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Report No : TSC-101-10-AP-07-0 (SAR )

**Date of Issue : Nov. 22, 2012**

# SAR Test Report

**Device Under Test : Rugged Tablet PC**

**Model No. : M9700**

**Applicant : DAP Technologies LTD**

This Test report applied to the tested sample only.

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Report No : TSC-101-10-AP-07-0 (SAR )

**Applicant :** DAP Technologies LTD

**TEL. :** (480)319-3199

**Addr. :** 4535 Boul. Wilfrid-Hamel Suite 100, Quebec, G1P 2J7, Canada

**Device Under Test :** Rugged Tablet PC

**Trade name :** dAP

**Model No. :** M9700

**Manufacturer :** WINMATE Communication INC.

**Applied Date :** Oct. 16, 2012

**Date of Sample Arrived :** Oct. 16, 2012

**Date of Finished :** Nov. 13, 2012

**Applied standard :** IEEE 1528 2003, 47 CFR §2.1093, OET 65 Supplement C 01-01

Industry Canada RSS-210

**Cited Document :** KDB 447498, 450824, 616217, 248227, 616217, 648474, 941225,

FCC DA02-1438,

**Test Equipment :** Refer to page 22

**Test Environment :** 23°C, 50 % R.H.

**Test results :** IEEE 1528 2003 Complied

Industry Canada RSS-210 Complied

SAR 1g = **0.770** W/kg (Maximum), Refer to page 24

Approved by	Reviewed by	Test Engineer
Ko Ming Hong Ko Ming-Hong	chia-cheng chang Chia-cheng Chang	Shin-yen Du Shin-yen Du

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## 1. General Information

### 1.1 EUT Description

Product Name	Rugged Tablet PC
Trade Name	dAP
Model No.	M9700
Operation Frequency	GRPS/EGPRS850, WCDMA Band 5 CDMA2000 BC0, U/L 824-849MHz, D/L 869-894 MHz; GPRS/EGPRS1900, WCDMA Band 2 CDMA2000 BC1, U/L 1850-1910MHz, D/L 1930-1990 MHz; WiFi and Bluetooth 2402-2483MHz
FCC ID	T5M9700WBW
IC	4609A-9700WBW
Antenna Type	INTERNAL(WLAN/Bluetooth Antenna Gain: 2dBi ; Mobile Antenna Gain: 2dBi)
Device Category	Portable
Battery	T-GEE PSE6054D0 5300mAh 2S1P
WLAN Module	Sparklan (RT3090BC4)
Mobile Module	Sierra MC 8355
RF Exposure Environment	Uncontrolled
Output Power (Conducted)	Please refer to P.21

### 1.2 Test Environment

Ambient conditions in the laboratory:

Items	Required	Actual
Temperature (°C)	24	See first page
Humidity (%RH)	55	See first page

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## 2. SAR Measurement System

### 2.1 ALSAS-10U System Description

**ALSAS-10-U** is fully compliant with the technical and scientific requirements of IEEE 1528, IEC 62209, EN50361, CENELEC, ARIB, ACA, and the Federal Communications Commission. The system comprises of a six axes articulated robot which utilizes a dedicated controller. ALSAS-10U uses the latest methodologies and FDTD modeling to provide a platform which is repeatable with minimum uncertainty.



#### 2.1.1 Applications

Predefined measurement procedures compliant with the guidelines of CENELEC, IEEE, IEC, FCC, etc are utilized during the assessment for the device. Automatic detection for all SAR maximum are embedded within the core architecture for the system, ensuring that peak locations used for centering the zoom scan are within a 1mm resolution and a 0.05mm repeatable position. System operation range currently available up-to 6 GHz in simulated tissue.

#### 2.1.2 Area Scans

Area scans are defined prior to the measurement process being executed with a user defined variable spacing between each measurement point (integral) allowing low uncertainty measurements to be conducted. Scans defined for FCC applications utilize a  $10\text{mm}^2$  step integral, with 1mm interpolation used to locate the peak SAR area used for zoom scan assessments.

Where the system identifies multiple SAR peaks (which are within 25% of peak value) the system will provide the user with the option of assessing each peak location individually for zoom scan averaging.

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### 2.1.3 Zoom Scan (Cube Scan Averaging)

The averaging zoom scan volume utilized in the ALSAS-10U software is in the shape of a cube and the side dimension of a 1 g or 10 g mass is dependent on the density of the liquid representing the simulated tissue. A density of 1000 kg/m<sup>3</sup> is used to represent the head and body tissue density and not the phantom liquid density, in order to be consistent with the definition of the liquid dielectric properties, i.e. the side length of the 1 g cube is 10mm, with the side length of the 10 g cube 21.5mm.

When the cube intersects with the surface of the phantom, it is oriented so that 3 vertices touch the surface of the shell or the center of a face is tangent to the surface. The face of the cube closest to the surface is modified in order to conform to the tangent surface.

The zoom scan integer steps can be user defined so as to reduce uncertainty, but normal practice for typical test applications (including FCC) utilize a physical step of 7x7x7 (5mmx5mmx5mm) providing a volume of 30mm in the X & Y axis, and 30mm in the Z axis.

### 2.1.4 ALSAS-10U Interpolation and Extrapolation Uncertainty

The overall uncertainty for the methodology and algorithms the used during the SAR calculation was evaluated using the data from IEEE 1528 based on the example f3 algorithm:

$$f_3(x, y, z) = A \frac{a^2}{\frac{a^2}{4} + x'^2 + y'^2} \cdot \left( e^{-\frac{2z}{a}} + \frac{a^2}{2(a + 2z)^2} \right)$$

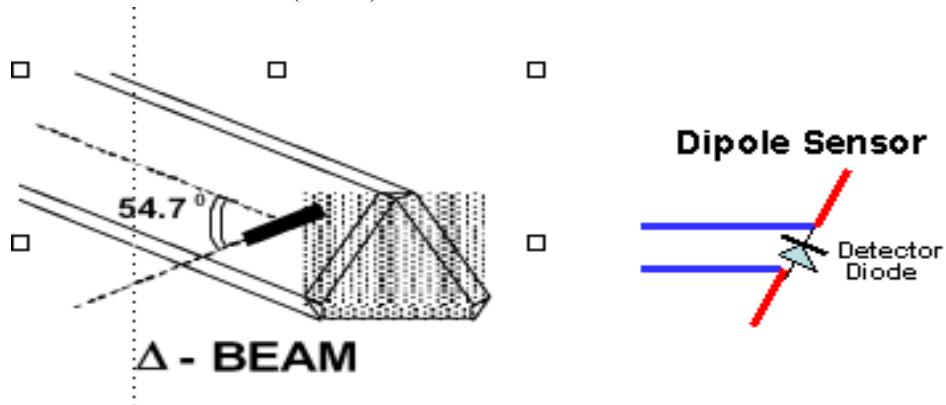
## 2.2 Isotropic E-Field Probe

The isotropic E-Field probe has been fully calibrated and assessed for isotropicity, and boundary effect within a controlled environment. Depending on the frequency for which the probe is calibrated the method utilized for calibration will change. A number of methods is used for calibrating probes, and these are outlined in the table below:

Calibration Frequency	Air Calibration	Tissue Calibration
2450MHz	TEM Cell	Temperature

The E-Field probe utilizes a triangular sensor arrangement as detailed in the diagram below:

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SAR is assessed with a calibrated probe which moves at a default height of 5mm from the center of the diode, which is mounted to the sensor, to the phantom surface (in the Z Axis). The 5mm offset height has been selected so as to minimize any resultant boundary effect due to the probe being in close proximity to the phantom surface.

The following algorithm is an example of the function used by the system for linearization of the output from the probe when measuring complex modulation schemes.

$$V_i = U_i + U_i^2 \cdot \frac{cf}{dcp_i}$$

#### 2.2.1 Isotropic E-Field Probe Specification

<b>Calibration in Air</b>	Frequency Dependent Below 2GHz Calibration in air performed in a TEM Cell Above 2GHz Calibration in air performed in waveguide
<b>Sensitivity</b>	0.70 $\mu$ V/(V/m) <sup>2</sup> to 0.85 $\mu$ V/(V/m) <sup>2</sup>
<b>Dynamic Range</b>	0.0005 W/kg to 100W/kg
<b>Isotropic Response</b>	Better than 0.2dB
<b>Diode Compression point (DCP)</b>	Calibration for Specific Frequency
<b>Probe Tip Radius</b>	< 5mm
<b>Sensor Offset</b>	1.56 (+/- 0.02mm)
<b>Probe Length</b>	290mm
<b>Video Bandwidth</b>	@ 500 Hz: 1dB @1.02 KHz: 3dB
<b>Boundary Effect</b>	Less than 2% for distance greater than 2.4mm
<b>Spatial Resolution</b>	Diameter less than 5mm Compliant with Standards

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### 2.3 Boundary Detection Unit and Probe Mounting Device

ALSAS-10U incorporates a boundary detection unit with a sensitivity of 0.05mm for detecting all types of surfaces. The robust design allows for detection during probe tilt (probe normalize) exercises, and utilizes a second stage emergency stop. The signal electronics are fed directly into the robot controller for high accuracy surface detection in lateral and axial detection modes (X, Y, & Z).

The probe is mounted directly onto the Boundary Detection unit for accurate tooling and displacement calculations controlled by the robot kinematics. The probe is connect to an isolated probe interconnect where the output stage of the probe is fed directly into the amplifier stage of the Daq-Paq

### 2.4 Daq-Paq (Analog to Digital Electronics)

ALSAS-10U incorporates a fully calibrated Daq-Paq (analog to digital conversion system) which has a 4 channel input stage, sent via a 2 stage auto-set amplifier module. The input signal is amplified accordingly so as to offer a dynamic range from 5 $\mu$ V to 800mV. Integration of the fields measured is carried out at board level utilizing a Co-Processor which then sends the measured fields down into the main computational module in digitized form via an RS232 communications port. Probe linearity and duty cycle compensation is carried out within the main Daq-Paq module.

<b>ADC</b>	12 Bit
Amplifier Range	20mV to 200mV and 150mV to 800mV
Field Integration	Local Co-Processor utilizing proprietary integration algorithms
Number of Input Channels	4 in total 3 dedicated and 1 spare
Communication	Packet data via RS232

### 2.5 Axis Articulated Robot



ALSAS-10U utilizes a six axis articulated robot, which is controlled using a Pentium based real-time movement controller. The movement kinematics engine utilizes proprietary (Thermo CRS) interpolation and extrapolation algorithms, which allow full freedom of movement for each of the six joints within the working envelope. Utilization of joint 6 allows for full probe rotation with a tolerance better than 0.05mm around the central axis.

<b>Robot/Controller Manufacturer</b>	Thermo CRS
<b>Number of Axis</b>	Six independently controlled axis
<b>Positioning Repeatability</b>	0.05mm
<b>Controller Type</b>	Single phase Pentium based C500C
<b>Robot Reach</b>	710mm
<b>Communication</b>	RS232 and LAN compatible

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## 2.6 ALSAS Universal Workstation

ALSAS Universal workstation allows for repeatability and fast adaptability. It allows users to do calibration, testing and measurements using different types of phantoms with one set up, which significantly speeds up the measurement process.

## 2.7 Phantom Types

The ALSAS-10U allows the integration of multiple phantom types. SAM Phantoms fully compliant with IEEE 1528,EN50361 Universal Phantom, and Universal Flat.

### 2.7.1 APREL Laboratories Universal Phantom

The Universal Phantom is used on the ALSAS-10U as a system validation phantom. The Universal Phantom has been fully validated both experimentally from 800MHz to 6GHz and numerically using XFDTD numerical software. The shell thickness is 2mm overall, with a 4mm spacer located at the NF/MB intersection providing an overall thickness of 6mm in line with the requirements of IEEE-1528.

The design allows for fast and accurate measurements, of handsets, by allowing the conservative SAR to be evaluated at on frequency for both left and right head experiments in one measurement.



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### 3. Tissue Simulating Liquid

#### 3.1 The composition of the tissue simulating liquid

INGREDIENT (% Weight)	900MHz Head	850MHz Body	1900MHz Head	1900MHz Body	2450MHz Head	2450MHz Body
<b>Water</b>	40.92%	53.92%	52.64%	68.64%	73.2	70.2
<b>Salt</b>	1.48%	0.98%	0.36%	0.36%	0.04	0.1
<b>Sugar</b>	56.5%	44.5%	0%	0%	0%	0%
<b>HEC</b>	0.40%	1%	0%	0%	0%	0%
<b>Preventol</b>	0.10%	0.10%	0%	0%	0%	0%
<b>DGBE</b>	0%	0%	47.0%	31.0%	26.7%	29.7%

#### 3.2 Tissue Calibration Result

The dielectric parameters of the liquids were verified prior to the SAR evaluation using APREL Dielectric Probe Kit and Anritsu MS4623B Vector Network Analyzer

Head Tissue Simulant Measurement			Oct. 18 2012	
Frequency [MHz]	Description	Dielectric Parameters		Tissue Temp. [°C]
		$\epsilon_r$	$\sigma$ [s/m]	
900 MHz	Reference result $\pm 5\%$ window	41.5 $\pm$ 5%	0.97 $\pm$ 5%	N/A
	Measured	41.7	0.96	23.0
Body Tissue Simulant Measurement			Oct. 22 2012	
Frequency [MHz]	Description	Dielectric Parameters		Tissue Temp. [°C]
		$\epsilon_r$	$\sigma$ [s/m]	
835 MHz	Reference result $\pm 5\%$ window	55.2 $\pm$ 5%	0.97 $\pm$ 5%	N/A
	Measured	52.5	0.96	23.0

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Head Tissue Simulant Measurement				Oct. 24 2012
Frequency [MHz]	Description	Dielectric Parameters		Tissue Temp. [°C]
		$\epsilon_r$	$\sigma$ [s/m]	
1900 MHz	Reference result	40.0± 5%	1.40 ± 5%	N/A
	± 5% window	39.5	1.41	23.0

Body Tissue Simulant Measurement				Oct. 26 2012
Frequency [MHz]	Description	Dielectric Parameters		Tissue Temp. [°C]
		$\epsilon_r$	$\sigma$ [s/m]	
1900 MHz	Reference result	53.3± 5%	1.52 ± 5%	N/A
	± 5% window	52.8	1.54	23.0

Head Tissue Simulant Measurement				Oct. 18 2012
Frequency [MHz]	Description	Dielectric Parameters		Tissue Temp. [°C]
		$\epsilon_r$	$\sigma$ [s/m]	
2450 MHz	Reference result	39.2± 5%	1.80 ± 5%	N/A
	± 5% window	39.5	1.81	23.0

Body Tissue Simulant Measurement				Oct. 18 2012
Frequency [MHz]	Description	Dielectric Parameters		Tissue Temp. [°C]
		$\epsilon_r$	$\sigma$ [s/m]	
2450 MHz	Reference result	52.7± 5%	1.95 ± 5%	N/A
	± 5% window	52.5	1.99	23.0

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### 3.3 Tissue Dielectric Parameters for Head and Body Phantoms

The head tissue dielectric parameters recommended by the IEEE SCC-34/SC-2 in P1528 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 described in Reference [12] and extrapolated according to the head parameters specified in P1528.

Target Frequency (MHz)	Head		Body	
	$\epsilon_r$	$\sigma$ (S/m)	$\epsilon_r$	$\sigma$ (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

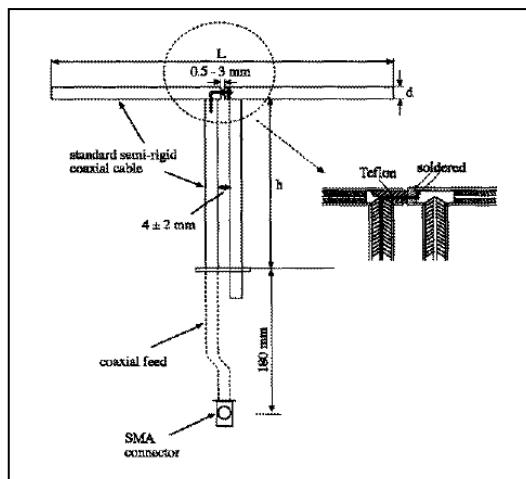
( $\epsilon_r$  = relative permittivity,  $\sigma$  = conductivity and  $\rho = 1000 \text{ kg/m}^3$ )

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## 4. SAR Measurement Procedure

### 4.1 SAR System Validation

#### 4.1.1 Validation Dipoles



The dipoles used is based on the IEEE-1528 standard, and is complied with mechanical and electrical specifications in line with the requirements of both IEEE and FCC Supplement C. the table below provides details for the mechanical and electrical specifications for the dipoles.

Frequency	L (mm)	h (mm)
900 MHz	149	83.9
1900 MHz	68	39.5
2450MHz	51.5	30.4

#### 4.1.2 Validation Result

Frequency (MHz)	Power	SAR <sub>1g</sub> (mw/g)	Power Drift (%)	Date
900	1 W	10.8	-	Oct. 18 2010
	500mW	5.58	4.438	Oct. 24 2012
	Normalize to 1 W	11.16		
1900	1 W	39.7	-	Oct. 18 2010
	250mW	9.587	-2.901	Oct. 18 2012
	Normalize to 1 W	38.35		
2450	1 W	52.4	-	Nov. 10 2009
	500mW	26.015	-2.336	Oct. 18 2012
	Normalize to 1 W	52.03		

Note: The validation dipoles was calibrated on Nov. 10 2009 and Oct. 18 2010 by Aprel Labs which din't provide the power drift in validation report. We will request our validation Labs provides the validation report to meet the FCC KDB450824 requirements next periodic validation.

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## **835MHz System validation**

### **SAR Test Report**

Report Date : 24-Oct-2012  
 By Operator : 123  
 Measurement Date : 24-Oct-2012  
 Starting Time : 24-Oct-2012 03:32:47 PM  
 End Time : 24-Oct-2012 03:55:28 PM  
 Scanning Time : 1361 secs

**Product Data**  
 Device Name : validation  
 Serial No. : 123  
 Type : Dipole  
 Model : 900  
 Frequency : 900.00 MHz  
 Max. Transmit Pwr : 1 W  
 Drift Time : 0 min(s)  
 Length : 2 mm  
 Width : 161 mm  
 Depth : 1 mm  
 Antenna Type : Internal  
 Orientation : Rotated Left 90°  
 Power Drift-Start : 5.581 W/kg  
 Power Drift-Finish: 5.829 W/kg  
 Power Drift (%) : 4.438  
 Picture :

**Phantom Data**  
 Name : APREL-Uni  
 Type : Uni-Phantom  
 Size (mm) : 280 x 280 x 200  
 Serial No. : User Define  
 Location : Center  
 Description : Uni\_Phantom

**Tissue Data**  
 Type : HEAD  
 Serial No. : 900  
 Frequency : 900.00 MHz  
 Last Calib. Date : 24-Oct-2012  
 Temperature : 23.00 °C  
 Ambient Temp. : 23.00 °C  
 Humidity : 50.00 RH%  
 Epsilon : 41.70 F/m  
 Sigma : 0.96 S/m  
 Density : 1000.00 kg/cu. m

**Probe Data**  
 Name : Probe 255  
 Model : E020  
 Type : E-Field Triangle  
 Serial No. : 255

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Last Calib. Date : 06-Dec-2011  
Frequency : 900.00 MHz  
Duty Cycle Factor: 1  
Conversion Factor: 6.8  
Probe Sensitivity: 1.20 1.20 1.20  $\mu\text{V}/(\text{V}/\text{m})^2$   
Compression Point: 95.00 mV  
Offset : 1.56 mm

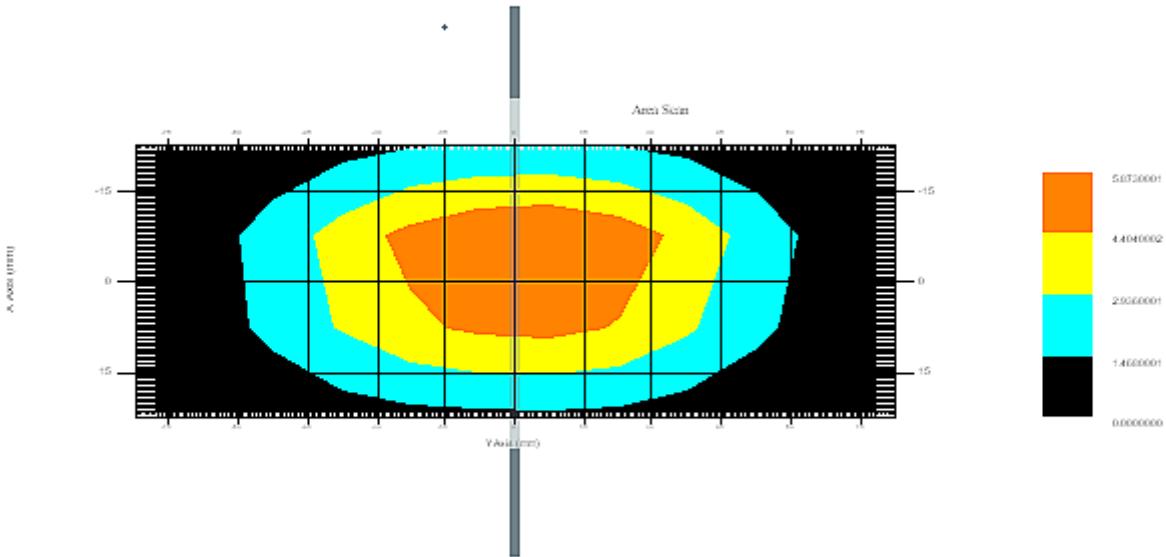
**Measurement Data**

Crest Factor : 1  
Scan Type : Complete  
Tissue Temp. : 23.00 °C  
Ambient Temp. : 23.00 °C  
Set-up Date : 24-Oct-2012  
Set-up Time : 2:37:02 PM  
Area Scan : 4x12x1 : Measurement x=15mm, y=15mm, z=4mm  
Zoom Scan : 5x5x8 : Measurement x=8mm, y=8mm, z=4mm

**Other Data**

DUT Position : Rotated Left 90°  
Separation : 0  
Channel : Mid

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1 gram SAR value : 5.225 W/kg  
 Area Scan Peak SAR : 4.614 W/kg  
 Zoom Scan Peak SAR : 9.138 W/kg

### Exposure Assessment Measurement Uncertainty

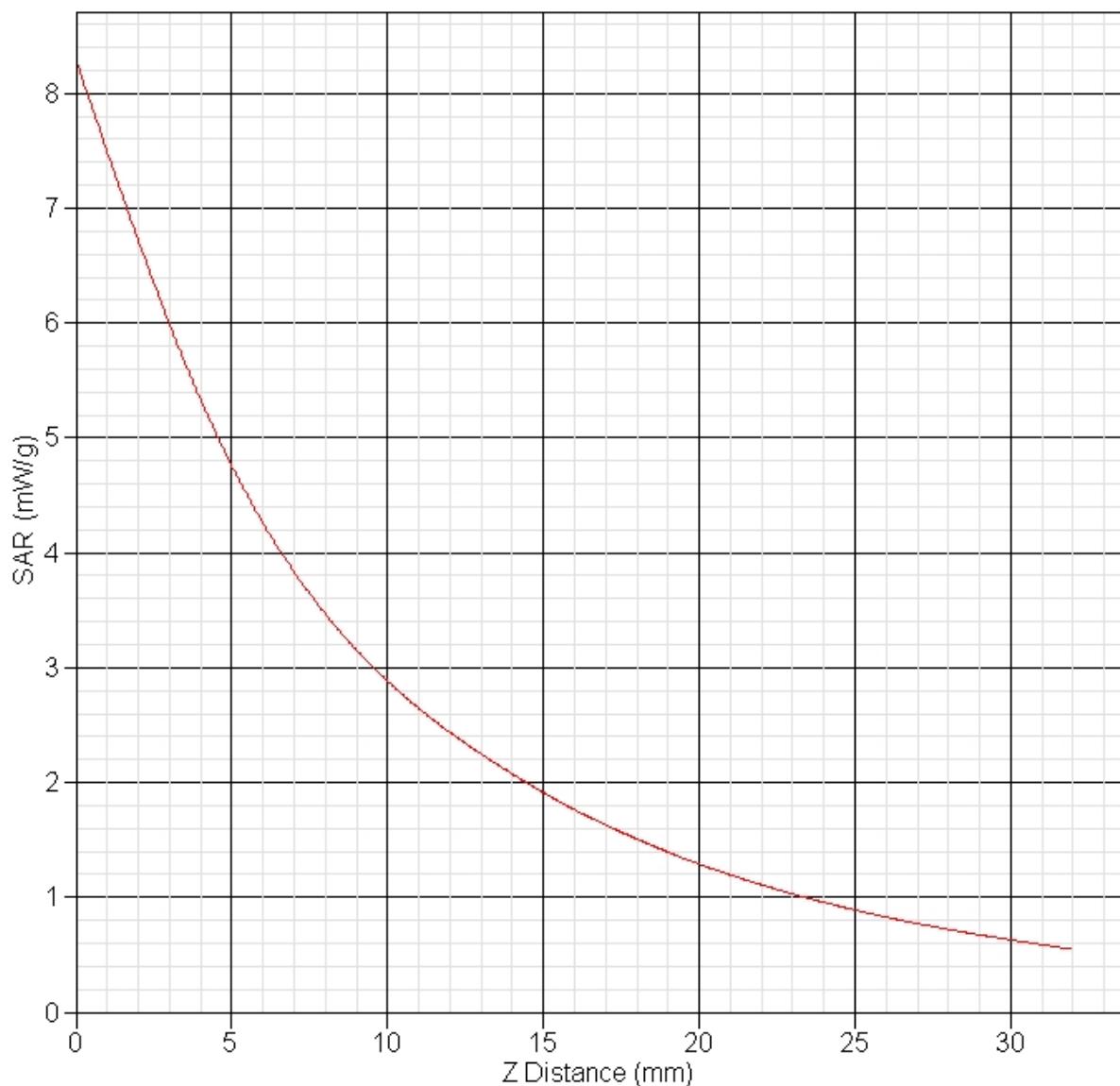
Source of Uncertainty	Tolerance Value	Probability Distribution	Divisor	$c_i^1 (1-g)$	Standard Uncertainty (1-g) %
Measurement System					
Probe Calibration	3.5	normal	1	1	3.5
Axial Isotropy	3.7	rectangular	$\sqrt{3}$	$(1-cp)^{1/2}$	1.5
Hemispherical Isotropy	10.9	rectangular	$\sqrt{3}$	$\sqrt{cp}$	4.4
Boundary Effect	1.0	rectangular	$\sqrt{3}$	1	0.6
Linearity	4.7	rectangular	$\sqrt{3}$	1	2.7
Detection Limit	1.0	rectangular	$\sqrt{3}$	1	0.6
Readout Electronics	1.0	normal	1	1	1.0
Response Time	0.8	rectangular	$\sqrt{3}$	1	0.5
Integration Time	1.7	rectangular	$\sqrt{3}$	1	1.0
RF Ambient Condition	3.0	rectangular	$\sqrt{3}$	1	1.7
Probe Positioner	0.4	rectangular	$\sqrt{3}$	1	0.2

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Mech.					
<b>Restriction</b>					
Probe Positioning with respect to Phantom Shell	2.9	rectangular	$\sqrt{3}$	1	1.7
Extrapolation and Integration	3.7	rectangular	$\sqrt{3}$	1	2.1
Test Sample Positioning	4.0	normal	1	1	4.0
Device Holder Uncertainty	2.0	normal	1	1	2.0
Drift of Output Power	4.4	rectangular	$\sqrt{3}$	1	2.6
<b>Phantom and Setup</b>					
Phantom Uncertainty(shape & thickness tolerance)	3.4	rectangular	$\sqrt{3}$	1	2.0
Liquid Conductivity(target)	5.0	rectangular	$\sqrt{3}$	0.7	2.0
Liquid Conductivity(meas.)	0.0	normal	1	0.7	0.0
Liquid Permittivity(target)	5.0	rectangular	$\sqrt{3}$	0.6	1.7
Liquid Permittivity(meas.)	0.5	normal	1	0.6	0.3
Combined Uncertainty		RSS			9.6
Combined Uncertainty (coverage factor=2)		Normal(k=2)			19.2

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**SAR-Z Axis**  
at Hotspot x:1.08 y:0.76



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## 1900MHz System validation

### SAR Test Report

Report Date : 18-Oct-2012  
By Operator : 123  
Measurement Date : 18-Oct-2012  
Starting Time : 18-Oct-2012 04:30:47 PM  
End Time : 18-Oct-2012 04:50:43 PM  
Scanning Time : 1196 secs

Product Data  
Device Name : validation  
Serial No. : 123  
Type : Dipole  
Model : 1900  
Frequency : 1900.00 MHz  
Max. Transmit Pwr : 1 W  
Drift Time : 0 min(s)  
Length : 2 mm  
Width : 68 mm  
Depth : 1 mm  
Antenna Type : Internal  
Orientation : Rotated Left 90°  
Power Drift-Start : 10.671 W/kg  
Power Drift-Finish: 10.361 W/kg  
Power Drift (%) : -2.901  
Picture :

Phantom Data  
Name : APREL-Uni  
Type : Uni-Phantom  
Size (mm) : 280 x 280 x 200  
Serial No. : User Define  
Location : Center  
Description : Uni\_Phantom

Tissue Data  
Type : HEAD  
Serial No. : 1900  
Frequency : 1900.00 MHz  
Last Calib. Date : 18-Oct-2012  
Temperature : 23.00 °C  
Ambient Temp. : 23.00 °C  
Humidity : 50.00 RH%  
Epsilon : 39.50 F/m  
Sigma : 1.41 S/m  
Density : 1000.00 kg/cu. m  
Probe Data  
Name : Probe 255  
Model : E020

Report No : TSC-101-10-AP-07-0 (SAR )

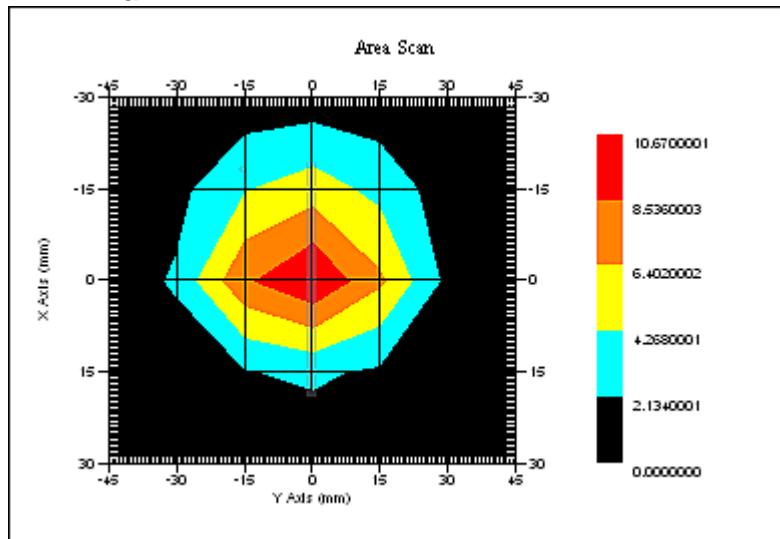
Type : E-Field Triangle  
 Serial No. : 255  
 Last Calib. Date : 06-Dec-2011  
 Frequency : 1900.00 MHz  
 Duty Cycle Factor: 1  
 Conversion Factor: 5.8  
 Probe Sensitivity: 1.20 1.20 1.20  $\mu\text{V}/(\text{V}/\text{m})^2$   
 Compression Point: 95.00 mV  
 Offset : 1.56 mm

**Measurement Data**

Crest Factor : 1  
 Scan Type : Complete  
 Tissue Temp. : 23.00 °C  
 Ambient Temp. : 23.00 °C  
 Set-up Date : 18-Oct-2012  
 Set-up Time : 3:05:01 PM  
 Area Scan : 5x7x1 : Measurement x=15mm, y=15mm, z=4mm  
 Zoom Scan : 5x5x8 : Measurement x=8mm, y=8mm, z=4mm

**Other Data**

DUT Position : Rotated Left 90°  
 Separation : 0  
 Channel : Mid



1 gram SAR value : 9.587 W/kg  
 Area Scan Peak SAR : 10.670 W/kg  
 Zoom Scan Peak SAR : 18.916 W/kg

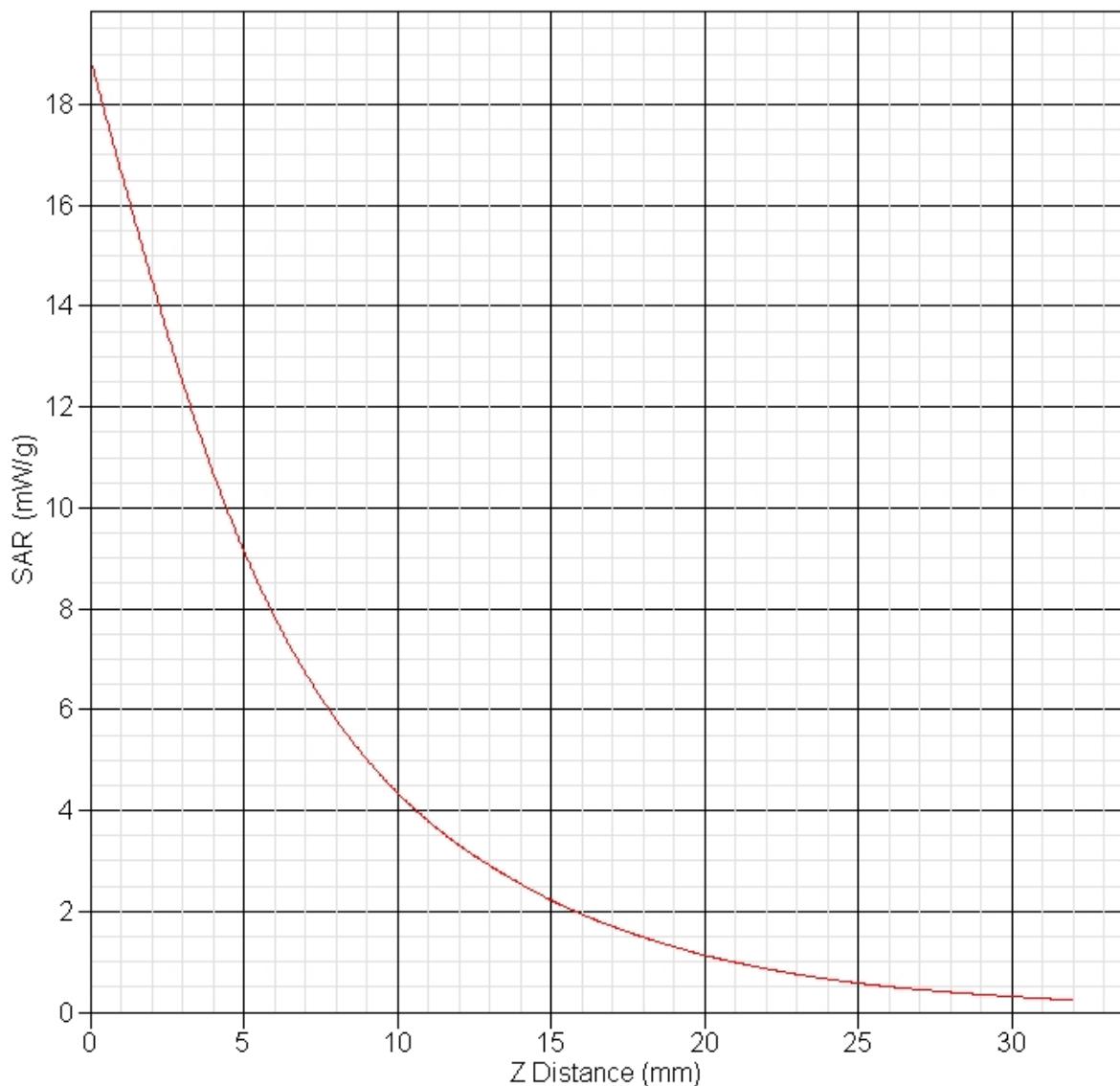
Report No : TSC-101-10-AP-07-0 (SAR )

### **Exposure Assessment Measurement Uncertainty**

<b>Source of Uncertainty</b>	<b>Tolerance Value</b>	<b>Probability Distribution</b>	<b>Divisor</b>	$c_i^1 (1-g)$	<b>Standard Uncertainty (1-g) %</b>
Measurement System					
Probe Calibration	3.5	normal	1	1	3.5
Axial Isotropy	3.7	rectangular	$\sqrt{3}$	$(1 - \frac{cp}{\sqrt{3}})^{1/2}$	1.5
Hemispherical Isotropy	10.9	rectangular	$\sqrt{3}$	$\sqrt{cp}$	4.4
Boundary Effect	1.0	rectangular	$\sqrt{3}$	1	0.6
Linearity	4.7	rectangular	$\sqrt{3}$	1	2.7
Detection Limit	1.0	rectangular	$\sqrt{3}$	1	0.6
Readout Electronics	1.0	normal	1	1	1.0
Response Time	0.8	rectangular	$\sqrt{3}$	1	0.5
Integration Time	1.7	rectangular	$\sqrt{3}$	1	1.0
RF Ambient Condition	3.0	rectangular	$\sqrt{3}$	1	1.7
Probe Positioner Mech.	0.4	rectangular	$\sqrt{3}$	1	0.2
Restriction					
Probe Positioning with respect to Phantom Shell	2.9	rectangular	$\sqrt{3}$	1	1.7
Extrapolation and Integration	3.7	rectangular	$\sqrt{3}$	1	2.1
Test Sample Positioning	4.0	normal	1	1	4.0
Device Holder Uncertainty	2.0	normal	1	1	2.0
Drift of Output Power	2.9	rectangular	$\sqrt{3}$	1	1.7
Phantom and Setup					
Phantom Uncertainty(shape & thickness tolerance)	3.4	rectangular	$\sqrt{3}$	1	2.0
Liquid Conductivity(target)	5.0	rectangular	$\sqrt{3}$	0.7	2.0
Liquid Conductivity(meas.)	0.7	normal	1	0.7	0.5
Liquid Permittivity(target)	5.0	rectangular	$\sqrt{3}$	0.6	1.7
Liquid Permittivity(meas.)	1.3	normal	1	0.6	0.8
Combined Uncertainty		RSS			9.4
Combined Uncertainty (coverage factor=2)		Normal(k=2)			18.9

Report No : TSC-101-10-AP-07-0 (SAR )

SAR-Z Axis  
at Hotspot x:0.09 y:-0.24



Report No : TSC-101-10-AP-07-0 (SAR )

## **2450MHz System validation**

### **SAR Test Report**

Report Date : 18-Oct-2012  
 By Operator : 123  
 Measurement Date : 18-Oct-2012  
 Starting Time : 18-Oct-2012 11:55:08 AM  
 End Time : 18-Oct-2012 12:12:29 PM  
 Scanning Time : 1041 secs

**Product Data**  
 Device Name : validation  
 Serial No. : 123  
 Type : Other  
 Model : 2450  
 Frequency : 2450.00 MHz  
 Max. Transmit Pwr : 1 W  
 Drift Time : 0 min(s)  
 Length : 45 mm  
 Width : 3 mm  
 Depth : 2 mm  
 Antenna Type : Internal  
 Orientation : Rotated Left 90°  
 Power Drift-Start : 24.552 W/kg  
 Power Drift-Finish: 23.978 W/kg  
 Power Drift (%) : -2.336  
 Picture :

**Phantom Data**  
 Name : APREL-Uni  
 Type : Uni-Phantom  
 Size (mm) : 280 x 280 x 200  
 Serial No. : User Define  
 Location : Center  
 Description : Uni\_Phantom

**Tissue Data**  
 Type : HEAD  
 Serial No. : 2450  
 Frequency : 2450.00 MHz  
 Last Calib. Date : 18-Oct-2012  
 Temperature : 24.00 °C  
 Ambient Temp. : 24.00 °C  
 Humidity : 50.00 RH%  
 Epsilon : 39.50 F/m  
 Sigma : 1.81 S/m  
 Density : 1000.00 kg/cu. m

**Probe Data**  
 Name : Probe 255  
 Model : E020  
 Type : E-Field Triangle  
 Serial No. : 255

Report No : TSC-101-10-AP-07-0 (SAR )

Last Calib. Date : 06-Dec-2011  
Frequency : 2450.00 MHz  
Duty Cycle Factor: 1  
Conversion Factor: 4.7  
Probe Sensitivity: 1.20 1.20 1.20  $\mu\text{V}/(\text{V}/\text{m})^2$   
Compression Point: 95.00 mV  
Offset : 1.56 mm

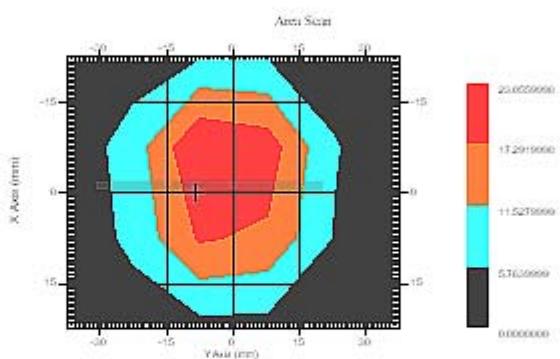
**Measurement Data**

Crest Factor : 1  
Scan Type : Complete  
Tissue Temp. : 24.00 °C  
Ambient Temp. : 24.00 °C  
Set-up Date : 18-Oct-2012  
Set-up Time : 11:54:51 AM  
Area Scan : 4x6x1 : Measurement x=15mm, y=15mm, z=4mm  
Zoom Scan : 5x5x8 : Measurement x=8mm, y=8mm, z=4mm

**Other Data**

DUT Position : Rotated Left 90°  
Separation : 0  
Channel : Mid

Report No : TSC-101-10-AP-07-0 (SAR )



1 gram SAR value : 26.015 W/kg  
Area Scan Peak SAR : 23.056 W/kg  
Zoom Scan Peak SAR : 52.745 W/kg

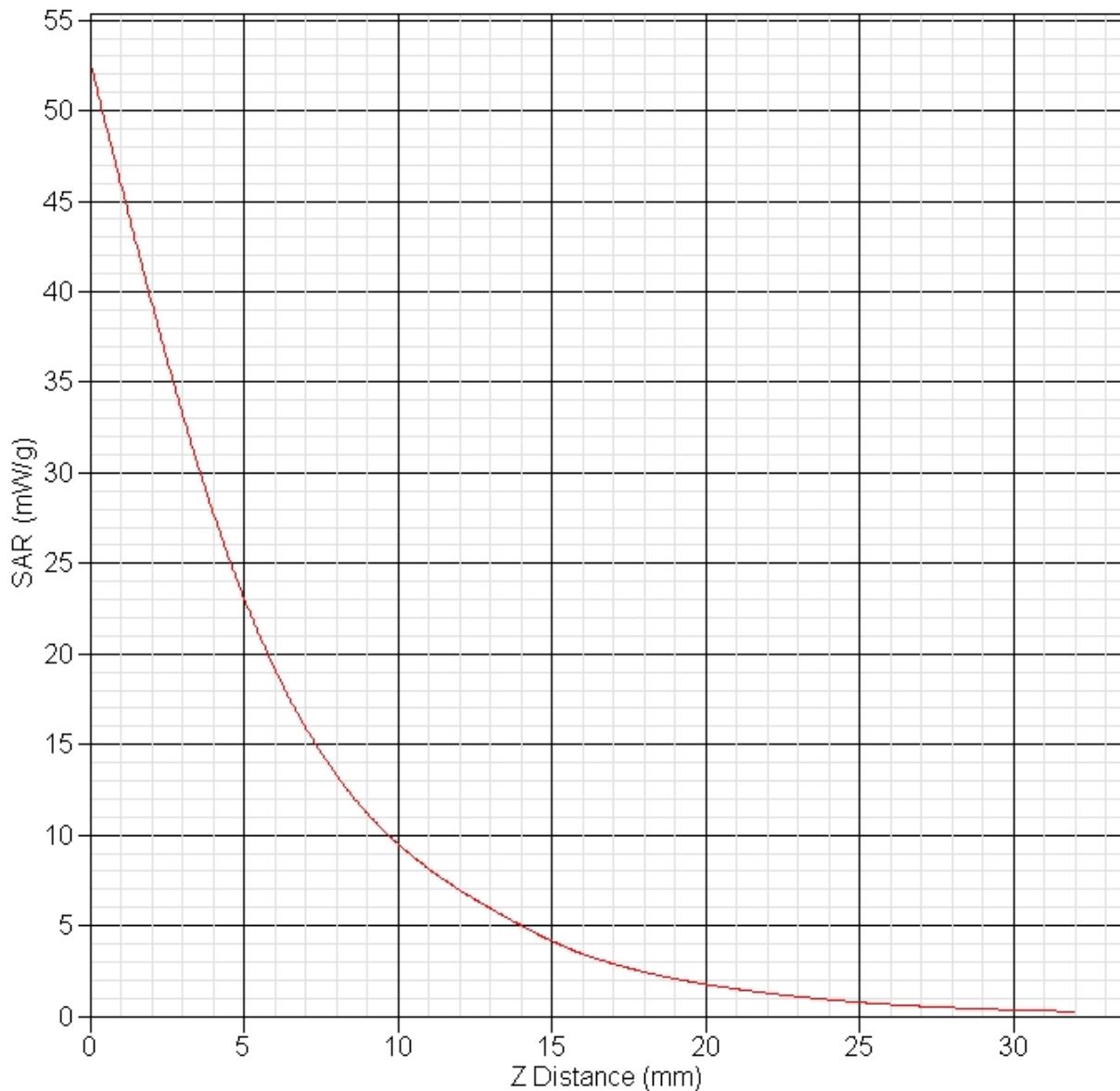
Report No : TSC-101-10-AP-07-0 (SAR )

### **Exposure Assessment Measurement Uncertainty**

<b>Source of Uncertainty</b>	<b>Tolerance Value</b>	<b>Probability Distribution</b>	<b>Divisor</b>	$c_i^1 (1-g)$	<b>Standard Uncertainty (1-g) %</b>
Measurement System					
Probe Calibration	3.5	normal	1	1	3.5
Axial Isotropy	3.7	rectangular	$\sqrt{3}$	$(1 - \frac{cp}{\sqrt{3}})^{1/2}$	1.5
Hemispherical Isotropy	10.9	rectangular	$\sqrt{3}$	$\sqrt{cp}$	4.4
Boundary Effect	1.0	rectangular	$\sqrt{3}$	1	0.6
Linearity	4.7	rectangular	$\sqrt{3}$	1	2.7
Detection Limit	1.0	rectangular	$\sqrt{3}$	1	0.6
Readout Electronics	1.0	normal	1	1	1.0
Response Time	0.8	rectangular	$\sqrt{3}$	1	0.5
Integration Time	1.7	rectangular	$\sqrt{3}$	1	1.0
RF Ambient Condition	3.0	rectangular	$\sqrt{3}$	1	1.7
Probe Positioner Mech.	0.4	rectangular	$\sqrt{3}$	1	0.2
Restriction					
Probe Positioning with respect to Phantom Shell	2.9	rectangular	$\sqrt{3}$	1	1.7
Extrapolation and Integration	3.7	rectangular	$\sqrt{3}$	1	2.1
Test Sample Positioning	4.0	normal	1	1	4.0
Device Holder Uncertainty	2.0	normal	1	1	2.0
Drift of Output Power	2.3	rectangular	$\sqrt{3}$	1	1.3
Phantom and Setup					
Phantom Uncertainty(shape & thickness tolerance)	3.4	rectangular	$\sqrt{3}$	1	2.0
Liquid Conductivity(target)	5.0	rectangular	$\sqrt{3}$	0.7	2.0
Liquid Conductivity(meas.)	0.6	normal	1	0.7	0.4
Liquid Permittivity(target)	5.0	rectangular	$\sqrt{3}$	0.6	1.7
Liquid Permittivity(meas.)	0.8	normal	1	0.6	0.5
Combined Uncertainty		RSS			9.3
Combined Uncertainty (coverage factor=2)		Normal(k=2)			18.7

Report No : TSC-101-10-AP-07-0 (SAR )

SAR-Z Axis  
at Hotspot x:1.10 y:0.76



Report No : TSC-101-10-AP-07-0 (SAR )

## 4.2 Arrangement Assessment Setup

### 4.2.1 Test Positions for body-worn

Body-worn operating configurations should be tested with the belt-clips and holsters attached to the device and positioned against a flat phantom in normal use configurations. A separation distance of 1.5 cm between the back of the device and a flat phantom is recommended for testing body-worn SAR compliance under such circumstances. Other separation distance may be used, but not exceed 2.5 cm.

## 4.3 SAR Measurement Procedure

The ALSAS-10U calculates SAR using the following equation,

$$SAR = \frac{\sigma |E|^2}{\rho}$$

$\sigma$ : represents the simulated tissue conductivity

$\rho$ : represents the tissue density

The EUT is set to transmit at the required power in line with product specification, at each frequency relating to the LOW, MID, and HIGH channel settings.

Pre-scans are made on the device to establish the location for the transmitting antenna, using a large area scan in either air or tissue simulation fluid.

The EUT is placed against the Universal Phantom where the maximum area scan dimensions are larger than the physical size of the resonating antenna. When the scan size is not large enough to cover the peak SAR distribution, it is modified by either extending the area scan size in both the X and Y directions, or the device is shifted within the predefined area.

The area scan is then run to establish the peak SAR location (interpolated resolution set at 1mm<sup>2</sup> ) which is then used to orient the center of the zoom scan. The zoom scan is then executed and the 1g and 10g averages are derived from the zoom scan volume (interpolated resolution set at 1mm<sup>3</sup> ).

Report No : TSC-101-10-AP-07-0 (SAR )

## 5. SAR Exposure Limits

SAR assessments have been made in line with the requirements of IEEE-1528, FCC Supplement C, and comply with ANSI/IEEE C95.1-1992 "Uncontrolled Environments" limits. These limits apply to a location which is deemed as "Uncontrolled Environment" which can be described as a situation where the general public may be exposed to an RF source with no prior knowledge or control over their exposure.

**Limits for General Population/Uncontrolled Exposure (W/kg)**

Type Exposure	Uncontrolled Environment Limit
Spatial Peak SAR (1g cube tissue for brain or body)	<b>1.60 W/kg</b>
Spatial Average SAR (whole body)	<b>0.08 W/kg</b>
Spatial Peak SAR (10g for hands, feet, ankles and wrist)	<b>4.00 W/kg</b>

Report No : TSC-101-10-AP-07-0 (SAR )

## 6. Test Equipment List

Instrument	Manufacturer	Model No.	Calibration Due	Calibration Cycle(year)
Data Acquisition Package	Aprel	ALS-DAQ-PAQ-2	NCR	NCR
Aprel Laboratories Probe	Aprel	ALS-E020(255)	10-Nov-2012	1
Aprel Laboratories Probe	Aprel	ALS-E020(SGL1)	10-Feb-2013	1
*Aprel Laboratories Dipole	Aprel	ALS-D-900-S-2	18-Oct-2013	3
*Aprel Laboratories Dipole	Aprel	ALS-D-1900-S-2	18-Oct-2013	3
*Aprel Laboratories Dipole	Aprel	ALS-D-2450-S-2	10-Nov-2012	3
Boundary Detection Sensor System	Aprel	ALS-PMDPS-2	NCR	NCR
Dielectric Probe Kit	Aprel	ALS-PR-DIEL	NCR	NCR
Universal Work Station	Aprel	ALS-UWS	NCR	NCR
Device Holder 2.0	Aprel	ALS-H-E-SET-2	NCR	NCR
Left Ear SAM Phantom	Aprel	ALS-P-SAM-L	NCR	NCR
Right Ear SAM Phantom	Aprel	ALS-P-SAM-R	NCR	NCR
Flat Phantom	Aprel	ALS-P-UP-1	NCR	NCR
Aprel Dipole Spacer	Aprel	ALS-DS-U	NCR	NCR
SAR Software	Aprel	ALSAS-10	NCR	NCR
CRS C500C Controller	Thermo	ALS-C500	NCR	NCR
CRF F3 Robot	Thermo	ALS-F3	NCR	NCR
Power Amplifier	Mini-Circuit	ZHL-42	NCR	NCR
Directional Coupler	Agilent	778D-012	NCR	NCR
Power meter	HP	437B	May 11 2013	1
Vector S/G	R&S	SMU200A	May 11 2013	1
Wireless Communications Test Set	Agilent	8960	May 11 2013	1
Vector Network	Anritsu	MS4623B	May 15 2013	1

\*The ALS-D-2450-S-2 dipole meet KDB 450824 requirements for the extended 3-year calibration interval. Please refer to P.163 and P.166 (return loss -25.451dB vs -29.4dB; impedance 46.2Ω vs 50.7Ω )

Report No : TSC-101-10-AP-07-0 (SAR )

## 7. Measurement Uncertainty

Source of Uncertainty	Tolerance Value	Probability Distribution	Divisor	$c_i^1 (1-g)$	Standard Uncertainty (1-g) %
Measurement System					
Probe Calibration	3.5	normal	1	1	3.5
Axial Isotropy	3.7	rectangular	$\sqrt{3}$	$(1 - \frac{cp}{\sqrt{3}})^{1/2}$	1.5
Hemispherical Isotropy	10.9	rectangular	$\sqrt{3}$	$\sqrt{cp}$	4.4
Boundary Effect	1.0	rectangular	$\sqrt{3}$	1	0.6
Linearity	4.7	rectangular	$\sqrt{3}$	1	2.7
Detection Limit	1.0	rectangular	$\sqrt{3}$	1	0.6
Readout Electronics	1.0	normal	1	1	1.0
Response Time	0.8	rectangular	$\sqrt{3}$	1	0.5
Integration Time	1.7	rectangular	$\sqrt{3}$	1	1.0
RF Ambient Condition	3.0	rectangular	$\sqrt{3}$	1	1.7
Probe Positioner Mech.	0.4	rectangular	$\sqrt{3}$	1	0.2
Restriction					
Probe Positioning with respect to Phantom Shell	2.9	rectangular	$\sqrt{3}$	1	1.7
Extrapolation and Integration	3.7	rectangular	$\sqrt{3}$	1	2.1
Test Sample Positioning	4.0	normal	1	1	4.0
Device Holder Uncertainty	2.0	normal	1	1	2.0
Drift of Output Power	4.4	rectangular	$\sqrt{3}$	1	2.6
Phantom and Setup					
Phantom Uncertainty(shape & thickness tolerance)	3.4	rectangular	$\sqrt{3}$	1	2.0
Liquid Conductivity(target)	5.0	rectangular	$\sqrt{3}$	0.7	2.0
Liquid Conductivity(meas.)	0.0	normal	1	0.7	0.0
Liquid Permittivity(target)	5.0	rectangular	$\sqrt{3}$	0.6	1.7
Liquid Permittivity(meas.)	0.5	normal	1	0.6	0.3
Combined Uncertainty		RSS			9.6
Combined Uncertainty (coverage factor=2)		Normal(k=2)			19.2

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## 8 SAR Test Results

### Conducted power measured(Mobile)

Mode	Channel	Output Power(dBm)
850MHz GPRS/EGPRS	128	32.2/32.1
	190	31.8/31.6
	251	32.0/31.9
1900MHz GPRS/EGPRS	512	28.6/28.5
	661	28.9/28.8
	810	28.9/28.7
WCBMA Band 5 WCDMA/HSUPA	4132	24.83/24.43
	4183	24.74/24.23
	4233	24.52/24.50
WCBMA Band 2 WCDMA/HSUPA	9262	24.07/24.13
	9400	24.70/24.77
	9538	24.40/24.49
CDMA2000 BC0 1X/EVDO	1013	23.32/23.50
	384	23.48/23.49
	777	23.71/23.59
CDMA2000 BC1 1X/EVDO	25	23.64/23.58
	600	23.84/23.72
	1175	23.52/23.50

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**Conducted power measured(WiFi and Bluetooth)**

Mode	Channel (Freq. MHz)	Output Power	
		PK(dBm)	AV(dBm)
802.11b	1(2412)	16.9	10.3
	6(2437)	17.2	10.5
	11(2462)	16.7	10.2
802.11g	1(2412)	13.6	7.5
	6(2437)	13.9	7.7
	11(2462)	13.5	7.5
802.11n(HT20)	5(2422)	13.7	7.6
	8(2437)	13.9	7.7
	11(2452)	13.6	7.4
802.11n(HT40)	5(2422)	13.7	7.6
	8(2437)	13.8	7.6
	11(2452)	13.6	7.5
Bluetooth	3.9dBm $\geq$ Output power $\geq$ 1.8dBm		

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**SAR Measured(Mobile)**

Test Position Body	Test Configuration	Frequency		Conducted Power (dBm)	<b>SAR<sub>1g</sub> (W/kg)</b>	Power Drift %	Limit (W/kg)
		Channel	MHz	Max			
850MHz GPRS	Rear Touch	128	824.20	32.2	0.139	1.743	1.6
	Rear Touch	190	836.60	31.8	0.127	2.977	1.6
	Rear Touch	251	848.80	32.0	0.198	3.261	1.6
	Front Touch	190	836.60	31.8	0.108	4.931	1.6
	Side Touch	190	836.60	31.8	0.042	4.023	1.6
1900MHz GPRS	Rear Touch	512	1850.20	28.6	0.193	-0.625	1.6
	Rear Touch	661	1880.00	28.9	0.199	3.048	1.6
	Rear Touch	810	1909.80	28.9	0.175	-4.775	1.6
	Front Touch	661	1880.00	28.9	0.128	-2.584	1.6
	Side Touch	661	1880.00	28.9	0.037	3.316	1.6

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Test Position Body	Test Configuration	Frequency		Conducted Power (dBm)	<b>SAR<sub>1g</sub></b> (W/kg)	Power Drift %	Limit (W/kg)
		Channel	MHz	Max			
WCBMA Band 5	Rear Touch	4132	826.40	24.83	0.172	4.601	1.6
	Rear Touch	4182	836.40	24.74	0.263	2.000	1.6
	Rear Touch	4233	846.60	24.52	0.246	4.696	1.6
	Front Touch	4182	836.40	24.74	0.217	-1.956	1.6
	Side Touch	4182	836.40	24.74	0.025	4.058	1.6
WCBMA Band 2	Rear Touch	9262	1852.40	24.07	0.674	-4.049	1.6
	Rear Touch	9400	1880.00	24.70	0.770	-0.609	1.6
	Rear Touch	9538	1907.60	24.40	0.325	-4.374	1.6
	Front Touch	9400	1880.00	24.70	0.147	-2.432	1.6
	Side Touch	9400	1880.00	24.70	0.145	-1.036	1.6

Report No : TSC-101-10-AP-07-0 (SAR )

Test Position Body	Test Configuration	Frequency		Conducted Power (dBm)	<b>SAR<sub>1g</sub></b> (W/kg)	Power Drift %	Limit (W/kg)
		Channel	MHz	Max			
CDMA2000 BC0 1X	Rear Touch	1013	824.7	23.32	0.407	-0.944	1.6
	Rear Touch	384	836.52	23.48	0.204	-0.502	1.6
	Rear Touch	777	848.31	23.71	0.223	0.677	1.6
	Front Touch	384	836.52	23.48	0.196	0.060	1.6
	Side Touch	384	836.52	23.48	0.014	4.074	1.6
CDMA2000 BC1 1X	Rear Touch	25	1851.25	23.64	0.463	1.747	1.6
	Rear Touch	600	1880	23.84	0.511	-0.097	1.6
	Rear Touch	1175	1908.75	23.52	0.546	-1.664	1.6
	Front Touch	600	1880	23.84	0.228	-2.584	1.6
	Side Touch	600	1880	23.84	0.063	4.345	1.6

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### SAR Measured(WiFi)

Test Position Body	Antenna Type	Frequency		Conducted Power (dBm)		<b>SAR</b> $1g$ (W/kg)	Power Drift %	Limit (W/kg)
		Channel	MHz	Max	Av			
802.11b_Rear	INTERNAL	1	2412	16.9	10.3	0.350	-4.45	1.6
802.11b_Rear	INTERNAL	6	2437	17.2	10.5	0.327	-4.50	1.6
802.11b_Rear	INTERNAL	11	2462	16.9	10.3	0.297	4.30	1.6
802.11b_Front	INTERNAL	6	2437	17.2	10.5	0.147	3.93	1.6
802.11b_Side	INTERNAL	6	2437	17.2	10.5	0.033	-4.90	1.6

Note:

1. The test signals (Tx power, Continuous mode and Channel) were Controlled by “RF test utility” which provides by Manufacturer during WiFi SAR testing.
2. Mobile and WiFi system can't use at the same time.
3. According to KDB 248227, SAR is not required for 802.11g channels when the maximum average output power is less than 1/4 dB higher than that measured on the corresponding 802.11b channels.
4. Bluetooth Conducted Maximum Output power  $\leq 3.9$  dBm. The MPE is  $7.72 \times 10^{-4}$  mW/cm<sup>2</sup> which is compliant with the MPE limits of 1.1310.

### 1.1310 MPE Limits

TABLE 1—LIMITS FOR MAXIMUM PERMISSIBLE EXPOSURE (MPE)

Frequency range (MHz)	Electric field strength (V/m)	Magnetic field strength (A/m)	Power density (mW/cm <sup>2</sup> )	Averaging time (minutes)
<b>(A) Limits for Occupational/Controlled Exposures</b>				
0.3–3.0 .....	614	1.63	*(100)	6
3.0–30 .....	1842f	4.89/f	*(900/f <sup>2</sup> )	6
30–300 .....	61.4	0.163	1.0	6
300–1500 .....	.....	.....	f/300	6
1500–100,000 .....	.....	.....	5	6
<b>(B) Limits for General Population/Uncontrolled Exposure</b>				
0.3–1.34 .....	614	1.63	*(100)	30
1.34–30 .....	824/f	2.19/f	*(180/f <sup>2</sup> )	30
30–300 .....	27.5	0.073	0.2	30
300–1500 .....	.....	.....	f/1500	30
1500–100,000 .....	.....	.....	1.0	30

f = frequency in MHz

\* = Plane-wave equivalent power density

NOTE 1 TO TABLE 1: Occupational/controlled limits apply in situations in which persons are exposed as a consequence of their employment provided those persons are fully aware of the potential for exposure and can exercise control over their exposure. Limits for occupational/controlled exposure also apply in situations when an individual is transient through a location where occupational/controlled limits apply provided he or she is made aware of the potential for exposure.

NOTE 2 TO TABLE 1: General population/uncontrolled exposures apply in situations in which the general public may be exposed, or in which persons that are exposed as a consequence of their employment may not be fully aware of the potential for exposure or can not exercise control over their exposure.

Report No : TSC-101-10-AP-07-0 (SAR )

## 9. EUT Photographs



Front View of EUT

Report No : TSC-101-10-AP-07-0 (SAR )



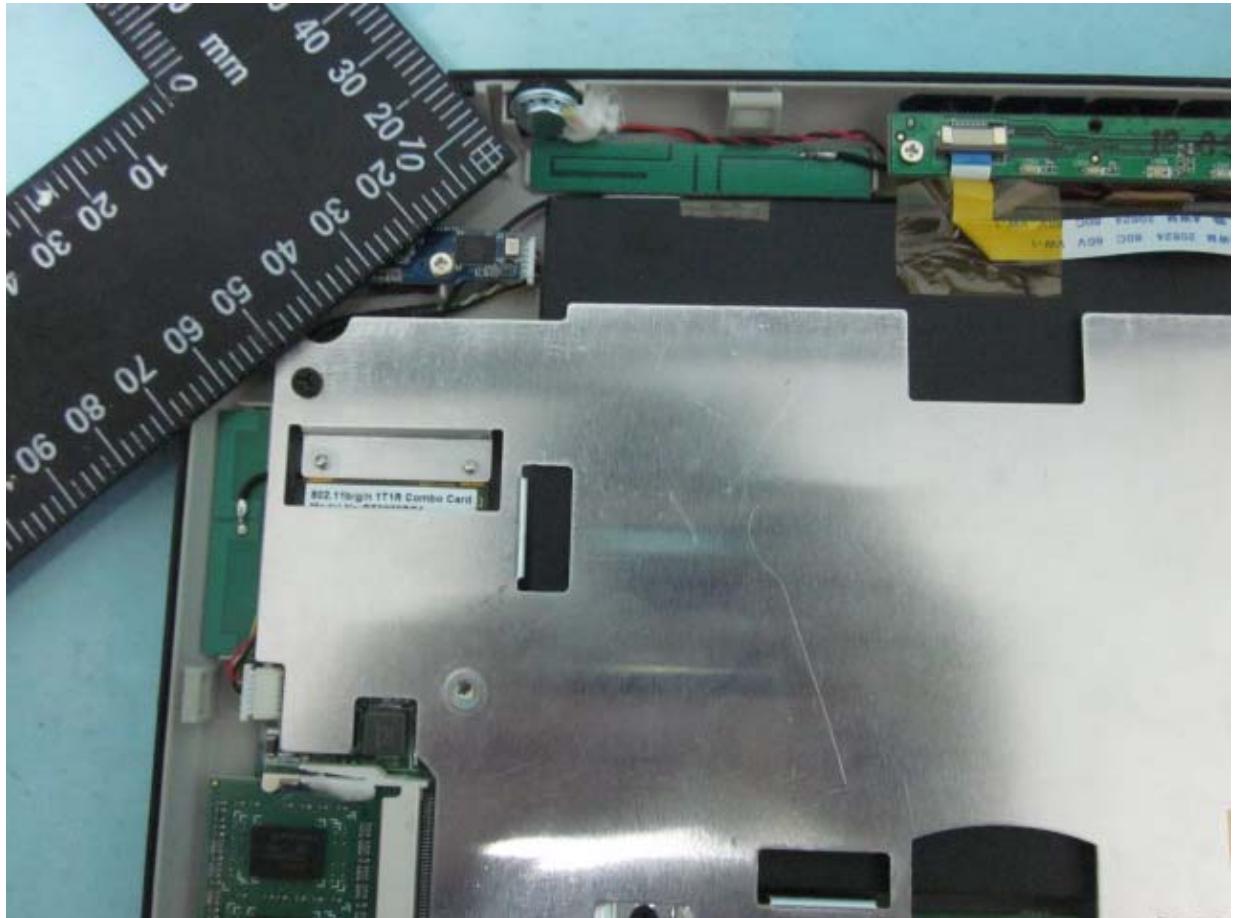
Rear View of EUT

Report No : TSC-101-10-AP-07-0 (SAR )



Transmit Antenna Location

Report No : TSC-101-10-AP-07-0 (SAR )



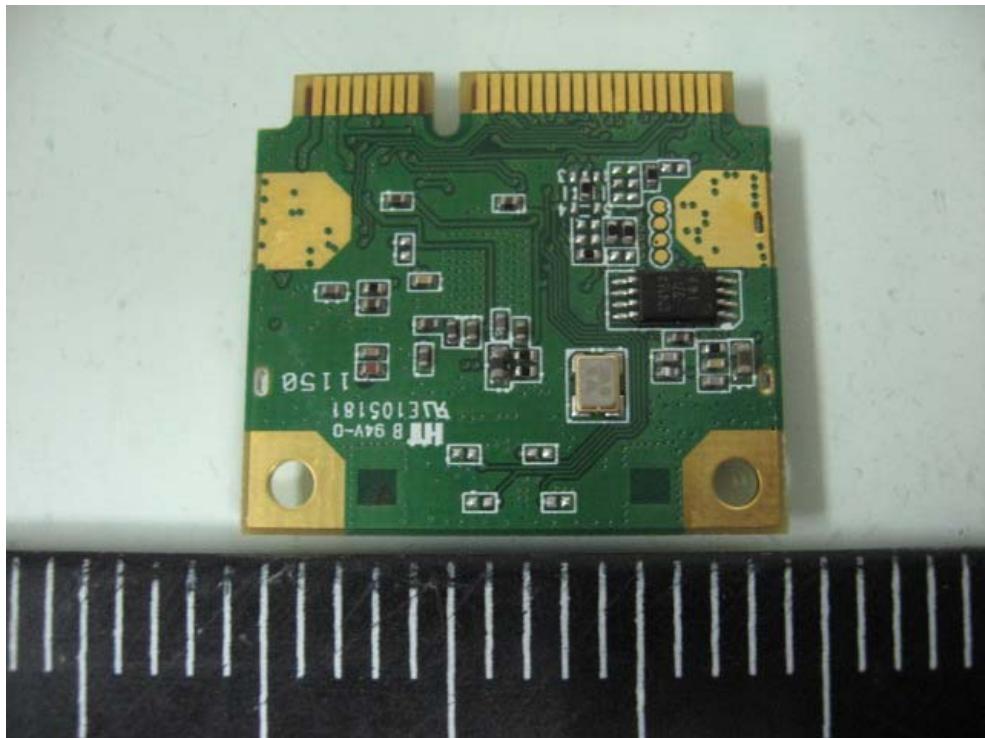
Transmit Antenna Distance (54mm between Mobile and Bluetooth)

Report No : TSC-101-10-AP-07-0 (SAR )



WLAN/Bluetooth Card Label

Report No : TSC-101-10-AP-07-0 (SAR )



WLAN/Bluetooth Card Rear view



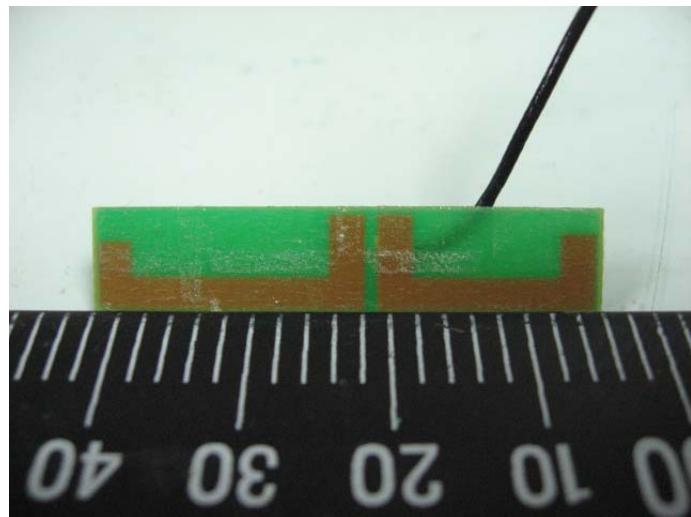
WLAN/Bluetooth Card Front view



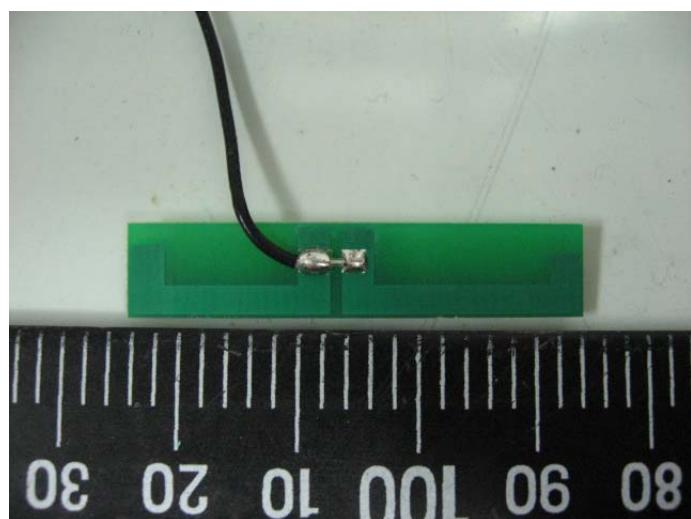
**Chunghwa Telecom CO., Ltd**  
**Telecommunication Laboratories**  
**Testing & Certification Center**



Report No : TSC-101-10-AP-07-0 (SAR )



Front View of WLAN/Bluetooth Antenna and Dimension



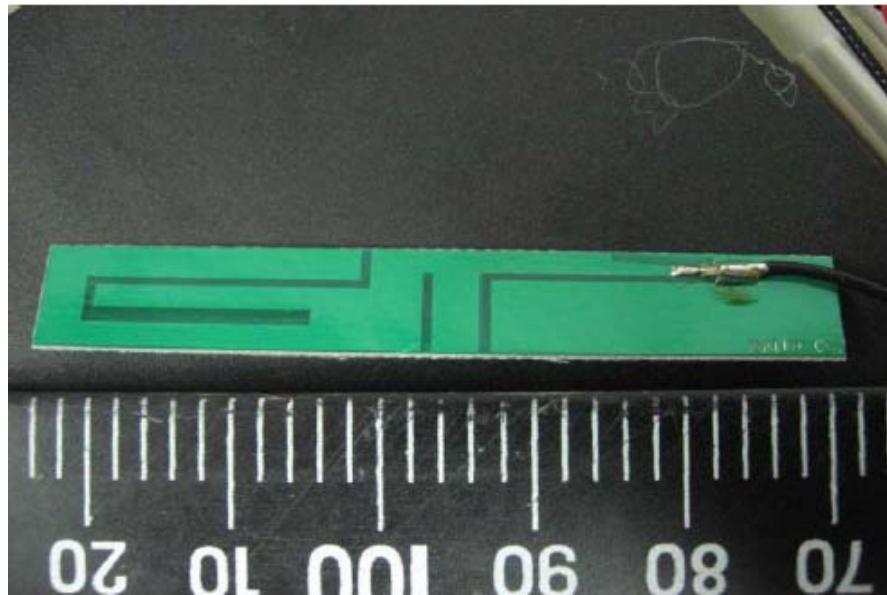
Rear View of WLAN/Bluetooth Antenna and Dimension

Report No : TSC-101-10-AP-07-0 (SAR )

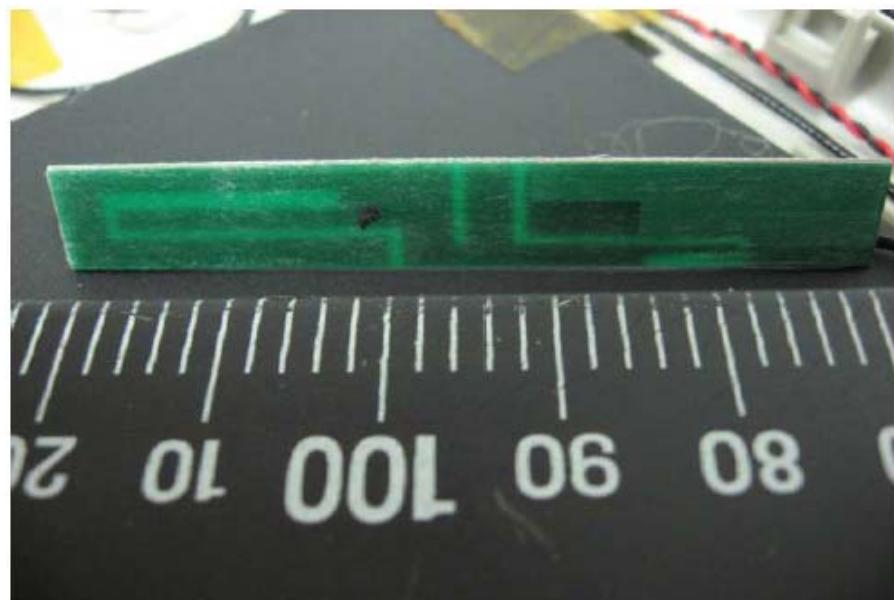


Mobile Module

Report No : TSC-101-10-AP-07-0 (SAR )



Front View of Mobile Antenna and Dimension



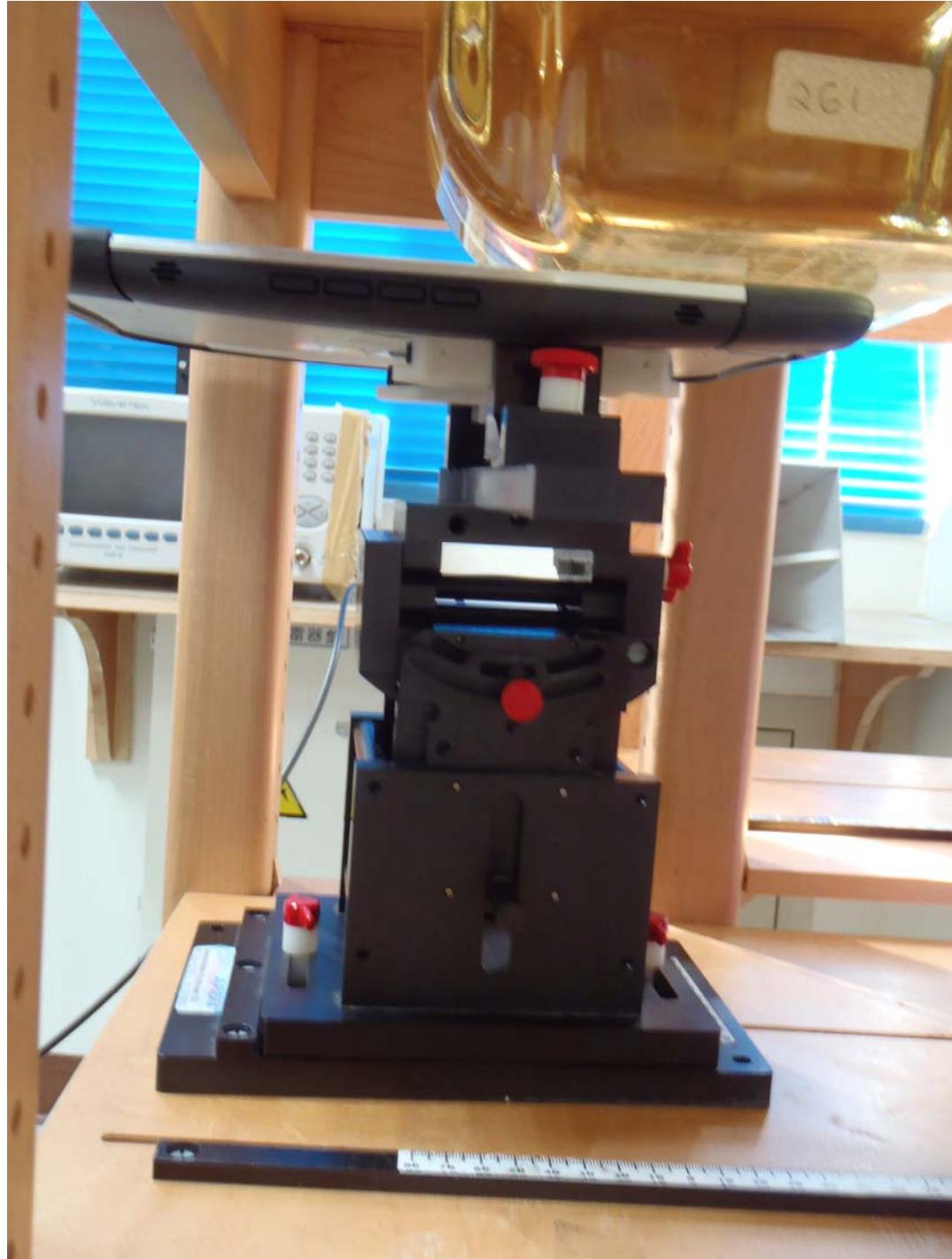
Rear View of Mobile Antenna and Dimension

Report No : TSC-101-10-AP-07-0 (SAR )

## A. TEST CONFIGURATIONS AND TEST DATA

### A.1 TEST CONFIGURATION

#### WiFi Front Touch



Report No : TSC-101-10-AP-07-0 (SAR )

**WiFi Side Touch**



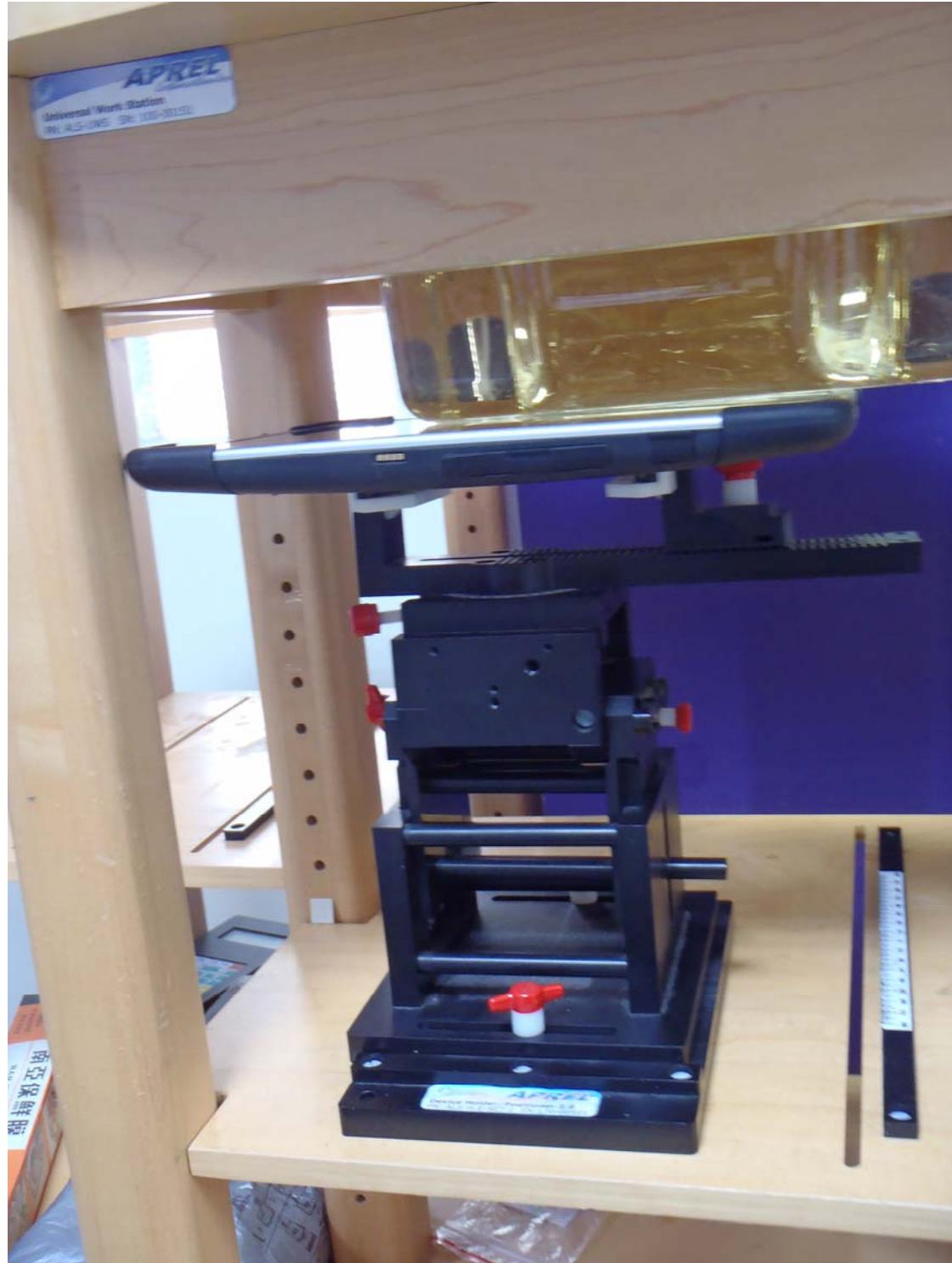
Report No : TSC-101-10-AP-07-0 (SAR )

**WiFi RearTouch**



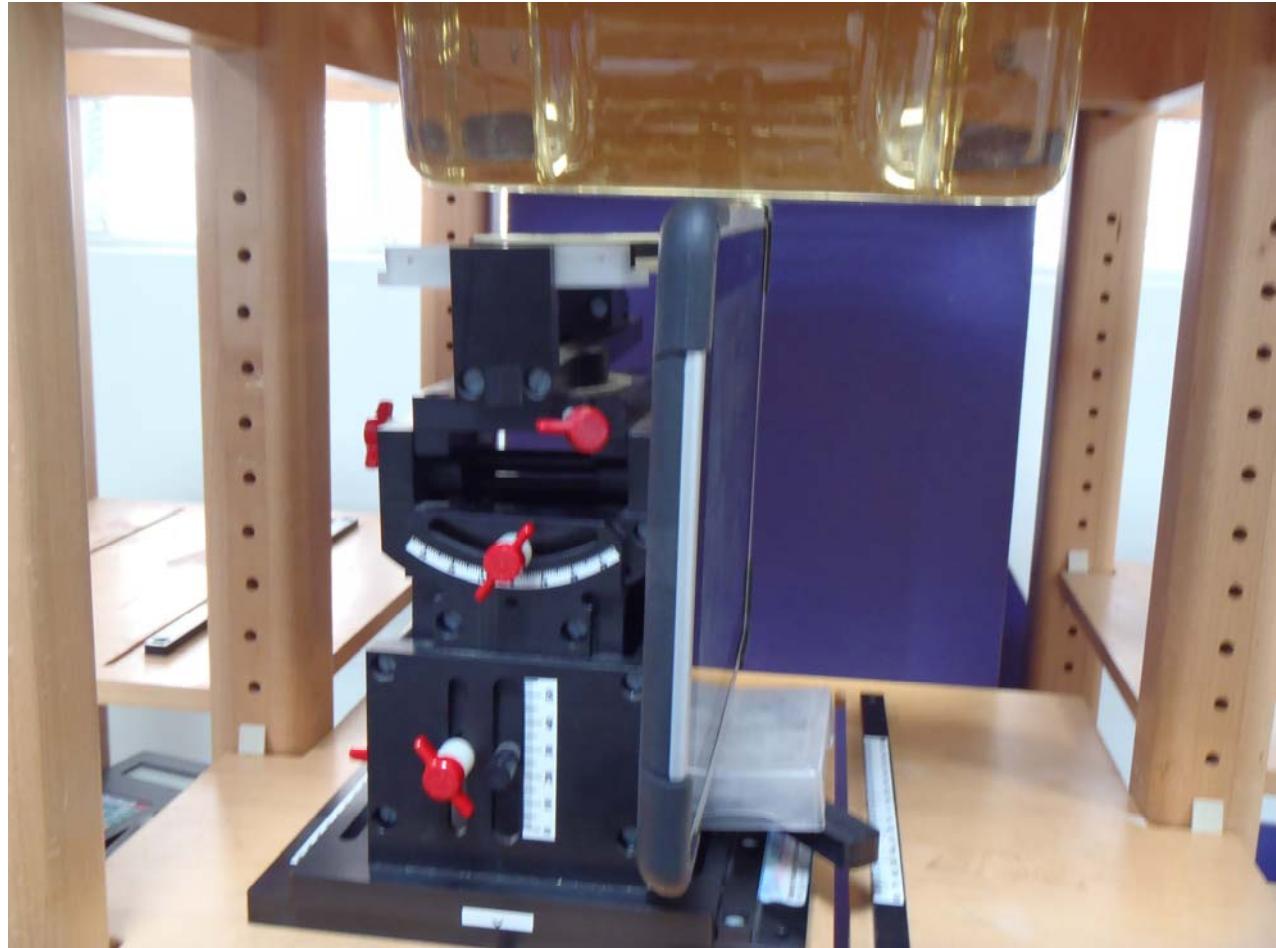
Report No : TSC-101-10-AP-07-0 (SAR )

**Mobile Front Touch**



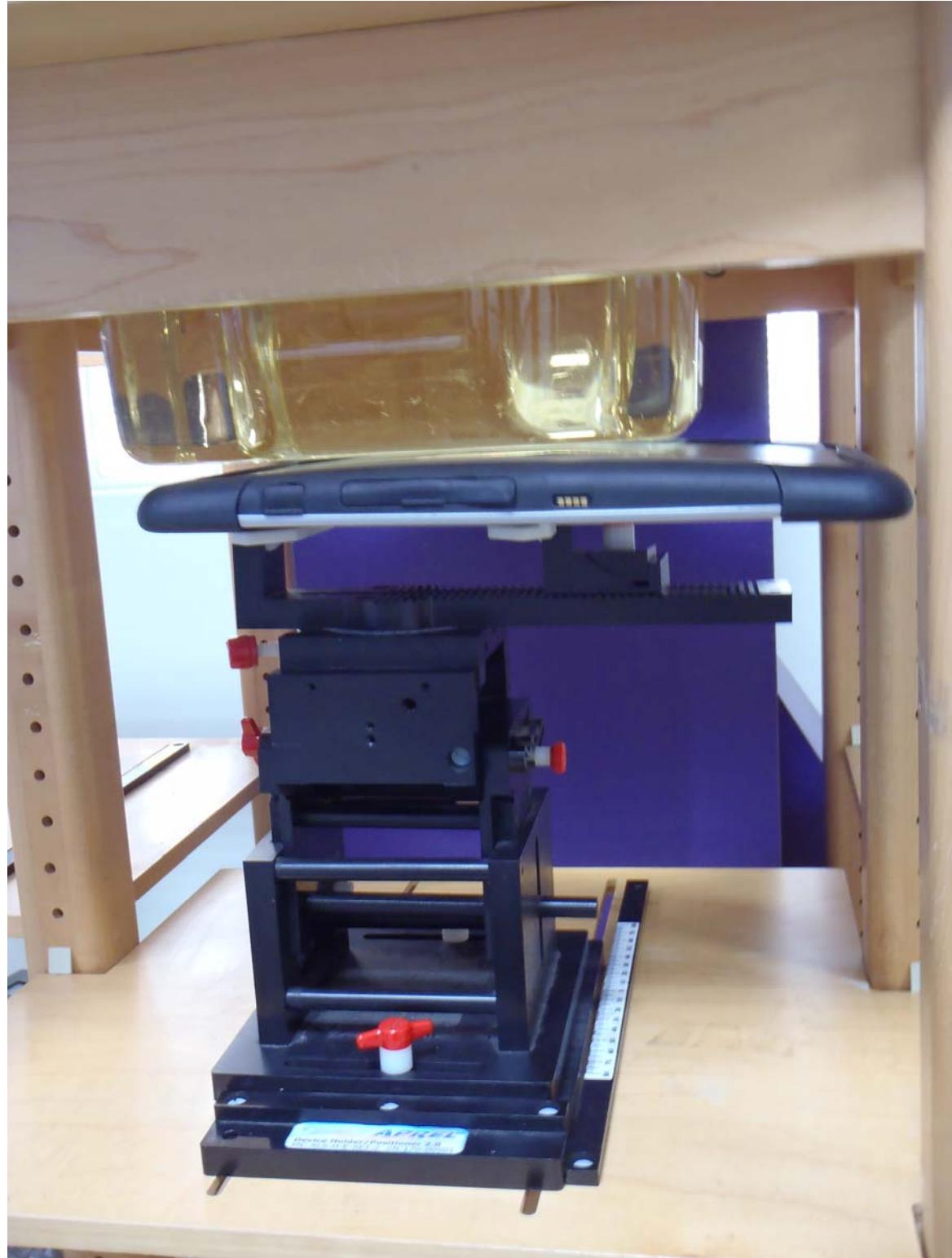
Report No : TSC-101-10-AP-07-0 (SAR )

**Mobile Side Touch**



Report No : TSC-101-10-AP-07-0 (SAR )

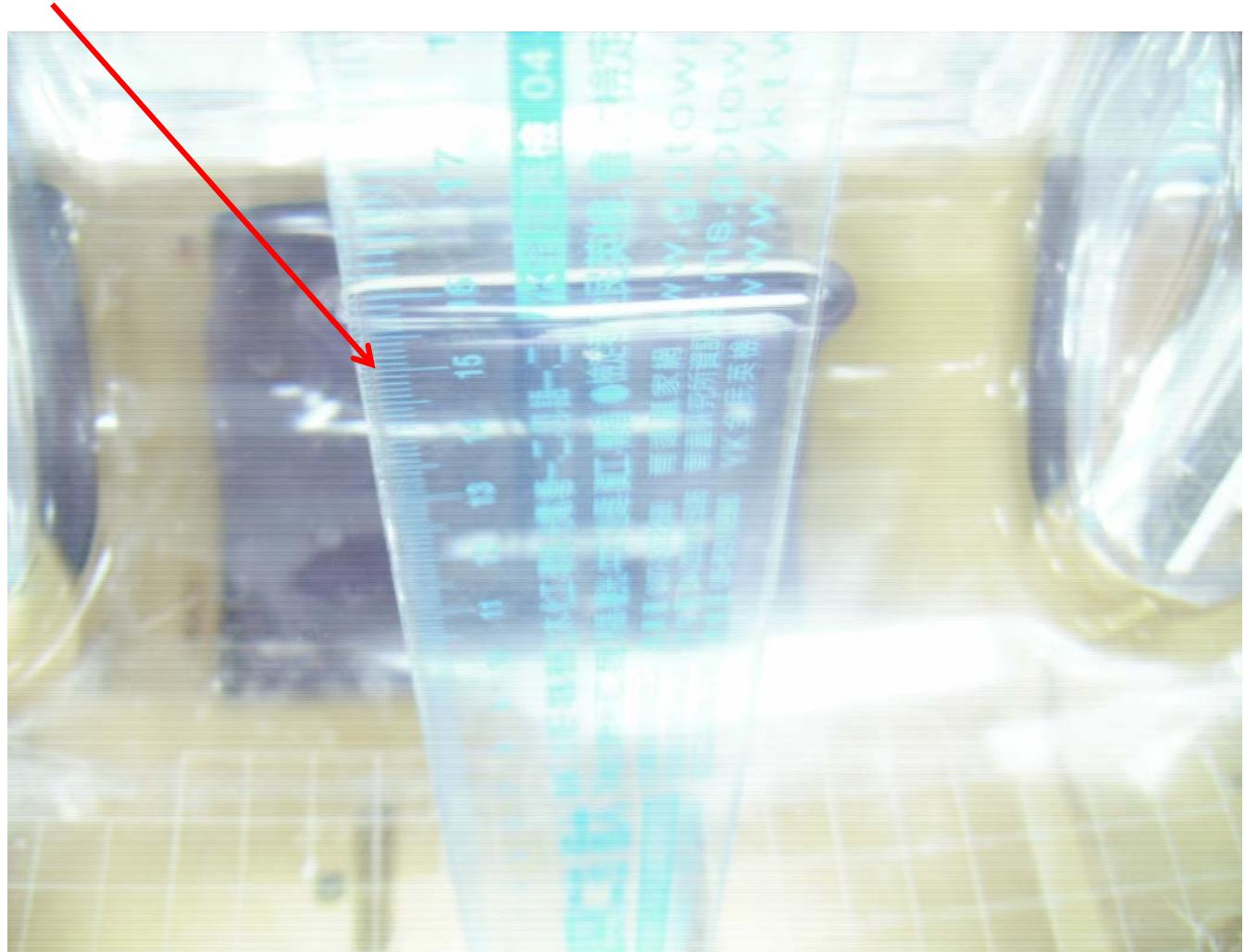
**Mobile Rear Touch**



Report No : TSC-101-10-AP-07-0 (SAR )

## A.2 LIQUID LEVEL PHOTO

Liquid Level in Flat Phantom > 15cm



Report No : TSC-101-10-AP-07-0 (SAR )

### A.3 TISSUE LIQUIDS Dielectric Parameter

#### A.3.1 2450 MHz TISSUE LIQUIDS Dielectric measurement data

##### **Head Tissue**

Tissue Data  
Epsilon : 39.5 F/m  
Sigma : 1.81 S/m

##### **Body Tissue**

Tissue Data  
Epsilon : 52.5 F/m  
Sigma : 1.99 S/m

#### A.3.2 850 MHz TISSUE LIQUIDS Dielectric measurement data

##### **900MHz Head Tissue**

Tissue Data  
Epsilon : 41.7 F/m  
Sigma : 0.96 S/m

##### **850 MHz Body Tissue**

Tissue Data  
Epsilon : 52.5 F/m  
Sigma : 0.96 S/m

#### A.3.3 1900 MHz TISSUE LIQUIDS Dielectric measurement data

##### **Head Tissue**

Tissue Data  
Epsilon : 39.5 F/m  
Sigma : 1.41 S/m

##### **Body Tissue**

Tissue Data  
Epsilon : 52.8 F/m  
Sigma : 1.54 S/m

Report No : TSC-101-10-AP-07-0 (SAR )

#### A.4. TEST DATA

##### A.4.1 802.11b Mode

##### Low Channel Rear Touch **SAR Test Report**

Report Date : 13-Nov-2012  
 By Operator : 123  
 Measurement Date : 13-Nov-2012  
 Starting Time : 13-Nov-2012 01:13:56 PM  
 End Time : 13-Nov-2012 01:38:11 PM  
 Scanning Time : 1455 secs

Product Data  
 Device Name : Winmate  
 Serial No. : M970D  
 Type : Other  
 Model : 2437  
 Frequency : 2412.00 MHz  
 Max. Transmit Pwr : 1 W  
 Drift Time : 0 min(s)  
 Length : 268 mm  
 Width : 205 mm  
 Depth : 18 mm  
 Antenna Type : Internal  
 Orientation : Touch  
 Power Drift-Start : 0.072 W/kg  
 Power Drift-Finish: 0.067 W/kg  
 Power Drift (%) : -4.450  
 Picture :

Phantom Data  
 Name : APREL-Uni  
 Type : Uni-Phantom  
 Size (mm) : 280 x 280 x 200  
 Serial No. : User Define  
 Location : Center  
 Description : Uni\_Phantom

Tissue Data  
 Type : BODY  
 Serial No. : 2450  
 Frequency : 2412.00 MHz  
 Last Calib. Date : 12-Nov-2012  
 Temperature : 24.00 °C  
 Ambient Temp. : 24.00 °C  
 Humidity : 50.00 RH%  
 Epsilon : 52.10 F/m  
 Sigma : 1.94 S/m  
 Density : 1000.00 kg/cu. m

Report No : TSC-101-10-AP-07-0 (SAR )

Probe Data

Name : Probe 255  
Model : E020  
Type : E-Field Triangle  
Serial No. : 255  
Last Calib. Date : 06-Dec-2011  
Frequency : 2450.00 MHz  
Duty Cycle Factor: 1  
Conversion Factor: 4.7  
Probe Sensitivity: 1.20 1.20 1.20  $\mu\text{V}/(\text{V}/\text{m})^2$   
Compression Point: 95.00 mV  
Offset : 1.56 mm

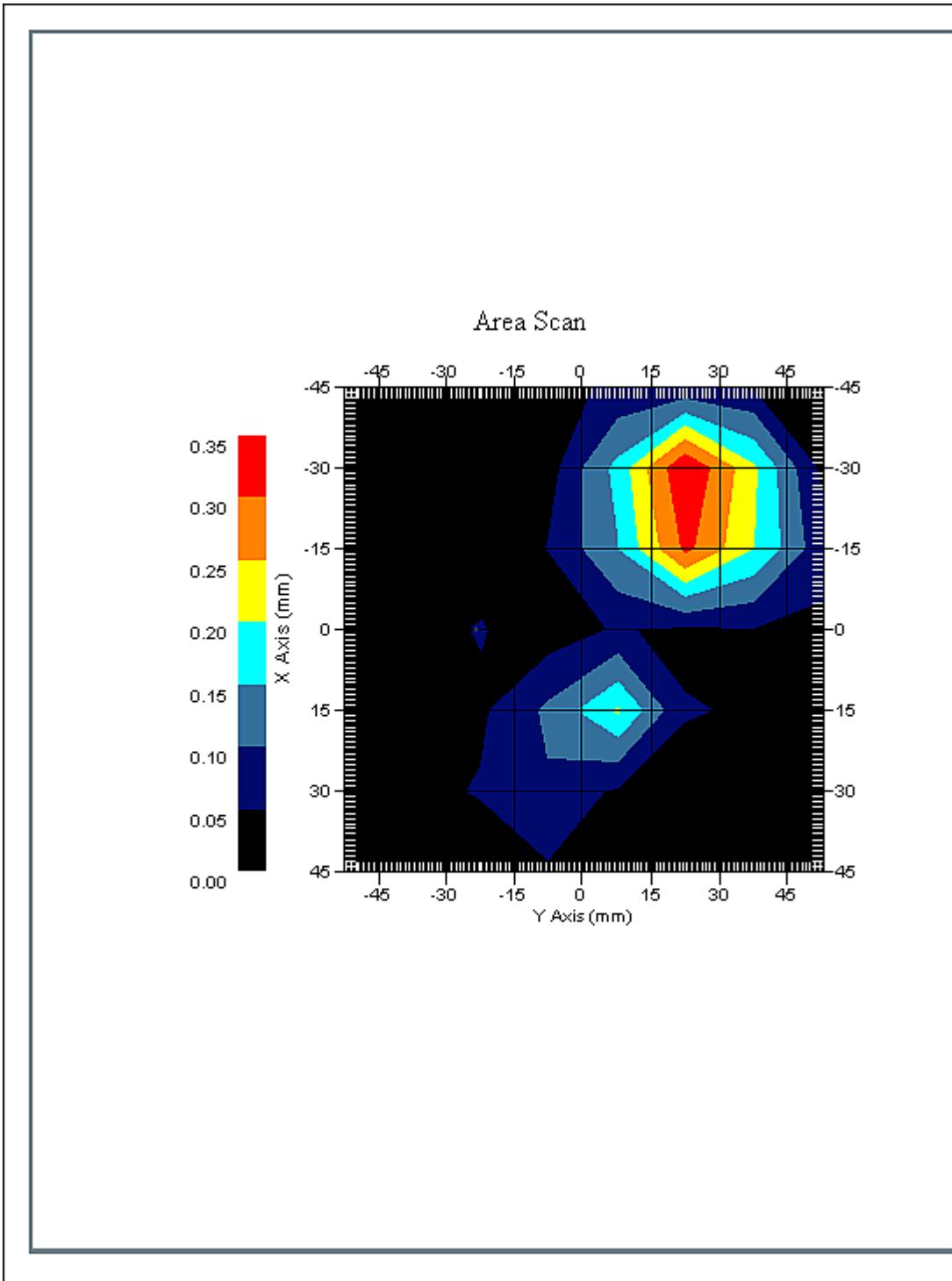
Measurement Data

Crest Factor : 1  
Scan Type : Complete  
Tissue Temp. : 24.00 °C  
Ambient Temp. : 24.00 °C  
Set-up Date : 13-Nov-2012  
Set-up Time : 8:11:44 AM  
Area Scan : 7x8x1 : Measurement x=15mm, y=15mm, z=4mm  
Zoom Scan : 5x5x8 : Measurement x=8mm, y=8mm, z=4mm

Other Data

DUT Position : Touch  
Separation : 0  
Channel : Low

Report No : TSC-101-10-AP-07-0 (SAR )



1 gram SAR value : 0.350 W/kg  
Area Scan Peak SAR : 0.350 W/kg  
Zoom Scan Peak SAR : 0.780 W/kg

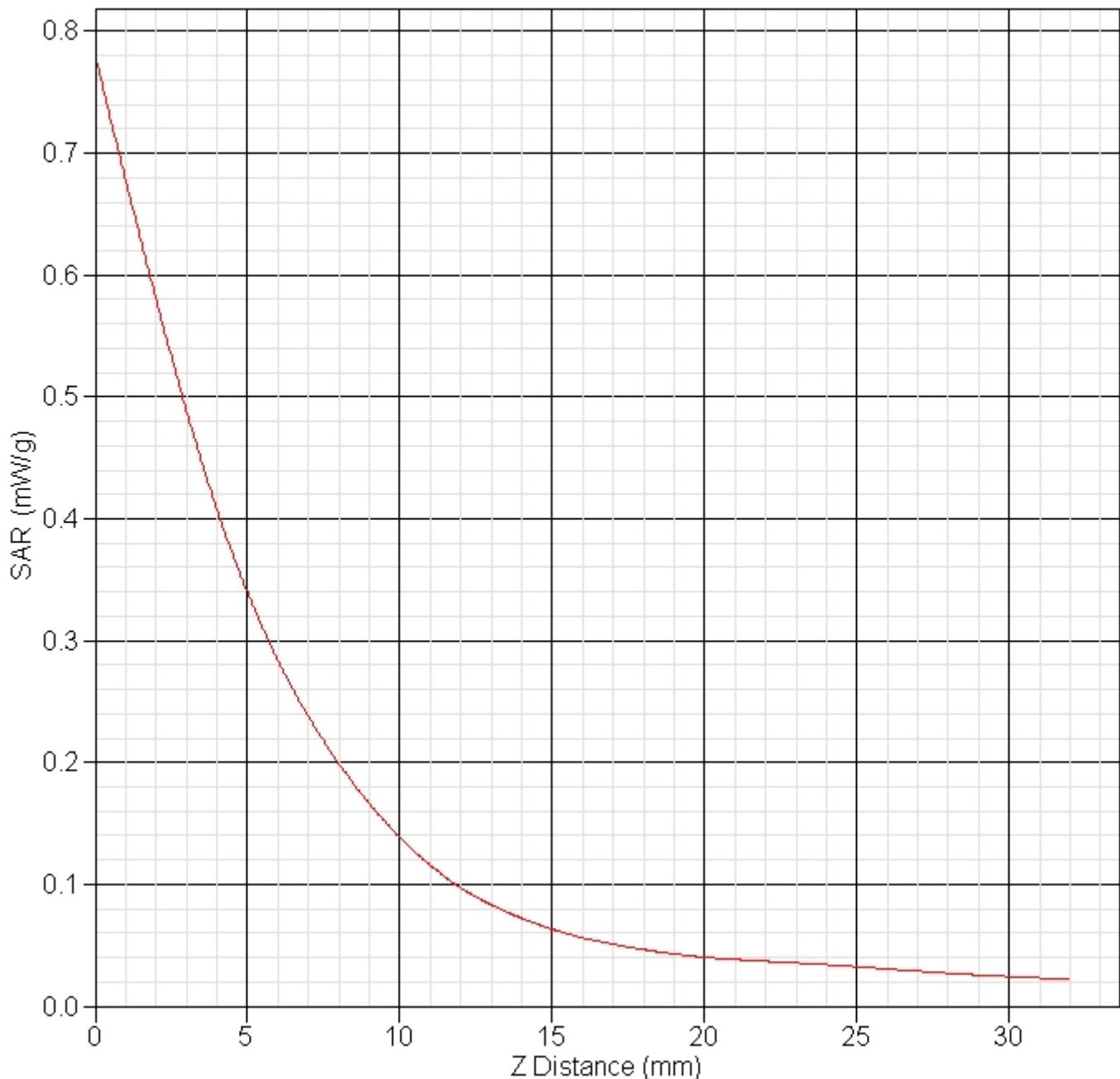
Report No : TSC-101-10-AP-07-0 (SAR )

### **Exposure Assessment Measurement Uncertainty**

<b>Source of Uncertainty</b>	<b>Tolerance Value</b>	<b>Probability Distribution</b>	<b>Divisor</b>	$c_i^1 (1-g)$	<b>Standard Uncertainty (1-g) %</b>
Measurement System					
Probe Calibration	3.5	normal	1	1	3.5
Axial Isotropy	3.7	rectangular	$\sqrt{3}$	$(1 - \frac{1}{cp})^{1/2}$	1.5
Hemispherical Isotropy	10.9	rectangular	$\sqrt{3}$	$\sqrt{cp}$	4.4
Boundary Effect	1.0	rectangular	$\sqrt{3}$	1	0.6
Linearity	4.7	rectangular	$\sqrt{3}$	1	2.7
Detection Limit	1.0	rectangular	$\sqrt{3}$	1	0.6
Readout Electronics	1.0	normal	1	1	1.0
Response Time	0.8	rectangular	$\sqrt{3}$	1	0.5
Integration Time	1.7	rectangular	$\sqrt{3}$	1	1.0
RF Ambient Condition	3.0	rectangular	$\sqrt{3}$	1	1.7
Probe Positioner Mech.	0.4	rectangular	$\sqrt{3}$	1	0.2
Restriction					
Probe Positioning with respect to Phantom Shell	2.9	rectangular	$\sqrt{3}$	1	1.7
Extrapolation and Integration	3.7	rectangular	$\sqrt{3}$	1	2.1
Test Sample Positioning	4.0	normal	1	1	4.0
Device Holder Uncertainty	2.0	normal	1	1	2.0
Drift of Output Power	4.4	rectangular	$\sqrt{3}$	1	2.6
Phantom and Setup					
Phantom Uncertainty(shape & thickness tolerance)	3.4	rectangular	$\sqrt{3}$	1	2.0
Liquid Conductivity(target)	5.0	rectangular	$\sqrt{3}$	0.7	2.0
Liquid Conductivity(meas.)	1.4	normal	1	0.7	0.0
Liquid Permittivity(target)	5.0	rectangular	$\sqrt{3}$	0.6	1.7
Liquid Permittivity(meas.)	1.4	normal	1	0.6	0.0
Combined Uncertainty		RSS			9.6
Combined Uncertainty (coverage factor=2)		Normal(k=2)			19.2

Report No : TSC-101-10-AP-07-0 (SAR )

SAR-Z Axis  
at Hotspot x:-6.89 y:22.76



Report No : TSC-101-10-AP-07-0 (SAR )

**Mid Channel Rear Touch**  
**SAR Test Report**

Report Date : 13-Nov-2012  
 By Operator : 123  
 Measurement Date : 13-Nov-2012  
 Starting Time : 13-Nov-2012 03:12:21 PM  
 End Time : 13-Nov-2012 03:36:52 PM  
 Scanning Time : 1471 secs

**Product Data**

Device Name : Winmate  
 Serial No. : M970D  
 Type : Other  
 Model : 2437  
 Frequency : 2437.00 MHz  
 Max. Transmit Pwr : 1 W  
 Drift Time : 0 min(s)  
 Length : 268 mm  
 Width : 205 mm  
 Depth : 18 mm  
 Antenna Type : Internal  
 Orientation : Touch  
 Power Drift-Start : 0.058 W/kg  
 Power Drift-Finish: 0.055 W/kg  
 Power Drift (%) : -4.529  
 Picture :

**Phantom Data**

Name : APREL-Uni  
 Type : Uni-Phantom  
 Size (mm) : 280 x 280 x 200  
 Serial No. : User Define  
 Location : Center  
 Description : Uni\_Phantom

**Tissue Data**

Type : BODY  
 Serial No. : 2450  
 Frequency : 2437.00 MHz  
 Last Calib. Date : 12-Nov-2012  
 Temperature : 24.00 °C  
 Ambient Temp. : 24.00 °C  
 Humidity : 50.00 RH%  
 Epsilon : 52.50 F/m  
 Sigma : 1.99 S/m  
 Density : 1000.00 kg/cu. m

**Probe Data**

Name : Probe 255  
 Model : E020  
 Type : E-Field Triangle  
 Serial No. : 255

Report No : TSC-101-10-AP-07-0 (SAR )

Last Calib. Date : 06-Dec-2011  
Frequency : 2450.00 MHz  
Duty Cycle Factor: 1  
Conversion Factor: 4.7  
Probe Sensitivity: 1.20 1.20 1.20  $\mu\text{V}/(\text{V}/\text{m})^2$   
Compression Point: 95.00 mV  
Offset : 1.56 mm

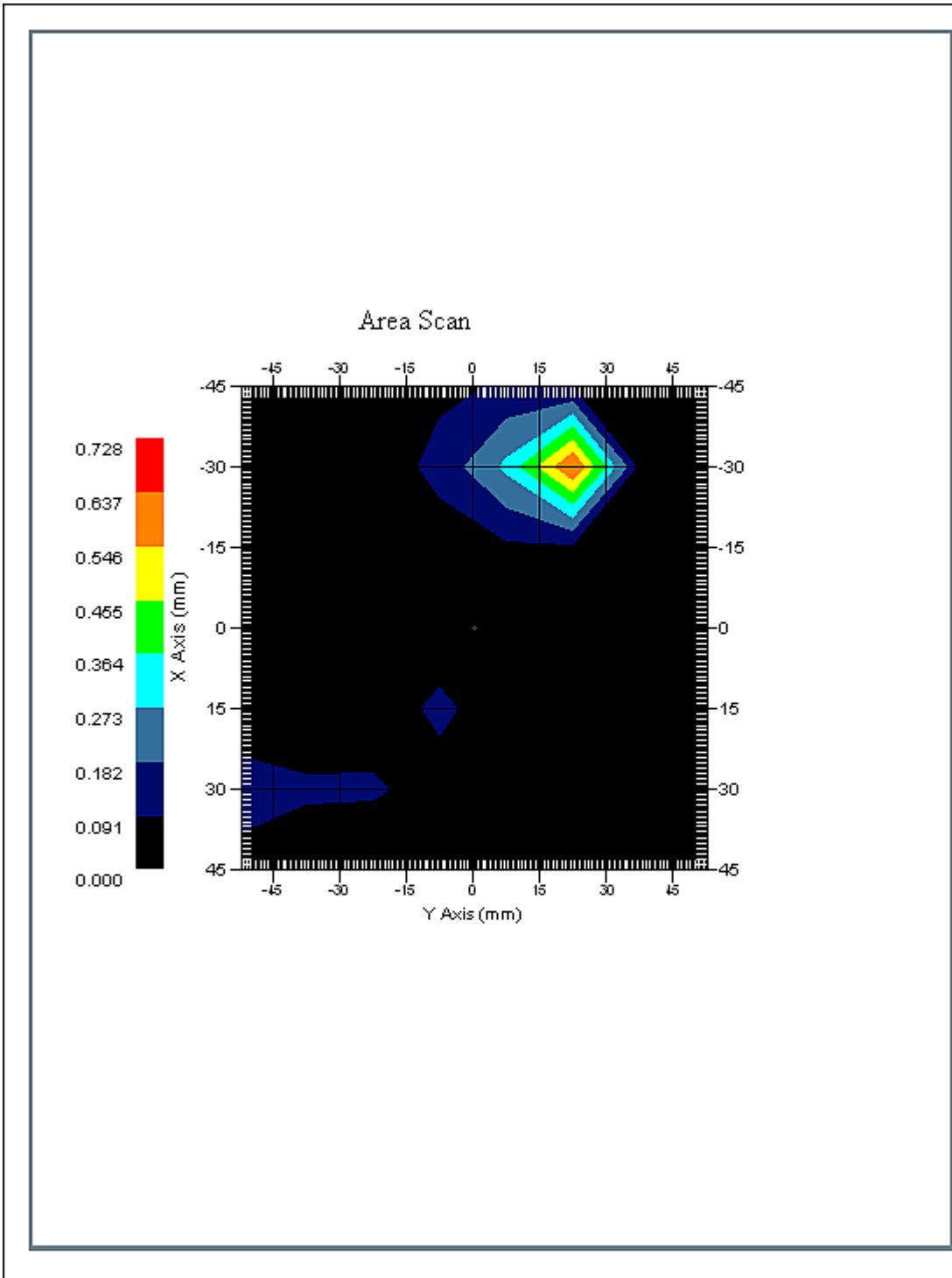
**Measurement Data**

Crest Factor : 1  
Scan Type : Complete  
Tissue Temp. : 24.00 °C  
Ambient Temp. : 24.00 °C  
Set-up Date : 13-Nov-2012  
Set-up Time : 8:11:44 AM  
Area Scan : 7x8x1 : Measurement x=15mm, y=15mm, z=4mm  
Zoom Scan : 5x5x8 : Measurement x=8mm, y=8mm, z=4mm

**Other Data**

DUT Position : Touch  
Separation : 0  
Channel : Mid

Report No : TSC-101-10-AP-07-0 (SAR )



1 gram SAR value : 0.327 W/kg  
Area Scan Peak SAR : 0.638 W/kg  
Zoom Scan Peak SAR : 0.790 W/kg

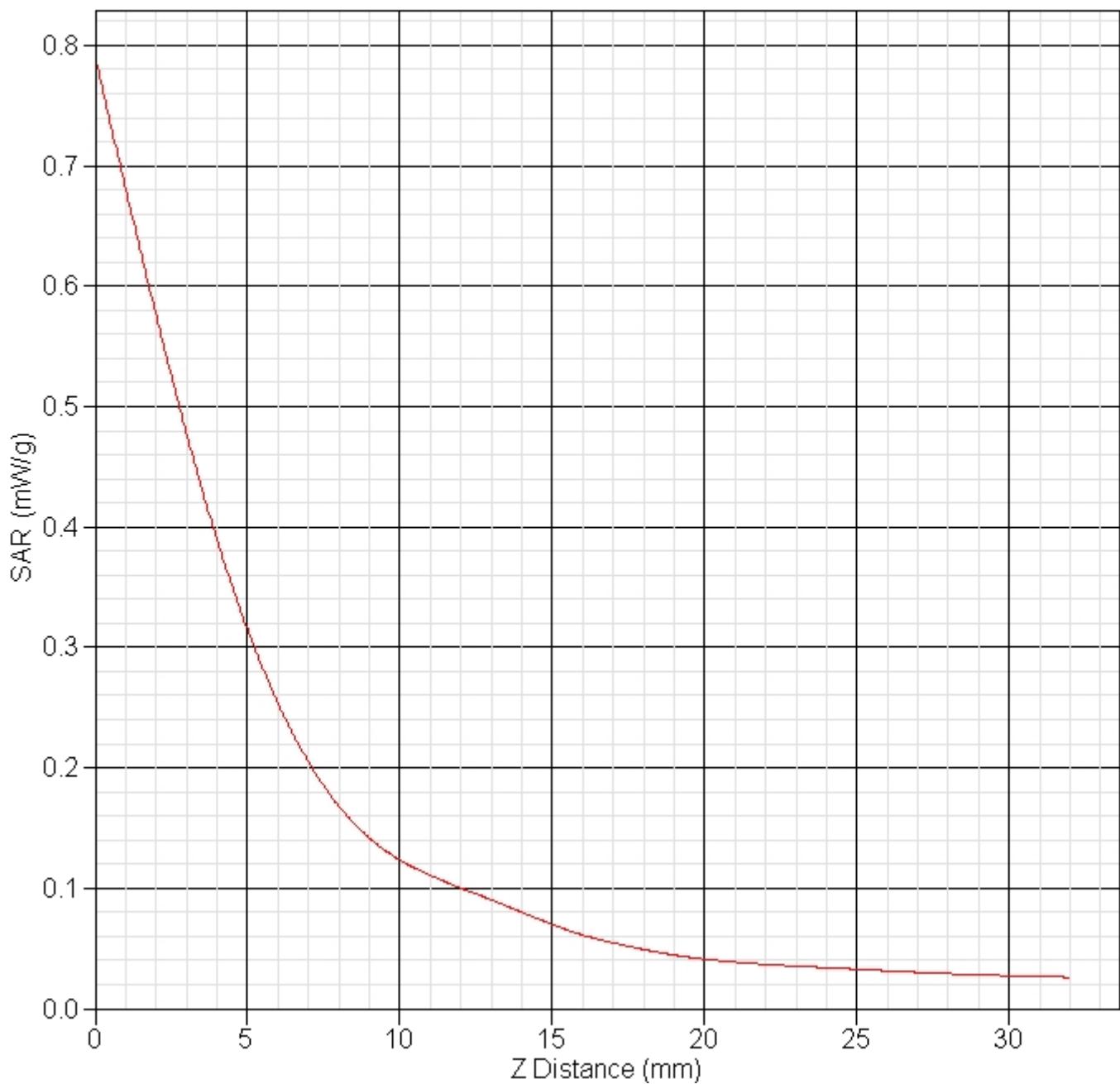
Report No : TSC-101-10-AP-07-0 (SAR )

### **Exposure Assessment Measurement Uncertainty**

<b>Source of Uncertainty</b>	<b>Tolerance Value</b>	<b>Probability Distribution</b>	<b>Divisor</b>	$c_i^1 (1-g)$	<b>Standard Uncertainty (1-g) %</b>
Measurement System					
Probe Calibration	3.5	normal	1	1	3.5
Axial Isotropy	3.7	rectangular	$\sqrt{3}$	$(1 - \frac{1}{cp})^{1/2}$	1.5
Hemispherical Isotropy	10.9	rectangular	$\sqrt{3}$	$\sqrt{cp}$	4.4
Boundary Effect	1.0	rectangular	$\sqrt{3}$	1	0.6
Linearity	4.7	rectangular	$\sqrt{3}$	1	2.7
Detection Limit	1.0	rectangular	$\sqrt{3}$	1	0.6
Readout Electronics	1.0	normal	1	1	1.0
Response Time	0.8	rectangular	$\sqrt{3}$	1	0.5
Integration Time	1.7	rectangular	$\sqrt{3}$	1	1.0
RF Ambient Condition	3.0	rectangular	$\sqrt{3}$	1	1.7
Probe Positioner Mech.	0.4	rectangular	$\sqrt{3}$	1	0.2
Restriction					
Probe Positioning with respect to Phantom Shell	2.9	rectangular	$\sqrt{3}$	1	1.7
Extrapolation and Integration	3.7	rectangular	$\sqrt{3}$	1	2.1
Test Sample Positioning	4.0	normal	1	1	4.0
Device Holder Uncertainty	2.0	normal	1	1	2.0
Drift of Output Power	4.5	rectangular	$\sqrt{3}$	1	2.6
Phantom and Setup					
Phantom Uncertainty(shape & thickness tolerance)	3.4	rectangular	$\sqrt{3}$	1	2.0
Liquid Conductivity(target)	5.0	rectangular	$\sqrt{3}$	0.7	2.0
Liquid Conductivity(meas.)	1.4	normal	1	0.7	0.0
Liquid Permittivity(target)	5.0	rectangular	$\sqrt{3}$	0.6	1.7
Liquid Permittivity(meas.)	1.4	normal	1	0.6	0.0
Combined Uncertainty		RSS			9.6
Combined Uncertainty (coverage factor=2)		Normal(k=2)			19.2

Report No : TSC-101-10-AP-07-0 (SAR )

SAR-Z Axis  
at Hotspot x:-14.91 y:14.76



Report No : TSC-101-10-AP-07-0 (SAR )

### **High Channel Rear Touch**

#### **SAR Test Report**

Report Date : 13-Nov-2012  
 By Operator : 123  
 Measurement Date : 13-Nov-2012  
 Starting Time : 13-Nov-2012 01:58:20 PM  
 End Time : 13-Nov-2012 02:22:41 PM  
 Scanning Time : 1461 secs

**Product Data**  
 Device Name : Winmate  
 Serial No. : M970D  
 Type : Other  
 Model : 2437  
 Frequency : 2462.00 MHz  
 Max. Transmit Pwr : 1 W  
 Drift Time : 0 min(s)  
 Length : 268 mm  
 Width : 205 mm  
 Depth : 18 mm  
 Antenna Type : Internal  
 Orientation : Touch  
 Power Drift-Start : 0.021 W/kg  
 Power Drift-Finish: 0.021 W/kg  
 Power Drift (%) : 4.304  
 Picture :

**Phantom Data**  
 Name : APREL-Uni  
 Type : Uni-Phantom  
 Size (mm) : 280 x 280 x 200  
 Serial No. : User Define  
 Location : Center  
 Description : Uni\_Phantom

**Tissue Data**  
 Type : BODY  
 Serial No. : 2450  
 Frequency : 2462.00 MHz  
 Last Calib. Date : 12-Nov-2012  
 Temperature : 24.00 °C  
 Ambient Temp. : 24.00 °C  
 Humidity : 50.00 RH%  
 Epsilon : 53.20 F/m  
 Sigma : 1.99 S/m  
 Density : 1000.00 kg/cu. m

**Probe Data**  
 Name : Probe 255  
 Model : E020  
 Type : E-Field Triangle  
 Serial No. : 255

Report No : TSC-101-10-AP-07-0 (SAR )

Last Calib. Date : 06-Dec-2011  
Frequency : 2450.00 MHz  
Duty Cycle Factor: 1  
Conversion Factor: 4.7  
Probe Sensitivity: 1.20 1.20 1.20  $\mu\text{V}/(\text{V}/\text{m})^2$   
Compression Point: 95.00 mV  
Offset : 1.56 mm

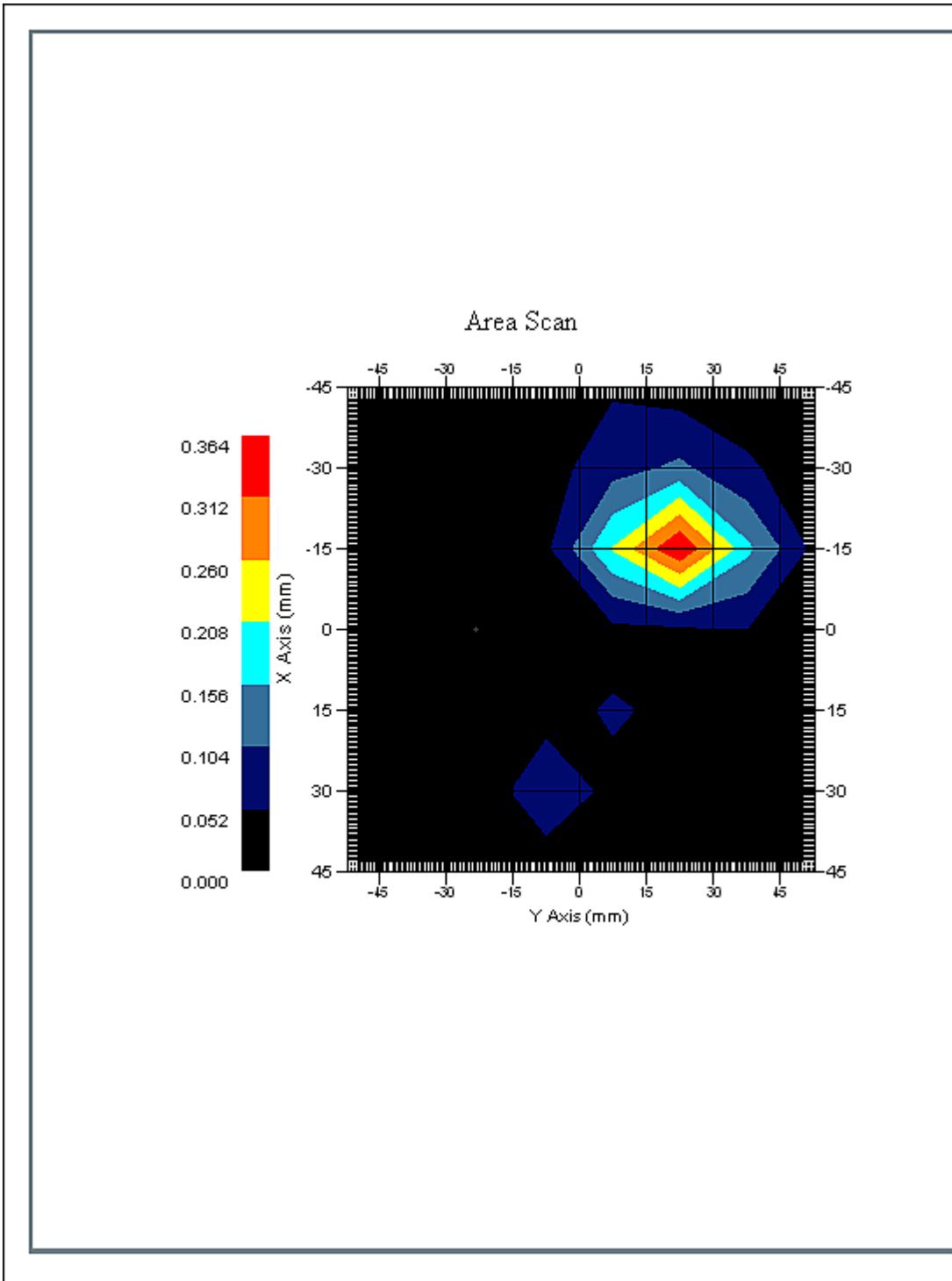
**Measurement Data**

Crest Factor : 1  
Scan Type : Complete  
Tissue Temp. : 24.00 °C  
Ambient Temp. : 24.00 °C  
Set-up Date : 13-Nov-2012  
Set-up Time : 8:11:44 AM  
Area Scan : 7x8x1 : Measurement x=15mm, y=15mm, z=4mm  
Zoom Scan : 5x5x8 : Measurement x=8mm, y=8mm, z=4mm

**Other Data**

DUT Position : Touch  
Separation : 0  
Channel : High

Report No : TSC-101-10-AP-07-0 (SAR )



1 gram SAR value : 0.297 W/kg  
Area Scan Peak SAR : 0.362 W/kg  
Zoom Scan Peak SAR : 0.680 W/kg

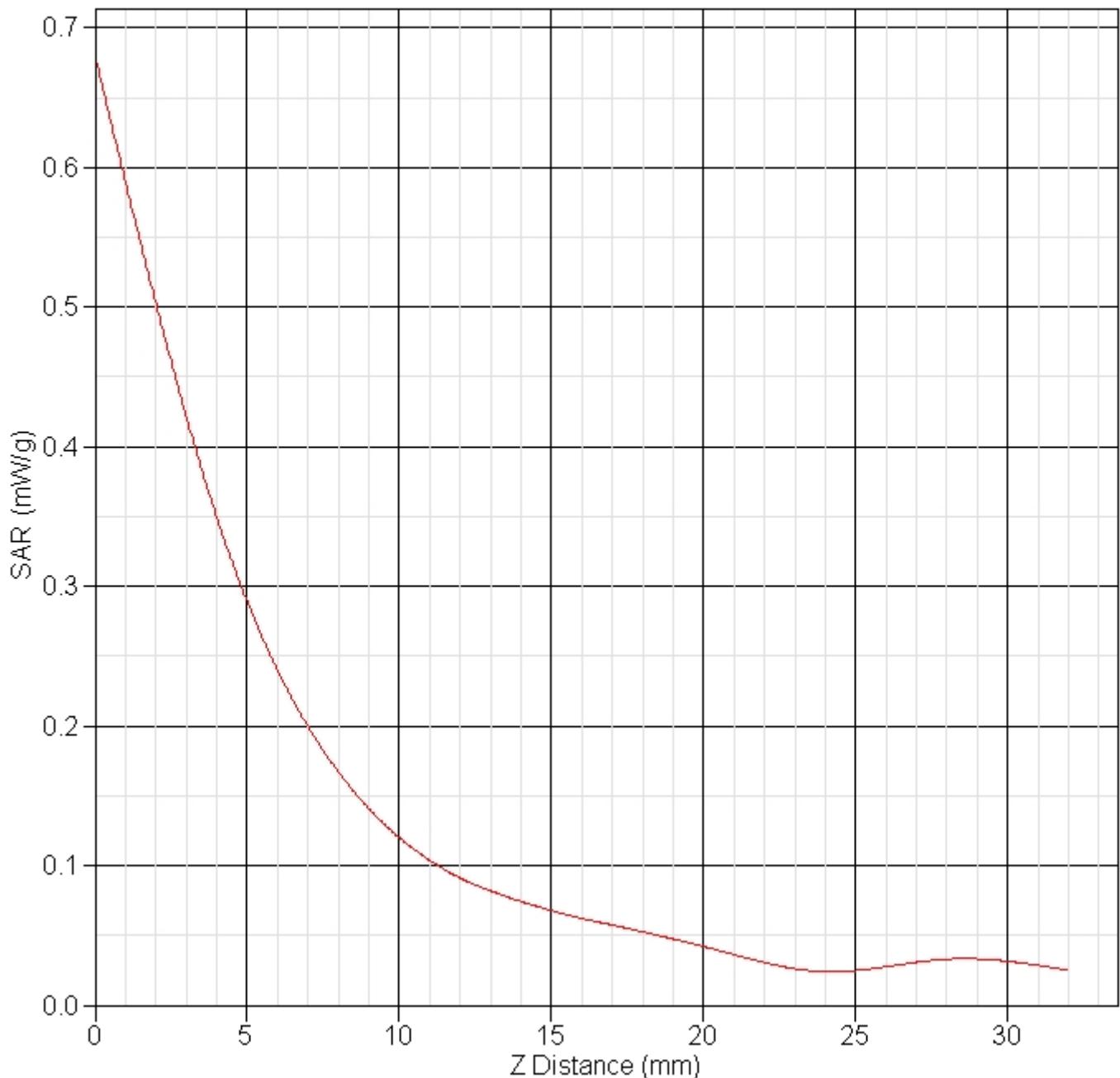
Report No : TSC-101-10-AP-07-0 (SAR )

### **Exposure Assessment Measurement Uncertainty**

<b>Source of Uncertainty</b>	<b>Tolerance Value</b>	<b>Probability Distribution</b>	<b>Divisor</b>	$c_i^1 (1-g)$	<b>Standard Uncertainty (1-g) %</b>
Measurement System					
Probe Calibration	3.5	normal	1	1	3.5
Axial Isotropy	3.7	rectangular	$\sqrt{3}$	$(1 - \frac{1}{cp})^{1/2}$	1.5
Hemispherical Isotropy	10.9	rectangular	$\sqrt{3}$	$\sqrt{cp}$	4.4
Boundary Effect	1.0	rectangular	$\sqrt{3}$	1	0.6
Linearity	4.7	rectangular	$\sqrt{3}$	1	2.7
Detection Limit	1.0	rectangular	$\sqrt{3}$	1	0.6
Readout Electronics	1.0	normal	1	1	1.0
Response Time	0.8	rectangular	$\sqrt{3}$	1	0.5
Integration Time	1.7	rectangular	$\sqrt{3}$	1	1.0
RF Ambient Condition	3.0	rectangular	$\sqrt{3}$	1	1.7
Probe Positioner Mech.	0.4	rectangular	$\sqrt{3}$	1	0.2
Restriction					
Probe Positioning with respect to Phantom Shell	2.9	rectangular	$\sqrt{3}$	1	1.7
Extrapolation and Integration	3.7	rectangular	$\sqrt{3}$	1	2.1
Test Sample Positioning	4.0	normal	1	1	4.0
Device Holder Uncertainty	2.0	normal	1	1	2.0
Drift of Output Power	4.3	rectangular	$\sqrt{3}$	1	2.5
Phantom and Setup					
Phantom Uncertainty(shape & thickness tolerance)	3.4	rectangular	$\sqrt{3}$	1	2.0
Liquid Conductivity(target)	5.0	rectangular	$\sqrt{3}$	0.7	2.0
Liquid Conductivity(meas.)	1.4	normal	1	0.7	0.0
Liquid Permittivity(target)	5.0	rectangular	$\sqrt{3}$	0.6	1.7
Liquid Permittivity(meas.)	1.4	normal	1	0.6	0.0
Combined Uncertainty		RSS			9.5
Combined Uncertainty (coverage factor=2)		Normal(k=2)			19.1

Report No : TSC-101-10-AP-07-0 (SAR )

SAR-Z Axis  
at Hotspot x:0.08 y:22.76



Report No : TSC-101-10-AP-07-0 (SAR )

#### A.4.2 GPRS Mode

### 850MHz Low Channel Rear Touch SAR Test Report

Report Date : 31-Oct-2012  
 By Operator : 123  
 Measurement Date : 31-Oct-2012  
 Starting Time : 31-Oct-2012 04:40:19 PM  
 End Time : 31-Oct-2012 05:07:10 PM  
 Scanning Time : 1611 secs

Product Data  
 Device Name : Winmate  
 Serial No. : M970D  
 Type : Other  
 Model : 835  
 Frequency : 824.20 MHz  
 Max. Transmit Pwr : 1 W  
 Drift Time : 0 min(s)  
 Length : 120 mm  
 Width : 120 mm  
 Depth : 18 mm  
 Antenna Type : Internal  
 Orientation : Rotated Left 90°  
 Power Drift-Start : 0.116 W/kg  
 Power Drift-Finish: 0.118 W/kg  
 Power Drift (%) : 1.743  
 Picture :

Phantom Data  
 Name : APREL-Uni  
 Type : Uni-Phantom  
 Size (mm) : 280 x 280 x 200  
 Serial No. : User Define  
 Location : Center  
 Description : Uni\_Phantom

Tissue Data  
 Type : BODY  
 Serial No. : 835  
 Frequency : 824.20 MHz  
 Last Calib. Date : 31-Oct-2012  
 Temperature : 23.00 °C  
 Ambient Temp. : 23.00 °C  
 Humidity : 55.00 RH%  
 Epsilon : 53.90 F/m  
 Sigma : 0.98 S/m  
 Density : 1000.00 kg/cu. m  
 Probe Data

Report No : TSC-101-10-AP-07-0 (SAR )

Name : SGL1  
Model : 835  
Type : E-Field Triangle  
Serial No. : SGL1  
Last Calib. Date : 10-Feb-2012  
Frequency : 835.00 MHz  
Duty Cycle Factor: 4  
Conversion Factor: 7.1  
Probe Sensitivity: 1.20 1.20 1.20  $\mu\text{V}/(\text{V}/\text{m})^2$   
Compression Point: 95.00 mV  
Offset : 1.56 mm

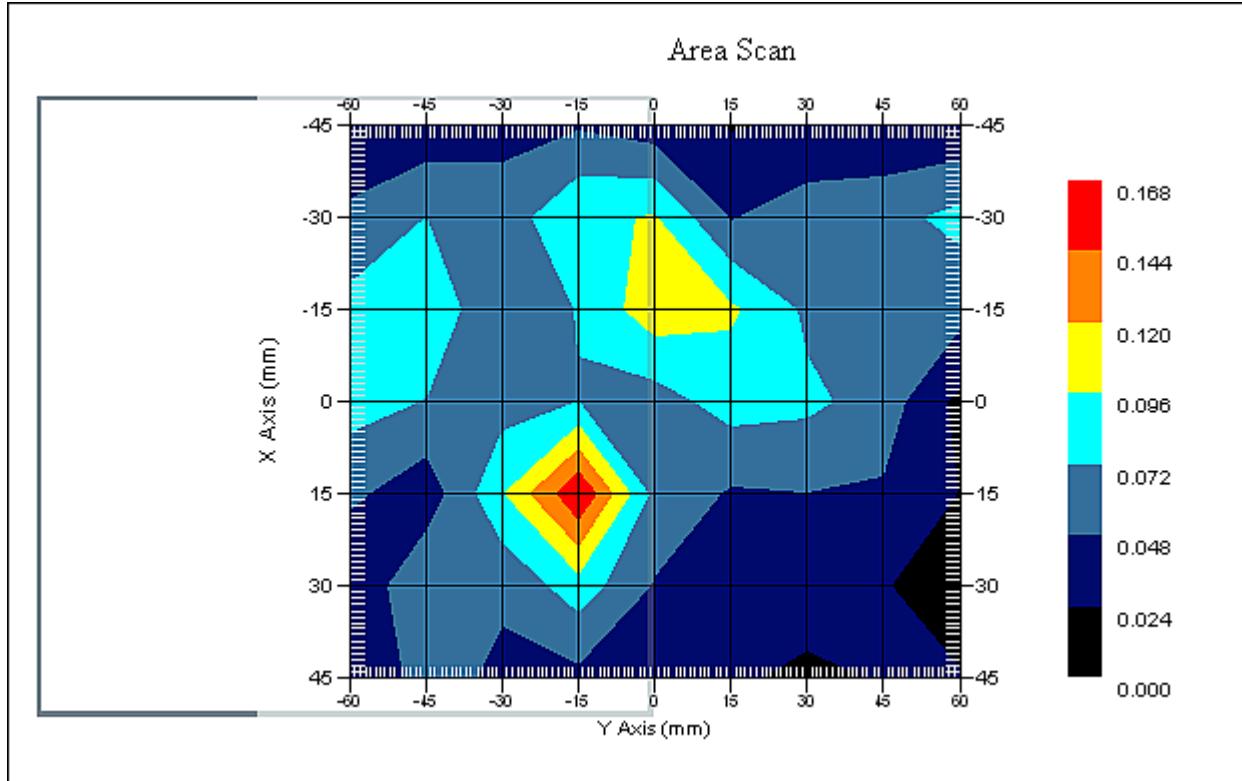
**Measurement Data**

Crest Factor : 4  
Scan Type : Complete  
Tissue Temp. : 23.00 °C  
Ambient Temp. : 23.00 °C  
Set-up Date : 31-Oct-2012  
Set-up Time : 8:53:02 AM  
Area Scan : 7x9x1 : Measurement x=15mm, y=15mm, z=4mm  
Zoom Scan : 5x5x8 : Measurement x=8mm, y=8mm, z=4mm

**Other Data**

DUT Position : Rotated Left 90°  
Separation : 0  
Channel : Low

Report No : TSC-101-10-AP-07-0 (SAR )



1 gram SAR value : 0.139 W/kg

Area Scan Peak SAR : 0.166 W/kg

Zoom Scan Peak SAR : 0.250 W/kg

### Exposure Assessment Measurement Uncertainty

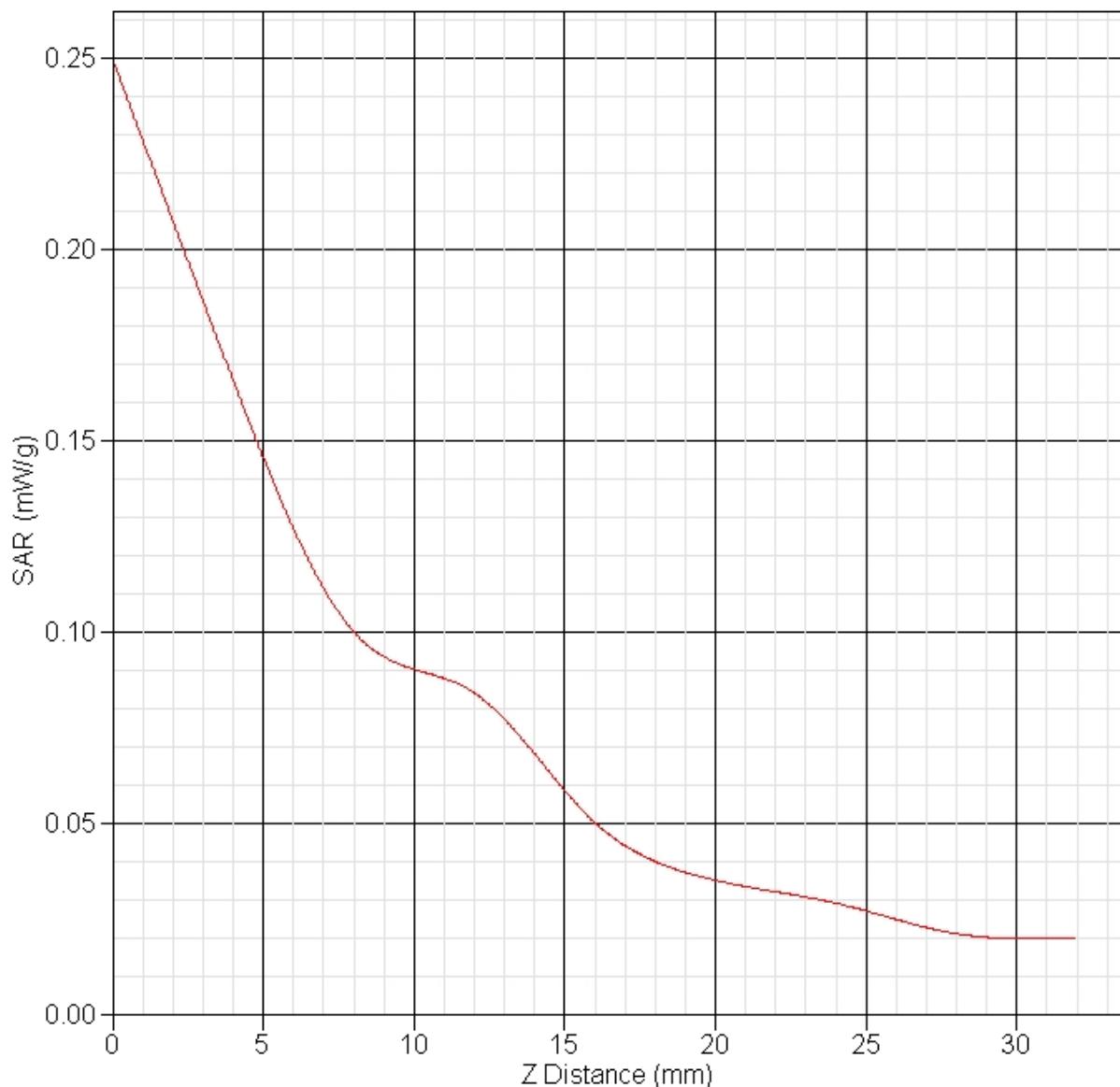
Source of Uncertainty	Tolerance Value	Probability Distribution	Divisor	$c_i^1 (1-g)$	Standard Uncertainty (1-g) %
Measurement System					
Probe Calibration	3.5	normal	1	1	3.5
Axial Isotropy	3.7	rectangular	$\sqrt{3}$	$(1-c_p)^{1/2}$	1.5
Hemispherical Isotropy	10.9	rectangular	$\sqrt{3}$	$\sqrt{c_p}$	4.4
Boundary Effect	1.0	rectangular	$\sqrt{3}$	1	0.6
Linearity	4.7	rectangular	$\sqrt{3}$	1	2.7
Detection Limit	1.0	rectangular	$\sqrt{3}$	1	0.6
Readout Electronics	1.0	normal	1	1	1.0
Response Time	0.8	rectangular	$\sqrt{3}$	1	0.5
Integration Time	1.7	rectangular	$\sqrt{3}$	1	1.0
RF Ambient Condition	3.0	rectangular	$\sqrt{3}$	1	1.7
Probe Positioner Mech.	0.4	rectangular	$\sqrt{3}$	1	0.2
Restriction					
Probe Positioning	2.9	rectangular	$\sqrt{3}$	1	1.7

Report No : TSC-101-10-AP-07-0 (SAR )

with respect to Phantom Shell					
Extrapolation and Integration	3.7	rectangular	$\sqrt{3}$	1	2.1
Test Sample Positioning	4.0	normal	1	1	4.0
Device Holder Uncertainty	2.0	normal	1	1	2.0
Drift of Output Power	1.7	rectangular	$\sqrt{3}$	1	1.0
Phantom and Setup					
Phantom Uncertainty(shape & thickness tolerance)	3.4	rectangular	$\sqrt{3}$	1	2.0
Liquid Conductivity(target)	5.0	rectangular	$\sqrt{3}$	0.7	2.0
Liquid Conductivity(meas.)	1.0	normal	1	0.7	0.7
Liquid Permittivity(target)	5.0	rectangular	$\sqrt{3}$	0.6	1.7
Liquid Permittivity(meas.)	2.7	normal	1	0.6	1.6
Combined Uncertainty		RSS			9.4
Combined Uncertainty (coverage factor=2)		Normal(k=2)			18.9

Report No : TSC-101-10-AP-07-0 (SAR )

**SAR-Z Axis**  
at Hotspot x:30.06 y:-15.25



Report No : TSC-101-10-AP-07-0 (SAR )

## **850MHz Mid Channel Rear Touch**

### **SAR Test Report**

Report Date : 31-Oct-2012  
 By Operator : 123  
 Measurement Date : 31-Oct-2012  
 Starting Time : 31-Oct-2012 04:11:18 PM  
 End Time : 31-Oct-2012 04:37:31 PM  
 Scanning Time : 1573 secs

**Product Data**  
 Device Name : Winmate  
 Serial No. : M970D  
 Type : Other  
 Model : 835  
 Frequency : 836.60 MHz  
 Max. Transmit Pwr : 1 W  
 Drift Time : 0 min(s)  
 Length : 120 mm  
 Width : 120 mm  
 Depth : 18 mm  
 Antenna Type : Internal  
 Orientation : Rotated Left 90°  
 Power Drift-Start : 0.110 W/kg  
 Power Drift-Finish: 0.113 W/kg  
 Power Drift (%) : 2.977  
 Picture :

**Phantom Data**  
 Name : APREL-Uni  
 Type : Uni-Phantom  
 Size (mm) : 280 x 280 x 200  
 Serial No. : User Define  
 Location : Center  
 Description : Uni\_Phantom

**Tissue Data**  
 Type : BODY  
 Serial No. : 835  
 Frequency : 835.00 MHz  
 Last Calib. Date : 31-Oct-2012  
 Temperature : 23.00 °C  
 Ambient Temp. : 23.00 °C  
 Humidity : 55.00 RH%  
 Epsilon : 53.70 F/m  
 Sigma : 0.98 S/m  
 Density : 1000.00 kg/cu. m

**Probe Data**  
 Name : SGL1  
 Model : 835  
 Type : E-Field Triangle  
 Serial No. : SGL1

Report No : TSC-101-10-AP-07-0 (SAR )

Last Calib. Date : 10-Feb-2012  
Frequency : 835.00 MHz  
Duty Cycle Factor: 4  
Conversion Factor: 7.1  
Probe Sensitivity: 1.20 1.20 1.20  $\mu\text{V}/(\text{V}/\text{m})^2$   
Compression Point: 95.00 mV  
Offset : 1.56 mm

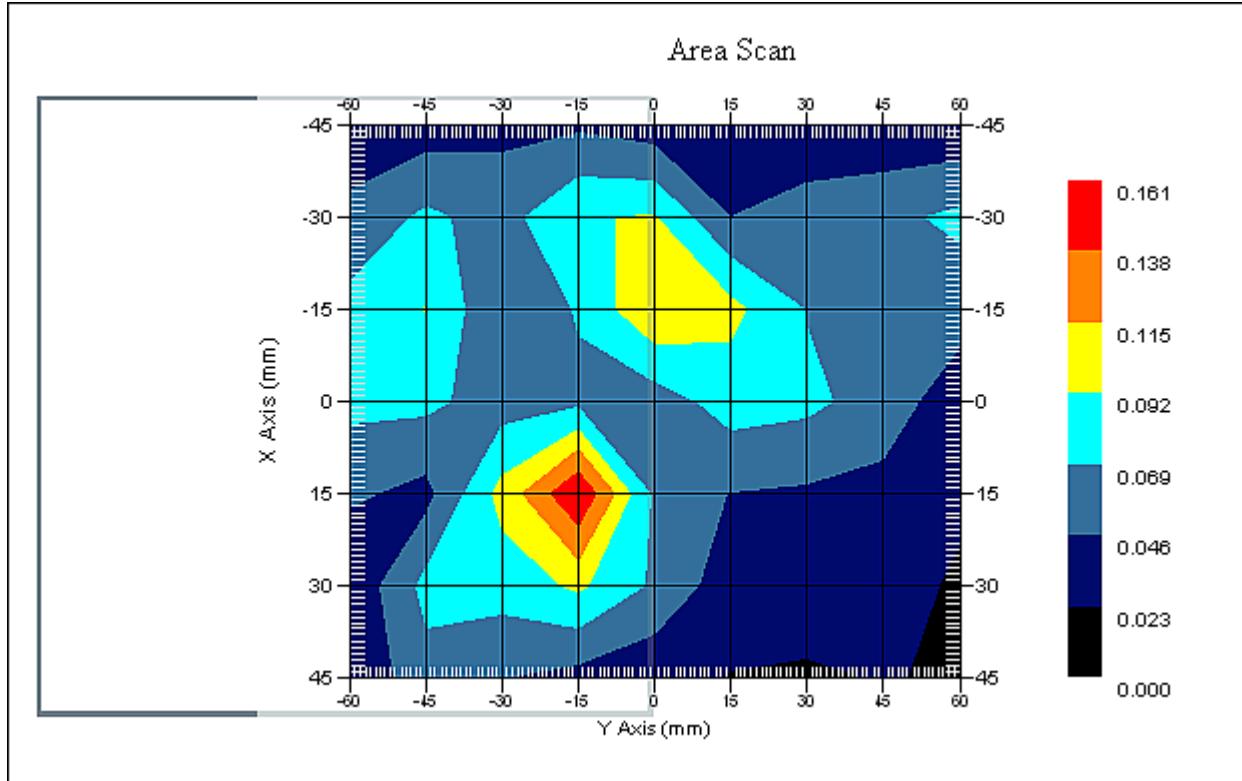
**Measurement Data**

Crest Factor : 4  
Scan Type : Complete  
Tissue Temp. : 23.00 °C  
Ambient Temp. : 23.00 °C  
Set-up Date : 31-Oct-2012  
Set-up Time : 8:53:02 AM  
Area Scan : 7x9x1 : Measurement x=15mm, y=15mm, z=4mm  
Zoom Scan : 5x5x8 : Measurement x=8mm, y=8mm, z=4mm

**Other Data**

DUT Position : Rotated Left 90°  
Separation : 0  
Channel : Mid

Report No : TSC-101-10-AP-07-0 (SAR )



1 gram SAR value : 0.127 W/kg

Area Scan Peak SAR : 0.160 W/kg

Zoom Scan Peak SAR : 0.250 W/kg

### Exposure Assessment Measurement Uncertainty

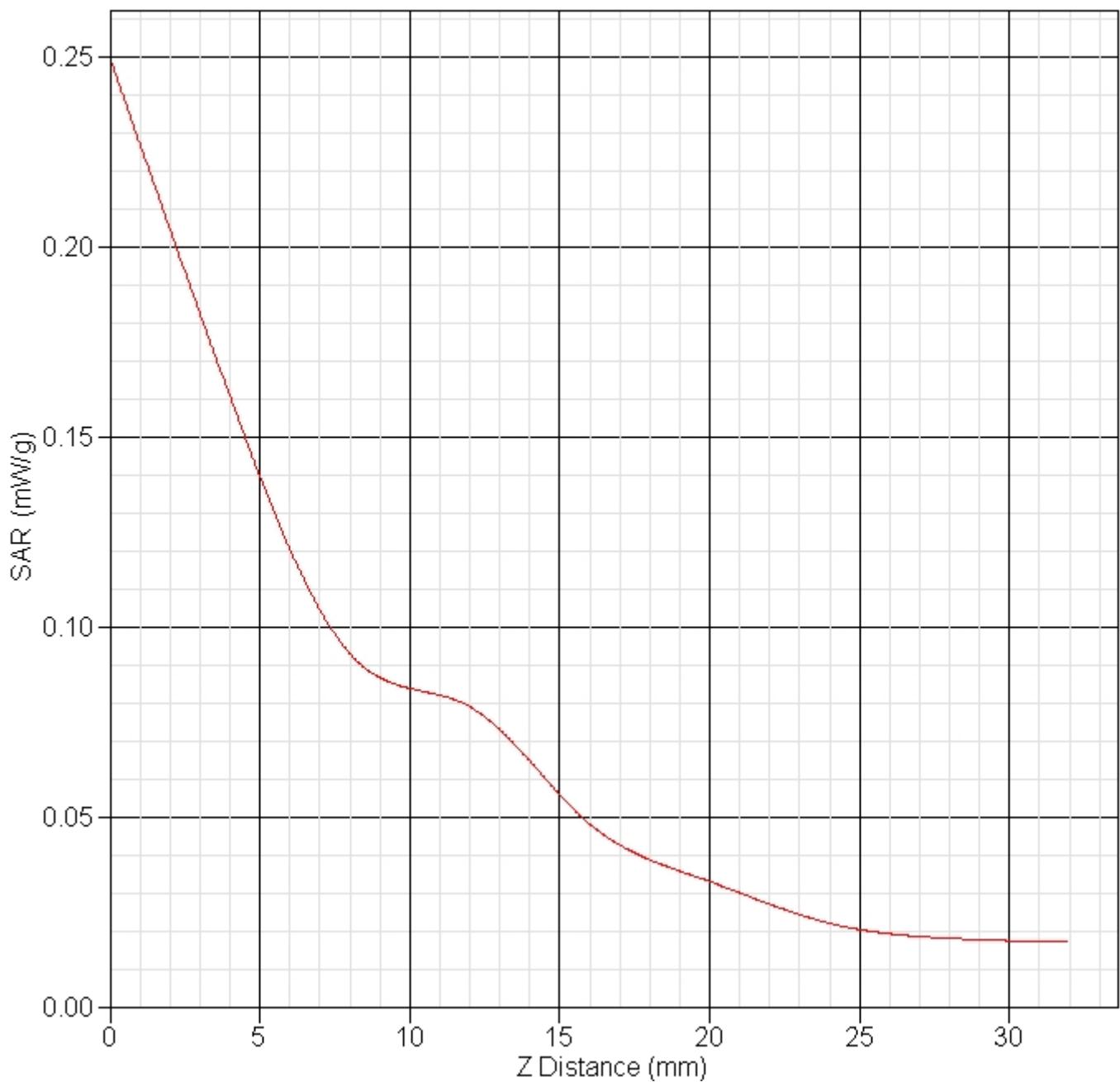
Source of Uncertainty	Tolerance Value	Probability Distribution	Divisor	$c_i^1 (1-g)$	Standard Uncertainty (1-g) %
Measurement System					
Probe Calibration	3.5	normal	1	1	3.5
Axial Isotropy	3.7	rectangular	$\sqrt{3}$	$(1-c_p)^{1/2}$	1.5
Hemispherical Isotropy	10.9	rectangular	$\sqrt{3}$	$\sqrt{c_p}$	4.4
Boundary Effect	1.0	rectangular	$\sqrt{3}$	1	0.6
Linearity	4.7	rectangular	$\sqrt{3}$	1	2.7
Detection Limit	1.0	rectangular	$\sqrt{3}$	1	0.6
Readout Electronics	1.0	normal	1	1	1.0
Response Time	0.8	rectangular	$\sqrt{3}$	1	0.5
Integration Time	1.7	rectangular	$\sqrt{3}$	1	1.0
RF Ambient Condition	3.0	rectangular	$\sqrt{3}$	1	1.7
Probe Positioner Mech.	0.4	rectangular	$\sqrt{3}$	1	0.2
Restriction					
Probe Positioning	2.9	rectangular	$\sqrt{3}$	1	1.7

Report No : TSC-101-10-AP-07-0 (SAR )

with respect to Phantom Shell					
Extrapolation and Integration	3.7	rectangular	$\sqrt{3}$	1	2.1
Test Sample Positioning	4.0	normal	1	1	4.0
Device Holder Uncertainty	2.0	normal	1	1	2.0
Drift of Output Power	3.0	rectangular	$\sqrt{3}$	1	1.7
Phantom and Setup					
Phantom Uncertainty(shape & thickness tolerance)	3.4	rectangular	$\sqrt{3}$	1	2.0
Liquid Conductivity(target)	5.0	rectangular	$\sqrt{3}$	0.7	2.0
Liquid Conductivity(meas.)	1.0	normal	1	0.7	0.7
Liquid Permittivity(target)	5.0	rectangular	$\sqrt{3}$	0.6	1.7
Liquid Permittivity(meas.)	2.7	normal	1	0.6	1.6
Combined Uncertainty		RSS			9.5
Combined Uncertainty (coverage factor=2)		Normal(k=2)			19.1

Report No : TSC-101-10-AP-07-0 (SAR )

SAR-Z Axis  
at Hotspot x:30.10 y:-15.24



Report No : TSC-101-10-AP-07-0 (SAR )

## **850MHz High Channel Rear Touch**

### **SAR Test Report**

Report Date : 01-Nov-2012  
 By Operator : 123  
 Measurement Date : 01-Nov-2012  
 Starting Time : 01-Nov-2012 09:42:34 AM  
 End Time : 01-Nov-2012 10:09:40 AM  
 Scanning Time : 1626 secs

#### Product Data

Device Name : Winmate  
 Serial No. : M970D  
 Type : Other  
 Model : 835  
 Frequency : 848.80 MHz  
 Max. Transmit Pwr : 1 W  
 Drift Time : 0 min(s)  
 Length : 120 mm  
 Width : 120 mm  
 Depth : 18 mm  
 Antenna Type : Internal  
 Orientation : Rotated Left 90°  
 Power Drift-Start : 0.211 W/kg  
 Power Drift-Finish: 0.218 W/kg  
 Power Drift (%) : 3.261  
 Picture :

#### Phantom Data

Name : APREL-Uni  
 Type : Uni-Phantom  
 Size (mm) : 280 x 280 x 200  
 Serial No. : User Define  
 Location : Center  
 Description : Uni\_Phantom

#### Tissue Data

Type : BODY  
 Serial No. : 835  
 Frequency : 848.80 MHz  
 Last Calib. Date : 31-Oct-2012  
 Temperature : 23.00 °C  
 Ambient Temp. : 23.00 °C  
 Humidity : 55.00 RH%  
 Epsilon : 53.20 F/m  
 Sigma : 0.97 S/m  
 Density : 1000.00 kg/cu. m

#### Probe Data

Name : SGL1  
 Model : 835  
 Type : E-Field Triangle  
 Serial No. : SGL1

Report No : TSC-101-10-AP-07-0 (SAR )

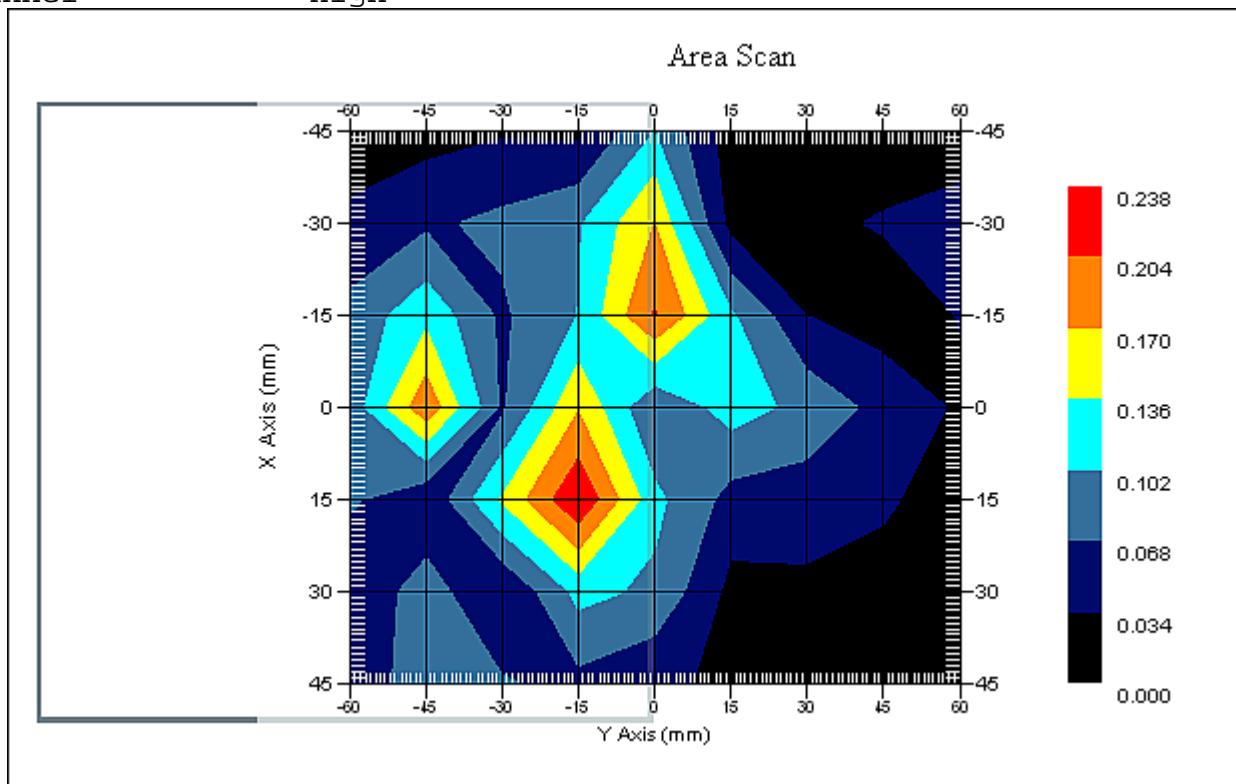
Last Calib. Date : 10-Feb-2012  
 Frequency : 835.00 MHz  
 Duty Cycle Factor: 4  
 Conversion Factor: 7.1  
 Probe Sensitivity: 1.20 1.20 1.20  $\mu\text{V}/(\text{V}/\text{m})^2$   
 Compression Point: 95.00 mV  
 Offset : 1.56 mm

Measurement Data

Crest Factor : 4  
 Scan Type : Complete  
 Tissue Temp. : 23.00 °C  
 Ambient Temp. : 23.00 °C  
 Set-up Date : 01-Nov-2012  
 Set-up Time : 8:20:05 AM  
 Area Scan : 7x9x1 : Measurement x=15mm, y=15mm, z=4mm  
 Zoom Scan : 5x5x8 : Measurement x=8mm, y=8mm, z=4mm

Other Data

DUT Position : Rotated Left 90°  
 Separation : 0  
 Channel : High



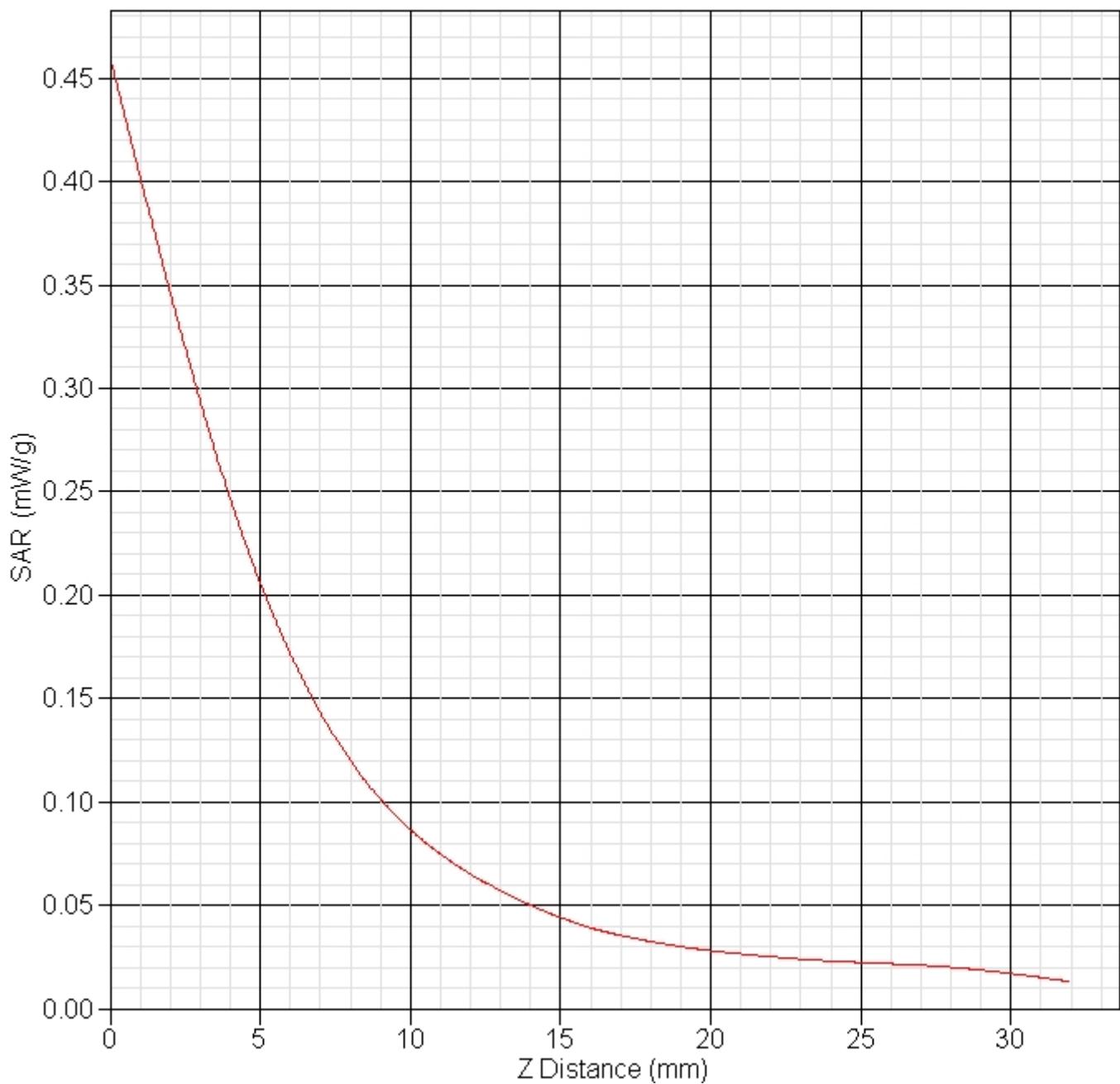
1 gram SAR value : 0.198 W/kg  
 Area Scan Peak SAR : 0.235 W/kg  
 Zoom Scan Peak SAR : 0.460 W/kg

Report No : TSC-101-10-AP-07-0 (SAR )

Source of Uncertainty	Tolerance Value	Probability Distribution	Divisor	$c_i^1 (1-g)$	Standard Uncertainty (1-g) %
Measurement System					
Probe Calibration	3.5	normal	1	1	3.5
Axial Isotropy	3.7	rectangular	$\sqrt{3}$	$(1 - \frac{cp}{10})^{1/2}$	1.5
Hemispherical Isotropy	10.9	rectangular	$\sqrt{3}$	$\sqrt{cp}$	4.4
Boundary Effect	1.0	rectangular	$\sqrt{3}$	1	0.6
Linearity	4.7	rectangular	$\sqrt{3}$	1	2.7
Detection Limit	1.0	rectangular	$\sqrt{3}$	1	0.6
Readout Electronics	1.0	normal	1	1	1.0
Response Time	0.8	rectangular	$\sqrt{3}$	1	0.5
Integration Time	1.7	rectangular	$\sqrt{3}$	1	1.0
RF Ambient Condition	3.0	rectangular	$\sqrt{3}$	1	1.7
Probe Positioner Mech.	0.4	rectangular	$\sqrt{3}$	1	0.2
Restriction					
Probe Positioning with respect to Phantom Shell	2.9	rectangular	$\sqrt{3}$	1	1.7
Extrapolation and Integration	3.7	rectangular	$\sqrt{3}$	1	2.1
Test Sample Positioning	4.0	normal	1	1	4.0
Device Holder Uncertainty	2.0	normal	1	1	2.0
Drift of Output Power	3.3	rectangular	$\sqrt{3}$	1	1.9
Phantom and Setup					
Phantom Uncertainty(shape & thickness tolerance)	3.4	rectangular	$\sqrt{3}$	1	2.0
Liquid Conductivity(target)	5.0	rectangular	$\sqrt{3}$	0.7	2.0
Liquid Conductivity(meas.)	1.0	normal	1	0.7	0.7
Liquid Permittivity(target)	5.0	rectangular	$\sqrt{3}$	0.6	1.7
Liquid Permittivity(meas.)	2.7	normal	1	0.6	1.6
Combined Uncertainty		RSS			9.6
Combined Uncertainty (coverage factor=2)		Normal(k=2)			19.2

Report No : TSC-101-10-AP-07-0 (SAR )

SAR-Z Axis  
at Hotspot x:38.08 y:-23.24



Report No : TSC-101-10-AP-07-0 (SAR )

**1900MHz Low Channel Rear Touch**  
**SAR Test Report**

Report Date : 26-Oct-2012  
 By Operator : 123  
 Measurement Date : 26-Oct-2012  
 Starting Time : 26-Oct-2012 10:07:00 AM  
 End Time : 26-Oct-2012 10:32:55 AM  
 Scanning Time : 1555 secs

**Product Data**  
 Device Name : Winmate  
 Serial No. : M970D  
 Type : Other  
 Model : 1900  
 Frequency : 1850.20 MHz  
 Max. Transmit Pwr : 1 W  
 Drift Time : 0 min(s)  
 Length : 120 mm  
 Width : 120 mm  
 Depth : 18 mm  
 Antenna Type : Internal  
 Orientation : Rotated Left 90°  
 Power Drift-Start : 0.130 W/kg  
 Power Drift-Finish: 0.129 W/kg  
 Power Drift (%) : -0.625  
 Picture :

**Phantom Data**  
 Name : APREL-Uni  
 Type : Uni-Phantom  
 Size (mm) : 280 x 280 x 200  
 Serial No. : User Define  
 Location : Center  
 Description : Uni\_Phantom

**Tissue Data**  
 Type : BODY  
 Serial No. : 1900  
 Frequency : 1900.00 MHz  
 Last Calib. Date : 25-Oct-2012  
 Temperature : 23.00 °C  
 Ambient Temp. : 23.00 °C  
 Humidity : 50.00 RH%  
 Epsilon : 52.80 F/m  
 Sigma : 1.50 S/m  
 Density : 1000.00 kg/cu. m

**Probe Data**  
 Name : SGL1  
 Model : 1800  
 Type : E-Field Triangle

Report No : TSC-101-10-AP-07-0 (SAR )

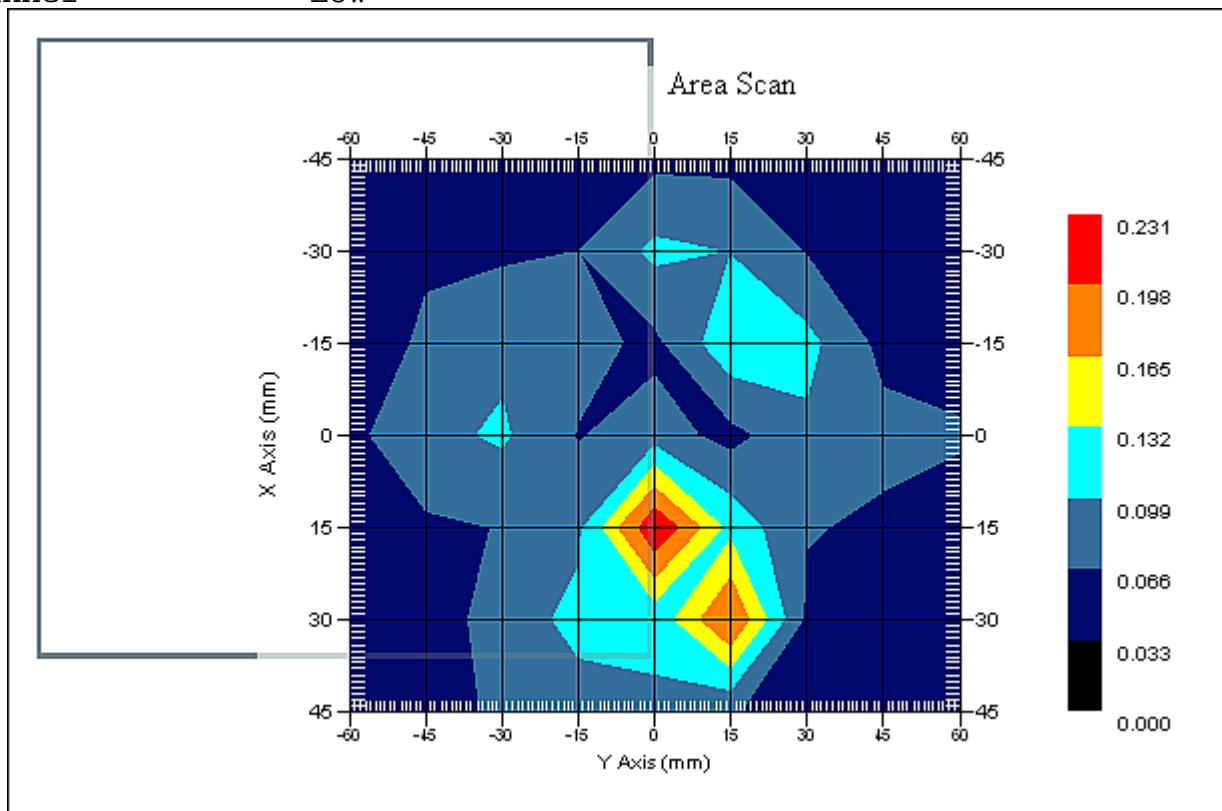
Serial No. : SGL1  
 Last Calib. Date : 10-Feb-2012  
 Frequency : 1800.00 MHz  
 Duty Cycle Factor: 4  
 Conversion Factor: 5.8  
 Probe Sensitivity: 1.20 1.20 1.20  $\mu\text{V}/(\text{V}/\text{m})^2$   
 Compression Point: 95.00 mV  
 Offset : 1.56 mm

Measurement Data

Crest Factor : 4  
 Scan Type : Complete  
 Tissue Temp. : 23.00 °C  
 Ambient Temp. : 23.00 °C  
 Set-up Date : 26-Oct-2012  
 Set-up Time : 8:05:22 AM  
 Area Scan : 7x9x1 : Measurement x=15mm, y=15mm, z=4mm  
 Zoom Scan : 5x5x8 : Measurement x=8mm, y=8mm, z=4mm

Other Data

DUT Position : Rotated Left 90°  
 Separation : 0  
 Channel : Low



1 gram SAR value : 0.193 W/kg  
 Area Scan Peak SAR : 0.230 W/kg  
 Zoom Scan Peak SAR : 0.390 W/kg

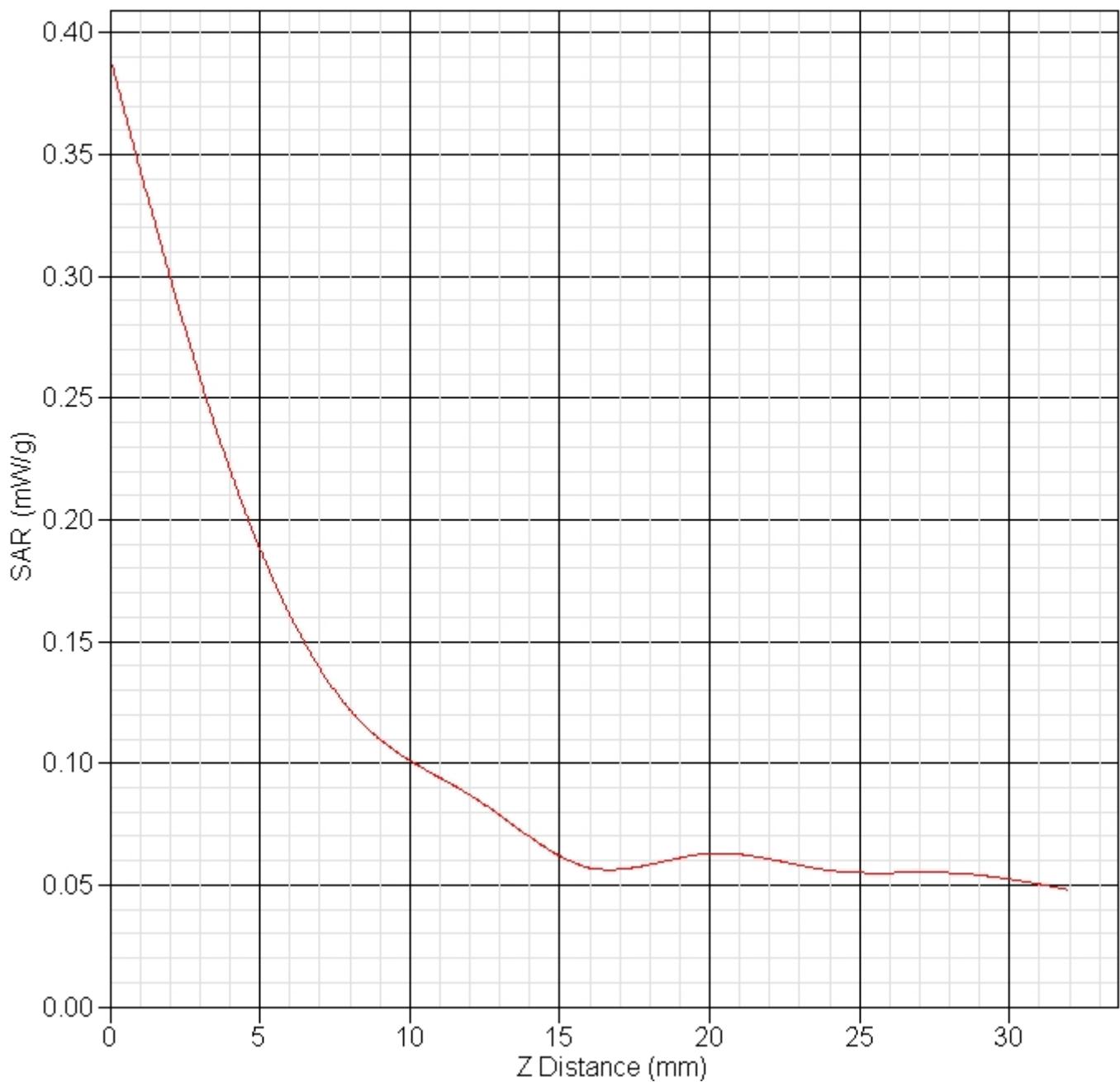
Report No : TSC-101-10-AP-07-0 (SAR )

### Exposure Assessment Measurement Uncertainty

Source of Uncertainty	Tolerance Value	Probability Distribution	Divisor	$c_i^1 (1-g)$	$c_i^1 (10-g)$	Standard Uncertainty (1-g) %
Measurement System						
Probe Calibration	3.5	normal	1	1	1	3.5
Axial Isotropy	3.7	rectangular	$\sqrt{3}$	$(1 - \frac{1}{cp})^{1/2}$	$(1 - \frac{1}{cp})^{1/2}$	1.5
Hemispherical Isotropy	10.9	rectangular	$\sqrt{3}$	$\sqrt{cp}$	$\sqrt{cp}$	4.4
Boundary Effect	1.0	rectangular	$\sqrt{3}$	1	1	0.6
Linearity	4.7	rectangular	$\sqrt{3}$	1	1	2.7
Detection Limit	1.0	rectangular	$\sqrt{3}$	1	1	0.6
Readout Electronics	1.0	normal	1	1	1	1.0
Response Time	0.8	rectangular	$\sqrt{3}$	1	1	0.5
Integration Time	1.7	rectangular	$\sqrt{3}$	1	1	1.0
RF Ambient Condition	3.0	rectangular	$\sqrt{3}$	1	1	1.7
Probe Positioner Mech.	0.4	rectangular	$\sqrt{3}$	1	1	0.2
Restriction						
Probe Positioning with respect to Phantom Shell	2.9	rectangular	$\sqrt{3}$	1	1	1.7
Extrapolation and Integration	3.7	rectangular	$\sqrt{3}$	1	1	2.1
Test Sample Positioning	4.0	normal	1	1	1	4.0
Device Holder Uncertainty	2.0	normal	1	1	1	2.0
Drift of Output Power	0.6	rectangular	$\sqrt{3}$	1	1	0.4
Phantom and Setup						
Phantom Uncertainty(shape & thickness tolerance)	3.4	rectangular	$\sqrt{3}$	1	1	2.0
Liquid Conductivity(target)	5.0	rectangular	$\sqrt{3}$	0.7	0.5	2.0
Liquid Conductivity(meas.)	0.0	normal	1	0.7	0.5	0.0
Liquid Permittivity(target)	5.0	rectangular	$\sqrt{3}$	0.6	0.5	1.7
Liquid Permittivity(meas.)	2.4	normal	1	0.6	0.5	1.5
Combined Uncertainty		RSS				9.4
Combined Uncertainty (coverage factor=2)		Normal(k=2)				18.7

Report No : TSC-101-10-AP-07-0 (SAR )

SAR-Z Axis  
at Hotspot x:30.07 y:-0.22



Report No : TSC-101-10-AP-07-0 (SAR )

### **1900MHz Middle Channel Rear Touch SAR Test Report**

Report Date : 26-Oct-2012  
 By Operator : 123  
 Measurement Date : 26-Oct-2012  
 Starting Time : 26-Oct-2012 08:25:19 AM  
 End Time : 26-Oct-2012 08:51:51 AM  
 Scanning Time : 1592 secs

**Product Data**  
 Device Name : Winmate  
 Serial No. : M970D  
 Type : Other  
 Model : 1900  
 Frequency : 1880.00 MHz  
 Max. Transmit Pwr : 1 W  
 Drift Time : 0 min(s)  
 Length : 120 mm  
 Width : 120 mm  
 Depth : 18 mm  
 Antenna Type : Internal  
 Orientation : Rotated Left 90°  
 Power Drift-Start : 0.114 W/kg  
 Power Drift-Finish: 0.117 W/kg  
 Power Drift (%) : 3.048  
 Picture :

**Phantom Data**  
 Name : APREL-Uni  
 Type : Uni-Phantom  
 Size (mm) : 280 x 280 x 200  
 Serial No. : User Define  
 Location : Center  
 Description : Uni\_Phantom

**Tissue Data**  
 Type : BODY  
 Serial No. : 1900  
 Frequency : 1900.00 MHz  
 Last Calib. Date : 25-Oct-2012  
 Temperature : 23.00 °C  
 Ambient Temp. : 23.00 °C  
 Humidity : 50.00 RH%  
 Epsilon : 52.00 F/m  
 Sigma : 1.52 S/m  
 Density : 1000.00 kg/cu. m

**Probe Data**  
 Name : SGL1  
 Model : 1800  
 Type : E-Field Triangle  
 Serial No. : SGL1

Report No : TSC-101-10-AP-07-0 (SAR )

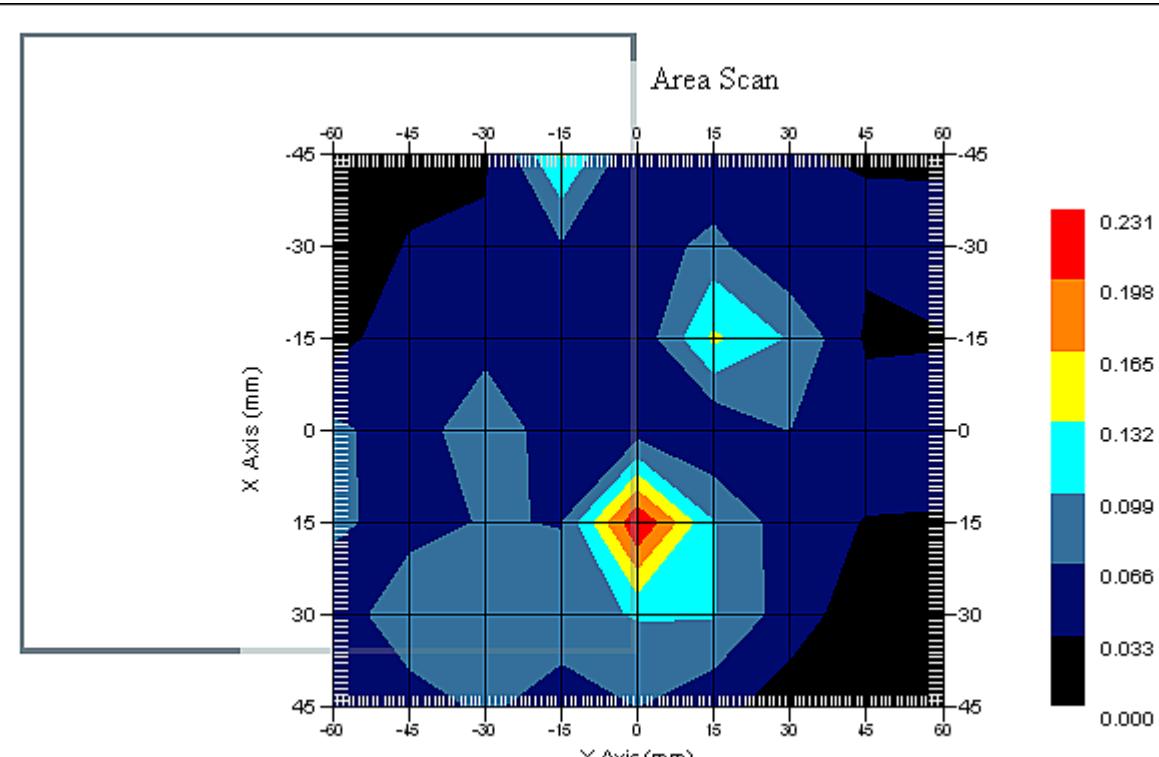
Last Calib. Date : 10-Feb-2012  
 Frequency : 1800.00 MHz  
 Duty Cycle Factor: 4  
 Conversion Factor: 5.8  
 Probe Sensitivity: 1.20 1.20 1.20  $\mu\text{V}/(\text{V}/\text{m})^2$   
 Compression Point: 95.00 mV  
 Offset : 1.56 mm

Measurement Data

Crest Factor : 4  
 Scan Type : Complete  
 Tissue Temp. : 23.00 °C  
 Ambient Temp. : 23.00 °C  
 Set-up Date : 26-Oct-2012  
 Set-up Time : 8:05:22 AM  
 Area Scan : 7x9x1 : Measurement x=15mm, y=15mm, z=4mm  
 Zoom Scan : 5x5x8 : Measurement x=8mm, y=8mm, z=4mm

Other Data

DUT Position : Rotated Left 90°  
 Separation : 0  
 Channel : Mid



1 gram SAR value : 0.199 W/kg  
 Area Scan Peak SAR : 0.231 W/kg  
 Zoom Scan Peak SAR : 0.570 W/kg

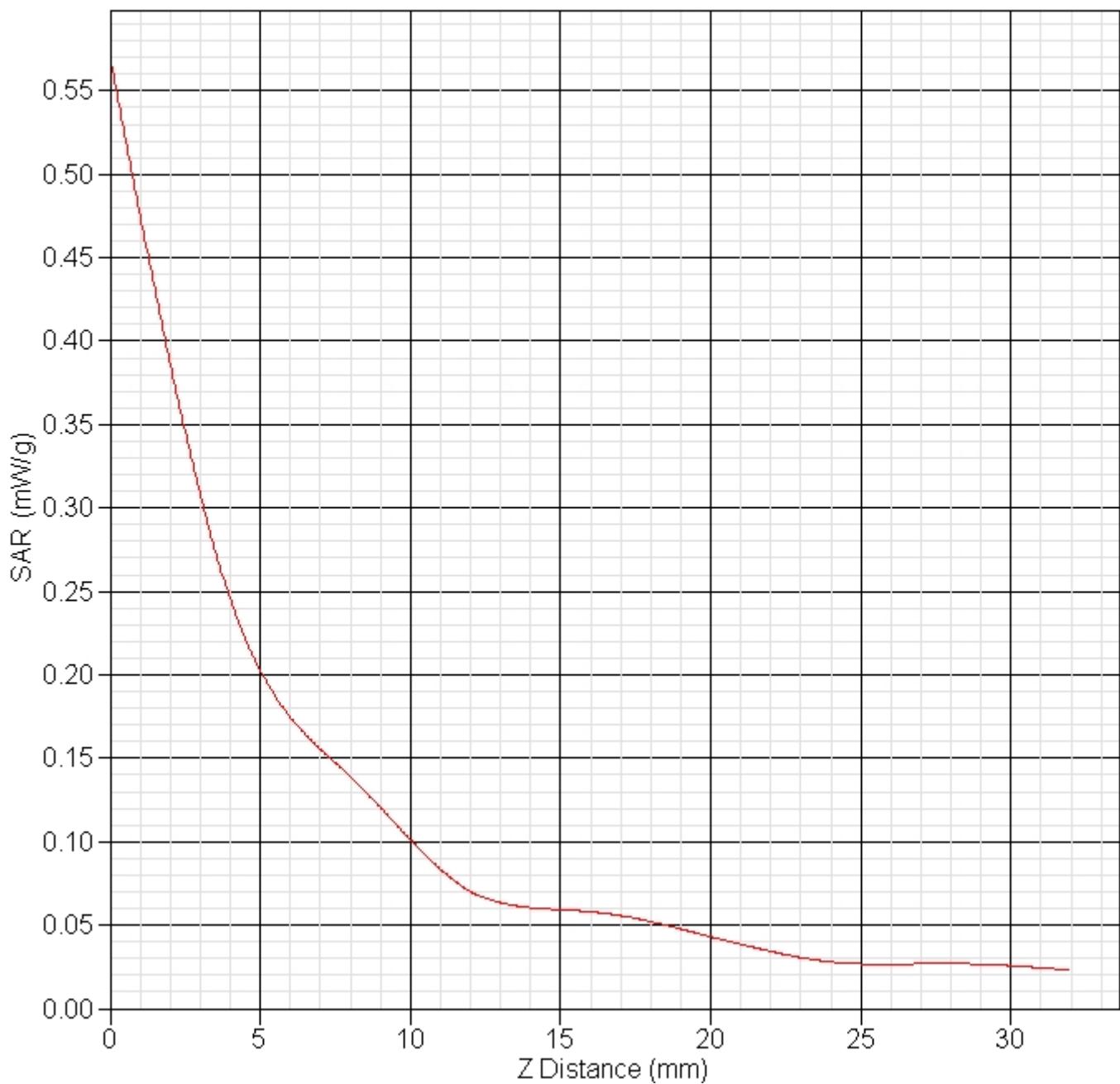
Report No : TSC-101-10-AP-07-0 (SAR )

### **Exposure Assessment Measurement Uncertainty**

<b>Source of Uncertainty</b>	<b>Tolerance Value</b>	<b>Probability Distribution</b>	<b>Divisor</b>	$c_i^1 (1-g)$	<b>Standard Uncertainty (1-g) %</b>
Measurement System					
Probe Calibration	3.5	normal	1	1	3.5
Axial Isotropy	3.7	rectangular	$\sqrt{3}$	$(1 - \frac{cp}{\sqrt{3}})^{1/2}$	1.5
Hemispherical Isotropy	10.9	rectangular	$\sqrt{3}$	$\sqrt{cp}$	4.4
Boundary Effect	1.0	rectangular	$\sqrt{3}$	1	0.6
Linearity	4.7	rectangular	$\sqrt{3}$	1	2.7
Detection Limit	1.0	rectangular	$\sqrt{3}$	1	0.6
Readout Electronics	1.0	normal	1	1	1.0
Response Time	0.8	rectangular	$\sqrt{3}$	1	0.5
Integration Time	1.7	rectangular	$\sqrt{3}$	1	1.0
RF Ambient Condition	3.0	rectangular	$\sqrt{3}$	1	1.7
Probe Positioner Mech.	0.4	rectangular	$\sqrt{3}$	1	0.2
Restriction					
Probe Positioning with respect to Phantom Shell	2.9	rectangular	$\sqrt{3}$	1	1.7
Extrapolation and Integration	3.7	rectangular	$\sqrt{3}$	1	2.1
Test Sample Positioning	4.0	normal	1	1	4.0
Device Holder Uncertainty	2.0	normal	1	1	2.0
Drift of Output Power	3.0	rectangular	$\sqrt{3}$	1	1.8
Phantom and Setup					
Phantom Uncertainty(shape & thickness tolerance)	3.4	rectangular	$\sqrt{3}$	1	2.0
Liquid Conductivity(target)	5.0	rectangular	$\sqrt{3}$	0.7	2.0
Liquid Conductivity(meas.)	0.0	normal	1	0.7	0.0
Liquid Permittivity(target)	5.0	rectangular	$\sqrt{3}$	0.6	1.7
Liquid Permittivity(meas.)	2.4	normal	1	0.6	1.5
Combined Uncertainty		RSS			9.5
Combined Uncertainty (coverage factor=2)		Normal(k=2)			19.1

Report No : TSC-101-10-AP-07-0 (SAR )

SAR-Z Axis  
at Hotspot x:30.06 y:-0.22



Report No : TSC-101-10-AP-07-0 (SAR )

**1900MHz High Channel Rear Touch**  
**SAR Test Report**

Report Date : 26-Oct-2012  
 By Operator : 123  
 Measurement Date : 26-Oct-2012  
 Starting Time : 26-Oct-2012 11:14:33 AM  
 End Time : 26-Oct-2012 11:40:25 AM  
 Scanning Time : 1552 secs

**Product Data**  
 Device Name : Winmate  
 Serial No. : M970D  
 Type : Other  
 Model : 1900  
 Frequency : 1909.80 MHz  
 Max. Transmit Pwr : 1 W  
 Drift Time : 0 min(s)  
 Length : 120 mm  
 Width : 120 mm  
 Depth : 18 mm  
 Antenna Type : Internal  
 Orientation : Rotated Left 90°  
 Power Drift-Start : 0.138 W/kg  
 Power Drift-Finish: 0.131 W/kg  
 Power Drift (%) : -4.775  
 Picture :

**Phantom Data**  
 Name : APREL-Uni  
 Type : Uni-Phantom  
 Size (mm) : 280 x 280 x 200  
 Serial No. : User Define  
 Location : Center  
 Description : Uni\_Phantom

**Tissue Data**  
 Type : BODY  
 Serial No. : 1900  
 Frequency : 1908.80 MHz  
 Last Calib. Date : 25-Oct-2012  
 Temperature : 23.00 °C  
 Ambient Temp. : 23.00 °C  
 Humidity : 50.00 RH%  
 Epsilon : 53.00 F/m  
 Sigma : 1.55 S/m  
 Density : 1000.00 kg/cu. m

**Probe Data**  
 Name : SGL1  
 Model : 2000  
 Type : E-Field Triangle  
 Serial No. : SGL1

Report No : TSC-101-10-AP-07-0 (SAR )

Last Calib. Date : 10-Feb-2012  
Frequency : 2000.00 MHz  
Duty Cycle Factor: 4  
Conversion Factor: 6.0  
Probe Sensitivity: 1.20 1.20 1.20  $\mu\text{V}/(\text{V}/\text{m})^2$   
Compression Point: 95.00 mV  
Offset : 1.56 mm

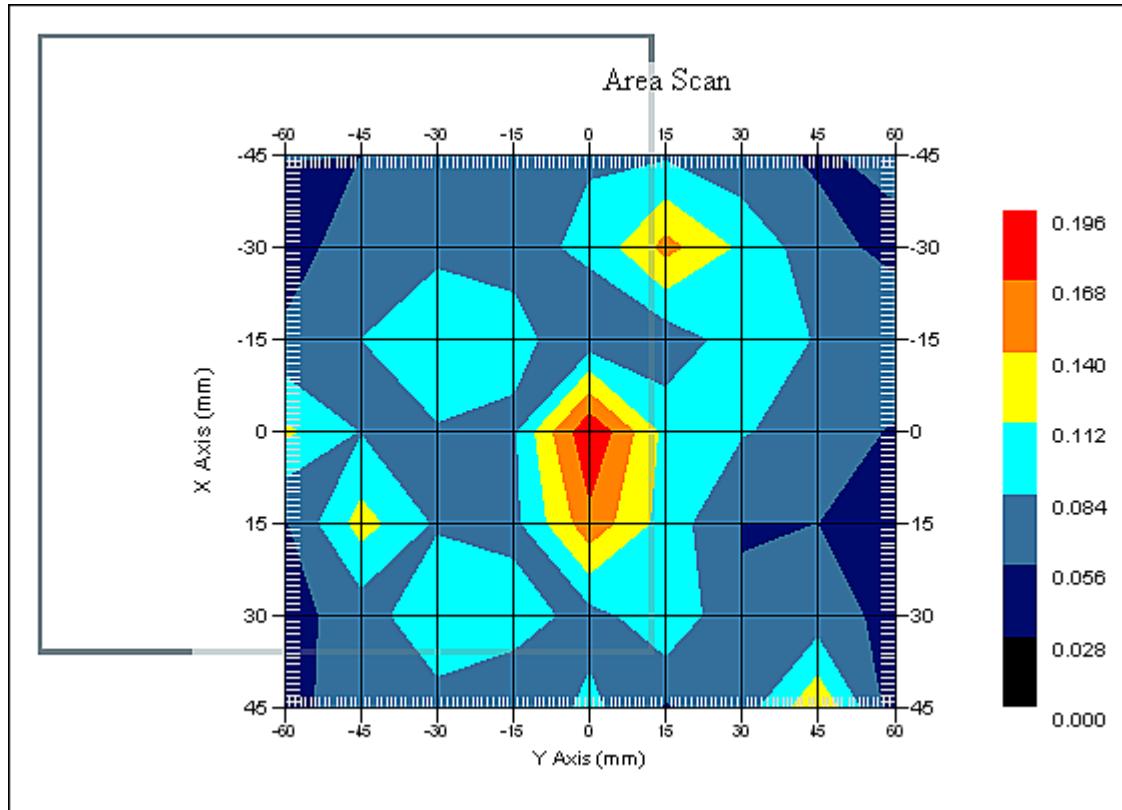
**Measurement Data**

Crest Factor : 4  
Scan Type : Complete  
Tissue Temp. : 23.00 °C  
Ambient Temp. : 23.00 °C  
Set-up Date : 26-Oct-2012  
Set-up Time : 8:05:22 AM  
Area Scan : 7x9x1 : Measurement x=15mm, y=15mm, z=4mm  
Zoom Scan : 5x5x8 : Measurement x=8mm, y=8mm, z=4mm

**Other Data**

DUT Position : Rotated Left 90°  
Separation : 0  
Channel : High

Report No : TSC-101-10-AP-07-0 (SAR )



1 gram SAR value : 0.175 W/kg  
Area Scan Peak SAR : 0.194 W/kg  
Zoom Scan Peak SAR : 0.380 W/kg

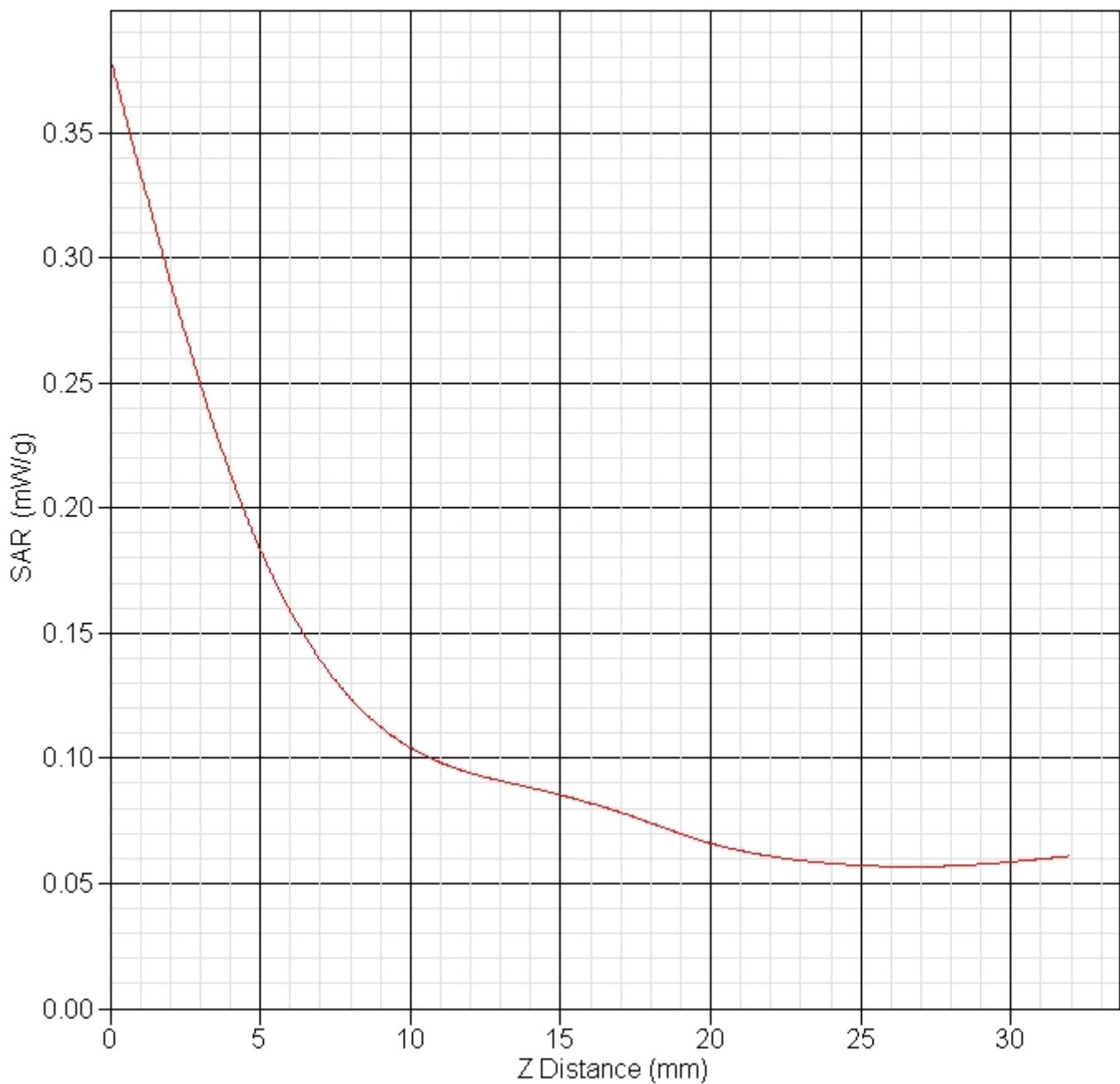
Report No : TSC-101-10-AP-07-0 (SAR )

### **Exposure Assessment Measurement Uncertainty**

<b>Source of Uncertainty</b>	<b>Tolerance Value</b>	<b>Probability Distribution</b>	<b>Divisor</b>	$c_i^1 (1-g)$	<b>Standard Uncertainty (1-g) %</b>
Measurement System					
Probe Calibration	3.5	normal	1	1	3.5
Axial Isotropy	3.7	rectangular	$\sqrt{3}$	$(1 - \frac{cp}{\sqrt{3}})^{1/2}$	1.5
Hemispherical Isotropy	10.9	rectangular	$\sqrt{3}$	$\sqrt{cp}$	4.4
Boundary Effect	1.0	rectangular	$\sqrt{3}$	1	0.6
Linearity	4.7	rectangular	$\sqrt{3}$	1	2.7
Detection Limit	1.0	rectangular	$\sqrt{3}$	1	0.6
Readout Electronics	1.0	normal	1	1	1.0
Response Time	0.8	rectangular	$\sqrt{3}$	1	0.5
Integration Time	1.7	rectangular	$\sqrt{3}$	1	1.0
RF Ambient Condition	3.0	rectangular	$\sqrt{3}$	1	1.7
Probe Positioner Mech.	0.4	rectangular	$\sqrt{3}$	1	0.2
Restriction					
Probe Positioning with respect to Phantom Shell	2.9	rectangular	$\sqrt{3}$	1	1.7
Extrapolation and Integration	3.7	rectangular	$\sqrt{3}$	1	2.1
Test Sample Positioning	4.0	normal	1	1	4.0
Device Holder Uncertainty	2.0	normal	1	1	2.0
Drift of Output Power	4.8	rectangular	$\sqrt{3}$	1	2.8
Phantom and Setup					
Phantom Uncertainty(shape & thickness tolerance)	3.4	rectangular	$\sqrt{3}$	1	2.0
Liquid Conductivity(target)	5.0	rectangular	$\sqrt{3}$	0.7	2.0
Liquid Conductivity(meas.)	0.0	normal	1	0.7	0.0
Liquid Permittivity(target)	5.0	rectangular	$\sqrt{3}$	0.6	1.7
Liquid Permittivity(meas.)	2.4	normal	1	0.6	1.5
Combined Uncertainty		RSS			9.8
Combined Uncertainty (coverage factor=2)		Normal(k=2)			19.6

Report No : TSC-101-10-AP-07-0 (SAR )

SAR-Z Axis  
at Hotspot x:15.11 y:-0.24



Report No : TSC-101-10-AP-07-0 (SAR )

#### A.4.3 WCDMA Mode

**850MHz Band 5**  
**Low Channel Rear Touch**  
**SAR Test Report**

Report Date : 26-Oct-2012  
 By Operator : 123  
 Measurement Date : 26-Oct-2012  
 Starting Time : 26-Oct-2012 04:42:56 PM  
 End Time : 26-Oct-2012 05:09:04 PM  
 Scanning Time : 1568 secs

Product Data  
 Device Name : Winmate  
 Serial No. : M970D  
 Type : Other  
 Model : 835  
 Frequency : 826.40 MHz  
 Max. Transmit Pwr : 1 W  
 Drift Time : 0 min(s)  
 Length : 120 mm  
 Width : 120 mm  
 Depth : 18 mm  
 Antenna Type : Internal  
 Orientation : Rotated Left 90°  
 Power Drift-Start : 0.058 W/kg  
 Power Drift-Finish: 0.060 W/kg  
 Power Drift (%) : 4.601  
 Picture :

Phantom Data  
 Name : APREL-Uni  
 Type : Uni-Phantom  
 Size (mm) : 280 x 280 x 200  
 Serial No. : User Define  
 Location : Center  
 Description : Uni\_Phantom

Tissue Data  
 Type : BODY  
 Serial No. : 835  
 Frequency : 826.00 MHz  
 Last Calib. Date : 26-Oct-2012  
 Temperature : 23.00 °C  
 Ambient Temp. : 23.00 °C  
 Humidity : 50.00 RH%  
 Epsilon : 54.50 F/m  
 Sigma : 0.96 S/m  
 Density : 1000.00 kg/cu. m

Report No : TSC-101-10-AP-07-0 (SAR )

Probe Data

Name : SGL1  
Model : 835  
Type : E-Field Triangle  
Serial No. : SGL1  
Last Calib. Date : 10-Feb-2012  
Frequency : 835.00 MHz  
Duty Cycle Factor: 1  
Conversion Factor: 7.1  
Probe Sensitivity: 1.20 1.20 1.20  $\mu\text{V}/(\text{V}/\text{m})^2$   
Compression Point: 95.00 mV  
Offset : 1.56 mm

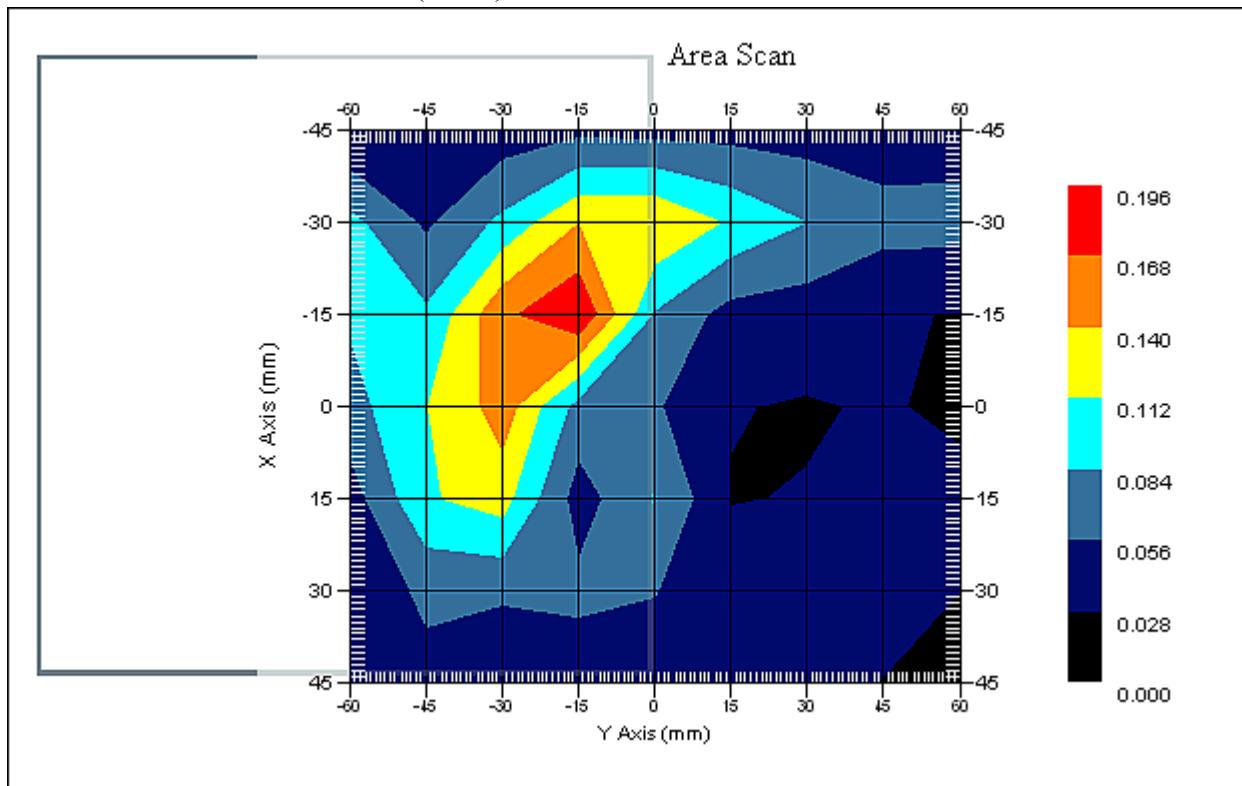
Measurement Data

Crest Factor : 1  
Scan Type : Complete  
Tissue Temp. : 23.00 °C  
Ambient Temp. : 23.00 °C  
Set-up Date : 26-Oct-2012  
Set-up Time : 1:40:00 PM  
Area Scan : 7x9x1 : Measurement x=15mm, y=15mm, z=4mm  
Zoom Scan : 5x5x8 : Measurement x=8mm, y=8mm, z=4mm

Other Data

DUT Position : Rotated Left 90°  
Separation : 0  
Channel : Low

Report No : TSC-101-10-AP-07-0 (SAR )



1 gram SAR value : 0.172 W/kg  
Area Scan Peak SAR : 0.194 W/kg  
Zoom Scan Peak SAR : 0.260 W/kg

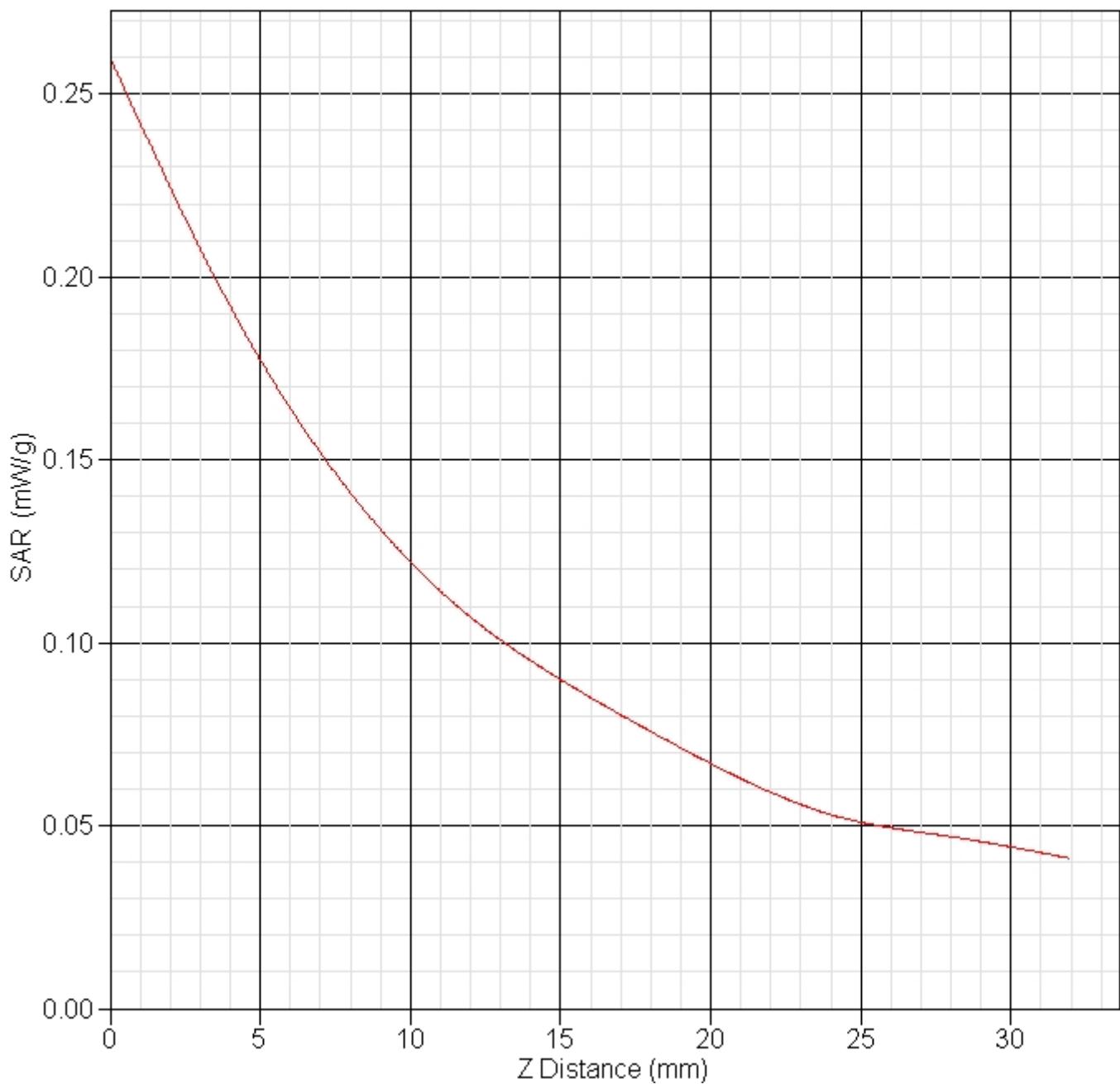
Report No : TSC-101-10-AP-07-0 (SAR )

### **Exposure Assessment Measurement Uncertainty**

<b>Source of Uncertainty</b>	<b>Tolerance Value</b>	<b>Probability Distribution</b>	<b>Divisor</b>	$c_i^1 (1-g)$	<b>Standard Uncertainty (1-g) %</b>
Measurement System					
Probe Calibration	3.5	normal	1	1	3.5
Axial Isotropy	3.7	rectangular	$\sqrt{3}$	$(1 - \frac{1}{cp})^{1/2}$	1.5
Hemispherical Isotropy	10.9	rectangular	$\sqrt{3}$	$\sqrt{cp}$	4.4
Boundary Effect	1.0	rectangular	$\sqrt{3}$	1	0.6
Linearity	4.7	rectangular	$\sqrt{3}$	1	2.7
Detection Limit	1.0	rectangular	$\sqrt{3}$	1	0.6
Readout Electronics	1.0	normal	1	1	1.0
Response Time	0.8	rectangular	$\sqrt{3}$	1	0.5
Integration Time	1.7	rectangular	$\sqrt{3}$	1	1.0
RF Ambient Condition	3.0	rectangular	$\sqrt{3}$	1	1.7
Probe Positioner Mech.	0.4	rectangular	$\sqrt{3}$	1	0.2
Restriction					
Probe Positioning with respect to Phantom Shell	2.9	rectangular	$\sqrt{3}$	1	1.7
Extrapolation and Integration	3.7	rectangular	$\sqrt{3}$	1	2.1
Test Sample Positioning	4.0	normal	1	1	4.0
Device Holder Uncertainty	2.0	normal	1	1	2.0
Drift of Output Power	4.6	rectangular	$\sqrt{3}$	1	2.8
Phantom and Setup					
Phantom Uncertainty(shape & thickness tolerance)	3.4	rectangular	$\sqrt{3}$	1	2.0
Liquid Conductivity(target)	5.0	rectangular	$\sqrt{3}$	0.7	2.0
Liquid Conductivity(meas.)	1.0	normal	1	0.7	0.7
Liquid Permittivity(target)	5.0	rectangular	$\sqrt{3}$	0.6	1.7
Liquid Permittivity(meas.)	0.7	normal	1	0.6	0.4
Combined Uncertainty		RSS			9.9
Combined Uncertainty (coverage factor=2)		Normal(k=2)			19.8

Report No : TSC-101-10-AP-07-0 (SAR )

SAR-Z Axis  
at Hotspot x:0.09 y:-23.24



Report No : TSC-101-10-AP-07-0 (SAR )

**850MHz Band 5**  
**Mid Channel Rear Touch**  
**SAR Test Report**

Report Date : 26-Oct-2012  
By Operator : 123  
Measurement Date : 26-Oct-2012  
Starting Time : 26-Oct-2012 03:30:27 PM  
End Time : 26-Oct-2012 03:56:05 PM  
Scanning Time : 1538 secs

Product Data  
Device Name : Winmate  
Serial No. : M970D  
Type : Other  
Model : 835  
Frequency : 836.60 MHz  
Max. Transmit Pwr : 1 W  
Drift Time : 0 min(s)  
Length : 268 mm  
Width : 205 mm  
Depth : 18 mm  
Antenna Type : Internal  
Orientation : Rotated Left 90°  
Power Drift-Start : 0.145 W/kg  
Power Drift-Finish: 0.148 W/kg  
Power Drift (%) : 2.000  
Picture :

Phantom Data  
Name : APREL-Uni  
Type : Uni-Phantom  
Size (mm) : 280 x 280 x 200  
Serial No. : User Define  
Location : Center  
Description : Uni\_Phantom

Tissue Data  
Type : BODY  
Serial No. : 835  
Frequency : 835.00 MHz  
Last Calib. Date : 26-Oct-2012  
Temperature : 23.00 °C  
Ambient Temp. : 23.00 °C  
Humidity : 50.00 RH%  
Epsilon : 54.80 F/m  
Sigma : 0.98 S/m  
Density : 1000.00 kg/cu. m  
Probe Data  
Name : SGL1  
Model : 835

Report No : TSC-101-10-AP-07-0 (SAR )

Type : E-Field Triangle  
Serial No. : SGL1  
Last Calib. Date : 10-Feb-2012  
Frequency : 835.00 MHz  
Duty Cycle Factor: 1  
Conversion Factor: 7.1  
Probe Sensitivity: 1.20 1.20 1.20  $\mu\text{V}/(\text{V}/\text{m})^2$   
Compression Point: 95.00 mV  
Offset : 1.56 mm

**Measurement Data**

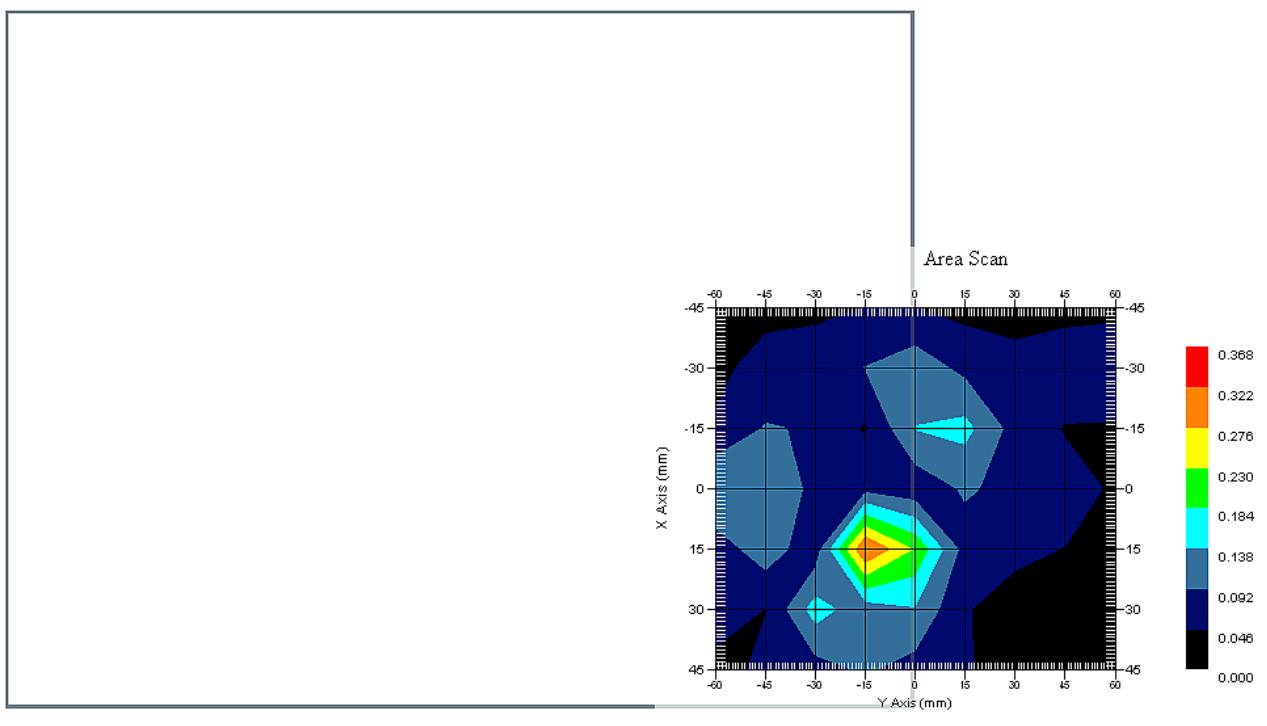
Crest Factor : 1  
Scan Type : Complete  
Tissue Temp. : 23.00 °C  
Ambient Temp. : 23.00 °C  
Set-up Date : 26-Oct-2012  
Set-up Time : 1:40:00 PM  
Area Scan : 7x9x1 : Measurement x=15mm, y=15mm, z=4mm  
Zoom Scan : 5x5x8 : Measurement x=8mm, y=8mm, z=4mm

**Other Data**

DUT Position : Rotated Left 90°  
Separation : 0  
Channel : Mid



Report No : TSC-101-10-AP-07-0 (SAR )



1 gram SAR value : 0.263 W/kg  
Area Scan Peak SAR : 0.324 W/kg  
Zoom Scan Peak SAR : 0.600 W/kg

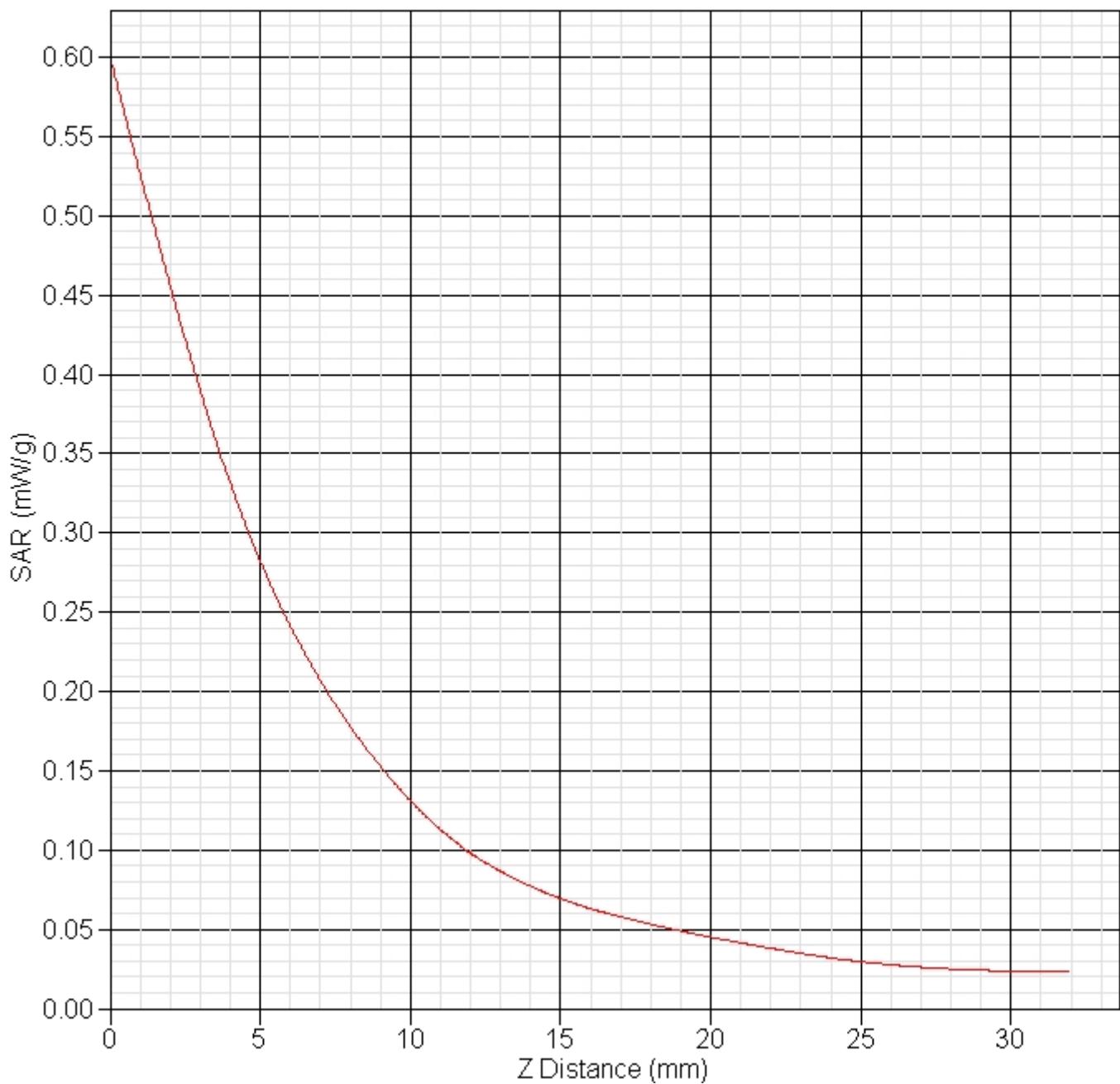
Report No : TSC-101-10-AP-07-0 (SAR )

### **Exposure Assessment Measurement Uncertainty**

<b>Source of Uncertainty</b>	<b>Tolerance Value</b>	<b>Probability Distribution</b>	<b>Divisor</b>	$c_i^1 (1-g)$	<b>Standard Uncertainty (1-g) %</b>
Measurement System					
Probe Calibration	3.5	normal	1	1	3.5
Axial Isotropy	3.7	rectangular	$\sqrt{3}$	$(1 - \frac{1}{cp})^{1/2}$	1.5
Hemispherical Isotropy	10.9	rectangular	$\sqrt{3}$	$\sqrt{cp}$	4.4
Boundary Effect	1.0	rectangular	$\sqrt{3}$	1	0.6
Linearity	4.7	rectangular	$\sqrt{3}$	1	2.7
Detection Limit	1.0	rectangular	$\sqrt{3}$	1	0.6
Readout Electronics	1.0	normal	1	1	1.0
Response Time	0.8	rectangular	$\sqrt{3}$	1	0.5
Integration Time	1.7	rectangular	$\sqrt{3}$	1	1.0
RF Ambient Condition	3.0	rectangular	$\sqrt{3}$	1	1.7
Probe Positioner Mech.	0.4	rectangular	$\sqrt{3}$	1	0.2
Restriction					
Probe Positioning with respect to Phantom Shell	2.9	rectangular	$\sqrt{3}$	1	1.7
Extrapolation and Integration	3.7	rectangular	$\sqrt{3}$	1	2.1
Test Sample Positioning	4.0	normal	1	1	4.0
Device Holder Uncertainty	2.0	normal	1	1	2.0
Drift of Output Power	2.0	rectangular	$\sqrt{3}$	1	1.2
Phantom and Setup					
Phantom Uncertainty(shape & thickness tolerance)	3.4	rectangular	$\sqrt{3}$	1	2.0
Liquid Conductivity(target)	5.0	rectangular	$\sqrt{3}$	0.7	2.0
Liquid Conductivity(meas.)	1.0	normal	1	0.7	0.7
Liquid Permittivity(target)	5.0	rectangular	$\sqrt{3}$	0.6	1.7
Liquid Permittivity(meas.)	0.7	normal	1	0.6	0.4
Combined Uncertainty		RSS			9.3
Combined Uncertainty (coverage factor=2)		Normal(k=2)			18.7

Report No : TSC-101-10-AP-07-0 (SAR )

SAR-Z Axis  
at Hotspot x:30.07 y:-15.24



Report No : TSC-101-10-AP-07-0 (SAR )

**850MHz Band 5**  
**High Channel Rear Touch**  
**SAR Test Report**

Report Date : 26-Oct-2012  
 By Operator : 123  
 Measurement Date : 26-Oct-2012  
 Starting Time : 26-Oct-2012 05:44:30 PM  
 End Time : 26-Oct-2012 06:10:36 PM  
 Scanning Time : 1566 secs

**Product Data**  
 Device Name : Winmate  
 Serial No. : M970D  
 Type : Other  
 Model : 835  
 Frequency : 846.60 MHz  
 Max. Transmit Pwr : 1 W  
 Drift Time : 0 min(s)  
 Length : 120 mm  
 Width : 120 mm  
 Depth : 18 mm  
 Antenna Type : Internal  
 Orientation : Rotated Left 90°  
 Power Drift-Start : 0.054 W/kg  
 Power Drift-Finish: 0.056 W/kg  
 Power Drift (%) : 4.696  
 Picture :

**Phantom Data**  
 Name : APREL-Uni  
 Type : Uni-Phantom  
 Size (mm) : 280 x 280 x 200  
 Serial No. : User Define  
 Location : Center  
 Description : Uni\_Phantom

**Tissue Data**  
 Type : BODY  
 Serial No. : 835  
 Frequency : 846.00 MHz  
 Last Calib. Date : 26-Oct-2012  
 Temperature : 23.00 °C  
 Ambient Temp. : 23.00 °C  
 Humidity : 50.00 RH%  
 Epsilon : 54.60 F/m  
 Sigma : 0.97 S/m  
 Density : 1000.00 kg/cu. m  
**Probe Data**  
 Name : SGL1  
 Model : 835

Report No : TSC-101-10-AP-07-0 (SAR )

Type : E-Field Triangle  
Serial No. : SGL1  
Last Calib. Date : 10-Feb-2012  
Frequency : 835.00 MHz  
Duty Cycle Factor: 1  
Conversion Factor: 7.1  
Probe Sensitivity: 1.20 1.20 1.20  $\mu\text{V}/(\text{V}/\text{m})^2$   
Compression Point: 95.00 mV  
Offset : 1.56 mm

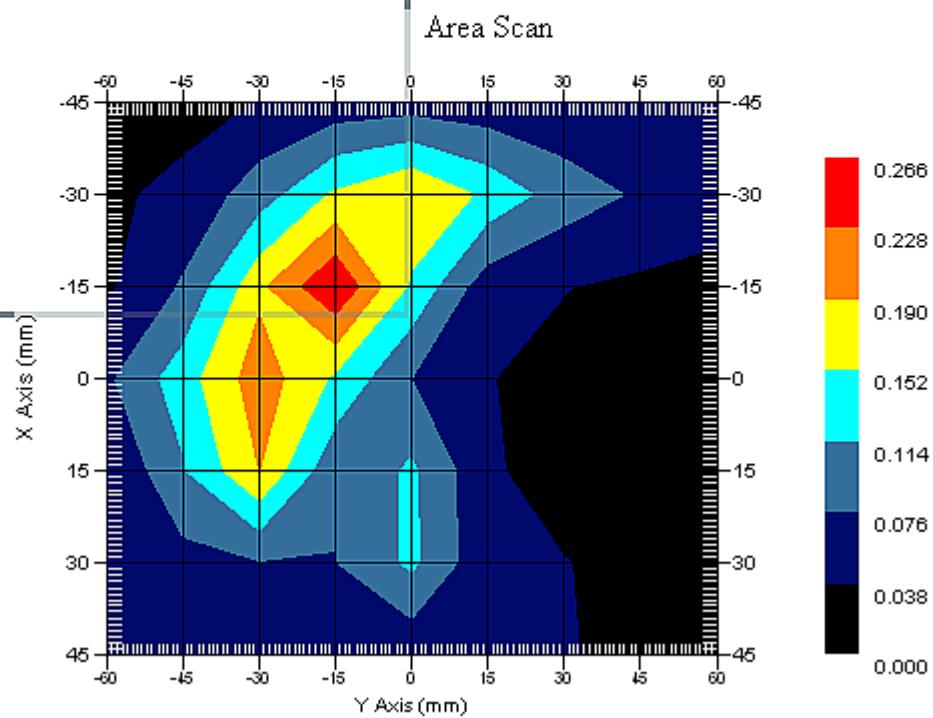
**Measurement Data**

Crest Factor : 1  
Scan Type : Complete  
Tissue Temp. : 23.00 °C  
Ambient Temp. : 23.00 °C  
Set-up Date : 26-Oct-2012  
Set-up Time : 1:40:00 PM  
Area Scan : 7x9x1 : Measurement x=15mm, y=15mm, z=4mm  
Zoom Scan : 5x5x8 : Measurement x=8mm, y=8mm, z=4mm

**Other Data**

DUT Position : Rotated Left 90°  
Separation : 0  
Channel : High

Report No : TSC-101-10-AP-07-0 (SAR )



1 gram SAR value : 0.246 W/kg  
Area Scan Peak SAR : 0.266 W/kg  
Zoom Scan Peak SAR : 0.400 W/kg

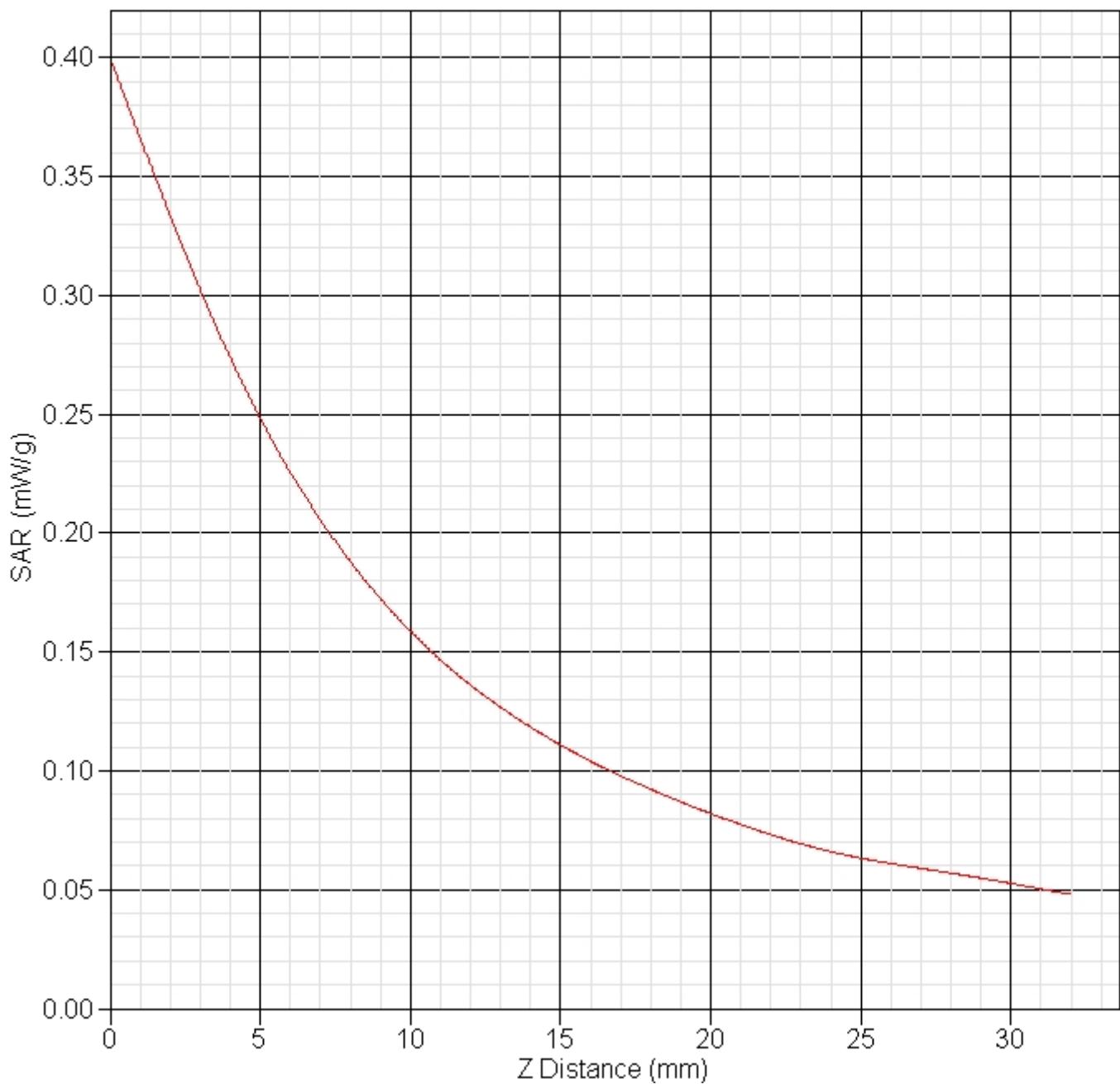
Report No : TSC-101-10-AP-07-0 (SAR )

### **Exposure Assessment Measurement Uncertainty**

<b>Source of Uncertainty</b>	<b>Tolerance Value</b>	<b>Probability Distribution</b>	<b>Divisor</b>	$c_i^1 (1-g)$	<b>Standard Uncertainty (1-g) %</b>
Measurement System					
Probe Calibration	3.5	normal	1	1	3.5
Axial Isotropy	3.7	rectangular	$\sqrt{3}$	$(1 - \frac{1}{cp})^{1/2}$	1.5
Hemispherical Isotropy	10.9	rectangular	$\sqrt{3}$	$\sqrt{cp}$	4.4
Boundary Effect	1.0	rectangular	$\sqrt{3}$	1	0.6
Linearity	4.7	rectangular	$\sqrt{3}$	1	2.7
Detection Limit	1.0	rectangular	$\sqrt{3}$	1	0.6
Readout Electronics	1.0	normal	1	1	1.0
Response Time	0.8	rectangular	$\sqrt{3}$	1	0.5
Integration Time	1.7	rectangular	$\sqrt{3}$	1	1.0
RF Ambient Condition	3.0	rectangular	$\sqrt{3}$	1	1.7
Probe Positioner Mech.	0.4	rectangular	$\sqrt{3}$	1	0.2
Restriction					
Probe Positioning with respect to Phantom Shell	2.9	rectangular	$\sqrt{3}$	1	1.7
Extrapolation and Integration	3.7	rectangular	$\sqrt{3}$	1	2.1
Test Sample Positioning	4.0	normal	1	1	4.0
Device Holder Uncertainty	2.0	normal	1	1	2.0
Drift of Output Power	4.7	rectangular	$\sqrt{3}$	1	3.2
Phantom and Setup					
Phantom Uncertainty(shape & thickness tolerance)	3.4	rectangular	$\sqrt{3}$	1	2.0
Liquid Conductivity(target)	5.0	rectangular	$\sqrt{3}$	0.7	2.0
Liquid Conductivity(meas.)	1.0	normal	1	0.7	0.7
Liquid Permittivity(target)	5.0	rectangular	$\sqrt{3}$	0.6	1.7
Liquid Permittivity(meas.)	0.7	normal	1	0.6	0.4
Combined Uncertainty		RSS			10.2
Combined Uncertainty (coverage factor=2)		Normal(k=2)			20.3

Report No : TSC-101-10-AP-07-0 (SAR )

SAR-Z Axis  
at Hotspot x:0.08 y:-15.24



Report No : TSC-101-10-AP-07-0 (SAR )

**1900 MHz Band 2  
Low Channel Rear Touch**

**SAR Test Report**

Report Date : 25-Oct-2012  
By Operator : 123  
Measurement Date : 25-Oct-2012  
Starting Time : 25-Oct-2012 09:32:46 AM  
End Time : 25-Oct-2012 10:01:11 AM  
Scanning Time : 1705 secs

**Product Data**

Device Name : Winmate  
Serial No. : M970D  
Type : Other  
Model : 1900  
Frequency : 1852.40 MHz  
Max. Transmit Pwr : 1 W  
Drift Time : 0 min(s)  
Length : 120 mm  
Width : 120 mm  
Depth : 18 mm  
Antenna Type : Internal  
Orientation : Rotated Left 90°  
Power Drift-Start : 0.768 W/kg  
Power Drift-Finish: 0.735 W/kg  
Power Drift (%) : -4.049  
Picture :

**Phantom Data**

Name : APREL-Uni  
Type : Uni-Phantom  
Size (mm) : 280 x 280 x 200  
Serial No. : User Define  
Location : Center  
Description : Uni\_Phantom

**Tissue Data**

Type : BODY  
Serial No. : 1900  
Frequency : 1900.00 MHz  
Last Calib. Date : 25-Oct-2012  
Temperature : 23.00 °C  
Ambient Temp. : 23.00 °C  
Humidity : 50.00 RH%  
Epsilon : 52.00 F/m  
Sigma : 1.52 S/m  
Density : 1000.00 kg/cu. m

**Probe Data**

Name : SGL1  
Model : 1800  
Type : E-Field Triangle

Report No : TSC-101-10-AP-07-0 (SAR )

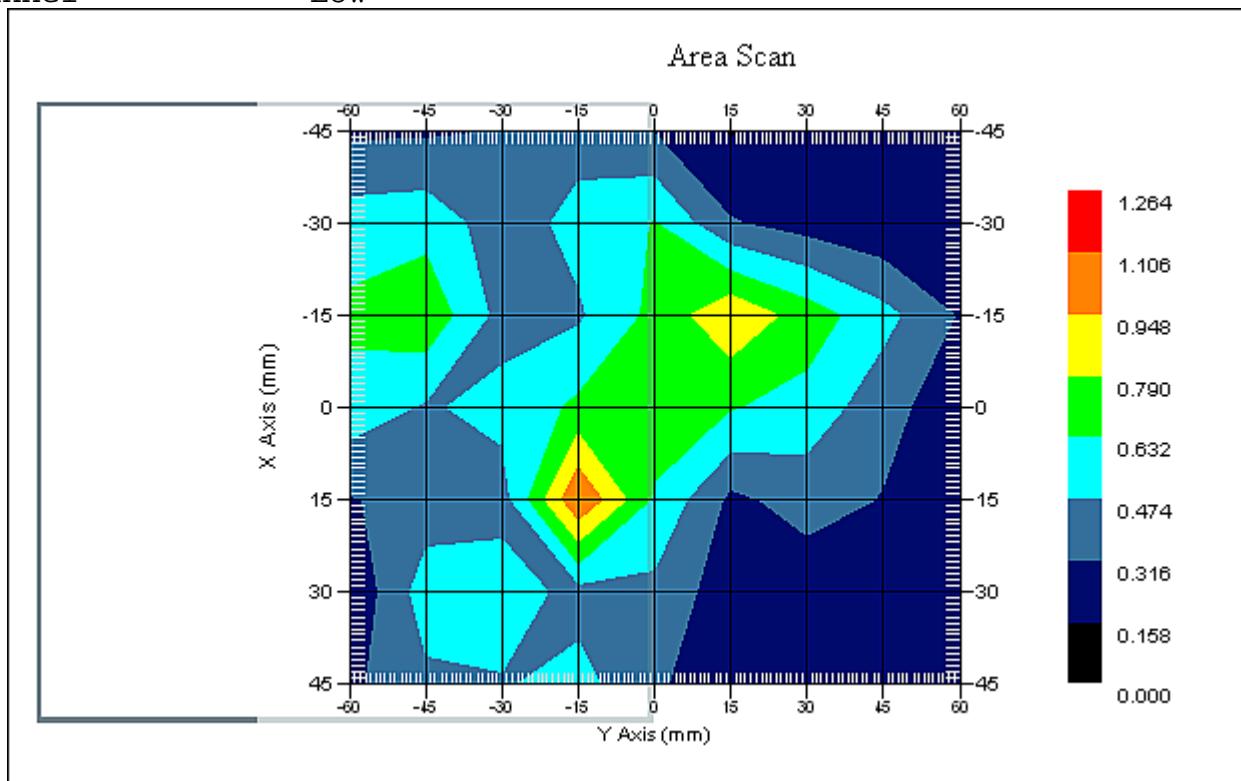
Serial No. : SGL1  
 Last Calib. Date : 10-Feb-2012  
 Frequency : 1800.00 MHz  
 Duty Cycle Factor: 1  
 Conversion Factor: 5.8  
 Probe Sensitivity: 1.20 1.20 1.20  $\mu\text{V}/(\text{V}/\text{m})^2$   
 Compression Point: 95.00 mV  
 Offset : 1.56 mm

**Measurement Data**

Crest Factor : 1  
 Scan Type : Complete  
 Tissue Temp. : 23.00 °C  
 Ambient Temp. : 23.00 °C  
 Set-up Date : 25-Oct-2012  
 Set-up Time : 8:55:53 AM  
 Area Scan : 7x9x1 : Measurement x=15mm, y=15mm, z=4mm  
 Zoom Scan : 5x5x8 : Measurement x=8mm, y=8mm, z=4mm

**Other Data**

DUT Position : Rotated Left 90°  
 Separation : 0  
 Channel : Low



1 gram SAR value : 0.674 W/kg  
 Area Scan Peak SAR : 1.109 W/kg  
 Zoom Scan Peak SAR : 1.871 W/kg

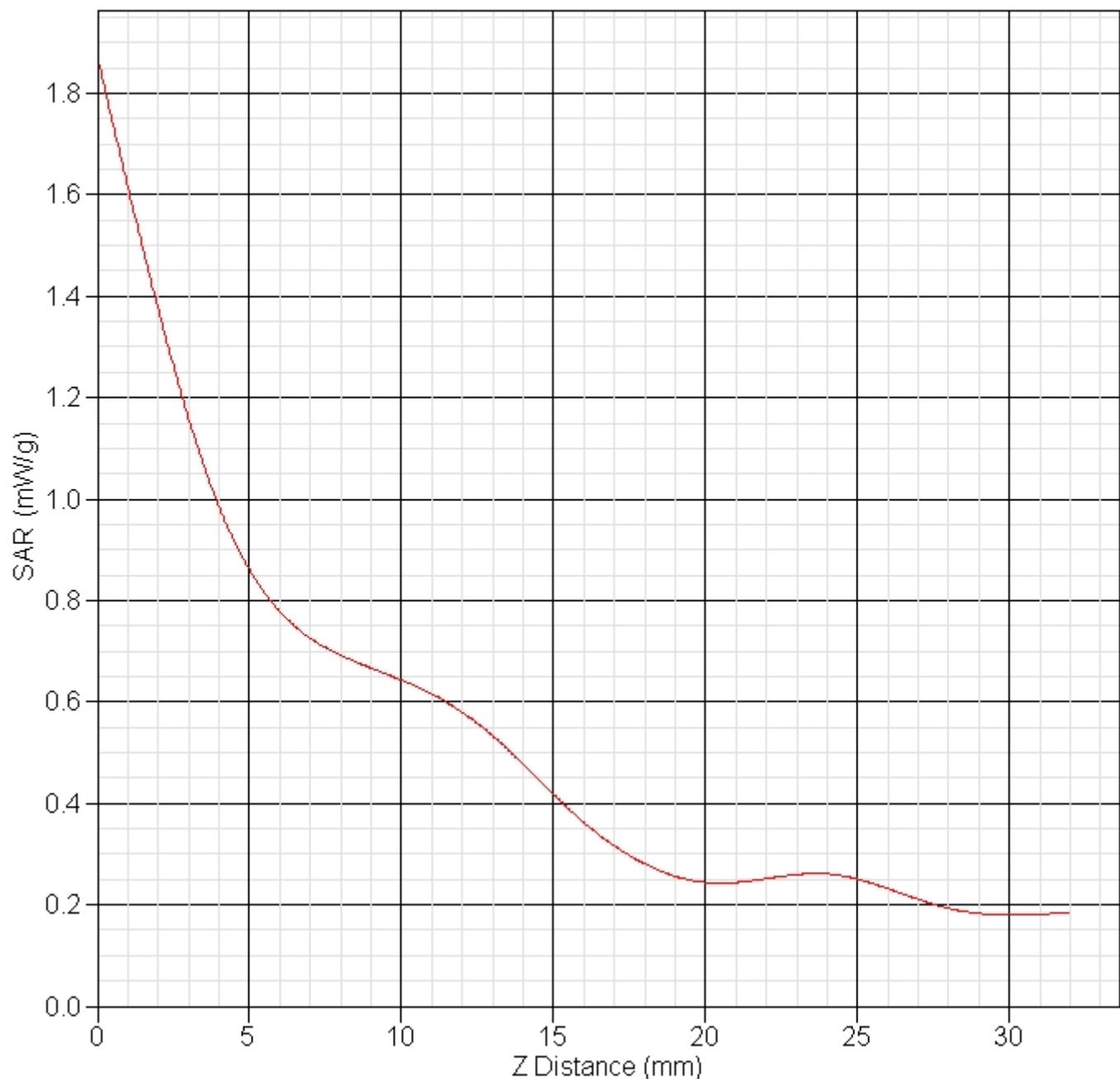
Report No : TSC-101-10-AP-07-0 (SAR )

### **Exposure Assessment Measurement Uncertainty**

Source of Uncertainty	Tolerance Value	Probability Distribution	Divisor	$c_i^1 (1-g)$	Standard Uncertainty (1-g) %
Measurement System					
Probe Calibration	3.5	normal	1	1	3.5
Axial Isotropy	3.7	rectangular	$\sqrt{3}$	$(1 - \frac{cp}{\sqrt{3}})^{1/2}$	1.5
Hemispherical Isotropy	10.9	rectangular	$\sqrt{3}$	$\sqrt{cp}$	4.4
Boundary Effect	1.0	rectangular	$\sqrt{3}$	1	0.6
Linearity	4.7	rectangular	$\sqrt{3}$	1	2.7
Detection Limit	1.0	rectangular	$\sqrt{3}$	1	0.6
Readout Electronics	1.0	normal	1	1	1.0
Response Time	0.8	rectangular	$\sqrt{3}$	1	0.5
Integration Time	1.7	rectangular	$\sqrt{3}$	1	1.0
RF Ambient Condition	3.0	rectangular	$\sqrt{3}$	1	1.7
Probe Positioner Mech.	0.4	rectangular	$\sqrt{3}$	1	0.2
Restriction					
Probe Positioning with respect to Phantom Shell	2.9	rectangular	$\sqrt{3}$	1	1.7
Extrapolation and Integration	3.7	rectangular	$\sqrt{3}$	1	2.1
Test Sample Positioning	4.0	normal	1	1	4.0
Device Holder Uncertainty	2.0	normal	1	1	2.0
Drift of Output Power	4.0	rectangular	$\sqrt{3}$	1	2.5
Phantom and Setup					
Phantom Uncertainty(shape & thickness tolerance)	3.4	rectangular	$\sqrt{3}$	1	2.0
Liquid Conductivity(target)	5.0	rectangular	$\sqrt{3}$	0.7	2.0
Liquid Conductivity(meas.)	0.0	normal	1	0.7	0.0
Liquid Permittivity(target)	5.0	rectangular	$\sqrt{3}$	0.6	1.7
Liquid Permittivity(meas.)	2.4	normal	1	0.6	1.5
Combined Uncertainty		RSS			9.8
Combined Uncertainty (coverage factor=2)		Normal(k=2)			19.6

Report No : TSC-101-10-AP-07-0 (SAR )

**SAR-Z Axis**  
at Hotspot x:30.08 y:-15.24



Report No : TSC-101-10-AP-07-0 (SAR )

**1900 MHz Band 2  
Mid Channel Rear Touch**

**SAR Test Report**

Report Date : 25-Oct-2012  
 By Operator : 123  
 Measurement Date : 25-Oct-2012  
 Starting Time : 25-Oct-2012 10:02:33 AM  
 End Time : 25-Oct-2012 10:31:26 AM  
 Scanning Time : 1733 secs

**Product Data**

Device Name : Winmate  
 Serial No. : M970D  
 Type : Other  
 Model : 1900  
 Frequency : 1880.00 MHz  
 Max. Transmit Pwr : 1 W  
 Drift Time : 0 min(s)  
 Length : 120 mm  
 Width : 120 mm  
 Depth : 18 mm  
 Antenna Type : Internal  
 Orientation : Rotated Left 90°  
 Power Drift-Start : 0.705 W/kg  
 Power Drift-Finish: 0.700 W/kg  
 Power Drift (%) : -0.609  
 Picture :

**Phantom Data**

Name : APREL-Uni  
 Type : Uni-Phantom  
 Size (mm) : 280 x 280 x 200  
 Serial No. : User Define  
 Location : Center  
 Description : Uni\_Phantom

**Tissue Data**

Type : BODY  
 Serial No. : 1900  
 Frequency : 1900.00 MHz  
 Last Calib. Date : 25-Oct-2012  
 Temperature : 23.00 °C  
 Ambient Temp. : 23.00 °C  
 Humidity : 50.00 RH%  
 Epsilon : 52.80 F/m  
 Sigma : 1.54 S/m  
 Density : 1000.00 kg/cu. m

**Probe Data**

Name : SGL1  
 Model : 1800  
 Type : E-Field Triangle

Report No : TSC-101-10-AP-07-0 (SAR )

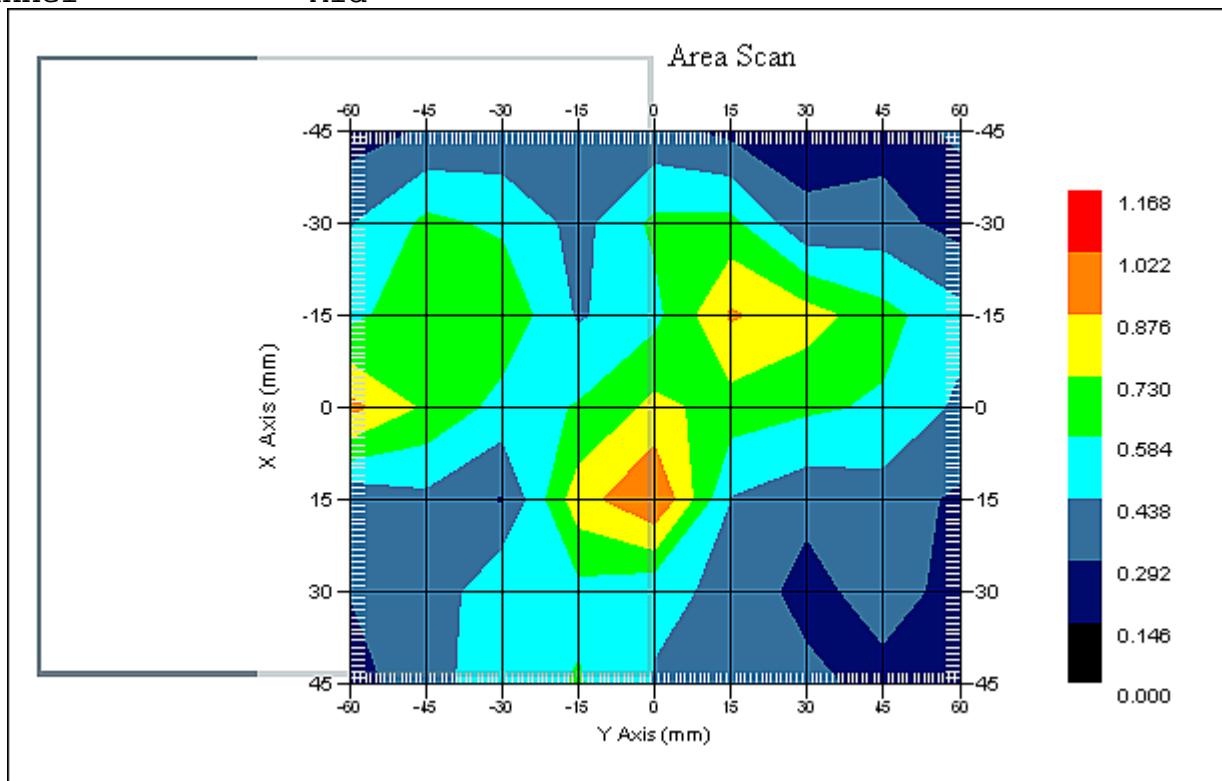
Serial No. : SGL1  
 Last Calib. Date : 10-Feb-2012  
 Frequency : 1800.00 MHz  
 Duty Cycle Factor: 1  
 Conversion Factor: 5.8  
 Probe Sensitivity: 1.20 1.20 1.20  $\mu\text{V}/(\text{V}/\text{m})^2$   
 Compression Point: 95.00 mV  
 Offset : 1.56 mm

Measurement Data

Crest Factor : 1  
 Scan Type : Complete  
 Tissue Temp. : 23.00 °C  
 Ambient Temp. : 23.00 °C  
 Set-up Date : 25-Oct-2012  
 Set-up Time : 8:55:53 AM  
 Area Scan : 7x9x1 : Measurement x=15mm, y=15mm, z=4mm  
 Zoom Scan : 5x5x8 : Measurement x=8mm, y=8mm, z=4mm

Other Data

DUT Position : Rotated Left 90°  
 Separation : 0  
 Channel : Mid



1 gram SAR value : 0.770 W/kg  
 Area Scan Peak SAR : 1.023 W/kg  
 Zoom Scan Peak SAR : 1.141 W/kg

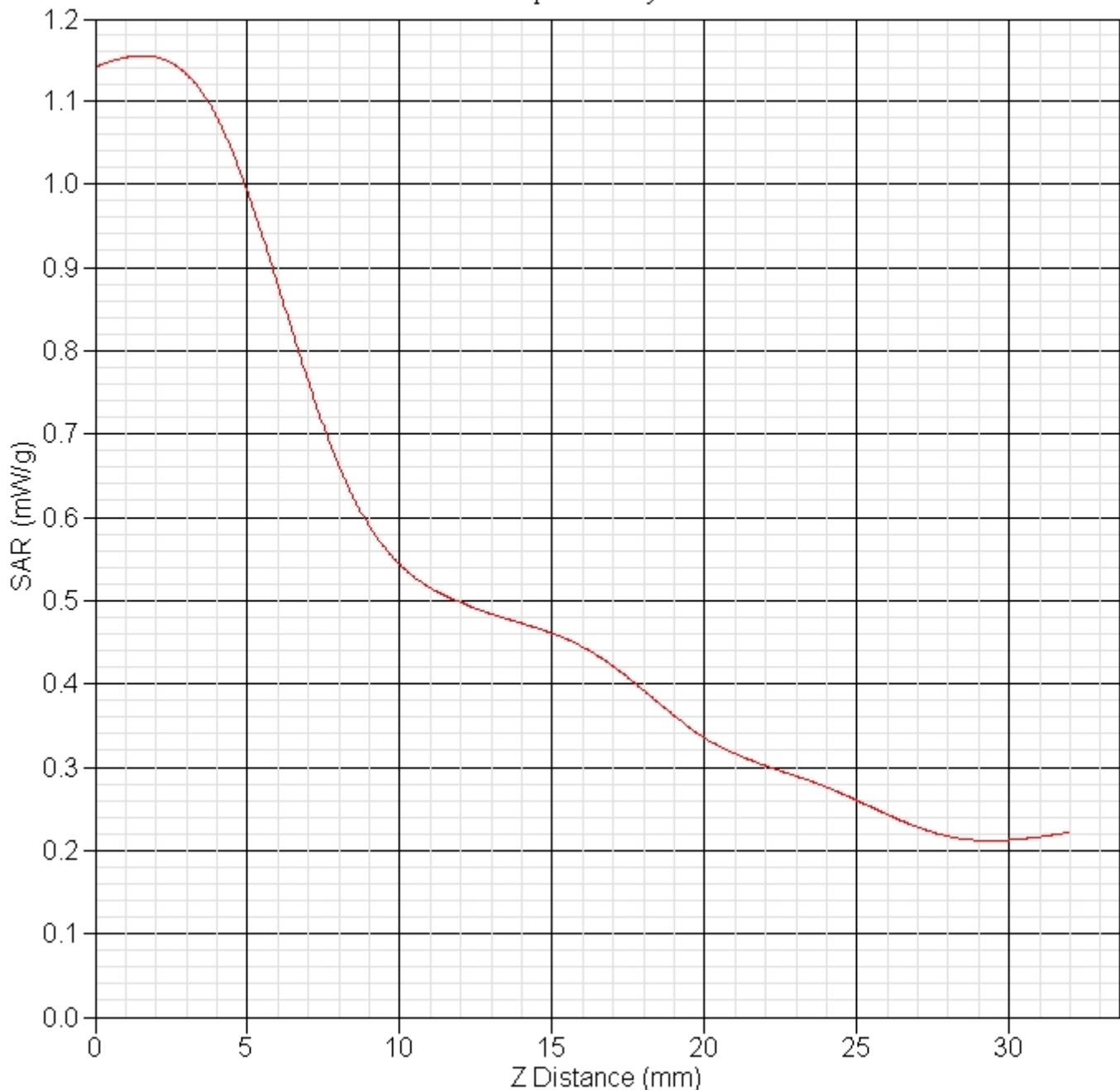
Report No : TSC-101-10-AP-07-0 (SAR )

### **Exposure Assessment Measurement Uncertainty**

Source of Uncertainty	Tolerance Value	Probability Distribution	Divisor	$c_i^t (1-g)$	Standard Uncertainty (1-g) %
Measurement System					
Probe Calibration	3.5	normal	1	1	3.5
Axial Isotropy	3.7	rectangular	$\sqrt{3}$	$(1 - \frac{cp}{\sqrt{3}})^{1/2}$	1.5
Hemispherical Isotropy	10.9	rectangular	$\sqrt{3}$	$\sqrt{cp}$	4.4
Boundary Effect	1.0	rectangular	$\sqrt{3}$	1	0.6
Linearity	4.7	rectangular	$\sqrt{3}$	1	2.7
Detection Limit	1.0	rectangular	$\sqrt{3}$	1	0.6
Readout Electronics	1.0	normal	1	1	1.0
Response Time	0.8	rectangular	$\sqrt{3}$	1	0.5
Integration Time	1.7	rectangular	$\sqrt{3}$	1	1.0
RF Ambient Condition	3.0	rectangular	$\sqrt{3}$	1	1.7
Probe Positioner Mech.	0.4	rectangular	$\sqrt{3}$	1	0.2
Restriction					
Probe Positioning with respect to Phantom Shell	2.9	rectangular	$\sqrt{3}$	1	1.7
Extrapolation and Integration	3.7	rectangular	$\sqrt{3}$	1	2.1
Test Sample Positioning	4.0	normal	1	1	4.0
Device Holder Uncertainty	2.0	normal	1	1	2.0
Drift of Output Power	0.6	rectangular	$\sqrt{3}$	1	0.4
Phantom and Setup					
Phantom Uncertainty(shape & thickness tolerance)	3.4	rectangular	$\sqrt{3}$	1	2.0
Liquid Conductivity(target)	5.0	rectangular	$\sqrt{3}$	0.7	2.0
Liquid Conductivity(meas.)	0.0	normal	1	0.7	0.0
Liquid Permittivity(target)	5.0	rectangular	$\sqrt{3}$	0.6	1.7
Liquid Permittivity(meas.)	2.4	normal	1	0.6	1.5
Combined Uncertainty		RSS			9.4
Combined Uncertainty (coverage factor=2)		Normal(k=2)			18.7

Report No : TSC-101-10-AP-07-0 (SAR )

SAR-Z Axis  
at Hotspot x:22.10 y:-0.25



Report No : TSC-101-10-AP-07-0 (SAR )

### 1900 MHz Band 2

### High Channel Rear Touch

### SAR Test Report

Report Date : 25-Oct-2012  
 By Operator : 123  
 Measurement Date : 25-Oct-2012  
 Starting Time : 25-Oct-2012 03:44:25 PM  
 End Time : 25-Oct-2012 04:10:34 PM  
 Scanning Time : 1569 secs

#### Product Data

Device Name : Winmate  
 Serial No. : M970D  
 Type : Other  
 Model : 1900  
 Frequency : 1907.60 MHz  
 Max. Transmit Pwr : 1 W  
 Drift Time : 0 min(s)  
 Length : 120 mm  
 Width : 120 mm  
 Depth : 18 mm  
 Antenna Type : Internal  
 Orientation : Rotated Left 90°  
 Power Drift-Start : 0.157 W/kg  
 Power Drift-Finish: 0.149 W/kg  
 Power Drift (%) : -4.374  
 Picture :

#### Phantom Data

Name : APREL-Uni  
 Type : Uni-Phantom  
 Size (mm) : 280 x 280 x 200  
 Serial No. : User Define  
 Location : Center  
 Description : Uni\_Phantom

#### Tissue Data

Type : BODY  
 Serial No. : 1900  
 Frequency : 1900.00 MHz  
 Last Calib. Date : 25-Oct-2012  
 Temperature : 23.00 °C  
 Ambient Temp. : 23.00 °C  
 Humidity : 50.00 RH%  
 Epsilon : 52.00 F/m  
 Sigma : 1.52 S/m  
 Density : 1000.00 kg/cu. m

#### Probe Data

Name : SGL1  
 Model : 2000  
 Type : E-Field Triangle

Report No : TSC-101-10-AP-07-0 (SAR )

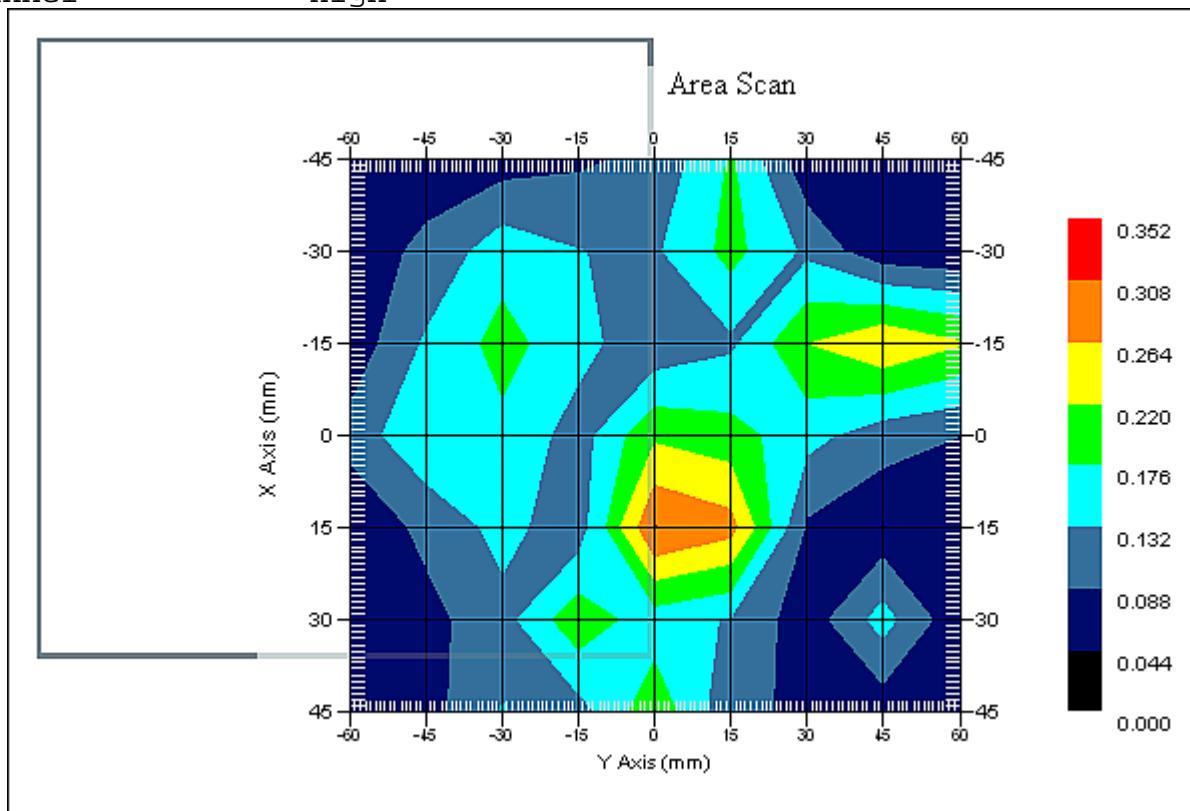
Serial No. : SGL1  
 Last Calib. Date : 10-Feb-2012  
 Frequency : 2000.00 MHz  
 Duty Cycle Factor: 1  
 Conversion Factor: 6  
 Probe Sensitivity: 1.20 1.20 1.20  $\mu\text{V}/(\text{V}/\text{m})^2$   
 Compression Point: 95.00 mV  
 Offset : 1.56 mm

**Measurement Data**

Crest Factor : 1  
 Scan Type : Complete  
 Tissue Temp. : 23.00 °C  
 Ambient Temp. : 23.00 °C  
 Set-up Date : 25-Oct-2012  
 Set-up Time : 8:55:53 AM  
 Area Scan : 7x9x1 : Measurement x=15mm, y=15mm, z=4mm  
 Zoom Scan : 5x5x8 : Measurement x=8mm, y=8mm, z=4mm

**Other Data**

DUT Position : Rotated Left 90°  
 Separation : 0  
 Channel : High



1 gram SAR value : 0.325 W/kg  
 Area Scan Peak SAR : 0.310 W/kg  
 Zoom Scan Peak SAR : 0.650 W/kg

Report No : TSC-101-10-AP-07-0 (SAR )

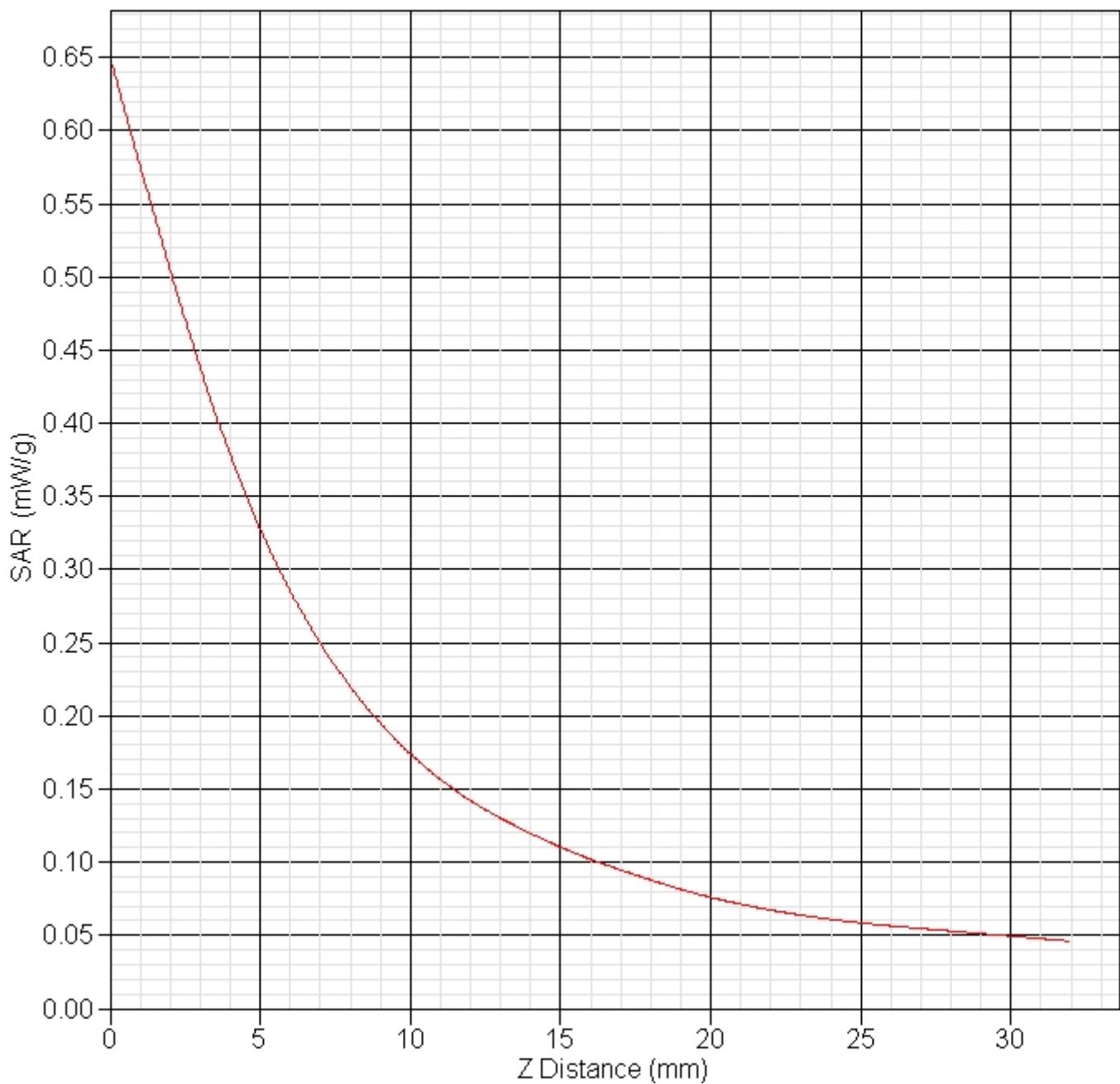
Report No : TSC-101-10-AP-07-0 (SAR )

### **Exposure Assessment Measurement Uncertainty**

<b>Source of Uncertainty</b>	<b>Tolerance Value</b>	<b>Probability Distribution</b>	<b>Divisor</b>	$c_i^1 (1-g)$	<b>Standard Uncertainty (1-g) %</b>
Measurement System					
Probe Calibration	3.5	normal	1	1	3.5
Axial Isotropy	3.7	rectangular	$\sqrt{3}$	$(1 - \frac{cp}{\sqrt{3}})^{1/2}$	1.5
Hemispherical Isotropy	10.9	rectangular	$\sqrt{3}$	$\sqrt{cp}$	4.4
Boundary Effect	1.0	rectangular	$\sqrt{3}$	1	0.6
Linearity	4.7	rectangular	$\sqrt{3}$	1	2.7
Detection Limit	1.0	rectangular	$\sqrt{3}$	1	0.6
Readout Electronics	1.0	normal	1	1	1.0
Response Time	0.8	rectangular	$\sqrt{3}$	1	0.5
Integration Time	1.7	rectangular	$\sqrt{3}$	1	1.0
RF Ambient Condition	3.0	rectangular	$\sqrt{3}$	1	1.7
Probe Positioner Mech.	0.4	rectangular	$\sqrt{3}$	1	0.2
Restriction					
Probe Positioning with respect to Phantom Shell	2.9	rectangular	$\sqrt{3}$	1	1.7
Extrapolation and Integration	3.7	rectangular	$\sqrt{3}$	1	2.1
Test Sample Positioning	4.0	normal	1	1	4.0
Device Holder Uncertainty	2.0	normal	1	1	2.0
Drift of Output Power	4.4	rectangular	$\sqrt{3}$	1	2.7
Phantom and Setup					
Phantom Uncertainty(shape & thickness tolerance)	3.4	rectangular	$\sqrt{3}$	1	2.0
Liquid Conductivity(target)	5.0	rectangular	$\sqrt{3}$	0.7	2.0
Liquid Conductivity(meas.)	0.0	normal	1	0.7	0.0
Liquid Permittivity(target)	5.0	rectangular	$\sqrt{3}$	0.6	1.7
Liquid Permittivity(meas.)	2.4	normal	1	0.6	1.5
Combined Uncertainty		RSS			9.8
Combined Uncertainty (coverage factor=2)		Normal(k=2)			19.6

Report No : TSC-101-10-AP-07-0 (SAR )

SAR-Z Axis  
at Hotspot x:22.07 y:-0.24



Report No : TSC-101-10-AP-07-0 (SAR )

#### A.4.4 CDMA2000 Mode

##### **850 MHz Band BC0 Low Channel Rear Touch**

##### **SAR Test Report**

Report Date : 01-Nov-2012  
 By Operator : 123  
 Measurement Date : 01-Nov-2012  
 Starting Time : 01-Nov-2012 11:19:37 AM  
 End Time : 01-Nov-2012 11:46:37 AM  
 Scanning Time : 1620 secs

Product Data  
 Device Name : Winmate  
 Serial No. : M970D  
 Type : Other  
 Model : 835  
 Frequency : 824.70 MHz  
 Max. Transmit Pwr : 2 W  
 Drift Time : 0 min(s)  
 Length : 120 mm  
 Width : 120 mm  
 Depth : 18 mm  
 Antenna Type : Internal  
 Orientation : Rotated Left 90°  
 Power Drift-Start : 0.223 W/kg  
 Power Drift-Finish: 0.220 W/kg  
 Power Drift (%) : -0.944  
 Picture :

Phantom Data  
 Name : APREL-Uni  
 Type : Uni-Phantom  
 Size (mm) : 280 x 280 x 200  
 Serial No. : User Define  
 Location : Center  
 Description : Uni\_Phantom

Tissue Data  
 Type : BODY  
 Serial No. : 835  
 Frequency : 835.00 MHz  
 Last Calib. Date : 01-Nov-2012  
 Temperature : 23.00 °C  
 Ambient Temp. : 23.00 °C  
 Humidity : 55.00 RH%  
 Epsilon : 53.20 F/m  
 Sigma : 0.99 S/m  
 Density : 1000.00 kg/cu. m

Report No : TSC-101-10-AP-07-0 (SAR )

Probe Data

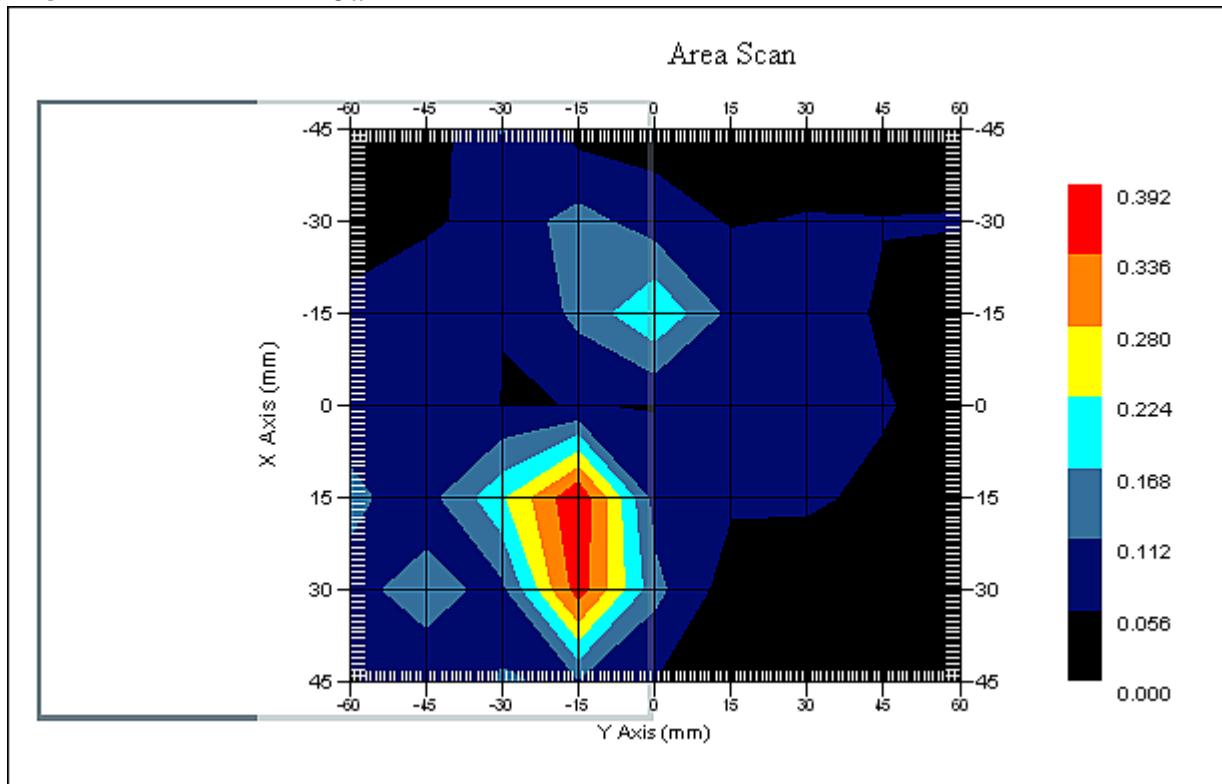
Name : SGL1  
 Model : 835  
 Type : E-Field Triangle  
 Serial No. : SGL1  
 Last Calib. Date : 10-Feb-2012  
 Frequency : 835.00 MHz  
 Duty Cycle Factor: 1  
 Conversion Factor: 7.1  
 Probe Sensitivity: 1.20 1.20 1.20  $\mu\text{V}/(\text{V}/\text{m})^2$   
 Compression Point: 95.00 mV  
 Offset : 1.56 mm

Measurement Data

Crest Factor : 1  
 Scan Type : Complete  
 Tissue Temp. : 23.00 °C  
 Ambient Temp. : 23.00 °C  
 Set-up Date : 01-Nov-2012  
 Set-up Time : 8:20:05 AM  
 Area Scan : 7x9x1 : Measurement x=15mm, y=15mm, z=4mm  
 Zoom Scan : 5x5x8 : Measurement x=8mm, y=8mm, z=4mm

Other Data

DUT Position : Rotated Left 90°  
 Separation : 0  
 Channel : Low



1 gram SAR value : 0.407 W/kg

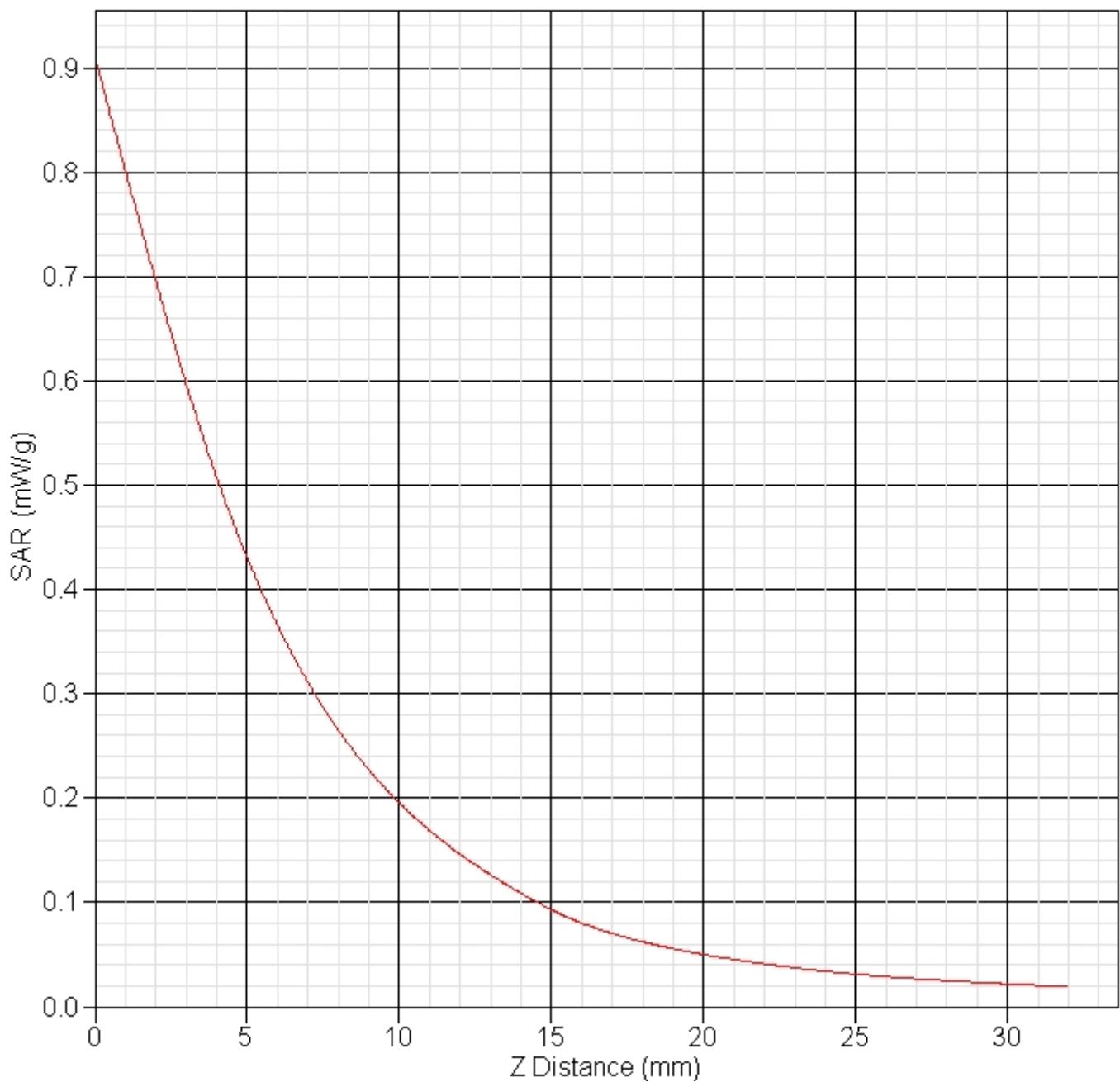
Report No : TSC-101-10-AP-07-0 (SAR )  
 Area Scan Peak SAR : 0.390 W/kg  
 Zoom Scan Peak SAR : 0.910 W/kg

### **Exposure Assessment Measurement Uncertainty**

Source of Uncertainty	Tolerance Value	Probability Distribution	Divisor	$c_i^1 (1-g)$	Standard Uncertainty (1-g) %
Measurement System					
Probe Calibration	3.5	normal	1	1	3.5
Axial Isotropy	3.7	rectangular	$\sqrt{3}$	$(1 - \frac{cp}{1})^{1/2}$	1.5
Hemispherical Isotropy	10.9	rectangular	$\sqrt{3}$	$\sqrt{cp}$	4.4
Boundary Effect	1.0	rectangular	$\sqrt{3}$	1	0.6
Linearity	4.7	rectangular	$\sqrt{3}$	1	2.7
Detection Limit	1.0	rectangular	$\sqrt{3}$	1	0.6
Readout Electronics	1.0	normal	1	1	1.0
Response Time	0.8	rectangular	$\sqrt{3}$	1	0.5
Integration Time	1.7	rectangular	$\sqrt{3}$	1	1.0
RF Ambient Condition	3.0	rectangular	$\sqrt{3}$	1	1.7
Probe Positioner Mech.	0.4	rectangular	$\sqrt{3}$	1	0.2
Restriction					
Probe Positioning with respect to Phantom Shell	2.9	rectangular	$\sqrt{3}$	1	1.7
Extrapolation and Integration	3.7	rectangular	$\sqrt{3}$	1	2.1
Test Sample Positioning	4.0	normal	1	1	4.0
Device Holder Uncertainty	2.0	normal	1	1	2.0
Drift of Output Power	0.9	rectangular	$\sqrt{3}$	1	0.5
Phantom and Setup					
Phantom Uncertainty(shape & thickness tolerance)	3.4	rectangular	$\sqrt{3}$	1	2.0
Liquid Conductivity(target)	5.0	rectangular	$\sqrt{3}$	0.7	2.0
Liquid Conductivity(meas.)	1.0	normal	1	0.7	0.7
Liquid Permittivity(target)	5.0	rectangular	$\sqrt{3}$	0.6	1.7
Liquid Permittivity(meas.)	2.7	normal	1	0.6	1.6
Combined Uncertainty		RSS			9.4
Combined Uncertainty (coverage factor=2)		Normal(k=2)			18.8

Report No : TSC-101-10-AP-07-0 (SAR )

SAR-Z Axis  
at Hotspot x:38.06 y:-23.25



Report No : TSC-101-10-AP-07-0 (SAR )

**850 MHz Band BC0  
Mid Channel Rear Touch**

**SAR Test Report**

Report Date : 01-Nov-2012  
 By Operator : 123  
 Measurement Date : 01-Nov-2012  
 Starting Time : 01-Nov-2012 10:16:35 AM  
 End Time : 01-Nov-2012 10:44:00 AM  
 Scanning Time : 1645 secs

**Product Data**

Device Name : Winmate  
 Serial No. : M970D  
 Type : Other  
 Model : 835  
 Frequency : 8336.52 MHz  
 Max. Transmit Pwr : 1 W  
 Drift Time : 0 min(s)  
 Length : 120 mm  
 Width : 120 mm  
 Depth : 18 mm  
 Antenna Type : Internal  
 Orientation : Rotated Left 90°  
 Power Drift-Start : 0.219 W/kg  
 Power Drift-Finish: 0.218 W/kg  
 Power Drift (%) : -0.502  
 Picture :

**Phantom Data**

Name : APREL-Uni  
 Type : Uni-Phantom  
 Size (mm) : 280 x 280 x 200  
 Serial No. : User Define  
 Location : Center  
 Description : Uni\_Phantom

**Tissue Data**

Type : BODY  
 Serial No. : 835  
 Frequency : 835.00 MHz  
 Last Calib. Date : 31-Oct-2012  
 Temperature : 23.00 °C  
 Ambient Temp. : 23.00 °C  
 Humidity : 55.00 RH%  
 Epsilon : 53.10 F/m  
 Sigma : 0.96 S/m  
 Density : 1000.00 kg/cu. m

**Probe Data**

Name : SGL1  
 Model : 835  
 Type : E-Field Triangle

Report No : TSC-101-10-AP-07-0 (SAR )

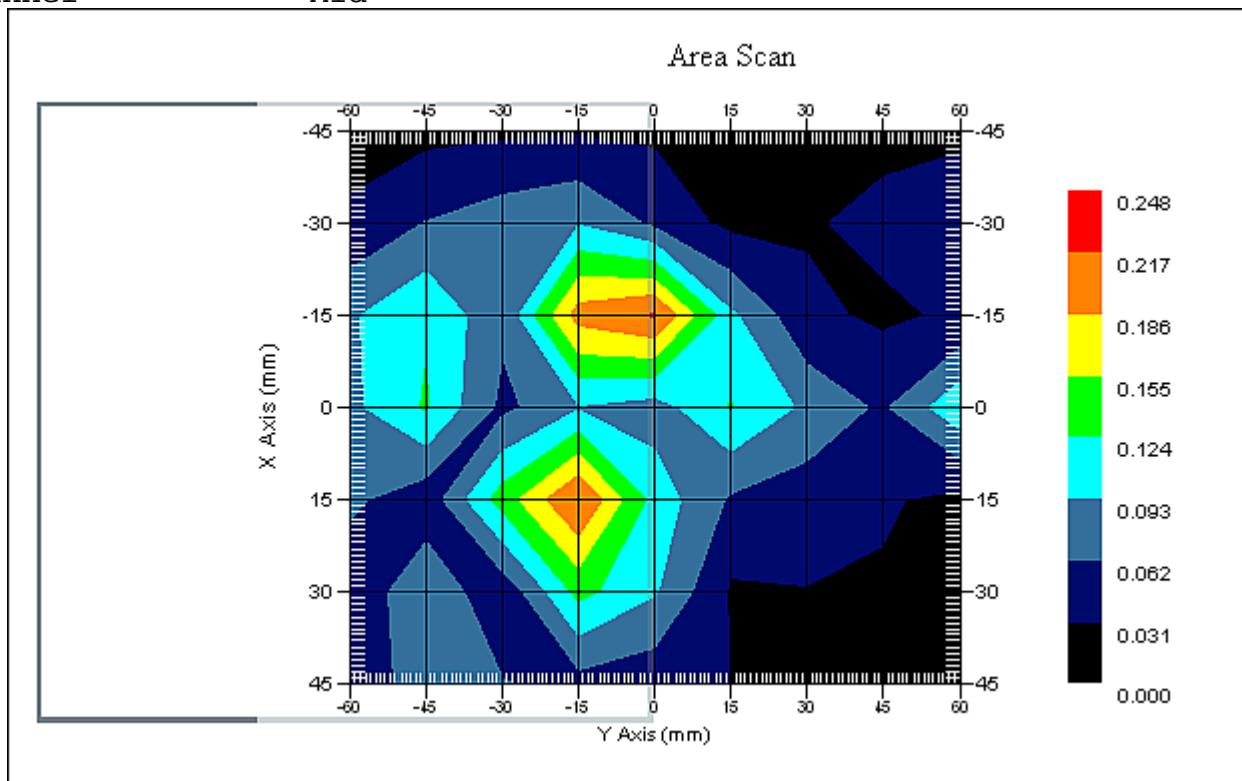
Serial No. : SGL1  
 Last Calib. Date : 10-Feb-2012  
 Frequency : 835.00 MHz  
 Duty Cycle Factor: 1  
 Conversion Factor: 7.1  
 Probe Sensitivity: 1.20 1.20 1.20  $\mu\text{V}/(\text{V}/\text{m})^2$   
 Compression Point: 95.00 mV  
 Offset : 1.56 mm

**Measurement Data**

Crest Factor : 1  
 Scan Type : Complete  
 Tissue Temp. : 23.00 °C  
 Ambient Temp. : 23.00 °C  
 Set-up Date : 01-Nov-2012  
 Set-up Time : 8:20:05 AM  
 Area Scan : 7x9x1 : Measurement x=15mm, y=15mm, z=4mm  
 Zoom Scan : 5x5x8 : Measurement x=8mm, y=8mm, z=4mm

**Other Data**

DUT Position : Rotated Left 90°  
 Separation : 0  
 Channel : Mid



1 gram SAR value : 0.204 W/kg  
 Area Scan Peak SAR : 0.220 W/kg  
 Zoom Scan Peak SAR : 0.480 W/kg

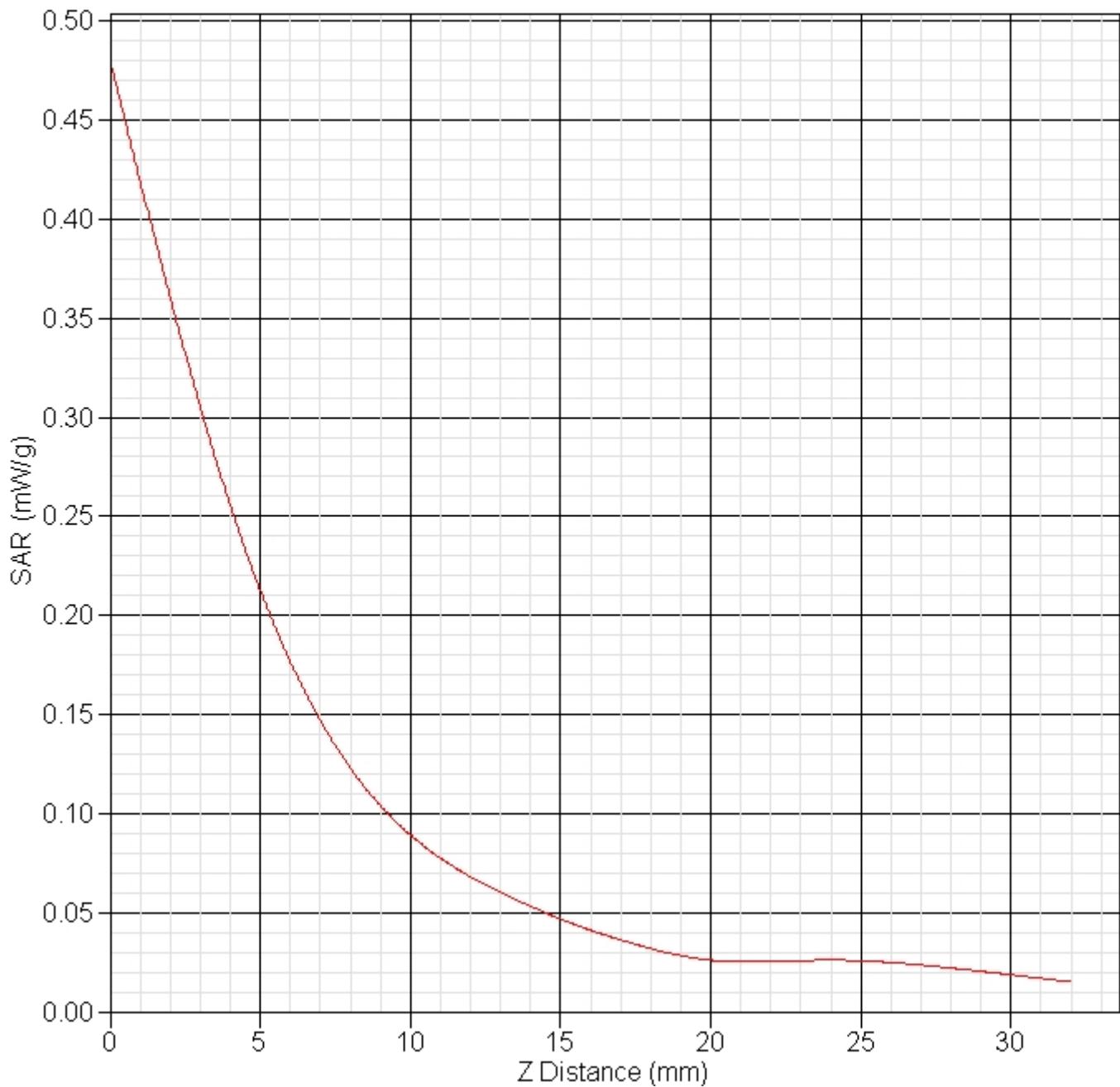
Report No : TSC-101-10-AP-07-0 (SAR )

### **Exposure Assessment Measurement Uncertainty**

<b>Source of Uncertainty</b>	<b>Tolerance Value</b>	<b>Probability Distribution</b>	<b>Divisor</b>	$c_i^1 (1-g)$	<b>Standard Uncertainty (1-g) %</b>
Measurement System					
Probe Calibration	3.5	normal	1	1	3.5
Axial Isotropy	3.7	rectangular	$\sqrt{3}$	$(1 - \frac{cp}{1})^{1/2}$	1.5
Hemispherical Isotropy	10.9	rectangular	$\sqrt{3}$	$\sqrt{cp}$	4.4
Boundary Effect	1.0	rectangular	$\sqrt{3}$	1	0.6
Linearity	4.7	rectangular	$\sqrt{3}$	1	2.7
Detection Limit	1.0	rectangular	$\sqrt{3}$	1	0.6
Readout Electronics	1.0	normal	1	1	1.0
Response Time	0.8	rectangular	$\sqrt{3}$	1	0.5
Integration Time	1.7	rectangular	$\sqrt{3}$	1	1.0
RF Ambient Condition	3.0	rectangular	$\sqrt{3}$	1	1.7
Probe Positioner Mech.	0.4	rectangular	$\sqrt{3}$	1	0.2
Restriction					
Probe Positioning with respect to Phantom Shell	2.9	rectangular	$\sqrt{3}$	1	1.7
Extrapolation and Integration	3.7	rectangular	$\sqrt{3}$	1	2.1
Test Sample Positioning	4.0	normal	1	1	4.0
Device Holder Uncertainty	2.0	normal	1	1	2.0
Drift of Output Power	0.5	rectangular	$\sqrt{3}$	1	0.3
Phantom and Setup					
Phantom Uncertainty(shape & thickness tolerance)	3.4	rectangular	$\sqrt{3}$	1	2.0
Liquid Conductivity(target)	5.0	rectangular	$\sqrt{3}$	0.7	2.0
Liquid Conductivity(meas.)	1.0	normal	1	0.7	0.7
Liquid Permittivity(target)	5.0	rectangular	$\sqrt{3}$	0.6	1.7
Liquid Permittivity(meas.)	2.7	normal	1	0.6	1.6
Combined Uncertainty		RSS			9.4
Combined Uncertainty (coverage factor=2)		Normal(k=2)			18.8

Report No : TSC-101-10-AP-07-0 (SAR )

SAR-Z Axis  
at Hotspot x:38.12 y:-23.25



Report No : TSC-101-10-AP-07-0 (SAR )

**850 MHz Band BC0  
High Channel Rear Touch**

**SAR Test Report**

Report Date : 01-Nov-2012  
 By Operator : 123  
 Measurement Date : 01-Nov-2012  
 Starting Time : 01-Nov-2012 10:45:16 AM  
 End Time : 01-Nov-2012 11:12:09 AM  
 Scanning Time : 1613 secs

**Product Data**

Device Name : Winmate  
 Serial No. : M970D  
 Type : Other  
 Model : 835  
 Frequency : 848.31 MHz  
 Max. Transmit Pwr : 1 W  
 Drift Time : 0 min(s)  
 Length : 120 mm  
 Width : 120 mm  
 Depth : 18 mm  
 Antenna Type : Internal  
 Orientation : Rotated Left 90°  
 Power Drift-Start : 0.214 W/kg  
 Power Drift-Finish: 0.216 W/kg  
 Power Drift (%) : 0.677  
 Picture :

**Phantom Data**

Name : APREL-Uni  
 Type : Uni-Phantom  
 Size (mm) : 280 x 280 x 200  
 Serial No. : User Define  
 Location : Center  
 Description : Uni\_Phantom

**Tissue Data**

Type : BODY  
 Serial No. : 835  
 Frequency : 848.00 MHz  
 Last Calib. Date : 01-Nov-2012  
 Temperature : 23.00 °C  
 Ambient Temp. : 23.00 °C  
 Humidity : 55.00 RH%  
 Epsilon : 54.70 F/m  
 Sigma : 0.99 S/m  
 Density : 1000.00 kg/cu. m

**Probe Data**

Name : SGL1  
 Model : 835  
 Type : E-Field Triangle

Report No : TSC-101-10-AP-07-0 (SAR )

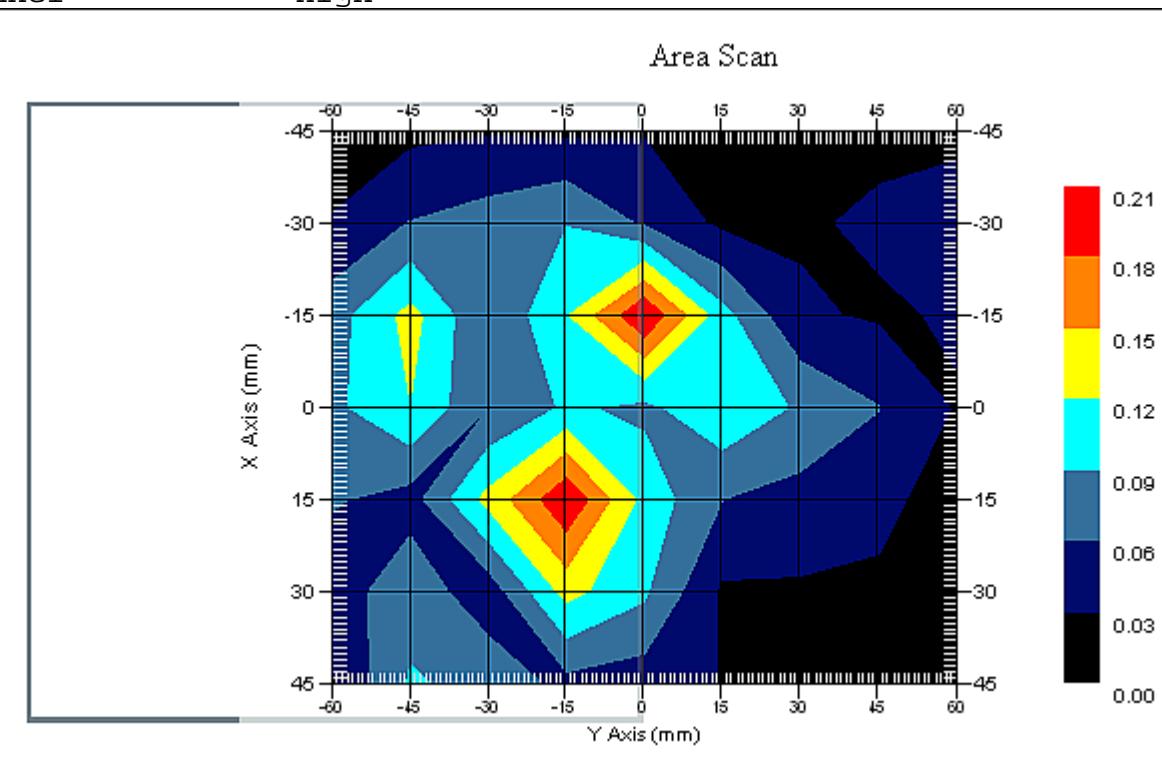
Serial No. : SGL1  
 Last Calib. Date : 10-Feb-2012  
 Frequency : 835.00 MHz  
 Duty Cycle Factor: 1  
 Conversion Factor: 7.1  
 Probe Sensitivity: 1.20 1.20 1.20  $\mu\text{V}/(\text{V}/\text{m})^2$   
 Compression Point: 95.00 mV  
 Offset : 1.56 mm

**Measurement Data**

Crest Factor : 1  
 Scan Type : Complete  
 Tissue Temp. : 23.00 °C  
 Ambient Temp. : 23.00 °C  
 Set-up Date : 01-Nov-2012  
 Set-up Time : 8:20:05 AM  
 Area Scan : 7x9x1 : Measurement x=15mm, y=15mm, z=4mm  
 Zoom Scan : 5x5x8 : Measurement x=8mm, y=8mm, z=4mm

**Other Data**

DUT Position : Rotated Left 90°  
 Separation : 0  
 Channel : High



1 gram SAR value : 0.223 W/kg  
 Area Scan Peak SAR : 0.209 W/kg  
 Zoom Scan Peak SAR : 0.440 W/kg

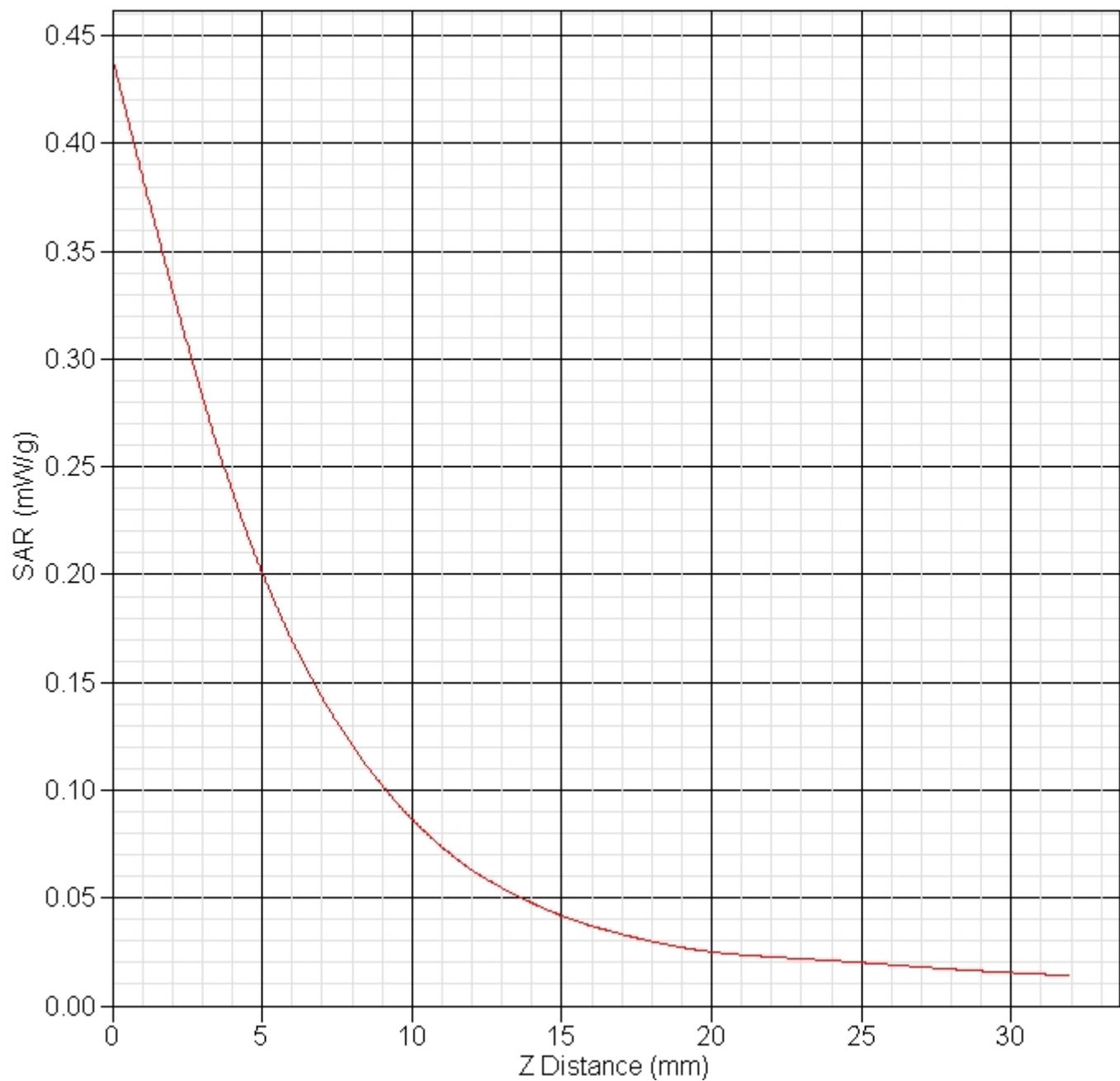
Report No : TSC-101-10-AP-07-0 (SAR )

### **Exposure Assessment Measurement Uncertainty**

Source of Uncertainty	Tolerance Value	Probability Distribution	Divisor	$c_i^t (1-g)$	Standard Uncertainty (1-g) %
Measurement System					
Probe Calibration	3.5	normal	1	1	3.5
Axial Isotropy	3.7	rectangular	$\sqrt{3}$	$(1 - \frac{cp}{\sqrt{3}})^{1/2}$	1.5
Hemispherical Isotropy	10.9	rectangular	$\sqrt{3}$	$\sqrt{cp}$	4.4
Boundary Effect	1.0	rectangular	$\sqrt{3}$	1	0.6
Linearity	4.7	rectangular	$\sqrt{3}$	1	2.7
Detection Limit	1.0	rectangular	$\sqrt{3}$	1	0.6
Readout Electronics	1.0	normal	1	1	1.0
Response Time	0.8	rectangular	$\sqrt{3}$	1	0.5
Integration Time	1.7	rectangular	$\sqrt{3}$	1	1.0
RF Ambient Condition	3.0	rectangular	$\sqrt{3}$	1	1.7
Probe Positioner Mech.	0.4	rectangular	$\sqrt{3}$	1	0.2
Restriction					
Probe Positioning with respect to Phantom Shell	2.9	rectangular	$\sqrt{3}$	1	1.7
Extrapolation and Integration	3.7	rectangular	$\sqrt{3}$	1	2.1
Test Sample Positioning	4.0	normal	1	1	4.0
Device Holder Uncertainty	2.0	normal	1	1	2.0
Drift of Output Power	0.7	rectangular	$\sqrt{3}$	1	0.4
Phantom and Setup					
Phantom Uncertainty(shape & thickness tolerance)	3.4	rectangular	$\sqrt{3}$	1	2.0
Liquid Conductivity(target)	5.0	rectangular	$\sqrt{3}$	0.7	2.0
Liquid Conductivity(meas.)	1.0	normal	1	0.7	0.7
Liquid Permittivity(target)	5.0	rectangular	$\sqrt{3}$	0.6	1.7
Liquid Permittivity(meas.)	2.7	normal	1	0.6	1.6
Combined Uncertainty		RSS			9.4
Combined Uncertainty (coverage factor=2)		Normal(k=2)			18.8

Report No : TSC-101-10-AP-07-0 (SAR )

SAR-Z Axis  
at Hotspot x:38.06 y:-23.25



Report No : TSC-101-10-AP-07-0 (SAR )

**1900 MHz BC1 Band  
Low Channel Rear Touch**

**SAR Test Report**

Report Date : 05-Nov-2012  
 By Operator : 123  
 Measurement Date : 05-Nov-2012  
 Starting Time : 05-Nov-2012 05:54:13 PM  
 End Time : 05-Nov-2012 06:18:29 PM  
 Scanning Time : 1456 secs

**Product Data**

Device Name : Winmate  
 Serial No. : M970D  
 Type : Other  
 Model : 1900  
 Frequency : 1851.25 MHz  
 Max. Transmit Pwr : 1 W  
 Drift Time : 0 min(s)  
 Length : 120 mm  
 Width : 120 mm  
 Depth : 18 mm  
 Antenna Type : Internal  
 Orientation : Rotated Left 90°  
 Power Drift-Start : 0.378 W/kg  
 Power Drift-Finish: 0.385 W/kg  
 Power Drift (%) : 1.747  
 Picture :

**Phantom Data**

Name : APREL-Uni  
 Type : Uni-Phantom  
 Size (mm) : 280 x 280 x 200  
 Serial No. : User Define  
 Location : Center  
 Description : Uni\_Phantom

**Tissue Data**

Type : HEAD  
 Serial No. : 1900  
 Frequency : 1900.00 MHz  
 Last Calib. Date : 05-Nov-2012  
 Temperature : 23.00 °C  
 Ambient Temp. : 23.00 °C  
 Humidity : 55.00 RH%  
 Epsilon : 52.80 F/m  
 Sigma : 1.51 S/m  
 Density : 1000.00 kg/cu. m

**Probe Data**

Name : SGL1  
 Model : 1800  
 Type : E-Field Triangle

Report No : TSC-101-10-AP-07-0 (SAR )

Serial No. : SGL1  
Last Calib. Date : 10-Feb-2012  
Frequency : 1800.00 MHz  
Duty Cycle Factor: 1  
Conversion Factor: 5.8  
Probe Sensitivity: 1.20 1.20 1.20  $\mu\text{V}/(\text{V}/\text{m})^2$   
Compression Point: 95.00 mV  
Offset : 1.56 mm

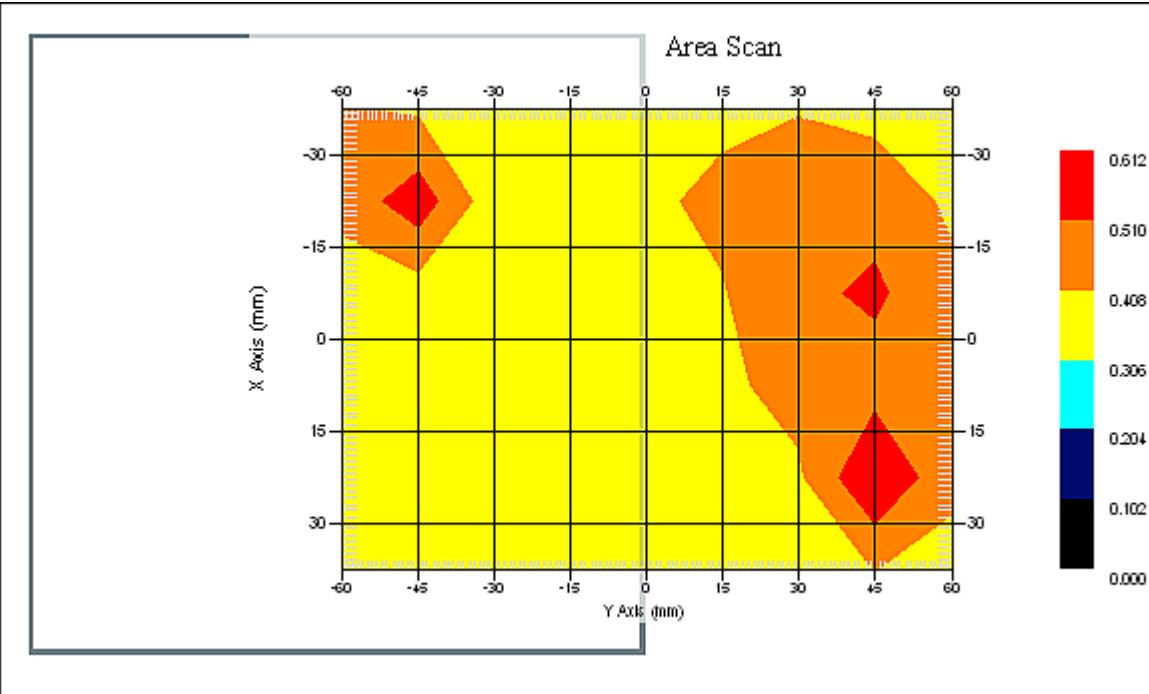
**Measurement Data**

Crest Factor : 1  
Scan Type : Complete  
Tissue Temp. : 23.00 °C  
Ambient Temp. : 23.00 °C  
Set-up Date : 05-Nov-2012  
Set-up Time : 8:05:22 AM  
Area Scan : 6x9x1 : Measurement x=15mm, y=15mm, z=4mm  
Zoom Scan : 5x5x8 : Measurement x=8mm, y=8mm, z=4mm

**Other Data**

DUT Position : Rotated Left 90°  
Separation : 0  
Channel : Low

Report No : TSC-101-10-AP-07-0 (SAR )



1 gram SAR value : 0.463 W/kg  
 Area Scan Peak SAR : 0.612 W/kg  
 Zoom Scan Peak SAR : 0.570 W/kg

### Exposure Assessment Measurement Uncertainty

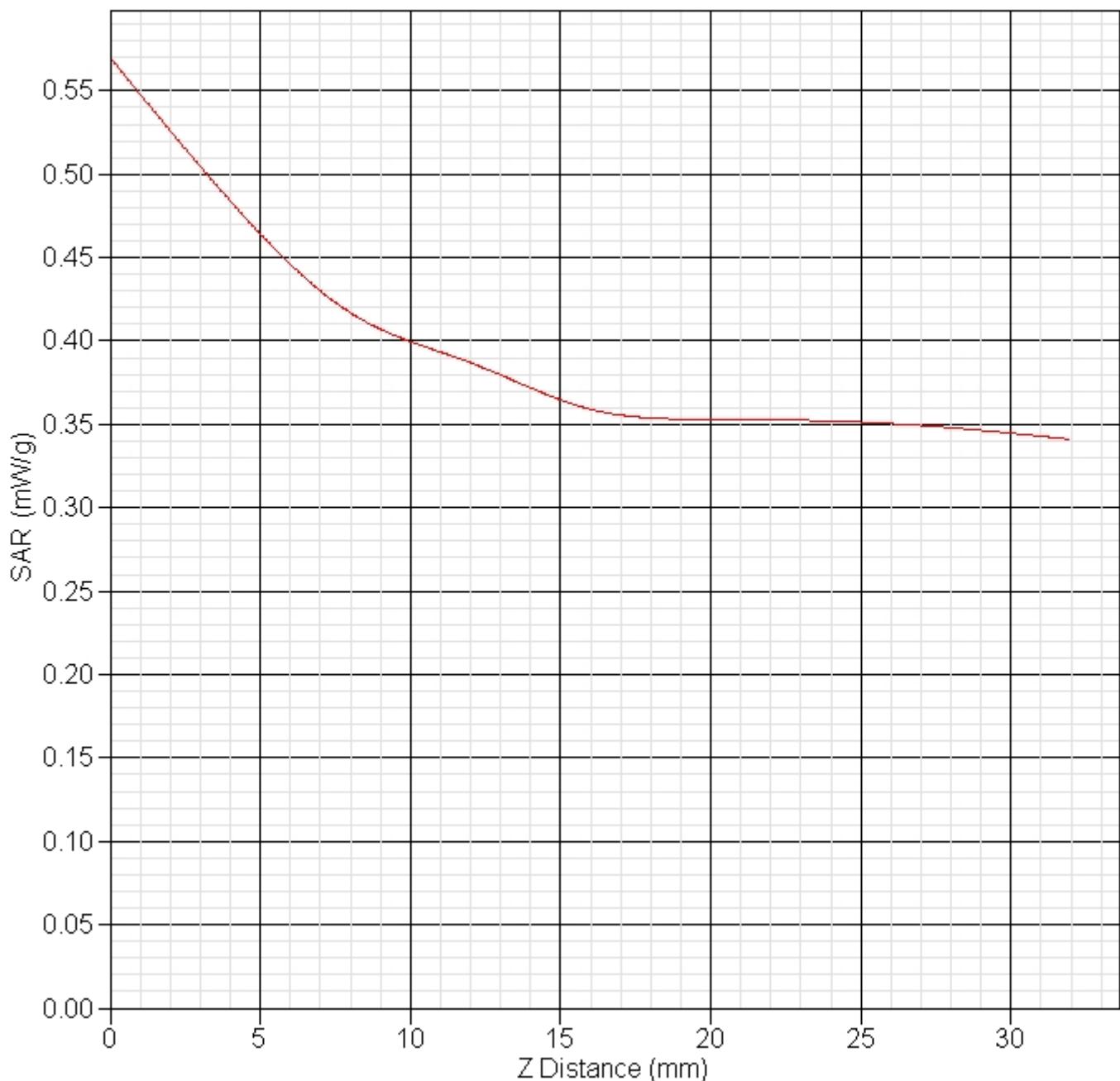
Source of Uncertainty	Tolerance Value	Probability Distribution	Divisor	$c_i^1 (1-g)$	Standard Uncertainty (1-g) %
Measurement System					
Probe Calibration	3.5	normal	1	1	3.5
Axial Isotropy	3.7	rectangular	$\sqrt{3}$	$(1 - \frac{cp}{\sqrt{3}})^{1/2}$	1.5
Hemispherical Isotropy	10.9	rectangular	$\sqrt{3}$	$\sqrt{cp}$	4.4
Boundary Effect	1.0	rectangular	$\sqrt{3}$	1	0.6
Linearity	4.7	rectangular	$\sqrt{3}$	1	2.7
Detection Limit	1.0	rectangular	$\sqrt{3}$	1	0.6
Readout Electronics	1.0	normal	1	1	1.0
Response Time	0.8	rectangular	$\sqrt{3}$	1	0.5
Integration Time	1.7	rectangular	$\sqrt{3}$	1	1.0
RF Ambient Condition	3.0	rectangular	$\sqrt{3}$	1	1.7
Probe Positioner Mech.	0.4	rectangular	$\sqrt{3}$	1	0.2
Restriction					
Probe Positioning with respect to Phantom Shell	2.9	rectangular	$\sqrt{3}$	1	1.7

Report No : TSC-101-10-AP-07-0 (SAR )

Extrapolation and Integration	3.7	rectangular	$\sqrt{3}$	1	2.1
Test Sample Positioning	4.0	normal	1	1	4.0
Device Holder Uncertainty	2.0	normal	1	1	2.0
Drift of Output Power	1.7	rectangular	$\sqrt{3}$	1	1.0
Phantom and Setup					
Phantom Uncertainty(shape & thickness tolerance)	3.4	rectangular	$\sqrt{3}$	1	2.0
Liquid Conductivity(target)	5.0	rectangular	$\sqrt{3}$	0.7	2.0
Liquid Conductivity(meas.)	2.1	normal	1	0.7	1.5
Liquid Permittivity(target)	5.0	rectangular	$\sqrt{3}$	0.6	1.7
Liquid Permittivity(meas.)	0.2	normal	1	0.6	0.1
Combined Uncertainty		RSS			9.4
Combined Uncertainty (coverage factor=2)		Normal(k=2)			18.8

Report No : TSC-101-10-AP-07-0 (SAR )

SAR-Z Axis  
at Hotspot x:30.10 y:44.73



Report No : TSC-101-10-AP-07-0 (SAR )

**1900 MHz BC1 Band**  
**Mid Channel Rear Touch**

**SAR Test Report**

Report Date : 05-Nov-2012  
By Operator : 123  
Measurement Date : 05-Nov-2012  
Starting Time : 05-Nov-2012 03:38:49 PM  
End Time : 05-Nov-2012 04:02:37 PM  
Scanning Time : 1428 secs

**Product Data**

Device Name : Winmate  
Serial No. : M970D  
Type : Other  
Model : 1900  
Frequency : 1880.00 MHz  
Max. Transmit Pwr : 1 W  
Drift Time : 0 min(s)  
Length : 120 mm  
Width : 120 mm  
Depth : 18 mm  
Antenna Type : Internal  
Orientation : Rotated Left 90°  
Power Drift-Start : 0.386 W/kg  
Power Drift-Finish: 0.386 W/kg  
Power Drift (%) : -0.097  
Picture :

**Phantom Data**

Name : APREL-Uni  
Type : Uni-Phantom  
Size (mm) : 280 x 280 x 200  
Serial No. : User Define  
Location : Center  
Description : Uni\_Phantom

**Tissue Data**

Type : HEAD  
Serial No. : 1900  
Frequency : 1900.00 MHz  
Last Calib. Date : 05-Nov-2012  
Temperature : 23.00 °C  
Ambient Temp. : 23.00 °C  
Humidity : 55.00 RH%  
Epsilon : 53.90 F/m  
Sigma : 1.53 S/m  
Density : 1000.00 kg/cu. m

**Probe Data**

Name : SGL1  
Model : 1800

Report No : TSC-101-10-AP-07-0 (SAR )

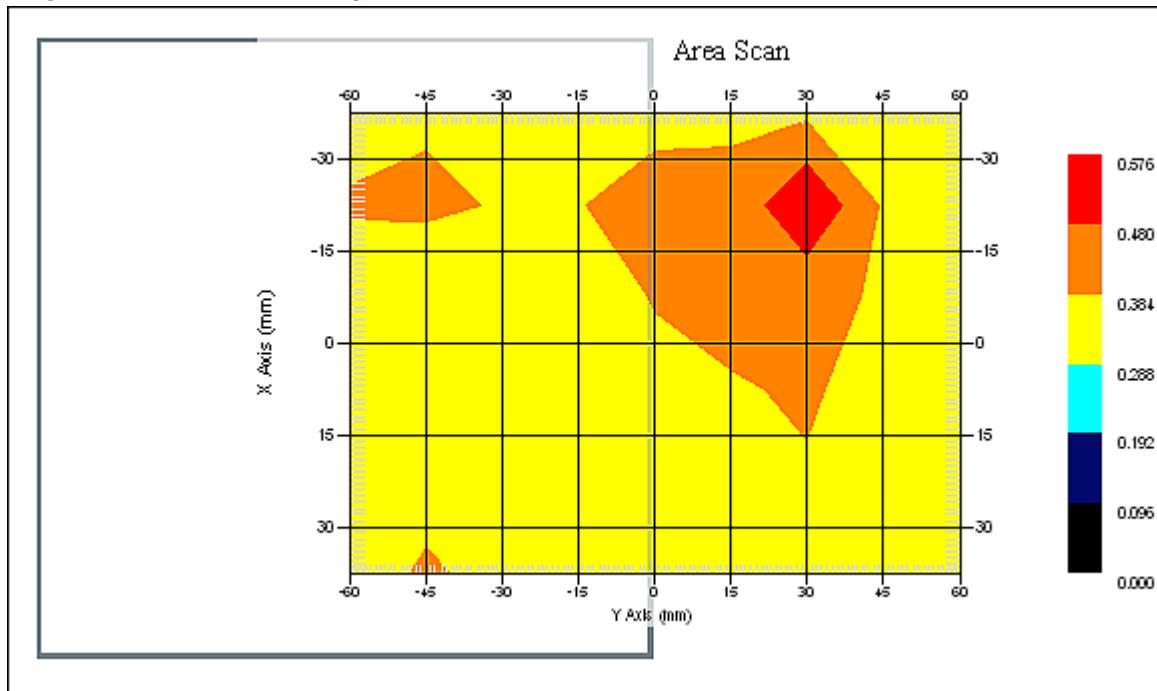
Type : E-Field Triangle  
 Serial No. : SGL1  
 Last Calib. Date : 10-Feb-2012  
 Frequency : 1800.00 MHz  
 Duty Cycle Factor: 1  
 Conversion Factor: 5.8  
 Probe Sensitivity: 1.20 1.20 1.20  $\mu\text{V}/(\text{V}/\text{m})^2$   
 Compression Point: 95.00 mV  
 Offset : 1.56 mm

**Measurement Data**

Crest Factor : 1  
 Scan Type : Complete  
 Tissue Temp. : 23.00 °C  
 Ambient Temp. : 23.00 °C  
 Set-up Date : 05-Nov-2012  
 Set-up Time : 8:05:22 AM  
 Area Scan : 6x9x1 : Measurement x=15mm, y=15mm, z=4mm  
 Zoom Scan : 5x5x8 : Measurement x=8mm, y=8mm, z=4mm

**Other Data**

DUT Position : Rotated Left 90°  
 Separation : 0  
 Channel : Mid



1 gram SAR value : 0.511 W/kg  
 Area Scan Peak SAR : 0.575 W/kg  
 Zoom Scan Peak SAR : 0.780 W/kg

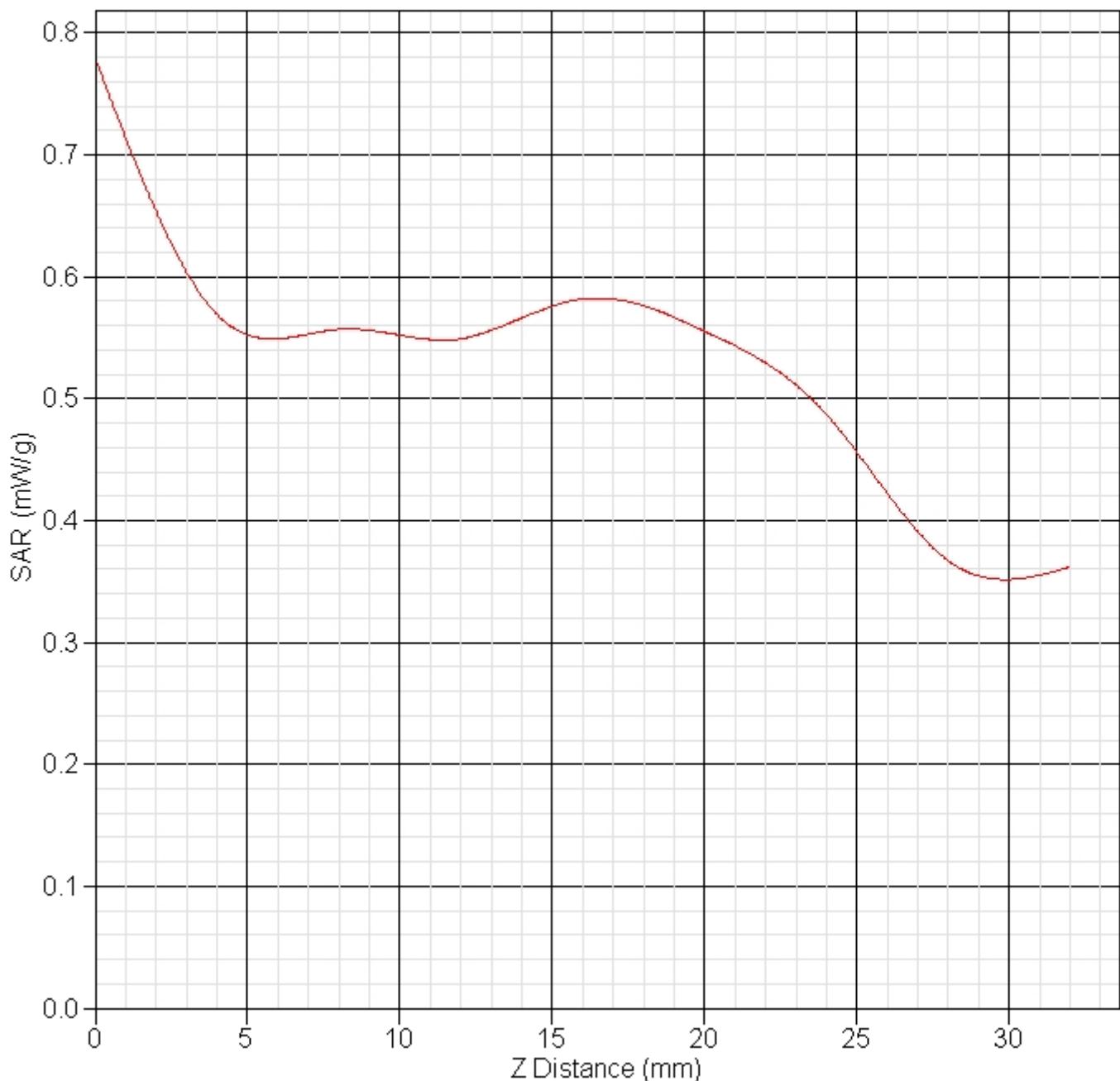
**Exposure Assessment Measurement Uncertainty**

Report No : TSC-101-10-AP-07-0 (SAR )

Source of Uncertainty	Tolerance Value	Probability Distribution	Divisor	$c_i^1 (1-g)$	Standard Uncertainty (1-g) %
Measurement System					
Probe Calibration	3.5	normal	1	1	3.5
Axial Isotropy	3.7	rectangular	$\sqrt{3}$	$(1 - \frac{1}{cp})^{1/2}$	1.5
Hemispherical Isotropy	10.9	rectangular	$\sqrt{3}$	$\sqrt{cp}$	4.4
Boundary Effect	1.0	rectangular	$\sqrt{3}$	1	0.6
Linearity	4.7	rectangular	$\sqrt{3}$	1	2.7
Detection Limit	1.0	rectangular	$\sqrt{3}$	1	0.6
Readout Electronics	1.0	normal	1	1	1.0
Response Time	0.8	rectangular	$\sqrt{3}$	1	0.5
Integration Time	1.7	rectangular	$\sqrt{3}$	1	1.0
RF Ambient Condition	3.0	rectangular	$\sqrt{3}$	1	1.7
Probe Positioner Mech.	0.4	rectangular	$\sqrt{3}$	1	0.2
Restriction					
Probe Positioning with respect to Phantom Shell	2.9	rectangular	$\sqrt{3}$	1	1.7
Extrapolation and Integration	3.7	rectangular	$\sqrt{3}$	1	2.1
Test Sample Positioning	4.0	normal	1	1	4.0
Device Holder Uncertainty	2.0	normal	1	1	2.0
Drift of Output Power	0.1	rectangular	$\sqrt{3}$	1	0.1
Phantom and Setup					
Phantom Uncertainty(shape & thickness tolerance)	3.4	rectangular	$\sqrt{3}$	1	2.0
Liquid Conductivity(target)	5.0	rectangular	$\sqrt{3}$	0.7	2.0
Liquid Conductivity(meas.)	2.1	normal	1	0.7	1.5
Liquid Permittivity(target)	5.0	rectangular	$\sqrt{3}$	0.6	1.7
Liquid Permittivity(meas.)	0.2	normal	1	0.6	0.1
Combined Uncertainty		RSS			9.4
Combined Uncertainty (coverage factor=2)		Normal(k=2)			18.7

Report No : TSC-101-10-AP-07-0 (SAR )

SAR-Z Axis  
at Hotspot x:1.12 y:21.75



Report No : TSC-101-10-AP-07-0 (SAR )

**1900 MHz BC1 Band  
High Channel Rear Touch**

**SAR Test Report**

Report Date : 05-Nov-2012  
 By Operator : 123  
 Measurement Date : 05-Nov-2012  
 Starting Time : 05-Nov-2012 04:28:21 PM  
 End Time : 05-Nov-2012 04:52:08 PM  
 Scanning Time : 1427 secs

**Product Data**

Device Name : Winmate  
 Serial No. : M970D  
 Type : Other  
 Model : 1900  
 Frequency : 1908.75 MHz  
 Max. Transmit Pwr : 1 W  
 Drift Time : 0 min(s)  
 Length : 120 mm  
 Width : 120 mm  
 Depth : 18 mm  
 Antenna Type : Internal  
 Orientation : Rotated Left 90°  
 Power Drift-Start : 0.411 W/kg  
 Power Drift-Finish: 0.405 W/kg  
 Power Drift (%) : -1.664  
 Picture :

**Phantom Data**

Name : APREL-Uni  
 Type : Uni-Phantom  
 Size (mm) : 280 x 280 x 200  
 Serial No. : User Define  
 Location : Center  
 Description : Uni\_Phantom

**Tissue Data**

Type : HEAD  
 Serial No. : 1900  
 Frequency : 1900.00 MHz  
 Last Calib. Date : 05-Nov-2012  
 Temperature : 23.00 °C  
 Ambient Temp. : 23.00 °C  
 Humidity : 55.00 RH%  
 Epsilon : 54.20 F/m  
 Sigma : 1.50 S/m  
 Density : 1000.00 kg/cu. m

**Probe Data**

Name : SGL1  
 Model : 2000

Report No : TSC-101-10-AP-07-0 (SAR )

Type : E-Field Triangle  
Serial No. : SGL1  
Last Calib. Date : 10-Feb-2012  
Frequency : 1800.00 MHz  
Duty Cycle Factor: 1  
Conversion Factor: 6.0  
Probe Sensitivity: 1.20 1.20 1.20  $\mu\text{V}/(\text{V}/\text{m})^2$   
Compression Point: 95.00 mV  
Offset : 1.56 mm

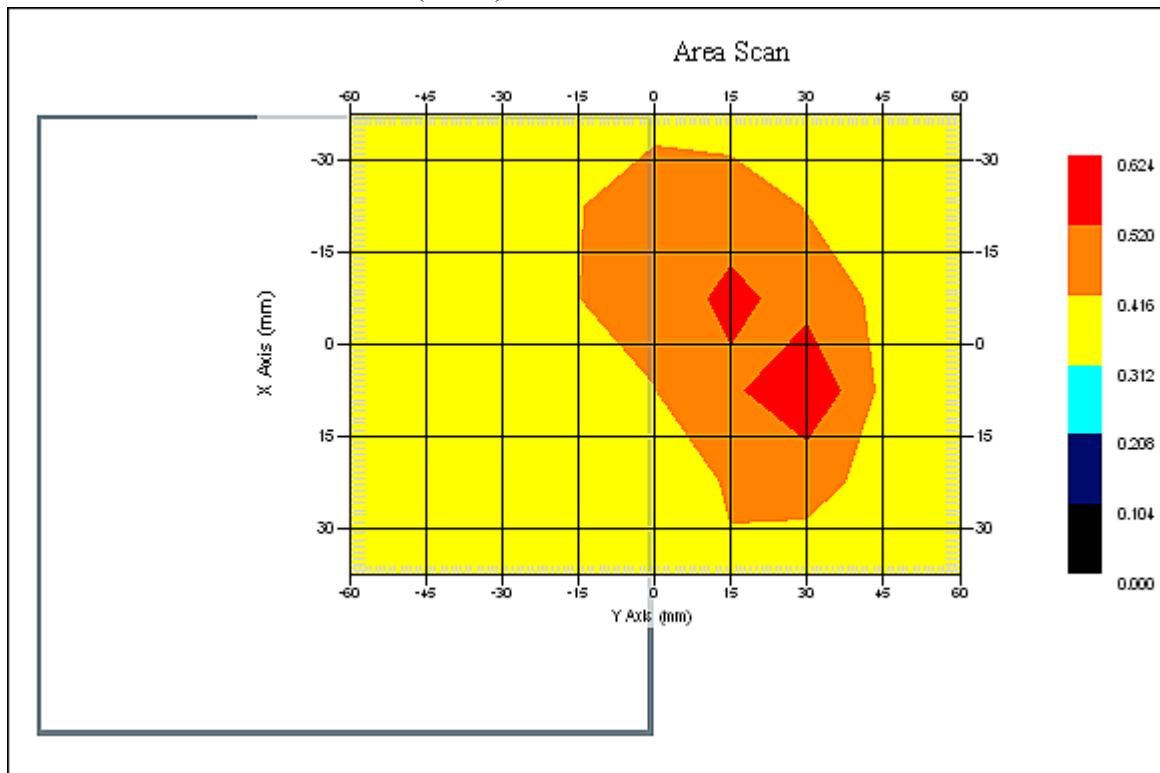
**Measurement Data**

Crest Factor : 1  
Scan Type : Complete  
Tissue Temp. : 23.00 °C  
Ambient Temp. : 23.00 °C  
Set-up Date : 05-Nov-2012  
Set-up Time : 8:05:22 AM  
Area Scan : 6x9x1 : Measurement x=15mm, y=15mm, z=4mm  
Zoom Scan : 5x5x8 : Measurement x=8mm, y=8mm, z=4mm

**Other Data**

DUT Position : Rotated Left 90°  
Separation : 0  
Channel : High

Report No : TSC-101-10-AP-07-0 (SAR )



1 gram SAR value : 0.546 W/kg  
Area Scan Peak SAR : 0.624 W/kg  
Zoom Scan Peak SAR : 0.660 W/kg

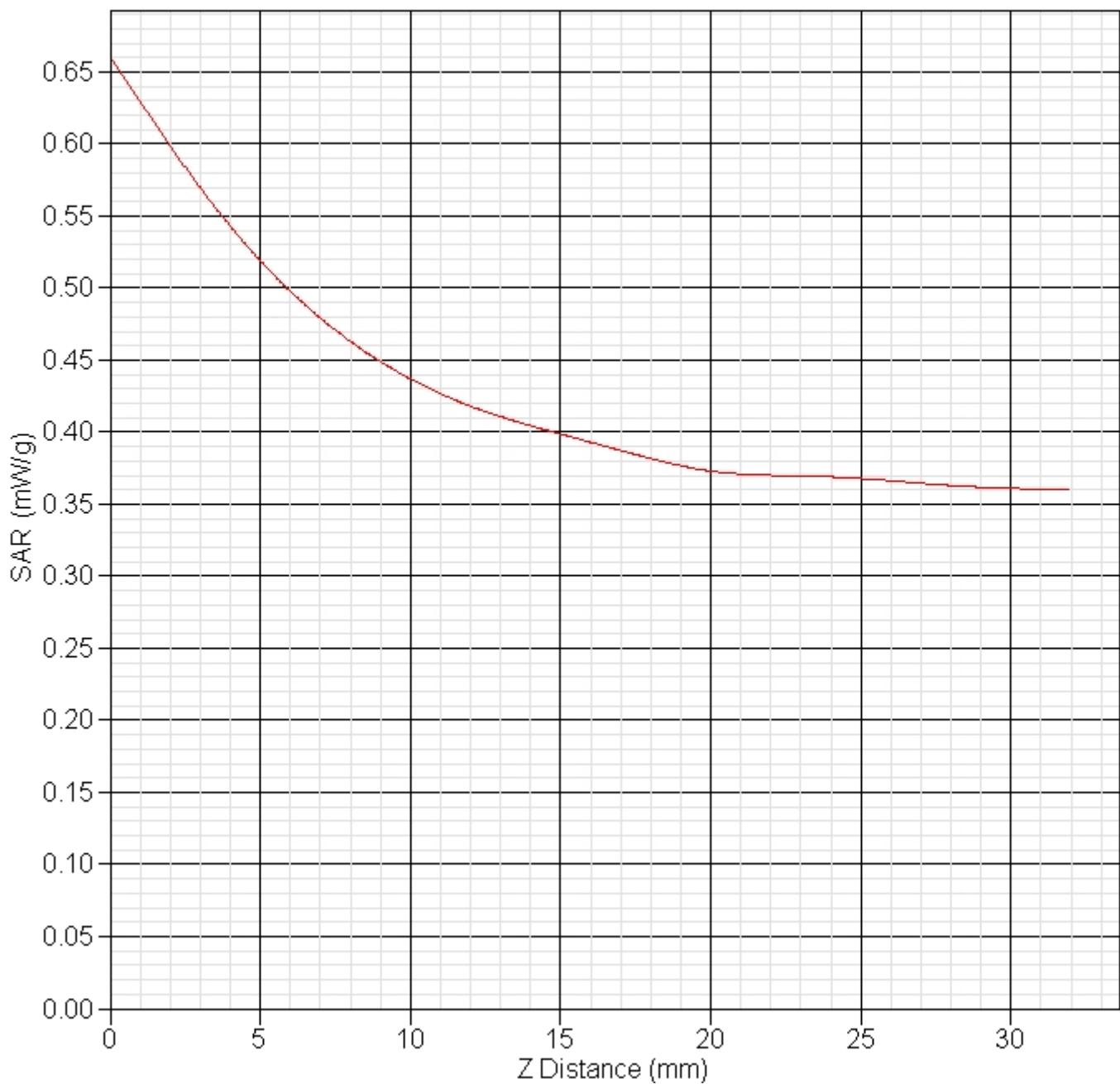
Report No : TSC-101-10-AP-07-0 (SAR )

### **Exposure Assessment Measurement Uncertainty**

<b>Source of Uncertainty</b>	<b>Tolerance Value</b>	<b>Probability Distribution</b>	<b>Divisor</b>	$c_i^1 (1-g)$	<b>Standard Uncertainty (1-g) %</b>
Measurement System					
Probe Calibration	3.5	normal	1	1	3.5
Axial Isotropy	3.7	rectangular	$\sqrt{3}$	$(1 - \frac{cp}{\sqrt{3}})^{1/2}$	1.5
Hemispherical Isotropy	10.9	rectangular	$\sqrt{3}$	$\sqrt{cp}$	4.4
Boundary Effect	1.0	rectangular	$\sqrt{3}$	1	0.6
Linearity	4.7	rectangular	$\sqrt{3}$	1	2.7
Detection Limit	1.0	rectangular	$\sqrt{3}$	1	0.6
Readout Electronics	1.0	normal	1	1	1.0
Response Time	0.8	rectangular	$\sqrt{3}$	1	0.5
Integration Time	1.7	rectangular	$\sqrt{3}$	1	1.0
RF Ambient Condition	3.0	rectangular	$\sqrt{3}$	1	1.7
Probe Positioner Mech.	0.4	rectangular	$\sqrt{3}$	1	0.2
Restriction					
Probe Positioning with respect to Phantom Shell	2.9	rectangular	$\sqrt{3}$	1	1.7
Extrapolation and Integration	3.7	rectangular	$\sqrt{3}$	1	2.1
Test Sample Positioning	4.0	normal	1	1	4.0
Device Holder Uncertainty	2.0	normal	1	1	2.0
Drift of Output Power	1.7	rectangular	$\sqrt{3}$	1	1.0
Phantom and Setup					
Phantom Uncertainty(shape & thickness tolerance)	3.4	rectangular	$\sqrt{3}$	1	2.0
Liquid Conductivity(target)	5.0	rectangular	$\sqrt{3}$	0.7	2.0
Liquid Conductivity(meas.)	2.1	normal	1	0.7	1.5
Liquid Permittivity(target)	5.0	rectangular	$\sqrt{3}$	0.6	1.7
Liquid Permittivity(meas.)	0.2	normal	1	0.6	0.1
Combined Uncertainty		RSS			9.4
Combined Uncertainty (coverage factor=2)		Normal(k=2)			18.8

Report No : TSC-101-10-AP-07-0 (SAR )

SAR-Z Axis  
at Hotspot x:-0.88 y:13.75



Report No : TSC-101-10-AP-07-0 (SAR )

### A. 4.5 Dipole Calibration Data

#### NCL CALIBRATION LABORATORIES

Calibration File No: DC-1095  
Project Number: SSI/DRB-TP-D01-032-E020-V2

### C E R T I F I C A T E   O F   C A L I B R A T I O N

It is certified that the equipment identified below has been calibrated in the  
NCL CALIBRATION LABORATORIES by qualified personnel following recognized  
procedures and using transfer standards traceable to NRC/NIST.

CHTL Validation Dipole

Manufacturer: APREL Laboratories  
Part number: AL9-O-2450-6-2  
Frequency: 2450 MHz  
Serial No: 2450-220-00751

Customer: CHTL

Calibrated: 10<sup>th</sup> November 2009  
Released on: 11<sup>th</sup> November 2009

This Calibration Certificate is incomplete Unless Accompanied with the Calibration Results Summary

Released By: \_\_\_\_\_

**NCL** CALIBRATION LABORATORIES

51 SPECTRUM WAY  
NEPCAN, ONTARIO  
CANADA K2R 1E8

Division of APREL Lab.  
TEL: (613) 820-4900  
FAX: (613) 820-4162

Report No : TSC-101-10-AP-07-0 (SAR )

**NCL Calibration Laboratories**

Division of APREL Laboratories.

**Conditions**

Dipole 2450-220-00751 was a re-calibration.

Ambient Temperature of the Laboratory: 22 °C +/- 0.5°C  
Temperature of the Tissue: 21 °C +/- 0.5°C

We the undersigned attest that to the best of our knowledge the calibration of this probe has been accurately conducted and that all information contained within this report has been reviewed for accuracy.

We the undersigned attest that to the best of our knowledge the calibration of this device has been accurately conducted and that all information contained within this report has been reviewed for accuracy.



Stuart Nicol



C. Teodorian

This page has been reviewed for content and attested to by signature within this document.

Report No : TSC-101-10-AP-07-0 (SAR )

#### **NCL Calibration Laboratories**

Division of APREL Laboratories.

#### **Calibration Results Summary**

The following results relate the Calibrated Dipole and should be used as a quick reference for the user.

##### **Mechanical Dimensions**

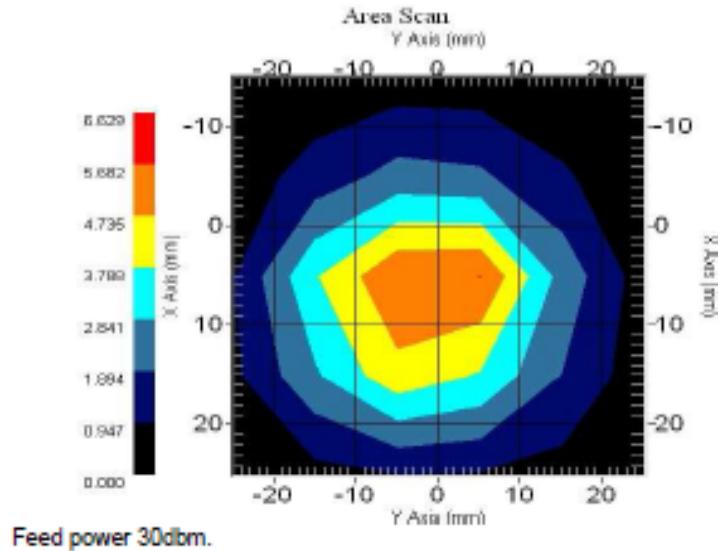
Length: 51.5 mm  
Height: 30.4 mm

##### **Electrical Specification**

SWR: 1.07 U  
Return Loss: -29.451 dB  
Impedance: 50.710  $\Omega$

##### **System Validation Results**

Frequency	1 Gram	10 Gram	Peak
2450 MHz	53.9	24.0	102.1



This page has been reviewed for content and attested to by signature within this document.

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Report No : TSC-101-10-AP-07-0 (SAR )

#### **NCL Calibration Laboratories**

Division of APREL Laboratories.

#### **Introduction**

This Calibration Report has been produced in line with the SSI Dipole Calibration Procedure SSI-TP-018-ALSAS. The results contained within this report are for Validation Dipole 2450-220-00751. The calibration routine consisted of a three-step process. Step 1 was a mechanical verification of the dipole to ensure that it meets the mechanical specifications. Step 2 was an Electrical Calibration for the Validation Dipole, where the SWR, Impedance, and the Return loss were assessed. Step 3 involved a System Validation using the ALSAS-10U, along with APREL E-020 130 MHz to 26 GHz E-Field Probe Serial Number 212.

#### **References**

SSI-TP-018-ALSAS Dipole Calibration Procedure  
SSI-TP-018 Tissue Calibration Procedure

IEEE 1528 "Recommended Practice for Determining the Peak Spatial-Average Specific Absorption Rate (SAR) in the Human Body Due to Wireless Communications Devices: Experimental Techniques"

#### **Conditions**

Dipole 2450-220-00751 was a re-calibration.

Ambient Temperature of the Laboratory: 22 °C +/- 0.5°C  
Temperature of the Tissue: 20 °C +/- 0.5°C

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This page has been reviewed for content and attested to by signature within this document.

Report No : TSC-101-10-AP-07-0 (SAR )

**NCL Calibration Laboratories**

Division of APREL Laboratories.

**Dipole Calibration Results**

**Mechanical Verification**

APREL Length	APREL Height	Measured Length	Measured Height
51.5 mm	30.4 mm	52.4 mm	30.6 mm

**Tissue Validation**

Head Tissue 2450 MHz	Measured
Dielectric constant, $\epsilon_r$	40.7
Conductivity, $\sigma$ [S/m]	1.85

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This page has been reviewed for content and attested to by signature within this document.



Report No : TSC-101-10-AP-07-0 (SAR )

**NCL Calibration Laboratories**

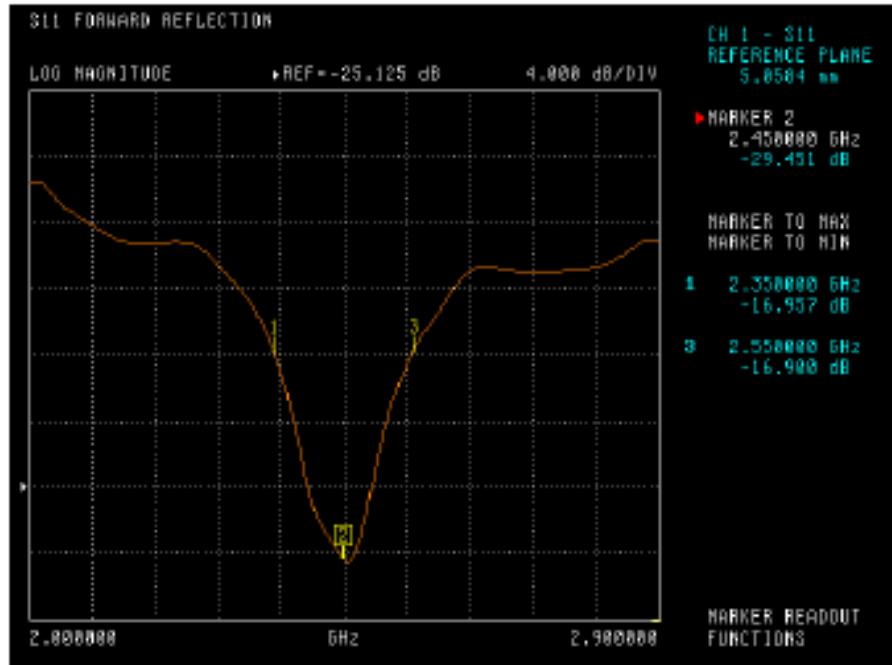
Division of APREL Laboratories.

**Electrical Calibration**

Test	Result
S11 R/L	-29.451 dB
SWR	1.07 U
Impedance	50.710 Ω

The Following Graphs are the results as displayed on the Vector Network Analyzer.

**S11 Parameter Return Loss**



This page has been reviewed for content and attested to by signature within this document.

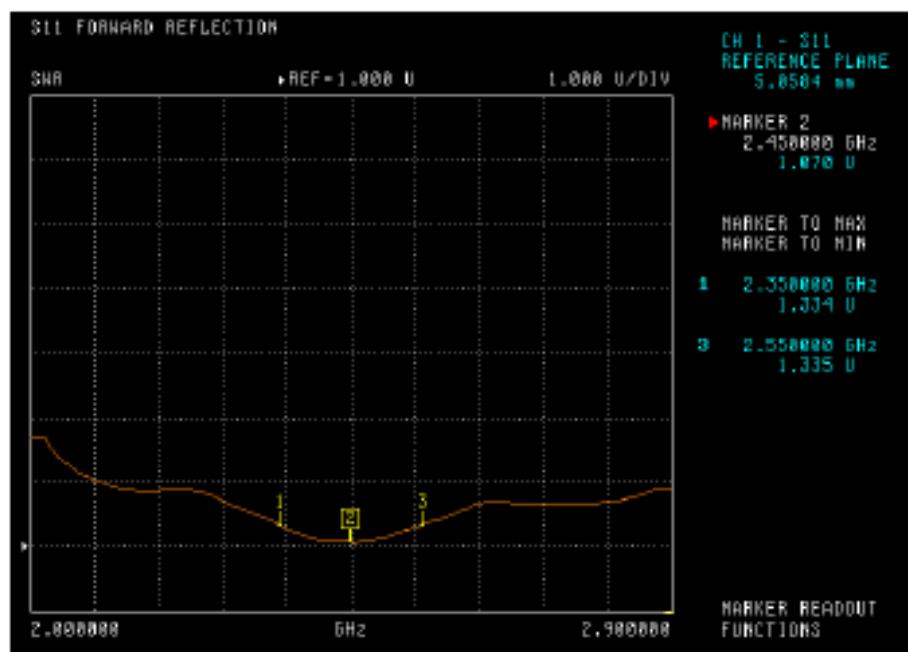
6

Report No : TSC-101-10-AP-07-0 (SAR )

**NCL Calibration Laboratories**

Division of APREL Laboratories.

**SWR**



This page has been reviewed for content and attested to by signature within this document.

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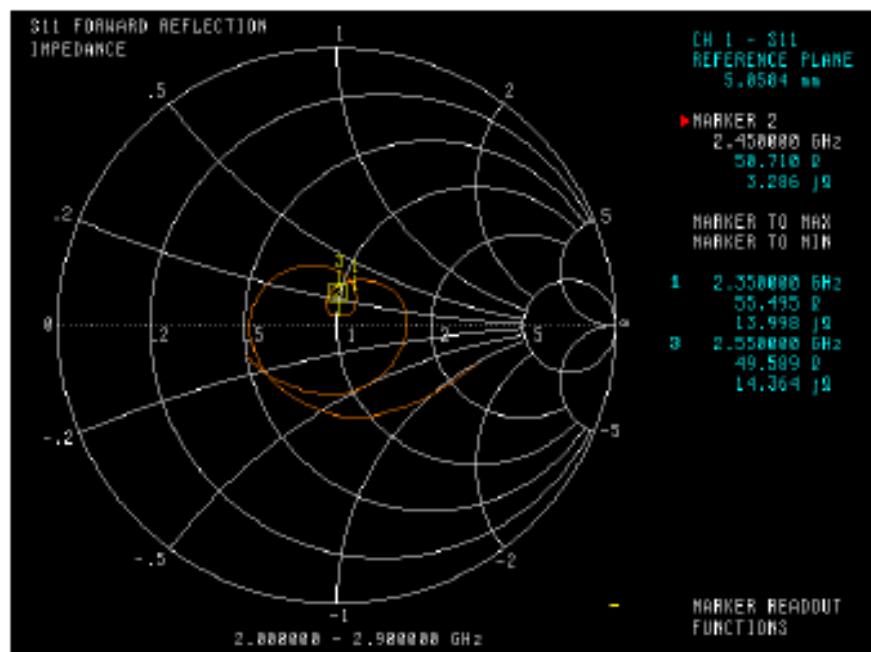


Report No : TSC-101-10-AP-07-0 (SAR )

**NCL Calibration Laboratories**

Division of APREL Laboratories.

**Smith Chart Dipole Impedance**



This page has been reviewed for content and attested to by signature within this document.

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Report No : TSC-101-10-AP-07-0 (SAR )

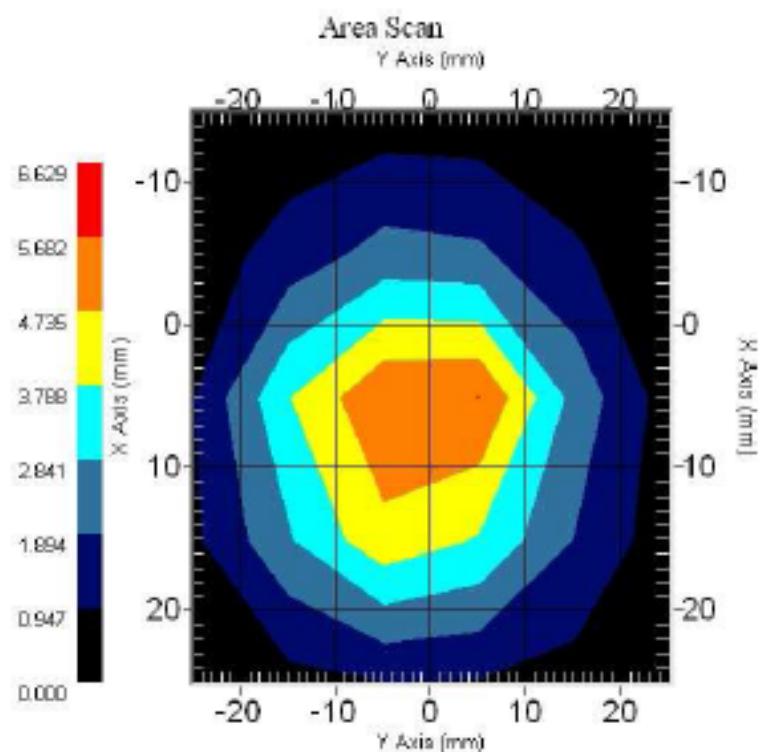
**NCL Calibration Laboratories**

Division of APREL Laboratories.

**System Validation Results Using the Electrically Calibrated Dipole**

Feed power 30dbm.

Head Tissue Frequency	1 Gram	10 Gram	Peak Above Feed Point
2450 MHz	53.9	24.0	102.1



This page has been reviewed for content and attested to by signature within this document.

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Report No : TSC-101-10-AP-07-0 (SAR )

**NCL Calibration Laboratories**

Division of APREL Laboratories.

**Test Equipment**

The test equipment used during Probe Calibration, manufacturer, model number and, current calibration status are listed and located on the main APREL server R:\NCL\Calibration Equipment\Instrument List May 2009.

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This page has been reviewed for content and attested to by signature within this document.

Report No : TSC-101-10-AP-07-0 (SAR )

#### A. 4.6 Probe Calibration Data

#### NCL CALIBRATION LABORATORIES

Calibration File No.: 1392, 1393, 1394

Client.: CHTL

#### C E R T I F I C A T E   O F   C A L I B R A T I O N

It is certified that the equipment identified below has been calibrated in the  
**NCL CALIBRATION LABORATORIES** by qualified personnel following recognized  
procedures and using transfer standards traceable to NRC/NIST.

Equipment: Miniature Isotropic RF Probe

Record of Calibration

Head and Body

Manufacturer: APREL Laboratories

Model No.: E-020

Serial No.: 255

Calibration Procedure: D01-032-E020-V2, D22-012-Tissue, D28-002-Dipole  
Project No: SGL-CHTL-probe-cal-5529

Calibrated: 25<sup>th</sup> November 2011  
Released: 6<sup>th</sup> December 2011

This Calibration Certificate is Incomplete Unless Accompanied with the Calibration Results Summary

Released By:



Art Brennan, Quality Manager

#### **NCL CALIBRATION LABORATORIES**

Suite 102, 303 Terry Fox Dr.  
OTTAWA, ONTARIO  
CANADA K2K 3J1

Division of APREL Lab.  
TEL: (613) 435-8300  
FAX: (613) 435-8306

Report No : TSC-101-10-AP-07-0 (SAR )

#### **NCL Calibration Laboratories**

Division of APREL Laboratories.

#### **Introduction**

This Calibration Report reproduces the results of the calibration performed in line with the references listed below. Calibration is performed using accepted methodologies as per the references listed below. Probes are calibrated for air, and tissue and the values reported are the results from the physical quantification of the probe through metrological practices.

#### **Calibration Method**

Probes are calibrated using the following methods.

<1000MHz

TEM Cell for sensitivity in air

Standard phantom using temperature transfer method for sensitivity in tissue

>1000MHz

Waveguide\* method to determine sensitivity in air and tissue

\*Waveguide is numerically (simulation) assessed to determine the field distribution and power

The boundary effect for the probe is assessed using a standard flat phantom where the probe output is compared against a numerically simulated series of data points

#### **References**

- o IEEE Standard 1528 (2003) including Amendment 1  
IEEE Recommended Practice for Determining the Peak Spatial-Average Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques
- o EN 62209-1 (2006)  
Human Exposure to RF Fields from hand-held and body-mounted wireless communication devices - Human models, instrumentation, and procedures-Part 1: Procedure to measure the Specific Absorption Rate (SAR) for hand-held mobile wireless devices
- o IEC 62209-2 Ed. 1.0 (2010-03)  
Human exposure to RF fields from hand-held and body-mounted wireless devices - Human models, instrumentation, and procedures - Part 2: specific absorption rate (SAR) for wireless communication devices (30 MHz - 6 GHz)
- o TP-D01-032-E020-V2 E-Field probe calibration procedure
- o D22-012-Tissue dielectric tissue calibration procedure
- o D28-002-Dipole procedure for validation of SAR system using a dipole
- o IEEE 1309 Draft Standard for Calibration of Electromagnetic Field Sensors and Probes, Excluding Antennas, from 9kHz to 40GHz

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**Conditions**

Probe 255 has been recalibrated and was found to be in good working order.

Ambient Temperature of the Laboratory: 22 °C +/- 1.5°C  
Temperature of the Tissue: 21 °C +/- 1.5°C  
Relative Humidity: < 60%

**Primary Measurement Standards**

Instrument	Serial Number	Cal due date
Power meter Anritsu MA2408A	90025437	Nov.3, 2012
Power Sensor Anritsu MA2481D	103555	Nov 3, 2012
Attenuator HP 8495A (70dB)	1944A10711	Sept. 13, 2012
Network Analyzer Anritsu MT8801C	MB11855	Feb. 7, 2012

**Secondary Measurement Standards**

Signal Generator Agilent E4438C -506 MY55182336 June 7, 2012

**Attestation**

The below named signatories have conducted the calibration and review of the data which is presented in this calibration report.

We the undersigned attest that to the best of our knowledge the calibration of this subject has been accurately conducted and that all information contained within the results pages have been reviewed for accuracy.



Art Brennan, Quality Manager



Dan Brooks, Test Engineer

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**Calibration Results Summary**

Probe Type:	E-Field Probe E-020
Serial Number:	255
Sensor Offset:	1.56 mm
Sensor Length:	2.5 mm
Tip Enclosure:	Ertalyte*
Tip Diameter:	<5 mm
Tip Length:	60 mm
Total Length:	290 mm

\*Resistive to recommended tissue recipes per IEEE-1528

**Sensitivity in Air**

Channel X:	1.2 $\mu\text{V}/(\text{V}/\text{m})^2$
Channel Y:	1.2 $\mu\text{V}/(\text{V}/\text{m})^2$
Channel Z:	1.2 $\mu\text{V}/(\text{V}/\text{m})^2$
Diode Compression Point:	95 mV

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#### Calibration for Tissue (Head H, Body B)

Frequency	Tissue Type	Measured Epsilon	Measured Sigma	Calibration Uncertainty	Tolerance Uncertainty for 5%*	Conversion Factor
900 H	Head	42.02	0.99	3.5	2.9	6.8
900 B	FC					
1900 H	Head	38.02	1.44	3.5	3.1	5.8
1900 B	FC					
2450 H	FC					
2450B	Body	50.22	1.93	3.5	3.25	4.7

\*FC, Future Calibration, as required

#### Boundary Effect:

Uncertainty resulting from the boundary effect is less than 2.1% for the distance between the tip of the probe and the tissue boundary, when less than 0.58mm.

#### Spatial Resolution:

The spatial resolution uncertainty is less than 1.5% for 4.9mm diameter probe.  
 The spatial resolution uncertainty is less than 1.0% for 2.5mm diameter probe.

#### DAQ-PAQ Contribution

To minimize the uncertainty calculation all tissue sensitivity values were calculated using a load impedance of  $5\text{ M}\Omega$ .

#### Boundary Effect:

For a distance of 0.58mm the worst case evaluated uncertainty (increase in the probe sensitivity) is less than 2.1%.

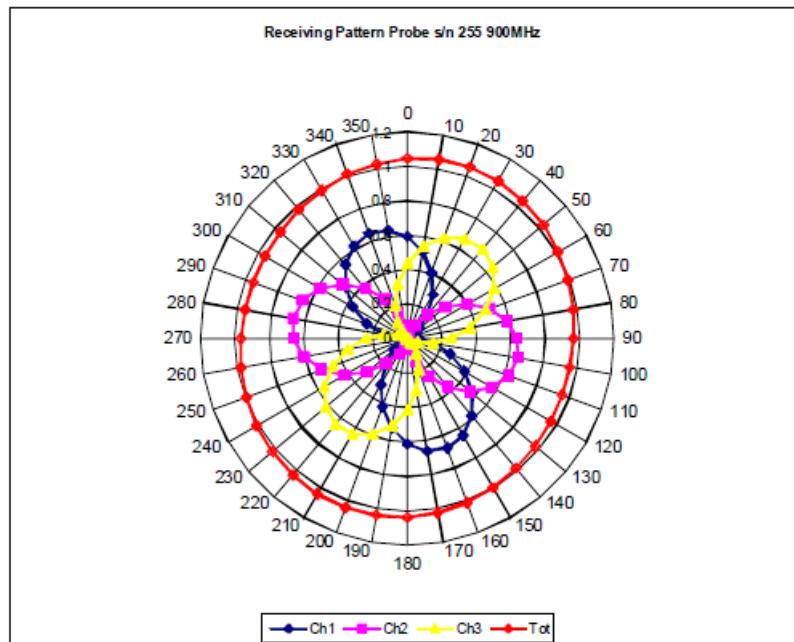
#### NOTES:

\*The maximum deviation from the centre frequency when comparing the lower to upper range is listed.

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**Receiving Pattern Air**

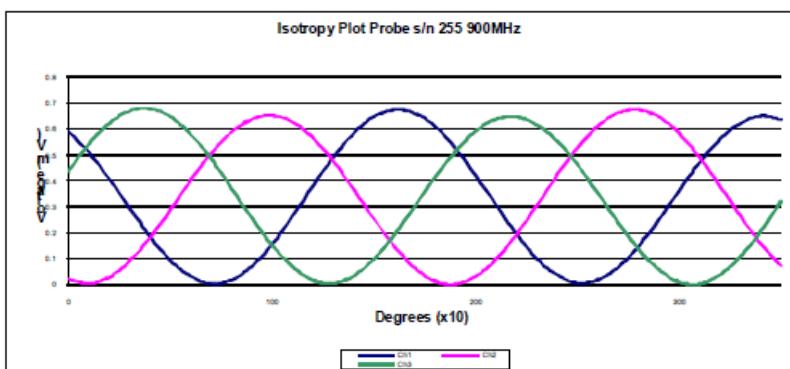
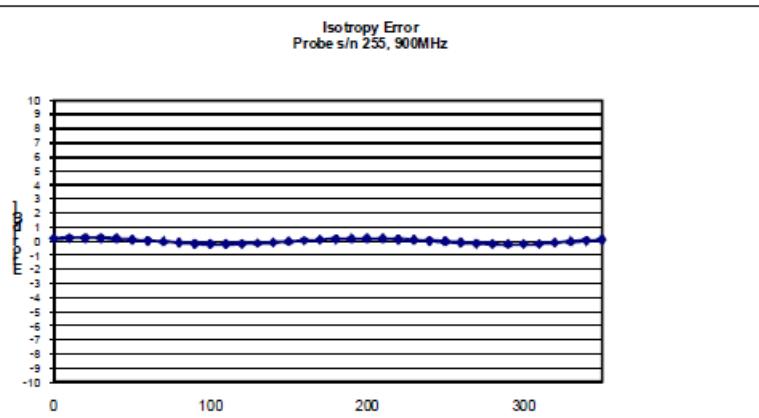


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**Isotropy Error 5200 MHz (Air)**



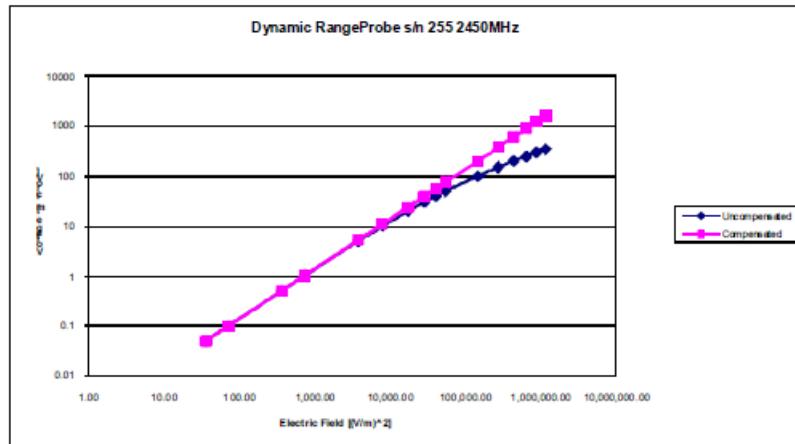
Isotropicity Tissue: 0.10 dB

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**Dynamic Range**



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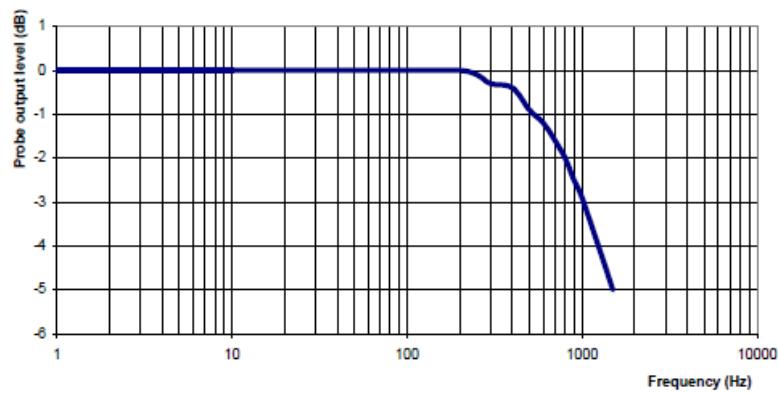


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**Video Bandwidth**

Probe Frequency Characteristics



Video Bandwidth at 500 Hz                    1 dB  
Video Bandwidth at 1.02 KHz:                3 dB

**Test Equipment**

The test equipment used during Probe Calibration, manufacturer, model number and, current calibration status are listed and located on the main APREL server R:\NCL\Calibration Equipment\Instrument List May 2011.