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CERTIFICATE OF COMPLIANCE
SAR EVALUATION

Alien Technology		Dates of Test:	August 7-12, 2019
845 Embedded Way		Test Report Number:	SAR.20190807
San Jose, CA 95138			Revision A

FCC ID:	P65ALRM702
Model(s):	ALR-H460
Test Sample:	Production Unit
Serial Number:	CW1610010006
Equipment Type:	Wireless RFID Scanner
Classification:	Portable Transmitter Hand Held Extremity Limits
TX Frequency Range:	699 – 716 MHz; 824 – 849 MHz; 1710 – 1755 MHz; 1850 – 1910 MHz; 2500 – 2570 MHz; 902 – 928 MHz; 2412 – 2462 MHz; 5180 – 5320 MHz; 5500 – 5700 MHz; 5745 – 5825 MHz
Frequency Tolerance:	± 2.5 ppm
Maximum RF Output:	750 MHz (LTE) – 22.50 dBm, 850 MHz (GSM) – 32.50 dBm, 850 MHz (UMTS) – 22.50 dBm, 900 MHz (RFID) – 30.00 dBm, 1750 MHz (UMTS) – 22.00 dBm, 1750 MHz (LTE) – 24.00 dBm, 1900 MHz (GSM) – 28.50 dBm, 1900 MHz (UMTS) – 21.50 dBm, 1900 MHz (LTE) – 23.50 dBm, 2500 MHz (LTE) – 24.50 dBm, 2450 MHz (b) – 16.50 dBm, 2450 MHz (g) – 14.50 dBm, 2450 MHz (n20) – 14.50 dBm, 2450 MHz (n40) – 13.50 dB, 5250 MHz (a) – 14.50 dB, 5250 MHz (n20) – 14.50 dB, 5250 MHz (n40) – 14.00 dB, 5600 MHz (a) – 15.50 dB, 5600 MHz (n20) – 15.00 dB, 5600 MHz (n40) – 14.00 dB, 5800 MHz (a) – 14.00 dB, 5800 MHz (n20) – 13.50 dB, 5800 MHz (n40) – 13.00 dB Conducted
Signal Modulation:	WCDMA, GMSK, 8-PSK, QPSK, 16-QAM, FHSS, DSSS, OFDM
Antenna Type:	Internal
Application Type:	Certification
FCC Rule Parts:	Part 2, 15C, 15E, 22, 24, 27
KDB Test Methodology:	KDB 447498 D01 v06, KDB 248227 v02r02, KDB 941225 D01 v03r01
Maximum SAR Value:	1.21 W/kg Reported Extremity SAR
Max. Simultaneous:	2.23 W/kg Reported Extremity SAR
Separation Distance:	0 mm

This wireless mobile and/or portable device has been shown to be compliant for localized specific absorption rate (SAR) for uncontrolled environment/general exposure 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 is subject to a denial of Federal benefits that includes 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

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Comment/Revision	Date
Original Release	August 22, 2019
Revision A – Corrected table on Page 79 to show extremity SAR limits, added extremity exposure condition to passing statement on page 79, and added extremity SAR to page 1 blue box for reported SAR values.	August 26, 2019

1. Introduction

This measurement report shows compliance of the Alien Technology Model ALR-H460 FCC ID: P65ALRM702 with FCC Part 2, 1093, ET Docket 93-62 Rules for mobile and portable devices. The FCC has adopted the guidelines for evaluating the environmental effects of radio frequency radiation in ET Docket 93-62 on August 6, 1996 to protect the public and workers from the potential hazards of RF emissions due to FCC regulated portable devices. [1], [6]

The test results recorded herein are based on a single type test of Alien Technology Model ALR-H460 and therefore apply only to the tested sample.

The test procedures and limits, as described in ANSI C95.1 – 1992 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 – 2013 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 ALR-H460 Wireless RFID Scanner. The table also shows the tolerance for the power level for each mode.

Band	Technology	3GPP Nominal Power dBm	Setpoint Nominal Power dBm	Tolerance dBm	Lower Tolerance dBm	Upper Tolerance dBm
750 MHz	LTE	N/A	N/A	N/A	N/A	22.50
850 MHz	GPRS	N/A	N/A	N/A	N/A	32.50
	UMTS	N/A	N/A	N/A	N/A	22.50
900 MHz	RFID	N/A	N/A	N/A	N/A	30.00
1750 MHz	UMTS	N/A	N/A	N/A	N/A	22.00
	LTE	N/A	N/A	N/A	N/A	24.00
1900 MHz	GPRS	N/A	N/A	N/A	N/A	28.50
	UMTS	N/A	N/A	N/A	N/A	21.50
	LTE	N/A	N/A	N/A	N/A	23.50
2500 MHz	LTE	N/A	N/A	N/A	N/A	24.50
WLAN – 2.4 GHz	802.11b	N/A	N/A	N/A	N/A	16.50
WLAN – 2.4 GHz	802.11gn20	N/A	N/A	N/A	N/A	14.50
WLAN – 2.4 GHz	802.11n40	N/A	N/A	N/A	N/A	13.50
WLAN – 5 GHz Band I	802.11an40	N/A	N/A	N/A	N/A	14.00
WLAN – 5 GHz Band I	802.11n20	N/A	N/A	N/A	N/A	14.50
WLAN – 5 GHz Band IIA	802.11a	N/A	N/A	N/A	N/A	14.50
WLAN – 5 GHz Band IIA	802.11n20n40	N/A	N/A	N/A	N/A	14.00
WLAN – 5 GHz Band IIC	802.11a	N/A	N/A	N/A	N/A	15.50
WLAN – 5 GHz Band IIC	802.11n20n40	N/A	N/A	N/A	N/A	14.50
WLAN – 5 GHz Band III	802.11a	N/A	N/A	N/A	N/A	14.00
WLAN – 5 GHz Band III	802.11n20n40	N/A	N/A	N/A	N/A	13.50
Bluetooth – BR/EDR	802.15	N/A	N/A	N/A	N/A	6.50
Bluetooth – LE	802.15	N/A	N/A	N/A	N/A	-2.50

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

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

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.

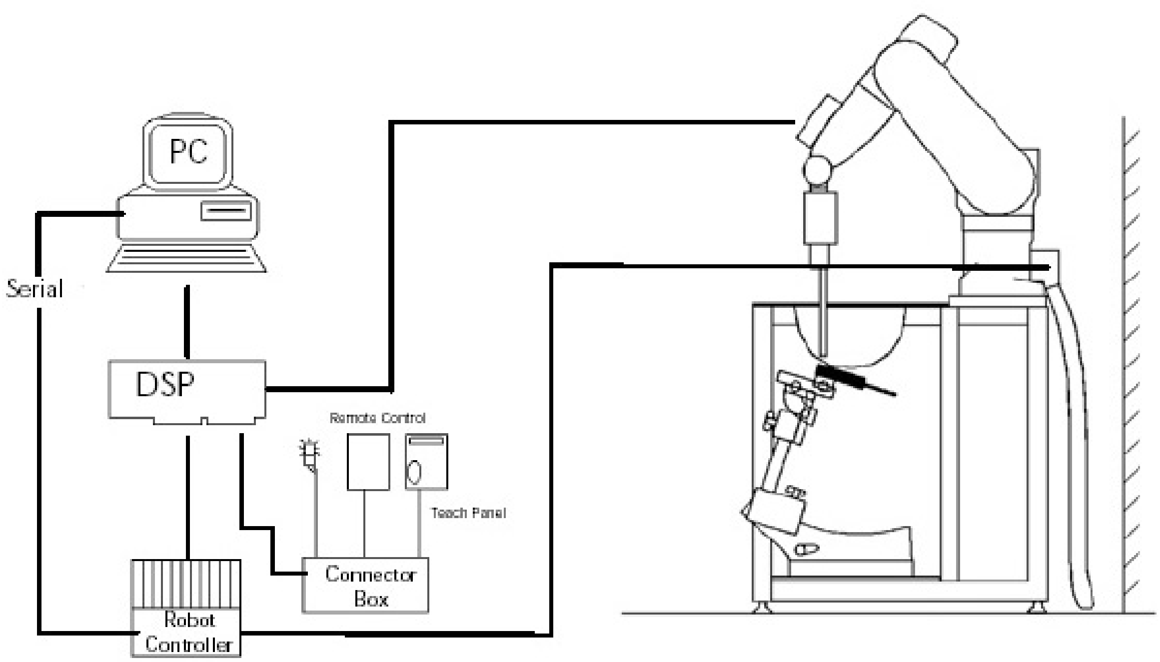


Figure 2.1 SAR Measurement System Setup

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

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

Application: SAR Dosimetry Testing
Compliance tests of wireless device

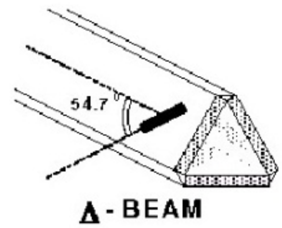


Figure 2.2 Triangular Probe Configurations

Figure 2.3 Probe Thick-Film Technique

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

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

where:

Δt = exposure time (30 seconds),

C = heat capacity of tissue (brain or muscle),

ΔT = temperature increase due to RF exposure.

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

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;

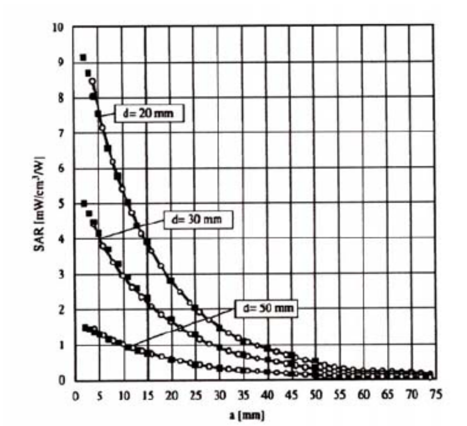


Figure 2.4 E-Field and Temperature Measurements at 900MHz

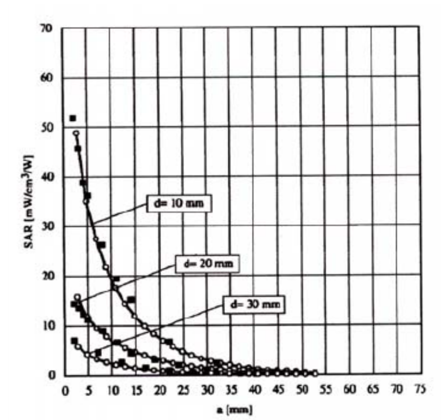


Figure 2.5 E-Field and Temperature Measurements at 1800MHz

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) $\mu V/(V/m)^2$ 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

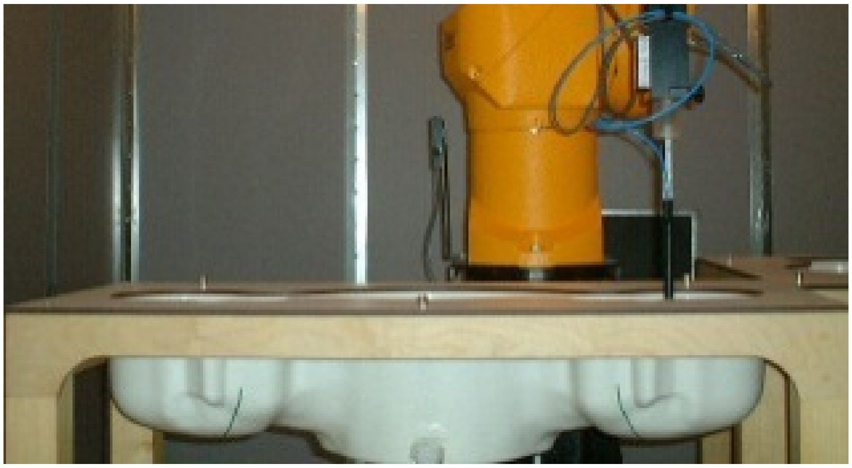


Figure 2.6 SAM Twin Phantom

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									
		750 MHz Head	835 MHz Head	900 MHz Head	1750 MHz Head	1900 MHz Head	2550 MHz Head	2450 MHz Head	5250 MHz Head	5600 MHz Head	5750 MHz Head
Mixing Percentage											
Water		Proprietary Mixture Procured from Speag									
Sugar											
Salt											
HEC											
Bactericide											
DGBE											
Dielectric Constant	Target	41.94	41.52	41.50	40.08	40.00	39.07	39.20	35.93	35.53	35.36
Conductivity (S/m)	Target	0.89	0.91	0.97	1.37	1.40	1.91	1.80	4.71	5.07	5.22

5. ANSI/IEEE C95.1 – 1992 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] Head	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

[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

Exposure Assessment Measurement Uncertainty

Relative DASY5 Uncertainty Budget for SAR Tests								
According to IEC62209-2/2010 (30 MHz - 6 GHz range)								
Error Description	Uncertainty Value	Probability Distribution	Divisor	c_i (1g)	c_i (10g)	Standard Uncertainty ± %, (1g)	Standard Uncertainty ± %, (10g)	v_i^2 or v_{eff}
Measurement System								
Probe calibration	± 6.6%	Normal	1	1	1	± 6.6%	± 6.6%	∞
Axial isotropy	± 4.7%	Rectangular	√3	0.7	0.7	± 1.9%	± 1.9%	∞
Hemispherical isotropy	± 9.6%	Rectangular	√3	0.7	0.7	± 3.9%	± 3.9%	∞
Boundary effects	± 2.0%	Rectangular	√3	1	1	± 1.2%	± 1.2%	∞
Probe linearity	± 4.7%	Rectangular	√3	1	1	± 2.7%	± 2.7%	∞
System detection limits	± 1.0%	Rectangular	√3	1	1	± 0.6%	± 0.6%	∞
Modulation response	± 2.4%	Rectangular	√3	1	1	± 1.4%	± 1.4%	∞
Readout electronics	± 0.3%	Normal	1	1	1	± 0.3%	± 0.3%	∞
Response time	± 0.8%	Rectangular	√3	1	1	± 0.5%	± 0.5%	∞
Integration time	± 2.6%	Rectangular	√3	1	1	± 1.5%	± 1.5%	∞
RF ambient noise	± 3.0%	Rectangular	√3	1	1	± 1.7%	± 1.7%	∞
RF ambient reflections	± 3.0%	Rectangular	√3	1	1	± 1.7%	± 1.7%	∞
Probe positioner	± 0.8%	Rectangular	√3	1	1	± 0.5%	± 0.5%	∞
Probe positioning	± 6.7%	Rectangular	√3	1	1	± 3.9%	± 3.9%	∞
Post-processing	± 4.0%	Rectangular	√3	1	1	± 2.3%	± 2.3%	∞
Test Sample Related								
Device positioning	± 2.9%	Normal	1	1	1	± 2.9%	± 2.9%	145
Device holder uncertainty	± 3.6%	Normal	1	1	1	± 3.6%	± 3.6%	5
Power drift	± 5.0%	Rectangular	√3	1	1	± 2.9%	± 2.9%	∞
Phantom and Setup								
Phantom uncertainty	± 7.9%	Rectangular	√3	1	1	± 4.6%	± 4.6%	∞
SAR algorithm correction	± 1.9%	Normal	1	1	0.84	± 1.9%	± 1.9%	∞
Liquid conductivity (meas.)	± 5.0%	Rectangular	√3	0.78	0.71	± 0.1%	± 0.1%	∞
Liquid permittivity (meas.)	± 5.0%	Rectangular	√3	0.26	0.26	± 0.1%	± 0.1%	∞
Temp. Unc. – Conductivity	± 3.4%	Rectangular	√3	0.78	0.71	± 1.5%	± 1.5%	∞
Temp. Unc. – Permittivity	± 0.4%	Rectangular	√3	0.23	0.26	± 0.1%	± 0.1%	∞
Combined Uncertainty						± 12.4%	± 12.3%	330
Expanded Std. Uncertainty						± 24.8%	± 24.6%	

Worst case uncertainty budget for DASY5 assessed according to IEC62209-2/2010 standard. The budget is valid for the frequency range 30 MHz – 6 GHz and represents a worst-case analysis. For specific tests and configurations, the uncertainty could be considerable smaller.

7. System Validation

Tissue Verification

Table 7.1 Measured Tissue Parameters

		750 MHz Head		835 MHz Head		900 MHz Head	
Date(s)		Aug. 7, 2019		Aug. 7, 2019		Aug. 10, 2019	
Liquid Temperature (˚C)	20.0	Target	Measured	Target	Measured	Target	Measured
Dielectric Constant: ε		41.94	41.46	41.52	41.45	41.50	41.34
Conductivity: σ		0.89	0.90	0.91	0.92	0.97	0.98
		1750 MHz Head		1900 MHz Head		2550 MHz Head	
Date(s)		Aug. 7, 2019		Aug. 7, 2019		Aug. 8, 2019	
Liquid Temperature (˚C)	20.0	Target	Measured	Target	Measured	Target	Measured
Dielectric Constant: ε		40.08	39.93	40.00	40.37	39.07	38.94
Conductivity: σ		1.37	1.39	1.40	1.43	1.91	1.92
		2450 MHz Head		5250 MHz Head		5600 MHz Head	
Date(s)		Aug. 9, 2019		Aug. 9, 2019		Aug. 9, 2019	
Liquid Temperature (˚C)	20.0	Target	Measured	Target	Measured	Target	Measured
Dielectric Constant: ε		39.20	38.96	35.93	35.95	35.53	35.53
Conductivity: σ		1.80	1.84	4.71	4.81	5.07	5.19
		5750 MHz Head					
Date(s)		Aug. 9, 2019					
Liquid Temperature (˚C)	20.0	Target	Measured				
Dielectric Constant: ε		35.36	35.36				
Conductivity: σ		5.22	5.36				

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 normalized 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 Target and Fast SAR to SAR (%)	Plot Number
07-Aug-2019	750 MHz	8.23	8.28	Head	+ 0.61	1
07-Aug-2019	835 MHz	9.44	9.41	Head	- 0.32	2
07-Aug-2019	900 MHz	10.90	11.20	Head	+ 2.75	3
07-Aug-2019	1750 MHz	36.10	37.10	Head	+ 2.77	4
07-Aug-2019	1900 MHz	40.60	41.20	Head	+ 1.48	5
07-Aug-2019	2550 MHz	55.60	57.10	Head	+ 2.70	6
07-Aug-2019	2450 MHz	51.70	52.90	Head	+ 2.32	7
07-Aug-2019	5250 MHz	82.80	84.10	Head	+ 1.57	8
07-Aug-2019	5600 MHz	85.40	85.30	Head	- 0.12	9
07-Aug-2019	5750 MHz	83.90	82.30	Head	- 1.91	10

See Appendix A for data plots.

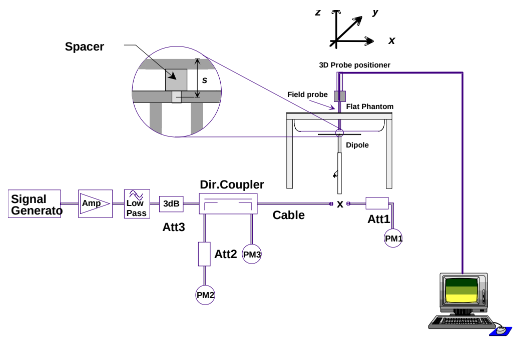


Figure 7.1 Dipole Validation Test Setup

8. 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 either placed into simulated transmit mode using the manufacturer's test codes or 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 EUT was tested on all sides of the device where the antenna was within 25 mm of that side. All measurements were conducted with the side of the device in direct contact with the phantom.

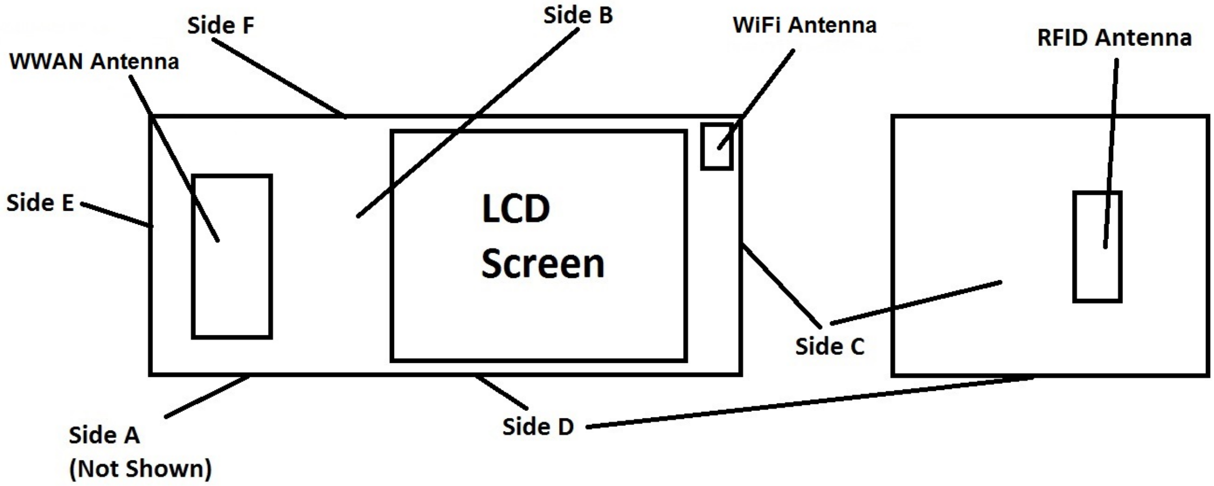
This device is capable of operating in 850/1900 GPRS/EDGE frequency bands. In GPRS mode, the device is in Class 4 for 850 MHz and Class 1 for 1900 MHz. In EDGE mode, the device is in Class E2 for 850/1900 MHz. The testing was conducted in the GPRS mode. The GPRS mode has 1-slot, 2-slot, 3-slot and 4-slot configurations. The power measured is peak power. The average power in all GPRS Slots calculated and the 2-slot had the highest average power. Therefore, the testing was conducted in 2-Slot. The EDGE mode is >5 dB lower than its equivalent slot configuration for GPRS. Therefore, the device was only tested in the highest power configuration which was 2-slot GPRS.

The WCDMA testing was conducted using 12.2 kbps RMC configured in Test Loop Mode 1. The HSPA testing was conducted with HS-DPCCH, E-DPCCH and E-DPDCH all enabled and a 12.2 kbps RMC. FRC was configured according to HS-DPCCH Sub-Test 1 using H-set 1 and QPSK.

The data rates used when evaluating the WiFi transmitter were the lowest data rates for each mode. The device was operating at its maximum output power at the lowest data rate for all measurements.

The device was on a minimum of 10 cm of Styrofoam during each test. The following is a pictorial drawing of the locations and separation distances.

Figure 8.1
SAR Location Diagram of Testing



Antenna Distances

WWAN main to RFID (mm):	130 mm
WLAN to RFID (mm):	85 mm

9. FCC 3G Measurement Procedures

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

9.1 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.

9.2 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	Cellular Band [dBm]			Sub-Test (See Table Below)	MPR
		4132	4183	4233		
99	WCDMA	22.48	22.23	22.17	-	-
6	HSDPA	22.11	22.43	22.34	1	0
6		22.14	22.04	22.32	2	0
6		21.71	21.67	21.50	3	0.5
6		21.71	21.64	21.98	4	0.5
6	HSUPA	22.10	22.36	22.27	1	0
6		20.12	20.22	20.46	2	2
6		21.23	21.15	21.40	3	1
6		20.36	20.31	20.27	4	2
6		22.33	22.24	22.17	5	0

3GPP Release Version	Mode	PCS Band [dBm]			Sub-Test (See Table Below)	MPR
		9262	9400	9538		
99	WCDMA	21.14	21.19	21.00	-	-
6	HSDPA	21.46	21.25	21.02	1	0
6		21.46	21.38	21.34	2	0
6		20.53	20.97	20.61	3	0.5
6		20.93	20.76	20.52	4	0.5
6	HSUPA	21.33	21.49	21.46	1	0
6		19.38	19.02	19.25	2	2
6		20.49	20.09	20.48	3	1
6		19.02	19.05	19.32	4	2
6		21.25	21.35	21.15	5	0

3GPP Release Version	Mode	AWS Band [dBm]			Sub-Test (See Table Below)	MPR
		1312	1413	1513		
99	WCDMA	21.94	21.92	21.58	-	-
6	HSDPA	21.70	21.94	21.69	1	0
6		21.94	21.65	21.88	2	0
6		21.39	21.17	21.13	3	0.5
6		21.31	21.40	21.13	4	0.5
6	HSUPA	21.63	21.53	21.93	1	0
6		19.57	19.81	19.74	2	2
6		20.72	20.88	20.76	3	1
6		19.68	19.96	19.60	4	2
6		21.86	21.95	21.78	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									

9.3 SAR Measurement Conditions for GSM

Configure the 8960 box to support GMSK and 8PSK call respectively, and set one timeslot and two timeslot transmission for GMSK GSM/GPRS and 8PSK EDGE. Measure and record power outputs for both modulations.

GPRS-GMSK/1 slot			
Band	Channel	Peak Power	Frame Average
Cellular	128	32.38	23.35
	190	32.45	23.42
	251	32.06	23.03
PCS	512	28.49	19.46
	661	28.26	19.23
	810	28.18	19.15

GPRS-GMSK/2 slot			
Band	Channel	Peak Power	Frame Average
Cellular	128	31.80	25.78
	190	31.50	25.48
	251	31.87	25.85
PCS	512	28.18	22.16
	661	28.11	22.09
	810	28.48	22.46

GPRS-GMSK/3 slot			
Band	Channel	Peak Power	Frame Average
Cellular	128	29.66	25.40
	190	29.72	25.46
	251	29.85	25.59
PCS	512	26.39	22.13
	661	26.46	22.20
	810	26.40	22.14

GPRS-GMSK/4 slot			
Band	Channel	Peak Power	Frame Average
Cellular	128	28.94	25.93
	190	28.98	25.97
	251	28.68	25.67
PCS	512	25.18	22.17
	661	25.20	22.19
	810	25.11	22.10

EDGE-8PSK/1 slot			
Band	Channel	Peak Power	Frame Average
Cellular	128	27.55	18.52
	190	27.63	18.60
	251	27.58	18.55
PCS	512	26.93	17.90
	661	26.59	17.56
	810	26.99	17.96

EDGE-8PSK/2 slot			
Band	Channel	Peak Power	Frame Average
Cellular	128	27.20	21.18
	190	27.28	21.26
	251	27.00	20.98
PCS	512	25.60	19.58
	661	25.75	19.73
	810	25.84	19.82

EDGE-8PSK/3 slot			
Band	Channel	Peak Power	Frame Average
Cellular	128	25.35	21.09
	190	25.39	21.13
	251	25.11	20.85
PCS	512	23.50	19.24
	661	23.85	19.59
	810	23.92	19.66

EDGE-8PSK/4 slot			
Band	Channel	Peak Power	Frame Average
Cellular	128	24.31	21.30
	190	24.39	21.38
	251	24.14	21.13
PCS	512	22.74	19.73
	661	22.85	19.84
	810	22.86	19.85

Band	Mode	Bandwidth (MHz)	Channel	Frequency (MHz)	Data Rate	Avg Power (dBm)	Tune-up Pwr (dBm)
2450 MHz	802.11b	20	1	2412	1 Mbps	16.45	16.50
			6	2437		16.50	16.50
			11	2462		16.50	16.50
	802.11g	20	1	2412	6 Mbps	14.45	14.50
			6	2437		14.42	14.50
			11	2462		14.46	14.50
	802.11n	20	1	2412	HT0	14.41	14.50
			6	2437		14.89	14.50
			11	2462		14.86	14.50
	802.11n	40	3	2422	HT0	13.37	13.50
			6	2437		13.34	13.50
			9	2452		13.34	13.50
5.15-5.25 GHz	802.11a	20	36	5180	6 Mbps	13.92	14.00
			40	5200		14.00	14.00
			44	5220		14.00	14.00
			48	5240		13.97	14.00
	802.11n	20	36	5180	HT0	14.37	14.50
			40	5200		14.35	14.50
			44	5220		14.34	14.50
			48	5240		14.37	14.50
	802.11n	40	38	5190	HT0	13.91	14.00
			46	5230		13.96	14.00
5.25-5.35 GHz	802.11a	20	52	5260	6 Mbps	14.44	14.50
			56	5280		14.50	14.50
			60	5300		14.50	14.50
			64	5320		14.48	14.50
	802.11n	20	52	5260	HT0	13.92	14.00
			56	5280		13.89	14.00
			60	5300		13.88	14.00
			64	5320		13.90	14.00
	802.11n	40	54	5270	HT0	13.91	14.00
			62	5310		13.88	14.00

Band	Mode	Bandwidth (MHz)	Channel	Frequency (MHz)	Data Rate	Avg Power (dBm)	Tune-up Pwr (dBm)
5600 MHz	802.11a	20	100	5500	6 Mbps	15.39	15.50
			104	5520		15.50	15.50
			108	5540		15.42	15.50
			112	5560		15.47	15.50
			116	5580		15.50	15.50
			120	5600		15.43	15.50
			124	5620		15.50	15.50
			128	5640		15.41	15.50
			132	5660		15.38	15.50
			136	5680		15.50	15.50
			140	5700		15.44	15.50
	802.11n	20	100	5500	HT0	14.88	15.00
			104	5520		14.83	15.00
			108	5540		14.85	15.00
			112	5560		14.86	15.00
			116	5580		14.84	15.00
			120	5600		14.90	15.00
			124	5620		14.91	15.00
			128	5640		14.94	15.00
			132	5660		14.81	15.00
			136	5680		14.89	15.00
			140	5700		14.88	15.00
	802.11n	40	102	5510	HT0	13.92	14.00
			110	5550		13.90	14.00
			118	5580		13.87	14.00
			126	5610		13.89	14.00
			134	5670		13.83	14.00

Band	Mode	Bandwidth (MHz)	Channel	Frequency (MHz)	Data Rate	Avg Power (dBm)	Tune-up Pwr (dBm)
5800 MHz	802.11a	20	149	5745	6 Mbps	14.00	14.00
			153	5765		13.93	14.00
			157	5785		14.00	14.00
			161	5805		13.94	14.00
			165	5825		14.00	14.00
	802.11n	20	149	5745	HT0	13.42	13.50
			153	5765		13.45	13.50
			157	5785		13.43	13.50
			161	5805		13.40	13.50
			165	5825		13.42	13.50
	802.11n	40	152	5760	HT0	13.44	13.50
			159	5795		13.39	13.50

Band	Mode	Channel	Frequency (MHz)	Data Rate	Avg Power (dBm)	Tune-up Pwr (dBm)
2450 MHz	Bluetooth v4.0	0	2402	BR/EDR	3.87	6.50
		39	2441		5.94	6.50
		78	2480		5.01	6.50
		0	2402	LE	-3.16	-2.50
		39	2441		-3.21	-2.50
		78	2480		-3.98	-2.50

Band	Mode	Bandwidth (MHz)	Channel	Frequency (MHz)	Data Rate	Antenna	Power (dBm)
900 MHz	RFID	N/A	1	902.8	N/A	Main	28.56
			25	915.0			28.87
			50	927.3			28.72

Figure 9.1 Test Reduction Table – 850 MHz

Mode	Side	Required Channel	Tested/Reduced
GSM	Back	128 – 824.2 MHz	Reduced[1]
		190 – 836.6 MHz	Tested
		251 – 848.8 MHz	Reduced[1]
	Bottom	128 – 824.2 MHz	Reduced[1]
		190 – 836.6 MHz	Tested
		251 – 848.8 MHz	Reduced[1]
	Left	128 – 824.2 MHz	Reduced[1]
		190 – 836.6 MHz	Tested
		251 – 848.8 MHz	Reduced[1]
	Right, Top	128 – 824.2 MHz	Reduced[2]
		190 – 836.6 MHz	Reduced[2]
		251 – 848.8 MHz	Reduced[2]
UMTS	Back	4132 – 826.4 MHz	Reduced[1]
		4183 – 836.6 MHz	Tested
		4233 – 846.6 MHz	Reduced[1]
	Bottom	4132 – 826.4 MHz	Reduced[1]
		4183 – 836.6 MHz	Tested
		4233 – 846.6 MHz	Reduced[1]
	Left	4132 – 826.4 MHz	Reduced[1]
		4183 – 836.6 MHz	Tested
		4233 – 846.6 MHz	Reduced[1]
	Right, Top	4132 – 826.4 MHz	Reduced[2]
		4183 – 836.6 MHz	Reduced[2]
		4233 – 846.6 MHz	Reduced[2]

Reduced[1] – When the reported SAR is ≤ 2.0 W/kg, SAR is not required for the remaining test configuration per KDB 447498 D01 v06 section 4.4.1 a) page 16.

Reduced[2] – When the antenna is more than 25 mm from a side, the test can be reduced per KDB447498 D01 v05r02 section 4.3.1 1) page 11. See below for calculations.

Calculations for test exclusion for Right and Top.

Maximum power: 396.3 mW
Top distance: 142 mm
Right distance: 52 mm

[{[(7.5)/(√0.849)]*50 mm}]+[{52-50 mm}*10]=426 mW which is greater than 396.3 mW

Figure 9.2 Test Reduction Table – 1900 MHz

Mode	Side	Required Channel	Tested/Reduced
GSM	Back	512 – 1850.2 MHz	Reduced[1]
		661 – 1880.0 MHz	Tested
		810 – 1909.8 MHz	Reduced[1]
	Bottom	512 – 1850.2 MHz	Reduced[1]
		661 – 1880.0 MHz	Tested
		810 – 1909.8 MHz	Reduced[1]
	Left	512 – 1850.2 MHz	Reduced[1]
		661 – 1880.0 MHz	Tested
		810 – 1909.8 MHz	Reduced[1]
	Right, Top	512 – 1850.2 MHz	Reduced[2]
		661 – 1880.0 MHz	Reduced[2]
		810 – 1909.8 MHz	Reduced[2]
UMTS	Back	9262 – 1852.4 MHz	Reduced[1]
		9400 – 1880.0 MHz	Tested
		9538 – 1907.6 MHz	Reduced[1]
	Bottom	9262 – 1852.4 MHz	Reduced[1]
		9400 – 1880.0 MHz	Tested
		9538 – 1907.6 MHz	Reduced[1]
	Left	9262 – 1852.4 MHz	Reduced[1]
		9400 – 1880.0 MHz	Tested
		9538 – 1907.6 MHz	Reduced[1]
	Right, Top	9262 – 1852.4 MHz	Reduced[2]
		9400 – 1880.0 MHz	Reduced[2]
		9538 – 1907.6 MHz	Reduced[2]

Reduced[1] – When the reported SAR is ≤ 2.0 W/kg, SAR is not required for the remaining test configuration per KDB 447498 D01 v06 section 4.4.1 a) page 16.

Reduced[2] – When the antenna is more than 25 mm from a side, the test can be reduced per KDB447498 D01 v05r02 section 4.3.1 1) page 11. See below for calculations.

Calculations for test exclusion for Right and Top.

Maximum power: 177.8 mW
Top distance: 142 mm
Right distance: 52 mm

[{[(7.5)/(√1.91)]*50 mm}]+[{52-50 mm}*10]=291 mW which is greater than 177.8 mW

Figure 9.3 Test Reduction Table – 1750 MHz

Mode	Side	Required Channel	Tested/Reduced
UMTS	Back	1312 – 1712.4 MHz	Reduced[1]
		1413 – 1732.6 MHz	Tested
		1513 – 1752.6 MHz	Reduced[1]
	Bottom	1312 – 1712.4 MHz	Reduced[1]
		1413 – 1732.6 MHz	Tested
		1513 – 1752.6 MHz	Reduced[1]
	Left	1312 – 1712.4 MHz	Reduced[1]
		1413 – 1732.6 MHz	Tested
		1513 – 1752.6 MHz	Reduced[1]
	Right, Top	1312 – 1712.4 MHz	Reduced[2]
		1413 – 1732.6 MHz	Reduced[2]
		1513 – 1752.6 MHz	Reduced[2]

Reduced[1] – When the reported SAR is ≤ 2.0 W/kg, SAR is not required for the remaining test configuration per KDB 447498 D01 v06 section 4.4.1 a) page 16.
Reduced[2] – When the antenna is more than 25 mm from a side, the test can be reduced per KDB447498 D01 v05r02 section 4.3.1 1) page 11. See below for calculations.

Calculations for test exclusion for Right and Top.

Maximum power: 158.5 mW
Top distance: 142 mm
Right distance: 52 mm

[{[(7.5)/(√1.755)]*50 mm}]+[{52-50 mm}*10]=303 mW which is greater than 158.5 mW

Figure 9.4 Test Reduction Table – 900 MHz

Mode	Side	Required Channel	Tested/Reduced
RFID	Back	0 – 902.75 MHz	Reduced[1]
		24 – 915.00 MHz	Tested
		49 – 927.75 MHz	Reduced[1]
	Top	0 – 902.75 MHz	Tested
		24 – 915.00 MHz	Tested
		49 – 927.75 MHz	Tested
	Left	0 – 902.75 MHz	Reduced[1]
		24 – 915.00 MHz	Tested
		49 – 927.75 MHz	Reduced[1]
	Right	0 – 902.75 MHz	Reduced[1]
		24 – 915.00 MHz	Tested
		49 – 927.75 MHz	Reduced[1]
	Bottom	0 – 902.75 MHz	Reduced[3]
		24 – 915.00 MHz	Reduced[3]
		49 – 927.75 MHz	Reduced[3]

Reduced[1] – When the reported SAR is ≤ 2.0 W/kg, SAR is not required for the remaining test configuration per KDB 447498 D01 v06 section 4.4.1 a) page 16.

Reduced[2] – When the antenna is more than 25 mm from a side, the test can be reduced per KDB447498 D01 v05r02 section 4.3.1 1) page 11. See below for calculations.

Calculations for test exclusion for Bottom.

Maximum power: 1000 mW
Bottom distance: 142 mm

[{[(3.0)/(√0.928)]*50 mm}]+[{142-50 mm}*10]=1075 mW which is greater than 1000 mW

Figure 9.4 Test Reduction Table – 2.4 GHz

Mode	Side	Required Channel	Tested/Reduced
802.11b	Back	1 – 2412 MHz	Reduced[1]
		6 – 2437 MHz	Tested
		11 – 2462 MHz	Reduced[1]
	Top	1 – 2412 MHz	Reduced[1]
		6 – 2437 MHz	Tested
		11 – 2462 MHz	Reduced[1]
	Right	1 – 2412 MHz	Reduced[1]
		6 – 2437 MHz	Tested
		11 – 2462 MHz	Reduced[1]
	Left, Bottom	1 – 2412 MHz	Reduced[4]
		6 – 2437 MHz	Reduced[4]
		11 – 2462 MHz	Reduced[4]
802.11g	Back	1 – 2412 MHz	Reduced[3]
		6 – 2437 MHz	Reduced[3]
		11 – 2462 MHz	Reduced[3]
	Top	1 – 2412 MHz	Reduced[3]
		6 – 2437 MHz	Reduced[3]
		11 – 2462 MHz	Reduced[3]
	Right	1 – 2412 MHz	Reduced[3]
		6 – 2437 MHz	Reduced[3]
		11 – 2462 MHz	Reduced[3]
	Left, Bottom	1 – 2412 MHz	Reduced[3]
		6 – 2437 MHz	Reduced[3]
		11 – 2462 MHz	Reduced[3]
802.11n	Back	1 – 2412 MHz	Reduced[3]
		6 – 2437 MHz	Reduced[3]
		11 – 2462 MHz	Reduced[3]
	Top	1 – 2412 MHz	Reduced[3]
		6 – 2437 MHz	Reduced[3]
		11 – 2462 MHz	Reduced[3]
	Right	1 – 2412 MHz	Reduced[3]
		6 – 2437 MHz	Reduced[3]
		11 – 2462 MHz	Reduced[3]
	Left, Bottom	1 – 2412 MHz	Reduced[3]
		6 – 2437 MHz	Reduced[3]
		11 – 2462 MHz	Reduced[3]

Reduced[1] – When the reported SAR is ≤ 1.0 W/kg, SAR is not required for the remaining test configuration per KDB 248227 D01 v02r02 section 5.1.1 1) page 9.
Reduced[2] – When the reported SAR is >2.0 W/kg, test the next highest configuration until the SAR value is ≤ 3.0 W/kg per KDB 248227 D01 v02r02 section 5.1.1 3) page 9.
Reduced[3] – When the highest reported SAR for DSSS is adjusted by the ratio of OFDM to DSSS specified maximum output power and the adjusted SAR is ≤ 3.0 W/kg, SAR is not required per KDB 248227 D01 v02r02 section 5.2.2 2) page 10.
Reduced[4] – When the antenna is more than 25 mm from a side, the test can be reduced per KDB447498 D01 v06 section 4.3.1 1) page 11. See below for calculations.

Calculations for test exclusion for Left and Bottom.

Maximum power: 44.7 mW
Left distance: 56 mm
Bottom distance: 152 mm

The closest distance is from the left side. Therefore, if the left side is excluded the bottom would also be excluded.

[{[(7.5)/(√2.462)]*50 mm}]+[{56-50 mm}*10]=298 mW which is greater than 44.7 mW

Figure 9.5 Test Reduction Table – 5.1 GHz

Mode	Side	Required Channel	Tested/Reduced
802.11a 5150 MHz	Back	36 – 5180 MHz	Reduced[1]
		40 – 5200 MHz	Reduced[1]
		44 – 5220 MHz	Reduced[1]
		48 – 5240 MHz	Reduced[1]
	Top	36 – 5180 MHz	Reduced[1]
		40 – 5200 MHz	Reduced[1]
		44 – 5220 MHz	Reduced[1]
		48 – 5240 MHz	Reduced[1]
	Right	36 – 5180 MHz	Reduced[1]
		40 – 5200 MHz	Reduced[1]
		44 – 5220 MHz	Reduced[1]
		48 – 5240 MHz	Reduced[1]
	Left, Bottom	36 – 5180 MHz	Reduced[2]
		40 – 5200 MHz	Reduced[2]
		44 – 5220 MHz	Reduced[2]
		48 – 5240 MHz	Reduced[2]
802.11n 5150 MHz	Back	36 – 5180 MHz	Reduced[1]
		40 – 5200 MHz	Reduced[1]
		44 – 5220 MHz	Reduced[1]
		48 – 5240 MHz	Reduced[1]
	Top	36 – 5180 MHz	Reduced[1]
		40 – 5200 MHz	Reduced[1]
		44 – 5220 MHz	Reduced[1]
		48 – 5240 MHz	Reduced[1]
	Right	36 – 5180 MHz	Reduced[1]
		40 – 5200 MHz	Reduced[1]
		44 – 5220 MHz	Reduced[1]
		48 – 5240 MHz	Reduced[1]
	Left, Bottom	36 – 5180 MHz	Reduced[2]
		40 – 5200 MHz	Reduced[2]
		44 – 5220 MHz	Reduced[2]
		48 – 5240 MHz	Reduced[2]
802.11ac 5210 MHz	Back	42 – 5210 MHz	Reduced[1]
	Top	42 – 5210 MHz	Reduced[1]
	Right	42 – 5210 MHz	Reduced[1]
	Left, Bottom	42 – 5210 MHz	Reduced[2]

Reduced[1] – When the highest reported SAR for DSSS is adjusted by the ratio of OFDM to DSSS specified maximum output power and the adjusted SAR is ≤ 3.0 W/kg, SAR is not required per KDB 248227 D01 v02r02 section 5.2.2 2) page 10.
Reduced[2] – When the antenna is more than 25 mm from a side, the test can be reduced per KDB447498 D01 v06 section 4.3.1 1) page 11. See below for calculations.

Calculations for test exclusion for Left and Bottom.

Maximum power: 28.2 mW
Left distance: 56 mm
Bottom distance: 152 mm

The closest distance is from the left side. Therefore, if the left side is excluded the bottom would also be excluded.

[{[(7.5)/(√5.24)]*50 mm}]+[{56-50 mm}*10]=223 mW which is greater than 28.2 mW

Figure 9.6 Test Reduction Table – 5.2 GHz

Mode	Side	Required Channel	Tested/Reduced
802.11a 5250 MHz	Back	52 – 5260 MHz	Reduced[1]
		56 – 5280 MHz	Reduced[1]
		60 – 5300 MHz	Tested
		64 – 5320 MHz	Reduced[1]
	Top	52 – 5260 MHz	Reduced[1]
		56 – 5280 MHz	Reduced[1]
		60 – 5300 MHz	Tested
		64 – 5320 MHz	Reduced[1]
	Right	52 – 5260 MHz	Reduced[1]
		56 – 5280 MHz	Reduced[1]
		60 – 5300 MHz	Tested
		64 – 5320 MHz	Reduced[1]
	Left, Bottom	52 – 5260 MHz	Reduced[2]
		56 – 5280 MHz	Reduced[2]
		60 – 5300 MHz	Reduced[2]
		64 – 5320 MHz	Reduced[2]
802.11n 5250 MHz	Back	52 – 5260 MHz	Reduced[1]
		56 – 5280 MHz	Reduced[1]
		60 – 5300 MHz	Reduced[1]
		64 – 5320 MHz	Reduced[1]
	Top	52 – 5260 MHz	Reduced[1]
		56 – 5280 MHz	Reduced[1]
		60 – 5300 MHz	Reduced[1]
		64 – 5320 MHz	Reduced[1]
	Right	52 – 5260 MHz	Reduced[1]
		56 – 5280 MHz	Reduced[1]
		60 – 5300 MHz	Reduced[1]
		64 – 5320 MHz	Reduced[1]
	Left, Bottom	52 – 5260 MHz	Reduced[2]
		56 – 5280 MHz	Reduced[2]
		60 – 5300 MHz	Reduced[2]
		64 – 5320 MHz	Reduced[2]
802.11ac 5210 MHz	Back	58 – 5290 MHz	Reduced[1]
	Top	58 – 5290 MHz	Reduced[1]
	Right	58 – 5290 MHz	Reduced[1]
	Left, Bottom	58 – 5290 MHz	Reduced[2]

Reduced[1] – When the reported SAR is ≤ 1.0 W/kg, SAR is not required for the remaining test configuration per KDB 248227 D01 v02r02 section 5.1.1 1) page 9.
Reduced[2] – When the antenna is more than 25 mm from a side, the test can be reduced per KDB447498 D01 v06 section 4.3.1 1) page 11. See below for calculations.
Reduced[3] – When the reported SAR is >2.0 W/kg, test the next highest configuration until the SAR value is ≤ 3.0 W/kg per KDB 248227 D01 v02r02 section 5.1.1 3) page 9.
Reduced[4] – When the reported SAR is >1.0 W/kg, test the next highest configuration until the SAR value is ≤ 2.0 W/kg per KDB 248227 D01 v02r02 section 5.1.1 2) page 9.

Calculations for test exclusion for Left and Bottom.

Maximum power: 28.2 mW
Left distance: 56 mm
Bottom distance: 152 mm

The closest distance is from the left side. Therefore, if the left side is excluded the bottom would also be excluded.

[{[(7.5)/(√5.32)]*50 mm}]+[{56-50 mm}*10]=222 mW which is greater than 28.2 mW

Figure 9.7 Test Reduction Table – 5.6 GHz

Mode	Side	Required Channel	Tested/Reduced
802.11a 5600 MHz	Back	100 – 5500 MHz	Reduced[4]
		104 – 5520 MHz	Reduced[4]
		108 – 5540 MHz	Reduced[4]
		112 – 5560 MHz	Reduced[4]
		116 – 5580 MHz	Reduced[4]
		120 – 5600 MHz	Reduced[4]
		124 – 5620 MHz	Tested
		128 – 5640 MHz	Reduced[4]
		132 – 5660 MHz	Reduced[4]
		136 – 5680 MHz	Reduced[4]
		140 – 5700 MHz	Reduced[4]
	Top	100 – 5500 MHz	Reduced[4]
		104 – 5520 MHz	Reduced[4]
		108 – 5540 MHz	Reduced[4]
		112 – 5560 MHz	Reduced[4]
		116 – 5580 MHz	Reduced[4]
		120 – 5600 MHz	Reduced[4]
		124 – 5620 MHz	Tested
		128 – 5640 MHz	Reduced[4]
		132 – 5660 MHz	Reduced[4]
		136 – 5680 MHz	Reduced[4]
		140 – 5700 MHz	Reduced[4]
	Right	100 – 5500 MHz	Reduced[4]
		104 – 5520 MHz	Reduced[4]
		108 – 5540 MHz	Reduced[4]
		112 – 5560 MHz	Reduced[4]
		116 – 5580 MHz	Reduced[4]
		120 – 5600 MHz	Reduced[4]
		124 – 5620 MHz	Tested
		128 – 5640 MHz	Reduced[4]
		132 – 5660 MHz	Reduced[4]
		136 – 5680 MHz	Reduced[4]
		140 – 5700 MHz	Reduced[4]
	Left, Bottom	100 – 5500 MHz	Reduced[3]
		104 – 5520 MHz	Reduced[3]
		108 – 5540 MHz	Reduced[3]
		112 – 5560 MHz	Reduced[3]
		116 – 5580 MHz	Reduced[3]
		120 – 5600 MHz	Reduced[3]
		124 – 5620 MHz	Reduced[3]
		128 – 5640 MHz	Reduced[3]
		132 – 5660 MHz	Reduced[3]
		136 – 5680 MHz	Reduced[3]
		140 – 5700 MHz	Reduced[3]

Reduced[1] – When the reported SAR is >1.0 W/kg, test the next highest configuration until the SAR value is ≤ 2.0 W/kg per KDB 248227 D01 v02r02 section 5.1.1 2) page 9.
Reduced[2] – When the reported SAR is >2.0 W/kg, test the next highest configuration until the SAR value is ≤ 3.0 W/kg per KDB 248227 D01 v02r02 section 5.1.1 3) page 9.
Reduced[3] – When the antenna is more than 25 mm from a side, the test can be reduced per KDB447498 D01 v06 section 4.3.1 1) page 11. See below for calculations.
Reduced[4] – When the reported SAR is ≤ 1.0 W/kg, SAR is not required for the remaining test configuration per KDB 248227 D01 v02r02 section 5.1.1 1) page 9.

Calculations for test exclusion for Left and Bottom.

Maximum power: 35.5 mW
Left distance: 56 mm
Bottom distance: 152 mm

The closest distance is from the left side. Therefore, if the left side is excluded the bottom would also be excluded.

[{[(7.5)/(√5.70)]*50 mm}]+[{56-50 mm}*10]=217 mW which is greater than 35.5 mW

Figure 9.8 Test Reduction Table – 5.6 GHz

Mode	Side	Required Channel	Tested/Reduced
802.11n 5600 MHz	Back	100 – 5500 MHz	Reduced[4]
		104 – 5520 MHz	Reduced[4]
		108 – 5540 MHz	Reduced[4]
		112 – 5560 MHz	Reduced[4]
		116 – 5580 MHz	Reduced[4]
		120 – 5600 MHz	Reduced[4]
		124 – 5620 MHz	Reduced[4]
		128 – 5640 MHz	Reduced[4]
		132 – 5660 MHz	Reduced[4]
		136 – 5680 MHz	Reduced[4]
		140 – 5700 MHz	Reduced[4]
	Top	100 – 5500 MHz	Reduced[4]
		104 – 5520 MHz	Reduced[4]
		108 – 5540 MHz	Reduced[4]
		112 – 5560 MHz	Reduced[4]
		116 – 5580 MHz	Reduced[4]
		120 – 5600 MHz	Reduced[4]
		124 – 5620 MHz	Reduced[4]
		128 – 5640 MHz	Reduced[4]
		132 – 5660 MHz	Reduced[4]
		136 – 5680 MHz	Reduced[4]
		140 – 5700 MHz	Reduced[4]
	Right	100 – 5500 MHz	Reduced[4]
		104 – 5520 MHz	Reduced[4]
		108 – 5540 MHz	Reduced[4]
		112 – 5560 MHz	Reduced[4]
		116 – 5580 MHz	Reduced[4]
		120 – 5600 MHz	Reduced[4]
		124 – 5620 MHz	Reduced[4]
		128 – 5640 MHz	Reduced[4]
		132 – 5660 MHz	Reduced[4]
		136 – 5680 MHz	Reduced[4]
		140 – 5700 MHz	Reduced[4]
	Left, Bottom	100 – 5500 MHz	Reduced[3]
		104 – 5520 MHz	Reduced[3]
		108 – 5540 MHz	Reduced[3]
		112 – 5560 MHz	Reduced[3]
		116 – 5580 MHz	Reduced[3]
		120 – 5600 MHz	Reduced[3]
		124 – 5620 MHz	Reduced[3]
		128 – 5640 MHz	Reduced[3]
		132 – 5660 MHz	Reduced[3]
		136 – 5680 MHz	Reduced[3]
		140 – 5700 MHz	Reduced[3]

Reduced[1] – When the reported SAR is >1.0 W/kg, test the next highest configuration until the SAR value is ≤ 2.0 W/kg per KDB 248227 D01 v02r02 section 5.1.1 2) page 9.
Reduced[2] – When the reported SAR is >2.0 W/kg, test the next highest configuration until the SAR value is ≤ 3.0 W/kg per KDB 248227 D01 v02r02 section 5.1.1 3) page 9.
Reduced[3] – When the antenna is more than 25 mm from a side, the test can be reduced per KDB447498 D01 v06 section 4.3.1 1) page 11. See below for calculations.
Reduced[4] – When the reported SAR is ≤ 1.0 W/kg, SAR is not required for the remaining test configuration per KDB 248227 D01 v02r02 section 5.1.1 1) page 9.

Calculations for test exclusion for Left and Bottom.

Maximum power: 56.2 mW
Left distance: 56 mm
Bottom distance: 152 mm

The closest distance is from the left side. Therefore, if the left side is excluded the bottom would also be excluded.

[{[(7.5)/(√5.70)]*50 mm}]+[{56-50 mm}*10]=217 mW which is greater than 35.5 mW

Figure 9.9 Test Reduction Table – 5.6 GHz

Mode	Side	Required Channel	Tested/Reduced
802.11ac 5600 MHz	Back	106 – 5530 MHz	Reduced[4]
		122 – 5610 MHz	Reduced[4]
		138 – 5690 MHz	Reduced[4]
	Top	106 – 5530 MHz	Reduced[4]
		122 – 5610 MHz	Reduced[4]
		138 – 5690 MHz	Reduced[4]
	Right	106 – 5530 MHz	Reduced[4]
		122 – 5610 MHz	Reduced[4]
		138 – 5690 MHz	Reduced[4]
	Left, Bottom	106 – 5530 MHz	Reduced[3]
		122 – 5610 MHz	Reduced[3]
		138 – 5690 MHz	Reduced[3]

Reduced[1] – When the reported SAR is >1.0 W/kg, test the next highest configuration until the SAR value is ≤ 2.0 W/kg per KDB 248227 D01 v02r02 section 5.1.1 2) page 9.
Reduced[2] – When the reported SAR is >2.0 W/kg, test the next highest configuration until the SAR value is ≤ 3.0 W/kg per KDB 248227 D01 v02r02 section 5.1.1 3) page 9.
Reduced[3] – When the antenna is more than 25 mm from a side, the test can be reduced per KDB447498 D01 v06 section 4.3.1 1) page 11. See below for calculations.
Reduced[4] – When the reported SAR is ≤ 1.0 W/kg, SAR is not required for the remaining test configuration per KDB 248227 D01 v02r02 section 5.1.1 1) page 9.

Calculations for test exclusion for Left and Bottom.

Maximum power: 56.2 mW
Left distance: 56 mm
Bottom distance: 152 mm

The closest distance is from the left side. Therefore, if the left side is excluded the bottom would also be excluded.

[{[(7.5)/(√5.70)]*50 mm}]+[{56-50 mm}*10]=217 mW which is greater than 35.5 mW

Figure 9.10 Test Reduction Table – 5.8 GHz

Mode	Side	Required Channel	Tested/Reduced
802.11a 5800 MHz	Back	149 – 5745 MHz	Reduced[1]
		153 – 5765 MHz	Reduced[1]
		157 – 5785 MHz	Tested
		161 – 5805 MHz	Reduced[1]
		165 – 5825 MHz	Reduced[1]
	Top	149 – 5745 MHz	Reduced[1]
		153 – 5765 MHz	Reduced[1]
		157 – 5785 MHz	Tested
		161 – 5805 MHz	Reduced[1]
		165 – 5825 MHz	Reduced[1]
	Right	149 – 5745 MHz	Reduced[1]
		153 – 5765 MHz	Reduced[1]
		157 – 5785 MHz	Tested
		161 – 5805 MHz	Reduced[1]
		165 – 5825 MHz	Reduced[1]
	Left, Bottom	149 – 5745 MHz	Reduced[4]
		153 – 5765 MHz	Reduced[4]
		157 – 5785 MHz	Reduced[4]
		161 – 5805 MHz	Reduced[4]
		165 – 5825 MHz	Reduced[4]
802.11n 5800 MHz	Back	149 – 5745 MHz	Reduced[1]
		153 – 5765 MHz	Reduced[1]
		157 – 5785 MHz	Reduced[1]
		161 – 5805 MHz	Reduced[1]
		165 – 5825 MHz	Reduced[1]
	Top	149 – 5745 MHz	Reduced[1]
		153 – 5765 MHz	Reduced[1]
		157 – 5785 MHz	Reduced[1]
		161 – 5805 MHz	Reduced[1]
		165 – 5825 MHz	Reduced[1]
	Right	149 – 5745 MHz	Reduced[1]
		153 – 5765 MHz	Reduced[1]
		157 – 5785 MHz	Reduced[1]
		161 – 5805 MHz	Reduced[1]
		165 – 5825 MHz	Reduced[1]
	Left, Bottom	149 – 5745 MHz	Reduced[4]
		153 – 5765 MHz	Reduced[4]
		157 – 5785 MHz	Reduced[4]
		161 – 5805 MHz	Reduced[4]
		165 – 5825 MHz	Reduced[4]
802.11ac 5800 MHz	Back	155 – 5775 MHz	Reduced[1]
	Top	155 – 5775 MHz	Reduced[1]
	Right	155 – 5775 MHz	Reduced[1]
	Left, Bottom	155 – 5775 MHz	Reduced[4]

Reduced[1] – When the reported SAR is ≤ 0.4 W/kg, SAR is not required for the remaining test configuration per KDB 248227 D01 v02r02 section 5.1.1 1) page 9.

Reduced[2] – When the reported SAR is > 0.4 W/kg, test next highest output power channel until SAR ≤ 0.8 W/kg then all remaining test configurations are not required per KDB 248227 D01 v02r02 section 5.1.1 2) page 9.

Reduced[3] – When the reported SAR is >0.8 W/kg, test the next highest configuration until the SAR value is ≤ 1.2 W/kg per KDB 248227 D01 v02r02 section 5.1.1 3) page 9.

Reduced[4] – When the antenna is more than 25 mm from a side, the test can be reduced per KDB447498 D01 v06 section 4.3.1 1) page 11. See below for calculations.

Calculations for test exclusion for Left and Bottom.

Maximum power: 25.1 mW
Left distance: 56 mm
Bottom distance: 152 mm

The closest distance is from the left side. Therefore, if the left side is excluded the bottom would also be excluded.

[{[(7.5)/(√5.825)]*50 mm}]+[{56-50 mm}*10]=215 mW which is greater than 25.1 mW

10. LTE Document Checklist

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

LTE Operating Band	Uplink (transmit) Low - high	Downlink (Receive) Low - high	Duplex mode (FDD/TDD)
2	1850-1910	1930-1990	FDD
4	1710-1755	2110-2155	FDD
7	2500-2570	2620-2690	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
7	5,10,15,20	2500-2570 MHz
12	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
7	5	2502.5	20775	2535.0	21100	2567.5	21425
7	10	2505.0	20800	2535.0	21100	2565.0	21400
7	15	2507.5	20825	2535.0	21100	2562.5	21375
7	20	2510.0	20850	2535.0	21100	2560.0	21350
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:
    - #1 WWAN Antenna (Transmit and Receive) Antenna (B2, B4, B5, B7, B12)
    - #2 WWAN Antenna (Receive Only)
    - #3 WLAN (Transmit and Receive)
    - #4 RFID (Transmit and Receive)

    Transmission relationship
    - All transmission (TX) is limited to the WWAN, RFID and WLAN antennas only
    - The device is unable to transmit WCDMA/HSPA and LTE simultaneously.
    - The Diversity antenna is receive only antenna which is reserved for the WWAN operation.
    - Rx is simultaneous
    - Simultaneous Tx with the WWAN, RFID and WLAN is active.

Antenna port	WWAN	802.11 abgn	RFID	BT
	TX	TX	TX	TX
#1 WWAN Antenna	----	No	**Yes**	Yes
#3 WLAN Antenna	No	----	**Yes**	No
#4 RFID Antenna	**Yes**	**Yes**	----	Yes

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 data only device. Data mode was tested in each operating mode and exposure condition in the 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 45-58 of this report. The below table shows the factory set point with the allowable tolerance.

Band	Technology	Class	3GPP Nominal Power dBm	Calibrated Nominal Power dBm	Tolerance dBm	Lower Tolerance dBm	Upper Tolerance dBm
Band 2 – 1900 MHz	LTE	3	23.0	23.0	+1.0/-1.7	21.3	24.0
Band 4 – 1750 MHz	LTE	3	23.0	23.0	+1.0/-1.7	21.3	24.0
Band 5 – 835 MHz	LTE	3	23.0	23.0	+1.0/-1.7	21.3	24.0
Band 7 – 2550 MHz	LTE	3	23.0	22.5	+0.5/-1.2	21.3	23.0
Band 13 – 750 MHz	LTE	3	23.0	23.0	+1.0/-1.7	21.3	24.0
Band 14 – 750 MHz	LTE	3	23.0	23.0	+1.0/-1.7	21.3	24.0
Band 66 – 1750 MHz	LTE	3	23.0	23.0	+1.0/-1.7	21.3	24.0
Band 48 – 3600 MHz	LTE	3	23.0	23.0	+1.0/-1.7	21.3	24.0

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:

Band	Technology	Class	3GPP Nominal Power dBm	Calibrated Nominal Power dBm	Tolerance dBm	Lower Tolerance dBm	Upper Tolerance dBm
Band 2 – 1900 MHz	WCDMA/HSPA	3	23.0	23.0	+1.0/-2.0	21.0	24.0
Band 5 – 850 MHz	WCDMA/HSPA	3	23.0	23.0	+1.0/-2.0	21.0	24.0
WLAN – 2.4 GHz	802.11b	N/A	N/A	14.0	±4.0	10.0	18.0
WLAN – 2.4 GHz	802.11g/n	N/A	N/A	11.0	±4.0	7.0	15.0
WLAN – 5.2 GHz	802.11an/ac	N/A	N/A	8.0	±4.0	4.0	12.0
WLAN – 5.8 GHz	802.11an/ac	N/A	N/A	16.0	±4.0	12.0	20.0

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 24-28 of this report. The table in item 9 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 unable to transmit WCDMA and LTE simultaneously.

The device is able to transmit WWAN, RFID, BT and WLAN simultaneously. See table in number 5 above.

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.

10.1 SAR Measurement Conditions for LTE Bands

10.1.1 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
7	5,10,15,20	2500-2570 MHz
12	5, 10	699-716 MHz

10.1.2 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.

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

Table 10.1.1 LTE Power Measurements

Band	Modulation	Bandwidth	RB Size	RB Offset	Channel	Frequency	Power
2	QPSK	1.4 MHz	6	0	19957	1710.7	21.9
					20175	1732.5	21.6
					20393	1754.3	22.0
			3	1	19957	1710.7	21.9
					20175	1732.5	21.6
					20393	1754.3	21.7
			1	0	19957	1710.7	22.8
					20175	1732.5	23.0
					20393	1754.3	22.9
			1	5	19957	1710.7	22.6
					20175	1732.5	23.1
					20393	1754.3	23.1
		3 MHz	15	0	19965	1711.5	21.7
					20175	1732.5	21.8
					20385	1753.5	21.7
			8	3	19965	1711.5	22.2
					20175	1732.5	22.1
					20385	1753.5	21.6
			1	0	19965	1711.5	22.7
					20175	1732.5	22.9
					20385	1753.5	23.2
			1	14	19965	1711.5	23.1
					20175	1732.5	22.8
					20385	1753.5	22.9
		5 MHz	25	0	19975	1712.5	22.0
					20175	1732.5	22.1
					20375	1752.5	21.9
			12	6	19975	1712.5	21.7
					20175	1732.5	21.5
					20375	1752.5	22.1
			1	0	19975	1712.5	22.6
					20175	1732.5	22.5
					20375	1752.5	22.7
			1	24	19975	1712.5	23.0
					20175	1732.5	23.1
					20375	1752.5	22.9

Band	Modulation	Bandwidth	RB Size	RB Offset	Channel	Frequency	Power
2	QPSK	10 MHz	50	0	20000	1715	21.6
					20175	1732.5	22.0
					20350	1750	21.8
			25	12	20000	1715	22.1
					20175	1732.5	21.8
					20350	1750	21.7
			1	0	20000	1715	23.2
					20175	1732.5	23.0
					20350	1750	22.7
			1	24	20000	1715	23.1
					20175	1732.5	23.2
					20350	1750	23.2
		15 MHz	75	0	20025	1717.5	22.0
					20175	1732.5	21.6
					20325	1747.5	21.6
			36	19	20025	1717.5	22.1
					20175	1732.5	22.0
					20325	1747.5	21.7
			1	0	20025	1717.5	23.1
					20175	1732.5	23.1
					20325	1747.5	23.1
			1	74	20025	1717.5	22.7
					20175	1732.5	22.8
					20325	1747.5	22.7
		20 MHz	100	0	20050	1720	21.7
					20175	1732.5	21.5
					20300	1745	22.1
			50	25	20050	1720	22.1
					20175	1732.5	21.7
					20300	1745	22.1
			1	0	20050	1720	23.0
					20175	1732.5	22.6
					20300	1745	23.0
			1	49	20050	1720	22.6
					20175	1732.5	22.6
					20300	1745	23.0

Band	Modulation	Bandwidth	RB Size	RB Offset	Channel	Frequency	Power
2	16QAM	1.4 MHz	6	0	19957	1710.7	20.6
					20175	1732.5	21.2
					20393	1754.3	20.8
			3	1	19957	1710.7	21.1
					20175	1732.5	20.8
					20393	1754.3	20.9
			1	0	19957	1710.7	22.1
					20175	1732.5	21.7
					20393	1754.3	21.8
			1	5	19957	1710.7	21.9
					20175	1732.5	22.0
					20393	1754.3	22.0
		3 MHz	15	0	19965	1711.5	21.0
					20175	1732.5	20.6
					20385	1753.5	20.9
			8	3	19965	1711.5	20.8
					20175	1732.5	20.7
					20385	1753.5	21.2
			1	0	19965	1711.5	21.9
					20175	1732.5	21.6
					20385	1753.5	21.5
			1	14	19965	1711.5	21.6
					20175	1732.5	22.0
					20385	1753.5	21.7
		5 MHz	25	0	19975	1712.5	20.6
					20175	1732.5	20.7
					20375	1752.5	20.8
			12	6	19975	1712.5	20.5
					20175	1732.5	20.8
					20375	1752.5	20.5
			1	0	19975	1712.5	22.1
					20175	1732.5	21.8
					20375	1752.5	21.6
			1	24	19975	1712.5	21.8
					20175	1732.5	21.8
					20375	1752.5	21.6

Band	Modulation	Bandwidth	RB Size	RB Offset	Channel	Frequency	Power
2	16QAM	10 MHz	50	0	20000	1715	20.5
					20175	1732.5	20.6
					20350	1750	20.6
			25	12	20000	1715	21.1
					20175	1732.5	20.6
					20350	1750	20.6
			1	0	20000	1715	21.8
					20175	1732.5	21.9
					20350	1750	22.1
			1	24	20000	1715	22.1
					20175	1732.5	22.0
					20350	1750	21.6
		15 MHz	75	0	20025	1717.5	20.5
					20175	1732.5	20.8
					20325	1747.5	20.8
			36	19	20025	1717.5	20.7
					20175	1732.5	20.6
					20325	1747.5	21.1
			1	0	20025	1717.5	22.1
					20175	1732.5	21.5
					20325	1747.5	21.8
			1	74	20025	1717.5	21.9
					20175	1732.5	22.1
					20325	1747.5	21.9
		20 MHz	100	0	20050	1720	20.5
					20175	1732.5	20.6
					20300	1745	20.7
			50	25	20050	1720	21.1
					20175	1732.5	20.8
					20300	1745	20.9
			1	0	20050	1720	21.6
					20175	1732.5	22.1
					20300	1745	21.9
			1	99	20050	1720	22.1
					20175	1732.5	21.5
					20300	1745	21.7

Band	Modulation	Bandwidth	RB Size	RB Offset	Channel	Frequency	Power
4	QPSK	1.4 MHz	6	0	19957	1710.7	22.1
					20175	1732.5	22.5
					20393	1754.3	22.5
			3	1	19957	1710.7	22.4
					20175	1732.5	22.5
					20393	1754.3	22.1
			1	0	19957	1710.7	23.1
					20175	1732.5	23.4
					20393	1754.3	23.7
			1	5	19957	1710.7	23.6
					20175	1732.5	23.5
					20393	1754.3	23.3
		3 MHz	15	0	19965	1711.5	22.6
					20175	1732.5	22.5
					20385	1753.5	22.5
			8	3	19965	1711.5	22.3
					20175	1732.5	22.1
					20385	1753.5	22.5
			1	0	19965	1711.5	23.6
					20175	1732.5	23.2
					20385	1753.5	23.6
			1	14	19965	1711.5	23.2
					20175	1732.5	23.1
					20385	1753.5	23.7
		5 MHz	25	0	19975	1712.5	22.7
					20175	1732.5	22.6
					20375	1752.5	22.4
			12	6	19975	1712.5	22.6
					20175	1732.5	22.3
					20375	1752.5	22.0
			1	0	19975	1712.5	23.4
					20175	1732.5	23.5
					20375	1752.5	23.2
			1	24	19975	1712.5	23.6
					20175	1732.5	23.3
					20375	1752.5	23.5

Band	Modulation	Bandwidth	RB Size	RB Offset	Channel	Frequency	Power
4	QPSK	10 MHz	50	0	20000	1715	22.6
					20175	1732.5	22.1
					20350	1750	22.4
			25	12	20000	1715	22.3
					20175	1732.5	22.5
					20350	1750	22.6
			1	0	20000	1715	23.4
					20175	1732.5	23.2
					20350	1750	23.1
			1	24	20000	1715	23.5
					20175	1732.5	23.6
					20350	1750	23.2
		15 MHz	75	0	20025	1717.5	22.5
					20175	1732.5	22.1
					20325	1747.5	22.4
			36	19	20025	1717.5	22.7
					20175	1732.5	22.2
					20325	1747.5	22.1
			1	0	20025	1717.5	23.7
					20175	1732.5	23.5
					20325	1747.5	23.7
			1	74	20025	1717.5	23.6
					20175	1732.5	23.0
					20325	1747.5	23.4
		20 MHz	100	0	20050	1720	22.2
					20175	1732.5	22.1
					20300	1745	22.5
			50	25	20050	1720	22.3
					20175	1732.5	22.7
					20300	1745	22.0
			1	0	20050	1720	23.0
					20175	1732.5	23.2
					20300	1745	23.6
			1	99	20050	1720	23.1
					20175	1732.5	23.6
					20300	1745	23.2

Band	Modulation	Bandwidth	RB Size	RB Offset	Channel	Frequency	Power
4	16QAM	1.4 MHz	6	0	19957	1710.7	22.1
					20175	1732.5	21.9
					20393	1754.3	21.6
			3	1	19957	1710.7	21.5
					20175	1732.5	22.1
					20393	1754.3	21.6
			1	0	19957	1710.7	23.0
					20175	1732.5	23.2
					20393	1754.3	22.8
			1	5	19957	1710.7	23.1
					20175	1732.5	22.5
					20393	1754.3	23.0
		3 MHz	15	0	19965	1711.5	22.1
					20175	1732.5	22.2
					20385	1753.5	21.7
			8	3	19965	1711.5	21.6
					20175	1732.5	21.8
					20385	1753.5	21.8
			1	0	19965	1711.5	22.7
					20175	1732.5	23.1
					20385	1753.5	22.8
			1	14	19965	1711.5	22.8
					20175	1732.5	22.5
					20385	1753.5	22.5
		5 MHz	25	0	19975	1712.5	22.1
					20175	1732.5	21.9
					20375	1752.5	21.5
			12	6	19975	1712.5	21.9
					20175	1732.5	21.8
					20375	1752.5	21.6
			1	0	19975	1712.5	23.1
					20175	1732.5	22.6
					20375	1752.5	23.1
			1	24	19975	1712.5	22.9
					20175	1732.5	23.0
					20375	1752.5	23.2

Band	Modulation	Bandwidth	RB Size	RB Offset	Channel	Frequency	Power
4	16QAM	10 MHz	50	0	20000	1715	21.7
					20175	1732.5	22.2
					20350	1750	21.9
			25	12	20000	1715	21.9
					20175	1732.5	21.8
					20350	1750	21.7
			1	0	20000	1715	23.2
					20175	1732.5	22.9
					20350	1750	23.1
			1	24	20000	1715	22.7
					20175	1732.5	22.6
					20350	1750	23.1
		15 MHz	75	0	20025	1717.5	21.8
					20175	1732.5	21.5
					20325	1747.5	22.0
			36	19	20025	1717.5	21.9
					20175	1732.5	21.9
					20325	1747.5	21.6
			1	0	20025	1717.5	23.1
					20175	1732.5	22.8
					20325	1747.5	22.6
			1	74	20025	1717.5	22.7
					20175	1732.5	22.7
					20325	1747.5	22.6
		20 MHz	100	0	20050	1720	22.1
					20175	1732.5	22.1
					20300	1745	21.9
			50	25	20050	1720	22.1
					20175	1732.5	21.8
					20300	1745	21.6
			1	0	20050	1720	22.5
					20175	1732.5	23.1
					20300	1745	22.7
			1	99	20050	1720	22.9
					20175	1732.5	23.1
					20300	1745	23.0

Band	Modulation	Bandwidth	RB Size	RB Offset	Channel	Frequency	Power
12	QPSK	5 MHz	25	0	23035	701.5	21.1
					23099	707.5	20.8
					23155	713.5	20.6
			12	6	23035	701.5	20.7
					23099	707.5	20.8
					23155	713.5	21.1
			1	0	23035	701.5	22.0
					23099	707.5	22.2
					23155	713.5	21.9
			1	24	23035	701.5	22.1
					23099	707.5	21.7
					23155	713.5	22.0
		10 MHz	50	0	23060	704.0	21.0
					23099	707.5	21.1
					23130	711.0	21.2
			25	12	23060	704.0	20.7
					23099	707.5	20.5
					23130	711.0	21.1
			1	0	23060	704.0	21.6
					23099	707.5	21.8
					23130	711.0	22.2
			1	49	23060	704.0	21.6
					23099	707.5	21.8
					23130	711.0	21.7
	16QAM	5 MHz	25	0	23035	701.5	19.7
					23099	707.5	20.1
					23155	713.5	20.1
			12	6	23035	701.5	19.8
					23099	707.5	19.7
					23155	713.5	19.8
			1	0	23035	701.5	20.5
					23099	707.5	20.5
					23155	713.5	20.7
			1	24	23035	701.5	20.7
					23099	707.5	20.6
					23155	713.5	20.7

Band	Modulation	Bandwidth	RB Size	RB Offset	Channel	Frequency	Power
12	16QAM	10 MHz	50	0	23060	704.0	20.1
					23099	707.5	19.6
					23130	711.0	20.2
			25	12	23060	704.0	19.6
					23099	707.5	20.0
					23130	711.0	20.1
			1	0	23060	704.0	20.8
					23099	707.5	20.6
					23130	711.0	21.0
			1	49	23060	704.0	21.2
					23099	707.5	20.9
					23130	711.0	20.7

Band	Modulation	Bandwidth	RB Size	RB Offset	Channel	Frequency	Power
7	QPSK	5 MHz	25	0	20775	2502.5	22.5
					21100	2535.0	22.8
					21425	2567.5	22.9
			12	6	20775	2502.5	22.5
					21100	2535.0	22.9
					21425	2567.5	23.1
			1	0	20775	2502.5	24.0
					21100	2535.0	23.6
					21425	2567.5	24.1
			1	24	20775	2502.5	23.9
					21100	2535.0	24.1
					21425	2567.5	24.0

Band	Modulation	Bandwidth	RB Size	RB Offset	Channel	Frequency	Power
7	QPSK	10 MHz	50	0	20800	2505.0	23.1
					21100	2535.0	23.1
					21400	2565.0	23.1
			25	12	20800	2505.0	22.9
					21100	2535.0	23.0
					21400	2565.0	23.2
			1	0	20800	2505.0	24.1
					21100	2535.0	24.2
					21400	2565.0	23.7
			1	24	20800	2505.0	23.7
					21100	2535.0	23.8
					21400	2565.0	23.7
		15 MHz	75	0	20825	2507.5	23.0
					21100	2535.0	23.0
					21375	2562.5	22.8
			36	19	20825	2507.5	22.8
					21100	2535.0	23.0
					21375	2562.5	23.1
			1	0	20825	2507.5	24.1
					21100	2535.0	24.0
					21375	2562.5	24.2
			1	74	20825	2507.5	23.7
					21100	2535.0	23.9
					21375	2562.5	23.5
		20 MHz	100	0	20850	2510.0	22.7
					21100	2535.0	22.7
					21350	2560.0	22.6
			50	25	20850	2510.0	23.1
					21100	2535.0	23.0
					21350	2560.0	22.7
			1	0	20850	2510.0	24.0
					21100	2535.0	23.9
					21350	2560.0	23.6
			1	49	20850	2510.0	23.9
					21100	2535.0	24.0
					21350	2560.0	23.5

Band	Modulation	Bandwidth	RB Size	RB Offset	Channel	Frequency	Power
7	16QAM	5 MHz	25	0	20775	2502.5	21.7
					21100	2535.0	21.8
					21425	2567.5	22.2
			12	6	20775	2502.5	21.8
					21100	2535.0	21.7
					21425	2567.5	21.8
			1	0	20775	2502.5	22.9
					21100	2535.0	22.8
					21425	2567.5	23.2
			1	24	20775	2502.5	22.9
					21100	2535.0	22.6
					21425	2567.5	22.7

Band	Modulation	Bandwidth	RB Size	RB Offset	Channel	Frequency	Power
7	16QAM	10 MHz	50	0	20800	2505.0	21.7
					21100	2535.0	21.9
					21400	2565.0	22.1
			25	12	20800	2505.0	21.7
					21100	2535.0	21.9
					21400	2565.0	21.7
			1	0	20800	2505.0	22.7
					21100	2535.0	22.5
					21400	2565.0	23.1
			1	24	20800	2505.0	22.6
					21100	2535.0	22.5
					21400	2565.0	22.8
		15 MHz	75	0	20825	2507.5	21.5
					21100	2535.0	21.6
					21375	2562.5	21.9
			36	19	20825	2507.5	21.6
					21100	2535.0	21.5
					21375	2562.5	21.9
			1	0	20825	2507.5	22.8
					21100	2535.0	23.0
					21375	2562.5	23.1
			1	74	20825	2507.5	23.0
					21100	2535.0	22.9
					21375	2562.5	22.6
		20 MHz	100	0	20850	2510.0	22.1
					21100	2535.0	21.8
					21350	2560.0	21.7
			50	25	20850	2510.0	21.8
					21100	2535.0	21.8
					21350	2560.0	22.2
			1	0	20850	2510.0	23.0
					21100	2535.0	22.9
					21350	2560.0	22.6
			1	99	20850	2510.0	22.9
					21100	2535.0	22.8
					21350	2560.0	22.8

Table 10.1.2 Test Reduction Table – LTE

Band/ Frequency (MHz)	Side	Required Test Channel	Bandwidth	Modulation	RB Allocation	RB Offset	Tested/ Reduced
		18700					Reduced[6]
		18900			50	0	Tested
		19100					Reduced[6]
		18700					Reduced[1]
		18900			100	0	Reduced[1]
		19100		QPSK			Reduced[1]
		18700					Reduced[2]
		18900				49	Tested
		19100			1		Reduced[2]
		18700					Reduced[2]
		18900				99	Reduced[2]
		19100	20 MHz				Reduced[2]
	Back	18700					Reduced[3]
		18900			50	25	Reduced[3]
		19100					Reduced[3]
		18700					Reduced[1]
		18900			100	0	Reduced[1]
		19100		16QAM			Reduced[1]
		18700					Reduced[4]
		18900				49	Reduced[4]
		19100			1		Reduced[4]
		18700					Reduced[4]
		18900				99	Reduced[4]
		19100					Reduced[4]
Band 2		All lower bandwidths (15 MHz, 10 MHz, 5 MHz, 3 MHz, 1.4 MHz)					Reduced[5]
1850-1910 MHz		18700					Reduced[6]
		18900			50	25	Tested
		19100					Reduced[6]
		18700					Reduced[1]
		18900			100	0	Reduced[1]
		19100		QPSK			Reduced[1]
		18700					Reduced[2]
		18900				49	Tested
		19100			1		Reduced[2]
		18700					Reduced[2]
		18900				99	Reduced[2]
		19100	20 MHz				Reduced[2]
	Bottom	18700					Reduced[3]
		18900			50	25	Reduced[3]
		19100					Reduced[3]
		18700					Reduced[1]
		18900			100	0	Reduced[1]
		19100		16QAM			Reduced[1]
		18700					Reduced[4]
		18900				49	Reduced[4]
		19100			1		Reduced[4]
		18700					Reduced[4]
		18900				99	Reduced[4]
		19100					Reduced[4]
		All lower bandwidths (15 MHz, 10 MHz, 5 MHz, 3 MHz, 1.4 MHz)					Reduced[5]

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 3) A) I) page 4.

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 3) B) I) page 4.

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 4) A) I) page 4.

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 4) B) I) page 5.

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 5) B) I) page 5.

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 page 4 footnote 2.

Band/ Frequency (MHz)	Side	Required Test Channel	Bandwidth	Modulation	RB Allocation	RB Offset	Tested/ Reduced
Band 2 1850-1910 MHz	Left	18700	20 MHz	QPSK	50	25	Reduced[6]
		18900					Tested
		19100					Reduced[6]
		18700			100	0	Reduced[1]
		18900					Reduced[1]
		19100					Reduced[1]
		18700			1	49	Reduced[2]
		18900					Tested
		19100					Reduced[2]
		18700				99	Reduced[2]
		18900					Reduced[2]
		19100					Reduced[2]
		18700		16QAM	50	25	Reduced[3]
		18900					Reduced[3]
		19100					Reduced[3]
		18700			100	0	Reduced[1]
		18900					Reduced[1]
		19100					Reduced[1]
		18700			1	49	Reduced[4]
		18900					Reduced[4]
		19100					Reduced[4]
		18700				99	Reduced[4]
		18900					Reduced[4]
		19100					Reduced[4]
		All lower bandwidths (15 MHz, 10 MHz, 5 MHz, 3 MHz, 1.4 MHz)					Reduced[5]

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 3) A) I) page 4.

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 3) B) I) page 4.

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 4) A) I) page 4.

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 4) B) I) page 5.

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 5) B) I) page 5.

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 page 4 footnote 2.

Top and Right Reduced based on distance in KDB 447498 D01 v06 (See below calculations).

Maximum power: 223.9 mW
Top distance: 142 mm
Right distance: 52 mm

[{[(7.5)/(√1.91)]*50 mm}]+[{52-50 mm}*10]=291 mW which is greater than 223.9 mW

Band/ Frequency (MHz)	Side	Required Test Channel	Bandwidth	Modulation	RB Allocation	RB Offset	Tested/ Reduced
Band 4 1710-1755 MHz	Back	20050	20 MHz	QPSK	50	25	Reduced[6]
		20175					Tested
		20300					Reduced[6]
		20050			100	0	Reduced[1]
		20175					Reduced[1]
		20300					Reduced[1]
		20050			1	49	Reduced[2]
		20175					Tested
		20300					Reduced[2]
		20050				99	Reduced[2]
		20175					Reduced[2]
		20300					Reduced[2]
		20050		16QAM	50	25	Reduced[3]
		20175					Reduced[3]
		20300					Reduced[3]
		20050			100	0	Reduced[1]
		20175					Reduced[1]
		20300					Reduced[1]
		20050			1	49	Reduced[4]
		20175					Reduced[4]
		20300					Reduced[4]
		20050				99	Reduced[4]
		20175					Reduced[4]
		20300					Reduced[4]
		All lower bandwidths (15 MHz, 10 MHz, 5 MHz, 3 MHz, 1.4 MHz)					Reduced[5]
	Bottom	20050	20 MHz	QPSK	50	25	Reduced[6]
		20175					Tested
		20300					Reduced[6]
		20050			100	0	Reduced[1]
		20175					Reduced[1]
		20300					Reduced[1]
		20050			1	49	Reduced[2]
		20175					Tested
		20300					Reduced[2]
		20050				99	Reduced[2]
		20175					Reduced[2]
		20300					Reduced[2]
		20050		16QAM	50	25	Reduced[3]
		20175					Reduced[3]
		20300					Reduced[3]
		20050			100	0	Reduced[1]
		20175					Reduced[1]
		20300					Reduced[1]
		20050			1	49	Reduced[4]
		20175					Reduced[4]
		20300					Reduced[4]
		20050				99	Reduced[4]
		20175					Reduced[4]
		20300					Reduced[4]
		All lower bandwidths (15 MHz, 10 MHz, 5 MHz, 3 MHz, 1.4 MHz)					Reduced[5]

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 3) A) I) page 4.

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 3) B) I) page 4.

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 4) A) I) page 4.

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 4) B) I) page 5.

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 5) B) I) page 5.

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 page 4 footnote 2.

Band/ Frequency (MHz)	Side	Required Test Channel	Bandwidth	Modulation	RB Allocation	RB Offset	Tested/ Reduced
Band 4 1710-1755 MHz	Left	1755	20 MHz	QPSK	50	25	Reduced[6]
		20175					Tested
		20300					Reduced[6]
		20050			100	0	Reduced[1]
		20175					Reduced[1]
		20300					Reduced[1]
		20050			1	49	Reduced[2]
		20175					Tested
		20300					Reduced[2]
		20050				99	Reduced[2]
		20175					Reduced[2]
		20300					Reduced[2]
		20050		16QAM	50	25	Reduced[3]
		20175					Reduced[3]
		20300					Reduced[3]
		20050			100	0	Reduced[1]
		20175					Reduced[1]
		20300					Reduced[1]
		20050			1	49	Reduced[4]
		20175					Reduced[4]
		20300					Reduced[4]
		20050				99	Reduced[4]
		20175					Reduced[4]
		20300					Reduced[4]
		All lower bandwidths (15 MHz, 10 MHz, 5 MHz, 3 MHz, 1.4 MHz)					Reduced[5]

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 3) A) I) page 4.

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 3) B) I) page 4.

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 4) A) I) page 4.

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 4) B) I) page 5.

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 5) B) I) page 5.

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 page 4 footnote 2.

Top and Right Reduced based on distance in KDB 447498 D01 v06 (See below calculations).

Maximum power: 251.2 mW
Top distance: 142 mm
Right distance: 52 mm

[{[(7.5)/(√1.755)]*50 mm}]+[{52-50 mm}*10]=303 mW which is greater than 251.2 mW

Band/ Frequency (MHz)	Side	Required Test Channel	Bandwidth	Modulation	RB Allocation	RB Offset	Tested/ Reduced
Band 7 2500-2570 MHz	Back	20850	20 MHz	QPSK	50	25	Reduced[6]
		21100					Tested
		21350					Reduced[6]
		20850			100	0	Reduced[1]
		21100					Reduced[1]
		21350					Reduced[1]
		20850			1	49	Reduced[2]
		21100					Tested
		21350					Reduced[2]
		20850				99	Reduced[2]
		21100					Reduced[2]
		21350					Reduced[2]
		20850		16QAM	50	25	Reduced[3]
		21100					Reduced[3]
		21350					Reduced[3]
		20850			100	0	Reduced[1]
		21100					Reduced[1]
		21350					Reduced[1]
		20850			1	49	Reduced[4]
		21100					Reduced[4]
		21350					Reduced[4]
		20850				99	Reduced[4]
		21100					Reduced[4]
		21350					Reduced[4]
		All lower bandwidths (15 MHz, 10 MHz, 5 MHz)					Reduced[5]
	Bottom	20850	20 MHz	QPSK	50	25	Reduced[6]
		21100					Tested
		21350					Reduced[6]
		20850			100	0	Reduced[1]
		21100					Reduced[1]
		21350					Reduced[1]
		20850			1	49	Reduced[2]
		21100					Tested
		21350					Reduced[2]
		20850				99	Reduced[2]
		21100					Reduced[2]
		21350					Reduced[2]
		20850		16QAM	50	25	Reduced[3]
		21100					Reduced[3]
		21350					Reduced[3]
		20850			100	0	Reduced[1]
		21100					Reduced[1]
		21350					Reduced[1]
		20850			1	49	Reduced[4]
		21100					Reduced[4]
		21350					Reduced[4]
		20850				99	Reduced[4]
		21100					Reduced[4]
		21350					Reduced[4]
		All lower bandwidths (15 MHz, 10 MHz, 5 MHz)					Reduced[5]

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 3) A) I) page 4.

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 3) B) I) page 4.

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 4) A) I) page 4.

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 4) B) I) page 5.

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 5) B) I) page 5.

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 page 4 footnote 2.

Band/ Frequency (MHz)	Side	Required Test Channel	Bandwidth	Modulation	RB Allocation	RB Offset	Tested/ Reduced
Band 7 2500-2570 MHz	Left	20850	20 MHz	QPSK	50	25	Reduced[6]
		21100					Tested
		21350					Reduced[6]
		20850			100	0	Reduced[1]
		21100					Reduced[1]
		21350					Reduced[1]
		20850			1	49	Reduced[2]
		21100					Tested
		21350					Reduced[2]
		20850				99	Reduced[2]
		21100					Reduced[2]
		21350					Reduced[2]
		20850		16QAM	50	25	Reduced[3]
		21100					Reduced[3]
		21350					Reduced[3]
		20850			100	0	Reduced[1]
		21100					Reduced[1]
		21350					Reduced[1]
		20850			1	49	Reduced[4]
		21100					Reduced[4]
		21350					Reduced[4]
		20850				99	Reduced[4]
		21100					Reduced[4]
		21350					Reduced[4]
		All lower bandwidths (15 MHz, 10 MHz, 5 MHz)					Reduced[5]

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 3) A) I) page 4.

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 3) B) I) page 4.

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 4) A) I) page 4.

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 4) B) I) page 5.

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 5) B) I) page 5.

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 page 4 footnote 2.

Top and Right Reduced based on distance in KDB 447498 D01 v06 (See below calculations).

Maximum power: 281.8 mW
Top distance: 142 mm
Right distance: 52 mm

[{[(7.5)/(√2.70)]*50 mm}]+[{52-50 mm}*10]=288 mW which is greater than 281.8 mW

Band/ Frequency (MHz)	Side	Required Test Channel	Bandwidth	Modulation	RB Allocation	RB Offset	Tested/ Reduced
Band 12 699-716 MHz	Back	23060	10 MHz	QPSK	25	12	Reduced[6]
		23099					Tested
		23130					Reduced[6]
		23060			50	0	Reduced[1]
		23099					Reduced[1]
		23130					Reduced[1]
		23060			1	24	Reduced[2]
		23099					Tested
		23130					Reduced[2]
		23060				49	Reduced[2]
		23099					Reduced[2]
		23130					Reduced[2]
		23060		16QAM	25	12	Reduced[3]
		23099					Reduced[3]
		23130					Reduced[3]
		23060			50	0	Reduced[1]
		23099					Reduced[1]
		23130					Reduced[1]
		23060			1	24	Reduced[4]
		23099					Reduced[4]
		23130					Reduced[4]
		23060				49	Reduced[4]
		23099					Reduced[4]
		23130					Reduced[4]
		All lower bandwidths (5 MHz)					Reduced[5]
	Bottom	23060	10 MHz	QPSK	25	12	Reduced[6]
		23099					Tested
		23130					Reduced[6]
		23060			50	0	Reduced[1]
		23099					Reduced[1]
		23130					Reduced[1]
		23060			1	24	Reduced[2]
		23099					Tested
		23130					Reduced[2]
		23060				49	Reduced[2]
		23099					Reduced[2]
		23130					Reduced[2]
		23060		16QAM	25	12	Reduced[3]
		23099					Reduced[3]
		23130					Reduced[3]
		23060			50	0	Reduced[1]
		23099					Reduced[1]
		23130					Reduced[1]
		23060			1	24	Reduced[4]
		23099					Reduced[4]
		23130					Reduced[4]
		23060				49	Reduced[4]
		23099					Reduced[4]
		23130					Reduced[4]
		All lower bandwidths (5 MHz)					Reduced[5]

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 3) A) I) page 4.

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 3) B) I) page 4.

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 4) A) I) page 4.

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 4) B) I) page 5.

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 5) B) I) page 5.

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 page 4 footnote 2.

Band/ Frequency (MHz)	Side	Required Test Channel	Bandwidth	Modulation	RB Allocation	RB Offset	Tested/ Reduced
Band 12 699-712 MHz	Left	23060	10 MHz	QPSK	25	12	Reduced[6]
		23099					Tested
		23130					Reduced[6]
		23060			50	0	Reduced[1]
		23099					Reduced[1]
		23130					Reduced[1]
		23060			1	24	Reduced[2]
		23099					Tested
		23130					Reduced[2]
		23060				49	Reduced[2]
		23099					Reduced[2]
		23130					Reduced[2]
		23060		16QAM	25	12	Reduced[3]
		23099					Reduced[3]
		23130					Reduced[3]
		23060			50	0	Reduced[1]
		23099					Reduced[1]
		23130					Reduced[1]
		23060			1	24	Reduced[4]
		23099					Reduced[4]
		23130					Reduced[4]
		23060				49	Reduced[4]
		23099					Reduced[4]
		23130					Reduced[4]
		All lower bandwidths (5 MHz)					Reduced[5]

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 3) A) I) page 4.

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 3) B) I) page 4.

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 4) A) I) page 4.

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 4) B) I) page 5.

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 5) B) I) page 5.

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 page 4 footnote 2.

Top and Right Reduced based on distance in KDB 447498 D01 v06 (See below calculations).

Maximum power: 177.8 mW
Top distance: 142 mm
Right distance: 52 mm

[{[(7.5)/(√0.716)]*50 mm}]+[{52-50 mm}*10]=463 mW which is greater than 177.8 mW

SAR Data Summary – 750 MHz Body – 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)		
0 mm	1	Back	707.5	23095	10 MHz/QPSK	1	24	0	21.8	0.265	0.31
	-----		707.5	23095	10 MHz/QPSK	25	12	1	20.5	0.211	0.27
	-----	Bottom	707.5	23095	10 MHz/QPSK	1	24	0	21.8	0.238	0.28
	-----		707.5	23095	10 MHz/QPSK	25	12	1	20.5	0.191	0.24
	-----	Left	707.5	23095	10 MHz/QPSK	1	24	0	21.8	0.0938	0.11
	-----		707.5	23095	10 MHz/QPSK	25	12	1	20.5	0.0748	0.09

Head Tissue
4.0 W/kg (mW/g)
averaged over 10 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

Note: LTE Band 17 is fully within LTE Band 12. Therefore, LTE Band 17 was not tested for this report.

SAR Data Summary – 850 MHz Body

MEASUREMENT RESULTS									
Plot	**Gap**	**Tech.**	**Side**	**Frequency**		**Modulation**	**End Power**	**Measured SAR (W/kg)**	**Reported SAR (W/kg)**
				MHz	**Ch.**		**(dBm)**		
2	0 mm	GSM	Back	836.6	190	GMSK	31.50	0.229	0.26
-----			Bottom	836.6	190		31.50	0.162	0.18
-----			Left	836.6	190		31.50	0.0629	0.07
3		UMTS	Back	836.6	4183	WCDMA	22.23	0.270	0.29
-----			Bottom	836.6	4183		22.23	0.161	0.17
-----			Left	836.6	4183		22.23	0.0869	0.09

Head Tissue
4.0 W/kg (mW/g)
averaged over 10 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

SAR Data Summary – 900 MHz Body RFID

MEASUREMENT RESULTS								
Plot	**Gap**	**Side**	**Frequency**		**Modulation**	**End Power**	**Measured SAR (W/kg)**	**Reported SAR (W/kg)**
			MHz	**Ch.**		**(dBm)**		
-----	0 mm	Back	915.00	24	FHSS	28.87	0.403	0.52
10		Top	915.00	24	FHSS	28.87	0.936	1.21
-----		Left	915.00	24	FHSS	28.87	0.339	0.44
-----		Right	915.00	24	FHSS	28.87	0.225	0.29

Head Tissue
4.0 W/kg (mW/g)
averaged over 10 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

SAR Data Summary – 1750 MHz Body

MEASUREMENT RESULTS									
Plot	**Gap**	**Tech.**	**Side**	**Frequency**		**Modulation**	**End Power**	**Measured SAR (W/kg)**	**Reported SAR (W/kg)**
				MHz	**Ch.**		**(dBm)**		
4	0 mm	UMTS	Back	1732.6	1413	WCDMA	21.92	0.619	0.63
-----			Bottom	1732.6	1413		21.92	0.357	0.36
-----			Left	1732.6	1413		21.92	0.252	0.26

Head Tissue
4.0 W/kg (mW/g)
averaged over 10 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

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Vice President

SAR Data Summary – 1750 MHz Body – 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)**		
0 mm	5	Back	1732.5	20175	20 MHz/QPSK	1	49	0	23.6	0.671	0.74
	-----		1732.5	20175	20 MHz/QPSK	50	24	1	22.7	0.544	0.65
	-----	Bottom	1732.5	20175	20 MHz/QPSK	1	49	0	23.6	0.377	0.41
	-----		1732.5	20175	20 MHz/QPSK	50	24	1	22.7	0.304	0.37
	-----	Left	1732.5	20175	20 MHz/QPSK	1	49	0	23.6	0.235	0.26
	-----		1732.5	20175	20 MHz/QPSK	50	24	1	22.7	0.187	0.23

Head Tissue
4.0 W/kg (mW/g)
averaged over 10 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

SAR Data Summary – 1900 MHz Body

MEASUREMENT RESULTS

Plot	Gap	Tech.	Side	Frequency		Modulation	End Power	Measured SAR (W/kg)	Reported SAR (W/kg)
				MHz	Ch.		(dBm)		
6	0 mm	GSM	Back	1880.0	661	GMSK	28.11	0.360	0.44
-----			Bottom	1880.0	661		28.11	0.135	0.17
-----			Left	1880.0	661		28.11	0.218	0.27
7		UMTS	Back	1880.0	9400	WCDMA	21.19	0.755	0.57
-----			Bottom	1880.0	9400		21.19	0.334	0.21
-----			Left	1880.0	9400		21.19	0.586	0.45

Head Tissue
4.0 W/kg (mW/g)
averaged over 10 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

SAR Data Summary – 1900 MHz Body – LTE Band 2

MEASUREMENT RESULTS											
Gap	Plot	Position	Frequency		BW/ Modulation	RB Size	RB Offset	MPR Target	End Power	Measured SAR	Reported SAR
			MHz	Ch.					(dBm)	(W/kg)	(W/kg)
0 mm	8	Back	1860.0	18700	20 MHz/QPSK	1	49	0	22.6	0.826	1.02
	-----		1880.0	18900	20 MHz/QPSK	50	24	1	21.7	0.680	0.82
	-----	Bottom	1900.0	19100	20 MHz/QPSK	1	49	0	22.6	0.415	0.51
	-----		1860.0	18700	20 MHz/QPSK	50	24	1	21.7	0.333	0.40
	-----	Left	1880.0	18900	20 MHz/QPSK	1	49	0	22.6	0.532	0.66
	-----		1900.0	19100	20 MHz/QPSK	50	24	1	21.7	0.430	0.52

Head Tissue
4.0 W/kg (mW/g)
averaged over 10 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

SAR Data Summary – 2550 MHz Body – LTE Band 7

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)		
0 mm	-----	Back	2535.0	21100	20 MHz/QPSK	1	49	0	24.0	0.811	0.91
	-----		2535.0	21100	20 MHz/QPSK	50	24	1	23.0	0.683	0.77
	-----	Bottom	2535.0	21100	20 MHz/QPSK	1	49	0	24.0	0.742	0.83
	-----		2535.0	21100	20 MHz/QPSK	50	24	1	23.0	0.636	0.71
	9	Left	2535.0	21100	20 MHz/QPSK	1	49	0	24.0	0.884	0.99
	-----		2535.0	21100	20 MHz/QPSK	50	24	1	23.0	0.752	0.84

Head Tissue
4.0 W/kg (mW/g)
averaged over 10 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

SAR Data Summary – 2450 MHz Body 802.11b

MEASUREMENT RESULTS								
Plot	Gap	Side	Frequency		Modulation	End Power	Measured SAR (W/kg)	Reported SAR (W/kg)
			MHz	Ch.		(dBm)		
11	0 mm	Back	2437	6	DSSS	16.50	0.493	0.49
-----		Top	2437	6	DSSS	16.50	0.0596	0.06
-----		Right	2437	6	DSSS	16.50	0.372	0.37

Head Tissue
4.0 W/kg (mW/g)
averaged over 10 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

SAR Data Summary – 5200 MHz Body

MEASUREMENT RESULTS								
Plot	Gap	Side	Frequency		Modulation	End Power	Measured SAR (W/kg)	Reported SAR (W/kg)
			MHz	Ch.		(dBm)		
12	0 mm	Back	5300	60	OFDM	14.50	0.00954	0.01
-----		Top	5300	60	OFDM	14.50	0.00264	<0.01
-----		Right	5300	60	OFDM	14.50	0.00162	<0.01

Head Tissue
4.0 W/kg (mW/g)
averaged over 10 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

SAR Data Summary – 5600 MHz Body

MEASUREMENT RESULTS								
Plot	**Gap**	**Side**	**Frequency**		**Modulation**	**End Power**	**Measured SAR (W/kg)**	**Reported SAR (W/kg)**
			MHz	**Ch.**		**(dBm)**		
13	0 mm	Back	5620	124	OFDM	15.50	0.0631	0.06
-----		Top	5620	124	OFDM	15.50	0.0263	0.03
-----		Right	5620	124	OFDM	15.50	0.0283	0.03

Head Tissue
4.0 W/kg (mW/g)
averaged over 10 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

SAR Data Summary – 5800 MHz Body

MEASUREMENT RESULTS								
Plot	**Gap**	**Side**	**Frequency**		**Modulation**	**End Power**	**Measured SAR (W/kg)**	**Reported SAR (W/kg)**
			MHz	**Ch.**		**(dBm)**		
14	0 mm	Back	5785	157	OFDM	14.00	0.0499	0.05
-----		Top	5785	157	OFDM	14.00	0.0139	0.01
-----		Right	5785	157	OFDM	14.00	0.0215	0.02

Head Tissue
4.0 W/kg (mW/g)
averaged over 10 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

SAR Data Summary – Simultaneous Evaluation

MEASUREMENT RESULTS								
Frequency		Modulation	Frequency		Modulation	SAR_1	SAR_2	SAR Total
MHz	Ch.		MHz	Ch.				
1860.0	18700	QPSK	915.0	24	FHSS	1.02	1.21	2.23
2437	6	DSSS	915.0	24	FHSS	0.49	1.21	1.70
2440	39	GFSK	915.0	24	FHSS	0.05	1.21	1.26

Head Tissue
4.0 W/kg (mW/g)
averaged over 10 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 extremity exposure conditions page 11.

For BT transmitter, the SAR value is estimated per KDB447498 D01 v06 section 4.3.2 b) 1) on page 14. The minimum distance from the BT antenna to the user is 7 mm.

BT = 0.05 W/kg

9. Test Equipment List

Table 9.1 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	04/16/2020	04/16/2019	1416
SPEAG E-Field Probe EX3DV4	04/24/2020	04/24/2019	3662
Speag Validation Dipole D750V2	07/13/2019	07/13/2018	1016
Speag Validation Dipole D835V2	07/13/2019	07/13/2018	4d089
Speag Validation Dipole D1750V2	07/20/2019	07/20/2018	1018
Speag Validation Dipole D1900V2	07/13/2019	07/13/2018	5d116
Speag Validation Dipole D2550V2	07/12/2019	07/12/2018	1003
Speag Validation Dipole D2450V2	07/12/2019	07/12/2018	829
Speag Validation Dipole D5GHzV2	07/19/2019	07/19/2018	1085
Agilent N1911A Power Meter	04/27/2020	04/27/2019	GB45100254
Agilent N1922A Power Sensor	04/27/2020	04/27/2019	MY45240464
Advantest R3261A Spectrum Analyzer	03/25/2020	03/25/2019	31720068
Agilent (HP) 8350B Signal Generator	03/20/2020	03/20/2019	2749A10226
Agilent (HP) 83525A RF Plug-In	03/20/2020	03/20/2019	2647A01172
Agilent (HP) 8753C Vector Network Analyzer	03/20/2020	03/20/2019	3135A01724
Agilent (HP) 85047A S-Parameter Test Set	03/20/2020	03/20/2019	2904A00595
Agilent (HP) 8960 Base Station Sim.	03/19/2020	03/19/2019	MY48360364
Anritsu MT8820C	01/26/2020	01/26/2019	6201176199
Agilent 778D Dual Directional Coupler	N/A	N/A	MY48220184
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 (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
Head Equivalent Matter (2550 MHz)	N/A	N/A	N/A
Head Equivalent Matter (2450 MHz)	N/A	N/A	N/A
Head Equivalent Matter (5 GHz)	N/A	N/A	N/A

10. 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.

11. 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 – 2002, IEEE Recommended Practice for the Measurement of Potentially Hazardous Electromagnetic Fields – RF and Microwave, New York: IEEE, 2002.

[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, Radio Frequency Exposure Compliance of Radiocommunication Apparatus (All Frequency Bands), March 2015.

[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 07/Aug/2019
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	41.76	0.86
0.7040	42.18	0.89	41.732	0.864*
0.7075	42.163	0.89	41.708	0.868*
0.7100	42.15	0.89	41.69	0.87
0.7110	42.145	0.89	41.685	0.871*
0.7200	42.10	0.89	41.64	0.88
0.7300	42.05	0.89	41.57	0.89
0.7400	41.99	0.89	41.51	0.89
0.7500	41.94	0.89	41.46	0.90
0.7600	41.89	0.89	41.40	0.91
0.7700	41.84	0.89	41.34	0.92

* value interpolated

****
Test Result for UIM Dielectric Parameter
Wed 07/Aug/2019
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	41.52	0.89
0.8100	41.63	0.90	41.47	0.90
0.8200	41.58	0.90	41.41	0.91
0.8264	41.548	0.90	41.442	0.91*
0.8300	41.53	0.90	41.46	0.91
0.8350	41.515	0.905	41.445	0.915*
0.8366	41.51	0.907	41.44	0.917*
0.8400	41.50	0.91	41.43	0.92
0.8466	41.50	0.917	41.417	0.927*
0.8500	41.50	0.92	41.41	0.93
0.8600	41.50	0.93	41.39	0.94
0.8700	41.50	0.94	41.38	0.95

* value interpolated

****
Test Result for UIM Dielectric Parameter
Sat 10/Aug/2019
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
0.8800	41.50	0.95	41.37	0.96
0.8900	41.50	0.96	41.35	0.97
0.9000	41.50	0.97	41.34	0.98
0.9028	41.50	0.973	41.337	0.983*
0.9100	41.50	0.98	41.33	0.99
0.9153	41.495	0.98	41.325	0.99*
0.9200	41.49	0.98	41.32	0.99
0.9273	41.475	0.987	41.305	0.997*
0.9300	41.47	0.99	41.30	1.00
0.9400	41.45	0.99	41.29	1.01
0.9500	41.43	0.99	41.27	1.02

* value interpolated

****
Test Result for UIM Dielectric Parameter
Wed 07/Aug/2019
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	40.03	1.35
1.7100	40.14	1.35	40.01	1.36
1.7124	40.138	1.35	40.005	1.362*
1.7200	40.13	1.35	39.99	1.37
1.7300	40.11	1.36	39.97	1.37
1.7325	40.105	1.363	39.965	1.373*
1.7326	40.105	1.363	39.965	1.373*
1.7400	40.09	1.37	39.95	1.38
1.7450	40.085	1.37	39.94	1.385*
1.7500	40.08	1.37	39.93	1.39
1.7526	40.075	1.373	39.925	1.393*
1.7600	40.06	1.38	39.91	1.40
1.7700	40.05	1.38	39.89	1.41
1.7800	40.03	1.39	39.87	1.41
1.7900	40.02	1.39	39.85	1.42

* value interpolated

****
Test Result for UIM Dielectric Parameter
Wed 07/Aug/2019
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	40.43	1.38
1.8502	40.00	1.40	40.43	1.38*
1.8524	40.00	1.40	40.425	1.382*
1.8600	40.00	1.40	40.41	1.39
1.8700	40.00	1.40	40.39	1.40
1.8800	40.00	1.40	40.38	1.41
1.8900	40.00	1.40	40.37	1.41
1.9000	40.00	1.40	40.37	1.43
1.9076	40.00	1.40	40.355	1.438*
1.9098	40.00	1.40	40.35	1.44*
1.9100	40.00	1.40	40.35	1.44

*value interpolated

****
Test Result for UIM Dielectric Parameter
Thu 08/Aug/2019
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
2.4900	39.15	1.84	39.02	1.84
2.5000	39.14	1.85	39.01	1.85
2.5100	39.12	1.87	39.00	1.87
2.5200	39.11	1.88	38.98	1.89
2.5300	39.10	1.89	38.97	1.90
2.5350	39.095	1.895	38.965	1.905*
2.5400	39.09	1.90	38.96	1.91
2.5500	39.07	1.91	38.94	1.92
2.5600	39.06	1.92	38.93	1.93
2.5700	39.05	1.93	38.92	1.94
2.5800	39.03	1.94	38.90	1.95

* value interpolated

****
Test Result for UIM Dielectric Parameter
Fri 09/Aug/2019
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
2.4100	39.26	1.76	39.06	1.79
2.4120	39.258	1.762	39.056	1.792*
2.4200	39.25	1.77	39.04	1.80
2.4300	39.24	1.78	39.02	1.81
2.4370	39.226	1.787	39.013	1.824*
2.4400	39.22	1.79	39.01	1.83
2.4500	39.20	1.80	38.96	1.84
2.4600	39.19	1.81	38.96	1.85
2.4620	39.186	1.812	38.956	1.852*
2.4700	39.17	1.82	38.94	1.86
2.4800	39.16	1.83	38.92	1.89

* value interpolated

```
**************************************************************
Test Result for UIM Dielectric Parameter
Fri 09/Aug/2019
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
5.1000	36.10	4.55	36.12	4.64
5.1200	36.08	4.57	36.10	4.66
5.1400	36.05	4.59	36.07	4.68
5.1600	36.03	4.61	36.05	4.71
5.1800	36.01	4.63	36.03	4.73
5.2000	35.99	4.65	36.00	4.75
5.2200	35.96	4.68	35.98	4.77
5.2400	35.94	4.70	35.96	4.79
5.2500	35.93	4.71	35.945	4.805*
5.2600	35.92	4.72	35.93	4.82
5.2800	35.89	4.74	35.90	4.84
5.3000	35.87	4.76	35.87	4.86
5.3200	35.85	4.78	35.85	4.88
5.3400	35.83	4.80	35.83	4.91
5.3600	35.80	4.82	35.81	4.93
5.3800	35.78	4.84	35.78	4.95
5.4000	35.76	4.86	35.76	4.97
5.4200	35.73	4.88	35.74	5.00
5.4400	35.71	4.90	35.73	5.02
5.4600	35.69	4.92	35.70	5.04
5.4800	35.67	4.94	35.67	5.06
5.5000	35.64	4.96	35.64	5.08
5.5200	35.62	4.98	35.62	5.10
5.5400	35.60	5.00	35.60	5.12
5.5600	35.57	5.02	35.58	5.15
5.5800	35.55	5.04	35.55	5.17
5.6000	35.53	5.07	35.53	5.19
5.6200	35.51	5.09	35.50	5.21
5.6400	35.48	5.11	35.48	5.24
5.6600	35.46	5.13	35.46	5.26
5.6800	35.44	5.15	35.44	5.28
5.7000	35.41	5.17	35.41	5.30
5.7200	35.39	5.19	35.39	5.33
5.7400	35.37	5.21	35.37	5.35
5.7450	35.365	5.215	35.365	5.355*
5.7500	35.36	5.22	35.36	5.36*
5.7600	35.35	5.23	35.35	5.37
5.7800	35.32	5.25	35.33	5.39
5.7850	35.315	5.255	35.32	5.395*
5.8000	35.30	5.27	35.29	5.41
5.8200	35.28	5.29	35.27	5.44
5.8250	35.273	5.295	35.265	5.445*
5.8400	35.25	5.31	35.25	5.46
5.8600	35.23	5.33	35.23	5.48

* value interpolated

RF Exposure Lab

Plot 1

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 = 0.9 S/m; ε_r = 41.46; ρ = 1000 kg/m^3
Phantom section: Flat Section

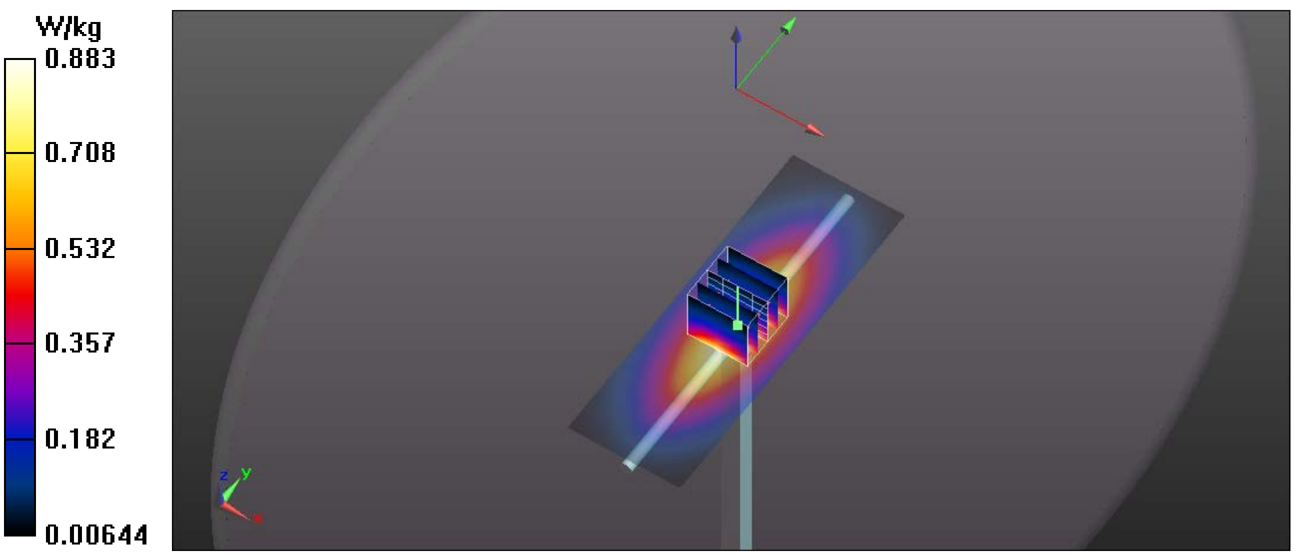
Test Date: Date: 8/7/2019; Ambient Temp: 23 °C; Tissue Temp: 21 °C

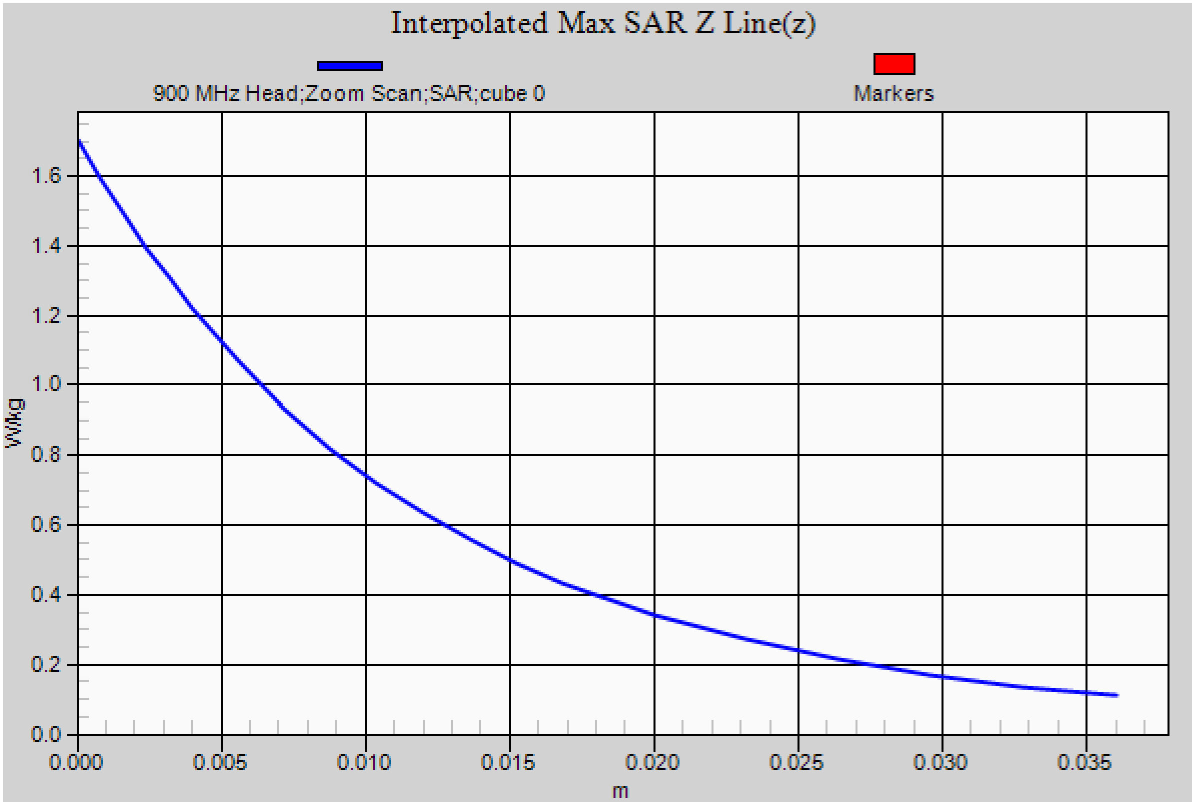
Probe: EX3DV4 - SN3662; ConvF(9.57, 9.57, 9.57); Calibrated: 4/24/2019;
Sensor-Surface: 2mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1416; Calibrated: 4/16/2019
Phantom: ELI v5.0; Type: QDOVA002AA; Serial: 2037
Measurement SW: DASY52, Version 52.10 (0); SEMCAD X Version 14.6.10 (7417)

Procedure Notes:

750 MHz Head/Verification/Area Scan (41x121x1): Interpolated grid: dx=1.500 mm, dy=1.500 mm
Maximum value of SAR (interpolated) = 0.883 W/kg

750 MHz Head/Verification /Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 31.949 V/m; Power Drift = -0.03 dB
Peak SAR (extrapolated) = 1.691 mW/g
P_{in}= 100 mW
SAR(1 g) = 0.828 mW/g; SAR(10 g) = 0.532 mW/g
Maximum value of SAR (measured) = 0.888 W/kg




Interpolated Max SAR Z Line(z)
900 MHz Head;Zoom Scan;SAR;cube 0
Markers
W/kg
1.6
1.4
1.2
1.0
0.8
0.6
0.4
0.2
0.0
0.000
0.005
0.010
0.015
0.020
0.025
0.030
0.035
m

RF Exposure Lab

Plot 2

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 = 0.915 S/m; ε_r = 41.445; ρ = 1000 kg/m^3
Phantom section: Flat Section

Test Date: Date: 8/7/2019; Ambient Temp: 23 °C; Tissue Temp: 21 °C

Probe: EX3DV4 - SN3662; ConvF(9.12, 9.12, 9.12); Calibrated: 4/24/2019;
Sensor-Surface: 2mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1416; Calibrated: 4/16/2019
Phantom: ELI v5.0; Type: QDOVA002AA; Serial: 2037
Measurement SW: DASY52, Version 52.10 (0); SEMCAD X Version 14.6.10 (7417)

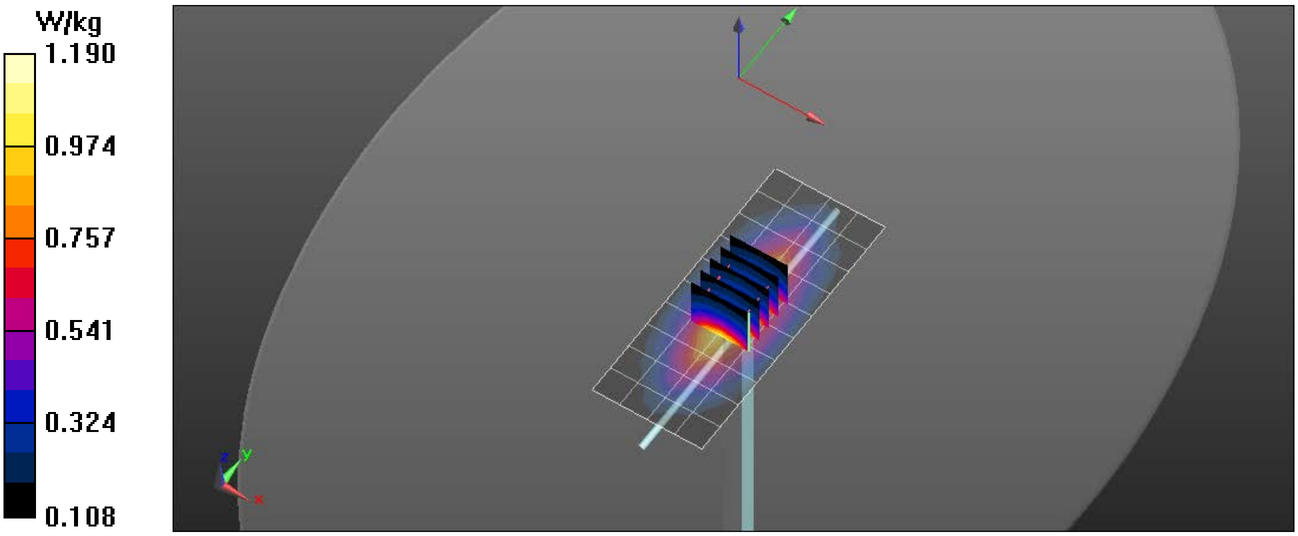
Procedure Notes:

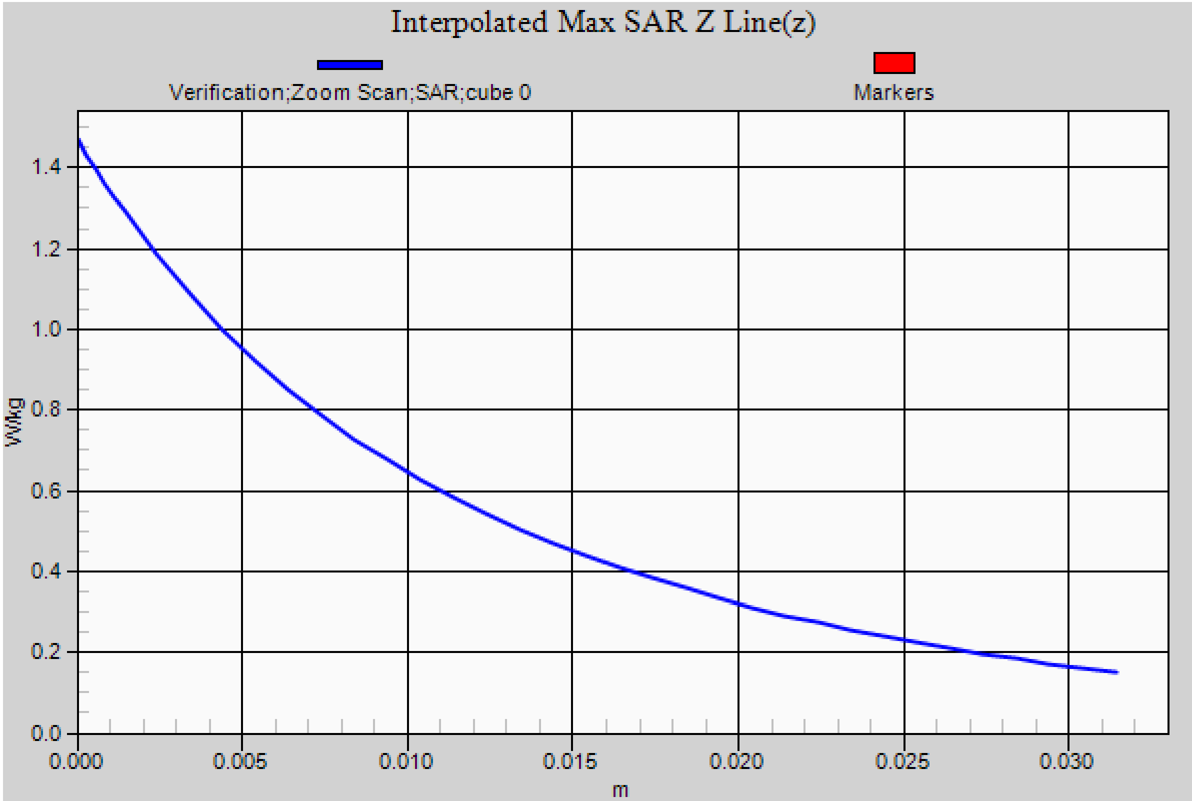
835 MHz/Verification/Area Scan (5x11x1): Measurement grid: dx=15mm, dy=15mm

Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (measured) = 1.19 W/kg

835 MHz/Verification/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 31.568 V/m; Power Drift = -0.02 dB
Peak SAR (extrapolated) = 1.43 W/kg
SAR(1 g) = 0.941 W/kg; SAR(10 g) = 0.612 W/kg

Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (measured) = 1.2 W/kg




Interpolated Max SAR Z Line(z)
Verification;Zoom Scan;SAR;cube 0
Markers
W/kg
1.4
1.2
1.0
0.8
0.6
0.4
0.2
0.0
0.000
0.005
0.010
0.015
0.020
0.025
0.030
m

RF Exposure Lab

Plot 3

DUT: Dipole 900 MHz D900V2; Type: D900V2; Serial: D900V2 - SN:1d044

Communication System: CW; Frequency: 900 MHz; Duty Cycle: 1:1
Medium: HSL900; Medium parameters used: f = 900 MHz; σ = 0.98 mho/m; ε_r = 41.34; ρ = 1000 kg/m^3
Phantom section: Flat Section

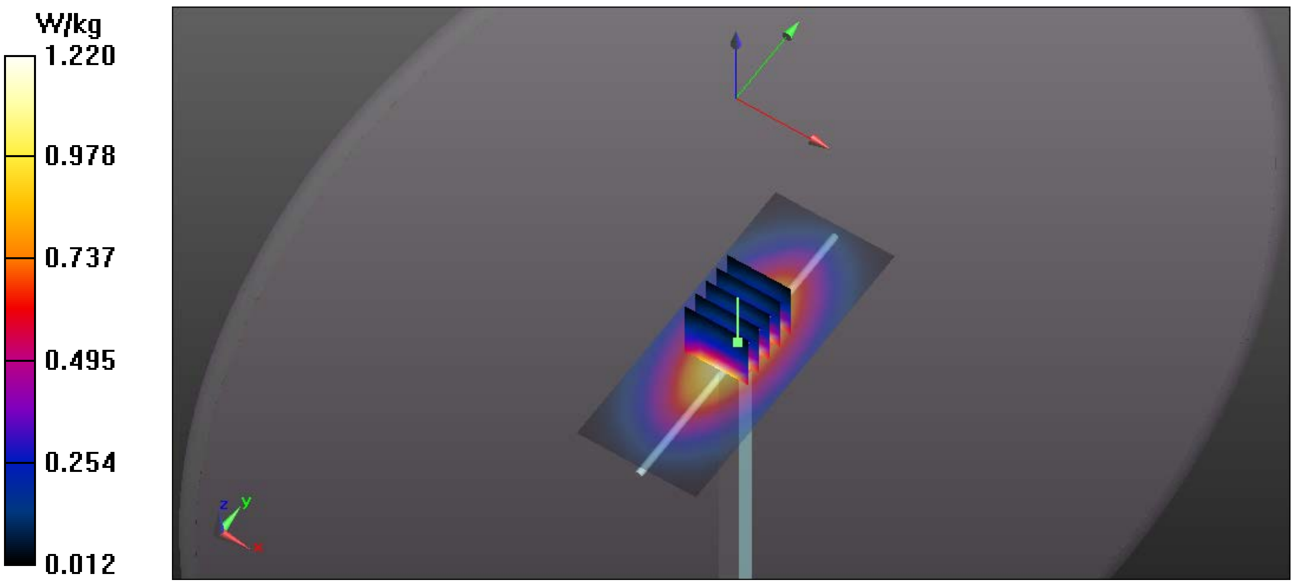
Test Date: Date: 8/10/2019; Ambient Temp: 23 °C; Tissue Temp: 21 °C

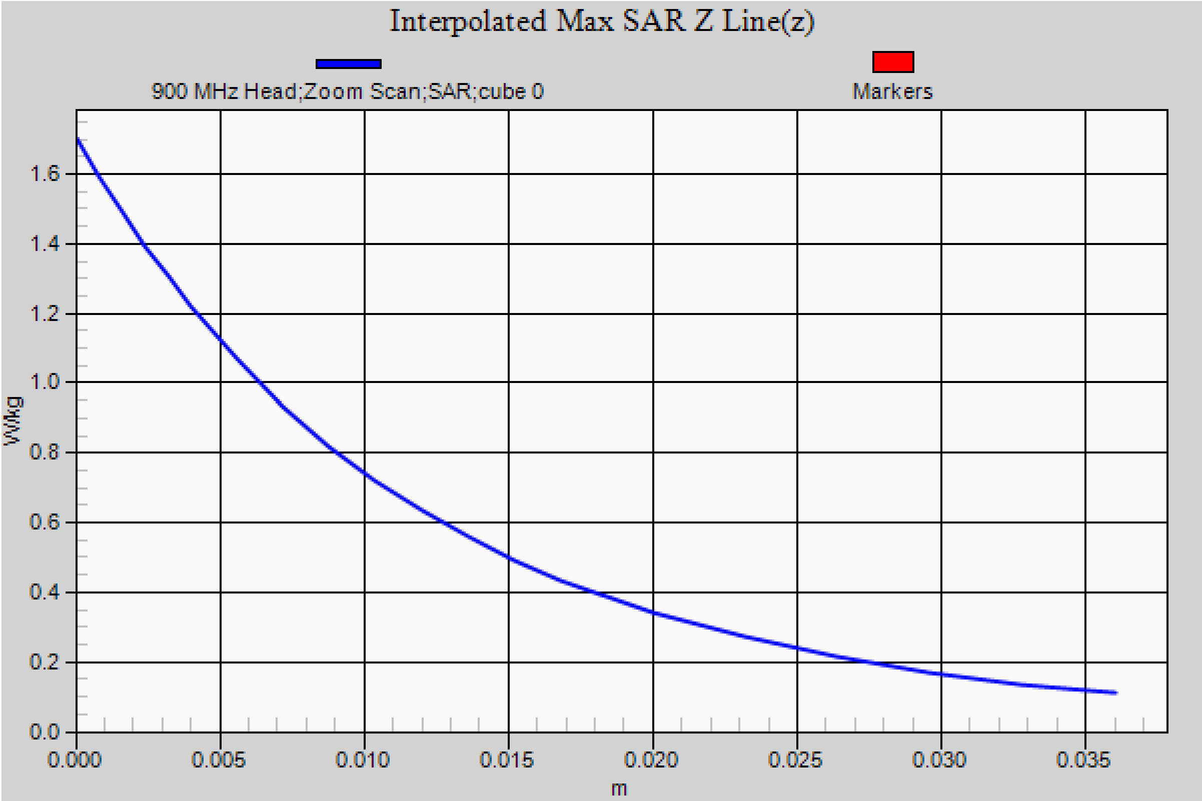
Probe: EX3DV4 - SN3662; ConvF(9.12, 9.12, 9.12); Calibrated: 4/24/2019;
Sensor-Surface: 2mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1416; Calibrated: 4/16/2019
Phantom: ELI v5.0; Type: QDOVA002AA; Serial: 2037
Measurement SW: DASY52, Version 52.10 (0); SEMCAD X Version 14.6.10 (7417)

Procedure Notes:

Verification/900 MHz Head/Area Scan (41x101x1): Interpolated grid: dx=1.500 mm, dy=1.500 mm
Maximum value of SAR (interpolated) = 1.19 W/kg

Verification/900 MHz Head/Zoom Scan (5x5x8)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 33.687 V/m; Power Drift = -0.03 dB
Peak SAR (extrapolated) = 1.691 mW/g
SAR(1 g) = 1.12 mW/g; SAR(10 g) = 0.695 mW/g
Maximum value of SAR (measured) = 1.21 W/kg




Interpolated Max SAR Z Line(z)
900 MHz Head;Zoom Scan;SAR;cube 0
Markers
W/kg
1.6
1.4
1.2
1.0
0.8
0.6
0.4
0.2
0.0
0.000
0.005
0.010
0.015
0.020
0.025
0.030
0.035
m

RF Exposure Lab

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 = 1.39 S/m; ε_r = 39.93; ρ = 1000 kg/m^3
Phantom section: Flat Section

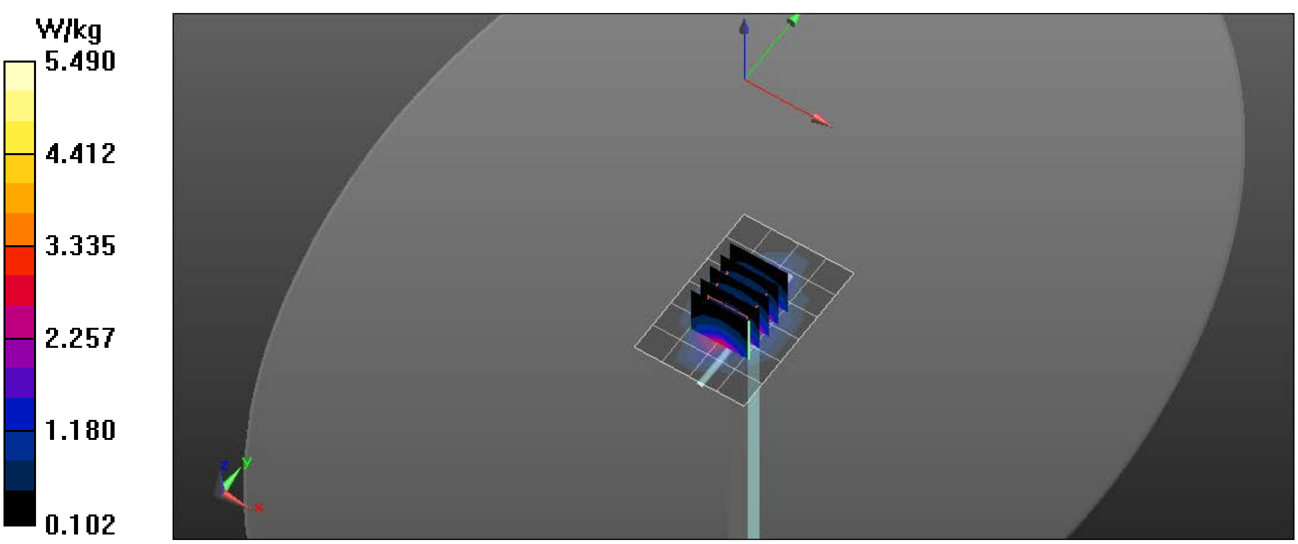
Test Date: Date: 8/7/2019; Ambient Temp: 23 °C; Tissue Temp: 21 °C

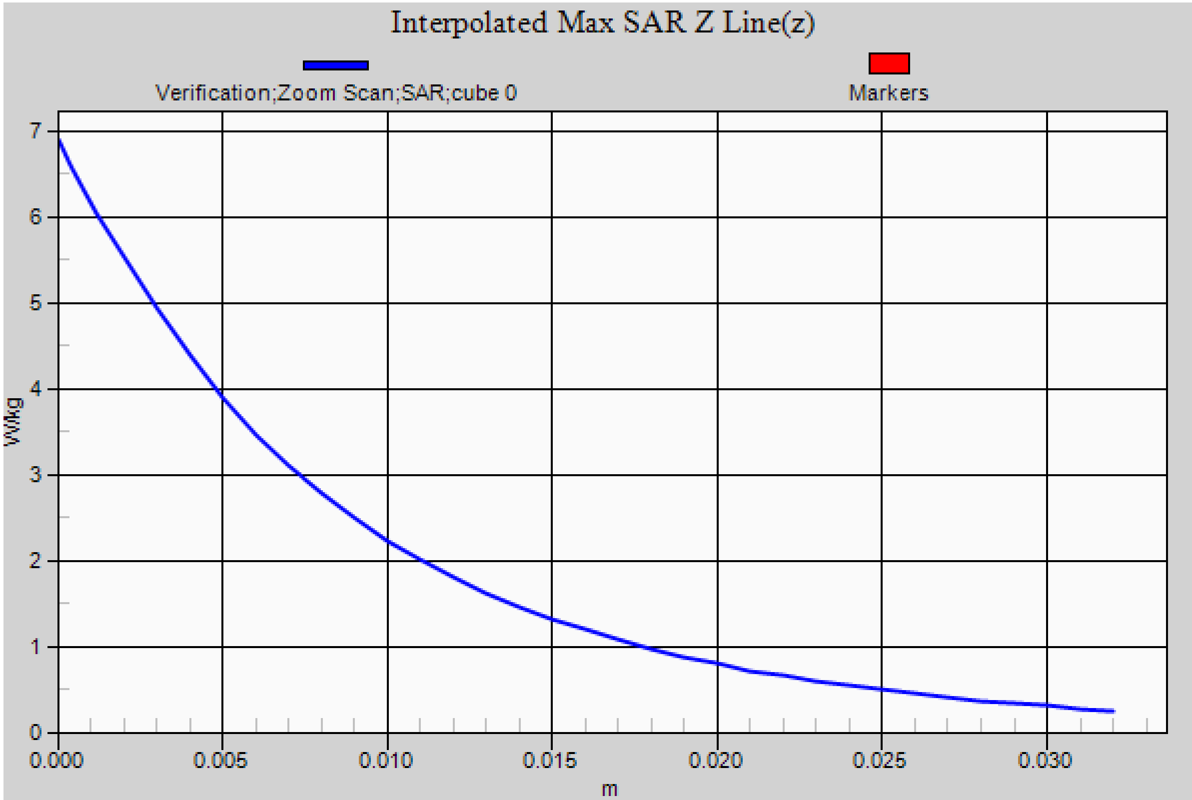
Probe: EX3DV4 - SN3662; ConvF(8.23, 8.23, 8.23); Calibrated: 4/24/2019;
Sensor-Surface: 2mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1416; Calibrated: 4/16/2019
Phantom: ELI v5.0; Type: QDOVA002AA; Serial: 2037
Measurement SW: DASY52, Version 52.10 (0); SEMCAD X Version 14.6.10 (7417)

Procedure Notes:

1750 MHz/Verification/Area Scan (5x7x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (measured) = 5.33 W/kg

1750 MHz/Verification/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 31.227 V/m; Power Drift = -0.01 dB
Peak SAR (extrapolated) = 6.89 W/kg
SAR(1 g) = 3.71 W/kg; SAR(10 g) = 1.91 W/kg
Maximum value of SAR (measured) = 5.49 W/kg




Interpolated Max SAR Z Line(z)
Verification;Zoom Scan;SAR;cube 0
Markers
W/kg
7
6
5
4
3
2
1
0
0.000
0.005
0.010
0.015
0.020
0.025
0.030
m

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 = 1.43 S/m; ε_r = 40.37; ρ = 1000 kg/m^3
Phantom section: Flat Section

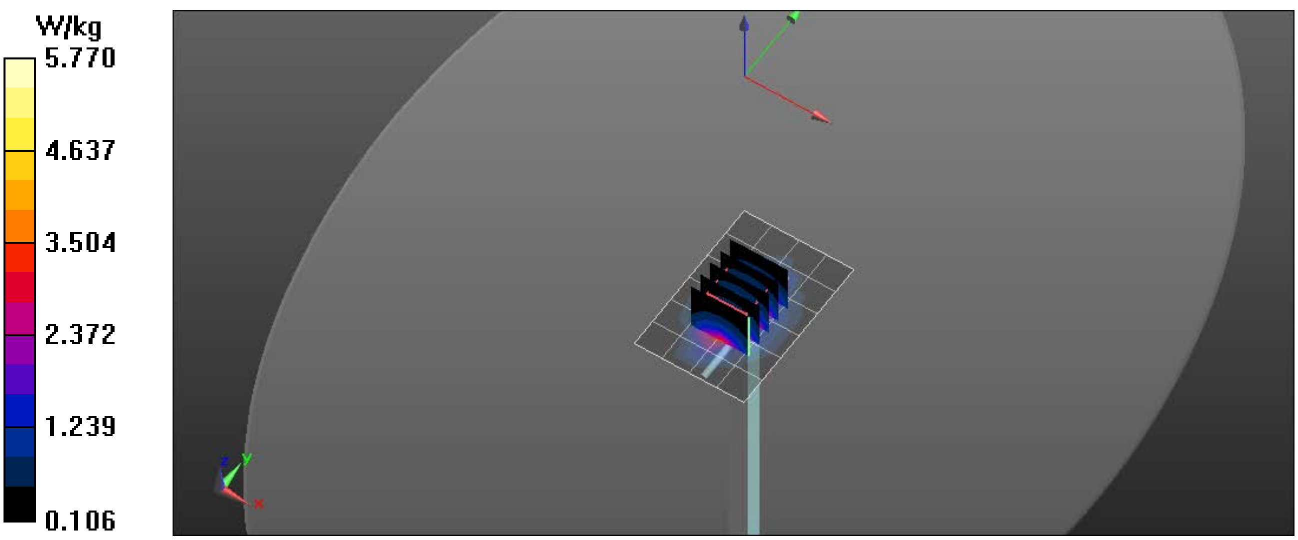
Test Date: Date: 8/7/2019; Ambient Temp: 23 °C; Tissue Temp: 21 °C

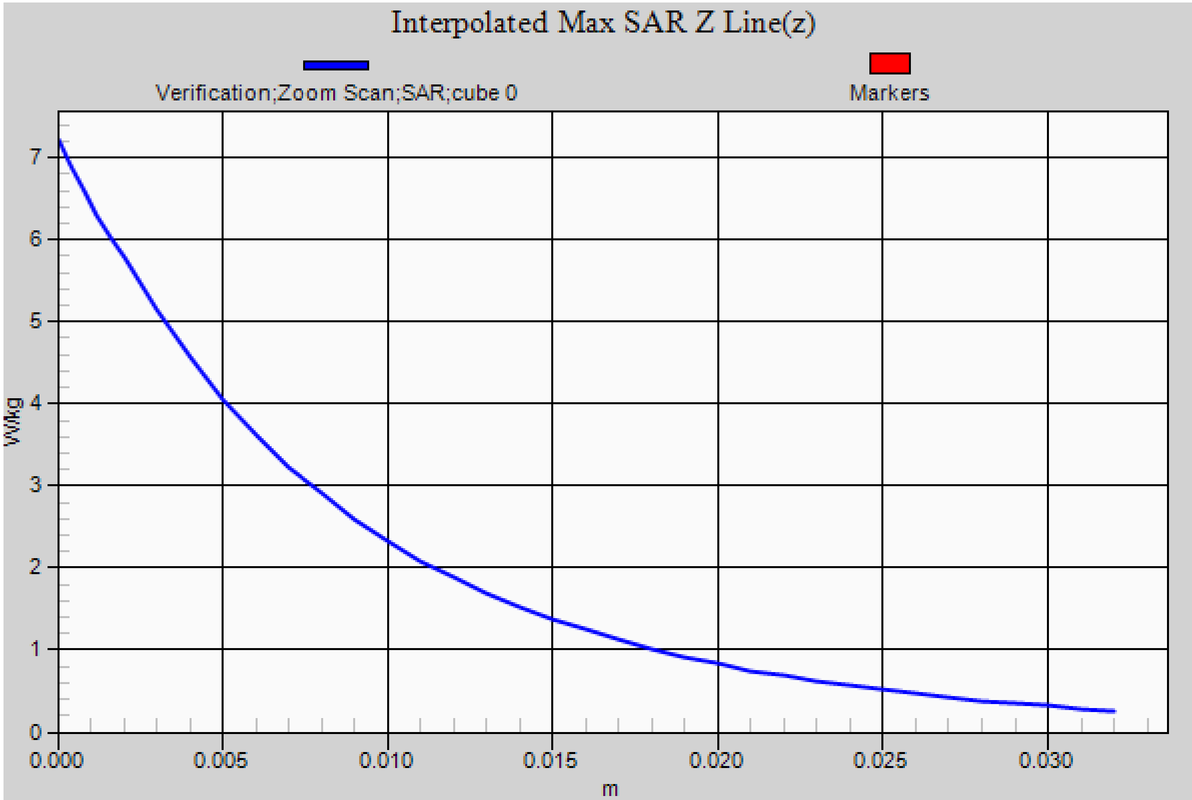
Probe: EX3DV4 - SN3662; ConvF(7.9, 7.9, 7.9); Calibrated: 4/24/2019;
Sensor-Surface: 2mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1416; Calibrated: 4/16/2019
Phantom: ELI v5.0; Type: QDOVA002AA; Serial: 2037
Measurement SW: DASY52, Version 52.10 (0); SEMCAD X Version 14.6.10 (7417)

Procedure Notes:

1900 MHz/Verification/Area Scan (5x7x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (measured) = 5.52 W/kg

1900 MHz/Verification/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 32.186 V/m; Power Drift = -0.03 dB
Peak SAR (extrapolated) = 7.25 W/kg
SAR(1 g) = 4.12 W/kg; SAR(10 g) = 2.15 W/kg
Maximum value of SAR (measured) = 5.79 W/kg




Interpolated Max SAR Z Line(z)
Verification;Zoom Scan;SAR;cube 0
Markers
W/kg
7
6
5
4
3
2
1
0
0.000
0.005
0.010
0.015
0.020
0.025
0.030
m

RF Exposure Lab

Plot 6

DUT: Dipole 2550 MHz D2550V2; Type: D2550V2; Serial: D2550V2 - SN:1003

Communication System: CW; Frequency: 2550 MHz; Duty Cycle: 1:1
Medium: HSL2550; Medium parameters used: f = 2550 MHz; σ = 1.92 S/m; ε_r = 38.94; ρ = 1000 kg/m^3
Phantom section: Flat Section

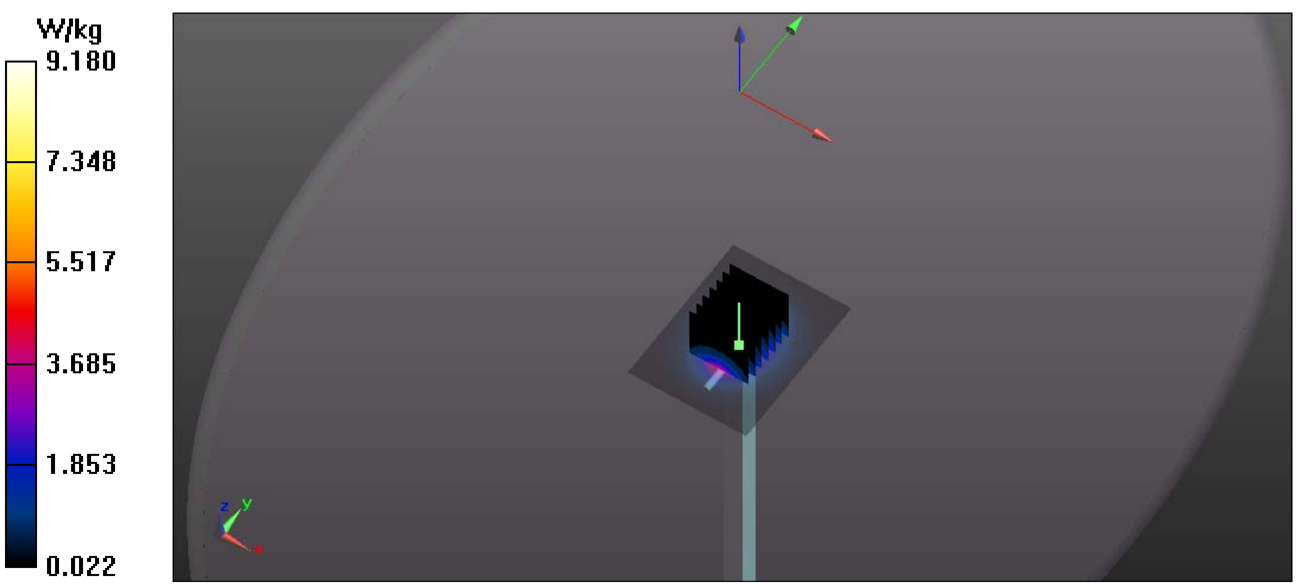
Test Date: Date: 8/8/2019; Ambient Temp: 23 °C; Tissue Temp: 21 °C

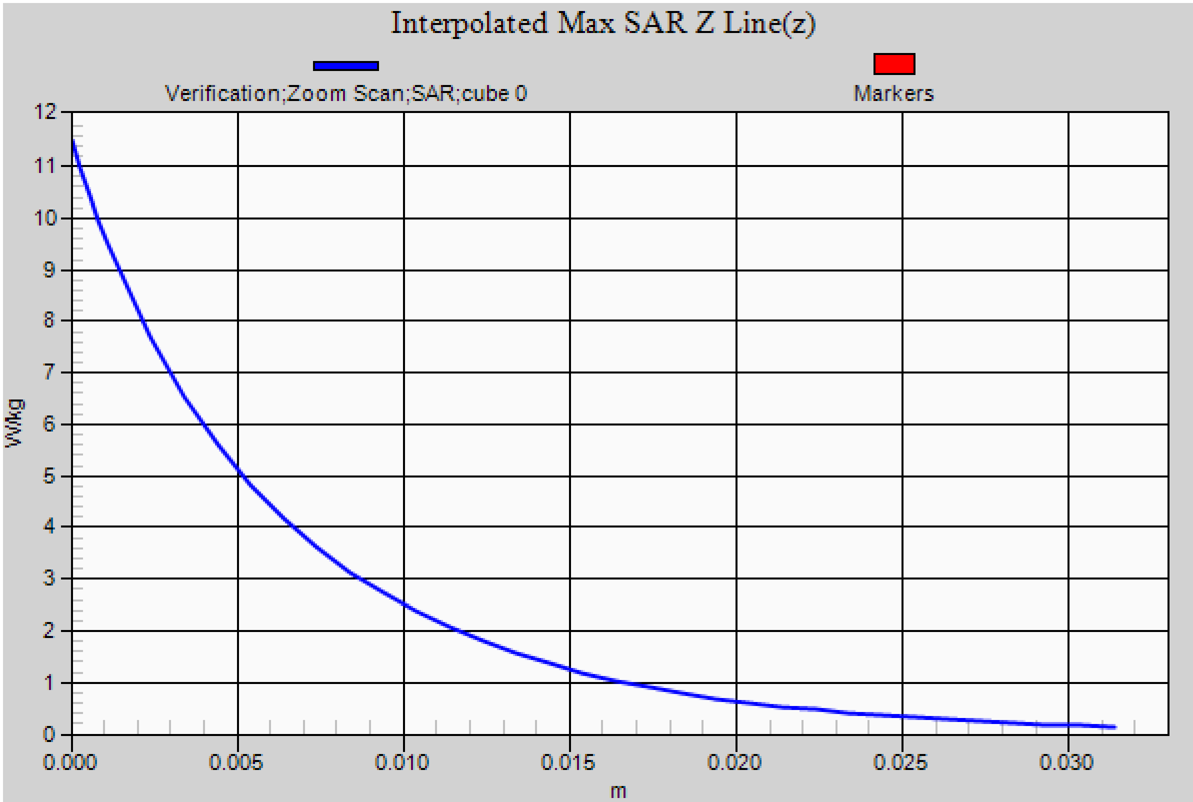
Probe: EX3DV4 - SN3662; ConvF(7.21, 7.21, 7.21); Calibrated: 4/24/2019;
Sensor-Surface: 2mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1416; Calibrated: 4/16/2019
Phantom: ELI v5.0; Type: QDOVA002AA; Serial: 2037
Measurement SW: DASY52, Version 52.10 (0); SEMCAD X Version 14.6.10 (7417)

Procedure Notes:

2550 MHz Body/Verification/Area Scan (61x81x1): Interpolated grid: dx=1.000 mm, dy=1.000 mm
Maximum value of SAR (interpolated) = 9.18 W/kg

2550 MHz Body/Verification/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 54.541 V/m; Power Drift = -0.02 dB
Peak SAR (extrapolated) = 11.5 W/kg
SAR(1 g) = 5.71 W/kg; SAR(10 g) = 2.56 W/kg
Maximum value of SAR (measured) = 8.98 W/kg




Interpolated Max SAR Z Line(z)
Verification;Zoom Scan;SAR;cube 0
Markers
W/kg
12
11
10
9
8
7
6
5
4
3
2
1
0
0.000
0.005
0.010
0.015
0.020
0.025
0.030
m

RF Exposure Lab

Plot 7

DUT: Dipole 2450 MHz D2450V2; Type: D2450V2; Serial: D2450V2 - SN:829

Communication System: CW; Frequency: 2450 MHz; Duty Cycle: 1:1
Medium: HSL2450; Medium parameters used: f = 2450 MHz; σ = 1.84 S/m; ε_r = 38.96; ρ = 1000 kg/m^3
Phantom section: Flat Section

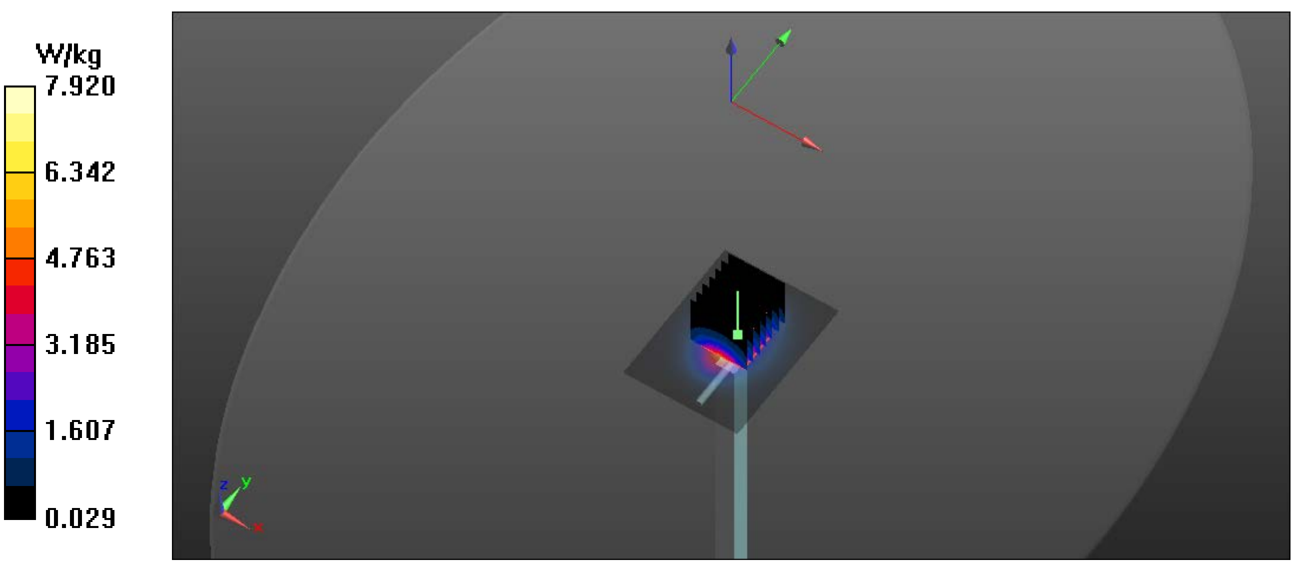
Test Date: Date: 8/9/2019; Ambient Temp: 23 °C; Tissue Temp: 21 °C

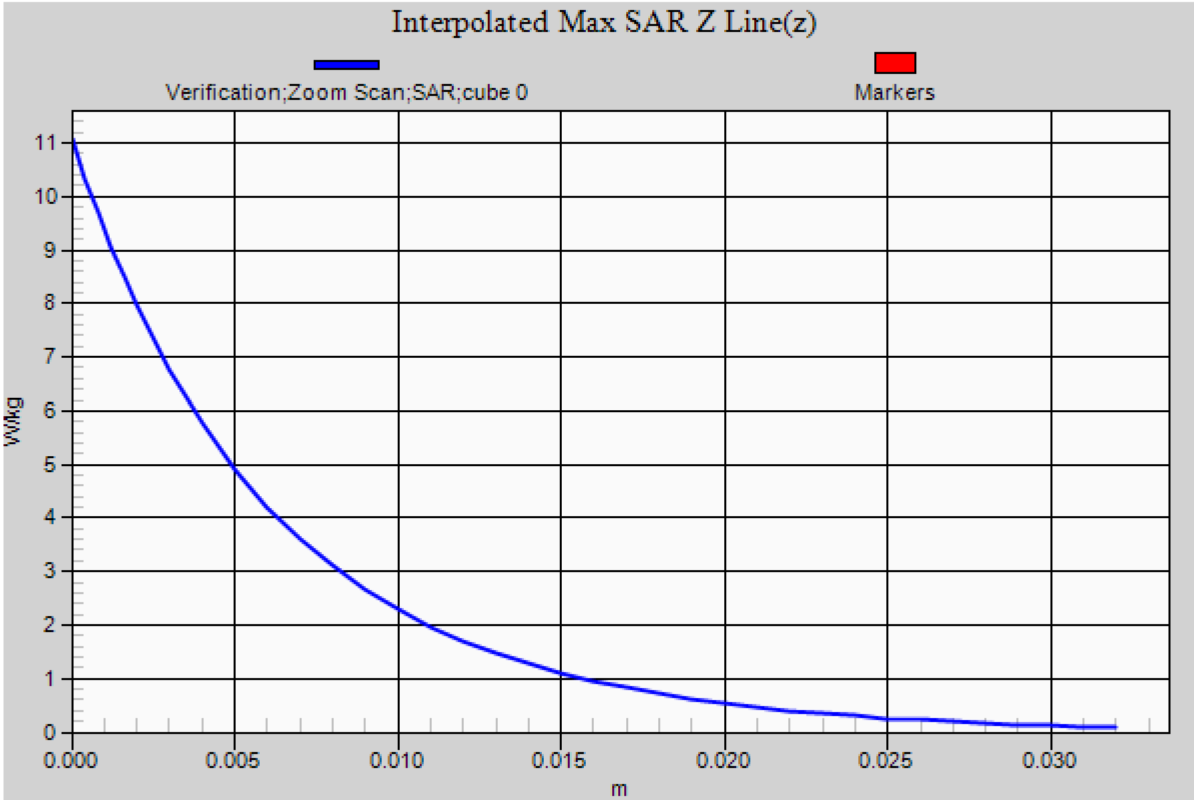
Probe: EX3DV4 - SN3662; ConvF(7.33, 7.33, 7.33); Calibrated: 4/24/2019;
Sensor-Surface: 2mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1416; Calibrated: 4/16/2019
Phantom: ELI v5.0; Type: QDOVA002AA; Serial: 2037
Measurement SW: DASY52, Version 52.10 (0); SEMCAD X Version 14.6.10 (7417)

Procedure Notes:

2450 MHz Head/Verification/Area Scan (7x9x1): Measurement grid: dx=10mm, dy=10mm
Maximum value of SAR (measured) = 7.93 W/kg

2450 MHz Head/Verification/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 58.792 V/m; Power Drift = -0.01 dB
Peak SAR (extrapolated) = 11.15 W/kg
SAR(1 g) = 5.29 W/kg; SAR(10 g) = 2.48 W/kg
Maximum value of SAR (measured) = 8.39 W/kg




Interpolated Max SAR Z Line(z)
Verification;Zoom Scan;SAR;cube 0
Markers
W/kg
11
10
9
8
7
6
5
4
3
2
1
0
0.000
0.005
0.010
0.015
0.020
0.025
0.030
m

RF Exposure Lab

Plot 8

DUT: Dipole D5GHzV2; Type: D5GHzV2; Serial: D5GHzV2 - SN:1085

Communication System: CW; Frequency: 5250 MHz; Duty Cycle: 1:1
Medium: HSL3-6GHz; Medium parameters used (interpolated): f = 5250 MHz; σ = 4.805 S/m; ε_r = 35.945; ρ = 1000 kg/m^3
Phantom section: Flat Section

Test Date: Date: 8/9/2019; Ambient Temp: 23 °C; Tissue Temp: 21 °C

Probe: EX3DV4 - SN3662; ConvF(5.05, 5.05, 5.05); Calibrated: 4/24/2019;
Sensor-Surface: 2mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1416; Calibrated: 4/16/2019
Phantom: ELI v5.0; Type: QDOVA002AA; Serial: 2037
Measurement SW: DASY52, Version 52.10 (0); SEMCAD X Version 14.6.10 (7417)

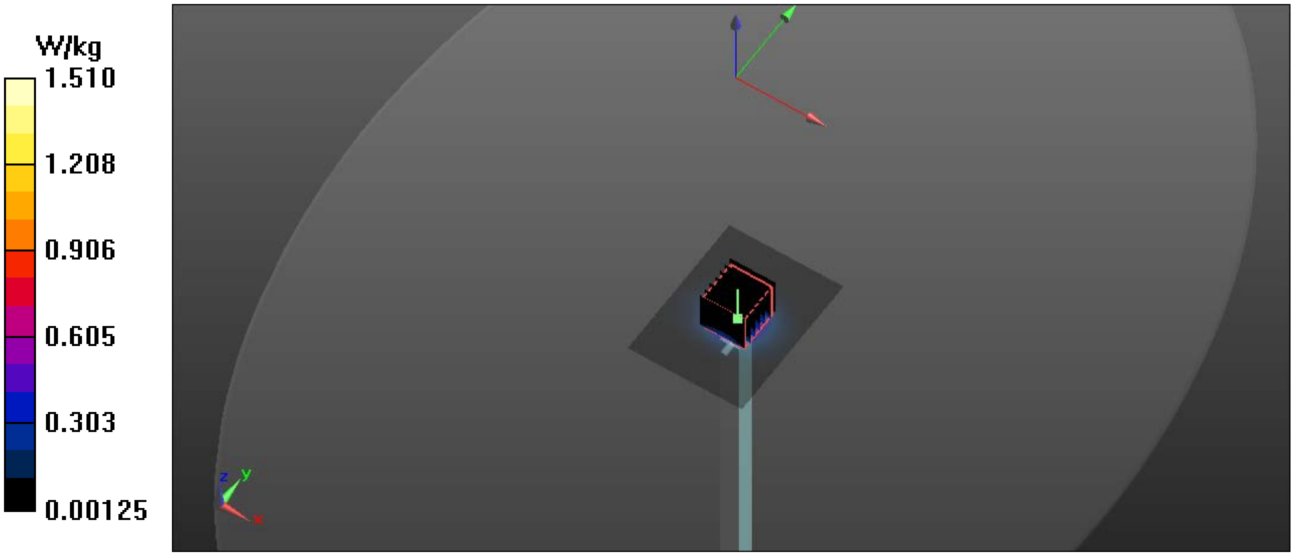
Procedure Notes:

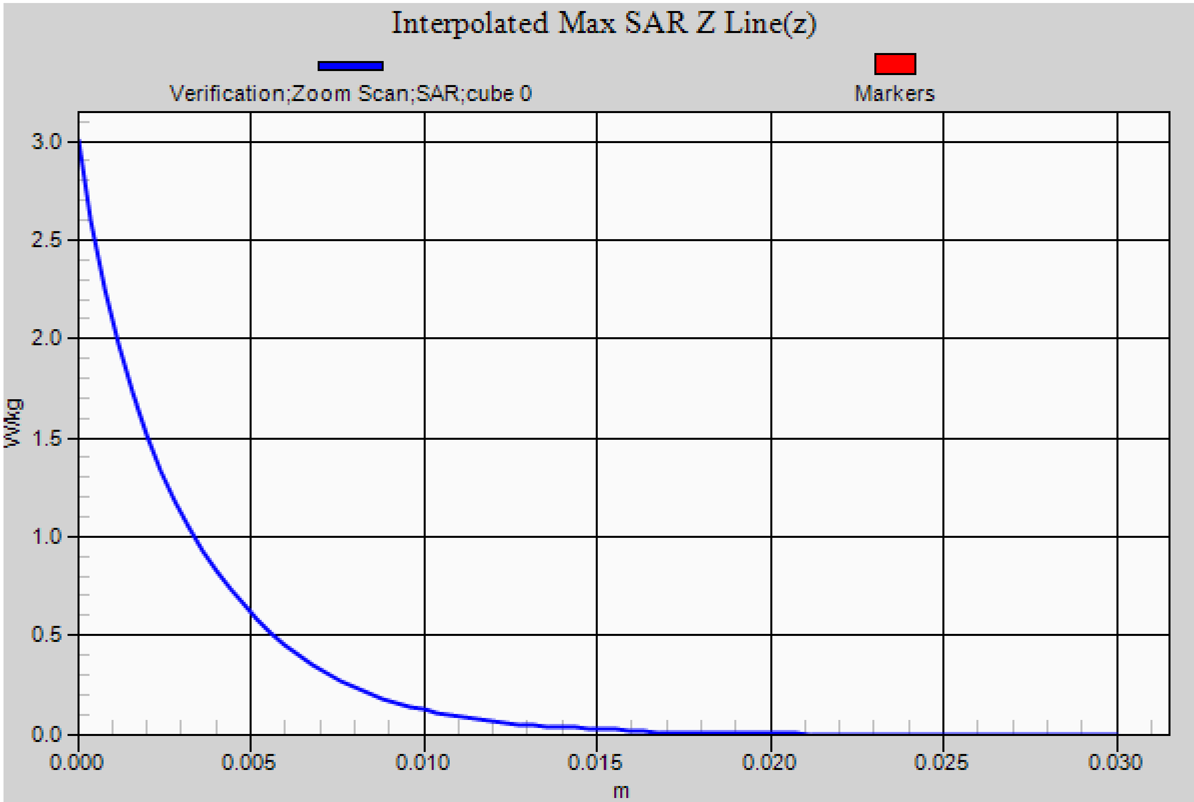
5250 MHz Head/Verification/Area Scan (7x9x1): Measurement grid: dx=10mm, dy=10mm

Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (measured) = 1.5 W/kg

5250 MHz Head/Verification/Zoom Scan (8x8x15)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=2mm
Reference Value = 58.697 V/m; Power Drift = -0.02 dB
Peak SAR (extrapolated) = 3.06 W/kg
SAR(1 g) = 0.841 W/kg; SAR(10 g) = 0.242 W/kg

Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (measured) = 1.96 W/kg




Interpolated Max SAR Z Line(z)
Verification;Zoom Scan;SAR;cube 0
Markers
W/kg
3.0
2.5
2.0
1.5
1.0
0.5
0.0
0.000
0.005
0.010
0.015
0.020
0.025
0.030
m

RF Exposure Lab

Plot 9

DUT: Dipole D5GHzV2; Type: D5GHzV2; Serial: D5GHzV2 - SN:1085

Communication System: CW; Frequency: 5600 MHz; Duty Cycle: 1:1
Medium: HSL3-6GHz; Medium parameters used: f = 5600 MHz; σ = 5.19 S/m; ε_r = 35.53; ρ = 1000 kg/m^3
Phantom section: Flat Section

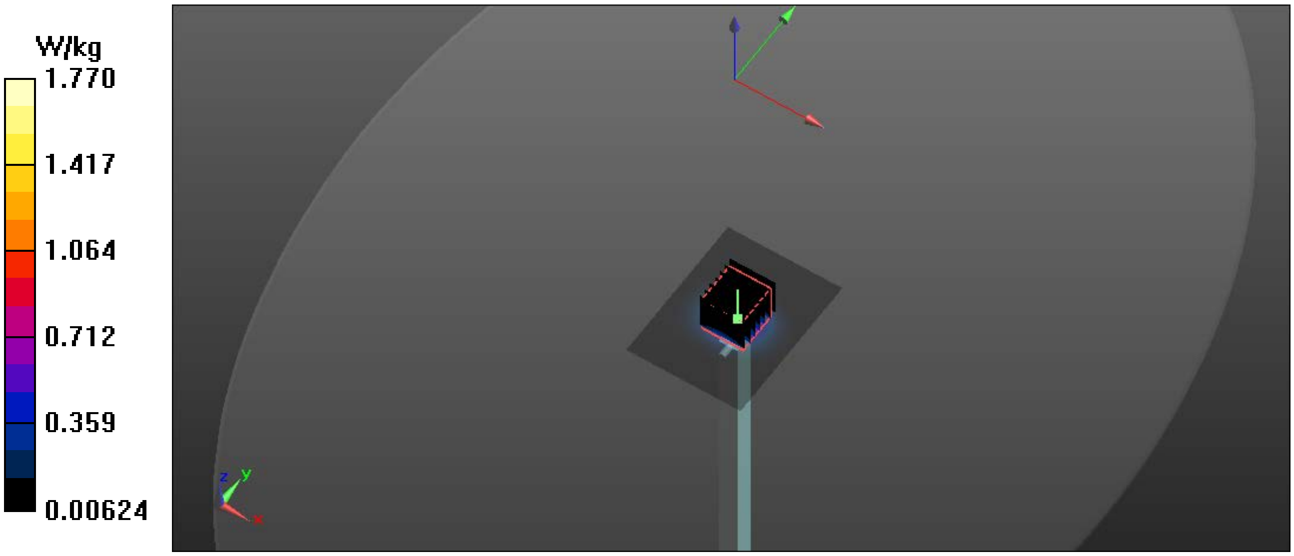
Test Date: Date: 8/9/2019; Ambient Temp: 23 °C; Tissue Temp: 21 °C

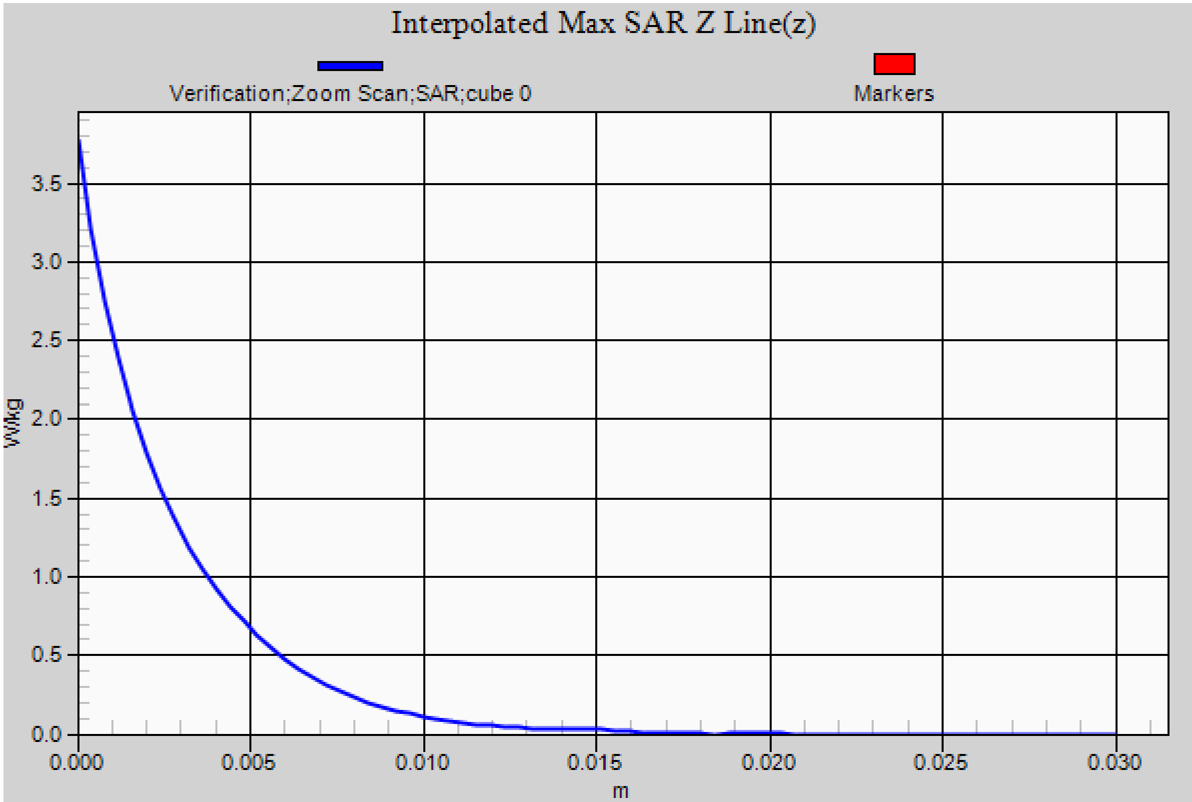
Probe: EX3DV4 - SN3662; ConvF(4.81, 4.81, 4.81); Calibrated: 4/24/2019;
Sensor-Surface: 2mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1416; Calibrated: 4/16/2019
Phantom: ELI v5.0; Type: QDOVA002AA; Serial: 2037
Measurement SW: DASY52, Version 52.10 (0); SEMCAD X Version 14.6.10 (7417)

Procedure Notes:

5600 MHz Head/Verification/Area Scan (7x9x1): Measurement grid: dx=10mm, dy=10mm
Maximum value of SAR (measured) = 1.75 W/kg

5600 MHz Head/Verification/Zoom Scan (8x8x15)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=2mm
Reference Value = 13.798 V/m; Power Drift = -0.01 dB
Peak SAR (extrapolated) = 3.79 W/kg
SAR(1 g) = 0.853 W/kg; SAR(10 g) = 0.243 W/kg
Maximum value of SAR (measured) = 2.03 W/kg




Interpolated Max SAR Z Line(z)
Verification;Zoom Scan;SAR;cube 0
Markers
W/kg
3.5
3.0
2.5
2.0
1.5
1.0
0.5
0.0
0.000
0.005
0.010
0.015
0.020
0.025
0.030
m

RF Exposure Lab

Plot 10

DUT: Dipole D5GHzV2; Type: D5GHzV2; Serial: D5GHzV2 - SN:1085

Communication System: CW; Frequency: 5750 MHz; Duty Cycle: 1:1
Medium: HSL3-6GHz; Medium parameters used (interpolated): f = 5750 MHz; σ = 5.36 S/m; ε_r = 35.36; ρ = 1000 kg/m^3
Phantom section: Flat Section

Test Date: Date: 8/9/2019; Ambient Temp: 23 °C; Tissue Temp: 21 °C

Probe: EX3DV4 - SN3662; ConvF(4.9, 4.9, 4.9); Calibrated: 4/24/2019;
Sensor-Surface: 2mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1416; Calibrated: 4/16/2019
Phantom: ELI v5.0; Type: QDOVA002AA; Serial: 2037
Measurement SW: DASY52, Version 52.10 (0); SEMCAD X Version 14.6.10 (7417)

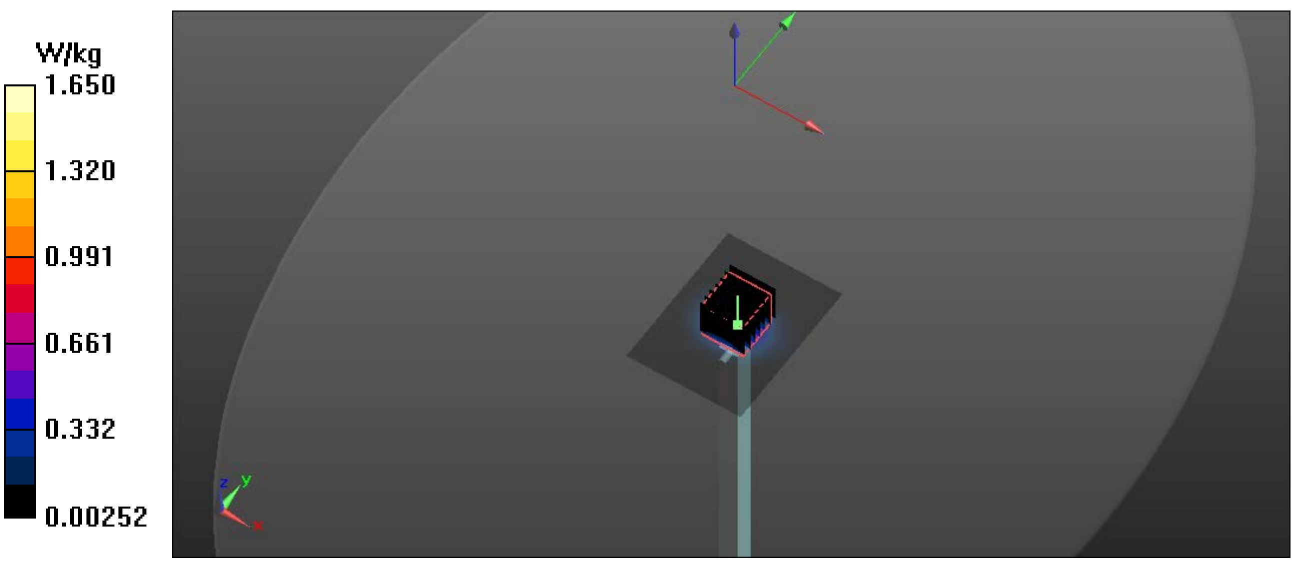
Procedure Notes:

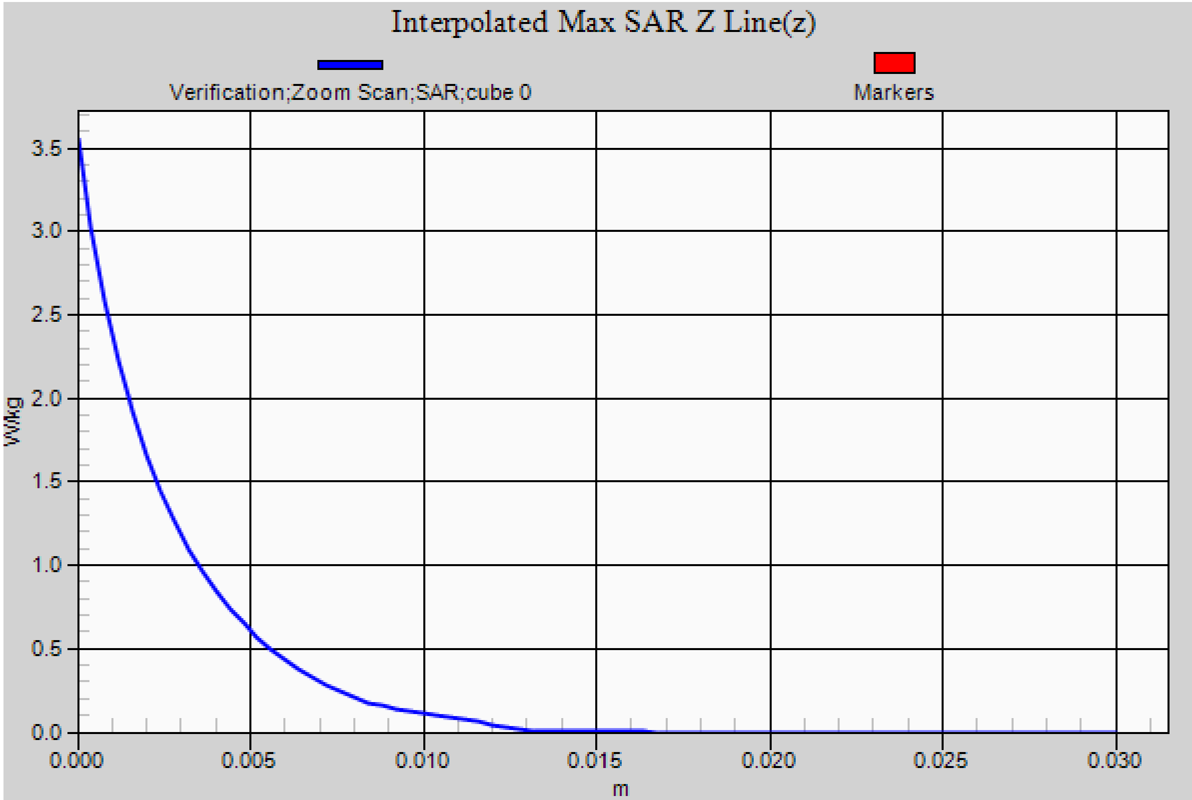
5800 MHz Head/Verification/Area Scan (7x9x1): Measurement grid: dx=10mm, dy=10mm

Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (measured) = 1.67 W/kg

5800 MHz Head/Verification/Zoom Scan (8x8x15)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=2mm
Reference Value = 12.942 V/m; Power Drift = -0.02 dB
Peak SAR (extrapolated) = 3.59 W/kg
SAR(1 g) = 0.823 W/kg; SAR(10 g) = 0.241 W/kg

Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (measured) = 1.86 W/kg




Interpolated Max SAR Z Line(z)
Verification;Zoom Scan;SAR;cube 0
Markers
W/kg
3.5
3.0
2.5
2.0
1.5
1.0
0.5
0.0
0.000
0.005
0.010
0.015
0.020
0.025
0.030
m

Appendix B – SAR Test Data Plots

RF Exposure Lab

Plot 1

DUT: ALR-H460 With RFID; Type: RFID Scanner; Serial: CW16100100006

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 = 0.868 S/m; ε_r = 41.708; ρ = 1000 kg/m^3
Phantom section: Flat Section

Test Date: Date: 8/8/2019; Ambient Temp: 23 °C; Tissue Temp: 21 °C

Probe: EX3DV4 - SN3662; ConvF(9.57, 9.57, 9.57); Calibrated: 4/24/2019;
Sensor-Surface: 2mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1416; Calibrated: 4/16/2019
Phantom: ELI v5.0; Type: QDOVA002AA; Serial: 2037
Measurement SW: DASY52, Version 52.10 (0); SEMCAD X Version 14.6.10 (7417)

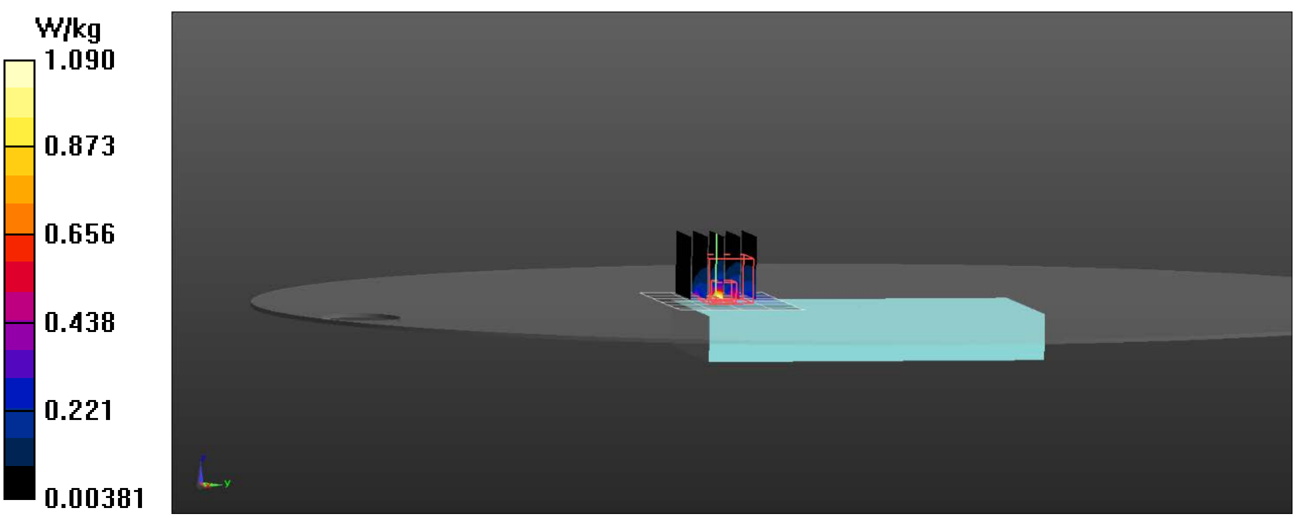
Procedure Notes:

750 MHz LTE/Back 1 RB 24 Offset Mid/Area Scan (7x5x1): Measurement grid: dx=15mm, dy=15mm

Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (measured) = 0.808 W/kg

750 MHz LTE/Back 1 RB 24 Offset Mid/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 16.13 V/m; Power Drift = 0.04 dB
Peak SAR (extrapolated) = 1.69 W/kg
SAR(1 g) = 0.604 W/kg; SAR(10 g) = 0.265 W/kg

Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (measured) = 1.09 W/kg



RF Exposure Lab

Plot 2

DUT: ALR-H460 With RFID; Type: RFID Scanner; Serial: CW16100100006

Communication System: GPRS 2-Slot (GMSK); Frequency: 836.6 MHz; Duty Cycle: 1:4.00037
Medium: HSL835; Medium parameters used (interpolated): f = 836.6 MHz; σ = 0.917 S/m; ε_r = 41.44; ρ = 1000 kg/m^3
Phantom section: Flat Section

Test Date: Date: 8/7/2019; Ambient Temp: 23 °C; Tissue Temp: 21 °C

Probe: EX3DV4 - SN3662; ConvF(9.12, 9.12, 9.12); Calibrated: 4/24/2019;
Sensor-Surface: 2mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1416; Calibrated: 4/16/2019
Phantom: ELI v5.0; Type: QDOVA002AA; Serial: 2037
Measurement SW: DASY52, Version 52.10 (0); SEMCAD X Version 14.6.10 (7417)

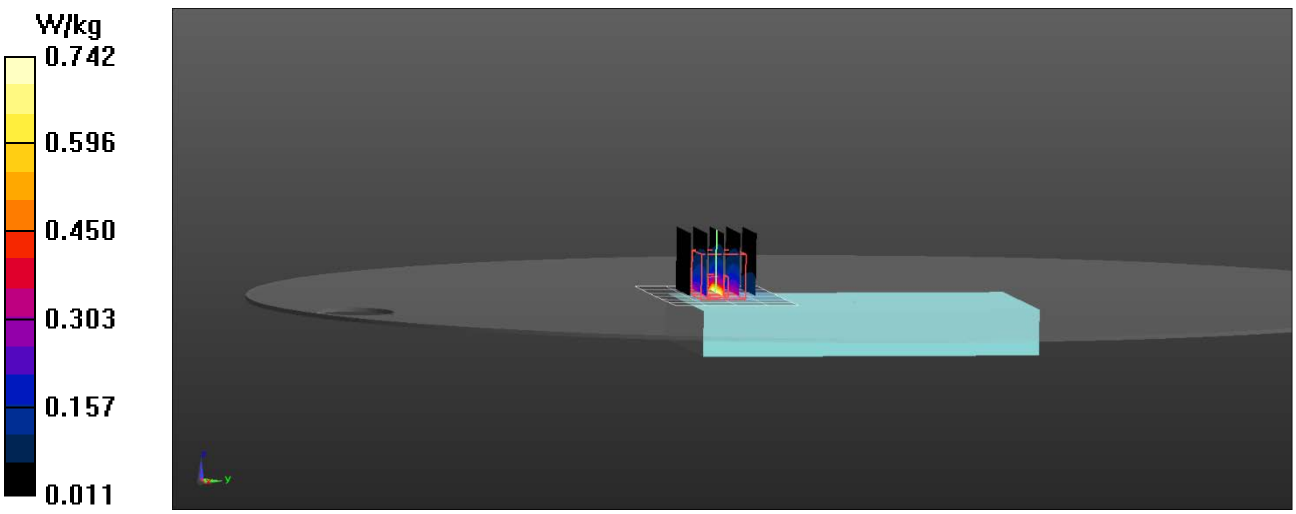
Procedure Notes:

850 MHz GSM/Back Mid/Area Scan (7x5x1): Measurement grid: dx=15mm, dy=15mm

Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (measured) = 0.584 W/kg

850 MHz GSM/Back Mid/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 7.133 V/m; Power Drift = -0.03 dB
Peak SAR (extrapolated) = 1.03 W/kg
SAR(1 g) = 0.468 W/kg; SAR(10 g) = 0.229 W/kg

Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (measured) = 0.742 W/kg



RF Exposure Lab

Plot 3

DUT: ALR-H460 With RFID; Type: RFID Scanner; Serial: CW16100100006

Communication System: UMTS (WCDMA); Frequency: 836.6 MHz; Duty Cycle: 1:1
Medium: HSL835; Medium parameters used (interpolated): f = 836.6 MHz; σ = 0.917 S/m; ε_r = 41.44; ρ = 1000 kg/m^3
Phantom section: Flat Section

Test Date: Date: 8/7/2019; Ambient Temp: 23 °C; Tissue Temp: 21 °C

Probe: EX3DV4 - SN3662; ConvF(9.12, 9.12, 9.12); Calibrated: 4/24/2019;
Sensor-Surface: 2mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1416; Calibrated: 4/16/2019
Phantom: ELI v5.0; Type: QDOVA002AA; Serial: 2037
Measurement SW: DASY52, Version 52.10 (0); SEMCAD X Version 14.6.10 (7417)

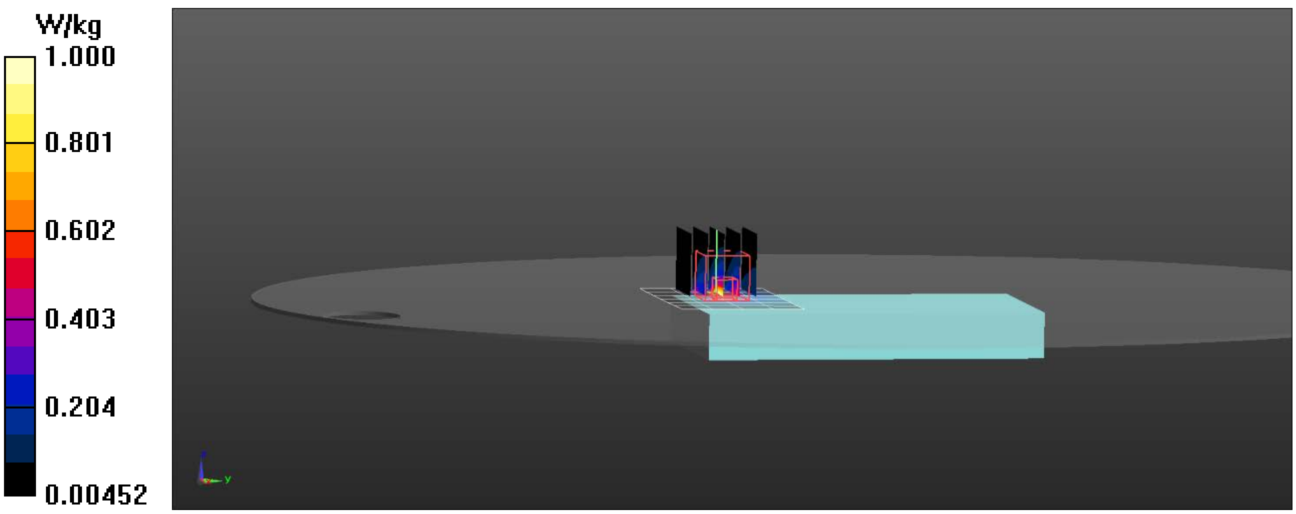
Procedure Notes:

850 MHz UMTS/Back Mid/Area Scan (7x5x1): Measurement grid: dx=15mm, dy=15mm

Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (measured) = 0.739 W/kg

850 MHz UMTS/Back Mid/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 7.175 V/m; Power Drift = 0.02 dB
Peak SAR (extrapolated) = 1.39 W/kg
SAR(1 g) = 0.608 W/kg; SAR(10 g) = 0.270 W/kg

Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (measured) = 1.00 W/kg



RF Exposure Lab

Plot 4

DUT: ALR-H460 With RFID; Type: RFID Scanner; Serial: CW16100100006

Communication System: UMTS (WCDMA); Frequency: 1732.6 MHz; Duty Cycle: 1:1
Medium: HSL1750; Medium parameters used (interpolated): f = 1732.6 MHz; σ = 1.373 S/m; ε_r = 39.965; ρ = 1000 kg/m^3
Phantom section: Flat Section

Test Date: Date: 8/7/2019; Ambient Temp: 23 °C; Tissue Temp: 21 °C

Probe: EX3DV4 - SN3662; ConvF(8.23, 8.23, 8.23); Calibrated: 4/24/2019;
Sensor-Surface: 2mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1416; Calibrated: 4/16/2019
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 UMTS/Back Mid/Area Scan (7x5x1): Measurement grid: dx=15mm, dy=15mm

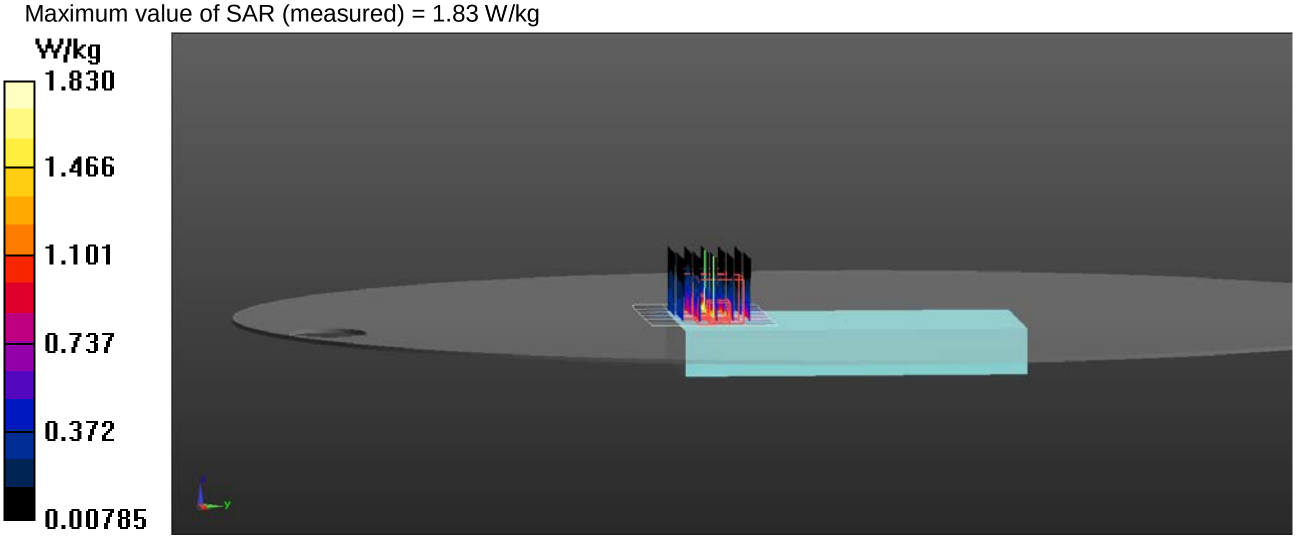
Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (measured) = 1.81 W/kg

1750 MHz UMTS/Back Mid/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 13.16 V/m; Power Drift = -0.04 dB
Peak SAR (extrapolated) = 2.86 W/kg
SAR(1 g) = 1.35 W/kg; SAR(10 g) = 0.619 W/kg

Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (measured) = 2.06 W/kg

1750 MHz UMTS/Back Mid/Zoom Scan (5x5x7)/Cube 1: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 13.16 V/m; Power Drift = -0.04 dB
Peak SAR (extrapolated) = 2.53 W/kg
SAR(1 g) = 1.2 W/kg; SAR(10 g) = 0.590 W/kg

Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (measured) = 1.83 W/kg



RF Exposure Lab

Plot 5

DUT: ALR-H460 With RFID; Type: RFID Scanner; Serial: CW16100100006

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 = 1.373 S/m; ε_r = 39.965; ρ = 1000 kg/m^3
Phantom section: Flat Section

Test Date: Date: 8/8/2019; Ambient Temp: 23 °C; Tissue Temp: 21 °C

Probe: EX3DV4 - SN3662; ConvF(8.23, 8.23, 8.23); Calibrated: 4/24/2019;
Sensor-Surface: 2mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1416; Calibrated: 4/16/2019
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 LTE/Back 1 RB 49 Offset Mid/Area Scan (7x5x1): Measurement grid: dx=15mm, dy=15mm

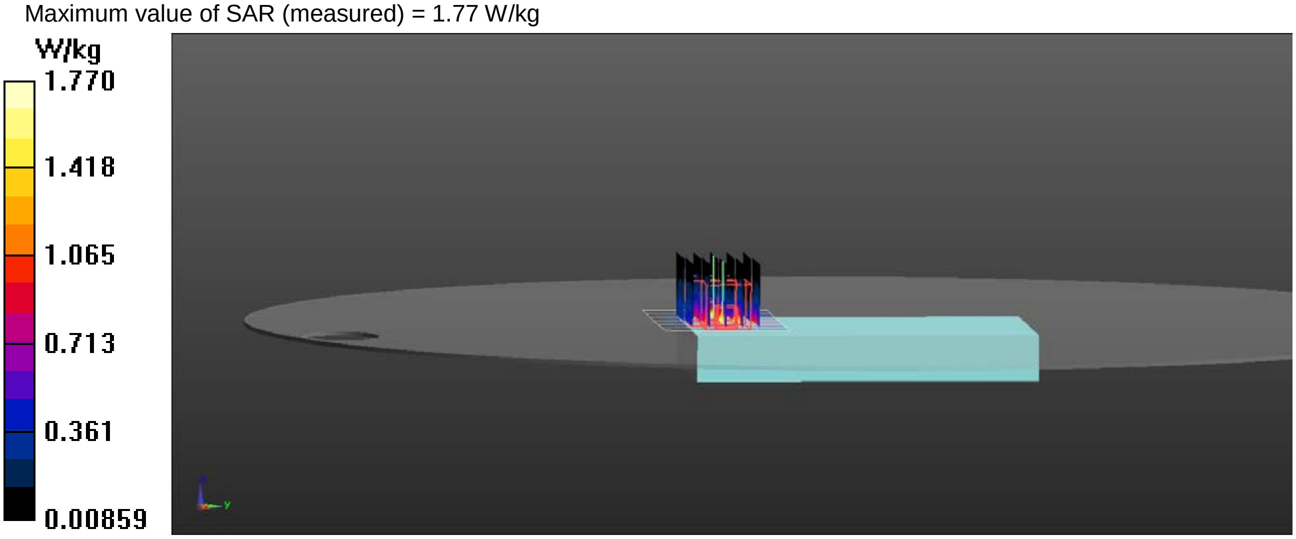
Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (measured) = 1.95 W/kg

1750 MHz LTE/Back 1 RB 49 Offset Mid/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 11.64 V/m; Power Drift = 0.02 dB
Peak SAR (extrapolated) = 3.06 W/kg
SAR(1 g) = 1.43 W/kg; SAR(10 g) = 0.671 W/kg

Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (measured) = 2.25 W/kg

1750 MHz LTE/Back 1 RB 49 Offset Mid/Zoom Scan (5x5x7)/Cube 1: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 11.64 V/m; Power Drift = 0.02 dB
Peak SAR (extrapolated) = 2.64 W/kg
SAR(1 g) = 1.06 W/kg; SAR(10 g) = 0.498 W/kg

Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (measured) = 1.77 W/kg



RF Exposure Lab

Plot 6

DUT: ALR-H460 With RFID; Type: RFID Scanner; Serial: CW16100100006

Communication System: GPRS 2-Slot (GMSK); Frequency: 1880 MHz; Duty Cycle: 1:4.00037
Medium: HSL1900; Medium parameters used: f = 1880 MHz; σ = 1.41 S/m; ε_r = 40.38; ρ = 1000 kg/m^3
Phantom section: Flat Section

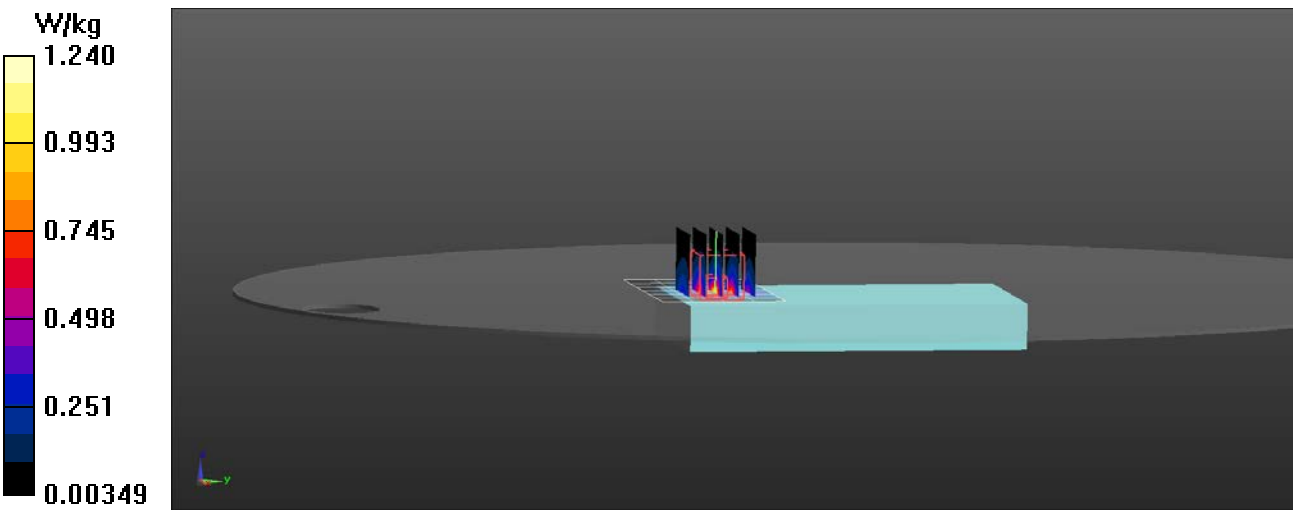
Test Date: Date: 8/7/2019; Ambient Temp: 23 °C; Tissue Temp: 21 °C

Probe: EX3DV4 - SN3662; ConvF(7.9, 7.9, 7.9); Calibrated: 4/24/2019;
Sensor-Surface: 2mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1416; Calibrated: 4/16/2019
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 GSM/Back Mid/Area Scan (7x5x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (measured) = 0.908 W/kg

1900 MHz GSM/Back Mid/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 7.441 V/m; Power Drift = -0.01 dB
Peak SAR (extrapolated) = 1.61 W/kg
SAR(1 g) = 0.778 W/kg; SAR(10 g) = 0.360 W/kg
Maximum value of SAR (measured) = 1.24 W/kg



RF Exposure Lab

Plot 7

DUT: ALR-H460 With RFID; Type: RFID Scanner; Serial: CW16100100006

Communication System: UMTS (WCDMA); Frequency: 1880 MHz; Duty Cycle: 1:1
Medium: HSL1900; Medium parameters used: f = 1880 MHz; σ = 1.41 S/m; ε_r = 40.38; ρ = 1000 kg/m^3
Phantom section: Flat Section

Test Date: Date: 8/7/2019; Ambient Temp: 23 °C; Tissue Temp: 21 °C

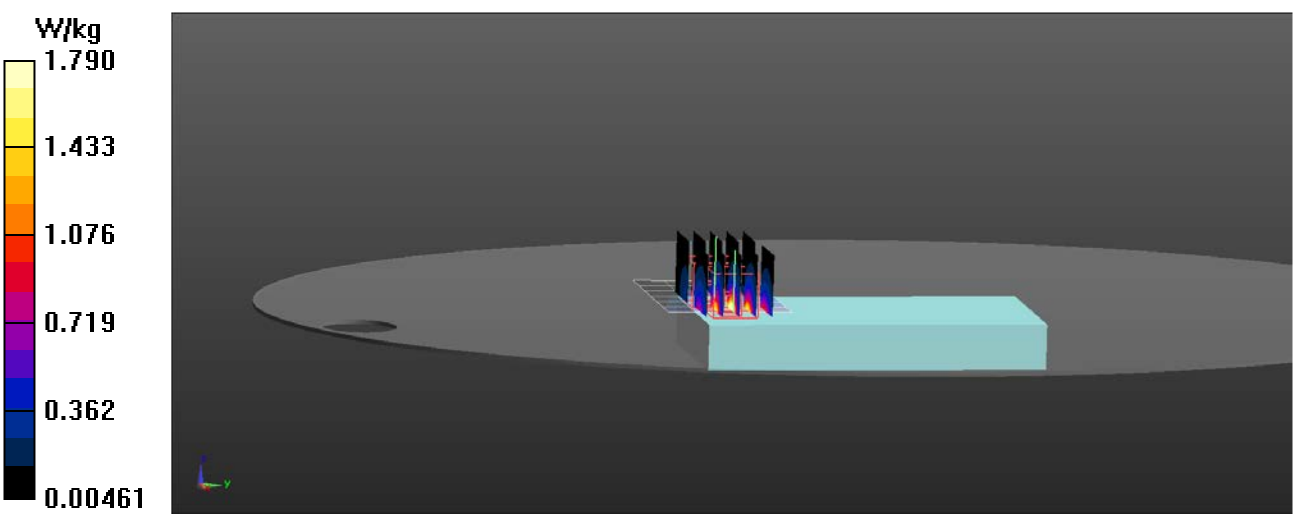
Probe: EX3DV4 - SN3662; ConvF(7.9, 7.9, 7.9); Calibrated: 4/24/2019;
Sensor-Surface: 2mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1416; Calibrated: 4/16/2019
Phantom: ELI v5.0; Type: QDOVA002AA; Serial: 2037
Measurement SW: DASY52, Version 52.10 (0); SEMCAD X Version 14.6.10 (7417)

Procedure Notes:

1900 MHz UMTS/Back Mid/Area Scan (7x5x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (measured) = 1.86 W/kg

1900 MHz UMTS/Back Mid/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 10.68 V/m; Power Drift = 0.01 dB
Peak SAR (extrapolated) = 3.13 W/kg
SAR(1 g) = 1.6 W/kg; SAR(10 g) = 0.755 W/kg
Maximum value of SAR (measured) = 2.36 W/kg

1900 MHz UMTS/Back Mid/Zoom Scan (5x5x7)/Cube 1: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 10.68 V/m; Power Drift = 0.01 dB
Peak SAR (extrapolated) = 2.50 W/kg
SAR(1 g) = 1.1 W/kg; SAR(10 g) = 0.461 W/kg
Maximum value of SAR (measured) = 1.79 W/kg



RF Exposure Lab

Plot 8

DUT: ALR-H460 With RFID; Type: RFID Scanner; Serial: CW16100100006

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 = 1.41 S/m; ε_r = 40.38; ρ = 1000 kg/m^3
Phantom section: Flat Section

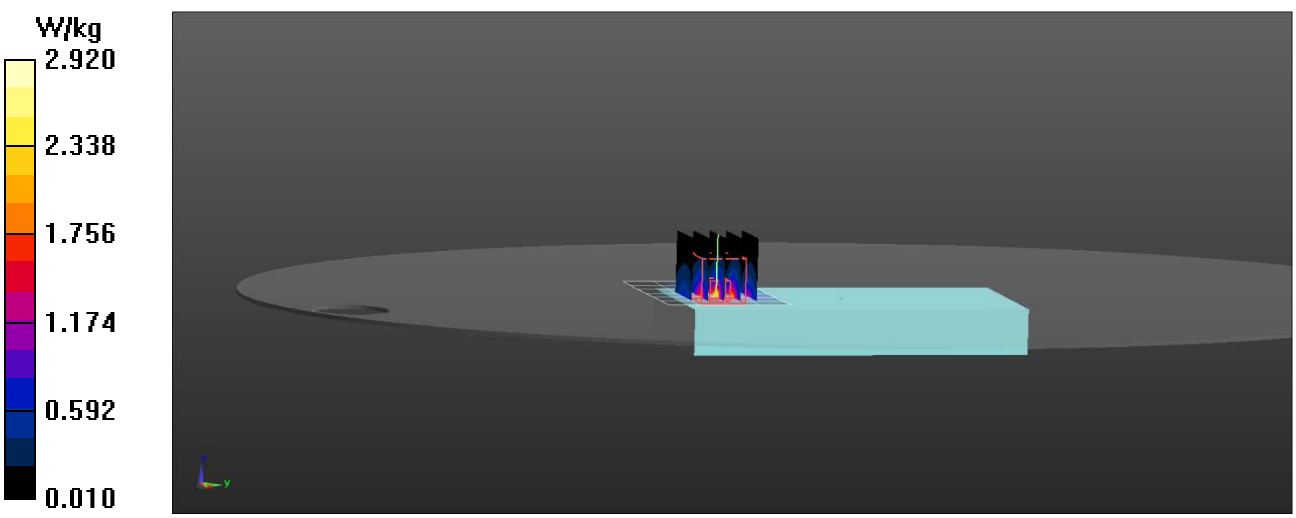
Test Date: Date: 8/8/2019; Ambient Temp: 23 °C; Tissue Temp: 21 °C

Probe: EX3DV4 - SN3662; ConvF(7.9, 7.9, 7.9); Calibrated: 4/24/2019;
Sensor-Surface: 2mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1416; Calibrated: 4/16/2019
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 LTE/Back 1 RB 49 Offset Mid/Area Scan (7x5x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (measured) = 2.61 W/kg

1900 MHz LTE/Back 1 RB 49 Offset Mid/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 10.46 V/m; Power Drift = 0.02 dB
Peak SAR (extrapolated) = 3.80 W/kg
SAR(1 g) = 1.81 W/kg; SAR(10 g) = 0.826 W/kg
Maximum value of SAR (measured) = 2.92 W/kg



RF Exposure Lab

Plot 9

DUT: ALR-H460 With RFID; Type: RFID Scanner; Serial: CW16100100006

Communication System: LTE (SC-FDMA, 1 RB, 20 MHz, QPSK); Frequency: 2535 MHz; Duty Cycle: 1:1
Medium: HSL2550; Medium parameters used (interpolated): f = 2535 MHz; σ = 1.905 S/m; ε_r = 38.965; ρ = 1000 kg/m^3
Phantom section: Flat Section

Test Date: Date: 8/8/2019; Ambient Temp: 23 °C; Tissue Temp: 21 °C

Probe: EX3DV4 - SN3662; ConvF(7.21, 7.21, 7.21); Calibrated: 4/24/2019;
Sensor-Surface: 2mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1416; Calibrated: 4/16/2019
Phantom: ELI v5.0; Type: QDOVA002AA; Serial: 2037
Measurement SW: DASY52, Version 52.10 (0); SEMCAD X Version 14.6.10 (7417)

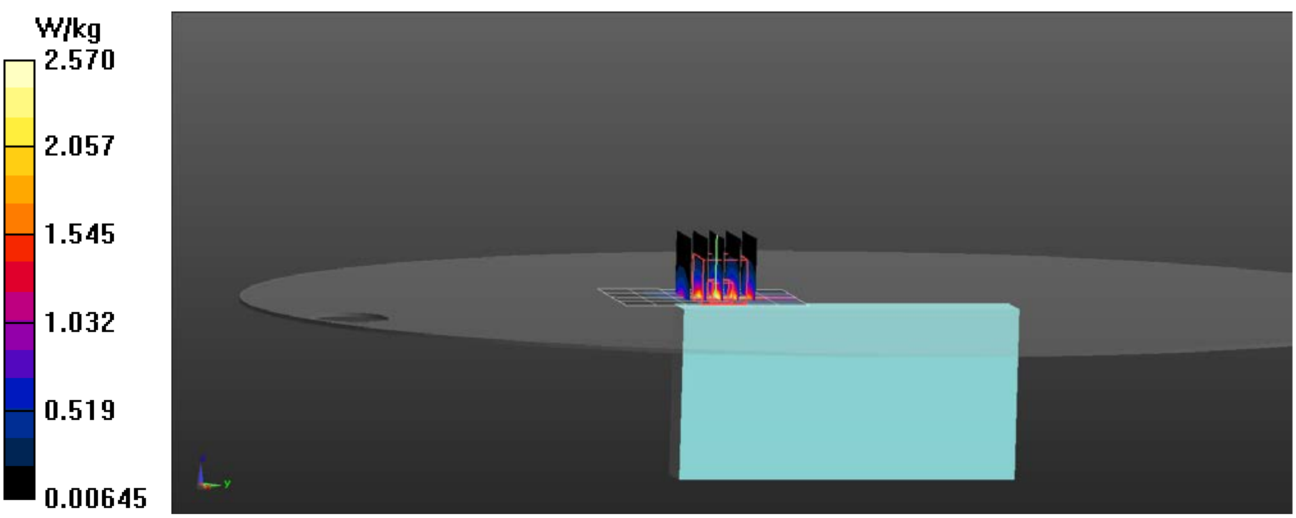
Procedure Notes:

2550 MHz LTE/Left 1 RB 49 Offset Mid/Area Scan (5x7x1): Measurement grid: dx=15mm, dy=15mm

Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (measured) = 2.56 W/kg

2550 MHz LTE/Left 1 RB 49 Offset Mid/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 16.11 V/m; Power Drift = 0.03 dB
Peak SAR (extrapolated) = 3.92 W/kg
SAR(1 g) = 1.85 W/kg; SAR(10 g) = 0.884 W/kg

Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (measured) = 2.57 W/kg



RF Exposure Lab

Plot 10

DUT: ALR-H460 With RFID; Type: RFID Scanner; Serial: CW16100100006

Communication System: FM; Frequency: 915.25 MHz; Duty Cycle: 1:1
Medium: HSL900; Medium parameters used (interpolated): f = 915.25 MHz; σ = 0.99 S/m; ε_r = 41.325; ρ = 1000 kg/m^3
Phantom section: Flat Section

Test Date: Date: 8/12/2019; Ambient Temp: 23 °C; Tissue Temp: 21 °C

Probe: EX3DV4 - SN3662; ConvF(9.12, 9.12, 9.12); Calibrated: 4/24/2019;
Sensor-Surface: 2mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1416; Calibrated: 4/16/2019
Phantom: ELI v5.0; Type: QDOVA002AA; Serial: 2037
Measurement SW: DASY52, Version 52.10 (0); SEMCAD X Version 14.6.10 (7417)

Procedure Notes:

900 MHz RFID/Top 25 Mid/Area Scan (9x9x1): Measurement grid: dx=15mm, dy=15mm

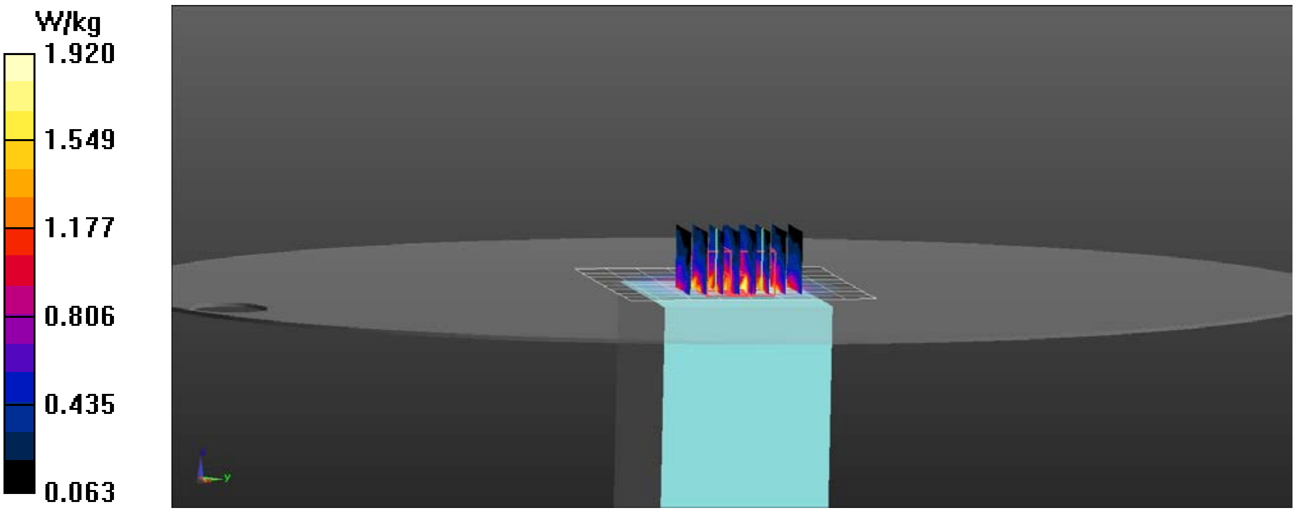
Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (measured) = 2.05 W/kg

900 MHz RFID/Top 25 Mid/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 29.32 V/m; Power Drift = 0.04 dB
Peak SAR (extrapolated) = 2.11 W/kg
SAR(1 g) = 1.47 W/kg; SAR(10 g) = 0.936 W/kg

Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (measured) = 1.73 W/kg

900 MHz RFID/Top 25 Mid/Zoom Scan (5x5x7)/Cube 1: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 29.32 V/m; Power Drift = 0.04 dB
Peak SAR (extrapolated) = 2.29 W/kg
SAR(1 g) = 1.39 W/kg; SAR(10 g) = 0.921 W/kg

Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (measured) = 1.92 W/kg



RF Exposure Lab

Plot 11

DUT: ALR-H460 With RFID; Type: RFID Scanner; Serial: CW16100100006

Communication System: WiFi 802.11b (DSSS, 1 Mbps); Frequency: 2437 MHz; Duty Cycle: 1:1
Medium: HSL2450; Medium parameters used (interpolated): f = 2437 MHz; σ = 1.824 S/m; ε_r = 39.013; ρ = 1000 kg/m^3
Phantom section: Flat Section

Test Date: Date: 8/9/2019; Ambient Temp: 23 °C; Tissue Temp: 21 °C

Probe: EX3DV4 - SN3662; ConvF(7.33, 7.33, 7.33); Calibrated: 4/24/2019;
Sensor-Surface: 2mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1416; Calibrated: 4/16/2019
Phantom: ELI v5.0; Type: QDOVA002AA; Serial: 2037
Measurement SW: DASY52, Version 52.10 (0); SEMCAD X Version 14.6.10 (7417)

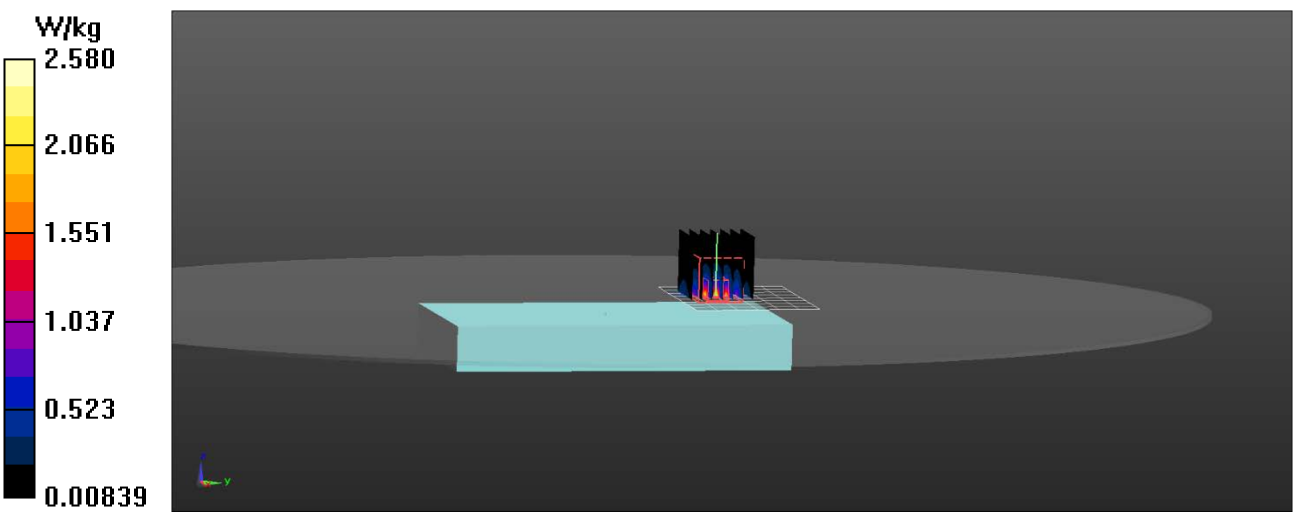
Procedure Notes:

2450 MHz/Back Mid/Area Scan (9x7x1): Measurement grid: dx=10mm, dy=10mm

Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (measured) = 2.54 W/kg

2450 MHz/Back Mid/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 5.017 V/m; Power Drift = -0.02 dB
Peak SAR (extrapolated) = 3.86 W/kg
SAR(1 g) = 1.42 W/kg; SAR(10 g) = 0.493 W/kg

Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (measured) = 2.58 W/kg



RF Exposure Lab

Plot 12

DUT: ALR-H460 With RFID; Type: RFID Scanner; Serial: CW16100100006

Communication System: WiFi 802.11a (OFDM, 6 Mbps); Frequency: 5300 MHz; Duty Cycle: 1:1
Medium: HSL3-6GHz; Medium parameters used: f = 5300 MHz; σ = 4.86 S/m; ε_r = 35.87; ρ = 1000 kg/m^3
Phantom section: Flat Section

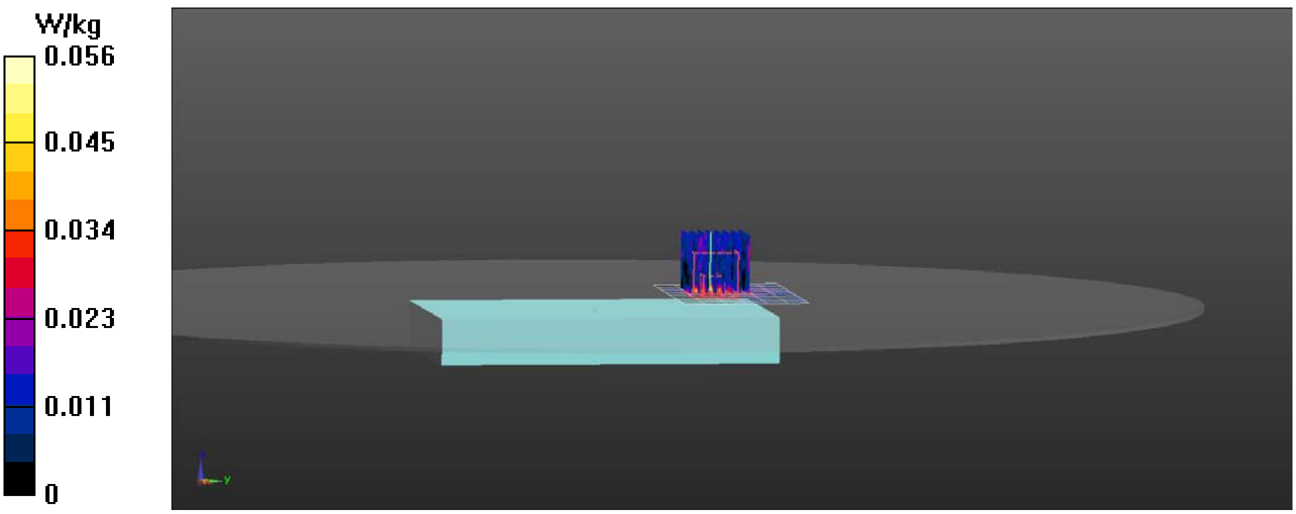
Test Date: Date: 8/9/2019; Ambient Temp: 23 °C; Tissue Temp: 21 °C

Probe: EX3DV4 - SN3662; ConvF(5.05, 5.05, 5.05); Calibrated: 4/24/2019;
Sensor-Surface: 2mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1416; Calibrated: 4/16/2019
Phantom: ELI v5.0; Type: QDOVA002AA; Serial: 2037
Measurement SW: DASY52, Version 52.10 (0); SEMCAD X Version 14.6.10 (7417)

Procedure Notes:

5200 MHz/Back 60/Area Scan (9x7x1): Measurement grid: dx=10mm, dy=10mm
Maximum value of SAR (measured) = 0.0418 W/kg

5200 MHz/Back 60/Zoom Scan (8x8x12)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=2mm
Reference Value = 1.115 V/m; Power Drift = -0.02 dB
Peak SAR (extrapolated) = 0.132 W/kg
SAR(1 g) = 0.024 W/kg; SAR(10 g) = 0.00954 W/kg
Maximum value of SAR (measured) = 0.0564 W/kg



RF Exposure Lab

Plot 13

DUT: ALR-H460 With RFID; Type: RFID Scanner; Serial: CW16100100006

Communication System: WiFi 802.11a (OFDM, 6 Mbps); Frequency: 5620 MHz; Duty Cycle: 1:1
Medium: HSL3-6GHz; Medium parameters used: f = 5620 MHz; σ = 5.21 S/m; ε_r = 35.5; ρ = 1000 kg/m^3
Phantom section: Flat Section

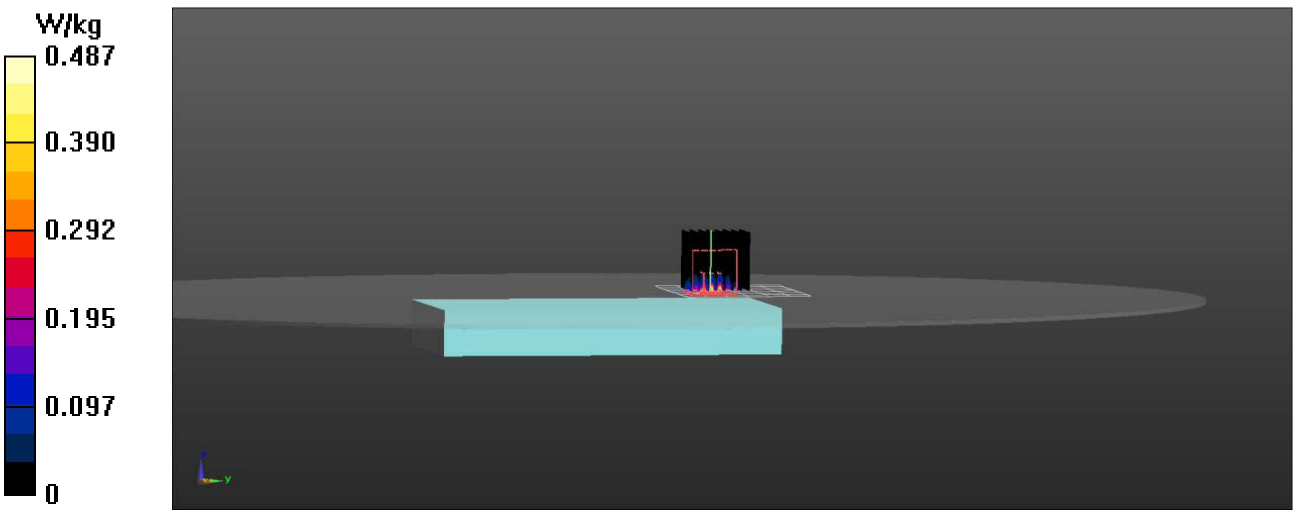
Test Date: Date: 8/9/2019; Ambient Temp: 23 °C; Tissue Temp: 21 °C

Probe: EX3DV4 - SN3662; ConvF(4.81, 4.81, 4.81); Calibrated: 4/24/2019;
Sensor-Surface: 2mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1416; Calibrated: 4/16/2019
Phantom: ELI v5.0; Type: QDOVA002AA; Serial: 2037
Measurement SW: DASY52, Version 52.10 (0); SEMCAD X Version 14.6.10 (7417)

Procedure Notes:

5600 MHz/Back 124/Area Scan (9x7x1): Measurement grid: dx=10mm, dy=10mm
Maximum value of SAR (measured) = 0.450 W/kg

5600 MHz/Back 124/Zoom Scan (8x8x12)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=2mm
Reference Value = 0 V/m; Power Drift = 0.00 dB
Peak SAR (extrapolated) = 0.977 W/kg
SAR(1 g) = 0.235 W/kg; SAR(10 g) = 0.063 W/kg
Maximum value of SAR (measured) = 0.487 W/kg



RF Exposure Lab

Plot 14

DUT: ALR-H460 With RFID; Type: RFID Scanner; Serial: CW16100100006

Communication System: WiFi 802.11a (OFDM, 6 Mbps); Frequency: 5785 MHz; Duty Cycle: 1:1
Medium: HSL3-6GHz; Medium parameters used (interpolated): f = 5785 MHz; σ = 5.395 S/m; ε_r = 35.32; ρ = 1000 kg/m^3
Phantom section: Flat Section

Test Date: Date: 8/9/2019; Ambient Temp: 23 °C; Tissue Temp: 21 °C

Probe: EX3DV4 - SN3662; ConvF(4.9, 4.9, 4.9); Calibrated: 4/24/2019;
Sensor-Surface: 2mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1416; Calibrated: 4/16/2019
Phantom: ELI v5.0; Type: QDOVA002AA; Serial: 2037
Measurement SW: DASY52, Version 52.10 (0); SEMCAD X Version 14.6.10 (7417)

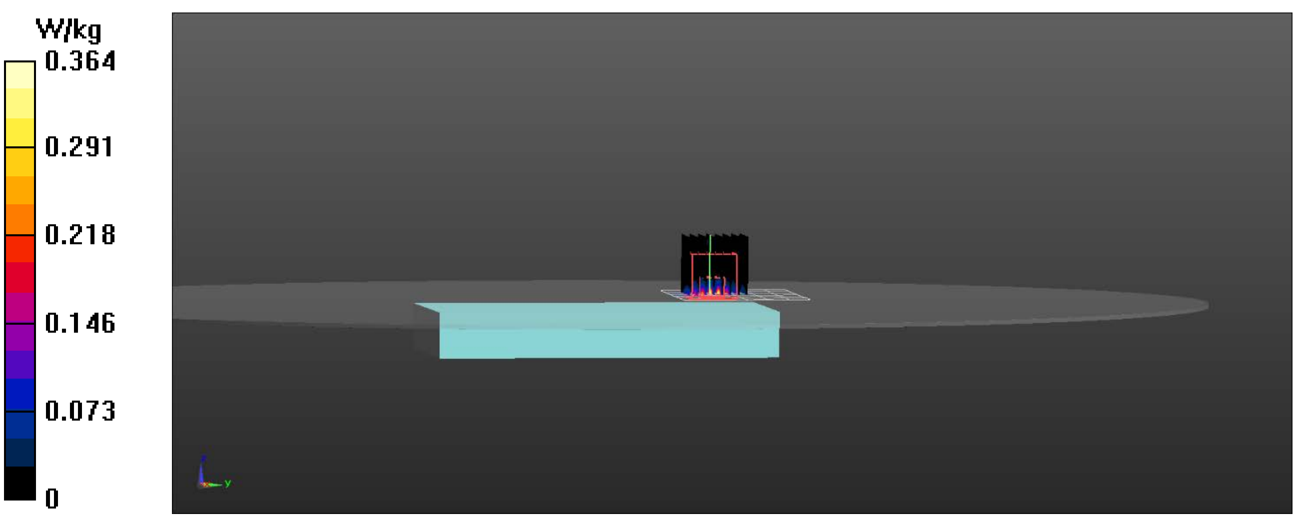
Procedure Notes:

5800 MHz/Back 157/Area Scan (9x7x1): Measurement grid: dx=10mm, dy=10mm

Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (measured) = 0.285 W/kg

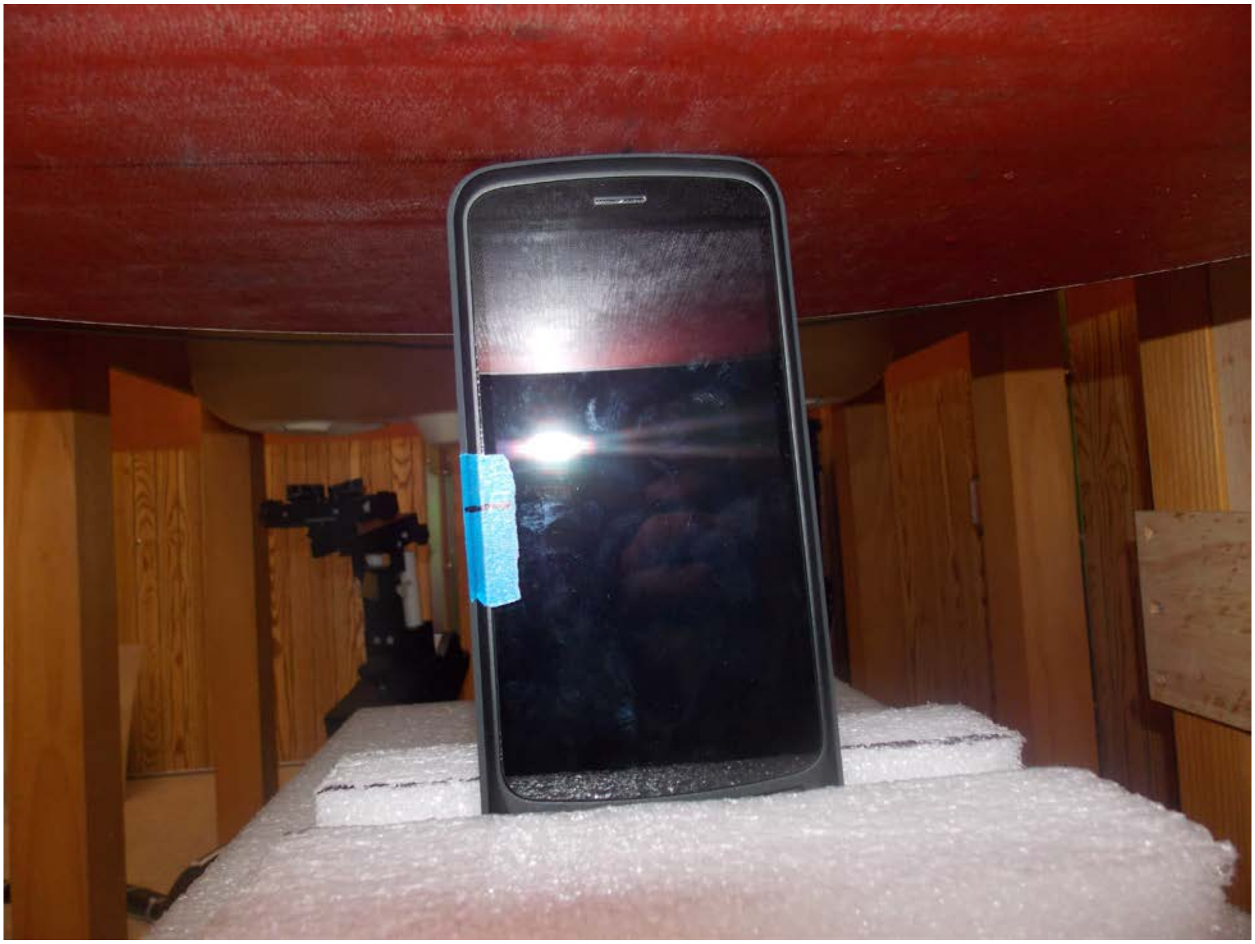
5800 MHz/Back 157/Zoom Scan (8x8x12)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=2mm
Reference Value = 0.7960 V/m; Power Drift = -0.02 dB
Peak SAR (extrapolated) = 0.786 W/kg
SAR(1 g) = 0.173 W/kg; SAR(10 g) = 0.050 W/kg

Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (measured) = 0.364 W/kg



Appendix C – SAR Test Setup Photos

Test Position Back Testing 0 mm Gap



Test Position Top Testing 0 mm Gap

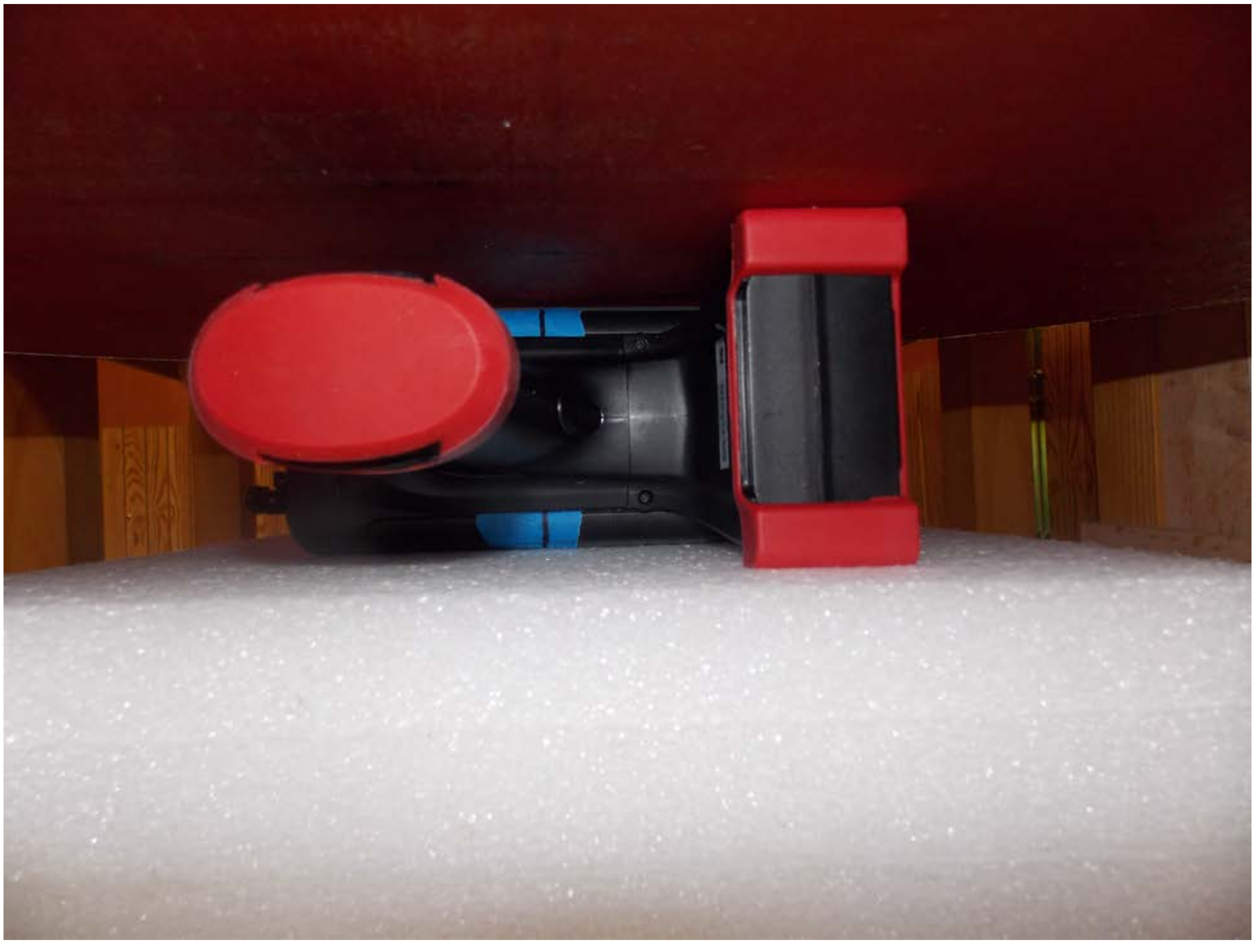
Test Position Right Testing 0 mm Gap

Test Position Bottom Testing 0 mm Gap

Test Position Left Testing 0 mm Gap

Test Position Back RFID Testing 0 mm Gap

Test Position Top RFID Testing 0 mm Gap



Test Position Right RFID Testing 0 mm Gap

Test Position Left RFID Testing 0 mm Gap

Front of Device

Back of Device Without RFID Module

Front of Device With RFID Module

Side of Device With RFID Module

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: EX3-3662_Apr19

CALIBRATION CERTIFICATE

Object	EX3DV4 - SN:3662
Calibration procedure(s)	QA CAL-01.v9, QA CAL-14.v5, QA CAL-23.v5, QA CAL-25.v7 Calibration procedure for dosimetric E-field probes
Calibration date:	April 24, 2019

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	03-Apr-19 (No. 217-02892/02893)	Apr-20
Power sensor NRP-Z91	SN: 103244	03-Apr-19 (No. 217-02892)	Apr-20
Power sensor NRP-Z91	SN: 103245	03-Apr-19 (No. 217-02893)	Apr-20
Reference 20 dB Attenuator	SN: S5277 (20x)	04-Apr-19 (No. 217-02894)	Apr-20
DAE4	SN: 660	19-Dec-18 (No. DAE4-660_Dec18)	Dec-19
Reference Probe ES3DV2	SN: 3013	31-Dec-18 (No. ES3-3013_Dec18)	Dec-19
Secondary Standards	ID	Check Date (in house)	Scheduled Check
Power meter E4419B	SN: GB41293874	06-Apr-16 (in house check Jun-18)	In house check: Jun-20
Power sensor E4412A	SN: MY41498087	06-Apr-16 (in house check Jun-18)	In house check: Jun-20
Power sensor E4412A	SN: 000110210	06-Apr-16 (in house check Jun-18)	In house check: Jun-20
RF generator HP 8648C	SN: US3642U01700	04-Aug-99 (in house check Jun-18)	In house check: Jun-20
Network Analyzer E8358A	SN: US41080477	31-Mar-14 (in house check Oct-18)	In house check: Oct-19

	Name	Function	Signature
Calibrated by:	Claudio Leubler	Laboratory Technician	
Approved by:	Katja Pokovic	Technical Manager	

Issued: April 25, 2019

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., ϑ = 0 is normal to probe axis
Connector Angle	information used in DASY system to align probe sensor X to the robot coordinate system

Calibration is Performed According to the Following Standards:

a) IEEE Std 1528-2013, "IEEE Recommended Practice for Determining the Peak Spatial-Averaged Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques", June 2013
b) IEC 62209-1, ", "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 ϑ = 0 (f ≤ 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 ≤ 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:3662

Basic Calibration Parameters

	Sensor X	Sensor Y	Sensor Z	Unc (k=2)
Norm ($\mu V/(V/m)^2$)[A]	0.43	0.45	0.50	± 10.1 %
DCP (mV)[B]	100.7	100.3	97.0	

Calibration Results for Modulation Response

UID	Communication System Name		A dB	B dB$\sqrt{\mu V}$	C	D dB	VR mV	Max dev.	Unc[E] (k=2)
0	CW	X	0.0	0.0	1.0	0.00	157.7	±1.9 %	± 4.7 %
		Y	0.0	0.0	1.0		152.9		
		Y	0.0	0.0	1.0		153.2		

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 Pages 5 and 6).
[B] Numerical linearization parameter: uncertainty not required.
[E] Uncertainty is determined using the max. deviation from linear response applying rectangular distribution and is expressed for the square of the field value.

DASY/EASY - Parameters of Probe: EX3DV4 - SN:3662

Other Probe Parameters

Sensor Arrangement	Triangular
Connector Angle (°)	-22.4
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

DASY/EASY - Parameters of Probe: EX3DV4 - SN:3662

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)
750	41.9	0.89	9.57	9.57	9.57	0.49	0.80	± 12.0 %
900	41.5	0.97	9.12	9.12	9.12	0.51	0.80	± 12.0 %
1750	40.1	1.37	8.23	8.23	8.23	0.38	0.85	± 12.0 %
1900	40.0	1.40	7.90	7.90	7.90	0.37	0.85	± 12.0 %
2300	39.5	1.67	7.50	7.50	7.50	0.39	0.85	± 12.0 %
2450	39.2	1.80	7.33	7.33	7.33	0.41	0.84	± 12.0 %
2600	39.0	1.96	7.21	7.21	7.21	0.42	0.85	± 12.0 %
3500	37.9	2.91	7.07	7.07	7.07	0.30	1.20	± 13.1 %
3700	37.7	3.12	6.92	6.92	6.92	0.35	1.25	± 13.1 %
5250	35.9	4.71	5.05	5.05	5.05	0.40	1.80	± 13.1 %
5600	35.5	5.07	4.81	4.81	4.81	0.40	1.80	± 13.1 %
5750	35.4	5.22	4.90	4.90	4.90	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.

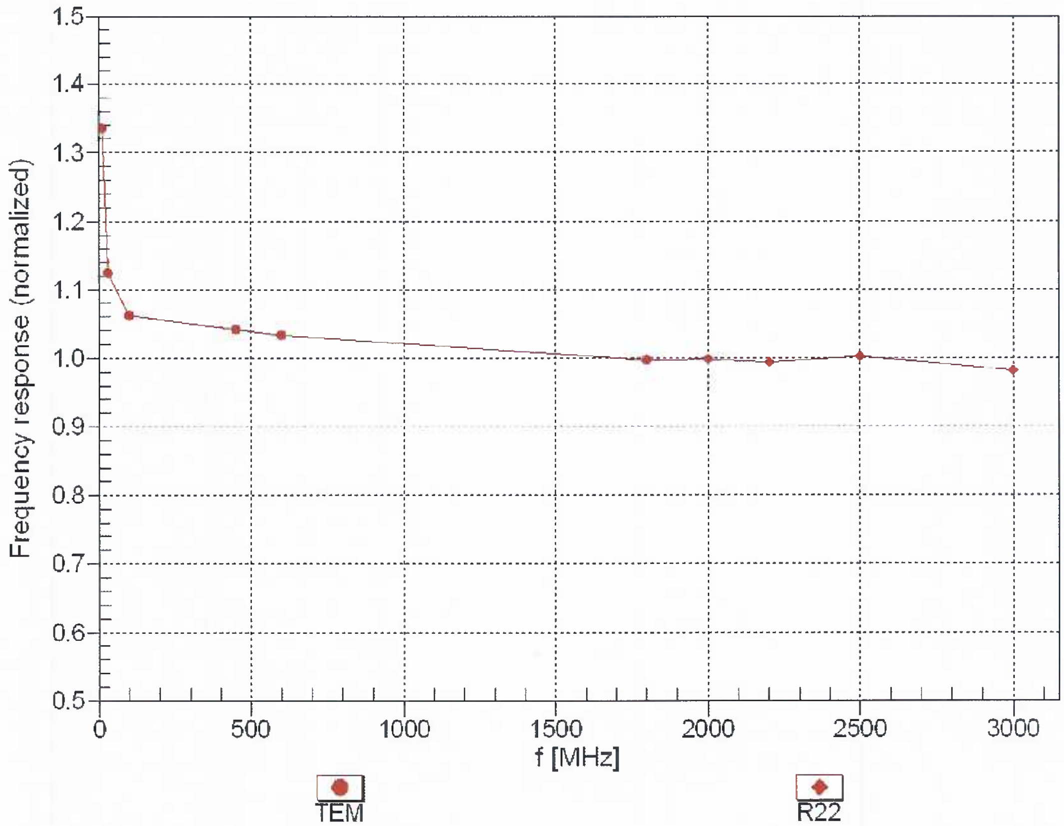
DASY/EASY - Parameters of Probe: EX3DV4 - SN:3662

Calibration Parameter Determined in Body Tissue Simulating Media

f (MHz) [C]	Relative Permittivity [F]	Conductivity (S/m) [F]	ConvF X	ConvF Y	ConvF Z	Alpha [G]	Depth [G] (mm)	Unc (k=2)
750	55.5	0.96	9.55	9.55	9.55	0.47	0.80	± 12.0 %
900	55.0	1.05	9.34	9.34	9.34	0.45	0.80	± 12.0 %
1750	53.4	1.49	7.95	7.95	7.95	0.40	0.85	± 12.0 %
1900	53.3	1.52	7.69	7.69	7.69	0.43	0.84	± 12.0 %
2300	52.9	1.81	7.43	7.43	7.43	0.40	0.86	± 12.0 %
2450	52.7	1.95	7.36	7.36	7.36	0.40	0.85	± 12.0 %
2600	52.5	2.16	7.12	7.12	7.12	0.22	0.97	± 12.0 %
3500	51.3	3.31	6.83	6.83	6.83	0.30	1.25	± 13.1 %
3700	51.0	3.55	6.52	6.52	6.52	0.35	1.25	± 13.1 %
5250	48.9	5.36	4.30	4.30	4.30	0.50	1.90	± 13.1 %
5600	48.5	5.77	3.87	3.87	3.87	0.50	1.90	± 13.1 %
5750	48.3	5.94	4.07	4.07	4.07	0.50	1.90	± 13.1 %

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

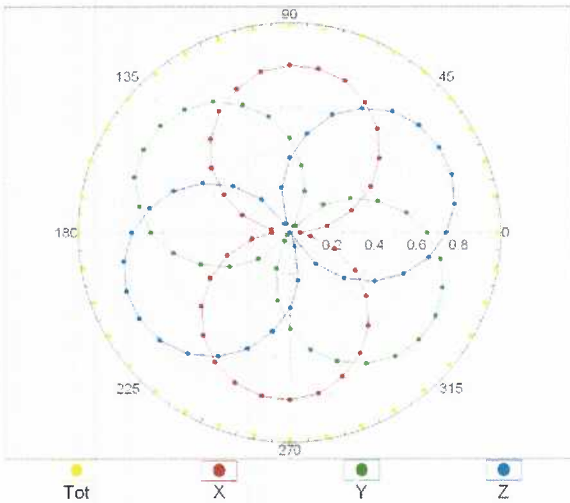
Frequency Response of E-Field
(TEM-Cell:ifi110 EXX, Waveguide: R22)



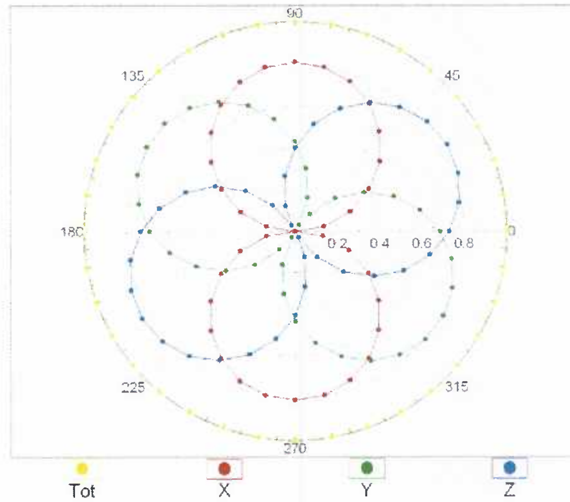
Uncertainty of Frequency Response of E-field: ± 6.3% (k=2)

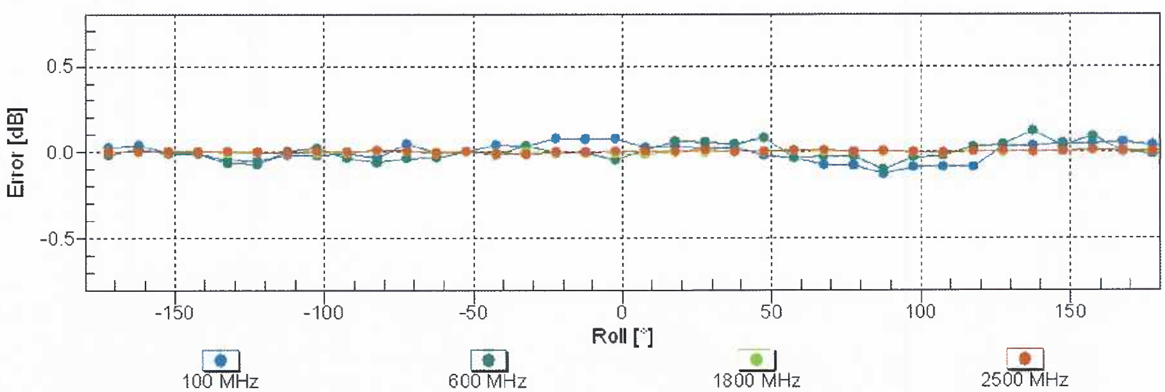
Receiving Pattern (ϕ), $\vartheta = 0°$

f=600 MHz,TEM



f=1800 MHz,R22

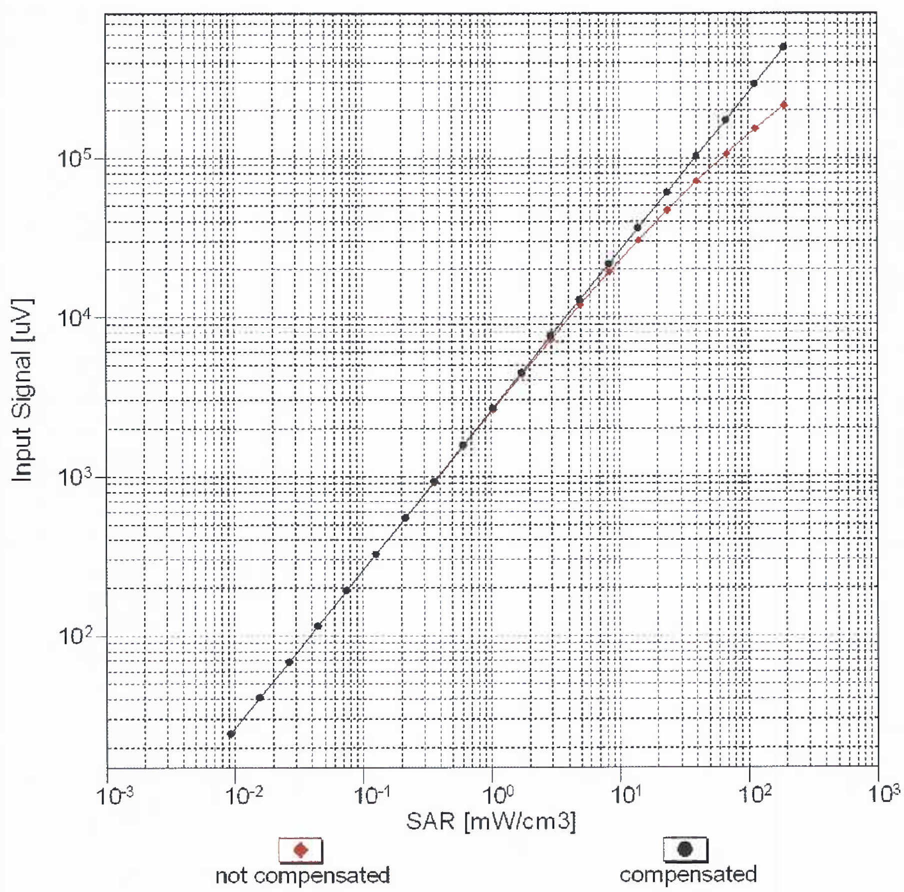


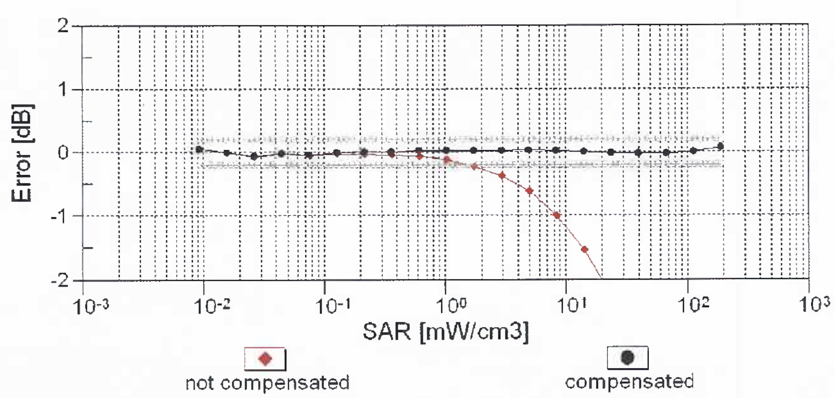


Uncertainty of Axial Isotropy Assessment: ± 0.5% (k=2)

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

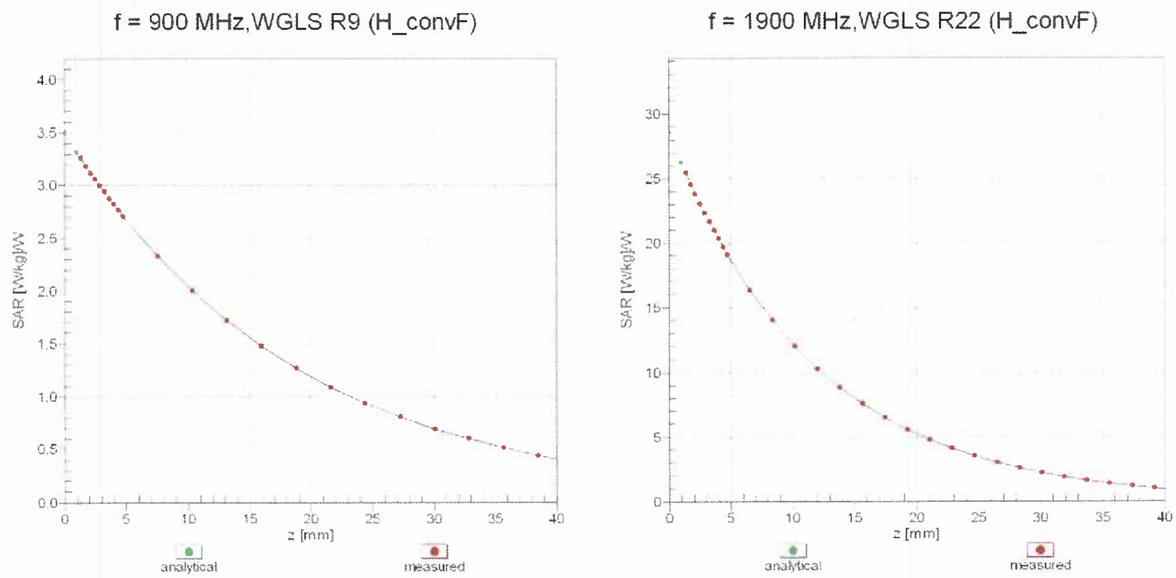
(TEM cell , f_{eval}= 1900 MHz)





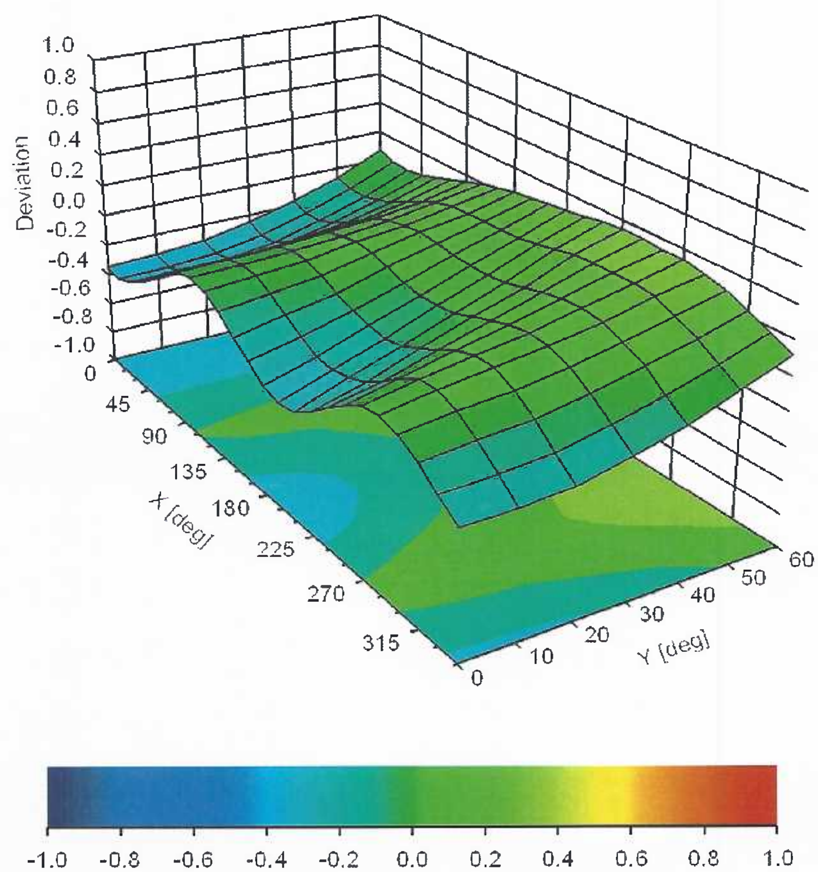
Uncertainty of Linearity Assessment: ± 0.6% (k=2)

Conversion Factor Assessment



Deviation from Isotropy in Liquid

Error (ϕ, ϑ), f = 900 MHz



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

Appendix E – Dipole Calibration Data Sheets

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

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

Accredited by the Swiss Accreditation Service (SAS)
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Accreditation No.: SCS 0108

Client **RF Exposure Lab**

Certificate No: D750V3-1016_Jul18

CALIBRATION CERTIFICATE

Object	D750V3 - SN:1016
Calibration procedure(s)	QA CAL-05.v10 Calibration procedure for dipole validation kits above 700 MHz
Calibration date:	July 13, 2018

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	04-Apr-18 (No. 217-02672/02673)	Apr-19
Power sensor NRP-Z91	SN: 103244	04-Apr-18 (No. 217-02672)	Apr-19
Power sensor NRP-Z91	SN: 103245	04-Apr-18 (No. 217-02673)	Apr-19
Reference 20 dB Attenuator	SN: 5058 (20k)	04-Apr-18 (No. 217-02682)	Apr-19
Type-N mismatch combination	SN: 5047.2 / 06327	04-Apr-18 (No. 217-02683)	Apr-19
Reference Probe EX3DV4	SN: 7349	30-Dec-17 (No. EX3-7349_Dec17)	Dec-18
DAE4	SN: 601	26-Oct-17 (No. DAE4-601_Oct17)	Oct-18

Secondary Standards	ID #	Check Date (in house)	Scheduled Check
Power meter EPM-442A	SN: GB37480704	07-Oct-15 (in house check Oct-16)	In house check: Oct-18
Power sensor HP 8481A	SN: US37292783	07-Oct-15 (in house check Oct-16)	In house check: Oct-18
Power sensor HP 8481A	SN: MY41092317	07-Oct-15 (in house check Oct-16)	In house check: Oct-18
RF generator R&S SMT-06	SN: 100972	15-Jun-15 (in house check Oct-16)	In house check: Oct-18
Network Analyzer Agilent E8358A	SN: US41080477	31-Mar-14 (in house check Oct-17)	In house check: Oct-18

	Name	Function	Signature
Calibrated by:	Manu Seitz	Laboratory Technician	
Approved by:	Katja Pokovic	Technical Manager	

Issued: July 16, 2018

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

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Glossary:

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

Calibration is Performed According to the Following Standards:

a) IEEE Std 1528-2013, "IEEE Recommended Practice for Determining the Peak Spatial-Averaged Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques", June 2013
b) IEC 62209-1, "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"

Additional Documentation:

e) DASY4/5 System Handbook

Methods Applied and Interpretation of Parameters:

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

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

Measurement Conditions

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

DASY Version	DASY5	V52.10.1
Extrapolation	Advanced Extrapolation	
Phantom	Modular Flat Phantom	
Distance Dipole Center - TSL	15 mm	with Spacer
Zoom Scan Resolution	dx, dy, dz = 5 mm	
Frequency	750 MHz ± 1 MHz	

Head TSL parameters

The following parameters and calculations were applied.

	Temperature	**Permittivity**	**Conductivity**
Nominal Head TSL parameters	22.0 °C	41.9	0.89 mho/m
Measured Head TSL parameters	(22.0 ± 0.2) °C	40.9 ± 6 %	0.89 mho/m ± 6 %
Head TSL temperature change during test	< 0.5 °C	----	----

SAR result with Head TSL

SAR averaged over 1 cm^3 (1 g) of Head TSL	Condition	
SAR measured	250 mW input power	2.07 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**8.23 W/kg ± 17.0 % (k=2)**

SAR averaged over 10 cm^3 (10 g) of Head TSL	condition	
SAR measured	250 mW input power	1.35 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**5.38 W/kg ± 16.5 % (k=2)**

Body TSL parameters

The following parameters and calculations were applied.

	Temperature	**Permittivity**	**Conductivity**
Nominal Body TSL parameters	22.0 °C	55.5	0.96 mho/m
Measured Body TSL parameters	(22.0 ± 0.2) °C	55.3 ± 6 %	0.96 mho/m ± 6 %
Body TSL temperature change during test	< 0.5 °C	----	----

SAR result with Body TSL

SAR averaged over 1 cm^3 (1 g) of Body TSL	Condition	
SAR measured	250 mW input power	2.14 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	**8.55 W/kg ± 17.0 % (k=2)**

SAR averaged over 10 cm^3 (10 g) of Body TSL	condition	
SAR measured	250 mW input power	1.41 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	**5.64 W/kg ± 16.5 % (k=2)**

Appendix (Additional assessments outside the scope of SCS 0108)

Antenna Parameters with Head TSL

Impedance, transformed to feed point	53.4 Ω + 0.0 jΩ
Return Loss	- 29.6 dB

Antenna Parameters with Body TSL

Impedance, transformed to feed point	48.8 Ω - 2.6 jΩ
Return Loss	- 30.7 dB

General Antenna Parameters and Design

Electrical Delay (one direction)	1.038 ns

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

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

Additional EUT Data

Manufactured by	SPEAG
Manufactured on	March 22, 2010

Extended Calibration
Usage of SAR dipoles calibrated less than 3 years ago but more than 1 year ago were confirmed in maintaining return loss (<-20 dB, within 20% of prior calibration) and impedance (within 5 ohm from prior calibration) requirements per extended calibrations in KDB Publication 865664 D01 v01r04.

D750V3 SN: 1016 - Head

Date of Measurement	Return Loss (dB)	Δ%	Impedance Real (Ω)	ΔΩ	Impedance Imaginary (jΩ)	ΔΩ
7/13/2018	-29.6		53.4		0.0	
7/13/2019	-28.2	-4.7	54.9	1.5	-0.2	-0.2

D750V3 SN: 1016 - Body

Date of Measurement	Return Loss (dB)	Δ%	Impedance Real (Ω)	ΔΩ	Impedance Imaginary (jΩ)	ΔΩ
7/13/2018	-30.7		48.8		-2.6	
7/13/2019	-29.8	-2.9	49.2	0.4	-2.7	-0.1

DASY5 Validation Report for Head TSL

Date: 13.07.2018

Test Laboratory: SPEAG, Zurich, Switzerland

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

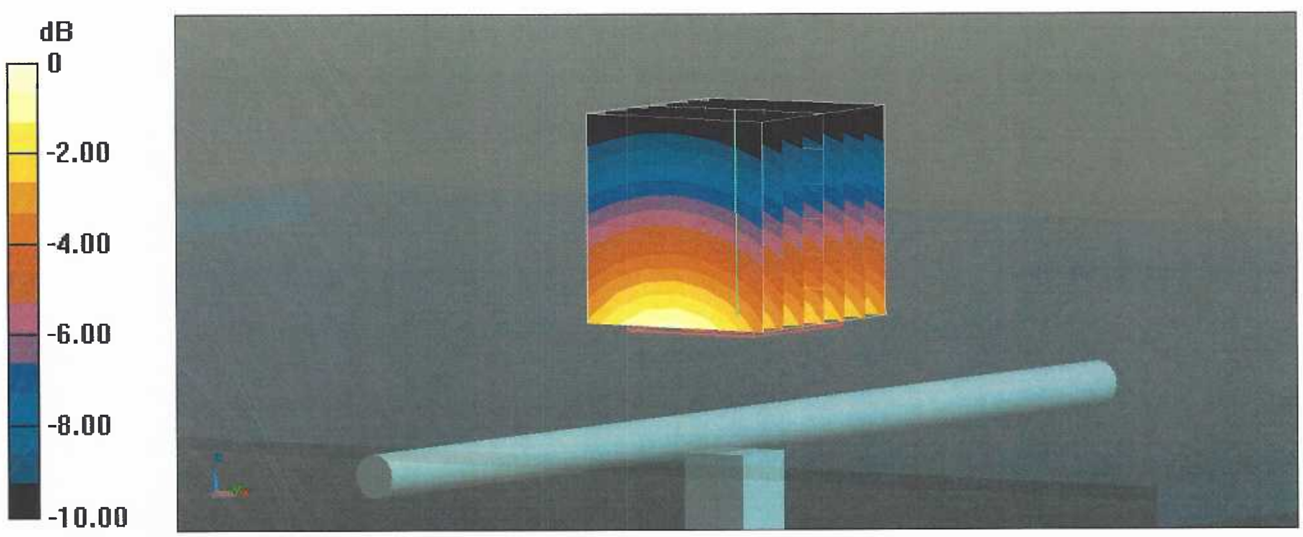
Communication System: UID 0 - CW; Frequency: 750 MHz
Medium parameters used: f = 750 MHz; $\sigma = 0.89$ S/m; $\varepsilon_r = 40.9$; $\rho = 1000$ kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2011)

DASY52 Configuration:

- Probe: EX3DV4 - SN7349; ConvF(10.22, 10.22, 10.22) @ 750 MHz; Calibrated: 30.12.2017
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 26.10.2017
- Phantom: Flat Phantom 4.9 (front); Type: QD 00L P49 AA; Serial: 1001
- DASY52 52.10.1(1476); SEMCAD X 14.6.11(7439)

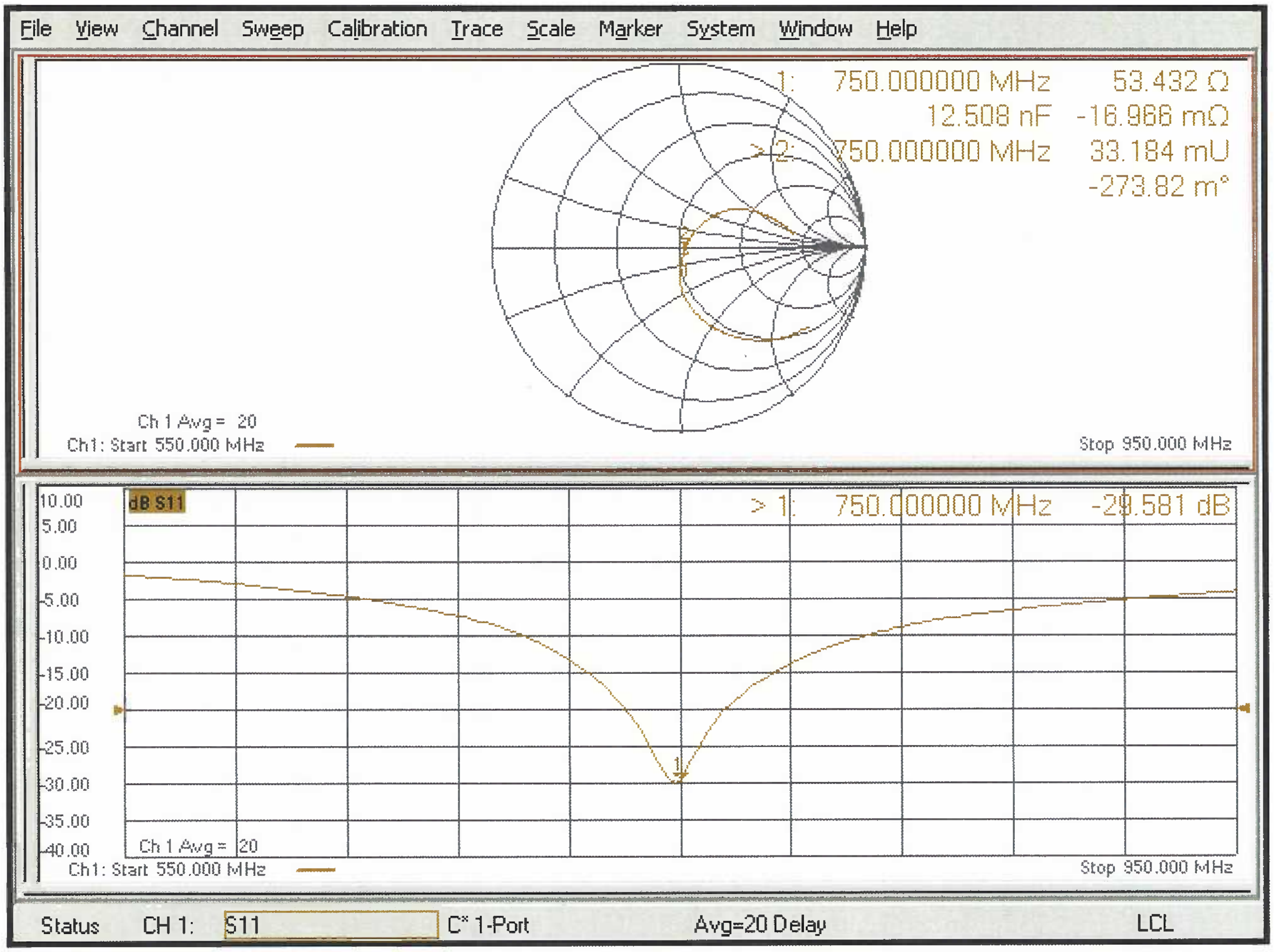
Dipole Calibration for Head Tissue/Pin=250 mW, d=15mm/Zoom Scan (7x7x7)/Cube 0:

Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 59.03 V/m; Power Drift = -0.03 dB
Peak SAR (extrapolated) = 3.10 W/kg
SAR(1 g) = 2.07 W/kg; SAR(10 g) = 1.35 W/kg
Maximum value of SAR (measured) = 2.76 W/kg



0 dB = 2.76 W/kg = 4.41 dBW/kg

Impedance Measurement Plot for Head TSL



DASY5 Validation Report for Body TSL

Date: 13.07.2018

Test Laboratory: SPEAG, Zurich, Switzerland

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

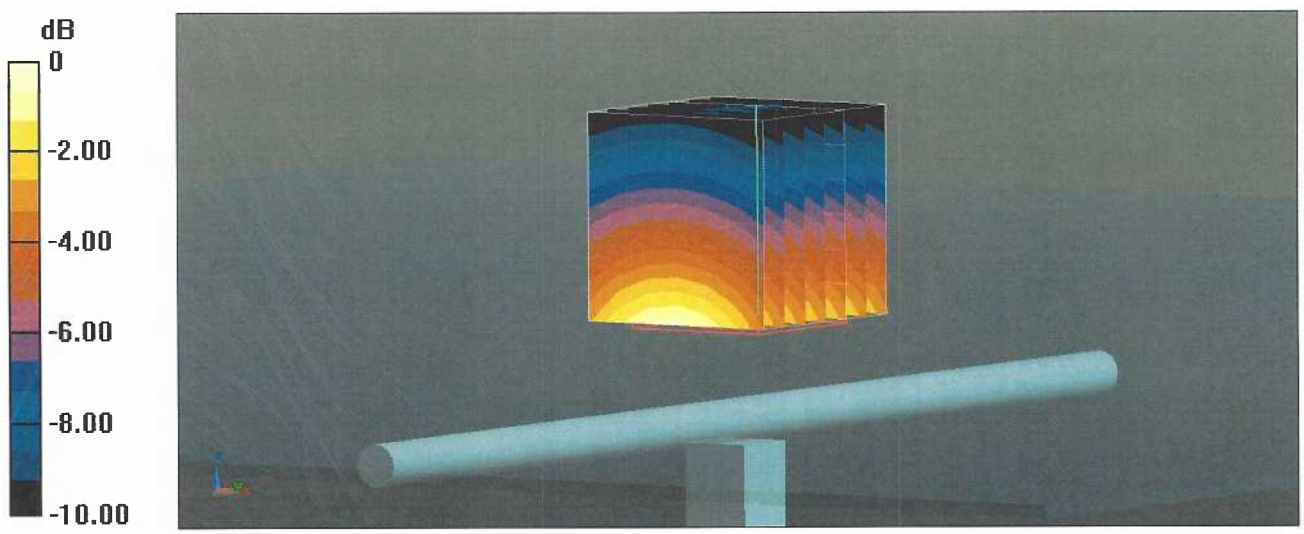
Communication System: UID 0 - CW; Frequency: 750 MHz
Medium parameters used: f = 750 MHz; σ = 0.96 S/m; ε_r = 55.3; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2011)

DASY52 Configuration:

- Probe: EX3DV4 - SN7349; ConvF(10.19, 10.19, 10.19) @ 750 MHz; Calibrated: 30.12.2017
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 26.10.2017
- Phantom: Flat Phantom 4.9 (Back); Type: QD 00R P49 AA; Serial: 1005
- DASY52 52.10.1(1476); SEMCAD X 14.6.11(7439)

Dipole Calibration for Body Tissue/Pin=250 mW, d=15mm/Zoom Scan (7x7x7)/Cube 0:

Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 57.68 V/m; Power Drift = -0.03 dB
Peak SAR (extrapolated) = 3.18 W/kg
SAR(1 g) = 2.14 W/kg; SAR(10 g) = 1.41 W/kg
Maximum value of SAR (measured) = 2.84 W/kg



0 dB = 2.84 W/kg = 4.53 dBW/kg