ELECTROMAGNETIC EMISSIONS COMPLIANCE REPORT

Applicant:	Murata Electronics North America 3330 Cumberland Blvd SE #700, Atlanta, GA 30339
Manufacturer:	Murata Manufacturing Co. 1 Chome-10-1 Higashikotari, Nagaokakyo, Kyoto 617-0832, Japan
Product Name:	Type2GD
Brand Name:	Murata
Model No.:	LBAD0ZZ2GD
ISED PMN:	2GD
Report Number:	TERF2408002531ER
FCC ID	HSW-TY2GD
IC:	4492A-TY2GD
Date of EUT Received:	August 27, 2024
Date of Test:	August 28, 2024～October 16, 2024
Issue Date:	November 25, 2024

Approved By 

Marcus Tseng

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 & 24E & 27C & 90S and ISED RSS-Gen, 130, 132, 133, 139.

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
TERF2408002531ER	00	Original	Nov. 13, 2024	Candice Li	
TERF2408002531ER	01	Add the description for Section 4.1, item 3.	Nov. 25, 2024	Candice Li	

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:	Type2GD
Brand Name:	Murata
Model No.:	LBAD0ZZ2GD
Hardware Version:	ES1
Firmware Version:	BF_CORE_02_01_00_02_42951
EUT Series No.:	358419510001498
Power Supply:	3.6 Vdc
Test Software (Name/Version)	Connect with callbox

1.2 Frequency Range

CAT-M1 Band 2			
BW (MHz)	Operation Frequency (MHz)		
1.4	1850.7	-	1909.3
3	1851.5	-	1908.5
5	1852.5	-	1907.5
10	1855.0	-	1905.0
15	1857.5	-	1902.5
20	1860.0	-	1900.0

CAT-M1 Band 4			
BW (MHz)	Operation Frequency (MHz)		
1.4	1710.7	-	1754.3
3	1711.5	-	1753.5
5	1712.5	-	1752.5
10	1715.0	-	1750.0
15	1717.5	-	1747.5
20	1720.0	-	1745.0

CAT-M1 Band 5			
BW (MHz)	Operation Frequency (MHz)		
1.4	824.7	-	848.3
3	825.5	-	847.5
5	826.5	-	846.5
10	829.0	-	844.0

CAT-M1 Band 12			
BW (MHz)	Operation Frequency (MHz)		
1.4	699.7	-	715.3
3	700.5	-	714.5
5	701.5	-	713.5
10	704.0	-	711.0

CAT-M1 Band 13			
BW (MHz)	Operation Frequency (MHz)		
5	779.5	-	784.5
10	782.0		

CAT-M1 Band 17			
BW (MHz)	Operation Frequency (MHz)		
5	706.5	-	713.5
10	709.0	-	711.0

CAT-M1 Band 25			
BW (MHz)	Operation Frequency (MHz)		
1.4	1850.7	-	1914.3
3	1851.5	-	1913.5
5	1852.5	-	1912.5
10	1855.0	-	1910.0
15	1857.5	-	1907.5
20	1860.0	-	1905.0

CAT-M1 Band 26 Part 90			
BW (MHz)	Operation Frequency (MHz)		
1.4	814.7	-	823.3
3	815.5	-	822.5
5	816.5	-	821.5
10	819.0		

CAT-M1 Band 26			
BW (MHz)	Operation Frequency (MHz)		
1.4	824.7	-	848.3
3	825.5	-	847.5
5	826.5	-	846.5
10	829.0	-	844.0
15	831.5	-	841.5

CAT-M1 Band 66			
BW (MHz)	Operation Frequency (MHz)		
1.4	1710.7	-	1779.3
3	1711.5	-	1778.5
5	1712.5	-	1777.5
10	1715.0	-	1775.0
15	1717.5	-	1772.5
20	1720.0	-	1770.0

Note: Operation frequency 814~824MHz is diabled in Canada.

1.3 Antenna Designation

Antenna Type	Part No.	Antenna Model No.
Omni-Directional	T6140XX-AGDPU-S	Ant0
Note: Transmission frequencies in this test report are only available by the above antenna(s).		

Type	Modulation	Frequency (MHz)			Peak Antenna Gain (dBi)
					Ant0
Omni-Directional	Band 2	1850	~	1910	2
	Band 4	1710	~	1755	2
	Band 5	824	~	849	2
	Band 12	699	~	716	2
	Band 13	777	~	787	2
	Band 17	704	~	716	2
	Band 25	1850	~	1915	2
	Band 26	824	~	849	2
	Band 26 Part 90	814	~	824	2
	Band 66	1710	~	1780	2

Note: Antenna information is provided by the applicant.

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

CAT-M1 Band	BW	Frequency		Modulation	ERP / EIRP (dBm)		(W)	99%	Type of Emission
2	1.4	1850.7	1909.3	QPSK	24.94	EIRP	**0.312**	1.0758	1M08G7D
				16QAM	24.38	EIRP	0.274	1.0769	1M08D7W
2	3	1851.5	1908.5	QPSK	24.69	EIRP	0.294	1.0758	1M08G7D
				16QAM	24.23	EIRP	0.265	1.0780	1M08D7W
2	5	1852.5	1907.5	QPSK	24.83	EIRP	0.304	1.0866	1M09G7D
				16QAM	25.15	EIRP	0.327	1.0779	1M08D7W
2	10	1855.0	1905.0	QPSK	24.81	EIRP	0.303	1.0861	1M09G7D
				16QAM	25.13	EIRP	0.326	1.0857	1M09D7W
2	15	1857.5	1902.5	QPSK	24.83	EIRP	0.304	1.082	1M08G7D
				16QAM	25.35	EIRP	**0.343**	1.081	1M08D7W
2	20	1860.0	1900.0	QPSK	24.85	EIRP	0.305	1.084	1M08G7D
				16QAM	25.16	EIRP	0.328	1.087	1M09D7W
CAT-M1 Band	BW	Frequency		Modulation	ERP / EIRP (dBm)		(W)	99%	Type of Emission
4	1.4	1710.7	1754.3	QPSK	25.06	EIRP	**0.321**	1.0774	1M08G7D
				16QAM	24.68	EIRP	0.294	1.0772	1M08D7W
4	3	1711.5	1753.5	QPSK	25.02	EIRP	0.318	1.0773	1M08G7D
				16QAM	24.60	EIRP	0.288	1.0771	1M08D7W
4	5	1712.5	1752.5	QPSK	24.92	EIRP	0.310	1.0859	1M09G7D
				16QAM	25.38	EIRP	0.345	1.0800	1M08D7W
4	10	1715.0	1750.0	QPSK	24.98	EIRP	0.315	1.0882	1M09G7D
				16QAM	25.31	EIRP	0.340	1.0860	1M09D7W
4	15	1717.5	1747.5	QPSK	25.05	EIRP	0.320	1.0859	1M09G7D
				16QAM	25.41	EIRP	**0.348**	1.0842	1M08D7W
4	20	1720.0	1745.0	QPSK	24.94	EIRP	0.312	1.0880	1M09G7D
				16QAM	25.28	EIRP	0.337	1.0836	1M08D7W
CAT-M1 Band	BW	Frequency		Modulation	ERP / EIRP (dBm)		(W)	99%	Type of Emission
5	1.4	824.7	848.3	QPSK	22.72	ERP	**0.187**	1.0772	1M08G7D
				16QAM	22.30	ERP	0.170	1.0773	1M08D7W
5	3	825.5	847.5	QPSK	22.43	ERP	0.175	1.0751	1M08G7D
				16QAM	22.07	ERP	0.161	1.0756	1M08D7W
5	5	826.5	846.5	QPSK	22.56	ERP	0.180	1.0819	1M08G7D
				16QAM	22.93	ERP	0.196	1.0806	1M08D7W
5	10	829.0	844.0	QPSK	22.56	ERP	0.180	1.0808	1M08G7D
				16QAM	22.97	ERP	**0.198**	1.0865	1M09D7W

CAT-M1 Band	BW	Frequency		Modulation	ERP / EIRP (dBm)		(W)	99%	Type of Emission
12	1.4	699.7	715.3	QPSK	22.79	ERP	**0.190**	1.0733	1M07G7D
				16QAM	22.18	ERP	0.165	1.0746	1M07D7W
12	3	700.5	714.5	QPSK	22.68	ERP	0.185	1.0756	1M08G7D
				16QAM	22.10	ERP	0.162	1.0758	1M08D7W
12	5	701.5	713.5	QPSK	22.50	ERP	0.178	1.0823	1M08G7D
				16QAM	22.91	ERP	0.195	1.0792	1M08D7W
12	10	704.0	711.0	QPSK	22.53	ERP	0.179	1.0866	1M09G7D
				16QAM	23.02	ERP	**0.200**	1.0846	1M08D7W
CAT-M1 Band	BW	Frequency		Modulation	ERP / EIRP (dBm)		(W)	99%	Type of Emission
13	5	779.5	784.5	QPSK	22.62	ERP	0.183	1.0848	1M08G7D
				16QAM	22.98	ERP	**0.199**	1.0806	1M08D7W
13	10	782.0	782.0	QPSK	22.68	ERP	**0.185**	1.0785	1M08G7D
				16QAM	22.94	ERP	0.197	1.0865	1M09D7W
CAT-M1 Band	BW	Frequency		Modulation	ERP / EIRP (dBm)		(W)	99%	Type of Emission
25	1.4	1850.7	1914.3	QPSK	24.98	EIRP	**0.315**	1.0768	1M08G7D
				16QAM	24.50	EIRP	0.282	1.0780	1M08D7W
25	3	1851.5	1913.5	QPSK	24.93	EIRP	0.311	1.0772	1M08G7D
				16QAM	24.24	EIRP	0.265	1.0779	1M08D7W
25	5	1852.5	1912.5	QPSK	24.78	EIRP	0.301	1.0902	1M09G7D
				16QAM	25.17	EIRP	**0.329**	1.0805	1M08D7W
25	10	1855.0	1910.0	QPSK	24.77	EIRP	0.300	1.0802	1M08G7D
				16QAM	25.14	EIRP	0.327	1.0859	1M09D7W
25	15	1857.5	1907.5	QPSK	24.84	EIRP	0.305	1.0890	1M09G7D
				16QAM	25.16	EIRP	0.328	1.0848	1M08D7W
25	20	1860.0	1905.0	QPSK	24.83	EIRP	0.304	1.0865	1M09G7D
				16QAM	25.17	EIRP	**0.329**	1.0838	1M08D7W
CAT-M1 Band	BW	Frequency		Modulation	Conducted (dBm)		(W)	99%	Type of Emission
26 Part	1.4	814.7	823.3	QPSK	22.72	ERP	**0.187**	1.0772	1M08G7D
				16QAM	22.20	ERP	0.166	1.0788	1M08D7W
26 Part	3	815.5	822.5	QPSK	22.47	ERP	0.177	1.0740	1M07G7D
				16QAM	22.72	ERP	0.187	1.0769	1M08D7W
26 Part	5	816.5	821.5	QPSK	22.53	ERP	0.179	1.0835	1M08G7D
				16QAM	22.94	ERP	**0.197**	1.0801	1M08D7W
26 Part	10	819.0	819.0	QPSK	22.41	ERP	0.174	1.0724	1M07G7D
				16QAM	22.40	ERP	0.174	1.0826	1M08D7W

CAT-M1 Band	BW	Frequency		Modulation	ERP / EIRP (dBm)		(W)	99%	Type of Emission
26	1.4	824.7	848.3	QPSK	22.80	ERP	**0.191**	1.0791	1M08G7D
				16QAM	22.33	ERP	0.171	1.0747	1M07D7W
26	3	825.5	847.5	QPSK	22.54	ERP	0.179	1.0725	1M07G7D
				16QAM	22.10	ERP	0.162	1.0757	1M08D7W
26	5	826.5	846.5	QPSK	22.63	ERP	0.183	1.0872	1M09G7D
				16QAM	22.94	ERP	0.197	1.0798	1M08D7W
26	10	829.0	844.0	QPSK	22.65	ERP	0.184	1.0818	1M08G7D
				16QAM	22.90	ERP	0.195	1.0863	1M09D7W
26	15	831.5	841.5	QPSK	22.63	ERP	0.183	1.0902	1M09G7D
				16QAM	23.00	ERP	**0.200**	1.0837	1M08D7W
CAT-M1 Band	BW	Frequency		Modulation	ERP / EIRP (dBm)		(W)	99%	Type of Emission
66	1.4	1710.7	1779.3	QPSK	25.16	EIRP	0.328	1.0740	1M07G7D
				16QAM	24.90	EIRP	0.309	1.0772	1M08D7W
66	3	1711.5	1778.5	QPSK	25.08	EIRP	0.322	1.0765	1M08G7D
				16QAM	24.68	EIRP	0.294	1.0785	1M08D7W
66	5	1712.5	1777.5	QPSK	25.14	EIRP	0.327	1.0827	1M08G7D
				16QAM	25.48	EIRP	0.353	1.0824	1M08D7W
66	10	1715.0	1775.0	QPSK	25.08	EIRP	0.322	1.0888	1M09G7D
				16QAM	25.47	EIRP	0.352	1.0844	1M08D7W
66	15	1717.5	1772.5	QPSK	25.17	EIRP	**0.329**	1.0801	1M08G7D
				16QAM	25.48	EIRP	0.353	1.0872	1M09D7W
66	20	1720.0	1770.0	QPSK	25.17	EIRP	**0.329**	1.0810	1M08G7D
				16QAM	25.51	EIRP	**0.356**	1.0859	1M09D7W

1.5 Test Methodology of Applied Standards

FCC 47 CFR Part 2, 22H, 24E, 27C, Part 90.
ISED RSS-GEN Issue 5 Amendment 2 Feb. 2021
ISED RSS-130 Issue 2 Feb. 2019,
ISED RSS-132 Issue 4 Jan. 2023
ISED RSS-133 Issue 7,
ISED RSS-139 Issue 4 Amendment Oct. 2022
ANSI C63.26-2015
KDB971168 D01 Power Meas license Digital System v03r01
TS 151 010-1 is used to set, and measure the output power.

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:

CAT-M1 Band 2

Test mode	DC voltage (V)	DC current (mA)
CAT-M1 Band 2_20M QPSK	3.6	172

CAT-M1 Band 4

Test mode	DC voltage (V)	DC current (mA)
CAT-M1 Band 4_20M QPSK	3.6	153

LTE Band 5

Test mode	DC voltage (V)	DC current (mA)
LTE Band 5_10M QPSK	3.6	167

CAT-M1 Band 12

Test mode	DC voltage (V)	DC current (mA)
CAT-M1 Band 12_10M	3.6	168

CAT-M1 Band 13

Test mode	DC voltage (V)	DC current (mA)
CAT-M1 Band 13_10M	3.6	159

CAT-M1 Band 25

Test mode	DC voltage (V)	DC current (mA)
CAT-M1 Band 25_20M	3.6	166

CAT-M1 Band 26 for Part 90S

Test Mode	DC voltage (V)	DC current (mA)
CAT-M1 Band 26_10M	3.6	170

LTE Band 26

Test mode	DC voltage (V)	DC current (mA)
LTE Band 26_15M QPSK	3.6	159

CAT-M1 Band 66

Test mode	DC voltage (V)	DC current (mA)
CAT-M1 Band 66_20M	3.6	164

2.6 Test Configuration

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

2.6.1 Equipment used for test

Radiated Emission Test Site: SAC 3					
EQUIPMENT TYPE	MFR	MODEL NUMBER	SERIAL NUMBER	LAST CAL.	CAL DUE.
Notebook	Lenovo	L480	PF-1D07MD 19/08	N/A	N/A

3 SUMMARY OF TEST RESULTS

FCC Rules	IC Rules	Description Of Test	Result
§2.1046(a)	RSS-GEN §6.12	RF Power Output	Compliant
§22.913(a)(5) §24.232(c) §27.50(b)(9)(10) §27.50(c)(9)(10) §27.50(d)(4) §90.635	RSS-130 §4.6 RSS-132 §5.4 RSS-133 §5.5 RSS-139 §5.5	ERP/ EIRP measurement	Compliant
§2.1049(h)	RSS-GEN §6.7	99% & 26dB Occuupied Bandwidth	Compliant
§2.1051 §22.917(a) §24.238(a) §27.50(c)(5) §27.53(c)(2),(4) §27.53(g) §27.53(h) §90.691	RSS-GEN §6.13 RSS-130 §4.7 RSS-132 §5.5 RSS-133 §5.6 RSS-139 §5.6	Out of Band Emissions at Antenna Terminals and Band Edge / Emission mask requirements	Compliant
§2.1053 §22.917(a) §24.238(a) §27.53(c)(2),(4) §27.50(c)(5) §27.53(f) §27.53(g) §27.53(h) §90.691(a)(1)(2)	RSS-GEN §6.13 RSS-130 §4.7 RSS-132 §5.5 RSS-133 §5.6 RSS-139 §5.6	Field Strength of Spurious Radiation	Compliant
§22.913(d) §24.232(d) §27.50(a)(1)(B) §27.50(d)(5)	RSS-130 §4.6.1 RSS-132 §5.4 RSS-133 §5.5 RSS-139 §5.5	Peak to Average Ratio	Compliant
§2.1055(a)(1) §22.355 §24.235 §27.54	RSS-130 §4.5 RSS-132 §5.3 RSS-133 §5.4 RSS-139 §5.4	Frequency Stability	Compliant

4 DESCRIPTION OF TEST MODES

4.1 The Worst Test Modes and Configuration

1. The EUT has been tested under operating condition.
2. 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.
3. The LTE power of B17 is the same as that of B12, so the test items will be covered by B12.

Test Items	Max. Output Power														
Band	Test Channel			Bandwidth (MHz)						Modulation		RB #		
	L	M	H	1.4	3	5	10	15	20	QPSK	16QAM	1	Half	Full
2	v	v	v	v	v	v	v	v	v	v	v	v	v	v
4	v	v	v	v	v	v	v	v	v	v	v	v	v	v
5	v	v	v	v	v	v	v	-	-	v	v	v	v	v
12	v	v	v	v	v	v	v	-	-	v	v	v	v	v
13	v	v	v	-	-	v	v	-	-	v	v	v	v	v
25	v	v	v	v	v	v	v	v	v	v	v	v	v	v
26	v	v	v	v	v	v	v	v	-	v	v	v	v	v
26 P90	v	v	v	v	v	v	v	-	-	v	v	v	v	v
66	v	v	v	v	v	v	v	v	v	v	v	v	v	v
Test Items	Freqency Stability														
2	-	v	-	-	-	-	v	-	-	v	-	-	-	v
4	-	v	-	-	-	-	v	-	-	v	-	-	-	v
5	-	v	-	-	-	-	v	-	-	v	-	-	-	v
12	-	v	-	-	-	-	v	-	-	v	-	-	-	v
13	-	v	-	-	-	-	v	-	-	v	-	-	-	v
25	-	v	-	-	-	-	v	-	-	v	-	-	-	v
26	-	v	-	-	-	-	v	-	-	v	-	-	-	v
26 P90	-	v	-	-	-	-	v	-	-	v	-	-	-	v
66	-	v	-	-	-	-	v	-	-	v	-	-	-	v
71	-	v	-	-	-	-	v	-	-	v	-	-	-	v
Test Items	26dB and 99% Bandwidth														
Band	Test Channel			Bandwidth (MHz)						Modulation		RB #		
	L	M	H	1.4	3	5	10	15	20	QPSK	16QAM	1	Half	Full
2	v	v	v	v	v	v	v	v	v	v	v	-	-	v
4	v	v	v	v	v	v	v	v	v	v	v	-	-	v
5	v	v	v	v	v	v	v	-	-	v	v	-	-	v
12	v	v	v	v	v	v	v	-	-	v	v	-	-	v
13	v	v	v	-	-	v	v	-	-	v	v	-	-	v
25	v	v	v	v	v	v	v	v	v	v	v	-	-	v
26	v	v	v	v	v	v	v	v	-	v	v	-	-	v
26 P90	v	v	v	v	v	v	v	-	-	v	v	-	-	v
66	v	v	v	v	v	v	v	v	v	v	v	-	-	v
Test Items	Peak-to-Av erage Ratio														
2	v	v	v	v	v	v	v	v	v	v	v	-	-	v
4	v	v	v	v	v	v	v	v	v	v	v	-	-	v
5	v	v	v	v	v	v	v	-	-	v	v	-	-	v
12	v	v	v	v	v	v	v	-	-	v	v	-	-	v
13	v	v	v	-	-	v	v	-	-	v	v	-	-	v
25	v	v	v	v	v	v	v	v	v	v	v	-	-	v
26	v	v	v	v	v	v	v	v	-	v	v	-	-	v
26 P90	v	v	v	v	v	v	v	-	-	v	v	-	-	v
66	v	v	v	v	v	v	v	v	v	v	v	-	-	v

Test Items	Band Edge													
Band	Test Channel			Bandwidth (MHz)						Modulation		RB #		
	L	M	H	1.4	3	5	10	15	20	QPSK	16QAM	1	Half	Full
2	V	-	V	V	V	V	V	V	V	V	-	V	V	V
4	V	-	V	V	V	V	V	V	V	V	-	V	V	V
5	V	-	V	V	V	V	V	-	-	V	-	V	V	V
12	V	-	V	V	V	V	V	-	-	V	-	V	V	V
13	V	-	V	-	-	V	V	-	-	V	-	V	V	V
25	V	-	V	V	V	V	V	V	V	V	-	V	V	V
26	V	-	V	V	V	V	V	V	-	V	-	V	V	V
26 P90	V	-	V	V	V	V	V	-	-	V	-	V	V	V
66	V	-	V	V	V	V	V	V	V	V	-	V	V	V

Test Items	Conducted Emission													
2	V	V	V	V	V	V	V	V	V	V	-	V	-	-
4	V	V	V	V	V	V	V	V	V	V	-	V	-	-
5	V	V	V	V	V	V	V	-	-	V	-	V	-	-
12	V	V	V	V	V	V	V	-	-	V	-	V	-	-
13	V	V	V	-	-	V	V	-	-	V	-	V	-	-
25	V	V	V	V	V	V	V	V	V	V	-	V	-	-
26	V	V	V	V	V	V	V	V	-	V	-	V	-	-
26 P90	V	V	V	V	V	V	V	-	-	V	-	V	-	-
66	V	V	V	V	V	V	V	V	V	V	-	V	-	-

Test Items	Radiated Emission													
Band	Test Channel			Bandwidth (MHz)						Modulation		RB #		
	L	M	H	1.4	3	5	10	15	20	QPSK	16QAM	1	Half	Full
2	V	V	V	-	-	-	-	V	-	-	V	V	-	-
4	V	V	V	-	-	-	-	V	-	-	V	V	-	-
5	V	V	V	-	-	-	V	-	-	-	V	V	-	-
12	V	V	V	-	-	-	V	-	-	-	V	V	-	-
13	V	V	V	-	-	V	-	-	-	-	V	V	-	-
25	V	V	V	-	-	-	-	-	V	-	V	V	-	-
26	V	V	V	-	-	-	-	V	-	-	V	V	-	-
26 P90	V	V	V	-	-	V	-	-	-	-	V	V	-	-
66	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.
Attenuator	Mini-Circuits	BW-S10W2+	12	12/12/2023	12/11/2024
DC Block	Mini-Circuits	BLK-18-S+	12	12/12/2023	12/11/2024
DC Power Supply	Gwinstek	SPS-3610	GEW902152	01/18/2024	01/17/2025
Spectrum Analyzer	KEYSIGHT	N9010A	MY57120290	04/10/2024	04/09/2025
Radio Communication Analyzer	Anritsu	MT8821C	6261786084	01/16/2024	01/15/2025
Splitter	RF-LAMBDA	RFLT2W1G18G	11-JSPF412-018	12/12/2023	12/11/2024
Temperature Chamber	Giant Force	GTH-150-40-CP-AR	MAA0512-018	06/05/2024	06/04/2025
Test Software	SGS	Radio Test Software	Ver. 21	N.C.R	N.C.R

6.2 Radiated Measurement

Radiated Emission Test Site: SAC 3					
EQUIPMENT TYPE	MFR	MODEL NUMBER	SERIAL NUMBER	LAST CAL.	CAL DUE.
1.3G High Pass Filter	Woken	WHKX10-1066	20	12/12/2023	12/11/2024
3.1G High Pass Filter	Woken	WFIL-H3100-18000F-01	WRGBAFWC2B6	12/12/2023	12/11/2024
Band Reject Filter 1700-2000	EWT	EWT-54-0038	M1	12/12/2023	12/11/2024
Band Reject Filter 635-920	Titan	T04N63592050S01	23040703-4	12/12/2023	12/11/2024
Bi-log Antenna	SCHWARZBECK	VULB9168	1208	07/17/2024	07/16/2025
Bi-log Antenna	SCHWARZBECK	VULB9168	378	08/09/2024	08/08/2025
Coaxial Cables	EMCI+Huber Suhner	EMC107-SM-SM-1000 +SUCOFLEX 104PEA +EMC107-SM-SM-1500 +SUCOFLEX 106	RX Cable 9K-18G (221110+MY4251/4PEA+221106+76096/6)	08/30/2024	08/29/2025
Coaxial Cables	Huber Suhner	SUCOFLEX 102	RX Cable 18G-40G MY2630/2+805062/2	08/30/2024	08/29/2025
Coaxial Cables	Huber Suhner	SUCOFLEX 102+SUCOFLEX 106	TX Cable 30M-40G 23051/2+76096/6+22962/2	08/30/2024	08/29/2025
EXA Spectrum Analyzer	KEYSIGHT	N9010B	MY63440386	02/06/2024	02/05/2025
Horn Antenna	RF SPIN	DRH0844	LE2D05A0844	07/10/2024	07/09/2025
Horn Antenna	SCHWARZBECK	BBHA9120D	1441	09/23/2024	09/22/2025
Horn Antenna	SCHWARZBECK	BBHA9120D	603	05/15/2024	05/14/2025
Horn Antenna	SCHWARZBECK	BBHA9170	184	12/28/2023	12/27/2024
Network Analyzer	Anritsu	MS4644A	1216312	12/07/2023	12/06/2024
Pre-Amplifier	EMCI	EMC118A45SEE	980868	08/30/2024	08/29/2025
Pre-Amplifier	EMCI	EMC184045SEE	9080939	08/30/2024	08/29/2025
Pre-Amplifier	HP	8447D	2944A07676	08/30/2024	08/29/2025
Radio Communication Analyzer	Anritsu	MT8821C	6262044751	10/31/2023	10/30/2024
Site Cal	SGS	SAC 3	N/A	08/30/2024	08/29/2025
Test Software	Audix	e3	Ver. 9.210616	N.C.R	N.C.R

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

7 MAXIMUM OUTPUT POWER

7.1 Standard Applicable

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.

7.2 FCC 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 24.232(c)

Mobile and portable stations are limited to 2 W EIRP.

FCC 27.50 (b)

(9) Control stations and mobile stations transmitting in the 746-757 MHz, 776-788 MHz, and 805-806 MHz bands are limited to 30 watts ERP.

(10) Portable stations (hand-held devices) transmitting in the 746-757 MHz, 776-788 MHz, and 805-806 MHz bands are limited to 3 watts ERP.

FCC 27.50(c)

(9) Control and mobile stations in the 698-746 MHz band are limited to 30 watts ERP.

(10) Portable stations (hand-held devices) are limited to 3 watts ERP.

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 90.635(b)

Mobile station is limited to 100W ERP

RSS-130 §4.6

The e.r.p. shall not exceed 3 watts for mobile equipment, fixed subscriber equipment and portable equipment operating in the Band 617-652 and 663-698MHz.

RSS-132 §5.4

The transmitter output power shall be measured in terms of average power. The equivalent radiated power (e.r.p.) shall not exceed 7 watts for mobile equipment and 3 watts for portable equipment.

The effective isotropic radiated power (e.i.r.p.) shall not exceed the limits specified in SRSP-503 for base station equipment.

RSS-133 §5.5

The maximum power spectral density of the equipment, measured in terms of average values, shall comply with the limits specified in table 2. These limits are either specified in terms of equivalent isotropically radiated power (e.i.r.p.) or TRP for the purpose of certification and may not apply to all deployment scenarios. Consult SRSP-510 for more deployment details in the bands 1850-1915 MHz and 1930-1995 MHz. AAS equipment with eight antenna elements or less can demonstrate compliance with the e.i.r.p limit specified for non-AAS equipment in table 2, instead of the TRP limit.

Table 2: Maximum power spectral density of equipment

Equipment type	Maximum power spectral density
Non-AAS fixed station and base station	3280 W/MHz e.i.r.p
AAS fixed station and base station	46 dBm/MHz TRP
Subscriber equipment	2 W /channel bandwidth e.i.r.p

RSS-139 §5.5

The maximum output power of the equipment shall comply with the limits specified below. In the tables, maximum power refers to the equivalent isotropically radiated power (e.i.r.p.) or total radiated power (TRP), measured in terms of average values.

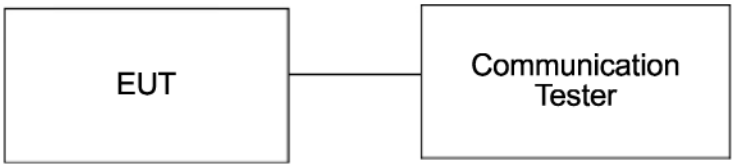
The limits in this RSS are specified for the purpose of certification and may not apply to all deployment scenarios. Consult SRSP-513 and SRSP-519 for more details on the bands 2110-2180 MHz and 2180-2200 MHz respectively.

Table 3: Maximum power of equipment in the band 1710-1780 MHz	
Equipment type	**Maximum power**
Fixed station and base station	30 dBm e.i.r.p./channel bandwidth
Subscriber equipment	30 dBm e.i.r.p./channel bandwidth

Table 4: Maximum power of equipment in the band 2110-2180 MHz	
Equipment type	**Maximum power**
Non-AAS fixed station and base station	65 dBm e.i.r.p./MHz
AAS fixed station and base station	46 dBm TRP/MHz
Subscriber equipment	30 dBm e.i.r.p./channel bandwidth

Table 5: Maximum power of equipment in the band 2180-2200 MHz	
Equipment type	Maximum power
Non-AAS base station	65 dBm e.i.r.p./MHz
AAS base station	46 dBm TRP/MHz

7.3 Test Set-up



Note: *Measurement setup for testing on Antenna connector*

7.4 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.

The Procedure of KDB941225 (SAR Measurement Procedures for 3G devices, (WCDMA/HSPA) was used for EUT and Base station setting. RMC 12.2kps is used for this testing, and KDB 971168 D01 Power Meas License Digital System as the supplemental test methodology to adjust the proper setting obtaining the measurement results.WAll bands conducted average power is obtained from the simulator telecommunication test set.

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

ERP/EIRP = PMeas + GT-LC

Where:

ERP/EIRP	= effective or equivalent radiated power, respectively (expressed in the same units as PMeas, typically dBW or dBm);
PMeas	= measured transmitter output power or PSD, in dBm or dBW;
GT	= gain of the transmitting antenna, in dBd (ERP) or dBi (EIRP)
LC	= signal attenuation in the connecting cable between the transmitter and antenna, in dB.2

For devices utilizing multiple antennas, KDB 662911 provides guidance for determining the effective array transmit antenna gain term to be used in the above equation.

7.6 Measurement Result

Antenna gain (dBi) 2

CAT-M1 Band 2_Uplink frequency band : 1850 to 1910 MHz										
BW (MHz)	UL Channel	Frequency (MHz)	Modulation	RB allocation	RB Start	Index	Conducted Average (dBm)	EIRP Average (dBm)	EIRP Limit (dBm)	Margin (dB)
1.4	18607	1850.7	QPSK	1	0	0	22.94	**24.94**	33	-8.06
				6	0	0	20.17	22.17	33	-10.83
	18900	1880	QPSK	1	0	0	22.86	24.86	33	-8.14
				6	0	0	21.28	23.28	33	-9.72
	19193	1909.3	QPSK	1	5	0	22.68	24.68	33	-8.32
				6	0	0	21.10	23.10	33	-9.90
	18607	1850.7	16QAM	1	0	0	21.22	23.22	33	-9.78
				6	0	0	21.22	23.22	33	-9.78
	18900	1880	16QAM	1	0	0	22.28	24.28	33	-8.72
				6	0	0	21.16	23.16	33	-9.84
	19193	1909.3	16QAM	1	5	0	22.38	**24.38**	33	-8.62
				6	0	0	21.24	23.24	33	-9.76

Antenna gain (dBi) 2

CAT-M1 Band 2_Uplink frequency band : 1850 to 1910 MHz										
BW (MHz)	UL Channel	Frequency (MHz)	Modulation	RB allocation	RB Start	Index	Conducted Average (dBm)	EIRP Average (dBm)	EIRP Limit (dBm)	Margin (dB)
3	18615	1851.5	QPSK	1	0	0	22.66	24.66	33	-8.34
				6	0	0	21.03	23.03	33	-9.97
	18900	1880	QPSK	1	0	0	22.60	24.60	33	-8.40
				6	0	0	21.03	23.03	33	-9.97
	19185	1908.5	QPSK	1	5	1	22.69	**24.69**	33	-8.31
				6	0	1	20.96	22.96	33	-10.04
	18615	1851.5	16QAM	1	0	0	22.11	24.11	33	-8.89
				6	0	0	21.06	23.06	33	-9.94
	18900	1880	16QAM	1	0	0	22.09	24.09	33	-8.91
				6	0	0	21.01	23.01	33	-9.99
	19185	1908.5	16QAM	1	5	1	22.23	**24.23**	33	-8.77
				6	0	1	21.05	23.05	33	-9.95

Antenna gain (dBi) 2

CAT-M1 Band 2_Uplink frequency band : 1850 to 1910 MHz										
BW (MHz)	UL Channel	Frequency (MHz)	Modulation	RB allocation	RB Start	Index	Conducted Average (dBm)	EIRP Average (dBm)	EIRP Limit (dBm)	Margin (dB)
5	18625	1852.5	QPSK	1	0	0	22.81	24.81	33	-8.19
				6	0	0	22.11	24.11	33	-8.89
	18900	1880	QPSK	1	0	0	22.77	24.77	33	-8.23
				6	0	0	22.13	24.13	33	-8.87
	19175	1907.5	QPSK	1	5	3	22.83	**24.83**	33	-8.17
				6	0	3	22.03	24.03	33	-8.97
	18625	1852.5	16QAM	1	0	0	23.15	**25.15**	33	-7.85
				6	0	0	21.02	23.02	33	-9.98
	18900	1880	16QAM	1	0	0	23.03	25.03	33	-7.97
				6	0	0	21.01	23.01	33	-9.99
	19175	1907.5	16QAM	1	5	3	23.15	**25.15**	33	-7.85
				6	0	3	21.03	23.03	33	-9.97

Antenna gain (dBi) 2

CAT-M1 Band 2_Uplink frequency band : 1850 to 1910 MHz										
BW (MHz)	UL Channel	Frequency (MHz)	Modulation	RB allocation	RB Start	Index	Conducted Average (dBm)	EIRP Average (dBm)	EIRP Limit (dBm)	Margin (dB)
10	18650	1855	QPSK	1	0	0	22.55	24.55	33	-8.45
				6	0	0	22.03	24.03	33	-8.97
	18900	1880	QPSK	1	0	0	22.74	24.74	33	-8.26
				6	0	0	22.14	24.14	33	-8.86
	19150	1905	QPSK	1	5	7	22.81	**24.81**	33	-8.19
				6	0	7	22.10	24.10	33	-8.90
	18650	1855	16QAM	1	0	0	23.02	25.02	33	-7.98
				6	0	0	21.12	23.12	33	-9.88
	18900	1880	16QAM	1	0	0	23.03	25.03	33	-7.97
				6	0	0	21.06	23.06	33	-9.94
	19150	1905	16QAM	1	5	7	23.13	**25.13**	33	-7.87
				6	0	7	21.02	23.02	33	-9.98

Antenna gain (dBi) 2

CAT-M1 Band 2_Uplink frequency band : 1850 to 1910 MHz										
BW (MHz)	UL Channel	Frequency (MHz)	Modulation	RB allocation	RB Start	Index	Conducted Average (dBm)	EIRP Average (dBm)	EIRP Limit (dBm)	Margin (dB)
15	18675	1857.5	QPSK	1	0	0	22.79	24.79	33	-8.21
				6	0	0	22.64	24.64	33	-8.36
	18900	1880	QPSK	1	0	0	22.83	**24.83**	33	-8.17
				6	0	0	22.74	24.74	33	-8.26
	19125	1902.5	QPSK	1	5	11	22.82	24.82	33	-8.18
				6	0	11	22.66	24.66	33	-8.34
	18675	1857.5	16QAM	1	0	0	23.35	**25.35**	33	-7.65
				6	0	0	22.78	24.78	33	-8.22
	18900	1880	16QAM	1	0	0	23.31	25.31	33	-7.69
				6	0	0	22.68	24.68	33	-8.32
	19125	1902.5	16QAM	1	5	11	23.05	25.05	33	-7.95
				6	0	11	22.64	24.64	33	-8.36

Antenna gain (dBi) 2

CAT-M1 Band 2_Uplink frequency band : 1850 to 1910 MHz										
BW (MHz)	UL Channel	Frequency (MHz)	Modulation	RB allocation	RB Start	Index	Conducted Average (dBm)	EIRP Average (dBm)	EIRP Limit (dBm)	Margin (dB)
20	18700	1860	QPSK	1	0	0	22.80	24.80	33	-8.20
				6	0	0	22.81	24.81	33	-8.19
	18900	1880	QPSK	1	0	0	22.67	24.67	33	-8.33
				6	0	0	22.64	24.64	33	-8.36
	19100	1900	QPSK	1	5	15	22.85	**24.85**	33	-8.15
				6	0	15	22.68	24.68	33	-8.32
	18700	1860	16QAM	1	0	0	23.15	25.15	33	-7.85
				6	0	0	22.72	24.72	33	-8.28
	18900	1880	16QAM	1	0	0	23.12	25.12	33	-7.88
				6	0	0	22.65	24.65	33	-8.35
	19100	1900	16QAM	1	5	15	23.16	**25.16**	33	-7.84
				6	0	15	22.70	24.70	33	-8.30