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SAR Test Report

Report Number: M160204F

Test Sample: GE Mining Personnel Tag Transmitter

Model Number: PROD1060-2

Tested For: GE Mining Australia

Date of Issue: 20th February 2017

Table: Test Report

Table of Revisions				
Report Number	Revision Number	Description	Pages affected	Date
M160204F	1	Original	N/A	17 Feb. 2017
M160204F	2	Corrected typos pages 2 and 14. Pages 5 and 14 tables added. Tuneup power revised and SAR results updated conducrted power results added.	2, 14, 5	5th April 2017

CONTENTS

SAR EVALUATION

GE Mining Personnel Tag Transmitter, **Model:** PROD1060-2 **Report Number:** M160204F

1.0 GENERAL INFORMATION

Test Sample:	GE Mining Personnel Tag Transmitter (Belt Unit)
Model Number:	PROD1060-2
Serial Number:	Sample1: 060616100003, Sample 2: 060616100004
FCC ID:	YIY-PROD10602
IC ID:	8903A-PROD10602
Hardware Version:	Version A
Software Version:	Firmware ver. 1.3.9
Manufacturer:	GE Mining
Device Category:	Portable Transmitter
Test Device:	Production Unit / Prototype Sample
RF exposure Category:	General Public/Unaware user
Tested for:	GE Mining Australia
Address:	3 Co-Wynn Close, Fountaindale NSW 2258
Contact:	Steve Clifton
Phone:	+61 2 4336 1800
Email:	steven.clifton@ge.com
Tested for:	GE Mining Australia
FCC KDB Procedures:	447498 D01 General RF Exposure Guidance v06 865664 D01 SAR Measurement 100 MHz to 6 GHz v01r04 865664 D02 RF Exposure Reporting v01r02
Test Standard/s:	Radio Frequency Exposure Compliance of Radiocommunication Apparatus (All Frequency Bands) RSS-102 **EN 62209-2:2010** Human exposure to radio frequency fields from hand-held and bodymounted wireless communication devices. Human models, instrumentation, and procedures. **Part 2**: Procedure to determine the specific absorption rate (SAR) for wireless communication devices used in close proximity to the human body (frequency range of 30 MHz to 6 GHz)
IEEE 1528: 2013	Recommended Practice for Determining the Peak Spatial-Average Specific Absorption Rate (SAR) in the Human Head Due to Wireless Communications Devices: Measurement Techniques.
Statement Of Compliance:	The GE Mining Personnel Tag Transmitter, model PROD1060-2. Complied with the FCC General public/uncontrolled RF exposure limits of 1.6mW/g per requirements of 47CFR2.1093(d). It also complied with ISED RSS-102 requirements.
Highest Reported SAR:	900 MHz Band – 0.003 mW/g
Test Dates:	10th February 2017
Test Officer:	 **Peter Jakubiec**
Authorised Signature:	 **Chris Zombolas** **Technical Director**

2.0 DESCRIPTION OF DEVICE

2.1 Description of Test Sample

The device tested was a GE Mining Personnel Tag Transmitter (Belt Unit), Model: PROD1060-2 operating in 900 MHz frequency band. It will be referred to as the device under test (DUT) throughout this report. The DUT has two internal integral fixed length antennas that do not transmit simultaneously and it was tested in the Belt Clip configurations of the phantom.

Table: DUT (Device Under Test) Parameters

Operating Mode during Testing	: Continuous Wave 100% duty cycle
Operating Mode production sample	: 0.3% (980µS packet duration every 320mS repetition)
Modulation:	: FM
Device Power Rating for test sample and identical production unit	: 20 dBm
Device Dimensions (LxWxH)	: 100 x 75 x 45 mm
Antenna type	PCB antennas: PC91.07.0100A.dB
Applicable Head Configurations	: None
Applicable Body Configurations	: Belt Clip Position
Battery Options	: 3.6V 1860 mAh Li-ion Battery

2.2 Test sample Accessories

2.2.1 Battery Types

SAR measurements were performed with the standard 3.6 V battery.

2.2.2 Belt Clip

One type of metal belt clip is sold with the device. The belt clip is fixed to the back of the device and provides a spacing of 5 mm between the device and flat phantom. This metal belt-clip was attached to the device during testing in the Belt-Clip position.

2.3 Test Signal, Frequency and Output Power

The DUT was provided by GE Mining Australia, for this evaluation. It operates in the 900 MHz frequency band. The transmitter was configured into a test mode that ensured a continuous RF transmission for the duration of each SAR scan. The device transmission characteristics were also monitored during testing to confirm the device was transmitting continuously. There were no wires or other connections to the DUT during the SAR measurements.

Table: Test Frequencies

Frequency	Market Region	Max. Power (dBm)
920 MHz	Region 2 (North America)	20

2.4 Conducted Power Measurements

Table: Conducted power measured at RF port

Frequency	Antenna	Max. Power (dBm)
920 MHz	Right (Vertically polarised)	19.46
920 MHz	Top (Horizontally polarised)	19.49

2.5 Battery Status

The DUT battery was fully charged prior to commencement of each measurement. The battery condition was monitored by measuring the RF power at a defined position inside the phantom before the commencement of each test and again after the completion of the test.

2.6 Details of Test Laboratory

2.6.1 Location

EMC Technologies Pty Ltd
176 Harrick Road
Keilor Park, (Melbourne) Victoria
Australia 3042

Telephone: +61 3 9365 1000
Facsimile: +61 3 9331 7455
email: melb@emctech.com.au
website: www.emctech.com.au

2.6.2 Accreditations

EMC Technologies Pty. Ltd. is accredited by the National Association of Testing Authorities, Australia (NATA). **NATA Accredited Laboratory Number: 5292**

EMC Technologies Pty Ltd is NATA accredited for the following standards:

AS/NZS 2772.2 2011:	RF and microwave radiation hazard measurement
ACMA:	Radio communications (Electromagnetic Radiation - Human Exposure) Standard 2014
EN 50360: 2001	Product standard to demonstrate the compliance of mobile phones with the basic restrictions related to human exposure to electromagnetic fields (300 MHz – 3 GHz)
EN 62209-1:2006	Human Exposure to radio frequency fields from hand-held and body-mounted wireless communication devices - Human models instrumentation and procedures. **Part 1:** Procedure to determine the specific absorption rate (SAR) for hand-held devices used in close proximity to the ear (300 MHz to 3 GHz)
EN 62209-2:2010	Human Exposure to radio frequency fields from hand-held and body-mounted wireless communication devices - Human models instrumentation and procedures **Part 2:** Procedure to determine the specific absorption rate (SAR) for wireless communication devices used in close proximity to the human body (frequency range of 30 MHz to 6 GHz
IEEE 1528: 2013	Recommended Practice for Determining the Peak Spatial-Average Specific Absorption Rate (SAR) in the Human Head Due to Wireless Communications Devices: Measurement Techniques.

Refer to NATA website www.nata.asn.au for the full scope of accreditation.

2.6.3 Environmental Factors

The measurements were performed in a shielded room with no background network signals. The temperature in the laboratory was controlled to within 20 ± 1 °C, the humidity was 53 %. The liquid parameters were measured prior to the commencement of the tests. Tests were performed to check that reflections within the environment did not influence the SAR measurements. The noise floor of the DASY5 SAR measurement system using ET3DV6 E-field probe is less than 5μV in both air and liquid mediums.

3. CALIBRATION AND VALIDATION PROCEDURES AND DATA

Prior to the SAR assessment, the system validation kit was used to verify that the DASY5 was operating within its specifications. The validation was performed at 900 MHz with the SPEAG calibrated dipole.

The validation dipoles are highly symmetric and matched at the centre frequency for the specified liquid and distance to the phantom. The accurate distance between the liquid surface and the dipole centre is achieved with a distance holder that snaps onto the dipole.

System validation is performed by feeding a known power level into a reference dipole, set at a known distance from the phantom. The measured SAR is compared to the theoretically derived level.

2.6.4 System Check Results @ 900 MHz

The following table lists the results of the System Check. The forward power into the reference antenna for each SAR System Check was adjusted to 250mW.

2.6.5 Deviation from reference validation values

The reference SAR values are derived using a reference dipole and flat phantom suitable at the frequencies listed below. These reference SAR values are obtained from the IEEE Std 1528 and are normalized to 1W.

The SPEAG calibration reference SAR value is the SAR validation result obtained in a specific dielectric liquid using the validation dipole during calibration. The measured one-gram SAR should be within 10% of the expected target reference values shown in table below.

Table: Deviation from reference validation values

Date	**Frequency (MHz)**	**Measured SAR 1g (input power = 1000mW)**	**Measured SAR 1g (Normalized to 1W)**	**SPEAG Calibration Reference SAR Value 1g (mW/g)**	**Deviation From SPEAG 1g (%)**	IEEE Std 1528 reference SAR value 1g (mW/g)	Deviation From IEEE (%)	**Last Validation Date**
10th Feb 2017	900	2.72	10.88	10.7	1.68	-	-	17th June 2016

NOTE: All reference validation values are referenced to 1W input power.

2.6.6 Liquid Temperature and Humidity

The humidity and dielectric/ambient temperatures are recorded during the assessment of the tissue material dielectric parameters. The difference between the ambient temperature of the liquid during the dielectric measurement and the temperature during tests was less than |2|°C.

Table: Temperature and Humidity recorded for each day

Date	Ambient Temperature (°C)	Liquid Temperature (°C)	Humidity (%)
10th February 2017	19.6	19.3	53

3.0 SAR MEASUREMENT PROCEDURE USING DASY5

The SAR evaluation was performed with the SPEAG DASY5 system. A summary of the procedure follows:

a) A measurement of the SAR value at a fixed location is used as a reference value for assessing the power drop of the DUT. The SAR at this point is measured at the start of the test and then again at the end of the test.

b) The SAR distribution at the exposed side of the head or the flat section of the phantom is measured at a distance of 4.0 mm from the inner surface of the shell. The area covers the entire dimension of the DUT and the horizontal grid spacing is 20 mm x 20 mm. The actual largest Area Scan has dimensions of 120 mm x 180 mm surrounding the test device. Based on this data, the area of the maximum absorption is determined by Spline interpolation.

c) Around this point, a volume of 32 mm x 32 mm x 30 mm is assessed by measuring 5 x 5 x 7 points. On the basis of this data set, the spatial peak SAR value is evaluated with the following procedure:

   (i) The data at the surface are extrapolated, since the centre of the dipoles is 2.7 mm away from the tip of the probe and the distance between the surface and the lowest measuring point is 4 mm. The extrapolation is based on a least square algorithm. A polynomial of the fourth order is calculated through the points in z-axes. This polynomial is then used to evaluate the points between the surface and the probe tip.

   (ii) The maximum interpolated value is searched with a straightforward algorithm. Around this maximum the SAR values averaged over the spatial volumes (1 g and 10 g) are computed using the 3D-Spline interpolation algorithm. The 3D-Spline is composed of three one-dimensional splines with the “Not a knot”- condition (in x, y and z-direction). The volume is integrated with the trapezoidal – algorithm. One thousand points (10 x 10 x 10) are interpolated to calculate the averages.

   (iii) All neighbouring volumes are evaluated until no neighbouring volume with a higher average value is found.

(iv) The SAR value at the same location as in Step (a) is again measured

4.0 MEASUREMENT UNCERTAINTY

The uncertainty analysis is based on the template listed in the IEEE Std 1528 for both Handset SAR tests and System Check uncertainty. The measurement uncertainty of a specific device is evaluated independently and the total uncertainty for both evaluations (95% confidence level) must be less than 30%.

Table: Uncertainty Budget for DASY5 Version 52 (Build 1258) – DUT SAR test

Error Description	Uncert. Value	Prob. Dist.	Div.	C_i (1g)	C_i (10g)	1g u_i	10g u_i	v_i
Measurement System								
Probe Calibration	6	N	1.00	1	1	6.00	6.00	∞
Axial Isotropy	4.7	R	1.73	0.7	0.7	1.90	1.90	∞
Hemispherical Isotropy	9.6	R	1.73	0.7	0.7	3.88	3.88	∞
Boundary Effects	1	R	1.73	1	1	0.58	0.58	∞
Linearity	4.7	R	1.73	1	1	2.71	2.71	∞
System Detection Limits	1	R	1.73	1	1	0.58	0.58	∞
Modulation response	2.4	R	1.73	1	1	1.39	1.39	∞
Readout Electronics	0.3	N	1.00	1	1	0.30	0.30	∞
Response Time	0.8	R	1.73	1	1	0.46	0.46	∞
Integration Time	2.6	R	1.73	1	1	1.50	1.50	∞
RF Ambient Noise	3	R	1.73	1	1	1.73	1.73	∞
RF Ambient Reflections	3	R	1.73	1	1	1.73	1.73	∞
Probe Positioner	0.4	R	1.73	1	1	0.23	0.23	∞
Probe Positioning	2.9	R	1.73	1	1	1.67	1.67	∞
Post Processing	2	R	1.73	1	1	1.15	1.15	∞
Test Sample Related								
Power Scaling	0	R	1.73	1	1	0.00	0.00	∞
Test Sample Positioning	2.9	N	1.00	1	1	2.90	2.90	145
Device Holder Uncertainty	3.6	N	1.00	1	1	3.60	3.60	5
Output Power Variation – SAR Drift Measurement	2.73	R	1.73	1	1	1.57	1.57	∞
Phantom and Setup								
Phantom Uncertainty	7.6	R	1.73	1	1	4.39	4.39	∞
Liquid Conductivity – Deviation from target values	5	R	1.73	0.64	0.43	1.85	1.24	∞
Liquid Permittivity – Deviation from target values	5	R	1.73	0.6	0.49	1.73	1.41	∞
Liquid Conductivity – Measurement uncertainty	2.5	N	1.00	0.64	0.71	1.60	1.78	∞
Liquid Permittivity – Measurement uncertainty	2.5	N	1.00	0.6	0.26	1.50	0.65	∞
Temp.unc. - Conductivity	3.4	R	1.73	0.78	0.71	0.77	0.70	∞
Temp. unc. - Permittivity	0.4	R	1.73	0.23	0.26	0.04	0.05	∞
Combined standard Uncertainty (u_c)						11.50	11.32	
Expanded Uncertainty (95% CONFIDENCE LEVEL)			k= 2			23.00	22.63	

Estimated total measurement uncertainty for the DASY5 measurement system was ±11.50%. The expanded uncertainty (K = 2) was assessed to be ±23.00% based on 95% confidence level. The uncertainty is not added to the measurement result.

Table: Uncertainty Budget for DASY5 Version 52 (Build 1258) – DUT SAR test
IEC 62209-2 and 62209-1 UNCERTAINTY FOR RSS-102

Error Description	Uncert. Value	Prob. Dist.	Div.	C_i (1g)	C_i (10g)	1g u_i	10g u_i	v_i
Measurement System								
Probe Calibration	6	N	1.00	1	1	6.00	6.00	∞
Axial Isotropy	4.7	R	1.73	0.7	0.7	1.90	1.90	∞
Hemispherical Isotropy	9.6	R	1.73	0.7	0.7	3.88	3.88	∞
Boundary Effects	1	R	1.73	1	1	0.58	0.58	∞
Linearity	4.7	R	1.73	1	1	2.71	2.71	∞
System Detection Limits	1	R	1.73	1	1	0.58	0.58	∞
Modulation response	2.4	R	1.73	1	1	1.39	1.39	∞
Readout Electronics	0.3	N	1.00	1	1	0.30	0.30	∞
Response Time	0.8	R	1.73	1	1	0.46	0.46	∞
Integration Time	2.6	R	1.73	1	1	1.50	1.50	∞
RF Ambient Noise	3	R	1.73	1	1	1.73	1.73	∞
RF Ambient Reflections	3	R	1.73	1	1	1.73	1.73	∞
Probe Positioner	0.4	R	1.73	1	1	0.23	0.23	∞
Probe Positioning	2.9	R	1.73	1	1	1.67	1.67	∞
Post Processing	2	R	1.73	1	1	1.15	1.15	∞
Test Sample Related								
Power Scaling	0	R	1.73	1	1	0.00	0.00	∞
Test Sample Positioning	2.9	N	1.00	1	1	2.90	2.90	145
Device Holder Uncertainty	3.6	N	1.00	1	1	3.60	3.60	∞
Output Power Variation – SAR Drift Measurement	2.73	R	1.73	1	1	1.57	1.57	∞
Phantom and Setup								
Phantom Uncertainty	7.6	R	1.73	1	1	4.39	4.39	∞
Liquid Conductivity – Deviation from target values	5	R	1.73	0.64	0.43	1.85	1.24	∞
Liquid Permittivity – Deviation from target values	5	R	1.73	0.6	0.49	1.73	1.41	∞
Liquid Conductivity – Measurement uncertainty	2.5	N	1.00	0.64	0.43	1.60	1.08	∞
Liquid Permittivity – Measurement uncertainty	2.5	N	1.00	0.6	0.49	1.50	1.23	∞
Temp.unc. - Conductivity	3.4	R	1.73	0.78	0.71	1.53	1.39	∞
Temp. unc. - Permittivity	0.4	R	1.73	0.23	0.26	0.05	0.06	∞
Combined standard Uncertainty (u_c)						11.58	11.34	
Expanded Uncertainty (95% CONFIDENCE LEVEL)			k= 2			23.15	22.68	

Estimated total measurement uncertainty for the DASY5 measurement system was ±11.58%. The expanded uncertainty (K = 2) was assessed to be ±23.15% based on 95% confidence level. The uncertainty is not added to the measurement result.

Table: Uncertainty Budget for DASY5 Version 52 (Build 1258)- System Check

Error Description	Uncert. Value	Prob. Dist.	Div.	C_i (1g)	C_i (10g)	1g u_i	10g u_i	v_i
Measurement System								
Probe Calibration	6	N	1.00	1	1	6.00	6.00	∞
Axial Isotropy	4.7	R	1.73	1	1	2.71	2.71	∞
Hemispherical Isotropy	9.6	R	1.73	0	0	0.00	0.00	∞
Boundary Effects	1	R	1.73	1	1	0.58	0.58	∞
Linearity	4.7	R	1.73	1	1	2.71	2.71	∞
System Detection Limits	1	R	1.73	1	1	0.58	0.58	∞
Modulation response	0	R	1.73	1	1	0.00	0.00	∞
Readout Electronics	0.3	N	1.00	1	1	0.30	0.30	∞
Response Time	0	R	1.73	1	1	0.00	0.00	∞
Integration Time	0	R	1.73	1	1	0.00	0.00	∞
RF Ambient Noise	1	R	1.73	1	1	0.58	0.58	∞
RF Ambient Reflections	1	R	1.73	1	1	0.58	0.58	∞
Probe Positioner	0.8	R	1.73	1	1	0.46	0.46	∞
Probe Positioning	6.7	R	1.73	1	1	3.87	3.87	∞
Post Processing	2	R	1.73	1	1	1.15	1.15	∞
Dipole Related								
Deviation of exp. dipole	5.5	R	1.73	1	1	3.18	3.18	##
Dipole Axis to Liquid Dist.	2	R	1.73	1	1	1.15	1.15	##
Input power & SAR drift	3.40	R	1.73	1	1	1.96	1.96	∞
Phantom and Setup								
Phantom Uncertainty	4	R	1.73	1	1	2.31	2.31	∞
Liquid Conductivity – Deviation from target values	5	R	1.73	0.64	0.43	1.85	1.24	∞
Liquid Permittivity – Deviation from target values	5	R	1.73	0.6	0.49	1.73	1.41	∞
Liquid Conductivity – Measurement uncertainty	2.5	N	1.00	0.78	0.71	1.95	1.78	∞
Liquid Permittivity – Measurement uncertainty	2.5	N	1.00	0.26	0.26	0.65	0.65	∞
Temp.unc. - Conductivity	3.4	R	1.73	0.78	0.71	0.77	0.70	∞
Temp. unc. - Permittivity	0.4	R	1.73	0.23	0.26	0.04	0.05	∞
Combined standard Uncertainty (u_c)						10.02	9.84	
Expanded Uncertainty (95% CONFIDENCE LEVEL)			k= 2			20.05	19.68	

Estimated total measurement uncertainty for the DASY5 measurement system was ±10.02%. The expanded uncertainty (K = 2) was assessed to be ±20.05% based on 95% confidence level. The uncertainty is not added to the System Check measurement result.

5.0 EQUIPMENT LIST AND CALIBRATION DETAILS

Table: SPEAG DASY5 Version 52 (Build 1258)

Equipment Type	Manufacturer	Model Number	Serial Number	Calibration Due	Used For this Test?
Robot - Six Axes	Staubli	RX90BL	N/A	Not applicable	✓
Robot Remote Control	SPEAG	CS7MB	RX90B	Not applicable	✓
SAM Phantom	SPEAG	N/A	1260	Not applicable	
SAM Phantom	SPEAG	N/A	1060	Not applicable	✓
Flat Phantom	AndreT	10.1	P 10.1	Not Applicable	
Flat Phantom	AndreT	9.1	P 9.1	Not Applicable	
Flat Phantom	SPEAG	ELI 4.0	1101	Not Applicable	
Data Acquisition Electronics	SPEAG	DAE3 V1	359	07-June-2017	
Data Acquisition Electronics	SPEAG	DAE3 V1	442	06-Dec-2017	✓
Probe E-Field - Dummy	SPEAG	DP1	N/A	Not applicable	
Probe E-Field	SPEAG	ET3DV6	1380	08-Dec-2017	✓
Probe E-Field	SPEAG	ET3DV6	1377	15-June-2017	
Probe E-Field	SPEAG	ES3DV6	3029	Not Used	
Probe E-Field	SPEAG	EX3DV4	3956	15-June-2016	
Probe E-Field	SPEAG	EX3DV4	7358	09-Dec-2017	
Validation Source 150 MHz	SPEAG	CLA150	4003	06-Dec-2019	
Antenna Dipole 300 MHz	SPEAG	D300V3	1012	09-Dec-2018	
Antenna Dipole 450 MHz	SPEAG	D450V3	1074	09-Dec-2018	
Antenna Dipole 600 MHz	SPEAG	D600V3	1008	16-Oct-2018	
Antenna Dipole 750 MHz	SPEAG	D750V2	1051	08-Dec-2019	
Antenna Dipole 900 MHz	SPEAG	D900V2	047	09-Dec-2017	✓
Antenna Dipole 1640 MHz	SPEAG	D1640V2	314	05-Dec-2017	
Antenna Dipole 1800 MHz	SPEAG	D1800V2	242	05-Dec-2017	
Antenna Dipole 1950 MHz	SPEAG	D1950V3	1113	09-Dec-2018	
Antenna Dipole 2300 MHz	SPEAG	D2300V2	1032	10-Dec-2018	
Antenna Dipole 2450 MHz	SPEAG	D2450V2	724	10-Dec-2018	
Antenna Dipole 2600 MHz	SPEAG	D2600V2	1044	09-Dec-2019	
Antenna Dipole 3500 MHz	SPEAG	D3500V2	1002	13-July-2013	
Antenna Dipole 5600 MHz	SPEAG	D5GHzV2	1008	02-Dec-2019	
RF Amplifier	EIN	603L	N/A	*In test	
RF Amplifier	Mini-Circuits	ZHL-42	N/A	*In test	✓
RF Amplifier	Mini-Circuits	ZVE-8G	N/A	*In test	
Synthesized signal generator	Hewlett Packard	86630A	3250A00328	*In test	✓
RF Power Meter	Hewlett Packard	437B	3125012786	*In test	✓
RF Power Sensor 0.01 - 18 GHz	Hewlett Packard	8481H	1545A01634	18-Oct-2017	✓
RF Power Meter	Rohde & Schwarz	NRP	101415	16-Oct-2016	
RF Power Sensor	Rohde & Schwarz	NRP - Z81	100174	19-Oct-2017	
RF Power Meter Dual	Hewlett Packard	435A	1733A05847	*In test	✓
RF Power Sensor	Hewlett Packard	8482A	2349A10114	*In test	✓
Network Analyser	Hewlett Packard	8714B	GB3510035	15-Nov-2017	✓
Network Analyser	Hewlett Packard	8753ES	JP39240130	03-Dec-2016	
Network Analyser	Hewlett Packard	8753D	3410A04122	04-Feb-2017	
Dual Directional Coupler	Hewlett Packard	778D	1144 04700	*In test	
Dual Directional Coupler	NARDA	3022	75453	*In test	✓
Thermometer	Digitech	QM7217	T-103	31-Aug-2017	✓
Thermometer	Digitech	QM7217	T-104	15-Jan-2017	

* Calibrated during the test for the relevant parameters.

6.0 SAR TEST METHOD

6.1 Description of the Test Positions (Face Frontal and Belt Clip)

SAR measurements were performed in the “Belt Clip” position. The “Belt Clip” position was measured in the flat section of the SPEAG SAM phantom.
See Appendix A for photos of test positions.

6.1.1 “Belt Clip” Position

The device was tested in the (2.00 mm) flat section of the SPEAG phantom for the “Belt Clip” position. A belt clip maintained a distance of approximately 5 mm between the back of the device and the flat phantom. The Transceiver was placed at the flat section of the phantom and suspended until the Belt Clip touched the phantom. The belt clip was made of metal.

6.2 List of All Test Cases (Antenna In/Out, Test Frequencies, User Modes)

The device has a fixed antenna. The SAR was measured at three test channels with the test sample operating at maximum power, as specified in section 2.3.

6.3 FCC RF Exposure Limits for Occupational/ Controlled Exposure

Spatial Peak SAR Limits For:	
Partial-Body:	8.0 mW/g (averaged over any 1g cube of tissue)
Hands, Wrists, Feet and Ankles:	20.0 mW/g (averaged over 10g cube of tissue)

6.4 FCC RF Exposure Limits for Un-controlled/Non–occupational

Spatial Peak SAR Limits For:	
Partial-Body:	1.6 mW/g (averaged over any 1g cube of tissue)
Hands, Wrists, Feet and Ankles:	4.0 mW/g (averaged over 10g cube of tissue)

7.0 SAR MEASUREMENT RESULTS

The SAR values averaged over 1g tissue mass were determined for the sample device for the Belt Clip configuration of the phantom.

Table: SAR MEASUREMENT RESULTS – Belt Clip positions 920 MHz

Test Position	Plot No.	Test Mode	Test Ch.	Test Freq. (MHz)	SAR (1g) mW/g	Drift (dB)	∈r (target 55.0 ±5% 52.3 to 57.8)	σ (target 1.05 ±5% 1.00 to 1.10)	Tune –Up SAR (mW/g)
Belt Clip Sample 1 Antenna (Right)	1.	CW	3	920	0.00129	-0.09	53.7	1.067	0.001
Belt Clip Sample 2 Antenna (Top)	2.	CW	3	920	**0.00155**	-0.12	53.7	1.067	0.002
System Check	3.	CW	1	900	2.72	-0.08	53.92	1.046	-

Note: The uncertainty of the system (± 23.00 %) has not been added to the results.

Table: MEASUREMENT RESULTS – Liquid parameters 900 MHz Band

∈r (target)	σ (target)	∈r Measured on 10 Feb. 2017	σ Measured on 10 Feb. 2017
55.0 ±5% 52.3 to 57.8	**1.05 ±5% 1.00 to 1.10**	53.7	1.067
55.0 ±5% 52.3 to 57.8	**1.05 ±5% 1.00 to 1.10**	53.7	1.067
55.0 ±5% 52.3 to 57.8	**1.05 ±5% 1.00 to 1.10**	53.92	1.046

8.0 COMPLIANCE STATEMENT

The GE Mining Personnel Tag Transmitter model PROD1060-2 was tested on behalf of GE Mining Australia. It complied with the FCC SAR requirements. It also complied with IC RSS-102 requirements.

The highest Measured SAR level was 0.00155 mW/g for a 1g cube. The manufacturer's tune up power is stated to be 100 mW. Scaling the SAR value, the maximum Reported SAR value is **0.002 mW/g**. This value was measured in the "Belt Clip" position and antenna "Top" of Sample 2, and was below the uncontrolled limit of 1.6 mW/g, even taking into account the measurement uncertainty of 23.00 %.
The SAR test Variability check was not required because the highest measured SAR was less than 0.8 mW/g.