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TEST REPORT

FCC PART 15 SUBPART E 15.407

Report Reference No. : CTL2409192011-WF01

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Product Name : Audio and video wireless extender

Model/Type reference : LY-HE30W

List Model(s)..... : LY-HE30W-A,LY-HE30W-B,LY-HE30W-C,LY-HE30W-D

Trade Mark..... : N/A

FCC ID..... : 2BKN6-TXHE30W

Applicant's name : Shenzhen Laiyu Technology Co., Ltd.

Address of applicant : 505, Building 0100029, Xiawei Industrial Zone, Zhangxi
Community, Guanhu Street,Shenzhen City Longhua District,
Shenzhen City, China

Test Firm..... : Shenzhen CTL Testing Technology Co., Ltd.

Address of Test Firm : Floor 1-A, Baisha Technology Park, No.3011, Shahexi Road,
Nanshan District, Shenzhen, China 518055

Test specification..... :

Standard : 47 CFR FCC Part 15 Subpart E 15.407

TRF Originator : Shenzhen CTL Testing Technology Co., Ltd.

Master TRF..... : Dated 2011-01

Date of receipt of test item : Aug.26, 2024

Date of Test Date..... : Aug.26, 2024-Sep.18, 2024

Date of Issue : Sep.25, 2024

Result..... : Pass

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TEST REPORT

Test Report No. :	CTL2409192011-WF01	Sep.25, 2024
		Date of issue

Equipment under Test : Audio and video wireless extender

Sample No : CTL2409192011

Model /Type : LY-HE30W

Listed Models : LY-HE30W-A,LY-HE30W-B,LY-HE30W-C,LY-HE30W-D

Applicant : **Shenzhen Laiyu Technology Co., Ltd.**

Address : 505, Building 0100029, Xiawei Industrial Zone, Zhangxi Community, Guanhu Street,Shenzhen City Longhua District, Shenzhen City, China

Manufacturer : **Shenzhen Laiyu Technology Co., Ltd.**

Address : 505, Building 0100029, Xiawei Industrial Zone, Zhangxi Community, Guanhu Street,Shenzhen City Longhua District, Shenzhen City, China

Test result	Pass *
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* In the configuration tested, the EUT complied with the standards specified page 5.

The test results presented in this report relate only to the object tested.

This report shall not be reproduced, except in full, without the written approval of the issuing testing laboratory.

** Modified History **

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1. SUMMARY

1.1. TEST STANDARDS

The tests were performed according to following standards:

[FCC Rules Part 15 Subpart E](#)—Unlicensed National Information Infrastructure Devices

[ANSI C63.10: 2013](#): American National Standard for Testing Unlicensed Wireless Devices

[KDB789033 D02](#): General UNII Test Procedures New Rules v02r01

1.2. Test Description

FCC Requirement		
FCC Part 15.207	AC Power Conducted Emission	PASS
FCC Part 15.407(a)	Emission Bandwidth(26dBm Bandwidth)	PASS
FCC Part 15.407(e)	Minimum Emission Bandwidth(6dBm Bandwidth)	PASS
FCC Part 15.407(a)	Maximum Conducted Output Power	PASS
FCC Part 15.407(a)	Peak Power Spectral Density	PASS
FCC Part 15.407(g)	Frequency Stability	PASS
FCC Part 15.407(b)	Undesirable emission	PASS
FCC Part 15.407(b)/15.205/15.209	Radiated Emissions	PASS
FCC Part 15.203/15.247(b)	Antenna Requirement	PASS
FCC Part 15.407(c)	Operation in the absence of information to the transmit	PASS

1.3. Test Facility

1.3.1 Address of the test laboratory

Shenzhen CTL Testing Technology Co., Ltd.

Floor 1-A, Baisha Technology Park, No. 3011, Shaheji Road, Nanshan, Shenzhen 518055 China

The 3m-Semi anechoic test site fulfils CISPR 16-1-4 according to ANSI C63.10 and CISPR 16-1-4:2010 SVSWR requirement for radiated emission above 1GHz.

1.3.2 Laboratory accreditation

The test facility is recognized, certified, or accredited by the following organizations:

CNAS-Lab Code: L7497

Shenzhen CTL Testing Technology Co., Ltd. has been assessed and proved to be in compliance with CNAS-CL01 Accreditation Criteria for Testing and Calibration Laboratories (identical to ISO/IEC 17025: 2017 General Requirements) for the Competence of Testing and Calibration Laboratories.

A2LA-Lab Cert. No. 4343.01

Shenzhen CTL Testing Technology Co., Ltd, EMC Laboratory has been accredited by A2LA for technical competence in the field of electrical testing, and proved to be in compliance with ISO/IEC 17025: 2017 General Requirements for the Competence of Testing and Calibration Laboratories and any additional program requirements in the identified field of testing.

IC Registration No.: 9618B

CAB identifier: CN0041

The 3m alternate test site of Shenzhen CTL Testing Technology Co., Ltd. EMC Laboratory has been registered by Innovation, Science and Economic Development Canada to test to Canadian radio equipment requirements with Registration No.: 9618B.

FCC-Registration No.: 399832

Designation No.: CN1216

Shenzhen CTL Testing Technology Co., Ltd. EMC Laboratory has been registered and fully described in a report filed with the (FCC) Federal Communications Commission. The acceptance letter from the FCC is maintained in our files. Registration 399832.

1.4. Statement of the measurement uncertainty

The data and results referenced in this document are true and accurate. The reader is cautioned that there may be errors within the calibration limits of the equipment and facilities. The measurement uncertainty was calculated for all measurements listed in this test report acc. to CISPR 16 - 4 "Specification for radio disturbance and immunity measuring apparatus and methods – Part 4: Uncertainty in EMC Measurements" and is documented in the Shenzhen CTL Testing Technology Co., Ltd. quality system acc. to DIN EN ISO/IEC 17025. Furthermore, component and process variability of devices similar to that tested may result in additional deviation. The manufacturer has the sole responsibility of continued compliance of the device.

Hereafter the best measurement capability for CTL laboratory is reported:

Test	Measurement Uncertainty	Notes
Transmitter power conducted	± 0.57 dB	(1)
Transmitter power Radiated	± 2.20 dB	(1)
Conducted spurious emission 9KHz-40 GHz	± 2.20 dB	(1)
Occupied Bandwidth	± 0.01 ppm	(1)
Radiated Emission 9KHz~30MHz	± 3.66 dB	(1)
Radiated Emission 30~1000MHz	± 4.08 dB	(1)
Radiated Emission Above 1GHz	± 4.32 dB	(1)
Conducted Disturbance 0.15~30MHz	± 3.20 dB	(1)
20dB Emission Bandwidth	$\pm 1.9\%$	(1)
Carrier Frequency Separation	$\pm 1.9\%$	(1)
Maximum Power Spectral Density Level	± 0.98 dB	(1)
Number of Hopping Channel	$\pm 1.9\%$	(1)
Time of Occupancy	$\pm 0.11\%$	(1)
Max Peak Conducted Output Power	± 0.98 dB	(1)
Band-edge Spurious Emission	± 1.21 dB	(1)
Conducted RF Spurious Emission	9kHz-7GHz: ± 1.09 dB 7GHz-26.5GHz: ± 3.27 dB	(1)

(1) This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of $k=1.96$.

1.5. EUT configuration

The following peripheral devices and interface cables were connected during the measurement:

- - supplied by the manufacturer
- - supplied by the lab

○	Notebook computer	Manufacturer :	Huawei Technologies Co Ltd
		Model No. :	KPL-W00
○	HUAWEI SuperCharge	Manufacturer :	Huawei Technologies Co Ltd.
		Model No. :	HW-200200CP1

2. GENERAL INFORMATION

2.1. Environmental conditions

During the measurement the environmental conditions were within the listed ranges:

Normal Temperature:	25°C
Relative Humidity:	55 %
Air Pressure:	101 kPa

2.2. General Description of EUT

Product Name:	Audio and video wireless extender
Model/Type reference:	LY-HE30W
Power supply:	DC 5V
5G Wi-Fi :	
Supported type:	20MHz system
	802.11a
	802.11n
Operation frequency:	5180-5240MHz 5260-5320MHz 5500-5700MHz 5745-5825MHz
Modulation:	OFDM
Channel number:	24
Channel separation:	20MHz
Antenna type:	PCB Antenna
Antenna gain:	2.0dBi
MIMO:	Not Supported
TPC:	Not Supported
DFS Type:	Slave without Radar Detection

Note1: For more details, please refer to the user's manual of the EUT.

Note2: Antenna gain provided by the applicant.

2.3. Description of Test Modes and Test Frequency

The Applicant provides communication tools software to control the EUT for staying in continuous transmitting (Duty Cycle more than 98%) and receiving mode for testing.

All test performed at the low, middle and high of operational frequency range of each mode.

Operation Frequency List Wi-Fi on 5G Band:

Operating band	20MHz	
	Channel	Frequency (MHz)
U-NII 1 (5150MHz-5250MHz)	36	5180
	40	5200
	44	5220
	48	5240
U-NII 2A (5120MHz-5350MHz)	52	5260
	56	5280
	60	5300
	64	5320
U-NII 2C (5470MHz-5725MHz)	100	5500
	104	5520
	108	5540
	112	5560
	116	5580
	132	5660
	136	5680
	140	5700
U-NII 3 (5725MHz-5850MHz)	149	5745
	153	5765
	157	5785
	161	5805
	165	5825

Note:

1. "--"Means no channel(s) available any more.
2. The line display in grey is those Channels/Frequencies select to test in this report for each operation mode.

Data Rate Used:

Preliminary tests were performed in different data rate to find the worst radiated emission. The data rate shown in the table below is the worst-case rate with respect to the specific test item. Investigation has been done on all the possible configurations for searching the worst cases. The following table is a list of the test modes shown in this test report.

Test Items	Mode	Data Rate
Maximum Conducted Output Power Power Spectral Density Emission Bandwidth(26dBm Bandwidth) Minimum Emission Bandwidth(6dBm Bandwidth) Undesirable emission Frequency Stability	11a/OFDM	6 Mbps
	11n(20MHz), /OFDM	7.2 Mbps

2.4. Equipments Used during the Test

Conducted Emission						
Item	Test Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal.Due
	EMI Test Receiver	ROHDE & SCHWARZ	ESCI	1166.5950.03	2024/04/30	2025/04/29
	LISN	ROHDE & SCHWARZ	ESH2-Z5	860014/010	2024/04/30	2025/04/29
	Limitator	ROHDE & SCHWARZ	ESH3-Z2	100408	2024/04/30	2025/04/29
Software:						
Name of Software:				Version:		
ES-K1				V1.71		

Radiated Emissions and Band Edge					
Test Equipment	Manufacturer	Model No.	Serial No.	Calibration Date	Calibration Due Date
Active Loop Antenna	Da Ze	ZN30900A	/	2024/04/30	2025/04/29
Double cone logarithmic antenna	Schwarzbeck	VULB 9168	824	2023/02/13	2026/02/12
Horn Antenna	Sunol Sciences Corp.	DRH-118	A062013	2021/12/23	2024/12/22
Horn Antenna	Ocean Microwave	OBH1004 00	26999002	2021/12/22	2024/12/21
Amplifier	MRT Technology(Suzhou)Co., Ltd	MRT-AP0 1M06	S-001	2024/04/30	2025/04/29
Amplifier	Agilent	8449B	3008A02306	2024/04/30	2025/04/29
Amplifier	Brief&Smart	LNA-4018	2104197	2024/05/03	2025/05/02
EMI Test Receiver	ROHDE & SCHWARZ	ESCI	1166.5950.03	2024/04/30	2025/04/29
Spectrum Analyzer	RS	FSP	1164.4391.38	2024/05/03	2025/05/02
Test software					
Name of Software			Version		
EZ_EMG(Below 1GHz)			V1.1.4.2		
EZ_EMG(Above 1GHz)			V1.1.4.2		

Maximum Peak Output Power & 20dB Bandwidth & Frequency Separation & Number of hopping frequency & Dwell Time & Out-of-band Emissions					
Test Equipment	Manufacturer	Model No.	Serial No.	Calibration Date	Calibration Due Date
Spectrum Analyzer	Keysight	N9020A	MY53420874	2024/05/01	2025/04/30
Temperature/Humidity Meter	Ji Yu	MC501	/	2024/05/04	2025/05/03
Test Software					

Name of Software	Version
TST-PASS	V2.0

2.5. Related Submittal(s) / Grant (s)

This submittal(s) (test report) is intended to comply with Section 15.407 of the FCC Part 15, Subpart E Rules.

2.6. Modifications

No modifications were implemented to meet testing criteria.

3. TEST CONDITIONS AND RESULTS

3.1. Conducted Emissions Test

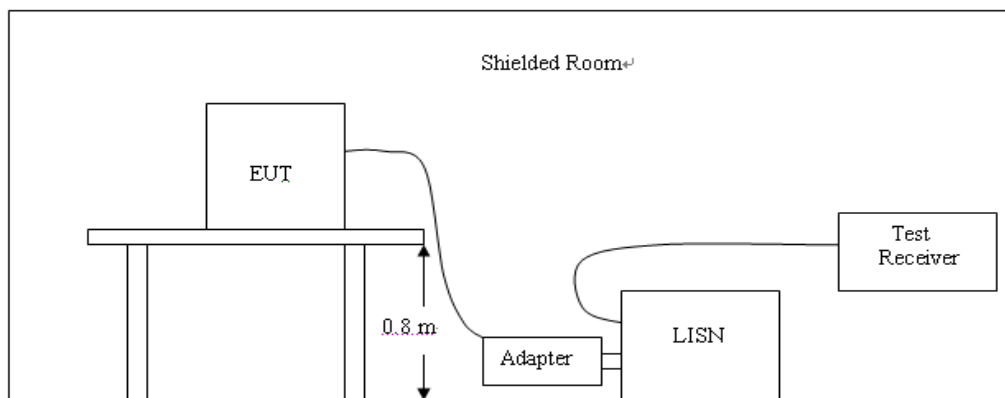
LIMIT

According to FCC CFR Title 47 Part 15 Subpart C Section 15.207, AC Power Line Conducted Emissions Limits for Licence-Exempt Radio Apparatus as below:

Frequency range (MHz)	Limit (dBuV)	
	Quasi-peak	Average
0.15-0.5	66 to 56*	56 to 46*
0.5-5	56	46
5-30	60	50

* Decreases with the logarithm of the frequency.

TEST CONFIGURATION

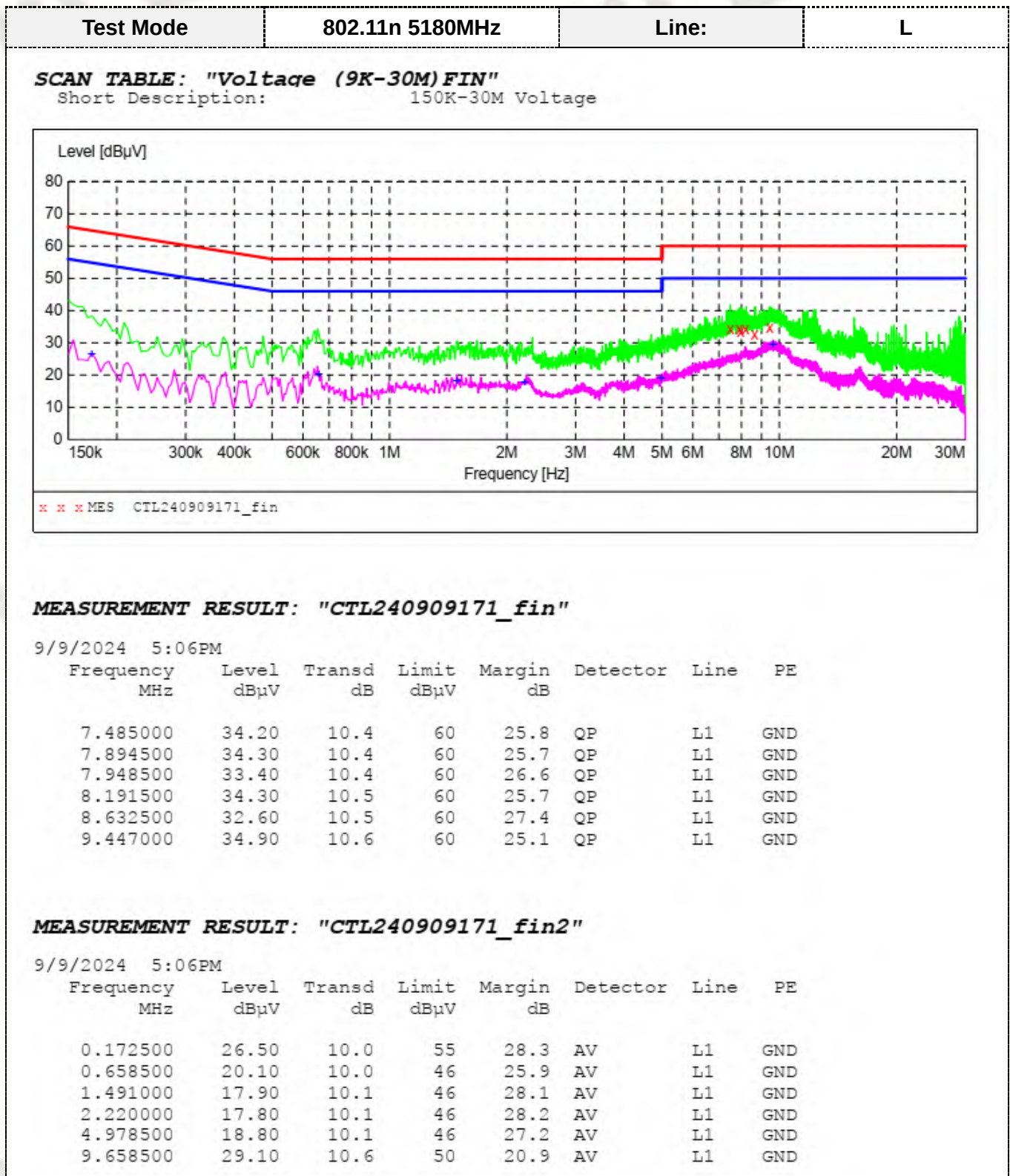


TEST PROCEDURE

1. The equipment was set up as per the test configuration to simulate typical actual usage per the user's manual. The EUT is a Laser Projector system; a wooden table with a height of 0.8 meters is used and is placed on the ground plane as per ANSI C63.10:2013.
2. Support equipment, if needed, was placed as per ANSI C63.10:2013.
3. All I/O cables were positioned to simulate typical actual usage as per ANSI C63.10:2013.
4. The adapter received AC120V/60Hz power through a Line Impedance Stabilization Network (LISN) which supplied power source and was grounded to the ground plane.
5. All support equipments received AC power from a second LISN, if any.
6. The EUT test program was started. Emissions were measured on each current carrying line of the EUT using a spectrum Analyzer / Receiver connected to the LISN powering the EUT. The LISN has two monitoring points: Line 1 (Hot Side) and Line 2 (Neutral Side). Two scans were taken: one with Line 1 connected to Analyzer / Receiver and Line 2 connected to a 50 ohm load; the second scan had Line 1 connected to a 50 ohm load and Line 2 connected to the Analyzer / Receiver.
7. Analyzer / Receiver scanned from 150 KHz to 30MHz for emissions in each of the test modes.
8. During the above scans, the emissions were maximized by cable manipulation.

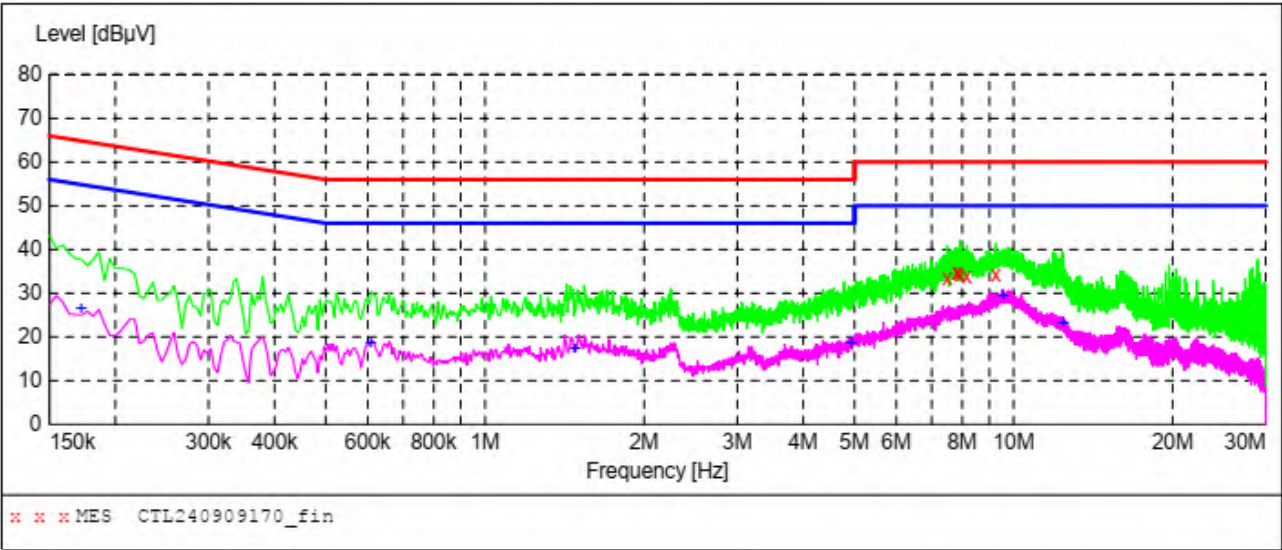
TEST RESULTS

Remark: 802.11a / 802.11n (HT20) all have been tested, only worse case is reported



Test Mode	802.11n 5180MHz	Line:	N
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SCAN TABLE: "Voltage (9K-30M)FIN"
Short Description: 150K-30M Voltage



MEASUREMENT RESULT: "CTL240909170_fin"

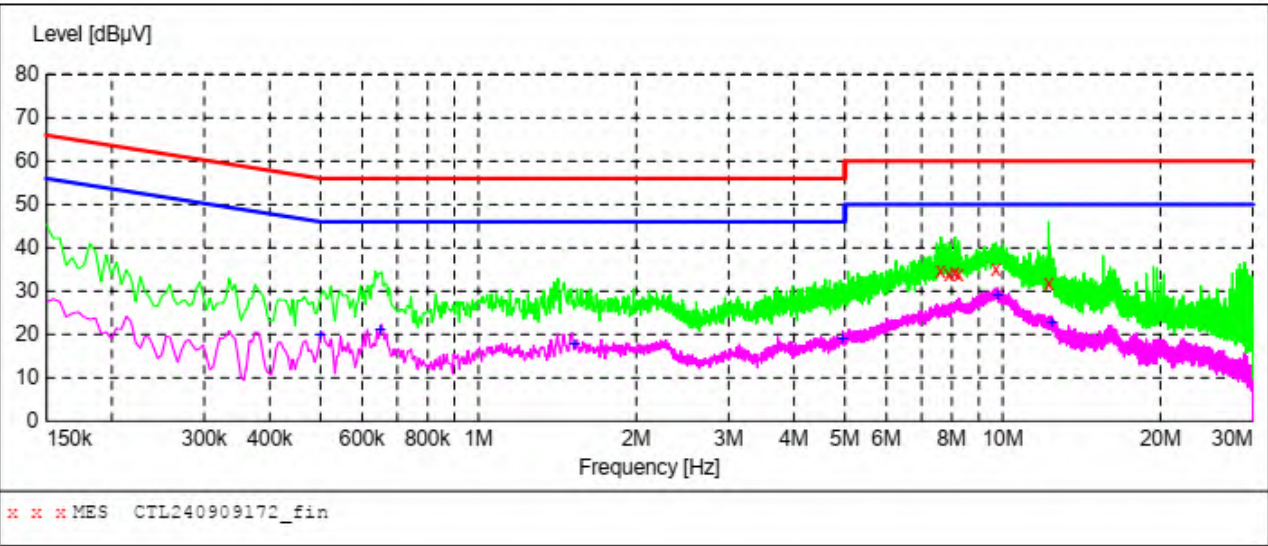
9/9/2024 5:03PM							
Frequency MHz	Level dBμV	Transd dB	Limit dBμV	Margin dB	Detector	Line	PE
7.485000	33.60	10.4	60	26.4	QP	N	GND
7.818000	34.90	10.4	60	25.1	QP	N	GND
7.831500	34.50	10.4	60	25.5	QP	N	GND
7.885500	34.40	10.4	60	25.6	QP	N	GND
8.142000	33.80	10.5	60	26.2	QP	N	GND
9.258000	34.30	10.6	60	25.7	QP	N	GND

MEASUREMENT RESULT: "CTL240909170_fin2"

9/9/2024 5:03PM							
Frequency MHz	Level dBμV	Transd dB	Limit dBμV	Margin dB	Detector	Line	PE
0.172500	26.20	10.0	55	28.6	AV	N	GND
0.609000	18.40	10.0	46	27.6	AV	N	GND
1.482000	17.20	10.1	46	28.8	AV	N	GND
4.942500	18.50	10.1	46	27.5	AV	N	GND
9.573000	29.10	10.6	50	20.9	AV	N	GND
12.435000	23.10	10.9	50	26.9	AV	N	GND

Test Mode	802.11n 5260MHz	Line:	L
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SCAN TABLE: "Voltage (9K-30M) FIN"
Short Description: 150K-30M Voltage



MEASUREMENT RESULT: "CTL240909172_fin"

9/9/2024 5:10PM							
Frequency MHz	Level dBuV	Transd dB	Limit dBuV	Margin dB	Detector	Line	PE
7.615500	34.50	10.4	60	25.5	QP	L1	GND
7.881000	34.00	10.4	60	26.0	QP	L1	GND
8.115000	34.10	10.5	60	25.9	QP	L1	GND
8.227500	34.00	10.5	60	26.0	QP	L1	GND
9.694500	35.00	10.6	60	25.0	QP	L1	GND
12.237000	31.90	10.9	60	28.1	QP	L1	GND

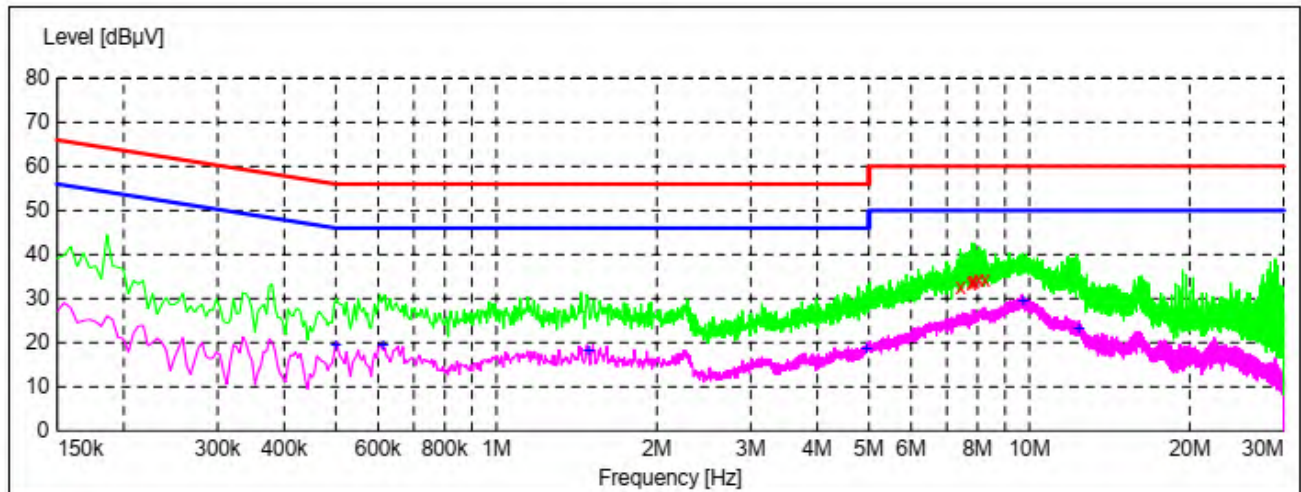
MEASUREMENT RESULT: "CTL240909172_fin2"

9/9/2024 5:10PM							
Frequency MHz	Level dBuV	Transd dB	Limit dBuV	Margin dB	Detector	Line	PE
0.501000	19.70	10.0	46	26.3	AV	L1	GND
0.649500	20.90	10.0	46	25.1	AV	L1	GND
1.527000	17.80	10.1	46	28.2	AV	L1	GND
4.960500	18.70	10.1	46	27.3	AV	L1	GND
9.802500	28.90	10.6	50	21.1	AV	L1	GND
12.448500	22.70	10.9	50	27.3	AV	L1	GND

Test Mode	802.11n 5260MHz	Line:	N
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SCAN TABLE: "Voltage (9K-30M)FIN"

Short Description: 150K-30M Voltage



*** MES CTL240909173_fin

MEASUREMENT RESULT: "CTL240909173_fin"

9/9/2024 5:14PM

Frequency MHz	Level dBμV	Transd dB	Limit dBμV	Margin dB	Detector	Line	PE
7.422000	32.80	10.4	60	27.2	QP	N	GND
7.782000	33.40	10.4	60	26.6	QP	N	GND
7.813500	34.00	10.4	60	26.0	QP	N	GND
7.876500	33.70	10.4	60	26.3	QP	N	GND
8.038500	34.40	10.4	60	25.6	QP	N	GND
8.241000	34.10	10.5	60	25.9	QP	N	GND

MEASUREMENT RESULT: "CTL240909173_fin2"

9/9/2024 5:14PM

Frequency MHz	Level dBμV	Transd dB	Limit dBμV	Margin dB	Detector	Line	PE
0.501000	19.10	10.0	46	26.9	AV	N	GND
0.613500	19.20	10.0	46	26.8	AV	N	GND
1.491000	17.90	10.1	46	28.1	AV	N	GND
4.956000	18.40	10.1	46	27.6	AV	N	GND
9.739500	29.10	10.6	50	20.9	AV	N	GND
12.417000	22.90	10.9	50	27.1	AV	N	GND

Test Mode

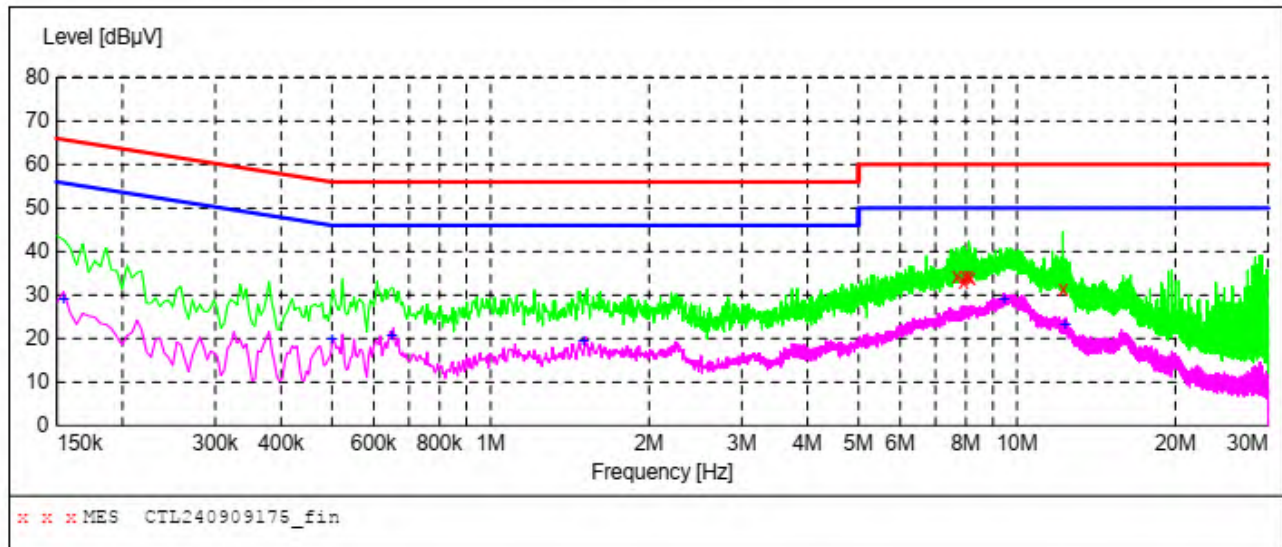
802.11n 5500MHz

Line:

L

SCAN TABLE: "Voltage (9K-30M)FIN"

Short Description: 150K-30M Voltage

**MEASUREMENT RESULT: "CTL240909175_fin"**

9/9/2024 5:21PM

Frequency MHz	Level dBμV	Transd dB	Limit dBμV	Margin dB	Detector	Line	PE
7.692000	34.10	10.4	60	25.9	QP	L1	GND
7.921500	33.10	10.4	60	26.9	QP	L1	GND
7.966500	34.40	10.4	60	25.6	QP	L1	GND
8.092500	34.40	10.4	60	25.6	QP	L1	GND
8.178000	33.90	10.5	60	26.1	QP	L1	GND
12.246000	31.40	10.9	60	28.6	QP	L1	GND

MEASUREMENT RESULT: "CTL240909175_fin2"

9/9/2024 5:21PM

Frequency MHz	Level dBμV	Transd dB	Limit dBμV	Margin dB	Detector	Line	PE
0.154500	28.70	10.0	56	27.1	AV	L1	GND
0.501000	19.80	10.0	46	26.2	AV	L1	GND
0.649500	20.70	10.0	46	25.3	AV	L1	GND
1.504500	19.10	10.1	46	26.9	AV	L1	GND
9.469500	28.90	10.6	50	21.1	AV	L1	GND
12.376500	23.20	10.9	50	26.8	AV	L1	GND

Test Mode

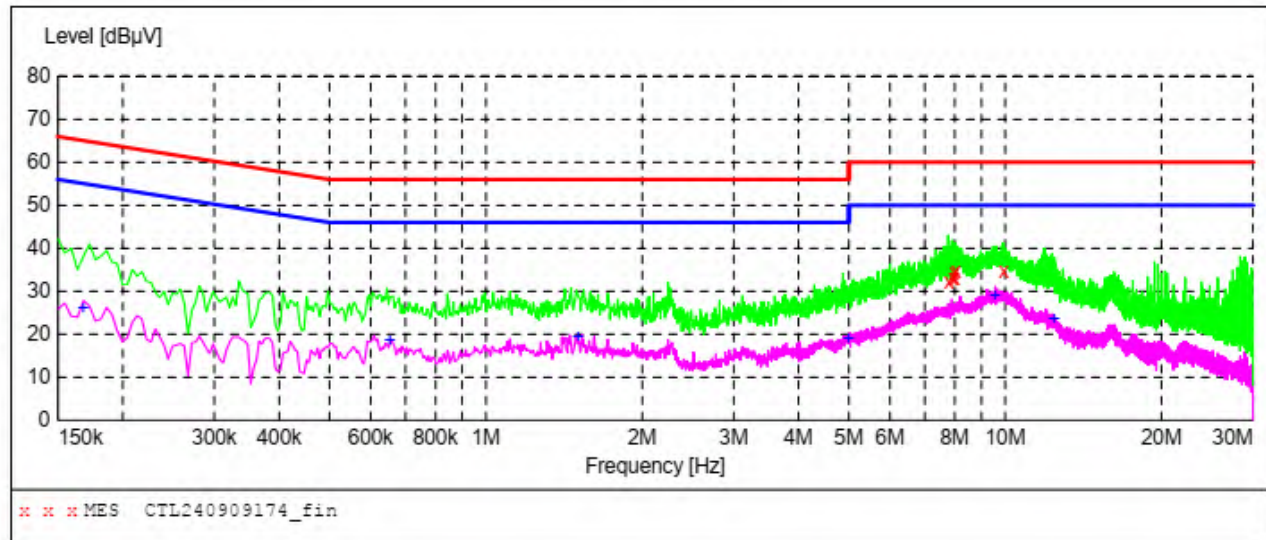
802.11n 5500MHz

Line:

N

SCAN TABLE: "Voltage (9K-30M) FIN"

Short Description: 150K-30M Voltage

**MEASUREMENT RESULT: "CTL240909174_fin"**

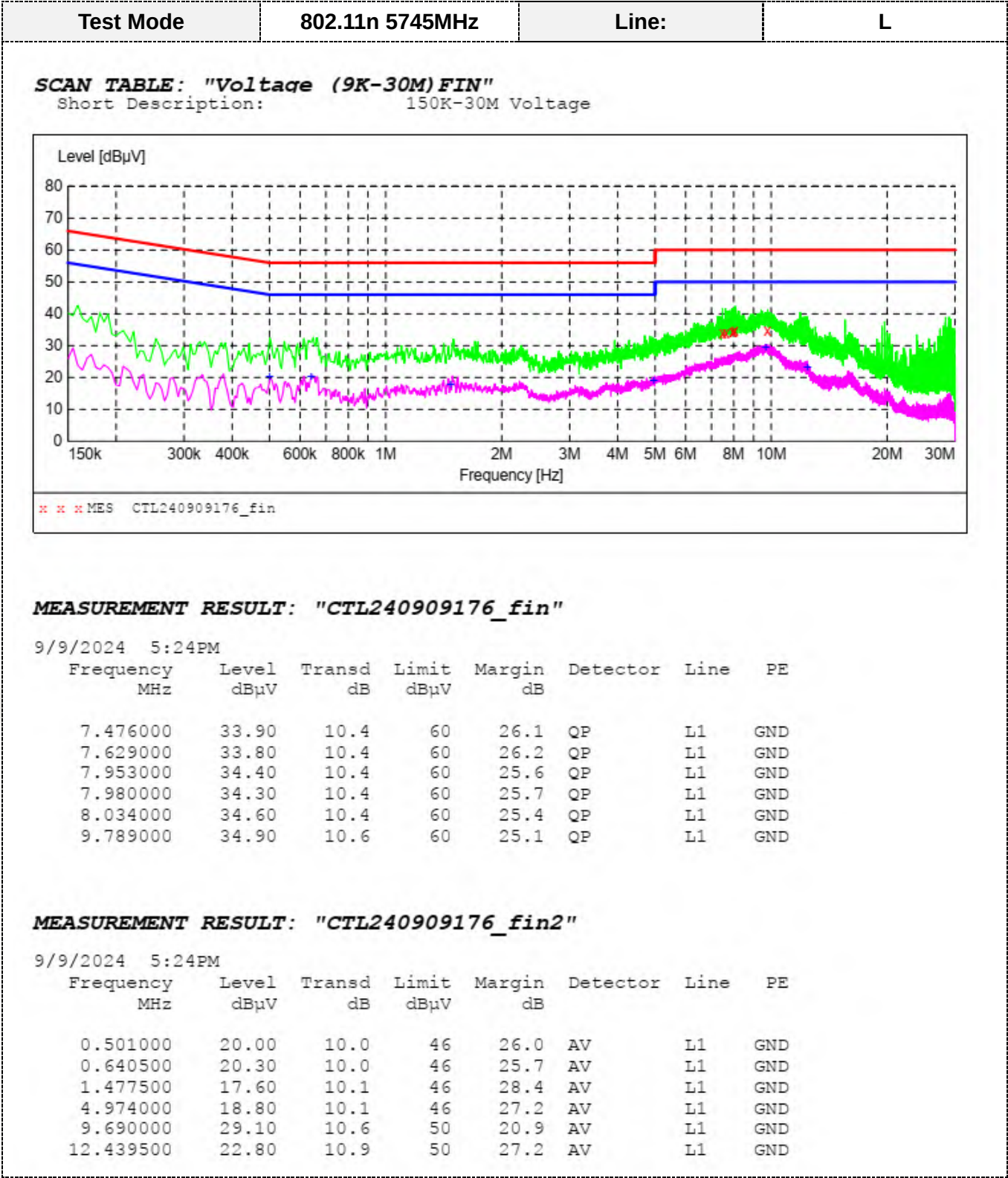
9/9/2024 5:17PM

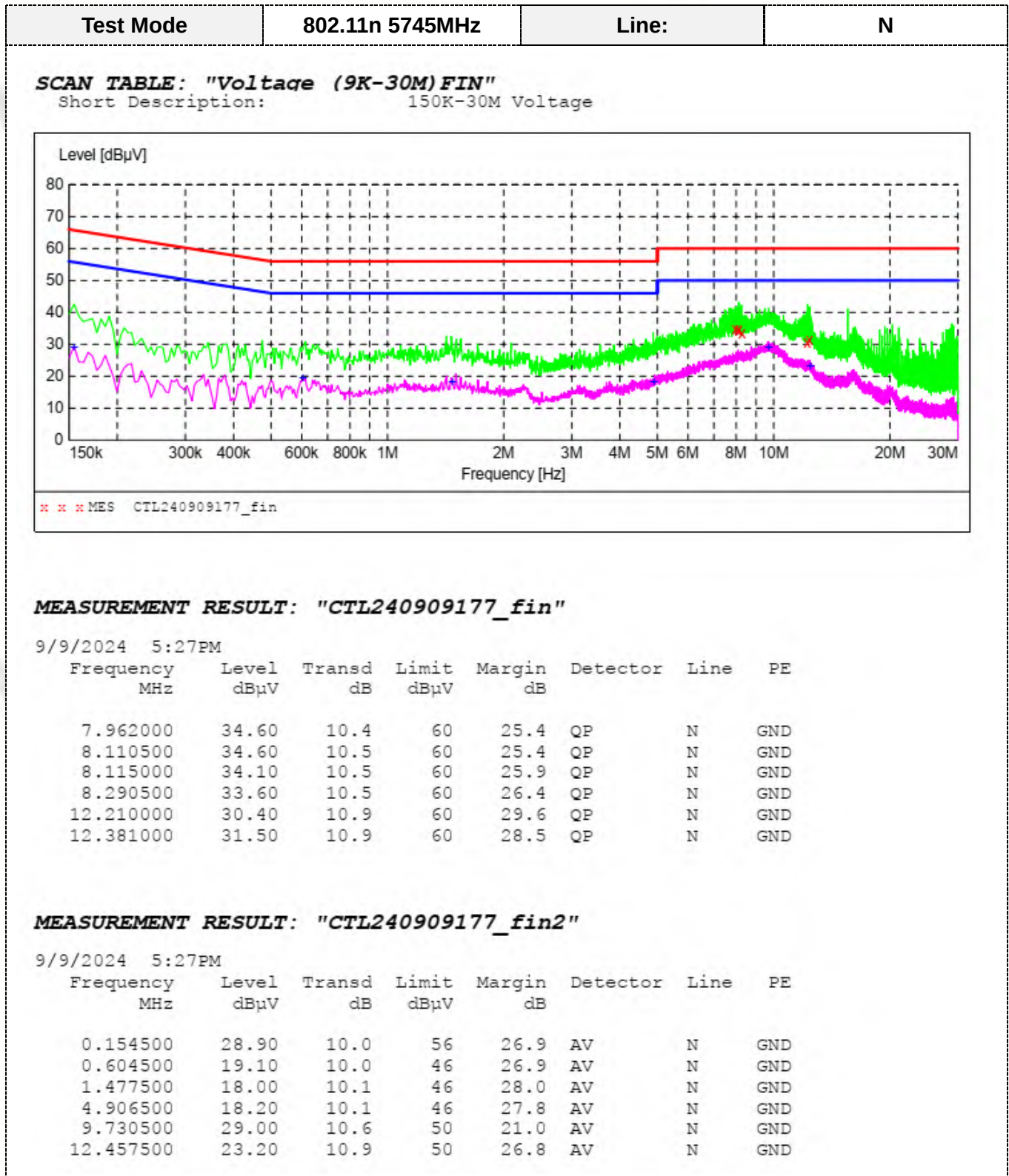
Frequency MHz	Level dBuV	Transd dB	Limit dBuV	Margin dB	Detector	Line	PE
7.800000	32.30	10.4	60	27.7	QP	N	GND
7.930500	33.10	10.4	60	26.9	QP	N	GND
7.980000	34.40	10.4	60	25.6	QP	N	GND
7.998000	33.10	10.4	60	26.9	QP	N	GND
8.034000	34.50	10.4	60	25.5	QP	N	GND
9.924000	34.50	10.6	60	25.5	QP	N	GND

MEASUREMENT RESULT: "CTL240909174_fin2"

9/9/2024 5:17PM

Frequency MHz	Level dBuV	Transd dB	Limit dBuV	Margin dB	Detector	Line	PE
0.168000	25.90	10.0	55	29.2	AV	N	GND
0.654000	18.40	10.0	46	27.6	AV	N	GND
1.509000	19.10	10.1	46	26.9	AV	N	GND
4.992000	18.70	10.1	46	27.3	AV	N	GND
9.582000	28.90	10.6	50	21.1	AV	N	GND
12.435000	23.40	10.9	50	26.6	AV	N	GND





Remark: Level(dBuV)=Reading(dBuV)+Transd.(dB)
Margin=Limit(dBuV)- Level(dBuV)

3.2. Radiated Emissions

Limit

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: 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.

Undesirable emission limits

Requirement	Limit(EIRP)	Limit (Field strength at 3m) Note1
15.407(b)(1)	PK:-27(dBm/MHz)	PK:68.2(dBμV/m)
15.407(b)(2)		
15.407(b)(3)		
15.407(b)(4)		

Note1: The following formula is used to convert the equipment isotropic radiated power (eirp) to field strength:

$$E = \frac{1000000\sqrt{30P}}{3} \mu\text{V/m, where P is the eirp (Watts)}$$

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

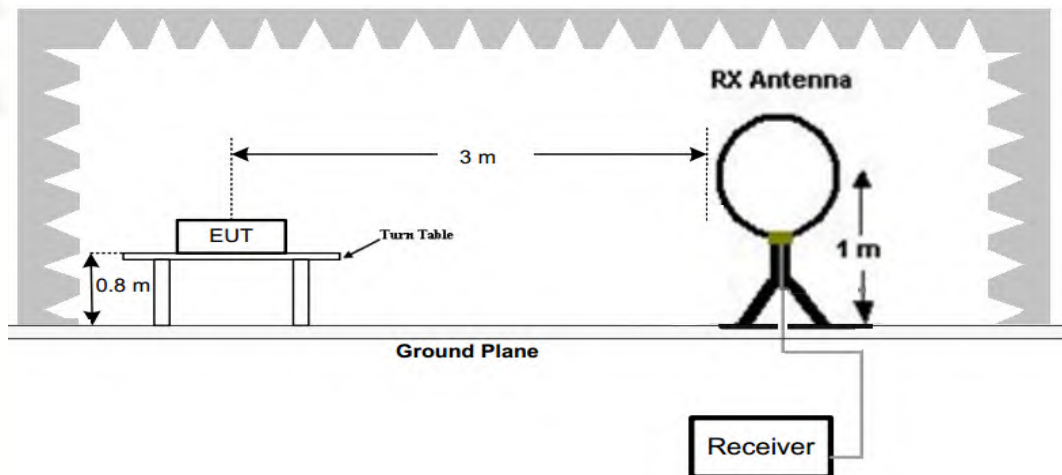
(6) In addition, radiated emissions which fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emission limits specified in §15.209(a)

Radiated emission limits

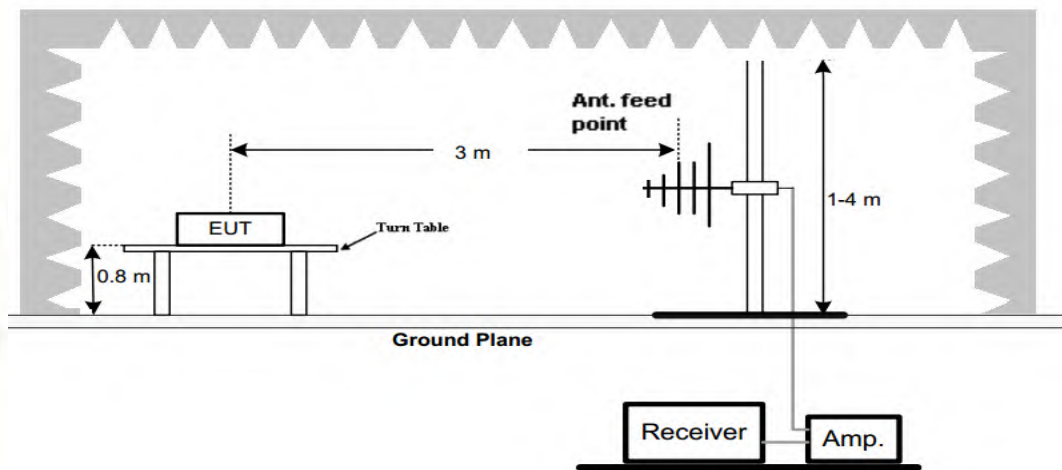
Frequency (MHz)	Distance (Meters)	Radiated (dBμV/m)	Radiated (μV/m)
0.009-0.49	3	$20\log(2400/F(\text{KHz}))+40\log(300/3)$	$2400/F(\text{KHz})$
0.49-1.705	3	$20\log(24000/F(\text{KHz}))+40\log(30/3)$	$24000/F(\text{KHz})$
1.705-30	3	$20\log(30)+40\log(30/3)$	30
30-88	3	40.0	100
88-216	3	43.5	150
216-960	3	46.0	200
Above 960	3	54.0	500

TEST CONFIGURATION

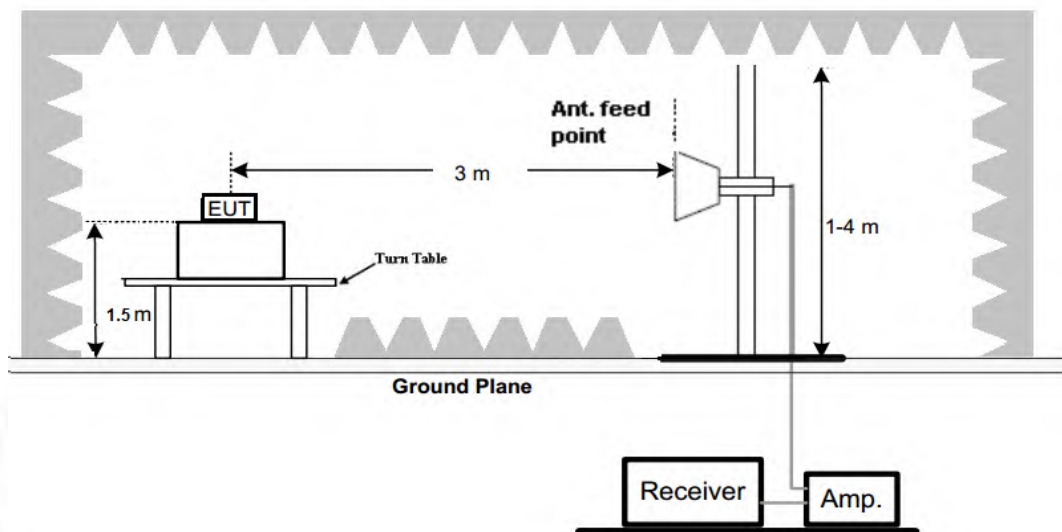
(A) Radiated Emission Test Set-Up, Frequency Below 30MHz



(B) Radiated Emission Test Set-Up, Frequency below 1000MHz



(C) Radiated Emission Test Set-Up, Frequency above 1000MHz



Test Procedure

- Below 1GHz measurement the EUT is placed on a turntable which is 0.8m above ground plane, and above 1GHz measurement EUT was placed on a low permittivity and low loss tangent turn table which is 1.5m above ground plane.
- Maximum procedure was performed by raising the receiving antenna from 1m to 4m and rotating the turn table from 0°C to 360°C to acquire the highest emissions from EUT
- And also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical.
- Repeat above procedures until all frequency measurements have been completed.
- Radiated emission test frequency band from 9KHz to 40GHz.
- The distance between test antenna and EUT as following table states:

Test Frequency range	Test Antenna Type	Test Distance
9KHz-30MHz	Active Loop Antenna	3
30MHz-1GHz	Bilog Antenna	3
1GHz-18GHz	Horn Antenna	3
18GHz-25GHz	Horn Antennna	1

- Setting test receiver/spectrum as following table states:

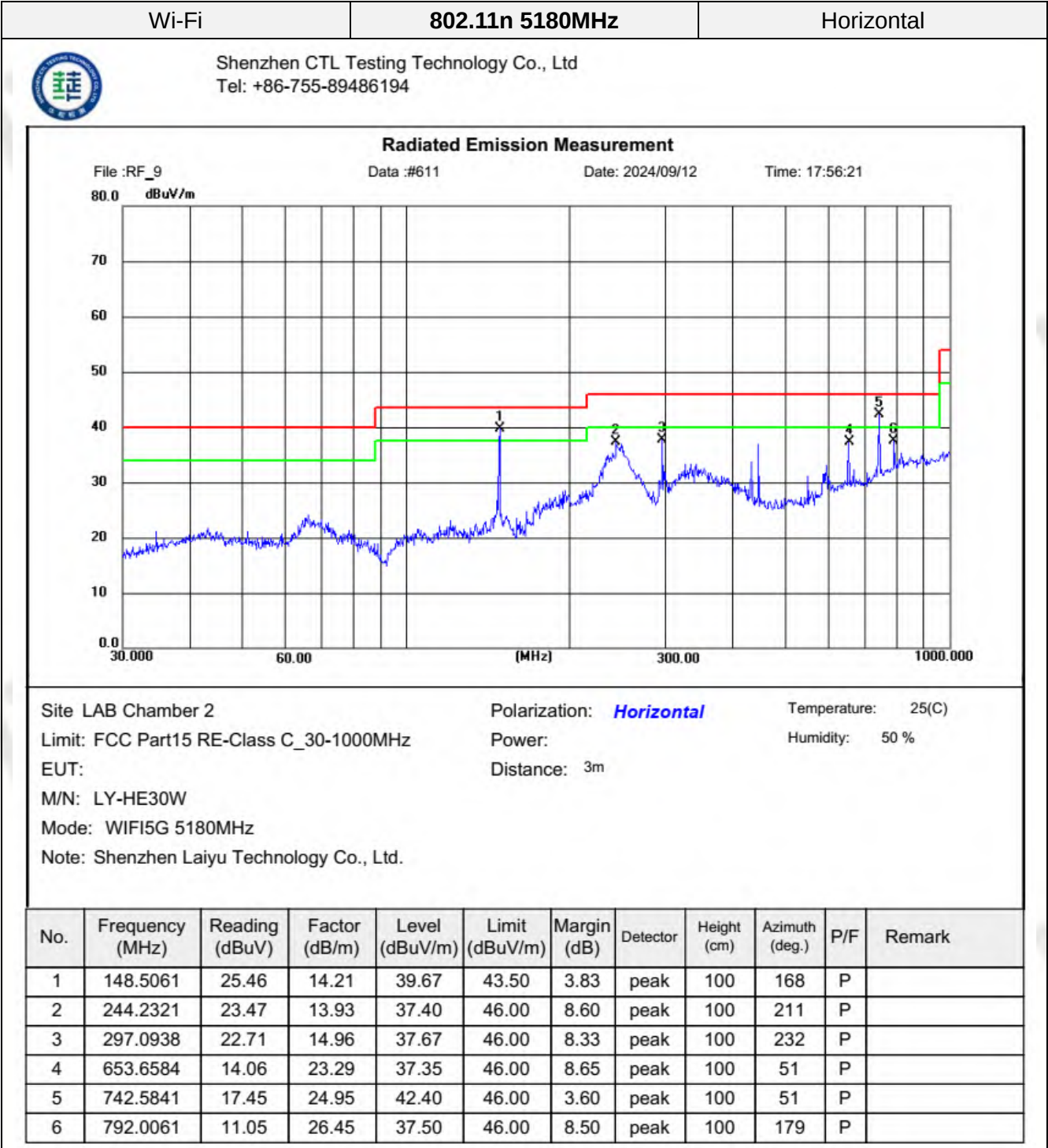
Test Frequency range	Test Receiver/Spectrum Setting	Detector
9KHz-150KHz	RBW=200Hz/VBW=3KHz, Sweep time=Auto	QP
150KHz-30MHz	RBW=9KHz/VBW=100KHz, Sweep time=Auto	QP
30MHz-1GHz	RBW=120KHz/VBW=1000KHz, Sweep time=Auto	QP
1GHz-40GHz	Peak Value: RBW=1MHz/VBW=3MHz, Sweep time=Auto Average Value: RBW=1MHz/VBW=10Hz, Sweep time=Auto	Peak

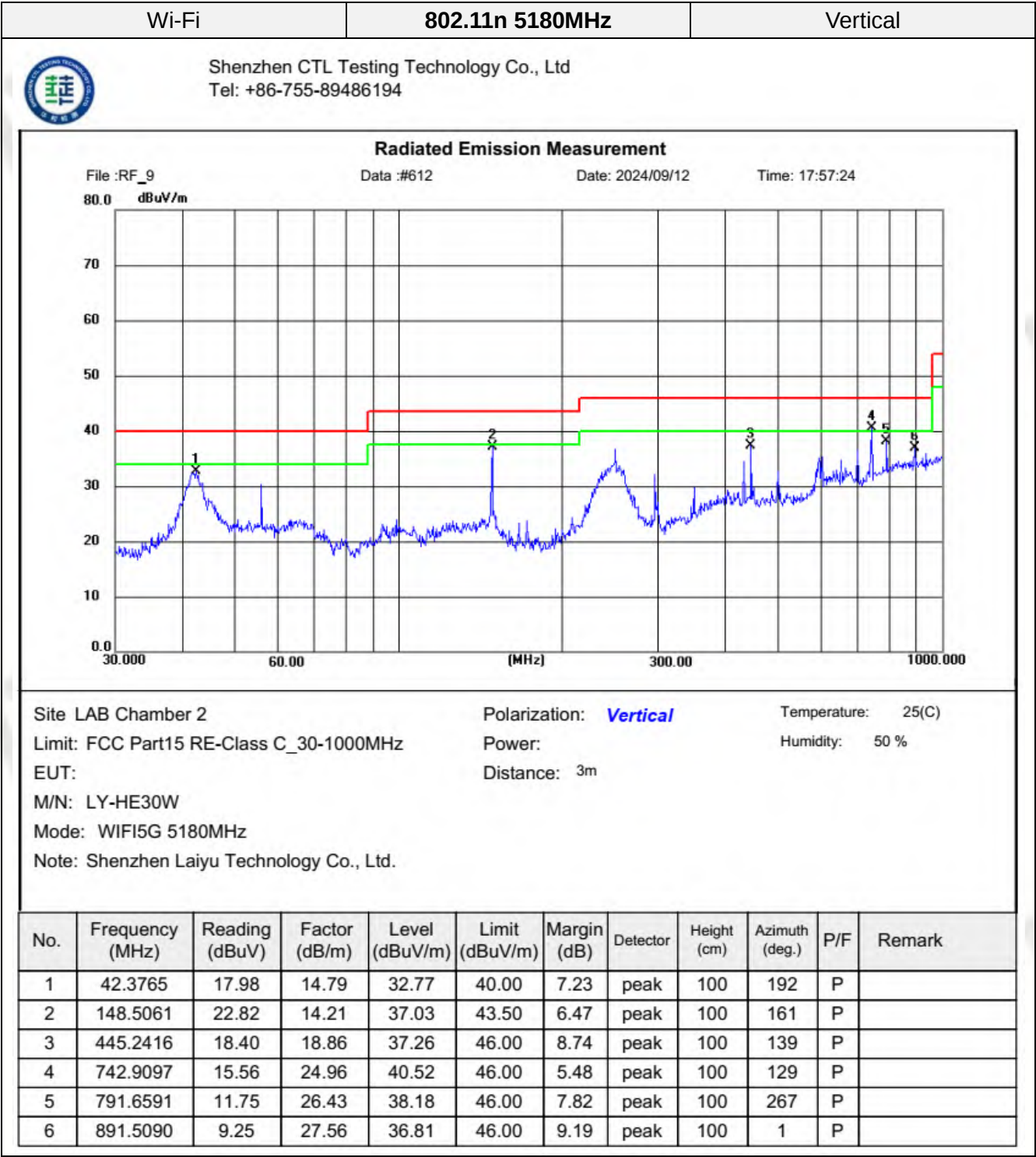
TEST RESULTS

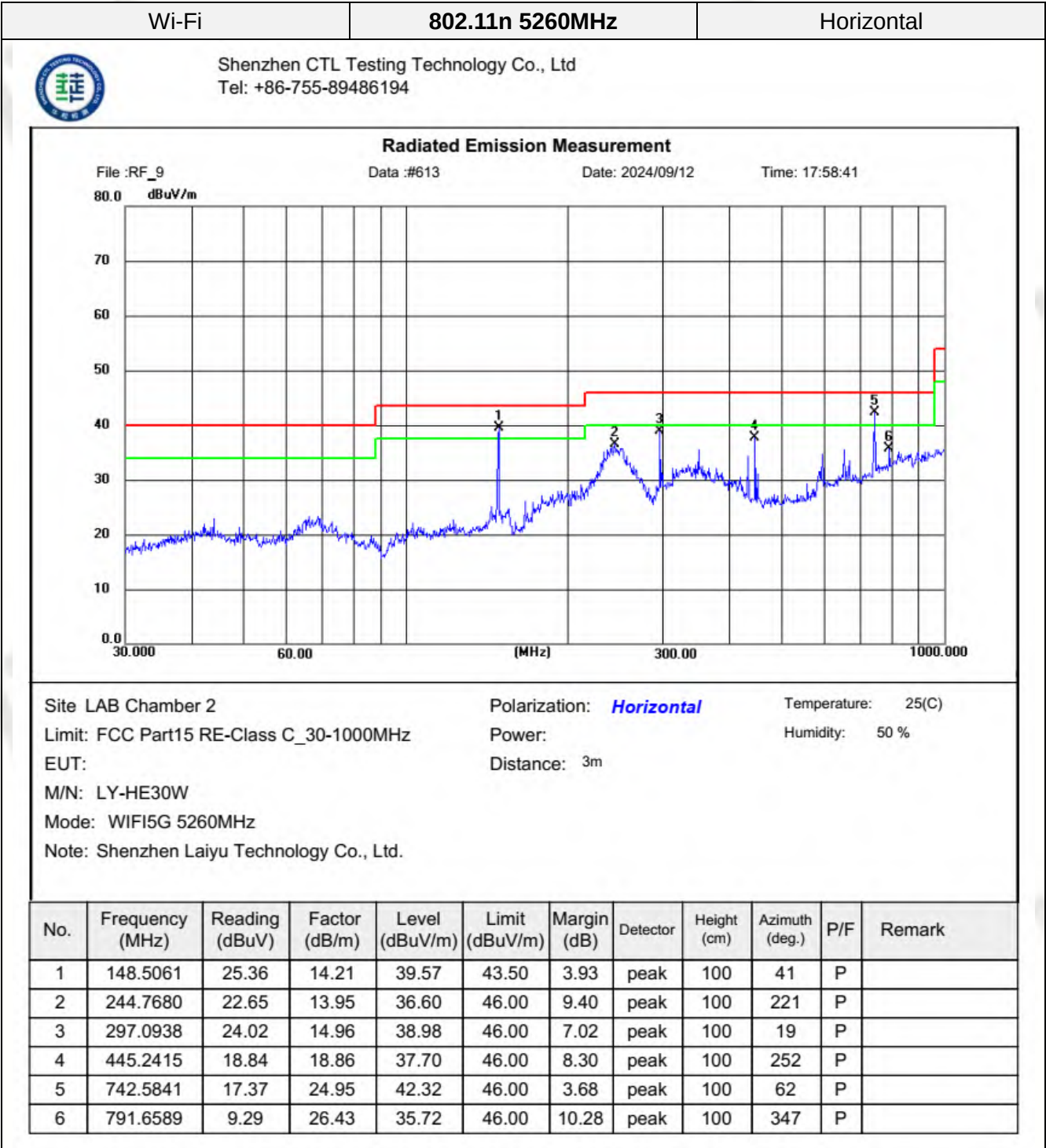
Remark:

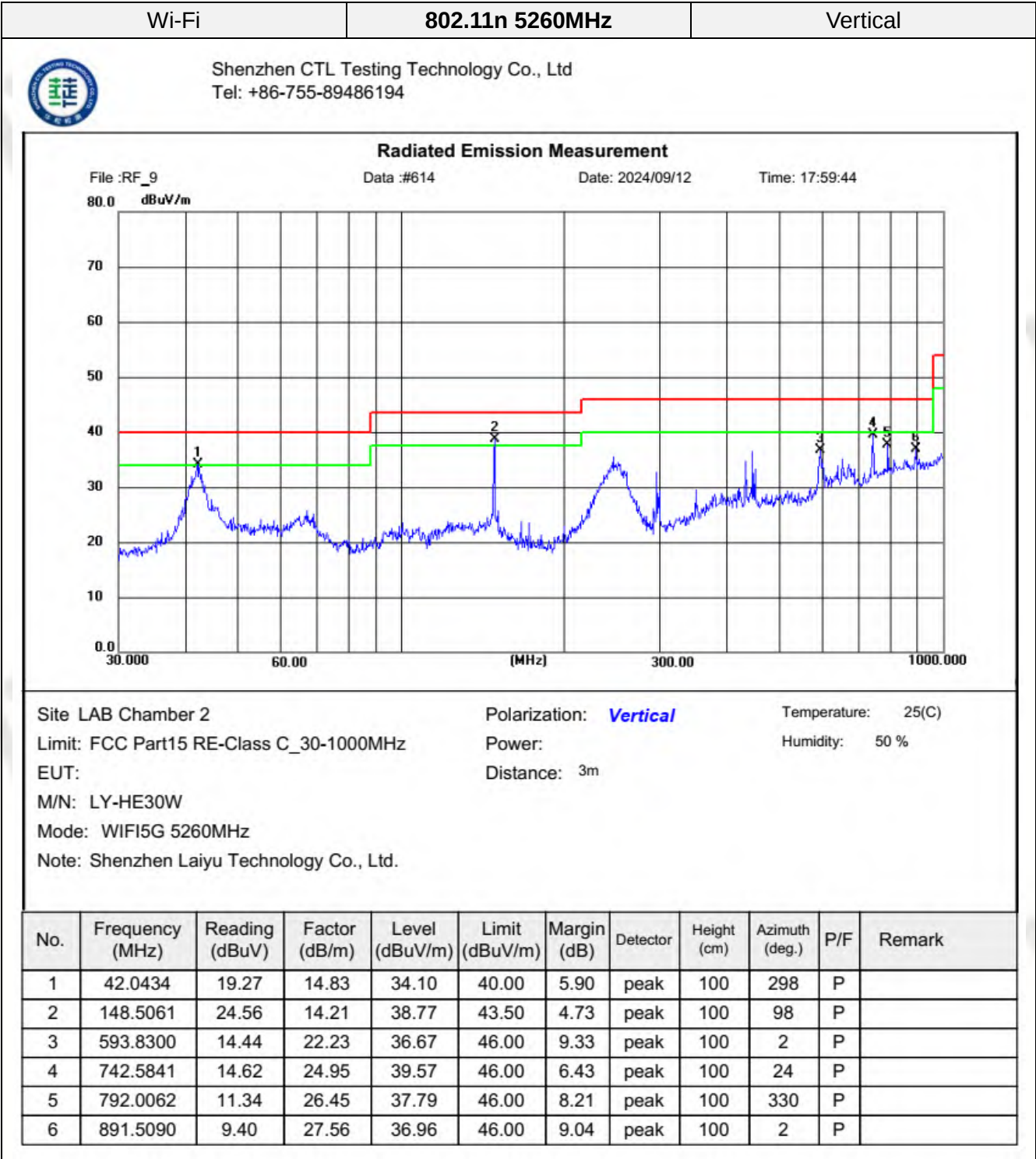
- This test was performed with EUT in X, Y, Z position and the worse case was found when EUT in X position.
- All modes U-NII 1,U-NII 2A,U-NII 2C,U-NII 3 All modulations 802.11a / 802.11n (HT20) have been tested have been tested for below 1GHz test, only the worst case 802.11n (HT20) low channel of U-NII 1 band was recorded.
- All modes U-NII 1,U-NII 2A,U-NII 2C,U-NII 3 All modulations 802.11a / 802.11n (HT20) have been tested for above 1GHz test, only the worst case 802.11n (HT20) was recorded.
- Radiated emission test from 9 KHz to 10th harmonic of fundamental was verified, and no emission found except system noise floor in 9 KHz to 30MHz and not recorded in this report.

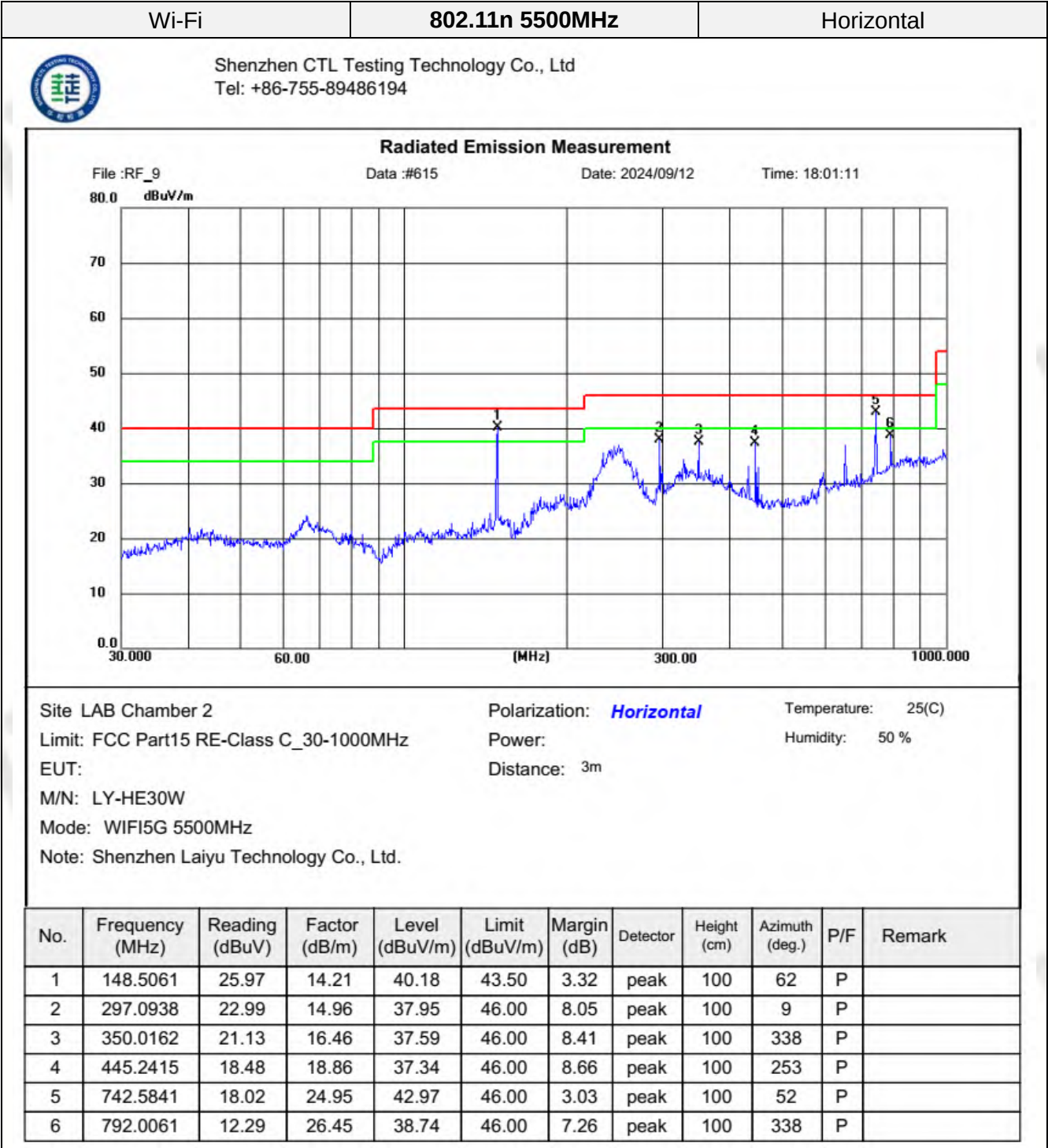
For 30MHz-1GHz

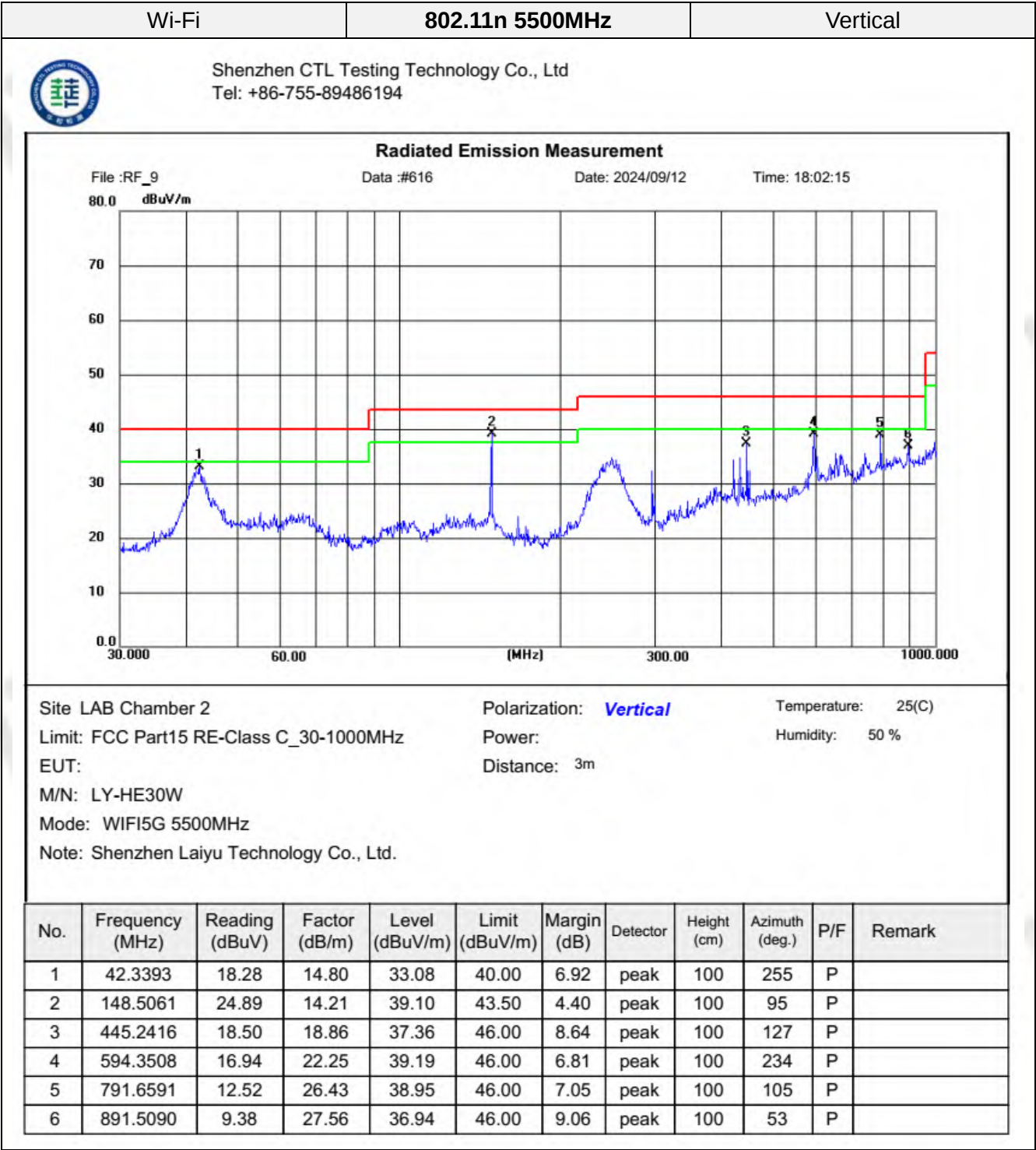


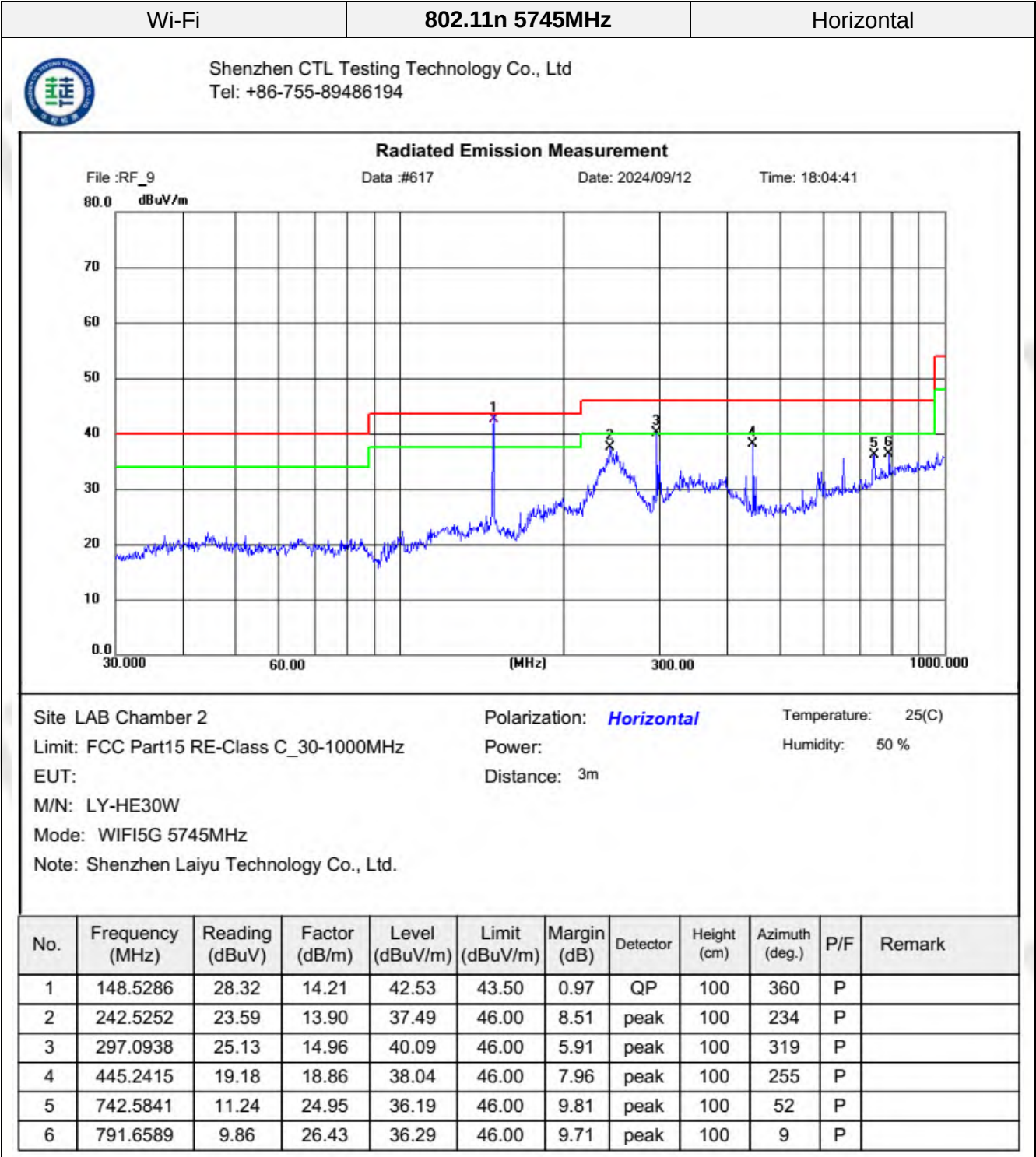


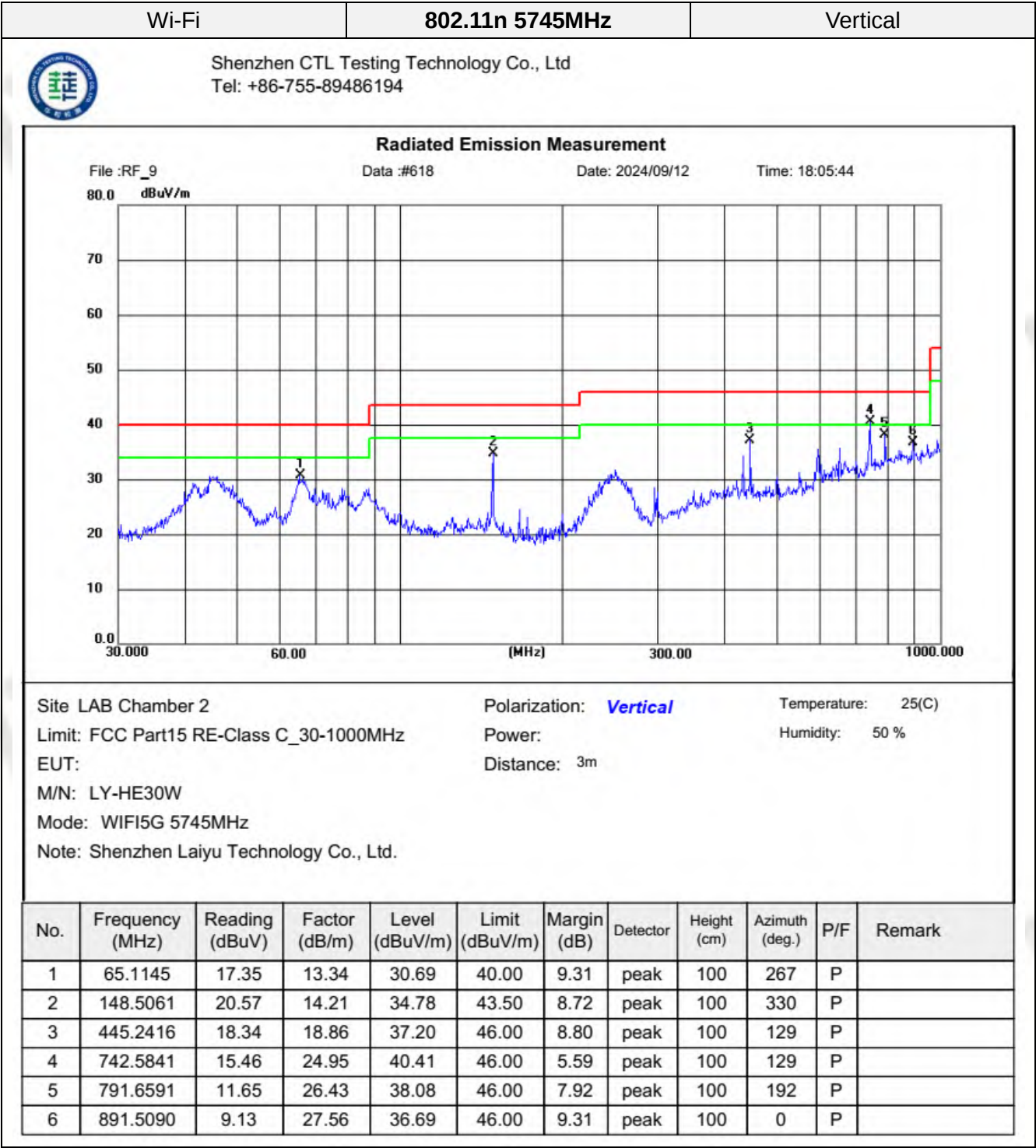








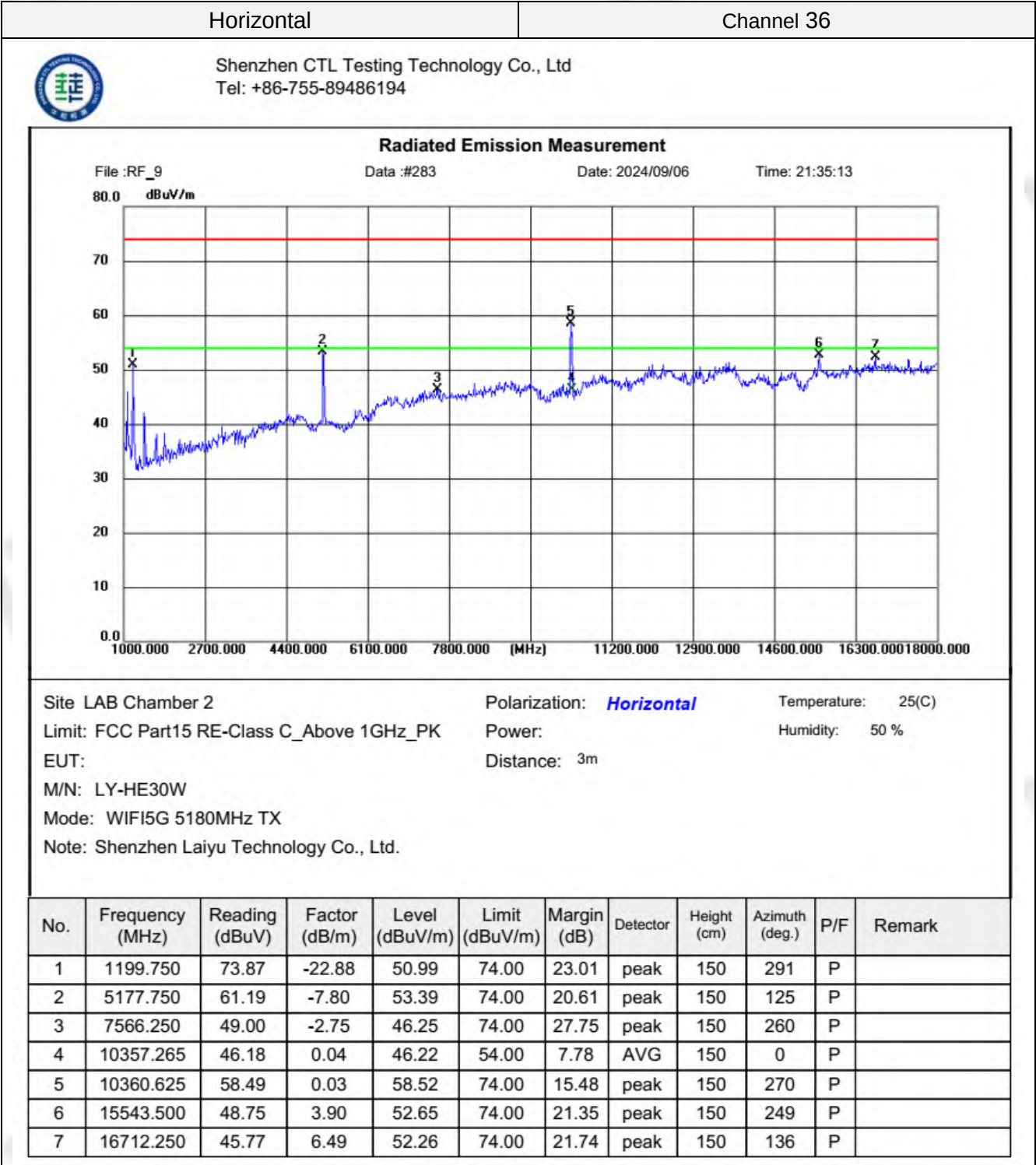


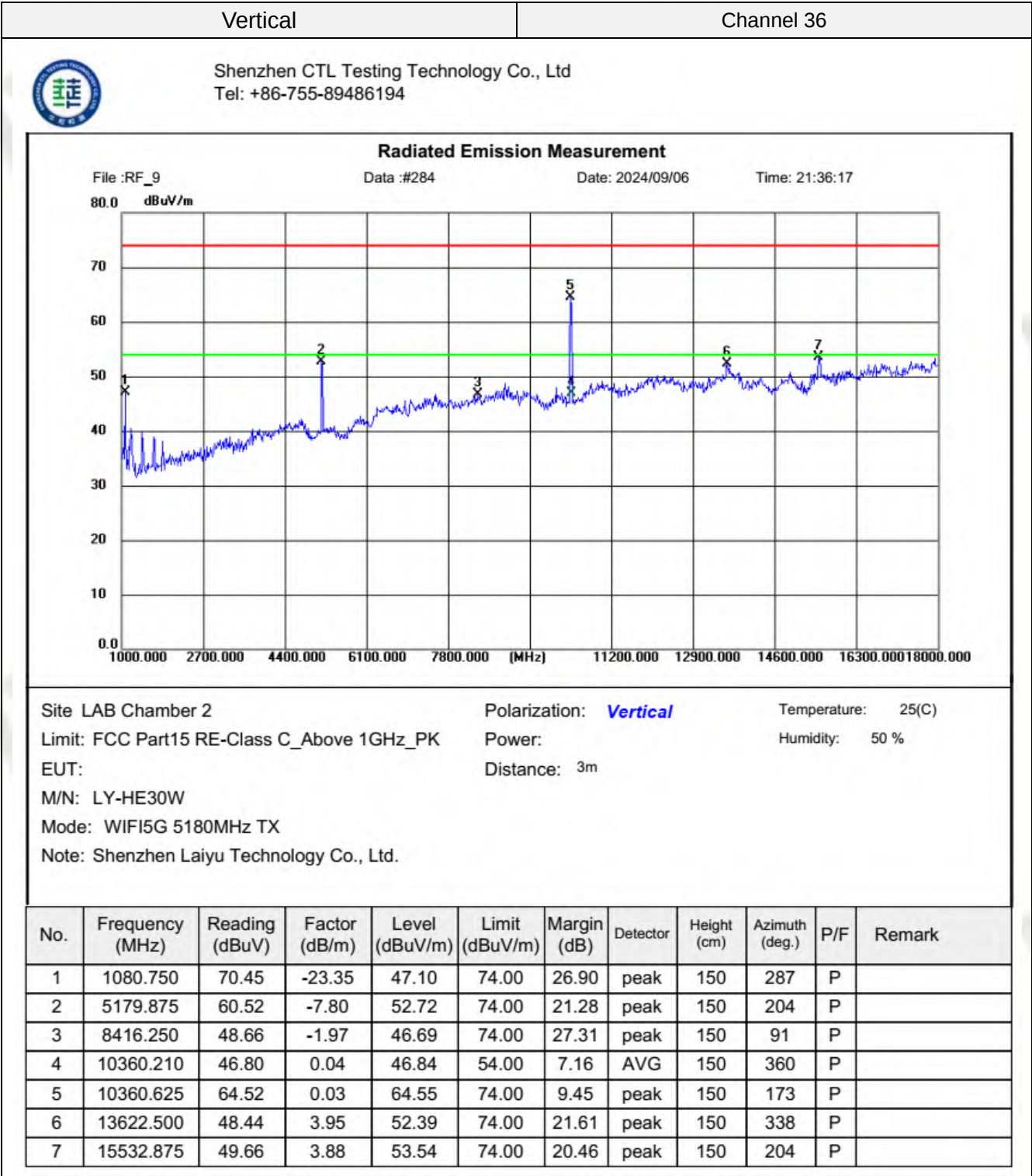


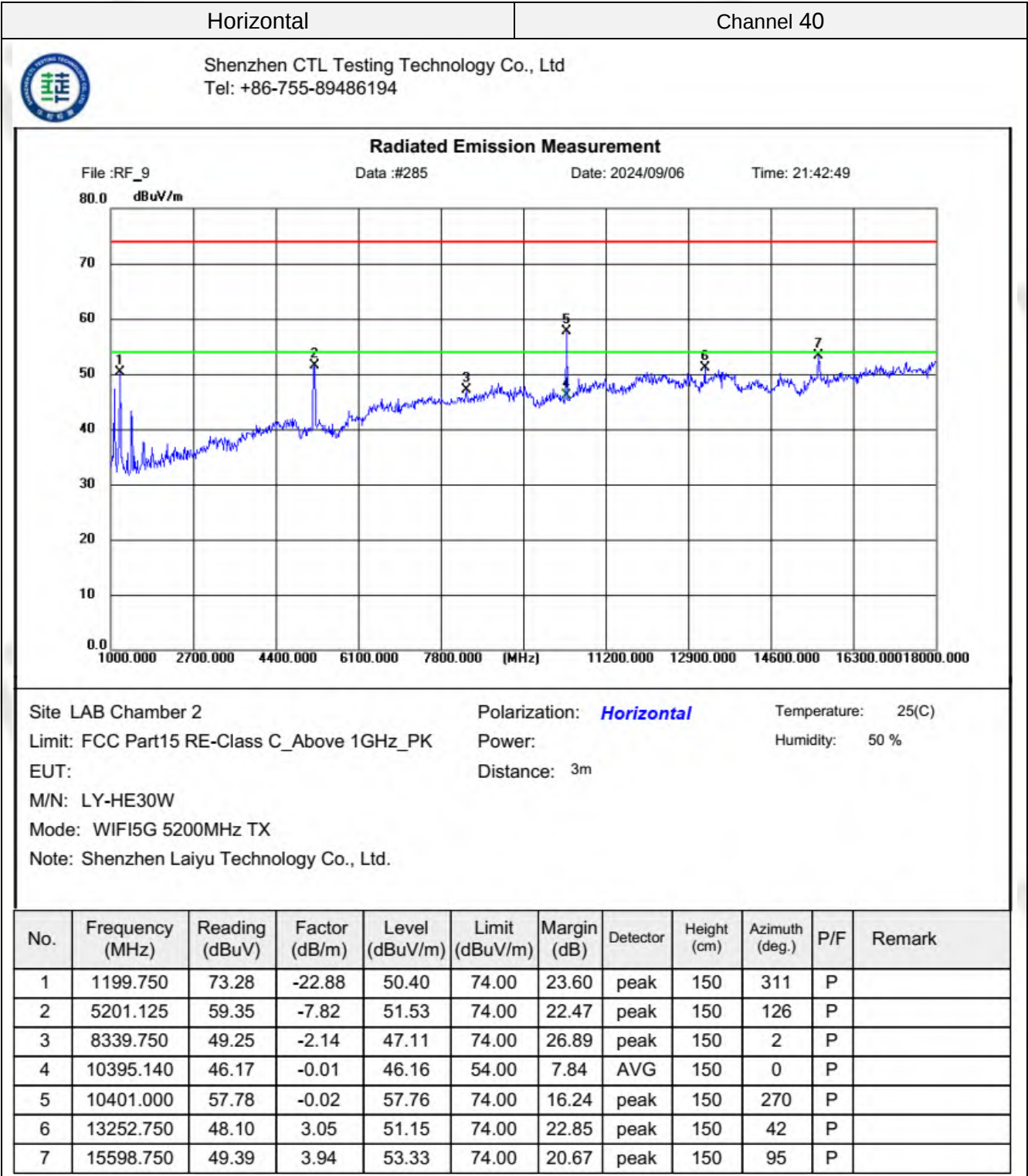
For 1GHz to 40GHz

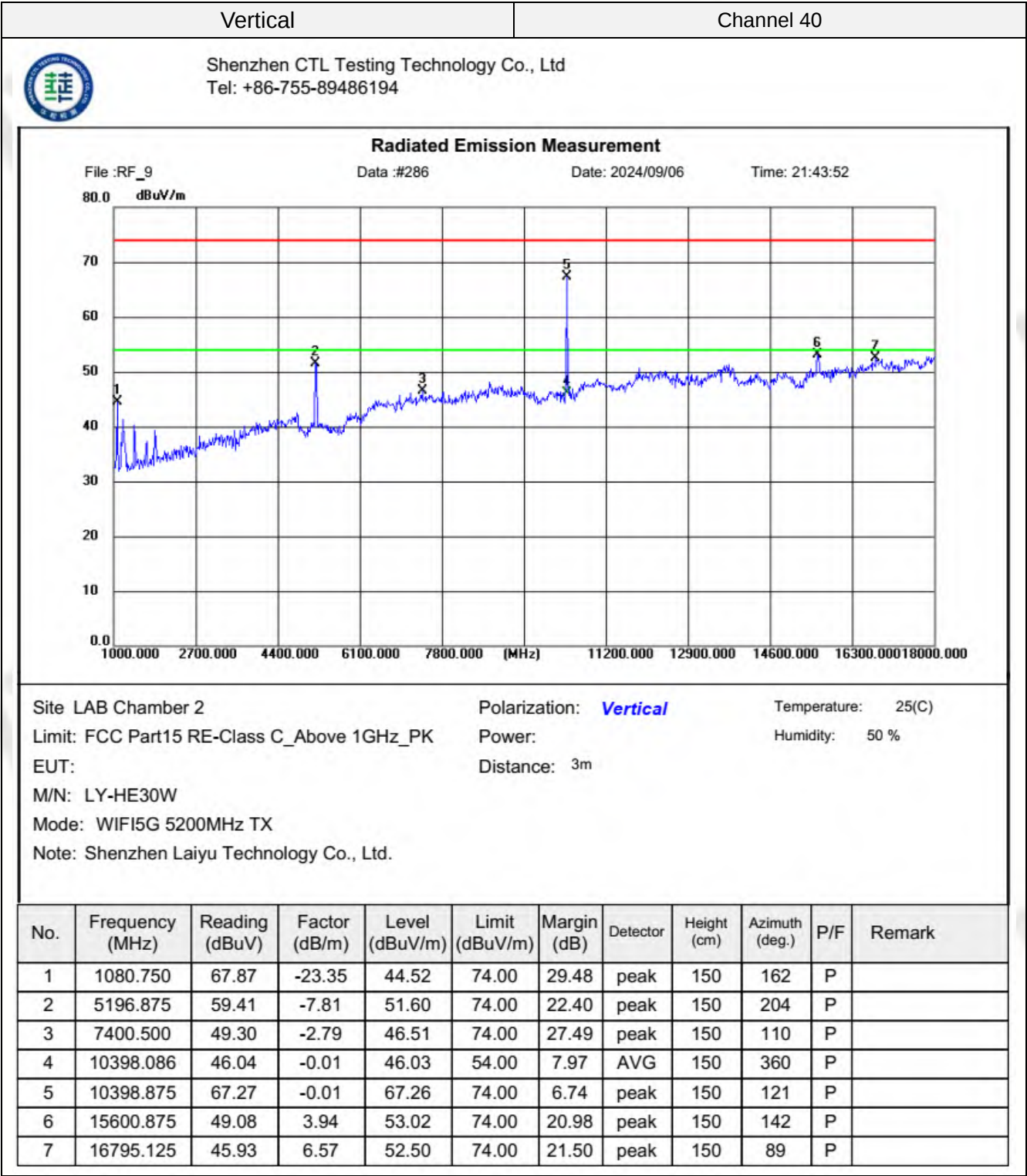
Note: 1. All 802.11a / 802.11n (HT20) modes have been tested for above 1GHz test, only the worst case 802.11n (HT20) was recorded.

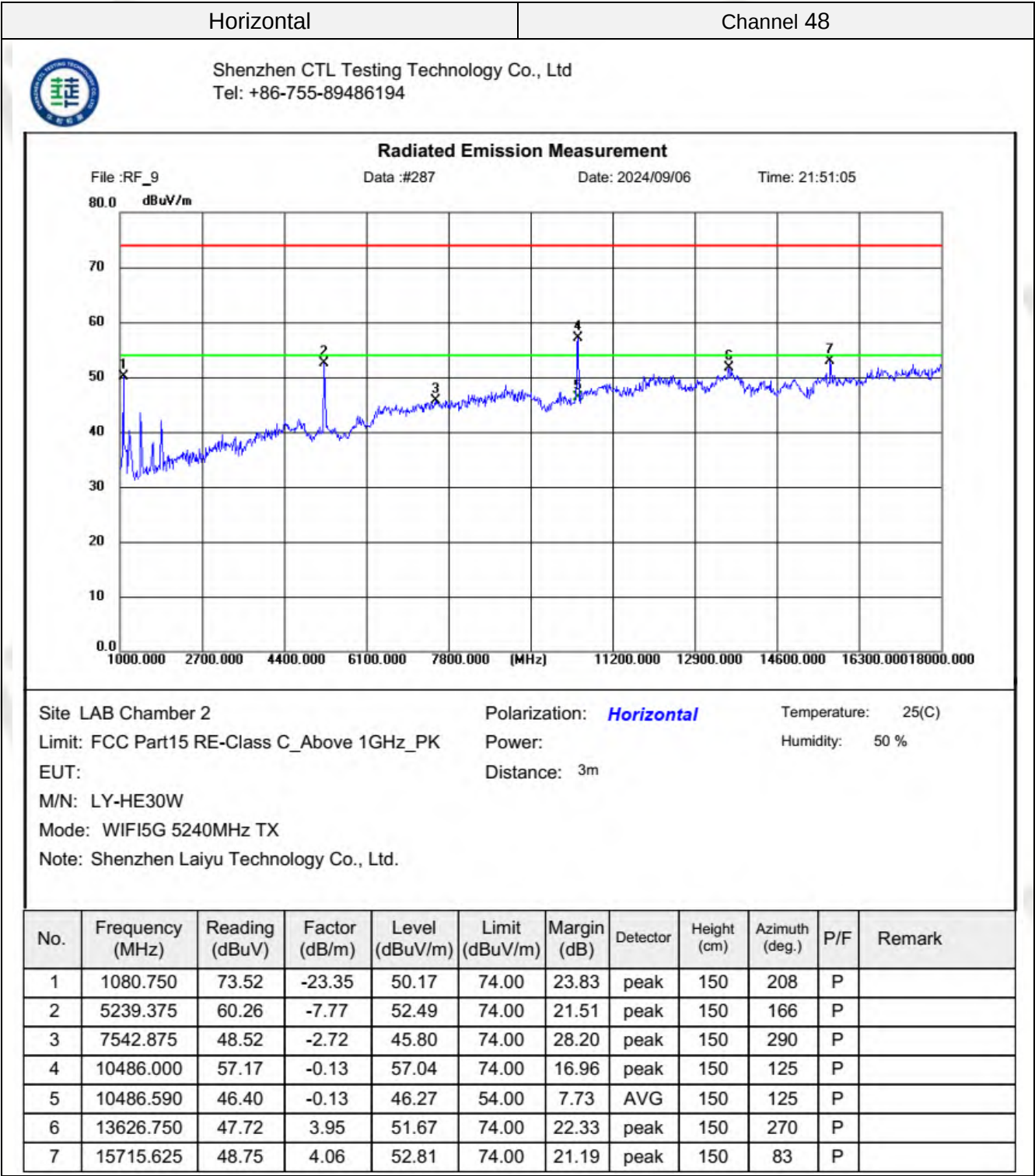
NII 1 & 802.11n (HT20) Mode (above 1GHz)

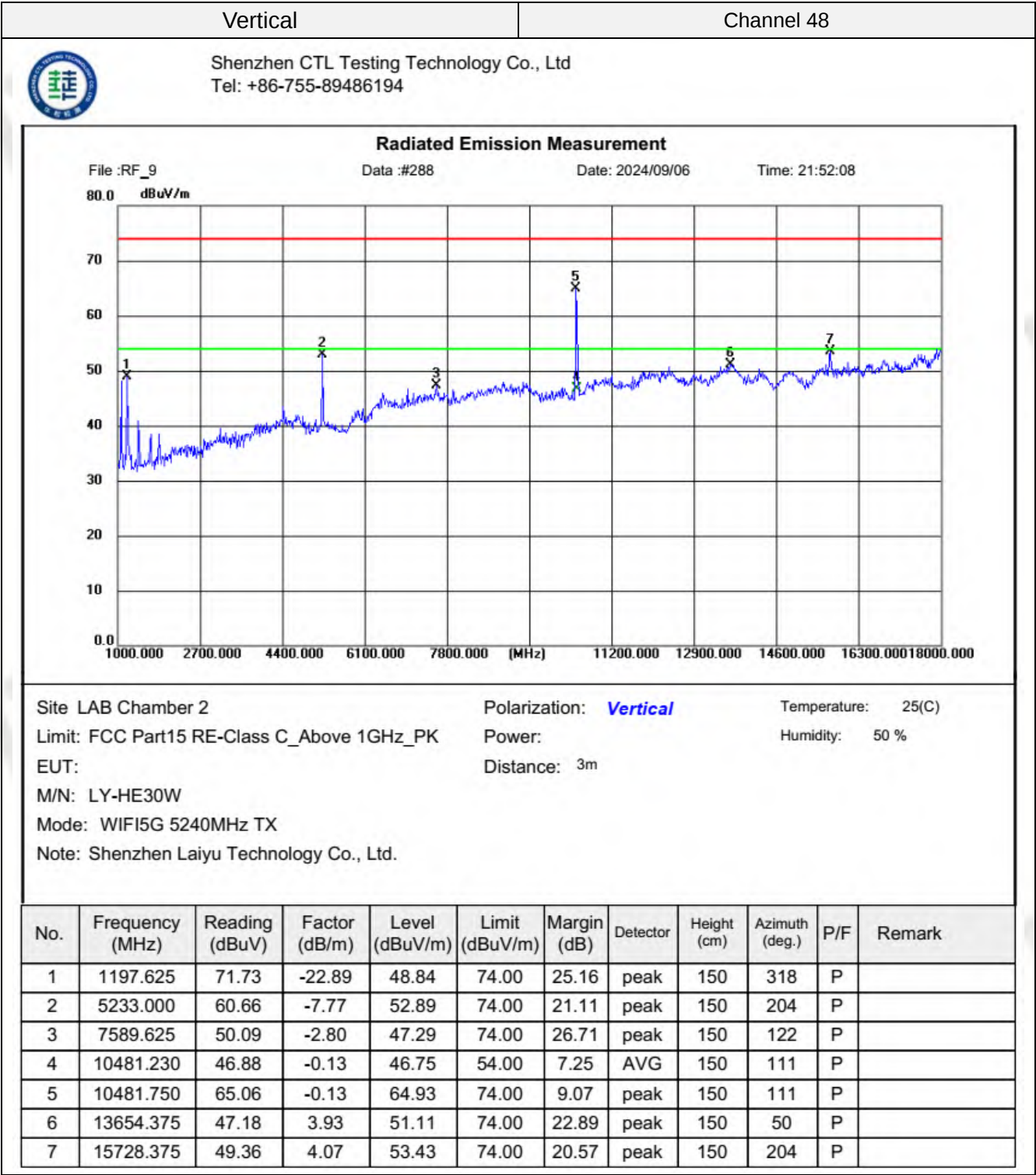




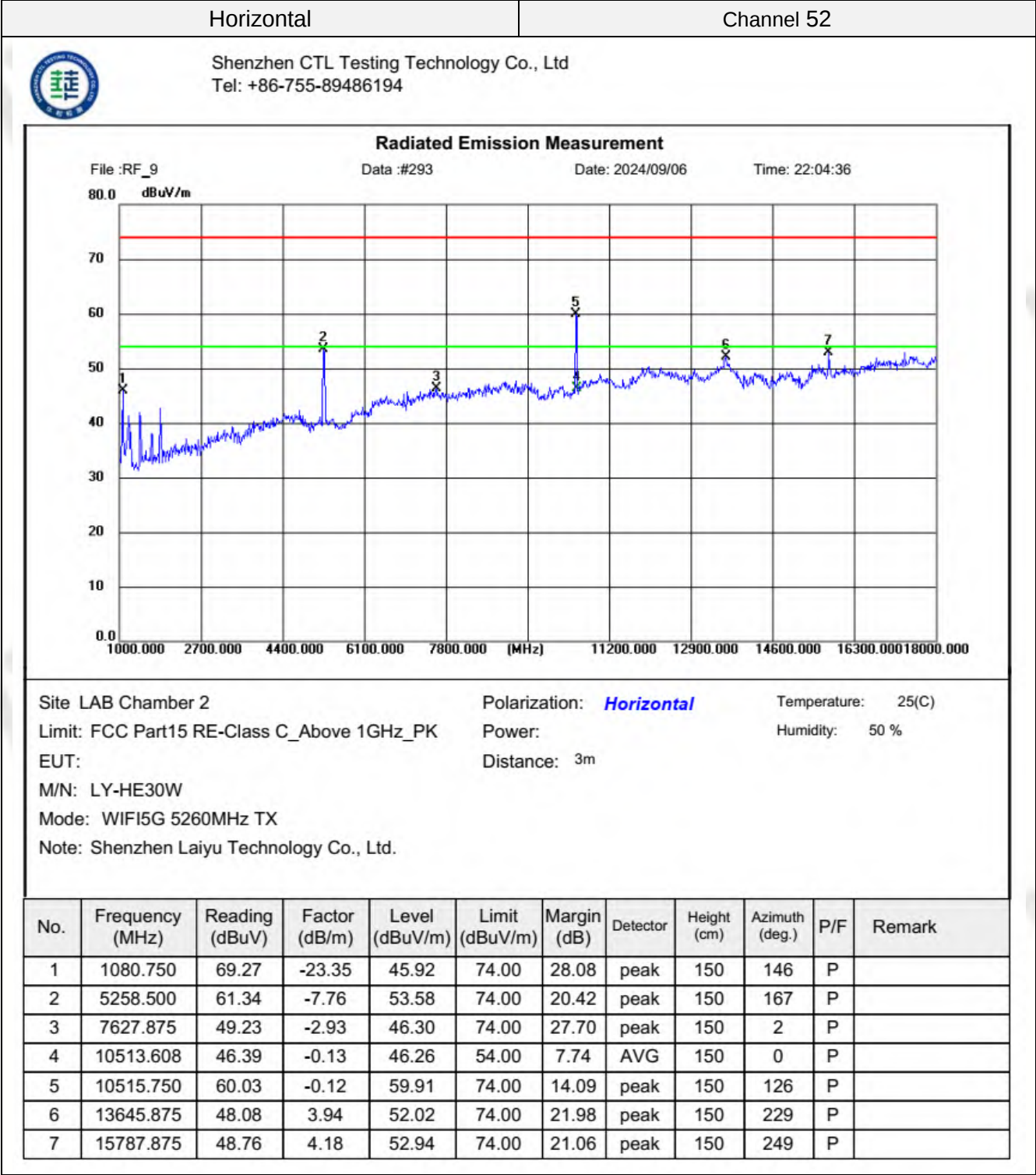


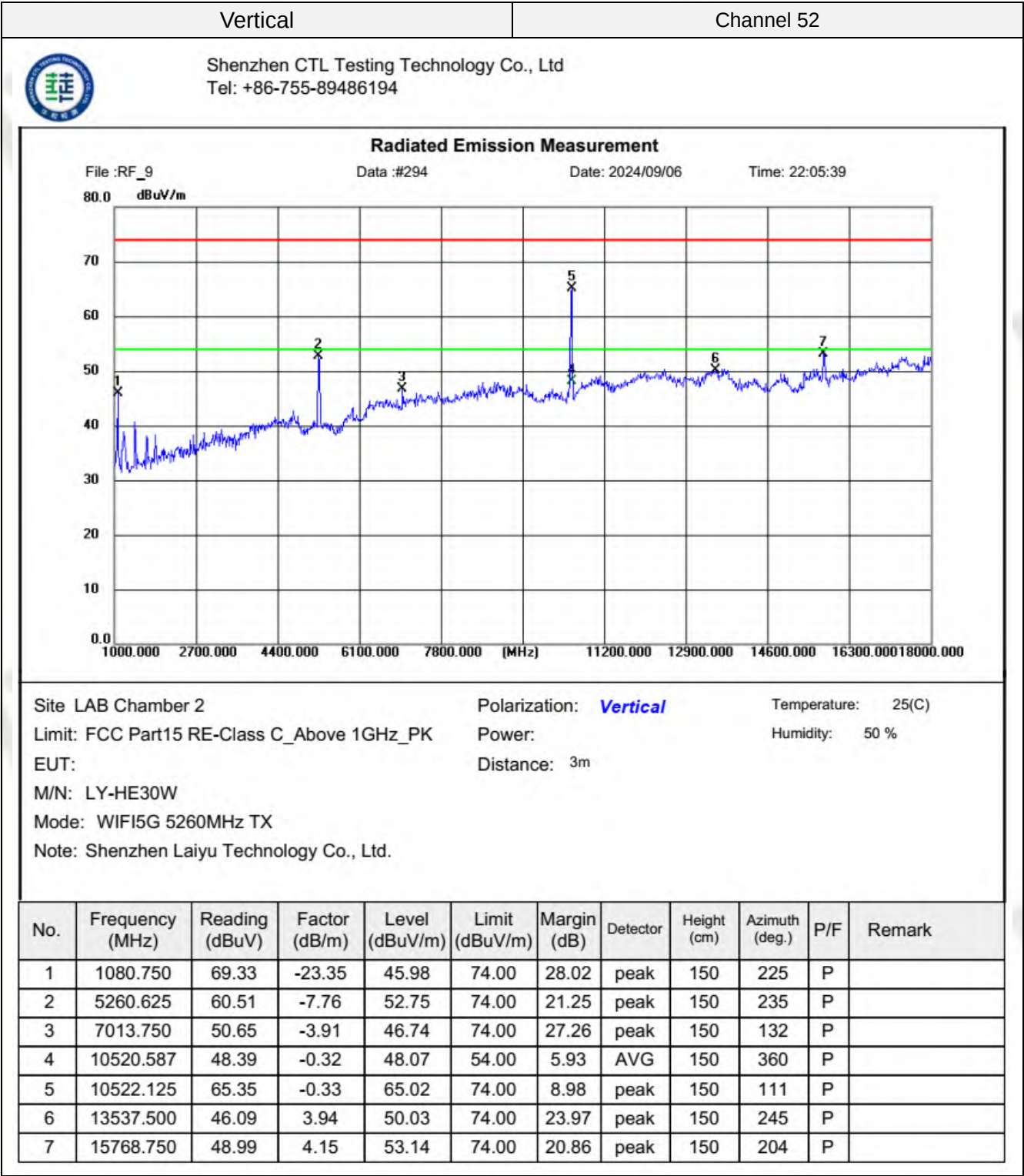


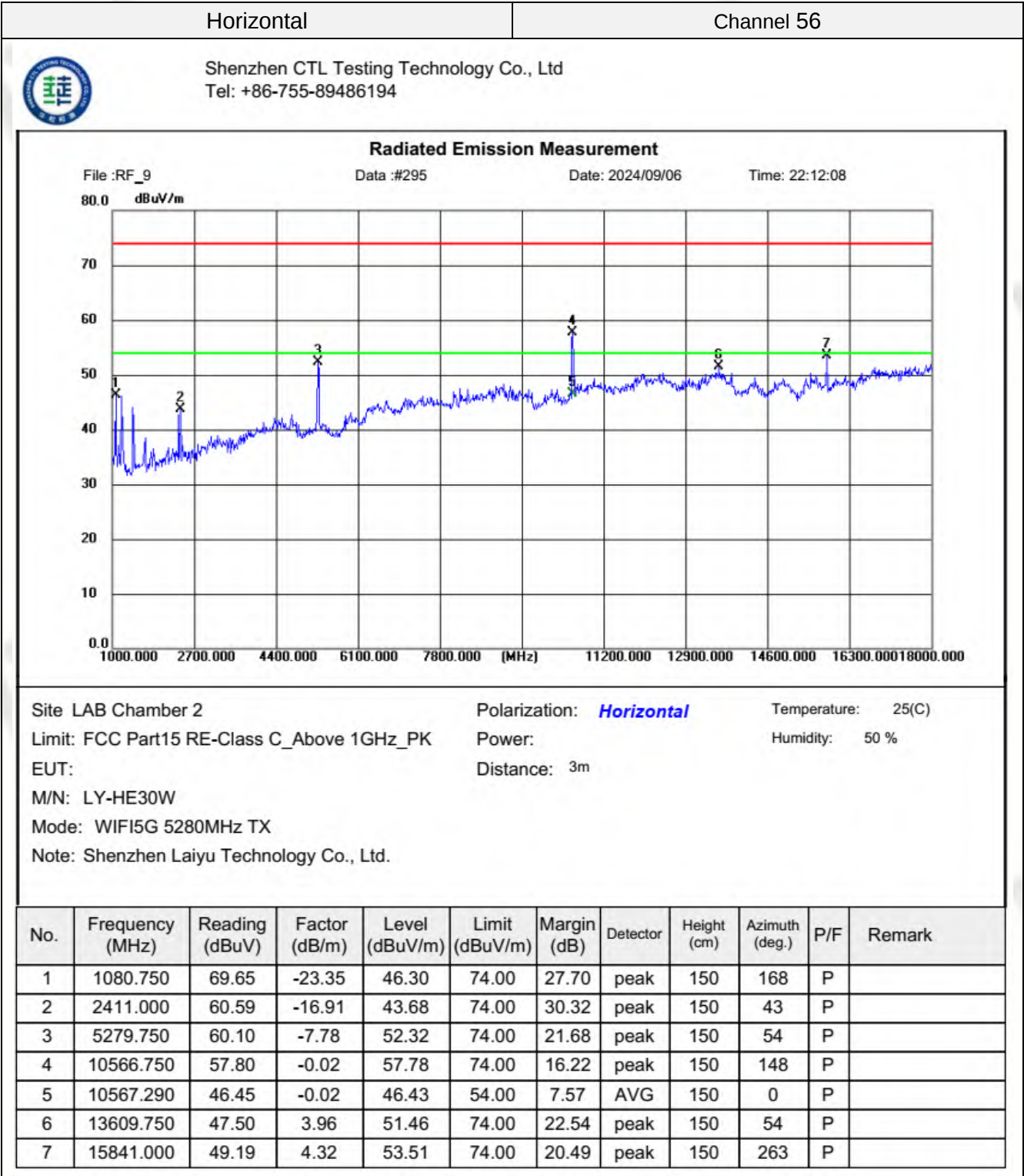


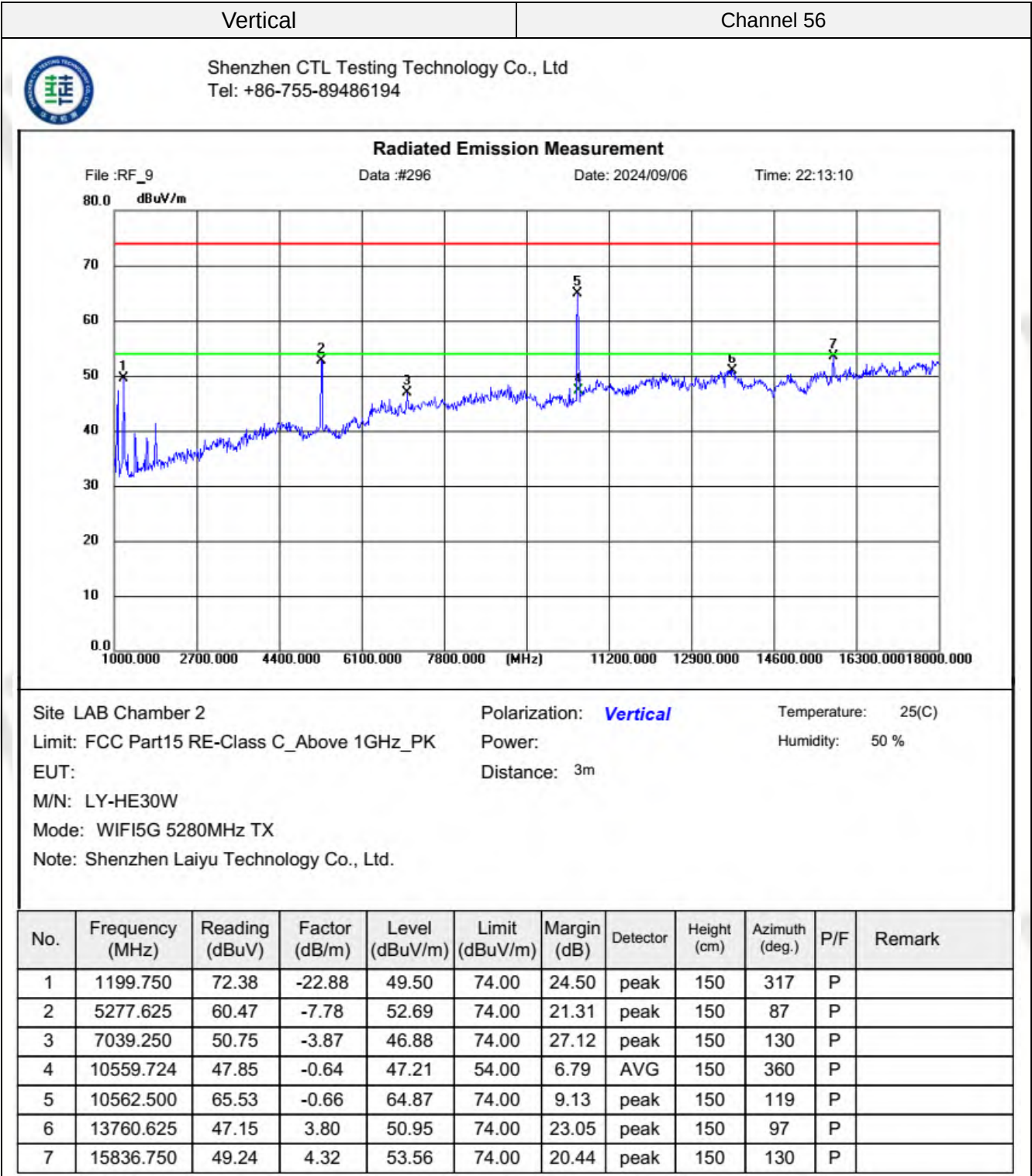


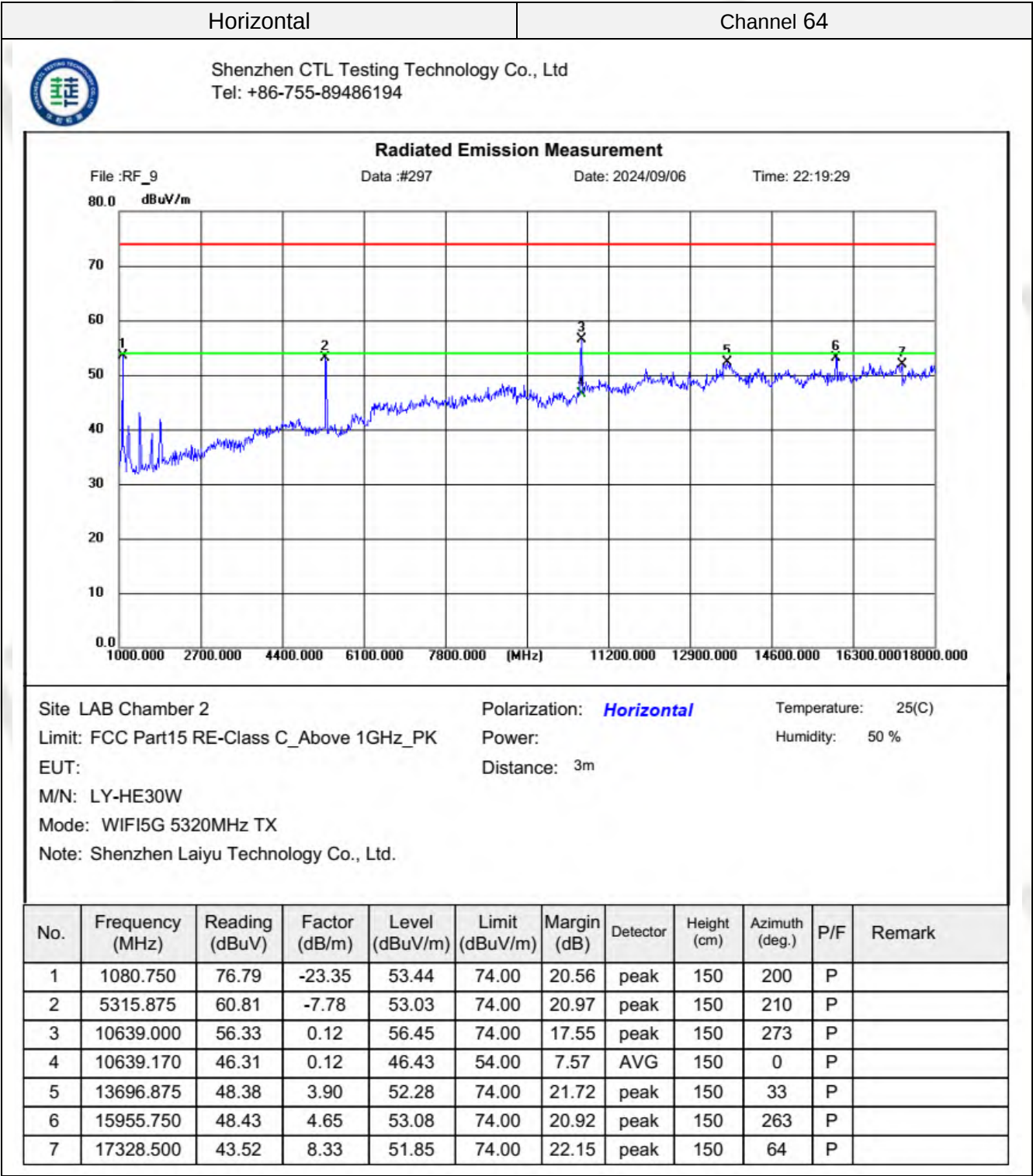
U-NII 2A & 802.11n (HT20) Mode (above 1GHz)

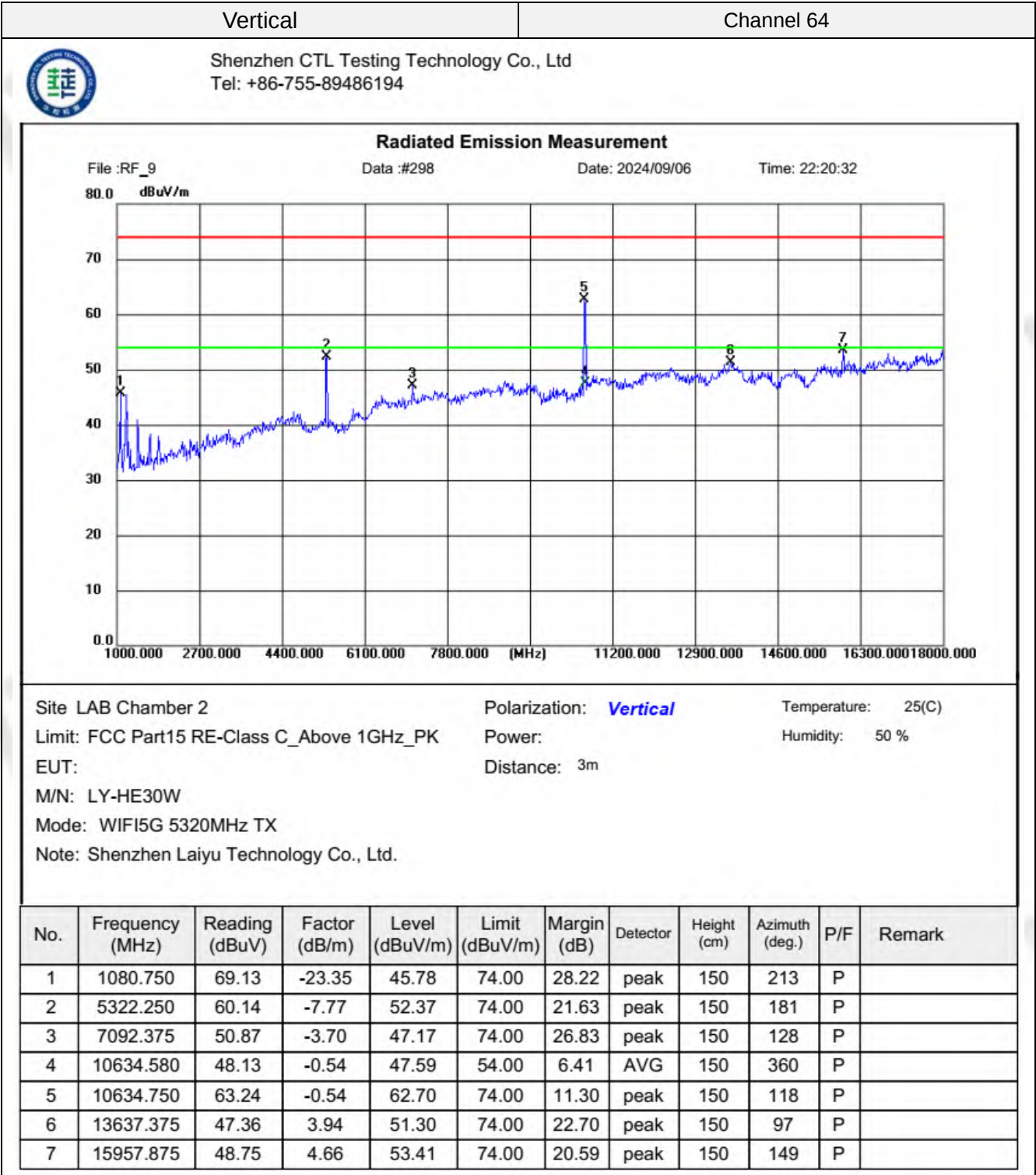




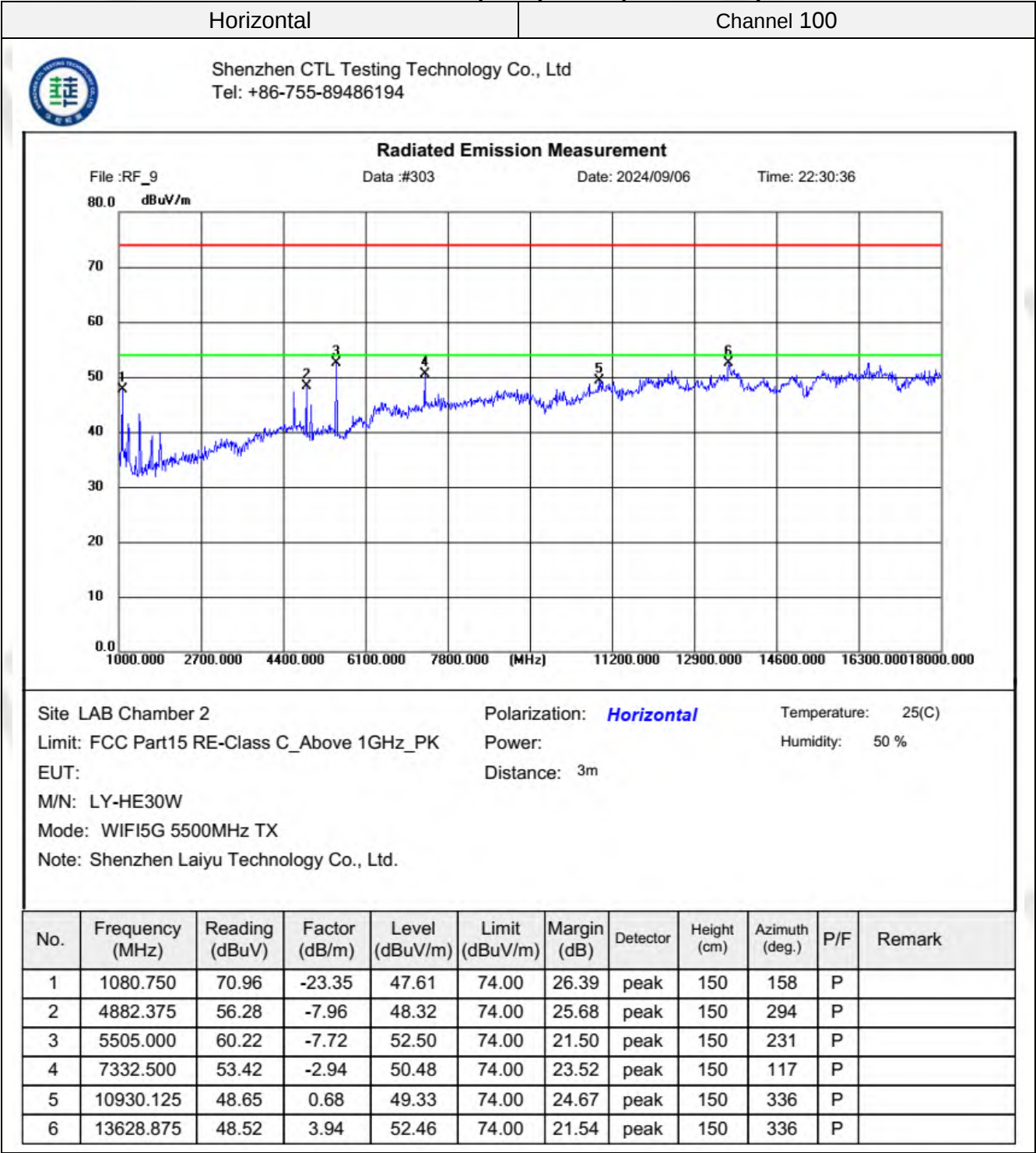


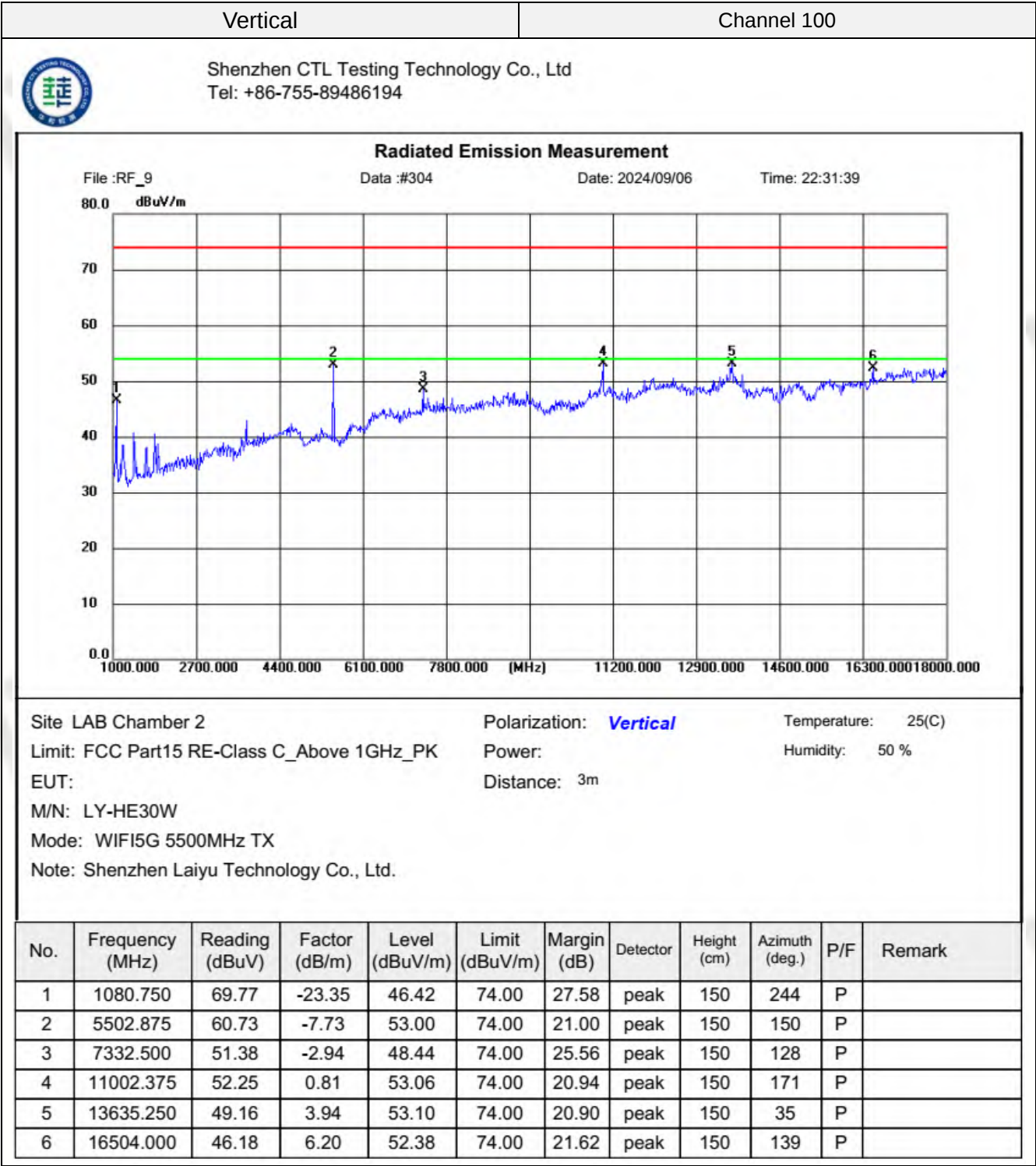


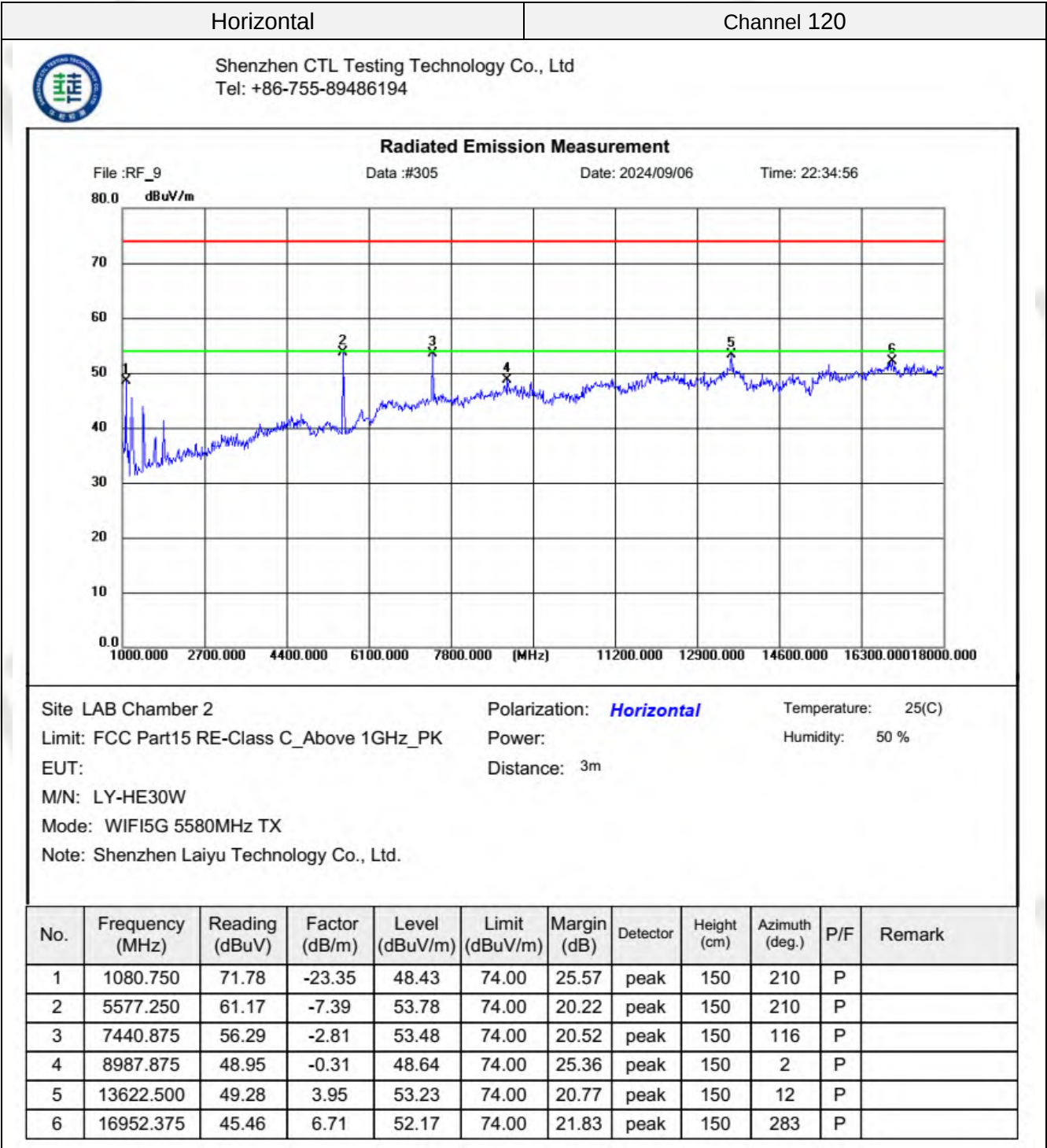


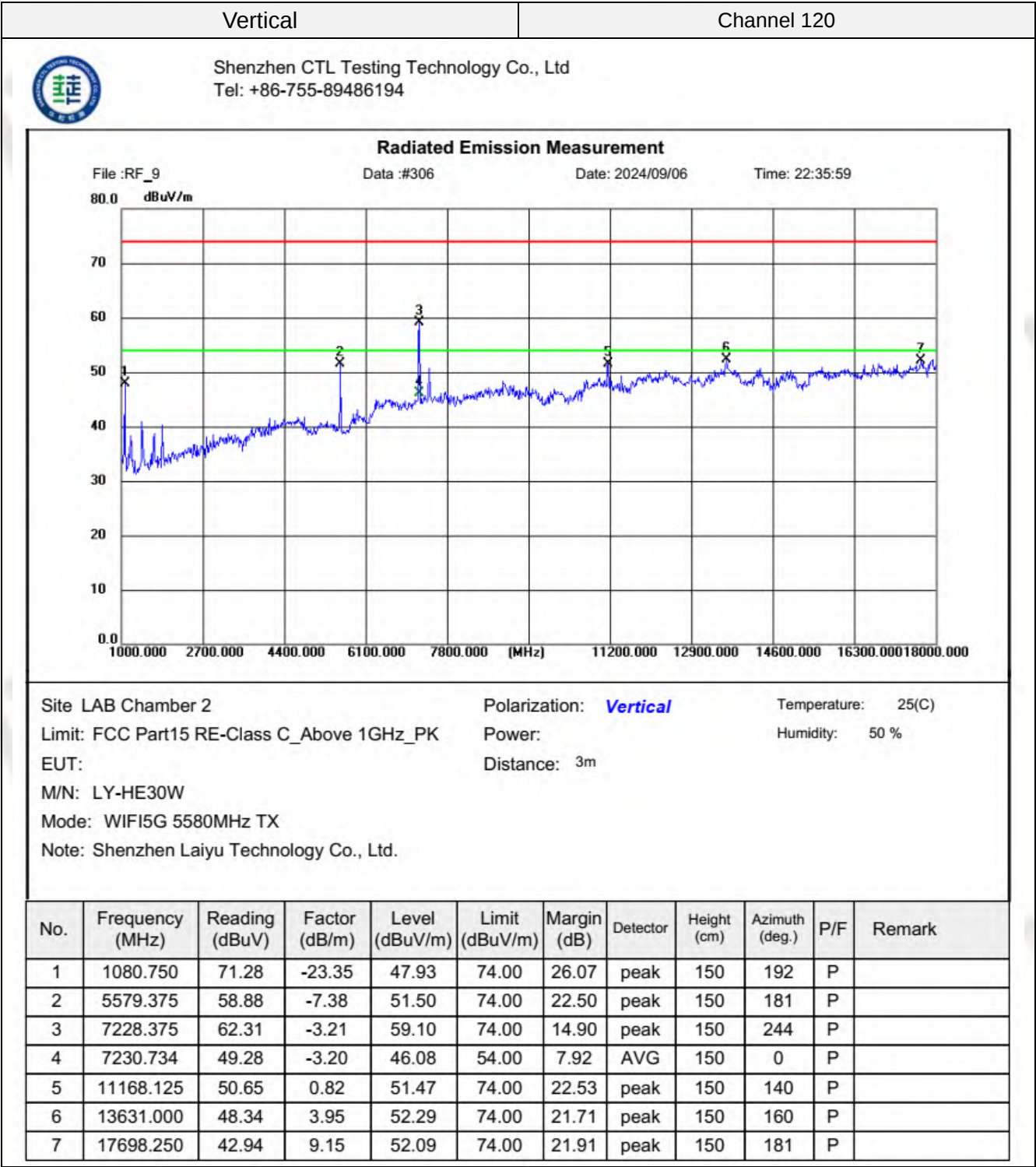


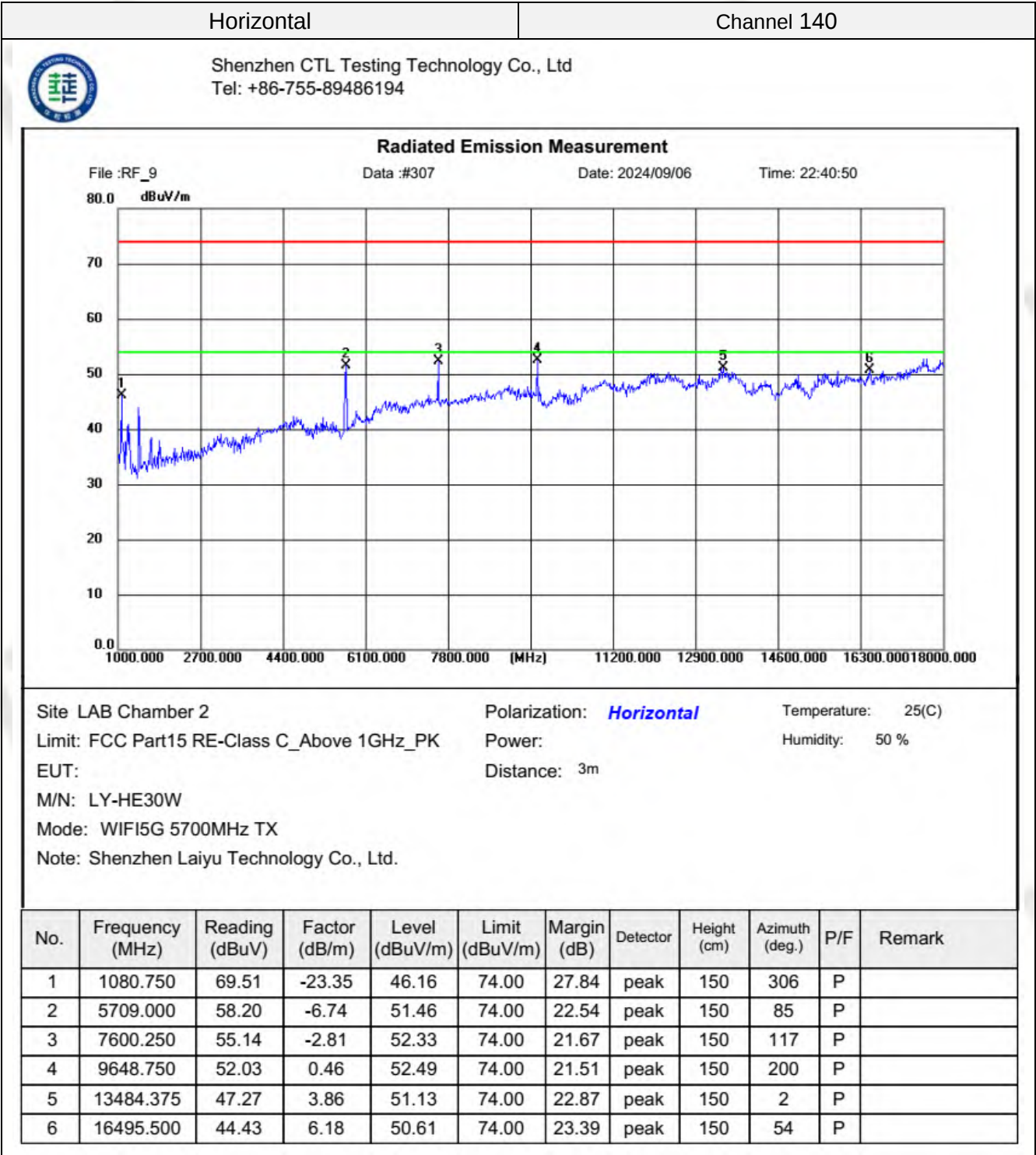
U-NII 2C & 802.11n (HT20) Mode (above 1GHz)

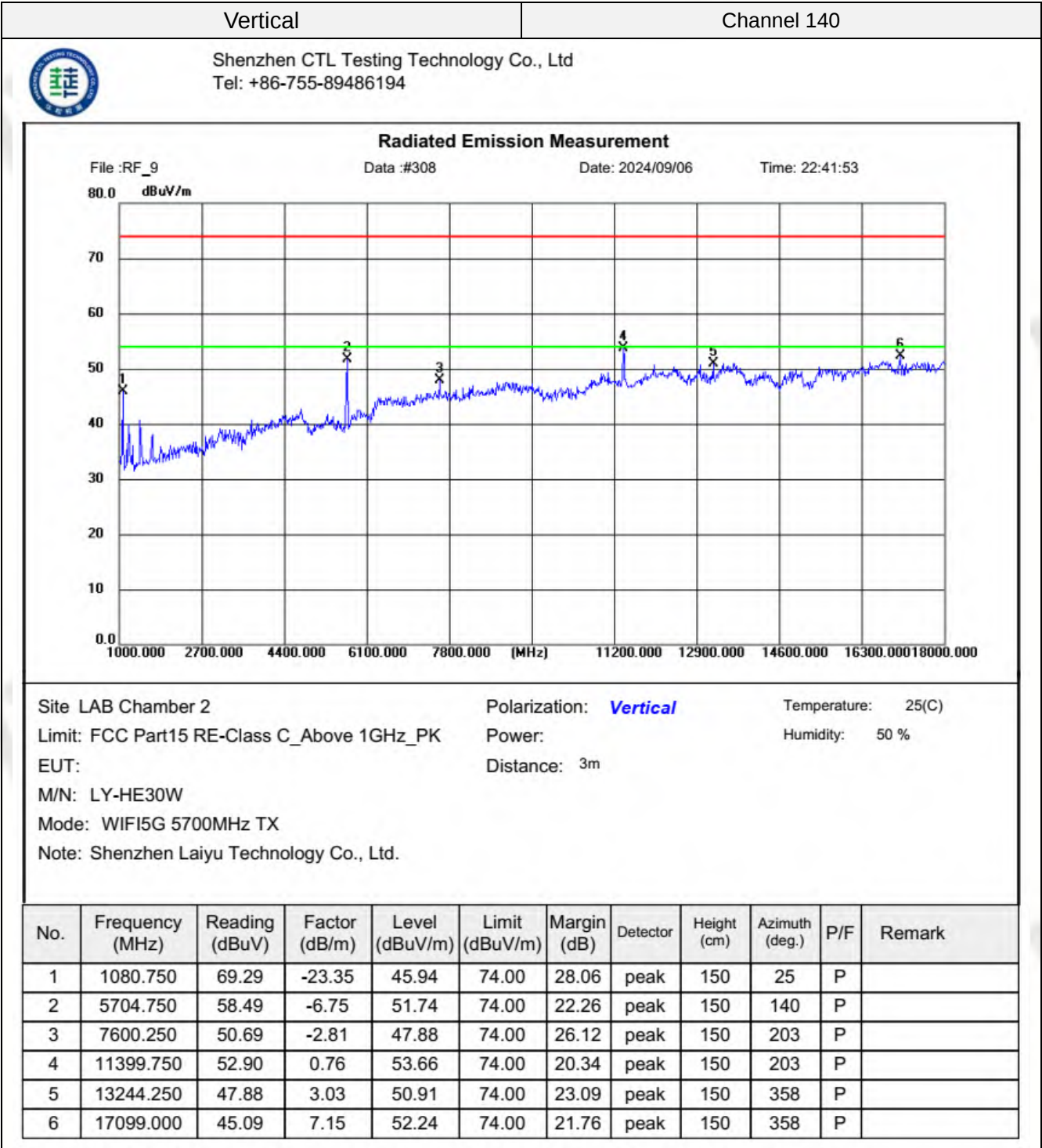




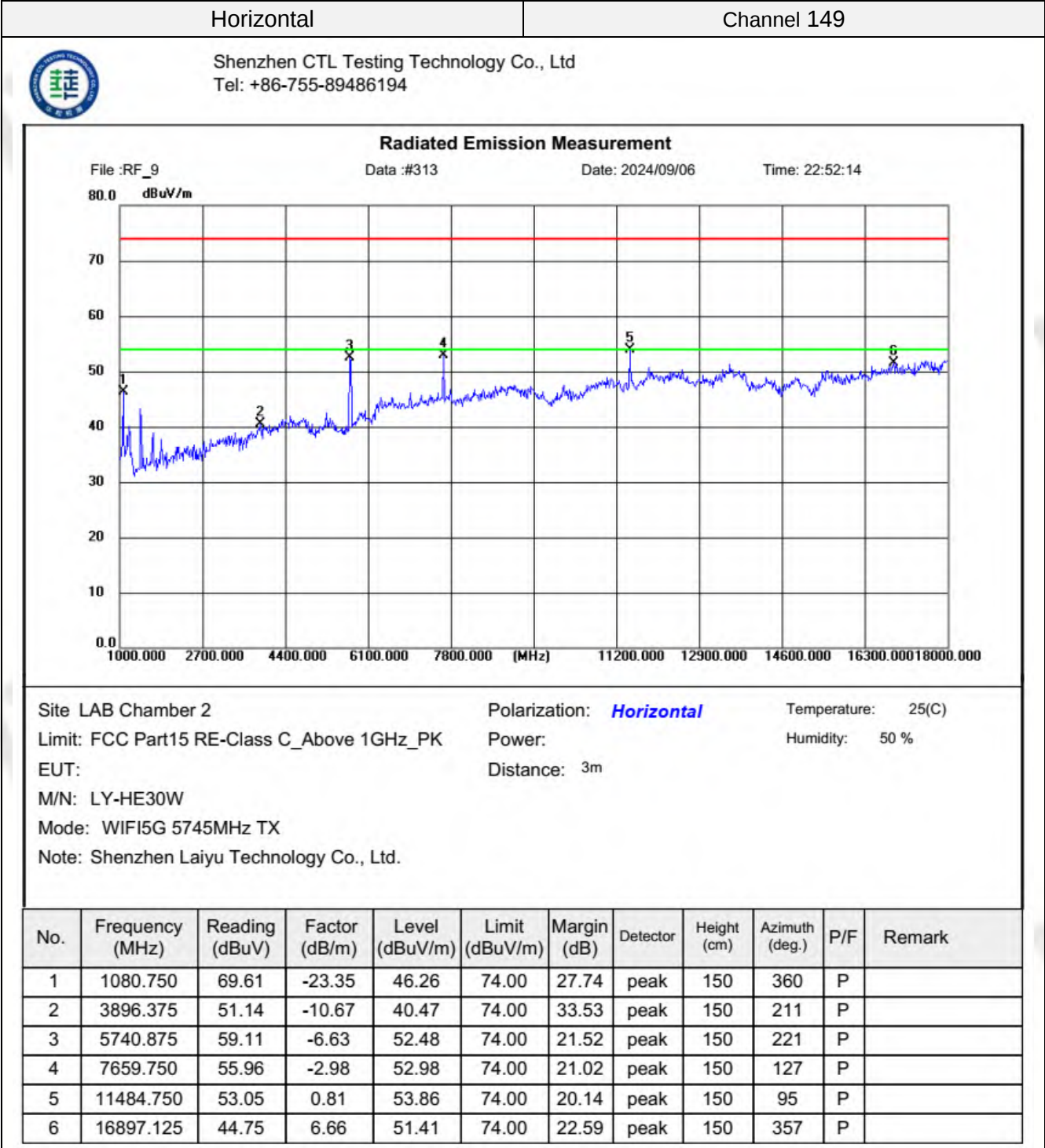


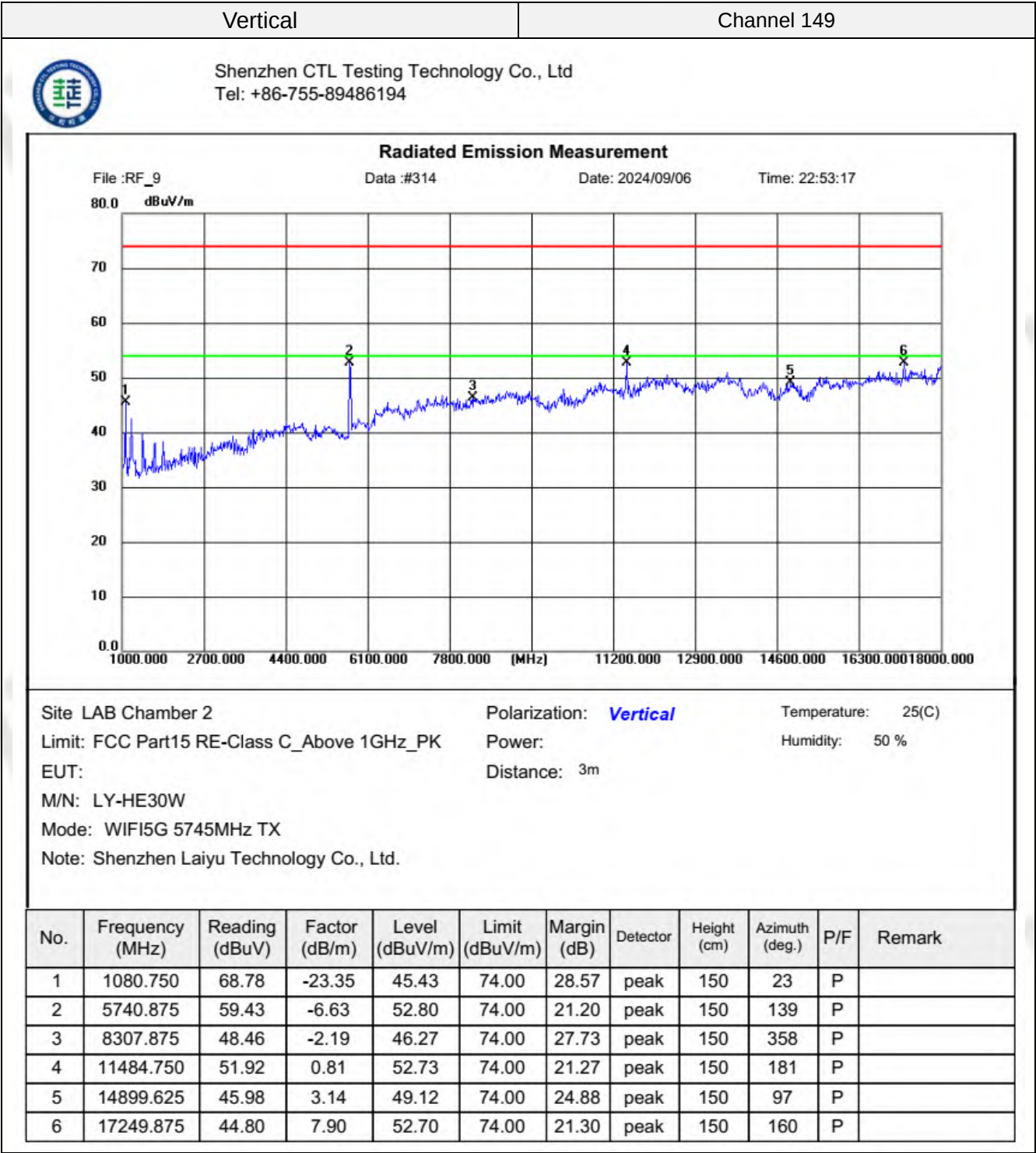


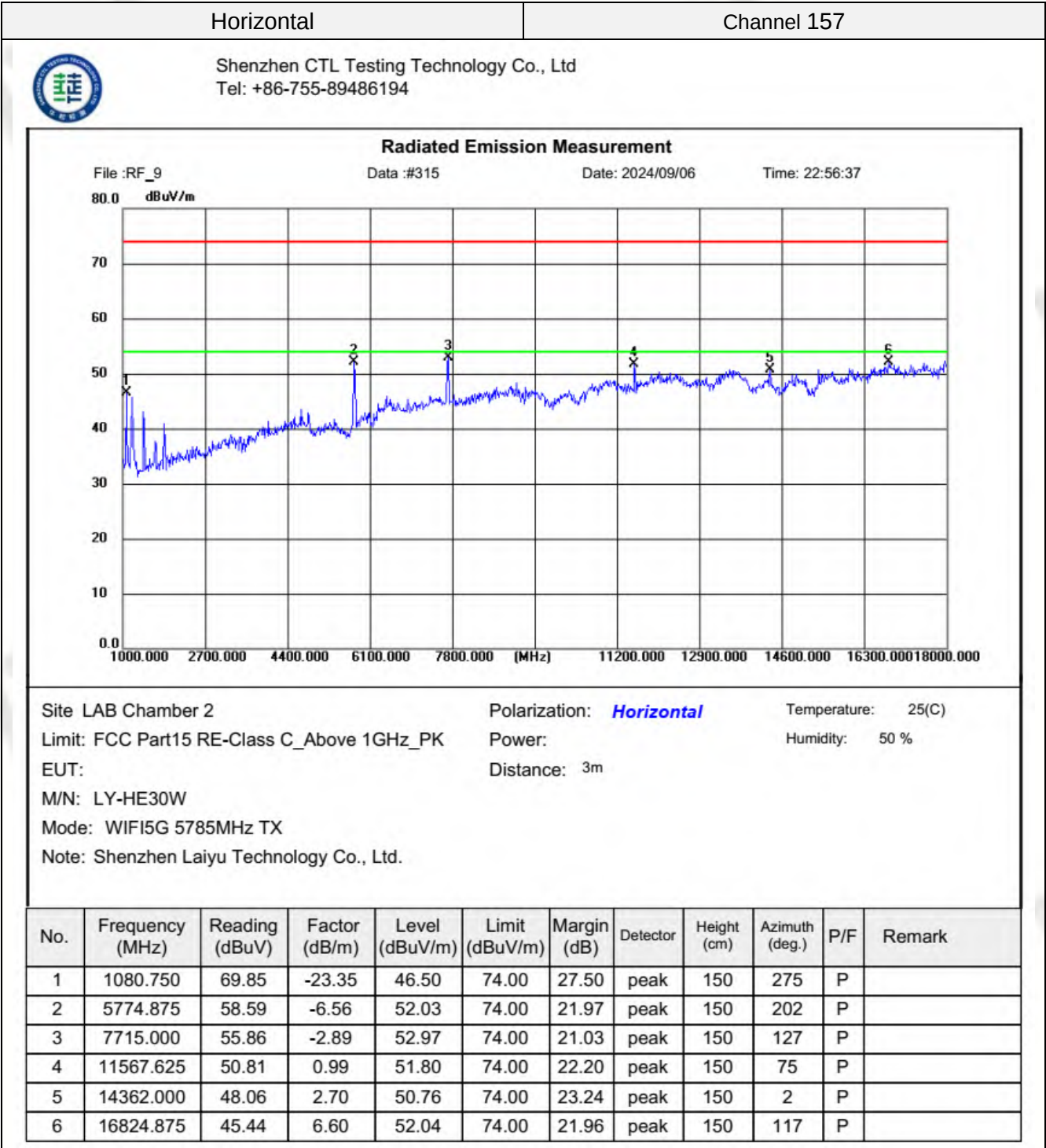


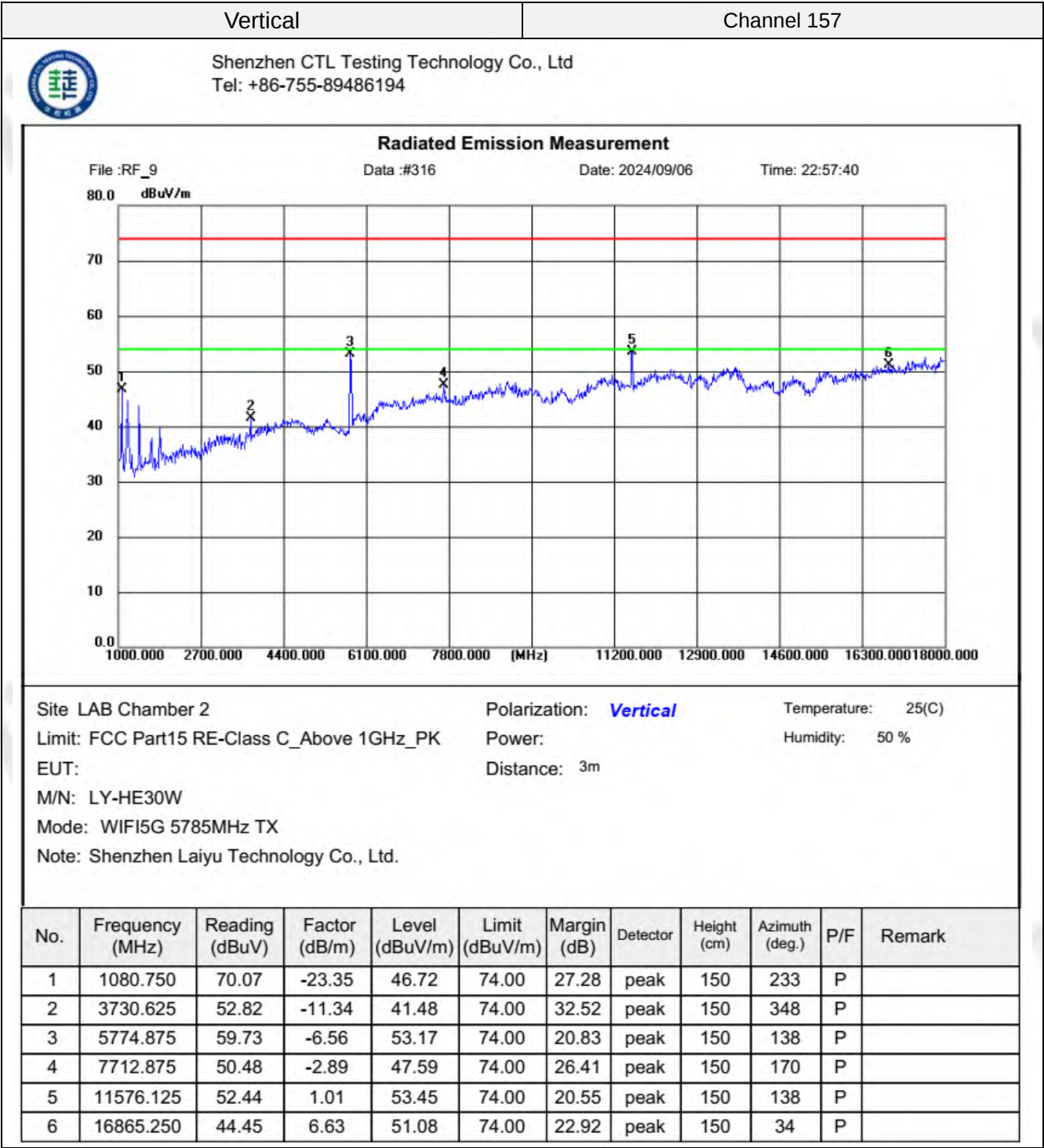


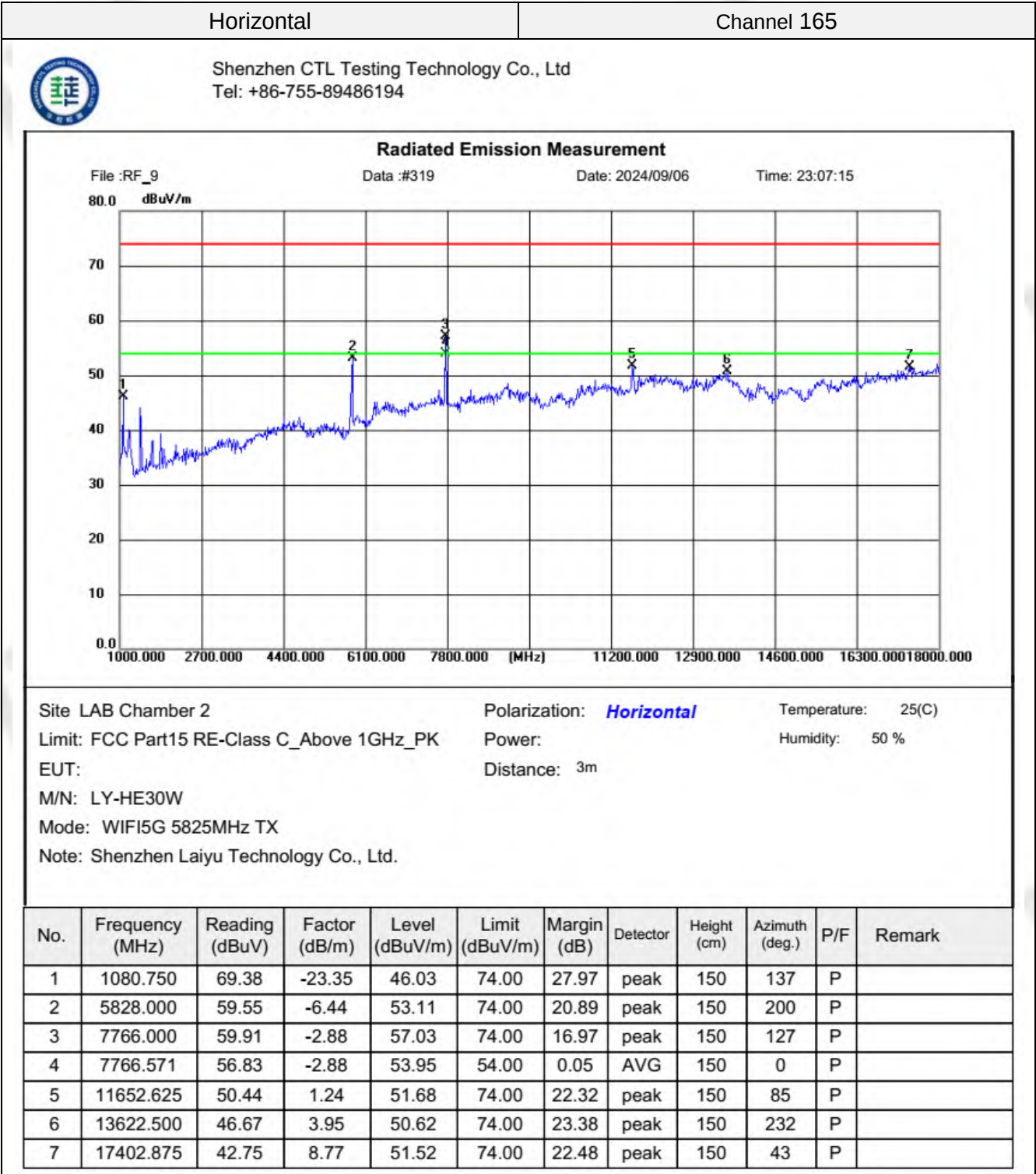
U-NII 3 & 802.11n (HT20) Mode (above 1GHz)

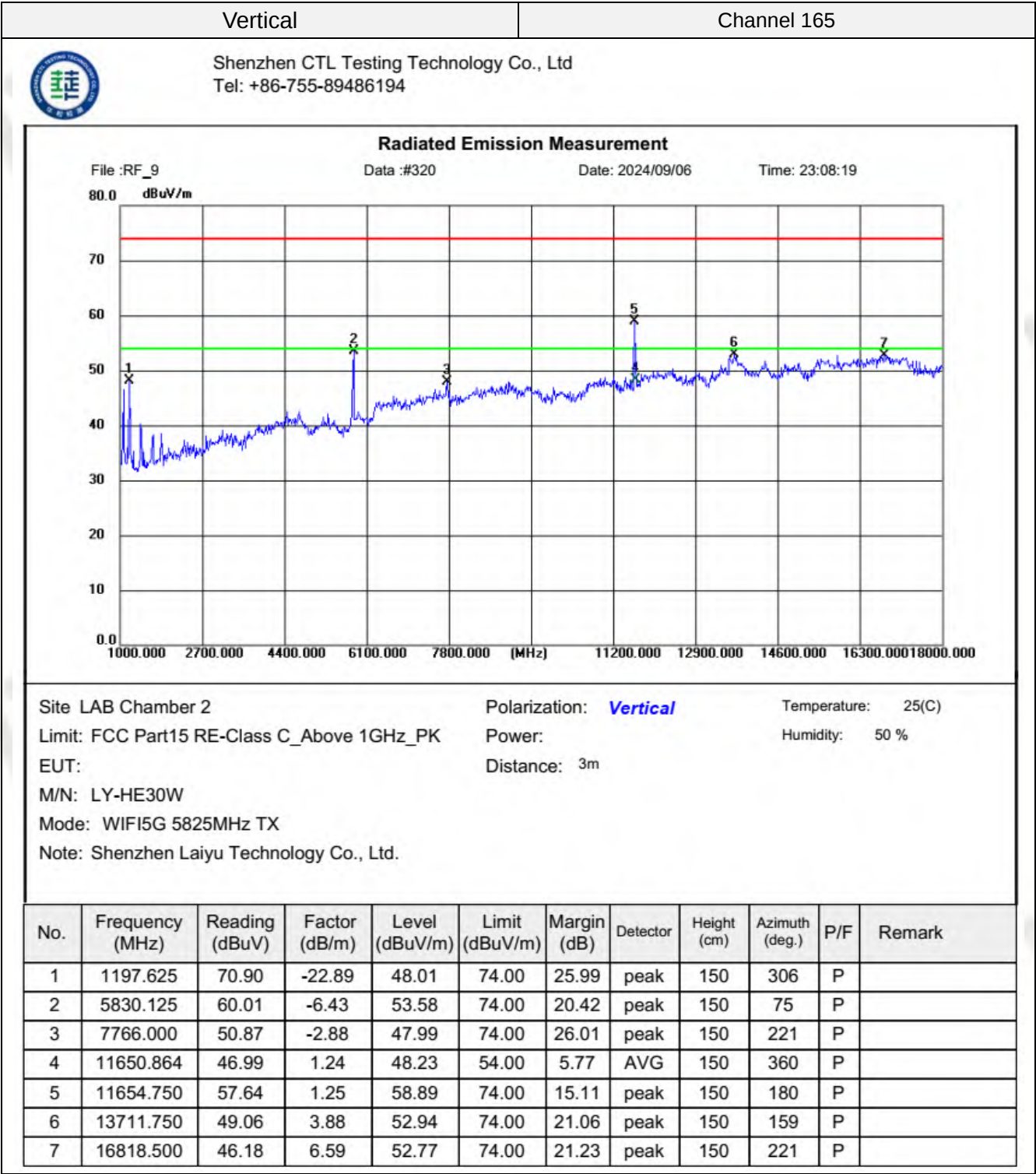












REMARKS:

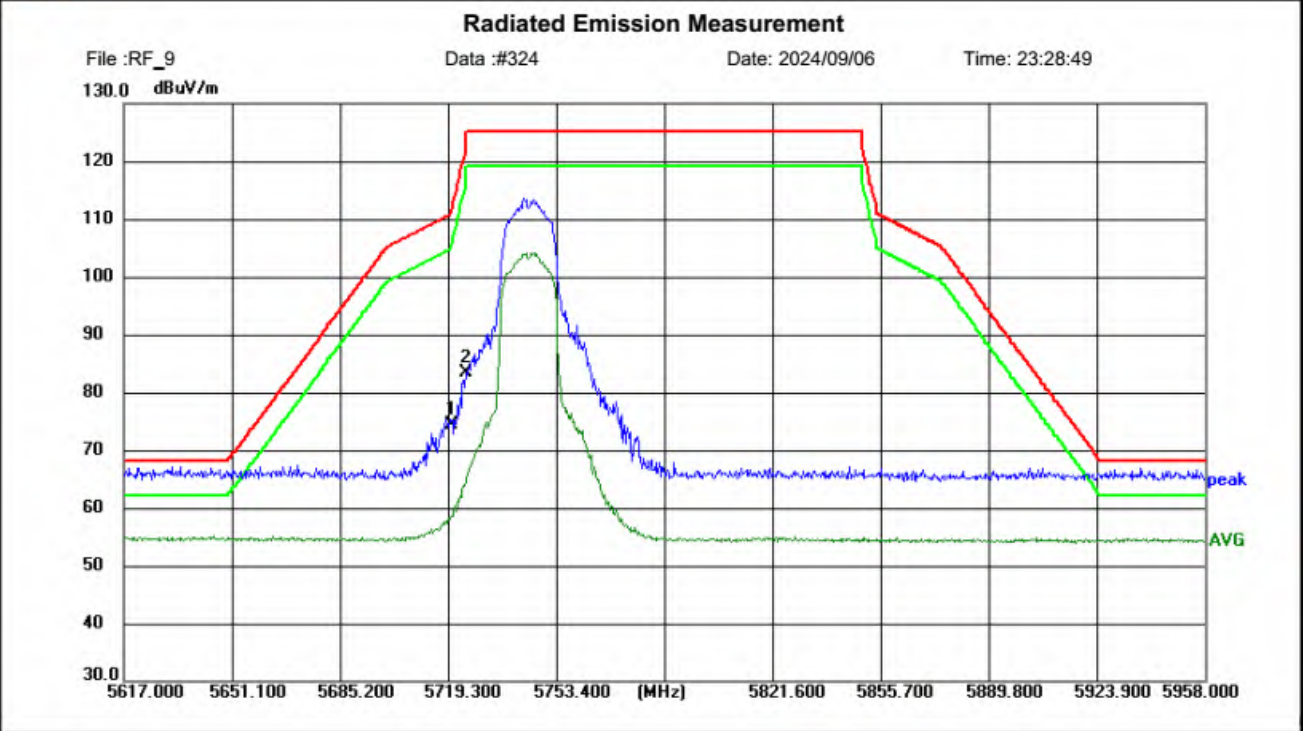
1. Emission level (dBuV/m) =Raw Value (dBuV)+Correction Factor (dB/m)
2. Correction Factor (dB/m) = Antenna Factor (dB/m)+Cable Factor (dB)-Pre-amplifier Factor
3. Margin value = Limit value- Emission level.
4. RBW1MHz VBW3MHz Peak detector is for PK value; RBW 1MHz VBW10Hz Peak detector is for AV value.
5. Worst case data at 6Mbps at IEEE 802.11a; MCS0 at IEEE 802.11n HT20,;
6. 18GHz-40GHz not recorded for no spurious point have a margin of less than 6 dB with respect to the limits.

Band Edge Test Plots

5745MHz 802.11n (HT20)



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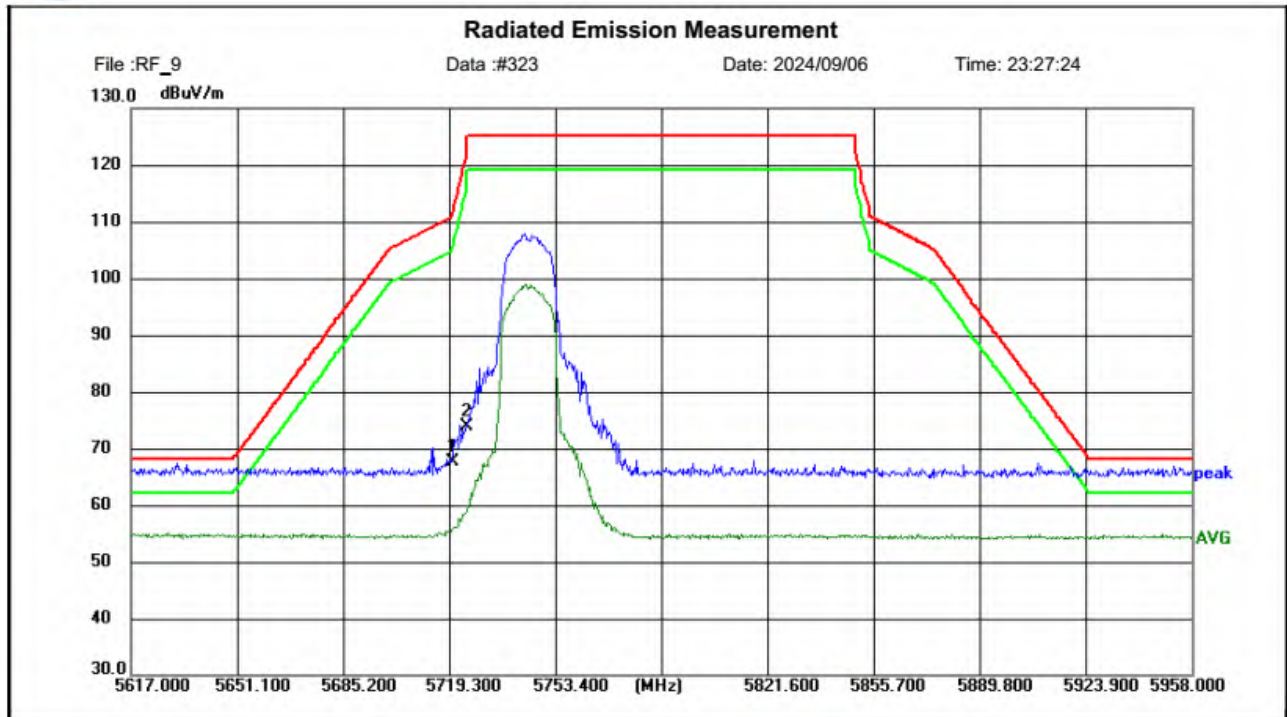
Site LAB Chamber 2
Limit: FCC Part15 Band edge (U-NII-3) PK
EUT:
M/N: LY-HE30W
Mode: WIFI5G 5745MHz TX
Note: Shenzhen Laiyu Technology Co., Ltd.

Polarization: *Horizontal* Temperature: 25(C)
Power: Humidity: 50 %
Distance: 3m

No.	Frequency (MHz)	Reading (dBUV)	Factor (dB/m)	Level (dBUV/m)	Limit (dBUV/m)	Margin (dB)	Detector	Height (cm)	Azimuth (deg.)	P/F	Remark
1	5720.000	46.18	28.15	74.33	110.80	36.47	peak	150	0	P	
2	5725.000	55.22	28.14	83.36	122.20	38.84	peak	150	0	P	



Shenzhen CTL Testing Technology Co., Ltd
Tel: +86-755-89486194



Site LAB Chamber 2
Limit: FCC Part15 Band edge (U-NII-3) PK
EUT:
M/N: LY-HE30W
Mode: WIFI5G 5745MHz TX
Note: Shenzhen Laiyu Technology Co., Ltd.

Polarization: **Vertical**
Power:
Distance: 3m

Temperature: 25(C)
Humidity: 50 %

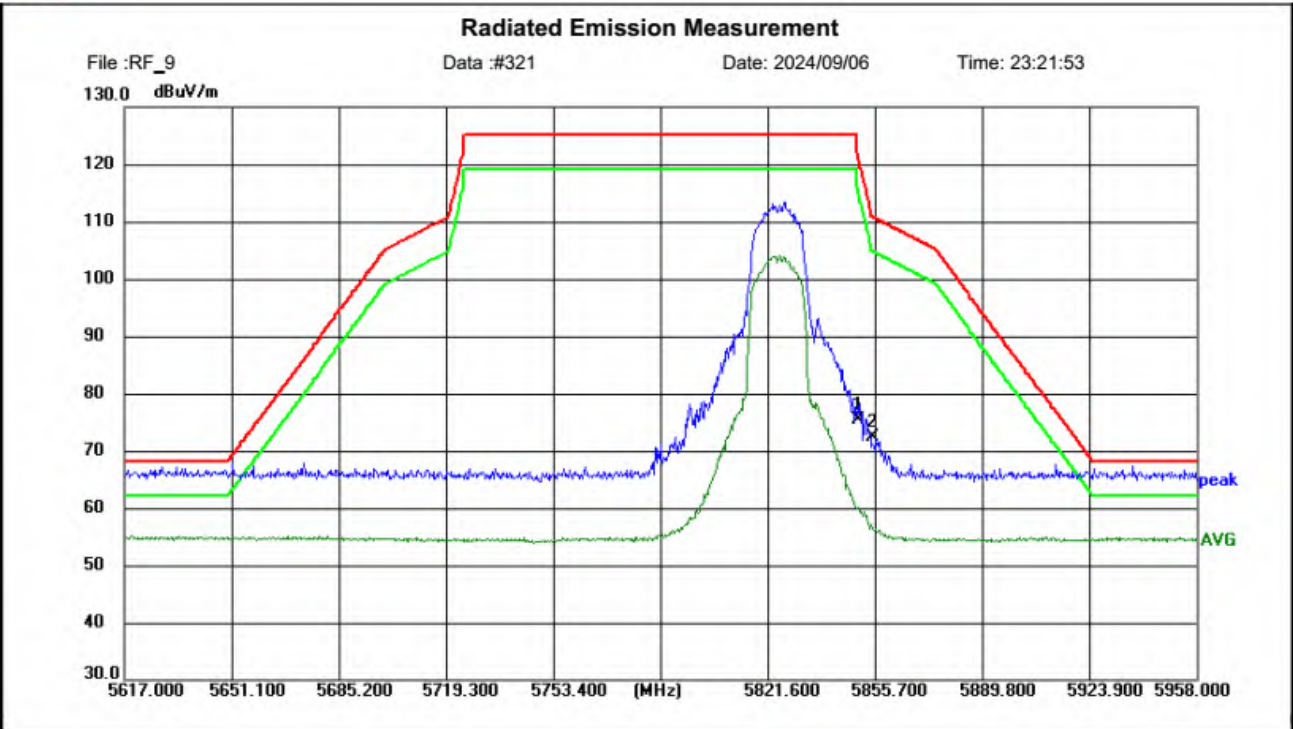
No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Azimuth (deg.)	P/F	Remark
1	5720.000	39.45	28.15	67.60	110.80	43.20	peak	150	360	P	
2	5725.000	45.67	28.14	73.81	122.20	48.39	peak	150	360	P	

Band Edge Test Plots

5825MHz 802.11n (HT20)



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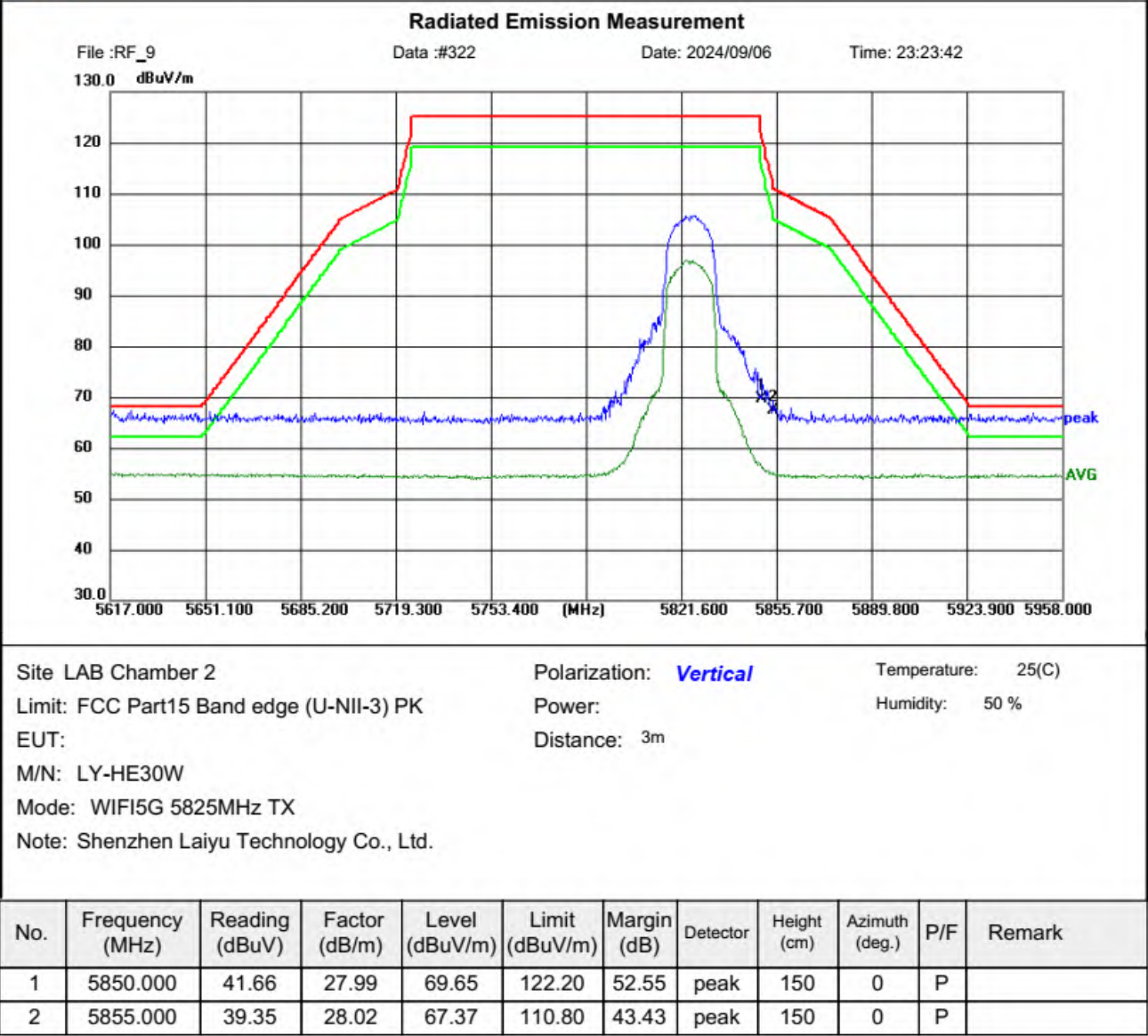


Site LAB Chamber 2	Polarization: Horizontal	Temperature: 25(C)
Limit: FCC Part15 Band edge (U-NII-3) PK	Power:	Humidity: 50 %
EUT:	Distance: 3m	
M/N: LY-HE30W		
Mode: WIFI5G 5825MHz TX		
Note: Shenzhen Laiyu Technology Co., Ltd.		

No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Azimuth (deg.)	P/F	Remark
1	5850.000	47.51	27.99	75.50	122.20	46.70	peak	150	360	P	
2	5855.000	44.28	28.02	72.30	110.80	38.50	peak	150	360	P	



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3.3. Maximum Conducted Average Output Power

Limit

FCC requirement:

For the band 5.15-5.25 GHz.

(i) For an outdoor 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 6dBi.

(ii) 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 6dBi.

(iii) For fixed point-to-point access points 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.

(iv) 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 250mW provided the maximum antenna gain does not exceed 6dBi.

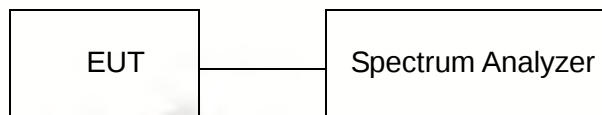
For the 5.25-5.35 GHz and 5.47-5.725 GHz bands, the maximum conducted output power over the frequency bands of operation shall not exceed the lesser of 250mW or $11\text{dBm} + 10\log B$, where B is the 26 dB emission bandwidth in megahertz.

For the band 5.725-5.85 GHz, the maximum conducted output power over the frequency band of operation shall not exceed 1 W

Test Procedure

Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to the spectrum.

Test Configuration



Test Results

Raw data reference to Section 2 CTL2409192011-WF_5G_BAND_1_Appendix.

Raw data reference to Section 2 CTL2409192011-WF_5G_BAND_2A_Appendix.

Raw data reference to Section 2 CTL2409192011-WF_5G_BAND_2C_Appendix.

Raw data reference to Section 2 CTL2409192011-WF_5G_BAND_3_Appendix.

3.4. Power Spectral Density

Limit

FCC requirement:

For the band 5.15-5.25 GHz.

- (i) For an outdoor access point operating in the band 5.15 - 5.25 GHz, the maximum power spectral density shall not exceed 17dBm in any 1 MHz band.^{note1}
- (ii) For an indoor access point operating in the band 5.15 - 5.25 GHz, the maximum power spectral density shall not exceed 17dBm in any 1 MHz band.^{note1}
- (iii) For fixed point-to-point access points operating in the band 5.15 - 5.25 GHz, transmitters that employ a directional antenna gain greater than 23dBi, a 1 dB reduction in maximum power spectral density is required for each 1 dB of antenna gain in excess of 23dBi.
- (iv) For mobile and portable client devices in the 5.15 - 5.25 GHz band, the maximum power spectral density shall not exceed 11dBm in any 1 MHz band.^{note1}

For the 5.25-5.35 GHz and 5.47-5.725 GHz bands

The maximum power spectral density shall not exceed 11dBm in any 1 megahertz band.

IC requirement:

For the band 5.15-5.25 GHz.

The e.i.r.p. spectral density shall not exceed 10dBm in any 1.0 MHz band.

Frequency band 5250-5350 MHz

The power spectral density shall not exceed 11dBm in any 1.0 MHz band

Frequency bands 5470-5600 MHz and 5650-5725 MHz

The power spectral density shall not exceed 11dBm in any 1.0 MHz band.

For the band 5.725 - 5.85 GHz

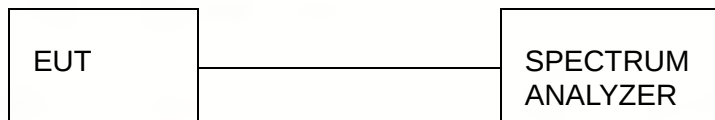
The maximum power spectral density shall not exceed 30dBm in any 500 kHz band.^{note1, note2}

Note1: If transmitting antennas of directional gain greater than 6dBi are used, the peak power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6dBi.

Note2: Fixed point - to-point U-NII devices operating in this band may employ transmitting antennas with directional gain greater than 6dBi 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.

Test Procedure

1. Use this procedure when the maximum peak conducted output power in the fundamental emission is used to demonstrate compliance.
2. Set the RBW = 1MHz for U-NII 1, U-NII 2A, U-NII C band and 510KHz for U-NII 3 band.
3. Set the VBW $\geq 3 \times$ RBW.
4. Set the span to encompass the entire EBW.
5. Detector = peak.
6. Sweep time = auto couple.
7. Trace mode = max hold.
8. Allow trace to fully stabilize.
9. Use the peak marker function to determine the maximum power level.

Test Configuration**Test Results**

Raw data reference to Section 3 CTL2409192011-WF_5G_BAND_1_Appendix.
Raw data reference to Section 3 CTL2409192011-WF_5G_BAND_2A_Appendix.
Raw data reference to Section 3 CTL2409192011-WF_5G_BAND_2C_Appendix.
Raw data reference to Section 3 CTL2409192011-WF_5G_BAND_3_Appendix.

3.5. Emission Bandwidth (26dBm Bandwidth)

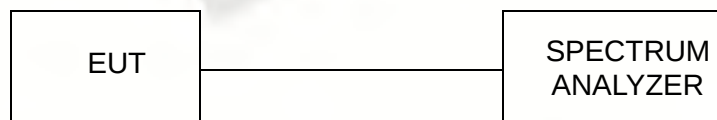
Limit

N/A

Test Procedure

1. Set resolution bandwidth (RBW) = approximately 1 % of the EBW.
2. Set the video bandwidth (VBW) > RBW.
3. Detector = Peak.
4. Trace mode = Max hold.
5. Measure the maximum width of the emission that is 26 dB down from the peak 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 %.

Test Configuration



Test Results

Raw data reference to Section 1 CTL2409192011-WF_5G_BAND_1_Appendix.
Raw data reference to Section 1 CTL2409192011-WF_5G_BAND_2A_Appendix.
Raw data reference to Section 1 CTL2409192011-WF_5G_BAND_2C_Appendix.
Raw data reference to Section 1 CTL2409192011-WF_5G_BAND_3_Appendix.

3.6. Minimum Emission Bandwidth (6dBm Bandwidth)

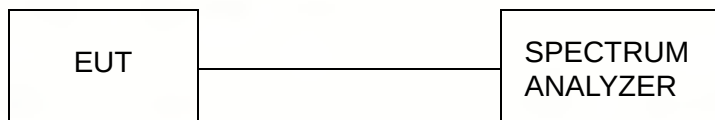
Limit

Section 15.407(e) specifies the minimum 6 dB emission bandwidth of at least 500 kHz for the band 5.725-5.85 GHz

Test Procedure

1. Set resolution bandwidth (RBW) = 100 kHz
2. Set the video bandwidth 3 x RBW.
3. Detector = Peak.
4. Trace mode = Max hold.
5. 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.

Test Configuration



Test Results

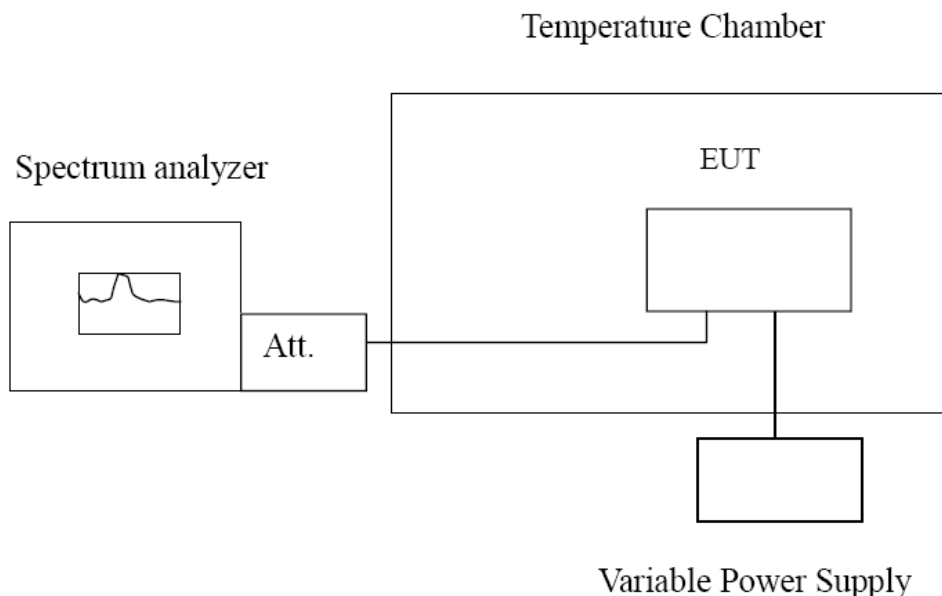
Raw data reference to Section 1 CTL2409192011-WF_5G_BAND_1_Appendix.
Raw data reference to Section 1 CTL2409192011-WF_5G_BAND_2A_Appendix.
Raw data reference to Section 1 CTL2409192011-WF_5G_BAND_2C_Appendix.
Raw data reference to Section 1 CTL2409192011-WF_5G_BAND_3_Appendix.

3.7. Frequency Stability

LIMIT

Manufacturers of U-NII devices are responsible for ensuring frequency stability such that an emission is maintained within the band of operation under all conditions of normal operation as specified in the users manual.

TEST CONFIGURATION



TEST PROCEDURE

Frequency Stability under Temperature Variations:

The equipment under test was connected to an external AC or DC power supply and input rated voltage. RF output was connected to a frequency counter or spectrum analyzer via feed through attenuators. The EUT was placed inside the temperature chamber. Set the spectrum analyzer RBW low enough to obtain the desired frequency resolution and measure EUT 20°C operating frequency as reference frequency. Turn EUT off and set the chamber temperature to -30°C. After the temperature stabilized for approximately 30 minutes recorded the frequency. Repeat step measure with 10°C increased per stage until the highest temperature of +50°C reached.

Frequency Stability under Voltage Variations:

Set chamber temperature to 20°C. Use a variable AC power supply / DC power source to power the EUT and set the voltage to rated voltage. Set the spectrum analyzer RBW low enough to obtain the desired frequency resolution and recorded the frequency.

Reduce the input voltage to specify extreme voltage variation ($\pm 15\%$) and endpoint, record the maximum frequency change.

TEST RESULTS

Raw data reference to Section 4 CTL2409192011-WF_5G_BAND_1_Appendix.

Raw data reference to Section 4 CTL2409192011-WF_5G_BAND_2A_Appendix.

Raw data reference to Section 4 CTL2409192011-WF_5G_BAND_2C_Appendix.

Raw data reference to Section 4 CTL2409192011-WF_5G_BAND_3_Appendix.

3.8. Antenna Requirement

Standard Applicable

For intentional device, according to FCC 47 CFR Section 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, the manufacturer may design the unit so that a broken antenna can be replaced by the user, but the use of a standard antenna jack or electrical connector is prohibited

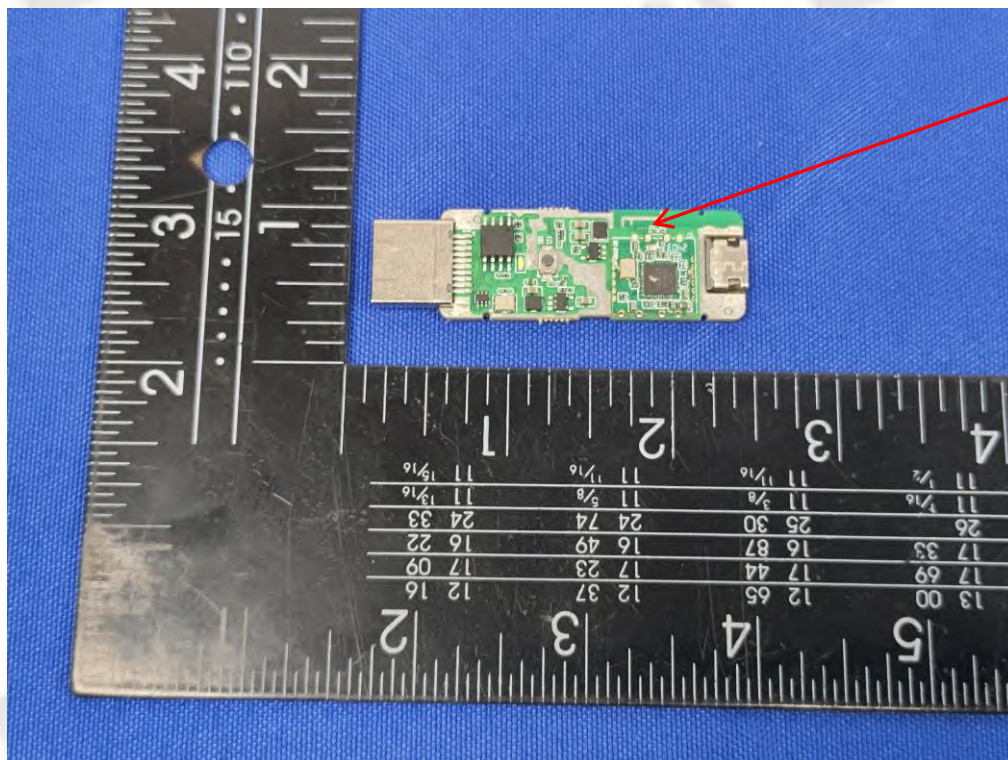
And according to FCC 47 CFR Section 15.407 (a), if transmitting antennas of directional gain greater than 6dBi are used, the power shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6dBi.

Refer to statement below for compliance

The manufacturer may design the unit so that the user can replace a broken antenna, but the use of a standard antenna jack or electrical connector is prohibited. Further, this requirement does not apply to intentional radiators that must be professionally installed.

Antenna Connected Construction

The maximum gain of 5G_Wi-Fi Antenna was 2dBi.



**WIFI
Antenna**

3.9. Operation in the absence of information to the transmit

Standard Applicable

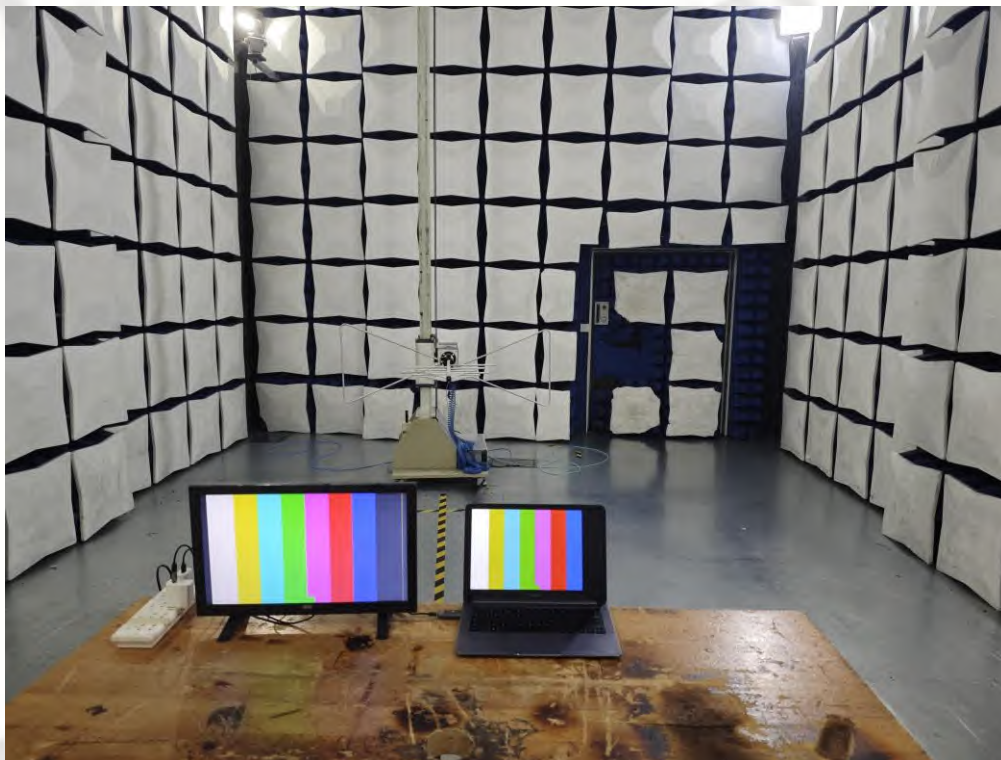
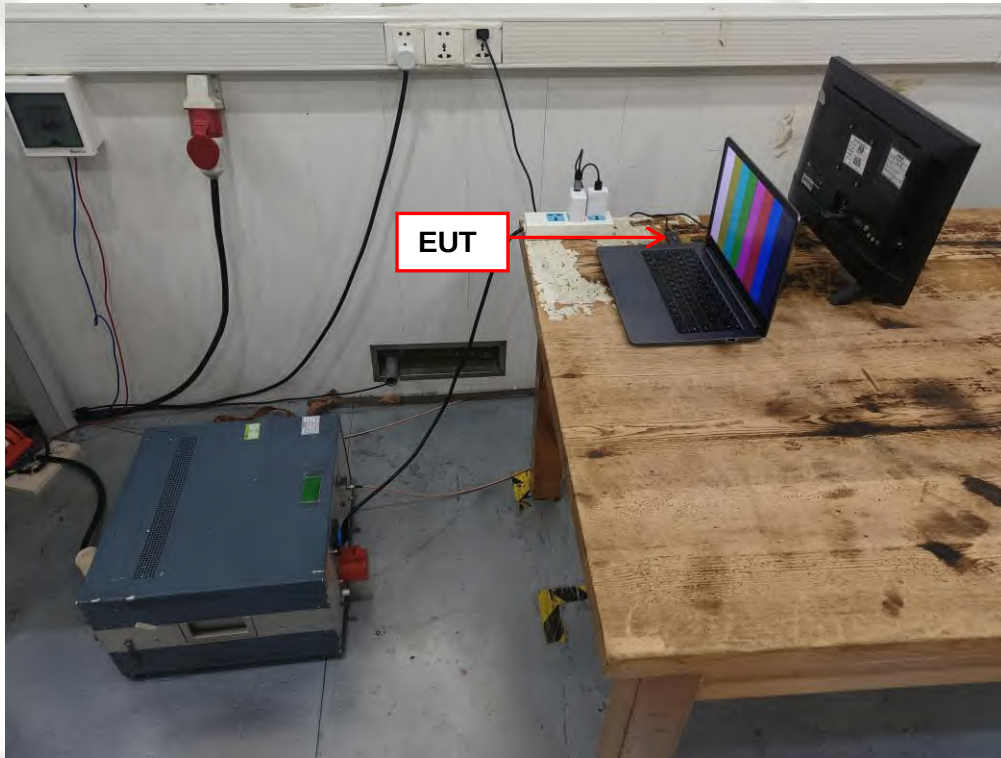
15.407(c) requirement:

The device shall automatically discontinue transmission in case of either absence of information to transmit or operational failure. These provisions are not intended to preclude the transmission of control or signaling information or the use of repetitive codes used by certain digital technologies to complete frame or burst intervals. Applicants shall include in their application for equipment authorization a description of how this requirement is met.

Results

While the EUT is not transmitting any information, the EUT can automatically discontinue transmission and become standby mode for power saving. The EUT can detect the controlling signal of ASK message transmitting from remote device and verify whether it shall resend or discontinue transmission. (manufacturer declare)

4. Test Setup Photos of the EUT

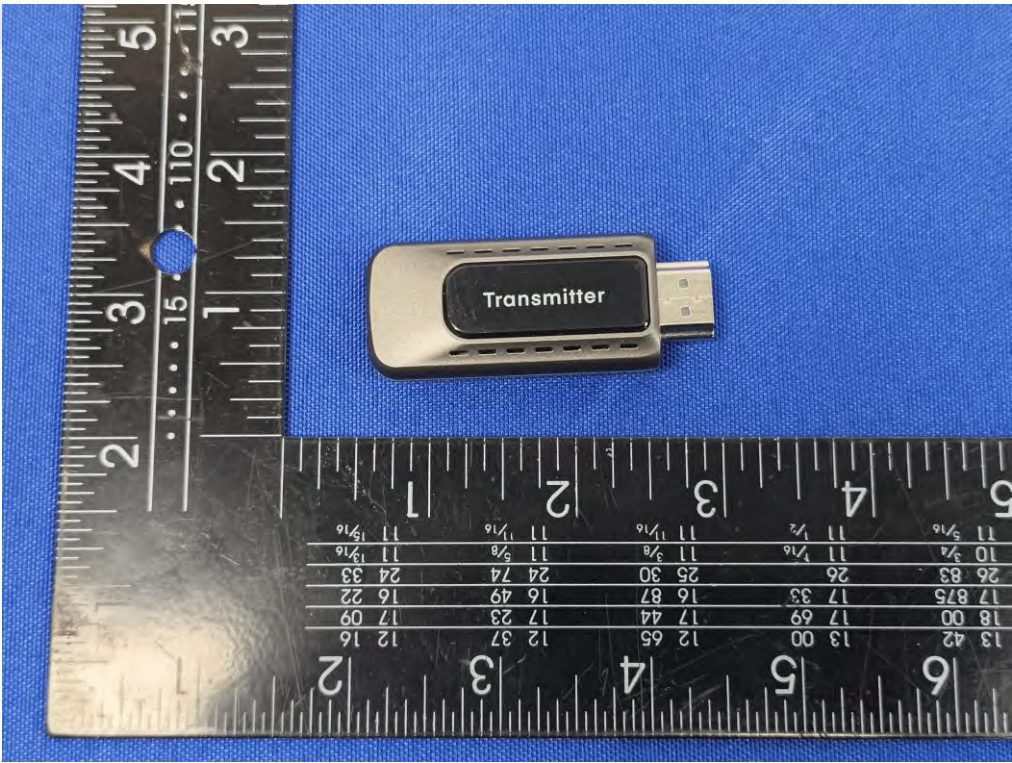
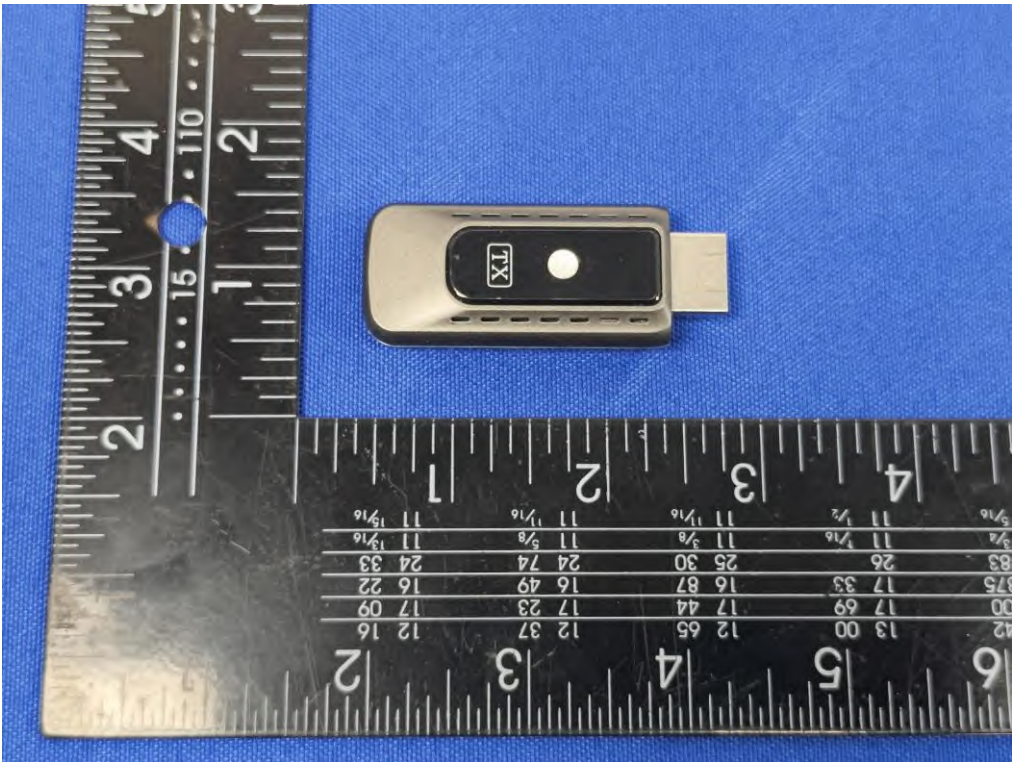


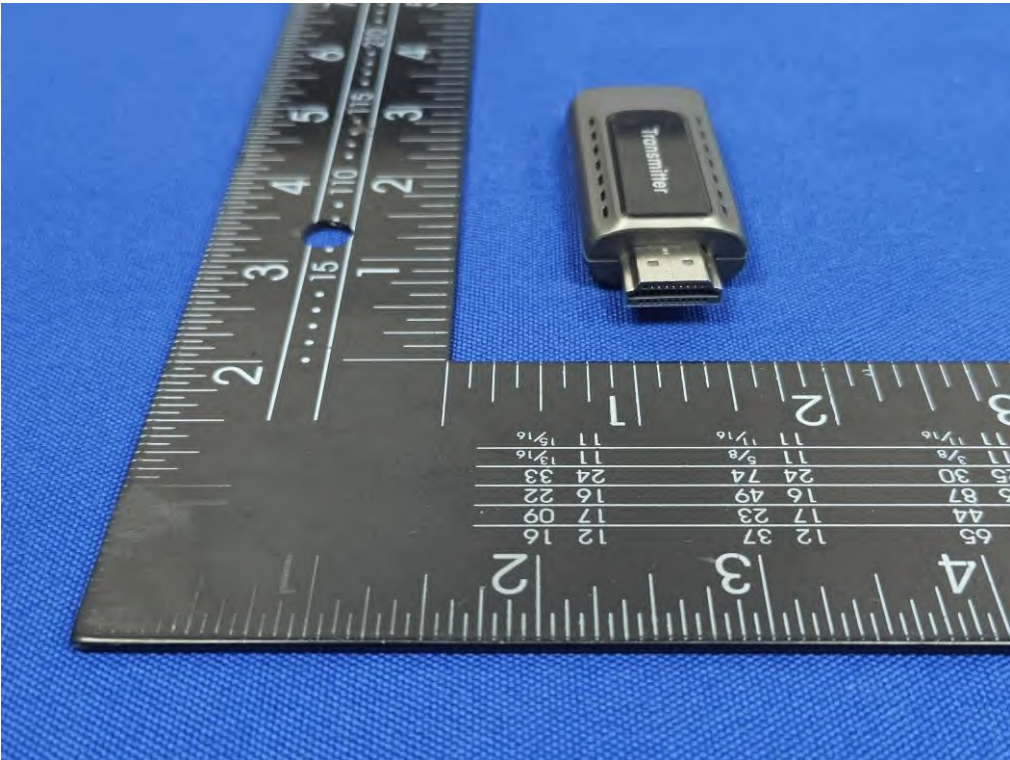
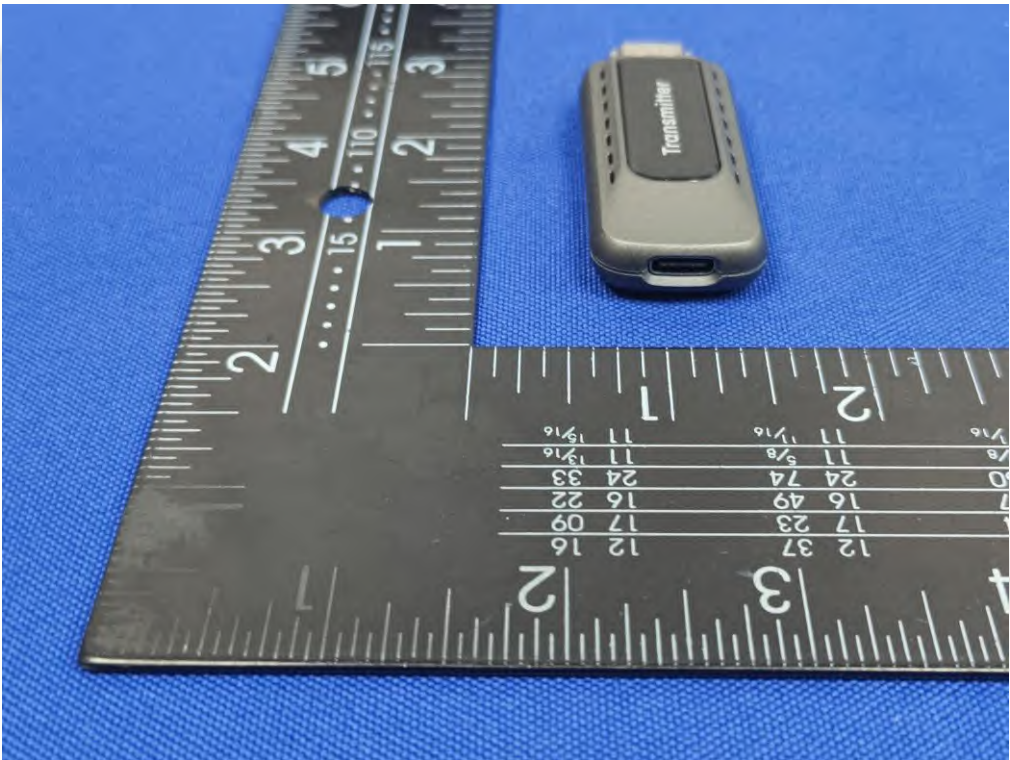


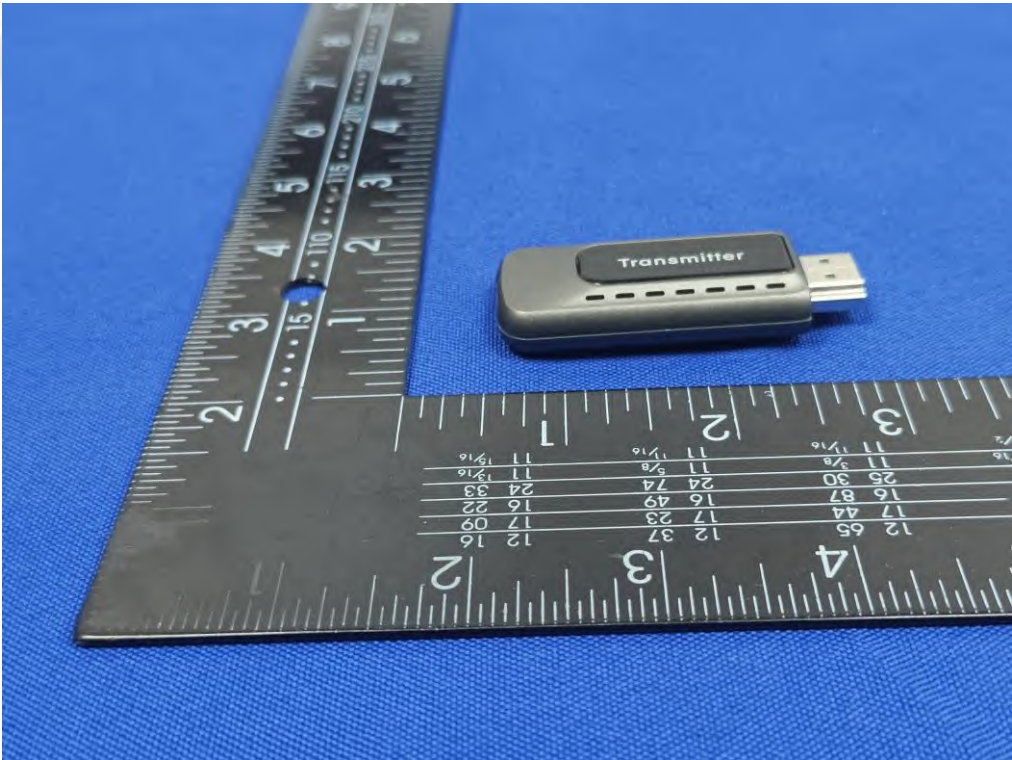
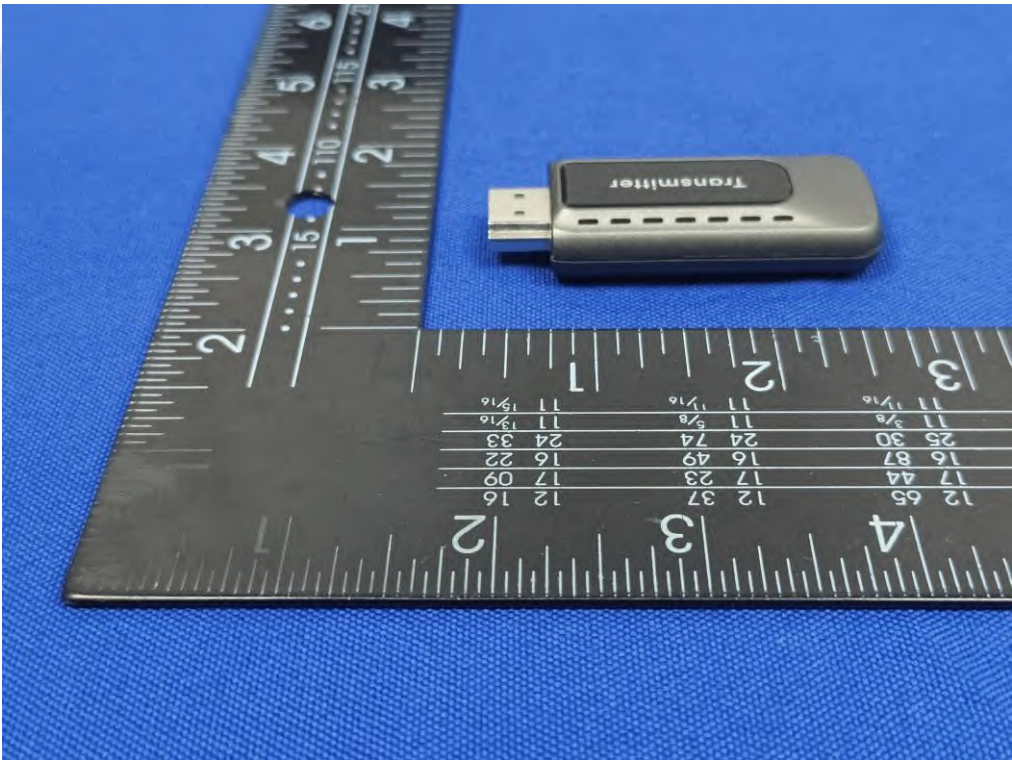
5. Photos of the EUT

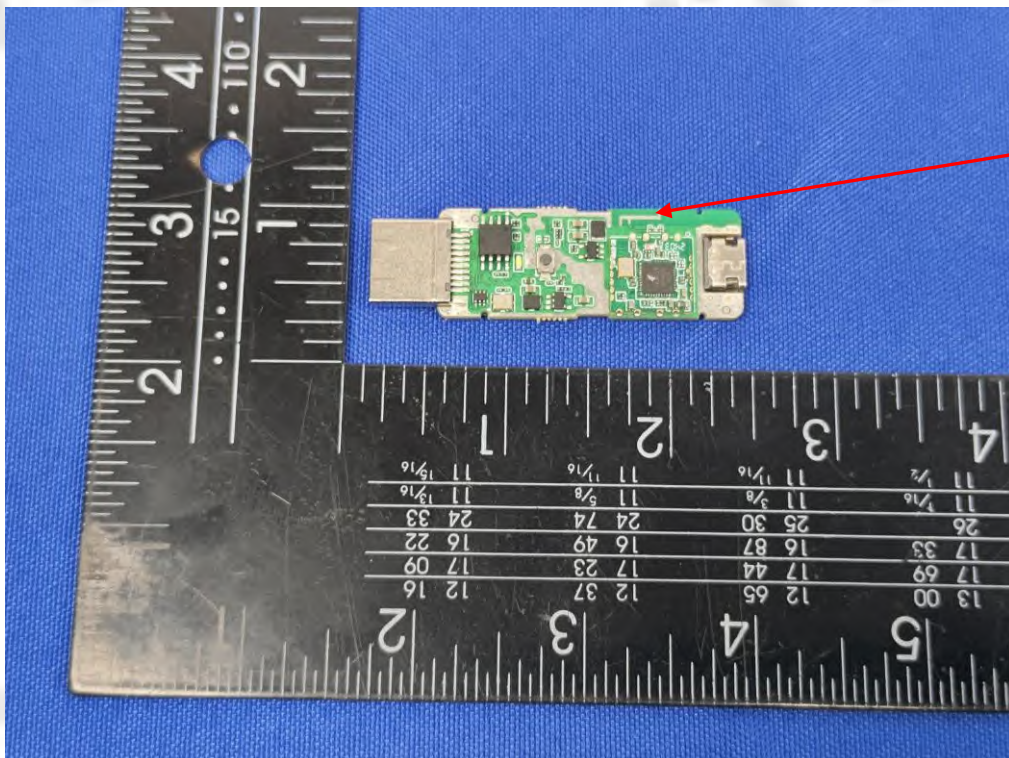
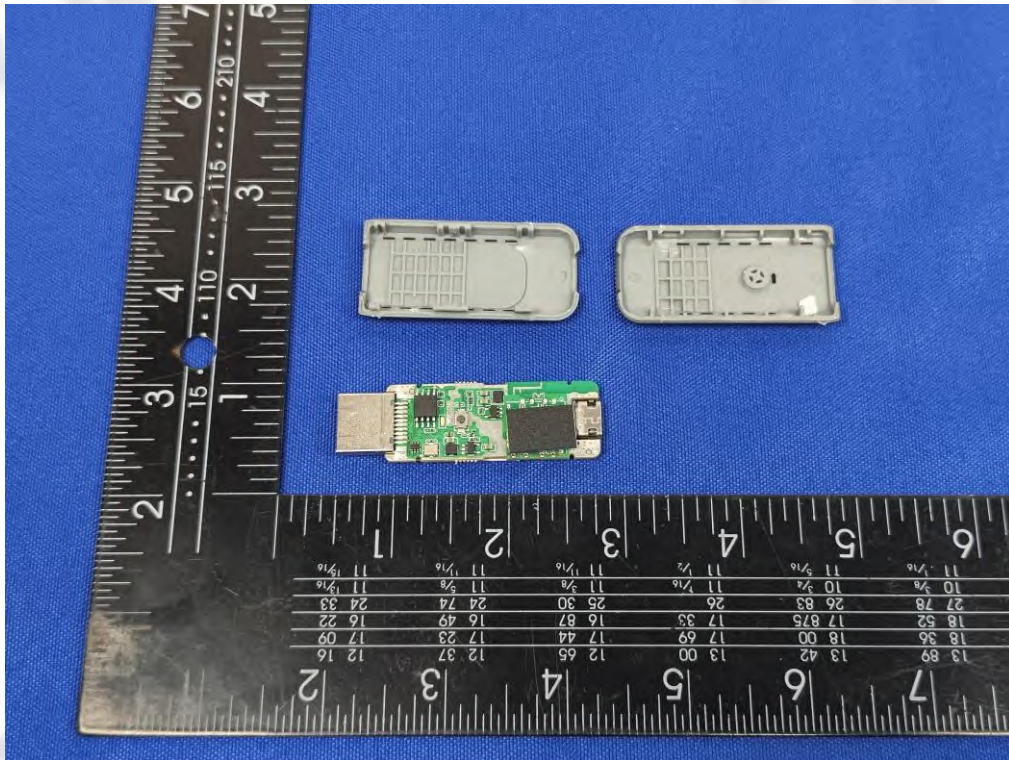
External Photos of EUT



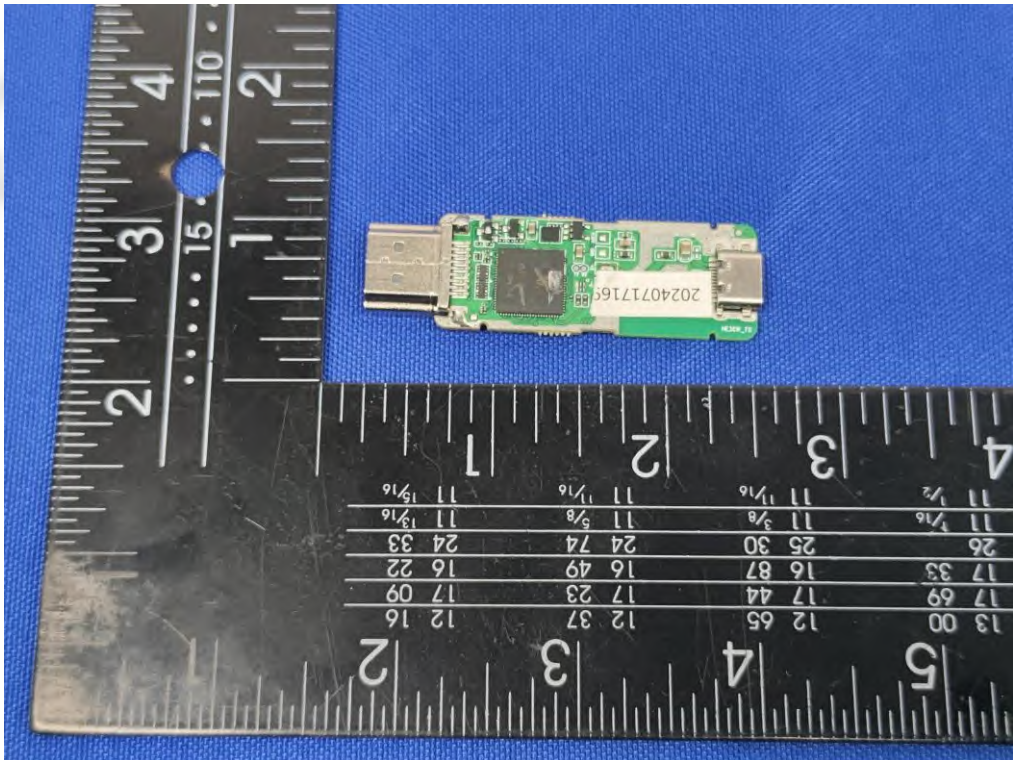


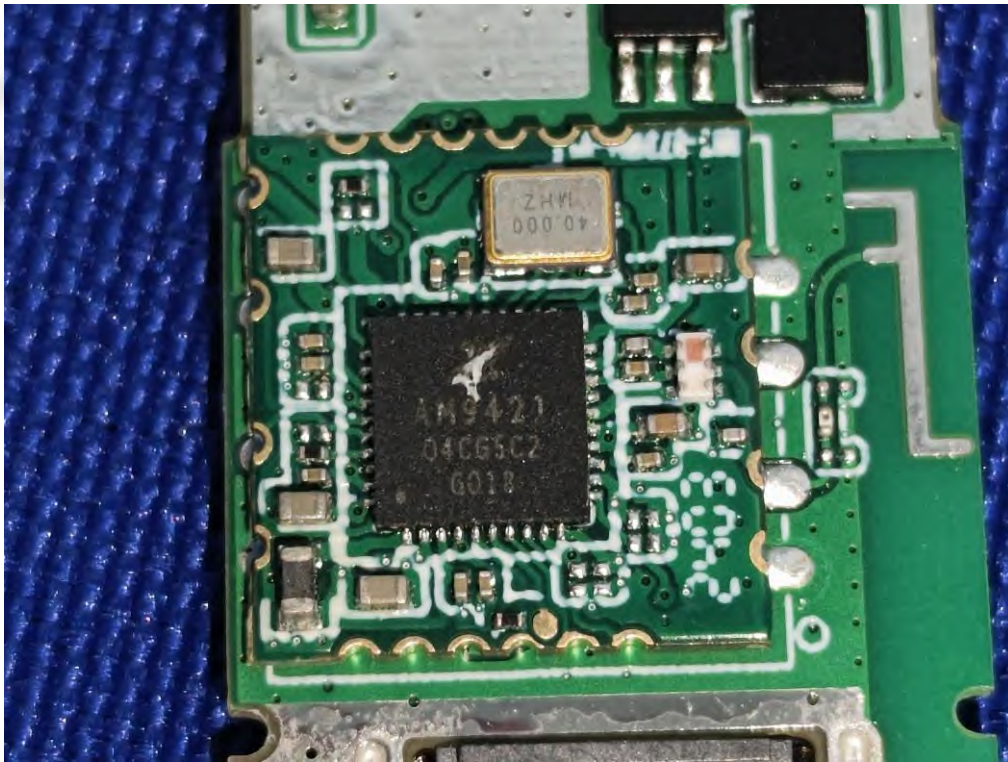




Internal Photos of EUT

Antenna





***** End of Report *****