

TEST REPORT

Applicant: Chengdu Xiaochen Technology Co., Ltd
EUT Description: VERTU META3 5G DIGITAL MOBILE PHONE
Model: VTL-202403
Brand: VERTU
FCC ID: 2BGHD-VTL202403
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
Date of Receipt: 2025/08/28
Date of Test: 2025/08/28 to 2025/11/05
Date of Issue: 2025/11/05

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.



Jim Huang
Approved By:



Carey Chen
Reviewed By:

Revision History

Rev.	Issue Date	Description	Revised by
01	2025/11/05	Original	Carey Chen

Summary of Test Results

FCC Part	Test Band	Test Item	Test Result
§2.1046, §22.913(a)(5)	NR Band n5	Effective Radiated Power	Pass
§2.1046, §27.50(h)(2) §24.232(c) §27.50(d)(4) §27.50(k)(3) §27.50(j)(3)	NR Band n7/ NR Band n38/ NR Band n41 NR Band n2/ NR Band n25 NR Band n66 NR Band n77/78(3450-3550MHz) NR Band n77/78(3700-3980MHz)	Effective Isotropic Radiated Power	Pass
§22.913(d) §24.232(d) §27.50(d)(5)	NR Band n5 NR Band n2/ NR Band n25 Others NR Band	Peak-Average Ratio	Pass
§2.1049	All NR Band	Occupied Bandwidth	Pass
§2.1051 §22.917(a) §27.53(m4) §24.238(a) §27.53(h) §27.50(n)(2) §27.53(l)(2)	NR Band n5 NR Band n7/ NR Band n38/ NR Band n41 NR Band n2/ NR Band n25 NR Band n66 NR Band n77/78(3450-3550MHz) NR Band n77/78(3700-3980MHz)	Band Edge	Pass
§2.1051 §22.917(a) §27.53(m) §24.238(a) §27.53(h) §27.50(n)(2) §27.53(l)(2)	NR Band n5 NR Band n7/ NR Band n38/ NR Band n41 NR Band n2/ NR Band n25 NR Band n66 NR Band n77/78(3450-3550MHz) NR Band n77/78(3700-3980MHz)	Spurious Emission at Antenna Terminals	Pass
§2.1051 §22.917(a) §27.53(m) §24.238(a) §27.53(h) §27.50(n)(2) §27.53(l)(2)	NR Band n5 NR Band n7/ NR Band n38/ NR Band n41 NR Band n2/ NR Band n25 NR Band n66 NR Band n77/78(3450-3550MHz) NR Band n77/78(3700-3980MHz)	Field Strength of Spurious Radiation	Pass
§2.1055 §22.355 §24.235 §27.54	NR Band n5 NR Band n2/ NR Band n25 Others NR Band	Frequency Stability	Pass
Remark: Pass: Meet the requirement.			

Table of Contents

1	General Description	5
1.1	Lab Information	5
1.1.1	Testing Location	5
1.1.2	Test Facility / Accreditations	5
1.2	Client Information	5
1.2.1	Applicant	5
1.2.2	Manufacturer	5
1.3	Product Information	6
2	Test Configuration	7
2.1	Test Channel	7
2.2	Worst-case configuration and Mode	13
2.3	Support Unit used in test	13
2.4	Test Environment	13
2.5	Test RF Cable	13
2.6	Modifications	13
2.7	Test Setup Diagram	14
2.7.1	Conducted Configuration	14
2.7.2	Radiated Configuration	15
3	Equipment and Measurement Uncertainty	16
3.1	Test Equipment List	16
3.2	Measurement Uncertainty	17
4	Test Results	18
4.1	Output Power(ERP / EIRP / Conducted Power)	18
4.2	Peak-Average Ratio	20
4.3	Occupied Bandwidth	21
4.4	Band Edge and Emission Mask	22
4.5	Spurious Emission at Antenna Terminals	23
4.6	Field Strength of Spurious Radiation	24
4.7	Frequency Stability V.S. Temperature, Voltage	26
5	Test Setup Photos	27
	Appendix	28

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:	Chengdu Xiaochen Technology Co., Ltd
Address:	3rd Floor,Building B15,Ganzhizhongguo Chengdu Center,No.777 HuafuAvenue Shuangliu County,Chengdu City,Sichuan Province,China

1.2.2 Manufacturer

Manufacturer:	VERTU INTERNATIONAL CORPORATION LIMITED
Address:	Chase Business Centre 39-41 Chase Side LondonEngland N14 5BP

1.3 Product Information

EUT Description:	VERTU META3 5G DIGITAL MOBILE PHONE									
Model:	VTL-202403									
Brand:	VERTU									
Hardware Version:	P10									
Software Version:	15.0.1_6.01.01.01									
IMEI:	RF Conducted	Sample 1: 357125130010600 Sample 2: 357125130012309								
	RSE	357125130005048								
Technical specification:										
Operation Frequency Range:	Band	TX Frequency					RX Frequency			
	NR Band n2	1850 to 1910 MHz					1930 to 1990 MHz			
	NR Band n5	824 to 849 MHz					869 to 894 MHz			
	NR Band n7	2500 to 2570 MHz					2620 to 2690 MHz			
	NR Band n25	1850 to 1915MHz					1930 to 1995 MHz			
	NR Band n38	2570 to 2620 MHz					2570 to 2620 MHz			
	NR Band n41	2496 to 2690 MHz					2496 to 2690 MHz			
	NR Band n66	1710 to 1780 MHz					2110 to 2200 MHz			
	NR Band n77*	3450 to 3550 MHz					3450 to 3550 MHz			
		3700 to 3980 MHz					3700 to 3980 MHz			
	NR Band n78*	3450 to 3550 MHz					3450 to 3550 MHz			
		3700 to 3800 MHz					3700 to 3800 MHz			
	Note*: The frequency range of NR Band n77 covers the frequency range of NR Band n78, so NR Band n78 is exempt from testing.									
NR CA:	CA_n5A-n78A;									
Type of Modulation:	☒ DFT-s-OFDM:	Pi/2-BPSK, QPSK, 16-QAM, 64-QAM, 256-QAM								
	☒ CP-OFDM:	QPSK, 16-QAM, 64-QAM, 256-QAM								
Power Class:	Class 3: All									
Antenna Type:	☐ External, ☒ Integrated									
Antenna Gain:	Band	Ant0 (dBi)	Ant1 (dBi)	Ant2 (dBi)	Ant3 (dBi)	Ant7 (dBi)	Ant8 (dBi)	Ant9 (dBi)	Ant10 (dBi)	Ant11 (dBi)
	NR Band n2	/	/	/	/	/	-1.8	/	-2.2	/
	NR Band n5	/	/	/	-4.6	/	/	/	/	-3.5
	NR Band n7	/	/	/	/	/	-2.7	/	-4.2	/
	NR Band n25	/	/	/	/	/	-1.8	/	-2.2	/
	NR Band n38	/	/	/	/	/	-2.7	/	-4.2	/
	NR Band n41	/	-4	-4.5	/	/	-2.7	/	-4.2	/
	NR Band n66	/	/	/	/	/	-3.1	/	-2.5	/
	NR Band n77	-4.3	/	-6.3	/	-2.7	/	-2.1	/	/
	NR Band n78	-4.3	/	-6.3	/	-2.7	/	-2.1	/	/
Remark: The above EUT's information was declared by applicant, please refer to the specifications or user's manual for more detailed description.										

2 Test Configuration

2.1 Test Channel

5G NR Band n2 and SCS 15 kHz						
Bandwidth	TX Frequency			RX Frequency		
	Range	Carrier centre (ARFCN)	Carrier centre (MHz)	Range	Carrier centre (ARFCN)	Carrier centre (MHz)
5MHz	Low	370500	1852.5	Low	386500	1932.5
	Middle	376000	1880	Middle	392000	1960
	High	381500	1907.5	High	397500	1987.5
10MHz	Low	371000	1855	Low	387000	1935
	Middle	376000	1880	Middle	392000	1960
	High	381000	1905	High	397000	1985
15MHz	Low	371500	1857.5	Low	387500	1937.5
	Middle	376000	1880	Middle	392000	1960
	High	380500	1902.5	High	396500	1982.5
20MHz	Low	372000	1860	Low	388000	1940
	Middle	376000	1880	Middle	392000	1960
	High	380000	1900	High	396000	1980

5G NR Band n5 and SCS 15 kHz						
Bandwidth	TX Frequency			RX Frequency		
	Range	Carrier centre (ARFCN)	Carrier centre (MHz)	Range	Carrier centre (ARFCN)	Carrier centre (MHz)
5MHz	Low	165300	826.5	Low	174300	871.5
	Middle	167300	836.5	Middle	176300	881.5
	High	169300	846.5	High	178300	891.5
10MHz	Low	165800	829	Low	174800	874
	Middle	167300	836.5	Middle	176300	881.5
	High	168800	844	High	177800	889
15MHz	Low	166300	831.5	Low	175300	876.5
	Middle	167300	836.5	Middle	176300	881.5
	High	168300	841.5	High	177300	886.5
20MHz	Low	166800	834	Low	175800	879
	Middle	167300	836.5	Middle	176300	881.5
	High	167800	839	High	176800	884

5G NR Band n7 and SCS 15 kHz						
Bandwidth	TX Frequency			RX Frequency		
	Range	Carrier centre (ARFCN)	Carrier centre (MHz)	Range	Carrier centre (ARFCN)	Carrier centre (MHz)
5MHz	Low	500500	2502.5	Low	524500	2622.5
	Middle	507000	2535	Middle	531000	2655
	High	513500	2567.5	High	537500	2687.5
10MHz	Low	501000	2505	Low	525000	2625
	Middle	507000	2535	Middle	531000	2655
	High	513000	2565	High	537000	2685
15MHz	Low	501500	2507.5	Low	525500	2627.5
	Middle	507000	2535	Middle	531000	2655
	High	512500	2562.5	High	536500	2682.5
20MHz	Low	502000	2510	Low	526000	2630
	Middle	507000	2535	Middle	531000	2655
	High	512000	2560	High	536000	2680
25MHz	Low	502500	2512.5	Low	526500	2632.5
	Middle	507000	2535	Middle	531000	2655
	High	511500	2557.5	High	535500	2677.5
30MHz	Low	503000	2515	Low	527000	2635
	Middle	507000	2535	Middle	531000	2655
	High	511000	2555	High	535000	2675
40MHz	Low	504000	2520	Low	528000	2640
	Middle	507000	2535	Middle	531000	2655
	High	510000	2550	High	534000	2670

5G NR Band n25 and SCS 15 kHz						
Bandwidth	TX Frequency			RX Frequency		
	Range	Carrier centre (ARFCN)	Carrier centre (MHz)	Range	Carrier centre (ARFCN)	Carrier centre (MHz)
5MHz	Low	370500	1852.5	Low	386500	1932.5
	Middle	376500	1882.5	Middle	392500	1962.5
	High	382500	1912.5	High	398500	1992.5
10MHz	Low	371000	1855	Low	387000	1935
	Middle	376500	1882.5	Middle	392500	1962.5
	High	382000	1910	High	398000	1990
15MHz	Low	371500	1857.5	Low	387500	1937.5
	Middle	376500	1882.5	Middle	392500	1962.5
	High	381500	1907.5	High	397500	1987.5
20MHz	Low	372000	1860	Low	388000	1940
	Middle	376500	1882.5	Middle	392500	1962.5
	High	381000	1905	High	397000	1985

5G NR Band n38, SCS 30 kHz and ΔF_{Raster} 30 kHz			
Bandwidth	TX & RX Frequency		
	Range	Carrier centre (ARFCN)	Carrier centre (MHz)
10MHz	Low	515000	2575
	Middle	519000	2595
	High	523000	2615
20MHz	Low	516000	2580
	Middle	519000	2595
	High	522000	2610
30MHz	Low	517000	2585
	Middle	519000	2595
	High	521000	2605
40MHz	Low	518000	2590
	Middle	519000	2595
	High	520000	2600

5G NR Band n41, SCS 30 kHz and ΔF_{Raster} 30 kHz			
Bandwidth	TX & RX Frequency		
	Range	Carrier centre (ARFCN)	Carrier centre (MHz)
10MHz	Low	500202	2501.01
	Middle	518598	2592.99
	High	537000	2685
20MHz	Low	501204	2506.02
	Middle	518598	2592.99
	High	535998	2679.99
30MHz	Low	502200	2511
	Middle	518598	2592.99
	High	534996	2674.98
40MHz	Low	503202	2516.01
	Middle	518598	2592.99
	High	534000	2670
50MHz	Low	504204	2521.02
	Middle	518598	2592.99
	High	532998	2664.99
60MHz	Low	505200	2526
	Middle	518598	2592.99
	High	531996	2659.98
70MHz	Low	506200	2531
	Middle	518598	2592.29
	High	531000	2655
80MHz	Low	507204	2536.02
	Middle	518598	2592.99
	High	529998	2649.99
90MHz	Low	508200	2541
	Middle	518598	2592.99
	High	528996	2644.98
100MHz	Low	509202	2546.01
	Middle	518598	2592.99
	High	528000	2640

5G NR Band n66, SCS 15 kHz						
Bandwidth	TX Frequency			RX Frequency		
	Range	Carrier centre (ARFCN)	Carrier centre (MHz)	Range	Carrier centre (ARFCN)	Carrier centre (MHz)
5MHz	Low	435500	1712.5	Low	422500	2112.5
	Middle	342500	1745	Middle	431000	2155
	High	349000	1777.5	High	439500	2197.5
10MHz	Low	343000	1715	Low	423000	2115
	Middle	349000	1745	Middle	431000	2155
	High	355000	1775	High	439000	2195
15MHz	Low	343500	1717.5	Low	423500	2117.5
	Middle	349000	1745	Middle	431000	2155
	High	354500	1772.5	High	438500	2192.5
20MHz	Low	344000	1720	Low	424000	2120
	Middle	349000	1745	Middle	431000	2155
	High	354000	1770	High	438000	2190

5G NR Band n77/n78(3450~3550MHz), SCS 30 kHz and ΔF_{Raster} 30 kHz			
Bandwidth	TX & RX Frequency		
	Range	Carrier centre (ARFCN)	Carrier centre (MHz)
10MHz	Low	630334	3455.01
	Middle	633334	3500.01
	High	636334	3545.01
20MHz	Low	630668	3460.02
	Middle	633334	3500.01
	High	636000	3540
30MHz	Low	631000	3465
	Middle	633334	3500.01
	High	635666	3534.99
40MHz	Low	631334	3470.01
	Middle	633334	3500.01
	High	635334	3530.01
50MHz	Low	631668	3475.02
	Middle	633334	3500.01
	High	635000	3525
60MHz	Low	632000	3480
	Middle	633334	3500.01
	High	634666	3519.99
70MHz	Low	632334	3485.01
	Middle	633334	3500.01
	High	634334	3515.01
80MHz	Low	632668	3490.02
	Middle	633334	3500.01
	High	634000	3510
90MHz	Low	633000	3495
	Middle	633334	3500.01
	High	633666	3504.99
100MHz	Low	633334	3500.01
	Middle		
	High		

5G NR Band n77(3700~3980MHz), SCS 30 kHz and ΔF_{Raster} 30 kHz			
Bandwidth	TX & RX Frequency		
	Range	Carrier centre (ARFCN)	Carrier centre (MHz)
10MHz	Low	647000	3705
	Middle	656000	3840
	High	665000	3975
20MHz	Low	647334	3710.01
	Middle	656000	3840
	High	664666	3969.99
30MHz	Low	647666	3714.99
	Middle	656000	3840
	High	664334	3965.01
40MHz	Low	648000	3720
	Middle	656000	3840
	High	664000	3960
50MHz	Low	648334	3725.01
	Middle	656000	3840
	High	663666	3954.99
60MHz	Low	648668	3730.02
	Middle	656000	3840
	High	663332	3949.98
70MHz	Low	649000	3735
	Middle	656000	3840
	High	663000	3945
80MHz	Low	649334	3740.01
	Middle	656000	3840
	High	662666	3939.99
90MHz	Low	649668	3745.02
	Middle	656000	3840
	High	662332	3934.98
100MHz	Low	650000	3750
	Middle	656000	3840
	High	662000	3930

5G NR Band n78(3700~3800MHz), SCS 30 kHz and ΔF_{Raster} 30 kHz			
Bandwidth	TX & RX Frequency		
	Range	Carrier centre (ARFCN)	Carrier centre (MHz)
10MHz	Low	647000	3705
	Middle	650000	3750
	High	653000	3795
20MHz	Low	647334	3710.01
	Middle	650000	3750
	High	652666	3789.99
30MHz	Low	647668	3715.02
	Middle	650000	3750
	High	652334	3785.01
40MHz	Low	648000	3720
	Middle	650000	3750
	High	652000	3780
50MHz	Low	648334	3725.01
	Middle	650000	3750
	High	651666	3774.99
60MHz	Low	648668	3730.02
	Middle	650000	3750
	High	651332	3769.98
70MHz	Low	649000	3735
	Middle	650000	3750
	High	651000	3765
80MHz	Low	649334	3740.01
	Middle	650000	3750
	High	650666	3759.99
90MHz	Low	649668	3745.02
	Middle	650000	3750
	High	650332	3754.98
100MHz	Low	650000	3750
	Middle		
	High		

2.2 Worst-case configuration and Mode

Test Mode	Description
TM 1	EUT communication with simulated station in DFT-s-OFDM Pi/2-BPSK mode
TM 2	EUT communication with simulated station in DFT-s-OFDM QPSK mode
TM 3	EUT communication with simulated station in DFT-s-OFDM 16QAM mode
TM 4	EUT communication with simulated station in DFT-s-OFDM 64QAM mode
TM 5	EUT communication with simulated station in DFT-s-OFDM 256QAM mode
TM 6	EUT communication with simulated station in CP QPSK mode
TM 7	EUT communication with simulated station in CP 16QAM mode
TM 8	EUT communication with simulated station in CP 64QAM mode
TM 9	EUT communication with simulated station in CP 256QAM mode

Note: Conduction Power & EIRP & RSE of all antennas are tested, and only the worst data is presented.

2.3 Support Unit used in test

The EUT has been tested as an independent unit.

2.4 Test Environment

Temperature:	Normal: 15°C ~ 35°C, Extreme: -30°C ~ +50°C
Relative Humidity	45 ~ 56 % RH Ambient
Voltage:	Nominal: 3.79 Vdc, Extreme: Low 3.65 Vdc, High 4.50 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.

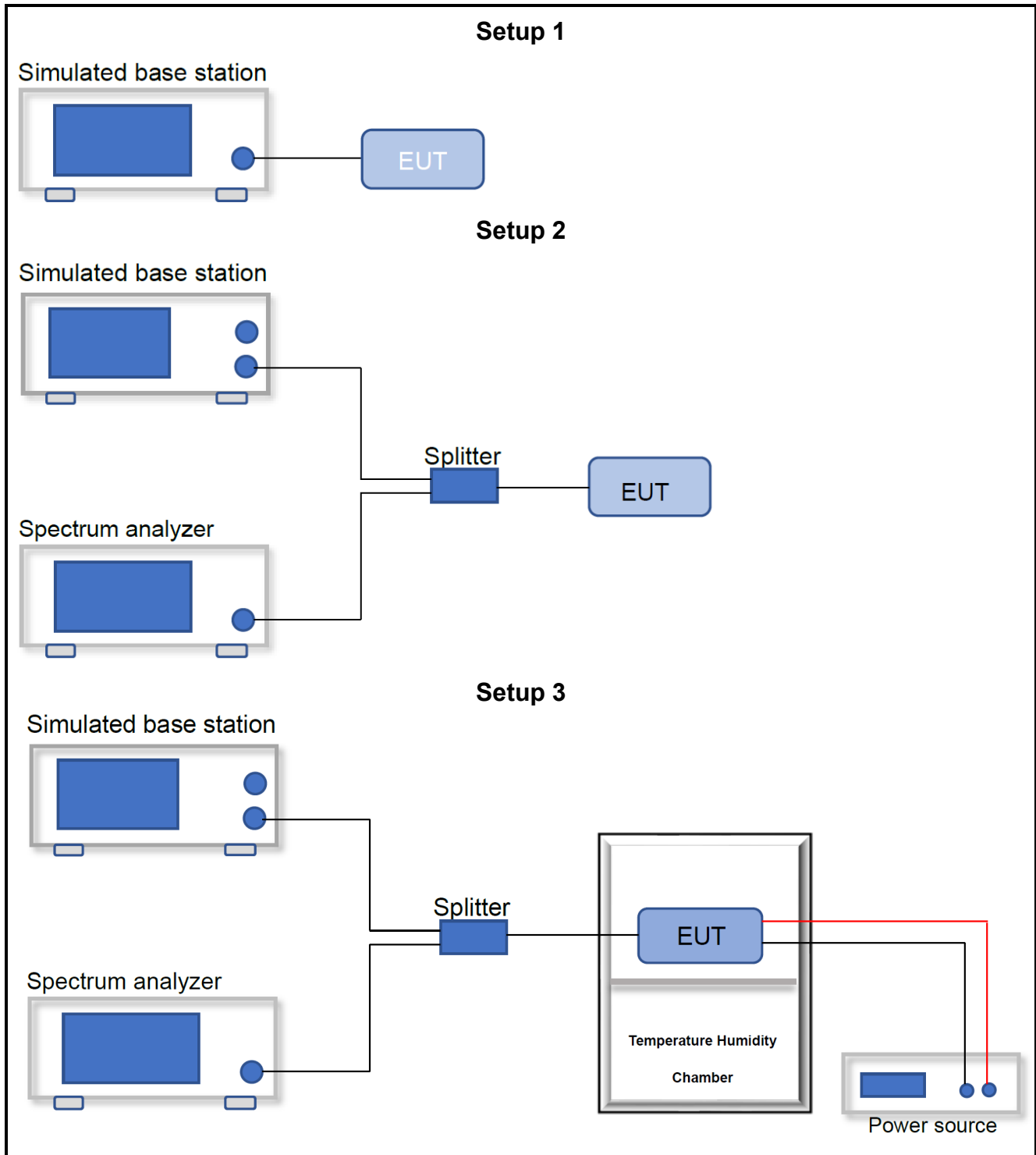
Offset = RF cable loss + attenuator factor.

2.6 Modifications

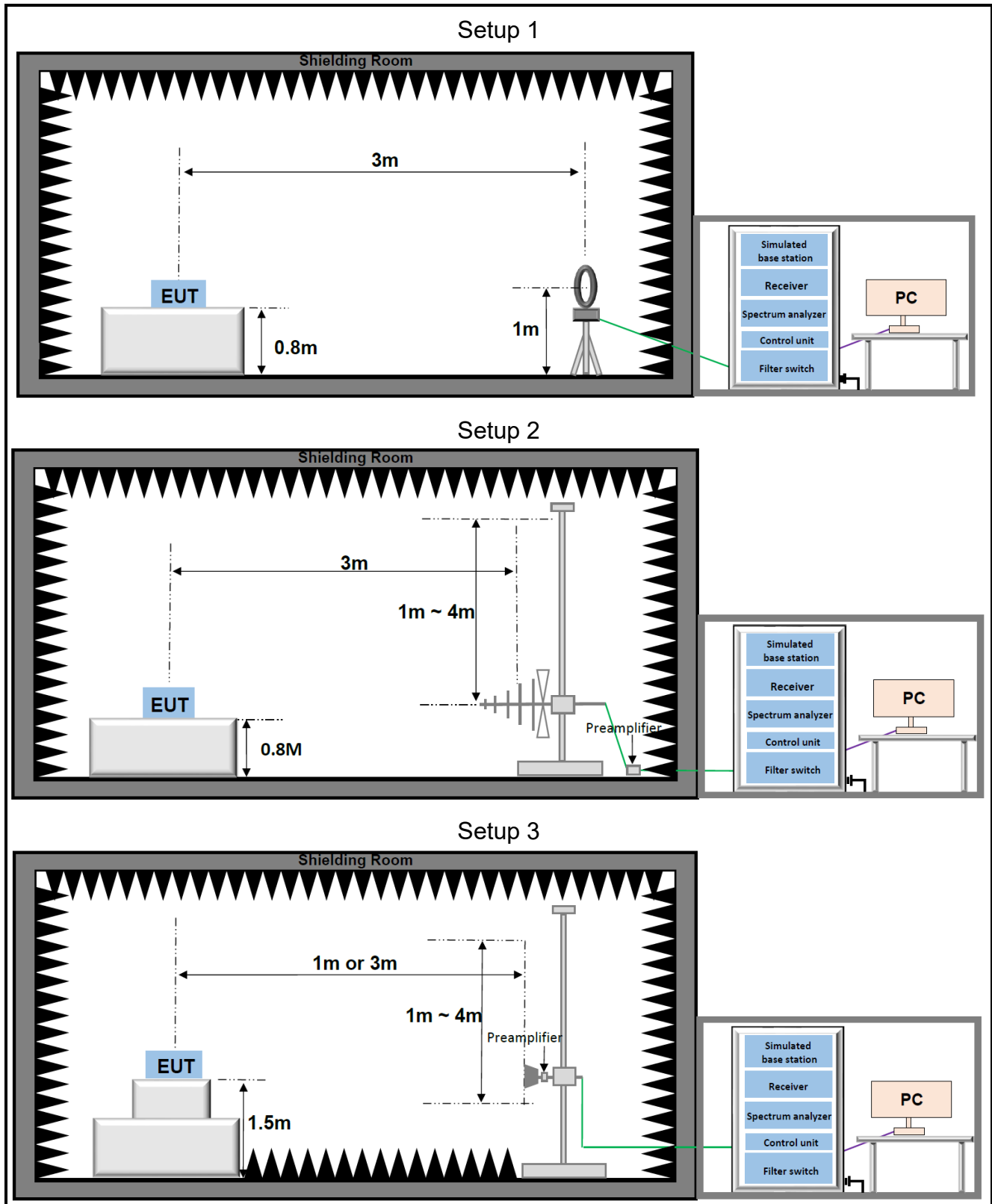
No modifications were made during testing.

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

RF Conducted 02					
Description	Manufacturer	Model	S.N.	Last Due	Cal Due
Signal Analyzer	Keysight	N9020A	MY53280106	2025/03/11	2026/03/10
EXG X-Series Microwave Analog Signal Generator	Keysight	N5173B	MY62220561	2025/05/29	2026/05/28
Radio Communication Test Station	Anritsu	MT8000A	6262036781	2024/11/04	2025/11/03
				2025/10/31	2026/10/30
Power Divider	Qotana	DBPD0200001800C	22122900036	2025/03/11	2027/03/10
Hygrometer	BingYu	HTC-1	N/A	2025/05/29	2027/05/28
EXA Signal Analyzer, Multi-touch	Keysight	N9010B	MY63440541	2025/05/29	2026/05/28
5G NR Basestation	StartPoint	SP9500-CTS	SP20676	2025/03/11	2026/03/10
Band Reject Filter Group	Tonscend	JS0806-F	23C806F0669	N/A	N/A
RF Control Unit	Tonscend	JS0806-1	22L8060651	N/A	N/A
Measurement Software	Tonscend	TS1120 V3.1.46	10636	N/A	N/A

Radiated Emission					
Description	Manufacturer	Model	S.N.	Last Due	Cal Due
Biconic Logarithmic Periodic Antennas	Schwarzbeck	VULB9163	1643	2023/06/25	2026/06/24
Double-Ridged Horn Antennas	Schwarzbeck	BBHA 9120D	2809	2023/06/25	2026/06/24
Broad-Band Horn Antenna	Schwarzbeck	BBHA 9170	1290	2023/06/25	2026/06/24
Loop Antenna	Schwarzbeck	FMZB 1519C	1519C-028	2023/06/29	2026/06/28
Signal Analyzer	Keysight	N9020A	MY49100252	2025/03/11	2026/03/10
EXA Signal Analyzer, Multi-touch	Keysight	N9010B	MY63440541	2025/05/29	2026/05/28
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	2025/07/25	2026/07/24
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	0.76dB
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)	NR Band n5	The ERP of mobile transmitters and auxiliary test transmitters must not exceed 7watts.
§24.232(c)	NR Band n2/ NR Band n25	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)	NR Band n7/ NR Band n38/ NR Band n41	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)	NR Band n66	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(k)(3)	5G NR n77/78(3450-3550MHz)	Mobile devices are limited to 1Watt (30 dBm) EIRP
§27.50(j)(3)	5G NR n77/78(3700-3980MHz)	Mobile and portable stations are limited to 1 Watt EIRP

Test Procedure

FCC KDB 971168 D01 V03r01 Section 5.2.1, for Conducted Output Power;

FCC KDB 971168 D01 V03r01 Section 5.2, for 4.2 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.

Effective (Isotropic) Radiated Power:

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

$EIRP(dBm) = \text{Conducted Power (dBm)} + \text{antenna gain (dBi)}$

$ERP = EIRP - 2.15dB$

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 Result

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

4.2 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.

Test Procedure

FCC KDB 971168 D01 V03r01 Section 5.7.1

Test Settings

The following guidelines are offered for performing a CCDF measurement.

1. Set resolution/measurement bandwidth $\geq$ OBW or specified reference bandwidth.
2. Set the number of counts to a value that stabilizes the measured CCDF curve.
3. 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.
4. Record the maximum PAPR level associated with a probability of 0.1%.
5. 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**.

4.3 Occupied Bandwidth

Limits

For Reporting Purposes only

Test Procedure

FCC 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 power setting.
4. RBW = 1 - 5% of the expected OBW
5. VBW = 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**.

4.4 Band Edge and Emission Mask

Limits

Band	Limit
NR Band n5 NR Band n2/ NR Band n25 NR Band n66	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.
NR Band n7/ NR Band n38/ NR Band n41	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.
NR Band n77/78(3450-3550MHz)	In the 1 MHz bands immediately outside and adjacent to the licensee's frequency block: ≤ -13 dB/(1% EBW, but no exceed 200kHz). In the bands between 1 and 5 MHz removed from the licensee's frequency block: ≤ -13 dB/(500 kHz, or greater)
NR Band n77/78(3700-3980MHz)	In the 1 MHz bands immediately outside and adjacent to the licensee's frequency block: ≤ -13 dB/(1% EBW, or 350kHz). In the bands between 1 and 5 MHz removed from the licensee's frequency block: ≤ -13 dB/(500 kHz, or greater)

Test Procedure

FCC 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 power setting.
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 Result

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

4.5 Spurious Emission at Antenna Terminals

Limits

Band	Limit
NR Band n5 NR Band n2/ NR Band n25 NR Band n66 NR Band n77/78(3450-3550MHz) NR Band n77/78(3700-3980MHz)	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.
NR Band n7/ NR Band n38/ NR Band n41	All frequencies between 2490.5 MHz and 2496 MHz and $5 + 10 \log(P)$ dB at or below 2490.5 MHz.

Test Procedure

FCC 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 power setting.
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. Trace = trace average for continuous emissions, max hold for pulse emissions
8. 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≥3 times the RBW
3. 150kHz – 30MHz: RBW=10kHz, VBW≥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**.

4.6 Field Strength of Spurious Radiation

Limits

Band	Limit
NR Band n5 NR Band n2/ NR Band n25 NR Band n66 NR Band n77/78(3450-3550MHz) NR Band n77/78(3700-3980MHz)	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.
NR Band n7/ NR Band n38/ NR Band n41	All frequencies between 2490.5 MHz and 2496 MHz and $55 + 10 \log(P)$ dB at or below 2490.5 MHz.

Test Procedure

FCC 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 80cm 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 $20 * \log(3) = 9.5424$*
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

- 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.
- 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.
- 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.

4. 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**.

4.7 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:

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

Test Procedure

FCC 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: **Appendix-F WWAN Setup Photos**

Appendix

Appendix List:

Appendix-D NR Band n2
Appendix-D NR Band n5
Appendix-D NR Band n7
Appendix-D NR Band n25
Appendix-D NR Band n38
Appendix-D NR Band n41
Appendix-D NR Band n66
Appendix-D NR Band n77(3450-3550)
Appendix-D NR Band n77(3700-3980)
Appendix-E Field Strength of Spurious Radiation-NR

~The End~