ELECTROMAGNETIC EMISSIONS COMPLIANCE REPORT

Applicant:	SHARP Corporation Mobile Communication BU 2-13-1 Iida Hachihonmatsu, Higashi-hiroshima city, Hiroshima, 739-0192, Japan
Manufacturer:	Sharp Corporation 1 Takumi-cho, Sakai-ku, Sakai City, Osaka 590-8522, Japan
Product Name:	Smart Phone
Brand Name:	SHARP
Report Number:	TERF2404001246ER
FCC ID	APYHRO00332
Date of EUT Received:	April 18, 2024
Date of Test:	April 18, 2024～May 16, 2024
Issue Date:	May 23, 2024

Approved By _____
Blue Yang

We hereby certify that:

The above equipment was tested by SGS Taiwan Ltd. Central RF Lab The test data, data evaluation, test procedures, and equipment configurations shown in this report were made in accordance with the procedures given in ANSI ANSI C63.26-2015 and the energy emitted by the sample EUT comply with FCC rule part 2 , 22H & 27 C.

The results of this report relate only to the sample identified in this report.

Revision History					
Report Number	**Revision**	**Description**	**Issue Date**	**Revised By**	**Remark**
TERF2404001246ER	00	Original.	May 23, 2024	Karen Huang	

Note:

1、 The remark "*" indicates modification of the report upon requests from certification body.

Contents

1 GENERAL PRODUCT INFORMATION

1.1 Product Description

Product Name:	Smart Phone
Brand Name:	SHARP
Hardware Version:	DVT
Firmware Version:	N/A
Power Supply:	3.89Vdc from Rechargeable Battery
Test Software (Name/Version)	QRCT V 4.0.00197

1.2 Operation Frequency Range

NR Band 5			
BW (MHz)	Operation Frequency (MHz)		
5	826.5	-	846.5
10	829.0	-	844.0
15	831.5	-	841.5
20	834.0	-	839.0

NR Band 41			
BW (MHz)	Operation Frequency (MHz)		
20	2506.0	-	2680.0
30	2511.0	-	2675.0
40	2516.0	-	2670.0
50	2521.0	-	2665.0
60	2526.0	-	2660.0
70	2531.0	-	2655.0
80	2536.0	-	2650.0
90	2541.0	-	2645.0
100	2546.0	-	2640.0

NR Band 66			
BW (MHz)	Operation Frequency (MHz)		
5	1712.5	-	1777.5
10	1715.0	-	1775.0
15	1717.5	-	1772.5
20	1720.0	-	1770.0
25	1722.5	-	1767.5
30	1725.0	-	1765.0
40	1730.0	-	1760.0

1.3 Antenna Designation

Antenna Type	Antenna Model No.
Inverted-F Antenna	ANT2
	ANT3
Note: Transmission frequencies in this test report are only available by the above antenna(s).	

5G NR Bands	Frequency (MHz)			Peak Antenna Gain (dBi)	
				ANT2	ANT3
5	824	~	849		-3.9
41	2496	~	2690		-8.4
66	1710	~	1780	-0.9	

Note: Antenna information is provided by the applicant.

1.4 Type of Emission & Max ERP/EIRP Power Measurement Result:

5G NR Band n5_Uplink frequency band : 824 to 849 MHz									
Bandwidth (MHz)	Low Frequency (MHz)	Upper Frequency (MHz)	Modulation	Conducted Average (dBm)	ERP Average (dBm)	ERP Average (W)	99% BW (MHz)	99% BW (kHz)	Type of Emission
5	826.5	846.5	DFT-s PI/2 BPSK	22.96	16.91	0.049	4.4892	4489.2	4M49G7W
			DFT-s QPSK	22.76	16.71	0.047	4.4949	4494.9	4M49G7W
			DFT-s QAM	21.80	15.75	0.038	4.4948	4494.8	4M49D7W
			CP QPSK	21.70	15.65	0.037	4.4949	4494.9	4M49G7W
			CP QAM	21.32	15.27	0.034	4.4949	4494.9	4M49D7W
10	829	844	DFT-s PI/2 BPSK	23.02	16.97	0.050	8.9824	8982.4	8M98G7W
			DFT-s QPSK	22.85	16.80	0.048	8.9785	8978.5	8M98G7W
			DFT-s QAM	21.89	15.84	0.038	8.9892	8989.2	8M99D7W
			CP QPSK	21.75	15.70	0.037	8.9785	8978.5	8M98G7W
			CP QAM	21.40	15.35	0.034	8.9892	8989.2	8M99D7W
15	831.5	841.5	DFT-s PI/2 BPSK	23.00	16.95	0.050	13.474	13474.0	13M5G7W
			DFT-s QPSK	22.92	16.87	0.049	13.457	13457.0	13M5G7W
			DFT-s QAM	21.94	15.89	0.039	13.466	13466.0	13M5D7W
			CP QPSK	21.81	15.76	0.038	13.457	13457.0	13M5G7W
			CP QAM	21.48	15.43	0.035	13.457	13457.0	13M5D7W
20	834	839	DFT-s PI/2 BPSK	23.06	17.01	0.050	17.944	17944.0	17M9G7W
			DFT-s QPSK	22.96	16.91	0.049	17.908	17908.0	17M9G7W
			DFT-s QAM	22.00	15.95	0.039	17.951	17951.0	18M0D7W
			CP QPSK	21.84	15.79	0.038	17.908	17908.0	17M9G7W
			CP QAM	21.53	15.48	0.035	17.951	17951.0	18M0D7W

FCC 5G NR Band n41_Uplink frequency band : 2496 to 2690 MHz									
Bandwidth (MHz)	Low Frequency (MHz)	Upper Frequency (MHz)	Modulation	Conducted Average (dBm)	EIRP Average (dBm)	EIRP Average (W)	99% BW (MHz)	99% BW (kHz)	Type of Emission
20	2506.02	2679.99	DFT-s PI/2 BPSK	23.18	14.78	0.030	17.958	17958.0	18M0G7W
			DFT-s QPSK	23.10	14.70	0.030	17.938	17938.0	17M9G7W
			DFT-s QAM	22.01	13.61	0.023	17.965	17965.0	18M0D7W
			CP QPSK	21.90	13.50	0.022	17.938	17938.0	17M9G7W
			CP QAM	21.54	13.14	0.021	17.965	17965.0	18M0D7W
30	2511	2674.98	DFT-s PI/2 BPSK	23.18	14.78	0.030	26.891	26891.0	26M9G7W
			DFT-s QPSK	23.10	14.70	0.030	26.906	26906.0	26M9G7W
			DFT-s QAM	22.04	13.64	0.023	26.931	26931.0	26M9D7W
			CP QPSK	21.95	13.55	0.023	26.906	26906.0	26M9G7W
			CP QAM	21.61	13.21	0.021	26.931	26931.0	26M9D7W
40	2516.01	2670	DFT-s PI/2 BPSK	23.13	14.73	0.030	35.786	35786.0	35M8G7W
			DFT-s QPSK	23.06	14.66	0.029	35.816	35816.0	35M8G7W
			DFT-s QAM	22.03	13.63	0.023	35.836	35836.0	35M8D7W
			CP QPSK	21.98	13.58	0.023	35.816	35816.0	35M8G7W
			CP QAM	21.66	13.26	0.021	35.836	35836.0	35M8D7W
50	2521.02	2664.99	DFT-s PI/2 BPSK	23.18	14.78	0.030	45.818	45818.0	45M8G7W
			DFT-s QPSK	23.06	14.66	0.029	45.778	45778.0	45M8G7W
			DFT-s QAM	22.02	13.62	0.023	45.811	45811.0	45M8D7W
			CP QPSK	22.04	13.64	0.023	45.778	45778.0	45M8G7W
			CP QAM	21.66	13.26	0.021	45.811	45811.0	45M8D7W
60	2526	2659.98	DFT-s PI/2 BPSK	23.07	14.67	0.029	57.933	57933.0	57M9G7W
			DFT-s QPSK	23.01	14.61	0.029	57.954	57954.0	58M0G7W
			DFT-s QAM	22.03	13.63	0.023	57.934	57934.0	57M9D7W
			CP QPSK	22.07	13.67	0.023	57.954	57954.0	58M0G7W
			CP QAM	21.79	13.39	0.022	57.934	57934.0	57M9D7W
70	2531.01	2655	DFT-s PI/2 BPSK	23.10	14.70	0.030	64.478	64478.0	64M5G7W
			DFT-s QPSK	22.98	14.58	0.029	64.523	64523.0	64M5G7W
			DFT-s QAM	22.02	13.62	0.023	64.45	64450.0	64M5D7W
			CP QPSK	22.00	13.60	0.023	64.523	64523.0	64M5G7W
			CP QAM	21.66	13.26	0.021	64.45	64450.0	64M5D7W
80	2536.02	2649.99	DFT-s PI/2 BPSK	23.17	14.77	0.030	77.273	77273.0	77M3G7W
			DFT-s QPSK	23.14	14.74	0.030	77.331	77331.0	77M3G7W
			DFT-s QAM	22.11	13.71	0.023	77.353	77353.0	77M4D7W
			CP QPSK	22.10	13.70	0.023	77.331	77331.0	77M3G7W
			CP QAM	21.74	13.34	0.022	77.353	77353.0	77M4D7W
90	2541	2644.98	DFT-s PI/2 BPSK	23.17	14.77	0.030	87.036	87036.0	87M0G7W
			DFT-s QPSK	23.04	14.64	0.029	86.957	86957.0	87M0G7W
			DFT-s QAM	22.08	13.68	0.023	87.081	87081.0	87M1D7W
			CP QPSK	22.06	13.66	0.023	86.957	86957.0	87M0G7W
			CP QAM	21.73	13.33	0.022	87.081	87081.0	87M1D7W
100	2546.01	2640	DFT-s PI/2 BPSK	23.22	14.82	0.030	96.519	96519.0	96M5G7W
			DFT-s QPSK	23.19	14.79	0.030	96.514	96514.0	96M5G7W
			DFT-s QAM	22.14	13.74	0.024	96.707	96707.0	96M7D7W
			CP QPSK	22.13	13.73	0.024	96.514	96514.0	96M5G7W
			CP QAM	21.82	13.42	0.022	96.707	96707.0	96M7D7W

5G NR Band n66_Uplink frequency band : 1710 to 1780 MHz									
Bandwidth (MHz)	Low Frequency (MHz)	Upper Frequency (MHz)	Modulation	Conducted Average (dBm)	EIRP Average (dBm)	EIRP Average (W)	99% BW (MHz)	99% BW (kHz)	Type of Emission
5	1712.5	1777.5	DFT-s PI/2 BPSK	22.78	21.88	0.154	4.4929	4492.9	4M49G7W
			DFT-s QPSK	22.64	21.74	0.149	4.4935	4493.5	4M49G7W
			DFT-s QAM	21.59	20.69	0.117	4.4993	4499.3	4M50D7W
			CP QPSK	21.81	20.91	0.123	4.4935	4493.5	4M49G7W
			CP QAM	21.49	20.59	0.115	4.4935	4493.5	4M49D7W
10	1715	1775	DFT-s PI/2 BPSK	22.77	21.87	0.154	8.9714	8971.4	8M97G7W
			DFT-s QPSK	22.60	21.70	0.148	8.9815	8981.5	8M98G7W
			DFT-s QAM	21.56	20.66	0.116	8.9858	8985.8	8M99D7W
			CP QPSK	21.74	20.84	0.121	8.9815	8981.5	8M98G7W
			CP QAM	21.47	20.57	0.114	8.9858	8985.8	8M99D7W
15	1717.5	1772.5	DFT-s PI/2 BPSK	22.73	21.83	0.152	13.457	13457.0	13M5G7W
			DFT-s QPSK	22.57	21.67	0.147	13.462	13462.0	13M5G7W
			DFT-s QAM	21.54	20.64	0.116	13.46	13460.0	13M5D7W
			CP QPSK	21.76	20.86	0.122	13.462	13462.0	13M5G7W
			CP QAM	21.42	20.52	0.113	13.462	13462.0	13M5D7W
20	1720	1770	DFT-s PI/2 BPSK	22.74	21.84	0.153	17.945	17945.0	17M9G7W
			DFT-s QPSK	22.64	21.74	0.149	17.946	17946.0	17M9G7W
			DFT-s QAM	21.60	20.70	0.117	17.936	17936.0	17M9D7W
			CP QPSK	21.81	20.91	0.123	17.946	17946.0	17M9G7W
			CP QAM	21.50	20.60	0.115	17.936	17936.0	17M9D7W
25	1722.5	1767.5	DFT-s PI/2 BPSK	22.72	21.82	0.152	22.983	22983.0	23M0G7W
			DFT-s QPSK	22.63	21.73	0.149	23.017	23017.0	23M0G7W
			DFT-s QAM	21.59	20.69	0.117	22.97	22970.0	23M0D7W
			CP QPSK	21.79	20.89	0.123	23.017	23017.0	23M0G7W
			CP QAM	21.49	20.59	0.115	22.97	22970.0	23M0D7W
30	1725	1765	DFT-s PI/2 BPSK	22.71	21.81	0.152	28.662	28662.0	28M7G7W
			DFT-s QPSK	22.67	21.77	0.150	28.665	28665.0	28M7G7W
			DFT-s QAM	21.65	20.75	0.119	28.689	28689.0	28M7D7W
			CP QPSK	21.85	20.95	0.124	28.665	28665.0	28M7G7W
			CP QAM	21.54	20.64	0.116	28.689	28689.0	28M7D7W
40	1730	1760	DFT-s PI/2 BPSK	22.75	21.85	0.153	38.722	38722.0	38M7G7W
			DFT-s QPSK	22.74	21.84	0.153	38.646	38646.0	38M6G7W
			DFT-s QAM	21.72	20.82	0.121	38.728	38728.0	38M7D7W
			CP QPSK	21.90	21.00	0.126	38.646	38646.0	38M6G7W
			CP QAM	21.57	20.67	0.117	38.728	38728.0	38M7D7W

1.5 Test Methodology of Applied Standards

FCC 47 CFR Part 2, 22H, 27C
ANSI C63.26-2015
KDB971168 D01 Power Meas license Digital System v03r01
KDB412172 D01 Determining ERP and EIRP v01r01

1.6 Test Facility

Laboratory	Test Site Address	Test Site Name	FCC Designation number	IC CAB identifier
SGS Taiwan Ltd. Central RF Lab. (TAF code 3702)	No.134, Wu Kung Road, New Taipei Industrial Park, Wuku District, New Taipei City, Taiwan.	SAC 1	TW0027	TW3702
		SAC 2		
		SAC 3		
		Conduction 1		
		Conducted 1		
		Conducted 2		
		Conducted 3		
		Conducted 4		
		Conducted 5		
		Conducted 6		
	No.2, Keji 1st Rd., Guishan District, Taoyuan City, Taiwan 333	Conduction C	TW0028	
		SAC C		
		SAC D		
		SAC G		
		Conducted A		
		Conducted B		
		Conducted C		
		Conducted D		
		Conducted E		
		Conducted F		
		Conducted G		

Note: Test site name is remarked on the equipment list in each section of this report as an indication where measurements occurred in specific test site and address.

1.7 Special Accessories

No special accessories were used during testing.

1.8 Equipment Modifications

There was no modifications incorporated into the EUT.

1.9 Radiated Emission Test Sites For Measurements From 9 kHz To 30 MHz

Radiated emission below 30MHz is measured in a 9m*6m*6m semi-anechoic chamber, the measurements correspond to those obtained at an open-field test site.
There is a comparison data of both open-field test site and semi-Anechoic chamber, and the result came out very similar.

2 SYSTEM TEST CONFIGURATION

2.1 EUT Configuration

The EUT configuration for testing is installed on RF field strength measurement to meet the Commissions requirement and operating in a manner which intends to maximize its emission characteristics in a continuous normal application.

2.2 EUT Exercise

The EUT (Transmitter) was operated in the continuous transmission mode employed with the simulator of the Base Station that fixates at test default channels to fix the Tx frequency which was for the purpose of the measurements.

2.3 Test Procedure

2.3.1 Conducted Measurement at Antenna Port

The EUT is placed on a table which is 0.8 m above ground plane. A low loss of RF cable was used to connect the antenna port of EUT to measurement equipment.

2.3.2 Radiated Emissions (ERP/EIRP)

The EUT is placed on a turn table, for emission measurements below 1 GHz is 0.8 m above ground plane, for emission measurements above 1 GHz, the table height shall be 1.5 m. The turn table shall rotate 360 degrees to determine the position of maximum emission level. EUT is set 3m away from the receiving antenna which varied from 1m to 4m to find out the highest emission. And also, each emission was to be maximized by changing the polarization of receiving antenna both Horizontal and Vertical. In order to find out the max. emission, the relative positions of this transmitter (EUT) was rotated through three orthogonal axes and measurement procedures for electric field radiated emissions above 1 GHz the EUT measurement is to be made “while keeping the antenna in the ‘cone of radiation’ from that area and pointed at the area both in azimuth and elevation, with polarization oriented for maximum response.” is still within the 3dB illumination BW of the measurement antenna.

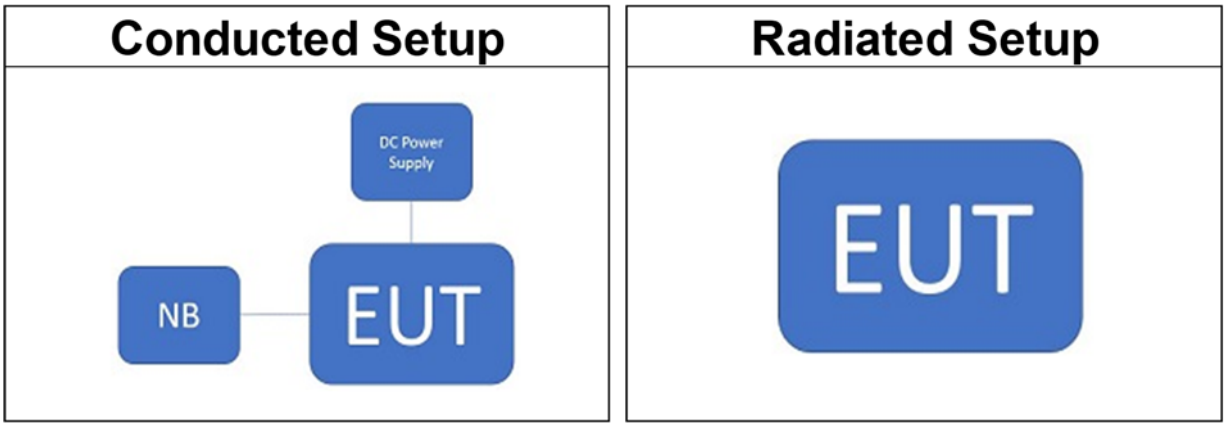
2.4 Measurement Results Explanation Example

For all conducted test items:
The offset level is set in the spectrum analyzer to compensate the RF cable loss and attenuation factor between EUT conducted port and spectrum analyzer. With the offset compensation, the spectrum analyzer reading level is exactly EUT RF output level.
Note:
The spectrum analyzer offset is derived from RF cable loss and attenuator factor.

2.5 Final Amplifier Voltage and Current Information:

5G NR BAND n5		
CP-OFDM_SCS 15 kHz		
Test mode	DC voltage (V)	DC current (mA)
Bandwidth:5MHz Mod:256QAM	3.89	663
Bandwidth:10MHz Mod:256QAM	3.89	654
Bandwidth:15MHz Mod:256QAM	3.89	648
Bandwidth:20MHz Mod:256QAM	3.89	671
5G NR BAND n41		
CP-OFDM_SCS 30 kHz		
Test mode	DC voltage (V)	DC current (mA)
Bandwidth:20MHz Mod:256QAM	3.89	661
Bandwidth:30MHz Mod:256QAM	3.89	652
Bandwidth:40MHz Mod:256QAM	3.89	639
Bandwidth:50MHz Mod:256QAM	3.89	642
Bandwidth:60MHz Mod:256QAM	3.89	653
Bandwidth:70MHz Mod:256QAM	3.89	655
Bandwidth:80MHz Mod:256QAM	3.89	661
Bandwidth:90MHz Mod:256QAM	3.89	666
Bandwidth:100MHz Mod:256QAM	3.89	642
5G NR BAND n66		
CP-OFDM_SCS 15 kHz		
Test mode	DC voltage (V)	DC current (mA)
Bandwidth:5MHz Mod:256QAM	3.89	643
Bandwidth:10MHz Mod:256QAM	3.89	647
Bandwidth:15MHz Mod:256QAM	3.89	651
Bandwidth:20MHz Mod:256QAM	3.89	653
Bandwidth:25MHz Mod:256QAM	3.89	648
Bandwidth:30MHz Mod:256QAM	3.89	649
Bandwidth:40MHz Mod:256QAM	3.89	655

2.6 Test Configuration



Note: Radio Communication Analyzer is placed in remote side for radiated test.

2.7 Control Unit(s)

Conducted Emission Test Site: Conducted 3					
EQUIPMENT TYPE	MFR	MODEL NUMBER	SERIAL NUMBER	LAST CAL.	CAL DUE.
Notebook	Lenovo	X240	PF-00UH6D	N/A	N/A

3 SUMMARY OF TEST RESULTS

FCC Rules	Description Of Test	Result
§2.1046(a)	RF Power Output	Compliant
§22.913(a)(5) §27.50(d)(4) §27.50(h)(2)	ERP/ EIRP measurement	Compliant
§2.1049(h)	99% & 26dB Occupied Bandwidth	Compliant
§2.1051 §22.917(a)(b) §27.53(h)(1)&(3) §27.53(m)(4)(6)	Out of Band Emissions at Antenna Terminals and Band Edge / Emission mask requirements	Compliant
§2.1053(a)(1) §22.917(a)(b) §27.53(h) §27.53(m)(4)	Field Strength of Spurious Radiation	Compliant
§22.913(d) §27.50(d)(5)	Peak to Average Ratio	Compliant
§2.1055(1) §22.355 §27.54 §90.213	Frequency Stability	Compliant

4 DESCRIPTION OF TEST MODES

4.1 The Worst Test Modes and Channel Details

1. The EUT has been tested under operating condition.
2. Pre-Scan has been conducted to determine the worst-case scenario from all possible combinations among available modulations, data rates and antenna ports, the worst case configurations listed below for the final test.
3. The field strength of radiated emission was measured as the EUT positioned in different orthogonal planes (E1/E2/H) based on actual usage of the EUT to pre-scan the emissions for determining the worst case scenario.

4.2 Measurement Configuration

Test Items	Band	Test Channel			Bandwidth (MHz)																Modulation DFT-s-OFDM					Modulation CP-OFDM				RB #					
		L	M	H	5	10	15	20	25	30	35	40	45	50	60	70	80	90	100	BPSK	QPSK	16 QAM	64 QAM	256 QAM	QPSK	16 QAM	64 QAM	256 QAM	Edge 1RB_Left	Edge 1RB_Right	Inner 1RB_Left	Inner 1RB_Right	Inner Full	Outer Full
Conducted Power	5	v	v	v	v	v	v	v												v	v	v	v	v	v	v	v	v			v	v	v	v
Freqency Stability			v					v																	v										v
Occupied Bandwidth		v	v	v	v	v	v	v												v	v	v	v	v										v
Bandedge		v		v	v	v	v	v												v					v				v	v				v
Mask																																			
Conducted Emission		v	v	v	v	v	v	v												v											v			
CCDF		v	v	v	v	v	v	v																v										v
Radiated Emission		v	v	v				v												v											v			

Test Items	Band	Test Channel			Bandwidth (MHz)																Modulation DFT-s-OFDM					Modulation CP-OFDM				RB #					
		L	M	H	5	10	15	20	25	30	35	40	45	50	60	70	80	90	100	BPSK	QPSK	16 QAM	64 QAM	256 QAM	QPSK	16 QAM	64 QAM	256 QAM	Edge 1RB_Left	Edge 1RB_Right	Inner 1RB_Left	Inner 1RB_Right	Inner Full	Outer Full
Conducted Power	41	v	v	v				v		v		v		v	v	v	v	v	v	v	v	v	v	v	v	v	v	v			v	v	v	v
Freqency Stability			v																v						v										v
Occupied Bandwidth		v	v	v				v		v		v		v	v	v	v	v	v	v	v	v	v												v
Bandedge		v		v																															
Mask		v		v				v		v		v		v	v	v	v	v	v	v					v				v	v				v
Conducted Emission		v	v	v				v		v		v		v	v	v	v	v	v	v											v			
CCDF		v	v	v				v		v		v		v	v	v	v	v	v					v										v
Radiated Emission		v	v	v															v	v											v			

Test Items	Band	Test Channel			Bandwidth (MHz)																Modulation DFT-s-OFDM					Modulation CP-OFDM				RB #					
		L	M	H	5	10	15	20	25	30	35	40	45	50	60	70	80	90	100	BPSK	QPSK	16 QAM	64 QAM	256 QAM	QPSK	16 QAM	64 QAM	256 QAM	Edge 1RB_Left	Edge 1RB_Right	Inner 1RB_Left	Inner 1RB_Right	Inner Full	Outer Full
Conducted Power	66	v	v	v	v	v	v	v	v	v		v								v	v	v	v	v	v	v	v	v			v	v	v	v
Freqency Stability			v									v													v										v
Occupied Bandwidth		v	v	v	v	v	v	v	v	v		v								v	v	v	v	v											v
Bandedge		v		v	v	v	v	v	v	v		v								v					v				v	v				v
Mask																																			
Conducted Emission		v	v	v	v	v	v	v	v	v		v								v											v			
CCDF		v	v	v	v	v	v	v	v	v		v												v										v
Radiated Emission		v	v	v	v															v											v			

5 MEASUREMENT UNCERTAINTY

Test Items	Uncertainty		
RF Power Output	+/-	0.97	dB
ERP/ EIRP measurement	+/-	2.15	dB
	+/-	2.15	dB
Emission Bandwidth	+/-	1.38	Hz
Out of Band Emissions at Antenna Terminals and Band Edge	+/-	0.77	dB
Peak to Average Ratio	+/-	0.97	dB
Frequency Stability vs. Temperature	+/-	1.48	Hz
Frequency Stability vs. Voltage	+/-	1.48	Hz
Temperature	+/-	0.6	°C
Humidity	+/-	3	%
DC / AC Power Source	+/-	1	%

Radiated Spurious Emission Measurement Uncertainty				
Polarization: Vertical	**+/-**	**1.89**	**dB**	9kHz~30MHz
	+/-	**4.15**	**dB**	30MHz - 1000MHz
	+/-	**3.43**	**dB**	1GHz - 18GHz
	+/-	**3.86**	**dB**	18GHz - 40GHz
Polarization: Horizontal	**+/-**	**1.89**	**dB**	9kHz~30MHz
	+/-	**4.02**	**dB**	30MHz - 1000MHz
	+/-	**3.43**	**dB**	1GHz - 18GHz
	+/-	**3.86**	**dB**	18GHz - 40GHz
Radiated Spurious Emission	**+/-**	**2**	**dB**	33GHz-50GHz
	+/-	**1.59**	**dB**	50GHz-60GHz
	+/-	**1.7**	**dB**	60GHz-90GHz
	+/-	**1.64**	**dB**	90GHz-140GHz
	+/-	**3.83**	**dB**	140GHz-220GHz

This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=2.

6 MEASUREMENT EQUIPMENT USED

6.1 Conducted Measurement

Conducted Emission Test Site: Conducted 3					
EQUIPMENT TYPE	MFR	MODEL NUMBER	SERIAL NUMBER	LAST CAL.	CAL DUE.
PXA Spectrum Analyzer	Agilent	N9030A	MY53120760	04/24/2024	04/23/2025
PXA Spectrum Analyzer	Keysight	N9030B	MY61330494	03/22/2024	03/21/2025
Test Software	SGS	Radio Test Software	Ver. 21	N.C.R	N.C.R
Temperature Chamber	Giant Force	GTH-150-40-CP-AR	MAA0512-018	05/24/2023	05/23/2024
DC Power Supply	Gwinstek	SPS-3610	GEV856750	08/04/2023	08/03/2024
Attenuator	Mini-Circuits	BW-S10W2+	8	12/12/2023	12/11/2024
DC Block	Mini-Circuits	BLK-18-S+	4	12/12/2023	12/11/2024

6.2 Radiated Measurement

Radiated Emission Test Site: SAC 2					
EQUIPMENT TYPE	MFR	MODEL NUMBER	SERIAL NUMBER	LAST CAL.	CAL DUE.
Bi-log Antenna	SCHWARZBECK	VULB9168	1208	07/21/2023	07/20/2024
Horn Antenna	SCHWARZBECK	BBHA9120D	320	02/16/2024	02/15/2025
Horn Antenna	SCHWARZBECK	BBHA9170	184	12/28/2023	12/27/2024
Horn Antenna	RF SPIN	DRH0844	LE2D05A0844	07/03/2023	07/02/2024
Horn Antenna	RF SPIN	DRH18-E	210303A18-ES	02/16/2024	02/15/2025
Bi-log Antenna	SCHWARZBECK	VULB9168	9168-1278	03/04/2024	03/03/2025
EXA Spectrum Analyzer	KEYSIGHT	N9010B	MY60242392	12/22/2023	12/21/2024
Network Analyzer	Anritsu	MS4644A	1216312	12/07/2023	12/06/2024
Radio Communication Analyer	KEYSIGHT	E7515B	MY59321561	06/27/2023	06/26/2024
Test Software	Audix	e3	Ver. 9.210616	N.C.R	N.C.R
Site Cal	SGS	SAC 2	N/A	08/31/2023	08/30/2024
Pre-Amplifier	EMCI	EMC184045B	980135	08/31/2023	08/30/2024
Pre-Amplifier	EMCI	EMC330N	980826	08/31/2023	08/30/2024
Pre-Amplifier	EMCI	EMC118A45SEE	980867	08/31/2023	08/30/2024
4G High Pass Filter	WI	WHKX4.0	22	12/12/2023	12/11/2024
2G High Pass Filter	Micro-Tronics	HPM50110	36	12/12/2023	12/11/2024
1G High Pass Filter	Micro-Tronics	HPM50108	32	12/12/2023	12/11/2024
Band Reject Filter 2240-2700	Titan	T04N22402700505O1	23040703-12	12/12/2023	12/11/2024
Band Reject Filter 635-920	WI	WRCGV695/920-635/980-40/12SS	1	12/12/2023	12/11/2024
Band Reject Filter 1700-2000	EWT	EWT-54-0038	M1	12/12/2023	12/11/2024
Coaxial Cables	Huber Suhner	SUCOFLEX 102	RX Cable 18G-40G MY2630/2+805062/2	08/31/2023	08/30/2024
Coaxial Cables	Huber Suhner	SUCOFLEX 102+SUCOFLEX 106	TX Cable 30M-40G 23051/2+76096/6+22962/2	08/31/2023	08/30/2024
Coaxial Cables	EMCI	EMC104-SM-SM-1000+EMC105-SM-SM-1000+EMC105-SM-SM-1500+EMC104-SM-SM-600+EMC105-SM-SM-2000	RX Cable 9K-18G (220236+201211+220906+220237+220909)	08/31/2023	08/30/2024

NOTE: *N.C.R refers to Not Calibrated Required.*

7 STANDARD APPLICABLE

7.1 Maximum Output Power

A base station simulator was used to establish communication with the EUT. Its parameters were set to transmit the maximum power on the EUT. The measured power in the radio frequency on the transmitter output terminals.

7.1.1 ERP/EIRP LIMIT

According to FCC §2.1046

FCC 22.913(a)

(5) mobile transmitters and auxiliary test transmitters must not exceed 7 watts.

FCC 27.50(d)

(4) Mobile, and portable (hand-held) stations operating in the 1710-1755 MHz, 1695-1710 MHz and 1755-1780 MHz bands are limited to 1W EIRP.

FCC 27, 50(h)

(2) Mobile and other user stations transmitting in the BRS and EBS bands are limited to 2 W EIRP.

7.2 Occupied Bandwidth Measurement

The occupied bandwidth 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.

7.3 Out Of Band Emission At Antenna Terminals

FCC §22.917(a), §27.53(h)

Out of band emissions.The power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least 43 + 10 log(P) dB.

FCC §27.53(h)

(h) *AWS emission limits*—(1) *General protection levels.* Except as otherwise specified below, for operations in the 1695-1710 MHz, 1710-1755 MHz, 1755-1780 MHz, 1915-1920 MHz, 1995-2000 MHz, 2000-2020 MHz, 2110-2155 MHz, 2155-2180 MHz, and 2180-2200 bands, the power of any emission outside a licensee's frequency block shall be attenuated below the transmitter power (P) in watts by at least $43 + 10 \log_{10}$ (P) dB.

FCC §27.53(m) (4) (6)

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. Mobile Satellite Service licensees operating on frequencies below 2495 MHz may also submit a documented interference complaint against BRS licensees operating on channel BRS Channel 1 on the same terms and conditions as adjacent channel BRS or EBS licensees.

Measurement procedure. Compliance with these rules is based on the use of measurement nstrumentation employing a resolution bandwidth of 1 megahertz 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; for mobile digital stations, in the 1 megahertz bands immediately outside and adjacent to the frequency block a resolution bandwidth of at least two percent may be employed, except when the 1 megahertz band is 2495-2496 MHz, in which case a resolution bandwidth of at least one percent may be employed. A narrower resolution bandwidth is permitted in all cases to improve measurement accuracy provided the measured power is integrated over the full required measurement bandwidth (i.e. 1 megahertz or 1 percent of emission bandwidth, as specified; or 1 megahertz or 2 percent for mobile digital stations, except in the band 2495-2496 MHz). 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 emissions are attenuated at least 26 dB below the transmitter power. With respect to television operations, measurements must be made of the separate visual and aural operating powers at sufficiently frequent intervals to ensure compliance with the rules.

7.4 Field Strength Of Spurious Radiation Measurement

According to FCC §2.1053,

FCC §22.917(a), §27.53(h)

Out of band emissions.The power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least 43 + 10 log(P) dB.

FCC §27.53(h)(1)

(h) *AWS emission limits*—(1) *General protection levels.* Except as otherwise specified below, for operations in the 1695-1710 MHz, 1710-1755 MHz, 1755-1780 MHz, 1915-1920 MHz, 1995-2000 MHz, 2000-2020 MHz, 2110-2155 MHz, 2155-2180 MHz, and 2180-2200 bands, the power of any emission outside a licensee's frequency block shall be attenuated below the transmitter power (P) in watts by at least 43 + 10 $\log_{10}$ (P) dB.

FCC §27.53(m) (4) (6)

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. Mobile Satellite Service licensees operating on frequencies below 2495 MHz may also submit a documented interference complaint against BRS licensees operating on channel BRS Channel 1 on the same terms and conditions as adjacent channel BRS or EBS licensees.

Measurement procedure. Compliance with these rules is based on the use of measurement nstrumentation employing a resolution bandwidth of 1 megahertz 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; for mobile digital stations, in the 1 megahertz bands immediately outside and adjacent to the frequency block a resolution bandwidth of at least two percent may be employed, except when

the 1 megahertz band is 2495-2496 MHz, in which case a resolution bandwidth of at least one percent may be employed. A narrower resolution bandwidth is permitted in all cases to improve measurement accuracy provided the measured power is integrated over the full required measurement bandwidth (i.e. 1 megahertz or 1 percent of emission bandwidth, as specified; or 1 megahertz or 2 percent for mobile digital stations, except in the band 2495-2496 MHz). 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 emissions are attenuated at least 26 dB below the transmitter power. With respect to television operations, measurements must be made of the separate visual and aural operating powers at sufficiently frequent intervals to ensure compliance with the rules.

7.5 Frequency Stability Measurement

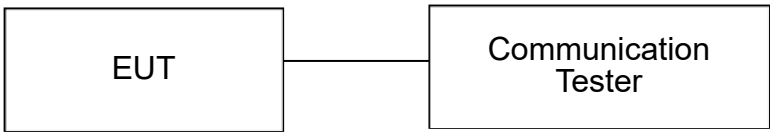
The frequency stability shall be sufficient to ensure that the fundamental emission stays within the authorized frequency block.

7.6 Peak to Average Ratio

The peak-to-average ratio (PAR) of the transmission may not exceed 13dB.

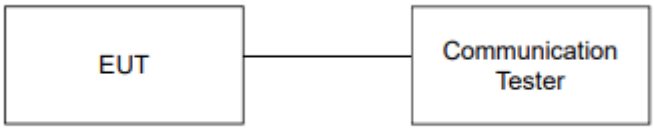
8 TEST SETUP

8.1 Maximum Output Power



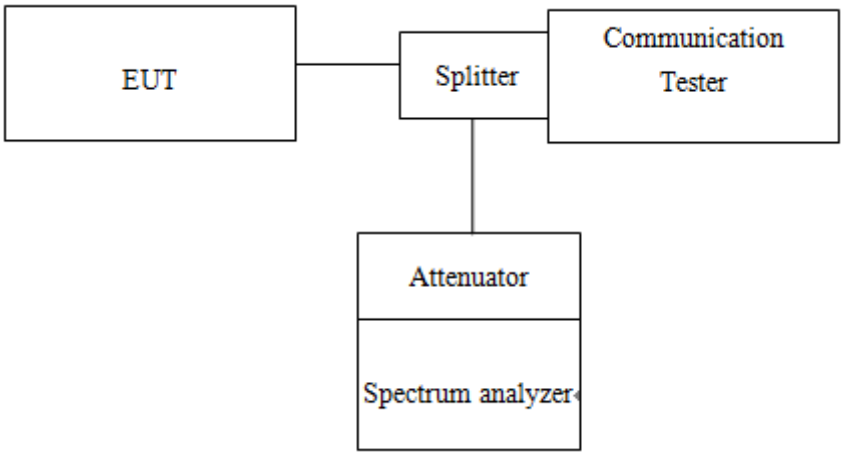
Note: *Measurement setup for testing on Antenna connector*

8.2 Occupied Bandwidth Measurement



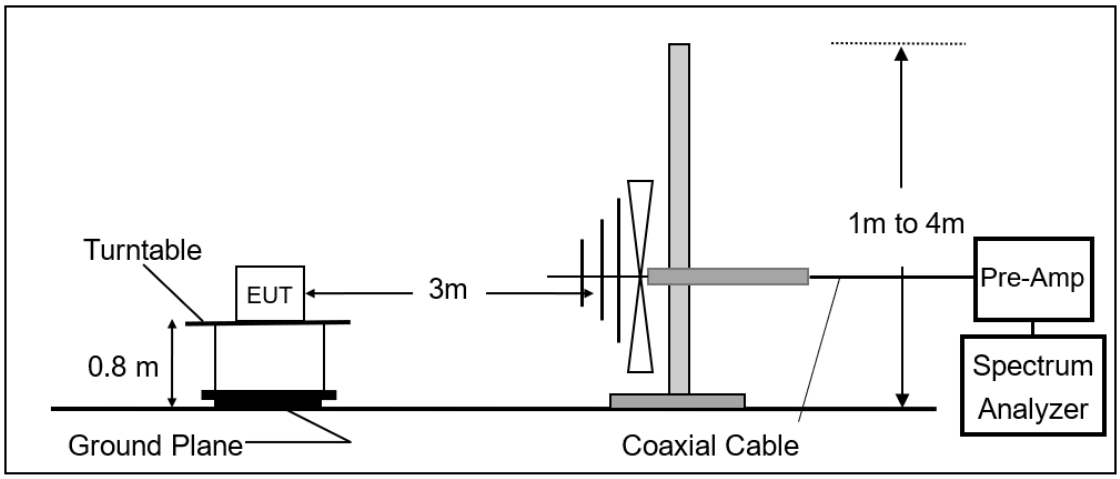
Note: *Measurement setup for testing on Antenna connector*

8.3 Out of Band Emission At Antenna Terminals

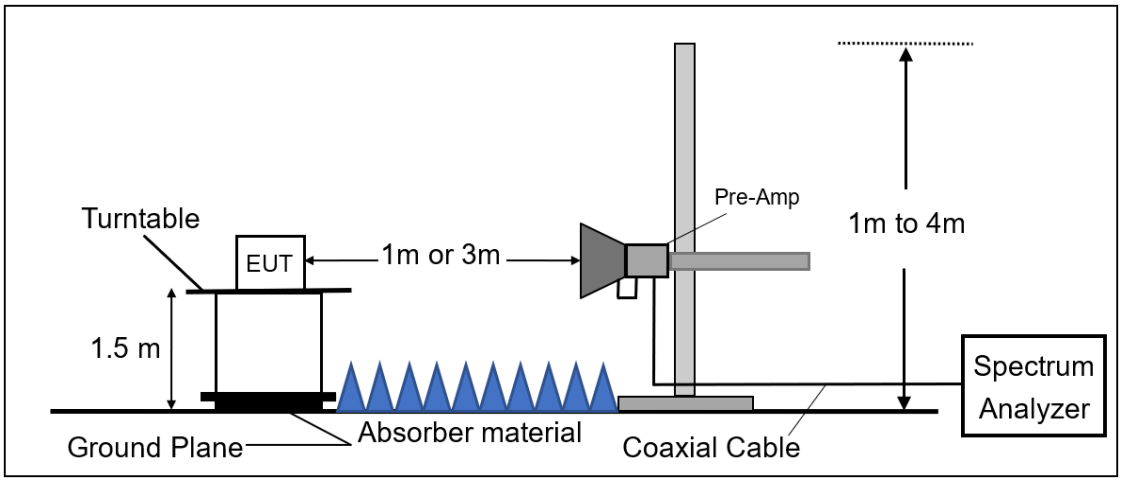


8.4 Field Strength of Spurious Radiation Measurement

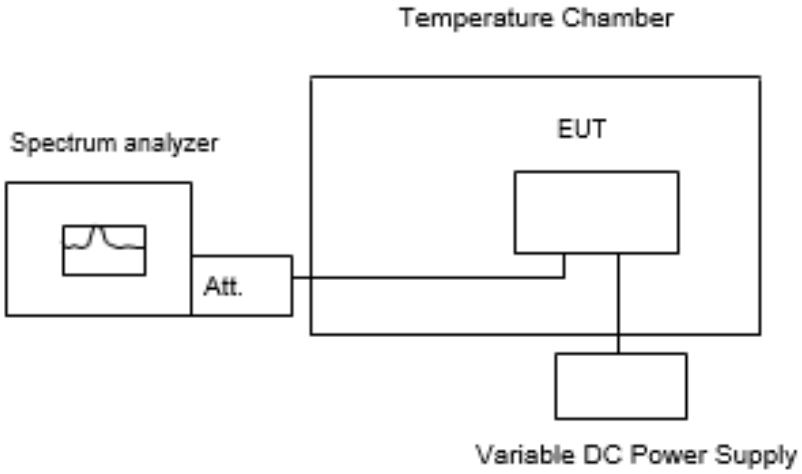
Radiated Emission Test Set-Up, Frequency From 30MHz to 1000MHz.



Radiated Emission Test Set-Up, Frequency Above 1GHz.

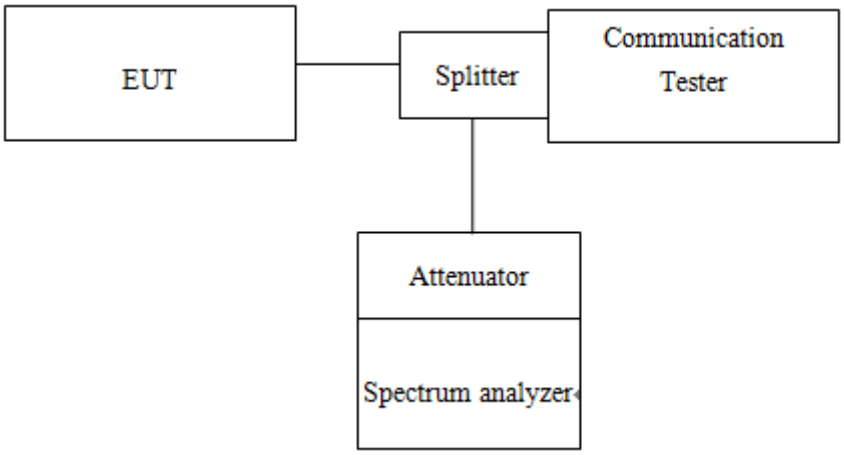


8.5 Frequency Stability Measurement



Note: *Measurement setup for testing on Antenna connector*

8.6 Peak To Average Ratio



9 TEST PROCEDURE

9.1 Maximum Output Power

9.1.1 Output Power Measurement Applicable Guideance

The transmitter output was connected to a communication tester. Transmitter output was read off the communication tester in dBm. The power output at the transmitter antenna port was determined by the communication tester reading.
KDB 971168 D01 Power Meas License Digital System as the supplemental test methodology to adjust the proper setting obtaining the measurement results.
All LTE bands conducted average power is obtained from the simulator telecommunication test set.

9.1.2 Determining ERP and/or EIRP from conducted RF output power measurements

According to KDB 412172 D01 Power Approach,

$EIRP = P_T + G_T - L_C$,

$ERP = EIRP - 2.15$,

Where:

ERP or EIRP	= effective radiated power or equivalent isotropically radiated power (expressed in the same units as PT, typically dBW, dBm, or power spectral density (PSD)2), relative to either a dipole antenna (ERP) or an isotropic antenna (EIRP);
P_T	= transmitter output power, expressed in dBW, dBm, or PSD;
G_T	= gain of the transmitting antenna, in dBd (ERP) or dBi (EIRP);
L_C	= signal attenuation in the connecting cable between the transmitter and antenna, in dB.

9.2 Occupied Bandwidth Measurement

99% &26dB Bandwidth with detector peak

The EUT's output RF connector was connected with a short cable to the spectrum analyzer, RBW was set to about 1% of emission BW, VBW= 3 times RBW, -26dBc display line was placed on the screen (or 26dB bandwidth), the occupied bandwidth is the delta frequency between the two points where the display line intersects the signal trace. Then set RBW to 99% bandwidth, RBW= 1%, VBW= 3 * RBW, with span > 2 * Signal BW, set % Power = 99%.

9.3 Out of Band Emission at Antenna Terminals

9.3.1 Conducted Emission

The RF output of the transceiver was connected to a spectrum analyzer through appropriate attenuation The resolution bandwidth of the spectrum analyzer was set at 1MHz, sufficient scans were taken to show the out of band Emissions if any up to 10th harmonic.

1. To connect Antenna Port of EUT to Spectrum.
2. Set RBW = 1MHz & VBW = 1MHz on Spectrum.
3. Allow trace to fully stabilize
4. Repeat above procedures until all default test channel measured were complete.

9.3.2 Band Edge

1. To connect Antenna Port of EUT to Spectrum.
2. The band edge of low and high channels for the highest RF powers was measured. Setting RBW ≥ 1% EBW.
3. Allow trace to fully stabilize
4. Repeat above procedures until all default test channel measured were complete.

9.4 Field Strength of Spurious Radiation Measurement

The EUT was placed on a non-conductive; the measurement antenna was placed at a distance of 3 meters from the EUT. During the tests, the antenna height and the EUT azimuth were varied in order to identify the maximum level of emissions from the EUT. This maximization process was repeated with the EUT positioned in each of its three orthogonal orientations.

The frequency range up to tenth harmonic was investigated for each of three fundamental frequencies (low, middle and high channels). Once spurious emission was identified, the power of the emission was determined using the substitution method.

The spurious emissions attenuation was calculated as the difference between radiated power at the fundamental frequency and the spurious emissions frequency.

ERP (dBm) = SG Level(dBm) + Antenna Gain(dBd) + Cable Loss(dB)

EIRP (dBm) = SG Level(dBm) + Antenna Gain(dBi) + Cable Loss(dB)

9.5 Frequency Stability Measurement

The equipment under test was connected to an external AC or DC power supply and input rated voltage. RF output was connected to a frequency counter or spectrum analyzer via feed through attenuators. The EUT was placed inside the temperature chamber. Set the spectrum analyzer RBW low enough to obtain the desired frequency resolution and measure EUT 25°C operating frequency as reference frequency. Turn EUT off and set the chamber temperature to –30°C. After the temperature stabilized for approximately 30 minutes recorded the frequency. Repeat step measure with 10°C increased per stage until the highest temperature of +50°C reached.

Set chamber temperature to 25℃. Use a variable AC power supply / DC power source to power the EUT and set the voltage to rated voltage. Set the spectrum analyzer RBW low enough to obtain the desired frequency resolution and recorded the frequency.
Reduce the input voltage to specify extreme voltage variation (+/- 15%) and endpoint as declared by the manufacturer, record the maximum frequency change.

9.6 Peak to Average Ratio

1. KDB 971168 D01 is employed as the following procedure is proper adjusted accordingly:
2. Set resolution/measurement bandwidth ≥ signal's occupied bandwidth; & internal =1ms
3. Set the number of counts to a value that stabilizes the measured CCDF curve.

10 MEASUREMENT RESULTS

Please refer to the Annex A-Measurement Results.

~End of Report~