FCC SAR TEST REPORT

ISSUED BY
Shenzhen BALUN Technology Co., Ltd.

FOR

VR GOGGLES

ISSUED TO
Guangzhou EHang Intelligent Technology Co., Ltd.

Room 402, 4th Floor, 11 Aoti Road, Tianhe District, Guangzhou, China

Report No.:	BL-SZ15C0314-701
EUT Type:	VR GOGGLES
Model Name:	GVR-200W
Brand Name:	EHANG
FCC ID:	2ADPF-GVR-200W
Test Standard:	FCC 47 CFR Part 2.1093
	ANSI C95.1: 2005
	IEEE 1528: 2013
Maximum SAR:	Head (1 g): 0.481 W/kg
Test Conclusion:	Pass
Test Date:	Feb. 26, 2016
Date of Issue:	Mar. 14, 2016

Tested by: Tu Lang
Tu Lang
(Engineer)
Date Mar. 14, 2016

Approved by:
Wei Yanquan
(Chief Engineer)
Date Mar. 14, 2016

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Revision History

Version	Issue Date	Revisions Content
Rev. 01	Feb. 24, 2016	Initial Issue
Rev. 02	Mar. 1, 2016	Retest; modified the name of antenna; modified the sketch map at section 9.
Rev. 03	Mar. 14, 2016	Deleted the chapter 6.2; Revised the antenna dimensions for antenna 2 in section 9; Added the SPEAG written conformation in the annex F.3; Update the test position for front side in section 10.1.

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1 GENERAL INFORMATION

1.1 Identification of the Testing Laboratory

Company Name	Shenzhen BALUN Technology Co.,Ltd.
Address	Block B, 1st FL, Baisha Science and Technology Park, Shahe Xi Road, Nanshan District, Shenzhen, Guangdong Province,P. R. China
Phone Number	+86 755 6685 0100
Fax Number	+86 755 6182 4271

1.2 Identification of the Responsible Testing Location

Test Location	Shenzhen BALUN Technology Co.,Ltd.
Address	Block B, 1st FL, Baisha Science and Technology Park, Shahe Xi Road, Nanshan District, Shenzhen, Guangdong Province,P. R. China
Accreditation Certificate	The laboratory has been listed by Industry Canada to perform electromagnetic emission measurements. The recognition numbers of test site are 11524A-1. The laboratory has been listed by US Federal Communications Commission to perform electromagnetic emission measurements. The recognition numbers of test site are 832625. The laboratory has met the requirements of the IAS Accreditation Criteria for Testing Laboratories (AC89), has demonstrated compliance with ISO/IEC Standard 17025:2005. The accreditation certificate number is TL-588. The laboratory is a testing organization accredited by China National Accreditation Service for Conformity Assessment (CNAS) according to ISO/IEC 17025. The accreditation certificate number is L6791.
Description	All measurement facilities used to collect the measurement data are located at Block B, FL 1, Baisha Science and Technology Park, Shahe Xi Road, Nanshan District, Shenzhen, Guangdong Province, P. R. China 518055

1.3 Test Environment Condition

Ambient Temperature	20 to 22℃
Ambient Relative Humidity	38 to 52%
Ambient Pressure	100 to 102KPa

1.4 Announce

(1) The test report reference to the report template version v2.1.

(2) The test report is invalid if not marked with the signatures of the persons responsible for preparing and approving the test report.

(3) The test report is invalid if there is any evidence and/or falsification.

(4) The results documented in this report apply only to the tested sample, under the conditions and modes of operation as described herein.

(5) This document may not be altered or revised in any way unless done so by BALUN and all revisions are duly noted in the revisions section.

(6) Content of the test report, in part or in full, cannot be used for publicity and/or promotional purposes without prior written approval from the laboratory.

2 PRODUCT INFORMATION

2.1 Applicant

Applicant	Guangzhou EHang Intelligent Technology Co., Ltd.
Address	Room 402, 4th Floor, 11 Aoti Road, Tianhe District, Guangzhou, China

2.2 Manufacturer

Manufacturer	Guangzhou EHang Intelligent Technology Co., Ltd.
Address	Room 402, 4th Floor, 11 Aoti Road, Tianhe District, Guangzhou, China

2.3 Factory Information

Factory	Guangzhou EHang Intelligent Technology Co., Ltd.
Address	Buliding #3, No.72, 2nd Nanxiang Road, Science City, Huangpu Development Zone, Guangzhou, China

2.4 General Description for Equipment under Test (EUT)

EUT Type	VR GOGGLES
Model Name Under Test	GVR-200W
Series Model Name	N/A
Description of Model Name Differentiation	N/A
Hardware Version	V1.0
Software Version	V1.0
Dimensions (Approx.)	162 × 40 × 31 mm
Weight (Approx.)	255 g
Network and Wireless connectivity	WLAN; 2.4 GHz FHSS, 5.8 G (The EUT only can work as a receiver at 5.8G, so it wasn't evaluated for RF exposure at 5.8G)

2.5 Ancillary Equipment

Ancillary Equipment 1	Battery	
	Brand Name	N/A
	Model No.	GEB 702382
	Serial No.	N/A
	Capacitance	1700 mAh
	Rated Voltage	3.7 V
	Limit Charge Voltage	4.25 V
Ancillary Equipment 2	Charger	
	Brand Name	N/A
	Model No.	GAT-200
	Serial No.	N/A
	Rated Input	100-240 V~, 2000mA, 50/60 Hz
	Rated Output Port 1	16.8 V⎓, 3500 mA
	Rated Output Port 2	5 V⎓, 2000 mA

2.6 Technical Information

The requirement for the following technical information of the EUT was tested in this report:

Operating Mode	2.4GHz FHSS; WLAN	
Frequency Range	2.4GHz FHSS Antenna 1	2405 MHz~2475 MHz
	2.4GHz FHSS Antenna 2	2405 MHz~2475 MHz
	WLAN	2400 MHz~2483.5 MHz
Channels for 2.4GHz FHSS	Low(2405.5MHz)/ Middle(2440.0MHz)/ High(2475.0MHz)	
Channels for WLAN	1 (2412MHz)/ 6 (2437MHz)/ 11 (2462MHz)	
Antenna Type	2.4G FHSS Antenna 1: PIFA Antenna 2.4G FHSS Antenna 2: Dipole Antenna WLAN: PCB Antenna	
Exposure Category	General Population/Uncontrolled exposure	
EUT Stage	Portable Device	
Product	Type	
	☒ Production unit	☐ Identical prototype

3 SUMMARY OF TEST RESULT

3.1 Test Standards

No.	Identity	Document Title
1	FCC 47 CFR Part 2.1093	Frequency Allocations and Radio Treaty Matters; General Rules and Regulations
2	ANSI/IEEE Std. C95.1-2005	IEEE Standard for Safety Levels with Respect to Human Exposure to Radio Frequency Electromagnetic Fields, 3 kHz to 300 GHz
3	IEEE Std. 1528-2013	Recommended Practice for Determining the Peak Spatial-Average Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques
4	FCC KDB 447498 D01 v06	Mobile and Portable Device RF Exposure Procedures and Equipment Authorization Policies
5	FCC KDB 941225 D06 v02r01	SAR Evaluation Procedures for Portable Devices with Wireless Router Capabilities
6	FCC KDB 865664 D01 v01r04	SAR Measurement 100 MHz to 6 GHz
7	FCC KDB 865664 D02 v01r02	RF Exposure Reporting
8	FCC KDB 648474 D04 v01r03	SAR Evaluation Considerations for Wireless Handsets
9	OET Inquiry System Inquiry Tracking Number 128109	SAR Test Guidance for VR GOGGLES

3.2 Device Category and SAR Limit

This device belongs to portable device category because its radiating structure is allowed to be used within 20 centimeters of the body of the user.

Limit for General Population/Uncontrolled exposure should be applied for this device, it is 1.6 W/kg as averaged over any 1 gram of tissue.

Table of Exposure Limits:

Body Position	SAR Value (W/Kg)	
	General Population/ Uncontrolled Exposure	Occupational/ Controlled Exposure
Whole-Body SAR (averaged over the entire body)	0.08	0.4
Partial-Body SAR (averaged over any 1 gram of tissue)	1.60	8.0
SAR for hands, wrists, feet and ankles (averaged over any 10 grams of tissue)	4.0	20.0

NOTE:

General Population/Uncontrolled Exposure: Locations where there is the exposure of individuals who have no knowledge or control of their exposure. General population/uncontrolled exposure limits are applicable to situations in which the general public may be exposed or in which persons who are exposed as a consequence of their employment may not be made fully aware of the potential for exposure or cannot exercise control over their exposure. Members of the general public would come under this category when exposure is not employment-related; for example, in the case of a wireless transmitter that exposes persons in its vicinity.

Occupational/Controlled Exposure: Locations where there is exposure that may be incurred by persons who are aware of the potential for exposure, In general, occupational/controlled exposure limits are applicable to situations in which persons are exposed as a consequence of their employment, who have been made fully aware of the potential for exposure and can exercise control over their exposure. This exposure category is also applicable when the exposure is of a transient nature due to incidental passage through a location where the exposure levels may be higher than the general population/uncontrolled limits, but the exposed person is fully aware of the potential for exposure and can exercise control over his or her exposure by leaving the area or by some other appropriate means.

3.3 Test Result Summary

3.3.1 Highest SAR (1 g Value)

<table>
<tr><th rowspan="2">Band</th><th rowspan="2">Antenna</th><th>Maximum Scaled SAR (W/kg)</th><th>Maximum Report SAR (W/kg)</th><th rowspan="2">Limit (W/kg)</th></tr>
<tr><th>Head</th><th>Head</th></tr>
<tr><td>2.4G FHSS</td><td>1</td><td>0.481</td><td rowspan="2">0.481</td><td rowspan="2">1.6</td></tr>
<tr><td>2.4G FHSS</td><td>2</td><td>0.064</td></tr>
<tr><td>Verdict</td><td colspan="4">Pass</td></tr>
</table>

3.3.2 Highest Simultaneous SAR

Simultaneous Mode	Simultaneous Configuration	Simultaneous SAR (W/kg)	Limit (W/kg)	Verdict
Antenna 1	2.4GHz FHSS + WLAN	0.722	1.6	Pass
Antenna 2	2.4GHz FHSS + WLAN	0.305	1.6	Pass

3.4 Test Uncertainty

3.4.1 Measurement uncertainly evaluation for SAR test

The following measurement uncertainty levels have been estimated for tests performed on the EUT as specified in IEEE 1528 This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=2.

1) System Measurement Uncertainty (frequency range from 300 MHz to 3 GHz)

Uncertainty Component	Tol (+- %)	Prob. Dist.	Div.	Ci (1g)	Ci (10g)	1g Ui (+-%)	10g Ui (+-%)	Vi
Measurement System								
Probe calibration	6.0	N	1	1	1	6.00	6.00	∞
Axial Isotropy	4.7	R	$\sqrt{3}$	0.7	0.7	1.90	1.90	∞
Hemispherical Isotropy	9.6	R	$\sqrt{3}$	0.7	0.7	3.90	3.90	∞
Boundary effect	1.0	R	$\sqrt{3}$	1	1	0.60	0.60	∞
Linearity	4.7	R	$\sqrt{3}$	1	1	2.70	2.70	∞
System detection limits	1.0	R	$\sqrt{3}$	1	1	0.60	0.60	∞
Readout Electronics	0.3	N	1	1	1	0.30	0.30	∞
Response Time	0.8	R	$\sqrt{3}$	1	1	0.50	0.50	∞
Integration Time	2.6	R	$\sqrt{3}$	1	1	1.50	1.50	∞
RF ambient Conditions - Noise	3.0	R	$\sqrt{3}$	1	1	1.70	1.70	∞
RF ambient Conditions - Reflections	3.0	R	$\sqrt{3}$	1	1	1.70	1.70	∞
Probe positioner Mechanical Tolerance	0.4	R	$\sqrt{3}$	1	1	0.20	0.20	∞
Probe positioning with respect to Phantom Shell	2.9	R	$\sqrt{3}$	1	1	1.70	1.70	∞
Extrapolation, interpolation and integration Algoritms for Max. SAR Evaluation	2.0	R	$\sqrt{3}$	1	1	1.20	1.20	∞
Test sample Related								
Test sample positioning	2.9	N	1	1	1	2.90	2.90	N-1
Device Holder Uncertainty	3.6	N	1	1	1	3.60	3.60	N-1
Output power Variation - SAR drift measurement	5.0	R	$\sqrt{3}$	1	1	2.90	2.90	∞
SAR scaling	0.0	R	$\sqrt{3}$	1	1	0.00	0.00	∞
Phantom and Tissue Parameters								
Phantom Uncertainty (Shape and thickness tolerances)	4.0	R	$\sqrt{3}$	1	1	3.50	3.50	∞
SAR correction	1.9	R	$\sqrt{3}$	1	0.84	1.10	0.90	∞
Liquid conductivity - measurement uncertainty	2.5	N	$\sqrt{3}$	0.78	0.71	1.10	1.00	∞
Liquid permittivity - measurement uncertainty	2.5	N	$\sqrt{3}$	0.26	0.26	0.30	0.40	∞
Liquid conductivity - temperature uncertainty	3.4	N	$\sqrt{3}$	0.78	0.71	1.50	1.40	∞
Liquid permittivity - temperature uncertainty	0.4	N	$\sqrt{3}$	0.26	0.26	0.10	0.10	∞
Combined Standard Uncertainty		RSS				13.1	13.0	
Expanded Uncertainty (95% Confidence interval)		K=2				26.1	26.1	

2) System Measurement Uncertainty (frequency range from 3 GHz to 6 GHz)

Uncertainty Component	Tol (+- %)	Prob. Dist.	Div.	Ci (1g)	Ci (10g)	1g Ui (+-%)	10g Ui (+-%)	Vi
Measurement System								
Probe calibration	6.55	N	1	1	1	6.55	6.55	∞
Axial Isotropy	4.7	R	$\sqrt{3}$	0.7	0.7	1.90	1.90	∞
Hemispherical Isotropy	9.6	R	$\sqrt{3}$	0.7	0.7	3.90	3.90	∞
Boundary effect	2.0	R	$\sqrt{3}$	1	1	1.20	1.20	∞
Linearity	4.7	R	$\sqrt{3}$	1	1	2.70	2.70	∞
System detection limits	1.0	R	$\sqrt{3}$	1	1	0.60	0.60	∞
Readout Electronics	0.3	N	1	1	1	0.30	0.30	∞
Reponse Time	0.8	R	$\sqrt{3}$	1	1	0.50	0.50	∞
Integration Time	2.6	R	$\sqrt{3}$	1	1	1.50	1.50	∞
RF ambient Conditions - Noise	3.0	R	$\sqrt{3}$	1	1	1.70	1.70	∞
RF ambient Conditions - Reflections	3.0	R	$\sqrt{3}$	1	1	1.70	1.70	∞
Probe positioner Mechanical Tolerance	0.8	R	$\sqrt{3}$	1	1	0.50	0.50	∞
Probe positioning with respect to Phantom Shell	6.7	R	$\sqrt{3}$	1	1	3.90	3.90	∞
Extrapolation, interpolation and integration Algoritms for Max. SAR Evaluation	4.0	R	$\sqrt{3}$	1	1	2.30	2.30	∞
Test sample Related								
Test sample positioning	2.9	N	1	1	1	2.90	2.90	N-1
Device Holder Uncertainty	3.6	N	1	1	1	3.60	3.60	N-1
Output power Variation - SAR drift measurement	5.0	R	$\sqrt{3}$	1	1	2.90	2.90	∞
SAR scaling	0.0	R	$\sqrt{3}$	1	1	0.00	0.00	∞
Phantom and Tissue Parameters								
Phantom Uncertainty (Shape and thickness tolerances)	6.6	R	$\sqrt{3}$	1	1	3.80	3.80	∞
SAR correction	1.9	R	$\sqrt{3}$	1	0.84	1.10	0.90	∞
Liquid conductivity - measurement uncertainty	2.5	N	$\sqrt{3}$	0.78	0.71	1.10	1.00	∞
Liquid permittivity - measurement uncertainty	2.5	N	$\sqrt{3}$	0.26	0.26	0.30	0.40	∞
Liquid conductivity - temperature uncertainty	3.4	N	$\sqrt{3}$	0.78	0.71	1.50	1.40	∞
Liquid permittivity - temperature uncertainty	0.4	N	$\sqrt{3}$	0.26	0.26	0.10	0.10	∞
Combined Standard Uncertainty		RSS				14.0	14.0	
Expanded Uncertainty (95% Confidence interval)		K=2				28.1	28.0	

3.4.2 Measurement uncertainly evaluation for system check

This measurement uncertainty budget is suggested by IEEE 1528. The break down of the individual uncertainties is as follows:

1) System Measurement Uncertainty (frequency range from 300 MHz to 3 GHz)

Uncertainty Component	Tol (+- %)	Prob. Dist.	Div.	Ci (1g)	Ci (10g)	1g Ui (+-%)	10g Ui (+-%)	Vi
Measurement System								
Probe calibration	6.0	N	1	1	1	6.00	6.00	∞
Axial Isotropy	4.7	R	$\sqrt{3}$	0.7	0.7	1.90	1.90	∞
Hemispherical Isotropy	9.6	R	$\sqrt{3}$	0.7	0.7	3.90	3.90	∞
Boundary effect	1.0	R	$\sqrt{3}$	1	1	0.60	0.60	∞
Linearity	4.7	R	$\sqrt{3}$	1	1	2.70	2.70	∞
System detection limits	1.0	R	$\sqrt{3}$	1	1	0.60	0.60	∞
Readout Electronics	0.3	N	1	1	1	0.30	0.30	∞
Reponse Time	0.8	R	$\sqrt{3}$	1	1	0.50	0.50	∞
Integration Time	2.6	R	$\sqrt{3}$	1	1	1.50	1.50	∞
RF ambient Conditions - Noise	3.0	R	$\sqrt{3}$	1	1	1.70	1.70	∞
RF ambient Conditions - Reflections	3.0	R	$\sqrt{3}$	1	1	1.70	1.70	∞
Probe positioner Mechanical Tolerance	0.4	R	$\sqrt{3}$	1	1	0.20	0.20	∞
Probe positioning with respect to Phantom Shell	2.9	R	$\sqrt{3}$	1	1	1.70	1.70	∞
Extrapolation, interpolation and integration Algoritms for Max. SAR Evaluation	2.0	R	$\sqrt{3}$	1	1	1.20	1.20	∞
Dipole								
Deviation of experimental dipole	5.5	R	$\sqrt{3}$	1	1	3.20	3.20	∞
Dipole axis to liquid distance	2.0	R	1	1	1	1.20	1.20	∞
Power drift	4.7	R	$\sqrt{3}$	1	1	2.70	2.70	∞
Phantom and Tissue Parameters								
Phantom Uncertainty (Shape and thickness tolerances)	4.0	R	$\sqrt{3}$	1	1	3.50	3.50	∞
SAR correction	1.9	R	$\sqrt{3}$	1	0.84	1.10	0.90	∞
Liquid conductivity - measurement uncertainty	2.5	N	$\sqrt{3}$	0.78	0.71	1.10	1.00	∞
Liquid permittivity - measurement uncertainty	2.5	N	$\sqrt{3}$	0.26	0.26	0.30	0.40	∞
Liquid conductivity - temperature uncertainty	3.4	N	$\sqrt{3}$	0.78	0.71	1.50	1.40	∞
Liquid permittivity - temperature uncertainty	0.4	N	$\sqrt{3}$	0.26	0.26	0.10	0.10	∞
Combined Standard Uncertainty		RSS				10.56	10.52	
Expanded Uncertainty (95% Confidence interval)		K=2				21.12	21.04	

2) System Measurement Uncertainty (frequency range from 3 GHz to 6 GHz)

Uncertainty Component	Tol (+- %)	Prob. Dist.	Div.	Ci (1g)	Ci (10g)	1g Ui (+-%)	10g Ui (+-%)	Vi
Measurement System								
Probe calibration	6.55	N	1	1	1	6.55	6.55	∞
Axial Isotropy	4.7	R	$\sqrt{3}$	0.7	0.7	1.90	1.90	∞
Hemispherical Isotropy	9.6	R	$\sqrt{3}$	0.7	0.7	3.90	3.90	∞
Boundary effect	2.0	R	$\sqrt{3}$	1	1	1.20	1.20	∞
Linearity	4.7	R	$\sqrt{3}$	1	1	2.70	2.70	∞
System detection limits	1.0	R	$\sqrt{3}$	1	1	0.60	0.60	∞
Readout Electronics	0.3	N	1	1	1	0.30	0.30	∞
Reponse Time	0.8	R	$\sqrt{3}$	1	1	0.50	0.50	∞
Integration Time	2.6	R	$\sqrt{3}$	1	1	1.50	1.50	∞
RF ambient Conditions - Noise	3.0	R	$\sqrt{3}$	1	1	1.70	1.70	∞
RF ambient Conditions - Reflections	3.0	R	$\sqrt{3}$	1	1	1.70	1.70	∞
Probe positioner Mechanical Tolerance	0.8	R	$\sqrt{3}$	1	1	0.50	0.50	∞
Probe positioning with respect to Phantom Shell	6.7	R	$\sqrt{3}$	1	1	3.90	3.90	∞
Extrapolation, interpolation and integration Algoritms for Max. SAR Evaluation	4.0	R	$\sqrt{3}$	1	1	2.30	2.30	∞
Dipole								
Deviation of experimental dipole	5.5	R	$\sqrt{3}$	1	1	3.20	3.20	∞
Dipole axis to liquid distance	2.0	R	1	1	1	1.20	1.20	∞
Power drift	4.7	R	$\sqrt{3}$	1	1	2.70	2.70	∞
Phantom and Tissue Parameters								
Phantom Uncertainty (Shape and thickness tolerances)	6.6	R	$\sqrt{3}$	1	1	3.80	3.80	∞
SAR correction	1.9	R	$\sqrt{3}$	1	0.84	1.10	0.90	∞
Liquid conductivity - measurement uncertainty	2.5	N	$\sqrt{3}$	0.78	0.71	1.10	1.00	∞
Liquid permittivity - measurement uncertainty	2.5	N	$\sqrt{3}$	0.26	0.26	0.30	0.40	∞
Liquid conductivity - temperature uncertainty	3.4	N	$\sqrt{3}$	0.78	0.71	1.50	1.40	∞
Liquid permittivity - temperature uncertainty	0.4	N	$\sqrt{3}$	0.26	0.26	0.10	0.10	∞
Combined Standard Uncertainty		RSS				11.75	11.72	
Expanded Uncertainty (95% Confidence interval)		K=2				23.50	23.44	

4 MEASUREMENT SYSTEM

4.1 Specific Absorption Rate (SAR) Definition

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:

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

SAR is expressed in units of Watts per kilogram (W/kg) SAR measurement can be related to the electrical field in the tissue by

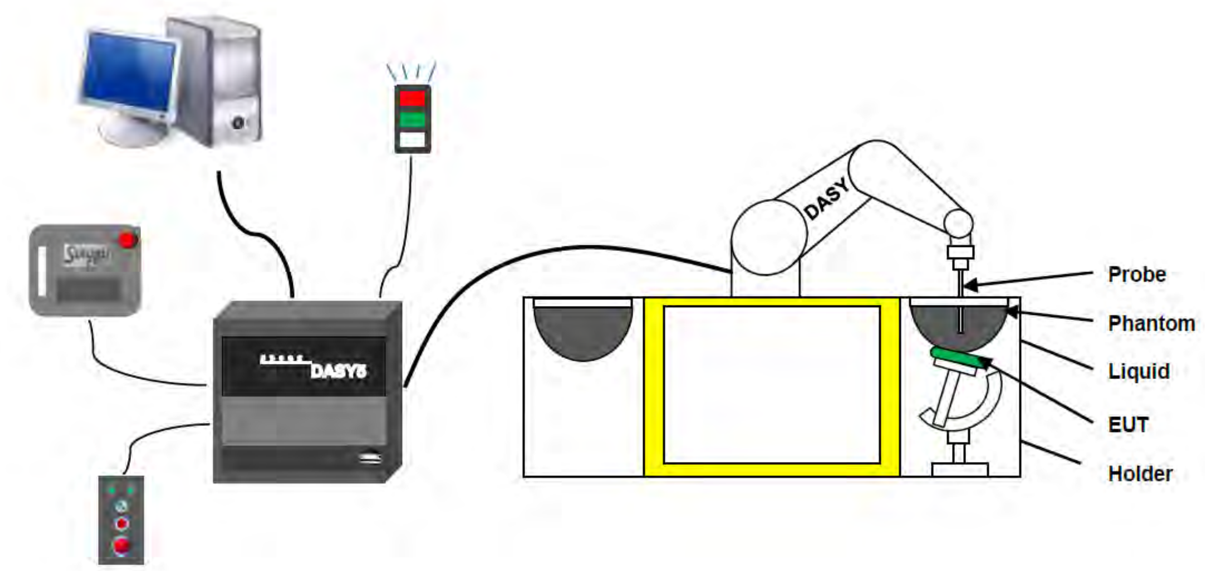
$$\mathrm{SAR} = \frac{\sigma E^2}{\rho}$$

Where: σ is the conductivity of the tissue,

ρis the mass density of the tissue and E is the RMS electrical field strength.

4.2 DASY SAR System

4.2.1 DASY SAR System Diagram



The DASY5 system for performing compliance tests consists of the following items:

1. A standard high precision 6-axis robot (Stäubli RX family) with controller 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 electronic (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. A unit to operate the optical surface detector which is connected the EOC.
5. The Electro-Optical Coupler (EOC) performs the conversion from t to he optical into a digital electric signal of the DAE. The EOC is connected to the DASY5 measurement server.
6. The DASY5 measurement server, which performs all real-time data evaluation for field measurements and surface detection, controls robot movements and handles safety operation.
7. DASY5 software and SEMCAD data evaluation software.
8. Remote control with teach panel and additional circuitry for robot safety such as warning lamps, etc.
9. The generic twin phantom enabling the testing of 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. System validation dipoles allowing to validate the proper functioning of the system.

4.2.2 Robot

The Dasy SAR system uses the high precision robots. Symmetrical design with triangular core Built-in optical fiber for surface detection system For the 6-axis controller system, Built-in shielding against static charges PEEK enclosure material (resistant to organic solvents). The robot series have many features that are important for our application:

- High precision
  (repeatability ±0.02 mm)
- High reliability
  (industrial design)
- Low maintenance costs
  (virtually maintenance free due to direct drive gears; no belt drives)
- Jerk-free straight movements
  (brush less synchron motors; no stepper motors)
- Low ELF interference
  (motor control _elds shielded via the closed metallic construction shields)

4.2.3 E-Field Probe

The probe is specially designed and calibrated for use in liquids with high permittivities for the measurements the Specific Dosimetric E-Field Probe EX3DV4-SN:7340 with following specifications is used.

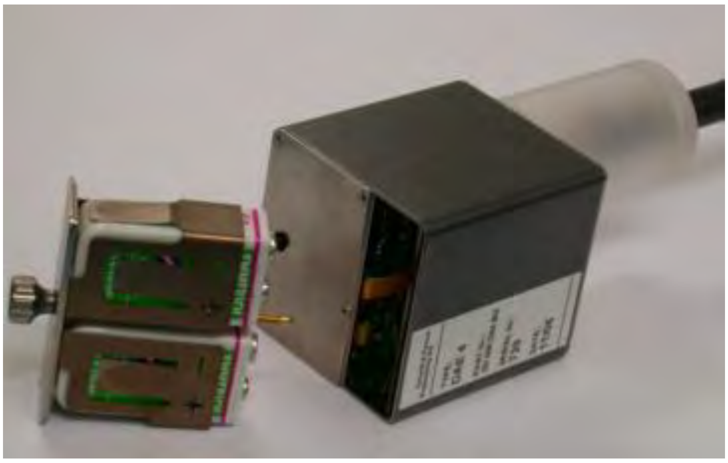
Construction	Symmetrical design with triangular core Built-in optical fiber for surface detection systemBuilt-in shielding against static charges PEEK enclosure material (resistant to organic solvents, e.g., glycolether)
Calibration	ISO/IEC 17025 calibration service available
Frequency	10 MHz to 6 GHz; Linearity: ± 0.2 dB (30 MHz to 6 GHz)
Directivity	± 0.2 dB in HSL (rotation around probe axis) ; ± 0.4 dB in HSL (rotation normal to probe axis)
Dynamic range	5 μW/g to > 100 mW/g; Linearity: ± 0.2 dB
Dimensions	Overall length: 337 mm (Tip: 9 mm) Tip diameter: 2.5 mm (Body: 10 mm) Distance from probe tip to dipole centers: 1.0 mm
Application	General dosimetry up to 3 GHz Compliance tests of mobile phones Fast automatic scanning in arbitrary phantoms (EX3DV4)

E-Field Probe Calibration Process

Probe calibration is realized, in compliance with CENELEC EN 62209-1/-2 and IEEE 1528 std, with CALISAR, Antennessa proprietary calibration system. The calibration is performed with the EN 62209-1/2 annexe technique using reference guide at the five frequencies.

4.2.4 Data Acquisition Electronics

The data acquisition electronics (DAE) consist of a highly sensitive electrometer-grade preamplifier with auto-zeroing, a channel and gain-switching multiplexer, a fast 16 bit AD-converte and a command decoder with a control logic unit. Transmission to the measurement server is accomplished through an optical downlink for data and status information, as well as an optical uplink for commands and the clock.



- Input Impedance: 200MOhm
- The Inputs: Symmetrical and Floating
- Commom Mode Rejection: Above 80dB

4.2.5 Phantoms

For the measurements the Specific Anthropomorphic Mannequin (SAM) defined by the IEEE SCC-34/SC2 group is used. The phantom is a polyurethane shell integrated in a wooden table. The thickness of the phantom amounts to 2mm +/- 0.2mm. It enables the dosimetric evaluation of left and right phone usage and includes an additional flat phantom part for the simplified performance check. The phantom set-up includes a cover, which prevents the evaporation of the liquid.

- Left hand
- Right hand
- Flat phantom

Photo of Phantom SN1857

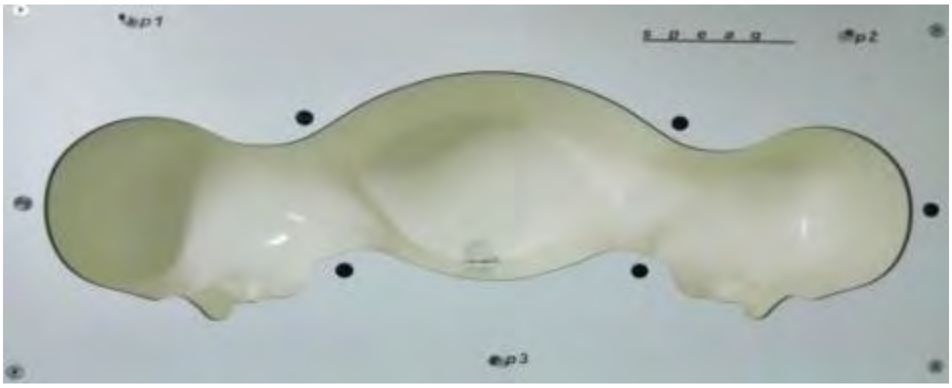
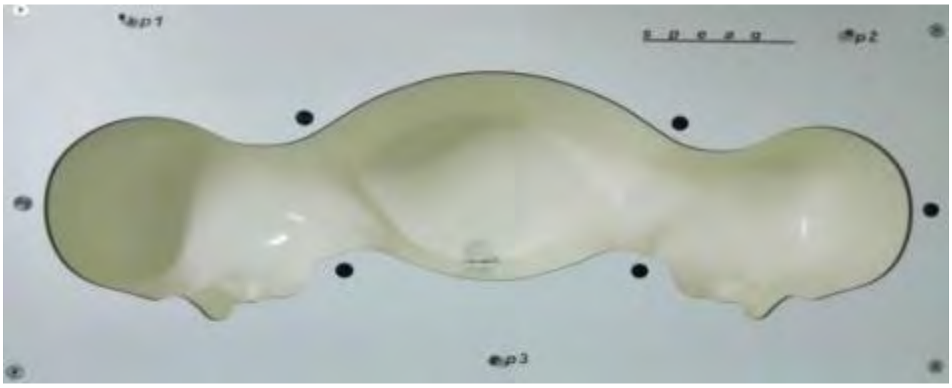


Photo of Phantom SN1859



Serial Number	Material	Length	Height
SN 1857 SAM1	Vinylester, glass fiber reinforced	1000	500
SN 1859 SAM2	Vinylester, glass fiber reinforced	1000	500

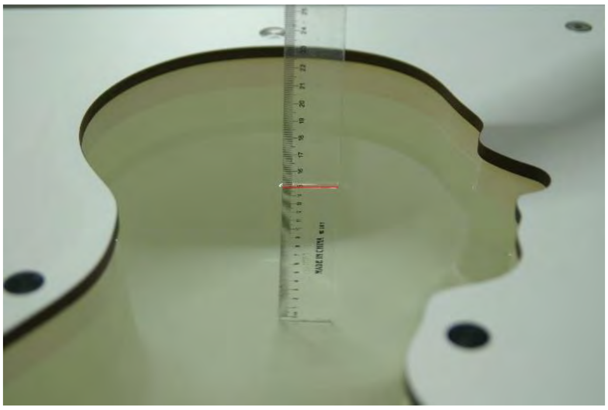
4.2.6 Device Holder

The DASY5 device holder has two scales for device rotation (with respect to the body axis) and the device inclination (with respect to the line between the ear openings). The plane between the ear openings and the mouth tip has a rotation angle of 65°. The bottom plate contains three pair of bolts for locking the device holder. The device holder positions are adjusted to the standard measurement positions in the three sections. This device holder is used for standard mobile phones or PDA‟s only. If necessary an additional support of polystyrene material is used. Larger DUT‟s (e.g. notebooks) cannot be tested using this device holder. Instead a support of bigger polystyrene cubes and thin polystyrene plates is used to position the DUT in all relevant positions to find and measure spots with maximum SAR values. Therefore those devices are normally only tested at the flat part of the SAM.

The positioning system allows obtaining cheek and tilting position with a very good accuracy. Incompliance with CENELEC, the tilt angle uncertainty is lower than 1°.

4.2.7 Simulating Liquid

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%.

Head Liquid Depth	Body Liquid Depth
	

The following table gives the recipes for tissue simulating liquid and the theoretical Conductivity/Permittivity.

Head (Reference IEEE1528)								
Frequency (MHz)	Water (%)	Sugar (%)	Cellulose (%)	Salt (%)	Preventol (%)	DGBE (%)	Conductivity σ (S/m)	Permittivity ε
750	41.1	57.0	0.2	1.4	0.2	0	0.89	41.9
835	40.3	57.9	0.2	1.4	0.2	0	0.90	41.5
900	40.3	57.9	0.2	1.4	0.2	0	0.97	41.5
1800, 1900, 2000	55.2	0	0	0.3	0	44.5	1.4	40.0
2450	55.0	0	0	0.1	0	44.9	1.80	39.2
2600	54.9	0	0	0.1	0	45.0	1.96	39.0
Frequency (MHz)	Water (%)	Hexyl Carbitol (%)			Triton X-100 (%)		Conductivity σ (S/m)	Permittivity ε
5200	62.52	17.24			17.24		4.66	36.0
5800	62.52	17.24			17.24		5.27	35.3
Body (From instrument manufacturer)								
Frequency (MHz)	Water (%)	Sugar (%)	Cellulose (%)	Salt (%)	Preventol (%)	DGBE (%)	Conductivity σ (S/m)	Permittivity ε
750	51.7	47.2	0	0.9	0.1	0	0.96	55.5
835	50.8	48.2	0	0.9	0.1	0	0.97	55.2
900	50.8	48.2	0	0.9	0.1	0	1.05	55.0
1800, 1900, 2000	70.2	0	0	0.4	0	29.4	1.52	53.3
2450	68.6	0	0	0.1	0	31.3	1.95	52.7
2600	68.2	0	0	0.1	0	31.7	2.16	52.5

Frequency(MHz)	Water	DGBE (%)	Salt (%)	Conductivity σ (S/m)	Permittivity ε
5200	78.60	21.40	/	5.54	47.86
5800	78.50	21.40	0.1	6.0	48.20

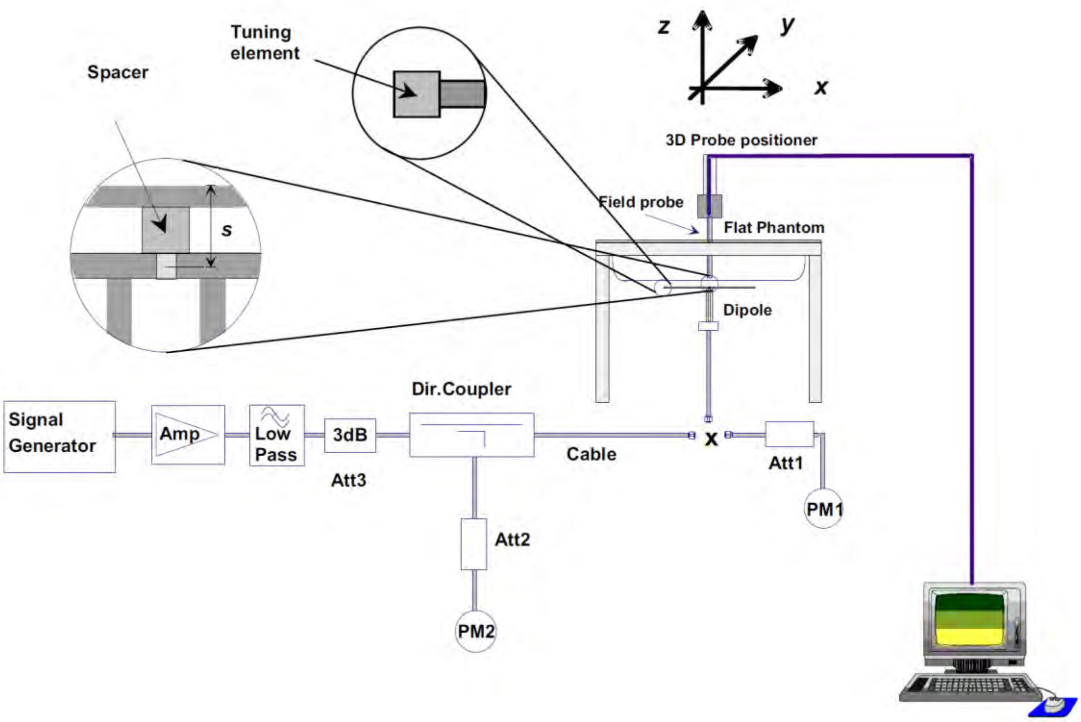
5 SYSTEM VERIFICATION

5.1 Purpose of System Check

The system performance check verifies that the system operates within its specifications. System and operator errors can be detected and corrected. It is recommended that the system performance check be performed prior to any usage of the system in order to guarantee reproducible results. The system performance check uses normal SAR measurements in a simplified setup with a well characterized source.This setup was selected to give a high sensitivity to all parameters that might fail or vary over time. The system check does not intend to replace the calibration of the components, but indicates situations where the system uncertainty is exceeded due to drift or failure.

5.2 System Check Setup

In the simplified setup for system evaluation, the EUT is replaced by a calibrated dipole and the power source is replaced by a continuous wave that comes from a signal generator. The calibrated dipole must be placed beneath the flat phantom section of the SAM twin phantom with the correct distance holder. The distance holder should touch the phantom surface with a light pressure at the reference marking and be oriented parallel to the long side of the phantom. The equipment setup is shown below:



6 TEST POSITION CONFIGURATIONS

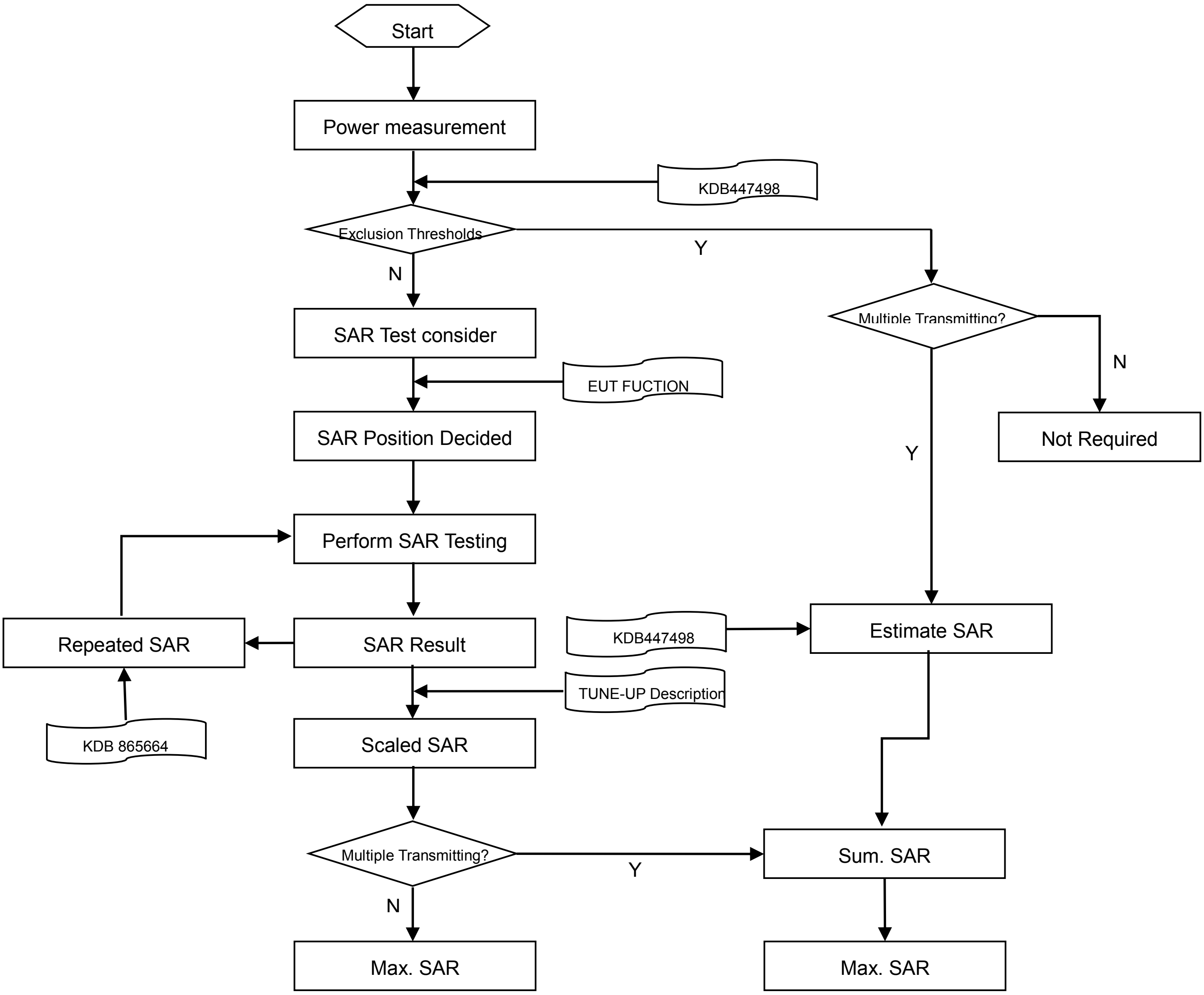
According to KDB inquiry tracking number 128109, headsets are tested for SAR compliance in head configurations described in the following subsections.

6.1 Head Exposure Conditions

Head exposure is limited to next to the ear mode operations. Generally, head SAR compliance is tested according to the test positions defined in IEEE Std 1528-2013 using the SAM phantom. However, the SAM (head) phantom is generally unacceptable for testing SAR of other head and body exposure conditions.
The EUT tested in the reported is a VR goggle. According to KDB inquiry tracking number 128109, the EUT should be placed against the flat phantom filled with head tissue simulating liquid to simulate the head exposure conditions. For the front side tests, compress the black padding as much as possible.

7 MEASUREMENT PROCEDURE

7.1 Measurement Process Diagram



7.2 SAR Scan General Requirement

Probe boundary effect error compensation is required for measurements with the probe tip closer than half a probe tip diameter to the phantom surface. Boththe probe tip diameter and sensor offset distance must satisfy measurement protocols; to ensure probe boundary effect errors are minimized and the higher fields closest to the phantom surface can be correctly measured and extrapolated to the phantom surface for computing 1 g SAR. Tolerances of the post-processing algorithms must be verified by the test laboratory for the scan resolutions used in the SAR measurements, according to the reference distribution functions specified in IEEE Std 1528-2013.

<table>
<tr><th colspan="3"></th><th>≤3GHz</th><th>>3GHz</th></tr>
<tr><td colspan="3">Maximum distance from closest measurement point (geometric center of probe sensors) to phantom surface</td><td>5±1 mm</td><td>½·δ·ln(2)±0.5 mm</td></tr>
<tr><td colspan="3">Maximum probe angle from probe axis to phantom surface normal at the measurement location</td><td>30°±1°</td><td>20°±1°</td></tr>
<tr><td colspan="3" rowspan="2">Maximum area scan spatial resolution: Δx Area , Δy Area</td><td>≤ 2 GHz: ≤ 15 mm
2 – 3 GHz: ≤ 12 mm</td><td>3–4 GHz: ≤ 12 mm
4 – 6 GHz: ≤ 10 mm</td></tr>
<tr><td colspan="2">When the x or y dimension of the test device, in the measurement plane orientation, is smaller than the above, the measurement resolution must be ≤ the corresponding x or y dimension of the test device with at least one measurement point on the test device.</td></tr>
<tr><td colspan="3">Maximum zoom scan spatial resolution: Δx Zoom , Δy Zoom</td><td>≤ 2 GHz: ≤ 8 mm
2 –3 GHz: ≤ 5 mm*</td><td>3–4 GHz: ≤ 5 mm*
4 – 6 GHz: ≤ 4 mm*</td></tr>
<tr><td rowspan="7">Maximum zoom scan spatial resolution, normal to phantom surface</td><td colspan="2" rowspan="3">uniform grid: Δz Zoom (n)</td><td rowspan="3">≤ 5 mm</td><td>3–4 GHz: ≤ 4 mm</td></tr>
<tr><td>4–5 GHz: ≤ 3 mm</td></tr>
<tr><td>5–6 GHz: ≤ 2 mm</td></tr>
<tr><td rowspan="4">graded grid</td><td rowspan="3">Δz Zoom (1): between 1st two points closest to phantom surface</td><td rowspan="3">≤ 4 mm</td><td>3–4 GHz: ≤ 3 mm</td></tr>
<tr><td>4–5 GHz: ≤ 2.5 mm</td></tr>
<tr><td>5–6 GHz: ≤ 2 mm</td></tr>
<tr><td>Δz Zoom (n>1): between subsequent points</td><td colspan="2">≤ 1.5·Δz Zoom (n-1)</td></tr>
<tr><td rowspan="3">Minimum zoom scan volume</td><td colspan="2" rowspan="3">x, y, z</td><td rowspan="3">≥30 mm</td><td>3–4 GHz: ≥ 28 mm</td></tr>
<tr><td>4–5 GHz: ≥ 25 mm</td></tr>
<tr><td>5–6 GHz: ≥ 22 mm</td></tr>
<tr><td colspan="5">Note:
1. δ is the penetration depth of a plane-wave at normal incidence to the tissue medium; see draft standard IEEE P1528-2011 for details.
2. * When zoom scan is required and the reported SAR from the area scan based 1 g SAR estimation procedures of KDB 447498 is ≤ 1.4 W/kg, ≤ 8 mm, ≤ 7 mm and ≤ 5 mm zoom scan resolution may be applied, respectively, for 2 GHz to 3GHz, 3 GHz to 4 GHz and 4 GHz to 6 GHz.</td></tr>
</table>

7.3 Measurement Procedure

The following steps are used for each test position

a. Establish a call with the maximum output power with a base station simulator. The connection between the mobile and the base station simulator is established via air interface
b. Measurement of the local E-field value at a fixed location. This value serves as a reference value for calculating a possible power drift.
c. Measurement of the SAR distribution with a grid of 8 to 16mm * 8 to16 mm and a constant distance to the inner surface of the phantom. Since the sensors cannot directly measure at the inner phantom surface, the values between the sensors and the inner phantom surface are extrapolated. With these values the area of the maximum SAR is calculated by an interpolation scheme.
d. Around this point, a cube of 30 * 30 * 30 mm or 32 * 32 *32 mm is assessed by measuring 5 or 8 * 5 or 8*4 or 5 mm. With these data, the peak spatial-average SAR value can be calculated.

7.4 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. Area scan and zoom scan resolution setting follows KDB 865664 D01v01r04 quoted below.

When the 1 g SAR of the highest peak is within 2 dB of the SAR limit, additional zoom scans are required for other peaks within 2 dB of the highest peak that have not been included in any zoom scan to ensure there is no increase in SAR.

8 CONDUCTED RF OUPUT POWER

8.1 2.4GHz FHSS

Antenna 1

Band (GHz)	Mode	Channel	Freq. (MHz)	Peak Power (dBm)	SAR Test Require.
2.4G (2.405-2.475)	FHSS	Low	2405.5	12.71	No
		Middle	2440.0	14.07	No
		High	2475.0	**14.87**	Yes

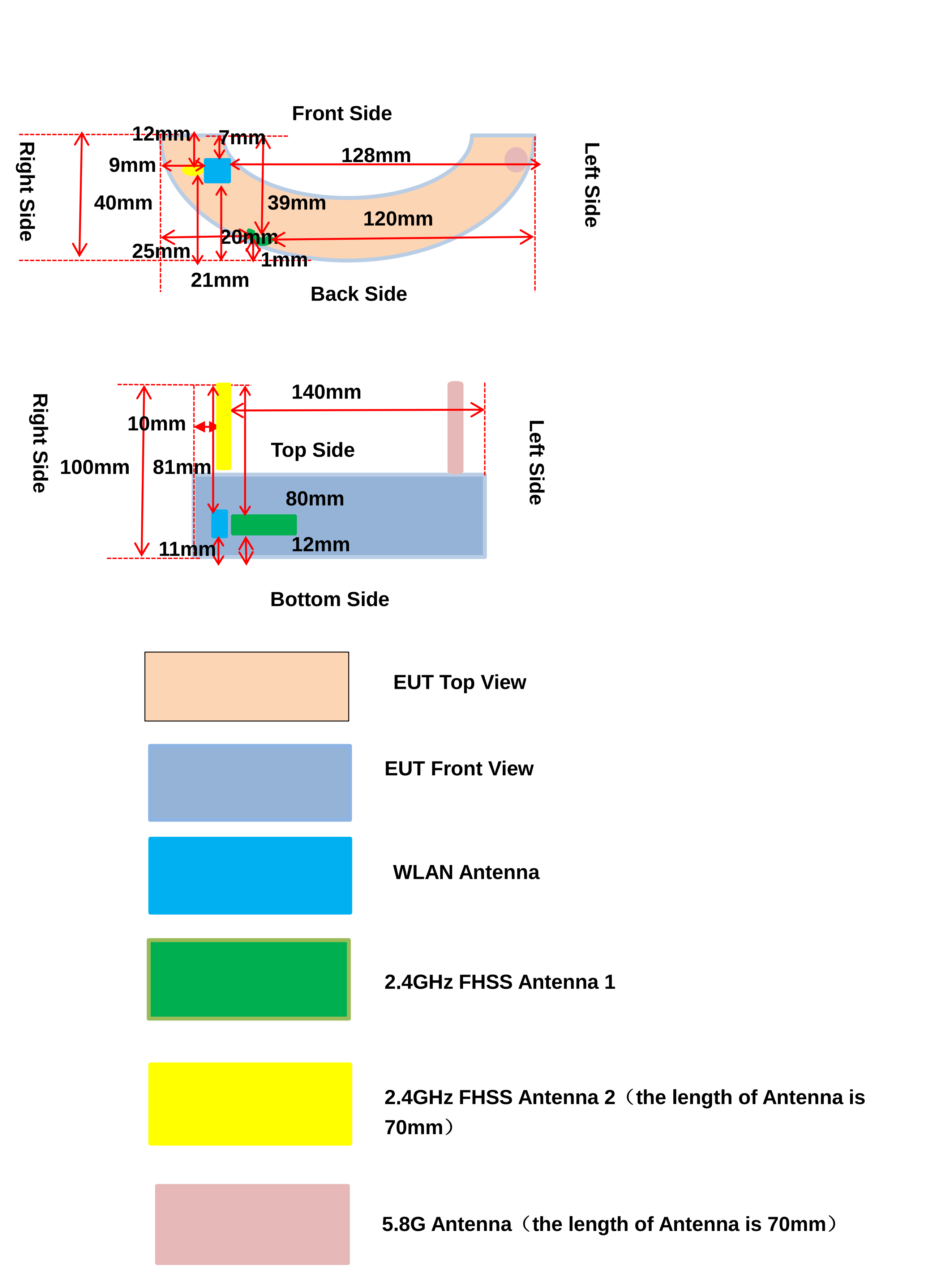
Antenna 2

Band (GHz)	Mode	Channel	Freq. (MHz)	Peak Power (dBm)	SAR Test Require.
2.4G (2.405-2.475)	FHSS	Low	2405.5	12.31	No
		Middle	2440.0	14.06	No
		High	2475.0	**14.86**	Yes

8.2 WIFI

Band (GHz)	Mode	Channel	Freq. (MHz)	Peak Power (dBm)	SAR Test Require.
2.4G (2.4~2.4835)	802.11b	1	2412	7.20	No
		6	2437	**7.53**	No
		11	2462	7.15	No

9 TEST EXCLUSION CONSIDERATION



9.1 SAR Test Exclusion Consideration Table

According with FCC KDB 447498 D01, Appendix A, <SAR Test Exclusion Thresholds for 100 MHz－6 GHz and ≤ 50 mm> Table, this Device SAR test configurations consider as following :

Band	Mode	Max. Peak Power		Test Position Configurations					
		dBm	mW	Front Side	Back Side	Left Side	Right Side	Top Side	Bottom Side
2.4GHz FHSS	Distance to User			39 mm	1 mm	120 mm	20 mm	81 mm	12 mm
	Antenna 1	15.00	31.62	Yes	Yes	No	Yes	No	Yes
	Distance to User			12 mm	25mm	140 mm	10 mm	0 mm	100mm
	Antenna 2	15.00	31.62	Yes	No	No	Yes	Yes	No
WLAN	Distance to User			7 mm	21 mm	128 mm	9 mm	81 mm	11 mm
	802.11b	7.60	5.75	No	No	No	No	No	No

Note:

1. Maximum power is the source-based time-average power and represents the maximum RF output power including tune-up tolerance among production units
2. Per KDB 447498 D01, for larger devices, the test separation distance of adjacent edge configuration is determined by the closest separation between the antenna and the user.
3. Per KDB 447498 D01, standalone SAR test exclusion threshold is applied; If the distance of the antenna to the user is < 5mm, 5mm is used to determine SAR exclusion threshold
4. Per KDB 447498 D01, the 1-g and 10-g SAR test exclusion thresholds for 100 MHz to 6 GHz at test separation distances ≤ 50 mm are determined by:
   [(max. power of channel, including tune-up tolerance, mW)/(min. test separation distance, mm)] ·[√f(GHz)] ≤ 3.0 for 1-g SAR and ≤ 7.5 for 10-g extremity SAR
   a. f(GHz) is the RF channel transmit frequency in GHz
   b. Power and distance are rounded to the nearest mW and mm before calculation
   c. The result is rounded to one decimal place for comparison
   d. For < 50 mm distance, we just calculate mW of the exclusion threshold value (3.0) to do compare.

   This formula is [3.0] / [√f(GHz)] ·[(min. test separation distance, mm)] = exclusion threshold of mW.
5. Per KDB 447498 D01, at 100 MHz to 6 GHz and for test separation distances > 50 mm, the SAR test exclusion threshold is determined according to the following:
   a. [Threshold at 50 mm in step 1) + (test separation distance - 50 mm)·(f(MHz)/150)] mW, at 100 MHz to 1500 MHz
   b. [Threshold at 50 mm in step 1) + (test separation distance - 50 mm)·10] mW at > 1500 MHz and ≤ 6 GHz
6. According to KDB 447498 D01 standalone SAR test exclusion threshold , WLAN SAR test are not required for this device.

minimum distance of exclusion SAR test

Band	Mode	Max. Power of Channel （mW）	Frequency （GHz）	Min. Test Separation Distance （mm）
2.4GHz FHSS	Antenna 1	31.62	2.475	16.6
	Antenna 2	31.62	2.475	16.6

9.2 10g Extremity Exposure Consideration

According with FCC KDB 648474 D04, for smart phones with a display diagonal dimension > 15.0 cm or an overall diagonal dimension > 16.0 cm that provide similar mobile web access and multimedia support found in mini-tablets or UMPC mini-tablets that support voice calls next to the ear, unless it is confirmed otherwise through KDB inquiries, the following phablet procedures should be applied to evaluate SAR compliance for each applicable wireless modes and frequency band. Devices marketed as phablets, regardless of form factors and operating characteristics must be tested as a phablet to determine SAR compliance;

The UMPC mini-tablet procedures must also be applied to test the SAR of all surfaces and edges with an antenna located at ≤ 25 mm from that surface or edge, in direct contact with a flat phantom, for 10-g extremity SAR according to the body-equivalent tissue dielectric parameters in KDB 865664 to address interactive hand use exposure conditions. The UMPC mini-tablet 1-g SAR at 5 mm is not required. When hotspot mode applies, 10-g extremity SAR is required only for the surfaces and edges with hotspot mode 1-g reported SAR > 1.2 W/kg.

Conclusion:

The one display of EUT overall diagonal dimension is 3.0 cm, which is less than 16.0 cm, 10 g extremity SAR is not required.

10 TEST RESULT

10.1 2.4GHz FHSS

Mode	Position	Dist. (mm)	Ch.	Freq. (MHz)	Power Drift (%)	1 g Meas. SAR (W/Kg)	Meas. Power (dBm)	Max. tune-up Power(dBm)	Scaling Factor	1 g Scaled SAR (W/Kg)	Meas. No.
Antenna 1											
Head Exposure											
DATA	Front Side	0	High	2475.0	NA	NA	14.87	15.00	NA	NA	Note 5
	Back Side	0	High	2475.0	-2.95	**0.467**	14.87	15.00	1.030	**0.481**	1#
	Right Side	0	High	2475.0	2.57	0.019	14.87	15.00	1.006	0.019	2#
	Bottom Side	0	High	2475.0	-1.60	0.046	14.87	15.00	1.030	0.047	3#
Antenna 2											
Head Exposure											
DATA	Front Side	0	High	2475.0	NA	NA	15.02	15.10	1.019	NA	Note 5
	Right Edge	0	High	2475.0	-3.39	0.050	14.86	15.00	1.033	0.052	4#
	Top Edge	0	High	2475.0	2.80	**0.062**	14.86	15.00	1.033	**0.064**	5#

Note :

1. Refer to ANNEX C for the detailed test data for each test configuration.
2. Power Drift(%)=10^[Meas Power Drift(dB)/10]-1.
3. According to KDB inquiry tracking number 128109, we used a flat phantom with head liquid to simulate the actual usage.
4. A non-standard setup was used for SAR testing based on guidance from the FCC. The operational description contains additional information.
5. The SAR values for the front side for antenna 2 and antenna 1 are below the environment electromagnetic noise, so the SAR measurement aren't considered in this report.

11 SAR Measurement Variability

According to KDB 865664 D01, SAR measurement variability was assessed for each frequency band, which is determined by the SAR probe calibration point and tissue-equivalent medium used for the device measurements. When both head and body tissue-equivalent media are required for SAR measurements in a frequency band, the variability measurement procedures should be applied to the tissue medium with the highest measured SAR, using the highest measured SAR configuration for that tissue-equivalent medium. Alternatively, if the highest measured SAR for both head and body tissue-equivalent media are ≤ 1.45 W/kg and the ratio of these highest SAR values, i.e., largest divided by smallest value, is ≤ 1.10, the highest SAR configuration for either head or body tissue-equivalent medium may be used to perform the repeated measurement. These additional measurements are repeated after the completion of all measurements requiring the same head or body tissue-equivalent medium in a frequency band. The test device should be returned to ambient conditions (normal room temperature) with the battery fully charged before it is re-mounted on the device holder for the repeated measurement(s) to minimize any unexpected variations in the repeated results.

SAR repeated measurement procedure:

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

Note: The highest measured SAR is 0.467 W/kg, which less than 0.8 W/kg, repeated measurement is not required.

12 SIMULTANEOUS TRANSMISSION

Simultaneous transmission SAR test exclusion is determined for each operating configuration and exposure condition according to the reported standalone SAR of each applicable simultaneous transmitting antenna. When the sum of SAR 1g of all simultaneously transmitting antennas in an operating mode and exposure condition combination is within the SAR limit (SAR 1g 1.6 W/kg), the simultaneous transmission SAR is not required. When the sum of SAR 1g is greater than the SAR limit (SAR 1g 1.6 W/kg), SAR test exclusion is determined by the SAR to Peak Location Ratio (SPLSR).

12.1 Simultaneous Transmission Mode Consider

Antenna	Mode	2.4G FHSS&2.4GWLAN
		Body
1	2.4GHz FHSS	+ WLAN
2	2.4GHz FHSS	+ WLAN

Note:

1. The device supports only data mode transmission.
2. Antenna 1 and 2 for 2.4GHz FHSS can't transmit at the same time.

12.2 Estimated SAR Calculation

According to KDB 447498 D01, when standalone SAR test exclusion applies to an antenna that transmits simultaneously with other antennas, the standalone SAR was estimated according to following formula to result in substantially conservative SAR values of <= 0.4 W/kg to determine simultaneous transmission SAR test exclusion.

$$\text{Estimated SAR} = \frac{Max.Tune\ Up\ Power(mw)}{Min\ Test\ Separation\ Distance} * \frac{\sqrt{f_{GHz}}}{x}$$ (where x = 7.5 for 1-g SAR)

If the minimum test separation distance is < 5 mm, a distance of 5 mm is used for estimated SAR calculation. When the test separation distance is > 50 mm, the 0.4 W/kg is used for SAR-1g.

Band	Mode	Position	Antenna To user (mm)	SAR Testing	Max. Tune-up Power (dBm)	Max. Tune-up Power (mW)	Frequency (GHz)	Calculation Distance/Gap (mm)	Estimated SAR (W/kg)
WLAN	802.11b	Back Side	5	NO	7.60	5.75	2.462	5	0.241
		Right Side	5	NO	7.60	5.75	2.462	5	0.241
		Bottom Side	5	NO	7.60	5.75	2.462	5	0.241

12.3 Sum SAR of Simultaneous Transmission

12.3.1 Sum Head SAR of Simultaneous Transmission

Simultaneous Mode	Mode	Max. 1g SAR (W/kg)	1g Sum SAR (W/kg)	SPLSR (Yes/No)
Antenna 1 2.4GHz FHSS + WLAN	2.4GHz FHSS	0.481	0.722	No
	WLAN	0.241		
Antenna 2 2.4GHz FHSS + WLAN	2.4GHz FHSS	0.064	0.305	No
	WLAN	0.241		

13 TEST EQUIPMENTS LIST

Description	Manufacturer	Model	Serial No.	Cal. Date	Cal. Due
PC	Dell	N/A	N/A	N/A	N/A
2450MHz Validation Dipole	Speag	D2450V2	SN: 952	2014/11/27	2016/11/26
E-Field Probe	Speag	EX3DV4	SN: 7340	2015/12/10	2016/12/09
Phantom1	Speag	SAM	SN: 1859	N/A	N/A
Phantom2	Speag	SAM	SN: 1857	N/A	N/A
Data acquisition electronics	Speag	DAE4	SN: 1454	2015/12/08	2016/12/07
Signal Generator	R&S	SMBV100A	260592	2015/07/16	2016/07/15
Power Meter	Agilent	E4419B	GB40201833	2015/10/14	2016/10/13
Power Sensor	R&S	NRP-Z21	103971	2015/07/16	2016/07/15
Power Amplifier	SATIMO	6552B	22374	N/A	N/A
Dielectric Probe Kit	SATIMO	SCLMP	SN 25/13 OCPG56	2015/08/17	2016/08/16
Wireless Communication Test Set	R&S	CMW 500	138884	2015/07/16	2016/07/15
Network Analyzer	R&S	ZVL-6	EMY46103472	2015/07/16	2016/07/15
Attenuator	COM-MW	ZA-S1-31	1305003187	N/A	N/A
Directional coupler	AA-MCS	AAMCS-UDC	000272	N/A	N/A

ANNEX A SIMULATING LIQUID VERIFICATION RESULT

The dielectric parameters of the liquids were verified prior to the SAR evaluation using an SCLMP Dielectric Probe Kit.

Date	Liquid Type	Fre. (MHz)	Temp. (℃)	Meas. Conductivity (σ) (S/m)	Meas. Permittivity (ε)	Target Conductivity (σ) (S/m)	Target Permittivity (ε)	Conductivity Tolerance (%)	Permittivity Tolerance (%)
2016.02.26	Head	2450	21.1	1.85	38.53	1.80	39.20	2.78	-1.71
Note: The tolerances limit of Conductivity and Permittivity is ± 5%.									

ANNEX B SYSTEM CHECK RESULT

Comparing to the original SAR value provided by SPEAG, the validation data should be within its specification of 10 %(for 1 g).

Date	Liquid Type	Freq. (MHz)	Power (mW)	Measured SAR (W/kg)	Normalized SAR (W/kg)	Dipole SAR (W/kg)	Tolerance (%)	Targeted SAR(W/kg)	Tolerance (%)
2016.02.26	Head	2450	100	5.47	54.70	52.30	4.59	52.4	4.39
Note: The tolerance limit of System validation ±10%.									

System Performance Check Data (2450MHz Head)

Date/Time: 2/26/2016

Communication System Band: D2450 (2450.0 MHz); Frequency: 2450 MHz;Duty Cycle: 1:1

Medium parameters used: f = 2450 MHz; σ = 1.85 S/m; ε_r = 38.53; ρ = 1000 kg/m^3

Phantom section: Flat Section

Ambient Temperature:21.8 Liquid Temperature:21.1

DASY5 Configuration:

- Probe: EX3DV4 - SN7340; ConvF(7.62, 7.62, 7.62); Calibrated: 12/10/2015;
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1454; Calibrated: 12/8/2015
- Phantom: SAM (30deg probe tilt) with CRP v5.0 on left 1859; Type: QD000P40CD; Serial: TP:1859
- Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

Configuration/CW2450 HEAD/Area Scan (101x101x1): Interpolated grid: dx=1.000 mm, dy=1.000 mm

Maximum value of SAR (interpolated) = 6.26 W/kg

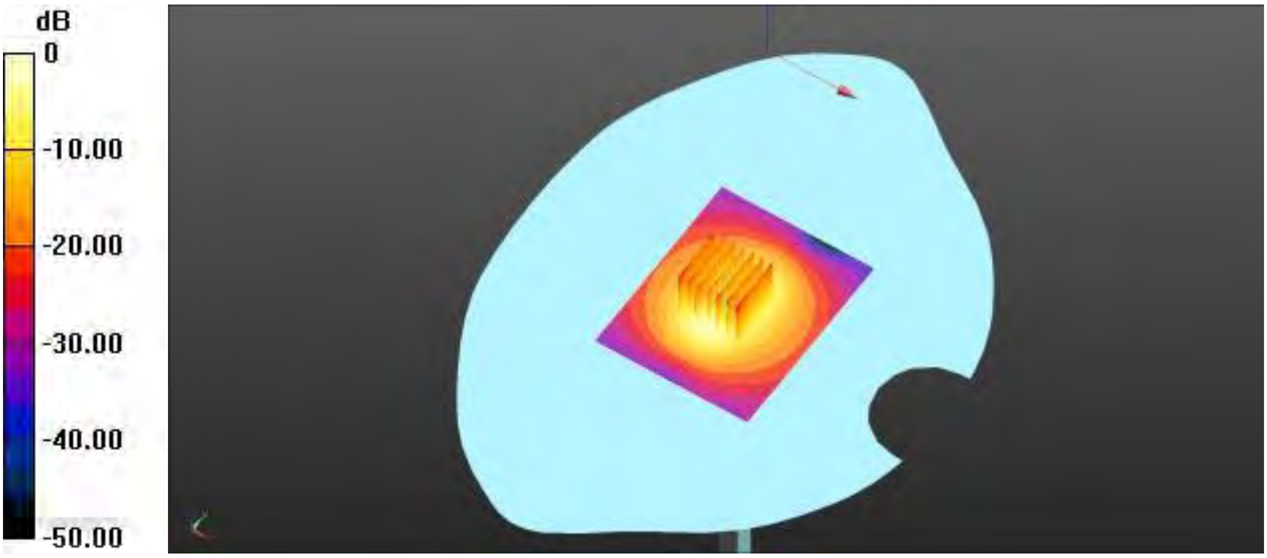
Configuration/CW2450 HEAD/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 58.51 V/m; Power Drift = 0.03 dB

Peak SAR (extrapolated) = 12.2 W/kg

SAR(1 g) = 5.47 W/kg; SAR(10 g) = 2.50 W/kg

Maximum value of SAR (measured) = 6.29 W/kg



0 dB = 6.29 W/kg = 7.99 dBW/kg

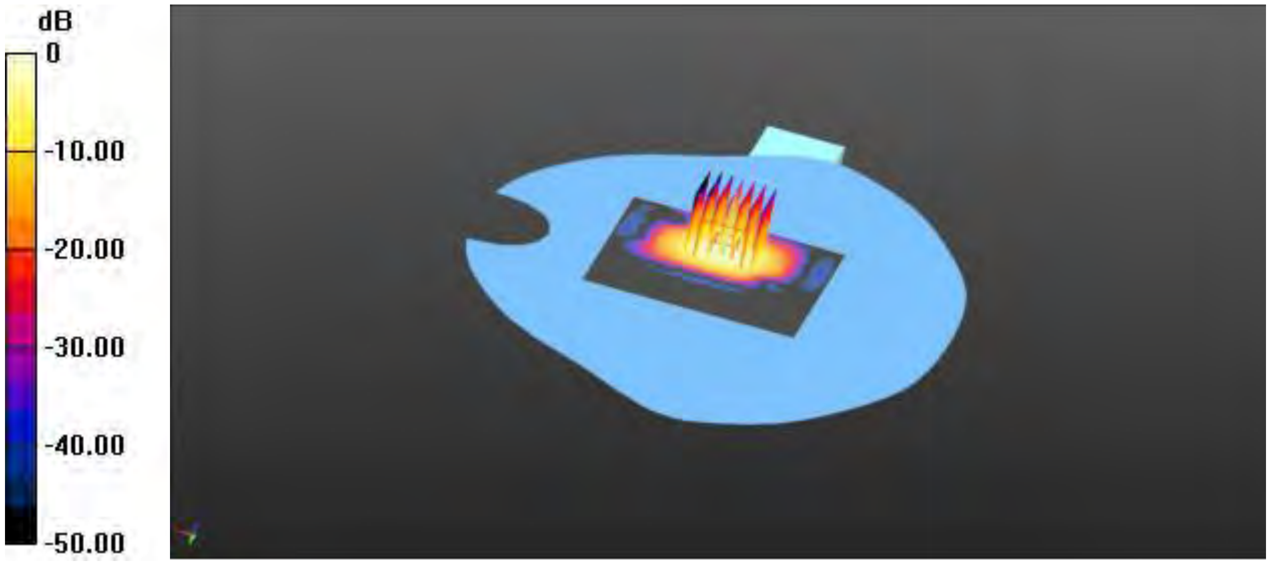
ANNEX C TEST DATA

MEAS. 1 Body Plane with Back Side on High Channel in FHSS 2.4GHz mode with Antenna 1

Date/Time: 2/26/2016
Communication System Band: CW2440; Frequency: 2475 MHz;Duty Cycle: 1:1
Medium parameters used: f = 2475 MHz; σ = 1.87 S/m; εr = 38.26; ρ = 1000 kg/m^3
Phantom section: Flat Section
Ambient Temperature:21.8 Liquid Temperature:21.1
DASY5 Configuration:

- Probe: EX3DV4 - SN7340; ConvF(7.62, 7.62, 7.62); Calibrated: 12/10/2015;
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1454; Calibrated: 12/8/2015
- Phantom: SAM (30deg probe tilt) with CRP v5.0 on left 1859; Type: QD000P40CD; Serial: TP:1859
- Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

Configuration/ FHSS 2475MHz Body Back on Antenna 1 /Area Scan (81x81x1): Interpolated grid: dx=1.200 mm, dy=1.200 mm
Maximum value of SAR (interpolated) = 0.684 W/kg
Configuration/ FHSS 2475MHz Body Back on Antenna 1 /Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 4.494 V/m; Power Drift = -0.13 dB
Peak SAR (extrapolated) = 1.15 W/kg
SAR(1 g) = 0.467 W/kg; SAR(10 g) = 0.184 W/kg
Maximum value of SAR (measured) = 0.541 W/kg



0 dB = 0.684 W/kg = -1.65 dBW/kg

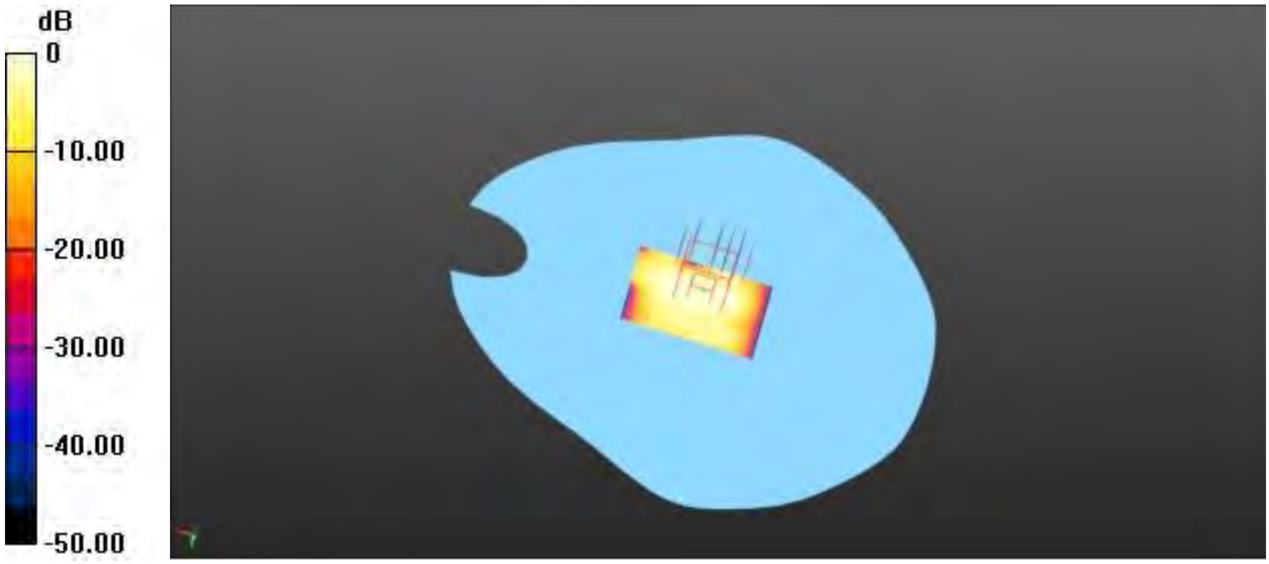
MEAS. 2 Body Plane with Right Edge on High Channel in FHSS 2.4GHz mode with Antenna 1

Date/Time: 2/26/2016
Communication System Band: CW2440; Frequency: 2475 MHz;Duty Cycle: 1:1
Medium parameters used: f = 2475 MHz; σ = 1.87 S/m; εr = 38.26; ρ = 1000 kg/m^3
Phantom section: Flat Section
Ambient Temperature:21.8 Liquid Temperature:21.1
DASY5 Configuration:

- Probe: EX3DV4 - SN7340; ConvF(7.62, 7.62, 7.62); Calibrated: 12/10/2015;
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1454; Calibrated: 12/8/2015
- Phantom: SAM (30deg probe tilt) with CRP v5.0 on left 1859; Type: QD000P40CD; Serial: TP:1859
- Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

Configuration/FHSS 2475MHz Body Right on Antenna 1/Area Scan (51x51x1): Interpolated grid: dx=1.200 mm, dy=1.200 mm
Maximum value of SAR (interpolated) = 0.0242 W/kg

Configuration/FHSS 2475MHz Body Right on Antenna 1 /Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 2.991 V/m; Power Drift = 0.11 dB
Peak SAR (extrapolated) = 0.0550 W/kg
SAR(1 g) = 0.019 W/kg; SAR(10 g) = 0.00789 W/kg
Maximum value of SAR (measured) = 0.0220 W/kg



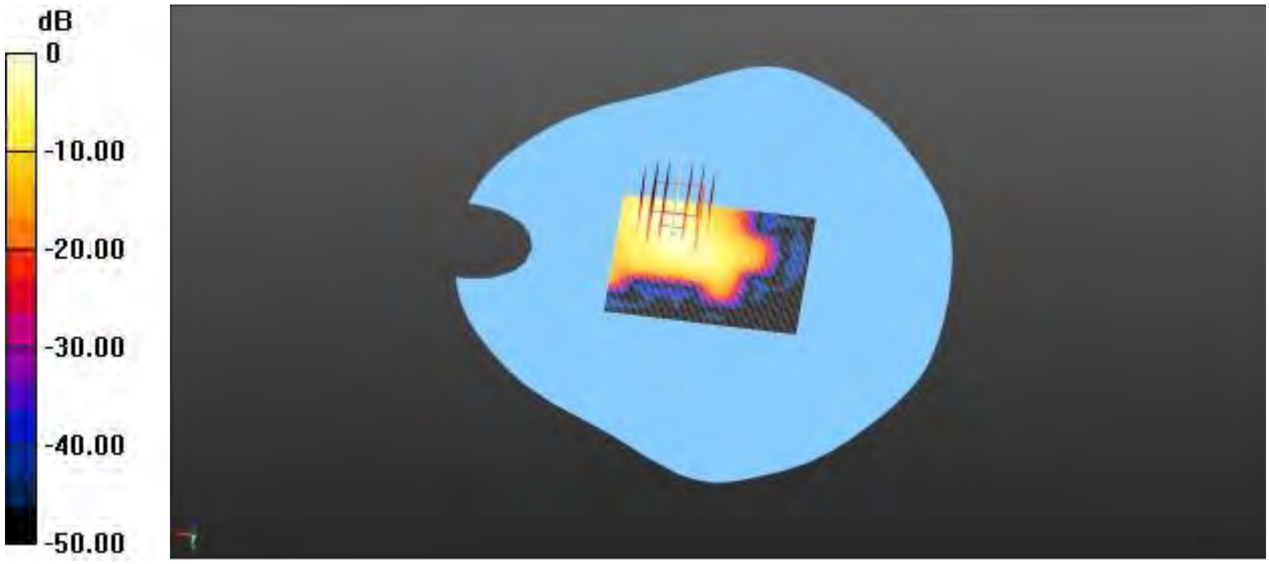
0 dB = 0.0220 W/kg = -16.58 dBW/kg

MEAS. 3 Body Plane with Bottom Edge on High Channel in FHSS 2.4GHz mode with Antenna 1

Date/Time: 2/26/2016
Communication System Band: CW2440; Frequency: 2475 MHz;Duty Cycle: 1:1
Medium parameters used: f = 2475 MHz; σ = 1.87 S/m; εr = 38.26; ρ = 1000 kg/m3
Phantom section: Flat Section
Ambient Temperature:21.8 Liquid Temperature:21.1
DASY5 Configuration:

- Probe: EX3DV4 - SN7340; ConvF(7.62, 7.62, 7.62); Calibrated: 12/10/2015;
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1454; Calibrated: 12/8/2015
- Phantom: SAM (30deg probe tilt) with CRP v5.0 on left 1859; Type: QD000P40CD; Serial: TP:1859
- Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

Configuration/FHSS 2475MHz Body Bottom on Antenna 1/Area Scan (71x71x1): Interpolated grid: dx=1.200 mm, dy=1.200 mm
Maximum value of SAR (interpolated) = 0.0768 W/kg
Configuration/FHSS 2475MHz Body Bottom on Antenna 1/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 3.783 V/m; Power Drift = -0.07 dB
Peak SAR (extrapolated) = 0.147 W/kg
SAR(1 g) = 0.046 W/kg; SAR(10 g) = 0.017 W/kg
Maximum value of SAR (measured) = 0.0613 W/kg



0 dB = 0.0768 W/kg = -11.15 dBW/kg

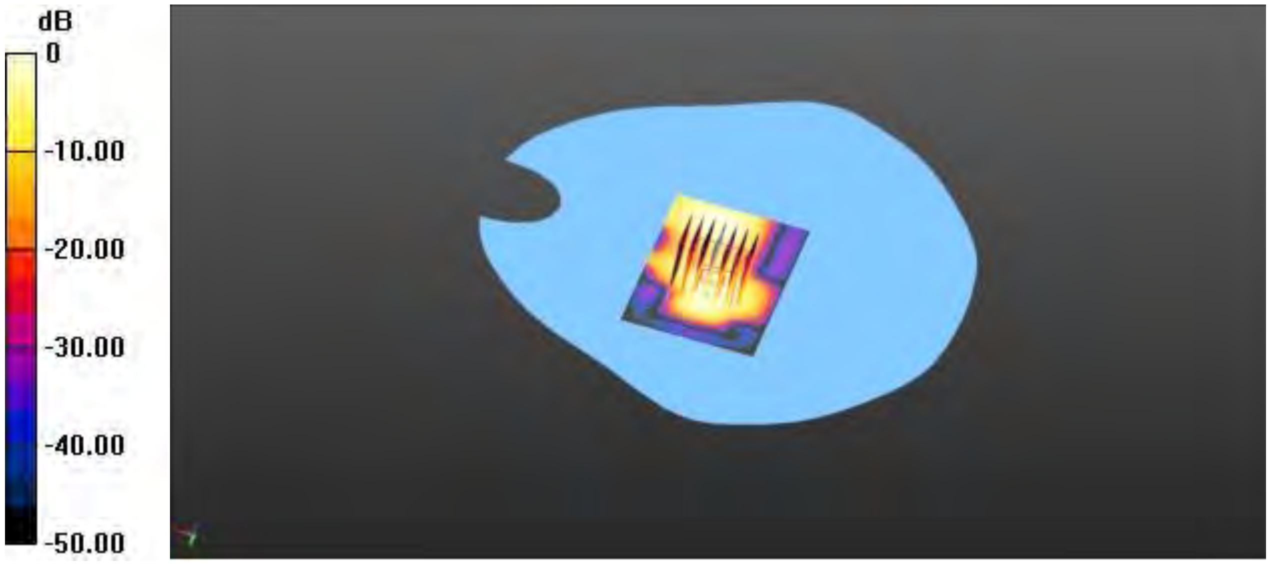
MEAS. 4 Body Plane with Right Edge on High Channel in FHSS 2.4GHz mode with Antenna 2

Date/Time: 2/26/2016
Communication System Band: CW2440; Frequency: 2475 MHz;Duty Cycle: 1:1
Medium parameters used: f = 2475 MHz; σ = 1.87 S/m; εr = 38.26; ρ = 1000 kg/m^3
Phantom section: Flat Section
Ambient Temperature:21.8 Liquid Temperature:21.1
DASY5 Configuration:

- Probe: EX3DV4 - SN7340; ConvF(7.62, 7.62, 7.62); Calibrated: 12/10/2015;
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1454; Calibrated: 12/8/2015
- Phantom: SAM (30deg probe tilt) with CRP v5.0 on left 1859; Type: QD000P40CD; Serial: TP:1859
- Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

Configuration/FHSS 2475MHz Body Right on Antenna 2/Area Scan (51x101x1): Interpolated grid: dx=1.200 mm, dy=1.200 mm
Maximum value of SAR (interpolated) = 0.0729 W/kg

Configuration/FHSS 2475MHz Body Right on Antenna 2/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 2.903 V/m; Power Drift = -0.15 dB
Peak SAR (extrapolated) = 0.111 W/kg
SAR(1 g) = 0.050 W/kg; SAR(10 g) = 0.020 W/kg
Maximum value of SAR (measured) = 0.0612 W/kg



0 dB = 0.0612 W/kg = -12.13 dBW/kg

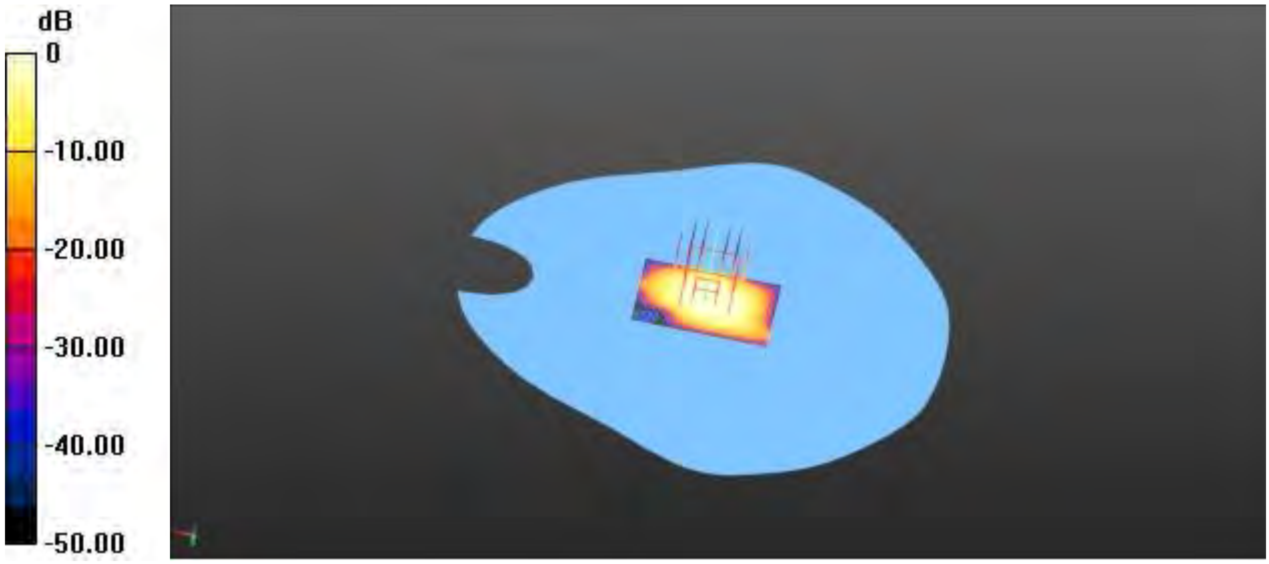
MEAS. 5 Body Plane with Top Edge on High Channel in FHSS 2.4GHz mode with Antenna 2

Date/Time: 2/26/2016
Communication System Band: CW2440; Frequency: 2475 MHz;Duty Cycle: 1:1
Medium parameters used: f = 2475 MHz; σ = 1.87 S/m; εr = 38.26; ρ = 1000 kg/m^3
Phantom section: Flat Section
Ambient Temperature:21.8 Liquid Temperature:21.1
DASY5 Configuration:

- Probe: EX3DV4 - SN7340; ConvF(7.62, 7.62, 7.62); Calibrated: 12/10/2015;
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1454; Calibrated: 12/8/2015
- Phantom: SAM (30deg probe tilt) with CRP v5.0 on left 1859; Type: QD000P40CD; Serial: TP:1859
- Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

Configuration/FHSS 2475MHz Body Top on Antenna 2/Area Scan (51x51x1): Interpolated grid: dx=1.200 mm, dy=1.200 mm
Maximum value of SAR (interpolated) = 0.0883 W/kg

Configuration/FHSS 2475MHz Body Top on Antenna 2/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 5.858 V/m; Power Drift = 0.12 dB
Peak SAR (extrapolated) = 0.131 W/kg
SAR(1 g) = 0.062 W/kg; SAR(10 g) = 0.026 W/kg
Maximum value of SAR (measured) = 0.0727 W/kg



0 dB = 0.0727 W/kg = -11.38 dBW/kg

ANNEX D EUT EXTERNAL PHOTOS

Please refer the document “BL-SZ15C0314-AW.pdf”.

ANNEX E SAR TEST SETUP PHOTOS

Please refer the document “BL-SZ15C0314-AS.pdf”.

ANNEX F CALIBRATION REPORT

F.1 E-Field Probe

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CNAS CALIBRATION No. L0570

Client **baluntek** **Certificate No: Z15-97196**

CALIBRATION CERTIFICATE

Object	EX3DV4 - SN:7340
Calibration Procedure(s)	FD-Z11-2-004-01 Calibration Procedures for Dosimetric E-field Probes
Calibration date:	December 10, 2015

This calibration Certificate documents the traceability to national standards, which realize the physical units of measurements(SI). The measurements and the uncertainties with confidence probability are given on the following pages and are part of the certificate.

All calibrations have been conducted in the closed laboratory facility: environment temperature(22±3)℃ and humidity<70%.

Calibration Equipment used (M&TE critical for calibration)

Primary Standards	ID #	Cal Date(Calibrated by, Certificate No.)	Scheduled Calibration
Power Meter NRP2	101919	01-Jul-15 (CTTL, No.J15X04256)	Jun-16
Power sensor NRP-Z91	101547	01-Jul-15 (CTTL, No.J15X04256)	Jun-16
Power sensor NRP-Z91	101548	01-Jul-15 (CTTL, No.J15X04256)	Jun-16
Reference10dBAttenuator	18N50W-10dB	13-Mar-14(TMC,No.JZ14-1103)	Mar-16
Reference20dBAttenuator	18N50W-20dB	13-Mar-14(TMC,No.JZ14-1104)	Mar-16
Reference Probe EX3DV4	SN 7307	27-Feb-15(SPEAG,No.EX3-7307_Feb15)	Feb-16
DAE4	SN 771	27-Jan-15(SPEAG, No.DAE4-771_Jan15)	Jan -16
Secondary Standards	ID #	Cal Date(Calibrated by, Certificate No.)	Scheduled Calibration
SignalGeneratorMG3700A	6201052605	01-Jul-15 (CTTL, No.J15X04255)	Jun-16
Network Analyzer E5071C	MY46110673	03-Feb-15 (CTTL, No.J15X00728)	Feb-16

	Name	Function	Signature
Calibrated by:	Yu Zongying	SAR Test Engineer	
Reviewed by:	Qi Dianyuan	SAR Project Leader	
Approved by:	Lu Bingsong	Deputy Director of the laboratory	

Issued: December 11, 2015

This calibration certificate shall not be reproduced except in full without written approval of the laboratory.

Certificate No: Z15-97196 Page 1 of 11

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Glossary:

TSL	tissue simulating liquid
NORMx,y,z	sensitivity in free space
ConvF	sensitivity in TSL / NORMx,y,z
DCP	diode compression point
CF	crest factor (1/duty_cycle) of the RF signal
A,B,C,D	modulation dependent linearization parameters
Polarization Φ	Φ rotation around probe axis
Polarization θ	θ rotation around an axis that is in the plane normal to probe axis (at measurement center), i θ=0 is normal to probe axis
Connector Angle	information used in DASY system to align probe sensor X to the robot coordinate system

Calibration is Performed According to the Following Standards:

a) IEEE Std 1528-2013, "IEEE Recommended Practice for Determining the Peak Spatial-Averaged Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques", June 2013

b) IEC 62209-1, "Procedure to measure the Specific Absorption Rate (SAR) for hand-held devices used in close proximity to the ear (frequency range of 300MHz to 3GHz)", February 2005

Methods Applied and Interpretation of Parameters:

- *NORMx,y,z:* Assessed for E-field polarization θ=0 (f≤900MHz in TEM-cell; f>1800MHz: waveguide). NORMx,y,z are only intermediate values, i.e., the uncertainties of NORMx,y,z does not effect the E^2-field uncertainty inside TSL (see below ConvF).
- *NORM(f)x,y,z = NORMx,y,z* frequency_response* (see Frequency Response Chart). This linearization is implemented in DASY4 software versions later than 4.2. The uncertainty of the frequency response is included in the stated uncertainty of ConvF.
- *DCPx,y,z:* DCP are numerical linearization parameters assessed based on the data of power sweep (no uncertainty required). DCP does not depend on frequency nor media.
- PAR: PAR is the Peak to Average Ratio that is not calibrated but determined based on the signal characteristics.
- *Ax,y,z; Bx,y,z; Cx,y,z;VRx,y,z:*A,B,C are numerical linearization parameters assessed based on the data of power sweep for specific modulation signal. The parameters do not depend on frequency nor media. VR is the maximum calibration range expressed in RMS voltage across the diode.
- *ConvF and Boundary Effect Parameters:* Assessed in flat phantom using E-field (or Temperature Transfer Standard for f≤800MHz) and inside waveguide using analytical field distributions based on power measurements for f >800MHz. The same setups are used for assessment of the parameters applied for boundary compensation (alpha, depth) of which typical uncertainty valued are given. These parameters are used in DASY4 software to improve probe accuracy close to the boundary. The sensitivity in TSL corresponds to NORMx,y,z* ConvF whereby the uncertainty corresponds to that given for ConvF. A frequency dependent ConvF is used in DASY version 4.4 and higher which allows extending the validity from±50MHz to±100MHz.
- *Spherical isotropy (3D deviation from isotropy):* in a field of low gradients realized using a flat phantom exposed by a patch antenna.
- *Sensor Offset:* The sensor offset corresponds to the offset of virtual measurement center from the probe tip (on probe axis). No tolerance required.
- *Connector Angle:* The angle is assessed using the information gained by determining the *NORMx* (no uncertainty required).

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Probe EX3DV4

SN: 7340

Calibrated: December 10, 2015

Calibrated for DASY/EASY Systems

(Note: non-compatible with DASY2 system!)

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DASY/EASY – Parameters of Probe: EX3DV4 – SN: 7340

Basic Calibration Parameters

	Sensor X	Sensor Y	Sensor Z	Unc (k=2)
Norm(μV/(V/m)^2)[A]	0.51	0.48	0.45	±10.8%
DCP(mV)[B]	100.7	101.8	105.1	

Modulation Calibration Parameters

UID	Communication System Name		A dB	B dB√μV	C	D dB	VR mV	Unc[E] (k=2)
0	CW	X	0.0	0.0	1.0	0.00	194.7	±2.2%
		Y	0.0	0.0	1.0		188.5	
		Z	0.0	0.0	1.0		183.1	

The reported uncertainty of measurement is stated as the standard uncertainty of Measurement multiplied by the coverage factor k=2, which for a normal distribution Corresponds to a coverage probability of approximately 95%.

[A] The uncertainties of Norm X, Y, Z do not affect the E^2-field uncertainty inside TSL (see Page 5 and Page 6).
[B] Numerical linearization parameter: uncertainty not required.
[E] Uncertainly is determined using the max. deviation from linear response applying rectangular distribution and is expressed for the square of the field value.

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DASY/EASY – Parameters of Probe: EX3DV4 – SN: 7340

Calibration Parameter Determined in Head Tissue Simulating Media

f [MHz][C]	Relative Permittivity [F]	Conductivity (S/m) [F]	ConvF X	ConvF Y	ConvF Z	Alpha[G]	Depth[G] (mm)	Unct. (k=2)
850	41.5	0.92	9.56	9.56	9.56	0.12	1.42	±12%
1750	40.1	1.37	8.22	8.22	8.22	0.22	1.08	±12%
1900	40.0	1.40	8.15	8.15	8.15	0.21	1.09	±12%
2450	39.2	1.80	7.62	7.62	7.62	0.48	0.72	±12%
2600	39.0	1.96	7.42	7.42	7.42	0.34	0.98	±12%
5200	36.0	4.66	5.33	5.33	5.33	0.39	1.21	±13%
5600	35.5	5.07	4.70	4.70	4.70	0.39	1.20	±13%
5800	35.3	5.27	4.68	4.68	4.68	0.39	1.25	±13%

[C] Frequency validity of ±100MHz only applies for DASY v4.4 and higher (Page 2), else it is restricted to ±50MHz. The uncertainty is the RSS of ConvF uncertainty at calibration frequency and the uncertainty for the indicated frequency band.
[F] At frequency below 3 GHz, the validity of tissue parameters (ε and σ) can be relaxed to ±10% if liquid compensation formula is applied to measured SAR values. At frequencies above 3 GHz, the validity of tissue parameters (ε and σ) is restricted to ±5%. The uncertainty is the RSS of the ConvF uncertainty for indicated target tissue parameters.
[G] Alpha/Depth are determined during calibration. SPEAG warrants that the remaining deviation due to the boundary effect after compensation is always less than ± 1% for frequencies below 3 GHz and below ± 2% for the frequencies between 3-6 GHz at any distance larger than half the probe tip diameter from the boundary.

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DASY/EASY – Parameters of Probe: EX3DV4 – SN: 7340

Calibration Parameter Determined in Body Tissue Simulating Media

f [MHz][C]	Relative Permittivity[F]	Conductivity (S/m)[F]	ConvF X	ConvF Y	ConvF Z	Alpha[G]	Depth[G] (mm)	Unct. (k=2)
850	55.2	0.99	9.83	9.83	9.83	0.15	1.46	±12%
1750	53.4	1.49	7.87	7.87	7.87	0.20	1.16	±12%
1900	53.3	1.52	7.51	7.51	7.51	0.18	1.30	±12%
2450	52.7	1.95	7.38	7.38	7.38	0.35	0.97	±12%
2600	52.5	2.16	6.99	6.99	6.99	0.34	1.02	±12%
5200	49.0	5.30	4.56	4.56	4.56	0.45	1.31	±13%
5600	48.5	5.77	3.98	3.98	3.98	0.48	1.33	±13%
5800	48.2	6.00	4.15	4.15	4.15	0.50	1.18	±13%

[C] Frequency validity of ±100MHz only applies for DASY v4.4 and higher (Page 2), else it is restricted to ±50MHz. The uncertainty is the RSS of ConvF uncertainty at calibration frequency and the uncertainty for the indicated frequency band.
[F] At frequency below 3 GHz, the validity of tissue parameters (ε and σ) can be relaxed to ±10% if liquid compensation formula is applied to measured SAR values. At frequencies above 3 GHz, the validity of tissue parameters (ε and σ) is restricted to ±5%. The uncertainty is the RSS of the ConvF uncertainty for indicated target tissue parameters.
[G] Alpha/Depth are determined during calibration. SPEAG warrants that the remaining deviation due to the boundary effect after compensation is always less than ± 1% for frequencies below 3 GHz and below ± 2% for the frequencies between 3-6 GHz at any distance larger than half the probe tip diameter from the boundary.

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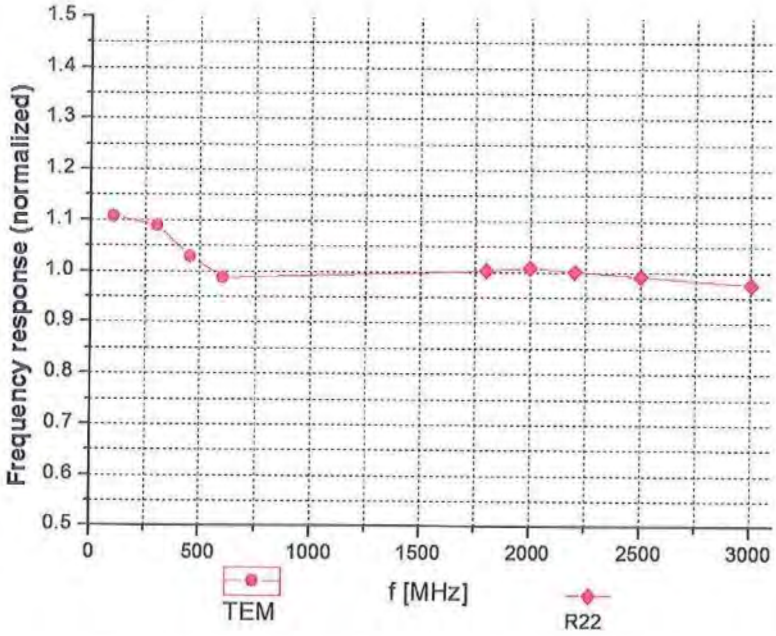
Frequency Response of E-Field
(TEM-Cell: ifi110 EXX, Waveguide: R22)



Uncertainty of Frequency Response of E-field: ±7.5% (k=2)

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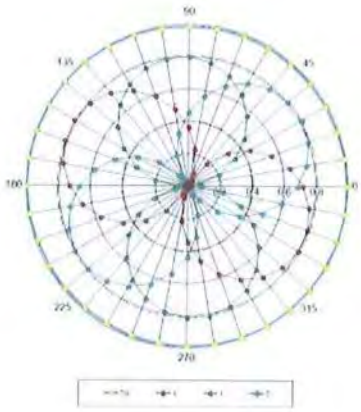
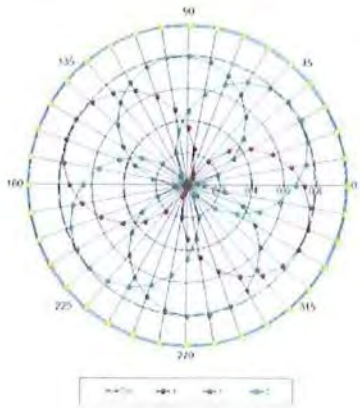
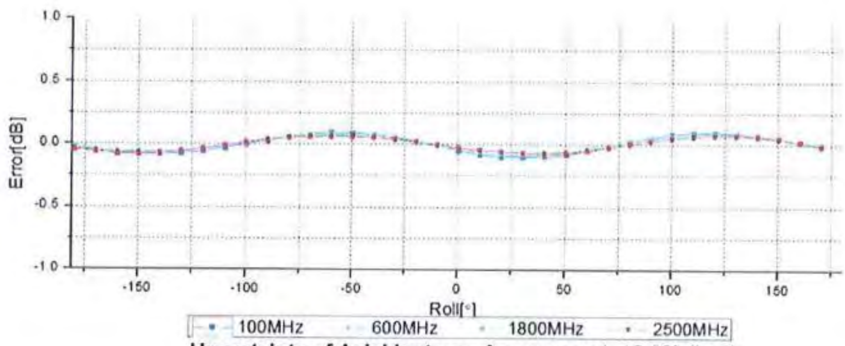
Receiving Pattern (Φ), θ=0°

f=600 MHz, TEM



f=1800 MHz, R22





Uncertainty of Axial Isotropy Assessment: ±0.9% (k=2)

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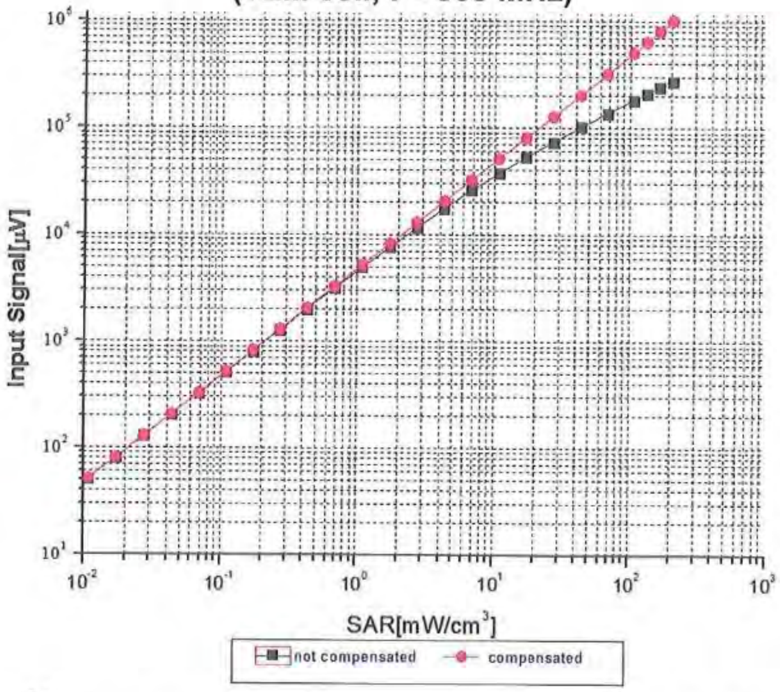
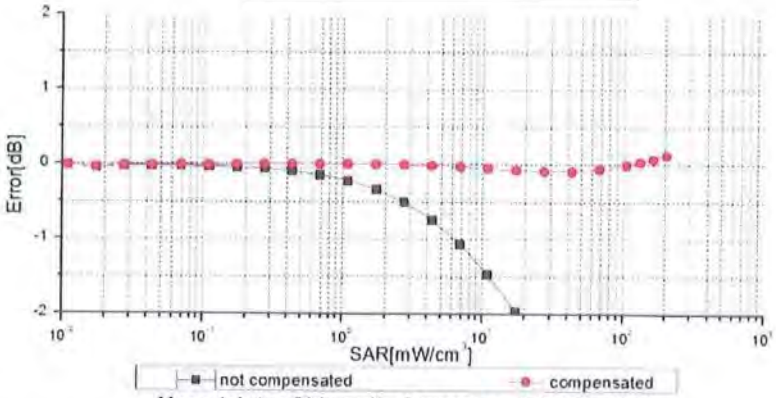
Dynamic Range f(SAR_{head})
(TEM cell, f = 900 MHz)





Uncertainty of Linearity Assessment: ±0.9% (k=2)

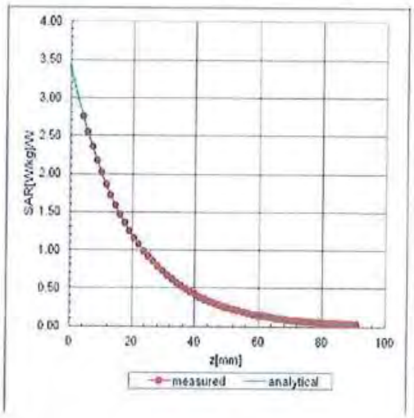
Certificate No: Z15-97196

Page 9 of 11

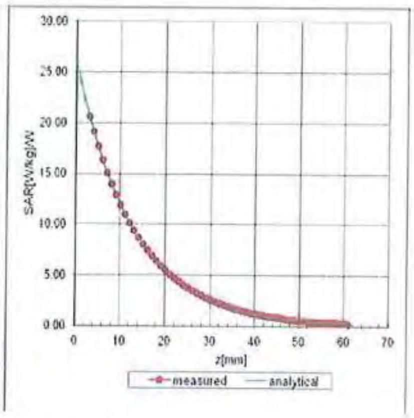
In Collaboration with
s p e a g
CALIBRATION LABORATORY
Add: No.51 Xueyuan Road, Haidian District, Beijing, 100191, China
Tel: +86-10-62304633-2218 Fax: +86-10-62304633-2209
E-mail: cttl@chinattl.com Http://www.chinattl.cn

Conversion Factor Assessment

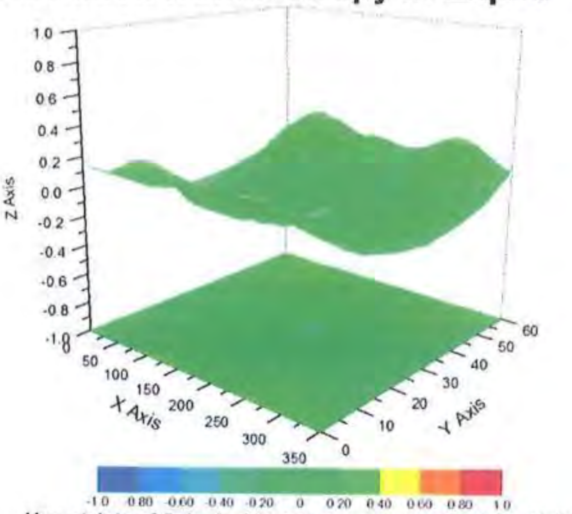
f=850 MHz, WGLS R9(H_convF)



f=1750 MHz, WGLS R22(H_convF)



Deviation from Isotropy in Liquid



Uncertainty of Spherical Isotropy Assessment: ±2.8% (K=2)

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E-mail: cttl@chinattl.com Http://www.chinattl.cn

DASY/EASY – Parameters of Probe: EX3DV4 – SN: 7340

Other Probe Parameters

Sensor Arrangement	Triangular
Connector Angle (°)	130.2
Mechanical Surface Detection Mode	enabled
Optical Surface Detection Mode	disable
Probe Overall Length	337mm
Probe Body Diameter	10mm
Tip Length	9mm
Tip Diameter	2.5mm
Probe Tip to Sensor X Calibration Point	1mm
Probe Tip to Sensor Y Calibration Point	1mm
Probe Tip to Sensor Z Calibration Point	1mm
Recommended Measurement Distance from Surface	1.4mm

F.2 Data Acquisition Electronics

In Collaboration with
speag
CALIBRATION LABORATORY

Add: No.51 Xueyuan Road, Haidian District, Beijing, 100191, China
Tel: +86-10-62304633-2218 Fax: +86-10-62304633-2209
E-mail: cttl@chinattl.com Http://www.chinattl.cn

CALIBRATION
No. L0570

Client : **baluntek** **Certificate No: Z15-97195**

CALIBRATION CERTIFICATE

Object	DAE4 - SN: 1454
Calibration Procedure(s)	FD-Z11-2-002-01 Calibration Procedure for the Data Acquisition Electronics (DAEx)
Calibration date:	December 08, 2015

This calibration Certificate documents the traceability to national standards, which realize the physical units of measurements(SI). The measurements and the uncertainties with confidence probability are given on the following pages and are part of the certificate.

All calibrations have been conducted in the closed laboratory facility: environment temperature(22±3)℃ and humidity<70%.

Calibration Equipment used (M&TE critical for calibration)

Primary Standards	ID #	Cal Date(Calibrated by, Certificate No.)	Scheduled Calibration
Process Calibrator 753	1971018	06-July-15 (CTTL, No:J15X04257)	July-16

	Name	Function	Signature
Calibrated by:	Yu Zongying	SAR Test Engineer	
Reviewed by:	Qi Dianyuan	SAR Project Leader	
Approved by:	Lu Bingsong	Deputy Director of the laboratory	

Issued: December 09, 2015

Certificate No: Z15-97195 Page 1 of 3

In Collaboration with
s p e a g
CALIBRATION LABORATORY

Add: No.51 Xueyuan Road, Haidian District, Beijing, 100191, China
Tel: +86-10-62304633-2218 Fax: +86-10-62304633-2209
E-mail: cttl@chinattl.com Http://www.chinattl.cn

Glossary:

DAE	data acquisition electronics
Connector angle	information used in DASY system to align probe sensor X to the robot coordinate system.

Methods Applied and Interpretation of Parameters:

- *DC Voltage Measurement*: Calibration Factor assessed for use in DASY system by comparison with a calibrated instrument traceable to national standards. The figure given corresponds to the full scale range of the voltmeter in the respective range.

- *Connector angle*: The angle of the connector is assessed measuring the angle mechanically by a tool inserted. Uncertainty is not required.

- The report provide only calibration results for DAE, it does not contain other performance test results.

In Collaboration with
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CALIBRATION LABORATORY
Add: No.51 Xueyuan Road, Haidian District, Beijing, 100191, China
Tel: +86-10-62304633-2218 Fax: +86-10-62304633-2209
E-mail: cttl@chinattl.com Http://www.chinattl.cn

DC Voltage Measurement

A/D - Converter Resolution nominal

High Range: 1LSB = 6.1μV , full range = -100...+300 mV

Low Range: 1LSB = 61nV , full range = -1.......+3mV

DASY measurement parameters: Auto Zero Time: 3 sec; Measuring time: 3 sec

Calibration Factors	X	Y	Z
High Range	404.175 ± 0.15% (k=2)	403.666 ± 0.15% (k=2)	403.739 ± 0.15% (k=2)
Low Range	4.01281 ± 0.7% (k=2)	3.9916 ± 0.7% (k=2)	3.99929 ± 0.7% (k=2)

Connector Angle

Connector Angle to be used in DASY system	317.5° ± 1 °

Certificate No: Z15-97195 Page 3 of 3

F.3 Dual Logo-CTTL-SPEAG Certificates

Schmid & Partner Engineering AG

s p e a g

Zeughausstrasse 43, 8004 Zurich, Switzerland
Phone +41 44 245 9700, Fax +41 44 245 9779
info@speag.com, http://www.speag.com

Tolan Tu
Shenzhen BALUN Technology Co., Ltd.
Block B, FL 1, Baisha Science and Technology Park, Shahe Xi Road, Nanshan District, ShenZhen, GuangDong Province,
P. R. China

Email: tulang@baluntek.com

Zurich, March 4, 2016/ kp

To whom it may concern:

Schmid & Partner Engineering AG (SPEAG), established and reputable manufacturers of dosimetry equipment at Zeughausstrasse 43 CH - 8004 Zurich Switzerland, do hereby certify that below listed calibration certificates have been approved for release under CTTL-SPEAG dual-logo as per QAP4CAL agreement between SPEAG and CTTL Beijing SAR calibration lab.

Certificate No. Z15-97195 (calibration of DAE4 – SN: 1454)
Certificate No. Z15-97196 (calibration of EX3DV4 – SN: 7340)

Yours sincerely,

Schmid & Partner Engineering AG

s p e a g

Schmid & Partner Engineering AG
Zeughausstrasse 43, 8004 Zurich, Switzerland
Phone +41 44 245 9700, Fax +41 44 245 9779
info@speag.com, http://www.speag.com

Dr. Katja Pokovic
Director Laboratory & Services

1/1

F.4 2450MHz Dipole

Calibration Laboratory of
Schmid & Partner
Engineering AG
Zeughausstrasse 43, 8004 Zurich, Switzerland

S Schweizerischer Kalibrierdienst
C Service suisse d'étalonnage
S Servizio svizzero di taratura
S Swiss Calibration Service

Accredited by the Swiss Accreditation Service (SAS)
The Swiss Accreditation Service is one of the signatories to the EA Multilateral Agreement for the recognition of calibration certificates

Accreditation No.: **SCS 108**

Client **Dgieie (Vitec)**

Certificate No: **D2450V2-952_Nov14**

CALIBRATION CERTIFICATE

Object	D2450V2 - SN: 952
Calibration procedure(s)	QA CAL-05.v9 Calibration procedure for dipole validation kits above 700 MHz
Calibration date:	November 27, 2014

This calibration certificate documents the traceability to national standards, which realize the physical units of measurements (SI).
The measurements and the uncertainties with confidence probability are given on the following pages and are part of the certificate.

All calibrations have been conducted in the closed laboratory facility: environment temperature (22 ± 3)°C and humidity < 70%.

Calibration Equipment used (M&TE critical for calibration)

Primary Standards	ID #	Cal Date (Certificate No.)	Scheduled Calibration
Power meter EPM-442A	GB37480704	07-Oct-14 (No. 217-02020)	Oct-15
Power sensor HP 8481A	US37292783	07-Oct-14 (No. 217-02020)	Oct-15
Power sensor HP 8481A	MY41092317	07-Oct-14 (No. 217-02021)	Oct-15
Reference 20 dB Attenuator	SN: 5058 (20k)	03-Apr-14 (No. 217-01918)	Apr-15
Type-N mismatch combination	SN: 5047.2 / 06327	03-Apr-14 (No. 217-01921)	Apr-15
Reference Probe ES3DV3	SN: 3205	30-Dec-13 (No. ES3-3205_Dec13)	Dec-14
DAE4	SN: 601	18-Aug-14 (No. DAE4-601_Aug14)	Aug-15

Secondary Standards	ID #	Check Date (in house)	Scheduled Check
RF generator R&S SMT-06	100005	04-Aug-99 (in house check Oct-13)	In house check: Oct-16
Network Analyzer HP 8753E	US37390585 S4206	18-Oct-01 (in house check Oct-14)	In house check: Oct-15

	Name	Function	Signature
Calibrated by:	Michael Weber	Laboratory Technician	M.Weber
Approved by:	Katja Pokovic	Technical Manager	

Issued: November 28, 2014

Calibration Laboratory of
Schmid & Partner
Engineering AG
Zeughausstrasse 43, 8004 Zurich, Switzerland

S Schweizerischer Kalibrierdienst
C Service suisse d'étalonnage
Servizio svizzero di taratura
S Swiss Calibration Service

Accredited by the Swiss Accreditation Service (SAS)
The Swiss Accreditation Service is one of the signatories to the EA Multilateral Agreement for the recognition of calibration certificates

Accreditation No.: **SCS 108**

Glossary:

TSL	tissue simulating liquid
ConvF	sensitivity in TSL / NORM x,y,z
N/A	not applicable or not measured

Calibration is Performed According to the Following Standards:

a) IEEE Std 1528-2013, "IEEE Recommended Practice for Determining the Peak Spatial-Averaged Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques", June 2013
b) IEC 62209-1, "Procedure to measure the Specific Absorption Rate (SAR) for hand-held devices used in close proximity to the ear (frequency range of 300 MHz to 3 GHz)", February 2005
c) KDB 865664, "SAR Measurement Requirements for 100 MHz to 6 GHz"

Additional Documentation:

d) DASY4/5 System Handbook

Methods Applied and Interpretation of Parameters:

- *Measurement Conditions:* Further details are available from the Validation Report at the end of the certificate. All figures stated in the certificate are valid at the frequency indicated.
- *Antenna Parameters with TSL:* The dipole is mounted with the spacer to position its feed point exactly below the center marking of the flat phantom section, with the arms oriented parallel to the body axis.
- *Feed Point Impedance and Return Loss:* These parameters are measured with the dipole positioned under the liquid filled phantom. The impedance stated is transformed from the measurement at the SMA connector to the feed point. The Return Loss ensures low reflected power. No uncertainty required.
- *Electrical Delay:* One-way delay between the SMA connector and the antenna feed point. No uncertainty required.
- *SAR measured:* SAR measured at the stated antenna input power.
- *SAR normalized:* SAR as measured, normalized to an input power of 1 W at the antenna connector.
- *SAR for nominal TSL parameters:* The measured TSL parameters are used to calculate the nominal SAR result.

The reported uncertainty of measurement is stated as the standard uncertainty of measurement multiplied by the coverage factor k=2, which for a normal distribution corresponds to a coverage probability of approximately 95%.

Measurement Conditions

DASY system configuration, as far as not given on page 1.

DASY Version	DASY5	V52.8.8
Extrapolation	Advanced Extrapolation	
Phantom	Modular Flat Phantom	
Distance Dipole Center - TSL	10 mm	with Spacer
Zoom Scan Resolution	dx, dy, dz = 5 mm	
Frequency	2450 MHz ± 1 MHz	

Head TSL parameters

The following parameters and calculations were applied.

	Temperature	**Permittivity**	**Conductivity**
Nominal Head TSL parameters	22.0 °C	39.2	1.80 mho/m
Measured Head TSL parameters	(22.0 ± 0.2) °C	39.0 ± 6 %	1.86 mho/m ± 6 %
Head TSL temperature change during test	< 0.5 °C	----	----

SAR result with Head TSL

SAR averaged over 1 cm^3 (1 g) of Head TSL	Condition	
SAR measured	250 mW input power	13.3 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**52.3 W/kg ± 17.0 % (k=2)**

SAR averaged over 10 cm^3 (10 g) of Head TSL	condition	
SAR measured	250 mW input power	6.17 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**24.5 W/kg ± 16.5 % (k=2)**

Body TSL parameters

The following parameters and calculations were applied.

	Temperature	**Permittivity**	**Conductivity**
Nominal Body TSL parameters	22.0 °C	52.7	1.95 mho/m
Measured Body TSL parameters	(22.0 ± 0.2) °C	50.9 ± 6 %	2.03 mho/m ± 6 %
Body TSL temperature change during test	< 0.5 °C	----	----

SAR result with Body TSL

SAR averaged over 1 cm^3 (1 g) of Body TSL	Condition	
SAR measured	250 mW input power	13.0 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	**50.6 W/kg ± 17.0 % (k=2)**

SAR averaged over 10 cm^3 (10 g) of Body TSL	condition	
SAR measured	250 mW input power	6.02 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	**23.7 W/kg ± 16.5 % (k=2)**

Appendix (Additional assessments outside the scope of SCS108)

Antenna Parameters with Head TSL

Impedance, transformed to feed point	53.4 Ω + 3.0 jΩ
Return Loss	- 27.2 dB

Antenna Parameters with Body TSL

Impedance, transformed to feed point	50.7 Ω + 5.1 jΩ
Return Loss	- 25.8 dB

General Antenna Parameters and Design

Electrical Delay (one direction)	1.161 ns

After long term use with 100W radiated power, only a slight warming of the dipole near the feedpoint can be measured.

The dipole is made of standard semirigid coaxial cable. The center conductor of the feeding line is directly connected to the second arm of the dipole. The antenna is therefore short-circuited for DC-signals. On some of the dipoles, small end caps are added to the dipole arms in order to improve matching when loaded according to the position as explained in the "Measurement Conditions" paragraph. The SAR data are not affected by this change. The overall dipole length is still according to the Standard.
No excessive force must be applied to the dipole arms, because they might bend or the soldered connections near the feedpoint may be damaged.

Additional EUT Data

Manufactured by	SPEAG
Manufactured on	August 05, 2014

DASY5 Validation Report for Head TSL

Date: 27.11.2014

Test Laboratory: SPEAG, Zurich, Switzerland

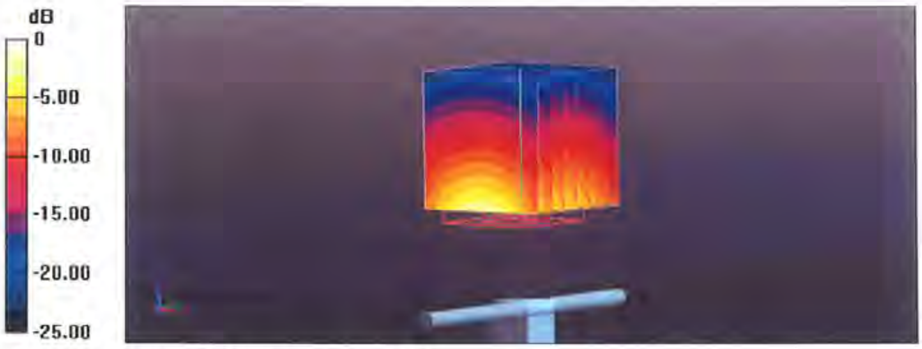
DUT: Dipole 2450 MHz; Type: D2450V2; Serial: D2450V2 - SN: 952

Communication System: UID 0 - CW; Frequency: 2450 MHz
Medium parameters used: f = 2450 MHz; σ = 1.86 S/m; ε_r = 39; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2011)

DASY52 Configuration:

- Probe: ES3DV3 - SN3205; ConvF(4.53, 4.53, 4.53); Calibrated: 30.12.2013;
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 18.08.2014
- Phantom: Flat Phantom 5.0 (front); Type: QD000P50AA; Serial: 1001
- DASY52 52.8.8(1222); SEMCAD X 14.6.10(7331)

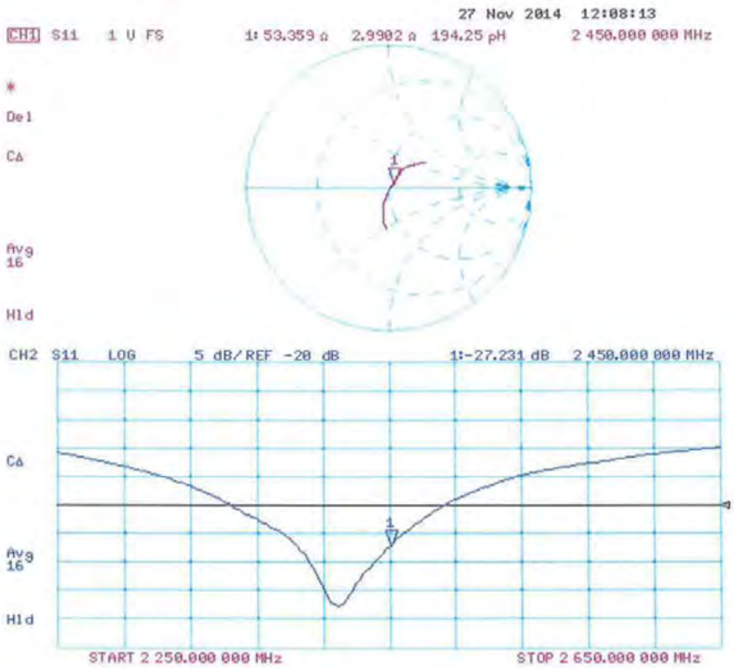
Dipole Calibration for Head Tissue/Pin=250 mW, d=10mm/Zoom Scan (7x7x7)/Cube 0:
Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 100.8 V/m; Power Drift = 0.00 dB
Peak SAR (extrapolated) = 27.5 W/kg
SAR(1 g) = 13.3 W/kg; SAR(10 g) = 6.17 W/kg
Maximum value of SAR (measured) = 17.5 W/kg



0 dB = 17.5 W/kg = 12.43 dBW/kg

Certificate No: D2450V2-952_Nov14 Page 5 of 8

Impedance Measurement Plot for Head TSL



DASY5 Validation Report for Body TSL

Date: 27.11.2014

Test Laboratory: SPEAG, Zurich, Switzerland

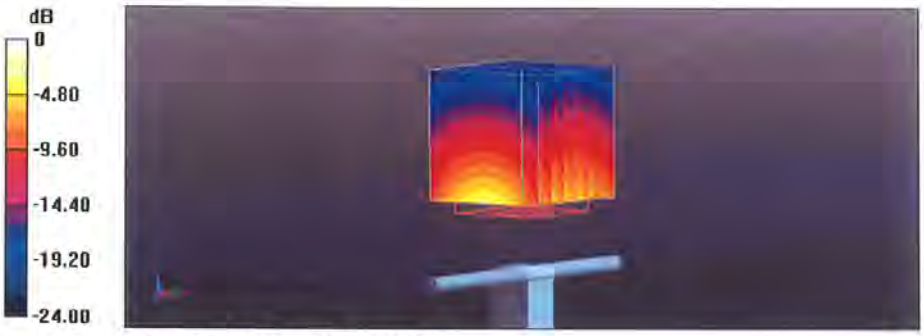
DUT: Dipole 2450 MHz; Type: D2450V2; Serial: D2450V2 - SN: 952

Communication System: UID 0 - CW; Frequency: 2450 MHz
Medium parameters used: f = 2450 MHz: $\sigma = 2.03$ S/m; $\varepsilon_r = 50.9$; $\rho = 1000$ kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2011)

DASY52 Configuration:

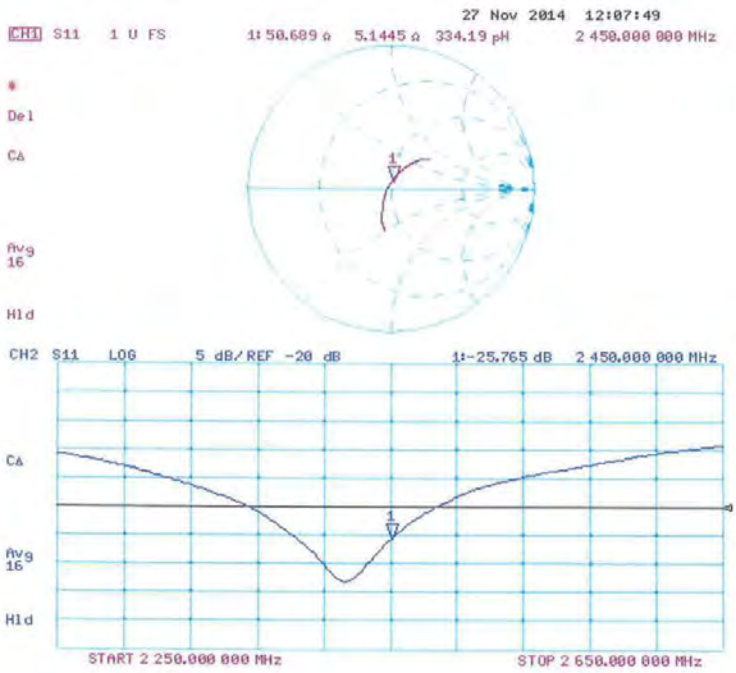
- Probe: ES3DV3 - SN3205; ConvF(4.35, 4.35, 4.35); Calibrated: 30.12.2013;
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 18.08.2014
- Phantom: Flat Phantom 5.0 (back); Type: QD000P50AA; Serial: 1002
- DASY52 52.8.8(1222); SEMCAD X 14.6.10(7331)

Dipole Calibration for Body Tissue/Pin=250 mW, d=10mm/Zoom Scan (7x7x7)/Cube 0:
Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 95.25 V/m; Power Drift = -0.01 dB
Peak SAR (extrapolated) = 27.2 W/kg
SAR(1 g) = 13 W/kg; SAR(10 g) = 6.02 W/kg
Maximum value of SAR (measured) = 17.3 W/kg



0 dB = 17.3 W/kg = 12.38 dBW/kg

Impedance Measurement Plot for Body TSL



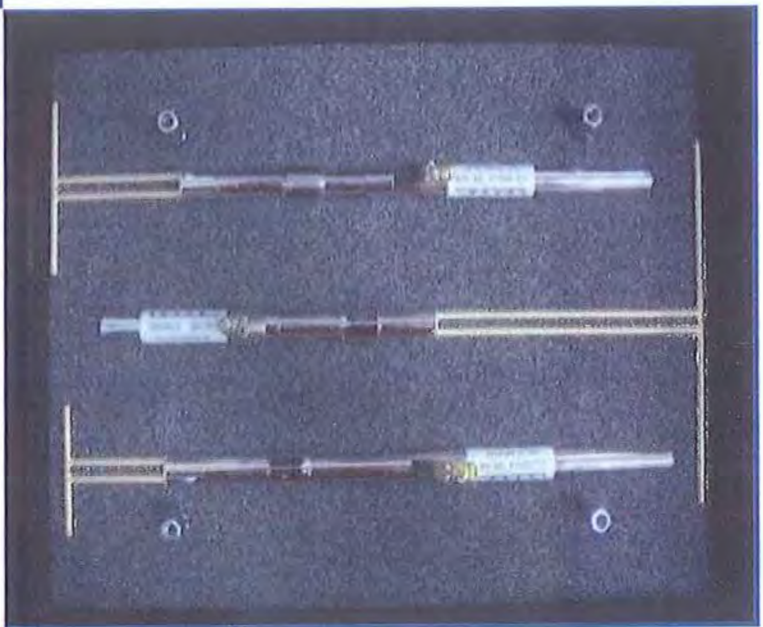
Certificate No: D2450V2-952_Nov14 Page 8 of 8

F.5 Dipole Performance Measurement Report

SAR Dipole Performance Measurement Report

ISSUED BY
Shenzhen BALUN Technology Co., Ltd.

FOR
Validation Dipoles



Tested by: Tu Lang (Engineer)

Approved by: Wei Yanquan (Chief Engineer)

Report No.:	LW-SZ15C0264-701
EUT Type:	SAR Validation Dipole
Model Name:	D835V2, D1750V2 D1900V2, D2450V2 D2600V2, D5GHzV2
Brand Name:	Speag
Test Conclusion:	Pass
Test Date:	Oct. 23, 2015 ~ Oct. 26, 2015
Date of Issue:	Oct. 29, 2015

1 GENERAL INFORMATION

1.1 Introduction

This document contains a summary of the requirements set forth by the IEEE 1528, FCC KDB 865664 D01 for reference dipoles used for SAR measurement system validations. Instead of the typical annual calibration recommended by measurement standards, the reference dipoles were demonstrated that the SAR target, impedance and return loss have remain stable, so the longer calibration interval is acceptable.

1.2 General Description for Equipment under Test (EUT)

EUT Type	DASY 52 Reference Dipoles
Manufacturer	Speag

Parameter	EUT 1	EUT 2	EUT 3	EUT 4	EUT 5	EUT 6
Model	D835V2	D1750V2	D1900V2	D2450V2	D2600V2	D5GHzV2
Frequency	835 MHz	1750 MHz	1900 MHz	2450 MHz	2600 MHz	5GHz-6GHz
Serial Number	SN 4d187	SN 1130	SN 5d193	SN 952	SN 1095	SN 1200
Product Condition (New/ Used)	Used	Used	Used	Used	Used	Used
Last Cal. Date	2014/11/26	2014/11/28	2014/11/28	2014/11/27	2014/11/27	2014/12/4

1.3 EUT Photos

D835V2

D1750V2

D1900V2

D2450V2

D2600V2

D5GHzV2

2 SIMULATING LIQUID VERIFICATION

Liquid Type	Fre. (MHz)	Meas. Conductivity (σ) (S/m)	Meas. Permittivity (ε)	Target Conductivity (σ) (S/m)	Target Permittivity (ε)	Conductivity Tolerance (%)	Permittivity Tolerance (%)
Head	835	0.89	41.83	0.90	41.50	-1.11	0.80
Body	835	0.98	53.88	0.97	55.20	1.03	-2.39
Head	1750	1.38	39.23	1.37	40.10	0.73	-2.17
Body	1750	1.45	51.75	1.49	53.40	-2.68	-3.09
Head	1900	1.43	39.44	1.40	40.00	2.14	-1.40
Body	1900	1.55	51.61	1.52	53.30	1.97	-3.17
Head	2450	1.84	38.53	1.80	39.20	2.22	-1.71
Body	2450	1.99	51.17	1.95	52.70	2.05	-2.90
Head	2600	1.97	38.09	1.96	39.00	0.51	-2.33
Body	2600	2.20	50.81	2.16	52.50	1.85	-3.22
Head	5200	4.78	36.52	4.66	35.99	2.58	1.47
Body	5200	5.38	48.74	5.30	49.01	1.51	-0.55
Head	5600	5.20	35.06	5.07	35.53	2.56	-1.32
Body	5600	5.72	46.31	5.77	48.47	-0.87	-4.46
Head	5800	5.42	34.40	5.27	35.30	2.85	-2.55
Body	5800	5.92	46.06	6.00	48.20	-1.33	-4.44

3 DIPOLE IMPEDANCE AND RETURN LOSS

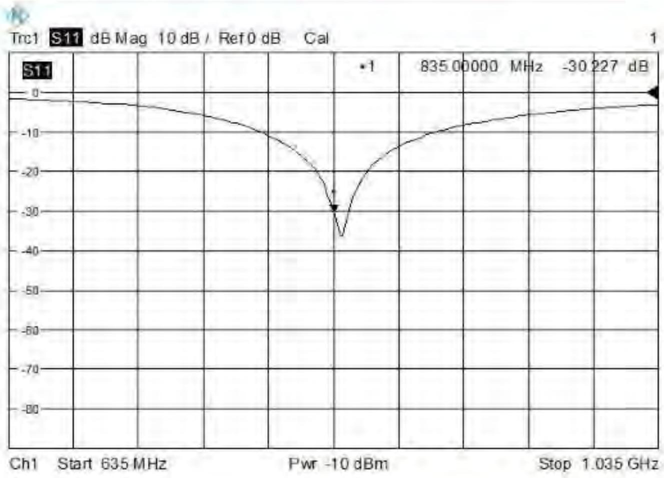
The dipoles are designed to have low return loss when presented against a flat phantom at the specified distance. A Vector Network Analyser was used to perform a return loss measurement on the specific dipole when in the measurement location against the phantom and the distance was specified by the manufacturer with a special, low loss and low relative permittivity spacer.
The impedance was measured at the SMA-connector with the network analyser.

3.1 D835V2

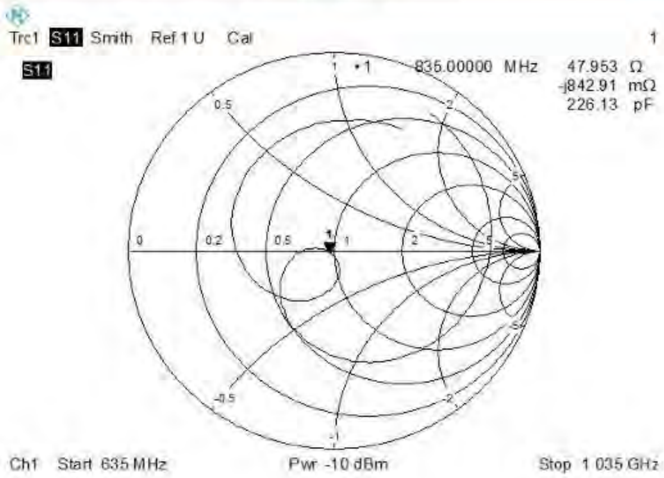
RETURN LOSS AND IMPEDANCE IN HEAD LIQUID

Frequency (MHz)	Return Loss (dB)	Requirement (dB)	Impedance
835	-30.227	-20	48.0 Ω - 0.842 jΩ

Return Loss



Impedance



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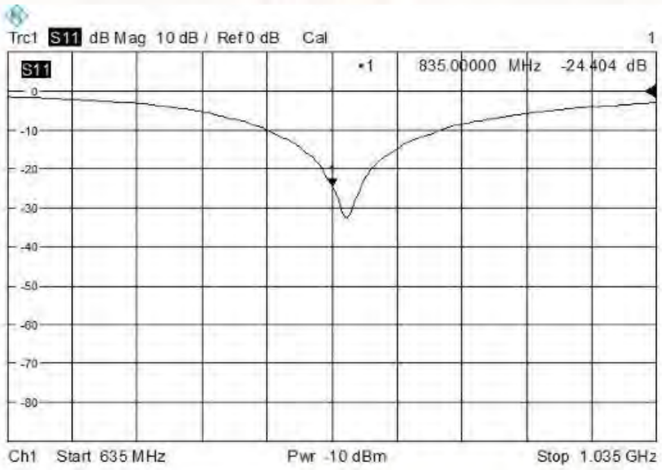
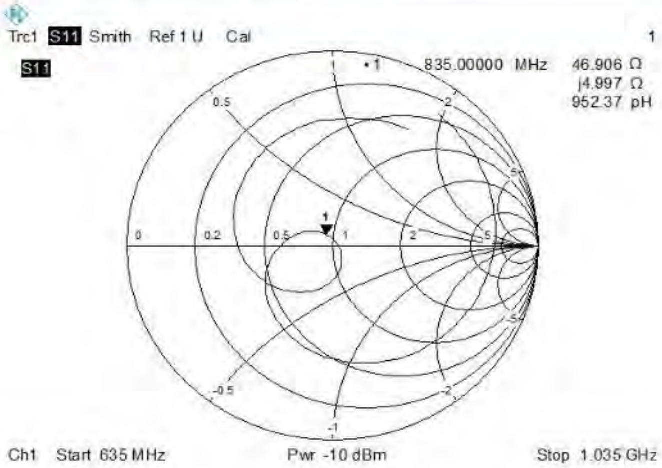
RETURN LOSS AND IMPEDANCE IN BODY LIQUID

Frequency (MHz)	Return Loss (dB)	Requirement (dB)	Impedance
835	-24.404	-20	46.9 Ω + 4.997 jΩ

Return Loss



Impedance

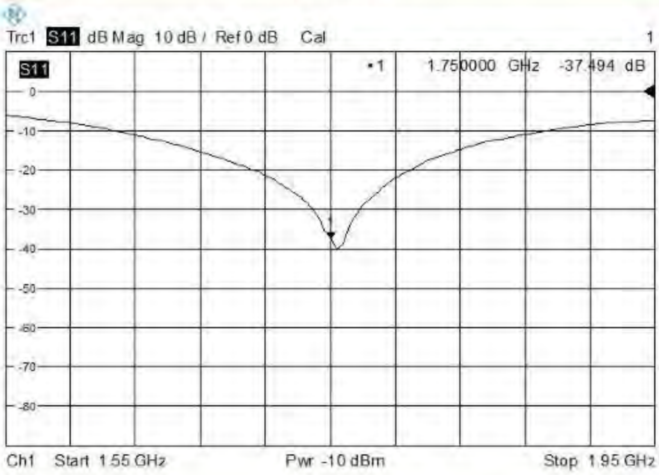


3.2 D1750V2

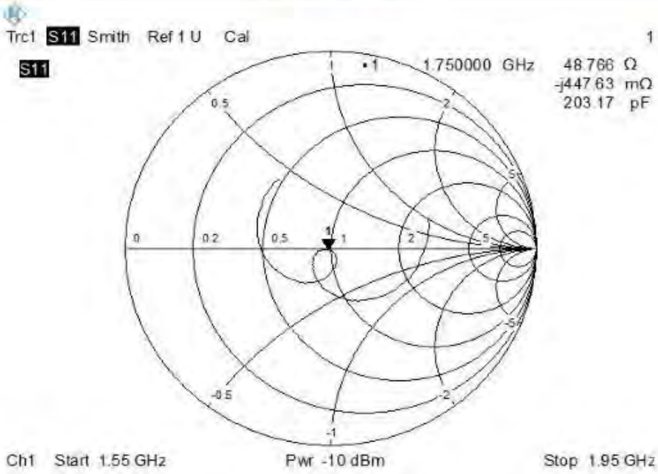
RETURN LOSS AND IMPEDANCE IN HEAD LIQUID

Frequency (MHz)	Return Loss (dB)	Requirement (dB)	Impedance
1750	-37.494	-20	48.8 Ω - 0.448 jΩ

Return Loss



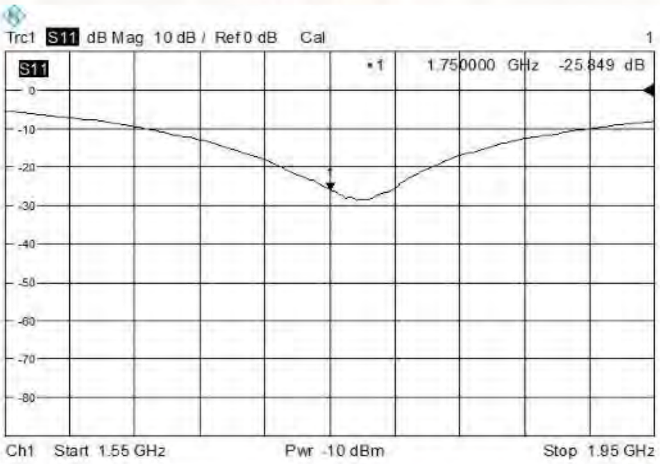
Impedance



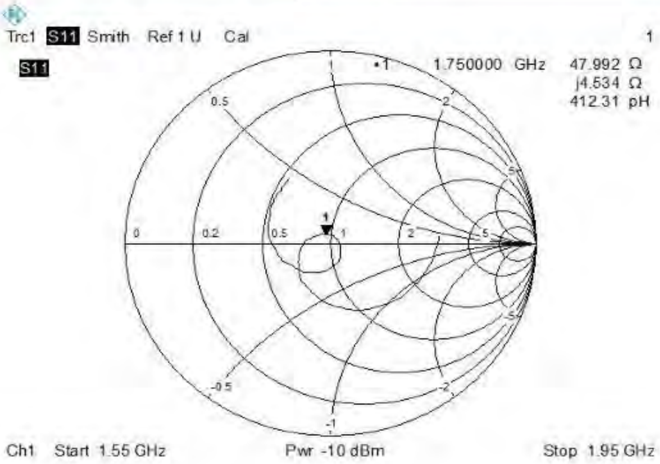
RETURN LOSS AND IMPEDANCE IN BODY LIQUID

Frequency (MHz)	Return Loss (dB)	Requirement (dB)	Impedance
1750	-25.849	-20	48.0 Ω + 4.534 jΩ

Return Loss



Impedance

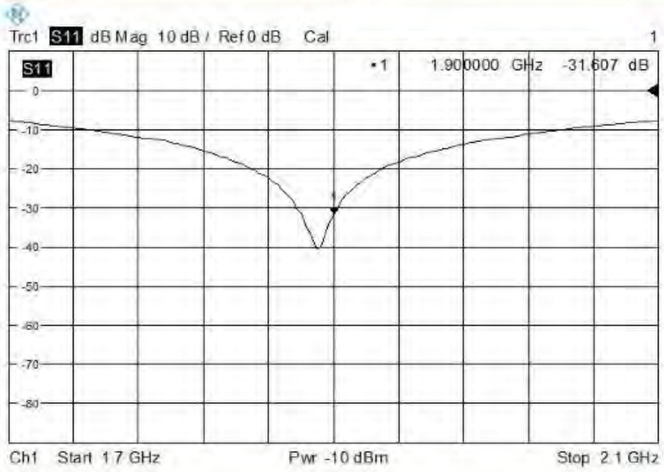


3.3 D1900V2

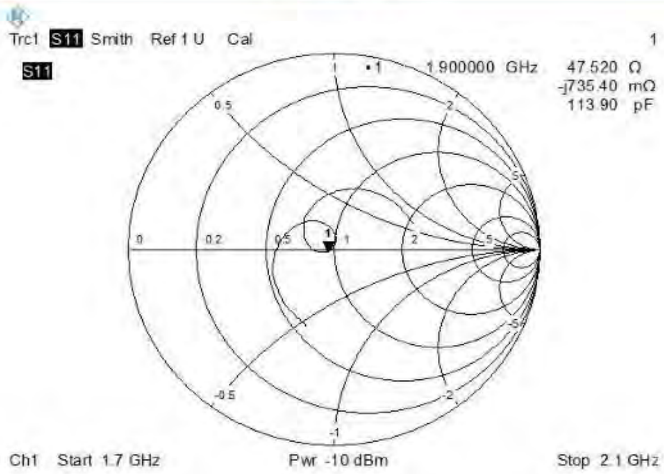
RETURN LOSS AND IMPEDANCE IN HEAD LIQUID

Frequency (MHz)	Return Loss(dB)	Requirement (dB)	Impedance
1900	-31.607	-20	47.520 Ω-0.735 jΩ

Return Loss



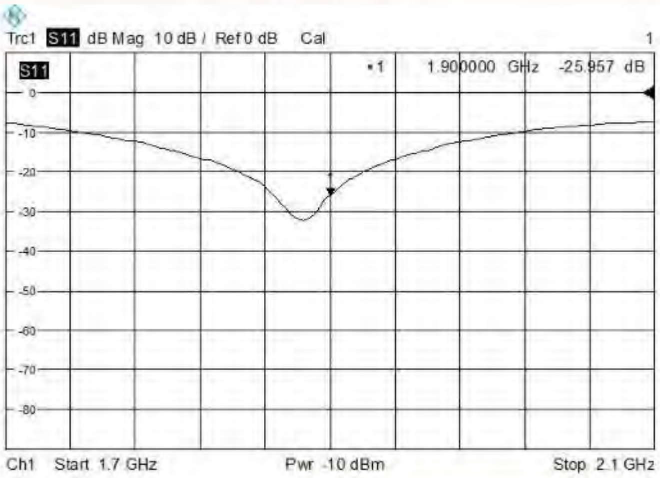
Impedance



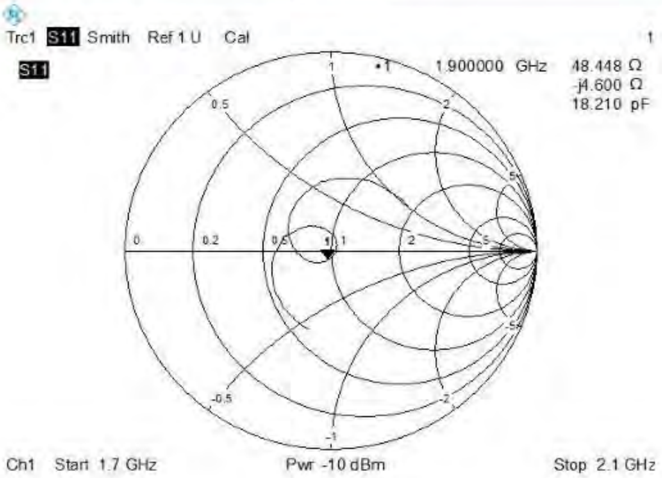
RETURN LOSS AND IMPEDANCE IN BODY LIQUID

Frequency (MHz)	Return Loss (dB)	Requirement (dB)	Impedance
1900	-25.957	-20	48.4 Ω - 4.6 jΩ

Return Loss



Impedance

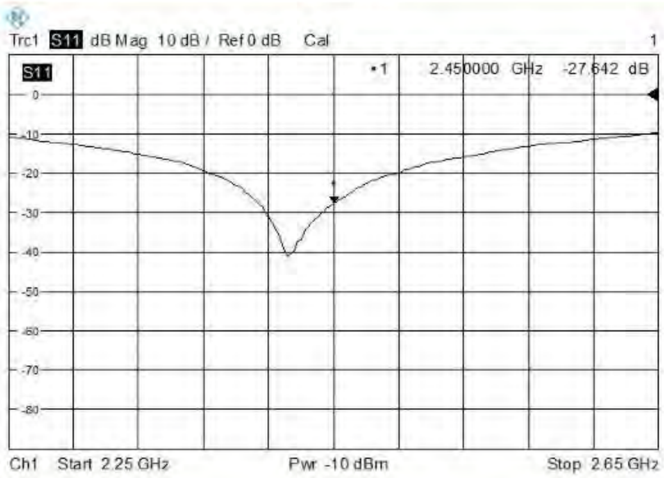


3.4 D2450V2

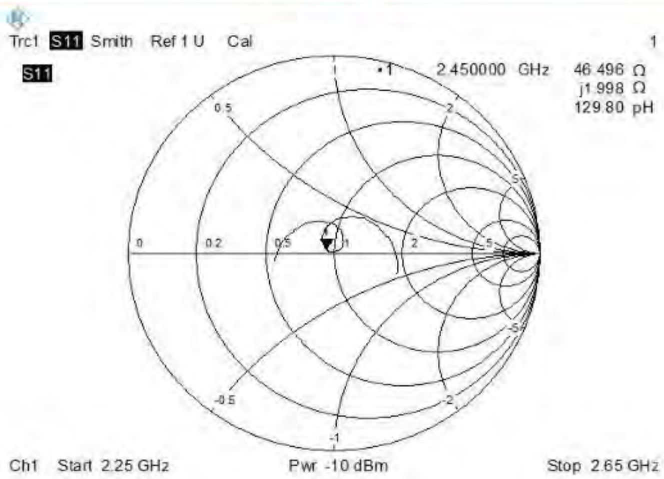
RETURN LOSS AND IMPEDANCE IN HEAD LIQUID

Frequency (MHz)	Return Loss (dB)	Requirement (dB)	Impedance
2450	-27.642	-20	46.5 Ω + 1.998 jΩ

Return Loss



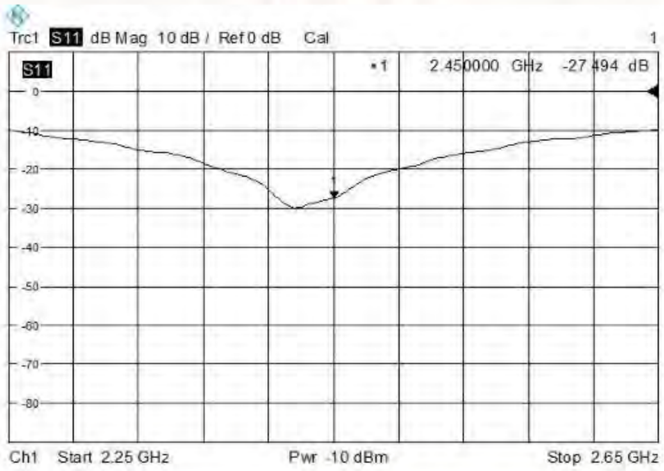
Impedance



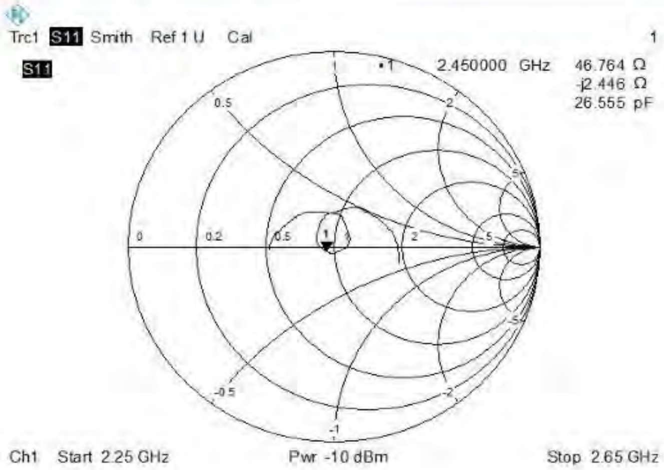
RETURN LOSS AND IMPEDANCE IN BODY LIQUID

Frequency (MHz)	Return Loss (dB)	Requirement (dB)	Impedance
2450	-27.494	-20	46.8 Ω - 2.446 jΩ

Return Loss



Impedance

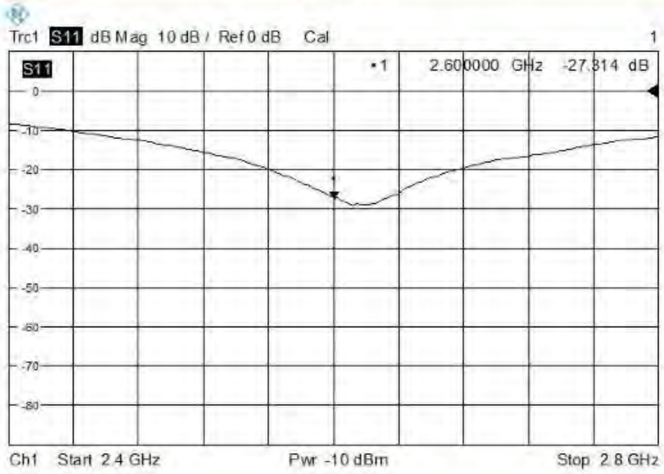


3.5 D2600V2

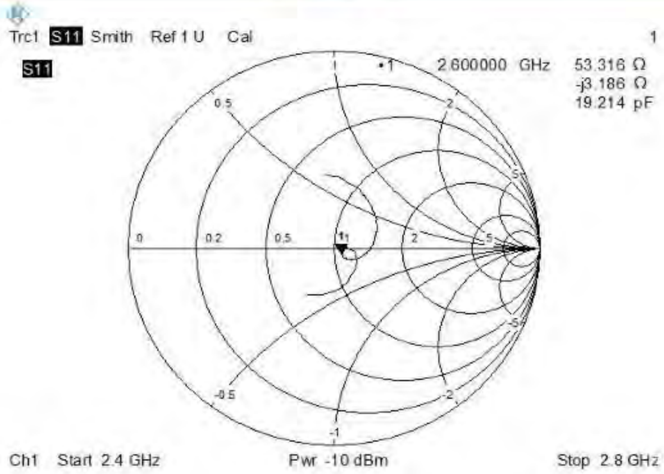
RETURN LOSS AND IMPEDANCE IN HEAD LIQUID

Frequency (MHz)	Return Loss (dB)	Requirement (dB)	Impedance
2600	-27.314	-20	53.3 Ω - 3.186 jΩ

Return Loss



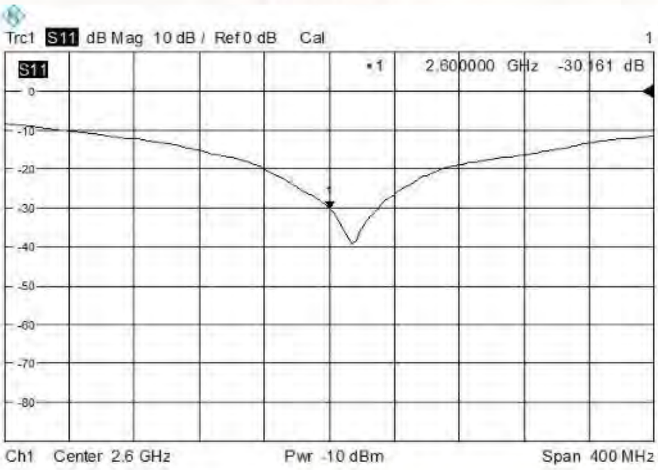
Impedance



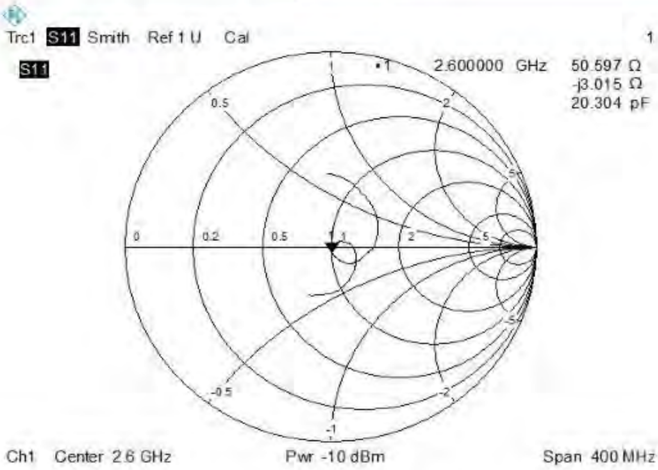
RETURN LOSS AND IMPEDANCE IN BODY LIQUID

Frequency (MHz)	Return Loss (dB)	Requirement (dB)	Impedance
2600	-30.161	-20	50.6 Ω - 3.015 jΩ

Return Loss



Impedance

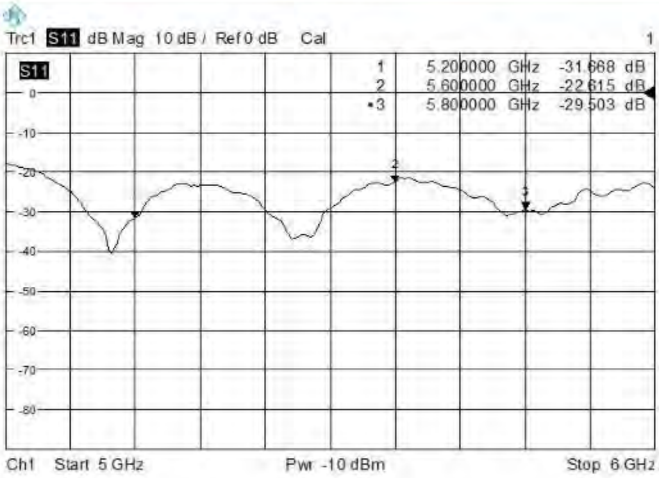


3.6 D5GHzV2

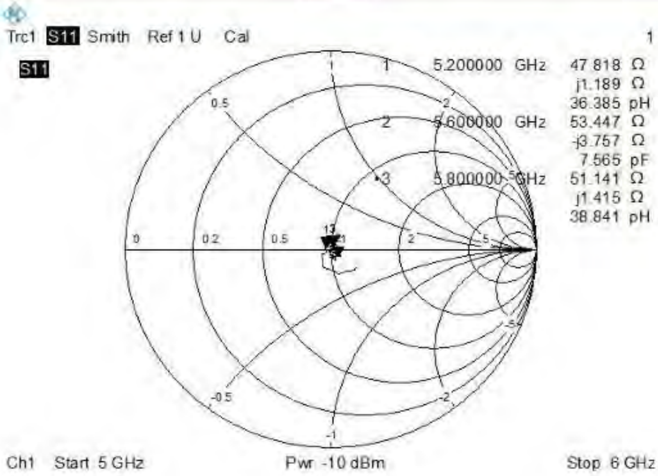
RETURN LOSS AND IMPEDANCE IN HEAD LIQUID

Frequency (MHz)	Return Loss (dB)	Requirement (dB)	Impedance
5200	-31.668	-20	47.8 Ω + 1.189 jΩ
5600	-22.615	-20	53.4 Ω - 3.757 jΩ
5800	-29.503	-20	51.1 Ω + 1.415 jΩ

Return Loss



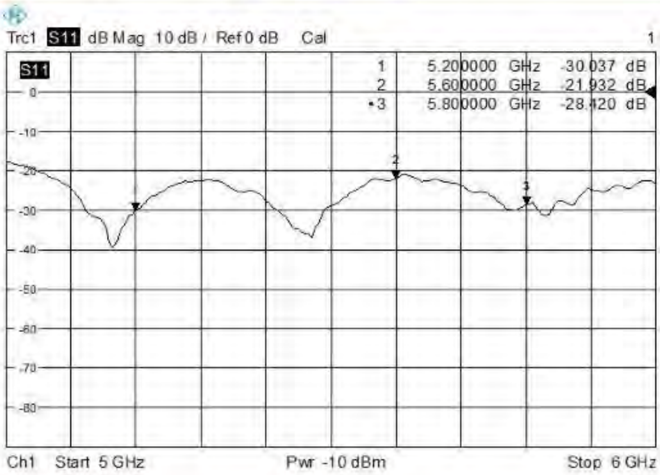
Impedance



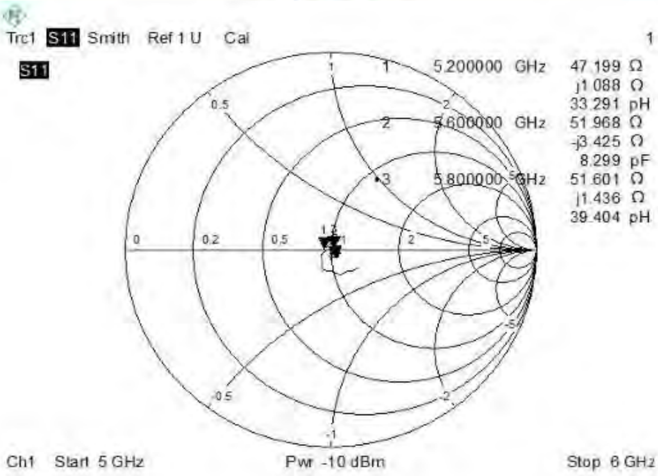
RETURN LOSS AND IMPEDANCE IN BODY LIQUID

Frequency (MHz)	Return Loss (dB)	Requirement (dB)	Impedance
5200	-30.037	-20	47.2 Ω + 1.088 jΩ
5600	-21.932	-20	52.0 Ω - 3.425 jΩ
5800	-28.420	-20	51.6 Ω + 1.436 jΩ

Return Loss

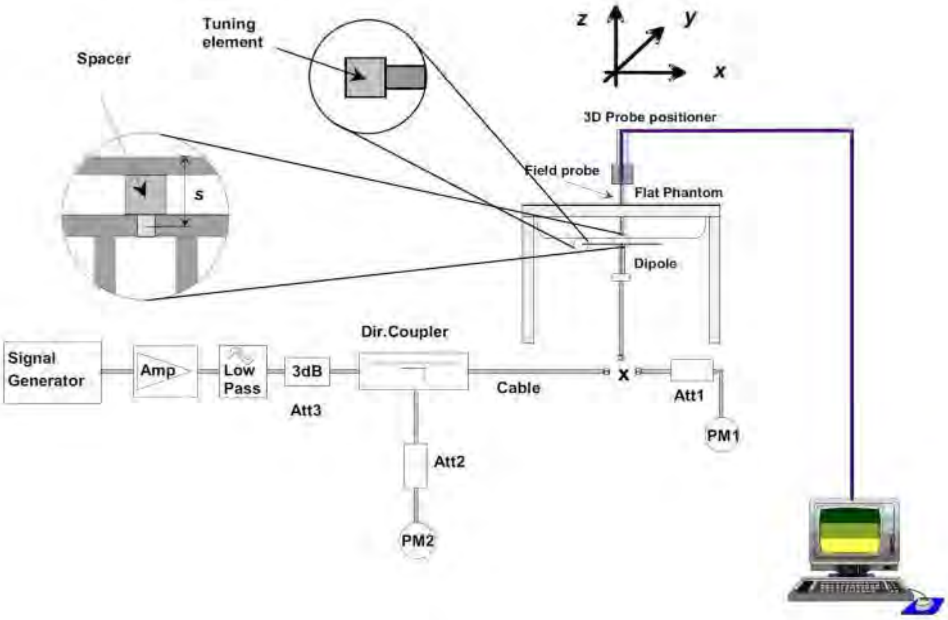


Impedance



4 VALIDATION MEASUREMENT

The IEEE Std. 1528, FCC KDBs and CEI/IEC 62209 standards state that the system validation measurements must be performed using a reference dipole meeting the fore mentioned return loss and mechanical dimension requirements. The validation measurement must be performed against a liquid filled flat phantom, with the phantom constructed as outlined in the fore mentioned standards. Per the standards, the dipole shall be positioned below the bottom of the phantom, with the dipole length centered and parallel to the longest dimension of the flat phantom, with the top surface of the dipole at the described distance from the bottom surface of the phantom.



4.1 Dipole SAR Validation Measurement Result

Freq. (MHz)	Liquid Type	Power (mW)	1 g Measured SAR (W/kg)	Normalized SAR (W/kg)	10 g Measured SAR (W/kg)	Normalized SAR (W/kg)	1 g Targeted SAR (W/kg)	Tolerance (%)	10 g Targeted SAR (W/kg)	Tolerance (%)
835	Head	100	0.959	9.59	0.627	6.27	9.56	0.31	6.22	0.80
	Body	100	0.961	9.61	0.634	6.34	9.56	0.52	6.22	1.93
1750	Head	100	3.440	34.40	1.810	18.10	36.40	-5.49	19.30	-6.22
	Body	100	3.660	36.60	1.950	19.50	36.40	0.55	19.30	1.04
1900	Head	100	3.960	39.60	2.070	20.70	39.70	-0.25	20.50	0.98
	Body	100	4.010	40.10	2.090	20.90	39.70	1.01	20.50	1.95
2450	Head	100	5.260	52.60	2.410	24.10	52.40	0.38	24.00	0.42
	Body	100	5.130	51.30	2.330	23.30	52.40	-2.10	24.00	-2.92
2600	Head	100	5.410	54.10	2.360	23.60	55.30	-2.17	24.60	-4.07

	Body	100	5.580	55.80	2.420	24.20	55.30	0.90	24.60	-1.63
5200	Head	100	8.220	82.20	2.240	22.40	76.50	7.45	21.60	3.70
	Body	100	8.320	83.20	2.280	22.80	76.50	8.76	21.60	5.56
5600	Head	100	8.240	82.40	2.260	22.60				
	Body	100	8.410	84.10	2.330	23.30				
5800	Head	100	7.280	72.80	2.120	21.20	78.0	-6.67	21.90	-3.20
	Body	100	8.240	82.40	2.300	23.00	78.0	5.64	21.90	5.02

4.2 D835V2

4.2.1 Dipole 835 MHz Validation Measurement for Head Tissue

Dipole 835 MHz; Type: D835V2; Serial: D835V2-SN: 4d187

Date/Time: 10/25/2015

Communication System Band: D835 (835.0 MHz); Frequency: 835 MHz; Duty Cycle: 1:1

Medium parameters used: f = 835 MHz; σ = 0.89 S/m; ε_r = 41.83; ρ = 1000 kg/m^3

Phantom section: Flat Section

Ambient Temperature: 21.4 Liquid Temperature: 20.8

DASY5 Configuration:

- Probe: EX3DV4 - SN7340; ConvF(9.56, 9.56, 9.56);
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1454;
- Phantom: SAM (30deg probe tilt) with CRP v5.0 Right 1857; Type: QD000P40CD; Serial: TP1857
- Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

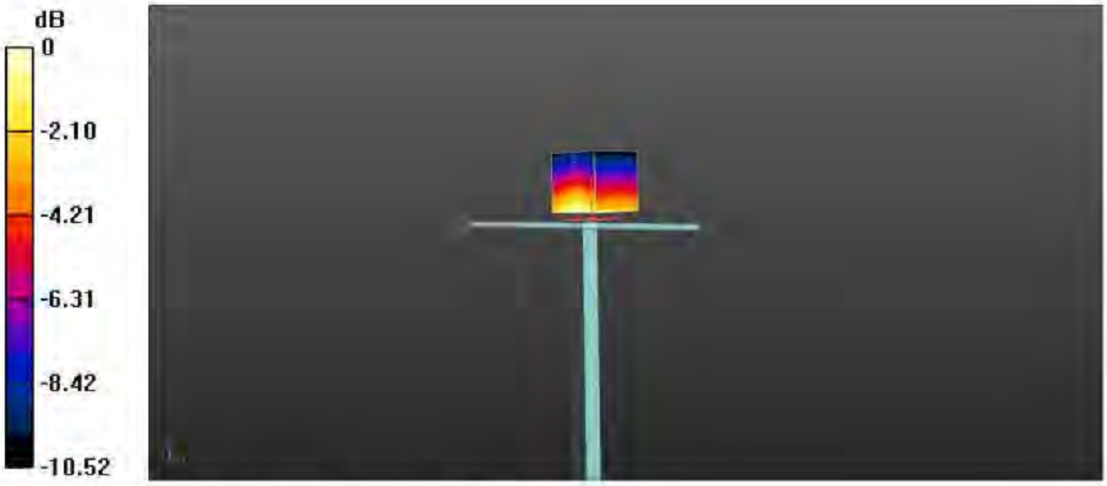
Dipole validation measurement for Head Tissue/Pin= 100mW , d=15mm/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 34.03 V/m; Power Drift = -0.01 dB

Peak SAR (extrapolated) = 1.44 W/kg

SAR(1 g) = 0.959 W/kg; SAR(10 g) = 0.627 W/kg

Maximum value of SAR (measured) = 1.03 W/kg



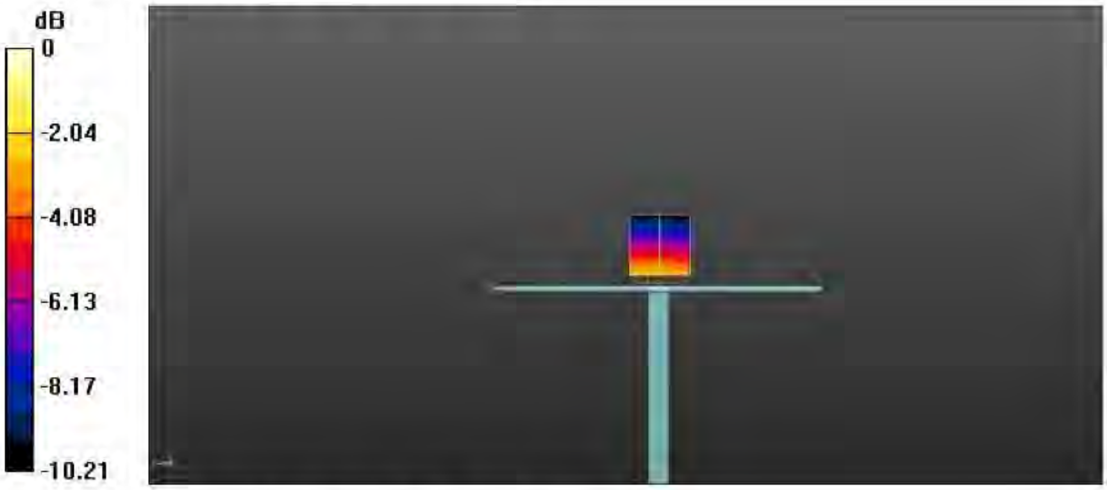
0 dB = 1.03 W/kg = 0.13 dBW/kg

4.2.2 Dipole 835 MHz Validation Measurement for Body Tissue

Dipole 835 MHz; Type: D835V2; Serial: D835V2-SN: 4d187
Date/Time: 10/25/2015
Communication System Band: D835 (835.0 MHz); Frequency: 835 MHz;Duty Cycle: 1:1
Medium parameters used: f = 835 MHz; σ = 0.98 S/m; ε_r = 53.88; ρ = 1000 kg/m^3
Phantom section: Flat Section
Ambient Temperature: 22.4 Liquid Temperature: 21.8
DASY5 Configuration:

- Probe: EX3DV4 - SN7340; ConvF(9.83, 9.83, 9.83);
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1454;
- Phantom: SAM (30deg probe tilt) with CRP v5.0 on left 1859; Type: QD000P40CD; Serial: TP:1859
- Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

Dipole validation measurement for Body Tissue/Pin= 100mW , d=15mm /Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 31.63 V/m; Power Drift = -0.10 dB
Peak SAR (extrapolated) = 1.40 W/kg
SAR(1 g) = 0.961 W/kg; SAR(10 g) = 0.634 W/kg
Maximum value of SAR (measured) = 1.04 W/kg



0 dB = 1.04 W/kg = 0.17 dBW/kg

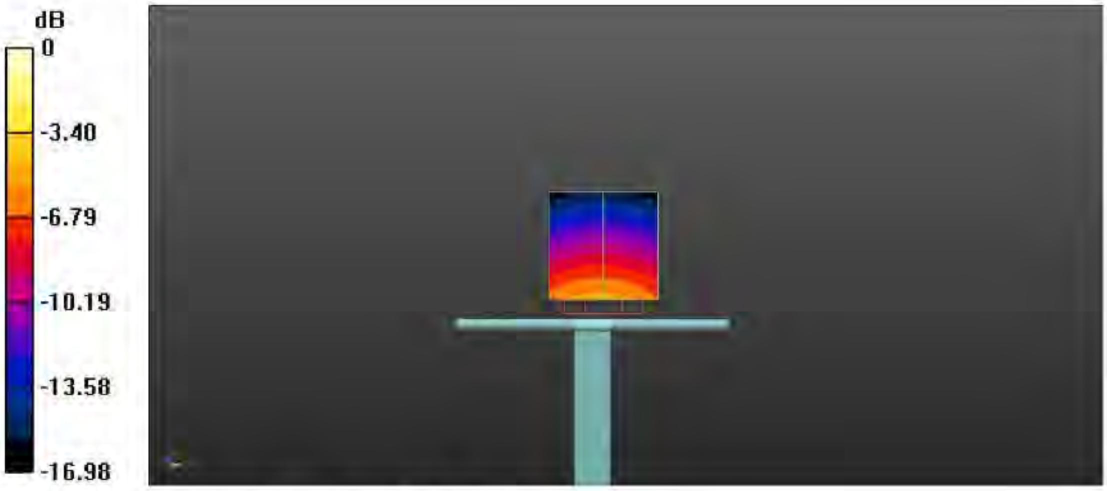
4.3 D1750V2

4.3.1 Dipole 1750 MHz Validation Measurement for Head Tissue

Dipole 1750 MHz; Type: D1750V2; Serial: D1750V2-SN: 1130
Date/Time: 10/23/2015
Communication System Band: D1750 (1750.0 MHz); Frequency: 1750 MHz;Duty Cycle: 1:1
Medium parameters used: f = 1750 MHz; σ = 1.38 S/m; ε_r = 39.23; ρ = 1000 kg/m^3
Phantom section: Flat Section
Ambient Temperature:21.8 Liquid Temperature:21.2
DASY5 Configuration:

- Probe: EX3DV4 - SN7340; ConvF(9.13, 9.13, 9.13);
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1454;
- Phantom: SAM (30deg probe tilt) with CRP v5.0 on left 1859; Type: QD000P40CD; Serial: TP:1859
- Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

Dipole validation measurement for Head Tissue/Pin= 100mW ,d=10mm /Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 40.68 V/m; Power Drift = -0.17 dB
Peak SAR (extrapolated) = 6.42 W/kg
SAR(1 g) = 3.44 W/kg; SAR(10 g) = 1.81 W/kg
Maximum value of SAR (measured) = 3.87 W/kg



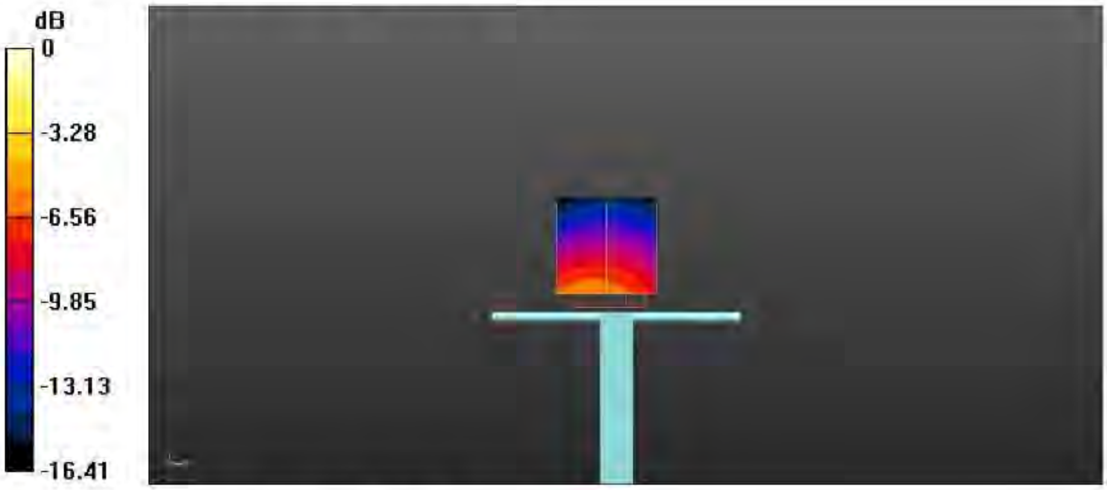
0 dB = 3.87 W/kg = 5.88 dBW/kg

4.3.2 Dipole 1750 MHz Validation Measurement for Body Tissue

Dipole 1750 MHz; Type: D1750V2; Serial: D1750V2-SN: 1130
Date/Time: 10/22/2015
Communication System Band: D1750 (1750.0 MHz); Frequency: 1750 MHz;Duty Cycle: 1:1
Medium parameters used: f = 1750 MHz; σ = 1.45 S/m; ε_r = 51.75; ρ = 1000 kg/m^3
Phantom section: Flat Section
Ambient Temperature:21.8 Liquid Temperature:21.2
DASY5 Configuration:

- Probe: EX3DV4 - SN7340; ConvF(7.87, 7.87, 7.87);
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1454;
- Phantom: SAM (30deg probe tilt) with CRP v5.0 on left 1859; Type: QD000P40CD; Serial: TP:1859
- Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

Dipole validation measurement for Body Tissue/Pin= 100mW ,d=10mm /Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 38.41 V/m; Power Drift = -0.13 dB
Peak SAR (extrapolated) = 6.61 W/kg
SAR(1 g) = 3.66 W/kg; SAR(10 g) = 1.95 W/kg
Maximum value of SAR (measured) = 4.14 W/kg



0 dB = 4.14 W/kg = 6.17 dBW/kg

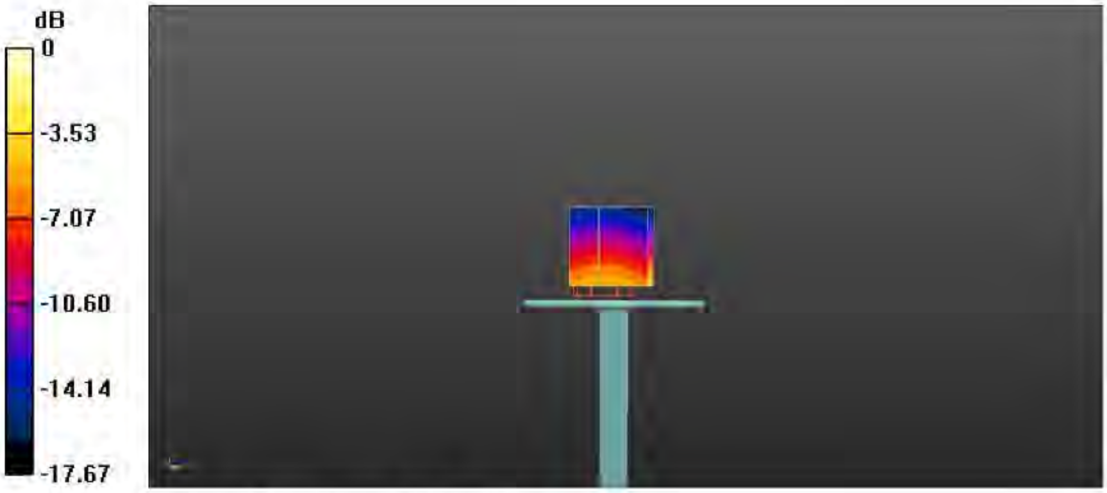
4.4 D1900V2

4.4.1 Dipole 1900 MHz Validation Measurement for Head Tissue

Dipole 1900 MHz; Type: D1900V2; Serial: D1900V2-SN: 5d193
Date/Time: 10/25/2015
Communication System Band: D1900 (1900.0 MHz); Frequency: 1900 MHz;Duty Cycle: 1:1
Medium parameters used: f = 1900 MHz; σ = 1.43 S/m; ε_r = 39.75; ρ = 1000 kg/m^3
Phantom section: Flat Section
Ambient Temperature:21.7 Liquid Temperature:20.9
DASY5 Configuration:

- Probe: EX3DV4 - SN7340; ConvF(8.15, 8.15, 8.15);
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1454;
- Phantom: SAM (30deg probe tilt) with CRP v5.0 on left 1859; Type: QD000P40CD; Serial: TP:1859
- Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

Dipole validation measurement for Head Tissue/Pin= 100mW ,d=10mm /Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 48.36 V/m; Power Drift = -0.08 dB
Peak SAR (extrapolated) = 7.33 W/kg
SAR(1 g) = 3.96 W/kg; SAR(10 g) = 2.07 W/kg
Maximum value of SAR (measured) = 4.40 W/kg



0 dB = 4.40 W/kg = 6.43 dBW/kg

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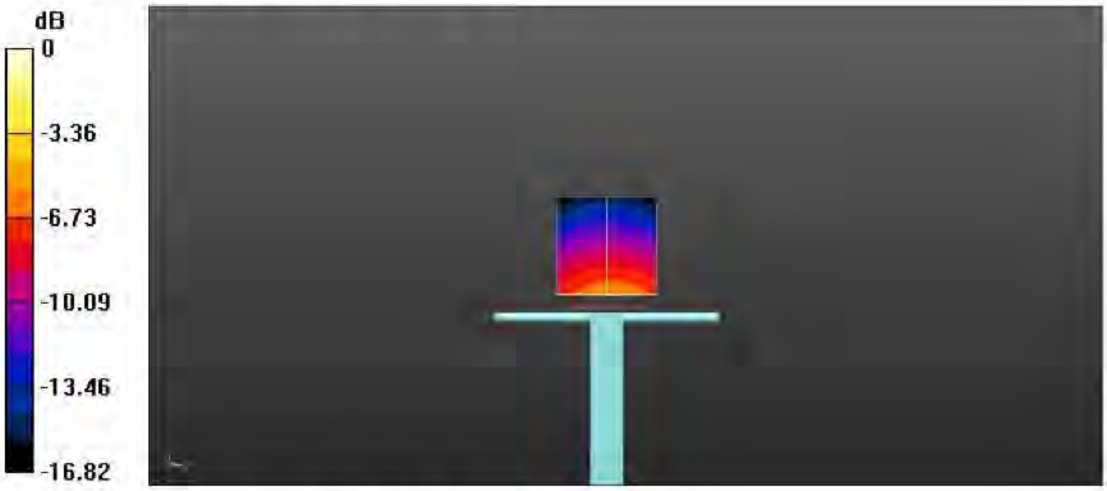
4.4.2 Dipole 1900 MHz Validation Measurement for Body Tissue

Dipole 1900 MHz; Type: D1900V2; Serial: D1900V2-SN: 5d193
Date/Time: 10/25/2015
Communication System Band: D1900 (1900.0 MHz); Frequency: 1900 MHz;Duty Cycle: 1:1
Medium parameters used: f = 1900 MHz; σ = 1.55 S/m; ε_r = 51.61; ρ = 1000 kg/m^3
Phantom section: Flat Section
Ambient Temperature:21.7 Liquid Temperature:20.9
DASY5 Configuration:

- Probe: EX3DV4 - SN7340; ConvF(7.51, 7.51, 7.51);
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1454;
- Phantom: SAM (30deg probe tilt) with CRP v5.0 Right 1857; Type: QD000P40CD; Serial: TP1857
- Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

Dipole validation measurement for Body Tissue/Pin= 100mW ,d=10mm /Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 48.99 V/m; Power Drift = -0.07 dB
Peak SAR (extrapolated) = 7.27 W/kg
SAR(1 g) = 4.01 W/kg; SAR(10 g) = 2.09 W/kg
Maximum value of SAR (measured) = 4.55 W/kg



0 dB = 4.55 W/kg = 6.58 dBW/kg

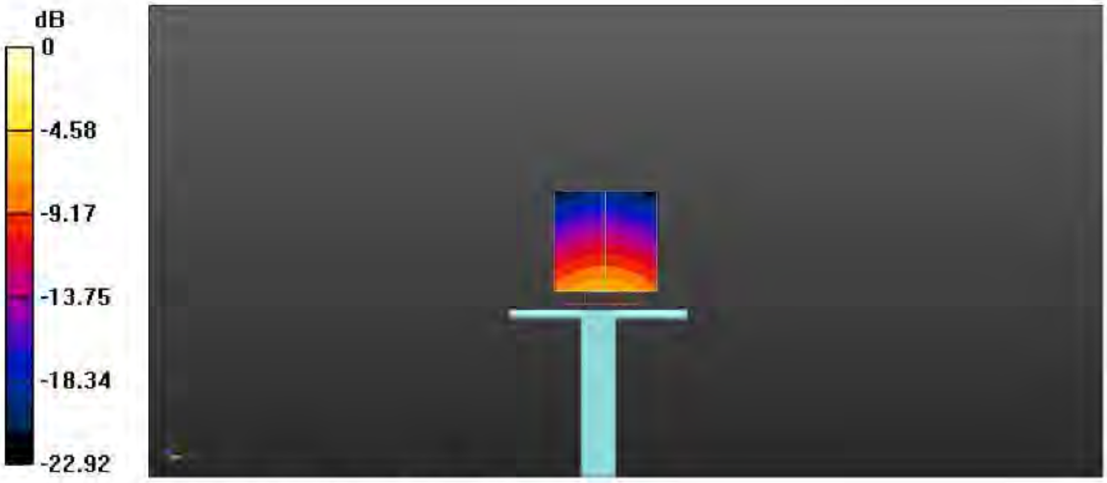
4.5 D2450V2

4.5.1 Dipole 2450 MHz Validation Measurement for Head Tissue

Dipole 2450 MHz; Type: D2450V2; Serial: D2450V2-SN: 952
Date/Time: 10/24/2015
Communication System Band: CD2450 (2450.0 MHz); Frequency: 2450 MHz;Duty Cycle: 1:1
Medium parameters used: f = 2450 MHz; σ = 1.84 S/m; ε_r = 38.53; ρ = 1000 kg/m^3
Phantom section: Flat Section
Ambient Temperature:22.1 Liquid Temperature:21.2
DASY5 Configuration:

- Probe: EX3DV4 - SN7340; ConvF(7.62, 7.62, 7.62);
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1454;
- Phantom: SAM (30deg probe tilt) with CRP v5.0 Right 1857; Type: QD000P40CD; Serial: TP1857
- Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

Dipole validation measurement for Head Tissue/Pin= 100mW ,d=10mm /Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 53.74 V/m; Power Drift = 0.17 dB
Peak SAR (extrapolated) = 11.3 W/kg
SAR(1 g) = 5.26 W/kg; SAR(10 g) = 2.41 W/kg
Maximum value of SAR (measured) = 6.00 W/kg



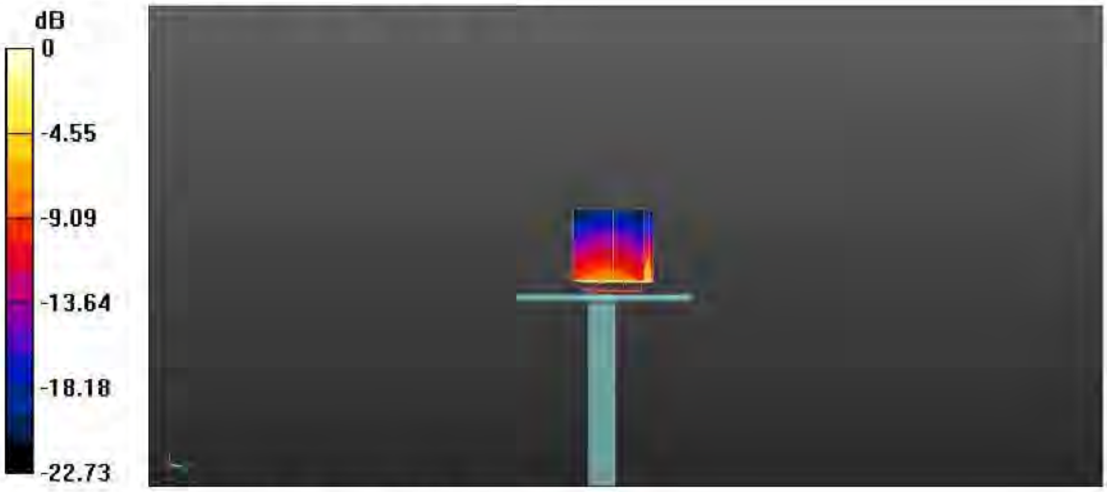
0 dB = 6.00 W/kg = 7.78 dBW/kg

4.5.2 Dipole 2450 MHz Validation Measurement for Body Tissue

Dipole 2450 MHz; Type: D2450V2; Serial: D2450V2-SN: 952
Date/Time: 10/24/2015
Communication System Band: D2450 (2450.0 MHz); Frequency: 2450 MHz;Duty Cycle: 1:1
Medium parameters used: f = 2450 MHz; σ = 1.99 S/m; ε_r = 51.17; ρ = 1000 kg/m^3
Phantom section: Flat Section
Ambient Temperature:22.1 Liquid Temperature:21.2
DASY5 Configuration:

- Probe: EX3DV4 - SN7340; ConvF(7.55, 7.55, 7.55);
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1454;
- Phantom: SAM (30deg probe tilt) with CRP v5.0 Right 1857; Type: QD000P40CD; Serial: TP1857
- Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

Dipole validation measurement for Body Tissue/Pin= 100mW ,d=10mm /Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 50.42 V/m; Power Drift = -0.03 dB
Peak SAR (extrapolated) = 10.8 W/kg
SAR(1 g) = 5.13 W/kg; SAR(10 g) = 2.33 W/kg
Maximum value of SAR (measured) = 5.91 W/kg



0 dB = 5.91 W/kg = 7.72 dBW/kg

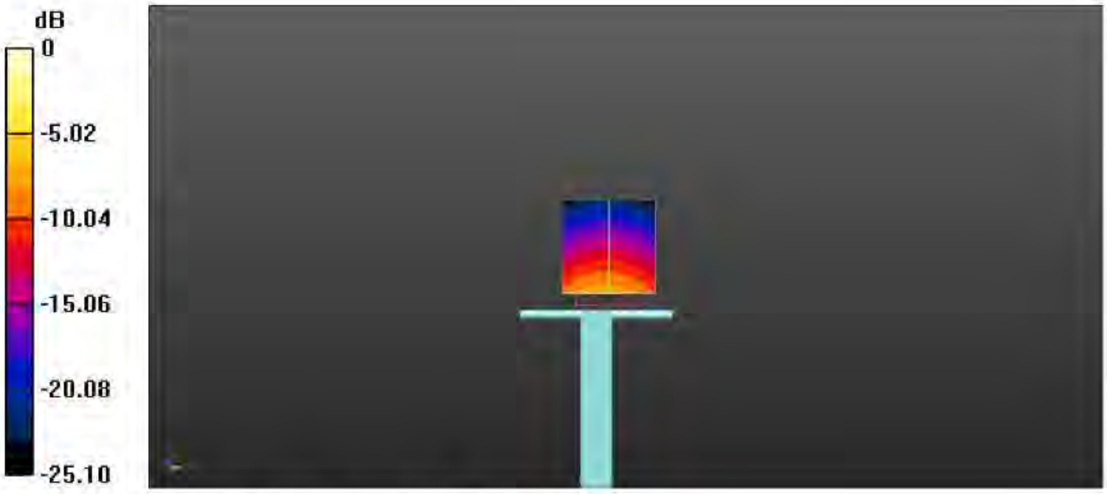
4.6 D2600V2

4.6.1 Dipole 2600 MHz Validation Measurement for Head Tissue

Dipole 2600 MHz; Type: D2600V2; Serial: D2600V2-SN: 1095
Date/Time: 10/24/2015
Communication System Band: D2600 (2600.0 MHz); Frequency: 2600 MHz;Duty Cycle: 1:1
Medium parameters used: f = 2600 MHz; σ = 1.97 S/m; ε_r = 38.09; ρ = 1000 kg/m^3
Phantom section: Flat Section
Ambient Temperature:21.5 Liquid Temperature:20.6
DASY5 Configuration:

- Probe: EX3DV4 - SN7340; ConvF(7.64, 7.64, 7.64);
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1454;
- Phantom: SAM (30deg probe tilt) with CRP v5.0 Right 1857; Type: QD000P40CD; Serial: TP1857
- Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

Dipole validation measurement for Head Tissue/Pin= 100mW ,d=10mm /Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 52.69 V/m; Power Drift = -0.11 dB
Peak SAR (extrapolated) = 12.2 W/kg
SAR(1 g) = 5.41 W/kg; SAR(10 g) = 2.36 W/kg
Maximum value of SAR (measured) = 6.17 W/kg



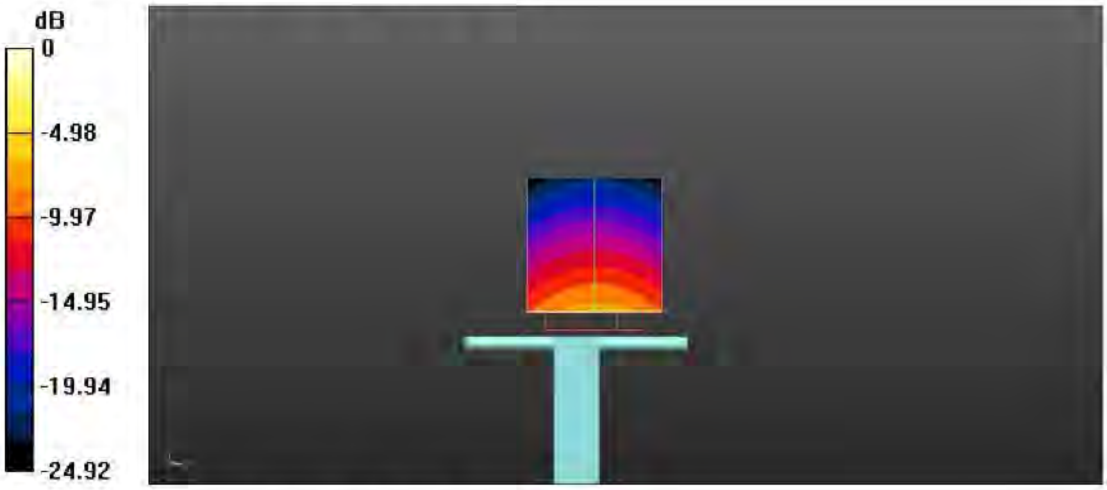
0 dB = 6.17 W/kg = 7.90 dBW/kg

4.6.2 Dipole 2600 MHz Validation Measurement for Body Tissue

Dipole 2600 MHz; Type: D2600V2; Serial: D835V2-SN: 1095
Date/Time: 10/24/2015
Communication System Band: D2600 (2600.0 MHz); Frequency: 2600 MHz;Duty Cycle: 1:1
Medium parameters used: f = 2600 MHz; σ = 2.20 S/m; ε_r = 50.81; ρ = 1000 kg/m^3
Phantom section: Flat Section
Ambient Temperature:21.5 Liquid Temperature:20.6
DASY5 Configuration:

- Probe: EX3DV4 - SN7340; ConvF(7.11, 7.11, 7.11);
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1454;
- Phantom: SAM (30deg probe tilt) with CRP v5.0 Right 1857; Type: QD000P40CD; Serial: TP1857
- Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

Dipole validation measurement for Body Tissue/Pin= 100mW ,d=10mm /Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 52.33 V/m; Power Drift = -0.03 dB
Peak SAR (extrapolated) = 12.3 W/kg
SAR(1 g) = 5.58 W/kg; SAR(10 g) = 2.42 W/kg
Maximum value of SAR (measured) = 6.45 W/kg



0 dB = 6.45 W/kg = 8.10 dBW/kg

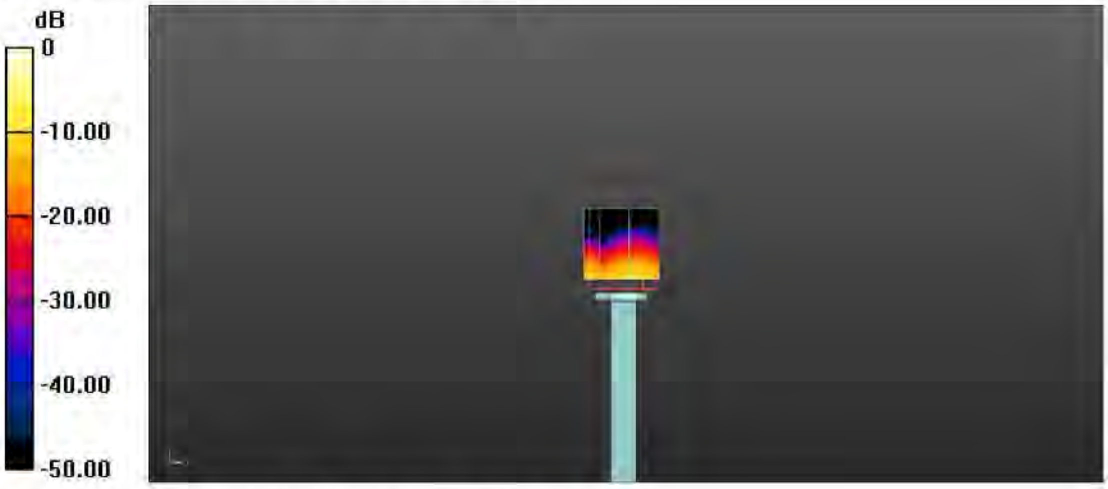
4.7 D5GHzV2

4.7.1 Dipole 5 GHz Validation Measurement for Head Tissue

Dipole 5GHz; Type: D5GHzV2; Serial: D5GHzV2-SN: 1200
Date/Time: 10/26/2015
Communication System Band: D5GHz (5000.0 - 6000.0 MHz);
Frequency: 5200 MHz,
Frequency: 5600 MHz,
Frequency: 5800 MHz;
Duty Cycle: 1:1
Medium parameters used: f = 5200 MHz; σ = 4.78 S/m; ε_r = 36.52; ρ = 1000 kg/m^3 , Medium parameters used: f = 5600 MHz; σ = 5.20 S/m; ε_r = 35.06; ρ = 1000 kg/m^3 , Medium parameters used: f = 5800 MHz; σ = 5.42 S/m; ε_r = 34.40; ρ = 1000 kg/m^3
Phantom section: Flat Section
Ambient Temperature:22.0 Liquid Temperature:20.3
DASY5 Configuration:

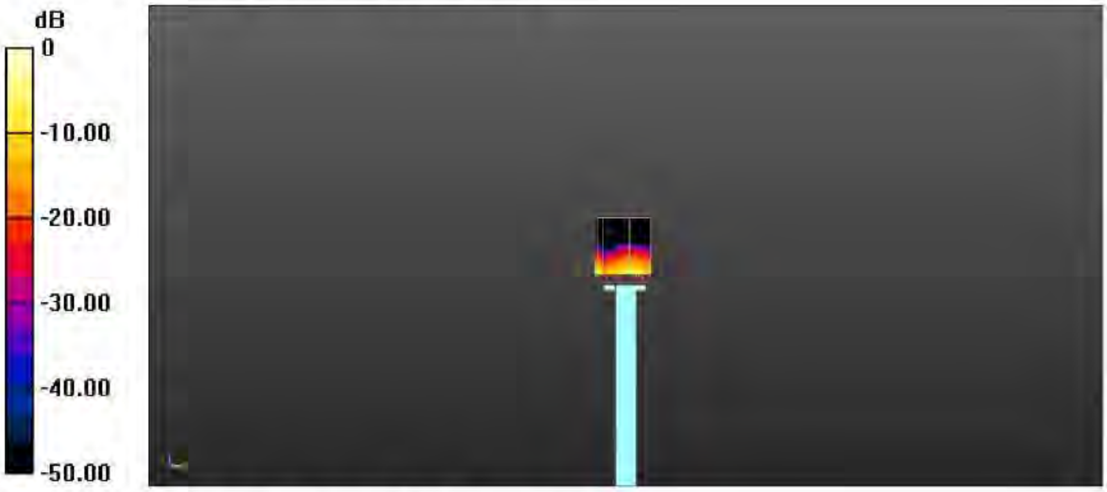
- Probe: EX3DV4 - SN7340; ConvF(5.33, 5.33, 5.33); ConvF(4.70, 4.70, 4.70); ConvF(4.68, 4.68, 4.68);
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1454;
- Phantom: SAM (30deg probe tilt) with CRP v5.0 on left 1859; Type: QD000P40CD; Serial: TP:1859
- Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

Dipole validation measurement for Head Tissue/Pin= 100mW ,dist=10mm,f=5200 MHz /Zoom Scan (7x7x21)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=1.4mm
Reference Value = 45.80 V/m; Power Drift = 0.07 dB
Peak SAR (extrapolated) = 25.9 W/kg
SAR(1 g) = 8.22 W/kg; SAR(10 g) = 2.24 W/kg
Maximum value of SAR (measured) = 9.71 W/kg



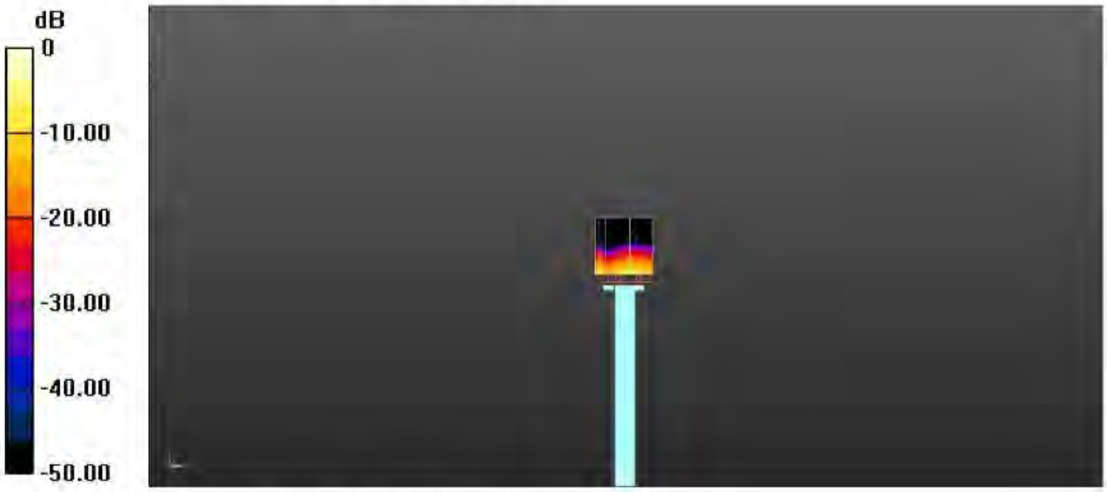
0 dB = 9.71 W/kg = 9.87 dBW/kg

Dipole validation measurement for Head Tissue/Pin= 100mW ,dist=10mm,f=5600 MHz /Zoom Scan (7x7x21)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=1.4mm
Reference Value = 44.02 V/m; Power Drift = 0.17 dB
Peak SAR (extrapolated) = 28.3 W/kg
SAR(1 g) = 8.24 W/kg; SAR(10 g) = 2.29 W/kg
Maximum value of SAR (measured) = 9.45 W/kg



0 dB = 9.45 W/kg = 9.75 dBW/kg

Dipole Calibration for Head Tissue/Pin= 100mW ,dist=10mm,f=5800 MHz /Zoom Scan (7x7x21)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=1.4mm
Reference Value = 39.70 V/m; Power Drift = 0.00 dB
Peak SAR (extrapolated) = 24.4 W/kg
SAR(1 g) = 7.28 W/kg; SAR(10 g) = 2.12 W/kg
Maximum value of SAR (measured) = 8.38 W/kg



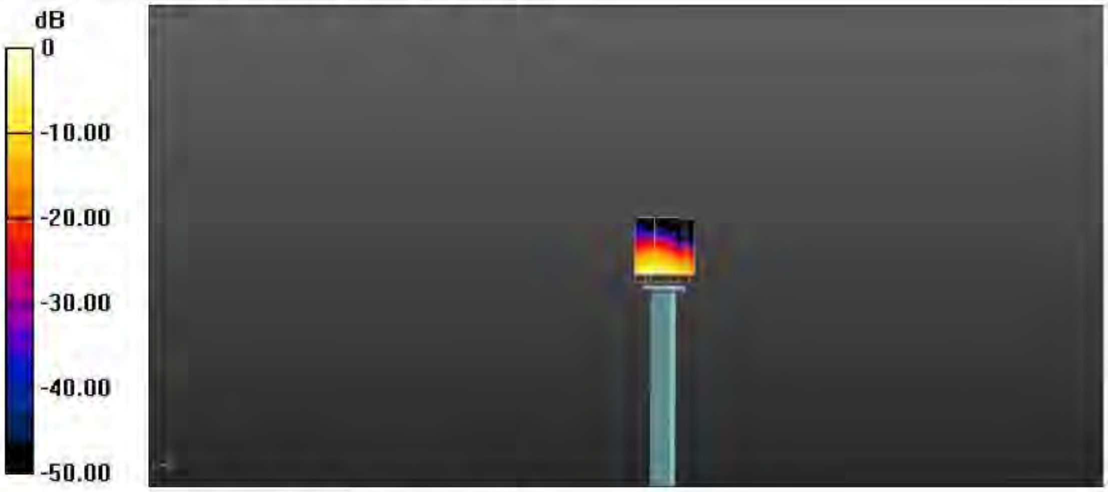
0 dB = 8.79 W/kg = 9.44 dBW/kg

4.7.2 Dipole 5 GHz Validation Measurement for Body Tissue

Dipole 5GHz; Type: D5GHzV2; Serial: D5GHzV2-SN: 1200
Date/Time: 10/26/2015
Communication System Band: D5GHz (5000.0 - 6000.0 MHz); Frequency: 5200 MHz; Frequency: 5600 MHz; Frequency: 5800 MHz; Duty Cycle: 1:1
Medium parameters used: f = 5200 MHz; σ = 5.38 S/m; ε_r = 48.74; ρ = 1000 kg/m^3 , Medium parameters used: f = 5600 MHz; σ = 5.72 S/m; ε_r = 46.31; ρ = 1000 kg/m^3, Medium parameters used: f = 5800 MHz; σ = 5.92 S/m; ε_r = 46.06; ρ = 1000 kg/m^3
Phantom section: Flat Section
Ambient Temperature:22.3 Liquid Temperature:21.4
DASY5 Configuration:

- Probe: EX3DV4 - SN7340; ConvF(4.56, 4.56, 4.56);ConvF(3.98, 3.98, 3.98); ConvF(4.15, 4.15, 4.15);
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1454;
- Phantom: SAM (30deg probe tilt) with CRP v5.0 on left 1859; Type: QD000P40CD; Serial: TP:1859
- Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

Dipole validation measurement for Body Tissue/Pin= 100mW ,dist=10mm,f=5200 MHz /Zoom Scan (7x7x21)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=1.4mm
Reference Value = 45.58 V/m; Power Drift = 0.07 dB
Peak SAR (extrapolated) = 26.9 W/kg
SAR(1 g) = 8.32 W/kg; SAR(10 g) = 2.28 W/kg
Maximum value of SAR (measured) = 9.86 W/kg

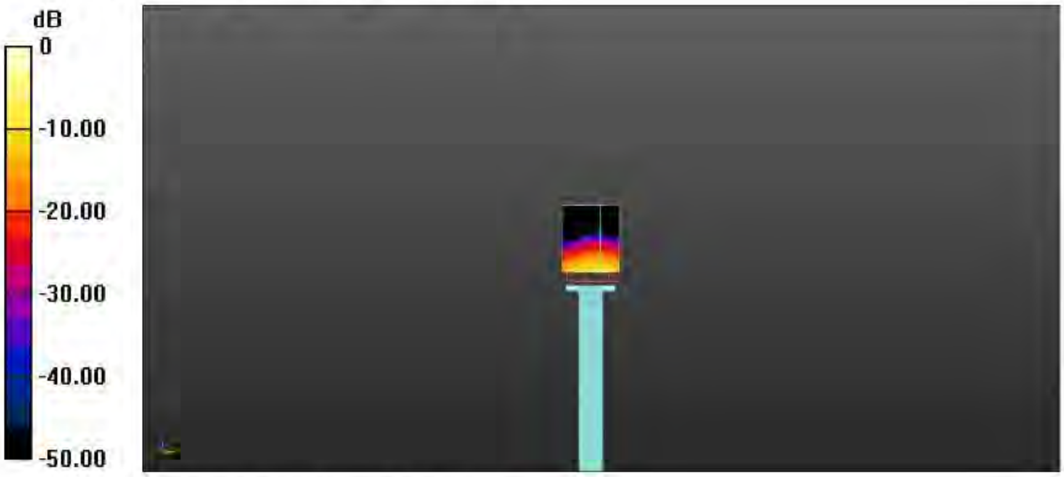


0 dB = 9.86 W/kg = 9.94 dBW/kg

Dipole validation measurement for Body Tissue/Pin= 100mW , dist=10mm,f=5600 MHz /Zoom Scan (7x7x21)/Cube 0:
Measurement grid: dx=4mm, dy=4mm, dz=1.4mm
Reference Value = 47.14 V/m; Power Drift = 0.17 dB
Peak SAR (extrapolated) = 35.1 W/kg
SAR(1 g) = 8.41 W/kg; SAR(10 g) = 2.33 W/kg
Maximum value of SAR (measured) = 10.3 W/kg

0 dB = 10.3 W/kg = 9.90 dBW/kg

Dipole validation measurement for Body Tissue/Pin= 100mW ,dist=10mm,f=5800 MHz /Zoom Scan (7x7x21)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=1.4mm
Reference Value = 41.88 V/m; Power Drift = 0.06 dB
Peak SAR (extrapolated) = 28.9 W/kg
SAR(1 g) = 8.24 W/kg; SAR(10 g) = 2.3 W/kg
Maximum value of SAR (measured) = 9.33 W/kg



0 dB = 9.33 W/kg = 9.70 dBW/kg

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