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## **TEST REPORT**

Test Result :	PASS *	
Date of Issue:	2024/01/04	
Date of Test:	2023/12/15 to 2023/12/29	
Date of Receipt:	2023/11/28	
	47 CFR Part 27	
	47 CFR Part 22 47 CFR Part 24	
Standards:	47 CFR Part 2	
FCC ID:	PY7-37016L	
Trade Mark:	Sony	
EUT Description:	GSM/WCDMA/LTE Phone with BT, DTS/UNII a/b/g/n/ac, NFC and GNSS	
Address of Manufacturer:	1-7-1 Konan Minato-ku Tokyo, 108-0075 Japan	
Manufacturer:	Sony Corporation	
Address of Applicant:	1-7-1 Konan Minato-ku Tokyo, 108-0075 Japan	
Applicant:	Sony Corporation	
Application No.:	SEWM2311000475RG	

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

Authorized Signature:

Well Wei Wireless Laboratory Manager



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### 1 Version

	Revision Record			
Version	Chapter	Date	Modifier	Remark
01		2024/01/04		Original

Prepared By	(Levi Li) / Test Engineer
Checked By	Stone Gu) / Reviewer



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5	Main Test Instruments		
6	Measurement Uncertainty		
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### 2 Test Summary

#### 2.1 GSM 850/UMTS 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.3	Pass
Peak-Average Ratio	§22.913(d)	Limit≤13 dB	Section 2 of Appendix B.1&B.3	Pass
Bandwidth	§2.1049	OBW: No limit. EBW: No limit.	Section 3 of Appendix B.1&B.3	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 4 of Appendix B.1&B.3	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 4 of Appendix B.1&B.3	Pass
Field Strength of Spurious Radiation	§2.1053, §22.917(a)	FCC: ≤ -13 dBm/100 kHz.	Section 5 of Appendix B.1&B.3	Pass
Frequency Stability	§2.1055(a)(1)(b) §2.1055(d)(2) §22.355	±2.5ppm.	Section 6 of Appendix B.1&B.3	Pass
Modulation Characteristics	§2.1047	Digital modulation	on the operation specific radio meet the requirement of	Ilation can base on theory of the technology to modulation directly without sting



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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.2	Pass
Peak-Average Ratio	§24.232(d)	Limit≤13 dB	Section 2 of Appendix B.2	Pass
Bandwidth	§2.1049	OBW: No limit. EBW: No limit.	Section 3 of Appendix B.2	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 4 of Appendix B.2	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.	Section 4 of Appendix B.2	Pass
Field Strength of Spurious Radiation	§2.1053, §24.238(a)	≤ -13 dBm/1 MHz.	Section 5 of Appendix B.2	Pass
Frequency Stability	§2.1055(a)(1)(b) §2.1055(d)(2) §24.235	Within authorized bands of operation/frequency block.	Section 6 of Appendix B.2	Pass
Modulation Characteristics	§2.1047	Digital modulation	Remark: Modula base on the op theory of the spec- technology to m modulation requ directly without	eration cific radio neet the iirement



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Test Item	FCC Rule No.	Requirements	Test Result	Verdict
Effective (Isotropic) Radiated Power Output Data	§2.1046 §27.50(c)(10)	ERP ≤ 3 W.	Section 1 of Appendix B.4	Pass
Peak-Average Ratio		Limit≤13 dB	Section 2 of Appendix B.4	Pass
Bandwidth	§2.1049	OBW: No limit. EBW: No limit.	Section 3 of Appendix B.4	Pass
Band Edges Compliance	§2.1051, §27.53(g)	≤ -13 dBm/1%*EBW, in 1 MHz bands immediately outside and adjacent to the frequency block.	Section 4 of Appendix B.4	Pass
Spurious Emission at Antenna Terminals	§2.1051, §27.53(g)	FCC: ≤ -13 dBm/100 kHz, from 9 kHz to 10 <sup>th</sup> harmonics but outside authorized operating frequency ranges.	Section 5 of Appendix B.4	Pass
Field Strength of Spurious Radiation	§2.1053, §27.53(g)	FCC: ≤ -13 dBm/100 kHz.	Section 6 of Appendix B.4	Pass
Frequency Stability	§2.1055(a)(1)(b) §2.1055(d)(2) §27.54	Within authorized bands of operation/frequency block.	Section 7 of Appendix B.4	Pass
Modulation Characteristics	§2.1047	Digital modulation	Remark: Modula base on the op theory of the spectechnology to m modulation requirectly without	eration cific radio neet the iirement

#### 2.3 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.5	Pass
Peak-Average Ratio		≤13 dB	Section 2 of Appendix B.5	Pass
Bandwidth	§2.1049	OBW: No limit. EBW: No limit.	Section 3 of Appendix B.5	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 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 4 of Appendix B.5	Pass
Spurious Emission at Antenna Terminals	§2.1051, §27.53(m)	9 kHz %5 MHz XMHz 10th harmonics X=Max {6MHz, EBW}	Section 5 of Appendix B.5	Pass
Field Strength of Spurious Radiation	§2.1053, §27.53(m)	9 kHz %5 MHz XMHz 10th harmonics X=Max {6MHz, EBW}	Section 6 of Appendix B.5	Pass
Frequency Stability	§2.1055(a)(1)(b) §2.1055(d)(2) §27.54	Within authorized bands of operation/frequency block.	Section 7 of Appendix B.5	Pass
Modulation	§2.1047	Digital modulation	Remark: Modu	lation can

#### 2.4 LTE Band 41

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Characteristics		base on the operation theory of the specific radio technology to meet the modulation requirement directly without testing

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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:	Levi Li, 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

S

EUT Description:	GSM/WCDMA/LTE Phone with BT, DTS/UNII a/b/g/n/ac, NFC and GNSS						
Trade Mark:	Sony						
Hardware Version:	А	A					
Software Version:	1.69						
Power Supply:	Battery 3.89V						
	RF Conducted	HQ63B104B6					
SN:	RSE HQ63B104B3						
Antenna Type:	PIFA Antenna						
	GSM850:	-1.6d	Bi (Ant0)	GSM1900:		0.9dBi (Ant1)	
	WCDMA Band V:	-1.6dBi (Ant0)		LTE Band 12	2:	-3.4dBi (Ant0)	
Antenna Gain:	LTE Band 41:	0.4dBi (Ant0)					
	Note: The antenna gain are derived from the gain information report provided by the manufacturer.						
RF Cable:	4dB(Below 1GHz) 4.2dB(1.0~2.4GHz) 4.5dB(2.4~3.4GHz)						
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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		44-46 % RH Ambient			
Value		Temperature(°C)	Voltage(V)		
NTNV		22~23	3.89		
LTLV		-30	3.4		
LTHV		-30	4.48		
HTLV		50	3.4		
HTHV		50	4.48		
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		

### 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	SSM GSM	UMTS		TE			
	Band		TX			RX	
	GSM850		824 to	824 to 849 MHz		869 to 894 MHz	
Supported Frequency Denge	GSM1900		1850 to	o 1910 MHz		1930 to 1	990 MHz
Supported Frequency Range	UMTS Band V		824 to	849 MHz		869 to 89	94 MHz
	LTE Band 12		699 to	716 MHz		729 to 74	6 MHz
	LTE Band 41		2496 to	2690MHz		2496 to 2	2690MHz
	GSM system:		⊠0.2 N	lHz			
	UMTS system:	1	⊠5 MH	Z			
Supported Channel Bandwidth	LTE Band 12		⊠1.4 N	IHz 🛛 3 MHz	$\boxtimes$	35 MHz	⊠10 MHz
	LTE Band 41		⊠5 MH	z 🛛 🖾 10 MHz	$z$ $\boxtimes$	15 MHz	20 MHz
	Note: WCDMA supports HSUPA, HSDPA, but only the worst case was tested and the data displayed in this report.					e was	
Characteristics	Description						
	GSM:	GN	GMSK 8PSK				
	GSM850	247	247KGXW 245KG7W				
	GSM1900	250	KGXW	242KG7W			
	UMTS:	QP	SK				
Designation of Emissions	Band V	4M	16F9W				
(Remark: the necessary	E-UTRA:	QP	SK	16QAM	640	QAM	
bandwidth of which is the worst value from the		1M	10G7D	1M11W7D	1M	10W7D	
measured occupied	LTE Band 12	2M	70G7D	2M70W7D	2M	70W7D	
bandwidths for each type of channel bandwidth		4M	48G7D	4M48W7D	4M	48W7D	
configuration.)		8M	95G7D	8M94W7D	8M	94W7D	
		4M	48G7D	4M47W7D	4M	49W7D	
		8M	95G7D	8M98W7D	8M	96W7D	
	LTE Band 41	131	//5G7D	13M5W7D	13	M5W7D	
	1		/19G7D	17M9W7D	17	M9W7D	



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#### 3.9 Test Frequencies

Test Mode	TX / RX	RF Channel			
Test Would		Low (L)	Middle (M)	High (H)	
GSM850	TX RX	Channel 128	Channel 190	Channel 251	
		824.2MHz	836.6 MHz	848.8 MHz	
		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)	
	TX	Channel 512	Channel 661	Channel 810	
GSM1900		1850.2MHz	1880.0 MHz	1909.8 MHz	
G2M1900		Channel 512	Channel 661	Channel 810	
	RX	1930.2 MHz	1960.0 MHz	1989.8 MHz	

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



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Test Mede	Developing		<u> </u>	RF Channel	
Test Mode	Bandwidth	TX / RX	Low (L)	Middle (M)	High (H)
		ТХ	Channel 23017	Channel 23095	Channel 23173
			699.7 MHz	707.5 MHz	715.3 MHz
	1.4MHz	RX	Channel 5017	Channel 5095	Channel 5173
			729.7 MHz	737.5 MHz	745.3 MHz
	3MHz		Channel 23025	Channel 23095	Channel 23165
		TX	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	5MHz -	ТХ	Channel 23035	Channel 23095	Channel 23155
			701.5 MHz	707.5 MHz	713.5 MHz
		RX	Channel 5035	Channel 5095	Channel 5155
			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
		ΓΛ	734 MHz	737.5 MHz	741 MHz
Test Mode	Bandwidth	TX / RX		RF Channel	
restivioue	Banuwiuth		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

TX / RX

TX / RX

TX / RX



10MHz

15MHz

20MHz

LTE Band 41

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2501 MHz

Channel 39725

2503.5 MHz

Channel 39750

2506 MHz

2593 MHz

Channel40620

2593 MHz

Channel40620

2593 MHz

2685 MHz

Channel 41515

2682.5 MHz

Channel 41490

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
- VBW ≥ 3 x 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 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 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 Y 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 $\mu$ 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 Y 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  $\pm 0.00025\%$  ( $\pm 2.5$  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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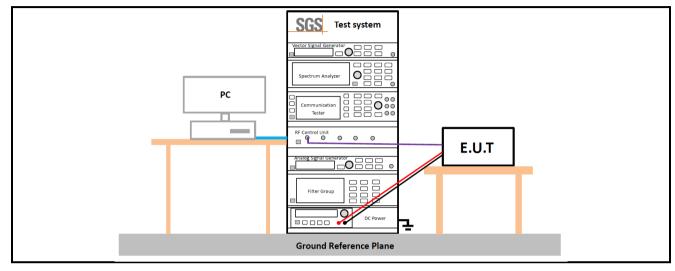
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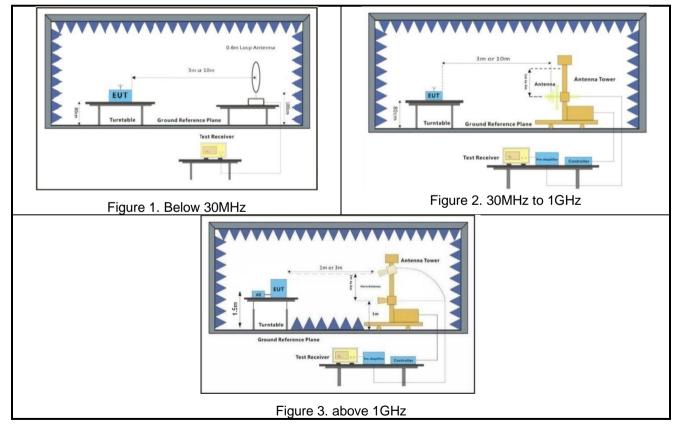
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#### 4.9 Test Setups

#### 4.9.1 Test Setup 1



#### 4.9.2 Test Setup 2





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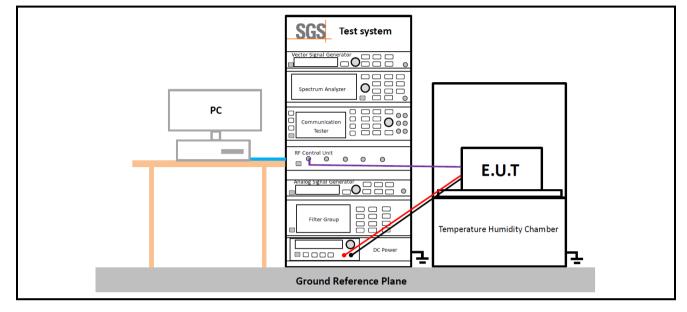
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#### 4.9.3 Test Setup 3





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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;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					
	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					
	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)					
Test Mode	GSM/TM1;GSM/TM2;UMTS/TM1;LTE/TM1					
	Spurious Emission at Antenna Terminals					
Test Case	Test Conditions					



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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				
Field Strength of Spurious Radiation				
Test Case	Test Conditions			
Test Environment	Ambient Climate & Rated Voltage			
Test Setup	Test Setup 2			
RF Channels (TX)	L, M, H (L= low channel, M= middle channel, H= high channel)			
Test Mode	GSM/TM1;UMTS/TM1;LTE/TM1 Remark: All bandwidth and modulation of GSM/UMTS/LTE have been pre tested, and only the worst results are reflected in the report.			
	Frequency Stability			
Test Case	Test Conditions			
Test Environment	(1) -30 °C to +50 °C with step 10 °C at Rated Voltage			
rest Environment	(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			
	The report only show the bandwidth with the worst case.			



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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	2023/02/06	2024/02/05				
Signal Analyzer	ROHDE&SCHWARZ	FSV3030	SUWI-01-02-02	2023/05/11	2024/05/10				
Measurement Software	Tonscend	JS1120-3 Test System V 2.6.88.0336	SUWI-02-09-09	NCR	NCR				
Measurement Software	TST	TST-271-2.0	SUWI-03-55-01	NCR	NCR				
Radio Communication Analyzer	Anritsu	MT8821C	SUWI-01-26-03	2023/11/21	2024/11/20				
Wideband Radio Communication Tester	ROHDE&SCHWARZ	CMW500	SUWI-01-16-05	2023/02/06	2024/02/05				
DC Power Supply	HYELEC	HY3005B	SUWI-01-18-01	2023/02/06	2024/02/05				
Temperature Chamber	ESPEC	SU-242	SUWI-01-13-01	2023/02/06	2024/02/05				
Receiving antenna	SCHWRZBECK MESS- ELEKTRONIK	BBHA 9120D	SUWI-01-11-02	2023/05/13	2024/05/12				
Wideband Radio Communication Test Ststion	Anritsu	MT8000A	SUWI-01-34-02	2023/09/12	2024/09/11				
Signal Analyzer	ROHDE&SCHWARZ	FSW43	SUWI-01-02-04	2023/05/11	2024/05/10				

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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	2021/05/08	2024/05/07
Temperature and humidity meter	MingGao	TH101B	SUWI-01-01-05	2023/02/07	2024/02/06
Signal Analyzer	KEYSIGHT	N9020A	SUWI-01-02-07	2023/11/21	2024/11/20
Test receiver	ROHDE&SCHWARZ	ESR7	SUWI-01-10-01	2023/02/08	2024/02/07
Receiving antenna	SCHWRZBECK MESS- ELEKTRONIK	VULB 9163	SUWI-01-11-01	2023/05/13	2024/05/12
Receiving antenna	SCHWRZBECK MESS- ELEKTRONIK	BBHA 9120D	SUWI-01-11-02	2023/05/13	2024/05/12
Active Loop Antenna	SCHWRZBECK MESS- ELEKTRONIK	FMZB 1519B	SUWI-01-21-01	2023/05/13	2024/05/12
Amplifier	Tonscend	TAP9K3G40	SUWI-01-14-01	2023/02/06	2024/02/05
Amplifier	Tonscend	TAP01018050	SUWI-01-14-02	2023/02/06	2024/02/05
Wideband Radio Communication Tester	Anritsu	MT8820C	SUWI-01-26-01	2023/09/13	2024/09/12
Wideband Radio Communication Tester	ROHDE&SCHWARZ	CMW500	SUWI-01-16-09	2023/09/16	2024/09/15
Measurement Software	Tonscend	JS32-RE 4.0.0.0	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

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 %	
		± 3.13dB (9k -30MHz)	
7	Radiated Emission	± 4.8dB (30M -1GHz)	
		± 4.8dB (1GHz to 18GHz)	

accordance with the recommendations of ISO 17025 as following:

Remark:

The U<sub>lab</sub> (lab Uncertainty) is less than U<sub>cispr/ETSI</sub> (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.1	WWAN Setup Photos
Appendix B.1	GSM 850
Appendix B.2	GSM 1900
Appendix B.3	WCDMA Band V
Appendix B.4	LTE Band 12
Appendix B.5	LTE Band 41

---End of Report---



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