

TEST REPORT

Application No: SZCR2511005020WM

Applicant: TCL Communication Ltd.

Address of Applicant: 5/F, Building 22E, 22 Science Park East Avenue, Hong Kong Science Park, Shatin, NT, Hong Kong

Manufacturer: TCL Communication Ltd.

Address of Manufacturer: 5/F, Building 22E, 22 Science Park East Avenue, Hong Kong Science Park, Shatin, NT, Hong Kong

EUT Description: UMTS/LTE/NR Mobile phone

Model No.: T440R

FCC ID: 2ACCJH201

Standards: 47 CFR Part 2
47 CFR Part 22
47 CFR Part 24
47 CFR Part 27
47 CFR Part 90

Date of Receipt: 2025/09/19 (for report SZCR250900414402)
2025/11/14 (for report SZCR251100502003)

Date of Test: 2025/09/22 to 2025/10/30 (for report SZCR250900414402)
2025/11/17 to 2025/12/07 (for report SZCR251100502003)

Date of Issue: 2025/10/30 (for report SZCR250900414402)
2025/12/11 (for report SZCR251100502003)

Test Result:	PASS *
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* In the configuration tested, the EUT detailed in this report complied with the standards specified above.

Keny Xu

Keny Xu
EMC Laboratory Manager



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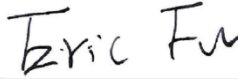
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Revision Record				
Version	Chapter	Date	Modifier	Remark
01		2025/12/11		Original

Authorized for issue by:				
				
		Charlie Dai/Project Engineer		
				
		Eric Fu/Reviewer		



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2 Test Summary

2.1 NR Band n5

Test Item	FCC Rule No.	Requirements	Test Result	Verdict
Effective (Isotropic) Radiated Power Output Data	§2.1046, §22.913(a)(5)	FCC: ERP ≤ 7 W	Refer to the Appendixs	Pass
Peak-Average Ratio	§22.913(d)	Limit≤13 dB		Pass
Bandwidth	§2.1049	OBW: No limit. EBW: No limit.		Pass
Band Edges Compliance	§2.1051, §22.917(a)	≤ -13 dBm/1%*EBW, in 1 MHz bands immediately outside and adjacent to the frequency block.		Pass
Spurious Emission at Antenna Terminals	§2.1051, §22.917(a)	FCC: ≤ -13 dBm/100 kHz, from 9 kHz to 10th harmonics but outside authorized operating frequency ranges.		Pass
Field Strength of Spurious Radiation	§2.1053, §22.917(a)	FCC: ≤ -13 dBm/100 kHz.		Pass
Frequency Stability	§2.1055(a)(1)(b) §2.1055(d)(2) §22.355	±2.5ppm.		Pass



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2.2 NR Band n2

Test Item	FCC Rule No.	Requirements	Test Result	Verdict
Effective (Isotropic) Radiated Power Output Data	§2.1046, §24.232(c)	EIRP $\leq$ 2 W	Refer to the Appendixs	Pass
Peak-Average Ratio	§24.232(d)	Limit $\leq$ 13 dB		Pass
Bandwidth	§2.1049	OBW: No limit. EBW: No limit.		Pass
Band Edges Compliance	§2.1051, §24.238(a)	$\leq$ -13 dBm/1%*EBW, in 1 MHz bands immediately outside and adjacent to the frequency block.		Pass
Spurious Emission at Antenna Terminals	§2.1051, §24.238(a)	$\leq$ -13 dBm/1 MHz, from 9 kHz to 10 th harmonics but outside authorized operating frequency ranges.		Pass
Field Strength of Spurious Radiation	§2.1053, §24.238(a)	$\leq$ -13 dBm/1 MHz.		Pass
Frequency Stability	§2.1055(a)(1)(b) §2.1055(d) (2) §24.235	Within authorized bands of operation/frequency block.		Pass



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2.3 NR Band n14

Test Item	FCC Rule No.	Requirements	Test Result	Verdict
Effective (Isotropic) Radiated Power Output Data	§2.1046 §90.542(a)	ERP ≤ 3 W.	Refer to the Appendix	Pass
Peak-Average Ratio	---	Limit≤13 dB		Pass
Bandwidth	§2.1049	OBW: No limit. EBW: No limit.		Pass
Emission Mask	§2.1051 §90.210(b)	Transmitters designed for operation under this part on frequencies other than listed in this section must meet the emission mask requirements of Emission Mask B. Equipment operating under this part on frequencies allocated to but shared with the Federal Government, must meet the applicable Federal Government technical standards (b) Emission Mask B. For transmitters that are equipped with an audio low-pass filter, the power of any emission must be attenuated below the unmodulated carrier power (P) as follows: (1) On any frequency removed from the assigned frequency by more than 50 percent, but not more than 100 percent of the authorized bandwidth: At least 25 dB.(2) On any frequency removed from the assigned frequency by more than 100 percent, but not more than 250 percent of the authorized bandwidth: At least 35 dB..(3) On any frequency removed from the assigned frequency by more than 250 percent of the authorized bandwidth: At least 43 + 10 log (P) dB.		Pass
Band Edges Compliance	§2.1051 §90.543(e)(2)(3)	(1) On all frequencies between 769-775 MHz and 799-805 MHz, by a factor not less than 76 + 10 log (P) dB in a 6.25 kHz band segment, for base and fixed stations.(2) On all frequencies between 769-775 MHz and 799-805 MHz, by a factor not less than 65 + 10 log (P) dB in a 6.25 kHz band segment, for mobile and portable stations.(3) On any		Pass



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Test Item	FCC Rule No.	Requirements	Test Result	Verdict
		frequency between 775-788 MHz, above 805 MHz, and below 758 MHz, by at least $43 + 10 \log(P)$ dB.		
Spurious Emission at Antenna Terminals	§2.1051, §90.543(c) §90.543(f)	FCC: ≤ -13 dBm/100 kHz, from 9 kHz to 10th harmonics but outside authorized operating frequency ranges. For operations in the 758–775 MHz and 788–805 MHz bands, all emissions including harmonics in the band 1559–1610 MHz shall be limited to -70 dBW/ MHz equivalent isotropically radiated power (EIRP) for wideband signals, and -80 dBW EIRP for discrete emissions of less than 700 Hz bandwidth.		Pass
Field Strength of Spurious Radiation	§2.1053, §90.543(c) §90.543(f)	FCC: ≤ -13 dBm/100 kHz. For operations in the 758–775 MHz and 788–805 MHz bands, all emissions including harmonics in the band 1559–1610 MHz shall be limited to -70 dBW/ MHz equivalent isotropically radiated power (EIRP) for wideband signals, and -80 dBW EIRP for discrete emissions of less than 700 Hz bandwidth.		Pass
Frequency Stability	§2.1055(a)(1)(b) §2.1055(d)(1) §90.213	Within authorized bands of operation/frequency block.		Pass



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2.4 NR Band n66

Test Item	FCC Rule No.	Requirements	Test Result	Verdict
Effective (Isotropic) Radiated Power Output Data	§2.1046, §27.50(d)(4)	EIRP ≤ 1 W	Refer to the Appendix	Pass
Peak-Average Ratio	§27.50(d)(5)	Limit≤13 dB		Pass
Bandwidth	§2.1049	OBW: No limit. EBW: No limit.		Pass
Band Edges Compliance	§2.1051, §27.53(h)	≤ -13 dBm/1%*EBW, in 1 MHz bands immediately outside and adjacent to the frequency block.		Pass
Spurious Emission at Antenna Terminals	§2.1051, §27.53(h)	≤ -13 dBm/1 MHz, from 9 kHz to 10 th harmonics but outside authorized operating frequency ranges.		Pass
Field Strength of Spurious Radiation	§2.1053, §27.53(h)	≤ -13 dBm/1 MHz.		Pass
Frequency Stability	§2.1055(a)(1)(b) §2.1055(d) (2) §27.54	Within authorized bands of operation/frequency block.		Pass



2.5 NR Band n77

3450-3550MHz:

Test Item	FCC Rule No.	Requirements	Test Result	Verdict
Effective (Isotropic) Radiated Power Output Data	§2.1046, §27.50(k)(3)	EIRP ≤ 30dBm	Refer to the Appendixs	Pass
Peak-Average Ratio	§27.50(k)(4)	FCC: Limit≤13 dB		Pass
Bandwidth	§2.1049	OBW: No limit. EBW: No limit.		Pass
Band Edges Compliance	§2.1051, §27.50(n)(2)	For mobile operations in the 3450-3550 MHz band, the conducted power of any emission outside the licensee's authorized bandwidth shall not exceed -13 dBm/MHz.		Pass
Spurious Emission at Antenna Terminals	§2.1051, §27.50(n)(2)	For mobile operations in the 3450-3550 MHz band, the conducted power of any emission outside the licensee's authorized bandwidth shall not exceed -13 dBm/MHz.		Pass
Field Strength of Spurious Radiation	§2.1053, §27.50(n)(2)	For mobile operations in the 3450-3550 MHz band, the conducted power of any emission outside the licensee's authorized bandwidth shall not exceed -13 dBm/MHz.		Pass
Frequency Stability	§2.1055(a)(1)(b) §2.1055(d) (2) §27.54	Within authorized bands of operation/ frequency block.		Pass



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3700-3980MHz:

Test Item	FCC Rule No.	Requirements	Test Result	Verdict
Effective (Isotropic) Radiated Power Output Data	§2.1046, §27.50(j)(3)	EIRP ≤ 1W	Refer to the Appendixs	Pass
Peak-Average Ratio	---	≤13 dB		Pass
Bandwidth	§2.1049	OBW: No limit. EBW: No limit.		Pass
Band Edges Compliance	§2.1051, §27.53(l)(2)	(2) For mobile operations in the 3700-3980 MHz band, the conducted power of any emission outside the licensee's authorized bandwidth shall not exceed -13 dBm/MHz. Compliance with this paragraph (l)(2) is based on the use of measurement instrumentation employing a resolution bandwidth of 1 megahertz or greater. However, in the 1 megahertz bands immediately outside and adjacent to the licensee's frequency block, the minimum resolution bandwidth for the measurement shall be either one percent of the emission bandwidth of the fundamental emission of the transmitter or 350 kHz. In the bands between 1 and 5 MHz removed from the licensee's frequency block, the minimum resolution bandwidth for the measurement shall be 500 kHz.		Pass
Spurious Emission at Antenna Terminals	§2.1051, §27.53(l)(2)	not exceed -13 dBm/MHz.		Pass
Field Strength of Spurious Radiation	§2.1053, §27.53(l)(2)	not exceed -13 dBm/MHz		Pass
Frequency Stability	§2.1055(a)(1)(b) §2.1055(d)(2) §27.54	Within authorized bands of operation/frequency block.		Pass



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Remark:

Model No.: T440R

This test report (Ref. No.: SZCR251100502003) is based on the original test report (Ref. No.: SZCR250900414402) which dated on 2025/10/30.

Review this report and original report, this report just changed the model number.

According to the declaration from the applicant, the models in this report and models in original report were identical, the difference as below.

1. Memory changed from 3G to 2G.
2. Mechanical Modifications: Remove the charging port.
3. Use new battery model and USB cable
4. Software Modifications: T440R disabled the GSM bands, add eSIM
5. Hardware Modifications:

➤ Baseband changes: **NO**

➤ Band changes: Yes Main bands for conformance testing changes (Yes/No):

Product	GSM	UMTS	LTE	LTE CA	5G NR SA	5G NR NSA
T440G	850/900/1800/1900	B1/2/5	B2/4/5/12/13/48/66	2CA for UL CA 2CA for DL CA	n2/5/48/66/77	N2/5/66/77
T440R	NA	B1/B2/B4(add)/B5	LTE:B2/B3(add)/B4/B5/B7(add)/B12/B14(add)/B20(add)/B29(add)/B66.	2CA for UL CA 2CA for DL CA	n2/n5/n14(add)/n66/n77	N2/5/66/77

Considering to the difference, pre-scan was performed on the sample in this report to find the items which can be influential to the result in the original test report for fully retest.

Therefore in this report NR Band n14 and the newly added NSA combination were tested and other test data in this report are based on the previous report with report number SZCR250900414402.



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4 General Information

4.1 General Description of EUT

EUT Description:	UMTS/LTE/NR Mobile phone			
Model No.:	T440R			
Hardware Version:	04			
Software Version:	vBR4A			
Power Supply:	Powered by DC3.87V/2900mAh by Rechargeable Li-ion Battery. Charged by USB port from adapter or charging base. Adapter: Model: UC13US Input: 100-240V 50/60Hz 0.5A Output: 5.0V 2A Docking Station: Model: DST440G Input: 5.0V 2A Output: 5.0V 2A EUT1: Battery model: TLp029M9 EUT2: Battery model: TLp029M7			
IMEI:	RF Conducted	IMEI1: 016771000005510 IMEI2: 016771000005569		
	RSE	IMEI1: 016771000006229 IMEI2: 016771000006328		
Antenna Type:	FPC Antenna			
Antenna Gain:	NR Band n2:	-0.1dBi(Ant1)	NR Band n5:	-2.4dBi(Ant0)
	NR Band n14:	-1.2dBi(Ant0)	/	/
	NR Band n66:	-0.5dBi(Ant1)	NR Band n77:	-1.1dBi(Ant3)
	Note: The antenna gain are derived from the gain information report provided by the manufacturer.			
RF Cable*:	9kHz ~ 30MHz (0.3dB)	30MHz ~ 1000MHz (0.6dB)	1000MHz ~ 2000MHz (0.8dB)	
	2000MHz ~ 4000MHz (1.1dB)	4000MHz ~ 6000MHz (1.8dB)	6000MHz ~ 12750MHz (2.6dB)	
	Above 12750MHz(3.5dB)			
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4.2 Test Mode

Test Mode	Test Modes Description
NR/TM1	NR system, DFT-s-Pi/2-BPSK modulation
NR/TM2	NR system, DFT-s-QPSK modulation
NR/TM3	NR system, DFT-s-16QAM modulation
NR/TM4	NR system, DFT-s-64QAM modulation
NR/TM5	NR system, DFT-s-256QAM modulation
NR/TM6	NR system, CP-QPSK modulation
NR/TM7	NR system, CP-16QAM modulation
NR/TM8	NR system, CP-64QAM modulation
NR/TM9	NR system, CP-256QAM modulation
Remark: The test mode(s) are selected according to relevant radio technology specifications.	

4.3 Test Environment

Environment Parameter	101 kPa Selected Values During Tests	
Relative Humidity	44-60 % RH Ambient	
Value	Temperature(°C)	Voltage(V)
NTNV	22~25	3.85
LTLV	-10	3.6
LTHV	-10	4.4
HTLV	55	3.6
HTHV	55	4.4
Remark:		
NV: Normal Voltage	LV: Low Extreme Test Voltage	HV: High Extreme Test Voltage
NT: Normal Temperature	LT: Low Extreme Test Temperature	HT: High Extreme Test Temperature

4.4 Description of Support Units

The EUT has been tested as an independent unit.



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4.5 Measurement Uncertainty

For a 95% confidence level ($k = 2$), the measurement expanded uncertainties for defined systems, in accordance with the recommendations of ISO 17025 as following:

No.	Item	Measurement Uncertainty
1	Radio Frequency	$\pm 9.84\text{Hz}$
2	Duty cycle	$\pm 0.185\%$
3	Occupied Bandwidth	$\pm 0.20\%$
4	RF conducted power	$\pm 0.42\text{dB}$
5	RF power density	$\pm 1.97\text{dB}$
6	Conducted Spurious emissions	$\pm 0.42\text{dB}$
7	Radiated Spurious emission test(UE)	$\pm 4.8\text{dB}$ (30MHz-1GHz)
		$\pm 4.68\text{dB}$ (1GHz-6GHz)
		$\pm 4.52\text{dB}$ (6GHz-18GHz)
		$\pm 5.26\text{dB}$ (18GHz-40GHz)

Remark:

The Ulab (lab Uncertainty) is less than Ucispr/ETSI (CISPR/ETSI Uncertainty), so the test results

- compliance is deemed to occur if no measured disturbance level exceeds the disturbance limit;
- non-compliance is deemed to occur if any measured disturbance level exceeds the disturbance limit.



4.6 Test Location

All tests were performed at:

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

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

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

No tests were sub-contracted.

4.7 Test Facility

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

• A2LA (Certificate No. 3816.01)

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

• VCCI (Member No. 1937)

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

• FCC –Designation Number: CN1336

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

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

• Innovation, Science and Economic Development Canada

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

CAB identifier: CN0006.

IC#: 4620C.



4.8 Technical Specification

Characteristics	Description				
Radio System Type	☒ SA ☒ NSA				
Supported Frequency Range	Band	TX		RX	
	NR Band n2	1850 to 1910 MHz		1930 to 1990 MHz	
	NR Band n5	824 to 849 MHz		869 to 894 MHz	
	NR Band n14	788 to 798 MHz		758 to 768 MHz	
	NR Band n66	1710 to 1780 MHz		2110 to 2180MHz	
	NR Band n77*	3700 to 3980 MHz		3700 to 3980 MHz	
		3450 to 3550 MHz		3450 to 3550 MHz	
	NSA: DC_2A_n2A, DC_5A_n2A, DC_66A_n2A, DC_2A_n5A, DC_66A_n5A, DC_2A_n66A, DC_5A_n66A, DC_66A_n66A, DC_2A_n77A, DC_5A_n77A, DC_66A_n77A, DC_12A_n2A, DC_12A_n66A, DC_12A_n77A DC_14A_n2A, DC_14A_n66A, DC_14A_n77A Remark: ENDC&CA inter-band only test RSE, report only show worst mode.				
Supported Channel Bandwidth	NR Band n2	SCS 15kHz:			
		☒ 5 MHz	☒ 10 MHz	☒ 15 MHz	☒ 20 MHz
		☒ 25 MHz	☒ 30 MHz	☒ 40 MHz	
	NR Band n5	SCS 15kHz:			
		☒ 5 MHz	☒ 10 MHz	☒ 15 MHz	☒ 20 MHz
		☒ 25 MHz			
	NR Band n14	SCS 15kHz:			
		☒ 5 MHz	☒ 10 MHz	☒ 15 MHz	
	NR Band n66	SCS 15kHz:			
		☒ 5 MHz	☒ 10 MHz	☒ 15 MHz	☒ 20 MHz
		☒ 25 MHz	☒ 30 MHz	☒ 40 MHz	
	NR Band n77	SCS 30kHz			
		☒ 10 MHz	☒ 15 MHz	☒ 20 MHz	☒ 25 MHz
		☒ 30 MHz	☒ 40 MHz	☒ 50 MHz	☒ 60 MHz
		☒ 70 MHz	☒ 80 MHz	☒ 90 MHz	☒ 100 MHz



4.9 Test Frequencies

4.9.1 Reference test frequencies for NR operating band n2

4.9.1.1 Test frequencies for NR operating band n2 and SCS 15 kHz

CBW [MHz]	Range		Carrier centre [MHz]	Carrier centre [ARFCN]	SS block SCS [kHz]
5	Downlink	Low	1932.5	386500	15
		Mid	1960	392000	
		High	1987.5	397500	
	Uplink	Low	1852.5	370500	-
		Mid	1880	376000	
		High	1907.5	381500	
10	Downlink	Low	1935	387000	15
		Mid	1960	392000	
		High	1985	397000	
	Uplink	Low	1855	371000	-
		Mid	1880	376000	
		High	1905	381000	
15	Downlink	Low	1937.5	387500	15
		Mid	1960	392000	
		High	1982.5	396500	
	Uplink	Low	1857.5	371500	-
		Mid	1880	376000	
		High	1902.5	380500	
20	Downlink	Low	1940	388000	15
		Mid	1960	392000	
		High	1980	396000	
	Uplink	Low	1860	372000	-
		Mid	1880	376000	
		High	1900	380000	
25	Downlink	Low	1942.5	388500	15
		Mid	1960	392000	
		High	1977.5	395500	
	Uplink	Low	1862.5	372500	-
		Mid	1880	376000	
		High	1897.5	379500	
30	Downlink	Low	1945	389000	15
		Mid	1960	392000	
		High	1975	395000	
	Uplink	Low	1865	373000	-
		Mid	1880	376000	
		High	1895	379000	
40	Downlink	Low	1950	390000	15
		Mid	1960	392000	
		High	1970	394000	
	Uplink	Low	1870	374000	-
		Mid	1880	376000	
		High	1890	378000	



4.9.2 Reference test frequencies for NR operating band n5

4.9.2.1 Test frequencies for NR operating band n5 and SCS 15 kHz

CBW [MHz]	Range		Carrier centre [MHz]	Carrier centre [ARFCN]	SS block SCS [kHz]
5	Downlink	Low	871.5	174300	15
		Mid	881.5	176300	
		High	891.5	178300	
	Uplink	Low	826.5	165300	-
		Mid	836.5	167300	
		High	846.5	169300	
10	Downlink	Low	874	174800	15
		Mid	881.5	176300	
		High	889	177800	
	Uplink	Low	829	165800	-
		Mid	836.5	167300	
		High	844	168800	
15	Downlink	Low	876.5	175300	15
		Mid	881.5	176300	
		High	886.5	177300	
	Uplink	Low	831.5	166300	-
		Mid	836.5	167300	
		High	841.5	168300	
20	Downlink	Low	879	175800	15
		Mid	881.5	176300	
		High	884	176800	
	Uplink	Low	834	166800	-
		Mid	836.5	167300	
		High	839	167800	
25	Downlink	Low	881.5	176300	15



4.9.3 Reference test frequencies for NR operating band n14

4.9.3.1 Test frequencies for NR operating band n14 and SCS 15 kHz

Bandwidth [MHz]	Range		Carrier centre [MHz]	Carrier centre [ARFCN]	SS block SCS [kHz]
5	Downlink	Low	760.5	151200	15
		Mid	763	152600	
		High	765.5	153100	
	Uplink	Low	790.5	158100	--
		Mid	793	158600	
		High	795.5	159100	
10	Downlink	Low	/	/	15
		Mid	763	152600	
		High	/	/	
	Uplink	Low	/	/	--
		Mid	793	158600	
		High	/	/	



4.9.4 Reference test frequencies for NR operating band n66

4.9.4.1 Test frequencies for NR operating band n66 and SCS 15 kHz

CBW [MHz]	Range		Carrier centre [MHz]	Carrier centre [ARFCN]	SS block SCS [kHz]
5	Downlink	Low	2112.5	422500	15
		Mid	2145	429000	
		High	2177.5	435500	
	Uplink	Low	1712.5	342500	-
		Mid	1745	349000	
		High	1777.5	355500	
10	Downlink	Low	2115	423000	15
		Mid	2145	429000	
		High	2175	435000	
	Uplink	Low	1715	343000	-
		Mid	1745	349000	
		High	1775	355000	
15	Downlink	Low	2117.5	423500	15
		Mid	2145	429000	
		High	2172.5	434500	
	Uplink	Low	1717.5	343500	-
		Mid	1745	349000	
		High	1772.5	354500	
20	Downlink	Low	2120	424000	15
		Mid	2145	429000	
		High	2170	434000	
	Uplink	Low	1720	344000	-
		Mid	1745	349000	
		High	1770	354000	
25	Downlink	Low	2122.5	424500	15
		Mid	2145	429000	
		High	2167.5	433500	
	Uplink	Low	1722.5	344500	-
		Mid	1745	349000	
		High	1767.5	353500	
30	Downlink	Low	2125	425000	15
		Mid	2145	429000	
		High	2165	433000	
	Uplink	Low	1725	345000	-
		Mid	1745	349000	
		High	1765	353000	
40	Downlink	Low	2130	426000	15
		Mid	2145	429000	
		High	2160	432000	
	Uplink	Low	1730	346000	-
		Mid	1745	349000	
		High	1760	352000	



4.9.5 Reference test frequencies for NR operating band n77

4.9.5.1 Test frequencies for NR operating band n77 and SCS 30 kHz

3700-3980:

CBW [MHz]	Range		Carrier centre [MHz]	Carrier centre [ARFCN]	SS block SCS [kHz]
10	Downlink & Uplink	Low	3705	647000	30
		Mid	3840	656000	
		High	3975	665000	
15	Downlink & Uplink	Low	3707.52	647168	30
		Mid	3840	656000	
		High	3972.48	664832	
20	Downlink & Uplink	Low	3710.01	647334	30
		Mid	3840	656000	
		High	3969.99	664666	
25	Downlink & Uplink	Low	3712.5	647500	30
		Mid	3840	656000	
		High	3967.5	664500	
30	Downlink & Uplink	Low	3715.02	647668	30
		Mid	3840	656000	
		High	3964.98	664332	
40	Downlink & Uplink	Low	3720	648000	30
		Mid	3840	656000	
		High	3960	664000	
50	Downlink & Uplink	Low	3725.01	648334	30
		Mid	3840	656000	
		High	3954.99	663666	
60	Downlink & Uplink	Low	3730.02	648668	30
		Mid	3840	656000	
		High	3949.98	663332	
70	Downlink & Uplink	Low	3735	649000	30
		Mid	3840	656000	
		High	3945	663000	
80	Downlink & Uplink	Low	3740.01	649334	30
		Mid	3840	656000	
		High	3939.99	662666	
90	Downlink & Uplink	Low	3745.02	649668	30
		Mid	3840	656000	
		High	3934.98	662332	
100	Downlink & Uplink	Low	3750	650000	30
		Mid	3840	656000	
		High	3930	662000	



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3450-3550:

CBW [MHz]	Range		Carrier centre [MHz]	Carrier centre [ARFCN]	SS block SCS [kHz]
10	Downlink & Uplink	Low	3455.01	630334	30
		Mid	3500.01	633334	
		High	3544.98	636332	
15	Downlink & Uplink	Low	3457.5	630500	30
		Mid	3500.01	633334	
		High	3542.49	636166	
20	Downlink & Uplink	Low	3460.02	630668	30
		Mid	3500.01	633334	
		High	3540	636000	
25	Downlink & Uplink	Low	3462.51	630834	30
		Mid	3500.01	633334	
		High	3537.48	635832	
30	Downlink & Uplink	Low	3465	631000	30
		Mid	3500.01	633334	
		High	3534.99	635666	
40	Downlink & Uplink	Low	3470.01	631334	30
		Mid	3500.01	633334	
		High	3529.98	635332	
50	Downlink & Uplink	Low	3475.02	631668	30
		Mid	3500.01	633334	
		High	3525	635000	
60	Downlink & Uplink	Low	3480	632000	30
		Mid	3500.01	633334	
		High	3519.99	634666	
70	Downlink & Uplink	Low	3485.01	632334	30
		Mid	3500.01	633334	
		High	3514.98	634332	
80	Downlink & Uplink	Low	3490.02	632668	30
		Mid	3500.01	633334	
		High	3510	634000	
90	Downlink & Uplink	Low	3495	633000	30
		Mid	3500.01	633334	
		High	3504.99	633666	
100	Downlink & Uplink	Low	\	\	30
		Mid	3500.01	633334	
		High	\	\	



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5 Equipment List

5G NR Test System					
Test Equipment	Manufacturer	Model No.	Inventory No.	Cal. date (yyyy/mm/dd)	Cal.Due date (yyyy/mm/dd)
Signal Generator	Rohde & Schwarz	SMR20	SZ-WRG-M-016	2025/08/14	2026/08/13
Signal Generator	Keysight	N5182B	SZ-WRG-M-025	2025/01/07	2026/01/06
Spectrum Analyzer	Keysight	N9020A	SZ-WRG-M-026		
Radio Communication Tester	Anritsu	MT8821C	SZ-WRG-M-014	2025/08/14	2026/08/13
Radio Communication Tester	Anritsu	MT8000A	SZ-WRG-M-013	2025/08/14	2026/08/13
Programmable Temperature & Humidity Chamber	Votsch Industrietechnik GmbH	VT 4002	SZ-WRG-M-017	2024/12/30	2025/12/29
DC power supply	HYELEC	HY3005B	SZ-WRG-M-024	2025/07/24	2026/07/23
Humidity/ Temperature Indicator	Shanghai Meteorological	HTC-1	SZ-WRG-M-077	2025/05/27	2026/05/26
Test Software	TST PASS	TST PASS V2.0	N/A	NCR	NCR



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Radiated spurious emissions					
Test Equipment	Manufacturer	Model No.	Inventory No.	Cal. date (yyyy/mm/dd)	Cal.Due date (yyyy/mm/dd)
MXE EMI receiver (3Hz-3.6GHz)	KEYSIGHT	N9038B	SEM004-29	2025/07/25	2026/07/24
Signal & Spectrum Analyzer	Rohde & Schwarz	FSV	SZ-WRG-M-048	2025/01/07	2026/01/06
Pre-amplifier (30MHz-1GHz)	SGS	AMP30M1G30	SEM005-33	2025/03/04	2026/03/03
Low Noise Amplifier 30M-8GHz	Tonscend	TAP30M8G30	SZ-WRG-M-050	2025/01/07	2026/01/06
Low Noise Amplifier 1G-18GHz	Tonscend	TAP01018050	SZ-WRG-M-051	2025/01/07	2026/01/06
Low Noise Amplifier 18G-40GHz	Tonscend	TAP18040048	SZ-WRG-M-052	2025/01/08	2026/01/07
Active Loop Antenna 9kHz-30MHz	SCHWARZBECK	FMZB 1519B	SZ-WRG-M-053	2023/12/25	2025/12/24
TRILOG Breitband Antenne 30MHz-1GHz	SCHWARZBECK	VULB 9168	SZ-WRG-M-054	2023/12/25	2025/12/24
Double Ridge Horn Antenna 1GHz-18GHz	SCHWARZBECK	BBHA 9120 D	SZ-WRG-M-055	2023/12/21	2025/12/20
SHF-EHF Horn 15GHz-40GHz	SCHWARZBECK	BBHA 9170	SZ-WRG-M-056	2023/12/25	2025/12/24
Measurement Software	AUDIX	e3 V8.2014-6-27	NCR	NCR	NCR
Chamber	CRTSGSSAC966	N/A	SZ-WRG-C-063	2025/01/06	2028/01/05
Humidity/ Temperature Indicator	Deli	8838	SEM002-46	2025/08/06	2026/08/05
Radio Communication Tester	STARPOINT	SP9500	SZ-WRG-M-083	2025/05/22	2026/05/21

Remark: NCR=No Calibration Requirement.



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6 Description of Tests

6.1 Conducted Output Power

Measurement Procedure: FCC KDB 971168 D01 V03r01 Section 5.2.1

The transmitter output was connected to a calibrated coaxial cable, attenuator and power meter, the other end of which was connected to a Base Station Simulator. The Base Station Simulator was set to force the EUT to its maximum power setting. The power output at the transmitter antenna port was determined by adding the value of the cable insertion loss to the power reading. The tests were performed at three frequencies (low channel, middle channel and high channel) and on the highest power levels, which can be setup on the transmitters.

Remark: Reference test setup 1



6.2 Effective (Isotropic) Radiated Power of Transmitter

Measurement Procedure: FCC KDB 971168 D01 V03r01 Section 5.8.4

Calculate power in dBm by the following formula:

ERP (dBm) = Conducted Power (dBm) + antenna gain (dBd)

EIRP(dBm) = Conducted Power (dBm) + antenna gain (dBi)

EIRP=ERP+2.15dB



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6.3 Occupied Bandwidth

Measurement Procedure: FCC KDB 971168 D01 V03r01 Section 4.2 & 4.3

The occupied bandwidth, that is the frequency bandwidth such that, below its lower and above its upper frequency limits, the mean powers radiated are each equal to 0.5 percent of the total mean power radiated by a given emission shall be measured. The transmitter output was connected to a calibrated coaxial cable, attenuator and Spectrum analyser, the other end of which was connected to a Base Station Simulator. The Base Station Simulator was set to force the EUT to its maximum power setting. The tests were performed at three frequencies (low channel, middle channel and high channel). The span of the analyzer shall be set to capture all products of the modulation process, including the emission skirts. The resolution bandwidth shall be set to as close to 1 percent of the selected span as is possible without being below 1 percent. The video bandwidth shall be set to 3 times the resolution bandwidth. Video averaging is not permitted. Where practical, a sampling detector shall be used since a peak or, peak hold, may produce a wider bandwidth than actual. The trace data points are recovered and are directly summed in linear terms. The recovered amplitude data points, beginning at the lowest frequency, are placed in a running sum until 0.5 percent of the total is reached and that frequency recorded. The process is repeated for the highest frequency data points. This frequency is recorded. The span between the two recorded frequencies is the occupied bandwidth.

Remark: Reference test setup 1

Test Settings

1. The signal analyzer's automatic bandwidth measurement capability was used to perform the 99% occupied bandwidth and the 26dB bandwidth. The bandwidth measurement was not influenced by any intermediate power nulls in the fundamental emission.
2. RBW = 1 – 5% of the expected OBW
3. VBW $\geq 3 \times$ RBW
4. Detector = Peak
5. Trace mode = max hold
6. Sweep = auto couple
7. The trace was allowed to stabilize
8. If necessary, steps 2 – 7 were repeated after changing the RBW such that it would be within 1 – 5% of the 99% occupied bandwidth observed in Step 7



6.4 Band Edge at Antenna Terminals

Measurement Procedure: FCC KDB 971168 D01 V03r01 Section 6.0

The transmitter output was connected to a calibrated coaxial cable, attenuator and Spectrum analyser, the other end of which was connected to a Base Station Simulator. The Base Station Simulator was set to force the EUT to its maximum power setting. The tests were performed at two frequencies (low channel and high channel).in the 1MHz bands immediately outside and adjacent to the frequency block a resolution bandwidth of 100kHz or 1% of the emission bandwidth of the fundamental emission of the transmitter may be employed. The EUT emission bandwidth is measured as the width of the signal between two points, outside of which all emission are attenuated at least 26dB below the transmitter power. The video bandwidth of the spectrum analyzer was set at thrice the resolution bandwidth. Detector Mode was set to peak or peak hold power.

Remark: Reference test setup 1

Test Settings

1. Start and stop frequency were set such that the band edge would be placed in the center of the plot
2. Span was set large enough so as to capture all out of band emissions near the band edge
3. $RBW \geq 1\%$ of the emission bandwidth
4. $VBW \geq 3 \times RBW$
5. Detector = RMS
6. Number of sweep points $\geq 2 \times \text{Span}/RBW$
7. Trace mode = trace average for continuous emissions, max hold for pulse emissions
8. Sweep time = auto couple
9. The trace was allowed to stabilize



6.5 Spurious And Harmonic Emissions at Antenna Terminal

Measurement Procedure: FCC KDB 971168 D01 V03r01 Section 6.0

The transmitter output was connected to a calibrated coaxial cable, attenuator and Spectrum analyzer, the other end of which was connected to a Base Station Simulator. The Base Station Simulator was set to force the EUT to its maximum power setting. The tests were performed at three frequencies (low channel and high channel). The level of the carrier and the various conducted spurious and harmonic frequencies is measured by means of a calibrated spectrum analyzer. The spectrum is scanned from the lowest frequency generated in the equipment up to a frequency including its 10th harmonic. On any frequency outside a licensee's frequency block, the power of any emission shall be attenuated below the transmitter power (P) by at least $43 + 10 \log(P)$ dB. Compliance with these provisions is based on the use of measurement instrumentation employing a resolution bandwidth of 1 MHz or greater. However, in the 1 MHz bands immediately outside and adjacent to the frequency 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 are attenuated at least 26 dB below the transmitter power.

Remark: Reference test setup 1

Test Settings

1. Start frequency was set to 9kHz and stop frequency was set to at least 10* the fundamental frequency (Separated into at least two plots per channel)
2. Detector = RMS
3. Trace mode = trace average for continuous emissions, max hold for pulse emissions
4. Sweep time = auto couple
5. The trace was allowed to stabilize
6. Please see test notes below for RBW and VBW settings



6.6 Peak-Average Ratio

Measurement Procedure: FCC KDB 971168 D01 V03r01 Section 5.7.2

A peak to average ratio measurement is performed at the conducted port of the EUT. For WCDMA signals, the spectrum analyzers Complementary Cumulative Distribution Function (CCDF) measurement profile is used to determine the largest deviation between the average and the peak power of the EUT in a given bandwidth. The CCDF curve shows how much time the peak waveform spends at or above a given average power level. The percent of time the signal spends at or above the level defines the probability for that particular power level. For GSM signals, an average and a peak trace are used on a spectrum analyzer to determine the largest deviation between the average and the peak power of the EUT in a bandwidth greater than the emission bandwidth. The traces are generated with the spectrum analyzer set to zero span mode.

Remark: Reference test setup 1

Test Settings

1. The signal analyzer's CCDF measurement profile is enabled
2. Frequency = carrier center frequency
3. Measurement BW > Emission bandwidth of signal
4. The signal analyzer was set to collect one million samples to generate the CCDF curve
5. The measurement interval was set depending on the type of signal analyzed. For continuous signals (>98% duty cycle), the measurement interval was set to 1ms. For burst transmissions, the spectrum analyzer is set to use an internal "RF Burst" trigger that is synced with an incoming pulse and the measurement interval is set to less than the duration of the "on time" of one burst to ensure that energy is only captured during a time in which the transmitter is operating at maximum power



6.7 Field Strength of Spurious Radiation

Measurement Procedure: FCC KDB 971168 D01 V03r01 Section 5.8

Below 1GHz test procedure as below:

- 1). The EUT was powered ON and placed on a 80cm high table in the chamber. The antenna of the transmitter was extended to its maximum length.
- 2). The disturbance of the transmitter was maximized on the test receiver display by raising and lowering from 1m to 4m (for the test frequency of below 30MHz, the antenna was tuned to heights 1 meter) the receive antenna and by rotating through 360° the turntable. After the fundamental emission was maximized, a field strength measurement was made.
- 3). Steps 1) and 2) were performed with the EUT and the receive antenna in both vertical and horizontal polarization.
- 4). Test the EUT in the lowest channel, the middle channel ,the Highest channel.
- 5). The radiation measurements are performed in X, Y, Z axis positioning. And found the X axis positioning which it is worse case, Only the test worst case mode is recorded in the report.
- 6). Repeat above procedures until all frequencies measured was complete.

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

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

Above 1GHz test procedure as below:

- 1) Different between above is the test site, change from Semi- Anechoic Chamber to fully Anechoic Chamber
- 2) Calculate power in dBm by the following formula:

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

$$\text{EIRP (dBm)} = E \text{ (dB}\mu\text{V/m)} + 20 \log D - 104.8; \text{ where D is the measurement distance in meters}$$
- 3). Test the EUT in the lowest channel, the middle channel the Highest channel
- 4). The radiation measurements are performed in X, Y, Z axis positioning. And found the X axis positioning which it is worse case, Only the test worst case mode is recorded in the report.
- 5). Repeat above procedures until all frequencies measured was complete

Remark1: Reference test setup 2

Remark2: The emission below 18G were measured at a 3m test distance, while emissions above 18GHz were measured at a 1m test distance. At a measurement distance of 1 meter the limit line was increased by $20 \cdot \log(3/1) = 9.54 \text{ dB}$.

Remark: Reference test setup 2

Remark:

1) The field strength is calculated by adding the Antenna Factor, Cable Factor & AMP. The basic equation with a sample calculation is as follows:

AF = Antenna Factor(dB/m)

Factor = Cable Factor(dB) - Preamplifier (dB)

Level = Reading Level + AF + Factor -95.26

Margin = Limit – Level

2) Scan from 9kHz to 40GHz, The disturbance between 9KHz to 30MHz and 18GHz to 40GHz was very low, and the harmonics were the highest point could be found when testing, so only the harmonics had been displayed. The amplitude of spurious emissions from the radiator which are attenuated more than 20dB below the limit need not be reported.

3) All modes have been tested, but only the worst case data displayed in this report.



6.8 Frequency Stability / Temperature Variation

Measurement Procedure:

Frequency stability testing is performed in accordance with the guidelines of FCC KDB 971168 D01 V03r01 Section 9

The frequency stability of the transmitter is measured by:

- 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.

Specification – The frequency stability shall be sufficient to ensure that the fundamental emission stays within the authorized frequency block. The frequency stability of the transmitter shall be maintained within $\pm 0.00025\%$ (± 2.5 ppm) of the center frequency.

Time Period and Procedure:

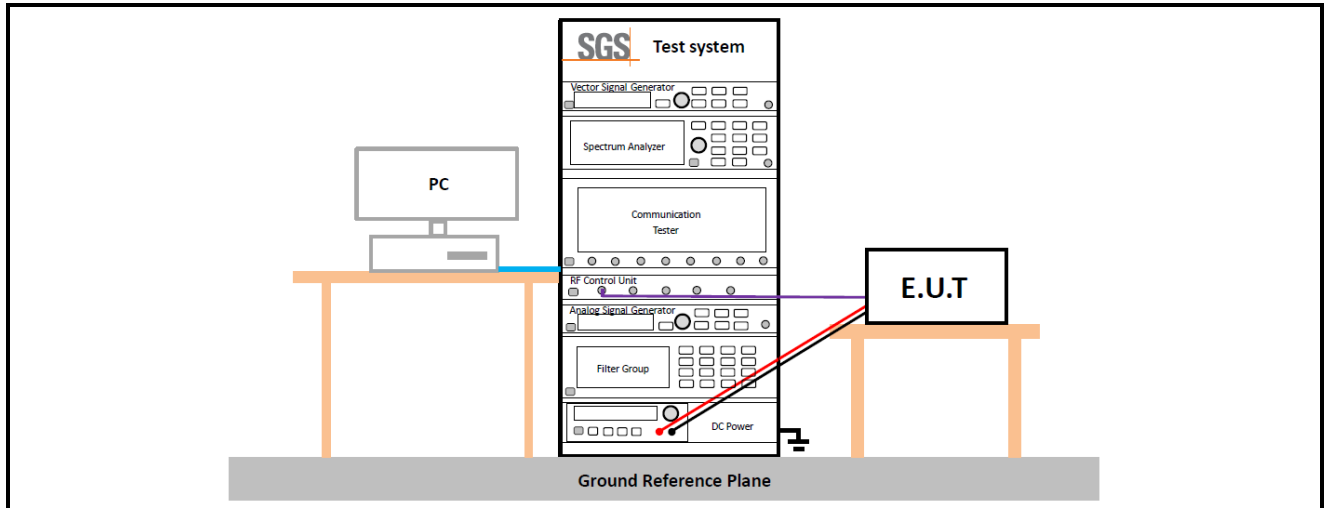
1. The carrier frequency of the transmitter is measured at room temperature (20°C to provide a reference).
2. The equipment is turned on in a “standby” condition for fifteen minutes before applying power to the transmitter. Measurement of the carrier frequency of the transmitter is made within one minute 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.

Remark: Reference test setup 3

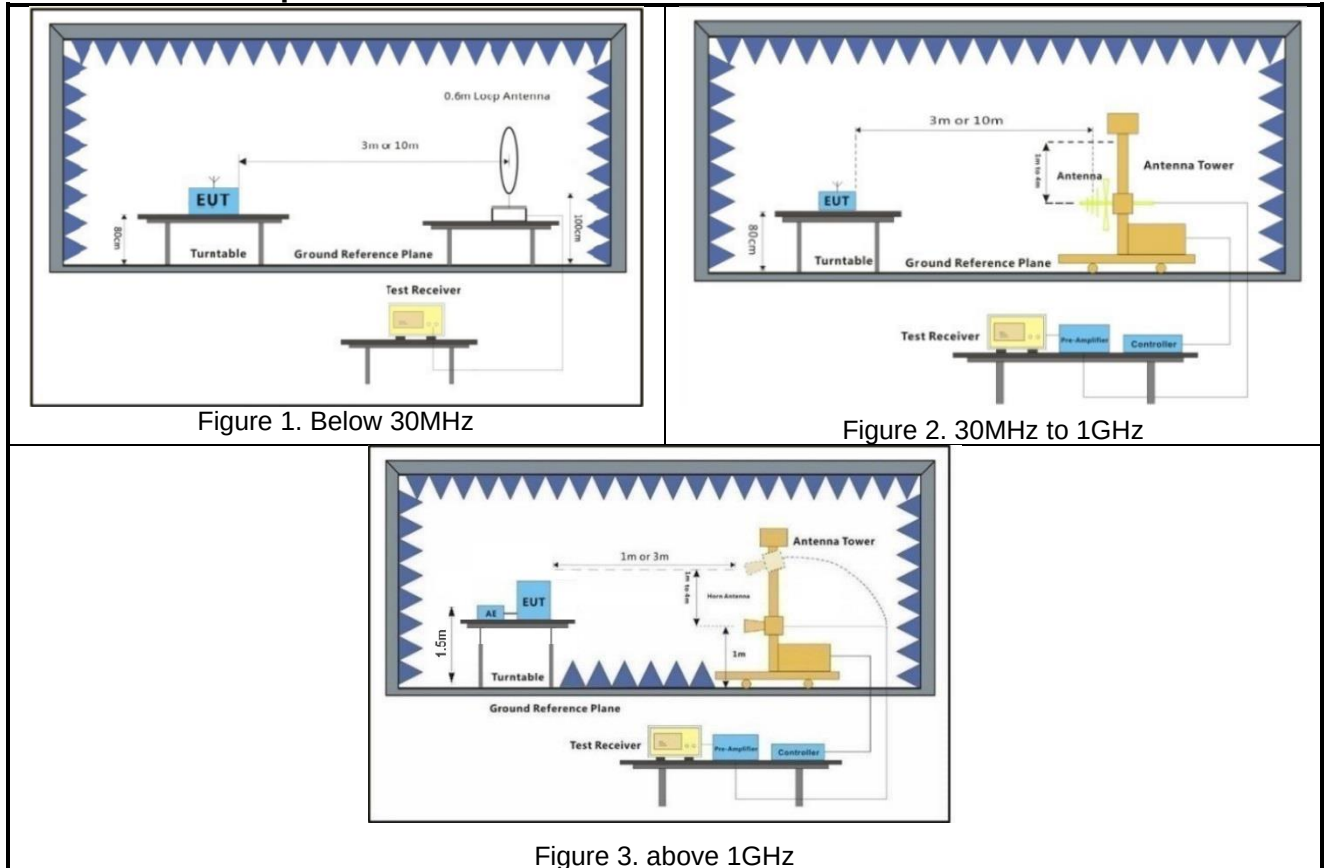


6.9 Test Setups

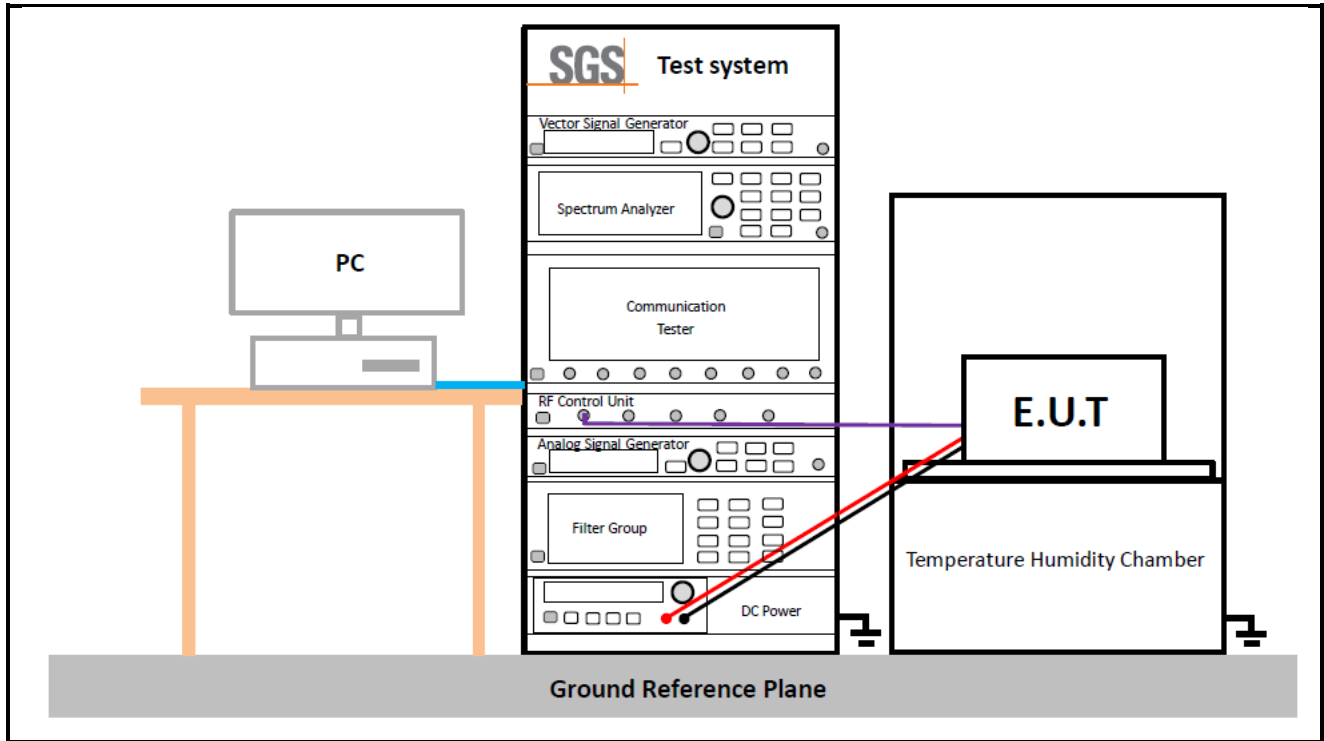
6.9.1 Test Setup 1



6.9.2 Test Setup 2



6.9.3 Test Setup 3



6.10 Test Conditions

Transmit Output Power Data - Average Power, Total	
Test Case	Test Conditions
Test Environment	Ambient Climate & Rated Voltage
Test Setup	Test Setup 1
RF Channels (TX)	L, M, H (L= low channel, M= middle channel, H= high channel)
Test Mode	NR/TM1; NR/TM2; NR/TM3; NR/TM4; NR/TM5; NR/TM6; NR/TM7; NR/TM8; NR/TM9
Peak-to-Average Ratio	
Test Case	Test Conditions
Test Environment	Ambient Climate & Rated Voltage
Test Setup	Test Setup 1
RF Channels (TX)	L, M, H (L= low channel, M= middle channel, H= high channel)
Test Mode	NR/TM1; NR/TM2; NR/TM6;
Bandwidth - Occupied Bandwidth	
Test Case	Test Conditions
Test Environment	Ambient Climate & Rated Voltage
Test Setup	Test Setup 1
RF Channels (TX)	L, M, H (L= low channel, M= middle channel, H= high channel)
Test Mode	NR/TM1; NR/TM2; NR/TM3; NR/TM4; NR/TM5; NR/TM6; NR/TM7; NR/TM8; NR/TM9
Bandwidth - Emission Bandwidth	
Test Case	Test Conditions
Test Environment	Ambient Climate & Rated Voltage
Test Setup	Test Setup 1
RF Channels (TX)	L, M, H (L= low channel, M= middle channel, H= high channel)
Test Mode	NR/TM1; NR/TM2; NR/TM3; NR/TM4; NR/TM5; NR/TM6; NR/TM7; NR/TM8; NR/TM9
Band Edges Compliance	
Test Case	Test Conditions
Test Environment	Ambient Climate & Rated Voltage
Test Setup	Test Setup 1
RF Channels (TX)	L, H (L= low channel, H= high channel)



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Page:

Test Mode	NR/TM1; NR/TM2; NR/TM6;
Spurious Emission at Antenna Terminals	
Test Case	Test Conditions
Test Environment	Ambient Climate & Rated Voltage
Test Setup	Test Setup 1
RF Channels (TX)	L, M, H (L= low channel, M= middle channel, H= high channel)
Test Mode	NR/TM1; NR/TM2; NR/TM6;
Adjacent Channel Leakage Ratio	
Test Case	Test Conditions
Test Environment	Ambient Climate & Rated Voltage
Test Setup	Test Setup 1
RF Channels (TX)	L, M, H (L= low channel, M= middle channel, H= high channel)
Test Mode	NR/TM1; NR/TM2; NR/TM3; NR/TM4; NR/TM5; NR/TM6; NR/TM7; NR/TM8; NR/TM9
Field Strength of Spurious Radiation	
Test Case	Test Conditions
Test Environment	Ambient Climate & Rated Voltage
Test Setup	Test Setup 2
RF Channels (TX)	L, M, H (L= low channel, M= middle channel, H= high channel)
Test Mode	NR/TM1 Remark: All bandwidth and modulation of NR have been pre tested, and only the worst results are reflected in the report.
Frequency Stability	
Test Case	Test Conditions
Test Environment	(1) -30 °C to +50 °C with step 10 °C at Rated Voltage (2) VL, VN and VH of Rated Voltage at Ambient Climate.
Test Setup	Test Setup 3
RF Channels (TX)	M (M= middle channel)
Test Mode	NR/TM2 The report only show the bandwidth with the worst case.



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7 Appendixes

SZCR2511005020WM Appendix	Setup Photo
Appendix B.4	NR Band n14
Appendix C.2	NR RSE

---End of Report---



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