

## RF EXPOSURE REPORT



**Applicant:** CASTLES TECHNOLOGY CO., LTD.  
6F, NO. 207-5, SEC. 3, BEIXIN RD., XINDIAN DISTRICT,  
NEW TAIPEI CITY 231030, TAIWAN (R.O.C)

**Manufacturer:** CASTLES TECHNOLOGY CO., LTD.  
6F, NO. 207-5, SEC. 3, BEIXIN RD., XINDIAN DISTRICT,  
NEW TAIPEI CITY 231030, TAIWAN (R.O.C)

**Product Name:** Smart module

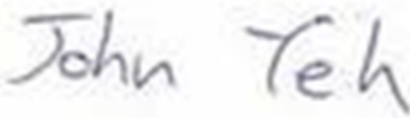
**Brand Name:** 

**Model No.:** SLM500

**FCC ID** WIYSLM500QA

**Date of EUT Received:** Aug. 01, 2024

**Issue Date:** Sep. 30, 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.

The results of this report relate only to the 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](http://www.sgs.com.tw)

Member of SGS Group

## Revision History

Report Number	Revision	Description	Issue Date	Revised By	Remark
TESA2408000479ES	00	Original	Sep. 18, 2024	Kimmy Chiou	
TESA2408000479ES	01	Modify comment	Sep. 30, 2024	Kimmy Chiou	*

**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](http://www.sgs.com.tw)

Member of SGS Group

## Contents

<b>1</b>	<b>DESCRIPTION OF EQUIPMENT UNDER TEST (EUT)</b>	<b>4</b>
1.1	PRODUCT DESCRIPTION	4
1.2	EVALUATION SITE	4
1.3	ANTENNA INFORMATION:	5
1.4	RATED POWER	6
<b>2</b>	<b>FCC MAXIMUM PERMISSIBLE EXPOSURE (MPE)</b>	<b>7</b>
2.1	FCC STANDARD APPLICABLE	7
2.2	POWER DENSITY CALCULATION (WORST CASE)	8

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](http://www.sgs.com.tw)

Member of SGS Group

## 1 DESCRIPTION OF EQUIPMENT UNDER TEST (EUT)

### 1.1 Product Description

Product Name:	Smart module
Brand Name:	
Model No.:	SLM500
Product Name of Host:	POS Terminal
Brand Name of Host:	
Model No. of Host:	S1E2-UPT

### 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.

### 1.3 Antenna Information:

Freq. (MHz)	Peak Antenna Gain (dBi)
2412-2462	2.42
5150-5250	1.89
5250-5350	2.23
5470-5725	1.54
5725-5850	0.98

Operating Frequency (MHz)			Ant 0 Peak Gain (dBi)
GSM / GPRS / EDGE 850	824 ~ 849		2.67
GSM / GPRS / EDGE 1900	1850 ~ 1910		2.40
WCDMA / HSPA Band II	1850 ~ 1910		2.40
WCDMA / HSPA Band IV	1710 ~ 1753		2.21
WCDMA / HSPA Band V	824 ~ 849		2.67
LTE-Band 2	1850 ~ 1910		2.40
LTE-Band 4	1710 ~ 1755		2.21
LTE-Band 5	824 ~ 849		2.67
LTE-Band 7	2500 ~ 2570		1.64
LTE-Band 12	699 ~ 716		4.52
LTE-Band 13	777 ~ 787		3.97
LTE-Band 17	704 ~ 716		4.52
LTE-Band 25	1850 ~ 1915		2.40
LTE-Band 26	824 ~ 849		2.67
LTE-Band 26 Part 90	814 ~ 824		3.32
LTE-Band 66	1710 ~ 1780		2.21

**Note:** Antenna information is provided by the applicant.

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.

## 1.4 Rated Power

Operating Frequency (MHz)		Max. Output Power (dBm)	Antenna Gain (dBi)	ERP (dBm)	ERP (W)	separation distance(m)	EIRP / ERP (dBm)	Power Density (mW/cm <sup>2</sup> )	Limit (mW/cm <sup>2</sup> )	Density / Limit	FCC Worst Case
GSM / GPRS / EDGE 850	824 ~ 849	25.97	2.67	26.49	0.45	0.2	28.64	0.15	0.55	0.27	
GSM / GPRS / EDGE 1900	1850 ~ 1910	22.97	2.40	23.22	0.21	0.2	25.37	0.07	1.00	0.07	
WCDMA / HSPA Band II	1850 ~ 1910	25.70	2.40	25.95	0.39	0.2	28.10	0.13	1.00	0.13	
WCDMA / HSPA Band IV	1710 ~ 1753	25.70	2.21	25.76	0.38	0.2	27.91	0.12	1.00	0.12	
WCDMA / HSPA Band V	824 ~ 849	25.70	2.67	26.22	0.42	0.2	28.37	0.14	0.55	0.25	
LTE-Band 2	1850 ~ 1910	25.70	2.40	25.95	0.39	0.2	28.10	0.13	1.00	0.13	
LTE-Band 4	1710 ~ 1755	25.70	2.21	25.76	0.38	0.2	27.91	0.12	1.00	0.12	
LTE-Band 5	824 ~ 849	25.70	2.67	26.22	0.42	0.2	28.37	0.14	0.55	0.25	
LTE-Band 7	2500 ~ 2570	25.70	1.64	25.19	0.33	0.2	27.34	0.11	1.00	0.11	
LTE-Band 12	699 ~ 716	25.70	4.52	28.07	0.64	0.2	30.22	0.21	0.47	0.45	V
LTE-Band 13	777 ~ 787	25.70	3.97	27.52	0.56	0.2	29.67	0.18	0.52	0.35	
LTE-Band 17	704 ~ 716	25.70	4.52	28.07	0.64	0.2	30.22	0.21	0.47	0.45	V
LTE-Band 25	1850 ~ 1915	25.70	2.40	25.95	0.39	0.2	28.10	0.13	1.00	0.13	
LTE-Band 26	824 ~ 849	25.70	2.67	26.22	0.42	0.2	28.37	0.14	0.55	0.25	
LTE-Band 26 Part 90	814 ~ 824	25.70	3.32	26.87	0.49	0.2	29.02	0.16	0.54	0.30	
LTE-Band 66	1710 ~ 1780	25.70	2.21	25.76	0.38	0.2	27.91	0.12	1.00	0.12	

### Note:

Time slot average factor is as follows:

1 T x slot = 9.03 dB, Frame-Average output power = Burst-Average output power – 9.03 dB

2 T x slot = 6.02 dB, Frame-Average output power = Burst-Average output power – 6.02 dB

3 T x slot = 4.26 dB, Frame-Average output power = Burst-Average output power – 4.26 dB

4 T x slot = 3.01 dB, Frame-Average output power = Burst-Average output power – 3.01 dB

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](http://www.sgs.com.tw)

Member of SGS Group

## 2 FCC 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 Permissive Exposure (MPE)

Frequency Range (MHz)	Electric Field Strength (V/m)	Magnetic Field Strength (A/m)	Power Density (mW/cm <sup>2</sup> )	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 <sup>2</sup> )	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

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](http://www.sgs.com.tw)

Member of SGS Group

## 2.2 Power Density Calculation (Worst Case)

### FCC Standalone MPE

Operation Mode	Evaluation Frequency (MHz)	Operation Distance (cm)	Max. Output Power Include Tolerance (dBm)	Antenna Gain (dBi)	Max. EIRP (mW)	Power Density (PD) (mW/cm <sup>2</sup> )	Limit (mW/cm <sup>2</sup> )	Pass / Fail	Power Density / Limit	Collocated MPE
BT	2480.00	20	14	2.42	43.85	0.0087	1.000	Pass	0.009	V
WLAN 2.4G	2442.00	20	18	2.42	110.15	0.022	1.000	Pass	0.022	V
WLAN 5G	5550.00	20	17	1.54	71.45	0.014	1.000	Pass	0.014	V
LTE-Band 12	699.70	20	25.7	4.52	1051.96	0.209	0.466	Pass	0.448	V

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

### 2.2.1 Collocated Power Density Calculation

#### FCC Collocated MPE

Operation Mode	$\Sigma$ (Power Density / Limit)
NFC+BT+WLAN+WWAN	0.493

Note: NFC calculated from TESA2409000571ES.

**Note:**

1.  $\Sigma(\text{Power Density} / \text{Limit})$ : This is a summation of [(Power Density for each transmitter/antenna included in the simultaneous transmission) / (corresponding MPE limit)].
2. Considering the collocated transmitters, the aggregated (Power Density /limit) is smaller than 1, and MPE of collocated transmitters is compliant

~ 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.