RF Test Report

FCC ID: 2BL5O-ZX800-SG

Test Report No……..:	RF241031011-01-001
Product(s) Name……..:	LTE Module
Model(s)……..:	ZX800-SG
Trade Mark……....:	ZXINFOTEK
Applicant……..…:	ZXInfoTek(Shenzhen) Co., Ltd.
Address……..…...:	Room 205,2/F,building 1, software industry base, No. 81, 83, 85, Gaoxin South10th Road, Binhai community, Yuehai street, Nanshan District, Shenzhen
Receipt Date……..:	2024.11.05
Test Date……....:	2024.11.06~2024.11.25
Issued Date……..…:	2024.11.26
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	Shenzhen Haiyun Standard Technical Co., Ltd. HAIYUN Report Seal
Black Ding	Tim.zhang	Misue Su	

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REPORT ISSUED HISTORY

Amendment Report Issue Date: 2024.11.26

● No additional attachment

○ Additional attachments were issued following record

Attachment No.	Issue Date	Description

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	------
2.1051 & 90.691	Conducted Spurious Emissions	PASS	------
2.1053 & 90.691	Radiated Spurious Emissions	PASS	------
2.1051 & 90.691	Band Edge	PASS	------
2.1055 & 90.213	Frequency Stability	PASS	------

Note:

(1) “N/A” denotes test is not applicable in this test report.

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	±143.88kHz
Power Spectral Density	±0.743dB
Conducted Spurious Emission	±1.328dB
RF power conducted	±0.384dB
Conducted emission(9kHz~30MHz) AC main	±2.72dB
Radiated emission(9kHz~30MHz)	±2.66dB
Radiated emission (30MHz~1GHz)	±4.62dB
Radiated emission (1GHz~18GHz)	±4.86dB
Radiated emission (18GHz~40GHz)	±3.80dB

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 & EIRP	23.3°C	49%	DC 3.3V	Albert Fan
Occupied Bandwidth	23.3°C	49%	DC 3.3V	Albert Fan
Conducted Spurious Emissions	23.3°C	49%	DC 3.3V	Albert Fan
Band Edge	23.3°C	49%	DC 3.3V	Albert Fan
Frequency Stability	23.3°C	49%	DC 3.3V	Albert Fan
Radiated Spurious Emissions (9 kHz to 30 MHz)	24.1°C	51%	DC 3.3V	Lemon He
Radiated Spurious Emissions (30 MHz to 1000 MHz)	24.1°C	51%	DC 3.3V	Lemon He
Radiated Spurious Emissions (Above 1000 MHz)	24.1°C	51%	DC 3.3V	Lemon He

2.. GENERAL INFORMATION

2.1. GENERAL DESCRIPTION OF EUT

Product No.	POC241031011-S001	
Equipment	LTE Module	
Brand Name	ZXINFOTEK	
Test Model	ZX800-SG	
Power Source	DC 3.3V	
Modulation Type	QPSK,16QAM	
Operation Band	Band 26	
Frequency Range	LTE Band 26	Tx: 814MHz–824MHz
		Rx: 859MHz–869MHz
Channel Bandwidth	LTE Band 26	1.4MHz, 3MHz, 5MHz, 10MHz
Antenna Type	FPC Antenna	
Antenna Gain	LTE Band 26	1.36dBi

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	DC Power Supply	Agilent	E3642A	/

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.

ERP:

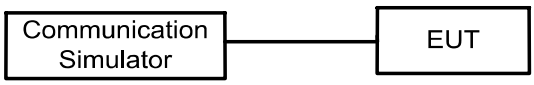
EIRP= Output Power + Antenan gain
ERP = EIPR - 2.15dBi.

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 D.

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.

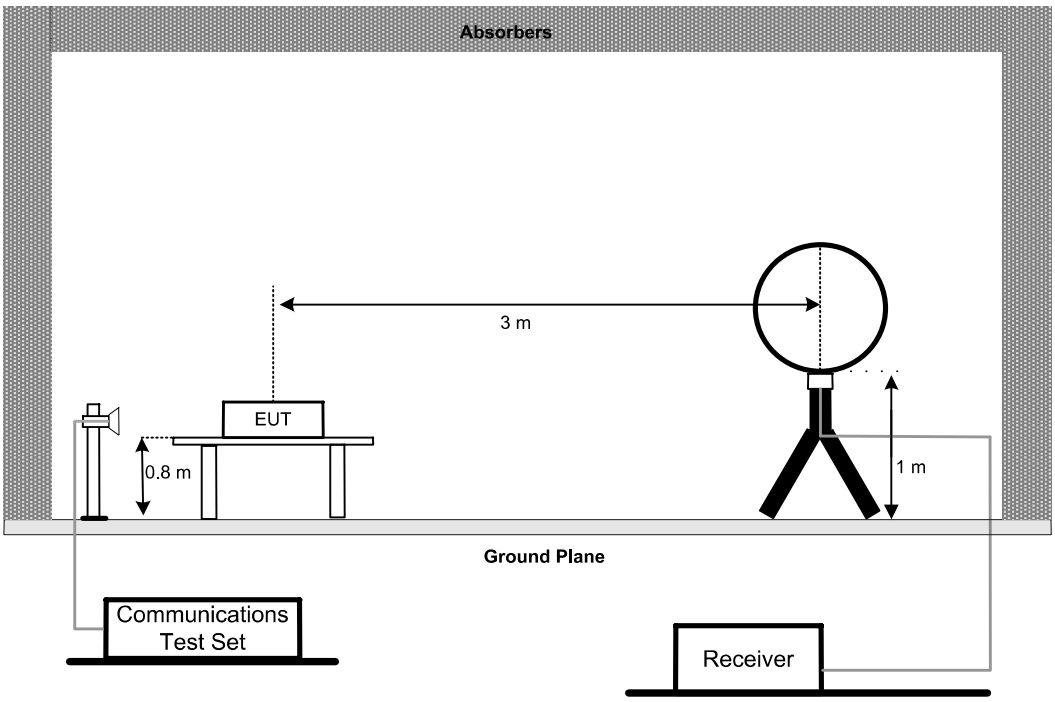
3.2.2. TEST PROCEDURES

The testing follows FCC KDB 971168 v03r01 Section 6.2.

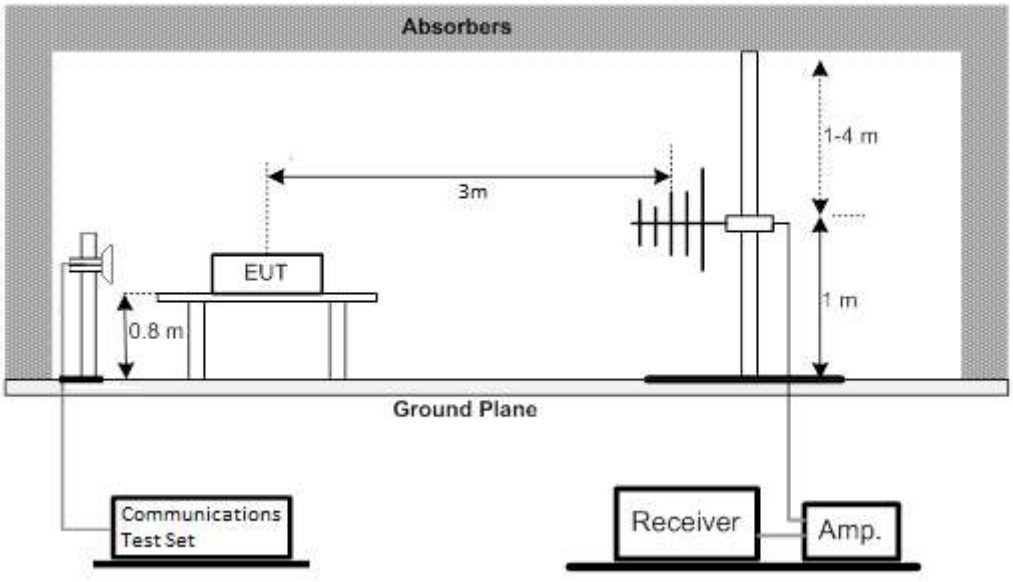
1. In the semi-anechoic chamber, EUT placed on the 0.8m height of Turn Table, rotated the table around 360 degrees to search the maximum radiation power and receiver antenna shall be rotated vertical and horizontal polarization and moved height from 1m to 4m to find the maximum polar radiated power. 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 = Output power level of S.G – TX cable loss + Antenna gain of substitution horn.
4. ERP can be calculated form EIRP by subtracting the gain of dipole, ERP = EIPR - 2.15dBi.
5. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 1MHz/3MHz.

3.2.3. TEST SETUP LAYOUT

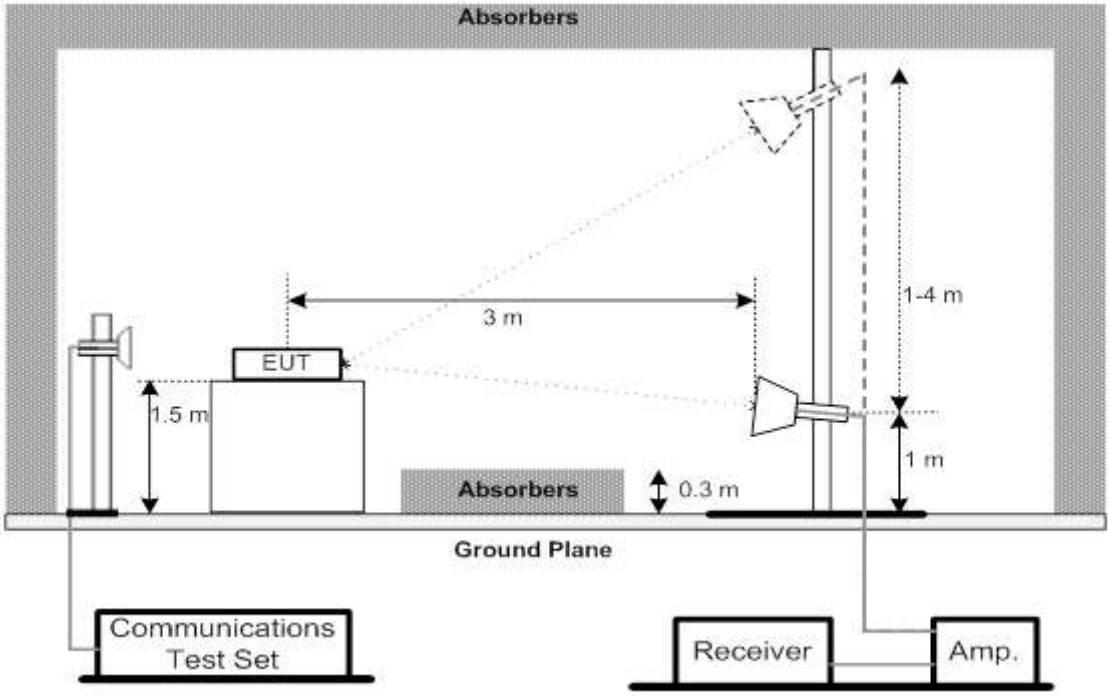
Below 30MHz



30MHz to 1000MHz



Above 1GHz



3.2.4. TESTDEVIATION

No deviation.

3.2.5. TEST RESULTS (9KHZ TO 30MHZ)

Please refer to the APPENDIX A.

3.2.6. TEST RESULTS (30MHZ TO 1000MHZ)

Please refer to the APPENDIX B.

3.2.7. TEST RESULTS (ABOVE 1000MHZ)

Please refer to the APPENDIX C.

Note:

1. For radiated emission above 1 GHz test, the spurious points of 1GHz~18GHz and 18GHz~27GHz have been pre-tested and in this report only recorded the worst case. The remaining spurious points are all below the limit value of 20dB.
2. Pre-scan all test modes and channels, worst case for mid channel was recorded.

3.3 CONDUCTED SPURIOUS EMISSIONS

3.3.1 LIMIT

The level of the carrier and the various conducted spurious and harmonic frequencies is measured by means of a calibrated spectrum analyzer. The spectrum is scanned from the lowest frequency generated in the equipment up to a frequency including its 10th harmonic. On any frequency outside a licensee's frequency block, the power of any emission shall be attenuated below the transmitter power (P) by at least 43 + 10 log(P) dB. Compliance with these provisions is based on the use of measurement instrumentation employing a resolution bandwidth of 1 MHz or greater. However, in the 1 MHz bands immediately outside and adjacent to the frequency block a resolution bandwidth of at least one percent of the emission bandwidth of the fundamental emission of the transmitter may be employed. The emission bandwidth is defined as the width of the signal between two points, one below the carrier center frequency and one above the carrier center frequency, outside of which all emission are attenuated at least 26 dB below the transmitter power.

3.3.2 TEST PROCEDURES USED

KDB 971168 v03r01-Section 6.1

3.3.3 TEST SETTINGS

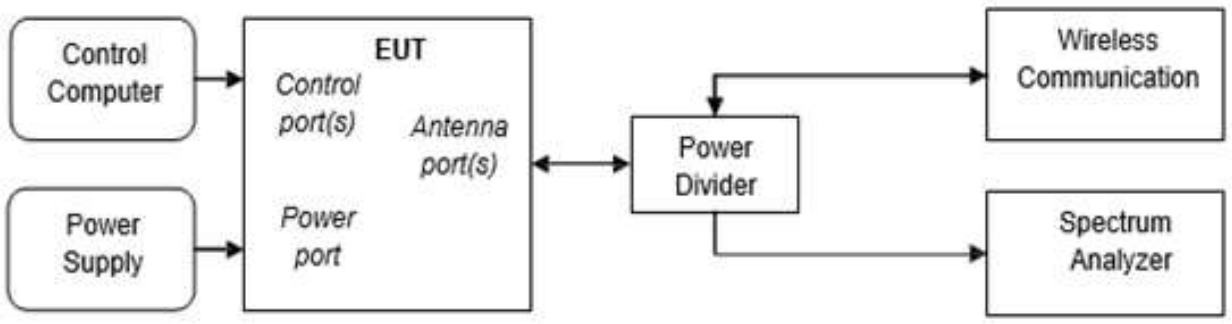
1. 9kHz~150kHz, RBW = 1kHz, VBW ≥ 3×RBW,

   150kHz~30MHz, RBW = 10kHz, VBW ≥ 3×RBW,

   30MHz~1GHz, RBW = 100 kHz, VBW = 300 kHz.

   Above 1GHz, RBW = 1 MHz, VBW = 3 MHz.
2. Detector: Peak
3. Trace mode= max hold.

3.3.4 TEST SETUP LAYOUT



3.3.5 TEST RESULTS

Please refer to the Appendix D.

3.4 OCCUPIED BANDWIDTH

3.4.1 LIMIT

The occupied bandwidth, that is the frequency bandwidth such that, below its lower and above its upper frequency limits, the mean powers radiated are each equal to 0.5 percent of the total mean power radiated by a given emission shall be measured. The span of the analyzer shall be set to capture all products of the modulation process, including the emission skirts. The resolution bandwidth shall be set to as close to 1 percent of the selected span as is possible without being below 1 percent. The video bandwidth shall be set to 3 times the resolution bandwidth. Video averaging is not permitted. Where practical, a sampling detector shall be used since a peak or, peak hold, may produce a wider bandwidth than actual. The trace data points are recovered and are directly summed in linear terms. The recovered amplitude data points, beginning at the lowest frequency, are placed in a running sum until 0.5 percent of the total is reached and that frequency recorded. The process is repeated for the highest frequency data points. This frequency is recorded. The span between the two recorded frequencies is the occupied bandwidth.

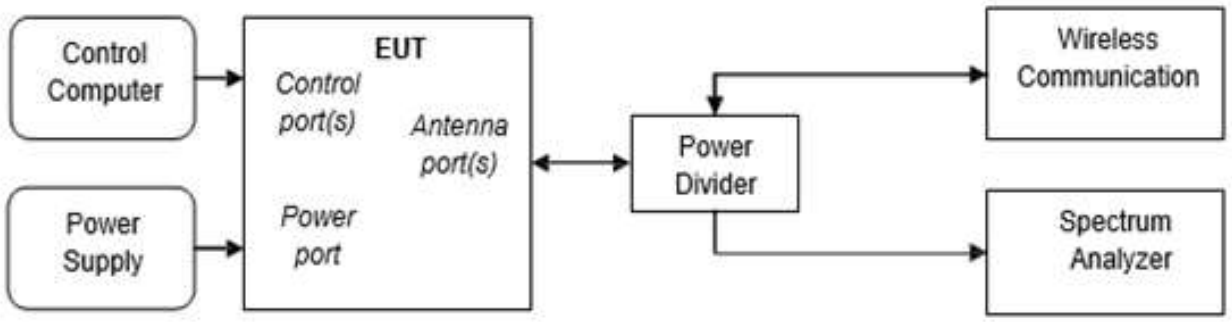
3.4.2 TEST PROCEDURES USED

KDB 971168 v03r01-Section 4

3.4.3 TEST SETTINGS

1. SET RBW=1-5% of OBW
2. SET VBW ⩾ 3*RBW
3. Detector: Peak
4. Trace mode= max hold.
5. Sweep= auto couple
6. Steps 1-5 were repeated after it is stable

3.4.4 TEST SETUP LAYOUT



3.4.5 TEST RESULTS

Please refer to the Appendix D.

3.5 BAND EDGE MEASUREMENTS

The 1 MHz bands immediately outside and adjacent to the frequency block a resolution bandwidth of at least one percent of the emission bandwidth of the fundamental emission of the transmitter may be employed. The emission power must be attenuated below the transmitting power (P) by a factor of at least 43+10log10P dB.

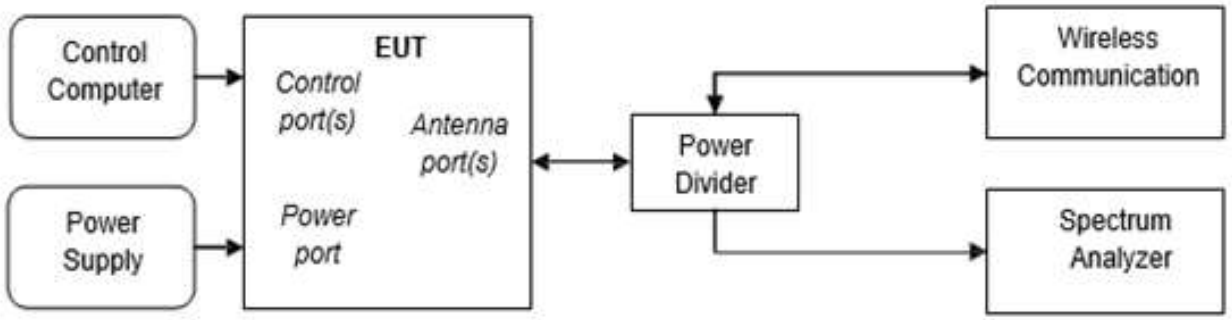
3.5.1 TEST PROCEDURES USED

KDB 971168 v03r01-Section 6

3.5.2 TEST SETTINGS

1. SET RBW ≥ 1% of Emission BW.
2. SET VBW about three times of RBW
3. Detector: RMS
4. Trace mode= max hold.
5. Span= 2MHz

3.5.3 TEST SETUP LAYOUT



3.5.4 TEST RESULTS

Please refer to the Appendix D.

3.6 FREQUENCY STABILITY

Frequency stability testing is performed in accordance with the guidelines of ANSI/TIA-603-E-2016. The frequency stability of the transmitter is measured by:
a. Temperature: The temperature is varied from -30°C to +65°C in 10°C increments using an environmental chamber.
b. Primary Supply Voltage: The primary supply voltage is varied from 85% to 115% of the nominal value for non hand-carried battery and AC powered equipment. For hand-carried, battery-powered equipment, primary supply voltage is reduced to the battery operating end point which shall be specified by the manufacturer.

Specification – The frequency stability shall be sufficient to ensure that the fundamental emission stays within the authorized frequency block. The frequency stability of the transmitter shall be maintained within ±0.00025% (±2.5 ppm) of the center frequency.

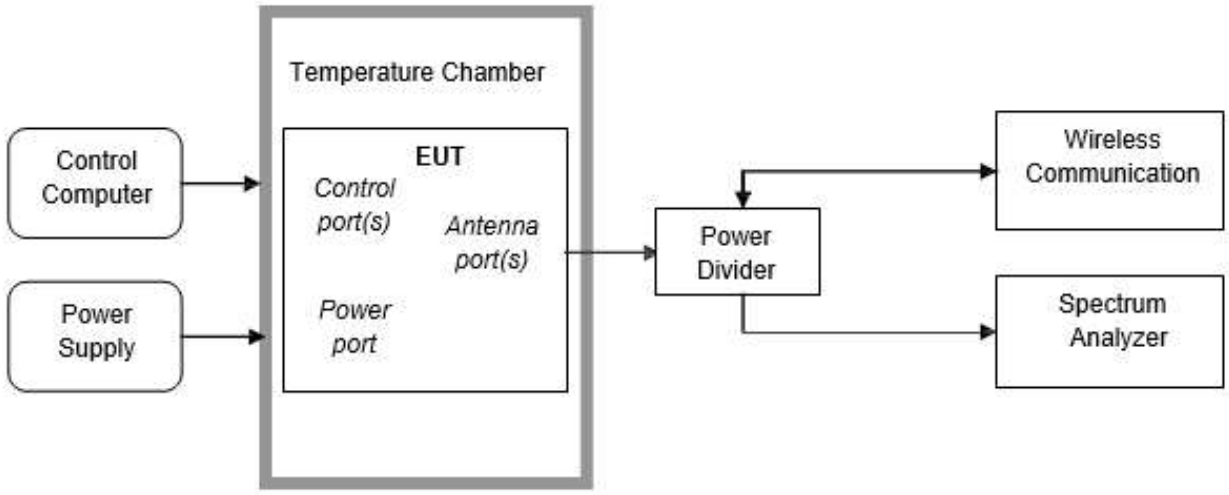
3.6.1 TIME PERIOD AND PROCEDURE:

The carrier frequency of the transmitter is measured at room temperature (20°C to provide a reference).
The equipment is turned on in a “standby” condition for fifteen minutes before applying power to the transmitter.
Measurement of the carrier frequency of the transmitter is made within one minute after applying power to the transmitter.
Frequency measurements are made at 10°C intervals ranging from -30°C to +50°C. A period of at least one half-hour is provided to allow stabilization of the equipment at each temperature level.

3.6.2 TEST PROCEDURES USED

KDB 971168 v03r01-Section 9

3.6.3 TEST SETUP LAYOUT



3.6.4 TEST RESULTS

Please refer to the Appendix D.

4. LIST OF MEASUREMENT EQUIPMENTS

No.	Equipment	Manufacturer	Type No.	Serial No.	Inventory No.	Cal. date (yyyy/mm/dd)	Cal. Due date (yyyy/mm/dd)
Radiated Emissions							
1	Test receiver	Rohde&Schwarz	ESU	100184	JLE011	2024/4/24	2025/4/23
2	Horn Antenna	SCHWARZBECK	BBHA 9120 D	9120D-1273	JLE028	2024/4/20	2025/4/19
3	Low frequency amplifier	Unknown	LNA 0920N	2014	JLE023	2024/4/24	2025/4/23
4	High frequency amplifier	Schwarzbeck	BBV 9718	284	JLE024	2024/4/24	2025/4/23
5	Log periodic antenna	Schwarzbeck	VULB 9168	1151	JLE012	2024/4/20	2025/4/19
6	Temp&Humidity Recorder	Meideshi	JR900	/	JLE021	2024/4/24	2025/4/23
7	Horn Antenna	SCHWARZBECK	BBHA 9170	9170#685	JLE029	2024/7/15	2025/7/14
8	Loop Antenna	SCHWARZBECK	FMZB151 9B	00029	JLE030	2024/7/15	2025/7/14
9	Broadband preamplifier	Schwarzbeck	BBV9721	9721-019	JLE025	2024/4/24	2025/4/23
10	RF cable(966 chamber)9kHz-1GHz	Unknown	Unknown	Unknown	JLE026	2024/4/24	2025/4/23
11	RF cable(966 chamber)1GHz-18GHz	Unknown	Unknown	Unknown	JLE027	2024/4/24	2025/4/23
12	Test software	Farad Technology Co., Ltd	EZ-EMC Ver.TW-03A2				
RF Conducted Emissions							
1	MXA Signal Analyzer	Keysight	N9021B	MY60080169	JLE050	2024/4/20	2025/4/19
2	RF Control Unit	dsusoft	JS0806-2	21G8060449	JLE053	2024/4/20	2025/4/19
3	power supply unit	dsusoft	JS0806-4 ADC	N/A	JLE055	2024/4/20	2025/4/19
4	VXG Signal Generator	Keysight	M9384B	MY61270787	JLE051	2024/4/20	2025/4/19
5	EXG Analog Signal Generator	Keysight	N5173B	MY59101282	JLE052	2024/4/20	2025/4/19
6	Wideband Radio Communication Tester	Rohde&Schwarz	CMW500	1201.0002K50-116064-Dt	JLE054	2024/4/20	2025/4/19
7	Test software	dsusoft	JS1120-3 Ver.3.2.22.0				

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

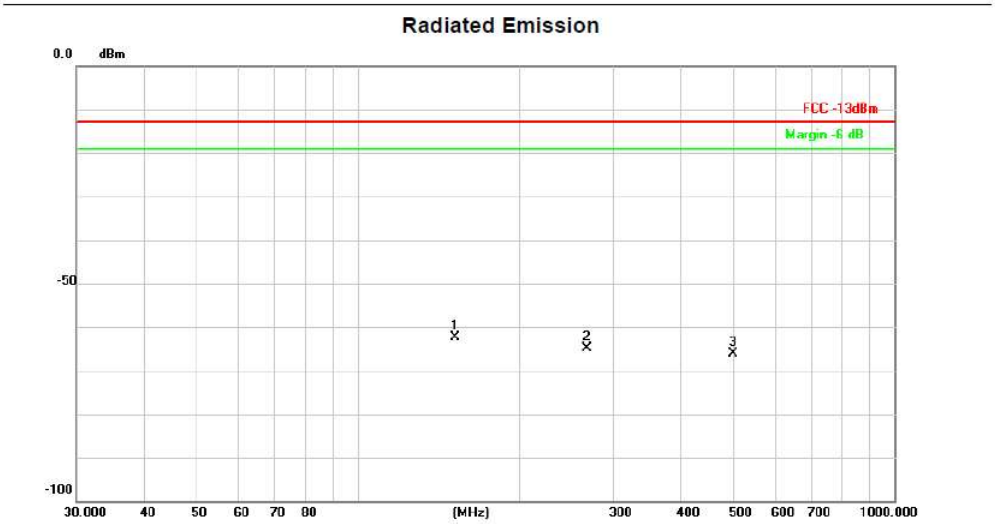
Radiated emission: 9KHz-30MHz

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.

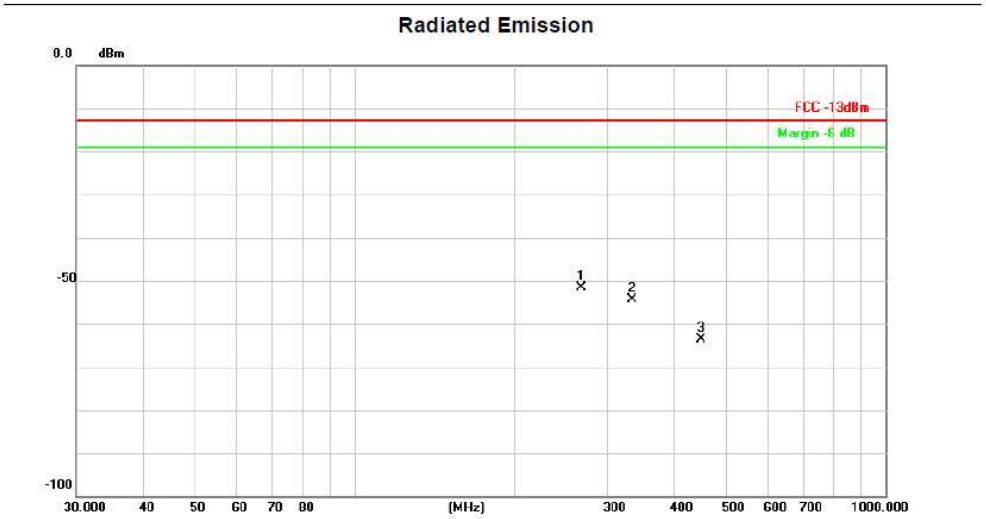
APPENDIX B - RADIATED SPURIOUS EMISSIONS (30MHZ TO 1000MHZ)

Test Mode	LTE Band 26_TX Mid CH	Polarization	Vertical



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over		Antenna Height	Table Degree	
		MHz	dBm	dB	dBm	dBm	dB	Detector	cm	degree	Comment
1	*	152.1297	-53.70	-8.70	-62.40	-13.00	-49.40	peak			
2		266.6090	-53.56	-11.36	-64.92	-13.00	-51.92	peak			
3		501.1790	-61.04	-5.04	-66.08	-13.00	-53.08	peak			

Test Mode	LTE Band 26_TX Mid CH	Polarization	Horizontal

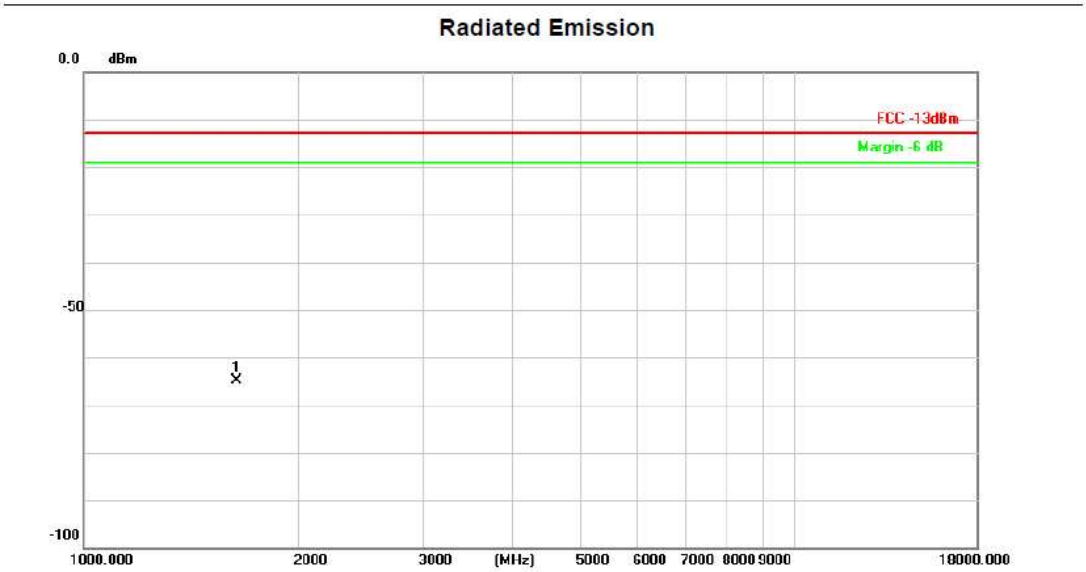


No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over		Antenna Height	Table Degree	
		MHz	dBm	dB	dBm	dBm	dB	Detector	cm	degree	Comment
1	*	266.6090	-40.20	-11.36	-51.56	-13.00	-38.56	peak			
2		333.6867	-45.48	-8.96	-54.44	-13.00	-41.44	peak			
3		451.1350	-57.65	-5.94	-63.59	-13.00	-50.59	peak			

REMARKS:
(1) Measurement Value = Reading Level + Correct Factor.
(2) Margin Level = Measurement Value - Limit Value.

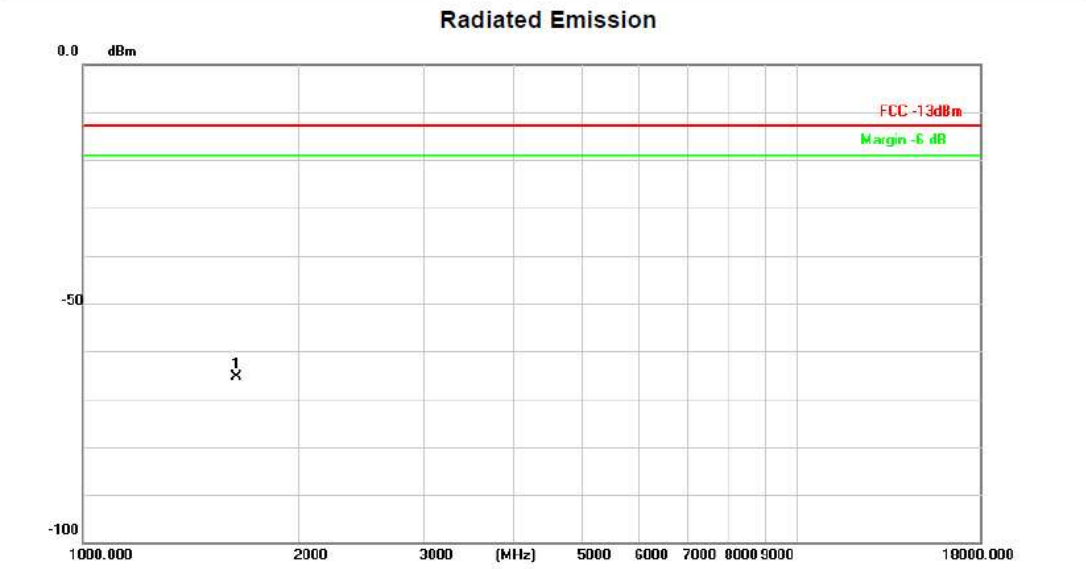
APPENDIX D - RADIATED SPURIOUS EMISSIONS (ABOVE 1000MHZ)

Test Mode	LTE Band 26_TX Mid CH	Polarization	Vertical



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over		Antenna Height	Table Degree	
		MHz	dBm	dB	dBm	dBm	dB	Detector	cm	degree	Comment
1	*	1638.000	-70.78	5.84	-64.94	-13.00	-51.94	peak			

Test Mode	LTE Band 26_TX Mid CH	Polarization	Horizontal



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over		Antenna Height	Table Degree	
		MHz	dBm	dB	dBm	dBm	dB	Detector	cm	degree	Comment
1	*	1638.000	-71.29	5.84	-65.45	-13.00	-52.45	peak			

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.

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Tel: 0755-26024411

Email: service@hy-lab.cn

End of Test Report