



中认信通

CHINA CERTIFICATION ICT CO., LTD (DONGGUAN)



TEST REPORT

Applicant: Guangzhou Robustel Co., Ltd.

Address: 501, Building #2,63 Yongan Road, Huangpu District,Guangzhou

FCC ID: 2AAJGR2000S-MHI

Product Name: Industrial Dual SIM Cellular VPN Router

Model Number: R2000-4L

**Standard(s): 47 CFR Part 15 Subpart B
ANSI C63.4-2014**

The above equipment has been tested and found compliance with the requirement of the relative standards by China Certification ICT Co., Ltd (Dongguan)

Report Number: CR21110045-00B

Date Of Issue: 2021-11-24

Reviewed By: Sun Zhong *Sun Zhong*

Title: Manager

Test Laboratory: China Certification ICT Co., Ltd (Dongguan)

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Test Facility

The Test site used by China Certification ICT Co., Ltd (Dongguan) to collect test data is located on the No. 113, Pingkang Road, Dalang Town, Dongguan, Guangdong, 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. : 442868, the FCC Designation No. : CN1314.

The lab has been recognized by Innovation, Science and Economic Development Canada to test to Canadian radio equipment requirements, the CAB identifier: CN0123.

Declarations

China Certification ICT Co., Ltd (Dongguan) is not responsible for the authenticity of any test data provided by the applicant. Data included from the applicant that may affect test results are marked with a triangle symbol “▲”. Customer model name, addresses, names, trademarks etc. are not considered data.

Unless otherwise stated the results shown in this test report refer only to the sample(s) tested.

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CONTENTS

TEST FACILITY	2
DECLARATIONS.....	2
1. GENERAL INFORMATION.....	4
1.1 PRODUCT DESCRIPTION FOR EQUIPMENT UNDER TEST (EUT)	4
1.2 DESCRIPTION OF TEST CONFIGURATION	5
1.2.4 Block Diagram of Test Setup.....	5
1.3 MEASUREMENT UNCERTAINTY	6
2. SUMMARY OF TEST RESULTS	7
3. REQUIREMENTS AND TEST PROCEDURES	8
3.1 AC LINE CONDUCTED EMISSIONS	8
3.1.1 EUT Setup.....	8
3.1.2 EMI Test Receiver Setup	8
3.1.3 Test Procedure	9
3.1.4 Corrected Amplitude & Margin Calculation.....	9
3.2 RADIATION SPURIOUS EMISSIONS	10
3.2.1 EUT Setup.....	10
3.2.2 EMI Test Receiver Setup	11
3.2.3 Test Procedure	11
3.2.4 Corrected Amplitude & Margin Calculation.....	11
4. TEST DATA AND RESULTS.....	12
4.1 AC LINE CONDUCTED EMISSIONS	12
4.2 RADIATION SPURIOUS EMISSIONS	15

1. GENERAL INFORMATION

1.1 Product Description for Equipment under Test (EUT)

EUT Name:	Industrial Dual SIM Cellular VPN Router
EUT Model:	R2000-4L
Highest Operation Frequency:	2462 MHz
Rated Input Voltage:	DC 12V from adapter
Serial Number:	CR21110045-RF-S7
EUT Received Date:	2021.11.03
EUT Received Status:	GOOD

Accessory Information:

Accessory Description	Manufacturer	Model	Parameters
Adapter	Dongguan Gangqi	GQ24-120150-AX	Input: AC100V-240V 50/60Hz 1A Output: DC 12V 1.5A

1.2 Description of Test Configuration

1.2.1 EUT Operation Condition:

EUT Operation Mode:	The system was configured for testing in Typical Use Mode, which was provided by the manufacturer. Test Mode: operating
Equipment Modifications:	No
EUT Exercise Software:	Lan Test.exe

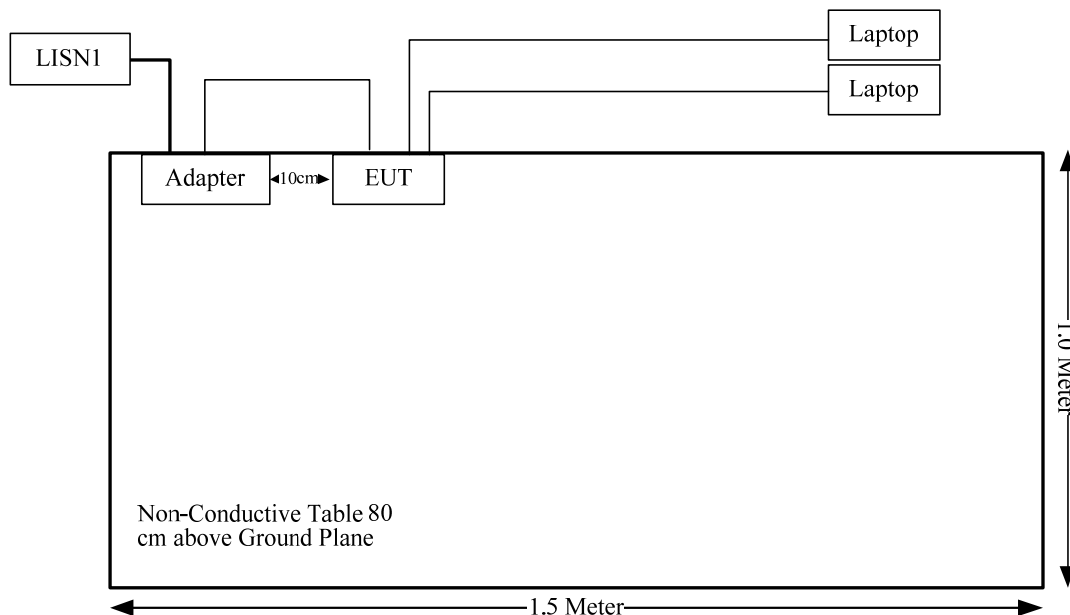
1.2.2 Support Equipment List and Details

Manufacturer	Description	Model	Serial Number
ThinkPad	Laptop	E450	PF-0MR8KV 16/08
DELL	Laptop	PP11L	QDS-BRCM1017

1.2.3 Support Cable List and Details

Cable Description	Shielding Type	Ferrite Core	Length (m)	From Port	To
RJ45 Cable	No	No	10	EUT	Laptop
Power Cable	No	No	1.5	Adapter	EUT
RJ45 Cable	No	No	10	EUT	Laptop

1.2.4 Block Diagram of Test Setup



1.3 Measurement Uncertainty

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

Parameter	Measurement Uncertainty
Unwanted Emissions, radiated	30M~200MHz: 4.15 dB, 200M~1GHz: 5.61 dB, 1G~6GHz: 5.14 dB, 6G~18GHz: 5.93 dB, 18G~26.5G: 5.47 dB, 26.5G~40G: 5.63 dB
Temperature	±1°C
Humidity	±5%
AC Power Lines Conducted Emission	2.8 dB (150 kHz to 30 MHz)

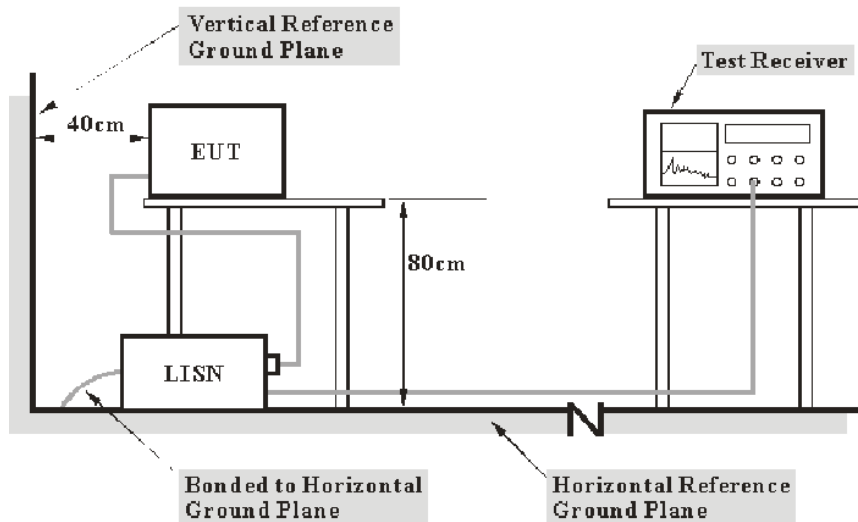
2. SUMMARY OF TEST RESULTS

Standard(s) Section	Description of Test	Result
§15.107	Conducted emissions	Compliance
§15.109	Radiated emissions	Compliance

3. REQUIREMENTS AND TEST PROCEDURES

3.1 AC Line Conducted Emissions

3.1.1 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 C63.4-2014 measurement procedure. The specification used was with the FCC Part 15 B Class B limits.

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

The adapter was connected to the main LISN with a 120 V/60 Hz AC power source.

3.1.2 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

3.1.3 Test Procedure

During the conducted emission test, the adapter was connected to the outlet of the first LISN and the other support equipments were connected to the outlet of the second LISN.

Maximizing procedure was performed on the six (6) highest emissions of the EUT, the report shall list the six emissions with the smallest margin relative to the limit, unless the margin is greater than 20 dB.

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

The report shall list the six emissions with the smallest margin relative to the limit, unless the margin is greater than 20 dB.

3.1.4 Corrected Amplitude & Margin Calculation

The basic equation is as follows:

Result = Reading + Factor

Factor = attenuation caused by cable loss + voltage division factor of AMN

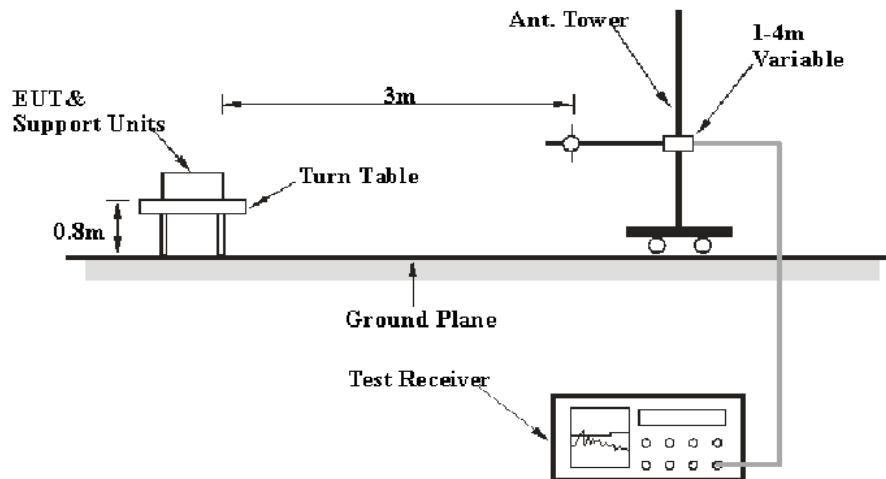
The “**Margin**” column of the following data tables indicates the degree of compliance within the applicable limit. The equation for margin calculation is as follows:

Margin = Limit – Result

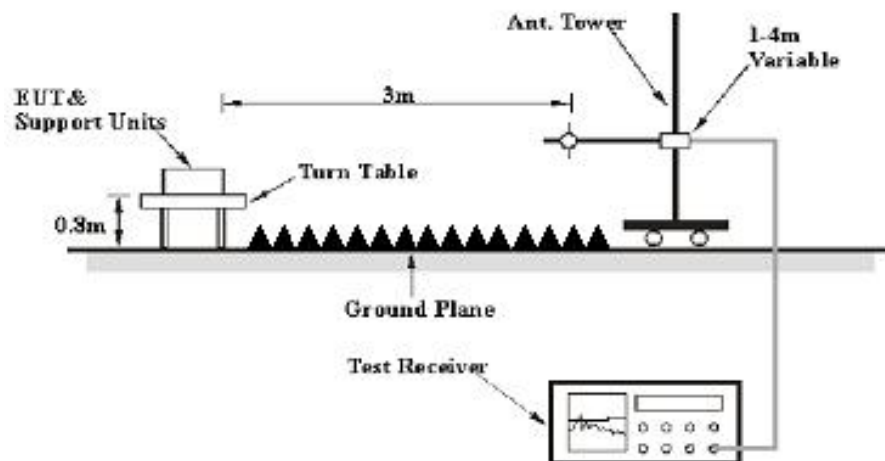
3.2 Radiated Emissions

3.2.1 EUT Setup

Below 1GHz:



Above 1GHz:



The radiated emission were performed in the 3 meters chamber test site, using the setup accordance with the ANSI C63.4-2014. The specification used was with the FCC Part 15 B Class B limits.

3.2.2 EMI Test Receiver Setup

The system was investigated from 30 MHz to 13 GHz.

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

Frequency Range	RBW	Video B/W	IF B/W	Measurement
30 MHz – 1000 MHz	120 kHz	300 kHz	120 kHz	QP
Above 1 GHz	1 MHz	3 MHz	/	Peak
	1 MHz	Reduced video bandwidth	/	AVG

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

3.2.3 Test Procedure

During the radiated emissions, the adapter was connected to the first AC floor outlet and the other support equipments were connected to the second AC floor outlet.

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

The data was recorded in the Quasi-peak detection mode for below 1 GHz, peak and average detection mode above 1 GHz.

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

3.2.4 Corrected Amplitude & Margin Calculation

The basic equation is as follows:

Result = Reading + Factor

Factor = Antenna Factor + Cable Loss- Amplifier Gain

The “**Margin**” column of the following data tables indicates the degree of compliance within the applicable limit. The equation for margin calculation is as follows:

Margin = Limit – Result

4. TEST DATA AND RESULTS

4.1 AC Line Conducted Emissions

Serial Number:	CR21110045-RF-S7	Test Date:	2021-11-09
Test Site:	CE	Test Mode:	operating
Tester:	Nick Tang	Test Result:	Pass

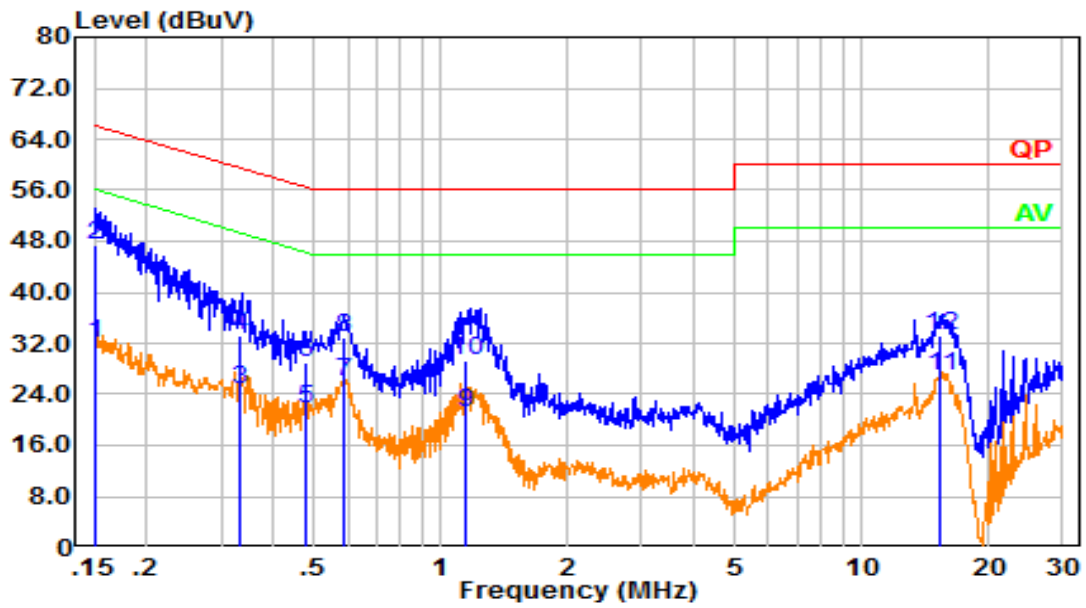
Environmental Conditions:					
Temperature: (°C)	20.4	Relative Humidity: (%)	69	ATM Pressure: (kPa)	101.6

Test Equipment List and Details:

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
R&S	LISN	ENV216	101132	2021-04-25	2022-04-24
R&S	EMI Test Receiver	ESR3	102726	2021-07-22	2022-07-21
MICRO-COAX	Coaxial Cable	UTIFLEX	C-0200-01	2021-08-08	2022-08-07
Audix	Test Software	E3	190306 (V9)	N/A	N/A

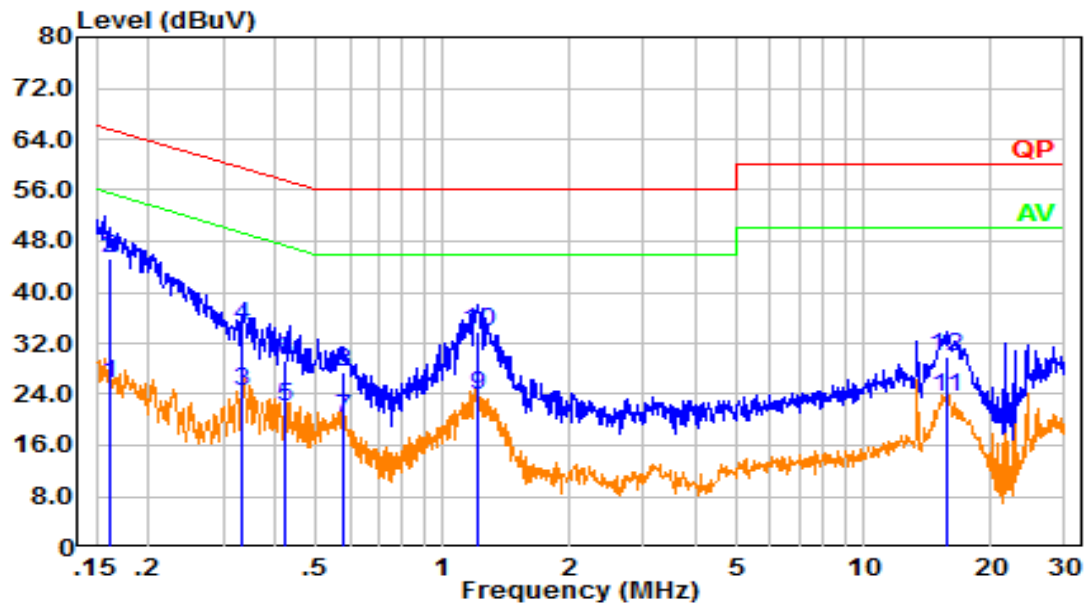
* Statement of Traceability: China Certification ICT Co., Ltd (Dongguan) attests that all calibrations have been performed, traceable to National Primary Standards and International System of Units (SI).

Line:



No.	Frequency (MHz)	Reading (dBμV)	Factor (dB)	Result (dBμV)	Limit (dBμV)	Margin (dB)	Detector
1	0.151	22.33	9.61	31.94	55.93	23.98	Average
2	0.151	37.79	9.61	47.40	65.93	18.53	QP
3	0.333	15.23	9.61	24.84	49.37	24.54	Average
4	0.333	23.52	9.61	33.13	59.37	26.24	QP
5	0.478	12.27	9.61	21.88	46.37	24.49	Average
6	0.478	19.36	9.61	28.97	56.37	27.40	QP
7	0.588	16.45	9.62	26.07	46.00	19.93	Average
8	0.588	23.34	9.62	32.96	56.00	23.04	QP
9	1.148	11.59	9.62	21.21	46.00	24.79	Average
10	1.148	19.77	9.62	29.39	56.00	26.61	QP
11	15.377	17.17	9.69	26.86	50.00	23.14	Average
12	15.377	23.38	9.69	33.07	60.00	26.93	QP

Neutral:



No.	Frequency (MHz)	Reading (dB μ V)	Factor (dB)	Result (dB μ V)	Limit (dB μ V)	Margin (dB)	Detector
1	0.161	16.02	9.61	25.63	55.42	29.79	Average
2	0.161	35.60	9.61	45.21	65.42	20.21	QP
3	0.334	14.69	9.61	24.30	49.34	25.04	Average
4	0.334	25.14	9.61	34.75	59.34	24.59	QP
5	0.421	12.41	9.61	22.02	47.43	25.41	Average
6	0.421	19.76	9.61	29.37	57.43	28.06	QP
7	0.577	10.58	9.62	20.20	46.00	25.80	Average
8	0.577	17.91	9.62	27.53	56.00	28.47	QP
9	1.205	14.22	9.62	23.84	46.00	22.16	Average
10	1.205	24.30	9.62	33.92	56.00	22.08	QP
11	15.672	13.71	9.70	23.42	50.00	26.58	Average
12	15.672	20.06	9.70	29.77	60.00	30.23	QP

4.2 Radiation Emissions

Serial Number:	CR21110045-RF-S7	Test Date:	2021-11-09~2021-11-18
Test Site:	966-1, 966-2	Test Mode:	operating
Tester:	Alex Hu, Carl Liang	Test Result:	Pass

Environmental Conditions:

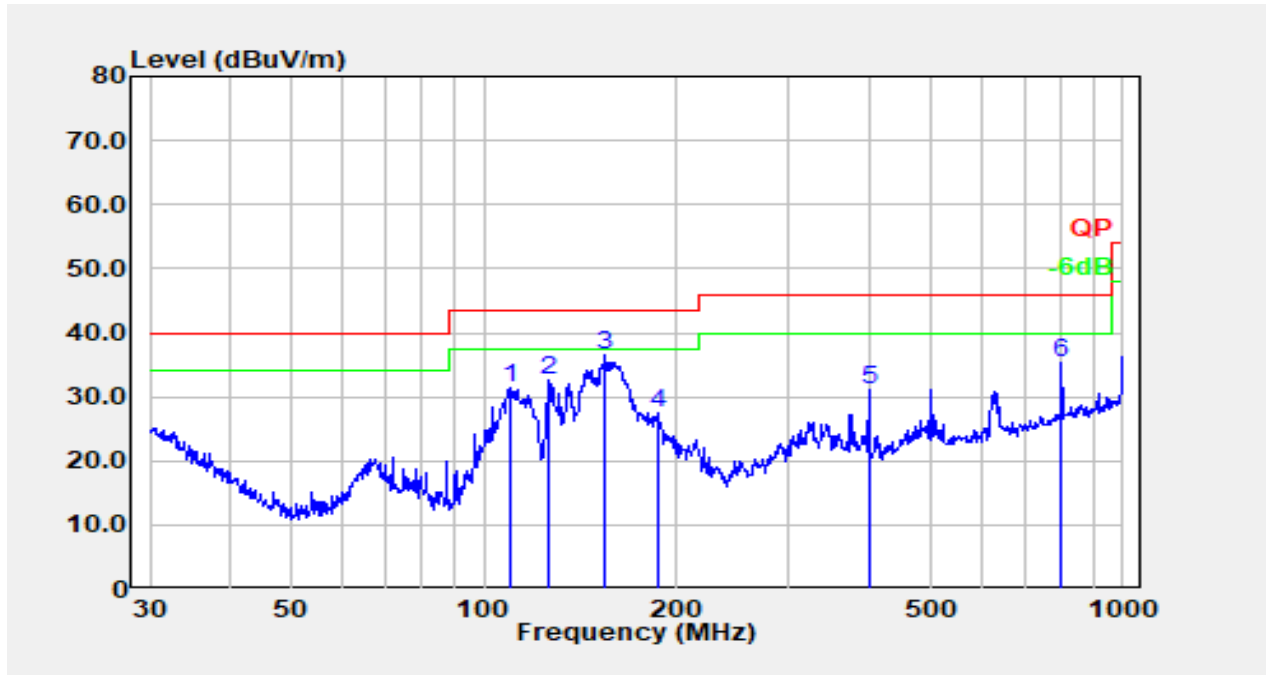
Temperature: (°C)	23.5~23.7	Relative Humidity: (%)	56~60	ATM Pressure: (kPa)	101.5~101.6
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Test Equipment List and Details:

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
Sunol Sciences	Antenna	JB6	A082520-5	2020-10-19	2023-10-18
R&S	EMI Test Receiver	ESR3	102724	2021-07-22	2022-07-21
TIMES MICROWAVE	Coaxial Cable	LMR-600-UltraFlex	C-0470-02	2021-07-18	2022-07-17
TIMES MICROWAVE	Coaxial Cable	LMR-600-UltraFlex	C-0780-01	2021-07-18	2022-07-17
Sonoma	Amplifier	310N	186165	2021-07-18	2022-07-17
Audix	Test Software	E3	201021 (V9)	N/A	N/A
ETS-Lindgren	Horn Antenna	3115	9912-5985	2020-10-13	2023-10-12
R&S	Spectrum Analyzer	FSV40	101591	2021-07-22	2022-07-21
MICRO-COAX	Coaxial Cable	UFA210A-1-1200-70U300	217423-008	2021-08-08	2022-08-07
MICRO-COAX	Coaxial Cable	UFA210A-1-2362-300300	235780-001	2021-08-08	2022-08-07
Mini	Pre-amplifier	ZVA-183-S+	5969001149	2021-11-10	2022-11-09
E-Microwave	Band Rejection Filter	2400-2483.5MHz	OE01902424	2021-08-08	2022-08-07
Mini Circuits	High Pass Filter	VHF-6010+	31119	2021-08-08	2022-08-07

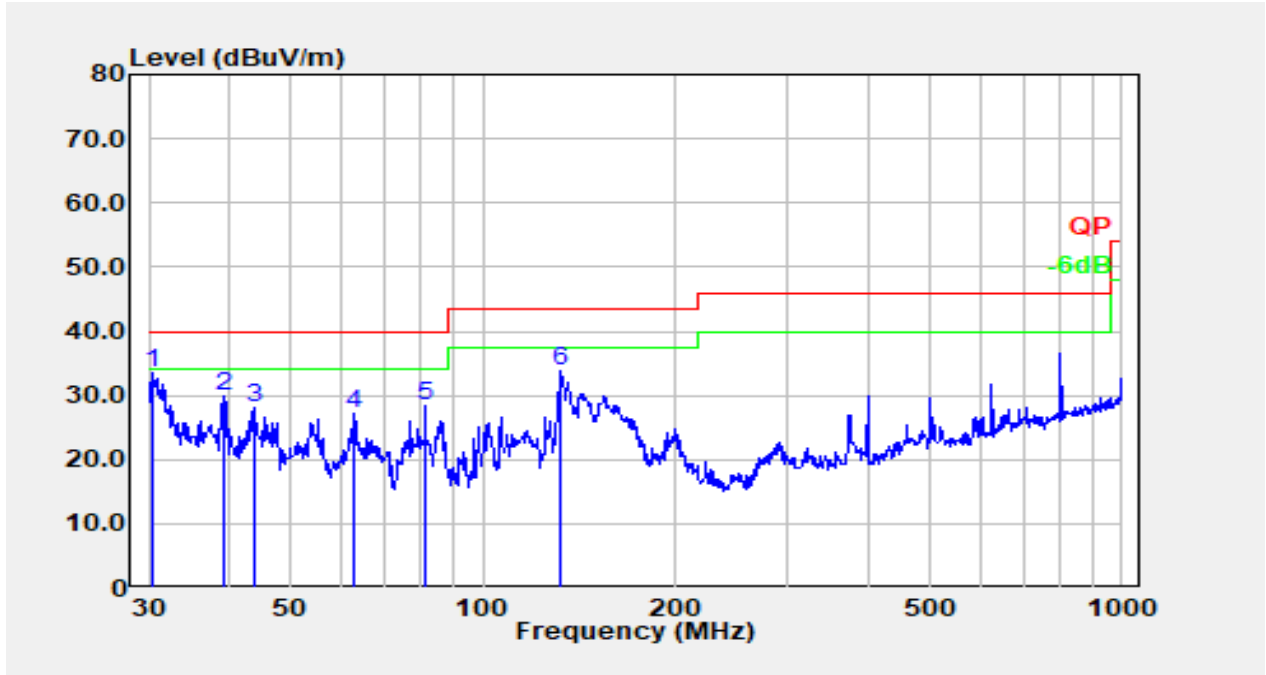
* Statement of Traceability: China Certification ICT Co., Ltd (Dongguan) attests that all calibrations have been performed, traceable to National Primary Standards and International System of Units (SI).

1) 30MHz-1GHz:

Horizontal:

No.	Frequency (MHz)	Reading (dB μ V)	Factor (dB/m)	Result (dB μ V/m)	Limit (dB μ V/m)	Margin (dB)	Detector
1	109.796	44.11	-12.63	31.48	43.50	12.02	Peak
2	126.329	44.18	-11.57	32.61	43.50	10.89	Peak
3	154.279	48.73	-12.30	36.42	43.50	7.08	Peak
4	187.753	41.04	-13.69	27.35	43.50	16.15	Peak
5	400.432	39.95	-9.00	30.95	46.00	15.05	Peak
6	801.786	37.79	-2.45	35.34	46.00	10.66	Peak

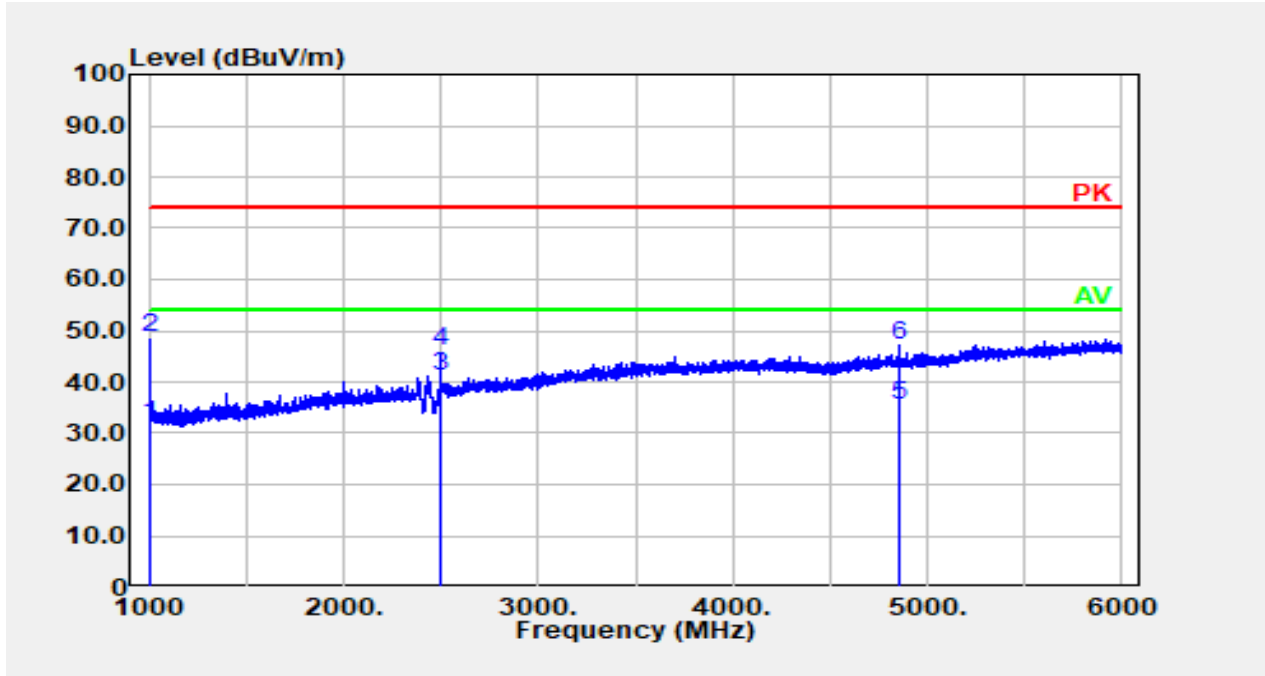
Vertical:



No.	Frequency (MHz)	Reading (dBμV)	Factor (dB/m)	Result (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Detector
1	30.317	37.54	-4.03	33.51	40.00	6.49	Peak
2	39.437	40.81	-11.07	29.74	40.00	10.26	Peak
3	43.812	41.73	-13.80	27.94	40.00	12.06	Peak
4	62.871	44.46	-17.36	27.10	40.00	12.90	Peak
5	81.212	46.14	-17.63	28.51	40.00	11.49	Peak
6	132.221	45.53	-11.68	33.85	43.50	9.65	Peak

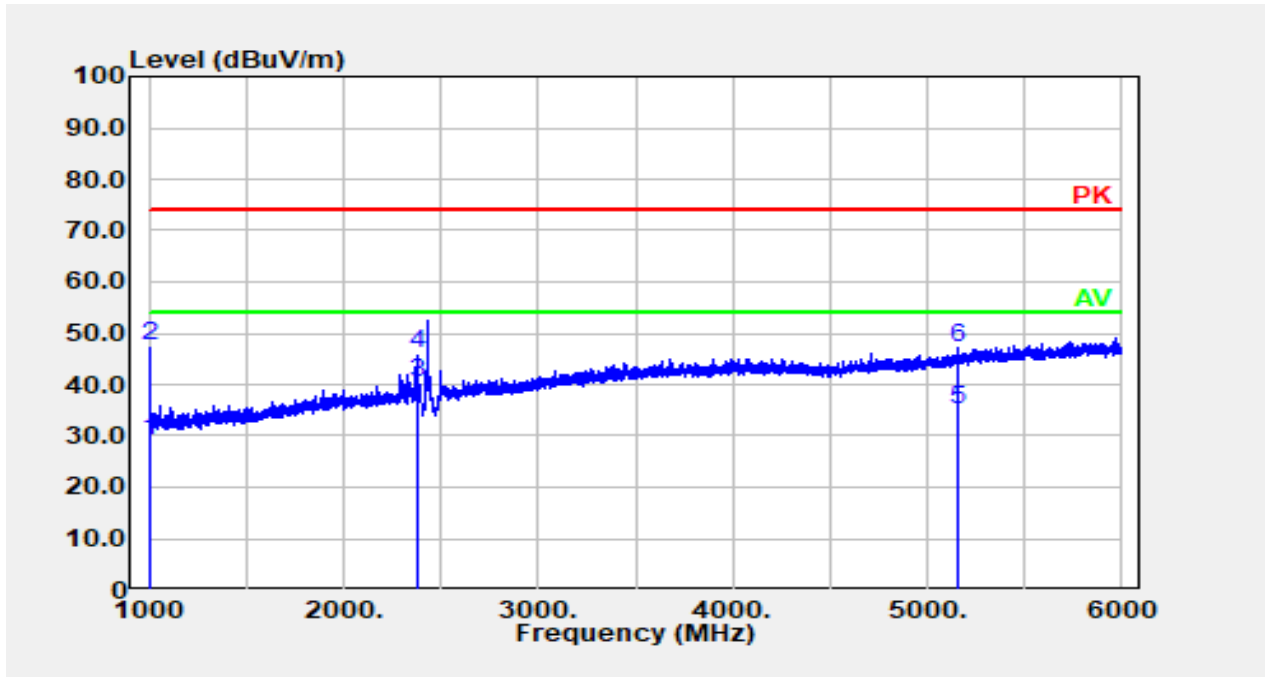
2) Above 1GHz

Horizontal:

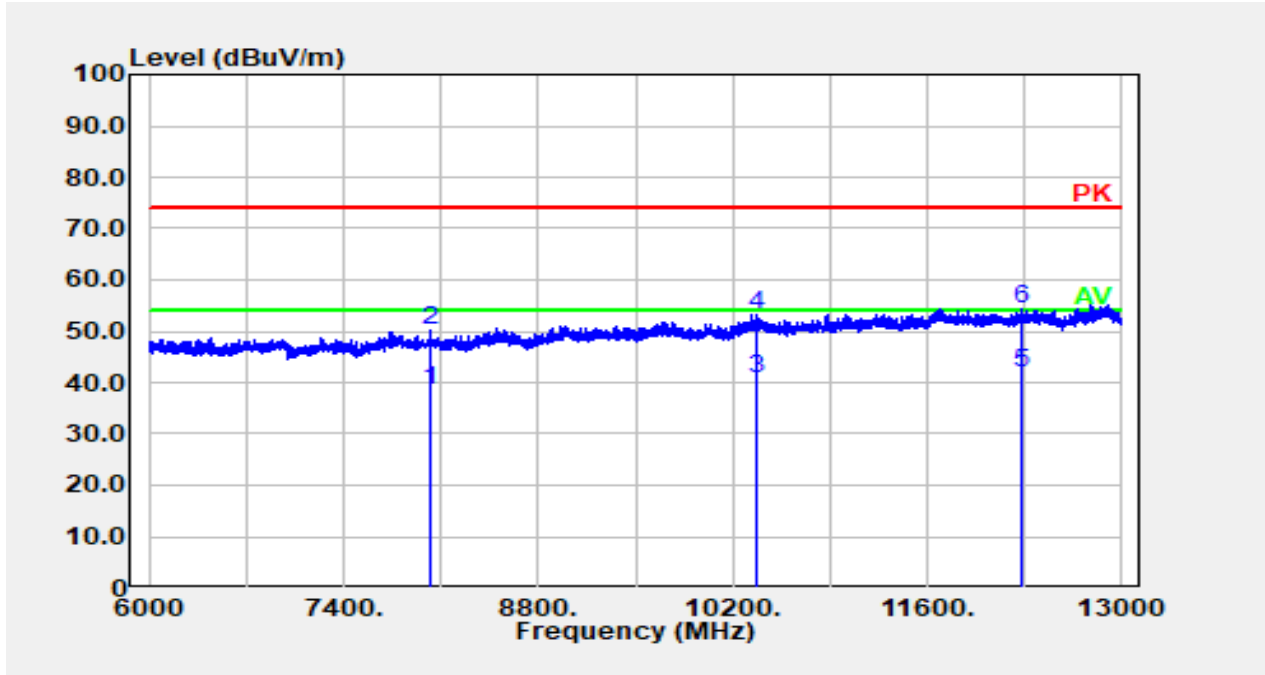


No.	Frequency (MHz)	Reading (dBμV)	Factor (dB/m)	Result (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Detector
1	1000.000	34.26	-2.59	31.67	54.00	22.33	Average
2	1000.000	51.36	-2.59	48.77	74.00	25.23	Peak
3	2500.300	37.62	3.64	41.26	54.00	12.74	Average
4	2500.300	42.36	3.64	46.00	74.00	28.00	Peak
5	4853.771	24.98	10.52	35.50	54.00	18.50	Average
6	4853.771	36.72	10.52	47.24	74.00	26.76	Peak

Vertical:

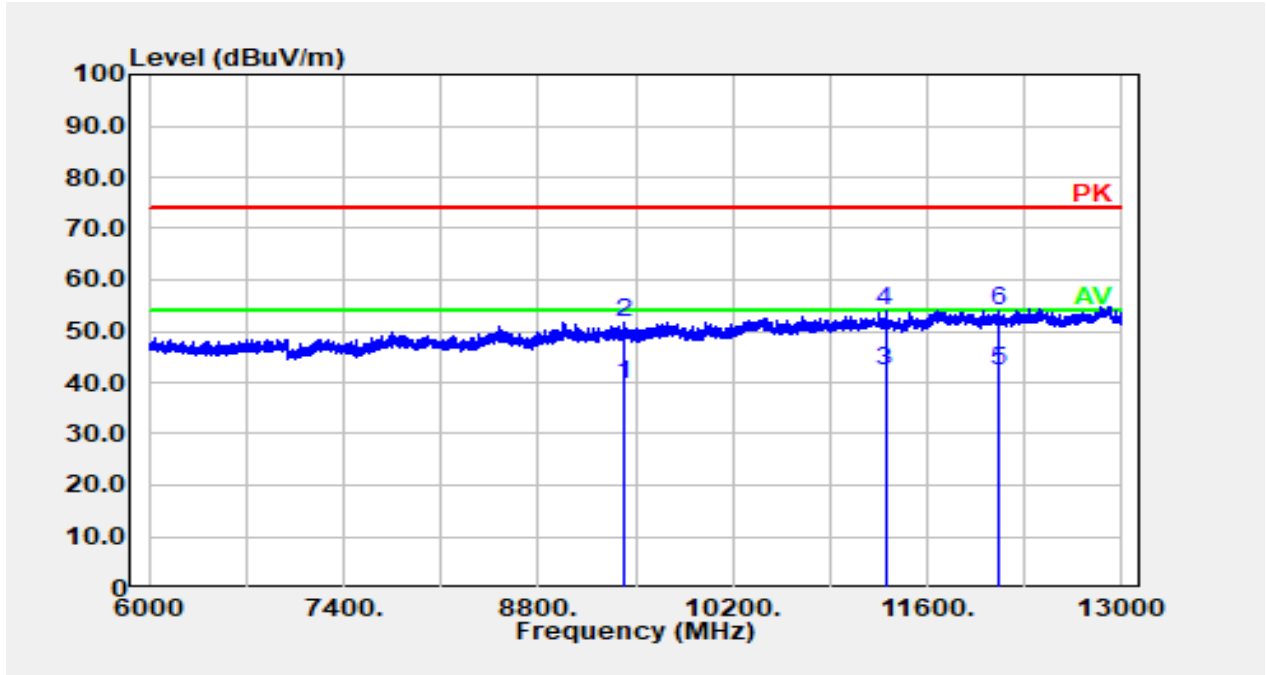


No.	Frequency (MHz)	Reading (dBμV)	Factor (dB/m)	Result (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Detector
1	1000.000	31.47	-2.59	28.88	54.00	25.12	Average
2	1000.000	50.31	-2.59	47.72	74.00	26.28	Peak
3	2374.275	36.94	3.54	40.48	54.00	13.52	Average
4	2374.275	42.59	3.54	46.13	74.00	27.87	Peak
5	5151.831	23.64	11.53	35.17	54.00	18.83	Average
6	5151.831	35.73	11.53	47.26	74.00	26.74	Peak

Horizontal:

No.	Frequency (MHz)	Reading (dB μ V)	Factor (dB/m)	Result (dB μ V/m)	Limit (dB μ V/m)	Margin (dB)	Detector
1	8017.804	22.58	15.79	38.37	54.00	15.63	Average
2	8017.804	34.23	15.79	50.02	74.00	23.98	Peak
3	10374.470	22.34	18.44	40.78	54.00	13.22	Average
4	10374.470	34.93	18.44	53.37	74.00	20.63	Peak
5	12287.260	21.37	20.67	42.04	54.00	11.96	Average
6	12287.260	33.75	20.67	54.42	74.00	19.58	Peak

Vertical:



No.	Frequency (MHz)	Reading (dBμV)	Factor (dB/m)	Result (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Detector
1	9413.883	22.14	17.57	39.71	54.00	14.29	Average
2	9413.883	34.07	17.57	51.64	74.00	22.36	Peak
3	11297.260	22.39	19.77	42.16	54.00	11.84	Average
4	11297.260	34.12	19.77	53.89	74.00	20.11	Peak
5	12108.020	21.47	20.68	42.15	54.00	11.85	Average
6	12108.020	33.34	20.68	54.02	74.00	19.98	Peak

==== END OF REPORT ====