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Report No : TSC-100-06-IN-02 (SAR)

Date of Issue : June 28, 2011



SAR Test Report

Device Under Test : Wi/driver

Model No. : WID

Applicant : Kingston Digital Inc.

This Test report applied to the tested sample only.

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Report No : TSC-100-06-IN-02 (SAR)

Applicant : Kingston Digital Inc.

TEL. : 714-445-3473

Addr. : 17600 Newhope street, Fountain Valley, CALIFORNIA, 92708, USA

Device Under Test : Wi/driver

Trade name : Kingston Digital Inc.

Model No. : WID

Manufacturer : CC&C Technologies, Inc.

Applied Date : June 17, 2011

Date of Sample Arrived : June 17, 2011

Date of Finished : June 27, 2011

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

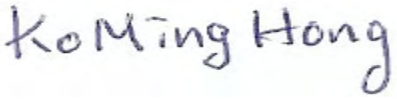
Cited Document : KDB 447498, 450824, 616217, 248227 FCC DA02-1438

Test Equipment : Refer to page 19

Test Environment : 24°C, 50 % R.H.

Test results : IEEE 1528 2003 Complied

SAR 1g = 0.958 W/kg (Maximum), Refer to page 21

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

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1. General Information

1.1 EUT Description

Product Name	Wi/driver
Trade Name	Kingston Digital Inc.
Model No.	WID
Operation Frequency	2412-2462MHz
FCC ID	ZME-WID
Antenna Type	INTERNAL
Device Category	Portable
Battery	Lithium-Ion Polymer Battery :<=20Wh, 3.7V, Model no.:LC705053
WLAN ANT	0dBi typ. (Peak Gain)
RF Exposure Environment	Uncontrolled
Output Power* (Conducted)	802.11 b 16.23 dBm(max), 5.77(av) 802.11 g 13.67 dBm(max), 7.02(av) 802.11 n 14.49 dBm(max), 5.57(av)

*According to KDB 248227 the SAR test is required or not depends on the maximum average output power in some cases. The isotropic E-Field probe has been fully calibrated and assessed for isotropicity on page 5 just for calibration.

1.2 Test Environment

Ambient conditions in the laboratory:

Items	Required	Actual
Temperature (°C)	24	See first page
Humidity (%RH)	50	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 10mm² 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/m³ 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

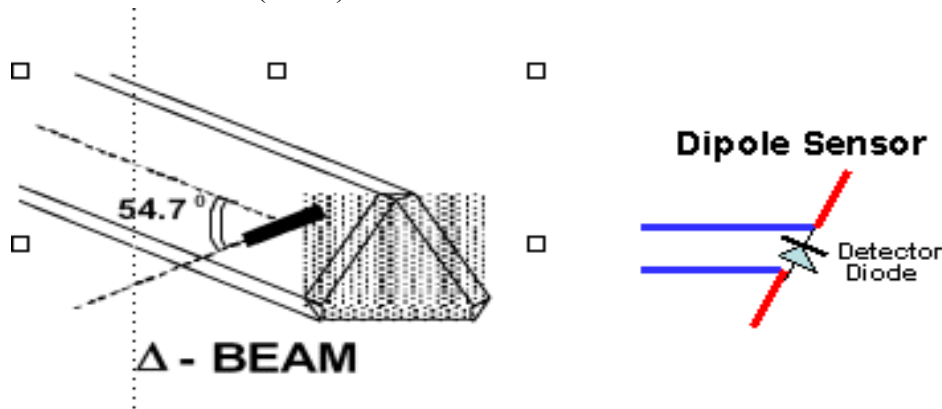
The isotropic E-Field probe has been fully calibrated and assessed for isotropicity, and boundary effect within a controlled environment. Depending on the frequency for which the probe is calibrated the method utilized for calibration will change. A number of methods is used for calibrating probes, and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

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

ADC	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.

Robot/Controller Manufacturer	Thermo CRS
Number of Axis	Six independently controlled axis
Positioning Repeatability	0.05mm
Controller Type	Single phase Pentium based C500C
Robot Reach	710mm
Communication	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	1800MHz Head	2450MHz Body
Water	40.92%	52.64%	73.2
Salt	1.48%	0.36%	0.04
Sugar	56.5%	0%	0%
HEC	0.40%	0%	0%
Preventol	0.10%	0%	0%
DGBE	0%	47.0%	26.7%

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				June 17 2011
Frequency [MHz]	Description	Dielectric Parameters		Tissue Temp.
		ϵ_r	σ [s/m]	[°C]
		39.5	1.82	23.0
2450 MHz	Reference result ± 5% window	39.2	1.80	N/A
		37.4 to 41.1	1.71 to 1.89	
		39.5	1.82	23.0

Body Tissue Simulant Measurement				June 17-27 2011
Frequency [MHz]	Description	Dielectric Parameters		Tissue Temp.
		ϵ_r	σ [s/m]	[°C]
		52.5	1.96	23.0
2450 MHz	Reference result ± 5% window	52.7	1.95	N/A
		50.2 to 55.3	1.85 to 2.04	
		52.6-53.8	1.92-1.98	24.0



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

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

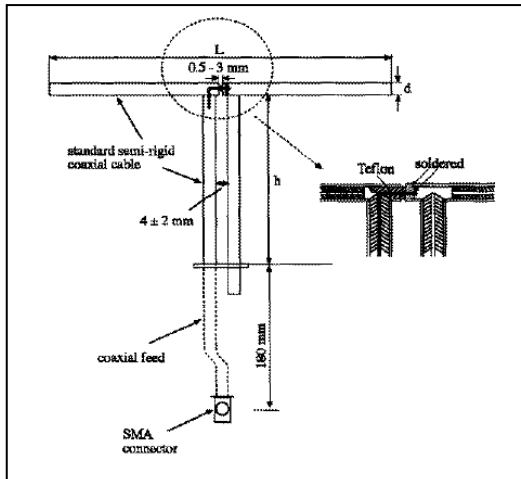


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4. SAR Measurement Procedure

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)
2450MHz	51.5	30.4

4.1.2 Validation Result

Frequency (MHz)	Power	SAR _{1g} (mw/g)	Power Drift (%)	Date
2450	1 W	53.9	-	Nov. 10 2009
2450	1 W	54.312	-1.152	June 17 2011

Note: The validation dipole was calibrated on Nov. 10 2009 by Aprel Labs which didn'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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ALSAS-10U VER 2.3.8.90
APREL Laboratories

SAR Test Report

Report Date : 17-Jun-2011
By Operator : 123
Measurement Date : 17-Jun-2011
Starting Time : 17-Jun-2011 10:58:54 AM
End Time : 17-Jun-2011 11:30:19 AM
Scanning Time : 1885 secs

Product Data

Device Name : validation
Serial No. : test
Type : Dipole
Model : 2450
Frequency : 2450.00 MHz
Max. Transmit Pwr : 1 W
Drift Time : 0 min(s)
Length : 64 mm
Width : 3.6 mm
Depth : 89.8 mm
Antenna Type : Internal
Orientation : Touch
Power Drift-Start : 26.786 W/kg
Power Drift-Finish: 26.477 W/kg
Power Drift (%) : -1.152
Picture : (No picture)

Phantom Data

Name : APREL-Uni
Type : Uni-Phantom
Size (mm) : 280 x 280 x 200
Serial No. : System Default
Location : Center
Description : Uni_Phantom

Tissue Data

Type : HEAD
Serial No. : 2450
Frequency : 2450.00 MHz
Last Calib. Date : 17-Jun-2011
Temperature : 23.00 °C
Ambient Temp. : 23.00 °C
Humidity : 55.00 RH%
Epsilon : 39.50 F/m
Sigma : 1.82 S/m
Density : 1000.00 kg/cu. m
Probe Data
Name : Probe 257 - CHTL



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Model : E020
Type : E-Field Triangle
Serial No. : 257
Last Calib. Date : 19-Oct-2010
Frequency : 2450.00 MHz
Duty Cycle Factor: 1
Conversion Factor: 5
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

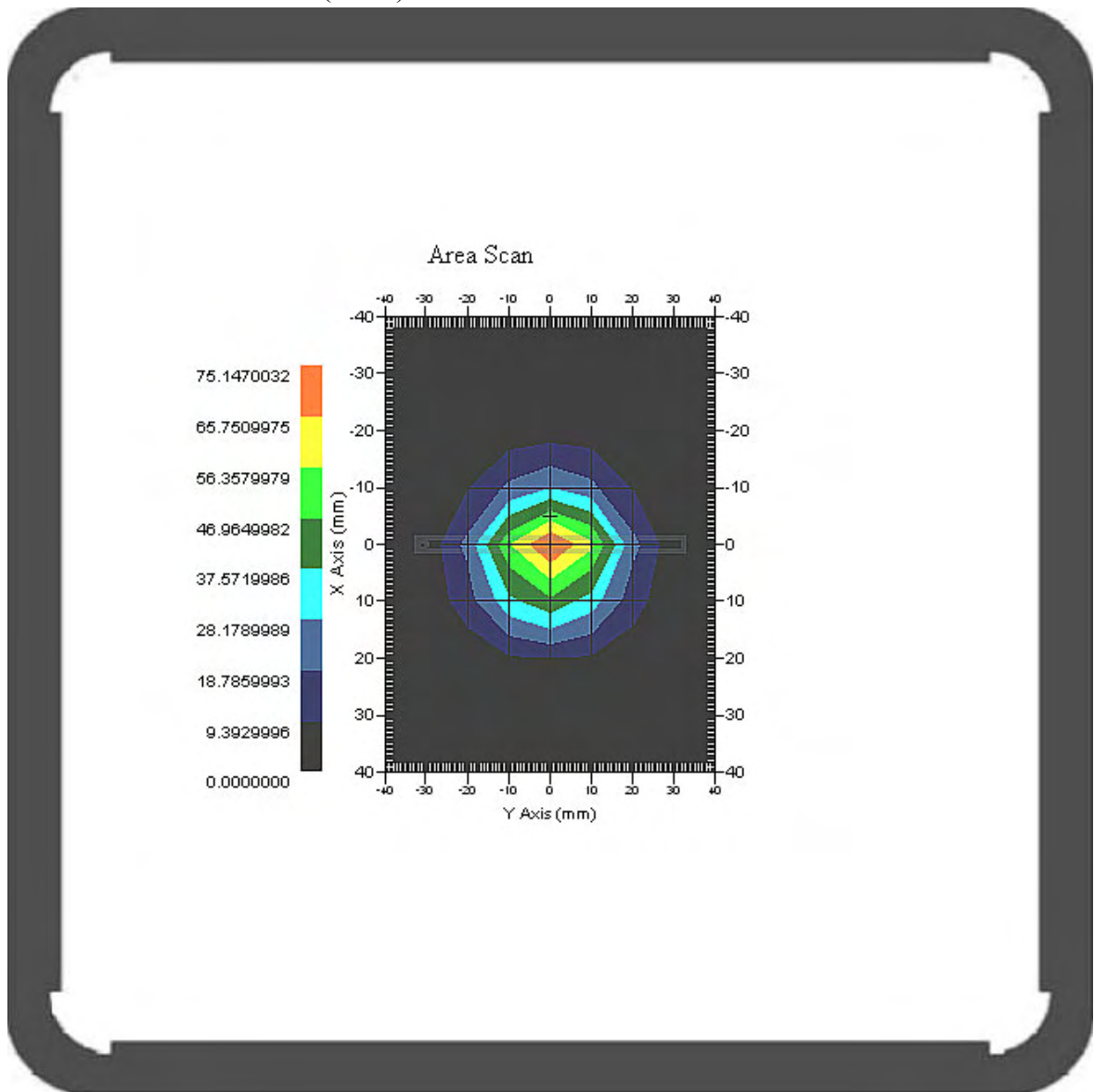
Crest Factor : 1
Scan Type : Complete
Tissue Temp. : 23.00 °C
Ambient Temp. : 24.00 °C
Set-up Date : 17-Jun-2011
Set-up Time : 10:17:51 AM
Area Scan : 9x9x1 : Measurement x=10mm, y=10mm, z=4mm
Zoom Scan : 5x5x8 : Measurement x=8mm, y=8mm, z=4mm

Other Data

DUT Position : Touch
Separation : 0
Channel : Mid



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1 gram SAR value : 54.312 W/kg
10 gram SAR value : 28.946 W/kg
Area Scan Peak SAR : 75.147 W/kg
Zoom Scan Peak SAR : 132.115 W/kg

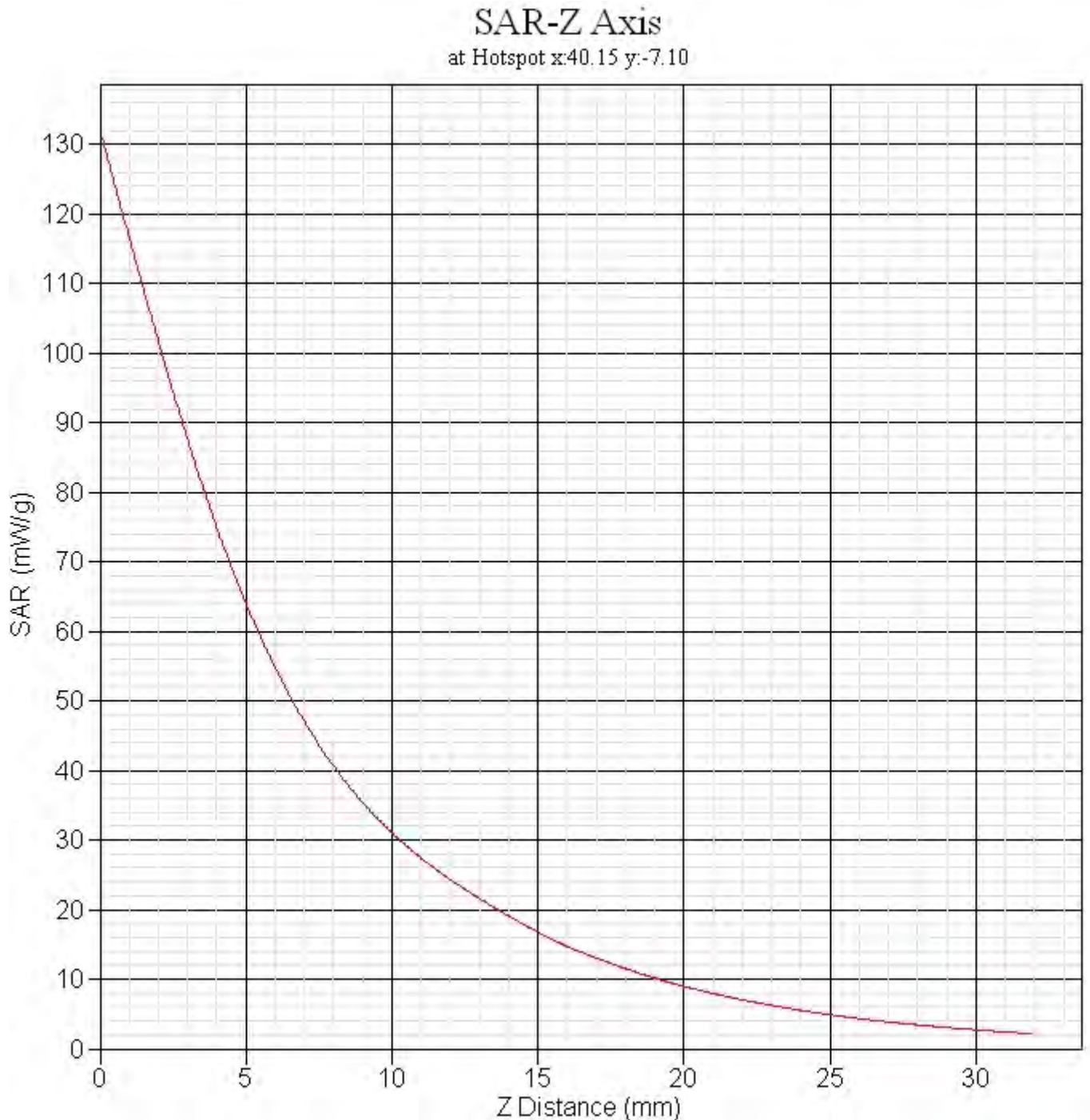
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Exposure Assessment Measurement Uncertainty

Source of Uncertainty	Tolerance Value	Probability Distribution	Divisor	c_1^1 (1-g)	c_1^1 (10-g)	Standard Uncertainty (1-g) %
Measurement System						
Probe Calibration	3.5	normal	1	1	1	3.5
Axial Isotropy	3.7	rectangular	$\sqrt{3}$	$(1-cp)^{1/2}$	$(1-cp)^{1/2}$	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	1.2	rectangular	$\sqrt{3}$	1	1	0.7
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.)	1.1	normal	1	0.7	0.5	0.8
Liquid Permittivity(target)	5.0	rectangular	$\sqrt{3}$	0.6	0.5	1.7
Liquid Permittivity(meas.)	0.8	normal	1	0.6	0.5	0.5
Combined Uncertainty		RSS				9.3
Combined Uncertainty (coverage factor=2)		Normal (k=2)				18.6



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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



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compliance under such circumstances. Other
separation distance may be use, but not exceed 2.5 cm.

4.3 SAR Measurement Procedure

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

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

σ : represents the simulated tissue conductivity

ρ : 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 1mm²) 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 1mm³).



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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)	1.60 W/kg
Spatial Average SAR (whole body)	0.08 W/kg
Spatial Peak SAR (10g for hands, feet, ankles and wrist)	4.00 W/kg

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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	18-Oct.-2011	1
Aprel Laboratories Dipole*	Aprel	ALS-D-2450-S-2	10-Nov.-2011	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
Universal Radio Communication Tester	JRC	NZ-917BJ	NCR	NCR
Vector S/G	R&S	SMU200A	May 30 2012	1
Vector Network	Anritsu	MS4623B	May 27 2012	1

*The ALS-D-2450-S-2 dipole meet KDB 450824 requirements for the extended 3-year calibration interval. Please refer to P.100 and P.110 (return loss -25.451dB vs -29.4dB; impedance 46.2Ω vs 50.7Ω) This dipole didn't use for system validation on test report from Jan. 2005 to 10 Nov. 2009.

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7. 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	$\sqrt{3}$	$(1-cp)^{1/2}$	$(1-cp)^{1/2}$	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	1.2	rectangular	$\sqrt{3}$	1	1	0.7
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.)	1.1	normal	1	0.7	0.5	0.8
Liquid Permittivity(target)	5.0	rectangular	$\sqrt{3}$	0.6	0.5	1.7
Liquid Permittivity(meas.)	0.8	normal	1	0.6	0.5	0.5
Combined Uncertainty		RSS				9.3
Combined Uncertainty (coverage factor=2)		Normal (k=2)				18.6

Report No : TSC-100-06-IN-02 (SAR)

8 SAR Test Results

Kingston WI-WID conducted peak power (dBm)

BW=20MHz	11b(CCK/DSSS)		11g(OFDM)		BW=40MHz	11n(OFDM)	
Freq(MHZ)	PK	AV	PK	AV	Freq(MHZ)	PK	AV
2412(CH1)	15.83	7.20	13.67	7.02	2422(CH5)	13.35	5.5
2437(CH6)	16.23	5.77	8.93	5.87	2437(CH8)	14.49	5.57
2462(CH11)	15.04	5.21	13.64	5.96	2452(CH11)	12.81	5.88

Test Position Body	Antenna Type	Frequency		Conducted Power (dBm)		SAR 1g (W/kg)	Power Drift %	Limit (W/kg)
		Channel	MHz	Pk	Av			
802.11b_Touch	INTERNAL	1	2412	15.83	7.20	0.268	-7.4	1.6
802.11b_Touch	INTERNAL	6	2437	16.23	5.77	0.284	-11.7	1.6
802.11b_Touch _Rear	INTERNAL	6	2437	16.23	5.77	0.182	4.8	1.6
802.11b_Touch	INTERNAL	11	2462	15.04	5.21	0.585	-6.2	1.6
802.11g_Touch	INTERNAL	1	2412	13.67	7.02	0.818	-13.1	1.6
802.11g_Touch	INTERNAL	6	2437	8.93	5.87	0.702	-12.7	1.6
802.11g_Touch _Rear	INTERNAL	6	2437	8.93	5.87	0.265	14.9	1.6
802.11g_Touch	INTERNAL	11	2462	13.64	5.96	0.444	-6.0	1.6
802.11n_Touch	INTERNAL	5	2422	13.35	5.5	0.754	14.7	1.6
802.11n_Touch	INTERNAL	8	2437	14.49	5.57	0.692	23.6	1.6
802.11n_Touch _Rear	INTERNAL	8	2437	14.49	5.57	0.458	-13.0	1.6
802.11n_Touch	INTERNAL	11	2452	12.81	5.88	0.958	12.6	1.6

Note: The test signals (modes and Channels) was Controlled by “Test utility” which provided by DUT Manufacturer on SAR testing

The SAR of Rear side touch of EUT is less than Front side touch due to the EUT transmit antenna is shielded by MB (refer to P.28).



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Report No : TSC-100-06-IN-02 (SAR)

9. EUT Photographs



Front View of EUT



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Report No : TSC-100-06-IN-02 (SAR)



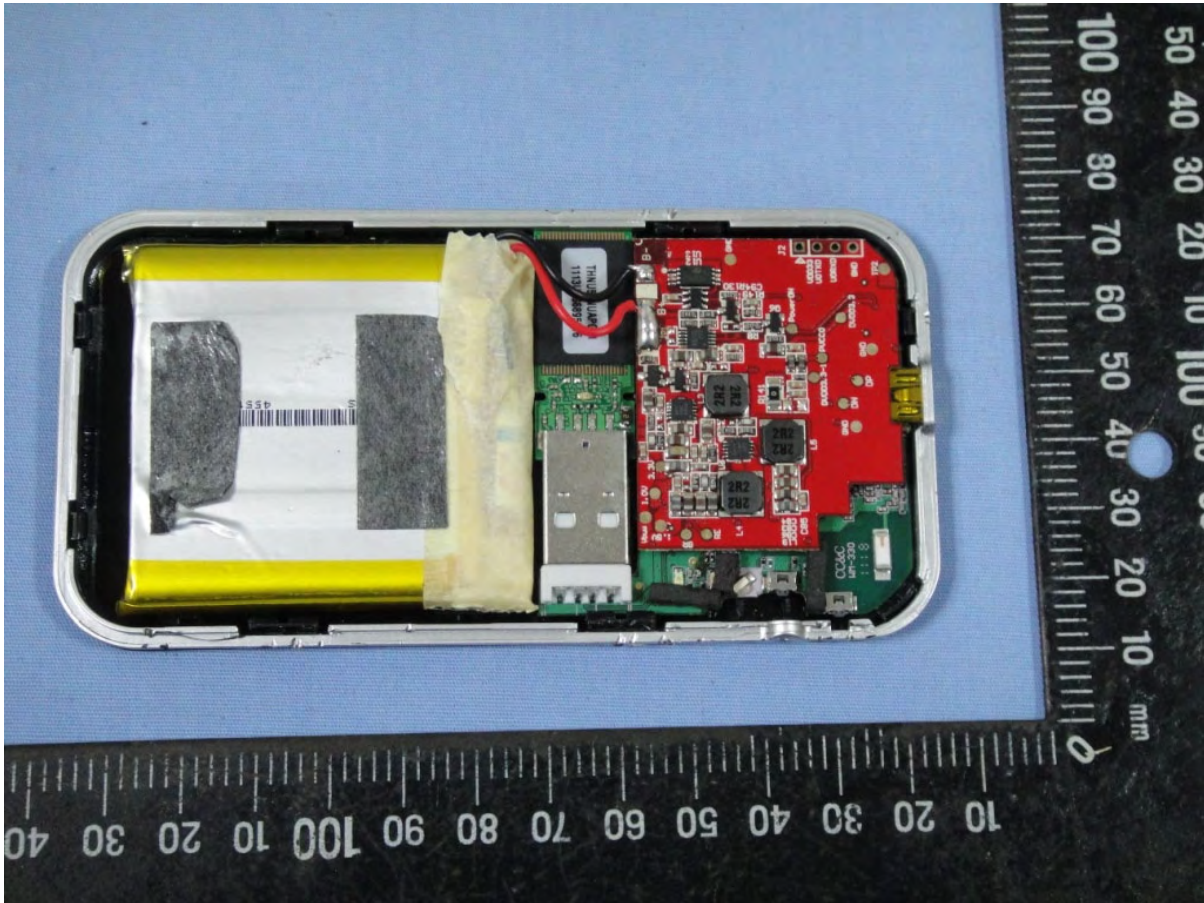
Rear View of EUT



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Report No : TSC-100-06-IN-02 (SAR)



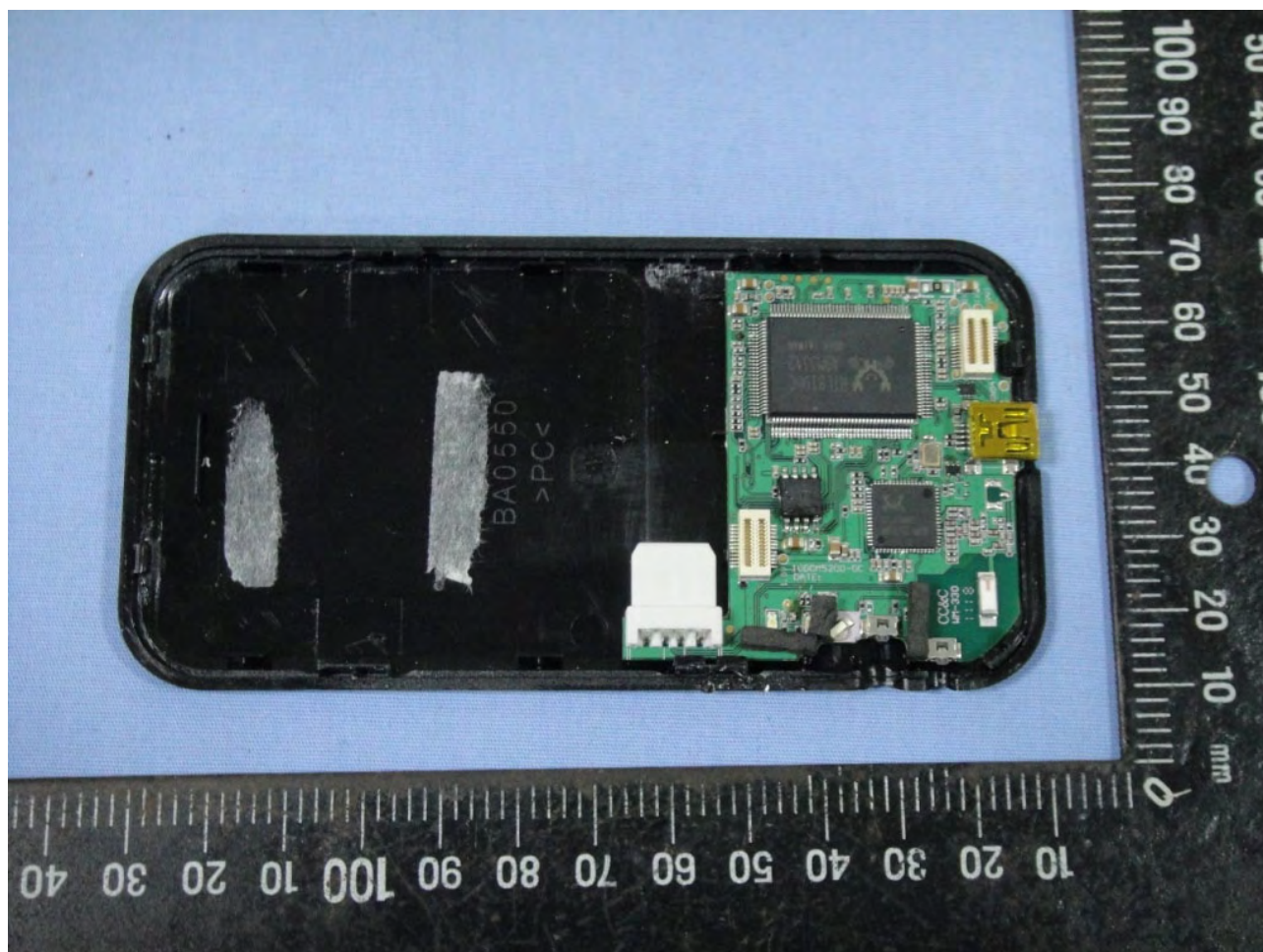
EUT Top 1

Report No : TSC-100-06-IN-02 (SAR)



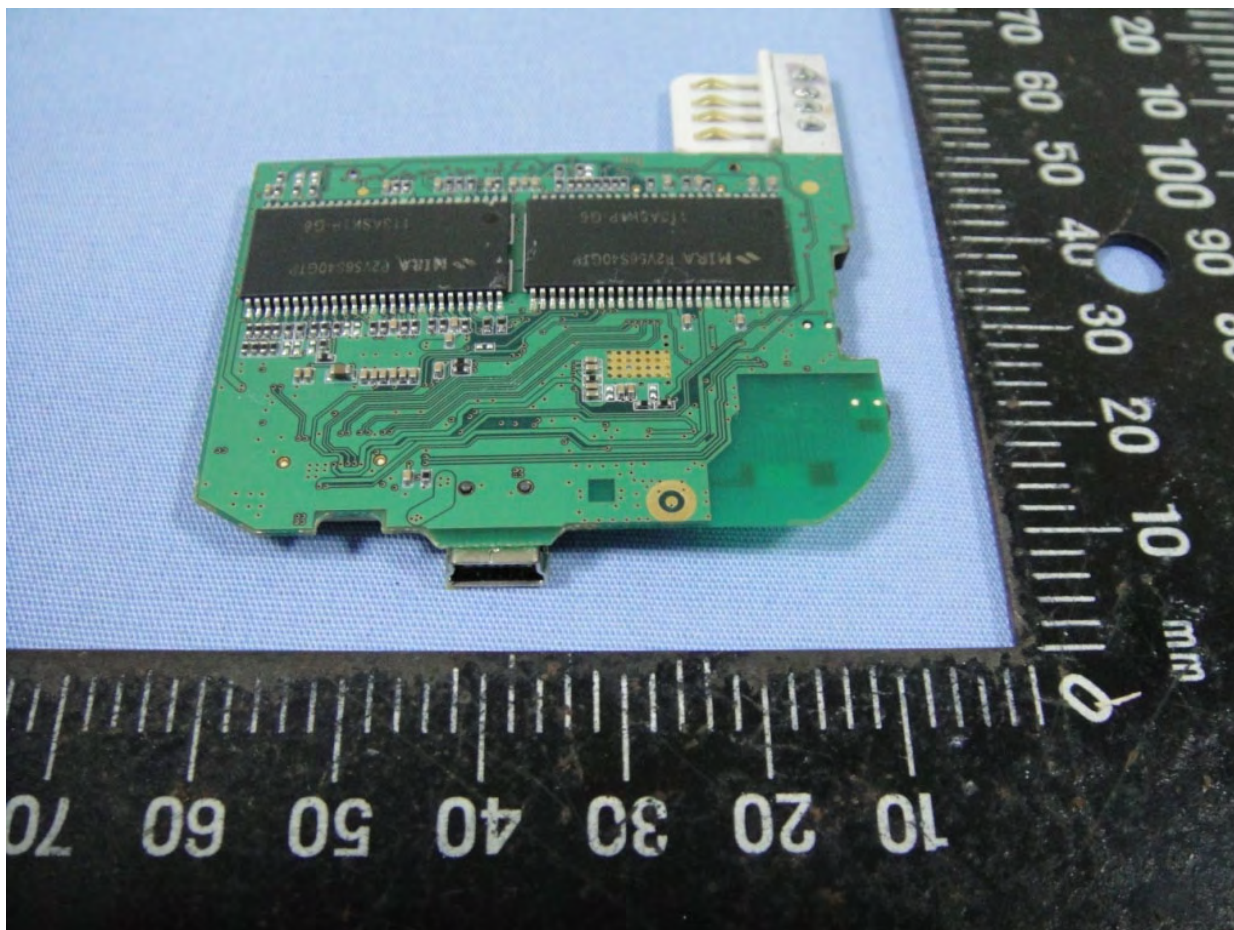
EUT Top 2

Report No : TSC-100-06-IN-02 (SAR)



EUT Top 3

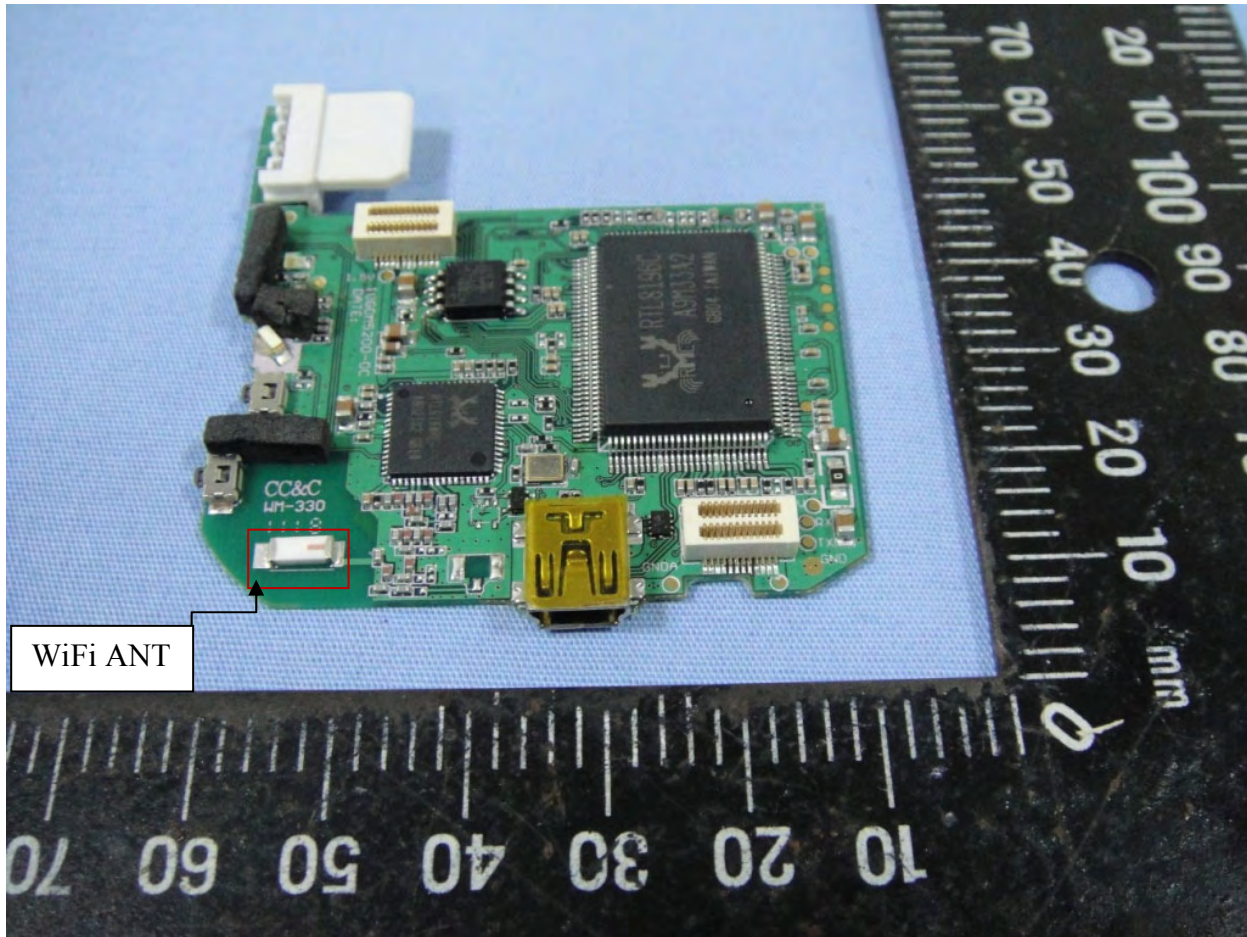
Report No : TSC-100-06-IN-02 (SAR)



EUT_MB_Rear



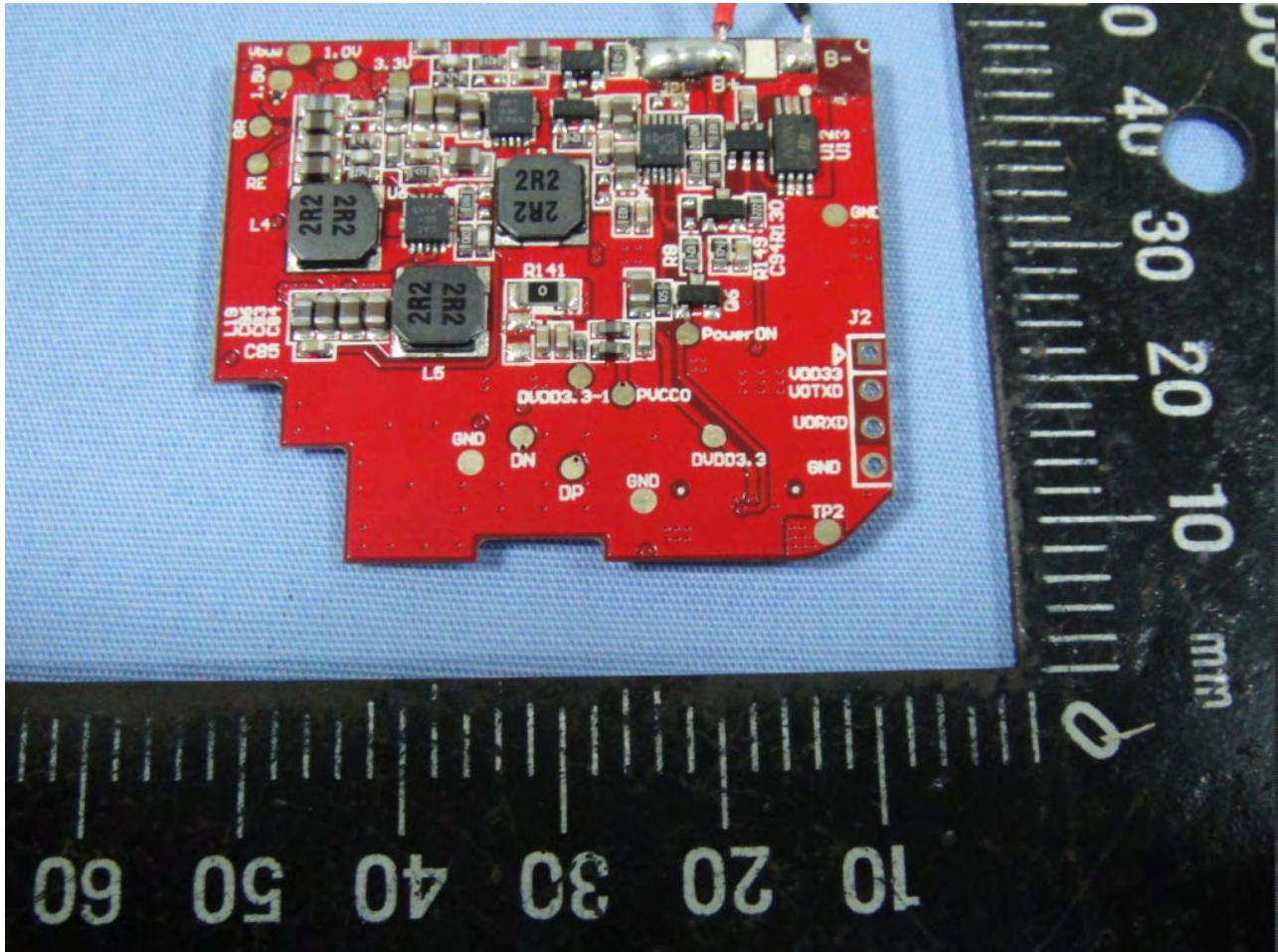
Report No : TSC-100-06-IN-02 (SAR)



EUT_MB_Front and WiFi ANT position



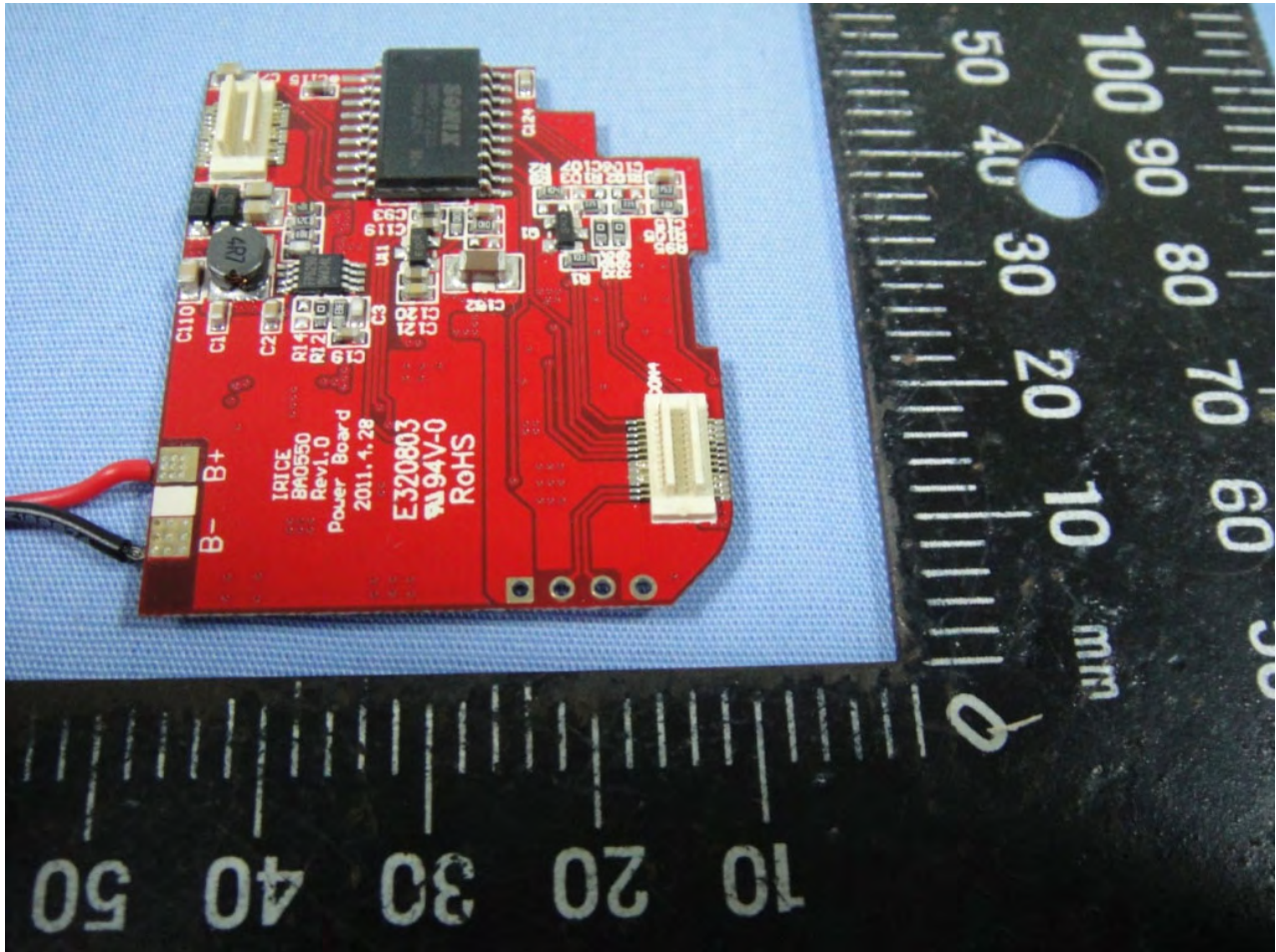
Report No : TSC-100-06-IN-02 (SAR)



EUT_PB_Rear

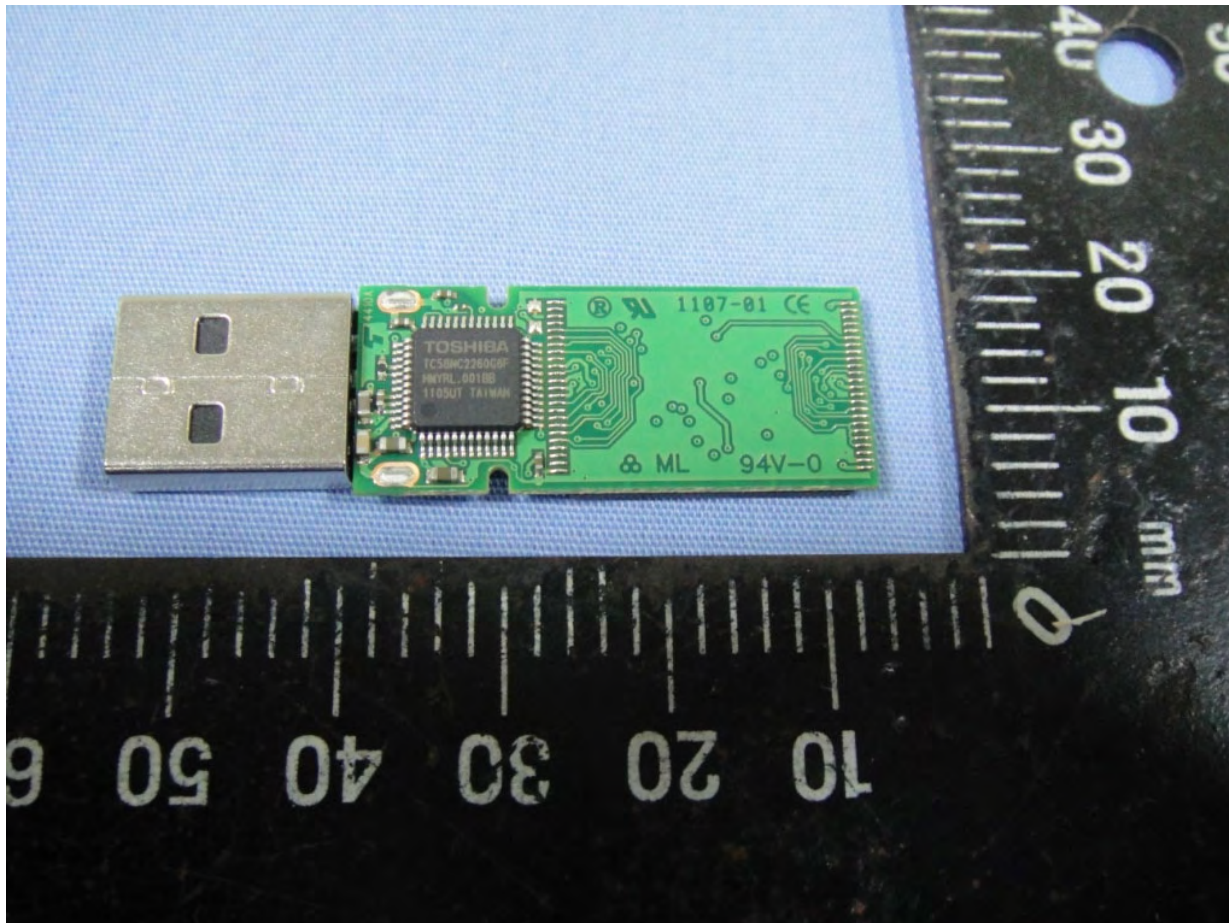


Report No : TSC-100-06-IN-02 (SAR)



EUT_PB_Front

Report No : TSC-100-06-IN-02 (SAR)



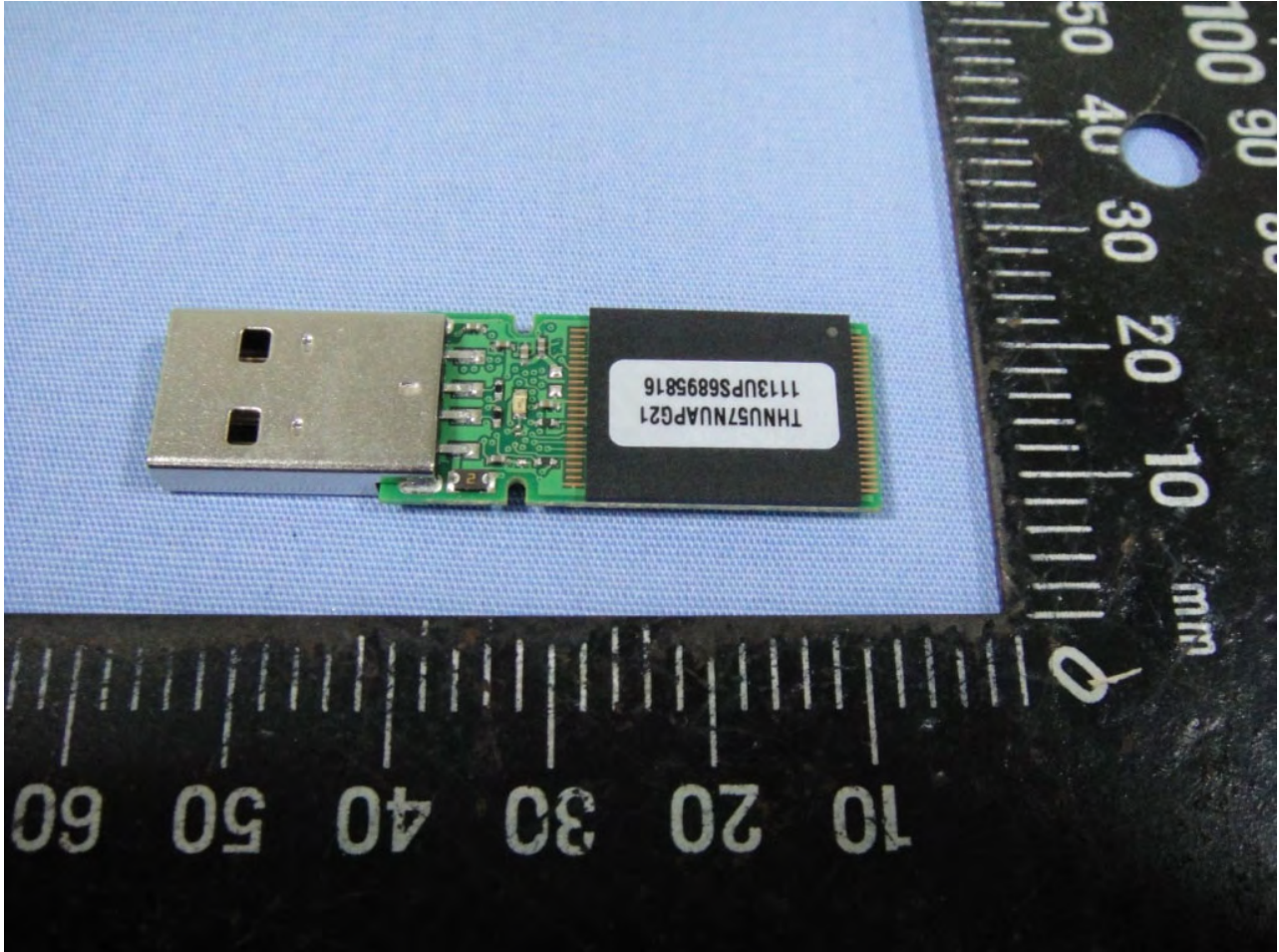
EUT_USB_Rear



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Report No : TSC-100-06-IN-02 (SAR)



EUT_USB_Front

Report No : TSC-100-06-IN-02 (SAR)



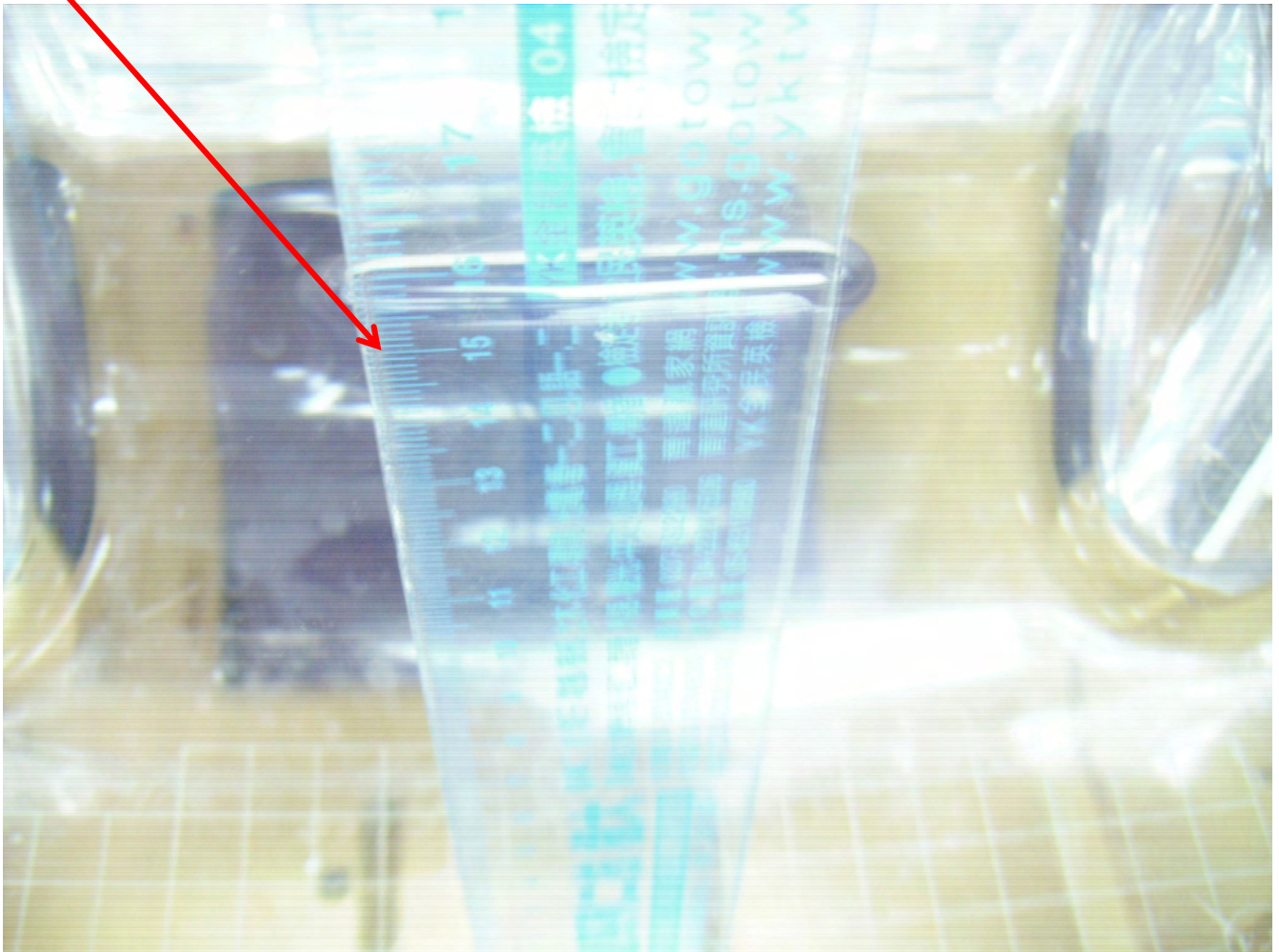
EUT Label

Report No : TSC-100-06-IN-02 (SAR)

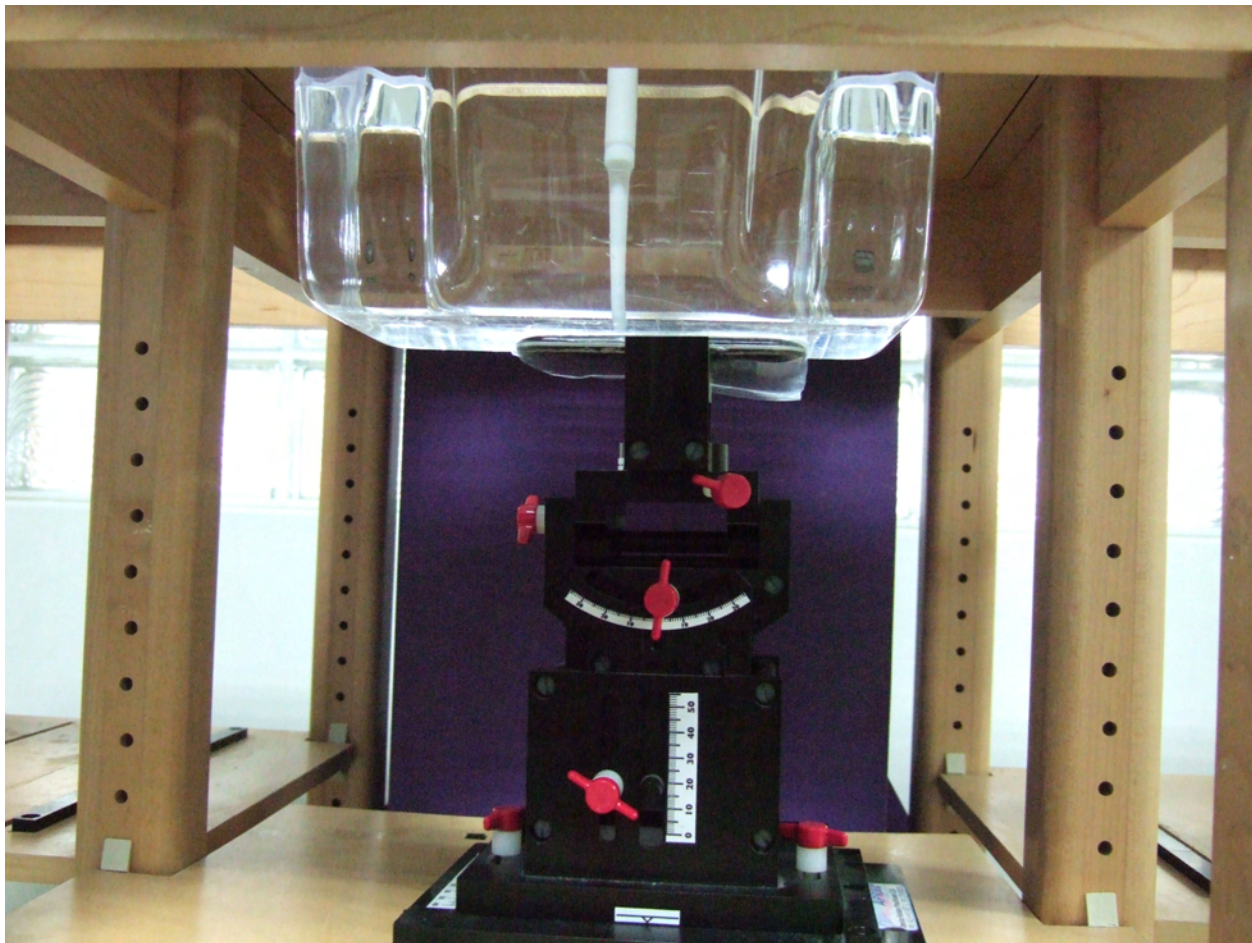
A. TEST CONFIGURATIONS AND TEST DATA

A.1 TEST CONFIGURATION

Liquid Level in Flat Phantom > 15cm

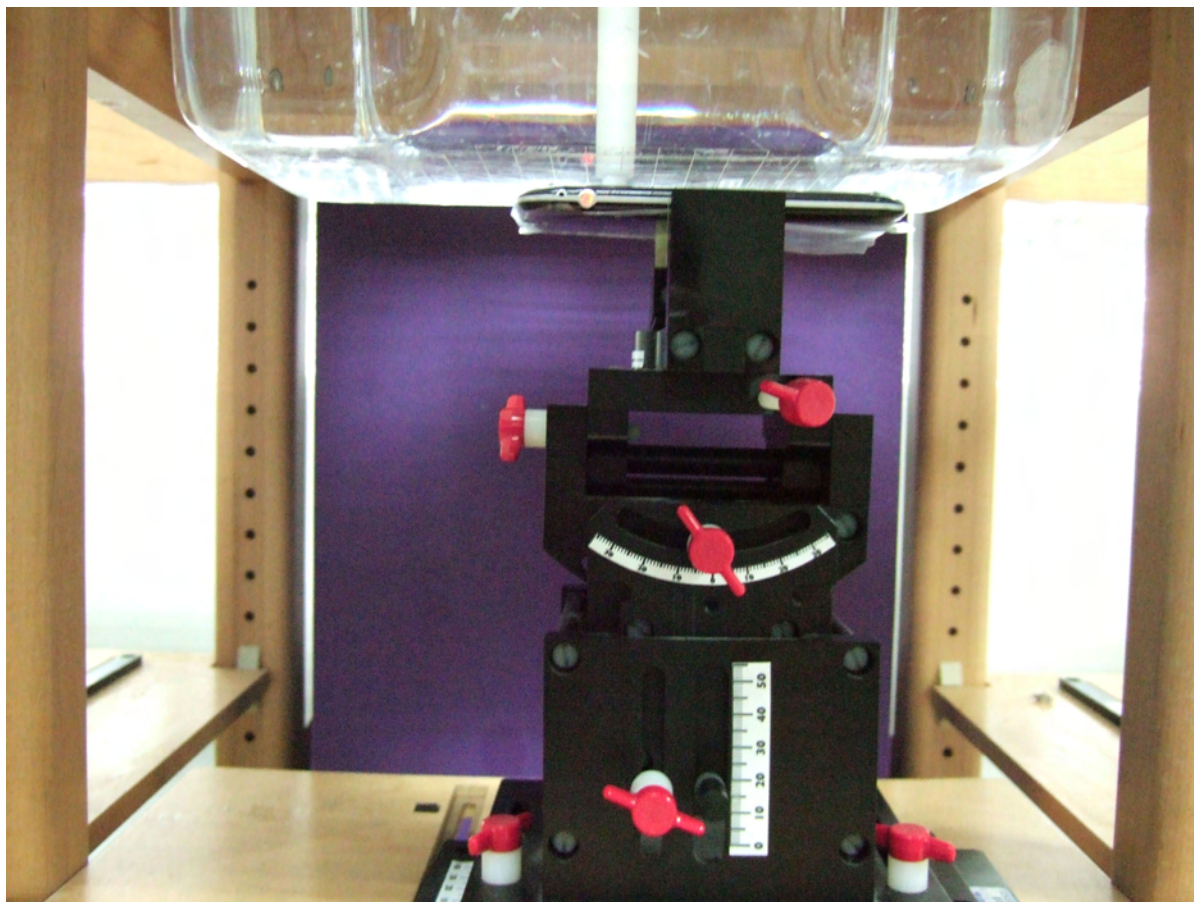


Report No : TSC-100-06-IN-02 (SAR)



802.11b/g/n Touch Position Front

Report No : TSC-100-06-IN-02 (SAR)



802.11b/g/n Touch Position Rear



Report No : TSC-100-06-IN-02 (SAR)

A.3 TISSUE LIQUIDS Dielectric Parameter

A.3.1 2450 MHz TISSUE LIQUIDS Dielectric measurement data

Head Tissue (Cal. Date: June 17 2011)

Tissue Data

Epsilon : 39.5 F/m

Sigma : 1.82 S/m

Density : 1000.00 kg/cu. M

Body Tissue (Cal. Date: June 17-27 2011)

Tissue Data

Epsilon : 52.6-53.8 F/m

Sigma : 1.92-1.98 S/m

Density : 1000.00 kg/cu. M



Report No : TSC-100-06-IN-02 (SAR)

A.4. TEST DATA

A.4.1 802.11b Mode

802.11b CH1 Touch Position

ALSAS-10U VER 2.3.8.90
APREL Laboratories

SAR Test Report

Report Date : 21-Jun-2011
By Operator : 123
Measurement Date : 21-Jun-2011
Starting Time : 21-Jun-2011 08:55:13 AM
End Time : 21-Jun-2011 09:20:48 AM
Scanning Time : 1535 secs

Product Data
Device Name : KDI
Serial No. : WID
Type : Other
Model : WID
Frequency : 2412.00 MHz
Max. Transmit Pwr : 1 W
Drift Time : 0 min(s)
Length : 62 mm
Width : 123 mm
Depth : 11 mm
Antenna Type : Internal
Orientation : Touch
Power Drift-Start : 0.158 W/kg
Power Drift-Finish: 0.147 W/kg
Power Drift (%) : -7.469
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 : 2450.00 MHz
Last Calib. Date : 20-Jun-2011
Temperature : 25.00 °C



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Report No : TSC-100-06-IN-02 (SAR)

Ambient Temp. : 25.00 °C
Humidity : 50.00 RH%
Epsilon : 53.80 F/m
Sigma : 1.98 S/m
Density : 1000.00 kg/cu. m
Probe Data
Name : Probe 257 - CHTL
Model : E020
Type : E-Field Triangle
Serial No. : 257
Last Calib. Date : 19-Oct-2010
Frequency : 2450.00 MHz
Duty Cycle Factor: 1
Conversion Factor: 5
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

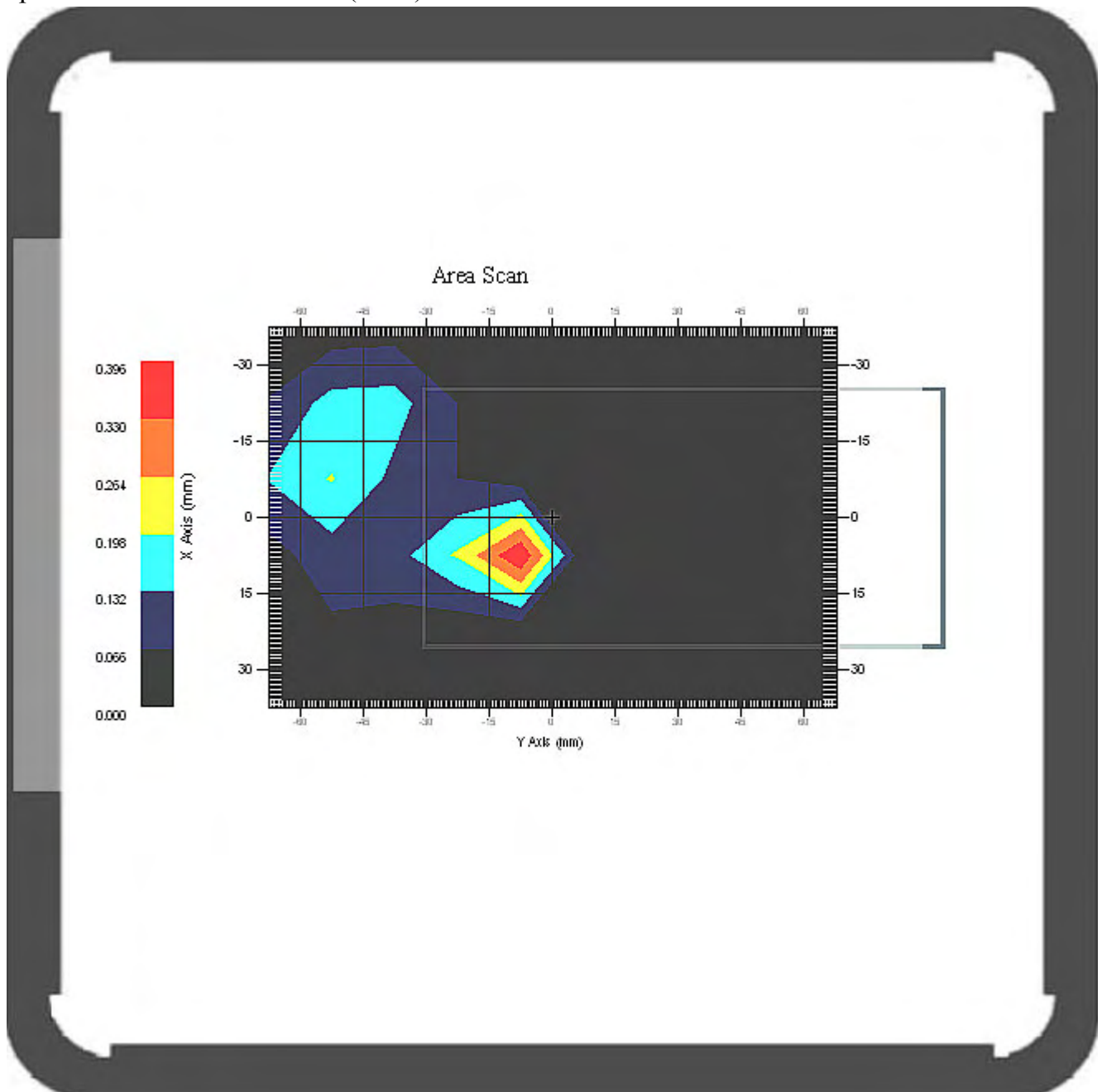
Crest Factor : 1
Scan Type : Complete
Tissue Temp. : 25.00 °C
Ambient Temp. : 25.00 °C
Set-up Date : 21-Jun-2011
Set-up Time : 8:03:28 AM
Area Scan : 6x10x1 : Measurement x=15mm, y=15mm, z=4mm
Zoom Scan : 5x5x8 : Measurement x=8mm, y=8mm, z=4mm

Other Data

DUT Position : Touch
Separation : 0
Channel : Low



Report No : TSC-100-06-IN-02 (SAR)



1 gram SAR value : 0.268 W/kg
10 gram SAR value : 0.045 W/kg
Area Scan Peak SAR : 0.396 W/kg
Zoom Scan Peak SAR : 1.541 W/kg

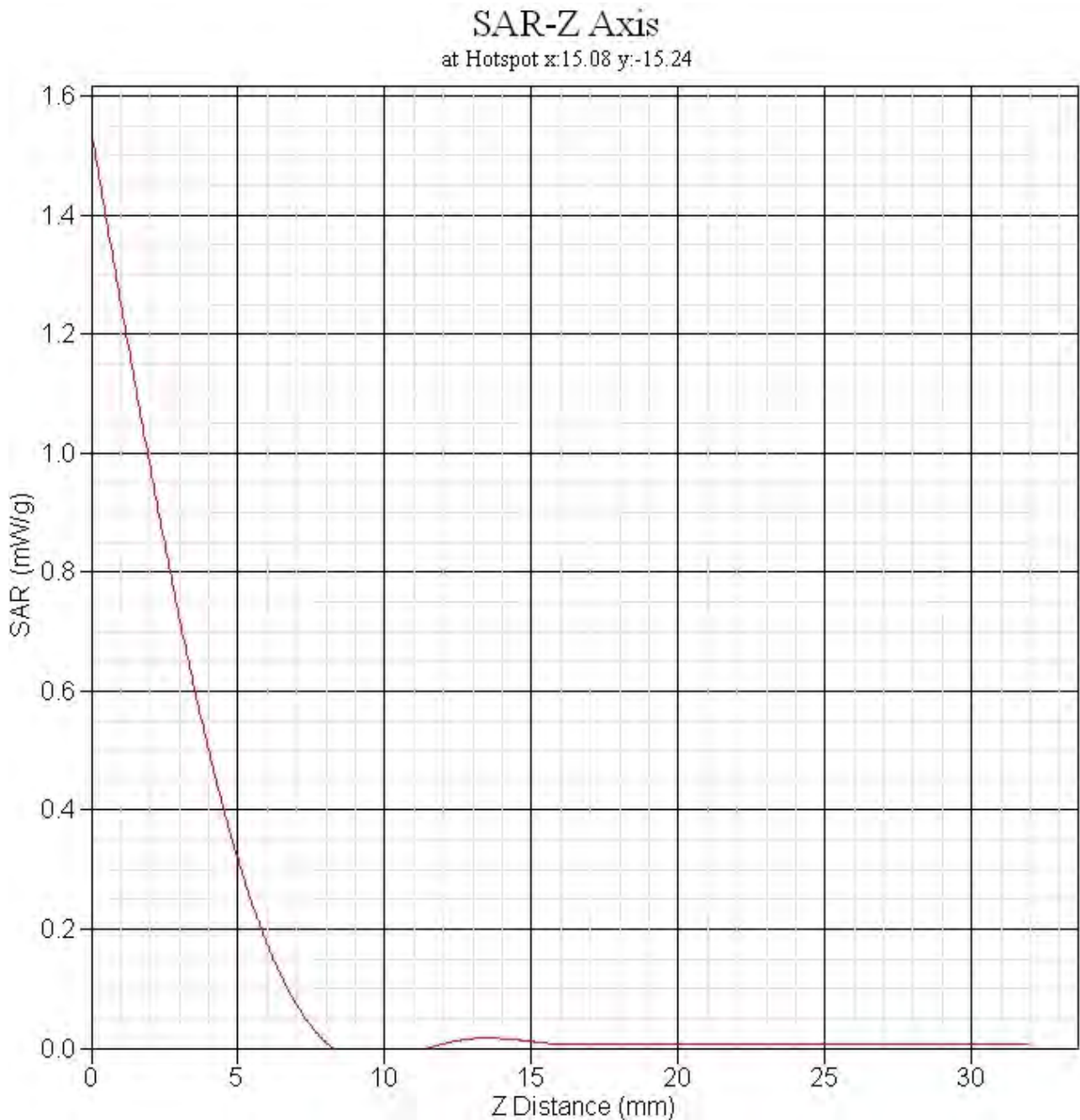
Report No : TSC-100-06-IN-02 (SAR)

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	$\sqrt{3}$	$(1-cp)^{1/2}$	$(1-cp)^{1/2}$	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	7.5	rectangular	$\sqrt{3}$	1	1	4.3
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.)	1.0	normal	1	0.7	0.5	0.7
Liquid Permittivity(target)	5.0	rectangular	$\sqrt{3}$	0.6	0.5	1.7
Liquid Permittivity(meas.)	2.2	normal	1	0.6	0.5	1.3
Combined Uncertainty		RSS				10.3
Combined Uncertainty (coverage factor=2)		Normal (k=2)				20.6



Report No : TSC-100-06-IN-02 (SAR)





Report No : TSC-100-06-IN-02 (SAR)

802.11b CH6 Touch Position

ALSAS-10U VER 2.3.8.90

APREL Laboratories

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SAR Test Report

Report Date : 17-Jun-2011
By Operator : 123
Measurement Date : 17-Jun-2011
Starting Time : 17-Jun-2011 03:03:20 PM
End Time : 17-Jun-2011 03:29:47 PM
Scanning Time : 1587 secs

Product Data

Device Name : KDI
Serial No. : WID
Type : Other
Model : WID
Frequency : 2437.00 MHz
Max. Transmit Pwr : 1 W
Drift Time : 0 min(s)
Length : 123 mm
Width : 62 mm
Depth : 11 mm
Antenna Type : Internal
Orientation : Touch
Power Drift-Start : 0.192 W/kg
Power Drift-Finish: 0.169 W/kg
Power Drift (%) : -11.711
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 : 2450.00 MHz
Last Calib. Date : 17-Jun-2011
Temperature : 25.00 °C
Ambient Temp. : 25.00 °C
Humidity : 55.00 RH%
Epsilon : 53.50 F/m
Sigma : 1.97 S/m
Density : 1000.00 kg/cu. m



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E-mail: tsd@cht.com.tw <http://www.chttl.com.tw>

Report No : TSC-100-06-IN-02 (SAR)

Probe Data

Name : Probe 257 - CHTL
Model : E020
Type : E-Field Triangle
Serial No. : 257
Last Calib. Date : 19-Oct-2010
Frequency : 2450.00 MHz
Duty Cycle Factor: 1
Conversion Factor: 5
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

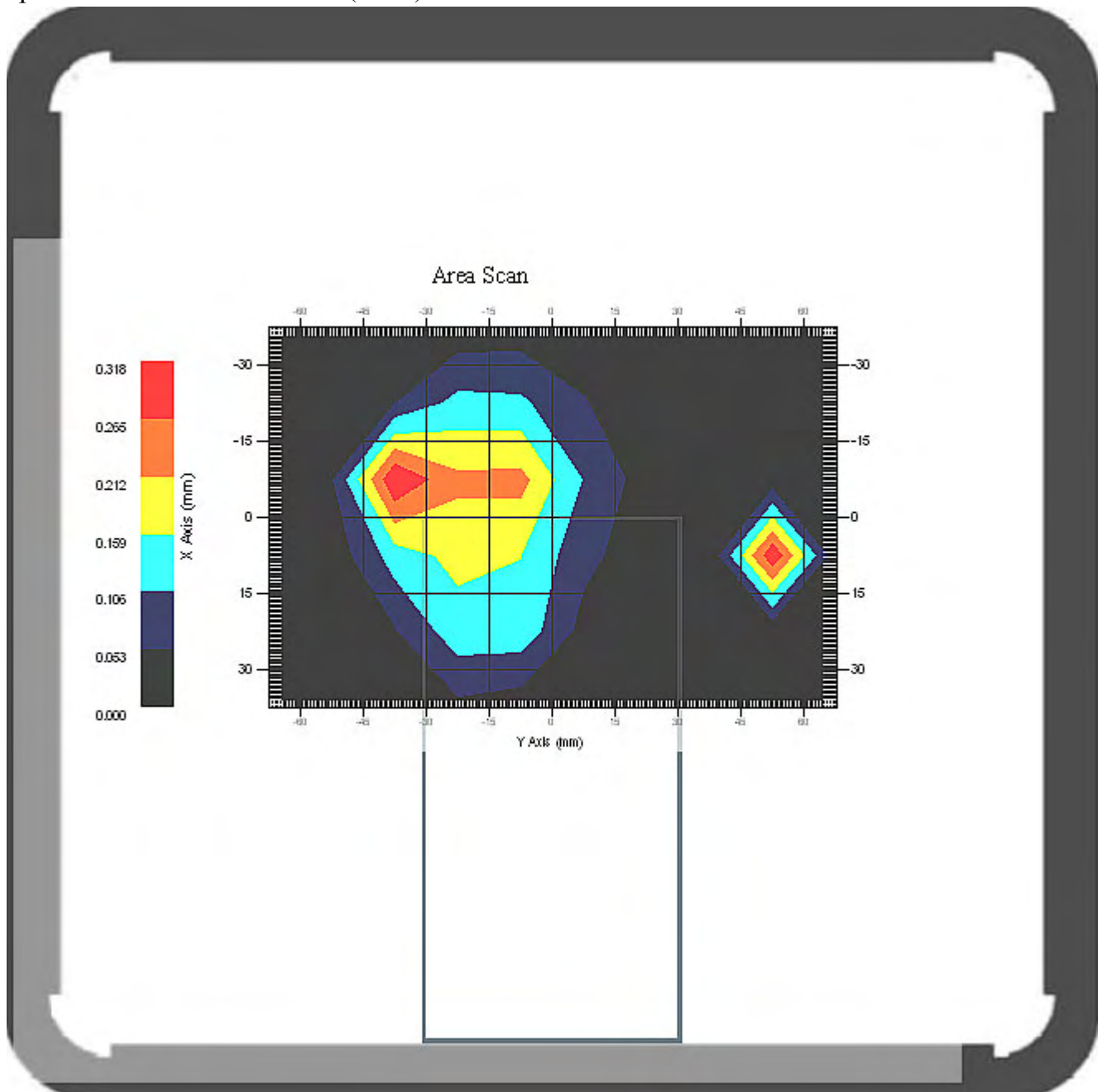
Crest Factor : 1
Scan Type : Complete
Tissue Temp. : 25.00 °C
Ambient Temp. : 25.00 °C
Set-up Date : 17-Jun-2011
Set-up Time : 2:25:32 PM
Area Scan : 6x10x1 : Measurement x=15mm, y=15mm, z=4mm
Zoom Scan : 5x5x8 : Measurement x=8mm, y=8mm, z=4mm

Other Data

DUT Position : Touch
Separation : 0
Channel : Mid



Report No : TSC-100-06-IN-02 (SAR)



1 gram SAR value : 0.284 W/kg
10 gram SAR value : 0.131 W/kg
Area Scan Peak SAR : 0.316 W/kg
Zoom Scan Peak SAR : 0.590 W/kg

Report No : TSC-100-06-IN-02 (SAR)

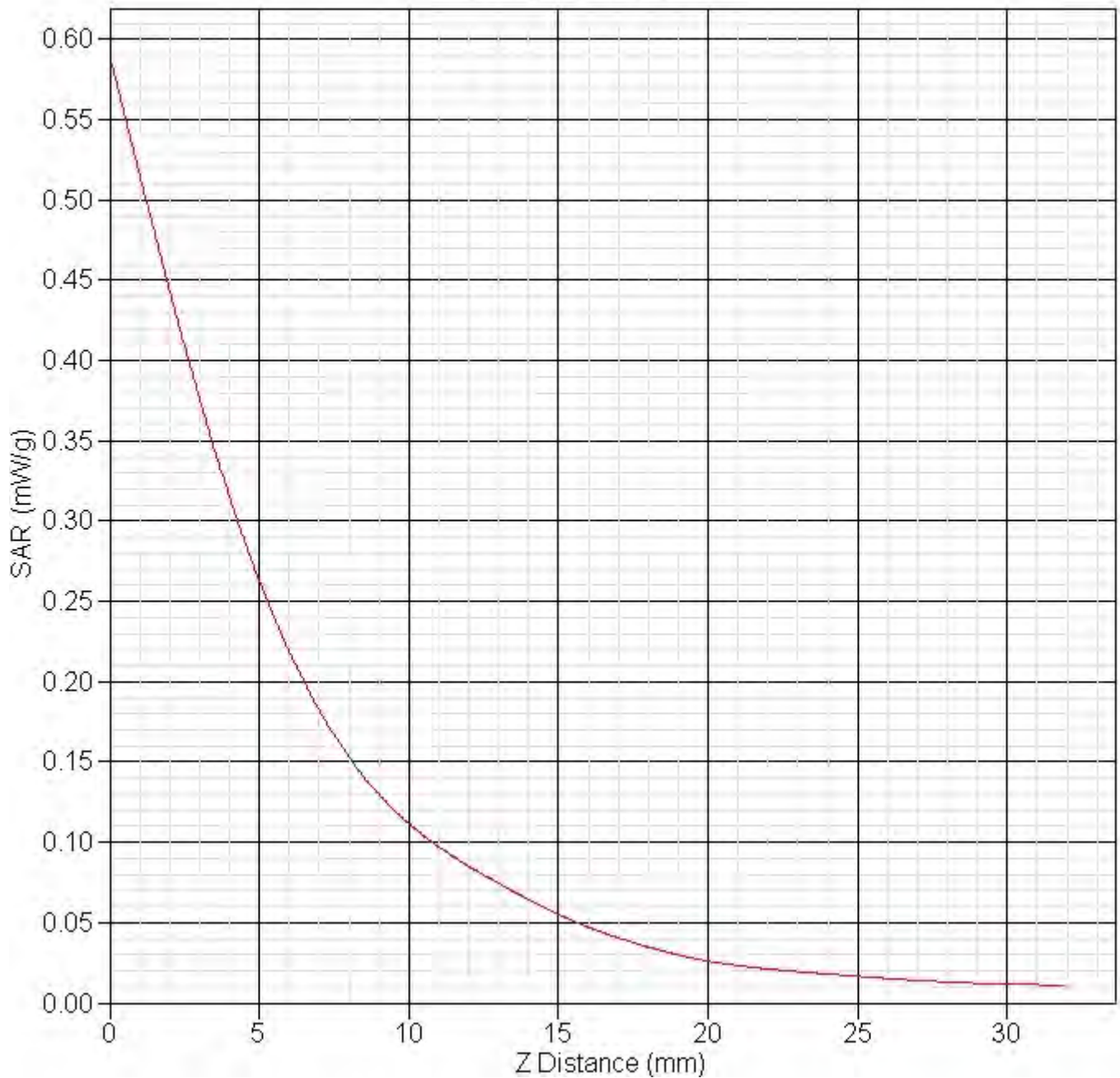
Exposure Assessment Measurement Uncertainty

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	$\sqrt{3}$	$(1-cp)^{1/2}$	$(1-cp)^{1/2}$	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	11.7	rectangular	$\sqrt{3}$	1	1	6.8
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.)	1.0	normal	1	0.7	0.5	0.7
Liquid Permittivity(target)	5.0	rectangular	$\sqrt{3}$	0.6	0.5	1.7
Liquid Permittivity(meas.)	1.5	normal	1	0.6	0.5	0.9
Combined Uncertainty		RSS				11.5
Combined Uncertainty (coverage factor=2)		Normal (k=2)				23.0



Report No : TSC-100-06-IN-02 (SAR)

SAR-Z Axis
at Hotspot x:0.09 y:-37.27





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Report No : TSC-100-06-IN-02 (SAR)

802.11b CH6 Touch_Rear Position

ALSAS-10U VER 2.3.8.90
APREL Laboratories

SAR Test Report

Report Date : 04-Jul-2011
By Operator : 123
Measurement Date : 04-Jul-2011
Starting Time : 04-Jul-2011 10:14:53 AM
End Time : 04-Jul-2011 10:40:56 AM
Scanning Time : 1563 secs

Product Data
Device Name : KDI
Serial No. : WID
Type : Other
Model : WID
Frequency : 2437.00 MHz
Max. Transmit Pwr : 1 W
Drift Time : 0 min(s)
Length : 62 mm
Width : 123 mm
Depth : 11 mm
Antenna Type : Internal
Orientation : Touch
Power Drift-Start : 0.251 W/kg
Power Drift-Finish: 0.264 W/kg
Power Drift (%) : 4.840
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 : 2450.00 MHz
Last Calib. Date : 04-Jul-2011
Temperature : 23.00 °C
Ambient Temp. : 23.00 °C
Humidity : 50.00 RH%
Epsilon : 52.00 F/m
Sigma : 1.91 S/m
Density : 1000.00 kg/cu. m



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Report No : TSC-100-06-IN-02 (SAR)

Probe Data

Name : Probe 257 - CHTL
Model : E020
Type : E-Field Triangle
Serial No. : 257
Last Calib. Date : 19-Oct-2010
Frequency : 2450.00 MHz
Duty Cycle Factor: 1
Conversion Factor: 5
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

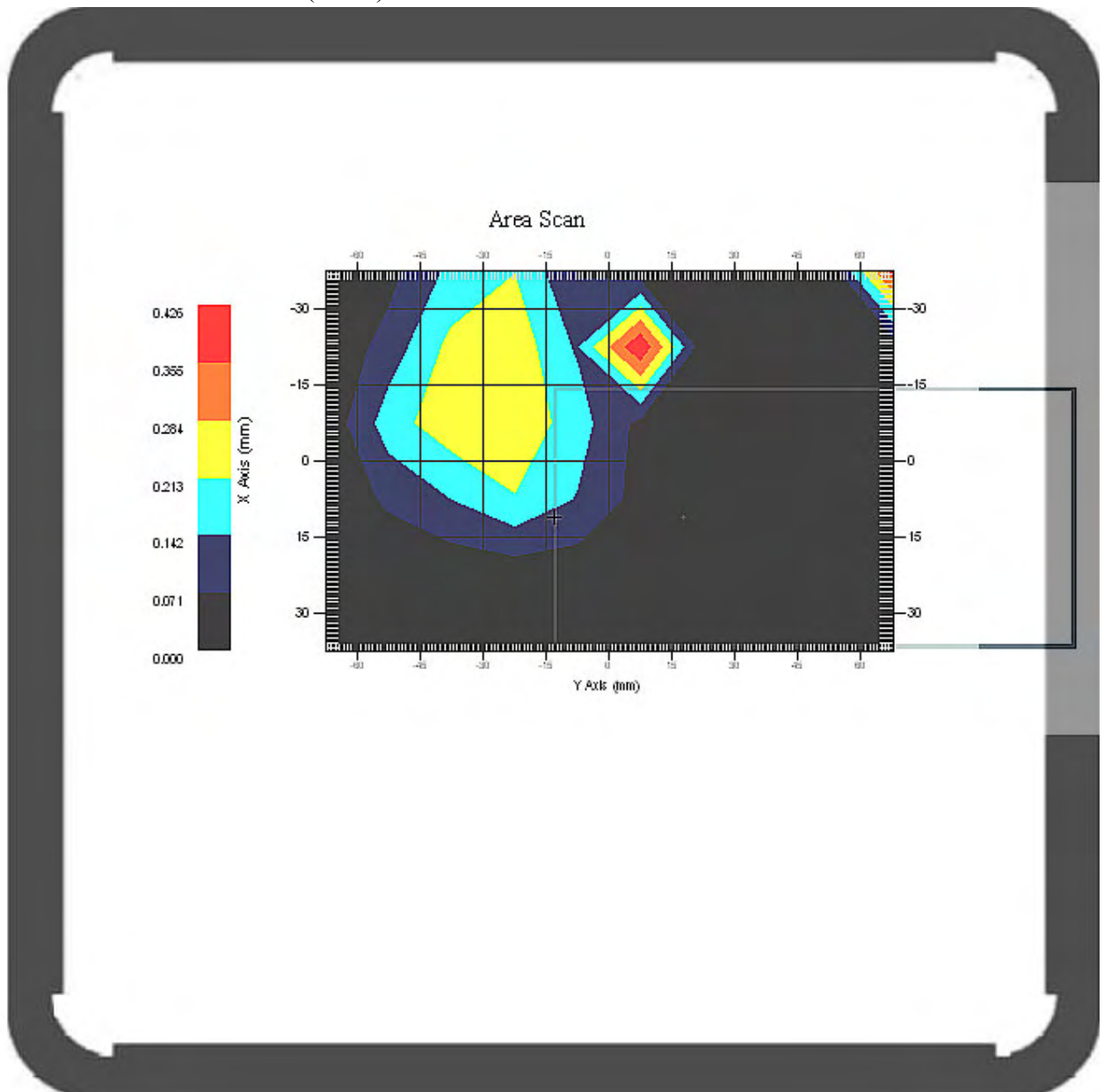
Crest Factor : 1
Scan Type : Complete
Tissue Temp. : 23.00 °C
Ambient Temp. : 23.00 °C
Set-up Date : 04-Jul-2011
Set-up Time : 8:30:28 AM
Area Scan : 6x10x1 : Measurement x=15mm, y=15mm, z=4mm
Zoom Scan : 5x5x8 : Measurement x=8mm, y=8mm, z=4mm

Other Data

DUT Position : Touch
Separation : 0
Channel : Mid



Report No : TSC-100-06-IN-02 (SAR)



1 gram SAR value : 0.182 W/kg
10 gram SAR value : 0.109 W/kg
Area Scan Peak SAR : 0.423 W/kg
Zoom Scan Peak SAR : 0.300 W/kg

Report No : TSC-100-06-IN-02 (SAR)

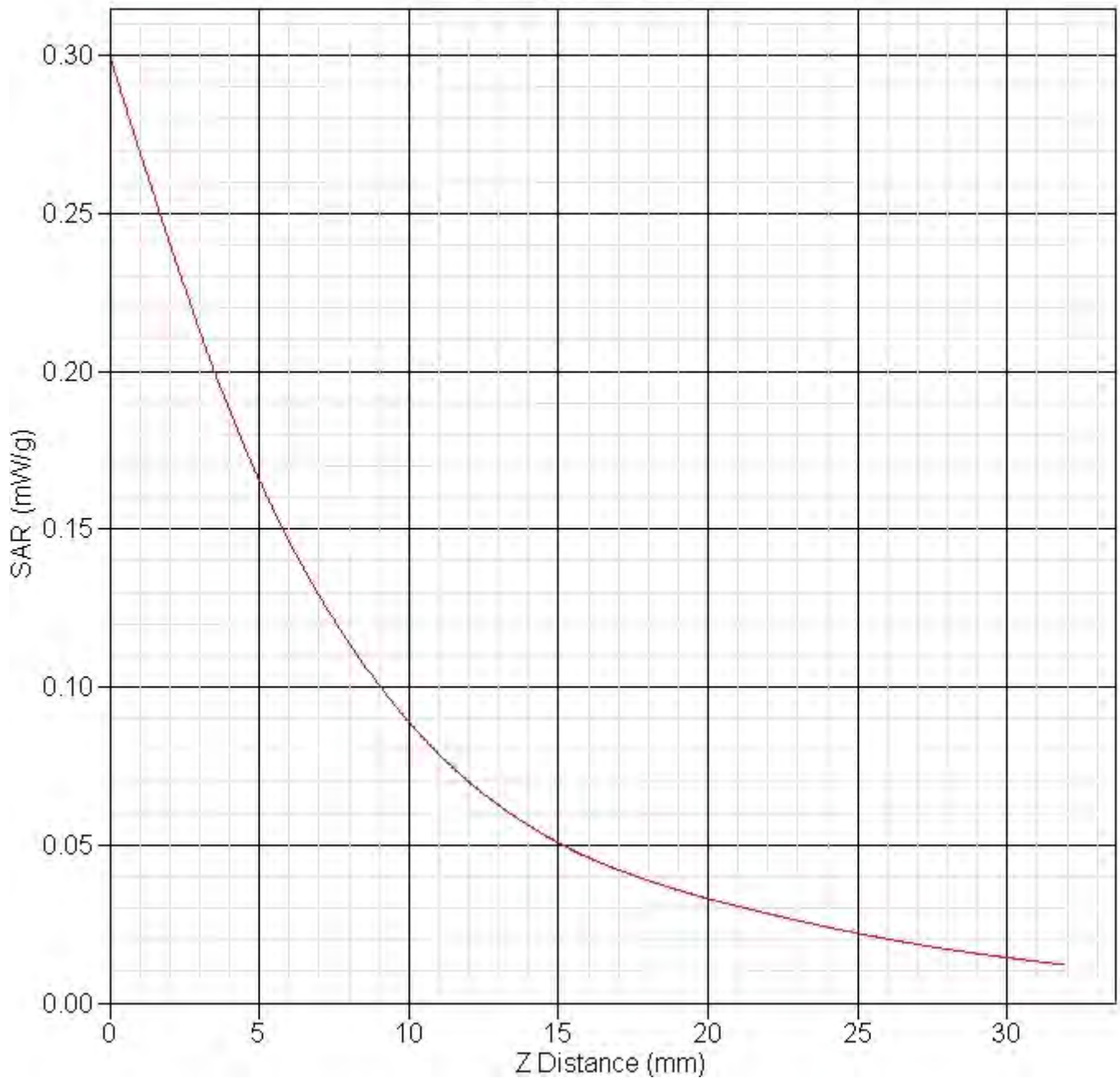
Exposure Assessment Measurement Uncertainty

Source of Uncertainty	Tolerance Value	Probability Distribution	Divisor	c_1^1 (1-g)	c_1^1 (10-g)	Standard Uncertainty (1-g) %
Measurement System						
Probe Calibration	3.5	normal	1	1	1	3.5
Axial Isotropy	3.7	rectangular	$\sqrt{3}$	$(1-cp)^{1/2}$	$(1-cp)^{1/2}$	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	4.8	rectangular	$\sqrt{3}$	1	1	2.8
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.)	1.4	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.)	1.4	normal	1	0.6	0.5	0.0
Combined Uncertainty		RSS				9.6
Combined Uncertainty (coverage factor=2)		Normal (k=2)				19.3



Report No : TSC-100-06-IN-02 (SAR)

SAR-Z Axis
at Hotspot x:1.11 y:-8.27





Report No : TSC-100-06-IN-02 (SAR)

802.11b CH11 Touch Position

ALSAS-10U VER 2.3.8.90
APREL Laboratories

SAR Test Report

Report Date : 20-Jun-2011
By Operator : 123
Measurement Date : 20-Jun-2011
Starting Time : 20-Jun-2011 02:29:37 PM
End Time : 20-Jun-2011 02:55:48 PM
Scanning Time : 1571 secs

Product Data
Device Name : KDI
Serial No. : WID
Type : Other
Model : WID
Frequency : 2462.00 MHz
Max. Transmit Pwr : 1 W
Drift Time : 0 min(s)
Length : 123 mm
Width : 62 mm
Depth : 11 mm
Antenna Type : Internal
Orientation : Touch
Power Drift-Start : 0.174 W/kg
Power Drift-Finish: 0.163 W/kg
Power Drift (%) : -6.226
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 : 2450.00 MHz
Last Calib. Date : 20-Jun-2011
Temperature : 25.00 °C
Ambient Temp. : 25.00 °C
Humidity : 50.00 RH%
Epsilon : 53.20 F/m
Sigma : 1.95 S/m
Density : 1000.00 kg/cu. m



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Report No : TSC-100-06-IN-02 (SAR)

Probe Data

Name : Probe 257 - CHTL
Model : E020
Type : E-Field Triangle
Serial No. : 257
Last Calib. Date : 19-Oct-2010
Frequency : 2450.00 MHz
Duty Cycle Factor: 1
Conversion Factor: 5
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

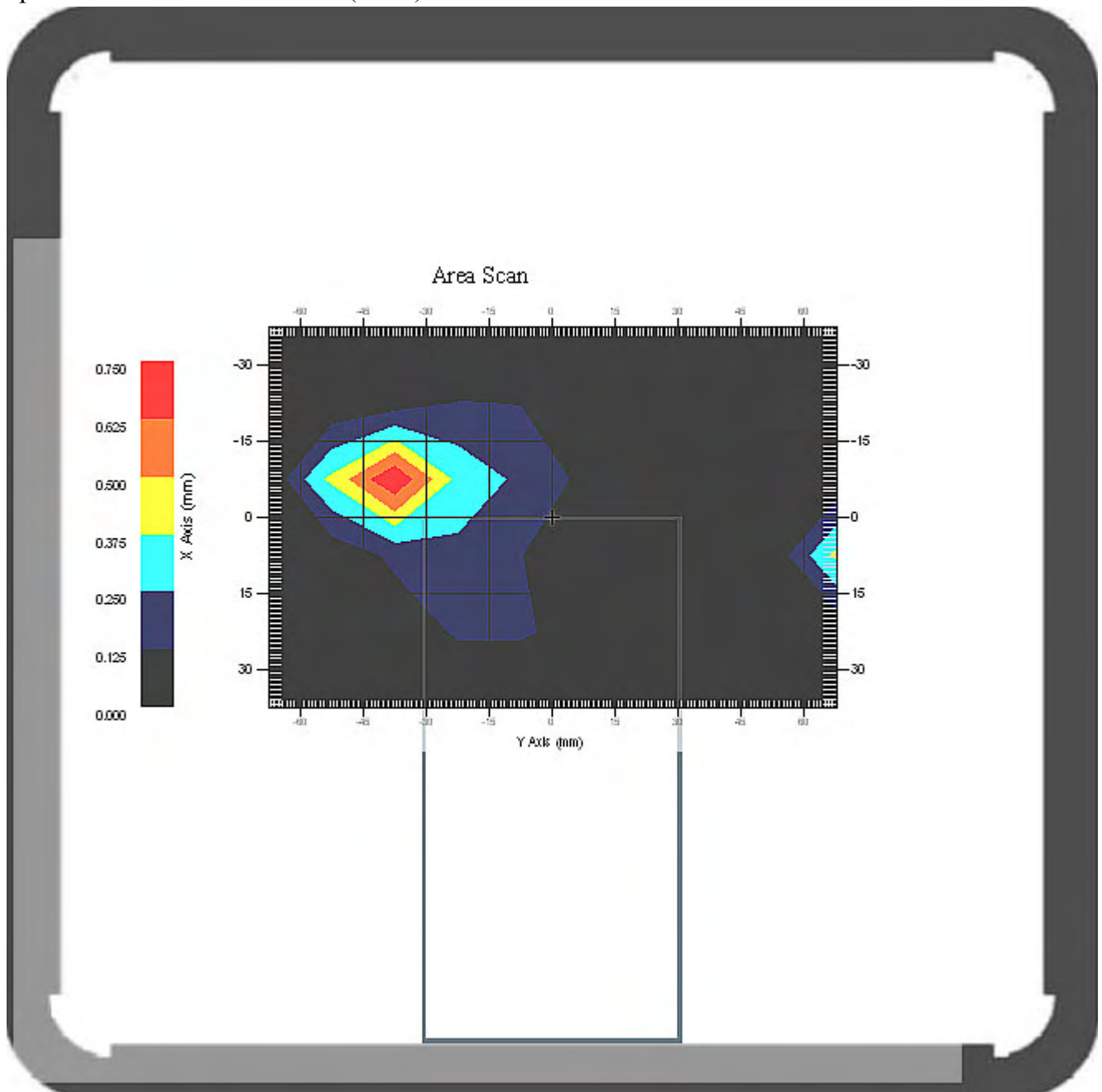
Crest Factor : 1
Scan Type : Complete
Tissue Temp. : 25.00 °C
Ambient Temp. : 25.00 °C
Set-up Date : 20-Jun-2011
Set-up Time : 2:25:32 PM
Area Scan : 6x10x1 : Measurement x=15mm, y=15mm, z=4mm
Zoom Scan : 5x5x8 : Measurement x=8mm, y=8mm, z=4mm

Other Data

DUT Position : Touch
Separation : 0
Channel : High



Report No : TSC-100-06-IN-02 (SAR)



1 gram SAR value : 0.585 W/kg
10 gram SAR value : 0.198 W/kg
Area Scan Peak SAR : 0.750 W/kg
Zoom Scan Peak SAR : 1.661 W/kg

Report No : TSC-100-06-IN-02 (SAR)

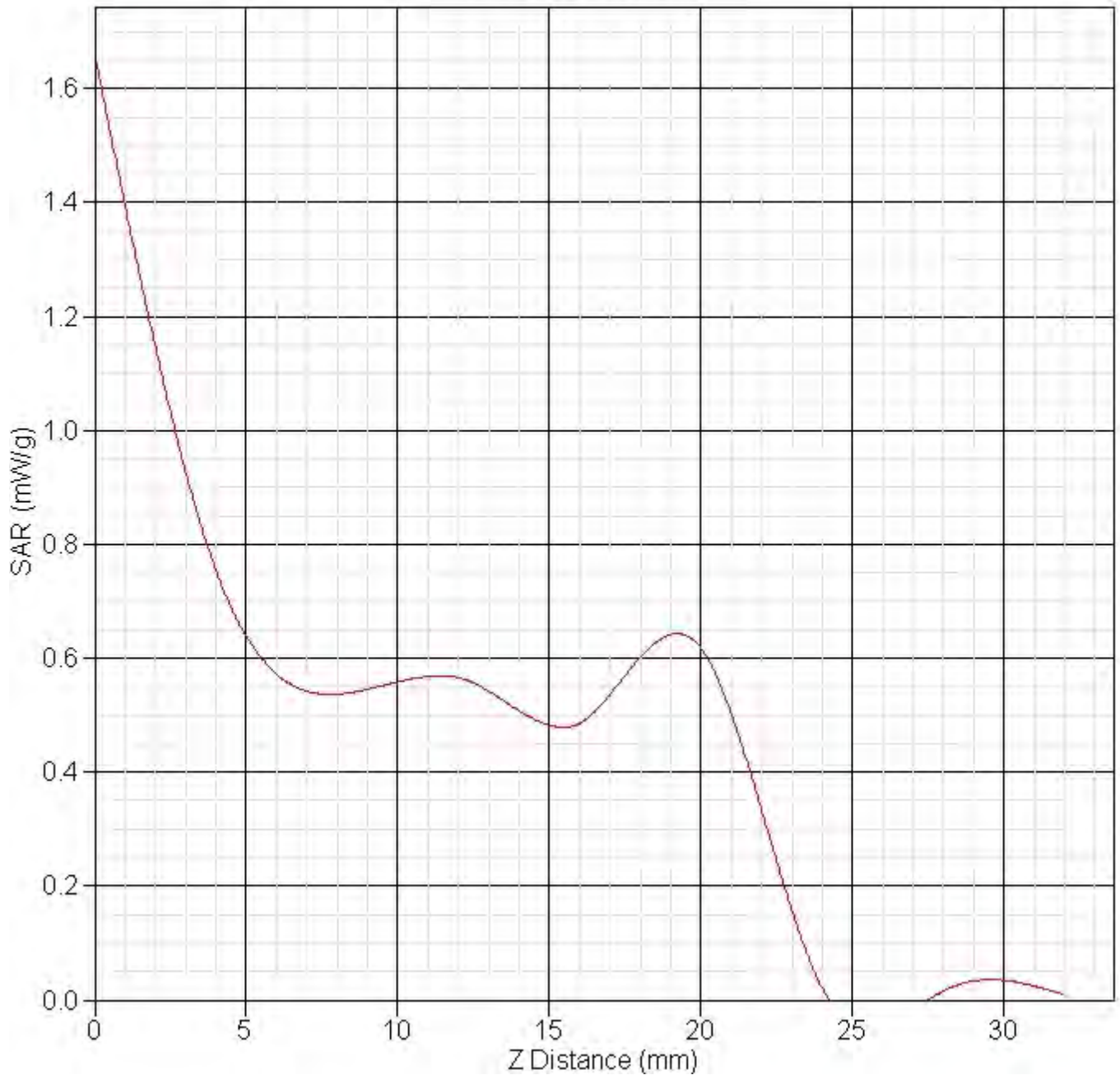
Exposure Assessment Measurement Uncertainty

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	$\sqrt{3}$	$(1-cp)^{1/2}$	$(1-cp)^{1/2}$	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	6.2	rectangular	$\sqrt{3}$	1	1	3.6
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.)	0.9	normal	1	0.6	0.5	0.6
Combined Uncertainty		RSS				9.9
Combined Uncertainty (coverage factor=2)		Normal (k=2)				19.9



Report No : TSC-100-06-IN-02 (SAR)

SAR-Z Axis
at Hotspot x:8.08 y:-29.25





Report No : TSC-100-06-IN-02 (SAR)

A.4.2 802.11g Mode

802.11g CH1 Touch Position

ALSAS-10U VER 2.3.8.90

APREL Laboratories

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SAR Test Report

Report Date : 27-Jun-2011
By Operator : 123
Measurement Date : 27-Jun-2011
Starting Time : 27-Jun-2011 08:39:38 AM
End Time : 27-Jun-2011 09:06:05 AM
Scanning Time : 1587 secs

Product Data

Device Name : KDI
Serial No. : WID
Type : Other
Model : WID
Frequency : 2412.00 MHz
Max. Transmit Pwr : 1 W
Drift Time : 0 min(s)
Length : 62 mm
Width : 123 mm
Depth : 11 mm
Antenna Type : Internal
Orientation : Touch
Power Drift-Start : 0.301 W/kg
Power Drift-Finish: 0.262 W/kg
Power Drift (%) : -13.197
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 : 2450.00 MHz
Last Calib. Date : 27-Jun-2011
Temperature : 23.00 °C
Ambient Temp. : 23.00 °C
Humidity : 50.00 RH%



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E-mail: tsd@cht.com.tw <http://www.chttl.com.tw>

Report No : TSC-100-06-IN-02 (SAR)

Epsilon : 52.60 F/m
Sigma : 1.92 S/m
Density : 1000.00 kg/cu. m
Probe Data
Name : Probe 257 - CHTL
Model : E020
Type : E-Field Triangle
Serial No. : 257
Last Calib. Date : 19-Oct-2010
Frequency : 2450.00 MHz
Duty Cycle Factor: 1
Conversion Factor: 5
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

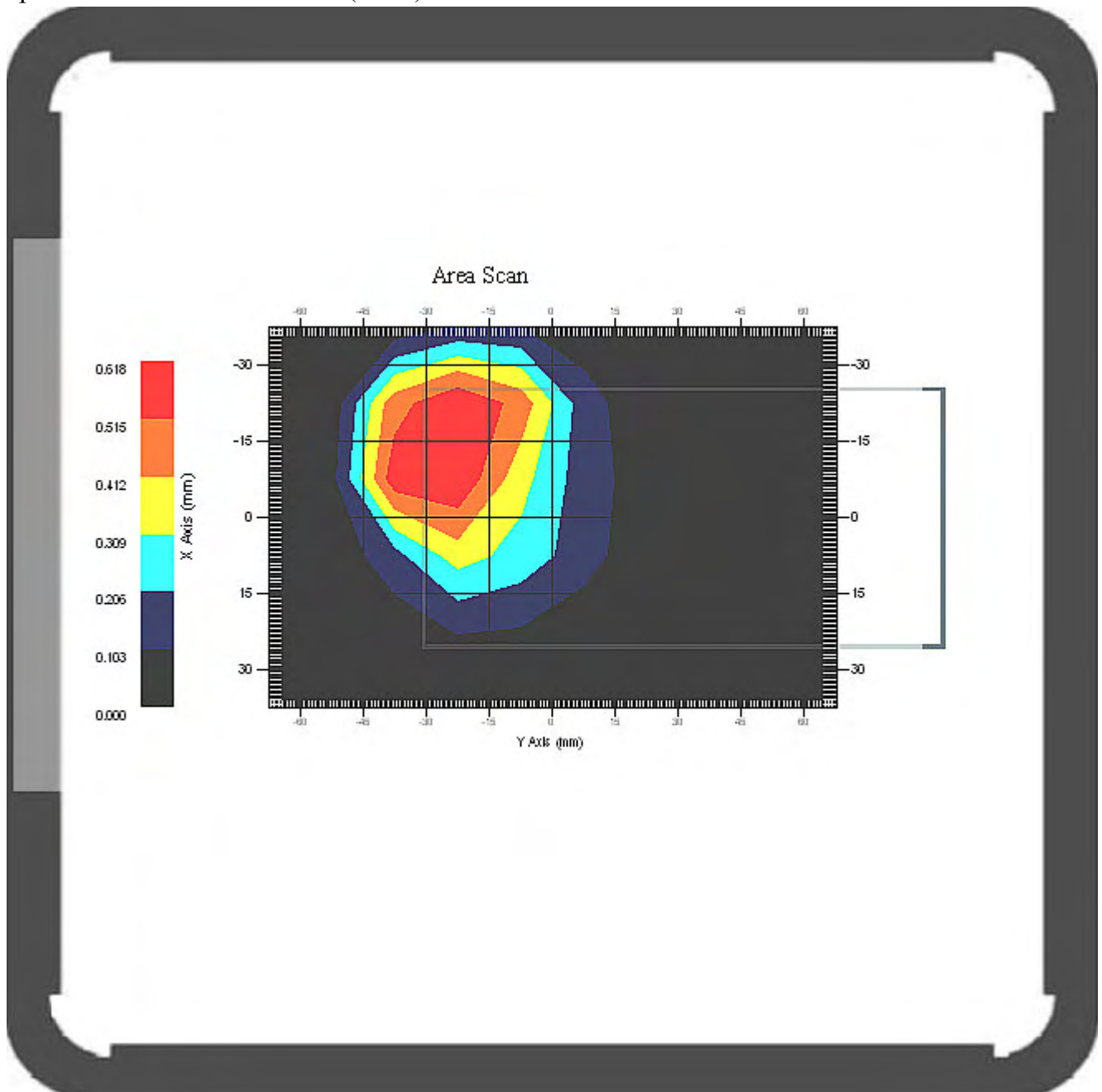
Crest Factor : 1
Scan Type : Complete
Tissue Temp. : 23.00 °C
Ambient Temp. : 23.00 °C
Set-up Date : 27-Jun-2011
Set-up Time : 8:30:28 AM
Area Scan : 6x10x1 : Measurement x=15mm, y=15mm, z=4mm
Zoom Scan : 5x5x8 : Measurement x=8mm, y=8mm, z=4mm

Other Data

DUT Position : Touch
Separation : 0
Channel : Low



Report No : TSC-100-06-IN-02 (SAR)



1 gram SAR value : 0.818 W/kg
10 gram SAR value : 0.360 W/kg
Area Scan Peak SAR : 0.615 W/kg
Zoom Scan Peak SAR : 1.861 W/kg

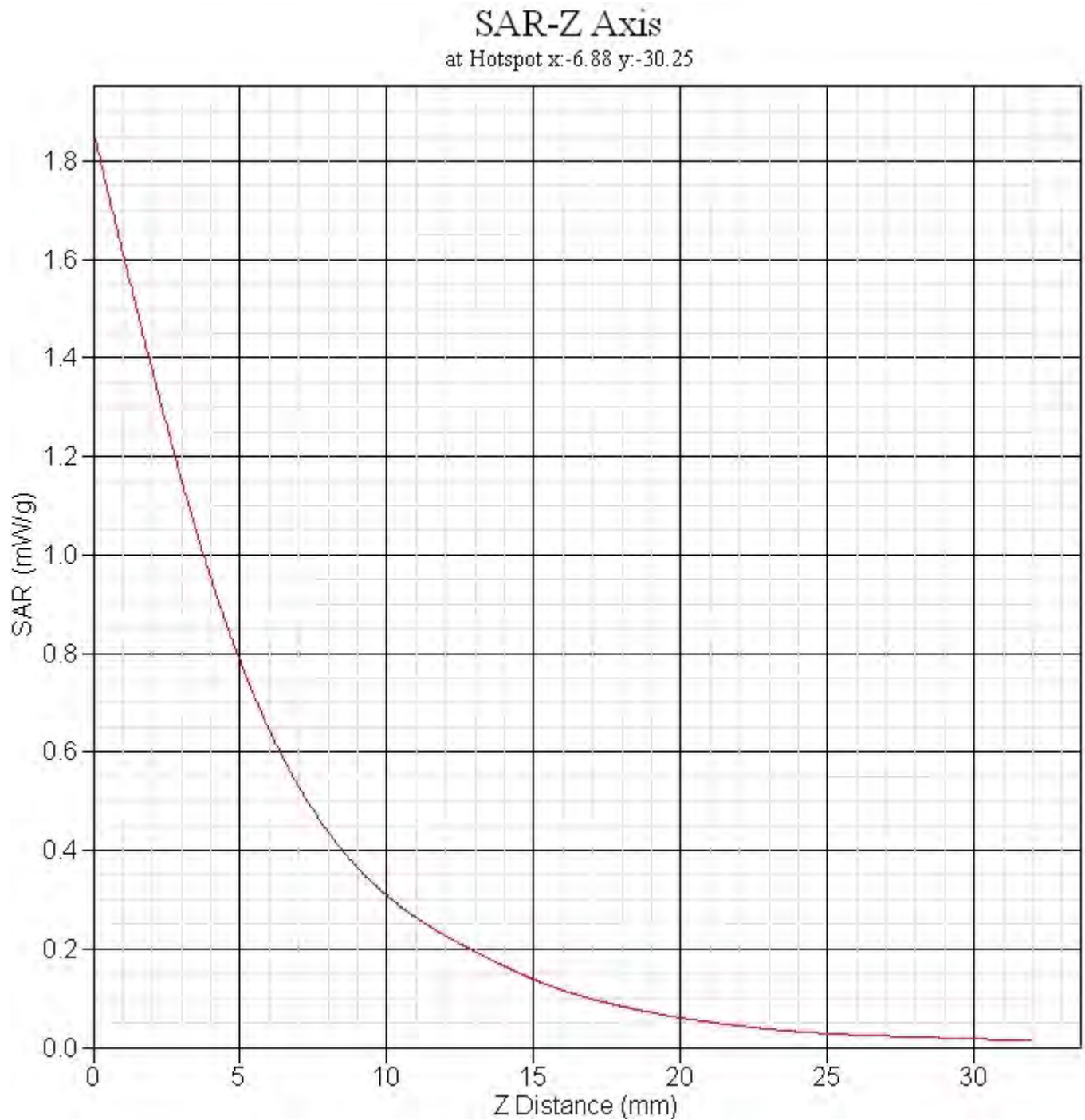
Report No : TSC-100-06-IN-02 (SAR)

Exposure Assessment Measurement Uncertainty

Source of Uncertainty	Tolerance Value	Probability Distribution	Divisor	c_1^1 (1-g)	c_1^1 (10-g)	Standard Uncertainty (1-g) %
Measurement System						
Probe Calibration	3.5	normal	1	1	1	3.5
Axial Isotropy	3.7	rectangular	$\sqrt{3}$	$(1-cp)^{1/2}$	$(1-cp)^{1/2}$	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	13.2	rectangular	$\sqrt{3}$	1	1	7.6
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.)	1.5	normal	1	0.7	0.5	1.1
Liquid Permittivity(target)	5.0	rectangular	$\sqrt{3}$	0.6	0.5	1.7
Liquid Permittivity(meas.)	0.2	normal	1	0.6	0.5	0.1
Combined Uncertainty		RSS				12.0
Combined Uncertainty (coverage factor=2)		Normal (k=2)				24.0



Report No : TSC-100-06-IN-02 (SAR)





Report No : TSC-100-06-IN-02 (SAR)

802.11g CH6 Touch Position

ALSAS-10U VER 2.3.8.90
APREL Laboratories

SAR Test Report

Report Date : 27-Jun-2011
By Operator : 123
Measurement Date : 27-Jun-2011
Starting Time : 27-Jun-2011 11:22:36 AM
End Time : 27-Jun-2011 11:48:15 AM
Scanning Time : 1539 secs

Product Data
Device Name : KDI
Serial No. : WID
Type : Other
Model : WID
Frequency : 2437.00 MHz
Max. Transmit Pwr : 1 W
Drift Time : 0 min(s)
Length : 62 mm
Width : 123 mm
Depth : 11 mm
Antenna Type : Internal
Orientation : Touch
Power Drift-Start : 0.239 W/kg
Power Drift-Finish: 0.236 W/kg
Power Drift (%) : -1.421
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 : 2450.00 MHz
Last Calib. Date : 27-Jun-2011
Temperature : 23.00 °C
Ambient Temp. : 23.00 °C
Humidity : 50.00 RH%
Epsilon : 52.60 F/m
Sigma : 1.92 S/m
Density : 1000.00 kg/cu. m



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E-mail: tsd@cht.com.tw <http://www.chttl.com.tw>

Report No : TSC-100-06-IN-02 (SAR)

Probe Data

Name : Probe 257 - CHTL
Model : E020
Type : E-Field Triangle
Serial No. : 257
Last Calib. Date : 19-Oct-2010
Frequency : 2450.00 MHz
Duty Cycle Factor: 1
Conversion Factor: 5
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

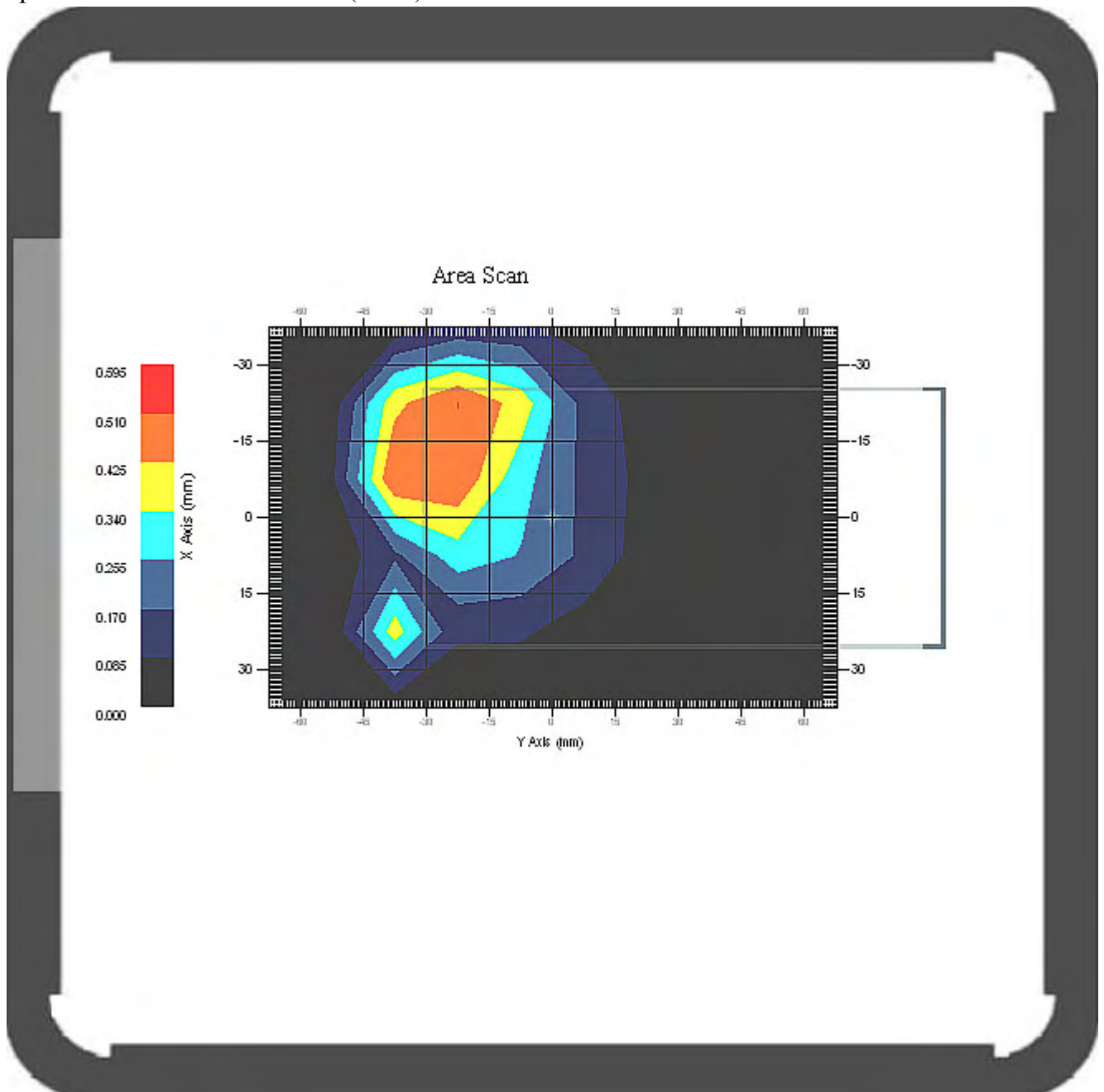
Crest Factor : 1
Scan Type : Complete
Tissue Temp. : 23.00 °C
Ambient Temp. : 23.00 °C
Set-up Date : 27-Jun-2011
Set-up Time : 8:30:28 AM
Area Scan : 6x10x1 : Measurement x=15mm, y=15mm, z=4mm
Zoom Scan : 5x5x8 : Measurement x=8mm, y=8mm, z=4mm

Other Data

DUT Position : Touch
Separation : 0
Channel : Mid



Report No : TSC-100-06-IN-02 (SAR)



1 gram SAR value : 0.702 W/kg
10 gram SAR value : 0.300 W/kg
Area Scan Peak SAR : 0.511 W/kg
Zoom Scan Peak SAR : 1.611 W/kg

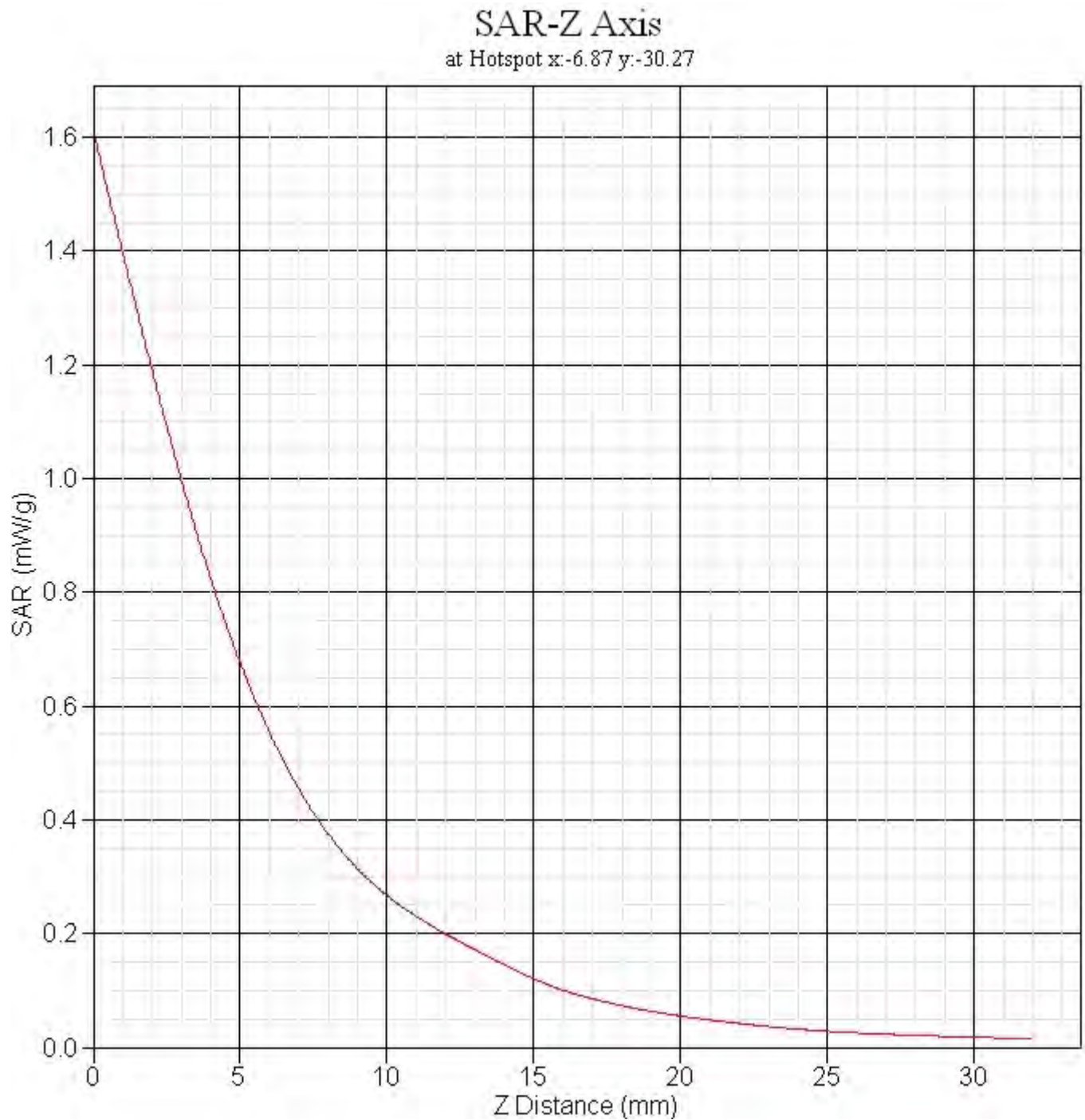
Report No : TSC-100-06-IN-02 (SAR)

Exposure Assessment Measurement Uncertainty

Source of Uncertainty	Tolerance Value	Probability Distribution	Divisor	c_1^1 (1-g)	c_1^1 (10-g)	Standard Uncertainty (1-g) %
Measurement System						
Probe Calibration	3.5	normal	1	1	1	3.5
Axial Isotropy	3.7	rectangular	$\sqrt{3}$	$(1-cp)^{1/2}$	$(1-cp)^{1/2}$	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	1.4	rectangular	$\sqrt{3}$	1	1	0.8
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.)	1.5	normal	1	0.7	0.5	1.1
Liquid Permittivity(target)	5.0	rectangular	$\sqrt{3}$	0.6	0.5	1.7
Liquid Permittivity(meas.)	0.2	normal	1	0.6	0.5	0.1
Combined Uncertainty		RSS				9.3
Combined Uncertainty (coverage factor=2)		Normal (k=2)				18.7



Report No : TSC-100-06-IN-02 (SAR)





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Report No : TSC-100-06-IN-02 (SAR)

802.11g CH6 Touch_Rear Position

ALSAS-10U VER 2.3.8.90
APREL Laboratories

SAR Test Report

Report Date : 04-Jul-2011
By Operator : 123
Measurement Date : 04-Jul-2011
Starting Time : 04-Jul-2011 09:47:49 AM
End Time : 04-Jul-2011 10:14:01 AM
Scanning Time : 1572 secs

Product Data
Device Name : KDI
Serial No. : WID
Type : Other
Model : WID
Frequency : 2437.00 MHz
Max. Transmit Pwr : 1 W
Drift Time : 0 min(s)
Length : 62 mm
Width : 123 mm
Depth : 11 mm
Antenna Type : Internal
Orientation : Touch
Power Drift-Start : 0.230 W/kg
Power Drift-Finish: 0.265 W/kg
Power Drift (%) : 14.903
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 : 2450.00 MHz
Last Calib. Date : 04-Jul-2011
Temperature : 23.00 °C
Ambient Temp. : 23.00 °C
Humidity : 50.00 RH%
Epsilon : 52.00 F/m
Sigma : 1.91 S/m
Density : 1000.00 kg/cu. m



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Report No : TSC-100-06-IN-02 (SAR)

Probe Data

Name : Probe 257 - CHTL
Model : E020
Type : E-Field Triangle
Serial No. : 257
Last Calib. Date : 19-Oct-2010
Frequency : 2450.00 MHz
Duty Cycle Factor: 1
Conversion Factor: 5
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

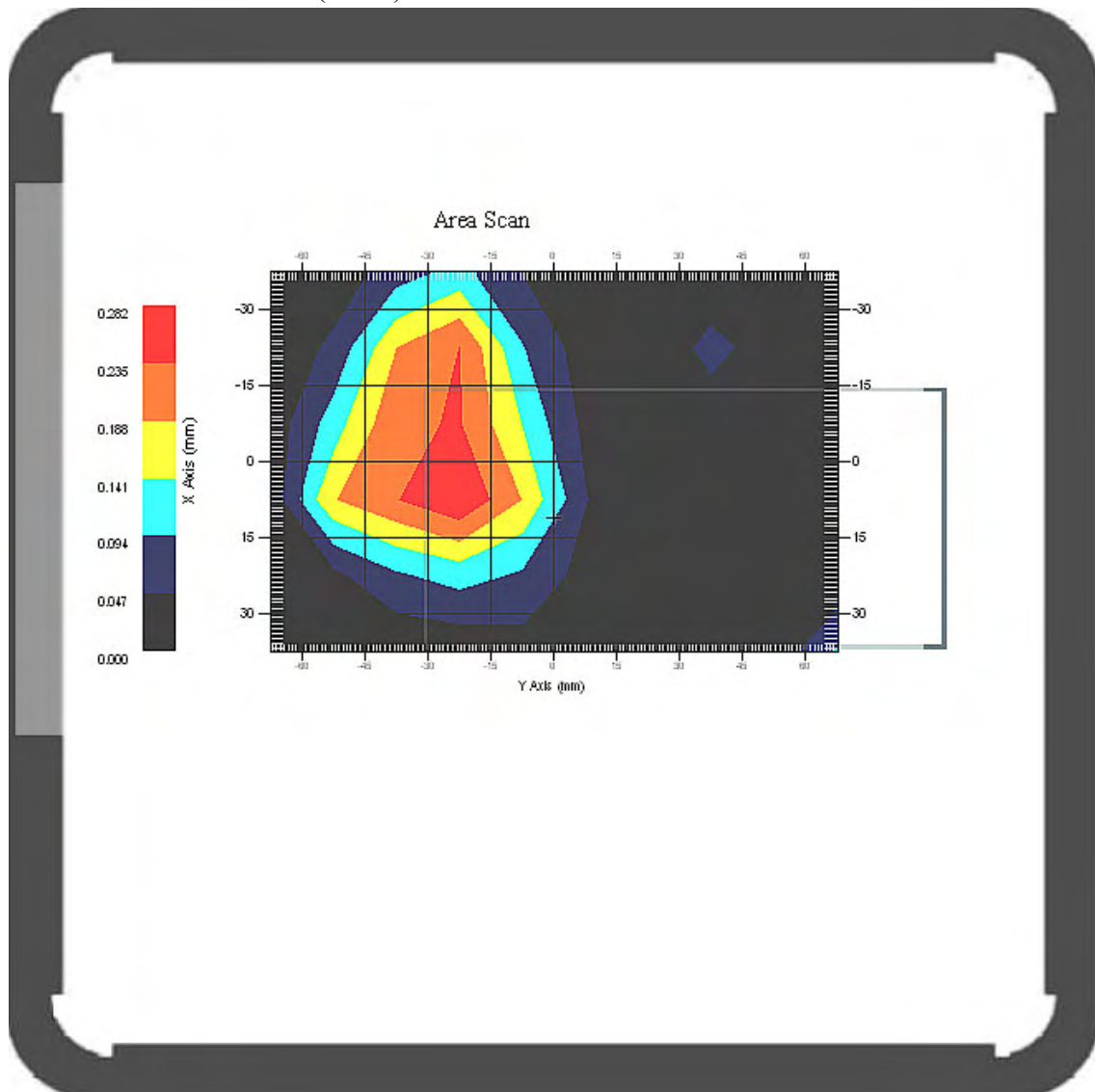
Crest Factor : 1
Scan Type : Complete
Tissue Temp. : 23.00 °C
Ambient Temp. : 23.00 °C
Set-up Date : 04-Jul-2011
Set-up Time : 8:30:28 AM
Area Scan : 6x10x1 : Measurement x=15mm, y=15mm, z=4mm
Zoom Scan : 5x5x8 : Measurement x=8mm, y=8mm, z=4mm

Other Data

DUT Position : Touch
Separation : 0
Channel : Mid



Report No : TSC-100-06-IN-02 (SAR)



1 gram SAR value : 0.265 W/kg
10 gram SAR value : 0.141 W/kg
Area Scan Peak SAR : 0.280 W/kg
Zoom Scan Peak SAR : 0.460 W/kg

Report No : TSC-100-06-IN-02 (SAR)

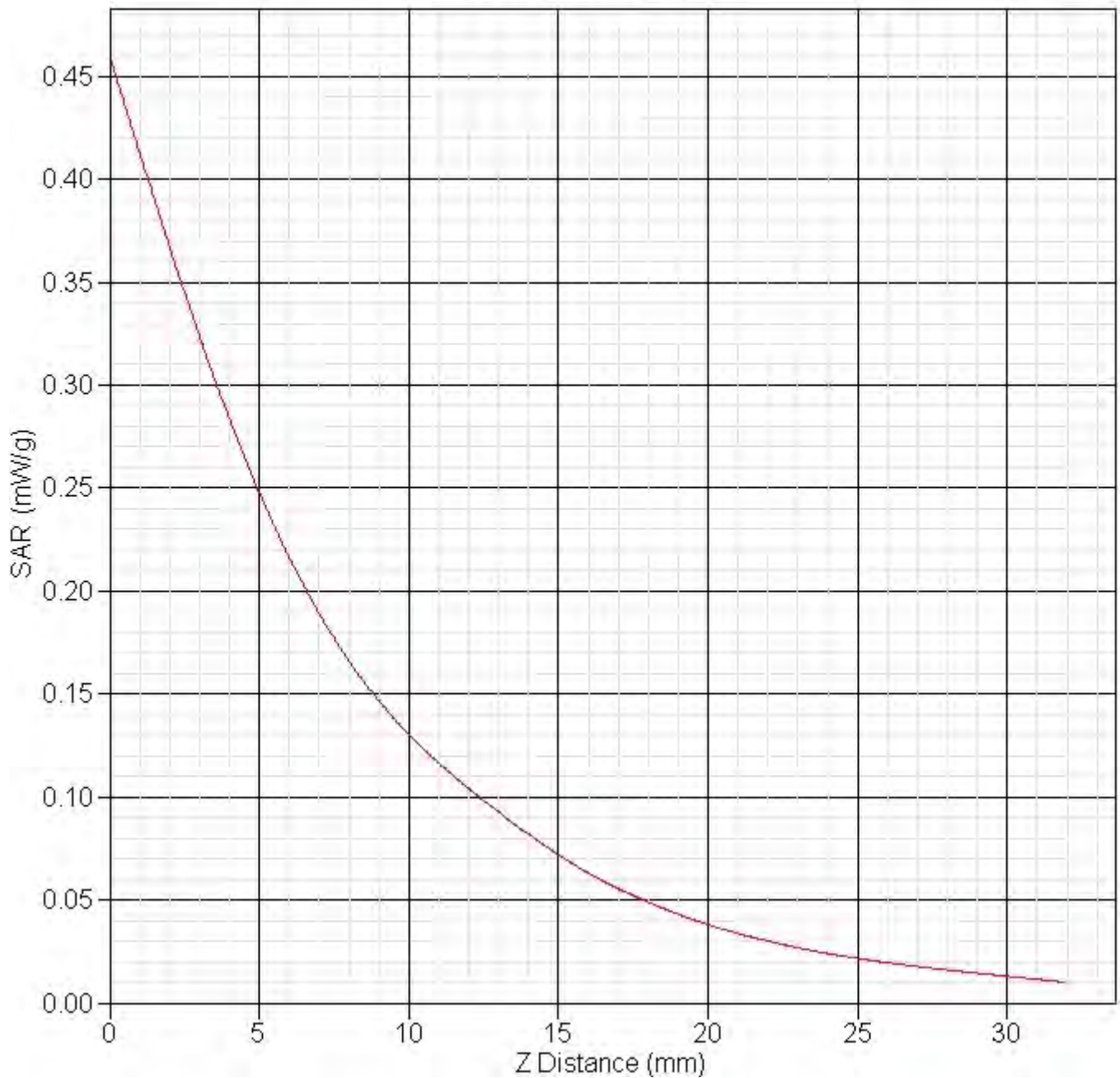
Exposure Assessment Measurement Uncertainty

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	$\sqrt{3}$	$(1-cp)^{1/2}$	$(1-cp)^{1/2}$	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	14.9	rectangular	$\sqrt{3}$	1	1	8.6
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.)	1.4	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.)	1.4	normal	1	0.6	0.5	0.0
Combined Uncertainty		RSS				12.6
Combined Uncertainty (coverage factor=2)		Normal (k=2)				25.2



Report No : TSC-100-06-IN-02 (SAR)

SAR-Z Axis
at Hotspot x:15.13 y:-22.25





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Report No : TSC-100-06-IN-02 (SAR)

802.11g CH11 Touch Position

ALSAS-10U VER 2.3.8.90
APREL Laboratories

SAR Test Report

Report Date : 27-Jun-2011
By Operator : 123
Measurement Date : 27-Jun-2011
Starting Time : 27-Jun-2011 09:10:12 AM
End Time : 27-Jun-2011 09:36:04 AM
Scanning Time : 1552 secs

Product Data
Device Name : KDI
Serial No. : WID
Type : Other
Model : WID
Frequency : 2462.00 MHz
Max. Transmit Pwr : 1 W
Drift Time : 0 min(s)
Length : 62 mm
Width : 123 mm
Depth : 11 mm
Antenna Type : Internal
Orientation : Touch
Power Drift-Start : 0.175 W/kg
Power Drift-Finish: 0.164 W/kg
Power Drift (%) : -6.094
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 : 2450.00 MHz
Last Calib. Date : 27-Jun-2011
Temperature : 23.00 °C
Ambient Temp. : 23.00 °C
Humidity : 50.00 RH%
Epsilon : 52.60 F/m
Sigma : 1.92 S/m
Density : 1000.00 kg/cu. m



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Report No : TSC-100-06-IN-02 (SAR)

Probe Data

Name : Probe 257 - CHTL
Model : E020
Type : E-Field Triangle
Serial No. : 257
Last Calib. Date : 19-Oct-2010
Frequency : 2450.00 MHz
Duty Cycle Factor: 1
Conversion Factor: 5
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

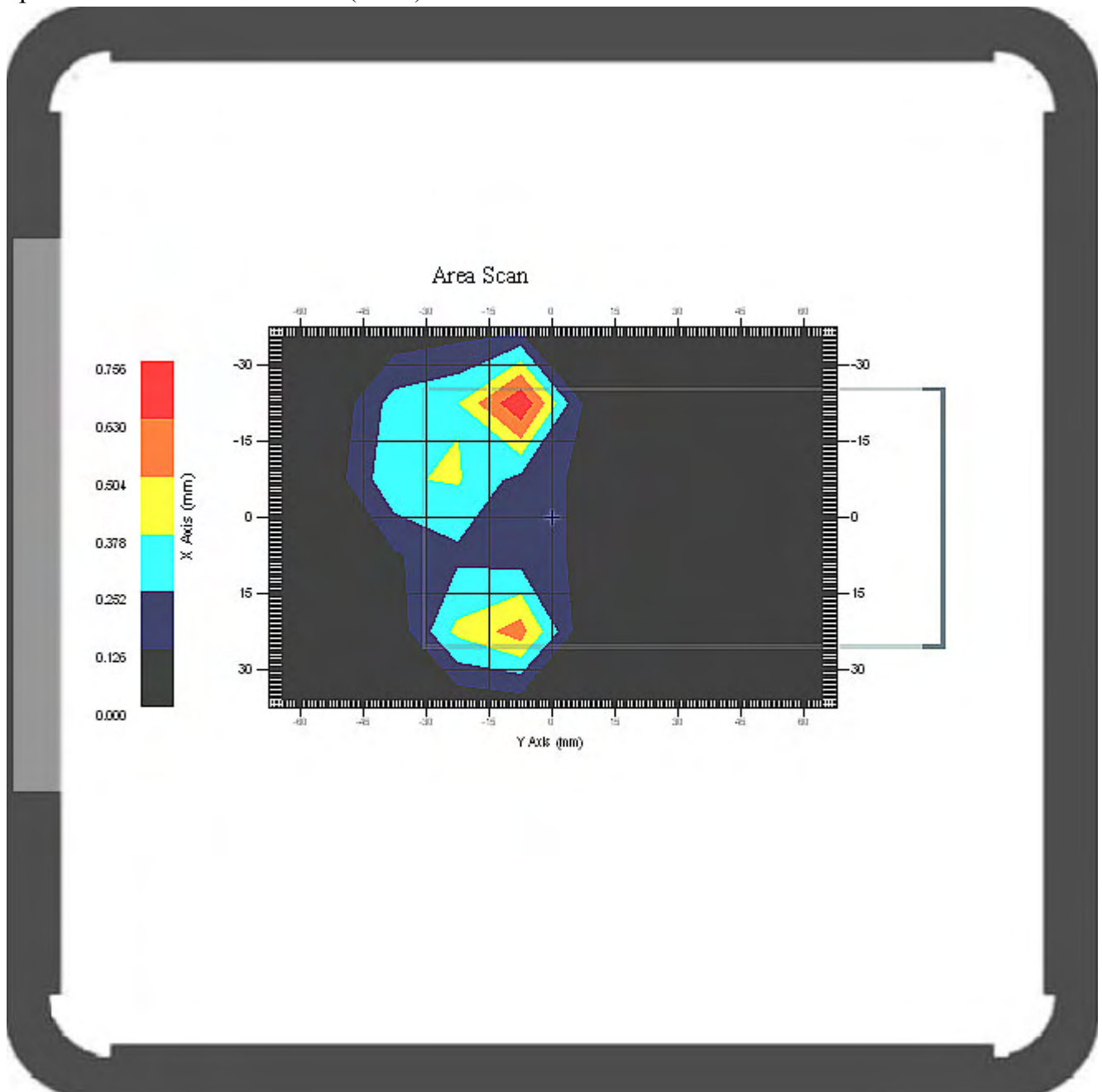
Crest Factor : 1
Scan Type : Complete
Tissue Temp. : 23.00 °C
Ambient Temp. : 23.00 °C
Set-up Date : 27-Jun-2011
Set-up Time : 8:30:28 AM
Area Scan : 6x10x1 : Measurement x=15mm, y=15mm, z=4mm
Zoom Scan : 5x5x8 : Measurement x=8mm, y=8mm, z=4mm

Other Data

DUT Position : Touch
Separation : 0
Channel : High



Report No : TSC-100-06-IN-02 (SAR)



1 gram SAR value : 0.444 W/kg
10 gram SAR value : 0.228 W/kg
Area Scan Peak SAR : 0.755 W/kg
Zoom Scan Peak SAR : 0.480 W/kg

Report No : TSC-100-06-IN-02 (SAR)

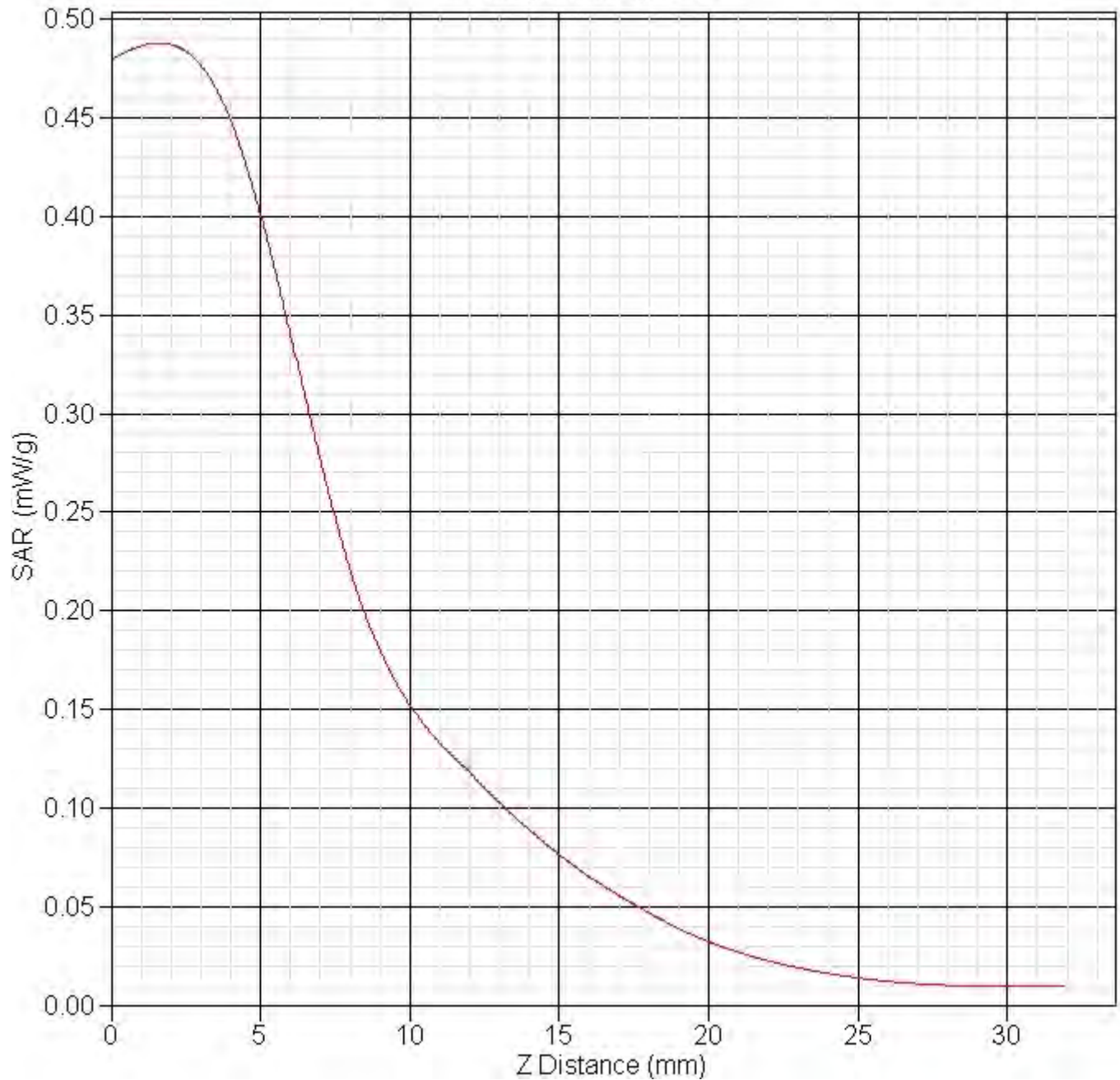
Exposure Assessment Measurement Uncertainty

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	$\sqrt{3}$	$(1-cp)^{1/2}$	$(1-cp)^{1/2}$	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	6.1	rectangular	$\sqrt{3}$	1	1	3.5
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.)	1.5	normal	1	0.7	0.5	1.1
Liquid Permittivity(target)	5.0	rectangular	$\sqrt{3}$	0.6	0.5	1.7
Liquid Permittivity(meas.)	0.2	normal	1	0.6	0.5	0.1
Combined Uncertainty		RSS				9.9
Combined Uncertainty (coverage factor=2)		Normal (k=2)				19.9



Report No : TSC-100-06-IN-02 (SAR)

SAR-Z Axis
at Hotspot x:-6.92 y:-23.24





Report No : TSC-100-06-IN-02 (SAR)

A.4.3 802.11n Mode

802.11n CH5 Touch Position

ALSAS-10U VER 2.3.8.90
 APREL Laboratories

SAR Test Report

Report Date : 27-Jun-2011
 By Operator : 123
 Measurement Date : 27-Jun-2011
 Starting Time : 27-Jun-2011 10:22:08 AM
 End Time : 27-Jun-2011 10:48:18 AM
 Scanning Time : 1570 secs

Product Data
 Device Name : KDI
 Serial No. : WID
 Type : Other
 Model : WID
 Frequency : 2422.00 MHz
 Max. Transmit Pwr : 1 W
 Drift Time : 0 min(s)
 Length : 62 mm
 Width : 123 mm
 Depth : 11 mm
 Antenna Type : Internal
 Orientation : Touch
 Power Drift-Start : 0.219 W/kg
 Power Drift-Finish: 0.252 W/kg
 Power Drift (%) : 14.722
 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 : 2450.00 MHz
 Last Calib. Date : 27-Jun-2011
 Temperature : 23.00 °C
 Ambient Temp. : 23.00 °C
 Humidity : 50.00 RH%
 Epsilon : 52.60 F/m



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Report No : TSC-100-06-IN-02 (SAR)

Sigma : 1.92 S/m
Density : 1000.00 kg/cu. m
Probe Data
Name : Probe 257 - CHTL
Model : E020
Type : E-Field Triangle
Serial No. : 257
Last Calib. Date : 19-Oct-2010
Frequency : 2450.00 MHz
Duty Cycle Factor: 1
Conversion Factor: 5
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

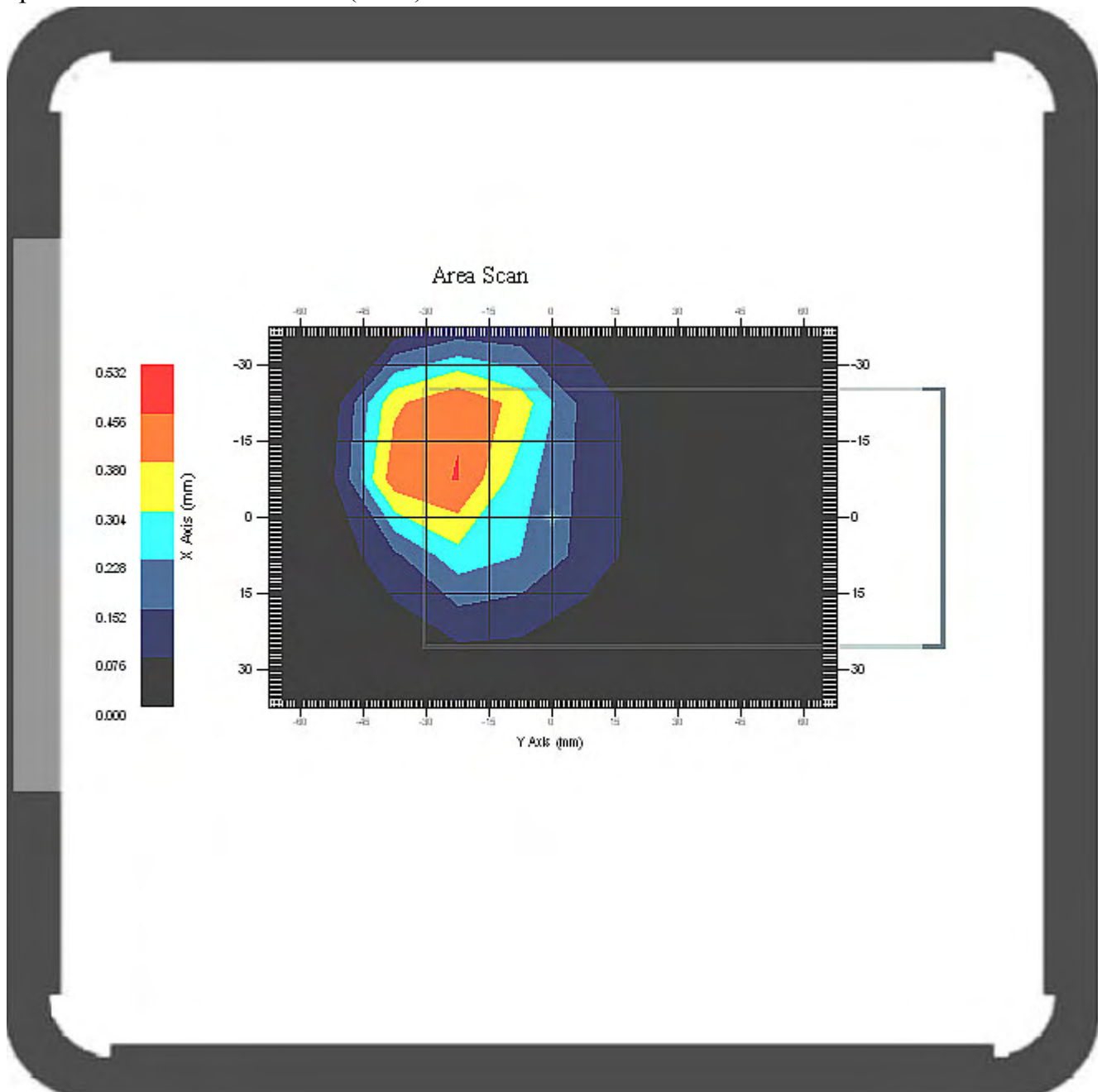
Crest Factor : 1
Scan Type : Complete
Tissue Temp. : 23.00 °C
Ambient Temp. : 23.00 °C
Set-up Date : 27-Jun-2011
Set-up Time : 8:30:28 AM
Area Scan : 6x10x1 : Measurement x=15mm, y=15mm, z=4mm
Zoom Scan : 5x5x8 : Measurement x=8mm, y=8mm, z=4mm

Other Data

DUT Position : Touch
Separation : 0
Channel : Low



Report No : TSC-100-06-IN-02 (SAR)



1 gram SAR value : 0.754 W/kg
10 gram SAR value : 0.325 W/kg
Area Scan Peak SAR : 0.458 W/kg
Zoom Scan Peak SAR : 2.151 W/kg

Report No : TSC-100-06-IN-02 (SAR)

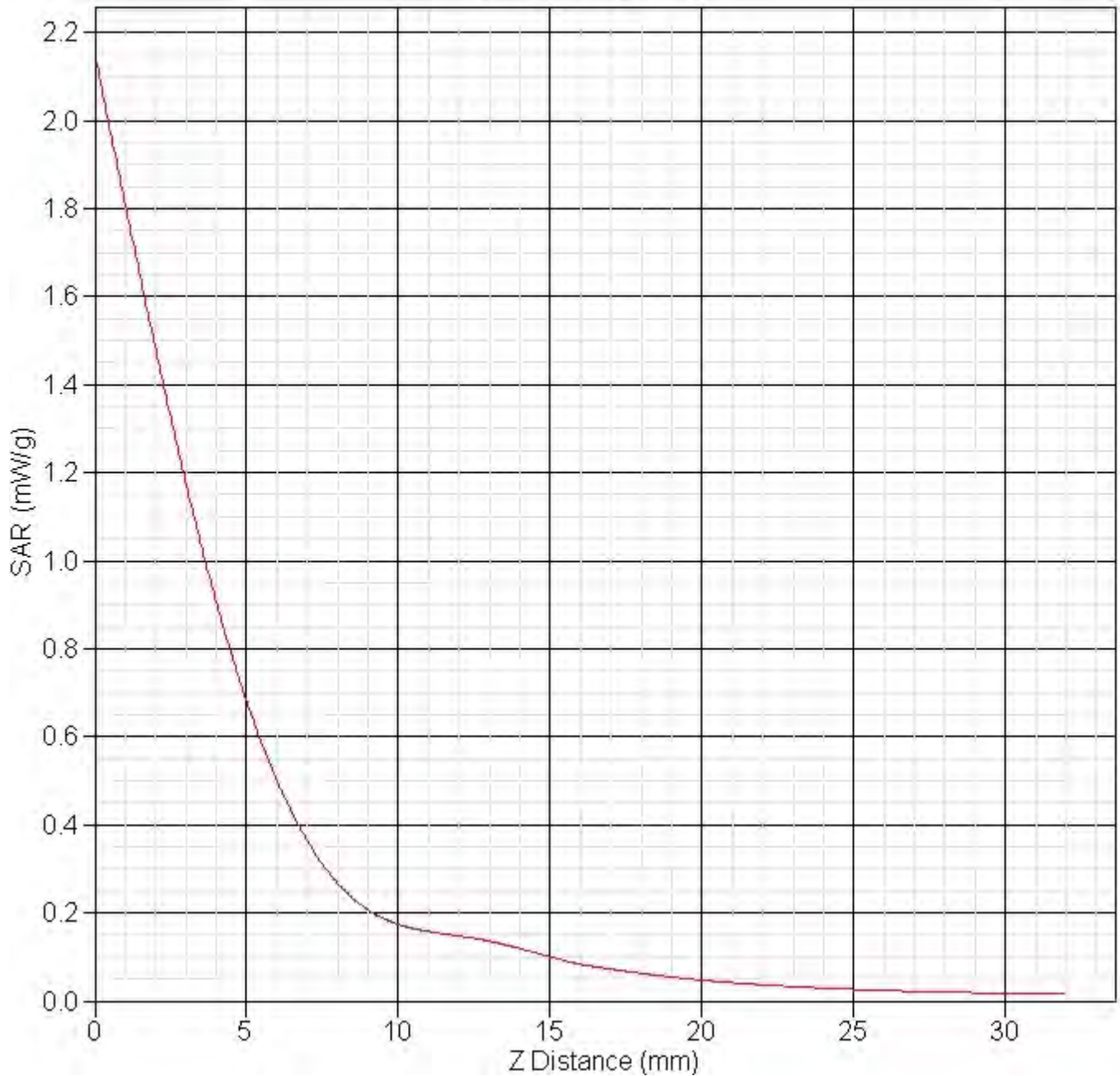
Exposure Assessment Measurement Uncertainty

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	$\sqrt{3}$	$(1-cp)^{1/2}$	$(1-cp)^{1/2}$	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	14.7	rectangular	$\sqrt{3}$	1	1	8.5
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.)	1.5	normal	1	0.7	0.5	1.1
Liquid Permittivity(target)	5.0	rectangular	$\sqrt{3}$	0.6	0.5	1.7
Liquid Permittivity(meas.)	0.2	normal	1	0.6	0.5	0.1
Combined Uncertainty		RSS				12.6
Combined Uncertainty (coverage factor=2)		Normal (k=2)				25.2



Report No : TSC-100-06-IN-02 (SAR)

SAR-Z Axis
at Hotspot x:-7.91 y:-22.24





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Report No : TSC-100-06-IN-02 (SAR)

802.11n CH8 Touch Position

ALSAS-10U VER 2.3.8.90
APREL Laboratories

SAR Test Report

Report Date : 27-Jun-2011
By Operator : 123
Measurement Date : 27-Jun-2011
Starting Time : 27-Jun-2011 10:52:14 AM
End Time : 27-Jun-2011 11:18:29 AM
Scanning Time : 1575 secs

Product Data
Device Name : KDI
Serial No. : WID
Type : Other
Model : WID
Frequency : 2437.00 MHz
Max. Transmit Pwr : 1 W
Drift Time : 0 min(s)
Length : 62 mm
Width : 123 mm
Depth : 11 mm
Antenna Type : Internal
Orientation : Touch
Power Drift-Start : 0.192 W/kg
Power Drift-Finish: 0.237 W/kg
Power Drift (%) : 23.680
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 : 2450.00 MHz
Last Calib. Date : 27-Jun-2011
Temperature : 23.00 °C
Ambient Temp. : 23.00 °C
Humidity : 50.00 RH%
Epsilon : 52.60 F/m
Sigma : 1.92 S/m
Density : 1000.00 kg/cu. m



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Report No : TSC-100-06-IN-02 (SAR)

Probe Data

Name : Probe 257 - CHTL
Model : E020
Type : E-Field Triangle
Serial No. : 257
Last Calib. Date : 19-Oct-2010
Frequency : 2450.00 MHz
Duty Cycle Factor: 1
Conversion Factor: 5
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

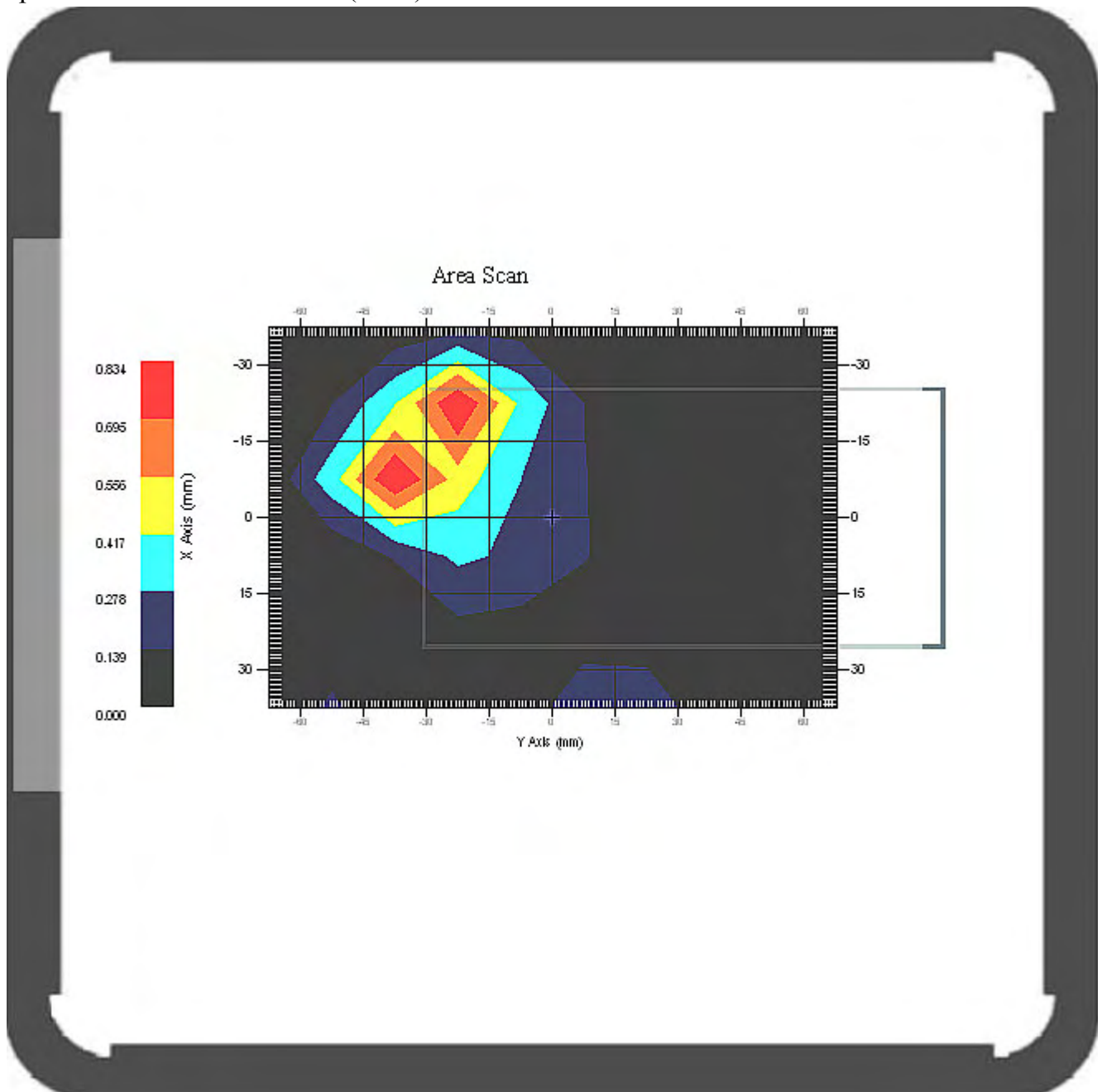
Crest Factor : 1
Scan Type : Complete
Tissue Temp. : 23.00 °C
Ambient Temp. : 23.00 °C
Set-up Date : 27-Jun-2011
Set-up Time : 8:30:28 AM
Area Scan : 6x10x1 : Measurement x=15mm, y=15mm, z=4mm
Zoom Scan : 5x5x8 : Measurement x=8mm, y=8mm, z=4mm

Other Data

DUT Position : Touch
Separation : 0
Channel : Mid



Report No : TSC-100-06-IN-02 (SAR)



1 gram SAR value : 0.692 W/kg
10 gram SAR value : 0.320 W/kg
Area Scan Peak SAR : 0.834 W/kg
Zoom Scan Peak SAR : 1.611 W/kg

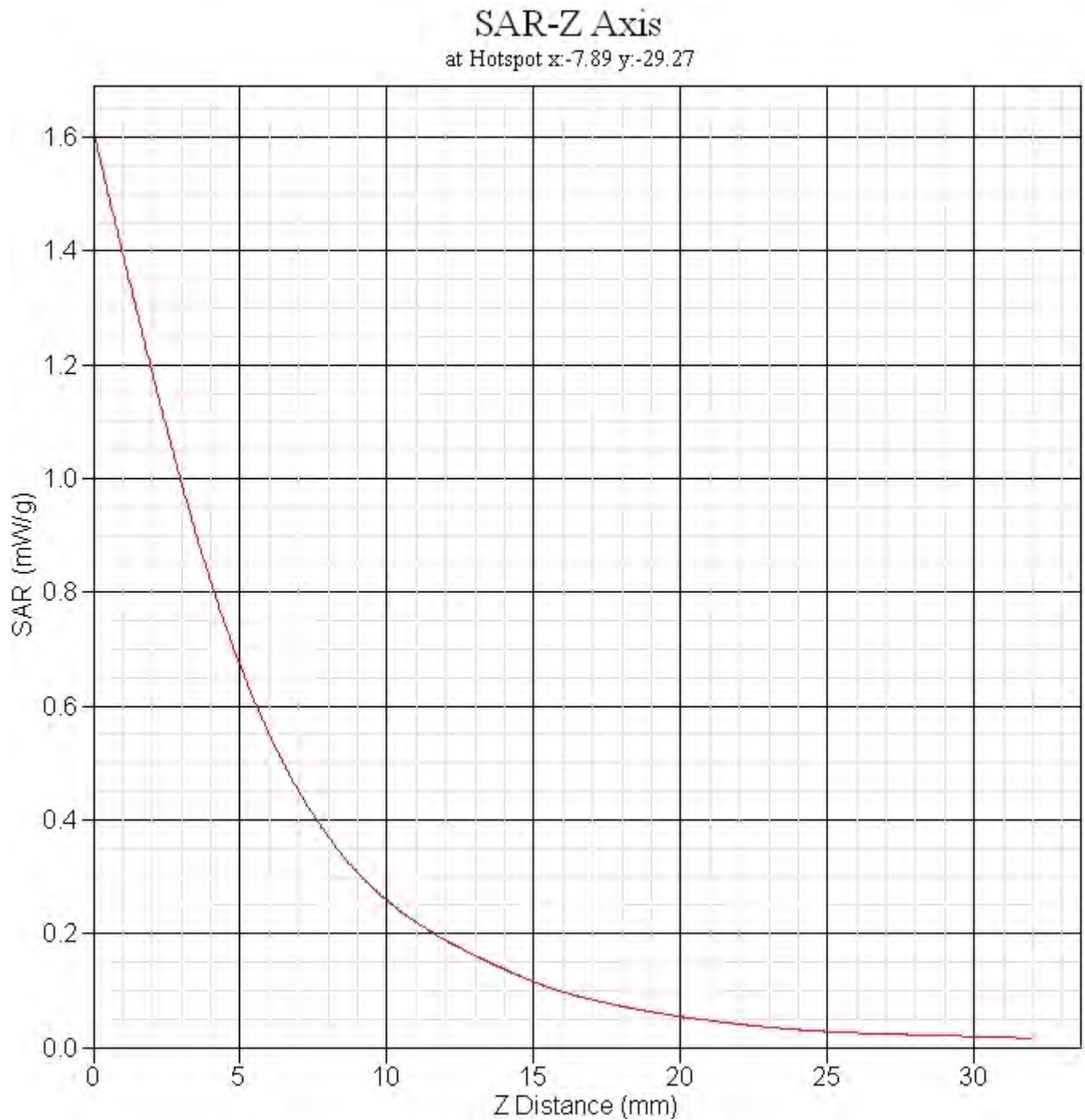
Report No : TSC-100-06-IN-02 (SAR)

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	$\sqrt{3}$	$(1-cp)^{1/2}$	$(1-cp)^{1/2}$	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	23.7	rectangular	$\sqrt{3}$	1	1	13.7
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.)	1.5	normal	1	0.7	0.5	1.1
Liquid Permittivity(target)	5.0	rectangular	$\sqrt{3}$	0.6	0.5	1.7
Liquid Permittivity(meas.)	0.2	normal	1	0.6	0.5	0.1
Combined Uncertainty		RSS				16.6
Combined Uncertainty (coverage factor=2)		Normal (k=2)				33.1



Report No : TSC-100-06-IN-02 (SAR)





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Report No : TSC-100-06-IN-02 (SAR)

802.11n CH8 Touch_Rear Position

ALSAS-10U VER 2.3.8.90
APREL Laboratories

SAR Test Report

Report Date : 04-Jul-2011
By Operator : 123
Measurement Date : 04-Jul-2011
Starting Time : 04-Jul-2011 11:45:12 AM
End Time : 04-Jul-2011 12:11:24 PM
Scanning Time : 1572 secs

Product Data
Device Name : KDI
Serial No. : WID
Type : Other
Model : WID
Frequency : 2437.00 MHz
Max. Transmit Pwr : 1 W
Drift Time : 0 min(s)
Length : 62 mm
Width : 123 mm
Depth : 11 mm
Antenna Type : Internal
Orientation : Touch
Power Drift-Start : 0.225 W/kg
Power Drift-Finish: 0.195 W/kg
Power Drift (%) : -13.045
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 : 2450.00 MHz
Last Calib. Date : 04-Jul-2011
Temperature : 23.00 °C
Ambient Temp. : 23.00 °C
Humidity : 50.00 RH%
Epsilon : 52.00 F/m
Sigma : 1.91 S/m
Density : 1000.00 kg/cu. m



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Report No : TSC-100-06-IN-02 (SAR)

Probe Data

Name : Probe 257 - CHTL
Model : E020
Type : E-Field Triangle
Serial No. : 257
Last Calib. Date : 19-Oct-2010
Frequency : 2450.00 MHz
Duty Cycle Factor: 1
Conversion Factor: 5
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

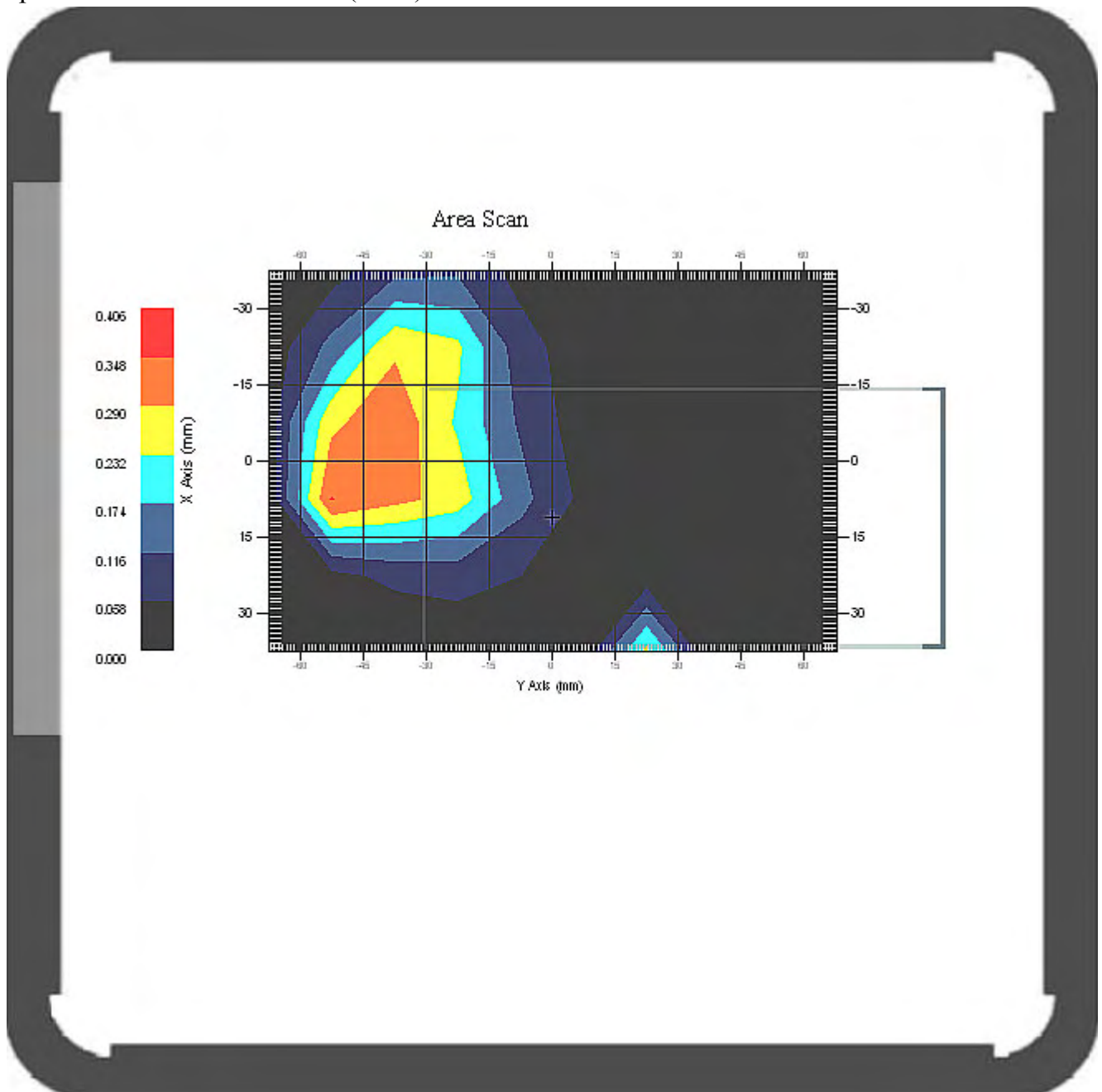
Crest Factor : 1
Scan Type : Complete
Tissue Temp. : 23.00 °C
Ambient Temp. : 23.00 °C
Set-up Date : 04-Jul-2011
Set-up Time : 8:30:28 AM
Area Scan : 6x10x1 : Measurement x=15mm, y=15mm, z=4mm
Zoom Scan : 5x5x8 : Measurement x=8mm, y=8mm, z=4mm

Other Data

DUT Position : Touch
Separation : 0
Channel : Mid



Report No : TSC-100-06-IN-02 (SAR)



1 gram SAR value : 0.458 W/kg
10 gram SAR value : 0.194 W/kg
Area Scan Peak SAR : 0.350 W/kg
Zoom Scan Peak SAR : 1.100 W/kg

Report No : TSC-100-06-IN-02 (SAR)

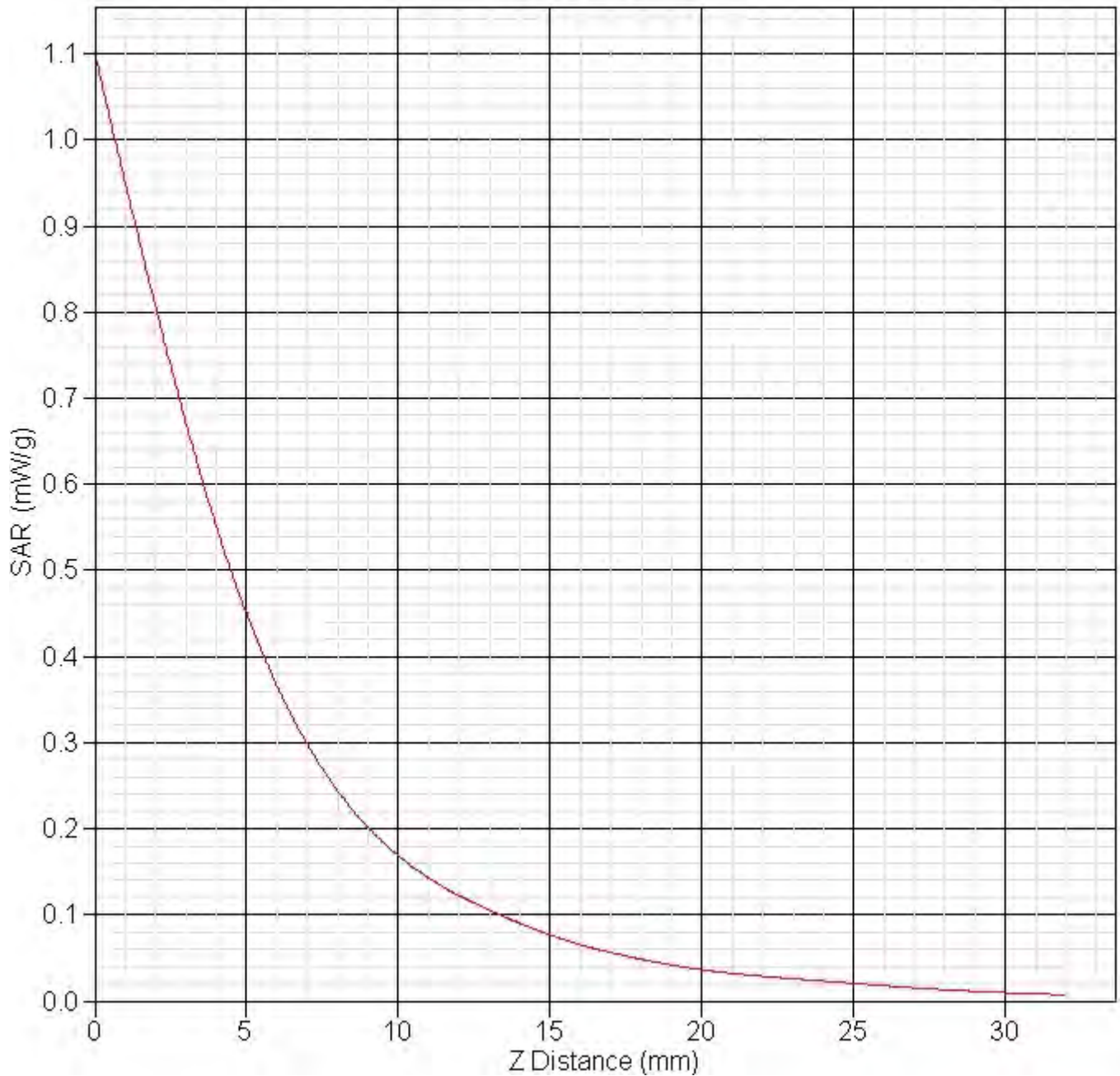
Exposure Assessment Measurement Uncertainty

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	$\sqrt{3}$	$(1-cp)^{1/2}$	$(1-cp)^{1/2}$	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	13.0	rectangular	$\sqrt{3}$	1	1	7.5
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.)	1.4	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.)	1.4	normal	1	0.6	0.5	0.0
Combined Uncertainty		RSS				11.9
Combined Uncertainty (coverage factor=2)		Normal (k=2)				23.8



Report No : TSC-100-06-IN-02 (SAR)

SAR-Z Axis
at Hotspot x:8.11 y:-45.27





Report No : TSC-100-06-IN-02 (SAR)

802.11n CH11 Touch Position

ALSAS-10U VER 2.3.8.90
APREL Laboratories

SAR Test Report

Report Date : 27-Jun-2011
By Operator : 123
Measurement Date : 27-Jun-2011
Starting Time : 27-Jun-2011 09:51:48 AM
End Time : 27-Jun-2011 10:18:04 AM
Scanning Time : 1576 secs

Product Data
Device Name : KDI
Serial No. : WID
Type : Other
Model : WID
Frequency : 2452.00 MHz
Max. Transmit Pwr : 1 W
Drift Time : 0 min(s)
Length : 62 mm
Width : 123 mm
Depth : 11 mm
Antenna Type : Internal
Orientation : Touch
Power Drift-Start : 0.176 W/kg
Power Drift-Finish: 0.198 W/kg
Power Drift (%) : 12.657
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 : 2450.00 MHz
Last Calib. Date : 27-Jun-2011
Temperature : 23.00 °C
Ambient Temp. : 23.00 °C
Humidity : 50.00 RH%
Epsilon : 52.60 F/m
Sigma : 1.92 S/m
Density : 1000.00 kg/cu. m



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

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FAX : +886 3 4202444
ADDR. : 12, Lane 551, Min-Tsu Road Sec. 5
Yang-Mei, Taoyuan, Taiwan, R.O.C.
E-mail: tsd@cht.com.tw <http://www.chttl.com.tw>

Report No : TSC-100-06-IN-02 (SAR)

Probe Data

Name : Probe 257 - CHTL
Model : E020
Type : E-Field Triangle
Serial No. : 257
Last Calib. Date : 19-Oct-2010
Frequency : 2450.00 MHz
Duty Cycle Factor: 1
Conversion Factor: 5
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

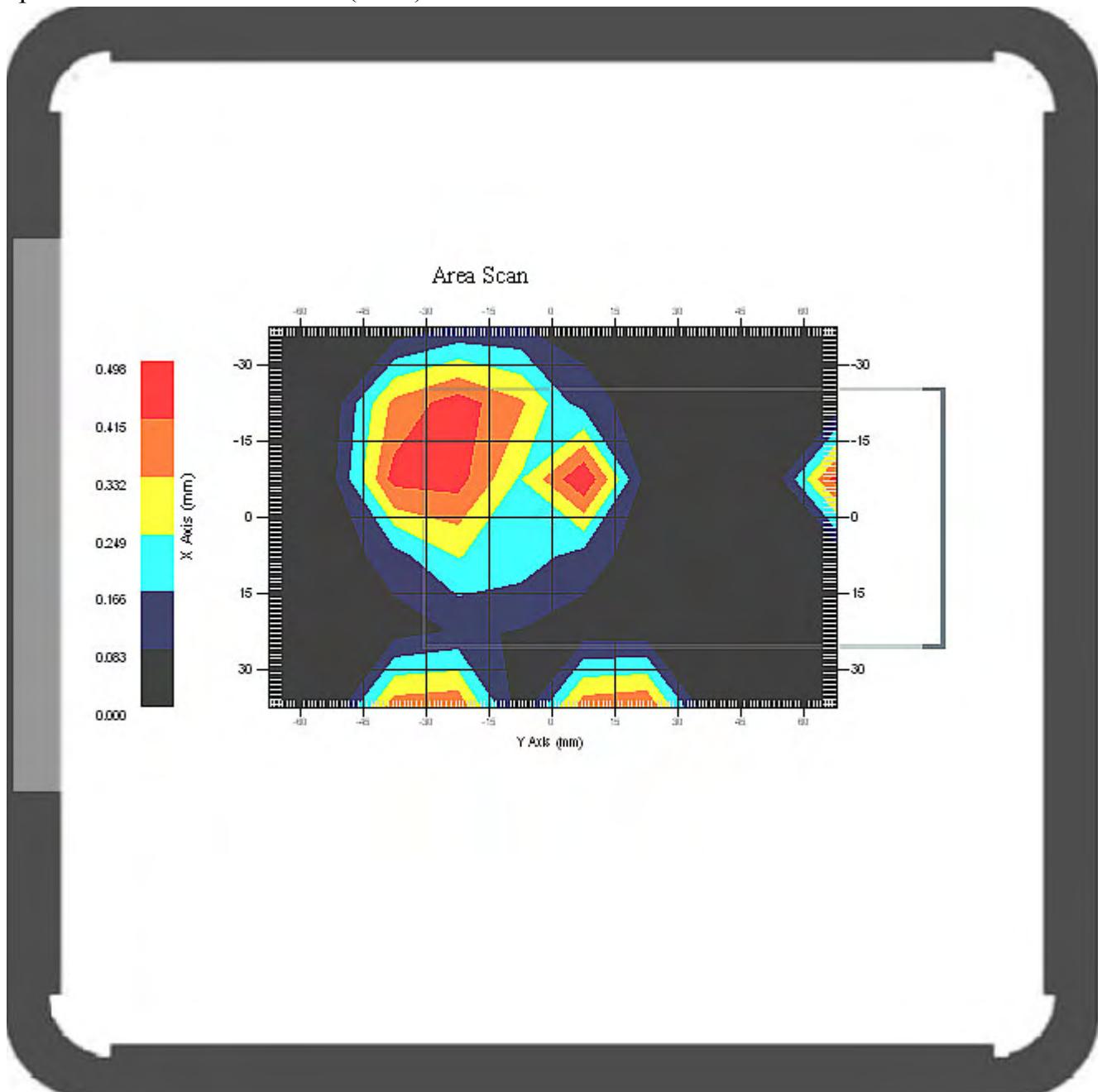
Crest Factor : 1
Scan Type : Complete
Tissue Temp. : 23.00 °C
Ambient Temp. : 23.00 °C
Set-up Date : 27-Jun-2011
Set-up Time : 8:30:28 AM
Area Scan : 6x10x1 : Measurement x=15mm, y=15mm, z=4mm
Zoom Scan : 5x5x8 : Measurement x=8mm, y=8mm, z=4mm

Other Data

DUT Position : Touch
Separation : 0
Channel : High



Report No : TSC-100-06-IN-02 (SAR)



1 gram SAR value : 0.958 W/kg
10 gram SAR value : 0.352 W/kg
Area Scan Peak SAR : 0.496 W/kg
Zoom Scan Peak SAR : 2.311 W/kg

Report No : TSC-100-06-IN-02 (SAR)

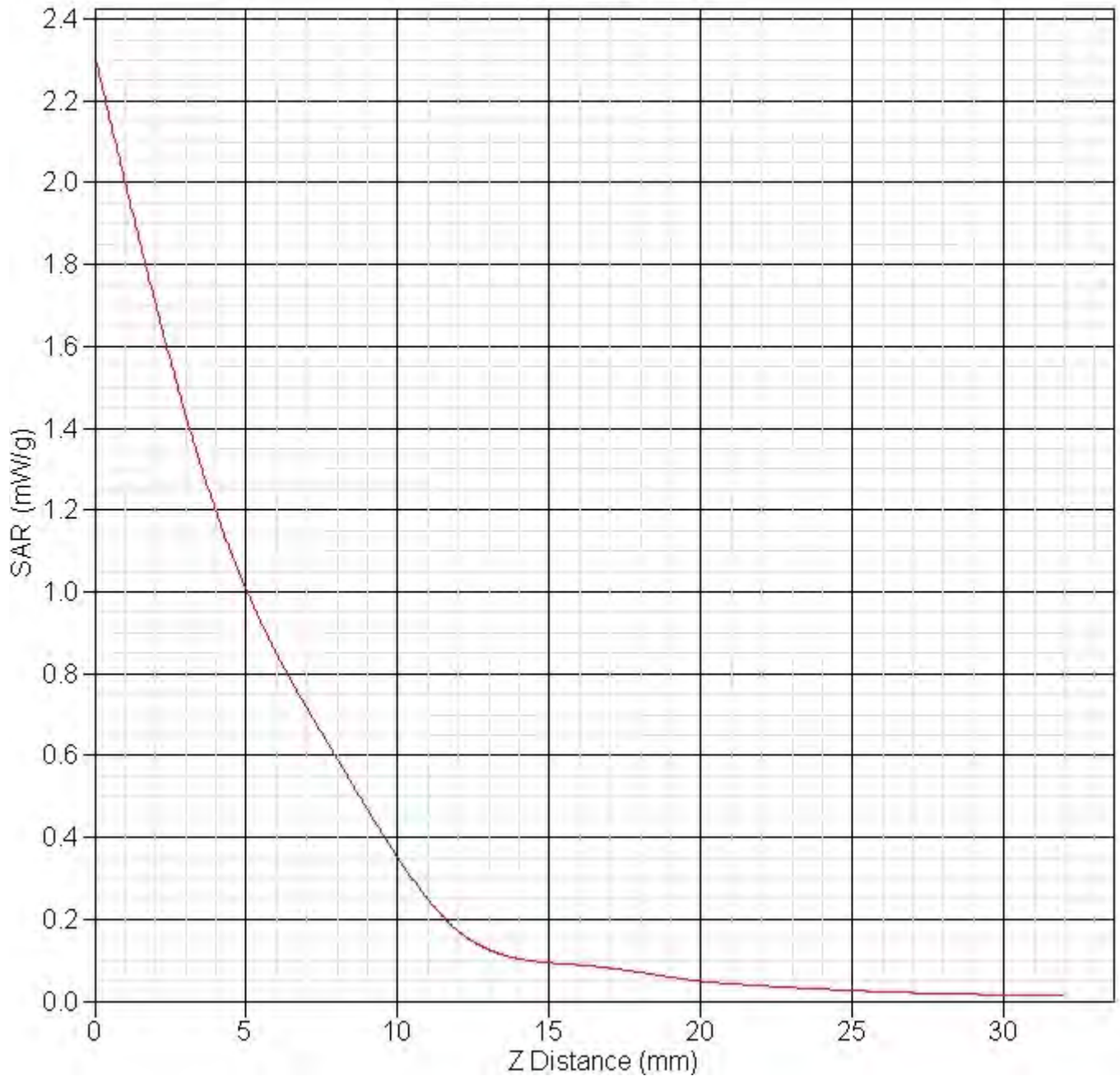
Exposure Assessment Measurement Uncertainty

Source of Uncertainty	Tolerance Value	Probability Distribution	Divisor	c_1 (1-g)	c_1 (10-g)	Standard Uncertainty (1-g) %
Measurement System						
Probe Calibration	3.5	normal	1	1	1	3.5
Axial Isotropy	3.7	rectangular	$\sqrt{3}$	$(1-cp)^{1/2}$	$(1-cp)^{1/2}$	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	12.7	rectangular	$\sqrt{3}$	1	1	7.3
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.)	1.5	normal	1	0.7	0.5	1.1
Liquid Permittivity(target)	5.0	rectangular	$\sqrt{3}$	0.6	0.5	1.7
Liquid Permittivity(meas.)	0.2	normal	1	0.6	0.5	0.1
Combined Uncertainty		RSS				11.8
Combined Uncertainty (coverage factor=2)		Normal (k=2)				23.6



Report No : TSC-100-06-IN-02 (SAR)

SAR-Z Axis
at Hotspot x:-6.91 y:-30.27





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Report No : TSC-100-06-IN-02 (SAR)

A. 4.4 Dipole Calibration Data

NCL CALIBRATION LABORATORIES

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

CERTIFICATE OF CALIBRATION

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: ALB-D-2450-S-2
Frequency: 2450 MHz
Serial No: 2450-220-00751

Customer: CHTL

Calibrated: 10th November 2009
Released on: 11th November 2009

This Calibration Certificate is incomplete unless accompanied with the Calibration Results Summary

Reviewed By: 

NCL CALIBRATION LABORATORIES
51 SPECTRUM WAY
NEPEAN, ONTARIO
CANADA K2R 1E0
Division of APREL Lab
TEL: (613) 820-4960
FAX: (613) 820-4160



Report No : TSC-100-06-IN-02 (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-100-06-IN-02 (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

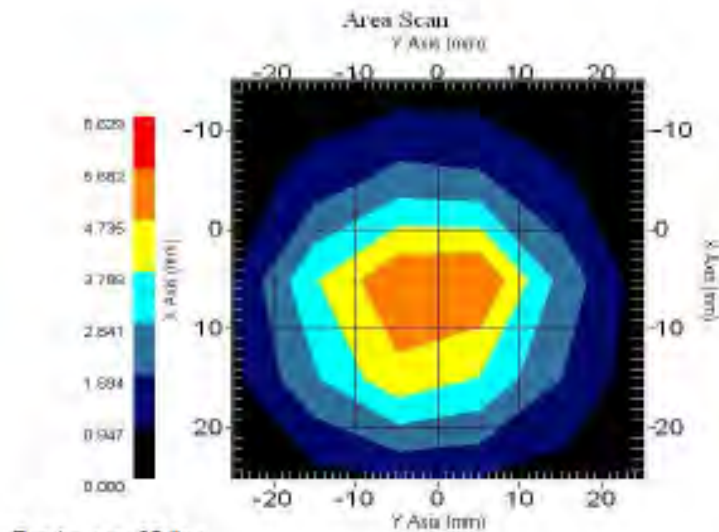
Length: 51.5 mm
Height: 30.4 mm

Electrical Specification

SWR: 1.07 U
Return Loss: -29.451 dB
Impedance: 50.710 Ω

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.



Report No : TSC-100-06-IN-02 (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



Report No : TSC-100-06-IN-02 (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, ϵ_r	40.7
Conductivity, σ [S/m]	1.85

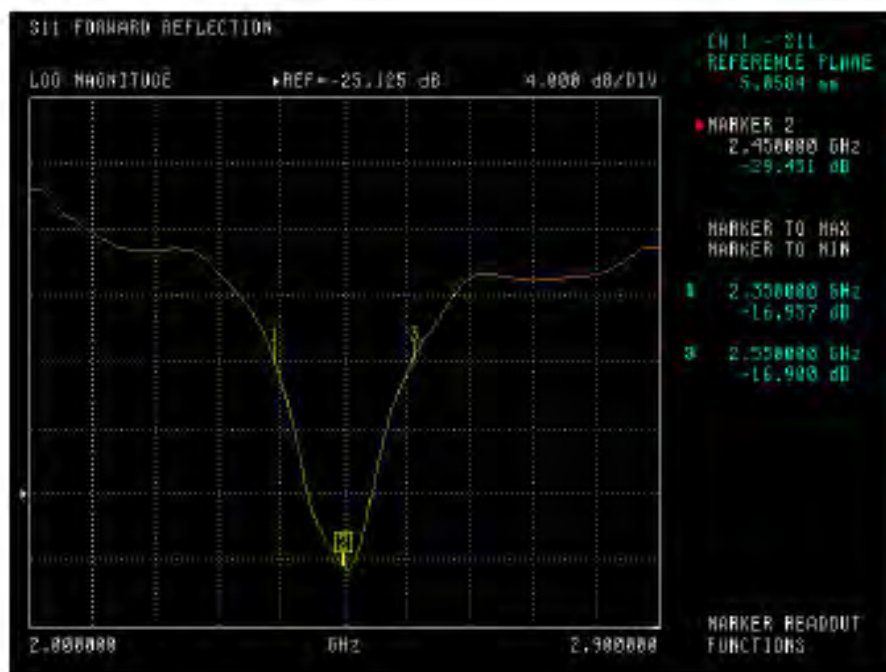
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NCL Calibration Laboratories
Division of APREL Laboratories

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

S11 Parameter Return Loss



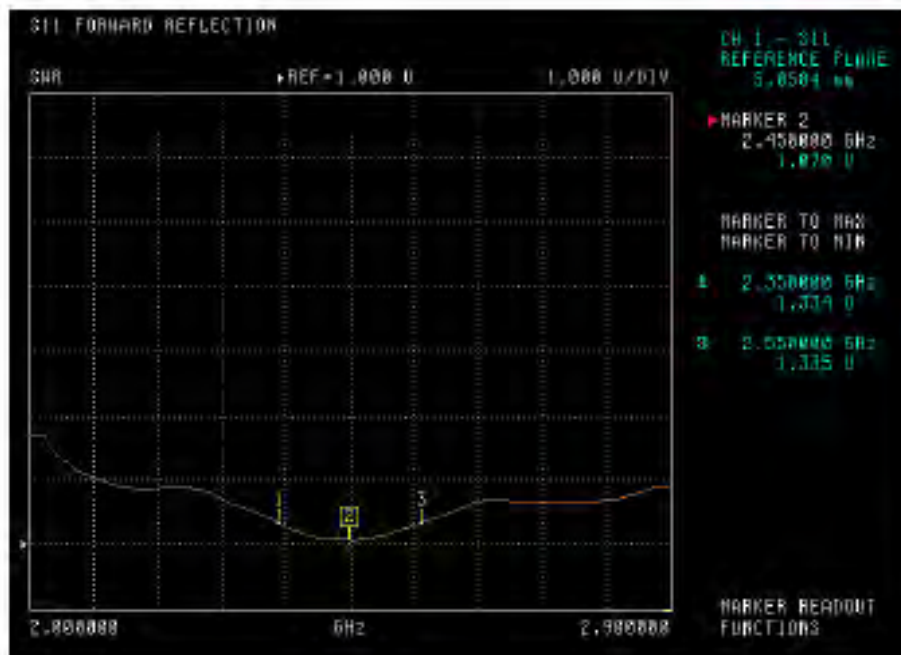
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Report No : TSC-100-06-IN-02 (SAR)

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SWR



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Smith Chart Dipole Impedance



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Report No : TSC-100-06-IN-02 (SAR)

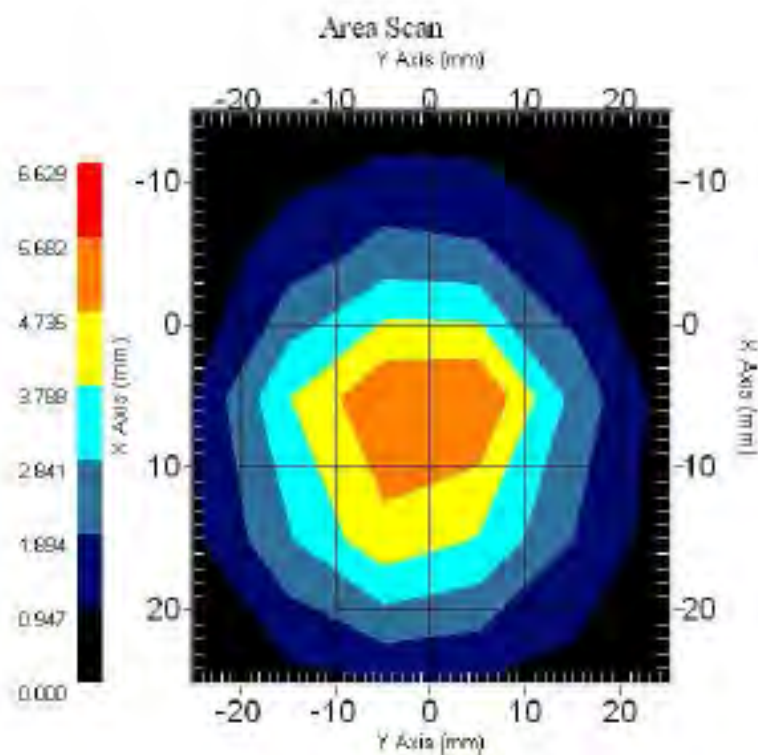
NCL Calibration Laboratories

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



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Report No : TSC-100-06-IN-02 (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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Yang-Mei, Taoyuan, Taiwan, R.O.C.
E-mail: tsd@cht.com.tw <http://www.chttl.com.tw>

Report No : TSC-100-06-IN-02 (SAR)

NCL CALIBRATION LABORATORIES	
Calibration File No: DC-501 Project Number: CHTL-ALSAS 10U-5118	
CERTIFICATE OF CALIBRATION	
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: ALS-D-2450-S-2	
Frequency: 2450 MHz	
Serial No: 2450-220-00751	
Customer: CHTL	
Calibrated: 18 th January 2005 Released on: 18 th January 2005	
Released By:	
NCL CALIBRATION LABORATORIES	
51 SPECTRUM WAY MIDLAND, ONTARIO CANADA N4R 1E9	Division of APREL Ltd TEL: (416) 320-4655 FAX: (416) 320-4162



Report No : TSC-100-06-IN-02 (SAR)

NCL Calibration Laboratories

Division of APREL Laboratories

Conditions

Dipole 2450-2212-00751 was new and taken from stock prior to 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.

Stuart Nicol
Director Product Development

Y. Chen
Member of Engineering Staff
(Calibration Engineer)

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



Report No : TSC-100-06-IN-02 (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

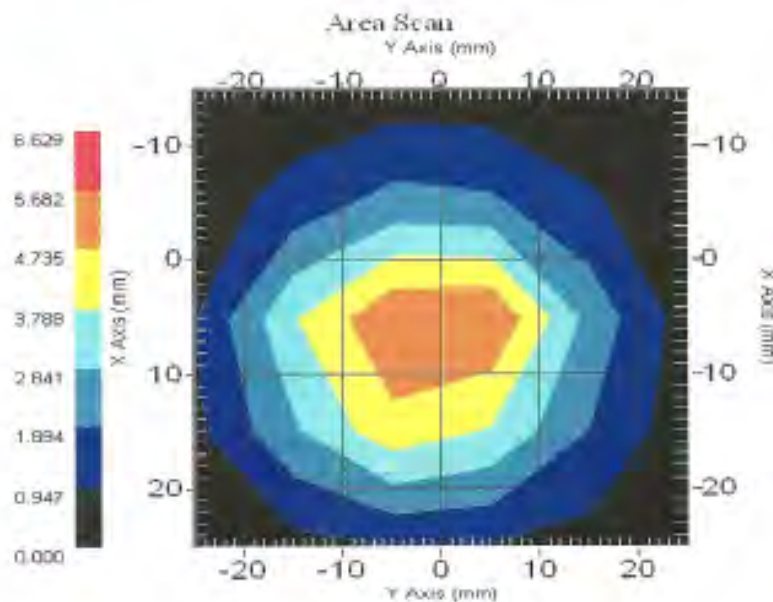
Length: 51.5 mm
Height: 30.4 mm

Electrical Specification

SWR: 1.12 U
Return Loss: -25.4 dB
Impedance: 46.2 Ω

System Validation Results

Frequency	1 Gram	10 Gram	Peak
2450 MHz	5.31	2.44	10.18



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Report No : TSC-100-06-IN-02 (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-016 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 new taken from stock.

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

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Report No : TSC-100-06-IN-02 (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, ϵ_r	39.2
Conductivity, σ [S/m]	1.80

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Yang-Mei, Taoyuan, Taiwan, R.O.C.
E-mail: tsd@cht.com.tw <http://www.chttl.com.tw>

Report No : TSC-100-06-IN-02 (SAR)

A.4.5 Probe Calibration Data

NCL CALIBRATION LABORATORIES

Calibration File No.: CP-1173

Client: CHTL

CERTIFICATE OF CALIBRATION

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 2450 MHz

Manufacturer: APREL Laboratories

Model No.: ALB-E-020

Serial No.: 257

BODY Calibration

Calibration Procedure: SSI/DRB-TP-001-032-E020-V2

Project No: SGL-CHTL-E020-CAL-5542

Calibrated: 19 October 2010
Released on: 20 October 2010

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

Released By: _____

NCL CALIBRATION LABORATORIES

17 Bentley Ave.
NEPEAN, ONTARIO
CANADA K2E 8T7

Division of APREL Lab.
TEL: (813) 825-4868
FAX: (813) 825-4161



Report No : TSC-100-06-IN-02 (SAR)

NCL Calibration Laboratories

Division of APREL Laboratories.

Introduction

This Calibration Report reproduces the results of the calibration performed in line with the SSI/DRB-TP-D01-032-E020-V2 E-Field Probe Calibration Procedure. The results contained within this report are for APREL E-Field Probe E-020 257.

References

SSI/DRB-TP-D01-032-E020-V2 E-Field Probe 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"
SSI-TP-011 Tissue Calibration Procedure

Conditions

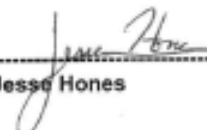
Probe 257 is a re-calibration, but original for frequency and body.

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.


Stuart Nicol


Jesse Hones



Report No : TSC-100-06-IN-02 (SAR)

NCL Calibration Laboratories

Division of APREL Laboratories.

Calibration Results Summary

Probe Type:	E-Field Probe E-020
Serial Number:	257
Frequency:	2450 MHz
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:	$1.2 \mu V/(V/m)^2$
Channel Y:	$1.2 \mu V/(V/m)^2$
Channel Z:	$1.2 \mu V/(V/m)^2$
Diode Compression Point:	95 mV



Report No : TSC-100-06-IN-02 (SAR)

NCL Calibration Laboratories

Division of APREL Laboratories.

Sensitivity in Body Tissue

Frequency: 2450 MHz

Epsilon: 50.66 (+/-5%) **Sigma:** 1.97 S/m (+/-5%)

ConvF

Channel X: 4.5

Channel Y: 4.5

Channel Z: 4.5

Tissue sensitivity values were calculated using the load impedance of the APREL Laboratories Daq-Paq.

Boundary Effect:

Uncertainty resulting from the boundary effect is less than 2% for the distance between the tip of the probe and the tissue boundary, when less than 2.44mm.

Spatial Resolution:

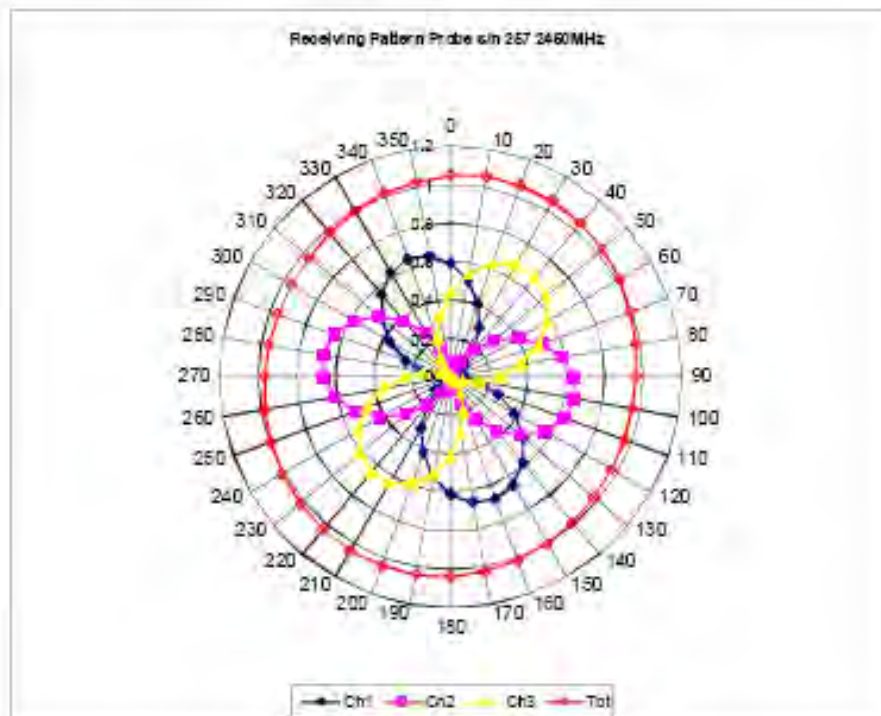
The measured probe tip diameter is 5 mm (+/- 0.01 mm) and therefore meets the requirements of SSI/DRB-TP-D01-032 for spatial resolution.



Report No : TSC-100-06-IN-02 (SAR)

NCL Calibration Laboratories
Division of APREL Laboratories.

Receiving Pattern 2450 MHz (Air)

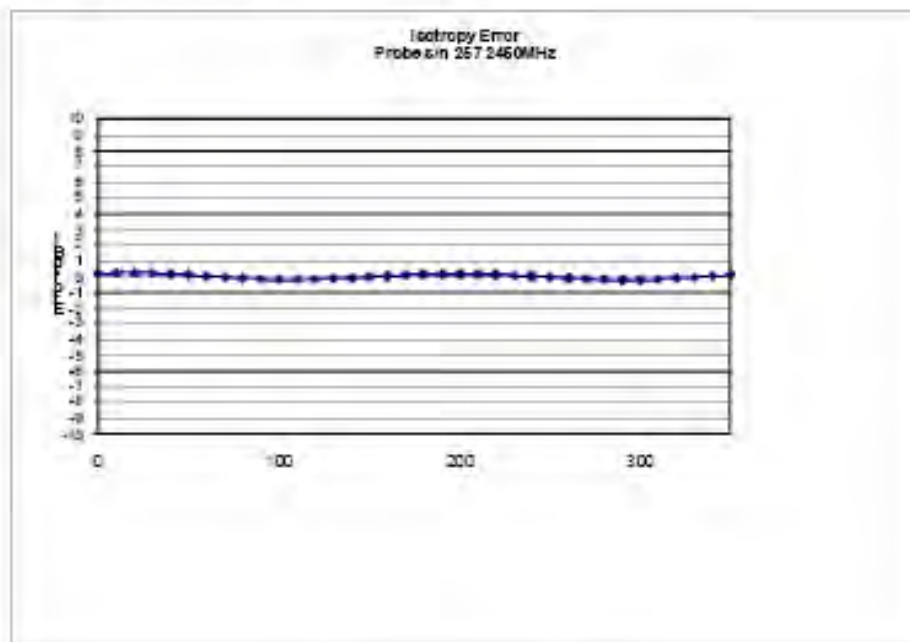




Report No : TSC-100-06-IN-02 (SAR)

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Isotropy Error 2450 MHz (Air)



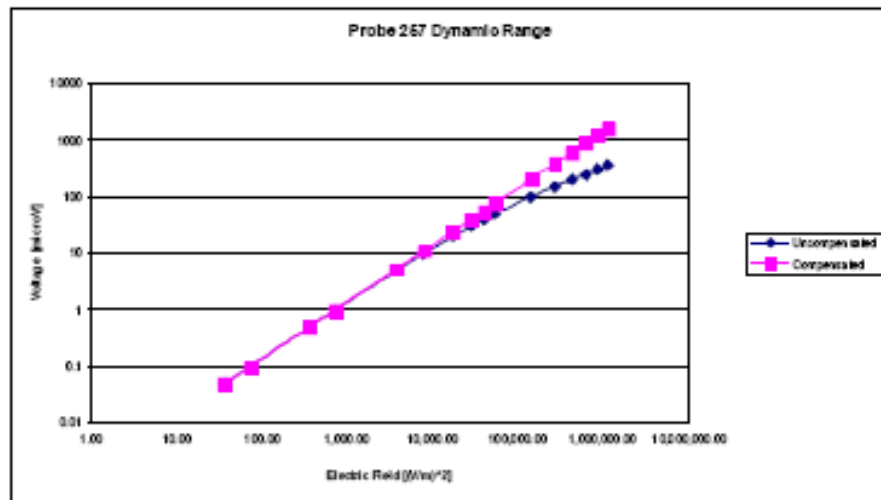
Isotropy in Tissue: 0.10 dB



Report No : TSC-100-06-IN-02 (SAR)

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Dynamic Range

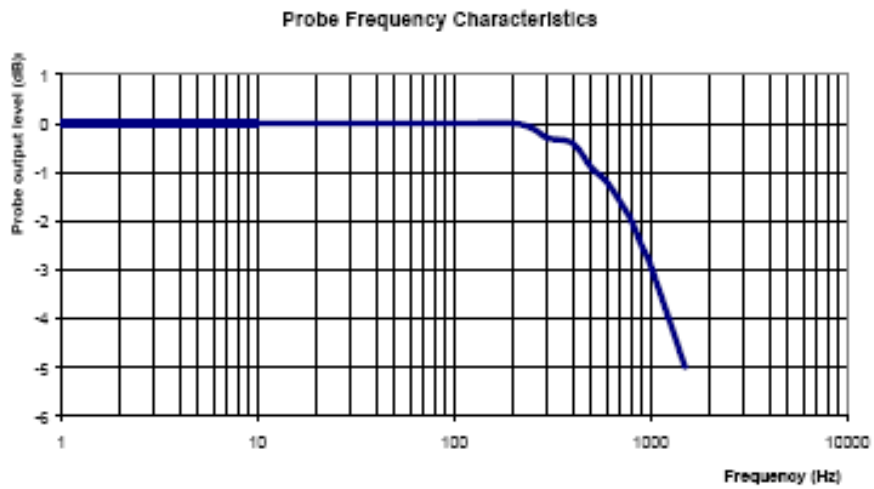




Report No : TSC-100-06-IN-02 (SAR)

NCL Calibration Laboratories
Division of APREL Laboratories.

Video Bandwidth



Video Bandwidth at 500 Hz	1 dB
Video Bandwidth at 1000 Hz	3 dB



Report No : TSC-100-06-IN-02 (SAR)

NCL Calibration Laboratories

Division of APREL Laboratories.

Conversion Factor Uncertainty Assessment

Frequency: 2450MHz

Epsilon: 50.66 (+/-5%) Sigma: 1.97 S/m (+/-5%)

ConvF

Channel X: 4.5 7%(K=2)

Channel Y: 4.5 7%(K=2)

Channel Z: 4.5 7%(K=2)

To minimize the uncertainty calculation all tissue sensitivity values were calculated using a load impedance of 5 MΩ.

Boundary Effect:

For a distance of 2.4mm the evaluated uncertainty (increase in the probe sensitivity) is less than 2%.



Report No : TSC-100-06-IN-02 (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 2010.