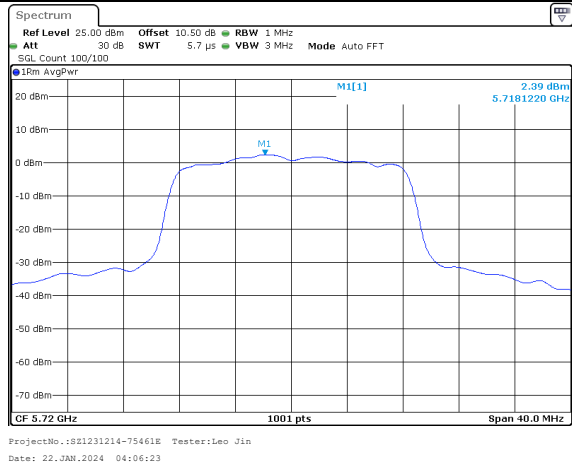


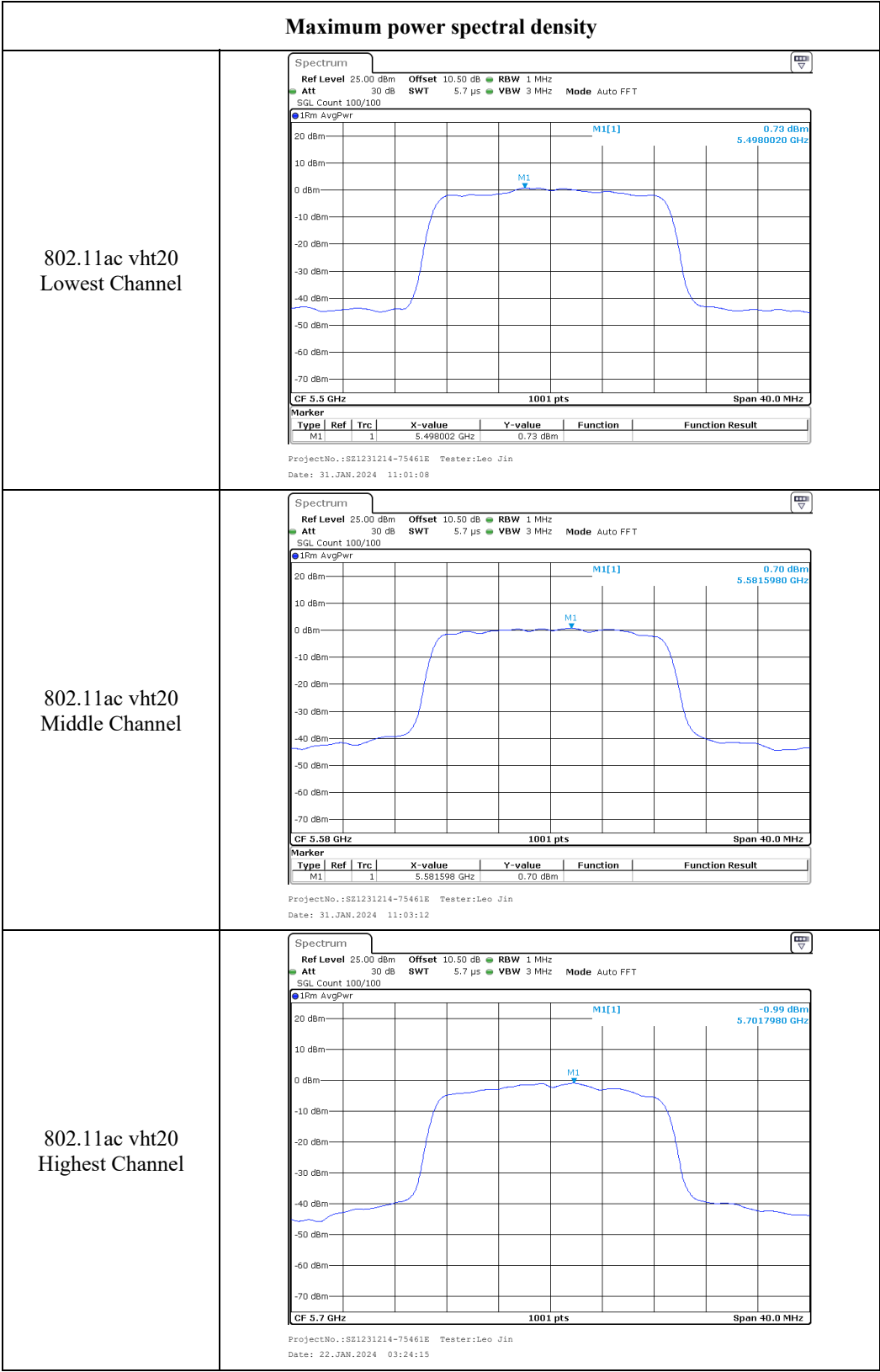


5470-5725MHz:

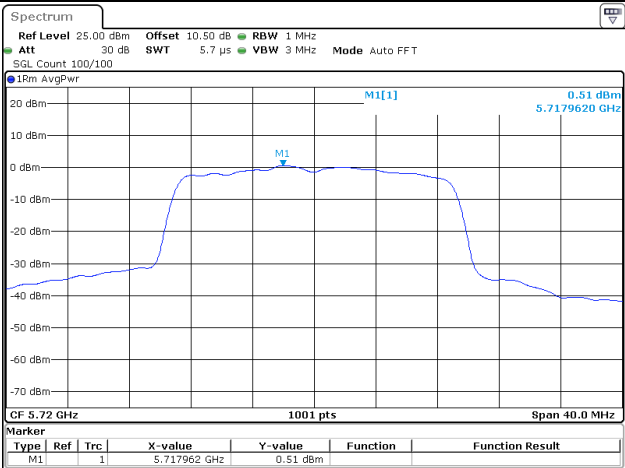


802.11a
Cross Channel

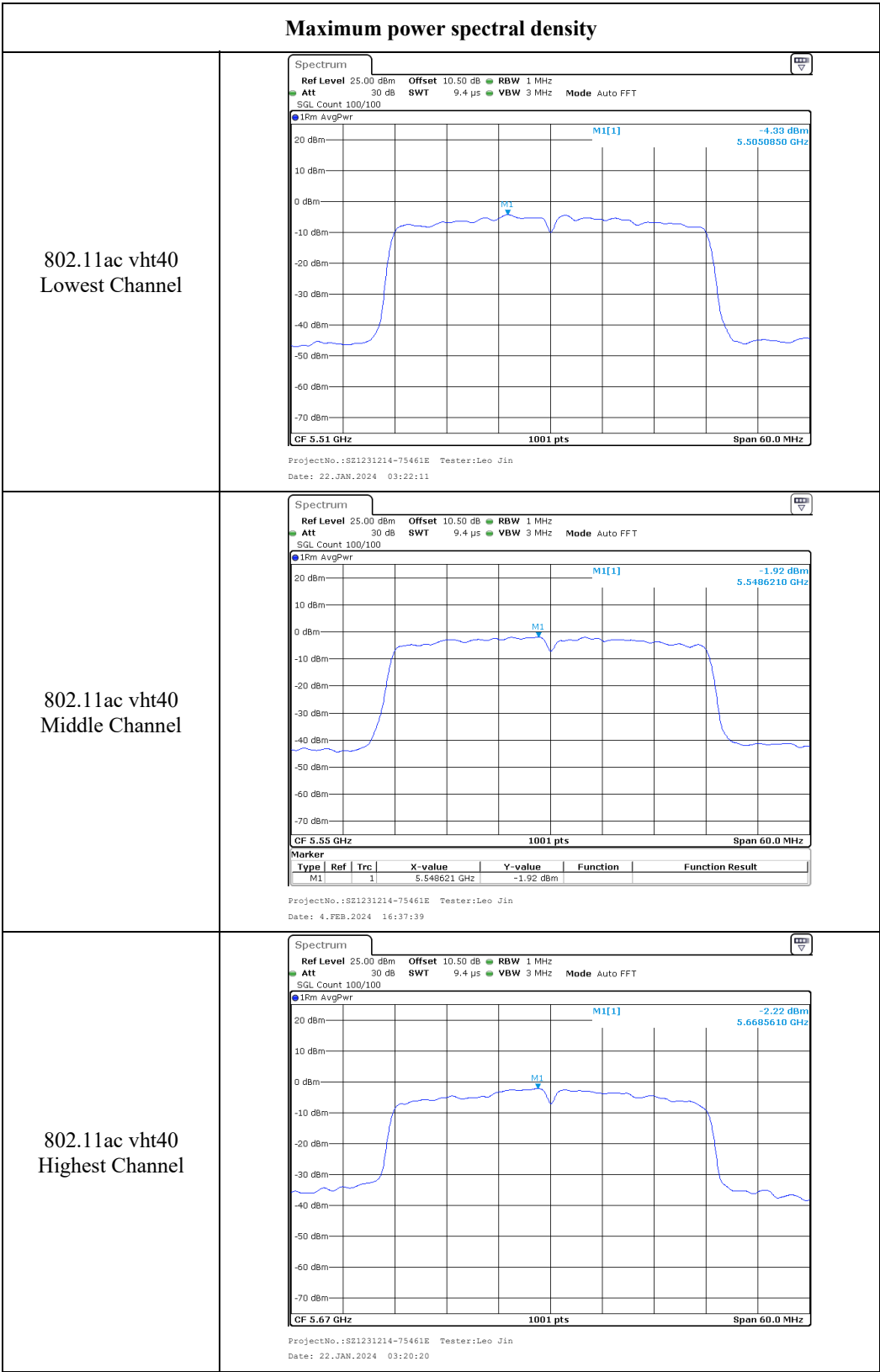




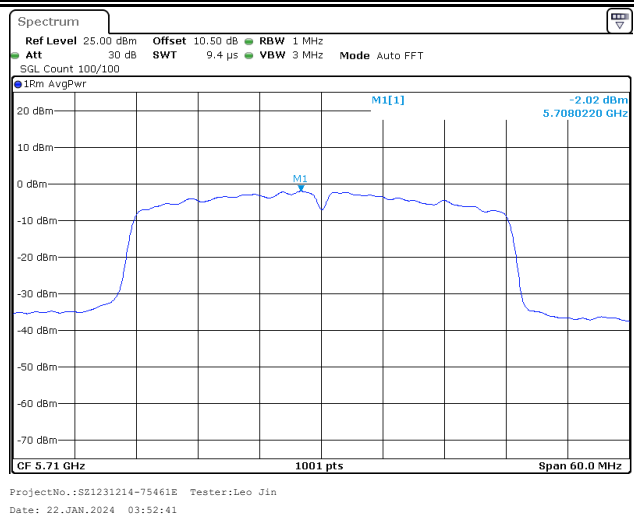
802.11ac vht20
Cross Channel

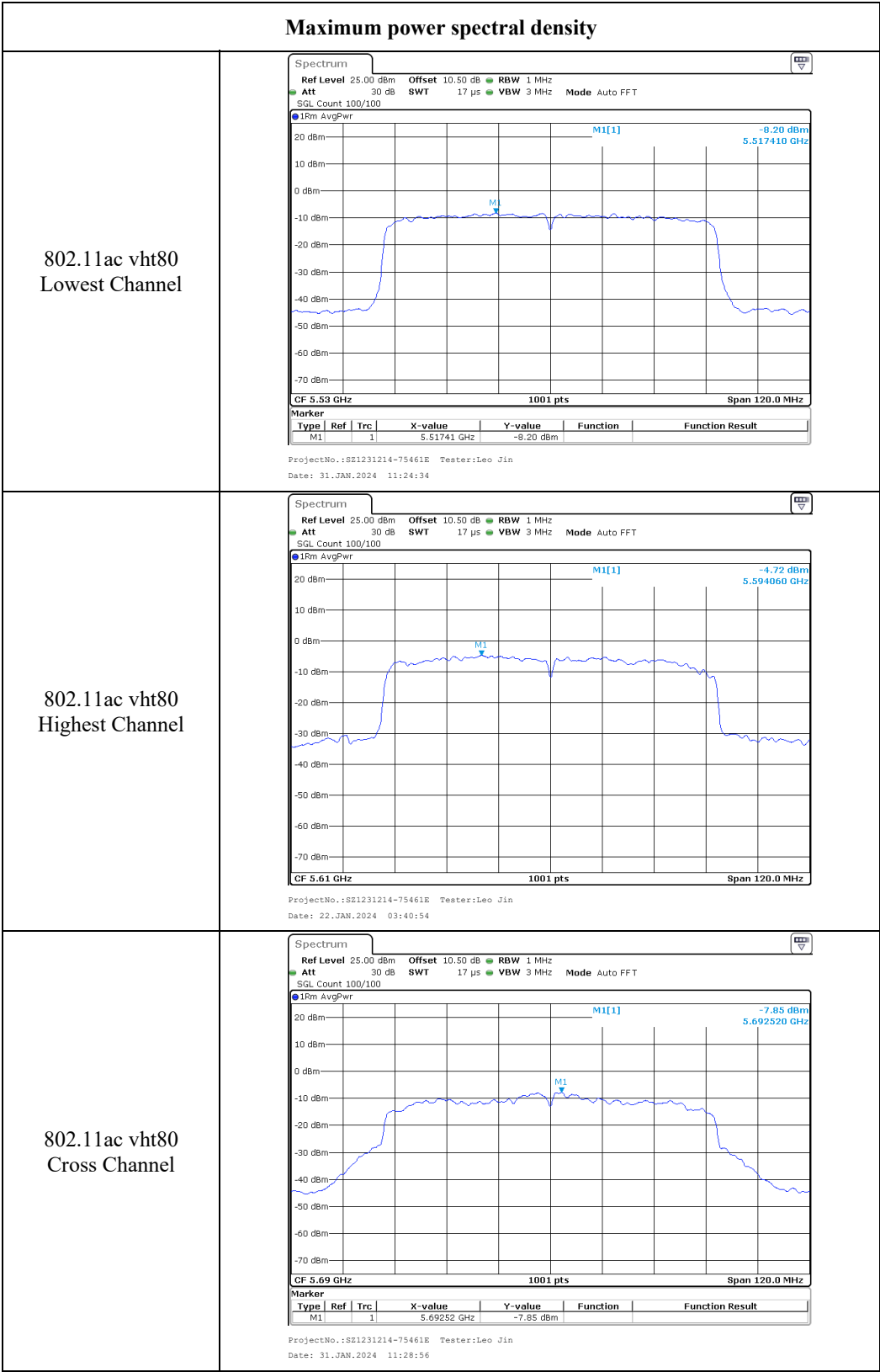


ProjectNo.:SZ1231214-75461E Tester:Leo Jin
Date: 31.JAN.2024 11:13:01

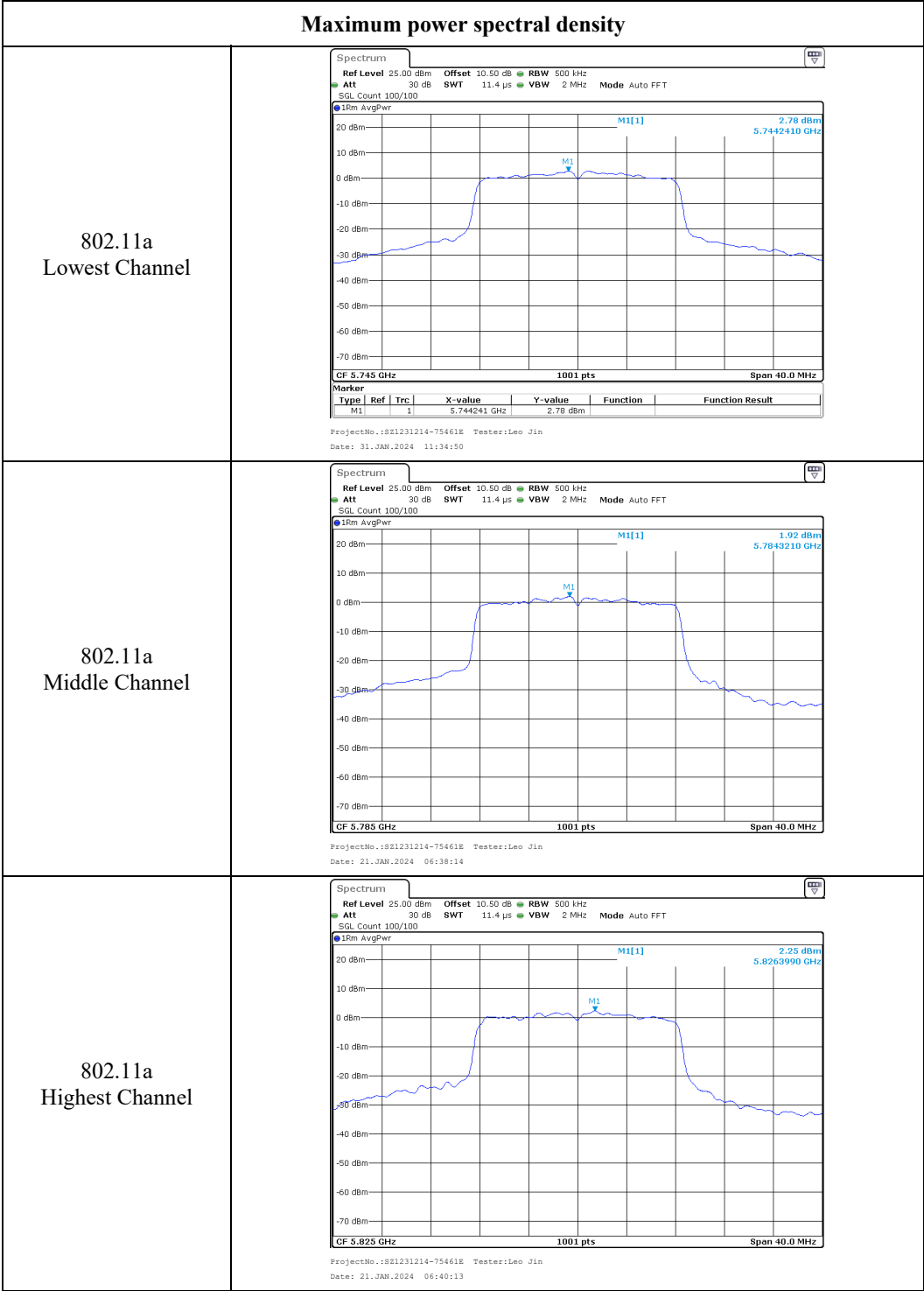


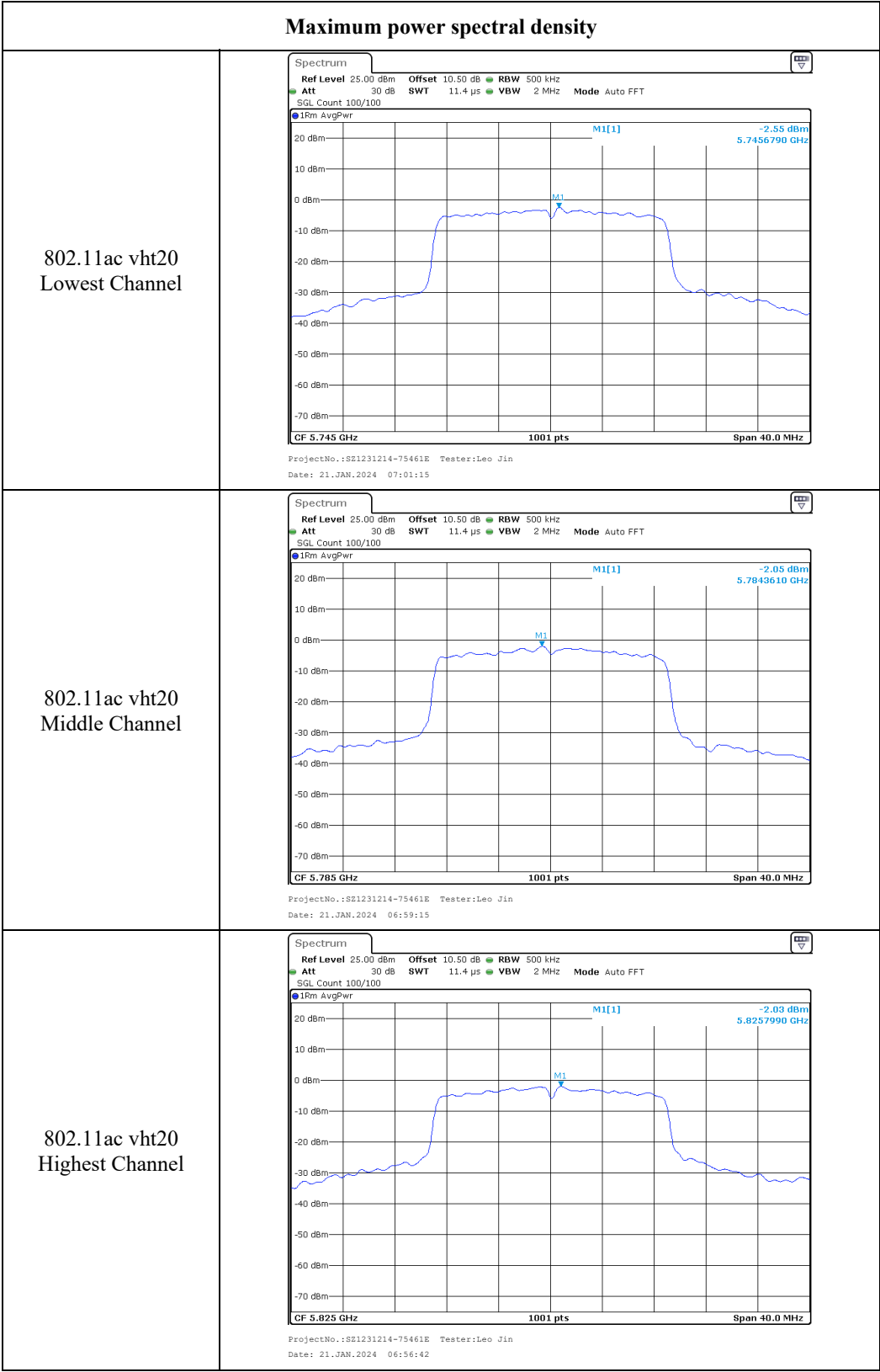
802.11ac vht40
Cross Channel

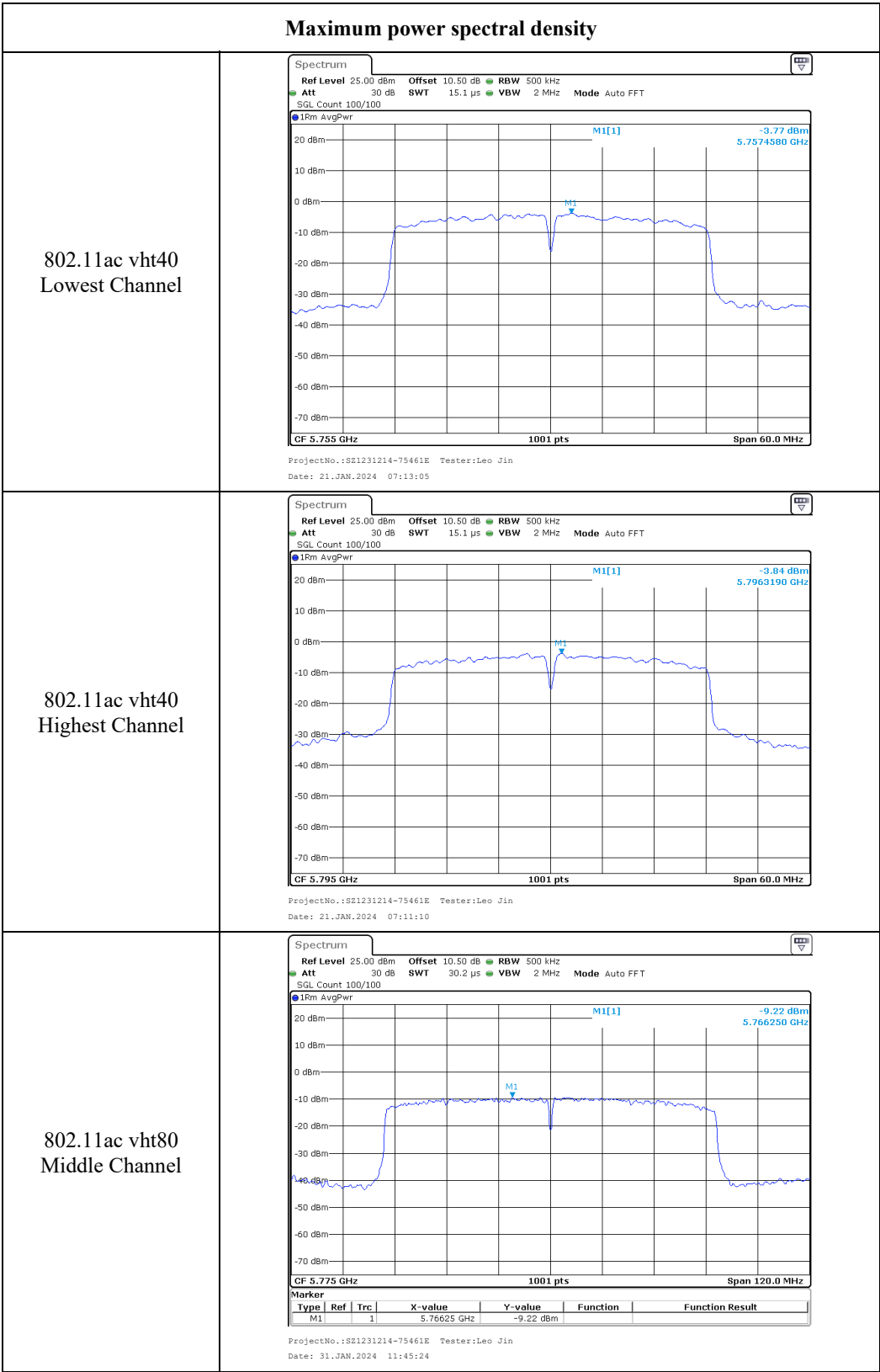




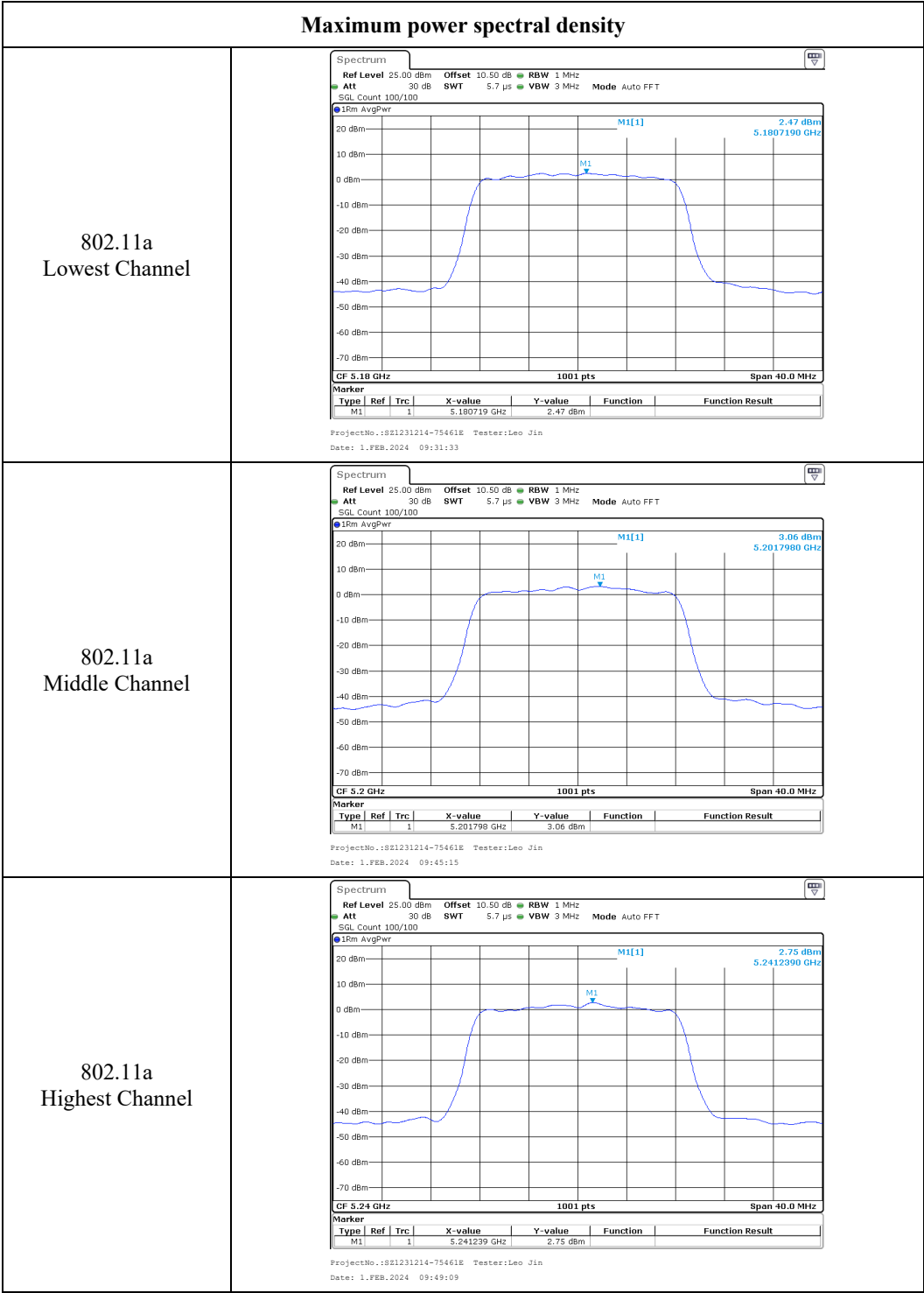
5725-5850MHz:



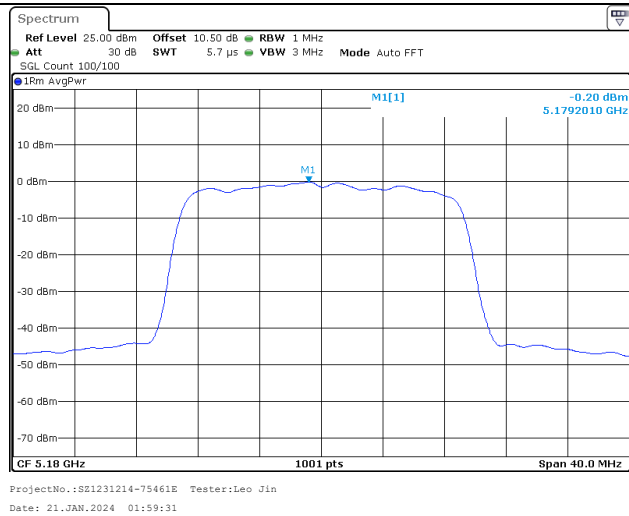
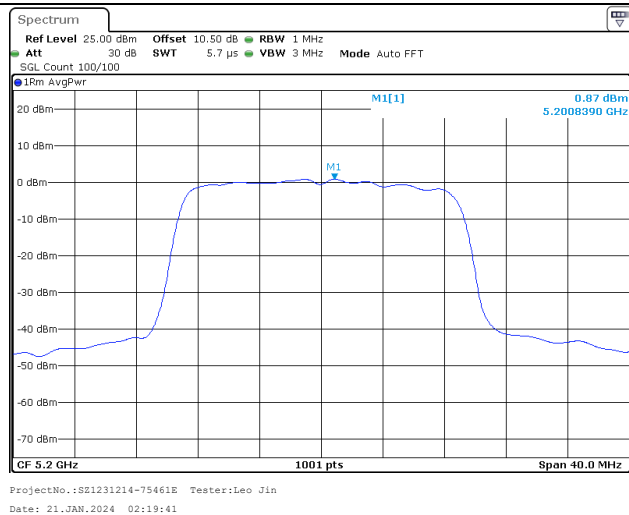
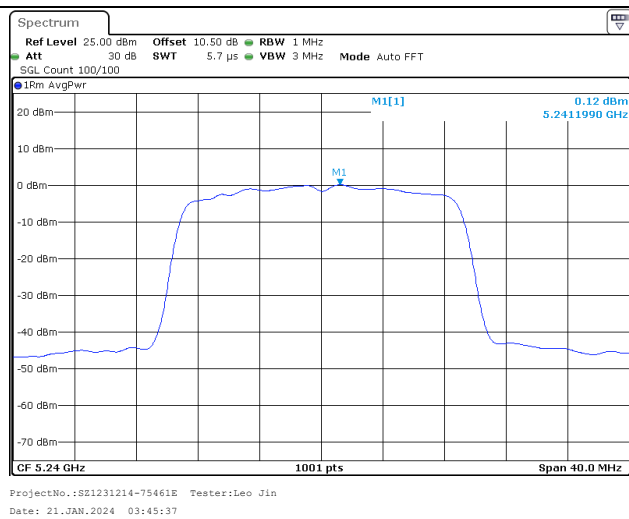


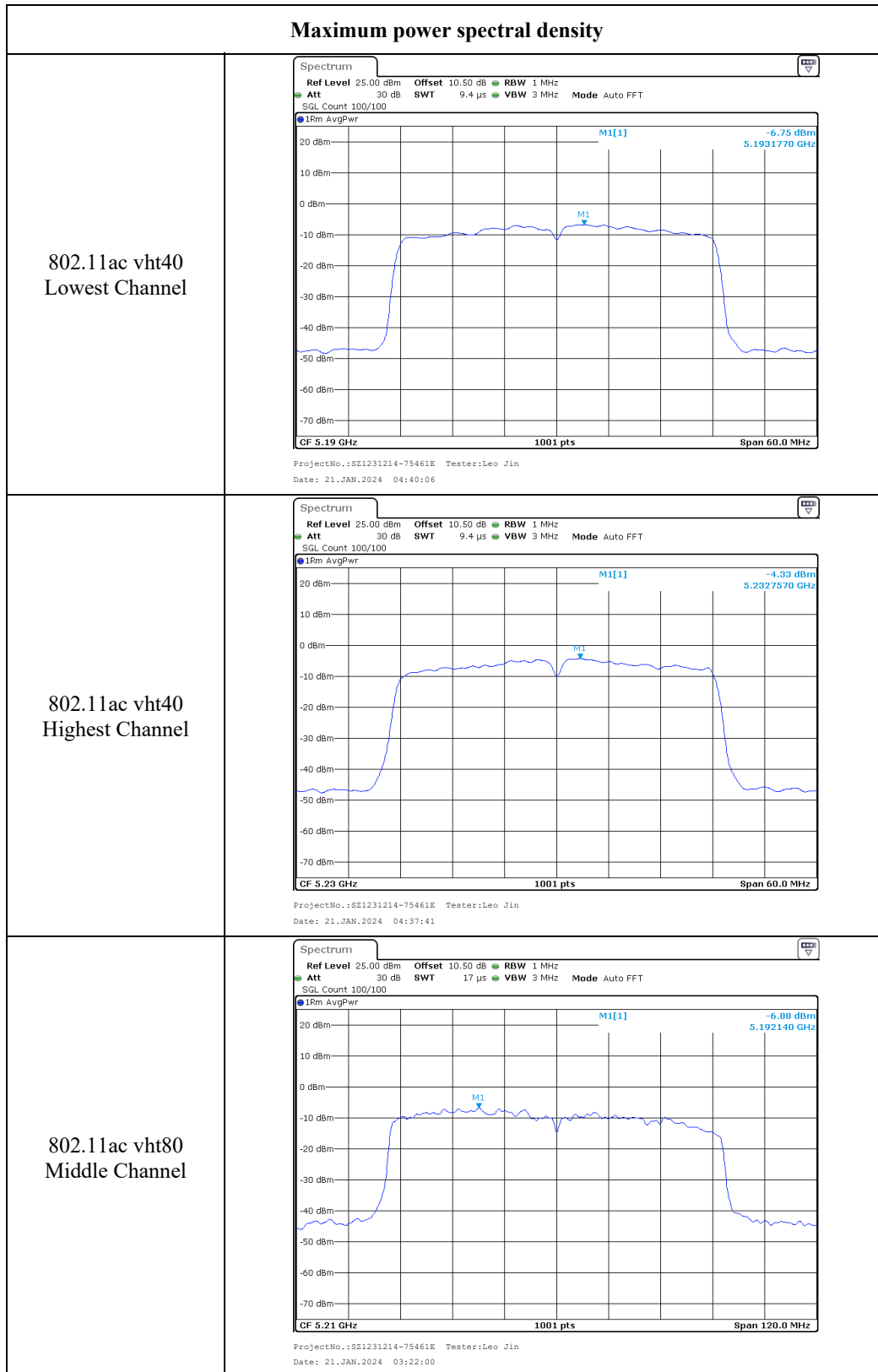


ANT 2
5150-5250MHz:

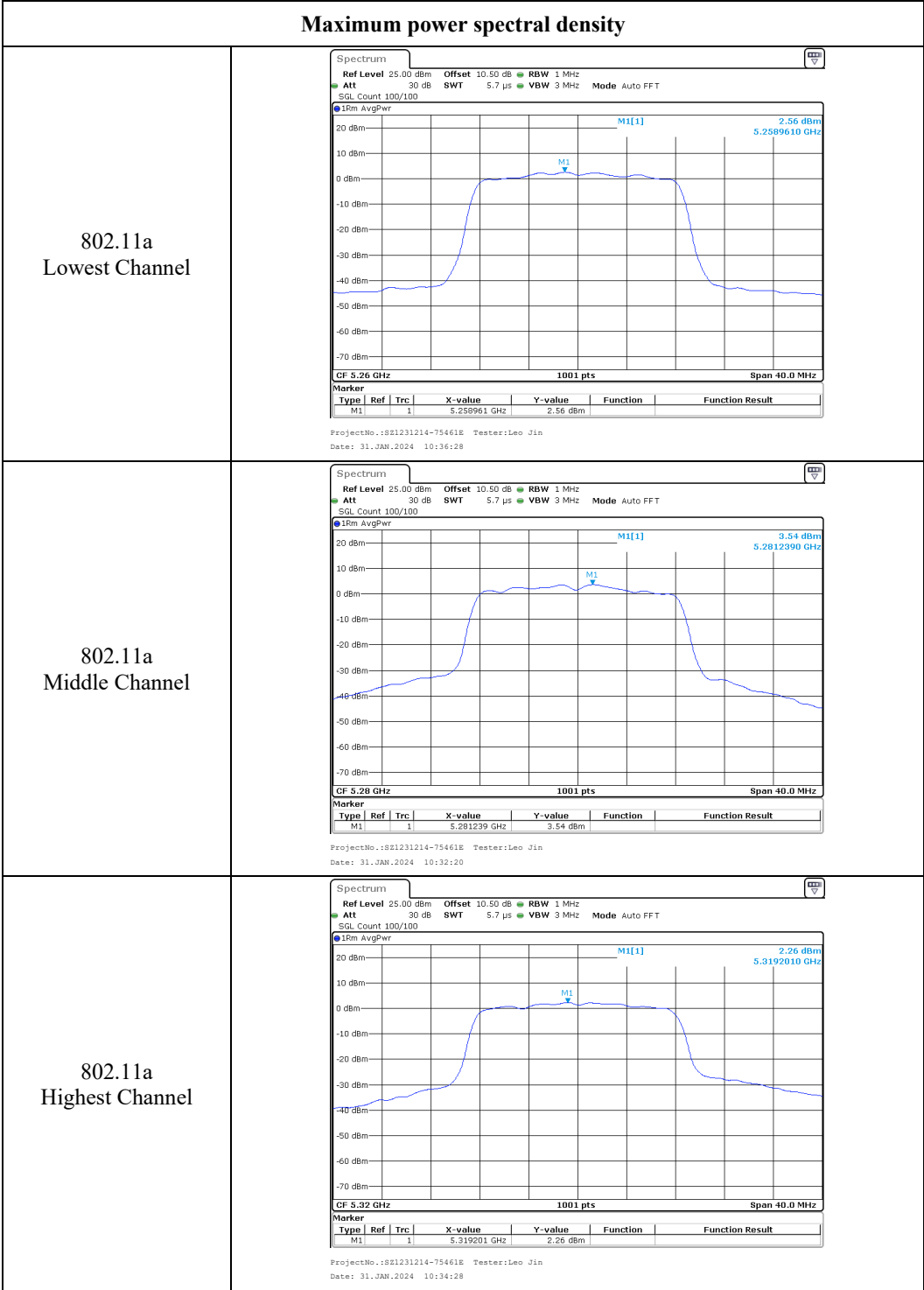


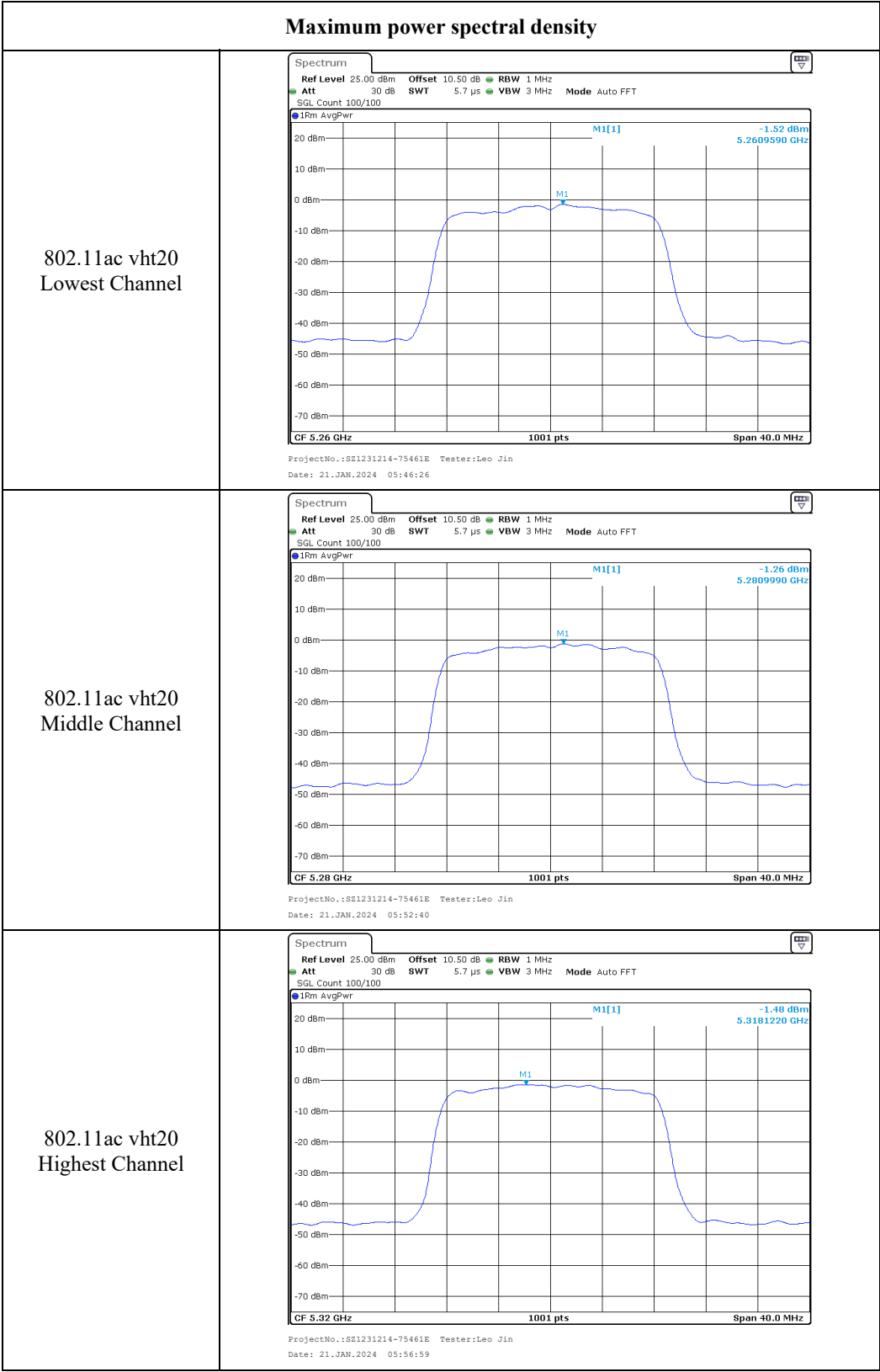
Maximum power spectral density

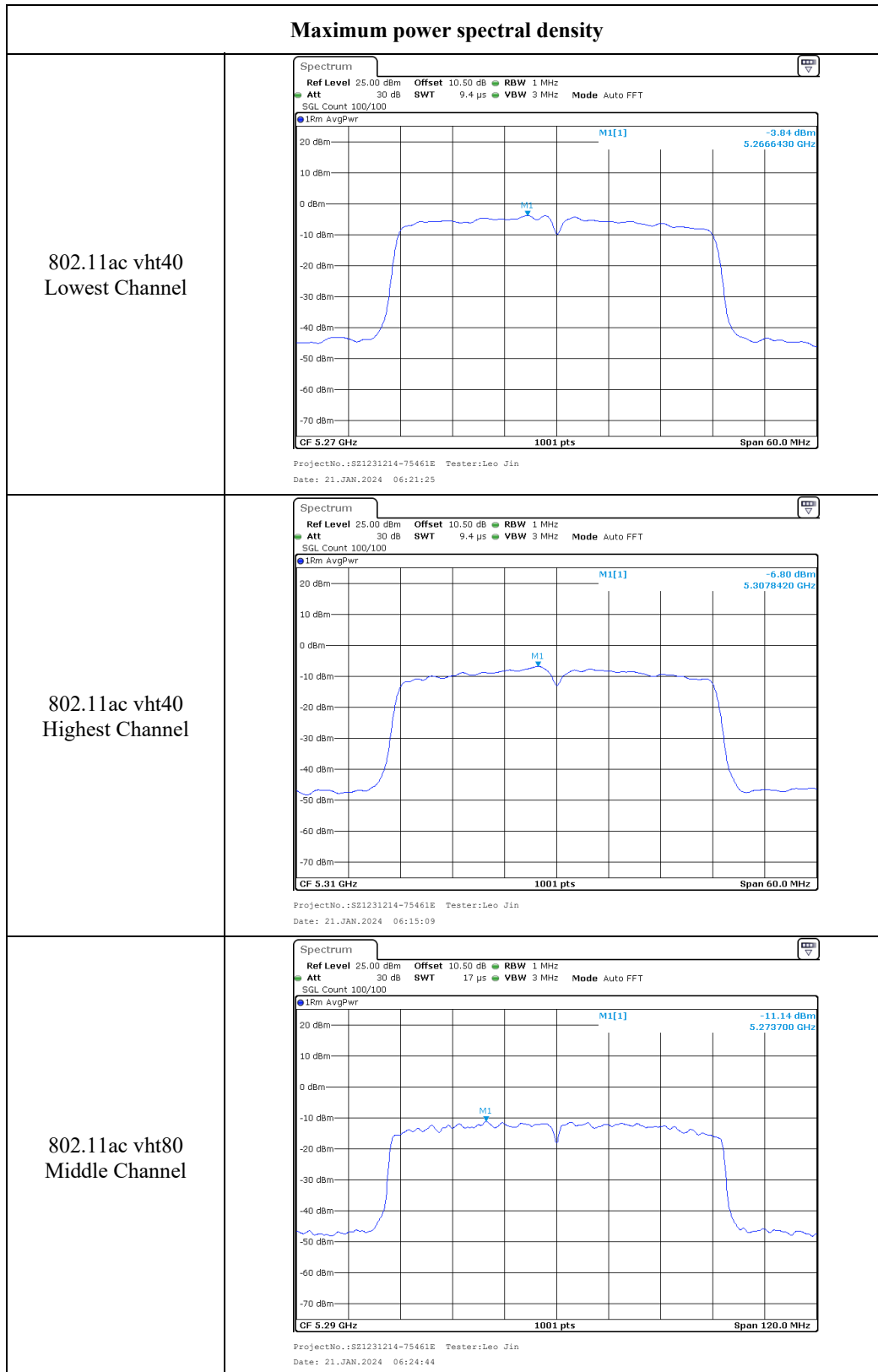
802.11ac vht20
Lowest Channel802.11ac vht20
Middle Channel802.11ac vht20
Highest Channel



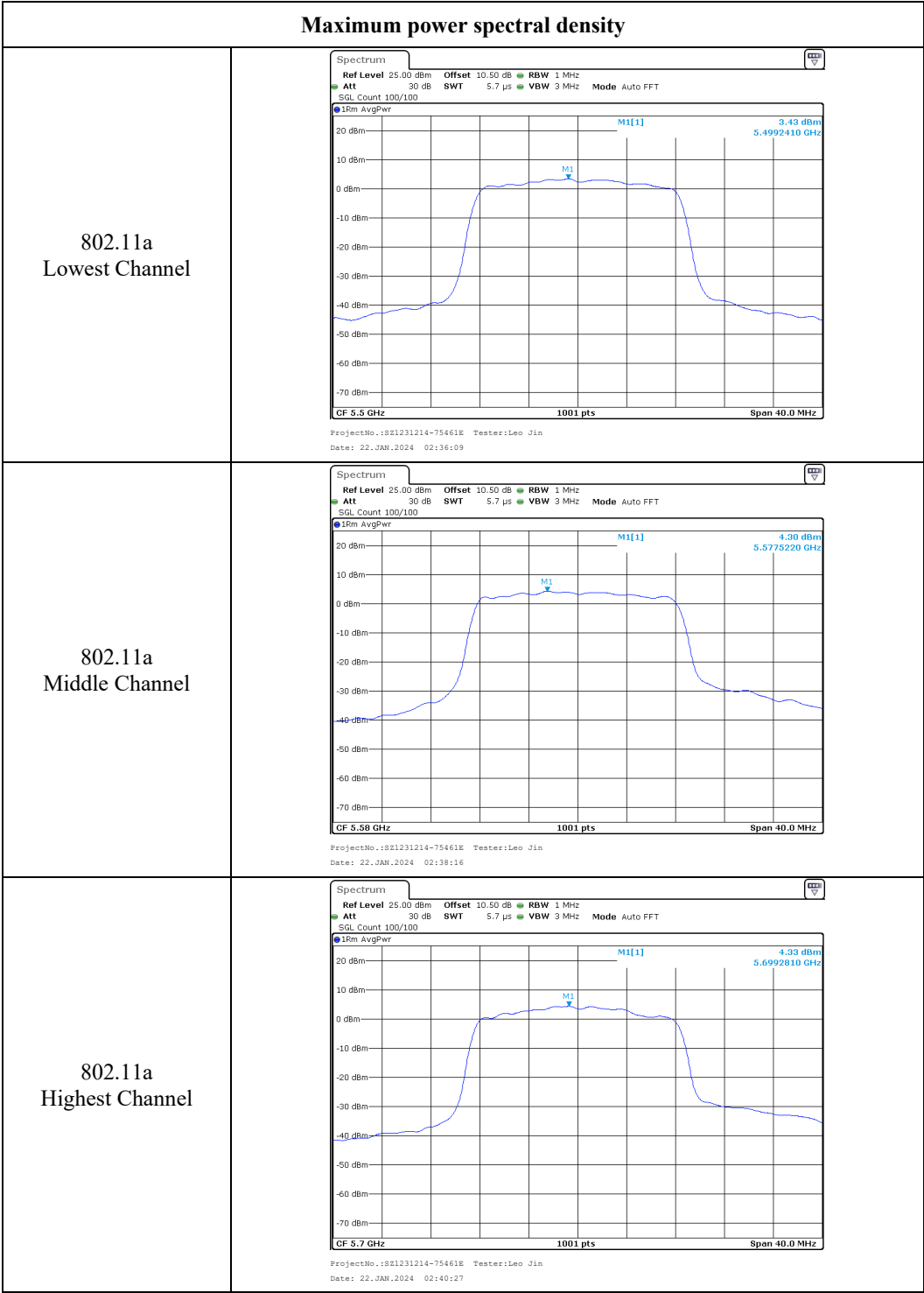
5250-5350MHz:



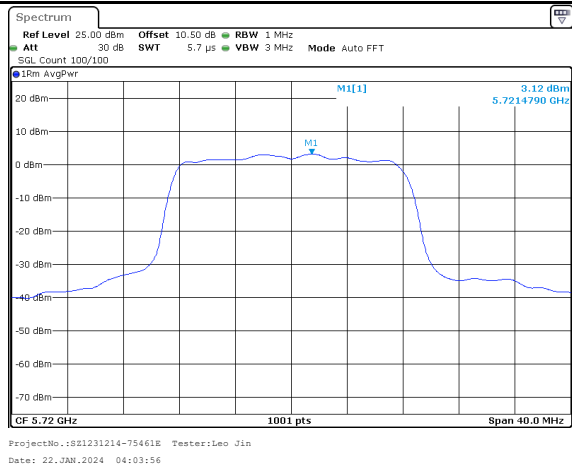


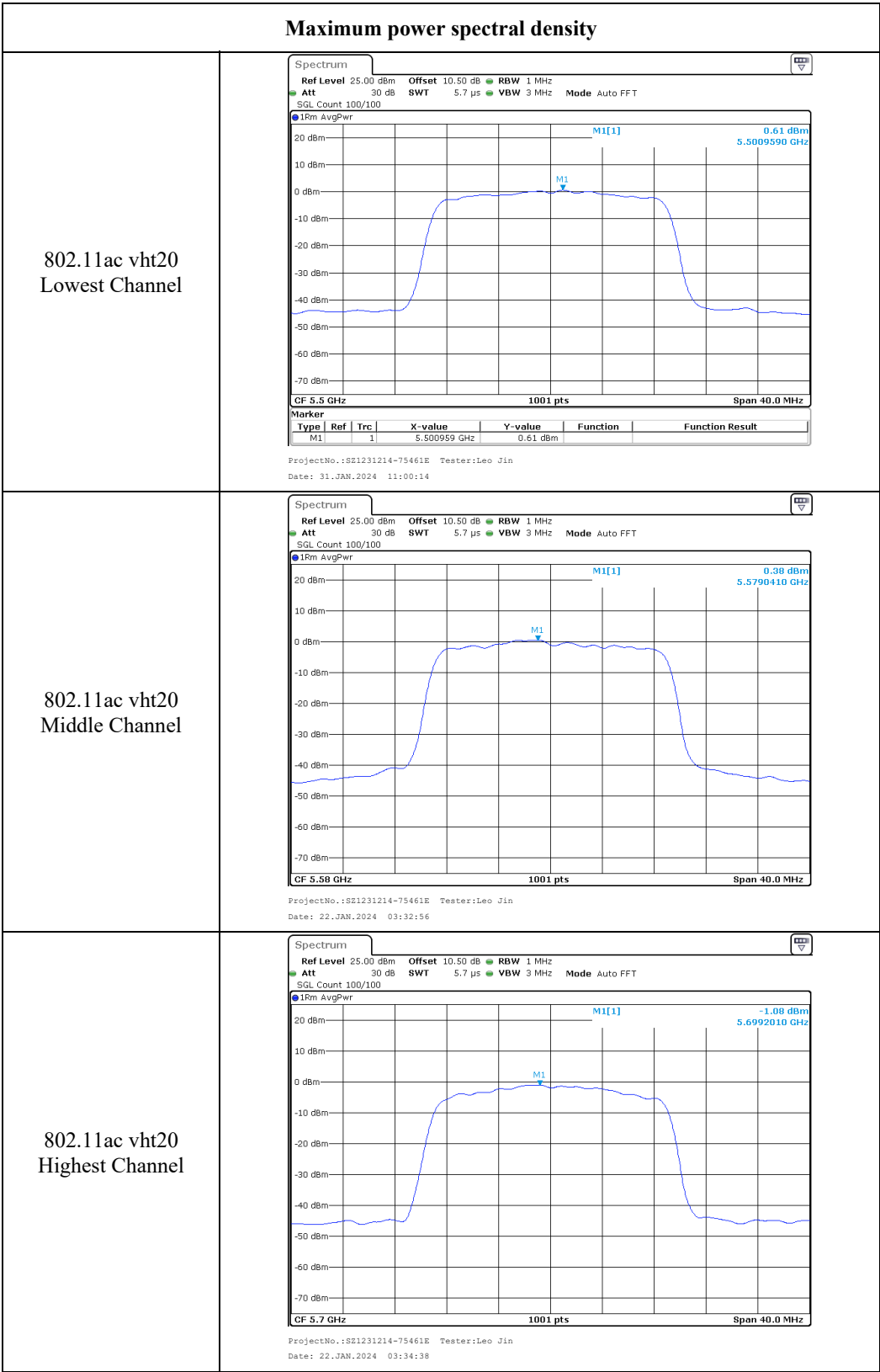


5470-5725MHz:

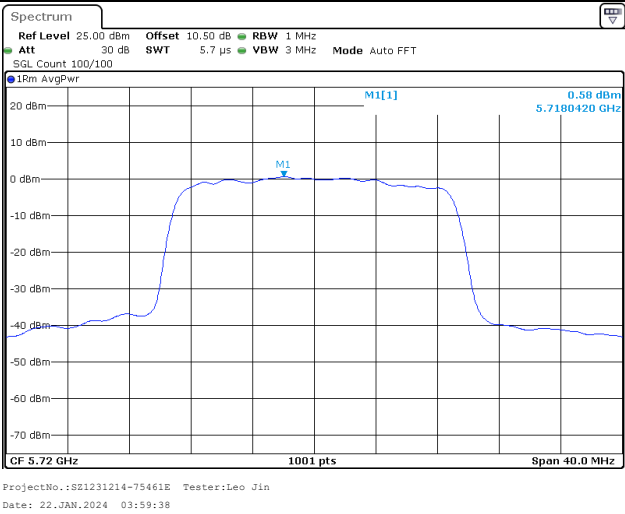


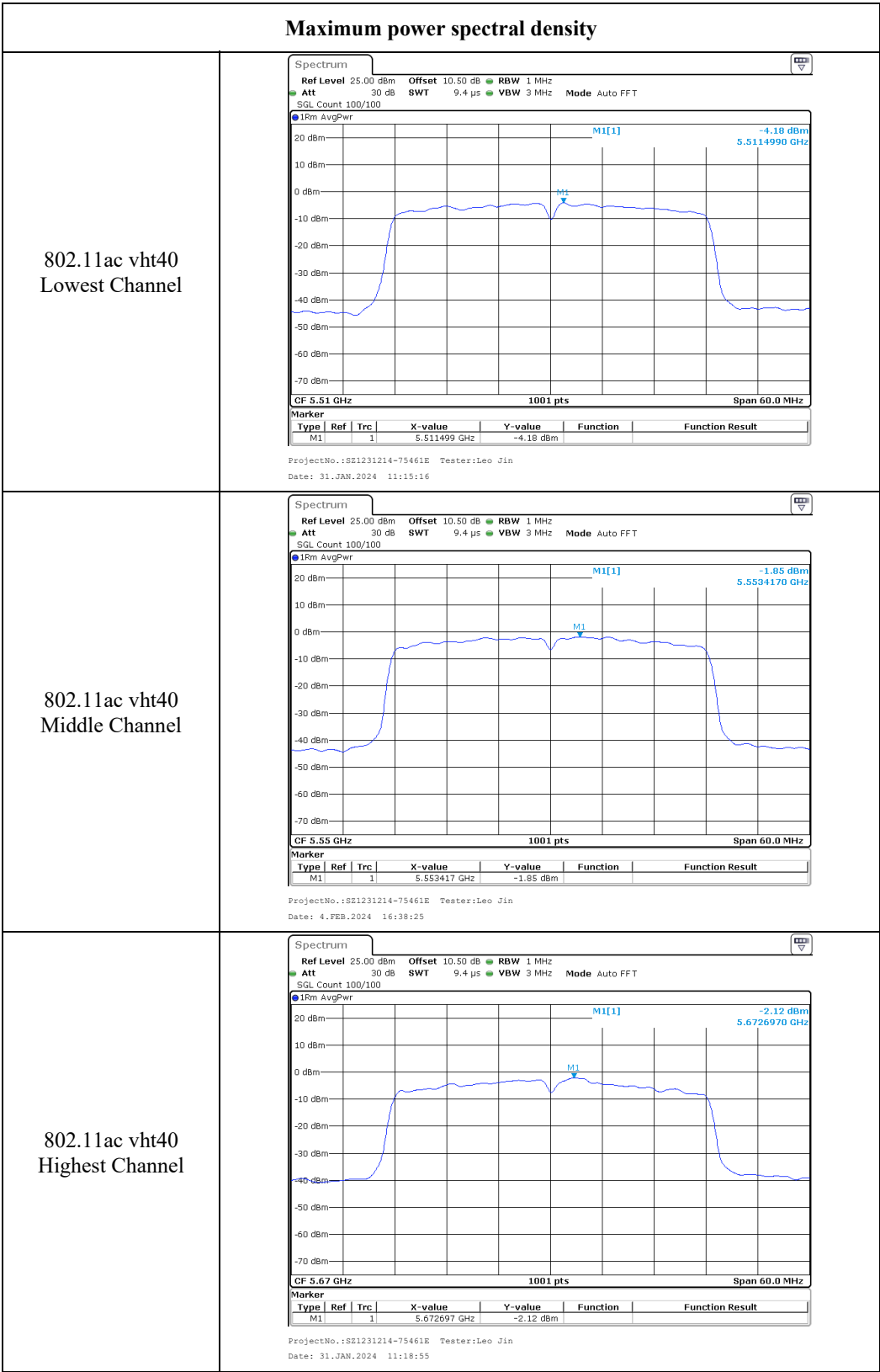
802.11a
Cross Channel



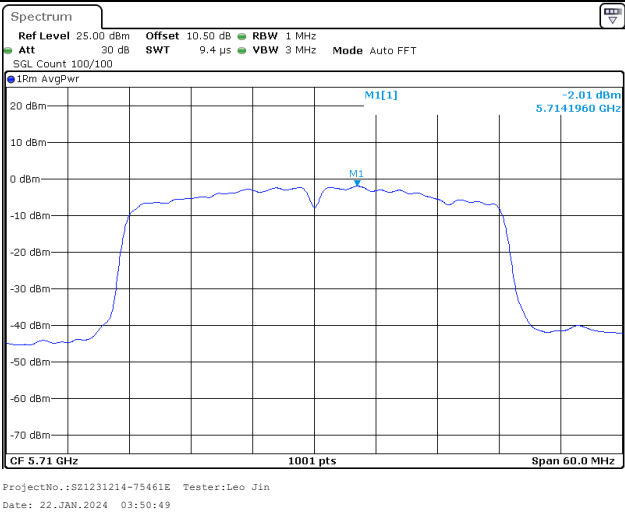


802.11ac vht20
Cross Channel



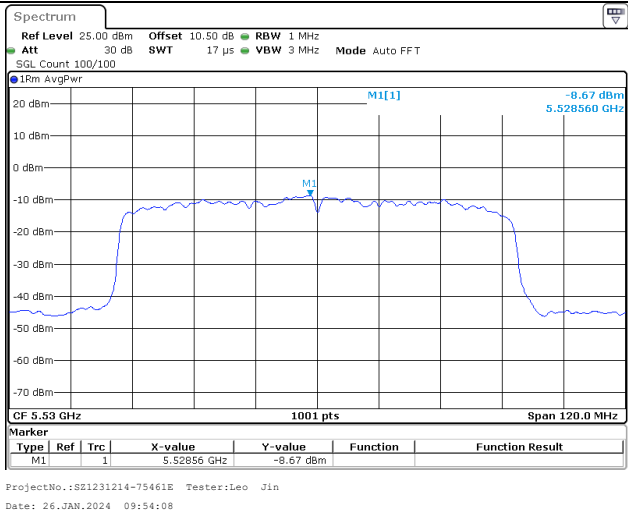


802.11ac vht40
Cross Channel

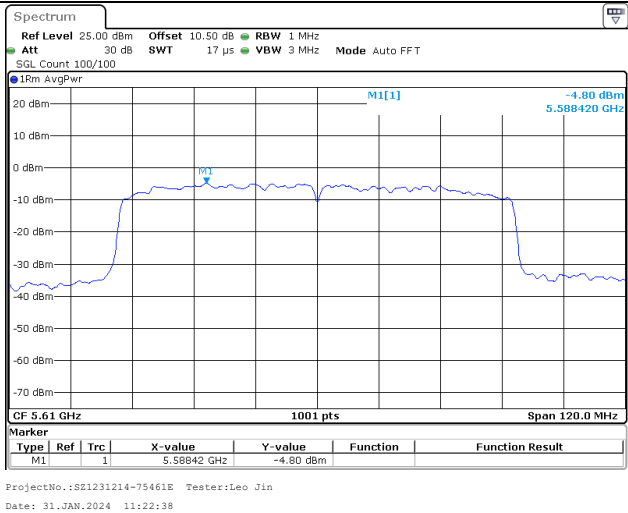


Maximum power spectral density

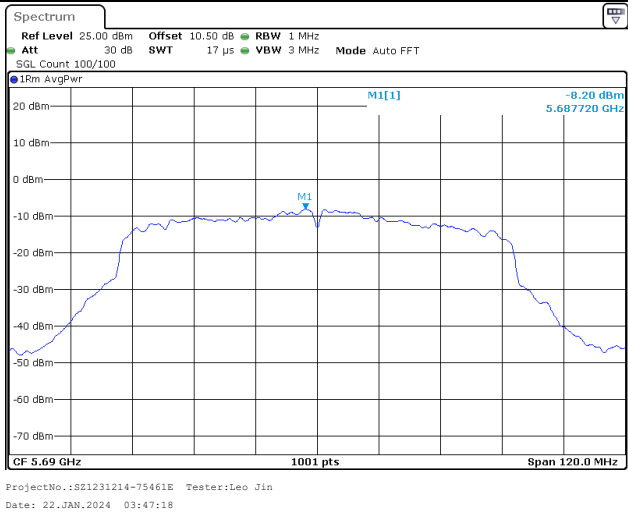
802.11ac vht80
Lowest Channel



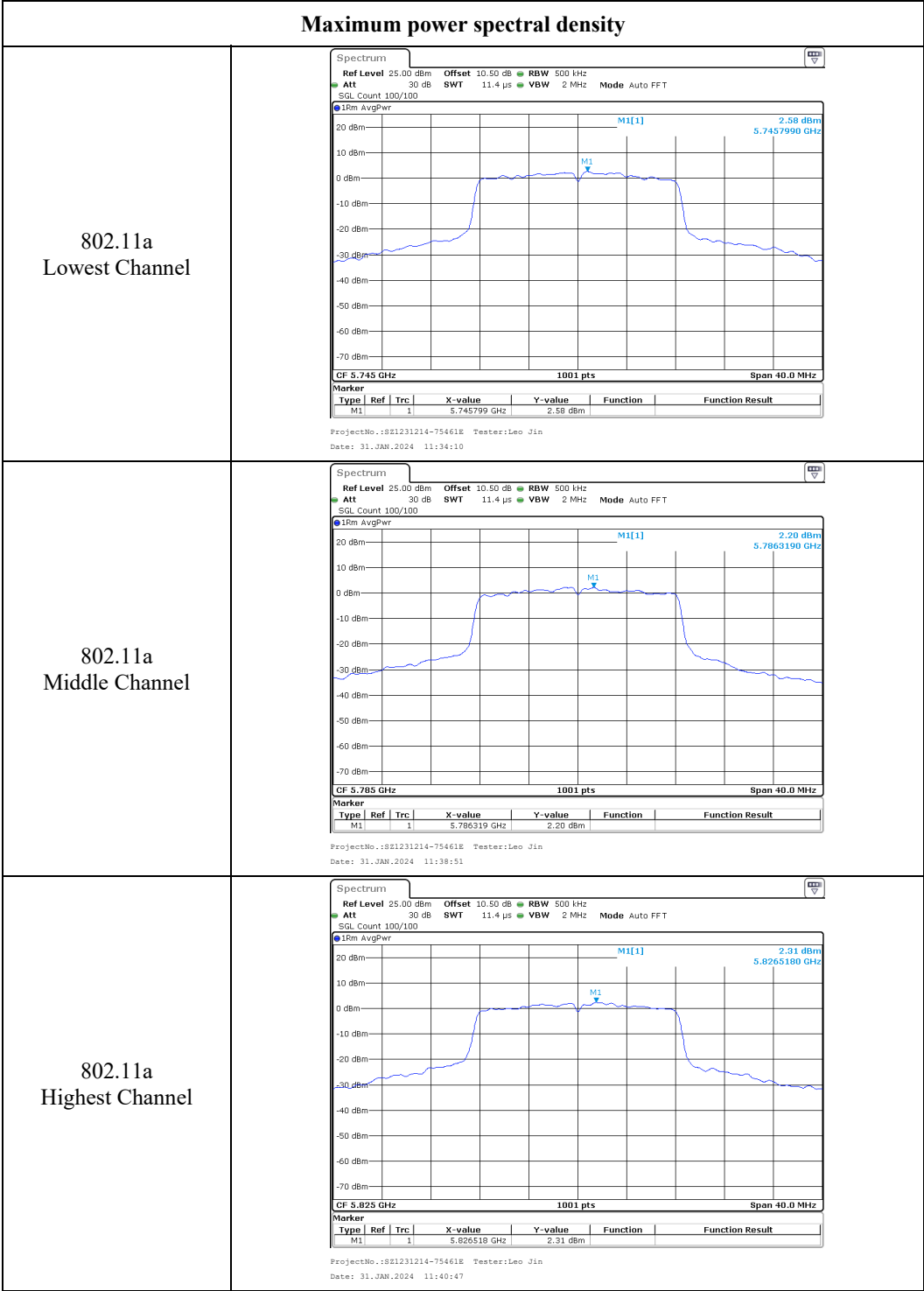
802.11ac vht80
Highest Channel



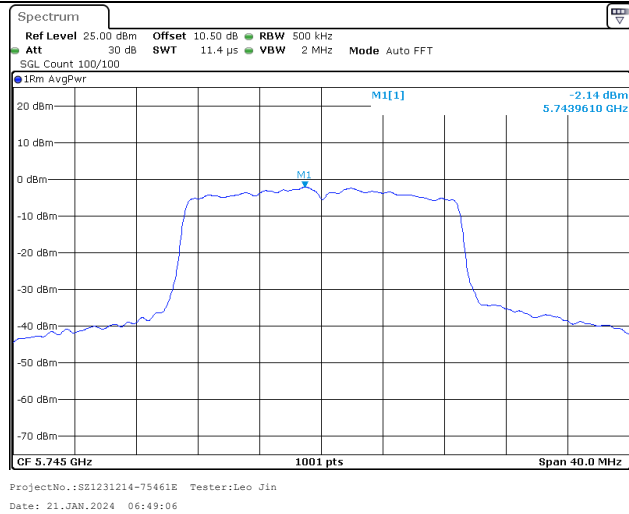
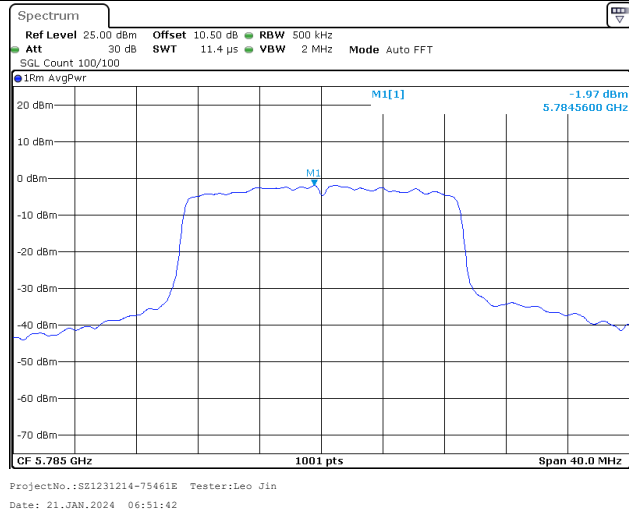
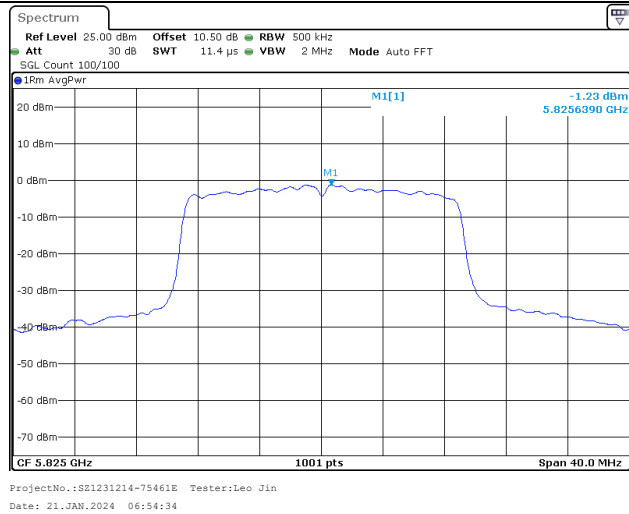
802.11ac vht80
Cross Channel

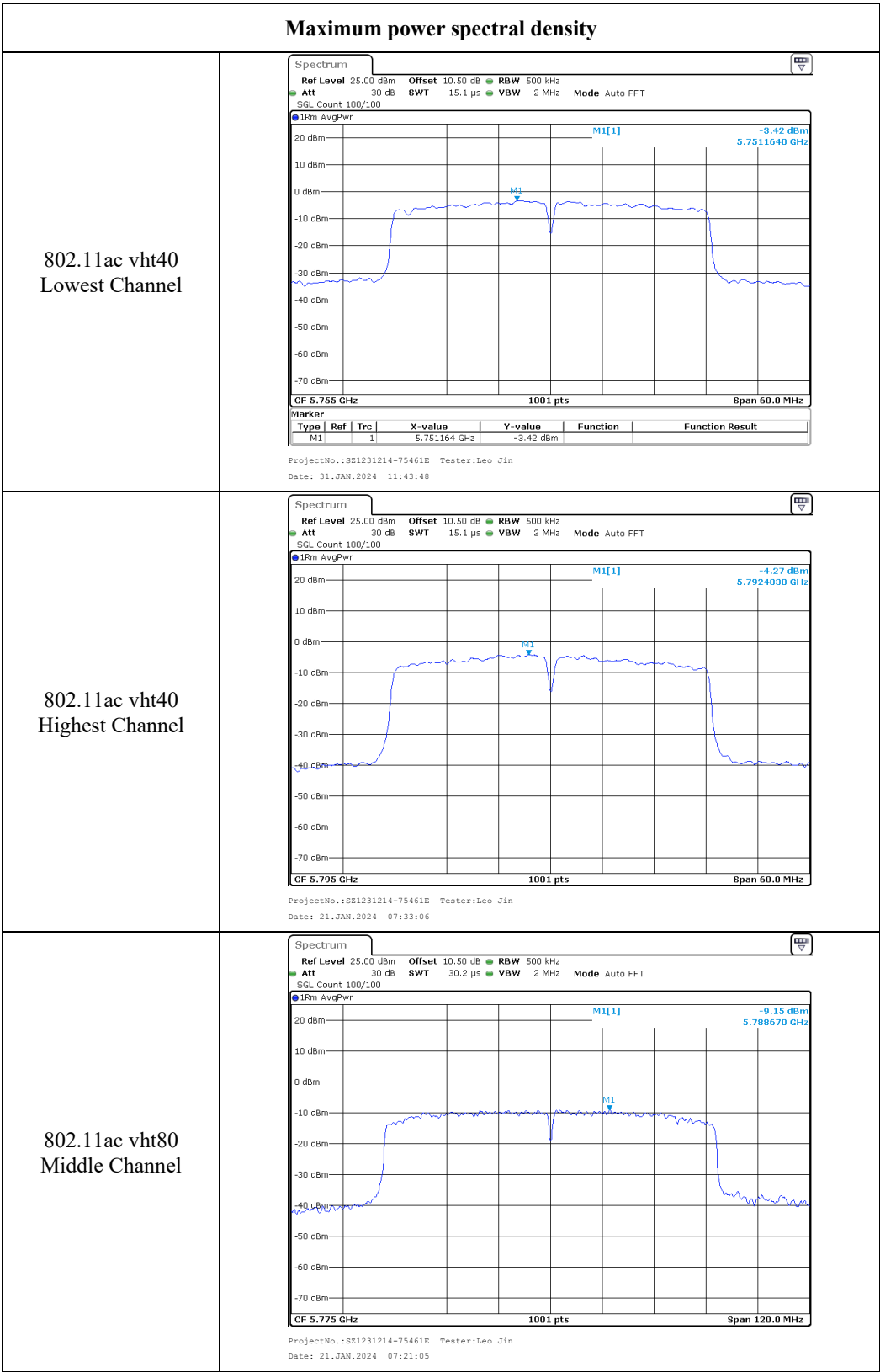


5725-5850MHz:



Maximum power spectral density

802.11ac vht20
Lowest Channel802.11ac vht20
Middle Channel802.11ac vht20
Highest Channel



EUT PHOTOGRAPHS

Please refer to the attachment SZ1231214-75461E-RF External photo and SZ1231214-75461E-RF Internal photo.

TEST SETUP PHOTOGRAPHS

Please refer to the attachment SZ1231214-75461E-RF Test Setup photo.

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