

|                                                                                  |                                                   |                                                           |                                                          |                                                                                                                                                                       |
|----------------------------------------------------------------------------------|---------------------------------------------------|-----------------------------------------------------------|----------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|  | <u>Date(s) of Evaluation</u><br>April 2 & 3, 2014 | <u>Test Report Serial No.</u><br>032814W77-1287-s         | <u>Test Report Revision No.</u><br>Rev 1.2 (3rd Release) |   |
|                                                                                  | <u>Test Report Issue Date</u><br>May 21, 2014     | <u>Description of Test(s)</u><br>Specific Absorption Rate | <u>RF Exposure Category</u><br>General Population        |                                                                                                                                                                       |

## DECLARATION OF COMPLIANCE

### SAR RF EXPOSURE EVALUATION - FCC / IC Original Filing

|                               |                                                       |                                                                      |                      |                                       |  |  |
|-------------------------------|-------------------------------------------------------|----------------------------------------------------------------------|----------------------|---------------------------------------|--|--|
| <b>TEST LAB INFORMATION</b>   | <b>Name</b>                                           | CELLTECH LABS INC.                                                   |                      |                                       |  |  |
|                               | <b>Address</b>                                        | 21-364 Lougheed Road, Kelowna, B.C. V1X 7R8 Canada                   |                      |                                       |  |  |
| <b>TEST LAB ACCREDITATION</b> | <b>Type</b>                                           | ISO / IEC 17025                                                      | <b>Accreditation</b> | A2LA Test Lab Certificate No. 2470.01 |  |  |
| <b>APPLICANT INFORMATION</b>  | <b>Name</b>                                           | BLACKLINE GPS                                                        |                      |                                       |  |  |
|                               | <b>Address</b>                                        | Suite 101, 1215 13 <sup>th</sup> St SE, Calgary, AB, T2G 3J4, Canada |                      |                                       |  |  |
| <b>STANDARDS APPLIED</b>      | <b>FCC</b>                                            | 47 CFR §2.1093                                                       | <b>IC</b>            | Health Canada Safety Code 6           |  |  |
| <b>PROCEDURES APPLIED</b>     | <b>FCC</b>                                            | KDB 447498 D01v05r01, KDB 865664 D01v01r02                           | <b>IC</b>            | RSS102 Issue 4                        |  |  |
|                               | <b>FCC</b>                                            | KDB 865664 D02v01r01, KDB 643646 D01v01r01                           | <b>IEC</b>           | 62209-1:2005                          |  |  |
|                               | <b>IEEE</b>                                           | IEEE 1528-2013                                                       | <b>IEC</b>           | 62209-2:2010                          |  |  |
| <b>DEVICE CLASSIFICATION</b>  | <b>FCC</b>                                            | Unlicensed, Spread Spectrum Digital Device (DSS) - FCC Part 15       |                      |                                       |  |  |
|                               | <b>IC</b>                                             | Spread Spectrum Digital Device (902-928 MHz) - RSS-210               |                      |                                       |  |  |
| <b>DEVICE DESCRIPTION</b>     | Lone Worker Safety Device w/ GPS & 2.4 GHz Receivers. |                                                                      |                      |                                       |  |  |
| <b>Device Model #:</b>        | 900 NAT 001A                                          |                                                                      |                      |                                       |  |  |
| <b>APPLICATION TYPE</b>       | Original Filing                                       |                                                                      |                      |                                       |  |  |
| <b>DATE(S) OF EVALUATION</b>  | April 2-3, 2014                                       |                                                                      |                      | <b>SAMPLES RECEIVED</b>               |  |  |

#### Devices Tested

| FCC ID    | IC Certification | Model(s)                      |        | Frequency Range | Manufacturer's Rated Output Power (dBm) |
|-----------|------------------|-------------------------------|--------|-----------------|-----------------------------------------|
| W77LNR900 | 8255A-LNR900     | Loner 900 (metal belt-clip)   | 101505 | 902-928 Tx/Rx   | 27 +/- 2dBm                             |
|           |                  | Loner 900 (plastic belt-clip) | 101506 |                 |                                         |

#### Antennas Tested

Internal

#### Batteries Tested

Internal Li-ion

#### Body-Worn Accessories Tested

#### Audio Accessories Tested

| Part Number | Description | Part Number | Description |
|-------------|-------------|-------------|-------------|
| N/A         | Belt Clip   | N/A         | N/A         |

#### EVALUATION RESULTS

|                                        |             |              |             |            |                            |                                      |
|----------------------------------------|-------------|--------------|-------------|------------|----------------------------|--------------------------------------|
| <b>Maximum SAR Level Evaluated FCC</b> | <b>Body</b> | <b>0.741</b> | <b>W/kg</b> | <b>10g</b> | <b>31% FSK Duty Factor</b> | <b>General Public / Uncontrolled</b> |
| <b>Maximum SAR Level Evaluated IC</b>  | <b>Body</b> | <b>0.829</b> |             |            |                            |                                      |
| <b>FCC / IC Spatial Peak SAR Limit</b> | <b>Body</b> | <b>1.6</b>   | <b>W/kg</b> | <b>10g</b> | <b>31% FSK Duty Factor</b> | <b>General Public / Uncontrolled</b> |

Celltech Labs Inc. declares under its sole responsibility that this wireless portable device has demonstrated compliance with the Specific Absorption Rate (SAR) RF exposure requirements specified in FCC 47 CFR §2.1093 and Health Canada Safety Code 6 for the General Population / Uncontrolled Exposure environment. The device was tested in accordance with the measurement procedures specified in FCC OET Bulletin 65, Supplement C (Edition 01-01), Industry Canada RSS-102 Issue 4, IEEE Standard 1528-2013 and International Standard IEC 62209-2:2010. All measurements were performed in accordance with the SAR system manufacturer recommendations.

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The results and statements contained in this report pertain only to the device(s) evaluated

I attest to the accuracy of data. All measurements were performed by me or were made under my supervision and are correct to the best of my knowledge and belief. I assume full responsibility for the completeness of these measurements and vouch for the qualifications of all persons taking them.

|                                |                                                                                     |                         |                        |                           |
|--------------------------------|-------------------------------------------------------------------------------------|-------------------------|------------------------|---------------------------|
| <b>Test Report Approved By</b> |  | <b>Art Voss, P.Eng.</b> | <b>Senior Engineer</b> | <b>Celltech Labs Inc.</b> |
|--------------------------------|-------------------------------------------------------------------------------------|-------------------------|------------------------|---------------------------|

|                         |                                    |                                                                                                                      |           |               |              |              |
|-------------------------|------------------------------------|----------------------------------------------------------------------------------------------------------------------|-----------|---------------|--------------|--------------|
| <b>Applicant:</b>       | Blackline GPS                      | <b>FCC ID:</b>                                                                                                       | W77LNR900 | <b>IC ID:</b> | 8255A-LNR900 |              |
| <b>DUT Type:</b>        | Lone Worker Safety Device with GPS | <b>Models:</b>                                                                                                       | Loner 900 | 902 - 928 MHz |              |              |
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|                                                                                  | <u>Test Report Issue Date</u><br>May 21, 2014     | <u>Description of Test(s)</u><br>Specific Absorption Rate | <u>RF Exposure Category</u><br>General Population        |                                                                                    |

Test Lab Certificate No. 2470.01

| REVISION HISTORY |                                                                                                                                        |                |               |
|------------------|----------------------------------------------------------------------------------------------------------------------------------------|----------------|---------------|
| REVISION NO.     | DESCRIPTION                                                                                                                            | IMPLEMENTED BY | RELEASE DATE  |
| 1.0              | Initial Release                                                                                                                        | Art Voss       | May 21, 2014  |
| 1.1              | a. Corrected conducted power measurements<br>b. Corrected references to KDB 865664<br>c. Included dipole extended calibration document | Art Voss       | June 10, 2014 |
| 1.2              | a. Corrected Dipole extended calibration document                                                                                      | Art Voss       | June 11, 2014 |

| TEST REPORT SIGN-OFF |                    |               |                    |
|----------------------|--------------------|---------------|--------------------|
| DEVICE TESTED BY     | REPORT PREPARED BY | QA REVIEW BY  | REPORT APPROVED BY |
| Art Voss             | Cheri Frangiadakis | Glen Westwell | Art Voss           |

|                         |                                           |                                                                                                                      |                  |                      |                     |              |
|-------------------------|-------------------------------------------|----------------------------------------------------------------------------------------------------------------------|------------------|----------------------|---------------------|--------------|
| <b>Applicant:</b>       | <b>Blackline GPS</b>                      | <b>FCC ID:</b>                                                                                                       | <b>W77LNR900</b> | <b>IC ID:</b>        | <b>8255A-LNR900</b> |              |
| <b>DUT Type:</b>        | <b>Lone Worker Safety Device with GPS</b> | <b>Models:</b>                                                                                                       | <b>Loner 900</b> | <b>902 – 928 MHz</b> |                     |              |
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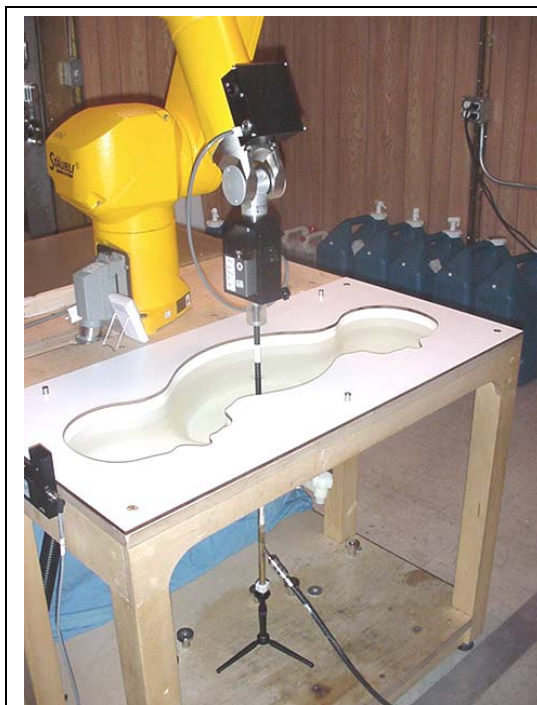
Test Lab Certificate No. 2470.01

## 1.0 INTRODUCTION

This measurement report demonstrates that the Blackline GPS Model(s): Loner 900 Lone Worker Safety Device with GPS complies with the SAR (Specific Absorption Rate) RF exposure requirements FCC 47 CFR §2.1093 (see reference [1]) and Health Canada's Safety Code 6 (see reference [2]) for the General Population / Uncontrolled Exposure environment. The measurement procedures described in FCC KDB 865664 (see reference [3]), IC RSS-102 Issue 4 (see reference [4]), IEEE Standard 1528-2013 (see reference [5]) and IEC Standard 62209-2:2010 (see reference [6]) were employed. A description of the device, operating configuration, detailed summary of the test results, methodology and procedures used in the evaluation, equipment used and the various provisions of the rules are included within this test report.

## 2.0 SAR MEASUREMENT SYSTEM

Celltech Labs Inc. SAR measurement facility utilizes the Dosimetric Assessment System (DASY™) manufactured by Schmid & Partner Engineering AG (SPEAG™) of Zurich, Switzerland. The DASY4 measurement system is comprised of the measurement server, robot controller, computer, near-field probe, probe alignment sensor, specific anthropomorphic mannequin (SAM) phantom, and various planar phantoms for head and/or body SAR evaluations. The robot is a six-axis industrial robot performing precise movements to position the probe to the location (points) of maximum electromagnetic field (EMF). A cell controller system contains the power supply, robot controller, teach pendant (joystick), and remote control is used to drive the robot motors. The Staubli robot is connected to the cell controller to allow software manipulation of the robot. A data acquisition electronic (DAE) circuit performs the signal amplification, signal multiplexing, AD-conversion, offset measurements, mechanical surface detection, collision detection, etc. is connected to the Electro-optical coupler (EOC). The EOC performs the conversion from the optical into digital electric signal of the DAE and transfers data to the DASY4 measurement server. The DAE4 utilizes a highly sensitive electrometer-grade preamplifier with auto-zeroing, a channel and gain-switching multiplexer, a fast 16-bit AD-converter and a command decoder and control logic unit. Transmission to the DASY4 measurement server is accomplished through an optical downlink for data and status information and an optical uplink for commands and clock lines. The mechanical probe-mounting device includes two different sensor systems for frontal and sidewise probe contacts. The sensor systems are also used for mechanical surface detection and probe collision detection. The robot uses a controller with a built in VME-bus computer.



**DASY4 System**



**DASY4 Measurement Server**

|                         |                                           |                                                                                                                      |                  |                      |                     |              |
|-------------------------|-------------------------------------------|----------------------------------------------------------------------------------------------------------------------|------------------|----------------------|---------------------|--------------|
| <b>Applicant:</b>       | <b>Blackline GPS</b>                      | <b>FCC ID:</b>                                                                                                       | <b>W77LNR900</b> | <b>IC ID:</b>        | <b>8255A-LNR900</b> |              |
| <b>DUT Type:</b>        | <b>Lone Worker Safety Device with GPS</b> | <b>Models:</b>                                                                                                       | <b>Loner 900</b> | <b>902 – 928 MHz</b> |                     |              |
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|                                                                                  |                                                   |                                                           |                                                          |                                                                                    |
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### 3.0 RF CONDUCTED OUTPUT POWER MEASUREMENTS

| MEASURED RF CONDUCTED OUTPUT POWER LEVELS                                                                                                                                                                                                                                                                                     |                       |             |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------|-------------|
| Test Freq.                                                                                                                                                                                                                                                                                                                    | Conducted Power (dBm) |             |
| MHz                                                                                                                                                                                                                                                                                                                           | Measured              | Max Rated   |
| 902                                                                                                                                                                                                                                                                                                                           | 27.3                  | 27 +/- 2dBm |
| 915                                                                                                                                                                                                                                                                                                                           | 27.3                  | 27 +/- 2dBm |
| 928                                                                                                                                                                                                                                                                                                                           | 27.3                  | 27 +/- 2dBm |
| Notes                                                                                                                                                                                                                                                                                                                         |                       |             |
| 1. The test channels were selected in accordance with the procedures specified in FCC KDB 447498 (see reference [8]).                                                                                                                                                                                                         |                       |             |
| 2. The RF conducted output power levels of the DUT were measured by Celltech Labs prior to the SAR evaluations using a Gigatronics 8652A Universal Power Meter at the external antenna connector of the radio in accordance with requirements of FCC 47 CFR §2.1046 (see reference [13]) and IC RSS-Gen (see reference [14]). |                       |             |

**Note:** The conducted power measurements were performed at a Duty Cycle of 100%. The rated power is based on a Duty Cycle of 100%. Under normal operation, the device transmits a total of 8 seconds in a 26 second period.

|                         |                                           |                                                                                                                      |                  |                  |                      |              |
|-------------------------|-------------------------------------------|----------------------------------------------------------------------------------------------------------------------|------------------|------------------|----------------------|--------------|
| <b>Applicant:</b>       | <b>Blackline GPS</b>                      | <b>FCC ID:</b>                                                                                                       | <b>W77LNR900</b> | <b>IC ID:</b>    | <b>8255A-LNR900</b>  |              |
| <b>DUT Type:</b>        | <b>Lone Worker Safety Device with GPS</b> |                                                                                                                      | <b>Models:</b>   | <b>Loner 900</b> | <b>902 – 928 MHz</b> |              |
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|                                                                                  | <u>Test Report Issue Date</u><br>May 21, 2014     | <u>Description of Test(s)</u><br>Specific Absorption Rate | <u>RF Exposure Category</u><br>General Population        |                                                                                    |

Test Lab Certificate No. 2470.01

## 4.0 FLUID DIELECTRIC PARAMETERS

| FLUID DIELECTRIC PARAMETERS |        |                    |          |          |                        |                        |
|-----------------------------|--------|--------------------|----------|----------|------------------------|------------------------|
| Date: 2 April 2014          |        | Frequency: 900 MHz |          |          | Tissue: Body           |                        |
| Freq (MHz)                  | Test_e | Test_s             | Target_e | Target_s | Deviation Permittivity | Deviation Conductivity |
| 800                         | 51.85  | 0.90               | 55.34    | 0.97     | -6.31%                 | -7.22%                 |
| 810                         | 52.21  | 0.91               | 55.30    | 0.97     | -5.59%                 | -6.19%                 |
| 820                         | 51.77  | 0.93               | 55.26    | 0.97     | -6.32%                 | -4.12%                 |
| 830                         | 51.76  | 0.94               | 55.22    | 0.97     | -6.27%                 | -3.09%                 |
| 840                         | 51.47  | 0.95               | 55.18    | 0.98     | -6.72%                 | -3.06%                 |
| 850                         | 51.46  | 0.96               | 55.15    | 0.99     | -6.69%                 | -3.03%                 |
| 860                         | 51.50  | 0.99               | 55.12    | 1.00     | -6.57%                 | -1.00%                 |
| 870                         | 51.14  | 0.99               | 55.09    | 1.01     | -7.17%                 | -1.98%                 |
| 880                         | 51.12  | 0.99               | 55.06    | 1.03     | -7.16%                 | -3.88%                 |
| 890                         | 51.17  | 1.02               | 55.03    | 1.04     | -7.01%                 | -1.92%                 |
| 900                         | 50.88  | 1.02               | 55.00    | 1.05     | -7.49%                 | -2.86%                 |
| 902*                        | 50.90  | 1.02               | 55.00    | 1.05     | -7.45%                 | -2.86%                 |
| 910                         | 50.94  | 1.02               | 55.00    | 1.06     | -7.38%                 | -3.77%                 |
| 915*                        | 50.90  | 1.02               | 55.00    | 1.06     | -7.45%                 | -3.77%                 |
| 920                         | 50.97  | 1.03               | 54.99    | 1.06     | -7.31%                 | -2.83%                 |
| 928*                        | 51.00  | 1.05               | 54.98    | 1.06     | -7.24%                 | -0.94%                 |
| 930                         | 51.03  | 1.05               | 54.97    | 1.07     | -7.17%                 | -1.87%                 |
| 940                         | 50.61  | 1.05               | 54.95    | 1.07     | -7.90%                 | -1.87%                 |
| 950                         | 50.42  | 1.06               | 54.93    | 1.08     | -8.21%                 | -1.85%                 |
| 960                         | 50.31  | 1.09               | 54.92    | 1.08     | -8.39%                 | 0.93%                  |
| 970                         | 50.53  | 1.09               | 54.90    | 1.08     | -7.96%                 | 0.93%                  |
| 980                         | 50.09  | 1.09               | 54.88    | 1.09     | -8.73%                 | 0.00%                  |
| 990                         | 50.12  | 1.11               | 54.86    | 1.09     | -8.64%                 | 1.83%                  |
| 1000                        | 49.92  | 1.14               | 54.84    | 1.10     | -8.97%                 | 3.64%                  |

\*interpolated using DASY4 software

| Test Date | Fluid Type | Ambient Temperature | Fluid Temperature | Fluid Depth | Atmospheric Pressure | Relative Humidity | $\rho$ (Kg/m <sup>3</sup> ) |
|-----------|------------|---------------------|-------------------|-------------|----------------------|-------------------|-----------------------------|
| Apr 2     | 900 Body   | 25°C                | 23.6°C            | ≥ 15 cm     | 102.6 kPa            | 16%               | 1000                        |
| Apr 3     | 900 Body   | 25°C                | 23.6°C            | ≥ 15 cm     | 102.6 kPa            | 16%               | 1000                        |

|                         |                                           |                                                                                                                      |                  |                      |                     |              |
|-------------------------|-------------------------------------------|----------------------------------------------------------------------------------------------------------------------|------------------|----------------------|---------------------|--------------|
| <b>Applicant:</b>       | <b>Blackline GPS</b>                      | <b>FCC ID:</b>                                                                                                       | <b>W77LNR900</b> | <b>IC ID:</b>        | <b>8255A-LNR900</b> |              |
| <b>DUT Type:</b>        | <b>Lone Worker Safety Device with GPS</b> | <b>Models:</b>                                                                                                       | <b>Loner 900</b> | <b>902 – 928 MHz</b> |                     |              |
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| BODY-WORN SAR EVALUATION SUMMARY |                                                                                                                                                                            |       |                             |                             |       |              |            |                          |                                   |            |                       |                      |        |     |
|----------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------|-----------------------------|-----------------------------|-------|--------------|------------|--------------------------|-----------------------------------|------------|-----------------------|----------------------|--------|-----|
| Test Date                        | Plot #                                                                                                                                                                     | Freq. | Test Mode                   | Accessories attached to DUT |       | Spacing (cm) |            | Measured Conducted Power | Measured SAR (1g) W/kg            |            | SAR Drift During Test | Scaled SAR (1g) W/kg |        |     |
|                                  |                                                                                                                                                                            | MHz   |                             | Body                        | Audio | DUT          | Antenna    |                          | dBm                               | Duty Cycle |                       | 100%                 | 31%    |     |
|                                  |                                                                                                                                                                            |       |                             |                             |       |              |            |                          |                                   | 100%       |                       |                      |        | 31% |
| Apr 2                            | B1                                                                                                                                                                         | 915   | FSK                         | Metal Belt-Clip             | -     | 1.5          | n/a        | 29.1                     | 2.03                              | 0.629      | -0.115                | 2.08                 | 0.645  |     |
| Apr 3                            | B2                                                                                                                                                                         | 902   | FSK                         | Metal Belt-Clip             | -     | 1.5          | n/a        | 29.0                     | 1.86                              | 0.577      | -0.187                | 1.94                 | 0.601  |     |
| Apr 3                            | B3                                                                                                                                                                         | 928   | FSK                         | Metal Belt-Clip             | -     | 1.5          | n/a        | 29.1                     | 2.39                              | 0.741      | -0.119                | 2.46                 | 0.829* |     |
| SAR SAFETY LIMIT(S)              |                                                                                                                                                                            |       |                             |                             |       |              | BODY       | SPATIAL PEAK             | RF EXPOSURE CATEGORY              |            |                       |                      |        |     |
| FCC 47 CFR 2.1093                |                                                                                                                                                                            |       | Health Canada Safety Code 6 |                             |       | 1.6 W/kg     | 1g average |                          | General Population / Uncontrolled |            |                       |                      |        |     |
| Notes                            |                                                                                                                                                                            |       |                             |                             |       |              |            |                          |                                   |            |                       |                      |        |     |
| 1.                               | Detailed measurement data and plot showing the maximum SAR location of the DUT is reported in Appendix A.                                                                  |       |                             |                             |       |              |            |                          |                                   |            |                       |                      |        |     |
| 2.                               | The SAR drift of the DUT was measured by the DASY4 system for the duration of the SAR evaluation.                                                                          |       |                             |                             |       |              |            |                          |                                   |            |                       |                      |        |     |
| 3.                               | The Lithium-ion battery installed in the DUT was fully charged prior to the SAR evaluation.                                                                                |       |                             |                             |       |              |            |                          |                                   |            |                       |                      |        |     |
| 4.                               | The fluid temperature remained within +/-2°C from the dielectric parameter measurement to the completion of the SAR test.                                                  |       |                             |                             |       |              |            |                          |                                   |            |                       |                      |        |     |
| 5.                               | The dielectric parameters of the simulated tissue mixture were measured prior to the SAR evaluations using a Dielectric Probe Kit and a Network Analyzer (see Appendix C). |       |                             |                             |       |              |            |                          |                                   |            |                       |                      |        |     |
| 6.                               | Phantom: ELI Phantom                                                                                                                                                       |       |                             |                             |       |              |            |                          |                                   |            |                       |                      |        |     |

|                         |                                                                                                                      |                |                  |                  |                      |              |
|-------------------------|----------------------------------------------------------------------------------------------------------------------|----------------|------------------|------------------|----------------------|--------------|
| <b>Applicant:</b>       | <b>Blackline GPS</b>                                                                                                 | <b>FCC ID:</b> | <b>W77LNR900</b> | <b>IC ID:</b>    | <b>8255A-LNR900</b>  |              |
| <b>DUT Type:</b>        | <b>Lone Worker Safety Device with GPS</b>                                                                            |                | <b>Models:</b>   | <b>Loner 900</b> | <b>902 – 928 MHz</b> |              |
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## 6.0 SAR SCALING (TUNE-UP TOLERANCE)

The Radio was tested at maximum output power, thus no scaling required.

## 7.0 SAR PROBE CALIBRATION & MEASUREMENT FREQUENCIES

The following procedures are recommended for to minimize probe calibration and tissue dielectric parameter discrepancies. In general, SAR measurements below 300 MHz should be within  $\pm 50$  MHz of the probe calibration frequency. At 300 MHz to 6 GHz, measurements should be within  $\pm 100$  MHz of the probe calibration frequency. Measurements exceeding 50% of these intervals,  $\pm 25$  MHz  $< 300$  MHz and  $\pm 50$  MHz  $\geq 300$  MHz, require additional steps (per FCC KDB 865664 D01v01 - see reference [15]).

| Probe Calibration Freq.                                                                                                      | Device Measurement Freq. | Frequency Interval | $\pm 50$ MHz $\geq 300$ MHz |
|------------------------------------------------------------------------------------------------------------------------------|--------------------------|--------------------|-----------------------------|
| 900 MHz                                                                                                                      | 902 MHz                  | 2 MHz              | $< 50$ MHz <sup>1</sup>     |
|                                                                                                                              | 915 MHz                  | 15 MHz             | $< 50$ MHz <sup>1</sup>     |
|                                                                                                                              | 928 MHz                  | 28 MHz             | $< 50$ MHz <sup>1</sup>     |
| 1. The probe calibration and measurement frequency interval is $< 50$ MHz; therefore the additional steps were not required. |                          |                    |                             |

|                         |                                                                                                                      |                |           |                      |              |              |
|-------------------------|----------------------------------------------------------------------------------------------------------------------|----------------|-----------|----------------------|--------------|--------------|
| <b>Applicant:</b>       | Blackline GPS                                                                                                        | <b>FCC ID:</b> | W77LNR900 | <b>IC ID:</b>        | 8255A-LNR900 |              |
| <b>DUT Type:</b>        | Lone Worker Safety Device with GPS                                                                                   | <b>Models:</b> | Loner 900 | <b>902 – 928 MHz</b> |              |              |
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|                                                                                  |                                            |                                                    |                                                   |                                                                                    |
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|                                                                                  | Test Report Issue Date<br>May 21, 2014     | Description of Test(s)<br>Specific Absorption Rate | RF Exposure Category<br>General Population        |                                                                                    |

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## 8.0 SAR LEVEL CORRECTION FOR FLUID DEVIATION (IC RSS-102 / IEC 62209-2)

The SAR levels are corrected for deviation of complex permittivity in accordance with Section 6.1.1 of IEC 62209-2:2010 (see reference [6]) as shown below.

| Test Config. | Date | Test Freq. (GHz) | Test_e | Test_s | Target_e | Target_s | Deviation Permittivity | Deviation Conductivity | Measured SAR Level 50% d/f (W/kg) | Corrected SAR Level 50% d/f (W/kg) |
|--------------|------|------------------|--------|--------|----------|----------|------------------------|------------------------|-----------------------------------|------------------------------------|
| Body         | 4/2  | 0.928*           | 54.98  | 1.06   | 51.0     | 1.05     | -7.24%                 | -0.94%                 | 0.741                             | 0.807                              |

\*interpolated using DASY4 software

SAR Correction Formula (IEC 62209-2:2010 Section 6.1.1)

$$\Delta \text{SAR} = c_e \Delta \epsilon_r + c_\sigma \Delta \sigma \quad (\text{F.1})$$

where

$c_e = \partial(\Delta \text{SAR}) / \partial(\Delta \epsilon_r)$  is the coefficients representing the sensitivity of SAR to permittivity where SAR is normalized to output power;

$c_\sigma = \partial(\Delta \text{SAR}) / \partial(\Delta \sigma)$  is the coefficients representing the sensitivity of SAR to conductivity, where SAR is normalized to output power.

The values of  $c_e$  and  $c_\sigma$  have a simple relationship with frequency that can be described using polynomial equations. For the 1 g averaged SAR  $c_e$  and  $c_\sigma$  are given by

$$c_e = -7,854 \times 10^{-4} f^3 + 9,402 \times 10^{-3} f^2 - 2,742 \times 10^{-2} f - 0,2026 \quad (\text{F.2})$$

$$c_\sigma = 9,804 \times 10^{-3} f^3 - 8,661 \times 10^{-2} f^2 + 2,981 \times 10^{-2} f + 0,7829 \quad (\text{F.3})$$

where

$f$  is the frequency in GHz.

SAR Correction Calculation

|                 |         |
|-----------------|---------|
| Date            | 2 April |
| Frequency (GHz) | 0.928   |
| Ce              | -0.2206 |
| Cσ              | 0.7438  |
| Δ E             | -7.24%  |
| Δσ              | -0.94%  |
| ΔSAR            | 0.90%   |

Conclusion

The correction  $\Delta \text{SAR}$  has a negative sign; therefore correction is applied to the measured SAR level.

|                         |                                                                                                                      |         |           |        |               |              |
|-------------------------|----------------------------------------------------------------------------------------------------------------------|---------|-----------|--------|---------------|--------------|
| Applicant:              | Blackline GPS                                                                                                        | FCC ID: | W77LNR900 | IC ID: | 8255A-LNR900  |              |
| DUT Type:               | Lone Worker Safety Device with GPS                                                                                   | Models: | Loner 900 |        | 902 – 928 MHz |              |
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## 9.0 DETAILS OF SAR EVALUATION

- The number of test frequencies and the test channels evaluated for SAR were selected in accordance with the procedures described in FCC KDB 447498 (see reference [8]).
- Each SAR evaluation was performed with a fully charged battery.
- The SAR drift of the DUT was measured by the DASY4 system for the duration of the SAR evaluations. The measured SAR drift was added to the measured SAR levels to report scaled SAR levels as shown in the SAR test data tables.
- The fluid temperature was measured prior to and after the SAR evaluations. The fluid temperature remained within +/- 2°C during the SAR evaluations.
- The dielectric parameters of the simulated tissue mixtures were measured prior to the SAR evaluations using a Dielectric Probe Kit and a Network Analyzer (see Appendix C).
- The DUT was tested at the maximum conducted output power level preset by the manufacturer in unmodulated continuous transmit operation (Continuous Wave mode at 100% duty cycle).
- The DUT was evaluated for SAR in accordance with the procedures described in FCC KDB 643646 D01v01 (see reference [9]).

## 10.0 SAR EVALUATION PROCEDURES

- The evaluation was performed in the applicable area of the phantom depending on the type of device being tested. For devices held to the ear during normal operation, both the left and right ear positions were evaluated using the SAM phantom.
  - For body-worn and face-held devices a planar phantom was used.
- The SAR was determined by a pre-defined procedure within the DASY4 software. Upon completion of a reference and optical surface check, the exposed region of the phantom was scanned near the inner surface with a grid spacing of 15mm x 15mm.  
An area scan was determined as follows:
  - Based on the defined area scan grid, a more detailed grid is created to increase the points by a factor of 10. The interpolation function then evaluates all field values between corresponding measurement points.
  - A linear search is applied to find all the candidate maxima. Subsequently, all maxima are removed that are >2 dB from the global maximum. The remaining maxima are then used to position the cube scans.  
A 1g and 10g spatial peak SAR was determined as follows:
- Extrapolation is used to find the points between the dipole center of the probe and the surface of the phantom. This data cannot be measured, since the center 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 1.4 mm (see probe calibration document in Appendix F). The extrapolation was based on trivariate quadratics computed from the previously calculated 3D interpolated points nearest the phantom surface.
- Interpolated data is used to calculate the average SAR over 1g and 10g cubes by spatially discretizing the entire measured cube. The volume used to determine the averaged SAR is a 1mm grid (42875 interpolated points).
- A zoom scan volume of 30 mm x 30 mm x 30 mm (5 x 5 x 7 points) centered at the peak SAR location determined from the area scan is used for all zoom scans for devices with a transmit frequency < 800 MHz. Zoom scans for frequencies ≥ 800 MHz are determined with a scan volume of 30 mm x 30 mm x 30 mm (7 x 7 x 7) to ensure complete capture of the peak spatial-average SAR.

|                         |                                           |                                                                                                                      |                  |                      |                     |               |
|-------------------------|-------------------------------------------|----------------------------------------------------------------------------------------------------------------------|------------------|----------------------|---------------------|---------------|
| <b>Applicant:</b>       | <b>Blackline GPS</b>                      | <b>FCC ID:</b>                                                                                                       | <b>W77LNR900</b> | <b>IC ID:</b>        | <b>8255A-LNR900</b> |               |
| <b>DUT Type:</b>        | <b>Lone Worker Safety Device with GPS</b> | <b>Models:</b>                                                                                                       | <b>Loner 900</b> | <b>902 – 928 MHz</b> |                     |               |
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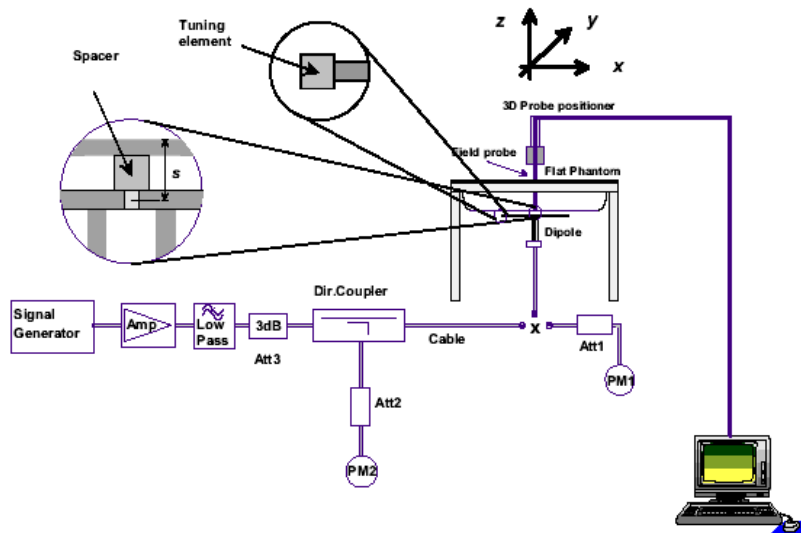
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## 11.0 SYSTEM VERIFICATION

Prior to the SAR evaluations, system checks were performed with a planar phantom and SPEAG 900 MHz dipole (see Appendix B) in accordance with the procedures described in IEEE Standard 1528-2013 (see reference [5]) and IEC Standard 62209-2:2010 (see reference [6]). The dielectric parameters of the simulated tissue mixture were measured prior to the system performance check using a Dielectric Probe Kit and a Network Analyzer (see Appendix C). A forward power of 250 mW was applied to the dipole and the system was verified to a tolerance of  $\pm 10\%$  from the SAR system manufacturer's dipole calibration target SAR value (see Appendix E).

### SYSTEM PERFORMANCE CHECK EVALUATIONS

| Test Date | Equiv. Tissue Freq. (MHz) | SAR 1g (W/kg)                                                                                                                                                                                                |       |       | Dielectric Constant $\epsilon_r$ |       |       | Conductivity $\sigma$ (mho/m) |       |       | $\rho$ (Kg/m <sup>3</sup> ) | Amb. Temp. (°C) | Fluid Temp. (°C) | Fluid Depth (cm) | Humid. (%) | Barom. Press. (kPa) |
|-----------|---------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------|-------|----------------------------------|-------|-------|-------------------------------|-------|-------|-----------------------------|-----------------|------------------|------------------|------------|---------------------|
|           |                           | SPEAG Target                                                                                                                                                                                                 | Meas. | Dev.  | SPEAG Target                     | Meas. | Dev.  | SPEAG Target                  | Meas. | Dev.  |                             |                 |                  |                  |            |                     |
| Apr 2     | Body 900                  | 2.8 $\pm 10\%$                                                                                                                                                                                               | 2.71  | -3.2% | 55.0 $\pm 5\%$                   | 50.88 | -7.5% | 1.05 $\pm 5\%$                | 1.02  | -2.9% | 1000                        | 25              | 23.6             | $\geq 15$        | 16         | 102.6               |
| Notes     | 1.                        | The target SAR values are the measured values from the SAR system manufacturer's dipole calibration (see Appendix E).                                                                                        |       |       |                                  |       |       |                               |       |       |                             |                 |                  |                  |            |                     |
|           | 2.                        | The target dielectric parameters are the nominal values from the SAR system manufacturer's dipole calibration (see Appendix E).                                                                              |       |       |                                  |       |       |                               |       |       |                             |                 |                  |                  |            |                     |
|           | 3.                        | The fluid temperature was measured prior to and after the system performance check evaluations. The fluid temperature remained within $\pm 2^\circ\text{C}$ during the system performance check evaluations. |       |       |                                  |       |       |                               |       |       |                             |                 |                  |                  |            |                     |
|           | 4.                        | The dielectric parameters of the simulated tissue mixture were measured prior to the system performance check using a Dielectric Probe Kit and a Network Analyzer (see Appendix C).                          |       |       |                                  |       |       |                               |       |       |                             |                 |                  |                  |            |                     |



System Performance Check Measurement Setup (IEEE Standard 1528-2013)



SPEAG 900 MHz Validation Dipole Setup

|                         |                                    |                                                                                                                      |           |        |               |               |
|-------------------------|------------------------------------|----------------------------------------------------------------------------------------------------------------------|-----------|--------|---------------|---------------|
| Applicant:              | Blackline GPS                      | FCC ID:                                                                                                              | W77LNR900 | IC ID: | 8255A-LNR900  |               |
| DUT Type:               | Lone Worker Safety Device with GPS | Models:                                                                                                              | Loner 900 |        | 902 – 928 MHz |               |
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|                                                                                  | <u>Test Report Issue Date</u><br>May 21, 2014     | <u>Description of Test(s)</u><br>Specific Absorption Rate | <u>RF Exposure Category</u><br>General Population        |                                                                                                                                                                       |
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## 12.0 SIMULATED EQUIVALENT TISSUES

The simulated equivalent tissue recipes in the table below are derived from the SAR system manufacturer's suggested recipes in the DASY4 manual (see references [10] and [11]) in accordance with the procedures and requirements specified in IEEE Standard 1528-2013 (see reference [5]) and IEC Standard 62209-1:2005 (see reference [7]). The ingredient percentage may have been adjusted minimally in order to achieve the appropriate target dielectric parameters within the specified tolerance.

| SIMULATED TISSUE MIXTURES |             |                            |         |
|---------------------------|-------------|----------------------------|---------|
| INGREDIENT                | Water       | 900MHz Body Tissue Mixture | 53.79 % |
|                           | Sugar       |                            | 45.13 % |
|                           | Salt        |                            | 0.98 %  |
|                           | HEC         |                            | --      |
|                           | Bactericide |                            | 0.10 %  |

## 13.0 SAR LIMITS

| SAR RF EXPOSURE LIMITS                                                                                                                                                                         |                             |                                              |                                      |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------|----------------------------------------------|--------------------------------------|
| FCC 47 CFR 2.1093                                                                                                                                                                              | Health Canada Safety Code 6 | (General Population / Uncontrolled Exposure) | (Occupational / Controlled Exposure) |
| Spatial Average<br>(averaged over the whole body)                                                                                                                                              |                             | 0.08 W/kg                                    | 0.4 W/kg                             |
| Spatial Peak<br>(averaged over any 1 g of tissue)                                                                                                                                              |                             | 1.6 W/kg                                     | 8.0 W/kg                             |
| Spatial Peak<br>(hands/wrists/feet/ankles averaged over 10 g)                                                                                                                                  |                             | 4.0 W/kg                                     | 20.0 W/kg                            |
| The Spatial Average value of the SAR averaged over the whole body.                                                                                                                             |                             |                                              |                                      |
| The Spatial Peak value of the SAR averaged over any 1 gram of tissue (defined as a tissue volume in the shape of a cube) and over the appropriate averaging time.                              |                             |                                              |                                      |
| The Spatial Peak value of the SAR averaged over any 10 grams of tissue (defined as a tissue volume in the shape of a cube) and over the appropriate averaging time.                            |                             |                                              |                                      |
| Uncontrolled environments are defined as locations where there is potential exposure of individuals who have no knowledge or control of their potential exposure.                              |                             |                                              |                                      |
| Controlled environments are defined as locations where there is potential exposure of individuals who have knowledge of their potential exposure and can exercise control over their exposure. |                             |                                              |                                      |

|                         |                                    |                                                                                                                      |           |           |               |               |
|-------------------------|------------------------------------|----------------------------------------------------------------------------------------------------------------------|-----------|-----------|---------------|---------------|
| Applicant:              | Blackline GPS                      | FCC ID:                                                                                                              | W77LNR900 | IC ID:    | 8255A-LNR900  |               |
| DUT Type:               | Lone Worker Safety Device with GPS |                                                                                                                      | Models:   | Loner 900 | 902 – 928 MHz |               |
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|--------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------|-----------------------------------------------------------|----------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------|
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## 14.0 ROBOT SYSTEM SPECIFICATIONS

|                                                 |                                                                                   |
|-------------------------------------------------|-----------------------------------------------------------------------------------|
| <u>Specifications</u>                           |                                                                                   |
| Positioner                                      | Stäubli Unimation Corp. Robot Model: RX60L                                        |
| Repeatability                                   | 0.02 mm                                                                           |
| No. of axis                                     | 6                                                                                 |
| <u>Data Acquisition Electronic (DAE) System</u> |                                                                                   |
| <u>Cell Controller</u>                          |                                                                                   |
| Processor                                       | AMD Athlon XP 2400+                                                               |
| Clock Speed                                     | 2.0 GHz                                                                           |
| Operating System                                | Windows XP Professional                                                           |
| <u>Data Converter</u>                           |                                                                                   |
| Features                                        | Signal Amplifier, multiplexer, A/D converter, and control logic                   |
| Software                                        | Measurement Software: DASY4, V4.7 Build 80                                        |
|                                                 | Postprocessing Software: SEMCAD, V1.8 Build 186                                   |
| Connecting Lines                                | Optical downlink for data and status info., Optical uplink for commands and clock |
| <u>DASY4 Measurement Server</u>                 |                                                                                   |
| Function                                        | Real-time data evaluation for field measurements and surface detection            |
| Hardware                                        | PC/104 166MHz Pentium CPU; 32 MB chipdisk; 64 MB RAM                              |
| Connections                                     | COM1, COM2, DAE, Robot, Ethernet, Service Interface                               |
| <u>E-Field Probe</u>                            |                                                                                   |
| Model                                           | ET3DV6                                                                            |
| Serial No.                                      | 1590                                                                              |
| Construction                                    | Triangular core fiber optic detection system                                      |
| Frequency                                       | 10 MHz to 6 GHz                                                                   |
| Linearity                                       | ±0.2 dB (30 MHz to 3 GHz)                                                         |
| <u>Phantom 1</u>                                |                                                                                   |
| Type                                            | ELI Elliptical Planar Phantom                                                     |
| Shell Material                                  | Fiberglass                                                                        |
| Thickness                                       | 2mm +/- .2mm                                                                      |
| Volume                                          | > 30 Liter                                                                        |

|                         |                                           |                                                                                                                      |                  |                      |                     |               |
|-------------------------|-------------------------------------------|----------------------------------------------------------------------------------------------------------------------|------------------|----------------------|---------------------|---------------|
| <b>Applicant:</b>       | <b>Blackline GPS</b>                      | <b>FCC ID:</b>                                                                                                       | <b>W77LNR900</b> | <b>IC ID:</b>        | <b>8255A-LNR900</b> |               |
| <b>DUT Type:</b>        | <b>Lone Worker Safety Device with GPS</b> | <b>Models:</b>                                                                                                       | <b>Loner 900</b> | <b>902 – 928 MHz</b> |                     |               |
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|                                                                                  | <u>Test Report Issue Date</u><br>May 21, 2014     | <u>Description of Test(s)</u><br>Specific Absorption Rate | <u>RF Exposure Category</u><br>General Population        |                                                                                                                                                                       |

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## 15.0 PROBE SPECIFICATION (ET3DV6)

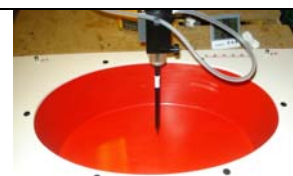
|                 |                                                                                                                                                          |
|-----------------|----------------------------------------------------------------------------------------------------------------------------------------------------------|
| Construction:   | Symmetrical design with triangular core;<br>Built-in shielding against static charges<br>PEEK enclosure material (resistant to organic solvents, glycol) |
| Calibration:    | In air from 10 MHz to 2.5 GHz<br>In head simulating tissue at frequencies of 900 MHz<br>and 1.8 GHz (accuracy $\pm 8\%$ )                                |
| Frequency:      | 10 MHz to > 6 GHz; Linearity: $\pm 0.2$ dB (30 MHz to 3 GHz)                                                                                             |
| Directivity:    | $\pm 0.2$ dB in head tissue (rotation around probe axis)<br>$\pm 0.4$ dB in head tissue (rotation normal to probe axis)                                  |
| Dynamic Range:  | 5 $\mu$ W/g to > 100 mW/g; Linearity: $\pm 0.2$ dB                                                                                                       |
| Surface Detect: | $\pm 0.2$ mm repeatability in air and clear liquids over diffuse reflecting surfaces                                                                     |
| Dimensions:     | Overall length: 330 mm; Tip length: 16 mm;<br>Body diameter: 12 mm; Tip diameter: 6.8 mm<br>Distance from probe tip to dipole centers: 2.7 mm            |
| Application:    | General dosimetry up to 3 GHz; Compliance tests of mobile phone                                                                                          |



ET3DV6 E-Field Probe

## 16.0 PHANTOM

The ELI V5.0 phantom is an elliptical planar fiberglass shell phantom with a shell thickness of 2.0mm  $\pm$  .2mm at the planar area. This phantom conforms to OET Bulletin 65, Supplement C, IEEE 1528-2013, IEC 62209-1 and IEC 62209-2.



ELI Planar Phantom

## 17.0 DEVICE HOLDER

The DASY4 device holder has two scales for device rotation (with respect to the body axis) and the device inclination (with respect to the line between the ear openings). The plane between the ear openings and the mouth tip has a rotation angle of 65°. The bottom plate contains three pair of bolts for locking the device holder. The device holder positions are adjusted to the standard measurement positions in the three sections.



Device Holder

|                         |                                           |                                                                                                                      |                  |                      |                     |               |
|-------------------------|-------------------------------------------|----------------------------------------------------------------------------------------------------------------------|------------------|----------------------|---------------------|---------------|
| <b>Applicant:</b>       | <b>Blackline GPS</b>                      | <b>FCC ID:</b>                                                                                                       | <b>W77LNR900</b> | <b>IC ID:</b>        | <b>8255A-LNR900</b> |               |
| <b>DUT Type:</b>        | <b>Lone Worker Safety Device with GPS</b> | <b>Models:</b>                                                                                                       | <b>Loner 900</b> | <b>902 – 928 MHz</b> |                     |               |
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|                                                                                  | <u>Test Report Issue Date</u><br>May 21, 2014     | <u>Description of Test(s)</u><br>Specific Absorption Rate | <u>RF Exposure Category</u><br>General Population        |                                                                                                                                                                       |

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## 18.0 TEST EQUIPMENT LIST

| TEST EQUIPMENT |                                          | ASSET NO. | SERIAL NO. | DATE CALIBRATED | CALIBRATION INTERVAL |
|----------------|------------------------------------------|-----------|------------|-----------------|----------------------|
| USED           | DESCRIPTION                              |           |            |                 |                      |
| x              | Schmid & Partner DASY4 System            | -         | -          | -               | -                    |
| x              | -DASY4 Measurement Server                | 00158     | 1078       | CNR             | CNR                  |
| x              | -Robot                                   | 00046     | 599396-01  | CNR             | CNR                  |
| x              | -DAE4                                    | 00019     | 353        | 9 April 2014    | Biennial             |
| x              | -ET3DV6 E-Field Probe                    | 00017     | 1590       | 15 April 2014   | Annual               |
| x              | -D900V2 Validation Dipole                | 00020     | 4d054      | 20 April 2014   | Triennial            |
| x              | SPEAG SAM Twin Phantom V4.0C             | 00154     | 1033       | CNR             | CNR                  |
| x              | HP 85070C Dielectric Probe Kit           | 00033     | none       | CNR             | CNR                  |
| x              | Gigatronics 8652A Power Meter            | 00110     | 1835801    | 17 March 2014   | Biennial             |
| x              | Gigatronics 80701A Power Sensor          | 00249     | 1834473    | 17 March 2014   | Biennial             |
| x              | Gigatronics 80701A Power Sensor          | 00248     | 1833687    | 17 March 2014   | Biennial             |
| x              | HP 8753ET Network Analyzer               | 00134     | US39170292 | 26 April 2012   | Biennial             |
| x              | Rohde & Schwarz SMR20 Signal Generator   | 00006     | 100104     | 8 May 2014      | Biennial             |
| x              | Amplifier Research 5S1G4 Power Amplifier | 00106     | 26235      | CNR             | CNR                  |
| Abbr.          | CNR = Calibration Not Required           |           |            |                 |                      |

|                         |                                           |                                                                                                                      |                  |                      |                     |               |
|-------------------------|-------------------------------------------|----------------------------------------------------------------------------------------------------------------------|------------------|----------------------|---------------------|---------------|
| <b>Applicant:</b>       | <b>Blackline GPS</b>                      | <b>FCC ID:</b>                                                                                                       | <b>W77LNR900</b> | <b>IC ID:</b>        | <b>8255A-LNR900</b> |               |
| <b>DUT Type:</b>        | <b>Lone Worker Safety Device with GPS</b> | <b>Models:</b>                                                                                                       | <b>Loner 900</b> | <b>902 – 928 MHz</b> |                     |               |
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|                                                                                  |                                                   |                                                           |                                                          |                                                                                    |
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|  | <u>Date(s) of Evaluation</u><br>April 2 & 3, 2014 | <u>Test Report Serial No.</u><br>032814W77-1287-s         | <u>Test Report Revision No.</u><br>Rev 1.2 (3rd Release) |  |
|                                                                                  | <u>Test Report Issue Date</u><br>May 21, 2014     | <u>Description of Test(s)</u><br>Specific Absorption Rate | <u>RF Exposure Category</u><br>General Population        |                                                                                    |

Test Lab Certificate No. 2470.01

## 19.0 MEASUREMENT UNCERTAINTIES (IC)

### UNCERTAINTY BUDGET FOR DEVICE EVALUATION (IEC 62209-2:2010)

| Source of Uncertainty                                                    | IEC 62209-2 Section | Tolerance / Uncertainty ±% | Probability Distribution | Divisor     | ci 1g | ci 10g | Standard Uncertainty ±% (1g) | Standard Uncertainty ±% (10g) | V <sub>i</sub> or V <sub>eff</sub> |
|--------------------------------------------------------------------------|---------------------|----------------------------|--------------------------|-------------|-------|--------|------------------------------|-------------------------------|------------------------------------|
| <b>Measurement System</b>                                                |                     |                            |                          |             |       |        |                              |                               |                                    |
| Probe Calibration (900 MHz)                                              | 7.2.2.1             | 6.0                        | Normal                   | 1           | 1     | 1      | 6.0                          | 6.0                           | ∞                                  |
| Isotropy                                                                 | 7.2.2.2             | 4.7                        | Rectangular              | 1.732050808 | 1     | 1      | 2.7                          | 2.7                           | ∞                                  |
| Boundary Effect                                                          | 7.2.2.6             | 1                          | Rectangular              | 1.732050808 | 1     | 1      | 0.6                          | 0.6                           | ∞                                  |
| Linearity                                                                | 7.2.2.3             | 4.7                        | Rectangular              | 1.732050808 | 1     | 1      | 2.7                          | 2.7                           | ∞                                  |
| Detection Limits                                                         | 7.2.2.5             | 1                          | Rectangular              | 1.732050808 | 1     | 1      | 0.6                          | 0.6                           | ∞                                  |
| Readout Electronics                                                      | 7.2.2.7             | 0.3                        | Normal                   | 1           | 1     | 1      | 0.3                          | 0.3                           | ∞                                  |
| Response Time                                                            | 7.2.2.8             | 0.8                        | Rectangular              | 1.732050808 | 1     | 1      | 0.5                          | 0.5                           | ∞                                  |
| Integration Time                                                         | 7.2.2.9             | 2.6                        | Rectangular              | 1.732050808 | 1     | 1      | 1.5                          | 1.5                           | ∞                                  |
| RF Ambient Conditions                                                    | 7.2.4.5             | 3                          | Rectangular              | 1.732050808 | 1     | 1      | 1.7                          | 1.7                           | ∞                                  |
| Probe Positioner Mechanical Restrictions                                 | 7.2.3.1             | 0.4                        | Rectangular              | 1.732050808 | 1     | 1      | 0.2                          | 0.2                           | ∞                                  |
| Probe Positioning wrt Phantom Shell                                      | 7.2.3.3             | 2.9                        | Rectangular              | 1.732050808 | 1     | 1      | 1.7                          | 1.7                           | ∞                                  |
| Post-processing                                                          | 7.2.5               | 1                          | Rectangular              | 1.732050808 | 1     | 1      | 0.6                          | 0.6                           | ∞                                  |
| <b>Test Sample Related</b>                                               |                     |                            |                          |             |       |        |                              |                               |                                    |
| Test Sample Positioning                                                  | 7.2.3.4.3           | 2.9                        | Normal                   | 1           | 1     | 1      | 2.9                          | 2.9                           | 12                                 |
| Device Holder Uncertainty                                                | 7.2.3.4.2           | 3.6                        | Normal                   | 1           | 1     | 1      | 3.6                          | 3.6                           | 8                                  |
| Drift of Output Power (meas. SAR drift)                                  | 7.2.2.10            | 0                          | Rectangular              | 1.732050808 | 1     | 1      | 0.0                          | 0.0                           | ∞                                  |
| <b>Phantom and Tissue Parameters</b>                                     |                     |                            |                          |             |       |        |                              |                               |                                    |
| Phantom Uncertainty                                                      | 7.2.3.2             | 4                          | Rectangular              | 1.732050808 | 1     | 1      | 2.3                          | 2.3                           | ∞                                  |
| SAR Correction Algorithm for deviations in permittivity and conductivity | 7.2.4.3             | 1.9                        | Normal                   | 1           | 1     | 0.81   | 1.9                          | 1.54                          | ∞                                  |
| Liquid Conductivity (measured)                                           | 7.2.4.3             | 3.77                       | Normal                   | 1           | 0.78  | 0.71   | 2.9                          | 2.7                           | ∞                                  |
| Liquid Permittivity (measured)                                           | 7.2.4.3             | 7.45                       | Normal                   | 1           | 0.23  | 0.26   | 1.7                          | 1.9                           | ∞                                  |
| Liquid Permittivity - temp. uncertainty                                  | 7.2.4.4             | 1                          | Rectangular              | 1.732050808 | 0.78  | 0.71   | 0.5                          | 0.4                           | ∞                                  |
| Liquid Conductivity - temp. uncertainty                                  | 7.2.4.4             | 0.25                       | Rectangular              | 1.732050808 | 0.23  | 0.26   | 0.0                          | 0.0                           | ∞                                  |
| <b>Combined Standard Uncertainty</b>                                     | <b>7.3.1</b>        |                            | <b>RSS</b>               |             |       |        | <b>10.11</b>                 | <b>10.01</b>                  |                                    |
| <b>Expanded Uncertainty (95% Confidence Interval)</b>                    | <b>7.3.2</b>        |                            | <b>k=2</b>               |             |       |        | <b>20.22</b>                 | <b>20.03</b>                  |                                    |

Measurement Uncertainty Table in accordance with International Standard IEC 62209-2:2010

This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=2

|                         |                                           |                                                                                                                      |                  |                      |                     |               |
|-------------------------|-------------------------------------------|----------------------------------------------------------------------------------------------------------------------|------------------|----------------------|---------------------|---------------|
| <b>Applicant:</b>       | <b>Blackline GPS</b>                      | <b>FCC ID:</b>                                                                                                       | <b>W77LNR900</b> | <b>IC ID:</b>        | <b>8255A-LNR900</b> |               |
| <b>DUT Type:</b>        | <b>Lone Worker Safety Device with GPS</b> | <b>Models:</b>                                                                                                       | <b>Loner 900</b> | <b>902 – 928 MHz</b> |                     |               |
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|                                                                                  |                                                   |                                                           |                                                          |                                                                                                                        |
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|  | <u>Date(s) of Evaluation</u><br>April 2 & 3, 2014 | <u>Test Report Serial No.</u><br>032814W77-1287-s         | <u>Test Report Revision No.</u><br>Rev 1.2 (3rd Release) | <br>Test Lab Certificate No. 2470.01 |
|                                                                                  | <u>Test Report Issue Date</u><br>May 21, 2014     | <u>Description of Test(s)</u><br>Specific Absorption Rate | <u>RF Exposure Category</u><br>General Population        |                                                                                                                        |

## 20.0 REFERENCES

- [1] Federal Communications Commission - "Radiofrequency radiation exposure evaluation: portable devices", Rule Part 47 CFR §2.1093.
- [2] Health Canada - "Limits of Human Exposure to Radiofrequency Electromagnetic Fields in the Frequency Range from 3 kHz to 300 GHz", Safety Code 6: 1999.
- [3] Federal Communications Commission, Office of Engineering and Technology - "SAR Measurement Requirements for 100 MHz to 6 GHz"; KDB 865664 D01v01r03: February 2014.
- [4] Industry Canada - "Radio Frequency (RF) Exposure Compliance of Radiocommunication Apparatus (All Frequency Bands)", Radio Standards Specification RSS-102 Issue 4: March 2010.
- [5] IEEE Standard 1528-2013 - "Recommended Practice for Determining the Peak Spatial-Average Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques": December 2003.
- [6] International Standard IEC 62209-2 Edition 1.0 2010-03 - "Human exposure to radio frequency fields from hand-held & body-mounted wireless communication devices - 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)".
- [7] IEC International Standard 62209-1:2005 - "Human exposure to radio frequency fields from hand-held and body-mounted wireless communication devices - Human models, instrumentation, and procedures."
- [8] Federal Communications Commission, Office of Engineering and Technology - "Mobile and Portable Device RF Exposure Procedures and Equipment Authorization Policies"; KDB 447498 D01v05r01: May 2013.
- [10] Schmid & Partner Engineering AG - DASY4 Manual V4.6, Chapter 16 Application Note, Head Tissue Recipe: Sept. 2005.
- [11] Schmid & Partner Engineering AG - DASY4 Manual V4.6, Chapter 17 Application Note, Body Tissue Recipe: Sept. 2005.
- [12] ISO/IEC 17025 - "General requirements for the competence of testing and calibration laboratories (ISO/IEC 17025:2005)."
- [13] Federal Communications Commission - "Measurements Required: RF Power Output"; Rule Part 47 CFR §2.1046.
- [14] Industry Canada - "General Requirements and Information for the Certification of Radiocommunication Equipment", Radio Standards Specification RSS-Gen Issue 3: December 2010.

|                         |                                           |                                                                                                                      |                  |                      |                     |               |
|-------------------------|-------------------------------------------|----------------------------------------------------------------------------------------------------------------------|------------------|----------------------|---------------------|---------------|
| <b>Applicant:</b>       | <b>Blackline GPS</b>                      | <b>FCC ID:</b>                                                                                                       | <b>W77LNR900</b> | <b>IC ID:</b>        | <b>8255A-LNR900</b> |               |
| <b>DUT Type:</b>        | <b>Lone Worker Safety Device with GPS</b> | <b>Models:</b>                                                                                                       | <b>Loner 900</b> | <b>902 – 928 MHz</b> |                     |               |
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|                                                                                  | <u>Test Report Issue Date</u><br>May 21, 2014     | <u>Description of Test(s)</u><br>Specific Absorption Rate | <u>RF Exposure Category</u><br>General Population        |                                                                                                                        |

## APPENDIX A - SAR MEASUREMENT PLOTS

|                         |                                           |                                                                                                                      |                  |                      |                     |               |
|-------------------------|-------------------------------------------|----------------------------------------------------------------------------------------------------------------------|------------------|----------------------|---------------------|---------------|
| <b>Applicant:</b>       | <b>Blackline GPS</b>                      | <b>FCC ID:</b>                                                                                                       | <b>W77LNR900</b> | <b>IC ID:</b>        | <b>8255A-LNR900</b> |               |
| <b>DUT Type:</b>        | <b>Lone Worker Safety Device with GPS</b> | <b>Models:</b>                                                                                                       | <b>Loner 900</b> | <b>902 – 928 MHz</b> |                     |               |
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|                                                                                  | <u>Test Report Issue Date</u><br>May 21, 2014     | <u>Description of Test(s)</u><br>Specific Absorption Rate | <u>RF Exposure Category</u><br>General Population        |                                                                                    |

## Plot B1

Date Tested: 04/02/2014

**DUT: BlackLine GPS; Type: GPS gadge; Serial: App 2**

Program Notes: 2 April 2014; Ambient Temp: 25C; Fluid Temp: 23.6C; Humidity: 16%

Procedure Notes:

Communication System: CW

Frequency: 915 MHz; Duty Cycle: 1:1

Medium: M900 Medium parameters used (interpolated):  $f = 915 \text{ MHz}$ ;  $\sigma = 1.02 \text{ mho/m}$ ;  $\epsilon_r = 50.9$ ;  $\rho = 1000 \text{ kg/m}^3$

- Probe: ET3DV6 - SN1590; ConvF(6.63, 6.63, 6.63); Calibrated: 24/04/2013
- Sensor-Surface: 4mm (Mechanical Surface Detection (Locations From Previous Scan Used))Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn353; Calibrated: 19/04/2012
- Phantom: ELI v5.0; Type: QDOVA002AA; Serial: TP:xxxx
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

**Body 915MHz/Area Scan (7x12x1):** Measurement grid: dx=10mm, dy=10mm

Info: Interpolated medium parameters used for SAR evaluation.

Maximum value of SAR (measured) = 2.23 mW/g

**Body 915MHz/Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=7.5mm, dy=7.5mm, dz=5mm

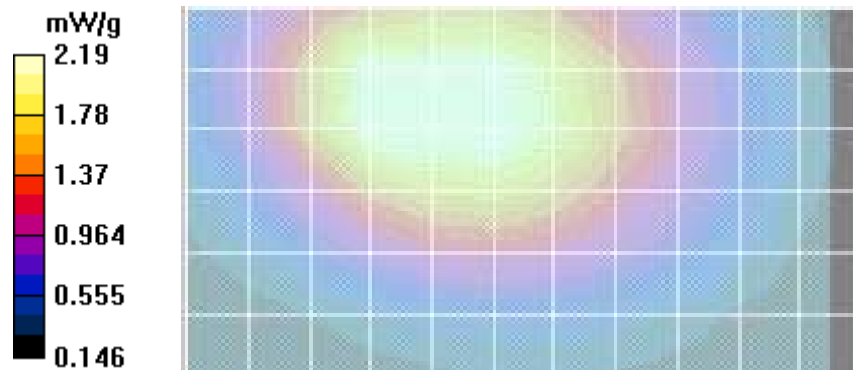
Reference Value = 19.8 V/m; Power Drift = -0.115 dB

Peak SAR (extrapolated) = 3.17 W/kg

**SAR(1 g) = 2.03 mW/g; SAR(10 g) = 1.39 mW/g**

Info: Interpolated medium parameters used for SAR evaluation.

Maximum value of SAR (measured) = 2.19 mW/g



|                         |                                           |                                                                                                                      |                  |                      |                     |               |
|-------------------------|-------------------------------------------|----------------------------------------------------------------------------------------------------------------------|------------------|----------------------|---------------------|---------------|
| <b>Applicant:</b>       | <b>Blackline GPS</b>                      | <b>FCC ID:</b>                                                                                                       | <b>W77LNR900</b> | <b>IC ID:</b>        | <b>8255A-LNR900</b> |               |
| <b>DUT Type:</b>        | <b>Lone Worker Safety Device with GPS</b> | <b>Models:</b>                                                                                                       | <b>Loner 900</b> | <b>902 – 928 MHz</b> |                     |               |
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|                                                                                  | <u>Test Report Issue Date</u><br>May 21, 2014     | <u>Description of Test(s)</u><br>Specific Absorption Rate | <u>RF Exposure Category</u><br>General Population        |                                                                                    |

Test Lab Certificate No. 2470.01

## Plot B2

Date Tested: 04/03/2014

**DUT: BlackLine GPS; Type: GPS gadge; Serial: App 2**

Program Notes: 2 April 2014; Ambient Temp: 25C; Fluid Temp: 23.6C; Humidity: 16%

Procedure Notes:

Communication System: CW

Frequency: 902 MHz; Duty Cycle: 1:1

Medium: M900 Medium parameters used (interpolated):  $f = 902 \text{ MHz}$ ;  $\sigma = 1.02 \text{ mho/m}$ ;  $\epsilon_r = 50.9$ ;  $\rho = 1000 \text{ kg/m}^3$

- Probe: ET3DV6 - SN1590; ConvF(6.63, 6.63, 6.63); Calibrated: 24/04/2013
- Sensor-Surface: 4mm (Mechanical Surface Detection (Locations From Previous Scan Used))Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn353; Calibrated: 19/04/2012
- Phantom: ELI v5.0; Type: QDOVA002AA; Serial: TP:xxxx
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

**Body 902MHz/Area Scan (7x12x1):** Measurement grid:  $dx=10\text{mm}$ ,  $dy=10\text{mm}$

Info: Interpolated medium parameters used for SAR evaluation.

Maximum value of SAR (measured) = 2.02 mW/g

**Body 902MHz/Zoom Scan (5x5x7)/Cube 0:** Measurement grid:  $dx=7.5\text{mm}$ ,  $dy=7.5\text{mm}$ ,  $dz=5\text{mm}$

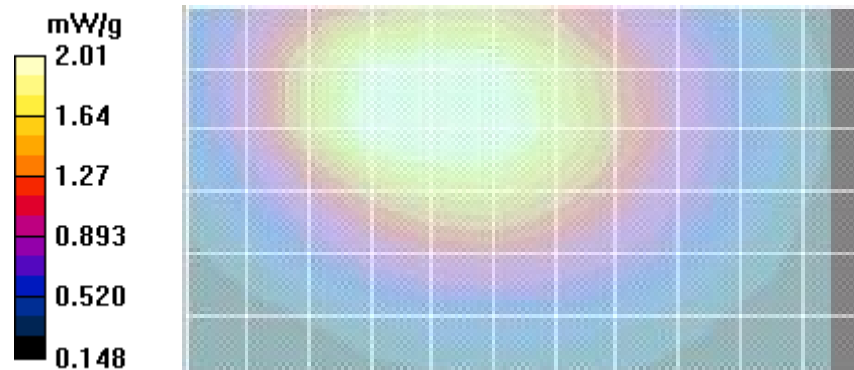
Reference Value = 19.9 V/m; Power Drift = -0.187 dB

Peak SAR (extrapolated) = 2.96 W/kg

**SAR(1 g) = 1.86 mW/g; SAR(10 g) = 1.29 mW/g**

Info: Interpolated medium parameters used for SAR evaluation.

Maximum value of SAR (measured) = 2.01 mW/g



|                         |                                           |                                                                                                                      |                  |                      |                     |               |
|-------------------------|-------------------------------------------|----------------------------------------------------------------------------------------------------------------------|------------------|----------------------|---------------------|---------------|
| <b>Applicant:</b>       | <b>Blackline GPS</b>                      | <b>FCC ID:</b>                                                                                                       | <b>W77LNR900</b> | <b>IC ID:</b>        | <b>8255A-LNR900</b> |               |
| <b>DUT Type:</b>        | <b>Lone Worker Safety Device with GPS</b> | <b>Models:</b>                                                                                                       | <b>Loner 900</b> | <b>902 – 928 MHz</b> |                     |               |
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|  | <u>Date(s) of Evaluation</u><br>April 2 & 3, 2014 | <u>Test Report Serial No.</u><br>032814W77-1287-s         | <u>Test Report Revision No.</u><br>Rev 1.2 (3rd Release) |  |
|                                                                                  | <u>Test Report Issue Date</u><br>May 21, 2014     | <u>Description of Test(s)</u><br>Specific Absorption Rate | <u>RF Exposure Category</u><br>General Population        |                                                                                    |

Test Lab Certificate No. 2470.01

### Plot B3

Date Tested: 04/03/2014

**DUT: BlackLine GPS; Type: GPS gadge; Serial: App 2**

Program Notes: 2 April 2014; Ambient Temp: 25C; Fluid Temp: 23.6C; Humidity: 16%

Procedure Notes:

Communication System: CW

Frequency: 928 MHz; Duty Cycle: 1:1

Medium: M900 Medium parameters used (interpolated):  $f = 928 \text{ MHz}$ ;  $\sigma = 1.05 \text{ mho/m}$ ;  $\epsilon_r = 51$ ;  $\rho = 1000 \text{ kg/m}^3$

- Probe: ET3DV6 - SN1590; ConvF(6.63, 6.63, 6.63); Calibrated: 24/04/2013
- Sensor-Surface: 4mm (Mechanical Surface Detection (Locations From Previous Scan Used))Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn353; Calibrated: 19/04/2012
- Phantom: ELI v5.0; Type: QDOVA002AA; Serial: TP:xxxx
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

**Body 928MHz/Area Scan (7x12x1):** Measurement grid:  $dx=10\text{mm}$ ,  $dy=10\text{mm}$

Info: Interpolated medium parameters used for SAR evaluation.

Maximum value of SAR (measured) = 2.59 mW/g

**Body 928MHz/Zoom Scan (5x5x7)/Cube 0:** Measurement grid:  $dx=7.5\text{mm}$ ,  $dy=7.5\text{mm}$ ,  $dz=5\text{mm}$

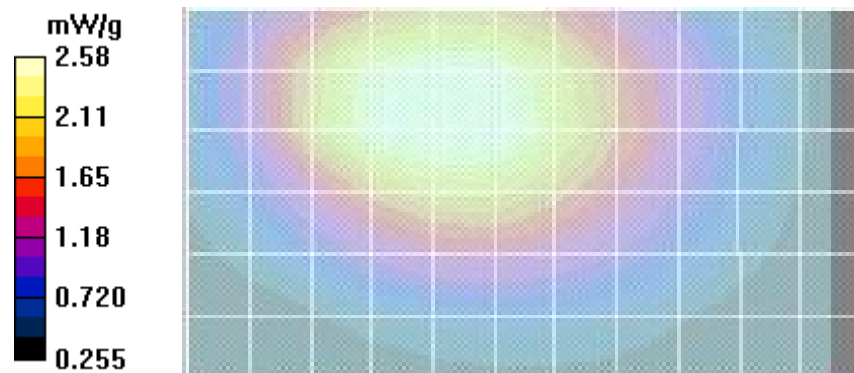
Reference Value = 22.2 V/m; Power Drift = -0.119 dB

Peak SAR (extrapolated) = 3.21 W/kg

**SAR(1 g) = 2.39 mW/g; SAR(10 g) = 1.65 mW/g**

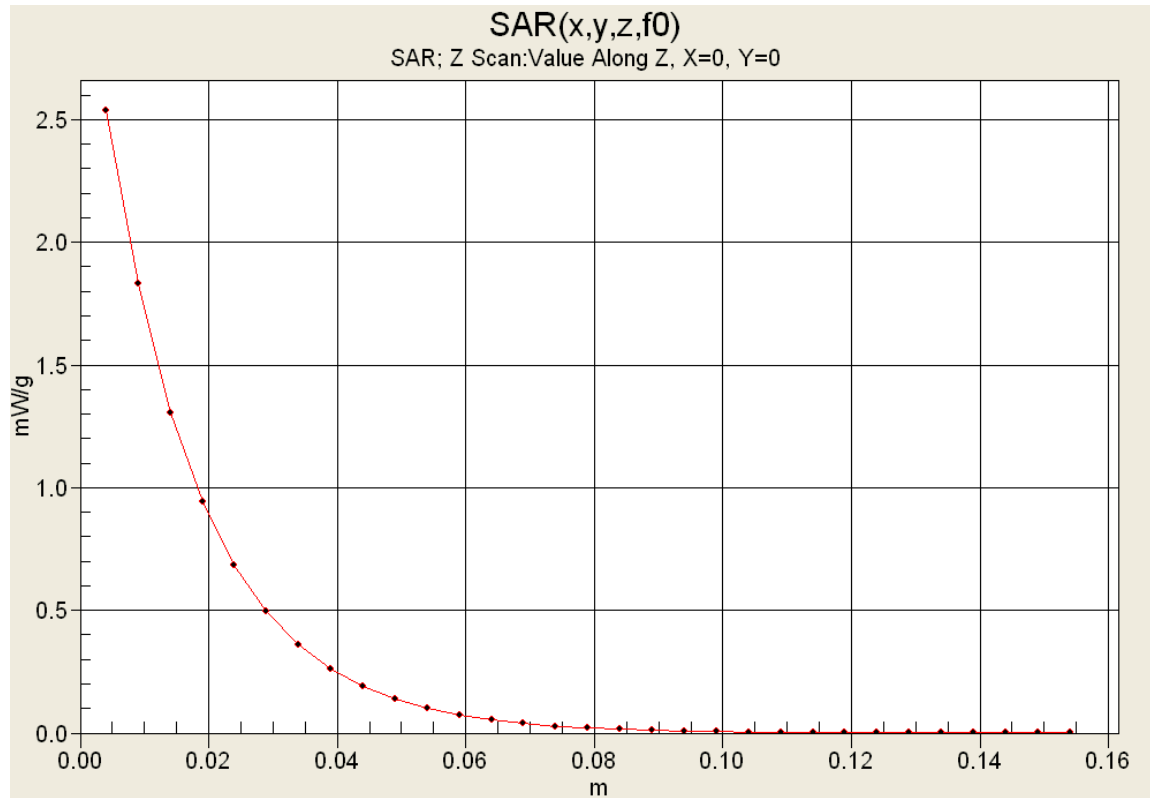
Info: Interpolated medium parameters used for SAR evaluation.

Maximum value of SAR (measured) = 2.58 mW/g



|                         |                                           |                                                                                                                      |                  |                      |                     |               |
|-------------------------|-------------------------------------------|----------------------------------------------------------------------------------------------------------------------|------------------|----------------------|---------------------|---------------|
| <b>Applicant:</b>       | <b>Blackline GPS</b>                      | <b>FCC ID:</b>                                                                                                       | <b>W77LNR900</b> | <b>IC ID:</b>        | <b>8255A-LNR900</b> |               |
| <b>DUT Type:</b>        | <b>Lone Worker Safety Device with GPS</b> | <b>Models:</b>                                                                                                       | <b>Loner 900</b> | <b>902 – 928 MHz</b> |                     |               |
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## Z-Axis Scan



|                                                                                  |                                                   |                                                           |                                                          |                                                                                                                        |
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|  | <u>Date(s) of Evaluation</u><br>April 2 & 3, 2014 | <u>Test Report Serial No.</u><br>032814W77-1287-s         | <u>Test Report Revision No.</u><br>Rev 1.2 (3rd Release) | <br>Test Lab Certificate No. 2470.01 |
|                                                                                  | <u>Test Report Issue Date</u><br>May 21, 2014     | <u>Description of Test(s)</u><br>Specific Absorption Rate | <u>RF Exposure Category</u><br>General Population        |                                                                                                                        |

## APPENDIX B - SYSTEM PERFORMANCE CHECK PLOTS

|                         |                                           |                                                                                                                      |                  |                      |                     |               |
|-------------------------|-------------------------------------------|----------------------------------------------------------------------------------------------------------------------|------------------|----------------------|---------------------|---------------|
| <b>Applicant:</b>       | <b>Blackline GPS</b>                      | <b>FCC ID:</b>                                                                                                       | <b>W77LNR900</b> | <b>IC ID:</b>        | <b>8255A-LNR900</b> |               |
| <b>DUT Type:</b>        | <b>Lone Worker Safety Device with GPS</b> | <b>Models:</b>                                                                                                       | <b>Loner 900</b> | <b>902 – 928 MHz</b> |                     |               |
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|  | <u>Date(s) of Evaluation</u><br>April 2 & 3, 2014 | <u>Test Report Serial No.</u><br>032814W77-1287-s         | <u>Test Report Revision No.</u><br>Rev 1.2 (3rd Release) |  |
|                                                                                  | <u>Test Report Issue Date</u><br>May 21, 2014     | <u>Description of Test(s)</u><br>Specific Absorption Rate | <u>RF Exposure Category</u><br>General Population        |                                                                                    |

## System Performance Check - 900 MHz Body

Date Tested: 04/02/2014

**DUT: Dipole 900 MHz; Type: D900V2; Serial: 054; Calibrated: 20 Apr 2012**

Program Notes: 2 April 2014; Ambient Temp: 25C; Fluid Temp: 23.6C; Humidity: 16%

Procedure Notes:

Communication System: CW

Frequency: 900 MHz; Duty Cycle: 1:1

Medium: M900 Medium parameters used:  $f = 900 \text{ MHz}$ ;  $\sigma = 1.02 \text{ mho/m}$ ;  $\epsilon_r = 50.9$ ;  $\rho = 1000 \text{ kg/m}^3$

- Probe: ET3DV6 - SN1590; ConvF(6.63, 6.63, 6.63); Calibrated: 24/04/2013
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn353; Calibrated: 19/04/2012
- Phantom: ELI v5.0; Type: QDOVA002AA; Serial: TP:xxxx
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

**Body D=15mm P=250mW, TS=2.80 2/Area Scan (7x7x1):** Measurement grid: dx=10mm, dy=10mm

Maximum value of SAR (measured) = 2.90 mW/g

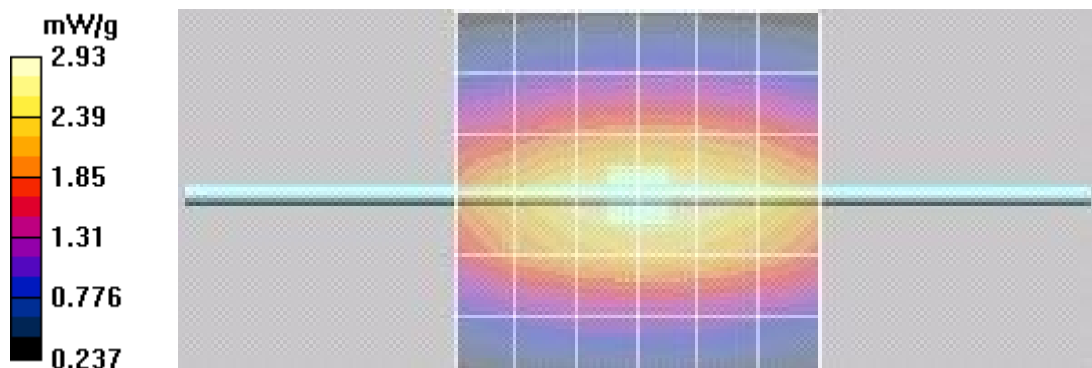
**Body D=15mm P=250mW, TS=2.80 2/Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=7.5mm, dy=7.5mm, dz=5mm

Reference Value = 55.1 V/m; Power Drift = -0.008 dB

Peak SAR (extrapolated) = 3.96 W/kg

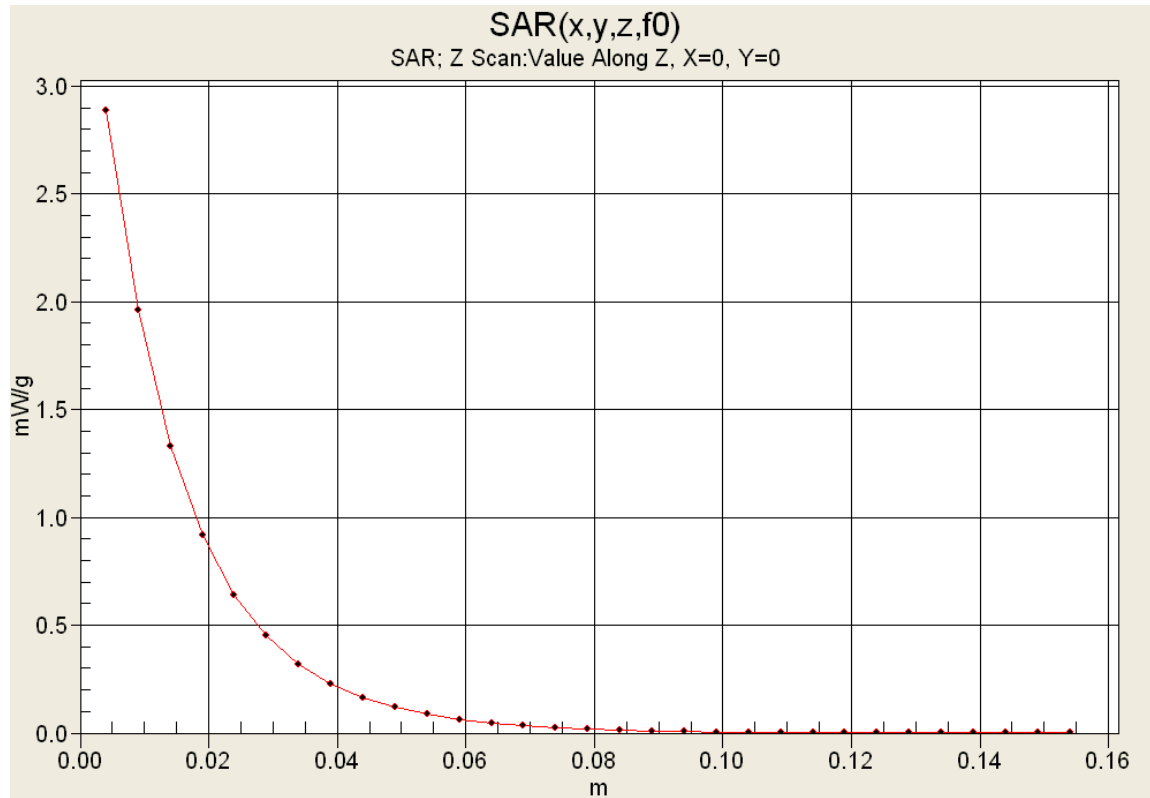
**SAR(1 g) = 2.71 mW/g; SAR(10 g) = 1.74 mW/g**

Maximum value of SAR (measured) = 2.93 mW/g



|                         |                                                                                                                      |                |                  |                      |                     |               |
|-------------------------|----------------------------------------------------------------------------------------------------------------------|----------------|------------------|----------------------|---------------------|---------------|
| <b>Applicant:</b>       | <b>Blackline GPS</b>                                                                                                 | <b>FCC ID:</b> | <b>W77LNR900</b> | <b>IC ID:</b>        | <b>8255A-LNR900</b> |               |
| <b>DUT Type:</b>        | <b>Lone Worker Safety Device with GPS</b>                                                                            | <b>Models:</b> | <b>Loner 900</b> | <b>902 – 928 MHz</b> |                     |               |
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## Z-Axis Scan



|                                                                                  |                                                   |                                                           |                                                          |                                                                                    |
|----------------------------------------------------------------------------------|---------------------------------------------------|-----------------------------------------------------------|----------------------------------------------------------|------------------------------------------------------------------------------------|
|  | <u>Date(s) of Evaluation</u><br>April 2 & 3, 2014 | <u>Test Report Serial No.</u><br>032814W77-1287-s         | <u>Test Report Revision No.</u><br>Rev 1.2 (3rd Release) |  |
|                                                                                  | <u>Test Report Issue Date</u><br>May 21, 2014     | <u>Description of Test(s)</u><br>Specific Absorption Rate | <u>RF Exposure Category</u><br>General Population        |                                                                                    |

Test Lab Certificate No. 2470.01

## APPENDIX C - MEASURED FLUID DIELECTRIC PARAMETERS

|                         |                                           |                                                                                                                      |                  |                      |                     |               |
|-------------------------|-------------------------------------------|----------------------------------------------------------------------------------------------------------------------|------------------|----------------------|---------------------|---------------|
| <b>Applicant:</b>       | <b>Blackline GPS</b>                      | <b>FCC ID:</b>                                                                                                       | <b>W77LNR900</b> | <b>IC ID:</b>        | <b>8255A-LNR900</b> |               |
| <b>DUT Type:</b>        | <b>Lone Worker Safety Device with GPS</b> | <b>Models:</b>                                                                                                       | <b>Loner 900</b> | <b>902 – 928 MHz</b> |                     |               |
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|                                                                                  |                                                   |                                                           |                                                          |                                                                                    |
|----------------------------------------------------------------------------------|---------------------------------------------------|-----------------------------------------------------------|----------------------------------------------------------|------------------------------------------------------------------------------------|
|  | <u>Date(s) of Evaluation</u><br>April 2 & 3, 2014 | <u>Test Report Serial No.</u><br>032814W77-1287-s         | <u>Test Report Revision No.</u><br>Rev 1.2 (3rd Release) |  |
|                                                                                  | <u>Test Report Issue Date</u><br>May 21, 2014     | <u>Description of Test(s)</u><br>Specific Absorption Rate | <u>RF Exposure Category</u><br>General Population        |                                                                                    |

Test Lab Certificate No. 2470.01

## 900 MHz Body

\*\*\*\*\*

Celltech Labs Inc.

Test Result for UIM Dielectric Parameter

02/Apr/2014

Frequency(GHz)

FCC\_eH FCC Bulletin 65 Supplement C ( June 2001) Limits for Head Epsilon

FCC\_sH FCC Bulletin 65 Supplement C (June 2001) Limits for Head Sigma

FCC\_eB FCC Limits for Body Epsilon

FCC\_sB FCC Limits for Body Sigma

Test\_e Epsilon of UIM

Test\_s Sigma of UIM

\*\*\*\*\*

| Freq   | FCC_eB | FCC_sB | Test_e | Test_s |
|--------|--------|--------|--------|--------|
| 0.8000 | 55.34  | 0.97   | 51.85  | 0.90   |
| 0.8100 | 55.30  | 0.97   | 52.21  | 0.91   |
| 0.8200 | 55.26  | 0.97   | 51.77  | 0.93   |
| 0.8300 | 55.22  | 0.97   | 51.76  | 0.94   |
| 0.8400 | 55.18  | 0.98   | 51.47  | 0.95   |
| 0.8500 | 55.15  | 0.99   | 51.46  | 0.96   |
| 0.8600 | 55.12  | 1.00   | 51.50  | 0.99   |
| 0.8700 | 55.09  | 1.01   | 51.14  | 0.99   |
| 0.8800 | 55.06  | 1.03   | 51.12  | 0.99   |
| 0.8900 | 55.03  | 1.04   | 51.17  | 1.02   |
| 0.9000 | 55.00  | 1.05   | 50.88  | 1.02   |
| 0.9100 | 55.00  | 1.06   | 50.94  | 1.02   |
| 0.9200 | 54.99  | 1.06   | 50.97  | 1.03   |
| 0.9300 | 54.97  | 1.07   | 51.03  | 1.05   |
| 0.9400 | 54.95  | 1.07   | 50.61  | 1.05   |
| 0.9500 | 54.93  | 1.08   | 50.42  | 1.06   |
| 0.9600 | 54.92  | 1.08   | 50.31  | 1.09   |
| 0.9700 | 54.90  | 1.08   | 50.53  | 1.09   |
| 0.9800 | 54.88  | 1.09   | 50.09  | 1.09   |
| 0.9900 | 54.86  | 1.09   | 50.12  | 1.11   |
| 1.0000 | 54.84  | 1.10   | 49.92  | 1.14   |

|                         |                                           |                                                                                                                      |                  |                      |                     |               |
|-------------------------|-------------------------------------------|----------------------------------------------------------------------------------------------------------------------|------------------|----------------------|---------------------|---------------|
| <b>Applicant:</b>       | <b>Blackline GPS</b>                      | <b>FCC ID:</b>                                                                                                       | <b>W77LNR900</b> | <b>IC ID:</b>        | <b>8255A-LNR900</b> |               |
| <b>DUT Type:</b>        | <b>Lone Worker Safety Device with GPS</b> | <b>Models:</b>                                                                                                       | <b>Loner 900</b> | <b>902 – 928 MHz</b> |                     |               |
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|                                                                                  |                                                   |                                                           |                                                          |                                                                                    |
|----------------------------------------------------------------------------------|---------------------------------------------------|-----------------------------------------------------------|----------------------------------------------------------|------------------------------------------------------------------------------------|
|  | <u>Date(s) of Evaluation</u><br>April 2 & 3, 2014 | <u>Test Report Serial No.</u><br>032814W77-1287-s         | <u>Test Report Revision No.</u><br>Rev 1.2 (3rd Release) |  |
|                                                                                  | <u>Test Report Issue Date</u><br>May 21, 2014     | <u>Description of Test(s)</u><br>Specific Absorption Rate | <u>RF Exposure Category</u><br>General Population        |                                                                                    |

Test Lab Certificate No. 2470.01

## APPENDIX D - SAR TEST SETUP & DUT PHOTOGRAPHS

|                         |                                           |                                                                                                                      |                  |                      |                     |               |
|-------------------------|-------------------------------------------|----------------------------------------------------------------------------------------------------------------------|------------------|----------------------|---------------------|---------------|
| <b>Applicant:</b>       | <b>Blackline GPS</b>                      | <b>FCC ID:</b>                                                                                                       | <b>W77LNR900</b> | <b>IC ID:</b>        | <b>8255A-LNR900</b> |               |
| <b>DUT Type:</b>        | <b>Lone Worker Safety Device with GPS</b> | <b>Models:</b>                                                                                                       | <b>Loner 900</b> | <b>902 – 928 MHz</b> |                     |               |
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|                                                                                  |                                                   |                                                           |                                                          |                                                                                                                                                                       |
|----------------------------------------------------------------------------------|---------------------------------------------------|-----------------------------------------------------------|----------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|  | <u>Date(s) of Evaluation</u><br>April 2 & 3, 2014 | <u>Test Report Serial No.</u><br>032814W77-1287-s         | <u>Test Report Revision No.</u><br>Rev 1.2 (3rd Release) |   |
|                                                                                  | <u>Test Report Issue Date</u><br>May 21, 2014     | <u>Description of Test(s)</u><br>Specific Absorption Rate | <u>RF Exposure Category</u><br>General Population        |                                                                                                                                                                       |

Test Lab Certificate No. 2470.01

## BODY-WORN SAR TEST SETUP PHOTOGRAPHS



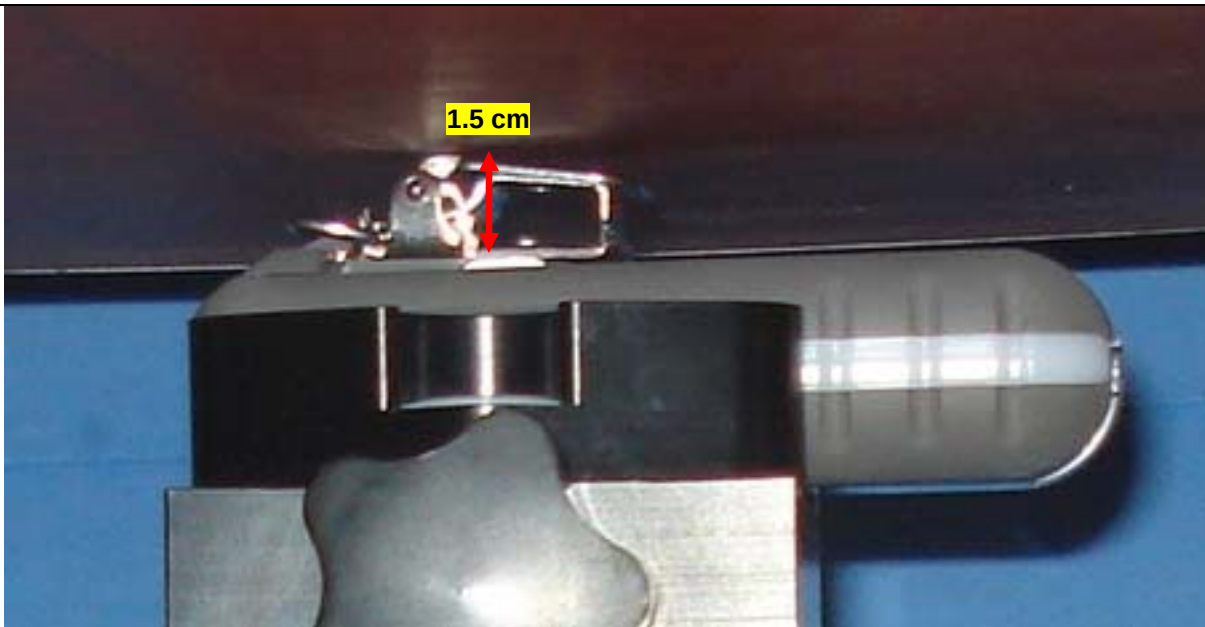
Body-worn SAR Configuration Test Setup with Belt-Clip

|                         |                                           |                                                                                                                      |                  |                      |                     |               |
|-------------------------|-------------------------------------------|----------------------------------------------------------------------------------------------------------------------|------------------|----------------------|---------------------|---------------|
| <b>Applicant:</b>       | <b>Blackline GPS</b>                      | <b>FCC ID:</b>                                                                                                       | <b>W77LNR900</b> | <b>IC ID:</b>        | <b>8255A-LNR900</b> |               |
| <b>DUT Type:</b>        | <b>Lone Worker Safety Device with GPS</b> | <b>Models:</b>                                                                                                       | <b>Loner 900</b> | <b>902 – 928 MHz</b> |                     |               |
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|                                                                                  |                                                   |                                                           |                                                          |                                                                                    |
|----------------------------------------------------------------------------------|---------------------------------------------------|-----------------------------------------------------------|----------------------------------------------------------|------------------------------------------------------------------------------------|
|  | <u>Date(s) of Evaluation</u><br>April 2 & 3, 2014 | <u>Test Report Serial No.</u><br>032814W77-1287-s         | <u>Test Report Revision No.</u><br>Rev 1.2 (3rd Release) |  |
|                                                                                  | <u>Test Report Issue Date</u><br>May 21, 2014     | <u>Description of Test(s)</u><br>Specific Absorption Rate | <u>RF Exposure Category</u><br>General Population        |                                                                                    |

Test Lab Certificate No. 2470.01

## BODY-WORN SAR TEST SETUP PHOTOGRAPHS

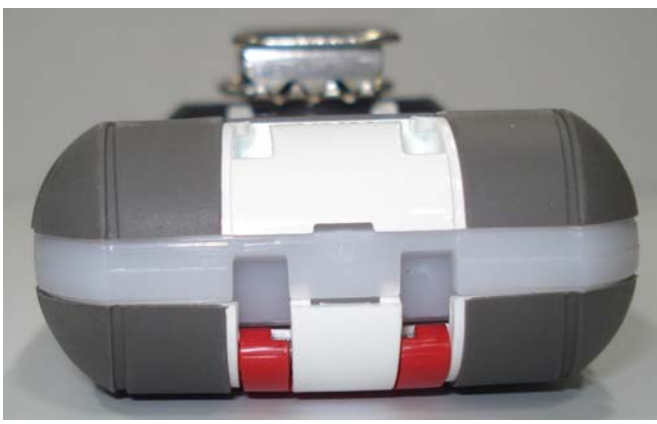


Body-worn SAR Configuration

|                         |                                           |                                                                                                                      |                  |                      |                     |               |
|-------------------------|-------------------------------------------|----------------------------------------------------------------------------------------------------------------------|------------------|----------------------|---------------------|---------------|
| <b>Applicant:</b>       | <b>Blackline GPS</b>                      | <b>FCC ID:</b>                                                                                                       | <b>W77LNR900</b> | <b>IC ID:</b>        | <b>8255A-LNR900</b> |               |
| <b>DUT Type:</b>        | <b>Lone Worker Safety Device with GPS</b> | <b>Models:</b>                                                                                                       | <b>Loner 900</b> | <b>902 – 928 MHz</b> |                     |               |
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|                                                                                  |                                                   |                                                           |                                                          |                                                                                    |
|----------------------------------------------------------------------------------|---------------------------------------------------|-----------------------------------------------------------|----------------------------------------------------------|------------------------------------------------------------------------------------|
|  | <u>Date(s) of Evaluation</u><br>April 2 & 3, 2014 | <u>Test Report Serial No.</u><br>032814W77-1287-s         | <u>Test Report Revision No.</u><br>Rev 1.2 (3rd Release) |  |
|                                                                                  | <u>Test Report Issue Date</u><br>May 21, 2014     | <u>Description of Test(s)</u><br>Specific Absorption Rate | <u>RF Exposure Category</u><br>General Population        |                                                                                    |

## DUT PHOTOGRAPHS

|                                                                                     |  |                                                                                    |                                                                                      |                                                                                     |                                                                                      |
|-------------------------------------------------------------------------------------|--|------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------|
|    |  |  |                                                                                      |  |  |
| Front Side                                                                          |  | Back Side                                                                          |                                                                                      | Left Side                                                                           | Right Side                                                                           |
|  |  |                                                                                    |  |                                                                                     |                                                                                      |
| Top Side                                                                            |  |                                                                                    | Bottom Side                                                                          |                                                                                     |                                                                                      |

|                         |                                    |                                                                                                                      |           |           |               |               |
|-------------------------|------------------------------------|----------------------------------------------------------------------------------------------------------------------|-----------|-----------|---------------|---------------|
| Applicant:              | Blackline GPS                      | FCC ID:                                                                                                              | W77LNR900 | IC ID:    | 8255A-LNR900  |               |
| DUT Type:               | Lone Worker Safety Device with GPS |                                                                                                                      | Models:   | Loner 900 | 902 – 928 MHz |               |
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|                                                                                  |                                                   |                                                           |                                                          |                                                                                                                        |
|----------------------------------------------------------------------------------|---------------------------------------------------|-----------------------------------------------------------|----------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------|
|  | <u>Date(s) of Evaluation</u><br>April 2 & 3, 2014 | <u>Test Report Serial No.</u><br>032814W77-1287-s         | <u>Test Report Revision No.</u><br>Rev 1.2 (3rd Release) | <br>Test Lab Certificate No. 2470.01 |
|                                                                                  | <u>Test Report Issue Date</u><br>May 21, 2014     | <u>Description of Test(s)</u><br>Specific Absorption Rate | <u>RF Exposure Category</u><br>General Population        |                                                                                                                        |

## APPENDIX E - DIPOLE CALIBRATION

|                         |                                           |                                                                                                                      |                  |                      |                     |               |
|-------------------------|-------------------------------------------|----------------------------------------------------------------------------------------------------------------------|------------------|----------------------|---------------------|---------------|
| <b>Applicant:</b>       | <b>Blackline GPS</b>                      | <b>FCC ID:</b>                                                                                                       | <b>W77LNR900</b> | <b>IC ID:</b>        | <b>8255A-LNR900</b> |               |
| <b>DUT Type:</b>        | <b>Lone Worker Safety Device with GPS</b> | <b>Models:</b>                                                                                                       | <b>Loner 900</b> | <b>902 – 928 MHz</b> |                     |               |
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Accredited by the Swiss Accreditation Service (SAS)  
 The Swiss Accreditation Service is one of the signatories to the EA  
 Multilateral Agreement for the recognition of calibration certificates

Accreditation No.: **SCS 108**

Client **Celltech**

Certificate No: **D900V2-054\_Apr12**

## CALIBRATION CERTIFICATE

Object **D900V2 - SN: 054**

Calibration procedure(s) **QA CAL-05.v8**  
**Calibration procedure for dipole validation kits above 700 MHz**

Calibration date: **April 20, 2012**

This calibration certificate documents the traceability to national standards, which realize the physical units of measurements (SI).  
 The measurements and the uncertainties with confidence probability are given on the following pages and are part of the certificate.

All calibrations have been conducted in the closed laboratory facility: environment temperature ( $22 \pm 3$ )°C and humidity < 70%.

Calibration Equipment used (M&TE critical for calibration)

| Primary Standards           | ID #               | Cal Date (Certificate No.)     | Scheduled Calibration |
|-----------------------------|--------------------|--------------------------------|-----------------------|
| Power meter EPM-442A        | GB37480704         | 05-Oct-11 (No. 217-01451)      | Oct-12                |
| Power sensor HP 8481A       | US37292783         | 05-Oct-11 (No. 217-01451)      | Oct-12                |
| Reference 20 dB Attenuator  | SN: 5058 (20k)     | 27-Mar-12 (No. 217-01530)      | Apr-13                |
| Type-N mismatch combination | SN: 5047.2 / 06327 | 27-Mar-12 (No. 217-01533)      | Apr-13                |
| Reference Probe ES3DV3      | SN: 3205           | 30-Dec-11 (No. ES3-3205_Dec11) | Dec-12                |
| DAE4                        | SN: 601            | 04-Jul-11 (No. DAE4-601_Jul11) | Jul-12                |

| Secondary Standards       | ID #             | Check Date (in house)             | Scheduled Check        |
|---------------------------|------------------|-----------------------------------|------------------------|
| Power sensor HP 8481A     | MY41092317       | 18-Oct-02 (in house check Oct-11) | In house check: Oct-13 |
| RF generator R&S SMT-06   | 100005           | 04-Aug-99 (in house check Oct-11) | In house check: Oct-13 |
| Network Analyzer HP 8753E | US37390585 S4206 | 18-Oct-01 (in house check Oct-11) | In house check: Oct-12 |

|                |                |                       |           |
|----------------|----------------|-----------------------|-----------|
|                | Name           | Function              | Signature |
| Calibrated by: | Israe El-Naouq | Laboratory Technician |           |
| Approved by:   | Katja Pokovic  | Technical Manager     |           |

Issued: April 20, 2012

This calibration certificate shall not be reproduced except in full without written approval of the laboratory.



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The Swiss Accreditation Service is one of the signatories to the EA  
Multilateral Agreement for the recognition of calibration certificates

Accreditation No.: **SCS 108**

**Glossary:**

|       |                                 |
|-------|---------------------------------|
| TSL   | tissue simulating liquid        |
| ConvF | sensitivity in TSL / NORM x,y,z |
| N/A   | not applicable or not measured  |

**Calibration is Performed According to the Following Standards:**

- IEEE Std 1528-2003, "IEEE Recommended Practice for Determining the Peak Spatial-Averaged Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques", December 2003
- IEC 62209-1, "Procedure to measure the Specific Absorption Rate (SAR) for hand-held devices used in close proximity to the ear (frequency range of 300 MHz to 3 GHz)", February 2005
- Federal Communications Commission Office of Engineering & Technology (FCC OET), "Evaluating Compliance with FCC Guidelines for Human Exposure to Radiofrequency Electromagnetic Fields; Additional Information for Evaluating Compliance of Mobile and Portable Devices with FCC Limits for Human Exposure to Radiofrequency Emissions", Supplement C (Edition 01-01) to Bulletin 65

**Additional Documentation:**

- DASY4/5 System Handbook

**Methods Applied and Interpretation of Parameters:**

- Measurement Conditions:** Further details are available from the Validation Report at the end of the certificate. All figures stated in the certificate are valid at the frequency indicated.
- Antenna Parameters with TSL:** The dipole is mounted with the spacer to position its feed point exactly below the center marking of the flat phantom section, with the arms oriented parallel to the body axis.
- Feed Point Impedance and Return Loss:** These parameters are measured with the dipole positioned under the liquid filled phantom. The impedance stated is transformed from the measurement at the SMA connector to the feed point. The Return Loss ensures low reflected power. No uncertainty required.
- Electrical Delay:** One-way delay between the SMA connector and the antenna feed point. No uncertainty required.
- SAR measured:** SAR measured at the stated antenna input power.
- SAR normalized:** SAR as measured, normalized to an input power of 1 W at the antenna connector.
- SAR for nominal TSL parameters:** The measured TSL parameters are used to calculate the nominal SAR result.

The reported uncertainty of measurement is stated as the standard uncertainty of measurement multiplied by the coverage factor  $k=2$ , which for a normal distribution corresponds to a coverage probability of approximately 95%.

## Measurement Conditions

DASY system configuration, as far as not given on page 1.

|                                     |                        |             |
|-------------------------------------|------------------------|-------------|
| <b>DASY Version</b>                 | DASY5                  | V52.8.1     |
| <b>Extrapolation</b>                | Advanced Extrapolation |             |
| <b>Phantom</b>                      | Modular Flat Phantom   |             |
| <b>Distance Dipole Center - TSL</b> | 15 mm                  | with Spacer |
| <b>Zoom Scan Resolution</b>         | dx, dy, dz = 5 mm      |             |
| <b>Frequency</b>                    | 900 MHz $\pm$ 1 MHz    |             |

## Head TSL parameters

The following parameters and calculations were applied.

|                                                | Temperature         | Permittivity   | Conductivity         |
|------------------------------------------------|---------------------|----------------|----------------------|
| <b>Nominal Head TSL parameters</b>             | 22.0 °C             | 41.5           | 0.97 mho/m           |
| <b>Measured Head TSL parameters</b>            | (22.0 $\pm$ 0.2) °C | 40.5 $\pm$ 6 % | 0.96 mho/m $\pm$ 6 % |
| <b>Head TSL temperature change during test</b> | < 0.5 °C            | ----           | ----                 |

## SAR result with Head TSL

|                                                             |                    |                                                  |
|-------------------------------------------------------------|--------------------|--------------------------------------------------|
| <b>SAR averaged over 1 cm<sup>3</sup> (1 g) of Head TSL</b> | Condition          |                                                  |
| SAR measured                                                | 250 mW input power | 2.61 mW / g                                      |
| SAR for nominal Head TSL parameters                         | normalized to 1W   | <b>10.5 mW / g <math>\pm</math> 17.0 % (k=2)</b> |

|                                                               |                    |                                                  |
|---------------------------------------------------------------|--------------------|--------------------------------------------------|
| <b>SAR averaged over 10 cm<sup>3</sup> (10 g) of Head TSL</b> | condition          |                                                  |
| SAR measured                                                  | 250 mW input power | 1.68 mW / g                                      |
| SAR for nominal Head TSL parameters                           | normalized to 1W   | <b>6.74 mW / g <math>\pm</math> 16.5 % (k=2)</b> |

## Body TSL parameters

The following parameters and calculations were applied.

|                                                | Temperature         | Permittivity   | Conductivity         |
|------------------------------------------------|---------------------|----------------|----------------------|
| <b>Nominal Body TSL parameters</b>             | 22.0 °C             | 55.0           | 1.05 mho/m           |
| <b>Measured Body TSL parameters</b>            | (22.0 $\pm$ 0.2) °C | 54.2 $\pm$ 6 % | 1.07 mho/m $\pm$ 6 % |
| <b>Body TSL temperature change during test</b> | < 0.5 °C            | ----           | ----                 |

## SAR result with Body TSL

|                                                             |                    |                                                  |
|-------------------------------------------------------------|--------------------|--------------------------------------------------|
| <b>SAR averaged over 1 cm<sup>3</sup> (1 g) of Body TSL</b> | Condition          |                                                  |
| SAR measured                                                | 250 mW input power | 2.80 mW / g                                      |
| SAR for nominal Body TSL parameters                         | normalized to 1W   | <b>11.0 mW / g <math>\pm</math> 17.0 % (k=2)</b> |

|                                                               |                    |                                                  |
|---------------------------------------------------------------|--------------------|--------------------------------------------------|
| <b>SAR averaged over 10 cm<sup>3</sup> (10 g) of Body TSL</b> | condition          |                                                  |
| SAR measured                                                  | 250 mW input power | 1.80 mW / g                                      |
| SAR for nominal Body TSL parameters                           | normalized to 1W   | <b>7.11 mW / g <math>\pm</math> 16.5 % (k=2)</b> |

## Appendix

### Antenna Parameters with Head TSL

|                                      |                                |
|--------------------------------------|--------------------------------|
| Impedance, transformed to feed point | 52.5 $\Omega$ - 6.7 j $\Omega$ |
| Return Loss                          | - 23.1 dB                      |

### Antenna Parameters with Body TSL

|                                      |                                |
|--------------------------------------|--------------------------------|
| Impedance, transformed to feed point | 48.8 $\Omega$ - 7.7 j $\Omega$ |
| Return Loss                          | - 22.1 dB                      |

### General Antenna Parameters and Design

|                                  |          |
|----------------------------------|----------|
| Electrical Delay (one direction) | 1.410 ns |
|----------------------------------|----------|

After long term use with 100W radiated power, only a slight warming of the dipole near the feedpoint can be measured.

The dipole is made of standard semirigid coaxial cable. The center conductor of the feeding line is directly connected to the second arm of the dipole. The antenna is therefore short-circuited for DC-signals. On some of the dipoles, small end caps are added to the dipole arms in order to improve matching when loaded according to the position as explained in the "Measurement Conditions" paragraph. The SAR data are not affected by this change. The overall dipole length is still according to the Standard.

No excessive force must be applied to the dipole arms, because they might bend or the soldered connections near the feedpoint may be damaged.

### Additional EUT Data

|                 |                 |
|-----------------|-----------------|
| Manufactured by | SPEAG           |
| Manufactured on | August 25, 1999 |

## DASY5 Validation Report for Head TSL

Date: 20.04.2012

Test Laboratory: SPEAG, Zurich, Switzerland

**DUT: Dipole 900 MHz; Type: D900V2; Serial: D900V2 - SN: 054**

Communication System: CW; Frequency: 900 MHz

Medium parameters used:  $f = 900 \text{ MHz}$ ;  $\sigma = 0.96 \text{ mho/m}$ ;  $\epsilon_r = 40.5$ ;  $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section

Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY52 Configuration:

- Probe: ES3DV3 - SN3205; ConvF(5.97, 5.97, 5.97); Calibrated: 30.12.2011;
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 04.07.2011
- Phantom: Flat Phantom 4.9L; Type: QD000P49AA; Serial: 1001
- DASY52 52.8.1(838); SEMCAD X 14.6.5(6469)

### **Dipole Calibration for Head Tissue/Pin=250 mW, d=15mm/Zoom Scan (7x7x7)/Cube 0:**

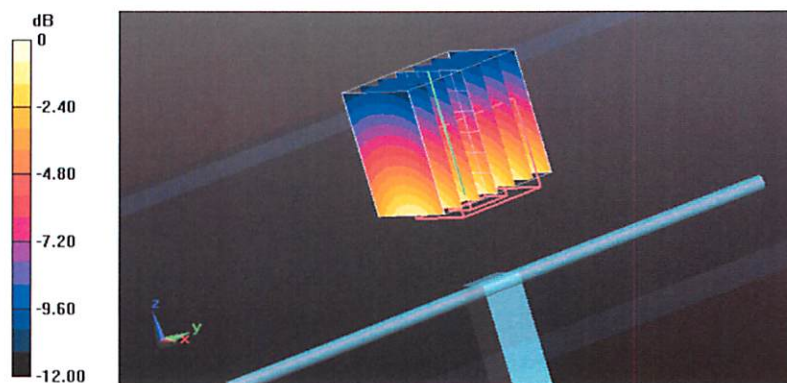
Measurement grid:  $dx=5\text{mm}$ ,  $dy=5\text{mm}$ ,  $dz=5\text{mm}$

Reference Value = 58.201 V/m; Power Drift = 0.03 dB

Peak SAR (extrapolated) = 3.900 mW/g

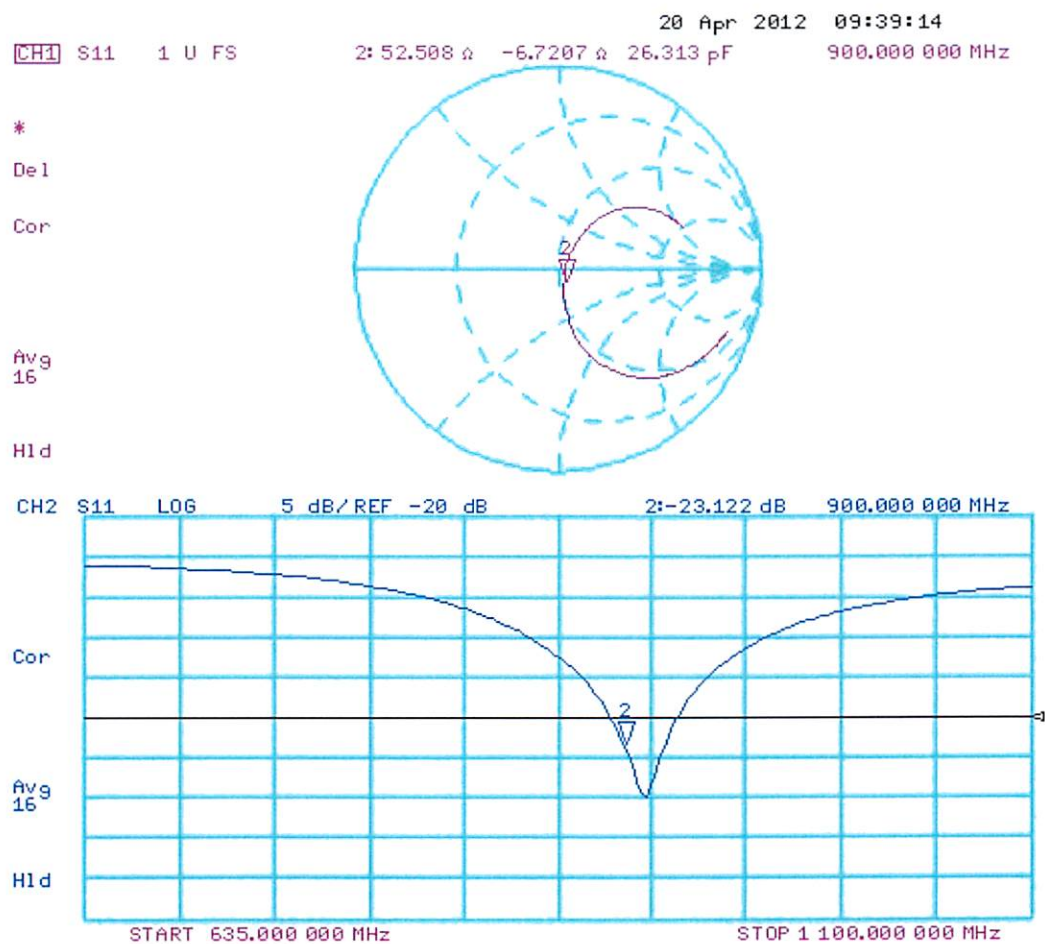
**SAR(1 g) = 2.61 mW/g; SAR(10 g) = 1.68 mW/g**

Maximum value of SAR (measured) = 3.07 mW/g



0 dB = 3.07 mW/g = 9.74 dB mW/g

### Impedance Measurement Plot for Head TSL



## DASY5 Validation Report for Body TSL

Date: 19.04.2012

Test Laboratory: SPEAG, Zurich, Switzerland

**DUT: Dipole 900 MHz; Type: D900V2; Serial: D900V2 - SN: 054**

Communication System: CW; Frequency: 900 MHz

Medium parameters used:  $f = 900 \text{ MHz}$ ;  $\sigma = 1.07 \text{ mho/m}$ ;  $\epsilon_r = 54.2$ ;  $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section

Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY52 Configuration:

- Probe: ES3DV3 - SN3205; ConvF(5.94, 5.94, 5.94); Calibrated: 30.12.2011;
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 04.07.2011
- Phantom: Flat Phantom 4.9L; Type: QD000P49AA; Serial: 1001
- DASY52 52.8.1(838); SEMCAD X 14.6.5(6469)

**Dipole Calibration for Body Tissue/Pin=250 mW, d=15mm/Zoom Scan (7x7x7)/Cube 0:**

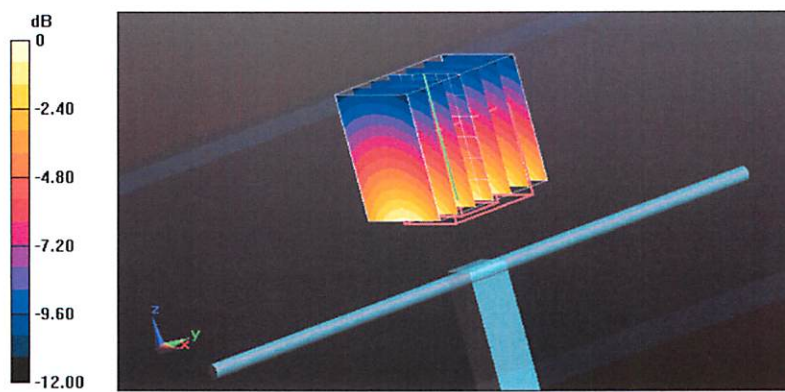
Measurement grid:  $dx=5\text{mm}$ ,  $dy=5\text{mm}$ ,  $dz=5\text{mm}$

Reference Value = 56.860 V/m; Power Drift = 0.00 dB

Peak SAR (extrapolated) = 4.281 mW/g

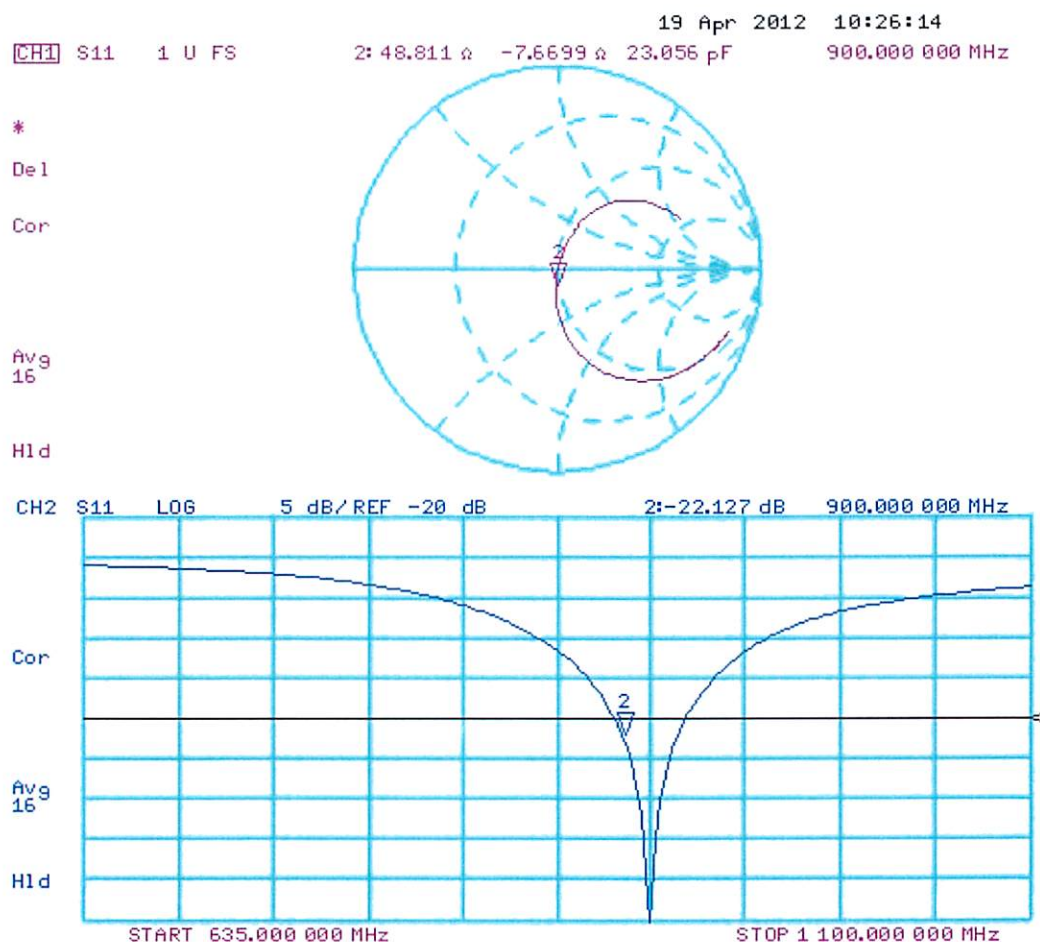
**SAR(1 g) = 2.8 mW/g; SAR(10 g) = 1.8 mW/g**

Maximum value of SAR (measured) = 3.30 mW/g



0 dB = 3.30 mW/g = 10.37 dB mW/g

### Impedance Measurement Plot for Body TSL



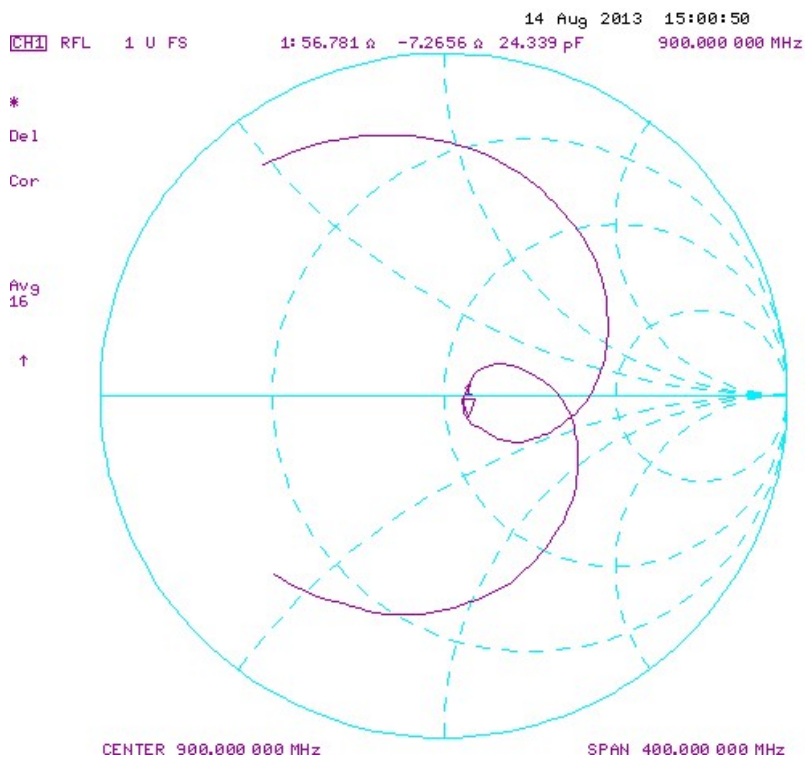
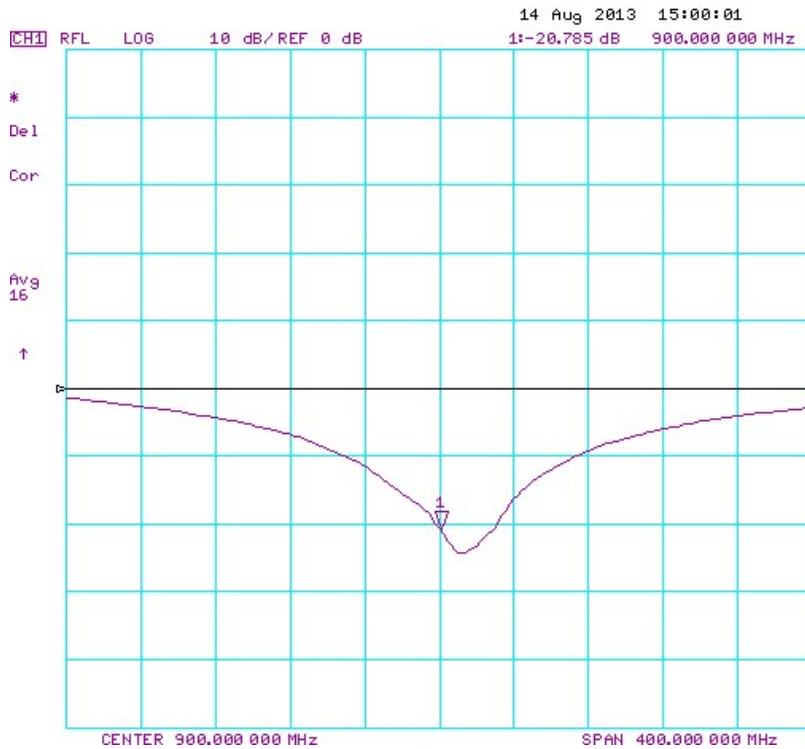
|                                                                                  |                                     |                                 |                                                                                                                        |
|----------------------------------------------------------------------------------|-------------------------------------|---------------------------------|------------------------------------------------------------------------------------------------------------------------|
|  | <u>Date:</u><br>Aug 14, 2013        | <u>Revision No.</u><br>Rev. 1.0 | <br>Test Lab Certificate No. 2470.01 |
|                                                                                  | 900 MHz Dipole Extended Calibration |                                 |                                                                                                                        |

Dipole: D900V2  
 Serial Number: 054  
 Last Calibrated: Apr. 20, 2012

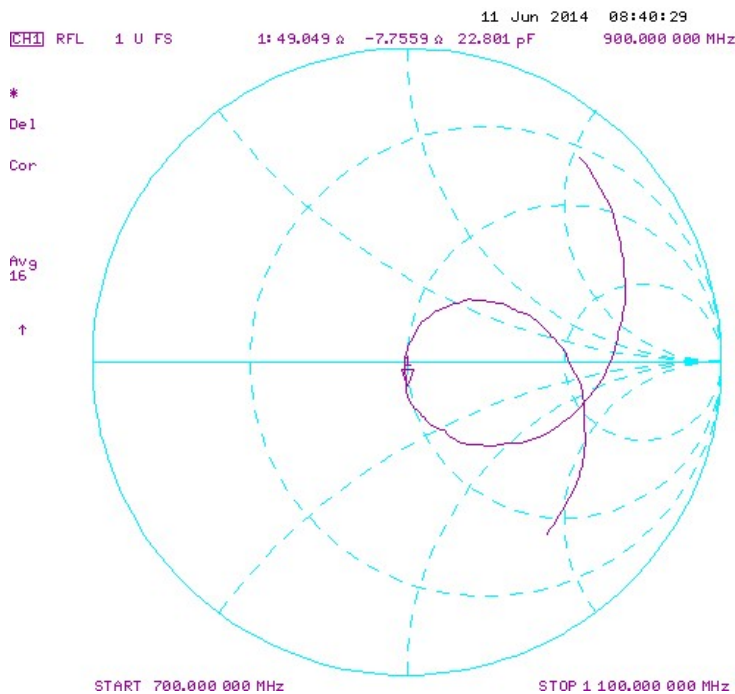
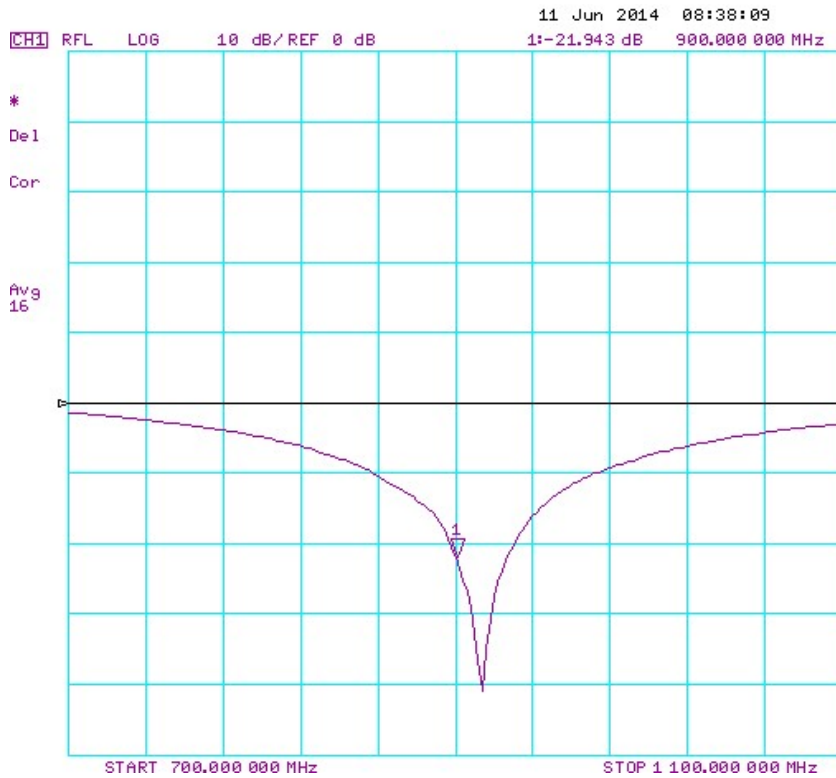
| Antenna Parameters with Head TSL     |                          |                       |                                  |                       |                     |                       |
|--------------------------------------|--------------------------|-----------------------|----------------------------------|-----------------------|---------------------|-----------------------|
|                                      | Impedance<br>Real (ohms) | Deviation<br>from cal | Impedance<br>Imaginary<br>(ohms) | Deviation<br>from cal | Return Loss<br>(dB) | Deviation<br>from Cal |
| <b>Last Calibration</b>              | 52.5                     | -                     | -6.7                             | -                     | -23.1               | -                     |
| <b>Extended Cal<br/>Aug 14, 2013</b> | 56.8                     | 4.3                   | -7.3                             | 0.6                   | -20.8               | 10%                   |
|                                      |                          |                       |                                  |                       |                     |                       |

| Antenna Parameters with Body TSL      |                          |                                 |                                  |                                 |                     |                              |
|---------------------------------------|--------------------------|---------------------------------|----------------------------------|---------------------------------|---------------------|------------------------------|
|                                       | Impedance<br>Real (ohms) | Deviation<br>from cal<br>(ohms) | Impedance<br>Imaginary<br>(ohms) | Deviation<br>from cal<br>(ohms) | Return Loss<br>(dB) | Deviation<br>from Cal<br>(%) |
| <b>Last Calibration</b>               | 48.8                     | -                               | -7.7                             | -                               | -22.1               | -                            |
| <b>Extended Cal<br/>June 11, 2014</b> | 49.05                    | 0.5%                            | -7.7                             | 0.0%                            | -21.9               | 0.9%                         |
|                                       |                          |                                 |                                  |                                 |                     |                              |

## Antenna VSWR with Head TSL



## Antenna VSWR with Body TSL



|                                                                                  |                                                   |                                                           |                                                          |                                                                                    |
|----------------------------------------------------------------------------------|---------------------------------------------------|-----------------------------------------------------------|----------------------------------------------------------|------------------------------------------------------------------------------------|
|  | <u>Date(s) of Evaluation</u><br>April 2 & 3, 2014 | <u>Test Report Serial No.</u><br>032814W77-1287-s         | <u>Test Report Revision No.</u><br>Rev 1.2 (3rd Release) |  |
|                                                                                  | <u>Test Report Issue Date</u><br>May 21, 2014     | <u>Description of Test(s)</u><br>Specific Absorption Rate | <u>RF Exposure Category</u><br>General Population        |                                                                                    |

Test Lab Certificate No. 2470.01

## APPENDIX F - PROBE CALIBRATION

|                         |                                           |                                                                                                                      |                  |                      |                     |               |
|-------------------------|-------------------------------------------|----------------------------------------------------------------------------------------------------------------------|------------------|----------------------|---------------------|---------------|
| <b>Applicant:</b>       | <b>Blackline GPS</b>                      | <b>FCC ID:</b>                                                                                                       | <b>W77LNR900</b> | <b>IC ID:</b>        | <b>8255A-LNR900</b> |               |
| <b>DUT Type:</b>        | <b>Lone Worker Safety Device with GPS</b> | <b>Models:</b>                                                                                                       | <b>Loner 900</b> | <b>902 – 928 MHz</b> |                     |               |
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 The Swiss Accreditation Service is one of the signatories to the EA  
 Multilateral Agreement for the recognition of calibration certificates

Accreditation No.: **SCS 108**

Client **Celltech**

Certificate No: **ET3-1590\_Apr13**

## CALIBRATION CERTIFICATE

Object **ET3DV6 - SN:1590**

Calibration procedure(s) **QA CAL-01.v8, QA CAL-12.v7, QA CAL-23.v4, QA CAL-25.v4**  
**Calibration procedure for dosimetric E-field probes**

Calibration date: **April 24, 2013**

This calibration certificate documents the traceability to national standards, which realize the physical units of measurements (SI).  
 The measurements and the uncertainties with confidence probability are given on the following pages and are part of the certificate.

All calibrations have been conducted in the closed laboratory facility: environment temperature  $(22 \pm 3)^{\circ}\text{C}$  and humidity  $< 70\%$ .

Calibration Equipment used (M&TE critical for calibration)

| Primary Standards          | ID              | Cal Date (Certificate No.)        | Scheduled Calibration  |
|----------------------------|-----------------|-----------------------------------|------------------------|
| Power meter E4419B         | GB41293874      | 04-Apr-13 (No. 217-01733)         | Apr-14                 |
| Power sensor E4412A        | MY41498087      | 04-Apr-13 (No. 217-01733)         | Apr-14                 |
| Reference 3 dB Attenuator  | SN: S5054 (3c)  | 04-Apr-13 (No. 217-01737)         | Apr-14                 |
| Reference 20 dB Attenuator | SN: S5277 (20x) | 04-Apr-13 (No. 217-01735)         | Apr-14                 |
| Reference 30 dB Attenuator | SN: S5129 (30b) | 04-Apr-13 (No. 217-01738)         | Apr-14                 |
| Reference Probe ES3DV2     | SN: 3013        | 28-Dec-12 (No. ES3-3013_Dec12)    | Dec-13                 |
| DAE4                       | SN: 660         | 31-Jan-13 (No. DAE4-660_Jan13)    | Jan-14                 |
| Secondary Standards        | ID              | Check Date (in house)             | Scheduled Check        |
| RF generator HP 8648C      | US3642U01700    | 4-Aug-99 (in house check Apr-13)  | In house check: Apr-15 |
| Network Analyzer HP 8753E  | US37390585      | 18-Oct-01 (in house check Oct-12) | In house check: Oct-13 |

|                                                                                                                 | Name            | Function              | Signature |
|-----------------------------------------------------------------------------------------------------------------|-----------------|-----------------------|-----------|
| Calibrated by:                                                                                                  | Claudio Leubler | Laboratory Technician |           |
| Approved by:                                                                                                    | Katja Pokovic   | Technical Manager     |           |
| Issued: April 27, 2013                                                                                          |                 |                       |           |
| This calibration certificate shall not be reproduced except in full without written approval of the laboratory. |                 |                       |           |



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Accreditation No.: **SCS 108**

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Multilateral Agreement for the recognition of calibration certificates

## Glossary:

|                          |                                                                                                                                                         |
|--------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------|
| TSL                      | tissue simulating liquid                                                                                                                                |
| NORM <sub>x,y,z</sub>    | sensitivity in free space                                                                                                                               |
| ConvF                    | sensitivity in TSL / NORM <sub>x,y,z</sub>                                                                                                              |
| DCP                      | diode compression point                                                                                                                                 |
| CF                       | crest factor (1/duty_cycle) of the RF signal                                                                                                            |
| A, B, C, D               | modulation dependent linearization parameters                                                                                                           |
| Polarization $\phi$      | $\phi$ rotation around probe axis                                                                                                                       |
| Polarization $\vartheta$ | $\vartheta$ rotation around an axis that is in the plane normal to probe axis (at measurement center),<br>i.e., $\vartheta = 0$ is normal to probe axis |

## Calibration is Performed According to the Following Standards:

- IEEE Std 1528-2003, "IEEE Recommended Practice for Determining the Peak Spatial-Averaged Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques", December 2003
- IEC 62209-1, "Procedure to measure the Specific Absorption Rate (SAR) for hand-held devices used in close proximity to the ear (frequency range of 300 MHz to 3 GHz)", February 2005

## Methods Applied and Interpretation of Parameters:

- NORM<sub>x,y,z</sub>**: Assessed for E-field polarization  $\vartheta = 0$  ( $f \leq 900$  MHz in TEM-cell;  $f > 1800$  MHz: R22 waveguide). NORM<sub>x,y,z</sub> are only intermediate values, i.e., the uncertainties of NORM<sub>x,y,z</sub> does not affect the  $E^2$ -field uncertainty inside TSL (see below *ConvF*).
- NORM(f)<sub>x,y,z</sub>** = NORM<sub>x,y,z</sub> \* *frequency\_response* (see Frequency Response Chart). This linearization is implemented in DASY4 software versions later than 4.2. The uncertainty of the frequency response is included in the stated uncertainty of *ConvF*.
- DCP<sub>x,y,z</sub>**: DCP are numerical linearization parameters assessed based on the data of power sweep with CW signal (no uncertainty required). DCP does not depend on frequency nor media.
- PAR**: PAR is the Peak to Average Ratio that is not calibrated but determined based on the signal characteristics
- A<sub>x,y,z</sub>; B<sub>x,y,z</sub>; C<sub>x,y,z</sub>; D<sub>x,y,z</sub>; VR<sub>x,y,z</sub>; A, B, C, D** are numerical linearization parameters assessed based on the data of power sweep for specific modulation signal. The parameters do not depend on frequency nor media. VR is the maximum calibration range expressed in RMS voltage across the diode.
- ConvF and Boundary Effect Parameters**: Assessed in flat phantom using E-field (or Temperature Transfer Standard for  $f \leq 800$  MHz) and inside waveguide using analytical field distributions based on power measurements for  $f > 800$  MHz. The same setups are used for assessment of the parameters applied for boundary compensation (alpha, depth) of which typical uncertainty values are given. These parameters are used in DASY4 software to improve probe accuracy close to the boundary. The sensitivity in TSL corresponds to NORM<sub>x,y,z</sub> \* *ConvF* whereby the uncertainty corresponds to that given for *ConvF*. A frequency dependent *ConvF* is used in DASY version 4.4 and higher which allows extending the validity from  $\pm 50$  MHz to  $\pm 100$  MHz.
- Spherical isotropy (3D deviation from isotropy)**: in a field of low gradients realized using a flat phantom exposed by a patch antenna.
- Sensor Offset**: The sensor offset corresponds to the offset of virtual measurement center from the probe tip (on probe axis). No tolerance required.

# Probe ET3DV6

## SN:1590

Manufactured: March 19, 2001  
Calibrated: April 24, 2013

**Calibrated for DASY/EASY Systems**  
(Note: non-compatible with DASY2 system!)

## DASY/EASY - Parameters of Probe: ET3DV6 - SN:1590

### Basic Calibration Parameters

|                                                           | Sensor X | Sensor Y | Sensor Z | Unc (k=2)     |
|-----------------------------------------------------------|----------|----------|----------|---------------|
| Norm ( $\mu\text{V}/(\text{V}/\text{m})^2$ ) <sup>A</sup> | 1.73     | 1.85     | 1.61     | $\pm 10.1 \%$ |
| DCP (mV) <sup>B</sup>                                     | 94.7     | 99.4     | 88.0     |               |

### Modulation Calibration Parameters

| UID | Communication System Name |   | A<br>dB | B<br>dB $\sqrt{\mu\text{V}}$ | C   | D<br>dB | VR<br>mV | Unc <sup>E</sup><br>(k=2) |
|-----|---------------------------|---|---------|------------------------------|-----|---------|----------|---------------------------|
| 0   | CW                        | X | 0.0     | 0.0                          | 1.0 | 0.00    | 186.7    | $\pm 2.7 \%$              |
|     |                           | Y | 0.0     | 0.0                          | 1.0 |         | 151.0    |                           |
|     |                           | Z | 0.0     | 0.0                          | 1.0 |         | 171.2    |                           |

The reported uncertainty of measurement is stated as the standard uncertainty of measurement multiplied by the coverage factor  $k=2$ , which for a normal distribution corresponds to a coverage probability of approximately 95%.

<sup>A</sup> The uncertainties of NormX,Y,Z do not affect the  $E^2$ -field uncertainty inside TSL (see Pages 5 and 6).

<sup>B</sup> Numerical linearization parameter: uncertainty not required.

<sup>E</sup> Uncertainty is determined using the max. deviation from linear response applying rectangular distribution and is expressed for the square of the field value.

## DASY/EASY - Parameters of Probe: ET3DV6 - SN:1590

### Calibration Parameter Determined in Head Tissue Simulating Media

| f (MHz) <sup>C</sup> | Relative Permittivity <sup>F</sup> | Conductivity (S/m) <sup>F</sup> | ConvF X | ConvF Y | ConvF Z | Alpha | Depth (mm) | Unct. (k=2) |
|----------------------|------------------------------------|---------------------------------|---------|---------|---------|-------|------------|-------------|
| 450                  | 43.5                               | 0.87                            | 7.53    | 7.53    | 7.53    | 0.21  | 2.23       | ± 13.4 %    |
| 750                  | 41.9                               | 0.89                            | 7.24    | 7.24    | 7.24    | 0.25  | 3.00       | ± 12.0 %    |
| 835                  | 41.5                               | 0.90                            | 6.84    | 6.84    | 6.84    | 0.26  | 3.00       | ± 12.0 %    |
| 900                  | 41.5                               | 0.97                            | 6.68    | 6.68    | 6.68    | 0.28  | 3.00       | ± 12.0 %    |

<sup>C</sup> Frequency validity of ± 100 MHz only applies for DASY v4.4 and higher (see Page 2), else it is restricted to ± 50 MHz. The uncertainty is the RSS of the ConvF uncertainty at calibration frequency and the uncertainty for the indicated frequency band.

<sup>F</sup> At frequencies below 3 GHz, the validity of tissue parameters ( $\epsilon$  and  $\sigma$ ) can be relaxed to ± 10% if liquid compensation formula is applied to measured SAR values. At frequencies above 3 GHz, the validity of tissue parameters ( $\epsilon$  and  $\sigma$ ) is restricted to ± 5%. The uncertainty is the RSS of the ConvF uncertainty for indicated target tissue parameters.

## DASY/EASY - Parameters of Probe: ET3DV6 - SN:1590

### Calibration Parameter Determined in Body Tissue Simulating Media

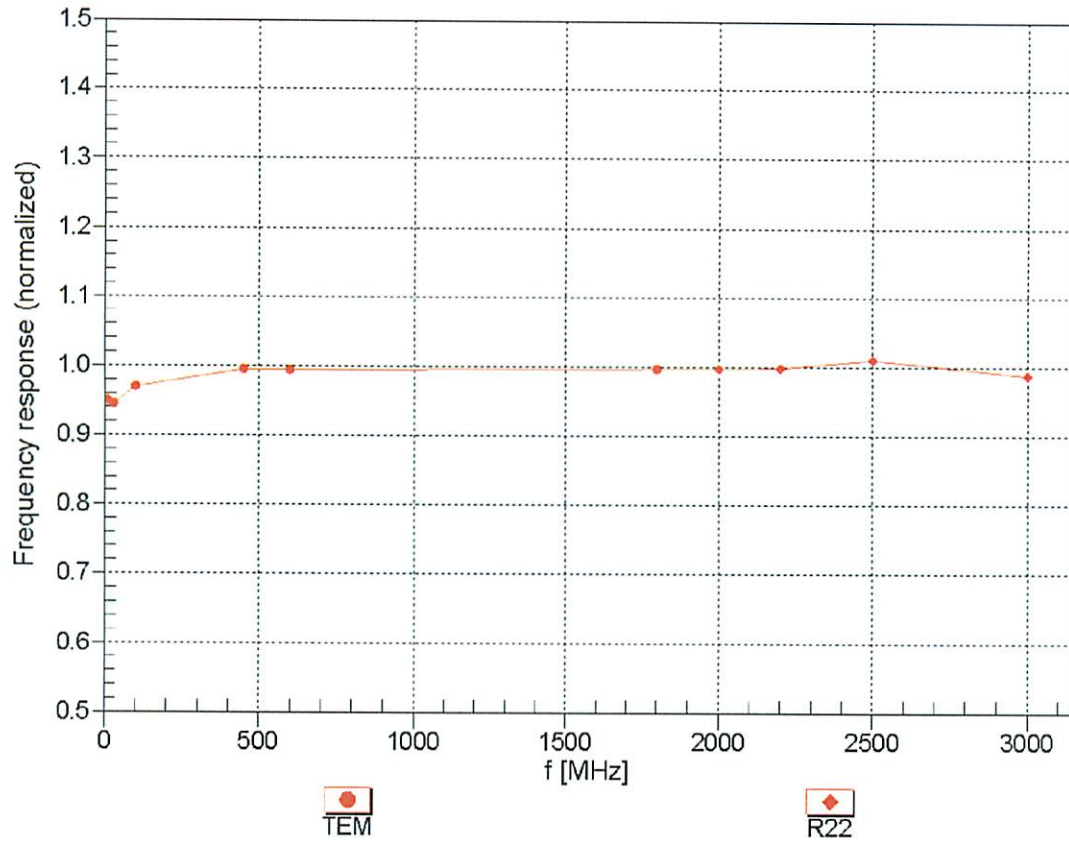
| f (MHz) <sup>C</sup> | Relative Permittivity <sup>F</sup> | Conductivity (S/m) <sup>F</sup> | ConvF X | ConvF Y | ConvF Z | Alpha | Depth (mm) | Unct. (k=2) |
|----------------------|------------------------------------|---------------------------------|---------|---------|---------|-------|------------|-------------|
| 450                  | 56.7                               | 0.94                            | 7.98    | 7.98    | 7.98    | 0.13  | 2.14       | ± 13.4 %    |
| 750                  | 55.5                               | 0.96                            | 6.84    | 6.84    | 6.84    | 0.31  | 2.49       | ± 12.0 %    |
| 835                  | 55.2                               | 0.97                            | 6.67    | 6.67    | 6.67    | 0.29  | 2.67       | ± 12.0 %    |
| 900                  | 55.0                               | 1.05                            | 6.63    | 6.63    | 6.63    | 0.26  | 3.00       | ± 12.0 %    |

<sup>C</sup> Frequency validity of ± 100 MHz only applies for DASY v4.4 and higher (see Page 2), else it is restricted to ± 50 MHz. The uncertainty is the RSS of the ConvF uncertainty at calibration frequency and the uncertainty for the indicated frequency band.

<sup>F</sup> At frequencies below 3 GHz, the validity of tissue parameters ( $\epsilon$  and  $\sigma$ ) can be relaxed to ± 10% if liquid compensation formula is applied to measured SAR values. At frequencies above 3 GHz, the validity of tissue parameters ( $\epsilon$  and  $\sigma$ ) is restricted to ± 5%. The uncertainty is the RSS of the ConvF uncertainty for indicated target tissue parameters.

## Frequency Response of E-Field

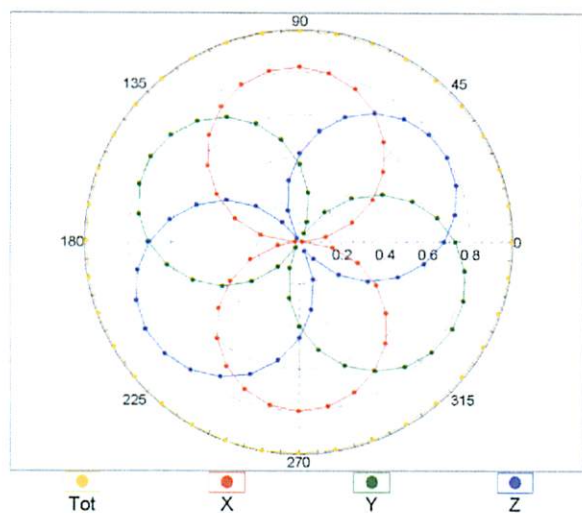
(TEM-Cell:ifi110 EXX, Waveguide: R22)



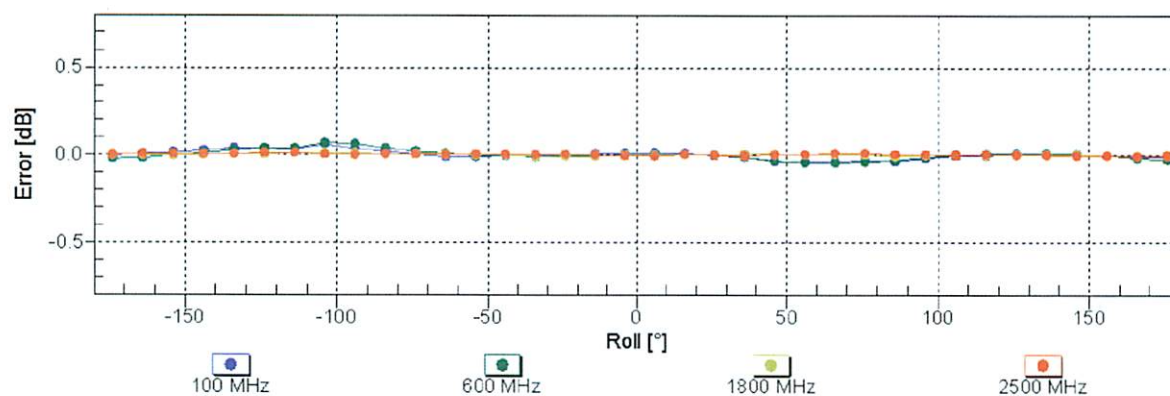
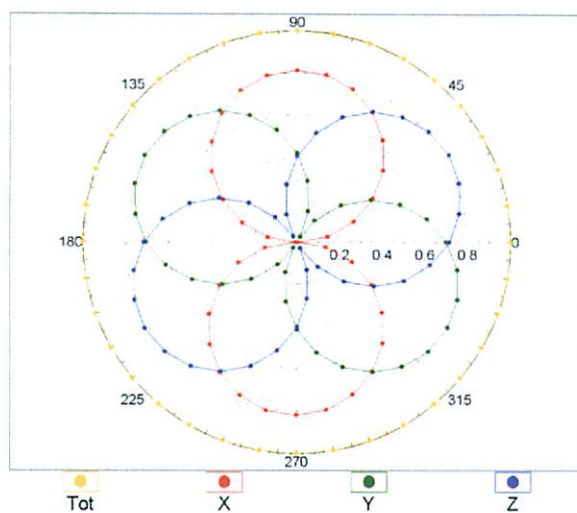
Uncertainty of Frequency Response of E-field:  $\pm 6.3\%$  ( $k=2$ )

## Receiving Pattern ( $\phi$ ), $\vartheta = 0^\circ$

f=600 MHz,TEM

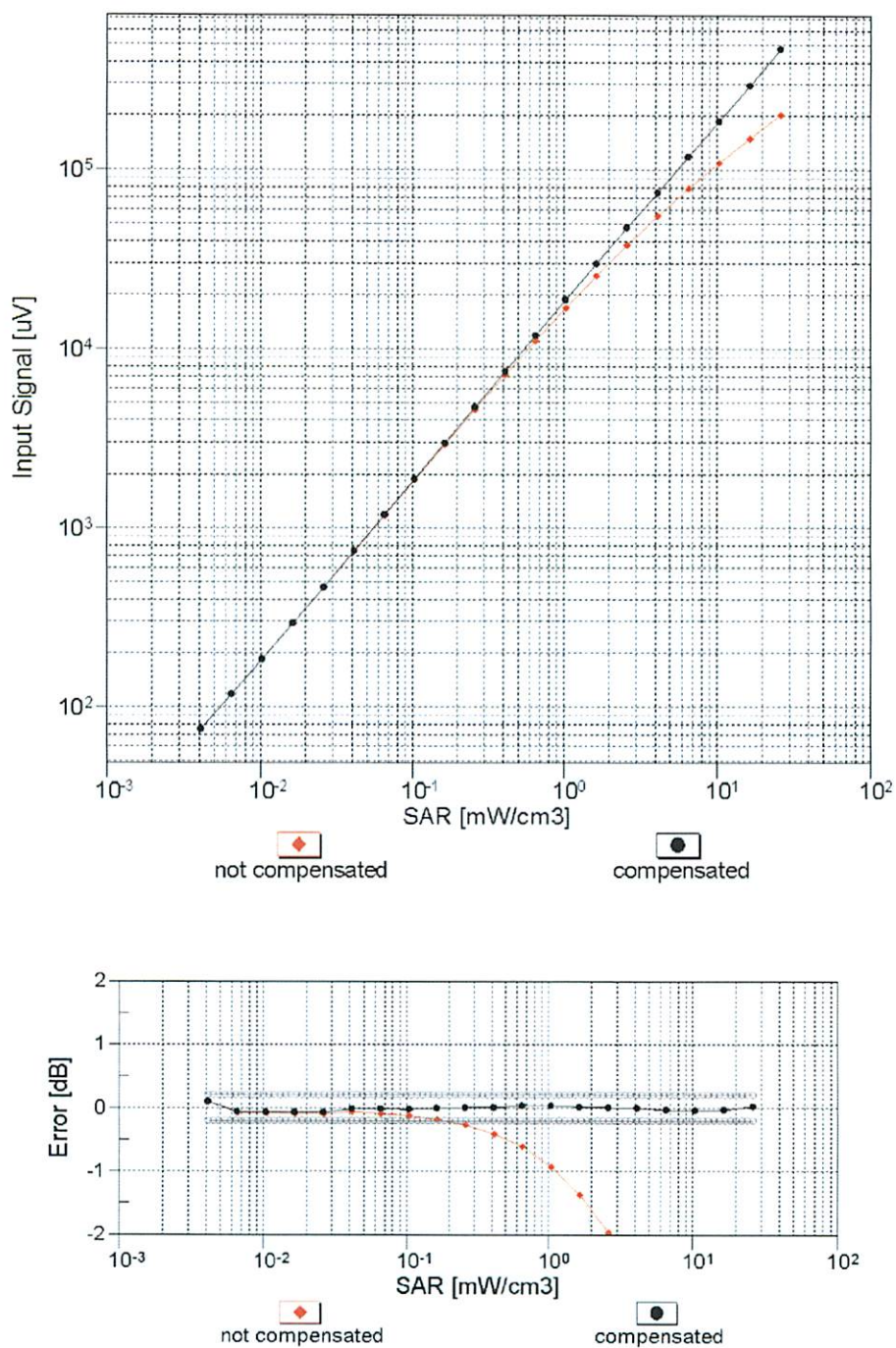


f=1800 MHz,R22



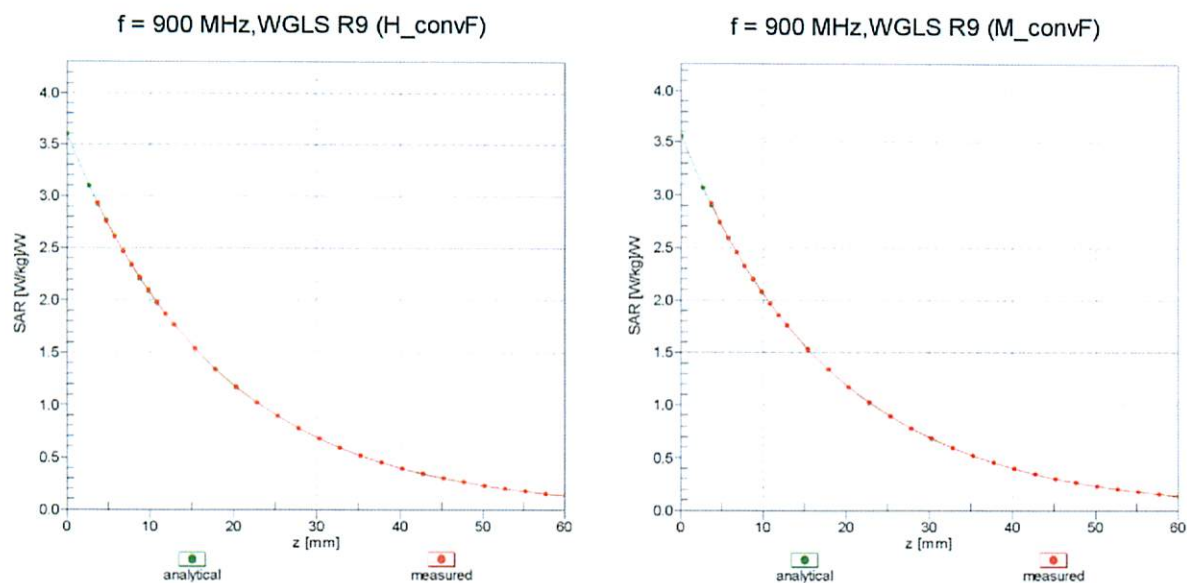
Uncertainty of Axial Isotropy Assessment:  $\pm 0.5\%$  ( $k=2$ )

## Dynamic Range $f(\text{SAR}_{\text{head}})$ (TEM cell , $f = 900 \text{ MHz}$ )



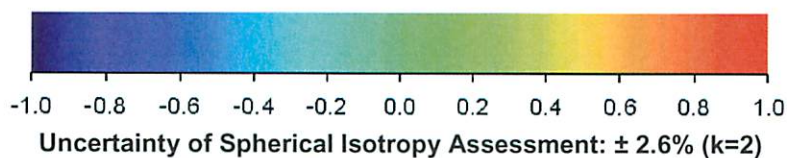
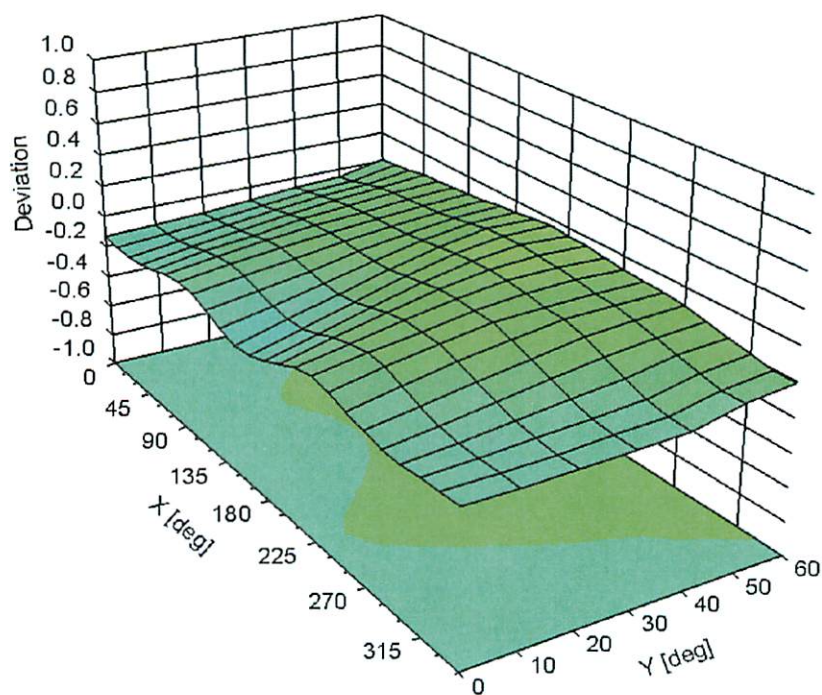
Uncertainty of Linearity Assessment:  $\pm 0.6\%$  ( $k=2$ )

## Conversion Factor Assessment



## Deviation from Isotropy in Liquid

Error ( $\phi$ ,  $\theta$ ),  $f = 900 \text{ MHz}$



## DASY/EASY - Parameters of Probe: ET3DV6 - SN:1590

### Other Probe Parameters

|                                               |            |
|-----------------------------------------------|------------|
| Sensor Arrangement                            | Triangular |
| Connector Angle (°)                           | 6          |
| Mechanical Surface Detection Mode             | enabled    |
| Optical Surface Detection Mode                | disabled   |
| Probe Overall Length                          | 337 mm     |
| Probe Body Diameter                           | 10 mm      |
| Tip Length                                    | 10 mm      |
| Tip Diameter                                  | 6.8 mm     |
| Probe Tip to Sensor X Calibration Point       | 2.7 mm     |
| Probe Tip to Sensor Y Calibration Point       | 2.7 mm     |
| Probe Tip to Sensor Z Calibration Point       | 2.7 mm     |
| Recommended Measurement Distance from Surface | 4 mm       |

## **Additional Conversion Factors**

**for Dosimetric E-Field Probe**

Type:

**ET3DV6**

Serial Number:

**1590**

Place of Assessment:

**Zurich**

Date of Assessment:

**April 29, 2013**

Probe Calibration Date:

**April 24, 2013**

Schmid & Partner Engineering AG hereby certifies that conversion factor(s) of this probe have been evaluated on the date indicated above. The assessment was performed using the FDTD numerical code SEMCAD of Schmid & Partner Engineering AG. Since the evaluation is coupled with measured conversion factors, it has to be recalculated yearly, i.e., following the re-calibration schedule of the probe. The uncertainty of the numerical assessment is based on the extrapolation from measured value at 450, 835 and 900 MHz.

Assessed by:



## Dosimetric E-Field Probe ET3DV6 SN:1590

Conversion factor ( $\pm$  standard deviation)

150  $\pm$  50 MHz      *ConvF*      9.31  $\pm$  10%

$\epsilon_r = 52.3 \pm 5\%$   
 $\sigma = 0.76 \pm 5\%$  mho/m  
(head tissue)

300  $\pm$  50 MHz      *ConvF*      8.36  $\pm$  9%

$\epsilon_r = 45.3 \pm 5\%$   
 $\sigma = 0.87 \pm 5\%$  mho/m  
(head tissue)

150  $\pm$  50 MHz      *ConvF*      8.65  $\pm$  10%

$\epsilon_r = 61.9 \pm 5\%$   
 $\sigma = 0.80 \pm 5\%$  mho/m  
(body tissue)

300  $\pm$  50 MHz      *ConvF*      8.41  $\pm$  9%

$\epsilon_r = 58.2 \pm 5\%$   
 $\sigma = 0.92 \pm 5\%$  mho/m  
(body tissue)

### Important Note:

**For numerically assessed probe conversion factors, parameters Alpha and Delta in the DASY software must have the following entries: Alpha = 0 and Delta = 1.**

**Please see also DASY Manual.**

|                                                                                  |                                                   |                                                           |                                                          |                                                                                    |
|----------------------------------------------------------------------------------|---------------------------------------------------|-----------------------------------------------------------|----------------------------------------------------------|------------------------------------------------------------------------------------|
|  | <u>Date(s) of Evaluation</u><br>April 2 & 3, 2014 | <u>Test Report Serial No.</u><br>032814W77-1287-s         | <u>Test Report Revision No.</u><br>Rev 1.2 (3rd Release) |  |
|                                                                                  | <u>Test Report Issue Date</u><br>May 21, 2014     | <u>Description of Test(s)</u><br>Specific Absorption Rate | <u>RF Exposure Category</u><br>General Population        |                                                                                    |

Test Lab Certificate No. 2470.01

## APPENDIX G - PHANTOM CERTIFICATE OF CONFORMITY

|                         |                                           |                                                                                                                      |                  |                      |                     |               |
|-------------------------|-------------------------------------------|----------------------------------------------------------------------------------------------------------------------|------------------|----------------------|---------------------|---------------|
| <b>Applicant:</b>       | <b>Blackline GPS</b>                      | <b>FCC ID:</b>                                                                                                       | <b>W77LNR900</b> | <b>IC ID:</b>        | <b>8255A-LNR900</b> |               |
| <b>DUT Type:</b>        | <b>Lone Worker Safety Device with GPS</b> | <b>Models:</b>                                                                                                       | <b>Loner 900</b> | <b>902 – 928 MHz</b> |                     |               |
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 Phone +41 44 245 9700, Fax +41 44 245 9779  
 info@speag.com, http://www.speag.com

## Certificate of Conformity / First Article Inspection

|              |                                                                         |
|--------------|-------------------------------------------------------------------------|
| Item         | Oval Flat Phantom ELI 5.0                                               |
| Type No      | QD OVA 002 A                                                            |
| Series No    | 1108 and higher                                                         |
| Manufacturer | Untersee Composites<br>Knebelstrasse 8, CH-8268 Mannenbach, Switzerland |

### Tests

Complete tests were made on the prototype units QD OVA 001 A, pre-series units QD OVA 001 B as well as on some series units QD OVA 001 B. Some tests are made on all series units QD OVA 002 A.

| Test                 | Requirement                                                                         | Details                                                                                      | Units tested              |
|----------------------|-------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------|---------------------------|
| Shape                | Internal dimensions, depth and sagging are compatible with standards                | Bottom elliptical 600 x 400 mm, Depth 190 mm, dimension compliant with [1] for $f > 375$ MHz | Prototypes                |
| Material thickness   | Bottom: 2.0mm +/- 0.2mm                                                             | dimension compliant with [3] for $f > 800$ MHz                                               | all                       |
| Material parameters  | rel. permittivity 2 – 5, loss tangent $\leq 0.05$ , at $f \leq 6$ GHz               | rel. permittivity 3.5 +/- 0.5 loss tangent $\leq 0.05$                                       | Material samples          |
| Material resistivity | Compatibility with tissue simulating liquids .                                      | Compatible with SPEAG liquids. **                                                            | Phantoms, Material sample |
| Sagging              | Sagging of the flat section in tolerance when filled with tissue simulating liquid. | within tolerance for filling height up to 155 mm                                             | Prototypes, samples       |

\*\* Note: Compatibility restrictions apply certain liquid components mentioned in the standard, containing e.g. DGBE, DGMHE or Triton X-100. Observe technical note on material compatibility.

### Standards

- [1] OET Bulletin 65, Supplement C, "Evaluating Compliance with FCC Guidelines for Human Exposure to Radiofrequency Electromagnetic Fields", Edition 01-01
- [2] IEEE 1528-2003, "Recommended Practice for Determining the Peak Spatial-Average Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques, December 2003
- [3] IEC 62209–1 ed1.0, "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 (frequency range of 300 MHz to 3 GHz)", 2005-02-18
- [4] IEC 62209–2 ed1.0, "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)", 2010-03-30

### Conformity

Based on the sample tests above, we certify that this item is in compliance with the uncertainty requirements of **body-worn** SAR measurements and system performance checks as specified in [1 – 4] and further standards.

Date 25.7.2011

Signature / Stamp

**s p e a g**

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