

FCC 2.1093 SAR Test Report

for

Uniform Industrial Corp.

**47341 Bayside Parkway, Fremont, California 94538,
United States**

Product Name : Payment Terminal
Model Name : TS890G
FCC ID : TFJTS890G

**Prepared by: : AUDIX Technology Corporation,
EMC Department**



The test report is based on a single evaluation of one sample of the above-mentioned products. It does not imply an assessment of the whole production and does not permit the use of the test lab logo.
The report must not be used by the client to claim product certification, approval, or endorsement by NVLAP, NIST, or any agency of the U.S. Government.

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TEST REPORT CERTIFICATION

Applicant : Uniform Industrial Corp.
Manufacturer : Uniform Industrial Corp.
EUT Description
(1) Product : Payment Terminal
(2) Model : TS890G
(3) Power Rating : (1)DC 7.4V (Via Battery)
(2)DC 9V (Via Adapter)

Measurement Standards Used:

47 CFR FCC Part 2 (§2.1093)
IEEE/ANSI C95.1-1992, IEEE 1528-2013,
KDB865664 D01 v01r04, KDB865664 D02 v01r02, KDB648474 D04 v01r03
KDB941225 D01 v03r01, KDB447498 D01 v06

Audix Technology Corp. tested the equipment mentioned in accordance with the requirements set forth in the above standards. Test results indicate that the equipment tested is capable of demonstrating compliance with the requirements as documented within this report.

Audix Technology Corp. does not assume responsibility for any conclusions and generalizations drawn from the test results with regard to other specimens and samples.

Date of Report: 2018. 10. 18

Reviewed by: Tina Huang (Tina Huang/Administrator)

Approved by: Ben Cheng (Ben Cheng/Manager)

1. REVISION RECORD OF TEST REPORT

Edition No	Issued Data	Revision Summary	Report Number
0	2018. 10. 16	Original Report	EM-SR180013

2. SUMMARY OF TEST RESULTS

Hand-held Mode		
Mode	Highest Measured Body SAR _{10g}	Highest Reported Scale SAR _{10g}
WCDMA Band II	0.103 (W/kg)	0.132 (W/kg)
WCDMA Band V	0.081 (W/kg)	0.102 (W/kg)
WCDMA Band V	0.096 (W/kg)	0.119 (W/kg)
Note: The SAR limit (SAR _{10g} 4W/kg) for general population / uncontrolled exposure is specified in FCC 47 CFR part 2 (2.1093).		

Body-worn Mode		
Mode	Highest Measured Body SAR _{1g}	Highest Reported Scale SAR _{1g}
WCDMA Band II	0.164 (W/kg)	0.210 (W/kg)
WCDMA Band V	0.119 (W/kg)	0.150 (W/kg)
WCDMA Band V	0.132 (W/kg)	0.164 (W/kg)
Note: The SAR limit (SAR _{1g} 1.6W/kg) for general population / uncontrolled exposure is specified in FCC 47 CFR part 2 (2.1093).		

3. GENERAL INFORMATION

3.1. Description of Application

Applicant	Uniform Industrial Corp. 47341 Bayside Parkway, Fremont, California 94538, United States
Manufacture	Uniform Industrial Corp. 1F, No.1, Lane 15, Ziqiang St., Tucheng Dist., New Taipei City 236, Taiwan, R.O.C
Product	Payment Terminal
Model	TS890G

3.2. Description of EUT

Test Model	TS890G
Serial Number	N/A
Power Rating	DC 7.4V (Via Battery) or DC 9V (Via Adapter)
RF Features	WCDMA/HSPA: Band II, Band VI & Band V
Sample Status	Production
Date of Receipt	2018. 09. 14
Date of Test	2018. 03. 09 ~ 12
Interface Ports of EUT	• DC Input Port x1
Accessories Supplied	• AC Adapter *2

3.3. Antenna Information

WCDMA Antenna					
No.	Antenna Part Number	Manufacture	Antenna Type	Frequency (MHz)	Max Gain (dBi)
1	YWX-6141SAHX-999	JOYMAX Electronics Co., Ltd.	Dipole	698-960	2
				1710-2170	
				2500-2700	

3.4. EUT Specifications Assessed in Current Report

WCDMA/HSPA		
Mode	Fundamental Range (MHz)	Channel Number
Band II	1852.4 ~ 1907.6	9262-9538
Band IV	1712.4 ~ 1752.6	1312-1513
Band V	826.4-846.6	4132-4233

3.6. Description of Key Components

Item	Supplier	Model	Description
Li-ion Battery Pack	Uniform Industrial Corp	326006100-R	7.4V 3.4Ah/24.6Wh
AC Adapter #1	Billion Electric Co. Ltd.	BA048-090500MCX	Input: AC 100-240V~1.5A, 50-60Hz Output: DC 9V, 5.0A
AC Adapter #2	Powertron Electronics Corp.	PA 1065-090T2B600	Input: AC 100-240V~1.5A, 50-60Hz Output: DC 9V, 6.0A

3.7. Tested Supporting System List

None

3.8. Setup Configuration



3.9. Test Environment

Ambient conditions in the laboratory:

Item	Require	Actual
Temperature (°C)	18-25	22 ± 2
Humidity (%RH)	30-70	48 ± 2

3.10. Description of Test Facility

Name of Test Firm	Audix Technology Corporation / EMC Department No. 53-11, Dingfu, Linkou Dist., New Taipei City 244, Taiwan Tel: +886-2-26092133 Fax: +886-2-26099303 Website : www.audixtech.com Contact e-mail: attemc_report@audixtech.com
Accreditations	The laboratory is accredited by following organizations under ISO/IEC 17025:2005 (1) NVLAP(USA) NVLAP Lab Code 200077-0 (2) TAF(Taiwan) No. 1724
Test Facilities	(1) SAR Room

3.11.Measurement Uncertainty

DASY5 Uncertainty According to IEEE 1528-2013 and IEC 62209-1/2016 (0.3 - 6 GHz range)								
Error Description	Uncert. value	Prob. Dist.	Div.	(ci) 1g	(ci) 10g	Std. Unc. (1g)	Std. Unc. (10g)	(vi) Veff
Measurement System								
Probe Calibration	±6.0%	N	1	1	1	±6.0%	±6.0%	∞
Axial Isotropy	±4.7%	R	$\sqrt{3}$	0.7	0.7	±1.9%	±1.9%	∞
Hemispherical Isotropy	±9.6%	R	$\sqrt{3}$	0.7	0.7	±3.9%	±3.9%	∞
Boundary Effects	±1.0%	R	$\sqrt{3}$	1	1	±0.6%	±0.6%	∞
Linearity	±4.7%	R	$\sqrt{3}$	1	1	±2.7%	±2.7%	∞
System Detection Limits	±1.0%	R	$\sqrt{3}$	1	1	±0.6%	±0.6%	∞
Readout Electronics	±0.3%	N	1	1	1	±0.3%	±0.3%	∞
Response Time	±0.8%	R	$\sqrt{3}$	1	1	±0.5%	±0.5%	∞
Integration Time	±2.6%	R	$\sqrt{3}$	1	1	±1.5%	±1.5%	∞
RF Ambient Noise	±3.0%	R	$\sqrt{3}$	1	1	±1.7%	±1.7%	∞
RF Ambient Reflections	±3.0%	R	$\sqrt{3}$	1	1	±1.7%	±1.7%	∞
Probe Positioner	±0.4%	R	$\sqrt{3}$	1	1	±0.2%	±0.2%	∞
Probe Positioning	±2.9%	R	$\sqrt{3}$	1	1	±1.7%	±1.7%	∞
Max. SAR Eval.	±1.0%	R	$\sqrt{3}$	1	1	±0.6%	±0.6%	∞
Test Sample Related								
Device Positioning	±2.9%	N	1	1	1	±2.9%	±2.9%	145
Device Holder	±3.6%	N	1	1	1	±3.6%	±3.6%	5
Power Drift	±5.0%	R	$\sqrt{3}$	1	1	±2.9%	±2.9%	∞
Phantom and Setup								
Phantom Uncertainty	±4.0%	R	$\sqrt{3}$	1	1	±2.3%	±2.3%	∞
Liquid Conductivity (target)	±5.0%	R	$\sqrt{3}$	0.64	0.43	±1.8%	±1.2%	∞
Liquid Conductivity (meas.)	±2.5%	N	1	0.64	0.43	±1.6%	±1.1%	∞
Liquid Permittivity (target)	±5.0%	R	$\sqrt{3}$	0.6	0.49	±1.7%	±1.4%	∞
Liquid Permittivity (meas.)	±2.5%	N	1	0.6	0.49	±1.5%	±1.2%	∞
Combined Std. Uncertainty						±11%	±10.8%	387
Expanded STD Uncertainty						±22%	±21.5%	

DASY5 Uncertainty According to IEC 62209-2/2010 (30 MHz - 6 GHz range)								
Error Description	Uncert. value	Prob. Dist.	Div.	(ci) 1g	(ci) 10g	Std. Unc. (1g)	Std. Unc. (10g)	(vi) Veff
Measurement System								
Probe Calibration	±6.0%	N	1	1	1	±6.0%	±6.0%	∞
Axial Isotropy	±4.7%	R	√3	0.7	0.7	±1.9%	±1.9%	∞
Hemispherical Isotropy	±9.6%	R	√3	0.7	0.7	±3.9%	±3.9%	∞
Boundary Effects	±1.0%	R	√3	1	1	±0.6%	±0.6%	∞
Linearity	±4.7%	R	√3	1	1	±2.7%	±2.7%	∞
System Detection Limits	±1.0%	R	√3	1	1	±0.6%	±0.6%	∞
Readout Electronic	±0.3%	N	1	1	1	±0.3%	±0.3%	∞
Response Time	±0.8%	R	√3	1	1	±0.5%	±0.5%	∞
Integration Time	±2.6%	R	√3	1	1	±1.5%	±1.5%	∞
RF Ambient Noise	±3.0%	R	√3	1	1	±1.7%	±1.7%	∞
RF Ambient Reflections	±3.0%	R	√3	1	1	±1.7%	±1.7%	∞
Probe Positioner	±0.4%	R	√3	1	1	±0.2%	±0.2%	∞
Probe Positioning	±2.9%	R	√3	1	1	±1.7%	±1.7%	∞
Modulation Response	±2.5%	R	√3	1	1	±1.45 %	±1.45 %	∞
Post-processing	±3.8%	R	√3	1	1	±2.2%	±2.2%	∞
Test Sample Related								
Test Sample Positioning	±2.9%	N	1	1	1	±2.9%	±2.9%	145
Device Holder	±3.6%	N	1	1	1	±3.6%	±3.6%	5
Power Drift	±5.0%	R	√3	1	1	±2.9%	±2.9%	∞
Power Scaling	±0.0%	R	√3	1	1	±0.0%	±0.0%	∞
Phantom and Setup								
Phantom Uncertainty	±4.5%	R	√3	1	1	±2.4%	±2.4%	∞
SAR correction	±1.9%	R	√3	1	0.84	±1.9%	±1.9%	∞
Liquid Conductivity (target)	±5.0%	R	√3	0.64	0.43	±1.8%	±1.2%	∞
Liquid Conductivity (mea.)DAK	±2.5%	R	√3	0.64	0.43	±0.9%	±0.6%	∞
Liquid Permittivity (target)	±5.0%	R	√3	0.6	0.49	±1.7%	±1.4%	∞
Liquid Permittivity(meas.)DAK	±2.5%	R	√3	0.6	0.49	±0.9%	±0.7%	∞
Combined Std. Uncertainty						±11.0%	±10.9%	387
Expanded STD Uncertainty						±22.1%	±21.8%	

4. MEASUREMENT EQUIPMENT LIST

Item	Type	Manufacturer	Model No.	Serial No.	Cal. Date	Cal. Interval
1.	Stäubli Robot TX90 XL	Stäubli	TX90	F12/5K9SA1/ A101	N/A	N/A
2.	Controller	SPEAG	CS8c	N/A	N/A	N/A
3.	SAM Twin Phantom	SPEAG	N/A	1706	N/A	N/A
4.	ELI5 Phantom	SPEAG	N/A	1170	N/A	N/A
5.	Device Holder	SPEAG	N/A	N/A	N/A	N/A
6.	Data Acquisition Electronic	SPEAG	DAE4	1337	2018. 09. 19	1 Year
7.	E-Field Probe	SPEAG	EX3DV4	3855	2018. 09. 27	1 Year
8.	SAR Software	SPEAG	DASY52	V.52.8.8.1222	N/A	N/A
9.	ENA Network Analyzer	Agilent	E5071C-480	Y46214331	2018. 09. 21	1 Year
10.	Signal Generator	Aglient	N5181A	MY50143917	2018. 09. 12	1 Year
11.	Power Meter	Anritsu	ML2495A	1145008	2017. 11. 03	1 Year
12.	Power Sensor	Anritsu	MA2411B	1126096	2017. 11. 03	1 Year
14.	Dipole Antenna	SPEAG	D835V2	4d136	2018. 09. 20	3 Years
15.	Dipole Antenna	SPEAG	D1750V2	1065	2018. 09. 19	3 Years
16.	Dipole Antenna	SPEAG	D1900V2	5d156	2018. 09. 19	3 Years

5. SAR MEASUREMENT SYSTEM

5.1. Definition of Specific Absorption Rate (SAR)

SAR is related to the rate at which energy is absorbed per unit mass in an object exposed to a radio field. The SAR distribution in a biological body is complicated and is usually carried out by experimental techniques or numerical modeling. The standard recommends limits for two tiers of groups, occupational/controlled and general population/uncontrolled, based on a person's awareness and ability to exercise control over his or her exposure. In general, occupational/controlled exposure limits are higher than the limits for general population/uncontrolled.

The SAR definition is the time derivative (rate) of the incremental energy (dW) absorbed by (dissipated in) an incremental mass (dm) contained in a volume element (dv) of a given density (ρ). The equation description is as below:

$$SAR = \frac{d}{dt} \left(\frac{dW}{dm} \right) = \frac{d}{dt} \left(\frac{dW}{\rho dv} \right)$$

SAR is expressed in units of Watts per kilogram (W/kg)

SAR measurement can be related to the electrical field in the tissue by

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

Where: σ is the conductivity of the tissue, ρ is the mass density of the tissue and E is the RMS electrical field strength.

5.2. SPEAG DASY System

DASY system consists of high precision robot, probe alignment sensor, phantom, robot controller, controlled measurement server and near-field probe. The robot includes six axes that can move to the precision position of the DASY5 software defined. The DASY software can define the area that is detected by the probe. The robot is connected to controlled box. Controlled measurement server is connected to the controlled robot box. The DAE includes amplifier, signal multiplexing, AD converter, offset measurement and surface detection. It is connected to the Electro-optical coupler (ECO). The ECO performs the conversion from the optical into digital electric signal of the DAE and transfers data to the PC.

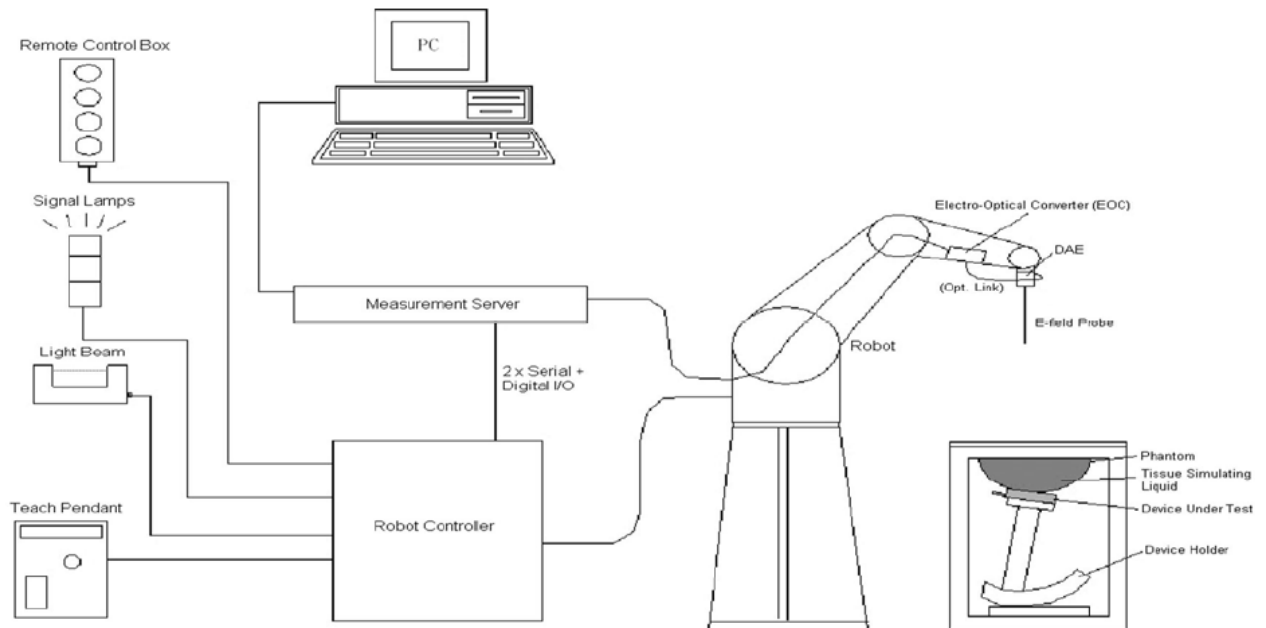
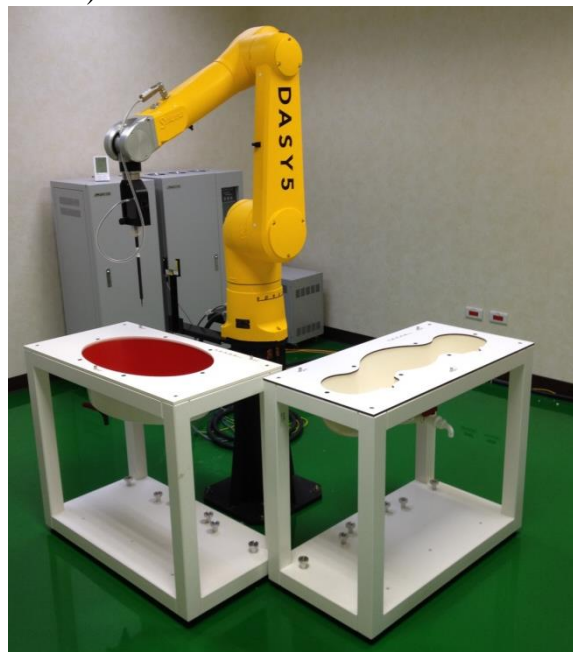


Fig-3.1 DASY System Setup


5.2.1. Robot

The DASY system uses the high precision robots from Stäubli SA (France). For the 6-axis controller system, the robot controller version (DASY5: CS8c) from Stäubli is used. The Stäubli robot series have many features that are important for our application:


- High precision (repeatability ± 0.035 mm)
- High reliability (industrial design)
- Jerk-free straight movements
- Low ELF interference (the closed metallic construction shields against motor control fields)




5.2.2. Probes

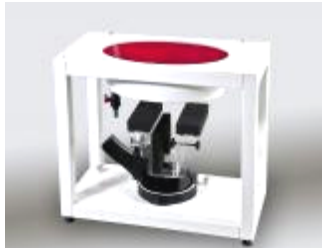
Model	Ex3DV4	
Construction	Symmetrical design with triangular core Built-in shielding against static charges PEEK enclosure material (resistant to organic solvents, e.g., DGBE)	
Frequency	10 MHz to 6 GHz Linearity: ± 0.2 dB	
Directivity	± 0.3 dB in HSL (rotation around probe axis) ± 0.5 dB in tissue material (rotation normal to probe axis)	
Dynamic Range	10 μ W/g to 100 mW/g Linearity: ± 0.2 dB (noise: typically < 1 μ W/g)	
Dimensions	Overall length: 337 mm (Tip: 20 mm) Tip diameter: 2.5 mm (Body: 12 mm) Typical distance from probe tip to dipole centers: 1 mm	

5.2.3. Data Acquisition Electronics (DAE)


Model	DAE4	
Construction	Signal amplifier, multiplexer, A/D converter and control logic. Serial optical link for communication with DASY4/5 embedded system (fully remote controlled). Two step probe touch detector for mechanical surface detection and emergency robot stop.	
Measurement Range	-100 to +300 mV (16 bit resolution and two range settings: 4mV, 400mV)	
Input Offset Voltage	$< 5\mu$ V (with auto zero)	
Input Bias Current	< 50 fA	
Dimensions	60 x 60 x 68 mm	


5.2.4. Phantom

Model	Twin SAM	
Construction	The shell corresponds to the specifications of the Specific Anthropomorphic Mannequin (SAM) phantom defined in IEEE 1528 and IEC 62209-1. It enables the dosimetric evaluation of left and right hand phone usage as well as body mounted usage at the flat phantom region. A cover prevents evaporation of the liquid. Reference markings on the phantom allow the complete setup of all predefined phantom positions and measurement grids by teaching three points with the robot.	
Material	Vinylester, glass fiber reinforced (VE-GF)	
Shell Thickness	2 ± 0.2 mm (6 ± 0.2 mm at ear point)	
Dimensions	Length: 1000 mm Width: 500 mm Height: adjustable feet	
Filling Volume	approx. 25 liters	


Model	ELI	
Construction	Phantom for compliance testing of handheld and body-mounted wireless devices in the frequency range of 30 MHz to 6 GHz. ELI is fully compatible with the IEC 62209-2 standard and all known tissue simulating liquids. ELI has been optimized regarding its performance and can be integrated into our standard phantom tables. A cover prevents evaporation of the liquid. Reference markings on the phantom allow installation of the complete setup, including all predefined phantom positions and measurement grids, by teaching three points. The phantom is compatible with all SPEAG dosimetric probes and dipoles.	
Material	Vinylester, glass fiber reinforced (VE-GF)	
Shell Thickness	2.0 ± 0.2 mm (bottom plate)	
Dimensions	Major axis: 600 mm Minor axis: 400 mm	
Filling Volume	approx. 30 liters	

5.2.5. Device Holder

Model	Mounting Device	
Construction	In combination with the Twin SAM Phantom or ELI4, the Mounting Device enables the rotation of the mounted transmitter device in spherical coordinates. Rotation point is the ear opening point. Transmitter devices can be easily and accurately positioned according to IEC, IEEE, FCC or other specifications. The device holder can be locked for positioning at different phantom sections (left head, right head, flat).	
Material	POM	

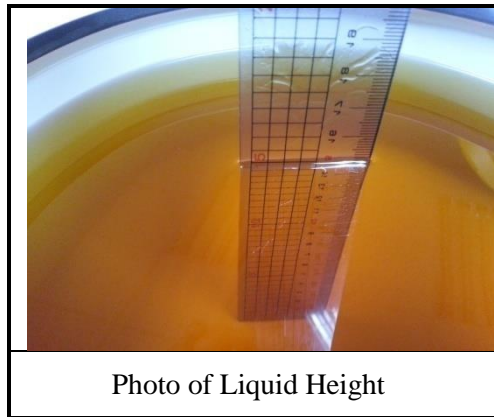
Model	Laptop Extensions Kit	
Construction	Simple but effective and easy-to-use extension for Mounting Device that facilitates the testing of larger devices according to IEC 62209-2 (e.g., laptops, cameras, etc.). It is lightweight and fits easily on the upper part of the Mounting Device in place of the phone positioner.	
Material	POM, Acrylic glass, Foam	

5.2.6. Reference Dipole

Model	System Validation Dipoles	
Construction	Symmetrical dipole with 1/4 balun. Enables measurement of feed point impedance with NWA. Matched for use near flat phantoms filled with tissue simulating solutions.	
Frequency	750 MHz to 5800 MHz	
Return Loss	> 20 dB	
Power Capability	> 100 W (f < 1GHz), > 40 W (f > 1GHz)	

5.2.7. Tissue Simulating Liquids

For SAR measurement of the field distribution inside the phantom, the phantom must be filled with homogeneous tissue simulating liquid to a depth of at least 15 cm. For head SAR testing, the liquid height from the ear reference point (ERP) of the phantom to the liquid top surface is larger than 15 cm. For body SAR testing, the liquid height from the center of the flat phantom to the liquid top surface is larger than 15 cm. The nominal dielectric values of the tissue simulating liquids in the phantom and the tolerance of 5% are listed in Table-5.1.



The dielectric properties of the head tissue simulating liquids are defined in IEEE 1528 and FCC OET 65 Supplement C Appendix C. For the body tissue simulating liquids, the dielectric properties are defined in FCC OET 65 Supplement C Appendix C. The dielectric properties of the tissue simulating liquids were verified prior to the SAR evaluation using an Agilent 85070D Dielectric Probe Kit and an Agilent Network Analyzer.

Table-5.1 Targets of Tissue Simulating Liquid

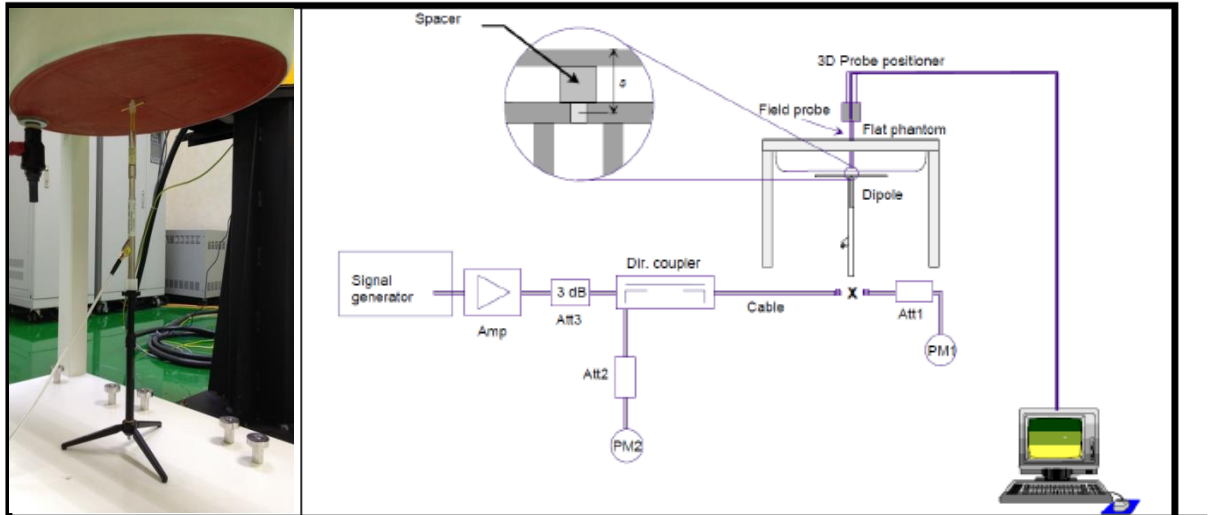
Target Frequency [MHz]	Target Permittivity (ϵ_r)	Range of $\pm 5\%$	Target Conductivity σ [s/m]	Range of $\pm 5\%$
For Head				
750	41.9	39.8 ~ 44.0	0.89	0.85 ~ 0.93
835	41.5	39.4 ~ 43.6	0.90	0.86 ~ 0.95
900	41.5	39.4 ~ 43.6	0.97	0.92 ~ 1.02
1450	40.5	38.5 ~ 42.5	1.20	1.14 ~ 1.26
1640	40.3	38.3 ~ 42.3	1.29	1.23 ~ 1.35
1750	40.1	38.1 ~ 42.1	1.37	1.30 ~ 1.44
1800	40.0	38.0 ~ 42.0	1.40	1.33 ~ 1.47
1900	40.0	38.0 ~ 42.0	1.40	1.33 ~ 1.47
2000	40.0	38.0 ~ 42.0	1.40	1.33 ~ 1.47
2300	39.5	37.5 ~ 41.5	1.67	1.59 ~ 1.75
2450	39.2	37.2 ~ 41.2	1.80	1.71 ~ 1.89
2600	39.0	37.1 ~ 41.0	1.96	1.86 ~ 2.06
3500	37.9	36.0 ~ 39.8	2.91	2.76 ~ 3.06
5200	36.0	34.2 ~ 37.8	4.66	4.43 ~ 4.89
5300	35.9	34.1 ~ 37.7	4.76	4.52 ~ 5.00
5500	35.6	33.8 ~ 37.4	4.96	4.71 ~ 5.21
5600	35.5	33.7 ~ 37.3	5.07	4.82 ~ 5.32
5800	35.3	33.5 ~ 37.1	5.27	5.01 ~ 5.53
For Body				
750	55.5	52.7 ~ 58.3	0.96	0.91 ~ 1.01
835	55.2	52.4 ~ 58.0	0.97	0.92 ~ 1.02
900	55.0	52.3 ~ 57.8	1.05	1.00 ~ 1.10
1450	54.0	51.3 ~ 56.7	1.30	1.24 ~ 1.37
1640	53.8	51.1 ~ 56.5	1.40	1.33 ~ 1.47
1750	53.4	50.7 ~ 56.1	1.49	1.42 ~ 1.56
1800	53.3	50.6 ~ 56.0	1.52	1.44 ~ 1.60
1900	53.3	50.6 ~ 56.0	1.52	1.44 ~ 1.60
2000	53.3	50.6 ~ 56.0	1.52	1.44 ~ 1.60
2300	52.9	50.3 ~ 55.5	1.81	1.72 ~ 1.90
2450	52.7	50.1 ~ 55.3	1.95	1.85 ~ 2.05
2600	52.5	49.9 ~ 55.1	2.16	2.05 ~ 2.27
3500	51.3	48.7 ~ 53.9	3.31	3.14 ~ 3.48
5200	49.0	46.6 ~ 51.5	5.30	5.04 ~ 5.57
5300	48.9	46.5 ~ 51.3	5.42	5.15 ~ 5.69
5500	48.6	46.2 ~ 51.0	5.65	5.37 ~ 5.93
5600	48.5	46.1 ~ 50.9	5.77	5.48 ~ 6.06
5800	48.2	45.8 ~ 50.6	6.00	5.70 ~ 6.30

Table-5.2 Recipes of Tissue Simulating Liquid

Tissue Type	Bactericide	DGBE	HEC	NaCl	Sucrose	Triton X-100	Water	Diethylene Glycol Mono-hexylether
For Head								
H750	0.2	-	0.2	1.5	56.0	-	42.1	-
H835	0.2	-	0.2	1.5	57.0	-	41.1	-
H900	0.2	-	0.2	1.4	58.0	-	40.2	-
H1450	-	43.3	-	0.6	-	-	56.1	-
H1640	-	45.8	-	0.5	-	-	53.7	-
H1750	-	47.0	-	0.4	-	-	52.6	-
H1800	-	44.5	-	0.3	-	-	55.2	-
H1900	-	44.5	-	0.2	-	-	55.3	-
H2000	-	44.5	-	0.1	-	-	55.4	-
H2300	-	44.9	-	0.1	-	-	55.0	-
H2450	-	45.0	-	0.1	-	-	54.9	-
H2600	-	45.1	-	0.1	-	-	54.8	-
H3500	-	8.0	-	0.2	-	20.0	71.8	-
H5G	-	-	-	-	-	17.2	65.5	17.3
For Body								
B750	0.2	-	0.2	0.8	48.8	-	50.0	-
B835	0.2	-	0.2	0.9	48.5	-	50.2	-
B900	0.2	-	0.2	0.9	48.2	-	50.5	-
B1450	-	34.0	-	0.3	-	-	65.7	-
B1640	-	32.5	-	0.3	-	-	67.2	-
B1750	-	31.0	-	0.2	-	-	68.8	-
B1800	-	29.5	-	0.4	-	-	70.1	-
B1900	-	29.5	-	0.3	-	-	70.2	-
B2000	-	30.0	-	0.2	-	-	69.8	-
B2300	-	31.0	-	0.1	-	-	68.9	-
B2450	-	31.4	-	0.1	-	-	68.5	-
B2600	-	31.8	-	0.1	-	-	68.1	-
B3500	-	28.8	-	0.1	-	-	71.1	-
B5G	-	-	-	-	-	10.7	78.6	10.7

5.3. SAR System Verification

The system check verifies that the system operates within its specifications. It is performed daily or before every SAR measurement. The system check uses normal SAR measurements in the flat section of the phantom with a matched dipole at a specified distance. The system verification setup is shown as below.



The validation dipole is placed beneath the flat phantom with the specific spacer in place. The distance spacer is touch the phantom surface with a light pressure at the reference marking and be oriented parallel to the long side of the phantom. The power meter PM1 measures the forward power at the location of the system check dipole connector. The signal generator is adjusted for the desired forward power (250 mW is used for 700 MHz to 3 GHz, 100 mW is used for 3.5 GHz to 6 GHz) at the dipole connector and the power meter PM2 is read at that level. After connecting the cable to the dipole, the signal generator is readjusted for the same reading at power meter PM2.

After system check testing, the SAR result will be normalized to 1W forward input power and compared with the reference SAR value derived from validation dipole certificate report. The deviation of system check should be within 10 %.

5.3.1. SAR System Verification Result

System Performance Check at WCDMA				
Dipole Kit: D835V2 (Body)				
Frequency [MHz]	Description	SAR [w/kg] 1g	SAR [w/kg] 10g	Tissue Temp. [°C]
835MHz	Reference result	9.5	6.21	N/A
	± 10% window	8.550 to 10.450	5.589 to 6.831	
	2018. 10. 11	10.44	6.60	21.8
Note: All SAR values are normalized to 1W forward power.				

System Performance Check at WCDMA				
Dipole Kit: D1750V2 (Body)				
Frequency [MHz]	Description	SAR [w/kg] 1g	SAR [w/kg] 10g	Tissue Temp. [°C]
1750MHz	Reference result	37.0	19.6	N/A
	± 10% window	33.300 to 40.700	17.640 to 21.560	
	2018. 10. 12	38.72	20.28	21.5
Note: All SAR values are normalized to 1W forward power.				

System Performance Check at WCDMA				
Dipole Kit: D1900V2 (Body)				
Frequency [MHz]	Description	SAR [w/kg] 1g	SAR [w/kg] 10g	Tissue Temp. [°C]
1900MHz	Reference result	40.3	21.1	N/A
	± 10% window	36.270 to 44.330	18.990 to 23.210	
	2018. 10. 12	39.44	20.48	21.5
Note: All SAR values are normalized to 1W forward power.				

5.3.2. SAR System Check Data

Date: 10/11/2018

Test Laboratory: Audix_SAR Lab

System Check_B835

DUT: D835V2 - SN4d136; Type: D835V2; Serial: SN4d136

Communication System: UID 0, CW (0); Frequency: 835 MHz; Duty Cycle: 1:1

Medium parameters used: $f = 835$ MHz; $\sigma = 0.973$ S/m; $\epsilon_r = 54.324$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

DASY Configuration:

- Probe: EX3DV4 - SN3855; ConvF(9.76, 9.76, 9.76); Calibrated: 9/27/2018;
- Sensor-Surface: 2mm (Mechanical Surface Detection), $z = 1.0, 31.0$
- Electronics: DAE4 Sn1337; Calibrated: 9/19/2018
- Phantom: ELI v5.0; Type: QDOVA002AA; Serial: TP:1170
- DASY52 52.8.8(1258); SEMCAD X 14.6.10(7373)

Area Scan (8x8x1): Measurement grid: $dx=10$ mm, $dy=10$ mm

Maximum value of SAR (measured) = 3.83 W/kg

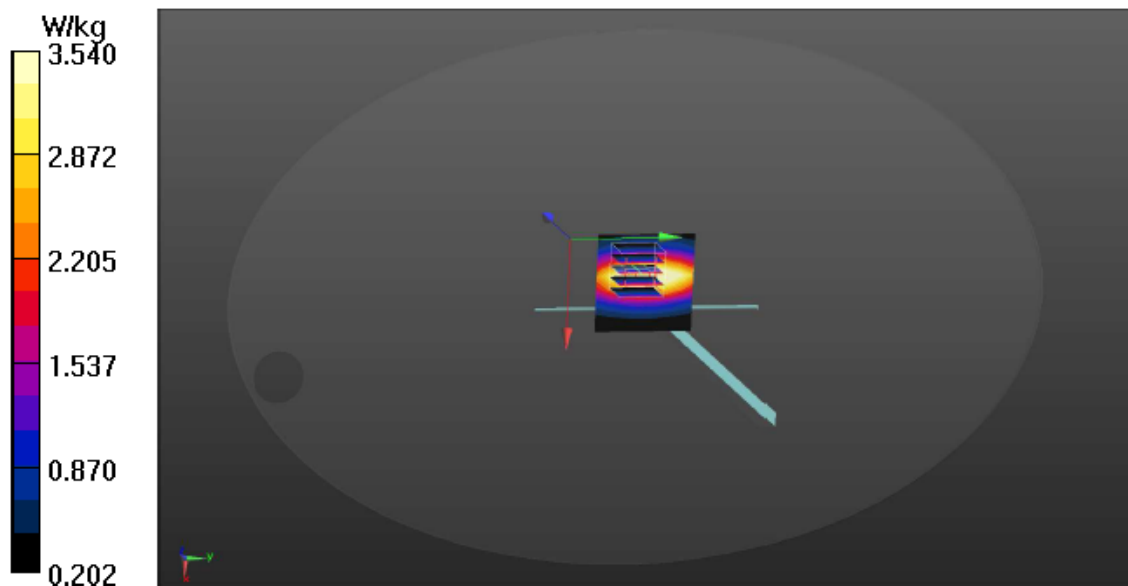
Zoom Scan (5x5x7)/Cube 0: Measurement grid: $dx=8$ mm, $dy=8$ mm, $dz=5$ mm

Reference Value = 61.86 V/m; Power Drift = -0.20 dB

Peak SAR (extrapolated) = 4.74 W/kg

SAR(1 g) = 2.61 W/kg; SAR(10 g) = 1.65 W/kg

Maximum value of SAR (measured) = 3.54 W/kg



Date: 10/12/2018

Test Laboratory: Audix_SAR Lab

System Check_B1750**DUT: Dipole 1750 MHz D1750V2; Type: D1750V2; Serial: D1750V2 - SN:1065**

Communication System: UID 0, CW (0); Frequency: 1750 MHz; Duty Cycle: 1:1

Medium parameters used: $f = 1750$ MHz; $\sigma = 1.471$ S/m; $\epsilon_r = 53.811$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

DASY Configuration:

- Probe: EX3DV4 - SN3855; ConvF(8.48, 8.48, 8.48); Calibrated: 9/27/2018;
- Sensor-Surface: 2mm (Mechanical Surface Detection), $z = 1.0, 31.0$
- Electronics: DAE4 Sn1337; Calibrated: 9/19/2018
- Phantom: ELI v5.0; Type: QDOVA002AA; Serial: TP:1170
- DASY52 52.8.8(1258); SEMCAD X 14.6.10(7373)

Area Scan (7x7x1): Measurement grid: $dx=10$ mm, $dy=10$ mm

Maximum value of SAR (measured) = 12.6 W/kg

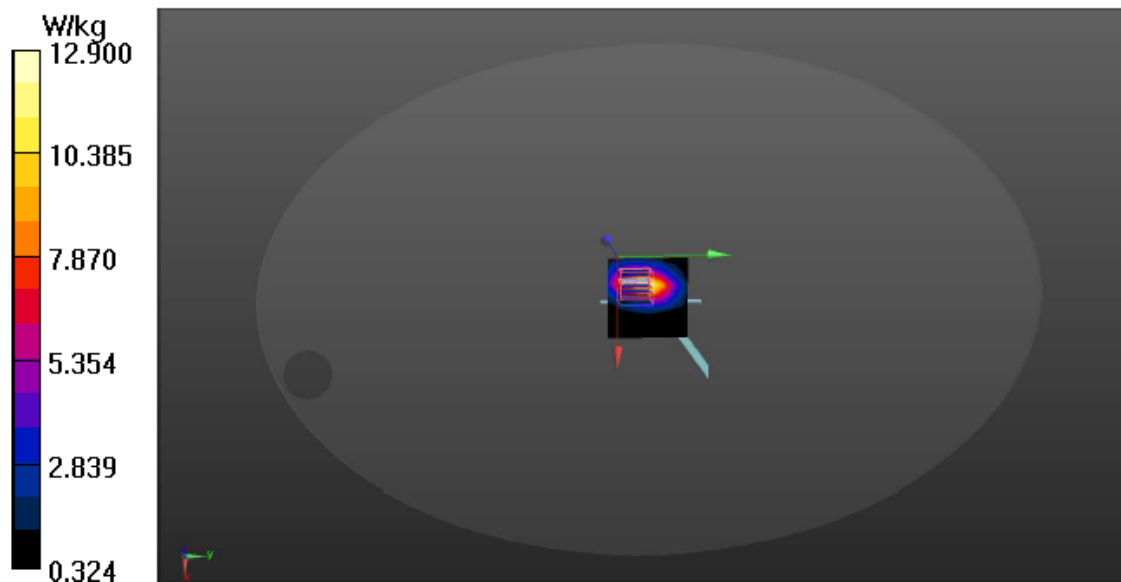
Zoom Scan (7x7x9)/Cube 0: Measurement grid: $dx=4$ mm, $dy=4$ mm, $dz=2.5$ mm

Reference Value = 64.45 V/m; Power Drift = 0.15 dB

Peak SAR (extrapolated) = 16.0 W/kg

SAR(1 g) = 9.68 W/kg; SAR(10 g) = 5.07 W/kg

Maximum value of SAR (measured) = 12.9 W/kg



Date: 10/12/2018

Test Laboratory: Audix_SAR Lab

System Check_B1900**DUT: Dipole 1900 MHz D1900V2; Type: D1900V2; Serial: D1900V2 - SN:5d156**

Communication System: UID 0, CW (0); Frequency: 1900 MHz; Duty Cycle: 1:1

Medium parameters used: $f = 1900$ MHz; $\sigma = 1.569$ S/m; $\epsilon_r = 53.013$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

DASY Configuration:

- Probe: EX3DV4 - SN3855; ConvF(8.14, 8.14, 8.14); Calibrated: 9/27/2018;
- Sensor-Surface: 2mm (Mechanical Surface Detection), $z = 1.0, 31.0$
- Electronics: DAE4 Sn1337; Calibrated: 9/19/2018
- Phantom: ELI v5.0; Type: QDOVA002AA; Serial: TP:1170
- DASY52 52.8.8(1258); SEMCAD X 14.6.10(7373)

Area Scan (7x7x1): Measurement grid: $dx=10$ mm, $dy=10$ mm

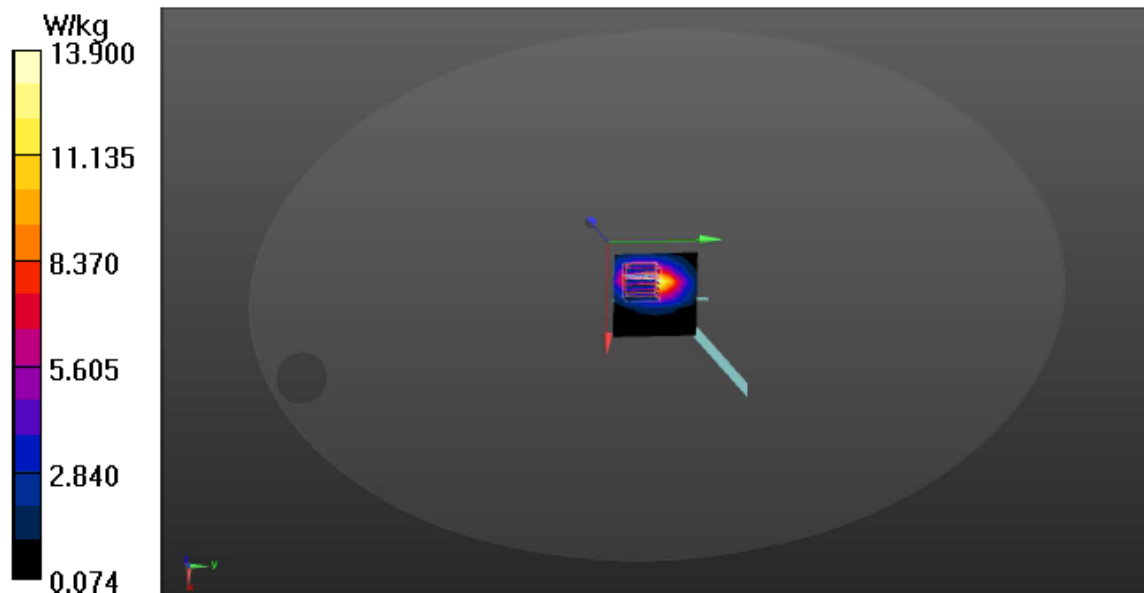
Maximum value of SAR (measured) = 13.9 W/kg

Zoom Scan (7x7x9)/Cube 0: Measurement grid: $dx=4$ mm, $dy=4$ mm, $dz=2.5$ mm

Reference Value = 64.22 V/m; Power Drift = 0.18 dB

Peak SAR (extrapolated) = 17.4 W/kg

SAR(1 g) = 9.86 W/kg; SAR(10 g) = 5.12 W/kg



5.4. SAR Measurement Procedure

According to the SAR test standard, the recommended procedure for assessing the peak spatial-average SAR value consists of the following steps:

- (a) Power reference measurement
- (b) Area scan
- (c) Zoom scan
- (d) Power drift measurement

The SAR measurement procedures for each of test conditions are as follows:

- (a) Make EUT to transmit maximum output power
- (b) Measure conducted output power through RF cable
- (c) Place the EUT in the specific position of phantom
- (d) Perform SAR testing steps on the DASY system
- (e) Record the SAR value

5.4.1. Area & Zoom Scan Procedure

First Area Scan is used to locate the approximate location(s) of the local peak SAR value(s). The measurement grid within an Area Scan is defined by the grid extent, grid step size and grid offset. Next, in order to determine the EM field distribution in a three-dimensional spatial extension, Zoom Scan is required. The Zoom Scan is performed around the highest E-field value to determine the averaged SAR-distribution over 10 g. According to KDB 865664 D01 v01r03, the resolution for Area and Zoom scan is specified in the table below.

Items	<= 2 GHz	2-3 GHz	3-4 GHz	4-5 GHz	5-6 GHz
Area Scan (Δx , Δy)	<= 15mm	<= 12mm	<= 12mm	<= 10mm	<= 10mm
Zoom Scan (Δx , Δy)	<= 8mm	<= 5mm	<= 5mm	<= 4mm	<= 4mm
Zoom Scan (Δz)	<= 5mm	<= 5mm	<= 4mm	<= 3mm	<= 2mm
Zoom Scan Volume	>= 30mm	>= 30mm	>= 28mm	>= 25mm	>= 22mm

Note:

When zoom scan is required and report SAR is ≤ 1.4 W/kg, the zoom scan resolution of Δx / Δy (2-3GHz: ≤ 8 mm, 3-4GHz: ≤ 7 mm, 4-6GHz: ≤ 5 mm) may be applied.

5.4.2. Volume Scan Procedure

The volume scan is used for assess overlapping SAR distributions for antennas transmitting in different frequency bands. It is equivalent to an oversized zoom scan used in standalone measurements. The measurement volume will be used to enclose all the simultaneous transmitting antennas. For antennas transmitting simultaneously in different frequency bands, the volume scan is measured separately in each frequency band. In order to sum correctly to compute the 1g aggregate SAR, the EUT remain in the same test position for all measurements and all volume scan use the same spatial resolution and grid spacing. When all volume scan were completed, the software, SEMCAD postprocessor can combine and subsequently superpose these measurement data to calculating the multiband SAR.

5.4.3. Power Drift Monitoring

All SAR testing is under the EUT install full charged battery and transmit maximum output power. In DASY measurement software, the power reference measurement and power drift measurement procedures are used for monitoring the power drift of EUT during SAR test. Both these procedures measure the field at a specified reference position before and after the SAR testing. The software will calculate the field difference in dB. If the power drift more than 5%, the SAR will be retested.

5.4.4. Spatial Peak SAR Evaluation

The procedure for spatial peak SAR evaluation has been implemented according to the test standard. It can be conducted for 1g and 10g, as well as for user-specific masses. The DASY software includes all numerical procedures necessary to evaluate the spatial peak SAR value.

The base for the evaluation is a "cube" measurement. The measured volume must include the 1g and 10g cubes with the highest averaged SAR values. For that purpose, the center of the measured volume is aligned to the interpolated peak SAR value of a previously performed area scan.

The entire evaluation of the spatial peak values is performed within the post-processing engine (SEMCAD). The system always gives the maximum values for the 1g and 10g cubes. The algorithm to find the cube with highest averaged SAR is divided into the following stages:

- (a) Extraction of the measured data (grid and values) from the Zoom Scan
- (b) Calculation of the SAR value at every measurement point based on all stored data (A/D values and measurement parameters)
- (c) Generation of a high-resolution mesh within the measured volume
- (d) Interpolation of all measured values form the measurement grid to the high-resolution grid
- (e) Extrapolation of the entire 3-D field distribution to the phantom surface over the distance from sensor to surface
- (f) Calculation of the averaged SAR within masses of 1g and 10g

5.4.5. SAR Averaged Methods

In DASY, the interpolation and extrapolation are both based on the modified Quadratic Shepard's method. The interpolation scheme combines a least-square fitted function method and a weighted average method which are the two basic types of computational interpolation and approximation.

Extrapolation routines are used to obtain SAR values between the lowest measurement points and the inner phantom surface. The extrapolation distance is determined by the surface detection distance and the probe sensor offset. The uncertainty increases with the extrapolation distance. To keep the uncertainty within 1% for the 1 g and 10 g cubes, the extrapolation distance should not be larger than 5 mm.

6. SAR MEASUREMENT EVALUATION

6.1. EUT Configuration and Setting

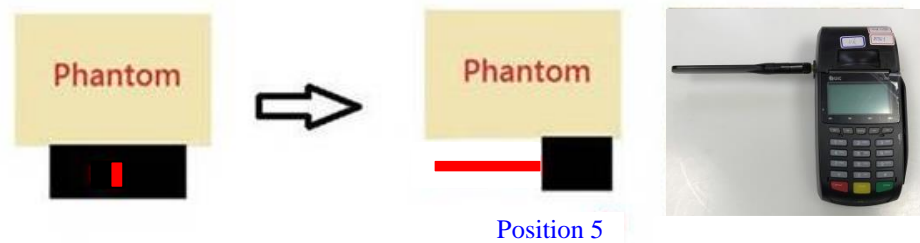
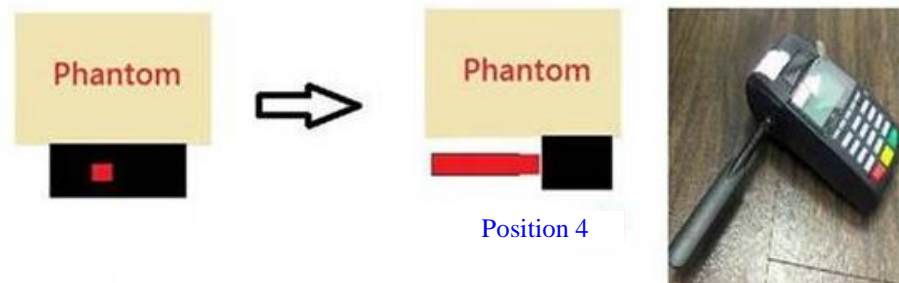
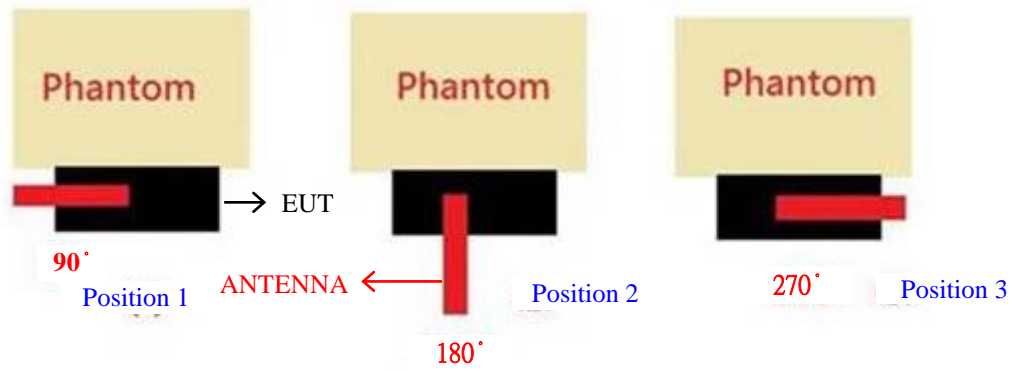
Body-worn accessory exposure is typically related to voice mode operations when handsets are carried in body-worn accessories. The body-worn accessory procedures in KDB 447498 D01 are used to test for body-worn accessory SAR compliance, without a headset connected to it. This enables the test results for such configuration to be compatible with that required for hotspot mode when the body-worn accessory test separation distance is greater than or equal to that required for hotspot mode. When the reported SAR for a body-worn accessory, measured without a headset connected to the handset, is $> 1.2 \text{ W/kg}$, the highest reported SAR configuration for that wireless mode and frequency band should be repeated for that body-worn accessory with a headset attached to the handset.

Body-worn accessories that do not contain metallic or conductive components may be tested according to worst-case exposure configurations, typically according to the smallest test separation distance required for the group of body-worn accessories with similar operating and exposure characteristics. All body-worn accessories containing metallic components are tested in conjunction with the host device.

Body-worn accessory SAR compliance is based on a single minimum test separation distance for all wireless and operating modes applicable to each body-worn accessory used by the host, and according to the relevant voice and/or data mode transmissions and operations. If a body-worn accessory supports voice only operations in its normal and expected use conditions, testing of data mode for body-worn compliance is not required.

A conservative minimum test separation distance for supporting off-the-shelf body-worn accessories that may be acquired by users of consumer handsets is used to test for body-worn accessory SAR compliance. This distance is determined by the handset manufacturer, according to the requirements of Supplement C 01-01. Devices that are designed to operate on the body of users using lanyards and straps, or without requiring additional body-worn accessories, will be tested using a conservative minimum test separation distance $\leq 5 \text{ mm}$ to support compliance.

6.2. EUT Testing Position



6.3. Tissue Calibration Result

The dielectric parameters of the liquids were verified prior to the SAR evaluation using Aligent Dielectric Probe Kit and Aligent E5071C Vector Network Analyzer.

Body Tissue Simulate Measurement							
Frequency [MHz]	Description	Dielectric Parameters					Tissue Temp. [°C]
		ϵ_r			σ [s/m]		
835MHz	Reference result ± 5% window	55.20			0.97		N/A
		52.440	to	57.960	0.922	to	
	2018. 10. 11	54.324			0.973		21.8

Body Tissue Simulate Measurement							
Frequency [MHz]	Description	Dielectric Parameters					Tissue Temp. [°C]
		ϵ_r			σ [s/m]		
1750MHz	Reference result ± 5% window	53.40			1.49		N/A
		50.730	to	56.070	1.416	to	
	2018. 10. 12	53.013			1.569		21.5

Body Tissue Simulate Measurement							
Frequency [MHz]	Description	Dielectric Parameters					Tissue Temp. [°C]
		ϵ_r			σ [s/m]		
1900MHz	Reference result ± 5% window	53.30		1.52			N/A
		50.635	to	55.965	1.444	to	
	2018. 10. 12	53.811		1.471			21.5

6.4. 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

6.5. Conducted Power Measurement

3G-WCDMA Mode	3GPP Subtest	Conducted Power (dBm)			MPR
		Band II Channel			
		CH 9262 (1852.4MHz)	CH 9400 (1880MHz)	CH 9538 (1907.6MHz)	
WCDMA R99	N/A	23.93	23.30	23.43	N/A
Rel5 HSDPA	1	22.90	23.27	23.41	0
	2	22.86	23.24	23.37	0
	3	23.69	23.14	23.12	0.5
	4	23.57	23.09	23.06	0.5
Rel6 HSUPA	1	23.88	23.24	23.38	0
	2	22.18	21.62	21.78	2
	3	22.92	22.47	22.63	1
	4	22.03	21.40	21.63	2
	5	23.77	23.19	23.25	0

3G-WCDMA Mode	3GPP Subtest	Conducted Power (dBm)			MPR
		Band 4 Channel			
		CH 1312 (1712.4MHz)	CH 1413 (1732.6MHz)	CH 1513 (1752.6MHz)	
WCDMA R99	N/A	23.80	23.50	23.56	N/A
Rel5 HSDPA	1	23.76	23.45	23.50	0
	2	23.71	23.40	23.47	0
	3	23.56	23.18	23.15	0.5
	4	23.49	23.13	23.09	0.5
Rel6 HSUPA	1	23.72	23.41	23.50	0
	2	21.85	21.66	21.78	2
	3	22.94	22.57	22.68	1
	4	21.80	21.61	21.67	2
	5	23.68	23.39	23.44	0

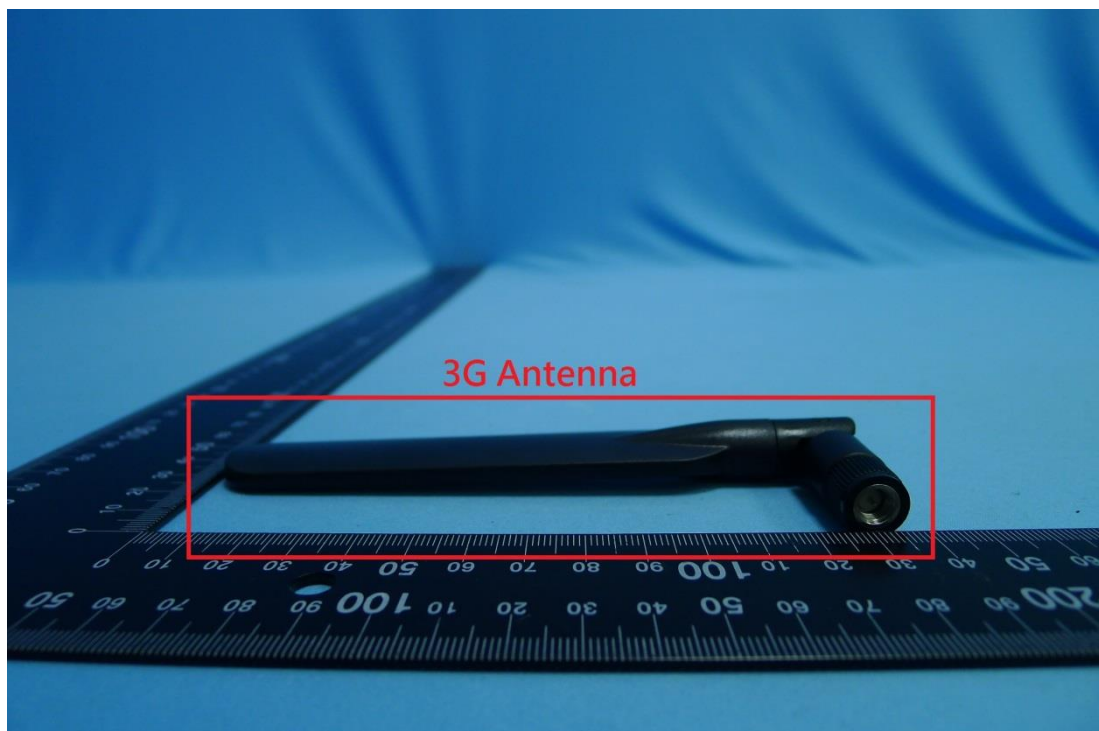
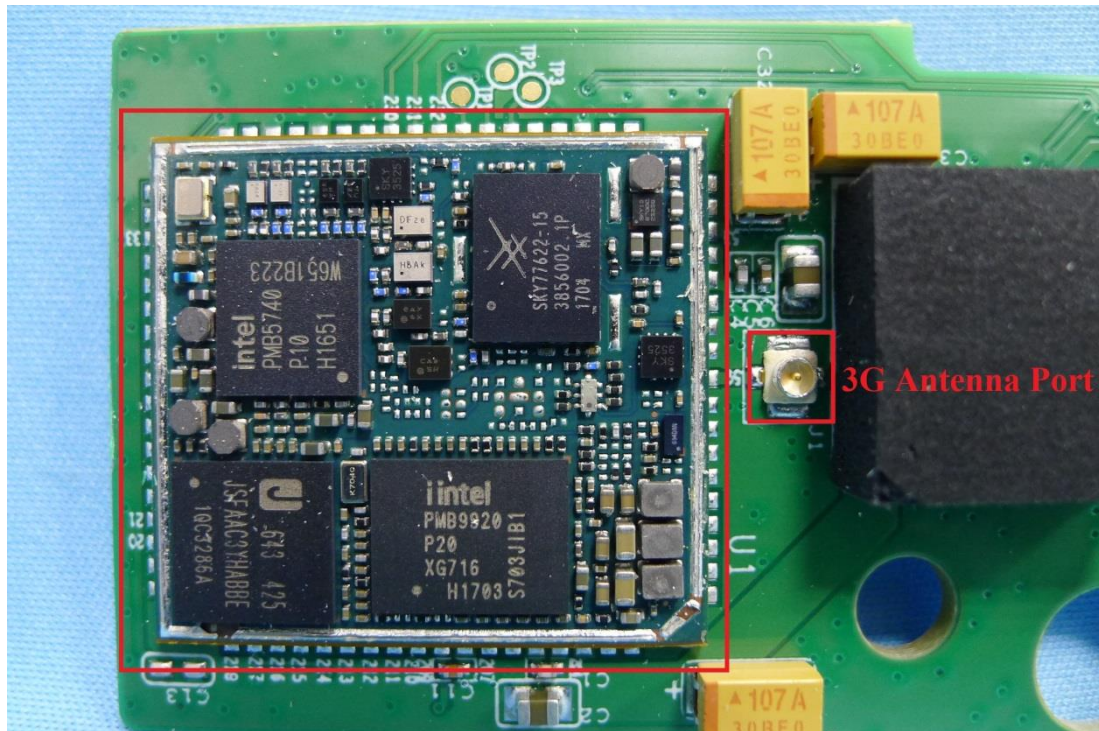
Note: 1. Scale factor is applied to calculated scale SAR presented in section 6.7.
 2. Scale factor not listed for channels are exempted from SAR testing.

3G-WCDMA Mode	3GPP Subtest	Conducted Power (dBm)			MPR
		Band 5 Channel			
		CH 4132 (826.4MHz)	CH 4183 (836.6MHz)	CH 4233 (846.6MHz)	
WCDMA R99	N/A	23.62	23.56	23.56	N/A
Rel5 HSDPA	1	23.58	23.51	23.50	0
	2	23.54	23.47	23.44	0
	3	23.27	23.18	23.09	0.5
	4	23.16	23.05	23.01	0.5
Rel6 HSUPA	1	23.54	23.48	23.46	0
	2	21.77	21.82	21.63	2
	3	22.72	22.82	22.86	1
	4	21.82	21.66	21.58	2
	5	23.51	23.44	23.41	0

Note: 1. Scale factor is applied to calculated scale SAR presented in section 6.7.

2. Scale factor not listed for channels are exempted from SAR testing.

6.7. Exposure Positions Consideration



6.8. SAR Test Result

Test Date	2018/10/11 ~ 12	Temp./Hum.	22°C/53%
Test Voltage	DC 7.4V (Via Battery)		

● Hand-held Mode

Liquid Temperature : 22.0°C					Depth of Liquid: > 15cm				
Test Position: Body	Antenna Position	Separation Distance (cm)	Frequency (MHz)	Conducted power (dBm)	Maximum Tune-up (dBm)	SAR 10g (W/kg)	Scale Factor	Scale SAR 10g (W/kg)	SAR 10g Limit (W/kg)
WCDMA R99 Band II									
Position 1	Fixed	0	1880	23.30	24.5	0.088	1.32	0.116	4.0
Position 2						0.044	1.32	0.058	
Position 3						0.062	1.32	0.082	
Position 4						0.058	1.32	0.076	
Position 5						0.072	1.32	0.095	
Position 1			1852.4	23.93		0.097	1.14	0.111	
Position 1			1907.6	23.43		0.103	1.28	0.132	
WCDMA R99 Band IV									
Position 1	Fixed	0	1732.6	23.50	24.5	0.065	1.26	0.082	4.0
Position 2						0.046	1.26	0.058	
Position 3						0.080	1.26	0.101	
Position 4						0.081	1.26	0.102	
Position 5						0.077	1.26	0.097	
Position 4			1712.4	23.80		0.071	1.17	0.083	
Position 4			1752.6	23.56		0.069	1.24	0.086	
WCDMA R99 Band V									
Position 1	Fixed	0	836.6	23.56	24.5	0.096	1.24	0.119	4.0
Position 2						0.038	1.24	0.047	
Position 3						0.081	1.24	0.101	
Position 4						0.065	1.24	0.081	
Position 5						0.076	1.24	0.094	
Position 1			826.4	23.62		0.077	1.22	0.094	
Position 1			846.6	23.56		0.075	1.24	0.093	

Note: Pursuant KDB941255 D01, none of secondary mode setting lend to conducted power exceeding the conducted power in primary mode by more than 0.25dB. Therefore no addition SAR measurement was performed.

● Body-won Mode

Liquid Temperature : 22.0°C					Depth of Liquid: > 15cm				
Test Position: Body	Antenna Position	Separation Distance (cm)	Frequency (MHz)	Conducted power (dBm)	Maximum Tune-up (dBm)	SAR 1g (W/kg)	Scale Factor	Scale SAR 1g (W/kg)	SAR 1g Limit (W/kg)
WCDMA R99 Band II									
Position 1	Fixed	0	1880	23.30	24.5	0.138	1.32	0.182	1.6
Position 2						0.073	1.32	0.096	
Position 3						0.099	1.32	0.131	
Position 4						0.095	1.32	0.125	
Position 5						0.116	1.32	0.153	
Position 1			0.154	1.14		0.176			
Position 1			1907.6	23.43		0.164	1.28	0.210	
WCDMA R99 Band IV									
Position 1	Fixed	0	1732.6	23.50	24.5	0.099	1.26	0.125	1.6
Position 2						0.074	1.26	0.093	
Position 3						0.123	1.26	0.155	
Position 4						0.117	1.26	0.147	
Position 5						0.119	1.26	0.150	
Position 4			0.108	1.17		0.127			
Position 4			1752.6	23.56		0.108	1.24	0.134	
WCDMA R99 Band V									
Position 1	Fixed	0	836.6	23.56	24.5	0.132	1.24	0.164	1.6
Position 2						0.050	1.24	0.062	
Position 3						0.112	1.24	0.139	
Position 4						0.090	1.24	0.112	
Position 5						0.107	1.24	0.133	
Position 1			0.106	1.22		0.130			
Position 1			846.6	23.56		0.104	1.24	0.129	

Note: Pursuant KDB941255 D01, none of secondary mode setting lend to conducted power exceeding the conducted power in primary mode by more than 0.25dB. Therefore no addition SAR measurement were performed



Audix Technology Corp.
No. 53-11, Dingfu, Linkou, Dist.,
New Taipei City 244, Taiwan

APPENDIX A

Tel: +886 2 26099301
Fax: +886 2 26099303

APPENDIX A

GRAPH RESULT

(Model: TS890G)

Audix Technology Corp.
No. 53-11, Dingfu, Linkou, Dist.,
New Taipei City 244, Taiwan

Tel: +886 2 26099301
Fax: +886 2 26099303

Test Mode: WCDMA Band II

Date: 10/12/2018

Test Laboratory: Audix_SAR Lab

P15 WCDMA CH9400 1880MHz Position 1**DUT: TS890G**

Communication System: UID 0, UMTS-FDD (WCDMA) (0); Frequency: 1880 MHz; Duty Cycle: 1:1

Medium parameters used: $f = 1880$ MHz; $\sigma = 1.543$ S/m; $\epsilon_r = 53.099$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

DASY Configuration:

- Probe: EX3DV4 - SN3855; ConvF(8.14, 8.14, 8.14); Calibrated: 9/27/2018;
- Sensor-Surface: 2mm (Mechanical Surface Detection), $z = 1.0, 31.0$
- Electronics: DAE4 Sn1337; Calibrated: 9/19/2018
- Phantom: ELI v5.0; Type: QDOVA002AA; Serial: TP:1170
- DASY52 52.10.0(1446); SEMCAD X 14.6.10(7373)

Area Scan (4x10x1): Measurement grid: $dx=20$ mm, $dy=20$ mm

Maximum value of SAR (measured) = 0.172 W/kg

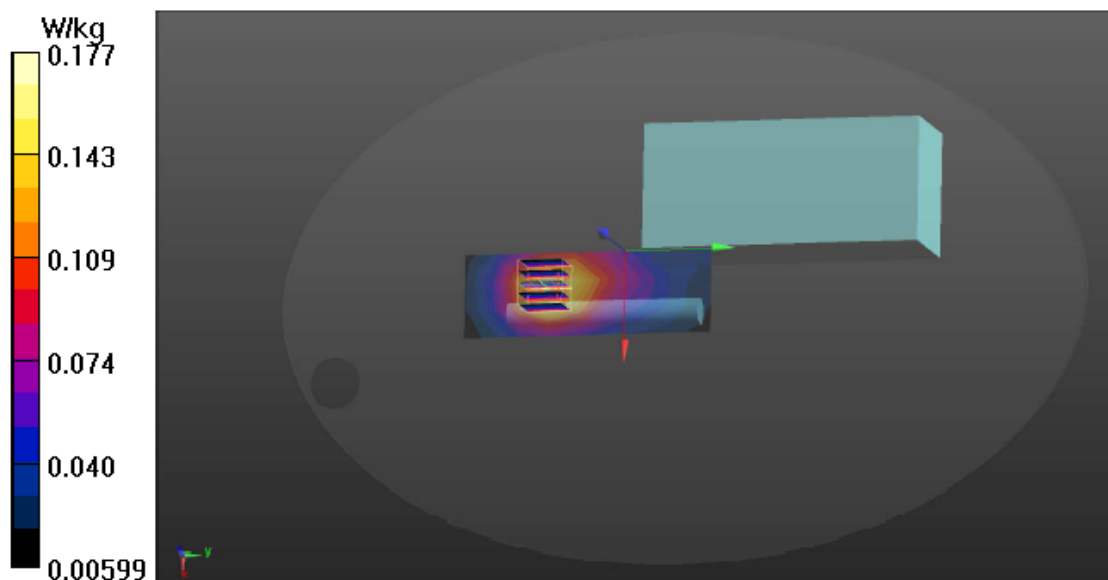
Zoom Scan (5x5x7)/Cube 0: Measurement grid: $dx=8$ mm, $dy=8$ mm, $dz=5$ mm

Reference Value = 4.371 V/m; Power Drift = -0.32 dB

Peak SAR (extrapolated) = 0.212 W/kg

SAR(1 g) = 0.138 W/kg; SAR(10 g) = 0.088 W/kg

Maximum value of SAR (measured) = 0.177 W/kg



Audix Technology Corp.
No. 53-11, Dingfu, Linkou, Dist.,
New Taipei City 244, Taiwan

Tel: +886 2 26099301
Fax: +886 2 26099303

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Test Laboratory: Audix_SAR Lab

P16 WCDMA CH9400 1880MHz Position 2

DUT: TS890G

Communication System: UID 0, UMTS-FDD (WCDMA) (0); Frequency: 1880 MHz; Duty Cycle: 1:1

Medium parameters used: $f = 1880$ MHz; $\sigma = 1.543$ S/m; $\epsilon_r = 53.099$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

DASY Configuration:

- Probe: EX3DV4 - SN3855; ConvF(8.14, 8.14, 8.14); Calibrated: 9/27/2018;
- Sensor-Surface: 2mm (Mechanical Surface Detection), $z = 1.0, 31.0$
- Electronics: DAE4 Sn1337; Calibrated: 9/19/2018
- Phantom: ELI v5.0; Type: QDOVA002AA; Serial: TP:1170
- DASY52 52.10.0(1446); SEMCAD X 14.6.10(7373)

Area Scan (6x5x1): Measurement grid: $dx=20$ mm, $dy=20$ mm

Maximum value of SAR (measured) = 0.0875 W/kg

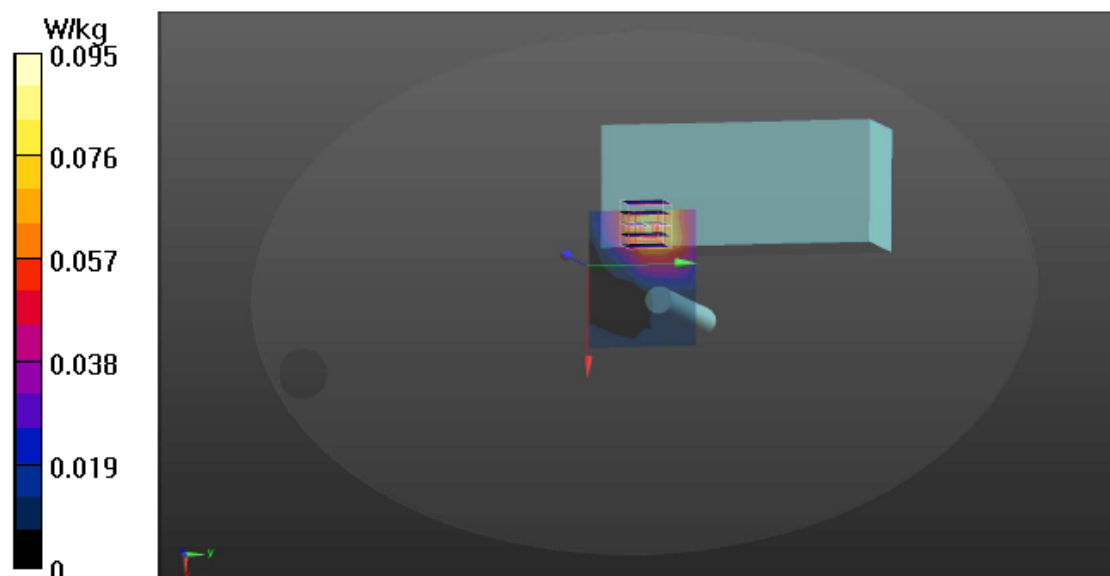
Zoom Scan (5x5x7)/Cube 0: Measurement grid: $dx=8$ mm, $dy=8$ mm, $dz=5$ mm

Reference Value = 2.110 V/m; Power Drift = -1.73 dB

Peak SAR (extrapolated) = 0.120 W/kg

SAR(1 g) = 0.073 W/kg; SAR(10 g) = 0.044 W/kg

Maximum value of SAR (measured) = 0.0954 W/kg



Audix Technology Corp.
No. 53-11, Dingfu, Linkou, Dist.,
New Taipei City 244, Taiwan

Tel: +886 2 26099301
Fax: +886 2 26099303

Date: 10/12/2018

Test Laboratory: Audix_SAR Lab

P17 WCDMA CH9400 1880MHz Position 3

DUT: TS890G

Communication System: UID 0, UMTS-FDD (WCDMA) (0); Frequency: 1880 MHz; Duty Cycle: 1:1

Medium parameters used: $f = 1880$ MHz; $\sigma = 1.543$ S/m; $\epsilon_r = 53.099$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

DASY Configuration:

- Probe: EX3DV4 - SN3855; ConvF(8.14, 8.14, 8.14); Calibrated: 9/27/2018;
- Sensor-Surface: 2mm (Mechanical Surface Detection), $z = 1.0, 31.0$
- Electronics: DAE4 Sn1337; Calibrated: 9/19/2018
- Phantom: ELI v5.0; Type: QDOVA002AA; Serial: TP:1170
- DASY52 52.10.0(1446); SEMCAD X 14.6.10(7373)

Area Scan (4x10x1): Measurement grid: $dx=20$ mm, $dy=20$ mm

Maximum value of SAR (measured) = 0.116 W/kg

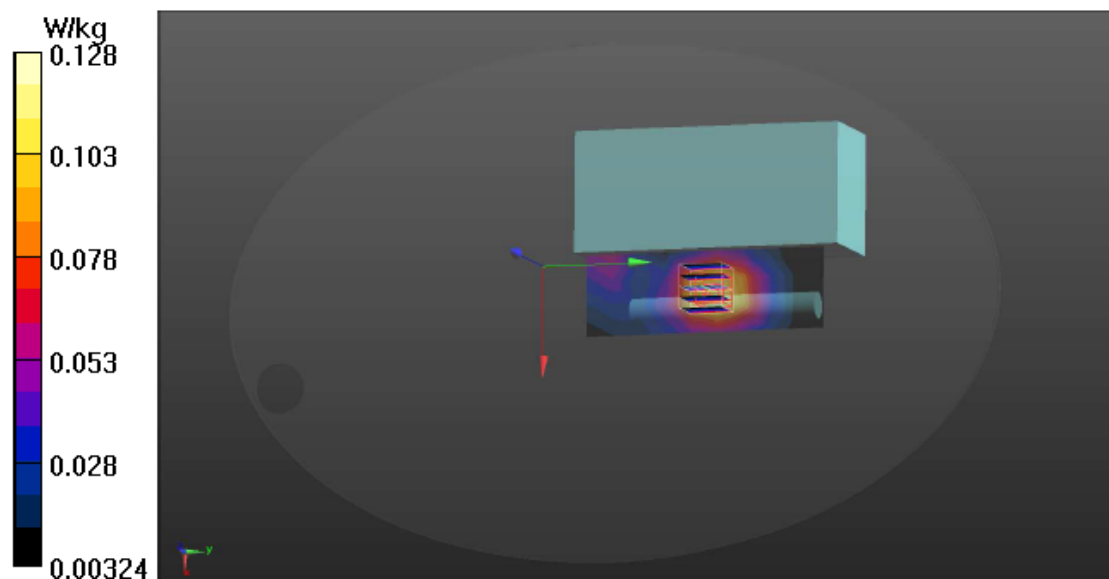
Zoom Scan (5x5x7)/Cube 0: Measurement grid: $dx=8$ mm, $dy=8$ mm, $dz=5$ mm

Reference Value = 4.369 V/m; Power Drift = 0.63 dB

Peak SAR (extrapolated) = 0.155 W/kg

SAR(1 g) = 0.099 W/kg; SAR(10 g) = 0.062 W/kg

Maximum value of SAR (measured) = 0.128 W/kg



Audix Technology Corp.
No. 53-11, Dingfu, Linkou, Dist.,
New Taipei City 244, Taiwan

Tel: +886 2 26099301
Fax: +886 2 26099303

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Test Laboratory: Audix_SAR Lab

P18 WCDMA CH9400 1880MHz Position 4

DUT: TS890G

Communication System: UID 0, UMTS-FDD (WCDMA) (0); Frequency: 1880 MHz; Duty Cycle: 1:1

Medium parameters used: $f = 1880$ MHz; $\sigma = 1.543$ S/m; $\epsilon_r = 53.099$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

DASY Configuration:

- Probe: EX3DV4 - SN3855; ConvF(8.14, 8.14, 8.14); Calibrated: 9/27/2018;
- Sensor-Surface: 2mm (Mechanical Surface Detection), $z = 1.0, 31.0$
- Electronics: DAE4 Sn1337; Calibrated: 9/19/2018
- Phantom: ELI v5.0; Type: QDOVA002AA; Serial: TP:1170
- DASY52 52.10.0(1446); SEMCAD X 14.6.10(7373)

Area Scan (10x4x1): Measurement grid: $dx=20$ mm, $dy=20$ mm

Maximum value of SAR (measured) = 0.118 W/kg

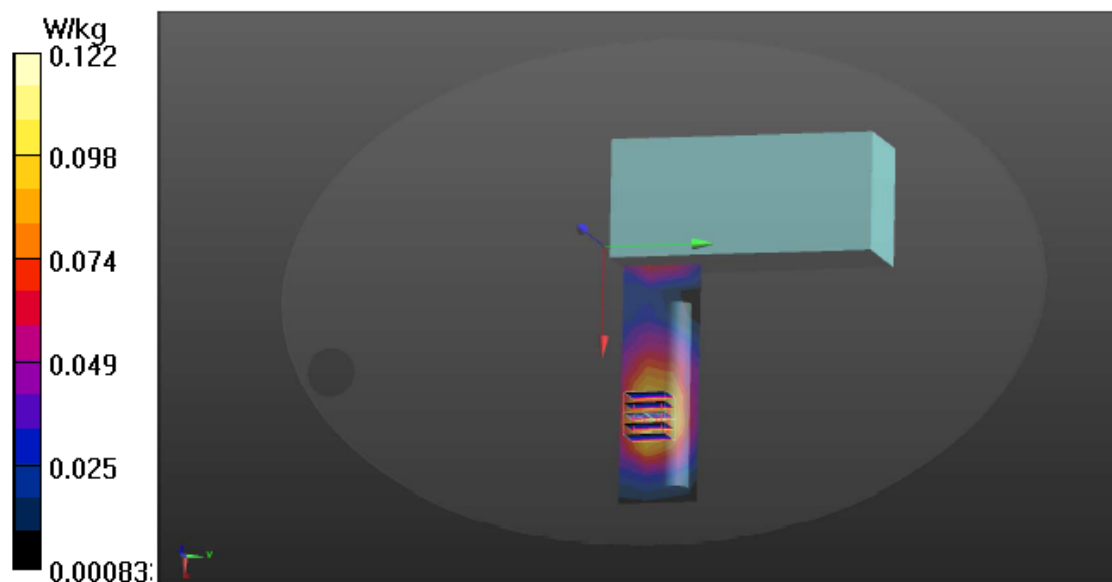
Zoom Scan (5x5x7)/Cube 0: Measurement grid: $dx=8$ mm, $dy=8$ mm, $dz=5$ mm

Reference Value = 3.351 V/m; Power Drift = -0.05 dB

Peak SAR (extrapolated) = 0.147 W/kg

SAR(1 g) = 0.095 W/kg; SAR(10 g) = 0.058 W/kg

Maximum value of SAR (measured) = 0.122 W/kg



Audix Technology Corp.
No. 53-11, Dingfu, Linkou, Dist.,
New Taipei City 244, Taiwan

Tel: +886 2 26099301
Fax: +886 2 26099303

Date: 10/12/2018

Test Laboratory: Audix_SAR Lab

P19 WCDMA CH9400 1880MHz Position 5

DUT: TS890G

Communication System: UID 0, UMTS-FDD (WCDMA) (0); Frequency: 1880 MHz; Duty Cycle: 1:1

Medium parameters used: $f = 1880$ MHz; $\sigma = 1.543$ S/m; $\epsilon_r = 53.099$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

DASY Configuration:

- Probe: EX3DV4 - SN3855; ConvF(8.14, 8.14, 8.14); Calibrated: 9/27/2018;
- Sensor-Surface: 2mm (Mechanical Surface Detection), $z = 1.0, 31.0$
- Electronics: DAE4 Sn1337; Calibrated: 9/19/2018
- Phantom: ELI v5.0; Type: QDOVA002AA; Serial: TP:1170
- DASY52 52.10.0(1446); SEMCAD X 14.6.10(7373)

Area Scan (10x4x1): Measurement grid: $dx=20$ mm, $dy=20$ mm

Maximum value of SAR (measured) = 0.143 W/kg

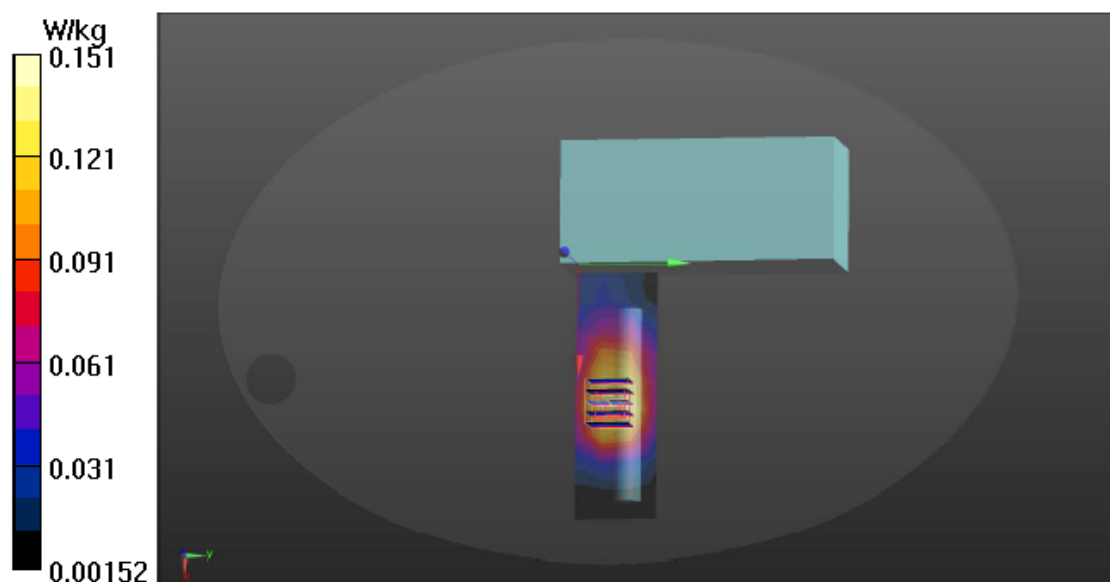
Zoom Scan (5x5x7)/Cube 0: Measurement grid: $dx=8$ mm, $dy=8$ mm, $dz=5$ mm

Reference Value = 4.950 V/m; Power Drift = -0.94 dB

Peak SAR (extrapolated) = 0.182 W/kg

SAR(1 g) = 0.116 W/kg; SAR(10 g) = 0.072 W/kg

Maximum value of SAR (measured) = 0.151 W/kg



Audix Technology Corp.
No. 53-11, Dingfu, Linkou, Dist.,
New Taipei City 244, Taiwan

Tel: +886 2 26099301
Fax: +886 2 26099303

Date: 10/12/2018

Test Laboratory: Audix_SAR Lab

P20 WCDMA CH9262 1852.4MHz Position 1

DUT: TS890G

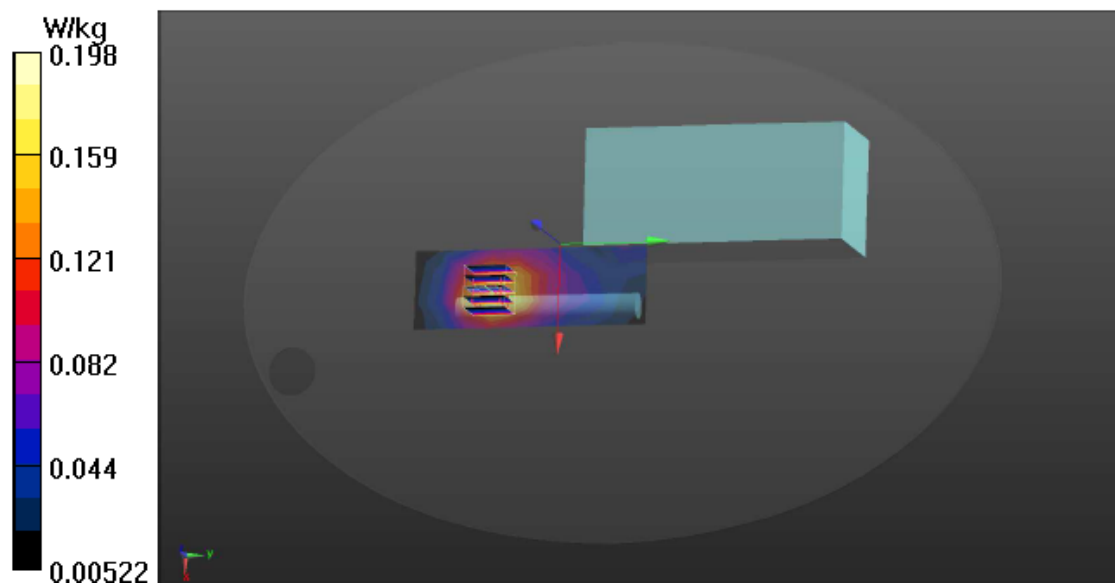
Communication System: UID 0, UMTS-FDD (WCDMA) (0); Frequency: 1852.4 MHz; Duty Cycle: 1:1
Medium parameters used (interpolated): $f = 1852.4$ MHz; $\sigma = 1.51$ S/m; $\epsilon_r = 53.226$; $\rho = 1000$ kg/m³
Phantom section: Flat Section

DASY Configuration:

- Probe: EX3DV4 - SN3855; ConvF(8.14, 8.14, 8.14); Calibrated: 9/27/2018;
- Sensor-Surface: 2mm (Mechanical Surface Detection), $z = 1.0, 31.0$
- Electronics: DAE4 Sn1337; Calibrated: 9/19/2018
- Phantom: ELI v5.0; Type: QDOVA002AA; Serial: TP:1170
- DASY52 52.10.0(1446); SEMCAD X 14.6.10(7373)

Area Scan (4x10x1): Measurement grid: $dx=20$ mm, $dy=20$ mm
Maximum value of SAR (measured) = 0.192 W/kg

Zoom Scan (5x5x7)/Cube 0: Measurement grid: $dx=8$ mm, $dy=8$ mm, $dz=5$ mm
Reference Value = 4.833 V/m; Power Drift = -0.26 dB
Peak SAR (extrapolated) = 0.238 W/kg
SAR(1 g) = 0.154 W/kg; SAR(10 g) = 0.097 W/kg
Maximum value of SAR (measured) = 0.198 W/kg



Audix Technology Corp.
No. 53-11, Dingfu, Linkou, Dist.,
New Taipei City 244, Taiwan

Tel: +886 2 26099301
Fax: +886 2 26099303

Date: 10/12/2018

Test Laboratory: Audix_SAR Lab

P21 WCDMA CH9538 1907.6MHz Position 1

DUT: TS890G

Communication System: UID 0, UMTS-FDD (WCDMA) (0); Frequency: 1907.6 MHz; Duty Cycle: 1:1

Medium parameters used: $f = 1908$ MHz; $\sigma = 1.579$ S/m; $\epsilon_r = 52.987$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

DASY Configuration:

- Probe: EX3DV4 - SN3855; ConvF(8.14, 8.14, 8.14); Calibrated: 9/27/2018;
- Sensor-Surface: 2mm (Mechanical Surface Detection), $z = 1.0, 31.0$
- Electronics: DAE4 Sn1337; Calibrated: 9/19/2018
- Phantom: ELI v5.0; Type: QDOVA002AA; Serial: TP:1170
- DASY52 52.8.8(1258); SEMCAD X 14.6.10(7373)

Area Scan (4x10x1): Measurement grid: $dx=20$ mm, $dy=20$ mm

Maximum value of SAR (measured) = 0.225 W/kg

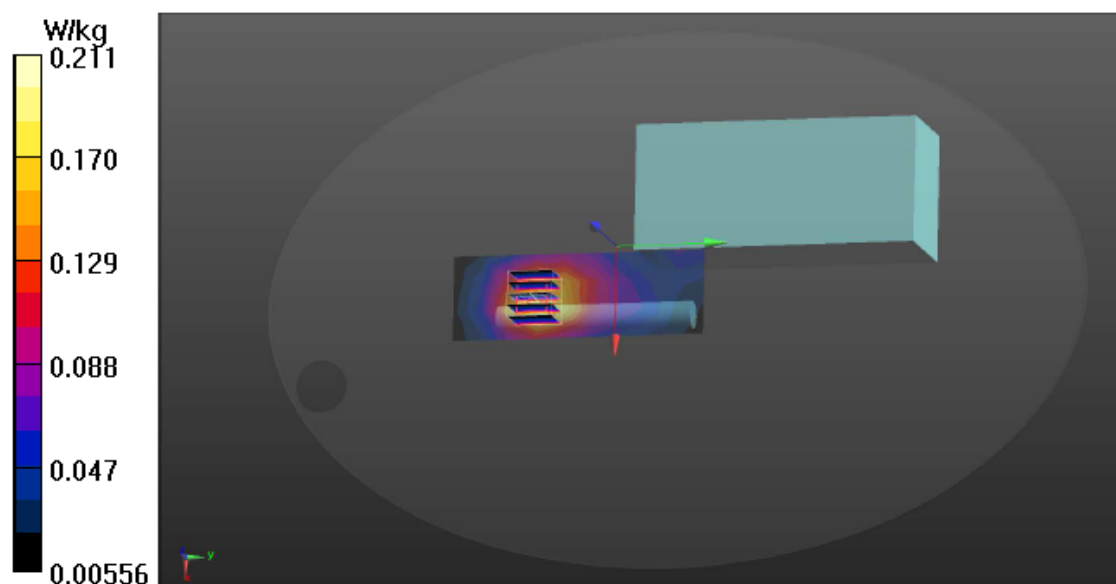
Zoom Scan (5x5x7)/Cube 0: Measurement grid: $dx=8$ mm, $dy=8$ mm, $dz=5$ mm

Reference Value = 4.326 V/m; Power Drift = 0.20 dB

Peak SAR (extrapolated) = 0.244 W/kg

SAR(1 g) = 0.164 W/kg; SAR(10 g) = 0.103 W/kg

Maximum value of SAR (measured) = 0.211 W/kg



Audix Technology Corp.
No. 53-11, Dingfu, Linkou, Dist.,
New Taipei City 244, Taiwan

Tel: +886 2 26099301
Fax: +886 2 26099303

Test Mode: WCDMA Band IV

Date: 10/12/2018

Test Laboratory: Audix_SAR Lab

P8 WCDMA CH1413 1732.6MHz Position 1**DUT: TS890G**

Communication System: UID 0, UMTS-FDD (WCDMA) (0); Frequency: 1732.6 MHz; Duty Cycle: 1:1

Medium parameters used: $f = 1733$ MHz; $\sigma = 1.454$ S/m; $\epsilon_r = 53.851$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

DASY Configuration:

- Probe: EX3DV4 - SN3855; ConvF(8.48, 8.48, 8.48); Calibrated: 9/27/2018;
- Sensor-Surface: 2mm (Mechanical Surface Detection), $z = 1.0, 31.0$
- Electronics: DAE4 Sn1337; Calibrated: 9/19/2018
- Phantom: ELI v5.0; Type: QDOVA002AA; Serial: TP:1170
- DASY52 52.8.8(1258); SEMCAD X 14.6.10(7373)

Area Scan (4x10x1): Measurement grid: $dx=20$ mm, $dy=20$ mm

Maximum value of SAR (measured) = 0.117 W/kg

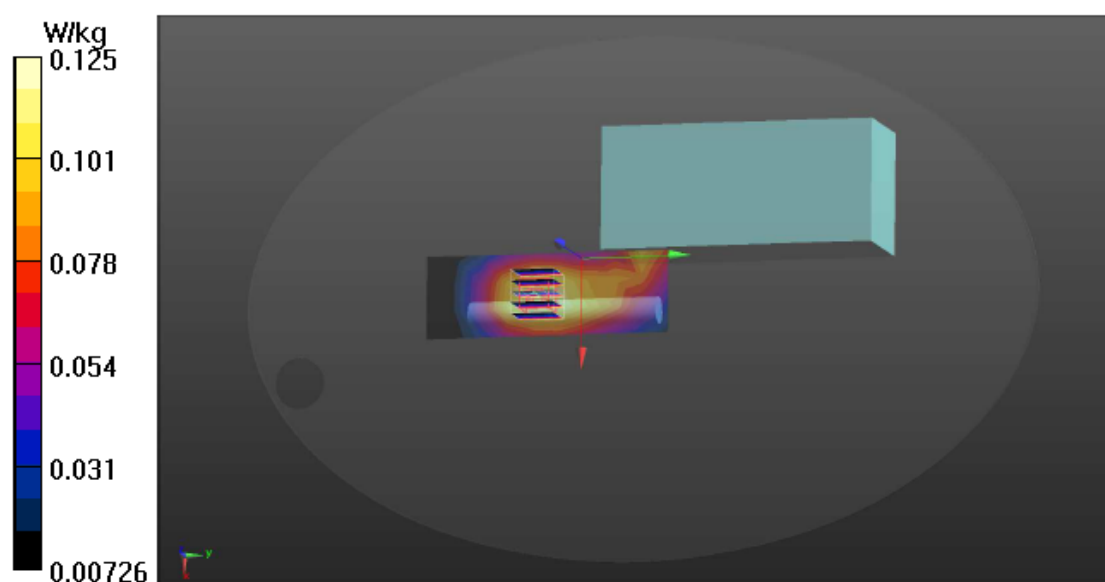
Zoom Scan (5x5x7)/Cube 0: Measurement grid: $dx=8$ mm, $dy=8$ mm, $dz=5$ mm

Reference Value = 6.954 V/m; Power Drift = -0.46 dB

Peak SAR (extrapolated) = 0.148 W/kg

SAR(1 g) = 0.099 W/kg; SAR(10 g) = 0.065 W/kg

Maximum value of SAR (measured) = 0.125 W/kg



Audix Technology Corp.
No. 53-11, Dingfu, Linkou, Dist.,
New Taipei City 244, Taiwan

Tel: +886 2 26099301
Fax: +886 2 26099303

Date: 10/12/2018

Test Laboratory: Audix_SAR Lab

P9 WCDMA CH1413 1732.6MHz Position 2

DUT: TS890G

Communication System: UID 0, UMTS-FDD (WCDMA) (0); Frequency: 1732.6 MHz; Duty Cycle: 1:1

Medium parameters used: $f = 1733$ MHz; $\sigma = 1.454$ S/m; $\epsilon_r = 53.851$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

DASY Configuration:

- Probe: EX3DV4 - SN3855; ConvF(8.48, 8.48, 8.48); Calibrated: 9/27/2018;
- Sensor-Surface: 2mm (Mechanical Surface Detection), $z = 1.0, 31.0$
- Electronics: DAE4 Sn1337; Calibrated: 9/19/2018
- Phantom: ELI v5.0; Type: QDOVA002AA; Serial: TP:1170
- DASY52 52.8.8(1258); SEMCAD X 14.6.10(7373)

Area Scan (6x5x1): Measurement grid: $dx=20$ mm, $dy=20$ mm

Maximum value of SAR (measured) = 0.0916 W/kg

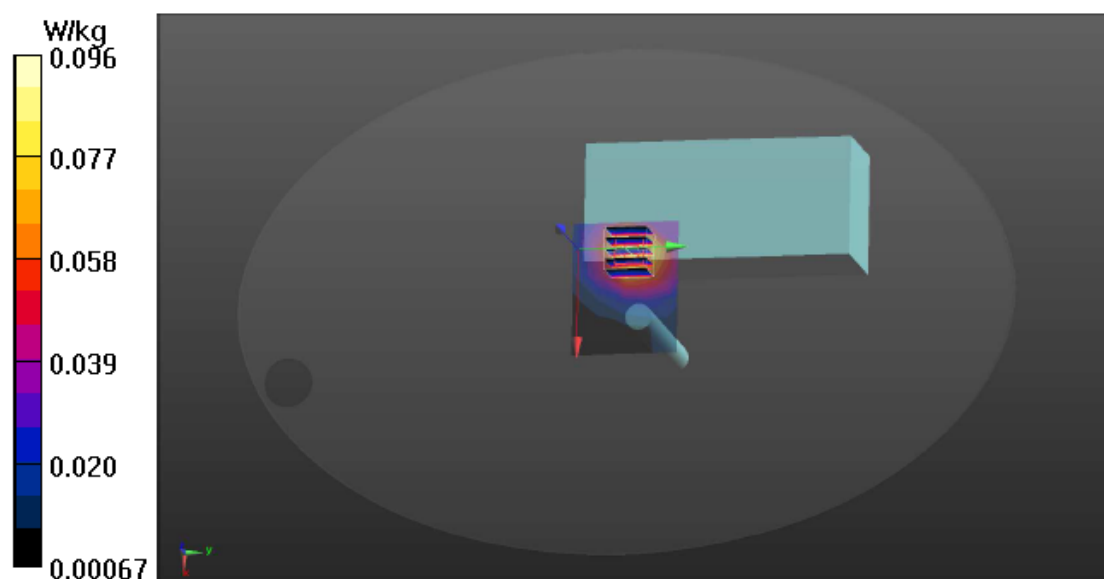
Zoom Scan (5x5x7)/Cube 0: Measurement grid: $dx=8$ mm, $dy=8$ mm, $dz=5$ mm

Reference Value = 4.206 V/m; Power Drift = 0.14 dB

Peak SAR (extrapolated) = 0.118 W/kg

SAR(1 g) = 0.074 W/kg; SAR(10 g) = 0.046 W/kg

Maximum value of SAR (measured) = 0.0964 W/kg



Audix Technology Corp.
No. 53-11, Dingfu, Linkou, Dist.,
New Taipei City 244, Taiwan

Tel: +886 2 26099301
Fax: +886 2 26099303

Date: 10/12/2018

Test Laboratory: Audix_SAR Lab

P10 WCDMA CH1413 1732.6MHz Position 3

DUT: TS890G

Communication System: UID 0, UMTS-FDD (WCDMA) (0); Frequency: 1732.6 MHz; Duty Cycle: 1:1

Medium parameters used: $f = 1733$ MHz; $\sigma = 1.454$ S/m; $\epsilon_r = 53.851$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

DASY Configuration:

- Probe: EX3DV4 - SN3855; ConvF(8.48, 8.48, 8.48); Calibrated: 9/27/2018;
- Sensor-Surface: 2mm (Mechanical Surface Detection), $z = 1.0, 31.0$
- Electronics: DAE4 Sn1337; Calibrated: 9/19/2018
- Phantom: ELI v5.0; Type: QDOVA002AA; Serial: TP:1170
- DASY52 52.8.8(1258); SEMCAD X 14.6.10(7373)

Area Scan (4x10x1): Measurement grid: $dx=20$ mm, $dy=20$ mm

Maximum value of SAR (measured) = 0.144 W/kg

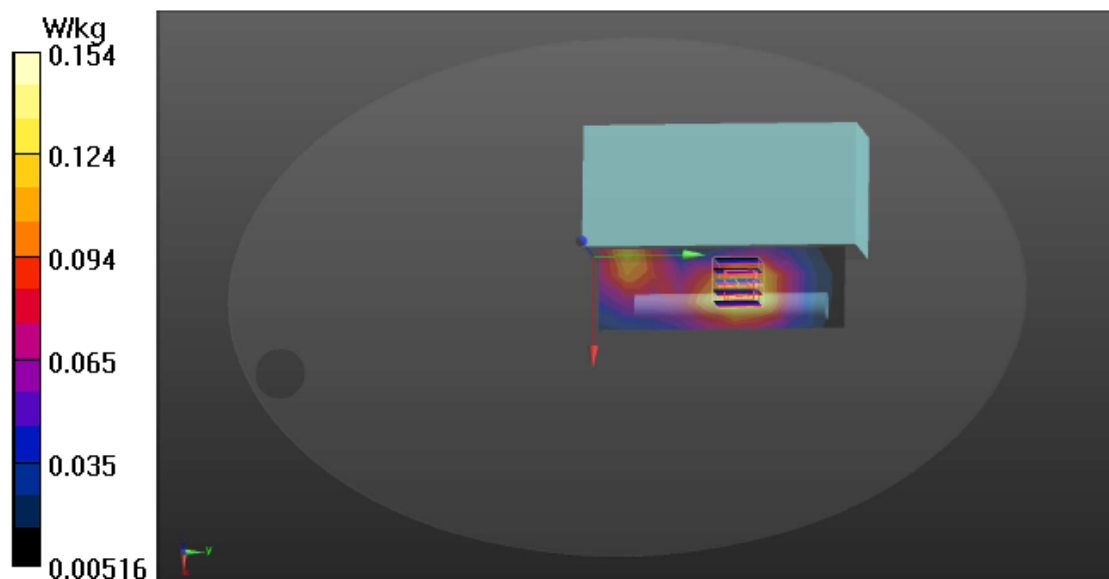
Zoom Scan (5x5x7)/Cube 0: Measurement grid: $dx=8$ mm, $dy=8$ mm, $dz=5$ mm

Reference Value = 7.226 V/m; Power Drift = -0.07 dB

Peak SAR (extrapolated) = 0.184 W/kg

SAR(1 g) = 0.123 W/kg; SAR(10 g) = 0.080 W/kg

Maximum value of SAR (measured) = 0.154 W/kg



Audix Technology Corp.
No. 53-11, Dingfu, Linkou, Dist.,
New Taipei City 244, Taiwan

Tel: +886 2 26099301
Fax: +886 2 26099303

Date: 10/12/2018

Test Laboratory: Audix_SAR Lab

P11 WCDMA CH1413 1732.6MHz Position 4

DUT: TS890G

Communication System: UID 0, UMTS-FDD (WCDMA) (0); Frequency: 1732.6 MHz; Duty Cycle: 1:1

Medium parameters used: $f = 1733$ MHz; $\sigma = 1.454$ S/m; $\epsilon_r = 53.851$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

DASY Configuration:

- Probe: EX3DV4 - SN3855; ConvF(8.48, 8.48, 8.48); Calibrated: 9/27/2018;
- Sensor-Surface: 2mm (Mechanical Surface Detection), $z = 1.0, 31.0$
- Electronics: DAE4 Sn1337; Calibrated: 9/19/2018
- Phantom: ELI v5.0; Type: QDOVA002AA; Serial: TP:1170
- DASY52 52.8.8(1258); SEMCAD X 14.6.10(7373)

Area Scan (10x4x1): Measurement grid: $dx=20$ mm, $dy=20$ mm

Maximum value of SAR (measured) = 0.133 W/kg

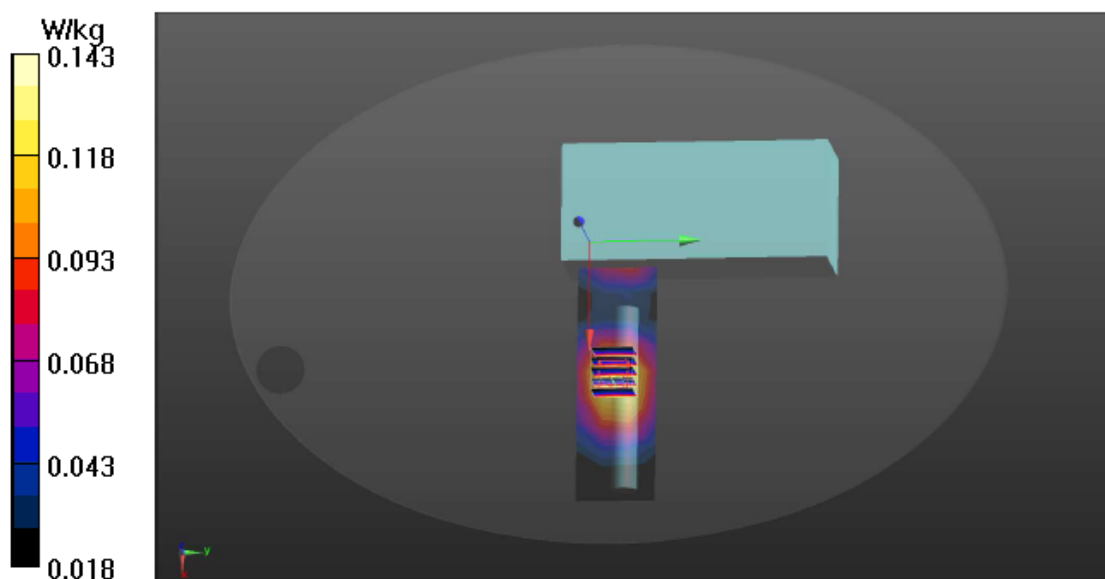
Zoom Scan (5x5x7)/Cube 0: Measurement grid: $dx=8$ mm, $dy=8$ mm, $dz=5$ mm

Reference Value = 5.067 V/m; Power Drift = 0.37 dB

Peak SAR (extrapolated) = 0.169 W/kg

SAR(1 g) = 0.117 W/kg; SAR(10 g) = 0.081 W/kg

Maximum value of SAR (measured) = 0.143 W/kg



Audix Technology Corp.
No. 53-11, Dingfu, Linkou, Dist.,
New Taipei City 244, Taiwan

Tel: +886 2 26099301
Fax: +886 2 26099303

Date: 10/12/2018

Test Laboratory: Audix_SAR Lab

P12 WCDMA CH1413 1732.6MHz Position 5

DUT: TS890G

Communication System: UID 0, UMTS-FDD (WCDMA) (0); Frequency: 1732.6 MHz; Duty Cycle: 1:1

Medium parameters used: $f = 1733$ MHz; $\sigma = 1.454$ S/m; $\epsilon_r = 53.851$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

DASY Configuration:

- Probe: EX3DV4 - SN3855; ConvF(8.48, 8.48, 8.48); Calibrated: 9/27/2018;
- Sensor-Surface: 2mm (Mechanical Surface Detection), $z = 1.0, 31.0$
- Electronics: DAE4 Sn1337; Calibrated: 9/19/2018
- Phantom: ELI v5.0; Type: QDOVA002AA; Serial: TP:1170
- DASY52 52.10.0(1446); SEMCAD X 14.6.10(7373)

Area Scan (10x4x1): Measurement grid: $dx=20$ mm, $dy=20$ mm

Maximum value of SAR (measured) = 0.142 W/kg

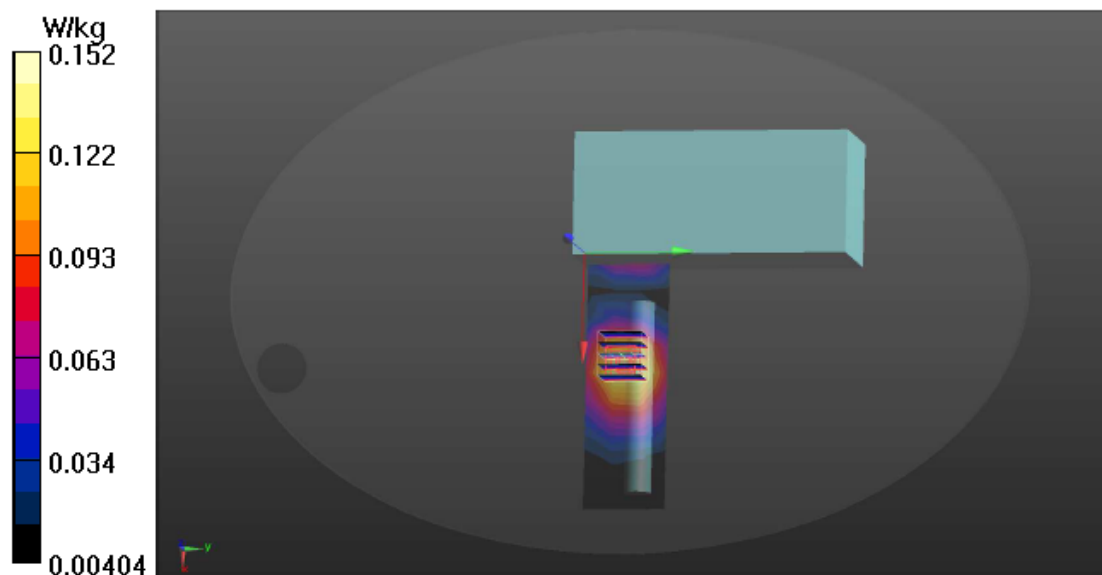
Zoom Scan (5x5x7)/Cube 0: Measurement grid: $dx=8$ mm, $dy=8$ mm, $dz=5$ mm

Reference Value = 3.176 V/m; Power Drift = -0.53 dB

Peak SAR (extrapolated) = 0.182 W/kg

SAR(1 g) = 0.119 W/kg; SAR(10 g) = 0.077 W/kg

Maximum value of SAR (measured) = 0.152 W/kg



Audix Technology Corp.
No. 53-11, Dingfu, Linkou, Dist.,
New Taipei City 244, Taiwan

Tel: +886 2 26099301
Fax: +886 2 26099303

Date: 10/12/2018

Test Laboratory: Audix_SAR Lab

P13 WCDMA CH1312 1712.4MHz Position 4

DUT: TS890G

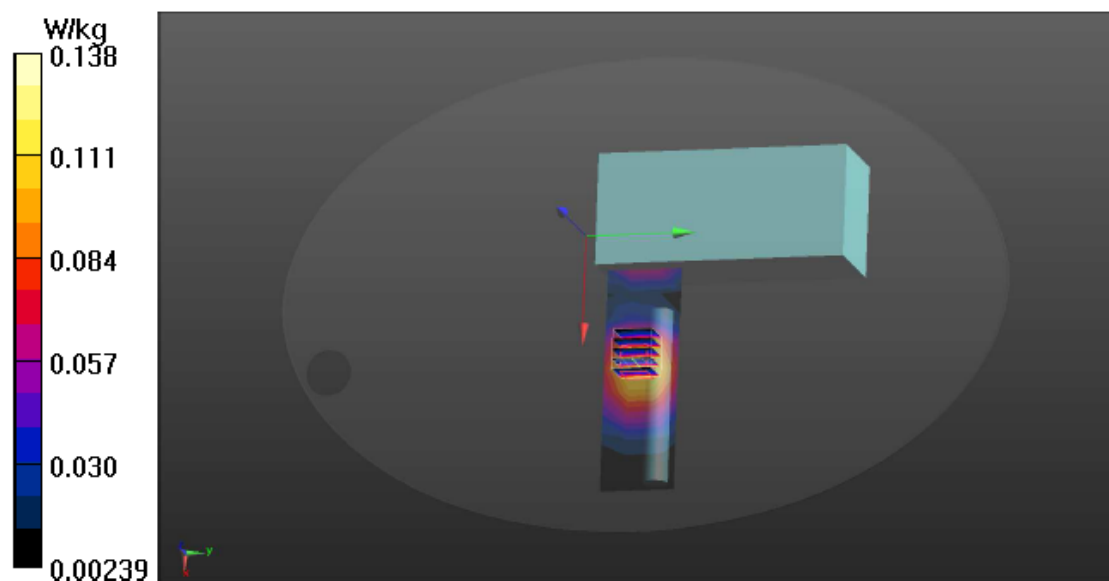
Communication System: UID 0, UMTS-FDD (WCDMA) (0); Frequency: 1712.4 MHz; Duty Cycle: 1:1
Medium parameters used (interpolated): $f = 1712.4$ MHz; $\sigma = 1.431$ S/m; $\epsilon_r = 53.902$; $\rho = 1000$ kg/m³
Phantom section: Flat Section

DASY Configuration:

- Probe: EX3DV4 - SN3855; ConvF(8.48, 8.48, 8.48); Calibrated: 9/27/2018;
- Sensor-Surface: 2mm (Mechanical Surface Detection), $z = 1.0, 31.0$
- Electronics: DAE4 Sn1337; Calibrated: 9/19/2018
- Phantom: ELI v5.0; Type: QDOVA002AA; Serial: TP:1170
- DASY52 52.10.0(1446); SEMCAD X 14.6.10(7373)

Area Scan (10x4x1): Measurement grid: $dx=20$ mm, $dy=20$ mm
Maximum value of SAR (measured) = 0.125 W/kg

Zoom Scan (5x5x7)/Cube 0: Measurement grid: $dx=8$ mm, $dy=8$ mm, $dz=5$ mm
Reference Value = 2.969 V/m; Power Drift = 0.12 dB
Peak SAR (extrapolated) = 0.164 W/kg
SAR(1 g) = 0.108 W/kg; SAR(10 g) = 0.071 W/kg
Maximum value of SAR (measured) = 0.138 W/kg



Audix Technology Corp.
No. 53-11, Dingfu, Linkou, Dist.,
New Taipei City 244, Taiwan

Tel: +886 2 26099301
Fax: +886 2 26099303

Date: 10/12/2018

Test Laboratory: Audix_SAR Lab

P14 WCDMA CH1513 1752.6MHz Position 4

DUT: TS890G

Communication System: UID 0, UMTS-FDD (WCDMA) (0); Frequency: 1752.6 MHz; Duty Cycle: 1:1

Medium parameters used: $f = 1753$ MHz; $\sigma = 1.474$ S/m; $\epsilon_r = 53.803$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

DASY Configuration:

- Probe: EX3DV4 - SN3855; ConvF(8.48, 8.48, 8.48); Calibrated: 9/27/2018;
- Sensor-Surface: 2mm (Mechanical Surface Detection), $z = 1.0, 31.0$
- Electronics: DAE4 Sn1337; Calibrated: 9/19/2018
- Phantom: ELI v5.0; Type: QDOVA002AA; Serial: TP:1170
- DASY52 52.10.0(1446); SEMCAD X 14.6.10(7373)

Area Scan (10x4x1): Measurement grid: $dx=20$ mm, $dy=20$ mm

Maximum value of SAR (measured) = 0.139 W/kg

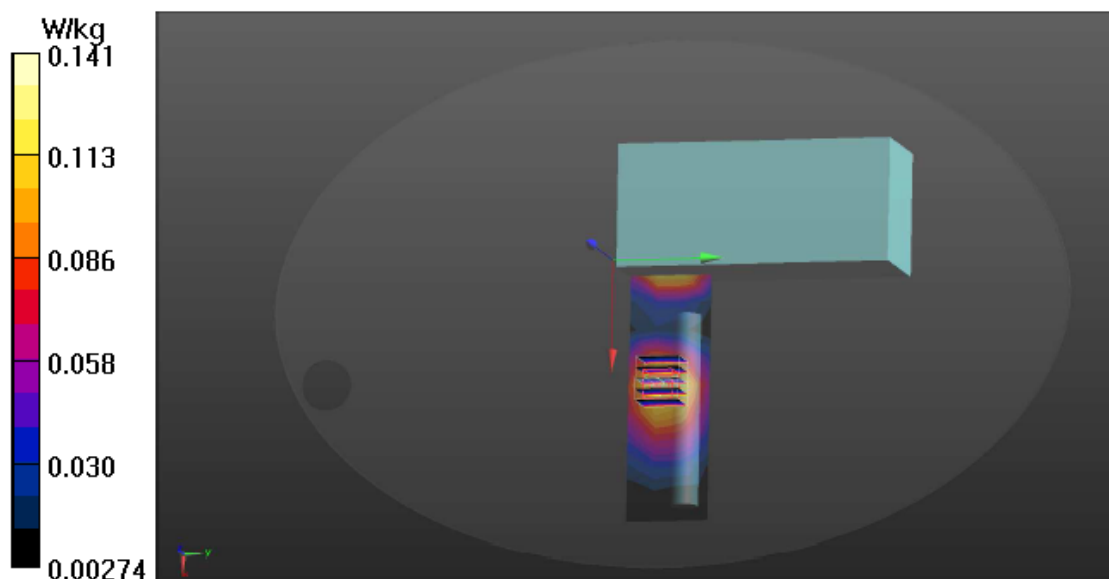
Zoom Scan (5x5x7)/Cube 0: Measurement grid: $dx=8$ mm, $dy=8$ mm, $dz=5$ mm

Reference Value = 5.483 V/m; Power Drift = 0.55 dB

Peak SAR (extrapolated) = 0.170 W/kg

SAR(1 g) = 0.108 W/kg; SAR(10 g) = 0.069 W/kg

Maximum value of SAR (measured) = 0.141 W/kg



Audix Technology Corp.
No. 53-11, Dingfu, Linkou, Dist.,
New Taipei City 244, Taiwan

Tel: +886 2 26099301
Fax: +886 2 26099303

Test Mode: WCDMA Band V

Date: 10/11/2018

Test Laboratory: Audix_SAR Lab

P1 WCDMA CH4183 836.6MHz Position 1**DUT: TS890G**

Communication System: UID 0, UMTS-FDD (WCDMA) (0); Frequency: 836.6 MHz; Duty Cycle: 1:1

Medium parameters used: $f = 837$ MHz; $\sigma = 0.976$ S/m; $\epsilon_r = 54.307$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

DASY Configuration:

- Probe: EX3DV4 - SN3855; ConvF(9.76, 9.76, 9.76); Calibrated: 9/27/2018;
- Sensor-Surface: 2mm (Mechanical Surface Detection), $z = 1.0, 31.0$
- Electronics: DAE4 Sn1337; Calibrated: 9/19/2018
- Phantom: ELI v5.0; Type: QDOVA002AA; Serial: TP:1170
- DASY52 52.10.0(1446); SEMCAD X 14.6.10(7373)

Area Scan (4x10x1): Measurement grid: $dx=20$ mm, $dy=20$ mm

Maximum value of SAR (measured) = 0.152 W/kg

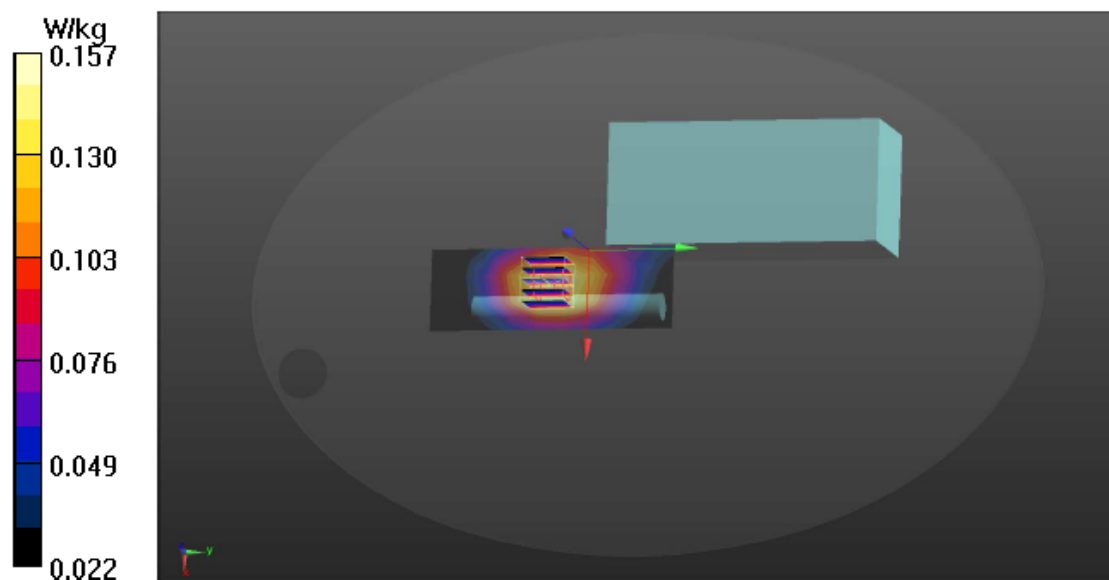
Zoom Scan (5x5x7)/Cube 0: Measurement grid: $dx=8$ mm, $dy=8$ mm, $dz=5$ mm

Reference Value = 6.049 V/m; Power Drift = -0.25 dB

Peak SAR (extrapolated) = 0.177 W/kg

SAR(1 g) = 0.132 W/kg; SAR(10 g) = 0.096 W/kg

Maximum value of SAR (measured) = 0.157 W/kg



Audix Technology Corp.
No. 53-11, Dingfu, Linkou, Dist.,
New Taipei City 244, Taiwan

Tel: +886 2 26099301
Fax: +886 2 26099303

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Test Laboratory: Audix_SAR Lab

P2 WCDMA CH4183 836.6MHz Position 2

DUT: TS890G

Communication System: UID 0, UMTS-FDD (WCDMA) (0); Frequency: 836.6 MHz; Duty Cycle: 1:1

Medium parameters used: $f = 837$ MHz; $\sigma = 0.976$ S/m; $\epsilon_r = 54.307$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

DASY Configuration:

- Probe: EX3DV4 - SN3855; ConvF(9.76, 9.76, 9.76); Calibrated: 9/27/2018;
- Sensor-Surface: 2mm (Mechanical Surface Detection), $z = 1.0, 31.0$
- Electronics: DAE4 Sn1337; Calibrated: 9/19/2018
- Phantom: ELI v5.0; Type: QDOVA002AA; Serial: TP:1170
- DASY52 52.8.8(1258); SEMCAD X 14.6.10(7373)

Area Scan (7x7x1): Measurement grid: $dx=20$ mm, $dy=20$ mm

Maximum value of SAR (measured) = 0.0566 W/kg

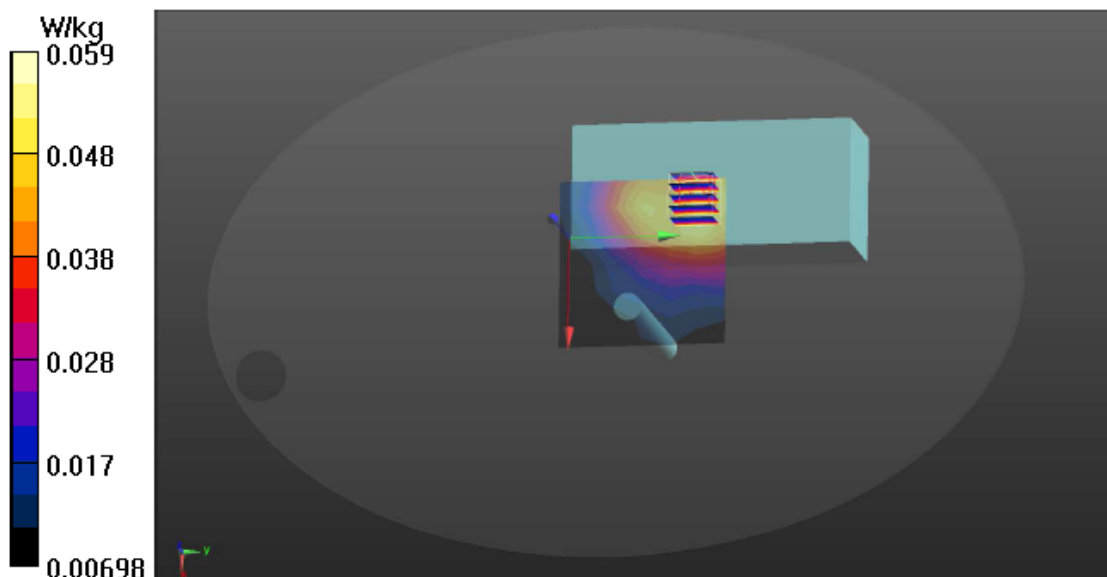
Zoom Scan (5x5x7)/Cube 0: Measurement grid: $dx=8$ mm, $dy=8$ mm, $dz=5$ mm

Reference Value = 3.614 V/m; Power Drift = 0.28 dB

Peak SAR (extrapolated) = 0.0660 W/kg

SAR(1 g) = 0.050 W/kg; SAR(10 g) = 0.038 W/kg

Maximum value of SAR (measured) = 0.0586 W/kg



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No. 53-11, Dingfu, Linkou, Dist.,
New Taipei City 244, Taiwan

Tel: +886 2 26099301
Fax: +886 2 26099303

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P3 WCDMA CH4183 836.6MHz Position 3

DUT: TS890G

Communication System: UID 0, UMTS-FDD (WCDMA) (0); Frequency: 836.6 MHz; Duty Cycle: 1:1

Medium parameters used: $f = 837$ MHz; $\sigma = 0.976$ S/m; $\epsilon_r = 54.307$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

DASY Configuration:

- Probe: EX3DV4 - SN3855; ConvF(9.76, 9.76, 9.76); Calibrated: 9/27/2018;
- Sensor-Surface: 2mm (Mechanical Surface Detection), $z = 1.0, 31.0$
- Electronics: DAE4 Sn1337; Calibrated: 9/19/2018
- Phantom: ELI v5.0; Type: QDOVA002AA; Serial: TP:1170
- DASY52 52.8.8(1258); SEMCAD X 14.6.10(7373)

Area Scan (4x10x1): Measurement grid: $dx=20$ mm, $dy=20$ mm

Maximum value of SAR (measured) = 0.126 W/kg

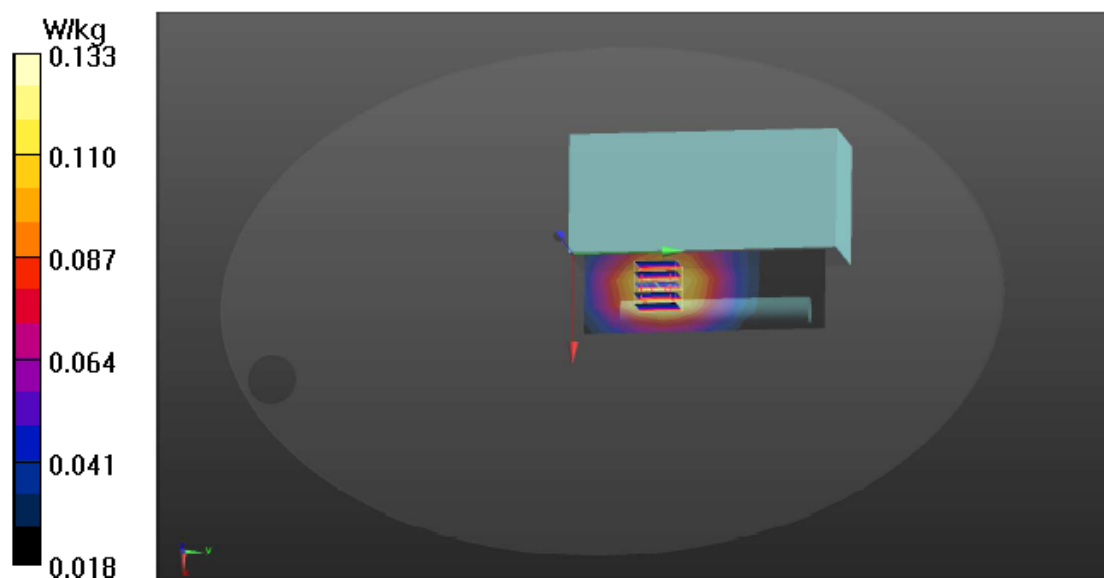
Zoom Scan (5x5x7)/Cube 0: Measurement grid: $dx=8$ mm, $dy=8$ mm, $dz=5$ mm

Reference Value = 9.399 V/m; Power Drift = -0.18 dB

Peak SAR (extrapolated) = 0.150 W/kg

SAR(1 g) = 0.112 W/kg; SAR(10 g) = 0.081 W/kg

Maximum value of SAR (measured) = 0.133 W/kg



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No. 53-11, Dingfu, Linkou, Dist.,
New Taipei City 244, Taiwan

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P4 WCDMA CH4183 836.6MHz Position 4

DUT: TS890G

Communication System: UID 0, UMTS-FDD (WCDMA) (0); Frequency: 836.6 MHz; Duty Cycle: 1:1

Medium parameters used: $f = 837$ MHz; $\sigma = 0.976$ S/m; $\epsilon_r = 54.307$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

DASY Configuration:

- Probe: EX3DV4 - SN3855; ConvF(9.76, 9.76, 9.76); Calibrated: 9/27/2018;
- Sensor-Surface: 2mm (Mechanical Surface Detection), $z = 1.0, 31.0$
- Electronics: DAE4 Sn1337; Calibrated: 9/19/2018
- Phantom: ELI v5.0; Type: QDOVA002AA; Serial: TP:1170
- DASY52 52.8.8(1258); SEMCAD X 14.6.10(7373)

Area Scan (10x4x1): Measurement grid: $dx=20$ mm, $dy=20$ mm

Maximum value of SAR (measured) = 0.106 W/kg

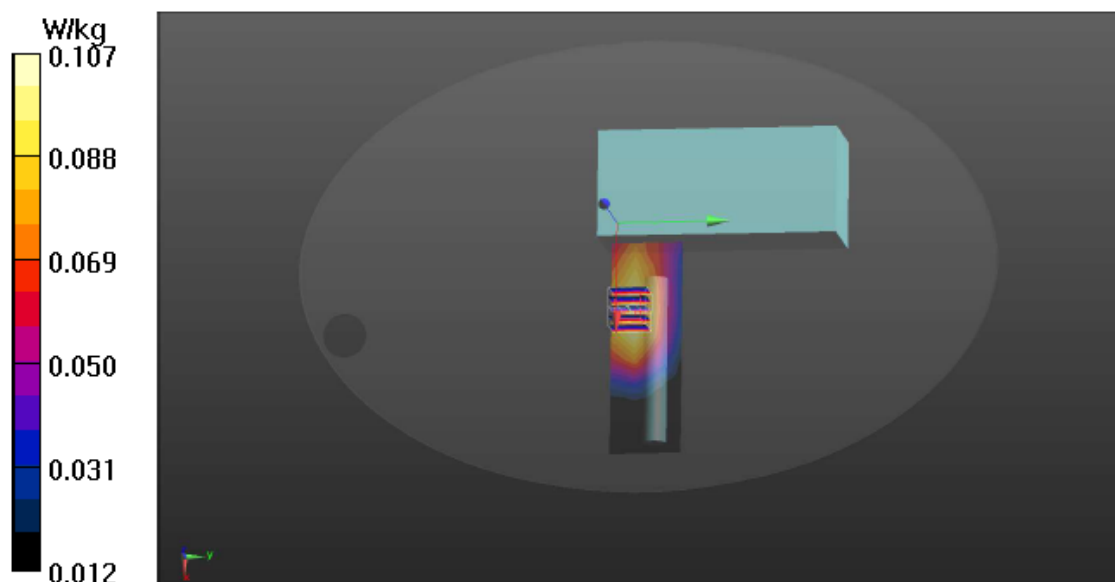
Zoom Scan (5x5x7)/Cube 0: Measurement grid: $dx=8$ mm, $dy=8$ mm, $dz=5$ mm

Reference Value = 9.366 V/m; Power Drift = -0.03 dB

Peak SAR (extrapolated) = 0.120 W/kg

SAR(1 g) = 0.090 W/kg; SAR(10 g) = 0.065 W/kg

Maximum value of SAR (measured) = 0.107 W/kg



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No. 53-11, Dingfu, Linkou, Dist.,
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Test Laboratory: Audix_SAR Lab

P5 WCDMA CH4183 836.6MHz Position 5

DUT: TS890G

Communication System: UID 0, UMTS-FDD (WCDMA) (0); Frequency: 836.6 MHz; Duty Cycle: 1:1

Medium parameters used: $f = 837$ MHz; $\sigma = 0.976$ S/m; $\epsilon_r = 54.307$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

DASY Configuration:

- Probe: EX3DV4 - SN3855; ConvF(9.76, 9.76, 9.76); Calibrated: 9/27/2018;
- Sensor-Surface: 2mm (Mechanical Surface Detection), $z = 1.0, 31.0$
- Electronics: DAE4 Sn1337; Calibrated: 9/19/2018
- Phantom: ELI v5.0; Type: QDOVA002AA; Serial: TP:1170
- DASY52 52.8.8(1258); SEMCAD X 14.6.10(7373)

Area Scan (10x4x1): Measurement grid: $dx=20$ mm, $dy=20$ mm

Maximum value of SAR (measured) = 0.128 W/kg

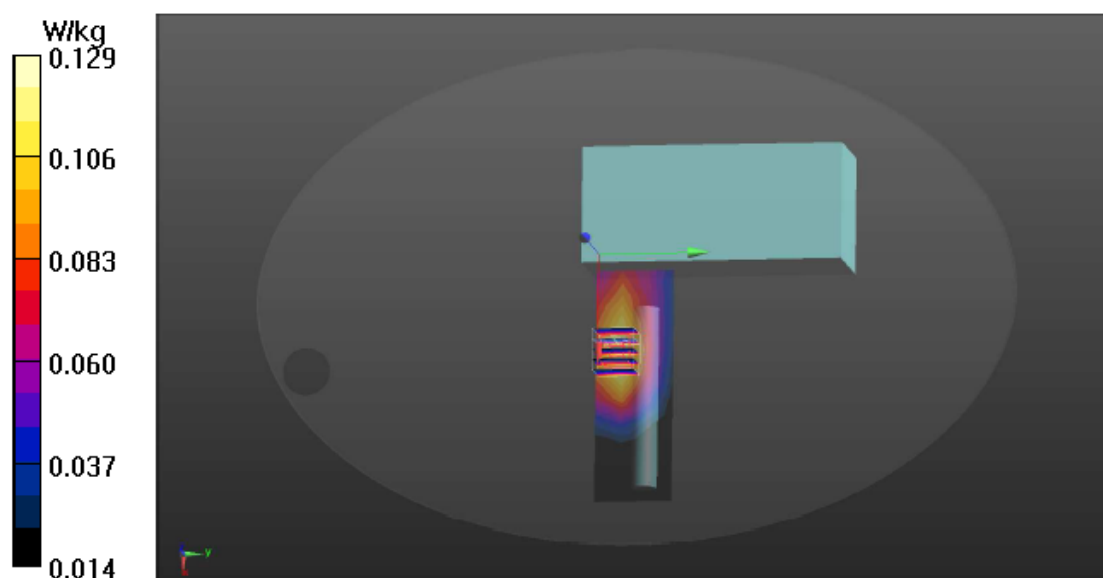
Zoom Scan (5x5x7)/Cube 0: Measurement grid: $dx=8$ mm, $dy=8$ mm, $dz=5$ mm

Reference Value = 9.532 V/m; Power Drift = -0.01 dB

Peak SAR (extrapolated) = 0.146 W/kg

SAR(1 g) = 0.107 W/kg; SAR(10 g) = 0.076 W/kg

Maximum value of SAR (measured) = 0.129 W/kg



Audix Technology Corp.
No. 53-11, Dingfu, Linkou, Dist.,
New Taipei City 244, Taiwan

Tel: +886 2 26099301
Fax: +886 2 26099303

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Test Laboratory: Audix_SAR Lab

P6 WCDMA CH4132 826.4MHz Position 1

DUT: TS890G

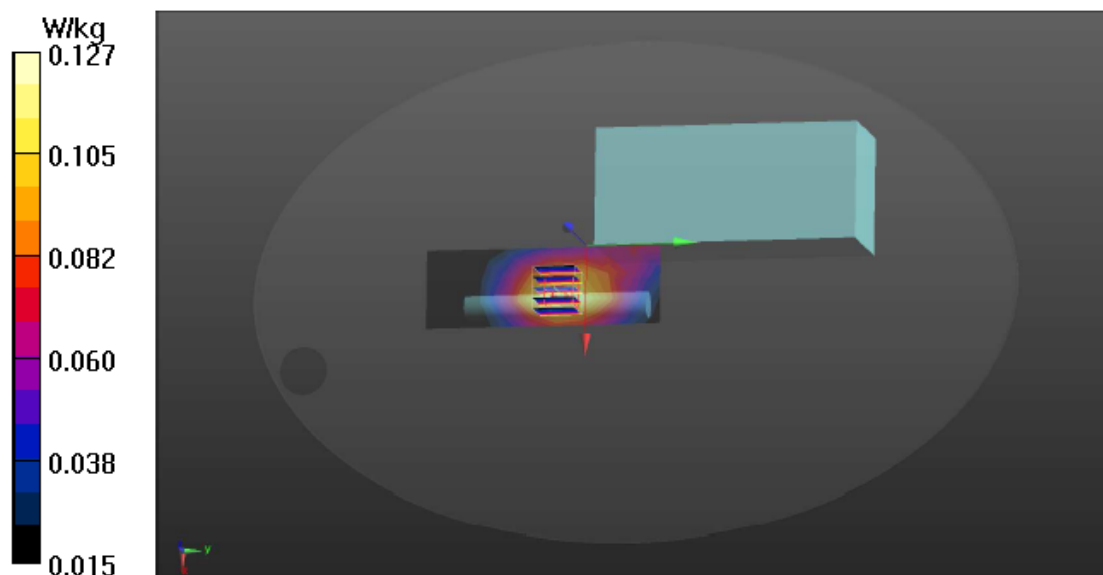
Communication System: UID 0, UMTS-FDD (WCDMA) (0); Frequency: 826.4 MHz; Duty Cycle: 1:1
Medium parameters used (interpolated): $f = 826.4$ MHz; $\sigma = 0.964$ S/m; $\epsilon_r = 54.395$; $\rho = 1000$ kg/m³
Phantom section: Flat Section

DASY Configuration:

- Probe: EX3DV4 - SN3855; ConvF(9.76, 9.76, 9.76); Calibrated: 9/27/2018;
- Sensor-Surface: 2mm (Mechanical Surface Detection), $z = 1.0, 31.0$
- Electronics: DAE4 Sn1337; Calibrated: 9/19/2018
- Phantom: ELI v5.0; Type: QDOVA002AA; Serial: TP:1170
- DASY52 52.8.8(1258); SEMCAD X 14.6.10(7373)

Area Scan (4x10x1): Measurement grid: $dx=20$ mm, $dy=20$ mm
Maximum value of SAR (measured) = 0.125 W/kg

Zoom Scan (5x5x7)/Cube 0: Measurement grid: $dx=8$ mm, $dy=8$ mm, $dz=5$ mm
Reference Value = 7.819 V/m; Power Drift = 0.01 dB
Peak SAR (extrapolated) = 0.143 W/kg
SAR(1 g) = 0.106 W/kg; SAR(10 g) = 0.077 W/kg
Maximum value of SAR (measured) = 0.127 W/kg



Audix Technology Corp.
No. 53-11, Dingfu, Linkou, Dist.,
New Taipei City 244, Taiwan

Tel: +886 2 26099301
Fax: +886 2 26099303

Date: 10/11/2018

Test Laboratory: Audix_SAR Lab

P7 WCDMA CH4233 846.6MHz Position 1

DUT: TS890G

Communication System: UID 0, UMTS-FDD (WCDMA) (0); Frequency: 846.6 MHz; Duty Cycle: 1:1

Medium parameters used: $f = 847$ MHz; $\sigma = 0.987$ S/m; $\epsilon_r = 54.205$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

DASY Configuration:

- Probe: EX3DV4 - SN3855; ConvF(9.76, 9.76, 9.76); Calibrated: 9/27/2018;
- Sensor-Surface: 2mm (Mechanical Surface Detection), $z = 1.0, 31.0$
- Electronics: DAE4 Sn1337; Calibrated: 9/19/2018
- Phantom: ELI v5.0; Type: QDOVA002AA; Serial: TP:1170
- DASY52 52.8.8(1258); SEMCAD X 14.6.10(7373)

Area Scan (4x10x1): Measurement grid: $dx=20$ mm, $dy=20$ mm

Maximum value of SAR (measured) = 0.121 W/kg

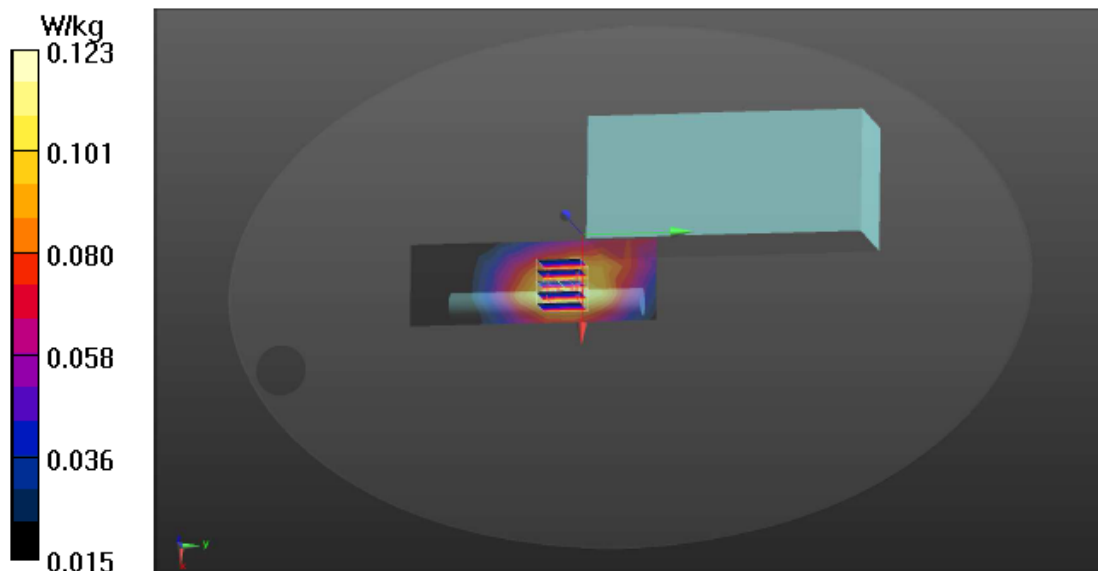
Zoom Scan (5x5x7)/Cube 0: Measurement grid: $dx=8$ mm, $dy=8$ mm, $dz=5$ mm

Reference Value = 8.723 V/m; Power Drift = -0.09 dB

Peak SAR (extrapolated) = 0.138 W/kg

SAR(1 g) = 0.104 W/kg; SAR(10 g) = 0.075 W/kg

Maximum value of SAR (measured) = 0.123 W/kg





Audix Technology Corp.
No. 53-11, Dingfu, Linkou, Dist.,
New Taipei City 244, Taiwan

APPENDIX B

Tel: +886 2 26099301
Fax: +886 2 26099303

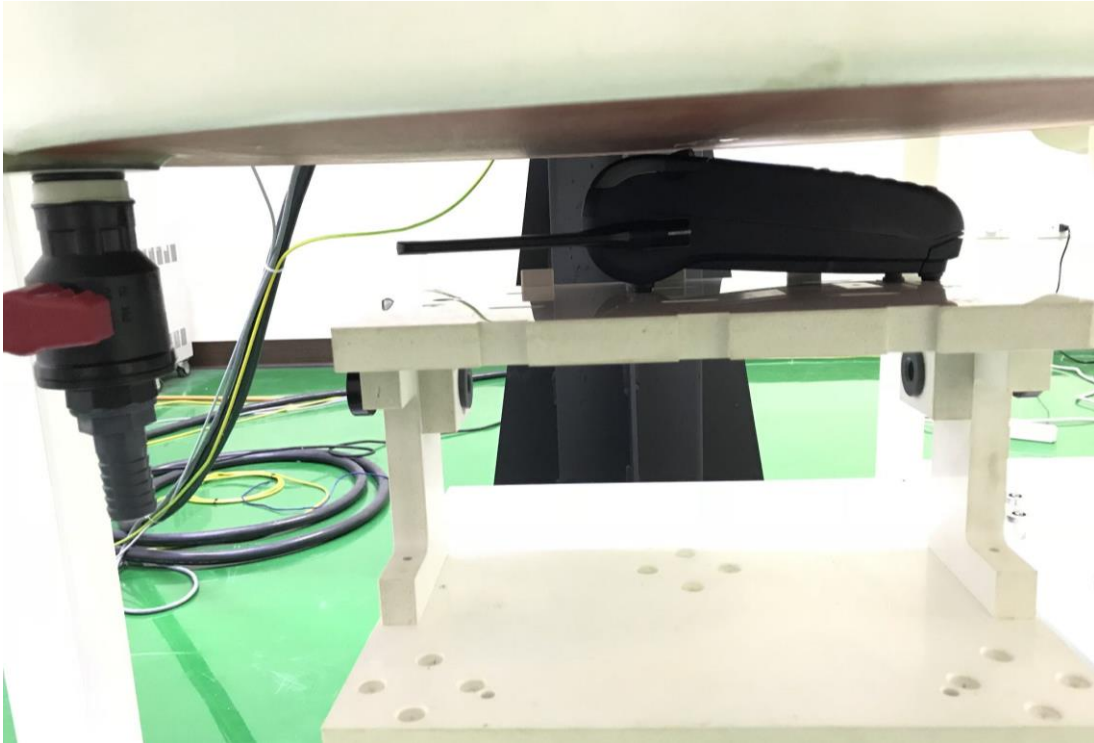
APPENDIX B

TEST PHOTOGRAPHS

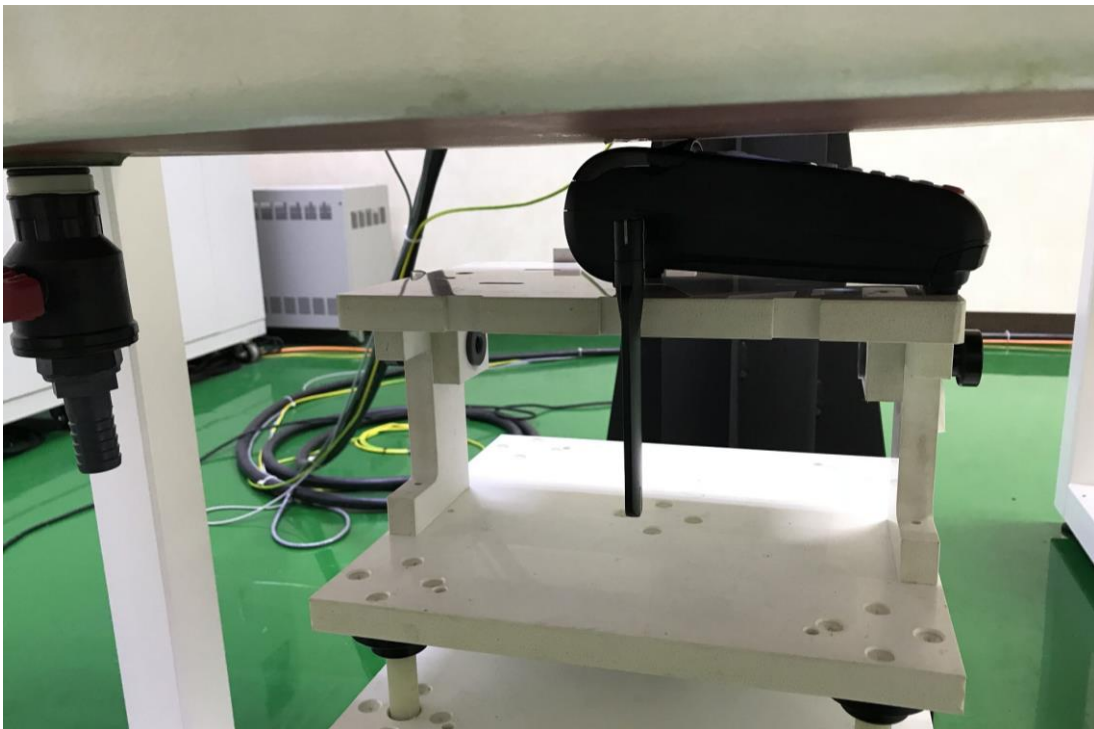
(Model: TS890G)

B.1 SAR MEASUREMENT

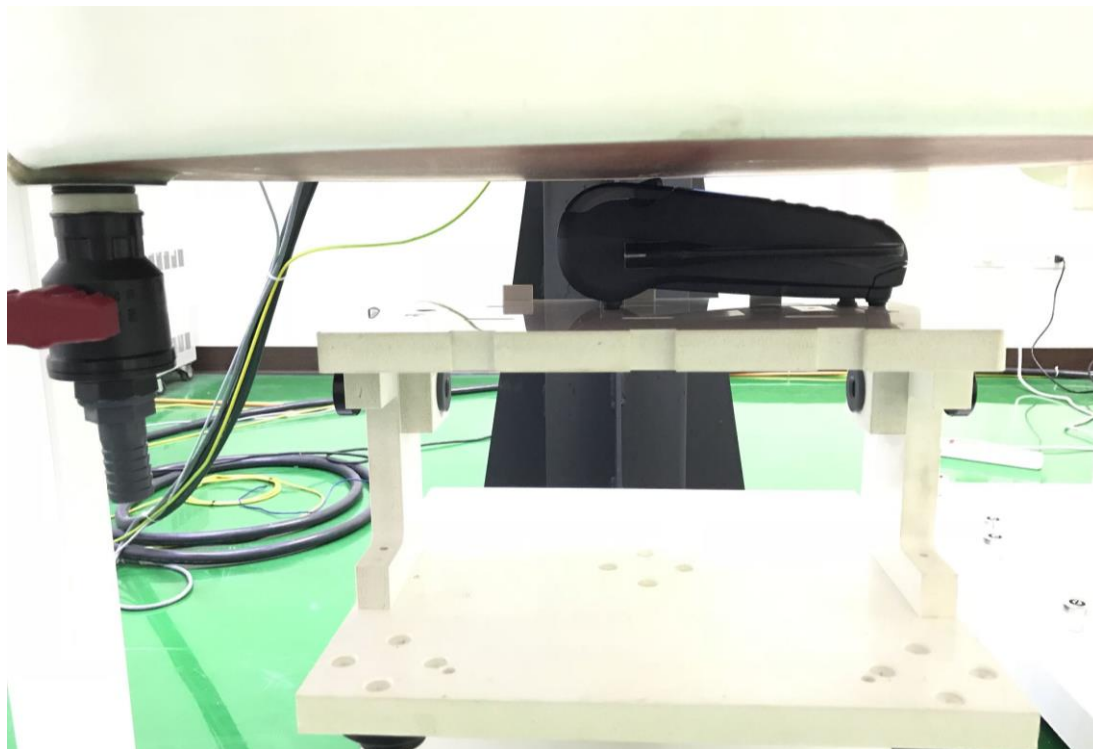
Test Position 1



Test Position 2



Test Position 3



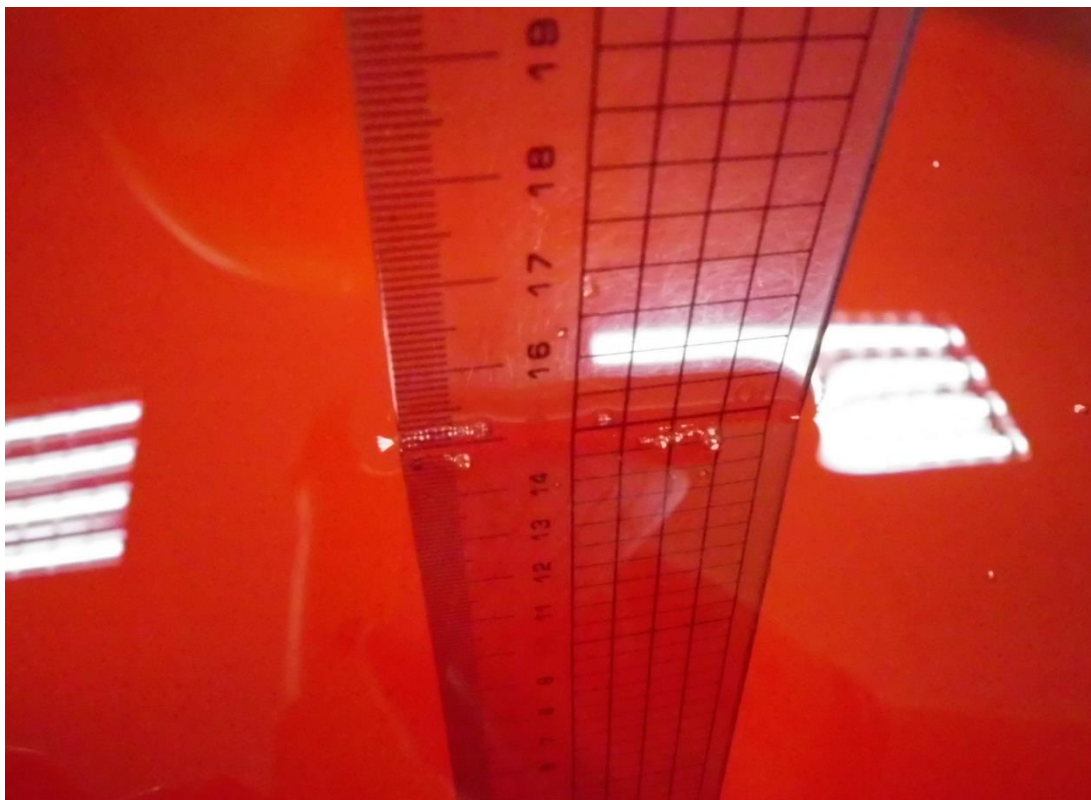
Test Position 4



Test Position 5



Depth of the Liquid in the Phantom-Zoom In





Audix Technology Corp.
No. 53-11, Dingfu, Linkou, Dist.,
New Taipei City 244, Taiwan

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Tel: +886 2 26099301
Fax: +886 2 26099303

APPENDIX C

Test Equipment Calibration Data