

FCC SAR TEST REPORT

Test File No : F690501/RF-SAR002239-A2

Equipment Under Test	LED View Cover
Model Name	EF-NG935
Applicant	Samsung Electronics
Address of Applicant	129, Samsung-ro, Yeongtong-gu, Suwon-si, Gyeonggi-do, 16677 Republic of Korea
FCC ID	A3L-EFNG935
Call Phone FCC ID	A3LSMG935US
Exposure Category	General Population/Uncontrolled Exposure
Standards	FCC 47 CFR Part 2 (2.1093) IEEE 1528, 2013 ANSI/IEEE C95.1, C95.3
Date of Test(s)	2016-02-12
Date of Issue	2016-04-11

In the configuration tested, the EUT complied with the standards specified above.

Remarks:

This report details the results of the testing carried out on one sample, the results contained in this test report do not relate to other samples of the same product. The manufacturer should ensure that all products in series production are in conformity with the product sample detailed in this report. This report may only be reproduced and distributed in full. If the product in this report is used in any configuration other than that detailed in the report, the manufacturer must ensure the new system complies with all relevant standards. Any mention of SGS Korea Co., Ltd. or testing done by SGS Korea Co., Ltd. in connection with distribution or use of the product described in this report must be approved by SGS Korea Co., Ltd. in writing.



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Revision history

Revision	Date of issue	Revisions	Revised By
-	February 13, 2016	Initial issue	-
A1	February 13, 2016	Added Call Phone FCC ID Section 6. KDB 941225 Updated Section 14. Dipole Updated	Jamie Kim
A1	April 11, 2016	Section 6. Added Note	Jamie Kim

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1 Testing Laboratory

Company Name	SGS Korea Co., Ltd. (Gunpo Laboratory)
Address	Wireless Div. 4, LS-ro 182beon-gil, Gunpo-si, Gyeonggi-do, 15807 Republic of Korea
Telephone	+82 +31 428 5700
FAX	+82 +31 427 2371

2 Details of Manufacturer

Applicant	Samsung Electronics Co., Ltd
Address	129, Samsung-ro, Yeongtong-gu, Suwon-si, Gyeonggi-do, 16677 Republic of Korea
Email	kangho.ko@samsung.com
Phone No.	+82-31-301-1107

3 Description of EUT(s)

EUT Type	LED View Cover
Model Name	EF-NG935
Serial Number	RF7H11HQANFWIS
Mode of Operation	NFC
Tx Frequency Range	NFC (13.56 MHz)

4 Information of Attached Cell Phone

EUT Type	Portable Handset
Model Name	SM-G930A, SM-G930P, SM-G930T, SM-G930V, SM-G930R4
Serial Number	02FB3
Mode of Operation	GSM 1900
Tx Frequency Range	GSM 1900 (1850.20 MHz ~ 1909.80 MHz)

5 The Highest Reported SAR Values

Equipment Class	Band	Highest Reported SAR 1g (W/kg)
PCE	Original GPRS 1900	1.00
	Attached LED Cover GPRS 1900	0.65
Simultaneous SAR per KDB 690783 D01v01r03		N/A

6 Test Methodology

ANSI C95.1–1999: IEEE Standard for Safety Levels with Respect to Human Exposure to Radio Frequency Electromagnetic Fields, 3 kHz to 300 GHz. It specifies the maximum exposure limit of 1.6 W/kg as averaged over any 1 gram of tissue for portable devices being used within 20 cm of the user in the uncontrolled environment.

Test tests documented in this report were performed in accordance with IEEE Standard 1528-2013 and the following published KDB procedures.

In additions;

<input checked="" type="checkbox"/>	KDB 865664 D01v01r04	SAR Measurement Requirements for 100 MHz to 6 GHz
<input checked="" type="checkbox"/>	KDB 447498 D01v06	Mobile and Portable Devices RF Exposure Procedures and Equipment Authorization Policies
<input type="checkbox"/>	KDB 447498 D02v02r01	SAR Measurement Procedures for USB Dongle Transmitters
<input type="checkbox"/>	KDB 248227 D01v02r02	SAR Guidance For IEEE 802.11 (Wi-Fi) Transmitters
<input type="checkbox"/>	KDB 615223 D01v01r01	802.16e/WiMax SAR Measurement Guidance
<input type="checkbox"/>	KDB 616217 D04v01r02	SAR Evaluation Considerations for Laptop, Notebook, Netbook and Tablet Computers
<input type="checkbox"/>	KDB 643646 D01v01r03	SAR Test Reduction Considerations for Occupational PTT Radios
<input type="checkbox"/>	KDB 648474 D03v01r03	Evaluation and Approval Considerations for Handsets with Specific Wireless Charging Battery Covers
<input checked="" type="checkbox"/>	KDB 648474 D04v01r03	SAR Evaluation Considerations for Wireless Handsets
<input type="checkbox"/>	KDB 680106 D01v02	RF Exposure Considerations for Low Power Consumer Wireless Power Transfer Applications
<input checked="" type="checkbox"/>	KDB 941225 D01v03r01	3G SAR Measurement Procedures
<input type="checkbox"/>	KDB 941225 D05v02r04	SAR Evaluation Considerations for LTE Devices
<input type="checkbox"/>	KDB 941225 D06v02r01	SAR Evaluation Procedures for Portable Devices with Wireless Router Capabilities
<input type="checkbox"/>	KDB 941225 D07v01r02	SAR Evaluation Procedures for UMPC Mini-Tablet Devices

Note: A non-standard setup was used for SAR testing based on guidance from the FCC. The operational description contains additional information.

7 Testing Environment

Ambient temperature	: 18°C ~ 25°C
Relative humidity	: 30% ~ 70%
Liquid temperature of during the test	: <

8 Specific Absorption Rate (SAR)

8.1 Introduction

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

8.2 SAR Definition

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

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

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

SAR measurement can be either related to the temperature elevation in tissue by

$$SAR = C \left(\frac{\delta T}{\delta t} \right)$$

Where: C is the specific heat capacity, δT is the temperature rise and δt is the exposure duration, or related to the electrical field in the tissue by

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

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

However for evaluating SAR of low power transmitter, electrical field measurement is typically applied.

8.3 Test Standards and Limits

According to FCC 47CFR §2.1093(d) The limits to be used for evaluation are based generally on criteria published by the American National Standards Institute (ANSI) for localized specific absorption rate ("SAR") in Section 4.2 of "IEEE Standard for Safety Levels with Respect to Human Exposure to Radio Frequency Electromagnetic Fields, 3

source. SAR values have been related to threshold levels for potential biological hazards. The criteria to be used are specified in paragraphs (d)(1) and (d)(2) of this section and shall apply for portable devices transmitting in the frequency range from 100

9 The SAR Measurement System

A block diagram of the SAR measurement System is given in Fig. a. This SAR Measurement System uses a Computer-controlled 3-D stepper motor system (SPEAG DASY 4 professional system). The model EX3DV4 field probe is used to determine the internal electric fields. The SAR can be obtained from the equation $SAR = \sigma (|E_i|^2) / \rho$ where σ and ρ are the conductivity and mass density of the tissue-simulant.

The DASY 4 system for performing compliance tests consists of the following items:

- A standard high precision 6-axis robot (Staubli TX family) with controller, teach pendant and software. An arm extension is for accommodating the data acquisition electronics (DAE).
- A dosimeter 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.
- Data acquisition electronics (DAE) which performs the signal amplification, signal multiplexing, AD-conversion, offset measurements, mechanical surface detection, collision detection, etc. The unit is battery powered with standard or rechargeable batteries. The signal is optically transmitted to the EOC.

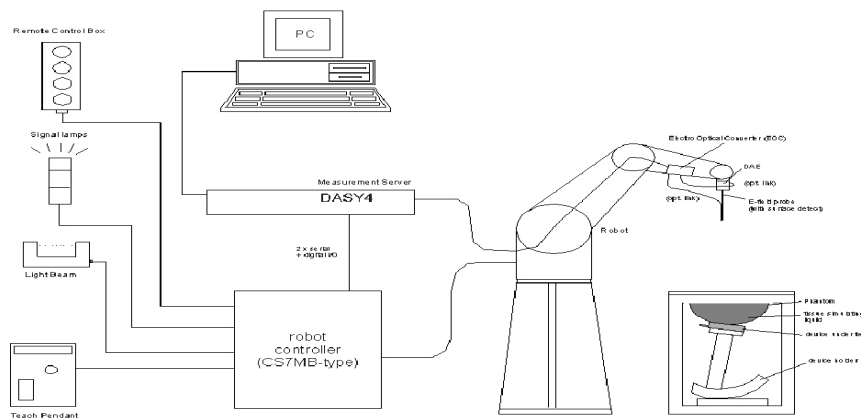


Fig a. The microwave circuit arrangement used for SAR system verification

- The Electro-optical converter (EOC) performs the conversion between optical and electrical of the signals for the digital communication to the DAE and for the analog signal from the optical surface detection. The EOC is connected to the measurement server.
- The function of the measurement server is to perform the time critical tasks such as signal filtering, control of the robot operation and fast movement interrupts.
- A probe alignment unit which improves the (absolute) accuracy of the probe positioning.
- A computer operating Windows XP.
- DASY 4 software.
- Remote control with teach pendant and additional circuitry for robot safety such as warning lamps, etc.
- The ELI phantom enabling testing flat usage.
- Tissue simulating liquid mixed according to the given recipes.
- Validation dipole kits allowing to validate the proper functioning of the system.

10 System Components

10.1 Probe

- Construction** : Symmetrical design with triangular core.
Built-in shielding against static charges.
PEEK enclosure material (resistant to organic solvents,
e.g., DGBE)
- Calibration** : Basic Broad Band Calibration in air Conversion Factors
(CF) for HSL 835 and HSL1900.
Additional CF-Calibration for other liquids and
frequencies upon request.
- Frequency** : 10

EX3DV4 E-Field Probe

10.3 Device Holder

Construction: : In combination with the Twin SAM PhantomV4.0/V4.0C or Twin SAM, the Mounting Device (made from POM) enables the rotation of the mounted transmitter in spherical coordinates, whereby the rotation point is the ear opening. The devices can be easily and accurately positioned according to IEC, IEEE, CENELEC, FCC or other specifications. The device holder can be locked at different phantom locations (left head, right head, flat phantom).



Device Holder

11 SAR Measurement Procedures

11.1 Normal SAR Measurement Procedure

Step 1: Power Reference Measurement

The Power Reference Measurement and Power Drift Measurements are for monitoring the power drift of the device under test in the batch process. The Minimum distance of probe sensors to surface determines the closest measurement point to phantom surface. The minimum distance of probe sensors to surface is 1.4

< Area and Zoom Scan Resolutions per FCC KDB Publication 865664 D01v01r04 >

		≤ 3 GHz	> 3 GHz
Maximum distance from closest measurement point (geometric center of probe sensors) to phantom surface		5 ± 1 mm	$\frac{1}{2} \cdot \delta \cdot \ln(2) \pm 0.5$ mm
Maximum probe angle from probe axis to phantom surface normal at the measurement location		$30^\circ \pm 1^\circ$	$20^\circ \pm 1^\circ$
Maximum area scan spatial resolution: $\Delta x_{Area}, \Delta y_{Area}$		≤ 2 GHz: ≤ 15 mm $2 - 3$ GHz: ≤ 12 mm	$3 - 4$ GHz: ≤ 12 mm $4 - 6$ GHz: ≤ 10 mm
		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 \leq the corresponding x or y dimension of the test device with at least one measurement point on the test device.	
Maximum zoom scan spatial resolution: $\Delta x_{Zoom}, \Delta y_{Zoom}$		≤ 2 GHz: ≤ 8 mm $2 - 3$ GHz: ≤ 5 mm*	$3 - 4$ GHz: ≤ 5 mm* $4 - 6$ GHz: ≤ 4 mm*
Maximum zoom scan spatial resolution, normal to phantom surface	uniform grid: $\Delta z_{Zoom}(n)$	≤ 5 mm	$3 - 4$ GHz: ≤ 4 mm $4 - 5$ GHz: ≤ 3 mm $5 - 6$ GHz: ≤ 2 mm
	graded grid $\Delta z_{Zoom}(1)$: between 1 st two points closest to phantom surface	≤ 4 mm	$3 - 4$ GHz: ≤ 3 mm $4 - 5$ GHz: ≤ 2.5 mm $5 - 6$ GHz: ≤ 2 mm
	$\Delta z_{Zoom}(n>1)$: between subsequent points	$\leq 1.5 \cdot \Delta z_{Zoom}(n-1)$	
Minimum zoom scan volume	x, y, z	≥ 30 mm	$3 - 4$ GHz: ≥ 28 mm $4 - 5$ GHz: ≥ 25 mm $5 - 6$ GHz: ≥ 22 mm
<p>Note: δ is the penetration depth of a plane-wave at normal incidence to the tissue medium; see draft standard IEEE P1528-2011 for details.</p> <p>* When zoom scan is required and the <u>reported</u> SAR from the area scan based <i>1-g SAR estimation</i> 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 3 GHz, 3 GHz to 4 GHz and 4 GHz to 6 GHz.</p>			

12 SAR System Verification

The microwave circuit arrangement for system verification is sketched in Fig. 1. The daily system accuracy verification occurs within the flat section of the ELI phantom. A SAR measurement was performed to see if the measured SAR was within +/- 10% from the target SAR values. These tests were done at 1900

13 Tissue Simulant Fluid for the Frequency Band

The dielectric properties for this simulant fluid were measured by using the Speag Model DAK-3.5 Dielectric Probe in conjunction with Agilent E5071C Network Analyzer(300

14 Instruments List

Test Platform	SPEAG DASY4 Professional
Location	SGS Korea Co., Ltd. 4, Ls-ro 182beon-gil, Gyeonggi-do, E&E Lab
Manufacture	SPEAG
Description	SAR Test System (Frequency range 300

15 FCC Power Measurement Procedures

The SAR measurement Software calculates a reference point at the start and end of the test to check for power drifts. If conducted power deviations of more than 5 % occurred, the tests were repeated.

16 Measured and Reported SAR

Per FCC KDB Publication 447498 D01v06, When SAR is not measured at the maximum power level allowed for production units, the results must be scaled to the maximum tune-up tolerance limit according to the power applied to the individual channels tested to determine compliance. For simultaneous transmission, the measured aggregate SAR must be scaled according to the sum of the differences between the maximum tune-up tolerance and actual power used to test each transmitter. When SAR is measured at or scaled to the maximum tune-up tolerance limit, the results are referred to as reported SAR. Test highest reported SAR results are identified on the grant of equipment authorization according to procedures in KDB 690783 D01v01r03.

17 Maximum Output Power Specifications (Attached Cell Phone)

This device operates using the following maximum output power specifications. SAR values were scaled to the maximum allowed power to determine compliance per KDB Publication 447498 D01v06

Mode / Band		Burst Average GMSK (dBm)			
		1 TX Slots	2 TX Slots	3 TX Slots	4 TX Slots
GSM 1900	Maximum	30.5	30.0	27.5	26.5
	Nominal	30.0	29.5	27.0	26.0

18 RF Conducted Power Measurement (Attached Cell Phone)

Band	Channel	Burst Average GMSK (dBm)			
		1 TX Slots	2 TX Slots	3 TX Slots	4 TX Slots
GSM 1900	661	27.21	26.97	26.47	24.61
Band	Channel	Frame Average GMSK (dBm)			
		1 TX Slots	2 TX Slots	3 TX Slots	4 TX Slots
GSM 1900	661	18.18	20.95	22.21	21.60

19. SAR Data Summary

Original Call Phone Worst Case Mode Test GSM 1900	Ambient Temperature (°C)	22.5
	Liquid Temperature (°C)	21.9
	Date	2016-02-12

EUT Position	Mode	Traffic Channel Frequency (Power(dBm)	Peak SAR of Area Scan(W/kg)	1-g SAR (W/kg)	Scaling Factor (Power)	1-g Scaled SAR (W/kg)
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Appendixes List

Appendix A	A.1 Verification Test Plots for 1900MHz A.2 SAR Test Plots for Original Worst Case GSM 1900 A.3 SAR Test Plots for Call Phone + LED Cover
Appendix B	B.1 Uncertainty Analysis
Appendix C	C.1 Calibration certificate for Probe C.2 Calibration certificate for DAE C.3 Calibration certificate for Dipole

Appendix A.1 Verification Test Plots for 1900 MHz

Date: 2016-02-12

Test Laboratory: SGS Korea (Gunpo Laboratory)
 File Name: [1900MHz Verification.da4](#)

Input Power : 100 mW

Ambient Temp : 22.5 °C Tissue Temp : 21.9 °C

DUT: Dipole 1900 MHz; Type: D1900V2; Serial: D1900V2 - SN:5d158
Program Name: Verification

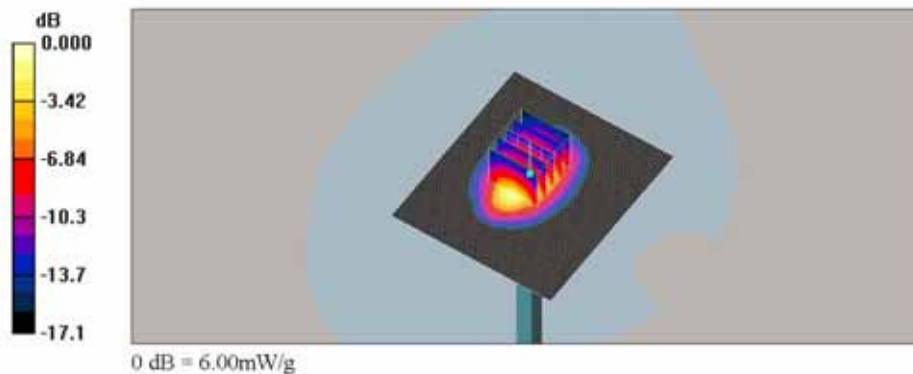
Communication System: CW; Frequency: 1900 MHz; Duty Cycle: 1:1
 Medium parameters used: $f = 1900$ MHz; $\sigma = 1.55$ mho/m; $\epsilon_r = 51.6$; $\rho = 1000$ kg/m³
 Phantom section: Flat Section

DASY4 Configuration:

- Probe: EX3DV4 - SN3791; ConvF(6.84, 6.84, 6.84); Calibrated: 2015-05-26
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn567; Calibrated: 2016-01-26
- Phantom: SAM Phantom TP-1645; Type: SAM Phantom; Serial: TP-1645
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

1900MHz Verification/Area Scan (71x81x1): Measurement grid: dx=15mm, dy=15mm
 Maximum value of SAR (interpolated) = 6.09 mW/g

1900MHz Verification/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
 Reference Value = 63.1 V/m; Power Drift = -0.024 dB
 Peak SAR (extrapolated) = 7.02 W/kg
SAR(1 g) = 4 mW/g; SAR(10 g) = 2.12 mW/g
 Maximum value of SAR (measured) = 6.00 mW/g



Appendix A.2 SAR Test Plots for Original Worst Case GSM 1900

Date: 2016-02-12

Test Laboratory: SGS Korea (Gunpo Laboratory)
 File Name: [GPRS1900_Rear_CH661_3TX.d44](#)

Ambient Temp : 22.5 °C Tissue Temp : 21.9 °C

DUT: Cell Phone(A3LSMG935US); Type: Portable Handset; Serial: 02FB3
Program Name: Body

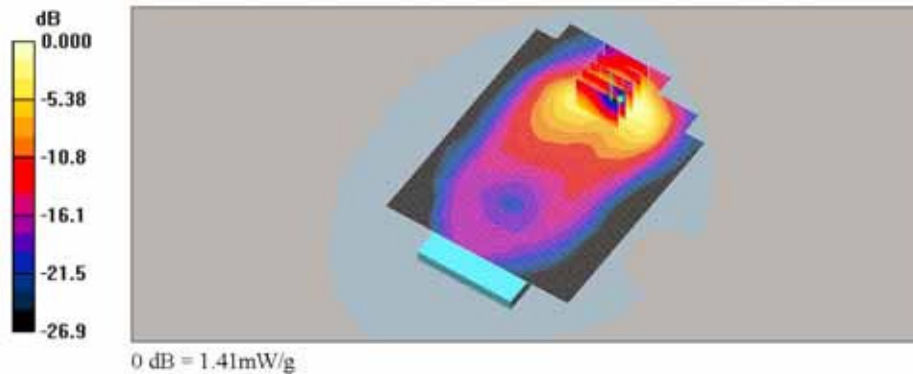
Communication System: GPRS1900 3TX; Frequency: 1880 MHz; Duty Cycle: 1:2.77
 Medium parameters used: $f = 1880$ MHz; $\sigma = 1.52$ mho/m; $\epsilon_r = 51.7$; $\rho = 1000$ kg/m³
 Phantom section: Flat Section

DASY4 Configuration:

- Probe: EX3DV4 - SN3791; ConvF(6.84, 6.84, 6.84); Calibrated: 2015-05-26
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn567; Calibrated: 2016-01-26
- Phantom: SAM Phantom TP-1645; Type: SAM Phantom; Serial: TP-1645
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

GPRS1900_Rear_CH661_3TX/Area Scan (91x121x1): Measurement grid: dx=15mm, dy=15mm
 Maximum value of SAR (interpolated) = 1.37 mW/g

GPRS1900_Rear_CH661_3TX/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
 Reference Value = 3.98 V/m; Power Drift = -0.107 dB
 Peak SAR (extrapolated) = 1.86 W/kg
SAR(1 g) = 0.992 mW/g; SAR(10 g) = 0.480 mW/g
 Maximum value of SAR (measured) = 1.41 mW/g



Appendix A.3 SAR Test Plots for Call Phone + LED Cover

Date: 2016-02-12

Test Laboratory: SGS Korea (Gunpo Laboratory)
 File Name: [GPRS1900_Rear_CH661_3TX_LED_Cover.da4](#)

Ambient Temp : 22.5 °C Tissue Temp : 21.9 °C

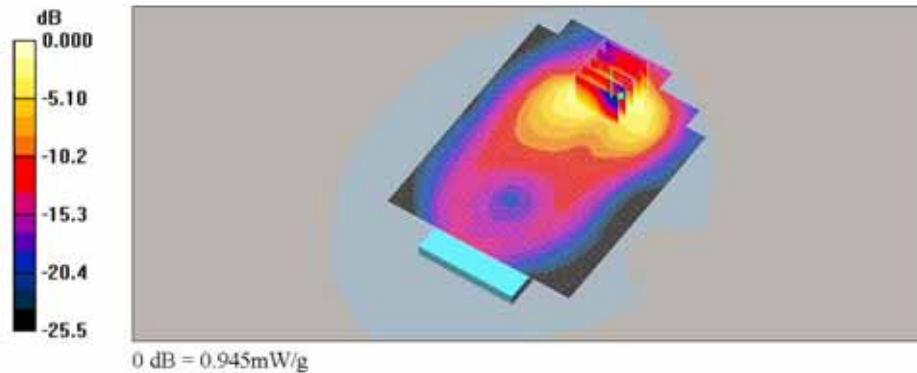
DUT: Cell Phone(A3LSMG935US)+LED Cover(A3L-ENFG935); Type: Portable Handset; Serial: 02FB3+RF7H11HQHAZWIS
Program Name: Body

Communication System: GPRS1900 3TX; Frequency: 1880 MHz; Duty Cycle: 1:2.77
 Medium parameters used: f = 1880 MHz; $\sigma = 1.52$ mho/m; $\epsilon_r = 51.7$; $\rho = 1000$ kg/m³
 Phantom section: Flat Section

DASY4 Configuration:
 - Probe: EX3DV4 - SN3791; ConvF(6.84, 6.84, 6.84); Calibrated: 2015-05-26
 - Sensor-Surface: 1.4mm (Mechanical Surface Detection)
 - Electronics: DAE3 Sn567; Calibrated: 2016-01-26
 - Phantom: SAM Phantom TP-1645; Type: SAM Phantom; Serial: TP-1645
 - Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

GPRS1900_Rear_CH661_3TX_LED Cover/Area Scan (91x121x1): Measurement grid: dx=15mm, dy=15mm
 Maximum value of SAR (interpolated) = 0.822 mW/g

GPRS1900_Rear_CH661_3TX_LED Cover/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
 Reference Value = 4.21 V/m; Power Drift = -0.181 dB
 Peak SAR (extrapolated) = 1.15 W/kg
SAR(1 g) = 0.644 mW/g; SAR(10 g) = 0.332 mW/g
 Maximum value of SAR (measured) = 0.945 mW/g



B.1 Uncertainty Analysis DASY5 #1

Measurement uncertainty for 300 MHz to 3 GHz averaged over 1 gram

a

Appendix C.1 Calibration certificate for Probe(S/N 3791)

**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 0108**



Client **SGS (Dymstec)**

Certificate No: **EX3-3791_May15**

CALIBRATION CERTIFICATE

Object: **EX3DV4 - SN:3791**

Calibration procedure(s): **QA CAL-01.v9, QA CAL-14.v4, QA CAL-23.v5, QA CAL-25.v6
 Calibration procedure for dosimetric E-field probes**

Calibration date: **May 26, 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)°C and humidity < 70%.

Calibration Equipment used (M&TE critical for calibration)

Primary Standards	ID	Cal Date (Certificate No.)	Scheduled Calibration
Power meter E4419B	GB41293874	01-Apr-15 (No. 217-02128)	Mar-16
Power sensor E4412A	MY41498087	01-Apr-15 (No. 217-02128)	Mar-16
Reference 3 dB Attenuator	SN: S8054 (3c)	01-Apr-15 (No. 217-02129)	Mar-16
Reference 20 dB Attenuator	SN: S5277 (20x)	01-Apr-15 (No. 217-02132)	Mar-16
Reference 30 dB Attenuator	SN: S5129 (30b)	01-Apr-15 (No. 217-02133)	Mar-16
Reference Probe ES3DV2	SN: 3013	30-Dec-14 (No. ES3-3013_Dec14)	Dec-15
DAE4	SN: 660	14-Jan-15 (No. DAE4-660_Jan15)	Jan-16
Secondary Standards	ID	Check Date (in house)	Scheduled Check
RF generator HP 8648C	US3642U01700	4-Aug-99 (in house check Apr-13)	In house check: Apr-16
Network Analyzer HP 8753E	US37390585	18-Oct-01 (in house check Oct-14)	In house check: Oct-15

Calibrated by:	Name Jeton Kastrati	Function Laboratory Technician	Signature
Approved by:	Name Katja Pokovic	Function Technical Manager	Signature

Issued: May 28, 2015

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

**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 0108**

Glossary:

TSL	tissue simulating liquid
NORM _{x,y,z}	sensitivity in free space
ConvF	sensitivity in TSL / NORM _{x,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.e., $\theta = 0$ 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 300 MHz to 3 GHz)", February 2005

Methods Applied and Interpretation of Parameters:

- **NORM_{x,y,z}**: Assessed for E-field polarization $\theta = 0$ ($f \leq 900$ MHz in TEM-cell; $f > 1800$ MHz: R22 waveguide). NORM_{x,y,z} are only intermediate values, i.e., the uncertainties of NORM_{x,y,z} does not affect the E²-field uncertainty inside TSL (see below ConvF).
- **NORM(f)_{x,y,z}** = NORM_{x,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.
- **DCP_{x,y,z}**: DCP are numerical linearization parameters assessed based on the data of power sweep with CW signal (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
- **A_{x,y,z}; B_{x,y,z}; C_{x,y,z}; D_{x,y,z}; VR_{x,y,z}**: A, B, C, D 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 $f \leq 800$ MHz) and inside waveguide using analytical field distributions based on power measurements for $f > 800$ MHz. The same setups are used for assessment of the parameters applied for boundary compensation (alpha, depth) of which typical uncertainty values are given. These parameters are used in DASY4 software to improve probe accuracy close to the boundary. The sensitivity in TSL corresponds to NORM_{x,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 ± 50 MHz to ± 100 MHz.
- **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 NORM_x (no uncertainty required).

EX3DV4 – SN:3791

May 26, 2015

Probe EX3DV4

SN:3791

Manufactured: February 18, 2011
Calibrated: May 26, 2015

Calibrated for DASY/EASY Systems
(Note: non-compatible with DASY2 system!)

EX3DV4- SN:3791

May 26, 2015

DASY/EASY - Parameters of Probe: EX3DV4 - SN:3791

Basic Calibration Parameters

	Sensor X	Sensor Y	Sensor Z	Unc (k=2)
Norm ($\mu\text{V}/(\text{V}/\text{m})^2$) ^A	0.55	0.54	0.53	$\pm 10.1 \%$
DCP (mV) ^B	104.7	101.1	99.5	

Modulation Calibration Parameters

UID	Communication System Name		A dB	B dB $\sqrt{\mu\text{V}}$	C	D dB	VR mV	Unc ^E (k=2)
0	CW	X	0.0	0.0	1.0	0.00	140.9	$\pm 3.3 \%$
		Y	0.0	0.0	1.0		145.5	
		Z	0.0	0.0	1.0		145.6	

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 NormX,Y,Z do not affect the E^2 -field uncertainty inside TSL (see Pages 5 and 6).

^B Numerical linearization parameter: uncertainty not required.

^E Uncertainty is determined using the max. deviation from linear response applying rectangular distribution and is expressed for the square of the field value.

EX3DV4- SN:3791

May 26, 2015

DASY/EASY - Parameters of Probe: EX3DV4 - SN:3791

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 (mm) ^G	Unct. (k=2)
835	41.5	0.90	8.57	8.57	8.57	0.17	1.90	± 12.0 %
900	41.5	0.97	8.45	8.45	8.45	0.19	1.84	± 12.0 %
1750	40.1	1.37	7.45	7.45	7.45	0.40	0.80	± 12.0 %
1900	40.0	1.40	7.16	7.16	7.16	0.46	0.80	± 12.0 %
2300	39.5	1.67	6.65	6.65	6.65	0.43	0.82	± 12.0 %
2450	39.2	1.80	6.42	6.42	6.42	0.45	0.80	± 12.0 %
2600	39.0	1.96	6.17	6.17	6.17	0.38	0.96	± 12.0 %
5200	36.0	4.66	4.91	4.91	4.91	0.35	1.80	± 13.1 %
5300	35.9	4.76	4.64	4.64	4.64	0.35	1.80	± 13.1 %
5500	35.6	4.96	4.56	4.56	4.56	0.40	1.80	± 13.1 %
5600	35.5	5.07	4.36	4.36	4.36	0.40	1.80	± 13.1 %
5800	35.3	5.27	4.45	4.45	4.45	0.40	1.80	± 13.1 %

^C Frequency validity above 300 MHz of ± 100 MHz only applies for DASY v4.4 and higher (see Page 2), else it is restricted to ± 50 MHz. The uncertainty is the RSS of the ConvF uncertainty at calibration frequency and the uncertainty for the indicated frequency band. Frequency validity below 300 MHz is ± 10, 25, 40, 50 and 70 MHz for ConvF assessments at 30, 64, 128, 150 and 220 MHz respectively. Above 5 GHz frequency validity can be extended to ± 110 MHz.

^F At frequencies 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 frequencies between 3-6 GHz at any distance larger than half the probe tip diameter from the boundary.

EX3DV4- SN:3791

May 26, 2015

DASY/EASY - Parameters of Probe: EX3DV4 - SN:3791

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)
835	55.2	0.97	8.76	8.76	8.76	0.28	1.16	± 12.0 %
900	55.0	1.05	8.51	8.51	8.51	0.31	1.10	± 12.0 %
1750	53.4	1.49	7.18	7.18	7.18	0.48	0.80	± 12.0 %
1900	53.3	1.52	6.84	6.84	6.84	0.44	0.80	± 12.0 %
2450	52.7	1.95	6.60	6.60	6.60	0.39	0.80	± 12.0 %
2600	52.5	2.16	6.28	6.28	6.28	0.38	0.80	± 12.0 %
5200	49.0	5.30	4.30	4.30	4.30	0.45	1.90	± 13.1 %
5300	48.9	5.42	4.10	4.10	4.10	0.45	1.90	± 13.1 %
5600	48.5	5.77	3.82	3.82	3.82	0.50	1.90	± 13.1 %
5800	48.2	6.00	3.72	3.72	3.72	0.50	1.90	± 13.1 %

^C Frequency validity above 300 MHz of ± 100 MHz only applies for DASY v4.4 and higher (see Page 2), else it is restricted to ± 50 MHz. The uncertainty is the RSS of the ConvF uncertainty at calibration frequency and the uncertainty for the indicated frequency band. Frequency validity below 300 MHz is ± 10, 25, 40, 50 and 70 MHz for ConvF assessments at 30, 64, 128, 150 and 220 MHz respectively. Above 5 GHz frequency validity can be extended to ± 110 MHz.

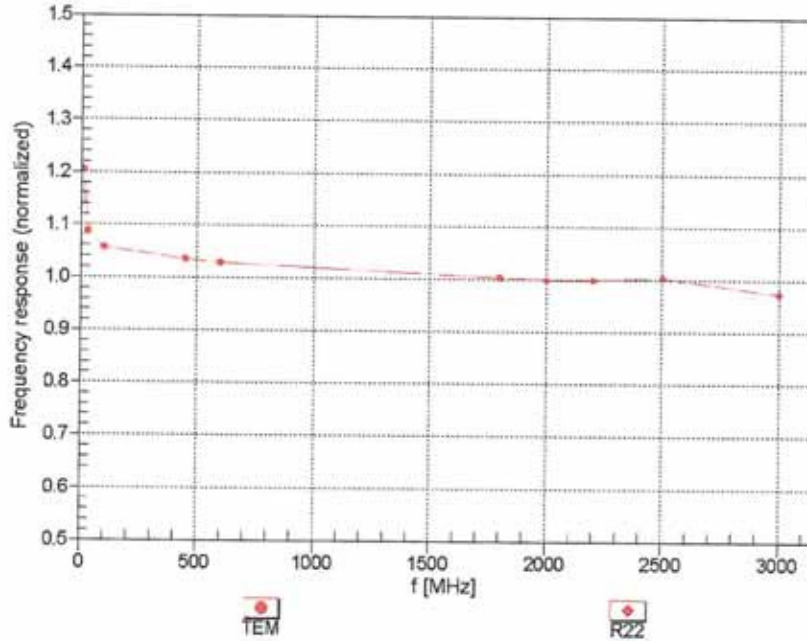
^F At frequencies below 3 GHz, the validity of tissue parameters (ϵ and σ) can be relaxed to ± 10% if liquid compensation formula is applied to measured SAR values. At frequencies above 3 GHz, the validity of tissue parameters (ϵ and σ) is restricted to ± 5%. The uncertainty is the RSS of the ConvF uncertainty 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 frequencies between 3-6 GHz at any distance larger than half the probe tip diameter from the boundary.

EX3DV4- SN:3791

May 26, 2015

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

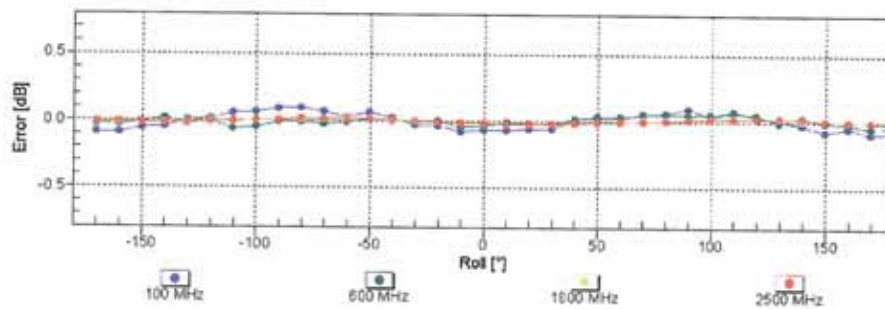
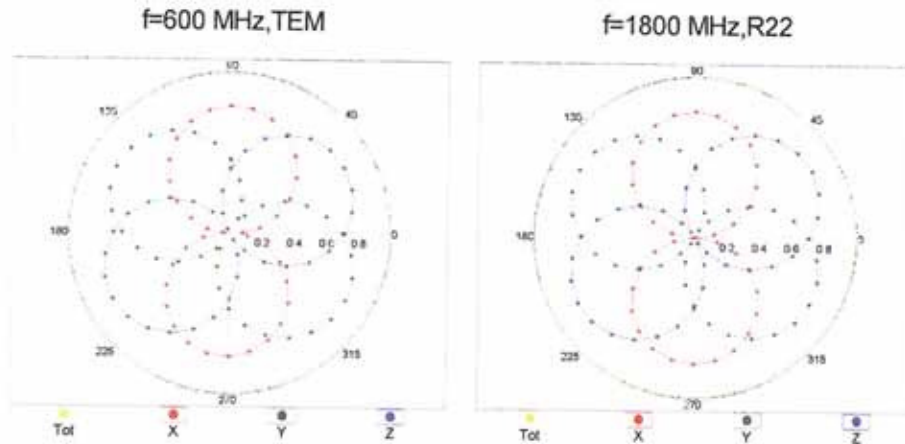


Uncertainty of Frequency Response of E-field: $\pm 6.3\%$ (k=2)

EX3DV4- SN:3791

May 26, 2015

Receiving Pattern (ϕ), $\theta = 0^\circ$

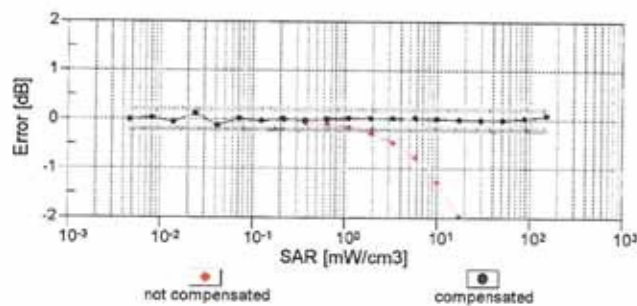
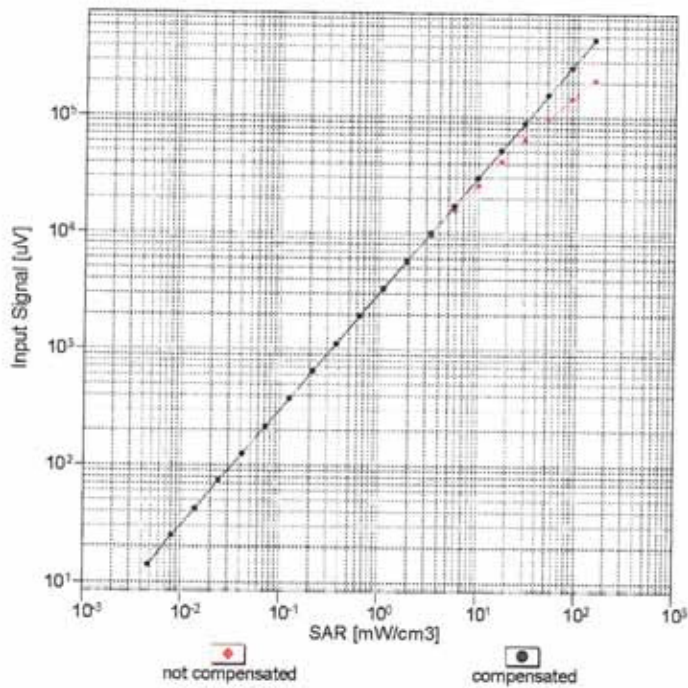


Uncertainty of Axial Isotropy Assessment: $\pm 0.5\%$ (k=2)

EX3DV4- SN:3791

May 26, 2015

Dynamic Range $f(SAR_{head})$
 (TEM cell, $f_{eval} = 1900$ MHz)

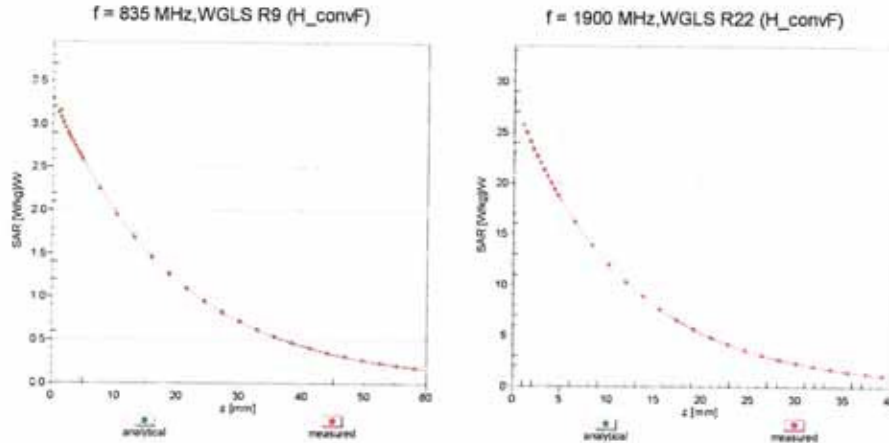


Uncertainty of Linearity Assessment: $\pm 0.6\%$ ($k=2$)

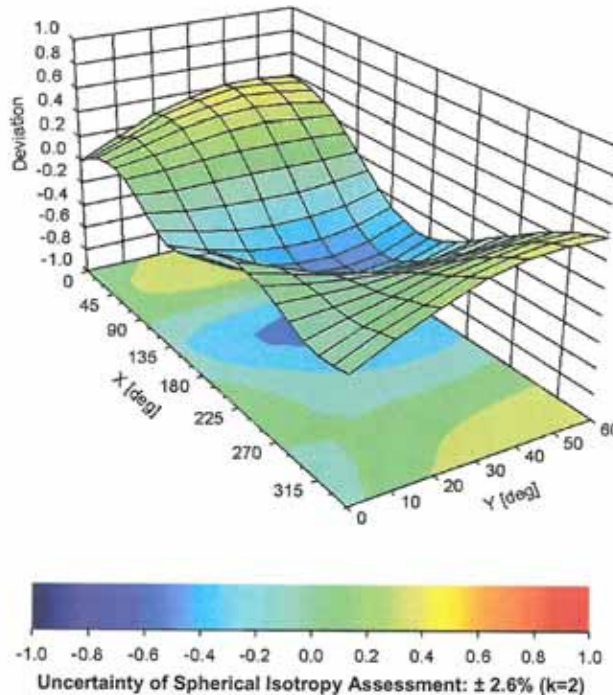
EX3DV4- SN:3791

May 26, 2015

Conversion Factor Assessment



Deviation from Isotropy in Liquid Error (ϕ, θ), f = 900 MHz



EX3DV4- SN:3791

May 26, 2015

DASY/EASY - Parameters of Probe: EX3DV4 - SN:3791

Other Probe Parameters

Sensor Arrangement	Triangular
Connector Angle (°)	69.7
Mechanical Surface Detection Mode	enabled
Optical Surface Detection Mode	disabled
Probe Overall Length	337 mm
Probe Body Diameter	10 mm
Tip Length	9 mm
Tip Diameter	2.5 mm
Probe Tip to Sensor X Calibration Point	1 mm
Probe Tip to Sensor Y Calibration Point	1 mm
Probe Tip to Sensor Z Calibration Point	1 mm
Recommended Measurement Distance from Surface	1.4 mm



Appendix C.2

DC Voltage Measurement

A/D - Converter Resolution nominal

High Range: 1LSB = 6.1 μ V , 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	404.722 \pm 0.02% (k=2)	404.468 \pm 0.02% (k=2)	404.559 \pm 0.02% (k=2)
Low Range	3.95717 \pm 1.50% (k=2)	3.97236 \pm 1.50% (k=2)	3.96088 \pm 1.50% (k=2)

Connector Angle

Connector Angle to be used in DASY system	5.0 $^{\circ}$ \pm 1 $^{\circ}$
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Appendix (Additional assessments outside the scope of SCS0108)

1. DC Voltage Linearity

High Range	Reading (μ V)	Difference (μ V)	Error (%)
Channel X + Input	200039.44	3.95	0.00
Channel X + Input	20010.09	5.51	0.03
Channel X - Input	-20001.95	3.63	-0.02
Channel Y + Input	200038.39	2.75	0.00
Channel Y + Input	20005.77	1.25	0.01
Channel Y - Input	-20003.83	1.96	-0.01
Channel Z + Input	200039.05	3.88	0.00
Channel Z + Input	20003.12	-1.30	-0.01
Channel Z - Input	-20003.03	2.76	-0.01

Low Range	Reading (μ V)	Difference (μ V)	Error (%)
Channel X + Input	2000.42	-0.37	-0.02
Channel X + Input	201.05	0.32	0.16
Channel X - Input	-198.92	0.27	-0.14
Channel Y + Input	2000.80	0.06	0.00
Channel Y + Input	200.66	0.09	0.05
Channel Y - Input	-199.98	-0.69	0.35
Channel Z + Input	2000.80	0.20	0.01
Channel Z + Input	199.37	-1.24	-0.62
Channel Z - Input	-200.58	-1.23	0.62

2. Common mode sensitivity

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

	Common mode Input Voltage (mV)	High Range Average Reading (μ V)	Low Range Average Reading (μ V)
Channel X	200	2.74	1.36
	- 200	-0.60	-2.08
Channel Y	200	0.66	-0.06
	- 200	-0.78	-1.16
Channel Z	200	3.85	3.52
	- 200	-6.05	-6.27

3. Channel separation

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

	Input Voltage (mV)	Channel X (μ V)	Channel Y (μ V)	Channel Z (μ V)
Channel X	200	-	-0.96	-3.39
Channel Y	200	8.03	-	-0.22
Channel Z	200	5.75	5.98	-

4. AD-Converter Values with inputs shorted

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

	High Range (LSB)	Low Range (LSB)
Channel X	16274	16202
Channel Y	16146	13920
Channel Z	15961	15010

5. Input Offset Measurement

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

Input 10MΩ

	Average (μV)	min. Offset (μV)	max. Offset (μV)	Std. Deviation (μV)
Channel X	0.97	-0.59	2.15	0.50
Channel Y	0.06	-1.18	1.26	0.47
Channel Z	-0.20	-1.36	0.89	0.44

6. Input Offset Current

Nominal Input circuitry offset current on all channels: <25fA

7. Input Resistance (Typical values for information)

	Zeroing (kOhm)	Measuring (MOhm)
Channel X	200	200
Channel Y	200	200
Channel Z	200	200

8. Low Battery Alarm Voltage (Typical values for information)

Typical values	Alarm Level (VDC)
Supply (+ Vcc)	+7.9
Supply (- Vcc)	-7.6

9. Power Consumption (Typical values for information)

Typical values	Switched off (mA)	Stand by (mA)	Transmitting (mA)
Supply (+ Vcc)	+0.01	+6	+14
Supply (- Vcc)	-0.01	-8	-9

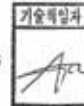
Appendix C.3 Calibration certificate for Dipole

**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

Accreditation No.: **SCS 0108**



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

Client **SGS (Dymstec)**

Certificate No: **D1900V2-5d158_Apr15**

CALIBRATION CERTIFICATE			
Object	D1900V2 - SN:5d158		
Calibration procedure(s)	QA CAL-05.v9 Calibration procedure for dipole validation kits above 700 MHz		
Calibration date:	April 29, 2015		
<p>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.</p> <p>All calibrations have been conducted in the closed laboratory facility: environment temperature (22 ± 3)°C and humidity < 70%.</p> <p>Calibration Equipment used (M&TE critical for calibration)</p>			
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 B481A	US37292783	07-Oct-14 (No. 217-02020)	Oct-15
Power sensor HP B481A	MY41092317	07-Oct-14 (No. 217-02021)	Oct-15
Reference 20 dB Attenuator	SN: 5058 (20k)	01-Apr-15 (No. 217-02131)	Mar-16
Type-N mismatch combination	SN: 5047.2 / 06327	01-Apr-15 (No. 217-02134)	Mar-16
Reference Probe ES3DV3	SN: 3205	30-Dec-14 (No. ES3-3205_Dec14)	Dec-15
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
Calibrated by:	Name Claudio Leubler	Function Laboratory Technician	Signature
Approved by:	Name Katja Pokovic	Function Technical Manager	Signature
			Issued: April 29, 2015
This calibration certificate shall not be reproduced except in full without written approval of the laboratory.			

Certificate No: D1900V2-5d158_Apr15

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**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 0108**

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%.

Appendix (Additional assessments outside the scope of SCS 0108)

Antenna Parameters with Head TSL

Impedance, transformed to feed point	53.0 Ω + 4.7 jΩ
Return Loss	- 25.3 dB

Antenna Parameters with Body TSL

Impedance, transformed to feed point	48.7 Ω + 5.3 jΩ
Return Loss	- 25.2 dB

General Antenna Parameters and Design

Electrical Delay (one direction)	1.200 ns
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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	December 20, 2011

DASY5 Validation Report for Head TSL

Date: 29.04.2015

Test Laboratory: SPEAG, Zurich, Switzerland

DUT: Dipole 1900 MHz; Type: D1900V2; Serial: D1900V2 - SN:5d158

Communication System: UID 0 - CW; Frequency: 1900 MHz

Medium parameters used: $f = 1900$ MHz; $\sigma = 1.37$ S/m; $\epsilon_r = 38.6$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2011)

DASY52 Configuration:

- Probe: ES3DV3 - SN3205; ConvF(5, 5, 5); Calibrated: 30.12.2014;
- 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:

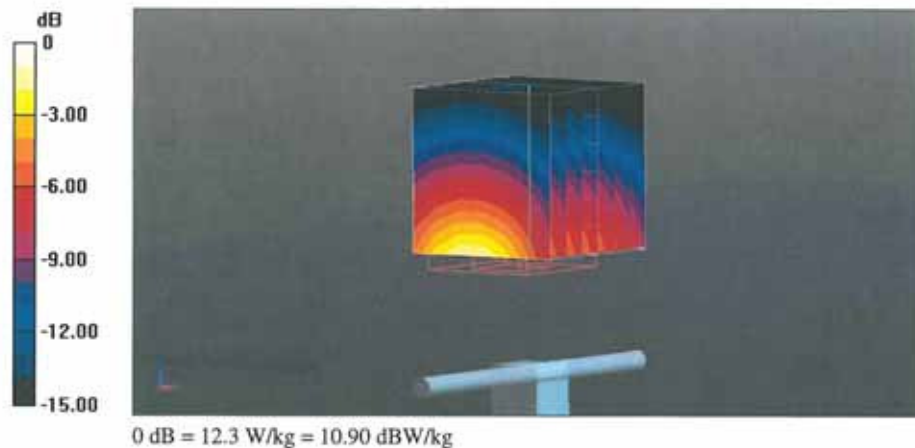
Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 97.30 V/m; Power Drift = 0.04 dB

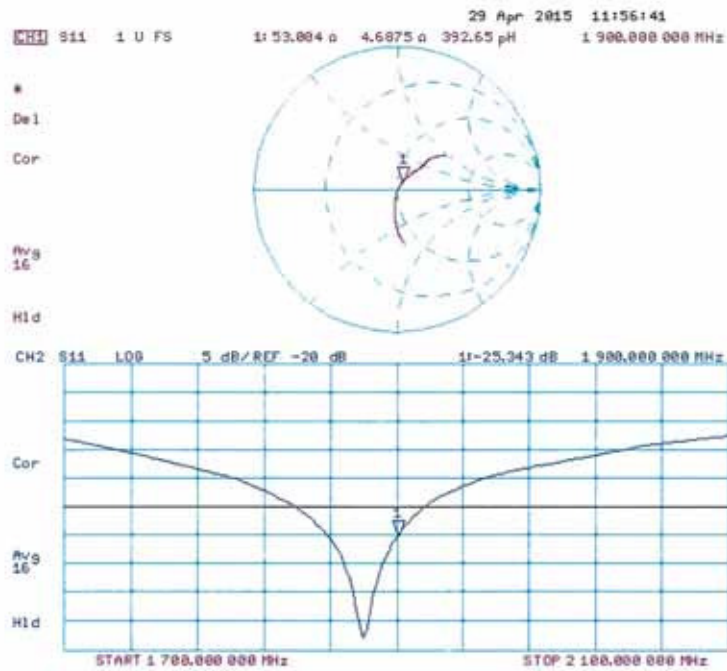
Peak SAR (extrapolated) = 18.3 W/kg

SAR(1 g) = 10 W/kg; SAR(10 g) = 5.26 W/kg

Maximum value of SAR (measured) = 12.3 W/kg



Impedance Measurement Plot for Head TSL



DASY5 Validation Report for Body TSL

Date: 29.04.2015

Test Laboratory: SPEAG, Zurich, Switzerland

DUT: Dipole 1900 MHz; Type: D1900V2; Serial: D1900V2 - SN:5d158

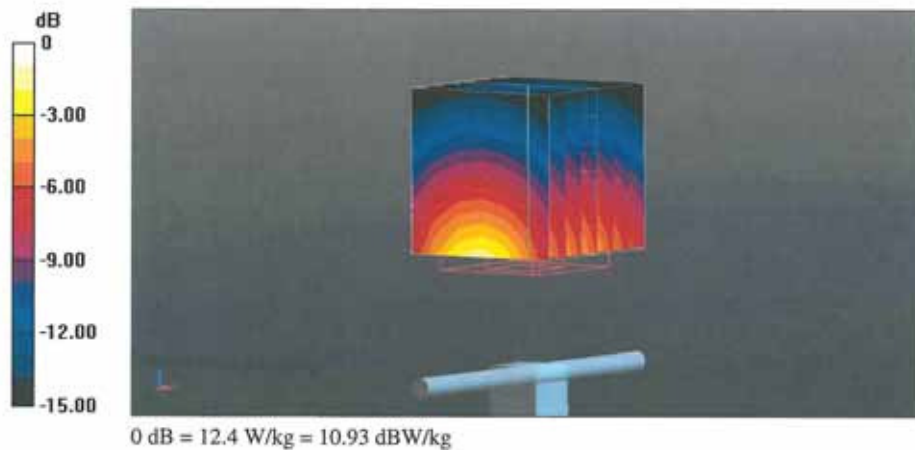
Communication System: UID 0 - CW; Frequency: 1900 MHz
 Medium parameters used: $f = 1900$ MHz; $\sigma = 1.5$ S/m; $\epsilon_r = 52.8$; $\rho = 1000$ kg/m³
 Phantom section: Flat Section
 Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2011)

DASY52 Configuration:

- Probe: ES3DV3 - SN3205; ConvF(4.65, 4.65, 4.65); Calibrated: 30.12.2014;
- 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: $dx=5$ mm, $dy=5$ mm, $dz=5$ mm
 Reference Value = 95.57 V/m; Power Drift = 0.00 dB
 Peak SAR (extrapolated) = 16.7 W/kg
SAR(1 g) = 9.86 W/kg; SAR(10 g) = 5.25 W/kg
 Maximum value of SAR (measured) = 12.4 W/kg



Impedance Measurement Plot for Body TSL

