

FCC ID: VBU-V2VBS23

To whom it may concern,

**[RFID & Detector part]**

We, UL Japan, Inc, hereby declare that Hotel Card Lock (Slim type), model: ALVBS (FCC ID: VBU-V2VBS23) of MIWA LOCK CO., LTD. is exempt from RF exposure SAR evaluation as its output power meets the exclusion limits stated in KDB 447498D01(v06).

KDB 447498D01(v06) has the following exclusion for portable devices:

The SAR test exclusion thresholds for below 100 MHz at test separation distances  $\leq 50$  mm are determined by step c) 1):

- c) For frequencies below 100 MHz, the following may be considered for SAR test exclusion:
  - 1) For test separation distances  $> 50$  mm and  $< 200$  mm, the power threshold at the corresponding test separation distance at 100 MHz in step b) is multiplied by  $[1 + \log(100 / f(\text{MHz}))]$
  - 2) For test separation distances  $\leq 50$  mm, the power threshold determined by the equation in c) 1) for 50 mm and 100 MHz is multiplied by  $\frac{1}{2}$

**[RFID]**

Numeric exemption threshold:

$P_{th}$ step c) [mW]:	1072.71
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Radio specification and use-case for this device are below:

$f$ [MHz]:	13.56
$d$ [mm]:	200
Maximum average output power [mW]:	0.000025

$f$  [MHz]: Operating frequency

$d$  [mm]: Minimum separation distance

Maximum average output power [mW]: timed-average power

This is less than  $P_{th}$  step c), so SAR test is exemption for this device.

**[Detector]**

Numeric exemption threshold:

$P_{th}$ step c) [mW]:	1072.71
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Radio specification and use-case for this device are below:

$f$ [MHz]:	13.56
$d$ [mm]:	200
Maximum average output power [mW]:	0.000015

$f$  [MHz]: Operating frequency

$d$  [mm]: Minimum separation distance

Maximum average output power [mW]: timed-average power

This is less than  $P_{th}$  step c), so SAR test is exemption for this device.

**[Bluetooth (LE) part]**

We, UL Japan, Inc, hereby declare that Hotel Card Lock (Slim type), model: ALVBS (FCC ID: VBU-V2VBS23) of MIWA LOCK CO., LTD. is exempt from RF exposure SAR evaluation because 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 according to the Code of Federal Regulation title 47 section 1.1307(b)(3)(i)(B). This method is used at separation distances  $d$  (cm) from 0.5 centimeters to 40 centimeters and at frequencies from 0.3 GHz to 6 GHz (inclusive) for single RF sources.  $P_{th}$  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

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

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

When the minimum separation distance is shorter than 0.5 cm, 0.5 cm is applied.

The SAR evaluation exemption threshold is calculated as below.

**[Bluetooth (LE)]**

$P_{th}$ (mW)	3060
$f$ (GHz)	2.48
$ERP_{20 \text{ cm}}$ (mW)	3060
$d$ (cm)	20.0

Conducted Power (dBm)	4.48
(mW)	2.81
Antenna Gain (dBi)	0.90
EIRP (dBm)	5.38
ERP (dBm)	3.24
(mW)	2.11

The Maximum time-averaged power or ERP whichever greater is 2.9 mW.  
(Rounded up to two decimals place)

Transmitters used in mobile exposure conditions for simultaneous transmission operations according to KDB447498 D04.

Value is calculated using the following formula according to the Code of Federal Regulation title 47 section 1.1307(b)(3)(ii)(B).

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

**[RFID part and Bluetooth (LE) part]**

$$0.000025 / 1072.71 + 2.11 / 3060 = 0.00000002 + 0.0007 = \mathbf{0.0007} < 1$$

**[Detector part and Bluetooth (LE) part]**

$$0.000015 / 1072.71 + 2.11 / 3060 = 0.00000001 + 0.0007 = \mathbf{0.0007} < 1$$

Thank you for your attention to this matter.

*T. Shimada*

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Engineer