

TEST REPORT

Applicant: Vantiva USA LLC

EUT Description: 5G Module

Model: FG180-NA

Brand: N/A

FCC ID: G95FG180NA

Standards: FCC CFR Title 47 Part 2
FCC CFR Title 47 Part 22
FCC CFR Title 47 Part 24
FCC CFR Title 47 Part 27
FCC CFR Title 47 Part 90
FCC CFR Title 47 Part 96

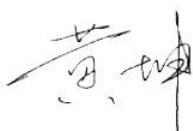
Date of Receipt: 2024/09/05 (Original Report TCWA24080023401)
2024/12/23 (Original Report TCWA24120038201)
2025/05/07 (This Report TCWA25040028001)

Date of Test: 2024/09/05 to 2024/12/16 (Original Report TCWA24080023401)
2024/12/23 to 2025/02/19 (Original Report TCWA24120038201)
2025/05/07 to 2025/05/30 (This Report TCWA25040028001)

Date of Issue: 2025/06/03

TOWE. tested the above equipment in accordance with the requirements set forth in the above standards. The test results show that the equipment tested is capable of demonstrating compliance with the requirements as documented in this report.

the results documented in this report apply only the tested sample, under the conditions and modes of operation as described herein. It is the manufacturer's responsibility assure that additional production units of the model are manufactured with identical electrical and mechanical components. All sample tested were in good operating condition throughout the entire test program. Measurement Uncertainties are published for informational purposes only and were not taken into account unless noted otherwise. without written approval of TOWE, the test report shall not be reproduced except in full.



Huangkun
Approved By:



ChenChengfu
Reviewed By:

Revision History

Rev.	Issue Date	Description	Revised by
01	2025/06/03	Original	Chen Chengfu

Reporting Declaration

Remark for report TCWA24120038201:

According to the declaration letter from client, this report all frequency bands have updated antenna gain, so the Field Strength of Spurious Radiation was retested and EIRP/ERP was recalculated. Due to some frequency bands needing to meet FCC limits and reducing power, so the power test data of LTE Band 30/42/43/48/CA_48C were retested.

All the other data reflected in this report are based on the original report with report number TCWA24080023401 (FCC ID: ZMOFG180WNA).

Remark for report TCWA25040028001:

According to the declaration letter from client, this report the worst data of Field Strength of Spurious Radiation is spot checked.

All the other data reflected in this report are based on the original report with report number TCWA24120038201 (FCC ID: G95FG180NA).

Summary of Test Results

FCC Part	Test Band	Test Item	Test Result
§2.1046 §22.913(a)(5) §27.50(b)(9) §27.50(c)(10) §90.542(a)	LTE Band 5/26(824 ~ 849MHz)/CA_5B LTE Band 13 LTE Band 12/17/CA_12B/71 LTE Band 14	Effective Radiated Power	Pass
§2.1046 §24.232(c) §27.50(d)(4) §27.50(h)(2) §27.50(k)(3)	LTE Band 2/25/CA_2C LTE Band 4/66/CA_66B/CA_66C LTE Band 7/38/41/CA_7C/CA_41C LTE Band 42	Effective Isotropic Radiated Power	Pass
§27.50(a)(3) §96.41	LTE Band 30 LTE Band 42/43/48/CA_48C	Maximum EIRP and Maximum PSD	Pass
§2.1046 §90.635(b)	LTE Band 26(814 ~ 824MHz)	Transmitter Conducted Output Power	Pass
§22.913(d) §24.232(d) §27.50(k)(4) §96.41 §27.50(d)(5)	LTE Band 5/26(824 ~ 849MHz)/CA_5B LTE Band 2/25/CA_2C LTE Band 42 LTE Band 42/43/48/CA_48C Others Band	Peak-Average Ratio	Pass
§2.1049	All Band	Occupied Bandwidth	Pass
§2.1051 §90.210(b) §90.691(a)	LTE Band 14 LTE Band 26(814 ~ 824MHz)	Emission Mask	Pass
§2.1051 §22.917(a) §24.238(a) §27.53(c) §27.53(g) §27.53(h) §27.53(m) §90.543(e)(2)(3) §27.53(a)(4) §27.53(n)(2) §27.53(g) §96.41	LTE Band 5/26(824 ~ 849MHz)/CA_5B LTE Band 2/25/CA_2C LTE Band 13 LTE Band 12/17/CA_12B LTE Band 4/66/CA_66B/CA_66C LTE Band 7/38/41/CA_7C/CA_41C LTE Band 14 LTE Band 30 LTE Band 42 LTE Band 71 LTE Band 42/43/48/CA_48C	Band Edge	Pass
§2.1051 §22.917(a) §24.238(a) §27.53(c) §27.53(g) §27.53(h) §27.53(m) §90.691	LTE Band 5/26(824 ~ 849MHz)/CA_5B LTE Band 2/25/CA_2C LTE Band 13 LTE Band 12/17/CA_12B LTE Band 4/66/CA_66B/CA_66C LTE Band 7/38/41/CA_7C/CA_41C LTE Band 26(814 ~ 824MHz)	Spurious Emission at Antenna Terminals	Pass

FCC Part	Test Band	Test Item	Test Result
§90.543(c)(f) §27.53(a)(4) §27.53(n)(2) §27.53(g) §96.41	LTE Band 14 LTE Band 30 LTE Band 42 LTE Band 71 LTE Band 42/43/48/CA_48C		
§2.1053 §22.917(a) §24.238(a) §27.53(c)&(f) §27.53(g) §27.53(h) §27.53(m) §90.691 §90.543(c)(f) §27.53(a)(4) §27.53(n)(2) §27.53(g) §96.41	LTE Band 5/26(824 ~ 849MHz)/CA_5B LTE Band 2/25/CA_2C LTE Band 13 LTE Band 12/17/CA_12B LTE Band 4/66/CA_66B/CA_66C LTE Band 7/38/41/CA_7C/CA_41C LTE Band 26(814 ~ 824MHz) LTE Band 14 LTE Band 30 LTE Band 42 LTE Band 71 LTE Band 42/43/48/CA_48C	Field Strength of Spurious Radiation	Pass
§2.1055 §22.355 §24.235 §27.54 §90.213 §96.41	LTE Band 5/26(824 ~ 849MHz)/CA_5B LTE Band 2/25/CA_2C Others Band LTE Band 26(814 ~ 824MHz)/14 LTE Band 42/43/48/CA_48C	Frequency Stability	Pass
§96.41	LTE Band 48/CA_48C	Adjacent Channel Leakage Ratio	Pass
Remark: Pass: Meet the requirement.			

Table of Contents

1	General Description	7
1.1	Lab Information.....	7
1.1.1	Testing Location	7
1.1.2	Test Facility / Accreditations	7
1.2	Client Information	7
1.2.1	Applicant.....	7
1.2.2	Manufacturer.....	7
1.3	Product Information.....	8
2	Test Configuration	10
2.1	Test Channel	10
2.2	Test Mode	21
2.3	Support Unit used in test	21
2.4	Test Environment.....	21
2.5	Test RF Cable	21
2.6	Modifications.....	21
2.7	Test Setup Diagram	22
2.7.1	Conducted Configuration	22
2.7.2	Radiated Configuration	23
3	Equipment and Measurement Uncertainty.....	24
3.1	Test Equipment List.....	24
3.2	Measurement Uncertainty	26
4	Test Results.....	27
4.1	Output Power (ERP / EIRP / Conducted Power)	27
4.2	Maximum EIRP and Maximum PSD	29
4.3	Peak-Average Ratio	31
4.4	Occupied Bandwidth	32
4.5	Band Edge and Emission Mask	33
4.6	Spurious Emission at Antenna Terminals	35
4.7	Field Strength of Spurious Radiation.....	37
4.8	Frequency Stability V.S. Temperature, Voltage.....	40
5	Test Setup Photos.....	41
	Appendix.....	42

1 General Description

1.1 Lab Information

1.1.1 Testing Location

These measurements tests were conducted at the Sushi TOWE Wireless Testing(Shenzhen) Co., Ltd. facility located at F401 and F101, Building E, Hongwei Industrial Zone, Liuxian 3rd Road, Bao'an District, Shenzhen, China. The measurement facility is compliant with the test site requirements specified in ANSI C63.4-2014
Tel.: +86-755-27212361

Contact Email: info@towewireless.com

1.1.2 Test Facility / Accreditations

A2LA (Certificate Number: 7088.01)

This laboratory is accredited in accordance with the recognized International Standard ISO/IEC 17025:2017 General requirements for the competence of testing and calibration laboratories. This accreditation demonstrates technical competence for a defined scope and the operation of a laboratory quality management system (refer to joint ISO-ILAC-IAF Communiqué dated April 2017).

FCC Designation No.: CN1353

Sushi TOWE Wireless Testing(Shenzhen) Co., Ltd. has been recognized as an accredited testing laboratory. Designation Number: CN1353.

ISED CAB identifier: CN0152

Sushi TOWE Wireless Testing(Shenzhen) Co., Ltd. has been recognized by ISED as an accredited testing laboratory.

CAB identifier: CN0152

Company Number: 31000

1.2 Client Information

1.2.1 Applicant

Applicant:	Vantiva USA LLC
Address:	4855 Peachtree Industrial Blvd, Suite 200, Norcross, GA 30092, USA

1.2.2 Manufacturer

Manufacturer:	Vantiva USA LLC
Address:	4855 Peachtree Industrial Blvd, Suite 200, Norcross, GA 30092, USA

1.3 Product Information

EUT Description:	5G Module		
Model:	FG180-NA		
Brand:	N/A		
Hardware Version:	V1.3		
Software Version:	99111.1000.00.01.01.04		
SN:	C7X2QQ002A (Original)		
IMEI:	353652770103803 (This)		
Device Capabilities:			
Modulation Type:	LTE:	☒ QPSK, ☒ 16QAM, ☒ 64QAM, ☒ 256QAM	
Operation Frequency Range:	Band	TX Frequency	RX Frequency
	LTE Band 2	1850 to 1910 MHz	1930 to 1990 MHz
	LTE Band 4	1710 to 1755 MHz	2110 to 2155 MHz
	LTE Band 5	824 to 849 MHz	869 to 894 MHz
	LTE Band 7	2500 to 2570 MHz	2620 to 2690 MHz
	LTE Band 12	699 to 716 MHz	729 to 746 MHz
	LTE Band 13	777 to 787 MHz	746 to 756 MHz
	LTE Band 14	788 to 798 MHz	758 to 768 MHz
	LTE Band 17	704 to 716 MHz	734 to 746 MHz
	LTE Band 25	1850 to 1915MHz	1930 to 1995 MHz
	LTE Band 26 (814 to 824 MHz)	814 to 824MHz	859 to 869 MHz
	LTE Band 26 (824 to 849 MHz)	824 to 849 MHz	869 to 894 MHz
	LTE Band 30	2305 to 2315 MHz	2350 to 2360 MHz
	LTE Band 38	2570 to 2620 MHz	2570 to 2620 MHz
	LTE Band 41	2496 to 2690MHz	2496 to 2690MHz
	LTE Band 42	3450 to 3550 MHz	3450 to 3550 MHz
		3550 to 3600 MHz	3550 to 3600 MHz
	LTE Band 43	3600 to 3700 MHz	3600 to 3700 MHz
	LTE Band 48	3550 to 3700 MHz	3550 to 3700 MHz
	LTE Band 66	1710 to 1780 MHz	2110 to 2200 MHz
	LTE Band 71	663 to 698 MHz	617 to 652 MHz
	LTE UL CA: CA_12B; CA_2C; CA_41C; CA_48C; CA_5B; CA_66B; CA_66C; CA_7C; UL CA_12A-25A; UL CA_12A-30A; UL CA_12A-66A; UL CA_13A-66A; UL CA_14A-30A; UL CA_14A-66A; UL CA_25A-26A; UL CA_2A-12A; UL CA_2A-13A; UL CA_2A-14A; UL CA_2A-17A; UL CA_2A-30A; UL CA_2A-4A; UL CA_2A-5A; UL CA_2A-66A; UL CA_2A-71A; UL CA_2A-7A; UL CA_30A-66A; UL CA_4A-12A; UL CA_4A-17A; UL CA_4A-30A; UL CA_4A-5A; UL CA_4A-71A; UL CA_4A-7A; UL CA_5A-25A; UL CA_5A-30A; UL CA_5A-66A; UL CA_5A-7A; UL CA_66A-71A; UL CA_7A-12A; UL CA_7A-13A; UL CA_7A-26A; UL CA_7A-66A; UL CA_2A-26A; UL CA_7A-71A; UL CA_25A-66A;		

	UL CA_7A-25A;		
Power Class:	Class 2: LTE Band 41; LTE UL CA_41C		
Antenna:	Type:	Dipole	
	Model:	GHT-019A	
	Impedance	50Ω	
	SN.:	N/A	
Antenna Gain:	Band	Ant1(dBi)	Ant8(dBi)
	LTE Band 2:	2.5	4
	LTE Band 4:	2.5	3.5
	LTE Band 5:	/	1.5
	LTE Band 7:	3.5	/
	LTE Band 12:	/	1.7
	LTE Band 13:	/	1
	LTE Band 14:	/	1.2
	LTE Band 17:	/	1.7
	LTE Band 25:	2.5	4
	LTE Band 26:	/	1.5
	LTE Band 30:	3	/
	LTE Band 38:	3.3	3.8
	LTE Band 41:	4	3.8
	LTE Band 42: (3450 to 3550 MHz)	3.5	3
	LTE Band 42: (3550 to 3600 MHz)	3	4.7
	LTE Band 43:	3.5	4.8
	LTE Band 48:	3.5	4.6
	LTE Band 66:	2.5	3.5
	LTE Band 71:	1.2	1.2
Remark: The above EUT's information was declared by applicant, please refer to the specifications or user manual for more detailed description.			

2 Test Configuration

2.1 Test Channel

Band	Bandwidth	TX Frequency			RX Frequency		
		Range	Channel	Frequency	Range	Channel	Frequency
LTE Band 2	1.4MHz	Low	18607	1850.7 MHz	Low	607	1930.7 MHz
		Middle	18900	1880 MHz	Middle	900	1960 MHz
		High	19193	1909.3 MHz	High	1193	1989.3 MHz
	3MHz	Low	18615	1851.5 MHz	Low	615	1931.5 MHz
		Middle	18900	1880 MHz	Middle	900	1960 MHz
		High	19185	1908.5 MHz	High	1185	1988.5 MHz
	5MHz	Low	18625	1852.5 MHz	Low	625	1932.5 MHz
		Middle	18900	1880 MHz	Middle	900	1960 MHz
		High	19175	1907.5 MHz	High	1175	1987.5 MHz
	10MHz	Low	18650	1855 MHz	Low	650	1935 MHz
		Middle	18900	1880 MHz	Middle	900	1960 MHz
		High	19150	1905 MHz	High	1150	1985 MHz
	15MHz	Low	18675	1857.5 MHz	Low	675	1937.5 MHz
		Middle	18900	1880 MHz	Middle	900	1960 MHz
		High	19125	1902.5 MHz	High	1125	1982.5 MHz
LTE Band 4	1.4MHz	Low	18700	1860 MHz	Low	700	1940 MHz
		Middle	18900	1880 MHz	Middle	900	1960 MHz
		High	19100	1900 MHz	High	1100	1980 MHz
	3MHz	Low	19957	1710.7 MHz	Low	1957	2110.7 MHz
		Middle	20175	1732.5 MHz	Middle	2175	2132.5MHz
		High	20393	1754.3 MHz	High	2393	2154.3 MHz
	5MHz	Low	19965	1711.5 MHz	Low	1965	2111.5 MHz
		Middle	20175	1732.5 MHz	Middle	2175	2132.5MHz
		High	20385	1753.5 MHz	High	2385	2153.5 MHz
	10MHz	Low	19975	1712.5 MHz	Low	1975	2112.5 MHz
		Middle	20175	1732.5 MHz	Middle	2175	2132.5MHz
		High	20375	1752.5 MHz	High	2375	2152.5 MHz
	15MHz	Low	20000	1715 MHz	Low	2115	2115 MHz
		Middle	20175	1732.5 MHz	Middle	2175	2132.5MHz
		High	20350	1750 MHz	High	2350	2150 MHz
LTE Band 5	1.4MHz	Low	20025	1717.5 MHz	Low	2025	2117.5 MHz
		Middle	20175	1732.5 MHz	Middle	2175	2132.5MHz
		High	20325	1747.5 MHz	High	2325	2147.5 MHz
	3MHz	Low	20050	1720 MHz	Low	2050	2120 MHz
		Middle	20175	1732.5 MHz	Middle	2175	2132.5MHz
		High	20300	1745 MHz	High	2300	2145 MHz
	5MHz	Low	20407	824.7 MHz	Low	2407	869.7 MHz
		Middle	20525	836.5 MHz	Middle	2525	881.5 MHz
		High	20643	848.3 MHz	High	2643	893.3 MHz
	10MHz	Low	20415	825.5 MHz	Low	2415	870.5 MHz
		Middle	20525	836.5 MHz	Middle	2525	881.5 MHz
		High	20635	847.5 MHz	High	2635	892.5 MHz
LTE Band 7	5MHz	Low	20425	826.5 MHz	Low	2425	871.5 MHz
		Middle	20525	836.5 MHz	Middle	2525	881.5 MHz
		High	20625	846.5 MHz	High	2625	891.5 MHz
	10MHz	Low	20450	829 MHz	Low	2450	874 MHz
		Middle	20525	836.5 MHz	Middle	2525	881.5 MHz
		High	20600	844 MHz	High	2600	889 MHz
	15MHz	Low	20775	2502.5 MHz	Low	2775	2622.5 MHz
		Middle	21100	2535 MHz	Middle	3100	2655 MHz
		High	21425	2567.5 MHz	High	3425	2687.5 MHz
LTE Band 7	10MHz	Low	20800	2505 MHz	Low	2800	2625 MHz

Band	Bandwidth	TX Frequency			RX Frequency		
		Range	Channel	Frequency	Range	Channel	Frequency
		Middle	21100	2535 MHz	Middle	3100	2655 MHz
		High	21400	2565 MHz	High	3400	2685 MHz
		Low	20825	2507.5 MHz	Low	2825	2627.5 MHz
	15MHz	Middle	21100	2535 MHz	Middle	3100	2655 MHz
		High	21375	2562.5 MHz	High	3375	2682.5 MHz
		Low	20850	2510 MHz	Low	2850	2630 MHz
	20MHz	Middle	21100	2535 MHz	Middle	3100	2655 MHz
		High	21350	2560 MHz	High	3350	2680 MHz
LTE Band 12	1.4MHz	Low	23017	699.7 MHz	Low	5017	729.7 MHz
		Middle	23095	707.5 MHz	Middle	5095	737.5 MHz
		High	23173	715.3 MHz	High	5173	745.3 MHz
	3MHz	Low	23025	700.5 MHz	Low	5025	730.5 MHz
		Middle	23095	707.5 MHz	Middle	5095	737.5 MHz
		High	23165	714.5 MHz	High	5165	744.5 MHz
	5MHz	Low	23035	701.5 MHz	Low	5035	731.5 MHz
		Middle	23095	707.5 MHz	Middle	5095	737.5 MHz
		High	23155	713.5 MHz	High	5155	743.5 MHz
	10MHz	Low	23060	704 MHz	Low	5060	734 MHz
		Middle	23095	707.5 MHz	Middle	5095	737.5 MHz
		High	23130	711 MHz	High	5130	741 MHz
LTE Band 13	5MHz	Low	23205	779.5 MHz	Low	5205	748.5 MHz
		Middle	23230	782 MHz	Middle	5230	751 MHz
		High	23255	784.5 MHz	High	5255	753.5 MHz
	10MHz	Low	23230	782 MHz	Low	5230	751 MHz
		Middle	23230	782 MHz	Middle	5230	751 MHz
		High	23230	782 MHz	High	5230	751 MHz
LTE band 14	5MHz	Low	23305	790.5 MHz	Low	5305	760.5 MHz
		Middle	23330	793 MHz	Middle	5330	763 MHz
		High	23355	795.5 MHz	High	5355	765.5 MHz
	10MHz	Low	23330	793 MHz	Low	5330	763 MHz
		Middle	23330	793 MHz	Middle	5330	763 MHz
		High	23330	793 MHz	High	5330	763 MHz
LTE band 17	5MHz	Low	23755	706.5 MHz	Low	5755	736.5 MHz
		Middle	23790	710 MHz	Middle	5790	740 MHz
		High	23825	713.5 MHz	High	5825	743.5 MHz
	10MHz	Low	23780	709 MHz	Low	5780	739 MHz
		Middle	23790	710 MHz	Middle	5790	740 MHz
		High	23800	711 MHz	High	5800	741 MHz
LTE Band 25	1.4MHz	Low	26047	1850.7 MHz	Low	8047	1930.7 MHz
		Middle	26365	1882.5 MHz	Middle	8365	1962.5 MHz
		High	26683	1914.3 MHz	High	8683	1994.3 MHz
	3MHz	Low	26055	1851.5 MHz	Low	8055	1931.5 MHz
		Middle	26365	1882.5 MHz	Middle	8365	1962.5 MHz
		High	26675	1913.5 MHz	High	8675	1993.5 MHz
	5MHz	Low	26065	1852.5 MHz	Low	8065	1932.5 MHz
		Middle	26365	1882.5 MHz	Middle	8365	1962.5 MHz
		High	26665	1912.5 MHz	High	8665	1992.5 MHz
	10MHz	Low	26090	1855 MHz	Low	8090	1935 MHz
		Middle	26365	1882.5 MHz	Middle	8365	1962.5 MHz
		High	26640	1910 MHz	High	8640	1990 MHz
	15MHz	Low	26115	1857.5 MHz	Low	8115	1937.5 MHz
		Middle	26365	1882.5 MHz	Middle	8365	1962.5 MHz
		High	26615	1907.5 MHz	High	8615	1987.5 MHz
	20MHz	Low	26140	1860 MHz	Low	8140	1940 MHz
		Middle	26365	1882.5 MHz	Middle	8365	1962.5 MHz
		High	26590	1905 MHz	High	8590	1985 MHz

Band	Bandwidth	TX Frequency			RX Frequency		
		Range	Channel	Frequency	Range	Channel	Frequency
LTE Band 26 (814-824)	1.4MHz	Low	26697	814.7 MHz	Low	8697	859.7 MHz
		Middle	26740	819 MHz	Middle	8740	864MHz
		High	26783	823.3 MHz	High	8783	868.3 MHz
	3MHz	Low	26705	815.5 MHz	Low	8705	860.5 MHz
		Middle	26740	819 MHz	Middle	8740	864MHz
		High	26775	822.5 MHz	High	8775	867.5 MHz
	5MHz	Low	26715	816.5 MHz	Low	8715	861.5 MHz
		Middle	26740	819 MHz	Middle	8740	864MHz
		High	26765	821.5 MHz	High	8765	866.5 MHz
	10MHz	Low	26740	819 MHz	Low	8740	864MHz
		Middle	26740	819 MHz	Middle	8740	864MHz
		High	26740	819 MHz	High	8740	864MHz
LTE Band 26 (824-849)	1.4MHz	Low	26797	824.7 MHz	Low	8797	869.7 MHz
		Middle	26915	836.5 MHz	Middle	8915	881.5 MHz
		High	27033	848.3 MHz	High	9033	893.3 MHz
	3MHz	Low	26805	825.5 MHz	Low	8805	870.5 MHz
		Middle	26915	836.5 MHz	Middle	8915	881.5 MHz
		High	27025	847.5 MHz	High	9025	892.5 MHz
	5MHz	Low	26815	826.5 MHz	Low	8815	871.5 MHz
		Middle	26915	836.5 MHz	Middle	8915	881.5 MHz
		High	27015	846.5 MHz	High	9015	891.5 MHz
	10MHz	Low	26840	829 MHz	Low	8840	844 MHz
		Middle	26915	836.5 MHz	Middle	8915	881.5 MHz
		High	26990	844 MHz	High	8990	889 MHz
	15MHz	Low	26865	831.5 MHz	Low	8865	876.5 MHz
		Middle	26915	836.5 MHz	Middle	8915	881.5 MHz
		High	26965	841.5 MHz	High	8965	886.5 MHz
LTE Band 30	5MHz	Low	27685	2307.5 MHz	Low	9795	2352.5MHz
		Middle	27710	2310MHz	Middle	9820	2355 MHz
		High	27735	2312.5 MHz	High	9845	2357.5MHz
	10MHz	Low	27710	2310 MHz	Low	9820	2355 MHz
		Middle	27710	2310 MHz	Middle	9820	2355 MHz
		High	27710	2310 MHz	High	9820	2355 MHz
LTE Band 38	5MHz	Low	37775	2572.5 MHz	Low	37775	2572.5 MHz
		Middle	38000	2595 MHz	Middle	38000	2595 MHz
		High	38225	2617.5 MHz	High	38225	2617.5 MHz
	10MHz	Low	37800	2575 MHz	Low	37800	2575 MHz
		Middle	38000	2595 MHz	Middle	38000	2595 MHz
		High	38200	2615 MHz	High	38200	2615 MHz
	15MHz	Low	37825	2577.5 MHz	Low	37825	2577.5 MHz
		Middle	38000	2595 MHz	Middle	38000	2595 MHz
		High	38175	2612.5 MHz	High	38175	2612.5 MHz
	20MHz	Low	37850	2580 MHz	Low	37850	2580 MHz
		Middle	38000	2595 MHz	Middle	38000	2595 MHz
		High	38150	2610 MHz	High	38150	2610 MHz
LTE Band 41 (2496-2690)	5MHz	Low	39675	2498.5 MHz	Low	39675	2498.5 MHz
		Middle	40620	2593 MHz	Middle	40620	2593 MHz
		High	41565	2687.5 MHz	High	41565	2687.5 MHz
	10MHz	Low	39700	2501 MHz	Low	39700	2501 MHz
		Middle	40620	2593 MHz	Middle	40620	2593 MHz
		High	41540	2685 MHz	High	41540	2685 MHz
	15MHz	Low	39725	2503.5 MHz	Low	39725	2503.5 MHz
		Middle	40620	2593 MHz	Middle	40620	2593 MHz
		High	41515	2682.5 MHz	High	41515	2682.5 MHz
	20MHz	Low	39750	2506 MHz	Low	39750	2506 MHz
		Middle	40620	2593 MHz	Middle	40620	2593 MHz

Band	Bandwidth	TX Frequency			RX Frequency		
		Range	Channel	Frequency	Range	Channel	Frequency
LTE Band 66	1.4MHz	High	41490	2680 MHz	High	41490	2680 MHz
		Low	131979	1710.7 MHz	Low	66443	2110.7 MHz
		Middle	132322	1745 MHz	Middle	66786	2145MHz
	3MHz	High	132665	1779.3 MHz	High	67329	2199.3 MHz
		Low	131987	1711.5 MHz	Low	66451	2111.5 MHz
		Middle	132322	1745 MHz	Middle	66786	2145MHz
	5MHz	High	132657	1778.5MHz	High	67321	2198.5MHz
		Low	131997	1712.5 MHz	Low	66461	2112.5 MHz
		Middle	132322	1745 MHz	Middle	66786	2145MHz
	10MHz	High	132647	1777.5 MHz	High	67311	2197.5 MHz
		Low	132022	1715 MHz	Low	66486	2115 MHz
		Middle	132322	1745 MHz	Middle	66786	2145MHz
	15MHz	High	132622	1775 MHz	High	67286	2195 MHz
		Low	132047	1717.5 MHz	Low	66511	2117.5 MHz
		Middle	132322	1745 MHz	Middle	66786	2145MHz
	20MHz	High	132597	1772.5 MHz	High	67261	2192.5 MHz
		Low	132072	1720 MHz	Low	66536	2120 MHz
		Middle	132322	1745 MHz	Middle	66786	2145MHz
LTE Band 71	5MHz	High	132572	1770 MHz	High	67236	2190 MHz
		Low	133147	665.5 MHz	Low	68611	619.5 MHz
		Middle	133297	680.5 MHz	Middle	68761	634.5 MHz
	10MHz	High	133447	695.5 MHz	High	68911	649.5 MHz
		Low	133172	668 MHz	Low	68636	622 MHz
		Middle	133297	680.5 MHz	Middle	68761	634.5 MHz
	15MHz	High	133422	693 MHz	High	68886	647 MHz
		Low	133197	670.5 MHz	Low	68661	624.5 MHz
		Middle	133297	680.5 MHz	Middle	68761	634.5 MHz
	20MHz	High	133397	690.5 MHz	High	68861	644.5 MHz
		Low	133222	673 MHz	Low	68686	627 MHz
		Middle	133297	680.5 MHz	Middle	68761	634.5 MHz
		High	133372	688 MHz	High	68836	642 MHz

Test Mode	Bandwidth	TX / RX	RF Channel		
			Low (L)	Middle (M)	High (H)
LTE Band 42 (3450-3550)	5MHz	TX	Channel 42115	Channel 42590	Channel 43065
			3452.5 MHz	3500 MHz	3547.5 MHz
		RX	Channel 42115	Channel 42590	Channel 43065
			3452.5 MHz	3500 MHz	3547.5 MHz
	10MHz	TX	Channel 42140	Channel 42590	Channel 43040
			3455 MHz	3500 MHz	3545 MHz
		RX	Channel 42140	Channel 42590	Channel 43040
			3455 MHz	3500 MHz	3545 MHz
	15MHz	TX	Channel 42165	Channel 42590	Channel 43015
			3457.5 MHz	3500 MHz	3542.5 MHz
		RX	Channel 42165	Channel 42590	Channel 43015
			3457.5 MHz	3500 MHz	3542.5 MHz
	20MHz	TX	Channel 42190	Channel 42590	Channel 42990
			3460 MHz	3500 MHz	3540 MHz
		RX	Channel 42190	Channel 42590	Channel 42990
			3460 MHz	3500 MHz	3540 MHz

Test Mode	Bandwidth	TX / RX	RF Channel		
			Low (L)	Middle (M)	High (H)
LTE Band 42 (3550-3600)	5MHz	TX	Channel 40115	Channel 43340	Channel 43565
			3552.5 MHz	3575 MHz	3597.5 MHz
		RX	Channel 40115	Channel 43340	Channel 43565
			3552.5 MHz	3575 MHz	3597.5 MHz
	10MHz	TX	Channel 43140	Channel 43340	Channel 43540
			3555 MHz	3575 MHz	3595 MHz
		RX	Channel 43140	Channel 43340	Channel 43540
			3555 MHz	3575 MHz	3595 MHz
	15MHz	TX	Channel 43165	Channel 43340	Channel 43515
			3557.5 MHz	3575 MHz	3592.5 MHz
		RX	Channel 43165	Channel 43340	Channel 43515
			3557.5 MHz	3575 MHz	3592.5 MHz
	20MHz	TX	Channel 43190	Channel 43340	Channel 43490
			3560 MHz	3575 MHz	3590 MHz
		RX	Channel 43190	Channel 43340	Channel 43490
			3560 MHz	3575 MHz	3590 MHz

Test Mode	Bandwidth	TX / RX	RF Channel		
			Low (L)	Middle (M)	High (H)
LTE Band 43 (3600-3700)	5MHz	TX/RX	Channel 43615	Channel44090	Channel 44565
			3602.5 MHz	3650.0 MHz	3697.5 MHz
	10MHz	TX/RX	Channel 43640	Channel44090	Channel 44540
			3605.0 MHz	3650.0 MHz	3695.0 MHz
	15MHz	TX/RX	Channel 43665	Channel44090	Channel 44515
			3607.5 MHz	3650.0 MHz	3692.5 MHz
	20MHz	TX/RX	Channel 43690	Channel44090	Channel 44490
			3610 MHz	3650.0 MHz	3690.0 MHz

Test Mode	Bandwidth	TX / RX	RF Channel		
			Low (L)	Middle (M)	High (H)
LTE Band 48	5MHz	TX/RX	Channel 55265	Channel55990	Channel 56715
			3552.5 MHz	3625.0 MHz	3697.5 MHz
	10MHz	TX/RX	Channel 55290	Channel55990	Channel 56690
			3555.0 MHz	3625.0 MHz	3695.0 MHz
	15MHz	TX/RX	Channel 55315	Channel55990	Channel 56665
			3557.5 MHz	3625.0 MHz	3692.5 MHz
	20MHz	TX/RX	Channel 55340	Channel55990	Channel 56640
			3560.0 MHz	3625.0 MHz	3690.0 MHz

Table 4.3.1.1.2A-2: Test frequencies for CA_2C

Range	CC-Combo / N _{RB,agg} [RB]	CC1 Note1					CC2 Note1				
		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+100	25	18633	1853.3	633	1933.3	100	18750	1865	750	1945
		100	18700	1860	700	1940	25	18817	1871.7	817	1951.7
	50+75	50	18653	1855.3	653	1935.3	75	18773	1867.3	773	1947.3
		75	18675	1857.5	675	1937.5	50	18795	1869.5	795	1949.5
	50+100	50	18655	1855.5	655	1935.5	100	18799	1869.9	799	1949.9
		100	18700	1860	700	1940	50	18844	1874.4	844	1954.4
	75+75	75	18675	1857.5	675	1937.5	75	18825	1872.5	825	1952.5
	75+100	75	18678	1857.8	678	1937.8	100	18849	1874.9	849	1954.9
		100	18700	1860	700	1940	75	18871	1877.1	871	1957.1
	100+100	100	18700	1860	700	1940	100	18898	1879.8	898	1959.8
Mid	25+100	25	18808	1870.8	808	1950.8	100	18925	1882.5	925	1962.5
		100	18875	1877.5	875	1957.5	25	18992	1889.2	992	1969.2
	50+75	50	18829	1872.9	829	1952.9	75	18949	1884.9	949	1964.9
		75	18851	1875.1	851	1955.1	50	18971	1887.1	971	1967.1
	50+100	50	18806	1870.6	806	1950.6	100	18950	1885	950	1965
		100	18851	1875.1	851	1955.1	50	18995	1889.5	995	1969.5
	75+75	75	18825	1872.5	825	1952.5	75	18975	1887.5	975	1967.5
	75+100	75	18803	1870.3	803	1950.3	100	18974	1887.4	974	1967.4
		100	18826	1872.6	826	1952.6	75	18997	1889.7	997	1969.7
	100+100	100	18801	1870.1	801	1950.1	100	18999	1889.9	999	1969.9
High	25+100	25	18983	1888.3	983	1968.3	100	19100	1900	1100	1980
		100	19050	1895	1050	1975	25	19167	1906.7	1167	1986.7
	50+75	50	19005	1890.5	1005	1970.5	75	19125	1902.5	1125	1982.5
		75	19027	1892.7	1027	1972.7	50	19147	1904.7	1147	1984.7
	50+100	50	18956	1885.6	956	1965.6	100	19100	1900	1100	1980
		100	19001	1890.1	1001	1970.1	50	19145	1904.5	1145	1984.5
	75+75	75	18975	1887.5	975	1967.5	75	19125	1902.5	1125	1982.5
	75+100	75	18929	1882.9	929	1962.9	100	19100	1900	1100	1980
		100	18951	1885.1	951	1965.1	75	19122	1902.2	1122	1982.2
	100+100	100	18902	1880.2	902	1960.2	100	19100	1900	1100	1980
Note 1: Carriers in increasing frequency order.											

Table 4.3.1.1.5A-1: Test frequencies for CA_5B

Range	CC-Combo / N _{RB_agg} [RB]	CC1 Note1					CC2 Note1				
		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

Note 1: Carriers in increasing frequency order.

Table 4.3.1.1.7A-1: Test frequencies for CA_7C

Range	CC-Combo / N _{RB_agg} [RB]	CC1 Note1					CC2 Note1				
		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
Mid	100+100	100	20850	2510	2850	2630	100	21048	2529.8	3048	2649.8
		100	21006	2525.6	3006	2645.6	100	21150	2540	3150	2660
	50+100	50	21051	2530.1	3051	2650.1	50	21195	2544.5	3195	2664.5
		100	21051	2530.1	3051	2650.1	50	21171	2542.1	3171	2662.1
	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
High	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
		100	21206	2545.6	3206	2665.6	100	21350	2560	3350	2680
	50+100	50	21251	2550.1	3251	2670.1	50	21395	2564.5	3395	2684.5
		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	21225	2547.5	3225	2667.5	75	21375	2562.5	3375	2682.5
	75+75	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
		100	21152	2540.2	3152	2660.2	100	21350	2560	3350	2680

Note 1: Carriers in increasing frequency order.

Table 4.3.1.1.12A-1: Test frequencies for CA_12B

Range	CC-Combo / N _{RB_agg} [RB]	CC1 Note1					CC2 Note1				
		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	23035	701.5	5035	731.5	25	23083	706.3	5083	736.3
	25+50	25	23038	701.8	5038	731.8	50	23110	709	5110	739
Mid	25+25	25	23071	705.1	5071	735.1	25	23119	709.9	5119	739.9
	25+50	25	23048	702.8	5048	732.8	50	23120	710	5120	740
High	25+25	25	23107	708.7	5107	738.7	25	23155	713.5	5155	743.5
	25+50	25	23058	703.8	5058	733.8	50	23130	711	5130	741

Note 1: Carriers in increasing frequency order.

Table 4.3.1.2.9A-1: Test frequencies for CA_41C

Range	CC-Combo / N _{RB_agg} [RB]	CC1 Note1			CC2 Note1		
		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	39728	2503.8	100	39899	2520.9
	75+100	100	39750	2506	75	39921	2523.1
		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	40523	2583.3	100	40694	2600.4
	75+100	100	40546	2585.6	75	40717	2602.7
		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	41319	2662.9	100	41490	2680
	75+100	100	41341	2665.1	75	41512	2682.2
		100	41292	2660.2	100	41490	2680

Note 1: Carriers in increasing frequency order.

LTE CA 48C(3550-3700):

Range	CC-Combo / NRB_agg [RB]	CC1 Note1			CC2 Note1		
		BW [RB]	NUL/DL	fUL/DL [MHz]	BW [RB]	NUL/DL	fUL/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
Note 1: Carriers in increasing frequency order.							

Table 4.3.1.1.66A-1: Test frequencies for CA_66B

Range	CC-Combo / N _{RB,agg} [RB]	CC1 Note1					CC2 Note1				
		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
Mid	50+50	50	132022	1715	66486	2115	50	132121	1724.9	66585	2124.9
	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 ²	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 ³	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
Note 1: Carriers in increasing frequency order.											
Note 2: Applicable for intra-band contiguous CA without UL CA.											
Note 3: Applicable for intra-band contiguous CA with UL CA.											

LTE CA_66C:

Range	CC-Combo / N _{RB_agg} [RB]	CC1 Note1					CC2 Note1					
		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 ²	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 ³	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	
Note 1: Carriers in increasing frequency order.												
Note 2: Applicable for intra-band contiguous CA without UL CA.												
Note 3: Applicable for intra-band contiguous CA with UL CA.												

2.2 Test Mode

Test Mode	Description
TM 1	EUT communication with simulated station in LTE/QPSK mode
TM 2	EUT communication with simulated station in LTE/16QAM mode
TM 3	EUT communication with simulated station in LTE/64QAM mode
TM 4	EUT communication with simulated station in LTE/256QAM mode

Note:

1. The maximum Conducted Power is calculated from max output power and max antenna gain, only the maximum Conducted Power is shown in the report.

2.3 Support Unit used in test

Description	Manufacturer	Model	Serial Number
Development Board *	Fibocom	ADP-FG190B-NA-21-00	/

Remark: * the information of table is provided by client.

2.4 Test Environment

Temperature:	Normal: 15°C ~ 35°C, Extreme: -30°C ~ +50°C
Relative Humidity	45-56 % RH Ambient
Voltage:	Nominal: 3.8 Vdc, Extreme: Low 3.3 Vdc, High 4.4 Vdc

2.5 Test RF Cable

For all conducted test items: The offset level is set spectrum analyzer to compensate the RF cable loss and attenuator factor between RF conducted output port and spectrum analyzer. With the offset compensation, the spectrum analyzer reading level will be exactly the RF output level.

The spectrum analyzer offset is derived from RF cable loss and attenuator factor.

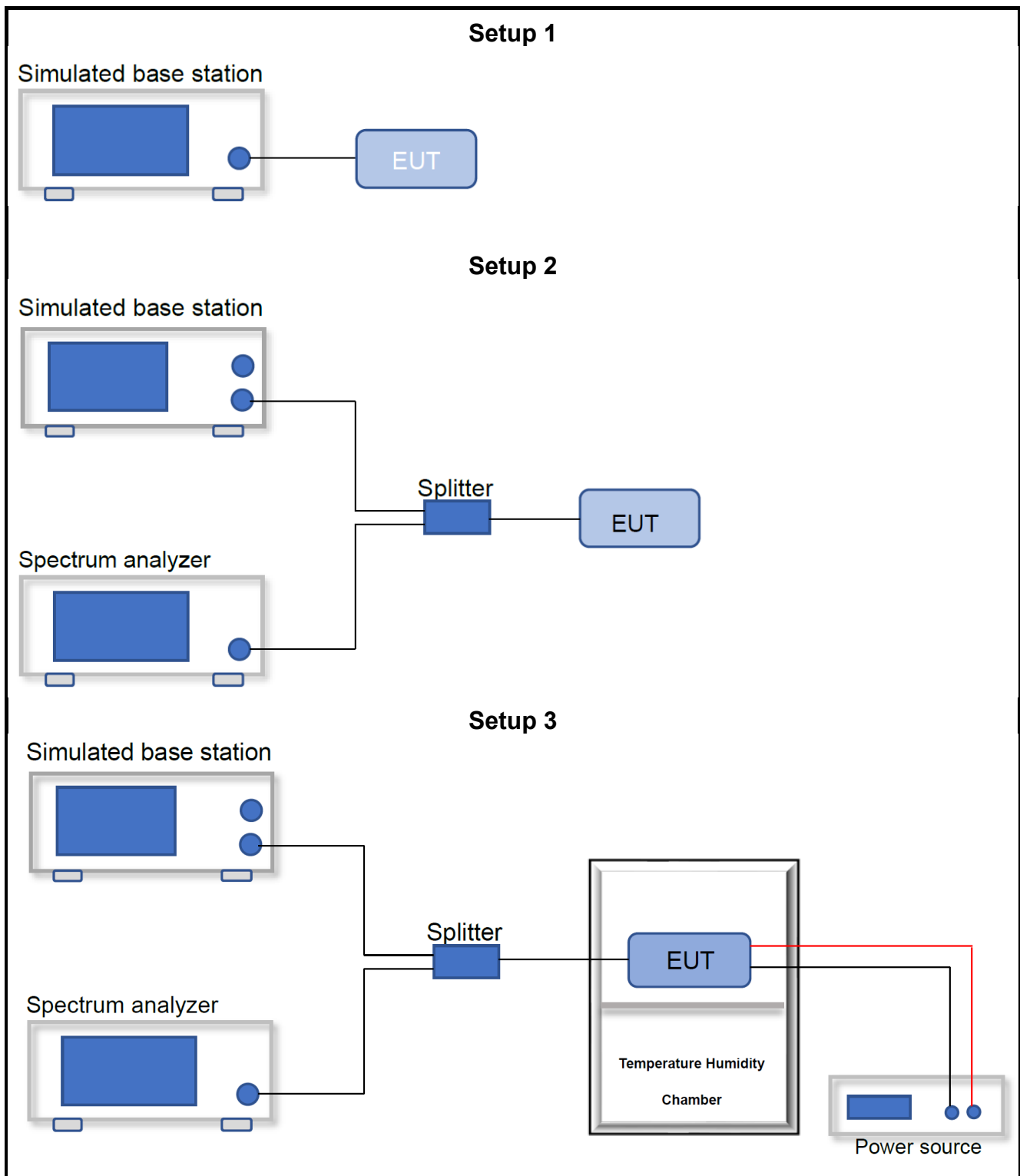
Offset = RF cable loss + attenuator factor.

2.6 Modifications

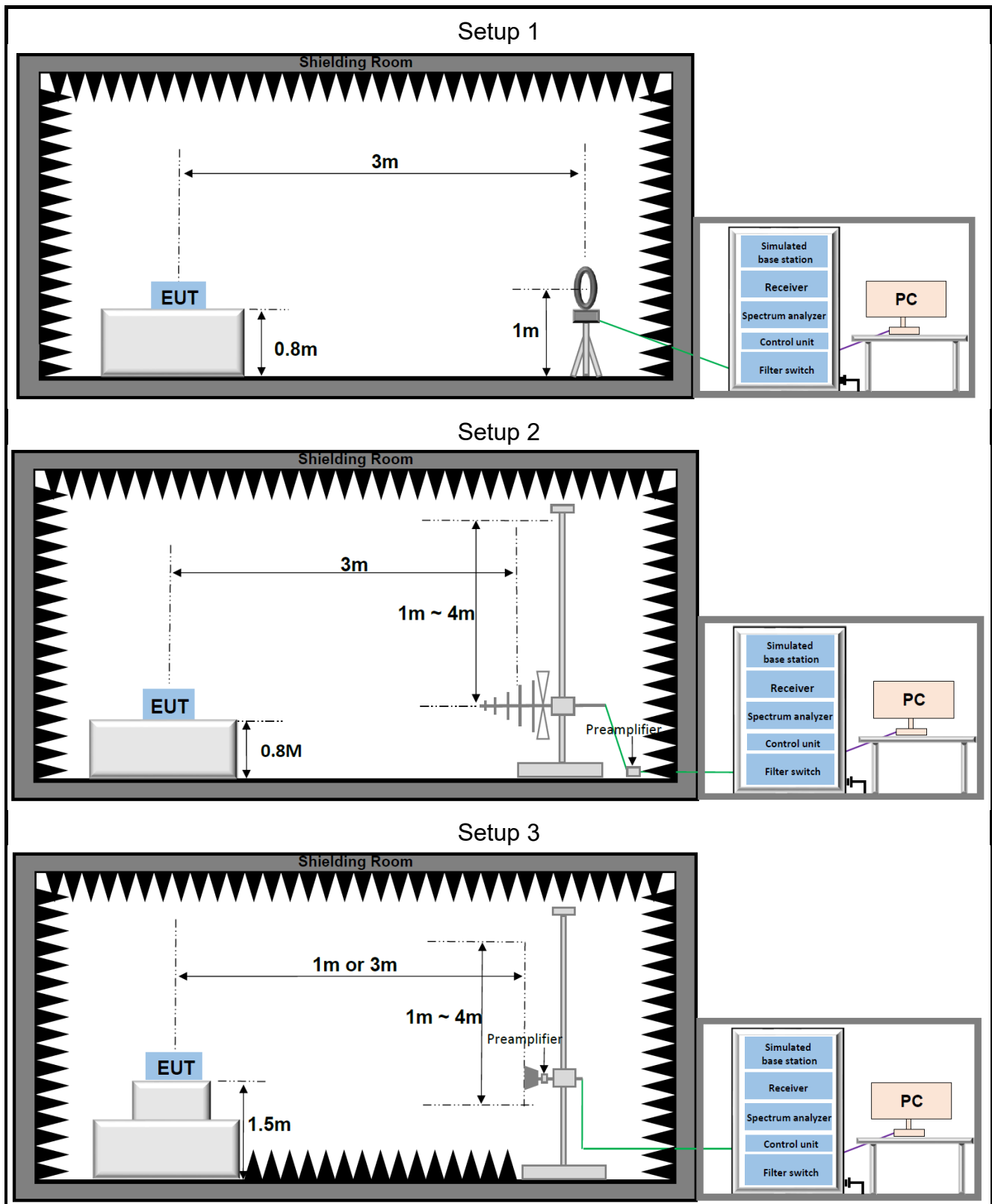
No modifications were made during testing.

2.7 Test Setup Diagram

2.7.1 Conducted Configuration



2.7.2 Radiated Configuration



3 Equipment and Measurement Uncertainty

All test and measuring equipment utilized to perform the tests documented in this report are calibrated on a regular basis, whichever is less, and where applicable is traceable recognized national standards.

3.1 Test Equipment List

Original:

RF Conducted 05 (for report TCWA24080023401 & TCWA24120038201)					
Description	Manufacturer	Model	SN	Last Due	Cal Due
Radio Communication Analyzer	Anritsu	MT8821C	6262170436	2024/03/25	2025/03/24
Wideband Radio Communication Tester	R&S	CMW500	151064	2024/03/25	2025/03/24
Signal Analyzer	Keysight	N9020A	US46470468	2024/03/25	2025/03/24
Signal Generator	Keysight	N5182A	MY50144316	2024/03/25	2025/03/24
Signal Generator	R&S	SMR20	100621	2024/03/25	2025/03/24
Hygrometer	BingYu	HTC-1	N/A	2023/06/01	2025/05/31
Band Reject Filter Group	Tonscend	JS0806-F	23A806F0647	N/A	N/A
RF Control Unit	Tonscend	JS0806-1	22L8060639	N/A	N/A
Measurement Software	Tonscend	TS1120 V3.1.46	10636	N/A	N/A

Radiated Emission (for report TCWA24080023401 & TCWA24120038201)					
Description	Manufacturer	Model	SN	Last Due	Cal Due
Biconic Logarithmic Periodic Antennas	Schwarzbeck	VULB9163	1643	2023/06/25	2025/06/24
Double-Ridged Horn Antennas	Schwarzbeck	BBHA 9120D	2809	2023/06/25	2025/06/24
Broad-Band Horn Antenna	Schwarzbeck	BBHA 9170	1290	2023/06/25	2025/06/24
Loop Antenna	Schwarzbeck	FMZB 1519C	1519C-028	2023/06/29	2025/06/28
Signal Analyzer	Keysight	N9020A	MY49100252	2024/03/25	2025/03/24
EXA Signal Analyzer, Multi-touch	Keysight	N9010B	MY63440541	2024/05/30	2025/05/29
Wideband Radio Communication Tester	R&S	CMW500	150645	2024/03/25	2025/03/24
Low Noise Amplifier	Tonscend	TAP9K3G40	AP23A8060273	2023/04/08	2025/04/07
Low Noise Amplifier	Tonscend	TAP01018050	AP22G806258	2023/04/08	2025/04/07
Low Noise Amplifier	Tonscend	TAP18040048	AP22G806247	2023/04/08	2025/04/07
Hygrometer	BINGYU	HTC-1	N/A	2023/06/01	2025/05/31
Test Software	Tonscend	TS+ V5.0.0	N/A	N/A	N/A

This:

Radiated Emission (for report TCWA25040028001)					
Description	Manufacturer	Model	S.N.	Last Due	Cal Due
Biconic Logarithmic Periodic Antennas	Schwarzbeck	VULB9163	1643	2023/06/25	2025/06/24
Double-Ridged Horn Antennas	Schwarzbeck	BBHA 9120D	2809	2023/06/25	2025/06/24
Broad-Band Horn Antenna	Schwarzbeck	BBHA 9170	1290	2023/06/25	2025/06/24
Loop Antenna	Schwarzbeck	FMZB 1519C	1519C-028	2023/06/29	2025/06/28
Signal Analyzer	Keysight	N9020A	MY49100252	2025/03/11	2026/03/10
Wideband Radio Communication Tester	R&S	CMW500	150645	2025/03/11	2026/03/10
Low Noise Amplifier	Tonscend	TAP9K3G40	AP23A8060273	2025/03/11	2027/03/10
Low Noise Amplifier	Tonscend	TAP01018050	AP22G806258	2025/03/11	2027/03/10
Low Noise Amplifier	Tonscend	TAP18040048	AP22G806247	2025/03/11	2027/03/10
Hygrometer	BINGYU	HTC-1	N/A	2023/06/01	2025/05/31
Test Software	Tonscend	TS+	Version: 5.0.0	N/A	N/A

3.2 Measurement Uncertainty

Parameter	U _{lab}
Frequency error	50.30Hz
Output power	0.74dB
Conducted spurious emissions	2.22dB
Radiated Emissions(9kHz~30MHz)	2.40dB
Radiated Emissions(30MHz~1000MHz)	4.66dB
Radiated Emissions(1GHz~18GHz)	5.42dB
Radiated Emissions(18GHz~40GHz)	5.46dB

Uncertainty figures are valid to a confidence level of 95%

4 Test Results

4.1 Output Power (ERP / EIRP / Conducted Power)

Limits

FCC Part	Test Band	Limit
§22.913(a)(5)	LTE Band 5/26(824 ~ 849MHz)/CA_5B	The ERP of mobile transmitters and auxiliary test transmitters must not exceed 7watts.
§24.232(c)	LTE Band 2/25/CA_2C	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.
§27.50(h)(2)	LTE Band 7/38/41/CA_7C/CA_41C	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
§27.50(d)(4)	LTE Band 4/66/CA_66B/CA_66C	Fixed, mobile, and portable (hand-held) stations operating in the 1710-1755MHz band and mobile and portable stations operating in the 1695-1710 MHz and 1755-1780MHz bands are limited to 1watt EIRP. Fixed stations operating in the 1710-1755MHz 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.
§27.50(c)(10)	LTE Band 12/17/CA_12B/71	Portable stations (hand-held devices) in the 600 MHz uplink band and the 698-746 MHz band, and fixed and mobile stations in the 600 MHz uplink band are limited to 3watts ERP.
§27.50(b)(9)	LTE Band 13	Control stations and mobile stations transmitting in the 746–757 MHz, 776–788 MHz, and 805–806 MHz bands and fixed stations transmitting in the 787–788 MHz and 805–806 MHz bands are limited to 30 watts ERP.
§90.542(a)	LTE Band 14	Portable stations (hand-held devices) transmitting in the 758-768 MHz band and the 788-798 MHz band are limited to 3 watts ERP.
§90.635(b)	LTE Band 26(814~824MHz)	The maximum output power of the transmitter for mobile stations is 100 watts (20dBw).
§27.50(k)(3)	LTE Band 42	EIRP ≤ 30dBm

Test Procedure

KDB 971168 D01 V03r01 Section 5.2.1, for Conducted Output Power

KDB 971168 D01 V03r01 Section 5.2, for Effective (Isotropic) Radiated Power

Test Settings

Conducted Output Power:

The transmitter output was connected to a calibrated attenuator, the other end of which was connected to the simulated base station. The simulated station was set to force the EUT to its maximum power setting, Transmitter output power was read off in dBm, read values have added cable loss and attenuation.

Radiated Power:

The formula for calculating ERP/EIRP based on conduction power is as follows:

EIRP (dBm) = Conducted Power (dBm) + antenna gain (dBi)
ERP=EIRP - 2.15dB

Test Setup

Refer to section 2.7.1 Setup 1

Measuring Instruments

The measuring equipment is listed in the section 3.1 of this test report.

Test Results

The detailed test data see: **Appendix**.

4.2 Maximum EIRP and Maximum PSD

Limits

FCC Part	Test Band	Limit		
§27.50(a)(3)	LTE Band 30	For mobile and portable stations transmitting in the 2305-2315 MHz band or the 2350-2360 MHz 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 or another advanced mobile broadband protocol that avoids concentrating energy at the edge of the operating band the average EIRP must not exceed 250 milliwatts within any 5 megahertz of authorized bandwidth but may exceed 50 milliwatts within any 1 megahertz of authorized bandwidth.		
§96.41	LTE Band 42/43/48/CA_48C	Device	Maximum EIRP (dBm/10 megahertz)	Maximum PSD (dBm/MHz)
		End User Device	23	n/a
		Category A CBSD	30	20
		Category B CBSD ¹	47	37

Test Procedure

KDB 971168 D01 V03r01 Section 5.4

Test Settings

- Set span to $2 \times$ to $3 \times$ the OBW.
- Set RBW = 1% to 5% of the OBW.
- Set VBW $\geq 3 \times$ RBW.
- Set number of measurement points in sweep $\geq 2 \times$ span / RBW.
- Sweep time:
 - Set = auto-couple, or
 - Set $\geq [10 \times (\text{number of points in sweep}) \times (\text{transmission symbol period})]$ for single sweep (automation-compatible) measurement.
- Detector = power averaging (rms).
- Set sweep trigger to "free run."
- Trace average at least 100 traces in power averaging (rms) mode if sweep is set to auto-couple. To accurately determine the average power over the on and off time of the transmitter, it can be necessary to increase the number of traces to be averaged above 100, or if using a manually configured sweep time, increase the sweep time.
- Compute power by integrating the spectrum across the OBW of the signal using the instrument's band or channel power measurement function with band/channel limits set equal to the OBW band edges. If the instrument does not have a band or channel power function, sum the spectrum levels (in linear power units) at intervals equal to the RBW extending across the entire OBW of the spectrum.
- Add $10 \log (1/\text{duty cycle})$ to the measured power level to compute the average power during continuous transmission. For example, add $[10 \log (1/0.25)] = 6 \text{ dB}$ if the duty cycle is a constant 25%.

Test notes

- When average PSD limits are specified, the same fundamental measurement condition applies as previously discussed (i.e., averaging is to be performed only over durations of active transmissions at maximum output power level). Thus, when performing this measurement, the EUT must either be configured to transmit continuously at full power while the compliance measurement is performed, or else the measurement instrumentation must be configured to acquire data only over durations when the EUT is actively transmitting at full power. In circumstances where neither of these conditions can be realized, then alternative procedures are provided for both constant duty cycle and non-constant duty cycle transmissions.

2. The PSD is measured following the same procedures described in 5.2.4.4 for measuring the total average power, but with the RBW set to the reference bandwidth specified by the applicable regulatory requirement, and by using the marker function to identify the maximum PSD instead of summing the power across the OBW. If the fundamental measurement condition cannot be realized, then one of the alternative procedures in 5.2.4.4.2 or 5.2.4.4.3 should be selected.

Test Setup

Refer to section 2.7.1 Setup 2

Measuring Instruments

The measuring equipment is listed in the section 3.1 of this test report.

Test Result

The detailed test data see: **Appendix**.

4.3 Peak-Average Ratio

Limits

§22.913(d): The peak-to-average ratio (PAR) of the transmission must not exceed 13 dB.

§24.232(d): The peak-to-average ratio (PAR) of the transmission may not exceed 13 dB.

§27.50(d)(5): The peak-to-average ratio (PAR) of the transmission may not exceed 13 dB.

§96.41: The peak-to-average ratio (PAR) of the transmission may not exceed 13 dB.

Test Procedure

KDB 971168 D01 V03r01 Section 5.7.1

Test Settings

The following guidelines are offered for performing a CCDF measurement.

11. Set resolution/measurement bandwidth $\geq$ OBW or specified reference bandwidth.
12. Set the number of counts to a value that stabilizes the measured CCDF curve.
13. Set the measurement interval as follows:
 - a) For continuous transmissions, set to the greater of $[10 \times (\text{number of points in sweep}) \times (\text{transmission symbol period})]$ or 1 ms.
 - b) 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. Set the measurement interval to a time that is less than or equal to the burst duration.
 - c) If there are several carriers in a single antenna port, the peak power shall be determined for each individual carrier (by disabling the other carriers while measuring the required carrier) and the total peak power calculated from the sum of the individual carrier peak powers.
14. Record the maximum PAPR level associated with a probability of 0.1%.
15. The peak power level is calculated from the sum of the PAPR value from step d) to the measured average power.

Test Setup

Refer to section 2.7.1 Setup 2

Measuring Instruments

The measuring equipment is listed in the section 3.1 of this test report.

Test Result

The detailed test data see: **Appendix**.

4.4 Occupied Bandwidth

Limits

For Reporting Purposes only

Test Procedure

KDB 971168 D01 V03r01 Section 4.2 & 4.3

Test Settings

1. The transmitter output was connected to a calibrated coaxial cable and coupler, The other end is connected to the spectrum analyzer and simulated station.
2. The signal analyzer automatic bandwidth measurement capability was used to perform the 99% occupied bandwidth and the 26dB bandwidth. The bandwidth measurement was not influenced by ant intermediate power nulls in the fundamental emission.
3. The simulated base station was set to force the EUT to its maximum transmitting power.
4. RBW = 1 - 5% of the expected OBW
5. VBW $\geq$ 3 times the RBW
6. Sweep = Auto
7. Detector = Peak
8. Trace = Max hold
9. The trace was allowed to stabilize

Test Setup

Refer to section 2.7.1 Setup 2

Measuring Instruments

The measuring equipment is listed in the section 3.1 of this test report.

Test Result

The detailed test data see: **Appendix**.

4.5 Band Edge and Emission Mask

Limits

FCC part	Test Band	Limit
§22.917(a) §24.238(a) §27.53(c) §27.53(g) §27.53(h)	LTE Band 5/26(824 ~ 849MHz)/CA_5B LTE Band 2/25/CA_2C LTE Band 13 LTE Band 12/17/CA_12B/71 LTE Band 4/66/CA_66B/CA_66C	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.
§27.53(m)	LTE Band 7/38/41/CA_7C/CA_41C	For mobile digital stations, the attenuation factor shall be not less than $40 + 10 \log(P)$ dB on all frequencies between the channel edge and 5 MHz from the channel edge, $43 + 10 \log(P)$ dB on all frequencies between 5 MHz and X MHz from the channel edge, and $55 + 10 \log(P)$ dB on all frequencies more than X MHz from the channel edge, where X is the greater of 6 MHz or the actual emission bandwidth as defined in paragraph (m)(6) of this section. In addition, the attenuation factor shall not be less than $43 + 10 \log(P)$ dB on all frequencies between 2490.5 MHz and 2496 MHz and $55 + 10 \log(P)$ dB at or below 2490.5 MHz.
§90.210(b) §90.691(a)	LTE Band 14/LTE Band 26(814 ~ 824MHz)	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. On any frequency between 775-788 MHz, above 805 MHz, and below 758 MHz, by at least $43 + 10 \log(P)$ dB. in the 100 kHz bands immediately outside and adjacent to the frequency block, a resolution bandwidth of 30 kHz be employed.
§27.53(a)	LTE Band 30	By a factor of not less than: $43 + 10 \log(P)$ dB on all frequencies between 2305 and 2320 MHz and on all frequencies between 2345 and 2360 MHz that are outside the licensed band(s) of operation, not less than $55 + 10 \log(P)$ dB on all frequencies between 2320 and 2324 MHz and on all frequencies between 2341 and 2345 MHz, not less than $61 + 10 \log(P)$ dB on all frequencies between 2324 and 2328 MHz and on all frequencies between 2337 and 2341 MHz, and not less than $67 + 10 \log(P)$ dB on all frequencies between 2328 and 2337 MHz; By a factor of not less than $43 + 10 \log(P)$ dB on all frequencies between 2300 and 2305 MHz, $55 + 10 \log(P)$ dB on all frequencies between 2296 and 2300 MHz, $61 + 10 \log(P)$ dB on all frequencies between 2292 and 2296 MHz, $67 + 10 \log(P)$ dB on all frequencies between 2288 and 2292 MHz, and $70 + 10 \log(P)$ dB below

		2288 MHz; By a factor of not less than $43 + 10 \log (P)$ dB on all frequencies between 2360 and 2365 MHz, and not less than $70 + 10 \log (P)$ dB above 2365 MHz.
§27.53(n)(2)	LTE Band 42	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.
§96.41	LTE Band 42/43/48/CA_48C	for channel and frequency assignments made by the SAS to CBSDs, 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.

Test Procedure

KDB 971168 D01 V03r01 Section 6.0

Test Settings

1. The transmitter output was connected to a calibrated coaxial cable and coupler, The other end is connected to the spectrum analyzer and simulated station.
2. The simulated base station was set to force the EUT to its maximum transmitting power.
3. Start and stop frequency were set such that the band edge would be placed in the center of the plot.
4. RBW $\geq 1\%$ of the emission bandwidth
5. VBW ≥ 3 times the RBW
6. Detector = RMS
7. Number of sweep point ≥ 2 times Span/RBW
8. Sweep = Auto
9. Trace = Max hold
10. The trace was allowed to stabilize

Test Setup

Refer to section 2.7.1. Setup 2

Measuring Instruments

The measuring equipment is listed in the section 3.1 of this test report.

Test ResultThe detailed test data see: **Appendix**.

4.6 Spurious Emission at Antenna Terminals

Limits

FCC part	Test Band	Limit
§22.917(a) §24.238(a) §27.53(c) §27.53(g) §27.53(h) §90.543(c)(f) §27.53(g)	LTE Band 5/26(824 ~ 849MHz)/CA_5B LTE Band 2/25/CA_2C LTE Band 13 LTE Band 12/17/CA_12B LTE Band 4/66/CA_66B/CA_66C LTE Band 14 LTE Band 71	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.
§27.53(m)	LTE Band 7/38/41/CA_7C/CA_41C	All frequencies between 2490.5 MHz and 2496 MHz and $55 + 10 \log(P)$ dB at or below 2490.5 MHz.
§90.691	LTE Band 26(814~824MHz)	The power of any emission shall be attenuated below the transmitter power (P) in watts by at least $43 + 10 \log(P)$ decibels or 80 decibels, whichever is the lesser attenuation.
§27.53(a)	LTE Band 30	not less than $70 + 10 \log(P)$ dB below 2288 MHz and above 2365 MHz.
§27.53(n)(2)	LTE Band 42	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.
§96.41	LTE Band 42/43/48/CA_48C	for channel and frequency assignments made by the SAS to CBSDs, 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. (2) Additional protection levels. Notwithstanding paragraph (d)(1) of this section, the conducted power of any emissions below 3530 MHz or above 3720 MHz shall not exceed -40 dBm/MHz.

Test Procedure

KDB 971168 D01 V03r01 Section 6.0

Test Settings

1. The transmitter output was connected to a calibrated coaxial cable and coupler, The other end is connected to the spectrum analyzer and simulated station.
2. The simulated base station was set to force the EUT to its maximum transmitting power.
3. Start frequency was set to 9kHz and stop frequency was set to 10th harmonic.
4. RBW and VBW (see test notes)
5. Detector = RMS
6. Sweep = Auto
7. Sweep point = below 30MHz(1001pts); 30MHz – 1GHz(2001pts); above 1GHz(40001pts)
8. Trace = trace average for continuous emissions, max hold for pulse emissions
9. Allow trace to fully stabilize

Test Notes

1. Compliance with the applicable limits is based on the use of measurement instrumentation employing a resolution bandwidth 100kHz or greater for measurements below 1GHz. However, in the 1MHz bands immediately outside and adjacent to the frequency block a resolution bandwidth of at least one percent of the emission bandwidth of the fundamental emission of the transmitter may be employed. The emission bandwidth is defined as the width of the signal between two points, one below the carrier center frequency and one above the carrier center frequency, outside of which all emission is attenuated at least 26dB below the transmitter power
2. 9kHz – 150kHz: RBW=1kHz, VBW $\geq$ 3 times the RBW
3. 150kHz – 30MHz: RBW=10kHz, VBW $\geq$ 3 times the RBW

Test Setup

Refer to section 2.7.1. Setup 2

Measuring Instruments

The measuring equipment is listed in the section 3.1 of this test report.

Test Result

The detailed test data see: **Appendix**.

4.7 Field Strength of Spurious Radiation

Limits

FCC part	Test Band	Limit
§2.1053 §22.917(a) §24.238(a) §27.53(g) §27.53(h) §27.53(m) §27.53(g)	LTE Band 5/26(824 ~ 849MHz)/CA_5B LTE Band 2/25/CA_2C LTE Band 12/17/CA_12B LTE Band 4/66/CA_66B/CA_66C LTE Band 7/38/41/CA_7C/CA_41C LTE Band 71	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.
§27.53(c)(f)	LTE Band 13	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; 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.
§90.543(e)(f)	LTE Band 14	least $43 + 10 \log(P)$ dB. 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.
§27.53(m)	LTE Band 7/38/41/CA_7C/CA_41C	All frequencies between 2490.5 MHz and 2496 MHz and $55 + 10 \log(P)$ dB at or below 2490.5 MHz.
§90.691	LTE Band 26(814~824MHz)	The power of any emission shall be attenuated below the transmitter power (P) in watts by at least $43 + 10 \log(P)$ decibels or 80 decibels, whichever is the lesser attenuation.
§27.53(a)	LTE Band 30	By a factor of not less than: $43 + 10 \log(P)$ dB on all frequencies between 2305 and 2320 MHz and on all frequencies between 2345 and 2360 MHz that are outside the licensed band(s) of operation, not less than $55 + 10 \log(P)$ dB on all frequencies between 2320 and 2324 MHz and on all frequencies between 2341 and 2345 MHz, not less than $61 + 10 \log(P)$ dB on all frequencies between 2324 and 2328 MHz and on all frequencies between 2337 and 2341 MHz, and not less than $67 + 10 \log(P)$ dB on all frequencies between 2328 and 2337 MHz; By a factor of not less than $43 + 10 \log(P)$ dB on all frequencies between 2300 and 2305 MHz, $55 + 10 \log(P)$ dB on all frequencies between 2296 and 2300 MHz, $61 + 10 \log(P)$ dB on all frequencies between 2292 and 2296 MHz, $67 + 10 \log(P)$ dB on all frequencies between 2288 and 2292 MHz, and $70 + 10 \log(P)$ dB below 2288 MHz; By a factor of not less than $43 + 10 \log(P)$ dB on all

		frequencies between 2360 and 2365 MHz, and not less than 70 + 10 log (P) dB above 2365 MHz.
§27.53(n)(2)	LTE Band 42	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.
§96.41	LTE Band 42/43/48/CA_48C	for channel and frequency assignments made by the SAS to CBSDs, 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. (2) Additional protection levels. Notwithstanding paragraph (d)(1) of this section, the conducted power of any emissions below 3530 MHz or above 3720 MHz shall not exceed -40dBm/MHz.

Test Procedure

KDB 971168 D01 V03r01 Section 7

Test Settings

- For radiated emissions measurements performed at frequencies less than or equal to 1GHz, the EUT shall be placed on a RF-transparent table or support at a nominal height of 80cm above the reference ground plane.
- For radiated emissions measurements performed at frequencies above 1GHz, the EUT shall be placed on a RF-transparent table or support at a nominal height of 150cm above the ground plane.
- Radiated measurements shall be made with the measurement antenna positioned in both horizontal and vertical polarization. The measurement antenna shall be varied from 1m to 4m in height above the reference ground in a search for the relative positioning that produces the maximum radiated signal level (i.e, field strength or received power), when orienting the measurement antenna in vertical polarization, the minimum height of the lowest element of the antenna shall clear the site reference ground plane by at least 25cm.
- For each suspected emission, the EUT was ranged its worst case and then tune the antenna tower(from 1~4m) and turntable(from 0~360°) find the maximum reading. Preamplifier and a high pass filter are used for the test in order get better signal level comply with the guidelines.
- The simulated base station was set to force the EUT to its maximum transmitting power.
- spectrum analyzer setting:
Measurements 9KHz~150KHz: RBW = 300Hz; VBW ≥ 3 kHz; Detector = RMS
Measurements 150KHz~30MHz: RBW = 10KHz; VBW ≥ 30 kHz; Detector = RMS
Measurements 30MHz~1000MHz: RBW = 100KHz or 1MHz; VBW ≥ 1MHz or 3MHz; Detector = RMS
Measurements Above 1000MHz: RBW = 1 MHz; VBW ≥ 3 MHz; Detector = RMS
- The field strength is calculated by adding the Antenna Factor, Cable Factor. The basic equation with a sample calculation is as follows:

$$E(\text{dB}\mu\text{V/m}) = \text{Measured amplitude level (dB}\mu\text{V)} + \text{Cable Loss (dB)} + \text{Antenna Factor (dB/m)}.$$

$$E(\text{dB}\mu\text{V/m}) = \text{Measured amplitude level (dBm)} + 107 + \text{Cable Loss (dB)} + \text{Antenna Factor (dB/m)}.$$

$$E(\text{dB}\mu\text{V/m}) = \text{EIRP(dBm)} - 20\log(D) + 104.8; \text{ where } D \text{ is the measurement distance(in the far field region) in m.}$$

$$\text{EIRP(dBm)} = E(\text{dB}\mu\text{V/m}) + 20\log(D) - 104.8; \text{ where } D \text{ is the measurement distance(in the far field region) in m.}$$

So, from d: The measuring distance is usually at 3m, then $20 \cdot \log(3) = 9.5424$
Then, $\text{EIRP (dBm)} = E(\text{dB}\mu\text{V/m}) + 9.5424 - 104.8 = E(\text{dB}\mu\text{V/m}) - 95.2576$
- Repeat above procedures until all frequencies measured was complete.
- Measure and record the results in the test report.

Test notes

3. This device employs GSM, GPRS, and EGPRS capabilities. The EUT was tested under all configurations and the highest powers is reported in GPRS mode while transmitting with one slot active.
4. This device employs UMTS technology with WCDMA(AMR/RMC) and HSDPA capabilities. The EUT was tested under all configurations and the highest power is reported in WCDMA mode with HSDPA Inactive at 12.2kbps RMC and TPC bits all set to "1".
5. The EUT was tested in three orthogonal planes and in all possible test configurations and positioning. The worst-case emissions are reported with the EUT positioning, modulations, RB sizes and offsets, and channel bandwidth configurations shown in the tables below.
6. Emissions below 18GHz were measured at a 3-meter test distance while emissions above 18GHz were measured at a 1-meter test distance with the application of a distance correction factor.
7. Radiated spurious emissions were investigated from 9kHz to 30MHz, 30MHz-1GHz and above 1GHz. the disturbance between 9KHz to 30MHz, 30MHz-1GHz and 18GHz to 40GHz was very low. The amplitude of spurious emissions from the radiator which are attenuated more than 20dB below the limit need not be recorded, so only the harmonics had been displayed.
8. The "-" shown in the following RSE tables are used to denote a noise floor measurement.

Test Setup

Refer to section 2.7.2 for details.

Measuring Instruments

The measuring equipment is listed in the section 3.1 of this test report.

Test Result

The detailed test data see: **Appendix**.

4.8 Frequency Stability V.S. Temperature, Voltage

Limits

§22.355:

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

§24.235 / §27.54 / §90.213 / §96.41:

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

Test Procedure

KDB 971168 D01 V03r01 Section 9

Test Settings

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

Test Notes

- a.) Temperature:
The temperature is varied from -30°C to +50°C in 10°C increments using an environmental chamber.
- b.) Primary Supply Voltage:
The primary supply voltage is varied from 85% to 115% of the nominal value for non-hand-carried battery and AC powered equipment. For hand-carried, battery-powered equipment, primary supply voltage is reduced to the battery operating end point which shall be specified by the manufacturer.

Test Setup

Refer to section 2.7.1 Setup 3

Measuring Instruments

The measuring equipment is listed in the section 3.1 of this test report.

Test Result

The detailed test data see: **Appendix**.

5 Test Setup Photos

The detailed test data see: **Test Setup Photos**

Appendix

Appendix List:

Appendix-A LTE Band 2
Appendix-A LTE Band 4
Appendix-A LTE Band 5
Appendix-A LTE Band 7
Appendix-A LTE Band 12
Appendix-A LTE Band 13
Appendix-A LTE Band 14
Appendix-A LTE Band 17
Appendix-A LTE Band 25
Appendix-A LTE Band 26(814-824)
Appendix-A LTE Band 26(824-849)
Appendix-A LTE Band 30
Appendix-A LTE Band 38
Appendix-A LTE Band 41
Appendix-A LTE Band 42(3450-3550)
Appendix-A LTE Band 42(3550-3600)
Appendix-A LTE Band 43(3600-3700)
Appendix-A LTE Band 48
Appendix-A LTE Band 66
Appendix-A LTE Band 71
Appendix-A LTE CA_2C
Appendix-A LTE CA_5B
Appendix-A LTE CA_7C
Appendix-A LTE CA_12B
Appendix-A LTE CA_41C
Appendix-A LTE CA_48C
Appendix-A LTE CA_66B
Appendix-A LTE CA_66C
Appendix-C Field Strength of Spurious Radiation-LTE

~The End~