

**RADIOCOMMUNICATIONS EQUIPMENT  
RF EXPOSURE EXEMPTION ASSESSMENT AGAINST  
  
FCC 47 CFR 1.1310 & 2.1093  
RADIOFREQUENCY RADIATION EXPOSURE LIMITS**

|                    |                                                                   |
|--------------------|-------------------------------------------------------------------|
| Client:            | PJM SYSTEMS PTY LTD                                               |
| Address:           | Unit 10, 3 Northward Street,<br>Upper Coomera QLD 4209, Australia |
| Report Number:     | 0830WAL_MARS-24AT_EMR(FCC)                                        |
| Date of Assessment | 17 May 2024                                                       |
| File Number:       | WAL230922                                                         |

|                        |                                 |
|------------------------|---------------------------------|
| Equipment Name:        | MARS-24AT                       |
| Equipment Model No:    | MARS-24AT                       |
| Equipment FCC ID:      | 2BEI3-MARS24AT                  |
| Equipment Description: | Multiple Antenna Reader Systems |

|         |                                                               |
|---------|---------------------------------------------------------------|
| Result: | <b>COMPLIES</b><br>(General Population/Uncontrolled Exposure) |
|---------|---------------------------------------------------------------|

|              |           |
|--------------|-----------|
| Assessed by: | Colin Gan |
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|              |               |
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| Approved by: | Daniel Blunck |
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|                |             |
|----------------|-------------|
| Date of Issue: | 30 Aug 2024 |
|----------------|-------------|

Results appearing herein relate only to the sample(s) assessed through the submitted test report(s).  
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| EQUIPMENT DETAILS               |                                                                  |
|---------------------------------|------------------------------------------------------------------|
| MANUFACTURER:                   | PJM SYSTEMS PTY LTD                                              |
| MODEL:                          | MARS-24AT                                                        |
| OPERATING FREQUENCY:            | 13.56 MHz                                                        |
| TRANSMITTER POWER INTO ANTENNA: | 43.80 dBm (24 W) <sup>Note 1</sup>                               |
| TYPE OF ANTENNA:                | 1.6mm FR4 PCB 4 turn rectangular RfID antenna <sup>Note 2</sup>  |
| ANTENNA GAIN:                   | -39 dBi <sup>Note 2</sup> ( $1.259 \times 10^{-4}$ numeric gain) |
| TRANSMISSION CAPABILITY:        | Single transmissions at a time only. <sup>Note 3</sup>           |

**Notes:**

1. Maximum conducted RF power data provided by client.
2. Data from ANTENNA 031-10-113 provided by client.
3. Although the equipment has 24 antenna ports client has stated that transmission is through one antenna at a time.

**RF Exposure Exemption Assessment**

**References**

- [1] CFR 47, Part 2.1091 Radiofrequency radiation exposure evaluation: mobile devices.
- [2] CFR 47, Part 2.1093 Radiofrequency radiation exposure evaluation: portable devices.
- [4] CFR 47, Part 1.1310 Radiofrequency radiation exposure limits.
- [5] 447498 D04 Interim General RF Exposure Guidance v01.

**Maximum Permissible Exposure (MPE)**

As specified in Table 1 (II) of 47 CFR 1.1310 – Limits for MPE, Limits for General Population / Uncontrolled Exposure:

| <i>Frequency Range (MHz)</i> | <i>Power Density (mW/cm<sup>2</sup>)</i> |
|------------------------------|------------------------------------------|
| 1.34 – 30                    | ( $180/f^2$ )                            |

*f* is frequency in MHz.

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## MPE Calculation

The Equipment Under Test (EUT) was supplied with transmitter antennas having maximum antenna gain as indicated in the Equipment Details above.

Results of MPE calculations for the EUT in standalone configuration is shown below.

### Formulas

$$E (V/m) = \frac{\sqrt{30 \times P \times G}}{d}$$

$$P_d (W/m) = \frac{E^2}{377}$$

$$\text{hence, } P_d (W/m) = \frac{30 \times P \times G}{377 \times d^2}$$

where

*E* – Electric Field

*P* – RF Output Power (W)

*G* – Numeric Antenna Gain

*d* – Separation Distance (m)

| Freq.<br>(MHz) | P<br>(W) | G<br>(Numeric)           | d<br>(m) | P <sub>d</sub><br>(mW/cm <sup>2</sup> ) | P <sub>d</sub> Limit<br>(mW/cm <sup>2</sup> ) |
|----------------|----------|--------------------------|----------|-----------------------------------------|-----------------------------------------------|
| 13.56          | 24       | 1.259 × 10 <sup>-4</sup> | 0.20     | 0.006                                   | 0.978                                         |

**Based on the MPE calculations, the EUT complies with the FCC limit with a separation distance of 20 cm between the transmission point (generally referring to the transmit antenna or structure) and the human body, which is to be clearly and prominently stated in the product manuals for the indicated maximum antenna gain.**

The above minimum safety distance is not valid for transmit antennas with higher antenna gains.

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### **Austest Summary and Recommendations**

The equipment complies with FCC 47 CFR 2.1091 requirements referencing 1.1310, Table 1 (II), Limits for Maximum Permissible Exposure (MPE), Limits for General Population / Uncontrolled Exposure, when the indicated minimum separation distance is adhered to.

If compliance is sought for model numbers other than those listed in the test report, then the compliance folder must hold additional documentation, demonstrating the equivalence of the products between the different model numbers.

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