EMC Technologies

Global Product Certification
EMC-EMF-Safety Approvals

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SAR Test Report

Report Number: M170410F

Test Sample:	Lone Worker Personal Safety Monitoring Transmitter
Model:	G7x
FCC ID:	W77G7X
ISED ID:	8255A-G7X
Tested For:	Blackline Safety Corp
Date of Issue:	14th July 2017

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Table 1

Table of Revisions				
Report Number	Revision Number	Description	Pages affected	Date
M170410F	1	Original	N/A	28th April 2017
M170410F	2	Model number changed Calibration Table updated Liquid parameters updated in tables (tables added)	1, 4, 5, 19-22, 24-26, 30-46 13 16, 18, 54	19th June 2017
M170410F	3	Duty Cycle explanation added	6	14th July 2017

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SAR TEST REPORT

Report Number: M170410F

FCC ID: W77G7X ISED ID: 8255A-G7X

1.0 GENERAL INFORMATION

Test Sample:	Lone Worker Personal Safety Monitoring Transmitter
Device Category:	Portable Transmitter
Test Device:	Pre-Production Unit
Model:	G7x
Device ID:	3973000004
Software Version No.:	3.299S1_LGC
Hardware Version No.:	0
FCC ID:	W77G7X
ISED ID:	8255A-G7X
RF exposure Category:	General Population/Uncontrolled
Manufacturer:	Blackline Safety Corp.

FCC KDB Procedures:

1. 447498 D01 General RF Exposure Guidance v06
   865664 D01 SAR Measurement 100 MHz to 6 GHz v01
   865664 D02 RF Exposure Reporting v01r01

Test Standard/s:

2. Radio Frequency Exposure Compliance of Radiocommunication Apparatus (All Frequency Bands) RSS-102, Issue 5, March 2015
3. **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)
4. **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 Blackline Safety Lone Worker WWAN Transmitter G7x 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 - 1.04 mW/g

Test Dates: 20th to 21st April 2017

Test Officer:

Peter Jakubiec

Authorised Signature:

Chris Zombolas
Technical Director

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SAR TEST REPORT
Lone Worker Personal Safety Monitoring Transmiter
Model: G7x
Report Number: M170410F

2.0 INTRODUCTION

Testing was performed on the Blackline Safety Personal Safety Monitoring Transmitter, Model: G7x.
It will be referred to as the DUT throughout this report.

3.0 TEST SAMPLE TECHNICAL INFORMATION

(Information supplied by the client)

Table 2 DUT (Device Under Test) Parameters

Operating Mode During Testing	:100 % RF Duty Cycle
Operating Mode Production Sample	: 31 % RF Duty Cycle
Modulation:	:FHSS
Antenna type	:Internal flexible circuit, model - G7XANT
Applicable Head Configurations	: None
Applicable Body Worn-Configurations	: Belt Clip
Battery Options	: 3.7V 1100mAh Li-ion Battery Pack

3.1 Test Signal, Frequency and Output Power

The DUT was provided by Blackline Safety Australia Pty Ltd. It was put into test mode using programming codes. There is only one mode of operation of the transmitter utilizing FHSS technique. The channels utilised in the measurements were the traffic channels shown in the table below. The power level was set to 29 dBm.

Channels and Output power:

Table 3

Channel and Mode	Frequency MHz	Average Output Power dBm
Channels 1, 2 and 3	903, 915 and 927	29 (+1, -2)

Test sample Accessories

3.2.1 Battery Types

One type of Narada Lithium Poly battery is used to power the DUT.

Standard Battery

Model	NLP503759H1
V/mAh	3.7V/1100mAh

4.0 CONDUCTED POWER MEASUREMENT

For the SAR measurements the DUT was operating at full transmit power and 100% RF Duty Cycle.

The frequency span of the 900 MHz band was more than 10MHz consequently; the SAR levels of the test sample were measured for lowest, centre and highest channels in the applicable modes. There were no wires or other connections to the DUT during the SAR measurements. At the beginning of the SAR tests, the conducted power of the DUT was measured after temporary modification of antenna connector inside the DUT's TX RX compartment. Measurements were performed with a calibrated Power Meter. The results of this measurement are listed in tables below. During normal operation, the DUT transmits at 31% RF Duty Cycle: During normal operation, the DUT transmits at most 289 ms every second, a 29% duty cycle.
During synchronization, the DUT transmits with a pattern that repeats every 26 seconds. The total transmission time of synchronization transmissions integrated over 26 seconds is 8 seconds, a 31 % duty cycle. This is the worst case RF Duty cycle that the DUT will have at any time during its use.

Table: Frequency and Conducted Power Results

Table 4

RF Channel	Measured Power Average (dBm) (100% Duty Cycle)	Calculated Power (dBm) (31% Duty Cycle)
903	28.64	23.55
915	28.52	23.43
927	28.40	23.31

4.1 Battery Status

The DUT battery was fully charged prior to commencement of measurement. The battery condition was monitored by measuring the RF field at a defined position inside the phantom before the commencement of each test and again after the completion of the test. It was not possible to perform conducted power measurements at the output of the DUT, at the beginning and end of each scan due to lack of a suitable antenna port. The uncertainty associated with the power drift was less than 5% and was assessed in the uncertainty budget.

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5.0 DETAILS OF TEST LABORATORY

5.1 Location

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176 Harrick Road
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Australia 3042

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

5.2 Accreditations

EMC Technologies Pty. Ltd. is accredited by the National Association of Testing Authorities, Australia (NATA).
NATA Accredited Laboratory Number: 5292
Last assessed in February 2017, next scheduled assessment in June 2017

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

Table 5

AS/NZS 2772.2 2016:	Radiofrequency Fields. **Part 2:** Principles and methods of measurement and computation - 3kHz to 300 GHz.
ACMA:	Radiocommunications (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.
FCC Knowledge Database:	KDB measurement procedures publications: 447498 D01 General RF Exposure Guidance v06 865664 D01 SAR Measurement 100 MHz to 6 GHz v01 865664 D02 RF Exposure Reporting v01r01
RSS-102:	Radio Frequency (RF) Exposure Compliance of Radiocommunication Apparatus (All Frequency Bands), Issue 5, March 2015

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

5.3 Environmental Factors

The measurements were performed in a shielded room with no background RF signals. The temperature in the laboratory was controlled to within 20±1°C, the humidity was in the range 51% to 57%. The liquid parameters are measured daily prior to the commencement of each test. 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 the SN1380 probe was less than 5μV in both air and liquid mediums.

6.0 CALIBRATION AND VERIFICATION PROCEDURES AND DATA

6.1 System Verification

6.1.1 Deviation from reference validation values

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

The reference SAR values are derived using a reference dipoles and flat section of the phantom suitable for the frequencies listed below. These reference SAR values are obtained from the IEEE Std 1528-2013 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 6

Frequency and Date	Measured SAR 1g (mW/g)	Measured SAR 1g (Normalized to 1W)	SPEAG Calibration reference SAR Value 1g (mW/g)	Deviation From SPEAG Reference 1g (%)	IEEE Std 1528 reference SAR value 1g (mW/g)	Deviation From IEEE 1g (%)	Last Validation Date
900MHz 20th April 17	2.92	11.68	10.7	9.16	N/A	N/A	29th March 2017
900MHz 21st April 17	2.77	11.08	10.7	3.55	N/A	N/A	29th March 2017

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

6.1.2 Liquid Temperature and Humidity

The humidity and dielectric/ambient temperatures were 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

Table 7

Date	Ambient Temperature (°C)	Liquid Temperature (°C)	Humidity (%)
20th April 2017	20.1	19.8	57
21st April 2017	19.9	19.7	51

7.0 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 flat section of the flat 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 15 mm x 15 mm. The actual largest Area Scan has dimensions of 105 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.

d)

   (i) 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.

   (ii) 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 to evaluate the actual power drift.

8.0 MEASUREMENT UNCERTAINTY

The uncertainty analysis is based on the template listed in the IEEE Std 1528-2013 for both Handset SAR tests and System Verification 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 8: Uncertainty Budget for DASY5 Version 52 (Build 1258) – DUT SAR

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	4.72	R	1.73	1	1	2.73	2.73	∞
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)						11.71	11.53	
Expanded Uncertainty (95% CONFIDENCE LEVEL)			k=	2		23.43	23.43	

Estimated total measurement uncertainty for the DASY5 measurement system was ±11.71%. The expanded uncertainty (K = 2) was assessed to be ±23.43% based on 95% confidence level. The uncertainty is not added to the measurement result.

Table 9: **Uncertainty Budget IEC 62209-2 (RSS-102) for DASY5 Version 52 (Build 1258) – DUT SAR**

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	4.72	R	1.73	1	1	2.73	2.73	∞
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)						11.79	11.56	
Expanded Uncertainty (95% CONFIDENCE LEVEL)			k=	2		23.58	23.11	

Estimated total measurement uncertainty for the DASY5 measurement system was ±11.79%. The expanded uncertainty (K = 2) was assessed to be ±23.58% based on 95% confidence level. The uncertainty is not added to the measurement result.

Table 10: Uncertainty Budget for DASY5 Version 52 (Build 1258) – System Verification

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 Verification measurement result.

9.0 EQUIPMENT LIST AND CALIBRATION DETAILS

Table 11: 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	09-Feb-2018	✓
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	
Radio Communication Test Set	Rohde & Schwarz	CMU200	101573	Not Applicable	✓
Radio Communication Test Set	Anritsu	MT8820A	6200240559	Not Applicable	
Radio Communication Test Set	Agilent	PXT E6621A	MY51100168	Not Applicable	

* Calibrated during the test for the relevant parameters.

10.0 SAR TEST METHOD

10.1 Description of the Test Positions (Belt Clip)

SAR measurements were performed in the “Belt Clip” positions. “Belt Clip” position was measured in the flat section of the SPEAG ELI 4.0 phantom.
See Appendix A for photos of test positions.

10.1.1 “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 11 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.

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

The DUT has a fixed antenna. Depending on the measured SAR level up to three test channels with the test sample operating at maximum power were recorded. The following table represents the matrix used to determine what testing was required. All relevant provisions of KDB 447498 are applied for SAR measurements of the host system.

Table 12

Phantom Configuration	Device Mode Band Name	Test Configurations		
		Channel (Low)	Channel (Middle)	Channel (High)
Belt Clip	FHSS 900 MHz	x	x	x

Legend

X	Testing Required in this configuration
	Testing required in this configuration only if SAR of middle channel is more than 3dB below the SAR limit or it is the worst case.

11.0 SAR MEASUREMENT RESULTS

The SAR values averaged over 1g tissue masses were determined for the sample DUT for all test configurations listed in section 10.2.

11.1 SAR Results

Table below displays the SAR results.

Table: SAR MEASUREMENT RESULTS – 900MHz

Table 13

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 (W/kg)
Body Worn Belt Clip Standard Cartridge 20-04-17	1.	CW	1	903	2.46	-0.14	54.03	1.06	**1.04**
Body Worn Belt Clip Standard Cartridge 20-04-17	2.	CW	2	915	2.02	-0.15	53.91	1.074	0.88
Body Worn Belt Clip Standard Cartridge 20-04-17	3.	CW	3	927	1.2	-0.13	53.77	1.087	0.54
Body Worn Belt Clip Standard Cartridge Variability 20-04-17	4.	CW	1	903	2.29	-0.21	54.03	1.06	0.97
Body Worn Belt Clip H2S Cartridge 20-04-17	5.	CW	1	903	0.848	-0.1	54.03	1.06	0.36
Body Worn Belt Clip H2S Cartridge 20-04-17	6.	CW	2	915	0.723	-0.19	53.91	1.074	0.32
Body Worn Belt Clip H2S Cartridge 21-04-17	7.	CW	3	927	0.401	-0.07	52.51	1.078	0.18
Body Worn Belt Clip O2 CO H2S LEL Cartridge 21-04-17	8.	CW	1	903	0.38	-0.06	52.72	1.053	0.16
Body Worn Belt Clip O2 CO H2S LEL Cartridge 21-04-17	9.	CW	2	915	0.351	-0.15	52.63	1.065	0.15
Body Worn Belt Clip O2 CO H2S LEL Cartridge 21-04-17	10.	CW	3	927	0.206	-0.12	52.51	1.078	0.09
System Check 20-04-17	11.	CW	1	900	2.92	-0.03	54.07	1.056	-
System Check 21-04-17	12.	CW	1	900	2.77	-0.08	52.78	1.049	-

NOTE: The measurement uncertainty of 23.43% was not added to the result.

Table: Liquid Parameters 900MHz

Table 14

Date	Freq. (MHz)	∈r (target 55.0 ±5% 52.3 to 57.8)	σ (target 1.05 ±5% 1.00 to 1.10)
20-April-2017	903	54.03	1.06
20-April-2017	915	53.91	1.074
20-April-2017	927	53.77	1.087
20-April-2017	900	54.07	1.056

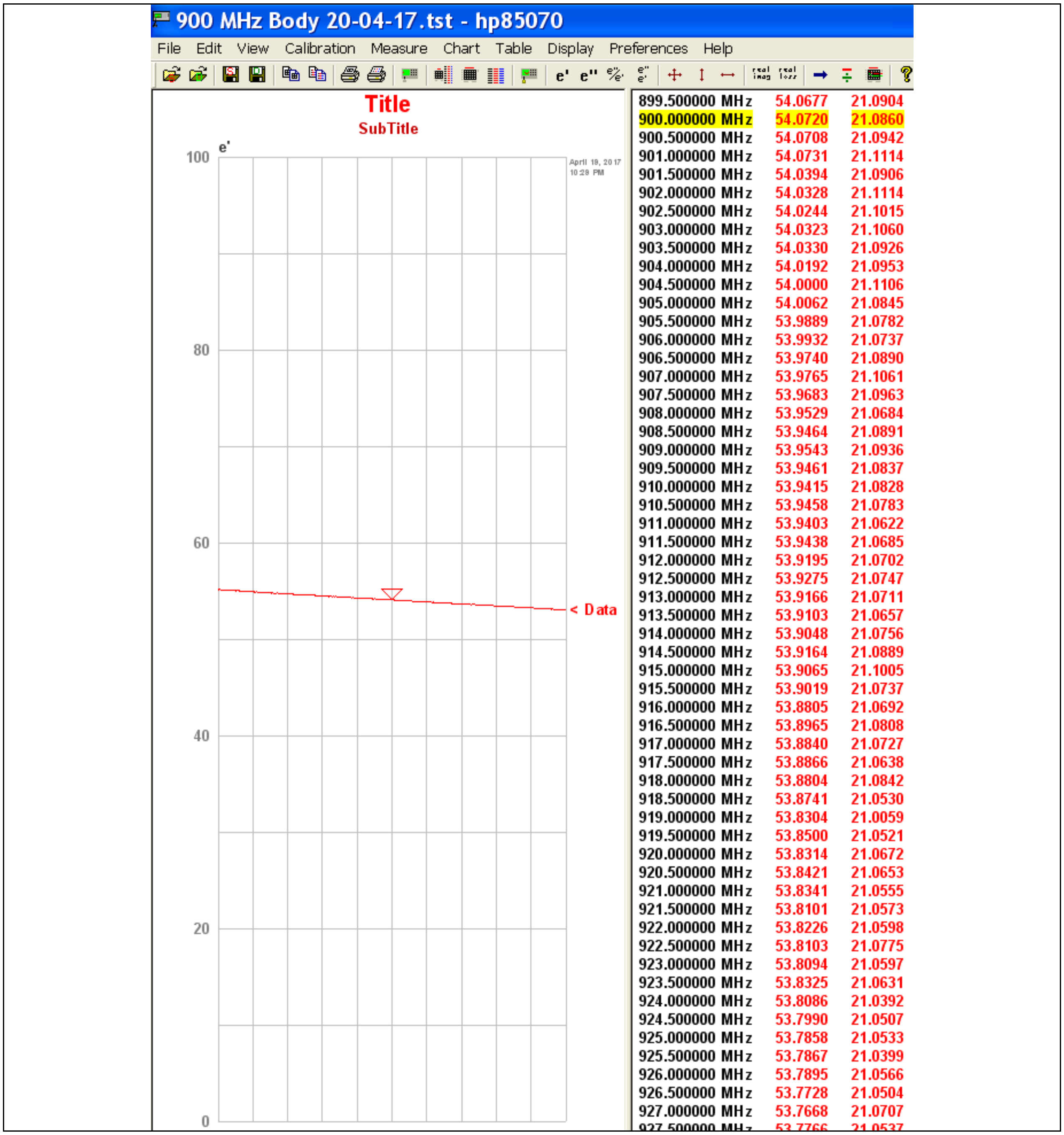
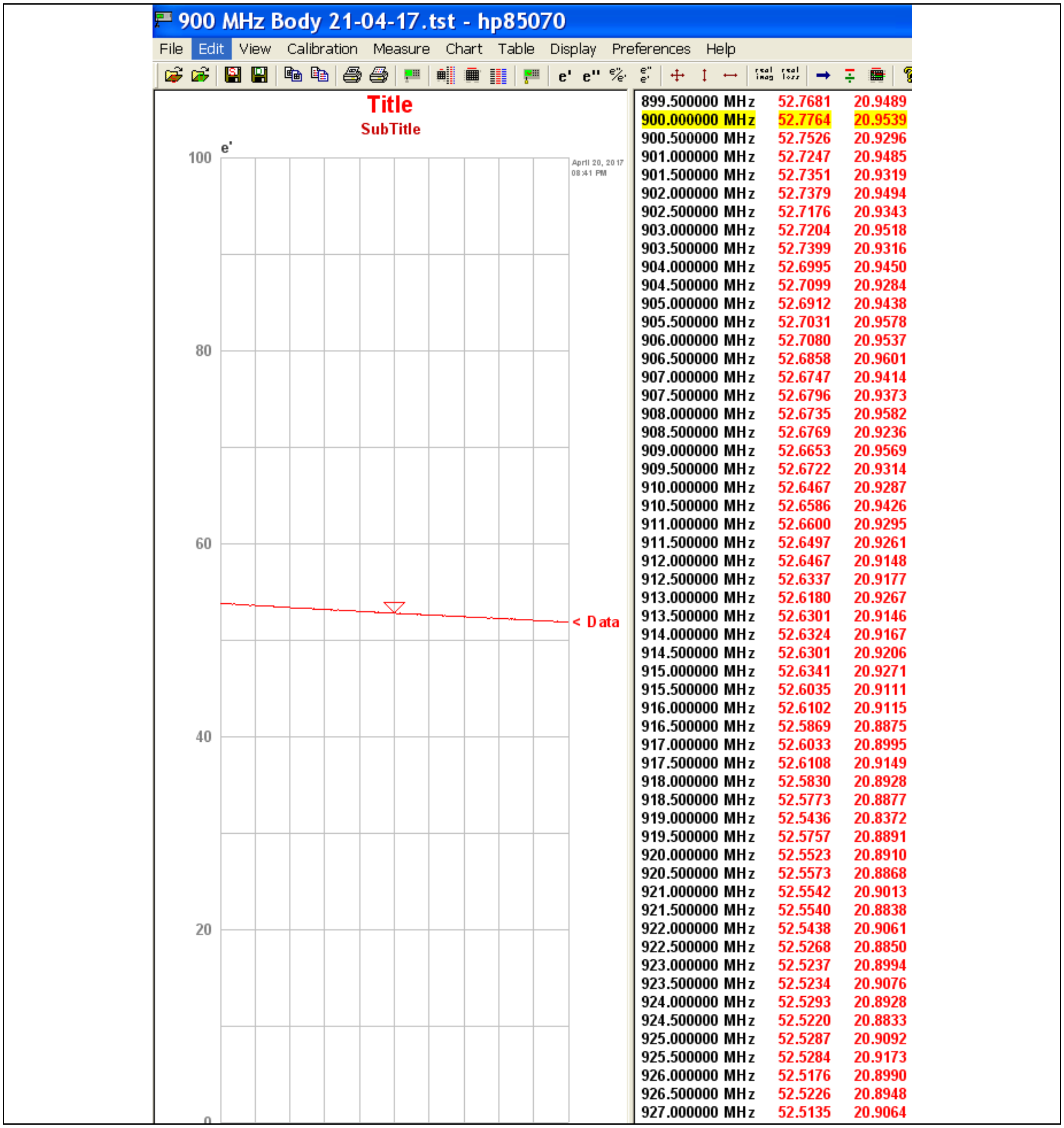


Table: Liquid Parameters 900MHz

Table 15

Date	Freq. (MHz)	∈r (target 55.0 ±5% 52.3 to 57.8)	σ (target 1.05 ±5% 1.00 to 1.10)
21-April-2017	903	52.72	1.053
21-April-2017	915	52.63	1.065
21-April-2017	927	52.51	1.078
21-April-2017	900	52.78	1.049



12.0 COMPLIANCE STATEMENT

The Blackline Safety Lone Worker Personal Safety Monitoring Transmitter, Model: G7x was found to comply with the FCC and RSS-102 SAR requirements.

The highest SAR level measured was 2.46 mW/g for a 1g cube. The manufacturer's tune up power is stated to be 30.0 dBm, and the RF Duty Cycle 31%.. Scaling the SAR result, the maximum SAR value is **1.04 mW/g.** This value was measured at 903 MHz (channel 1) in the "Body Worn Belt Clip" position with Standard Cartridge. This was below the limit of 1.6 mW/g for uncontrolled exposure, even taking into account the measurement uncertainty of 23.43 %.

The SAR test Variability checks were conducted and the repeated results are included in the SAR results tables.