



SAR Evaluation Report

IN ACCORDANCE WITH THE REQUIREMENTS OF
FCC OET BULLETIN 65 SUPPLEMENT C

FOR

TrimTrac Pro E

MODEL: 80200-00

FCC ID: JUPTRIMTRACE

REPORT NUMBER: 07U11144-1

ISSUE DATE: JUNE 29, 2007

Prepared for

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NVLAP LAB CODE 200065-0

Revision History

Rev.	Issued date	Revisions	Revised By
--	June 29, 2007	Initial issue	Sunny Shih

CERTIFICATE OF COMPLIANCE (SAR EVALUATION)**DATES OF TEST:** June 21 - 22, 2007

APPLICANT: ADDRESS:	Trimble Navigation Limited 510 DeGuigne Dr. Sunnyvale, CA 94085
FCC ID: MODEL:	JUPTRIMTRACE 80200-00
DEVICE CATEGORY: EXPOSURE CATEGORY:	Portable Device General Population/Uncontrolled Exposure

TrimTrac Pro E operates at GSM850 & GSM1900 US bands.

Test Sample is a: Production unit

Rule Parts	Frequency Range [MHz]	The Highest SAR Values [1g_mW/g]
FCC 22H	824.2 - 848.8	0.645
FCC 24E	1850.20 - 1909.8	0.375

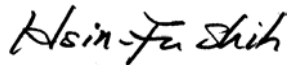
This wireless portable device has been shown to be capable of compliance for localized specific absorption rate (SAR) for General Population/Uncontrolled Exposure limits specified in ANSI/IEEE Std. C95.1-1992 and had been tested in accordance with the measurement procedures specified in FCC OET 65 Supplement C (Edition 01-01).

This wireless device has been shown to be capable of compliance for localized specific absorption rate (SAR) for General Population/Uncontrolled Exposure limits specified and tested in accordance with procedures referenced below in Section 2.

Note: The results documented in this report apply only to the tested sample, under the conditions and modes of operation as described herein. This document may not be altered or revised in any way unless done so by Compliance Certification Services and all revisions are duly noted in the revisions section. Any alteration of this document not carried out by Compliance Certification Services will constitute fraud and shall nullify the document. No part of this report may be used to claim product certification, approval, or endorsement by NVLAP, NIST, or any government agency.

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1 DEVICE UNDER TEST (DUT) DESCRIPTION

TrimTrac Pro E operates at GSM850 & GSM1900 US bands.	
Normal operation:	Body position
Accessories:	N/A
Earphone/Headset Jack:	N/A
Duty cycle:	12.5%
Power supply:	<ul style="list-style-type: none">• Disposable battery - AA Alkaline battery x 4, rating 1.5 Vdc• Rechargeable battery - Lexel, LH070-3A44C3BROT, 3.6 Vdc, 700 mAh.

2 FACILITIES AND ACCREDITATION

The test sites and measurement facilities used to collect data are located at 47173 Benicia Street, Fremont, CA 94538 USA. The sites are constructed in conformance with the requirements of ANSI C63.4, ANSI C63.7 and CISPR Publication 22. All receiving equipment conforms to CISPR Publication 16-1, "Radio Interference Measuring Apparatus and Measurement Methods."

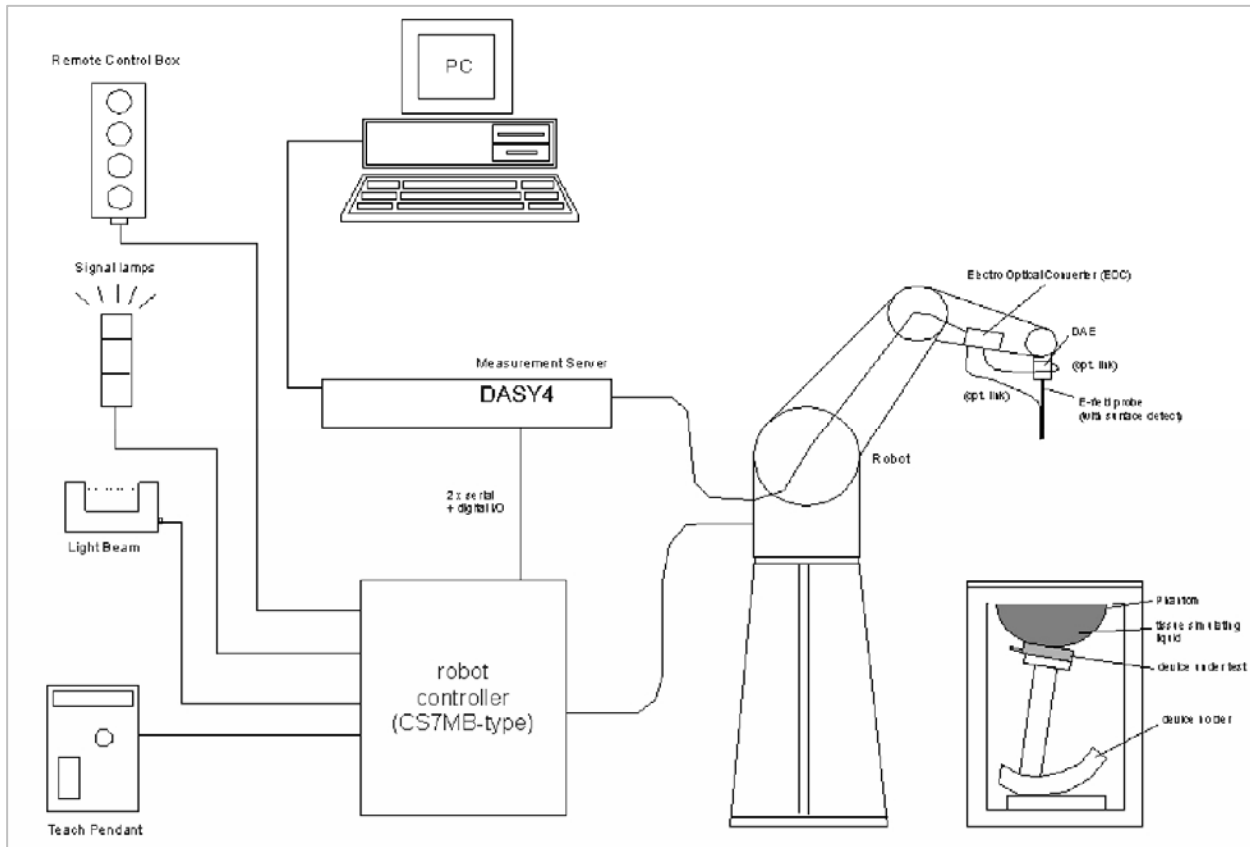


NVLAP LAB CODE 200065-0

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3 SYSTEM DESCRIPTION



The DASY4 system for performing compliance tests consists of the following items:

- A standard high precision 6-axis robot (Stäubli RX family) with controller, teach pendant and software. An arm extension for accommodating the data acquisition electronics (DAE).
- A dosimetric probe, i.e., an isotropic E-field probe optimized and calibrated for usage in tissue simulating liquid. The probe is equipped with an optical surface detector system.
- A data acquisition electronics (DAE) which performs the signal amplification, signal multiplexing, AD-conversion, offset measurements, mechanical surface detection, collision detection, etc. The unit is battery powered with standard or rechargeable batteries. The signal is optically transmitted to the EOC.
- The function of the measurement server is to perform the time critical tasks such as signal filtering, control of the robot operation and fast movement interrupts.
- A probe alignment unit which improves the (absolute) accuracy of the probe positioning.
- A computer operating Windows 2000 or Windows XP.
- DASY4 software.
- Remote controls with teach pendant and additional circuitry for robot safety such as warning lamps, etc.
- The SAM twin phantom enabling testing left-hand and right-hand usage.
- The device holder for handheld mobile phones.
- Tissue simulating liquid mixed according to the given recipes.
- Validation dipole kits allowing to validate the proper functioning of the system.

3.1 COMPOSITION OF INGREDIENTS FOR TISSUE SIMULATING LIQUIDS

The following tissue formulations are provided for reference only as some of the parameters have not been thoroughly verified. The composition of ingredients may be modified accordingly to achieve the desired target tissue parameters required for routine SAR evaluation.

Ingredients (% by weight)	Frequency (MHz)									
	450		835		915		1900		2450	
Tissue Type	Head	Body	Head	Body	Head	Body	Head	Body	Head	Body
Water	38.56	51.16	41.45	52.4	41.05	56.0	54.9	40.4	62.7	73.2
Salt (NaCl)	3.95	1.49	1.45	1.4	1.35	0.76	0.18	0.5	0.5	0.04
Sugar	56.32	46.78	56.0	45.0	56.5	41.76	0.0	58.0	0.0	0.0
HEC	0.98	0.52	1.0	1.0	1.0	1.21	0.0	1.0	0.0	0.0
Bactericide	0.19	0.05	0.1	0.1	0.1	0.27	0.0	0.1	0.0	0.0
Triton X-100	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	36.8	0.0
DGBE	0.0	0.0	0.0	0.0	0.0	0.0	44.92	0.0	0.0	26.7
Dielectric Constant	43.42	58.0	42.54	56.1	42.0	56.8	39.9	54.0	39.8	52.5
Conductivity (S/m)	0.85	0.83	0.91	0.95	1.0	1.07	1.42	1.45	1.88	1.78

Salt: 99+% Pure Sodium Chloride

Sugar: 98+% Pure Sucrose

Water: De-ionized, 16 MΩ+ resistivity

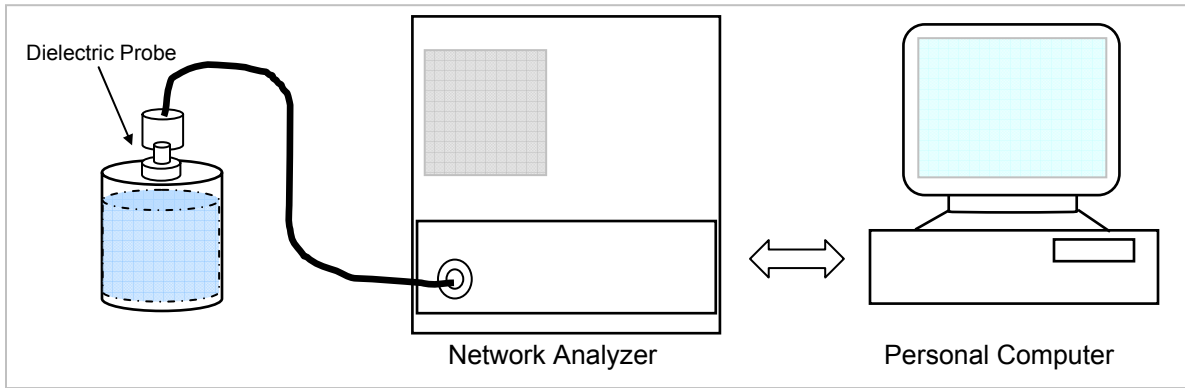
HEC: Hydroxyethyl Cellulose

DGBE: 99+% Di(ethylene glycol) butyl ether, [2-(2-butoxyethoxy)ethanol]

Triton X-100 (ultra pure): Polyethylene glycol mono [4-(1,1, 3, 3-tetramethylbutyl)phenyl]ether

4 SIMULATING LIQUID PARAMETERS CHECK

The simulating liquids should be checked at the beginning of a series of SAR measurements to determine if the dielectric parameters are within the tolerances of the specified target values. The relative permittivity and conductivity of the tissue material should be within $\pm 5\%$ of the values given in the table below.



Set-up for liquid parameters check

Reference Values of Tissue Dielectric Parameters for Head and Body Phantom (for 150 – 3000 MHz and 5800 MHz)

The head tissue dielectric parameters recommended by the IEEE SCC-34/SC-2 in IEEE Standard 1528 have been incorporated in the following table. These head parameters are derived from planar layer models simulating the highest expected SAR for the dielectric properties and tissue thickness variations in a human head. Other head and body tissue parameters that have not been specified in P1528 are derived from the tissue dielectric parameters computed from the 4-Cole-Cole equations and extrapolated according to the head parameters specified in IEEE Standard 1528.

Target Frequency (MHz)	Head		Body	
	ϵ_r	σ (S/m)	ϵ_r	σ (S/m)
150	52.3	0.76	61.9	0.80
300	45.3	0.87	58.2	0.92
450	43.5	0.87	56.7	0.94
835	41.5	0.90	55.2	0.97
900	41.5	0.97	55.0	1.05
915	41.5	0.98	55.0	1.06
1450	40.5	1.20	54.0	1.30
1610	40.3	1.29	53.8	1.40
1800 – 2000	40.0	1.40	53.3	1.52
2450	39.2	1.80	52.7	1.95
3000	38.5	2.40	52.0	2.73
5800	35.3	5.27	48.2	6.00

(ϵ_r = relative permittivity, σ = conductivity and $\rho = 1000 \text{ kg/m}^3$)

4.1 SIMULATING LIQUID PARAMETER CHECK RESULT

Simulating Liquid Dielectric Parameters Check Result @ Muscle 835 MHz

Room Ambient Temperature = 22°C; Relative humidity = 40%

Measured by: Ninous Davoudi

Simulating Liquid			Parameters		Measured	Target	Deviation (%)	Limit (%)	
f (MHz)	Temp. (°C)	Depth (cm)							
835	21	15	e'	55.3136	Relative Permittivity (e _r):	55.3136	55.2	0.21	± 5
			e"	21.4024	Conductivity (σ):	0.99419	0.97	2.49	± 5

Liquid Check

Ambient temperature: 22.0 deg. C; Liquid temperature: 21.0 deg C

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Frequency	e'	e"
800000000.	55.2550	21.3126
805000000.	55.3172	21.3286
810000000.	55.4131	21.3426
815000000.	55.4450	21.3508
820000000.	55.4764	21.3866
825000000.	55.4377	21.3972
830000000.	55.4019	21.4122
835000000.	55.3136	21.4024
840000000.	55.2328	21.3790
845000000.	55.1098	21.3282
850000000.	54.9945	21.2644
855000000.	54.8690	21.2275
860000000.	54.7685	21.1385
865000000.	54.6143	21.1037
870000000.	54.4945	21.0138
875000000.	54.4055	20.9453
880000000.	54.3413	20.9108
885000000.	54.2910	20.8819
890000000.	54.2997	20.8934
895000000.	54.3417	20.8809
900000000.	54.3494	20.9393

The conductivity (σ) can be given as:

$$\sigma = \omega \epsilon_0 e'' = 2 \pi f \epsilon_0 e''$$

where $f = \text{target } f * 10^6$

$\epsilon_0 = 8.854 * 10^{-12}$

Simulating Liquid Dielectric Parameters Check Result @ Muscle 900 MHz

Room Ambient Temperature = 22°C; Relative humidity = 40%

Measured by: Ninous Davoudi

Simulating Liquid			Parameters		Measured	Target	Deviation (%)	Limit (%)	
f (MHz)	Temp. (°C)	Depth (cm)							
900	21	15	e'	54.3494	Relative Permittivity (ε _r):	54.3494	55.0	-1.18	± 5
			e"	20.9393	Conductivity (σ):	1.04839	1.05	-0.15	± 5

Liquid Check

Ambient temperature: 22.0 deg. C; Liquid temperature: 21.0 deg C

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Frequency	e'	e"
850000000.	54.9945	21.2644
855000000.	54.8690	21.2275
860000000.	54.7685	21.1385
865000000.	54.6143	21.1037
870000000.	54.4945	21.0138
875000000.	54.4055	20.9453
880000000.	54.3413	20.9108
885000000.	54.2910	20.8819
890000000.	54.2997	20.8934
895000000.	54.3417	20.8809
900000000.	54.3494	20.9393
905000000.	54.3442	21.0282
910000000.	54.3139	21.0899
915000000.	54.2622	21.1339
920000000.	54.1839	21.1470
925000000.	54.0997	21.1422
930000000.	54.0571	21.1105
935000000.	53.9922	21.0474
940000000.	53.9574	20.9318
945000000.	53.9776	20.8755
950000000.	53.9663	20.7919

The conductivity (σ) can be given as:

$$\sigma = \omega \epsilon_0 e'' = 2 \pi f \epsilon_0 e''$$

where $f = \text{target } f * 10^6$

$$\epsilon_0 = 8.854 * 10^{-12}$$

Simulating Liquid Dielectric Parameters Check Result @ Muscle 1900 MHz

Room Ambient Temperature = 22°C; Relative humidity = 40%

Measured by: Ninous Davoudi

Simulating Liquid			Parameters		Measured	Target	Deviation (%)	Limit (%)	
f (MHz)	Temp. (°C)	Depth (cm)							
1900	21	15	e'	53.7197	Relative Permittivity (ε _r):	53.7197	53.3	0.79	± 5
			e"	13.8737	Conductivity (σ):	1.46644	1.52	-3.52	± 5

Liquid Check

Ambient temperature: 22.0 deg. C; Liquid temperature: 21.0 deg C

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Frequency	e'	e"
1710000000.	53.8263	13.5427
1720000000.	53.8735	13.6551
1730000000.	53.9369	13.7568
1740000000.	54.0297	13.7808
1750000000.	54.1042	13.6860
1760000000.	54.1659	13.5420
1770000000.	54.2101	13.4713
1780000000.	54.1210	13.4620
1790000000.	53.9680	13.4950
1800000000.	53.7937	13.5591
1810000000.	53.6549	13.6849
1820000000.	53.5282	13.8703
1830000000.	53.4333	14.0465
1840000000.	53.4011	14.1052
1850000000.	53.5181	14.0589
1860000000.	53.7537	13.9685
1870000000.	53.9508	13.9467
1880000000.	54.0063	13.9254
1890000000.	53.8783	13.8992
1900000000.	53.7197	13.8737
1910000000.	53.5079	13.8712

The conductivity (σ) can be given as:

$$\sigma = \omega \epsilon_0 e'' = 2 \pi f \epsilon_0 e''$$

where $f = \text{target } f * 10^6$

$$\epsilon_0 = 8.854 * 10^{-12}$$

5 SYSTEM PERFORMANCE CHECK

The system performance check is performed prior to any usage of the system in order to guarantee reproducible results. The system performance check verifies that the system operates within its specifications of $\pm 10\%$.

System Performance Check Measurement Conditions

- The measurements were performed in the flat section of the SAM twin phantom filled with Body simulating liquid of the following parameters.
- The DASY4 system with an Isotropic E-Field Probe EX3DV3-SN: 3531 was used for the measurements.
- The dipole was mounted on the small tripod so that the dipole feed point was positioned below the center marking of the flat phantom section and the dipole was oriented parallel to the body axis (the long side of the phantom). The standard measuring distance was 10 mm (above 1 GHz) and 15 mm (below 1 GHz) from dipole center to the simulating liquid surface.
- The coarse grid with a grid spacing of 15 mm was aligned with the dipole.
For 5 GHz band - The coarse grid with a grid spacing of 10 mm was aligned with the dipole.
- Special 5 x 5 x 7 fine cube was chosen for cube integration(dx=dy=7.5mm; dz=5mm).
For 5 GHz band - Special 8x8x8 fine cube was chosen for cube integration(dx=dy=4.3mm; dz=3mm)
- Distance between probe sensors and phantom surface was set to 4 mm.
For 5 GHz band - Distance between probe sensors and phantom surface was set to 2.0mm
- The dipole input power (forward power) was 250 mW $\pm 3\%$.
- The results are normalized to 1 W input power.

Reference SAR Values for body-tissue

In the table below, the numerical reference SAR values of a SPEAG validation dipoles placed below the flat phantom filled with body-tissue simulating liquid are given. The reference SAR values were calculated using the finite-difference time-domain method and the geometry parameters.

Dipole Type	Distance (mm)	Frequency (MHz)	SAR (1g) [W/kg]	SAR (10g) [W/kg]	SAR (peak) [W/kg]
D450V2	15	450	5.01	3.36	7.22
D835V2	15	835	9.71	6.38	14.1
D900V2	15	900	11.1	7.17	16.3
D1450V2	10	1450	29.6	16.6	49.8
D1800V2	10	1800	38.5	20.3	67.5
D1900V2	10	1900	39.8	20.8	69.6
D2000V2	10	2000	40.9	21.2	71.5
D2450V2	10	2450	51.2	23.7	97.6

Note: All SAR values normalized to 1 W forward power.

5.1 SYSTEM PERFORMANCE CHECK RESULTS**System Validation Dipole: D900V2 SN: 108**

Date: June 21, 2007

Room Ambient Temperature = 22°C; Relative humidity = 40%

Measured by: Ninous Davoudi

Body Simulating Liquid			SAR (mW/g)		Normalized to 1 W	Target	Deviation (%)	Limit (%)
f (MHz)	Temp. (°C)	Depth (cm)						
900	21	15	1g	2.78	11.12	11.1	0.18	± 10
			10g	1.81	7.24	7.17	0.98	± 10

System Validation Dipole: D1900V2 SN:5d043

Date: June 21, 2007

Room Ambient Temperature = 22°C; Relative humidity = 40%

Measured by: Ninous Davoudi

Body Simulating Liquid			SAR (mW/g)		Normalized to 1 W	Target	Deviation (%)	Limit (%)
f (MHz)	Temp. (°C)	Depth (cm)						
1900	21	15	1g	10.30	41.2	39.8	3.52	± 10
			10g	5.4	21.6	20.8	3.85	± 10

6 SAR MEASUREMENT PROCEDURE

A summary of the procedure follows:

- a) A measurement of the SAR value at a fixed location is used as a reference value for assessing the power drop of the DUT. The SAR at this point is measured at the start of the test, and then again at the end of the test.
- b) The SAR distribution at the exposed flat section of the flat phantom is measured at a distance of 4 mm from the inner surface of the shell. The area covers the entire dimension of the DUT and the horizontal grid spacing is 15 mm x 15 mm. Based on this data, the area of the maximum absorption is determined by Spline interpolation. The first Area Scan covers the entire dimension of the DUT to ensure that the hotspot was correctly identified.

For 5 GHz band - The SAR distribution at the exposed flat section of the flat phantom is measured at a distance of 2.0 mm from the inner surface of the shell. The area covers the entire dimension of the DUT and the horizontal grid spacing is 10 mm x 10 mm. Based on this data, the area of the maximum absorption is determined by Spline interpolation. The first Area Scan covers the entire dimension of the DUT to ensure that the hotspot was correctly identified.

- c) Around this point, a volume of X=Y= 30 and Z=21 mm is assessed by measuring 5 x 5 x 7 mm points. On the basis of this data set, the spatial peak SAR value is evaluated with the following procedure:

For 5 GHz band - Around this point, a volume of X=Y=24 and Z=20 mm is assessed by measuring 7 x 7 x 9 mm points. On the basis of this data set, the spatial peak SAR value is evaluated with the following procedure:

- (i) The data at the surface are extrapolated, since the centre of the dipoles is 1.2 mm away from the tip of the probe and the distance between the surface and the lowest measuring point is 1.3 mm. The extrapolation is based on a least square algorithm. A polynomial of the fourth order is calculated through the points in z-axes. This polynomial is then used to evaluate the points between the surface and the probe tip.
- (ii) The maximum interpolated value is searched with a straightforward algorithm. Around this maximum the SAR values averaged over the spatial volumes (1 g and 10 g) are computed using the 3D-Spline interpolation algorithm. The 3D-Spline is composed of three one-dimensional splines with the "Not a knot"- condition (in x, y and z-direction). The volume is integrated with the trapezoidal – algorithm. One thousand points (10 x 10 x 10) are interpolated to calculate the averages.
- (iii) All neighbouring volumes are evaluated until no neighbouring volume with a higher average value is found.
- (iv) The SAR value at the same location as in Step (a) is again measured to evaluate the actual power drift.

6.1 DASY4 SAR MEASUREMENT PROCEDURE

Step 1: Power Reference Measurement

The Power Reference Measurement and Power Drift Measurements are for monitoring the power drift of the device under test in the batch process. The Minimum distance of probe sensors to surface determines the closest measurement point to phantom surface. The minimum distance of probe sensors to surface is 2.1 mm. This distance cannot be smaller than the Distance of sensor calibration points to probe tip as defined in the probe properties (for example, 1.2 mm for an EX3DV3 probe type).

Step 2: Area Scan

The Area Scan is used as a fast scan in two dimensions to find the area of high field values, before doing a fine measurement around the hot spot. The sophisticated interpolation routines implemented in DASY4 software can find the maximum locations even in relatively coarse grids. When an Area Scan has measured all reachable points, it computes the field maximal found in the scanned area, within a range of the global maximum. The range (in dB) is specified in the standards for compliance testing. For example, a 2 dB range is required in IEEE Standard 1528, EN 50361 and IEC 62209 standards, whereby 3 dB is a requirement when compliance is assessed in accordance with the ARIB standard (Japan). If only one Zoom Scan follows the Area Scan, then only the absolute maximum will be taken as reference. For cases where multiple maximums are detected, the number of Zoom Scans has to be increased accordingly.

Step 3: Zoom Scan

Zoom Scans are used to assess the peak spatial SAR values within a cubic averaging volume containing 1 g and 10 g of simulated tissue. The Zoom Scan measures 5 x 5 x 7 points within a cube whose base faces are centered on the maxima found in a preceding area scan job within the same procedure. When the measurement is done, the Zoom Scan evaluates the averaged SAR for 1 g and 10 g and displays these values next to the job's label.

For 5 GHz band – Same as above except the Zoom Scan measures 7 x 7 x 9 points.

Step 4: Power drift measurement

The Power Drift Measurement measures the field at the same location as the most recent power reference measurement within the same procedure, and with the same settings. The Power Drift Measurement gives the field difference in dB from the reading conducted within the last Power Reference Measurement. This allows a user to monitor the power drift of the device under test within a batch process. The measurement procedure is the same as Step 1.

Step 5: Z-Scan

The Z Scan measures points along a vertical straight line. The line runs along the Z-axis of a one-dimensional grid. In order to get a reasonable extrapolation, the extrapolated distance should not be larger than the step size in Z-direction.

7 PROCEDURE USED TO ESTABLISH TEST SIGNAL

The following procedures had been used to prepare the EUT for the SAR test.

The following setting is used to prepare the EUT in GSM850/1900MHz bands for the SAR test.

Agilent 8960 series 10 E5515C, Wireless Communication Test Set is used to control the EUT and measure the output power.

The following setting was used to establish the signal.

Service selection → Test Mode A – Auto Slot Config. → off
 Main Service → Packet Data
 Network Support → GSM only
 Slot Config → 33 dBm for GSM850 and 30 dBm for GSM1900

Conducted power:

GSM850

Channel	Frequency (MHz)	Power (dBm)
128	824.2	33.20
192	837	33.10
251	848.8	33.00

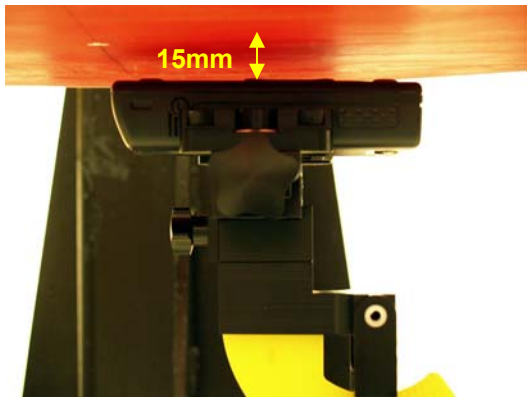
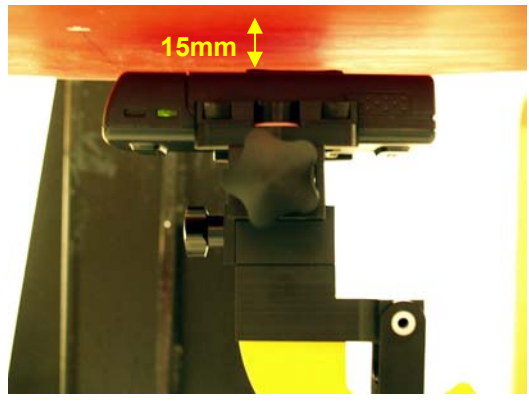
GSM1900

Channel	Frequency (MHz)	Power (dBm)
512	1850.2	29.40
661	1880.0	29.60
810	1909.8	29.80

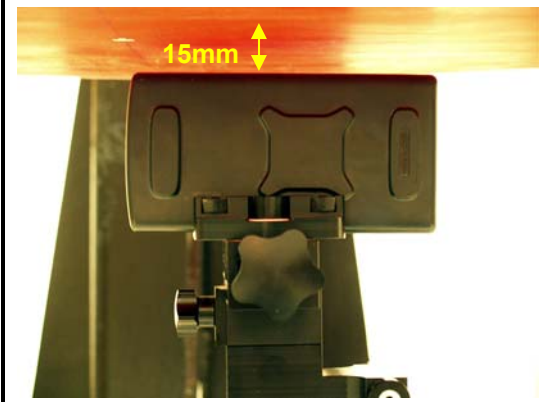
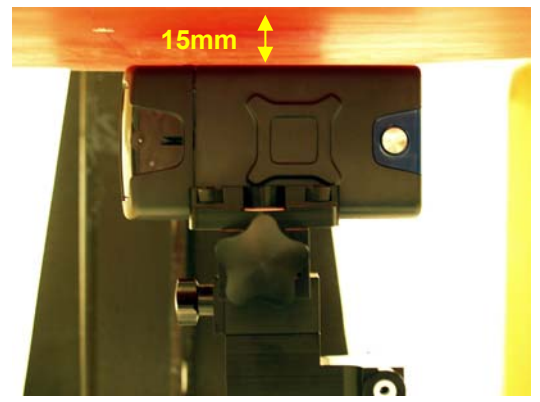
8 SAR MEASUREMENT RESULTS

8.1 CELL BAND

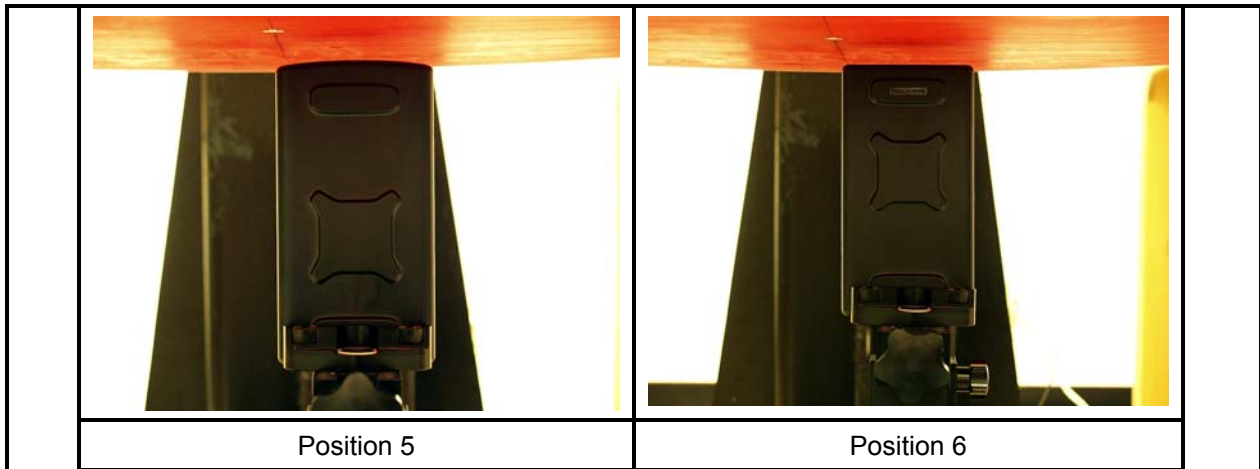
8.1.1 POSITION 1 & 2

					
Position 1	Position 2				
GSM 850					
Test Mode	Channel	f (MHz)	Measured SAR 1g (mW/g)	Power Drift (dB)	Extrapolated ¹⁾ SAR 1g (mW/g)
Position 1	128	824.2	0.638	0.000	0.638
	192	837.0			
	251	848.8			
	251⁴⁾	848.8			
Position 2	128	824.2	0.349	0.000	0.349
	192	837.0			
	251	848.8			
Notes:					
1) The exact method of extrapolation is Measured SAR x 10 [^] (-drift/10). The SAR reported at the end of the measurement process by the DASY4 system can be scaled up by the Power drift to determine the SAR at the beginning of the measurement process.					
2) The SAR measured at the middle channel for this configuration is at least 3 dB lower (0.8 mW/g) than SAR limit (1.6 mW/g), thus testing at low & high channel is optional.					
3) Please see attachments for the detailed measurement data and plots showing the maximum SAR location of the EUT.					
4) With alternate battery.					

8.1.2 POSITION 3 & 4

					
Position 3	Position 4				
GSM 850					
Test Mode	Channel	f (MHz)	Measured SAR 1g (mW/g)	Power Drift (dB)	Extrapolated ¹⁾ SAR 1g (mW/g)
Position 3	128	824.2	0.272	0.000	0.272
	192	837.0			
	251	848.8			
Position 4	128	824.2	0.309	0.000	0.309
	192	837.0			
	251	848.8			
<p>Notes:</p> <ol style="list-style-type: none"> 1) The exact method of extrapolation is $\text{Measured SAR} \times 10^{(-\text{drift}/10)}$. The SAR reported at the end of the measurement process by the DASY4 system can be scaled up by the Power drift to determine the SAR at the beginning of the measurement process. 2) The SAR measured at the middle channel for this configuration is at least 3 dB lower (0.8 mW/g) than SAR limit (1.6 mW/g), thus testing at low & high channel is optional. 3) Please see attachments for the detailed measurement data and plots showing the maximum SAR location of the EUT. 					

8.1.3 POSITION 5 & 6



GSM 850

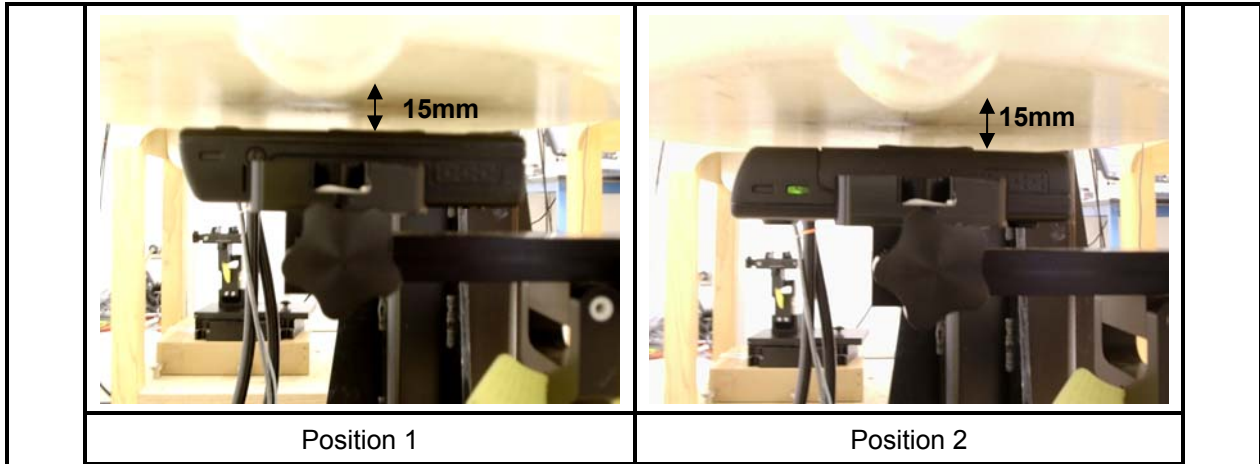
Test Mode	Channel	f (MHz)	Measured SAR 1g (mW/g)	Power Drift (dB)	Extrapolated ¹⁾ SAR 1g (mW/g)
Position 5	128	824.2	0.016	-0.055	0.017
	192	837.0			
	251	848.8			
Position 6	128	824.2	0.023	-0.029	0.023
	192	837.0			
	251	848.8			

Notes:

- 1) The exact method of extrapolation is Measured SAR x 10^{^(-drift/10)}. The SAR reported at the end of the measurement process by the DASY4 system can be scaled up by the Power drift to determine the SAR at the beginning of the measurement process.
- 2) The SAR measured at the middle channel for this configuration is at least 3 dB lower (0.8 mW/g) than SAR limit (1.6 mW/g), thus testing at low & high channel is optional.
- 3) Please see attachments for the detailed measurement data and plots showing the maximum SAR location of the EUT.
- 4) The separation distance is 15mm.

8.2 PCS BAND

8.2.1 POSITION 1 & 2

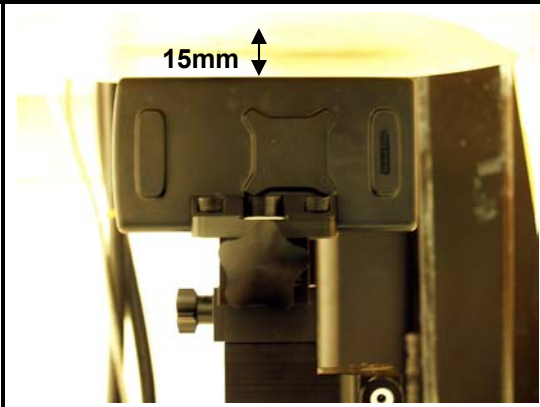
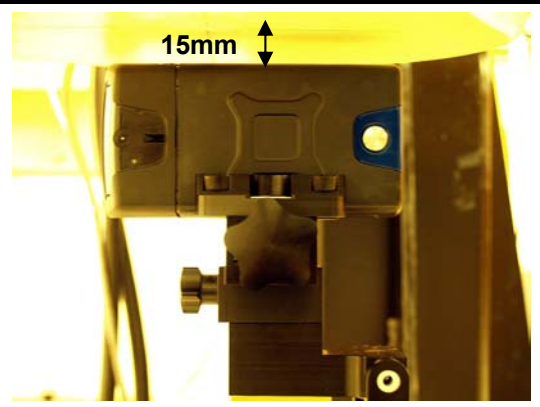


GSM 1900					
Test Mode	Channel	f (MHz)	Measured SAR 1g (mW/g)	Power Drift (dB)	Extrapolated¹⁾ SAR 1g (mW/g)
Position 1	512	1850.2			
	661	1880.0	0.351	-0.050	0.355
	810	1909.8			
	661⁴⁾	1880.0	0.370	-0.057	0.375
Position 2	512	1850.2			
	661	1880.0	0.082	-0.080	0.084
	810	1909.8			



Notes:

- 1) The exact method of extrapolation is $\text{Measured SAR} \times 10^{(-\text{drift}/10)}$. The SAR reported at the end of the measurement process by the DASY4 system can be scaled up by the Power drift to determine the SAR at the beginning of the measurement process.
- 2) The SAR measured at the middle channel for this configuration is at least 3 dB lower (0.8 mW/g) than SAR limit (1.6 mW/g), thus testing at low & high channel is optional.
- 3) Please see attachments for the detailed measurement data and plots showing the maximum SAR location of the EUT.
- 4) With alternate battery.

8.2.2 POSITION 3 & 4

 <p style="text-align: center;">Position 3</p>	 <p style="text-align: center;">Position 4</p>				
GSM 1900					
Test Mode	Channel	f (MHz)	Measured SAR 1g (mW/g)	Power Drift (dB)	Extrapolated ¹⁾ SAR 1g (mW/g)
Position 3	512	1850.2	0.097	0.000	0.097
	661	1880.0			
	810	1909.8			
Notes:					
<p>1) The exact method of extrapolation is $\text{Measured SAR} \times 10^{(-\text{drift}/10)}$. The SAR reported at the end of the measurement process by the DASY4 system can be scaled up by the Power drift to determine the SAR at the beginning of the measurement process.</p> <p>2) The SAR measured at the middle channel for this configuration is at least 3 dB lower (0.8 mW/g) than SAR limit (1.6 mW/g), thus testing at low & high channel is optional.</p> <p>3) Please see attachments for the detailed measurement data and plots showing the maximum SAR location of the EUT.</p> <p>4) Position 4 skipped since SAR value is low.</p>					

8.2.3 POSITION 5 & 6

					
Position 5		Position 6			
GSM 1900					
Test Mode	Channel	f (MHz)	Measured SAR 1g (mW/g)	Power Drift (dB)	Extrapolated ¹⁾ SAR 1g (mW/g)
Position 5	512	1850.2	0.226	0.000	0.226
	661	1880.0			
	810	1909.8			
Position 6	512	1850.2	0.017	0.000	0.017
	661	1880.0			
	810	1909.8			
Notes:					
1) The exact method of extrapolation is Measured SAR x 10 [^] (-drift/10). The SAR reported at the end of the measurement process by the DASY4 system can be scaled up by the Power drift to determine the SAR at the beginning of the measurement process.					
2) The SAR measured at the middle channel for this configuration is at least 3 dB lower (0.8 mW/g) than SAR limit (1.6 mW/g), thus testing at low & high channel is optional.					
3) Please see attachments for the detailed measurement data and plots showing the maximum SAR location of the EUT.					
4) The separation distance is 15mm.					

9 MEASUREMENT UNCERTAINTY

9.1 MEASUREMENT UNCERTAINTY FOR 300 MHz – 3000 MHz

Uncertainty component	Tol. (±%)	Probe Dist.	Div.	Ci (1g)	Ci (10g)	Std. Unc.(±%)	
						Ui (1g)	Ui(10g)
Measurement System							
Probe Calibration	4.80	N	1	1	1	4.80	4.80
Axial Isotropy	4.70	R	1.732	0.707	0.707	1.92	1.92
Hemispherical Isotropy	9.60	R	1.732	0.707	0.707	3.92	3.92
Boundary Effects	1.00	R	1.732	1	1	0.58	0.58
Linearity	4.70	R	1.732	1	1	2.71	2.71
System Detection Limits	1.00	R	1.732	1	1	0.58	0.58
Readout Electronics	1.00	N	1	1	1	1.00	1.00
Response Time	0.80	R	1.732	1	1	0.46	0.46
Integration Time	2.60	R	1.732	1	1	1.50	1.50
RF Ambient Conditions - Noise	1.59	R	1.732	1	1	0.92	0.92
RF Ambient Conditions - Reflections	0.00	R	1.732	1	1	0.00	0.00
Probe Positioner Mechanical Tolerance	0.40	R	1.732	1	1	0.23	0.23
Probe Positioning With Respect to Phantom Shell	2.90	R	1.732	1	1	1.67	1.67
Extrapolation, interpolation, and integration algorithms for max. SAR evaluation	3.90	R	1.732	1	1	2.25	2.25
Test sample Related							
Test Sample Positioning	1.10	N	1	1	1	1.10	1.10
Device Holder Uncertainty	3.60	N	1	1	1	3.60	3.60
Power and SAR Drift Measurement	5.00	R	1.732	1	1	2.89	2.89
Phantom and Tissue Parameters							
Phantom Uncertainty	4.00	R	1.732	1	1	2.31	2.31
Liquid Conductivity - Target	5.00	R	1.732	0.64	0.43	1.85	1.24
Liquid Conductivity - Meas.	8.60	N	1	0.64	0.43	5.50	3.70
Liquid Permittivity - Target	5.00	R	1.732	0.6	0.49	1.73	1.41
Liquid Permittivity - Meas.	3.30	N	1	0.6	0.49	1.98	1.62
Combined Standard Uncertainty			RSS			11.44	10.49
Expanded Uncertainty (95% Confidence Interval)			K=2			22.87	20.98
Notes for table							
1. Tol. - tolerance in influence quantity							
2. N - Nomal							
3. R - Rectangular							
4. Div. - Divisor used to obtain standard uncertainty							
5. Ci - is te sensitivity coefficient							

10 EQUIPMENT LIST AND CALIBRATION

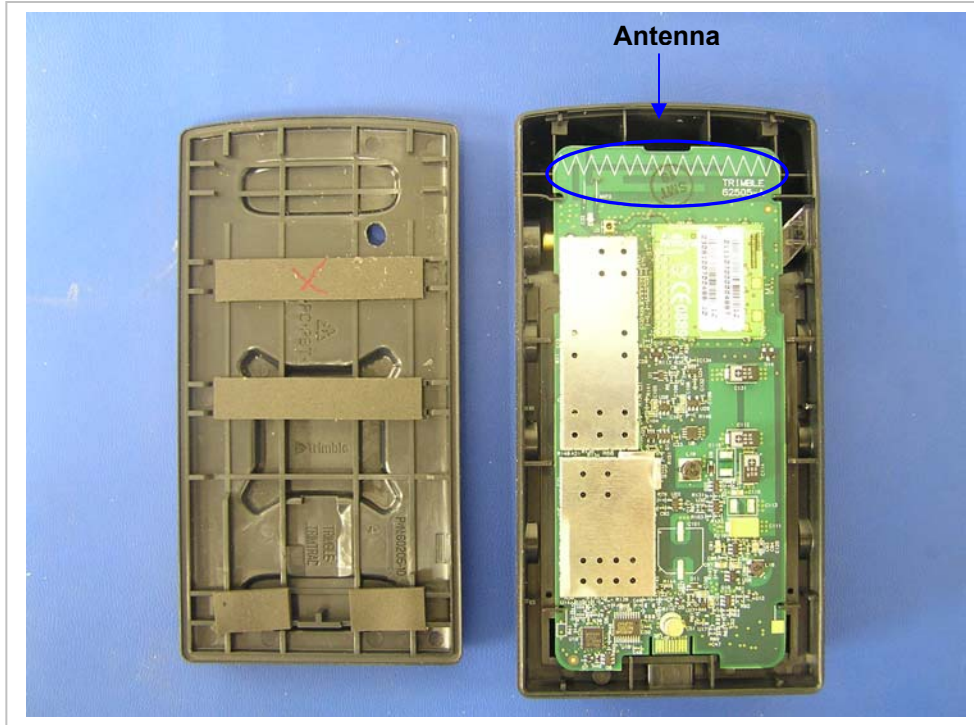
Name of Equipment	Manufacturer	Type/Model	Serial Number	Cal. Due date		
				MM	DD	Year
Robot - Six Axes	Stäubli	RX90BL	N/A			N/A
Robot Remote Control	Stäubli	CS7MB	3403-91535			N/A
DASY4 Measurement Server	SPEAG	SEUMS001BA	1041			N/A
Probe Alignment Unit	SPEAG	LB (V2)	261			N/A
SAM Phantom (SAM1)	SPEAG	QD000P40CA	1185			N/A
SAM Phantom (SAM2)	SPEAG	QD000P40CA	1050			N/A
Oval Flat Phantom (ELI 4.0)	SPEAG	QD OVA001 B	1003			N/A
Electronic Probe kit	HP	85070C	N/A			N/A
S-Parameter Network Analyzer	Agilent	8753ES-6	US39173569	2	14	2008
E-Field Probe	SPEAG	EX3DV4	3554	4	24	2008
Thermometer	ERTCO	639-1S	1718	11	7	2007
Data Acquisition Electronics	SPEAG	DAE3 V1	427	11	16	2007
System Validation Dipole	SPEAG	D900V2	108	2	22	2008
System Validation Dipole	SPEAG	D1900V2	5d043	1	23	2008
Signal Generator	R&S	SMP 04	DE34210	10	9	2007
Power Meter	Giga-tronics	8651A	8651404	4	3	2008
Power Sensor	Giga-tronics	80701A	1834588	4	17	2008
Amplifier	Mini-Circuits	ZHL-42W	D072701-5			N/A
Radio Communication Tester	R & S	CMU 200	106291	4	16	2008
Simulating Liquid	CCS	M835	N/A	Within 24 hrs of first test		
Simulating Liquid	CCS	M1900	N/A	Within 24 hrs of first test		

11 PHOTOS

DUT



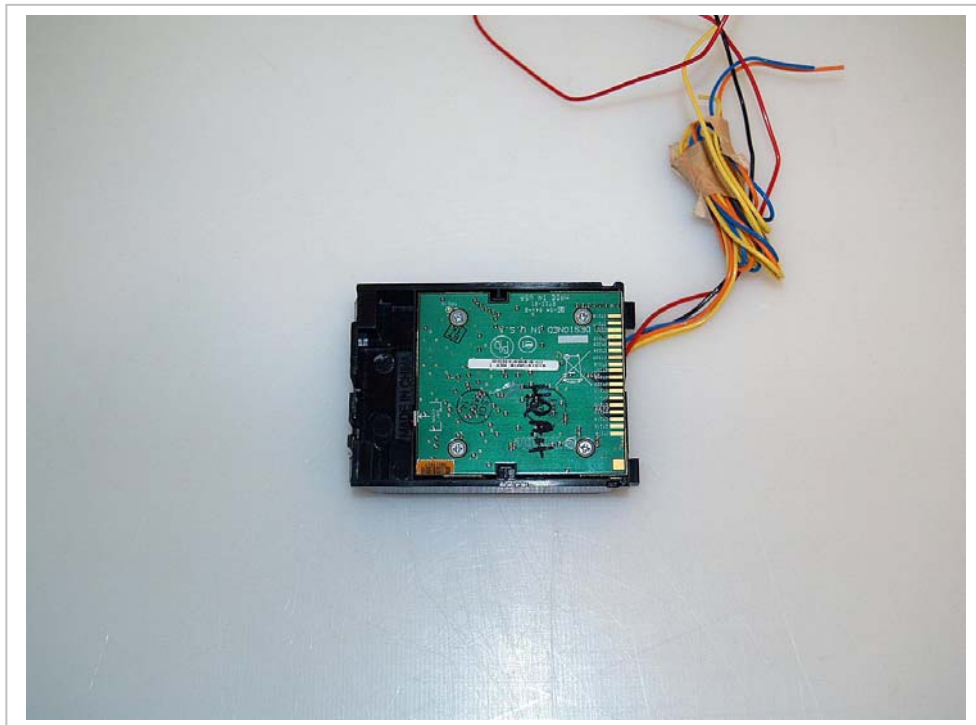
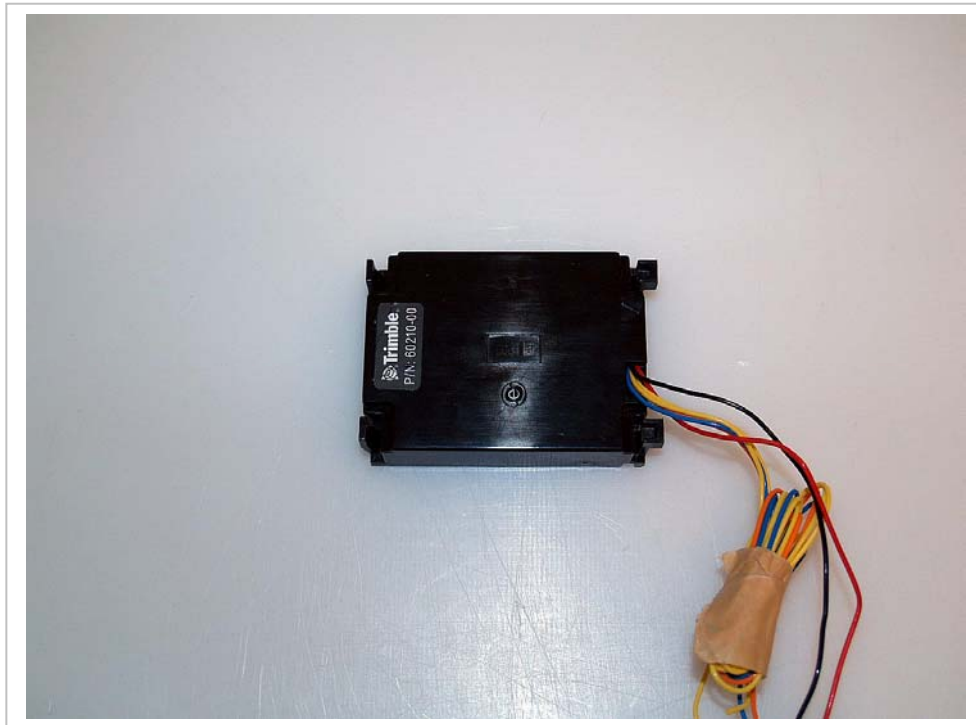
Antenna Location



DUT with Battery Compartment



Battery – Lexel LH070-3A44C3BROT



12 ATTACHMENTS

No.	Contents	No. Of Pages
1	System Performance Check Plots	4
2-1	SAR Test Plots – Cell Band	8
2-2	SAR Test Plots – PCS Band	7
3	Certificate of E-Field Probe - EX3DV4SN3554	10
4	Certificate of System Validation Dipole - D900V2 SN:108	9
5	Certificate of System Validation Dipole - D1900V2 SN:5d043	9

END OF REPORT