

RF EXPOSURE REPORT



Applicant: Murata Electronics North America
2200 Lake Park Dr #7604, Smyrna, GA 30080 USA
Manufacturer: Murata Electronics North America
2200 Lake Park Dr #7604, Smyrna, GA 30080 USA
Product Name: Type 1SC
Brand Name: Murata
Model No.: LBAD0XX1SC-DM
FCC ID HSW-TY1SCDM
Date of EUT Received: Jun. 25, 2024
Issue Date: Sep. 13, 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 §1.1307 & KDB 447498 D04 v01.

The results of this report relate to the specific sample identified in this 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.
除非另有說明，此報告結果僅對測試之樣品負責，同時此樣品僅保留90天。本報告未經本公司書面許可，不可部份複製。

This document is issued by the Company subject to its General Conditions of Service printed overleaf, available on request or accessible at <http://www.sgs.com.tw/Terms-and-Conditions> and for electronic format documents, subject to Terms and Conditions for Electronic Documents at <http://www.sgs.com.tw/Terms-and-Conditions>. Attention is drawn to the limitation of liability, indemnification and jurisdiction issues defined therein. Any holder of this document is advised that information contained hereon reflects the Company's findings at the time of its intervention only and within the limits of Client's instructions, if any. The Company's sole responsibility is to its Client and this document does not exonerate parties to a transaction from exercising all their rights and obligations under the transaction documents. This document cannot be reproduced except in full, without prior written approval of the Company. Any unauthorized alteration, forgery or falsification of the content or appearance of this document is unlawful and offenders may be prosecuted to the fullest extent of the law.

SGS Taiwan Ltd.

No.134, Wu Kung Road, New Taipei Industrial Park, Wuku District, New Taipei City, Taiwan/新北市五股區新北產業園區五工路 134 號

台灣檢驗科技股份有限公司

t (886-2) 2299-3279

f (886-2) 2298-0488

www.sgs.com.tw

Member of SGS Group

Revision History

Report Number	Revision	Description	Issue Date	Revised By	Remark
TESA2406000406ES	00	Original	Sep. 13, 2024	Cindy Chou	

Note:

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

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.

除非另有說明，此報告結果僅對測試之樣品負責，同時此樣品僅保留90天。本報告未經本公司書面許可，不可部份複製。

This document is issued by the Company subject to its General Conditions of Service printed overleaf, available on request or accessible at <http://www.sgs.com.tw/Terms-and-Conditions> and for electronic format documents, subject to Terms and Conditions for Electronic Documents at <http://www.sgs.com.tw/Terms-and-Conditions>. Attention is drawn to the limitation of liability, indemnification and jurisdiction issues defined therein. Any holder of this document is advised that information contained hereon reflects the Company's findings at the time of its intervention only and within the limits of Client's instructions, if any. The Company's sole responsibility is to its Client and this document does not exonerate parties to a transaction from exercising all their rights and obligations under the transaction documents. This document cannot be reproduced except in full, without prior written approval of the Company. Any unauthorized alteration, forgery or falsification of the content or appearance of this document is unlawful and offenders may be prosecuted to the fullest extent of the law.

SGS Taiwan Ltd.

No.134,Wu Kung Road, New Taipei Industrial Park, Wuku District, New Taipei City, Taiwan/新北市五股區新北產業園區五工路 134 號

台灣檢驗科技股份有限公司

t (886-2) 2299-3279

f (886-2) 2298-0488

www.sgs.com.tw

Member of SGS Group

Contents

1	DESCRIPTION OF EQUIPMENT UNDER TEST (EUT)	4
1.1	PRODUCT DESCRIPTION.....	4
1.2	EVALUATION SITE	4
2	DETERMINATION OF MPE EXEMPTION	5
2.1	FCC.....	5

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.

除非另有說明，此報告結果僅對測試之樣品負責，同時此樣品僅保留90天。本報告未經本公司書面許可，不可部份複製。

This document is issued by the Company subject to its General Conditions of Service printed overleaf, available on request or accessible at <http://www.sgs.com.tw/Terms-and-Conditions> and for electronic format documents, subject to Terms and Conditions for Electronic Documents at <http://www.sgs.com.tw/Terms-and-Conditions>. Attention is drawn to the limitation of liability, indemnification and jurisdiction issues defined therein. Any holder of this document is advised that information contained hereon reflects the Company's findings at the time of its intervention only and within the limits of Client's instructions, if any. The Company's sole responsibility is to its Client and this document does not exonerate parties to a transaction from exercising all their rights and obligations under the transaction documents. This document cannot be reproduced except in full, without prior written approval of the Company. Any unauthorized alteration, forgery or falsification of the content or appearance of this document is unlawful and offenders may be prosecuted to the fullest extent of the law.

SGS Taiwan Ltd.

No.134,Wu Kung Road, New Taipei Industrial Park, Wuku District, New Taipei City, Taiwan/新北市五股區新北產業園區五工路 134 號

台灣檢驗科技股份有限公司

t (886-2) 2299-3279

f (886-2) 2298-0488

www.sgs.com.tw

Member of SGS Group

1 DESCRIPTION OF EQUIPMENT UNDER TEST (EUT)

1.1 Product Description

Product Name:	Type 1SC
Brand Name:	Murata
Model No.:	LBAD0XX1SC-DM

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, Nei Hu District, Taipei City, 222 Taiwan.	TW0029	23862	

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.

除非另有說明，此報告結果僅對測試之樣品負責，同時此樣品僅保留90天。本報告未經本公司書面許可，不可部份複製。

This document is issued by the Company subject to its General Conditions of Service printed overleaf, available on request or accessible at <http://www.sgs.com.tw/Terms-and-Conditions>, and for electronic format documents, subject to Terms and Conditions for Electronic Documents at <http://www.sgs.com.tw/Terms-and-Conditions>. Attention is drawn to the limitation of liability, indemnification and jurisdiction issues defined therein. Any holder of this document is advised that information contained hereon reflects the Company's findings at the time of its intervention only and within the limits of Client's instructions, if any. The Company's sole responsibility is to its Client and this document does not exonerate parties to a transaction from exercising all their rights and obligations under the transaction documents. This document cannot be reproduced except in full, without prior written approval of the Company. Any unauthorized alteration, forgery or falsification of the content or appearance of this document is unlawful and offenders may be prosecuted to the fullest extent of the law.

SGS Taiwan Ltd.

No.134,Wu Kung Road, New Taipei Industrial Park, Wuku District, New Taipei City, Taiwan/新北市五股區新北產業園區五工路 134 號

台灣檢驗科技股份有限公司

t (886-2) 2299-3279

f (886-2) 2298-0488

www.sgs.com.tw

Member of SGS Group

2 DETERMINATION OF MPE EXEMPTION

2.1 FCC

2.1.1 Single RF Source

As per §1.1307(b)(3)(i),

- (A) The available maximum time-averaged power is no more than 1 mW, regardless of separation distance. This exemption may not be used in conjunction with other exemption criteria other than those in paragraph (b)(3)(ii)(A) of this section. Medical implant devices may only use this exemption and that in paragraph (b)(3)(ii)(A);
- (B) Or the available maximum time-averaged power or effective radiated power (ERP), whichever is greater, is less than or equal to the threshold P_{th} (mW) described in the following formula. This method shall only be used at separation distances (cm) from 0.5 centimeters to 40 centimeters and at frequencies from 0.3 GHz to 6 GHz (inclusive). P_{th} is given by:

$$P_{th} \text{ (mW)} = \begin{cases} ERP_{20 \text{ cm}} (d/20 \text{ cm})^x & d \leq 20 \text{ cm} \\ ERP_{20 \text{ cm}} & 20 \text{ cm} < d \leq 40 \text{ cm} \end{cases}$$

Where

$$x = -\log_{10} \left(\frac{60}{ERP_{20 \text{ cm}} \sqrt{f}} \right) \text{ and } f \text{ is in GHz;}$$

and

$$ERP_{20 \text{ cm}} \text{ (mW)} = \begin{cases} 2040f & 0.3 \text{ GHz} \leq f < 1.5 \text{ GHz} \\ 3060 & 1.5 \text{ GHz} \leq f \leq 6 \text{ GHz} \end{cases}$$

d = the separation distance (cm);

Note: when 10-g extremity SAR applies, SAR test exemption may be considered by applying a factor of 2.5 to the SAR-based exemption thresholds.

- (C) Or using Table 1 and the minimum separation distance (R in meters) from the body of a nearby person for the frequency (f in MHz) at which the source operates, the ERP (watts) is no more than the calculated value prescribed for that frequency. For the exemption in Table 1 to apply, R must be at least $\lambda/2\pi$, where λ is the free-space operating wavelength in meters. If the ERP of a single RF source is not easily obtained, then the available maximum time-averaged power may be used in lieu of ERP if the physical dimensions of the radiating structure(s) do not exceed the electrical length of $\lambda/4$ or if the antenna gain is less than that of a half-wave dipole (1.64 linear value).

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.
除非另有說明，此報告結果僅對測試之樣品負責，同時此樣品僅保留90天。本報告未經本公司書面許可，不可部份複製。

This document is issued by the Company subject to its General Conditions of Service printed overleaf, available on request or accessible at <http://www.sgs.com.tw/Terms-and-Conditions>, and for electronic format documents, subject to Terms and Conditions for Electronic Documents at <http://www.sgs.com.tw/Terms-and-Conditions>. Attention is drawn to the limitation of liability, indemnification and jurisdiction issues defined therein. Any holder of this document is advised that information contained hereon reflects the Company's findings at the time of its intervention only and within the limits of Client's instructions, if any. The Company's sole responsibility is to its Client and this document does not exonerate parties to a transaction from exercising all their rights and obligations under the transaction documents. This document cannot be reproduced except in full, without prior written approval of the Company. Any unauthorized alteration, forgery or falsification of the content or appearance of this document is unlawful and offenders may be prosecuted to the fullest extent of the law.

Table 1 to § 1.1307(b)(3)(i)(C) –

Single RF Sources Subject to Routine Environmental Evaluation

RF Source frequency (MHz)			Minimum Distance			Threshold ERP (W)
fL		fH	$\lambda_L / 2\pi$		$\lambda_H / 2\pi$	
0.3	-	1.34	159m	-	35.6m	1920 R ²
1.34	-	30	35.6m	-	1.6m	3450 R ² /f ²
30	-	300	1.6m	-	159mm	3.83 R ²
300	-	1500	159mm	-	31.8mm	0.0128 R ² f
1500	-	100000	31.8mm	-	0.5mm	19.2R ²

R= minimum separation distance in meter

f = frequency in MHz

2.1.2 Multiple RF Sources

In the case of fixed RF sources operating in the same time-averaging period, or of multiple mobile or portable RF sources within a device operating in the same time averaging period, if the sum of the fractional contributions to the applicable thresholds is less than or equal to 1 as indicated in the following equation.

$$\sum_{i=1}^a \frac{P_i}{P_{th,i}} + \sum_{j=1}^b \frac{ERP_j}{ERP_{th,j}} + \sum_{k=1}^c \frac{Evaluated_k}{Exposure Limit_k} \leq 1$$

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.
除非另有說明，此報告結果僅對測試之樣品負責，同時此樣品僅保留90天。本報告未經本公司書面許可，不可部份複製。

This document is issued by the Company subject to its General Conditions of Service printed overleaf, available on request or accessible at <http://www.sgs.com.tw/Terms-and-Conditions> and for electronic format documents, subject to Terms and Conditions for Electronic Documents at <http://www.sgs.com.tw/Terms-and-Conditions>. Attention is drawn to the limitation of liability, indemnification and jurisdiction issues defined therein. Any holder of this document is advised that information contained hereon reflects the Company's findings at the time of its intervention only and within the limits of Client's instructions, if any. The Company's sole responsibility is to its Client and this document does not exonerate parties to a transaction from exercising all their rights and obligations under the transaction documents. This document cannot be reproduced except in full, without prior written approval of the Company. Any unauthorized alteration, forgery or falsification of the content or appearance of this document is unlawful and offenders may be prosecuted to the fullest extent of the law.

SGS Taiwan Ltd.

No.134,Wu Kung Road, New Taipei Industrial Park, Wuku District, New Taipei City, Taiwan/新北市五股區新北產業園區五工路 134 號

台灣檢驗科技股份有限公司

t (886-2) 2299-3279

f (886-2) 2298-0488

www.sgs.com.tw

Member of SGS Group

2.1.3 Single RF Source Evaluation Results

Note: For conservativeness, the lowest uplink frequency of each band is used to determine the minimum separation distance of that band. All the single RF source results (P or ERP) are less than their corresponding threshold (P_{th} or ERP_{th}), so they are exempt from RF exposure testing.

CAT M1	Frequency (MHz)	Max. tune-up power (dBm)	ERP (dBm)	ERP (W)	R = actual Minimum separation distance(m)	ERP_{th} (W)	Allowable Gain according to ERP_{th} (dBi)	EIRP (ERP)	EIRP (ERP) Limit (dBm)	Allowable Gain according to EIRP (dBi)	Max. Allowable Gain (dBi)
Band 2	1850.7	23	20.85	0.122	0.200	0.768	29.49	23.00	33.00	10.00	10.00
Band 4	1710.7	23	20.85	0.122	0.200	0.768	29.49	23.00	30.00	7.00	7.00
Band 5	824.7	23	20.85	0.122	0.200	0.422	27.36	20.85	38.45	17.60	17.60
Band 12	699.7	23	20.85	0.122	0.200	0.358	26.81	20.85	34.77	13.92	13.92
Band 13	779.5	23	20.85	0.122	0.200	0.399	27.17	20.85	34.77	13.92	13.92
Band 14	788.1	23	20.85	0.122	0.200	0.404	27.21	20.85	34.77	13.92	13.92
Band 17	704.1	23	20.85	0.122	0.200	0.360	26.83	20.85	34.77	13.92	13.92
Band 25	1850.7	23	20.85	0.122	0.200	0.768	29.49	23.00	33.00	10.00	10.00
Band 26	814.7	23	20.85	0.122	0.200	0.417	27.32	23.00	38.45	15.45	15.45
Band 66	1772.5	24.5	22.35	0.172	0.200	0.768	29.73	24.50	30.00	5.50	5.50
Band 71	673	24.5	22.35	0.172	0.200	0.345	27.13	22.35	34.77	12.42	12.42

NB IoT	Frequency (MHz)	Max. tune-up power (dBm)	ERP (dBm)	ERP (W)	R = actual Minimum separation distance(m)	ERP_{th} (W)	Allowable Gain according to ERP_{th} (dBi)	EIRP (ERP)	EIRP (ERP) Limit (dBm)	Allowable Gain according to EIRP (dBi)	Max. Allowable Gain (dBi)
Band 2	1850.2	23	20.85	0.122	0.200	0.768	29.49	23.00	33.00	10.00	10.00
Band 4	1710.2	23	20.85	0.122	0.200	0.768	29.49	23.00	30.00	7.00	7.00
Band 5	824.2	23	20.85	0.122	0.200	0.422	27.36	20.85	38.45	17.60	17.60
Band 12	699.2	24	21.85	0.153	0.200	0.358	27.08	21.85	34.77	12.92	12.92
Band 13	777.2	24	21.85	0.153	0.200	0.398	27.41	21.85	34.77	12.92	12.92
Band 17	704.2	24	21.85	0.153	0.200	0.361	27.11	21.85	34.77	12.92	12.92
Band 25	1850.2	22	19.85	0.097	0.200	0.768	29.37	22.00	33.00	11.00	11.00
Band 26	814.1	24	21.85	0.153	0.200	0.417	27.56	21.85	38.45	16.60	16.60

NTN	Frequency (MHz)	Max. tune-up power (dBm)	ERP (dBm)	ERP (W)	R = actual Minimum separation distance(m)	ERP_{th} (W)	Allowable Gain according to ERP_{th} (dBi)	Conducted Average (dBm)	EIRP (ERP) Limit (dBm)	Allowable Gain according to EIRP (dBi)	Max. Allowable Gain (dBi)
Band 23	2019.9	25	22.85	0.193	0.200	0.768	29.83	8.47	70.00	61.53	29.83
Band n255	1659.9	25	22.85	0.193	0.200	0.768	29.83	8.47	70.00	61.53	29.83
Band n256	2009.9	25	22.85	0.193	0.200	0.768	29.83	8.47	70.00	61.53	29.83

~ 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.

除非另有說明，此報告結果僅對測試之樣品負責，同時此樣品僅保留90天。本報告未經本公司書面許可，不可部份複製。

This document is issued by the Company subject to its General Conditions of Service printed overleaf, available on request or accessible at <http://www.sgs.com.tw/Terms-and-Conditions> and for electronic format documents, subject to Terms and Conditions for Electronic Documents at <http://www.sgs.com.tw/Terms-and-Conditions>. Attention is drawn to the limitation of liability, indemnification and jurisdiction issues defined therein. Any holder of this document is advised that information contained hereon reflects the Company's findings at the time of its intervention only and within the limits of Client's instructions, if any. The Company's sole responsibility is to its Client and this document does not exonerate parties to a transaction from exercising all their rights and obligations under the transaction documents. This document cannot be reproduced except in full, without prior written approval of the Company. Any unauthorized alteration, forgery or falsification of the content or appearance of this document is unlawful and offenders may be prosecuted to the fullest extent of the law.

SGS Taiwan Ltd.

No.134,Wu Kung Road, New Taipei Industrial Park, Wuku District, New Taipei City, Taiwan/新北市五股區新北產業園區五工路 134 號

台灣檢驗科技股份有限公司

t (886-2) 2299-3279

f (886-2) 2298-0488

www.sgs.com.tw

Member of SGS Group