



Shenzhen CTL Testing Technology Co., Ltd.
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TEST REPORT

FCC PART 15.247

Report Reference No.....: CTL2411291011-WF03

Compiled by: Happy Guo
(position+printed name+signature) (File administrators)

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(position+printed name+signature) (Test Engineer)

Approved by: Ivan Xie
(position+printed name+signature) (Manager)



Product Name.....: laptop

Model/Type reference.....: T152A

List Model(s).....: T140A, T156A, T160A, T173A

Trade Mark.....: N/A

FCC ID.....: 2BAGV-F152A

Applicant's name.....: Shenzhen Forwell Electronics Technology Co., Ltd.

Address of applicant.....: 2nd Floor,Building A,Shatang Beifangyongfa Science and
Technology Park,Jincheng Rd.,Shajing,Baoan,Shenzhen,
Guangdong,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.....: FCC Part 15.247: Operation within the bands 902-928 MHz,
2400-2483.5 MHz and 5725-5850 MHz.

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

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

Date of receipt of test item.....: Dec. 06, 2024

Date of Test Date.....: Dec. 06, 2024-Dec. 09, 2024

Date of Issue.....: Dec. 10, 2024

Result.....: Pass

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TEST REPORT

Test Report No. : CTL2411291011-WF03	Dec. 10, 2024 Date of issue
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Equipment under Test : laptop

Sample No : CTL2411291011

Model /Type : T152A

Listed Models : T140A, T156A, T160A, T173A

Applicant : **Shenzhen Forwell Electronics Technology Co., Ltd.**

Address : 2nd Floor,Building A,Shatang Beifangyongfa Science and Technology Park,Jincheng Rd.,Shajing,Baoan, Shenzhen,Guangdong,China

Manufacturer : **Shenzhen Forwell Electronics Technology Co., Ltd.**

Address : 2nd Floor,Building A,Shatang Beifangyongfa Science and Technology Park,Jincheng Rd.,Shajing,Baoan, Shenzhen,Guangdong,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 **

[illegible]

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1. SUMMARY

1.1. TEST STANDARDS

The tests were performed according to following standards:

[FCC Rules Part 15.247](#): Frequency Hopping, Direct Spread Spectrum and Hybrid Systems that are in operation within the bands of 902-928 MHz, 2400-2483.5 MHz, and 5725-5850 MHz

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

[KDB 558074 D01 15.247 Meas Guidance v05r02](#) : Guidance for Performing Compliance Measurements on Digital Transmission Systems (DTS) Operating Under §15.247

According to FCC's request, Test Procedure 789033 D02 General UNII Test Procedures New Rules v01r03 and [KDB 662911 D01 Multiple Transmitter Output v02r01](#) is required to be used for this kind of FCC 15.407 Ull device.

1.2. Test Description

FCC PART 15.247		
FCC Part 15.109/ 15.205/ 15.209	Radiated Emissions	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, Shaheixi Road, Nanshan District, Shenzhen, China 518055

There is one 3m semi-anechoic chamber and two line conducted labs for final test. The Test Sites meet the requirements in documents ANSI C63.10 and CISPR 22/EN 55022 requirements.

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 Radiated	± 2.20 dB	(1)
Radiated Emission 9kHz~30MHz	± 3.66 dB	(1)
Radiated Emission 30~1000MHz	± 4.10 dB	(1)
Radiated Emission Above 1GHz	± 4.32 dB	(1)
DTS Bandwidth	$\pm 1.9\%$	(1)
Maximum Conducted Output Power	± 1.18 dB	(1)
Maximum Power Spectral Density Level	± 0.98 dB	(1)
Band-edge	± 1.21 dB	(1)
Unwanted Emissions In Non-restricted Freq Bands	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 $k=1.96$.

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:	laptop
Model/Type reference:	T152A
Power supply:	Input: 100-240V~ 50/60Hz 1.2A Output: 12.0V-3.0A 36.0W
2.4G Wi-Fi	
Supported type:	802.11b/802.11g/802.11n(HT20)/802.11n(HT40)
Modulation:	802.11b: DSSS 802.11g/802.11n(HT20)/802.11n(HT40): OFDM
Operation frequency:	802.11b/802.11g/802.11n(HT20): 2412MHz~2462MHz 802.11n(HT40): 2422MHz~2452MHz
Channel number:	802.11b/802.11g/802.11n(HT20): 11 802.11n(HT40): 7
Channel separation:	802.11b/802.11g/802.11n(HT20)/802.11n(HT40)
Antenna type:	Ant 1: FPC Antenna Ant 2: FPC Antenna
Antenna gain:	Ant 1: 1.35dBi Ant 2: 1.37dBi
MIMO:	Not Supported

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

Note2: Antenna gain provided by the applicant.

Note3: This report is for 2.4G Wi-Fi only.

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.

There are 11 channels provided to the EUT and Channel 01/03/06/09/11 were selected for Wi-Fi test.

Operation Frequency Wi-Fi :

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

Note: The line display in grey were the channel selected for testing

2.4. Equipments Used during the Test

Conducted Emission						
Test Equipment	Manufacturer	Model No.	Serial No.	Previous calibration	Last Cal.	Cal.Due
EMI Test Receiver	ROHDE & SCHWARZ	ESCI	1166.5950.03	2023/05/04	2024/04/30	2025/04/29
LISN	ROHDE & SCHWARZ	ESH2-Z5	860014/010	2023/05/04	2024/04/30	2025/04/29
Limitator	ROHDE & SCHWARZ	ESH3-Z2	100408	2023/05/04	2024/04/30	2025/04/29
Software:						
Name of Software:			Version:			
ES-K1			V1.71			

Radiated Emission						
Test Equipment	Manufacturer	Model No.	Serial No.	Previous calibration	Last Cal.	Cal.Due
Active Loop Antenna	Da Ze	ZN30900A	/	2021/05/13	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	OBH100400	26999002	/	2021/12/22	2024/12/21
Amplifier	MRT-AP01M06	MRT	S-001	2023/05/04	2024/04/30	2025/04/29
Amplifier	Agilent	8449B	3008A02306	2023/05/04	2024/04/30	2025/04/29
Amplifier	Brief&Smart	LNA-4018	2104197	2023/05/05	2024/05/03	2025/05/02
EMI Test Receiver	ROHDE & SCHWARZ	ESCI	1166.5950.03	2023/05/04	2024/04/30	2025/04/29
Spectrum Analyzer	RS	FSP	1164.4391.38	2023/05/05	2024/05/03	2025/05/02
Software:						
Name of Software:			Version:			
EZ_EMC(Below 1GHz)			V1.1.4.2			
EZ_EMC(Above 1GHz)			V1.1.4.2			

RF Conducted						
Test Equipment	Manufacturer	Model No.	Serial No.	Previous calibration	Last Cal.	Cal.Due
Spectrum Analyzer	Keysight	N9020A	MY53420874	2023/05/04	2024/05/01	2025/04/30
Temperature/Humidity Meter	Ji Yu	MC501	/	2023/05/09	2024/05/04	2025/05/03
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 15.247 of the FCC Part 15, Subpart C Rules.

2.6. Modifications

No modifications were implemented to meet testing criteria.

3. TEST CONDITIONS AND RESULTS

3.1. Radiated Emissions

Limit

For intentional device, according to § 15.209(a), the general requirement of field strength of radiated emission out of authorized band shall not exceed the following table at a 3 meters measurement distance.

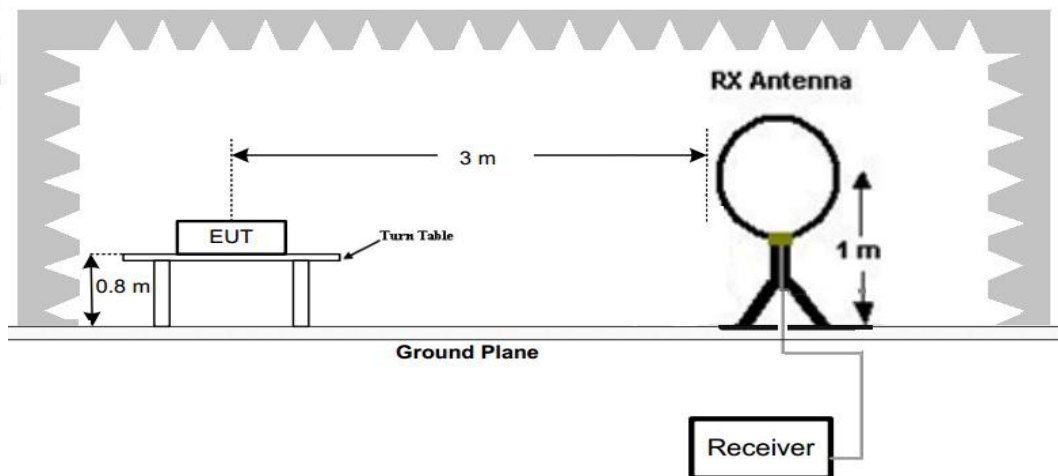
In addition, radiated emissions which fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emission limits specified in §15.209(a)

Radiated emission limits

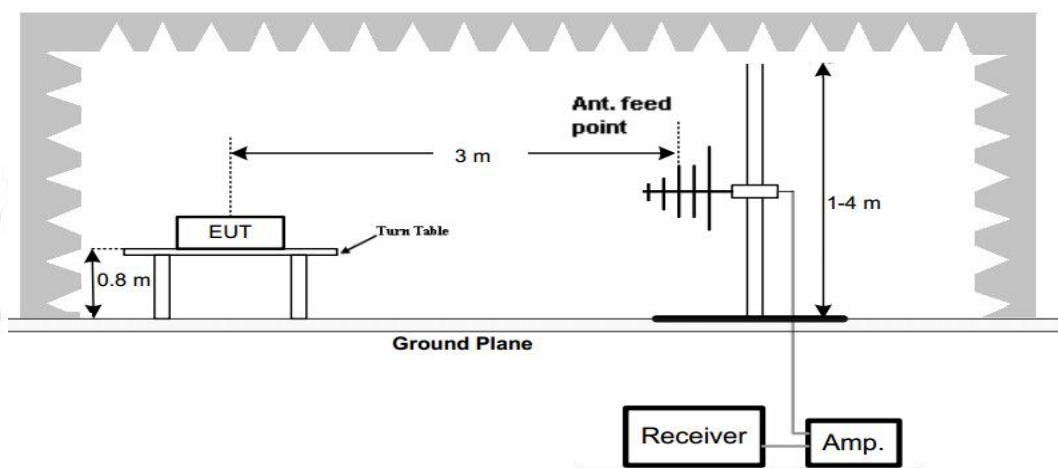
Frequency (MHz)	Distance (Meters)	Radiated (dB μ V/m)	Radiated (μ V/m)
0.009-0.49	3	$20\log(2400/F(\text{kHz})) + 40\log(300/3)$	$2400/F(\text{kHz})$
0.49-1.705	3	$20\log(24000/F(\text{kHz})) + 40\log(30/3)$	$24000/F(\text{kHz})$
1.705-30	3	$20\log(30) + 40\log(30/3)$	30
30-88	3	40.0	100
88-216	3	43.5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

TEST CONFIGURATION

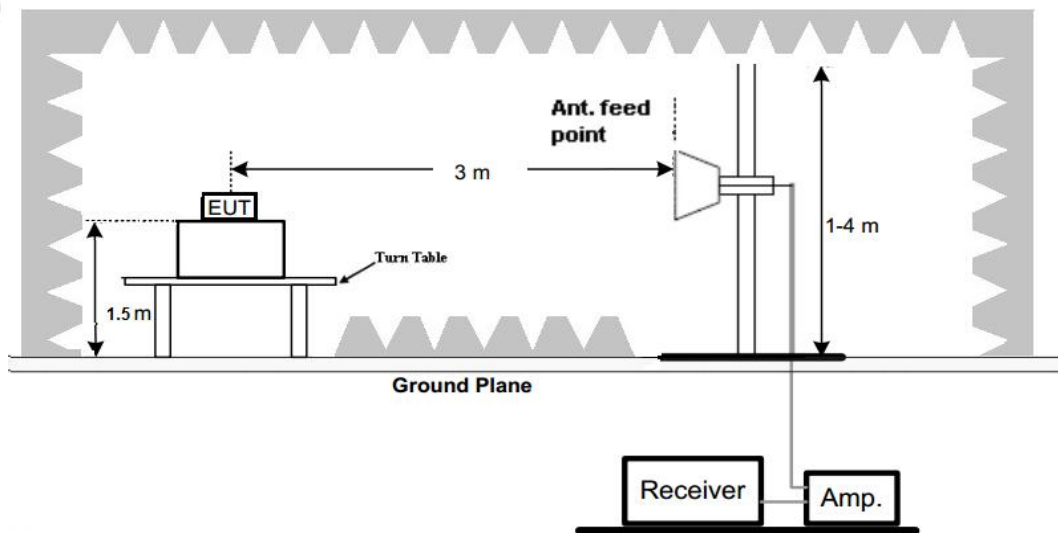
(A) Radiated Emission Test Set-Up, Frequency Below 30MHz



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



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



Test Procedure

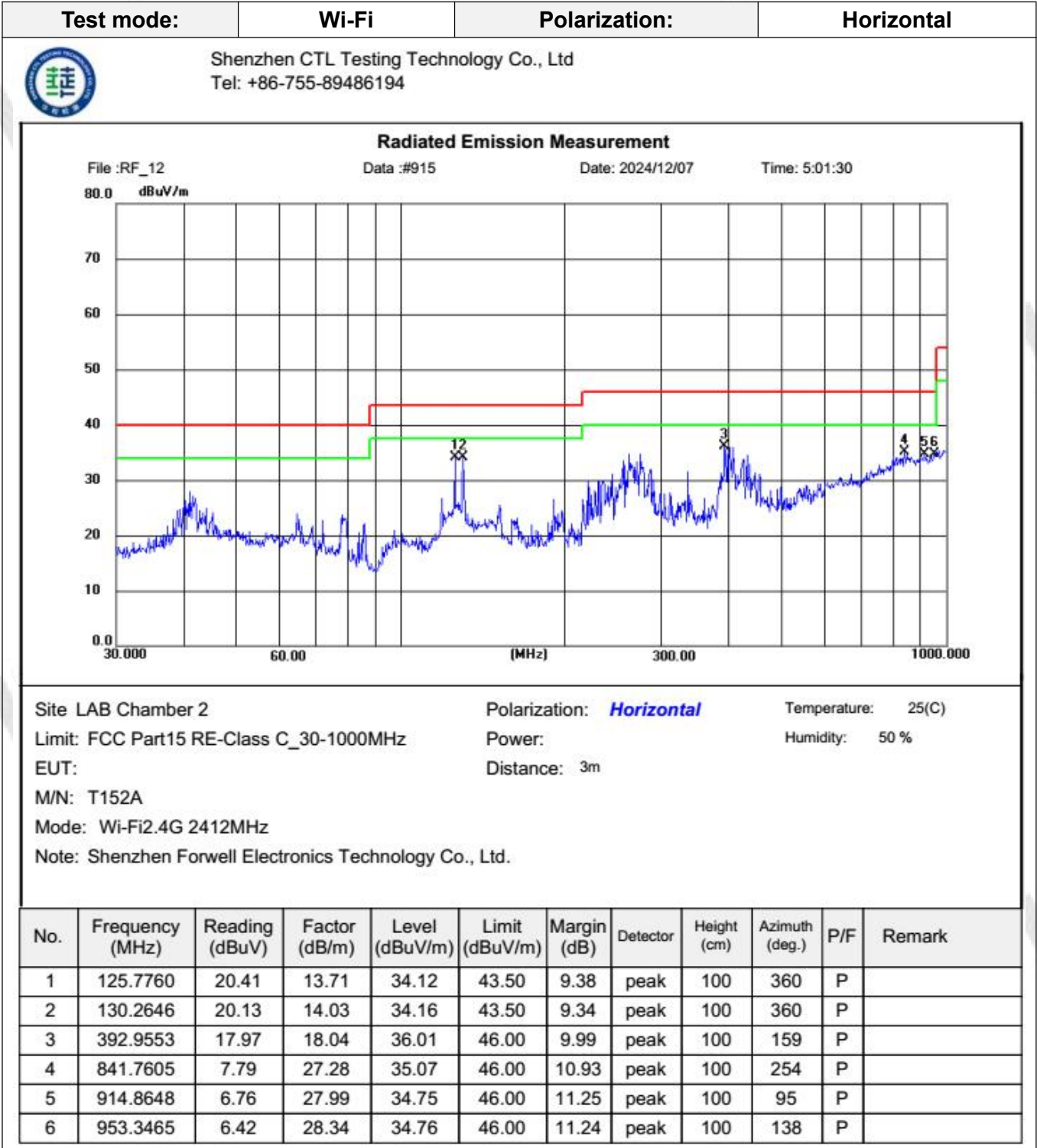
1. Below 1GHz measurement the EUT is placed on a turntable which is 0.8m above ground plane, and above 1GHz measurement EUT was placed on a low permittivity and low loss tangent turn table which is 1.5m above ground plane.
2. Maximum procedure was performed by raising the receiving antenna from 1m to 4m and rotating the turn table from 0°C to 360°C to acquire the highest emissions from EUT
3. And also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical.
4. Repeat above procedures until all frequency measurements have been completed.
5. The EUT was pretested with 3 orientations placed on the table for the radiated emission measurement –X, Y, and Z-plane. The X-plane results were found as the worst case and were shown in this report.

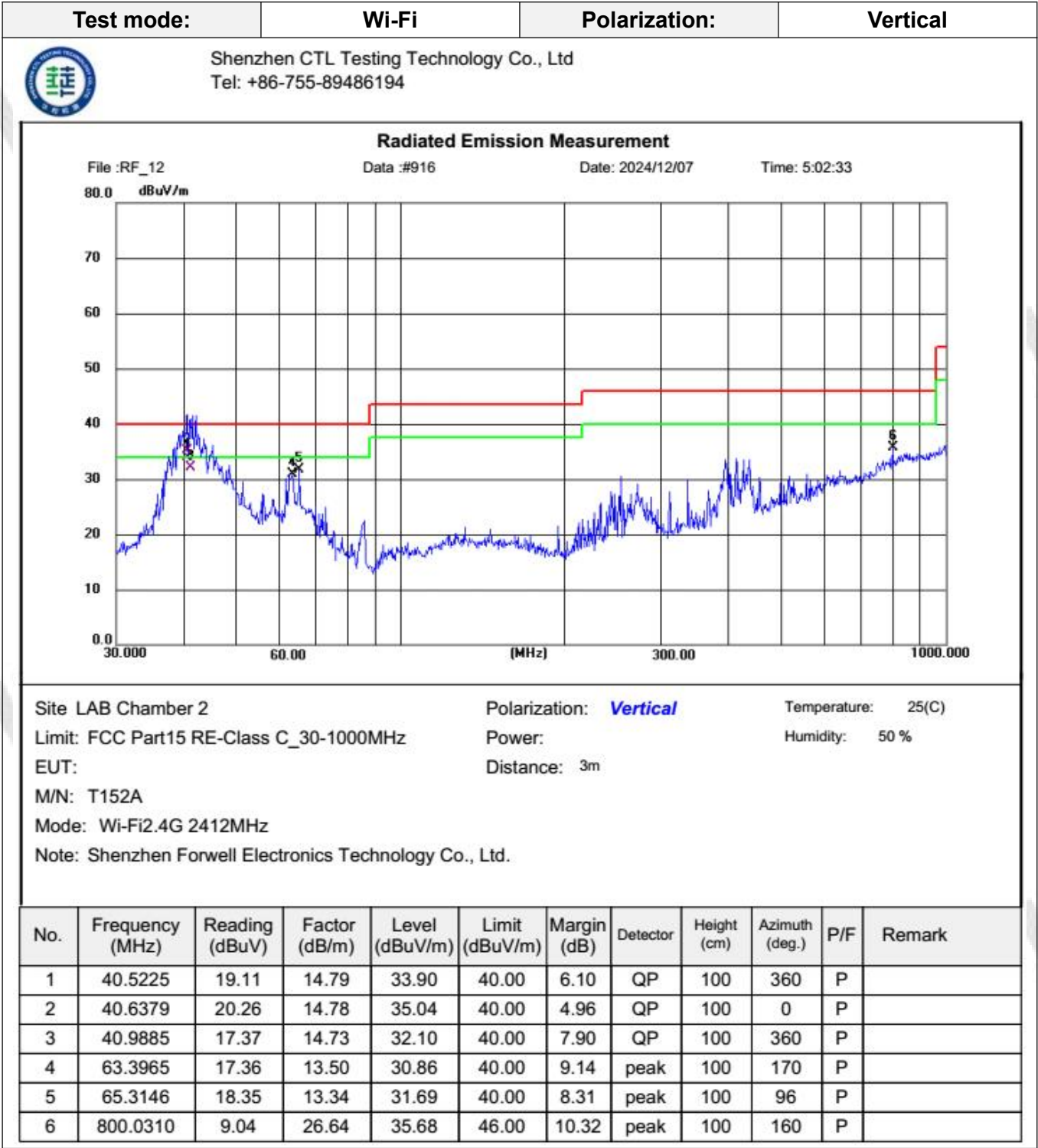
TEST RESULTS

Remark:

1. All three channels (lowest/middle/highest) of each mode were measured below 1GHz and recorded worst case at 802.11b low channel.
2. Radiated emission test from 9 kHz to 10th harmonic of fundamental was verified, Found the emission level are attenuated 20dB below the limits from 9 kHz to 30MHz, so it does not recorded in report.

For 30MHz-1GHz





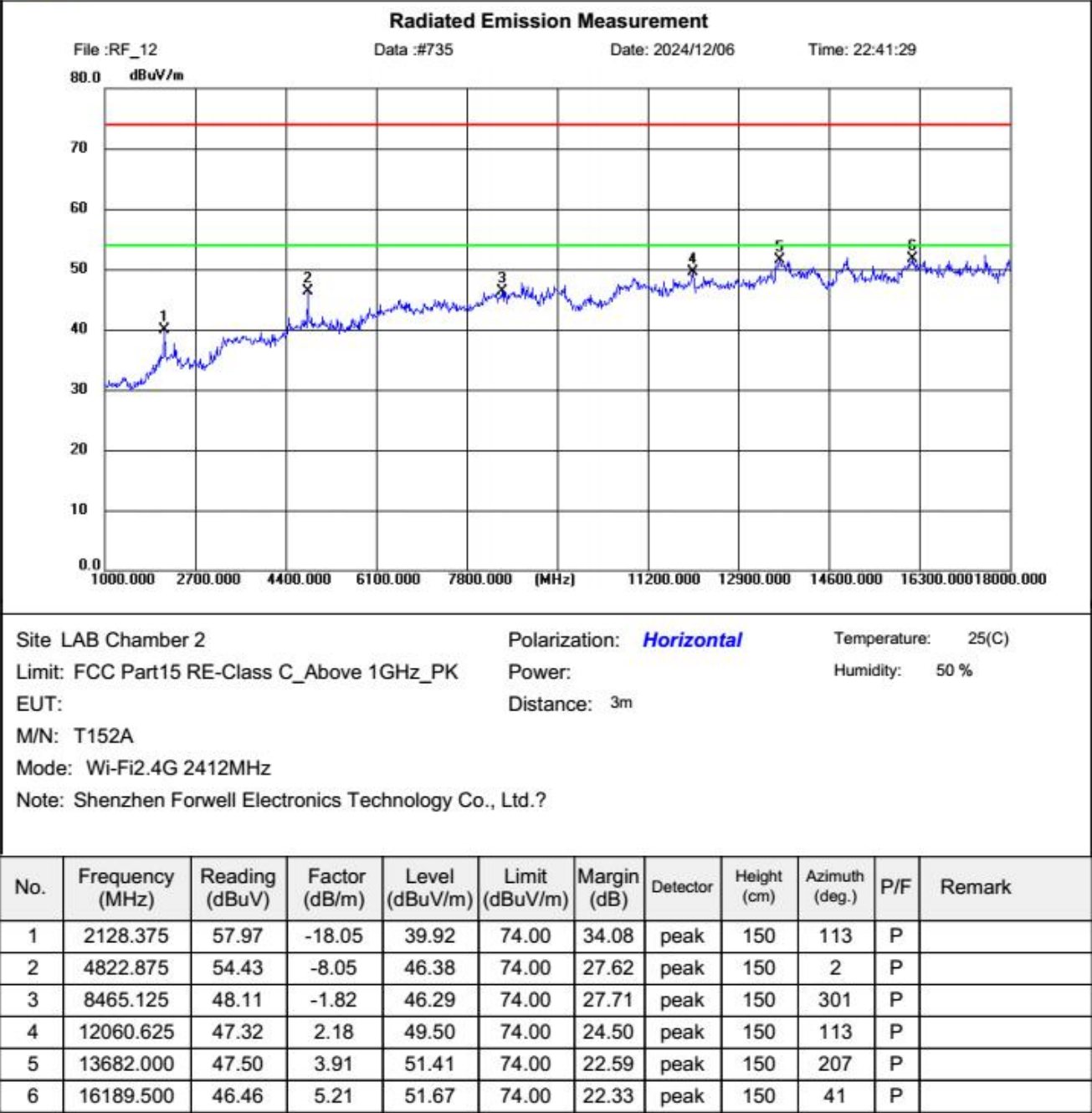
For 1GHz to 25GHz

802.11b Mode (above 1GHz)

Note: 802.11b/802.11g/802.11n (H20) /802.11n (H40) all have been tested, only worse case 802.11b is reported



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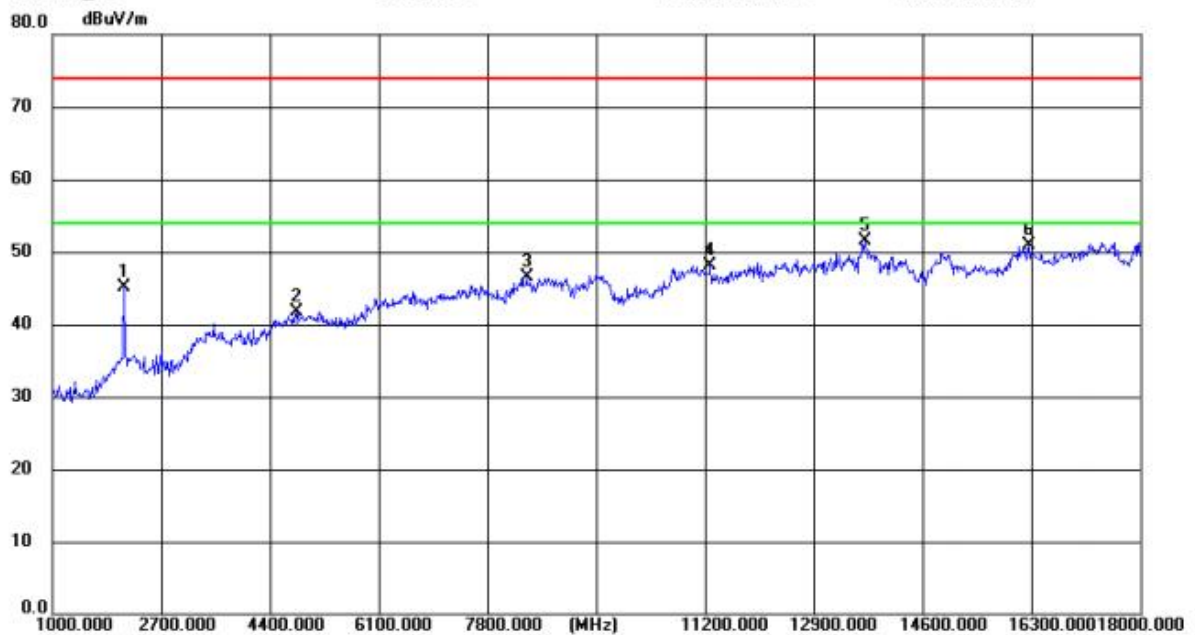
Radiated Emission Measurement

File : RF_12

Data : #736

Date: 2024/12/06

Time: 22:42:31



Site LAB Chamber 2

Polarization: **Vertical**

Temperature: 25(C)

Limit: FCC Part15 RE-Class C_Above 1GHz_PK

Power:

Humidity: 50 %

EUT:

Distance: 3m

M/N: T152A

Mode: Wi-Fi2.4G 2412MHz

Note: Shenzhen Forwell Electronics 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	2132.625	63.22	-18.02	45.20	74.00	28.80	peak	150	25	P	
2	4822.875	49.85	-8.05	41.80	74.00	32.20	peak	150	98	P	
3	8414.125	48.48	-1.97	46.51	74.00	27.49	peak	150	46	P	
4	11291.375	47.37	0.80	48.17	74.00	25.83	peak	150	88	P	
5	13703.250	47.63	3.90	51.53	74.00	22.47	peak	150	317	P	
6	16268.125	45.42	5.44	50.86	74.00	23.14	peak	150	161	P	



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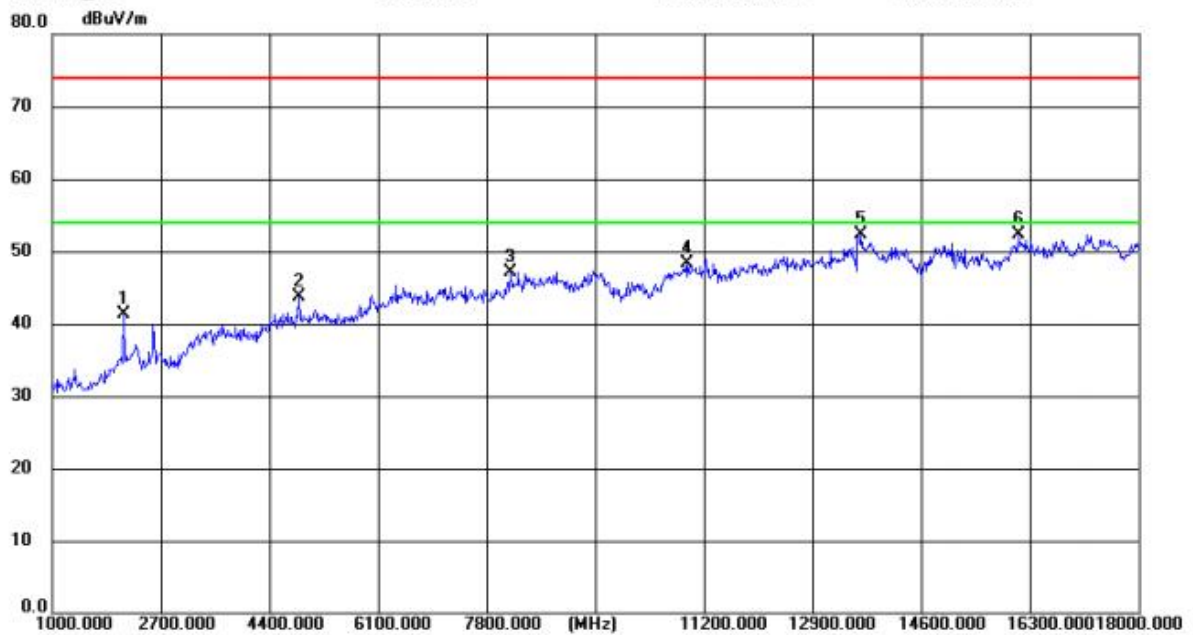
Radiated Emission Measurement

File :RF_12

Data :#737

Date: 2024/12/06

Time: 22:45:49



Site LAB Chamber 2

Polarization: **Horizontal**

Temperature: 25(C)

Limit: FCC Part15 RE-Class C_Above 1GHz_PK

Power:

Humidity: 50 %

EUT:

Distance: 3m

M/N: T152A

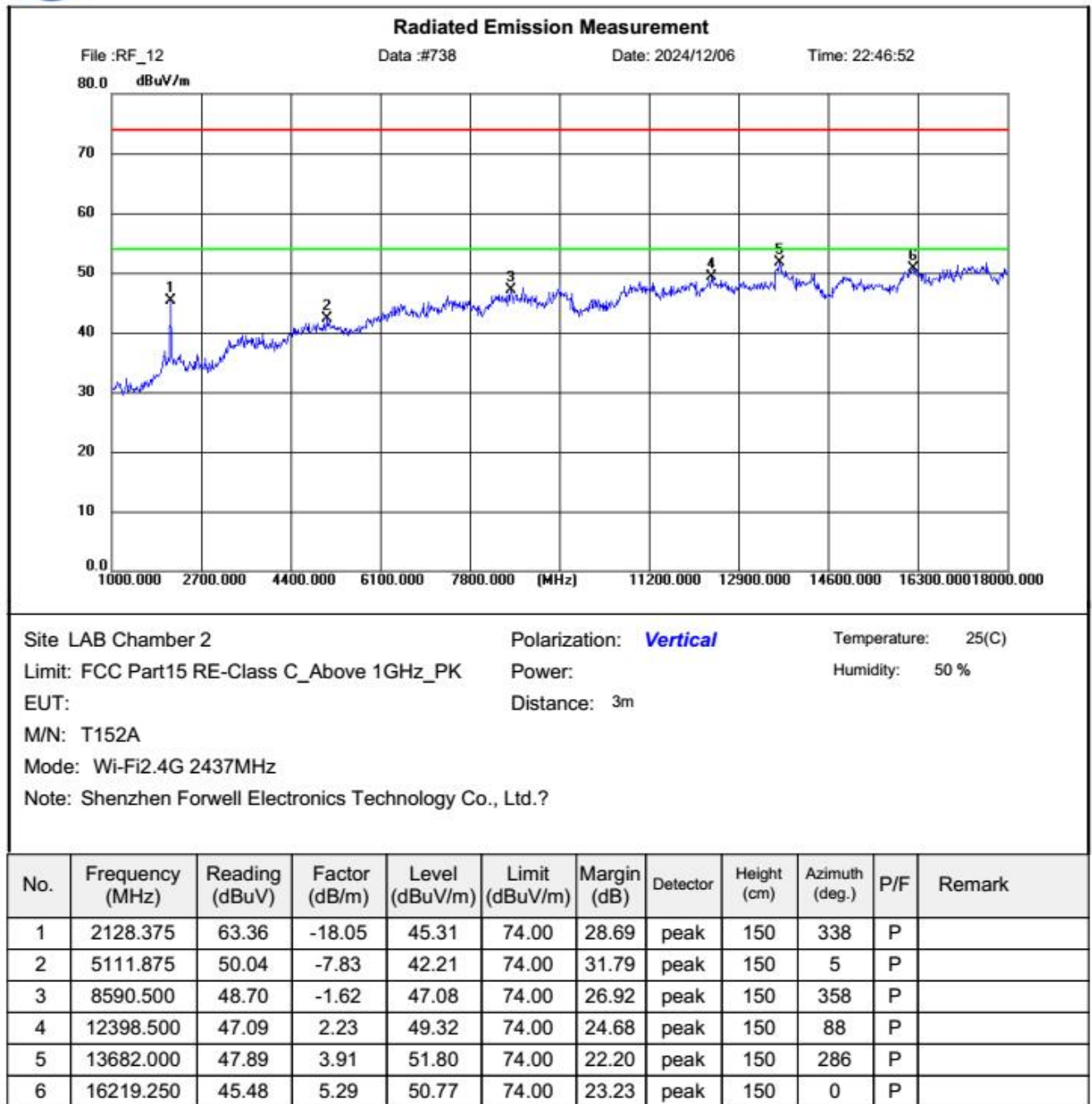
Mode: Wi-Fi2.4G 2437MHz

Note: Shenzhen Forwell Electronics 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	2130.500	59.39	-18.04	41.35	74.00	32.65	peak	150	242	P	
2	4873.875	51.69	-7.97	43.72	74.00	30.28	peak	150	95	P	
3	8186.750	49.69	-2.51	47.18	74.00	26.82	peak	150	147	P	
4	10949.250	47.66	0.72	48.38	74.00	25.62	peak	150	95	P	
5	13675.625	48.34	3.91	52.25	74.00	21.75	peak	150	325	P	
6	16134.250	47.21	5.05	52.26	74.00	21.74	peak	150	242	P	

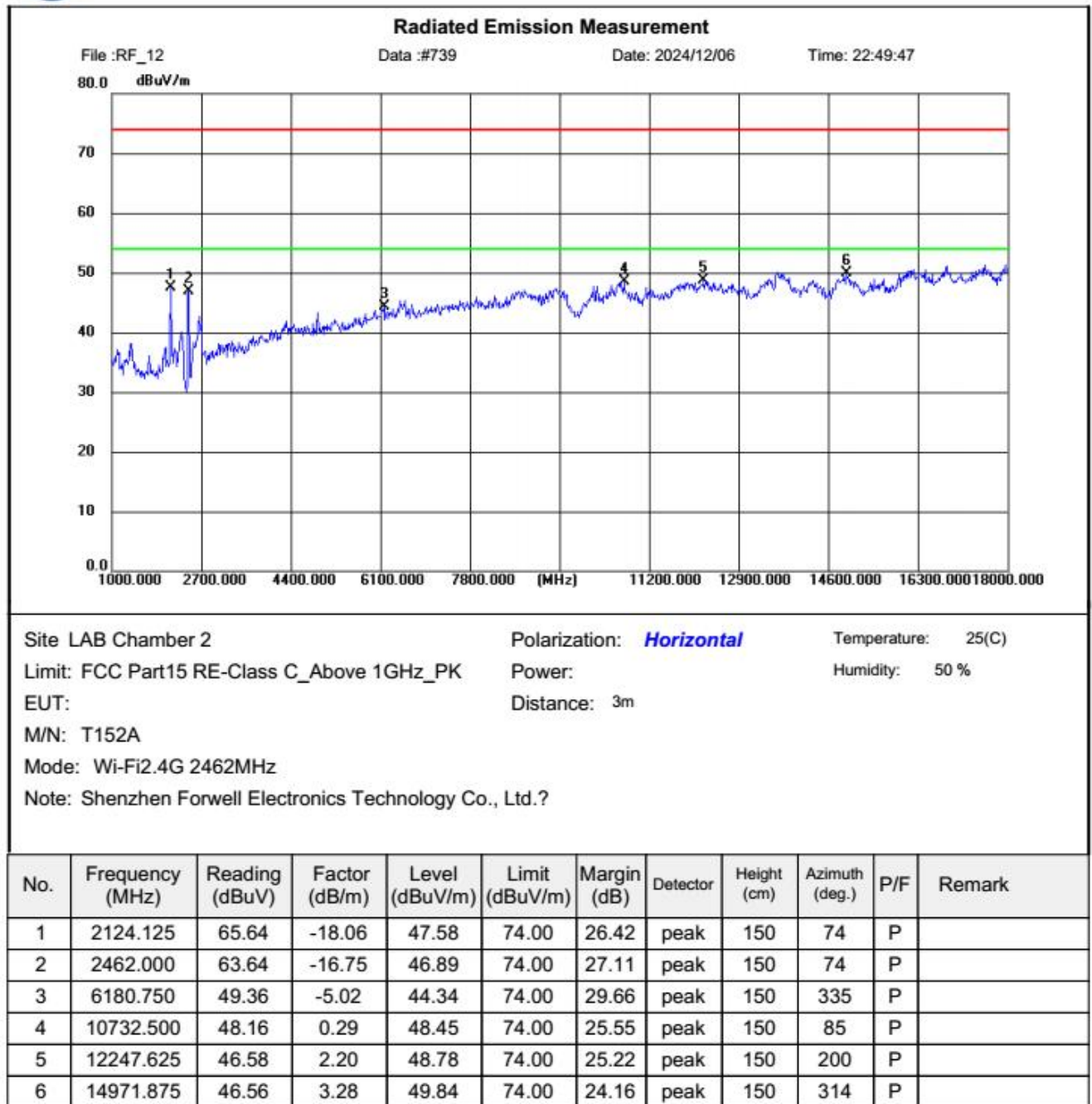


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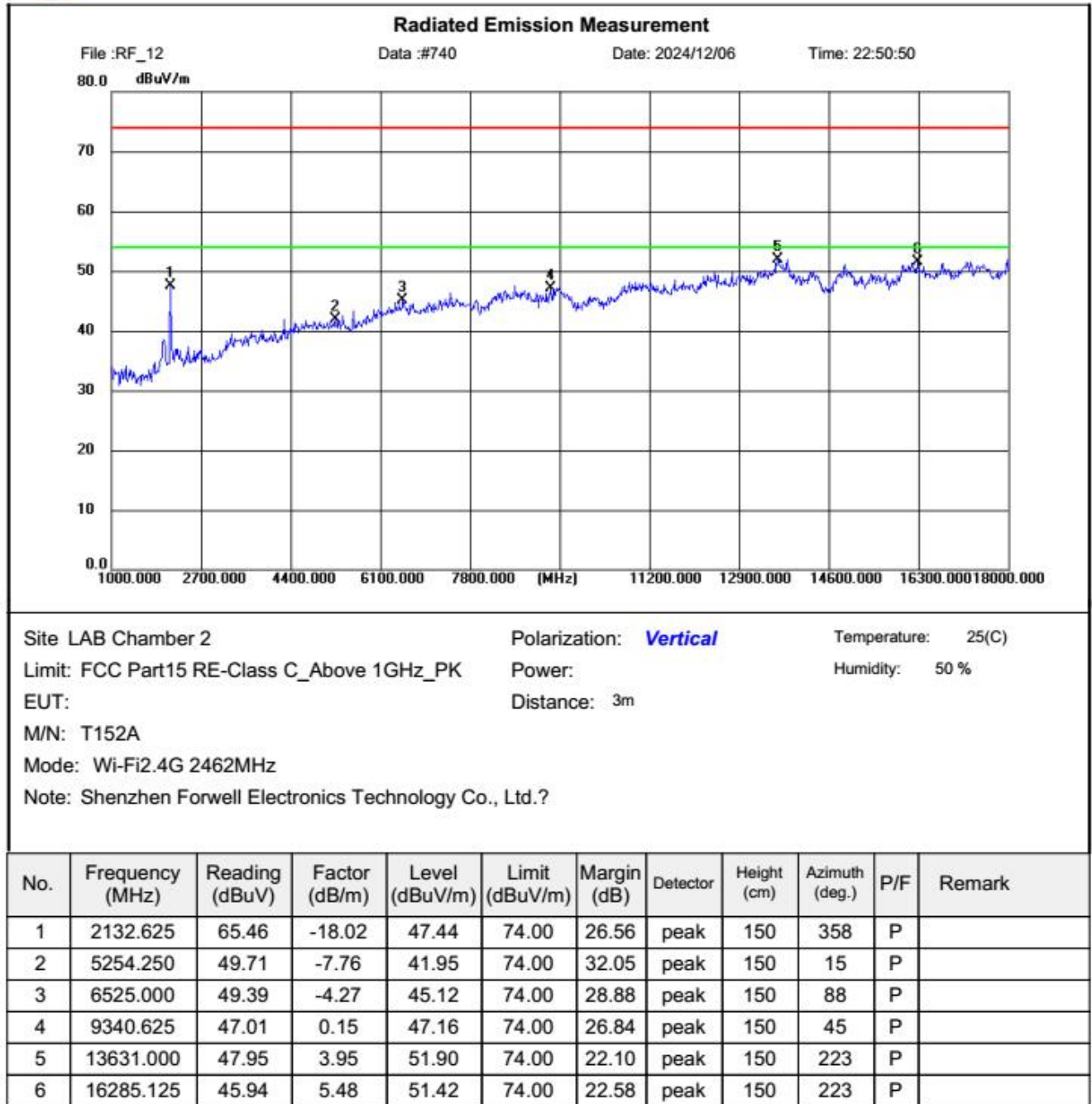


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**REMARKS:**

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. PK detector measurement value is lower than the average limit. Therefore, there is no need to test AV detector measurements.
5. RBW1MHz VBW3MHz Peak detector is for PK value; RBW 1MHz VBW10Hz Peak detector is for AV value.
6. Other emissions are attenuated 20dB below the limits from 9 kHz to 30MHz, so it does not recorded in report.
7. 18GHz-26GHz not recorded for no spurious point have a margin of less than 6 dB with respect to the limits.

4. Test Setup Photos of the EUT

Reference to the test report No. CTL2411291011-WF01

5. Photos of the EUT

Reference to the test report No. CTL2411291011-WF01

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