EMC Technologies Pty Ltd
ABN 82 057 105 549
157 Harrick Road, Keilor Park
Victoria 3042, Australia

Telephone: +61 3 9365 1000
Email: sales@emctech.com.au
Web: www.emctech.com.au

47 CFR Part 2.1093
Radiofrequency radiation exposure evaluation: Portable devices

Test Sample:	Collison 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

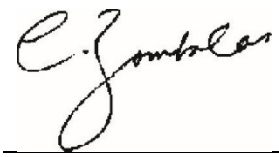
Contents

47 CFR Part 2.1093
Radiofrequency radiation exposure evaluation: Portable devices

Issued by: EMC TECHNOLOGIES PTY. LTD.,
176 Harrick Road, Keilor Park, VIC 3042, Australia.
Phone: +61 3 9365 1000, **E-mail:** sales@emctech.com.au, **Web:** www.emctech.com.au
FCC registration number: 90560 and ISED Canada iOATS number: IC 3569B

Test Sample:	Collison Avoidance System Personnel Protection Head Unit
Model Number:	PROD1061
FCC ID:	YIY-PROD1061
Manufacturer:	GE Mining Australia
Tested for:	GE Mining Australia
Address:	3 Co-Wyn Close, Fountaindale, NSW, 2258, Australia
Phone:	+612 4336 1800
Contact:	Neil Mosley
Email:	neil.mosley@ge.com
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 Collison 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:

Test Sample:	Collison Avoidance System CAS-GPS-PPU, Personnel Protection Head Unit
Model Number:	PROD1061
Operating Frequency Band:	902 MHz to 928 MHz
Frequency Range:	Single Channel at 920 MHz
Modulation:	4GFSK
Number of Channels:	1
Nominal Output Power:	10 dBm
Peak Output Power*:	+10.63 dBm (12 mW)
Antenna:	JOHANSON TECHNOLOGY 0915AT43A0026
Maximum Gain of Antenna Assembly:	-1.0 dBi
DC Supply Port Voltage Rating:	3.7 VDC (Internal Li-Ion battery)
Operating Temperature Range:	-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 Magnetoquasistatic 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 **≤ 50 mm** are determined by:

1-g Head or body:

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

10-g Extremity:

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

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
- $f(GHz)$ 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)					SAR Test Exclusion Threshold (mW)
	5	10	15	20	25	
150	39	77	116	155	194	
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

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

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

Exempt from further SAR measurement

6 CONCLUSION

The PROD1061 Collison 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.