TEST REPORT

Applicant:	UCLOUDLINK (SINGAPORE) PTE. LTD
Address:	80 ROBINSON ROAD #02-00, SINGAPORE
Equipment Type:	5G Wireless Router
Model Name:	GLMR23A02
Brand Name:	GlocalMe
FCC ID:	2BB6E-GLMR23A02
Test Standard:	47 CFR Part 2 (Others refer to chapter 3.1)
Sample Arrival Date:	Mar. 18, 2024
Test Date:	Mar. 29, 2024 - Apr. 22, 2024
Date of Issue:	May 17, 2024

ISSUED BY:

Shenzhen BALUN Technology Co., Ltd.

Tested by: Liu Juren **Checked by:** Wu Huihui **Approved by:** Tolan Tu (Testing Director)

Revision History

Version	Issue Date	Revisions Content
Rev. 01	May 17, 2024	Initial Issue

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1 GENERAL INFORMATION

1.1 Test Laboratory

Name	Shenzhen BALUN Technology Co., Ltd.
Address	Block B, 1/F, Baisha Science and Technology Park, Shahe Xi Road, Nanshan District, Shenzhen, Guangdong Province, P. R. China
Phone Number	+86 755 6685 0100

1.2 Test Location

Name	Shenzhen BALUN Technology Co., Ltd.
Location	☐ Block B, 1/F, Baisha Science and Technology Park, Shahe Xi Road, Nanshan District, Shenzhen, Guangdong Province, P. R. China
	☑ 1/F, Building B, Ganghongji High-tech Intelligent Industrial Park, No. 1008, Songbai Road, Yangguang Community, Xili Sub-district, Nanshan District, Shenzhen, Guangdong Province, P. R. China
Accreditation Certificate	The laboratory is a testing organization accredited by FCC as a accredited testing laboratory. The designation number is CN1196.

2 PRODUCT INFORMATION

2.1 Applicant Information

Applicant	UCLOUDLINK (SINGAPORE) PTE. LTD
Address	80 ROBINSON ROAD #02-00, SINGAPORE

2.2 Manufacturer Information

Manufacturer	UCLOUDLINK (SINGAPORE) PTE. LTD
Address	80 ROBINSON ROAD #02-00, SINGAPORE

2.3 General Description for Equipment under Test (EUT)

EUT Name	5G Wireless Router
Model Name Under Test	GLMR23A02
Series Model Name	N/A
Description of Model name differentiation	N/A
Hardware Version	N/A
Software Version	N/A
Dimensions (Approx.)	N/A
Weight (Approx.)	N/A

2.4 Technical Information

All Network and Wireless connectivity for EUT	EC25-AFXD 3G Network WCDMA/HSDPA/HSUPA/DC-HSUPA/HSPA+ Band 2/4/5 RM520N-GL 3G Network WCDMA/HSDPA/HSUPA/DC-HSUPA/HSPA+ Band 2/4/5 EC25-AFXD 4G Network LTE FDD Band 2/4/5/12/13/14/66/71 RM520N-GL 4G Network LTE FDD Band 2/4/5/7/12/13/14/17/25/26/30/66/71 LTE TDD Band 38/41/42/43/48 LTE CA Uplink (UL): CA_2C, CA_5B, CA_7C, CA_38C, CA_41C, CA_43C, CA_66C, CA_66B, CA_48C, CA_42C, CA_2A-4A, CA_2A-5A, CA_2A-7A, CA_2A-12A, CA_2A-13A, CA_2A-30A, CA_2A-66A, CA_4A-5A, CA_4A-7A, CA_4A-12A, CA_4A-13A, CA_4A-30A, CA_5A-7A, CA_5A-30A, CA_5A-66A, CA_12A-30A, CA_12A-66A, CA_13A-66A, CA_14A-30A RM520N-GL 5G Network NR: SA n2/n5/n7/n12/n13/n14/n25/n26/n30/n38/n41/n48/n66/n70/n71/n77/n78 SA UL MIMO: n41/n77/n78 NSA(EN-DC): DC_13A_n66A, DC_5A_n2A, DC_14A_n2A, DC_30A_n2A, DC_2A_n5A, DC_30A_n5A, DC_66A_n5A, DC_2A_n12A, DC_66A_n12A, DC_2A_n66A, DC_5A_n66A, DC_12A_n66A, DC_14A_n66A: DC_30A_n66A, DC_12A_n2A, DC_66A_n2A, DC_71A_n2A, DC_12A_n41A, DC_71A_n66A: DC_2A_n71A DC_66A_n71A, DC_66A_n25A, DC_25A_n41A, DC_12A_n78A, DC_13A_n78A DC_25A_n78A, DC_12A_n77A: DC_13A_n77A, DC_14A_n77A, DC_26A_n78A DC_2A_n78A, DC_26A_n41A, DC_2A_n41A, DC_7A_n5A, DC_38A_n78A DC_7A_n71A: DC_41A_n78A: DC_5A_n7A: DC_12A_n7A, DC_66A_n7A DC_13A_n2A, DC_48A_n5A, DC_48A_n66A, DC_7A_n66A, DC_2A_n48A DC_5A_n48A, DC_13A_n48A, DC_66A_n48A, DC_4A_n78A, DC_20A_n77A DC_5A_n78A, DC_4A_n41A, DC_66A_n38A, DC_2A_n38A, DC_12A_n38A DC_4A_n38A, DC_5A_n38A, DC_66A_n78A, DC_12A_n25A, DC_25A_n77A DC_2A_n77A, DC_71A_n78A, DC_71A_n38A, DC_13A_n7A, DC_5A_n41A DC_66A_n41A, DC_2A_n7A, DC_7A_n2A, DC_5A_n40A, DC_30A_n77A DC_41A_n77A, DC_7A_n78A: DC_48A_n25A, DC_66A_n28A: DC_71A_n41A DC_28A_n66A, DC_30A_n12A, DC_2A_n14A, DC_30A_n14A, DC_66A_n14A DC_2A_n30A, DC_5A_n30A, DC_12A_n30A, DC_14A_n30A, DC_66A_n30A DC_71A_n7A, DC_7A_n12A, DC_5A_n77A, DC_66A_n77A, DC_71A_n77A DC_4A_n2A, DC_7A_n25A, DC_71A_n25A, DC_5A_n25A, DC_26A_n25A, DC_4A_n7A, DC_13A_n25A, DC_7A_n77A, DC_48A_n71A, DC_48A_n12A

	WIFI 802.11a, 802.11b, 802.11g, 802.11n, 802.11ac and 802.11ax U-NII-1/3
About the Product	The equipment is 5G Wireless Router, intended for used with information technology equipment. The equipment equipped with two WWAN modules namely EC25-AFXD and RM520N-GL. This report is for module RM520N-GL.

The following is the technical information of the EUT tested frequency bands in this report.

Operating Bands	LTE FDD Band 2/4/5/7/12/13/14/17/25/26/30/66/71 LTE TDD Band 38/41/42/43/48 CA_2C, CA_5B, CA_7C, CA_38C, CA_41C, CA_43C, CA_66C, CA_66B, CA_48C, CA_42C, CA_2A-4A, CA_2A-5A, CA_2A-7A, CA_2A-12A, CA_2A-13A, CA_2A-30A, CA_2A-66A, CA_4A-5A, CA_4A-7A, CA_4A-12A, CA_4A-13A, CA_4A-30A, CA_5A-7A, CA_5A-30A, CA_5A-66A, CA_12A-30A, CA_12A-66A, CA_13A-66A, CA_14A-30A SA: n2/n5/n7/n12/n13/n14/n25/n26/n30/n38/n41/n48/n66/n70/n71/n77/n78 SA UL MIMO: n41/n77/n78 NSA(EN-DC): DC_13A_n66A, DC_5A_n2A, DC_14A_n2A, DC_30A_n2A, DC_2A_n5A, DC_30A_n5A, DC_66A_n5A, DC_2A_n12A, DC_66A_n12A, DC_2A_n66A, DC_5A_n66A, DC_12A_n66A, DC_14A_n66A: DC_30A_n66A, DC_12A_n2A, DC_66A_n2A, DC_71A_n2A, DC_12A_n41A, DC_71A_n66A: DC_2A_n71A DC_66A_n71A, DC_66A_n25A, DC_25A_n41A, DC_12A_n78A, DC_13A_n78A DC_25A_n78A, DC_12A_n77A: DC_13A_n77A, DC_14A_n77A, DC_26A_n78A DC_2A_n78A, DC_26A_n41A, DC_2A_n41A, DC_7A_n5A, DC_38A_n78A DC_7A_n71A: DC_41A_n78A: DC_5A_n7A: DC_12A_n7A, DC_66A_n7A DC_13A_n2A, DC_48A_n5A, DC_48A_n66A, DC_7A_n66A, DC_2A_n48A DC_5A_n48A, DC_13A_n48A, DC_66A_n48A, DC_4A_n78A, DC_20A_n77A DC_5A_n78A, DC_4A_n41A, DC_66A_n38A, DC_2A_n38A, DC_12A_n38A DC_4A_n38A, DC_5A_n38A, DC_66A_n78A, DC_12A_n25A, DC_25A_n77A DC_2A_n77A, DC_71A_n78A, DC_71A_n38A, DC_13A_n7A, DC_5A_n41A DC_66A_n41A, DC_2A_n7A, DC_7A_n2A, DC_5A_n40A, DC_30A_n77A DC_41A_n77A, DC_7A_n78A: DC_48A_n25A, DC_66A_n28A: DC_71A_n41A DC_28A_n66A, DC_30A_n12A, DC_2A_n14A, DC_30A_n14A, DC_66A_n14A DC_2A_n30A, DC_5A_n30A, DC_12A_n30A, DC_14A_n30A, DC_66A_n30A DC_71A_n7A, DC_7A_n12A, DC_5A_n77A, DC_66A_n77A, DC_71A_n77A DC_4A_n2A, DC_7A_n25A, DC_71A_n25A, DC_5A_n25A, DC_26A_n25A, DC_4A_n7A, DC_13A_n25A, DC_7A_n77A, DC_48A_n71A, DC_48A_n12A

Modulation Type	WCDMA	QPSK
	HSDP/HSUPA/ DC-HSUPA/HSPA+	QPSK
	LTE	QPSK
		16QAM
		64QAM
		256QAM
	NR	CP-OFDM: QPSK / 16QAM / 64QAM / 256QAM
		DFT-s-OFDM: PI/2 BPSK / QPSK / 16QAM / 64QAM / 256QAM
Antenna Type	Dipole Antenna	
Antenna Gain	WCDMA Band 2: 2 dBi WCDMA Band 4: 2.8 dBi WCDMA Band 5: -0.01 dBi FDD LTE Band 2: 2 dBi FDD LTE Band 4: 2.8 dBi FDD LTE Band 5: -0.01 dBi FDD LTE Band 7: 2.97 dBi FDD LTE Band 12: -0.14 dBi FDD LTE Band 13: -0.29 dBi FDD LTE Band 14: -0.28 dBi FDD LTE Band 17: -0.14 dBi FDD LTE Band 25: 2 dBi FDD LTE Band 26(814-824MHz): -0.01 dBi FDD LTE Band 26(824-849MHz): -0.01 dBi FDD LTE Band 30: 1.05 dBi FDD LTE Band 66: 2.8 dBi FDD LTE Band 71: -0.06 dBi TDD LTE Band 38: 2.14 dBi TDD LTE Band 41: 2.98 dBi TDD LTE Band 42(3450-3550MHz): 2.2 dBi TDD LTE Band 43(3700-3800MHz): 0.21 dBi TDD LTE Band 48: 0.29 dBi NR Band n2: 2 dBi NR Band n5: -0.01 dBi NR Band n7: 2.97 dBi NR Band n12: -0.14 dBi NR Band n13: -0.29 dBi NR Band n14: -0.28 dBi NR Band n25: 2 dBi NR Band n26(814-824MHz): -0.01 dBi NR Band n26(824-849MHz): -0.01 dBi NR Band n30: 1.05 dBi NR Band n38: 2.14 dBi	

	NR Band n41: 2.98 dBi NR Band n66: 2.8 dBi NR Band n48: 0.29 dBi NR Band n70: 2.42 dBi NR Band n71: -0.6 dBi NR Band n77(3450-3550MHz): 2.2 dBi NR Band n77(3700-3980MHz): 0.21 dBi NR Band n78(3450-3550MHz): 2.2 dBi NR Band n78(3700-3800MHz): 0.21 dBi
The Max RF Output Power (EIRP/ERP)	WCDMA Band 2: 26.71 dBm WCDMA Band 4: 26.45 dBm WCDMA Band 5: 22.17 dBm FDD LTE Band 2: 26.09 dBm FDD LTE Band 4: 26.98 dBm FDD LTE Band 5: 22.64 dBm FDD LTE Band 7: 27.06 dBm FDD LTE Band 12: 21.71 dBm FDD LTE Band 13: 21.50 dBm FDD LTE Band 14: 21.70 dBm FDD LTE Band 17: 21.85 dBm FDD LTE Band 25: 25.99 dBm FDD LTE Band 26(814-824MHz): 21.80 dBm FDD LTE Band 26(824-849MHz): 20.67 dBm FDD LTE Band 30: 23.29 dBm FDD LTE Band 66: 26.61 dBm FDD LTE Band 71: 28.46 dBm TDD LTE Band 38: 23.49 dBm TDD LTE Band 41: 21.35 dBm TDD LTE Band 42(3450-3550MHz): 21.53 dBm TDD LTE Band 43(3700-3800MHz): 27.03 dBm TDD LTE Band 48: 18.49 dBm NR Band n2: 26.63 dBm NR Band n5: 22.43 dBm NR Band n7: 27.48 dBm NR Band n12: 22.30 dBm NR Band n13: 21.67 dBm NR Band n14: 21.98 dBm NR Band n25: 25.50 dBm NR Band n26(814-824MHz): 22.18 dBm NR Band n26(824-849MHz): 22.36 dBm NR Band n30: 23.37 dBm NR Band n38: 27.09 dBm NR Band n41: 29.33 dBm NR Band n66: 27.49 dBm

	NR Band n48: 21.78 dBm NR Band n70: 25.51 dBm NR Band n71: 21.82 dBm NR Band n77(3450-3550MHz): 28.88 dBm NR Band n77(3700-3980MHz): 26.70 dBm NR Band n78(3450-3550MHz): 28.69 dBm NR Band n78(3700-3800MHz): 27.06 dBm
SCS and Channel Bandwidths	n2_SCS 15kHz: 5 MHz, 10 MHz, 15 MHz, 20 MHz n5_SCS 15kHz: 5 MHz, 10 MHz, 15 MHz, 20 MHz n7_SCS 15kHz: 5 MHz, 10 MHz, 15 MHz, 20 MHz, 25 MHz, 30 MHz, 40 MHz n12_SCS 15kHz: 5 MHz, 10 MHz, 15 MHz n13_SCS 15kHz: 5 MHz, 10 MHz n14_SCS 15kHz: 5 MHz, 10 MHz n25_SCS 15kHz: 5 MHz, 10 MHz, 15 MHz, 20 MHz, 25 MHz, 30 MHz, 40 MHz n26(814-824MHz)_SCS 15kHz: 5 MHz, 10 MHz n26(824-849MHz)_SCS 15kHz: 5 MHz, 10 MHz, 15 MHz, 20 MHz n30_SCS 15kHz: 5 MHz, 10 MHz n38_SCS 30kHz: 20 MHz, 30 MHz, 40 MHz n41_SCS 30kHz: 20 MHz, 30 MHz, 40 MHz, 50 MHz, 60 MHz, 70 MHz, 80 MHz, 90 MHz, 100 MHz n66_SCS 15kHz: 5 MHz, 10 MHz, 15 MHz, 20 MHz, 30 MHz, 40 MHz n48_SCS 30kHz: 10 MHz, 20 MHz, 30 MHz, 40 MHz n70_SCS 15kHz: 5 MHz, 10 MHz, 15 MHz n71_SCS 15kHz: 5 MHz, 10 MHz, 15 MHz, 20 MHz n77(3450-3550MHz)_SCS 30kHz: 10 MHz, 15 MHz, 20 MHz, 30 MHz, 40 MHz, 50 MHz, 60 MHz, 70 MHz, 80 MHz, 90 MHz, 100 MHz n77(3700-3980MHz)_SCS 30kHz: 10 MHz, 15 MHz, 20 MHz, 30 MHz, 40 MHz, 50 MHz, 60 MHz, 70 MHz, 80 MHz, 90 MHz, 100 MHz n78(3450-3550MHz)_SCS 30kHz: 10 MHz, 15 MHz, 20 MHz, 30 MHz, 40 MHz, 50 MHz, 60 MHz, 70 MHz, 80 MHz, 90 MHz, 100 MHz n78(3700-3800MHz)_SCS 30kHz: 10 MHz, 15 MHz, 20 MHz, 30 MHz, 40 MHz, 50 MHz, 60 MHz, 70 MHz, 80 MHz, 90 MHz, 100 MHz

Band	Power Class	Tx Frequency Range	Rx Frequency Range
WCDMA B2	3	1850 MHz ~ 1910 MHz	1930 MHz ~ 1990 MHz
WCDMA B4	3	1710 MHz ~ 1755 MHz	2110 MHz ~ 2155 MHz
WCDMA B5	3	824 MHz ~ 849 MHz	869 MHz ~ 894 MHz
LTE B2	3	1850 MHz ~ 1910 MHz	1930 MHz ~ 1990 MHz
LTE B4	3	1710 MHz ~ 1755 MHz	2110 MHz ~ 2155 MHz
LTE B5	3	824 MHz ~ 849 MHz	869 MHz ~ 894 MHz
LTE B7	3	2500 MHz ~ 2570 MHz	2620 MHz ~ 2690 MHz
LTE B12	3	699 MHz ~ 716 MHz	729 MHz ~ 746 MHz

LTE B13	3	777 MHz ~ 787 MHz	746 MHz ~ 756 MHz
LTE B14	3	788 MHz ~ 798 MHz	758 MHz ~ 768 MHz
LTE B17	3	704 MHz ~ 716 MHz	734 MHz ~ 746 MHz
LTE B25	3	1850 MHz ~ 1915 MHz	1930 MHz ~ 1995 MHz
LTE B26	3	814 MHz ~ 824 MHz	859 MHz ~ 869 MHz
		824 MHz ~ 849 MHz	869 MHz ~ 894 MHz
LTE B30	3	2305 MHz ~ 2315 MHz	2350 MHz ~ 2360 MHz
LTE B38	3	2570 MHz ~ 2620 MHz	2570 MHz ~ 2620 MHz
LTE B41	3	2496 MHz ~ 2690 MHz	2496 MHz ~ 2690 MHz
LTE B42	3	3450 MHz ~ 3550 MHz	3450 MHz ~ 3550 MHz
LTE B43	3	3700 MHz ~ 3800 MHz	3700 MHz ~ 3800 MHz
LTE B48	3	3550 MHz ~ 3700 MHz	3550 MHz ~ 3700 MHz
LTE B66	3	1710 MHz ~ 1780 MHz	2110 MHz ~ 2180 MHz
LTE B71	3	663 MHz ~ 698 MHz	617 MHz ~ 652 MHz
NR n2	3	1850 MHz ~ 1910 MHz	1930 MHz ~ 1990 MHz
NR n5	3	824 MHz ~ 849 MHz	869 MHz ~ 894 MHz
NR n7	3	2500 MHz ~ 2570 MHz	2620 MHz ~ 2690 MHz
NR n12	3	699 MHz ~ 716 MHz	729 MHz ~ 746 MHz
NR n13	3	777 MHz ~ 787 MHz	746 MHz ~ 756 MHz
NR n14	3	788 MHz ~ 798 MHz	758 MHz ~ 768 MHz
NR n25	3	1850 MHz ~ 1915 MHz	1930 MHz ~ 1995 MHz
NR n26	3	814 MHz ~ 824 MHz	859 MHz ~ 869 MHz
	3	824 MHz ~ 849 MHz	869 MHz ~ 894 MHz
NR n30	3	2305 MHz ~ 2315 MHz	2350 MHz ~ 2360 MHz
NR n38	3	2570 MHz ~ 2620 MHz	2570 MHz ~ 2620 MHz
NR n41	2	2496 MHz ~ 2690 MHz	2496 MHz ~ 2690 MHz
NR n 66	3	1710 MHz ~ 1780 MHz	2110 MHz ~ 2180 MHz
NR n48	3	3550 MHz ~ 3700 MHz	3550 MHz ~ 3700 MHz
NR n70	3	1695 MHz ~ 1710 MHz	1995 MHz ~ 2020 MHz
NR n71	3	663 MHz ~ 698 MHz	617 MHz ~ 652 MHz
NR n77	2	3450 MHz ~ 3550 MHz	3450 MHz ~ 3550 MHz
	2	3700MHz ~ 3980MHz	3700MHz ~ 3980MHz
NR n78	2	3450 MHz ~ 3550 MHz	3450 MHz ~ 3550 MHz
	2	3700MHz ~ 3800MHz	3700MHz ~ 3800MHz

Note1: The EUT information provided by the applicant, except for The Max RF Conducted Power. For more detailed band specifications and features description, please refer to the manufacturer's specifications or user's manual.

3 SUMMARY OF TEST RESULTS

3.1 Test Standards

No.	Identity	Document Title
1	47 CFR Part 2	Frequency Allocations and Radio Treaty Matters; General Rules and Regulations
2	47 CFR Part 22 Subpart H	Cellular Radiotelephone Service
3	47 CFR Part 24 Subpart E	Broadband PCS
4	47 CFR Part 27	Miscellaneous Wireless Communications Services
5	47 CFR Part 90 Subpart S	Regulations Governing Licensing and Use of Frequencies in the 806-824, 851-869, 896-901, and 935-940 MHz Bands
6	47 CFR Part 90 Subpart R	Regulations Governing Licensing and Use of Frequencies in the 758-775 and 788-805 MHz Bands
7	47 CFR Part 96	CITIZENS BROADBAND RADIO SERVICE
8	ANSI C63.26-2015	American National Standard for Compliance Testing of Transmitters Used in Licensed Radio Services
9	KDB 971168 D01 v03	Measurement Guidance for Certification of Licensed Digital Transmitters

3.2 Test Verdict

No.	Test Description	FCC Part No.	Test Result	Test Verdict
1	Conducted RF Output Power	2.1046	Reporting only (ANNEX A.1)	Pass
2	Effective (Isotropic) Radiated Power	2.1046 22.913 24.232 27.50 90.635(b) 90.542(a) 96.41(b)	ANNEX A.1	Pass
3	Peak to Average Radio	2.1046 24.232(d) 27.50(d)	ANNEX A.2	Pass
4	Occupied Bandwidth	2.1049 22.917 24.238 27.53 90.209	ANNEX A.3	Pass
5	Frequency Stability	2.1055 22.355 24.235 27.54 90.213	ANNEX A.4	Pass
6	Spurious Emission at Antenna Terminals	2.1051 22.917 24.238 27.53 90.691 90.543 96.41(e)	ANNEX A.5	Pass
7	Band Edge	2.1051 22.917 24.238 27.53 90.691 90.543 96.41(e)	ANNEX A.6	Pass
8	Field Strength of Spurious Radiation	2.1053 22.917 24.238 27.53	ANNEX A.7	Pass

No.	Test Description	FCC Part No.	Test Result	Test Verdict
		90.691 90.543 96.41(e)		
Note: The RF module (Model Name: RM520N-GL, FCC ID: XMR2023RM520NGL) installed in the EUT is electronically and mechanically identical to the original certified module in the test report No. SEWA2309000114RG01 & No. SEWA23090001 & No. 14RG02ZEWA2310000147RG & No. ZEWA2310000147RG02, which issued by SGS-CSTC Standards Technical Services Co., Ltd. Shenzhen Branch on Oct. 31, 2023, so just the Field Strength of Spurious Radiation was retested in this report. Other test items please refer to the report No. SEWA2309000114RG01 & No. SEWA23090001 & No. 14RG02ZEWA2310000147RG & No. ZEWA2310000147RG02, which issued by SGS-CSTC Standards Technical Services Co., Ltd. Shenzhen Branch on Oct. 31, 2023.				

4 GENERAL TEST CONFIGURATIONS

4.1 Test Environments

During the measurement, the environmental conditions were within the listed ranges:

Relative Humidity		20% to 75%
Atmospheric Pressure		98 kPa to 102 kPa
Test Voltage of the EUT	NV (Normal Voltage)	12 V
	LV (Low Voltage)	10.8 V
	HV (High Voltage)	13.2 V
Test Temperature of the EUT	NT (Normal Temperature)	15 °C to 35 °C
	LT (Low Temperature)	-30 °C
	HT (High Temperature)	50 °C

4.2 Test Equipment List

Description	Manufacturer	Model	Serial No.	Version	Cal. Date	Cal. Due
Radiated Test System						
Radiated Test System Test Software	BALUN	BL410-E	N/A	V22.4	N/A	N/A
Wideband Radio Communication Tester	R&S	CMW 500	100854	V3.7.172	2023.05.09	2024.05.08
Wideband Radio Communication Tester	R&S	CMW 500	120598	V3.7.172	2023.11.20	2024.11.19
5G Wireless Test Platform	Starpoint	SP9500-CTS	20395	C1.0.7.30+SP1	2023.05.25	2024.05.24
Spectrum Analyzer	R&S	FSV40	101544	2.30.SP4	2023.12.27	2024.12.26
Test Antenna-Horn(18-40 GHz)	A-INFO	LB-180400KF	J211060273	N/A	2021.07.02	2024.07.01
Test Antenna-Bi-Log(30 MHz-3 GHz)	Schwarzbeck	VULB 9163	01414	N/A	2023.11.03	2026.11.02
Test Antenna-Horn(1-18 GHz)	Schwarzbeck	BBHA 9120D	02459	N/A	2021.05.20	2024.05.19
Anechoic Chamber	YIHENG	C8-966	N/A	N/A	2021.09.29	2024.09.28
EMI Receiver	Keysight	N9038A	MY55330121	A.20.03	2023.05.09	2024.05.08

4.3 Test Configurations

Test Items	Test Mode	Test Channel		
		LCH	MCH	HCH
Field Strength of Spurious Radiation	WCDMA Band 2	v	v	v
	WCDMA Band 4	v	v	v
	WCDMA Band 5	v	v	v
Note 1: The mark “v” means that this configuration is chosen for testing.				

Test Mode	UL Channel	UL Channel No.	UL Frequency (MHz)
WCDMA Band 2	Low Channel	9262	1852.4
	Middle Channel	9400	1880.0
	High Channel	9538	1907.6
WCDMA Band 4	Low Channel	1312	1712.4
	Middle Channel	1412	1732.4
	High Channel	1513	1752.6
WCDMA Band 5	Low Channel	4132	826.4
	Middle Channel	4182	836.4
	High Channel	4233	846.6

LTE Band	Bandwidth (MHz)						Modulation Type		RB#			Test Channel		
	1.4	3	5	10	15	20	QPSK	16-QAM	1	Half	Full	LCH	MCH	HCH
Field Strength of Spurious Radiation														
2	Worst Case													
4	Worst Case													
5	Worst Case													
12	Worst Case													
13	Worst Case													
14	Worst Case													
17	Worst Case													
25	Worst Case													
26	Worst Case													
30	Worst Case													
66	Worst Case													
71	Worst Case													
38	Worst Case													
41	Worst Case													
42	Worst Case													
43	Worst Case													
48	Worst Case													

Test Mode	UL Channel	Channel Bandwidth (MHz)	UL Channel No.	UL Frequency (MHz)
LTE Band 2	Low Range	1.4	18607	1850.7
		3	18615	1851.5
		5	18625	1852.5
		10	18650	1855
		15	18675	1857.5
		20	18700	1860
	Middle Range	1.4/3/5/10/15/20	18900	1880
	High Range	1.4	19193	1909.3
		3	19185	1908.5
		5	19175	1907.5
		10	19150	1905
		15	19125	1902.5
		20	19100	1900
LTE Band 4	Low Range	1.4	19957	1710.7
		3	19965	1711.5
		5	19975	1712.5
		10	20000	1715
		15	20025	1717.5
		20	20050	1720
	Middle Range	1.4/3/5/10/15/20	20175	1732.5
	High Range	1.4	20393	1754.3
		3	20385	1753.5
		5	20375	1752.5
		10	20350	1750
		15	20325	1747.5
		20	20300	1745
LTE Band 5	Low Range	1.4	20407	824.7
		3	20415	825.5
		5	20425	826.5
		10	20450	829
	Middle Range	1.4/3/5/10	20525	836.5
	High Range	1.4	20643	848.3
		3	20635	847.5
		5	20625	846.5
		10	20600	844
LTE Band 12	Low Range	1.4	23017	699.7
		3	23025	700.5
		5	23035	701.5
		10	23060	704
	Middle Range	1.4/3/5/10	23095	707.5

Test Mode	UL Channel	Channel Bandwidth (MHz)	UL Channel No.	UL Frequency (MHz)
	High Range	1.4	23173	715.3
		3	23165	714.5
		5	23155	713.5
		10	23130	711
LTE Band 13	Low Range	5	23205	779.5
		10	23230	782
	Middle Range	5/10	23230	782
	High Range	5	23255	784.5
		10	23230	782
LTE Band 14	Low Range	5	23305	790.5
		10	23330	793
	Middle Range	5/10	23330	793
	High Range	5	23355	795.5
		10	23330	793
LTE Band 17	Low Range	5	23755	706.5
		10	23780	709
	Middle Range	5/10	23790	710
	High Range	5	23825	713.5
		10	23800	711
LTE Band 25	Low Range	1.4	26047	1850.7
		3	26055	1851.5
		5	26065	1852.5
		10	26090	1855
		15	26115	1857.5
		20	26140	1860
	Middle Range	1.4/3/5/10/15/20	26365	1882.5
	High Range	1.4	26683	1914.3
		3	26675	1913.5
		5	26665	1912.5
		10	26640	1910
		15	26615	1907.5
		20	26590	1905
LTE Band 26 (Part22)	Low Range	1.4	26797	824.7
		3	26805	825.5
		5	26815	826.5
		10	26840	829
		15	26865	831.5
	Middle Range	1.4/3/5/10/15	26915	836.5
	High Range	1.4	27033	848.3
		3	27025	847.5
		5	27015	846.5

Test Mode	UL Channel	Channel Bandwidth (MHz)	UL Channel No.	UL Frequency (MHz)
		10	26990	844
		15	26965	841.5
LTE Band 26 (Part90)	Low Range	1.4	26697	814.7
		3	26705	815.5
		5	26715	816.5
		10	---	---
	Middle Range	1.4/3/5/10	26740	819
	High Range	1.4	26783	823.3
		3	26775	822.5
		5	26765	821.5
		10	---	---
LTE Band 30	Low Range	5	27685	2307.5
		10	---	---
	Middle Range	5/10	27710	2310
	High Range	5	27735	2312.5
		10	---	---
LTE Band 38	Low Range	5	37775	2572.5
		10	37800	2575
		15	37825	2577.5
		20	37850	2580
	Middle Range	5/10/15/20	38000	2595
	High Range	5	38225	2617.5
		10	38200	2615
		15	38175	2612.5
		20	38150	2610
LTE Band 41	Low Range	5	39675	2498.5
		10	39700	2501
		15	39725	2503.5
		20	39750	2506
	Middle Range	5/10/15/20	40620	2593
	High Range	5	41565	2687.5
		10	41540	2685
		15	41515	2682.5
		20	41490	2680
LTE Band 42	Low Range	5	42115	3454.5
		10	42140	3455
		15	42165	3457.5
		20	42190	3460
	Middle Range	5/10/15/20	42590	3500
	High Range	5	43065	3547.5
		10	43040	3545

Test Mode	UL Channel	Channel Bandwidth (MHz)	UL Channel No.	UL Frequency (MHz)
		15	43015	3542.5
		20	42990	3540
LTE Band 43	Low Range	5	44615	3702.5
		10	44640	3705
		15	44665	3707.5
		20	44690	3710
	Middle Range	5/10/15/20	45090	3750
	High Range	5	45565	3797.5
		10	45540	3795
		15	45515	3792.5
		20	45490	3790
LTE Band 48	Low Range	5	55265	3552.5
		10	55290	3555
		15	55315	3557.5
		20	55340	3560
	Middle Range	5/10/15/20	55990	3625
	High Range	5	56715	3697.5
		10	56690	3695
		15	56665	3692.5
		20	56640	3690
LTE Band 66	Low Range	1.4	131979	1710.7
		3	131987	1711.5
		5	131997	1712.5
		10	132022	1715
		15	132047	1717.5
		20	132072	1720
	Middle Range	1.4/3/5/10/15/20	132322	1745
	High Range	1.4	132665	1779.3
		3	132657	1778.5
		5	132647	1777.5
		10	132622	1775
		15	132597	1772.5
		20	132572	1770
LTE Band 71	Low Range	5	133147	665.5
		10	133172	668
		15	133197	670.5
		20	133222	673
	Middle Range	5/10/15/20	133322	683
	High Range	5	133447	695.5
		10	133422	693
		15	133397	690.5

Test Mode	UL Channel	Channel Bandwidth (MHz)	UL Channel No.	UL Frequency (MHz)
		20	133372	688

Test frequencies for CA_2C (2496-2690MHz)							
Range	CC-Combo / NRB_agg [RB]	CC1			CC2		
		BW [RB]	$N_{UL/DL}$	$f_{UL/DL}$ [MHz]	BW [RB]	$N_{UL/DL}$	$f_{UL/DL}$ [MHz]
Low	25+100	25	18633	1853.3	633	1933.3	100
		100	18700	1860	700	1940	25
	50+75	50	18653	1855.3	653	1935.3	75
		75	18675	1857.5	675	1937.5	50
	50+100	50	18655	1855.5	655	1935.5	100
		100	18700	1860	700	1940	50
	75+75	75	18675	1857.5	675	1937.5	75
	75+100	75	18678	1857.8	678	1937.8	100
		100	18700	1860	700	1940	75
	100+100	100	18700	1860	700	1940	100
Mid	25+100	25	18808	1870.8	808	1950.8	100
		100	18875	1877.5	875	1957.5	25
	50+75	50	18829	1872.9	829	1952.9	75
		75	18851	1875.1	851	1955.1	50
	50+100	50	18806	1870.6	806	1950.6	100
		100	18851	1875.1	851	1955.1	50
	75+75	75	18825	1872.5	825	1952.5	75
	75+100	75	18803	1870.3	803	1950.3	100
		100	18826	1872.6	826	1952.6	75
	100+100	100	18801	1870.1	801	1950.1	100
High	25+100	25	18983	1888.3	983	1968.3	100
		100	19050	1895	1050	1975	25
	50+75	50	19005	1890.5	1005	1970.5	75
		75	19027	1892.7	1027	1972.7	50
	50+100	50	18956	1885.6	956	1965.6	100
		100	19001	1890.1	1001	1970.1	50
	75+75	75	18975	1887.5	975	1967.5	75
	75+100	75	18929	1882.9	929	1962.9	100
		100	18951	1885.1	951	1965.1	75
	100+100	100	18902	1880.2	902	1960.2	100

Test frequencies for CA_5B											
Range	CC-Combo / NRB_agg [RB]	CC1					CC2				
		BW [RB]	N_{UL}	f_{UL} [MHz]	N_{DL}	f_{DL} [MHz]	BW [RB]	N_{UL}	f_{UL} [MHz]	N_{DL}	f_{DL} [MHz]
Low	15+25	15	20416	825.6	2416	870.6	25	20455	829.5	2455	874.5
		25	20425	826.5	2425	871.5	15	20464	830.4	2464	875.4
	25+50	25	20428	826.8	2428	871.8	50	20500	834	2500	879
	50+25	50	20450	829	2450	874	25	20522	836.2	2522	881.2
	50+50	50	20450	829	2450	874	50	20549	838.9	2549	883.9
Mid	15+25	15	20501	834.1	2501	879.1	25	20540	838.0	2540	883.0
		25	20510	835.0	2510	880.0	15	20549	838.9	2549	883.9
	25+50	25	20478	831.8	2478	876.8	50	20550	839	2550	884
	50+25	50	20500	834	2500	879	25	20572	841.2	2572	886.2
	50+50	50	20476	831.6	2476	876.6	50	20575	841.5	2575	886.5
High	15+25	15	20586	842.6	2586	887.6	25	20625	846.5	2625	891.5
		25	20595	843.5	2595	888.5	15	20634	847.4	2634	892.4
	25+50	25	20528	836.8	2528	881.8	50	20600	844	2600	889
	50+25	50	20550	839	2550	884	25	20622	846.2	2622	891.2
	50+50	50	20501	834.1	2501	879.1	50	20600	844	2600	889

Test frequencies for CA_7C											
Range	CC-Combo / NRB_agg [RB]	CC1					CC2				
		BW [RB]	N_{UL}	f_{UL} [MHz]	N_{DL}	f_{DL} [MHz]	BW [RB]	N_{UL}	f_{UL} [MHz]	N_{DL}	f_{DL} [MHz]
Low	50+100	50	20805	2505.5	2805	2625.5	100	20949	2519.9	2949	2639.9
		100	20850	2510	2850	2630	50	20994	2524.4	2994	2644.4
	75+50	75	20825	2507.5	2825	2627.5	50	20945	2519.5	2945	2639.5
	75+75	75	20825	2507.5	2825	2627.5	75	20975	2522.5	2975	2642.5
	75+100	75	20828	2507.8	2828	2627.8	100	20999	2524.9	2999	2644.9
		100	20850	2510	2850	2630	75	21021	2527.1	3021	2647.1
	100+100	100	20850	2510	2850	2630	100	21048	2529.8	3048	2649.8
Mid	50+100	50	21006	2525.6	3006	2645.6	100	21150	2540	3150	2660
		100	21051	2530.1	3051	2650.1	50	21195	2544.5	3195	2664.5
	75+50	75	21051	2530.1	3051	2650.1	50	21171	2542.1	3171	2662.1
	75+75	75	21025	2527.5	3025	2647.5	75	21175	2542.5	3175	2662.5
	75+100	75	21003	2525.3	3003	2645.3	100	21174	2542.4	3174	2662.4
		100	21026	2527.6	3026	2647.6	75	21197	2544.7	3197	2664.7
	100+100	100	21001	2525.1	3001	2645.1	100	21199	2544.9	3199	2664.9
High	50+100	50	21206	2545.6	3206	2665.6	100	21350	2560	3350	2680
		100	21251	2550.1	3251	2670.1	50	21395	2564.5	3395	2684.5
	75+50	75	21277	2552.7	3277	2672.7	50	21397	2564.7	3397	2684.7
	75+75	75	21225	2547.5	3225	2667.5	75	21375	2562.5	3375	2682.5
	75+100	75	21179	2542.9	3179	2662.9	100	21350	2560	3350	2680
		100	21201	2545.1	3201	2665.1	75	21372	2562.2	3372	2682.2
	100+100	100	21152	2540.2	3152	2660.2	100	21350	2560	3350	2680

Test frequencies for CA_38C							
Range	CC-Combo / NRB_agg [RB]	CC1			CC2		
		BW [RB]	$N_{UL/DL}$	$f_{UL/DL}$ [MHz]	BW [RB]	$N_{UL/DL}$	$f_{UL/DL}$ [MHz]
Low	75+75	75	37825	2577.5	75	37975	2592.5
	100+100	100	37850	2580	100	38048	2599.8
Mid	75+75	75	37925	2587.5	75	38075	2602.5
	100+100	100	37901	2585.1	100	38099	2604.9
High	75+75	75	38025	2597.5	75	38175	2612.5
	100+100	100	37952	2590.2	100	38150	2610

Test frequencies for CA_41C (2496-2690MHz)							
Range	CC-Combo / NRB_agg [RB]	CC1			CC2		
		BW [RB]	$N_{UL/DL}$	$f_{UL/DL}$ [MHz]	BW [RB]	$N_{UL/DL}$	$f_{UL/DL}$ [MHz]
Low	25+100	25	39683	2499.3	100	39800	2511
		100	39750	2506	25	39867	2517.7
	50+75	50	39703	2501.3	75	39823	2513.3
		75	39725	2503.5	50	39845	2515.5
	50+100	50	39705	2501.5	100	39849	2515.9
		100	39750	2506	50	39894	2520.4
	75+75	75	39725	2503.5	75	39875	2518.5
	75+100	75	39728	2503.8	100	39899	2520.9
		100	39750	2506	75	39921	2523.1
	100+100	100	39750	2506	100	39948	2525.8
Mid	25+100	25	40528	2583.8	100	40645	2595.5
		100	40595	2590.5	25	40712	2602.2
	50+75	50	40549	2585.9	75	40669	2597.9
		75	40571	2588.1	50	40691	2600.1
	50+100	50	40526	2583.6	100	40670	2598.0
		100	40571	2588.1	50	40715	2602.5
	75+75	75	40545	2585.5	75	40695	2600.5
	75+100	75	40523	2583.3	100	40694	2600.4
		100	40546	2585.6	75	40717	2602.7
	100+100	100	40521	2583.1	100	40719	2602.9
High	25+100	25	41373	2668.3	100	41490	2680
		100	41440	2675	25	41557	2686.7
	50+75	50	41395	2670.5	75	41515	2682.5
		75	41417	2672.7	50	41537	2684.7
	50+100	50	41346	2665.6	100	41490	2680
		100	41391	2670.1	50	41535	2684.5
	75+75	75	41365	2667.5	75	41515	2682.5
	75+100	75	41319	2662.9	100	41490	2680
		100	41341	2665.1	75	41512	2682.2
	100+100	100	41292	2660.2	100	41490	2680

Test frequencies for CA_66C											
Range	CC-Combo / NRB_agg [RB]	CC1					CC2				
		BW [RB]	N_{UL}	f_{UL} [MHz]	N_{DL}	f_{DL} [MHz]	BW [RB]	N_{UL}	f_{UL} [MHz]	N_{DL}	f_{DL} [MHz]
Low	50+75	50	132025	1715.3	66489	2115.3	75	132145	1727.3	66609	2127.3
		75	132047	1717.5	66511	2117.5	50	132167	1729.5	66631	2129.5
	50+100	50	132027	1715.5	66491	2115.5	100	132171	1729.9	66635	2129.9
		100	132072	1720	66536	2120	50	132216	1734.4	66680	2134.4
	75+75	75	132047	1717.5	66511	2117.5	75	132197	1732.5	66661	2132.5
	75+100	75	132050	1717.8	66514	2117.8	100	132221	1734.9	66685	2134.9
		100	132072	1720	66536	2120	75	132243	1737.1	66707	2137.1
	100+25	100	132072	1720	66536	2120	25	132189	1731.7	66653	2131.7
		25	132005	1713.3	66469	2113.3	100	132122	1725.0	66586	2125.0
	100+100	100	132072	1720	66536	2120	100	132270	1739.8	66734	2139.8
Mid	50+75	50	132351	1747.9	66815	2147.9	75	132471	1759.9	66935	2159.9
		75	132373	1750.1	66837	2150.1	50	132493	1762.1	66957	2162.1
	50+100	50	132328	1745.6	66792	2145.6	100	132472	1760	66936	2160
		100	132373	1750.1	66837	2150.1	50	132517	1764.5	66981	2164.5
	75+75	75	132347	1747.5	66811	2147.5	75	132497	1762.5	66961	2162.5
	75+100	75	132325	1745.3	66789	2145.3	100	132496	1762.4	66960	2162.4
		100	132348	1747.6	66812	2147.6	75	132519	1764.7	66983	2164.7
	100+25	100	132397	1752.5	66861	2152.5	25	132514	1764.2	66978	2164.2
		25	132330	1745.8	66794	2145.8	100	132447	1757.5	66911	2157.5
	100+100	100	132323	1745.1	66787	2145.1	100	132521	1764.9	66985	2164.9
High	50+75	50	132622	1775	67086	2175	75	NA	NA	67206	2187
		75	132597	1772.5	67061	2172.5	50	NA	NA	67181	2184.5
	50+100	50	132622	1775	67086	2175	100	NA	NA	67230	2189.4
		100	132572	1770	67036	2170	50	NA	NA	67180	2184.4
	75+75	75	132597	1772.5	67061	2172.5	75	NA	NA	67211	2187.5
	75+100	75	132597	1772.5	67061	2172.5	100	NA	NA	67232	2189.6
		100	132572	1770	67036	2170	75	NA	NA	67207	2187.1
	100+25	100	132572	1770	67036	2170	25	NA	NA	67153	2181.7
		25	132647	1777.5	67111	2177.5	100	NA	NA	67228	2189.2
	100+100	100	132572	1770	67036	2170	100	NA	NA	67234	2189.8
High	50+75	50	132477	1760.5	66941	2160.5	75	132597	1772.5	67061	2172.5
		75	132499	1762.7	66963	2162.7	50	132619	1774.7	67083	2174.7
	50+100	50	132428	1755.6	66892	2155.6	100	132572	1770	67036	2170
		100	132473	1760.1	66937	2160.1	50	132617	1774.5	67081	2174.5
	75+75	75	132447	1757.5	66911	2157.5	75	132597	1772.5	67061	2172.5
	75+100	75	132401	1752.9	66885	2152.9	100	132572	1770	67036	2170
		100	132423	1755.1	66887	2155.1	75	132594	1772.2	67058	2172.2

	100+25	100	132522	1765	66986	2165	25	132639	1776.7	67103	2176.7
		25	132455	1758.3	66919	2158.3	100	132572	1770.0	67036	2170.0
	100+100	100	132374	1750.2	66838	2150.2	100	132572	1770	67036	2170

Test frequencies for CA_66B											
Range	CC-Combo / NRB_agg [RB]	CC1					CC2				
		BW [RB]	N_{UL}	f_{UL} [MHz]	N_{DL}	f_{DL} [MHz]	BW [RB]	N_{UL}	f_{UL} [MHz]	N_{DL}	f_{DL} [MHz]
Low	25+25	25	131997	1712.5	66461	2112.5	25	132045	1717.3	66509	2117.3
	25+50	25	132000	1712.8	66464	2112.8	50	132072	1720	66536	2120
		50	132022	1715	66486	2115	25	132094	1722.2	66558	2122.2
	25+75	25	132002	1713	66466	2113	75	132095	1722.3	66559	2122.3
		75	132047	1717.5	66511	2117.5	25	132140	1726.8	66604	2126.8
	50+50	50	132022	1715	66486	2115	50	132121	1724.9	66585	2124.9
Mid	25+25	25	132398	1752.6	66862	2152.6	25	132446	1757.4	66910	2157.4
	25+50	25	132375	1750.3	66839	2150.3	50	132447	1757.5	66911	2157.5
		50	132397	1752.5	66861	2152.5	25	132469	1759.7	66933	2159.7
	25+75	25	132353	1748.1	66817	2148.1	75	132446	1757.4	66910	2157.4
		75	132398	1752.6	66862	2152.6	25	132491	1761.9	66955	2161.9
	50+50	50	132373	1750.1	66837	2150.1	50	132472	1760	66936	2160
High	25+25	25	132647	1777.5	67111	2177.5	25	NA	NA	67159	2182.3
	25+50	25	132647	1777.5	67111	2177.5	50	NA	NA	67183	2184.7
		50	132622	1775	67086	2175	25	NA	NA	67158	2182.2
	25+75	25	132647	1777.5	67111	2177.5	75	NA	NA	67204	2186.8
		75	132597	1772.5	67061	2172.5	25	NA	NA	67154	2181.8
	50+50	50	132622	1775	67086	2175	50	NA	NA	67185	2184.9
High	25+25	25	132599	1772.7	67063	2172.7	25	132647	1777.5	67111	2177.5
	25+50	25	132550	1767.8	67014	2167.8	50	132622	1775.	67086	2175
		50	132572	1770	67036	2170	25	132644	1777.2	67108	2177.2
	25+75	25	132504	1763.2	66968	2163.2	75	132597	1772.5	67061	2172.5
		75	132549	1767.7	67013	2167.7	25	132642	1777	67106	2177
	50+50	50	132523	1765.1	66987	2165.1	50	132622	1775	67086	2175

Test frequencies for CA_48C							
Range	CC-Combo / NRB_agg [RB]	CC1			CC2		
		BW [RB]	$N_{UL/DL}$	$f_{UL/DL}$ [MHz]	BW [RB]	$N_{UL/DL}$	$f_{UL/DL}$ [MHz]
Low	25+100	25	55273	3553.3	100	55390	3565
		100	55340	3560	25	55457	3571.7
	50+100	50	55295	3555.5	100	55439	3569.9
		100	55340	3560	50	55484	3574.4
	75+100	75	55318	3557.8	100	55489	3574.9
		100	55340	3560	75	55511	3577.1
	100+100	100	55340	3560	100	55538	3579.8
Mid	25+100	25	55898	3615.8	100	56015	3627.5
		100	55965	3622.5	25	56082	3634.2
	50+100	50	55896	3615.6	100	56040	3630
		100	55941	3620.1	50	56085	3634.5
	75+100	75	55893	3615.3	100	56064	3632.4
		100	55916	3617.6	75	56087	3634.7
	100+100	100	55891	3615.1	100	56089	3634.9
High	25+100	25	56523	3678.3	100	56640	3690
		100	56590	3685	25	56707	3696.7
	50+100	50	56496	3675.6	100	56640	3690
		100	56541	3680.1	50	56685	3694.5
	75+100	75	56469	3672.9	100	56640	3690
		100	56491	3675.1	75	56662	3692.2
	100+100	100	56442	3670.2	100	56640	3690

Test frequencies for CA_42C							
Range	CC-Combo / NRB_agg [RB]	CC1			CC2		
		BW [RB]	$N_{UL/DL}$	$f_{UL/DL}$ [MHz]	BW [RB]	$N_{UL/DL}$	$f_{UL/DL}$ [MHz]
Low	25+100	25	41623	3403.3	100	41740	3415
		100	41690	3410	25	41807	3421.7
	50+100	50	41645	3405.5	100	41789	3419.9
		100	41690	3410	50	41834	3424.4
	75+100	75	41668	3407.8	100	41839	3424.9
		100	41690	3410	75	41861	3427.1
	100+100	100	41690	3410	100	41888	3429.8
Mid	25+100	25	42498	3490.8	100	42615	3502.5
		100	42565	3497.5	25	42682	3509.2
	50+100	50	42496	3490.6	100	42640	3505
		100	42541	3495.1	50	42685	3509.5
	75+100	75	42493	3490.3	100	42664	3507.4
		100	42516	3492.6	75	42687	3509.7
	100+100	100	42491	3490.1	100	42689	3509.9
High	25+100	25	43373	3578.3	100	43490	3590
		100	43440	3585	25	43557	3596.7
	50+100	50	43346	3575.6	100	43490	3590
		100	43391	3580.1	50	43535	3594.5
	75+100	75	43319	3572.9	100	43490	3590
		100	43341	3575.1	75	43512	3592.2
	100+100	100	43292	3570.2	100	43490	3590

Test Mode	Channel Bandwidth (MHz)	UL Channel	UL Channel No.	UL Frequency (MHz)
NR Band n2	5	Low Range	370500	1852.5
		Middle Range	376000	1880
		High Range	381500	1907.5
	10	Low Range	371000	1855
		Middle Range	376000	1880
		High Range	381000	1905
	15	Low Range	371500	1857.5
		Middle Range	376000	1880
		High Range	380500	1902.5
	20	Low Range	372000	1860
		Middle Range	376000	1880
		High Range	380000	1900

Test Mode	Channel Bandwidth (MHz)	UL Channel	UL Channel No.	UL Frequency (MHz)
NR Band n5	5	Low Range	165300	826.5
		Middle Range	167300	836.5
		High Range	169300	846.5
	10	Low Range	165800	829
		Middle Range	167300	836.5
		High Range	168300	844
	15	Low Range	166300	831.5
		Middle Range	167300	836.5
		High Range	168300	841.5
	20	Low Range	166800	834
		Middle Range	167300	836.5
		High Range	167800	839

Test Mode	Channel Bandwidth (MHz)	UL Channel	UL Channel No.	UL Frequency (MHz)
NR Band n7	5	Low Range	500500	2502.5
		Middle Range	507000	2535
		High Range	513500	2567.5
	10	Low Range	501000	2505
		Middle Range	507000	2535
		High Range	513000	2565
	15	Low Range	501500	2507.5
		Middle Range	507000	2535
		High Range	512500	2562.5
	20	Low Range	502000	2510
		Middle Range	507000	2535
		High Range	512000	2560
	25	Low Range	502500	2512.5
		Middle Range	507000	2535
		High Range	511500	2557.5
	30	Low Range	503000	2515
		Middle Range	507000	2535
		High Range	511000	2555
	40	Low Range	504000	2520
		Middle Range	507000	2535
		High Range	510000	2550
	50	Low Range	505000	2525
		Middle Range	507000	2535
		High Range	509000	2545

Test Mode	Channel Bandwidth (MHz)	UL Channel	UL Channel No.	UL Frequency (MHz)
NR Band n12	5	Low Range	140300	701.5
		Middle Range	141500	707.5
		High Range	142700	713.5
	10	Low Range	140800	704
		Middle Range	141500	707.5
		High Range	142200	711
	15	Low Range	141300	706.5
		Middle Range	141500	707.5
		High Range	141700	708.5

Test Mode	Channel Bandwidth (MHz)	UL Channel	UL Channel No.	UL Frequency (MHz)
NR Band n13	5	Low Range	155900	779.5
		Middle Range	156400	782
		High Range	156900	784.5
	10	Low Range	/	/
		Middle Range	155900	779.5
		High Range	/	/

Test Mode	Channel Bandwidth (MHz)	UL Channel	UL Channel No.	UL Frequency (MHz)
NR Band n14	5	Low Range	158100	790.5
		Middle Range	158600	793
		High Range	159100	795.5
	10	Low Range	/	/
		Middle Range	152600	763
		High Range	/	/

Test Mode	Channel Bandwidth (MHz)	UL Channel	UL Channel No.	UL Frequency (MHz)
NR Band n25	5	Low Range	370500	1852.5
		Middle Range	376500	1882.5
		High Range	382500	1912.5
	10	Low Range	371000	1855
		Middle Range	376500	1882.5
		High Range	382000	1910
	15	Low Range	371500	1857.5
		Middle Range	376500	1882.5
		High Range	381500	1907.5
	20	Low Range	372000	1860
		Middle Range	376500	1882.5
		High Range	381000	1905
	25	Low Range	372500	1862.5
		Middle Range	376500	1882.5
		High Range	380500	1902.5
	30	Low Range	373000	1865
		Middle Range	376500	1882.5
		High Range	380000	1900
	40	Low Range	374000	1870
		Middle Range	376500	1882.5
		High Range	379000	1895

Test Mode	Channel Bandwidth (MHz)	UL Channel	UL Channel No.	UL Frequency (MHz)
NR Band n26(814-824MHz)	5	Low Range	163300	816.5
		Middle Range	163800	819
		High Range	164300	821.5
	10	Low Range	/	/
		Middle Range	163800	819
		High Range	/	/

Test Mode	Channel Bandwidth (MHz)	UL Channel	UL Channel No.	UL Frequency (MHz)
NR Band n26(824-849MHz)	5	Low Range	165300	826.5
		Middle Range	167300	836.5
		High Range	169300	846.5
	10	Low Range	165800	829
		Middle Range	167300	836.5
		High Range	168800	844
	15	Low Range	166300	831 5
		Middle Range	167300	836.5
		High Range	168300	841.5
	20	Low Range	166800	834
		Middle Range	167300	836.5
		High Range	167800	839

Test Mode	Channel Bandwidth (MHz)	UL Channel	UL Channel No.	UL Frequency (MHz)
NR Band n30	5	Low Range	461500	2307.5
		Middle Range	462000	2310
		High Range	462500	2312.5
	10	Low Range	462000	2310
		Middle Range	462000	2310
		High Range	462000	2310

Test Mode	Channel Bandwidth (MHz)	UL Channel	UL Channel No.	UL Frequency (MHz)
NR Band n38	10	Low Range	515000	2575
		Middle Range	519000	2595
		High Range	523000	2615
	15	Low Range	515500	2577.5
		Middle Range	519000	2595
		High Range	522500	2612.5
	20	Low Range	516000	2580
		Middle Range	519000	2595
		High Range	522000	2610
	25	Low Range	516500	2582.5
		Middle Range	519000	2595
		High Range	521500	2607.5
	30	Low Range	517000	2585
		Middle Range	519000	2595
		High Range	521000	2605
	40	Low Range	518000	2590
		Middle Range	519000	2595
		High Range	520000	2600

Test Mode	Channel Bandwidth (MHz)	UL Channel	UL Channel No.	UL Frequency (MHz)
NR Band n41	10	Low Range	500202	2501.01
		Middle Range	518598	2592.99
		High Range	537000	2685
	15	Low Range	500700	2503.5
		Middle Range	518598	2592.99
		High Range	536496	2682.48
	20	Low Range	501204	2506.02
		Middle Range	518598	2592.99
		High Range	535998	2679.99
	30	Low Range	502200	2511
		Middle Range	518598	2592.99
		High Range	534996	2674.98
	40	Low Range	503202	2516.01
		Middle Range	518598	2592.99
		High Range	534000	2670
	50	Low Range	504204	2521.02
		Middle Range	518598	2592.99
		High Range	532998	2664.99
	60	Low Range	505200	2526
		Middle Range	518598	2592.99
		High Range	531996	2659.98
	70	Low Range	506202	2531.01
		Middle Range	518598	2592.99
		High Range	531000	2655
	80	Low Range	507204	2536.02
		Middle Range	518598	2592.99
		High Range	529998	2649.99
	90	Low Range	508200	2541
		Middle Range	518598	2592.99
		High Range	528996	2644.98
	100	Low Range	509202	2546.01
		Middle Range	518598	2592.99
		High Range	528000	2640

Test Mode	Channel Bandwidth (MHz)	UL Channel	UL Channel No.	UL Frequency (MHz)
NR Band n66	5	Low Range	342500	1712.5
		Middle Range	349000	1745
		High Range	355500	1777.5
	10	Low Range	343000	1715
		Middle Range	349000	1745
		High Range	355000	1775
	15	Low Range	343500	1717.5
		Middle Range	349000	1745
		High Range	354500	1772.5
	20	Low Range	344000	1720
		Middle Range	349000	1745
		High Range	354000	1770
	30	Low Range	345000	1725
		Middle Range	349000	1745
		High Range	353000	1765
	40	Low Range	346000	1730
		Middle Range	349000	1745
		High Range	352000	1760

Test Mode	Channel Bandwidth (MHz)	UL Channel	UL Channel No.	UL Frequency (MHz)
NR Band n70	5	Low Range	339500	1697.5
		Middle Range	340500	1702.5
		High Range	341500	1707.5
	10	Low Range	340000	1700
		Middle Range	340500	1702.5
		High Range	341000	1705
	15	Low Range	/	/
		Middle Range	340500	1702.5
		High Range	/	/

Test Mode	Channel Bandwidth (MHz)	UL Channel	UL Channel No.	UL Frequency (MHz)
NR Band n71	5	Low Range	133100	665.5
		Middle Range	136100	680.5
		High Range	139100	695.5
	10	Low Range	133600	668
		Middle Range	136100	680.5
		High Range	138600	693
	15	Low Range	134100	670.5
		Middle Range	136100	680.5
		High Range	138100	690.5
	20	Low Range	134600	673
		Middle Range	136100	680.5
		High Range	137600	688

Test Mode	Channel Bandwidth (MHz)	UL Channel	UL Channel No.	UL Frequency (MHz)
NR Band n77(3450-3550 MHz)	10	Low Range	630334	3455.01
		Middle Range	633332	3499.98
		High Range	636332	3544.98
	15	Low Range	630500	3457.5
		Middle Range	633332	3499.98
		High Range	636166	3542.49
	20	Low Range	630668	3460.02
		Middle Range	633332	3499.98
		High Range	636000	3540
	25	Low Range	630834	3462.51
		Middle Range	633332	3499.98
		High Range	635832	3537.48
	30	Low Range	631000	3465
		Middle Range	633332	3499.98
		High Range	635666	3534.99
	40	Low Range	631334	3470.01
		Middle Range	633332	3499.98
		High Range	635332	3529.98
	50	Low Range	631668	3475.02
		Middle Range	633332	3499.98
		High Range	635000	3525
	60	Low Range	632000	3480
		Middle Range	633332	3499.98
		High Range	634666	3519.99
	70	Low Range	632334	3485.01
		Middle Range	633332	3499.98
		High Range	634332	3514.98
	80	Low Range	632668	3490.02
		Middle Range	633332	3499.98
		High Range	634000	3510
	90	Low Range	633000	3495
		Middle Range	633332	3499.98
		High Range	633666	3504.99
	100	Low Range	633332	3499.98
		Middle Range	633332	3499.98
		High Range	633332	3499.98
NR Band n77(3700-3980 MHz)	10	Low Range	647000	3705
		Middle Range	656000	3840
		High Range	665000	3975
	15	Low Range	647168	3707.52

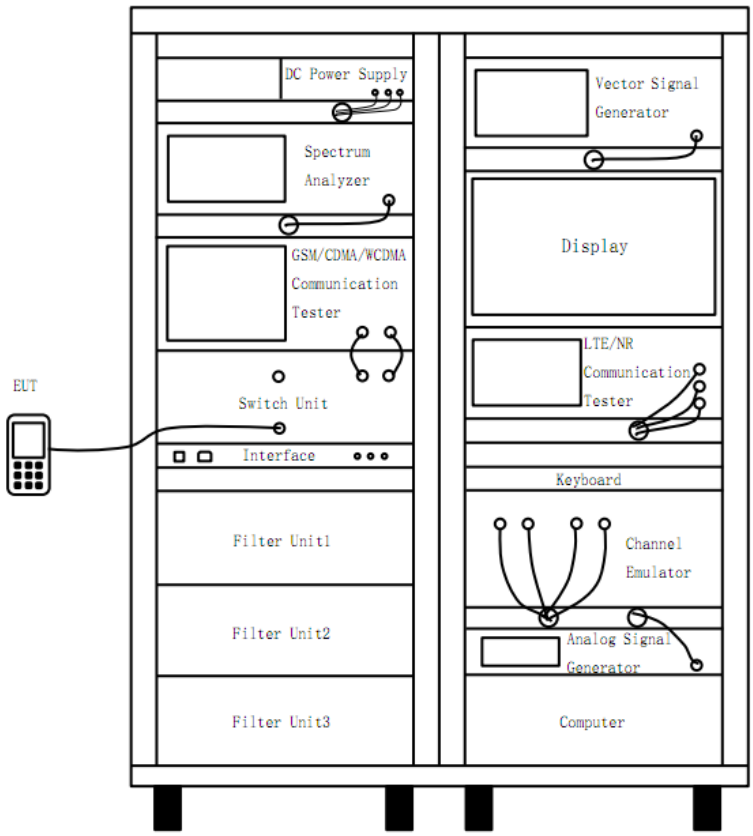
Test Mode	Channel Bandwidth (MHz)	UL Channel	UL Channel No.	UL Frequency (MHz)
		Middle Range	656000	3840
		High Range	664832	3972.48
	20	Low Range	647334	3710.01
		Middle Range	656000	3840
		High Range	664666	3969.99
	25	Low Range	647500	3712.5
		Middle Range	656000	3840
		High Range	664500	3967.5
	30	Low Range	647668	3715.02
		Middle Range	656000	3840
		High Range	664332	3964.98
	40	Low Range	648000	3720
		Middle Range	656000	3840
		High Range	664000	3960
	50	Low Range	648334	3725.01
		Middle Range	656000	3840
		High Range	663666	3954.99
	60	Low Range	648668	3730.02
		Middle Range	656000	3840
		High Range	663332	3949.98
	70	Low Range	649000	3735
		Middle Range	656000	3840
		High Range	663000	3945
	80	Low Range	649334	3740.01
		Middle Range	656000	3840
		High Range	662666	3939.99
	90	Low Range	649668	3745.02
		Middle Range	656000	3840
		High Range	662332	3934.98
	100	Low Range	650000	3750
		Middle Range	656000	3840
		High Range	662000	3930

Test Mode	Channel Bandwidth (MHz)	UL Channel	UL Channel No.	UL Frequency (MHz)
NR Band n78(3450-3550 MHz)	10	Low Range	630334	3455.01
		Middle Range	633332	3499.98
		High Range	636332	3544.98
	15	Low Range	630500	3457.5
		Middle Range	633332	3499.98
		High Range	636166	3542.49
	20	Low Range	630668	3460.02
		Middle Range	633332	3499.98
		High Range	636000	3540
	25	Low Range	630834	3462.51
		Middle Range	633332	3499.98
		High Range	635832	3537.48
	30	Low Range	631000	3465
		Middle Range	633332	3499.98
		High Range	635666	3534.99
	40	Low Range	631334	3470.01
		Middle Range	633332	3499.98
		High Range	635332	3529.98
	50	Low Range	631668	3475.02
		Middle Range	633332	3499.98
		High Range	635000	3525
	60	Low Range	632000	3480
		Middle Range	633332	3499.98
		High Range	634666	3519.99
	70	Low Range	632334	3485.01
		Middle Range	633332	3499.98
		High Range	634332	3514.98
	80	Low Range	632668	3490.02
		Middle Range	633332	3499.98
		High Range	634000	3510
	90	Low Range	633000	3495
		Middle Range	633332	3499.98
		High Range	633666	3504.99
	100	Low Range	633332	3499.98
		Middle Range	633332	3499.98
		High Range	633332	3499.98
NR Band n78(3700-3800 MHz)	10	Low Range	647000	3705
		Middle Range	650000	3750
		High Range	653000	3795
	15	Low Range	647168	3707.52

Test Mode	Channel Bandwidth (MHz)	UL Channel	UL Channel No.	UL Frequency (MHz)
		Middle Range	650000	3750
		High Range	652832	3792.48
	20	Low Range	647334	3710.01
		Middle Range	650000	3750
		High Range	652666	3789.99
	25	Low Range	647500	3712.5
		Middle Range	650000	3750
		High Range	652500	3787.5
	30	Low Range	647668	3715.02
		Middle Range	650000	3750
		High Range	652332	3784.98
	40	Low Range	648000	3720
		Middle Range	650000	3750
		High Range	652000	3780
	50	Low Range	648334	3725.01
		Middle Range	650000	3750
		High Range	651666	3774.99
	60	Low Range	648668	3730.02
		Middle Range	650000	3750
		High Range	651332	3769.98
	70	Low Range	649000	3735
		Middle Range	650000	3750
		High Range	651000	3765
	80	Low Range	649332	3739.98
		Middle Range	650000	3750
		High Range	650666	3759.99
	90	Low Range	649668	3745.02
		Middle Range	650000	3750
		High Range	650332	3754.98
	100	Low Range	650000	3750
		Middle Range	650000	3750
		High Range	650000	3750

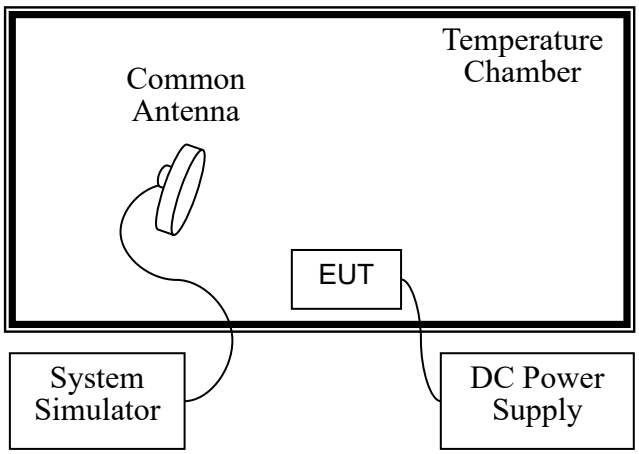
4.4 Test Setup

4.4.1 For Antenna Port Test



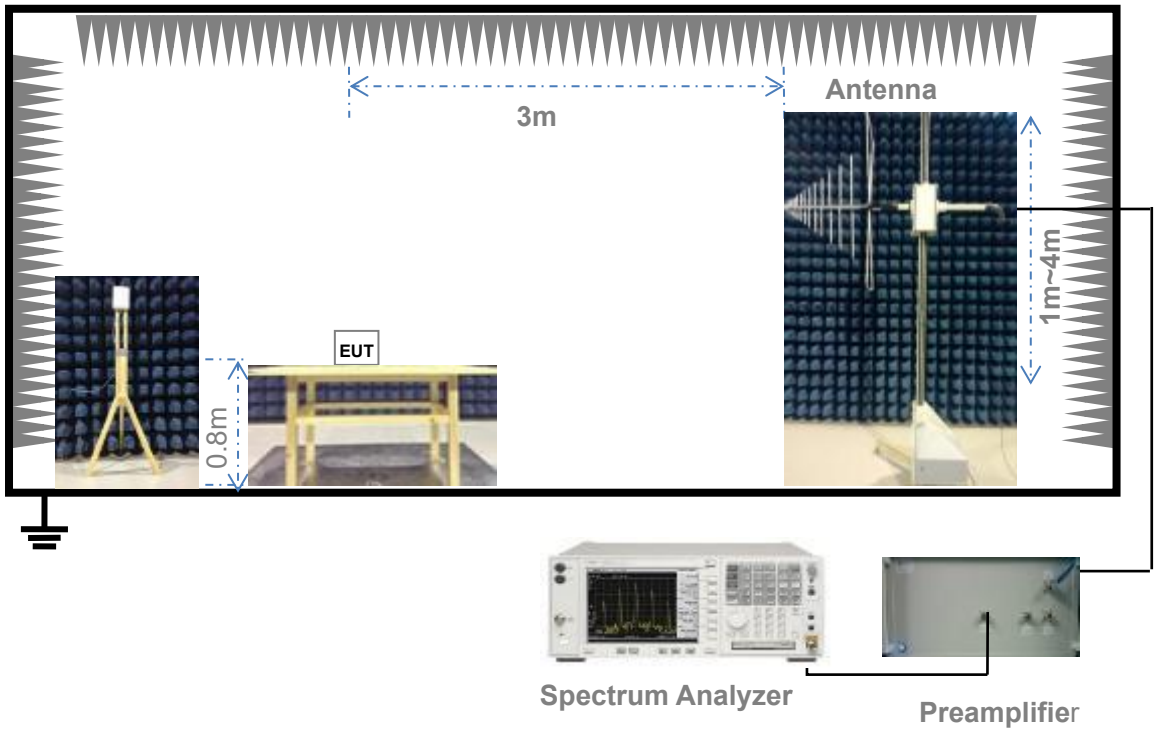
(Diagram 1)

4.4.2 For Frequency Stability Test



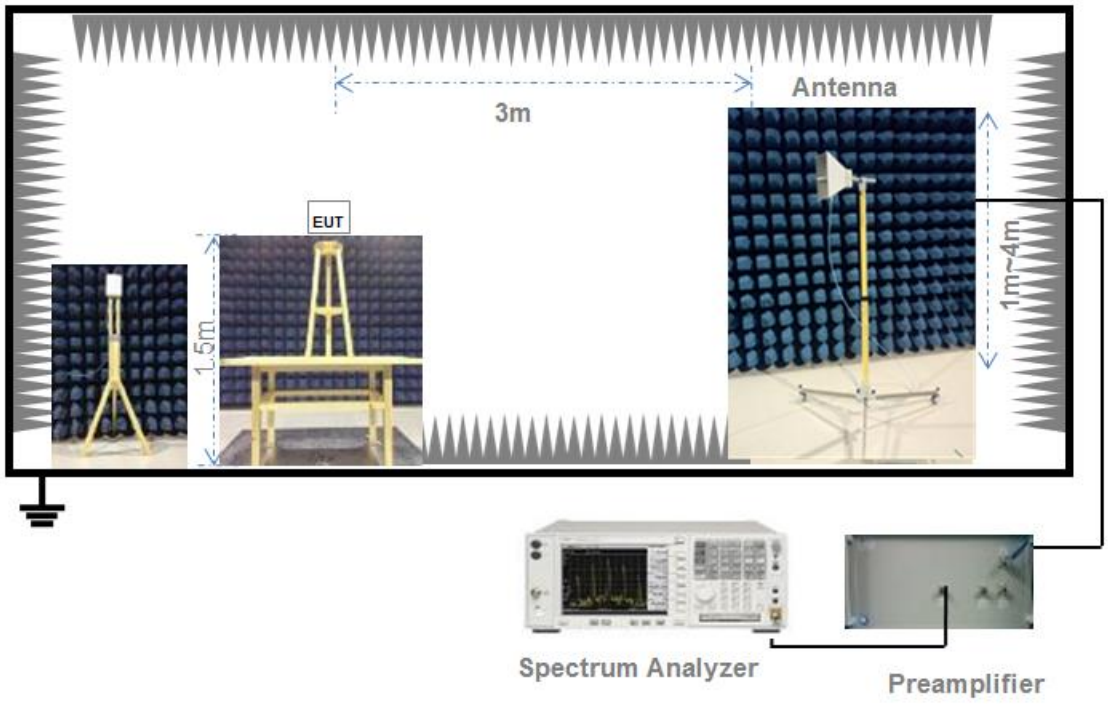
(Diagram 2)

4.4.3 For Radiated Test (30 MHz ~ 1 GHz)



(Diagram 3)

4.4.4 For Radiated Test (Above 1 GHz)



(Diagram 4)

5 TEST ITEMS

5.1 Transmitter Radiated Power (EIRP/ERP)

5.1.1 Limit

FCC § 2.1046 & 22.913(a) & 24.232(c) & 27.50(a) & 27.50(b) & 27.50(c) & 27.50(d) & 27.50(h) & 27.50(j) & 27.50(k) & 90.635(b) & 90.542(a) & 96.41(b)

According to FCC section 22.913(a) (5), the Effective Radiated Power (ERP) of mobile transmitters and auxiliary test transmitters must not exceed 7 watts.

According to FCC section 24.232(c), mobile and portable stations are limited to 2 watts EIRP and the equipment must employ a means for limiting power to the minimum necessary for successful communications.

According to FCC section 27.50(a) (3), for mobile and portable stations transmitting in the 2305-2315MHz band or the 2350-2360MHz band, the average EIRP must not exceed 50 milliwatts within any 1 megahertz of authorized bandwidth, except that for mobile and portable stations compliant with 3GPP LTE standards. For mobile and portable stations using time division duplexing (TDD) technology, the duty cycle must not exceed 38 percent in the 2305-2315 MHz and 2350-2360 MHz bands.

FCC section 27.50(b) (10), portable stations (hand-held devices) transmitting in the 746-757MHz, 776-788MHz, and 805-806MHz bands are limited to 3 watts ERP.

FCC section 27.50(c) (10), portable stations (hand-held devices) in the 600MHz uplink band and the 698-746MHz band, and fixed and mobile stations in the 600MHz uplink band are limited to 3 watts ERP.

FCC section 27.50(d) (4), fixed, mobile, and portable (hand-held) stations operating in the 1710-1755 MHz band and mobile and portable stations operating in the 1695-1710 MHz and 1755-1780 MHz bands are limited to 1 watt EIRP. Fixed stations operating in the 1710-1755 MHz band are limited to a maximum antenna height of 10 meters above ground. Mobile and portable stations operating in these bands must employ a means for limiting power to the minimum necessary for successful communications.

(7) Fixed, mobile, and portable (hand-held) stations operating in the 2000-2020 MHz band are limited to 2 watts EIRP.

And FCC section 27.50(h) (2), for mobile and other user stations, mobile stations are limited to 2.0 watts EIRP. All user stations are limited to 2.0 watts transmitter output power.

FCC section 27.50(j) (3), for mobile, and portable (hand-held) stations operating in the 3700-3980 MHz band are limited to 1 watt EIRP.

FCC section 27.50(k) (3), Mobile devices are limited to 1Watt (30 dBm) EIRP in the 3450-3550 MHz band.

According to FCC section 90.635(b), the maximum output power of the transmitter for mobile stations is 100 watts (20dBW).

According to FCC section 90.542(a) (7), portable stations (hand-held devices) transmitting in the 758-768 MHz band and the 788-798 MHz band are limited to 3 watts ERP.

FCC section 96.41(b), the maximum effective isotropic radiated power (EIRP) and maximum Power Spectral Density (PSD) of any CBSD and End User Device must comply with the limits shown in the table in this paragraph below:

Device	Maximum EIRP (dBm/10 megahertz)	Maximum PSD (dBm/MHz)
End User Device	23	N/A
Category A CBSD	30	20
Category B CBSD[note1]	47	37
Note1: Category B CBSDs will only be authorized for use after an ESC is approved and commercially deployed consistent with §§ 96.15 and 96.67.		

5.1.2 Test Setup

The section 4.4.1 (Diagram 1) test setup description is used for conducted test, and the section 4.4.3 and 4.4.4 (Diagram 3, 4) test setup description is used for radiated test. The photo of test setup please refer to ANNEX B.

5.1.3 Test Procedure

Description of the Conducted Output Power Measurement

The EUT is coupled to the SS with attenuator through power splitter; the RF load attached to EUT antenna terminal is 50Ohm; the path loss as the factor is calibrated to correct the reading. A system simulator is used to establish communication with the EUT, and its parameters are set to force the EUT transmitting at maximum output power. The measured power in the radio frequency on the transmitter output terminals shall be reported.

The relevant equation for determining the conducted measured value is:

Conducted Output Power Value (dBm) = Measured Value (dBm) + Path Loss (dB)

where:
Conducted Output Power Value = final conducted measured value in the conducted power test, in dBm;
Measured Value = measured conducted power received by spectrum analyzer or power meter, in dBm;
Path Loss = signal attenuation in the connecting cable between the transmitter and spectrum analyzer or power meter, including external cable loss, in dB;

During the test, the data of Path Loss (dB) is added in the spectrum analyzer or power meter, so Measured Value (dBm) is the final values which contains the data of Path Loss (dB).

For example:

In the conducted output power test, when measured value for GSM850 is 24.7 dBm, and path loss is 8.5 dB, then final conducted output power value is:

Conducted Output Power Value (dBm) = 24.7 dBm + 8.5 dB = 33.2 dBm

Description of the Transmitter Radiated Power Measurement

In many cases, the RF output power limits for licensed digital transmission devices is specified in terms of effective radiated power (ERP) or equivalent isotropic radiated power (EIRP). Typically, ERP is specified when the operating frequency is less than or equal to 1 GHz and EIRP is specified when the operating frequency is greater than 1 GHz. Both are determined by adding the transmit antenna gain to the conducted RF output power with the primary difference between the two being that when determining the ERP, the transmit antenna gain is referenced to a dipole antenna (i.e., dBd) whereas when determining the EIRP, the transmit antenna gain is referenced to an isotropic antenna (dBi).

Final measurement calculation as below:

The relevant equation for determining the ERP or EIRP from the conducted RF output power measured using the guidance provided above is:

ERP/EIRP = P_{Meas} + GT − LC

where:
ERP/EIRP = effective or equivalent radiated power, respectively (expressed in the same units as P_{Meas}, typically dBW or dBm);
P_{Meas} = measured transmitter output power or PSD, in dBm or dBW;
GT = gain of the transmitting antenna, in dBd (ERP) or dBi (EIRP);
dBd (ERP)=dBi (EIRP) -2.15 dB
LC = signal attenuation in the connecting cable between the transmitter and antenna, in dB.

For devices utilizing multiple antennas, KDB 662911 provides guidance for determining the effective array transmit antenna gain term to be used in the above equation.

For example:
In the EIRP test, when P_{Meas} value for GSM1900 is 30.2 dBm, LC is 0.6 dB, and GT is -3.4 dB, then final EIRP value is:
EIRP for GSM1900 = 30.2 dBm - 3.4 dBi - 0.6 dB = 26.2 dBm

The relevant equation for determining the ERP/EIRP from the radiated RF output power is:
ERP/EIRP (dBm) = SA Read Value (dBm) + Correction Factor (dB)

where:
ERP/EIRP = effective or equivalent radiated power, in dBm;
SA Read Value = measured transmitter power received by EMI receiver or spectrum analyzer, in dBm;
Correction Factor = total correction factor including cable loss, in dB;

During the test, the data of Correction Factor (dB) is added in the EMI receiver or spectrum analyzer, so SA Read Value (dBm) is the final values which contains the data of Correction Factor (dB).

For example:

In the ERP test, when SA read value for GSM850 is 21dBm, and correction factor is 8dB, then final ERP value for GSM850 is:

ERP (dBm) = 21dBm + 8dB = 29dBm

5.1.4 Test Result

Please refer to ANNEX A.1.

5.2 Peak to Average Ratio

5.2.1 Limit

FCC § 2.1046 & 24.232(d) & 27.50(d) & 27.50(j) & 27.50(k)

In addition, when the transmitter power is measured in terms of average value, the peak-to-average power ratio (PAPR) of the transmitter shall not exceed 13 dB for more than 0.1% of the time using a signal corresponding to the highest PAPR during periods of continuous transmission.

According to FCC section 24.232(d), power measurements for transmissions by stations authorized under this section may be made either in accordance with a Commission-approved average power technique or in compliance with 24.232 (e) of this section. In both instances, equipment employed must be authorized in accordance with the provisions of § 24.51. In measuring transmissions in this band using an average power technique, the peak-to-average ratio (PAR) of the transmission may not exceed 13 dB.

FCC section 24.232(e), peak transmit power must be measured over any interval of continuous transmission using instrumentation calibrated in terms of an rms equivalent voltage. The measurement results shall be properly adjusted for any instrument limitations, such as detector response times, limited resolution bandwidth capability when compared to the emission bandwidth, sensitivity, etc., so as to obtain a true peak measurement for the emission in question over the full bandwidth of the channel.

According to FCC section 27.50(d) (5) & 27.50(j) & 27.50(k), in measuring transmissions in this band using an average power technique, the peak-to-average ratio (PAR) of the transmission may not exceed 13dB.

5.2.2 Test Setup

The section 4.4.1 (Diagram 1) test setup description is used for this test. The photo of test setup please refer to ANNEX B.

5.2.3 Test Procedure

Here the lowest, middle and highest channels are selected to perform testing to verify the peak-to-average ratio.

According to KDB 971168 D01, there is CCDF procedure for PAPR:

a) Refer to instrument’s analyzer instruction manual for details on how to use the power statistics/CCDF function;

b) Set resolution/measurement bandwidth ≥ signal’s occupied bandwidth;

c) Set the number of counts to a value that stabilizes the measured CCDF curve;

d) Set the measurement interval as follows:

1) for continuous transmissions, set to 1 ms,

2) for burst transmissions, employ an external trigger that is synchronized with the EUT burst timing sequence, or use the internal burst trigger with a trigger level that allows the burst to stabilize and set the measurement interval to a time that is less than or equal to the burst duration.

e) Record the maximum PAPR level associated with a probability of 0.1%.

Alternate procedure for PAPR:

Use one of the procedures presented in 4.1 to measure the total peak power and record as P_{Pk}. Use one of the applicable procedures presented 4.2 to measure the total average power and record as P_{Avg}. Both the peak and average power levels must be expressed in the same logarithmic units (e.g., dBm). Determine the PAPR from:

PAPR (dB) = P_{Pk} (dBm) - P_{Avg} (dBm).

5.2.4 Test Result

Please refer to ANNEX A.2.

5.3 Occupied Bandwidth

5.3.1 Limit

FCC § 2.1049

The occupied bandwidth 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.

Many of the individual rule parts specify a relative OBW in lieu of the 99% OBW. In such cases, the OBW is defined as the width of the signal between two points, one below the carrier center frequency and on above the carrier center frequency, outside of which all emissions are attenuated by at least X dB below the transmitter power, where the value of X is typically specified as 26.

5.3.2 Test Setup

The section 4.4.1 (Diagram 1) test setup description is used for this test. The photo of test setup please refer to ANNEX B.

5.3.3 Test Procedure

The following procedure shall be used for measuring power bandwidth.

a) The spectrum analyzer center frequency is set to the nominal EUT channel center frequency. The frequency span for the spectrum analyzer shall be set wide enough to capture all modulation products including the emission skirts (i.e., two to five times the anticipated OBW).

b) The nominal IF filter bandwidth (3 dB RBW) shall be in the range of 1 to 5 % of the anticipated OBW, and the VBW shall be at least 3 times the RBW.

c) Set the reference level of the instrument as required to keep the signal from exceeding the maximum input mixer level for linear operation. In general, the peak of the spectral envelope must be at least 10log (OBW / RBW) below the reference level.

d) NOTE—Steps a) through c) may require iteration to adjust within the specified tolerances.

e) For -26 dB OBW, the dynamic range of the spectrum analyzer at the selected RBW shall be at least 10dB below the target “-X dB down” requirement, e.g. -26 dB OBW, the spectrum analyzer noise floor at the selected RBW shall be 36dB below the reference value.

f) Set the detection mode to peak, and the trace mode to max hold.

g) For 99% OBW, use the 99 % power bandwidth function of the spectrum analyzer (if available) and report the measured bandwidth.

If the instrument does not have a 99 % power bandwidth function, the trace data points are to be recovered and directly summed in linear power terms. The recovered amplitude data points, beginning at the lowest frequency, are placed in a running sum until 0.5 % of the total is reached; that frequency is

recorded as the lower frequency. The process is repeated until 99.5 % of the total is reached; that frequency is recorded as the upper frequency. The 99 % power bandwidth is the difference between these two frequencies.

h) For -26 dB OBW, determine the reference value: Set the EUT to transmit a modulated signal. Allow the trace to stabilize. Set the spectrum analyzer marker to the highest level of the displayed trace (this is the reference value).

Determine the “-X dB down amplitude” as equal to (reference value -X). Alternatively, this calculation can be performed by the analyzer by using the marker-delta function.

Place two markers, one at the lowest and the other at the highest frequency of the envelope of the spectral display such that each marker is at or slightly below “-X dB down amplitude” determined in step g). If a marker is below this “-X dB down amplitude” value it shall be placed as close as possible to this value. The OBW is the positive frequency difference between the two markers.

i) The OBW shall be reported by providing plot(s) of the measuring instrument display. The frequency and amplitude axes and scale shall be clearly labeled. Tabular data may be reported in addition to the plot(s).

j) Change variable modulations, coding, or channel bandwidth settings, then repeat above test procedures.

5.3.4 Test Result

Please refer to ANNEX A.3.

5.4 Frequency Stability

5.4.1 Limit

FCC § 2.1055 & 22.355 & 24.235 & 27.54 & 90.213

FCC § 2.1055

The frequency stability shall be measured with variation of ambient temperature as follows:

(1) The temperature is varied from -30°C to +50°C.

(2) Frequency measurements shall be made at the extremes of the specified temperature range and at intervals of not more than 10°C through the range.

The frequency stability shall be measured with variation of primary supply voltage as follows:

(1) Vary primary supply voltage from 85 to 115 percent of the nominal value for other than carried battery equipment.

(2) For hand carried, battery powered equipment, reduce primary supply voltage to the battery operating and point which shall be specified by the manufacture.

(3) The supply voltage shall be measured at the input to the cable normally provided with the equipment, or at the power supply terminals if cables are not normally provided.

FCC § 22.355

Except as otherwise provided in this part, the carrier frequency of each transmitter in the Public Mobile Services must be maintained within the tolerances given in Table C-1 of this section.

Table C-1—Frequency Tolerance for Transmitters in the Public Mobile Services

Frequency range (MHz)	Base, fixed (ppm)	Mobile > 3 watts (ppm)	Mobile ≤ 3 watts (ppm)
25 to 50	20.0	20.0	50.0
50 to 450	5.0	5.0	50.0
450 to 512	2.5	5.0	5.0
821 to 896	1.5	2.5	2.5
928 to 929	5.0	n/a	n/a
929 to 960	1.5	n/a	n/a
2110 to 2220	10.0	n/a	n/a

FCC § 24.235

The frequency stability shall be sufficient to ensure that the fundamental emission stays within the authorized frequency block.

FCC § 27.54

The frequency stability shall be sufficient to ensure that the fundamental emissions stay within the authorized bands of operation.

FCC § 90.213

The frequency stability shall not depart from the reference frequency in excess of ±2.5ppm for mobile stations.

5.4.2 Test Setup

The section 4.4.2 (Diagram 2) test setup description is used for this test. The photo of test setup please refer to ANNEX B.

5.4.3 Test Procedure

1. The EUT is placed in a temperature chamber.

2. The temperature is set to 25°C and allowed to stabilize. After sufficient soak time, the transmitting frequency error is measured.

3. The temperature is increased by not more than 10 degrees, allowed to stabilize and soak, and then repeat the frequency error measurement.

4. Repeat procedure 3 until +50°C and -30°C is reached.

5. Change supply voltage, and repeat measurement until extreme voltage is reached.

5.4.4 Test Result

Please refer to ANNEX A.4.

5.5 Spurious Emission at Antenna Terminals

5.5.1 Limit

FCC § 2.1051 & 22.917(a) & 24.238(a) & 27.53(a) & 27.53(c) & 27.53(f) & 27.53(g) & 27.53(h) & 27.53(l) & 27.53(m) & 27.53(n) & 90.691 & 90.543 & 96.41(e)

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 emissions are attenuated at least 26 dB below the transmitter power.

FCC § 22.917(a) & 24.238(a)

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. This is calculated to be -13 dBm.

FCC § 27.53(a) (4)

For mobile and portable stations operating in the 2305-2315MHz and 2350-2360MHz bands:

(1)By a factor of not less than: 43 + 10 log (P) dB on all frequencies between 2305 and 2320MHz and on all frequencies between 2345 and 2360MHz that are outside the licensed band(s) of operation, not less than 55 + 10 log (P) dB on all frequencies between 2320 and 2324MHz and on all frequencies between 2341 and 2345MHz, not less than 61 + 10 log (P) dB on all frequencies between 2324 and 2328MHz and on all frequencies between 2337 and 2341MHz, and not less than 67 + 10 log (P) dB on all frequencies between 2328 and 2337MHz.

(2)By a factor of not less than 43 + 10 log (P) dB on all frequencies between 2300 and 2305MHz, 55 + 10 log (P) dB on all frequencies between 2296 and 2300MHz, 61 + 10 log (P) dB on all frequencies between 2292 and 2296MHz, 67 + 10 log (P) dB on all frequencies between 2288 and 2292MHz, and 70 + 10 log (P) dB below 2288MHz.

(3)By a factor of not less than 43 + 10 log (P) dB on all frequencies between 2360 and 2365MHz, and not less than 70 + 10 log (P) dB above 2365MHz.

FCC § 27.53(c)

For operations in the 746–758 MHz band and the 776–788 MHz band, the power of any emission outside the licensee’s frequency band(s) of operation shall be attenuated below the transmitter power (P) within the licensed band(s) of operation, measured in watts, in accordance with the following:

(1) On any frequency outside the 746–758 MHz band, the power of any emission shall be attenuated outside the

band below the transmitter power (P) by at least 43 + 10 log (P) dB;

(2) On any frequency outside the 776–788 MHz band, the power of any emission shall be attenuated outside the

band below the transmitter power (P) by at least 43 + 10 log (P) dB;

(3) On all frequencies between 763–775 MHz and 793–805 MHz, by a factor not less than 76 + 10 log (P) dB in a 6.25 kHz band segment, for base and fixed stations;

(4) On all frequencies between 763–775 MHz and 793–805 MHz, by a factor not less than 65 + 10 log (P) dB in a 6.25 kHz band segment, for mobile and portable stations;

(5) Compliance with the provisions of paragraphs (c)(1) and (c)(2) of this section is based on the use of measurement instrumentation employing a resolution bandwidth of 100 kHz or greater.

However, in the 100 kHz bands immediately outside and adjacent to the frequency block, a resolution bandwidth

of at least 30 kHz may be employed;

(6) Compliance with the provisions of paragraphs (c)(3) and (c)(4) of this section is based on the use of measurement instrumentation such that the reading taken with any resolution bandwidth setting should be adjusted to indicate spectral energy in a 6.25 kHz segment.

FCC § 27.53(f)

For operations in the 746–758 MHz, 775–788 MHz, and 805–806 MHz bands, emissions in the band 1559–1610 MHz shall be limited to - 70 dBW/MHz equivalent isotropically radiated power (EIRP) for wideband signals, and -80 dBW EIRP for discrete emissions of less than 700 Hz bandwidth. For the purpose of equipment authorization, a transmitter shall be tested with an antenna that is representative of the type that will be used with the equipment in normal operation.

FCC § 27.53(g)

For operations in the 600MHz band and the 698-746MHz band, the power of any emission outside a licensee’s frequency band(s) of operation shall be attenuated below the transmitter power (P) within the licensed band(s) of operation, measured in watts, by at least 43+10*log(P) dB. Compliance with this provision is based on the use of measurement instrumentation employing a resolution bandwidth of 100 kHz bands immediately outside and adjacent to a licensee’s frequency block, a resolution bandwidth of at least 30 kHz may be employed.

FCC § 27.53(h) (1)

Except as otherwise specified below, for operations in the 1695-1710 MHz, 1710-1755 MHz, 1755-1780 MHz, 1915-1920 MHz, 1995-2000 MHz, 2000-2020 MHz, 2110-2155 MHz, 2155-2180 MHz, and 2180-2200 bands, the power of any emission outside a licensee's frequency block shall be attenuated below the transmitter power (P) in watts by at least 43 + 10 $\log_{10}$ (P) dB.

FCC § 27.53(l) (2)

For mobile operations in the 3700-3980 MHz band, the conducted power of any emission outside the licensee's authorized bandwidth shall not exceed −13 dBm/MHz.

FCC § 27.53(m) (4)

For mobile digital stations (BRS and EBS stations), the attenuation factor shall be not less than:

• 40+10logP dB (−10 dBm, 100 nW) on all frequencies between the channel edge and 5 MHz from the channel edge.

• 43+10logP dB (−13 dBm, 50 nW) on all frequencies between 5 MHz and X MHz from the channel edge,

• 55+10logP dB (−25 dBm, 3 nW) on all frequencies more than X MHz from the channel edge, where X is the greater of 6 MHz or the actual emission bandwidth (26 dB).

In addition, the attenuation factor shall not be less that 43 + 10 log (P) dB on all frequencies between 2490.5 MHz and 2496 MHz and 55 + 10 log (P) dB at or below 2490.5 MHz. Mobile Satellite Service licensees operating on frequencies below 2495 MHz may also submit a documented interference complaint against BRS licensees operating on channel BRS Channel 1 on the same terms and conditions as adjacent channel BRS or EBS licensees.

FCC § 27.53(n) (2)

For mobile operations in the 3450-3550 MHz band, the conducted power of any emission outside the licensee's authorized bandwidth shall not exceed −13 dBm/MHz.

FCC § 90.691

(a) Out-of-band emission requirement shall apply only to the “outer” channels included in an EA license and to spectrum adjacent to interior channels used by incumbent licensees. The emission limits are as follows:

(1) For any frequency removed from the EA licensee's frequency block by up to and including 37.5 kHz, the power of any emission shall be attenuated below the transmitter power (P) in watts by at least 116 $Log_{10}(f/6.1)$ decibels or 50 + 10 $Log_{10}(P)$ decibels or 80 decibels, whichever is the lesser attenuation, where f is the frequency removed from the center of the outer channel in the block in kilohertz and where f is greater than 12.5 kHz.

(2) For any frequency removed from the EA licensee's frequency block greater than 37.5 kHz, the power of any emission shall be attenuated below the transmitter power (P) in watts by at least 43 + $10Log_{10}(P)$ decibels or 80 decibels, whichever is the lesser attenuation, where f is the frequency removed from the center of the outer channel in the block in kilohertz and where f is greater than 37.5 kHz.

(b) When an emission outside of the authorized bandwidth causes harmful interference, the Commission may, at its discretion, require greater attenuation than specified in this section.

FCC § 90.543

(e) For operations in the 758–768 MHz and the 788–798 MHz bands, the power of any emission outside the licensee’s frequency band(s) of operation shall be attenuated below the transmitter power (P) within the licensed band(s) of operation, measured in watts, in accordance with the following:

(1) On all frequencies between 769–775 MHz and 799–805 MHz, by a factor not less than 76 + 10 log (P) dB in a 6.25 kHz band segment, for base and fixed stations.

(2) On all frequencies between 769–775 MHz and 799–805 MHz, by a factor not less than 65 + 10 log (P)

dB in a 6.25 kHz band segment, for mobile and portable stations.

(3) On any frequency between 775–788 MHz, above 805 MHz, and below 758 MHz, by at least 43 + 10 log (P) dB.

(4) Compliance with the provisions of paragraphs (e)(1) and (2) of this section is based on the use of measurement instrumentation such that the reading taken with any resolution bandwidth setting should be adjusted to indicate spectral energy in a 6.25 kHz segment.

(f) For operations in the 758–775 MHz and 788–805 MHz bands, all emissions including harmonics in the band 1559– 1610 MHz shall be limited to -70 dBW/ MHz equivalent isotropically radiated power (EIRP) for wideband signals, and -80 dBW EIRP for discrete emissions of less than 700 Hz bandwidth. For the purpose of equipment authorization, a transmitter shall be tested with an antenna that is representative of the type that will be used with the equipment in normal operation.

FCC § 96.41(e)

The conducted power of any emission outside the fundamental emission (whether in 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 emission shall not exceed-25 dBm/MHz.The conducted power of any emissions below 3530 MHz or above 3720 MHz shall not exceed-40 dBm/MHz.

Compliance with the applicable limits is based on the use of measurement instrumentation employing a resolution bandwidth of 100 kHz or greater for frequencies less than 1 GHz and 1 MHz or greater for frequencies greater than1GHz.However, in the 1 MHz bands immediately outside and adjacent to the frequency block a resolutionbandwidth 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 least26 dB below the transmitter power.

5.5.2 Test Setup

The section 4.4.1 (Diagram 1) test setup description was used for this test. The photo of test setup please refer to ANNEX B.

5.5.3 Test Procedure

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 blocks 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 emissions are attenuated at least 26 dB below the transmitter power.

1. The EUT is coupled to the system simulator and spectrum analyzer; the RF load attached to EUT antenna terminal is 50Ohm; the path loss as the factor is calibrated to correct the reading.

2. Base Station is used to establish communication with the EUT, and its parameters are set to force the EUT transmitting at maximum output power.

3. The RF output of the transmitter is connected to the input of the spectrum analyzer through sufficient attenuation.

4. Spurious emissions are tested with 0.001MHz RBW for frequency less than 150kHz, 0.01MHz RBW for frequency less than 30MHz, 0.1MHz RBW for frequency less than 1GHz, and 1MHz RBW for frequency above 1GHz. And sweep point number are at least 401, referring to following formula.

Sweep point number = Span/RBW

VBW=3*RBW

Detector Mode=mean or average power

5. Record the frequencies and levels of spurious emissions.

5.5.4 Test Result

Please refer to ANNEX A.5.

5.6 Band Edge

5.6.1 Limit

FCC § 2.1051 & 22.917(a) & 24.238(a) & 27.53(a) & 27.53(c) & 27.53(g) & 27.53(h) & 27.53(l) & 27.53(m) & 27.53(n) & 90.691 & 90.543 & 96.41(e)

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 emissions are attenuated at least 26 dB below the transmitter power.

FCC § 22.917(a) & 24.238(a)

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. This is calculated to be -13 dBm.

FCC § 27.53(a) (4)

For mobile and portable stations operating in the 2305-2315MHz and 2350-2360MHz bands:

(1)By a factor of not less than: 43 + 10 log (P) dB on all frequencies between 2305 and 2320MHz and on all frequencies between 2345 and 2360MHz that are outside the licensed band(s) of operation, not less than 55 + 10 log (P) dB on all frequencies between 2320 and 2324MHz and on all frequencies between 2341 and 2345MHz, not less than 61 + 10 log (P) dB on all frequencies between 2324 and 2328MHz and on all frequencies between 2337 and 2341MHz, and not less than 67 + 10 log (P) dB on all frequencies between 2328 and 2337MHz.

(2)By a factor of not less than 43 + 10 log (P) dB on all frequencies between 2300 and 2305MHz, 55 + 10 log (P) dB on all frequencies between 2296 and 2300MHz, 61 + 10 log (P) dB on all frequencies between 2292 and 2296MHz, 67 + 10 log (P) dB on all frequencies between 2288 and 2292MHz, and 70 + 10 log (P) dB below 2288MHz.

(3)By a factor of not less than 43 + 10 log (P) dB on all frequencies between 2360 and 2365MHz, and not less than 70 + 10 log (P) dB above 2365MHz.

FCC § 27.53(c)

For operations in the 746–758 MHz band and the 776–788 MHz band, the power of any emission outside the licensee’s frequency band(s) of operation shall be attenuated below the transmitter power (P) within the licensed band(s) of operation, measured in watts, in accordance with the following:

(1) On any frequency outside the 746–758 MHz band, the power of any emission shall be attenuated outside the

band below the transmitter power (P) by at least 43 + 10 log (P) dB;

(2) On any frequency outside the 776–788 MHz band, the power of any emission shall be attenuated outside the

band below the transmitter power (P) by at least 43 + 10 log (P) dB;

(3) On all frequencies between 763–775 MHz and 793–805 MHz, by a factor not less than 76 + 10 log (P) dB in a 6.25 kHz band segment, for base and fixed stations;

(4) On all frequencies between 763–775 MHz and 793–805 MHz, by a factor not less than 65 + 10 log (P) dB in a 6.25 kHz band segment, for mobile and portable stations;

(5) Compliance with the provisions of paragraphs (c)(1) and (c)(2) of this section is based on the use of measurement instrumentation employing a resolution bandwidth of 100 kHz or greater.

However, in the 100 kHz bands immediately outside and adjacent to the frequency block, a resolution bandwidth

of at least 30 kHz may be employed;

(6) Compliance with the provisions of paragraphs (c)(3) and (c)(4) of this section is based on the use of measurement instrumentation such that the reading taken with any resolution bandwidth setting should be adjusted to indicate spectral energy in a 6.25 kHz segment.

FCC § 27.53(g)

For operations in the 600MHz band and the 698-746MHz band, the power of any emission outside a licensee’s frequency band(s) of operation shall be attenuated below the transmitter power (P) within the licensed band(s) of operation, measured in watts, by at least 43+10*log(P) dB. Compliance with this provision is based on the use of measurement instrumentation employing a resolution bandwidth of 100 kHz bands immediately outside and adjacent to a licensee’s frequency block, a resolution bandwidth of at least 30 kHz may be employed.

FCC § 27.53(h) (1)

Except as otherwise specified below, for operations in the 1695-1710 MHz, 1710-1755 MHz, 1755-1780 MHz, 1915-1920 MHz, 1995-2000 MHz, 2000-2020 MHz, 2110-2155 MHz, 2155-2180 MHz, and 2180-2200 bands, the power of any emission outside a licensee's frequency block shall be attenuated below the transmitter power (P) in watts by at least 43 + 10 $\log_{10}$ (P) dB.

FCC § 27.53(l) (2)

For mobile operations in the 3700-3980 MHz band, the conducted power of any emission outside the licensee's authorized bandwidth shall not exceed −13 dBm/MHz.

FCC § 27.53(m) (4)

For mobile digital stations (BRS and EBS stations), the attenuation factor shall be not less than:

• 40+10logP dB (−10 dBm, 100 nW) on all frequencies between the channel edge and 5 MHz from the channel edge.

• 43+10logP dB (−13 dBm, 50 nW) on all frequencies between 5 MHz and X MHz from the channel edge,

• 55+10logP dB (−25 dBm, 3 nW) on all frequencies more than X MHz from the channel edge, where X is the greater of 6 MHz or the actual emission bandwidth (26 dB).

In addition, the attenuation factor shall not be less that 43 + 10 log (P) dB on all frequencies between 2490.5 MHz and 2496 MHz and 55 + 10 log (P) dB at or below 2490.5 MHz. Mobile Satellite Service licensees operating on frequencies below 2495 MHz may also submit a documented interference complaint against BRS licensees operating on channel BRS Channel 1 on the same terms and conditions as adjacent channel BRS or EBS licensees.

FCC § 27.53(n) (2)

For mobile operations in the 3450-3550 MHz band, the conducted power of any emission outside the licensee's authorized bandwidth shall not exceed −13 dBm/MHz.

FCC § 90.691

(a) Out-of-band emission requirement shall apply only to the “outer” channels included in an EA license and to spectrum adjacent to interior channels used by incumbent licensees. The emission limits are as follows:

(1) For any frequency removed from the EA licensee's frequency block by up to and including 37.5 kHz, the power of any emission shall be attenuated below the transmitter power (P) in watts by at least 116 Log_{10}(f/6.1) decibels or 50 + 10 Log_{10}(P) decibels or 80 decibels, whichever is the lesser attenuation, where f is the frequency removed from the center of the outer channel in the block in kilohertz and where f is greater than 12.5 kHz.

(2) For any frequency removed from the EA licensee's frequency block greater than 37.5 kHz, the power of any emission shall be attenuated below the transmitter power (P) in watts by at least 43 + 10Log_{10}(P) decibels or 80 decibels, whichever is the lesser attenuation, where f is the frequency removed from the center of the outer channel in the block in kilohertz and where f is greater than 37.5 kHz.

(b) When an emission outside of the authorized bandwidth causes harmful interference, the Commission may, at its discretion, require greater attenuation than specified in this section.

FCC § 90.543

(e) For operations in the 758–768 MHz and the 788–798 MHz bands, the power of any emission outside the licensee’s frequency band(s) of operation shall be attenuated below the transmitter power (P) within the licensed band(s) of operation, measured in watts, in accordance with the following:

(1) On all frequencies between 769–775 MHz and 799–805 MHz, by a factor not less than 76 + 10 log (P) dB in a 6.25 kHz band segment, for base and fixed stations.

(2) On all frequencies between 769–775 MHz and 799–805 MHz, by a factor not less than 65 + 10 log (P) dB in a 6.25 kHz band segment, for mobile and portable stations.

(3) On any frequency between 775–788 MHz, above 805 MHz, and below 758 MHz, by at least 43 + 10 log (P) dB.

(4) Compliance with the provisions of paragraphs (e)(1) and (2) of this section is based on the use of measurement instrumentation such that the reading taken with any resolution bandwidth setting should be adjusted to indicate spectral energy in a 6.25 kHz segment.

FCC § 96.41(e)

The conducted power of any emission outside the fundamental emission (whether in 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 emission shall not exceed-25 dBm/MHz.The conducted power of any emissions below 3530 MHz or above 3720 MHz shall not exceed-40 dBm/MHz.

Compliance with the applicable limits is based on the use of measurement instrumentation employing a resolution bandwidth of 100 kHz or greater for frequencies less than 1 GHz and 1 MHz or greater for frequencies greater than1GHz.However, in the 1 MHz bands immediately outside and adjacent to the frequency block a resolutionbandwidth 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 least26 dB below the transmitter power.

5.6.2 Test Setup

The section 4.4.1 (Diagram 1) test setup description was used for this test. The photo of test setup please refer to ANNEX B.

5.6.3 Test Procedure

The EUT, which is powered by the Battery, is coupled to the Spectrum Analyzer (SA) and the System Simulator (SS) with attenuators through the Power Splitter; the RF load attached to the EUT antenna terminal is 50 Ohm; the path loss as the factor is calibrated to correct the reading.

1.The EUT is coupled to the system simulator and spectrum analyzer; the RF load attached to EUT antenna terminal is 50Ohm; the path loss as the factor is calibrated to correct the reading.

2. Base Station is used to establish communication with the EUT, and its parameters are set to force the EUT transmitting at maximum output power.

3. The RF output of the transmitter is connected to the input of the spectrum analyzer through sufficient attenuation.

4. The center of the spectrum analyzer was set to block edge frequency.

5. Band edge are tested with 1%*cBW (RBW), and sweep point number referred to following formula.

Sweep point number = 2*Span/RBW

VBW=3RBW

6. Record the frequencies and levels of spurious emissions.

For mobile and portable stations, on all frequencies between 763–775 MHz and 793–805 MHz, by a factor not less than 65 + 10 log (P) dB in a 6.25 kHz band segment. Since it was not possible to set the resolution bandwidth to 6.25 kHz with the available equipment, a bandwidth of 10 kHz was used instead to show compliance. By using a 10 kHz bandwidth on the spectrum analyzer.

10*log(10 kHz / 6.25 kHz) = 2.04 dB
Limit Line = -35 dBm + 2.04 dB = -32.96dBm

5.6.4 Test Result

Please refer to ANNEX A.6.

5.7 Field Strength of Spurious Radiation

5.7.1 Limit

FCC § 2.1053 & 22.917(a) & 24.238(a) & 27.53(a) & 27.53(c) & 27.53(f) & 27.53(g) & 27.53(h) & 27.53(l) & 27.53(m) & 27.53(n) & 90.691& 90.543 & 96.41(e)

FCC § 22.917(a) & 24.238(a)

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. This is calculated to be -13 dBm.

FCC § 27.53(a) (4)

For mobile and portable stations operating in the 2305-2315MHz and 2350-2360MHz bands:

(1)By a factor of not less than: 43 + 10 log (P) dB on all frequencies between 2305 and 2320MHz and on all frequencies between 2345 and 2360MHz that are outside the licensed band(s) of operation, not less than 55 + 10 log (P) dB on all frequencies between 2320 and 2324MHz and on all frequencies between 2341 and 2345MHz, not less than 61 + 10 log (P) dB on all frequencies between 2324 and 2328MHz and on all frequencies between 2337 and 2341MHz, and not less than 67 + 10 log (P) dB on all frequencies between 2328 and 2337MHz.

(2)By a factor of not less than 43 + 10 log (P) dB on all frequencies between 2300 and 2305MHz, 55 + 10 log (P) dB on all frequencies between 2296 and 2300MHz, 61 + 10 log (P) dB on all frequencies between 2292 and 2296MHz, 67 + 10 log (P) dB on all frequencies between 2288 and 2292MHz, and 70 + 10 log (P) dB below 2288MHz.

(3)By a factor of not less than 43 + 10 log (P) dB on all frequencies between 2360 and 2365MHz, and not less than 70 + 10 log (P) dB above 2365MHz.

FCC § 27.53(c)

For operations in the 746–758 MHz band and the 776–788 MHz band, the power of any emission outside the licensee’s frequency band(s) of operation shall be attenuated below the transmitter power (P) within the licensed band(s) of operation, measured in watts, in accordance with the following:

(1) On any frequency outside the 746–758 MHz band, the power of any emission shall be attenuated outside the

band below the transmitter power (P) by at least 43 + 10 log (P) dB;

(2) On any frequency outside the 776–788 MHz band, the power of any emission shall be attenuated outside the

band below the transmitter power (P) by at least 43 + 10 log (P) dB;

(3) On all frequencies between 763–775 MHz and 793–805 MHz, by a factor not less than 76 + 10 log (P) dB in a 6.25 kHz band segment, for base and fixed stations;

(4) On all frequencies between 763–775 MHz and 793–805 MHz, by a factor not less than 65 + 10 log (P) dB in a 6.25 kHz band segment, for mobile and portable stations;

(5) Compliance with the provisions of paragraphs (c)(1) and (c)(2) of this section is based on the use of

measurement instrumentation employing a resolution bandwidth of 100 kHz or greater.

However, in the 100 kHz bands immediately outside and adjacent to the frequency block, a resolution bandwidth

of at least 30 kHz may be employed;

(6) Compliance with the provisions of paragraphs (c)(3) and (c)(4) of this section is based on the use of measurement instrumentation such that the reading taken with any resolution bandwidth setting should be adjusted to indicate spectral energy in a 6.25 kHz segment.

FCC § 27.53(f)

For operations in the 746–758 MHz, 775–788 MHz, and 805–806 MHz bands, emissions in the band 1559–1610 MHz shall be limited to - 70 dBW/MHz equivalent isotropically radiated power (EIRP) for wideband signals, and -80 dBW EIRP for discrete emissions of less than 700 Hz bandwidth. For the purpose of equipment authorization, a transmitter shall be tested with an antenna that is representative of the type that will be used with the equipment in normal operation.

FCC § 27.53(g)

For operations in the 600MHz band and the 698-746MHz band, the power of any emission outside a licensee’s frequency band(s) of operation shall be attenuated below the transmitter power (P) within the licensed band(s) of operation, measured in watts, by at least 43+10*log(P) dB. Compliance with this provision is based on the use of measurement instrumentation employing a resolution bandwidth of 100 kHz bands immediately outside and adjacent to a licensee’s frequency block, a resolution bandwidth of at least 30 kHz may be employed.

FCC § 27.53(h) (1)

Except as otherwise specified below, for operations in the 1695-1710 MHz, 1710-1755 MHz, 1755-1780 MHz, 1915-1920 MHz, 1995-2000 MHz, 2000-2020 MHz, 2110-2155 MHz, 2155-2180 MHz, and 2180-2200 bands, the power of any emission outside a licensee's frequency block shall be attenuated below the transmitter power (P) in watts by at least $43 + 10 \log_{10}(P)$ dB.

FCC § 27.53(l) (2)

For mobile operations in the 3700-3980 MHz band, the conducted power of any emission outside the licensee's authorized bandwidth shall not exceed −13 dBm/MHz.

FCC § 27.53(m) (4)

For mobile digital stations (BRS and EBS stations), the attenuation factor shall be not less than:

• 40+10logP dB (−10 dBm, 100 nW) on all frequencies between the channel edge and 5 MHz from the channel edge.

• 43+10logP dB (−13 dBm, 50 nW) on all frequencies between 5 MHz and X MHz from the channel edge,

• 55+10logP dB (−25 dBm, 3 nW) on all frequencies more than X MHz from the channel edge, where X is the greater of 6 MHz or the actual emission bandwidth (26 dB).

In addition, the attenuation factor shall not be less that 43 + 10 log (P) dB on all frequencies between 2490.5 MHz and 2496 MHz and 55 + 10 log (P) dB at or below 2490.5 MHz. Mobile Satellite Service

licensees operating on frequencies below 2495 MHz may also submit a documented interference complaint against BRS licensees operating on channel BRS Channel 1 on the same terms and conditions as adjacent channel BRS or EBS licensees.

FCC § 27.53(n) (2)

For mobile operations in the 3450-3550 MHz band, the conducted power of any emission outside the licensee's authorized bandwidth shall not exceed −13 dBm/MHz.

FCC § 90.691

(a) Out-of-band emission requirement shall apply only to the “outer” channels included in an EA license and to spectrum adjacent to interior channels used by incumbent licensees. The emission limits are as follows:

(1) For any frequency removed from the EA licensee's frequency block by up to and including 37.5 kHz, the power of any emission shall be attenuated below the transmitter power (P) in watts by at least 116 $Log_{10}(f/6.1)$ decibels or 50 + 10 $Log_{10}(P)$ decibels or 80 decibels, whichever is the lesser attenuation, where f is the frequency removed from the center of the outer channel in the block in kilohertz and where f is greater than 12.5 kHz.

(2) For any frequency removed from the EA licensee's frequency block greater than 37.5 kHz, the power of any emission shall be attenuated below the transmitter power (P) in watts by at least 43 + $10Log_{10}(P)$ decibels or 80 decibels, whichever is the lesser attenuation, where f is the frequency removed from the center of the outer channel in the block in kilohertz and where f is greater than 37.5 kHz.

(b) When an emission outside of the authorized bandwidth causes harmful interference, the Commission may, at its discretion, require greater attenuation than specified in this section.

FCC § 90.543

(e) For operations in the 758–768 MHz and the 788–798 MHz bands, the power of any emission outside the licensee’s frequency band(s) of operation shall be attenuated below the transmitter power (P) within the licensed band(s) of operation, measured in watts, in accordance with the following:

(1) On all frequencies between 769–775 MHz and 799–805 MHz, by a factor not less than 76 + 10 log (P) dB in a 6.25 kHz band segment, for base and fixed stations.

(2) On all frequencies between 769–775 MHz and 799–805 MHz, by a factor not less than 65 + 10 log (P) dB in a 6.25 kHz band segment, for mobile and portable stations.

(3) On any frequency between 775–788 MHz, above 805 MHz, and below 758 MHz, by at least 43 + 10 log (P) dB.

(4) Compliance with the provisions of paragraphs (e)(1) and (2) of this section is based on the use of measurement instrumentation such that the reading taken with any resolution bandwidth setting should be adjusted to indicate spectral energy in a 6.25 kHz segment.

(f) For operations in the 758–775 MHz and 788–805 MHz bands, all emissions including harmonics in the band 1559– 1610 MHz shall be limited to -70 dBW/ MHz equivalent isotropically radiated power (EIRP) for

wideband signals, and -80 dBW EIRP for discrete emissions of less than 700 Hz bandwidth. For the purpose of equipment authorization, a transmitter shall be tested with an antenna that is representative of the type that will be used with the equipment in normal operation.

FCC § 96.41(e)

The conducted power of any emission outside the fundamental emission (whether in 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 emission shall not exceed-25 dBm/MHz.The conducted power of any emissions below 3530 MHz or above 3720 MHz shall not exceed-40 dBm/MHz.

Compliance with the applicable limits is based on the use of measurement instrumentation employing a resolution bandwidth of 100 kHz or greater for frequencies less than 1 GHz and 1 MHz or greater for frequencies greater than1GHz.However, in the 1 MHz bands immediately outside and adjacent to the frequency block a resolutionbandwidth 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 least26 dB below the transmitter power.

5.7.2 Test Setup

The section 4.4.3 and 4.4.4 (Diagram 3, 4) test setup description was used for this test. The photo of test setup please refer to ANNEX B.

5.7.3 Test Procedure

1. On a test site, the EUT shall be placed at 80cm height on a turn table, and in the position close to normal use as declared by the applicant.

2. The test antenna shall be oriented initially for vertical polarization located 3 m from EUT to correspond to the fundamental frequency of the transmitter.

3. The output of the test antenna shall be connected to the measuring receiver and the peak detector is used for the measurement.

4. During the measurement of the EUT, the resolution bandwidth was to 1 MHz and the average bandwidth

was set to 1 MHz.

5. The transmitter shall be switched on; the measuring receiver shall be tuned to the frequency of the

transmitter under test.

6. The test antenna shall be raised and lowered through the specified range of height until the maximum

signal level is detected by the measuring receiver.

7. The transmitter shall be rotated through 360° in the horizontal plane, until the maximum signal level is detected by the measuring receiver.

8. The test antenna shall be raised and lowered again through the specified range of height until the maximum signal level is detected by the measuring receiver.

9. The maximum signal level detected by the measuring receiver shall be noted.

10. The EUT was replaced by half-wave dipole (824 ~ 849 MHz) or horn antenna (1 850 ~ 1 910 MHz) connected to a signal generator.

11. In necessary, the input attenuator setting on the measuring receiver shall be adjusted in order to increase

the sensitivity of the measuring receiver.

12. The test antenna shall be raised and lowered through the specified range of height to ensure that the maximum signal is received.

13. The input signal to the substitution antenna shall be adjusted to the level that produces a level detected by the measuring received, which is equal to the level noted while the transmitter radiated power was measured, corrected for the change of input attenuator setting of the measuring receiver.

14. 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.

15. The measurement shall be repeated with the test antenna and the substitution antenna orientated for horizontal polarization.

Final measurement calculation as below:

The relevant equation for determining the ERP/EIRP from the radiated RF output power is:

ERP/EIRP (dBm) = SA Read Value (dBm) + Correction Factor (dB)

where:
ERP/EIRP = effective or equivalent radiated power, in dBm;
SA Read Value = measured transmitter power received by EMI receiver or spectrum analyzer, in dBm;
Correction Factor = total correction factor including cable loss, in dB;

During the test, the data of Correction Factor (dB) is added in the EMI receiver or spectrum analyzer, so SA Read Value (dBm) is the final values which contains the data of Correction Factor (dB).

For example:

In the ERP test, when SA read value for GSM850 is 21dBm, and correction factor is 8dB, then final ERP value for GSM850 is:

ERP (dBm) = 21dBm + 8dB = 29dBm

5.7.4 Test Result

Please refer to ANNEX A.7.

ANNEX A TEST RESULTS

A.1 Transmitter Radiated Power (EIRP/ERP)

Note: The Transmitter Radiated Power (EIRP/ERP) please refer to the Report No. SEWA2309000114RG01 & No. SEWA23090001 & No. 14RG02ZEWA2310000147RG & No. ZEWA2310000147RG02, which issued by SGS-CSTC Standards Technical Services Co., Ltd. Shenzhen Branch on Oct. 31, 2023, **7 Appendixes.**

A.2 Peak to Average Ratio

Note: The Peak to Average Ratio please refer to the Report No. SEWA2309000114RG01 & No. SEWA23090001 & No. 14RG02ZEWA2310000147RG & No. ZEWA2310000147RG02, which issued by SGS-CSTC Standards Technical Services Co., Ltd. Shenzhen Branch on Oct. 31, 2023, **7 Appendixes.**

A.3 Occupied Bandwidth

Note: The Occupied Bandwidth please refer to the Report No. SEWA2309000114RG01 & No. SEWA23090001 & No. 14RG02ZEWA2310000147RG & No. ZEWA2310000147RG02, which issued by SGS-CSTC Standards Technical Services Co., Ltd. Shenzhen Branch on Oct. 31, 2023, **7 Appendixes.**

A.4 Frequency Stability

Note: The Frequency Stability please refer to the Report No. SEWA2309000114RG01 & No. SEWA23090001 & No. 14RG02ZEWA2310000147RG & No. ZEWA2310000147RG02, which issued by SGS-CSTC Standards Technical Services Co., Ltd. Shenzhen Branch on Oct. 31, 2023, **7 Appendixes.**

A.5 Spurious Emission at Antenna Terminals

Note: The Spurious Emission at Antenna Terminals please refer to the Report No. SEWA2309000114RG01 & No. SEWA23090001 & No. 14RG02ZEWA2310000147RG & No. ZEWA2310000147RG02, which issued by SGS-CSTC Standards Technical Services Co., Ltd. Shenzhen Branch on Oct. 31, 2023, **7 Appendixes.**

A.6 Band Edge

Note: The Band Edge please refer to the Report No. SEWA2309000114RG01 & No. SEWA23090001 & No. 14RG02ZEWA2310000147RG & No. ZEWA2310000147RG02, which issued by SGS-CSTC Standards Technical Services Co., Ltd. Shenzhen Branch on Oct. 31, 2023, **7 Appendixes.**

A.7 Field Strength of Spurious Radiation

Note 1: All modes have been tested, and only the worst case data are shown here.

Note 2: The frequencies of verdict which are marked by "N/A" should be ignored because they are UE carrier frequency.

Note 3: Test plots please refer to the document “Annex No.: BL-SZ2430942-502 Data Part 1.pdf”.

Note 4: The disturbance above 26.5GHz was very low, and the above harmonics were the highest point could befound when testing, so only the worst case data displayed in this report.

ANNEX B TEST SETUP PHOTOS

Please refer to the document “BL-SZ2430942-AR.PDF”.

ANNEX C EUT EXTERNAL PHOTOS

Please refer to the document “BL-SZ2430942-AW.PDF”.

ANNEX D EUT INTERNAL PHOTOS

Please refer to the document “BL-SZ2430942-AI.PDF”.

Statement

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--END OF REPORT--