From: oetech@fccsun27w.fcc.gov [mailto:oetech@fccsun27w.fcc.gov]
Sent: Thursday, June 05, 2014 6:19 AM
To: Art Voss
Subject: Response to Inquiry to FCC (Tracking Number 342483)

Office of Engineering and Technology

Inquiry on 05/21/2014 :

Inquiry:

This inquiry is per KDB 865664D0v01r03 -

"Until the detailed design criteria and SAR target values are fully documented in subsequent IEC 62209 draft or final revisions, test labs should confirm the SAR target values and required measurement setup configurations through KDB inquiry when a shielded current loop is used for the first time. A KDB inquiry must be submitted to determine if any other alternative techniques may be acceptable."

Attached is the procedure and the manufacturer's targets. Please advise if any additional information is required.

Thank you

Art Voss

FCC response on 06/05/2014

This specific KDB inquiry is for a specific 150 MHz current loop only and is for purpose of using this loop in SAR system validation and verification measurements when all applicable SAR measurement requirements for the individual test device are satisfied. According to the calibration results, this loop has a very narrow tuning range; less than 2 – 3 MHz to meet SAR system validation and verification specifications. The return loss for head liquid is -19.4 dB, which does not meet the -20 dB specified in existing SAR measurement standards. The return loss for body liquid is -20 dB, which is considered marginal. In order to use this loop, it must be tuned to 150 MHz +/- 0.5 MHz or better to avoid additional concerns in comparing test results to the calibrated results. This must be clearly explained for the results shown in each applicable SAR report. Because of the narrow tuning range, it is unclear if there could be issues in scaling the SAR results when much lower than 1 W power is applied to perform the SAR system validation or verification without additional confirmation results. We highly recommend that close to 1 W be used and the results should be adjusted (scaled) for minor variations from the 1.0 W target.

On the calibration certificate, it is indicated that IEC 62209-2 procedures are applied with respect to the frequency range of 300 MHz – 6 GHz. Please be aware that these loops are only defined at selected frequencies between 30 - 220 MHz in SAR measurement standards. The FCC does not have SAR measurement procedures for below 100 MHz due to availability of acceptable tissue-equivalent dielectric parameters and recipes. The dielectric parameters in IEC 62209-2 for below 100 MHz are not acceptable for FCC equipment certification testing. Therefore, only the 150 and 220 MHz loops within the series of loops defined in the on-going draft IEC 62209-2 document may be applicable for FCC equipment certification, provided the calibration results are reviewed through an initial KDB inquiry.

You may use this specific 150 MHz current loop, CLA150 – SN: 4007, for applicable 150 MHz SAR system validation and verification to support FCC equipment certification that requires 150 MHz SAR measurements. Provided the concerns and conditions identified in this KDB inquiry are satisfied, a PBA is not necessary for equipment approval by a TCB. A copy of this KDB inquiry must be provided to each TCB for each FCC equipment approval that involves this specific current loop until further notice through applicable KDB publications. The TCB is responsible for verifying the required conditions are satisfied for using this current loop and to determine if a PBA is necessary, including proper SAR probe calibration and tissue-equivalent dielectric parameter/liquid requirements for using the equipment to test an applicable device. All SAR system validation and verification results must meet the normally required requirements in KDB 865664.

This KDB inquiry applies to CLA150 – SN: 4007 only and is for purpose of making SAR measurements with a calibrated SAR probe for devices in the 150 MHz range covered by the probe calibration point frequency range when the required SAR measurement procedures are used.

21-364 Lougheed Road, Kelowna, British Columbia, Canada V1X 7R8
Tel: 1-250-765-7650 Fax: 1-250-765-7645

Date: 2 June, 2014

TO: FCC KDB Inquiry 342483

RE: 150 MHz Current Loop SAR Calibration Source

Per KDB 865664 D01v01R03, Celltech Labs' SAR System Verification and System Validation are performed per KDB865664D01v01r03, IEEE1528-2013, IEC 62209-1 and IEC 62209-2 using a SPEAG CLA-150 Current Loop calibration source. Below is a typical setup photo using the CLA-150 with an ELI 5.0 planar phantom, type QD OVA 002 A. The manufacturer's calibration targets are attached.

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 Celltech

Certificate No: CLA150-4007_Jan14/2

CALIBRATION CERTIFICATE (Replacement of No: CLA150-4007_Jan14)

Object	CLA150 - SN: 4007
Calibration procedure(s)	QA CAL-15.v8 Calibration procedure for system validation sources below 700 MHz
Calibration date:	January 24, 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 E4419B	GB41293874	04-Apr-13 (No. 217-01733)	Apr-14
Power sensor E4412A	MY41498087	04-Apr-13 (No. 217-01733)	Apr-14
Reference 3 dB Attenuator	SN: S5054 (3c)	04-Apr-13 (No. 217-01737)	Apr-14
Reference 20 dB Attenuator	SN: S5058 (20k)	04-Apr-13 (No. 217-01736)	Apr-14
Type-N mismatch combination	SN: 5047.3 / 06327	04-Apr-13 (No. 217-01739)	Apr-14
Reference Probe EX3DV4	SN: 3877	06-Jan-14 (No. EX3-3877_Jan14)	Jan-15
DAE4	SN: 654	18-Jul-13 (No. DAE4-654_Jul13)	Jul-14

Secondary Standards	ID #	Check Date (in house)	Scheduled Check
RF generator HP 8648C	US3642U01700	04-Aug-99 (in house check Apr-13)	In house check: Apr-16
Network Analyzer HP 8753E	US37390585 S4206	18-Oct-01 (in house check Oct-13)	In house check: Oct-14

	Name	Function	Signature
Calibrated by:	Israe El-Naouq	Laboratory Technician	
Approved by:	Katja Pokovic	Technical Manager	

Issued: April 14, 2014

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) IEC 62209-2, "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 2013
b) KDB 865664, "SAR Measurement Requirements for 100 MHz to 6 GHz"

Additional Documentation:

c) 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 source is mounted in a touch configuration below the center marking of the flat phantom.
- *Return Loss:* This parameter is measured with the source positioned under the liquid filled phantom (as described in the measurement condition clause). The Return Loss ensures low reflected power. 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	V52.8.7
Extrapolation	Advanced Extrapolation	
Phantom	ELI4 Flat Phantom	Shell thickness: 2 ± 0.2 mm
EUT Positioning	Touch Position	
Zoom Scan Resolution	dx, dy, dz = 5.0 mm	
Frequency	150 MHz ± 1 MHz	

Head TSL parameters

The following parameters and calculations were applied.

	Temperature	**Permittivity**	**Conductivity**
Nominal Head TSL parameters	22.0 °C	52.3	0.76 mho/m
Measured Head TSL parameters	(22.0 ± 0.2) °C	50.5 ± 6 %	0.76 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	1 W input power	3.89 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**3.86 W/kg ± 18.4 % (k=2)**

SAR averaged over 10 cm^3 (10 g) of Head TSL	condition	
SAR measured	1 W input power	2.57 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**2.55 W/kg ± 18.0 % (k=2)**

Body TSL parameters

The following parameters and calculations were applied.

	Temperature	**Permittivity**	**Conductivity**
Nominal Body TSL parameters	22.0 °C	61.9	0.80 mho/m
Measured Body TSL parameters	(22.0 ± 0.2) °C	62.8 ± 6 %	0.80 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	1 W input power	3.89 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	**3.90 W/kg ± 18.4 % (k=2)**

SAR averaged over 10 cm^3 (10 g) of Body TSL	condition	
SAR measured	1 W input power	2.59 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	**2.60 W/kg ± 18.0 % (k=2)**

Appendix

Antenna Parameters with Head TSL

Impedance, transformed to feed point	43.1 Ω - 7.3 jΩ
Return Loss	- 19.4 dB

Antenna Parameters with Body TSL

Impedance, transformed to feed point	46.9 Ω - 9.2 jΩ
Return Loss	- 20.0 dB

Additional EUT Data

Manufactured by	SPEAG
Manufactured on	December 12, 2013

DASY5 Validation Report for Head TSL

Date: 24.01.2014

Test Laboratory: SPEAG, Zurich, Switzerland

DUT: CLA150; Type: CLA150; Serial: CLA150 - SN: 4007

Communication System: UID 0 - CW; Frequency: 150 MHz
Medium parameters used: f = 150 MHz; σ = 0.76 S/m; ε_r = 50.5; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY52 Configuration:

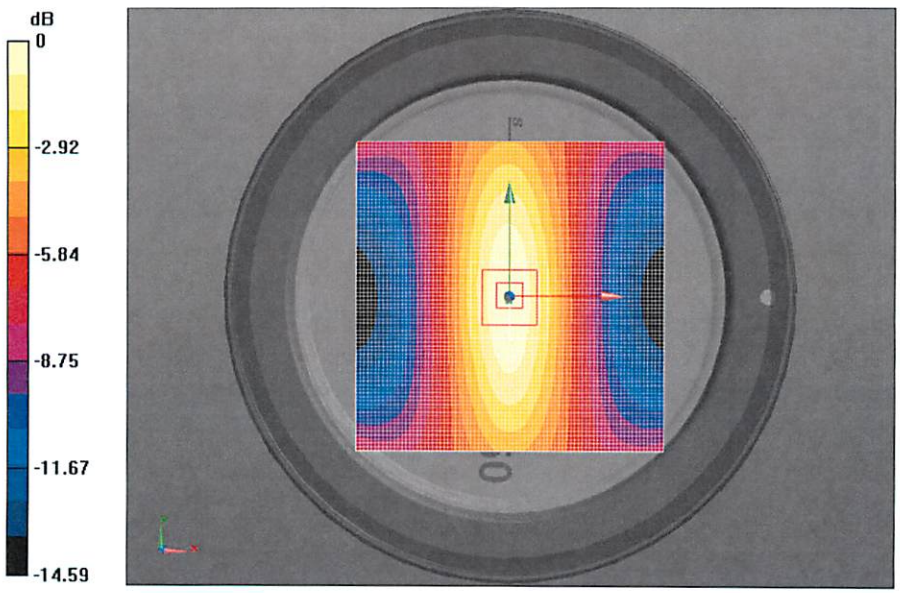
- Probe: EX3DV4 - SN3877; ConvF(11.76, 11.76, 11.76); Calibrated: 06.01.2014;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn654; Calibrated: 18.07.2013
- Phantom: ELI v4.0; Type: QDOVA001BB; Serial: TP:1003
- DASY52 52.8.7(1137); SEMCAD X 14.6.10(7164)

CLA Calibration for HSL-LF Tissue/CLA150, touch configuration, Pin=1W/Area Scan (81x81x1): Interpolated grid: dx=1.500 mm, dy=1.500 mm

Maximum value of SAR (interpolated) = 5.02 W/kg

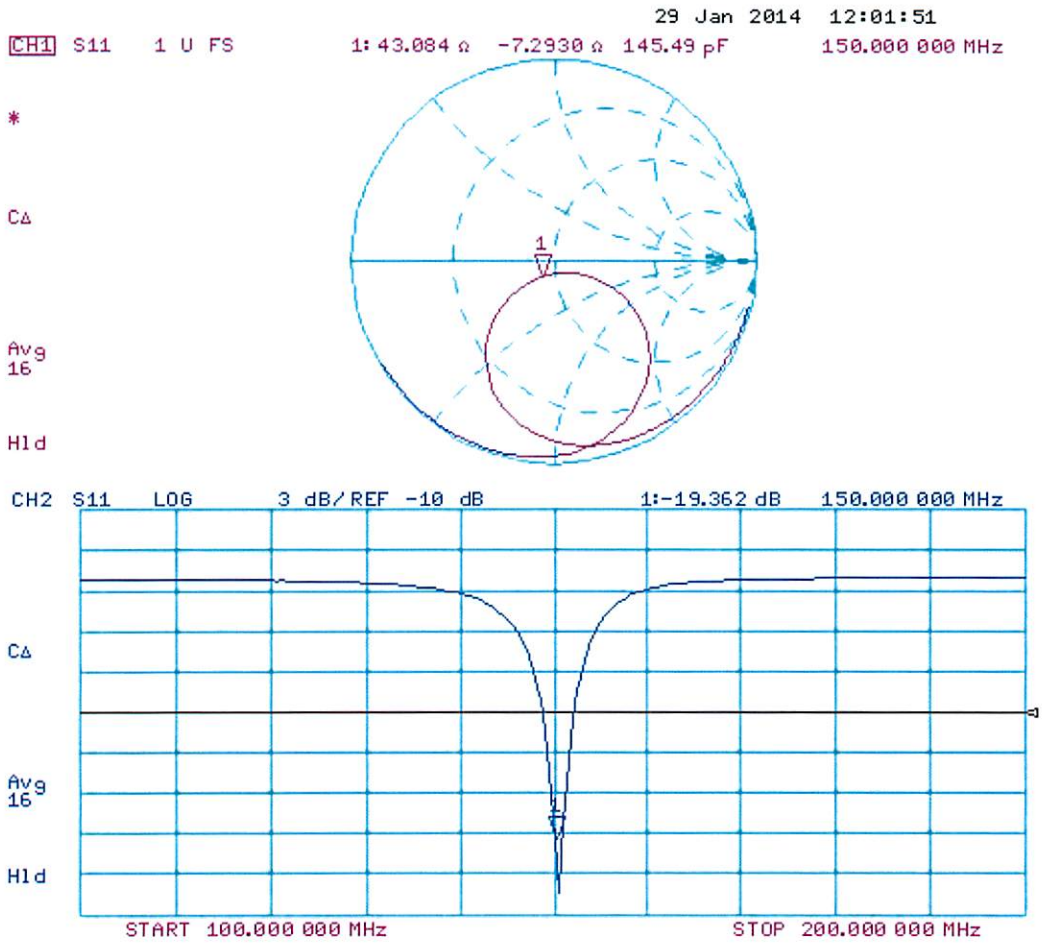
CLA Calibration for HSL-LF Tissue/CLA150, touch configuration, Pin=1W/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 81.695 V/m; Power Drift = -0.04 dB
Peak SAR (extrapolated) = 6.28 W/kg
SAR(1 g) = 3.89 W/kg; SAR(10 g) = 2.57 W/kg
Maximum value of SAR (measured) = 5.03 W/kg



0 dB = 5.02 W/kg = 7.01 dBW/kg

Impedance Measurement Plot for Head TSL



DASY5 Validation Report for Body TSL

Date: 24.01.2014

Test Laboratory: SPEAG, Zurich, Switzerland

DUT: CLA150; Type: CLA150; Serial: CLA150 - SN: 4007

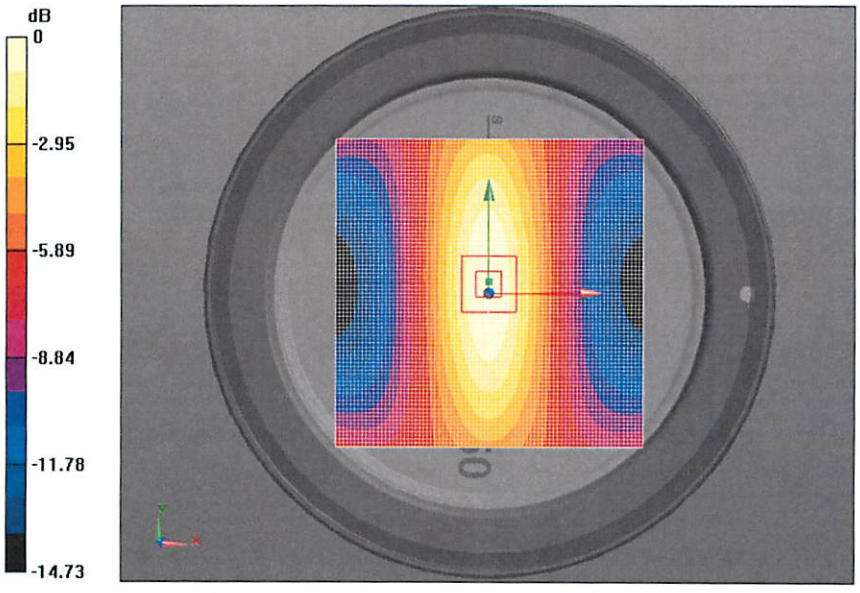
Communication System: UID 0 - CW; Frequency: 150 MHz
Medium parameters used: f = 150 MHz; σ = 0.799 S/m; ε_r = 62.757; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY52 Configuration:

- Probe: EX3DV4 - SN3877; ConvF(11.45, 11.45, 11.45); Calibrated: 06.01.2014;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn654; Calibrated: 18.07.2013
- Phantom: ELI v4.0; Type: QDOVA001BB; Serial: TP:1003
- DASY52 52.8.7(1137); SEMCAD X 14.6.10(7164)

CLA Calibration for MSL-LF Tissue/CLA150, touch configuration, Pin=1W/Area Scan (81x81x1): Interpolated grid: dx=1.500 mm, dy=1.500 mm
Maximum value of SAR (interpolated) = 5.00 W/kg

CLA Calibration for MSL-LF Tissue/CLA150, touch configuration, Pin=1W/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 79.120 V/m; Power Drift = 0.00 dB
Peak SAR (extrapolated) = 6.25 W/kg
SAR(1 g) = 3.89 W/kg; SAR(10 g) = 2.59 W/kg
Maximum value of SAR (measured) = 5.02 W/kg



0 dB = 5.00 W/kg = 6.99 dBW/kg

Impedance Measurement Plot for Body TSL