


RF EXPOSURE REPORT



FCC Applicant: Ceres Tag LTD
58-62 Gilbert Road, Lutwyche, QLD, Australia 4030

Product Name: Animal Traceability Device

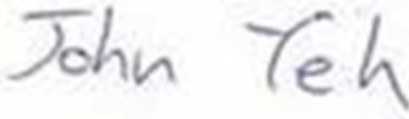
Brand Name: 

Model No.: LX700W

Report Number: TESA2205000124E5

FCC ID 2A2O3-LX700W

Issue Date: Jan. 30, 2023



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.

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

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Revision History

Report Number	Revision	Description	Issue Date	Revised By	Remark
TESA2205000124E5	00	Original	Jul. 27, 2022	Ruby Ou	*
TESA2205000124E5	01	Modify applicant	Aug. 04, 2022	Ruby Ou	
TESA2205000124E5	02	Update BT duty cycle	Sep. 26, 2022	Ruby Ou	
TESA2205000124E5	03	Update BT duty cycle	Jan. 18, 2023	Ruby Ou	
TESA2205000124E5	04	Update BT	Jan. 30, 2023	Ruby Ou	

Note:

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

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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	SINGLE RF SOURCE.....	5
2.2	MULTIPLE RF SOURCES.....	6
2.3	SINGLE RF SOURCE EVALUATION RESULTS	7

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1 DESCRIPTION OF EQUIPMENT UNDER TEST (EUT)

1.1 Product Description

Product Name:	Animal Traceability Device
Brand Name:	
Model No.:	LX700W

1.2 Evaluation site

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

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2 DETERMINATION OF MPE EXEMPTION

2.1 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).

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**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

2.2 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.

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

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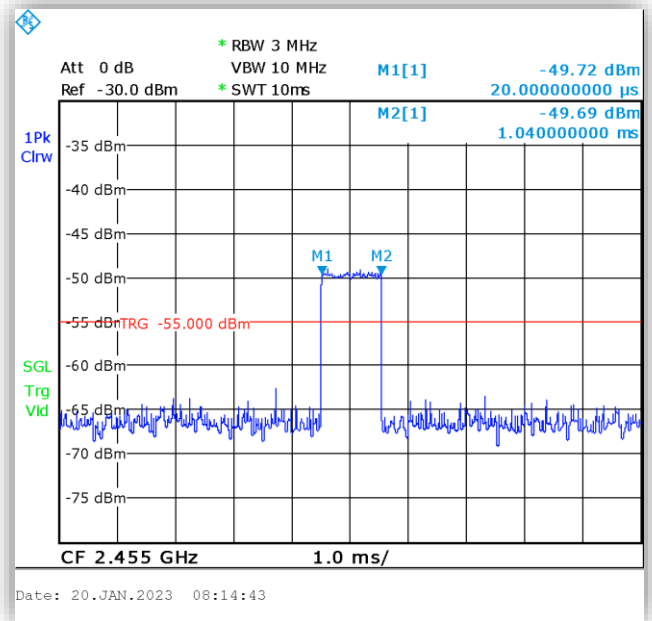
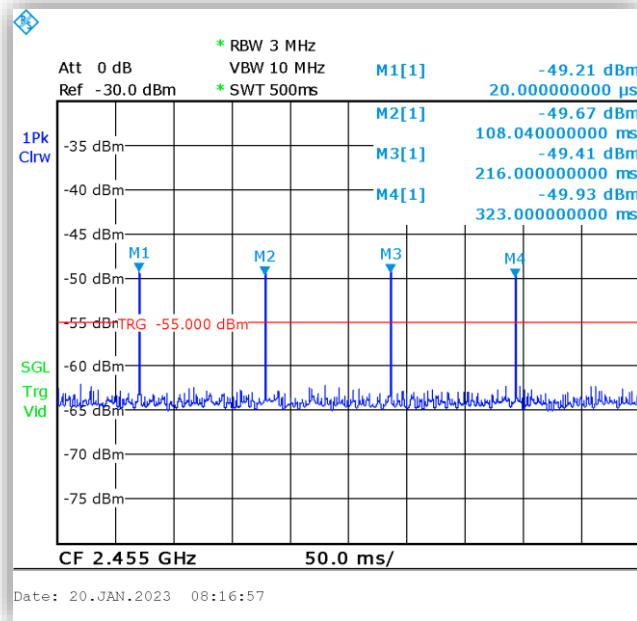
2.3 1-mW Test Exemption result for Single Source

2.3.1 Bluetooth

Bluetooth packets are broadcast with a hardcoded sleep cycle will ensure the duty cycle does not exceed the limits shown below.

The Maximum RF packet transmission duration is 1.024 milliseconds.

Software sleeps for a minimum duration of 100ms after every transmission.



Therefore:

$$\text{Maximum duty cycle} = (1.024 / 100) = 1.024\%$$

$$\text{Maximum specified output power} = 8 \text{ dBm (6.310 mW)}$$

$$\text{Antenna peak gain} = 1 \text{ dBi}$$

$$\text{Thus, the maximum available time-averaged output power} = 6.310 \text{ mW} \times 1.024\% = 0.0646 \text{ mW} (= -11.89\text{dBm})$$

So BT is SAR test exemption because maximum available time-averaged output power is less than 1 mW.

2.3.2 Satellite

Satellite communicates a single packet at every 1 hour (Ceres Wild)

Battery Charge	Packets per Day	
	Ceres Trace / Ceres Ranch	Ceres Wild
≥ 65%	4	24 (The worst case scenario)
< 65%	4	24
< 45%	4	12

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<30%	3	8
<15%	0	0

The Maximum duty cycle = 1.4 seconds / 3600 seconds = 0.04%

Maximum specified output power = 27 dBm (501.187 mW)

Antenna peak gain = 1.06 dBi

Thus, maximum available time-averaged output power = 501.187 mW x 0.04% = 0.2 mW (= -6.99dBm)

So Satellite is SAR test exemption because maximum available time-averaged output power is less than 1 mW.

2.4 1-mW Test Exemption for Multiple Sources

Bluetooth and Satellite can transmit simultaneously, and simultaneous transmission is compliant because the aggregate maximum available time-averaged output power of all transmitting antennas is 0.2646 mW (≤ 1 mW)

~ End of Report ~

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