RF Exposure Lab

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CERTIFICATE OF COMPLIANCE
SAR EVALUATION

Inseego	Dates of Test: February 11-April 9, May 7, 2019
9645 Scranton Road, Suite 205	Test Report Number: SAR.20190423
San Diego, CA 92121	Revision A

FCC ID:	PKRISGM1000
IC Certificate:	3229A-M1000
Model(s):	M1000
Test Sample:	Engineering Unit Same as Production
FID Number:	FF161218B00028, FF161218B00059, FF130219B00637
Equipment Type:	Wireless Hotspot Modem
Classification:	Portable Transmitter Next to Body
TX Frequency Range:	777 – 787 MHz, 824 – 848 MHz; 1710 – 1780 MHz; 1850 – 1910 MHz, 2412 – 2462 MHz, 5150 – 5250 MHz, 5745 – 5825 MHz
Frequency Tolerance:	± 2.5 ppm
Maximum RF Output:	750 MHz (LTE) – 24.0 dBm, 850 MHz (WCDMA) – 24.0 dBm, 850 MHz (LTE) – 24.0 dBm, 1750 MHz (WCDMA) – 24.0 dBm, 1750 MHz (LTE) – 23.0 dBm, 1900 MHz (WCDMA) – 24.0 dBm, 1900 MHz (LTE) – 22.5 dBm, 2450 MHz (b) – 14.0 dBm, 2450 MHz(g/n) – 14.0 dBm, 5100 MHz (an/ac) – 14.0 dBm, 5800 MHz (an/ac) – 14.0 dBm Conducted
Signal Modulation:	WCDMA, QPSK, 16QAM, DSSS, OFDM
Antenna Type:	WWAN – Novatel Wireless, P/N 12023244 (Ant0), P/N 12023245 (Ant1), P/N 12023246 (Ant2) P/N 12023247 (Ant3), P/N 12023248 (Ant4), P/N 12023249 (Ant5), P/N Itched on PCB (Ant6), P/N 12023250 (Ant7), P/N 12023251 (WLAN0), P/N 12023252 (WLAN1), P/N 31325791 (mmW)
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, D02 v02r01, D05 v02r01 & D06 v01
Industry Canada:	RSS-102 Issue 5, Safety Code 6
Max. Stand Alone SAR Value:	1.18 W/kg Reported
Max. Simultaneous SAR Value:	84.4% Ratio of Limit for SAR and Power Density
Separation Distance:	10 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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1. Introduction

This measurement report shows compliance of the Novatel Wireless Model M1000 FCC ID: PKRISGM1000 with FCC Part 2, 1093, ET Docket 93-62 Rules for mobile and portable devices and IC Certificate: 3229A-M1000 with RSS102 Issue 5 & Safety Code 6. 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 Novatel Wireless Model M1000 and therefore apply only to the tested sample.

The test procedures, as described in ANSI C95.1 – 1999 Standard for Safety Levels with Respect to Human Exposure to Radio Frequency Electromagnetic Fields, 3 kHz to 300 GHz [2], ANSI C95.3 – 2002 Recommended Practice for the Measurement of Potentially Hazardous Electromagnetic Fields [3], IEEE Std.1528 – 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 M1000 wireless modem. The table also shows the tolerance for the power level for each mode.

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	22.0	+0.5/-1.7	20.3	22.5
Band 4 – 1750 MHz	LTE	3	23.0	22.0	+1.0/-1.7	20.3	23.0
Band 5 – 835 MHz	LTE	3	23.0	23.0	+1.0/-1.7	21.3	24.0
Band 13 – 750 MHz	LTE	3	23.0	23.0	+1.0/-1.7	21.3	24.0
Band 66 – 1750 MHz	LTE	3	23.0	22.0	+1.0/-1.7	20.3	23.0
Band 2 – 1900 MHz	WCDMA/HSPA	3	23.0	23.0	+1.0/-2.0	21.0	24.0
Band 4 – 1750 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	12.0	±2.0	10.0	14.0
WLAN – 2.4 GHz	802.11g/n	N/A	N/A	12.0	±2.0	10.0	14.0
WLAN – 5.2 GHz	802.11an/ac	N/A	N/A	12.0	±2.0	10.0	14.0
WLAN – 5.8 GHz	802.11an/ac	N/A	N/A	12.0	±2.0	10.0	14.0
5G – mmW	LTE-TDD	3	N/A	N/A	N/A	N/A	14.0

Band UL 2CA Combination	Technology	Paired Spectrum	Class	3GPP Nominal	INSG Nominal	Tolerances	INSG Lower	INSG Upper
2A-13A	LTE	FDD	3	20	20	+1.0/-1.7	18.3	21
4A-13A	LTE	FDD	3	20	20	+1.0/-1.7	18.3	21
5B	LTE	FDD	3	20	20	+1.0/-1.7	18.3	21

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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)

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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.

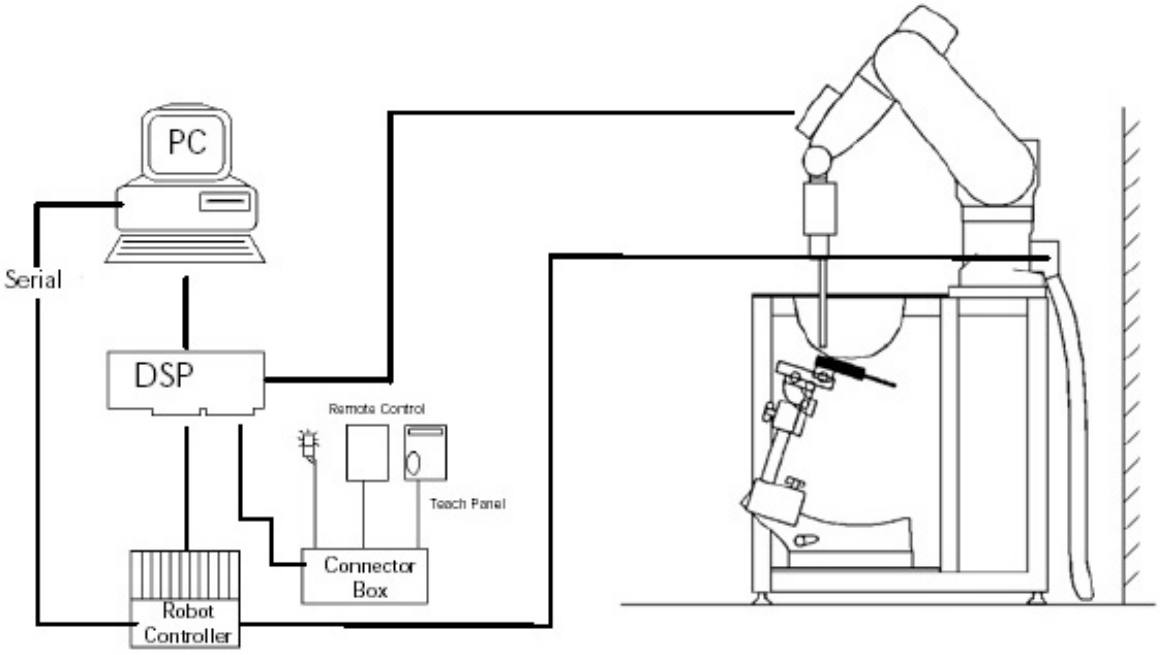

Figure 2.1 SAR Measurement System Setup

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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

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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

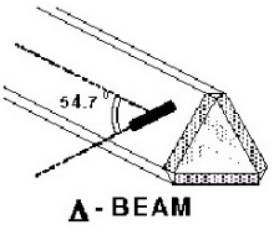

Figure 2.2 Triangular Probe Configurations

Figure 2.3 Probe Thick-Film Technique

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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

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

where:

Δt = exposure time (30 seconds),

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

ΔT = temperature increase due to RF exposure.

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

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;

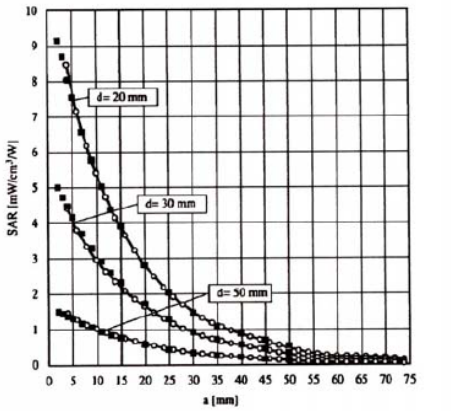

Figure 2.4 E-Field and Temperature Measurements at 900MHz

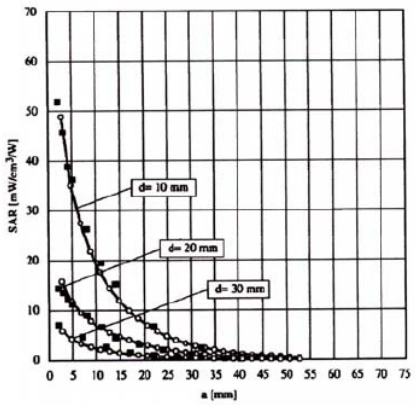

Figure 2.5 E-Field and Temperature Measurements at 1800MHz

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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

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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.

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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.

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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

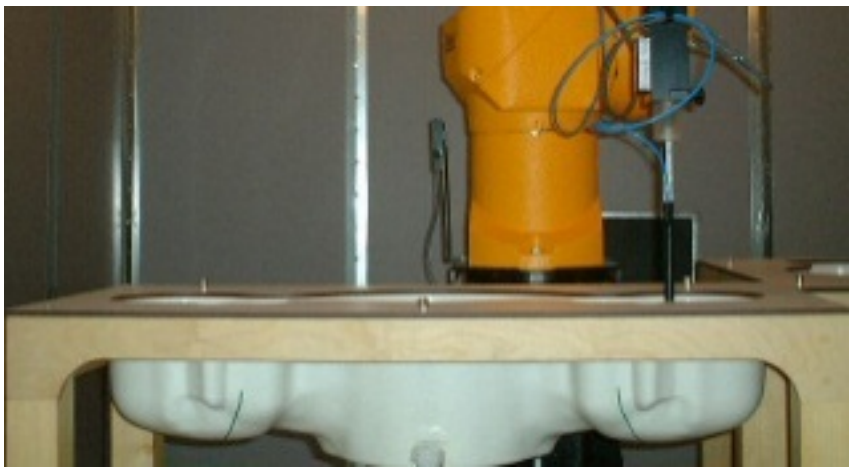

Figure 2.6 SAM Twin Phantom

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.

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3. Probe and Dipole Calibration

See Appendix D and E.

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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 Body	835 MHz Body	1900 MHz Body	2450 MHz Body	1750 MHz Body	3-5 GHz Body
Mixing Percentage							
Water		Proprietary Purchased From Speag	52.50	69.91	73.20	Proprietary Purchased From Speag	Proprietary Purchased From Speag
Sugar			45.00	0.00	0.00		
Salt			1.40	0.13	0.10		
HEC			1.00	0.00	0.00		
Bactericide			0.10	0.00	0.00		
DGBE			0.00	29.96	26.70		
Dielectric Constant	Target	55.50	55.20	53.30	52.70	53.4	Various
Conductivity (S/m)	Target	0.96	0.97	1.52	1.95	1.49	Various

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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.

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6. Measurement Uncertainty

Measurement uncertainty table is not required per KDB 865664 D01 v01r04 section 2.8.2 page 12. SAR measurement uncertainty analysis is required in the SAR report only when the highest measured SAR in a frequency band is ≥ 1.5 W/kg for 1-g SAR. The equivalent ratio (1.5/1.6) should be applied to extremity and occupational exposure conditions. The highest reported value is less than 1.5 W/kg. Therefore, the measurement uncertainty table is not required.

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7. System Validation

Tissue Verification

Table 7.1 Measured Tissue Parameters

		750 MHz Body		835 MHz Body		835 MHz Body	
Date(s)		Feb. 19, 2019		Feb. 18, 2019		Mar. 5, 2019	
Liquid Temperature (˚C)	20.0	Target	Measured	Target	Measured	Target	Measured
Dielectric Constant: ε		55.53	54.43	55.20	54.57	55.20	54.37
Conductivity: σ		0.96	1.02	0.97	0.99	0.97	0.98
		1750 MHz Body		1750 MHz Body		1900 MHz Body	
Date(s)		Feb. 21, 2019		Mar. 6, 2019		Feb. 11, 2019	
Liquid Temperature (˚C)	20.0	Target	Measured	Target	Measured	Target	Measured
Dielectric Constant: ε		53.43	52.66	53.43	52.68	53.30	52.97
Conductivity: σ		1.49	1.54	1.49	1.56	1.52	1.58
		1900 MHz Body		2450 MHz Body		5250 MHz Body	
Date(s)		Mar. 4, 2019		Mar. 13, 2019		Mar. 11, 2019	
Liquid Temperature (˚C)	20.0	Target	Measured	Target	Measured	Target	Measured
Dielectric Constant: ε		53.30	53.17	52.70	52.58	49.01	48.88
Conductivity: σ		1.52	1.54	1.95	2.00	5.30	5.40
		5750 MHz Body		750 MHz Body		835 MHz Body	
Date(s)		Mar. 11, 2019		May 7, 2019		May 7, 2019	
Liquid Temperature (˚C)	20.0	Target	Measured	Target	Measured	Target	Measured
Dielectric Constant: ε		48.20	48.14	55.53	55.57	55.20	55.91
Conductivity: σ		6.00	5.99	0.96	0.99	0.97	0.99
		1750 MHz Body		1900 MHz Body			
Date(s)		May 7, 2019		May 7, 2019			
Liquid Temperature (˚C)	20.0	Target	Measured	Target	Measured		
Dielectric Constant: ε		53.43	53.32	53.30	52.07		
Conductivity: σ		1.49	1.52	1.52	1.47		

See Appendix A for data printout.

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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 (%)	Plot Number
19-Feb-2019	750 MHz	8.55	8.61	Body	+ 0.70	1
18-Feb-2019	835 MHz	9.57	9.61	Body	+ 0.42	2
05-Mar-2019	835 MHz	9.57	9.63	Body	+ 0.63	3
21-Feb-2019	1750 MHz	36.50	36.90	Body	+ 1.10	4
06-Mar-2019	1750 MHz	36.50	36.50	Body	+ 0.00	5
11-Feb-2019	1900 MHz	39.90	40.10	Body	+ 0.50	6
04-Mar-2019	1900 MHz	39.90	40.20	Body	+ 0.75	7
13-Mar-2019	2450 MHz	51.00	51.20	Body	+ 0.39	8
11-Mar-2019	5200 MHz	76.80	76.30	Body	- 0.65	9
11-Mar-2019	5800 MHz	76.20	75.90	Body	- 0.39	10
07-May-2019	750 MHz	8.55	8.65	Body	+ 1.17	11
07-May-2019	835 MHz	9.57	9.53	Body	- 0.42	12
07-May-2019	1750 MHz	36.50	36.80	Body	+ 0.82	13
07-May-2019	1900 MHz	39.90	39.80	Body	- 0.25	14

See Appendix A for data plots.

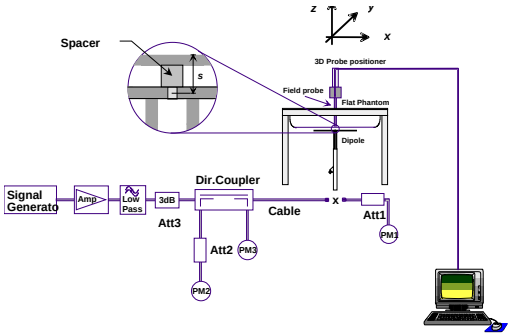

Figure 7.1 Dipole Validation Test Setup

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8. LTE Document Checklist

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

LTE Operating Band	Uplink (transmit)	Downlink (Receive)	Duplex mode (FDD/TDD)
	Low - high	Low - high	
2	1850-1910	1930-1990	FDD
4	1710-1755	2110-2155	FDD
5	824-849	869-894	FDD
13	777-787	746-756	FDD
66	1710-1780	2110-2200	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
5	1.4, 3, 5, 10	824-849 MHz
13	5, 10	777-787 MHz
66	1.4, 3, 5, 10, 15, 20	1710-1780 MHz

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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
5	1.4	824.7	20407	836.5	20525	848.3	20643
5	3	825.5	20415	836.5	20525	847.5	20635
5	5	826.5	20425	836.5	20525	846.5	20625
5	10	829.0	20450	836.5	20525	844.0	20600
13	5	779.5	23205	782.0	23230	784.5	23225
13	10	-----	-----	782.0	23230	-----	-----
66	5	1712.5	131997	1755.0	132422	1777.4	132646
66	10	1716.1	132033	1755.0	132422	1774.9	132621
66	15	1717.5	132047	1755.0	132422	1772.4	132596
66	20	1720.0	132072	1755.0	132422	1769.9	132571

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

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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 14 antennas:

- #0 WWAN Antenna (Transmit and Receive) Antenna (B2, B4, B5, B13, B66)
- #1 WWAN Antenna (Receive Only)
- #2 WWAN Antenna (Receive Only)
- #3 WWAN Antenna (Receive Only)
- #4 WWAN Antenna (B48 Only Not Used)
- #5 WWAN Antenna (Receive Only)
- #6 WWAN Antenna (Not Used)
- #7 WWAN Antenna (Not Used)
- #8 WLAN0 Antenna (Transmit and Receive)
- #9 WLAN1 Antenna (Transmit and Receive)
- #10 5G Antenna 0
- #11 5G Antenna 1
- #12 5G Antenna 2
- #13 5G Antenna 3

Transmission relationship

- All transmission (TX) is limited to the mmW, WWAN and WLAN antennas only
- The device is unable to transmit WCDMA/HSPA and LTE simultaneously.
- Rx is simultaneous
- Simultaneous Tx with the WWAN and WLAN is active.

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 hotspot 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.

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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 48-60 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	22.0	+0.5/-1.7	20.3	22.5
Band 4 – 1750 MHz	LTE	3	23.0	22.0	+1.0/-1.7	20.3	23.0
Band 5 – 835 MHz	LTE	3	23.0	23.0	+1.0/-1.7	21.3	24.0
Band 13 – 750 MHz	LTE	3	23.0	23.0	+1.0/-1.7	21.3	24.0
Band 66 – 1750 MHz	LTE	3	23.0	22.0	+1.0/-1.7	20.3	23.0

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 4 – 1750 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	12.0	±2.0	10.0	14.0
WLAN – 2.4 GHz	802.11g/n	N/A	N/A	12.0	±2.0	10.0	14.0
WLAN – 5.2 GHz	802.11an/ac	N/A	N/A	12.0	±2.0	10.0	14.0
WLAN – 5.8 GHz	802.11an/ac	N/A	N/A	12.0	±2.0	10.0	14.0

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 27-39 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 and WLAN simultaneously.

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TX Modes	WCDMA	LTE	802.11 b/g/n
1	**ON**	OFF	**ON**
2	OFF	**ON**	**ON**

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.

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9. SAR Test Data Summary

See Measurement Result Data Pages

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

Procedures Used To Establish Test Signal

The device was 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 testing was conducted on all edges closest to each antenna. Side A, Side B, Side C, Side D and Side E testing was conducted for the WWAN antenna for WCDMA and LTE Bands B2, B4, B5, B13, B14, and B66. The Side F was not tested for WCDMA and these LTE bands as the antenna was more than 2.5 cm from this side. The Side A, Side C, and Side F was tested for both WLAN antennas. Side B was tested for WLAN Tx0 antenna and Side D was tested for WLAN Tx1 antenna. Side D and Side E were not tested for Tx0 as the antenna was more than 2.5 cm from these sides. Side B and Side E were not tested for Tx1 as the antenna was more than 2.5 cm from these sides. All further test reductions are shown on page 46 for WCDMA bands, page 40-45 for WLAN and pages 61-72 for LTE bands. All testing was conducted per KDB 941225 D06. See the photo in Appendix C for a pictorial of the setups, labeling of the sides tested and antenna locations.

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.

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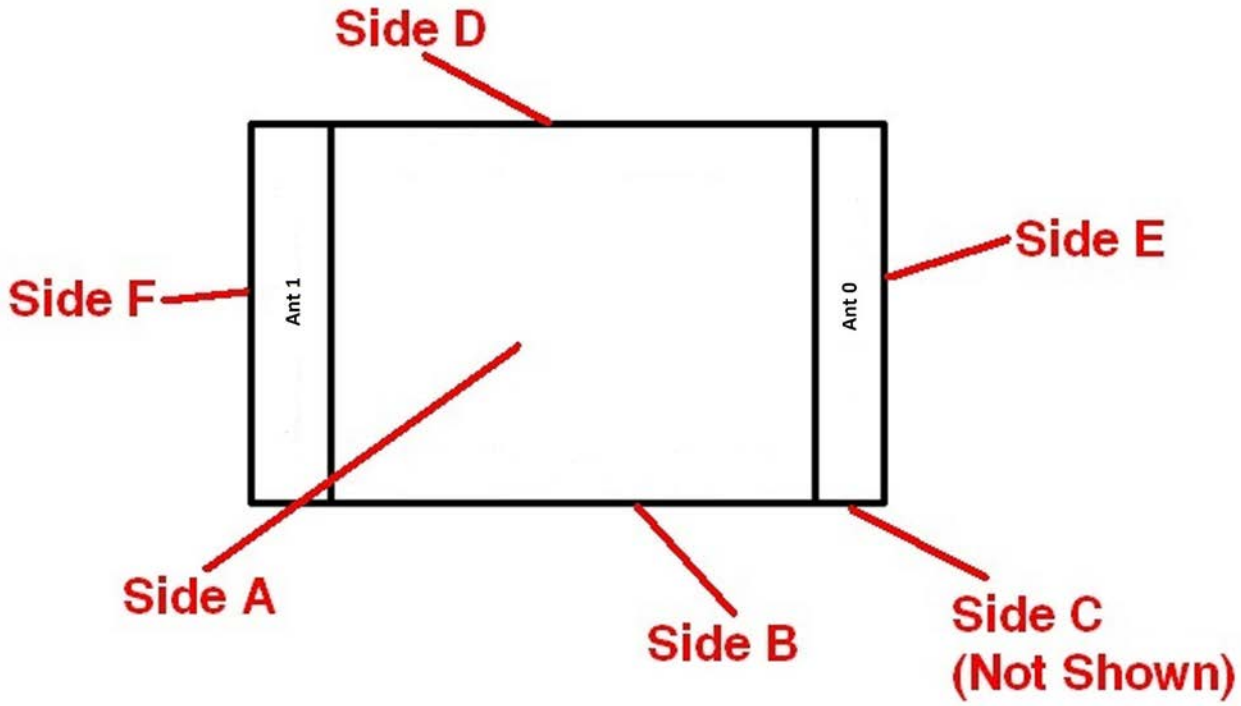
Figure 10.1
SAR Location Diagram of Modem Testing



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10. FCC 3G Measurement Procedures

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

10.1 Procedures Used to Establish RF Signal for SAR

The device was placed into a simulated call using a base station simulator in a screen room. Such test signals offer a consistent means for testing SAR and recommended for evaluating SAR. The SAR measurement software calculates a reference point at the start and end of the test to check for power drifts. If conducted power deviations of more than 5% occurred, the tests were repeated.

10.2 SAR Measurement Conditions for WCDMA/HSDPA/HSUPA

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

For Rel99

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

For HSDPA Rel 6

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

For HSUPA Rel 6

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

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3GPP Release Version	Mode	Cellular Band [dBm]			Sub-Test (See Table Below)	MPR
		4132	4183	4233		
99	WCDMA	23.70	24.00	23.70	-	-
6	HSDPA	23.36	23.07	23.09	1	0
6		23.32	23.09	23.05	2	0
6		22.99	22.92	22.89	3	0.5
6		22.94	22.99	22.90	4	0.5
6	HSUPA	23.40	23.10	23.13	1	0
6		21.45	21.49	21.46	2	2
6		22.47	22.48	22.49	3	1
6		21.46	21.41	21.44	4	2
6		23.32	23.04	23.07	5	0

PP Release Version	Mode	AWS Band [dBm]			Sub-Test (See Table Below)	MPR
		1312	1413	1513		
99	WCDMA	23.83	23.91	23.97	-	-
6	HSDPA	23.79	23.82	23.76	1	0
6		23.81	23.75	23.79	2	0
6		23.36	23.34	23.36	3	0.5
6		23.41	23.31	23.39	4	0.5
6	HSUPA	23.84	23.82	23.75	1	0
6		21.97	22.01	21.89	2	2
6		22.94	23.05	22.94	3	1
6		21.99	21.95	22.03	4	2
6		23.82	23.80	23.71	5	0

3GPP Release Version	Mode	PCS Band [dBm]			Sub-Test (See Table Below)	MPR
		9262	9400	9538		
99	WCDMA	23.60	23.70	23.40	-	-
6	HSDPA	23.02	23.00	23.31	1	0
6		23.01	22.99	23.28	2	0
6		22.56	22.52	22.66	3	0.5
6		22.41	22.31	22.52	4	0.5
6	HSUPA	23.00	22.98	23.21	1	0
6		21.07	21.01	21.12	2	2
6		22.06	22.05	22.23	3	1
6		20.99	20.95	22.03	4	2
6		22.89	22.91	23.05	5	0

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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									

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Band	Mode	Bandwidth (MHz)	Channel	Frequency (MHz)	Data Rate	Antenna	Avg Power (dBm)	Tune-up Pwr (dBm)
2450 MHz	802.11b	20	1	2412	1 Mbps	Tx0	13.6	14.00
			6	2437			13.4	14.00
			11	2462			13.5	14.00
			1	2412		Tx1	13.5	14.00
			6	2437			13.3	14.00
			11	2462			13.6	14.00
			1	2412	2 Mbps	Tx0	13.6	14.00
			6	2437			13.4	14.00
			11	2462			13.6	14.00
			1	2412		Tx1	13.7	14.00
			6	2437			13.5	14.00
			11	2462			13.6	14.00
			1	2412	5.5 Mbps	Tx0	13.5	14.00
			6	2437			13.2	14.00
			11	2462			13.5	14.00
			1	2412		Tx1	13.4	14.00
			6	2437			13.1	14.00
			11	2462			13.4	14.00
			1	2412	11 Mbps	Tx0	13.6	14.00
			6	2437			13.5	14.00
			11	2462			13.6	14.00
			1	2412		Tx1	13.8	14.00
			6	2437			13.6	14.00
			11	2462			13.7	14.00
	802.11g	20	1	2412	6 Mbps	Tx0	13.7	14.00
			6	2437			13.1	14.00
			11	2462			13.7	14.00
			1	2412		Tx1	13.7	14.00
			6	2437			13.2	14.00
			11	2462			13.7	14.00
			1	2412	9 Mbps	Tx0	13.8	14.00
			6	2437			13.2	14.00
			11	2462			13.8	14.00
			1	2412		Tx1	13.8	14.00
			6	2437			13.1	14.00
			11	2462			13.7	14.00
			1	2412	12 Mbps	Tx0	13.7	14.00
			6	2437			13.2	14.00
			11	2462			13.7	14.00
			1	2412		Tx1	13.7	14.00
			6	2437			13.1	14.00
			11	2462			13.6	14.00
			1	2412	18 Mbps	Tx0	13.9	14.00
			6	2437			13.5	14.00
			11	2462			13.9	14.00
			1	2412		Tx1	13.8	14.00
			6	2437			13.4	14.00
			11	2462			13.7	14.00
			1	2412	24 Mbps	Tx0	13.9	14.00
			6	2437			13.5	14.00
			11	2462			13.9	14.00
			1	2412		Tx1	13.8	14.00
			6	2437			13.6	14.00
			11	2462			13.8	14.00
			1	2412	36 Mbps	Tx0	13.1	14.00
			6	2437			13.7	14.00
			11	2462			13.5	14.00
			1	2412		Tx1	13.2	14.00
			6	2437			13.6	14.00
			11	2462			13.4	14.00
			1	2412	48 Mbps	Tx0	13.7	14.00
			6	2437			13.5	14.00
			11	2462			13.7	14.00
			1	2412		Tx1	13.6	14.00
			6	2437			13.5	14.00
			11	2462			13.6	14.00
			1	2412	54 Mbps	Tx0	13.8	14.00
			6	2437			13.7	14.00
			11	2462			13.6	14.00
			1	2412		Tx1	13.7	14.00
			6	2437			13.5	14.00
			11	2462			13.6	14.00

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Band	Mode	Bandwidth (MHz)	Channel	Frequency (MHz)	Data Rate	Antenna	Avg Power (dBm)	Tune-up Pwr (dBm)
2450 MHz	802.11n	20	1	2412	7.2 Mbps	Tx0	13.7	14.00
			6	2437			13.5	14.00
			11	2462			13.8	14.00
			1	2412		Tx1	13.7	14.00
			6	2437			13.6	14.00
			11	2462			13.9	14.00
			1	2412	14.4 Mbps	Tx0	13.7	14.00
			6	2437			13.4	14.00
			11	2462			13.6	14.00
			1	2412		Tx1	13.6	14.00
			6	2437			13.4	14.00
			11	2462			13.4	14.00
			1	2412	21.7 Mbps	Tx0	13.9	14.00
			6	2437			13.5	14.00
			11	2462			13.7	14.00
			1	2412		Tx1	13.7	14.00
			6	2437			13.3	14.00
			11	2462			13.5	14.00
			1	2412	28.9 Mbps	Tx0	13.7	14.00
			6	2437			13.7	14.00
			11	2462			13.9	14.00
			1	2412		Tx1	13.7	14.00
			6	2437			13.6	14.00
			11	2462			13.8	14.00
			1	2412	43.3 Mbps	Tx0	13.8	14.00
			6	2437			13.4	14.00
			11	2462			13.7	14.00
			1	2412		Tx1	13.8	14.00
			6	2437			13.4	14.00
			11	2462			13.6	14.00
			1	2412	57.8 Mbps	Tx0	13.8	14.00
			6	2437			13.5	14.00
			11	2462			13.7	14.00
			1	2412		Tx1	13.8	14.00
			6	2437			13.6	14.00
			11	2462			13.7	14.00
			1	2412	65.0 Mbps	Tx0	14.0	14.00
			6	2437			13.8	14.00
			11	2462			13.9	14.00
			1	2412		Tx1	13.8	14.00
			6	2437			13.7	14.00
			11	2462			13.8	14.00
			1	2412	72.2 Mbps	Tx0	13.5	14.00
			6	2437			13.3	14.00
			11	2462			13.6	14.00
			1	2412		Tx1	13.7	14.00
			6	2437			13.5	14.00
			11	2462			13.8	14.00
5.15-5.25 GHz	802.11a	20	36	5180	6 Mbps	Tx0	13.8	14.00
			40	5200			13.7	14.00
			44	5220			13.7	14.00
			48	5240			13.5	14.00
			36	5180		Tx1	13.7	14.00
			40	5200			13.7	14.00
			44	5220			13.6	14.00
			48	5240			13.5	14.00
			36	5180	9 Mbps	Tx0	13.5	14.00
			40	5200			13.6	14.00
			44	5220			13.6	14.00
			48	5240			13.6	14.00
			36	5180		Tx1	13.4	14.00
			40	5200			13.5	14.00
			44	5220			13.5	14.00
			48	5240			13.4	14.00
			36	5180	12 Mbps	Tx0	13.5	14.00
			40	5200			13.5	14.00
			44	5220			13.4	14.00
			48	5240			13.5	14.00
			36	5180		Tx1	13.6	14.00
			40	5200			13.5	14.00
			44	5220			13.6	14.00
			48	5240			13.5	14.00

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Band	Mode	Bandwidth (MHz)	Channel	Frequency (MHz)	Data Rate	Antenna	Avg Power (dBm)	Tune-up Pwr (dBm)
5.15-5.25 GHz	802.11a	20	36	5180	18 Mbps	Tx0	13.8	14.00
			40	5200			13.8	14.00
			44	5220			13.8	14.00
			48	5240			13.7	14.00
			36	5180		Tx1	13.8	14.00
			40	5200			13.8	14.00
			44	5220			13.7	14.00
			48	5240			13.7	14.00
			36	5180	24 Mbps	Tx0	13.8	14.00
			40	5200			13.8	14.00
			44	5220			13.8	14.00
			48	5240			13.8	14.00
			36	5180		Tx1	13.7	14.00
			40	5200			13.7	14.00
			44	5220			13.8	14.00
			48	5240			13.7	14.00
			36	5180	36 Mbps	Tx0	13.9	14.00
			40	5200			13.8	14.00
			44	5220			13.5	14.00
			48	5240			13.9	14.00
			36	5180		Tx1	13.6	14.00
			40	5200			13.8	14.00
			44	5220			13.8	14.00
			48	5240			13.5	14.00
			36	5180	48 Mbps	Tx0	13.6	14.00
			40	5200			13.9	14.00
			44	5220			13.5	14.00
			48	5240			13.8	14.00
			36	5180		Tx1	13.5	14.00
			40	5200			13.7	14.00
			44	5220			13.5	14.00
			48	5240			13.6	14.00
			36	5180	54 Mbps	Tx0	13.7	14.00
			40	5200			13.6	14.00
			44	5220			13.6	14.00
			48	5240			13.8	14.00
			36	5180		Tx1	13.7	14.00
			40	5200			13.9	14.00
			44	5220			13.4	14.00
			48	5240			13.7	14.00
	802.11n	20	36	5180	7.2 Mbps	Tx0	13.5	14.00
			40	5200			13.5	14.00
			44	5220			13.5	14.00
			48	5240			13.7	14.00
			36	5180		Tx1	13.6	14.00
			40	5200			13.5	14.00
			44	5220			13.5	14.00
			48	5240			13.7	14.00
			36	5180	14.4 Mbps	Tx0	13.5	14.00
			40	5200			13.6	14.00
			44	5220			13.5	14.00
			48	5240			13.5	14.00
			36	5180		Tx1	13.5	14.00
			40	5200			13.5	14.00
			44	5220			13.6	14.00
			48	5240			13.6	14.00
			36	5180	21.7 Mbps	Tx0	13.8	14.00
			40	5200			13.7	14.00
			44	5220			13.8	14.00
			48	5240			13.7	14.00
			36	5180		Tx1	13.6	14.00
			40	5200			13.5	14.00
			44	5220			13.7	14.00
			48	5240			13.6	14.00
			36	5180	28.9 Mbps	Tx0	13.8	14.00
			40	5200			13.7	14.00
			44	5220			13.6	14.00
			48	5240			13.9	14.00
			36	5180		Tx1	13.8	14.00
			40	5200			13.9	14.00
			44	5220			13.7	14.00
			48	5240			13.7	14.00

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Band	Mode	Bandwidth (MHz)	Channel	Frequency (MHz)	Data Rate	Antenna	Avg Power (dBm)	Tune-up Pwr (dBm)
5.15-5.25 GHz	802.11n	20	36	5180	43.3 Mbps	Tx0	13.5	14.00
			40	5200			13.7	14.00
			44	5220			13.9	14.00
			48	5240			13.5	14.00
			36	5180		Tx1	13.8	14.00
			40	5200			13.7	14.00
			44	5220			13.6	14.00
			48	5240			13.6	14.00
			36	5180	57.8 Mbps	Tx0	13.3	14.00
			40	5200			13.5	14.00
			44	5220			13.7	14.00
			48	5240			13.8	14.00
			36	5180		Tx1	13.2	14.00
			40	5200			13.6	14.00
			44	5220			13.7	14.00
			48	5240			13.5	14.00
			36	5180	65.0 Mbps	Tx0	13.9	14.00
			40	5200			13.8	14.00
			44	5220			13.8	14.00
			48	5240			13.7	14.00
			36	5180		Tx1	13.7	14.00
			40	5200			13.7	14.00
			44	5220			13.5	14.00
			48	5240			13.6	14.00
			36	5180	72.2 Mbps	Tx0	13.9	14.00
			40	5200			13.9	14.00
			44	5220			13.7	14.00
			48	5240			13.9	14.00
			36	5180		Tx1	13.9	14.00
			40	5200			13.7	14.00
			44	5220			13.6	14.00
			48	5240			13.9	14.00
	802.11n	40	38	5190	15 Mbps	Tx0	13.8	14.00
			46	5230			13.8	14.00
			38	5190		Tx1	13.8	14.00
			46	5230			13.7	14.00
			38	5190	30 Mbps	Tx0	13.6	14.00
			46	5230			13.7	14.00
			38	5190		Tx1	13.7	14.00
			46	5230			13.8	14.00
			38	5190	45 Mbps	Tx0	13.7	14.00
			46	5230			13.8	14.00
			38	5190		Tx1	13.7	14.00
			46	5230			13.9	14.00
			38	5190	60 Mbps	Tx0	13.8	14.00
			46	5230			14.0	14.00
			38	5190		Tx1	13.8	14.00
			46	5230			13.7	14.00
			38	5190	90 Mbps	Tx0	13.7	14.00
			46	5230			13.5	14.00
			38	5190		Tx1	13.8	14.00
			46	5230			13.8	14.00
			38	5190	120 Mbps	Tx0	14.0	14.00
			46	5230			13.8	14.00
			38	5190		Tx1	13.8	14.00
			46	5230			13.8	14.00
			38	5190	135 Mbps	Tx0	13.8	14.00
			46	5230			13.7	14.00
			38	5190		Tx1	13.9	14.00
			46	5230			13.7	14.00
			38	5190	150 Mbps	Tx0	13.7	14.00
			46	5230			13.8	14.00
			38	5190		Tx1	14.0	14.00
			46	5230			13.6	14.00
	802.11ac	20	36	5180	7.2 Mbps	Tx0	13.5	14.00
			40	5200			13.6	14.00
			44	5220			13.7	14.00
			48	5240			13.6	14.00
			36	5180		Tx1	13.7	14.00
			40	5200			13.7	14.00
			44	5220			13.7	14.00
			48	5240			13.7	14.00

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Band	Mode	Bandwidth (MHz)	Channel	Frequency (MHz)	Data Rate	Antenna	Avg Power (dBm)	Tune-up Pwr (dBm)
5.15-5.25 GHz	802.11ac	20	36	5180	14.4 Mbps	Tx0	13.7	14.00
			40	5200			13.7	14.00
			44	5220			13.7	14.00
			48	5240			13.7	14.00
			36	5180		Tx1	13.7	14.00
			40	5200			13.8	14.00
			44	5220			13.6	14.00
			48	5240			13.7	14.00
			36	5180	21.7 Mbps	Tx0	13.7	14.00
			40	5200			13.9	14.00
			44	5220			13.8	14.00
			48	5240			13.8	14.00
			36	5180		Tx1	13.9	14.00
			40	5200			13.9	14.00
			44	5220			13.9	14.00
			48	5240			14.0	14.00
			36	5180	28.9 Mbps	Tx0	13.9	14.00
			40	5200			13.9	14.00
			44	5220			13.9	14.00
			48	5240			13.7	14.00
			36	5180		Tx1	13.7	14.00
			40	5200			13.8	14.00
			44	5220			13.8	14.00
			48	5240			13.7	14.00
			36	5180	43.3 Mbps	Tx0	13.9	14.00
			40	5200			13.7	14.00
			44	5220			13.6	14.00
			48	5240			13.7	14.00
			36	5180		Tx1	13.8	14.00
			40	5200			13.9	14.00
			44	5220			13.5	14.00
			48	5240			13.7	14.00
			36	5180	57.8 Mbps	Tx0	13.6	14.00
			40	5200			13.7	14.00
			44	5220			13.8	14.00
			48	5240			13.5	14.00
			36	5180		Tx1	13.6	14.00
			40	5200			13.7	14.00
			44	5220			13.8	14.00
			48	5240			13.8	14.00
			36	5180	65.0 Mbps	Tx0	13.9	14.00
			40	5200			13.8	14.00
			44	5220			13.8	14.00
			48	5240			13.8	14.00
			36	5180		Tx1	13.7	14.00
			40	5200			13.7	14.00
			44	5220			13.8	14.00
			48	5240			13.8	14.00
			36	5180	72.2 Mbps	Tx0	13.8	14.00
			40	5200			13.8	14.00
			44	5220			13.8	14.00
			48	5240			13.7	14.00
			36	5180		Tx1	13.8	14.00
			40	5200			13.8	14.00
			44	5220			13.8	14.00
			48	5240			13.7	14.00
			36	5180	86.7 Mbps	Tx0	13.8	14.00
			40	5200			13.7	14.00
			44	5220			13.7	14.00
			48	5240			13.8	14.00
			36	5180		Tx1	13.7	14.00
			40	5200			13.6	14.00
			44	5220			13.6	14.00
			48	5240			13.8	14.00
	802.11ac	40	38	5190	15 Mbps	Tx0	13.7	14.00
			46	5230			13.8	14.00
			38	5190		Tx1	13.8	14.00
			46	5230			13.8	14.00
			38	5190	30 Mbps	Tx0	13.8	14.00
			46	5230			13.9	14.00
			38	5190		Tx1	13.8	14.00
			46	5230			13.8	14.00
			38	5190	45 Mbps	Tx0	13.9	14.00
			46	5230			13.8	14.00
			38	5190		Tx1	13.8	14.00
			46	5230			13.9	14.00

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Band	Mode	Bandwidth (MHz)	Channel	Frequency (MHz)	Data Rate	Antenna	Avg Power (dBm)	Tune-up Pwr (dBm)
5.15-5.25 GHz	802.11ac	40	38	5190	60 Mbps	Tx0	13.7	14.00
			46	5230			13.8	14.00
			38	5190		Tx1	13.9	14.00
			46	5230			13.7	14.00
			38	5190	90 Mbps	Tx0	13.7	14.00
			46	5230			13.8	14.00
			38	5190		Tx1	13.8	14.00
			46	5230			13.8	14.00
			38	5190	120 Mbps	Tx0	13.9	14.00
			46	5230			13.9	14.00
			38	5190		Tx1	13.8	14.00
			46	5230			13.8	14.00
			38	5190	135 Mbps	Tx0	13.9	14.00
			46	5230			13.9	14.00
			38	5190		Tx1	13.8	14.00
			46	5230			13.7	14.00
			38	5190	150 Mbps	Tx0	13.8	14.00
			46	5230			13.9	14.00
			38	5190		Tx1	13.9	14.00
			46	5230			13.7	14.00
			38	5190	180 Mbps	Tx0	13.8	14.00
			46	5230			13.8	14.00
			38	5190		Tx1	13.9	14.00
			46	5230			13.9	14.00
			38	5190	200 Mbps	Tx0	14.0	14.00
			46	5230			14.0	14.00
			38	5190		Tx1	13.8	14.00
			46	5230			13.8	14.00
	802.11ac	80	42	5210	32.5 Mbps	Tx0	13.9	14.00
						Tx1	13.9	14.00
			42	5210	65.0 Mbps	Tx0	13.8	14.00
						Tx1	14.0	14.00
			42	5210	97.5 Mbps	Tx0	13.8	14.00
						Tx1	13.9	14.00
			42	5210	130.0 Mbps	Tx0	13.8	14.00
						Tx1	13.7	14.00
			42	5210	195.0 Mbps	Tx0	13.7	14.00
						Tx1	13.7	14.00
			42	5210	260.0 Mbps	Tx0	13.9	14.00
						Tx1	13.9	14.00
			42	5210	292.5 Mbps	Tx0	13.9	14.00
						Tx1	13.7	14.00
			42	5210	325.0 Mbps	Tx0	13.7	14.00
						Tx1	13.7	14.00
			42	5210	390.0 Mbps	Tx0	13.9	14.00
						Tx1	14.0	14.00
			42	5210	433.3 Mbps	Tx0	13.8	14.00
						Tx1	13.9	14.00
5800 MHz	802.11a	20	149	5745	6 Mbps	Tx0	13.9	14.00
			153	5765			13.9	14.00
			157	5785			13.9	14.00
			161	5805			13.7	14.00
			165	5825			13.6	14.00
			149	5745		Tx1	13.7	14.00
			153	5765			13.7	14.00
			157	5785			13.7	14.00
			161	5805			13.8	14.00
			165	5825			13.9	14.00
			149	5745	9 Mbps	Tx0	13.8	14.00
			153	5765			13.7	14.00
			157	5785			13.9	14.00
			161	5805			13.7	14.00
			165	5825			13.9	14.00
			149	5745		Tx1	13.7	14.00
			153	5765			13.7	14.00
			157	5785			13.8	14.00
			161	5805			13.6	14.00
			165	5825			13.6	14.00

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Band	Mode	Bandwidth (MHz)	Channel	Frequency (MHz)	Data Rate	Antenna	Avg Power (dBm)	Tune-up Pwr (dBm)
5800 MHz	801.11a	20	149	5745	12 Mbps	Tx0	13.8	14.00
			153	5765			13.7	14.00
			157	5785			13.7	14.00
			161	5805			13.8	14.00
			165	5825			13.7	14.00
			149	5745		Tx1	13.8	14.00
			153	5765			13.9	14.00
			157	5785			13.7	14.00
			161	5805			13.8	14.00
			165	5825			13.8	14.00
			149	5745	18 Mbps	Tx0	13.6	14.00
			153	5765			13.8	14.00
			157	5785			13.8	14.00
			161	5805			13.8	14.00
			165	5825			13.7	14.00
			149	5745		Tx1	13.8	14.00
			153	5765			13.7	14.00
			157	5785			13.6	14.00
			161	5805			13.8	14.00
			165	5825			13.8	14.00
			149	5745	24 Mbps	Tx0	13.9	14.00
			153	5765			13.7	14.00
			157	5785			13.8	14.00
			161	5805			13.9	14.00
			165	5825			13.7	14.00
			149	5745		Tx1	13.8	14.00
			153	5765			13.8	14.00
			157	5785			13.9	14.00
			161	5805			13.7	14.00
			165	5825			13.6	14.00
			149	5745	36 Mbps	Tx0	13.7	14.00
			153	5765			13.8	14.00
			157	5785			13.7	14.00
			161	5805			13.8	14.00
			165	5825			13.8	14.00
			149	5745		Tx1	13.8	14.00
			153	5765			13.9	14.00
			157	5785			13.8	14.00
			161	5805			13.8	14.00
			165	5825			13.7	14.00
			149	5745	48 Mbps	Tx0	13.7	14.00
			153	5765			13.6	14.00
			157	5785			13.8	14.00
			161	5805			13.9	14.00
			165	5825			13.8	14.00
			149	5745		Tx1	13.7	14.00
			153	5765			13.7	14.00
			157	5785			13.7	14.00
			161	5805			13.8	14.00
			165	5825			13.8	14.00
			149	5745	54 Mbps	Tx0	13.7	14.00
			153	5765			13.8	14.00
			157	5785			13.7	14.00
			161	5805			13.8	14.00
			165	5825			13.7	14.00
			149	5745		Tx1	13.7	14.00
			153	5765			13.8	14.00
			157	5785			13.8	14.00
			161	5805			13.8	14.00
			165	5825			13.6	14.00
	802.11n	20	149	5745	7.2 Mbps	Tx0	13.9	14.00
			153	5765			13.8	14.00
			157	5785			13.9	14.00
			161	5805			13.8	14.00
			165	5825			13.7	14.00
			149	5745		Tx1	13.8	14.00
			153	5765			13.7	14.00
			157	5785			13.8	14.00
			161	5805			13.8	14.00
			165	5825			13.8	14.00
							13.9	

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Band	Mode	Bandwidth (MHz)	Channel	Frequency (MHz)	Data Rate	Antenna	Avg Power (dBm)	Tune-up Pwr (dBm)
5800 MHz	802.11n	20	149	5745	14.4 Mbps	Tx0	13.7	14.00
			153	5765			13.9	14.00
			157	5785			13.8	14.00
			161	5805			13.9	14.00
			165	5825			13.7	14.00
			149	5745		Tx1	13.6	14.00
			153	5765			13.6	14.00
			157	5785			13.8	14.00
			161	5805			13.7	14.00
			165	5825			13.8	14.00
			149	5745	21.7 Mbps	Tx0	13.9	14.00
			153	5765			13.7	14.00
			157	5785			13.7	14.00
			161	5805			13.6	14.00
			165	5825			13.7	14.00
			149	5745		Tx1	13.7	14.00
			153	5765			13.8	14.00
			157	5785			13.8	14.00
			161	5805			13.6	14.00
			165	5825			13.8	14.00
			149	5745	28.9 Mbps	Tx0	13.8	14.00
			153	5765			13.6	14.00
			157	5785			13.8	14.00
			161	5805			13.8	14.00
			165	5825			13.9	14.00
			149	5745		Tx1	13.9	14.00
			153	5765			13.7	14.00
			157	5785			13.8	14.00
			161	5805			13.6	14.00
			165	5825			13.6	14.00
			149	5745	43.3 Mbps	Tx0	13.7	14.00
			153	5765			13.8	14.00
			157	5785			13.7	14.00
			161	5805			13.9	14.00
			165	5825			13.6	14.00
			149	5745		Tx1	13.7	14.00
			153	5765			13.8	14.00
			157	5785			13.7	14.00
			161	5805			13.8	14.00
			165	5825			13.8	14.00
			149	5745	57.8 Mbps	Tx0	13.9	14.00
			153	5765			13.8	14.00
			157	5785			13.9	14.00
			161	5805			13.6	14.00
			165	5825			13.7	14.00
			149	5745		Tx1	13.8	14.00
			153	5765			13.7	14.00
			157	5785			13.8	14.00
			161	5805			13.7	14.00
			165	5825			13.6	14.00
			149	5745	65.0 Mbps	Tx0	13.7	14.00
			153	5765			13.8	14.00
			157	5785			13.7	14.00
			161	5805			13.7	14.00
			165	5825			13.7	14.00
			149	5745		Tx1	13.7	14.00
			153	5765			13.6	14.00
			157	5785			13.9	14.00
			161	5805			13.7	14.00
			165	5825			13.7	14.00
			149	5745	72.2 Mbps	Tx0	13.9	14.00
			153	5765			13.9	14.00
			157	5785			13.7	14.00
			161	5805			13.7	14.00
			165	5825			13.8	14.00
			149	5745		Tx1	13.9	14.00
			153	5765			13.6	14.00
			157	5785			13.8	14.00
			161	5805			13.6	14.00
			165	5825			13.7	14.00
							13.7	

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Band	Mode	Bandwidth (MHz)	Channel	Frequency (MHz)	Data Rate	Antenna	Avg Power (dBm)	Tune-up Pwr (dBm)
5800 MHz	802.11n	40	151	5755	15 Mbps	Tx0	13.8	14.00
			159	5795			13.9	14.00
			151	5755		Tx1	13.9	14.00
			159	5795			13.7	14.00
			151	5755	30 Mbps	Tx0	13.7	14.00
			159	5795			13.7	14.00
			151	5755		Tx1	13.8	14.00
			159	5795			13.9	14.00
			151	5755	45 Mbps	Tx0	13.9	14.00
			159	5795			13.8	14.00
			151	5755		Tx1	13.7	14.00
			159	5795			13.7	14.00
			151	5755	60 Mbps	Tx0	13.6	14.00
			159	5795			13.7	14.00
			151	5755		Tx1	13.9	14.00
			159	5795			13.8	14.00
			151	5755	90 Mbps	Tx0	13.8	14.00
			159	5795			13.7	14.00
			151	5755		Tx1	13.9	14.00
			159	5795			13.9	14.00
			151	5755	120 Mbps	Tx0	13.8	14.00
			159	5795			13.6	14.00
			151	5755		Tx1	13.8	14.00
			159	5795			13.8	14.00
			151	5755	135 Mbps	Tx0	13.8	14.00
			159	5795			13.7	14.00
			151	5755		Tx1	13.8	14.00
			159	5795			13.7	14.00
			151	5755	150 Mbps	Tx0	13.7	14.00
			159	5795			13.8	14.00
			151	5755		Tx1	13.9	14.00
			159	5795			13.7	14.00
	802.11ac	20	149	5745	7.2 Mbps	Tx0	13.9	14.00
			153	5765			13.7	14.00
			157	5785			13.8	14.00
			161	5805			13.9	14.00
			165	5825			13.9	14.00
			149	5745		Tx1	13.8	14.00
			153	5765			13.6	14.00
			157	5785			13.7	14.00
			161	5805			13.6	14.00
			165	5825			13.7	14.00
			149	5745	14.4 Mbps	Tx0	13.7	14.00
			153	5765			13.8	14.00
			157	5785			13.9	14.00
			161	5805			13.7	14.00
			165	5825			13.9	14.00
			149	5745		Tx1	13.7	14.00
			153	5765			13.8	14.00
			157	5785			13.8	14.00
			161	5805			13.6	14.00
			165	5825			13.7	14.00
			149	5745	21.7 Mbps	Tx0	13.6	14.00
			153	5765			13.8	14.00
			157	5785			13.7	14.00
			161	5805			13.9	14.00
			165	5825			13.8	14.00
			149	5745		Tx1	13.7	14.00
			153	5765			13.8	14.00
			157	5785			13.8	14.00
			161	5805			13.7	14.00
			165	5825			13.8	14.00

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Band	Mode	Bandwidth (MHz)	Channel	Frequency (MHz)	Data Rate	Antenna	Avg Power (dBm)	Tune-up Pwr (dBm)
5800 MHz	802.11ac	20	149	5745	28.9 Mbps	Tx0	13.8	14.00
			153	5765			13.9	14.00
			157	5785			13.8	14.00
			161	5805			13.8	14.00
			165	5825			13.6	14.00
			149	5745		Tx1	13.7	14.00
			153	5765			13.7	14.00
			157	5785			13.7	14.00
			161	5805			13.8	14.00
			165	5825			13.8	14.00
			149	5745	43.3 Mbps	Tx0	13.7	14.00
			153	5765			13.7	14.00
			157	5785			13.8	14.00
			161	5805			13.7	14.00
			165	5825			13.8	14.00
			149	5745		Tx1	13.9	14.00
			153	5765			13.7	14.00
			157	5785			13.7	14.00
			161	5805			13.7	14.00
			165	5825			13.8	14.00
			149	5745	57.8 Mbps	Tx0	13.7	14.00
			153	5765			13.8	14.00
			157	5785			13.8	14.00
			161	5805			13.8	14.00
			165	5825			13.6	14.00
			149	5745		Tx1	13.7	14.00
			153	5765			13.8	14.00
			157	5785			13.6	14.00
			161	5805			13.9	14.00
			165	5825			13.9	14.00
			149	5745	65.0 Mbps	Tx0	13.7	14.00
			153	5765			13.8	14.00
			157	5785			13.9	14.00
			161	5805			13.6	14.00
			165	5825			13.9	14.00
			149	5745		Tx1	13.8	14.00
			153	5765			13.8	14.00
			157	5785			13.9	14.00
			161	5805			13.9	14.00
			165	5825			13.8	14.00
			149	5745	72.2 Mbps	Tx0	13.8	14.00
			153	5765			13.7	14.00
			157	5785			13.6	14.00
			161	5805			13.7	14.00
			165	5825			13.8	14.00
			149	5745		Tx1	13.9	14.00
			153	5765			13.7	14.00
			157	5785			13.8	14.00
			161	5805			13.8	14.00
			165	5825			13.7	14.00
			149	5745	86.7 Mbps	Tx0	13.6	14.00
			153	5765			13.8	14.00
			157	5785			13.7	14.00
			161	5805			13.7	14.00
			165	5825			13.9	14.00
			149	5745		Tx1	13.6	14.00
			153	5765			13.9	14.00
			157	5785			13.7	14.00
			161	5805			13.6	14.00
			165	5825			13.7	14.00
	802.11ac	40	151	5755	15 Mbps	Tx0	13.7	14.00
			159	5795			13.8	14.00
			151	5755		Tx1	13.6	14.00
			159	5795			13.8	14.00
			151	5755	30 Mbps	Tx0	13.7	14.00
			159	5795			13.6	14.00
			151	5755		Tx1	13.6	14.00
			159	5795			13.9	14.00

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Band	Mode	Bandwidth (MHz)	Channel	Frequency (MHz)	Data Rate	Antenna	Avg Power (dBm)	Tune-up Pwr (dBm)
5800 MHz	802.11ac	40	151	5755	45 Mbps	Tx0	13.7	14.00
			159	5795			13.8	14.00
			151	5755		Tx1	13.7	14.00
			159	5795			13.6	14.00
			151	5755	60 Mbps	Tx0	13.7	14.00
			159	5795			13.8	14.00
			151	5755		Tx1	13.8	14.00
			159	5795			13.8	14.00
			151	5755	90 Mbps	Tx0	13.8	14.00
			159	5795			13.6	14.00
			151	5755		Tx1	13.8	14.00
			159	5795			13.8	14.00
			151	5755	120 Mbps	Tx0	13.8	14.00
			159	5795			13.8	14.00
			151	5755		Tx1	13.6	14.00
			159	5795			13.9	14.00
			151	5755	135 Mbps	Tx0	13.9	14.00
			159	5795			13.8	14.00
			151	5755		Tx1	13.6	14.00
			159	5795			13.8	14.00
			151	5755	150 Mbps	Tx0	13.8	14.00
			159	5795			13.7	14.00
			151	5755		Tx1	13.8	14.00
			159	5795			13.8	14.00
			151	5755	180 Mbps	Tx0	13.9	14.00
			159	5795			13.9	14.00
			151	5755		Tx1	13.7	14.00
			159	5795			13.7	14.00
			151	5755	200 Mbps	Tx0	13.8	14.00
			159	5795			13.9	14.00
			151	5755		Tx1	13.7	14.00
			159	5795			13.8	14.00
	802.11ac	80	155	5775	32.5 Mbps	Tx0	13.9	14.00
						Tx1	13.8	14.00
			155	5775	65.0 Mbps	Tx0	13.7	14.00
						Tx1	13.8	14.00
			155	5775	97.5 Mbps	Tx0	13.6	14.00
						Tx1	13.8	14.00
			155	5775	130.0 Mbps	Tx0	13.9	14.00
						Tx1	13.8	14.00
			155	5775	195.0 Mbps	Tx0	13.9	14.00
						Tx1	13.6	14.00
			155	5775	260.0 Mbps	Tx0	13.7	14.00
						Tx1	13.8	14.00
			155	5775	292.5 Mbps	Tx0	13.8	14.00
						Tx1	13.8	14.00
			155	5775	325.0 Mbps	Tx0	13.9	14.00
						Tx1	13.8	14.00
			155	5775	390.0 Mbps	Tx0	13.8	14.00
						Tx1	13.6	14.00
			155	5775	433.3 Mbps	Tx0	13.9	14.00
						Tx1	13.8	14.00

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Figure 10.1 Test Reduction Table – WiFi 2.4 GHz Chain 0

Mode	Side	Required Channel	Tested/Reduced
802.11b	Side A	1 – 2412 MHz	Reduced[1]
		6 – 2437 MHz	Tested
		11 – 2462 MHz	Reduced[1]
	Side B	1 – 2412 MHz	Reduced[1]
		6 – 2437 MHz	Tested
		11 – 2462 MHz	Reduced[1]
	Side C	1 – 2412 MHz	Reduced[1]
		6 – 2437 MHz	Tested
		11 – 2462 MHz	Reduced[1]
	Side D	1 – 2412 MHz	Reduced[3]
		6 – 2437 MHz	Reduced[3]
		11 – 2462 MHz	Reduced[3]
	Side E	1 – 2412 MHz	Reduced[3]
		6 – 2437 MHz	Reduced[3]
		11 – 2462 MHz	Reduced[3]
	Side F	1 – 2412 MHz	Reduced[1]
		6 – 2437 MHz	Tested
		11 – 2462 MHz	Reduced[1]
802.11g	Side A	1 – 2412 MHz	Reduced[2]
		6 – 2437 MHz	Reduced[2]
		11 – 2462 MHz	Reduced[2]
	Side B	1 – 2412 MHz	Reduced[2]
		6 – 2437 MHz	Reduced[2]
		11 – 2462 MHz	Reduced[2]
	Side C	1 – 2412 MHz	Reduced[2]
		6 – 2437 MHz	Reduced[2]
		11 – 2462 MHz	Reduced[2]
	Side D	1 – 2412 MHz	Reduced[2]
		6 – 2437 MHz	Reduced[2]
		11 – 2462 MHz	Reduced[2]
	Side E	1 – 2412 MHz	Reduced[2]
		6 – 2437 MHz	Reduced[2]
		11 – 2462 MHz	Reduced[2]
	Side F	1 – 2412 MHz	Reduced[2]
		6 – 2437 MHz	Reduced[2]
		11 – 2462 MHz	Reduced[2]
802.11n	Side A	1 – 2412 MHz	Reduced[2]
		6 – 2437 MHz	Reduced[2]
		11 – 2462 MHz	Reduced[2]
	Side B	1 – 2412 MHz	Reduced[2]
		6 – 2437 MHz	Reduced[2]
		11 – 2462 MHz	Reduced[2]
	Side C	1 – 2412 MHz	Reduced[2]
		6 – 2437 MHz	Reduced[2]
		11 – 2462 MHz	Reduced[2]
	Side D	1 – 2412 MHz	Reduced[2]
		6 – 2437 MHz	Reduced[2]
		11 – 2462 MHz	Reduced[2]
	Side E	1 – 2412 MHz	Reduced[2]
		6 – 2437 MHz	Reduced[2]
		11 – 2462 MHz	Reduced[2]
	Side F	1 – 2412 MHz	Reduced[2]
		6 – 2437 MHz	Reduced[2]
		11 – 2462 MHz	Reduced[2]

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 highest reported SAR for DSSS is adjusted by the ratio of OFDM to DSSS specified maximum output power and the adjusted SAR is ≤ 1.2 W/kg, SAR is not required per KDB 248227 D01 v02r02 section 5.2.2 2) page 10.

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.

Maximum power: 25.1 mW
Closest Distance to Side D: 57 mm
Closest Distance to Side E: 49 mm

The closest distance is from Side E. Therefore, if Side E is excluded then Side D would also be excluded.

[(25.1 mW)/(49 mm)]*√2.462=0.80 which is equal to or less than 3.0.

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Figure 10.2 Test Reduction Table – WiFi 2.4 GHz Chain 1

Mode	Side	Required Channel	Tested/Reduced
802.11b	Side A	1 – 2412 MHz	Reduced[1]
		6 – 2437 MHz	Tested
		11 – 2462 MHz	Reduced[1]
	Side B	1 – 2412 MHz	Reduced[3]
		6 – 2437 MHz	Reduced[3]
		11 – 2462 MHz	Reduced[3]
	Side C	1 – 2412 MHz	Reduced[1]
		6 – 2437 MHz	Tested
		11 – 2462 MHz	Reduced[1]
	Side D	1 – 2412 MHz	Reduced[1]
		6 – 2437 MHz	Tested
		11 – 2462 MHz	Reduced[1]
	Side E	1 – 2412 MHz	Reduced[3]
		6 – 2437 MHz	Reduced[3]
		11 – 2462 MHz	Reduced[3]
	Side F	1 – 2412 MHz	Reduced[1]
		6 – 2437 MHz	Tested
		11 – 2462 MHz	Reduced[1]
802.11g	Side A	1 – 2412 MHz	Reduced[2]
		6 – 2437 MHz	Reduced[2]
		11 – 2462 MHz	Reduced[2]
	Side B	1 – 2412 MHz	Reduced[2]
		6 – 2437 MHz	Reduced[2]
		11 – 2462 MHz	Reduced[2]
	Side C	1 – 2412 MHz	Reduced[2]
		6 – 2437 MHz	Reduced[2]
		11 – 2462 MHz	Reduced[2]
	Side D	1 – 2412 MHz	Reduced[2]
		6 – 2437 MHz	Reduced[2]
		11 – 2462 MHz	Reduced[2]
	Side E	1 – 2412 MHz	Reduced[2]
		6 – 2437 MHz	Reduced[2]
		11 – 2462 MHz	Reduced[2]
	Side F	1 – 2412 MHz	Reduced[2]
		6 – 2437 MHz	Reduced[2]
		11 – 2462 MHz	Reduced[2]
802.11n	Side A	1 – 2412 MHz	Reduced[2]
		6 – 2437 MHz	Reduced[2]
		11 – 2462 MHz	Reduced[2]
	Side B	1 – 2412 MHz	Reduced[2]
		6 – 2437 MHz	Reduced[2]
		11 – 2462 MHz	Reduced[2]
	Side C	1 – 2412 MHz	Reduced[2]
		6 – 2437 MHz	Reduced[2]
		11 – 2462 MHz	Reduced[2]
	Side D	1 – 2412 MHz	Reduced[2]
		6 – 2437 MHz	Reduced[2]
		11 – 2462 MHz	Reduced[2]
	Side E	1 – 2412 MHz	Reduced[2]
		6 – 2437 MHz	Reduced[2]
		11 – 2462 MHz	Reduced[2]
	Side F	1 – 2412 MHz	Reduced[2]
		6 – 2437 MHz	Reduced[2]
		11 – 2462 MHz	Reduced[2]

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 highest reported SAR for DSSS is adjusted by the ratio of OFDM to DSSS specified maximum output power and the adjusted SAR is ≤ 1.2 W/kg, SAR is not required per KDB 248227 D01 v02r02 section 5.2.2 2) page 10.

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.

Maximum power: 25.1 mW
Closest Distance to Side B: 57 mm
Closest Distance to Side E: 49 mm

The closest distance is from Side E. Therefore, if Side E is excluded then Side B would also be excluded.

[(25.1 mW)/(49 mm)]*√2.462=0.80 which is equal to or less than 3.0.

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Figure 10.3 Test Reduction Table – WiFi 5.1 GHz Chain 0

Mode	Side	Required Channel	Tested/Reduced
802.11a 5150 MHz	Side A	36 – 5180 MHz	Reduced[1]
		40 – 5200 MHz	Reduced[1]
		44 – 5220 MHz	Tested
		48 – 5240 MHz	Reduced[1]
	Side B	36 – 5180 MHz	Reduced[1]
		40 – 5200 MHz	Reduced[1]
		44 – 5220 MHz	Tested
		48 – 5240 MHz	Reduced[1]
	Side C	36 – 5180 MHz	Reduced[1]
		40 – 5200 MHz	Reduced[1]
		44 – 5220 MHz	Tested
		48 – 5240 MHz	Reduced[1]
	Side D	36 – 5180 MHz	Reduced[2]
		40 – 5200 MHz	Reduced[2]
		44 – 5220 MHz	Reduced[2]
		48 – 5240 MHz	Reduced[2]
	Side E	36 – 5180 MHz	Reduced[2]
		40 – 5200 MHz	Reduced[2]
		44 – 5220 MHz	Reduced[2]
		48 – 5240 MHz	Reduced[2]
	Side F	36 – 5180 MHz	Reduced[1]
		40 – 5200 MHz	Reduced[1]
		44 – 5220 MHz	Tested
		48 – 5240 MHz	Reduced[1]
802.11n 5150 MHz	Side A	36 – 5180 MHz	Reduced[1]
		40 – 5200 MHz	Reduced[1]
		44 – 5220 MHz	Reduced[1]
		48 – 5240 MHz	Reduced[1]
	Side B	36 – 5180 MHz	Reduced[1]
		40 – 5200 MHz	Reduced[1]
		44 – 5220 MHz	Reduced[1]
		48 – 5240 MHz	Reduced[1]
	Side C	36 – 5180 MHz	Reduced[1]
		40 – 5200 MHz	Reduced[1]
		44 – 5220 MHz	Reduced[1]
		48 – 5240 MHz	Reduced[1]
	Side D	36 – 5180 MHz	Reduced[2]
		40 – 5200 MHz	Reduced[2]
		44 – 5220 MHz	Reduced[2]
		48 – 5240 MHz	Reduced[2]
	Side E	36 – 5180 MHz	Reduced[2]
		40 – 5200 MHz	Reduced[2]
		44 – 5220 MHz	Reduced[2]
		48 – 5240 MHz	Reduced[2]
	Side F	36 – 5180 MHz	Reduced[1]
		40 – 5200 MHz	Reduced[1]
		44 – 5220 MHz	Reduced[1]
		48 – 5240 MHz	Reduced[1]

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 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 >0.4 W/kg, test the next highest configuration until the SAR value is ≤ 0.8 W/kg per KDB 248227 D01 v02r02 section 5.1.1 2) page 9.

Maximum power: 25.1 mW
Closest Distance to Side D: 57 mm
Closest Distance to Side E: 49 mm

The closest distance is from Side E. Therefore, if Side E is excluded then Side D would also be excluded.

[(25.1 mW)/(49 mm)]*√5.24=1.17 which is equal to or less than 3.0.

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Figure 10.4 Test Reduction Table – WiFi 5.1 GHz Chain 1

Mode	Side	Required Channel	Tested/Reduced
802.11a 5150 MHz	Side A	36 – 5180 MHz	Reduced[1]
		40 – 5200 MHz	Reduced[1]
		44 – 5220 MHz	Tested
		48 – 5240 MHz	Reduced[1]
	Side B	36 – 5180 MHz	Reduced[2]
		40 – 5200 MHz	Reduced[2]
		44 – 5220 MHz	Reduced[2]
		48 – 5240 MHz	Reduced[2]
	Side C	36 – 5180 MHz	Reduced[1]
		40 – 5200 MHz	Reduced[1]
		44 – 5220 MHz	Tested
		48 – 5240 MHz	Reduced[1]
	Side D	36 – 5180 MHz	Reduced[1]
		40 – 5200 MHz	Reduced[1]
		44 – 5220 MHz	Tested
		48 – 5240 MHz	Reduced[1]
	Side E	36 – 5180 MHz	Reduced[2]
		40 – 5200 MHz	Reduced[2]
		44 – 5220 MHz	Reduced[2]
		48 – 5240 MHz	Reduced[2]
	Side F	36 – 5180 MHz	Reduced[1]
		40 – 5200 MHz	Reduced[1]
		44 – 5220 MHz	Tested
		48 – 5240 MHz	Reduced[1]
802.11n 5150 MHz	Side A	36 – 5180 MHz	Reduced[1]
		40 – 5200 MHz	Reduced[1]
		44 – 5220 MHz	Reduced[1]
		48 – 5240 MHz	Reduced[1]
	Side B	36 – 5180 MHz	Reduced[2]
		40 – 5200 MHz	Reduced[2]
		44 – 5220 MHz	Reduced[2]
		48 – 5240 MHz	Reduced[2]
	Side C	36 – 5180 MHz	Reduced[1]
		40 – 5200 MHz	Reduced[1]
		44 – 5220 MHz	Reduced[1]
		48 – 5240 MHz	Reduced[1]
	Side D	36 – 5180 MHz	Reduced[1]
		40 – 5200 MHz	Reduced[1]
		44 – 5220 MHz	Reduced[1]
		48 – 5240 MHz	Reduced[1]
	Side E	36 – 5180 MHz	Reduced[2]
		40 – 5200 MHz	Reduced[2]
		44 – 5220 MHz	Reduced[2]
		48 – 5240 MHz	Reduced[2]
	Side F	36 – 5180 MHz	Reduced[1]
		40 – 5200 MHz	Reduced[1]
		44 – 5220 MHz	Reduced[1]
		48 – 5240 MHz	Reduced[1]

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 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.

Maximum power: 25.1 mW
Closest Distance to Side D: 57 mm
Closest Distance to Side E: 49 mm

The closest distance is from Side E. Therefore, if Side E is excluded then Side D would also be excluded.

[(25.1 mW)/(49 mm)]*√5.24=1.17 which is equal to or less than 3.0.

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Figure 10.5 Test Reduction Table – WiFi 5.8 GHz Chain 0

Mode	Side	Required Channel	Tested/Reduced
802.11a 5800 MHz	Side A	149 – 5745 MHz	Reduced[1]
		157 – 5785 MHz	Tested
		165 – 5825 MHz	Reduced[1]
	Side B	149 – 5745 MHz	Reduced[1]
		157 – 5785 MHz	Tested
		165 – 5825 MHz	Reduced[1]
	Side C	149 – 5745 MHz	Reduced[1]
		157 – 5785 MHz	Tested
		165 – 5825 MHz	Reduced[1]
	Side D	149 – 5745 MHz	Reduced[2]
		157 – 5785 MHz	Reduced[2]
		165 – 5825 MHz	Reduced[2]
	Side E	149 – 5745 MHz	Reduced[2]
		157 – 5785 MHz	Reduced[2]
		165 – 5825 MHz	Reduced[2]
	Side F	149 – 5745 MHz	Reduced[1]
		157 – 5785 MHz	Tested
		165 – 5825 MHz	Reduced[1]
802.11n 5800 MHz	Side A	149 – 5745 MHz	Reduced[1]
		157 – 5785 MHz	Reduced[1]
		165 – 5825 MHz	Reduced[1]
	Side B	149 – 5745 MHz	Reduced[1]
		157 – 5785 MHz	Reduced[1]
		165 – 5825 MHz	Reduced[1]
	Side C	149 – 5745 MHz	Reduced[1]
		157 – 5785 MHz	Reduced[1]
		165 – 5825 MHz	Reduced[1]
	Side D	149 – 5745 MHz	Reduced[2]
		157 – 5785 MHz	Reduced[2]
		165 – 5825 MHz	Reduced[2]
	Side E	149 – 5745 MHz	Reduced[2]
		157 – 5785 MHz	Reduced[2]
		165 – 5825 MHz	Reduced[2]
	Side F	149 – 5745 MHz	Reduced[1]
		157 – 5785 MHz	Reduced[1]
		165 – 5825 MHz	Reduced[1]

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 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 >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 reported SAR is >0.4 W/kg, test the next highest configuration until the SAR value is ≤ 0.8 W/kg per KDB 248227 D01 v02r02 section 5.1.1 2) page 9.

Maximum power: 25.1 mW
Closest Distance to Side D: 57 mm
Closest Distance to Side E: 49 mm

The closest distance is from Side E. Therefore, if Side E is excluded then Side D would also be excluded.

[(25.1 mW)/(49 mm)]*√5.825=1.23 which is equal to or less than 3.0.

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Figure 10.6 Test Reduction Table – WiFi 5.8 GHz Chain 1

Mode	Side	Required Channel	Tested/Reduced
802.11a 5800 MHz	Side A	149 – 5745 MHz	Reduced[1]
		157 – 5785 MHz	Tested
		165 – 5825 MHz	Reduced[1]
	Side B	149 – 5745 MHz	Reduced[2]
		157 – 5785 MHz	Reduced[2]
		165 – 5825 MHz	Reduced[2]
	Side C	149 – 5745 MHz	Reduced[1]
		157 – 5785 MHz	Tested
		165 – 5825 MHz	Reduced[1]
	Side D	149 – 5745 MHz	Reduced[1]
		157 – 5785 MHz	Tested
		165 – 5825 MHz	Reduced[1]
	Side E	149 – 5745 MHz	Reduced[2]
		157 – 5785 MHz	Reduced[2]
		165 – 5825 MHz	Reduced[2]
	Side F	149 – 5745 MHz	Reduced[1]
		157 – 5785 MHz	Tested
		165 – 5825 MHz	Reduced[1]
802.11n 5800 MHz	Side A	149 – 5745 MHz	Reduced[1]
		157 – 5785 MHz	Reduced[1]
		165 – 5825 MHz	Reduced[1]
	Side B	149 – 5745 MHz	Reduced[2]
		157 – 5785 MHz	Reduced[2]
		165 – 5825 MHz	Reduced[2]
	Side C	149 – 5745 MHz	Reduced[1]
		157 – 5785 MHz	Reduced[1]
		165 – 5825 MHz	Reduced[1]
	Side D	149 – 5745 MHz	Reduced[1]
		157 – 5785 MHz	Reduced[1]
		165 – 5825 MHz	Reduced[1]
	Side E	149 – 5745 MHz	Reduced[2]
		157 – 5785 MHz	Reduced[2]
		165 – 5825 MHz	Reduced[2]
	Side F	149 – 5745 MHz	Reduced[1]
		157 – 5785 MHz	Reduced[1]
		165 – 5825 MHz	Reduced[1]

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 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 >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 reported SAR is >0.4 W/kg, test the next highest configuration until the SAR value is ≤ 0.8 W/kg per KDB 248227 D01 v02r02 section 5.1.1 2) page 9.

Maximum power: 25.1 mW
Closest Distance to Side D: 57 mm
Closest Distance to Side E: 49 mm

The closest distance is from Side E. Therefore, if Side E is excluded then Side D would also be excluded.

[(25.1 mW)/(49 mm)]*√5.825=1.23 which is equal to or less than 3.0.

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Figure 10.7 Test Reduction Table – 3G 850 MHz

Band/ Frequency (MHz)	Technology	Side	Required Channel	Tested/ Reduced
Band 5 824-849 MHz	WCDMA	Side A	4132	Tested
			4183	Tested
			4233	Tested
		Side B	4132	Reduced[1]
			4183	Tested
			4233	Reduced[1]
		Side C	4132	Reduced[1]
			4183	Tested
			4233	Reduced[1]
		Side D	4132	Reduced[1]
			4183	Tested
			4233	Reduced[1]
		Side E	4132	Reduced[1]
			4183	Tested
			4233	Reduced[1]
		Side F	4132	Reduced[2]
			4183	Reduced[2]
			4233	Reduced[2]
Band 4 1710-1755 MHz		Side A	1312	Tested
			1413	Tested
			1513	Tested
		Side B	1312	Reduced[1]
			1413	Tested
			1513	Reduced[1]
		Side C	1312	Reduced[1]
			1413	Tested
			1513	Reduced[1]
		Side D	1312	Reduced[1]
			1413	Tested
			1513	Reduced[1]
		Side E	1312	Reduced[1]
			1413	Tested
			1513	Reduced[1]
		Side F	1312	Reduced[2]
			1413	Reduced[2]
			1513	Reduced[2]
Band 2 1850-1910 MHz		Side A	9262	Tested
			9400	Tested
			9538	Tested
		Side B	9262	Reduced[1]
			9400	Tested
			9538	Reduced[1]
		Side C	9262	Reduced[1]
			9400	Tested
			9538	Reduced[1]
		Side D	9262	Reduced[1]
			9400	Tested
			9538	Reduced[1]
		Side E	9262	Reduced[1]
			9400	Tested
			9538	Reduced[1]
		Side F	9262	Reduced[2]
			9400	Reduced[2]
			9538	Reduced[2]

Reduced[1] – When the mid channel is 3 dB below the limit, the remaining channels are not required per KDB 447498 D01 v06 section 4.3.3 page 14.

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.

Maximum power: 251.2 mW
Closest Distance to Side F: 97 mm

[{[(3.0)/(√0.849)]*50 mm}]+[{97-50 mm}*10]=632 mW which is greater than 251.2 mW
[{[(3.0)/(√1.755)]*50 mm}]+[{97-50 mm}*10]=583 mW which is greater than 251.2 mW
[{[(3.0)/(√1.91)]*50 mm}]+[{97-50 mm}*10]=578 mW which is greater than 251.2 mW

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10.5 SAR Measurement Conditions for LTE Bands

10.5.1 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
5	1.4, 3, 5, 10	824-849 MHz
13	5, 10	777-787 MHz
66	1.4, 3, 5, 10, 15, 20	1710-1780 MHz

10.5.2 Test Conditions

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

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

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Table 10.5.1 LTE Power Measurements

Band	Bandwidth	RB	Offset	Channel	Freq.	Max Tune Up	QPSK	16QAM
Band 13 Ant 0	5	1	0	23205	779.5	MIN = 21.3 dBm NOM = 23.0 dBm MAX = 24.0 dBm	23.26	22.71
				23230	782		23.28	22.90
				23255	784.5		23.73	22.88
		1	12	23205	779.5		23.11	22.47
				23230	782		23.83	23.03
				23255	784.5		23.91	23.30
		1	24	23205	779.5		23.82	23.44
				23230	782		23.95	23.35
				23255	784.5		23.95	23.46
		12	0	23205	779.5		22.09	21.33
				23230	782		22.88	21.88
				23255	784.5		22.89	21.95
		12	6	23205	779.5		22.35	21.41
				23230	782		23.04	22.06
				23255	784.5		23.08	21.98
		12	13	23205	779.5		22.95	21.94
				23230	782		22.98	21.97
				23255	784.5		23.08	21.98
		25	0	23205	779.5		22.63	21.64
				23230	782		22.92	21.92
				23255	784.5		22.99	21.87
	10	1	0	23230	782	MIN = 21.3 dBm NOM = 23.0 dBm MAX = 24.0 dBm	23.15	22.34
		1	25	23230	782		23.98	23.02
		1	49	23230	782		23.88	22.90
		25	0	23230	782		22.79	21.74
		25	13	23230	782		22.94	21.85
		25	25	23230	782		22.83	21.76
		50	0	23230	782		22.88	21.68
	UL MCS Index	MCS Index 6 => QPSK, TBS 6				MIN =>	22.09	21.33
		MCS Index 11 => 16QAM, TBS 10				MAX =>	23.98	23.46

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Band	Bandwidth	RB	Offset	Channel	Freq.	Max Tune Up	QPSK	16QAM
Band 5 Ant 0	1.4	1	0	20407	824.7	MIN = 21.3 dBm NOM = 23.0 dBm MAX = 24.0 dBm	23.69	22.33
				20525	836.5		23.90	23.13
				20643	848.3		23.29	21.97
		1	3	20407	824.7		23.69	22.52
				20525	836.5		24.00	23.26
				20643	848.3		22.90	21.32
		1	5	20407	824.7		23.53	22.22
				20525	836.5		23.99	23.14
				20643	848.3		22.34	21.38
		3	0	20407	824.7		23.78	22.50
				20525	836.5		23.98	22.94
				20643	848.3		23.25	21.78
		3	1	20407	824.7		23.78	22.54
				20525	836.5		24.00	23.09
				20643	848.3		23.13	21.63
		3	3	20407	824.7		23.64	22.34
				20525	836.5		24.00	23.12
				20643	848.3		22.55	21.36
		6	0	20407	824.7		22.82	21.57
				20525	836.5		23.09	22.09
				20643	848.3		22.08	21.64
	3	1	0	20415	825.5	MIN = 21.3 dBm NOM = 23.0 dBm MAX = 24.0 dBm	23.75	22.66
				20525	836.5		23.93	22.87
				20635	847.5		23.81	22.35
		1	7	20415	825.5		23.71	22.42
				20525	836.5		24.00	23.06
				20635	847.5		23.66	22.24
		1	14	20415	825.5		23.65	22.32
				20525	836.5		24.00	22.61
				20635	847.5		22.40	21.38
		8	0	20415	825.5		22.91	21.63
				20525	836.5		23.12	22.18
				20635	847.5		22.89	21.44
		8	3	20415	825.5		22.85	21.64
				20525	836.5		23.13	22.30
				20635	847.5		22.78	21.38

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Band	Bandwidth	RB	Offset	Channel	Freq.	Max Tune Up	QPSK	16QAM
Band 5 Ant 0	3	8	7	20415	825.5	MIN = 21.3 dBm NOM = 23.0 dBm MAX = 24.0 dBm	22.78	21.59
				20525	836.5		23.21	22.27
				20635	847.5		22.26	21.91
		15	0	20415	825.5		22.84	21.62
				20525	836.5		23.13	22.17
				20635	847.5		22.55	21.33
	5	1	0	20425	826.5	MIN = 21.3 dBm NOM = 23.0 dBm MAX = 24.0 dBm	23.79	22.81
				20525	836.5		23.79	22.88
				20625	846.5		23.51	22.20
		1	12	20425	826.5		23.78	23.13
				20525	836.5		24.00	23.18
				20625	846.5		23.98	22.56
		1	24	20425	826.5		23.84	23.18
				20525	836.5		23.61	22.32
				20625	846.5		22.53	21.34
		12	0	20425	826.5		22.93	21.79
				20525	836.5		23.06	22.17
				20625	846.5		22.80	21.42
		12	6	20425	826.5		22.92	21.65
				20525	836.5		23.21	22.24
				20625	846.5		22.97	21.54
		12	13	20425	826.5		22.92	21.61
				20525	836.5		23.14	22.04
				20625	846.5		22.55	21.32
		25	0	20425	826.5		22.87	21.61
				20525	836.5		23.12	22.04
				20625	846.5		22.66	21.39
	10	1	0	20450	829	MIN = 21.3 dBm NOM = 23.0 dBm MAX = 24.0 dBm	23.81	23.11
				20525	836.5		23.79	23.48
				20600	844		23.28	22.53
		1	25	20450	829		23.94	23.44
				20525	836.5		23.95	23.11
				20600	844		23.50	22.77
		1	49	20450	829		23.82	23.37
				20525	836.5		22.95	22.16
				20600	844		22.91	21.86
		25	0	20450	829		22.90	21.80
				20525	836.5		22.86	21.83
				20600	844		22.32	21.31

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Band	Bandwidth	RB	Offset	Channel	Freq.	Max Tune Up	QPSK	16QAM
Band 5 Ant 0	10	25	13	20450	829	MIN = 21.3 dBm NOM = 23.0 dBm MAX = 24.0 dBm	22.72	22.00
				20525	836.5		22.87	22.08
				20600	844		22.60	21.31
		25	25	20450	829		22.92	21.84
				20525	836.5		22.87	21.57
				20600	844		22.74	21.37
		50	0	20450	829		22.86	21.92
				20525	836.5		22.98	21.93
				20600	844		22.54	21.32
	UL MCS Index	MCS Index 6 => QPSK, TBS 6				MIN =>	22.08	21.31
		MCS Index 11 => 16QAM, TBS 10				MAX =>	24.00	23.48

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Band	Bandwidth	RB	Offset	Channel	Freq.	Max Tune Up	QPSK	16QAM
Band 4 Ant 0	3	1	0	19965	1711.5	MIN = 20.3 dBm NOM = 22.0 dBm MAX = 23.0 dBm	21.97	21.30
				20175	1732.5		22.94	22.16
				20385	1753.5		22.82	21.71
		1	7	19965	1711.5		23.13	21.83
				20175	1732.5		23.48	22.74
				20385	1753.5		23.34	22.00
		1	14	19965	1711.5		22.19	21.67
				20175	1732.5		23.35	22.52
				20385	1753.5		23.36	22.58
		8	0	19965	1711.5		22.38	21.70
				20175	1732.5		23.40	22.60
				20385	1753.5		23.85	22.59
		8	3	19965	1711.5		22.49	21.77
				20175	1732.5		23.41	22.64
				20385	1753.5		23.78	22.85
		8	7	19965	1711.5		22.53	21.76
				20175	1732.5		23.08	22.55
				20385	1753.5		23.58	22.04
		15	0	19965	1711.5		22.34	21.55
				20175	1732.5		23.20	22.58
				20385	1753.5		23.58	22.92
	5	1	0	19975	1712.5	MIN = 20.3 dBm NOM = 22.0 dBm MAX = 23.0 dBm	22.87	21.35
				20175	1732.5		23.01	22.95
				20375	1752.5		23.41	22.26
		1	12	19975	1712.5		22.28	21.98
				20175	1732.5		23.48	22.49
				20375	1752.5		23.64	22.68
		1	24	19975	1712.5		22.59	22.03
				20175	1732.5		23.08	22.12
				20375	1752.5		22.55	21.72
		12	0	19975	1712.5		22.44	21.60
				20175	1732.5		23.42	22.31
				20375	1752.5		23.58	22.76
		12	6	19975	1712.5		22.62	21.76
				20175	1732.5		23.37	22.63
				20375	1752.5		23.72	22.92

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Band	Bandwidth	RB	Offset	Channel	Freq.	Max Tune Up	QPSK	16QAM
Band 4 Ant 0	5	12	13	19975	1712.5	MIN = 20.3 dBm NOM = 22.0 dBm MAX = 23.0 dBm	22.77	21.91
				20175	1732.5		23.25	22.51
				20375	1752.5		23.05	22.00
		25	0	19975	1712.5		22.33	21.56
				20175	1732.5		22.96	22.30
				20375	1752.5		23.37	22.62
	10	1	0	20000	1715	MIN = 20.3 dBm NOM = 22.0 dBm MAX = 23.0 dBm	23.97	21.39
				20175	1732.5		23.57	22.54
				20350	1750		23.49	22.77
		1	25	20000	1715		22.73	22.29
				20175	1732.5		23.87	22.50
				20350	1750		23.59	22.35
		1	49	20000	1715		23.09	22.14
				20175	1732.5		23.52	22.87
				20350	1750		23.21	22.83
		25	0	20000	1715		22.56	21.62
				20175	1732.5		23.18	22.32
				20350	1750		22.94	22.40
		25	13	20000	1715		21.96	21.32
				20175	1732.5		23.06	22.22
				20350	1750		23.19	22.38
		25	25	20000	1715		22.46	21.60
				20175	1732.5		22.87	22.06
				20350	1750		23.38	22.57
		50	0	20000	1715		22.80	21.87
				20175	1732.5		22.69	21.89
				20350	1750		22.89	21.96
	15	1	0	20025	1717.5	MIN = 20.3 dBm NOM = 22.0 dBm MAX = 23.0 dBm	22.27	21.73
				20175	1732.5		23.10	22.57
				20325	1747.5		23.14	22.49
		1	37	20025	1717.5		23.45	22.96
				20175	1732.5		23.17	22.35
				20325	1747.5		23.43	22.50
		1	74	20025	1717.5		23.14	22.42
				20175	1732.5		22.86	22.01
				20325	1747.5		23.15	22.03
		36	0	20025	1717.5		22.89	21.33
				20175	1732.5		23.33	22.50
				20325	1747.5		22.75	21.95

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Band	Bandwidth	RB	Offset	Channel	Freq.	Max Tune Up	QPSK	16QAM
Band 4 Ant 0	15	36	19	20025	1717.5	MIN = 20.3 dBm NOM = 22.0 dBm MAX = 23.0 dBm	22.55	21.64
				20175	1732.5		23.08	22.29
				20325	1747.5		23.02	22.22
		36	39	20025	1717.5		23.07	22.20
				20175	1732.5		22.82	22.04
				20325	1747.5		23.36	22.37
		75	0	20025	1717.5		22.36	21.31
				20175	1732.5		22.78	21.79
				20325	1747.5		22.71	21.76
	20	1	0	20050	1720	MIN = 20.3 dBm NOM = 22.0 dBm MAX = 23.0 dBm	22.52	21.91
				20175	1732.5		22.80	22.93
				20300	1745		22.69	22.35
		1	49	20050	1720		23.66	22.43
				20175	1732.5		23.73	22.06
				20300	1745		23.32	22.20
		1	99	20050	1720		22.44	21.61
				20175	1732.5		22.86	21.77
				20300	1745		22.59	21.95
		50	0	20050	1720		22.70	21.31
				20175	1732.5		23.13	22.31
				20300	1745		22.90	21.67
		50	25	20050	1720		23.35	21.94
				20175	1732.5		23.27	22.03
				20300	1745		23.03	21.32
		50	50	20050	1720		23.52	22.16
				20175	1732.5		22.95	21.70
				20300	1745		23.33	22.02
		100	0	20050	1720		23.08	21.54
				20175	1732.5		23.18	21.85
				20300	1745		23.05	21.70
	UL MCS Index	MCS Index 6 => QPSK, TBS 6				MIN =>	21.96	21.30
		MCS Index 11 => 16QAM, TBS 10				MAX =>	23.97	22.96

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Band	Bandwidth	RB	Offset	Channel	Freq.	Max Tune Up	QPSK	16QAM
Band 66 Ant 0	3	1	0	131987	1711.5	MIN = 20.3 dBm NOM = 22.0 dBm MAX = 23.0 dBm	22.81	21.92
				132322	1745		22.48	21.31
				132657	1778.5		22.18	21.32
		1	7	131987	1711.5		22.10	22.00
				132322	1745		22.57	21.76
				132657	1778.5		22.31	21.96
		1	14	131987	1711.5		22.60	21.33
				132322	1745		22.43	21.36
				132657	1778.5		22.07	21.37
		8	0	131987	1711.5		22.07	21.34
				132322	1745		22.92	21.31
				132657	1778.5		22.36	21.31
		8	3	131987	1711.5		22.06	21.34
				132322	1745		21.92	21.36
				132657	1778.5		22.43	21.32
		8	7	131987	1711.5		21.97	21.99
				132322	1745		21.92	21.81
				132657	1778.5		22.70	21.39
		15	0	131987	1711.5		22.11	21.38
				132322	1745		22.09	21.94
				132657	1778.5		22.32	21.30
	5	1	0	131997	1712.5	MIN = 20.3 dBm NOM = 22.0 dBm MAX = 23.0 dBm	22.76	21.54
				132322	1745		22.67	21.67
				132647	1777.5		22.05	21.30
		1	12	131997	1712.5		22.34	21.38
				132322	1745		22.90	21.97
				132647	1777.5		22.16	21.94
		1	24	131997	1712.5		22.64	21.85
				132322	1745		22.50	21.55
				132647	1777.5		22.86	21.81
		12	0	131997	1712.5		22.20	21.88
				132322	1745		22.89	21.83
				132647	1777.5		22.40	21.39
		12	6	131997	1712.5		22.13	21.33
				132322	1745		22.11	21.88
				132647	1777.5		22.47	21.36
		12	13	131997	1712.5		22.21	21.94
				132322	1745		22.02	21.69
				132647	1777.5		22.32	21.39

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Band	Bandwidth	RB	Offset	Channel	Freq.	Max Tune Up	QPSK	16QAM
Band 66 Ant 0	5	25	0	131997	1712.5	MIN = 21.3 dBm NOM = 23.0 dBm MAX = 24.0 dBm	22.35	21.31
				132322	1745		22.52	21.73
				132647	1777.5		22.63	21.63
	10	1	0	132022	1715	MIN = 20.3 dBm NOM = 22.0 dBm MAX = 23.0 dBm	22.96	21.34
				132322	1745		22.03	21.44
				132622	1775		22.09	21.50
		1	25	132022	1715		22.86	22.04
				132322	1745		22.93	21.42
				132622	1775		22.37	21.46
		1	49	132022	1715		22.90	21.38
				132322	1745		22.92	21.51
				132622	1775		22.26	21.44
		25	0	132022	1715		22.84	21.77
				132322	1745		22.87	21.37
				132622	1775		22.10	21.37
		25	13	132022	1715		22.24	21.88
				132322	1745		22.45	21.69
				132622	1775		22.77	21.86
		25	25	132022	1715		22.09	21.77
				132322	1745		22.62	21.32
				132622	1775		22.59	21.72
		50	0	132022	1715		22.83	21.37
				132322	1745		22.10	21.88
				132622	1775		22.61	21.42
	15	1	0	132047	1717.5	MIN = 20.3 dBm NOM = 22.0 dBm MAX = 23.0 dBm	22.45	21.73
				132322	1745		22.44	21.60
				132597	1772.5		22.47	21.57
		1	37	132047	1717.5		23.05	21.83
				132322	1745		22.98	21.91
				132597	1772.5		22.35	21.40
		1	74	132047	1717.5		22.65	21.52
				132322	1745		22.18	21.75
				132597	1772.5		22.24	21.40
		36	0	132047	1717.5		22.14	21.86
				132322	1745		22.94	21.87
				132597	1772.5		22.33	21.86
		36	19	132047	1717.5		22.25	21.38
				132322	1745		22.02	21.83
				132597	1772.5		22.15	21.39

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Band	Bandwidth	RB	Offset	Channel	Freq.	Max Tune Up	QPSK	16QAM
Band 66 Ant 0	15	36	39	132047	1717.5	MIN = 20.3 dBm NOM = 22.0 dBm MAX = 23.0 dBm	22.93	21.93
				132322	1745		22.88	21.78
				132597	1772.5		22.26	21.82
		75	0	132047	1717.5		22.18	21.76
				132322	1745		22.24	21.56
				132597	1772.5		22.37	21.34
	20	1	0	132072	1720	MIN = 20.3 dBm NOM = 22.0 dBm MAX = 23.0 dBm	22.24	21.36
				132322	1745		22.16	21.34
				132572	1770		23.25	21.43
		1	49	132072	1720		23.11	21.98
				132322	1745		23.07	21.43
				132572	1770		22.57	21.56
		1	99	132072	1720		22.13	21.35
				132322	1745		22.14	21.32
				132572	1770		22.36	21.37
		50	0	132072	1720		22.28	21.39
				132322	1745		22.50	21.30
				132572	1770		23.08	21.36
		50	25	132072	1720		22.83	21.94
				132322	1745		22.37	21.37
				132572	1770		22.33	21.86
		50	50	132072	1720		22.51	21.41
				132322	1745		22.85	21.86
				132572	1770		22.70	21.77
		100	0	132072	1720		22.55	21.32
				132322	1745		22.97	21.44
				132572	1770		22.51	21.37
	UL MCS Index	MCS Index 6 => QPSK, TBS 6				MIN =>	21.92	21.30
		MCS Index 11 => 16QAM, TBS 10				MAX =>	23.25	22.04

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Band	Bandwidth	RB	Offset	Channel	Freq.	Max Tune Up	QPSK	16QAM
Band 2 Ant 0	3	1	0	18615	1851.5	MIN = 20.3 dBm NOM = 22.0 dBm MAX = 22.5 dBm	22.00	20.64
				18900	1880		22.00	20.83
				19185	1908.5		22.00	21.66
		1	7	18615	1851.5		22.00	21.60
				18900	1880		22.00	21.95
				19185	1908.5		22.00	20.64
		1	14	18615	1851.5		22.00	21.45
				18900	1880		22.00	20.54
				19185	1908.5		22.00	20.81
		8	0	18615	1851.5		21.77	20.46
				18900	1880		21.70	20.73
				19185	1908.5		21.78	20.34
		8	3	18615	1851.5		21.85	20.53
				18900	1880		21.85	20.79
				19185	1908.5		21.94	20.37
		8	7	18615	1851.5		21.74	20.53
				18900	1880		21.75	20.79
				19185	1908.5		21.69	20.91
		15	0	18615	1851.5		21.80	20.41
				18900	1880		21.89	20.78
				19185	1908.5		21.84	20.32
	5	1	0	18625	1852.5	MIN = 20.3 dBm NOM = 22.0 dBm MAX = 22.5 dBm	22.00	21.14
				18900	1880		22.00	21.10
				19175	1907.5		22.00	20.94
		1	12	18625	1852.5		21.89	20.32
				18900	1880		22.00	21.32
				19175	1907.5		22.00	21.82
		1	24	18625	1852.5		22.00	20.80
				18900	1880		22.00	20.94
				19175	1907.5		22.00	20.58
		12	0	18625	1852.5		21.67	20.36
				18900	1880		21.70	20.33
				19175	1907.5		21.68	20.35
		12	6	18625	1852.5		21.78	20.30
				18900	1880		21.79	20.44
				19175	1907.5		21.84	20.44
		12	13	18625	1852.5		21.69	20.36
				18900	1880		21.73	20.35
				19175	1907.5		21.85	20.34

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Band	Bandwidth	RB	Offset	Channel	Freq.	Max Tune Up	QPSK	16QAM
Band 2 Ant 0	5	25	0	18625	1852.5	MIN = 20.3 dBm NOM = 22.0 dBm MAX = 22.5 dBm	21.76	20.39
				18900	1880		21.69	20.43
				19175	1907.5		21.71	20.32
	10	1	0	18650	1855	MIN = 20.3 dBm NOM = 22.0 dBm MAX = 22.5 dBm	21.68	20.40
				18900	1880		21.69	20.58
				19150	1905		22.45	20.97
		1	25	18650	1855		21.83	21.27
				18900	1880		22.00	20.31
				19150	1905		22.00	20.36
		1	49	18650	1855		21.43	20.71
				18900	1880		21.48	20.52
				19150	1905		22.00	20.31
		25	0	18650	1855		21.06	20.36
				18900	1880		21.28	20.37
				19150	1905		21.03	20.79
		25	13	18650	1855		21.21	20.39
				18900	1880		21.47	20.42
				19150	1905		21.28	20.37
		25	25	18650	1855		21.89	20.89
				18900	1880		21.17	20.38
				19150	1905		21.97	20.38
		50	0	18650	1855		21.10	20.34
				18900	1880		21.20	20.35
				19150	1905		21.03	20.38
	15	1	0	18675	1857.5	MIN = 20.3 dBm NOM = 22.0 dBm MAX = 22.5 dBm	22.00	20.33
				18900	1880		22.00	21.58
				19125	1902.5		21.14	20.81
		1	37	18675	1857.5		22.00	21.45
				18900	1880		22.00	21.66
				19125	1902.5		22.00	21.45
		1	74	18675	1857.5		21.67	20.34
				18900	1880		22.00	21.67
				19125	1902.5		22.00	21.21
		36	0	18675	1857.5		21.27	20.31
				18900	1880		21.58	20.45
				19125	1902.5		21.85	20.57
		36	19	18675	1857.5		21.32	20.31
				18900	1880		21.59	20.51
				19125	1902.5		21.29	20.87

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Band	Bandwidth	RB	Offset	Channel	Freq.	Max Tune Up	QPSK	16QAM
Band 2 Ant 0	15	36	39	18675	1857.5	MIN = 20.3 dBm NOM = 22.0 dBm MAX = 22.5 dBm	21.21	20.34
				18900	1880		21.32	20.33
				19125	1902.5		21.20	20.34
		75	0	18675	1857.5		21.10	20.31
				18900	1880		21.49	20.30
				19125	1902.5		21.16	20.36
	20	1	0	18700	1860	MIN = 20.3 dBm NOM = 22.0 dBm MAX = 22.5 dBm	22.00	20.61
				18900	1880		22.00	21.72
				19100	1900		22.00	20.77
		1	49	18700	1860		22.00	21.47
				18900	1880		22.00	21.75
				19100	1900		21.57	20.64
		1	99	18700	1860		22.00	21.35
				18900	1880		22.00	21.33
				19100	1900		22.00	21.16
		50	0	18700	1860		21.57	20.31
				18900	1880		21.51	20.36
				19100	1900		21.91	20.32
		50	25	18700	1860		21.42	20.31
				18900	1880		21.56	20.37
				19100	1900		21.12	20.92
		50	50	18700	1860		21.07	20.95
				18900	1880		21.21	20.31
				19100	1900		21.10	20.95
		100	0	18700	1860		21.26	20.39
				18900	1880		21.25	20.34
				19100	1900		21.19	20.33
	UL MCS Index	MCS Index 6 => QPSK, TBS 6				MIN =>	21.03	20.30
		MCS Index 11 => 16QAM, TBS 10				MAX =>	22.84	21.95

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Table 10.5.2 Test Reduction Table – LTE

Band/ Frequency (MHz)	Side	Required Test Channel	Bandwidth	Modulation	RB Allocation	RB Offset	Tested/ Reduced
Band 2 1850-1910 MHz	A	18700	20 MHz	QPSK	50	0	Tested
		18900					Tested
		19100					Tested
		18700			100	0	Reduced[1]
		18900					Reduced[1]
		19100					Tested
		18700			1	49	Tested
		18900					Tested
		19100					Tested
		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]
	B	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.

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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	C	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[6]
		18900					Tested
		19100					Reduced[6]
		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]
	D	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[6]
		18900					Tested
		19100					Reduced[6]
		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.

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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	E	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[6]
		18900					Tested
		19100					Reduced[6]
		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.

Side F Reduced based on distance in KDB 447498 D01 v06 (See below calculations).

Maximum power: 251.2 mW
Closest Distance to Side F: 97 mm

[{[(3.0)/(√1.91)]*50 mm}]+[{97-50 mm}*10]=578 mW which is greater than 251.2 mW

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Band/ Frequency (MHz)	Side	Required Test Channel	Bandwidth	Modulation	RB Allocation	RB Offset	Tested/ Reduced
Band 66 1710-1780 MHz	A	132072	20 MHz	QPSK	50	25	Reduced[6]
		132322					Tested
		132572					Reduced[6]
		132072			100	0	Reduced[1]
		132322					Reduced[1]
		132572					Tested
		132072			1	49	Tested
		132322					Tested
		132572					Tested
		132072				99	Reduced[2]
		132322					Reduced[2]
		132572					Reduced[2]
		132072		16QAM	50	25	Reduced[3]
		132322					Reduced[3]
		132572					Reduced[3]
		132072			100	0	Reduced[1]
		132322					Reduced[1]
		132572					Reduced[1]
		132072			1	49	Reduced[4]
		132322					Reduced[4]
		132572					Reduced[4]
		132072				99	Reduced[4]
		132322					Reduced[4]
		132572					Reduced[4]
		All lower bandwidths (15 MHz, 10 MHz, 5 MHz, 3 MHz, 1.4 MHz)					Reduced[5]
	B	132072	20 MHz	QPSK	50	25	Reduced[6]
		132322					Tested
		132572					Reduced[6]
		132072			100	0	Reduced[1]
		132322					Reduced[1]
		132572					Reduced[1]
		132072			1	49	Reduced[6]
		132322					Tested
		132572					Reduced[6]
		132072				99	Reduced[2]
		132322					Reduced[2]
		132572					Reduced[2]
		132072		16QAM	50	25	Reduced[3]
		132322					Reduced[3]
		132572					Reduced[3]
		132072			100	0	Reduced[1]
		132322					Reduced[1]
		132572					Reduced[1]
		132072			1	49	Reduced[4]
		132322					Reduced[4]
		132572					Reduced[4]
		132072				99	Reduced[4]
		132322					Reduced[4]
		132572					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.

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Band/ Frequency (MHz)	Side	Required Test Channel	Bandwidth	Modulation	RB Allocation	RB Offset	Tested/ Reduced
Band 66 1710-1780 MHz	C	132072	20 MHz	QPSK	50	25	Reduced[6]
		132322					Tested
		132572					Reduced[6]
		132072			100	0	Reduced[1]
		132322					Reduced[1]
		132572					Reduced[1]
		132072			1	49	Reduced[6]
		132322					Tested
		132572					Reduced[6]
		132072				99	Reduced[2]
		132322					Reduced[2]
		132572					Reduced[2]
		132072		16QAM	50	25	Reduced[3]
		132322					Reduced[3]
		132572					Reduced[3]
		132072			100	0	Reduced[1]
		132322					Reduced[1]
		132572					Reduced[1]
		132072			1	49	Reduced[4]
		132322					Reduced[4]
		132572					Reduced[4]
		132072				99	Reduced[4]
		132322					Reduced[4]
		132572					Reduced[4]
		All lower bandwidths (15 MHz, 10 MHz, 5 MHz, 3 MHz, 1.4 MHz)					Reduced[5]
	D	132072	20 MHz	QPSK	50	25	Reduced[6]
		132322					Tested
		132572					Reduced[6]
		132072			100	0	Reduced[1]
		132322					Reduced[1]
		132572					Reduced[1]
		132072			1	49	Reduced[6]
		132322					Tested
		132572					Reduced[6]
		132072				99	Reduced[2]
		132322					Reduced[2]
		132572					Reduced[2]
		132072		16QAM	50	25	Reduced[3]
		132322					Reduced[3]
		132572					Reduced[3]
		132072			100	0	Reduced[1]
		132322					Reduced[1]
		132572					Reduced[1]
		132072			1	49	Reduced[4]
		132322					Reduced[4]
		132572					Reduced[4]
		132072				99	Reduced[4]
		132322					Reduced[4]
		132572					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.

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Band/ Frequency (MHz)	Side	Required Test Channel	Bandwidth	Modulation	RB Allocation	RB Offset	Tested/ Reduced
Band 66 1710-1780 MHz	E	132072	20 MHz	QPSK	50	25	Reduced[6]
		132322					Tested
		132572					Reduced[6]
		132072			100	0	Reduced[1]
		132322					Reduced[1]
		132572					Reduced[1]
		132072			1	49	Tested
		132322					Tested
		132572					Tested
		132072				99	Reduced[2]
		132322					Reduced[2]
		132572					Reduced[2]
		132072		16QAM	50	25	Reduced[3]
		132322					Reduced[3]
		132572					Reduced[3]
		132072			100	0	Reduced[1]
		132322					Reduced[1]
		132572					Reduced[1]
		132072			1	49	Reduced[4]
		132322					Reduced[4]
		132572					Reduced[4]
		132072				99	Reduced[4]
		132322					Reduced[4]
		132572					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.

Side F Reduced based on distance in KDB 447498 D01 v06 (See below calculations).

Maximum power: 251.2 mW
Closest Distance to Side F: 97 mm

[{[(3.0)/(√1.755)]*50 mm}]+[{97-50 mm}*10]=583 mW which is greater than 251.2 mW

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Band/ Frequency (MHz)	Side	Required Test Channel	Bandwidth	Modulation	RB Allocation	RB Offset	Tested/ Reduced
Band 5 824-849 MHz	A	20450	10 MHz	QPSK	25	12	Reduced[6]
		20525					Tested
		20600					Reduced[6]
		20450			50	0	Reduced[1]
		20525					Reduced[1]
		20600					Reduced[1]
		20450			1	24	Reduced[6]
		20525					Tested
		20600					Reduced[6]
		20450				49	Reduced[2]
		20525					Reduced[2]
		20600					Reduced[2]
		20450		16QAM	25	12	Reduced[3]
		20525					Reduced[3]
		20600					Reduced[3]
		20450			50	0	Reduced[1]
		20525					Reduced[1]
		20600					Reduced[1]
		20450			1	24	Reduced[4]
		20525					Reduced[4]
		20600					Reduced[4]
		20450				49	Reduced[4]
		20525					Reduced[4]
		20600					Reduced[4]
		All lower bandwidths (5 MHz)					Reduced[5]
	B	20450	10 MHz	QPSK	25	12	Reduced[6]
		20525					Tested
		20600					Reduced[6]
		20450			50	0	Reduced[1]
		20525					Reduced[1]
		20600					Reduced[1]
		20450			1	24	Reduced[6]
		20525					Tested
		20600					Reduced[6]
		20450				49	Reduced[2]
		20525					Reduced[2]
		20600					Reduced[2]
		20450		16QAM	25	12	Reduced[3]
		20525					Reduced[3]
		20600					Reduced[3]
		20450			50	0	Reduced[1]
		20525					Reduced[1]
		20600					Reduced[1]
		20450			1	24	Reduced[4]
		20525					Reduced[4]
		20600					Reduced[4]
		20450				49	Reduced[4]
		20525					Reduced[4]
		20600					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.

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Band/ Frequency (MHz)	Side	Required Test Channel	Bandwidth	Modulation	RB Allocation	RB Offset	Tested/ Reduced
Band 5 824-849 MHz	C	20450	10 MHz	QPSK	25	12	Reduced[6]
		20525					Tested
		20600					Reduced[6]
		20450			50	0	Reduced[1]
		20525					Reduced[1]
		20600					Reduced[1]
		20450			1	24	Reduced[6]
		20525					Tested
		20600					Reduced[6]
		20450				49	Reduced[2]
		20525					Reduced[2]
		20600					Reduced[2]
		20450		16QAM	25	12	Reduced[3]
		20525					Reduced[3]
		20600					Reduced[3]
		20450			50	0	Reduced[1]
		20525					Reduced[1]
		20600					Reduced[1]
		20450			1	24	Reduced[4]
		20525					Reduced[4]
		20600					Reduced[4]
		20450				49	Reduced[4]
		20525					Reduced[4]
		20600					Reduced[4]
		All lower bandwidths (5 MHz)					Reduced[5]
	D	20450	10 MHz	QPSK	25	12	Reduced[6]
		20525					Tested
		20600					Reduced[6]
		20450			50	0	Reduced[1]
		20525					Reduced[1]
		20600					Reduced[1]
		20450			1	12	Reduced[6]
		20525					Tested
		20600					Reduced[6]
		20450				24	Reduced[2]
		20525					Reduced[2]
		20600					Reduced[2]
		20450		16QAM	25	12	Reduced[3]
		20525					Reduced[3]
		20600					Reduced[3]
		20450			50	0	Reduced[1]
		20525					Reduced[1]
		20600					Reduced[1]
		20450			1	24	Reduced[4]
		20525					Reduced[4]
		20600					Reduced[4]
		20450				49	Reduced[4]
		20525					Reduced[4]
		20600					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.

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Band/ Frequency (MHz)	Side	Required Test Channel	Bandwidth	Modulation	RB Allocation	RB Offset	Tested/ Reduced
Band 5 824-849 MHz	E	20450	10 MHz	QPSK	25	12	Reduced[6]
		20525					Tested
		20600					Reduced[6]
		20450			50	0	Reduced[1]
		20525					Reduced[1]
		20600					Reduced[1]
		20450			1	12	Reduced[6]
		20525					Tested
		20600					Reduced[6]
		20450				24	Reduced[2]
		20525					Reduced[2]
		20600					Reduced[2]
		20450		16QAM	25	12	Reduced[3]
		20525					Reduced[3]
		20600					Reduced[3]
		20450			50	0	Reduced[1]
		20525					Reduced[1]
		20600					Reduced[1]
		20450			1	24	Reduced[4]
		20525					Reduced[4]
		20600					Reduced[4]
		20450				49	Reduced[4]
		20525					Reduced[4]
		20600					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.

Side F Reduced based on distance in KDB 447498 D01 v06 (See below calculations).

Maximum power: 251.2 mW
Closest Distance to Side F: 97 mm

[{[(3.0)/(√0.849)]*50 mm}]+[{97-50 mm}*10]=632 mW which is greater than 251.2 mW

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Band/ Frequency (MHz)	Side	Required Test Channel	Bandwidth	Modulation	RB Allocation	RB Offset	Tested/ Reduced
Band 13 777-787 MHz	A	23230	10 MHz	QPSK	25	12	Tested
		23230			50	0	Tested
		23230			1	24	Tested
		23230				49	Reduced[2]
		23230		16QAM	25	12	Reduced[3]
		23230			50	0	Reduced[1]
		23230			1	24	Reduced[4]
		23230				49	Reduced[4]
		All lower bandwidths (5 MHz)					Reduced[5]
	B	23230	10 MHz	QPSK	25	12	Tested
		23230			50	0	Reduced[1]
		23230			1	24	Tested
		23230				49	Reduced[2]
		23230		16QAM	25	12	Reduced[3]
		23230			50	0	Reduced[1]
		23230			1	24	Reduced[4]
		23230				49	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.

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Band/ Frequency (MHz)	Side	Required Test Channel	Bandwidth	Modulation	RB Allocation	RB Offset	Tested/ Reduced
Band 13 777-787 MHz	C	23230	10 MHz	QPSK	25	12	Tested
		23230			50	0	Reduced[1]
		23230			1	24	Tested
		23230				49	Reduced[2]
		23230		16QAM	25	12	Reduced[3]
		23230			50	0	Reduced[1]
		23230			1	24	Reduced[4]
		23230				49	Reduced[4]
		All lower bandwidths (5 MHz)					Reduced[5]
	D	23230	10 MHz	QPSK	25	12	Tested
		23230			50	0	Reduced[1]
		23230			1	24	Tested
		23230				49	Reduced[2]
		23230		16QAM	25	12	Reduced[3]
		23230			50	0	Reduced[1]
		23230			1	24	Reduced[4]
		23230				49	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.

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Band/ Frequency (MHz)	Side	Required Test Channel	Bandwidth	Modulation	RB Allocation	RB Offset	Tested/ Reduced
Band 13 777-787 MHz	E	23230	10 MHz	QPSK	25	12	Tested
		23230			50	0	Reduced[1]
		23230			1	24	Tested
		23230				49	Reduced[2]
		23230		16QAM	25	12	Reduced[3]
		23230			50	0	Reduced[1]
		23230			1	24	Reduced[4]
		23230				49	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.

Side F Reduced based on distance in KDB 447498 D01 v06 (See below calculations).

Maximum power: 251.2 mW
Closest Distance to Side F: 97 mm

[{[(3.0)/(√0.782)]*50 mm}]+[{97-50 mm}*10]=639 mW which is greater than 251.2 mW

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SAR Data Summary – 750 MHz Body – LTE Band 13

MEASUREMENT RESULTS

Gap	Plot	Position	Frequency		BW/ Modulation	RB Size	RB Offset	MPR Target	End Power (dBm)	Measured SAR (W/kg)	Reported SAR (W/kg)
			MHz	Ch.							
10 mm	1	Side A	782.0	23230	10 MHz/QPSK	1	25	0	23.98	0.890	0.89
	-----		782.0	23230	10 MHz/QPSK	25	13	1	22.94	0.767	0.78
	-----		782.0	23230	10 MHz/QPSK	50	0	1	22.88	0.651	0.67
	-----	Side B	782.0	23230	10 MHz/QPSK	1	25	0	23.98	0.543	0.55
	-----		782.0	23230	10 MHz/QPSK	25	13	1	22.94	0.439	0.45
	-----	Side C	782.0	23230	10 MHz/QPSK	1	25	0	23.98	0.795	0.80
	-----		782.0	23230	10 MHz/QPSK	25	13	1	22.94	0.643	0.65
	-----	Side D	782.0	23230	10 MHz/QPSK	1	25	0	23.98	0.257	0.26
	-----		782.0	23230	10 MHz/QPSK	25	13	1	22.94	0.199	0.20
	-----	Side E	782.0	23230	10 MHz/QPSK	1	25	0	23.98	0.172	0.17
	-----		782.0	23230	10 MHz/QPSK	25	13	1	22.94	0.121	0.12
	-----	Repeat	782.0	23230	10 MHz/QPSK	1	25	0	23.98	0.876	0.88

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

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

Jay M. Moulton
Vice President

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SAR Data Summary – 835 MHz Body - WCDMA

MEASUREMENT RESULTS										
Gap	Plot	Frequency		Modulation	Position	End Power	RMC	Test Set Up	Measured SAR	Reported SAR
		MHz	Ch.			(dBm)			(W/kg)	(W/kg)
10 mm	----	826.4	4132	WCDMA	Side A	23.70	12.2 kbps	Test Loop 1	0.685	0.73
	2	836.6	4183	WCDMA		24.00	12.2 kbps	Test Loop 1	0.817	0.82
	----	846.4	4233	WCDMA		23.70	12.2 kbps	Test Loop 1	0.685	0.73
	----	836.6	4183	WCDMA	Side B	24.00	12.2 kbps	Test Loop 1	0.445	0.45
	----	836.6	4183	WCDMA	Side C	24.00	12.2 kbps	Test Loop 1	0.720	0.72
	----	836.6	4183	WCDMA	Side D	24.00	12.2 kbps	Test Loop 1	0.309	0.31
	----	836.6	4183	WCDMA	Side E	24.00	12.2 kbps	Test Loop 1	0.164	0.16
	----	836.6	4183	WCDMA	Repeat	24.00	12.2 kbps	Test Loop 1	0.798	0.80
						Body 1.6 W/kg (mW/g) averaged over 1 gram				

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

Jay M. Moulton
Vice President

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SAR Data Summary – 835 MHz Body – LTE Band 5

MEASUREMENT RESULTS

Gap	Plot	Position	Frequency MHz	Frequency Ch.	BW/ Modulation	RB Size	RB Offset	MPR Target	End Power (dBm)	Measured SAR (W/kg)	Reported SAR (W/kg)
10 mm	3	Side A	836.5	20525	10 MHz/QPSK	1	25	0	23.95	0.623	0.63
	-----		836.5	20525	10 MHz/QPSK	25	13	1	22.87	0.494	0.51
	-----	Side B	836.5	20525	10 MHz/QPSK	1	25	0	23.95	0.344	0.35
	-----		836.5	20525	10 MHz/QPSK	25	13	1	22.87	0.283	0.29
	-----	Side C	836.5	20525	10 MHz/QPSK	1	25	0	23.95	0.437	0.44
	-----		836.5	20525	10 MHz/QPSK	25	13	1	22.87	0.338	0.35
	-----	Side D	836.5	20525	10 MHz/QPSK	1	25	0	23.95	0.227	0.23
	-----		836.5	20525	10 MHz/QPSK	25	13	1	22.87	0.186	0.19
	-----	Side E	836.5	20525	10 MHz/QPSK	1	25	0	23.95	0.247	0.25
	-----		836.5	20525	10 MHz/QPSK	25	13	1	22.87	0.171	0.18

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

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

Jay M. Moulton
Vice President

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SAR Data Summary – 1750 MHz Body - WCDMA

MEASUREMENT RESULTS

Gap	Plot	Frequency MHz	Frequency Ch.	Rev Level/ Modulation	Position	End Power (dBm)	RMC	Test Set Up	Measured SAR (W/kg)	Reported SAR (W/kg)
10 mm	----	1712.4	1312	WCDMA	Side A	23.83	12.2 kbps	Test Loop 1	0.733	0.76
	----	1732.6	1413	WCDMA		23.91	12.2 kbps	Test Loop 1	0.933	0.95
	4	1752.6	1513	WCDMA		23.97	12.2 kbps	Test Loop 1	1.17	1.18
	----	1732.6	1413	WCDMA	Side B	23.91	12.2 kbps	Test Loop 1	0.426	0.44
	----	1732.6	1413	WCDMA	Side C	23.91	12.2 kbps	Test Loop 1	0.355	0.36
	----	1732.6	1413	WCDMA	Side D	23.91	12.2 kbps	Test Loop 1	0.107	0.11
	----	1732.6	1413	WCDMA	Side E	23.91	12.2 kbps	Test Loop 1	0.517	0.53
	----	1752.6	1513	WCDMA	Repeat	23.91	12.2 kbps	Test Loop 1	1.15	1.17
						Body 1.6 W/kg (mW/g) averaged over 1 gram				

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

Jay M. Moulton
Vice President

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SAR Data Summary – 1750 MHz Body – LTE Band 66

MEASUREMENT RESULTS

Gap	Plot	Position	Frequency MHz	Frequency Ch.	BW/ Modulation	RB Size	RB Offset	MPR Target	End Power (dBm)	Measured SAR (W/kg)	Reported SAR (W/kg)
10 mm	-----	Side A	1720.0	132072	20 MHz/QPSK	1	49	0	23.00	0.852	0.85
	-----		1745.0	132322	20 MHz/QPSK	1	49	0	23.00	0.847	0.85
	5		1780.0	132572	20 MHz/QPSK	1	49	0	22.57	0.861	0.95
	-----		1745.0	132322	20 MHz/QPSK	50	25	1	22.37	0.712	0.82
	-----		1780.0	132572	20 MHz/QPSK	100	0	1	22.51	0.633	0.71
	-----	Side B	1745.0	132322	20 MHz/QPSK	1	49	0	23.00	0.364	0.36
	-----		1745.0	132322	20 MHz/QPSK	50	25	1	22.37	0.278	0.32
	-----	Side C	1745.0	132322	20 MHz/QPSK	1	49	0	23.00	0.349	0.35
	-----		1745.0	132322	20 MHz/QPSK	50	25	1	22.37	0.270	0.31
	-----	Side D	1745.0	132322	20 MHz/QPSK	1	49	0	23.00	0.0799	0.08
	-----		1745.0	132322	20 MHz/QPSK	50	25	1	22.37	0.0618	0.07
	-----	Side E	1720.0	132072	20 MHz/QPSK	1	49	0	23.00	0.675	0.68
	-----		1745.0	132322	20 MHz/QPSK	1	49	0	23.00	0.722	0.72
	-----		1780.0	132572	20 MHz/QPSK	1	49	0	22.57	0.697	0.77
	-----		1745.0	132322	20 MHz/QPSK	50	25	1	22.37	0.780	0.90
	-----	Repeat	1720.0	132072	20 MHz/QPSK	1	49	0	22.57	0.849	0.94

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

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

Jay M. Moulton
Vice President

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SAR Data Summary – 1900 MHz Body - WCDMA

MEASUREMENT RESULTS										
Gap	Plot	Frequency		Rev Level/ Modulation	Position	End Power	RMC	Test Set Up	Measured SAR	Reported SAR
		MHz	Ch.			(dBm)			(W/kg)	(W/kg)
10 mm	----	1852.4	9262	WCDMA	Side A	23.60	12.2 kbps	Test Loop 1	0.987	1.08
	----	1880.0	9400	WCDMA		23.70	12.2 kbps	Test Loop 1	1.01	1.08
	6	1907.6	9538	WCDMA		23.40	12.2 kbps	Test Loop 1	1.03	1.18
	----	1852.4	9262	WCDMA	Side B	23.70	12.2 kbps	Test Loop 1	0.669	0.72
	----	1880.0	9400	WCDMA	Side C	23.70	12.2 kbps	Test Loop 1	0.651	0.70
	----	1852.4	9262	WCDMA	Side D	23.70	12.2 kbps	Test Loop 1	0.0375	0.04
	----	1852.4	9262	WCDMA	Side E	23.70	12.2 kbps	Test Loop 1	0.609	0.65
	----	1907.6	9538	WCDMA	Repeat	23.40	12.2 kbps	Test Loop 1	1.01	1.16
						Body 1.6 W/kg (mW/g) averaged over 1 gram				

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

Jay M. Moulton
Vice President

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SAR Data Summary – 1900 MHz Body – LTE Band 2

MEASUREMENT RESULTS

Gap	Plot	Position	Frequency MHz	Frequency Ch.	BW/ Modulation	RB Size	RB Offset	MPR Target	End Power (dBm)	Measured SAR (W/kg)	Reported SAR (W/kg)
10 mm	-----	Side A	1860.0	18700	20 MHz/QPSK	1	49	0	22.39	0.777	0.80
	-----		1880.0	18900	20 MHz/QPSK	1	49	0	22.47	0.934	0.94
	7		1900.0	19100	20 MHz/QPSK	1	49	0	22.20	0.964	1.03
	-----		1860.0	18700	20 MHz/QPSK	50	25	1	21.42	0.650	0.74
	-----		1880.0	18900	20 MHz/QPSK	50	25	1	21.56	0.804	0.89
	-----		1900.0	19100	20 MHz/QPSK	50	25	1	21.12	0.768	0.94
	-----		1900.0	19100	20 MHz/QPSK	100	0	1	21.19	0.672	0.81
	-----	Side B	1880.0	18900	20 MHz/QPSK	1	49	0	22.47	0.454	0.46
	-----		1880.0	18900	20 MHz/QPSK	50	25	1	21.56	0.365	0.40
	-----	Side C	1880.0	18900	20 MHz/QPSK	1	49	0	22.47	0.654	0.66
	-----		1880.0	18900	20 MHz/QPSK	50	25	1	21.56	0.509	0.56
	-----	Side D	1880.0	18900	20 MHz/QPSK	1	49	0	22.47	0.0869	0.09
	-----		1880.0	18900	20 MHz/QPSK	50	25	1	21.56	0.0761	0.08
	-----	Side E	1860.0	18700	20 MHz/QPSK	1	49	0	22.39	0.674	0.69
	-----		1880.0	18900	20 MHz/QPSK	1	49	0	22.47	0.804	0.81
	-----		1900.0	19100	20 MHz/QPSK	1	49	0	22.20	0.630	0.68
	-----		1880.0	18900	20 MHz/QPSK	50	25	1	21.56	0.585	0.65
	-----	Repeat	1860.0	18700	20 MHz/QPSK	1	49	0	22.20	0.948	1.02

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

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

Jay M. Moulton
Vice President

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SAR Data Summary – 2450 MHz Body 802.11b

MEASUREMENT RESULTS									
Gap	Plot	Position	Frequency		Modulation	Antenna	End Power	Measured SAR (W/kg)	Reported SAR (W/kg)
			MHz	Ch.			(dBm)		
10 mm	-----	Side A	2437	6	DSSS	Tx0	13.4	0.0527	0.06
	-----	Side B	2437	6	DSSS		13.4	0.0562	0.07
	-----	Side C	2437	6	DSSS		13.4	0.0643	0.07
	-----	Side F	2437	6	DSSS		13.4	0.0302	0.04
	-----	Side A	2437	6	DSSS	Tx1	13.3	0.0418	0.05
	9	Side C	2437	6	DSSS		13.3	0.0990	0.12
	-----	Side D	2437	6	DSSS		13.3	0.0172	0.02
	-----	Side F	2437	6	DSSS		13.3	0.0299	0.04
							Body 1.6 W/kg (mW/g) averaged over 1 gram		

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

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Vice President

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SAR Data Summary – 5200 MHz Body 802.11a

MEASUREMENT RESULTS									
Gap	Plot	Position	Frequency		Modulation	Antenna	End Power	Measured SAR (W/kg)	Reported SAR (W/kg)
			MHz	Ch.			(dBm)		
10 mm	-----	Side A	5220	44	OFDM	Tx0	13.7	0.0548	0.06
	11	Side B	5220	44	OFDM		13.7	0.0851	0.09
	-----	Side C	5220	44	OFDM		13.7	0.125	0.13
	-----	Side F	5220	44	OFDM		13.7	0.0437	0.05
	-----	Side A	5220	44	OFDM	Tx1	13.6	0.0574	0.06
	-----	Side C	5220	44	OFDM		13.6	0.221	0.24
	-----	Side D	5220	44	OFDM		13.6	0.0149	0.02
	-----	Side F	5220	44	OFDM		13.6	0.0285	0.03
						Body 1.6 W/kg (mW/g) averaged over 1 gram			

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

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Vice President

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SAR Data Summary – 5800 MHz Body 802.11a

MEASUREMENT RESULTS									
Gap	Plot	Position	Frequency		Modulation	Antenna	End Power	Measured SAR (W/kg)	Reported SAR (W/kg)
			MHz	Ch.			(dBm)		
10 mm	-----	Side A	5785	157	OFDM	Tx0	13.9	0.0936	0.10
	-----	Side B	5785	157	OFDM		13.9	0.0506	0.05
	-----	Side C	5785	157	OFDM		13.9	0.0805	0.08
	-----	Side F	5785	157	OFDM		13.9	0.0948	0.10
	-----	Side A	5785	157	OFDM	Tx1	13.7	0.0447	0.05
	11	Side C	5785	157	OFDM		13.7	0.160	0.17
	-----	Side D	5785	157	OFDM		13.7	0.0214	0.02
	-----	Side F	5785	157	OFDM		13.7	0.0283	0.03
							Body 1.6 W/kg (mW/g) averaged over 1 gram		

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

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Vice President

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SAR Data Summary – Simultaneous Transmit (Worst Case) Ant 0 – WiFi

MEASUREMENT RESULTS								
Side	Frequency (WLAN)		Frequency (WWAN)		WWAN Technology	SAR (W/kg) WLAN	SAR (W/kg) WWAN	Total SAR (W/kg)
	MHz	Ch.	MHz	Ch.				
All	5520	44	1752.6	1512	WCDMA	0.24	1.18	1.42
					Body 1.6 W/kg (mW/g) averaged over 1 gram			

The sum of the two transmitters is less than the limit; therefore, the simultaneous transmission meets the requirements of KDB447498 D01 v06 section 4.3.2 page 11.

SAR Data Summary – Simultaneous Transmit (Worst Case) Ant 4 – WiFi

MEASUREMENT RESULTS								
Side	Frequency (WLAN)		Frequency (WWAN)		WWAN Technology	SAR (W/kg) WLAN	SAR (W/kg) WWAN	Total SAR (W/kg)
	MHz	Ch.	MHz	Ch.				
All	5520	44	3625.0	55990	LTE Band 48	0.24	0.67	0.91
					Body 1.6 W/kg (mW/g) averaged over 1 gram			

The sum of the two transmitters is less than the limit; therefore, the simultaneous transmission meets the requirements of KDB447498 D01 v06 section 4.3.2 page 11.

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SAR Data Summary – Body – LTE Bands 2, 4, 5, 13

MEASUREMENT RESULTS

Gap	Plot	Position	Frequency MHz	Frequency Ch.	BW/ Modulation	RB Size	RB Offset	MPR Target	End Power (dBm)	Measured SAR (W/kg)	Reported SAR (W/kg)
10 mm	-----	Side A	1900.0	19100	20 MHz/QPSK	1	49	0	20.61	0.658	0.72
	-----		1745.0	20300	20 MHz/QPSK	1	49	0	20.89	0.572	0.59
	-----		836.5	20525	20 MHz/QPSK	1	25	0	20.79	0.298	0.31
	-----		782.0	23230	20 MHz/QPSK	1	25	0	20.66	0.416	0.45

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

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

Jay M. Moulton
Vice President

SAR Data Summary – Simultaneous Transmit (Uplink CA)

MEASUREMENT RESULTS

Side	Frequency MHz	Frequency Ch.	Frequency MHz	Frequency Ch.	CA Combination	SAR_1 (W/kg)	SAR_2 (W/kg)	Total SAR (W/kg)
A	1900.0	19100	782.0	23230	2A-13A	0.72	0.45	1.17
	1745.0	20300	782.0	23230	4A-13A	0.59	0.45	1.04
	836.5	20525	836.5	20525	5B	0.31	0.31	0.62

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

The sum of the two transmitters is less than the limit; therefore, the simultaneous transmission meets the requirements of KDB447498 D01 v06 section 4.3.2 page 11.

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SAR Data Summary – Simultaneous Transmit 4G/WiFi/5G

MEASUREMENT RESULTS								
Side	Frequency (WLAN)		Frequency (WWAN)		WWAN Technology	SAR (W/kg) WLAN	SAR (W/kg) WWAN	Total SAR (W/kg)
	MHz	Ch.	MHz	Ch.				
All	5520	44	1900	19100	WCDMA	0.24	1.03	1.27
					Body 1.6 W/kg (mW/g) averaged over 1 gram			

The sum of the two transmitters is less than the limit; therefore, the simultaneous transmission meets the requirements of KDB447498 D01 v06 section 4.3.2 page 11.

In order to meet the simultaneous evaluation for all three transmitters, a volume scan was conducted on the highest SAR value for the WLAN and WWAN (anchor band). The final SAR value for simultaneous for 4G and WiFi is 1.05 W/kg. Please see plot 12 in appendix B for the simultaneous evaluation.

For the simultaneous evaluation for 4G/WiFi/5G, the ration of the SAR value for the 4G/WiFi to the limit and the ratio of the power density to the limit are added together. The sum must be less than 100%. Please see the calculations below for the evaluation.

SAR = 1.05 W/kg (Simultaneous Value)/1.6 W/kg (Limit) = 65.6%

Power Density = 0.188 mW/cm^2 (Measured Value)/1 mW/cm^2 (Limit) = 18.8%

The sum of the simultaneous ratio is 84.4%. Therefore, the simultaneous evaluation meets the requirements of KDB447498 v06.

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11. Test Equipment List

Table 11.1 Equipment Specifications

Type	Calibration Due Date	Calibration Done Date	Serial Number
Staubli Robot TX60L	N/A	N/A	F07/55M6A1/A/01
Measurement Controller CS8c	N/A	N/A	1012
ELI5 Flat Phantom	N/A	N/A	2037
Device Holder	N/A	N/A	N/A
Data Acquisition Electronics 4	01/10/2020	01/10/2019	1321
SPEAG E-Field Probe EX3DV4	04/20/2019	04/20/2018	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 D2450V2	07/12/2019	07/12/2018	829
Speag Validation Dipole D5GHzV2	07/19/2019	07/19/2018	1085
Agilent N1911A Power Meter	03/20/2020	03/20/2019	GB45100254
Agilent N1922A Power Sensor	06/21/2019	06/21/2017	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
Body Equivalent Matter (750 MHz)	N/A	N/A	N/A
Body Equivalent Matter (835 MHz)	N/A	N/A	N/A
Body Equivalent Matter (1750 MHz)	N/A	N/A	N/A
Body Equivalent Matter (1900 MHz)	N/A	N/A	N/A
Body Equivalent Matter (2450 MHz)	N/A	N/A	N/A
Body Equivalent Matter (3-5 GHz)	N/A	N/A	N/A

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12. Conclusion

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

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

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13. References

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

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

[3] ANSI/IEEE C95.3 – 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.

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Appendix A – System Validation Plots and Data

```
************************************************************
Test Result for UIM Dielectric Parameter
Tue 19/Feb/2019
Freq   Frequency(GHz)
FCC_eB Limits for Body Epsilon
FCC_sB Limits for Body Sigma
Test_e Epsilon  of  UIM
Test_s Sigma of UIM
************************************************************
Freq          FCC_eB FCC_sB Test_e Test_s
0.7000        55.73  0.96   54.68  0.97
0.7100        55.69  0.96   54.62  0.98
0.7200        55.65  0.96   54.57  0.99
0.7300        55.61  0.96   54.51  1.00
0.7400        55.57  0.96   54.47  1.01
0.7500        55.53  0.96   54.43  1.02
0.7600        55.49  0.96   54.39  1.03
0.7700        55.45  0.96   54.35  1.04
0.7800        55.41  0.97   54.31  1.05
0.7820        55.404 0.97   54.30  1.052*
0.7900        55.38  0.97   54.26  1.06
0.8000        55.34  0.97   54.21  1.06

* value interpolated

************************************************************
Test Result for UIM Dielectric Parameter
Tue 07/May/2019
Freq   Frequency(GHz)
FCC_eB Limits for Body Epsilon
FCC_sB Limits for Body Sigma
Test_e Epsilon  of  UIM
Test_s Sigma of UIM
************************************************************
Freq          FCC_eB FCC_sB Test_e Test_s
0.7000        55.73  0.96   55.72  0.97
0.7100        55.69  0.96   55.69  0.98
0.7200        55.65  0.96   55.66  0.98
0.7300        55.61  0.96   55.63  0.98
0.7400        55.57  0.96   55.60  0.99
0.7500        55.53  0.96   55.57  0.99
0.7600        55.49  0.96   55.54  0.99
0.7700        55.45  0.96   55.50  1.00
0.7800        55.41  0.97   55.46  1.00
0.7820        55.404 0.97   55.452 1.00*
0.7900        55.38  0.97   55.42  1.00
0.8000        55.34  0.97   55.38  1.01

* value interpolated
```


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************************************************************
Test Result for UIM Dielectric Parameter
Fri 29/Mar/2019
Freq   Frequency(GHz)
FCC_eB Limits for Body Epsilon
FCC_sB Limits for Body Sigma
Test_e Epsilon  of  UIM
Test_s Sigma of UIM
************************************************************
Freq          FCC_eB FCC_sB Test_e Test_s
0.8050        55.32  0.97   54.72  0.96
0.8150        55.28  0.97   54.68  0.97
0.8250        55.24  0.97   54.63  0.98
0.8290        55.224 0.97   54.606 0.984*
0.8350        55.20  0.97   54.57  0.99
0.8365        55.195 0.972  54.564 0.992*
0.8450        55.17  0.98   54.53  1.00
0.8490        55.158 0.984  54.518 1.004*
0.8550        55.14  0.99   54.50  1.01
0.8650        55.11  1.01   54.47  1.02

* value interpolated

************************************************************
Test Result for UIM Dielectric Parameter
Tue 05/Mar/2019
Freq   Frequency(GHz)
FCC_eB Limits for Body Epsilon
FCC_sB Limits for Body Sigma
Test_e Epsilon  of  UIM
Test_s Sigma of UIM
************************************************************
Freq          FCC_eB FCC_sB Test_e Test_s
0.8050        55.32  0.97   54.24  0.94
0.8150        55.28  0.97   54.28  0.95
0.8250        55.24  0.97   54.33  0.96
0.8264        55.234 0.97   54.336 0.963*
0.8350        55.20  0.97   54.37  0.98
0.8366        55.195 0.972  54.375 0.982*
0.8450        55.17  0.98   54.40  0.99
0.8466        55.165 0.982  54.406 0.995*
0.8550        55.14  0.99   54.44  1.02
0.8650        55.11  1.01   54.48  1.04

* value interpolated
```


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************************************************************
Test Result for UIM Dielectric Parameter
Tue 07/May/2019
Freq   Frequency(GHz)
FCC_eB Limits for Body Epsilon
FCC_sB Limits for Body Sigma
Test_e Epsilon  of  UIM
Test_s Sigma of UIM
************************************************************
Freq          FCC_eB FCC_sB Test_e Test_s
0.8050        55.32  0.97   56.05  0.96
0.8150        55.28  0.97   56.00  0.98
0.8250        55.24  0.97   55.95  0.98
0.8350        55.20  0.97   55.91  0.99
0.8365        55.196 0.972  55.905 0.991*
0.8550        55.14  0.99   55.84  1.00
0.8650        55.11  1.01   55.80  1.01
0.8750        55.08  1.02   55.78  1.03
0.8850        55.05  1.03   55.73  1.03
0.8950        55.02  1.04   55.70  1.04

* value interpolated

************************************************************
Test Result for UIM Dielectric Parameter
Thu 21/Feb/2019
Freq   Frequency(GHz)
FCC_eB Limits for Body Epsilon
FCC_sB Limits for Body Sigma
Test_e Epsilon  of  UIM
Test_s Sigma of UIM
************************************************************
Freq          FCC_eB FCC_sB Test_e Test_s
1.6900        53.59  1.45   52.87  1.49
1.7000        53.56  1.46   52.83  1.50
1.7100        53.54  1.46   52.79  1.51
1.7200        53.51  1.47   52.76  1.52
1.7300        53.48  1.48   52.72  1.53
1.7400        53.46  1.48   52.68  1.53
1.7450        53.445 1.485  52.67  1.535*
1.7500        53.43  1.49   52.66  1.54
1.7600        53.41  1.49   52.64  1.54
1.7700        53.38  1.50   52.63  1.55
1.7800        53.35  1.51   52.59  1.56
1.7900        53.33  1.51   52.56  1.57

* value interpolated
```


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```
************************************************************
Test Result for UIM Dielectric Parameter
Wed 06/Mar/2019
Freq   Frequency(GHz)
FCC_eB Limits for Body Epsilon
FCC_sB Limits for Body Sigma
Test_e Epsilon  of  UIM
Test_s Sigma of UIM
************************************************************
Freq          FCC_eB FCC_sB Test_e Test_s
1.6900        53.59  1.45   52.89  1.51
1.7000        53.56  1.46   52.85  1.52
1.7100        53.54  1.46   52.81  1.53
1.7124        53.533 1.462  52.803 1.532*
1.7200        53.51  1.47   52.78  1.54
1.7300        53.48  1.48   52.74  1.55
1.7326        53.475 1.48   52.73  1.55*
1.7400        53.46  1.48   52.70  1.55
1.7500        53.43  1.49   52.68  1.56
1.7526        53.425 1.49   52.675 1.56*
1.7600        53.41  1.49   52.66  1.56
1.7700        53.38  1.50   52.65  1.57
1.7800        53.35  1.51   52.61  1.58
1.7900        53.33  1.51   52.58  1.59

* value interpolated

************************************************************
Test Result for UIM Dielectric Parameter
Tue 07/May/2019
Freq   Frequency(GHz)
FCC_eB Limits for Body Epsilon
FCC_sB Limits for Body Sigma
Test_e Epsilon  of  UIM
Test_s Sigma of UIM
************************************************************
Freq          FCC_eB FCC_sB Test_e Test_s
1.7100        53.53  1.47   53.55  1.48
1.7200        53.51  1.47   53.52  1.49
1.7300        53.48  1.48   53.38  1.50
1.7400        53.46  1.48   53.36  1.51
1.7450        53.445 1.485  53.34  1.515*
1.7500        53.43  1.49   53.32  1.52
1.7600        53.41  1.49   53.30  1.53
1.7700        53.38  1.50   53.27  1.55
1.7800        53.35  1.51   53.23  1.55

* value interpolated
```


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```
************************************************************
Test Result for UIM Dielectric Parameter
Mon 11/Feb/2019
Freq   Frequency(GHz)
FCC_eB Limits for Body Epsilon
FCC_sB Limits for Body Sigma
Test_e Epsilon  of  UIM
Test_s Sigma of UIM
************************************************************
Freq          FCC_eB FCC_sB Test_e Test_s
1.8500        53.30  1.52   53.07  1.53
1.8600        53.30  1.52   53.05  1.54
1.8700        53.30  1.52   53.03  1.55
1.8800        53.30  1.52   53.01  1.56
1.8900        53.30  1.52   52.99  1.57
1.9000        53.30  1.52   52.97  1.58
1.9100        53.30  1.52   52.95  1.60
1.9200        53.30  1.52   52.94  1.61
1.9300        53.30  1.52   52.92  1.62

* value interpolated

************************************************************
Test Result for UIM Dielectric Parameter
Mon 04/Mar/2019
Freq   Frequency(GHz)
FCC_eB Limits for Body Epsilon
FCC_sB Limits for Body Sigma
Test_e Epsilon  of  UIM
Test_s Sigma of UIM
************************************************************
Freq          FCC_eB FCC_sB Test_e Test_s
1.8500        53.30  1.52   53.27  1.49
1.8524        53.30  1.52   53.265 1.492*
1.8600        53.30  1.52   53.25  1.50
1.8700        53.30  1.52   53.23  1.51
1.8800        53.30  1.52   53.21  1.52
1.8900        53.30  1.52   53.19  1.53
1.9000        53.30  1.52   53.17  1.54
1.9076        53.30  1.52   53.155 1.548*
1.9100        53.30  1.52   53.15  1.55
1.9200        53.30  1.52   53.14  1.57
1.9300        53.30  1.52   53.12  1.58

* value interpolated
```


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```
************************************************************
Test Result for UIM Dielectric Parameter
Tue 07/May/2019
Freq   Frequency(GHz)
FCC_eB Limits for Body Epsilon
FCC_sB Limits for Body Sigma
Test_e Epsilon  of  UIM
Test_s Sigma of UIM
************************************************************
Freq          FCC_eB FCC_sB Test_e Test_s
1.8400        53.30  1.52   52.04  1.43
1.8500        53.30  1.52   52.03  1.44
1.8600        53.30  1.52   52.03  1.44
1.8700        53.30  1.52   52.14  1.45
1.8800        53.30  1.52   52.10  1.45
1.8900        53.30  1.52   52.17  1.46
1.9000        53.30  1.52   52.07  1.47
1.9100        53.30  1.52   52.12  1.50
1.9200        53.30  1.52   52.00  1.50

* value interpolated

************************************************************
Test Result for UIM Dielectric Parameter
Wed 13/Mar/2019
Freq   Frequency(GHz)
FCC_eB Limits for Body Epsilon
FCC_sB Limits for Body Sigma
Test_e Epsilon  of  UIM
Test_s Sigma of UIM
************************************************************
Freq          FCC_eB FCC_sB Test_e Test_s
2.4100        52.75  1.91   52.66  1.95
2.4120        52.748 1.912  52.656 1.952*
2.4200        52.74  1.92   52.64  1.96
2.4300        52.73  1.93   52.62  1.97
2.4370        52.716 1.937  52.606 1.984*
2.4400        52.71  1.94   52.60  1.99
2.4500        52.70  1.95   52.58  2.00
2.4600        52.69  1.96   52.57  2.01
2.4620        52.686 1.964  52.566 2.012*
2.4700        52.67  1.98   52.55  2.02
2.4800        52.66  1.99   52.53  2.03

* value interpolated
```


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```
************************************************************
Test Result for UIM Dielectric Parameter
Mon 11/Mar/2019
Freq   Frequency(GHz)
FCC_eB Limits for Body Epsilon
FCC_sB Limits for Body Sigma
Test_e Epsilon  of  UIM
Test_s Sigma of UIM
************************************************************
```

Freq	FCC_eB	FCC_sB	Test_e	Test_s
5.1000	49.15	5.18	49.09	5.22
5.1200	49.12	5.21	49.06	5.25
5.1400	49.10	5.23	49.03	5.27
5.1600	49.07	5.25	49.00	5.29
5.1800	49.04	5.28	48.97	5.31
5.2000	49.01	5.30	48.94	5.34
5.2200	48.99	5.32	48.92	5.36
5.2400	48.96	5.35	48.89	5.38
5.2500	48.945	5.36	48.875	5.395*
5.2600	48.93	5.37	48.86	5.41
5.2800	48.91	5.39	48.84	5.43
5.3000	48.88	5.42	48.81	5.45
5.3200	48.85	5.44	48.78	5.48
5.3400	48.82	5.46	48.75	5.50
5.3600	48.80	5.49	48.72	5.52
5.3800	48.77	5.51	48.69	5.54
5.4000	48.74	5.53	48.66	5.57
5.4200	48.72	5.56	48.63	5.59
5.4400	48.69	5.58	48.60	5.61
5.4600	48.66	5.60	48.57	5.63
5.4800	48.63	5.63	48.54	5.66
5.5000	48.61	5.65	48.51	5.68
5.5200	48.58	5.67	48.48	5.70
5.5400	48.55	5.70	48.45	5.73
5.5600	48.53	5.72	48.42	5.75
5.5800	48.50	5.74	48.39	5.77
5.6000	48.47	5.77	48.36	5.80
5.6200	48.44	5.79	48.33	5.83
5.6400	48.42	5.81	48.30	5.85
5.6600	48.39	5.84	48.27	5.87
5.6800	48.36	5.86	48.24	5.90
5.7000	48.34	5.88	48.21	5.93
5.7200	48.31	5.91	48.18	5.95
5.7400	48.28	5.93	48.15	5.97
5.7450	48.273	5.935	48.143	5.978*
5.7500	48.265	5.94	48.135	5.985*
5.7600	48.25	5.95	48.12	6.00
5.7800	48.23	5.98	48.09	6.03
5.7850	48.223	5.985	48.08	6.033*
5.8000	48.20	6.00	48.05	6.04
5.8200	48.17	6.02	48.02	6.06
5.8250	48.165	6.028	48.013	6.068*
5.8400	48.15	6.05	47.99	6.09

* value interpolated

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RF Exposure Lab

Plot 1

DUT: Dipole 750 MHz D750V3; Type: D750V3; Serial: D750V3 - SN:1085

Communication System: CW; Frequency: 750 MHz; Duty Cycle: 1:1
Medium: MSL750; Medium parameters used: f = 750 MHz; σ = 1.02 S/m; ε_r = 54.43; ρ = 1000 kg/m^3
Phantom section: Flat Section

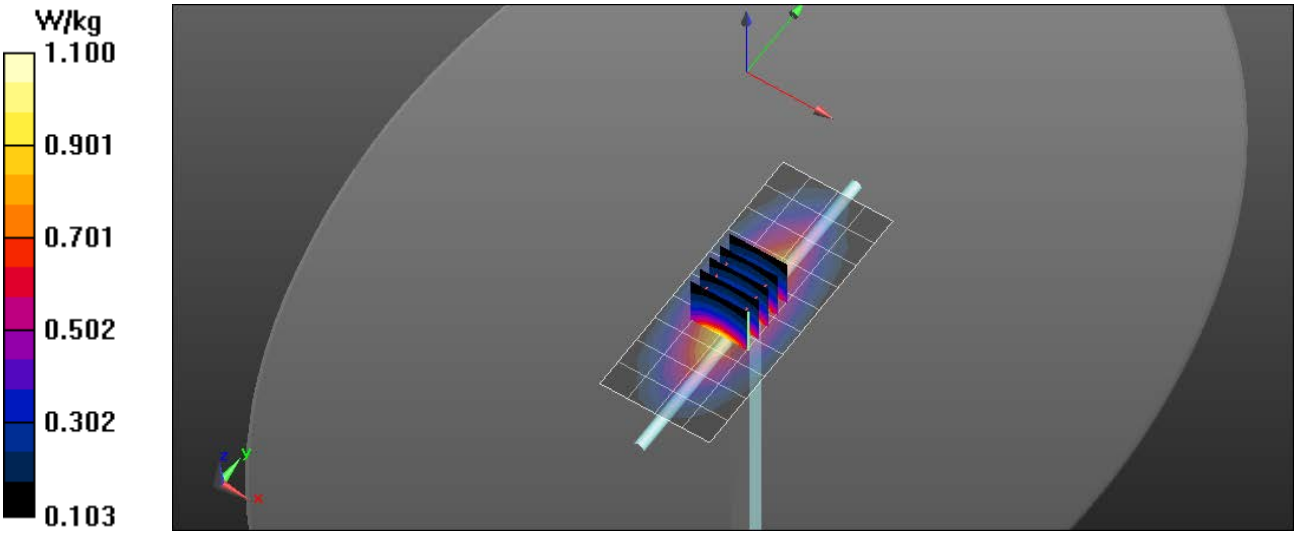
Test Date: Date: 2/19/2019; Ambient Temp: 23 °C; Tissue Temp: 21 °C

Probe: EX3DV4 - SN3662; ConvF(9.62, 9.62, 9.62); Calibrated: 4/20/2018;
Sensor-Surface: 2mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1321; Calibrated: 1/10/2019
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/Verification/Area Scan (5x11x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (measured) = 1.07 W/kg

750 MHz/Verification/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 30.367 V/m; Power Drift = 0.03 dB
Peak SAR (extrapolated) = 1.29 W/kg
SAR(1 g) = 0.861 W/kg; SAR(10 g) = 0.564 W/kg
Maximum value of SAR (measured) = 1.09 W/kg



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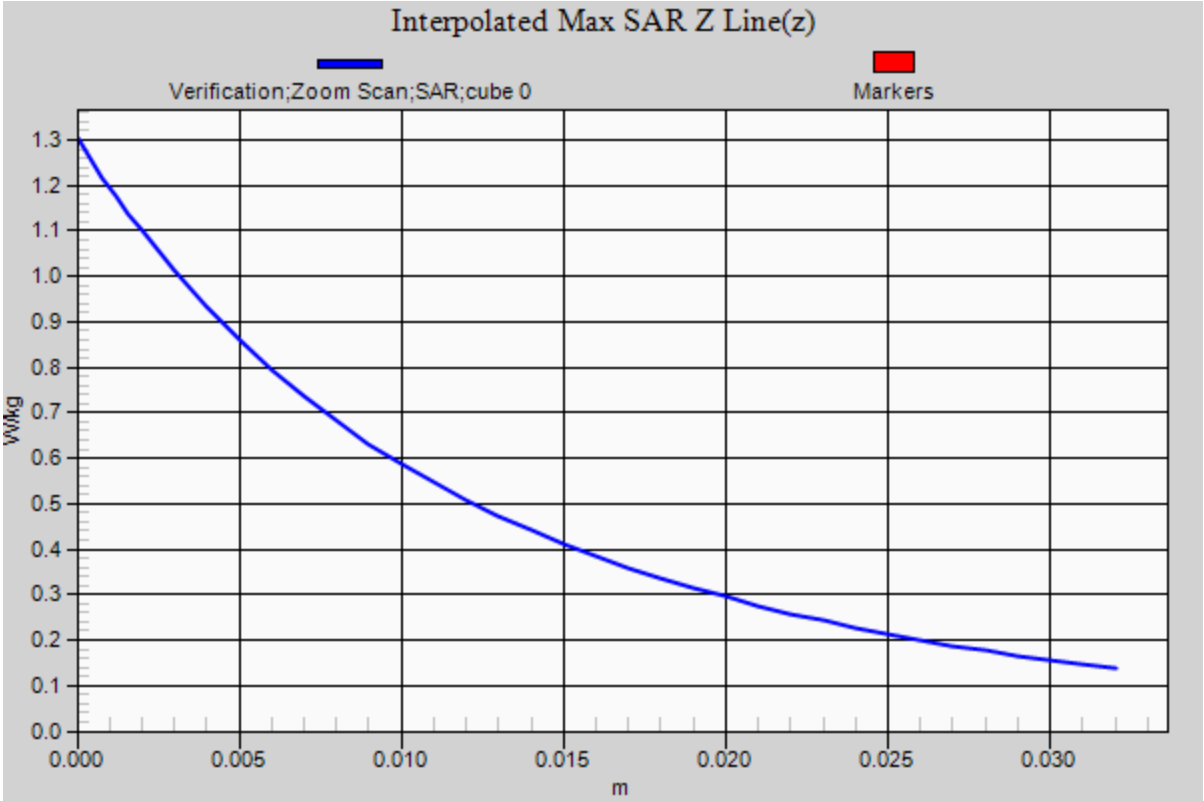

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RF Exposure Lab

Plot 2

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

Communication System: CW; Frequency: 835 MHz; Duty Cycle: 1:1
Medium: MSL835; Medium parameters used: f = 835 MHz; σ = 0.99 S/m; ε_r = 54.57; ρ = 1000 kg/m^3
Phantom section: Flat Section

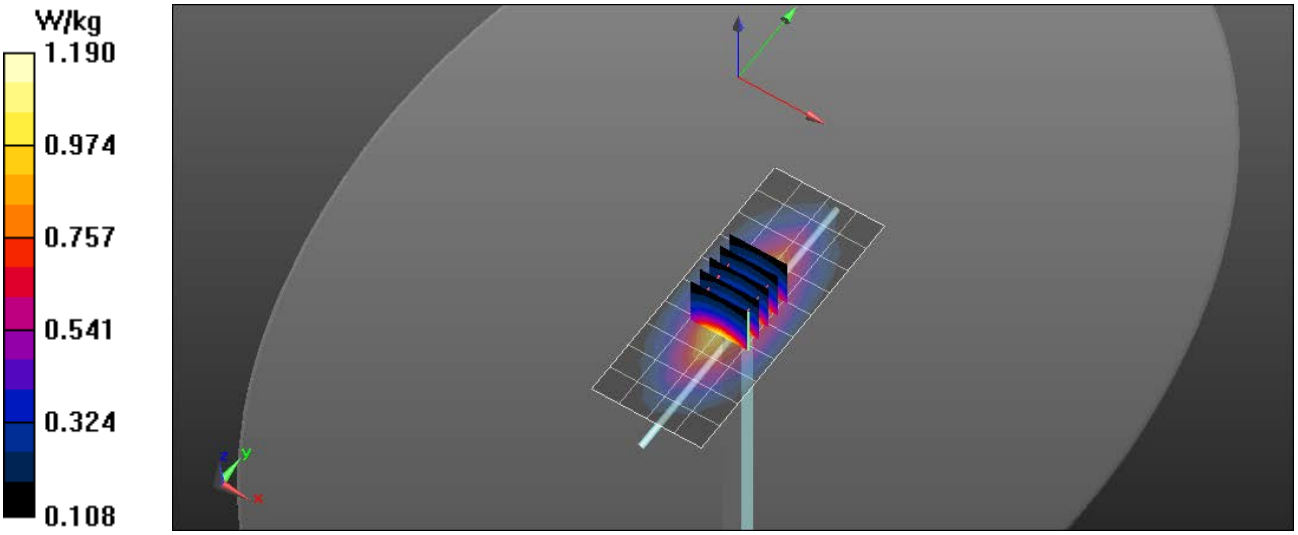
Test Date: Date: 2/18/2019; Ambient Temp: 23 °C; Tissue Temp: 21 °C

Probe: EX3DV4 - SN3662; ConvF(9.21, 9.21, 9.21); Calibrated: 4/20/2018;
Sensor-Surface: 2mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1321; Calibrated: 1/10/2019
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
Maximum value of SAR (measured) = 1.17 W/kg

835 MHz/Verification/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 30.589 V/m; Power Drift = -0.02 dB
Peak SAR (extrapolated) = 1.42 W/kg
SAR(1 g) = 0.961 W/kg; SAR(10 g) = 0.618 W/kg
Maximum value of SAR (measured) = 1.17 W/kg



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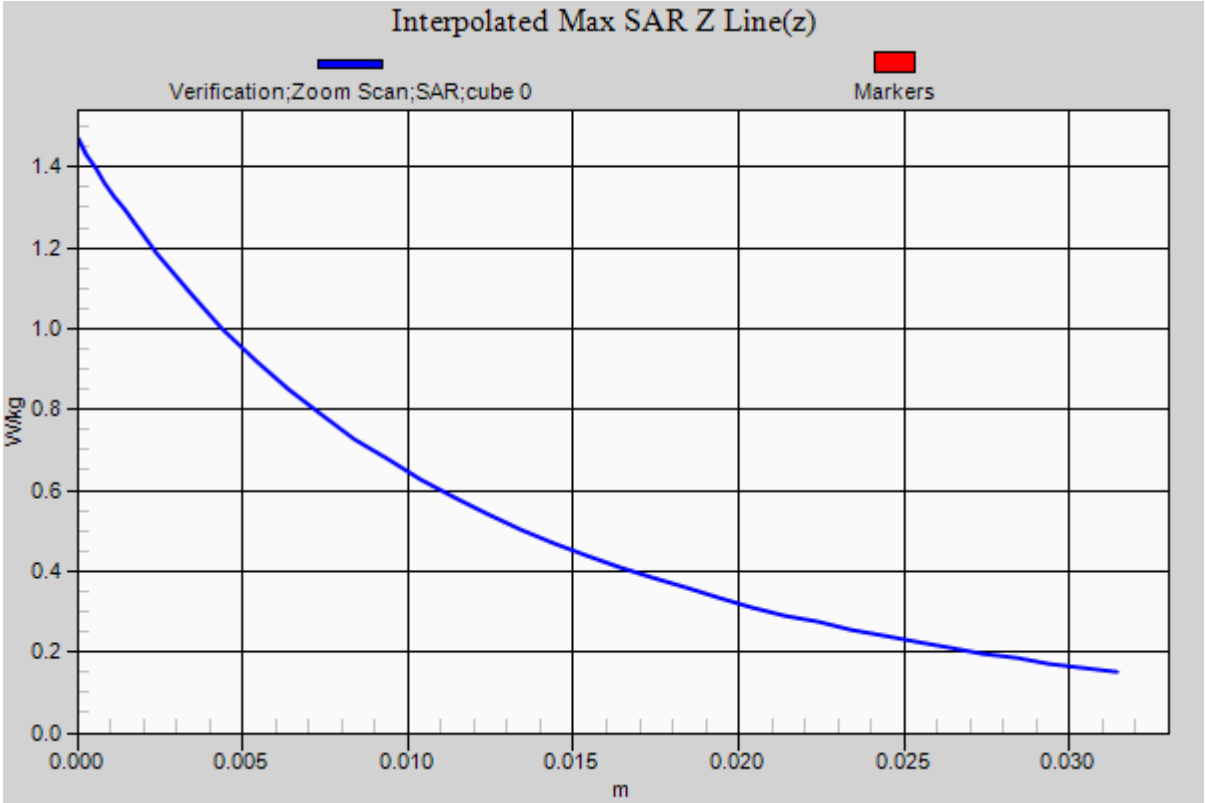

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RF Exposure Lab

Plot 3

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

Communication System: CW; Frequency: 835 MHz; Duty Cycle: 1:1
Medium: MSL835; Medium parameters used: f = 835 MHz; σ = 0.98 S/m; ε_r = 54.37; ρ = 1000 kg/m^3
Phantom section: Flat Section

Test Date: Date: 3/5/2019; Ambient Temp: 23 °C; Tissue Temp: 21 °C

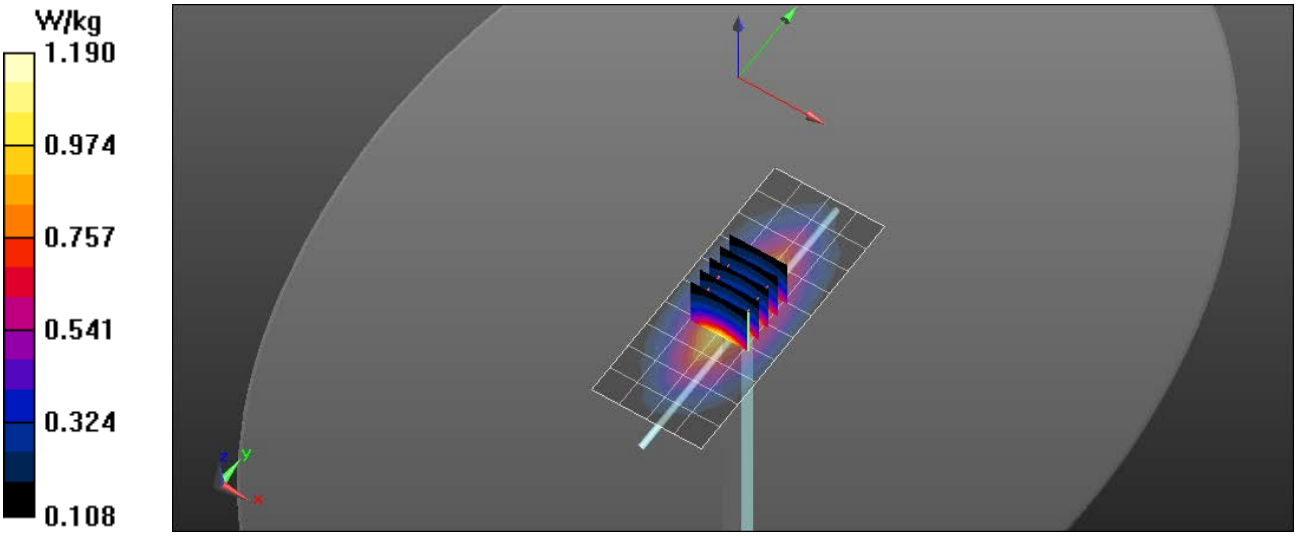
Probe: EX3DV4 - SN3662; ConvF(9.21, 9.21, 9.21); Calibrated: 4/20/2018;
Sensor-Surface: 2mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1321; Calibrated: 1/10/2019
Phantom: ELI v5.0; Type: QDOVA002AA; Serial: 2037
Measurement SW: DASY52, Version 52.10 (0); SEMCAD X Version 14.6.10 (7417)

Procedure Notes:

835 MHz/Verification/Area Scan (5x11x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (measured) = 1.18 W/kg

835 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) = 1.47 W/kg
SAR(1 g) = 0.963 W/kg; SAR(10 g) = 0.629 W/kg

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



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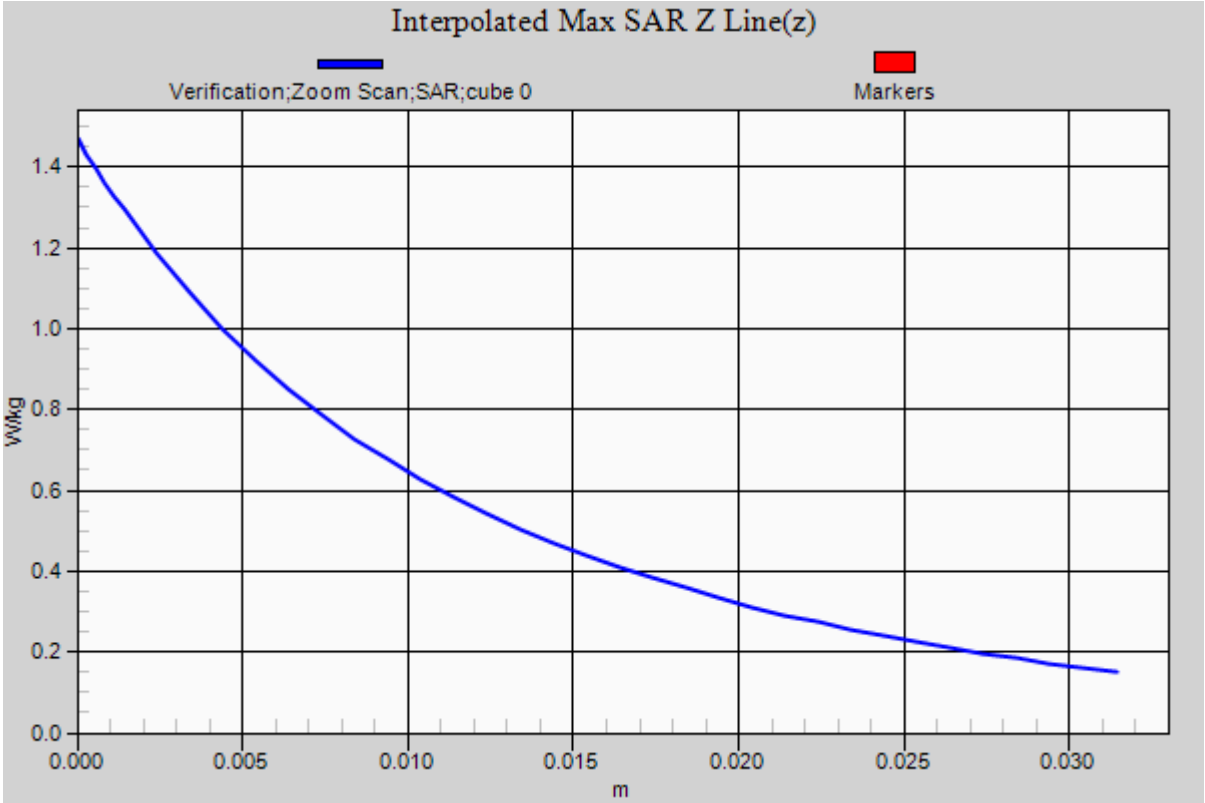

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RF Exposure Lab

Plot 4

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

Communication System: CW; Frequency: 1750 MHz; Duty Cycle: 1:1
Medium: MSL1750; Medium parameters used: f = 1750 MHz; σ = 1.54 S/m; ε_r = 52.66; ρ = 1000 kg/m^3
Phantom section: Flat Section

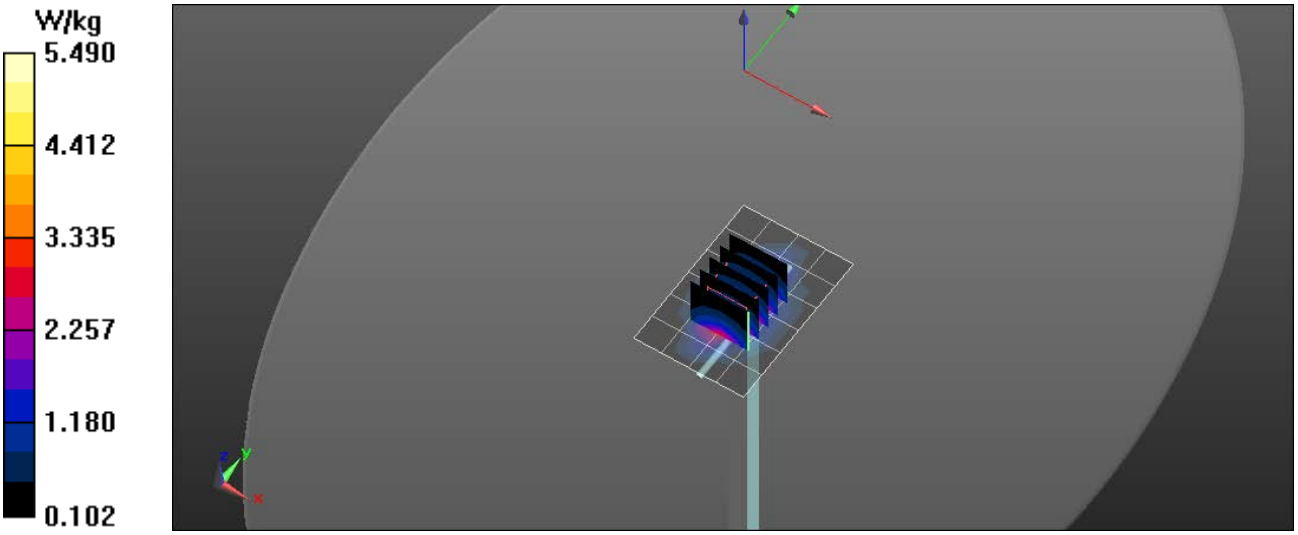
Test Date: Date: 2/21/2019; Ambient Temp: 23 °C; Tissue Temp: 21 °C

Probe: EX3DV4 - SN3662; ConvF(7.96, 7.96, 7.96); Calibrated: 4/20/2018;
Sensor-Surface: 2mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1321; Calibrated: 1/10/2019
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) = 5.38 W/kg

1750 MHz/Verification/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 32.667 V/m; Power Drift = -0.03 dB
Peak SAR (extrapolated) = 6.92 W/kg
SAR(1 g) = 3.69 W/kg; SAR(10 g) = 2.04 W/kg
Maximum value of SAR (measured) = 5.48 W/kg



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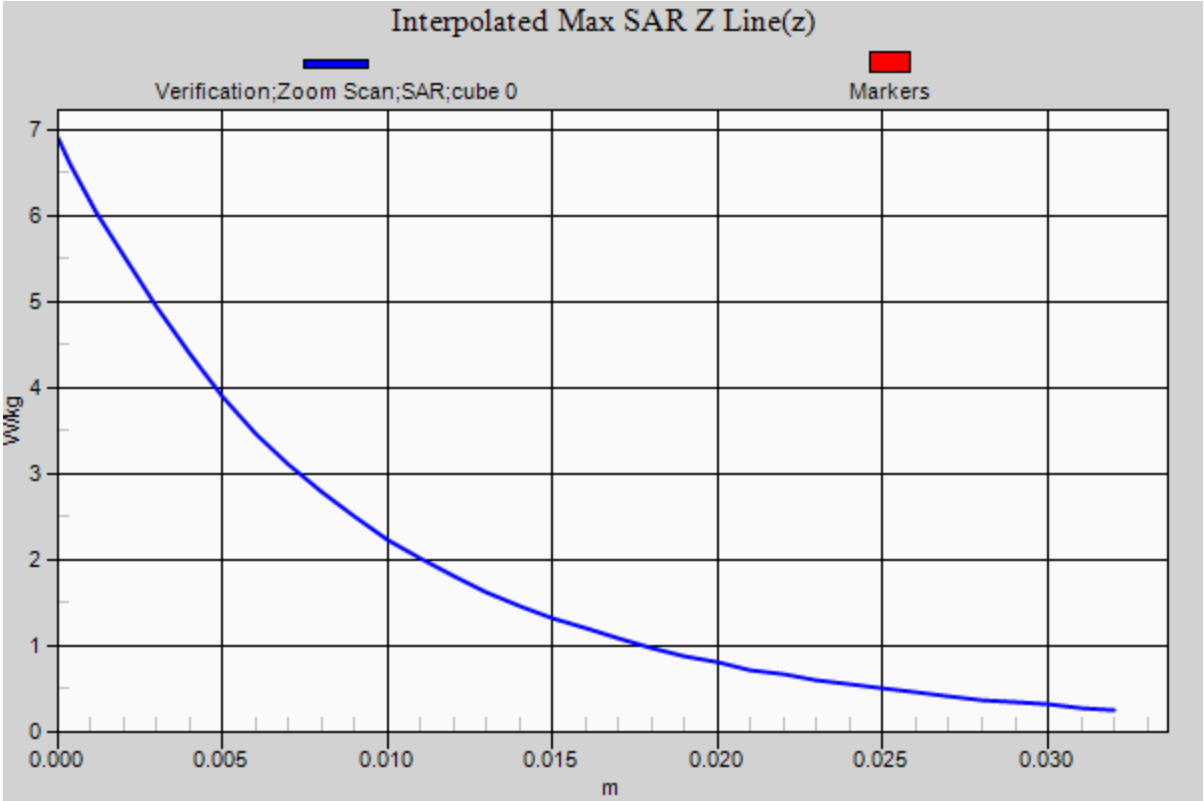

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RF Exposure Lab

Plot 5

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

Communication System: CW; Frequency: 1750 MHz; Duty Cycle: 1:1
Medium: MSL1750; Medium parameters used: f = 1750 MHz; σ = 1.56 S/m; ε_r = 52.68; ρ = 1000 kg/m^3
Phantom section: Flat Section

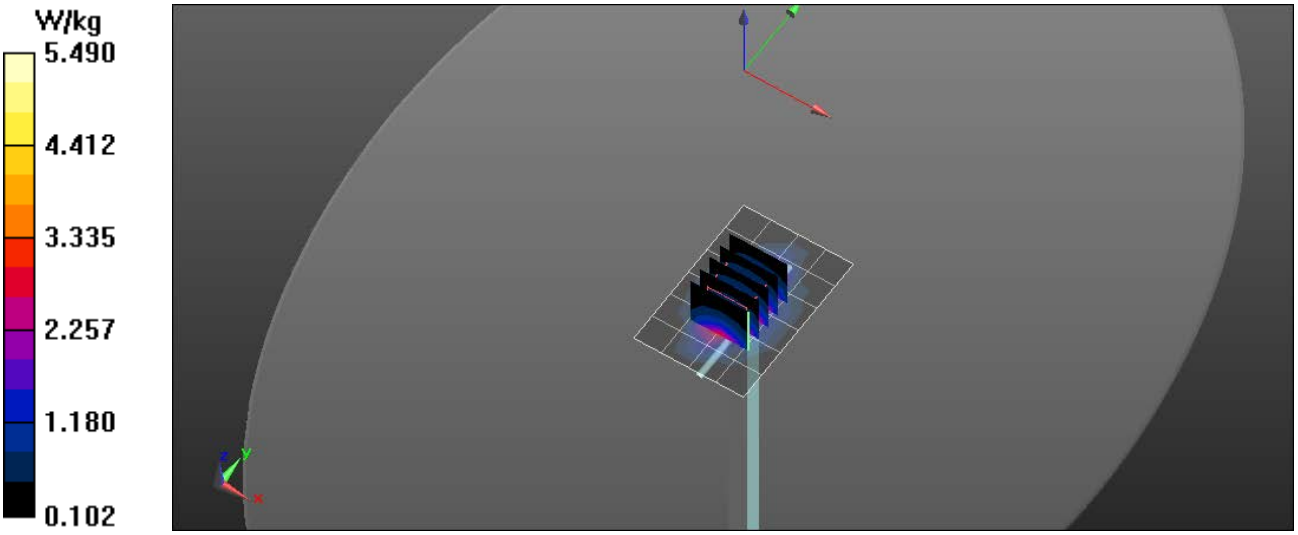
Test Date: Date: 3/6/2019; Ambient Temp: 23 °C; Tissue Temp: 21 °C

Probe: EX3DV4 - SN3662; ConvF(7.96, 7.96, 7.96); Calibrated: 4/20/2018;
Sensor-Surface: 2mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1321; Calibrated: 1/10/2019
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) = 3.65 W/kg; SAR(10 g) = 2.03 W/kg
Maximum value of SAR (measured) = 5.49 W/kg



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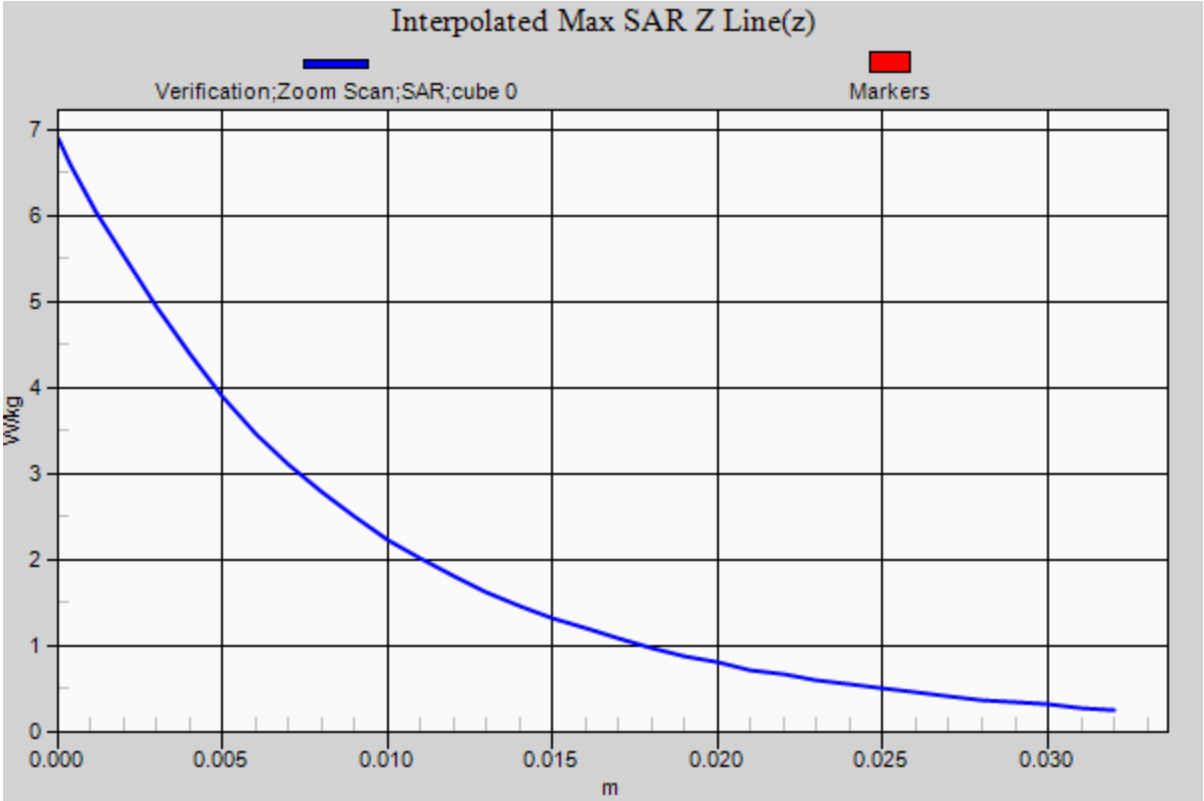

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Plot 6

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

Communication System: CW; Frequency: 1900 MHz; Duty Cycle: 1:1
Medium: MSL1900; Medium parameters used: f = 1900 MHz; σ = 1.58 S/m; ε_r = 52.97; ρ = 1000 kg/m^3
Phantom section: Flat Section

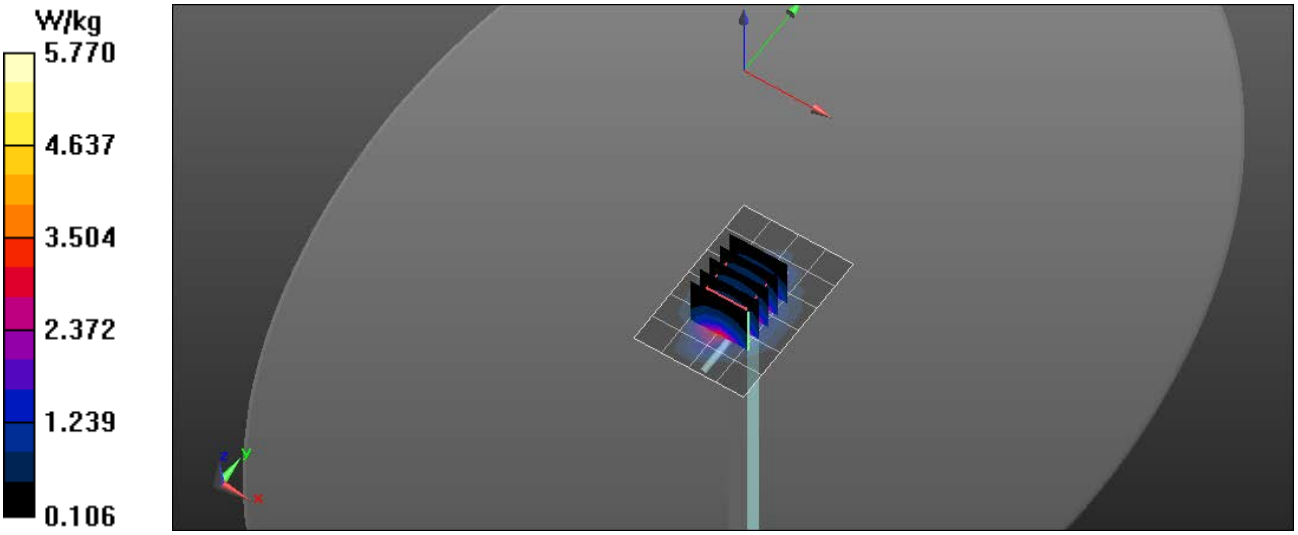
Test Date: Date: 2/11/2019; Ambient Temp: 23 °C; Tissue Temp: 21 °C

Probe: EX3DV4 - SN3662; ConvF(7.61, 7.61, 7.61); Calibrated: 4/20/2018;
Sensor-Surface: 2mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1321; Calibrated: 1/10/2019
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 = 33.856 V/m; Power Drift = -0.02 dB
Peak SAR (extrapolated) = 7.25 W/kg
SAR(1 g) = 4.01 W/kg; SAR(10 g) = 2.05 W/kg
Maximum value of SAR (measured) = 5.76 W/kg



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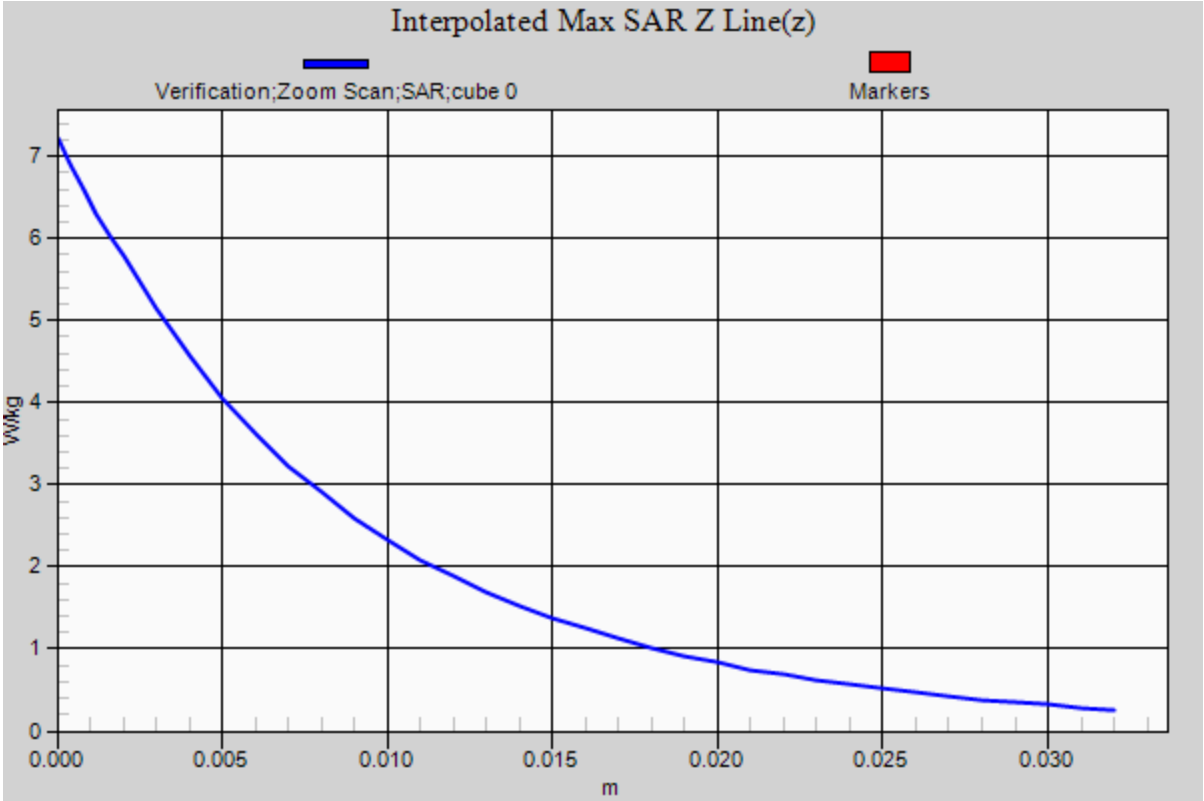

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RF Exposure Lab

Plot 7

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

Communication System: CW; Frequency: 1900 MHz; Duty Cycle: 1:1
Medium: MSL1900; Medium parameters used: f = 1900 MHz; σ = 1.54 S/m; ε_r = 53.17; ρ = 1000 kg/m^3
Phantom section: Flat Section

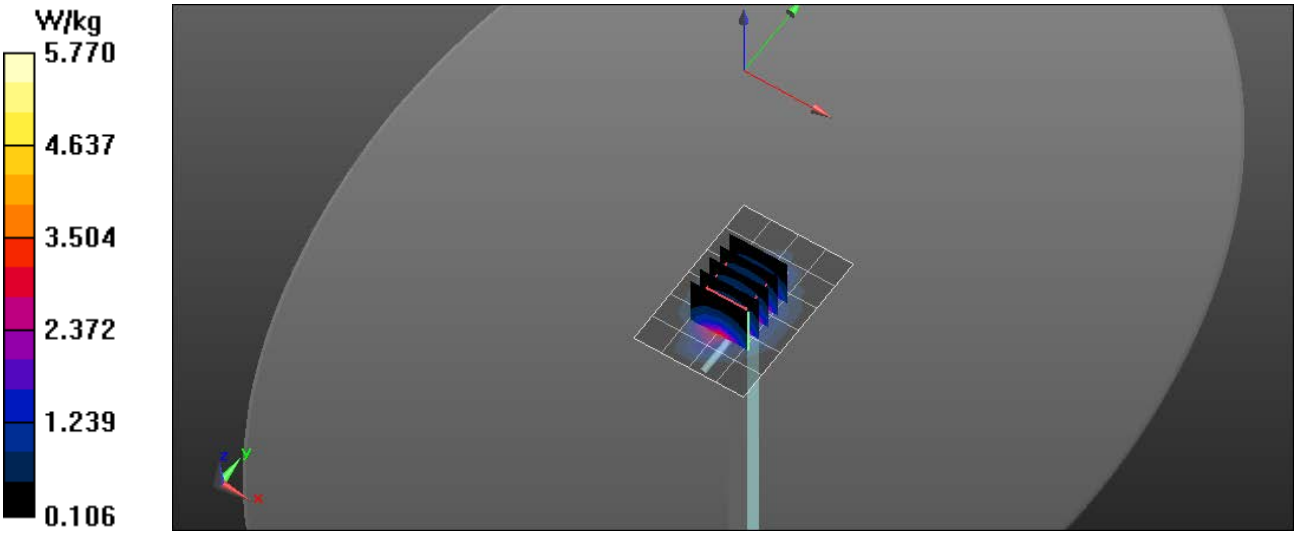
Test Date: Date: 3/4/2019; Ambient Temp: 23 °C; Tissue Temp: 21 °C

Probe: EX3DV4 - SN3662; ConvF(7.61, 7.61, 7.61); Calibrated: 4/20/2018;
Sensor-Surface: 2mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1321; Calibrated: 1/10/2019
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) = 5.44 W/kg

1900 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) = 7.22 W/kg
SAR(1 g) = 4.02 W/kg; SAR(10 g) = 2.1 W/kg
Maximum value of SAR (measured) = 5.77 W/kg



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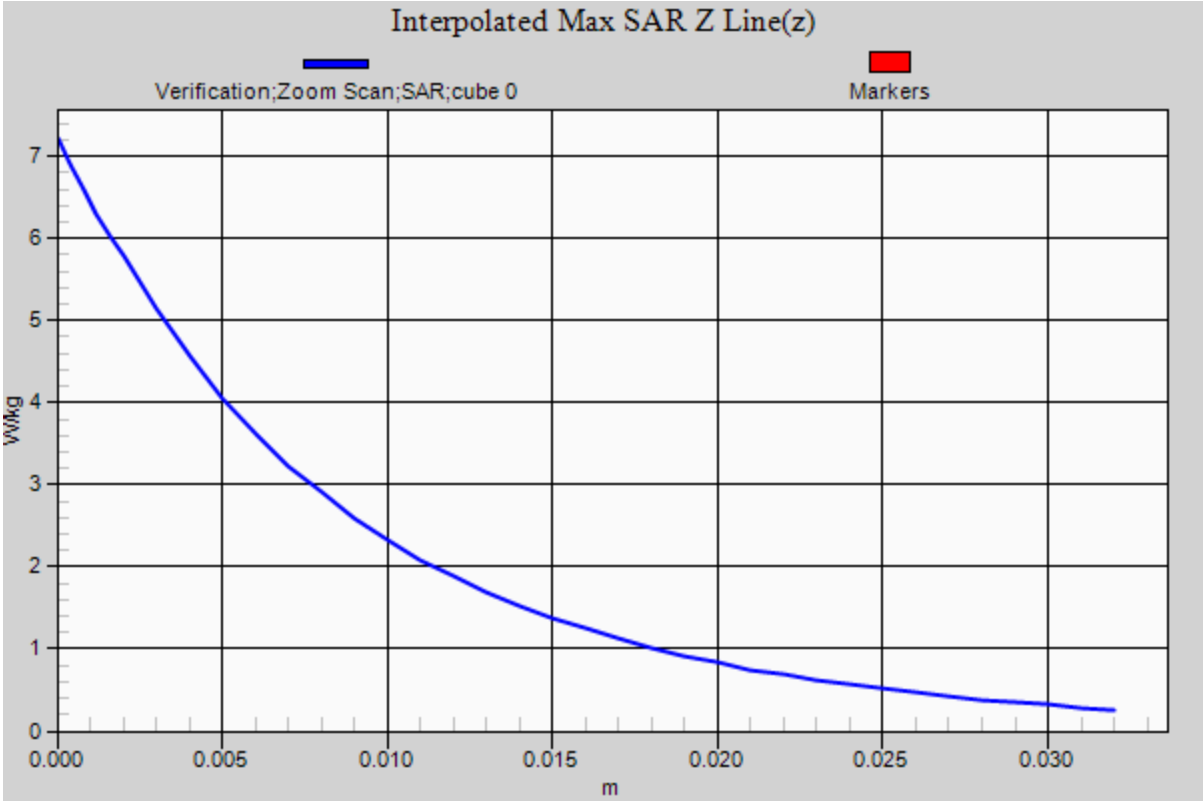

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RF Exposure Lab

Plot 8

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

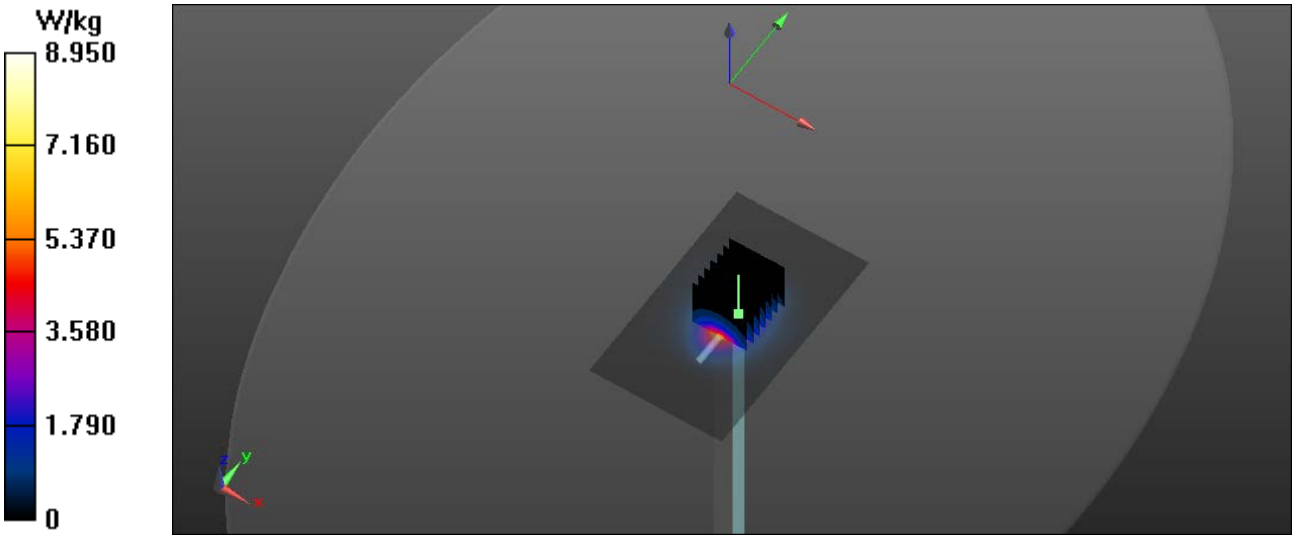
Communication System: CW; Frequency: 2450 MHz; Duty Cycle: 1:1
Medium: MSL2450; Medium parameters used: f = 2450 MHz; σ = 2 S/m; ε_r = 52.58; ρ = 1000 kg/m^3
Phantom section: Flat Section

Test Date: Date: 3/13/2019; Ambient Temp: 23 °C; Tissue Temp: 21 °C
Probe: EX3DV4 - SN3662; ConvF(7.29, 7.29, 7.29); Calibrated: 4/20/2018;
Sensor-Surface: 2mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1321; Calibrated: 1/10/2019
Phantom: ELI v5.0; Type: QDOVA002AA; Serial: 2037
Measurement SW: DASY52, Version 52.10 (0); SEMCAD X Version 14.6.10 (7417)

Procedure Notes:

Body Verification/2450 MHz/Area Scan (61x101x1): Interpolated grid: dx=1.200 mm, dy=1.200 mm
Maximum value of SAR (interpolated) = 8.92 W/kg

Body Verification/2450 MHz/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 53.359 V/m; Power Drift = -0.02 dB
Peak SAR (extrapolated) = 11.04 W/kg
SAR(1 g) = 5.12 W/kg; SAR(10 g) = 2.37 W/kg
Maximum value of SAR (measured) = 8.79 W/kg



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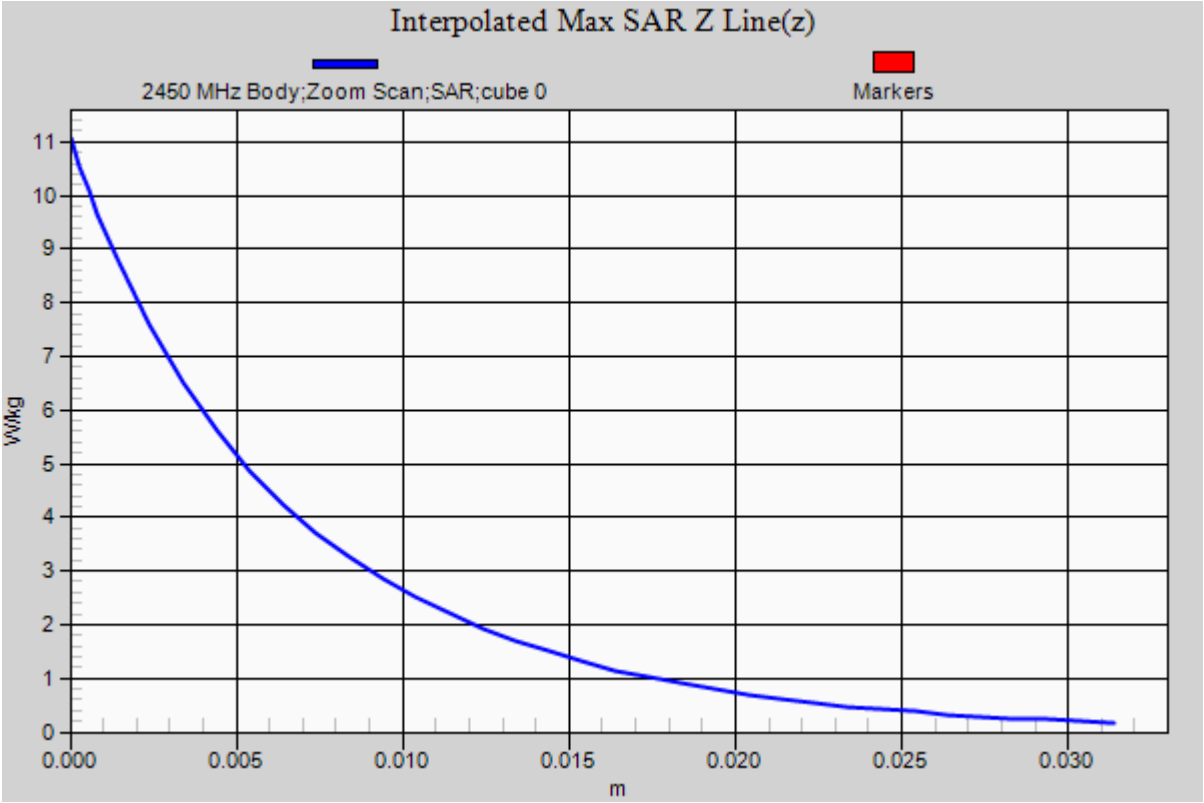

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RF Exposure Lab

Plot 9

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

Communication System: CW; Frequency: 5250 MHz; Duty Cycle: 1:1
Medium: MSL 3-6 GHz; Medium parameters used (interpolated): f = 5250 MHz; σ = 5.395 S/m; ε_r = 48.875; ρ = 1000 kg/m^3
Phantom section: Flat Section

Test Date: Date: 3/11/2019; Ambient Temp: 23 °C; Tissue Temp: 21 °C
Probe: EX3DV4 - SN3662; ConvF(4.46, 4.46, 4.46); Calibrated: 4/20/2018;
Sensor-Surface: 2mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1321; Calibrated: 1/10/2019
Phantom: ELI v5.0; Type: QDOVA002AA; Serial: 2037
Measurement SW: DASY52, Version 52.10 (0); SEMCAD X Version 14.6.10 (7417)

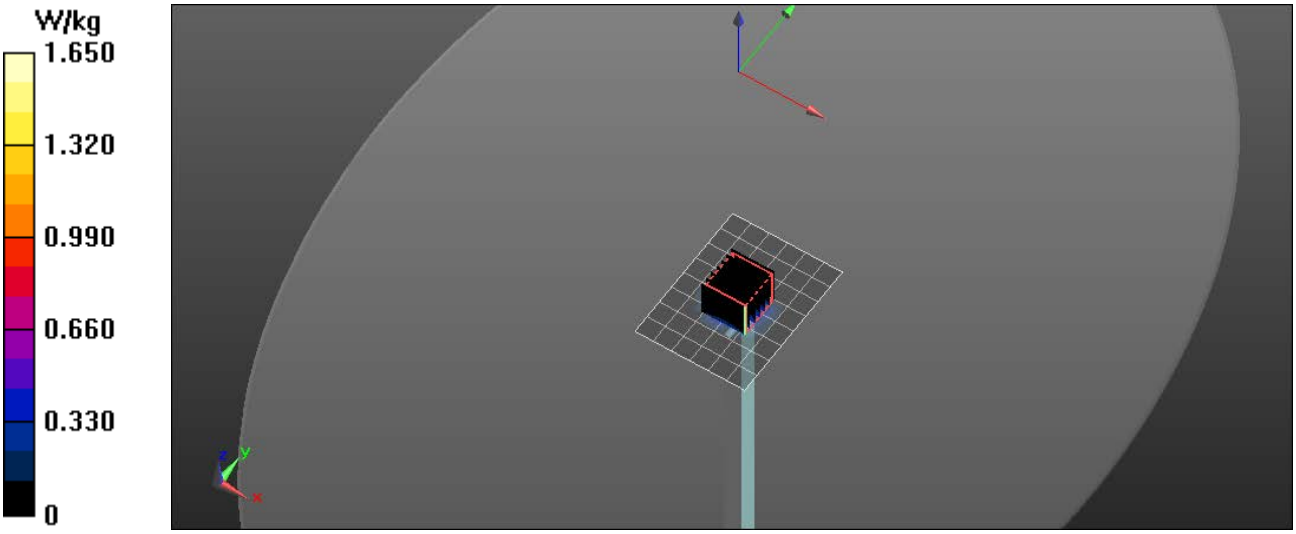
Procedure Notes:

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

Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (measured) = 1.58 W/kg

5250 MHz Body/Verification/Zoom Scan (7x7x12)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=2mm
Reference Value = 11.705 V/m; Power Drift = 0.01 dB
Peak SAR (extrapolated) = 3.75 W/kg
SAR(1 g) = 0.763 W/kg; SAR(10 g) = 0.211 W/kg

Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (measured) = 1.65 W/kg



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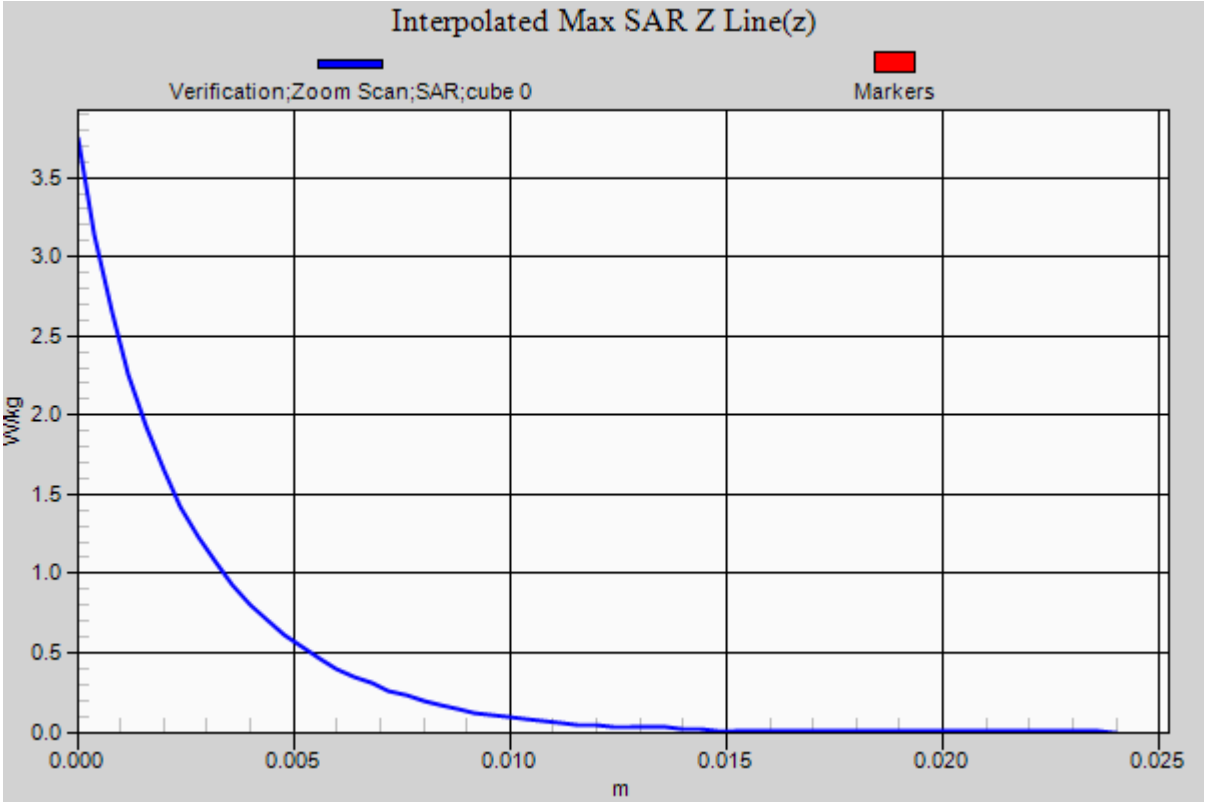

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RF Exposure Lab

Plot 10

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

Communication System: CW; Frequency: 5750 MHz; Duty Cycle: 1:1
Medium: MSL 3-6 GHz; Medium parameters used (interpolated): f = 5750 MHz; σ = 5.985 S/m; ε_r = 48.135; ρ = 1000 kg/m^3
Phantom section: Flat Section

Test Date: Date: 3/11/2019; Ambient Temp: 23 °C; Tissue Temp: 21 °C
Probe: EX3DV4 - SN3662; ConvF(4.08, 4.08, 4.08); Calibrated: 4/20/2018;
Sensor-Surface: 2mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1321; Calibrated: 1/10/2019
Phantom: ELI v5.0; Type: QDOVA002AA; Serial: 2037
Measurement SW: DASY52, Version 52.10 (0); SEMCAD X Version 14.6.10 (7417)

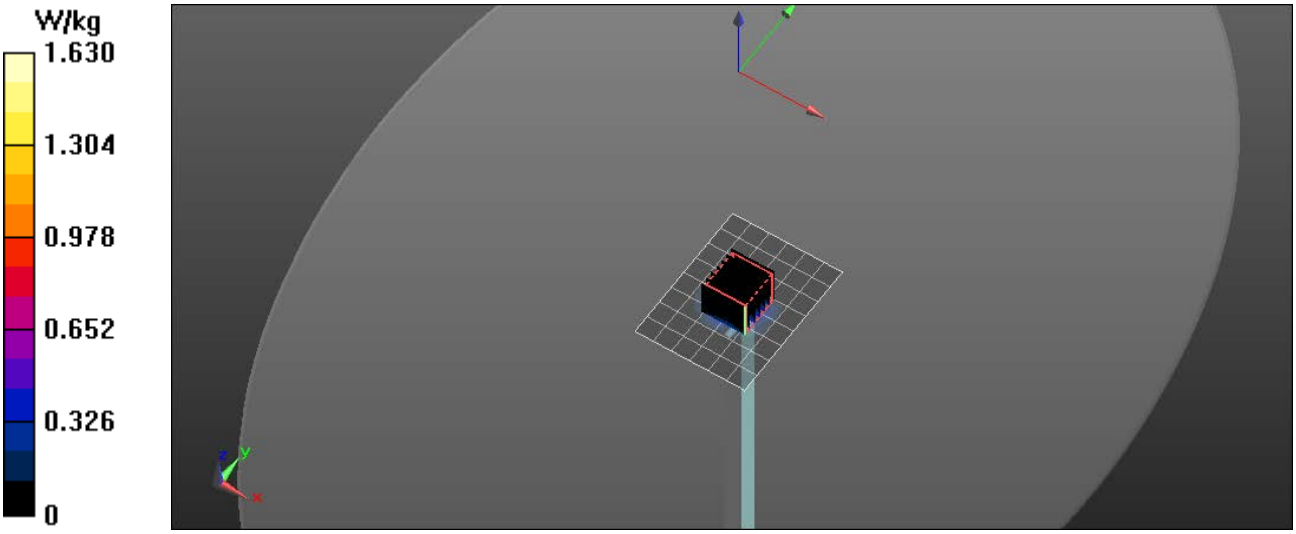
Procedure Notes:

5750 MHz Body/Verification/Area Scan (7x9x1): Measurement grid: dx=10mm, dy=10mm

Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (measured) = 1.56 W/kg

5750 MHz Body/Verification/Zoom Scan (7x7x12)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=2mm
Reference Value = 11.621 V/m; Power Drift = -0.01 dB
Peak SAR (extrapolated) = 3.47 W/kg
SAR(1 g) = 0.759 W/kg; SAR(10 g) = 0.208 W/kg

Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (measured) = 1.63 W/kg



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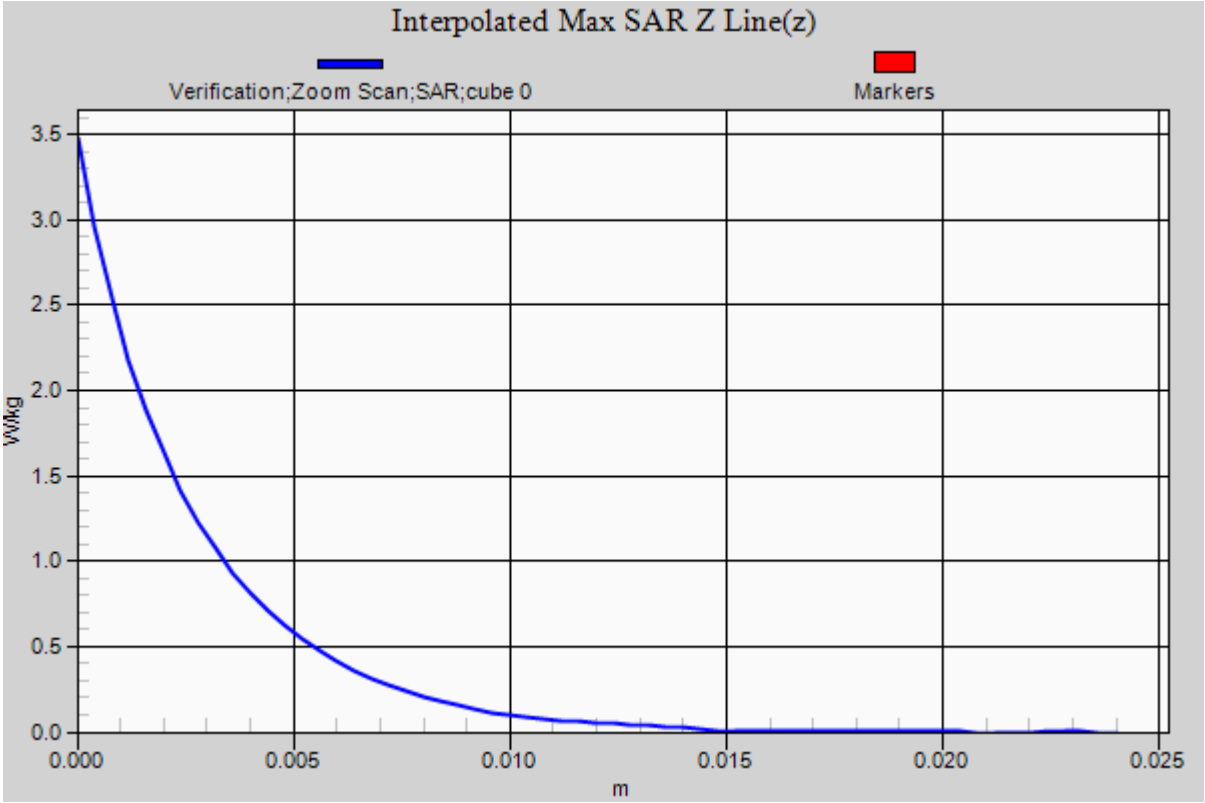

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RF Exposure Lab

Plot 11

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

Communication System: CW; Frequency: 750 MHz; Duty Cycle: 1:1
Medium: MSL750; Medium parameters used: f = 750 MHz; σ = 0.99 S/m; ε_r = 55.57; ρ = 1000 kg/m^3
Phantom section: Flat Section

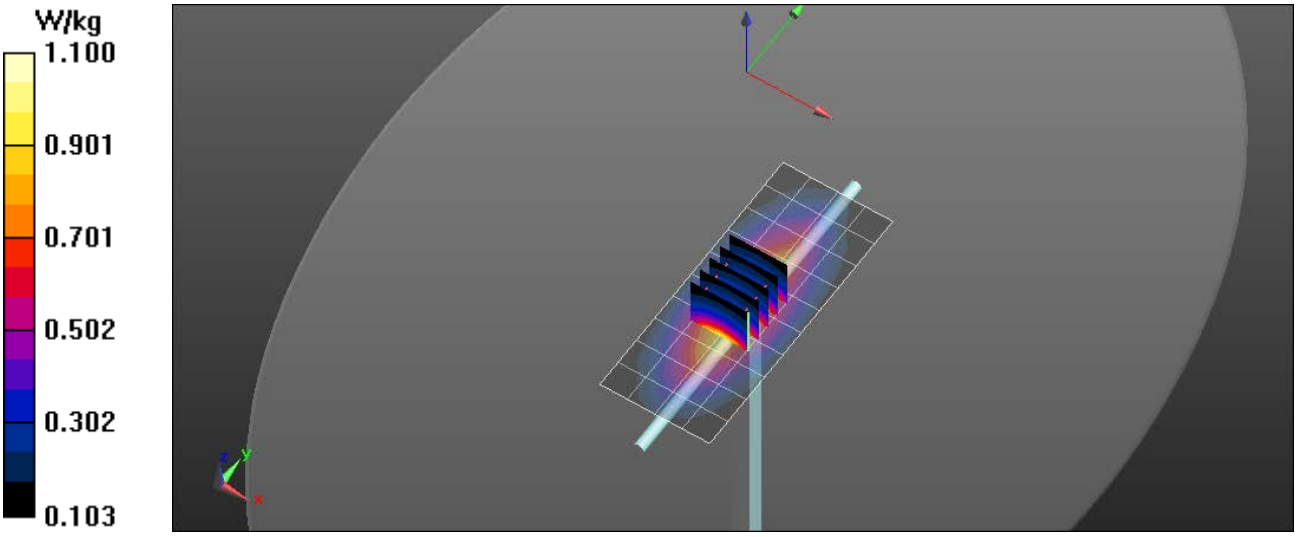
Test Date: Date: 5/7/2019; Ambient Temp: 23 °C; Tissue Temp: 21 °C

Probe: EX3DV4 - SN3662; ConvF(9.57, 9.57, 9.57); Calibrated: 4/24/2019;
Sensor-Surface: 2mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1321; Calibrated: 1/10/2018
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/Verification/Area Scan (5x11x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (measured) = 1.08 W/kg

750 MHz/Verification/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 31.227 V/m; Power Drift = 0.02 dB
Peak SAR (extrapolated) = 1.30 W/kg
SAR(1 g) = 0.865 W/kg; SAR(10 g) = 0.569 W/kg
Maximum value of SAR (measured) = 1.10 W/kg



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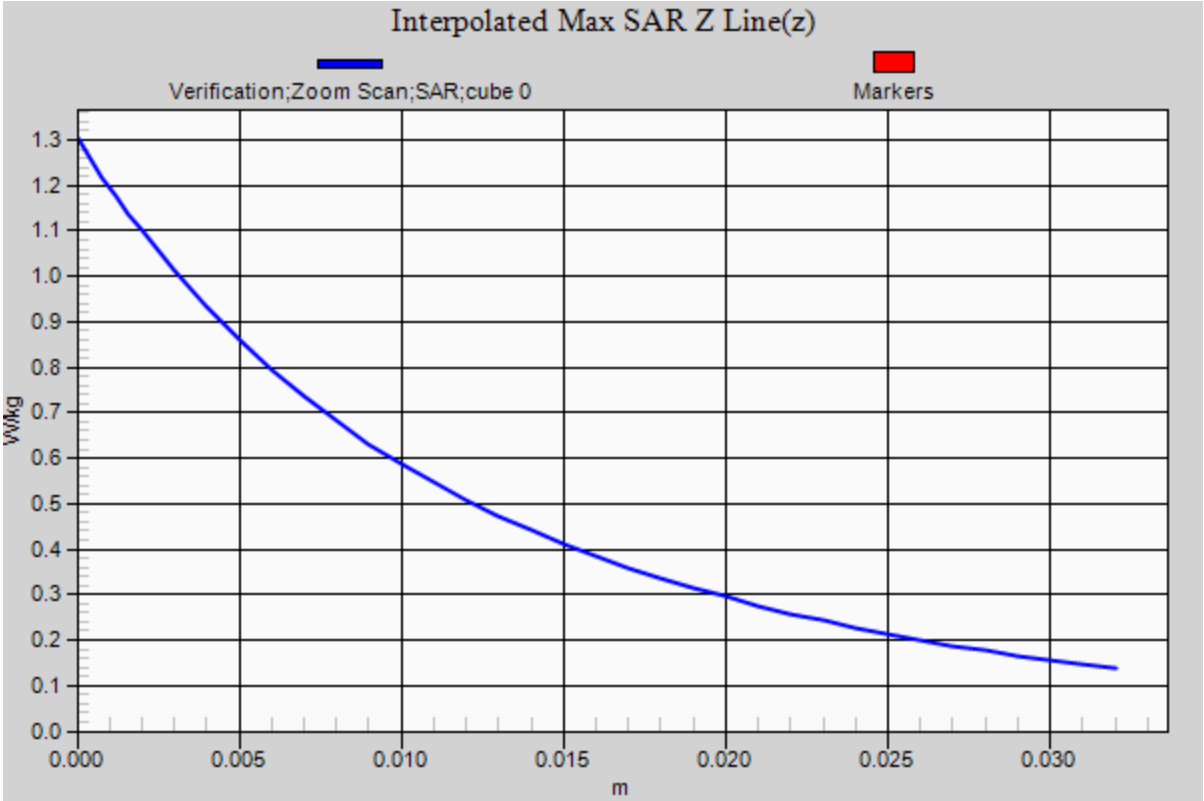

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RF Exposure Lab

Plot 12

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

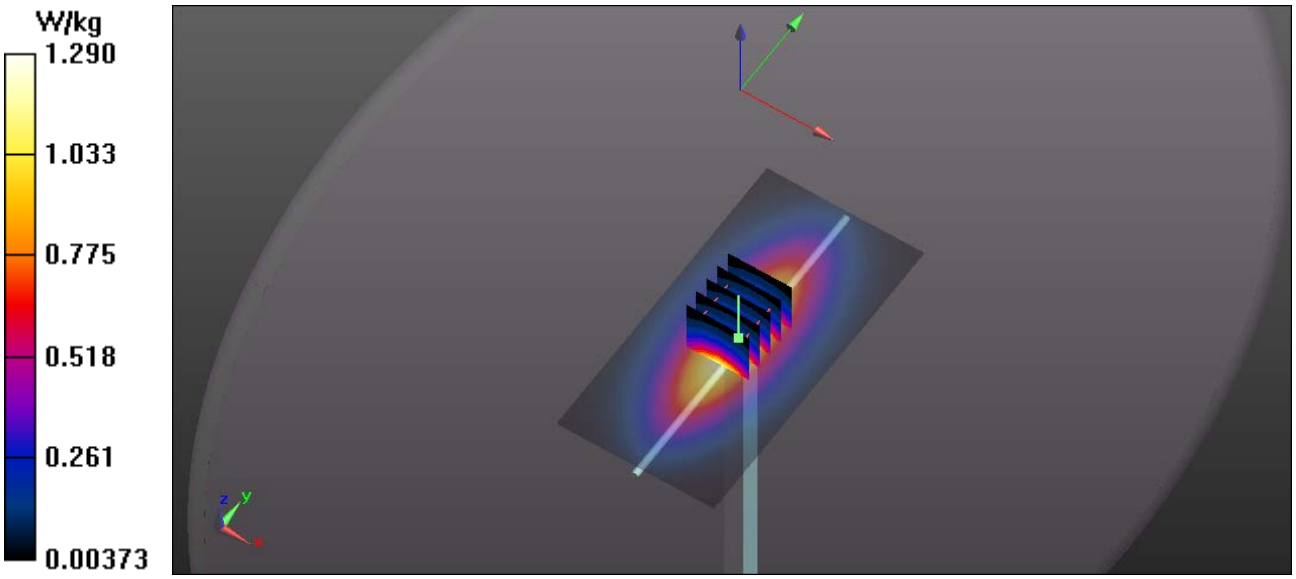
Communication System: CW; Frequency: 835 MHz; Duty Cycle: 1:1
Medium: MSL835; Medium parameters used: f = 835 MHz; σ = 0.99 S/m; ε_r = 55.91; ρ = 1000 kg/m^3
Phantom section: Flat Section

Test Date: Date: 5/7/2019; 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 Sn1321; Calibrated: 1/10/2018
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 Body/Verification/Area Scan (81x161x1): Interpolated grid: dx=1.000 mm, dy=1.000 mm
Maximum value of SAR (interpolated) = 1.29 W/kg

835 MHz Body/Verification/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 52.612 V/m; Power Drift = -0.02 dB
Peak SAR (extrapolated) = 1.47 W/kg
SAR(1 g) = 0.953 W/kg; SAR(10 g) = 0.632 W/kg
Maximum value of SAR (measured) = 1.29 W/kg



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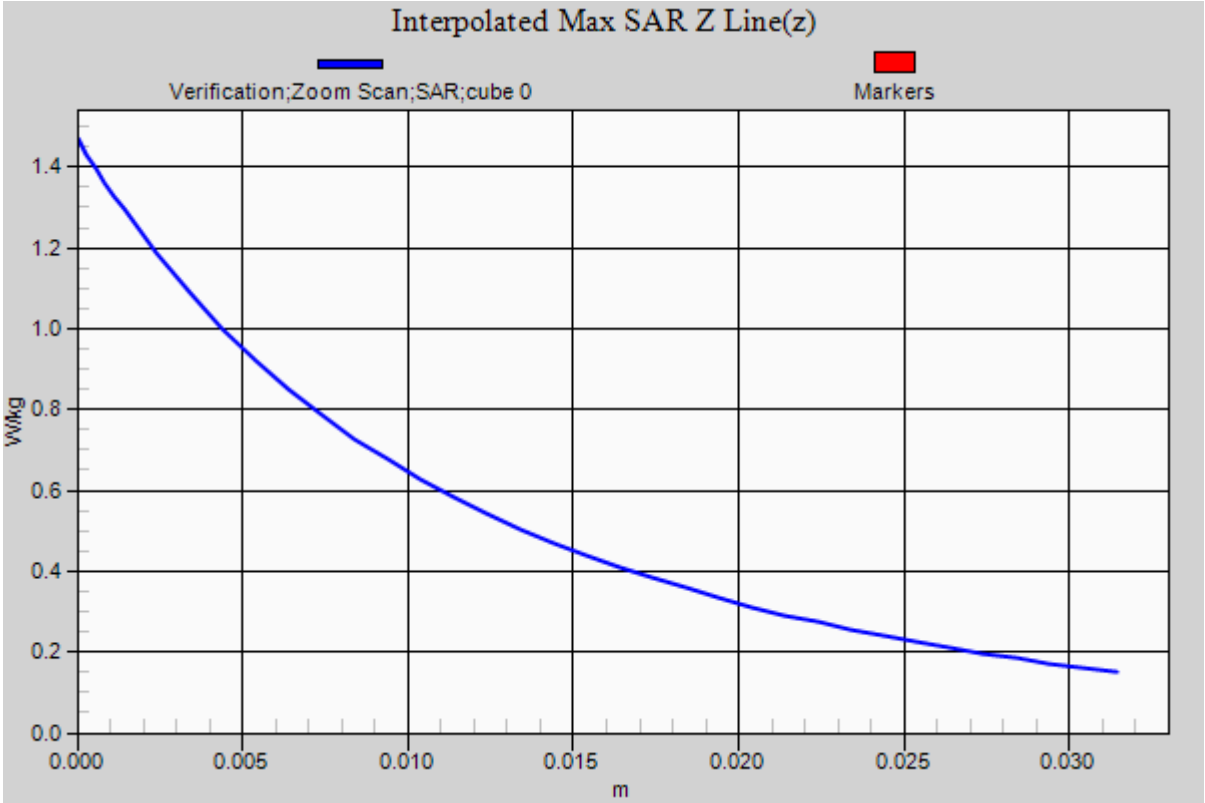

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RF Exposure Lab

Plot 13

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

Communication System: CW; Frequency: 1750 MHz; Duty Cycle: 1:1
Medium: MSL1750; Medium parameters used: f = 1750 MHz; σ = 1.52 S/m; ε_r = 53.32; ρ = 1000 kg/m^3
Phantom section: Flat Section

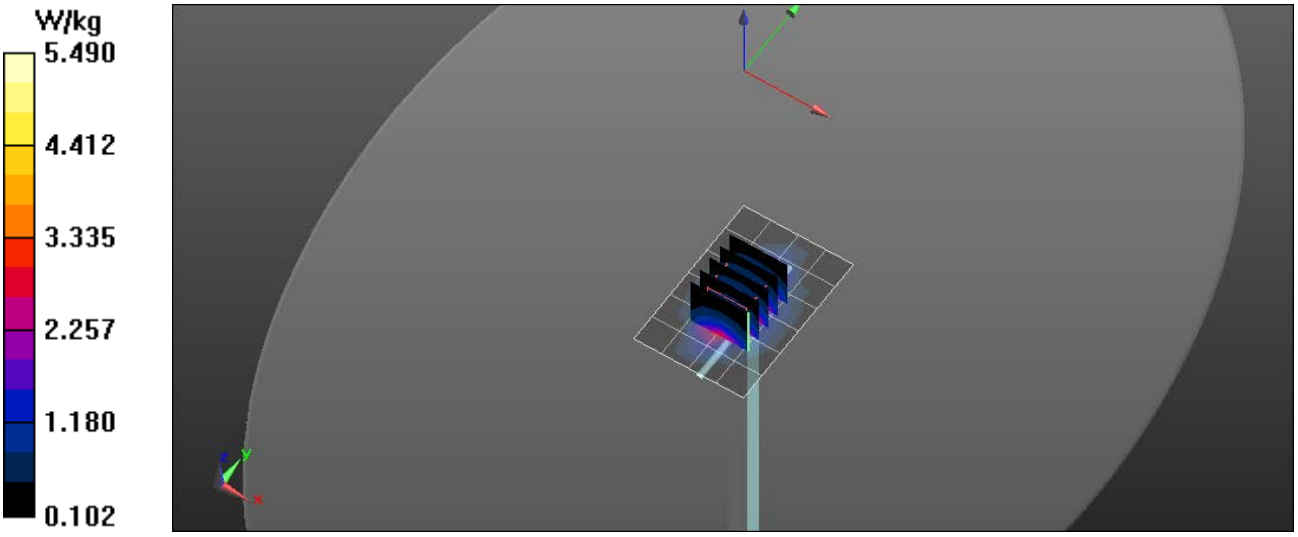
Test Date: Date: 5/7/2019; Ambient Temp: 23 °C; Tissue Temp: 21 °C

Probe: EX3DV4 - SN3662; ConvF(8.23, 8.23, 8.3); Calibrated: 4/24/2019;
Sensor-Surface: 2mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1321; Calibrated: 1/10/2018
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) = 3.68 W/kg; SAR(10 g) = 2.03 W/kg
Maximum value of SAR (measured) = 5.49 W/kg



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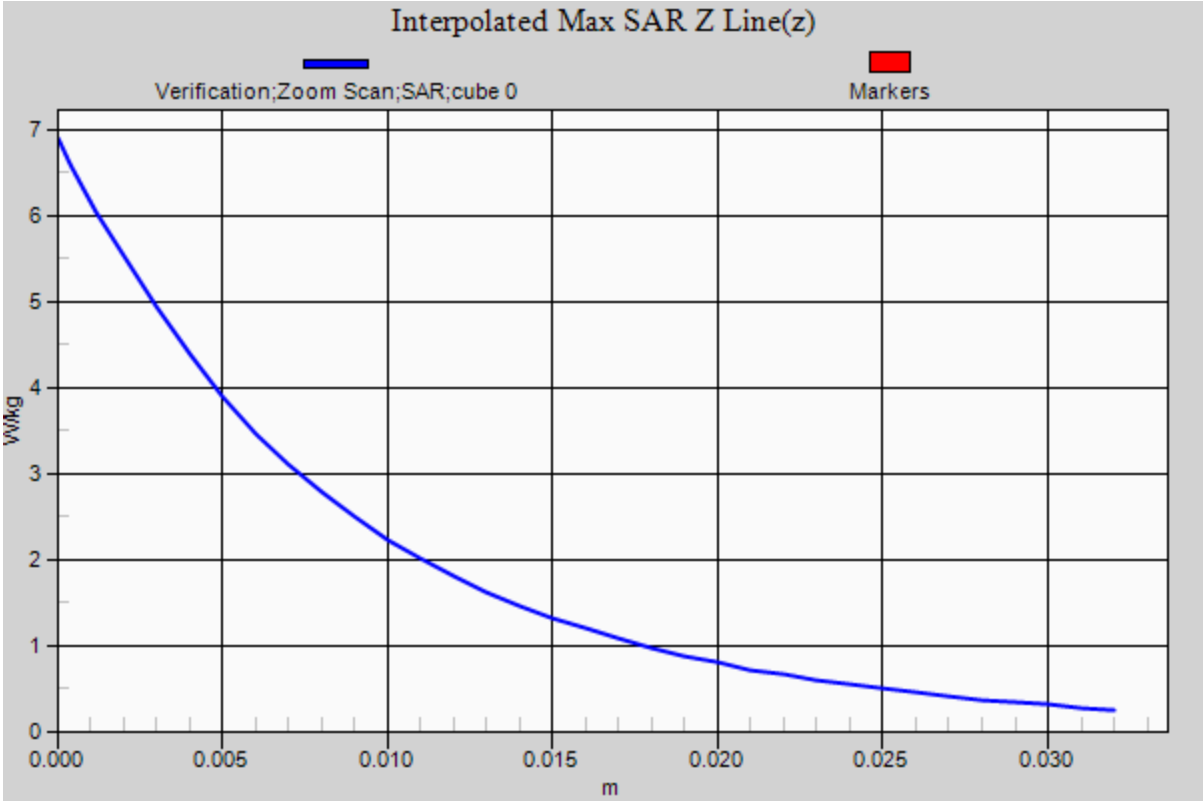

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RF Exposure Lab

Plot 14

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

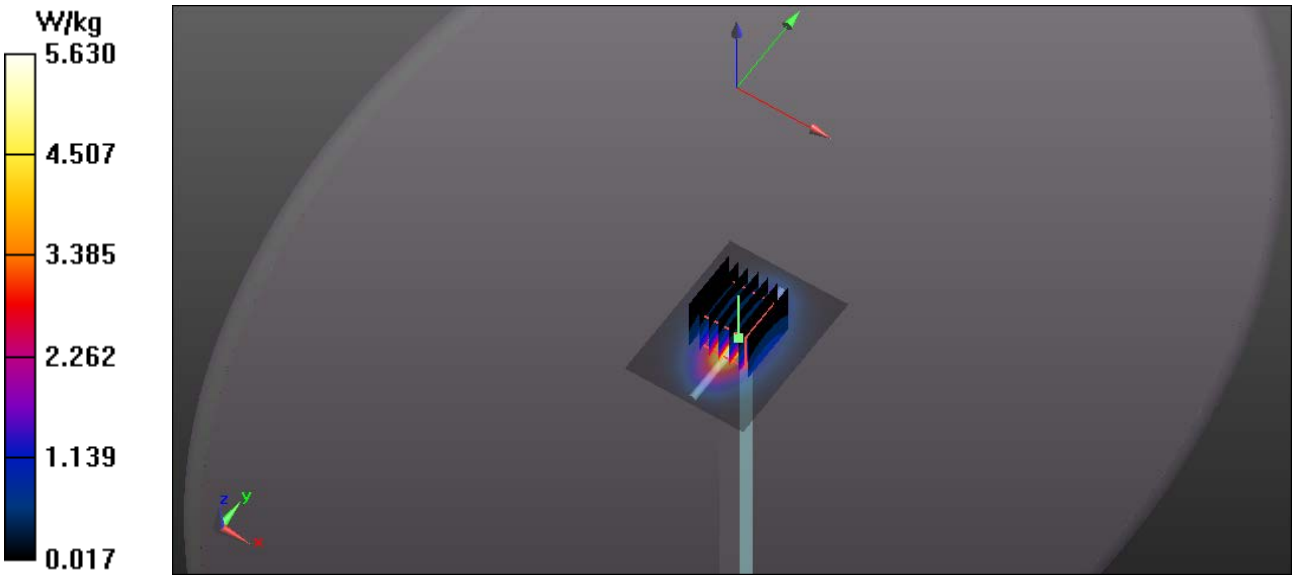
Communication System: CW; Frequency: 1900 MHz; Duty Cycle: 1:1
Medium: MSL1900; Medium parameters used: f = 1900 MHz; σ = 1.47 S/m; ε_r = 52.07; ρ = 1000 kg/m^3
Phantom section: Flat Section

Test Date: Date: 5/7/2019; 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 Sn1321; Calibrated: 1/10/2018
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 Body/Verification/Area Scan (61x81x1): Interpolated grid: dx=1.000 mm, dy=1.000 mm
Maximum value of SAR (interpolated) = 5.63 W/kg

1900 MHz Body/Verification/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 52.612 V/m; Power Drift = -0.02 dB
Peak SAR (extrapolated) = 6.68 W/kg
SAR(1 g) = 3.98 W/kg; SAR(10 g) = 1.92 W/kg
Maximum value of SAR (measured) = 5.63 W/kg



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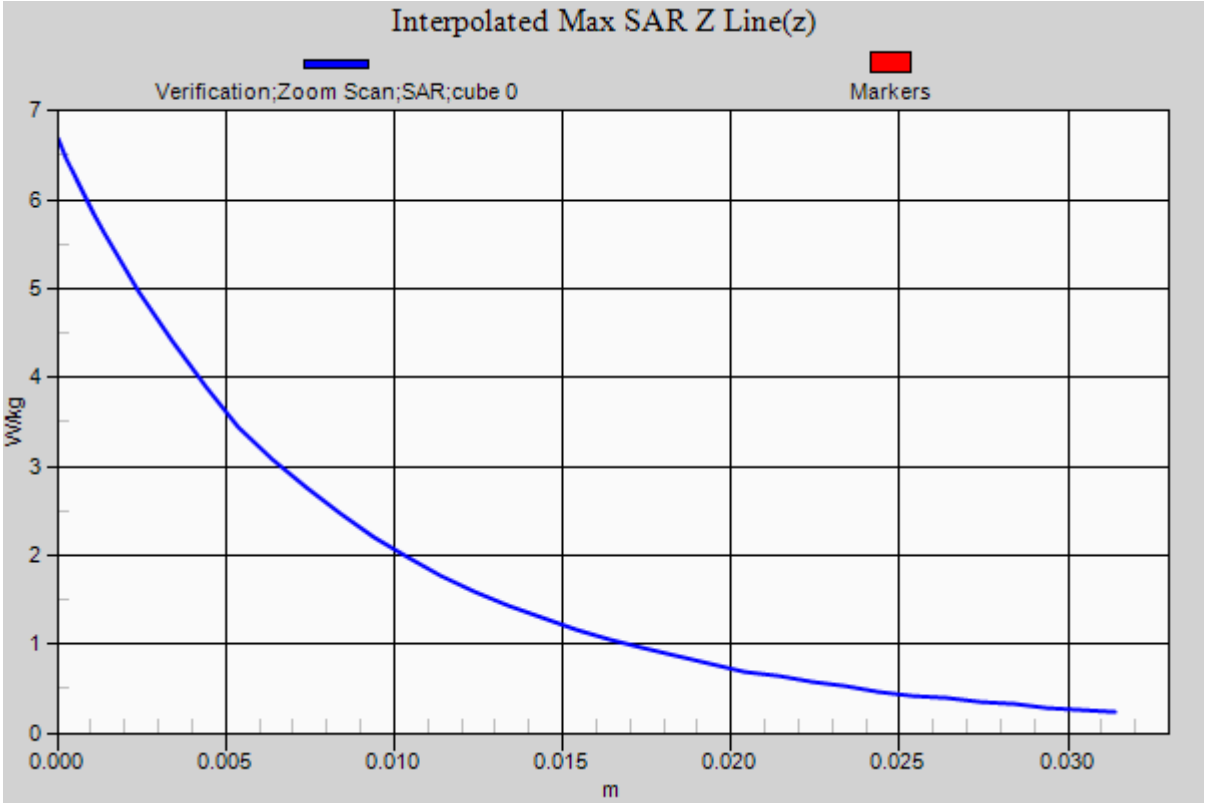

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Appendix B – SAR Test Data Plots

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RF Exposure Lab

Plot 1

DUT: M1000; Type: Hotspot; Serial: Eng 1

Communication System: LTE (SC-FDMA, 1 RB, 10 MHz, QPSK); Frequency: 782 MHz; Duty Cycle: 1:1
Medium: MSL750; Medium parameters used (interpolated): f = 782 MHz; σ = 1.052 S/m; ε_r = 54.3; ρ = 1000 kg/m^3
Phantom section: Flat Section

Test Date: Date: 2/20/2019; Ambient Temp: 23 °C; Tissue Temp: 21 °C

Probe: EX3DV4 - SN3662; ConvF(9.8, 9.8, 9.8); Calibrated: 4/20/2018;
Sensor-Surface: 2mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1321; Calibrated: 1/10/2018
Phantom: ELI v5.0; Type: QDOVA002AA; Serial: 2037
Measurement SW: DASY52, Version 52.10 (0); SEMCAD X Version 14.6.10 (7417)

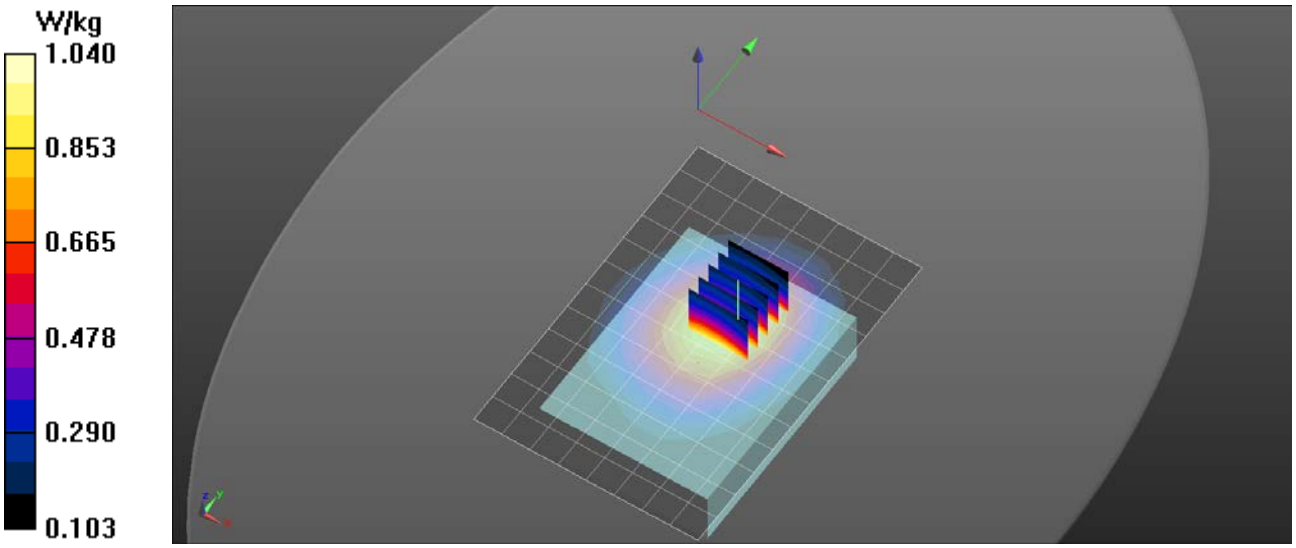
Procedure Notes:

Band 13 LTE/Side A 1 RB 24 Offset Ant 0 Mid/Area Scan (9x13x1): Measurement grid: dx=15mm, dy=15mm

Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (measured) = 0.998 W/kg

Band 13 LTE/Side A 1 RB 24 Offset Ant 0 Mid/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 29.27 V/m; Power Drift = 0.02 dB
Peak SAR (extrapolated) = 1.16 W/kg
SAR(1 g) = 0.890 W/kg

Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (measured) = 1.04 W/kg



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RF Exposure Lab

Plot 2

DUT: M1000; Type: Hotspot; Serial: Eng 1

Communication System: UMTS (WCDMA); Frequency: 836.6 MHz; Duty Cycle: 1:1
Medium: MSL835; Medium parameters used (interpolated): f = 836.6 MHz; σ = 0.982 S/m; ε_r = 54.375; ρ = 1000 kg/m^3
Phantom section: Flat Section

Test Date: Date: 3/5/2019; Ambient Temp: 23 °C; Tissue Temp: 21 °C

Probe: EX3DV4 - SN3662; ConvF(9.21, 9.21, 9.21); Calibrated: 4/20/2018;
Sensor-Surface: 2mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1321; Calibrated: 1/10/2018
Phantom: ELI v5.0; Type: QDOVA002AA; Serial: 2037
Measurement SW: DASY52, Version 52.10 (0); SEMCAD X Version 14.6.10 (7417)

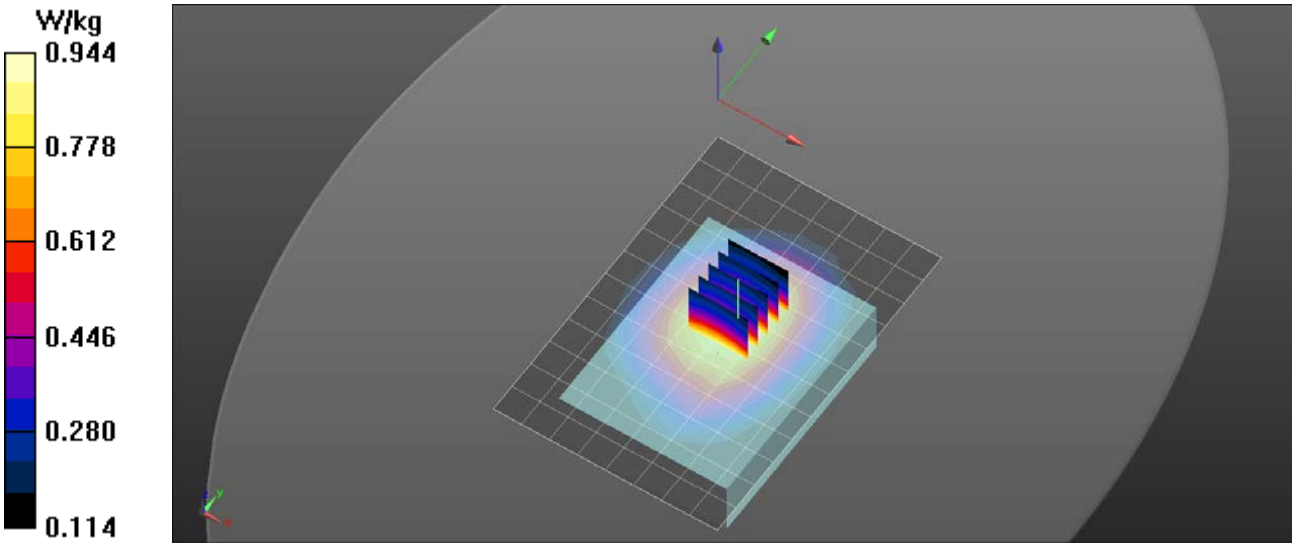
Procedure Notes:

Band 5 UMTS/Side A Ant 0 Mid/Area Scan (9x13x1): Measurement grid: dx=15mm, dy=15mm

Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (measured) = 0.936 W/kg

Band 5 UMTS/Side A Ant 0 Mid/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 28.70 V/m; Power Drift = 0.03 dB
Peak SAR (extrapolated) = 1.04 W/kg
SAR(1 g) = 0.817 W/kg

Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (measured) = 0.944 W/kg



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RF Exposure Lab

Plot 3

DUT: M1000; Type: Hotspot; Serial: Eng 1

Communication System: LTE (SC-FDMA, 1 RB, 10 MHz, QPSK); Frequency: 836.5 MHz; Duty Cycle: 1:1
Medium: MSL835; Medium parameters used (interpolated): f = 836.5 MHz; σ = 0.992 S/m; ε_r = 54.564; ρ = 1000 kg/m^3
Phantom section: Flat Section

Test Date: Date: 2/18/2019; Ambient Temp: 23 °C; Tissue Temp: 21 °C

Probe: EX3DV4 - SN3662; ConvF(9.21, 9.21, 9.21); Calibrated: 4/20/2018;
Sensor-Surface: 2mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1321; Calibrated: 1/10/2018
Phantom: ELI v5.0; Type: QDOVA002AA; Serial: 2037
Measurement SW: DASY52, Version 52.10 (0); SEMCAD X Version 14.6.10 (7417)

Procedure Notes:

Band 5 LTE/Side A 1 RB 24 Offset Ant 0 Mid/Area Scan (9x13x1): Measurement grid: dx=15mm, dy=15mm

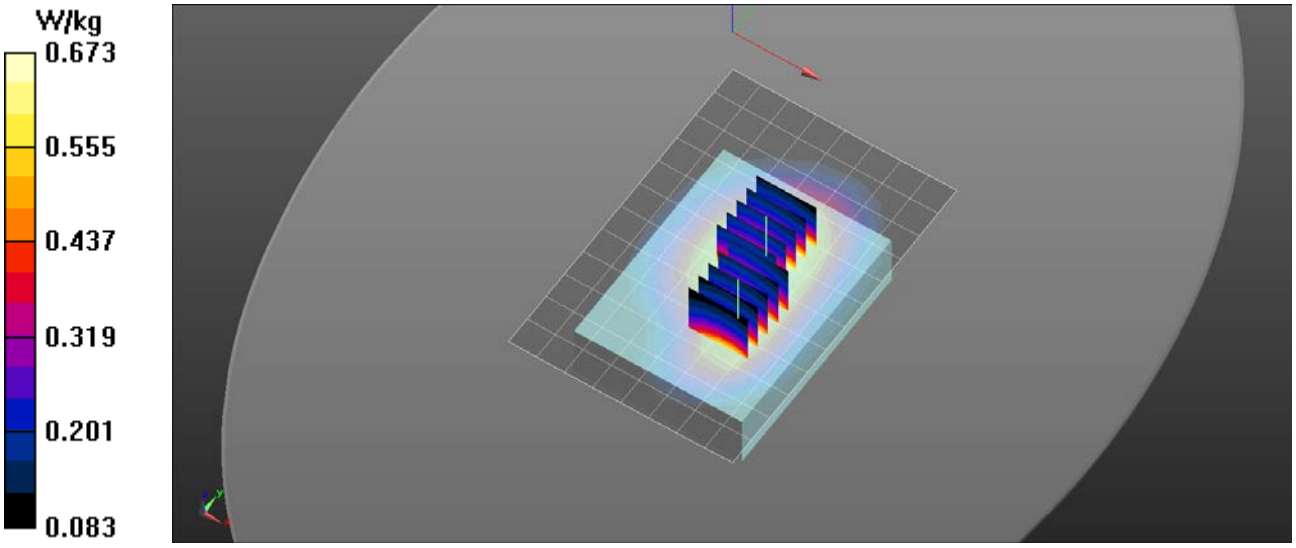
Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (measured) = 0.705 W/kg

Band 5 LTE/Side A 1 RB 24 Offset Ant 0 Mid/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 24.81 V/m; Power Drift = -0.02 dB
Peak SAR (extrapolated) = 0.816 W/kg
SAR(1 g) = 0.623 W/kg

Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (measured) = 0.727 W/kg

Band 5 LTE/Side A 1 RB 24 Offset Ant 0 Mid/Zoom Scan (5x5x7)/Cube 1: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 24.81 V/m; Power Drift = -0.02 dB
Peak SAR (extrapolated) = 0.745 W/kg
SAR(1 g) = 0.573 W/kg

Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (measured) = 0.673 W/kg



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Plot 4

DUT: M1000; Type: Hotspot; Serial: Eng 1

Communication System: UMTS (WCDMA); Frequency: 1752.6 MHz; Duty Cycle: 1:1
Medium: MSL1750; Medium parameters used (interpolated): f = 1752.6 MHz; σ = 1.56 S/m; ε_r = 52.675; ρ = 1000 kg/m^3
Phantom section: Flat Section

Test Date: Date: 3/6/2019; Ambient Temp: 23 °C; Tissue Temp: 21 °C

Probe: EX3DV4 - SN3662; ConvF(7.96, 7.96, 7.96); Calibrated: 4/20/2018;
Sensor-Surface: 2mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1321; Calibrated: 1/10/2018
Phantom: ELI v5.0; Type: QDOVA002AA; Serial: 2037
Measurement SW: DASY52, Version 52.10 (0); SEMCAD X Version 14.6.10 (7417)

Procedure Notes:

Band 4 UMTS/Side A Ant 0 High/Area Scan (9x13x1): Measurement grid: dx=15mm, dy=15mm

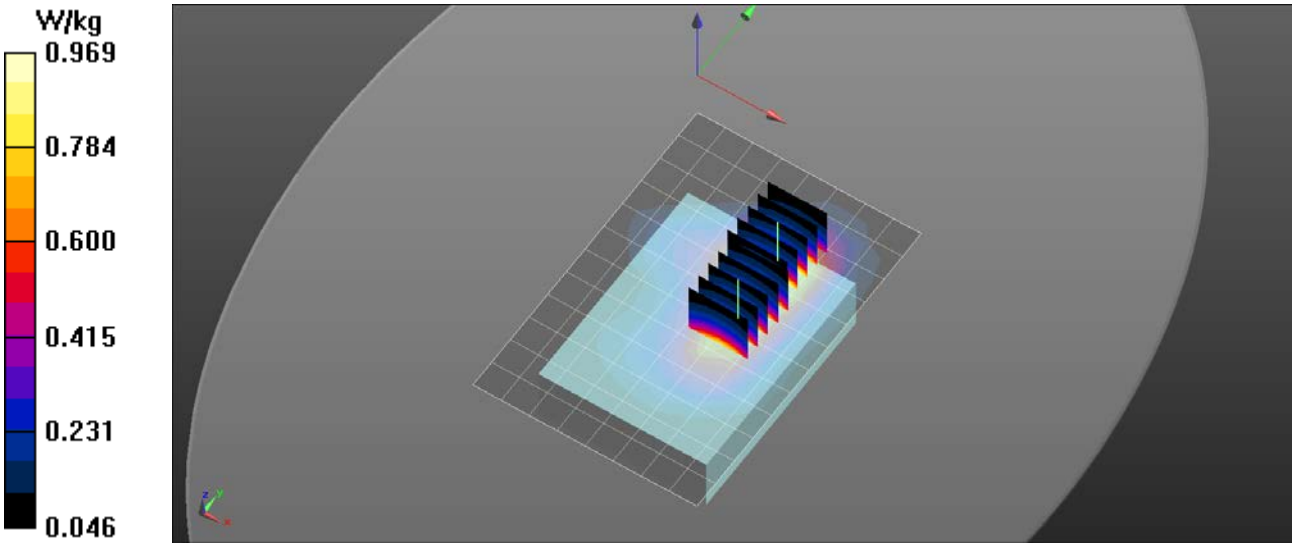
Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (measured) = 1.21 W/kg

Band 4 UMTS/Side A Ant 0 High/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 17.06 V/m; Power Drift = 0.04 dB
Peak SAR (extrapolated) = 1.48 W/kg
SAR(1 g) = 1.17 W/kg

Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (measured) = 1.22 W/kg

Band 4 UMTS/Side A Ant 0 High/Zoom Scan (5x5x7)/Cube 1: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 17.06 V/m; Power Drift = 0.04 dB
Peak SAR (extrapolated) = 1.16 W/kg
SAR(1 g) = 1.02 W/kg

Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (measured) = 0.969 W/kg



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Plot 5

DUT: M1000; Type: Hotspot; Serial: Eng 1

Communication System: LTE (SC-FDMA, 1 RB, 20 MHz, QPSK); Frequency: 1770 MHz; Duty Cycle: 1:1
Medium: MSL1750; Medium parameters used: f = 1770 MHz; σ = 1.55 S/m; ε_r = 52.63; ρ = 1000 kg/m^3
Phantom section: Flat Section

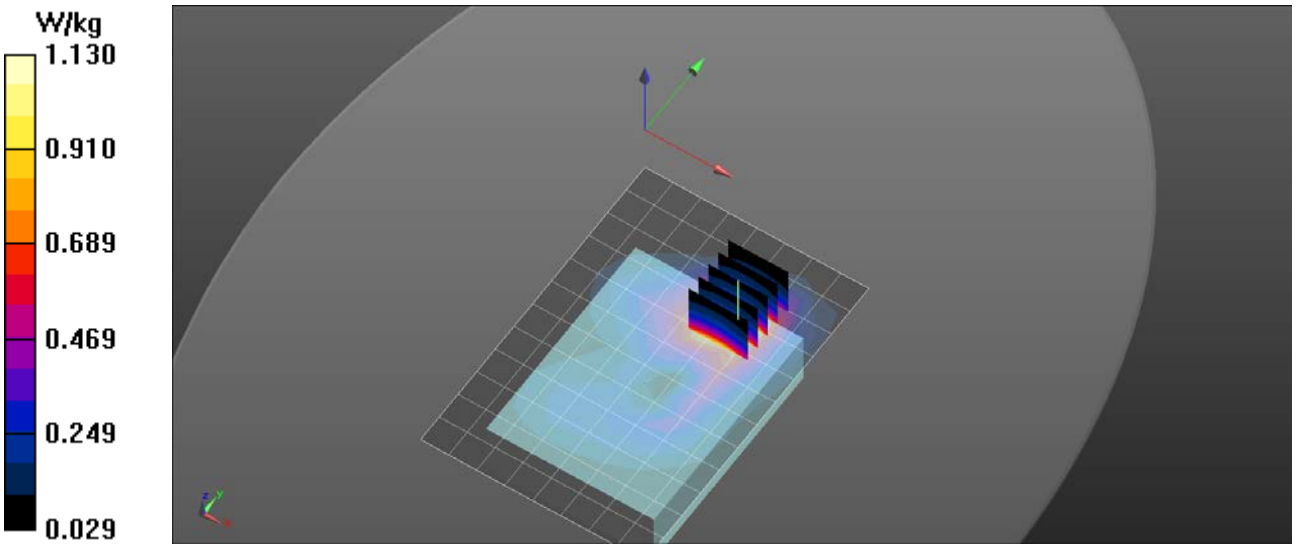
Test Date: Date: 2/21/2019; Ambient Temp: 23 °C; Tissue Temp: 21 °C

Probe: EX3DV4 - SN3662; ConvF(7.96, 7.96, 7.96); Calibrated: 4/20/2018;
Sensor-Surface: 2mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1321; Calibrated: 1/10/2018
Phantom: ELI v5.0; Type: QDOVA002AA; Serial: 2037
Measurement SW: DASY52, Version 52.10 (0); SEMCAD X Version 14.6.10 (7417)

Procedure Notes:

Band 66 LTE/Side A 1 RB 49 Offset Ant 0 High/Area Scan (9x13x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (measured) = 1.06 W/kg

Band 66 LTE/Side A 1 RB 49 Offset Ant 0 High/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 11.93 V/m; Power Drift = -0.03 dB
Peak SAR (extrapolated) = 1.40 W/kg
SAR(1 g) = 0.861 W/kg
Maximum value of SAR (measured) = 1.13 W/kg



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Plot 6

DUT: M1000; Type: Hotspot; Serial: Eng 1

Communication System: UMTS (WCDMA); Frequency: 1907.6 MHz; Duty Cycle: 1:1
Medium: MSL1900; Medium parameters used (interpolated): f = 1907.6 MHz; σ = 1.548 S/m; ε_r = 53.155; ρ = 1000 kg/m^3
Phantom section: Flat Section

Test Date: Date: 3/4/2019; Ambient Temp: 23 °C; Tissue Temp: 21 °C

Probe: EX3DV4 - SN3662; ConvF(7.61, 7.61, 7.61); Calibrated: 4/20/2018;
Sensor-Surface: 2mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1321; Calibrated: 1/10/2018
Phantom: ELI v5.0; Type: QDOVA002AA; Serial: 2037
Measurement SW: DASY52, Version 52.10 (0); SEMCAD X Version 14.6.10 (7417)

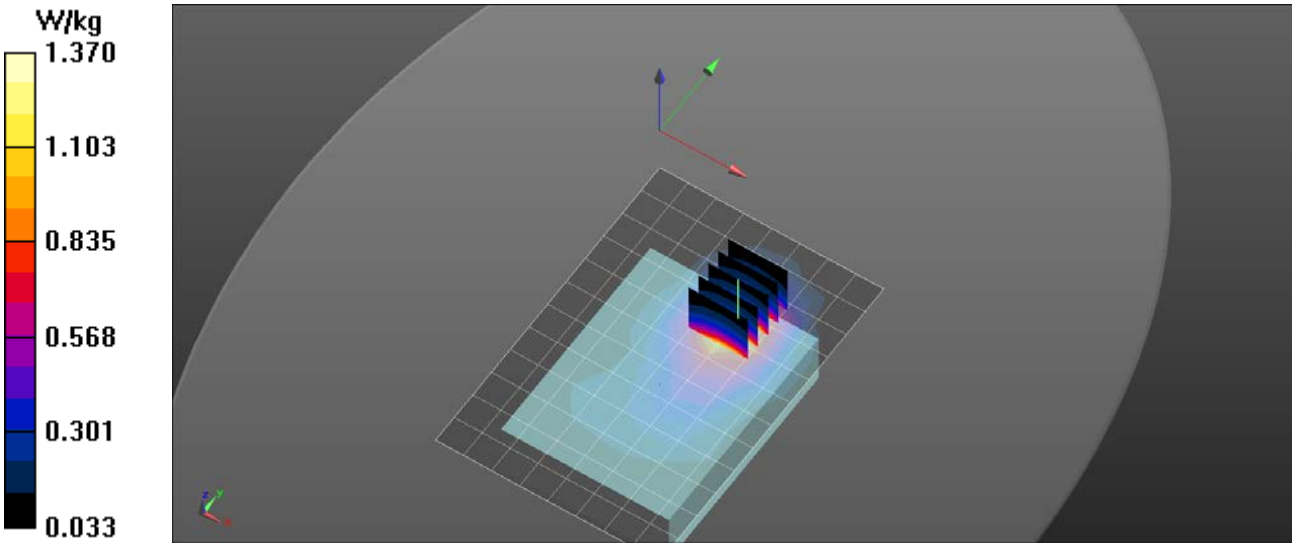
Procedure Notes:

Band 2 UMTS/Side A Ant 0 High/Area Scan (9x13x1): Measurement grid: dx=15mm, dy=15mm

Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (measured) = 1.32 W/kg

Band 2 UMTS/Side A Ant 0 High/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 12.58 V/m; Power Drift = -0.00 dB
Peak SAR (extrapolated) = 1.68 W/kg
SAR(1 g) = 1.03 W/kg

Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (measured) = 1.37 W/kg



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Plot 7

DUT: M1000; Type: Hotspot; Serial: Eng 1

Communication System: LTE (SC-FDMA, 1 RB, 20 MHz, QPSK); Frequency: 1900 MHz; Duty Cycle: 1:1
Medium: MSL1900; Medium parameters used: f = 1900 MHz; σ = 1.58 S/m; ε_r = 52.97; ρ = 1000 kg/m^3
Phantom section: Flat Section

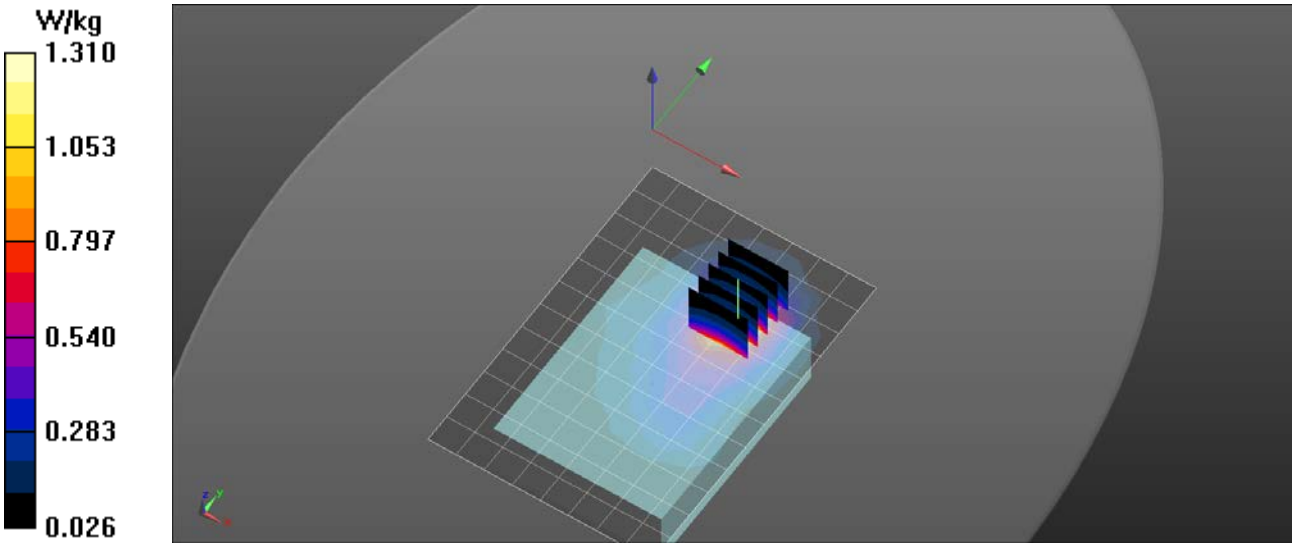
Test Date: Date: 2/11/2019; Ambient Temp: 23 °C; Tissue Temp: 21 °C

Probe: EX3DV4 - SN3662; ConvF(7.61, 7.61, 7.61); Calibrated: 4/20/2018;
Sensor-Surface: 2mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1321; Calibrated: 1/10/2018
Phantom: ELI v5.0; Type: QDOVA002AA; Serial: 2037
Measurement SW: DASY52, Version 52.10 (0); SEMCAD X Version 14.6.10 (7417)

Procedure Notes:

Band 2 LTE/Side A 1 RB 49 Offset Ant 0 High/Area Scan (9x13x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (measured) = 1.31 W/kg

Band 2 LTE/Side A 1 RB 49 Offset Ant 0 High/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 12.31 V/m; Power Drift = -0.02 dB
Peak SAR (extrapolated) = 1.63 W/kg
SAR(1 g) = 0.964 W/kg



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Plot 9

DUT: M1000; Type: Hotspot; Serial: Eng 1

Communication System: WiFi 802.11b (DSSS, 11 Mbps); Frequency: 2437 MHz; Duty Cycle: 1:1
Medium: MSL2450; Medium parameters used (interpolated): f = 2437 MHz; σ = 1.984 S/m; ε_r = 52.606; ρ = 1000 kg/m^3
Phantom section: Flat Section

Test Date: Date: 3/13/2019; Ambient Temp: 23 °C; Tissue Temp: 21 °C

Probe: EX3DV4 - SN3662; ConvF(7.29, 7.29, 7.29); Calibrated: 4/20/2018;
Sensor-Surface: 2mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1321; Calibrated: 1/10/2018
Phantom: ELI v5.0; Type: QDOVA002AA; Serial: 2037
Measurement SW: DASY52, Version 52.10 (0); SEMCAD X Version 14.6.10 (7417)

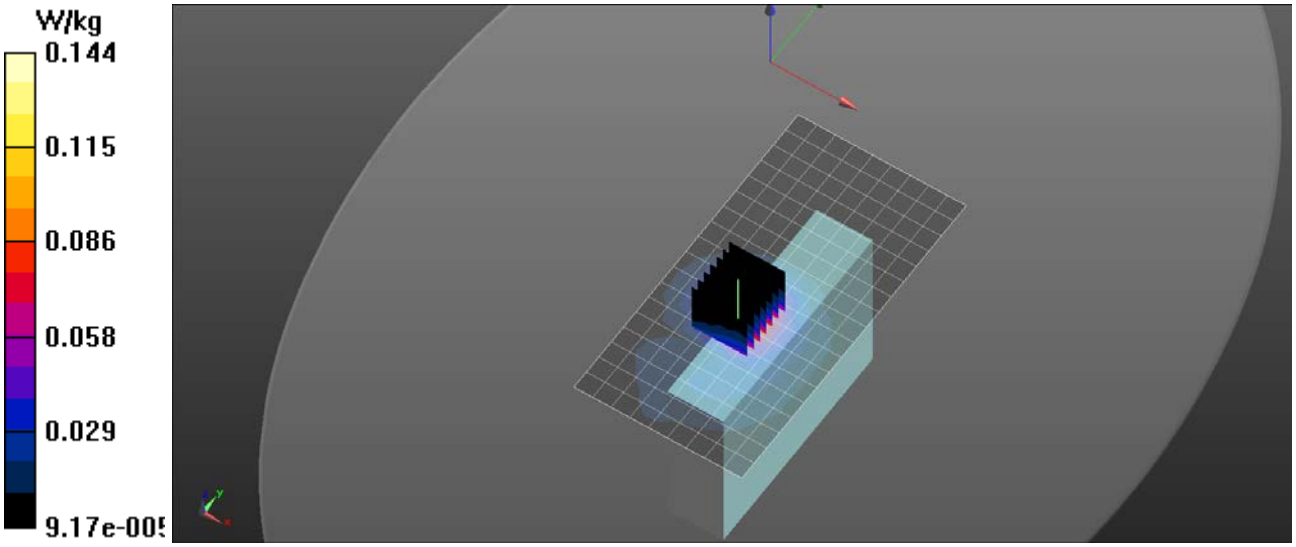
Procedure Notes:

2450 MHz/Side D Ant 1 Mid/Area Scan (10x19x1): Measurement grid: dx=10mm, dy=10mm

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

2450 MHz/Side D Ant 1 Mid/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 5.019 V/m; Power Drift = 0.04 dB
Peak SAR (extrapolated) = 0.190 W/kg
SAR(1 g) = 0.099 W/kg

Info: Interpolated medium parameters used for SAR evaluation.



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Plot 10

DUT: M1000; Type: Hotspot; Serial: Eng 1

Communication System: WiFi 802.11a (OFDM, 6 Mbps); Frequency: 5220 MHz; Duty Cycle: 1:1
Medium: MSL 3-6 GHz; Medium parameters used: f = 5220 MHz; σ = 5.7 S/m; ε_r = 48.48; ρ = 1000 kg/m^3
Phantom section: Flat Section

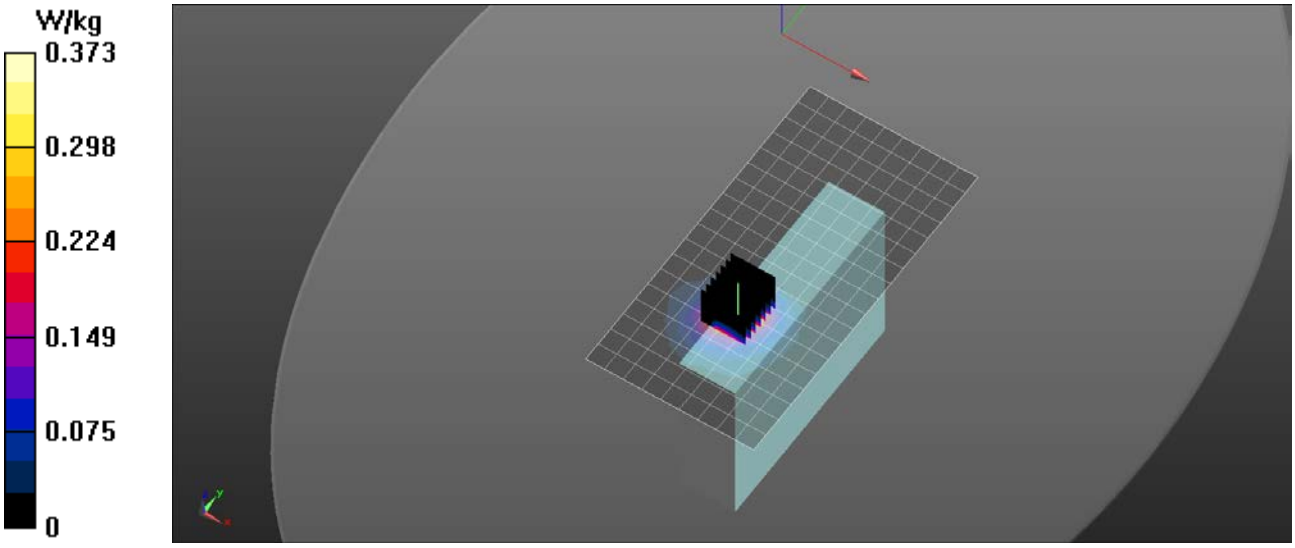
Test Date: Date: 3/11/2019; Ambient Temp: 23 °C; Tissue Temp: 21 °C

Probe: EX3DV4 - SN3662; ConvF(4.46, 4.46, 4.46); Calibrated: 4/20/2018;
Sensor-Surface: 2mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1321; Calibrated: 1/10/2018
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/Side D Ant 1 44/Area Scan (10x19x1): Measurement grid: dx=10mm, dy=10mm
Maximum value of SAR (measured) = 0.329 W/kg

5200 MHz/Side D Ant 1 44/Zoom Scan (7x7x12)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=2mm
Reference Value = 0 V/m; Power Drift = 0.00 dB
Peak SAR (extrapolated) = 1.34 W/kg
SAR(1 g) = 0.221 W/kg
Maximum value of SAR (measured) = 0.373 W/kg



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Plot 11

DUT: M1000; Type: Hotspot; Serial: Eng 1

Communication System: WiFi 802.11a (OFDM, 6 Mbps); Frequency: 5785 MHz; Duty Cycle: 1:1
Medium: MSL 3-6 GHz; Medium parameters used (interpolated): f = 5785 MHz; σ = 6.033 S/m; ε_r = 48.08; ρ = 1000 kg/m^3
Phantom section: Flat Section

Test Date: Date: 3/12/2019; Ambient Temp: 23 °C; Tissue Temp: 21 °C

Probe: EX3DV4 - SN3662; ConvF(4.08, 4.08, 4.08); Calibrated: 4/20/2018;
Sensor-Surface: 2mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1321; Calibrated: 1/10/2018
Phantom: ELI v5.0; Type: QDOVA002AA; Serial: 2037
Measurement SW: DASY52, Version 52.10 (0); SEMCAD X Version 14.6.10 (7417)

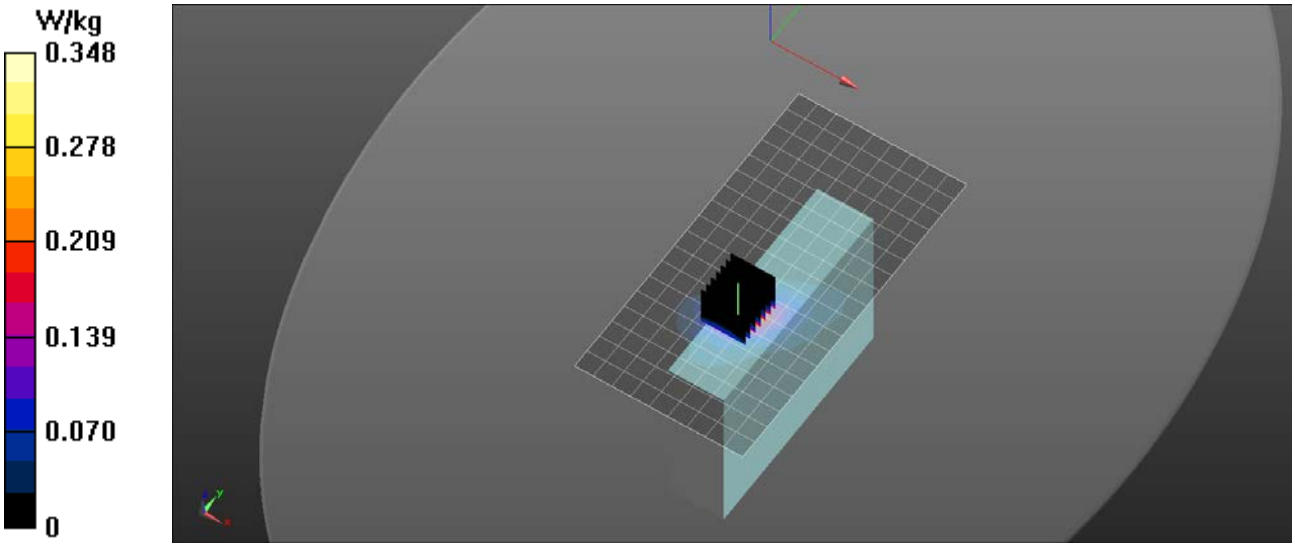
Procedure Notes:

5800 MHz/Side D Ant 1 157/Area Scan (10x19x1): Measurement grid: dx=10mm, dy=10mm

Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (measured) = 0.279 W/kg

5800 MHz/Side D Ant 1 157/Zoom Scan (7x7x12)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=2mm
Reference Value = 0.3310 V/m; Power Drift = 0.03 dB
Peak SAR (extrapolated) = 0.587 W/kg
SAR(1 g) = 0.160 W/kg

Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (measured) = 0.348 W/kg



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Plot 12

DUT: M1000; Type: Hotspot; Serial: Eng 1

Communication System: LTE (SC-FDMA, 1 RB, 20 MHz, QPSK); Frequency: 1900 MHz; Duty Cycle: 1:1
Medium: MSL1900; Medium parameters used: f = 1900 MHz; σ = 1.47 S/m; ε_r = 52.07; ρ = 1000 kg/m^3
Phantom section: Flat Section

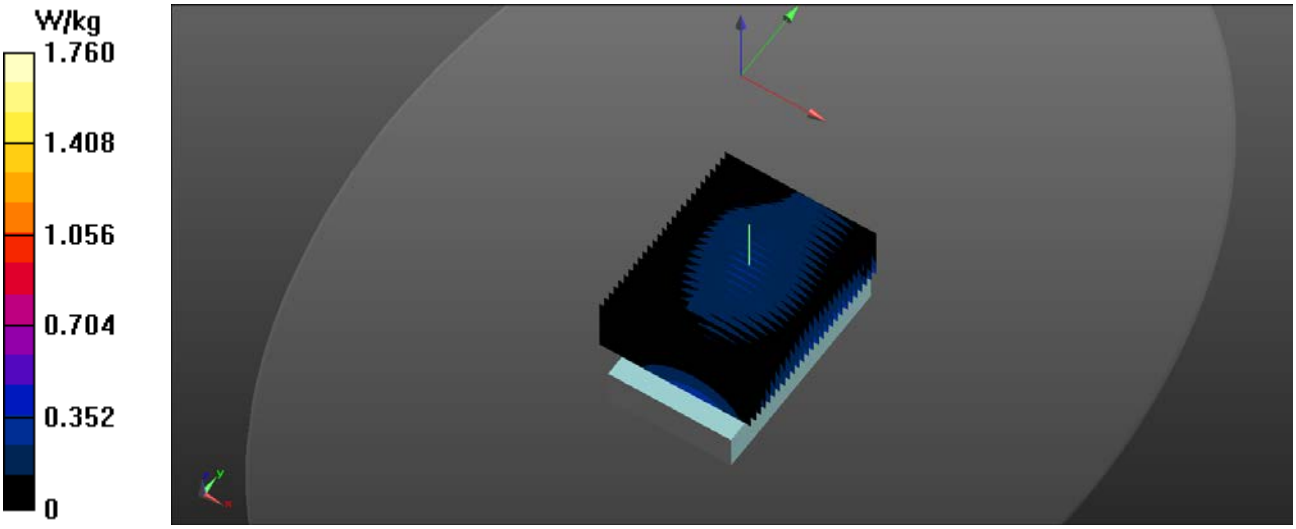
Communication System: WiFi 802.11a (OFDM, 6 Mbps); Frequency: 5220 MHz; Duty Cycle: 1:1
Medium: MSL 3-6 GHz; Medium parameters used: f = 5220 MHz; σ = 5.7 S/m; ε_r = 48.48; ρ = 1000 kg/m^3
Phantom section: Flat Section

Test Date: Date: 5/7/2019; Ambient Temp: 23 °C; Tissue Temp: 21 °C

Probe: EX3DV4 - SN3662; ConvF(7.61, 7.61, 7.61); Calibrated: 4/24/2019;
Sensor-Surface: 2mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1321; Calibrated: 1/10/2018
Phantom: ELI v5.0; Type: QDOVA002AA; Serial: 2037
Measurement SW: DASY52, Version 52.10 (0); SEMCAD X Version 14.6.10 (7417)

Procedure Notes:

Multi Band Result:
SAR(1 g) = 1.05 W/kg; SAR(10 g) = 0.652 W/kg
Maximum value of SAR (interpolated) = 1.76 W/kg



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Appendix D – Probe Calibration Data Sheets

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gm

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_Apr18

CALIBRATION CERTIFICATE

Object	EX3DV4 - SN:3662
Calibration procedure(s)	QA CAL-01.v9, QA CAL-14.v4, QA CAL-23.v5, QA CAL-25.v6 Calibration procedure for dosimetric E-field probes
Calibration date:	April 20, 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: S5277 (20x)	04-Apr-18 (No. 217-02682)	Apr-19
Reference Probe ES3DV2	SN: 3013	30-Dec-17 (No. ES3-3013_Dec17)	Dec-18
DAE4	SN: 660	21-Dec-17 (No. DAE4-660_Dec17)	Dec-18
Secondary Standards	ID	Check Date (in house)	Scheduled Check
Power meter E4419B	SN: GB41293874	06-Apr-16 (in house check Jun-16)	In house check: Jun-18
Power sensor E4412A	SN: MY41498087	06-Apr-16 (in house check Jun-16)	In house check: Jun-18
Power sensor E4412A	SN: 000110210	06-Apr-16 (in house check Jun-16)	In house check: Jun-18
RF generator HP 8648C	SN: US3642U01700	04-Aug-99 (in house check Jun-16)	In house check: Jun-18
Network Analyzer HP 8753E	SN: US37390585	18-Oct-01 (in house check Oct-17)	In house check: Oct-18

	Name	Function	Signature
Calibrated by:	Leif Klysner	Laboratory Technician	
Approved by:	Katja Pokovic	Technical Manager	

Issued: April 20, 2018

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Glossary:

TSL	tissue simulating liquid
NORMx,y,z	sensitivity in free space
ConvF	sensitivity in TSL / NORMx,y,z
DCP	diode compression point
CF	crest factor (1/duty_cycle) of the RF signal
A, B, C, D	modulation dependent linearization parameters
Polarization φ	φ rotation around probe axis
Polarization ϑ	ϑ rotation around an axis that is in the plane normal to probe axis (at measurement center), i.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).

Probe EX3DV4

SN:3662

Manufactured: October 20, 2008
Calibrated: April 20, 2018

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

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]	0.44	0.45	0.48	± 10.1 %
DCP (mV)[B]	102.6	97.6	96.4	

Modulation Calibration Parameters

UID	Communication System Name		A dB	B dB√μV	C	D dB	VR mV	Unc[E] (k=2)
0	CW	X	0.0	0.0	1.0	0.00	136.8	±3.3 %
		Y	0.0	0.0	1.0		132.2	
		Z	0.0	0.0	1.0		148.8	

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

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	9.80	9.80	9.80	0.43	0.90	± 12.0 %
900	41.5	0.97	9.29	9.29	9.29	0.40	0.91	± 12.0 %
1750	40.1	1.37	8.29	8.29	8.29	0.29	0.84	± 12.0 %
1900	40.0	1.40	8.01	8.01	8.01	0.37	0.80	± 12.0 %
2300	39.5	1.67	7.71	7.71	7.71	0.35	0.80	± 12.0 %
2450	39.2	1.80	7.39	7.39	7.39	0.28	0.91	± 12.0 %
2600	39.0	1.96	7.14	7.14	7.14	0.36	0.85	± 12.0 %
3500	37.9	2.91	7.08	7.08	7.08	0.25	1.20	± 13.1 %
3700	37.7	3.12	6.99	6.99	6.99	0.25	1.20	± 13.1 %
5250	35.9	4.71	5.04	5.04	5.04	0.35	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	4.89	4.89	4.89	0.40	1.80	± 13.1 %

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

[F] At frequencies below 3 GHz, the validity of tissue parameters (ε and σ) can be relaxed to ± 10% if liquid compensation formula is applied to measured SAR values. At frequencies above 3 GHz, the validity of tissue parameters (ε and σ) is restricted to ± 5%. The uncertainty is the RSS of the ConvF uncertainty for indicated target tissue parameters.

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

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	9.62	9.62	9.62	0.37	0.98	± 12.0 %
900	55.0	1.05	9.21	9.21	9.21	0.44	0.84	± 12.0 %
1750	53.4	1.49	7.96	7.96	7.96	0.45	0.80	± 12.0 %
1900	53.3	1.52	7.61	7.61	7.61	0.44	0.80	± 12.0 %
2300	52.9	1.81	7.33	7.33	7.33	0.41	0.80	± 12.0 %
2450	52.7	1.95	7.29	7.29	7.29	0.36	0.87	± 12.0 %
2600	52.5	2.16	7.15	7.15	7.15	0.26	0.99	± 12.0 %
3500	51.3	3.31	7.00	7.00	7.00	0.25	1.20	± 13.1 %
3700	51.0	3.55	6.71	6.71	6.71	0.23	1.20	± 13.1 %
5250	48.9	5.36	4.46	4.46	4.46	0.45	1.90	± 13.1 %
5600	48.5	5.77	3.91	3.91	3.91	0.50	1.90	± 13.1 %
5750	48.3	5.94	4.08	4.08	4.08	0.50	1.90	± 13.1 %

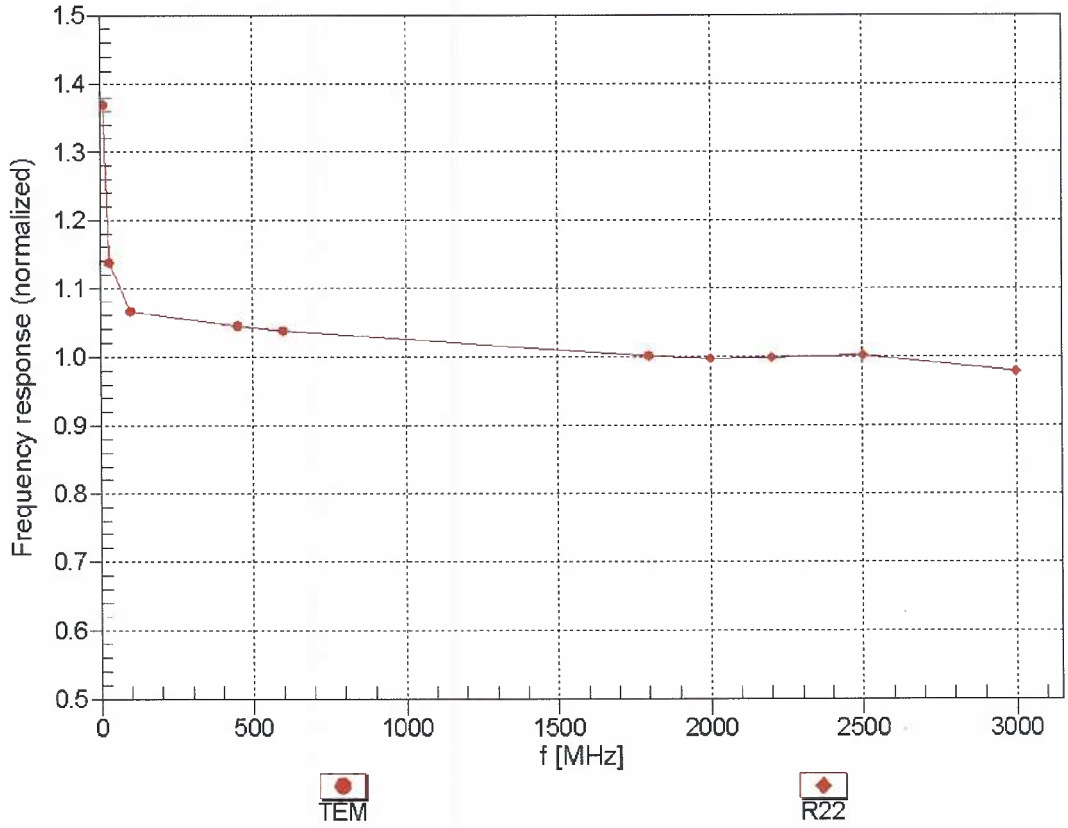
[C] Frequency validity above 300 MHz of ± 100 MHz only applies for DASY v4.4 and higher (see Page 2), else it is restricted to ± 50 MHz. The uncertainty is the RSS of the ConvF uncertainty at calibration frequency and the uncertainty for the indicated frequency band. Frequency validity below 300 MHz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

[F] At frequencies below 3 GHz, the validity of tissue parameters (ε and σ) can be relaxed to ± 10% if liquid compensation formula is applied to measured SAR values. At frequencies above 3 GHz, the validity of tissue parameters (ε and σ) is restricted to ± 5%. The uncertainty is the RSS of the ConvF uncertainty for indicated target tissue parameters.

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

Frequency Response of E-Field

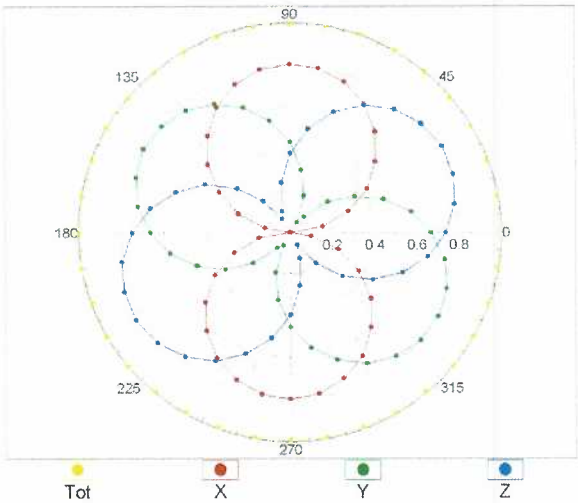
(TEM-Cell:ifi110 EXX, Waveguide: R22)



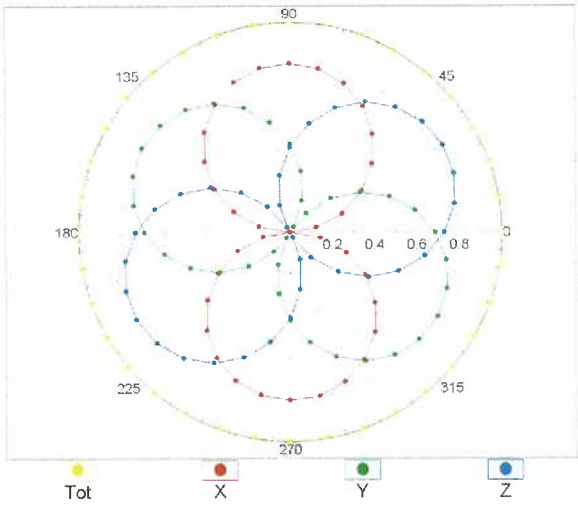
Uncertainty of Frequency Response of E-field: ± 6.3% (k=2)

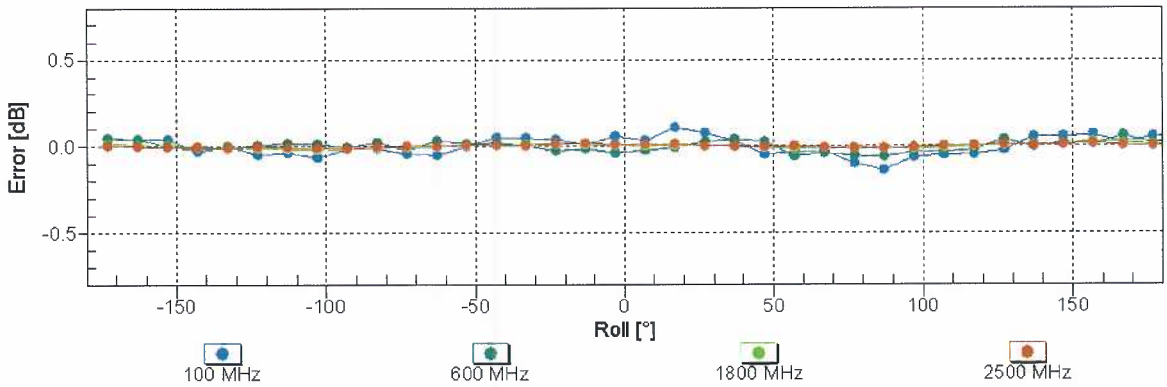
Receiving Pattern (ϕ), ϑ = 0°

f=600 MHz,TEM



f=1800 MHz,R22

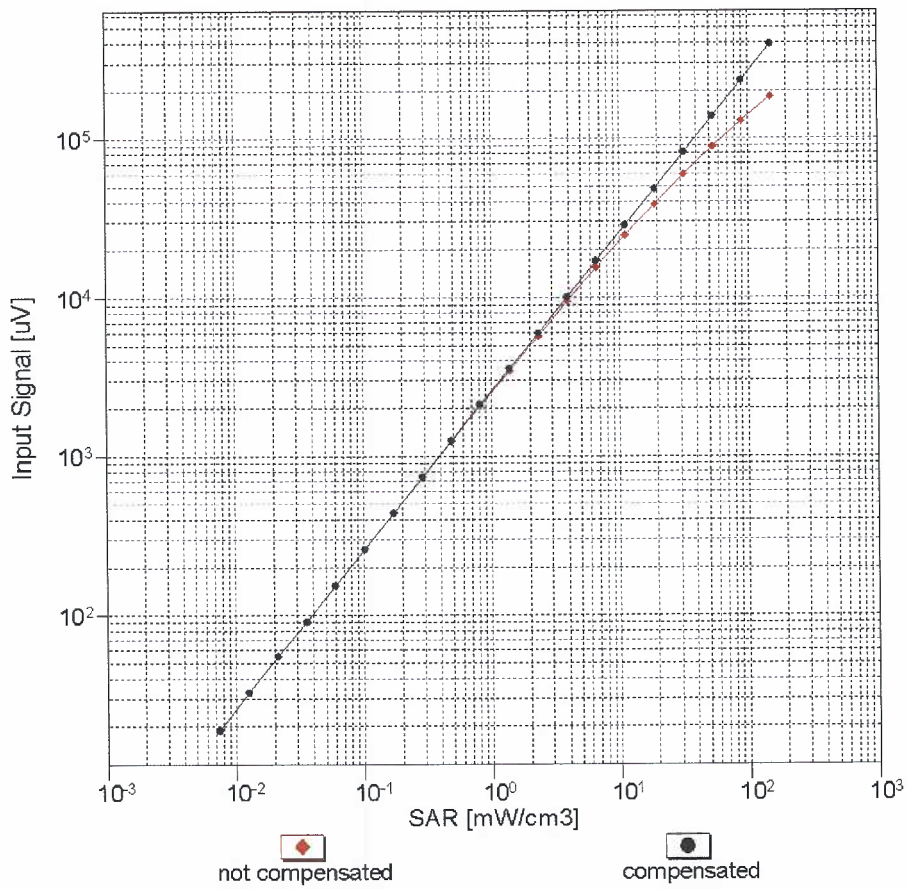


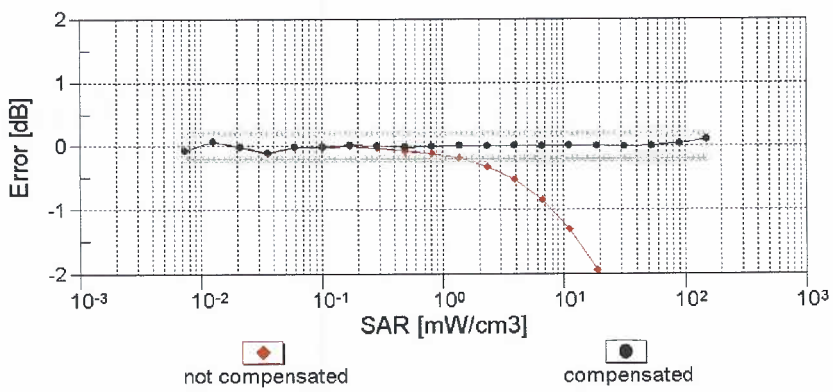


Uncertainty of Axial Isotropy Assessment: ± 0.5% (k=2)

Dynamic Range f(SAR_{head})

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

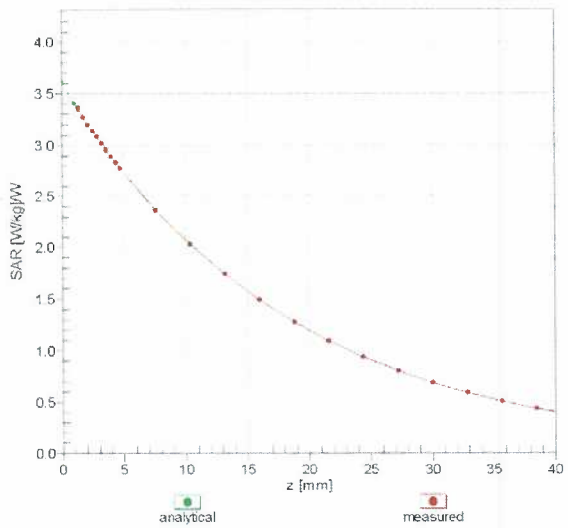




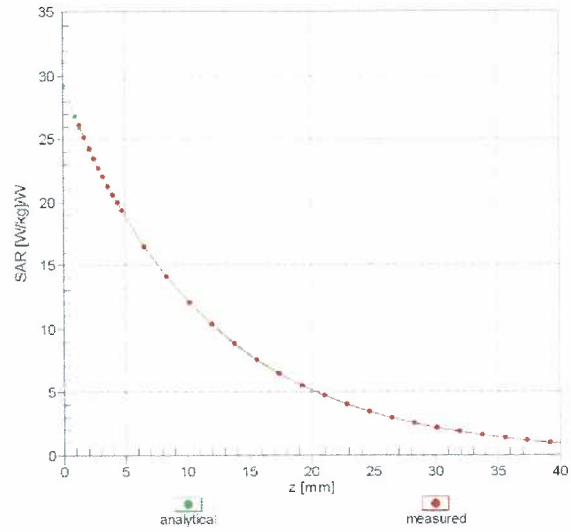
Uncertainty of Linearity Assessment: ± 0.6% (k=2)

Conversion Factor Assessment

f = 900 MHz,WGLS R9 (H_convF)

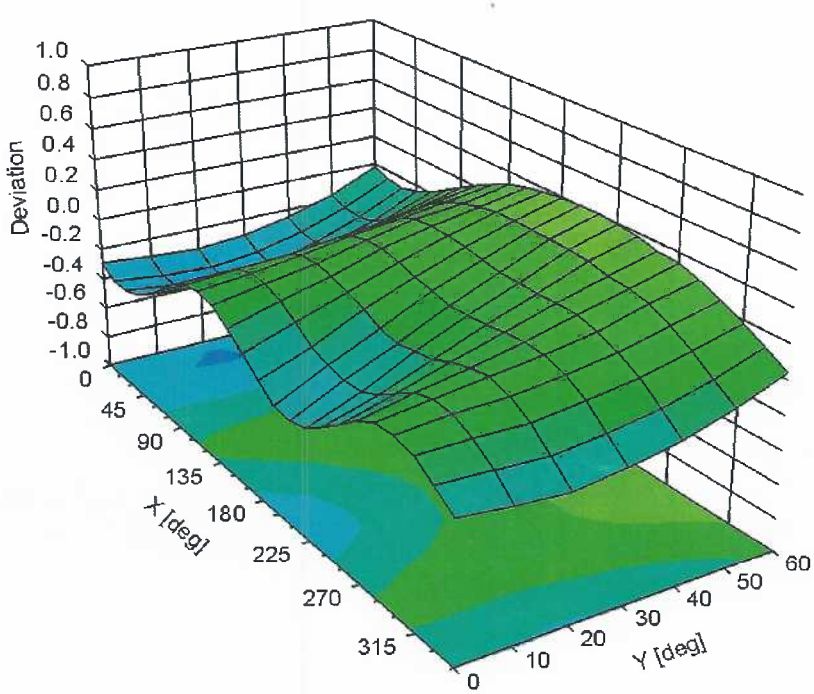


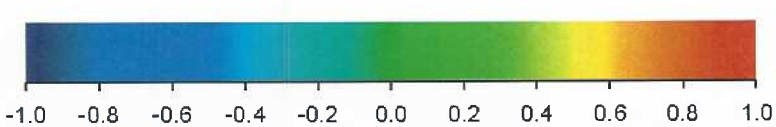
f = 1900 MHz,WGLS R22 (H_convF)



Deviation from Isotropy in Liquid

Error (ϕ, ϑ), f = 900 MHz





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

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

Other Probe Parameters

Sensor Arrangement	Triangular
Connector Angle (°)	-22.9
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

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

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

Glossary:

TSL	tissue simulating liquid
NORMx,y,z	sensitivity in free space
ConvF	sensitivity in TSL / NORMx,y,z
DCP	diode compression point
CF	crest factor (1/duty_cycle) of the RF signal
A, B, C, D	modulation dependent linearization parameters
Polarization φ	φ rotation around probe axis
Polarization ϑ	ϑ rotation around an axis that is in the plane normal to probe axis (at measurement center), i.e., 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√μV	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.