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Rev.: 01  
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## TEST REPORT

**Application No.:** SEWM2204000030RG  
**Applicant:** HMD Global Oy  
**Address of Applicant:** Bertel Jungin aukio 9, Espoo 02600, Finland  
**Manufacturer:** HMD Global Oy  
**Address of Manufacturer:** Bertel Jungin aukio 9, Espoo 02600, Finland  
**EUT Description:** Smart Phone  
**Model No.:** TA-1391  
**Trade Mark:** Nokia  
**FCC ID:** 2AJOTTA-1391  
**Standards:**  
47 CFR Part 2  
47 CFR Part 22  
47 CFR Part 24  
47 CFR Part 27  
**Date of Receipt:** 2021/4/1  
**Date of Test:** 2022/4/15 to 2022/5/19  
**Date of Issue:** 2022/5/20

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

Authorized Signature:



Panta Sun  
Wireless Laboratory Manager



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## 1 Version

### Revision Record

Version	Chapter	Date	Modifier	Remark
01		2022/5/20		Original

Prepared By		Weller Liu
<hr/> (Weller Liu) / Test Supervisor		
Checked By		Well Wei
<hr/> (Well Wei) / Reviewer		

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## 2 Test Summary

### 2.1 GSM850/UMTS Band 5/LTE Band 5

Test Item	FCC Rule No.	Requirements	Test Result	Verdict
Effective (Isotropic) Radiated Power Output Data	§2.1046, §22.913(a)(5)	ERP ≤ 7 W	Refer to ZR/2021/3003301	Pass
Peak-Average Ratio	§22.913(d)	Limit ≤ 13 dB	Refer to ZR/2021/3003301	Pass
Modulation Characteristics	§2.1047	Digital modulation	Refer to ZR/2021/3003301	Pass
Bandwidth	§2.1049	OBW: No limit. EBW: No limit.	Refer to ZR/2021/3003301	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.	Refer to ZR/2021/3003301	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.	Refer to ZR/2021/3003301	Pass
Field Strength of Spurious Radiation	§2.1053, §22.917(a)	FCC: ≤ -13 dBm/100 kHz.	Clause 4.7	Pass
Frequency Stability	§2.1055(a)(1)(b) §2.1055(d)(2) §22.355	≤ ±2.5 ppm.	Refer to ZR/2021/3003301	Pass

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## 2.2 GSM 1900/UMTS Band 2 /LTE Band 2

Test Item	FCC Rule No.	Requirements	Test Result	Verdict
Effective (Isotropic) Radiated Power Output Data	§2.1046, §24.232(c)	EIRP ≤ 2 W	Refer to ZR/2021/3003301	Pass
Peak-Average Ratio	§24.232(d)	Limit≤13 dB	Refer to ZR/2021/3003301	Pass
Modulation Characteristics	§2.1047	Digital modulation	Refer to ZR/2021/3003301	Pass
Bandwidth	§2.1049	OBW: No limit. EBW: No limit.	Refer to ZR/2021/3003301	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.	Refer to ZR/2021/3003301	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.	Refer to ZR/2021/3003301	Pass
Field Strength of Spurious Radiation	§2.1053, §24.238(a)	≤ -13 dBm/1 MHz.	Clause 4.7	Pass
Frequency Stability	§2.1055(a)(1)(b) §2.1055(d)(2) §24.235	Within authorized bands of operation/frequency block.	Refer to ZR/2021/3003301	Pass

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## 2.3 UMTS Band 4 /LTE Band 4

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 ZR/2021/3003301	Pass
Peak-Average Ratio	§27.50(d)(5)	Limit≤13 dB	Refer to ZR/2021/3003301	Pass
Modulation Characteristics	§2.1047	Digital modulation	Refer to ZR/2021/3003301	Pass
Bandwidth	§2.1049	OBW: No limit. EBW: No limit.	Refer to ZR/2021/3003301	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.	Refer to ZR/2021/3003301	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.	Refer to ZR/2021/3003301	Pass
Field Strength of Spurious Radiation	§2.1053, §27.53(h)	≤ -13 dBm/1 MHz.	Clause 4.7	Pass
Frequency Stability	§2.1055(a)(1)(b) §2.1055(d)(2) §27.54	Within authorized bands of operation/frequency block.	Refer to ZR/2021/3003301	Pass

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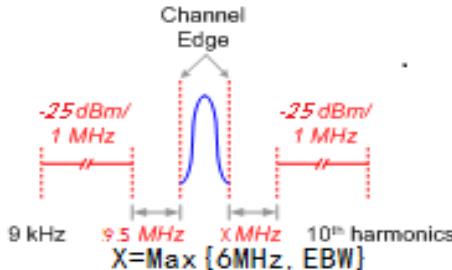
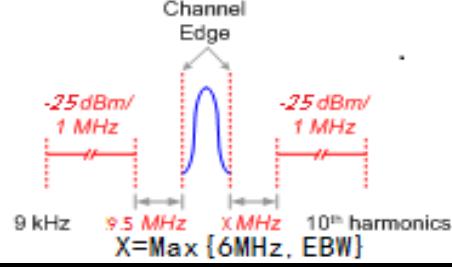
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## 2.4 LTE Band 7

Test Item	FCC Rule No.	Requirements	Test Result	Verdict
Effective (Isotropic) Radiated Power Output Data	§2.1046, §27.50(h)(2)	EIRP ≤ 2W	Refer to ZR/2021/3003301	Pass
Peak-Average Ratio	---	≤13 dB	Refer to ZR/2021/3003301	Pass
Modulation Characteristics	§2.1047	Digital modulation	Refer to ZR/2021/3003301	Pass
Bandwidth	§2.1049	OBW: No limit. EBW: No limit.	Refer to ZR/2021/3003301	Pass
Band Edges Compliance	§2.1051, §27.53(m4)	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.	Refer to ZR/2021/3003301	Pass
Spurious Emission at Antenna Terminals	§2.1051, §27.53(m)		Refer to ZR/2021/3003301	Pass
Field Strength of Spurious Radiation	§2.1053, §27.53(m)		Clause 4.7	Pass

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Frequency Stability	§2.1055(a)(1)(b) §2.1055(d)(2) §27.54	Within authorized bands of operation/frequency block.	Refer to ZR/2021/3003301	Pass
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This test report (Report No.: SEWM2204000030RG01 issue on 2022/5/20) is based on the original FCC ID with ID number 2AJOTTA-1391 issued on 2021/4/21.

Review this report and original report, this report just changing the parts according to the declaration letter from client.

Considering to the difference, pre-scan were 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 only radiated spurious emissions were performed based on the worst case of the original FCC ID with ID number 2AJOTTA-1391 issued on 2021/4/21 and other test data refer to the previous FCC ID with ID number 2AJOTTA-1391 issued on 2021/4/21.



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## 3 General Information

### 3.1 Details of Client

Applicant:	HMD Global Oy
Address of Applicant:	Bertel Jungin aukio 9, Espoo 02600, Finland
Manufacturer:	HMD Global Oy
Address of Manufacturer:	Bertel Jungin aukio 9, Espoo 02600, Finland

### 3.2 Test Location

Company:	SGS-CSTC Standards Technical Services (Suzhou) Co., Ltd
Address:	South of No. 6 Plant, No. 1, Runsheng Road, Suzhou Industrial Park, Suzhou Area, China (Jiangsu) Pilot Free Trade Zone
Post code:	215000
Test engineer:	King-p Li

### 3.3 Test Facility

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

**• A2LA (Certificate No. 6336.01)**

SGS-CSTC STANDARDS TECHNICAL SERVICES (SUZHOU) CO., LTD. is accredited by the American Association for Laboratory Accreditation(A2LA). Certificate No. 6336.01.

**• Innovation, Science and Economic Development Canada**

SGS-CSTC STANDARDS TECHNICAL SERVICES (SUZHOU) CO., LTD. has been recognized by ISED as an accredited testing laboratory.

CAB identifier: CN0120.

IC#: 27594.

**• FCC –Designation Number: CN1312**

SGS-CSTC STANDARDS TECHNICAL SERVICES (SUZHOU) CO., LTD. has been recognized as an accredited testing laboratory.

Designation Number: CN1312.

Test Firm Registration Number: 717327

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### 3.4 General Description of EUT

EUT Description:	Smart Phone		
Model No.:	TA-1391		
Trade Mark:	Nokia		
Hardware Version:	19545_1_10		
Software Version:	V1.260_A01		
Antenna Type:	<input type="checkbox"/> External, <input checked="" type="checkbox"/> Integrated		
Antenna Gain*:	<input checked="" type="checkbox"/> Provided by client		
	GSM850:	0.1dBi	GSM1900: 0.6dBi
	WCDMA Band II:	1.32dBi	WCDMA Band IV: 0.45dBi
	WCDMA Band V:	0.1dBi	
	LTE Band 2:	1.32dBi	LTE Band 4: 0.45dBi
	LTE Band 5:	0.1dBi	LTE Band 7: 0.5dBi
RF Cable*:	<input checked="" type="checkbox"/> Provided by client		
	0.5dB(0.6~1GHz)	0.8dB(1.4~2GHz)	1.0dB(2.1~2.7GHz)
	1.5dB(3~4GHz)	1.8dB(4.4~6GHz)	
Note: *Since the above data and/or information is provided by the client relevant results or conclusions of this report are only made for these data and/or information, SGS is not responsible for the authenticity, integrity and results of the data and information and/or the validity of the conclusion.			
Remark: 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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### 3.5 Test Mode

Test Mode	Test Modes Description
GSM/TM1	GSM system, GSM/GPRS, GMSK modulation
GSM/TM2	GSM system, EGPRS, 8PSK modulation
UMTS/TM1	UMTS system, WCDMA, QPSK modulation
LTE/TM1	LTE system, QPSK modulation
LTE/TM2	LTE system, 16QAM modulation
LTE/TM3	LTE system, 64QAM modulation

Remark: The test mode(s) are selected according to relevant radio technology specifications.

### 3.6 Test Environment

Environment Parameter	101.0 kPa Selected Values During Tests	
Relative Humidity	44-60 % RH Ambient	
Value	Temperature(°C)	Voltage(V)
NTNV	22~25	3.9
LTVN	-15	3.9
HTNV	55	3.9

Remark:

NV: Normal Voltage

NT: Normal Temperature

LT: Low Extreme Test Temperature

HT: High Extreme Test Temperature

### 3.7 Description of Support Units

The EUT has been tested as an independent unit.

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### 3.8 Technical Specification

Characteristics	Description						
Radio System Type	<input checked="" type="checkbox"/> GSM	<input checked="" type="checkbox"/> UMTS	<input checked="" type="checkbox"/> LTE				
Supported Frequency Range	Band	TX		RX			
	GSM850	824 to 849 MHz		869 to 894 MHz			
	GSM1900	1850 to 1910 MHz		1930 to 1990 MHz			
	UMTS Band II	1850 to 1910 MHz		1930 to 1990 MHz			
	UMTS Band IV	1710 to 1755 MHz		2110 to 2155 MHz			
	UMTS Band V	824 to 849 MHz		869 to 894 MHz			
	LTE Band 2	1850 to 1910 MHz		1930 to 1990 MHz			
	LTE Band 4	1710 to 1755 MHz		2110 to 2155 MHz			
	LTE Band 5	824 to 849 MHz		869 to 894 MHz			
	LTE Band 7	2500 to 2570 MHz		2620 to 2690 MHz			
Supported Channel Bandwidth	GSM system:	<input checked="" type="checkbox"/> 0.2 MHz					
	UMTS system:	<input checked="" type="checkbox"/> 5 MHz					
	LTE Band 2	<input checked="" type="checkbox"/> 1.4 MHz <input checked="" type="checkbox"/> 3 MHz <input checked="" type="checkbox"/> 5 MHz <input checked="" type="checkbox"/> 10 MHz <input checked="" type="checkbox"/> 15 MHz <input checked="" type="checkbox"/> 20 MHz					
	LTE Band 4	<input checked="" type="checkbox"/> 1.4 MHz <input checked="" type="checkbox"/> 3 MHz <input checked="" type="checkbox"/> 5 MHz <input checked="" type="checkbox"/> 10 MHz <input checked="" type="checkbox"/> 15 MHz <input checked="" type="checkbox"/> 20 MHz					
	LTE Band 5	<input checked="" type="checkbox"/> 1.4 MHz <input checked="" type="checkbox"/> 3 MHz <input checked="" type="checkbox"/> 5 MHz <input checked="" type="checkbox"/> 10 MHz					
	LTE Band 7	<input checked="" type="checkbox"/> 5 MHz <input checked="" type="checkbox"/> 10 MHz <input checked="" type="checkbox"/> 15 MHz <input checked="" type="checkbox"/> 20 MHz					
	Note1: WCDMA supports HSUPA, HSDPA, DC-HSDPA, HSPA+, but only the worst case was tested and the data displayed in this report.						

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### 3.9 Test Frequencies

Test Mode	TX / RX	RF Channel		
		Low (L)	Middle (M)	High (H)
GSM850	TX	Channel 128	Channel 190	Channel 251
		824.2MHz	836.6 MHz	848.8 MHz
	RX	Channel 128	Channel 190	Channel 251
		869.2 MHz	881.6 MHz	893.8 MHz

Test Mode	TX / RX	RF Channel		
		Low (L)	Middle (M)	High (H)
GSM1900	TX	Channel 512	Channel 661	Channel 810
		1850.2MHz	1880.0 MHz	1909.8 MHz
	RX	Channel 512	Channel 661	Channel 810
		1930.2 MHz	1960.0 MHz	1989.8 MHz

Test Mode	TX / RX	RF Channel		
		Low (L)	Middle (M)	High (H)
WCDMA Band II	TX	Channel 9262	Channel 9400	Channel 9538
		1852.4 MHz	1880.0 MHz	1907.6 MHz
	RX	Channel 9662	Channel 9800	Channel 9938
		1932.4 MHz	1960.0 MHz	1987.6 MHz

Test Mode	TX / RX	RF Channel		
		Low (L)	Middle (M)	High (H)
WCDMA Band IV	TX	Channel 1312	Channel 1413	Channel 1513
		1712.4MHz	1732.6 MHz	1752.6 MHz
	RX	Channel 1537	Channel 1638	Channel 1738
		2112.4 MHz	2132.6 MHz	2152.6 MHz

Test Mode	TX / RX	RF Channel		
		Low (L)	Middle (M)	High (H)
WCDMA Band V	TX	Channel 4132	Channel 4182	Channel 4233
		826.4MHz	836.4 MHz	846.6 MHz
	RX	Channel 4357	Channel 4407	Channel 4458
		871.4 MHz	881.4 MHz	891.6 MHz

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Test Mode	Bandwidth	TX / RX	RF Channel		
			Low (L)	Middle (M)	High (H)
LTE Band 2	1.4MHz	TX	Channel 18607	Channel 18900	Channel 19193
			1850.7 MHz	1880 MHz	1909.3 MHz
	RX	Channel 607	Channel 900	Channel 1193	
			1930.7 MHz	1960 MHz	1989.3 MHz
	3MHz	TX	Channel 18615	Channel 18900	Channel 19185
			1851.5 MHz	1880 MHz	1908.5 MHz
	5MHz	RX	Channel 615	Channel 900	Channel 1185
			1931.5 MHz	1960 MHz	1988.5 MHz
	10MHz	TX	Channel 18625	Channel 18900	Channel 19175
			1852.5 MHz	1880 MHz	1907.5 MHz
	15MHz	RX	Channel 625	Channel 900	Channel 1175
			1932.5 MHz	1960 MHz	1987.5 MHz
	20MHz	TX	Channel 18650	Channel 18900	Channel 19150
			1855 MHz	1880 MHz	1905 MHz
	RX	Channel 650	Channel 900	Channel 1150	
			1935 MHz	1960 MHz	1985 MHz
	15MHz	TX	Channel 18675	Channel 18900	Channel 19125
			1857.5 MHz	1880 MHz	1902.5 MHz
	RX	Channel 675	Channel 900	Channel 1125	
			1937.5 MHz	1960 MHz	1982.5 MHz
	20MHz	TX	Channel 18700	Channel 18900	Channel 19100
			1860 MHz	1880 MHz	1900 MHz
	RX	Channel 700	Channel 900	Channel 1100	
			1940 MHz	1960 MHz	1980 MHz

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Test Mode	Bandwidth	TX / RX	RF Channel		
			Low (L)	Middle (M)	High (H)
LTE Band 4	1.4MHz	TX	Channel 19957	Channel 20175	Channel 20393
			1710.7 MHz	1732.5 MHz	1754.3 MHz
		RX	Channel 1975	Channel 2175	Channel 2375
			2112.5 MHz	2132.5MHz	2152.5 MHz
	3MHz	TX	Channel 19965	Channel 20175	Channel 20385
			1711.5 MHz	1732.5 MHz	1753.5 MHz
		RX	Channel 2000	Channel 2175	Channel 2350
			2115 MHz	2132.5MHz	2150 MHz
	5MHz	TX	Channel 19975	Channel 20175	Channel 20375
			1712.5 MHz	1732.5 MHz	1752.5 MHz
		RX	Channel 1975	Channel 2175	Channel 2375
			2112.5 MHz	2132.5MHz	2152.5 MHz
	10MHz	TX	Channel 20000	Channel 20175	Channel 20350
			1715 MHz	1732.5 MHz	1750 MHz
		RX	Channel 2000	Channel 2175	Channel 2350
			2115 MHz	2132.5MHz	2150 MHz
	15MHz	TX	Channel 20025	Channel 20175	Channel 20325
			1717.5 MHz	1732.5 MHz	1747.5 MHz
		RX	Channel 2025	Channel 2175	Channel 2325
			2117.5 MHz	2132.5MHz	2147.5 MHz
	20MHz	TX	Channel 20050	Channel 20175	Channel 20300
			1720 MHz	1732.5 MHz	1745 MHz
		RX	Channel 2050	Channel 2175	Channel 2300
			2120 MHz	2132.5MHz	2145 MHz

Test Mode	Bandwidth	TX / RX	RF Channel		
			Low (L)	Middle (M)	High (H)
LTE Band 5	1.4MHz	TX	Channel 20407	Channel 20525	Channel 20643
			824.7 MHz	836.5 MHz	848.3 MHz
		RX	Channel 2407	Channel 2525	Channel 2643
			869.7 MHz	881.5 MHz	893.3 MHz
	3MHz	TX	Channel 20415	Channel 20525	Channel 20635
			825.5 MHz	836.5 MHz	847.5 MHz
		RX	Channel 2415	Channel 2525	Channel 2635
			870.5 MHz	881.5 MHz	892.5 MHz
	5MHz	TX	Channel 20425	Channel 20525	Channel 20625
			826.5 MHz	836.5 MHz	846.5 MHz
		RX	Channel 2425	Channel 2525	Channel 2625
			871.5 MHz	881.5 MHz	891.5 MHz
	10MHz	TX	Channel 20450	Channel 20525	Channel 20600
			829 MHz	836.5 MHz	844 MHz
		RX	Channel 2450	Channel 2525	Channel 2600
			874 MHz	881.5 MHz	889 MHz



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Test Mode	Bandwidth	TX / RX	RF Channel		
			Low (L)	Middle (M)	High (H)
LTE Band 7	5MHz	TX	Channel 20775	Channel 21100	Channel 21425
			2502.5 MHz	2535 MHz	2567.5 MHz
		RX	Channel 2775	Channel 3100	Channel 5825
			2622.5 MHz	2655 MHz	2687.5 MHz
	10MHz	TX	Channel 20800	Channel 21100	Channel 21400
			2505 MHz	2535 MHz	2565 MHz
		RX	Channel 2800	Channel 3100	Channel 3400
			2625 MHz	2655 MHz	2685 MHz
	15MHz	TX	Channel 20825	Channel 21100	Channel 21375
			2507.5 MHz	2535 MHz	2562.5 MHz
		RX	Channel 2825	Channel 3100	Channel 3375
			2627.5 MHz	2655 MHz	2682.5 MHz
	20MHz	TX	Channel 20850	Channel 21100	Channel 21350
			2510 MHz	2535 MHz	2560 MHz
		RX	Channel 2850	Channel 3100	Channel 3350
			2630 MHz	2655 MHz	2680 MHz

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## 4 Description of Tests

### 4.1 Conducted Output Power

Measurement Procedure: FCC KDB 971168 D01 V03r01

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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## 4.2 Effective (Isotropic) Radiated Power of Transmitter

Measurement Procedure: FCC KDB 971168 D01 V03r01 ; ANSI/C63.26 (2015)

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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## 4.3 Occupied Bandwidth

Measurement Procedure: FCC KDB 971168 D01 V03r01 Section 4.2

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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## 4.4 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 rms.

### 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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## 4.5 Spurious And Harmonic Emissions at Antenna Terminal

Measurement Procedure: FCC KDB 971168 D01 V03r01

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 30MHz 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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## 4.6 Peak-Average Ratio

Measurement Procedure: FCC KDB 971168 D01 V03r01 Section 5.7.1

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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## 4.7 Field Strength of Spurious Radiation

Measurement Procedure: FCC KDB 971168 D01 V03r01

### 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.

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

$\text{EIRP } (\text{dBm}) = E (\text{dB}\mu\text{V}/\text{m}) + 20 \log D - 104.8$ ; 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:

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

$\text{EIRP } (\text{dBm}) = E (\text{dB}\mu\text{V}/\text{m}) + 20 \log D - 104.8$ ; 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 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  $20^*\log(3/1) = 9.54 \text{ dB}$ .

### Remark: Reference test setup 2

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

Final Test Level = Receiver Reading + Factor(Antenna Factor + Cable Factor – Preamplifier Factor)

- 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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**Test on the worst case:****Test Band = GSM850****Test Channel = Low Channel**

<b>Data List</b>									
NO.	Frequency [MHz]	Reading [dB $\mu$ V]	Factor [dB]	Level [dBm]	Limit [dBm]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	1648	78.46	-118.07	-39.61	-13.00	26.61	263	162	Horizontal
2	2472	61.13	-114.39	-53.26	-13.00	40.26	241	35	Horizontal
3	3296.8	57.68	-111.89	-54.21	-13.00	41.21	176	130	Horizontal
4	4121	61.02	-109.81	-48.79	-13.00	35.79	284	204	Horizontal
5	4945.2	50.64	-107.88	-57.24	-13.00	44.24	196	56	Horizontal
6	5769.4	51.30	-105.32	-54.02	-13.00	41.02	244	182	Horizontal

<b>Data List</b>									
NO.	Frequency [MHz]	Reading [dB $\mu$ V]	Factor [dB]	Level [dBm]	Limit [dBm]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	1648	76.23	-118.07	-41.84	-13.00	28.84	263	75	Vertical
2	2472	64.63	-114.39	-49.76	-13.00	36.76	241	306	Vertical
3	3296.8	58.23	-111.89	-53.66	-13.00	40.66	176	296	Vertical
4	4121	58.74	-109.81	-51.07	-13.00	38.07	284	360	Vertical
5	4945.2	51.90	-107.88	-55.98	-13.00	42.98	196	84	Vertical
6	5769.4	51.01	-105.32	-54.31	-13.00	41.31	263	296	Vertical

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**Test Band = GSM850**  
**Test Channel = Mid Channel**

<b>Data List</b>									
NO.	Frequency [MHz]	Reading [dB $\mu$ V]	Factor [dB]	Level [dBm]	Limit [dBm]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	1672.8	73.20	-118.01	-44.81	-13.00	31.81	263	173	Horizontal
2	2509.2	57.92	-114.12	-56.20	-13.00	43.20	251	256	Horizontal
3	3345.6	56.38	-111.99	-55.61	-13.00	42.61	174	216	Horizontal
4	4182	57.98	-109.53	-51.55	-13.00	38.55	186	182	Horizontal
5	5018.4	50.78	-107.59	-56.81	-13.00	43.81	264	0	Horizontal
6	5854.8	51.15	-104.86	-53.71	-13.00	40.71	244	309	Horizontal

<b>Data List</b>									
NO.	Frequency [MHz]	Reading [dB $\mu$ V]	Factor [dB]	Level [dBm]	Limit [dBm]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	1672.8	73.70	-118.01	-44.31	-13.00	31.31	263	114	Vertical
2	2509.2	58.37	-114.12	-55.75	-13.00	42.75	241	351	Vertical
3	3345.6	53.25	-111.99	-58.74	-13.00	45.74	176	355	Vertical
4	4182	58.47	-109.53	-51.06	-13.00	38.06	284	360	Vertical
5	5018.4	50.71	-107.59	-56.88	-13.00	43.88	166	102	Vertical
6	5854.8	51.31	-104.86	-53.55	-13.00	40.55	244	271	Vertical

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**Test Band = GSM850**  
**Test Channel = High Channel**

<b>Data List</b>									
NO.	Frequency [MHz]	Reading [dB $\mu$ V]	Factor [dB]	Level [dBm]	Limit [dBm]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	1697.6	69.18	-117.95	-48.77	-13.00	35.77	263	191	Horizontal
2	2546	55.51	-114.17	-58.66	-13.00	45.66	241	191	Horizontal
3	3395.2	56.48	-112.09	-55.61	-13.00	42.61	176	127	Horizontal
4	4244	63.63	-109.38	-45.75	-13.00	32.75	284	42	Horizontal
5	5092.8	51.40	-107.28	-55.88	-13.00	42.88	186	212	Horizontal
6	5941.6	51.34	-104.60	-53.26	-13.00	40.26	266	212	Horizontal

<b>Data List</b>									
NO.	Frequency [MHz]	Reading [dB $\mu$ V]	Factor [dB]	Level [dBm]	Limit [dBm]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	1697.6	73.15	-117.95	-44.80	-13.00	31.80	263	126	Vertical
2	2546	57.94	-114.17	-56.23	-13.00	43.23	210	116	Vertical
3	3395.2	55.25	-112.09	-56.84	-13.00	43.84	175	21	Vertical
4	4244	64.71	-109.38	-44.67	-13.00	31.67	265	360	Vertical
5	5092.8	50.09	-107.28	-57.19	-13.00	44.19	284	211	Vertical
6	5941.6	51.80	-104.60	-52.80	-13.00	39.80	177	3	Vertical

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**Test Band = WCDMA Band IV\_ TM1**

**Test Channel = Low Channel**

<b>Final Data List</b>									
NO.	Frequency [MHz]	Reading [dB $\mu$ V]	Factor [dB]	Level [dBm]	Limit [dBm]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	3424.8	52.46	-111.70	-59.24	-13.00	46.24	263	182	Horizontal
2	5137.2	49.34	-106.90	-57.56	-13.00	44.56	241	163	Horizontal
3	6852.75	57.07	-101.85	-44.78	-13.00	31.78	175	182	Horizontal
4	8562	46.29	-96.84	-50.55	-13.00	37.55	265	329	Horizontal
5	10274.4	44.00	-93.22	-49.22	-13.00	36.22	284	83	Horizontal
6	11979.75	48.82	-91.96	-43.14	-13.00	30.14	177	199	Horizontal

<b>Final Data List</b>									
NO.	Frequency [MHz]	Reading [dB $\mu$ V]	Factor [dB]	Level [dBm]	Limit [dBm]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	3426.75	54.90	-111.70	-56.80	-13.00	43.80	263	148	Vertical
2	5137.2	50.63	-106.90	-56.27	-13.00	43.27	241	230	Vertical
3	6849.6	50.45	-101.86	-51.41	-13.00	38.41	176	360	Vertical
4	8562	48.46	-96.84	-48.38	-13.00	35.38	284	344	Vertical
5	10274.4	44.18	-93.22	-49.04	-13.00	36.04	187	360	Vertical
6	11986.8	44.03	-91.99	-47.96	-13.00	34.96	166	297	Vertical

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**Test Band = WCDMA Band IV\_ TM1**

**Test Channel = Mid Channel**

<b>Final Data List</b>									
NO.	Frequency [MHz]	Reading [dB $\mu$ V]	Factor [dB]	Level [dBm]	Limit [dBm]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	3465.2	54.67	-111.62	-56.95	-13.00	43.95	263	315	Horizontal
2	5197.8	50.24	-106.81	-56.57	-13.00	43.57	241	166	Horizontal
3	6935.25	58.97	-101.68	-42.71	-13.00	29.71	176	182	Horizontal
4	8663	47.23	-96.57	-49.34	-13.00	36.34	284	166	Horizontal
5	10395.6	42.57	-92.81	-50.24	-13.00	37.24	175	66	Horizontal
6	12128.2	44.63	-91.73	-47.10	-13.00	34.10	264	198	Horizontal

<b>Final Data List</b>									
NO.	Frequency [MHz]	Reading [dB $\mu$ V]	Factor [dB]	Level [dBm]	Limit [dBm]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	3466.5	57.72	-111.62	-53.90	-13.00	40.90	263	144	Vertical
2	5197.8	52.59	-106.81	-54.22	-13.00	41.22	241	47	Vertical
3	6930.4	50.03	-101.68	-51.65	-13.00	38.65	176	351	Vertical
4	8663	46.82	-96.57	-49.75	-13.00	36.75	284	80	Vertical
5	10395.6	41.78	-92.81	-51.03	-13.00	38.03	265	260	Vertical
6	12128.2	43.52	-91.73	-48.21	-13.00	35.21	241	3	Vertical

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**Test Band = WCDMA Band IV\_ TM1****Test Channel = High Channel**

<b>Final Data List</b>									
NO.	Frequency [MHz]	Reading [dB $\mu$ V]	Factor [dB]	Level [dBm]	Limit [dBm]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	3505.2	53.03	-111.51	-58.48	-13.00	45.48	263	197	Horizontal
2	5257.8	51.16	-106.73	-55.57	-13.00	42.57	241	163	Horizontal
3	7014.75	58.60	-101.62	-43.02	-13.00	30.02	176	180	Horizontal
4	8763	46.26	-96.13	-49.87	-13.00	36.87	284	279	Horizontal
5	10515.6	42.49	-92.55	-50.06	-13.00	37.06	166	3	Horizontal
6	12268.2	42.17	-91.51	-49.34	-13.00	36.34	244	296	Horizontal

<b>Final Data List</b>									
NO.	Frequency [MHz]	Reading [dB $\mu$ V]	Factor [dB]	Level [dBm]	Limit [dBm]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	3505.2	51.39	-111.51	-60.12	-13.00	47.12	263	180	Vertical
2	5257.8	51.74	-106.73	-54.99	-13.00	41.99	284	180	Vertical
3	7010.4	48.57	-101.63	-53.06	-13.00	40.06	176	358	Vertical
4	8763	46.31	-96.13	-49.82	-13.00	36.82	251	180	Vertical
5	10515.6	43.77	-92.55	-48.78	-13.00	35.78	174	131	Vertical
6	12268.2	41.25	-91.51	-50.26	-13.00	37.26	186	148	Vertical

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**Test Band = LTE Band 7\_ TM1**

**Test Channel = Low Channel**

<b>Final Data List</b>									
NO.	Frequency [MHz]	Reading [dB $\mu$ V]	Factor [dB]	Level [dBm]	Limit [dBm]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	5001.4286	62.52	-107.59	-45.07	-25.00	20.07	263	53	Horizontal
2	7503.27	58.39	-100.34	-41.95	-25.00	16.95	241	2	Horizontal
3	10004.36	57.61	-93.89	-36.28	-25.00	11.28	175	79	Horizontal
4	12505.45	61.12	-91.38	-30.26	-25.00	5.26	263	96	Horizontal
5	15006.54	44.26	-90.07	-45.81	-25.00	20.81	284	274	Horizontal
6	17507.63	40.74	-86.50	-45.76	-25.00	20.76	166	0	Horizontal

<b>Final Data List</b>									
NO.	Frequency [MHz]	Reading [dB $\mu$ V]	Factor [dB]	Level [dBm]	Limit [dBm]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	5001.4286	61.22	-107.59	-46.37	-25.00	21.37	163	324	Vertical
2	7503.27	59.08	-100.34	-41.26	-25.00	16.26	285	43	Vertical
3	10004.36	52.59	-93.89	-41.30	-25.00	16.30	265	33	Vertical
4	12505.45	60.79	-91.38	-30.59	-25.00	5.59	241	1	Vertical
5	15006.54	43.91	-90.07	-46.16	-25.00	21.16	185	201	Vertical
6	17507.63	39.86	-86.50	-46.64	-25.00	21.64	263	350	Vertical

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**Test Band = LTE Band 7\_ TM1**

**Test Channel = Mid Channel**

<b>Final Data List</b>									
NO.	Frequency [MHz]	Reading [dB $\mu$ V]	Factor [dB]	Level [dBm]	Limit [dBm]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	5052.18	60.32	-107.26	-46.94	-25.00	21.94	263	306	Horizontal
2	7578.27	61.32	-99.93	-38.61	-25.00	13.61	241	0	Horizontal
3	10104.36	54.01	-93.44	-39.43	-25.00	14.43	178	228	Horizontal
4	12630	60.86	-90.74	-29.88	-25.00	4.88	150	2	Horizontal
5	15156.54	42.86	-89.53	-46.67	-25.00	21.67	284	70	Horizontal
6	17682.63	40.94	-85.04	-44.10	-25.00	19.10	230	133	Horizontal

<b>Final Data List</b>									
NO.	Frequency [MHz]	Reading [dB $\mu$ V]	Factor [dB]	Level [dBm]	Limit [dBm]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	5052.18	59.38	-107.26	-47.88	-25.00	22.88	263	332	Vertical
2	7578.27	62.16	-99.93	-37.77	-25.00	12.77	185	24	Vertical
3	10104.36	50.35	-93.44	-43.09	-25.00	18.09	263	226	Vertical
4	12630	59.08	-90.74	-31.66	-25.00	6.66	241	357	Vertical
5	15156.54	43.07	-89.53	-46.46	-25.00	21.46	176	138	Vertical
6	17682.63	41.25	-85.04	-43.79	-25.00	18.79	263	271	Vertical

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**Test Band = LTE Band 7\_ TM1**  
**Test Channel = High Channel**

Final Data List									
NO.	Frequency [MHz]	Reading [dB $\mu$ V]	Factor [dB]	Level [dBm]	Limit [dBm]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	5102.1429	59.68	-106.95	-47.27	-25.00	22.27	163	68	Horizontal
2	7653.27	66.91	-99.75	-32.84	-25.00	7.84	281	0	Horizontal
3	10204.2857	54.97	-93.10	-38.13	-25.00	13.13	146	184	Horizontal
4	12755.45	60.95	-91.01	-30.06	-25.00	5.06	254	2	Horizontal
5	15306.54	43.64	-90.33	-46.69	-25.00	21.69	186	121	Horizontal
6	17857.63	41.60	-84.18	-42.58	-25.00	17.58	254	238	Horizontal

Final Data List									
NO.	Frequency [MHz]	Reading [dB $\mu$ V]	Factor [dB]	Level [dBm]	Limit [dBm]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	5102.1429	59.99	-106.95	-46.96	-25.00	21.96	196	324	Vertical
2	7653.27	68.19	-99.75	-31.56	-25.00	6.56	241	193	Vertical
3	10204.2857	53.90	-93.10	-39.20	-25.00	14.20	178	158	Vertical
4	12755.45	58.96	-91.01	-32.05	-25.00	7.05	265	357	Vertical
5	15306.54	43.74	-90.33	-46.59	-25.00	21.59	263	77	Vertical
6	17857.63	42.16	-84.18	-42.02	-25.00	17.02	284	157	Vertical

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## 4.8 Frequency Stability / Temperature Variation

### Measurement Procedure:

Frequency stability testing is performed in accordance with the guidelines of FCC KDB 971168 D01 V03r01; ANSI/C63.26 (2015)

. 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  $\pm 0.00025\%$  ( $\pm 2.5$  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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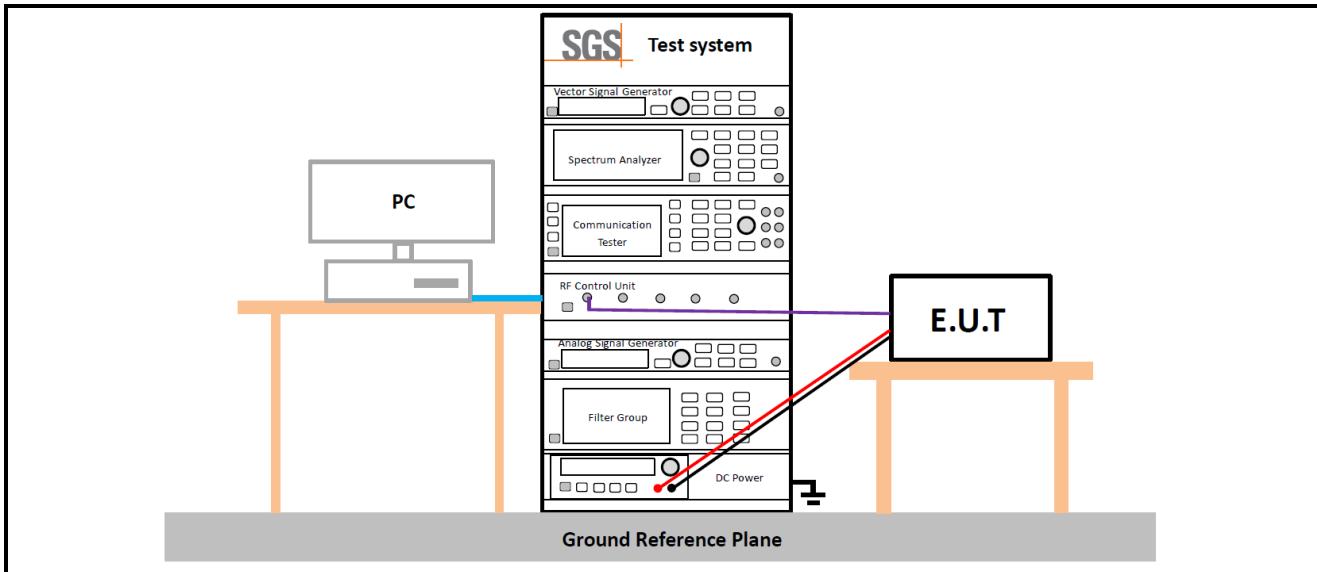
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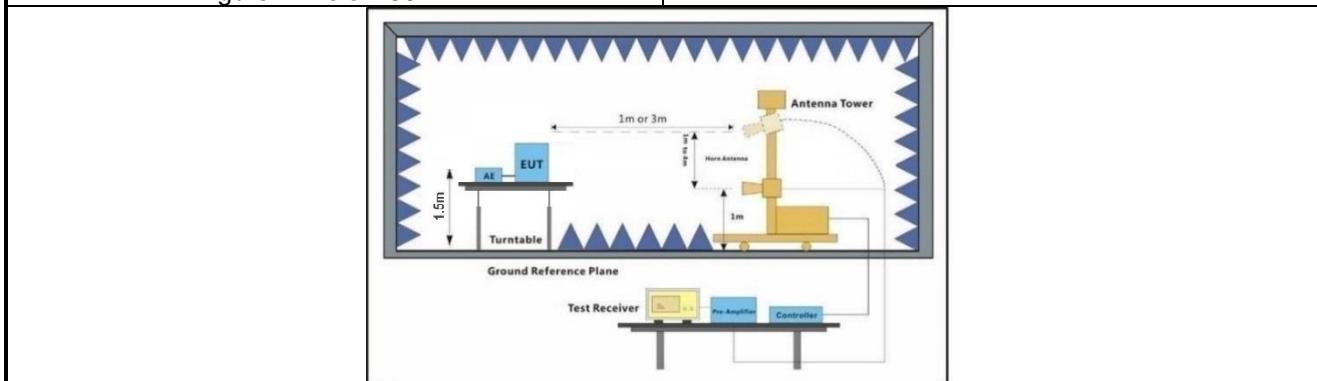
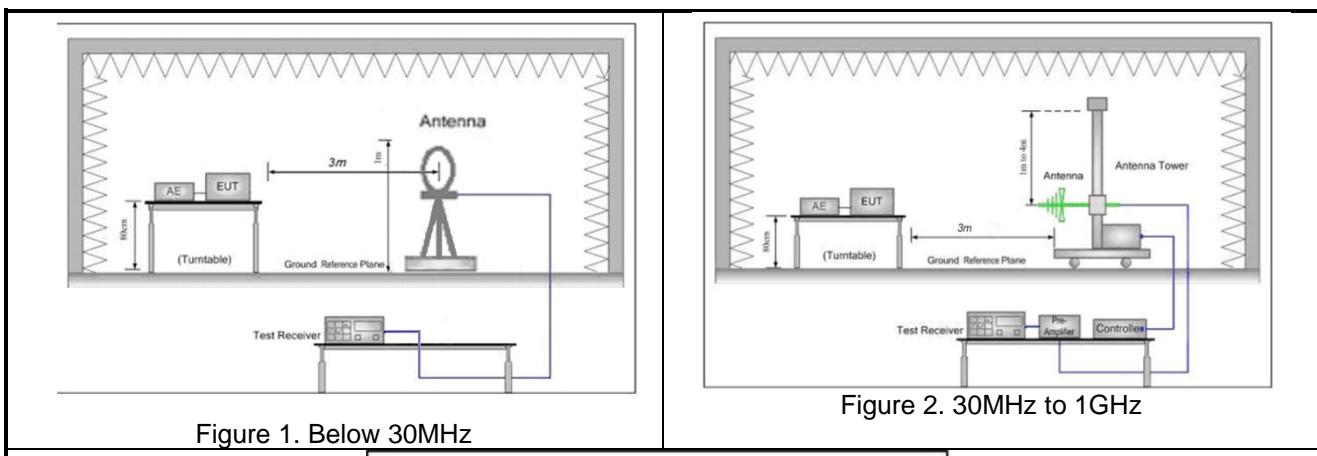
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## 4.9 Test Setups

### 4.9.1 Test Setup 1



### 4.9.2 Test Setup 2



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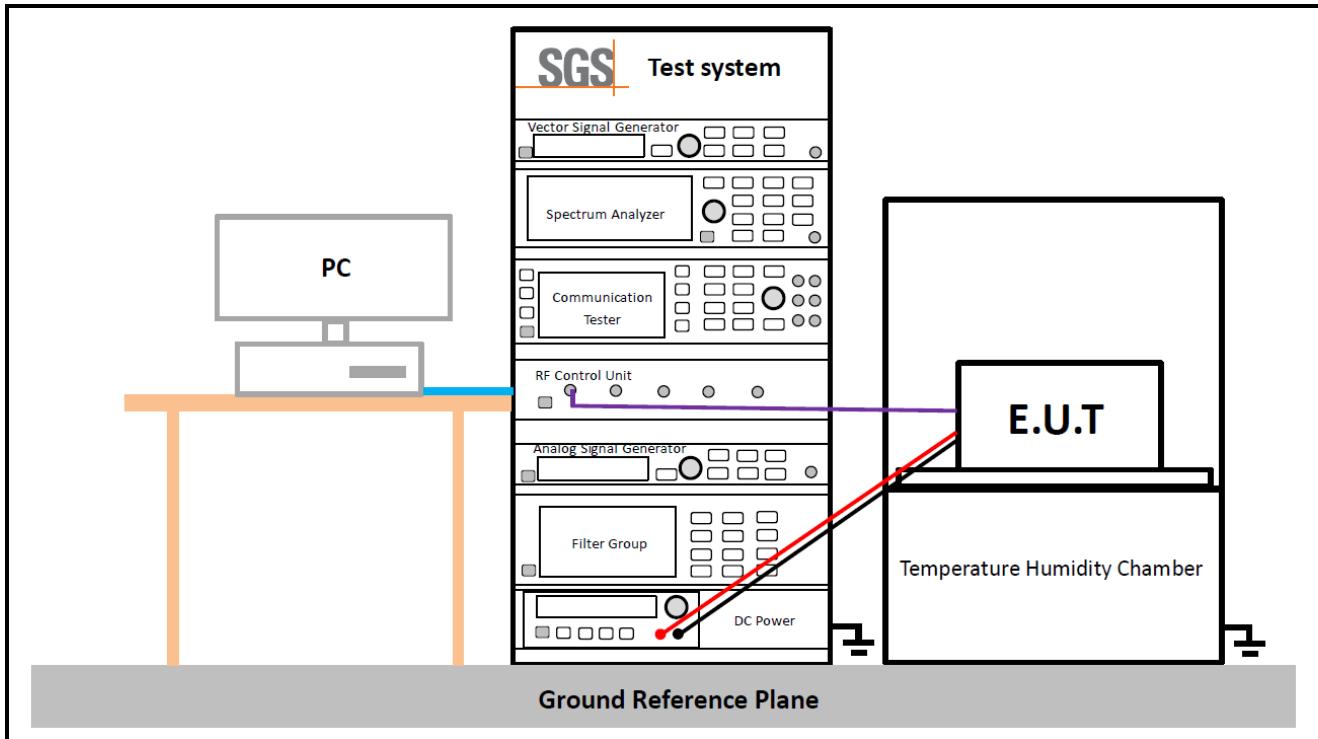
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Figure 3. above 1GHz

#### 4.9.3 Test Setup 3



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## 4.10 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	GSM/TM1;GSM/TM2;UMTS/TM1; LTE/TM1;LTE/TM2; LTE/TM3;
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	GSM/TM1;GSM/TM2;UMTS/TM1; LTE/TM1;LTE/TM2; LTE/TM3;
Modulation Characteristics	
Test Case	Test Conditions
Test Environment	Ambient Climate & Rated Voltage
Test Setup	Test Setup 1
RF Channels (TX)	M (M= middle channel)
Test Mode	GSM/TM1;GSM/TM2;UMTS/TM1; LTE/TM1;LTE/TM2; LTE/TM3;
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	GSM/TM1;GSM/TM2;UMTS/TM1; LTE/TM1;LTE/TM2; LTE/TM3;
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	GSM/TM1;GSM/TM2;UMTS/TM1; LTE/TM1;LTE/TM2; LTE/TM3;

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<b>Band Edges Compliance</b>	
<b>Test Case</b>	<b>Test Conditions</b>
Test Environment	Ambient Climate & Rated Voltage
Test Setup	Test Setup 1
RF Channels (TX)	L, H (L= low channel, H= high channel)
Test Mode	GSM/TM1;GSM/TM2;UMTS/TM1; LTE/TM1;LTE/TM2; LTE/TM3;

<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	GSM/TM1;GSM/TM2;UMTS/TM1; LTE/TM1;LTE/TM2; LTE/TM3;

<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	GSM/TM1; UMTS/TM1; LTE/TM1; Remark: If applicable, the EUT conf. that has maximum power density (based on the equivalent power level) is selected.

<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	GSM/TM1;GSM/TM2;UMTS/TM1; LTE/TM1;LTE/TM2; LTE/TM3;

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## 5 Main Test Instruments

RSE Test System					
Equipment	Manufacturer	Model No.	Inventory No.	Cal Date (yyyy-mm-dd)	Cal Due Date (yyyy-mm-dd)
Semi-Anechoic Chamber	Brilliant-emc	N/A	SUWI-04-02-01	2021/5/8	2024/5/7
Temperature and humidity meter	MingGao	TH101B	SUWI-01-01-05	2022/2/16	2023/2/15
Signal Analyzer	ROHDE&SCHWARZ	FSW43	SUWI-01-02-04	2021/5/28	2022/5/27
Signal Analyzer	KEYSIGHT	N9020A	SUWI-01-02-05	2021/12/4	2022/12/3
Test receiver	ROHDE&SCHWARZ	ESR7	SUWI-01-10-01	2022/2/19	2023/2/18
Receiving antenna	SCHWRZBECK MESS-ELEKTRONIK	VULB 9163	SUWI-01-11-01	2021/5/16	2023/5/15
Receiving antenna	SCHWRZBECK MESS-ELEKTRONIK	BBHA 9120D	SUWI-01-11-02	2021/5/16	2023/5/15
Receiving antenna	SCHWRZBECK MESS-ELEKTRONIK	BBHA 9170	SUWI-01-11-03	2021/5/14	2023/5/13
Amplifier	Tonscend	TAP9K3G40	SUWI-01-14-01	2022/2/15	2023/2/14
Amplifier	Tonscend	TAP01018050	SUWI-01-14-02	2022/2/15	2023/2/14
Amplifier	Tonscend	TAP18040048	SUWI-01-14-03	2022/2/19	2023/2/18
Active Loop Antenna	SCHWRZBECK MESS-ELEKTRONIK	FMZB 1519B	SUWI-01-21-01	2021/6/10	2022/6/9
Wideband Radio Communication Tester	Anritsu	MT8820C	SUWI-01-16-08	2022/2/15	2023/2/14
Measurement Software	Tonscend	JS32-RE V4.0.0.0	SUWI-02-09-04	NCR	NCR
Measurement Software	Tonscend	JS32-RSE V4.0.0.0	SUWI-02-09-06	NCR	NCR

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## 6 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	Radiated Emission	± 3.13dB (9k -30MHz)
		± 4.8dB (30M -1GHz)
		± 4.8dB (1GHz to 18GHz)
		± 4.8dB (Above 18GHz)

## 7 Photographs - Setup Photos

Refer to Appendix A.3 WWAN Setup Photos.

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The End



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