

RF Test Report

FCC ID: ZMOFG101NA

Test Report No.....: RF231214003-01-001

Product(s) Name.....: LTE Module

Model(s).....: FG101-NA

Trade Mark.....: Fibocom

Applicant.....: Fibocom Wireless Inc.

Address.....: 1101,Tower A, Building 6, Shenzhen International Innovation
Valley, Dashi 1st Rd, Nanshan, Shenzhen, China

Receipt Date.....: 2023.12.15

Test Date.....: 2024.12.18~2024.01.10

Issued Date.....: 2024.01.12

Standards.....: 47 CFR FCC Part 90 Subpart S
47 CFR FCC Part 2
ANSI C63.26-2015
ANSI/TIA/EIA-603-E-2016
FCC KDB 971168 D01 Power Meas License Digital Systems v03r01

Testing Laboratory.....: Shenzhen Haiyun Standard Technical Co., Ltd.

Prepared By:	Checked By:	Approved By:	
Black Ding	Tim Zhang	Misue Su	
<i>Black Ding</i>	<i>Tim.zhang</i>	<i>Misue Su</i>	

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REPORT ISSUED HISTORY

Amendment Report Issue Date: 2024.01.12

☐ No additional attachment

☒ Additional attachments were issued following record

Attachment No.	Issue Date	Description
SZ23060216W06	2023.07.20	Original report
RF231214003-01-001	2024.01.12	Compared with original report (SZ23060216W06), Please see the following table for details. The Radiated Emissions the worst case have been re-evaluated. In this report only updated the test results for Radiated Emissions, Maximum Output Power, other are kept the same

1.. SUMMARY OF TEST RESULTS

Test procedures according to the technical standard(s):

FCC Part 90 Subpart S & Part 2			
Standard(s) Section	Test Item	Judgment	Remark
2.1046 & 90.635 (b)	Effective Radiated Power	PASS	-----
90.209	Occupied Bandwidth	PASS	Note(2)
2.1051 & 90.691	Conducted Spurious Emissions	PASS	Note(2)
2.1053 & 90.691	Radiated Spurious Emissions	PASS	-----
2.1051 & 90.691	Band Edge	PASS	Note(2)
2.1055 & 90.213	Frequency Stability	PASS	Note(2)

Note:

- (1) "N/A" denotes test is not applicable in this test report.
- (2) For test item: Occupied Bandwidth, Conducted Spurious Emissions, Band Edge and Frequency Stability, Please refer to original report(SZ23060216W06)

1.1. TEST FACILITY

Company:	Shenzhen Haiyun Standard Technical CO., Ltd.
Address:	No. 110, 111, 112, 113, 115, 116, Block B, Jinyuan business Building, No. 302, Xixiang Avenue, Laodong Community, Xixiang Street, Bao'an District, Shenzhen P.R.C.
CNAS Registration Number:	CNAS L18252
CAB identifier:	CN0145
Company Number	30427
A2LA Certificate Number:	6823.01
Telephone:	0755-26024411

1.2. MEASUREMENT UNCERTAINTY

ISO/IEC 17025 requires that an estimate of the measurement uncertainties associated with the emissions test results be included in the report. The measurement uncertainties given below are based on a 95% confidence level (based on a coverage factor ($k=2$))

Uncertainty	
Parameter	Uncertainty
Occupied Channel Bandwidth	$\pm 143.88\text{kHz}$
Power Spectral Density	$\pm 0.743\text{dB}$
Conducted Spurious Emission	$\pm 1.328\text{dB}$
RF power conducted	$\pm 0.384\text{dB}$
Conducted emission(9kHz~30MHz) AC main	$\pm 2.72\text{dB}$
Radiated emission(9kHz~30MHz)	$\pm 2.66\text{dB}$
Radiated emission (30MHz~1GHz)	$\pm 4.62\text{dB}$
Radiated emission (1GHz~18GHz)	$\pm 4.86\text{dB}$
Radiated emission (18GHz~40GHz)	$\pm 3.80\text{dB}$

Note: Unless specifically mentioned, the uncertainty of measurement has not been taken into account to declare the compliance or non-compliance to the specification.

1.3. TEST ENVIRONMENT CONDITIONS

Test Item	Temperature	Humidity	Test Voltage	Tested By
Conducted Output Power & ERP	24.3°C	49%	DC 12V	Henry Huang
Radiated Spurious Emissions (9 kHz to 30 MHz)	24.5°C	52%	AC 120V/60Hz	Albert Fan
Radiated Spurious Emissions (30 MHz to 1000 MHz)	24.5°C	52%	AC 120V/60Hz	Albert Fan
Radiated Spurious Emissions (Above 1000 MHz)	24.5°C	52%	AC 120V/60Hz	Albert Fan

Note: Adapter supply voltage AC 120V/60Hz.

2.. GENERAL INFORMATION

2.1. GENERAL DESCRIPTION OF EUT

Product No.	POC231214003-S001	
Equipment	LTE Module	
Brand Name	Fibocom	
Test Model	FG101-NA	
Software Version	19101.1000.01.00.00.07	
Hardware Version	V1.2	
Power Source	DC 12V from adapter.	
Modulation Type	QPSK,16QAM, 64QAM	
Operation Band	Band 14 / 26	
Frequency Range	LTE Band 14	Tx: 788MHz–798MHz
		Rx: 758MHz–768MHz
	LTE Band 26	Tx: 814MHz–824MHz
		Rx: 859MHz–869MHz
Channel Bandwidth	LTE Band 14	5MHz, 10MHz
	LTE Band 26	1.4MHz, 3MHz, 5MHz, 10MHz
Antenna Type	PCB Antenna	
Antenna Gain	LTE Band 14	1.98dBi
	LTE Band 26	1.68dBi

Note:

1. For a more detailed features description, please refer to the manufacturer's specifications or the user's manual.

2.2 DESCRIPTION OF SUPPORT UNITS

The EUT has been tested as an independent unit together with other necessary accessories or support units. The following support units or accessories were used to form a representative test configuration during the tests.

Support Equipment				
No.	Equipment	Manufacturer	Model Name	Remarks
1	SIM Card	/	LTE 4G Card	/
2	Adapter	Shenzhen Ruide Electronics industrial Co.,Ltd	RD1202000-C55-154MG	/

3.. TEST RESULT

3.1. CONDUCTED OUTPUT POWER MEASUREMENT

3.1.1. LIMIT

Mobile / Portable station are limited to 100 watts e.r.p.

3.1.2. TEST PROCEDURE

The testing follows FCC KDB 971168 v03r01 Section 5.0.

ERP:

$EIRP = \text{Output Power} + \text{Antenan gain}$

$ERP = EIPR - 2.15\text{dBi}$.

Conducted Output Power:

The EUT was set up for the maximum power with GSM, GPRS, EDGE, WCDMA, CDMA, and LTE link data modulation and link up with simulator. Set the EUT to transmit under low, middle and high channel and record the power level shown on simulator.

3.1.3. TESTSETUP LAYOUT

Output Power Measurement



3.1.4. TEST DEVIATION

No deviation.

3.1.5. TEST RESULTS

Please refer to the APPENDIX A.

3.2. RADIATED SPURIOUS EMISSIONS MEASUREMENT

3.2.1. LIMIT

The power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least $43 + 10 \log(P)$ dB. The emission limit equal to -13dBm.

The power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least $60 + 10 \log(P)$ dB. The emission limit equal to -40dBm.

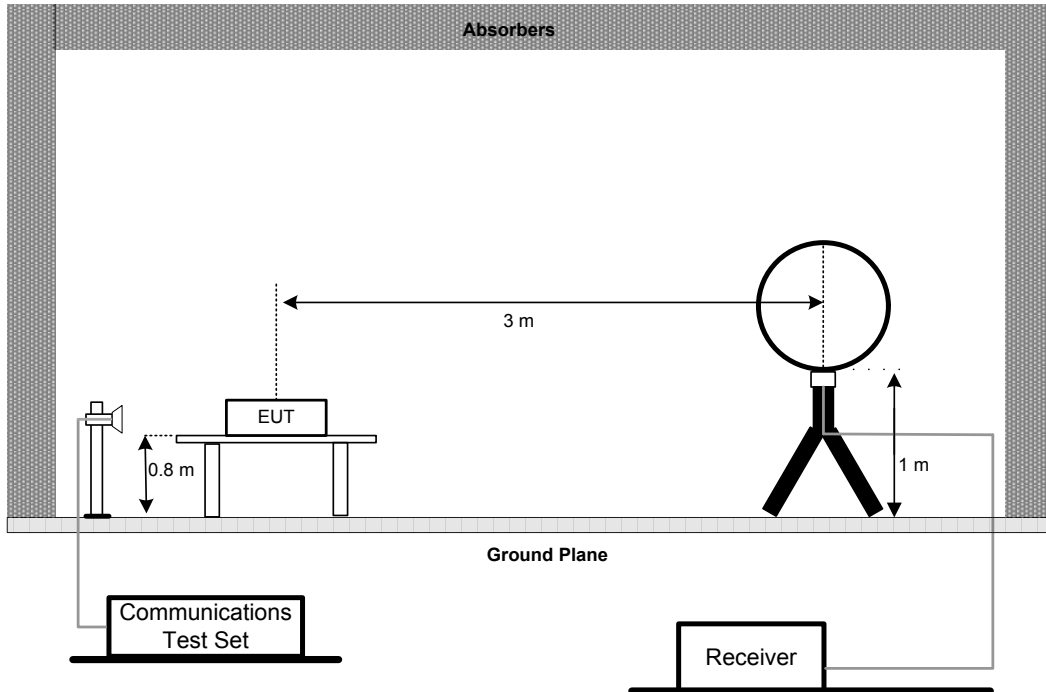
3.2.2. TEST PROCEDURES

The testing follows FCC KDB 971168 v03r01 Section 5.8.

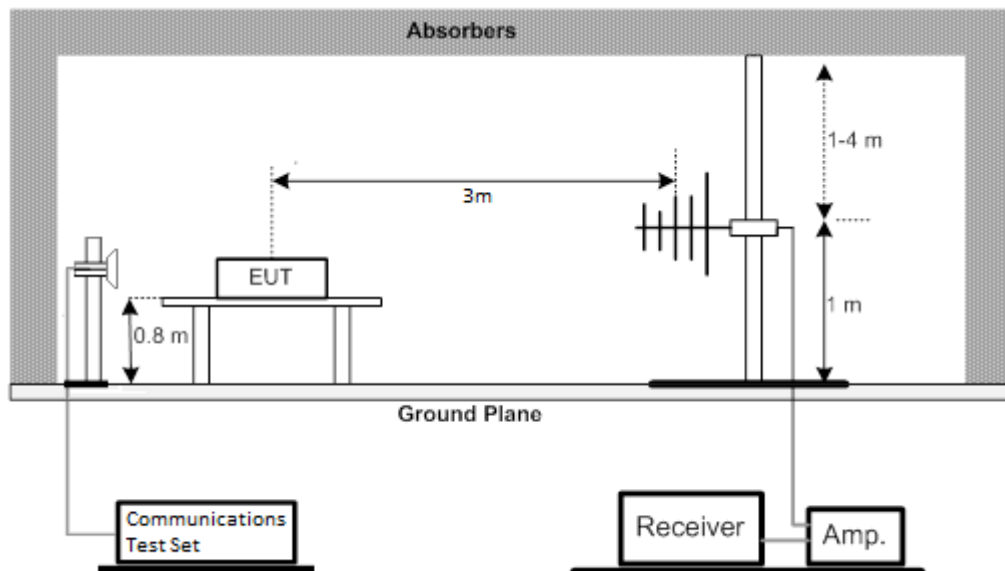
1. In the semi-anechoic chamber, EUT placed on the 0.8m height of Turn Table, rotated the table around 360 degrees to search the maximum radiation power and receiver antenna shall be rotated vertical and horizontal polarization and moved height from 1m to 4m to find the maximum polar radiated power. The "Read Value" is the spectrum reading the maximum power value.
2. The substitution horn antenna is substituted for EUT at the same position and signals generator export the CW signal to the substitution antenna via a TX cable. Rotated the Turn Table and moved receiving antenna to find the maximum radiation power. Adjust output power level of S.G to get a Value of spectrum reading equal to "Read Value " of step a. Record the power level of S.G
3. $EIRP = \text{Output power level of S.G} - \text{TX cable loss} + \text{Antenna gain of substitution horn}.$
4. ERP can be calculated form EIRP by subtracting the gain of dipole, $ERP = EIPR - 2.15\text{dBi}.$
5. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 1MHz/3MHz.

3.2.3. TEST SETUP LAYOUT

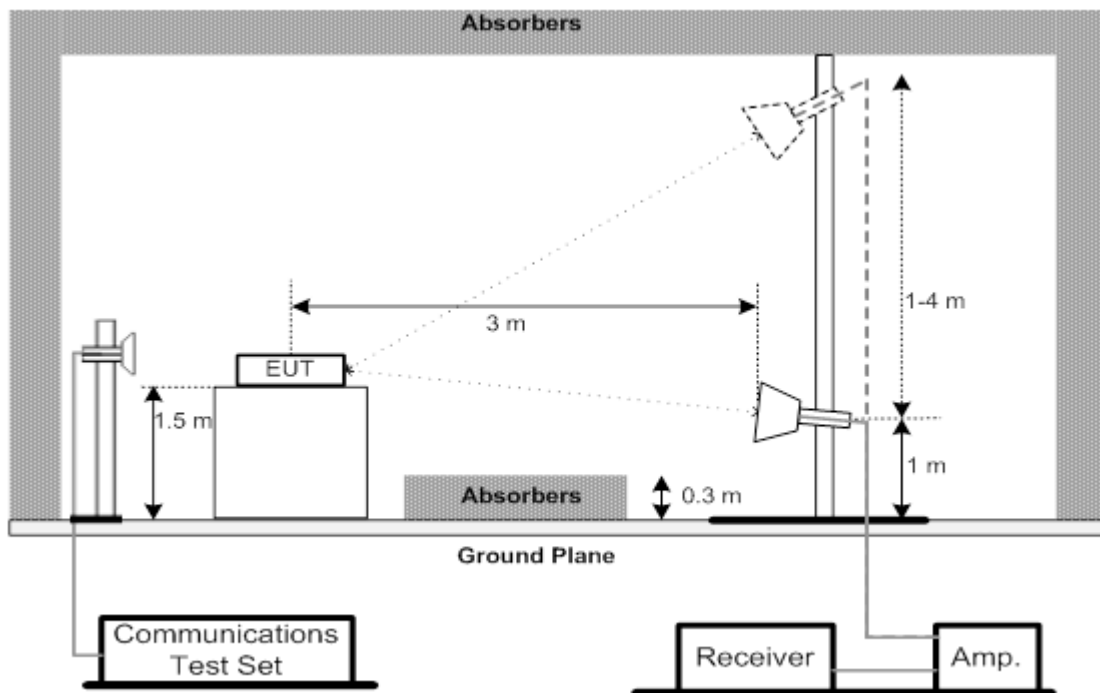
Below 30MHz



30MHz to 1000MHz



Above 1GHz



3.2.4. TEST DEVIATION

No deviation.

3.2.5. TEST RESULTS (9KHZ TO 30MHZ)

Please refer to the APPENDIX B.

3.2.6. TEST RESULTS (30MHZ TO 1000MHZ)

Please refer to the APPENDIX C.

3.2.7. TEST RESULTS (ABOVE 1000MHZ)

Please refer to the APPENDIX D.

4. LIST OF MEASUREMENT EQUIPMENTS

Radiated Emissions						
No.	Equipment	Manufacturer	Type No.	Serial No.	Cal. date (yyyy/mm/dd)	Cal. Due date (yyyy/mm/dd)
1	Test receiver	Rohde&Schwarz	ESU	100184	2023/5/3	2024/5/2
2	MXA Signal Analyzer	Keysight	N9010A	MY51440158	2023/4/22	2024/4/21
3	Log periodic antenna	Schwarzbeck	VULB 9168	1151	2023/5/4	2024/5/3
4	Low frequency amplifier	/	LNA 0920N	2014	2023/5/3	2024/5/2
5	High frequency amplifier	Schwarzbeck	BBV 9718	284	2023/5/3	2024/5/2
6	Horn Antenna	SCHWARZBECK	BBHA 9120 D	9120D-1273	2023/5/4	2024/5/3
7	Temp&Humidity Recorder	Meideshi	JR900	/	2023/5/3	2024/5/2
8	Horn Antenna	SCHWARZBECK	BBHA 9170	9170#685	2023/7/16	2024/7/15
9	Loop Antenna	SCHWARZBECK	FMZB151 9B	00029	2023/7/16	2024/7/15
10	Broadband preamplifier	Schwarzbeck	BBV9721	9721-019	2023/5/3	2024/5/2
11	Wideband Radio Communication Tester	Rohde&Schwarz	CMW500	1201.0002 K50-116064-Dt	2023/4/23	2024/4/22
12	Test software	Farad Technology Co., Ltd	EZ-EMC Ver.TW-03A2			
RF Conducted Emission						
1	MXA Signal Analyzer	Keysight	N9021B	MY60080169	2023/4/23	2024/4/22
2	RF Control Unit	dsusoft	JS0806-2	21G8060449	2023/4/23	2024/4/22
3	power supply unit	dsusoft	JS0806-4ADC	N/A	2023/4/23	2024/4/22
4	VXG Signal Generator	Keysight	M9384B	MY61270787	2023/4/23	2024/4/22
5	EXG Analog Signal Generator	Keysight	N5173B	MY59101282	2023/4/23	2024/4/22
6	Wideband Radio Communication Tester	Rohde&Schwarz	CMW500	1201.0002 K50-116064-Dt	2023/4/23	2024/4/22
7	Test software	dsusoft	JS1120-3 Ver.3.2.22.0			

APPENDIX A - CONDUCTED OUTPUT POWER

Conducted Output Power (dBm)

LTE Band 14						
BW [MHz]	Modulation	RB Size	RB Offset	Average Power Low Ch. / Freq.	Average Power Middle Ch. / Freq.	Average Power High Ch. / Freq.
Channel				/	23330	/
Frequency (MHz)				/	793	/
10	QPSK	1	0	/	23.12	/
10	QPSK	1	25	/	23.12	/
10	QPSK	1	49	/	23.01	/
10	QPSK	25	0	/	22.31	/
10	QPSK	25	12	/	22.04	/
10	QPSK	25	25	/	21.93	/
10	QPSK	50	0	/	21.99	/
10	16QAM	1	0	/	22.21	/
10	16QAM	1	25	/	22.25	/
10	16QAM	1	49	/	22.08	/
10	16QAM	25	0	/	21.04	/
10	16QAM	25	12	/	20.99	/
10	16QAM	25	25	/	20.88	/
10	16QAM	50	0	/	21.11	/
10	64QAM	1	0	/	21.20	/
10	64QAM	1	25	/	21.18	/
10	64QAM	1	49	/	21.14	/
10	64QAM	25	0	/	20.07	/
10	64QAM	25	12	/	20.07	/
10	64QAM	25	25	/	19.98	/
10	64QAM	50	0	/	20.05	/

LTE Band 14						
BW [MHz]	Modulation	RB Size	RB Offset	Average Power Low Ch. / Freq.	Average Power Middle Ch. / Freq.	Average Power High Ch. / Freq.
Channel				23305	23330	23355
Frequency (MHz)				790.5	793	795.5
5	QPSK	1	0	22.94	23.04	22.92
5	QPSK	1	12	23.15	23.10	23.03
5	QPSK	1	24	22.93	22.94	22.81
5	QPSK	12	0	22.18	22.26	22.16
5	QPSK	12	7	21.89	22.13	22.09
5	QPSK	12	13	22.09	22.10	21.98
5	QPSK	25	0	21.97	22.22	22.13
5	16QAM	1	0	22.24	22.29	22.26
5	16QAM	1	12	22.12	22.29	22.20
5	16QAM	1	24	21.96	22.10	22.36
5	16QAM	12	0	20.99	21.16	20.97
5	16QAM	12	7	21.16	20.95	21.05
5	16QAM	12	13	21.04	21.18	21.10
5	16QAM	25	0	20.90	21.35	21.16
5	64QAM	1	0	21.10	21.22	21.29
5	64QAM	1	12	21.06	21.30	21.12
5	64QAM	1	24	21.04	21.11	21.11
5	64QAM	12	0	20.09	20.11	20.16
5	64QAM	12	7	19.93	20.23	20.07
5	64QAM	12	13	19.92	20.17	20.10
5	64QAM	25	0	20.11	19.99	20.29

LTE Band 26						
BW [MHz]	Modulation	RB Size	RB Offset	Average Power Low Ch. / Freq.	Average Power Middle Ch. / Freq.	Average Power High Ch. / Freq.
Channel				/	26740	/
Frequency (MHz)				/	819.0	/
10	QPSK	1	0	/	22.86	/
10	QPSK	1	25	/	22.70	/
10	QPSK	1	49	/	22.86	/
10	QPSK	25	0	/	21.90	/
10	QPSK	25	12	/	21.73	/
10	QPSK	25	25	/	21.90	/
10	QPSK	50	0	/	21.91	/
10	16QAM	1	0	/	22.03	/
10	16QAM	1	25	/	22.15	/
10	16QAM	1	49	/	21.91	/
10	16QAM	25	0	/	20.85	/
10	16QAM	25	12	/	20.96	/
10	16QAM	25	25	/	20.91	/
10	16QAM	50	0	/	20.83	/
10	64QAM	1	0	/	21.06	/
10	64QAM	1	25	/	20.92	/
10	64QAM	1	49	/	21.07	/
10	64QAM	25	0	/	19.93	/
10	64QAM	25	12	/	19.82	/
10	64QAM	25	25	/	19.89	/
10	64QAM	50	0	/	19.83	/

LTE Band 26						
BW [MHz]	Modulation	RB Size	RB Offset	Average Power Low Ch. / Freq.	Average Power Middle Ch. / Freq.	Average Power High Ch. / Freq.
Channel				26715	26740	26765
Frequency (MHz)				816.5	819.0	821.5
5	QPSK	1	0	22.81	22.69	22.68
5	QPSK	1	12	22.77	22.73	22.72
5	QPSK	1	24	22.84	22.72	22.66
5	QPSK	12	0	21.98	21.96	21.87
5	QPSK	12	7	22.09	22.01	21.92
5	QPSK	12	13	21.96	21.70	21.87
5	QPSK	25	0	21.78	21.88	21.74
5	16QAM	1	0	21.86	21.90	21.78
5	16QAM	1	12	21.79	21.66	21.87
5	16QAM	1	24	21.92	21.85	21.83
5	16QAM	12	0	21.02	21.02	21.08
5	16QAM	12	7	20.80	20.70	20.77
5	16QAM	12	13	20.78	20.73	20.78
5	16QAM	25	0	20.78	20.90	20.72
5	64QAM	1	0	21.01	20.97	20.96
5	64QAM	1	12	21.00	20.92	20.87
5	64QAM	1	24	21.00	20.98	20.85
5	64QAM	12	0	19.80	19.96	19.91
5	64QAM	12	7	19.92	19.72	19.79
5	64QAM	12	13	19.94	19.73	19.81
5	64QAM	25	0	19.84	19.69	19.80

LTE Band 26						
BW [MHz]	Modulation	RB Size	RB Offset	Average Power Low Ch. / Freq.	Average Power Middle Ch. / Freq.	Average Power High Ch. / Freq.
Channel				26705	26740	26775
Frequency (MHz)				815.5	819.0	822.5
3	QPSK	1	0	22.83	22.78	22.84
3	QPSK	1	8	22.91	22.84	22.88
3	QPSK	1	14	22.73	22.65	22.61
3	QPSK	8	0	21.98	22.01	21.95
3	QPSK	8	4	21.81	21.74	21.78
3	QPSK	8	7	21.86	21.76	21.69
3	QPSK	15	0	21.86	21.88	21.88
3	16QAM	1	0	22.17	22.06	22.11
3	16QAM	1	8	22.13	22.00	22.04
3	16QAM	1	14	21.96	22.00	21.92
3	16QAM	8	0	21.02	20.93	21.06
3	16QAM	8	4	20.99	20.85	20.86
3	16QAM	8	7	20.85	20.77	20.77
3	16QAM	15	0	20.59	20.46	20.62
3	64QAM	1	0	21.22	21.07	20.94
3	64QAM	1	8	21.07	20.93	20.93
3	64QAM	1	14	20.91	20.91	20.84
3	64QAM	8	0	19.94	19.89	19.76
3	64QAM	8	4	19.81	19.82	19.87
3	64QAM	8	7	19.72	19.73	19.70
3	64QAM	15	0	19.80	19.90	19.83

LTE Band 26						
BW [MHz]	Modulation	RB Size	RB Offset	Average Power Low Ch. / Freq.	Average Power Middle Ch. / Freq.	Average Power High Ch. / Freq.
Channel				26697	26740	26783
Frequency (MHz)				814.7	819.0	823.3
1.4	QPSK	1	0	23.00	22.88	22.98
1.4	QPSK	1	3	22.75	22.79	22.67
1.4	QPSK	1	5	22.75	22.83	22.79
1.4	QPSK	3	0	21.89	21.93	21.87
1.4	QPSK	3	1	22.07	22.01	21.91
1.4	QPSK	3	3	21.95	21.71	21.75
1.4	QPSK	6	0	21.70	21.56	21.59
1.4	16QAM	1	0	21.92	21.82	21.97
1.4	16QAM	1	3	21.87	21.83	21.80
1.4	16QAM	1	5	22.04	21.87	21.95
1.4	16QAM	3	0	21.00	20.92	20.89
1.4	16QAM	3	1	20.88	20.93	20.74
1.4	16QAM	3	3	20.97	20.80	20.74
1.4	16QAM	6	0	20.61	20.64	20.66
1.4	64QAM	1	0	21.12	21.14	21.03
1.4	64QAM	1	3	20.90	20.81	20.88
1.4	64QAM	1	5	20.97	21.07	20.95
1.4	64QAM	3	0	19.89	19.92	19.85
1.4	64QAM	3	1	20.03	20.01	19.92
1.4	64QAM	3	3	19.89	19.88	19.90
1.4	64QAM	6	0	20.03	19.90	19.98

APPENDIX B - RADIATED SPURIOUS EMISSIONS (9KHZ TO 30MHZ)

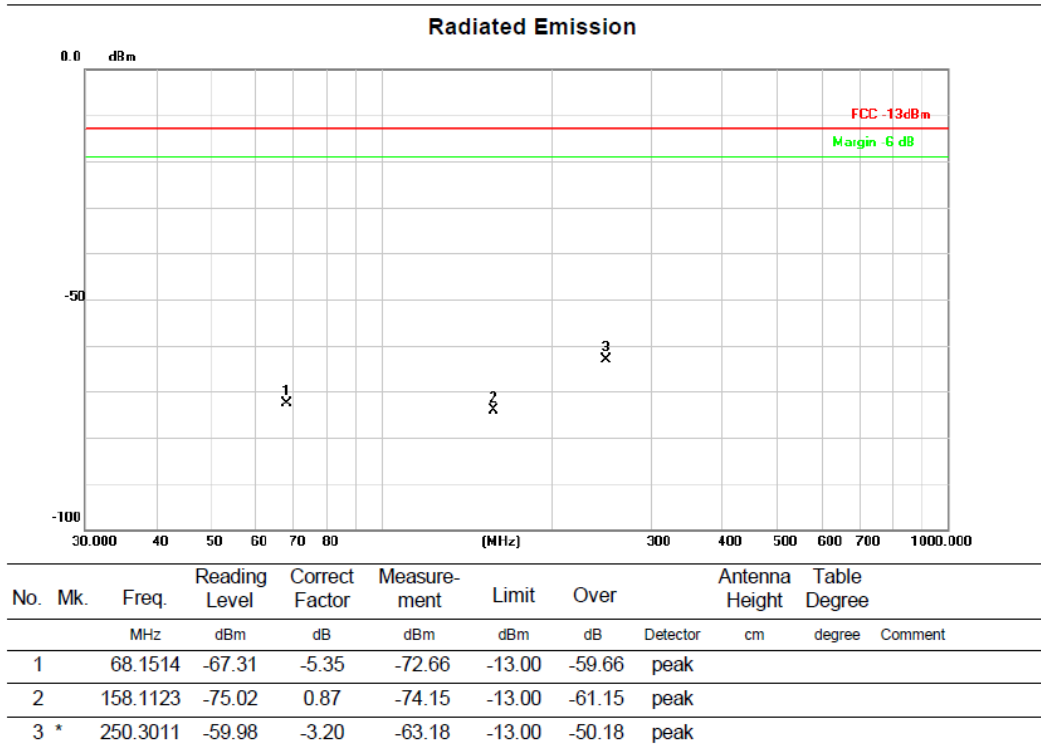
Radiated emission: 9KHz-30MHz

The low frequency, which started from 9 kHz to 30MHz, was pre-scanned and the result which was 20dB lower than the limit line was not reported.

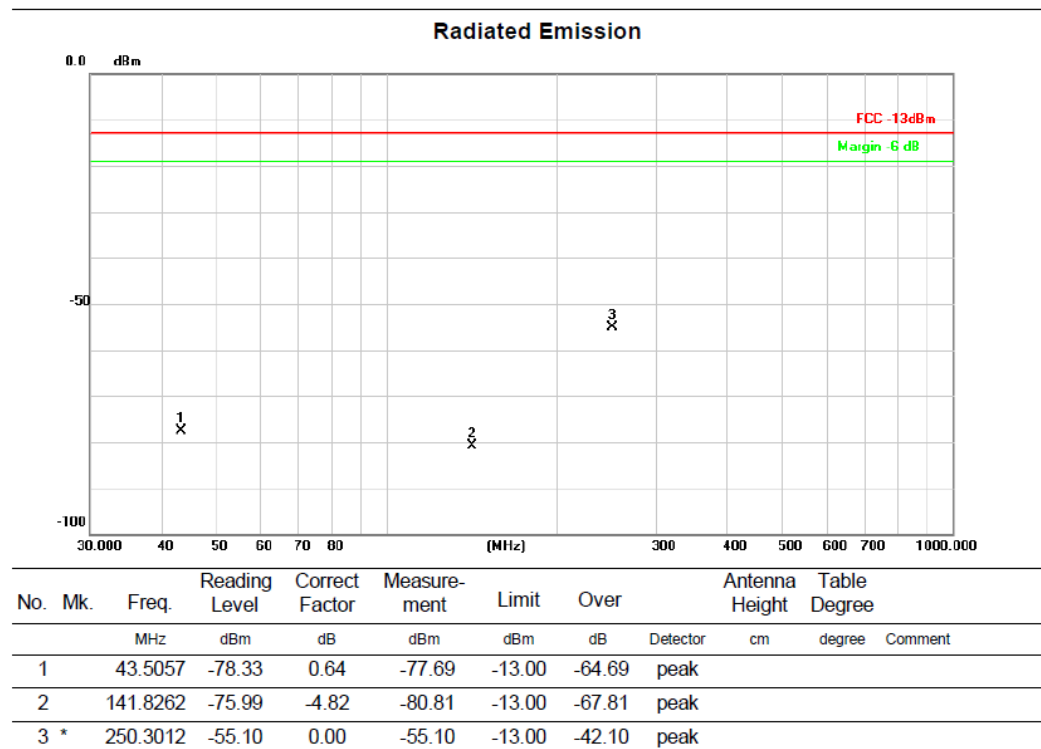
There is a comparison data of both open-field test site and semi-Anechoic chamber, and the result came out very similar.

APPENDIX C - RADIATED SPURIOUS EMISSIONS (30MHZ TO 1000MHZ)

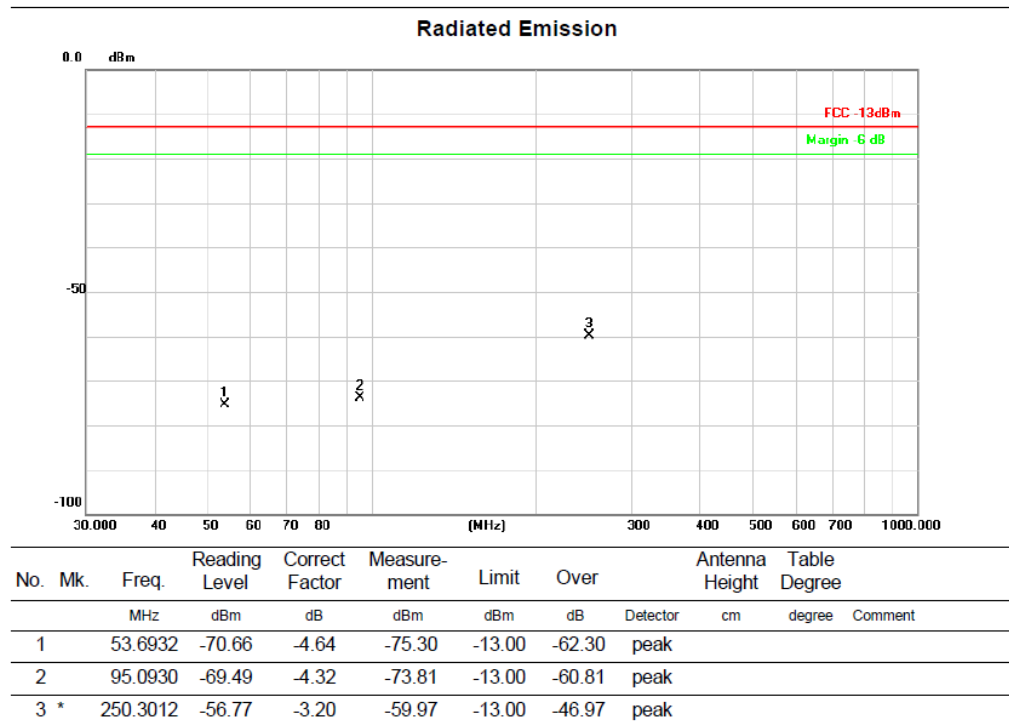
Test Mode	LTE Band 14_TX 793MHz	Polarization	Vertical
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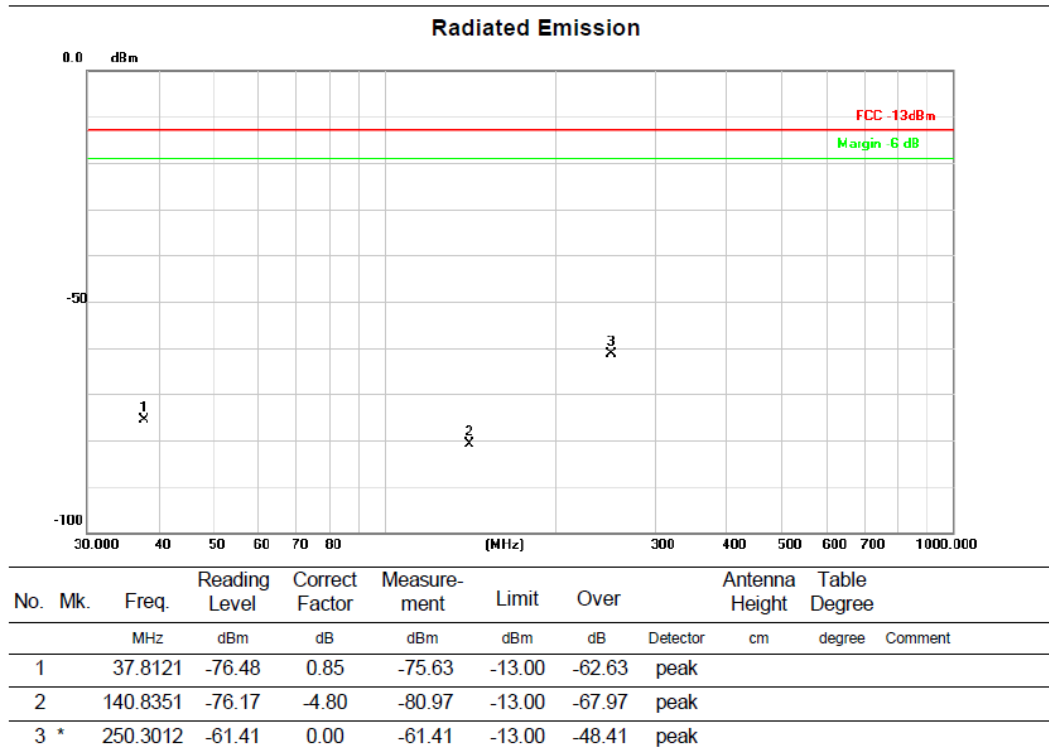
Test Mode	LTE Band 14_TX 793MHz	Polarization	Horizontal
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Test Mode	LTE Band 26_TX 831.5MHz	Polarization	Vertical
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Test Mode	LTE Band 26_TX 831.5MHz	Polarization	Horizontal
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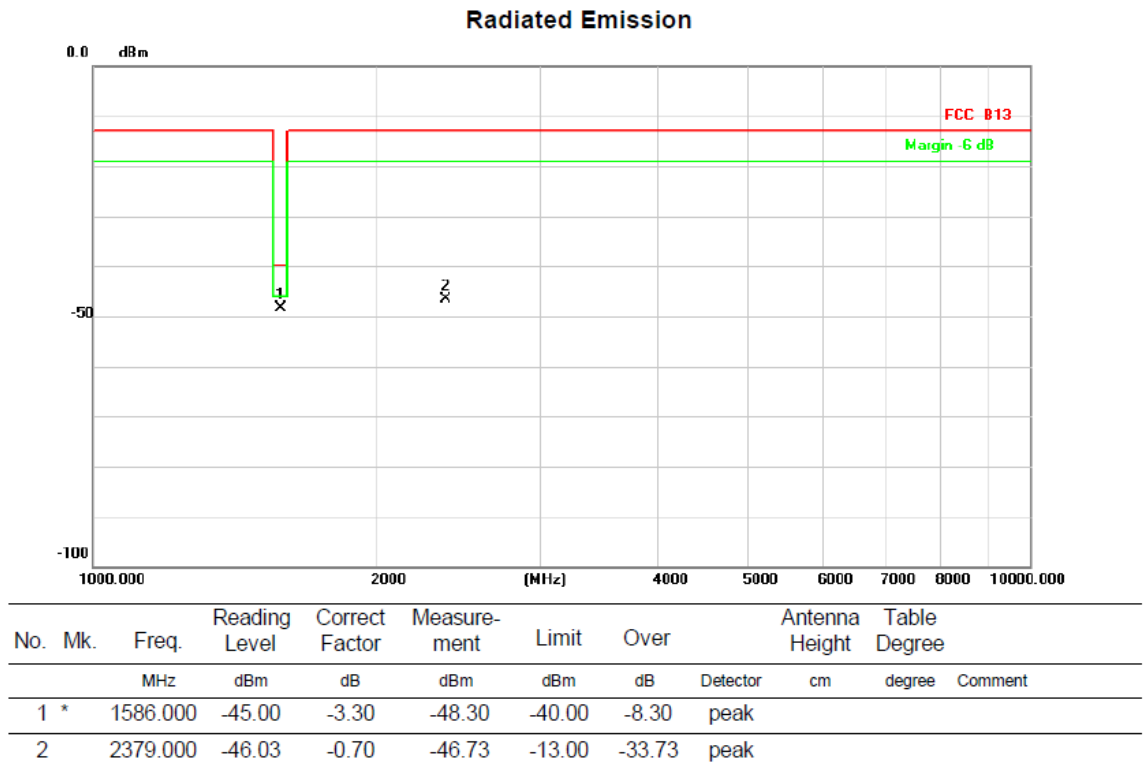
REMARKS:

(1) Measurement Value = Reading Level + Correct Factor.

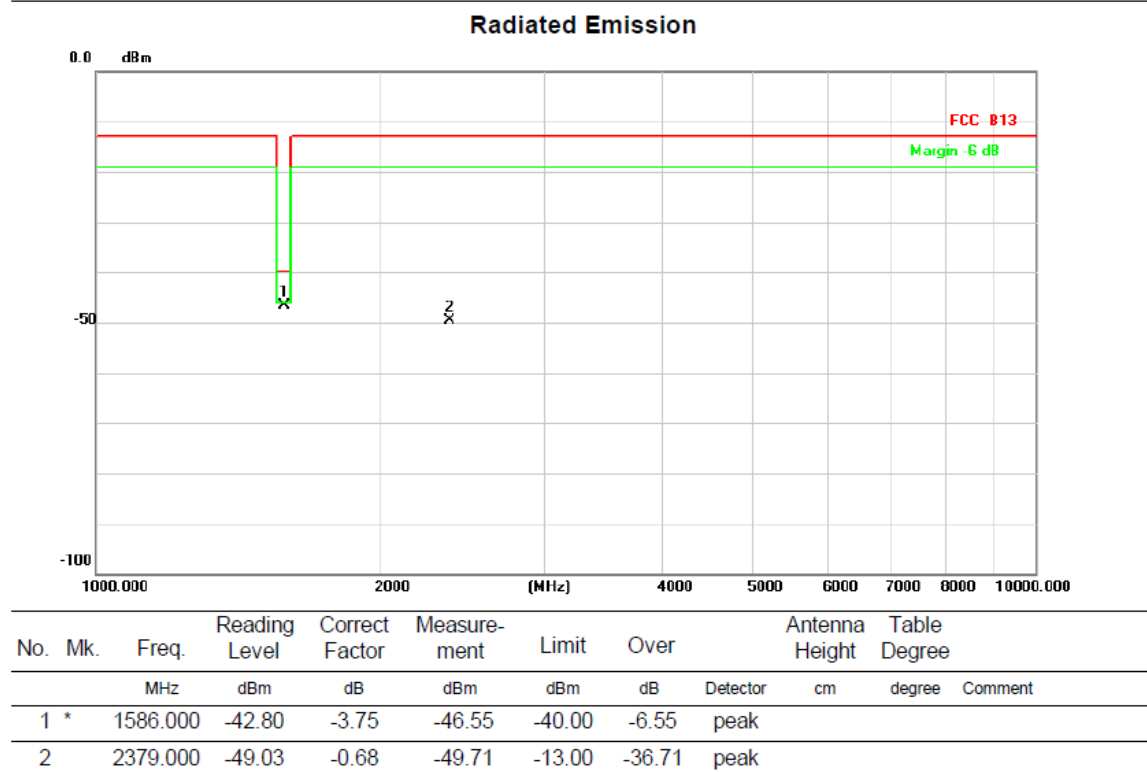
(2) Margin Level = Measurement Value - Limit Value.

APPENDIX D - RADIATED SPURIOUS EMISSIONS (ABOVE 1000MHZ)

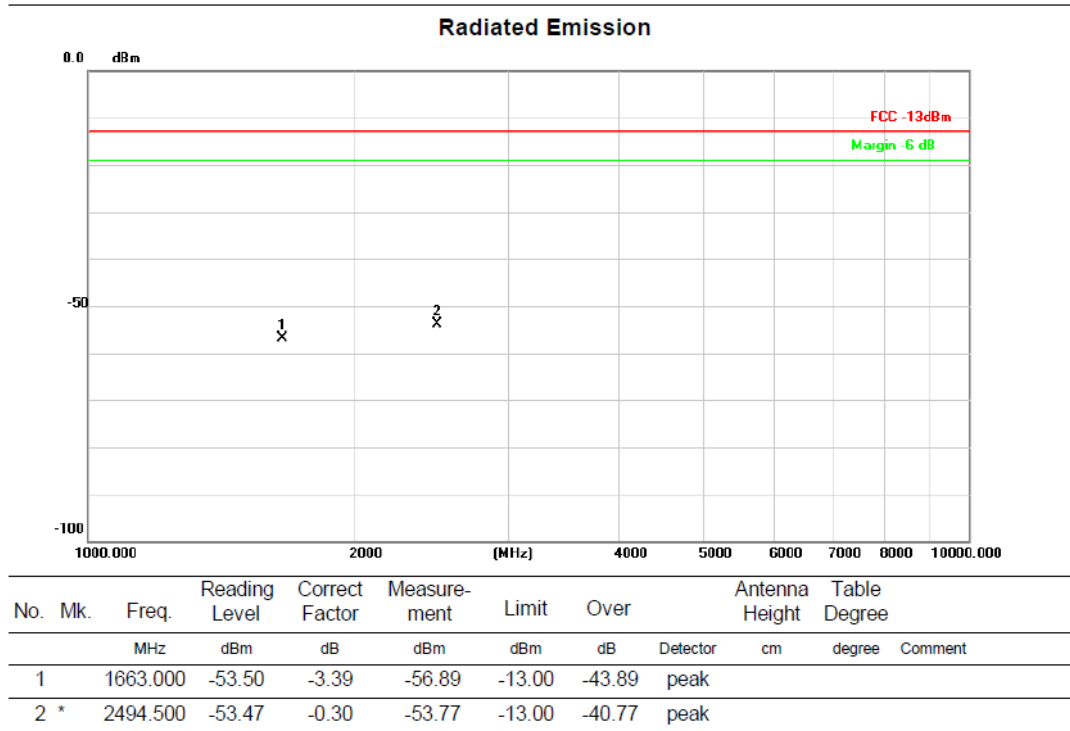
Test Mode	LTE Band 14_TX 793MHz	Polarization	Vertical
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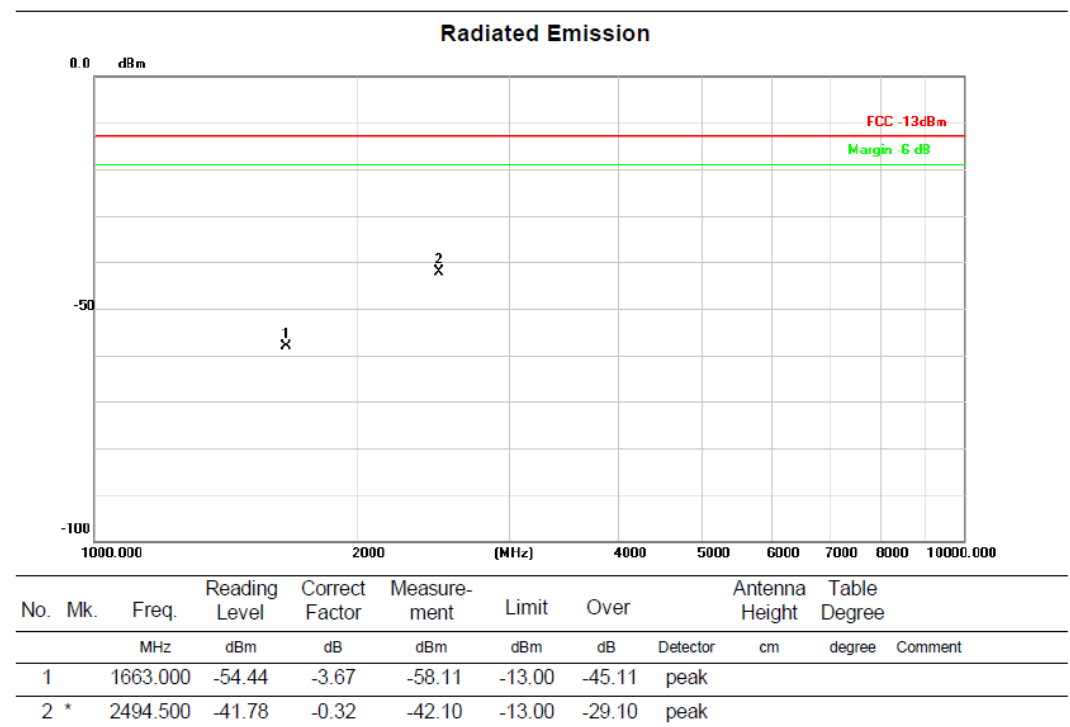
Test Mode	LTE Band 14_TX 793MHz	Polarization	Horizontal
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Test Mode	LTE Band 26_TX 831.5MHz	Polarization	Vertical
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Test Mode	LTE Band 26_TX 831.5MHz	Polarization	Horizontal
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REMARKS:

(1) Measurement Value = Reading Level + Correct Factor.

(2) Margin Level = Measurement Value - Limit Value.

Statement

1. The report is invalid without the official seal or special seal of Shenzhen Haiyun Standard Technology Co., Ltd. (hereinafter referred to as the unit).
2. The report is invalid without the signature of the approver.
3. The report is invalid if altered arbitrarily.
4. The report shall not be partially copied without the written approval of the unit.
5. The reported test results are only valid for the tested samples.
6. If there is any objection to the test report, it shall be submitted to the test unit within 15 days from the date of receiving the report, and the overdue shall not be accepted.

Shenzhen Haiyun Standard Technology Co., Ltd.

Address: Room 110, 111, 112, 113, 115, 116, Block B, Jinyuan Business Building, No. 302, Xixiang Avenue, Labor Community, Xixiang Street, Baoan District, Shenzhen, China

Tel: 0755-26024411

Email: service@hy-lab.cn

End of Test Report