



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

SZEMC-TRF-01 Rev. A/0 Aug01,2022

Report No.:

Page: 1 of 24

TEST REPORT

Application No.: SZCR2212004132AT
Applicant: Shenzhen RAKwireless Technology Co.,Ltd.
Address of Applicant: Room 506, Building B, New Compark, Pingshan First Road, Taoyuan Street, Nanshan District, Shenzhen, China
Manufacturer: Shenzhen RAKwireless Technology Co.,Ltd.
Address of Manufacturer: Room 506, Building B, New Compark, Pingshan First Road, Taoyuan Street, Nanshan District, Shenzhen, China
Equipment Under Test (EUT):
EUT Name: All-in-One. 5G
Model No.: M310
Trade Mark: RAK, MNTD
FCC ID: 2AF6B-M310
Standard(s) : 47 CFR Part 2
47 CFR Part 96 subpart E
Date of Receipt: 2022-12-08
Date of Test: 2023-03-14 to 2023-04-06
Date of Issue: 2023-04-19

Test Result:

Pass

* In the configuration tested, the EUT complied with the standards specified above.

Keny Xu

Keny Xu
EMC Laboratory Manager



Unless otherwise agreed in writing, this document is issued by the Company subject to its General Conditions of Service printed overleaf, available on request or accessible at <http://www.sgs.com/en/Terms-and-Conditions.aspx> and, for electronic format documents, subject to Terms and Conditions for Electronic Documents at <http://www.sgs.com/en/Terms-and-Conditions/Terms-e-Documents.aspx>. Attention is drawn to the limitation of liability, indemnification and jurisdiction issues defined therein. Any holder of this document is advised that information contained hereon reflects the Company's findings at the time of its intervention only and within the limits of Client's instructions, if any. The Company's sole responsibility is to its Client and this document does not exonerate parties to a transaction from exercising all their rights and obligations under the transaction documents. This document cannot be reproduced except in full, without prior written approval of the Company. Any unauthorized alteration, forgery or falsification of the content or appearance of this document is unlawful and offenders may be prosecuted to the fullest extent of the law. Unless otherwise stated the results shown in this test report refer only to the sample(s) tested and such sample(s) are retained for 30 days only.
Attention: To check the authenticity of testing/inspection report & certificate, please contact us at telephone: (86-755) 8307 1443, or email: CN.Doccheck@sgs.com

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

No.1 Workshop, M-10, Middle Section, Science & Technology Park, Shenzhen, China 518057 t (86-755) 26012053 f (86-755) 26710594 www.sgs.com.cn
中国·深圳·科技园中区M-10栋一号厂房 邮编: 518057 t (86-755) 26012053 f (86-755) 26710594 sgs.china@sgs.com

Member of the SGS Group (SGS SA)



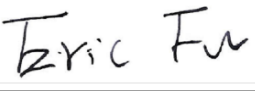
SGS-CSTC Standards Technical Services Co., Ltd. Shenzhen Branch

SZEMC-TRF-01 Rev. A/0 Aug01,2022

Report No.:

Page: 2 of 24

Revision Record				
Version	Chapter	Date	Modifier	Remark
01		2023-04-19		Original

Authorized for issue by:				
				
		Benson Wang/Project Engineer		
				
		Eric Fu/Reviewer		



Unless otherwise agreed in writing, this document is issued by the Company subject to its General Conditions of Service printed overleaf, available on request or accessible at <http://www.sgs.com/en/Terms-and-Conditions.aspx> and, for electronic format documents, subject to Terms and Conditions for Electronic Documents at <http://www.sgs.com/en/Terms-and-Conditions/Terms-e-Documents.aspx>. Attention is drawn to the limitation of liability, indemnification and jurisdiction issues defined therein. Any holder of this document is advised that information contained hereon reflects the Company's findings at the time of its intervention only and within the limits of Client's instructions, if any. The Company's sole responsibility is to its Client and this document does not exonerate parties to a transaction from exercising all their rights and obligations under the transaction documents. This document cannot be reproduced except in full, without prior written approval of the Company. Any unauthorized alteration, forgery or falsification of the content or appearance of this document is unlawful and offenders may be prosecuted to the fullest extent of the law. Unless otherwise stated the results shown in this test report refer only to the sample(s) tested and such sample(s) are retained for 30 days only.

Attention: To check the authenticity of testing /inspection report & certificate, please contact us at telephone: (86-755) 8307 1443, or email: CN.Doccheck@sgs.com

No.1 Workshop, M-10, Middle Section, Science & Technology Park, Shenzhen, China 518057 t (86-755) 26012053 f (86-755) 26710594 www.sgs.com.cn
中国·深圳·科技园中区M-10栋一号厂房 邮编: 518057 t (86-755) 26012053 f (86-755) 26710594 sgs.china@sgs.com

Member of the SGS Group (SGS SA)

2 Test Summary

Test Item	FCC Rule No.	Requirements	Verdict
Effective (Isotropic) Radiated Output Power Data & Maximum Power Spectral Density	§2.1046 §96.41(b)	EIRP≤ 30dBm/10MHz(LTE Band 48) PSD≤ 20dBm/MHz(LTE Band 48)	PASS
Peak-Average Ratio	§96.41(g)	≤13dB	PASS
Modulation Characteristics	§2.1047	Digital modulation	PASS
Bandwidth	§2.1049(h)	OBW: No limit EBW: No limit	PASS
Band Edge Compliance	§2.1051 §96.41(e)	Refer to clause 6.4 for LTE Band48	PASS
Spurious emissions at antenna terminals	§2.1051 §96.41(e)	Refer to clause 6.5 for LTE Band48	PASS
Field strength of spurious radiation	§2.1051 §96.41(e)	Refer to clause 6.6 for LTE Band48	PASS
Frequency stability	§2.1055	≤ ±2.5ppm.	PASS

3 Contents

	Page
1 COVER PAGE	1
2 Test Summary	3
3 Contents	4
4 General Information	6
4.1 Details of E.U.T.	6
4.2 Test Frequency	7
4.3 Test Environment	7
4.4 Description of Support Units	7
4.5 Measurement Uncertainty	8
4.6 Test Location	9
4.7 Test Facility	9
4.8 Deviation from Standards	9
4.9 Abnormalities from Standard Conditions	9
5 Equipment List	10
6 Radio Spectrum Matter Test Results	12
6.1 Effective (Isotropic) Radiated Output Power & Maximum Power Spectral Density	12
6.1.1 E.U.T. Operation	12
6.1.2 Test Setup Diagram	12
6.1.3 Measurement Data	12
6.2 Peak-Average Ratio	13
6.2.1 E.U.T. Operation	13
6.2.2 Test Setup Diagram	13
6.2.3 Measurement Data	13
6.3 Bandwidth	14
6.3.1 E.U.T. Operation	14
6.3.2 Test Setup Diagram	14
6.3.3 Measurement Data	14
6.4 Band Edge Compliance	15
6.4.1 E.U.T. Operation	15
6.4.2 Test Setup Diagram	15
6.4.3 Measurement Data	15
6.5 Spurious emissions at antenna terminals	16
6.5.1 E.U.T. Operation	16
6.5.2 Test Setup Diagram	16
6.5.3 Measurement Data	16
6.6 Field strength of spurious radiation	17
6.6.1 E.U.T. Operation	17
6.6.2 Test Setup Diagram	18
6.6.3 Measurement Procedure and Data	19
6.7 Frequency stability	22
6.7.1 E.U.T. Operation	22
6.7.2 Test Setup Diagram	22



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

SZEMC-TRF-01 Rev. A/0 Aug01,2022

Report No.:

Page: 5 of 24

6.7.3	Measurement Data	22
6.8	Modulation Characteristics	23
6.8.1	E.U.T. Operation	23
6.8.2	Test Setup Diagram	23
6.8.3	Measurement Data	23
7	Test Setup Photo	24
8	EUT Constructional Details (EUT Photos)	24



Unless otherwise agreed in writing, this document is issued by the Company subject to its General Conditions of Service printed overleaf, available on request or accessible at <http://www.sgs.com/en/Terms-and-Conditions.aspx> and, for electronic format documents, subject to Terms and Conditions for Electronic Documents at <http://www.sgs.com/en/Terms-and-Conditions/Terms-e-Documents.aspx>. Attention is drawn to the limitation of liability, indemnification and jurisdiction issues defined therein. Any holder of this document is advised that information contained hereon reflects the Company's findings at the time of its intervention only and within the limits of Client's instructions, if any. The Company's sole responsibility is to its Client and this document does not exonerate parties to a transaction from exercising all their rights and obligations under the transaction documents. This document cannot be reproduced except in full, without prior written approval of the Company. Any unauthorized alteration, forgery or falsification of the content or appearance of this document is unlawful and offenders may be prosecuted to the fullest extent of the law. Unless otherwise stated the results shown in this test report refer only to the sample(s) tested and such sample(s) are retained for 30 days only.

Attention: To check the authenticity of testing /inspection report & certificate, please contact us at telephone: (86-755) 8307 1443, or email: CN.Doccheck@sgs.com

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

No.1 Workshop, M-10, Middle Section, Science & Technology Park, Shenzhen, China 518057 t (86-755) 26012053 f (86-755) 26710594 www.ssgroup.com.cn
中国·深圳·科技园中区M-10栋一号厂房 邮编: 518057 t (86-755) 26012053 f (86-755) 26710594 sgs.china@sgs.com

Member of the SGS Group (SGS SA)

4 General Information

4.1 Details of E.U.T.

Power supply:	Powered by POE adapter: Adapter model: RP026-5601080YE Input: AC 100-240V 50/60Hz Output: DC 56.0V 1.08A
Cable:	Lan cable x 2: 302cm unshielded
EUT Type:	CBSD
Category of EUT:	Category A
LTE Operation Frequency Band:	Band 48 (3550-3700MHz)
Test Mode:	E-TM1.1; E-TM3.2; E-TM3.1;
Modulation Type:	QPSK, 16QAM, 64QAM
Bandwidth:	10MHz; 20MHz
Transmission (TX) and Receiving (RX) Antenna Ports:	TX port: 2
MIMO supported	2*2 UL
Antenna Type:	Integral Antenna
Antenna Gain:	5.5dBi

Note:

(1)The antenna gain value is provided by the customer. The test lab will not be responsible for wrong test result due to incorrect information about antenna gain values.



4.2 Test Frequency

Test mode:	Nominal Bandwidth (MHz)	RF Channel		
		Low (L)	Middle (M)	High (H)
		MHz	MHz	MHz
LTE FDD Band 48	10	3555.0	3625.0	3695.0
	20	3560.0	3625.0	3690.0

4.3 Test Environment

Environment Parameter	Selected Values During Tests	
Relative Humidity	52%	
Atmospheric Pressure:	1020Pa	
Temperature:	TL	-30°C
	TN	+20°C
	TH	+50°C
Voltage:	VL	DC 50.4 V
	VN	DC 56.0 V
	VH	DC 61.6 V

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

4.4 Description of Support Units

The EUT has been tested independent unit.



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

SZEMC-TRF-01 Rev. A/0 Aug01,2022

Report No.:

Page: 8 of 24

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	$\pm 3\%$



SGS-CSTC Standards Technical Services Co., Ltd.
Shenzhen Branch (SZEMC) EMC Laboratory

Unless otherwise agreed in writing, this document is issued by the Company subject to its General Conditions of Service printed overleaf, available on request or accessible at <http://www.sgs.com/en/Terms-and-Conditions.aspx> and, for electronic format documents, subject to Terms and Conditions for Electronic Documents at <http://www.sgs.com/en/Terms-and-Conditions/Terms-e-Document.aspx>. Attention is drawn to the limitation of liability, indemnification and jurisdiction issues defined therein. Any holder of this document is advised that information contained hereon reflects the Company's findings at the time of its intervention only and within the limits of Client's instructions, if any. The Company's sole responsibility is to its Client and this document does not exonerate parties to a transaction from exercising all their rights and obligations under the transaction documents. This document cannot be reproduced except in full, without prior written approval of the Company. Any unauthorized alteration, forgery or falsification of the content or appearance of this document is unlawful and offenders may be prosecuted to the fullest extent of the law. Unless otherwise stated the results shown in this test report refer only to the sample(s) tested and such sample(s) are retained for 30 days only.

Attention: To check the authenticity of testing /inspection report & certificate, please contact us at telephone: (86-755) 8307 1443, or email: CN.Doccheck@sgs.com
No.1 Workshop, M-10, Middle Section, Science & Technology Park, Shenzhen, China 518057 t (86-755) 26012053 f (86-755) 26710594 www.ssgroup.com.cn
中国·深圳·科技园中区M-10栋一号厂房 邮编: 518057 t (86-755) 26012053 f (86-755) 26710594 sgs.china@sgs.com

Member of the SGS Group (SGS SA)

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

SZEMC-TRF-01 Rev. A/0 Aug01,2022

Report No.:

Page: 9 of 24

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, 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



Unless otherwise agreed in writing, this document is issued by the Company subject to its General Conditions of Service printed overleaf, available on request or accessible at <http://www.sgs.com/en/Terms-and-Conditions.aspx> and, for electronic format documents, subject to Terms and Conditions for Electronic Documents at <http://www.sgs.com/en/Terms-and-Conditions/Terms-e-Documents.aspx>. Attention is drawn to the limitation of liability, indemnification and jurisdiction issues defined therein. Any holder of this document is advised that information contained hereon reflects the Company's findings at the time of its intervention only and within the limits of Client's instructions, if any. The Company's sole responsibility is to its Client and this document does not exonerate parties to a transaction from exercising all their rights and obligations under the transaction documents. This document cannot be reproduced except in full, without prior written approval of the Company. Any unauthorized alteration, forgery or falsification of the content or appearance of this document is unlawful and offenders may be prosecuted to the fullest extent of the law. Unless otherwise stated the results shown in this test report refer only to the sample(s) tested and such sample(s) are retained for 30 days only.

Attention: To check the authenticity of testing /inspection report & certificate, please contact us at telephone: (86-755) 8307 1443, or email: CN.Doccheck@sgs.com

SGS-CSTC Standards Technical Services Co., Ltd. Shenzhen Branch EMC Laboratory. No.1 Workshop, M-10, Middle Section, Science & Technology Park, Shenzhen, China 518057 t (86-755) 26012053 f (86-755) 26710594 www.sgs.com.cn
中国·深圳·科技园中区M-10栋一号厂房 邮编: 518057 t (86-755) 26012053 f (86-755) 26710594 sgs.china@sgs.com



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

SZEMC-TRF-01 Rev. A/0 Aug01,2022

Report No.:

Page: 10 of 24

5 Equipment List

RF test system

Test Equipment	Manufacturer	Model No.	Inventory No.	Cal. Date (yyyy-mm-dd)	Cal. Due date (yyyy-mm-dd)
Shielding Room	SAEMC	MSR733	SEM001-09	2022-05-14	2025-05-13
MXA Signal Analyzer	KEYSIGHT	N9020B	SEM004-17	2022-03-21 2023-03-20	2023-03-20 2024-03-14
Mobile Communications DC Source	Agilent	66319D	SEM011-12	2022-05-07	2023-05-06
Manual Step Attenuator	KEYSIGHT	8494B	SEM021-05	2022-04-07	2023-04-06
Manual Step Attenuator	KEYSIGHT	8496B	SEM021-06	2022-04-07	2023-04-06
Power Sensor	KEYSIGHT	U2021XA	SEM009-15	2022-04-07	2023-04-06
Programmable Temperature & Humidity Chamber	Votsch Industrietechnik GmbH	VT 4002	SEM002-15	2022-04-07	2023-04-06
Coaxial Cable	SGS	N/A	SEM031-01	2022-07-08	2023-07-07

RE in Chamber

Test Equipment	Manufacturer	Model No.	Inventory No.	Cal. Date (yyyy-mm-dd)	Cal. Due date (yyyy-mm-dd)
3m Semi-Anechoic Chamber	AUDIX	N/A	SEM001-02	2022-04-02	2025-04-01
EXA Signal Analyzer (10Hz-44GHz)	Agilent Technologies Inc	N9010A	SEM004-12	2022-04-07	2023-04-06
BiConiLog Antenna (26-3000MHz)	ETS-Lindgren	3142C	SEM003-01	2021-09-17	2023-09-16
Horn Antenna (800MHz-18GHz)	Rohde & Schwarz	HF907	SEM003-07	2022-07-24	2024-07-23
Horn Antenna (15-40GHz)	Schwarzbeck	BBHA 9170	SEM003-15	2022-08-10	2024-08-09
Broad-Band Horn Antenna	Schwarzbeck	BBHA 9120D	SEM003-32	2021-09-26	2024-09-25
Amplifier (0.1-1300MHz)	HP	8447D	SEM005-02	2022-09-15	2023-09-14
Microwave System Amplifier(0.5-26.5GHz)	Agilent	83017A	SEM005-25	2022-09-21	2023-09-20
Pre-amplifier (26- 40GHz)	Compliance Directions Systems Inc.	PAP-2640-50	SEM005-08	2022-03-22	2023-03-21
Substitution Antenna	Schwarzbeck	VULB9168	SEM003-18	2022-08-07	2025-08-06
Signal Generator(9kHz- 40GHz)	N5173B	MY53270267	Agilent	2022-07-12	2023-07-11



Unless otherwise agreed in writing, this document is issued by the Company subject to its General Conditions of Service printed overleaf, available on request or accessible at <http://www.sgs.com/en/Terms-and-Conditions.aspx> and, for electronic format documents, subject to Terms and Conditions for Electronic Documents at <http://www.sgs.com/en/Terms-and-Conditions/Terms-e-Documents.aspx>. Attention is drawn to the limitation of liability, indemnification and jurisdiction issues defined therein. Any holder of this document is advised that information contained hereon reflects the Company's findings at the time of its intervention only and within the limits of Client's instructions, if any. The Company's sole responsibility is to its Client and this document does not exonerate parties to a transaction from exercising all their rights and obligations under the transaction documents. This document cannot be reproduced except in full, without prior written approval of the Company. Any unauthorized alteration, forgery or falsification of the content or appearance of this document is unlawful and offenders may be prosecuted to the fullest extent of the law. Unless otherwise stated the results shown in this test report refer only to the sample(s) tested and such sample(s) are retained for 30 days only.

Attention: To check the authenticity of testing / inspection report and certificate, please contact us at telephone: (86-755) 8307 1443, or email: CN.Doccheck@sgs.com

SGS-CSTC Standards Technical Services Co., Ltd.
Shenzhen Branch, China Science & Technology Park, Shenzhen, China 518057 t (86-755) 26012053 f (86-755) 26710594 www.sgs.com.cn
中国·深圳·科技园中区M-10栋一号楼 邮编: 518057 t (86-755) 26012053 f (86-755) 26710594 sgs.china@sgs.com

Member of the SGS Group (SGS SA)



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

SZEMC-TRF-01 Rev. A/0 Aug01,2022

Report No.:

Page: 11 of 24

Measurement Software	AUDIX	e3 V8.2014-6-27	N/A	N/A	N/A
Coaxial Cable	SGS	N/A	SEM026-06	2022-07-08	2023-07-07

RE in Chamber					
Equipment	Manufacturer	Model No.	Inventory No.	Cal Date	Cal Due Date
Loop Antenna	ETS-Lindgren	6502	SEM003-08	2021-11-30	2023-11-29
3m Semi-Anechoic Chamber	ETS-LINDGREN	N/A	SEM001-01	2020-07-19	2023-07-18
MXE EMI Receiver	Agilent Technologies	N9038A	SEM004-15	2022-10-20	2023-10-19
BiConiLog Antenna	ETS-LINDGREN	3142C	SEM003-01	2021-09-17	2023-09-16
Substitution Antenna	ETS-Lindgren	3142C	SEM003-01	2020/06/26	2023/06/25
Pre-Amplifier	Agilent Technologies	8447D	SEM005-01	2022-03-21 2023-03-20	2023-03-20 2024-03-19
Signal Generator(9kHz-40GHz)	N5173B	MY53270267	Agilent	2022-07-12	2023-07-11
Measurement Software	AUDIX	e3 V8.2014-6-27	N/A	N/A	N/A
Coaxial Cable	SGS	N/A	SEM025-01	2022-07-08	2023-07-07

General used equipment					
Equipment	Manufacturer	Model No.	Inventory No.	Cal Date	Cal Due Date
Humidity/ Temperature Indicator	Mingle	N/A	SEM002-08	2022-09-04	2023-09-03
Humidity/ Temperature Indicator	Anymetre	TH101B	SEM002-09	2022-09-04	2023-09-03
Barometer	Changchun Meteorological Industry Factory	DYM3	SEM002-01	2022-03-21 2023-03-20	2023-03-20 2024-03-19



Unless otherwise agreed in writing, this document is issued by the Company subject to its General Conditions of Service printed overleaf, available on request or accessible at <http://www.sgs.com/en/Terms-and-Conditions.aspx> and, for electronic format documents, subject to Terms and Conditions for Electronic Documents at <http://www.sgs.com/en/Terms-and-Conditions/Terms-e-Documents.aspx>. Attention is drawn to the limitation of liability, indemnification and jurisdiction issues defined therein. Any holder of this document is advised that information contained hereon reflects the Company's findings at the time of its intervention only and within the limits of Client's instructions, if any. The Company's sole responsibility is to its Client and this document does not exonerate parties to a transaction from exercising all their rights and obligations under the transaction documents. This document cannot be reproduced except in full, without prior written approval of the Company. Any unauthorized alteration, forgery or falsification of the content or appearance of this document is unlawful and offenders may be prosecuted to the fullest extent of the law. Unless otherwise stated the results shown in this test report refer only to the sample(s) tested and such sample(s) are retained for 30 days only.

Attention: To check the authenticity of testing /inspection report & certificate, please contact us at telephone: (86-755) 8307 1443, or email: CN.Doccheck@sgs.com

SGS-CSTC Standards Technical Services Co., Ltd. Shenzhen Branch (China) Laboratory. No.1 Workshop, M-10, Middle Section, Science & Technology Park, Shenzhen, China 518057 t (86-755) 26012053 f (86-755) 26710594 www.sgs.com.cn
中国·深圳·科技园中区M-10栋一号厂房 邮编: 518057 t (86-755) 26012053 f (86-755) 26710594 sgs.china@sgs.com

Member of the SGS Group (SGS SA)

6 Radio Spectrum Matter Test Results

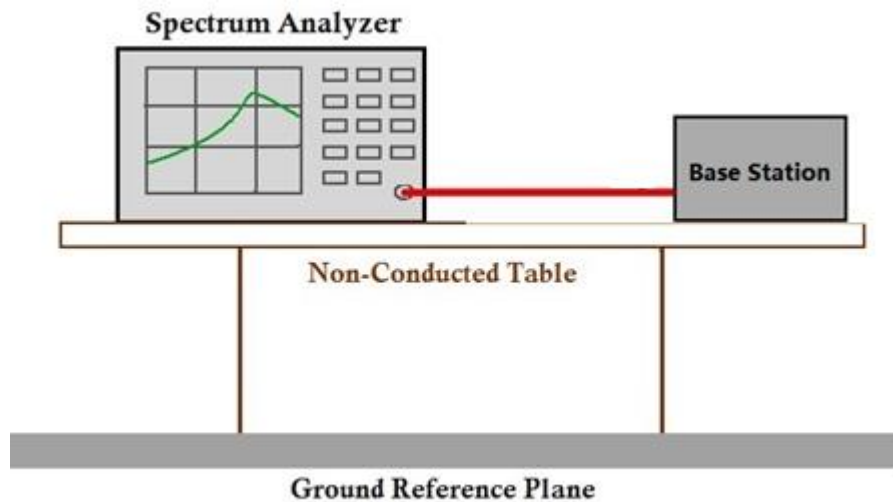
6.1 Effective (Isotropic) Radiated Output Power & Maximum Power Spectral Density

Test Requirement: §2.1046, §96.41(b)
 Test Method: ANSI C63.26-2015, KDB 971168 D01 v03r01
 Limit: EIRP≤30dBm/10MHz(LTE Band 48)
 PSD≤20dBm/MHz(LTE Band 48)

6.1.1 E.U.T. Operation

Operating Environment:
 Temperature: 21.5 °C Humidity: 53.5 % RH Atmospheric Pressure: 1020 mbar
 Test mode 01: Tx mode, Keep the EUT in transmitting mode.

6.1.2 Test Setup Diagram



6.1.3 Measurement Data

Please refer to Appendix for Effective (Isotropic) Radiated Output Power Data & Maximum Power Spectral Density.

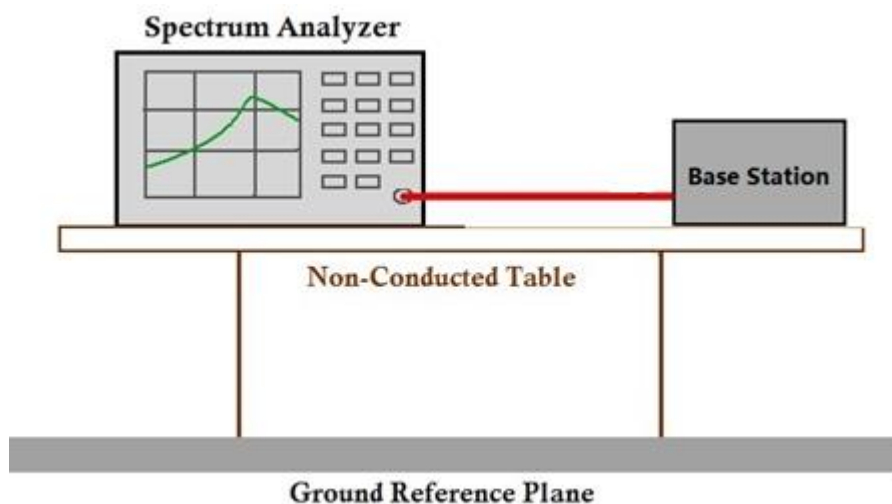
6.2 Peak-Average Ratio

Test Requirement: §96.41(g)
 Test Method: ANSI C63.26-2015, KDB 971168 D01 v03r01
 Limit: ≤13dB

6.2.1 E.U.T. Operation

Operating Environment:
 Temperature: 21.5 °C Humidity: 53.5 % RH Atmospheric Pressure: 1020 mbar
 Test mode 01: Tx mode, Keep the EUT in transmitting mode.

6.2.2 Test Setup Diagram



6.2.3 Measurement Data

Please refer to Appendix for Peak-Average Ratio.

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

SZEMC-TRF-01 Rev. A/0 Aug01,2022

Report No.:

Page: 14 of 24

6.3 Bandwidth

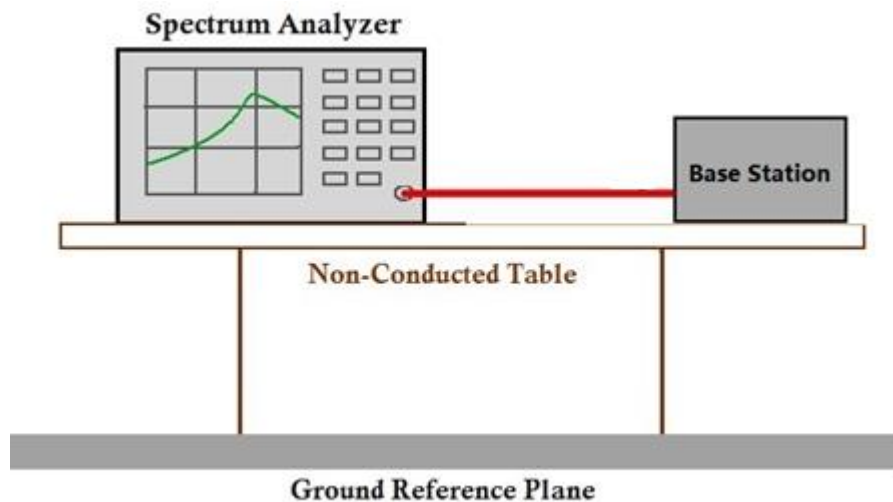
Test Requirement: S2.1049(h)
 Test Method: ANSI C63.26-2015, KDB 971168 D01 v03r01
 Limit: OBW: No limit
 EBW: No limit

6.3.1 E.U.T. Operation

Operating Environment:

Temperature: 21.5 °C Humidity: 53.5 % RH Atmospheric Pressure: 1020 mbar
 Test mode 01: Tx mode, Keep the EUT in transmitting mode.

6.3.2 Test Setup Diagram



6.3.3 Measurement Data

Please refer to Appendix for Bandwidth.

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

SZEMC-TRF-01 Rev. A/0 Aug01,2022

Report No.:

Page: 15 of 24

6.4 Band Edge Compliance

Test Requirement: §2.1051, §96.41(e),

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

Limit: For **Band48**:

- 1) The conducted power of any CBSD emission outside the fundamental emission bandwidth (whether the emission is inside or outside of the authorized band) shall not exceed -13 dBm/MHz within 0-10 megahertz above the upper SAS-assigned channel edge and within 0-10 megahertz below the lower SAS-assigned channel edge. At all frequencies greater than 10 megahertz above the upper SAS assigned channel edge and less than 10 MHz below the lower SAS assigned channel edge, the conducted power of any CBSD emission shall not exceed -25 dBm/MHz.
- 2) The conducted power of emissions below 3540 MHz or above 3710 MHz shall not exceed -25 dBm/MHz, and the conducted power of emissions below 3530 MHz or above 3720 MHz shall not exceed -40 dBm/MHz.

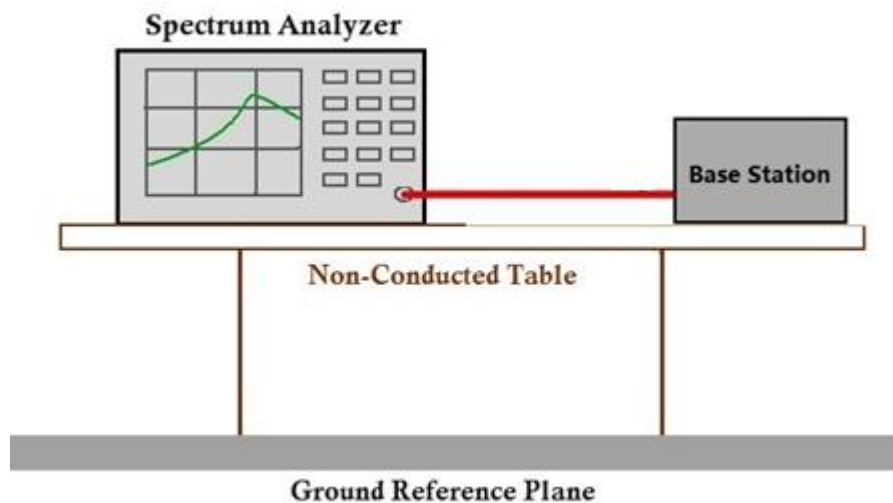
6.4.1 E.U.T. Operation

Operating Environment:

Temperature: 21.5°C Humidity: 53.5 % RH Atmospheric Pressure: 1020 mbar

Test mode 01: Tx mode, Keep the EUT in transmitting mode.

6.4.2 Test Setup Diagram



6.4.3 Measurement Data

Please refer to Appendix for Spurious emissions at antenna terminals & Band Edge.

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

SZEMC-TRF-01 Rev. A/0 Aug01,2022

Report No.:

Page: 16 of 24

6.5 Spurious emissions at antenna terminals

Test Requirement: §2.1051 ,§96.41(e)

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

Limit: For **Band48**:

- 1) The conducted power of any CBSD emission outside the fundamental emission bandwidth (whether the emission is inside or outside of the authorized band) shall not exceed -13 dBm/MHz within 0-10 megahertz above the upper SAS-assigned channel edge and within 0-10 megahertz below the lower SAS-assigned channel edge. At all frequencies greater than 10 megahertz above the upper SAS assigned channel edge and less than 10 MHz below the lower SAS assigned channel edge, the conducted power of any CBSD emission shall not exceed -25 dBm/MHz.
- 2) The conducted power of emissions below 3540 MHz or above 3710 MHz shall not exceed -25 dBm/MHz, and the conducted power of emissions below 3530 MHz or above 3720 MHz shall not exceed -40 dBm/MHz.

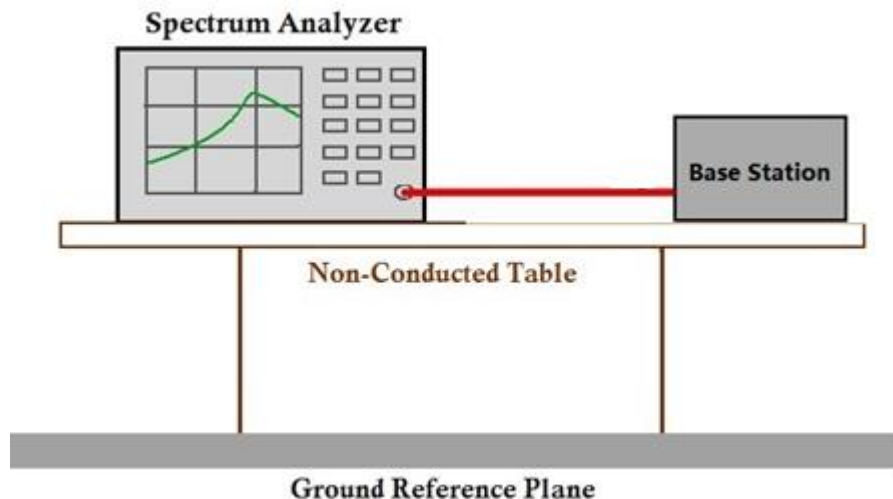
6.5.1 E.U.T. Operation

Operating Environment:

Temperature: 21.5°C Humidity: 53.5 % RH Atmospheric Pressure: 1020 mbar

Test mode 01: Tx mode, Keep the EUT in transmitting mode.

6.5.2 Test Setup Diagram



6.5.3 Measurement Data

Please refer to Appendix for Spurious emissions at antenna terminals & Band Edge.

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

SZEMC-TRF-01 Rev. A/0 Aug01,2022

Report No.:

Page: 17 of 24

6.6 Field strength of spurious radiation

Test Requirement: §2.1051, §96.41(e)

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

Limit: For **Band48**:

- 1) Emission outside the fundamental emission bandwidth (whether the emission is inside or outside of the authorized band) shall not exceed -13 dBm/MHz within 0-10 megahertz above the upper SAS-assigned channel edge and within 0-10 megahertz below the lower SAS-assigned channel edge. At all frequencies greater than 10 megahertz above the upper SAS assigned channel edge and less than 10 MHz below the lower SAS assigned channel edge, the emission shall not exceed -25 dBm/MHz.
- 2) Emissions below 3540 MHz or above 3710 MHz shall not exceed -25 dBm/MHz, and the emissions below 3530 MHz or above 3720 MHz shall not exceed -40dBm/MHz.

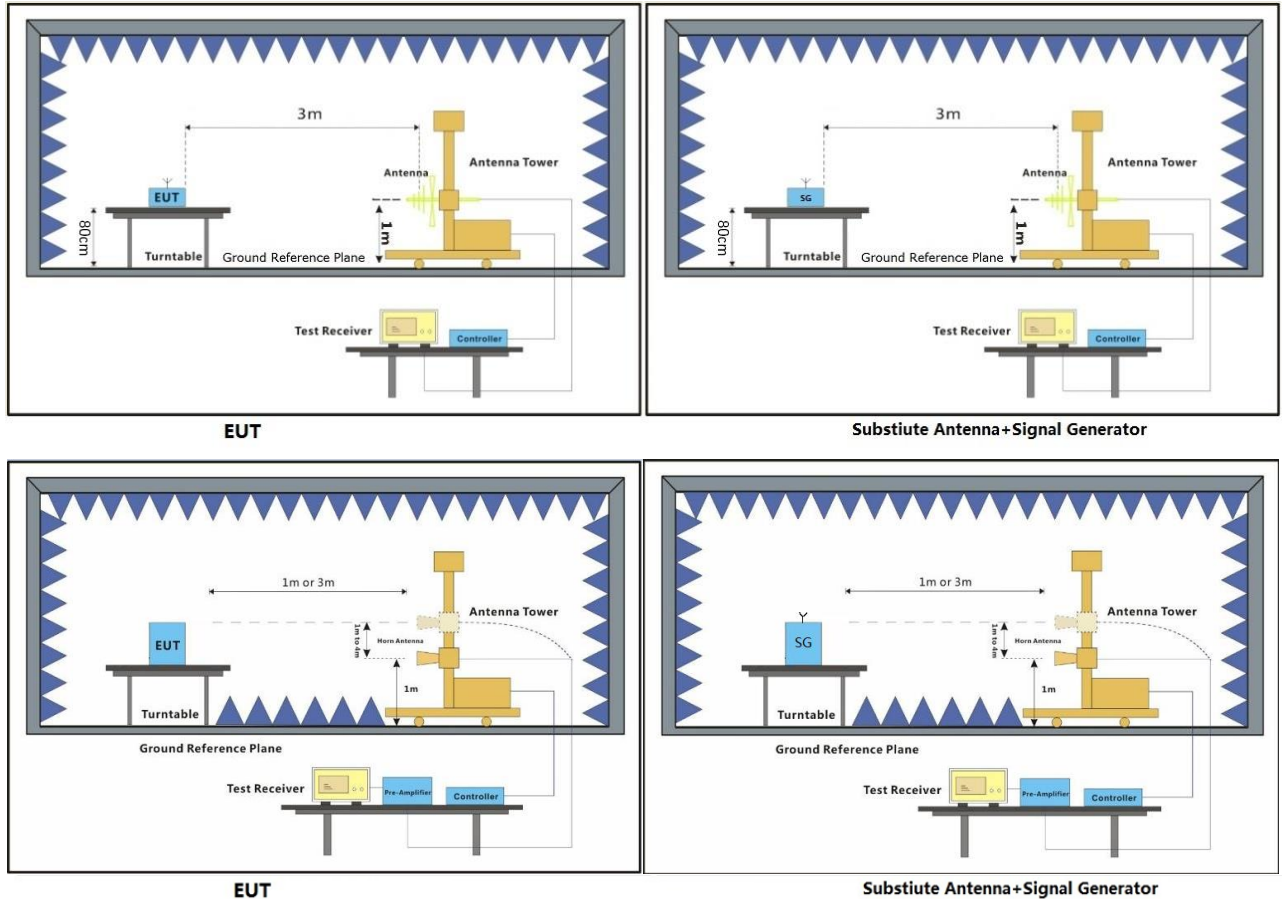
6.6.1 E.U.T. Operation

Operating Environment:

Temperature: 18.5 °C Humidity: 39.5 % RH Atmospheric Pressure: 1020 mbar

Test mode 01: Tx mode, Keep the EUT in transmitting mode.

6.6.2 Test Setup Diagram



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

SZEMC-TRF-01 Rev. A/0 Aug01,2022

Report No.:

Page: 19 of 24

6.6.3 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.



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

SZEMC-TRF-01 Rev. A/0 Aug01,2022

Report No.:

Page: 20 of 24

TM1.1 10MHz

Freq (MHz)	LISN_Factor (dB)	Cable_Loss (dB)	Preamp_Gain (dB)	Read_Level (dBm)	Level (dBm)	Limit_Line (dBm)	Over -40DBM	Polarization (H/V)	Remark
7101	35.8	8.42	35.93	-71.26	-52.34	-40	-12.34	Horizontal	Peak
10651.5	37.6	11.02	35.86	-71.04	-48.52	-40	-8.52	Horizontal	Peak
14202	39.5	12.92	37.21	-71.99	-48.63	-40	-8.63	Horizontal	Peak
Freq (MHz)	LISN_Factor (dB)	Cable_Loss (dB)	Preamp_Gain (dB)	Read_Level (dBm)	Level (dBm)	Limit_Line (dBm)	Over -40DBM	Polarization (H/V)	Remark
7101	35.8	8.42	35.93	-70.47	-51.55	-40	-11.55	Vertical	Peak
10651.5	37.6	11.02	35.86	-70.22	-47.7	-40	-7.7	Vertical	Peak
14202	39.5	12.92	37.21	-70.94	-47.58	-40	-7.58	Vertical	Peak

TM1.1 20MHz

Freq (MHz)	LISN_Factor (dB)	Cable_Loss (dB)	Preamp_Gain (dB)	Read_Level (dBm)	Level (dBm)	Limit_Line (dBm)	Over -40DBM	Polarization (H/V)	Remark
7241	35.8	8.55	35.96	-71.69	-52.91	-40	-12.91	Horizontal	Peak
10861.5	37.66	11.17	35.94	-70.02	-46.75	-40	-6.75	Horizontal	Peak
14482	39.86	12.92	37.22	-70.05	-46.57	-40	-6.57	Horizontal	Peak
Freq (MHz)	LISN_Factor (dB)	Cable_Loss (dB)	Preamp_Gain (dB)	Read_Level (dBm)	Level (dBm)	Limit_Line (dBm)	Over -40DBM	Polarization (H/V)	Remark
7241	35.8	8.55	35.96	-71.2	-52.42	-40	-12.42	Vertical	Peak
10861.5	37.66	11.17	35.94	-70.62	-47.35	-40	-7.35	Vertical	Peak
14482	39.86	12.92	37.22	-70.08	-46.6	-40	-6.6	Vertical	Peak

TM3.1 10MHz

Freq (MHz)	LISN_Factor (dB)	Cable_Loss (dB)	Preamp_Gain (dB)	Read_Level (dBm)	Level (dBm)	Limit_Line (dBm)	Over -40DBM	Polarization (H/V)	Remark
7381	35.9	8.68	35.98	-69.81	-51.06	-40	-11.06	Horizontal	Peak
11071.5	37.77	11.31	36.04	-70.38	-46.43	-40	-6.43	Horizontal	Peak
14762	40.16	12.93	37.24	-70.8	-44.89	-40	-4.89	Horizontal	Peak
Freq (MHz)	LISN_Factor (dB)	Cable_Loss (dB)	Preamp_Gain (dB)	Read_Level (dBm)	Level (dBm)	Limit_Line (dBm)	Over -40DBM	Polarization (H/V)	Remark
7381	35.9	8.68	35.98	-69.81	-51.06	-40	-11.06	Vertical	Peak
11071.5	37.77	11.31	36.04	-71.31	-47.36	-40	-7.36	Vertical	Peak
14762	40.16	12.93	37.24	-70.85	-44.94	-40	-4.94	Vertical	Peak

TM3.1 20MHz

Freq (MHz)	LISN_Factor (dB)	Cable_Loss (dB)	Preamp_Gain (dB)	Read_Level (dBm)	Level (dBm)	Limit_Line (dBm)	Over -40DBM	Polarization (H/V)	Remark
7102	35.8	8.42	35.93	-71.01	-52.1	-40	-12.1	Horizontal	Peak
10653	37.6	11.02	35.86	-70.83	-48.3	-40	-8.3	Horizontal	Peak
14204	39.51	12.92	37.21	-71	-47.63	-40	-7.63	Horizontal	Peak
Freq (MHz)	LISN_Factor (dB)	Cable_Loss (dB)	Preamp_Gain (dB)	Read_Level (dBm)	Level (dBm)	Limit_Line (dBm)	Over -40DBM	Polarization (H/V)	Remark
7102	35.8	8.42	35.93	-71.15	-52.24	-40	-12.24	Vertical	Peak
10653	37.6	11.02	35.86	-71.33	-48.8	-40	-8.8	Vertical	Peak
14204	39.51	12.92	37.21	-71	-47.63	-40	-7.63	Vertical	Peak

TM3.2 10MHz

Freq (MHz)	LISN_Factor (dB)	Cable_Loss (dB)	Preamp_Gain (dB)	Read_Level (dBm)	Level (dBm)	Limit_Line (dBm)	Over -40DBM	Polarization (H/V)	Remark
7232	35.8	8.54	35.95	-71.77	-52.98	-40	-12.98	Horizontal	Peak
10848	37.65	11.16	35.94	-71.03	-47.82	-40	-7.82	Horizontal	Peak
14464	39.83	12.92	37.22	-69.84	-46.37	-40	-6.37	Horizontal	Peak
Freq (MHz)	LISN_Factor (dB)	Cable_Loss (dB)	Preamp_Gain (dB)	Read_Level (dBm)	Level (dBm)	Limit_Line (dBm)	Over -40DBM	Polarization (H/V)	Remark
7232	35.8	8.54	35.95	-71.32	-52.53	-40	-12.53	Vertical	Peak
10848	37.65	11.16	35.94	-70.62	-47.41	-40	-7.41	Vertical	Peak
14464	39.83	12.92	37.22	-69.85	-46.38	-40	-6.38	Vertical	Peak



Unless otherwise agreed in writing, this document is issued by the Company subject to its General Conditions of Service printed overleaf, available on request or accessible at <http://www.sgs.com/en/Terms-and-Conditions.aspx> and, for electronic format documents, subject to Terms and Conditions for Electronic Documents at <http://www.sgs.com/en/Terms-and-Conditions/Terms-e-Documents.aspx>. Attention is drawn to the limitation of liability, indemnification and jurisdiction issues defined therein. Any holder of this document is advised that information contained hereon reflects the Company's findings at the time of its intervention only and within the limits of Client's instructions, if any. The Company's sole responsibility is to its Client and this document does not exonerate parties to a transaction from exercising all their rights and obligations under the transaction documents. This document cannot be reproduced except in full, without prior written approval of the Company. Any unauthorized alteration, forgery or falsification of the content or appearance of this document is unlawful and offenders may be prosecuted to the fullest extent of the law. Unless otherwise stated the results shown in this test report refer only to the sample(s) tested and such sample(s) are retained for 30 days only.

Attention: To check the authenticity of testing /inspection report & certificate, please contact us at telephone: (86-755) 8307 1443, or email: CN.Doccheck@sgs.com

No.1 Workshop, M-10, Middle Section, Science & Technology Park, Shenzhen, China 518057 t (86-755) 26012053 f (86-755) 26710594 www.sgs.com.cn
中国·深圳·科技园中区M-10栋一号厂房 邮编: 518057 t (86-755) 26012053 f (86-755) 26710594 sgs.china@sgs.com

Member of the SGS Group (SGS SA)



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

SZEMC-TRF-01 Rev. A/0 Aug01,2022

Report No.:

Page: 21 of 24

TM3.2 20MHz

Freq (MHz)	LISN_Factor (dB)	Cable_Loss (dB)	Preamp_Gain (dB)	Read_Level (dBm)	Level (dBm)	Limit_Line (dBm)	Over -40DBM	Polarization (H/V)	Remark
7362	35.9	8.66	35.98	-70.32	-51.55	-40	-11.55	Horizontal	Peak
11043	37.74	11.29	36.03	-70.81	-46.95	-40	-6.95	Horizontal	Peak
14724	40.12	12.93	37.24	-71.17	-45.61	-40	-5.61	Horizontal	Peak
Freq (MHz)	LISN_Factor (dB)	Cable_Loss (dB)	Preamp_Gain (dB)	Read_Level (dBm)	Level (dBm)	Limit_Line (dBm)	Over -40DBM	Polarization (H/V)	Remark
7362	35.9	8.66	35.98	-70.73	-51.96	-40	-11.96	Vertical	Peak
11043	37.74	11.29	36.03	-71.1	-47.24	-40	-7.24	Vertical	Peak
14724	40.12	12.93	37.24	-71.51	-45.95	-40	-5.95	Vertical	Peak



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

Unless otherwise agreed in writing, this document is issued by the Company subject to its General Conditions of Service printed overleaf, available on request or accessible at <http://www.sgs.com/en/Terms-and-Conditions.aspx> and, for electronic format documents, subject to Terms and Conditions for Electronic Documents at <http://www.sgs.com/en/Terms-and-Conditions/Terms-e-Documents.aspx>. Attention is drawn to the limitation of liability, indemnification and jurisdiction issues defined therein. Any holder of this document is advised that information contained hereon reflects the Company's findings at the time of its intervention only and within the limits of Client's instructions, if any. The Company's sole responsibility is to its Client and this document does not exonerate parties to a transaction from exercising all their rights and obligations under the transaction documents. This document cannot be reproduced except in full, without prior written approval of the Company. Any unauthorized alteration, forgery or falsification of the content or appearance of this document is unlawful and offenders may be prosecuted to the fullest extent of the law. Unless otherwise stated the results shown in this test report refer only to the sample(s) tested and such sample(s) are retained for 30 days only.

Attention: To check the authenticity of testing /inspection report & certificate, please contact us at telephone: (86-755) 8307 1443, or email: CN.Doccheck@sgs.com
No.1 Workshop, M-10, Middle Section, Science & Technology Park, Shenzhen, China 518057 t (86-755) 26012053 f (86-755) 26710594 www.sgs.com.cn
中国·深圳·科技园中区M-10栋一号厂房 邮编: 518057 t (86-755) 26012053 f (86-755) 26710594 sgs.china@sgs.com

Member of the SGS Group (SGS SA)

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

SZEMC-TRF-01 Rev. A/0 Aug01,2022

Report No.:

Page: 22 of 24

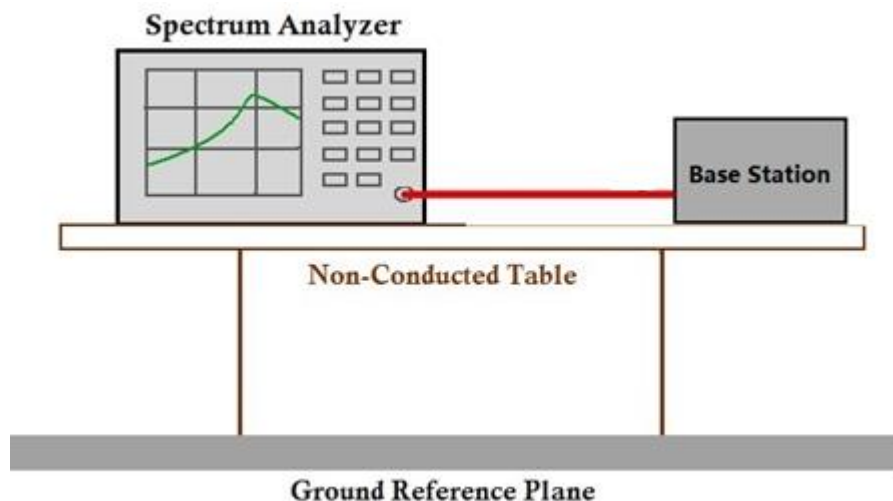
6.7 Frequency stability

Test Requirement: §2.1055
 Test Method: ANSI C63.26-2015, KDB 971168 D01 v03r01
 Limit: $\leq \pm 2.5\text{ppm}$.

6.7.1 E.U.T. Operation

Operating Environment:
 Temperature: 21.5 °C Humidity: 53.5 % RH Atmospheric Pressure: 1020 mbar
 Test mode 01: Tx mode, Keep the EUT in transmitting mode.

6.7.2 Test Setup Diagram



6.7.3 Measurement Data

Please refer to Appendix for Frequency stability.

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

SZEMC-TRF-01 Rev. A/0 Aug01,2022

Report No.:

Page: 23 of 24

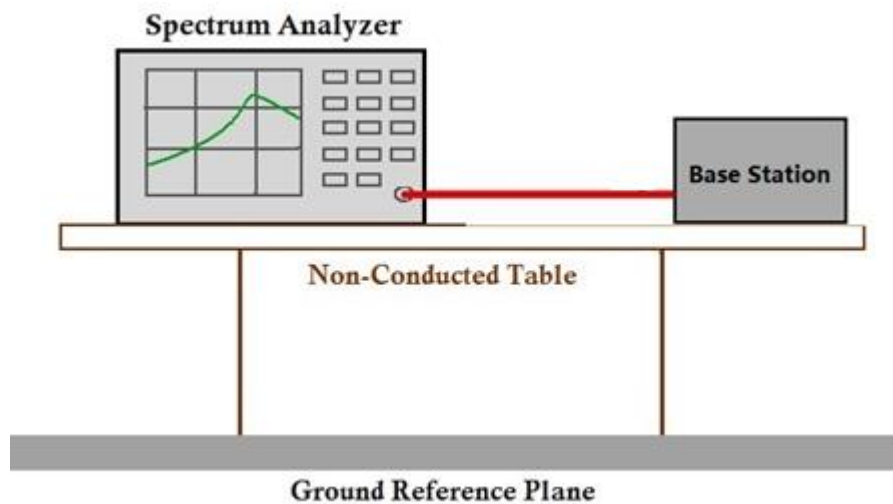
6.8 Modulation Characteristics

Test Requirement: §2.1047
 Test Method: ANSI C63.26-2015, KDB 971168 D01 v03r01
 Limit: Digital modulation

6.8.1 E.U.T. Operation

Operating Environment:
 Temperature: 21.5 °C Humidity: 53.5 % RH Atmospheric Pressure: 1020 mbar
 Test mode 01: Tx mode, Keep the EUT in transmitting mode.

6.8.2 Test Setup Diagram



6.8.3 Measurement Data

Pass, it's a digital modulation device.



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

SZEMC-TRF-01 Rev. A/0 Aug01,2022

Report No.:

Page: 24 of 24

7 Test Setup Photo

Refer to Appendix - Test Setup Photo for SZCR2212004132AT

8 EUT Constructional Details (EUT Photos)

Refer to Appendix – External and Internal Photos for SZCR2212004132AT

- End of the Report -



Unless otherwise agreed in writing, this document is issued by the Company subject to its General Conditions of Service printed overleaf, available on request or accessible at <http://www.sgs.com/en/Terms-and-Conditions.aspx> and, for electronic format documents, subject to Terms and Conditions for Electronic Documents at <http://www.sgs.com/en/Terms-and-Conditions/Terms-e-Documents.aspx>. Attention is drawn to the limitation of liability, indemnification and jurisdiction issues defined therein. Any holder of this document is advised that information contained hereon reflects the Company's findings at the time of its intervention only and within the limits of Client's instructions, if any. The Company's sole responsibility is to its Client and this document does not exonerate parties to a transaction from exercising all their rights and obligations under the transaction documents. This document cannot be reproduced except in full, without prior written approval of the Company. Any unauthorized alteration, forgery or falsification of the content or appearance of this document is unlawful and offenders may be prosecuted to the fullest extent of the law. Unless otherwise stated the results shown in this test report refer only to the sample(s) tested and such sample(s) are retained for 30 days only.

Attention: To check the authenticity of testing /inspection report & certificate, please contact us at telephone: (86-755) 8307 1443, or email: CN.Doccheck@sgs.com

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

No.1 Workshop, M-10, Middle Section, Science & Technology Park, Shenzhen, China 518057 t (86-755) 26012053 f (86-755) 26710594 www.sgs.com.cn
中国·深圳·科技园中区M-10栋一号厂房 邮编: 518057 t (86-755) 26012053 f (86-755) 26710594 sgs.china@sgs.com

Member of the SGS Group (SGS SA)