RF Exposure Lab
802 N. Twin Oaks Valley Road, Suite 105 • San Marcos, CA 92069 • U.S.A.
TEL (760) 471-2100 • FAX (760) 471-2121
http://www.rfexposurelab.com

CERTIFICATE OF COMPLIANCE
SAR EVALUATION

ICOM, Inc.
1-1-32 Kamiminami Hirano-ku
Osaka 547-0003
Japan

Dates of Test: Dec. 2-11, 2020 & Jul. 5, 2023
Test Report Number: SAR.20201208
Revision E
Lab Designation Number: US1195(FCC); US0194(ISED)

FCC ID:	AFJ417900
IC Certificate:	202D-417900
Model(s):	IP730D
HVIN:	417900-02
Test Sample:	Engineering Unit Same as Production
Serial No.:	Eng 1
Equipment Type:	Push-To-Talk Handheld Radio for Occupational Population Use
Classification:	Portable Transmitter Next to Face and Body
TX Frequency Range:	136 – 174 MHz, 699 – 716 MHz; 824 – 849 MHz; 1710 – 1755 MHz; 1850 – 1910 MHz; 2402 – 2480 MHz
Frequency Tolerance:	± 2.5 ppm
Maximum RF Output:	150 MHz (FM) – 36.99 dBm, 750 MHz (LTE) – 25.7 dBm, 835 MHz (WCDMA) – 25.0 dBm, 1750 MHz (LTE) – 25.7 dBm, 1900 MHz (WCDMA) – 25.0 dBm, 1900 MHz (LTE) -24.0 dBm, 2450 MHz (BT) – 11.1 dBm Conducted
Signal Modulation:	FM, QPSK, 16QAM, DSSS, GFSK
Body Worn:	MB-133, MB-136, MB-96F, MB-96FL, MB-96N, MB57L, LC-195
Audio Accessories:	HM-163MC, HM-184, HM-184H, HM-222, HM-222H, HM-236, HM-238MC, HM-245T, SP16-BW, SP-26, SP-27, SP-28, SP-29, SP-40, HS-94, HS-95, HS-97, VS-3, VS-4MC, VS-5MC, AD-135
Antenna Type:	FA-SC25V, FA-SC26VS, FA-SC27VS, FA-SC28V, FA-SC29V, FA-SC55V, FA-SC56VS, FA-SC57VS, FA-SC61VC, FA-SC62VC, FA-SC63VC and Internal Antenna For Cellular/BT
Battery:	BP-302, BP-303, BP-305
Application Type:	Certification
FCC Rule Parts:	Part 2, 15, 22, 24, 27, 90
KDB Test Methodology:	KDB 447498 D01 v06, KDB 643646 D01 v01r03, KDB 941225 D05 v02r05, KDB 865664 D01 v01r04, KDB 865664 D02 v01r02
Industry Canada:	RSS-102 Issue 5, Safety Code 6
Max. Stand Alone SAR Value:	0.72 W/kg for Face; 2.76 for Body Reported
Max. Simultaneous SAR Value:	0.36 W/kg Reported; 0.40 For Ratio Limit
Separation Distance:	25 mm for Face; 0 mm for Body

This wireless mobile and/or portable device has been shown to be compliant for localized specific absorption rate (SAR) for controlled environment/occupational limits specified in ANSI/IEEE Std. C95.1-1992 and had been tested in accordance with the measurement procedures specified in IEEE 1528-2013 and IEC 62209-2:2010 (See test report).

I attest to the accuracy of the data. All measurements were performed by myself or were made under my supervision and are correct to the best of my knowledge and belief. I assume full responsibility for the completeness of these measurements and vouch for the qualifications of all persons taking them.

RF Exposure Lab, LLC certifies that no party to this application has been denied FCC benefits pursuant to Section 5301 of the Anti-Drug Abuse Act of 1988, 21 U.S.C. 853(a).

Jay M. Moulton
Vice President

ACCREDITED
Testing Cert. # 2387.01

Table of Contents

Comment/Revision	Date
Original Release	December 17, 2020
Revision A – Correct Accessories List	January 19, 2021
Revision B – Add three additional audio accessories	January 20, 2021
Revision C – Add two additional high gain antennas and new BT module	August 11, 2023
Revision D – Correct HVIN	March 29, 2024
Revision E – Add note to BT testing table indicating test reduction	May 1, 2024

Note: The latest version supersedes all previous versions listed in the above table. The latest version shall be used.

1. Introduction

This measurement report shows compliance of the ICOM, Inc. Model IP730D FCC ID: AFJ417900 with FCC Part 2, 1093, ET Docket 93-62 Rules for mobile and portable devices and IC Certificate: 202D-417900 with RSS102 Issue 5 & Safety Code 6. The FCC/ISED have adopted the guidelines for evaluating the environmental effects of radio frequency radiation to protect the public and workers from the potential hazards of RF emissions due to FCC/ISED regulated portable devices. [1], [6]

The test results recorded herein are based on a single type test of ICOM, Inc. Model IP730D and therefore apply only to the tested sample.

The test procedures and limits, as described in ANSI C95.1 – 1999 Standard for Safety Levels with Respect to Human Exposure to Radio Frequency Electromagnetic Fields, 3 kHz to 300 GHz [2], ANSI C95.3 – 2002 Recommended Practice for the Measurement of Potentially Hazardous Electromagnetic Fields [3], IEEE Std.1528 – 2003 Recommended Practice [4], and Industry Canada Safety Code 6 Limits of Human Exposure to Radiofrequency Electromagnetic Fields in the Frequency Range from 3kHz to 300 GHz were employed.

The following table indicates all the wireless technologies operating in the IP730D Push-To-Talk Handheld Radio for Occupational Use. The table also shows the tolerance for the power level for each mode.

Band	Technology	Rel.	Class	3GPP Nominal Power dBm	Setpoint Nominal Power dBm	Tolerance dBm	Lower Tolerance dBm	Upper Tolerance dBm
Band 2	LTE	8	3	23.0	23.0	±2.7	20.3	25.70
Band 4	LTE	8	3	23.0	23.0	±2.7	20.3	25.70
Band 12	LTE	8	3	23.0	23.0	±2.7	20.3	25.70
Band 2	WCDMA	8	3	24.0	24.0	+1.0/-3.0	21.0	25.00
Band 5	WCDMA	8	3	24.0	24.0	+1.0/-3.0	21.0	25.00
VHF Band	FM	N/A	N/A	N/A	N/A	N/A	N/A	36.99
Bluetooth	Bluetooth	N/A	N/A	N/A	N/A	N/A	N/A	11.1

SAR Definition [5]

Specific Absorption Rate is defined as the time derivative (rate) of the incremental energy (*dW*) absorbed by (dissipated in) an incremental mass (*dm*) contained in a volume element (*dV*) of a given density (ρ).

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

SAR is expressed in units of watts per kilogram (W/kg). *SAR* can be related to the electric field at a point by

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

where:

σ = conductivity of the tissue (S/m)

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

E = rms electric field strength (V/m)

2. SAR Measurement Setup

Robotic System

These measurements are performed using the DASY52 automated dosimetric assessment system. The DASY52 is made by Schmid & Partner Engineering AG (SPEAG) in Zurich, Switzerland and consists of high precision robotics system (Staubli), robot controller, Intel Core2 computer, near-field probe, probe alignment sensor, and the generic twin phantom containing the brain equivalent material. The robot is a six-axis industrial robot performing precise movements to position the probe to the location (points) of maximum electromagnetic field (EMF) (see Fig. 2.1).

System Hardware

A cell controller system contains the power supply, robot controller teach pendant (Joystick), and a remote control used to drive the robot motors. The PC consists of the HP Intel Core2 computer with Windows XP system and SAR Measurement Software DASY52, A/D interface card, monitor, mouse, and keyboard. The Staubli Robot is connected to the cell controller to allow software manipulation of the robot. A data acquisition electronic (DAE) circuit that performs the signal amplification, signal multiplexing, AD-conversion, offset measurements, mechanical surface detection, collision detection, etc. is connected to the Electro-optical coupler (EOC). The EOC performs the conversion from the optical into digital electric signal of the DAE and transfers data to the PC plug-in card.

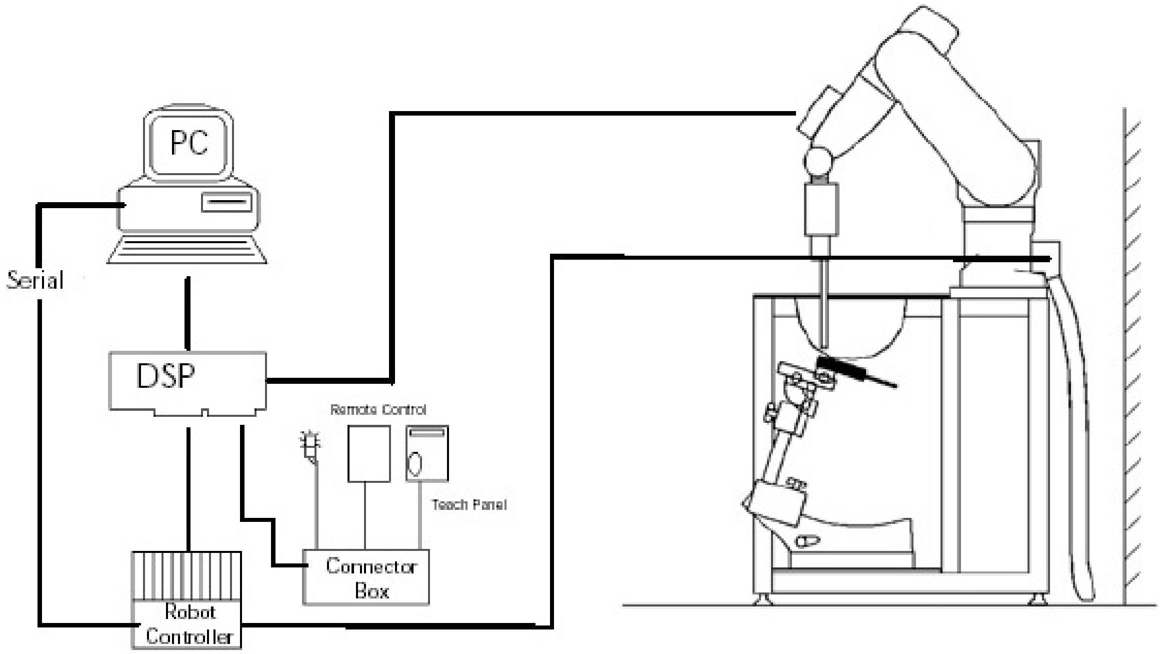


Figure 2.1 SAR Measurement System Setup

System Electronics

The DAE4 consists of a highly sensitive electrometer-grade preamplifier with auto-zeroing, a channel and gain-switching multiplexer, a fast 16 bit AD-converter and a command decoder and control logic unit. Transmission to the PC-card is accomplished through an optical downlink for data and status information and an optical uplink for commands and clock lines. The mechanical probe mounting device includes two different sensor systems for frontal and sidewise probe contacts. They are also used for mechanical surface detection and probe collision detection. The robot uses its own controller with a built in VME-bus computer. The system is described in detail in.

Probe Measurement System

The SAR measurements were conducted with the dosimetric probe EX3DV4, designed in the classical triangular configuration (see Fig. 2.2) and optimized for dosimetric evaluation. The probe is constructed using the thick film technique; with printed resistive lines on ceramic substrates. The probe is equipped with an optical multi fiber line ending at the front of the probe tip. (see Fig. 2.3) It is connected to the EOC box on the robot arm and provides an automatic detection of the phantom surface. Half of the fibers are connected to a pulsed infrared transmitter, the other half to a synchronized receiver. As the probe approaches the surface, the reflection from the surface produces a coupling from the transmitting to the receiving fibers. This reflection increases first during the approach, reaches maximum and then decreases. If the probe is flatly touching the surface, the coupling is zero. The distance of the coupling maximum to the surface is independent of the surface reflectivity and largely independent of the surface to probe angle. The DASY52 software reads the reflection during a software approach and looks for the maximum using a 2nd order fitting. The approach is stopped at reaching the maximum.

DAE System

Probe Specifications

Calibration: In air from 10 MHz to 6.0 GHz
In brain and muscle simulating tissue at Frequencies of 450 MHz, 835 MHz, 1750 MHz, 1900 MHz, 2450 MHz, 2600 MHz, 3500 MHz, 5200 MHz, 5300 MHz, 5600 MHz, 5800 MHz

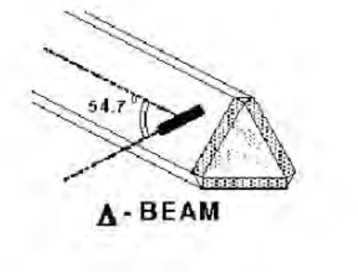


Figure 2.2 Triangular Probe Configurations

Frequency: 10 MHz to 6 GHz

Linearity: ±0.2dB (30 MHz to 6 GHz)

Dynamic: 10 mW/kg to 100 W/kg

Range: Linearity: ±0.2dB

Dimensions: Overall length: 330 mm

Tip length: 20 mm

Body diameter: 12 mm

Tip diameter: 2.5 mm

Distance from probe tip to sensor center: 1 mm

Figure 2.3 Probe Thick-Film Technique

Application: SAR Dosimetry Testing
Compliance tests of wireless device

Probe Calibration Process

Dosimetric Assessment Procedure

Each probe is calibrated according to a dosimetric assessment procedure described in with accuracy better than +/- 10%. The spherical isotropy was evaluated with the procedure described in and found to be better than +/-0.25dB. The sensitivity parameters (Norm X, Norm Y, Norm Z), the diode compression parameter (DCP) and the conversion factor (Conv F) of the probe is tested.

Free Space Assessment

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

Temperature Assessment *

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

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

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

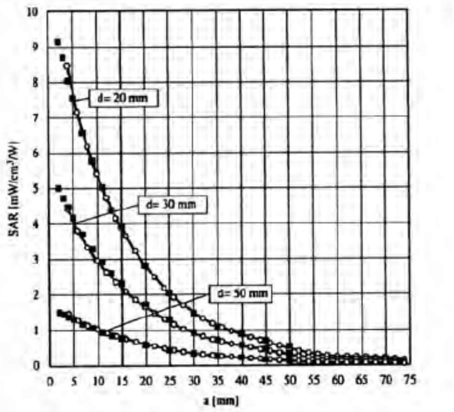
where:

Δt = exposure time (30 seconds),
C = heat capacity of tissue (brain or muscle),
ΔT = temperature increase due to RF exposure.

where:

σ = simulated tissue conductivity,
ρ = Tissue density (1.25 g/cm^3 for brain tissue)

SAR is proportional to ΔT / Δt , the initial rate of tissue heating, before thermal diffusion takes place.
Now it’s possible to quantify the electric field in the simulated tissue by equating the thermally derived SAR to the E- field;



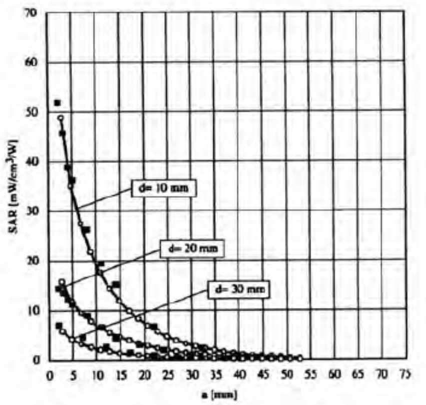


Figure 2.4 E-Field and Temperature Measurements at 900MHz

Figure 2.5 E-Field and Temperature Measurements at 1800MHz

Data Extrapolation

The DASY52 software automatically executes the following procedures to calculate the field units from the microvolt readings at the probe connector. The first step of the evaluation is a linearization of the filtered input signal to account for the compression characteristics of the detector diode. The compensation depends on the input signal, the diode type and the DC-transmission factor from the diode to the evaluation electronics. If the exciting field is pulsed, the crest factor of the signal must be known to correctly compensate for peak power. The formula for each channel can be given like below;

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

with V_i = compensated signal of channel i (i=x,y,z)
U_i = input signal of channel i (i=x,y,z)
cf = crest factor of exciting field (DASY parameter)
dcp_i = diode compression point (DASY parameter)

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

E-field probes:

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

with V_i = compensated signal of channel i (i = x,y,z)
$Norm_i$ = sensor sensitivity of channel i (i = x,y,z) μV/(V/m)^2 for E-field probes
ConvF = sensitivity of enhancement in solution
E_i = electric field strength of channel i in V/m

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

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

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

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

with SAR = local specific absorption rate in W/g
E_{tot} = total field strength in V/m
σ = conductivity in [mho/m] or [Siemens/m]
ρ = equivalent tissue density in g/cm^3

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

$$P_{pwe} = \frac{E_{tot}^2}{3770}$$

with P_{pwe} = equivalent power density of a plane wave in W/cm^2
E_{tot} = total electric field strength in V/m

Scanning procedure

- The DASY installation includes predefined files with recommended procedures for measurements and system check. They are read-only document files and destined as fully defined but unmeasured masks. All test positions (head or body-worn) are tested with the same configuration of test steps differing only in the grid definition for the different test positions.

- The „reference“ and „drift“ measurements are located at the beginning and end of the batch process. They measure the field drift at one single point in the liquid over the complete procedure. The indicated drift is mainly the variation of the DUT’s output power and should vary max. +/- 5 %.

- The highest integrated SAR value is the main concern in compliance test applications. These values can mostly be found at the inner surface of the phantom and cannot be measured directly due to the sensor offset in the probe. To extrapolate the surface values, the measurement distances to the surface must be known accurately. A distance error of 0.5mm could produce SAR errors of 6% at 1800 MHz. Using predefined locations for measurements is not accurate enough. Any shift of the phantom (e.g., slight deformations after filling it with liquid) would produce high uncertainties. For an automatic and accurate detection of the phantom surface, the DASY5 system uses the mechanical surface detection. The detection is always at touch, but the probe will move backward from the surface the indicated distance before starting the measurement.

- The „area scan“ measures the SAR above the DUT or verification dipole on a parallel plane to the surface. It is used to locate the approximate location of the peak SAR with 2D spline interpolation. The robot performs a stepped movement along one grid axis while the local electrical field strength is measured by the probe. The probe is touching the surface of the SAM during acquisition of measurement values. The scan uses different grid spacings for different frequency measurements. Standard grid spacing for head measurements in frequency ranges ≤ 2GHz is 15 mm in x - and y- dimension. For higher frequencies a finer resolution is needed, thus for the grid spacing is reduced according the following table:

Area scan grid spacing for different frequency ranges	
Frequency range	Grid spacing
≤ 2 GHz	≤ 15 mm
2 – 4 GHz	≤ 12 mm
4 – 6 GHz	≤ 10 mm

Grid spacing and orientation have no influence on the SAR result. For special applications where the standard scan method does not find the peak SAR within the grid, e.g. mobile phones with flip cover, the grid can be adapted in orientation. Results of this coarse scan are shown in annex B.

- A „zoom scan” measures the field in a volume around the 2D peak SAR value acquired in the previous „coarse“ scan. It uses a fine meshed grid where the robot moves the probe in steps along all the 3 axis (x,y and z-axis) starting at the bottom of the Phantom. The grid spacing for the cube measurement is varied according to the measured frequency range, the dimensions are given in the following table:

Zoom scan grid spacing and volume for different frequency ranges			
Frequency range	Grid spacing for x, y axis	Grid spacing for z axis	Minimum zoom scan volume
≤ 2 GHz	≤ 8 mm	≤ 5 mm	≥ 30 mm
2 – 3 GHz	≤ 5 mm	≤ 5 mm	≥ 28 mm
3 – 4 GHz	≤ 5 mm	≤ 4 mm	≥ 28 mm
4 – 5 GHz	≤ 4 mm	≤ 3 mm	≥ 25 mm
5 – 6 GHz	≤ 4 mm	≤ 2 mm	≥ 22 mm

DASY is also able to perform repeated zoom scans if more than 1 peak is found during area scan. In this document, the evaluated peak 1g and 10g averaged SAR values are shown in the 2D-graphics in annex B. Test results relevant for the specified standard (see section 3) are shown in table form in section 7.

Spatial Peak SAR Evaluation

The spatial peak SAR - value for 1 and 10 g is evaluated after the Cube measurements have been done. The basis of the evaluation are the SAR values measured at the points of the fine cube grid consisting of all points in the three directions x, y and z. The algorithm that finds the maximal averaged volume is separated into three different stages.

- The data between the dipole center of the probe and the surface of the phantom are extrapolated. This data cannot be measured since the center of the dipole is 1 to 2.7 mm away from the tip of the probe and the distance between the surface and the lowest measuring point is about 1 mm (see probe calibration sheet). The extrapolated data from a cube measurement can be visualized by selecting 'Graph Evaluated'.

- The maximum interpolated value is searched with a straight-forward algorithm. Around this maximum the SAR - values averaged over the spatial volumes (1g or 10 g) are computed using the 3d-spline interpolation algorithm. If the volume cannot be evaluated (i.e., if a part of the grid was cut off by the boundary of the measurement area) the evaluation will be started on the corners of the bottom plane of the cube.

- All neighbouring volumes are evaluated until no neighbouring volume with a higher average value is found.

Extrapolation

The extrapolation is based on a least square algorithm [W. Gander, Computermathematik, p.168-180]. Through the points in the first 3 cm along the z-axis, polynomials of order four are calculated. These polynomials are then used to evaluate the points between the surface and the probe tip. The points, calculated from the surface, have a distance of 1 mm from each other.

Interpolation

The interpolation of the points is done with a 3d-Spline. The 3d-Spline is composed of three one-dimensional splines with the "Not a knot"-condition [W. Gander, Computermathematik, p.141-150] (x, y and z -direction) [Numerical Recipes in C, Second Edition, p.123ff].

Volume Averaging

At First the size of the cube is calculated. Then the volume is integrated with the trapezoidal algorithm. 8000 points (20x20x20) are interpolated to calculate the average.

Advanced Extrapolation

DASY uses the advanced extrapolation option which is able to compensate boundary effects on E-field probes.

SAM PHANTOM

The SAM Twin Phantom V4.0 is constructed of a fiberglass shell integrated in a wooden table. The shape of the shell is based on data from an anatomical study designed to determine the maximum exposure in at least 90% of all users. It enables the dosimetric evaluation of left and right hand phone usage as well as body mounted usage at the flat phantom region. A cover prevents the evaporation of the liquid. Reference markings on the Phantom allow the complete setup of all predefined phantom positions and measurement grids by manually teaching three points in the robot. (see Fig. 2.6)

Phantom Specification

Phantom:	SAM Twin Phantom (V4.0)
Shell Material:	Vivac Composite
Thickness:	2.0 ± 0.2 mm

Figure 2.6 SAM Twin Phantom

Device Holder for Transmitters

In combination with the SAM Twin Phantom V4.0 the Mounting Device (see Fig. 2.7), enables the rotation of the mounted transmitter in spherical coordinates whereby the rotation point is the ear opening. The devices can be easily, accurately, and repeat ably be positioned according to the FCC, CENELEC, IEC and IEEE specifications. The device holder can be locked at different phantom locations (left head, right head, flat phantom).

Figure 2.7 Mounting Device

Note: A simulating human hand is not used due to the complex anatomical and geometrical structure of the hand that may produce infinite number of configurations. To produce the worst-case condition (the hand absorbs antenna output power), the hand is omitted during the tests.

3. Probe and Dipole Calibration

See Appendix D and E.

4. Phantom & Simulating Tissue Specifications

Head & Body Simulating Mixture Characterization

The head and body mixtures consist of the material based on the table listed below. The mixture is calibrated to obtain proper dielectric constant (permittivity) and conductivity of the desired tissue. Body tissue parameters that have not been specified in IEEE1528-2013 are derived from the issue dielectric parameters computed from the 4-Cole-Cole equations.

Table 4.1 Typical Composition of Ingredients for Tissue

Ingredients		Simulating Tissue				
		150 MHz Head	750 MHz Head	835 MHz Head	1750 MHz Head	1900 MHz Head
Mixing Percentage						
Water		Proprietary Purchased From Speag	Proprietary Purchased From Speag	Proprietary Purchased From Speag	Proprietary Purchased From Speag	Proprietary Purchased From Speag
Sugar						
Salt						
HEC						
Bactericide						
DGBE						
Dielectric Constant	Target	52.30	41.94	41.52	40.08	40.00
Conductivity (S/m)	Target	0.76	0.89	0.91	1.37	1.40

Ingredients		Simulating Tissue
		2450 MHz Head
Mixing Percentage		
Water		Proprietary Purchased From Speag
Sugar		
Salt		
HEC		
Bactericide		
DGBE		
Dielectric Constant	Target	39.20
Conductivity (S/m)	Target	1.80

5. ANSI/IEEE C95.1 – 1999 RF Exposure Limits [2]

Uncontrolled Environment

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

Controlled Environment

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

Table 5.1 Human Exposure Limits

	UNCONTROLLED ENVIRONMENT General Population (W/kg) or (mW/g)	CONTROLLED ENVIROMENT Professional Population (W/kg) or (mW/g)
SPATIAL PEAK SAR[1] Brain	1.60	8.00
SPATIAL AVERAGE SAR[2] Whole Body	0.08	0.40
SPATIAL PEAK SAR[3] Hands, Feet, Ankles, Wrists	4.00	20.00

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

[2] The Spatial Average value of the SAR averaged over the whole body.

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

6. Measurement Uncertainty

Measurement uncertainty table is not required per KDB 865664 D01 v01 section 2.8.2 page 12. SAR measurement uncertainty analysis is required in the SAR report only when the highest measured SAR in a frequency band is ≥ 1.5 W/kg for 1-g SAR. The equivalent ratio (1.5/1.6) should be applied to extremity and occupational exposure conditions. The highest reported value is less than 1.5 W/kg. Therefore, the measurement uncertainty table is not required.

7. System Validation

Tissue Verification

Table 7.1 Measured Tissue Parameters

		150 MHz Head		750 MHz Head		835 MHz Head	
Date(s)		Dec. 2, 2020		Dec. 11, 2020		Dec. 10, 2020	
Liquid Temperature (˚C)	20.0	Target	Measured	Target	Measured	Target	Measured
Dielectric Constant: ε		52.30	52.32	41.94	41.55	41.52	41.24
Conductivity: σ		0.76	0.78	0.89	0.91	0.91	0.95
		1750 MHz Head		1900 MHz Head		150 MHz Head	
Date(s)		Dec. 9, 2020		Dec. 8, 2020		Jul.5,2023	
Liquid Temperature (˚C)	20.0	Target	Measured	Target	Measured	Target	Measured
Dielectric Constant: ε		40.08	39.63	40.00	39.46	52.30	52.18
Conductivity: σ		1.37	1.42	1.40	1.46	0.76	0.78
		2450 MHz Head					
Date(s)		Jul. 5, 2023					
Liquid Temperature (˚C)	20.0	Target	Measured				
Dielectric Constant: ε		39.20	38.54				
Conductivity: σ		1.80	1.85				

See Appendix A for data printout.

Test System Verification

Prior to assessment, the system is verified to the ±10% of the specifications at the test frequency by using the system kit. Power is extrapolated to 1 watt. (Graphic Plots Attached)

Table 7.2 System Dipole Validation Target & Measured

	Test Frequency	Targeted SAR_{1g} (W/kg)	Measure SAR_{1g} (W/kg)	Tissue Used for Verification	Deviation (%)	Plot Number
02-Dec-2020	150 MHz	3.87	3.88	Head	+ 0.26	1
11-Dec-2020	750 MHz	8.23	8.26	Head	+ 0.36	2
10-Dec-2020	835 MHz	9.44	9.49	Head	+ 0.53	3
09-Dec-2020	1750 MHz	36.10	36.70	Head	+ 1.66	4
08-Dec-2020	1900 MHz	40.60	40.90	Head	+ 0.74	5
05-Jul-2023	150 MHz	3.82	3.90	Head	+ 2.09	6
05-Jul-2023	2450 MHz	54.10	54.80	Head	+ 1.29	7

See Appendix A for data plots.

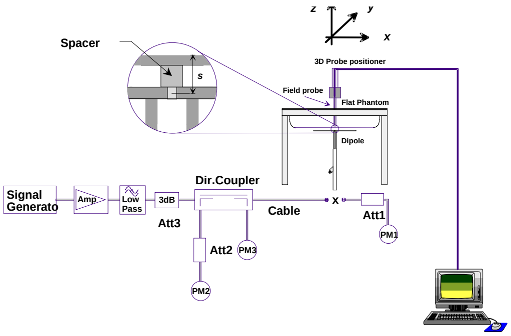


Figure 7.1 Dipole Validation Test Setup

8. LTE Document Checklist

1) Identify the operating frequency range of each LTE transmission band used by the device

LTE Operating Band	Uplink (transmit)	Downlink (Receive)	Duplex mode (FDD/TDD)
	Low - high	Low - high	
2	1850-1910	1930-1990	FDD
4	1710-1755	2110-2155	FDD
12	699-716	729-746	FDD

2) Identify the channel bandwidths used in each frequency band; 1.4, 3, 5, 10, 15, 20 MHz etc

LTE Band Class	Bandwidth (MHz)	Frequency or Freq. Band (MHz)
2	1.4, 3, 5, 10, 15, 20	1850-1910 MHz
4	1.4, 3, 5, 10, 15, 20	1710-1755 MHz
12	1.4, 3, 5, 10	699-716 MHz

3) Identify the high, middle and low (H, M, L) channel numbers and frequencies in each LTE frequency band

LTE Band Class	Bandwidth (MHz)	Frequency (MHz)/Channel #					
		Low		Mid		High	
2	1.4	1850.7	18607	1880.0	18900	1909.3	19193
2	3	1851.5	18615	1880.0	18900	1908.5	19185
2	5	1852.5	18625	1880.0	18900	1907.5	19175
2	10	1855.0	18650	1880.0	18900	1905.0	19150
2	15	1857.5	18675	1880.0	18900	1902.5	19125
2	20	1860.0	18700	1880.0	18900	1900.0	19100
4	1.4	1710.7	19957	1732.5	20175	1754.3	20393
4	3	1711.5	19965	1732.5	20175	1753.5	20385
4	5	1712.5	19975	1732.5	20175	1752.5	20375
4	10	1715.0	20000	1732.5	20175	1750.0	20350
4	15	1717.5	20025	1732.5	20175	1747.5	20325
4	20	1720.0	20050	1732.5	20175	1745.0	20300
12	1.4	699.7	23017	707.5	23095	715.3	23173
12	3	700.5	23025	707.5	23095	714.5	23165
12	5	701.5	23035	707.5	23095	713.5	23155
12	10	704.0	23060	707.5	23095	711.0	23130

4) Specify the UE category and uplink modulations used:
   - UE Category: 3
   - Uplink modulations: QPSK and 16QAM

5) Include descriptions of the LTE transmitter and antenna implementation; and also identify whether it is a standalone transmitter operating independently of other wireless transmitters in the device or sharing hardware components and/or antenna(s) with other transmitters etc

   The device has 3 antennas:
   - WWAN Main (Transmit and Receive) Antenna
   - VHF Antenna
   - BT Main Antenna

   Transmission relationship
   - All LTE/WCDMA transmission (TX) is limited to the WWAN antenna only
   - Simultaneous evaluation is conducted for the WWAN & BT and VHF & BT

6) Identify the LTE voice/data requirements in each operating mode and exposure condition with respect to head and body test configurations, antenna locations, handset flip-cover or slide positions, antenna diversity conditions etc

   The device is a voice/data device. Voice mode was tested in each operating mode and exposure condition in the head and body configuration. See test setup photos to see all configurations tested.

7) Identify if Maximum Power Reduction (MPR) is optional or mandatory, i.e. built-in by design:

   a) Only mandatory MPR may be considered during SAR testing, when the maximum output power is permanently limited by the MPR implemented within the UE; and only for the applicable RB (resource block) configurations specified in LTE standards

   MPR is mandatory, built-in by design on all production units. It was enabled during testing.

Modulation	Channel Bandwidth/transmission Bandwidth Configuration (RB)						MPR (dB)
	1.4 MHz	3.0 MHZ	5 MHz	10 MHz	15 MHz	20 MHz	
QPSK	> 5	> 4	> 8	> 12	> 16	> 18	≤ 1
16QAM	≤ 5	≤ 4	≤ 8	≤ 12	≤ 16	≤ 18	≤ 1
16QAM	> 5	> 4	> 8	> 12	> 16	> 18	≤ 2

   b) A-MPR (additional MPR) must be disabled
   c) A-MPR was disabled during testing.

8) Include the maximum average conducted output power measured on the required test channels for each channel bandwidth and UL modulation used in each frequency band:

   The maximum average conducted output power measured for the testing is listed on pages 42-57 of this report. The below table shows the factory set point with the allowable tolerance.

Band	Technology	Rel.	Class	3GPP Nominal Power dBm	Setpoint Nominal Power dBm	Tolerance dBm	Lower Tolerance dBm	Upper Tolerance dBm
Band 2	LTE	8	3	23.0	23.0	±2.7	20.3	25.70
Band 4	LTE	8	3	23.0	23.0	±2.7	20.3	25.70
Band 12	LTE	8	3	23.0	23.0	±2.7	20.3	25.70

9) Identify all other U.S. wireless operating modes (3G, Wi-Fi, WiMax, Bluetooth etc), device/exposure configurations (head and body, antenna and handset flip-cover or slide positions, antenna diversity conditions etc.) and frequency bands used for these modes

   Other wireless modes:
   The device contains a WiFi, BT and ISM transmitter as well. Simultaneous Tx is evaluated below.

Band	Technology	Rel.	Class	3GPP Nominal Power dBm	Setpoint Nominal Power dBm	Tolerance dBm	Lower Tolerance dBm	Upper Tolerance dBm
Band 2	WCDMA	8	3	24.0	24.0	+1.0/-3.0	21.0	25.00
Band 5	WCDMA	8	3	24.0	24.0	+1.0/-3.0	21.0	25.00
VHF Band	FM	N/A	N/A	N/A	N/A	N/A	N/A	36.99
Bluetooth	Bluetooth	N/A	N/A	N/A	N/A	N/A	N/A	11.1

10) Include the maximum average conducted output power measured for the other wireless modes and frequency bands.

    The maximum average conducted output power measured for the testing is listed on pages 36 & 39 of this report. The below table shows the factory set point with the allowable tolerance.

11) Identify the simultaneous transmission conditions for the voice and data configurations supported by all wireless modes, device configurations and frequency bands, for the head and body exposure conditions and device operating configurations (handset flip or cover positions, antenna diversity conditions etc.)

    The device is able to transmit simultaneously with the WWAN & BT and VHF & BT.

12) When power reduction is applied to certain wireless modes to satisfy SAR compliance for simultaneous transmission conditions, other equipment certification or operating requirements, include the maximum average conducted output power measured in each power reduction mode applicable to the simultaneous voice/data transmission configurations for such wireless configurations and frequency bands; and also include details of the power reduction implementation and measurement setup

    Power reduction is not required to satisfy SAR compliance.

13) Include descriptions of the test equipment, test software, built-in test firmware etc. required to support testing the device when power reduction is applied to one or more transmitters/antennas for simultaneous voice/data transmission

    Power reduction is not required to satisfy SAR compliance.

14) When appropriate, include a SAR test plan proposal with respect to the above

    Power reduction is not required to satisfy SAR compliance.

15) If applicable, include preliminary SAR test data and/or supporting information in laboratory testing inquiries to address specific issues and concerns or for requesting further test reduction considerations appropriate for the device; for example, simultaneous transmission configurations.

    Not applicable.

9. SAR Test Data Summary

See Measurement Result Data Pages

See Appendix B for SAR Test Data Plots.
See Appendix C for SAR Test Setup Photos.

Procedures Used To Establish Test Signal

The device was placed into simulated transmit mode using the manufacturer's test codes. Such test signals offer a consistent means for testing SAR and are recommended for evaluating SAR. When test modes are not available or inappropriate for testing a device, the actual transmission is activated through a base station simulator or similar equipment. See data pages for actual procedure used in measurement.

Device Test Condition

In order to verify that the device was tested at full power, conducted output power measurements were performed before and after each SAR measurement to confirm the output power unless otherwise noted. If a conducted power deviation of more than 5% occurred, the test was repeated. The power drift of each test is measured at the start of the test and again at the end of the test. The drift percentage is calculated by the formula ((end/start)-1)*100 and rounded to three decimal places. The drift percentage is calculated into the resultant SAR value on the data sheet for each test.

The IP730D was tested in the face position with the front of the device 25 mm away from the flat phantom. The IP730D was then tested in the body position with the body accessory (MB-133) in contact with the flat phantom. The audio accessory (HM-236) was used for all body measurements. All other audio accessories have been excluded per KDB 643646 D01 v01r03 section A2. All the audio accessories are 50 ohm connections to the radio and the standard audio accessory was used for all measurements next to the body per KDB 643646 D01 v01r03 section A2. For each of the tests conducted, the device was set to continuously transmit at a maximum output power on the channel specified in the test data. The SAR was scaled to 50% duty cycle per KDB 643646 D01 v01r03. All test reductions were reduced based on the reductions in KDB 643646 D01 v01r03. See pages 25-35 for a table of test reductions.

The LTE/WCDMA bands were all tested in the same configuration as the VHF band. The SAR limit used for the cellular bands was the general population. All test reductions are per KDB 447498 v06 and KDB941225 D01 v03r01 and D05 v02r05. See page 40 for a table of test reductions for WCDMA and pages 58-60 for LTE.

Simultaneous evaluation is shown on page 68.

The device was on a minimum of 10 cm of Styrofoam during each test.

Optional Accessories

Accessory	Description	Part Number
Battery A	Li-Ion, 3350 mAh	BP-303
Battery B	Li-Ion, 2010 mAh	BP-302
Battery C	5 AA Battery Case	BP-305
Antenna A	136 – 150 MHz	FA-SC25V
Antenna B	136 – 144 MHz	FA-SC-26VS
Antenna C	142 – 150 MHz	FA-SC27VS
Antenna D	148 – 162 MHz	FA-SC28V
Antenna E	160 – 174 MHz	FA-SC29V
Antenna F	150 – 174 MHz	FA-SC55V
Antenna G	150 – 162 MHz	FA-SC56VS
Antenna H	160 – 174 MHz	FA-SC57VS
Antenna I	136 – 174 MHz	FA-SC61VC
Antenna J	150 – 160 MHz	FA-SC62VC
Antenna K	155 – 165 MHz	FA-SC63VC
Audio Accessory A	Tie Clip Microphone	HM-163MC
Audio Accessory B	Speaker Microphone	HM-184
Audio Accessory C	Speaker Microphone	HM-222H
Audio Accessory D	Speaker Microphone	HM-236
Audio Accessory E	Tie Clip Microphone with Sub PTT Button	HM-238MC
Audio Accessory F	Speaker Microphone	HM-222
Audio Accessory G	Earphone Adapter	AD-135
Audio Accessory H	Earphone	SP-16BW
Audio Accessory I	Tube Earphone	SP-26
Audio Accessory J	Tube Earphone	SP-27
Audio Accessory K	Earhook Earphone	SP-28
Audio Accessory L	Earhook Earphone	SP-29
Audio Accessory M	Earphone	SP-40
Audio Accessory N	Earhook Type Headset	HS-94
Audio Accessory O	Neck Arm Type Headset	HS-95
Audio Accessory P	Headset with Throat Microphone	HS-97
Audio Accessory Q	Bluetooth Headset	VS-3
Audio Accessory R	PTT Switch Cable	VS-5MC
Audio Accessory S	PTT Switch Cable	VS-4MC
Audio Accessory T	External Speaker Microphone	HM-184H
Audio Accessory U	Earphone Adapter	AD-135
Audio Accessory V	External Speaker Microphone	HM-245T
Body Worn Accessory A	Belt Clip	MB-133
Body Worn Accessory B	Belt Clip	MB-136
Body Worn Accessory C	Belt Hanger	MB-96F
Body Worn Accessory D	Belt Hanger	MB-96FL
Body Worn Accessory E	Belt Hanger	MB-96N
Body Worn Accessory F	Shoulder Strap	MB-57L
Body Worn Accessory G	Carrying Case	LC-195

Audio Accessory D was chosen for the testing body worn radio configuration. Audio Accessory A-C and E-V are excluded per KDB 643646 D01 v01r01 page 10 1) A). The following tables shows all combinations with the tested combination marked yes.

Radio Face Test

Antenna A	Antenna B	Antenna C	Antenna D	Antenna E	Antenna F
Battery A	Battery A	Battery A	Battery A	Battery A	Battery A
No	No	No	No	No	No
Antenna G	**Antenna H**	**Antenna I**	**Antenna J**	**Antenna K**	
Battery A	Battery A	Battery A	Battery A	Battery A	
No	No	Yes	No	No	

All other antennas are excluded as they are fully within the same frequency of Antenna I per KDB643646 D01 v01r01.

Radio Body Test

Audio Accessory	**Antenna A**					
	Audio Acc’y A	Audio Acc’y B	Audio Acc’y C	Audio Acc’y D	Audio Acc’y E	Audio Acc’y F
	Battery A	Battery A	Battery A	Battery A	Battery A	Battery A
Body Worn A	No	No	No	No	No	No
Body Worn B	No	No	No	No	No	No
Body Worn C	No	No	No	No	No	No
Body Worn D	No	No	No	No	No	No
Body Worn E	No	No	No	No	No	No
Body Worn F	No	No	No	No	No	No
Body Worn G	No	No	No	No	No	No

Radio Body Test

Audio Accessory	**Antenna A**					
	Audio Acc’y G	Audio Acc’y H	Audio Acc’y I	Audio Acc’y J	Audio Acc’y K	Audio Acc’y L
	Battery A	Battery A	Battery A	Battery A	Battery A	Battery A
Body Worn A	No	No	No	No	No	No
Body Worn B	No	No	No	No	No	No
Body Worn C	No	No	No	No	No	No
Body Worn D	No	No	No	No	No	No
Body Worn E	No	No	No	No	No	No
Body Worn F	No	No	No	No	No	No
Body Worn G	No	No	No	No	No	No

Radio Body Test

Audio Accessory	**Antenna A**					
	Audio Acc’y M	Audio Acc’y N	Audio Acc’y O	Audio Acc’y P	Audio Acc’y Q	Audio Acc’y R
	Battery A	Battery A	Battery A	Battery A	Battery A	Battery A
Body Worn A	No	No	No	No	No	No
Body Worn B	No	No	No	No	No	No
Body Worn C	No	No	No	No	No	No
Body Worn D	No	No	No	No	No	No
Body Worn E	No	No	No	No	No	No
Body Worn F	No	No	No	No	No	No
Body Worn G	No	No	No	No	No	No

Radio Body Test

Audio Accessory	**Antenna A**			
	Audio Acc’y S	Audio Acc’y T	Audio Acc’y U	Audio Acc’y V
	Battery A	Battery A	Battery A	Battery A
Body Worn A	No	No	No	No
Body Worn B	No	No	No	No
Body Worn C	No	No	No	No
Body Worn D	No	No	No	No
Body Worn E	No	No	No	No
Body Worn F	No	No	No	No
Body Worn G	No	No	No	No

Radio Body Test

Audio Accessory	**Antenna B**					
	Audio Acc'y A	Audio Acc'y B	Audio Acc'y C	Audio Acc'y D	Audio Acc'y E	Audio Acc'y F
	Battery A	Battery A	Battery A	Battery A	Battery A	Battery A
Body Worn A	No	No	No	No	No	No
Body Worn B	No	No	No	No	No	No
Body Worn C	No	No	No	No	No	No
Body Worn D	No	No	No	No	No	No
Body Worn E	No	No	No	No	No	No
Body Worn F	No	No	No	No	No	No
Body Worn G	No	No	No	No	No	No

Radio Body Test

Audio Accessory	**Antenna B**					
	Audio Acc'y G	Audio Acc'y H	Audio Acc'y I	Audio Acc'y J	Audio Acc'y K	Audio Acc'y L
	Battery A	Battery A	Battery A	Battery A	Battery A	Battery A
Body Worn A	No	No	No	No	No	No
Body Worn B	No	No	No	No	No	No
Body Worn C	No	No	No	No	No	No
Body Worn D	No	No	No	No	No	No
Body Worn E	No	No	No	No	No	No
Body Worn F	No	No	No	No	No	No
Body Worn G	No	No	No	No	No	No

Radio Body Test

Audio Accessory	**Antenna B**					
	Audio Acc'y M	Audio Acc'y N	Audio Acc'y O	Audio Acc'y P	Audio Acc'y Q	Audio Acc'y R
	Battery A	Battery A	Battery A	Battery A	Battery A	Battery A
Body Worn A	No	No	No	No	No	No
Body Worn B	No	No	No	No	No	No
Body Worn C	No	No	No	No	No	No
Body Worn D	No	No	No	No	No	No
Body Worn E	No	No	No	No	No	No
Body Worn F	No	No	No	No	No	No
Body Worn G	No	No	No	No	No	No

Radio Body Test

Audio Accessory	**Antenna B**			
	Audio Acc'y S	Audio Acc'y T	Audio Acc'y U	Audio Acc'y V
	Battery A	Battery A	Battery A	Battery A
Body Worn A	No	No	No	No
Body Worn B	No	No	No	No
Body Worn C	No	No	No	No
Body Worn D	No	No	No	No
Body Worn E	No	No	No	No
Body Worn F	No	No	No	No
Body Worn G	No	No	No	No

Radio Body Test

Audio Accessory	Antenna C					
	Audio Acc'y A	Audio Acc'y B	Audio Acc'y C	Audio Acc'y D	Audio Acc'y E	Audio Acc'y F
	Battery A	Battery A	Battery A	Battery A	Battery A	Battery A
Body Worn A	No	No	No	No	No	No
Body Worn B	No	No	No	No	No	No
Body Worn C	No	No	No	No	No	No
Body Worn D	No	No	No	No	No	No
Body Worn E	No	No	No	No	No	No
Body Worn F	No	No	No	No	No	No
Body Worn G	No	No	No	No	No	No

Radio Body Test

Audio Accessory	Antenna C					
	Audio Acc'y G	Audio Acc'y H	Audio Acc'y I	Audio Acc'y J	Audio Acc'y K	Audio Acc'y L
	Battery A	Battery A	Battery A	Battery A	Battery A	Battery A
Body Worn A	No	No	No	No	No	No
Body Worn B	No	No	No	No	No	No
Body Worn C	No	No	No	No	No	No
Body Worn D	No	No	No	No	No	No
Body Worn E	No	No	No	No	No	No
Body Worn F	No	No	No	No	No	No
Body Worn G	No	No	No	No	No	No

Radio Body Test

Audio Accessory	Antenna C					
	Audio Acc'y M	Audio Acc'y N	Audio Acc'y O	Audio Acc'y P	Audio Acc'y Q	Audio Acc'y R
	Battery A	Battery A	Battery A	Battery A	Battery A	Battery A
Body Worn A	No	No	No	No	No	No
Body Worn B	No	No	No	No	No	No
Body Worn C	No	No	No	No	No	No
Body Worn D	No	No	No	No	No	No
Body Worn E	No	No	No	No	No	No
Body Worn F	No	No	No	No	No	No
Body Worn G	No	No	No	No	No	No

Radio Body Test

Audio Accessory	Antenna C			
	Audio Acc'y S	Audio Acc'y T	Audio Acc'y U	Audio Acc'y V
	Battery A	Battery A	Battery A	Battery A
Body Worn A	No	No	No	No
Body Worn B	No	No	No	No
Body Worn C	No	No	No	No
Body Worn D	No	No	No	No
Body Worn E	No	No	No	No
Body Worn F	No	No	No	No
Body Worn G	No	No	No	No

Radio Body Test

Audio Accessory	**Antenna D**					
	Audio Acc’y A	Audio Acc’y B	Audio Acc’y C	Audio Acc’y D	Audio Acc’y E	Audio Acc’y F
	Battery A	Battery A	Battery A	Battery A	Battery A	Battery A
Body Worn A	No	No	No	No	No	No
Body Worn B	No	No	No	No	No	No
Body Worn C	No	No	No	No	No	No
Body Worn D	No	No	No	No	No	No
Body Worn E	No	No	No	No	No	No
Body Worn F	No	No	No	No	No	No
Body Worn G	No	No	No	No	No	No

Radio Body Test

Audio Accessory	**Antenna D**					
	Audio Acc’y G	Audio Acc’y H	Audio Acc’y I	Audio Acc’y J	Audio Acc’y K	Audio Acc’y L
	Battery A	Battery A	Battery A	Battery A	Battery A	Battery A
Body Worn A	No	No	No	No	No	No
Body Worn B	No	No	No	No	No	No
Body Worn C	No	No	No	No	No	No
Body Worn D	No	No	No	No	No	No
Body Worn E	No	No	No	No	No	No
Body Worn F	No	No	No	No	No	No
Body Worn G	No	No	No	No	No	No

Radio Body Test

Audio Accessory	**Antenna D**					
	Audio Acc’y M	Audio Acc’y N	Audio Acc’y O	Audio Acc’y P	Audio Acc’y Q	Audio Acc’y R
	Battery A	Battery A	Battery A	Battery A	Battery A	Battery A
Body Worn A	No	No	No	No	No	No
Body Worn B	No	No	No	No	No	No
Body Worn C	No	No	No	No	No	No
Body Worn D	No	No	No	No	No	No
Body Worn E	No	No	No	No	No	No
Body Worn F	No	No	No	No	No	No
Body Worn G	No	No	No	No	No	No

Radio Body Test

Audio Accessory	**Antenna D**			
	Audio Acc’y S	Audio Acc’y T	Audio Acc’y U	Audio Acc’y V
	Battery A	Battery A	Battery A	Battery A
Body Worn A	No	No	No	No
Body Worn B	No	No	No	No
Body Worn C	No	No	No	No
Body Worn D	No	No	No	No
Body Worn E	No	No	No	No
Body Worn F	No	No	No	No
Body Worn G	No	No	No	No

Radio Body Test

Audio Accessory	Antenna E					
	Audio Acc'y A	Audio Acc'y B	Audio Acc'y C	Audio Acc'y D	Audio Acc'y E	Audio Acc'y F
	Battery A	Battery A	Battery A	Battery A	Battery A	Battery A
Body Worn A	No	No	No	No	No	No
Body Worn B	No	No	No	No	No	No
Body Worn C	No	No	No	No	No	No
Body Worn D	No	No	No	No	No	No
Body Worn E	No	No	No	No	No	No
Body Worn F	No	No	No	No	No	No
Body Worn G	No	No	No	No	No	No

Radio Body Test

Audio Accessory	Antenna E					
	Audio Acc'y G	Audio Acc'y H	Audio Acc'y I	Audio Acc'y J	Audio Acc'y K	Audio Acc'y L
	Battery A	Battery A	Battery A	Battery A	Battery A	Battery A
Body Worn A	No	No	No	No	No	No
Body Worn B	No	No	No	No	No	No
Body Worn C	No	No	No	No	No	No
Body Worn D	No	No	No	No	No	No
Body Worn E	No	No	No	No	No	No
Body Worn F	No	No	No	No	No	No
Body Worn G	No	No	No	No	No	No

Radio Body Test

Audio Accessory	Antenna E					
	Audio Acc'y M	Audio Acc'y N	Audio Acc'y O	Audio Acc'y P	Audio Acc'y Q	Audio Acc'y R
	Battery A	Battery A	Battery A	Battery A	Battery A	Battery A
Body Worn A	No	No	No	No	No	No
Body Worn B	No	No	No	No	No	No
Body Worn C	No	No	No	No	No	No
Body Worn D	No	No	No	No	No	No
Body Worn E	No	No	No	No	No	No
Body Worn F	No	No	No	No	No	No
Body Worn G	No	No	No	No	No	No

Radio Body Test

Audio Accessory	Antenna E			
	Audio Acc'y S	Audio Acc'y T	Audio Acc'y U	Audio Acc'y V
	Battery A	Battery A	Battery A	Battery A
Body Worn A	No	No	No	No
Body Worn B	No	No	No	No
Body Worn C	No	No	No	No
Body Worn D	No	No	No	No
Body Worn E	No	No	No	No
Body Worn F	No	No	No	No
Body Worn G	No	No	No	No

Radio Body Test

Audio Accessory	Antenna F					
	Audio Acc'y A	Audio Acc'y B	Audio Acc'y C	Audio Acc'y D	Audio Acc'y E	Audio Acc'y F
	Battery A	Battery A	Battery A	Battery A	Battery A	Battery A
Body Worn A	No	No	No	No	No	No
Body Worn B	No	No	No	No	No	No
Body Worn C	No	No	No	No	No	No
Body Worn D	No	No	No	No	No	No
Body Worn E	No	No	No	No	No	No
Body Worn F	No	No	No	No	No	No
Body Worn G	No	No	No	No	No	No

Radio Body Test

Audio Accessory	Antenna F					
	Audio Acc'y G	Audio Acc'y H	Audio Acc'y I	Audio Acc'y J	Audio Acc'y K	Audio Acc'y L
	Battery A	Battery A	Battery A	Battery A	Battery A	Battery A
Body Worn A	No	No	No	No	No	No
Body Worn B	No	No	No	No	No	No
Body Worn C	No	No	No	No	No	No
Body Worn D	No	No	No	No	No	No
Body Worn E	No	No	No	No	No	No
Body Worn F	No	No	No	No	No	No
Body Worn G	No	No	No	No	No	No

Radio Body Test

Audio Accessory	Antenna F					
	Audio Acc'y M	Audio Acc'y N	Audio Acc'y O	Audio Acc'y P	Audio Acc'y Q	Audio Acc'y R
	Battery A	Battery A	Battery A	Battery A	Battery A	Battery A
Body Worn A	No	No	No	No	No	No
Body Worn B	No	No	No	No	No	No
Body Worn C	No	No	No	No	No	No
Body Worn D	No	No	No	No	No	No
Body Worn E	No	No	No	No	No	No
Body Worn F	No	No	No	No	No	No
Body Worn G	No	No	No	No	No	No

Radio Body Test

Audio Accessory	Antenna F			
	Audio Acc'y S	Audio Acc'y T	Audio Acc'y U	Audio Acc'y V
	Battery A	Battery A	Battery A	Battery A
Body Worn A	No	No	No	No
Body Worn B	No	No	No	No
Body Worn C	No	No	No	No
Body Worn D	No	No	No	No
Body Worn E	No	No	No	No
Body Worn F	No	No	No	No
Body Worn G	No	No	No	No

Radio Body Test

Audio Accessory	Antenna G					
	Audio Acc’y A	Audio Acc’y B	Audio Acc’y C	Audio Acc’y D	Audio Acc’y E	Audio Acc’y F
	Battery A	Battery A	Battery A	Battery A	Battery A	Battery A
Body Worn A	No	No	No	No	No	No
Body Worn B	No	No	No	No	No	No
Body Worn C	No	No	No	No	No	No
Body Worn D	No	No	No	No	No	No
Body Worn E	No	No	No	No	No	No
Body Worn F	No	No	No	No	No	No
Body Worn G	No	No	No	No	No	No

Radio Body Test

Audio Accessory	Antenna G					
	Audio Acc’y G	Audio Acc’y H	Audio Acc’y I	Audio Acc’y J	Audio Acc’y K	Audio Acc’y L
	Battery A	Battery A	Battery A	Battery A	Battery A	Battery A
Body Worn A	No	No	No	No	No	No
Body Worn B	No	No	No	No	No	No
Body Worn C	No	No	No	No	No	No
Body Worn D	No	No	No	No	No	No
Body Worn E	No	No	No	No	No	No
Body Worn F	No	No	No	No	No	No
Body Worn G	No	No	No	No	No	No

Radio Body Test

Audio Accessory	Antenna G					
	Audio Acc’y M	Audio Acc’y N	Audio Acc’y O	Audio Acc’y P	Audio Acc’y Q	Audio Acc’y R
	Battery A	Battery A	Battery A	Battery A	Battery A	Battery A
Body Worn A	No	No	No	No	No	No
Body Worn B	No	No	No	No	No	No
Body Worn C	No	No	No	No	No	No
Body Worn D	No	No	No	No	No	No
Body Worn E	No	No	No	No	No	No
Body Worn F	No	No	No	No	No	No
Body Worn G	No	No	No	No	No	No

Radio Body Test

Audio Accessory	Antenna G			
	Audio Acc’y S	Audio Acc’y T	Audio Acc’y U	Audio Acc’y V
	Battery A	Battery A	Battery A	Battery A
Body Worn A	No	No	No	No
Body Worn B	No	No	No	No
Body Worn C	No	No	No	No
Body Worn D	No	No	No	No
Body Worn E	No	No	No	No
Body Worn F	No	No	No	No
Body Worn G	No	No	No	No

Radio Body Test

Audio Accessory	**Antenna H**					
	Audio Acc'y A	Audio Acc'y B	Audio Acc'y C	Audio Acc'y D	Audio Acc'y E	Audio Acc'y F
	Battery A	Battery A	Battery A	Battery A	Battery A	Battery A
Body Worn A	No	No	No	No	No	No
Body Worn B	No	No	No	No	No	No
Body Worn C	No	No	No	No	No	No
Body Worn D	No	No	No	No	No	No
Body Worn E	No	No	No	No	No	No
Body Worn F	No	No	No	No	No	No
Body Worn G	No	No	No	No	No	No

Radio Body Test

Audio Accessory	**Antenna H**					
	Audio Acc'y G	Audio Acc'y H	Audio Acc'y I	Audio Acc'y J	Audio Acc'y K	Audio Acc'y L
	Battery A	Battery A	Battery A	Battery A	Battery A	Battery A
Body Worn A	No	No	No	No	No	No
Body Worn B	No	No	No	No	No	No
Body Worn C	No	No	No	No	No	No
Body Worn D	No	No	No	No	No	No
Body Worn E	No	No	No	No	No	No
Body Worn F	No	No	No	No	No	No
Body Worn G	No	No	No	No	No	No

Radio Body Test

Audio Accessory	**Antenna H**					
	Audio Acc'y M	Audio Acc'y N	Audio Acc'y O	Audio Acc'y P	Audio Acc'y Q	Audio Acc'y R
	Battery A	Battery A	Battery A	Battery A	Battery A	Battery A
Body Worn A	No	No	No	No	No	No
Body Worn B	No	No	No	No	No	No
Body Worn C	No	No	No	No	No	No
Body Worn D	No	No	No	No	No	No
Body Worn E	No	No	No	No	No	No
Body Worn F	No	No	No	No	No	No
Body Worn G	No	No	No	No	No	No

Radio Body Test

Audio Accessory	**Antenna H**			
	Audio Acc'y S	Audio Acc'y T	Audio Acc'y U	Audio Acc'y V
	Battery A	Battery A	Battery A	Battery A
Body Worn A	No	No	No	No
Body Worn B	No	No	No	No
Body Worn C	No	No	No	No
Body Worn D	No	No	No	No
Body Worn E	No	No	No	No
Body Worn F	No	No	No	No
Body Worn G	No	No	No	No

Radio Body Test

Audio Accessory	Antenna I					
	Audio Acc'y A	Audio Acc'y B	Audio Acc'y C	Audio Acc'y D	Audio Acc'y E	Audio Acc'y F
	Battery A	Battery A	Battery A	Battery A	Battery A	Battery A
Body Worn A	No	No	No	Yes	No	No
Body Worn B	No	No	No	No	No	No
Body Worn C	No	No	No	No	No	No
Body Worn D	No	No	No	No	No	No
Body Worn E	No	No	No	No	No	No
Body Worn F	No	No	No	No	No	No
Body Worn G	No	No	No	No	No	No

Radio Body Test

Audio Accessory	Antenna I					
	Audio Acc'y G	Audio Acc'y H	Audio Acc'y I	Audio Acc'y J	Audio Acc'y K	Audio Acc'y L
	Battery A	Battery A	Battery A	Battery A	Battery A	Battery A
Body Worn A	No	No	No	No	No	No
Body Worn B	No	No	No	No	No	No
Body Worn C	No	No	No	No	No	No
Body Worn D	No	No	No	No	No	No
Body Worn E	No	No	No	No	No	No
Body Worn F	No	No	No	No	No	No
Body Worn G	No	No	No	No	No	No

Radio Body Test

Audio Accessory	Antenna I					
	Audio Acc'y M	Audio Acc'y N	Audio Acc'y O	Audio Acc'y P	Audio Acc'y Q	Audio Acc'y R
	Battery A	Battery A	Battery A	Battery A	Battery A	Battery A
Body Worn A	No	No	No	No	No	No
Body Worn B	No	No	No	No	No	No
Body Worn C	No	No	No	No	No	No
Body Worn D	No	No	No	No	No	No
Body Worn E	No	No	No	No	No	No
Body Worn F	No	No	No	No	No	No
Body Worn G	No	No	No	No	No	No

Radio Body Test

Audio Accessory	Antenna I			
	Audio Acc'y S	Audio Acc'y T	Audio Acc'y U	Audio Acc'y V
	Battery A	Battery A	Battery A	Battery A
Body Worn A	No	No	No	No
Body Worn B	No	No	No	No
Body Worn C	No	No	No	No
Body Worn D	No	No	No	No
Body Worn E	No	No	No	No
Body Worn F	No	No	No	No
Body Worn G	No	No	No	No

Radio Body Test

Audio Accessory	Antenna J					
	Audio Acc’y A	Audio Acc’y B	Audio Acc’y C	Audio Acc’y D	Audio Acc’y E	Audio Acc’y F
	Battery A	Battery A	Battery A	Battery A	Battery A	Battery A
Body Worn A	No	No	No	Yes	No	No
Body Worn B	No	No	No	No	No	No
Body Worn C	No	No	No	No	No	No
Body Worn D	No	No	No	No	No	No
Body Worn E	No	No	No	No	No	No
Body Worn F	No	No	No	No	No	No
Body Worn G	No	No	No	No	No	No

Radio Body Test

Audio Accessory	Antenna J					
	Audio Acc’y G	Audio Acc’y H	Audio Acc’y I	Audio Acc’y J	Audio Acc’y K	Audio Acc’y L
	Battery A	Battery A	Battery A	Battery A	Battery A	Battery A
Body Worn A	No	No	No	No	No	No
Body Worn B	No	No	No	No	No	No
Body Worn C	No	No	No	No	No	No
Body Worn D	No	No	No	No	No	No
Body Worn E	No	No	No	No	No	No
Body Worn F	No	No	No	No	No	No
Body Worn G	No	No	No	No	No	No

Radio Body Test

Audio Accessory	Antenna J					
	Audio Acc’y M	Audio Acc’y N	Audio Acc’y O	Audio Acc’y P	Audio Acc’y Q	Audio Acc’y R
	Battery A	Battery A	Battery A	Battery A	Battery A	Battery A
Body Worn A	No	No	No	No	No	No
Body Worn B	No	No	No	No	No	No
Body Worn C	No	No	No	No	No	No
Body Worn D	No	No	No	No	No	No
Body Worn E	No	No	No	No	No	No
Body Worn F	No	No	No	No	No	No
Body Worn G	No	No	No	No	No	No

Radio Body Test

Audio Accessory	Antenna J			
	Audio Acc’y S	Audio Acc’y T	Audio Acc’y U	Audio Acc’y V
	Battery A	Battery A	Battery A	Battery A
Body Worn A	No	No	No	No
Body Worn B	No	No	No	No
Body Worn C	No	No	No	No
Body Worn D	No	No	No	No
Body Worn E	No	No	No	No
Body Worn F	No	No	No	No
Body Worn G	No	No	No	No

Radio Body Test

Audio Accessory	**Antenna K**					
	Audio Acc'y A	Audio Acc'y B	Audio Acc'y C	Audio Acc'y D	Audio Acc'y E	Audio Acc'y F
	Battery A	Battery A	Battery A	Battery A	Battery A	Battery A
Body Worn A	No	No	No	Yes	No	No
Body Worn B	No	No	No	No	No	No
Body Worn C	No	No	No	No	No	No
Body Worn D	No	No	No	No	No	No
Body Worn E	No	No	No	No	No	No
Body Worn F	No	No	No	No	No	No
Body Worn G	No	No	No	No	No	No

Radio Body Test

Audio Accessory	**Antenna K**					
	Audio Acc'y G	Audio Acc'y H	Audio Acc'y I	Audio Acc'y J	Audio Acc'y K	Audio Acc'y L
	Battery A	Battery A	Battery A	Battery A	Battery A	Battery A
Body Worn A	No	No	No	No	No	No
Body Worn B	No	No	No	No	No	No
Body Worn C	No	No	No	No	No	No
Body Worn D	No	No	No	No	No	No
Body Worn E	No	No	No	No	No	No
Body Worn F	No	No	No	No	No	No
Body Worn G	No	No	No	No	No	No

Radio Body Test

Audio Accessory	**Antenna K**					
	Audio Acc'y M	Audio Acc'y N	Audio Acc'y O	Audio Acc'y P	Audio Acc'y Q	Audio Acc'y R
	Battery A	Battery A	Battery A	Battery A	Battery A	Battery A
Body Worn A	No	No	No	No	No	No
Body Worn B	No	No	No	No	No	No
Body Worn C	No	No	No	No	No	No
Body Worn D	No	No	No	No	No	No
Body Worn E	No	No	No	No	No	No
Body Worn F	No	No	No	No	No	No
Body Worn G	No	No	No	No	No	No

Radio Body Test

Audio Accessory	**Antenna K**			
	Audio Acc'y S	Audio Acc'y T	Audio Acc'y U	Audio Acc'y V
	Battery A	Battery A	Battery A	Battery A
Body Worn A	No	No	No	No
Body Worn B	No	No	No	No
Body Worn C	No	No	No	No
Body Worn D	No	No	No	No
Body Worn E	No	No	No	No
Body Worn F	No	No	No	No
Body Worn G	No	No	No	No

VHF		
Freq	**Channel**	**Power (dB)**
136	1	35.59
145	2	35.63
155	3	35.66
164	4	35.70
174	5	35.72
150	6	35.62
160	7	35.41
165	8	35.51

Per KDB 447498 D01 v05r01 page 7 section 6) pages 7-8, the number of channels required to be tested is as follows:

F_{high} = 174 MHz
F_c = 155 MHz
F_{low} = 136 MHz

$N_c = \text{Round }\{[100(f_{high} – f_{low})/f_c]^{0.5} \text{ x } (f_c/100)^{0.2}\} = \text{Round }\{[100(174\text{-}136)/155]^{0.5} \text{ x } (155/100)^{0.2}\} = 5$

Therefore, for the frequency band from 136 MHz to 174 MHz, 5 channels are required for testing.

Head SAR – In Front of Face (Handset)			
Antenna	Channel Freq. (MHz)	Battery A[1]	
		Measured Power (dBm)	Reported SAR (W/kg)
I[1]	136	35.59	0.30
	145	35.63	0.34
	155	35.66	0.43
	164	35.70	0.32
	174	35.72	0.35
J[1]	150	35.62	[2]
	155	35.66	0.46
	160	35.41	[2]
K[1]	155	35.66	0.61
	160	35.41	0.72
	165	35.51	0.64

[1] See Accessory table on page 24 of this report.
[2] Measurement was reduced per KDB 643646 D01 v01r01 page 2 section 1) A) I) a).

Body SAR (Handset)			
Antenna (MHz)	Channel Freq. (MHz)	Battery A[1]	
		Audio Accessory D[1]	
		Body Worn A[1]	
		Measured Power (W)	Reported SAR (W/kg)
I[1]	136	35.59	[2]
	145	35.63	[2]
	155	35.66	0.19
	164	35.70	[2]
	174	35.72	[2]
J[1]	150	35.62	[2]
	155	35.66	1.95
	160	35.41	[2]
K[1]	155	35.66	2.43
	160	35.41	2.76
	165	35.51	2.49

[1] See Accessory table on page 24 of this report.
[2] Measurement was reduced per KDB 643646 D01 v01r01 page 5 section 1) A) I) a).

10. 3G Measurement Procedures

Power measurements were performed using a base station simulator under average power.

10.1 Procedures Used to Establish RF Signal for SAR

The device was placed into a simulated call using a base station simulator in a screen room. Such test signals offer a consistent means for testing SAR and recommended for evaluating SAR. 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.

10.2 SAR Measurement Conditions for WCDMA/HSDPA/HSUPA

Configure the call box 8960 to support all WCDMA tests in respect to the 3GPP 34.121 (listed in Table below). Measure the power at Ch4132, 4182 and 4233 for US cell; Ch9262, 9400 and 9538 for US PCS band.

For Rel99

- Set a Test Mode 1 loop back with a 12.2kbps Reference Measurement Channel (RMC).
- Set and send continuously Up power control commands to the device
- Measure the power at the device antenna connector using the power meter with average detector.

For HSDPA Rel 6

- Establish a Test Mode 1 look back with both 1 12.2kbps RMC channel and a H-Set1 Fixed Reference Channel (FRC). With the 8960 this is accomplished by setting the signal Channel Coding to “Fixed Reference Channel” and configuring for HSET-1 QKSP.
- Set beta values and HSDPA settings for HSDPA Subtest1 according to Table below.
- Send continuously Up power control commands to the device
- Measure the power at the device antenna connector using the power meter with modulated average detector.
- Repeat the measurement for the HSDPA Subtest2, 3 and 4 as given in Table below.

For HSUPA Rel 6

- Use UL RMC 12.2kbps and FRC H-Set1 QPSK, Test Mode 1 loop back. With the 8960 this is accomplished by setting the signal Channel Coding to “E-DCH Test Channel” and configuring the equipment category to Cat5_10ms.
- Set the Absolute Grant for HSUPA Subtest1 according to Table below.
- Set the device power to be at least 5dB lower than the Maximum output power
- Send power control bits to give one TPC_cmd = +1 command to the device. If device doesn’t send any E-DPCH data with decreased E-TFCI within 500ms, then repeat this process until the decreased E-TFCI is reported.
- Confirm that the E-TFCI transmitted by the device is equal to the target E-TFCI in Table below. If the E-TFCI transmitted by the device is not equal to the target E-TFCI, then send power control bits to give one TPC_cmd = -1 command to the UE. If UE sends any E-DPCH data with decreased E-TFCI within 500 ms, send new power control bits to give one TPC_cmd = -1 command to the UE. Then confirm that the E-TFCI transmitted by the UE is equal to the target E-TFCI in Table below.
- Measure the power using the power meter with modulated average detector.
- Repeat the measurement for the HSUPA Subtest2, 3, 4 and 5 as given in Table below.

3GPP Release Version	Mode	835 MHz Band [dBm]			Sub-Test (See Table Below)	MPR
		4132	4183	4233		
99	WCDMA	23.69	23.94	23.64	-	-
6	HSDPA	23.66	23.79	23.90	1	0
6		23.62	23.97	23.88	2	0
6		23.16	23.26	23.18	3	0.5
6		23.29	23.13	23.50	4	0.5
6	HSUPA	23.68	23.80	23.89	1	0
6		21.51	21.76	21.83	2	2
6		22.90	22.64	22.72	3	1
6		21.59	21.81	21.94	4	2
6		23.85	23.71	23.81	5	0

3GPP Release Version	Mode	1900 MHz Band [dBm]			Sub-Test (See Table Below)	MPR
		9262	9400	9538		
99	WCDMA	23.82	23.87	23.85	-	-
6	HSDPA	23.54	23.88	23.51	1	0
6		23.66	23.93	23.56	2	0
6		23.17	23.48	23.41	3	0.5
6		23.09	23.12	23.21	4	0.5
6	HSUPA	24.00	23.78	23.85	1	0
6		21.52	21.51	21.54	2	2
6		22.78	22.50	22.68	3	1
6		21.59	21.67	21.59	4	2
6		23.67	23.70	23.99	5	0

Sub-Test Setup for Release 6 HSDPA

Sub-Test	β_c	β_d	B_c/β_d	β_{hs}
1	2/15	15/15	2/15	4/15
2	12/15	15/15	15/15	24/15
3	15/15	8/15	15/8	30/15
4	15/15	4/15	15/4	30/15
Δ_{ack}, Δ_{nack} and Δ_{cqi} = 8				

Sub-Test Setup for Release 6 HSUPA

Sub-Test	β_c	β_d	B_c/β_d	β_{hs}	B_{ec}	B_{ed}	MPR	AG Index	E-TFCI
1	11/15	15/15	11/15	22/15	209/225	1039/225	0.0	20	75
2	6/15	15/15	6/15	12/15	12/15	94/75	2.0	12	67
3	15/15	9/15	15/9	30/15	30/15	47/15	1.0	15	92
4	2/15	15/15	2/15	4/15	2/15	56/15	2.0	17	71
5	15/15	15/15	15/15	30/15	24/15	134/15	0.0	21	81
Δ_{ack}, Δ_{nack} and Δ_{cqi} = 8									

Figure 10.1 Test Reduction Table – WCDMA

Band/ Frequency (MHz)	Technology	Side	Required Channel	Tested/ Reduced
Band 2 1850-1910 MHz	WCDMA	Face	9262	Tested
			9400	Tested
			9538	Tested
		Body	9262	Reduced[1]
			9400	Tested
			9538	Reduced[1]
Band 5 824-849 MHz		Face	4132	Reduced[1]
			4183	Tested
			4233	Reduced[1]
		Body	4132	Tested
			4183	Tested
			4233	Tested

Reduced[1] – When the mid channel is 3 dB below the limit, the remaining channels are not required KDB447498 D01 v06.

10.3 SAR Measurement Conditions for LTE Bands

10.3.1 LTE Functionality

The follow table identifies all the channel bandwidths in each frequency band supported by this device.

LTE Band Class	Bandwidth (MHz)	Frequency or Freq. Band (MHz)
2	1.4, 3, 5, 10, 15, 20	1850-1910 MHz
4	1.4, 3, 5, 10, 15, 20	1710-1755 MHz
12	1.4, 3, 5, 10	699-716 MHz

10.3.2 Test Conditions

All SAR measurements for LTE were performed using the Anritsu MT8820C. A closed loop power control setting allowed the UE to transmit at the maximum output power during the SAR measurements. The Figure 11.1 table indicates all the test reduction utilized for this report.

MPR was enabled for this device. A-MPR was disabled for all SAR test measurements.

Table 10.3.2.1 LTE Power Measurements

Band	Modulation	Bandwidth	RB Size	RB Offset	Channel	Frequency	Power
2	QPSK	1.4 MHz	1	0	18607	1850.7	23.3
					18900	1880.0	23.8
					19193	1909.3	23.8
				3	18607	1850.7	23.6
					18900	1880.0	23.9
					19193	1909.3	23.9
				5	18607	1850.7	23.6
					18900	1880.0	23.4
					19193	1909.3	23.6
			3	0	18607	1850.7	23.7
					18900	1880.0	24.0
					19193	1909.3	23.6
				1	18607	1850.7	23.6
					18900	1880.0	23.7
					19193	1909.3	23.7
				3	18607	1850.7	23.4
					18900	1880.0	24.0
					19193	1909.3	23.4
			6	0	18607	1850.7	22.8
					18900	1880.0	22.4
					19193	1909.3	22.3
		3 MHz	1	0	18615	1851.5	23.7
					18900	1880.0	23.9
					19185	1908.5	23.8
				7	18615	1851.5	24.0
					18900	1880.0	23.5
					19185	1908.5	23.6
				14	18615	1851.5	23.4
					18900	1880.0	23.5
					19185	1908.5	23.5
			8	0	18615	1851.5	22.5
					18900	1880.0	22.6
					19185	1908.5	22.4
				3	18615	1851.5	22.9
					18900	1880.0	22.9
					19185	1908.5	22.7
				7	18615	1851.5	22.7
					18900	1880.0	22.6
					19185	1908.5	22.4
			15	0	18615	1851.5	22.7
					18900	1880.0	22.8
					19185	1908.5	22.4

Band	Modulation	Bandwidth	RB Size	RB Offset	Channel	Frequency	Power
2	QPSK	5 MHz	1	0	18625	1852.5	23.8
					18900	1880.0	23.4
					19175	1907.5	23.5
				12	18625	1852.5	23.4
					18900	1880.0	23.7
					19175	1907.5	23.6
				24	18625	1852.5	23.4
					18900	1880.0	23.3
					19175	1907.5	23.6
			12	0	18625	1852.5	22.9
					18900	1880.0	22.8
					19175	1907.5	22.4
				6	18625	1852.5	22.7
					18900	1880.0	22.9
					19175	1907.5	22.9
				13	18625	1852.5	22.7
					18900	1880.0	22.8
					19175	1907.5	22.6
			25	0	18625	1852.5	22.4
					18900	1880.0	22.5
					19175	1907.5	22.4
		10 MHz	1	0	18650	1855.0	23.8
					18900	1880.0	23.8
					19150	1905.0	23.6
				24	18650	1855.0	23.5
					18900	1880.0	23.4
					19150	1905.0	23.7
				49	18650	1855.0	23.7
					18900	1880.0	24.0
					19150	1905.0	23.6
			25	0	18650	1855.0	22.6
					18900	1880.0	23.0
					19150	1905.0	22.7
				13	18650	1855.0	22.5
					18900	1880.0	22.8
					19150	1905.0	22.8
				25	18650	1855.0	22.6
					18900	1880.0	22.8
					19150	1905.0	22.9
			50	0	18650	1855.0	23.0
					18900	1880.0	22.7
					19150	1905.0	22.6

Band	Modulation	Bandwidth	RB Size	RB Offset	Channel	Frequency	Power
2	QPSK	15 MHz	1	0	18675	1857.5	23.5
					18900	1880.0	23.3
					19125	1902.5	23.7
				37	18675	1857.5	23.4
					18900	1880.0	23.4
					19125	1902.5	23.5
				74	18675	1857.5	23.8
					18900	1880.0	23.8
					19125	1902.5	23.9
			36	0	18675	1857.5	22.7
					18900	1880.0	22.5
					19125	1902.5	22.7
				19	18675	1857.5	22.3
					18900	1880.0	22.8
					19125	1902.5	22.4
				39	18675	1857.5	22.7
					18900	1880.0	22.8
					19125	1902.5	22.5
			75	0	18675	1857.5	22.6
					18900	1880.0	22.4
					19125	1902.5	22.8
		20 MHz	1	0	18700	1860.0	23.5
					18900	1880.0	23.8
					19100	1900.0	23.3
				49	18700	1860.0	23.9
					18900	1880.0	23.7
					19100	1900.0	23.5
				99	18700	1860.0	23.4
					18900	1880.0	23.9
					19100	1900.0	23.9
			50	0	18700	1860.0	22.8
					18900	1880.0	22.4
					19100	1900.0	22.7
				24	18700	1860.0	22.7
					18900	1880.0	22.9
					19100	1900.0	22.4
				50	18700	1860.0	22.8
					18900	1880.0	22.5
					19100	1900.0	22.6
			100	0	18700	1860.0	22.9
					18900	1880.0	22.7
					19100	1900.0	22.5

Band	Modulation	Bandwidth	RB Size	RB Offset	Channel	Frequency	Power
2	16QAM	1.4 MHz	1	0	18607	1850.7	22.6
					18900	1880.0	22.6
					19193	1909.3	22.6
				3	18607	1850.7	22.9
					18900	1880.0	22.9
					19193	1909.3	22.6
				5	18607	1850.7	22.9
					18900	1880.0	22.3
					19193	1909.3	22.5
			3	0	18607	1850.7	22.4
					18900	1880.0	23.0
					19193	1909.3	22.4
				1	18607	1850.7	22.3
					18900	1880.0	22.4
					19193	1909.3	22.4
				3	18607	1850.7	22.9
					18900	1880.0	23.0
					19193	1909.3	22.3
			6	0	18607	1850.7	21.5
					18900	1880.0	22.0
					19193	1909.3	21.3
		3 MHz	1	0	18615	1851.5	22.7
					18900	1880.0	22.5
					19185	1908.5	22.3
				7	18615	1851.5	22.6
					18900	1880.0	23.0
					19185	1908.5	22.8
				14	18615	1851.5	22.3
					18900	1880.0	23.0
					19185	1908.5	22.8
			8	0	18615	1851.5	21.4
					18900	1880.0	21.4
					19185	1908.5	21.7
				3	18615	1851.5	21.4
					18900	1880.0	21.9
					19185	1908.5	21.7
				7	18615	1851.5	21.8
					18900	1880.0	21.9
					19185	1908.5	21.8
			15	0	18615	1851.5	21.8
					18900	1880.0	21.8
					19185	1908.5	21.6

Band	Modulation	Bandwidth	RB Size	RB Offset	Channel	Frequency	Power
2	16QAM	5 MHz	1	0	18625	1852.5	22.5
					18900	1880.0	22.5
					19175	1907.5	22.9
				12	18625	1852.5	23.0
					18900	1880.0	22.5
					19175	1907.5	22.7
				24	18625	1852.5	22.4
					18900	1880.0	22.9
					19175	1907.5	22.6
			12	0	18625	1852.5	21.8
					18900	1880.0	21.4
					19175	1907.5	21.8
				6	18625	1852.5	22.0
					18900	1880.0	21.5
					19175	1907.5	21.3
				13	18625	1852.5	21.8
					18900	1880.0	21.5
					19175	1907.5	21.3
			25	0	18625	1852.5	21.9
					18900	1880.0	21.8
					19175	1907.5	21.7
		10 MHz	1	0	18650	1855.0	22.9
					18900	1880.0	22.8
					19150	1905.0	22.5
				24	18650	1855.0	22.5
					18900	1880.0	22.5
					19150	1905.0	22.4
				49	18650	1855.0	22.6
					18900	1880.0	22.9
					19150	1905.0	22.7
			25	0	18650	1855.0	22.0
					18900	1880.0	21.4
					19150	1905.0	21.8
				13	18650	1855.0	21.5
					18900	1880.0	22.0
					19150	1905.0	21.5
				25	18650	1855.0	21.7
					18900	1880.0	22.0
					19150	1905.0	21.8
			50	0	18650	1855.0	21.4
					18900	1880.0	21.6
					19150	1905.0	21.7

Band	Modulation	Bandwidth	RB Size	RB Offset	Channel	Frequency	Power
2	16QAM	15 MHz	1	0	18675	1857.5	23.0
					18900	1880.0	22.7
					19125	1902.5	22.6
				37	18675	1857.5	22.7
					18900	1880.0	22.9
					19125	1902.5	22.7
				74	18675	1857.5	22.7
					18900	1880.0	22.6
					19125	1902.5	23.0
			36	0	18675	1857.5	21.9
					18900	1880.0	21.8
					19125	1902.5	21.4
				19	18675	1857.5	21.6
					18900	1880.0	21.9
					19125	1902.5	21.8
				39	18675	1857.5	21.9
					18900	1880.0	21.5
					19125	1902.5	21.8
			75	0	18675	1857.5	21.3
					18900	1880.0	21.5
					19125	1902.5	21.4
		20 MHz	1	0	18700	1860.0	22.6
					18900	1880.0	22.7
					19100	1900.0	22.5
				49	18700	1860.0	22.4
					18900	1880.0	22.7
					19100	1900.0	23.0
				99	18700	1860.0	22.3
					18900	1880.0	23.0
					19100	1900.0	22.5
			50	0	18700	1860.0	22.0
					18900	1880.0	21.8
					19100	1900.0	21.5
				24	18700	1860.0	21.6
					18900	1880.0	21.7
					19100	1900.0	21.7
				50	18700	1860.0	21.3
					18900	1880.0	21.4
					19100	1900.0	21.6
			100	0	18700	1860.0	21.3
					18900	1880.0	21.4
					19100	1900.0	21.7

Band	Modulation	Bandwidth	RB Size	RB Offset	Channel	Frequency	Power
4	QPSK	1.4 MHz	1	0	19957	1710.7	23.5
					20175	1732.5	24.0
					20393	1754.3	23.7
				3	19957	1710.7	23.4
					20175	1732.5	23.4
					20393	1754.3	23.4
				5	19957	1710.7	23.3
					20175	1732.5	23.4
					20393	1754.3	23.4
			3	0	19957	1710.7	23.9
					20175	1732.5	23.9
					20393	1754.3	23.7
				1	19957	1710.7	23.7
					20175	1732.5	23.7
					20393	1754.3	23.9
				3	19957	1710.7	24.0
					20175	1732.5	23.3
					20393	1754.3	23.8
			6	0	19957	1710.7	22.5
					20175	1732.5	22.6
					20393	1754.3	22.9
		3 MHz	1	0	19965	1711.5	24.0
					20175	1732.5	23.7
					20385	1753.5	23.4
				7	19965	1711.5	23.4
					20175	1732.5	23.7
					20385	1753.5	23.5
				14	19965	1711.5	23.9
					20175	1732.5	23.6
					20385	1753.5	23.9
			8	0	19965	1711.5	22.7
					20175	1732.5	22.7
					20385	1753.5	22.6
				3	19965	1711.5	22.9
					20175	1732.5	22.3
					20385	1753.5	22.6
				7	19965	1711.5	22.6
					20175	1732.5	22.9
					20385	1753.5	22.4
			15	0	19965	1711.5	22.5
					20175	1732.5	22.9
					20385	1753.5	22.7

Band	Modulation	Bandwidth	RB Size	RB Offset	Channel	Frequency	Power
4	QPSK	5 MHz	1	0	19975	1712.5	23.4
					20175	1732.5	23.6
					20375	1752.5	23.9
				12	19975	1712.5	23.7
					20175	1732.5	23.4
					20375	1752.5	23.8
				24	19975	1712.5	23.9
					20175	1732.5	23.7
					20375	1752.5	23.7
			12	0	19975	1712.5	22.8
					20175	1732.5	23.0
					20375	1752.5	22.6
				6	19975	1712.5	22.3
					20175	1732.5	22.6
					20375	1752.5	22.8
				13	19975	1712.5	22.5
					20175	1732.5	22.5
					20375	1752.5	22.4
			25	0	19975	1712.5	22.5
					20175	1732.5	22.6
					20375	1752.5	22.9
		10 MHz	1	0	20000	1715.0	23.9
					20175	1732.5	23.5
					20350	1750.0	23.5
				24	20000	1715.0	23.5
					20175	1732.5	23.9
					20350	1750.0	23.4
				49	20000	1715.0	23.9
					20175	1732.5	23.8
					20350	1750.0	23.6
			25	0	20000	1715.0	23.0
					20175	1732.5	22.4
					20350	1750.0	22.4
				13	20000	1715.0	22.7
					20175	1732.5	22.4
					20350	1750.0	22.5
				25	20000	1715.0	22.8
					20175	1732.5	22.6
					20350	1750.0	22.9
			50	0	20000	1715.0	22.8
					20175	1732.5	22.4
					20350	1750.0	22.8

Band	Modulation	Bandwidth	RB Size	RB Offset	Channel	Frequency	Power
4	QPSK	15 MHz	1	0	20025	1717.5	23.9
					20175	1732.5	23.6
					20325	1747.5	23.8
				37	20025	1717.5	23.9
					20175	1732.5	23.6
					20325	1747.5	23.6
				74	20025	1717.5	23.4
					20175	1732.5	23.3
					20325	1747.5	23.4
			36	0	20025	1717.5	22.7
					20175	1732.5	22.5
					20325	1747.5	22.7
				19	20025	1717.5	22.4
					20175	1732.5	23.0
					20325	1747.5	22.5
				39	20025	1717.5	22.7
					20175	1732.5	22.9
					20325	1747.5	22.5
			75	0	20025	1717.5	22.7
					20175	1732.5	22.8
					20325	1747.5	22.7
		20 MHz	1	0	20050	1720.0	23.6
					20175	1732.5	23.3
					20300	1745.0	23.5
				49	20050	1720.0	23.4
					20175	1732.5	23.8
					20300	1745.0	23.6
				99	20050	1720.0	23.9
					20175	1732.5	23.4
					20300	1745.0	23.5
			50	0	20050	1720.0	22.9
					20175	1732.5	22.6
					20300	1745.0	22.3
				24	20050	1720.0	22.4
					20175	1732.5	22.5
					20300	1745.0	22.8
				50	20050	1720.0	22.7
					20175	1732.5	22.9
					20300	1745.0	22.6
			100	0	20050	1720.0	22.9
					20175	1732.5	22.7
					20300	1745.0	22.5

Band	Modulation	Bandwidth	RB Size	RB Offset	Channel	Frequency	Power
4	16QAM	1.4 MHz	1	0	19957	1710.7	22.3
					20175	1732.5	22.6
					20393	1754.3	22.6
				3	19957	1710.7	22.9
					20175	1732.5	22.6
					20393	1754.3	22.6
				5	19957	1710.7	22.7
					20175	1732.5	22.8
					20393	1754.3	22.9
			3	0	19957	1710.7	22.6
					20175	1732.5	22.7
					20393	1754.3	22.7
				1	19957	1710.7	22.9
					20175	1732.5	22.8
					20393	1754.3	22.4
				3	19957	1710.7	22.3
					20175	1732.5	22.8
					20393	1754.3	22.4
			6	0	19957	1710.7	21.5
					20175	1732.5	21.5
					20393	1754.3	21.7
		3 MHz	1	0	19965	1711.5	23.0
					20175	1732.5	22.6
					20385	1753.5	22.6
				7	19965	1711.5	23.0
					20175	1732.5	22.6
					20385	1753.5	22.4
				14	19965	1711.5	22.9
					20175	1732.5	22.7
					20385	1753.5	22.5
			8	0	19965	1711.5	21.9
					20175	1732.5	22.0
					20385	1753.5	21.8
				3	19965	1711.5	21.5
					20175	1732.5	21.7
					20385	1753.5	21.5
				7	19965	1711.5	21.6
					20175	1732.5	21.3
					20385	1753.5	21.4
			15	0	19965	1711.5	21.7
					20175	1732.5	21.9
					20385	1753.5	21.7

Band	Modulation	Bandwidth	RB Size	RB Offset	Channel	Frequency	Power
4	16QAM	5 MHz	1	0	19975	1712.5	23.0
					20175	1732.5	22.6
					20375	1752.5	22.5
				12	19975	1712.5	22.7
					20175	1732.5	22.4
					20375	1752.5	22.9
				24	19975	1712.5	22.5
					20175	1732.5	22.9
					20375	1752.5	22.5
			12	0	19975	1712.5	21.5
					20175	1732.5	21.9
					20375	1752.5	22.0
				6	19975	1712.5	21.8
					20175	1732.5	21.5
					20375	1752.5	22.0
				13	19975	1712.5	21.4
					20175	1732.5	21.5
					20375	1752.5	21.8
			25	0	19975	1712.5	21.5
					20175	1732.5	21.4
					20375	1752.5	21.6
		10 MHz	1	0	20000	1715.0	22.8
					20175	1732.5	23.0
					20350	1750.0	22.9
				24	20000	1715.0	22.9
					20175	1732.5	22.9
					20350	1750.0	22.8
				49	20000	1715.0	22.5
					20175	1732.5	22.6
					20350	1750.0	22.5
			25	0	20000	1715.0	22.0
					20175	1732.5	21.8
					20350	1750.0	21.6
				13	20000	1715.0	21.3
					20175	1732.5	21.9
					20350	1750.0	21.7
				25	20000	1715.0	21.4
					20175	1732.5	21.4
					20350	1750.0	21.9
			50	0	20000	1715.0	21.6
					20175	1732.5	21.6
					20350	1750.0	21.3

Band	Modulation	Bandwidth	RB Size	RB Offset	Channel	Frequency	Power
4	16QAM	15 MHz	1	0	20025	1717.5	22.9
					20175	1732.5	22.4
					20325	1747.5	22.5
				37	20025	1717.5	22.6
					20175	1732.5	22.3
					20325	1747.5	22.3
				74	20025	1717.5	22.6
					20175	1732.5	22.5
					20325	1747.5	22.6
			36	0	20025	1717.5	21.8
					20175	1732.5	21.6
					20325	1747.5	21.5
				19	20025	1717.5	21.5
					20175	1732.5	21.6
					20325	1747.5	21.7
				39	20025	1717.5	21.4
					20175	1732.5	22.0
					20325	1747.5	22.0
			75	0	20025	1717.5	21.8
					20175	1732.5	21.3
					20325	1747.5	21.4
		20 MHz	1	0	20050	1720.0	22.5
					20175	1732.5	22.9
					20300	1745.0	22.8
				49	20050	1720.0	22.3
					20175	1732.5	22.8
					20300	1745.0	23.0
				99	20050	1720.0	22.7
					20175	1732.5	22.9
					20300	1745.0	22.8
			50	0	20050	1720.0	21.6
					20175	1732.5	22.0
					20300	1745.0	21.7
				24	20050	1720.0	21.4
					20175	1732.5	21.9
					20300	1745.0	21.8
				50	20050	1720.0	21.8
					20175	1732.5	22.0
					20300	1745.0	21.5
			100	0	20050	1720.0	21.4
					20175	1732.5	21.9
					20300	1745.0	21.9

Band	Modulation	Bandwidth	RB Size	RB Offset	Channel	Frequency	Power
12	QPSK	1.4 MHz	1	0	23017	699.7	23.9
					23095	707.5	23.9
					23173	715.3	23.4
				3	23017	699.7	23.5
					23095	707.5	23.5
					23173	715.3	23.9
				5	23017	699.7	23.9
					23095	707.5	23.9
					23173	715.3	24.0
			3	0	23017	699.7	23.8
					23095	707.5	23.3
					23173	715.3	23.7
				1	23017	699.7	23.8
					23095	707.5	23.8
					23173	715.3	23.9
				3	23017	699.7	24.0
					23095	707.5	23.5
					23173	715.3	23.3
			6	0	23017	699.7	22.5
					23095	707.5	23.0
					23173	715.3	22.6
		3 MHz	1	0	23025	700.5	23.4
					23095	707.5	23.7
					23165	714.5	23.3
				7	23025	700.5	23.5
					23095	707.5	23.5
					23165	714.5	23.3
				14	23025	700.5	23.5
					23095	707.5	23.5
					23165	714.5	23.4
			8	0	23025	700.5	22.4
					23095	707.5	22.6
					23165	714.5	22.5
				3	23025	700.5	22.5
					23095	707.5	22.9
					23165	714.5	22.6
				7	23025	700.5	22.9
					23095	707.5	22.6
					23165	714.5	22.4
			15	0	23025	700.5	22.9
					23095	707.5	22.6
					23165	714.5	22.8

Band	Modulation	Bandwidth	RB Size	RB Offset	Channel	Frequency	Power
12	QPSK	5 MHz	1	0	23035	701.5	23.9
					23095	707.5	23.5
					23155	713.5	23.6
				12	23035	701.5	23.4
					23095	707.5	23.8
					23155	713.5	23.7
				24	23035	701.5	23.7
					23095	707.5	23.5
					23155	713.5	23.9
			12	0	23035	701.5	22.9
					23095	707.5	22.5
					23155	713.5	22.8
				6	23035	701.5	22.9
					23095	707.5	22.6
					23155	713.5	22.7
				13	23035	701.5	22.3
					23095	707.5	23.0
					23155	713.5	23.0
			25	0	23035	701.5	22.3
					23095	707.5	23.0
					23155	713.5	22.6
		10 MHz	1	0	23060	704.0	23.5
					23095	707.5	23.3
					23130	711.0	23.6
				24	23060	704.0	23.5
					23095	707.5	23.9
					23130	711.0	23.5
				49	23060	704.0	24.0
					23095	707.5	23.8
					23130	711.0	23.6
			25	0	23060	704.0	22.5
					23095	707.5	22.9
					23130	711.0	22.7
				13	23060	704.0	22.6
					23095	707.5	22.3
					23130	711.0	22.9
				25	23060	704.0	22.6
					23095	707.5	22.6
					23130	711.0	22.7
			50	0	23060	704.0	22.7
					23095	707.5	22.9
					23130	711.0	22.8

Band	Modulation	Bandwidth	RB Size	RB Offset	Channel	Frequency	Power
12	16QAM	1.4 MHz	1	0	23017	699.7	22.5
					23095	707.5	22.4
					23173	715.3	22.3
				3	23017	699.7	22.8
					23095	707.5	22.9
					23173	715.3	22.5
				5	23017	699.7	22.4
					23095	707.5	22.7
					23173	715.3	22.6
			3	0	23017	699.7	22.5
					23095	707.5	22.7
					23173	715.3	22.6
				1	23017	699.7	22.5
					23095	707.5	22.9
					23173	715.3	22.4
				3	23017	699.7	22.8
					23095	707.5	22.4
					23173	715.3	23.0
			6	0	23017	699.7	21.9
					23095	707.5	21.7
					23173	715.3	21.5
		3 MHz	1	0	23025	700.5	22.7
					23095	707.5	22.9
					23165	714.5	22.6
				7	23025	700.5	22.7
					23095	707.5	22.6
					23165	714.5	22.5
				14	23025	700.5	22.5
					23095	707.5	23.0
					23165	714.5	22.7
			8	0	23025	700.5	21.4
					23095	707.5	21.4
					23165	714.5	21.4
				3	23025	700.5	21.9
					23095	707.5	21.8
					23165	714.5	21.8
				7	23025	700.5	21.4
					23095	707.5	22.0
					23165	714.5	21.6
			15	0	23025	700.5	22.0
					23095	707.5	21.4
					23165	714.5	21.3

Band	Modulation	Bandwidth	RB Size	RB Offset	Channel	Frequency	Power
12	16QAM	5 MHz	1	0	23035	701.5	22.5
					23095	707.5	22.7
					23155	713.5	22.7
				12	23035	701.5	23.0
					23095	707.5	23.0
					23155	713.5	22.7
				24	23035	701.5	22.5
					23095	707.5	22.7
					23155	713.5	22.4
			12	0	23035	701.5	21.4
					23095	707.5	21.8
					23155	713.5	21.7
				6	23035	701.5	21.9
					23095	707.5	21.9
					23155	713.5	21.9
				13	23035	701.5	21.5
					23095	707.5	21.4
					23155	713.5	21.6
			25	0	23035	701.5	21.7
					23095	707.5	21.6
					23155	713.5	21.7
		10 MHz	1	0	23060	704.0	22.5
					23095	707.5	22.9
					23130	711.0	22.5
				24	23060	704.0	22.9
					23095	707.5	22.5
					23130	711.0	22.8
				49	23060	704.0	23.0
					23095	707.5	22.3
					23130	711.0	23.0
			25	0	23060	704.0	21.9
					23095	707.5	21.7
					23130	711.0	21.4
				13	23060	704.0	21.3
					23095	707.5	21.7
					23130	711.0	21.4
				25	23060	704.0	21.8
					23095	707.5	21.7
					23130	711.0	21.4
			50	0	23060	704.0	21.7
					23095	707.5	21.7
					23130	711.0	21.4

Table 10.3.2.2 Test Reduction Table – LTE

Band/ Frequency (MHz)	Pos.	Required Test Channel	Bandwidth	Modulation	RB Allocation	RB Offset	Tested/ Reduced
Band 2 1850-1910 MHz	Face	18700	20 MHz	QPSK	50	24	Reduced[6]
		18900					Tested
		19100					Reduced[6]
		18700			100	0	Reduced[1]
		18900					Reduced[1]
		19100					Reduced[1]
		18700			1	0	Reduced[2]
		18900					Reduced[2]
		19100					Reduced[2]
		18700				49	Tested
		18900					Tested
		19100					Tested
		18700		16QAM	50	24	Reduced[3]
		18900					Reduced[3]
		19100					Reduced[3]
		18700			100	0	Reduced[1]
		18900					Reduced[1]
		19100					Reduced[1]
		18700			1	0	Reduced[4]
		18900					Reduced[4]
		19100					Reduced[4]
		18700				49	Reduced[4]
		18900					Reduced[4]
		19100					Reduced[4]
		All lower bandwidths (15 MHz, 10 MHz, 5 MHz, 3 MHz, 1.4 MHz)					Reduced[5]
	Back	18700	20 MHz	QPSK	50	24	Reduced[6]
		18900					Tested
		19100					Reduced[6]
		18700			100	0	Reduced[1]
		18900					Reduced[1]
		19100					Reduced[1]
		18700			1	0	Reduced[2]
		18900					Reduced[2]
		19100					Reduced[2]
		18700				49	Reduced[6]
		18900					Tested
		19100					Reduced[6]
		18700		16QAM	50	24	Reduced[3]
		18900					Reduced[3]
		19100					Reduced[3]
		18700			100	0	Reduced[1]
		18900					Reduced[1]
		19100					Reduced[1]
		18700			1	0	Reduced[4]
		18900					Reduced[4]
		19100					Reduced[4]
		18700				49	Reduced[4]
		18900					Reduced[4]
		19100					Reduced[4]
		All lower bandwidths (15 MHz, 10 MHz, 5 MHz, 3 MHz, 1.4 MHz)					Reduced[7]

Reduced[1] – If the SAR value in the 50% RB testing is less than 1.45 W/kg, the 100% RB testing is reduced per KDB941225 D05 v02r05.

Reduced[2] - If the SAR value in the 1 RB testing is less than 1.45 W/kg, the remaining channels are reduced per KDB941225 D05 v02r05.

Reduced[3] - If the SAR value in the 50% RB testing is less than 1.45 W/kg, the remaining channels are reduced per KDB941225 D05 v02r05.

Reduced[4]- If the SAR value in the 1 RB testing is less than 1.45 W/kg, the remaining channels are reduced per KDB941225 D05 v02r05.

Reduced[5]- If the conducted power is within ±0.5 dB, all testing where the SAR value is less than 1.45 W/kg is reduced per KDB941225 D05 v02r05.

Reduced[6]- If the SAR value measured on the middle channel is less than 0.8 W/kg and the conducted power is within ±0.5 dB, the remaining channels are reduced per KDB941225 D05 v02r05.

Reduced[7] - The remaining sides are not used next to the body.

Band/ Frequency (MHz)	Pos.	Required Test Channel	Bandwidth	Modulation	RB Allocation	RB Offset	Tested/ Reduced
Band 4 1710-1755 MHz	Face	20050	20 MHz	QPSK	50	24	Reduced[6]
		20175					Tested
		20300					Reduced[6]
		20050			100	0	Reduced[1]
		20175					Reduced[1]
		20300					Reduced[1]
		20050			1	0	Reduced[2]
		20175					Reduced[2]
		20300					Reduced[2]
		20050				49	Tested
		20175					Tested
		20300					Tested
		20050		16QAM	50	24	Reduced[3]
		20175					Reduced[3]
		20300					Reduced[3]
		20050			100	0	Reduced[1]
		20175					Reduced[1]
		20300					Reduced[1]
		20050			1	0	Reduced[4]
		20175					Reduced[4]
		20300					Reduced[4]
		20050				49	Reduced[4]
		20175					Reduced[4]
		20300					Reduced[4]
		All lower bandwidths (15 MHz, 10 MHz, 5 MHz, 3 MHz, 1.4 MHz)					Reduced[5]
	Back	20050	20 MHz	QPSK	50	24	Reduced[6]
		20175					Tested
		20300					Reduced[6]
		20050			100	0	Reduced[1]
		20175					Reduced[1]
		20300					Reduced[1]
		20050			1	0	Reduced[2]
		20175					Reduced[2]
		20300					Reduced[2]
		20050				49	Reduced[6]
		20175					Tested
		20300					Reduced[6]
		20050		16QAM	50	24	Reduced[3]
		20175					Reduced[3]
		20300					Reduced[3]
		20050			100	0	Reduced[1]
		20175					Reduced[1]
		20300					Reduced[1]
		20050			1	0	Reduced[4]
		20175					Reduced[4]
		20300					Reduced[4]
		20050				49	Reduced[4]
		20175					Reduced[4]
		20300					Reduced[4]
		All lower bandwidths (15 MHz, 10 MHz, 5 MHz, 3 MHz, 1.4 MHz)					Reduced[7]

Reduced[1] – If the SAR value in the 50% RB testing is less than 1.45 W/kg, the 100% RB testing is reduced per KDB941225 D05 v02r05.

Reduced[2] - If the SAR value in the 1 RB testing is less than 1.45 W/kg, the remaining channels are reduced per KDB941225 D05 v02r05.

Reduced[3] - If the SAR value in the 50% RB testing is less than 1.45 W/kg, the remaining channels are reduced per KDB941225 D05 v02r05.

Reduced[4]- If the SAR value in the 1 RB testing is less than 1.45 W/kg, the remaining channels are reduced per KDB941225 D05 v02r05.

Reduced[5]- If the conducted power is within ±0.5 dB, all testing where the SAR value is less than 1.45 W/kg is reduced per KDB941225 D05 v02r05.

Reduced[6]- If the SAR value measured on the middle channel is less than 0.8 W/kg and the conducted power is within ±0.5 dB, the remaining channels are reduced per KDB941225 D05 v02r05.

Reduced[7] - The remaining sides are not used next to the body.

Band/ Frequency (MHz)	Pos.	Required Test Channel	Bandwidth	Modulation	RB Allocation	RB Offset	Tested/ Reduced
Band 12 699-716 MHz	Face	23060	10 MHz	QPSK	50	24	Reduced[6]
		23095					Tested
		23129					Reduced[6]
		23060			100	0	Reduced[1]
		23095					Reduced[1]
		23129					Reduced[1]
		23060			1	0	Reduced[2]
		23095					Reduced[2]
		23129					Reduced[2]
		23060				49	Reduced[2]
		23095					Tested
		23129					Reduced[2]
		23060		16QAM	50	24	Reduced[3]
		23095					Reduced[3]
		23129					Reduced[3]
		23060			100	0	Reduced[1]
		23095					Reduced[1]
		23129					Reduced[1]
		23060			1	0	Reduced[4]
		23095					Reduced[4]
		23129					Reduced[4]
		23060				49	Reduced[4]
		23095					Reduced[4]
		23129					Reduced[4]
		All lower bandwidths (15 MHz, 10 MHz, 5 MHz, 3 MHz, 1.4 MHz)					Reduced[5]
	Back	23060	10 MHz	QPSK	50	24	Reduced[6]
		23095					Tested
		23129					Reduced[6]
		23060			100	0	Reduced[1]
		23095					Reduced[1]
		23129					Reduced[1]
		23060			1	0	Reduced[2]
		23095					Reduced[2]
		23129					Reduced[2]
		23060				49	Tested
		23095					Tested
		23129					Tested
		23060		16QAM	50	24	Reduced[3]
		23095					Reduced[3]
		23129					Reduced[3]
		23060			100	0	Reduced[1]
		23095					Reduced[1]
		23129					Reduced[1]
		23060			1	0	Reduced[4]
		23095					Reduced[4]
		23129					Reduced[4]
		23060				49	Reduced[4]
		23095					Reduced[4]
		23129					Reduced[4]
		All lower bandwidths (15 MHz, 10 MHz, 5 MHz, 3 MHz, 1.4 MHz)					Reduced[7]

Reduced[1] – If the SAR value in the 50% RB testing is less than 1.45 W/kg, the 100% RB testing is reduced per KDB941225 D05 v02r05.

Reduced[2] - If the SAR value in the 1 RB testing is less than 1.45 W/kg, the remaining channels are reduced per KDB941225 D05 v02r05.

Reduced[3] - If the SAR value in the 50% RB testing is less than 1.45 W/kg, the remaining channels are reduced per KDB941225 D05 v02r05.

Reduced[4]- If the SAR value in the 1 RB testing is less than 1.45 W/kg, the remaining channels are reduced per KDB941225 D05 v02r05.

Reduced[5]- If the conducted power is within ±0.5 dB, all testing where the SAR value is less than 1.45 W/kg is reduced per KDB941225 D05 v02r05.

Reduced[6]- If the SAR value measured on the middle channel is less than 0.8 W/kg and the conducted power is within ±0.5 dB, the remaining channels are reduced per KDB941225 D05 v02r05.

Reduced[7] - The remaining sides are not used next to the body.

SAR Data Summary – VHF Face SAR Measurements

MEASUREMENT RESULTS

Gap	Plot	Conf.	Battery	Frequency		Mod.	Ant.	End Power	Drift (dB)	Measured SAR (W/kg)	Adjusted SAR (W/kg)	SAR (W/kg) 50% Duty Cycle
				MHz	Ch.			(dBm)				
25 mm	-----	Radio	A	136	1	FM	I	35.59	-0.29	0.411	0.61	0.30
	-----			145	2	FM		35.63	-0.33	0.456	0.67	0.34
	1			155	3	FM		35.66	-0.46	0.570	0.86	0.43
	-----			164	4	FM		35.70	-0.37	0.442	0.65	0.32
	-----			174	5	FM		35.72	-0.31	0.481	0.69	0.35
	-----		A	155	3	FM	J	35.66	-0.28	0.632	0.92	0.46
	-----		C	155	3	FM		35.66	-0.37	0.135	0.20	0.10
	-----		A	155	3	FM	K	35.66	-0.36	0.821	1.21	0.61
	13			160	7	FM		35.41	-0.42	0.904	1.43	0.72
	-----			165	8	FM		35.51	-0.31	0.853	1.29	0.64
	-----		C	160	7	FM		35.41	-0.35	0.162	0.25	0.13

Head
8.0 W/kg (mW/g)
averaged over 1 gram

1. Battery is fully charged for all tests.
   Power Measured ☒Conducted ☐ERP ☐EIRP
2. SAR Measurement
   Phantom Configuration ☐Left Head ☒Eli4 ☐Right Head
   SAR Configuration ☒Head ☐Body
3. Test Signal Call Mode ☒Test Code ☐Base Station Simulator
4. Test Configuration ☐With Belt Clip ☐Without Belt Clip ☒N/A
5. Tissue Depth is at least 15.0 cm

Jay M. Moulton
Vice President

The adjusted SAR value was calculated by first scaling the SAR value up by the drift. This value was then scaled up based on the difference of the upper end of the tolerance (36.99 dB) and the measured conducted power. The resultant value is then multiplied by 0.5 to give the SAR value at 50% duty cycle.

SAR Data Summary – VHF Body SAR Measurements

MEASUREMENT RESULTS

Gap	Plot	Body Worn Acc.	Battery	Frequency		Mod.	Ant.	End Power	Drift (dB)	Measured SAR (W/kg)	Adjusted SAR (W/kg)	SAR (W/kg) 50% Duty Cycle
				MHz	Ch.			(dBm)				
0 mm	2	A	A	155	3	FM	I	35.66	-0.59	0.249	0.39	0.19
	-----		A	155	3	FM	J	35.66	-0.45	2.59	3.90	1.95
	-----		C	155	3	FM		35.66	-0.56	0.272	0.42	0.21
	-----		A	155	3	FM	K	35.66	-0.43	3.24	4.86	2.43
	14			160	7	FM		35.41	-0.57	3.37	5.53	2.76
	-----			165	8	FM		35.51	-0.51	3.15	4.98	2.49
	-----		C	160	7	FM		35.41	-0.55	0.336	0.55	0.27

Body
8.0 W/kg (mW/g)
averaged over 1 gram

1. Battery is fully charged for all tests.
   Power Measured ☒Conducted ☐ERP ☐EIRP
2. SAR Measurement
   Phantom Configuration ☐Left Head ☒Eli4 ☐Right Head
   SAR Configuration ☐Head ☒Body
3. Test Signal Call Mode ☒Test Code ☐Base Station Simulator
4. Test Configuration ☐With Belt Clip ☐Without Belt Clip ☒N/A
5. Tissue Depth is at least 15.0 cm

Jay M. Moulton
Vice President

The adjusted SAR value was calculated by first scaling the SAR value up by the drift. This value was then scaled up based on the difference of the upper end of the tolerance (36.99 dB) and the measured conducted power. The resultant value is then multiplied by 0.5 to give the SAR value at 50% duty cycle.

SAR Data Summary – 750 MHz LTE Band 12

MEASUREMENT RESULTS

Gap	Plot	Position	Frequency		BW/ Modulation	RB Size	RB Offset	MPR Target	End Power	Measured SAR (W/kg)	Reported SAR (W/kg)
			MHz	Ch.					(dBm)		
25 mm	3	Face	707.5	23095	10 MHz/QPSK	1	24	0	23.9	0.115	0.17
	-----		707.5	23095	10 MHz/QPSK	25	13	1	22.3	0.084	0.15
0 mm	-----	Body	704.0	23060	10 MHz/QPSK	1	24	0	23.5	0.109	0.18
	4		707.5	23095	10 MHz/QPSK	1	24	0	23.9	0.125	0.19
	-----		711.0	23129	10 MHz/QPSK	1	24	0	23.5	0.113	0.19
	-----		707.5	23095	10 MHz/QPSK	25	13	1	22.3	0.0956	0.17

Head & Body
1.6 W/kg (mW/g)
averaged over 1 gram

1. SAR Measurement
   Phantom Configuration ☐Left Head ☒Eli4 ☐Right Head
   SAR Configuration ☐Head ☒Body
2. Test Signal Call Mode ☐Test Code ☒Base Station Simulator
3. Test Configuration ☐With Belt Clip ☐Without Belt Clip ☒N/A
4. Tissue Depth is at least 15.0 cm

Jay M. Moulton
Vice President

SAR Data Summary – 835 MHz Band 5 - WCDMA

MEASUREMENT RESULTS										
Gap	Plot	Frequency		Modulation	Position	End Power	RMC	Test Set Up	Measured SAR (W/kg)	Reported SAR (W/kg)
		MHz	Ch.			(dBm)				
25 mm	5	836.6	4183	WCDMA	Face	23.94	12.2 kbps	Test Loop 1	0.0876	0.11
0 mm	----	826.4	4132	WCDMA	Body	23.69	12.2 kbps	Test Loop 1	0.101	0.14
	6	836.6	4183	WCDMA		23.94	12.2 kbps	Test Loop 1	0.119	0.15
	----	846.6	4233	WCDMA		23.64	12.2 kbps	Test Loop 1	0.108	0.15
						Head & Body **1.6 W/kg (mW/g)** averaged over 1 gram				

1. SAR Measurement
   Phantom Configuration ☐Left Head ☒Eli4 ☐Right Head
   SAR Configuration ☐Head ☒Body
2. Test Signal Call Mode ☐Test Code ☒Base Station Simulator
3. Test Configuration ☐With Belt Clip ☐Without Belt Clip ☒N/A
4. Tissue Depth is at least 15.0 cm

Jay M. Moulton
Vice President

SAR Data Summary – 1750 MHz LTE Band 4

MEASUREMENT RESULTS

Gap	Plot	Position	Frequency		BW/ Modulation	RB Size	RB Offset	MPR Target	End Power	Measured SAR (W/kg)	Reported SAR (W/kg)
			MHz	Ch.					(dBm)		
25 mm	-----	Face	1720.0	20050	20 MHz/QPSK	1	49	0	23.4	0.148	0.25
	7		1732.5	20175	20 MHz/QPSK	1	49	0	23.8	0.167	0.26
	-----		1745.0	20300	20 MHz/QPSK	1	49	0	23.6	0.152	0.25
	-----		1732.5	20175	20 MHz/QPSK	50	24	1	22.5	0.127	0.21
0 mm	8	Body	1732.5	20175	20 MHz/QPSK	1	49	0	23.8	0.0685	0.11
	-----		1732.5	20175	20 MHz/QPSK	50	24	1	22.5	0.0532	0.09
							Head & Body **1.6 W/kg (mW/g)** averaged over 1 gram				

1. SAR Measurement
   Phantom Configuration ☐Left Head ☒Eli4 ☐Right Head
   SAR Configuration ☐Head ☒Body
2. Test Signal Call Mode ☐Test Code ☒Base Station Simulator
3. Test Configuration ☐With Belt Clip ☐Without Belt Clip ☒N/A
4. Tissue Depth is at least 15.0 cm

Jay M. Moulton
Vice President

SAR Data Summary – 1900 MHz Band 2 - WCDMA

MEASUREMENT RESULTS

Gap	Plot	Frequency		Modulation	Position	End Power	RMC	Test Set Up	Measured SAR (W/kg)	Reported SAR (W/kg)
		MHz	Ch.			(dBm)				
25 mm	----	1852.4	9262	WCDMA	Face	23.82	12.2 kbps	Test Loop 1	0.113	0.15
	9	1880.0	9400	WCDMA		23.87	12.2 kbps	Test Loop 1	0.152	0.20
	----	1907.6	9538	WCDMA		23.85	12.2 kbps	Test Loop 1	0.136	0.18
0 mm	10	1880.0	9400	WCDMA	Body	23.87	12.2 kbps	Test Loop 1	0.0488	0.06
						Head & Body **1.6 W/kg (mW/g)** averaged over 1 gram				

1. SAR Measurement
   Phantom Configuration ☐Left Head ☒Eli4 ☐Right Head
   SAR Configuration ☐Head ☒Body
2. Test Signal Call Mode ☐Test Code ☒Base Station Simulator
3. Test Configuration ☐With Belt Clip ☐Without Belt Clip ☒N/A
4. Tissue Depth is at least 15.0 cm

Jay M. Moulton
Vice President

SAR Data Summary – 1900 MHz LTE Band 2

MEASUREMENT RESULTS

Gap	Plot	Position	Frequency		BW/ Modulation	RB Size	RB Offset	MPR Target	End Power	Measured SAR (W/kg)	Reported SAR (W/kg)
			MHz	Ch.					(dBm)		
25 mm	-----	Face	1860.0	18700	20 MHz/QPSK	1	49	0	23.9	0.160	0.24
	11		1880.0	18900	20 MHz/QPSK	1	49	0	23.7	0.177	0.28
	-----		1900.0	19100	20 MHz/QPSK	1	49	0	23.5	0.152	0.25
	-----		1880.0	18900	20 MHz/QPSK	50	24	1	22.9	0.126	0.19
0 mm	12	Body	1880.0	18900	20 MHz/QPSK	1	49	0	23.7	0.128	0.20
	-----		1880.0	18900	20 MHz/QPSK	50	24	1	22.9	0.094	0.14

Head & Body
1.6 W/kg (mW/g)
averaged over 1 gram

1. SAR Measurement
   Phantom Configuration ☐Left Head ☒Eli4 ☐Right Head
   SAR Configuration ☐Head ☒Body
2. Test Signal Call Mode ☐Test Code ☒Base Station Simulator
3. Test Configuration ☐With Belt Clip ☐Without Belt Clip ☒N/A
4. Tissue Depth is at least 15.0 cm

Jay M. Moulton
Vice President

SAR Data Summary – 2450 MHz - BT

MEASUREMENT RESULTS								
Gap	**Plot**	**Frequency**		**Modulation**	**Position**	**End Power**	**Measured SAR (W/kg)**	**Reported SAR (W/kg)**
		MHz	**Ch.**			**(dBm)**		
25 mm	----	2442	39	GMSK	Face	11.0	0.0526	0.05
0 mm	----	2442	39	GMSK	Body	11.0	0.0795	0.08

Head & Body
1.6 W/kg (mW/g)
averaged over 1 gram

1. SAR Measurement
   Phantom Configuration ☐Left Head ☒Eli4 ☐Right Head
   SAR Configuration ☐Head ☒Body
2. Test Signal Call Mode ☐Test Code ☒Base Station Simulator
3. Test Configuration ☐With Belt Clip ☐Without Belt Clip ☒N/A
4. Tissue Depth is at least 15.0 cm

Jay M. Moulton
Vice President

Note: Only the mid channel was tested as the low and high channel are not required based on KDB447498 D01 v06 section 4.4.1 a).

SAR Data Summary – Simultaneous Evaluation

MEASUREMENT RESULTS – WWAN & BT

Frequency		Modulation	Conf.	Frequency		Modulation	SAR$_1$	SAR$_2$	SAR Total
MHz	**Ch.**			**MHz**	**Ch.**				
1880	18900	QPSK	Body	2442	39	GMSK	0.28	0.08	0.36

Head & Body
1.6 W/kg (mW/g)
averaged over 1 gram

The sum of the two transmitters is less than the limit; therefore, the simultaneous transmission meets the requirements of KDB447498 D01 v06 section 4.3.2 page 13.

SAR Data Summary – Simultaneous Evaluation

The VHF and BT transmitters use two different limit requirements. Therefore, the simultaneous transmission is evaluated based on a ratio to the each limit.

The highest value for the BT is 0.08 W/kg. The limit for the BT is 1.6 W/kg. The ratio is the measured value divided by the limit.

The highest value for the VHF band is 2.76 W/kg. The limit for the VHF band is 8.0 W/kg. The ratio is the measured value divided by the limit.

2.76/8.0=0.345

The highest value for the BT band is 0.11. The limit for the BT band is 1.6 W/kg. The ratio is the calculated value divided by the limit.

0.08/1.6=0.05

The sum of the two transmitters is 0.05 + 0.345 = 0.395 = 0.40.

The sum of the two transmitter’s ratio is less than 1; therefore, the simultaneous transmission meets the requirements of KDB447498 D01 v06 section 4.3.2 page 13.

11. Test Equipment List

Table 11.1 Equipment Specifications

Type	Calibration Due Date	Calibration Done Date	Serial Number
Staubli Robot TX60L	N/A	N/A	F07/55M6A1/A/01
Measurement Controller CS8c	N/A	N/A	1012
ELI5 Flat Phantom	N/A	N/A	2037
Device Holder	N/A	N/A	N/A
Data Acquisition Electronics 4	04/21/2021	04/21/2020	1416
Data Acquisition Electronics 4	01/17/2024	01/17/2023	1321
SPEAG E-Field Probe EX3DV4	07/14/2021	07/14/2020	7531
SPEAG E-Field Probe EX3DV4	04/20/2024	04/20/2023	7531
Speag Validation CLA150	11/15/2021	11/15/2019	4002
Speag Validation CLA150	11/08/2023	11/08/2022	4002
Speag Validation Dipole D750V3	07/13/2021	07/13/2018	1016
Speag Validation Dipole D835V3	07/13/2021	07/13/2018	4d089
Speag Validation Dipole D1750V2	07/20/2021	07/20/2018	1018
Speag Validation Dipole D1900V2	07/13/2021	07/13/2018	5d116
Agilent N1911A Power Meter	04/27/2021	04/27/2020	GB45100254
Agilent N1922A Power Sensor	04/27/2021	04/27/2020	MY45240464
Advantest R3261A Spectrum Analyzer	03/16/2021	03/16/2020	31720068
Agilent (HP) 8350B Signal Generator	03/16/2021	03/16/2020	2749A10226
Agilent (HP) 83525A RF Plug-In	03/16/2021	03/16/2020	2647A01172
Agilent (HP) 8753C Vector Network Analyzer	03/16/2021	03/16/2020	3135A01724
Agilent (HP) 85047A S-Parameter Test Set	03/17/2021	03/17/2020	2904A00595
Agilent (HP) 8960 Base Station Sim.	05/31/2021	05/31/2020	MY48360364
Anritsu MT8820C	N/A	N/A	6201176199
Agilent N1911A Power Meter	03/14/2024	03/14/2023	GB45100254
Agilent N1922A Power Sensor	03/13/2024	03/13/2023	MY45240464
Agilent (HP) 8596E Spectrum Analyzer	03/13/2024	03/13/2023	3826A01468
Agilent (HP) 83752A Synthesized Sweeper	03/14/2024	03/14/2023	3610A01048
Agilent (HP) 8753C Vector Network Analyzer	03/14/2024	03/14/2023	3135A01724
Agilent (HP) 85047A S-Parameter Test Set	03/14/2024	03/14/2023	2904A00595
Copper Mountain R140 Vector Reflectometer	03/13/2024	03/13/2023	21390004
MiniCircuits BW-N20W5+ Fixed 20 dB Attenuator	N/A	N/A	N/A
MiniCircuits SPL-10.7+ Low Pass Filter	N/A	N/A	R8979513746
Aprel Dielectric Probe Assembly	N/A	N/A	0011
Head Equivalent Matter (150 MHz)	N/A	N/A	N/A
Head Equivalent Matter (750 MHz)	N/A	N/A	N/A
Head Equivalent Matter (835 MHz)	N/A	N/A	N/A
Head Equivalent Matter (1750 MHz)	N/A	N/A	N/A
Head Equivalent Matter (1900 MHz)	N/A	N/A	N/A

12. Conclusion

The SAR measurement indicates that the EUT complies with the RF radiation exposure limits of the FCC/IC. These measurements are taken to simulate the RF effects exposure under worst-case conditions. Precise laboratory measures were taken to assure repeatability of the tests. The tested device complies with the requirements in respect to all parameters subject to the test. The test results and statements relate only to the item(s) tested.

Please note that the absorption and distribution of electromagnetic energy in the body is a very complex phenomena that depends on the mass, shape, and size of the body; the orientation of the body with respect to the field vectors; and, the electrical properties of both the body and the environment. Other variables that may play a substantial role in possible biological effects are those that characterize the environment (e.g. ambient temperature, air velocity, relative humidity, and body insulation) and those that characterize the individual (e.g. age, gender, activity level, debilitation, or disease). Because innumerable factors may interact to determine the specific biological outcome of an exposure to electromagnetic fields, any protection guide shall consider maximal amplification of biological effects as a result of field-body interactions, environmental conditions, and physiological variables. [3]

13. References

[1] Federal Communications Commission, ET Docket 93-62, Guidelines for Evaluating the Environmental Effects of Radio Frequency Radiation, August 1996

[2] ANSI/IEEE C95.1 – 1992, American National Standard Safety Levels with respect to Human Exposure to Radio Frequency Electromagnetic Fields, 300kHz to 100GHz, New York: IEEE, 1992.

[3] ANSI/IEEE C95.3 – 1992, IEEE Recommended Practice for the Measurement of Potentially Hazardous Electromagnetic Fields – RF and Microwave, New York: IEEE, 1992.

[4] International Electrotechnical Commission, IEC 62209-2 (Edition 1.0), Human Exposure to radio frequency fields from hand-held and body mounted wireless communication devices – Human models, instrumentation, and procedures – Part 2: Procedure to determine the specific absorption rate (SAR) for wireless communication devices used in close proximity to the human body (frequency range of 30 MHz to 6 GHz), March 2010.

[5] IEEE Standard 1528 – 2013, IEEE Recommended Practice for Determining the Peak-Spatial Average Specific Absorption Rate (SAR) in the Human Head from Wireless Communication Devices: Measurement Techniques, June 2013.

[6] Industry Canada, RSS – 102 Issue 5 Draft, Radio Frequency Exposure Compliance of Radiocommunication Apparatus (All Frequency Bands), March 2014.

[7] Health Canada, Safety Code 6, Limits of Human Exposure to Radiofrequency Electromagnetic Fields in the Frequency Range from 3kHz to 300 GHz, 2009.

Appendix A – System Validation Plots and Data

```
************************************************************
Test Result for UIM Dielectric Parameter
Wed 02/Dec/2020
Freq   Frequency(GHz)
FCC_eH Limits for Head Epsilon
FCC_sH Limits for Head Sigma
Test_e Epsilon of UIM
Test_s Sigma of UIM
************************************************************
Freq         FCC_eH FCC_sH Test_e Test_s
0.1300       53.23  0.75   53.12  0.76
0.1360       52.954 0.75   52.886 0.766*
0.1400       52.77  0.75   52.73  0.77
0.1450       52.535 0.755  52.525 0.775*
0.1500       52.30  0.76   52.32  0.78
0.1550       52.065 0.765  52.105 0.785*
0.1600       51.83  0.77   51.89  0.79
0.1640       51.646 0.77   51.726 0.79*
0.1700       51.37  0.77   51.48  0.79
0.1740       51.182 0.774  51.308 0.794*
0.1800       50.90  0.78   51.05  0.80
0.1900       50.43  0.79   50.64  0.81

* value interpolated
```

```
************************************************************
Test Result for UIM Dielectric Parameter
Fri 11/Dec/2020
Freq   Frequency(GHz)
FCC_eH Limits for Head Epsilon
FCC_sH Limits for Head Sigma
Test_e Epsilon  of  UIM
Test_s Sigma of UIM
************************************************************
Freq         FCC_eH FCC_sH Test_e Test_s
0.7000       42.20  0.89   41.85  0.89
0.7040       42.18  0.89   41.822 0.894*
0.7075       42.163 0.89   41.798 0.898*
0.7100       42.15  0.89   41.78  0.90
0.7110       42.145 0.89   41.775 0.901*
0.7200       42.10  0.89   41.73  0.91
0.7300       42.05  0.89   41.66  0.91
0.7400       41.99  0.89   41.60  0.91
0.7500       41.94  0.89   41.55  0.91
0.7600       41.89  0.89   41.49  0.92
0.7700       41.84  0.89   41.43  0.92
0.7800       41.79  0.90   41.37  0.92
0.7900       41.73  0.90   41.31  0.93
0.8000       41.68  0.90   41.27  0.93

* value interpolated
```

```
************************************************************
Test Result for UIM Dielectric Parameter
Thu 10/Dec/2020
Freq   Frequency(GHz)
eH     Limits for Head Epsilon
sH     Limits for Head Sigma
Test_e Epsilon  of  UIM
Test_s Sigma of UIM
************************************************************
Freq          eH     sH     Test_e Test_s
0.8000        41.68  0.90   41.31  0.92
0.8100        41.63  0.90   41.26  0.93
0.8200        41.58  0.90   41.2   0.94
0.8290        41.535 0.90   41.245 0.94*
0.8300        41.53  0.90   41.25  0.94
0.8350        41.515 0.905  41.235 0.945*
0.8366        41.511 0.907  41.231 0.947*
0.8400        41.50  0.91   41.22  0.95
0.8420        41.50  0.912  41.216 0.952*
0.8440        41.50  0.914  41.212 0.954*
0.8470        41.50  0.917  41.206 0.957*
0.8500        41.50  0.92   41.20  0.96
0.8520        41.50  0.922  41.196 0.962*
0.8600        41.50  0.93   41.18  0.97
0.8700        41.50  0.94   41.17  0.98

* value interpolated
```

```
************************************************************
Test Result for UIM Dielectric Parameter
Wed 09/Dec/2020
Freq   Frequency(GHz)
eH Limits for Head Epsilon
sH Limits for Head Sigma
Test_e Epsilon  of  UIM
Test_s Sigma of UIM
************************************************************
Freq          eH     sH     Test_e Test_s
1.7000        40.16  1.34   39.73  1.38
1.7100        40.14  1.35   39.71  1.39
1.7200        40.13  1.35   39.69  1.40
1.7300        40.11  1.36   39.67  1.40
1.7325        40.105 1.363  39.665 1.403*
1.7400        40.09  1.37   39.65  1.41
1.7450        40.085 1.37   39.64  1.415*
1.7475        40.083 1.37   39.635 1.418*
1.7500        40.08  1.37   39.63  1.42
1.7600        40.06  1.38   39.61  1.43
1.7700        40.05  1.38   39.59  1.44
1.7750        40.04  1.385  39.58  1.44*
1.7800        40.03  1.39   39.57  1.44
1.7900        40.02  1.39   39.55  1.45

* value interpolated
```

```
************************************************************
Test Result for UIM Dielectric Parameter
Tue 08/Dec/2020
Freq   Frequency(GHz)
FCC_eH Limits for Head Epsilon
FCC_sH Limits for Head Sigma
Test_e Epsilon  of  UIM
Test_s Sigma of UIM
************************************************************
Freq          FCC_eH FCC_sH Test_e Test_s
1.8500        40.00  1.40   39.52  1.41
1.8524        40.00  1.40   39.515 1.412*
1.8600        40.00  1.40   39.50  1.42
1.8700        40.00  1.40   39.48  1.43
1.8800        40.00  1.40   39.47  1.44
1.8900        40.00  1.40   39.46  1.44
1.9000        40.00  1.40   39.46  1.46
1.9076        40.00  1.40   39.445 1.468*
1.9100        40.00  1.40   39.44  1.47
1.9200        40.00  1.40   39.43  1.47
1.9224        40.00  1.40   39.423 1.47*
1.9300        40.00  1.40   39.40  1.47
1.9400        40.00  1.40   39.38  1.48
1.9500        40.00  1.40   39.36  1.48
1.9600        40.00  1.40   39.34  1.49
1.9700        40.00  1.40   39.31  1.49
1.9776        40.00  1.40   39.295 1.49*
1.9800        40.00  1.40   39.29  1.49


*value interpolated
```

```
************************************************************
Test Result for UIM Dielectric Parameter
Wed 05/Jul/2023
Freq   Frequency(GHz)
FCC_eH FCC Limits for Head Epsilon
FCC_sH FCC Limits for Head Sigma
Test_e Epsilon  of  UIM
Test_s Sigma of UIM
************************************************************
Freq          FCC_eH FCC_sH Test_e Test_s
0.1300        53.23  0.75   53.13  0.77
0.1400        52.77  0.75   52.66  0.77
0.1500        52.30  0.76   52.18  0.78
0.1550        52.065 0.765  51.945 0.785*
0.1600        51.83  0.77   51.71  0.79
0.1650        51.60  0.77   51.485 0.79*
0.1700        51.37  0.77   51.26  0.79
0.1800        50.90  0.78   50.79  0.80
0.1900        50.43  0.79   50.34  0.80

* value interpolated
```

```
************************************************************
Test Result for UIM Dielectric Parameter
Wed 05/Jul/2023
Freq   Frequency(GHz)
FCC_eH Limits for Head Epsilon
FCC_sH Limits for Head Sigma
Test_e Epsilon  of  UIM
Test_s Sigma of UIM
************************************************************
Freq         FCC_eH FCC_sH Test_e Test_s
2.4000       39.27  1.75   38.66  1.79
2.4020       39.268 1.752  38.656 1.792*
2.4100       39.26  1.76   38.64  1.80
2.4200       39.25  1.77   38.62  1.81
2.4300       39.24  1.78   38.60  1.82
2.4400       39.22  1.79   38.59  1.84
2.4420       39.216 1.792  38.58  1.842*
2.4500       39.20  1.80   38.54  1.85
2.4600       39.19  1.81   38.54  1.86
2.4700       39.17  1.82   38.52  1.87
2.4800       39.16  1.83   38.50  1.90

* value interpolated
```

RF Exposure Lab

Plot 1

DUT: Loop 150 MHz CLA150; Type: CLA150; Serial: CLA150 - SN:4002

Communication System: CW; Frequency: 150 MHz; Duty Cycle: 1:1
Medium: HSL150; Medium parameters used: f = 150 MHz; σ = 0.78 S/m; ε_r = 52.32; ρ = 1000 kg/m^3
Phantom section: Flat Section

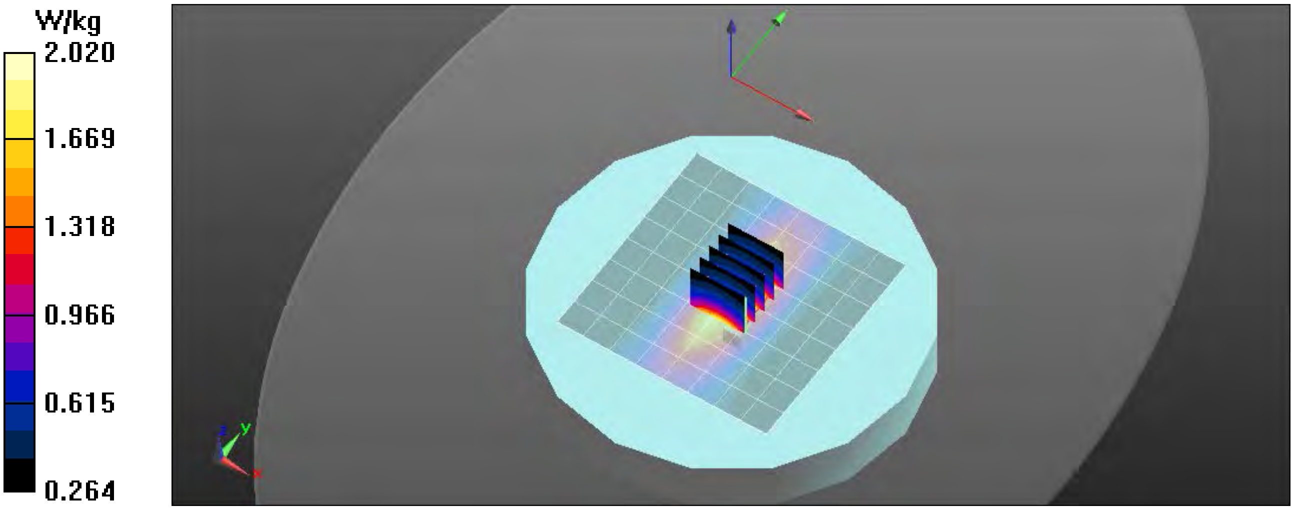
Test Date: Date: 12/2/2020; Ambient Temp: 23 °C; Tissue Temp: 21 °C

Probe: EX3DV4 – SN7531; ConvF(12.88, 12.88, 12.88); Calibrated: 7/14/2020;
Sensor-Surface: 2mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1416; Calibrated: 4/21/2020
Phantom: ELI v5.0; Type: QDOVA002AA; Serial: 2037
Measurement SW: DASY52, Version 52.10 (0); SEMCAD X Version 14.6.10 (7417)

Procedure Notes:

150 MHz Head/Verification/Area Scan (9x9x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (measured) = 1.96 W/kg

150 MHz Head/Verification/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 50.784 V/m; Power Drift = 0.00 dB
Peak SAR (extrapolated) = 3.04 W/kg
SAR(1 g) = 1.94 W/kg; SAR(10 g) = 1.29 W/kg
Maximum value of SAR (measured) = 2.02 W/kg



RF Exposure Lab

Plot 2

DUT: Dipole 750 MHz D750V3; Type: D750V3; Serial: D750V3 - SN 1016

Communication System: CW; Frequency: 750 MHz; Duty Cycle: 1:1
Medium: HSL750; Medium parameters used (interpolated): f = 750 MHz; σ = 0.91 S/m; ε_r = 41.55; ρ = 1000 kg/m^3
Phantom section: Flat Section

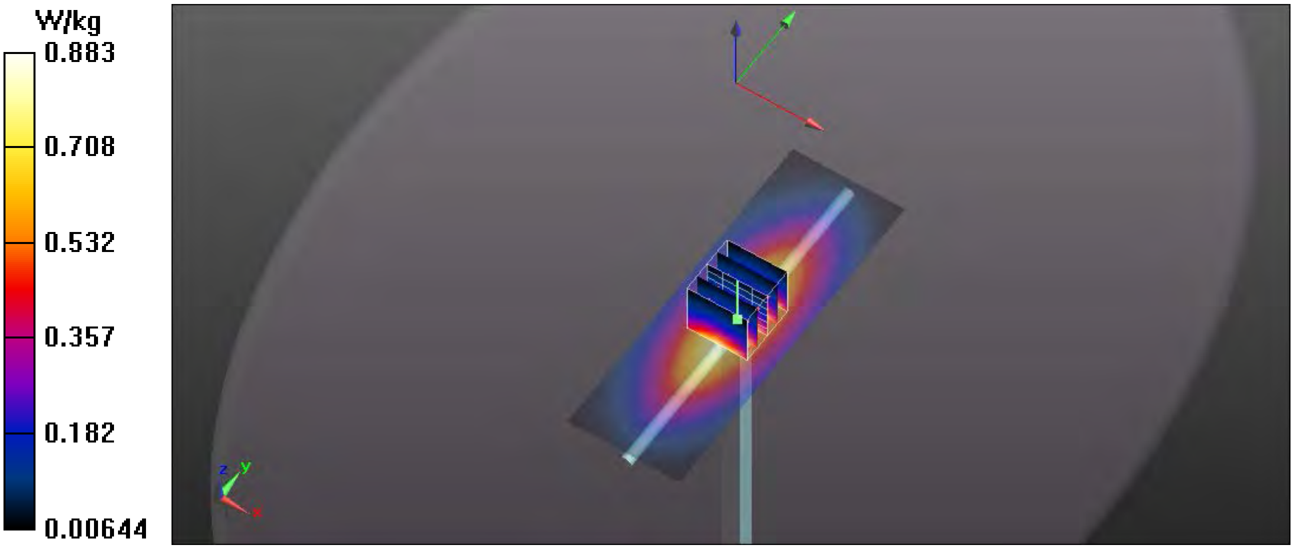
Test Date: Date: 12/11/2020; Ambient Temp: 23 °C; Tissue Temp: 21 °C

Probe: EX3DV4 – SN7531; ConvF(10.64, 10.64, 10.64); Calibrated: 7/14/2020;
Sensor-Surface: 2mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1416; Calibrated: 4/21/2020
Phantom: ELI v5.0; Type: QDOVA002AA; Serial: 2037
Measurement SW: DASY52, Version 52.10 (0); SEMCAD X Version 14.6.10 (7417)

Procedure Notes:

750 MHz Head/Verification/Area Scan (41x121x1): Interpolated grid: dx=1.500 mm, dy=1.500 mm
Maximum value of SAR (interpolated) = 0.752 W/kg

750 MHz Head/Verification /Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 35.839 V/m; Power Drift = -0.02 dB
Peak SAR (extrapolated) = 1.693 mW/g
P_{in}= 100 mW
SAR(1 g) = 0.826 mW/g; SAR(10 g) = 0.535 mW/g
Maximum value of SAR (measured) = 0.883 W/kg



RF Exposure Lab

Plot 3

DUT: Dipole 835 MHz D835V2; Type: D835V2; Serial: D835V2 - SN:4d089

Communication System: CW; Frequency: 835 MHz; Duty Cycle: 1:1
Medium: HSL835; Medium parameters used (interpolated): f = 835 MHz; σ = 0.945 S/m; ε_r = 41.235; ρ = 1000 kg/m^3
Phantom section: Flat Section

Test Date: Date: 12/10/2020; Ambient Temp: 23 °C; Tissue Temp: 21 °C
Probe: EX3DV4 – SN7531; ConvF(10.26, 10.26, 10.26); Calibrated: 7/14/2020;
Sensor-Surface: 2mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1416; Calibrated: 4/21/2020
Phantom: ELI v5.0; Type: QDOVA002AA; Serial: 2037
Measurement SW: DASY52, Version 52.10 (0); SEMCAD X Version 14.6.10 (7417)

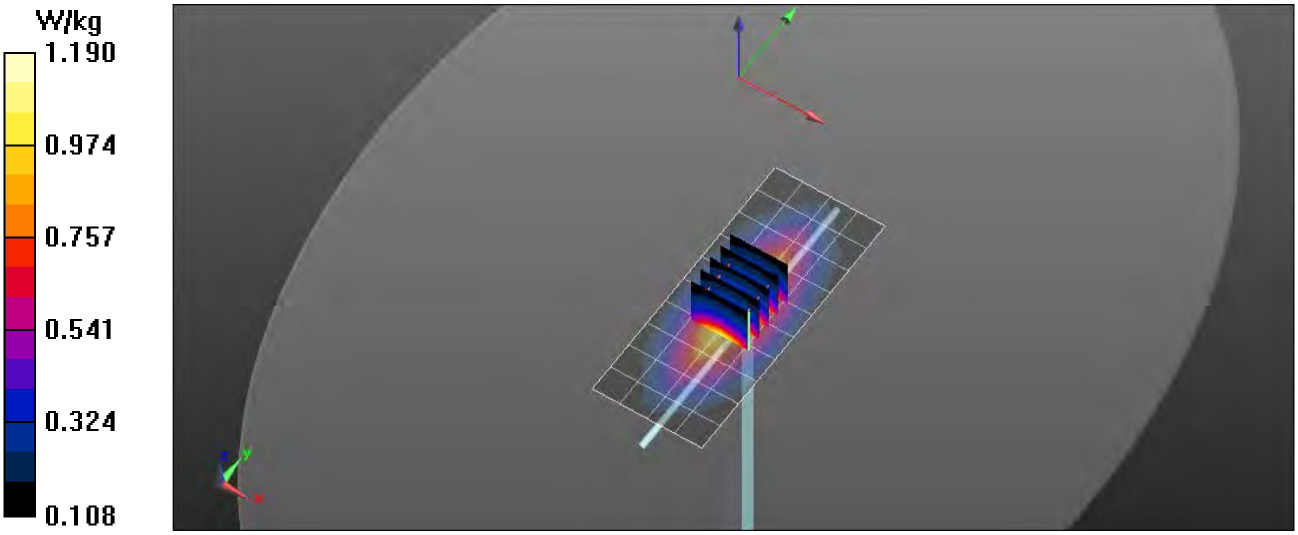
Procedure Notes:

835 MHz/Verification/Area Scan (5x11x1): Measurement grid: dx=15mm, dy=15mm

Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (measured) = 1.13 W/kg

835 MHz/Verification/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 33.125 V/m; Power Drift = -0.01 dB
Peak SAR (extrapolated) = 1.46 W/kg
Pin=100 mW
SAR(1 g) = 0.949 W/kg; SAR(10 g) = 0.614 W/kg

Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (measured) = 1.21 W/kg



Plot 4

DUT: Dipole 1750 MHz D1750V2; Type: D1750V2; Serial: D1750V2 - SN: 1018

Communication System: CW; Frequency: 1750 MHz; Duty Cycle: 1:1
Medium: HSL1750; Medium parameters used: f = 1750 MHz; σ = 1.42 S/m; ε_r = 39.63; ρ = 1000 kg/m^3
Phantom section: Flat Section

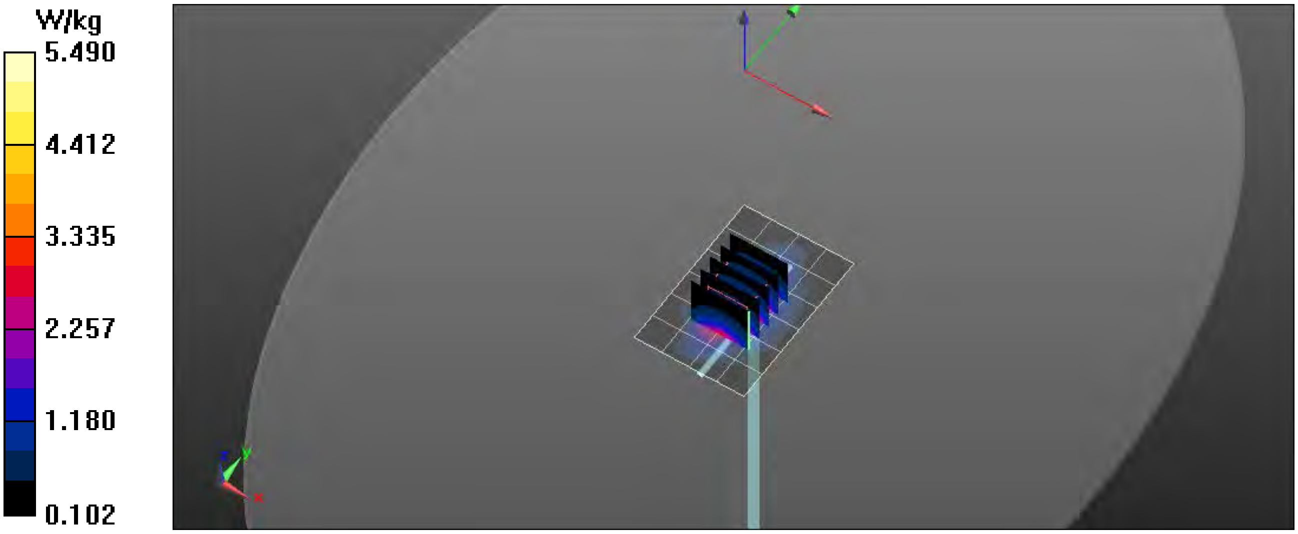
Test Date: Date: 12/9/2020; Ambient Temp: 23 °C; Tissue Temp: 21 °C

Probe: EX3DV4 – SN7531; ConvF(8.55, 8.55, 8.55); Calibrated: 7/14/2020;
Sensor-Surface: 2mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1416; Calibrated: 4/21/2020
Phantom: ELI v5.0; Type: QDOVA002AA; Serial: 2037
Measurement SW: DASY52, Version 52.10 (0); SEMCAD X Version 14.6.10 (7417)

Procedure Notes:

1750 MHz/Verification/Area Scan (5x7x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (measured) = 5.22 W/kg

1750 MHz/Verification/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 35.426 V/m; Power Drift = -0.01 dB
Peak SAR (extrapolated) = 6.88 W/kg
Pin=100 mW
SAR(1 g) = 3.67 W/kg; SAR(10 g) = 1.91 W/kg
Maximum value of SAR (measured) = 5.49 W/kg



RF Exposure Lab

Plot 5

DUT: Dipole 1900 MHz D1900V2; Type: D1900V2; Serial: D1900V2 - SN: 5d116

Communication System: CW; Frequency: 1900 MHz; Duty Cycle: 1:1
Medium: HSL1900; Medium parameters used: f = 1900 MHz; σ = 1.46 S/m; ε_r = 39.46; ρ = 1000 kg/m^3
Phantom section: Flat Section

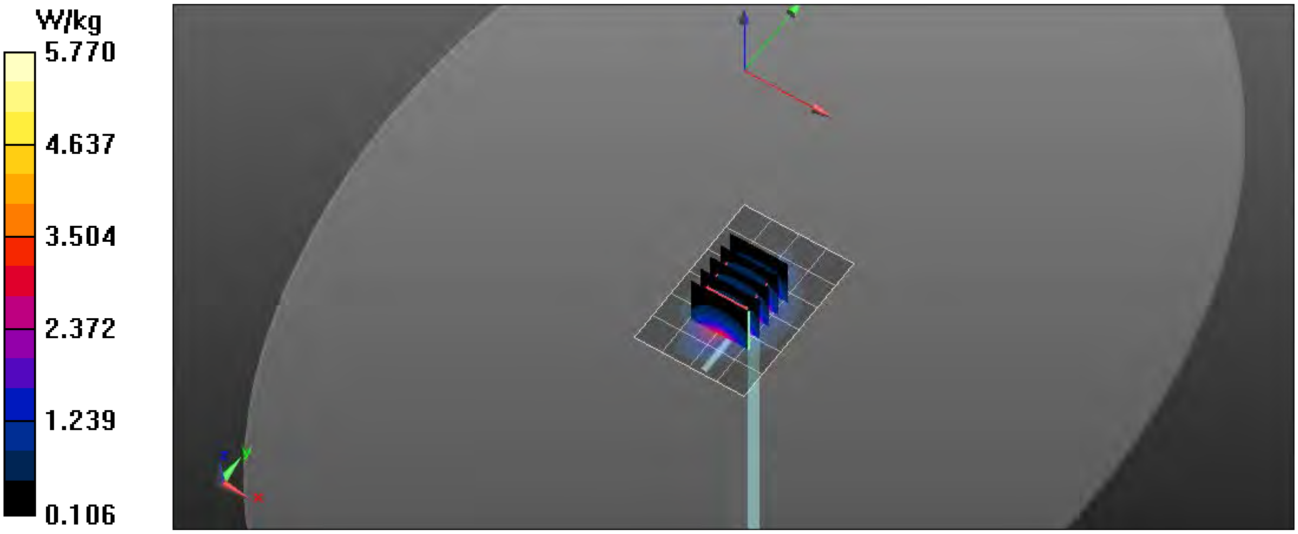
Test Date: Date: 12/8/2020; Ambient Temp: 23 °C; Tissue Temp: 21 °C

Probe: EX3DV4 – SN7531; ConvF(8.22, 8.22, 8.22); Calibrated: 7/14/2020;
Sensor-Surface: 2mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1416; Calibrated: 4/21/2020
Phantom: ELI v5.0; Type: QDOVA002AA; Serial: 2037
Measurement SW: DASY52, Version 52.10 (0); SEMCAD X Version 14.6.10 (7417)

Procedure Notes:

1900 MHz/Verification/Area Scan (5x7x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (measured) = 5.41 W/kg

1900 MHz/Verification/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 33.114 V/m; Power Drift = -0.03 dB
Peak SAR (extrapolated) = 7.18 W/kg
Pin=100 mW
SAR(1 g) = 4.09 W/kg; SAR(10 g) = 2.13 W/kg
Maximum value of SAR (measured) = 5.76 W/kg



RF Exposure Lab

Plot 6

DUT: Loop 150 MHz CLA150; Type: CLA150; Serial: CLA150 - SN:4002

Communication System: CW; Frequency: 150 MHz; Duty Cycle: 1:1
Medium: HSL300; Medium parameters used: f = 150 MHz; σ = 0.78 S/m; ε_r = 52.18; ρ = 1000 kg/m^3
Phantom section: Flat Section

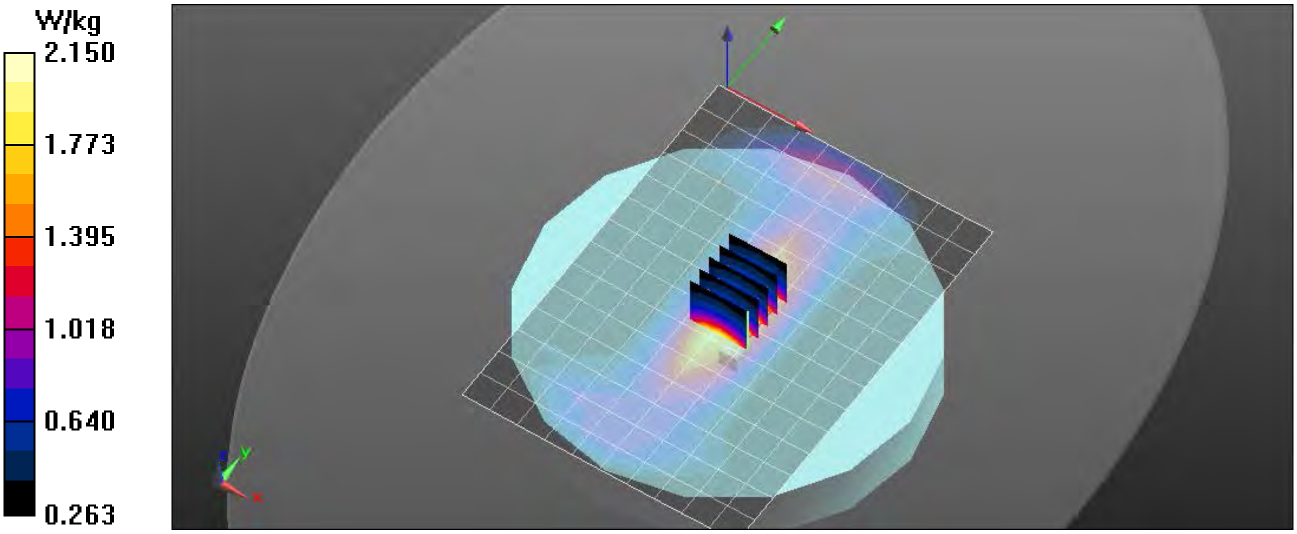
Test Date: Date: 7/5/2023; Ambient Temp: 23 °C; Tissue Temp: 21 °C

Probe: EX3DV4 – SN7531; ConvF(12.62, 12.62, 12.62); Calibrated: 4/20/2023;
Sensor-Surface: 2mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1321; Calibrated: 1/17/2023
Phantom: ELI v4.0; Type: QDOVA001BB; Serial: 1065
Measurement SW: DASY52, Version 52.10 (0); SEMCAD X Version 14.6.10 (7417)

Procedure Notes:

150 MHz Head/Verification/Area Scan (11x15x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (measured) = 2.12 W/kg

150 MHz Head/Verification/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 53.572 V/m; Power Drift = -0.02 dB
Peak SAR (extrapolated) = 3.22 W/kg
SAR(1 g) = 1.95 W/kg; SAR(10 g) = 1.26 W/kg
Maximum value of SAR (measured) = 2.15 W/kg
P_{in} = 500 mW



RF Exposure Lab

Plot 7

DUT: Dipole 2450 MHz D2450V2; Type: D2450V2; Serial: D2450V2 - SN: 881

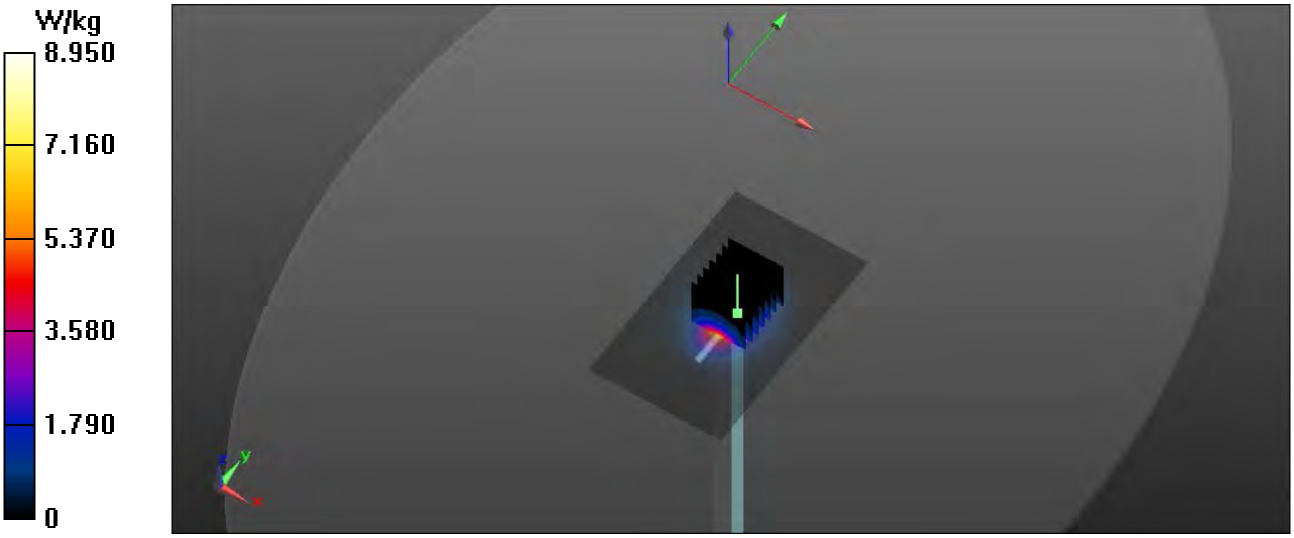
Communication System: CW; Frequency: 2450 MHz; Duty Cycle: 1:1
Medium: HSL2450; Medium parameters used: f = 2450 MHz; σ = 1.85 S/m; ε_r = 38.54; ρ = 1000 kg/m^3
Phantom section: Flat Section

Test Date: Date: 7/5/2023; Ambient Temp: 23 °C; Tissue Temp: 21 °C
Probe: EX3DV4 – SN7531; ConvF(7, 7.18, 7.72); Calibrated: 4/20/2023;
Sensor-Surface: 2mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1321; Calibrated: 1/17/2023
Phantom: ELI v4.0; Type: QDOVA001BB; Serial: 1065
Measurement SW: DASY52, Version 52.10 (0); SEMCAD X Version 14.6.10 (7417)

Procedure Notes:

Head Verification/2450 MHz/Area Scan (61x101x1): Interpolated grid: dx=1.200 mm, dy=1.200 mm
Maximum value of SAR (interpolated) = 8.22 W/kg

Head Verification/2450 MHz/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 53.782 V/m; Power Drift = -0.01 dB
Peak SAR (extrapolated) = 11.02 W/kg
P_{in}= 100 mW
SAR(1 g) = 5.48 W/kg; SAR(10 g) = 2.51 W/kg
Maximum value of SAR (measured) = 8.95 W/kg



Appendix B – SAR Test Data Plots

RF Exposure Lab

Plot 1

DUT: IP730D; Type: PTT; Serial: Eng 1

Communication System: FM; Frequency: 155 MHz; Duty Cycle: 1:1
Medium: HSL150; Medium parameters used (interpolated): f = 155 MHz; σ = 0.785 S/m; ε_r = 52.105; ρ = 1000 kg/m^3
Phantom section: Flat Section

Test Date: Date: 12/2/2020; Ambient Temp: 23 °C; Tissue Temp: 21 °C

Probe: EX3DV4 - SN7531; ConvF(12.88, 12.88, 12.88); Calibrated: 7/14/2020
Sensor-Surface: 2mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1416; Calibrated: 4/21/2020
Phantom: ELI v5.0; Type: QDOVA002AA; Serial: 2037
Measurement SW: DASY52, Version 52.10 (0); SEMCAD X Version 14.6.10 (7417)

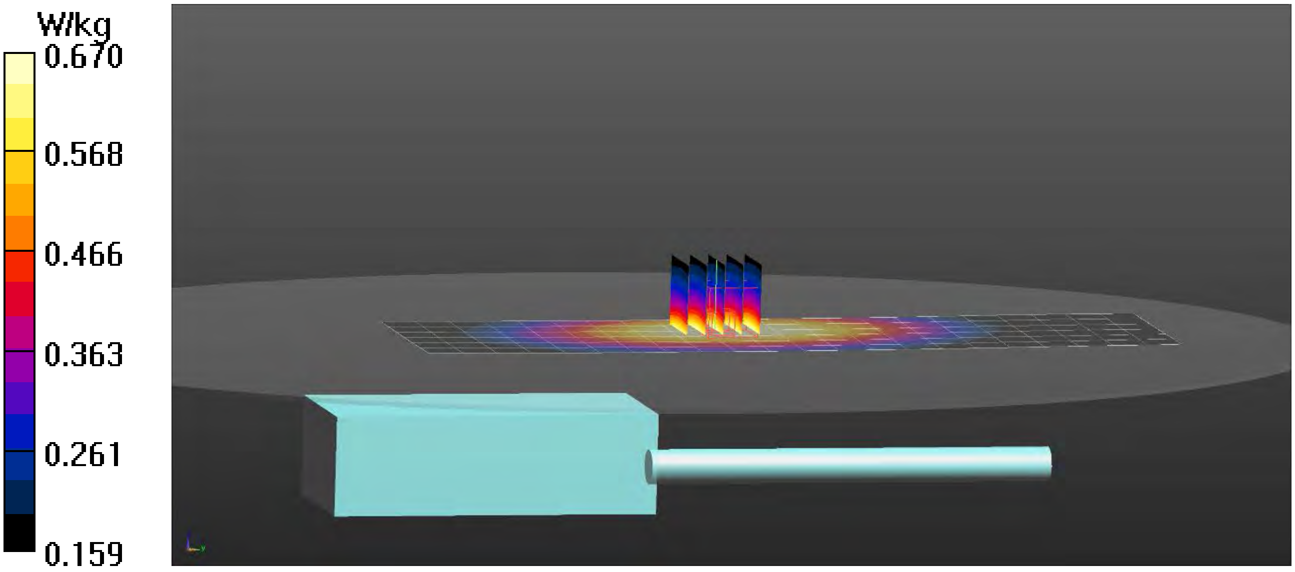
Procedure Notes:

VHF Ant FA-SC61VC/Face Std Bat 155/Area Scan (7x23x1): Measurement grid: dx=15mm, dy=15mm

Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (measured) = 0.697 W/kg

VHF Ant FA-SC61VC/Face Std Bat 155/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 26.97 V/m; Power Drift = -0.46 dB
Peak SAR (extrapolated) = 0.777 W/kg
SAR(1 g) = 0.570 W/kg; SAR(10 g) = 0.445 W/kg

Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (measured) = 0.670 W/kg



RF Exposure Lab

Plot 2

DUT: IP730D; Type: PTT; Serial: Eng 1

Communication System: FM; Frequency: 155 MHz; Duty Cycle: 1:1
Medium: HSL150; Medium parameters used (interpolated): f = 155 MHz; $\sigma = 0.785$ S/m; $\varepsilon_r = 52.105$; $\rho = 1000$ kg/m^3
Phantom section: Flat Section

Test Date: Date: 12/2/2020; Ambient Temp: 23 °C; Tissue Temp: 21 °C

Probe: EX3DV4 - SN7531; ConvF(12.88, 12.88, 12.88); Calibrated: 7/14/2020
Sensor-Surface: 2mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1416; Calibrated: 4/21/2020
Phantom: ELI v5.0; Type: QDOVA002AA; Serial: 2037
Measurement SW: DASY52, Version 52.10 (0); SEMCAD X Version 14.6.10 (7417)

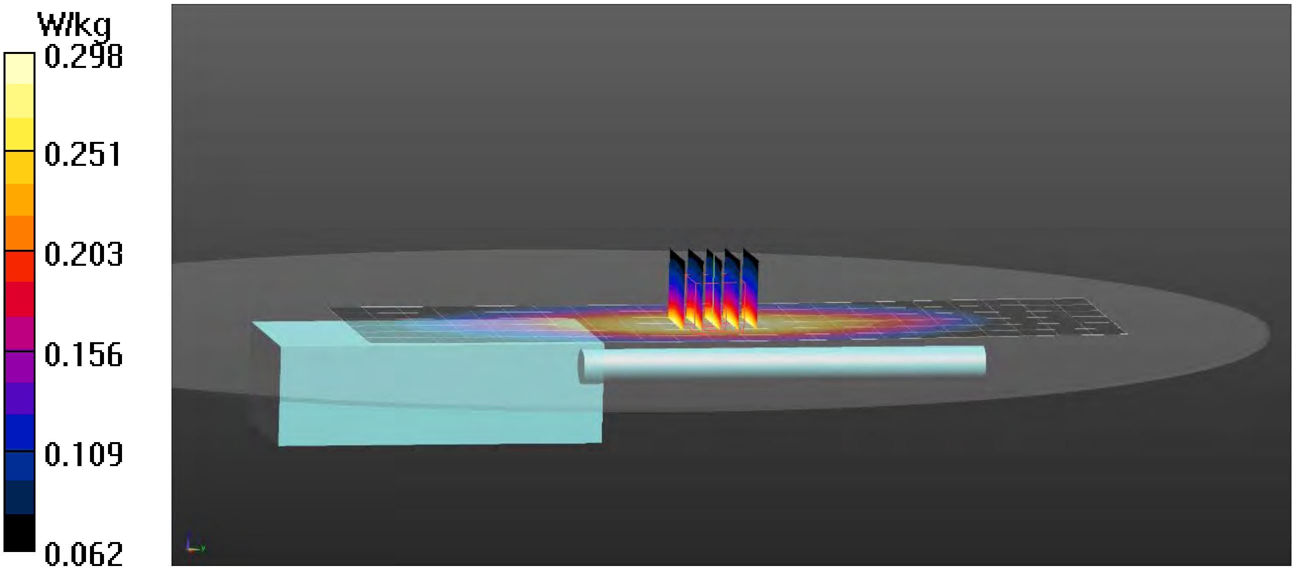
Procedure Notes:

VHF Ant FA-SC61VC/Body Belt Clip Std Bat 155/Area Scan (7x23x1): Measurement grid: dx=15mm, dy=15mm

Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (measured) = 0.301 W/kg

VHF Ant FA-SC61VC/Body Belt Clip Std Bat 155/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 17.18 V/m; Power Drift = -0.59 dB
Peak SAR (extrapolated) = 0.348 W/kg
SAR(1 g) = 0.249 W/kg; SAR(10 g) = 0.189 W/kg

Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (measured) = 0.298 W/kg



RF Exposure Lab

Plot 3

DUT: IP730D; Type: PTT; Serial: Eng 1

Communication System: LTE (SC-FDMA, 1 RB, 10 MHz, QPSK); Frequency: 707.5 MHz; Duty Cycle: 1:1
Medium: HSL750; Medium parameters used (interpolated): f = 707.5 MHz; $\sigma = 0.898$ S/m; $\varepsilon_r = 41.798$; $\rho = 1000$ kg/m^3
Phantom section: Flat Section

Test Date: Date: 12/11/2020; Ambient Temp: 23 °C; Tissue Temp: 21 °C

Probe: EX3DV4 - SN7531; ConvF(10.64, 10.64, 10.64); Calibrated: 7/14/2020
Sensor-Surface: 2mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1416; Calibrated: 4/21/2020
Phantom: ELI v5.0; Type: QDOVA002AA; Serial: 2037
Measurement SW: DASY52, Version 52.10 (0); SEMCAD X Version 14.6.10 (7417)

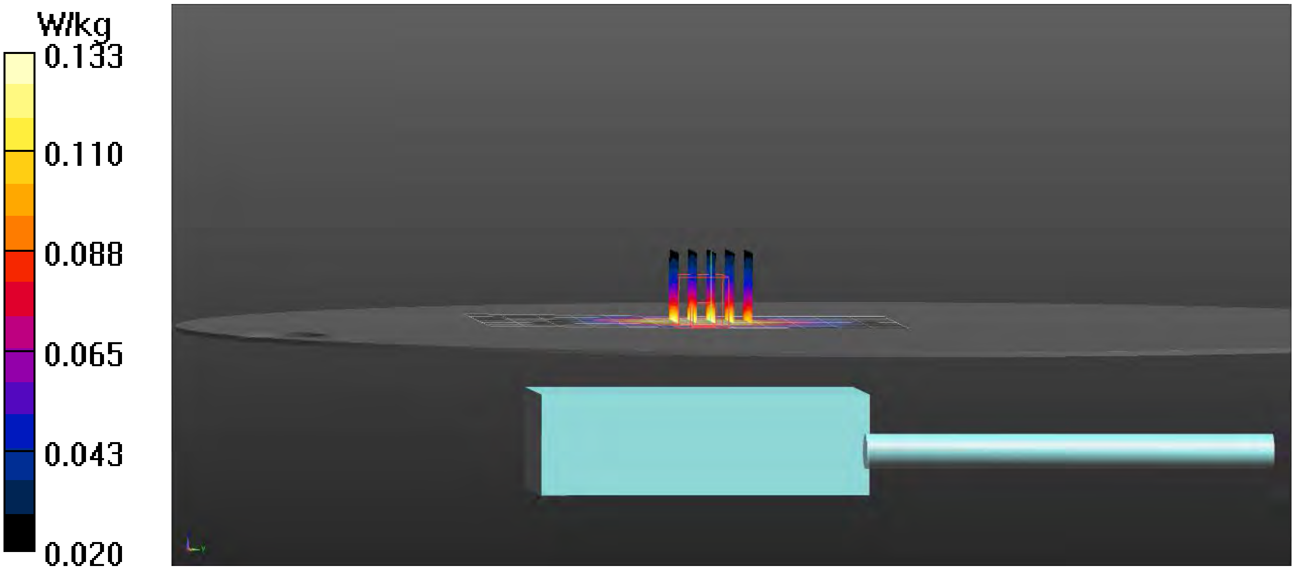
Procedure Notes:

Band 12/Face Std Bat LTE 1 RB 24 Offset Mid/Area Scan (7x13x1): Measurement grid: dx=15mm, dy=15mm

Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (measured) = 0.136 W/kg

Band 12/Face Std Bat LTE 1 RB 24 Offset Mid/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 5.566 V/m; Power Drift = 0.04 dB
Peak SAR (extrapolated) = 0.149 W/kg
SAR(1 g) = 0.115 W/kg; SAR(10 g) = 0.085 W/kg

Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (measured) = 0.133 W/kg



RF Exposure Lab

Plot 4

DUT: IP730D; Type: PTT; Serial: Eng 1

Communication System: LTE (SC-FDMA, 1 RB, 10 MHz, QPSK); Frequency: 707.5 MHz; Duty Cycle: 1:1
Medium: HSL750; Medium parameters used (interpolated): f = 707.5 MHz; σ = 0.898 S/m; ε_r = 41.798; ρ = 1000 kg/m^3
Phantom section: Flat Section

Test Date: Date: 12/11/2020; Ambient Temp: 23 °C; Tissue Temp: 21 °C

Probe: EX3DV4 - SN7531; ConvF(10.64, 10.64, 10.64); Calibrated: 7/14/2020
Sensor-Surface: 2mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1416; Calibrated: 4/21/2020
Phantom: ELI v5.0; Type: QDOVA002AA; Serial: 2037
Measurement SW: DASY52, Version 52.10 (0); SEMCAD X Version 14.6.10 (7417)

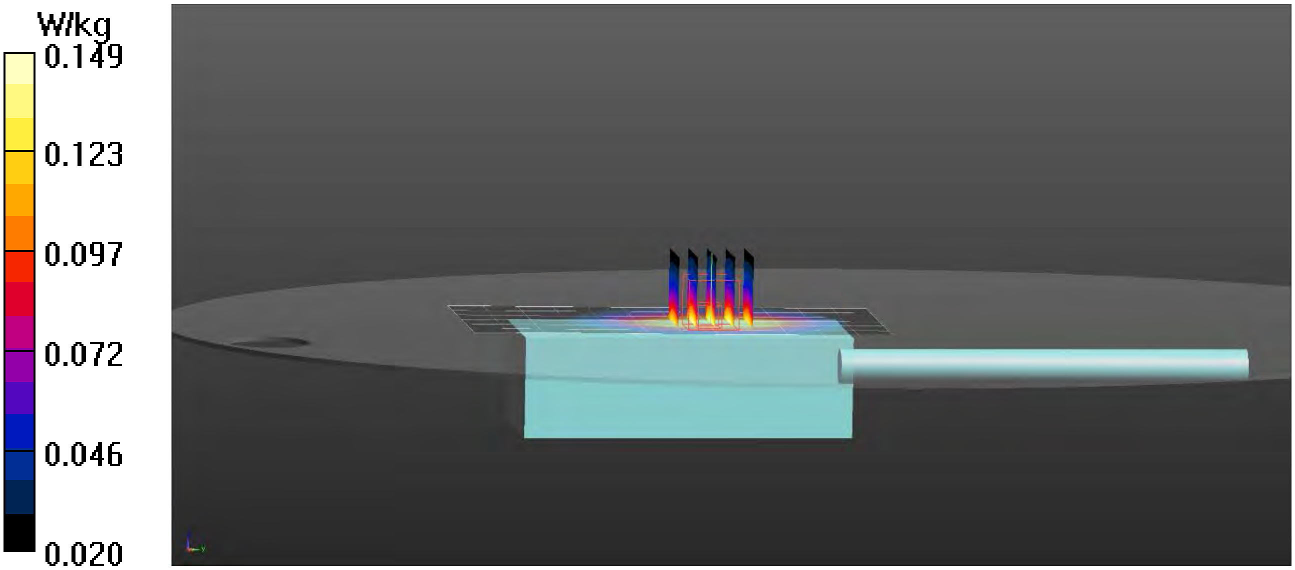
Procedure Notes:

Band 12/Body Belt Clip Std Bat LTE 1 RB 24 Offset Mid/Area Scan (7x13x1): Measurement grid: dx=15mm, dy=15mm

Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (measured) = 0.144 W/kg

Band 12/Body Belt Clip Std Bat LTE 1 RB 24 Offset Mid/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 5.619 V/m; Power Drift = 0.01 dB
Peak SAR (extrapolated) = 0.169 W/kg
SAR(1 g) = 0.125 W/kg; SAR(10 g) = 0.090 W/kg

Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (measured) = 0.149 W/kg



RF Exposure Lab

Plot 5

DUT: IP730D; Type: PTT; Serial: Eng 1

Communication System: UMTS (WCDMA); Frequency: 836.6 MHz; Duty Cycle: 1:1
Medium: HSL835; Medium parameters used (interpolated): f = 836.6 MHz; σ = 0.947 S/m; ε_r = 41.231; ρ = 1000 kg/m^3
Phantom section: Flat Section

Test Date: Date: 12/10/2020; Ambient Temp: 23 °C; Tissue Temp: 21 °C

Probe: EX3DV4 - SN7531; ConvF(10.26, 10.26, 10.26); Calibrated: 7/14/2020
Sensor-Surface: 2mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1416; Calibrated: 4/21/2020
Phantom: ELI v5.0; Type: QDOVA002AA; Serial: 2037
Measurement SW: DASY52, Version 52.10 (0); SEMCAD X Version 14.6.10 (7417)

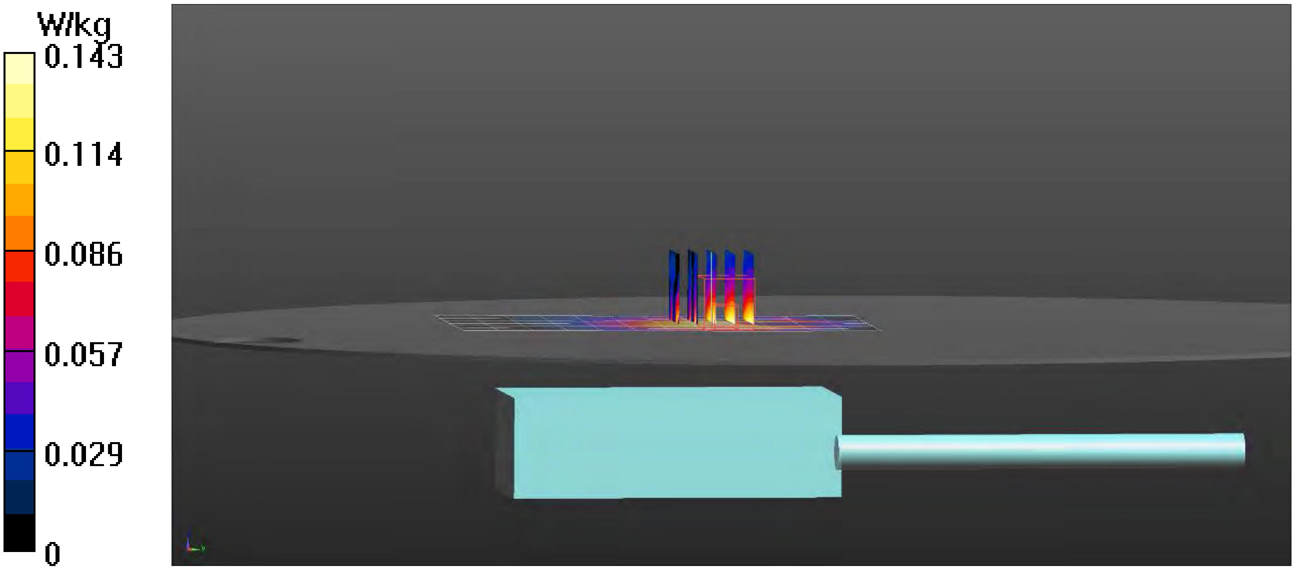
Procedure Notes:

Band 5/Face Std Bat WCDMA Mid/Area Scan (7x13x1): Measurement grid: dx=15mm, dy=15mm

Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (measured) = 0.140 W/kg

Band 5/Face Std Bat WCDMA Mid/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 8.066 V/m; Power Drift = 0.03 dB
Peak SAR (extrapolated) = 0.296 W/kg
SAR(1 g) = 0.158 W/kg; SAR(10 g) = 0.088 W/kg

Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (measured) = 0.143 W/kg



RF Exposure Lab

Plot 6

DUT: IP730D; Type: PTT; Serial: Eng 1

Communication System: UMTS (WCDMA); Frequency: 836.6 MHz; Duty Cycle: 1:1
Medium: HSL835; Medium parameters used (interpolated): f = 836.6 MHz; σ = 0.947 S/m; ε_r = 41.231; ρ = 1000 kg/m^3
Phantom section: Flat Section

Test Date: Date: 12/10/2020; Ambient Temp: 23 °C; Tissue Temp: 21 °C

Probe: EX3DV4 - SN7531; ConvF(10.26, 10.26, 10.26); Calibrated: 7/14/2020
Sensor-Surface: 2mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1416; Calibrated: 4/21/2020
Phantom: ELI v5.0; Type: QDOVA002AA; Serial: 2037
Measurement SW: DASY52, Version 52.10 (0); SEMCAD X Version 14.6.10 (7417)

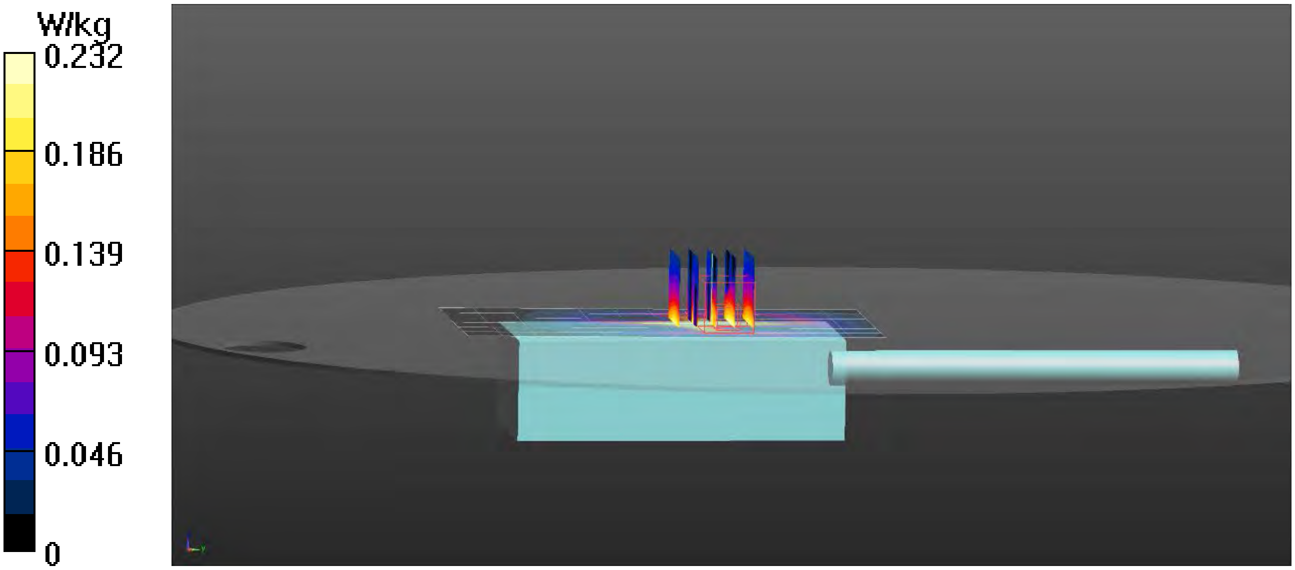
Procedure Notes:

Band 5/Body Belt Clip Std Bat WCDMA Mid/Area Scan (7x13x1): Measurement grid: dx=15mm, dy=15mm

Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (measured) = 0.233 W/kg

Band 5/Body Belt Clip Std Bat WCDMA Mid/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 7.501 V/m; Power Drift = 0.01 dB
Peak SAR (extrapolated) = 0.366 W/kg
SAR(1 g) = 0.232 W/kg; SAR(10 g) = 0.119 W/kg

Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (measured) = 0.232 W/kg



RF Exposure Lab

Plot 7

DUT: IP730D; Type: PTT; Serial: Eng 1

Communication System: LTE (SC-FDMA, 1 RB, 20 MHz, QPSK); Frequency: 1732.5 MHz; Duty Cycle: 1:1
Medium: HSL1750; Medium parameters used (interpolated): f = 1732.5 MHz; σ = 1.403 S/m; ε_r = 39.665; ρ = 1000 kg/m^3
Phantom section: Flat Section

Test Date: Date: 12/9/2020; Ambient Temp: 23 °C; Tissue Temp: 21 °C

Probe: EX3DV4 - SN7531; ConvF(8.55, 8.55, 8.55); Calibrated: 7/14/2020
Sensor-Surface: 2mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1416; Calibrated: 4/21/2020
Phantom: ELI v5.0; Type: QDOVA002AA; Serial: 2037
Measurement SW: DASY52, Version 52.10 (0); SEMCAD X Version 14.6.10 (7417)

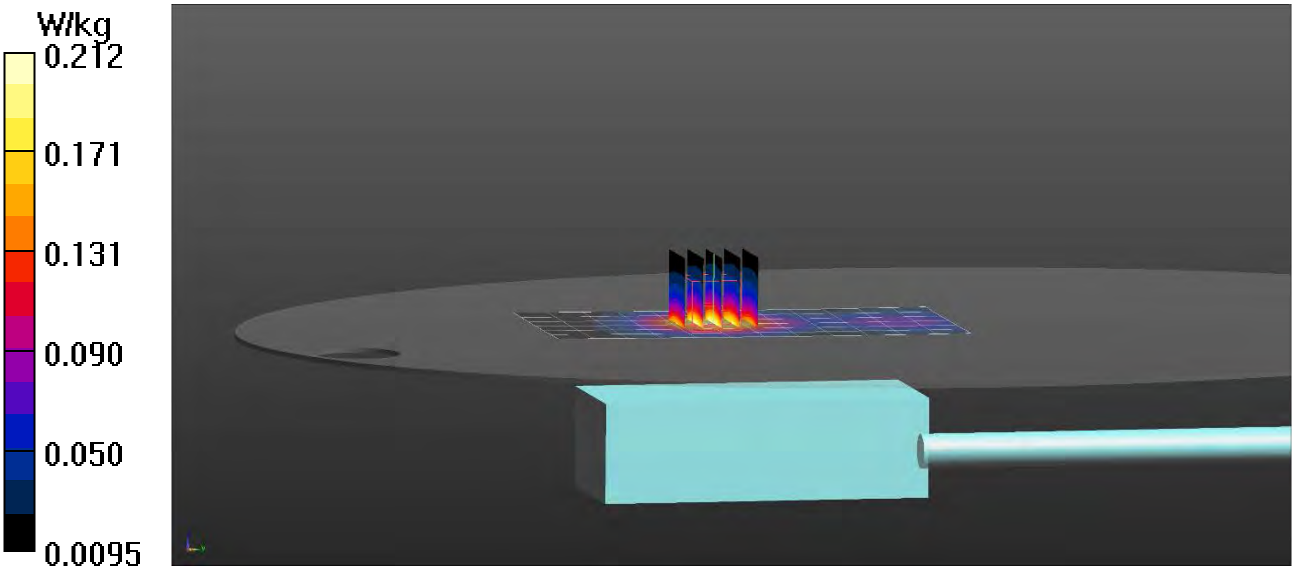
Procedure Notes:

Band 4/Face Std Bat LTE 1 RB 49 Offset Mid/Area Scan (7x13x1): Measurement grid: dx=15mm, dy=15mm

Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (measured) = 0.209 W/kg

Band 4/Face Std Bat LTE 1 RB 49 Offset Mid/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 7.049 V/m; Power Drift = -0.03 dB
Peak SAR (extrapolated) = 0.257 W/kg
SAR(1 g) = 0.167 W/kg; SAR(10 g) = 0.107 W/kg

Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (measured) = 0.212 W/kg



RF Exposure Lab

Plot 8

DUT: IP730D; Type: PTT; Serial: Eng 1

Communication System: LTE (SC-FDMA, 1 RB, 20 MHz, QPSK); Frequency: 1732.5 MHz; Duty Cycle: 1:1
Medium: HSL1750; Medium parameters used (interpolated): f = 1732.5 MHz; σ = 1.403 S/m; ε_r = 39.665; ρ = 1000 kg/m^3
Phantom section: Flat Section

Test Date: Date: 12/9/2020; Ambient Temp: 23 °C; Tissue Temp: 21 °C

Probe: EX3DV4 - SN7531; ConvF(8.55, 8.55, 8.55); Calibrated: 7/14/2020
Sensor-Surface: 2mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1416; Calibrated: 4/21/2020
Phantom: ELI v5.0; Type: QDOVA002AA; Serial: 2037
Measurement SW: DASY52, Version 52.10 (0); SEMCAD X Version 14.6.10 (7417)

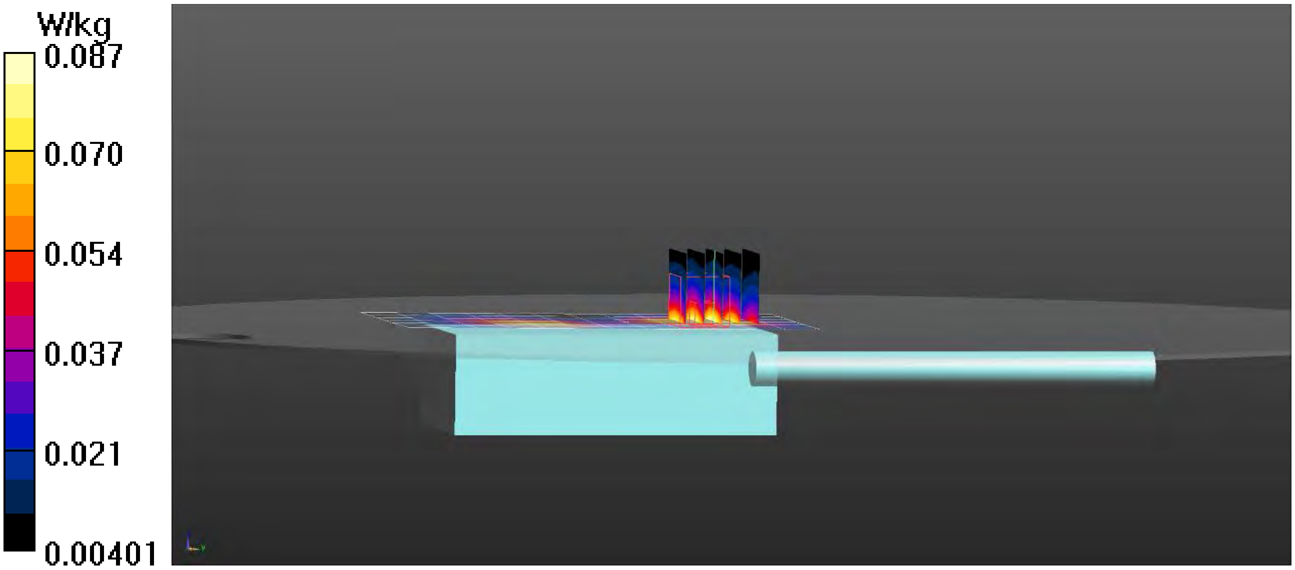
Procedure Notes:

Band 4/Body Belt Clip Std Bat LTE 1 RB 49 Offset Mid/Area Scan (7x13x1): Measurement grid: dx=15mm, dy=15mm

Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (measured) = 0.0868 W/kg

Band 4/Body Belt Clip Std Bat LTE 1 RB 49 Offset Mid/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 4.869 V/m; Power Drift = 0.02 dB
Peak SAR (extrapolated) = 0.106 W/kg
SAR(1 g) = 0.069 W/kg; SAR(10 g) = 0.044 W/kg

Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (measured) = 0.0866 W/kg



RF Exposure Lab

Plot 9

DUT: IP730D; Type: PTT; Serial: Eng 1

Communication System: UMTS (WCDMA); Frequency: 1880 MHz; Duty Cycle: 1:1
Medium: HSL1900; Medium parameters used: f = 1880 MHz; σ = 1.44 S/m; ε_r = 39.47; ρ = 1000 kg/m^3
Phantom section: Flat Section

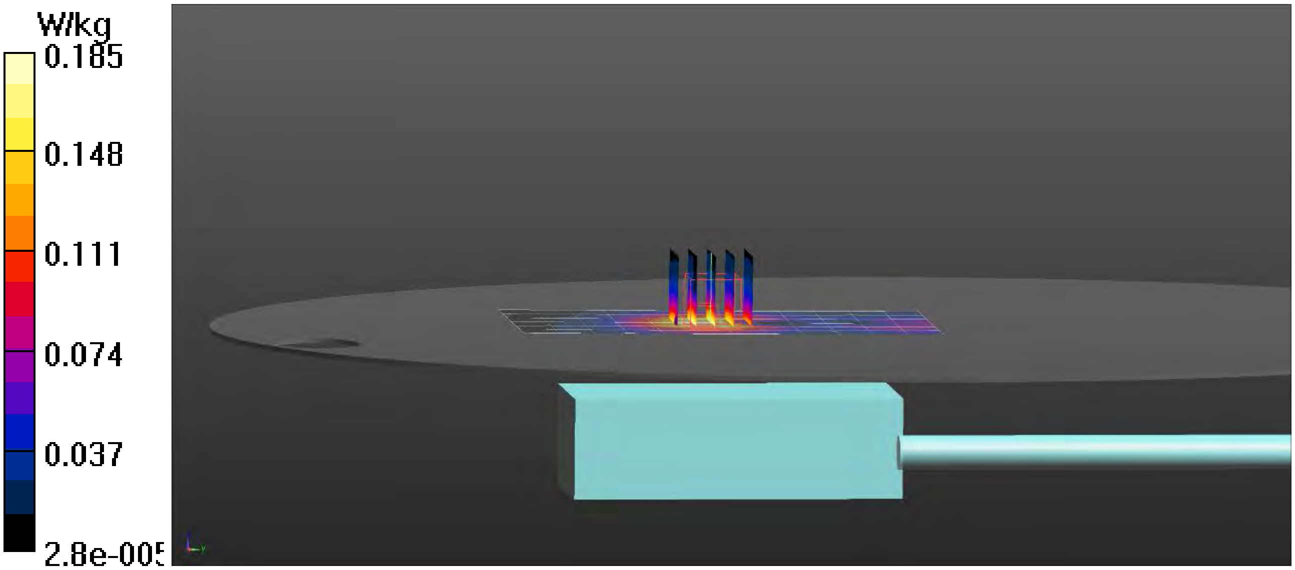
Test Date: Date: 12/8/2020; Ambient Temp: 23 °C; Tissue Temp: 21 °C

Probe: EX3DV4 - SN7531; ConvF(8.22, 8.22, 8.22); Calibrated: 7/14/2020
Sensor-Surface: 2mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1416; Calibrated: 4/21/2020
Phantom: ELI v5.0; Type: QDOVA002AA; Serial: 2037
Measurement SW: DASY52, Version 52.10 (0); SEMCAD X Version 14.6.10 (7417)

Procedure Notes:

Band 2/Face Std Bat WCDMA Mid/Area Scan (7x13x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (measured) = 0.180 W/kg

Band 2/Face Std Bat WCDMA Mid/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 6.608 V/m; Power Drift = -0.02 dB
Peak SAR (extrapolated) = 0.246 W/kg
SAR(1 g) = 0.152 W/kg; SAR(10 g) = 0.089 W/kg
Maximum value of SAR (measured) = 0.185 W/kg



RF Exposure Lab

Plot 10

DUT: IP730D; Type: PTT; Serial: Eng 1

Communication System: UMTS (WCDMA); Frequency: 1880 MHz; Duty Cycle: 1:1
Medium: HSL1900; Medium parameters used: f = 1880 MHz; σ = 1.44 S/m; ε_r = 39.47; ρ = 1000 kg/m^3
Phantom section: Flat Section

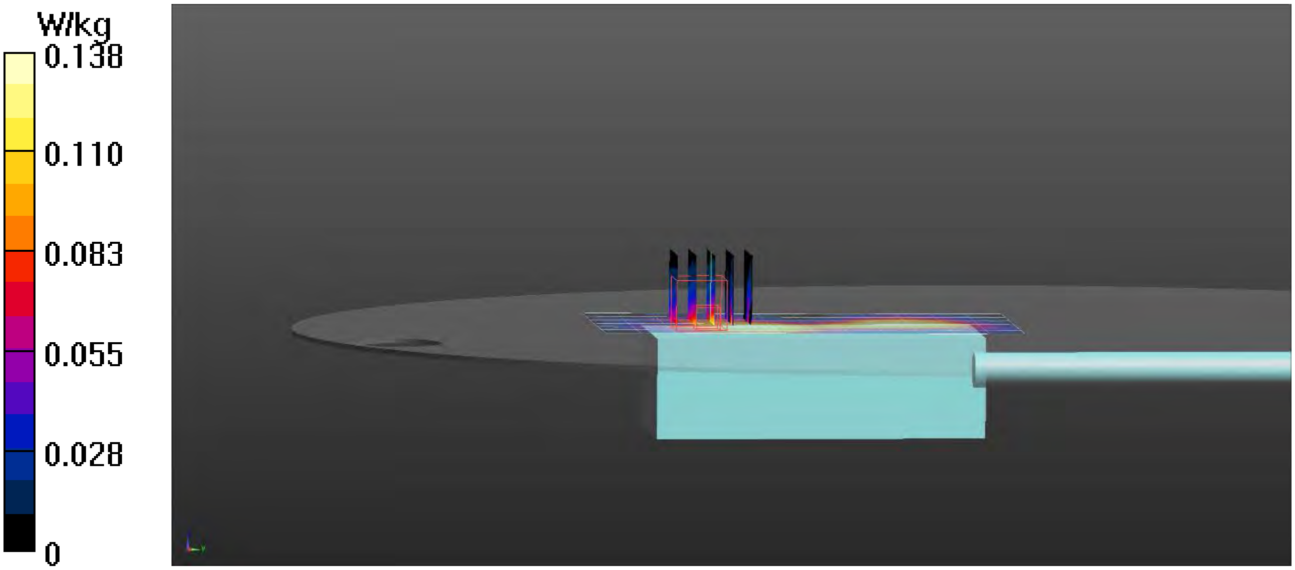
Test Date: Date: 12/8/2020; Ambient Temp: 23 °C; Tissue Temp: 21 °C

Probe: EX3DV4 - SN7531; ConvF(8.22, 8.22, 8.22); Calibrated: 7/14/2020
Sensor-Surface: 2mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1416; Calibrated: 4/21/2020
Phantom: ELI v5.0; Type: QDOVA002AA; Serial: 2037
Measurement SW: DASY52, Version 52.10 (0); SEMCAD X Version 14.6.10 (7417)

Procedure Notes:

Band 2/Body Belt Clip Std Bat WCDMA Mid/Area Scan (7x13x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (measured) = 0.146 W/kg

Band 2/Body Belt Clip Std Bat WCDMA Mid/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 3.400 V/m; Power Drift = 2.30 dB
Peak SAR (extrapolated) = 0.224 W/kg
SAR(1 g) = 0.092 W/kg; SAR(10 g) = 0.049 W/kg
Maximum value of SAR (measured) = 0.138 W/kg



RF Exposure Lab

Plot 11

DUT: IP730D; Type: PTT; Serial: Eng 1

Communication System: LTE (SC-FDMA, 1 RB, 20 MHz, QPSK); Frequency: 1880 MHz; Duty Cycle: 1:1
Medium: HSL1900; Medium parameters used: f = 1880 MHz; σ = 1.44 S/m; ε_r = 39.47; ρ = 1000 kg/m^3
Phantom section: Flat Section

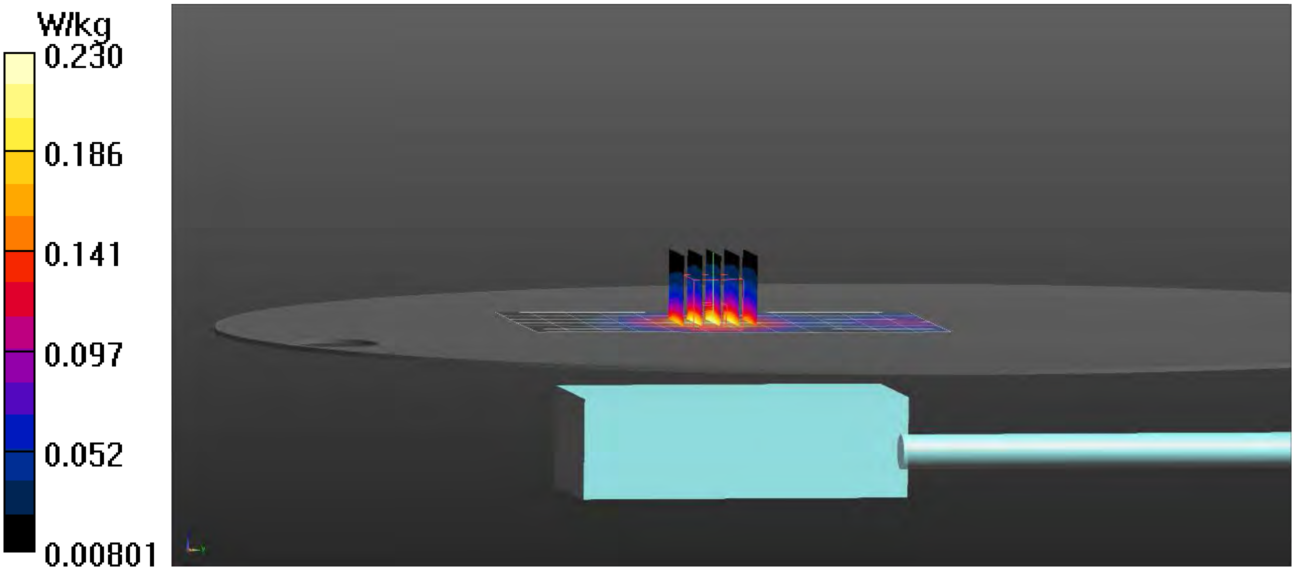
Test Date: Date: 12/8/2020; Ambient Temp: 23 °C; Tissue Temp: 21 °C

Probe: EX3DV4 - SN7531; ConvF(8.22, 8.22, 8.22); Calibrated: 7/14/2020
Sensor-Surface: 2mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1416; Calibrated: 4/21/2020
Phantom: ELI v5.0; Type: QDOVA002AA; Serial: 2037
Measurement SW: DASY52, Version 52.10 (0); SEMCAD X Version 14.6.10 (7417)

Procedure Notes:

Band 2/Face Std Bat LTE 1 RB 49 Offset Mid/Area Scan (7x13x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (measured) = 0.216 W/kg

Band 2/Face Std Bat LTE 1 RB 49 Offset Mid/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 7.380 V/m; Power Drift = 0.01 dB
Peak SAR (extrapolated) = 0.279 W/kg
SAR(1 g) = 0.177 W/kg; SAR(10 g) = 0.112 W/kg
Maximum value of SAR (measured) = 0.230 W/kg



RF Exposure Lab

Plot 12

DUT: IP730D; Type: PTT; Serial: Eng 1

Communication System: LTE (SC-FDMA, 1 RB, 20 MHz, QPSK); Frequency: 1880 MHz; Duty Cycle: 1:1
Medium: HSL1900; Medium parameters used: f = 1880 MHz; σ = 1.44 S/m; ε_r = 39.47; ρ = 1000 kg/m^3
Phantom section: Flat Section

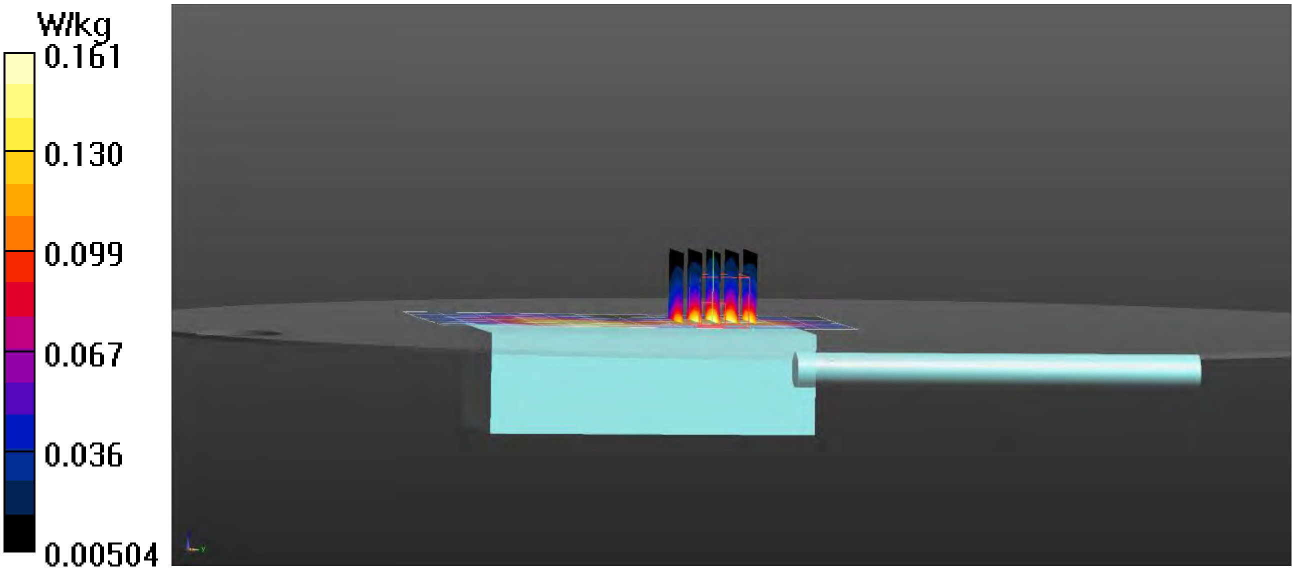
Test Date: Date: 12/9/2020; Ambient Temp: 23 °C; Tissue Temp: 21 °C

Probe: EX3DV4 - SN7531; ConvF(8.22, 8.22, 8.22); Calibrated: 7/14/2020
Sensor-Surface: 2mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1416; Calibrated: 4/21/2020
Phantom: ELI v5.0; Type: QDOVA002AA; Serial: 2037
Measurement SW: DASY52, Version 52.10 (0); SEMCAD X Version 14.6.10 (7417)

Procedure Notes:

Band 2/Body Belt Clip Std Bat LTE 1 RB 49 Offset Mid/Area Scan (7x13x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (measured) = 0.156 W/kg

Band 2/Body Belt Clip Std Bat LTE 1 RB 49 Offset Mid/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 5.825 V/m; Power Drift = 0.01 dB
Peak SAR (extrapolated) = 0.197 W/kg
SAR(1 g) = 0.128 W/kg; SAR(10 g) = 0.082 W/kg
Maximum value of SAR (measured) = 0.161 W/kg



RF Exposure Lab

Plot 13

DUT: IP730D; Type: PTT; Serial: Eng 1

Communication System: FM; Frequency: 160 MHz; Duty Cycle: 1:1
Medium: HSL150; Medium parameters used: f = 160 MHz; σ = 0.79 S/m; ε_r = 51.71; ρ = 1000 kg/m^3
Phantom section: Flat Section

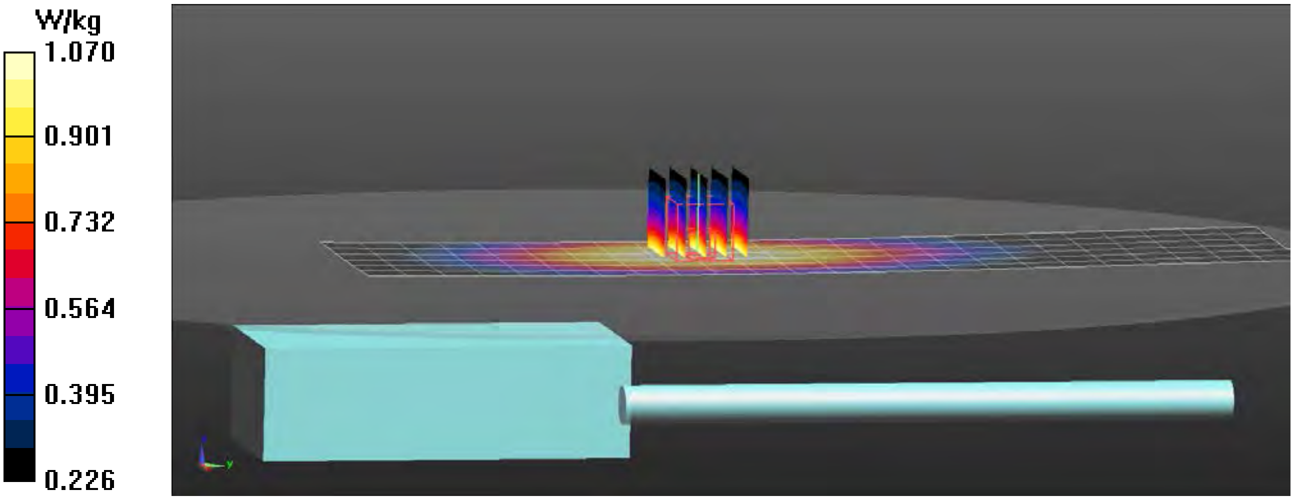
Test Date: Date: 7/5/2023; Ambient Temp: 23 °C; Tissue Temp: 21 °C

Probe: EX3DV4 - SN7531; ConvF(12.62, 12.62, 12.62); Calibrated: 4/20/2023
Sensor-Surface: 2mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1321; Calibrated: 1/17/2023
Phantom: ELI v4.0; Type: QDOVA001BB; Serial: 1065
Measurement SW: DASY52, Version 52.10 (0); SEMCAD X Version 14.6.10 (7417)

Procedure Notes:

VHF Ant FA-SC63VC/Face Std Bat 160/Area Scan (7x25x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (measured) = 1.11 W/kg

VHF Ant FA-SC63VC/Face Std Bat 160/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 33.06 V/m; Power Drift = -0.42 dB
Peak SAR (extrapolated) = 1.24 W/kg
SAR(1 g) = 0.904 W/kg; SAR(10 g) = 0.690 W/kg
Maximum value of SAR (measured) = 1.07 W/kg



RF Exposure Lab

Plot 14

DUT: IP730D; Type: PTT; Serial: Eng 1

Communication System: FM; Frequency: 160 MHz; Duty Cycle: 1:1
Medium: HSL150; Medium parameters used: f = 160 MHz; σ = 0.79 S/m; ε_r = 51.71; ρ = 1000 kg/m^3
Phantom section: Flat Section

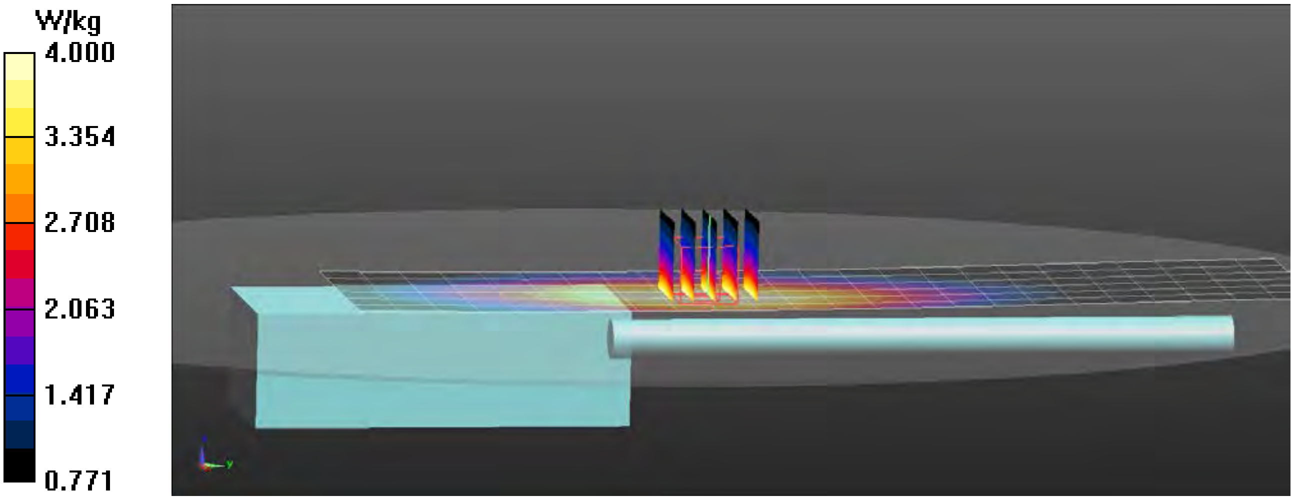
Test Date: Date: 7/5/2023; Ambient Temp: 23 °C; Tissue Temp: 21 °C

Probe: EX3DV4 - SN7531; ConvF(12.62, 12.62, 12.62); Calibrated: 4/20/2023
Sensor-Surface: 2mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1321; Calibrated: 1/17/2023
Phantom: ELI v4.0; Type: QDOVA001BB; Serial: 1065
Measurement SW: DASY52, Version 52.10 (0); SEMCAD X Version 14.6.10 (7417)

Procedure Notes:

VHF Ant FA-SC63VC/Body Belt Clip Std Bat 160/Area Scan (7x25x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (measured) = 4.16 W/kg

VHF Ant FA-SC63VC/Body Belt Clip Std Bat 160/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 68.70 V/m; Power Drift = -0.57 dB
Peak SAR (extrapolated) = 4.68 W/kg
SAR(1 g) = 3.37 W/kg; SAR(10 g) = 2.55 W/kg
Maximum value of SAR (measured) = 4.00 W/kg



Appendix C – SAR Test Setup Photos

Test Position Face 25 mm Gap

Test Position Body 0 mm Gap

Front of Device with Antenna

Back of Device

Audio and Body Worn Accessory

Additional Antennas J and K

Batteries

Appendix D – Probe Calibration Data Sheets

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 0108

Client **RF Exposure Lab**

Certificate No: EX3-7531_Jul20/2

CALIBRATION CERTIFICATE (Replacement of No: EX3-7531_Jul20)

Object: EX3DV4 - SN:7531

Calibration procedure(s): QA CAL-01.v9, QA CAL-12.v9, QA CAL-14.v6, QA CAL-23.v5, QA CAL-25.v7
Calibration procedure for dosimetric E-field probes

Calibration date: July 14, 2020

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 NRP	SN: 104778	01-Apr-20 (No. 217-03100/03101)	Apr-21
Power sensor NRP-Z91	SN: 103244	01-Apr-20 (No. 217-03100)	Apr-21
Power sensor NRP-Z91	SN: 103245	01-Apr-20 (No. 217-03101)	Apr-21
Reference 20 dB Attenuator	SN: CC2552 (20x)	31-Mar-20 (No. 217-03106)	Apr-21
DAE4	SN: 660	27-Dec-19 (No. DAE4-660_Dec19)	Dec-20
Reference Probe ES3DV2	SN: 3013	31-Dec-19 (No. ES3-3013_Dec19)	Dec-20
Secondary Standards	ID	Check Date (in house)	Scheduled Check
Power meter E4419B	SN: GB41293874	06-Apr-16 (in house check Jun-20)	In house check: Jun-22
Power sensor E4412A	SN: MY41498087	06-Apr-16 (in house check Jun-20)	In house check: Jun-22
Power sensor E4412A	SN: 000110210	06-Apr-16 (in house check Jun-20)	In house check: Jun-22
RF generator HP 8648C	SN: US3642U01700	04-Aug-99 (in house check Jun-20)	In house check: Jun-22
Network Analyzer E8358A	SN: US41080477	31-Mar-14 (in house check Oct-19)	In house check: Oct-20

	Name	Function	Signature
Calibrated by:	Jeton Kastrati	Laboratory Technician	i.V. M.Weber
Approved by:	Katja Pokovic	Technical Manager	

Issued: July 22, 2020

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

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.e., $\vartheta = 0$ 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, ", “Measurement procedure for the assessment of Specific Absorption Rate (SAR) from hand-held and body-mounted devices used next to the ear (frequency range of 300 MHz to 6 GHz)”, July 2016
c) IEC 62209-2, "Procedure to determine the Specific Absorption Rate (SAR) for wireless communication devices used in close proximity to the human body (frequency range of 30 MHz to 6 GHz)", March 2010
d) KDB 865664, “SAR Measurement Requirements for 100 MHz to 6 GHz”

Methods Applied and Interpretation of Parameters:

- *NORMx,y,z:* Assessed for E-field polarization $\vartheta = 0$ ($f \leq 900$ MHz in TEM-cell; $f > 1800$ MHz: R22 waveguide). NORMx,y,z are only intermediate values, i.e., the uncertainties of NORMx,y,z does not affect 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 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
- *Ax,y,z; Bx,y,z; Cx,y,z; Dx,y,z; VRx,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 *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 ± 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 *NORMx* (no uncertainty required).

DASY/EASY - Parameters of Probe: EX3DV4 - SN:7531

Basic Calibration Parameters

	Sensor X	Sensor Y	Sensor Z	Unc (k=2)
Norm (μV/(V/m)^2)[A]	0.39	0.47	0.39	± 10.1 %
DCP (mV)[B]	98.5	98.5	103.6	

Calibration Results for Modulation Response

UID	Communication System Name		A dB	B dB√μV	C	D dB	VR mV	Max dev.	Unc[E] (k=2)
0	CW	X	0.0	0.0	1.0	0.00	142.3	± 3.0 %	± 4.7 %
		Y	0.0	0.0	1.0		136.0		
		Z	0.0	0.0	1.0		138.4		

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).
[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.

DASY/EASY - Parameters of Probe: EX3DV4 - SN:7531

Other Probe Parameters

Sensor Arrangement	Triangular
Connector Angle (°)	-173.3
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

Note: Measurement distance from surface can be increased to 3-4 mm for an *Area Scan* job.

DASY/EASY - Parameters of Probe: EX3DV4 - SN:7531

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)	Unc (k=2)
150	52.3	0.76	12.88	12.88	12.88	0.00	1.00	± 13.3 %
220	49.0	0.81	12.66	12.66	12.66	0.00	1.00	± 13.3 %
300	45.3	0.87	12.13	12.13	12.13	0.03	1.30	± 13.3 %
450	43.5	0.87	11.31	11.31	11.31	0.13	1.30	± 13.3 %
600	42.7	0.88	10.87	10.87	10.87	0.08	1.30	± 13.3 %
750	41.9	0.89	10.64	10.64	10.64	0.29	1.14	± 12.0 %
900	41.5	0.97	10.26	10.26	10.26	0.46	0.82	± 12.0 %
1750	40.1	1.37	8.55	8.55	8.55	0.34	0.86	± 12.0 %
1900	40.0	1.40	8.22	8.22	8.22	0.30	0.86	± 12.0 %
2300	39.5	1.67	7.96	7.96	7.96	0.31	0.90	± 12.0 %
2450	39.2	1.80	7.61	7.61	7.61	0.29	0.90	± 12.0 %
2600	39.0	1.96	7.48	7.48	7.48	0.38	0.90	± 12.0 %
3500	37.9	2.91	6.73	6.73	6.73	0.40	1.35	± 13.1 %
3700	37.7	3.12	6.42	6.42	6.42	0.40	1.35	± 13.1 %
5250	35.9	4.71	5.20	5.20	5.20	0.40	1.80	± 13.1 %
5600	35.5	5.07	4.66	4.66	4.66	0.40	1.80	± 13.1 %
5750	35.4	5.22	4.80	4.80	4.80	0.40	1.80	± 13.1 %

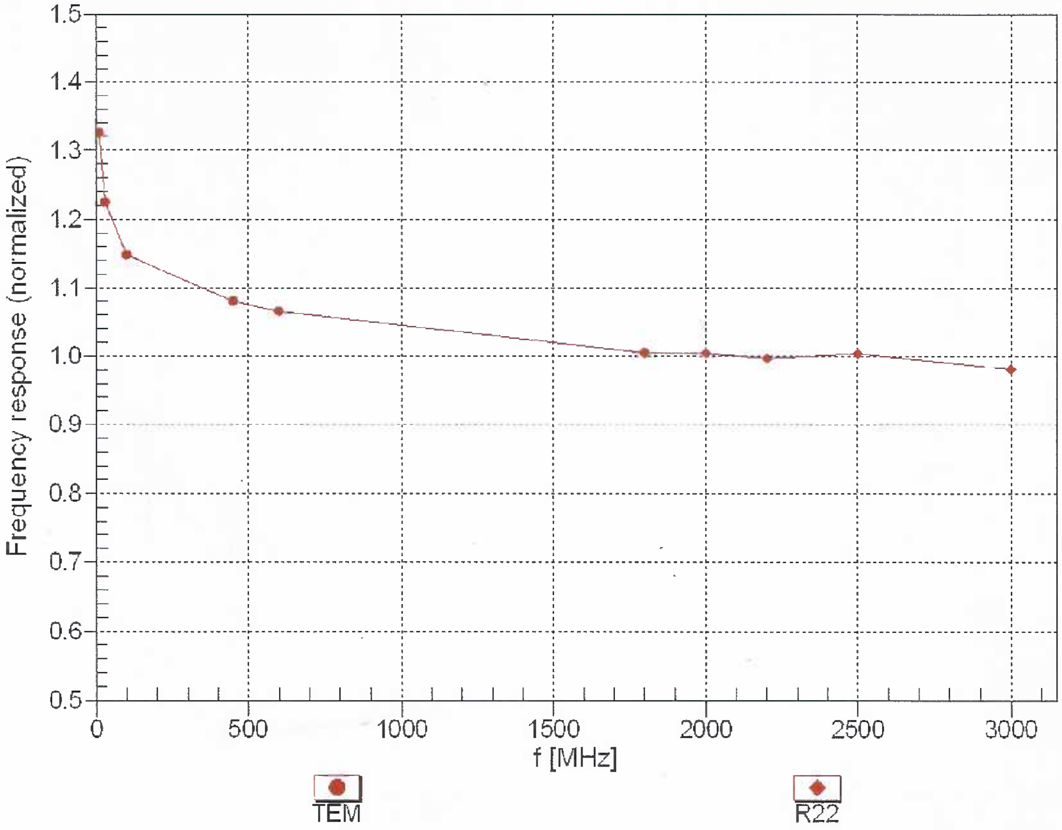
[C] Frequency validity above 300 MHz of ± 100 MHz only applies for DASY v4.4 and higher (see Page 2), else it is restricted to ± 50 MHz. The uncertainty is the RSS of the ConvF uncertainty at calibration frequency and the uncertainty for the indicated frequency band. Frequency validity below 300 MHz is ± 10, 25, 40, 50 and 70 MHz for ConvF assessments at 30, 64, 128, 150 and 220 MHz respectively. Validity of ConvF assessed at 6 MHz is 4-9 MHz, and ConvF assessed at 13 MHz is 9-19 MHz. 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.

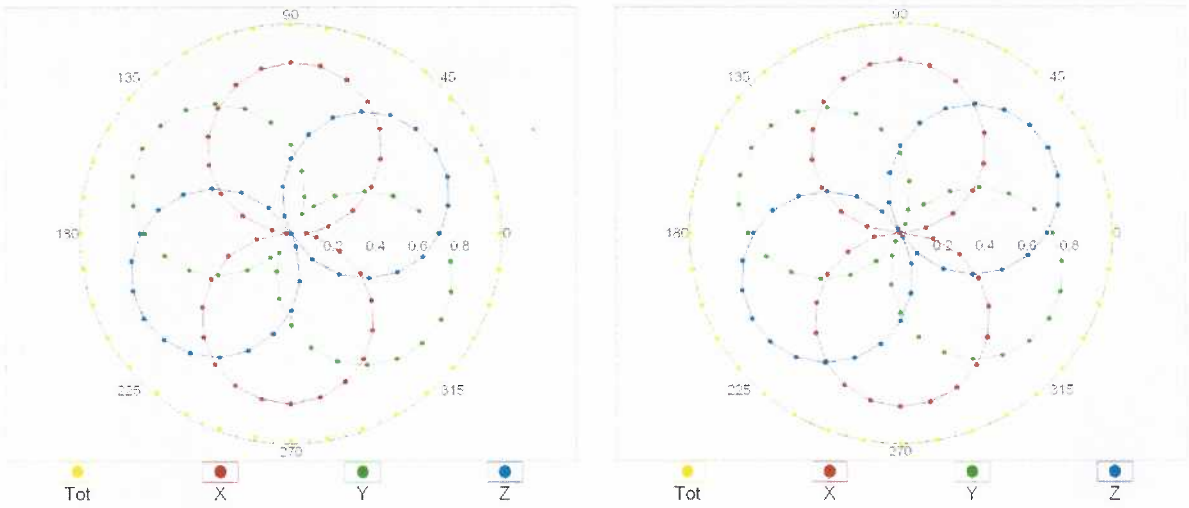
Frequency Response of E-Field

(TEM-Cell:ifi110 EXX, Waveguide: R22)

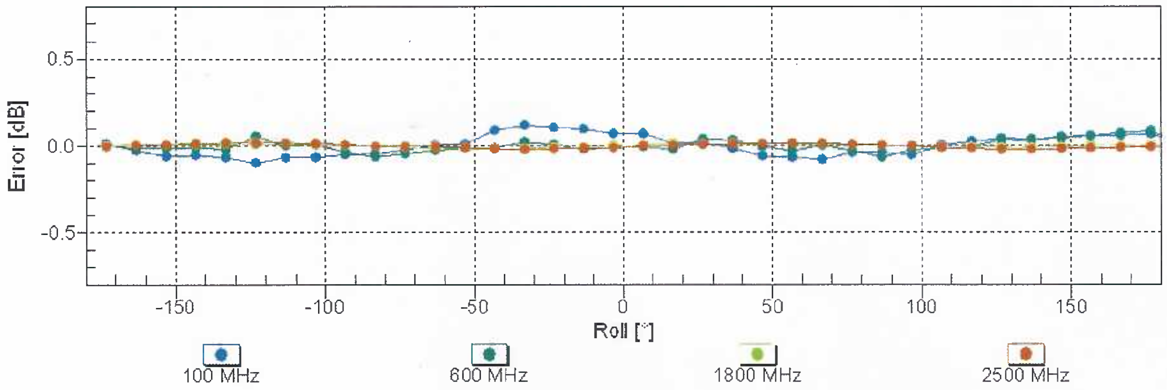


Uncertainty of Frequency Response of E-field: ± 6.3% (k=2)

Receiving Pattern (ϕ), ϑ = 0°


f=600 MHz,TEM

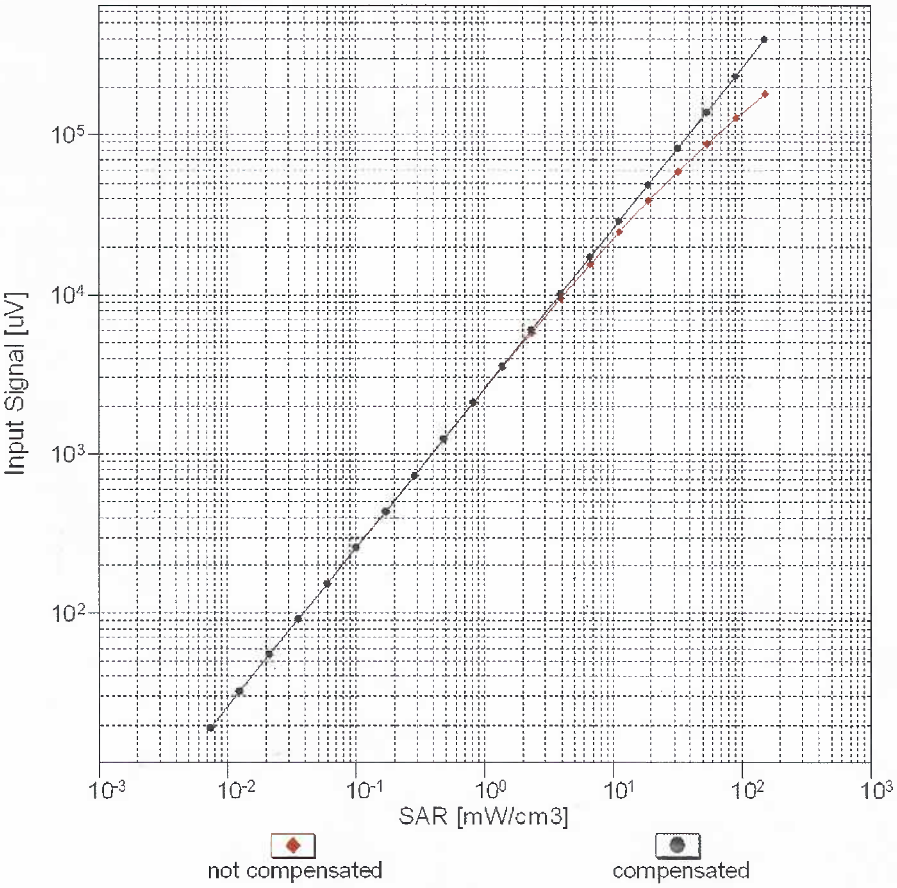
f=1800 MHz,R22

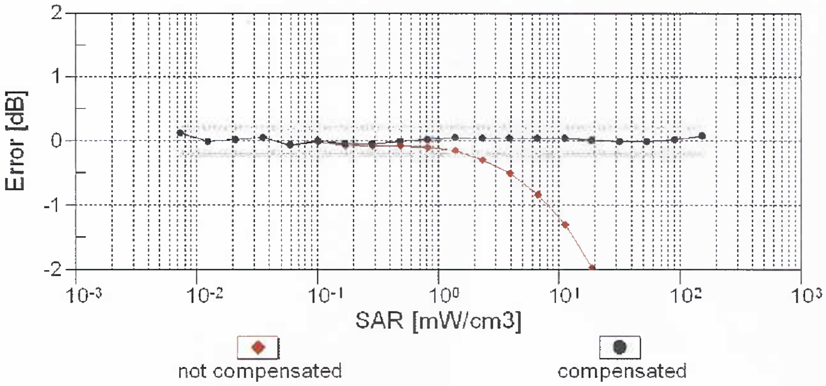


Uncertainty of Axial Isotropy Assessment: ± 0.5% (k=2)

Dynamic Range f(SAR$_{head}$)

(TEM cell , f$_{eval}$= 1900 MHz)

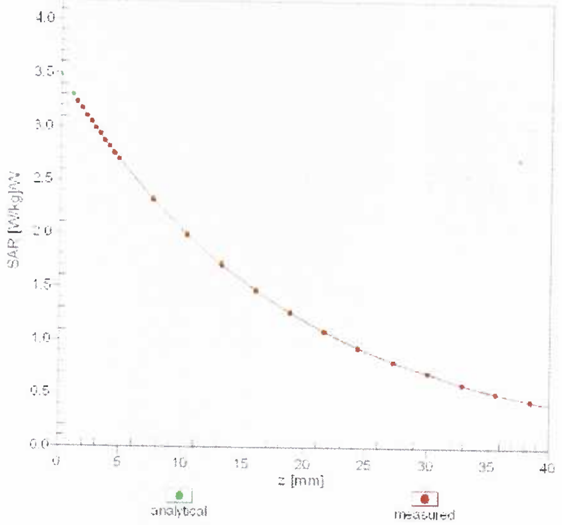




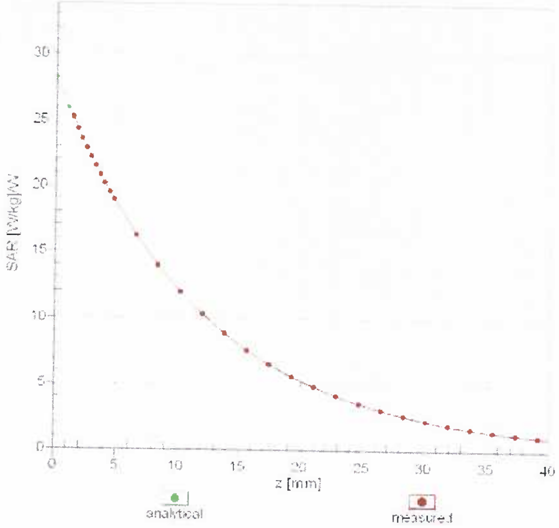
Uncertainty of Linearity Assessment: ± 0.6% (k=2)

Conversion Factor Assessment

f = 900 MHz,WGLS R9 (H_convF)

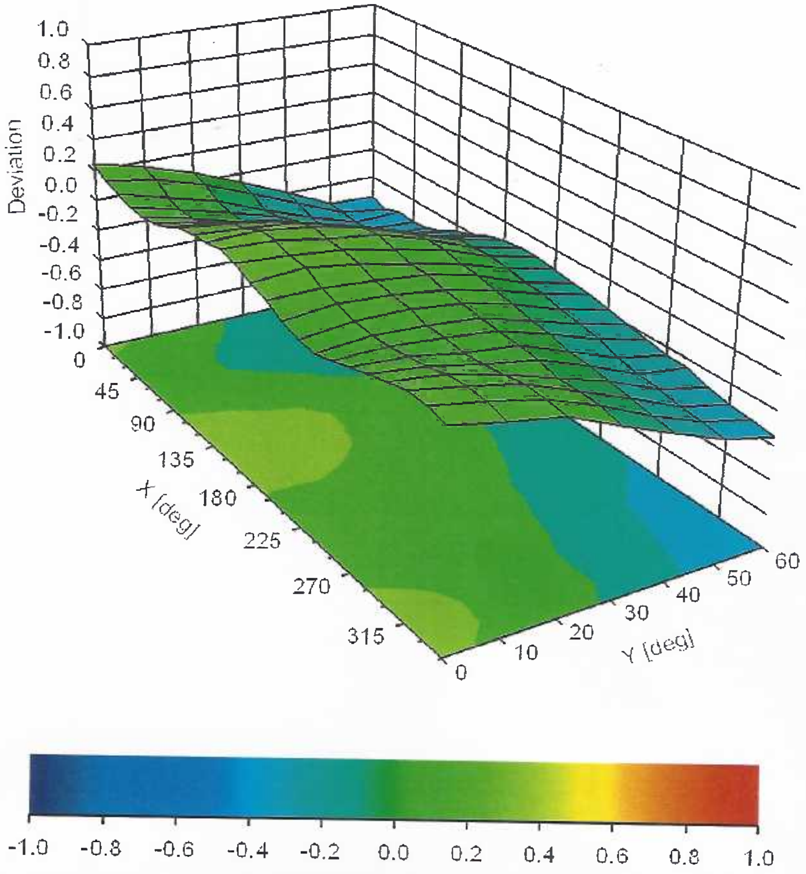


f = 1900 MHz,WGLS R22 (H_convF)



Deviation from Isotropy in Liquid

Error (ϕ, ϑ), f = 900 MHz



Uncertainty of Spherical Isotropy Assessment: ± 2.6% (k=2)

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

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Accreditation No.: SCS 0108

Client **RF Exposure Lab**
San Marcos, USA

Certificate No. **EX-7531_Apr23**

CALIBRATION CERTIFICATE

Object: EX3DV4 - SN:7531

Calibration procedure(s): QA CAL-01.v10, QA CAL-12.v10, QA CAL-14.v7, QA CAL-23.v6, QA CAL-25.v8
Calibration procedure for dosimetric E-field probes

Calibration date: April 20, 2023

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 NRP2	SN: 104778	30-Mar-23 (No. 217-03804/03805)	Mar-24
Power sensor NRP-Z91	SN: 103244	30-Mar-23 (No. 217-03804)	Mar-24
OCP DAK-3.5 (weighted)	SN: 1249	20-Oct-22 (OCP-DAK3.5-1249_Oct22)	Oct-23
OCP DAK-12	SN: 1016	20-Oct-22 (OCP-DAK12-1016_Oct22)	Oct-23
Reference 20 dB Attenuator	SN: CC2552 (20x)	30-Mar-23 (No. 217-03809)	Mar-24
DAE4	SN: 660	16-Mar-23 (No. DAE4-660_Mar23)	Mar-24
Reference Probe ES3DV2	SN: 3013	06-Jan-23 (No. ES3-3013_Jan23)	Jan-24

Secondary Standards	ID	Check Date (in house)	Scheduled Check
Power meter E4419B	SN: GB41293874	06-Apr-16 (in house check Jun-22)	In house check: Jun-24
Power sensor E4412A	SN: MY41498087	06-Apr-16 (in house check Jun-22)	In house check: Jun-24
Power sensor E4412A	SN: 000110210	06-Apr-16 (in house check Jun-22)	In house check: Jun-24
RF generator HP 8648C	SN: US3642U01700	04-Aug-99 (in house check Jun-22)	In house check: Jun-24
Network Analyzer E8358A	SN: US41080477	31-Mar-14 (in house check Oct-22)	In house check: Oct-24

	Name	Function	Signature
Calibrated by	Jeffrey Katzman	Laboratory Technician	
Approved by	Sven Kühn	Technical Manager	

Issued: April 21, 2023

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

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.e., $\vartheta = 0$ 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) IEC/IEEE 62209-1528, "Measurement Procedure For The Assessment Of Specific Absorption Rate Of Human Exposure To Radio Frequency Fields From Hand-Held And Body-Worn Wireless Communication Devices – Part 1528: Human Models, Instrumentation And Procedures (Frequency Range of 4 MHz to 10 GHz)", October 2020.
b) KDB 865664, "SAR Measurement Requirements for 100 MHz to 6 GHz"

Methods Applied and Interpretation of Parameters:

- *NORMx,y,z*: Assessed for E-field polarization $\vartheta = 0$ ($f \leq 900$ MHz in TEM-cell; $f > 1800$ MHz: R22 waveguide). NORMx,y,z are only intermediate values, i.e., the uncertainties of NORMx,y,z does not affect 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 with CW signal. 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; Dx,y,z; VRx,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 *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 ±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 *NORMx* (no uncertainty required).

Parameters of Probe: EX3DV4 - SN:7531

Basic Calibration Parameters

	Sensor X	Sensor Y	Sensor Z	Unc ($k = 2$)
Norm (μV/(V/m)^2) [A]	0.41	0.48	0.39	±10.1%
DCP (mV) [B]	98.5	98.5	99.5	±4.7%

Calibration Results for Modulation Response

UID	Communication System Name		A dB	B dB$\sqrt{\mu V}$	C	D dB	VR mV	Max dev.	Max Unc^E $k = 2$
0	CW	X	0.00	0.00	1.00	0.00	134.7	±2.4%	±4.7%
		Y	0.00	0.00	1.00		128.8		
		Z	0.00	0.00	1.00		132.7		
10352	Pulse Waveform (200Hz, 10%)	X	2.31	65.16	9.71	10.00	60.0	±3.1%	±9.6%
		Y	1.59	61.15	7.16		60.0		
		Z	2.41	65.62	9.96		60.0		
10353	Pulse Waveform (200Hz, 20%)	X	1.11	62.70	7.59	6.99	80.0	±2.3%	±9.6%
		Y	0.88	60.00	5.66		80.0		
		Z	1.48	64.85	8.53		80.0		
10354	Pulse Waveform (200Hz, 40%)	X	0.40	60.00	5.05	3.98	95.0	±1.5%	±9.6%
		Y	0.51	60.00	4.75		95.0		
		Z	0.48	61.05	5.53		95.0		
10355	Pulse Waveform (200Hz, 60%)	X	8.83	118.82	1.35	2.22	120.0	±2.2%	±9.6%
		Y	14.39	120.66	1.63		120.0		
		Z	0.23	60.00	3.70		120.0		
10387	QPSK Waveform, 1 MHz	X	1.37	65.47	13.89	1.00	150.0	±3.3%	±9.6%
		Y	1.62	67.01	14.97		150.0		
		Z	1.40	66.58	14.11		150.0		
10388	QPSK Waveform, 10 MHz	X	2.02	67.48	15.33	0.00	150.0	±1.0%	±9.6%
		Y	2.17	68.11	15.75		150.0		
		Z	1.92	67.06	15.11		150.0		
10396	64-QAM Waveform, 100 kHz	X	2.13	66.00	16.65	3.01	150.0	±1.1%	±9.6%
		Y	2.06	65.88	16.70		150.0		
		Z	2.16	67.23	17.33		150.0		
10399	64-QAM Waveform, 40 MHz	X	3.39	66.95	15.64	0.00	150.0	±2.4%	±9.6%
		Y	3.35	66.56	15.50		150.0		
		Z	3.30	66.72	15.51		150.0		
10414	WLAN CCDF, 64-QAM, 40 MHz	X	4.71	65.76	15.59	0.00	150.0	±4.2%	±9.6%
		Y	4.64	65.28	15.35		150.0		
		Z	4.59	65.62	15.50		150.0		

Note: For details on UID parameters see Appendix

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).

[B] Linearization parameter uncertainty for maximum specified field strength.

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

Parameters of Probe: EX3DV4 - SN:7531

Sensor Model Parameters

	C1 fF	C2 fF	α V^{-1}	T1 $ms V^{-2}$	T2 $ms V^{-1}$	T3 ms	T4 V^{-2}	T5 V^{-1}	T6
x	33.8	255.99	36.46	4.43	0.02	5.03	0.00	0.32	1.01
y	36.3	271.46	35.64	7.96	0.00	4.94	0.34	0.19	1.00
z	29.7	224.22	36.26	4.17	0.00	5.04	0.51	0.17	1.01

Other Probe Parameters

Sensor Arrangement	Triangular
Connector Angle	8.4°
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

Note: Measurement distance from surface can be increased to 3–4 mm for an *Area Scan* job.

Parameters of Probe: EX3DV4 - SN:7531

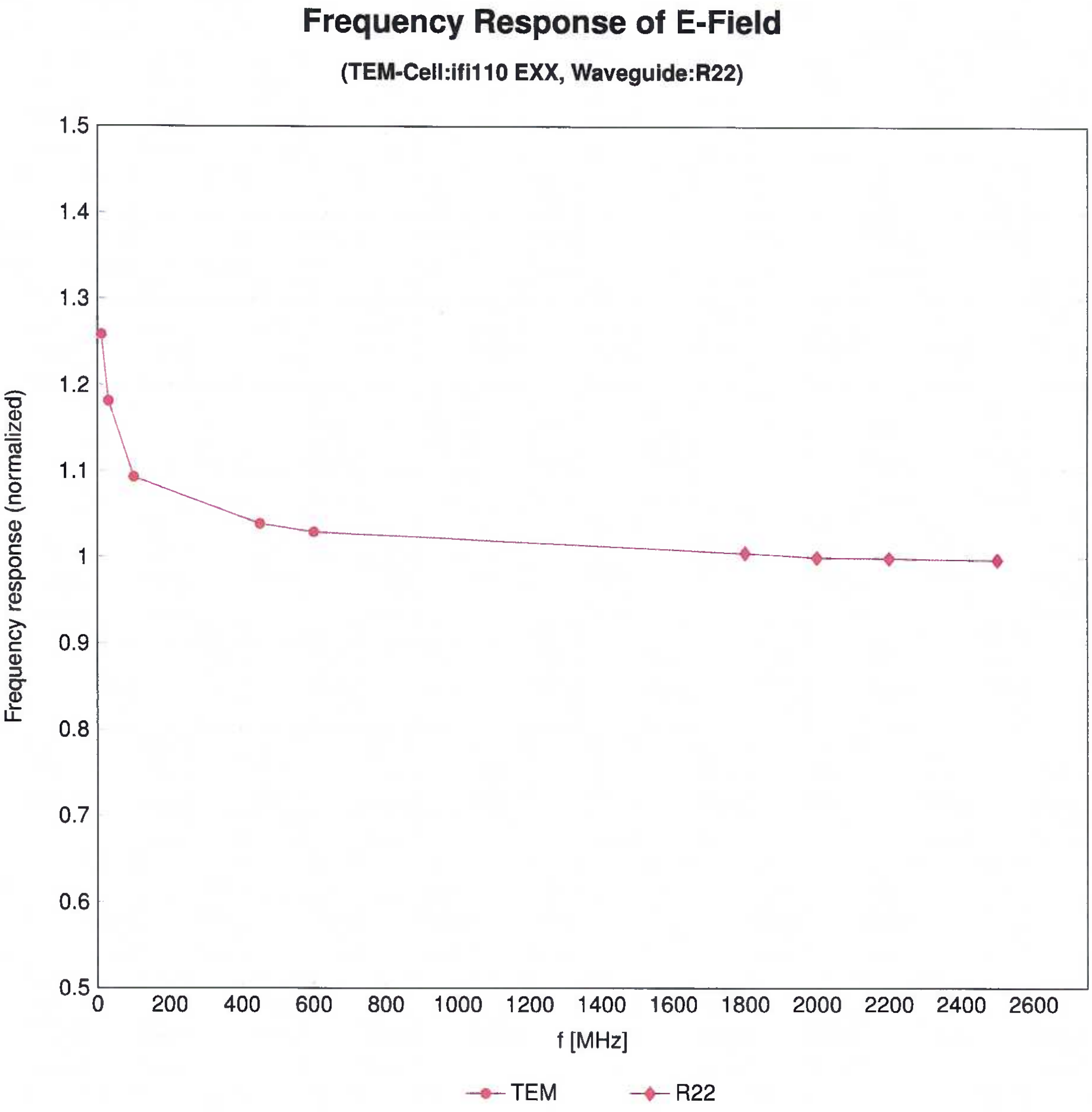
Calibration Parameter Determined in Head Tissue Simulating Media

f (MHz)[C]	Relative Permittivity[F]	Conductivity[F] (S/m)	ConvF X	ConvF Y	ConvF Z	Alpha[G]	Depth[G] (mm)	Unc ($k = 2$)
6	55.0	0.75	21.96	21.96	21.96	0.00	1.25	±13.3%
150	52.3	0.76	12.62	12.62	12.62	0.00	1.25	±13.3%
220	49.0	0.81	12.29	12.29	12.29	0.00	1.25	±13.3%
300	45.3	0.87	12.22	12.22	12.22	0.09	1.00	±13.3%
450	43.5	0.87	11.27	11.27	11.27	0.16	1.30	±13.3%
600	42.7	0.88	10.63	10.63	10.63	0.10	1.25	±13.3%
750	41.9	0.89	9.16	9.67	10.48	0.39	1.27	±12.0%
900	41.5	0.97	9.11	9.41	9.98	0.36	1.27	±12.0%
1450	40.5	1.20	8.00	8.26	8.92	0.45	1.27	±12.0%
1640	40.2	1.31	7.95	8.16	8.77	0.44	1.27	±12.0%
1750	40.1	1.37	8.00	8.29	9.01	0.25	1.27	±12.0%
1900	40.0	1.40	7.79	8.07	8.70	0.28	1.27	±12.0%
2300	39.5	1.67	7.32	7.51	8.08	0.29	1.27	±12.0%
2450	39.2	1.80	7.00	7.18	7.72	0.29	1.27	±12.0%
2600	39.0	1.96	6.95	7.12	7.65	0.27	1.27	±12.0%
5250	35.9	4.71	5.07	5.24	5.58	0.37	1.53	±14.0%
5600	35.5	5.07	4.44	4.60	4.87	0.40	1.67	±14.0%
5750	35.4	5.22	4.60	4.74	5.06	0.38	1.75	±14.0%

[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. Validity of ConvF assessed at 6 MHz is 4–9 MHz, and ConvF assessed at 13 MHz is 9–19 MHz. Above 5 GHz frequency validity can be extended to ±110 MHz.

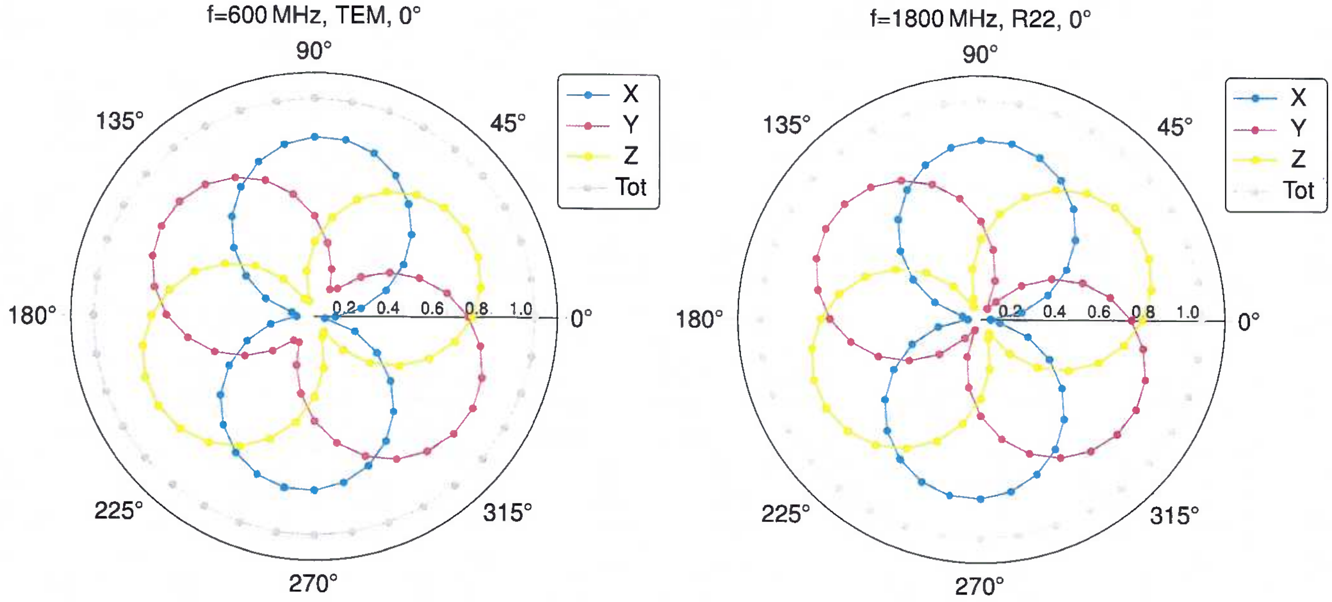
[F] The probes are calibrated using tissue simulating liquids (TSL) that deviate for ε and σ by less than ±5% from the target values (typically better than ±3%) and are valid for TSL with deviations of up to ±10%. If TSL with deviations from the target of less than ±5% are used, the calibration uncertainties are 11.1% for 0.7 - 3 GHz and 13.1% for 3 - 6 GHz.

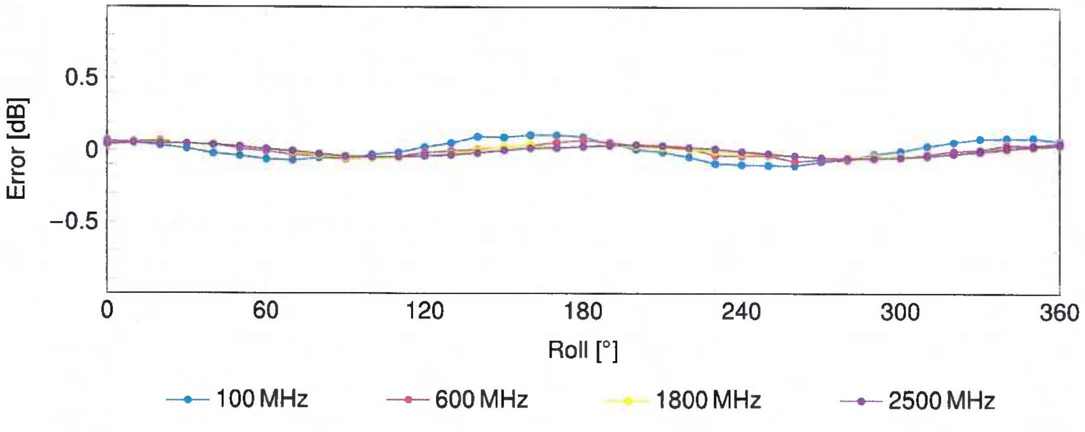
[G] Alpha/Depth are determined during calibration. SPEAG warrants that the remaining deviation due to the boundary effect after compensation is always less than ±1% for frequencies below 3 GHz and below ±2% for frequencies between 3–6 GHz at any distance larger than half the probe tip diameter from the boundary.



Uncertainty of Frequency Response of E-field: ±6.3% (k=2)

Receiving Pattern (ϕ), $\vartheta = 0°$

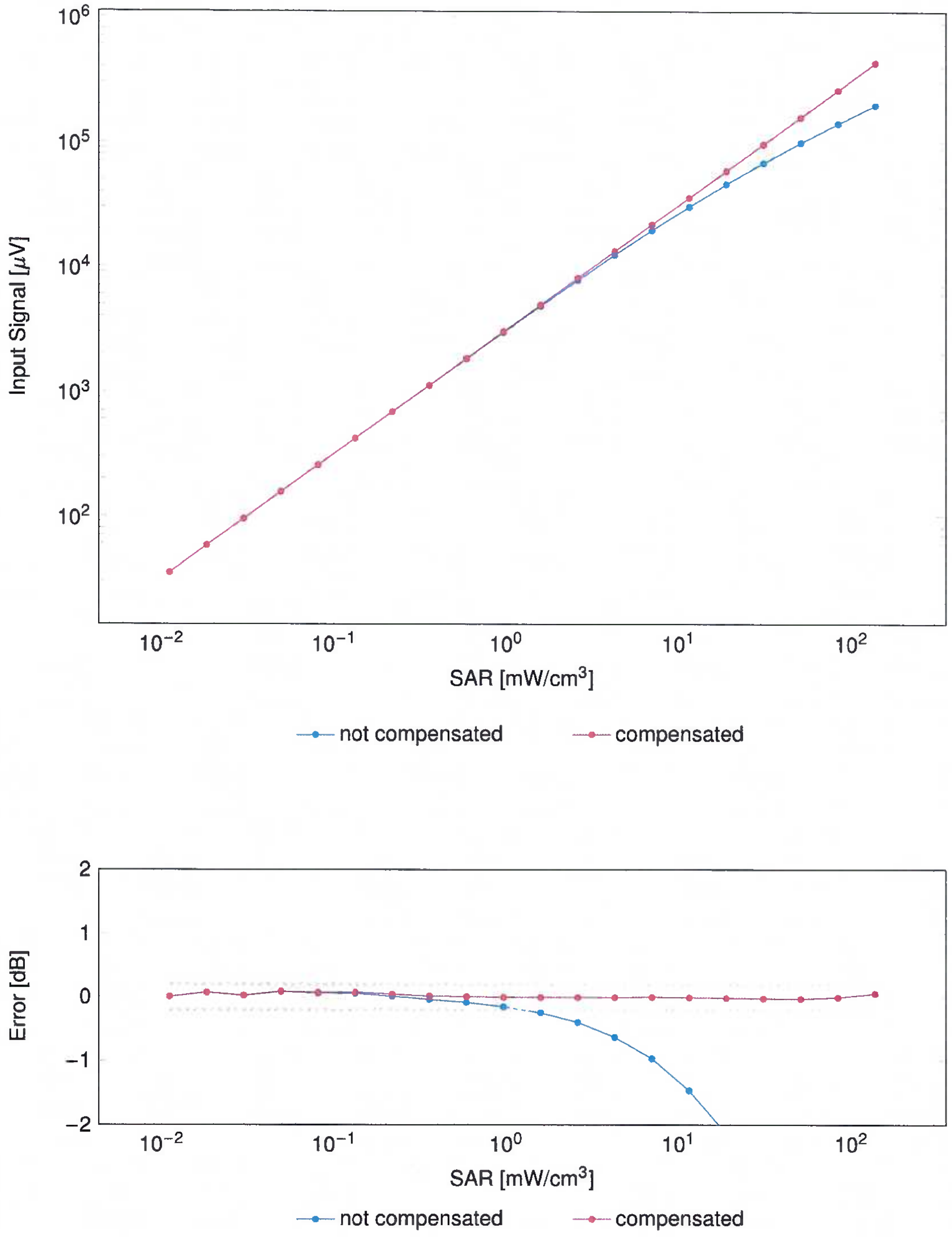




Uncertainty of Axial Isotropy Assessment: ±0.5% (k=2)

Dynamic Range f(SAR_{head})

(TEM cell, $f_{eval} = 1900\,MHz$)



Uncertainty of Linearity Assessment: ±0.6% (k=2)