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TEST REPORT

Application No.:	SEWM2212000312RG	
Applicant:	Sony Corporation	
Address of Applicant:	1-7-1 Konan Minato-ku Tokyo, 108-0075 Japan	
Manufacturer:	Sony Corporation	
Address of Manufacturer:	1-7-1 Konan Minato-ku Tokyo, 108-0075 Japan	
EUT Description:	GSM/WCDMA/LTE Phone with BT, DTS/UNII a/b/g/n/ac, NFC and GNSS	
Trade Mark:	Sony	
FCC ID:	PY7-18176E	
Standards:	47 CFR Part 2 47 CFR Part 22	
	47 CFR Part 24	
	47 CFR Part 27	
Date of Receipt:	2022/11/30	
Date of Test:	2022/12/20 to 2023/01/13	
Date of Issue:	2023/01/13	
Test Result :	PASS *	

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

Authorized Signature:

Sun áN

Panta Sun Wireless Laboratory Manager



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1 Version

		Revision Record		
Version	Chapter	Date	Modifier	Remark
01		2023/01/13		Original

Prepared By	weller lin
	(Weller Liu) / Test Engineer
Checked By	wen wei
	(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	Section 1 of Appendix B.1&B.2&B.4	Pass
Peak-Average Ratio	§22.913(d)	Limit≤13 dB	Section 2 of Appendix B.1&B.2&B.4	Pass
Modulation Characteristics	§2.1047	Digital modulation	Section 3 of Appendix B.1&B.2&B.4	Pass
Bandwidth	§2.1049	OBW: No limit. EBW: No limit.	Section 4 of Appendix B.1&B.2&B.4	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.	Section 5 of Appendix B.1&B.2&B.4	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.	Section 6 of Appendix B.1&B.2&B.4	Pass
Field Strength of Spurious Radiation	§2.1053, §22.917(a)	FCC: ≤ -13 dBm/100 kHz.	Section 7 of Appendix B.1&B.2&B.4	Pass
Frequency Stability	§2.1055(a)(1)(b) §2.1055(d)(2) §22.355	≤ ±2.5ppm.	Section 8 of Appendix B.1&B.2&B.4	Pass



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2.2 GSM 1900

Test Item	FCC Rule No.	Requirements	Test Result	Verdict
Effective (Isotropic) Radiated Power Output Data	§2.1046, §24.232(c)	EIRP ≤ 2 W	Section 1 of Appendix B.1	Pass
Peak-Average Ratio	§24.232(d)	Limit≤13 dB	Section 2 of Appendix B.1	Pass
Modulation Characteristics	§2.1047	Digital modulation	Section 3 of Appendix B.1	Pass
Bandwidth	§2.1049	OBW: No limit. EBW: No limit.	Section 4 of Appendix B.1	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.	Section 5 of Appendix B.1	Pass
Spurious Emission at Antenna Terminals	§2.1051, §24.238(a)	 ≤ -13 dBm/1 MHz, from 9 kHz to 10th harmonics but outside authorized operating frequency ranges. 	Section 6 of Appendix B.1	Pass
Field Strength of Spurious Radiation	§2.1053, §24.238(a)	≤ -13 dBm/1 MHz.	Section 7 of Appendix B.1	Pass
Frequency Stability	§2.1055(a)(1)(b) §2.1055(d)(2) §24.235	Within authorized bands of operation/frequency block.	Section 8 of Appendix B.1	Pass



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2.3 UMTS Band 4 /LTE Band 4

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Test Item	FCC Rule No.	Requirements	Test Result	Verdict
Effective (Isotropic) Radiated Power Output Data	§2.1046, §27.50(d)(4)	EIRP ≤ 1 W	Section 1 of Appendix B.2&B.3	Pass
Peak-Average Ratio	§27.50(d)(5)	Limit≤13 dB	Section 2 of Appendix B.2&B.3	Pass
Modulation Characteristics	§2.1047	Digital modulation	Section 3 of Appendix B.2&B.3	Pass
Bandwidth	§2.1049	OBW: No limit. EBW: No limit.	Section 4 of Appendix B.2&B.3	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.	Section 5 of Appendix B.2&B.3	Pass
Spurious Emission at Antenna Terminals	§2.1051, §27.53(h)	 ≤ -13 dBm/1 MHz, from 9 kHz to 10th harmonics but outside authorized operating frequency ranges. 	Section 6 of Appendix B.2&B.3	Pass
Field Strength of Spurious Radiation	§2.1053, §27.53(h)	≤ -13 dBm/1 MHz.	Section 7 of Appendix B.2&B.3	Pass
Frequency Stability	§2.1055(a)(1)(b) §2.1055(d)(2) §27.54	Within authorized bands of operation/frequency block.	Section 8 of Appendix B.2&B.3	Pass



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Verdict Test Item FCC Rule No. Requirements Test Result Effective (Isotropic) §2.1046 Section 1 of ERP \leq 3 W. Pass Radiated Power §27.50(c)(10) Appendix B.5 **Output Data** Section 2 of Peak-Average ---Limit≤13 dB Pass Ratio Appendix B.5 Modulation Section 3 of **Digital modulation** §2.1047 Pass Characteristics Appendix B.5 Section 4 of OBW: No limit. Bandwidth §2.1049 Pass EBW: No limit. Appendix B.5 ≤ -13 dBm/1%*EBW, in 1 MHz Band Edges §2.1051, bands immediately outside and Section 5 of Pass Compliance adjacent to the frequency Appendix B.5 §27.53(g) block. Spurious FCC: ≤ -13 dBm/100 kHz, from 9 kHz to 10th harmonics but Emission at §2.1051, Section 6 of Pass Antenna §27.53(g) outside authorized operating Appendix B.5 Terminals frequency ranges. Field Strength of §2.1053, Section 7 of FCC: ≤ -13 dBm/100 kHz. Spurious Pass §27.53(g) Appendix B.5 Radiation §2.1055(a)(1)(b) Frequency Within authorized bands of Section 8 of §2.1055(d)(2) Pass Stability operation/frequency block. Appendix B.5 §27.54

2.4 LTE Band 12



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Test Item	FCC Rule No.	Requirements	Test Result	Verdict
Effective (Isotropic) Radiated Power Output Data	§2.1046, §27.50(h)(2)	EIRP ≤ 2W	Section 1 of Appendix B.6	Pass
Peak-Average Ratio		≤13 dB	Section 2 of Appendix B.6	Pass
Modulation Characteristics	§2.1047	Digital modulation	Section 3 of Appendix B.6	Pass
Bandwidth	§2.1049	OBW: No limit. EBW: No limit.	Section 4 of Appendix B.6	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 de ned in paragraph (m)(6) of this section. In addition, the attenuation factor shall not be less that 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.	Section 5 of Appendix B.6	Pass
Spurious Emission at Antenna Terminals	§2.1051, §27.53(m)	P kHz %5 MHz XMHz 10 th harmonics X=Max {6MHz, EBW}	Section 6 of Appendix B.6	Pass
Field Strength of Spurious Radiation	§2.1053, §27.53(m)	25 dBm/ 1 MHz 9 kHz 9 5 MHz XMHz 10 th harmonics X=Max {6MHz, EBW}	Section 7 of Appendix B.6	Pass
Frequency Stability	§2.1055(a)(1)(b) §2.1055(d)(2) §27.54	Within authorized bands of operation/frequency block.	Section 8 of Appendix B.6	Pass

2.5 LTE Band 41



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3 General Information

3.1 Details of Client

Applicant:	Sony Corporation
Address of Applicant:	1-7-1 Konan Minato-ku Tokyo, 108-0075 Japan
Manufacturer:	Sony Corporation
Address of Manufacturer:	1-7-1 Konan Minato-ku Tokyo, 108-0075 Japan

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:	Weller Liu, Tizzy Song

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

S

EUT Description:	GSM/WCDMA/LT	GSM/WCDMA/LTE Phone with BT, DTS/UNII a/b/g/n/ac, NFC and GNSS					
Trade Mark:	Sony	Sony					
Hardware Version:	A						
Software Version:	0.287						
SN:	RF Conducted HQ62BB013D						
SIN.	RSE HQ62B20A2C						
Antenna Type:	PIFA Antenna						
	GSM850: -1.3dB		Bi(Ant0)	GSM1900:		1.8dBi(Ant1)	
Antonno Osini	WCDMA Band IV: 1.7dBi(Ant1)		si(Ant1)	WCDMA Band V: -1.3dBi(Ar		-1.3dBi(Ant0)	
Antenna Gain:	LTE Band 4:	1.7dB	i(Ant1)	LTE Band 5:		-1.3dBi(Ant0)	
	LTE Band 12:	-2.3dl	Bi(Ant0)	LTE Band 41	:	0.5dBi(Ant0)	
	0.8dB(Below 1GH	lz)	1.0dB(1.0~2	.4GHz)	1.2dB	8(2.4~3.4GHz)	
RF Cable:	1.5dB(Above 3.4GHz)						
Remark:							
As above information is p suitability, reliability or/an				GS is not liable	e to the	accuracy,	



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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
UMTS/TM2	UMTS system, WCDMA, 16QAM 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 Selec	101.0 kPa Selected Values During Tests			
Relative Humidity	44-46	% RH Ambient			
Value	Temperature(°C)	Voltage(V)			
NTNV	22~23	3.89			
LTLV	-30	3.40			
LTHV	-30	4.48			
HTLV	50	3.40			
HTHV	50	4.48			
Remark:					
NV: Normal Voltage LV: Lo	w Extreme Test Voltage	HV: High Extreme Test Voltage			
NT: Normal Temperature LT: Lo	w 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	GSM		TS	×ι	TE			
	Band		1	ТХ			RX	
	GSM850		8	324 to 8	849 MHz		869 to 894 MHz	
	GSM1900		1	1850 to	1910 MHz		1930 to 7	1990 MHz
	UMTS Band I\	/	1	1710 to	1755 MHz		2110 to 2	2155 MHz
Supported Frequency Range	UMTS Band V		8	324 to 8	849 MHz		869 to 89	94 MHz
	LTE Band 4		1	1710 to	1755 MHz		2110 to 2	2155 MHz
	LTE Band 5		8	324 to 8	849 MHz		869 to 89	94 MHz
	LTE Band 12		6	699 to 7	'16 MHz		729 to 74	46 MHz
	LTE Band 41		2	2496 to	2690MHz		2496 to 2	2690MHz
	GSM system:		\square	₫0.2 M	Hz			
	UMTS system	:	\triangleright	⊴5 MHz	2			
Supported Channel Bandwidth	LTE Band 4		\triangleright	⊴ 1.4 M	Hz 🛛 3 MHz	\triangleright]5 MHz	🛛 10 MHz
			\triangleright	⊠15 MHz ⊠20 MHz				
	LTE Band 5		\triangleright	⊴1.4 M	Hz 🛛 3 MHz	\geq]5 MHz	⊠10 MHz
	LTE Band 12		\triangleright	⊴1.4 M	Hz 🛛 3 MHz	\geq]5 MHz	⊠10 MHz
	LTE Band 41		\triangleright	⊴5 MHz	z 🛛 🖂 10 MHz	\mathbf{z}]15 MHz	20 MHz
	Note1: WCDMA supports HSUPA, HSDPA, DC-HSDPA,HSPA+, but only the worst case was tested and the data displayed in this report.							
Characteristics	Description							
	GSM:		GMS	К	8PSK			
	GSM850		248K	GXW	247KG7W			
	GSM1900		246K	GXW	246KG7W			
Designation of Emissions	UMTS:		QPSł	K				
(Remark: the necessary	Band IV		4M15	F9W				
bandwidth of which is the worst value from the	Band V		4M15	F9W				
measured occupied	E-UTRA:		QPSł	K	16QAM	640	QAM	
bandwidths for each type of channel bandwidth			1M10)G7D	1M09W7D	1M	09W7D	
configuration.)			2M70)G7D	2M69W7D	2M	69W7D	
	LTE Band 4	Ī	4M48	BG7D	4M47W7D	4M	48W7D	
			8M95	G7D	8M93W7D	8M	95W7D	
			13M5	G7D	13M5W7D	13N	//5W7D	



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		18M0G7D 17M9W7D 17M9W7D
		1M08G7D 1M09W7D 1M09W7D
	LTE Band 5	2M70G7D 2M69W7D 2M69W7D
		4M48G7D 4M47W7D 4M48W7D
		8M97G7D 8M94W7D 8M95W7D
	LTE Band 12	1M08G7D 1M09W7D 1M09W7D
		2M69G7D 2M69W7D 2M69W7D
		4M48G7D 4M47W7D 4M49W7D
	-	8M93G7D 8M92W7D 8M93W7D
		4M48G7D 4M47W7D 4M48W7D
	LTE Band 41	8M93G7D 8M94W7D 8M94W7D
		13M5G7D 13M5W7D 13M5W7D
		17M9G7D 17M9W7D 17M9W7D



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3.9 Test Frequencies

Test Mode	Test Mode TX / RX		RF Channel				
Test Would		Low (L)	Middle (M)	High (H)			
GSM850	ТХ	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				
Test Mode		Low (L)	Middle (M)	High (H)		
	ТХ	Channel 512	Channel 661	Channel 810		
GSM1900		1850.2MHz	1880.0 MHz	1909.8 MHz		
GSIM1900	RX	Channel 512	Channel 661	Channel 810		
		1930.2 MHz	1960.0 MHz	1989.8 MHz		

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

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



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

Test Made	Bandwidth	TX / RX	RF Channel			
Test Mode	Danuwiuun		Low (L)	Middle (M)	High (H)	
			Channel 20407	Channel 20525	Channel 20643	
		TX	824.7 MHz	836.5 MHz	848.3 MHz	
	1.4MHz	RX	Channel 2407	Channel 2525	Channel 2643	
		ΓA	869.7 MHz	881.5 MHz	893.3 MHz	
			Channel 20415	Channel 20525	Channel 20635	
	3MHz	TX	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	
LTE Band 5		тх	Channel 20425	Channel 20525	Channel 20625	
			826.5 MHz	836.5 MHz	846.5 MHz	
	5MHz	RX	Channel 2425	Channel 2525	Channel 2625	
			871.5 MHz	881.5 MHz	891.5 MHz	
			Channel 20450	Channel 20525	Channel 20600	
		TX	829 MHz	836.5 MHz	844 MHz	
	10MHz	RX	Channel 2450	Channel 2525	Channel 2600	
		٢A	874 MHz	881.5 MHz	889 MHz	



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Test Mede	Pondwidth	TV / DV		RF Channel		
Test Mode	Bandwidth	TX / RX	Low (L)	Middle (M)	High (H)	
			Channel 23017	Channel 23095	Channel 23173	
		ТХ	699.7 MHz	707.5 MHz	715.3 MHz	
	1.4MHz	RX	Channel 5017	Channel 5095	Channel 5173	
		КЛ	729.7 MHz	737.5 MHz	745.3 MHz	
	3MHz	ТΧ	Channel 23025	Channel 23095	Channel 23165	
			700.5 MHz	707.5 MHz	714.5 MHz	
		RX	Channel 5025	Channel 5095	Channel 5165	
			730.5 MHz	737.5 MHz	744.5 MHz	
LTE Band 12			Channel 23035	Channel 23095	Channel 23155	
		ТХ	701.5 MHz	707.5 MHz	713.5 MHz	
	5MHz	RX	Channel 5035	Channel 5095	Channel 5155	
		КЛ	731.5 MHz	737.5 MHz	743.5 MHz	
			Channel 23060	Channel 23095	Channel 23130	
		ТХ	704 MHz	707.5 MHz	711 MHz	
	10MHz	RX	Channel 5060	Channel 5095	Channel 5130	
		٢٨	734 MHz	737.5 MHz	741 MHz	

Teet Mede	Bandwidth	TX / RX	RF Channel			
Test Mode			Low (L)	Middle (M)	High (H)	
			Channel 39675	Channel40620	Channel 41565	
	5MHz	TX / RX	2498.5 MHz	2593 MHz	2687.5 MHz	
			Channel 39700	Channel40620	Channel 41540	
LTE Band 41	10MHz	TX / RX	2501 MHz	2593 MHz	2685 MHz	
(2496-2690)			Channel 39725	Channel40620	Channel 41515	
	15MHz	TX / RX	2503.5 MHz	2593 MHz	2682.5 MHz	
			Channel 39750	Channel40620	Channel 41490	
	20MHz	TX / RX	2506 MHz	2593 MHz	2680 MHz	



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4 Description of Tests

4.1 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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4.2 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 (dBi)

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 & 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

- 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 ≥ 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 > 1% of the emission bandwidth
- 4. $VBW \ge 3 \times RBW$
- 5. Detector = RMS
- 6. Number of sweep points ≥ 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 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 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 emissinos, 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 5.7.2

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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4.7 Field Strength of Spurious Radiation

Measurement Procedure: FCC KDB 971168 D01 V03r01 Section 5.8

Below 1GHz test procedure as below:

- 1). The EUT was powered ON and placed on a 80cm high table in the chamber. The antenna of the transmitter was extended to its maximum length.
- 2). The disturbance of the transmitter was maximized on the test receiver display by raising and lowering from 1m to 4m (for the test frequency of below 30MHz, the antenna was tuned to heights 1 meter) the receive antenna and by rotating through 360° the turntable. After the fundamental emission was maximized, a field strength measurement was made.
- 3). Steps 1) and 2) were performed with the EUT and the receive antenna in both vertical and horizontal polarization.
- 4). Test the EUT in the lowest channel, the middle channel ,the Highest channel.
- 5). The radiation measurements are performed in X, Y, Z axis positioning. And found the X axis positioning which it is worse case, Only the test worst case mode is recorded in the report.
- 6). Repeat above procedures until all frequencies measured was complete. E (dBµV/m) = Measured amplitude level (dBµV) + (Cable Loss (dB) + Antenna Factor (dB/m) – AMP(dB)) EIRP (dBm) = E (dBµV/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 μ V/m) = Measured amplitude level (dB μ V) + (Cable Loss (dB) + Antenna Factor (dB/m) AMP(dB)) EIRP (dBm) = E (dB μ 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 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 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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4.8 Frequency Stability / Temperature Variation

Measurement Procedure:

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

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

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

Time Period and Procedure:

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

Remark: Reference test setup 3



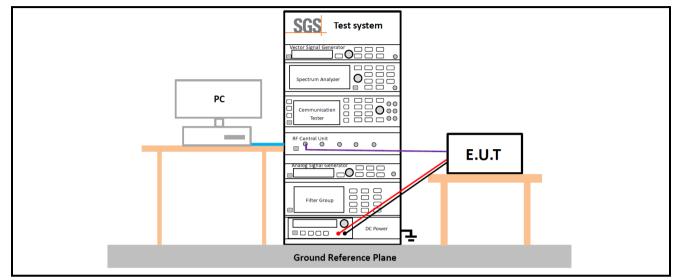
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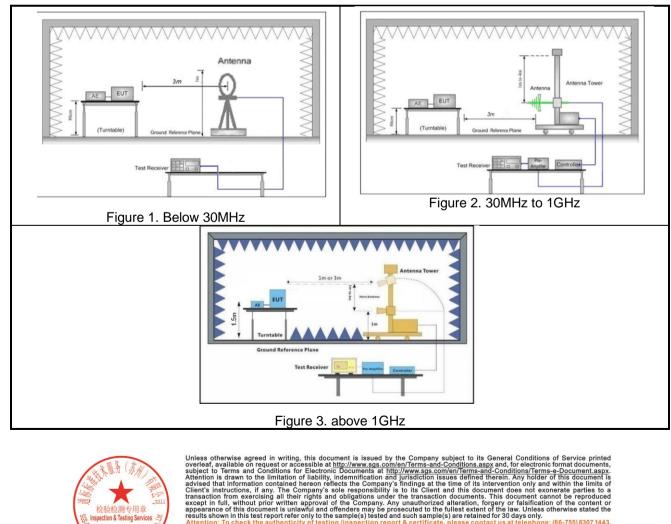
4.9 Test Setups

4.9.1 **Test Setup 1**



4.9.2 **Test Setup 2**

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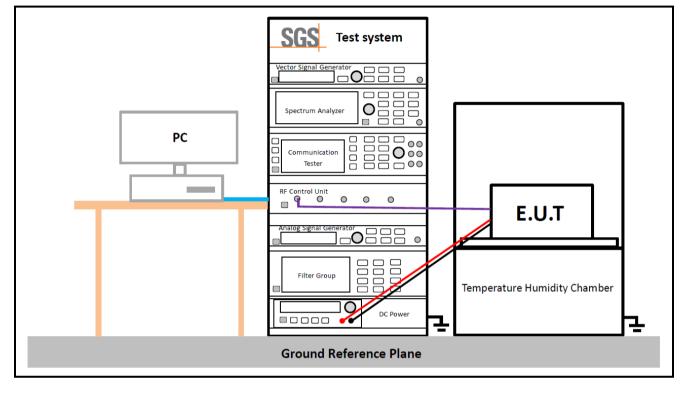
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4.9.3 Test Setup 3





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4.10Test 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;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 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	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			
	Band Edges Compliance			
Test Case	Test Conditions			



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mbient Climate & Rated Voltage				
act Catur 1				
Test Setup 1				
L, H (L= low channel, H= high channel)				
SSM/TM1;GSM/TM2;UMTS/TM1;LTE/TM1				
Spurious Emission at Antenna Terminals				
Test Conditions				
mbient Climate & Rated Voltage				
est Setup 1				
, M, H (L= low channel, M= middle channel, H= high channel)				
SM/TM1;GSM/TM2;UMTS/TM1;LTE/TM1				
Field Strength of Spurious Radiation				
Test Conditions				
mbient Climate & Rated Voltage				
est Setup 2				
, M, H (L= low channel, M= middle channel, H= high channel)				
SM/TM1;UMTS/TM1;LTE/TM1 temark: If applicable, the EUT conf. that has maximum power density (based on the quivalent power level) is selected.				
Frequency Stability				
Test Conditions				
1) -30 °C to +50 °C with step 10 °C at Rated Voltage				
2) VL, VN and VH of Rated Voltage at Ambient Climate.				
est Setup 3				
1 (M= middle channel)				



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5 Main Test Instruments

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RF conducted test					
Test Equipment	Manufacturer	Model No.	Inventory No.	Cal. date (yyyy/mm/dd)	Cal.Due date (yyyy/mm/dd)
Shielding Room	Brilliant-emc	N/A	SUWI-04-01-06	2021/05/08	2024/05/07
Temperature and humidity meter	MingGao	TH101B	SUWI-01-01-07	2022/02/16	2023/02/15
Signal Analyzer	ROHDE&SCHWARZ	FSV3030	SUWI-01-02-02	2022/05/17	2023/05/16
Measurement Software	Tonscend	JS1120-3 Test System V 2.6.88.0336	SUWI-02-09-09	NCR	NCR
Radio Communication Analyzer	Anritsu	MT8821C	SUWI-01-26-03	2022/11/23	2023/11/22
Wideband Radio Communication Tester	ROHDE&SCHWARZ	CMW500	SUWI-01-16-05	2022/02/14	2023/02/13
DC Power Supply	HYELEC	HY3005B	SUWI-01-18-01	2022/02/15	2023/02/14
Temperature Chamber	ESPEC	SU-242	SUWI-01-13-01	2022/02/15	2023/02/14
Wideband Radio Communication Test Ststion	Anritsu	MT8000A	SUWI-01-34-02	2022/09/16	2023/09/15
Signal Analyzer	ROHDE&SCHWARZ	FSW43	SUWI-01-02-04	2022/05/28	2023/05/27



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RSE Test System					
Test 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-04-02-02	2021/11/25	2024/11/24
Temperature and humidity meter	MingGao	TH101B	SUWI-01-01-15	2022/02/16	2023/02/15
Signal Analyzer	ROHDE&SCHWARZ	FSW43	SUWI-01-02-04	2022/05/28	2023/05/27
Signal Analyzer	KEYSIGHT	N9020A	SUWI-01-02-06	2022/11/23	2023/11/22
Test receiver	ROHDE&SCHWARZ	ESR7	SUWI-01-10-01	2022/02/19	2023/02/18
Receiving antenna	SCHWRZBECK MESS- ELEKTRONIK	VULB 9163	SUWI-01-11-04	2021/12/05	2023/12/04
Receiving antenna	SCHWRZBECK MESS- ELEKTRONIK	BBHA 9120D	SUWI-01-11-05	2021/12/05	2023/12/04
Receiving antenna	SCHWRZBECK MESS- ELEKTRONIK	BBHA 9170	SUWI-01-11-03	2021/05/14	2023/05/13
Active Loop Antenna	SCHWRZBECK MESS- ELEKTRONIK	FMZB 1519B	SUWI-01-21-01	2021/06/10	2023/06/09
Amplifier	Tonscend	TAP9K3G32	SUWI-01-14-06	2022/11/23	2023/11/22
Amplifier	Tonscend	TAP01018050	SUWI-01-14-04	2022/11/23	2023/11/22
Amplifier	Tonscend	TAP30M7G30	SUWI-01-14-05	2022/11/23	2023/11/22
Wideband Radio Communication Tester	Anritsu	MT8820C	SUWI-01-16-08	2022/02/14	2023/02/13
Measurement Software	Tonscend	JS32-RE V4.0.0.0	SUWI-02-09-04	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	Total RF power, conducted	±0.54dB
2	RF power density, conducted	±1.03dB
3	Spurious emissions, conducted	±0.54dB
4	Radio Frequency	±1.0 %
5	Duty Cycle	±0.37%
6	Occupied Bandwidth	±1.0 %
7		± 3.13dB (9k -30MHz)
	Radiated Emission	± 4.88dB (30M -1GHz)
	Radiated Emission	± 4.75dB (1GHz to 18GHz)
		± 4.77dB (Above 18GHz)
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The U_{Iab} (lab Uncertainty) is less than $U_{cispr/ETSI}$ (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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7 Appendixes

Appendix A.3	WWAN Setup Photos
Appendix B.1	GSM 850 & 1900
Appendix B.2	WCDMA Band IV & V
Appendix B.3	LTE Band 4
Appendix B.4	LTE Band 5
Appendix B.5	LTE Band 12
Appendix B.6	LTE Band 41

---End of Report---



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