



SGS-CSTC Standards Technical Services Co., Ltd. Shenzhen Branch

SZEMC-TRF-01 Rev. A/1

Report No.: SZCR240600244904

Page: 1 of 16

TEST REPORT

Application No.: SZCR2406002449AT
Applicant: FIH CO., LTD.
Address of Applicant: No.4, Mingsheng St., Tu-Cheng Dist., New Taipei City 23679 Taiwan
Manufacturer: Futaijing Precision Electronics (Beijing)co., Ltd.
Address of Manufacturer: No.9 JinXiu Street, Beijing Economic & Technological Development Area, Beijing 100176, China
Factory: Futaijing Precision Electronics (Beijing)co., Ltd.
Address of Factory: No.9 JinXiu Street, Beijing Economic & Technological Development Area, Beijing 100176, China
Equipment Under Test (EUT):
EUT Name: 4G Module
Model No.: 31PHBM2000A
FCC ID: RYQ31PHBM2000A
Standard(s) : 47 CFR Part 2
47 CFR Part 22 subpart H
47 CFR Part 24 subpart E
47 CFR Part 27 subpart C
Date of Receipt: 2024-06-26
Date of Test: 2024-07-07 to 2024-07-12
Date of Issue: 2024-07-15

Test Result:	Pass*
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* In the configuration tested, the EUT complied with the standards specified above.

Keny Xu
EMC Laboratory Manager



SGS-CSTC Standards Technical Services Co., Ltd.
Shenzhen Branch Laboratory

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SZEMC-TRF-01 Rev. A/1

Report No. SZCR240600244904

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Revision Record				
Version	Chapter	Date	Modifier	Remark
01		2024-07-15		Original

Authorized for issue by:			
		<i>Calvin Weng</i>	
		Calvin Weng/Project Engineer	
		<i>Eric Fu</i>	
		Eric Fu/Reviewer	



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2 Test Summary

Test Item	FCC Rule No.	Requirements	Verdict
Field strength of spurious radiation	§2.1051, §22.917, §24.238 §27.53(h)	≤ -13dBm	PASS

Remark: This report is based on a module test report SZCR240400147804, to install into a host and change the antenna, therefore, only radiated spurious emissions were re-tested on this report.

This report is prepared for FCC class II permissive change. The modular have been approved by FCC, FCC ID:RYQ31PHBM2000A, granted on 07/30/2024.



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4 General Information

4.1 Details of E.U.T.

Power supply:	DC12V
Sample Type:	Mobile production
Support Network:	RMC, HSDPA, HSUPA
Operation Frequency Band:	UMTS FDD Band II/IV/V
Modulation Type:	QPSK for WCDMA
Supported Channel Bandwidth:	5MHz for WCDMA
UMTS Power Class:	Level 3
Antenna Type:	Monopole antenna
Antenna Gain:	WCDMA B2:-4.7dBi; B4: -4.8dBi; B5:-5.3dBi
Host name:	RTBM
Host Model Number:	RTBM-EANAGEN

Remark: The information in this section is provided by the applicant or manufacturer, SGS is not liable to the accuracy, suitability, reliability or/and integrity of the information.

4.2 Description of Support Units

Description	Manufacturer	Model No.	Serial No.
Control board	Provided by Manufacture	--	--
Antenna box for LTE & GNSS	Provided by Manufacture	--	--
Speaker and Microphone	Provided by Manufacture	--	--
Main cable	Provided by Manufacture	--	--
Ethernet AMTD Cable	Provided by Manufacture	--	--
BUB cable	Provided by Manufacture	--	--
BUB(Backup Battery)	Provided by Manufacture	--	--



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4.3 Test Frequency

Test Mode	TX	RF Channel		
		Low(L)	Middle (M)	High (H)
WCDMA Band V	TX	Channel 4132	Channel 4183	Channel 4233
		826.4 MHz	836.6 MHz	846.6 MHz
Test Mode	TX	RF Channel		
		Low(L)	Middle (M)	High (H)
WCDMA Band IV	TX	Channel 1312	Channel 1413	Channel 1513
		1710 MHz	1732.6 MHz	1755 MHz
Test Mode	TX	RF Channel		
		Low(L)	Middle (M)	High (H)
WCDMA Band II	TX	Channel 9262	Channel 9400	Channel 9538
		1852.4 MHz	1880.0 MHz	1907.6 MHz

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4.4 Test Environment

Environment Parameter	Selected Values During Tests	
Temperature:	TL	-30°C
	TN	+20°C
	TH	+50°C
Voltage:	VL	10.2 Vdc
	VN	12 Vdc
	VH	13.8 Vdc

NOTE: VL= lower extreme test voltage

VN= nominal voltage

VH= upper extreme test voltage

TL= lower extreme test temperature

TN= normal temperature

TH= upper extreme test temperature

4.5 Measurement Uncertainty

No.	Item	Measurement Uncertainty
1	Radio Frequency	$\pm 5.4 \times 10^{-8}$
2	Duty cycle	$\pm 0.3\%$
3	Occupied Bandwidth	$\pm 3\%$
4	RF conducted power	$\pm 0.8\text{dB}$
5	RF power density	$\pm 0.4\text{dB}$
6	Conducted Spurious emissions	$\pm 2.7\text{dB}$
7	Radiated Spurious emission test	$\pm 3.1\text{dB}$ (Below 1GHz) $\pm 4.4\text{dB}$ (Above 1GHz)
8	Temperature test	$\pm 1^\circ\text{C}$
9	Humidity test	$\pm 3\%$
10	Supply voltages	$\pm 1.5\%$
11	Time	$\pm 3\%$

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4.6 Test Location

All tests were performed at:

SGS-CSTC Standards Technical Services Co., Ltd., Shenzhen Branch

No. 1 Workshop, M-10, Middle Section, Science & Technology Park, Nanshan District, Shenzhen, Guangdong, China. 518057.

Tel: +86 755 2601 2053 Fax: +86 755 2671 0594

No tests were sub-contracted.

4.7 Test Facility

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

- **A2LA (Certificate No. 3816.01)**

SGS-CSTC Standards Technical Services Co., Ltd., Shenzhen EMC Laboratory is accredited by the American Association for Laboratory Accreditation(A2LA). Certificate No. 3816.01.

- **VCCI (Member No. 1937)**

The 3m Fully-anechoic chamber for above 1GHz, 10m Semi-anechoic chamber for below 1GHz, Shielded Room for Mains Port Conducted Interference Measurement and Telecommunication Port Conducted Interference Measurement of SGS-CSTC Standards Technical Services Co., Ltd. Shenzhen EMC laboratory have been registered in accordance with the Regulations for Voluntary Control Measures with Registration No.: G-20026, R-14188, C-12383 and T-11153 respectively.

- **FCC –Designation Number: CN1336**

SGS-CSTC Standards Technical Services Co., Ltd., Shenzhen EMC Laboratory has been recognized as an accredited testing laboratory.

Designation Number: CN1336. Test Firm Registration Number: 787754.

- **Innovation, Science and Economic Development Canada**

SGS-CSTC Standards Technical Services Co., Ltd., Shenzhen EMC Laboratory has been recognized by ISED as an accredited testing laboratory.

CAB identifier: CN0006.

IC#: 4620C.

4.8 Deviation from Standards

None

4.9 Abnormalities from Standard Conditions

None

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5 Equipment List

RE in Chamber					
Test Equipment	Manufacturer	Model No.	Inventory No.	Cal. Date	Cal. Due date
3m Fully-Anechoic Chamber	AUDIX	N/A	SEM001-02	2024-05-11	2027-05-10
Signal Analyzer	Rohde & Schwarz	FSV40	SEM008-04	2024-03-15	2025-03-14
Trilog-Broadband Antenna	Schwarzbeck	VULB9168	SEM003-33	2021/9/25	2024/9/24
Substitution Antenna	Schwarzbeck	VULB9168	SEM003-18	2022/08/07	2025/08/06
Horn Antenna	Rohde&Schwarz	HF907	SEM003-07	2023-07-23	2025-07-22
Microwave system amplifier	Agilent	83017A	SEM005-25	2023-09-19	2024-09-18
Measurement Software	AUDIX	e3 V8.2014-6-27	N/A	N/A	N/A
Coaxial Cable	SGS	N/A	SEM026-01	2024-07-06	2025-07-05
Broad-Band Horn Antenna	Schwarzbeck	BBHA 9170	SEM003-15	2022-08-10	2024-08-09
Pre-Amplifier	Compliance Directions Systems Inc.	PAP-2640-50	SEM005-08	2024-03-15	2025-03-14
Signal Generator(9kHz-40GHz)	N5173B	MY53270267	Agilent	2023-9-19	2024-9-18
Broad-Band Horn Antenna	Schwarzbeck	BBHA 9120D	SEM003-32	2021-09-26	2024-09-25
Pre-amplifier	Rohde & Schwarz	CH14-H052	SEM005-17	2024-03-15	2025-03-14
Substitution Antenna	Rohde & Schwarz	HF907	SEM003-06	2022-08-07	2024-08-06
Substitution Antenna	ETS-LINDGREN	3160-09	SEM003-12	2022-08-10	2024-08-09
Universal Radio Communication Tester	Rohde & Schwarz	CMW 500	SEM010-03	2024-03-27	2025-03-26
Universal Radio Communication Tester	Anritsu	MT8000A	SEM010-10	2024-3-14	2025-3-13

General used equipment					
Equipment	Manufacturer	Model No.	Inventory No.	Cal Date	Cal Due Date
Humidity- Temperature Indicator	deli	8838	SEM002-32	2023-07-28	2024-07-27
Humidity- Temperature Indicator	deli	8838	SEM002-33	2023-07-28	2024-07-27
Barometer	Changchun Meteorological Industry Factory	DYM3	SEM002-01	2024-03-22	2025-03-21

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6 Radio Spectrum Matter Test Results

6.1 Spurious emissions at antenna terminals

Test Requirement: §2.1051, §22.917, §24.238, §27.53(h)
Test Method: ANSI C63.26-2015, KDB 971168 D01 v03r01
Limit: ≤ -13dBm

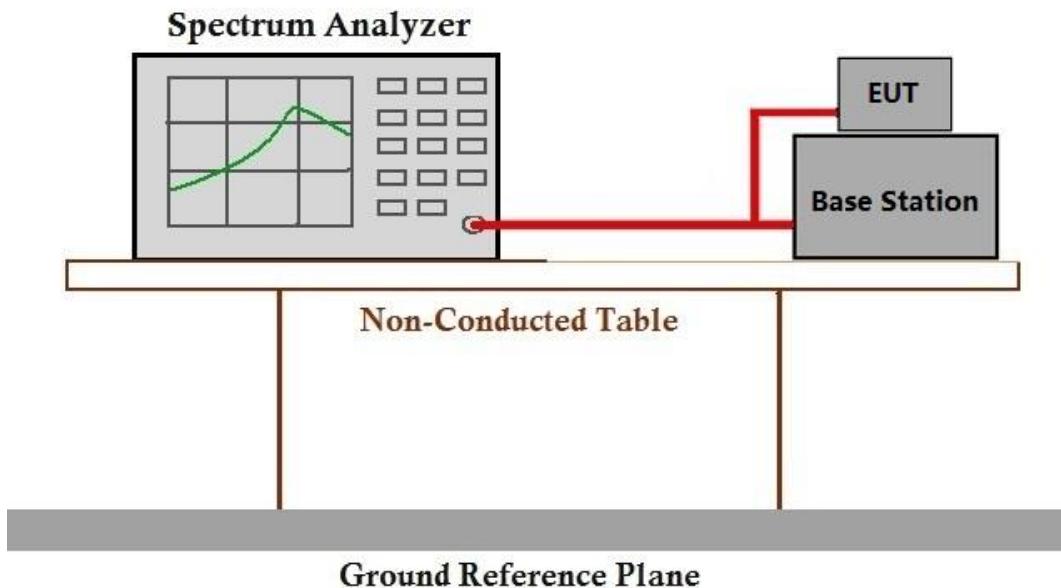
6.1.1 E.U.T. Operation

Operating Environment:

Temperature: 23.1 °C Humidity: 52.5 % RH Atmospheric Pressure: 1020 mbar

Test mode: 31: TX mode_Keep the EUT in transmitting mode

6.1.2 Test Setup Diagram



6.1.3 Measurement Data

Please refer to Appendix for WCDMA test data.

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6.2 Field strength of spurious radiation

Test Requirement: §2.1051, §22.917, §24.238, §27.53(h)

Test Method: ANSI C63.26-2015, KDB 971168 D01 v03r01

Limit: $\leq -13\text{dBm}$

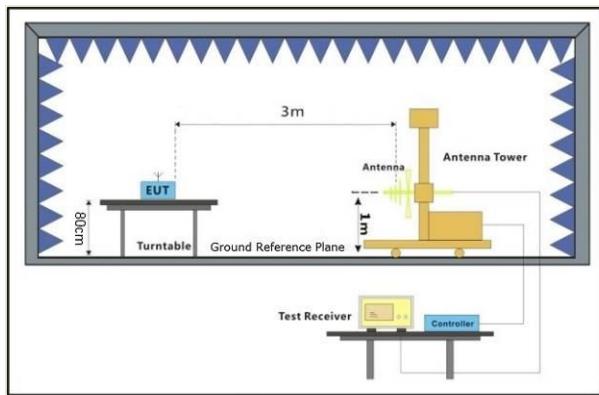
6.2.1 E.U.T. Operation

Operating Environment:

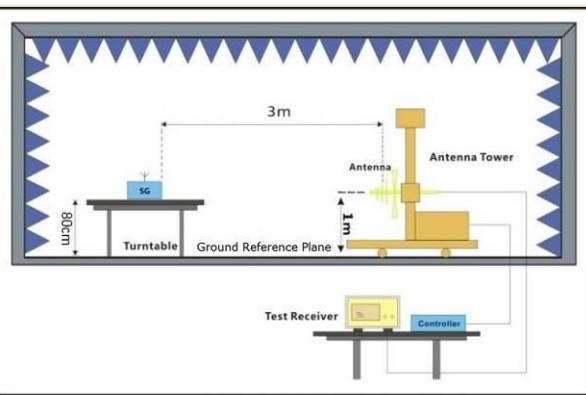
Temperature: 23.1 °C Humidity: 52.5 % RH Atmospheric Pressure: 1020 mbar

Test mode: 31: TX mode_Keep the EUT in transmitting mode

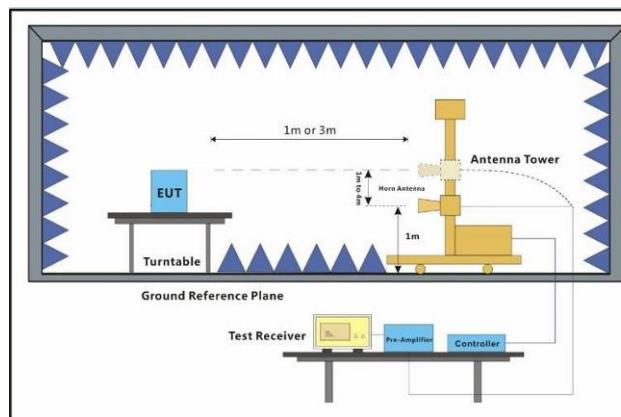
6.2.2 Test Setup Diagram



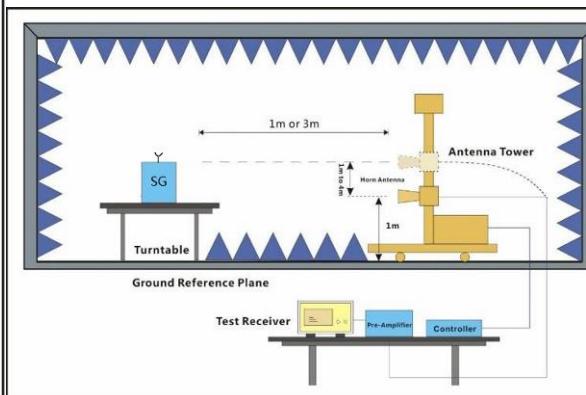
EUT



Substitute Antenna+Signal Generator



EUT



Substitute Antenna+Signal Generator



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6.2.3 Measurement Procedure and Data**Test Procedure:**

- (1) On a test site, the EUT shall be placed on a turntable and in the position closest to the normal use as declared by the user.
- (2) The test antenna shall be oriented initially for vertical polarization located 3m from the EUT to correspond to the transmitter.
- (3) The output of the antenna shall be connected to the measuring receiver and either a peak or quasi-peak detector was used for the measurement as indicated on the report. The detector selection is based on how close the emission level was approaching the limit.
- (4) The transmitter shall be switched on; if possible, without the modulation and the measurement receiver shall be tuned to the frequency of the transmitter under test.
- (5) The test antenna shall be raised and lowered through the specified range of height until the measuring receiver detects a maximum signal level.
- (6) The transmitter shall then be rotated through 360° in the horizontal plane, until the maximum signal level is detected by the measuring receiver.
- (7) The test antenna shall be raised and lowered again through the specified range of height until the measuring receiver detects a maximum signal level.
- (8) The maximum signal level detected by the measuring receiver shall be noted.
- (9) The measurement shall be repeated with the test antenna set to horizontal polarization.
- (10) Replace the antenna with a proper Antenna (substitution antenna).
- (11) The substitution antenna shall be oriented for vertical polarization and, if necessary, the length of the substitution antenna shall be adjusted to correspond to the frequency of transmitting.
- (12) The substitution antenna shall be connected to a calibrated signal generator.
- (13) If necessary, the input attenuator setting of the measuring receiver shall be adjusted in order to increase the sensitivity of the measuring receiver.
- (14) The test antenna shall be raised and lowered through the specified range of the height to ensure that the maximum signal is received.
- (15) The input signal to substitution antenna shall be adjusted to the level that produces a level detected by the measuring receiver, that is equal to the level noted while the transmitter radiated power was measured, corrected for the change of input attenuation setting of the measuring receiver.
- (16) The input level to the substitution antenna shall be recorded as power level in dBm, corrected for any change of input attenuator setting of the measuring receiver.
- (17) The measurement shall be repeated with the test antenna and the substitution antenna oriented for horizontal polarization.



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WCDMA Band 2-Low channel, Modulation: QPSK, Bandwidth:10MHz, 1RB#0								
Frequency (MHz)	EIRP (dBm)	Limit (dBm)	Over Limit (dB)	S.G. Power (dBm)	Cable Loss (dB)	Antenna Gain (dBi)	Polarization (H/V)	Result
1374.639	-54.06	-13	-41.06	-57.24	1.91	5.09	Horizontal	Pass
5009.426	-50.66	-13	-37.66	-56.55	4.26	10.15	Horizontal	Pass
9370.083	-49.87	-13	-36.87	-58.34	4.76	13.23	Horizontal	Pass
5073.591	-51.19	-13	-38.19	-57.12	4.26	10.19	Vertical	Pass
9465.979	-50.59	-13	-37.59	-59.03	4.8	13.24	Vertical	Pass
10750.81	-53.13	-13	-40.13	-61.26	5.07	13.2	Vertical	Pass

WCDMA Band 2-Middle channel, Modulation: QPSK, Bandwidth:10MHz, 1RB#0								
Frequency (MHz)	EIRP (dBm)	Limit (dBm)	Over Limit (dB)	S.G. Power (dBm)	Cable Loss (dB)	Antenna Gain (dBi)	Polarization (H/V)	Result
1374.639	-54.3	-13	-41.3	-57.48	1.91	5.09	Horizontal	Pass
5164.807	-50.48	-13	-37.48	-56.47	4.25	10.24	Horizontal	Pass
9490.104	-50.75	-13	-37.75	-59.17	4.82	13.24	Horizontal	Pass
5009.426	-51.29	-13	-38.29	-57.18	4.26	10.15	Vertical	Pass
9490.104	-50.48	-13	-37.48	-58.9	4.82	13.24	Vertical	Pass
10750.81	-53.54	-13	-40.54	-61.67	5.07	13.2	Vertical	Pass

WCDMA Band 2-High channel, Modulation: QPSK, Bandwidth:10MHz, 1RB#0								
Frequency (MHz)	EIRP (dBm)	Limit (dBm)	Over Limit (dB)	S.G. Power (dBm)	Cable Loss (dB)	Antenna Gain (dBi)	Polarization (H/V)	Result
1374.639	-54.14	-13	-41.14	-57.32	1.91	5.09	Horizontal	Pass
4996.69	-50.78	-13	-37.78	-56.66	4.26	10.14	Horizontal	Pass
9636.161	-50.22	-13	-37.22	-58.51	4.89	13.18	Horizontal	Pass
5099.487	-50.69	-13	-37.69	-56.63	4.26	10.2	Vertical	Pass
9417.908	-50.85	-13	-37.85	-59.31	4.78	13.24	Vertical	Pass
11782.55	-52.57	-13	-39.57	-60.77	5.05	13.25	Vertical	Pass

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WCDMA Band 4-Low channel, Modulation: QPSK, Bandwidth:10MHz, 1RB#0								
Frequency (MHz)	EIRP (dBm)	Limit (dBm)	Over Limit (dB)	S.G. Power (dBm)	Cable Loss (dB)	Antenna Gain (dBi)	Polarization (H/V)	Result
1374.639	-53.98	-13	-40.98	-57.16	1.91	5.09	Horizontal	Pass
5047.827	-50.86	-13	-37.86	-56.77	4.26	10.17	Horizontal	Pass
9346.262	-49.74	-13	-36.74	-58.23	4.74	13.23	Horizontal	Pass
5022.194	-51.02	-13	-38.02	-56.91	4.26	10.15	Vertical	Pass
9490.104	-49.74	-13	-36.74	-58.16	4.82	13.24	Vertical	Pass
10750.81	-52.6	-13	-39.6	-60.73	5.07	13.2	Vertical	Pass

WCDMA Band 4-Middle channel, Modulation: QPSK, Bandwidth:10MHz, 1RB#0								
Frequency (MHz)	EIRP (dBm)	Limit (dBm)	Over Limit (dB)	S.G. Power (dBm)	Cable Loss (dB)	Antenna Gain (dBi)	Polarization (H/V)	Result
1374.639	-53.89	-13	-40.89	-57.07	1.91	5.09	Horizontal	Pass
5022.194	-51.33	-13	-38.33	-57.22	4.26	10.15	Horizontal	Pass
9346.262	-50.47	-13	-37.47	-58.96	4.74	13.23	Horizontal	Pass
5230.963	-51.52	-13	-38.52	-57.55	4.25	10.28	Vertical	Pass
9538.543	-50.81	-13	-37.81	-59.19	4.84	13.22	Vertical	Pass
10062.31	-53.45	-13	-40.45	-61.41	5.08	13.04	Vertical	Pass

WCDMA Band 4-High channel, Modulation: QPSK, Bandwidth:10MHz, 1RB#0								
Frequency (MHz)	EIRP (dBm)	Limit (dBm)	Over Limit (dB)	S.G. Power (dBm)	Cable Loss (dB)	Antenna Gain (dBi)	Polarization (H/V)	Result
1374.639	-53.61	-13	-40.61	-56.79	1.91	5.09	Horizontal	Pass
5217.664	-50.84	-13	-37.84	-56.86	4.25	10.27	Horizontal	Pass
9562.854	-50.52	-13	-37.52	-58.88	4.85	13.21	Horizontal	Pass
5009.426	-50.43	-13	-37.43	-56.32	4.26	10.15	Vertical	Pass
9490.104	-50.41	-13	-37.41	-58.83	4.82	13.24	Vertical	Pass
10888.51	-52.16	-13	-39.16	-60.33	5.07	13.24	Vertical	Pass

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WCDMA Band 5-Low channel, Modulation: QPSK, Bandwidth:10MHz, 1RB#0								
Frequency (MHz)	EIRP (dBm)	Limit (dBm)	Over Limit (dB)	S.G. Power (dBm)	Cable Loss (dB)	Antenna Gain (dBi)	Polarization (H/V)	Result
1374.639	-54.01	-13	-41.01	-57.19	1.91	5.09	Horizontal	Pass
4983.987	-50.67	-13	-37.67	-56.54	4.25	10.12	Horizontal	Pass
9393.966	-50.75	-13	-37.75	-59.21	4.77	13.23	Horizontal	Pass
4933.497	-51.34	-13	-38.34	-57.16	4.22	10.04	Vertical	Pass
9490.104	-50.74	-13	-37.74	-59.16	4.82	13.24	Vertical	Pass
12620.84	-52.56	-13	-39.56	-60.45	5.41	13.3	Vertical	Pass

WCDMA Band 5-Middle channel, Modulation: QPSK, Bandwidth:10MHz, 1RB#0								
Frequency (MHz)	EIRP (dBm)	Limit (dBm)	Over Limit (dB)	S.G. Power (dBm)	Cable Loss (dB)	Antenna Gain (dBi)	Polarization (H/V)	Result
1374.639	-53.75	-13	-40.75	-56.93	1.91	5.09	Horizontal	Pass
5086.523	-50.38	-13	-37.38	-56.31	4.26	10.19	Horizontal	Pass
9490.104	-50.29	-13	-37.29	-58.71	4.82	13.24	Horizontal	Pass
4908.444	-50.87	-13	-37.87	-56.67	4.2	10.0	Vertical	Pass
9514.293	-50.57	-13	-37.57	-58.97	4.83	13.23	Vertical	Pass
10087.96	-52.75	-13	-39.75	-60.72	5.08	13.05	Vertical	Pass

WCDMA Band 5-High channel, Modulation: QPSK, Bandwidth:10MHz, 1RB#0								
Frequency (MHz)	EIRP (dBm)	Limit (dBm)	Over Limit (dB)	S.G. Power (dBm)	Cable Loss (dB)	Antenna Gain (dBi)	Polarization (H/V)	Result
1374.639	-54.17	-13	-41.17	-57.35	1.91	5.09	Horizontal	Pass
4983.987	-50.94	-13	-37.94	-56.81	4.25	10.12	Horizontal	Pass
9514.293	-50.1	-13	-37.1	-58.5	4.83	13.23	Horizontal	Pass
5022.194	-50.55	-13	-37.55	-56.44	4.26	10.15	Vertical	Pass
9490.104	-50.39	-13	-37.39	-58.81	4.82	13.24	Vertical	Pass
10860.83	-52.62	-13	-39.62	-60.78	5.07	13.23	Vertical	Pass

Note:

All modes have been tested and we found RMC Test mode has the worst test result. Only record the worst test result.

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7 Test Setup Photo

Refer to Appendix - Test Setup Photo for SZCR2406002449AT

8 EUT Constructional Details (EUT Photos)

Refer to Appendix – External and Internal Photos for SZCR2406002449AT

- End of the Report -



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