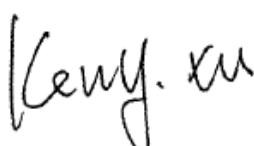


**TEST REPORT**

<b>Application No.:</b>	SZCR2501000291WM
<b>Applicant:</b>	vivo Mobile Communication Co., Ltd.
<b>Address of Applicant:</b>	No.1, vivo Road, Chang'an, Dongguan, Guangdong, China
<b>Manufacturer:</b>	vivo Mobile Communication Co., Ltd.
<b>Address of Manufacturer:</b>	No.1, vivo Road, Chang'an, Dongguan, Guangdong, China
<b>EUT Description:</b>	Mobile phone
<b>Model No.:</b>	V2440
<b>Trade Mark:</b>	vivo
<b>FCC ID:</b>	2AUCY-V2440A
<b>Standards:</b>	47 CFR Part 2 47 CFR Part 22 47 CFR Part 24 47 CFR Part 27 47 CFR Part 90
<b>Date of Receipt:</b>	2024/12/30 (for report SZCR241200494504) 2025/01/20 (for report SZCR250100029104)
<b>Date of Test:</b>	2025/01/07 to 2025/01/27 (for report SZCR241200494504) 2025/02/11 to 2025/02/12 (for report SZCR250100029104)
<b>Date of Issue:</b>	2025/02/17
<b>Test Result:</b>	<b>PASS *</b>

\* In the configuration tested, the EUT detailed in this report complied with the standards specified above.



Keny Xu  
EMC Laboratory Manager



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

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

SZEMC-TRF-01 Rev. A/1

Report No.: SZCR250100029104

Page: 2 of 45

Revision Record				
Version	Chapter	Date	Modifier	Remark
01		2025/02/17		Original

Authorized for issue by:				
		Sherlock Fang		
		<b>Sherlock Fang/Project Engineer</b>		
		Eric Fu		
		<b>Eric Fu/Reviewer</b>		

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## 2 Test Summary

### 2.1 NR Band n5/NR Band n26(824-849MHz)

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	Appendix B.23&B.26	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 n7/NR Band n38 / NR Band n41

Test Item	FCC Rule No.	Requirements	Test Result	Verdict
Effective (Isotropic) Radiated Power Output Data	§2.1046, §27.50(h)(2)	EIRP $\leq$ 2W		Pass
Peak-Average Ratio	---	$\leq$ 13 dB		Pass
Bandwidth	§2.1049	OBW: No limit. EBW: No limit.		Pass
Band Edges Compliance	§2.1051, §27.53(m)(4)	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 megahertz from the channel edge, $43 + 10 \log (P)$ dB on all frequencies between 5 megahertz and X megahertz from the channel edge, and $55 + 10 \log (P)$ dB on all frequencies more than X megahertz from the channel edge, where X is the greater of 6 megahertz 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.	Appendix B.24&B.27&B.28	Pass
Spurious Emission at Antenna Terminals	§2.1051, §27.53(m)			Pass
Field Strength of Spurious Radiation	§2.1053, §27.53(m)			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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## 2.3 NR Band n2

Test Item	FCC Rule No.	Requirements	Test Result	Verdict
Effective (Isotropic) Radiated Power Output Data	§2.1046, §24.232(c)	EIRP ≤ 2 W	Appendix B.22	Pass
Peak-Average Ratio	§24.232(d)	Limit≤13 dB		Pass
Bandwidth	§2.1049	OBW: No limit. EBW: No limit.		Pass
Band Edges Compliance	§2.1051, §24.238(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, §24.238(a)	≤ -13 dBm/1 MHz, from 9 kHz to 10 <sup>th</sup> harmonics but outside authorized operating frequency ranges.		Pass
Field Strength of Spurious Radiation	§2.1053, §24.238(a)	≤ -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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## 2.4 NR Band n26(814~824 MHz)

Test Item	FCC Rule No.	Requirements	Test Result	Verdict
Transmitter Conducted Power Output	§2.1046, §90.635(b)	< 100 W.		Pass
Peak-Average Ratio	---	Limit≤13 dB		Pass
Bandwidth	§2.1049	OBW: No limit. EBW: No limit.		Pass
Emission Mask	§2.1051 § 90.691(a)	For any frequency removed from the EA licensee's frequency block by up to and including 37.5 kHz, the power of any emission shall be attenuated below the transmitter power (P) in watts by at least 116 Log10(f/6.1) decibels or 50+10Log10(P) decibels or 80 decibels, whichever is the lesser attenuation, where f is the frequency removed from the center of the outer channel in the block in kilohertz and where f is greater than 12.5 kHz.	Appendix B.25	Pass
Spurious Emission at Antenna Terminals	§2.1051, §90.691	< 43 + 10Log10(P[Watts]) for all out-of-band emissions		Pass
Field Strength of Spurious Radiation	§2.1053, §90.691	< 43 + 10Log10(P[Watts]) for all out-of-band emissions		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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## 2.5 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	Appendix B.29	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 <sup>th</sup> 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

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**2.6 NR Band n77 / NR Band n78****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	Appendix B.30&B.32	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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SZEMC-TRF-01 Rev. A/1

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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		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.	Appendix B.31&B.33	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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### 3 Re-use of Measured Data

#### 3.1 Introduction Section

This application re-uses data collected on a similar device. The subject device of this application (Model: V2440, FCC ID: 2AUCY-V2440A) is electrically identical to the reference device (Model: V2440, FCC ID: 2AUCY-V2440) for the portions of the circuitry corresponding to the data being re-used. Based on their similarity, the FCC Part 22, 24, 27, 90 (equipment class: PCE) reuse the original model's result and do spot-check, following the FCC KDB 484596 D01 Referencing Test Data v02r02.

This test report (Report No.: SZCR250100029104 issue on 2025/02/17) is based on the original test report (Report No.: SZCR241200494504 issue on 2025/02/07).

According to the declaration from the applicant, The main difference between FCC ID: 2AUCY-V2440 and FCC ID: 2AUCY-V2440A is as below:

- Remove NFC.

The applicant takes full responsibility that the test data as referenced in this report represent compliance for this FCC ID: 2AUCY-V2440A .



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### 3.2 Spot Check Verification Data Section

In this report only Field Strength of Spurious Radiation were performed based on the worst case of the original report with report number SZCR241200494504 issue on 2025/02/07 and other test data in this report are based on the previous report with report number SZCR241200494504 issue on 2025/02/07. In this filing to demonstrate the test data from original model remains representative for the variant model.

Spot-check measurements, while being always compliant with the applicable rule part(s) for the test under consideration, show a deviation  $d_{dB}$  from the reference data no larger than 3 dB:

$$d_{dB} = | V_{dB} - R_{dB} | \leq 3 \text{ dB} \quad (1)$$

$V_{dB}$ , the variant spot-check level

$R_{dB}$ , the corresponding measurement level for the reference model

An alternative to the limit of eq. (1) is available, and is based on considering how far the reference data  $R_{dB}$  is from the compliance threshold  $C_{dB}$  (also expressed in dB), for the particular test under consideration. In this case, if  $M_{dB} = |C_{dB} - R_{dB}|$  is the margin in dB from the compliance limit, a spot check may be considered acceptable when the deviation  $d_{dB}$  from the reference data satisfies the following condition:

$$d_{dB} = | V_{dB} - R_{dB} | \leq (3 + M_{dB} / 20) \text{ dB} , \text{ for } 0 \leq M_{dB} \leq 60 \text{ dB} \quad (2)$$

where “| |” is the absolute value of the measured quantity.

When using the option in eq. (2),  $d_{dB}$  increases linearly from 3 dB to 6 dB.

Summary for power and RSE spot check for each rule entry and technology is listed as below:

Test Item	Reference FCC ID: 2AUCY-V2440		Variant FCC ID: 2AUCY-V2440A	Deviation (dB)	Limit (dB)
	(dBm)	(dBm)			
Field Strength of Spurious Radiation	NR Band 38	-46.59	-47.04	0.45	3

Conclusion:

Field Strength of Spurious Radiation test against the variant model based on the worst-case condition from the original model was performed in this filing and the verification test results similar to the original FCC ID. All tests meet FCC technical limits. Detail sport check test result can be found in the variant model report.



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## 5 General Information

### 5.1 General Description of EUT

EUT Description:	Mobile phone				
Model No.:	V2440				
Trade Mark:	vivo				
Hardware Version:	MP_0.1				
Software Version:	PD2447EF_EX_A_15.0.2.10.W30				
Power Supply:	DC 3.91V from internal rechargeable battery which can be charged by AC/DC adapter				
IMEI:	RF Conducted	867176079998233			
	RSE	866007079999353			
HPUE Power Class:	Class 2: NR Band n41; NR Band n78				
Antenna Type:	Ant11:IFA Antenna Others:PIFA Antenna				
Antenna Gain:	NR Band n2:	-6.53dBi(Ant11); -2.91dBi(Ant13); 0.21dBi(Ant31);			
	NR Band n5:	-4.53 dBi(Ant13); -4.64dBi(Ant31);			
	NR Band n7:	-2.31dBi(Ant11); -1.16dBi(Ant13); 0.49dBi(Ant31);			
	NR Band n26:	-4.53dBi(Ant13); -4.64dBi(Ant31);			
	NR Band n38:	-2.31dBi(Ant11); -0.71dBi(Ant13); 0.75dBi(Ant31);			
	NR Band n41:	-2.31dBi(Ant11); -0.71dBi(Ant13); 0.75dBi(Ant31);			
	NR Band n66:	-3.39dBi(Ant11); -1.75dBi(Ant13); -1.91dBi(Ant31);			
	NR Band n77:	0.96dBi(Ant11); -1.94dBi(Ant12); 0.13dBi(Ant21);0.41dBi(Ant23);			
	NR Band n78:	0.96dBi(Ant11); -1.94dBi(Ant12); 0.12dBi(Ant21);0.41dBi(Ant23);			
RF Cable:	Note: The antenna gain are derived from the gain information report provided by the manufacturer.				
	9kHz ~ 30MHz (0.3dB)	30MHz ~ 1000MHz (0.6dB)	1000MHz ~ 2000MHz (0.8dB)		
Remark:	2000MHz ~ 4000MHz (1.1dB)	4000MHz ~ 6000MHz (1.8dB)	6000MHz ~ 12750MHz (2.6dB)		
	Above 12750MHz(3.5dB)				

**Remark:**

1. Conduction Power &amp; EIRP of all antennas are tested, and only the worst data is presented.

2. As above information is provided and confirmed by the applicant. SGS is not liable to the accuracy, suitability,

reliability or/and integrity of the information.

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## 5.2 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.

## 5.3 Test Environment

Environment Parameter	101 kPa Selected Values During Tests	
Relative Humidity	44-46 % RH Ambient	
Value	Temperature(°C)	Voltage(V)
NTNV	22~23	3.91
LTLV	-30	3.7
LTHV	-30	4.3
HTLV	50	3.7
HTHV	50	4.3

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

## 5.4 Description of Support Units

The EUT has been tested as an independent unit.



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## 5.5 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 Ulub (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.

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## 5.6 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.

## 5.7 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.

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## 5.8 Technical Specification

Characteristics	Description			
Radio System Type	<input checked="" type="checkbox"/> SA <input checked="" type="checkbox"/> 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 n7	2500 to 2570 MHz	2620 to 2690 MHz	
	NR Band n26 (814 to 824 MHz)	814 to 824MHz	859 to 869 MHz	
	NR Band n26 (824 to 849 MHz)	824 to 849 MHz	869 to 894 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 2180 MHz	
	NR Band n77	3700 to 3980 MHz	3700 to 3980 MHz	
		3450 to 3550 MHz	3450 to 3550 MHz	
	NR Band n78*	3700 to 3800 MHz	3700 to 3800 MHz	
		3450 to 3550 MHz	3450 to 3550 MHz	
ENDC:				
DC_4A_n2A, DC_7A_n2A, DC_66A_n2A;DC_7A_n5A; DC_2A_n7A, DC_4A_n7A, DC_5A_n7A, DC_66A_n7A;DC_7A_n26A; DC_2A_n38A, DC_4A_n38A, DC_5A_n38A, DC_66A_n38A ; DC_2A_n41A, DC_4A_n41A, DC_26A_n41A, DC_66A_n41A;DC_2A_n66A, DC_5A_n66A,DC_7A_n66A; DC_7A_n77A; DC_2A_n78A, DC_4A_n78A, DC_5A_n78A, DC_7A_n78A, DC_26A_n78A, DC_38A_n78A, DC_41A_n78A, DC_66A_n78A;				
Remark: ENDC Only test RSE, report only show worst mode.				

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## 5.9 Test Frequencies

### 5.9.1 Reference test frequencies for NR operating band n2

#### 5.9.1.1 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
		Mid	1960	392000
		High	1987.5	397500
	Uplink	Low	1852.5	370500
		Mid	1880	376000
		High	1907.5	381500
10	Downlink	Low	1935	387000
		Mid	1960	392000
		High	1985	397000
	Uplink	Low	1855	371000
		Mid	1880	376000
		High	1905	381000
15	Downlink	Low	1937.5	387500
		Mid	1960	392000
		High	1982.5	396500
	Uplink	Low	1857.5	371500
		Mid	1880	376000
		High	1902.5	380500
20	Downlink	Low	1940	388000
		Mid	1960	392000
		High	1980	396000
	Uplink	Low	1860	372000
		Mid	1880	376000
		High	1900	380000

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**5.9.2 Reference test frequencies for NR operating band n5**
**5.9.2.1 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
		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
		Mid	881.5	176300
		High	889	177800
	Uplink	Low	829	165800
		Mid	836.5	167300
		High	844	168800
15	Downlink	Low	876.5	175300
		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
		Mid	881.5	176300
		High	884	176800
	Uplink	Low	834	166800
		Mid	836.5	167300
		High	839	167800

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**5.9.3 Reference test frequencies for NR operating band n7**
**5.9.3.1 Test frequencies for NR operating band n7 and SCS 15 kHz**

Bandwidth [MHz]	Range	Carrier centre [MHz]	Carrier centre [ARFCN]	SS block SCS [kHz]
5	Downlink	Low	2622.5	524500
		Mid	2655	531000
		High	2687.5	537500
	Uplink	Low	2502.5	500500
		Mid	2535	507000
		High	2567.5	513500
10	Downlink	Low	2625	525000
		Mid	2655	531000
		High	2685	537000
	Uplink	Low	2505	501000
		Mid	2535	507000
		High	2565	513000
15	Downlink	Low	2627.5	525500
		Mid	2655	531000
		High	2682.5	536500
	Uplink	Low	2507.5	501500
		Mid	2535	507000
		High	2562.5	512500
20	Downlink	Low	2630	526000
		Mid	2655	531000
		High	2680	536000
	Uplink	Low	2510	502000
		Mid	2535	507000
		High	2560	512000
25	Downlink	Low	2632.5	526500
		Mid	2655	531000
		High	2677.5	535500
	Uplink	Low	2512.5	502500
		Mid	2535	507000
		High	2557.5	511500
30	Downlink	Low	2635	52700
		Mid	2655	531000
		High	2675	535000
	Uplink	Low	2515	503000
		Mid	2535	507000
		High	2555	511000
40	Downlink	Low	2640	528000
		Mid	2655	531000
		High	2670	534000
	Uplink	Low	2520	504000
		Mid	2535	507000
		High	2550	510000
50	Downlink	Low	2645	529000
		Mid	2655	531000
		High	2665	533000
	Uplink	Low	2525	505000
		Mid	2535	507000
		High	2545	509000

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**5.9.4 Reference test frequencies for NR operating band n26**
**5.9.4.1 Test frequencies for NR operating band n26 and SCS 15 kHz**

814-824:

CBW [MHz]	Range	Carrier centre [MHz]	Carrier centre [ARFCN]	SS block SCS [kHz]
5	Downlink	Low	861.5	172300
		Mid	864	172800
		High	866.5	173300
	Uplink	Low	816.5	163300
		Mid	819	163800
		High	821.5	164300
10	Downlink	Low	/	/
		Mid	864	172800
		High	/	/
	Uplink	Low	/	/
		Mid	819	163800
		High	/	/

824-849:

CBW [MHz]	Range	Carrier centre [MHz]	Carrier centre [ARFCN]	SS block SCS [kHz]
5	Downlink	Low	871.5	174300
		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
		Mid	881.5	176300
		High	889	177800
	Uplink	Low	829	165800
		Mid	836.5	167300
		High	844	168800
15	Downlink	Low	876.5	175300
		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
		Mid	881.5	176300
		High	884	176800
	Uplink	Low	834	166800
		Mid	836.5	167300
		High	839	167800

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**5.9.5 Reference test frequencies for NR operating band n38**
**5.9.5.1 Test frequencies for NR operating band n38 and SCS 30 kHz**

Bandwidth [MHz]	Range		Carrier centre [MHz]	Carrier centre [ARFCN]	SS block SCS [kHz]
10	Downlink & Uplink	Low	2575	515000	30
		Mid	2595	519000	
		High	2615	523000	
15	Downlink & Uplink	Low	2577.5	515500	30
		Mid	2595	519000	
		High	2612.5	522500	
20	Downlink & Uplink	Low	2580	516000	30
		Mid	2595	519000	
		High	2610	522000	
25	Downlink & Uplink	Low	2582.5	516500	30
		Mid	2595	519000	
		High	2607.5	521500	
30	Downlink & Uplink	Low	2585	517000	30
		Mid	2595	519000	
		High	2605	521000	
40	Downlink & Uplink	Low	2590	518000	30
		Mid	2595	519000	
		High	2600	520000	

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**5.9.6 Reference test frequencies for NR operating band n41**
**5.9.6.1 Test frequencies for NR operating band n41 and SCS 30 kHz**

CBW [MHz]	Range	Carrier centre [MHz]	Carrier centre [ARFCN]	SS block SCS [kHz]
10	Downlink & Uplink	Low	2501.01	500202
		Mid	2592.99	518598
		High	2685	537000
15	Downlink & Uplink	Low	2503.5	500700
		Mid	2592.99	518598
		High	2682.48	536496
20	Downlink & Uplink	Low	2506.02	501204
		Mid	2592.99	518598
		High	2679.99	535998
30	Downlink & Uplink	Low	2511	502200
		Mid	2592.99	518598
		High	2674.98	534996
40	Downlink & Uplink	Low	2516.01	503202
		Mid	2592.99	518598
		High	2670	534000
50	Downlink & Uplink	Low	2521.02	504204
		Mid	2592.99	518598
		High	2664.99	532998
60	Downlink & Uplink	Low	2526	505200
		Mid	2592.99	518598
		High	2659.98	531996
80	Downlink & Uplink	Low	2536.02	507204
		Mid	2592.99	518598
		High	2649.99	529998
90	Downlink & Uplink	Low	2541	508200
		Mid	2592.99	518598
		High	2644.98	528996
100	Downlink & Uplink	Low	2546.01	509202
		Mid	2592.99	518598
		High	2640	528000

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**5.9.7 Reference test frequencies for NR operating band n66**
**5.9.7.1 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
		Mid	2145	429000
		High	2177.5	435500
	Uplink	Low	1712.5	342500
		Mid	1745	349000
		High	1777.5	355500
10	Downlink	Low	2115	423000
		Mid	2145	429000
		High	2175	435000
	Uplink	Low	1715	343000
		Mid	1745	349000
		High	1775	355000
15	Downlink	Low	2117.5	423500
		Mid	2145	429000
		High	2172.5	434500
	Uplink	Low	1717.5	343500
		Mid	1745	349000
		High	1772.5	354500
20	Downlink	Low	2120	424000
		Mid	2145	429000
		High	2170	434000
	Uplink	Low	1720	344000
		Mid	1745	349000
		High	1770	354000
25	Downlink	Low	2122.5	424500
		Mid	2145	429000
		High	2167.5	433500
	Uplink	Low	1722.5	344500
		Mid	1745	349000
		High	1767.5	353500
30	Downlink	Low	2125	425000
		Mid	2145	429000
		High	2165	433000
	Uplink	Low	1725	345000
		Mid	1745	349000
		High	1765	353000
40	Downlink	Low	2130	426000
		Mid	2145	429000
		High	2160	432000
	Uplink	Low	1730	346000
		Mid	1745	349000
		High	1760	352000

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**5.9.8 Reference test frequencies for NR operating band n77**
**5.9.8.1 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
		Mid	3840	656000
		High	3975	665000
15	Downlink & Uplink	Low	3707.52	647168
		Mid	3840	656000
		High	3972.48	664832
20	Downlink & Uplink	Low	3710.01	647334
		Mid	3840	656000
		High	3969.99	664666
25	Downlink & Uplink	Low	3712.5	647500
		Mid	3840	656000
		High	3967.5	664500
30	Downlink & Uplink	Low	3715.02	647668
		Mid	3840	656000
		High	3964.98	664332
40	Downlink & Uplink	Low	3720	648000
		Mid	3840	656000
		High	3960	664000
50	Downlink & Uplink	Low	3725.01	648334
		Mid	3840	656000
		High	3954.99	663666
60	Downlink & Uplink	Low	3730.02	648668
		Mid	3840	656000
		High	3949.98	663332
70	Downlink & Uplink	Low	3735	649000
		Mid	3840	656000
		High	3945	663000
80	Downlink & Uplink	Low	3740.01	649334
		Mid	3840	656000
		High	3939.99	662666
90	Downlink & Uplink	Low	3745.02	649668
		Mid	3840	656000
		High	3934.98	662332
100	Downlink & Uplink	Low	3750	650000
		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
		Mid	3500.01	633334
		High	3544.98	636332
15	Downlink & Uplink	Low	3457.5	630500
		Mid	3500.01	633334
		High	3542.49	636166
20	Downlink & Uplink	Low	3460.02	630668
		Mid	3500.01	633334
		High	3540	636000
25	Downlink & Uplink	Low	3462.51	630834
		Mid	3500.01	633334
		High	3537.48	635832
30	Downlink & Uplink	Low	3465	631000
		Mid	3500.01	633334
		High	3534.99	635666
40	Downlink & Uplink	Low	3470.01	631334
		Mid	3500.01	633334
		High	3529.98	635332
50	Downlink & Uplink	Low	3475.02	631668
		Mid	3500.01	633334
		High	3525	635000
60	Downlink & Uplink	Low	3480	632000
		Mid	3500.01	633334
		High	3519.99	634666
70	Downlink & Uplink	Low	3485.01	632334
		Mid	3500.01	633334
		High	3514.98	634332
80	Downlink & Uplink	Low	3490.02	632668
		Mid	3500.01	633334
		High	3510	634000
90	Downlink & Uplink	Low	3495	633000
		Mid	3500.01	633334
		High	3504.99	633666
100	Downlink & Uplink	Low	\	\
		Mid	3500.01	633334
		High	\	\

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**5.9.9 Reference test frequencies for NR operating band n78**
**5.9.9.1 Test frequencies for NR operating band n78 and SCS 30 kHz**

3700-3800:

CBW [MHz]	Range	Carrier centre [MHz]	Carrier centre [ARFCN]	SS block SCS [kHz]
10	Downlink & Uplink	Low	3705	647000
		Mid	3750	650000
		High	3795	653000
15	Downlink & Uplink	Low	3707.52	647168
		Mid	3750	650000
		High	3792.48	652832
20	Downlink & Uplink	Low	3710.01	647334
		Mid	3750	650000
		High	3789.99	652666
25	Downlink & Uplink	Low	3712.5	647500
		Mid	3750	650000
		High	3787.5	652500
30	Downlink & Uplink	Low	3715.02	647668
		Mid	3750	650000
		High	3784.98	652332
40	Downlink & Uplink	Low	3720	648000
		Mid	3750	650000
		High	3780	652000
50	Downlink & Uplink	Low	3725.01	648334
		Mid	3750	650000
		High	3774.99	651666
60	Downlink & Uplink	Low	3730.02	648668
		Mid	3750	650000
		High	3769.98	651332
70	Downlink & Uplink	Low	3735	649000
		Mid	3750	650000
		High	3765	651000
80	Downlink & Uplink	Low	3740.01	649334
		Mid	3750	650000
		High	3759.99	650666
90	Downlink & Uplink	Low	3745.02	649668
		Mid	3750	650000
		High	3754.98	650332
100	Downlink & Uplink	Low	/	/
		Mid	3750	650000
		High	/	/

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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
		Mid	3500.01	633334
		High	3545.01	636334
15	Downlink & Uplink	Low	3457.5	630500
		Mid	3500.01	633334
		High	3542.49	636166
20	Downlink & Uplink	Low	3460.02	630668
		Mid	3500.01	633334
		High	3540	636000
25	Downlink & Uplink	Low	3462.51	630834
		Mid	3500.01	633334
		High	3537.48	635832
30	Downlink & Uplink	Low	3465	631000
		Mid	3500.01	633334
		High	3534.99	635666
40	Downlink & Uplink	Low	3470.01	631334
		Mid	3500.01	633334
		High	3530.01	635334
50	Downlink & Uplink	Low	3475.02	631668
		Mid	3500.01	633334
		High	3525	635000
60	Downlink & Uplink	Low	3480	632000
		Mid	3500.01	633334
		High	3519.99	634666
70	Downlink & Uplink	Low	3485.01	632334
		Mid	3500.01	633334
		High	3515.01	634334
80	Downlink & Uplink	Low	3490.02	632668
		Mid	3500.01	633334
		High	3510	634000
90	Downlink & Uplink	Low	3495	633000
		Mid	3500.01	633334
		High	3504.99	633666
100	Downlink & Uplink	Low	\	\
		Mid	3500.01	633334
		High	\	\

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## 6 Equipment List

For report SZCR241200494504:

RF conducted test					
Test Equipment	Manufacturer	Model No.	Inventory No.	Cal. date (yyyy/mm/dd)	Cal.Due date (yyyy/mm/dd)
Signal Generator	Rohde & Schwarz	SMR 20	SZ-WRG-M-034	2024/08/19	2025/08/18
MXG Vector Signal Generator	Keysight	N5182B	SZ-WRG-M-015	2024/01/30	2025/01/29
Spectrum Analyzer	Keysight	N9030B	SEM004-30	2024/09/04	2025/09/03
Radio Communication Tester	Anritsu	MT8821C	SZ-WRG-M-014	2024/08/19	2025/08/18
Radio Communication Test Station	Anritsu	MT8000A	SZ-WRG-M-013	2024/08/17	2025/08/16
DC power supply	HYELEC	HY3005B	SZ-WRG-M-024	2024/10/12	2025/10/11
Programmable Temperature & Humidity Chamber	Votsch Industrietechnik GmbH	VT 4002	SEM002-15	2024/03/19	2025/03/18
Humi/ Temp Indicator	Shanghai Meteorological Industry Factory	HTC-1	SZ-WRG-M-077	2024/05/28	2025/05/27
Test Software	TST PASS	TST PASS V2.0	N/A	NCR	NCR

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

SZEMC-TRF-01 Rev. A/1

Report No.: SZCR250100029104

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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	2024/08/14	2025/08/13
Signal &Spectrum Analyzer	Rohde & Schwarz	FSV	SZ-WRG-M-048	2024/01/30	2025/01/29
Pre-amplifier (30MHz-1GHz)	SGS	AMP30M1G30	SEM005-33	2024/03/05	2025/03/04
Low Noise Amplifier 30M-8GHz	Tonscend	TAP30M8G30	SZ-WRG-M-050	2024/01/30	2025/01/29
Low Noise Amplifier 1G-18GHz	Tonscend	TAP01018050	SZ-WRG-M-051	2024/01/30	2025/01/29
Low Noise Amplifier 18G-40GHz	Tonscend	TAP18040048	SZ-WRG-M-052	2024/01/30	2025/01/29
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
RSE Test Software	Tonscend	JS32-RSE V4.0.0	SZ-WRG-M-058	NCR	NCR
RE Test Software	Tonscend	JS32-RE V4.0.0	SZ-WRG-M-059	NCR	NCR
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	2024/07/24	2025/07/23
Spectrum Analyzer	Keysight	N9020A	SZ-WRG-M-002	2024/08/17	2025/08/16
Radio Communication Tester	STARPOINT	SP9500	SZ-WRG-M-083	2024/05/24	2025/05/23

Remark: NCR=No Calibration Requirement.

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SZEMC-TRF-01 Rev. A/1

Report No.: SZCR250100029104

Page:

For report SZCR250100029104:

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	2024/08/14	2025/08/13
Signal & Spectrum Analyzer	Rohde & Schwarz	FSV	SZ-WRG-M-048	2025/01/07	2026/01/06
Pre-amplifier (30MHz-1GHz)	SGS	AMP30M1G30	SEM005-33	2024/03/05	2025/03/04
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	2025/01/07	2026/01/06
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
RSE Test Software	Tonscend	JS32-RSE V4.0.0	SZ-WRG-M-058	NCR	NCR
RE Test Software	Tonscend	JS32-RE V4.0.0	SZ-WRG-M-059	NCR	NCR
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	2024/07/24	2025/07/23
Spectrum Analyzer	Keysight	N9020A	SZ-WRG-M-002	2024/08/17	2025/08/16
Radio Communication Tester	STARPOINT	SP9500	SZ-WRG-M-083	2024/05/24	2025/05/23

Remark: NCR=No Calibration Requirement.

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## 7 Description of Tests

### 7.1 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**



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## 7.2 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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## 7.3 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 x 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



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## 7.4 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 x RBW
5. Detector = RMS
6. Number of sweep points  $\geq$  2 x 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



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## 7.5 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



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## 7.6 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



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## 7.7 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 Z 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.

$E$  (dB $\mu$ V/m) = Measured amplitude level (dB $\mu$ V) + (Cable Loss (dB) + Antenna Factor (dB/m) – AMP(dB))  
 $EIRP$  (dBm) =  $E$  (dB $\mu$ V/m) + 20 log D – 104.8; 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:  
 $E$  (dB $\mu$ V/m) = Measured amplitude level (dB $\mu$ V) + (Cable Loss (dB) + Antenna Factor (dB/m) – AMP(dB))  
 $EIRP$  (dBm) =  $E$  (dB $\mu$ V/m) + 20 log D – 104.8; 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 Z 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  $20 \times \log(3/1) = 9.54$  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.

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## 7.8 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 ±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**

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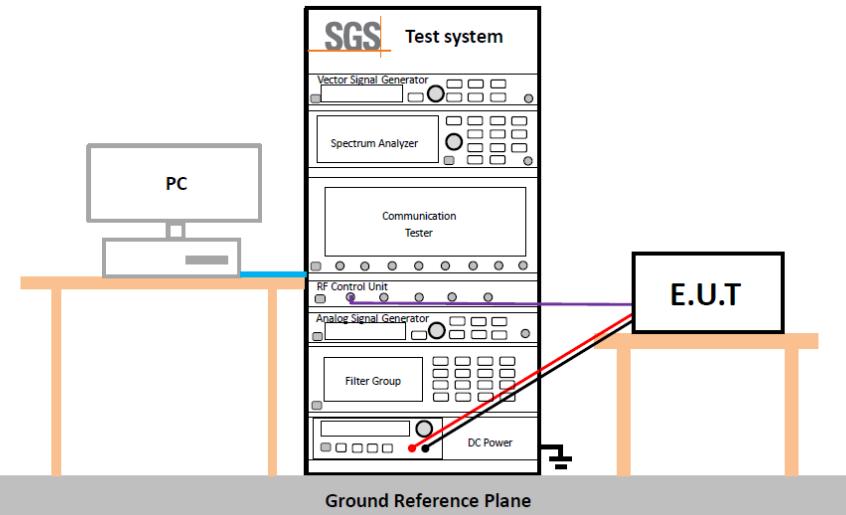
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### 7.9 Test Setups

#### 7.9.1 Test Setup 1



#### 7.9.2 Test Setup 2

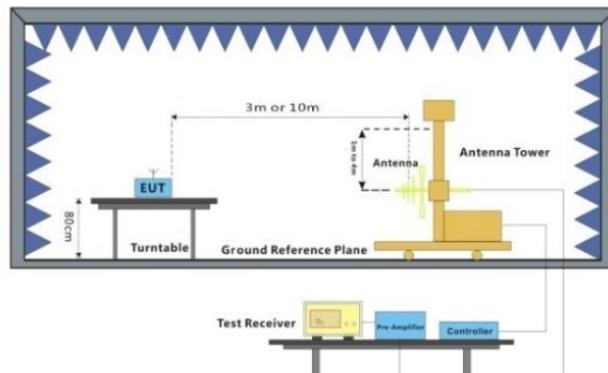
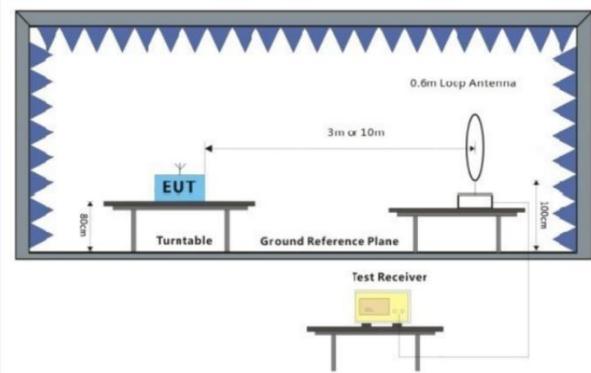


Figure 1. Below 30MHz

Figure 2. 30MHz to 1GHz

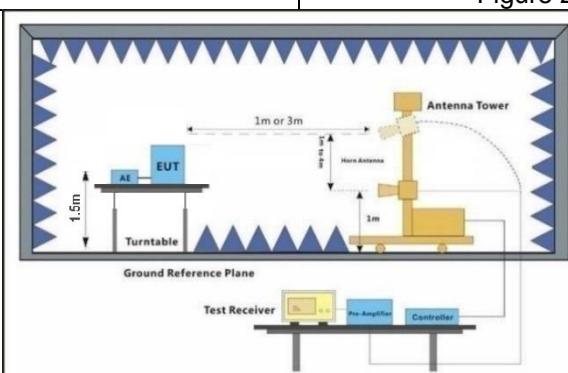


Figure 3. above 1GHz

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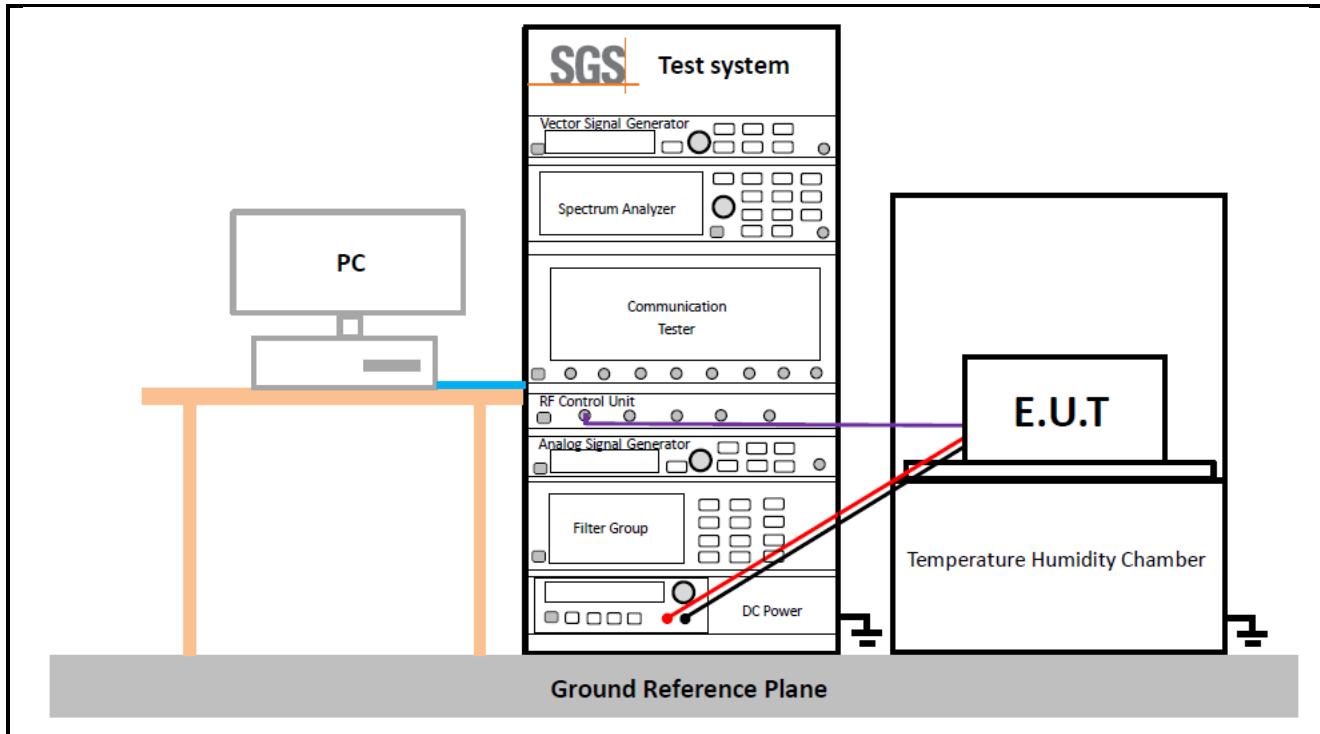
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### 7.9.3 Test Setup 3



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## 7.10 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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SZEMC-TRF-01 Rev. A/1

Report No.: SZCR250100029104

Page:

Test Mode	NR/TM1; NR/TM2; NR/TM6
<b>Spurious Emission at Antenna Terminals</b>	
<b>Test Case</b>	<b>Test Conditions</b>
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
<b>Field Strength of Spurious Radiation</b>	
<b>Test Case</b>	<b>Test Conditions</b>
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.
<b>Frequency Stability</b>	
<b>Test Case</b>	<b>Test Conditions</b>
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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## 8 Appendixes

SZCR2501000291 Appendix	Setup Photo
Appendix B.22	NR Band n2
Appendix B.23	NR Band n5
Appendix B.24	NR Band n7
Appendix B.25	NR Band n26(814-824)
Appendix B.26	NR Band n26(824-849)
Appendix B.27	NR Band n38
Appendix B.28	NR Band n41
Appendix B.29	NR Band n66
Appendix B.30	NR Band n77(3450-3550)
Appendix B.31	NR Band n77(3700-3980)
Appendix B.32	NR Band n78(3450-3550)
Appendix B.33	NR Band n78(3700-3800)

---End of Report---



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