SAR Test Report

Applicant : GARMIN Corporation

Product Type : GPS & Two-Way Radio

Trade Name : GARMIN

Model Number : A02963, B02963

Date of Received : May 09, 2016

Test Period : May 27, 2016

Date of Issued : Jul. 29, 2016

Issue by

Approved By : (Bill Hu)   Tested By : (Mark Duan)

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Taiwan Accreditation Foundation accreditation number: 1330

<u>Revision History</u>

Rev.	Issue Date	Revisions	Revised By
00	Jul. 19, 2016	Initial Issue	Tiffany Lee
01	Jul. 29, 2016	Revised Report Information.	Tiffany Lee

Contents

1. *Summary of Highest Reported SAR Value*

Standalone SAR		
Equipment Class	Max. Brain Reported SAR1-g(W/Kg)_50% Duty Cycle	Max. Muscle Reported SAR1-g(W/Kg)_50% Duty Cycle
GMRS	1.59	1.53
FRS	0.36	0.39

NOTE: 1. The N/A is EUT not apply to the assessment of the exposure conditions.

2. The test procedures, as described in American National Standards, Institute ANSI/IEEE C95.1 were employed and they specify the maximum exposure limit of Head & Body is SAR_{1g} 1.6 W/kg of tissue for portable devices being used within 20cm between user and EUT in the uncontrolled environment. A description of the product and operating configuration, detailed summary of the test results, methodology and procedures used in the equipment used are included within this test report.

3. For body worn operation, this device has been tested and meets FCC RF exposure guidelines when used with any accessory that contains no metal and which provides a minimum separation distance of 10 mm between this device and the body of the user. Use of other accessories may not ensure compliance with FCC RF exposure guidelines.

4. The EUT battery have be fully charged and checked periodically during the test to ascertain uniform power output.

2. *Description of Equipment under Test (EUT)*

Applicant	GARMIN Corporation No.68, Zhangshu 2nd Rd., Xizhi Dist., New Taipei City 221, Taiwan		
Manufacture	GARMIN Corporation No.68, Zhangshu 2nd Rd., Xizhi Dist., New Taipei City 221, Taiwan		
Product Type	GPS & Two-Way Radio		
Trade Name	GARMIN		
Model Number	A02963, B02963		
Model Different Description	Model Number	Memory	Camera
	A02963	8GB	Yes
	B02963	4GB	no
FCC ID	IPH-02963		
RF Function information	Operate Band	Operate Frequency (MHz)	RF Conducted Power (Avg.)
	GMRS	462.5625 – 462.7125 462.5500 – 462.7250	36.42dBm
	FRS	462.5625 – 462.7125 467.5625 – 467.7125	26.91dBm
Device Category	Portable Device		
RF Exposure Environment	General population / Uncontrolled environment		
Antenna Type	Coil Antenna		
Antenna Max. Gain	-1 dBi		
Battery Option	Standard		
	1)-Garmin / 011-02526-33 7.4V, 2400mAh(Li-ion battery) 2)- Alkaline 1.5V AA Battery *4 pcs		
Application Type	Certification		
Test Environment	Ambient Temperature： 22 ± 2 ° C Relative Humidity：40 - 70 %		

This wireless portable device has been shown to be capable of compliance for localized specific absorption rate (SAR) for General population / Uncontrolled environment limits specified in Standard C95.1-1999 and had been tested in accordance with the measurement procedures specified in IEEE Std. 1528-2013.

3. *Reference Testing Standards*

Standard	Description	Version
ANSI/IEEE C95.1	American National Standard safety levels with respect to human exposure to radio frequency electromagnetic fields, 300 KHz to 100 GHz, New York.	1992
IEEE 1528	IEEE Recommended Practice for Determining the Peak Spatial-Average Specific Absorption Rate (SAR) in the Human Head From Wireless Communications Devices: Measurement Techniques.	2013
FCC 47 CFR Part 2.1093	Radiofrequency radiation exposure evaluation: portable devices.	---
FCC KDB 865664 D01	SAR measurement 100 MHz to 6 GHz - describes SAR measurement procedures for devices operating between 100 MHz to 6 GHz	v01r04
FCC KDB 865664 D02	RF Exposure Reporting - provides general reporting requirements as well as certain specific information required to support MPE and SAR compliance.	v01r02
FCC KDB 447498 D01	General RF Exposure Guidance - provides guidance pertaining to RF exposure requirements for mobile and portable device equipment authorizations.	v06

4. *Measurement System*

4.1 SAR Definition

Specific Absorption Rate (SAR) is defined as 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). It is also defined as the rate of RF energy absorption per unit mass at a point in an absorbing body (see Figure 2).

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

Figure 2. **SAR Mathematical Equation**

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

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

Where：

σ = conductivity of the tissue (S/m)

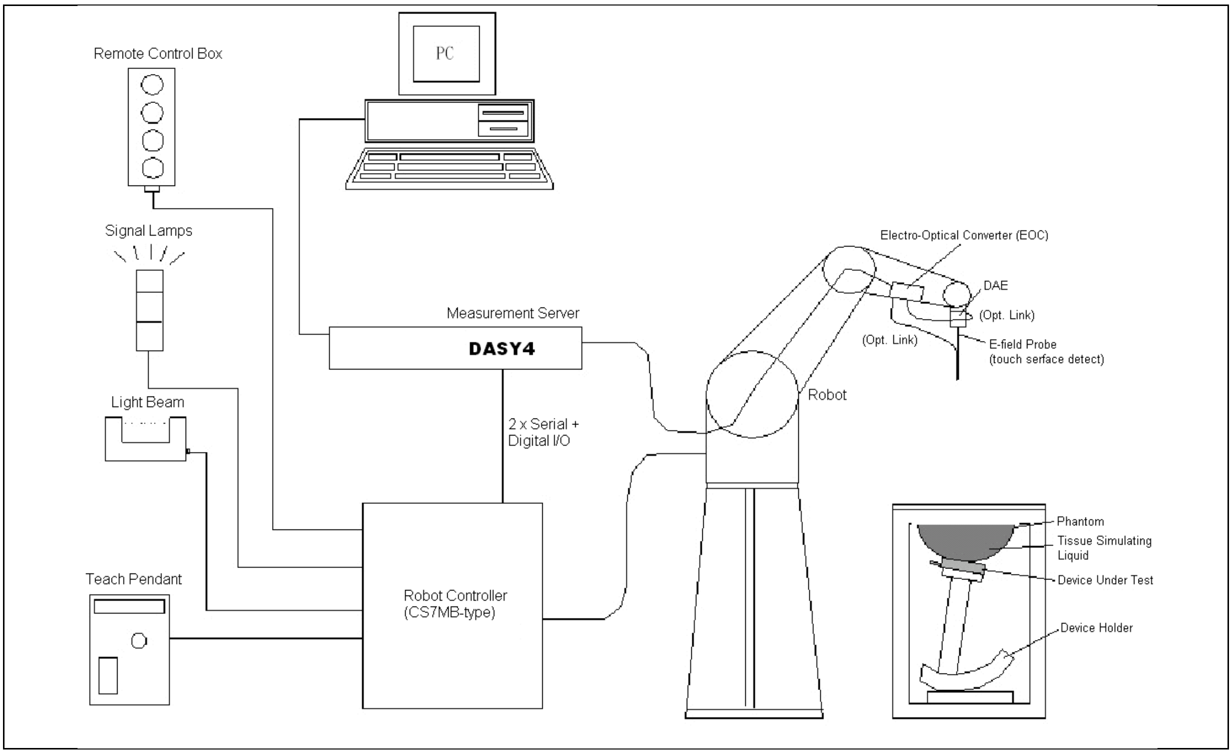
ρ = mass density of the tissue (kg/m^3)

E = RMS electric field strength (V/m)

＊Note：

The primary factors that control rate of energy absorption were found to be the wavelength of the incident field in relations to the dimensions and geometry of the irradiated organism, the orientation of the organism in relation to the polarity of field vectors, the presence of reflecting surfaces, and whether conductive contact is made by the organism with a ground plane〔2〕

4.2 SAR Measurement Setup



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

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

4.3 DASY E-Field Probe System

The SAR measurements were conducted with the dosimetric probe (manufactured by SPEAG), designed in the classical triangular configuration〔3〕and optimized for dosimetric evaluation. The probes is constructed using the thick film technique; with printed resistive lines on ceramic substrates. The probe is equipped with an optical multi-fiber line ending at the front of the probe tip. It is connected to the EOC box on the robot arm and provides an automatic detection of the phantom surface. Half of the fibers are connected to a pulsed infrared transmitter, the other half to a synchronized receiver. As the probe approaches the surface, the reflection from the surface produces a coupling from the transmitting to the receiving fibers. This reflection increases first during the approach, reaches maximum and then decreases. If the probe is flatly touching the surface, the coupling is zero. The distance of the coupling maximum to the surface is independent of the surface reflectivity and largely independent of the surface to probe angle. The DASY software reads the reflection during a software approach and looks for the maximum using a 2nd order fitting. The approach is stopped when reaching the maximum.

■ E-Field Probe Specification

Construction	Symmetrical design with triangular core
	Built-in shielding against static charges
	PEEK enclosure material (resistant to organic solvents, e.g., DGBE)
Calibration	ISO/IEC 17025 calibration service available
Frequency	10 MHz to > 6 GHz
	Linearity: ± 0.2 dB (30 MHz to 6 GHz)
Directivity	±0.3 dB in brain tissue (rotation around probe axis)
	±0.5 dB in brain tissue (rotation normal probe axis)
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

Figure 3. E-field Probe

Figure 4. Probe setup on robot

■ E-Field Probe Calibration process

Dosimetric Assessment Procedure

Each E-Probe/Probe Amplifier combination has unique calibration parameters. A TEM cell calibration procedure is conducted to determine the proper amplifier settings to enter in the probe parameters. The amplifier settings are determined for a given frequency by subjecting the probe to a known E-field density (1 mW/cm^2) using an RF Signal generator, TEM cell, and RF Power Meter.

Free Space Assessment

The free space E-field from amplified probe outputs is determined in a test chamber. This calibration can be performed in a TEM cell if the frequency is below 1 GHz and in a waveguide or other methodologies above 1 GHz for free space. For the free space calibration, the probe is placed in the volumetric center of the cavity and at the proper orientation with the field. The probe is rotated 360 degrees until the three channels show the maximum reading. The power density readings equates to 1 mW/cm^2.

Temperature Assessment

E-field temperature correlation calibration is performed in a flat phantom filled with the appropriate simulated head tissue. The E-field in the medium correlates with the temperature rise in the dielectric medium. For temperature correlation calibration a RF transparent thermistor-based temperature probe is used in conjunction with the E-field probe.

$$SAR = C\frac{\Delta T}{\Delta t}$$

Where：

Δt = Exposure time (30 seconds),

C = Heat capacity of tissue (head or body),

ΔT = Temperature increase due to RF exposure.

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

Where：

σ = Simulated tissue conductivity,

ρ = Tissue density (kg/m^3).

4.4 Data Acquisition Electronic (DAE) System

Model：	DAE3, 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：	< 5μV (with auto zero)
Input Bias Current：	< 50 fA
Dimensions：	60 x 60 x 68 mm

4.5 Robot

Positioner：	Stäubli Unimation Corp. Robot Model: RX90BL
Repeatability：	±0.02 mm
No. of Axis：	6

4.6 Measurement Server

Processor：	PC/104 with a 400MHz intel ULV Celeron
I/O-board：	Link to DAE4 (or DAE3) 16-bit A/D converter for surface detection system Digital I/O interface Serial link to robot Direct emergency stop output for robot

4.7 Device Holder

The DASY device holder is constructed of low-loss POM material having the following dielectric parameters: relative permittivity ε=3 and loss tangent δ=0.02. The amount of dielectric material has been reduced in the closest vicinity of the device, since measurements have suggested that the influence of the clamp on the test results could thus be lowered.

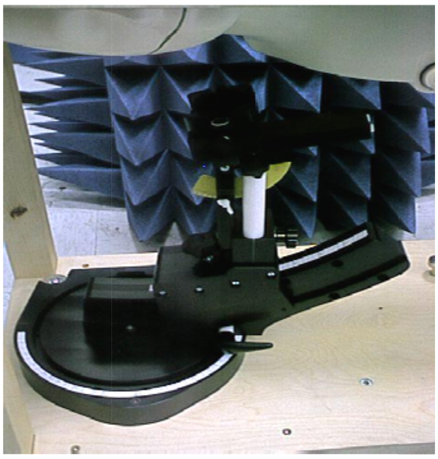


Figure 5. Device Holder

4.8 Oval Flat Phantom

The shell corresponds to the specifications of the Specific Anthropomorphic Mannequin (Oval Flat) phantom defined in IEEE 1528-2013., CENELEC 50361 and IEC 62209-2. It enables the dosimetric evaluation of wireless portable device 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 manually teaching three points with the robot.

Specification of ELI 5.0	
Shell Thickness	2 ±0.2 mm
Filling Volume	Approx. 30 liters
Dimensions	190×600×400 mm (H×L×W)

Table 1. Specification of ELI 5.0

Oval Flat Phantom

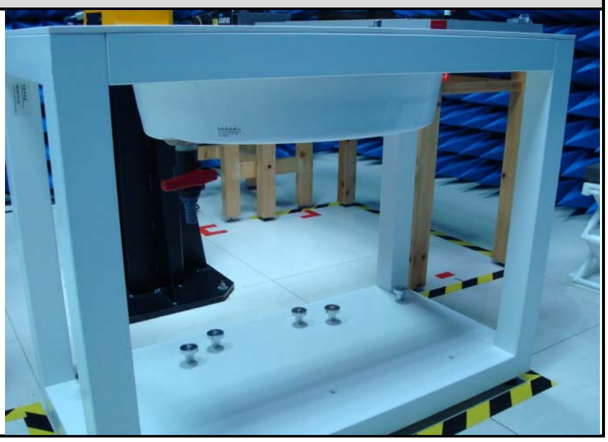


Figure 6. Oval Flat Phantom

4.9 Data Storage and Evaluation

■ Data Storage

The DASY software stores the assessed data from the data acquisition electronics as raw data (in microvolt readings from the probe sensors), together with all the necessary software parameters for the data evaluation (probe calibration data, liquid parameters and device frequency and modulation data) in measurement files with the extension DA4 or DA52. The post processing software evaluates the desired unit and format for output each time the data is visualized or exported. This allows verification of the complete software setup even after the measurement and allows correction of erroneous parameter settings. For example, if a measurement has been performed with an incorrect crest factor parameter in the device setup, the parameter can be corrected afterwards and the data can be reevaluated.

■ Data Evaluation

The DASY post processing software (SEMCAD) automatically executes the following procedures to calculate the field units from the microvolt readings at the probe connector. The parameters used in the evaluation are stored in the configuration modules of the software：

Probe parameters：	- Sensitivity	*Normi, ai0, ai1, ai2*
	- Conversion factor	*ConvFi*
	- Diode compression point	*dcpi*
Device parameters：	- Frequency	*f*
	- Crest factor	*cf*
Media parameters：	- Conductivity	*σ*
	- Density	*ρ*

These parameters must be set correctly in the software. They can be found in the component documents or they can be imported into the software from the configuration files issued for the DASY components. In the direct measuring mode of the multimeter option, the parameters of the actual system setup are used. In the scan visualization and export modes, the parameters stored in the corresponding document files are used.

The first step of the evaluation is a linearization of the filtered input signal to account for the compression characteristics of the detector diode. The compensation depends on the input signal, the diode type and the DC-transmission factor from the diode to the evaluation electronics. If the exciting field is pulsed, the crest factor of the signal must be known to correctly compensate for peak power. The formula for each channel can be given as：

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

With	*Vi*	= compensated signal of channel i (i = x, y, z)
	Ui	= input signal of channel i (i = x, y, z)
	cf	= crest factor of exciting field (DASY parameter)
	dcpi	= diode compression point (DASY parameter)

From the compensated input signals the primary field data for each channel can be evaluated：

E-field probes：

$$E_i = \sqrt{\frac{V_i}{Norm_i \cdot ConvF}}$$

H-field probes：

$$H_i = \sqrt{V_i} \cdot \frac{a_{i0} + a_{i1} f + a_{i2} f^2}{f}$$

with *Vi* = compensated signal of channel i (i = x, y, z)

Normi= sensor sensitivity of channel i (i = x, y, z)

μV/(V/m)2 for E-field Probes

ConvF = sensitivity enhancement in solution

aij = sensor sensitivity factors for H-field probes

f = carrier frequency [GHz]

Ei = electric field strength of channel i in V/*m*

Hi = magnetic field strength of channel i in A/m

The RSS value of the field components gives the total field strength (Hermitian magnitude)：

$$E_{tot} = \sqrt{E_x^2 + E_y^2 + E_z^2}$$

The primary field data are used to calculate the derived field units.

$$SAR = E_{tot}^2 \cdot \frac{\sigma}{\rho \cdot 1000}$$

with *SAR* = local specific absorption rate in mW/g

Etot = total field strength in V/m

σ = conductivity in [mho/m] or [Siemens/m]

ρ = equivalent tissue density in g/cm3

＊Note：That the density is set to 1, to account for actual head tissue density rather than the density of the tissue simulating liquid.

The power flow density is calculated assuming the excitation field to be a free space field.

$$P_{pwe} = \frac{E_{tot}^2}{3770} \quad \text{or} \quad P_{pwe} = \frac{H_{tot}^2}{37.7}$$

with *Ppwe* = equivalent power density of a plane wave in mW/cm2

Etot = total electric field strength in V/m

Htot = total magnetic field strength in A/m

4.10 Test Instruments

Manufacturer	Name of Equipment	Type/Model	Serial Number	Calibration	
				Last Cal.	Due Date
SPEAG	450MHz System Validation Kit	D450V2	1021	Apr. 21, 2016	Apr. 21, 2017
SPEAG	Dosimetric E-Field Probe	EX3DV4	3847	Apr. 14, 2016	Apr. 14, 2017
SPEAG	Data Acquisition Electronics	DAE4	779	Mar. 02, 2016	Mar. 02, 2017
SPEAG	Device Holder	N/A	N/A	NCR	
SPEAG	Measurement Server	SE UMS 001 BA	1021	NCR	
SPEAG	Phantom	ELI V4.0	1036	NCR	
SPEAG	Robot	Staubli RX90BL	F00/5D89B1/A/01	NCR	
SPEAG	Software	DASY4 V4.7 Build 80	N/A	NCR	
SPEAG	Software	SEMCAD V1.8 Build 186	N/A	NCR	
Agilent	Dielectric Probe Kit	85070C	US99360094	NCR	
Agilent	ENA Series Network Analyzer	E5071B	MY42404655	Apr. 13, 2016	Apr. 13, 2017
Agilent	MXG Vector Signal Generator	N5182B	MY53050382	May 20, 2016	May 20, 2017
Agilent	Power Sensor	8481H	3318A20779	Jun. 06, 2016	Jun. 06, 2017
Agilent	Power Meter	EDM Series E4418B	GB40206143	Jun. 06, 2016	Jun. 06, 2017
Anritsu	Power Meter	ML2495A	1135009	Aug. 24, 2015	Aug. 24, 2016
Agilent	Dual Directional Coupler	778D	50334	NCR	
Mini-Circuits	Power Amplifier	ZHL-42W-SMA	D111103#5	NCR	
Mini-Circuits	Power Amplifier	ZVE-8G-SMA	D042005 671800514	NCR	
Aisi	Attenuator	IEAT 3dB	N/A	NCR	

5. *Tissue Simulating Liquids*

The mixture is calibrated to obtain proper dielectric constant (permittivity) and conductivity of the tissue.
The dielectric parameters of the liquids were verified prior to the SAR evaluation using an 85070C Dielectric Probe Kit and an E5071B Network Analyzer.

IEEE SCC-34/SC-2 in 1528 recommended Tissue Dielectric Parameters

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

Target Frequency	Head		Body	
(MHz)	εr	σ (S/m)	εr	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
(εr = relative permittivity, σ = conductivity and ρ = 1000 kg/m3)				

Table 2. Tissue dielectric parameters for head and body phantoms

5.1 Ingredients

The following ingredients are used:

- Water: deionized water (pure H_20), resistivity ≥ 16 M Ω -as basis for the liquid
- Sugar: refied white sugar (typically 99.7 % sucrose, available as crystal sugar in food shops) -to reduce relative permittivity
- Salt: pure NaCl -to increase conductivity
- Cellulose: Hydroxyethyl-cellulose, medium viscosity (75-125 mPa.s, 2% in water, 20°C), CAS # 54290 -to increase viscosity and to keep sugar in solution.
- Preservative: Preventol D-7 Bayer AG, D-51368 Leverkusen, CAS # 55965-84-9 -to prevent the spread of bacteria and molds
- DGBE: Diethylenglycol-monobuthyl ether (DGBE), Fluka Chemie GmbH, CAS # 112-34-5 -to reduce relative permittivity

5.2 Recipes

The following tables give the recipes for tissue simulating liquids to be used in different frequency bands.

Note: The goal dielectric parameters (at 22 ℃) must be achieved within a tolerance of ±5% for εand ±5% for σ.

Liquid type	HSL 450 - A	
Ingredient	Weight (g)	Weight (%)
Water	522.94	38.91
Sugar	765.09	56.93
Cellulose	3.39	0.25
Salt	50.94	3.79
Preventol	1.63	0.12
Total amount	1’344.00	100.00
Goal dielectric parameters		
Frequency [MHz]	450	
Relative Permittivity	43.5	
Conductivity [S/m]	0.87	

Liquid type	MSL 450 - B	
Ingredient	Weight (g)	Weight (%)
Water	590.62	46.21
Sugar	654.00	51.17
Cellulose	2.36	0.18
Salt	29.96	2.34
Preventol	1.06	0.08
Total amount	1’278.00	100.00
Goal dielectric parameters		
Frequency [MHz]	450	
Relative Permittivity	56.7	
Conductivity [S/m]	0.94	

5.3 Liquid Parameters

Liquid Verify								
Ambient Temperature： 22 ± 2 °C；Relative Humidity：40 -70%								
Liquid Type	Frequency	Temp (°C)	Parameters	Target Value	Measured Value	Deviation (%)	Limit (%)	Measured Date
450MHz (Head)	450MHz	22.0	εr	43.50	43.70	0.46%	± 5%	May 27, 2016
			σ	0.870	0.870	0.00%	± 5%	
	463MHz	22.0	εr	43.43	43.49	0.23%	± 5%	
			σ	0.871	0.882	1.15%	± 5%	
	468MHz	22.0	εr	43.40	43.38	0.00%	± 5%	
			σ	0.871	0.887	2.30%	± 5%	
450MHz (Body)	450MHz	22.0	εr	56.70	58.41	3.00%	± 5%	May 27, 2016
			σ	0.940	0.938	0.00%	± 5%	
	463MHz	22.0	εr	56.65	58.33	3.00%	± 5%	
			σ	0.941	0.949	1.06%	± 5%	
	468MHz	22.0	εr	56.63	58.30	3.00%	± 5%	
			σ	0.941	0.954	1.06%	± 5%	

5.4 Liquid Depth

According to KDB 865664 ,the depth of tissue-equivalent liquid in a phantom must be ≥ 15.0 cm with ≤ ± 0.5 cm variation for SAR measurements ≤ 3 GHz and ≥ 10.0 cm with ≤ ± 0.5 cm variation for measurements > 3 GHz.

Figure 7. Body-Position

6. *System Verification*

6.1 Symmetric Dipoles for System Verification

Construction	Symmetrical dipole with l/4 balun enables measurement of feed point impedance with NWA matched for use near flat phantoms filled with head simulating solutions Includes distance holder and tripod adaptor Calibration Calibrated SAR value for specified position and input power at the flat phantom in head simulating solutions.
Frequency	450 MHz
Return Loss	> 20 dB at specified verification position
Power Capability	> 100 W (f < 1GHz); > 40 W (f > 1GHz)
Options	Dipoles for other frequencies or solutions and other calibration conditions are available upon request
Dimensions	D450V2：dipole length 270 mm; overall height 330 mm

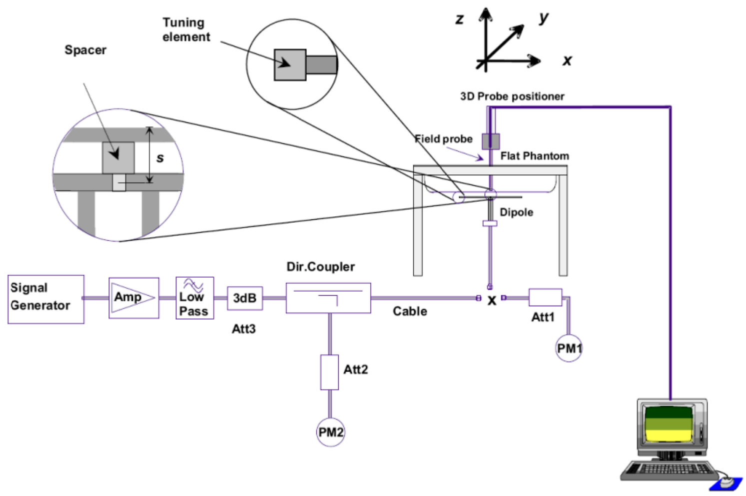


Figure 8. System Verification Setup Diagram

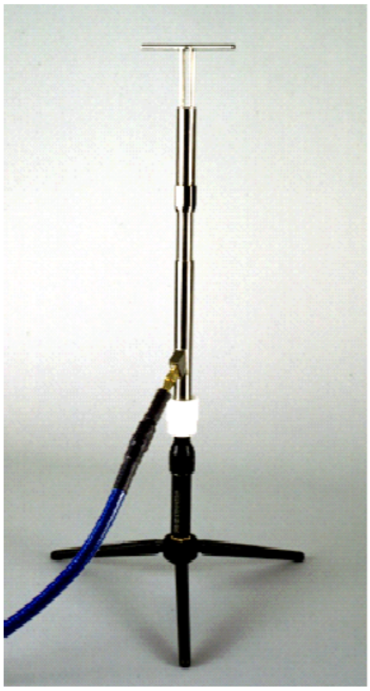


Figure 9. Validation Kit

6.2 Verification Summary

Prior to the assessment, the system validation kit was used to test whether the system was operating within its specifications of ± 7%. The verification was performed at 450MHz.

Mixture Type	Frequency (MHz)	Power	SAR_{1g} (W/Kg)	SAR_{10g} (W/Kg)	Drift (dB)	Difference percentage		Probe	Dipole	1W Target		Date
						1g	10g	Model / Serial No.	Model / Serial No.	SAR_{1g} (W/Kg)	SAR_{10g} (W/Kg)	
Head	450	250 mW	1.2	0.813	0	0.6%	2.6%	EX3DV4 SN: 3847	D450V2 SN:1021	4.77	3.17	May 27, 2016
		Normalize to 1 Watt	4.8	3.25								
Body	450	250 mW	1.16	0.767	-0.016	-3.3%	-3.2%	EX3DV4 SN: 3847	D450V2 SN:1021	4.8	3.17	May 27, 2016
		Normalize to 1 Watt	4.64	3.07								

6.3 Validation Summary

Per FCC KDB 865664 D02v01r02, SAR system validation status should be documented to confirm measurement accuracy. The SAR systems (including SAR probes, system components and software versions) used for this device were validated against its performance specifications prior to the SAR measurements. Reference dipoles were used with the required tissue- equivalent media for system validation, according to the procedures outlined in IEEE 1528-2013 and FCC KDB 865664 D01v01r04. Since SAR probe calibrations are frequency dependent, each probe calibration point was validated at a frequency within the valid frequency range of the probe calibration point, using the system that normally operates with the probe for routine SAR measurements and according to the required tissue-equivalent media.

A tabulated summary of the system validation status including the validation date(s), measurement frequencies, SAR probes and tissue dielectric parameters as below.

Probe Type Model / Serial No.	Prob Cal. Point (MHz)	Head / Body	Cond.	Perm.	CW Validation			Mod. Validation			Date
			εr	σ	Sensitivity	Probe Linearity	Probe Isotropy	Mod. Type	Duty Factor	PAR	
EX3DV4 SN: 3847	450	Head	43.70	0.870	Pass	Pass	Pass	FM	Pass	N/A	May 27, 2016
EX3DV4 SN: 3847	463	Head	43.49	0.882	Pass	Pass	Pass	FM	Pass	N/A	May 27, 2016
EX3DV4 SN: 3847	468	Head	43.38	0.887	Pass	Pass	Pass	FM	Pass	N/A	May 27, 2016
EX3DV4 SN: 3847	450	Body	58.41	0.938	Pass	Pass	Pass	FM	Pass	N/A	May 27, 2016
EX3DV4 SN: 3847	463	Body	58.33	0.949	Pass	Pass	Pass	FM	Pass	N/A	May 27, 2016
EX3DV4 SN: 3847	468	Body	58.30	0.954	Pass	Pass	Pass	FM	Pass	N/A	May 27, 2016

6.4 Measurement Uncertainty

IEC62209-1/IEEE 1528:2013

Item	Uncertainty Component	Uncertainty Value	Prob. Dist	Div.	c_i (1g)	c_i (10g)	Std. Unc. （1-g）	Std. Unc. （10-g）	v_i or V_{eff}
Measurement System									
u1	Probe Calibration (*k*=1)	±6.65%	Normal	1	1	1	±6.65%	±6.65%	∞
u2	Axial Isotropy	±4.7%	Rectangular	$\sqrt{3}$	0.7	0.7	±1.9%	±1.9%	∞
u3	Hemispherical Isotropy	±9.6%	Rectangular	$\sqrt{3}$	0.7	0.7	±3.9%	±3.9%	
u4	Boundary Effect	±1.0%	Rectangular	$\sqrt{3}$	1	1	±0.6%	±0.6%	∞
u5	Linearity	±4.7%	Rectangular	$\sqrt{3}$	1	1	±2.7%	±2.7%	∞
u6	System Detection Limit	±1.0%	Rectangular	$\sqrt{3}$	1	1	±0.6%	±0.6%	∞
u7	Readout Electronics	±0.3%	Normal	1	1	1	±0.3%	±0.3%	∞
u8	Response Time	±0.8%	Rectangular	$\sqrt{3}$	1	1	±0.5%	±0.5%	∞
u9	Integration Time	±1.9%	Rectangular	$\sqrt{3}$	1	1	±1.1%	±1.1%	∞
u10	RF Ambient Conditions	±3.0%	Rectangular	$\sqrt{3}$	1	1	±1.7%	±1.7%	∞
u11	RF Ambient Reflections	±3.0%	Rectangular	$\sqrt{3}$	1	1	±1.7%	±1.7%	∞
u12	Probe Positioner Mechanical Tolerance	±0.4%	Rectangular	$\sqrt{3}$	1	1	±0.2%	±0.2%	∞
u13	Probe Positioning with respect to Phantom Shell	±2.9%	Rectangular	$\sqrt{3}$	1	1	±1.7%	±1.7%	∞
u14	Extrapolation, interpolation and integration Algorithms for Max. SAR Evaluation	±1.0%	Rectangular	$\sqrt{3}$	1	1	±0.6%	±0.6%	∞
Test sample Related									
u15	Test sample Positioning	±3.6%	Normal	1	1	1	±3.6%	±3.6%	∞
u16	Device Holder Uncertainty	±2.7%	Normal	1	1	1	±2.7%	±2.7%	∞
u17	Output Power Variation - SAR drift measurement	±5.0%	Rectangular	$\sqrt{3}$	1	1	±2.9%	±2.9%	∞
Phantom and Tissue Parameters									
u18	Phantom Uncertainty (shape and thickness tolerances)	±4.0%	Rectangular	$\sqrt{3}$	1	1	±2.3%	±2.3%	∞
u19	Liquid Conductivity - deviation from target values	±5.0%	Rectangular	$\sqrt{3}$	0.64	0.43	±1.8%	±1.2%	∞
u20	Liquid Conductivity - measurement uncertainty	±2.5%	Normal	1	0.64	0.43	±1.6%	±1.08%	∞
u21	Liquid Permittivity - deviation from target values	±5.0%	Rectangular	$\sqrt{3}$	0.6	0.49	±1.7%	±1.4%	∞
u22	Liquid Permittivity - measurement uncertainty	±2.5%	Normal	1	0.6	0.49	±1.5%	±1.23%	∞
Combined standard uncertainty			RSS				±10.58%	±10.15%	∞
Expanded uncertainty (95% CONFIDENCE LEVEL)			*k*=2				±21.15%	±20.31%	

Table 3. Uncertainty Budget for frequency range 300MHz to 3GHz

IEC62209-2

Item	Uncertainty Component	Uncertainty Value	Prob. Dist	Div.	c_i (1g)	c_i (10g)	Std. Unc. (1-g)	Std. Unc. (10-g)	v_i or V_{eff}
Measurement System									
u1	Probe Calibration (k=1)	±6.65%	Normal	1	1	1	±6.65%	±6.65%	∞
u2	Axial Isotropy	±4.7%	Rectangular	$\sqrt{3}$	0.7	0.7	±1.9%	±1.9%	∞
u3	Hemispherical Isotropy	±9.6%	Rectangular	$\sqrt{3}$	0.7	0.7	±3.9%	±3.9%	
u4	Boundary Effect	±2.0%	Rectangular	$\sqrt{3}$	1	1	±1.2%	±1.2%	∞
u5	Linearity	±4.7%	Rectangular	$\sqrt{3}$	1	1	±2.7%	±2.7%	∞
u6	System Detection Limit	±1.0%	Rectangular	$\sqrt{3}$	1	1	±0.6%	±0.6%	∞
u7	Readout Electronics	±0.3%	Normal	1	1	1	±0.3%	±0.3%	∞
u8	Response Time	±0.8%	Rectangular	$\sqrt{3}$	1	1	±0.5%	±0.5%	∞
u9	Integration Time	±1.9%	Rectangular	$\sqrt{3}$	1	1	±1.1%	±1.1%	∞
u10	RF Ambient Conditions	±3.0%	Rectangular	$\sqrt{3}$	1	1	±1.7%	±1.7%	∞
u11	RF Ambient Reflections	±3.0%	Rectangular	$\sqrt{3}$	1	1	±1.7%	±1.7%	∞
u12	Probe Positioner Mechanical Tolerance	±0.8%	Rectangular	$\sqrt{3}$	1	1	±0.5%	±0.5%	∞
u13	Probe Positioning with respect to Phantom Shell	±6.7%	Rectangular	$\sqrt{3}$	1	1	±3.9%	±3.9%	∞
u14	Extrapolation, interpolation and integration Algorithms for Max. SAR Evaluation	±1.0%	Rectangular	$\sqrt{3}$	1	1	±0.6%	±0.6%	∞
Test sample Related									
u15	Test sample Positioning	±3.6%	Normal	1	1	1	±3.6%	±3.6%	∞
u16	Device Holder Uncertainty	±2.7%	Normal	1	1	1	±2.7%	±2.7%	∞
u17	Output Power Variation - SAR drift measurement	±5.0%	Rectangular	$\sqrt{3}$	1	1	±2.9%	±2.9%	∞
Phantom and Tissue Parameters									
u18	Phantom Uncertainty (shape and thickness tolerances)	±4.0%	Rectangular	$\sqrt{3}$	1	1	±2.3%	±2.3%	∞
u19	SAR correction	±1.9%	Rectangular	$\sqrt{3}$	1	0.84	±1.11%	±0.9%	∞
u20	Liquid Conductivity – deviation from target values	±5.0%	Rectangular	$\sqrt{3}$	0.64	0.43	±1.8%	±1.2%	∞
u21	Liquid Conductivity – measurement uncertainty	±2.5%	Normal	1	0.64	0.43	±1.6%	±1.08%	∞
u22	Liquid Permittivity - deviation from target values	±5.0%	Rectangular	$\sqrt{3}$	0.64	0.43	±1.8%	±1.2%	∞
u23	Liquid Permittivity - measurement uncertainty	±2.5%	Normal	1	0.64	0.43	±1.6%	±1.08%	∞
u24	Temp.Unc.- Conductivity	±3.4%	Rectangular	$\sqrt{3}$	0.78	0.71	±1.5%	±1.4%	∞
u25	Temp.Unc.- Permittivity	±0.4%	Normal	$\sqrt{3}$	0.23	0.26	±0.1%	±0.1%	∞
Combined standard uncertainty			RSS				±12.08%	±11.44%	∞
Expanded uncertainty (95% CONFIDENCE LEVEL)			k=2				±24.16%	±22.88%	

Table 4. Uncertainty Budget for frequency range 300MHz to 3GHz

Uncertainty of a System Performance Check with DASY System_IEC62209-2

Item	Uncertainty Component	Uncertainty Value	Prob. Dist	Div.	c_i (1g)	c_i (10g)	Std. Unc. （1-g）	Std. Unc. （10-g）	v_i or V_{eff}
Measurement System									
u1	Probe calibration (k=1)	±6.65%	Normal	1	1	1	±6.65%	±6.65%	∞
u2	Isotropy	±4.7%	Rectangular	$\sqrt{3}$	1	1	±0.52%	±0.52%	∞
u3	Linearity	±9.6%	Rectangular	$\sqrt{3}$	1	1	±0.52%	±0.52%	∞
u4	Modulation response	±1.0%	Rectangular	$\sqrt{3}$	1	1	±1.56%	±1.56%	∞
u5	Detection limits	±4.7%	Rectangular	$\sqrt{3}$	1	1	±0.58%	±0.58%	∞
u6	Boundary effect	±1.0%	Rectangular	$\sqrt{3}$	1	1	±0.58%	±0.58%	∞
u7	Readout electronics	±0.3%	Normal	1	1	1	±0.3%	±0.3%	∞
u8	Response time	±0.8%	Rectangular	$\sqrt{3}$	1	1	±0.46%	±0.46%	∞
u9	Integration time	±1.9%	Rectangular	$\sqrt{3}$	1	1	±1.5%	±1.5%	∞
u10	RF ambient conditions- noise	±3.0%	Rectangular	$\sqrt{3}$	1	1	±1.73%	±1.73%	∞
u11	RF ambient conditions- reflections	±3.0%	Rectangular	$\sqrt{3}$	1	1	±1.73%	±1.73%	∞
u12	Probe positioner mech. restrictions	±0.4%	Rectangular	$\sqrt{3}$	1	1	±0.23%	±0.23%	∞
u13	Probe positioning with respect to phantom shell	±2.9%	Rectangular	$\sqrt{3}$	1	1	±1.67%	±1.67%	∞
u14	Post-processing	±1.0%	Rectangular	$\sqrt{3}$	1	1	±0.58%	±0.58%	∞
Field source									
u15	Deviation of the experimental source from numerical source	±3.6%	Normal	1	1	1	±2%	±2%	∞
u16	Source to liquid distance	±2.7%	Rectangular	$\sqrt{3}$	1	1	±0.58%	±0.58%	∞
u17	Drift of output power (measured SAR drift)	±5.0%	Rectangular	$\sqrt{3}$	1	1	±2.89%	±2.89%	∞
Phantom and set-up									
u18	Phantom uncertainty (shape and thickness tolerances)	±4.0%	Rectangular	$\sqrt{3}$	1	1	±2.31%	±2.31%	∞
u19	Algorithm for correcting SAR for deviations in permittivity and conductivity	±5.0%	Normal	1	1	0.84	±2%	±1.68%	∞
u20	Liquid conductivity (meas.)	±2.5%	Normal	1	0.78	0.21	±1.95%	±0.53%	M
u21	Liquid permittivity (meas.)	±5.0%	Normal	1	0.23	0.26	±0.58%	±0.65%	M
u22	Liquid conductivity – temperature uncertainty	±2.5%	Rectangular	$\sqrt{3}$	0.78	0.71	±1.13%	±1.02%	∞
u23	Liquid permittivity – temperature uncertainty	±2.5%	Rectangular	$\sqrt{3}$	0.23	0.26	±0.33%	±0.38%	∞
Combined standard uncertainty			RSS				±8.88%	±8.61%	∞
Expanded uncertainty (95% CONFIDENCE LEVEL)			k=2				±17.77%	±17.22%	

Table 5. Uncertainty Budget for frequency range 300MHz to 3GHz

Uncertainty of a System Performance Check with DASY System_IEEE 1528-2013

Item	Uncertainty Component	Uncertainty Value	Prob. Dist	Div.	c_i (1g)	c_i (10g)	Std. Unc. （1-g）	Std. Unc. （10-g）	v_i or V_{eff}
Measurement System									
u1	Probe calibration (k=1)	±6.65%	Normal	1	1	1	±6.65%	±6.65%	∞
u2	Axial isotropy	±0.9%	Rectangular	$\sqrt{3}$	1	1	±0.52%	±0.52%	∞
u3	Hemispherical isotropy	±9.6%	Rectangular	$\sqrt{3}$	0	0	±0%	±0%	∞
u4	Boundary effect	±2.7%	Rectangular	$\sqrt{3}$	1	1	±1.56%	±1.56%	∞
u5	Linearity	±1%	Rectangular	$\sqrt{3}$	1	1	±0.58%	±0.58%	∞
u6	System detection limits	±1%	Rectangular	$\sqrt{3}$	1	1	±0.58%	±0.58%	∞
u7	Modulation response	±2.7%	Rectangular	$\sqrt{3}$	0	0	±0%	±0%	∞
u8	Readout electronics	±0.3%	Normal	1	1	1	±0.3%	±0.3%	∞
u9	Response time	±0.8%	Rectangular	$\sqrt{3}$	0	0	±0%	±0%	∞
u10	Integration time	±2.6%	Rectangular	$\sqrt{3}$	0	0	±0%	±0%	∞
u11	RF ambient conditions—noise	±3%	Rectangular	$\sqrt{3}$	1	1	±1.73%	±1.73%	∞
u12	RF ambient conditions—reflections	±3%	Rectangular	$\sqrt{3}$	1	1	±1.73%	±1.73%	∞
u13	Probe positioner mechanical tolerance	±0.4%	Rectangular	$\sqrt{3}$	1	1	±0.23%	±0.23%	∞
u14	Probe positioning with respect to phantom shell	±2.9%	Rectangular	$\sqrt{3}$	1	1	±1.67%	±1.67%	∞
u15	Extrapolation,interpolation and integration algorithms for max. SAR evaluation	±1%	Rectangular	$\sqrt{3}$	1	1	±0.58%	±0.58%	∞
System validation source (dipole)									
u16	Deviation of experimental dipole from numerical dipole	±2%	Normal	1	1	1	±2%	±2%	∞
u17	Input power and SAR drift measurement	±1%	Rectangular	$\sqrt{3}$	1	1	±0.58%	±0.58%	∞
u18	Dipole axis to liquid distance	±5%	Rectangular	$\sqrt{3}$	1	1	±2.89%	±2.89%	∞
Phantom and set-up									
u19	Phantom shell uncertainty—thickness and permittivity	±4%	Rectangular	$\sqrt{3}$	1	1	±2.31%	±2.31%	∞
u20	Uncertainty in SAR correction for deviations in permittivity and conductivity	±2%	Normal	1	1	0.84	±2%	±1.68%	∞
u21	Liquid conductivity measurement	±2.5%	Normal	1	0.78	0.71	±1.95%	±1.78%	M
u22	Liquid permittivity measurement	±2.5%	Normal	1	0.23	0.26	±0.58%	±0.65%	M
u23	Liquid conductivity—temperature uncertainty	±2.5%	Rectangular	$\sqrt{3}$	0.78	0.71	±1.13%	±1.02%	∞
u24	Liquid permittivity—temperature uncertainty	±2.5%	Rectangular	$\sqrt{3}$	0.23	0.26	±0.33%	±0.38%	∞
Combined standard uncertainty			RSS				±8.73%	±8.62%	∞
Expanded uncertainty (95% CONFIDENCE LEVEL)			k=2				±17.46%	±17.23%	

Table 6. Uncertainty Budget for frequency range 300MHz to 3GHz

7. Measurement Procedure

The measurement procedures are as follows:

1. Measure output power through RF cable and power meter
2. Set scan area, grid size and other setting on the DASY software
3. Find out the largest SAR result on these testing positions of each band

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

1. Power reference measurement
2. Area scan
3. Zoom scan
4. Power drift measurement

7.1 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

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

7.2 Area & Zoom Scan Procedures

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 measures points and step size follow as below. The Zoom Scan is performed around the highest E-field value to determine the averaged SAR-distribution over 10 g.

Grid Type	Frequency		Step size (mm)			X*Y*Z (Point)	Cube size			Step size		
			X	Y	Z		X	Y	Z	X	Y	Z
uniform grid	≦ 3GHz	≦2GHz	≤ 8	≤ 8	≤ 5	5*5*7	32	32	30	8	8	5
		2G - 3G	≤ 5	≤ 5	≤ 5	7*7*7	30	30	30	5	5	5
	3 - 6GHz	3 - 4GHz	≤ 5	≤ 5	≤ 4	7*7*8	30	30	28	5	5	4
		4 - 5GHz	≤ 4	≤ 4	≤ 3	8*8*10	28	28	27	4	4	3
		5 - 6GHz	≤ 4	≤ 4	≤ 2	8*8*12	28	28	22	4	4	2

(Our measure settings are refer KDB Publication 865664 D01v01r04)

7.3 Volume Scan Procedures

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 DUT 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.

7.4 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.

7.5 Power Drift Monitoring

All SAR testing is under the DUT 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 DUT 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.

8. Conducted Power

The conducted power turn-up tolerance, please reference manufacturer specification.

■ **Measurement result**

EUT Battery	Fully-charged with Li-ion Battery					
Frequency Band	Channel	Frequency (MHz)	Duty Cycle	Time-Avg. Power Tune-up Range (dBm)		
				Min	Nominal	Max.
GMRS	4	462.637	1	35	36	37
FRS	11	467.638	1	25	26	27

EUT Battery	Fully-charged with Alkaline Battery					
Frequency Band	Channel	Frequency (MHz)	Duty Cycle	Time-Avg. Power Tune-up Range (dBm)		
				Min	Nominal	Max.
GMRS	4	462.637	1	31	32	33
FRS	11	467.638	1	25	26	27

9. *Evaluation of SAR Test*

9.1 Evaluation of SAR Test Reduction

■ **General:**

1. The test data reported are the worst-case SAR value with the position set in a typical configuration. Test procedures used were according to IEEE1528-2013..
2. All modes of operation were investigated, and worst-case results are reported.
3. Tissue parameters and temperatures are listed on the SAR plots.
4. Batteries are fully charged for all readings.

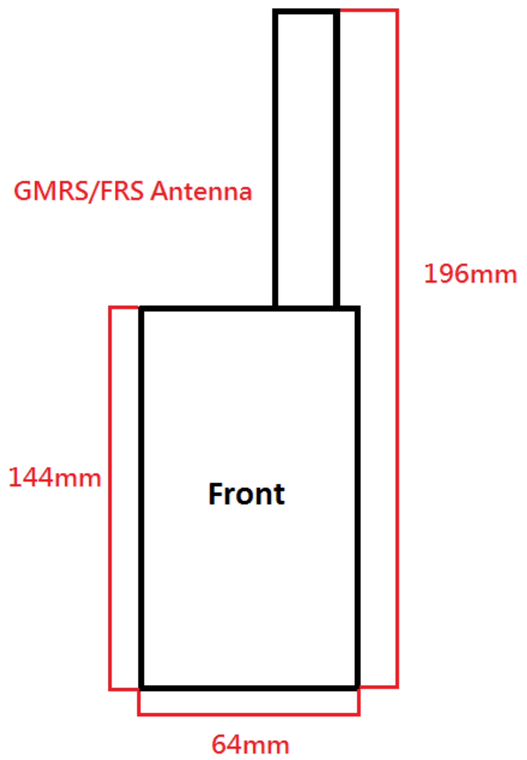
■ **According to FCC KDB KDB 447498:**

1. The test data reported are the worst-case SAR value with the position set in a typical configuration. Test procedures used were according to IEEE1528-2013.

■ **According to FCC KDB 865664:**

1. Repeated measurement is not required when the original highest measured SAR is < 0.80 W/kg.
2. When the original highest measured SAR is ≥ 0.80 W/kg, repeat that measurement once.
3. Perform a second repeated measurement only if the ratio of largest to smallest SAR for the original and first repeated measurements is > 1.20 or when the original or repeated measurement is ≥ 1.45 W/kg.
4. Perform a third repeated measurement only if the original, first or second repeated measurement is ≥ 1.5 W/kg and the ratio of largest to smallest SAR for the original, first and second repeated measurements is > 1.20.

9.2 Antenna Location



9.3 Stand-alone SAR Evaluate

Transmitter and antenna implementation as below:

Band	GMRS Antenna	FRS Antenna
GMRS	V	-
FRS	-	V

Stand-alone transmission configurations as below:

Band	Front	Back
GMRS	V	V
FRS	V	V

10. Test Results

Note:

1. According to the FCC guidance, FCC are willing to provide an exception and allow us to test the device with the power supply.Also, a “pre-heat” time is acceptable too.
2. 8.2V is simulation output power of Li-ion battery, and 6V is simulation voltage output of Alkaline battery.
3. The Reported SAR should be scale up twice. First SAR scale up is through 100% duty factor scaled to max tune-up tolerance. Second SAR scale up is for 50% duty factor for PTT ,which through 100% duty factor's reported SAR scaled to SAR 50% duty factor. However , the final data will be based in second result of SAR scale up.
4. The Alk pack battery could insert 4 AA battery with PCM protection.The typical full power voltage is around 6V, which is much lower than the li-battery (typical 7.4V, full power 8.2V).
5. The device have some mechanism could recognize either attached the ALK-battery or Li-battery, if the ALK-battery has been detected, the SW will automatically limit the power to maximum 2W (5W are not allow for the ALK-battery).
6. A non-standard test setup was used for SAR testing based on guidance from the FCC. The operational description contains additional information.

10.1 Applicable Limit Regulations

Accroding ANSI/IEEE C95.1 - IEEE Standard for Safety Levels with Respect to Human Exposure to Radio Frequency Electromagnetic Fields, 3 kHz to 300 GHz.

Safety Limits for Partial Body Exposure		
Human Exposure	Population Uncontrolled Exposure (W/kg) or (mW/g)	Occupational Controlled Exposure (W/kg) or (mW/g)
Spatial Peak SAR* (head)	1.60	8.00
Spatial Peak SAR** (Whole Body)	0.08	0.40
Spatial Peak SAR*** (Partial-Body)	1.60	8.00
Spatial Peak SAR**** (Hands / Feet / Ankle / Wrist)	4.00	20.00

NOTE：

* The Spatial Peak value of the SAR averaged over any 1 gram of tissue.
(defined as a tissue volume in the shape of a cube) and over the appropriate averaging time.

** The Spatial Average value of the SAR averaged over the whole – body.

*** The Spatial Average value of the SAR averaged over the partial – body.

**** The Spatial Peak value of the SAR averaged over any 10 grams of tissue.
(defined as a tissue volume in the shape of a cube) and over the appropriate averaging time.

Population / Uncontrolled Environments：are defined as locations where there is the exposure of individuals who have no knowledge or control of their exposure.

Occupational / Controlled Environments：are defined as locations where there is exposure that may be incurred by persons who are aware of the potential for exposure, (i.e. as a result of employment or occupation).

10.2 Brain SAR Results

Test Position	Band	Ch.	Frequency (MHz)	Spacing (mm)	Battery	ASSY	SAR 1g (W/Kg)	Power Drift	Avg Power	Max tune-up	Reported SAR 1g (W/Kg)
Front	GMRS	4	462.637	25	Power supply_8.2V_5W_ Pre-heat 30min	N/A	2.72	-0.09	36.42	37	3.11
Front	GMRS	4	462.637	25	Power supply_6V_2W	N/A	1.44	-0.02	32.90	33	1.47
Front	FRS	11	467.638	25	Power supply_8.2V_0.5W	N/A	0.69	-0.04	26.91	27	0.71

◆ **SAR values are scaled for the power drift**

Band	Ch.	Battery	ASSY.	SAR_{1g}[W/Kg] Duty Cycle		power drift (dB)	+ power drift 10^(dB/10)	SAR_{1g}[W/Kg] (include +power drift) Duty Cycle		Remark
				100%	50%			100%	50%	
GMRS	4	Power supply_8.2V_5W_ Pre-heat 30min	N/A	3.11	1.55	-0.091000	1.021	3.17	1.59	---
FRS	4	Power supply_6V_2W	N/A	1.47	0.74	-0.022000	1.005	1.48	0.74	---
FRS	11	Power supply_8.2V_0.5W	N/A	0.71	0.35	-0.042000	1.010	0.71	0.36	---

SAR is basically proportional to average transmit power and duty cycle

(i.e. SAR = P x T where P is the average transmit power and T is the transmit duty cycle).

SAR(unknown) = SAR(know) x (PxTx/P(known) T(known))

Where Px is the unknown power (i.e. the power at the highest drift)

Tx is the transmit duty cycle used at that unknown power.

If transmitter duty cycle is the same then it should be a relationship of Px/Pknown)

10.3 Muscle SAR Results

Test Position	Band	Ch.	Frequency (MHz)	Spacing (mm)	Battery	ASSY	SAR $_{1g}$ (W/Kg)	Power Drift	Avg Power	Max tune-up	Reported SAR $_{1g}$ (W/Kg)
Back	GMRS	4	462.637	10	Power supply_8.2V_5W_ Pre-heat 30min	010-10347-00-Headset	2.54	0.05	36.42	37	2.90
Back	GMRS	4	462.637	10	Power supply_6V_2W	010-10347-00-Headset	0.69	-0.04	32.90	33	0.70
Back	GMRS	4	462.637	10	Power supply_8.2V_5W_ Pre-heat 30min	010-11757-00-Headset	2.26	0.19	36.42	37	2.58
Back	GMRS	4	462.637	10	Power supply_8.2V_5W_ Pre-heat 30min	010-10346-00-Headset	2.49	-0.12	36.42	37	2.85
Back	FRS	11	467.638	10	Power supply_8.2V_0.5W	010-10347-00-Headset	0.65	-0.03	26.91	27	0.66
Back	GMRS	4	462.637	0	Power supply_8.2V_5W_ Pre-heat 30min	010-11022-20-Belt clip_010-10347-00-Headset	2.65	-0.04	36.42	37	3.03
Back	GMRS	4	462.637	0	Power supply_6V_2W	010-11022-20-Belt clip_010-10347-00-Headset	0.80	-0.05	32.90	33	0.82
Back	GMRS	4	462.637	0	Power supply_8.2V_5W_ Pre-heat 30min	010-11734-20-Belt clip_010-10347-00-Headset	2.21	-0.03	36.42	37	2.53
Back	GMRS	4	462.637	0	Power supply_8.2V_5W_ Pre-heat 30min	145-01383-00+ 013-00063-00-Belt clip_010-10347-00-Headset	1.61	-0.05	36.42	37	1.84
Back	FRS	11	467.638	0	Power supply_8.2V_0.5W	010-11022-20-Belt clip_010-10347-00-Headset	0.75	0.09	26.91	27	0.77

◆ **SAR values are scaled for the power drift**

Band	Ch.	Battery	ASSY.	SAR_{1g}[W/Kg] Duty Cycle 100%	SAR_{1g}[W/Kg] Duty Cycle 50%	power drift (dB)	+ power drift 10^(dB/10)	SAR_{1g}[W/Kg] (include +power drift) Duty Cycle 100%	SAR_{1g}[W/Kg] (include +power drift) Duty Cycle 50%	Remark
GMRS	4	Power supply_8.2V_5W_ Pre-heat 30min	010-10347-00-Headset	2.90	1.45	0.048000	1.011	2.94	1.47	---
	4	Power supply_6V_2W	010-10347-00-Headset	0.70	0.35	-0.039000	1.009	0.71	0.35	---
	4	Power supply_8.2V_5W_ Pre-heat 30min	010-11757-00-Headset	2.58	1.29	0.191000	1.045	2.70	1.35	---
	4	Power supply_8.2V_5W_ Pre-heat 30min	010-10346-00-Headset	2.85	1.42	-0.121000	1.028	2.93	1.46	---
FRS	11	Power supply_8.2V_0.5W	010-10347-00-Headset	0.66	0.33	-0.028000	1.006	0.67	0.33	---
GMRS	4	Power supply_8.2V_5W_ Pre-heat 30min	010-11022-20-Belt clip_ 010-10347-00-Headset	3.03	1.51	-0.035000	1.008	3.05	1.53	---
	4	Power supply_6V_2W	010-11022-20-Belt clip_ 010-10347-00-Headset	0.82	0.41	-0.046000	1.011	0.83	0.42	---
	4	Power supply_8.2V_5W_ Pre-heat 30min	010-11734-20-Belt clip_ 010-10347-00-Headset	2.53	1.26	-0.028000	1.006	2.54	1.27	---
	4	Power supply_8.2V_5W_ Pre-heat 30min	145-01383-00+013-00063-00-Belt clip_ 010-10347-00-Headset	1.84	0.92	-0.046000	1.011	1.86	0.93	---
FRS	11	Power supply_8.2V_0.5W	010-11022-20-Belt clip_ 010-10347-00-Headset	0.77	0.39	0.091000	1.021	0.79	0.39	---

SAR is basically proportional to average transmit power and duty cycle

(i.e. SAR = P x T where P is the average transmit power and T is the transmit duty cycle).

SAR(unknown) = SAR(know) x (PxTx/P(known) T(known))

Where Px is the unknown power (i.e. the power at the highest drift)

Tx is the transmit duty cycle used at that unknown power.

If transmitter duty cycle is the same then it should be a relationship of Px/Pknown)

10.4 SAR Variability Results

- **Test Condition of Variability:**

1. The original highest measured Reported SAR 1g (50% Duty factor) is ≥ 0.80 W/kg, repeat that measurement once.
2. Perform a second repeated measurement the ratio of largest to smallest SAR(50% Duty factor) for the original and first repeated measurements is < 1.2,the original or repeated measurement(50% Duty factor) is ≥ 1.45 W/kg (~ 10% from the 1-g SAR limit).
3. Perform a third repeated measurement only if the original, first or second repeated measurement(50% Duty factor) is ≥ 1.5 W/kg and the ratio of largest to smallest SAR for the original, first and second repeated measurements is > 1.20.

Original Index	Phantom Position	Operate Band	Ch.	Side to Phantom	Original SAR_{1g} (W/Kg)	First SAR_{1g} (W/Kg)	First Ratio	Second SAR_{1g} (W/Kg)	Second Ratio	Third SAR_{1g} (W/Kg)	Third Ratio
#5	Brain	GMRS	4	Front	2.72	2.68	1.01	2.58	1.05	2.68	1.01
#3	Muscle	GMRS	4	Back	2.65	2.63	1.01	2.64	1	2.59	1.02

Appendix A - System Performance Check

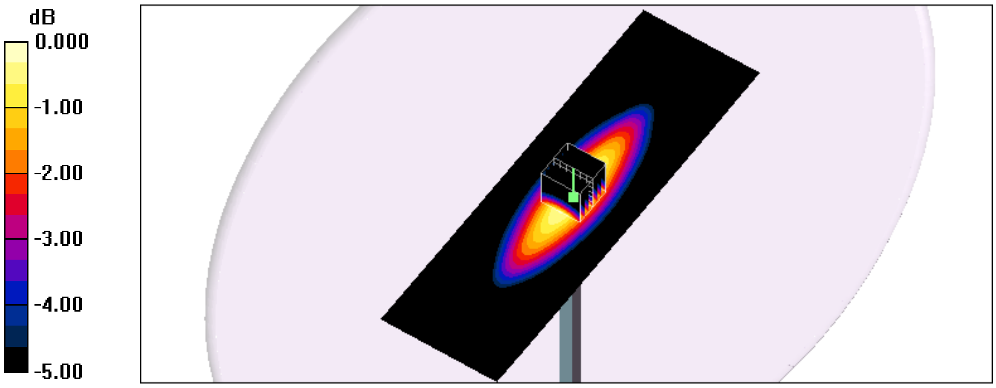
Test Laboratory: A Test Lab Techno Corp.
Date/Time: 5/27/2016 04:08:00 AM

System Performance Check at 450MHz_20160527_Head
DUT: Dipole 450MHz; Type: D450V2; Serial: D450V2 SN:1021

Communication System: CW; Frequency: 450 MHz;Duty Cycle: 1:1
Medium parameters used: f = 450 MHz; σ = 0.87 mho/m; εr = 43.7; ρ = 1000 kg/m3
Phantom section: Flat Section
Measurement Standard: DASY4 (High Precision Assessment)
DASY4 Configuration:
Area Scan setting - Find Secondary Maximum Within:2.0dB and with a peak SAR value greater than 0.5 W/Kg
Probe: EX3DV4 - SN3847; ConvF(10.69, 10.69, 10.69); Calibrated: 4/14/2016
Sensor-Surface: 2mm (Mechanical Surface Detection)
Electronics: DAE4 Sn779; Calibrated: 3/2/2016
Phantom: ELI 4.0; Type: QDOVA001BB; Serial: 1036
Measurement SW: DASY4, V4.7 Build 80;Postprocessing SW: SEMCAD, V1.8 Build 186

System performance cheek at 450MHz/Area Scan (61x201x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 1.52 W/kg

System performance cheek at 450MHz/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 42.3 V/m; Power Drift = 0.000 dB
Peak SAR (extrapolated) = 1.80 W/kg
SAR(1 g) = 1.2 W/kg; SAR(10 g) = 0.813 W/kg
Maximum value of SAR (measured) = 1.52 W/kg



0 dB = 1.52W/kg

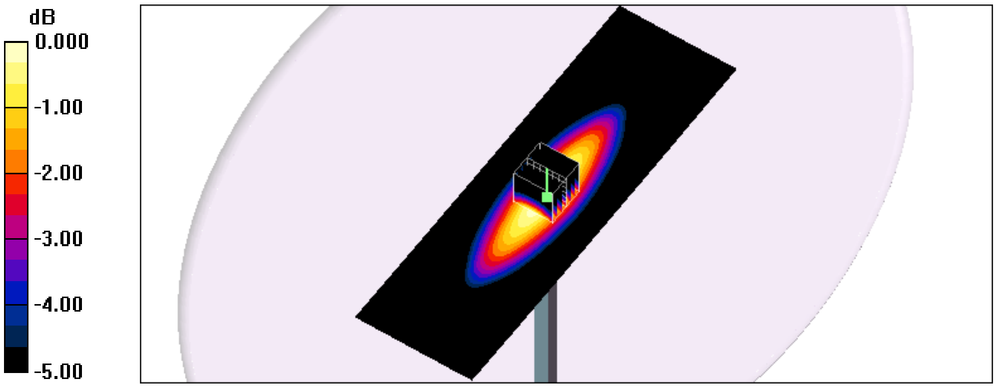
Test Laboratory: A Test Lab Techno Corp.
Date/Time: 5/27/2016 02:02:16 AM

System Performance Check at 450MHz_20160527_Body
DUT: Dipole 450MHz; Type: D450V2; Serial: D450V2 SN:1021

Communication System: CW; Frequency: 450 MHz;Duty Cycle: 1:1
Medium parameters used: f = 450 MHz; σ = 0.938 mho/m; εr = 58.4; ρ = 1000 kg/m3
Phantom section: Flat Section
Measurement Standard: DASY4 (High Precision Assessment)
DASY4 Configuration:
Area Scan setting - Find Secondary Maximum Within:2.0dB and with a peak SAR value greater than 0.5 W/Kg
Probe: EX3DV4 - SN3847; ConvF(11.13, 11.13, 11.13); Calibrated: 4/14/2016
Sensor-Surface: 2mm (Mechanical Surface Detection)
Electronics: DAE4 Sn779; Calibrated: 3/2/2016
Phantom: ELI 4.0; Type: QDOVA001BB; Serial: 1036
Measurement SW: DASY4, V4.7 Build 80;Postprocessing SW: SEMCAD, V1.8 Build 186

System performance cheek at 450MHz/Area Scan (61x201x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 1.42 W/kg

System performance cheek at 450MHz/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 39.0 V/m; Power Drift = -0.016 dB
Peak SAR (extrapolated) = 1.67 W/kg
SAR(1 g) = 1.16 W/kg; SAR(10 g) = 0.767 W/kg
Maximum value of SAR (measured) = 1.40 W/kg



0 dB = 1.40W/kg

Appendix B -   SAR Measurement Data

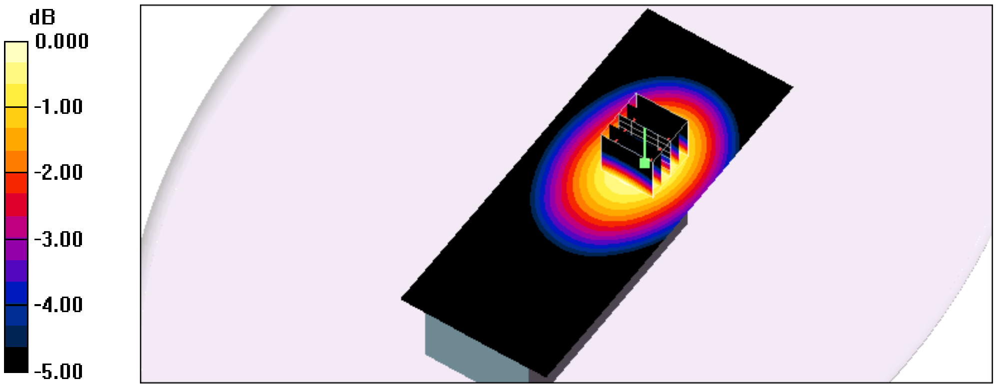
Test Laboratory: A Test Lab Techno Corp.
Date/Time: 5/27/2016 11:15:47 AM

5_GMRS CH4_Front_25mm_Brain_Power supply_8.2V_5W_Pre-heat 30min
DUT: A02963; Type: GPS & Two-Way Radio; Serial: N/A

Communication System: GMRS; Frequency: 462.637 MHz;Duty Cycle: 1:1
Medium parameters used: f = 463 MHz; σ = 0.882 mho/m; εr = 43.5; ρ = 1000 kg/m3
Phantom section: Flat Section
Measurement Standard: DASY4 (High Precision Assessment)
DASY4 Configuration:
Area Scan setting - Find Secondary Maximum Within:2.0dB and with a peak SAR value greater than 0.5 W/Kg
Probe: EX3DV4 - SN3847; ConvF(10.69, 10.69, 10.69); Calibrated: 4/14/2016
Sensor-Surface: 2mm (Mechanical Surface Detection)
Electronics: DAE4 Sn779; Calibrated: 3/2/2016
Phantom: ELI 4.0; Type: QDOVA001BB; Serial: 1036
Measurement SW: DASY4, V4.7 Build 80;Postprocessing SW: SEMCAD, V1.8 Build 186

Flat/Area Scan (61x151x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 3.28 W/kg

Flat/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 52.4 V/m; Power Drift = -0.091 dB
Peak SAR (extrapolated) = 3.76 W/kg
SAR(1 g) = 2.72 W/kg; SAR(10 g) = 1.99 W/kg
Maximum value of SAR (measured) = 3.27 W/kg



0 dB = 3.27W/kg

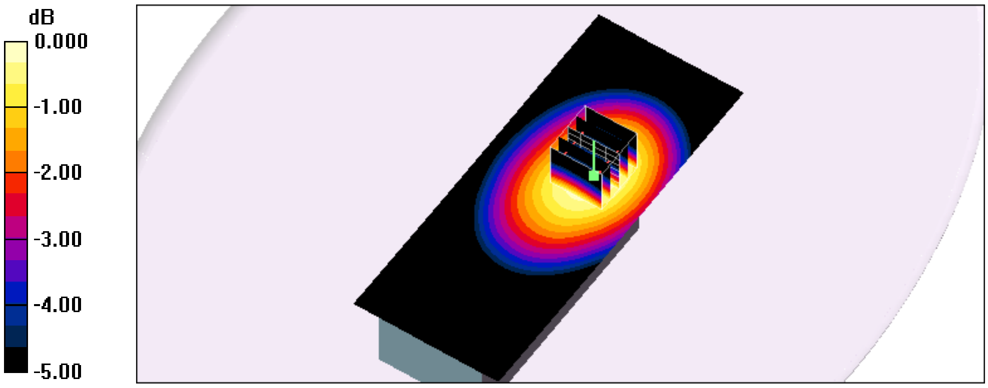
Test Laboratory: A Test Lab Techno Corp.
Date/Time: 5/27/2016 07:55:08 PM

12_GMRS CH4_Front_25mm_Brain_Power supply_6V_2W
DUT: A02963; Type: GPS & Two-Way Radio; Serial: N/A

Communication System: GMRS; Frequency: 462.637 MHz;Duty Cycle: 1:1
Medium parameters used: f = 463 MHz; σ = 0.882 mho/m; εr = 43.5; ρ = 1000 kg/m3
Phantom section: Flat Section
Measurement Standard: DASY4 (High Precision Assessment)
DASY4 Configuration:
Area Scan setting - Find Secondary Maximum Within:2.0dB and with a peak SAR value greater than 0.5 W/Kg
Probe: EX3DV4 - SN3847; ConvF(10.69, 10.69, 10.69); Calibrated: 4/14/2016
Sensor-Surface: 2mm (Mechanical Surface Detection)
Electronics: DAE4 Sn779; Calibrated: 3/2/2016
Phantom: ELI 4.0; Type: QDOVA001BB; Serial: 1036
Measurement SW: DASY4, V4.7 Build 80;Postprocessing SW: SEMCAD, V1.8 Build 186

Flat/Area Scan (61x151x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 1.71 W/kg

Flat/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 39.2 V/m; Power Drift = -0.022 dB
Peak SAR (extrapolated) = 1.96 W/kg
SAR(1 g) = 1.44 W/kg; SAR(10 g) = 1.07 W/kg
Maximum value of SAR (measured) = 1.71 W/kg



0 dB = 1.71W/kg

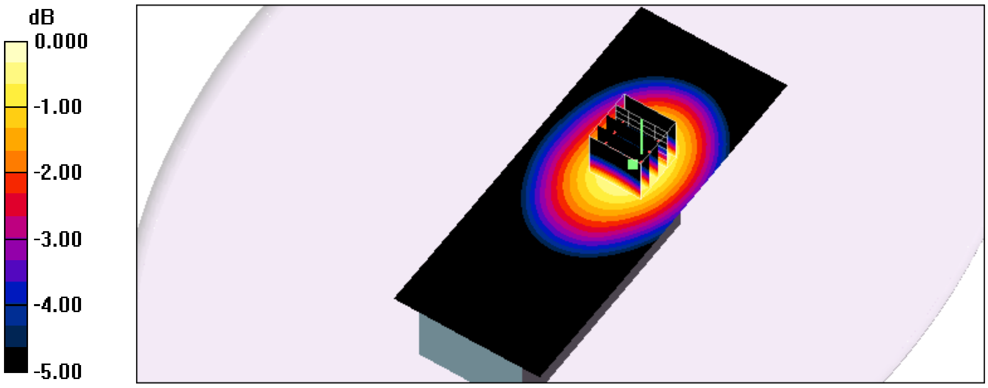
Test Laboratory: A Test Lab Techno Corp.
Date/Time: 5/27/2016 11:48:42 AM

6_FRS CH11_Front_25mm_Brain_Power supply_8.2V_0.5W
DUT: A02963; Type: GPS & Two-Way Radio; Serial: N/A

Communication System: FRS; Frequency: 467.638 MHz;Duty Cycle: 1:1
Medium parameters used: f = 468 MHz; σ = 0.887 mho/m; εr = 43.4; ρ = 1000 kg/m3
Phantom section: Flat Section
Measurement Standard: DASY4 (High Precision Assessment)
DASY4 Configuration:
Area Scan setting - Find Secondary Maximum Within:2.0dB and with a peak SAR value greater than 0.5 W/Kg
Probe: EX3DV4 - SN3847; ConvF(10.69, 10.69, 10.69); Calibrated: 4/14/2016
Sensor-Surface: 2mm (Mechanical Surface Detection)
Electronics: DAE4 Sn779; Calibrated: 3/2/2016
Phantom: ELI 4.0; Type: QDOVA001BB; Serial: 1036
Measurement SW: DASY4, V4.7 Build 80;Postprocessing SW: SEMCAD, V1.8 Build 186

Flat/Area Scan (61x151x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 0.835 W/kg

Flat/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 26.8 V/m; Power Drift = -0.042 dB
Peak SAR (extrapolated) = 0.951 W/kg
SAR(1 g) = 0.691 W/kg; SAR(10 g) = 0.505 W/kg
Maximum value of SAR (measured) = 0.831 W/kg



0 dB = 0.831W/kg

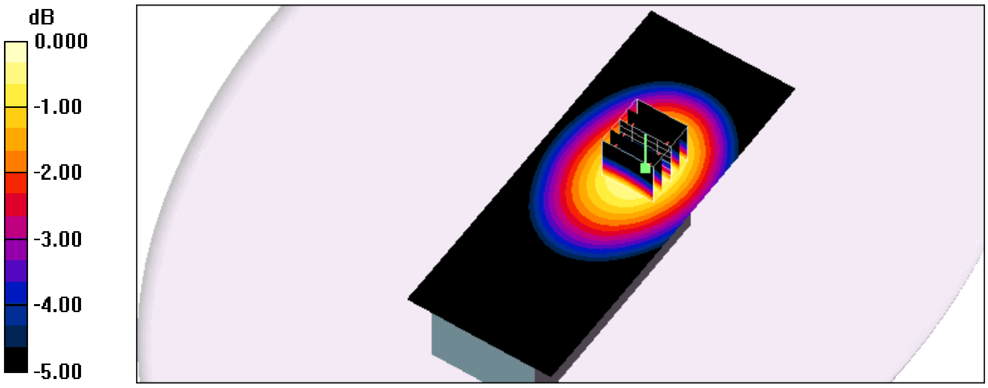
Test Laboratory: A Test Lab Techno Corp.
Date/Time: 5/27/2016 12:20:03 PM

9_GMRS CH4_Front_25mm_original 5_Brain_Power supply_8.2V_5W_Pre-heat 30min _measurement once
DUT: A02963; Type: GPS & Two-Way Radio; Serial: N/A

Communication System: GMRS; Frequency: 462.637 MHz;Duty Cycle: 1:1
Medium parameters used: f = 463 MHz; σ = 0.882 mho/m; εr = 43.5; ρ = 1000 kg/m3
Phantom section: Flat Section
Measurement Standard: DASY4 (High Precision Assessment)
DASY4 Configuration:
Area Scan setting - Find Secondary Maximum Within:2.0dB and with a peak SAR value greater than 0.5 W/Kg
Probe: EX3DV4 - SN3847; ConvF(10.69, 10.69, 10.69); Calibrated: 4/14/2016
Sensor-Surface: 2mm (Mechanical Surface Detection)
Electronics: DAE4 Sn779; Calibrated: 3/2/2016
Phantom: ELI 4.0; Type: QDOVA001BB; Serial: 1036
Measurement SW: DASY4, V4.7 Build 80;Postprocessing SW: SEMCAD, V1.8 Build 186

Flat/Area Scan (61x151x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 3.17 W/kg

Flat/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 52.6 V/m; Power Drift = 0.089 dB
Peak SAR (extrapolated) = 3.66 W/kg
SAR(1 g) = 2.68 W/kg; SAR(10 g) = 1.96 W/kg
Maximum value of SAR (measured) = 3.20 W/kg



0 dB = 3.20W/kg

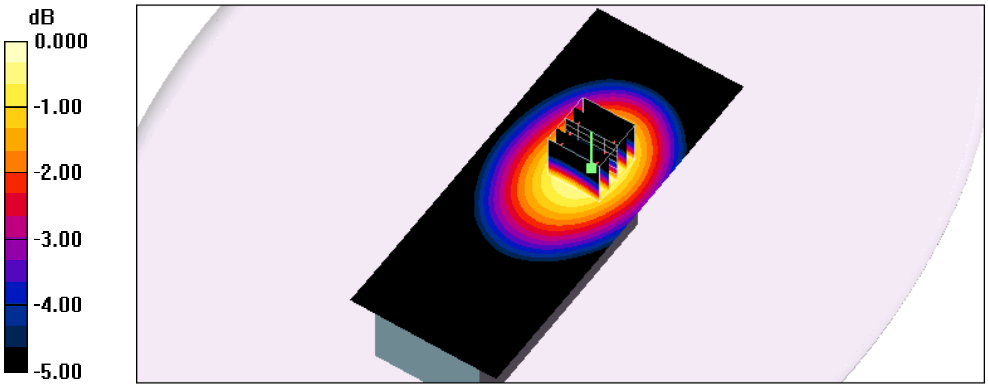
Test Laboratory: A Test Lab Techno Corp.
Date/Time: 5/27/2016 12:56:11 PM

15_GMRS CH4_Front_25mm_original 5_Brain_Power supply_8.2V_5W_Pre-heat 30min _measurement second
DUT: A02963; Type: GPS & Two-Way Radio; Serial: N/A

Communication System: GMRS; Frequency: 462.637 MHz;Duty Cycle: 1:1
Medium parameters used: f = 463 MHz; σ = 0.882 mho/m; εr = 43.5; ρ = 1000 kg/m3
Phantom section: Flat Section
Measurement Standard: DASY4 (High Precision Assessment)
DASY4 Configuration:
Area Scan setting - Find Secondary Maximum Within:2.0dB and with a peak SAR value greater than 0.5 W/Kg
Probe: EX3DV4 - SN3847; ConvF(10.69, 10.69, 10.69); Calibrated: 4/14/2016
Sensor-Surface: 2mm (Mechanical Surface Detection)
Electronics: DAE4 Sn779; Calibrated: 3/2/2016
Phantom: ELI 4.0; Type: QDOVA001BB; Serial: 1036
Measurement SW: DASY4, V4.7 Build 80;Postprocessing SW: SEMCAD, V1.8 Build 186

Flat/Area Scan (61x151x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 3.05 W/kg

Flat/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 52.6 V/m; Power Drift = 0.112 dB
Peak SAR (extrapolated) = 3.53 W/kg
SAR(1 g) = 2.58 W/kg; SAR(10 g) = 1.89 W/kg
Maximum value of SAR (measured) = 3.08 W/kg



0 dB = 3.08W/kg

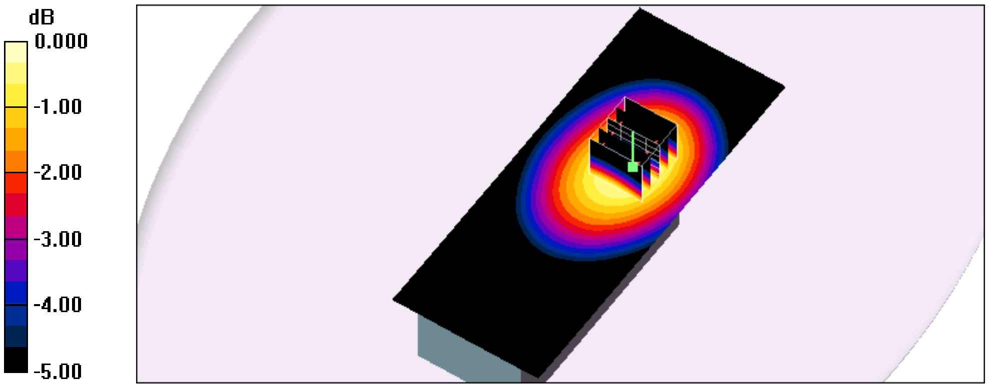
Test Laboratory: A Test Lab Techno Corp.
Date/Time: 5/27/2016 01:27:47 PM

16_GMRS CH4_Front_25mm_original 5_Brain_Power supply_8.2V_5W_Pre-heat 30min _measurement third
DUT: A02963; Type: GPS & Two-Way Radio; Serial: N/A

Communication System: GMRS; Frequency: 462.637 MHz;Duty Cycle: 1:1
Medium parameters used: f = 463 MHz; σ = 0.882 mho/m; εr = 43.5; ρ = 1000 kg/m3
Phantom section: Flat Section
Measurement Standard: DASY4 (High Precision Assessment)
DASY4 Configuration:
Area Scan setting - Find Secondary Maximum Within:2.0dB and with a peak SAR value greater than 0.5 W/Kg
Probe: EX3DV4 - SN3847; ConvF(10.69, 10.69, 10.69); Calibrated: 4/14/2016
Sensor-Surface: 2mm (Mechanical Surface Detection)
Electronics: DAE4 Sn779; Calibrated: 3/2/2016
Phantom: ELI 4.0; Type: QDOVA001BB; Serial: 1036
Measurement SW: DASY4, V4.7 Build 80;Postprocessing SW: SEMCAD, V1.8 Build 186

Flat/Area Scan (61x151x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 3.18 W/kg

Flat/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 52.6 V/m; Power Drift = 0.018 dB
Peak SAR (extrapolated) = 3.67 W/kg
SAR(1 g) = 2.68 W/kg; SAR(10 g) = 1.97 W/kg
Maximum value of SAR (measured) = 3.21 W/kg



0 dB = 3.21W/kg

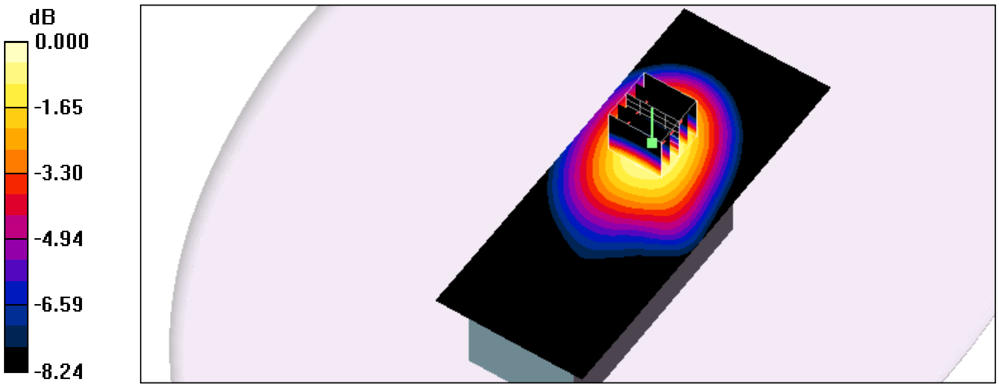
Test Laboratory: A Test Lab Techno Corp.
Date/Time: 5/27/2016 09:54:59 AM

1_GMRS CH4_Back_10mm_Muscle_010-10347-00-Headset_Power supply_8.2V_5W_Pre-heat 30min
DUT: A02963; Type: GPS & Two-Way Radio; Serial: N/A

Communication System: GMRS; Frequency: 462.637 MHz;Duty Cycle: 1:1
Medium parameters used: f = 463 MHz; σ = 0.949 mho/m; εr = 58.3; ρ = 1000 kg/m3
Phantom section: Flat Section
Measurement Standard: DASY4 (High Precision Assessment)
DASY4 Configuration:
Area Scan setting - Find Secondary Maximum Within:2.0dB and with a peak SAR value greater than 0.5 W/Kg
Probe: EX3DV4 - SN3847; ConvF(11.13, 11.13, 11.13); Calibrated: 4/14/2016
Sensor-Surface: 2mm (Mechanical Surface Detection)
Electronics: DAE4 Sn779; Calibrated: 3/2/2016
Phantom: ELI 4.0; Type: QDOVA001BB; Serial: 1036
Measurement SW: DASY4, V4.7 Build 80;Postprocessing SW: SEMCAD, V1.8 Build 186

Flat/Area Scan (61x81x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 3.02 W/kg

Flat/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 47.9 V/m; Power Drift = 0.048 dB
Peak SAR (extrapolated) = 3.47 W/kg
SAR(1 g) = 2.54 W/kg; SAR(10 g) = 1.86 W/kg
Maximum value of SAR (measured) = 3.03 W/kg



0 dB = 3.03W/kg

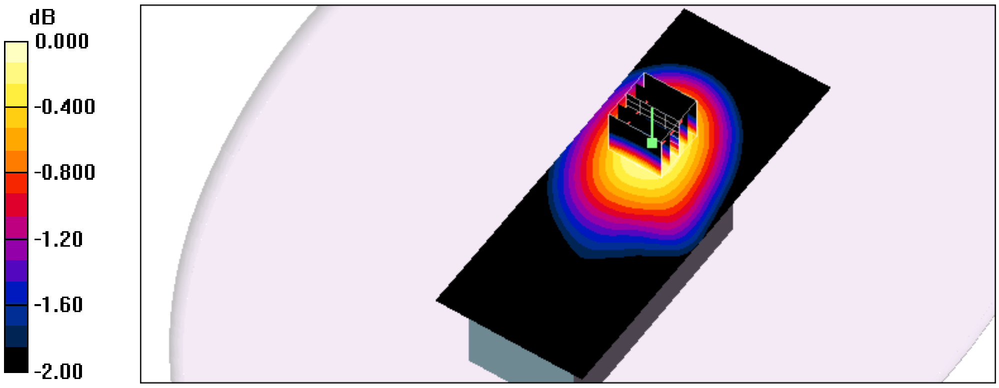
Test Laboratory: A Test Lab Techno Corp.
Date/Time: 5/27/2016 01:53:17 PM

13_GMRS CH4_Back_10mm_Muscle_010-10347-00-Headset_Power supply_6V_2W
DUT: A02963; Type: GPS & Two-Way Radio; Serial: N/A

Communication System: GMRS; Frequency: 462.637 MHz;Duty Cycle: 1:1
Medium parameters used: f = 463 MHz; σ = 0.949 mho/m; εr = 58.3; ρ = 1000 kg/m3
Phantom section: Flat Section
Measurement Standard: DASY4 (High Precision Assessment)
DASY4 Configuration:
Area Scan setting - Find Secondary Maximum Within:2.0dB and with a peak SAR value greater than 0.5 W/Kg
Probe: EX3DV4 - SN3847; ConvF(11.13, 11.13, 11.13); Calibrated: 4/14/2016
Sensor-Surface: 2mm (Mechanical Surface Detection)
Electronics: DAE4 Sn779; Calibrated: 3/2/2016
Phantom: ELI 4.0; Type: QDOVA001BB; Serial: 1036
Measurement SW: DASY4, V4.7 Build 80;Postprocessing SW: SEMCAD, V1.8 Build 186

Flat/Area Scan (61x81x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 0.815 W/kg

Flat/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 23.3 V/m; Power Drift = -0.039 dB
Peak SAR (extrapolated) = 0.926 W/kg
SAR(1 g) = 0.685 W/kg; SAR(10 g) = 0.514 W/kg
Maximum value of SAR (measured) = 0.813 W/kg



0 dB = 0.813W/kg

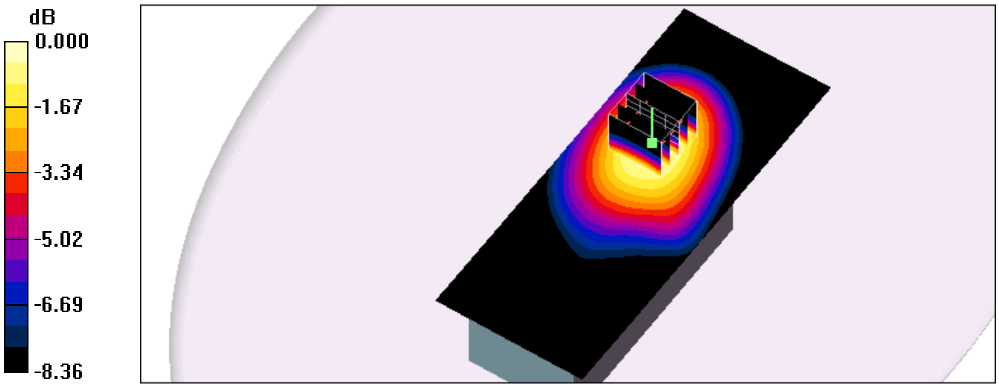
Test Laboratory: A Test Lab Techno Corp.
Date/Time: 5/27/2016 02:49:39 PM

7_GMRS CH4_Back_10mm_Muscle_010-11757-00-Headset_Power supply_8.2V_5W_Pre-heat 30min
DUT: A02963; Type: GPS & Two-Way Radio; Serial: N/A

Communication System: GMRS; Frequency: 462.637 MHz;Duty Cycle: 1:1
Medium parameters used: f = 463 MHz; σ = 0.949 mho/m; εr = 58.3; ρ = 1000 kg/m3
Phantom section: Flat Section
Measurement Standard: DASY4 (High Precision Assessment)
DASY4 Configuration:
Area Scan setting - Find Secondary Maximum Within:2.0dB and with a peak SAR value greater than 0.5 W/Kg
Probe: EX3DV4 - SN3847; ConvF(11.13, 11.13, 11.13); Calibrated: 4/14/2016
Sensor-Surface: 2mm (Mechanical Surface Detection)
Electronics: DAE4 Sn779; Calibrated: 3/2/2016
Phantom: ELI 4.0; Type: QDOVA001BB; Serial: 1036
Measurement SW: DASY4, V4.7 Build 80;Postprocessing SW: SEMCAD, V1.8 Build 186

Flat/Area Scan (61x81x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 2.67 W/kg

Flat/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 45.3 V/m; Power Drift = 0.191 dB
Peak SAR (extrapolated) = 3.13 W/kg
SAR(1 g) = 2.26 W/kg; SAR(10 g) = 1.67 W/kg
Maximum value of SAR (measured) = 2.70 W/kg



0 dB = 2.70W/kg

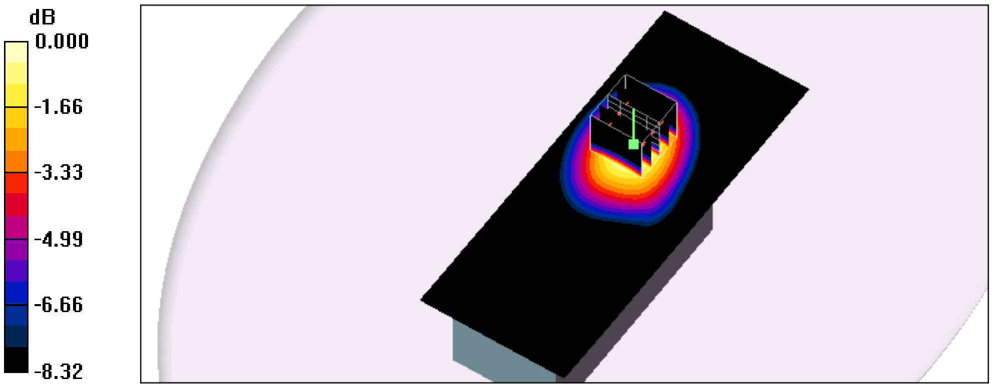
Test Laboratory: A Test Lab Techno Corp.
Date/Time: 5/27/2016 03:42:37 PM

8_GMRS CH4_Back_10mm_Muscle_010-10346-00-Headset_Power supply_8.2V_5W_Pre-heat 30min
DUT: A02963; Type: GPS & Two-Way Radio; Serial: N/A

Communication System: GMRS; Frequency: 462.637 MHz;Duty Cycle: 1:1
Medium parameters used: f = 463 MHz; σ = 0.949 mho/m; εr = 58.3; ρ = 1000 kg/m3
Phantom section: Flat Section
Measurement Standard: DASY4 (High Precision Assessment)
DASY4 Configuration:
Area Scan setting - Find Secondary Maximum Within:2.0dB and with a peak SAR value greater than 0.5 W/Kg
Probe: EX3DV4 - SN3847; ConvF(11.13, 11.13, 11.13); Calibrated: 4/14/2016
Sensor-Surface: 2mm (Mechanical Surface Detection)
Electronics: DAE4 Sn779; Calibrated: 3/2/2016
Phantom: ELI 4.0; Type: QDOVA001BB; Serial: 1036
Measurement SW: DASY4, V4.7 Build 80;Postprocessing SW: SEMCAD, V1.8 Build 186

Flat/Area Scan (61x81x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 3.02 W/kg

Flat/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 49.0 V/m; Power Drift = -0.121 dB
Peak SAR (extrapolated) = 3.43 W/kg
SAR(1 g) = 2.49 W/kg; SAR(10 g) = 1.84 W/kg
Maximum value of SAR (measured) = 2.97 W/kg



0 dB = 2.97W/kg

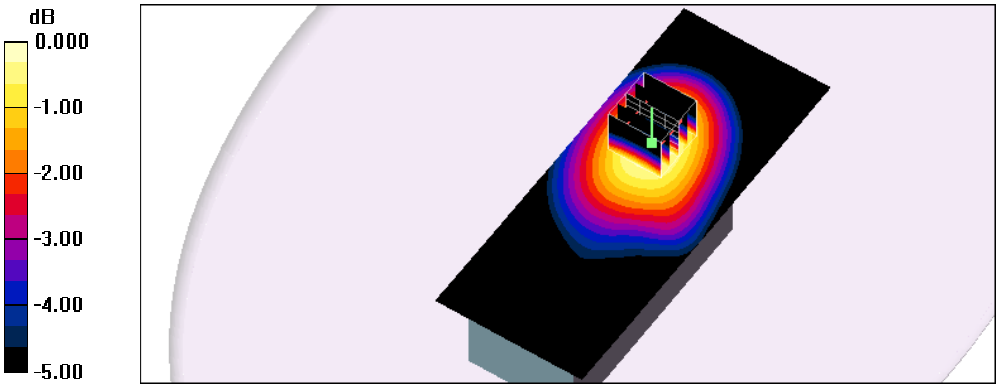
Test Laboratory: A Test Lab Techno Corp.
Date/Time: 5/27/2016 10:33:18 AM

2_FRS CH11_Back_10mm_Muscle_010-10347-00-Headset_Power supply_8.2V_0.5W
DUT: A02963; Type: GPS & Two-Way Radio; Serial: N/A

Communication System: FRS; Frequency: 467.638 MHz;Duty Cycle: 1:1
Medium parameters used: f = 468 MHz; σ = 0.954 mho/m; εr = 58.3; ρ = 1000 kg/m3
Phantom section: Flat Section
Measurement Standard: DASY4 (High Precision Assessment)
DASY4 Configuration:
Area Scan setting - Find Secondary Maximum Within:2.0dB and with a peak SAR value greater than 0.5 W/Kg
Probe: EX3DV4 - SN3847; ConvF(11.13, 11.13, 11.13); Calibrated: 4/14/2016
Sensor-Surface: 2mm (Mechanical Surface Detection)
Electronics: DAE4 Sn779; Calibrated: 3/2/2016
Phantom: ELI 4.0; Type: QDOVA001BB; Serial: 1036
Measurement SW: DASY4, V4.7 Build 80;Postprocessing SW: SEMCAD, V1.8 Build 186

Flat/Area Scan (61x151x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 0.780 W/kg

Flat/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 24.2 V/m; Power Drift = -0.028 dB
Peak SAR (extrapolated) = 0.904 W/kg
SAR(1 g) = 0.650 W/kg; SAR(10 g) = 0.475 W/kg
Maximum value of SAR (measured) = 0.778 W/kg



0 dB = 0.778W/kg

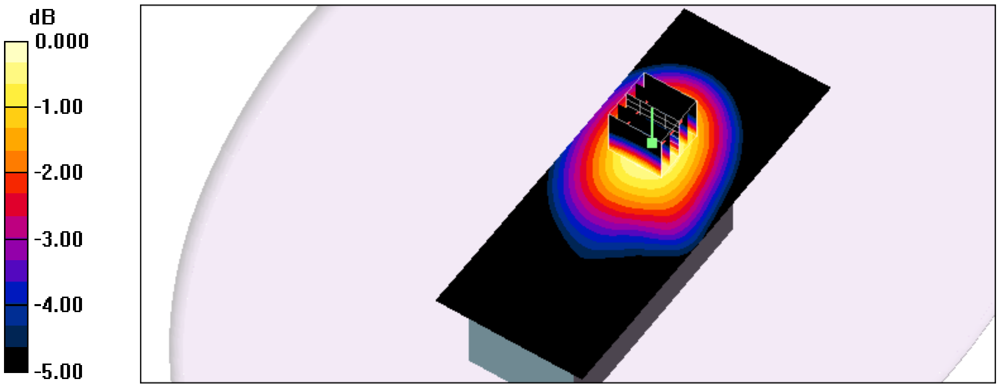
Test Laboratory: A Test Lab Techno Corp.
Date/Time: 5/27/2016 04:44:38 PM

3_GMRS CH4_Back_0mm_Muscle_010-11022-20-Belt clip_010-10347-00-Headset_Power supply_8.2V_5W_Pre-heat 30min
DUT: A02963; Type: GPS & Two-Way Radio; Serial: N/A

Communication System: GMRS; Frequency: 462.637 MHz;Duty Cycle: 1:1
Medium parameters used: f = 463 MHz; σ = 0.949 mho/m; εr = 58.3; ρ = 1000 kg/m3
Phantom section: Flat Section
Measurement Standard: DASY4 (High Precision Assessment)
DASY4 Configuration:
Area Scan setting - Find Secondary Maximum Within:2.0dB and with a peak SAR value greater than 0.5 W/Kg
Probe: EX3DV4 - SN3847; ConvF(11.13, 11.13, 11.13); Calibrated: 4/14/2016
Sensor-Surface: 2mm (Mechanical Surface Detection)
Electronics: DAE4 Sn779; Calibrated: 3/2/2016
Phantom: ELI 4.0; Type: QDOVA001BB; Serial: 1036
Measurement SW: DASY4, V4.7 Build 80;Postprocessing SW: SEMCAD, V1.8 Build 186

Flat/Area Scan (61x81x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 3.15 W/kg

Flat/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 55.7 V/m; Power Drift = -0.035 dB
Peak SAR (extrapolated) = 3.51 W/kg
SAR(1 g) = 2.65 W/kg; SAR(10 g) = 2 W/kg
Maximum value of SAR (measured) = 3.09 W/kg



0 dB = 3.09W/kg

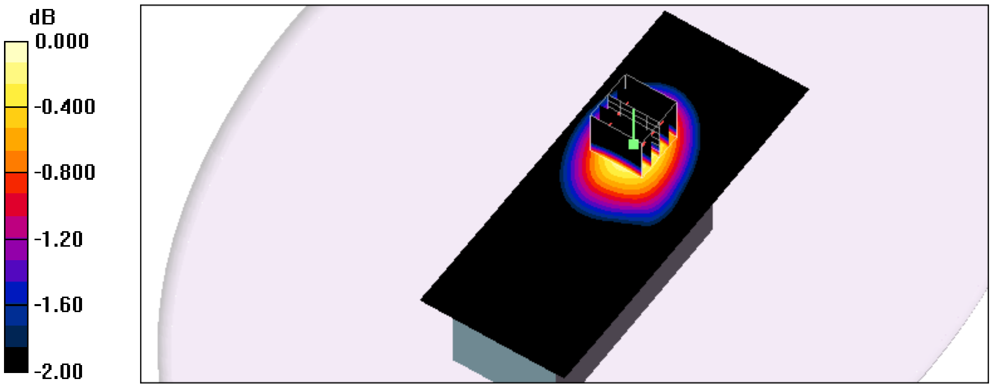
Test Laboratory: A Test Lab Techno Corp.
Date/Time: 5/27/2016 08:14:19 PM

14_GMRS CH4_Back_0mm_Muscle_010-11022-20-Belt clip_010-10347-00-Headset_Power supply_6V_2W
DUT: A02963; Type: GPS & Two-Way Radio; Serial: N/A

Communication System: GMRS; Frequency: 462.637 MHz;Duty Cycle: 1:1
Medium parameters used: f = 463 MHz; σ = 0.949 mho/m; εr = 58.3; ρ = 1000 kg/m3
Phantom section: Flat Section
Measurement Standard: DASY4 (High Precision Assessment)
DASY4 Configuration:
Area Scan setting - Find Secondary Maximum Within:2.0dB and with a peak SAR value greater than 0.5 W/Kg
Probe: EX3DV4 - SN3847; ConvF(11.13, 11.13, 11.13); Calibrated: 4/14/2016
Sensor-Surface: 2mm (Mechanical Surface Detection)
Electronics: DAE4 Sn779; Calibrated: 3/2/2016
Phantom: ELI 4.0; Type: QDOVA001BB; Serial: 1036
Measurement SW: DASY4, V4.7 Build 80;Postprocessing SW: SEMCAD, V1.8 Build 186

Flat/Area Scan (61x81x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 1.01 W/kg

Flat/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 30.3 V/m; Power Drift = -0.046 dB
Peak SAR (extrapolated) = 1.17 W/kg
SAR(1 g) = 0.804 W/kg; SAR(10 g) = 0.584 W/kg
Maximum value of SAR (measured) = 0.988 W/kg



0 dB = 0.988W/kg

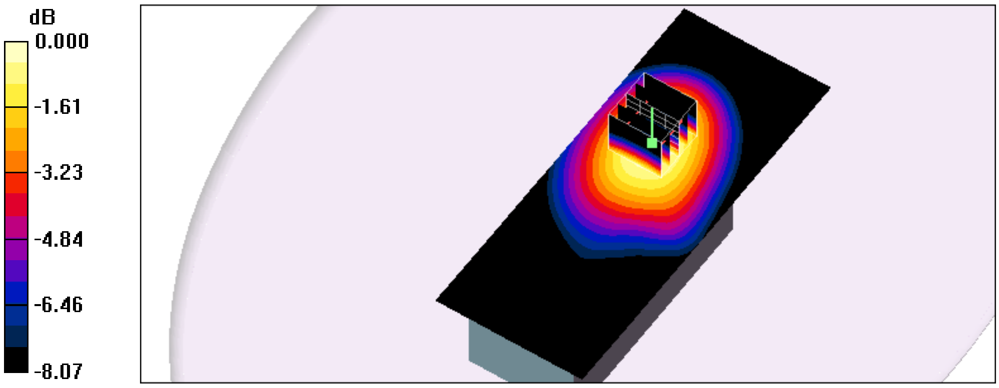
Test Laboratory: A Test Lab Techno Corp.
Date/Time: 5/27/2016 08:57:02 PM

15_GMRS CH4_Back_0mm_Muscle_010-11734-20-Belt clip_010-10347-00-Headset_Power supply_8.2V_5W_Pre-heat 30min
DUT: A02963; Type: GPS & Two-Way Radio; Serial: N/A

Communication System: GMRS; Frequency: 462.637 MHz;Duty Cycle: 1:1
Medium parameters used: f = 463 MHz; σ = 0.949 mho/m; εr = 58.3; ρ = 1000 kg/m3
Phantom section: Flat Section
Measurement Standard: DASY4 (High Precision Assessment)
DASY4 Configuration:
Area Scan setting - Find Secondary Maximum Within:2.0dB and with a peak SAR value greater than 0.5 W/Kg
Probe: EX3DV4 - SN3847; ConvF(11.13, 11.13, 11.13); Calibrated: 4/14/2016
Sensor-Surface: 2mm (Mechanical Surface Detection)
Electronics: DAE4 Sn779; Calibrated: 3/2/2016
Phantom: ELI 4.0; Type: QDOVA001BB; Serial: 1036
Measurement SW: DASY4, V4.7 Build 80;Postprocessing SW: SEMCAD, V1.8 Build 186

Flat/Area Scan (61x81x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 2.62 W/kg

Flat/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 47.6 V/m; Power Drift = -0.028 dB
Peak SAR (extrapolated) = 2.99 W/kg
SAR(1 g) = 2.21 W/kg; SAR(10 g) = 1.65 W/kg
Maximum value of SAR (measured) = 2.62 W/kg



0 dB = 2.62W/kg

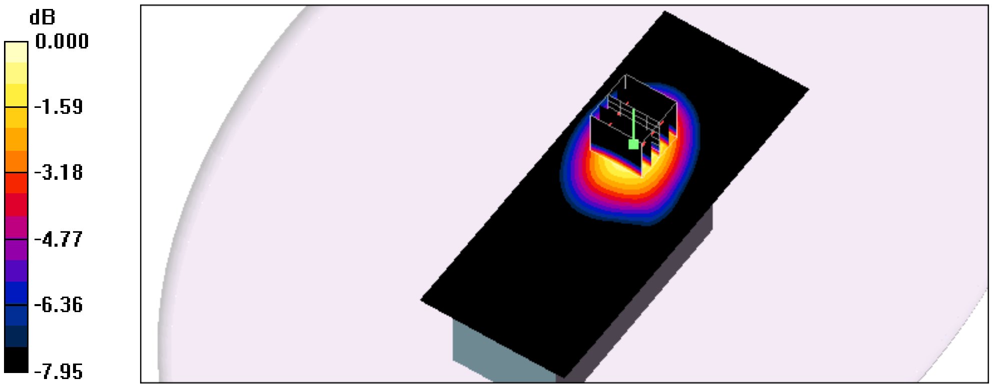
Test Laboratory: A Test Lab Techno Corp.
Date/Time: 5/27/2016 09:41:29 PM

16_GMRS CH4_Back_0mm_Muscle_145-01383-00+013-00063-00-Belt clip_010-10347-00-Headset_Power supply_8.2V_5W_Pre-heat 30min
DUT: A02963; Type: GPS & Two-Way Radio; Serial: N/A

Communication System: GMRS; Frequency: 462.637 MHz;Duty Cycle: 1:1
Medium parameters used: f = 463 MHz; σ = 0.949 mho/m; εr = 58.3; ρ = 1000 kg/m3
Phantom section: Flat Section
Measurement Standard: DASY4 (High Precision Assessment)
DASY4 Configuration:
Area Scan setting - Find Secondary Maximum Within:2.0dB and with a peak SAR value greater than 0.5 W/Kg
Probe: EX3DV4 - SN3847; ConvF(11.13, 11.13, 11.13); Calibrated: 4/14/2016
Sensor-Surface: 2mm (Mechanical Surface Detection)
Electronics: DAE4 Sn779; Calibrated: 3/2/2016
Phantom: ELI 4.0; Type: QDOVA001BB; Serial: 1036
Measurement SW: DASY4, V4.7 Build 80;Postprocessing SW: SEMCAD, V1.8 Build 186

Flat/Area Scan (61x81x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 2.01 W/kg

Flat/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 40.5 V/m; Power Drift = -0.046 dB
Peak SAR (extrapolated) = 2.27 W/kg
SAR(1 g) = 1.61 W/kg; SAR(10 g) = 1.21 W/kg
Maximum value of SAR (measured) = 1.92 W/kg



0 dB = 1.92W/kg

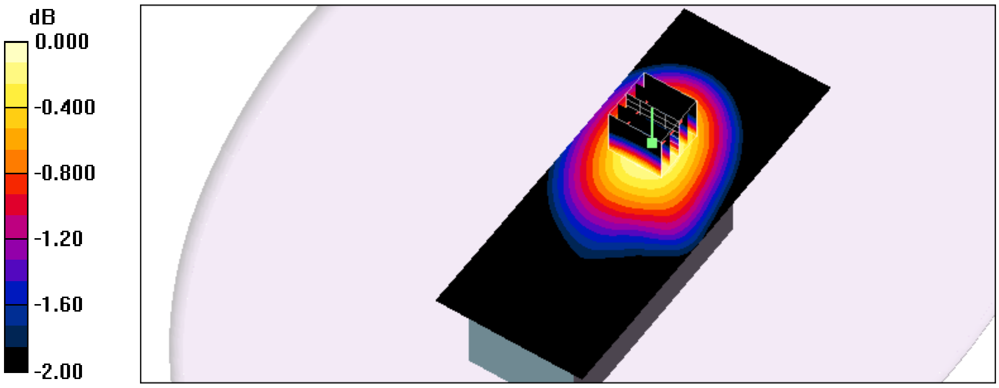
Test Laboratory: A Test Lab Techno Corp.
Date/Time: 5/27/2016 05:22:25 PM

4_FRS CH11_Back_0mm_Muscle_010-11022-20-Belt clip_010-10347-00-Headset_Power supply_8.2V_0.5W
DUT: A02963; Type: GPS & Two-Way Radio; Serial: N/A

Communication System: FRS; Frequency: 467.638 MHz;Duty Cycle: 1:1
Medium parameters used: f = 468 MHz; σ = 0.954 mho/m; εr = 58.3; ρ = 1000 kg/m3
Phantom section: Flat Section
Measurement Standard: DASY4 (High Precision Assessment)
DASY4 Configuration:
Area Scan setting - Find Secondary Maximum Within:2.0dB and with a peak SAR value greater than 0.5 W/Kg
Probe: EX3DV4 - SN3847; ConvF(11.13, 11.13, 11.13); Calibrated: 4/14/2016
Sensor-Surface: 2mm (Mechanical Surface Detection)
Electronics: DAE4 Sn779; Calibrated: 3/2/2016
Phantom: ELI 4.0; Type: QDOVA001BB; Serial: 1036
Measurement SW: DASY4, V4.7 Build 80;Postprocessing SW: SEMCAD, V1.8 Build 186

Flat/Area Scan (61x81x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 0.897 W/kg

Flat/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 29.4 V/m; Power Drift = 0.091 dB
Peak SAR (extrapolated) = 1.04 W/kg
SAR(1 g) = 0.754 W/kg; SAR(10 g) = 0.554 W/kg
Maximum value of SAR (measured) = 0.907 W/kg



0 dB = 0.907W/kg

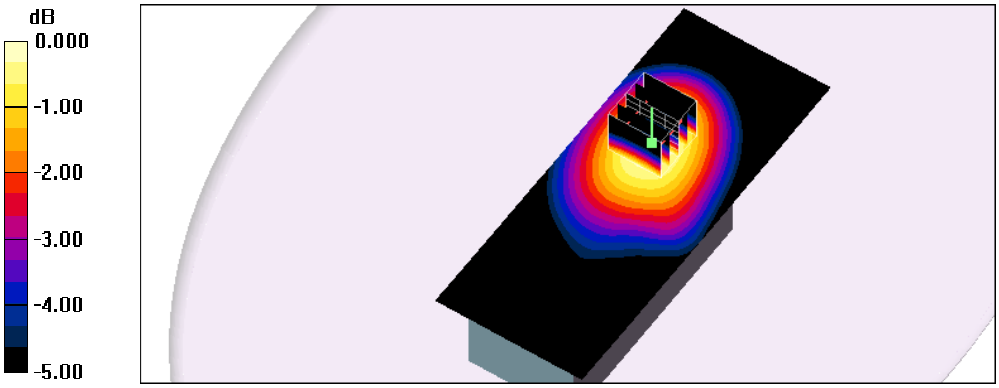
Test Laboratory: A Test Lab Techno Corp.
Date/Time: 5/27/2016 10:21:14 PM

10_GMRS CH4_Back_0mm_original 3_Muscle_010-11022-20-Belt clip_010-10347-00-Headset_Power supply_8.2V_5W_Pre-heat 30min_measurement once
DUT: A02963; Type: GPS & Two-Way Radio; Serial: N/A

Communication System: GMRS; Frequency: 462.637 MHz;Duty Cycle: 1:1
Medium parameters used: f = 463 MHz; σ = 0.949 mho/m; εr = 58.3; ρ = 1000 kg/m3
Phantom section: Flat Section
Measurement Standard: DASY4 (High Precision Assessment)
DASY4 Configuration:
Area Scan setting - Find Secondary Maximum Within:2.0dB and with a peak SAR value greater than 0.5 W/Kg
Probe: EX3DV4 - SN3847; ConvF(11.13, 11.13, 11.13); Calibrated: 4/14/2016
Sensor-Surface: 2mm (Mechanical Surface Detection)
Electronics: DAE4 Sn779; Calibrated: 3/2/2016
Phantom: ELI 4.0; Type: QDOVA001BB; Serial: 1036
Measurement SW: DASY4, V4.7 Build 80;Postprocessing SW: SEMCAD, V1.8 Build 186

Flat/Area Scan (61x81x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 3.11 W/kg

Flat/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 55.4 V/m; Power Drift = -0.025 dB
Peak SAR (extrapolated) = 3.49 W/kg
SAR(1 g) = 2.63 W/kg; SAR(10 g) = 1.98 W/kg
Maximum value of SAR (measured) = 3.07 W/kg



0 dB = 3.07W/kg

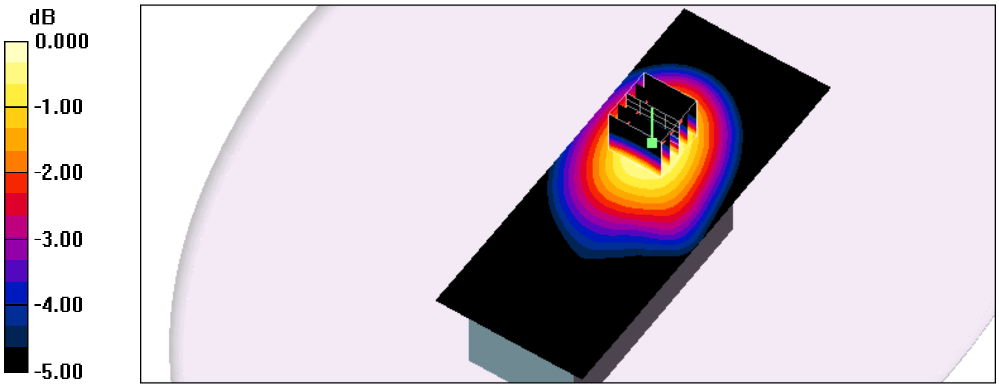
Test Laboratory: A Test Lab Techno Corp.
Date/Time: 5/27/2016 10:59:38 PM

11_GMRS CH4_Back_0mm_original 3_Muscle_010-11022-20-Belt clip_010-10347-00-Headset_Power supply_8.2V_5W_Pre-heat 30min_measurement second
DUT: A02963; Type: GPS & Two-Way Radio; Serial: N/A

Communication System: GMRS; Frequency: 462.637 MHz;Duty Cycle: 1:1
Medium parameters used: f = 463 MHz; σ = 0.949 mho/m; εr = 58.3; ρ = 1000 kg/m3
Phantom section: Flat Section
Measurement Standard: DASY4 (High Precision Assessment)
DASY4 Configuration:
Area Scan setting - Find Secondary Maximum Within:2.0dB and with a peak SAR value greater than 0.5 W/Kg
Probe: EX3DV4 - SN3847; ConvF(11.13, 11.13, 11.13); Calibrated: 4/14/2016
Sensor-Surface: 2mm (Mechanical Surface Detection)
Electronics: DAE4 Sn779; Calibrated: 3/2/2016
Phantom: ELI 4.0; Type: QDOVA001BB; Serial: 1036
Measurement SW: DASY4, V4.7 Build 80;Postprocessing SW: SEMCAD, V1.8 Build 186

Flat/Area Scan (61x81x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 3.11 W/kg

Flat/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 55.3 V/m; Power Drift = -0.007 dB
Peak SAR (extrapolated) = 3.51 W/kg
SAR(1 g) = 2.64 W/kg; SAR(10 g) = 1.98 W/kg
Maximum value of SAR (measured) = 3.08 W/kg



0 dB = 3.08W/kg

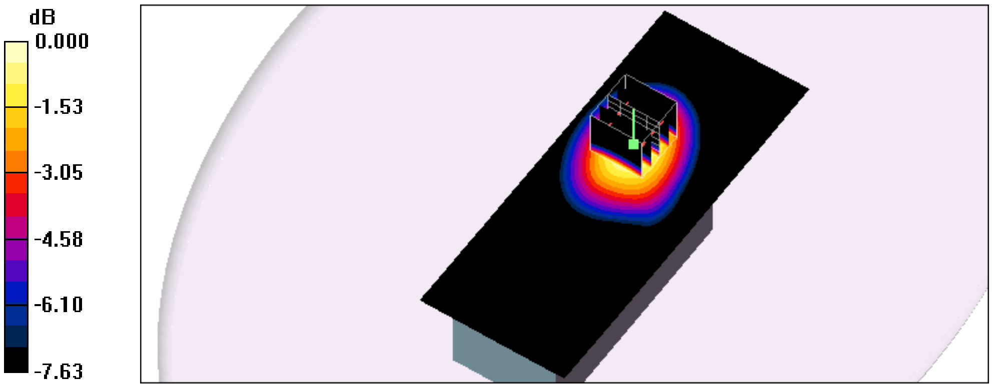
Test Laboratory: A Test Lab Techno Corp.
Date/Time: 5/27/2016 11:34:27 PM

17_GMRS CH4_Back_0mm_original 3_Muscle_010-11022-20-Belt clip_010-10347-00-Headset_Power supply_8.2V_5W_Pre-heat 30min_measurement third
DUT: A02963; Type: GPS & Two-Way Radio; Serial: N/A

Communication System: GMRS; Frequency: 462.637 MHz;Duty Cycle: 1:1
Medium parameters used: f = 463 MHz; σ = 0.949 mho/m; εr = 58.3; ρ = 1000 kg/m3
Phantom section: Flat Section
Measurement Standard: DASY4 (High Precision Assessment)
DASY4 Configuration:
Area Scan setting - Find Secondary Maximum Within:2.0dB and with a peak SAR value greater than 0.5 W/Kg
Probe: EX3DV4 - SN3847; ConvF(11.13, 11.13, 11.13); Calibrated: 4/14/2016
Sensor-Surface: 2mm (Mechanical Surface Detection)
Electronics: DAE4 Sn779; Calibrated: 3/2/2016
Phantom: ELI 4.0; Type: QDOVA001BB; Serial: 1036
Measurement SW: DASY4, V4.7 Build 80;Postprocessing SW: SEMCAD, V1.8 Build 186

Flat/Area Scan (61x81x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 3.05 W/kg

Flat/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 55.3 V/m; Power Drift = -0.007 dB
Peak SAR (extrapolated) = 3.45 W/kg
SAR(1 g) = 2.59 W/kg; SAR(10 g) = 1.94 W/kg
Maximum value of SAR (measured) = 3.03 W/kg



0 dB = 3.03W/kg

Appendix C - Calibration

All of the instruments Calibration information are listed below.

- Dipole _ D450V2 SN:1021 Calibration No.D450V2-1021_Apr16
- Probe _ EX3DV4 SN:3847 Calibration No.EX3-3847_ Apr16
- DAE _ DAE4 SN:779 Calibration No.Z16-97019