

RF EXPOSURE 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

FCC ID HSW-TY2GD

IC: 4492A-TY2GD

Date of EUT Received: Aug. 27, 2024

Issue Date: Nov. 25, 2024

Approved By

John Yeh

We hereby certify that:

The above equipment was evaluated by SGS Taiwan Ltd. The evaluation in this report is in compliance with FCC Rule Part §2.1091, KDB 447498 D01 v06 and RSS-102 issue 6.

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

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Revision History

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TESA2408000523ES	00	Original	Nov. 06, 2024	Cindy Chou	
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Note:

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

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1 DESCRIPTION OF EQUIPMENT UNDER TEST (EUT)

1.1 Product Description

Product Name:	Type2GD
Brand Name:	Murata
Model No.:	LBAD0ZZ2GD

1.2 Evaluation site

Laboratory	Site Address		FCC Designation number	ISED Company Number	CAB Identifier
SGS Taiwan Ltd. Central RF Lab. (TAF code 3702)	<input checked="" type="checkbox"/>	No. 134, Wu Kung Road, New Taipei Industrial Park, Wuku District, New Taipei City, 24803, Taiwan.	TW0027	4620A	TW3702
	<input type="checkbox"/>	No. 2, Keji 1st Rd., Guishan Township, Taoyuan County, 333 Taiwan.	TW0028	4620E	
	<input type="checkbox"/>	1F, No. 8, Alley 15, Lane 120, Sec. 1, Nei Hu Road, Neihu District, Taipei City, 222 Taiwan.	TW0029	23862	

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2 MAXIMUM PERMISSIBLE EXPOSURE (MPE)

2.1 FCC Standard Applicable

According to §1.1307(b)(1), systems operating under the provisions of this section shall be operated in a manner that ensure that the public is not exposed to radio frequency energy level in excess of the Commission's guideline.

This is a Mobile device, the MPE is required.

According to §1.1310 and §2.1091 RF exposure is calculated.

Limits for Maximum Permissible Exposure (MPE)

Frequency Range (MHz)	Electric Field Strength (V/m)	Magnetic Field Strength (A/m)	Power Density (mW/cm ²)	Averaging Time (minute)
Limits for General Population/Uncontrolled Exposure				
0.3-1.34	614	1.63	*(100)	30
1.34-30	824/f	2.19/f	*(180/f ²)	30
30-300	27.5	0.073	0.2	30
300-1500	/	/	f/1500	30
1500-100000	/	/	1.0	30

f = frequency in MHz

* = Plane-wave equipment power density

Prediction of MPE limit at a given distance

$$S=PG/4\pi R^2$$

Where: S = Power density

P = Power input to antenna

G = Power gain of the antenna in the direction of interest relative to an isotropic radiator

R = Distance to the center of radiation of the antenna

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2.2 Power Density Calculation (Worst Case)

CAT-M1	Evaluation Frequency (MHz)	Operation Distance (cm)	Max. Output Power Include Tolerance (dBm)	Antenna Gain (dBi)	Max. EIRP (mW)	Power Density (PD) (mW/cm ²)	Limit (mW/cm ²)	Pass / Fail	Power Density / Limit
LTE-Band 2	1850.70	20	24	2.00	398.11	0.079	1.000	Pass	0.079
LTE-Band 4	1710.70	20	24	2.00	398.11	0.079	1.000	Pass	0.079
LTE-Band 5	824.70	20	24	2.00	398.11	0.079	0.550	Pass	0.144
LTE-Band 12	699.70	20	24	2.00	398.11	0.079	0.466	Pass	0.170
LTE-Band 13	779.50	20	24	2.00	398.11	0.079	0.520	Pass	0.152
LTE-Band 25	1850.70	20	27	2.00	794.33	0.158	1.000	Pass	0.158
LTE-Band 26	824.70	20	24	2.00	398.11	0.079	0.550	Pass	0.144
LTE-Band 26 Part 90	814.70	20	24	2.00	398.11	0.079	0.543	Pass	0.145
LTE-Band 66	1710.70	20	24	2.00	398.11	0.079	1.000	Pass	0.079

NB-IoT	Evaluation Frequency (MHz)	Operation Distance (cm)	Max. Output Power Include Tolerance (dBm)	Antenna Gain (dBi)	Max. EIRP (mW)	Power Density (PD) (mW/cm ²)	Limit (mW/cm ²)	Pass / Fail	Power Density / Limit
LTE-Band 2	1850.70	20	24	2.00	398.11	0.079	1.000	Pass	0.079
LTE-Band 4	1710.70	20	24	2.00	398.11	0.079	1.000	Pass	0.079
LTE-Band 5	824.70	20	24	2.00	398.11	0.079	0.550	Pass	0.144
LTE-Band 12	699.70	20	24	2.00	398.11	0.079	0.466	Pass	0.170
LTE-Band 13	779.50	20	24	2.00	398.11	0.079	0.520	Pass	0.152
LTE-Band 25	1850.70	20	24	2.00	398.11	0.079	1.000	Pass	0.079
LTE-Band 26	824.70	20	24	2.00	398.11	0.079	0.550	Pass	0.144
LTE-Band 26 Part 90	814.70	20	24	2.00	398.11	0.079	0.543	Pass	0.145
LTE-Band 66	1710.70	20	24	2.00	398.11	0.079	1.000	Pass	0.079

Note: For conservativeness, the lowest uplink frequency of each band is used to determine the MPE limit of that band.

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2.3 ISED Standard Applicable

According to RSS-102 issue 6 §6.6 RF Exposure Evaluation

Field reference level (FRL) exposure evaluation is required if the separation distance between the user and/or bystander and the device's radiating element is greater than 20 cm (i.e. mobile devices), except when the device operates as follows:

below 20 MHz and the source-based, time-averaged maximum EIRP of the device is equal to or less than 1 W (adjusted for tune-up tolerance)

at or above 20 MHz and below 48 MHz and the source-based, time-averaged maximum EIRP of the device is equal to or less than $4.49/f^{0.5}W$

(adjusted for tune-up tolerance), where f is in MHz

at or above 48 MHz and below 300 MHz and the source-based, time-averaged maximum EIRP of the device is equal to or less than 0.6 W (adjusted for tune-up tolerance)

at or above 300 MHz and below 6 GHz and the source-based, time-averaged maximum EIRP of the device is equal to or less than $1.31 \times 10^{-2} f^{0.6834} W$

(adjusted for tune-up tolerance), where f is in MHz

at or above 6 GHz and the source-based, time-averaged maximum EIRP of the device is equal to or less than 5 W (adjusted for tune-up tolerance)

In these cases, the information contained in the RF exposure technical brief may be limited to information that demonstrates how the EIRP was derived.

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2.4 Field reference level (FRL) exposure exemption

CAT-M1	Evaluation Frequency (MHz)	Max. output Power include Tolerance (dBm)	Antenna Gain (dBi)	Max. EIRP (W)	Limit (W)	Max. EIRP / Limit	Pass / Fail
LTE-Band 2	1850.70	24	2.00	0.40	2.240	0.179	Pass
LTE-Band 4	1710.70	24	2.00	0.40	2.122	0.189	Pass
LTE-Band 5	824.70	24	2.00	0.40	1.289	0.310	Pass
LTE-Band 12	699.70	24	2.00	0.40	1.152	0.347	Pass
LTE-Band 13	779.50	24	2.00	0.40	1.240	0.323	Pass
LTE-Band 25	1850.70	27	2.00	0.79	2.240	0.353	Pass
LTE-Band 26	824.70	24	2.00	0.40	1.289	0.310	Pass
LTE-Band 66	1710.70	24	2.00	0.40	2.122	0.189	Pass

NB-IoT	Evaluation Frequency (MHz)	Max. output Power include Tolerance (dBm)	Antenna Gain (dBi)	Max. EIRP (W)	Limit (W)	Max. EIRP / Limit	Pass / Fail
LTE-Band 2	1850.70	24	2.00	0.40	2.240	0.179	Pass
LTE-Band 4	1710.70	24	2.00	0.40	2.122	0.189	Pass
LTE-Band 5	824.70	24	2.00	0.40	1.289	0.310	Pass
LTE-Band 12	699.70	24	2.00	0.40	1.152	0.347	Pass
LTE-Band 13	779.50	24	2.00	0.40	1.240	0.323	Pass
LTE-Band 25	1850.70	24	2.00	0.40	2.240	0.179	Pass
LTE-Band 26	824.70	24	2.00	0.40	1.289	0.310	Pass
LTE-Band 66	1710.70	24	2.00	0.40	2.122	0.189	Pass

Note: For conservativeness, the lowest uplink frequency of each band is used to determine the MPE limit of that band.

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2.5 Maximum Allowable Antenna Gain

FCC

CAT-M1	Freq. (MHz)	Operation Distance (cm)	Max. output Power include tolerance (dBm)	Max. Allowable Antenna Gain (dBi)	EIRP (ERP) Limit (dBm)	Max. output Power (mW)	Power Density (PD) (mW/cm ²)	PD Limit (mW/cm ²)	Allowable Gain according to EIRP (dBi)	Allowable Gain according to PD (dBi)	Power Density / Limit
LTE-Band 2	1850.7	20	24.00	9.00	33.00	1995.26	0.397	1.000	9.00	13.01	0.397
LTE-Band 4	1710.7	20	24.00	6.00	30.00	1000.00	0.199	1.000	6.00	13.01	0.199
LTE-Band 5	824.7	20	24.00	10.41	38.45	2760.58	0.549	0.550	14.45	10.41	0.998
LTE-Band 12	699.7	20	24.00	9.69	34.77	2338.84	0.466	0.466	10.77	9.69	1.000
LTE-Band 13	779.5	20	24.00	10.17	34.77	2612.16	0.520	0.520	10.77	10.17	1.000
LTE-Band 25	1850.7	20	24.00	9.00	33.00	1995.26	0.397	1.000	9.00	13.01	0.397
LTE-Band 26	824.7	20	24.00	10.41	38.45	2760.58	0.549	0.550	14.45	10.41	0.998
LTE-Band 26 Part 90	814.7	20	24.00	10.36	50.00	2728.98	0.543	0.543	26.00	10.36	1.000
LTE-Band 66	1710.70	20	24.00	6.00	30.00	1000.00	0.199	1.000	6.00	13.01	0.199

NB-IoT	Freq. (MHz)	Operation Distance (cm)	Max. output Power include tolerance (dBm)	Max. Allowable Antenna Gain (dBi)	EIRP (ERP) Limit (dBm)	Max. output Power (mW)	Power Density (PD) (mW/cm ²)	PD Limit (mW/cm ²)	Allowable Gain according to EIRP (dBi)	Allowable Gain according to PD (dBi)	Power Density / Limit
LTE-Band 2	1850.7	20	24.00	9.00	33.00	1995.26	0.397	1.000	9.00	13.01	0.397
LTE-Band 4	1710.7	20	24.00	6.00	30.00	1000.00	0.199	1.000	6.00	13.01	0.199
LTE-Band 5	824.7	20	24.00	10.41	38.45	2760.58	0.549	0.550	14.45	10.41	0.998
LTE-Band 12	699.7	20	24.00	9.69	34.77	2338.84	0.466	0.466	10.77	9.69	1.000
LTE-Band 13	779.5	20	24.00	10.17	34.77	2612.16	0.520	0.520	10.77	10.17	1.000
LTE-Band 25	1850.7	20	24.00	9.00	33.00	1995.26	0.397	1.000	9.00	13.01	0.397
LTE-Band 26	824.7	20	24.00	10.41	38.45	2760.58	0.549	0.550	14.45	10.41	0.998
LTE-Band 26 Part 90	814.7	20	24.00	10.36	50.00	2728.98	0.543	0.543	26.00	10.36	1.000
LTE-Band 66	1710.70	20	24.00	6.00	30.00	1000.00	0.199	1.000	6.00	13.01	0.199

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CAT-M1	Freq. (MHz)	Operation Distance (cm)	Max. output Power include tolerance (dBm)	Max. Allowable Antenna Gain (dBi)	EIRP (ERP) Limit (dBm)	Max. output Power (mW)	Limit (W)	Allowable Gain according to RF EIRP (dBi)	Allowable Gain according to MPE EIRP (dBi)
LTE-Band 2	1850.7	20	24.00	9.00	33.00	1995.26	2.240	9.00	9.50
LTE-Band 4	1710.7	20	24.00	6.00	30.00	1000.00	2.122	6.00	9.27
LTE-Band 5	824.7	20	24.00	7.10	40.60	1288.25	1.289	16.60	7.10
LTE-Band 12	699.7	20	24.00	6.61	34.77	1150.80	1.152	10.77	6.61
LTE-Band 13	779.5	20	24.00	6.93	34.77	1238.80	1.240	10.77	6.93
LTE-Band 25	1850.7	20	24.00	9.00	33.00	1995.26	2.240	9.00	9.50
LTE-Band 26	824.7	20	24.00	7.10	40.61	1288.25	1.289	16.61	7.10
LTE-Band 66	1710.70	20	24.00	6.00	30.00	1000.00	2.122	6.00	9.27

NB-IoT	Freq. (MHz)	Operation Distance (cm)	Max. output Power include tolerance (dBm)	Max. Allowable Antenna Gain (dBi)	EIRP (ERP) Limit (dBm)	Max. output Power (mW)	Limit (W)	Allowable Gain according to RF EIRP (dBi)	Allowable Gain according to MPE EIRP (dBi)
LTE-Band 2	1850.7	20	24.00	9.00	33.00	1995.26	2.240	9.00	9.50
LTE-Band 4	1710.7	20	24.00	6.00	30.00	1000.00	2.122	6.00	9.27
LTE-Band 5	824.7	20	24.00	7.10	40.60	1288.25	1.289	16.60	7.10
LTE-Band 12	699.7	20	24.00	6.61	34.77	1150.80	1.152	10.77	6.61
LTE-Band 13	779.5	20	24.00	6.93	34.77	1238.80	1.240	10.77	6.93
LTE-Band 25	1850.7	20	24.00	9.00	33.00	1995.26	2.240	9.00	9.50
LTE-Band 26	824.7	20	24.00	7.10	40.61	1288.25	1.289	16.61	7.10
LTE-Band 66	1710.70	20	24.00	6.00	30.00	1000.00	2.122	6.00	9.27

~ End of Report ~

Unless otherwise stated the results shown in this test report refer only to the sample(s) tested and such sample(s) are retained for 90 days only.

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