



# MPE Report

Report No.:STS2412237H01

Issued for

Sayme Monitorizacion Estructural SL

Poligono Tanos-Viernoles, B4, 39300 Torrelavega, Spain

Product Name: SAYME Dumpster Lock

Brand Name: SAYME

Model Name: 2XER34615M

Series Model(s): N/A

FCC ID: 2BMD7-13EA2BMD7

Test Standard: FCC 47CFR §2.1091

The test results presented in this report relate only to the object tested. This report shall not be reproduced, except in full, without the written approval of the ShenZhen STS Test Services Co., Ltd.

**TEST REPORT****Applicant's Name** ..... : Sayme Monitorizacion Estructural SL

Address ..... : Poligono Tanos-Viernes, B4, 39300 Torrelavega, Spain

**Manufacturer's Name** ..... : Sayme Monitorizacion Estructural SL

Address ..... : Poligono Tanos-Viernes, Parcela B4, 39300 Torrelavega, Spain

**Product Description**

Product Name ..... : SAYME Dumpster Lock

Brand Name ..... : SAYME

Model Name ..... : 2XER34615M

Series Model(s) ..... : N/A

**Test Standards** ..... : FCC 47CFR §2.1091

447498 D01 Interim General RF Exposure Guidance v06

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**Date of Test** ..... :

Date of receipt of test item ..... : 27 Dec. 2024

Date (s) of performance of tests ..... : 27 Dec. 2024~06 Jan. 2025

Date of Issue ..... : 06 Jan. 2025

Test Result ..... : **Pass**

Testing Engineer : \_\_\_\_\_

*Aaron Bu*

(Aaron Bu)

Technical Manager : \_\_\_\_\_

*Tony Liu*

(Tony Liu)

Authorized Signatory : \_\_\_\_\_

*Bovey Yang*

(Bovey Yang)





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**Revision History**

| Rev. | Issue Date   | Report No.    | Effect Page | Contents      |
|------|--------------|---------------|-------------|---------------|
| 00   | 06 Jan. 2025 | STS2412237H01 | ALL         | Initial Issue |
|      |              |               |             |               |



## 1. GENERAL INFORMATION

### 1.1 GENERAL DESCRIPTION OF THE EUT

|                     |                                              |                                                                                                                                                                                                                                                                                                                                 |
|---------------------|----------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Product Name        | SAYME Dumpster Lock                          |                                                                                                                                                                                                                                                                                                                                 |
| Brand Name          | SAYME                                        |                                                                                                                                                                                                                                                                                                                                 |
| Model Name          | 2XER34615M                                   |                                                                                                                                                                                                                                                                                                                                 |
| Series Model(s)     | N/A                                          |                                                                                                                                                                                                                                                                                                                                 |
| Model Difference    | N/A                                          |                                                                                                                                                                                                                                                                                                                                 |
| Product Description | The EUT is SAYME Dumpster Lock               |                                                                                                                                                                                                                                                                                                                                 |
|                     | Operation Frequency:                         | NFC:13.56 MHz<br>NB-IOT Band2: 1850-1910 MHz<br>NB-IOT Band4: 1710-1755 MHz<br>NB-IOT Band12: 699-716 MHz<br>NB-IOT Band13: 777-787 MHz<br>NB-IOT Band26: 814-824 MHz<br>NB-IOT Band66: 1710-1780 MHz<br>NB-IOT Band71: 663-698 MHz<br>802.11b/g/n(HT20):2412~2462 MHz<br>802.11n(HT40):2422~2452 MHz<br>BT/BLE: 2402 ~2480 MHz |
|                     | Modulation Type:                             | NFC:ASK<br>NB-IOT: BPSK/QPSK<br>BLE: GFSK<br>BT: GFSK, $\pi/4$ -DQPSK, 8DPSK<br>802.11b: DSSS;<br>802.11g/n(HT20/HT40): OFDM                                                                                                                                                                                                    |
|                     | Antenna gain:                                | NFC:-4.7 dBi<br>NB-IOT Band2: 1.87 dBi<br>NB-IOT Band4:3.12 dBi<br>NB-IOT Band12: 0.95 dBi<br>NB-IOT Band13: 2.23 dBi<br>NB-IOT Band26: 1.4 dBi<br>NB-IOT Band66: 3.12 dBi<br>NB-IOT Band71: -0.48 dBi<br>2.4G WiFi/BT/BLE: 3.7 dBi                                                                                             |
|                     | Antenna Designation:                         | NFC:Microstrip in the PCB<br>NB-IOT: External<br>2.4G WiFi/BT/BLE: Internal                                                                                                                                                                                                                                                     |
| Power Rating        | N/A                                          |                                                                                                                                                                                                                                                                                                                                 |
| Adapter             | N/A                                          |                                                                                                                                                                                                                                                                                                                                 |
| Battery             | Rated Voltage: DC 3.6V<br>Capacity: 16500mAh |                                                                                                                                                                                                                                                                                                                                 |
| Hardware Version    | DLNB10                                       |                                                                                                                                                                                                                                                                                                                                 |
| Software Version    | V11                                          |                                                                                                                                                                                                                                                                                                                                 |



## 1.2 TEST FACTORY

SHENZHEN STS TEST SERVICES CO., LTD

Add. : 101, Building B, Zhuoke Science Park, No.190 Chongqing Road, ZhanChengShequ, Fuhai Sub-District, Bao'an District, Shenzhen, Guang Dong, China

FCC test Firm Registration Number: 625569

IC test Firm Registration Number: 12108A

A2LA Certificate No.: 4338.01



## 2. FCC 47CFR §2.1091 REQUIREMENT

### 2.1 TEST STANDARDS

The limit for Maximum Permissible Exposure (MPE) specified in FCC 1.1310 is followed. The gain of the antennas used in the product is extracted from the Antenna data sheets provided and also the maximum total power input to the antenna is measured. Through the Friis transmission formula and the maximum gain of the antenna, we can calculate the distance, away from the product, where the limit of MPE is reached.

Although the Friis Transmission formula is far field assumption, the calculated result of that is an over-prediction for near field power density. It is taken as worst case to specify the safety range.

### 2.2 LIMIT

According to FCC 1.1310: The criteria listed in the following table shall be used to evaluate the environmental impact of the human exposure to radio-frequency (RF) radiation as specified in 1.1307 (b)

Limits for Maximum Permissible Exposure (MPE)

| Frequency Range (MHz)                                 | Electric Field Strength (V/m) | Magnetic Field Strength (A/m) | Power Density (mW/cm <sup>2</sup> ) |
|-------------------------------------------------------|-------------------------------|-------------------------------|-------------------------------------|
| Limits for Occupational / controlled Exposures        |                               |                               |                                     |
| 300 - 1500                                            | --                            | --                            | F/300                               |
| 3.0-30                                                | 1842/f                        | 4.89/f                        | *(900/f <sup>2</sup> )              |
| 1500 – 100000                                         | --                            | --                            | 5.0                                 |
| Limits for General population / Uncontrolled Exposure |                               |                               |                                     |
| 300 - 1500                                            | --                            | --                            | F/1500                              |
| 1.34-30                                               | 824/f                         | 2.19/f                        | *(180f <sup>2</sup> )               |
| 1500 – 100000                                         | --                            | --                            | 1.0                                 |

F= Frequency in MHz

Friss Formula

Friss Transmission Formula:  $P_d = (P_{out} * G) / (4 * \pi * r^2)$

Where

$P_d$  = power density in mW/cm<sup>2</sup>

$P_{out}$  = output power to antenna in mW

G = gain of antenna in linear scale

$\pi$  = 3.1416

R = Distance between observation point and the center of radiator in cm

If we know the maximum gain of the antenna and the total output power to the antenna, through calculation, we will know MPE value at distance 20cm.



## 2.3 TEST RESULT

Tune up

| Mode | Detector | Power (dBuV/m)<br>@3m | Power (dBm) | Tune up Power |
|------|----------|-----------------------|-------------|---------------|
| NFC  | PK       | 49.51                 | -45.69      | -45±1dBm      |

Note: Power(dBm) = dBuV/m@3m -95.2

| Mode          | Detector | Tune up Power |
|---------------|----------|---------------|
| NB-IOT Band2  | AV       | 25±1dBm       |
| NB-IOT Band4  | AV       | 25±1dBm       |
| NB-IOT Band12 | AV       | 25±1dBm       |
| NB-IOT Band13 | AV       | 25±1dBm       |
| NB-IOT Band26 | AV       | 25±1dBm       |
| NB-IOT Band66 | AV       | 25±1dBm       |
| NB-IOT Band71 | AV       | 25±1dBm       |
| WiFi 2.4G     | AV       | 18±1dBm       |
| BLE           | AV       | 0±1dBm        |
| BT            | PK       | 4±1dBm        |

| Protocol | Fre. (MHz) | Separation distance (cm) | Max EIRP (dBm) | Max EIRP (mW) | Power Density (mW/cm <sup>2</sup> ) | Limit (mW/cm <sup>2</sup> ) | Ratio      | Result |
|----------|------------|--------------------------|----------------|---------------|-------------------------------------|-----------------------------|------------|--------|
| NFC      | 13.56      | 20                       | -45            | 0.000032      | 0.00000001                          | 0.979                       | 0.00000001 | Pass   |

| Protocol      | Fre. (MHz) | Separation distance (cm) | Tune up power (dBm) | ANT Gain (dBi) | Max EIRP (dBm) | Max EIRP (mW) | Power Density (mW/cm <sup>2</sup> ) | Limit (mW/cm <sup>2</sup> ) | Ratio  | Result |
|---------------|------------|--------------------------|---------------------|----------------|----------------|---------------|-------------------------------------|-----------------------------|--------|--------|
| NB-IOT Band2  | 1850       | 20                       | 26.00               | 1.87           | 27.87          | 612.4         | 0.122                               | 1                           | 0.1218 | Pass   |
| NB-IOT Band4  | 1710       | 20                       | 26.00               | 3.12           | 29.12          | 816.6         | 0.162                               | 1                           | 0.1625 | Pass   |
| NB-IOT Band12 | 699        | 20                       | 26.00               | 0.95           | 26.95          | 495.5         | 0.099                               | 0.466                       | 0.2115 | Pass   |
| NB-IOT Band13 | 777        | 20                       | 26.00               | 2.23           | 28.23          | 665.3         | 0.132                               | 0.518                       | 0.2555 | Pass   |





|               |      |    |       |      |       |       |        |       |        |      |
|---------------|------|----|-------|------|-------|-------|--------|-------|--------|------|
| NB-IOT Band26 | 814  | 20 | 26.00 | 1.4  | 27.40 | 549.5 | 0.109  | 0.543 | 0.2015 | Pass |
| NB-IOT Band66 | 1710 | 20 | 26.00 | 3.12 | 29.12 | 816.6 | 0.162  | 1     | 0.1625 | Pass |
| NB-IOT Band71 | 663  | 20 | 26.00 | -0.5 | 25.52 | 356.5 | 0.071  | 0.442 | 0.1604 | Pass |
| WiFi 2.4G     | 2462 | 20 | 19    | 3.7  | 22.7  | 186.2 | 0.039  | 1     | 0.039  | Pass |
| BLE           | 2480 | 20 | 1     | 3.7  | 4.7   | 2.95  | 0.0006 | 1     | 0.0006 | Pass |
| BT            | 2480 | 20 | 5     | 3.7  | 8.7   | 7.41  | 0.0015 | 1     | 0.0015 | Pass |

**Multiple transmission:**

NFC+ NB-IOT Band13+2.4G WiFi+BT= 0.00000001+ 0.2555+0.039+0.0015 =0.296 < 1

Note: 1. The Maximum power is less than the limit, complies with the exemption requirements.

2. ERP = EIRP - 2.15

※※※※※END OF THE REPORT※※※※※