

**47 CFR Part 2.1093**  
**Radiofrequency radiation exposure evaluation:**  
**Portable devices**

**Test Sample:** Collision Avoidance System  
Personnel Protection Head Unit

**Model Number:** PROD1061

**FCC ID:** YIY-PROD1061

**Tested For:** GE Mining Australia

**Report Number:** M170309-1R1

**Date of Issue:** 3 May 2017

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## 47 CFR Part 2.1093

### Radiofrequency radiation exposure evaluation: Portable devices

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**Test Sample:** Collision Avoidance System  
Personnel Protection Head Unit  
**Model Number:** PROD1061  
**FCC ID:** YIY-PROD1061  
**Manufacturer:** GE Mining Australia

**Tested for:** GE Mining Australia  
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**KDB:** **447498 D01 General RF Exposure Guidance v06**  
RF exposure procedures and equipment authorization policies for mobile and portable devices.

**Result:** The PROD1061 complied with the RF exposure requirements of 47 CFR Part 2.1093 and met the SAR exclusion requirements of KDB 447498 D01 clause 4.3.1.

**Test Date:** 29 March 2017

  
**Test Officer:** Emad Mansour  
EMC/EMR/SAR Engineer

  
**Checked by:** Chris Zombolas  
Technical Director  
EMC Technologies Pty Ltd

## 1 INTRODUCTION

This report is intended to demonstrate compliance of the PROD1061 Collision Avoidance System Personnel Protection Head Unit with the RF exposure requirements of 47 CFR Part 2.1093. Evaluation was performed in accordance with FCC KDB 447498 D01.

The test sample was provided by the Client. The conclusion herein is based on the information provided by the client.

## 2 GENERAL INFORMATION

(Information supplied by the Client)

The Equipment Under Test (EUT) was identified as follows:

|                                          |                                                                           |
|------------------------------------------|---------------------------------------------------------------------------|
| <b>Test Sample:</b>                      | Collision Avoidance System<br>CAS-GPS-PPU, Personnel Protection Head Unit |
| <b>Model Number:</b>                     | PROD1061                                                                  |
| <b>Operating Frequency Band:</b>         | 902 MHz to 928 MHz                                                        |
| <b>Frequency Range:</b>                  | Single Channel at 920 MHz                                                 |
| <b>Modulation:</b>                       | 4GFSK                                                                     |
| <b>Number of Channels:</b>               | 1                                                                         |
| <b>Nominal Output Power:</b>             | 10 dBm                                                                    |
| <b>Peak Output Power*:</b>               | +10.63 dBm (12 mW)                                                        |
| <b>Antenna:</b>                          | JOHANSON TECHNOLOGY<br>0915AT43A0026                                      |
| <b>Maximum Gain of Antenna Assembly:</b> | -1.0 dBi                                                                  |
| <b>DC Supply Port Voltage Rating:</b>    | 3.7 VDC (Internal Li-Ion battery)                                         |
| <b>Operating Temperature Range:</b>      | -20 °C to 55 °C                                                           |

\*Note: Peak output power was measured. Refer to report M161022-5R1, section 3.6.1 issued by EMC Technologies.

## 3 TEST SAMPLE DESCRIPTION

The CAS-GPS PPU is a two part 'wearable technology' device designed to give CAS-GPS (Collision Awareness System) enabled fleet situational awareness of the device wearer. The CAS-GPS PPU will provide warnings of potentially unsafe interactions between personnel and machinery. The CAS-GPS PPU utilises a GNSS receiver for global positioning, Triaxially Diversified Magnetostatic Pick-Up for near field sensing in low permeability atmospheres and a short range digital transceiver for fleet and remote alarm connectivity.

#### 4 SAR TEST EXCLUSION THRESHOLD – 100 MHZ TO 6 GHZ

The 1-g and 10-g SAR test exclusion thresholds for 100 MHz to 6 GHz at test separation distances  $\leq 50$  mm are determined by:

1-g Head or body:

$$\frac{\text{max. power of channel, including tuneup tolerance (mW)}}{\text{min. test separation distance (mm)}} \times \sqrt{f(\text{GHz})} \leq 3.0$$

10-g Extremity:

$$\frac{\text{max. power of channel, including tuneup tolerance (mW)}}{\text{min. test separation distance (mm)}} \times \sqrt{f(\text{GHz})} \leq 7.5$$

Where

- Minimum test separation distance (*mm*): The minimum test separation distance is determined by the smallest distance from the antenna and radiating structures to the outer surface of the device
- Maximum power of channel (*mW*): Time-averaged maximum conducted output power
- $f(\text{GHz})$  is the RF channel transmit frequency in GHz
- Power and distance are rounded to the nearest mW and mm before calculation
- The result is rounded to one decimal place for comparison
- When the minimum test separation distance is  $< 5$  mm, a distance of 5 mm is applied.

The following table gives the maximum power at different separation distances to meet the 1-g head or body SAR evaluation exclusion threshold.

| Freq. (MHz) | Separation Dist. (mm) |    |     |     |     |                                            |
|-------------|-----------------------|----|-----|-----|-----|--------------------------------------------|
|             | 5                     | 10 | 15  | 20  | 25  |                                            |
| 150         | 39                    | 77 | 116 | 155 | 194 | SAR Test<br>Exclusion<br>Threshold<br>(mW) |
| 300         | 27                    | 55 | 82  | 110 | 137 |                                            |
| 450         | 22                    | 45 | 67  | 89  | 112 |                                            |
| 435         | 16                    | 33 | 49  | 66  | 82  |                                            |
| 900         | 16                    | 32 | 47  | 63  | 79  |                                            |
| 1500        | 12                    | 24 | 37  | 49  | 61  |                                            |
| 1900        | 11                    | 22 | 33  | 44  | 54  |                                            |
| 2450        | 10                    | 19 | 29  | 38  | 48  |                                            |
| 3600        | 8                     | 16 | 24  | 32  | 40  |                                            |
| 5200        | 7                     | 13 | 20  | 26  | 33  |                                            |
| 5400        | 6                     | 13 | 19  | 26  | 32  |                                            |
| 5800        | 6                     | 12 | 19  | 25  | 31  |                                            |

## 5 EVALUATION RESULT

Compliance with the RF exposure requirements for the PROD1061 was demonstrated by meeting the SAR evaluation exclusion threshold.

Max. power: 12 mW  
Tune-up tolerance: 0 mW, it was not possible to have a higher power setting.  
Min. separation distance: 5 mm  
Frequency: 0.920 GHz

$$\frac{\text{max. power of channel, including tuneup tolerance (mW)}}{\text{min. test separation distance (mm)}} \times \sqrt{f(\text{GHz})} \leq 3.0$$

$$\frac{12 \text{ (mW)}}{5 \text{ (mm)}} \times \sqrt{0.92 \text{ (GHz)}} = 2.3$$

**Exempt from further SAR measurement**

## 6 CONCLUSION

The PROD1061 Collision Avoidance System, Personnel Protection Head Unit evaluated on behalf of GE Mining Australia complied with the RF exposure requirements of 47 CFR Part 2.1093 and met the SAR exclusion requirements of KDB 447498 D01 clause 4.3.1.