RF Exposure Lab

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

CERTIFICATE OF COMPLIANCE
SAR EVALUATION

AVIWest, a Haivision Company	Dates of Test:	June 12 – 22, 2023
Parc Edonia, Bat X1, Rue de la Terre de Feu	Test Report Number:	SAR.20230610
35760 Saint-Gregoire		Revision A
France	Lab Designation Number:	US1195 (FCC); US0194 (ISED)

FCC ID:	2ASIK-EM91 & 2ASIK-CB178NF
IC Certificate:	21415-EM91 & 21415-CB178NF
HVIN/Model(s):	Pro360-5G
Contains Cellular Module:	Aviwest Model EM9191
Contain WiFi Module:	Aviwest Model AW-CB178NF
Test Sample:	Engineering Unit Same as Production
Serial Number:	AVWPRO31222008397
Equipment Type:	Wireless Video Transceiver
Classification:	Portable Transmitter Next to Body
TX Frequency Range:	663 – 698 MHz, 699 – 716 MHz, 777 – 787 MHz, 788 – 798 MHz, 814 – 849 MHz, 1710 – 1780 MHz, 1850 – 1915 MHz, 2496 – 2690 MHz, 3550 – 3700 MHz, 2412 – 2462 MHz, 5150 – 5350 MHz, 5500 – 5700 MHz, 5745 – 5825 MHz, 2402 – 2480 MHz
Frequency Tolerance:	± 2.5 ppm
Maximum RF Output:	600 MHz (LTE) – 24.0 dBm, 750 MHz (LTE) – 24.0 dBm, 850 MHz (WCDMA) – 24.5 dBm, 850 MHz (LTE) – 24.0 dBm, 1750 MHz (WCDMA) – 24.5 dBm, 1750 MHz (LTE) – 24.0 dBm, 1900 MHz (WCDMA) – 24.5 dBm, 1900 MHz (LTE) – 24.0 dBm, 2550 MHz (LTE) – 26.0 dBm, 3600 MHz (LTE) – 24.0 dBm, 2450 MHz (b) – 18.0 dBm, 2450 MHz (g) – 16.0 dBm, 2450 MHz (n20) – 15.0 dBm, 2450 MHz (n40) – 13.0 dBm, 5250 MHz (a) – 15.0 dBm, 5250 MHz (n20) – 14.0 dBm, 5250 MHz (n40) – 12.0 dBm, 5250 MHz (ac80) – 10.0 dBm, 5600 MHz (a) – 15.0 dBm, 5600 MHz (n20) – 14.0 dBm, 5600 MHz (n40) – 12.0 dBm, 5600 MHz (ac80) – 10.0 dBm, 5800 MHz (a) – 15.0 dBm, 5800 MHz (n20) – 14.0 dBm, 5800 MHz (n40) – 12.0 dBm, 5800 MHz (ac80) – 10.0 dBm, 2450 MHz (BT) – 4.0 dBm Conducted
Signal Modulation:	WCDMA, QPSK, 16QAM, DSSS, OFDM
Antenna Type:	Internal
Application Type:	Certification
FCC Rule Parts:	Part 2, 15, 22, 24, 27, 90
KDB Test Methodology:	KDB 447498 D01 v06, KDB 248227 v02r02, KDB 941225 D01 v03r01, D02 v02r01 & D05 v02r05
Industry Canada:	RSS-102 Issue 6, Safety Code 6
Max. Stand Alone SAR Value:	1.30 W/kg Reported
Max. Simultaneous Value:	0.04 Separation Ratio
Separation Distance:	15 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 62209-1528:2020 (See test report).

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

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

Jay M. Moulton
Vice President

ACCREDITED
Testing Cert. # 2387.01

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Comment/Revision	Date
Original Release	July 6, 2023
Revision A – Replace Sierra Wireless & Azureware with Aviwest on page 1, evaluated report to RSS-102 Issue 6, add 'The 15 mm gap is the thickness of the backpack' on page 24, add exclusion of BT testing on page 24 and correct type of Extremity to Body on page 80	June 13, 2024

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

1. Introduction

This measurement report shows compliance of the AVIWest, a Haivision Company Model Pro360-5G FCC ID: 2ASIK-EM91 & 2ASIK-CB178NF with FCC Part 2, 1093, ET Docket 93-62 Rules for mobile and portable devices and IC Certificate: 21415-EM91 & 21415-CB178NF with RSS102 Issue 6 & Safety Code 6. The FCC/ISED have adopted the guidelines for evaluating the environmental effects of radio frequency radiation to protect the public and workers from the potential hazards of RF emissions due to FCC/ISED regulated portable devices. [1], [6]

The test results recorded herein are based on a single type test of AVIWest, a Haivision Company Model Pro360-5G and therefore apply only to the tested sample.

The testing is this report was conducted on two transmit antennas. One in each plane of the device. The two remaining antennas on the same plane with the same distance were spot checked to verify the values were similar. Antenna M1 and M3 were chosen to do a full evaluation. Antennas M2, M4, M5 and M6 were spot checked. Both of the WiFi antennas had a full evaluation conducted on each antenna.

The test procedures and limits, as described in ANSI C95.1 – 1999 Standard for Safety Levels with Respect to Human Exposure to Radio Frequency Electromagnetic Fields, 3 kHz to 300 GHz [2], ANSI C95.3 – 2002 Recommended Practice for the Measurement of Potentially Hazardous Electromagnetic Fields [3], IEEE Std.1528 – 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 Pro360-5G Wireless Video Transceiver. The table also shows the tolerance for the power level for each mode.

Band	Technology	3GPP Nominal Power dBm	Calibrated Nominal Power dBm	Tolerance dBm	Lower Tolerance dBm	Upper Tolerance dBm
Band 2 – 1900 MHz	LTE	23.0	23.0	+1.0/-1.0	22.0	24.0
Band 4 – 1750 MHz	LTE	23.0	23.0	+1.0/-1.0	22.0	24.0
Band 5 – 850 MHz	LTE	23.0	23.0	+1.0/-1.0	22.0	24.0
Band 7 – 2550 MHz	LTE	23.0	23.0	+1.8/-1.0	22.0	24.8
Band 12 – 750 MHz	LTE	23.0	23.0	+1.0/-1.0	22.0	24.0
Band 13 – 750 MHz	LTE	23.0	23.0	+1.0/-1.0	22.0	24.0
Band 14 – 750 MHz	LTE	23.0	23.0	+1.0/-1.0	22.0	24.0
Band 17 – 750 MHz	LTE	23.0	23.0	+1.0/-1.0	22.0	24.0
Band 25 – 1900 MHz	LTE	23.0	23.0	+1.0/-1.0	22.0	24.0
Band 26 – 850 MHz	LTE	23.0	23.0	+1.0/-1.0	22.0	24.0
Band 38 – 2550 MHz	LTE	23.0	23.0	+1.0/-1.0	22.0	24.0
Band 41 – 2550 MHz PC3	LTE	23.0	23.0	+1.8/-1.0	22.0	24.8
Band 41 – 2550 MHz PC2	LTE	25.0	25.0	+1.0/-1.0	24.0	26.0
Band 48 – 3600 MHz	LTE	23.0	23.0	+1.0/-1.0	22.0	24.0
Band 66 – 1750 MHz	LTE	23.0	23.0	+1.0/-1.0	22.0	24.0
Band 71 – 600 MHz	LTE	23.0	23.0	+1.0/-1.0	22.0	24.0
Band 5 – 850 MHz	WCDMA/HSPA	23.5	23.5	+1.0/-1.0	22.5	24.5
Band 4 – 1750 MHz	WCDMA/HSPA	23.5	23.5	+1.0/-1.0	22.5	24.5
Band 2 – 1900 MHz	WCDMA/HSPA	23.5	23.5	+1.0/-1.0	22.5	24.5
WLAN – 2.4 GHz	802.11b	N/A	N/A	N/A	N/A	18.0
WLAN – 2.4 GHz	802.11g	N/A	N/A	N/A	N/A	16.0
WLAN – 2.4 GHz	802.11n20	N/A	N/A	N/A	N/A	15.0
WLAN – 2.4 GHz	802.11n40	N/A	N/A	N/A	N/A	13.0
WLAN – 5 GHz UNII Band I,IIA,IIC,III	802.11a	N/A	N/A	N/A	N/A	15.0
WLAN – 5 GHz UNII Band I,IIA,IIC,III	802.11n20	N/A	N/A	N/A	N/A	14.0
WLAN – 5 GHz UNII Band I,IIA,IIC,III	802.11n40	N/A	N/A	N/A	N/A	12.0
WLAN – 5 GHz UNII Band I,IIA,IIC,III	802.11ac80	N/A	N/A	N/A	N/A	10.0
BT – 2.4 GHz	Bluetooth	N/A	N/A	N/A	N/A	4.0

LTE UL CA Combinations (Aggregate Power)

Band UL 2CA Combination	Technology	Class	Nominal dBm	Tolerance dBm	Lower Tolerance dBm	Upper Tolerance dBm
12A-4A	LTE	23.0	23.0	+1.0/-1.0	22.0	24.0
12A-2A	LTE	23.0	23.0	+1.0/-1.0	22.0	24.0
13A-2A	LTE	23.0	23.0	+1.0/-1.0	22.0	24.0
13A-4A	LTE	23.0	23.0	+1.0/-1.0	22.0	24.0
5A-2A	LTE	23.0	23.0	+1.0/-1.0	22.0	24.0
5A-4A	LTE	23.0	23.0	+1.0/-1.0	22.0	24.0
66A-2A	LTE	23.0	23.0	+1.0/-1.0	22.0	24.0
66A-5A	LTE	23.0	23.0	+1.0/-1.0	22.0	24.0
7A-5A	LTE	23.0	23.0	+1.0/-1.0	22.0	24.0

FR1 NSA UL ENDC Combinations (Aggregate Power)

Band UL ENDC Combination	Technology	Class	Nominal dBm	Tolerance dBm	Lower Tolerance dBm	Upper Tolerance dBm
12A-n66A	LTE+FR1	3	23.0	+1.5/-1.5	21.5	24.5
12A-n2A	LTE+FR1	3	23.0	+1.5/-1.5	21.5	24.5
13A-n66A	LTE+FR1	3	23.0	+1.5/-1.5	21.5	24.5
13A-n2A	LTE+FR1	3	23.0	+1.5/-1.5	21.5	24.5
2A-n5A	LTE+FR1	3	23.0	+1.5/-1.5	21.5	24.5
2A-n71A	LTE+FR1	3	23.0	+1.5/-1.5	21.5	24.5
41A-n77A	LTE+FR1	3	23.0	+1.5/-1.5	21.5	24.5
5A-n66A	LTE+FR1	3	23.0	+1.5/-1.5	21.5	24.5
5A-n2A	LTE+FR1	3	23.0	+1.5/-1.5	21.5	24.5
66A-n5A	LTE+FR1	3	23.0	+1.5/-1.5	21.5	24.5
66A-n71A	LTE+FR1	3	23.0	+1.5/-1.5	21.5	24.5
7A-n5A	LTE+FR1	3	23.0	+1.5/-1.5	21.5	24.5
7A-n71A	LTE+FR1	3	23.0	+1.5/-1.5	21.5	24.5

SAR Definition [5]

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

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

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

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

where:

σ = conductivity of the tissue (S/m)

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

E = rms electric field strength (V/m)

2. SAR Measurement Setup

Robotic System

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

System Hardware

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

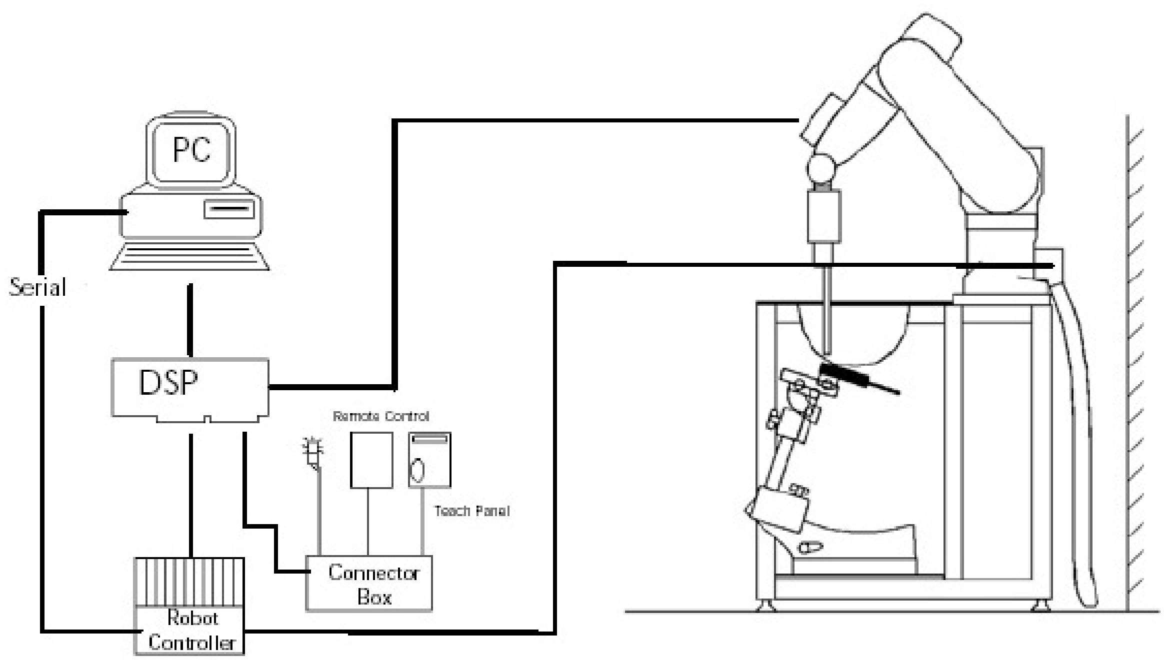


Figure 2.1 SAR Measurement System Setup

System Electronics

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

Probe Measurement System

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

DAE System

Probe Specifications

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

Frequency: 10 MHz to 6 GHz

Linearity: ±0.2dB (30 MHz to 6 GHz)

Dynamic: 10 mW/kg to 100 W/kg

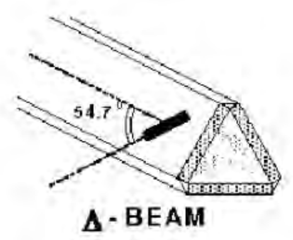


Figure 2.2 Triangular Probe Configurations

Range: Linearity: ±0.2dB

Dimensions: Overall length: 330 mm

Tip length: 20 mm

Body diameter: 12 mm

Tip diameter: 2.5 mm

Distance from probe tip to sensor center: 1 mm

Figure 2.3 Probe Thick-Film Technique

Application: SAR Dosimetry Testing
Compliance tests of wireless device

Probe Calibration Process

Dosimetric Assessment Procedure

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

Free Space Assessment

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

Temperature Assessment *

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

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

where:

Δt = exposure time (30 seconds),

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

ΔT = temperature increase due to RF exposure.

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

where:

σ = simulated tissue conductivity,

ρ = Tissue density (1.25 g/cm^3 for brain tissue)

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

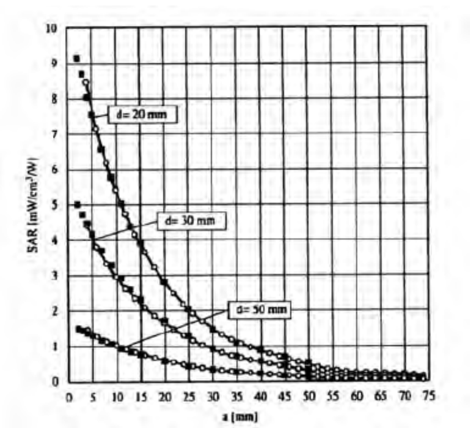


Figure 2.4 E-Field and Temperature Measurements at 900MHz

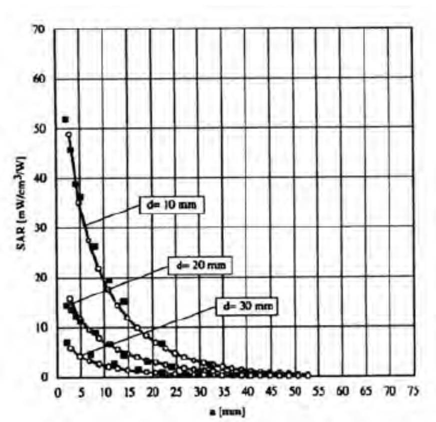


Figure 2.5 E-Field and Temperature Measurements at 1800MHz

Data Extrapolation

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

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

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

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

E-field probes:

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

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

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

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

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

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

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

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

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

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

Scanning procedure

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

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

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

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

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

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

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

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

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

Spatial Peak SAR Evaluation

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

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

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

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

Extrapolation

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

Interpolation

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

Volume Averaging

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

Advanced Extrapolation

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

SAM PHANTOM

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

Phantom Specification

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

Figure 2.6 SAM Twin Phantom

Device Holder for Transmitters

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

Figure 2.7 Mounting Device

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

3. Probe and Dipole Calibration

See Appendix D and E.

4. Phantom & Simulating Tissue Specifications

Head & Body Simulating Mixture Characterization

The head mixture 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.

Table 4.1 Typical Composition of Ingredients for Tissue

Ingredients		Simulating Tissue					
		750 MHz Head	900 MHz Head	1750 MHz Head	1900 MHz Head	2550 MHz Head	3500 MHz Head
Mixing Percentage							
Water		Proprietary Purchased From Speag					
Sugar							
Salt							
HEC							
Bactericide							
DGBE							
Dielectric Constant	Target	41.94	41.50	40.08	40.00	39.07	37.93
Conductivity (S/m)	Target	0.89	0.97	1.37	1.40	1.91	2.91

Ingredients		Simulating Tissue				
		3700 MHz Head	2450 MHz Head	5250 MHz Head	5600 MHz Head	5750 MHz Head
Mixing Percentage						
Water		Proprietary Purchased From Speag				
Sugar						
Salt						
HEC						
Bactericide						
DGBE						
Dielectric Constant	Target	37.70	39.20	35.93	35.53	35.36
Conductivity (S/m)	Target	3.12	1.80	4.71	5.07	5.22

5. ANSI/IEEE C95.1 – 1992 RF Exposure Limits [2]

Uncontrolled Environment

Uncontrolled Environments are defined as locations where there is the exposure of individuals who have no knowledge or control of their exposure. The general population/uncontrolled exposure limits are applicable to situations in which the general public may be exposed or in which persons who are exposed as a consequence of their employment may not be made fully aware of the potential for exposure or cannot exercise control over their exposure. Members of the general public would come under this category when exposure is not employment-related; for example, in the case of a wireless transmitter that exposes persons in its vicinity.

Controlled Environment

Controlled Environments are defined as locations where there is exposure that may be incurred by persons who are aware of the potential for exposure, (i.e. as a result of employment or occupation). In general, occupational/controlled exposure limits are applicable to situations in which persons are exposed as a consequence of their employment, who have been made fully aware of the potential for exposure and can exercise control over their exposure. This exposure category is also applicable when the exposure is of a transient nature due to incidental passage through a location where the exposure levels may be higher than the general population/uncontrolled limits, but the exposed person is fully aware of the potential for exposure and can exercise control over his or her exposure by leaving the area or by some other appropriate means.

Table 5.1 Human Exposure Limits

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

[1] The Spatial Peak value of the SAR averaged over any 1 gram of tissue (defined as a tissue volume in the shape of a cube) and over the appropriate averaging time.
[2] The Spatial Average value of the SAR averaged over the whole body.
[3] The Spatial Peak value of the SAR averaged over any 10 grams of tissue (defined as a tissue volume in the shape of a cube) and over the appropriate averaging time.

6. Measurement Uncertainty

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

7. System Validation

Tissue Verification

Table 7.1 Measured Tissue Parameters

		750 MHz Head		900 MHz Head		1750 MHz Head	
Date(s)		Jun. 13, 2023		Jun. 12, 2023		Jun. 16, 2023	
Liquid Temperature (˚C)	20.0	Target	Measured	Target	Measured	Target	Measured
Dielectric Constant: ε		41.94	41.46	41.50	41.34	40.08	39.24
Conductivity: σ		0.89	0.90	0.97	0.98	1.37	1.40
		1900 MHz Head		2550 MHz Head		3500 MHz Head	
Date(s)		Jun. 15, 2023		Jun. 19, 2023		Jun. 20, 2023	
Liquid Temperature (˚C)	20.0	Target	Measured	Target	Measured	Target	Measured
Dielectric Constant: ε		40.00	39.87	39.07	38.95	37.93	37.00
Conductivity: σ		1.40	1.39	1.91	1.94	2.91	2.96
		3700 MHz Head		2450 MHz Head		5250 MHz Head	
Date(s)		Jun. 20, 2023		Jun. 22, 2023		Jun. 21, 2023	
Liquid Temperature (˚C)	20.0	Target	Measured	Target	Measured	Target	Measured
Dielectric Constant: ε		37.70	36.53	39.20	38.34	35.93	34.77
Conductivity: σ		3.12	3.09	1.80	1.81	4.71	4.73
		5600 MHz Head		5750 MHz Head			
Date(s)		Jun. 21, 2023		Jun. 21, 2023			
Liquid Temperature (˚C)	20.0	Target	Measured	Target	Measured		
Dielectric Constant: ε		35.53	34.35	35.36	34.18		
Conductivity: σ		5.07	5.11	5.22	5.28		

See Appendix A for data printout.

Test System Verification

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

Table 7.2 System Dipole Validation Target & Measured

	Test Frequency	Targeted SAR_{1g} (W/kg)	Measure SAR_{1g} (W/kg)	Tissue Used for Verification	Deviation (%)	Plot Number
13-Jun-2023	750 MHz	8.57	8.58	Head	+ 0.12	1
12-Jun-2023	900 MHz	11.20	11.50	Head	+ 2.68	2
16-Jun-2023	1750 MHz	37.70	37.80	Head	+ 0.27	3
15-Jun-2023	1900 MHz	40.40	41.50	Head	+ 2.72	4
20-Jun-2023	2550 MHz	55.30	56.40	Head	+ 1.99	5
20-Jun-2023	3500 MHz	67.00	67.80	Head	+ 1.19	6
22-Jun-2023	3700 MHz	68.30	69.50	Head	+ 1.76	7
21-Jun-2023	2450 MHz	54.10	54.60	Head	+ 0.92	8
21-Jun-2023	5250 MHz	79.50	80.30	Head	+ 1.01	9
21-Jun-2023	5600 MHz	83.20	83.50	Head	+ 0.36	10
21-Jun-2023	5750 MHz	80.50	80.50	Head	+ 0.00	11

See Appendix A for data plots.

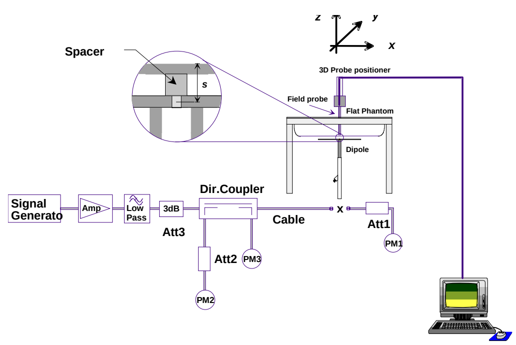


Figure 7.1 Dipole Validation Test Setup

8. LTE Document Checklist

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

LTE Operating Band	Uplink (transmit) Low - high	Downlink (Receive) Low - high	Duplex mode (FDD/TDD)
2	1850-1910	1930-1990	FDD
4	1710-1755	2110-2155	FDD
5	824-849	869-894	FDD
7	2500-2570	2620-2690	FDD
12	699-716	729-746	FDD
13	777-787	746-756	FDD
14	788-798	758-768	FDD
17	704-716	734-746	FDD
25	1850-1915	1930-1995	FDD
26	814-849	859-894	FDD
38	2570-2620	2570-2620	TDD
41	2496-2690	2496-2690	TDD
48	3550-3700	3550-3700	TDD
66	1710-1780	2110-2200	FDD
71	663-698	617-652	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
7	5, 10, 15, 20	2500-2570 MHz
12	1.4, 3, 5, 10	699-716 MHz
13	5, 10	777-787 MHz
14	5, 10	788-798 MHz
17	5, 10	704-716 MHz
25	1.4, 3, 5, 10, 15, 20	1850-1915 MHz
26	1.4, 3, 5, 10, 15	814-849 MHz
38	5, 10, 15, 20	2570-2620 MHz
41	5, 10, 15, 20	2496-2690 MHz
48	5, 10, 15, 20	3550-3700 MHz
66	1.4, 3, 5, 10, 15, 20	1710-1780 MHz
71	5, 10, 15, 20	663-698 MHz

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

LTE Band Class	Bandwidth (MHz)	Frequency (MHz)/Channel #					
		Low		Mid		High	
2	1.4	1850.7	18607	1880.0	18900	1909.3	19193
2	3	1851.5	18615	1880.0	18900	1908.5	19185
2	5	1852.5	18625	1880.0	18900	1907.5	19175
2	10	1855.0	18650	1880.0	18900	1905.0	19150
2	15	1857.5	18675	1880.0	18900	1902.5	19125
2	20	1860.0	18700	1880.0	18900	1900.0	19100
4	1.4	1710.7	19957	1732.5	20175	1754.3	20393
4	3	1711.5	19965	1732.5	20175	1753.5	20385
4	5	1712.5	19975	1732.5	20175	1752.5	20375
4	10	1715.0	20000	1732.5	20175	1750.0	20350
4	15	1717.5	20025	1732.5	20175	1747.5	20325
4	20	1720.0	20050	1732.5	20175	1745.0	20300
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
7	5	2502.5	20775	2535.0	21100	2567.5	21425
7	10	2505.0	20800	2535.0	21100	2565.0	21400
7	15	2507.5	20825	2535.0	21100	2562.5	21375
7	20	2510.0	20850	2535.0	21100	2560.0	21350
12	1.4	699.7	23017	707.5	23095	715.3	23173
12	3	700.5	23025	707.5	23095	714.5	23165
12	5	701.5	23035	707.5	23095	713.5	23155
12	10	704.0	23060	707.5	23095	711.0	23130
13	5	779.5	23205	782.0	23230	784.5	23225
13	10	-----	-----	782.0	23230	-----	-----
14	5	790.5	23305	793.0	23330	795.5	23355
14	10	-----	-----	793.0	23330	-----	-----
17	5	706.5	23755	710.0	23790	713.5	23825
17	10	709.0	23780	710.0	23790	711.0	23790
25	1.4	1850.7	26047	1882.5	26365	1914.3	26683
25	3	1851.5	26055	1882.5	26365	1913.5	26675
25	5	1852.5	26065	1882.5	26365	1912.5	26665
25	10	1855.0	26090	1882.5	26365	1910.0	26640
25	15	1857.5	26115	1882.5	26365	1907.5	26615
25	20	1860.0	26140	1882.5	26365	1905.0	26590
26	1.4	814.7	26697	831.5	26865	848.3	27033
26	3	815.5	26705	831.5	26865	847.5	27025
26	5	816.5	26715	831.5	26865	846.5	27015
26	10	819.0	26740	831.5	26865	844.0	26990
26	15	821.5	26765	831.5	26865	841.5	26995
38	5	2572.5	37775	2595.0	38000	2602.5	38075
38	10	2575.0	37800	2595.0	38000	2605.0	38100
38	15	2577.5	37825	2595.0	38000	2607.5	38125
38	20	2580.0	37850	2595.0	38000	2610.0	38150
41	5	2498.5	39675	2593	40620	2687.5	41565
41	10	2501.0	39700	2593	40620	2685.0	41540
41	15	2503.5	39725	2593	40620	2682.5	41515
41	20	2506.0	39750	2593	40620	2680.0	41490
48	5	3552.5	55265	3526.0	55990	3697.5	56715
48	10	3555.0	55290	3526.0	55990	3695.0	56690
48	15	3557.5	55315	3526.0	55990	3692.5	56665
48	20	3560.0	55340	3526.0	55990	3690.0	56640
66	1.4	1710.7	131979	1755.0	132422	1779.3	132665
66	3	1711.5	131987	1755.0	132422	1778.5	132657
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
71	5	665.5	133147	680.5	133297	695.5	133447
71	10	668.0	133172	680.5	133297	693.0	133422
71	15	670.5	133197	680.5	133297	690.5	133397
71	20	673.0	133222	680.5	133297	688.0	133372

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

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

   The device has 8 antennas:
   - 6 – 3G, 4G, FR1 (Transmit and Receive) Antennas
   - 2 – WiFi (Transmit and Receive) Antennas

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. Data mode was tested in each operating mode and exposure condition in the body configuration. See test setup photos to see all configurations tested.

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

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

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

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

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

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

   The maximum average conducted output power measured for the testing is listed on pages 32-68 of this report. The below table shows the factory set point with the allowable tolerance.

Band	Technology	3GPP Nominal Power dBm	Calibrated Nominal Power dBm	Tolerance dBm	Lower Tolerance dBm	Upper Tolerance dBm
Band 2 – 1900 MHz	LTE	23.0	23.0	+1.0/-1.0	22.0	24.0
Band 4 – 1750 MHz	LTE	23.0	23.0	+1.0/-1.0	22.0	24.0
Band 5 – 850 MHz	LTE	23.0	23.0	+1.0/-1.0	22.0	24.0
Band 7 – 2550 MHz	LTE	23.0	23.0	+1.8/-1.0	22.0	24.8
Band 12 – 750 MHz	LTE	23.0	23.0	+1.0/-1.0	22.0	24.0
Band 13 – 750 MHz	LTE	23.0	23.0	+1.0/-1.0	22.0	24.0
Band 14 – 750 MHz	LTE	23.0	23.0	+1.0/-1.0	22.0	24.0
Band 17 – 750 MHz	LTE	23.0	23.0	+1.0/-1.0	22.0	24.0
Band 25 – 1900 MHz	LTE	23.0	23.0	+1.0/-1.0	22.0	24.0
Band 26 – 850 MHz	LTE	23.0	23.0	+1.0/-1.0	22.0	24.0
Band 38 – 2550 MHz	LTE	23.0	23.0	+1.0/-1.0	22.0	24.0
Band 41 – 2550 MHz PC3	LTE	23.0	23.0	+1.8/-1.0	22.0	24.8
Band 41 – 2550 MHz PC2	LTE	25.0	25.0	+1.0/-1.0	24.0	26.0
Band 48 – 3600 MHz	LTE	23.0	23.0	+1.0/-1.0	22.0	24.0
Band 66 – 1750 MHz	LTE	23.0	23.0	+1.0/-1.0	22.0	24.0
Band 71 – 600 MHz	LTE	23.0	23.0	+1.0/-1.0	22.0	24.0

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

Other wireless modes:

Band	Technology	3GPP Nominal Power dBm	Calibrated Nominal Power dBm	Tolerance dBm	Lower Tolerance dBm	Upper Tolerance dBm
Band 5 – 850 MHz	WCDMA/HSPA	23.5	23.5	+1.0/-1.0	22.5	24.5
Band 4 – 1750 MHz	WCDMA/HSPA	23.5	23.5	+1.0/-1.0	22.5	24.5
Band 2 – 1900 MHz	WCDMA/HSPA	23.5	23.5	+1.0/-1.0	22.5	24.5
WLAN – 2.4 GHz	802.11b	N/A	N/A	N/A	N/A	18.0
WLAN – 2.4 GHz	802.11g	N/A	N/A	N/A	N/A	16.0
WLAN – 2.4 GHz	802.11n20	N/A	N/A	N/A	N/A	15.0
WLAN – 2.4 GHz	802.11n40	N/A	N/A	N/A	N/A	13.0
WLAN – 5 GHz UNII Band I,IIA,IIC,III	802.11a	N/A	N/A	N/A	N/A	15.0
WLAN – 5 GHz UNII Band I,IIA,IIC,III	802.11n20	N/A	N/A	N/A	N/A	14.0
WLAN – 5 GHz UNII Band I,IIA,IIC,III	802.11n40	N/A	N/A	N/A	N/A	12.0
WLAN – 5 GHz UNII Band I,IIA,IIC,III	802.11ac80	N/A	N/A	N/A	N/A	10.0
BT – 2.4 GHz	Bluetooth	N/A	N/A	N/A	N/A	4.0

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 28 and 69-71 of this report. The table in item 9 shows the factory set point with the allowable tolerance.

11) 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.

12) 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.

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

Power reduction is not required to satisfy SAR compliance.

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

Not applicable.

9. SAR Test Data Summary

See Measurement Result Data Pages

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

Procedures Used To Establish Test Signal

The device was 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.

Required Test Positions						
Antenna	Top	Back	Front	Left	Right	Bottom
Ant M1	No	Yes	No	No	No	No
Ant M3	No	Yes	No	No	No	No
Ant M2	No	Yes	No	No	No	No
Ant M4	No	Yes	No	No	No	No
Ant M5	No	Yes	No	No	No	No
Ant M6	No	Yes	No	No	No	No
WiFi W1	No	Yes	No	No	No	No
WiFi W2	No	Yes	No	No	No	No

All testing was conducted with a 15 mm gap. The 15 mm gap was used to simulate the case the device is carried in when in use by the user. The 15 mm gap is the thickness of the backpack.

The Bluetooth testing was excluded from SAR testing due to the low power of the transmitter. The maximum power of the Bluetooth transmitter is 4 dBm (2.5 mW).

For the FCC, the exclusion was based on the calculation in KDB447498 v06 section 4.3.1 a). The following is the formula for the Bluetooth transmitter.

[(2.5 mW)/(5 mm)]*$\sqrt{2.48}$=0.79 which is equal to or less than 3.0

For ISED, the exclusion is based on RSS-102 Issue 6 section 6.3 table 11. Therefore, for a separation distance of 5 mm in the table, the exclusion limit is 3 mW. The Bluetooth transmitter have a maximum transmit power of 2.5 mW which is below the 3 mW threshold. Therefore, the Bluetooth transmitter is excluded from SAR testing.

WCDMA Conducted Power

1. The following tests were conducted according to the test requirements outlines in 3GPP TS 34.121 specification.
2. The procedures in KDB 941225 D01v03r01 are applied for 3GPP Rel. 6 HSPA to configure the device in the required sub-test mode(s) to determine SAR test exclusion.
3. For DC-HSDPA, the device was configured according to the H-Set 12, Fixed Reference Channel (FRC) configuration in Table C.8.1.12 of 3GPP TS 34.121-1, with the primary and the secondary serving HS-DSCH Cell enabled during the power measurement.

A summary of these settings are illustrated below:

HSDPA SETUP CONFIGURATION:

a. The EUT was connected to Base Station Agilent E5515C referred to the Setup Configuration.
b. The RF path losses were compensated into the measurements.
c. A call was established between EUT and Base Station with following setting:
   i. Set Gain Factors (β_c and β_d) and parameters were set according to each
   ii. Specific sub-test in the following table, C10.1.4, quoted from the TS 34.121
   iii. Set RMC 12.2Kbps + HSDPA mode.
   iv. Set Cell Power = -86 dBm
   v. Set HS-DSCH Configuration Type to FRC (H-set 1, QPSK)
   vi. Select HSDPA Uplink Parameters
   vii. Set Delta ACK, Delta NACK and Delta CQI = 8
   viii. Set Ack-Nack Repetition Factor to 3
   ix. Set CQI Feedback Cycle (k) to 4 ms
   x. Set CQI Repetition Factor to 2
   xi. Power Ctrl Mode = All Up bits
d. The transmitted maximum output power was recorded.

Table C.10.1.4: β values for transmitter characteristics tests with HS-DPCCH

Sub-test	β_c	β_d	β_d *(SF)*	β_c/β_d	β_{HS} *(Note1, Note 2)*	CM (dB) *(Note 3)*	MPR (dB) *(Note 3)*
1	2/15	15/15	64	2/15	4/15	0.0	0.0
2	12/15 *(Note 4)*	15/15 *(Note 4)*	64	12/15 *(Note 4)*	24/15	1.0	0.0
3	15/15	8/15	64	15/8	30/15	1.5	0.5
4	15/15	4/15	64	15/4	30/15	1.5	0.5

Note 1: Δ_{ACK}, Δ_{NACK} and Δ_{CQI} = 30/15 with $\beta_{hs} = 30/15 * \beta_c$.

Note 2: For the HS-DPCCH power mask requirement test in clause 5.2C, 5.7A, and the Error Vector Magnitude (EVM) with HS-DPCCH test in clause 5.13.1A, and HSDPA EVM with phase discontinuity in clause 5.13.1AA, Δ_{ACK} and Δ_{NACK} = 30/15 with $\beta_{hs} = 30/15 * \beta_c$, and Δ_{CQI} = 24/15 with $\beta_{hs} = 24/15 * \beta_c$.

Note 3: CM = 1 for β_c/β_d =12/15, β_{hs}/β_c=24/15. For all other combinations of DPDCH, DPCCH and HS-DPCCH the MPR is based on the relative CM difference. This is applicable for only UEs that support HSDPA in release 6 and later releases.

Note 4: For subtest 2 the β_c/β_d ratio of 12/15 for the TFC during the measurement period (TF1, TF0) is achieved by setting the signalled gain factors for the reference TFC (TF1, TF1) to β_c = 11/15 and β_d = 15/15.

SETUP CONFIGURATION

HSUPA SETUP CONFIGURATION:

a. The EUT was connected to Base Station Agilent E5515C referred to the Setup Configuration.
b. The RF path losses were compensated into the measurements.
c. A call was established between EUT and Base Station with following setting * :
   i. Call Configs = 5.2B, 5.9B, 5.10B, and 5.13.2B with QPSK
   ii. Set the Gain Factors (β_c and β_d) and parameters (AG Index) were set according to each specific sub-test in the following table, C11.1.3, quoted from the TS 34.121
   iii. Set Cell Power = -86 dBm
   iv. Set Channel Type = 12.2k + HSPA
   v. Set UE Target Power
   vi. Power Ctrl Mode= Alternating bits
   vii. Set and observe the E-TFCI
   viii. Confirm that E-TFCI is equal to the target E-TFCI of 75 for sub-test 1, and other subtest's E-TFCI
d. The transmitted maximum output power was recorded.

Table C.11.1.3: β values for transmitter characteristics tests with HS-DPCCH and E-DCH

Sub-test	β_c	β_d	β_d *(SF)*	β_c/β_d	β_{HS} *(Note1)*	β_{ec}	β_{ed} *(Note 4) (Note 5)*	β_{ed} *(SF)*	β_{ed} *(Codes)*	CM *(dB) (Note 2)*	MPR *(dB) (Note 2) (Note 6)*	*AG Index (Note 5)*	*E-TFCI*
1	11/15 *(Note 3)*	15/15 *(Note 3)*	64	11/15 *(Note 3)*	22/15	209/225	1309/225	4	1	1.0	0.0	20	75
2	6/15	15/15	64	6/15	12/15	12/15	94/75	4	1	3.0	2.0	12	67
3	15/15	9/15	64	15/9	30/15	30/15	β_{ed}1: 47/15 β_{ed}2: 47/15	4 4	2	2.0	1.0	15	92
4	2/15	15/15	64	2/15	4/15	2/15	56/75	4	1	3.0	2.0	17	71
5	15/15	0	-	-	5/15	5/15	47/15	4	1	1.0	0.0	12	67

Note 1: For sub-test 1 to 4, Δ_{ACK}, Δ_{NACK} and Δ_{CQI} = 30/15 with β_{hs} = 30/15 * β_c . For sub-test 5, Δ_{ACK}, Δ_{NACK} and Δ_{CQI} = 5/15 with β_{hs} = 5/15 * β_c .
Note 2: CM = 1 for β_c/β_d =12/15, β_{hs}/β_c=24/15. For all other combinations of DPDCH, DPCCH, HS- DPCCH, E-DPDCH and E-DPCCH the MPR is based on the relative CM difference.
Note 3: For subtest 1 the β_c/β_d ratio of 11/15 for the TFC during the measurement period (TF1, TF0) is achieved by setting the signalled gain factors for the reference TFC (TF1, TF1) to β_c = 10/15 and β_d = 15/15.
Note 4: In case of testing by UE using E-DPDCH Physical Layer category 1, Sub-test 3 is omitted according to TS25.306 Table 5.1g.
Note 5: β_{ed} can not be set directly; it is set by Absolute Grant Value.
Note 6: For subtests 2, 3 and 4, UE may perform E-DPDCH power scaling at max power which could results in slightly smaller MPR values.

SETUP CONFIGURATION

DC-HSDPA 3GPP RELEASE 8 SETUP CONFIGURATION:

a. The EUT was connected to Base Station Agilent E5515C referred to the Setup Configuration below
b. The RF path losses were compensated into the measurements.
c. A call was established between EUT and Base Station with following setting:
   i. Set RMC 12.2Kbps + HSDPA mode.
   ii. Set Cell Power = -25 dBm
   iii. Set HS-DSCH Configuration Type to FRC (H-set 12, QPSK)
   iv. Select HSDPA Uplink Parameters
   v. Set Gain Factors (β_c and β_d) and parameters were set according to each Specific sub-test in the following table,
   C10.1.4, quoted from the TS
   34.121 a). Subtest 1:
   β_c/β_d=2/15
   b). Subtest 2:
   β_c/β_d=12/15 c).
   Subtest 3: β_c/β_d=15/8
   d). Subtest 4:
   β_c/β_d=15/4
   vi. Set Delta ACK, Delta NACK and Delta CQI = 8
   vii. Set Ack-Nack Repetition Factor to 3
   viii. Set CQI Feedback Cycle (k) to 4 ms
   ix. Set CQI Repetition Factor to 2
   x. Power Ctrl Mode = All Up bits
d. The transmitted maximum output power was recorded.

The following tests were conducted according to the test requirements outlines in 3GPP TS 34.121 specification. A summary of these settings are illustrated below:

C.8.1.12 Fixed Reference Channel Definition H-Set 12

Table C.8.1.12: Fixed Reference Channel H-Set 12

Parameter	Unit	Value
Nominal Avg. Inf. Bit Rate	kbps	60
Inter-TTI Distance	TTI's	1
Number of HARQ Processes	Proces ses	6
Information Bit Payload (N_{INF})	Bits	120
Number Code Blocks	Blocks	1
Binary Channel Bits Per TTI	Bits	960
Total Available SML's in UE	SML's	19200
Number of SML's per HARQ Proc.	SML's	3200
Coding Rate		0.15
Number of Physical Channel Codes	Codes	1
Modulation		QPSK
Note 1: The RMC is intended to be used for DC-HSDPA mode and both cells shall transmit with identical parameters as listed in the table. Note 2: Maximum number of transmission is limited to 1, i.e., retransmission is not allowed. The redundancy and constellation version 0 shall be used.		

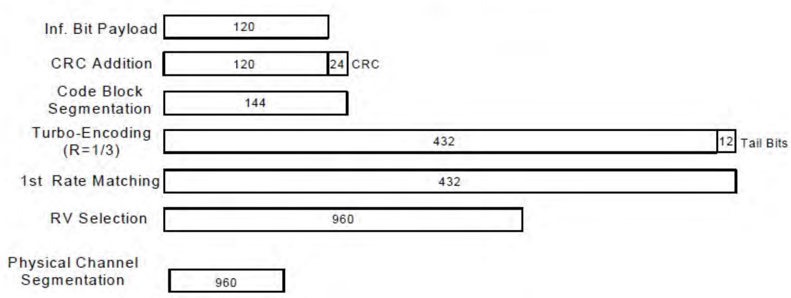


Figure C.8.19: Coding rate for Fixed reference Channel H-Set 12 (QPSK)

SETUP CONFIGURATION

<WCDMA Conducted Power>

GENERAL NOTE:

1. Per KDB 941225 D01v03r01, for SAR testing is measured using a 12.2 kbps RMC with TPC bits configured to all "1's".
2. Per KDB 941225 D01v03r01, RMC 12.2kbps setting is used to evaluate SAR. The maximum output power and tune-up tolerance specified for production units in HSDPA / HSUPA / DC-HSDPA is ≤ ¼ dB higher than RMC 12.2Kbps or when the highest reported SAR of the RMC12.2Kbps is scaled by the ratio of specified maximum output power and tune-up tolerance of HSDPA / HSUPA / DC-HSDPA to RMC12.2Kbps and the adjusted SAR is ≤ 1.2 W/kg, SAR measurement is not required for HSDPA / HSUPA / DC-HSDPA, and according to the following RF output power, the output power results of the secondary modes (HSUPA, HSDPA, DC-HSDPA) are less than ¼ dB higher than the primary modes; therefore, SAR measurement is not required for HSDPA / HSUPA / DC-HSDPA.

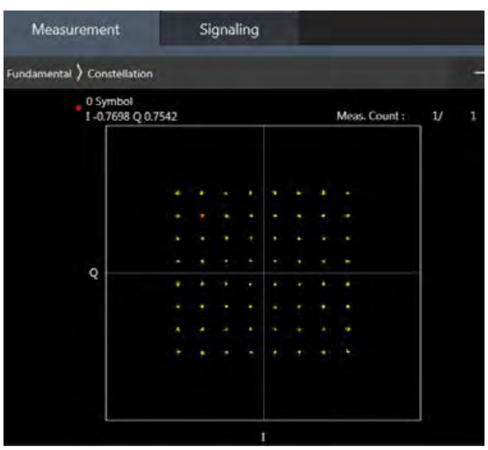
Full Power

Band		WCDMA II			Tune-up Limit (dBm)	WCDMA IV			Tune-up Limit (dBm)	WCDMA V			Tune-up Limit (dBm)
TX Channel		9262	9400	9538		1312	1413	1513		4132	4182	4233	
Rx Channel		9662	9800	9938		1537	1638	1738		4357	4407	4458	
Frequency (MHz)		1852.4	1880	1907.6		1712.4	1732.6	1752.6		826.4	836.4	846.6	
3GPP Rel 99	AMR 12.2Kbps	24.44	24.06	24.43	24.50	24.45	24.46	24.47	24.50	24.42	24.14	24.12	24.50
3GPP Rel 99	RMC 12.2Kbps	24.19	24.44	24.25	24.50	24.48	24.23	24.18	24.50	24.09	24.14	24.48	24.50
3GPP Rel 6	HSDPA Subtest-1	23.38	23.47	23.34	23.50	23.08	23.31	23.03	23.50	23.09	23.02	23.45	23.50
3GPP Rel 6	HSDPA Subtest-2	23.12	23.08	23.12	23.50	23.44	23.41	23.41	23.50	23.08	23.14	23.49	23.50
3GPP Rel 6	HSDPA Subtest-3	23.85	23.62	23.87	24.00	23.68	23.54	23.90	24.00	23.99	23.62	23.99	24.00
3GPP Rel 6	HSDPA Subtest-4	23.61	23.62	23.95	24.00	23.80	23.66	23.58	24.00	23.73	23.96	23.66	24.00
3GPP Rel 8	DC-HSDPA Subtest-1	23.21	23.40	23.49	23.50	23.50	23.38	23.00	23.50	23.48	23.06	23.34	23.50
3GPP Rel 8	DC-HSDPA Subtest-2	23.31	23.16	23.01	23.50	23.21	23.03	23.02	23.50	23.17	23.28	23.48	23.50
3GPP Rel 8	DC-HSDPA Subtest-3	23.72	23.57	23.58	24.00	23.93	23.89	23.69	24.00	23.55	23.53	23.75	24.00
3GPP Rel 8	DC-HSDPA Subtest-4	23.87	23.81	23.68	24.00	23.60	23.52	23.63	24.00	23.90	23.63	23.79	24.00
3GPP Rel 6	HSUPA Subtest-1	23.10	23.02	23.24	23.50	23.37	23.17	23.35	23.50	23.06	23.24	23.09	23.50
3GPP Rel 6	HSUPA Subtest-2	21.26	21.09	21.07	21.50	21.47	21.22	21.43	21.50	21.00	21.21	21.09	21.50
3GPP Rel 6	HSUPA Subtest-3	22.01	22.28	22.22	22.50	22.41	22.37	22.18	22.50	22.21	22.01	22.03	22.50
3GPP Rel 6	HSUPA Subtest-4	21.36	21.07	21.47	21.50	21.01	21.42	21.22	21.50	21.00	21.30	21.02	21.50
3GPP Rel 6	HSUPA Subtest-5	23.34	23.44	23.17	23.50	23.10	23.24	23.38	23.50	23.16	23.10	23.35	23.50

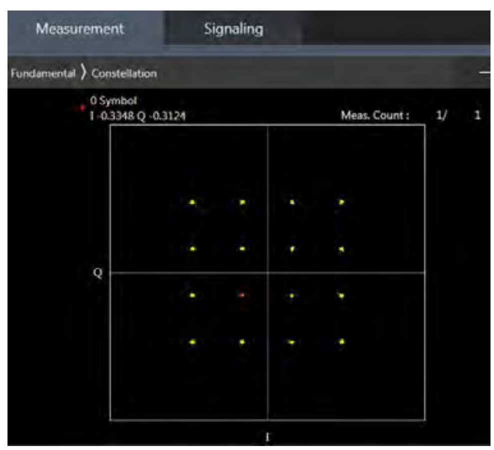
LTE Conducted Power

General Note:

1. Anritsu MT8820C base station simulator was used to setup the connection with EUT; the frequency band, channel bandwidth, RB allocation configuration, modulation type are set in the base station simulator to configure EUT transmitting at maximum power and at different configurations which are requested to be reported to FCC, for conducted power measurement and SAR testing.
2. Per KDB 941225 D05v02r05, when a properly configured base station simulator is used for the SAR and power measurements, spectrum plots for each RB allocation and offset configuration is not required.
3. Per KDB 941225 D05v02r05, start with the largest channel bandwidth and measure SAR for QPSK with 1 RB allocation, using the RB offset and required test channel combination with the highest maximum output power for RB offsets at the upper edge, middle and lower edge of each required test channel.
4. Per KDB 941225 D05v02r05, 50% RB allocation for QPSK SAR testing follows 1RB QPSK allocation procedure.
5. Per KDB 941225 D05v02r05, For QPSK with 100% RB allocation, SAR is not required when the highest maximum output power for 100 % RB allocation is less than the highest maximum output power in 50% and 1 RB allocations and the highest reported SAR for 1 RB and 50% RB allocation are ≤ 0.8 W/kg. Otherwise, SAR is measured for the highest output power channel; and if the reported SAR is > 1.45 W/kg, the remaining required test channels must also be tested.
6. Per KDB 941225 D05v02r05, 16QAM output power for each RB allocation configuration is > not ½ dB higher than the same configuration in QPSK and the reported SAR for the QPSK configuration is ≤ 1.45 W/kg; Per KDB 941225 D05v02r05, 16QAM SAR testing is not required.
7. Per KDB 941225 D05v02r05, Smaller bandwidth output power for each RB allocation configuration is > not ½ dB higher than the same configuration in the largest supported bandwidth, and the reported SAR for the largest supported bandwidth is ≤ 1.45 W/kg; Per KDB 941225 D05v02r05, smaller bandwidth SAR testing is not required.
8. LTE band 2/4/5/17/38 SAR test was covered by Band 25/66/26/12/41; according to April 2015 TCB workshop, SAR test for overlapping LTE bands can be reduced if
   a. the maximum output power, including tolerance, for the smaller band is ≤ the larger band to qualify for the SAR test exclusion
   b. the channel bandwidth and other operating parameters for the smaller band are fully supported by the larger band
9. According to 2017 TCB workshop, for 64 QAM and 16 QAM should be verified by checking the signal constellation with a call box to avoid incorrect maximum power levels due to MPR and other requirements associated with signal modulation, and the following figure is taken from the "Fundamental Measurement >> Modulation Analysis >> constellation" mode of the device connect to the MT8821C base station, therefore, the device 64QAM and 16QAM signal modulation are correct.



64QAM



16QAM

<TDD LTE SAR Measurement>

TDD LTE configuration setup for SAR measurement
SAR was tested with a fixed periodic duty factor according to the highest transmission duty factor implemented for the device and supported by 3GPP.

a. 3GPP TS 36.211 section 4.2 for Type 2 Frame Structure and Table 4.2-2 for uplink-downlink configurations
b. "special subframe S" contains both uplink and downlink transmissions, it has been taken into consideration to determine the transmission duty factor according to the worst case uplink and downlink cyclic prefix requirements for UpPTS
c. Establishing connections with base station simulators ensure a consistent means for testing SAR and recommended for evaluating SAR. The Anritsu MT8820C (firmware: #22.52#004) was used for LTE output power measurements and SAR testing.

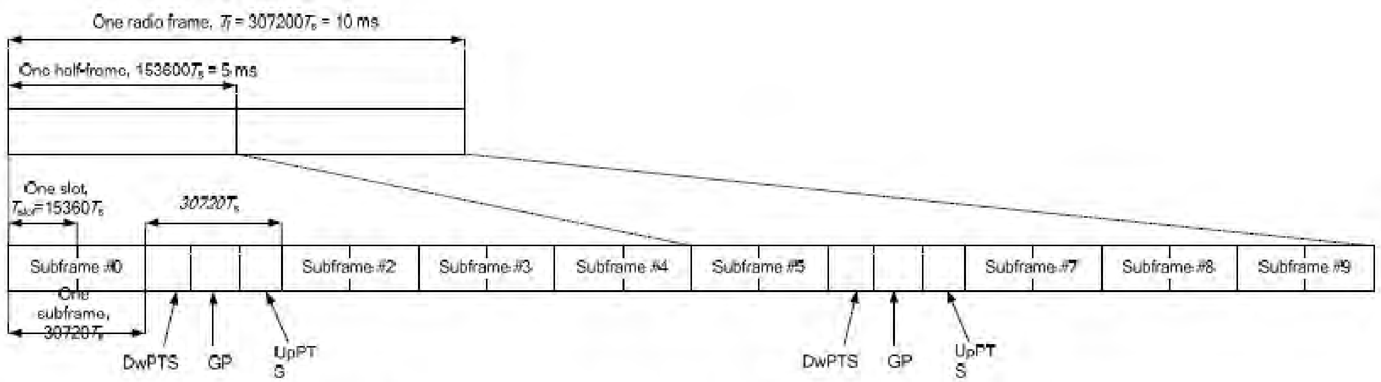


Figure 4.2-1: Frame structure type 2 (for 5 ms switch-point periodicity).

Table 4.2-2: Uplink-downlink configurations.

Uplink-downlink configuration	Downlink-to-Uplink Switch-point periodicity	Subframe number									
		0	1	2	3	4	5	6	7	8	9
0	5 ms	D	S	U	U	U	D	S	U	U	U
1	5 ms	D	S	U	U	D	D	S	U	U	D
2	5 ms	D	S	U	D	D	D	S	U	D	D
3	10 ms	D	S	U	U	U	D	D	D	D	D
4	10 ms	D	S	U	U	D	D	D	D	D	D
5	10 ms	D	S	U	D	D	D	D	D	D	D
6	5 ms	D	S	U	U	U	D	S	U	U	D

Table 4.2-1: Configuration of special subframe (lengths of DwPTS/GP/UpPTS).

Special subframe configuration	Normal cyclic prefix in downlink			Extended cyclic prefix in downlink		
	DwPTS	UpPTS		DwPTS	UpPTS	
		Normal cyclic prefix in uplink	Extended cyclic prefix in uplink		Normal cyclic prefix in uplink	Extended cyclic prefix in uplink
0	$6592 \cdot T_s$	$2192 \cdot T_s$	$2560 \cdot T_s$	$7680 \cdot T_s$	$2192 \cdot T_s$	$2560 \cdot T_s$
1	$19760 \cdot T_s$			$20480 \cdot T_s$		
2	$21952 \cdot T_s$			$23040 \cdot T_s$		
3	$24144 \cdot T_s$			$25600 \cdot T_s$		
4	$26336 \cdot T_s$			$7680 \cdot T_s$	$4384 \cdot T_s$	$5120 \cdot T_s$
5	$6592 \cdot T_s$	$4384 \cdot T_s$	$5120 \cdot T_s$	$20480 \cdot T_s$		
6	$19760 \cdot T_s$			$23040 \cdot T_s$		
7	$21952 \cdot T_s$			$12800 \cdot T_s$		
8	$24144 \cdot T_s$			-	-	-
9	$13168 \cdot T_s$			-	-	-

Special subframe (30720·T_S): Normal cyclic prefix in downlink (UpPTS)			
	Special subframe configuration	**Normal cyclic prefix in uplink**	**Extended cyclic prefix in uplink**
Uplink duty factor in one special subframe	**0~4**	7.13%	8.33%
	5~9	14.3%	16.7%

Special subframe(30720·T_S): Extended cyclic prefix in downlink (UpPTS)			
	Special subframe configuration	**Normal cyclic prefix in uplink**	**Extended cyclic prefix in uplink**
Uplink duty factor in one special subframe	**0~3**	7.13%	8.33%
	4~7	14.3%	16.7%

The highest duty factor is resulted from:

i. Uplink-downlink configuration: 0. In a half-frame consisted of 5 subfames, uplink operation is in 3 uplink subframes and 1 special subframe.

ii. special subframe configuration: 5-9 for normal cyclic prefix in downlink, 4-7 for extended cyclic prefix in downlink

iii. for special subframe with extended cyclic prefix in uplink, the total uplink duty factor in one half-frame is: (3+0.167)/5 = 63.3%

iv. for special subframe with normal cyclic prefix in uplink, the total uplink duty factor in one half-frame is: (3+0.143)/5 = 62.9%

v. For TDD LTE SAR measurement, the duty cycle 1:1.59 (62.9 %) was used perform testing and considering the theoretical duty cycle of 63.3% for extended cyclic prefix in the uplink, and the theoretical duty cycle of 62.9% for normal cyclic prefix in uplink, a scaling factor of extended cyclic prefix 63.3%/62.9% = 1.006 is applied to scale-up the measured SAR result. The scaled TDD LTE SAR = measured SAR (W/kg)* Tune-up Scaling Factor* scaling factor for extended cyclic prefix.

vi. The device supports Power Class 3 uplink-downlink configurations 0 and 6, and Power Class 2 uplink-downlink configurations 1 to 5 operations for LTE Band 41.

vii. The highest available duty cycle for Power Class 2 operation is 43.3% using UL-DL configuration 1, for Power Class 3 operation is 63.3% using UL-DL configuration 0. Per FCC Guidance, all SAR tests were performed using Power Class 3. SAR with Power Class 2 at the available duty factor was additionally performed for the Power Class 3 configuration with the highest SAR among all exposure condition.

Table 9.1 LTE Power Measurements

Band	Bandwidth	RB Size	RB Offset	Channel	Frequency	QPSK	16QAM
2	1.4 MHz	1	0	18607	1850.7	23.9	22.5
				18900	1880.0	23.4	22.6
				19193	1909.3	23.8	22.7
			3	18607	1850.7	23.8	22.6
				18900	1880.0	23.9	22.4
				19193	1909.3	24.0	22.9
			5	18607	1850.7	24.0	22.9
				18900	1880.0	23.7	22.3
				19193	1909.3	23.3	22.8
		3	0	18607	1850.7	23.7	22.3
				18900	1880.0	23.4	22.5
				19193	1909.3	23.8	22.7
			1	18607	1850.7	23.4	22.4
				18900	1880.0	23.9	23.0
				19193	1909.3	23.7	22.6
			3	18607	1850.7	24.0	22.7
				18900	1880.0	23.7	22.5
				19193	1909.3	23.7	22.8
		6	0	18607	1850.7	22.8	21.8
				18900	1880.0	22.7	21.9
				19193	1909.3	22.9	21.4
	3 MHz	1	0	18615	1851.5	23.8	22.3
				18900	1880.0	23.3	22.6
				19185	1908.5	23.4	22.8
			7	18615	1851.5	23.6	22.8
				18900	1880.0	23.7	22.4
				19185	1908.5	23.6	22.7
			14	18615	1851.5	23.5	22.9
				18900	1880.0	23.9	22.3
				19185	1908.5	23.8	22.6
		8	0	18615	1851.5	23.0	21.5
				18900	1880.0	22.7	21.5
				19185	1908.5	22.9	21.5
			7	18615	1851.5	23.0	21.9
				18900	1880.0	22.4	21.6
				19185	1908.5	22.5	21.5
			14	18615	1851.5	22.6	21.9
				18900	1880.0	23.0	21.6
				19185	1908.5	22.7	21.5
		15	0	18615	1851.5	22.6	21.7
				18900	1880.0	22.5	21.6
				19185	1908.5	22.3	21.4

Band	Bandwidth	RB Size	RB Offset	Channel	Frequency	QPSK	16QAM
2	5 MHz	1	0	18625	1852.5	23.8	22.3
				18900	1880.0	23.4	22.7
				19175	1907.5	23.4	22.6
			12	18625	1852.5	23.3	22.5
				18900	1880.0	23.7	22.3
				19175	1907.5	23.6	22.3
			24	18625	1852.5	23.9	22.8
				18900	1880.0	23.7	22.8
				19175	1907.5	23.8	22.5
		12	0	18625	1852.5	22.4	21.7
				18900	1880.0	22.4	21.9
				19175	1907.5	22.4	21.5
			6	18625	1852.5	22.9	21.9
				18900	1880.0	22.9	21.3
				19175	1907.5	22.9	21.3
			13	18625	1852.5	22.4	21.5
				18900	1880.0	22.6	21.5
				19175	1907.5	22.6	21.9
		25	0	18625	1852.5	22.6	21.6
				18900	1880.0	22.7	21.3
				19175	1907.5	23.0	21.7
	10 MHz	1	0	18650	1855.0	23.7	22.4
				18900	1880.0	23.8	22.3
				19150	1905.0	23.5	22.4
			24	18650	1855.0	23.6	22.3
				18900	1880.0	23.6	22.3
				19150	1905.0	23.4	22.3
			49	18650	1855.0	24.0	22.8
				18900	1880.0	23.7	22.7
				19150	1905.0	23.5	22.7
		25	0	18650	1855.0	22.9	21.8
				18900	1880.0	22.7	22.0
				19150	1905.0	23.0	21.6
			13	18650	1855.0	22.4	21.8
				18900	1880.0	22.5	21.8
				19150	1905.0	22.8	21.9
			25	18650	1855.0	22.9	21.5
				18900	1880.0	23.0	21.8
				19150	1905.0	22.8	21.6
		50	0	18650	1855.0	22.6	21.8
				18900	1880.0	22.9	21.4
				19150	1905.0	22.6	21.3

Band	Bandwidth	RB Size	RB Offset	Channel	Frequency	QPSK	16QAM
2	15 MHz	1	0	18675	1857.5	23.6	22.7
				18900	1880.0	24.0	22.6
				19125	1902.5	23.6	22.7
			37	18675	1857.5	23.9	22.5
				18900	1880.0	23.6	22.8
				19125	1902.5	23.5	22.4
			74	18675	1857.5	23.5	22.4
				18900	1880.0	23.4	22.8
				19125	1902.5	23.8	22.7
		36	0	18675	1857.5	22.5	21.8
				18900	1880.0	22.7	22.0
				19125	1902.5	22.8	21.4
			19	18675	1857.5	22.5	22.0
				18900	1880.0	22.9	22.0
				19125	1902.5	22.7	21.5
			39	18675	1857.5	22.6	21.8
				18900	1880.0	22.7	21.7
				19125	1902.5	22.9	21.3
		75	0	18675	1857.5	22.7	21.9
				18900	1880.0	22.4	21.7
				19125	1902.5	22.7	21.6
	20 MHz	1	0	18700	1860.0	23.7	22.6
				18900	1880.0	23.6	22.5
				19100	1900.0	23.6	22.9
			49	18700	1860.0	23.6	22.6
				18900	1880.0	24.0	22.8
				19100	1900.0	23.5	22.9
			99	18700	1860.0	23.7	22.7
				18900	1880.0	23.4	22.6
				19100	1900.0	23.6	22.9
		50	0	18700	1860.0	22.7	21.6
				18900	1880.0	22.4	21.9
				19100	1900.0	22.6	21.3
			24	18700	1860.0	22.5	22.0
				18900	1880.0	22.5	21.9
				19100	1900.0	22.3	21.7
			50	18700	1860.0	22.5	21.9
				18900	1880.0	22.8	21.5
				19100	1900.0	23.0	21.9
		100	0	18700	1860.0	22.9	21.8
				18900	1880.0	22.5	21.7
				19100	1900.0	22.7	21.6

Band	Bandwidth	RB Size	RB Offset	Channel	Frequency	QPSK	16QAM
4	1.4 MHz	1	0	19957	1710.7	23.8	22.4
				20175	1732.5	24.0	22.9
				20393	1754.3	23.9	22.6
			3	19957	1710.7	23.9	22.7
				20175	1732.5	23.6	22.4
				20393	1754.3	23.8	22.7
			5	19957	1710.7	23.7	22.7
				20175	1732.5	23.9	22.9
				20393	1754.3	23.4	22.9
		3	0	19957	1710.7	23.8	22.5
				20175	1732.5	23.9	22.9
				20393	1754.3	23.7	22.7
			1	19957	1710.7	23.8	22.5
				20175	1732.5	23.4	22.7
				20393	1754.3	24.0	22.3
			3	19957	1710.7	23.9	22.8
				20175	1732.5	23.5	22.8
				20393	1754.3	23.4	22.8
		6	0	19957	1710.7	22.7	21.6
				20175	1732.5	22.4	21.5
				20393	1754.3	22.6	21.8
	3 MHz	1	0	19965	1711.5	23.7	22.8
				20175	1732.5	23.9	22.6
				20385	1753.5	23.9	22.6
			7	19965	1711.5	23.9	23.0
				20175	1732.5	23.5	23.0
				20385	1753.5	23.5	22.4
			14	19965	1711.5	23.7	22.7
				20175	1732.5	23.4	22.5
				20385	1753.5	23.5	22.5
		8	0	19965	1711.5	22.8	21.6
				20175	1732.5	22.4	21.6
				20385	1753.5	22.3	21.7
			7	19965	1711.5	22.8	21.5
				20175	1732.5	22.9	21.5
				20385	1753.5	22.9	21.3
			14	19965	1711.5	22.3	21.7
				20175	1732.5	22.3	21.6
				20385	1753.5	22.5	21.7
		15	0	19965	1711.5	22.8	21.7
				20175	1732.5	22.7	21.7
				20385	1753.5	22.6	21.9

Band	Bandwidth	RB Size	RB Offset	Channel	Frequency	QPSK	16QAM
4	5 MHz	1	0	19975	1712.5	23.6	22.8
				20175	1732.5	23.5	22.9
				20375	1752.5	23.4	22.8
			12	19975	1712.5	23.8	22.6
				20175	1732.5	23.4	22.5
				20375	1752.5	23.8	22.3
			24	19975	1712.5	23.5	22.3
				20175	1732.5	24.0	22.6
				20375	1752.5	23.6	22.7
		12	0	19975	1712.5	22.9	21.9
				20175	1732.5	22.3	21.8
				20375	1752.5	22.8	21.6
			6	19975	1712.5	22.3	21.9
				20175	1732.5	22.8	21.7
				20375	1752.5	22.5	21.7
			13	19975	1712.5	22.5	21.4
				20175	1732.5	22.8	21.6
				20375	1752.5	22.7	22.0
		25	0	19975	1712.5	22.8	21.7
				20175	1732.5	22.5	21.6
				20375	1752.5	22.8	21.5
	10 MHz	1	0	20000	1715.0	23.4	22.6
				20175	1732.5	23.6	22.5
				20350	1750.0	23.8	22.9
			24	20000	1715.0	24.0	22.9
				20175	1732.5	23.9	23.0
				20350	1750.0	23.5	22.3
			49	20000	1715.0	23.8	22.4
				20175	1732.5	23.8	22.9
				20350	1750.0	23.9	22.3
		25	0	20000	1715.0	22.4	21.6
				20175	1732.5	22.6	21.9
				20350	1750.0	22.9	21.7
			13	20000	1715.0	22.5	21.3
				20175	1732.5	23.0	21.6
				20350	1750.0	22.7	21.7
			25	20000	1715.0	22.4	21.7
				20175	1732.5	22.8	22.0
				20350	1750.0	22.5	21.7
		50	0	20000	1715.0	22.9	21.9
				20175	1732.5	22.8	21.9
				20350	1750.0	22.5	21.6

Band	Bandwidth	RB Size	RB Offset	Channel	Frequency	QPSK	16QAM
4	15 MHz	1	0	20025	1717.5	23.5	23.0
				20175	1732.5	23.9	22.4
				20325	1747.5	23.4	22.6
			37	20025	1717.5	23.5	22.6
				20175	1732.5	23.5	22.9
				20325	1747.5	23.4	22.7
			74	20025	1717.5	23.5	22.9
				20175	1732.5	23.7	22.4
				20325	1747.5	23.9	22.8
		36	0	20025	1717.5	22.4	21.7
				20175	1732.5	22.5	21.8
				20325	1747.5	22.8	21.5
			19	20025	1717.5	22.7	21.5
				20175	1732.5	22.9	21.8
				20325	1747.5	22.6	22.0
			39	20025	1717.5	22.8	21.4
				20175	1732.5	23.0	21.9
				20325	1747.5	22.8	22.0
		75	0	20025	1717.5	22.8	21.7
				20175	1732.5	22.3	22.0
				20325	1747.5	22.6	21.9
	20 MHz	1	0	20050	1720.0	23.5	22.6
				20175	1732.5	23.4	22.9
				20300	1745.0	23.8	22.9
			49	20050	1720.0	23.4	22.8
				20175	1732.5	23.5	22.9
				20300	1745.0	23.7	22.3
			99	20050	1720.0	23.5	22.3
				20175	1732.5	23.5	22.9
				20300	1745.0	23.8	23.0
		50	0	20050	1720.0	22.7	21.8
				20175	1732.5	22.7	22.0
				20300	1745.0	22.5	21.4
			24	20050	1720.0	22.8	21.9
				20175	1732.5	22.6	22.0
				20300	1745.0	22.9	21.6
			50	20050	1720.0	22.3	21.9
				20175	1732.5	22.7	21.4
				20300	1745.0	22.6	21.8
		100	0	20050	1720.0	22.3	21.6
				20175	1732.5	22.4	21.8
				20300	1745.0	22.3	21.9

Band	Bandwidth	RB Size	RB Offset	Channel	Frequency	QPSK	16QAM
5	1.4 MHz	1	0	20407	824.7	23.7	22.4
				20525	836.5	23.6	22.9
				20643	848.3	23.5	22.4
			3	20407	824.7	23.4	22.8
				20525	836.5	23.7	22.5
				20643	848.3	23.3	22.5
			5	20407	824.7	23.5	22.7
				20525	836.5	23.8	22.5
				20643	848.3	23.6	22.4
		3	0	20407	824.7	24.0	22.9
				20525	836.5	23.7	22.8
				20643	848.3	23.5	22.6
			1	20407	824.7	23.7	22.6
				20525	836.5	23.9	22.5
				20643	848.3	23.8	22.7
			3	20407	824.7	23.7	22.6
				20525	836.5	23.6	22.7
				20643	848.3	23.3	22.7
		6	0	20407	824.7	22.5	21.5
				20525	836.5	22.6	21.5
				20643	848.3	22.8	21.6
	3 MHz	1	0	20415	825.5	23.7	22.6
				20525	836.5	23.6	22.4
				20635	847.5	23.4	22.5
			7	20415	825.5	23.6	22.6
				20525	836.5	23.6	22.7
				20635	847.5	23.8	22.4
			14	20415	825.5	23.4	22.7
				20525	836.5	23.8	22.3
				20635	847.5	23.6	22.9
		8	0	20415	825.5	22.6	21.5
				20525	836.5	22.5	21.5
				20635	847.5	22.3	21.6
			7	20415	825.5	22.5	21.4
				20525	836.5	22.8	21.8
				20635	847.5	22.7	21.3
			14	20415	825.5	22.6	21.5
				20525	836.5	22.4	21.7
				20635	847.5	22.6	21.5
		15	0	20415	825.5	22.9	21.5
				20525	836.5	22.9	22.0
				20635	847.5	22.6	21.5

Band	Bandwidth	RB Size	RB Offset	Channel	Frequency	QPSK	16QAM
5	5 MHz	1	0	20425	826.5	24.0	22.4
				20525	836.5	23.7	22.6
				20625	846.5	23.7	22.6
			12	20425	826.5	23.9	22.7
				20525	836.5	23.7	22.3
				20625	846.5	23.6	22.9
			24	20425	826.5	23.7	22.7
				20525	836.5	23.9	22.6
				20625	846.5	23.3	22.7
		12	0	20425	826.5	22.7	21.6
				20525	836.5	22.4	21.9
				20625	846.5	22.9	21.8
			6	20425	826.5	22.6	21.9
				20525	836.5	22.7	21.5
				20625	846.5	22.3	21.5
			13	20425	826.5	22.7	21.8
				20525	836.5	22.8	21.7
				20625	846.5	22.5	21.5
		25	0	20425	826.5	22.5	21.7
				20525	836.5	22.5	21.3
				20625	846.5	22.5	21.4
	10 MHz	1	0	20450	829.0	23.5	22.5
				20525	836.5	23.4	22.9
				20600	844.0	23.7	22.4
			24	20450	829.0	23.6	22.7
				20525	836.5	23.6	22.9
				20600	844.0	23.4	22.7
			49	20450	829.0	24.0	22.6
				20525	836.5	23.9	22.4
				20600	844.0	23.6	22.3
		25	0	20450	829.0	23.0	21.5
				20525	836.5	22.5	21.7
				20600	844.0	22.4	21.6
			13	20450	829.0	22.8	21.6
				20525	836.5	22.3	21.4
				20600	844.0	22.5	21.8
			25	20450	829.0	22.4	21.3
				20525	836.5	22.6	21.4
				20600	844.0	23.0	21.8
		50	0	20450	829.0	22.7	21.8
				20525	836.5	22.4	21.6
				20600	844.0	22.5	21.4

Band	Bandwidth	RB Size	RB Offset	Channel	Frequency	QPSK	16QAM
7	5 MHz	1	0	20775	2502.5	24.3	23.5
				21100	2535.0	24.5	23.2
				21425	2567.5	24.5	23.3
			12	20775	2502.5	24.1	23.4
				21100	2535.0	24.5	23.2
				21425	2567.5	24.2	23.7
			24	20775	2502.5	24.4	23.8
				21100	2535.0	24.1	23.2
				21425	2567.5	24.3	23.6
		12	0	20775	2502.5	23.6	22.1
				21100	2535.0	23.6	22.7
				21425	2567.5	23.6	22.3
			6	20775	2502.5	23.8	22.4
				21100	2535.0	23.8	22.5
				21425	2567.5	23.8	22.2
			13	20775	2502.5	23.3	22.7
				21100	2535.0	23.2	22.4
				21425	2567.5	23.8	22.2
		25	0	20775	2502.5	23.3	22.8
				21100	2535.0	23.8	22.7
				21425	2567.5	23.6	22.5
	10 MHz	1	0	20800	2505.0	24.3	23.5
				21100	2535.0	24.7	23.6
				21400	2565.0	24.7	23.8
			24	20800	2505.0	24.5	23.7
				21100	2535.0	24.8	23.1
				21400	2565.0	24.2	23.4
			49	20800	2505.0	24.7	23.3
				21100	2535.0	24.4	23.7
				21400	2565.0	24.8	23.6
		25	0	20800	2505.0	23.8	22.5
				21100	2535.0	23.4	22.6
				21400	2565.0	23.1	22.5
			13	20800	2505.0	23.7	22.6
				21100	2535.0	23.5	22.7
				21400	2565.0	23.6	22.4
			25	20800	2505.0	23.5	22.8
				21100	2535.0	23.4	22.5
				21400	2565.0	23.5	22.3
		50	0	20800	2505.0	23.5	22.4
				21100	2535.0	23.1	22.7
				21400	2565.0	23.4	22.3

Band	Bandwidth	RB Size	RB Offset	Channel	Frequency	QPSK	16QAM
7	15 MHz	1	0	20825	2507.5	24.5	23.4
				21100	2535.0	24.2	23.7
				21375	2562.5	24.8	23.6
			37	20825	2507.5	24.2	23.7
				21100	2535.0	24.4	23.2
				21375	2562.5	24.3	23.8
			74	20825	2507.5	24.7	23.4
				21100	2535.0	24.3	23.5
				21375	2562.5	24.7	23.4
		36	0	20825	2507.5	23.7	22.2
				21100	2535.0	23.6	22.3
				21375	2562.5	23.7	22.3
			19	20825	2507.5	23.2	22.6
				21100	2535.0	23.7	22.5
				21375	2562.5	23.7	22.4
			39	20825	2507.5	23.7	22.8
				21100	2535.0	23.5	22.5
				21375	2562.5	23.4	22.2
		75	0	20825	2507.5	23.1	22.5
				21100	2535.0	23.6	22.2
				21375	2562.5	23.6	22.4
	20 MHz	1	0	20850	2510.0	24.8	23.7
				21100	2535.0	24.7	23.2
				21350	2560.0	24.4	23.1
			49	20850	2510.0	24.4	23.2
				21100	2535.0	24.3	23.5
				21350	2560.0	24.5	23.6
			99	20850	2510.0	24.1	23.4
				21100	2535.0	24.8	23.3
				21350	2560.0	24.5	23.7
		50	0	20850	2510.0	23.4	22.4
				21100	2535.0	23.2	22.6
				21350	2560.0	23.7	22.7
			24	20850	2510.0	23.6	22.8
				21100	2535.0	23.3	22.6
				21350	2560.0	23.5	22.5
			50	20850	2510.0	23.2	22.1
				21100	2535.0	23.7	22.4
				21350	2560.0	23.2	22.3
		100	0	20850	2510.0	23.3	22.6
				21100	2535.0	23.4	22.3
				21350	2560.0	23.4	22.6

Band	Bandwidth	RB Size	RB Offset	Channel	Frequency	QPSK	16QAM
12	1.4 MHz	1	0	23017	699.7	23.3	22.4
				23095	707.5	23.7	22.6
				23173	715.3	23.9	22.6
			3	23017	699.7	23.5	22.5
				23095	707.5	23.4	22.6
				23173	715.3	23.3	22.8
			5	23017	699.7	23.9	22.7
				23095	707.5	23.4	22.5
				23173	715.3	23.8	22.5
		3	0	23017	699.7	23.5	22.4
				23095	707.5	23.9	22.8
				23173	715.3	23.7	22.3
			1	23017	699.7	23.4	22.7
				23095	707.5	23.4	22.6
				23173	715.3	23.8	22.5
			3	23017	699.7	23.5	22.7
				23095	707.5	23.7	22.8
				23173	715.3	23.4	22.4
		6	0	23017	699.7	22.5	21.3
				23095	707.5	22.5	22.0
				23173	715.3	22.5	21.6
	3 MHz	1	0	23025	700.5	23.8	22.8
				23095	707.5	23.9	23.0
				23165	714.5	23.6	22.5
			7	23025	700.5	23.9	22.3
				23095	707.5	23.4	22.5
				23165	714.5	23.5	22.8
			14	23025	700.5	23.9	22.7
				23095	707.5	23.5	22.5
				23165	714.5	23.3	22.8
		8	0	23025	700.5	22.7	21.9
				23095	707.5	22.6	21.6
				23165	714.5	22.8	22.0
			7	23025	700.5	22.9	21.3
				23095	707.5	22.6	21.8
				23165	714.5	22.7	21.5
			14	23025	700.5	22.5	21.5
				23095	707.5	22.7	21.9
				23165	714.5	22.7	21.3
		15	0	23025	700.5	22.4	21.8
				23095	707.5	22.4	21.9
				23165	714.5	23.0	21.8

Band	Bandwidth	RB Size	RB Offset	Channel	Frequency	QPSK	16QAM
12	5 MHz	1	0	23035	701.5	23.5	22.7
				23095	707.5	23.7	22.5
				23155	713.5	23.8	22.5
			12	23035	701.5	23.8	22.3
				23095	707.5	23.9	22.6
				23155	713.5	23.6	22.3
			24	23035	701.5	24.0	22.9
				23095	707.5	23.5	22.3
				23155	713.5	23.9	22.5
		12	0	23035	701.5	23.0	21.8
				23095	707.5	22.4	21.8
				23155	713.5	22.8	21.9
			6	23035	701.5	22.6	21.9
				23095	707.5	22.9	21.5
				23155	713.5	22.9	21.8
			13	23035	701.5	22.8	21.9
				23095	707.5	22.4	21.8
				23155	713.5	22.5	21.6
		25	0	23035	701.5	22.9	21.8
				23095	707.5	22.5	22.0
				23155	713.5	22.6	21.6
	10 MHz	1	0	23060	704.0	23.6	22.5
				23095	707.5	23.7	22.9
				23130	711.0	23.9	23.0
			24	23060	704.0	23.6	22.6
				23095	707.5	23.9	22.7
				23130	711.0	23.5	22.8
			49	23060	704.0	23.9	23.0
				23095	707.5	23.7	22.3
				23130	711.0	23.5	22.5
		25	0	23060	704.0	22.6	21.7
				23095	707.5	22.6	21.9
				23130	711.0	22.8	21.6
			13	23060	704.0	22.4	21.5
				23095	707.5	22.9	21.6
				23130	711.0	22.4	21.9
			25	23060	704.0	22.9	21.5
				23095	707.5	22.6	21.4
				23130	711.0	22.8	21.9
		50	0	23060	704.0	22.4	21.7
				23095	707.5	22.5	22.0
				23130	711.0	22.8	21.8

Band	Bandwidth	RB Size	RB Offset	Channel	Frequency	QPSK	16QAM
13	5 MHz	1	0	23205	779.5	23.4	22.5
				23230	782.0	24.0	22.3
				23129	784.5	23.9	22.3
			12	23205	779.5	23.6	22.6
				23230	782.0	23.7	22.9
				23129	784.5	23.5	22.8
			24	23205	779.5	23.6	22.7
				23230	782.0	23.7	23.0
				23129	784.5	23.7	22.4
		12	0	23205	779.5	22.5	21.9
				23230	782.0	22.6	21.6
				23129	784.5	22.5	21.8
			6	23205	779.5	22.6	21.4
				23230	782.0	22.5	21.4
				23129	784.5	22.9	21.8
			13	23205	779.5	22.4	21.7
				23230	782.0	22.9	21.4
				23129	784.5	22.6	21.4
		25	0	23205	779.5	23.0	21.9
				23230	782.0	22.9	21.5
				23129	784.5	22.9	22.0
	10 MHz	1	0	23230	782.0	23.6	22.9
			24	23230	782.0	23.9	22.6
			49	23230	782.0	23.5	22.7
		25	0	23230	782.0	22.6	21.8
			13	23230	782.0	22.8	21.5
			25	23230	782.0	22.6	21.6
		50	0	23230	782.0	22.3	21.9

Band	Bandwidth	RB Size	RB Offset	Channel	Frequency	QPSK	16QAM
14	5 MHz	1	0	23305	790.5	23.3	22.3
				23330	793.0	23.4	22.9
				23355	795.5	23.6	22.9
			12	23305	790.5	23.3	22.9
				23330	793.0	23.4	22.4
				23355	795.5	23.8	22.6
			24	23305	790.5	23.3	22.5
				23330	793.0	23.5	22.7
				23355	795.5	23.4	22.8
		12	0	23305	790.5	22.8	21.8
				23330	793.0	22.7	21.5
				23355	795.5	22.4	21.7
			6	23305	790.5	22.4	21.8
				23330	793.0	22.6	21.7
				23355	795.5	23.0	21.4
			13	23305	790.5	22.6	21.7
				23330	793.0	22.6	21.8
				23355	795.5	22.4	21.7
		25	0	23305	790.5	22.3	21.6
				23330	793.0	22.4	21.5
				23355	795.5	23.0	21.4
	10 MHz	1	0	23330	793.0	23.9	22.8
			24	23330	793.0	23.8	22.4
			49	23330	793.0	24.0	22.7
		25	0	23330	793.0	22.5	21.9
			13	23330	793.0	22.4	21.3
			25	23330	793.0	22.4	21.3
		50	0	23330	793.0	22.9	22.0

Band	Bandwidth	RB Size	RB Offset	Channel	Frequency	QPSK	16QAM
25	1.4 MHz	1	0	26047	1850.7	23.9	22.5
				26365	1882.5	23.7	22.7
				26683	1914.3	23.6	22.3
			3	26047	1850.7	23.6	22.6
				26365	1882.5	23.7	22.5
				26683	1914.3	23.4	22.6
			5	26047	1850.7	23.8	22.9
				26365	1882.5	23.7	22.4
				26683	1914.3	23.3	22.8
		3	0	26047	1850.7	23.6	22.8
				26365	1882.5	23.8	22.8
				26683	1914.3	23.7	22.6
			1	26047	1850.7	23.8	22.3
				26365	1882.5	23.5	22.5
				26683	1914.3	23.6	22.3
			3	26047	1850.7	23.9	22.3
				26365	1882.5	23.5	22.8
				26683	1914.3	23.5	22.3
		6	0	26047	1850.7	22.9	21.9
				26365	1882.5	22.8	21.4
				26683	1914.3	22.9	21.5
	3 MHz	1	0	26055	1851.5	24.0	23.0
				26365	1882.5	23.5	22.3
				26675	1913.5	23.7	22.6
			7	26055	1851.5	24.0	22.8
				26365	1882.5	23.3	23.0
				26675	1913.5	23.7	22.9
			14	26055	1851.5	23.5	22.6
				26365	1882.5	23.6	22.7
				26675	1913.5	23.8	23.0
		8	0	26055	1851.5	23.0	21.5
				26365	1882.5	22.7	21.8
				26675	1913.5	22.6	21.4
			7	26055	1851.5	22.4	21.6
				26365	1882.5	22.9	21.8
				26675	1913.5	22.3	21.7
			14	26055	1851.5	22.4	21.5
				26365	1882.5	22.7	21.4
				26675	1913.5	22.8	21.9
		15	0	26055	1851.5	22.8	21.9
				26365	1882.5	22.7	21.7
				26675	1913.5	22.9	22.0

Band	Bandwidth	RB Size	RB Offset	Channel	Frequency	QPSK	16QAM
25	5 MHz	1	0	26065	1852.5	23.6	22.4
				26365	1882.5	24.0	22.6
				26665	1912.5	23.3	22.8
			12	26065	1852.5	23.4	22.5
				26365	1882.5	23.8	22.3
				26665	1912.5	23.5	22.3
			24	26065	1852.5	23.4	22.4
				26365	1882.5	23.5	22.5
				26665	1912.5	23.7	22.6
		12	0	26065	1852.5	22.5	21.4
				26365	1882.5	23.0	21.5
				26665	1912.5	22.5	21.5
			6	26065	1852.5	22.6	21.4
				26365	1882.5	22.7	21.5
				26665	1912.5	23.0	21.3
			13	26065	1852.5	23.0	21.8
				26365	1882.5	22.5	21.6
				26665	1912.5	23.0	21.8
		25	0	26065	1852.5	22.7	21.5
				26365	1882.5	22.6	21.9
				26665	1912.5	22.4	21.9
	10 MHz	1	0	26090	1855.0	23.5	23.0
				26365	1882.5	23.8	22.3
				26640	1910.0	23.9	22.4
			24	26090	1855.0	23.5	22.7
				26365	1882.5	23.4	22.6
				26640	1910.0	23.3	22.5
			49	26090	1855.0	23.7	22.4
				26365	1882.5	23.8	22.9
				26640	1910.0	23.4	22.3
		25	0	26090	1855.0	22.3	21.9
				26365	1882.5	23.0	21.5
				26640	1910.0	22.9	22.0
			13	26090	1855.0	22.7	21.7
				26365	1882.5	22.6	21.6
				26640	1910.0	22.9	21.8
			25	26090	1855.0	22.7	21.8
				26365	1882.5	22.9	21.3
				26640	1910.0	22.7	21.8
		50	0	26090	1855.0	22.9	21.6
				26365	1882.5	22.9	21.3
				26640	1910.0	22.9	21.5

Band	Bandwidth	RB Size	RB Offset	Channel	Frequency	QPSK	16QAM
25	15 MHz	1	0	26115	1857.5	23.3	22.7
				26365	1882.5	23.6	22.8
				26615	1907.5	23.5	22.8
			37	26115	1857.5	23.9	22.4
				26365	1882.5	24.0	22.3
				26615	1907.5	23.7	22.5
			74	26115	1857.5	23.8	22.6
				26365	1882.5	23.5	22.5
				26615	1907.5	23.5	22.4
		36	0	26115	1857.5	22.3	21.9
				26365	1882.5	22.6	21.6
				26615	1907.5	22.7	21.4
			19	26115	1857.5	22.8	22.0
				26365	1882.5	22.6	21.6
				26615	1907.5	22.5	21.5
			39	26115	1857.5	22.7	22.0
				26365	1882.5	22.5	22.0
				26615	1907.5	22.7	22.0
		75	0	26115	1857.5	22.4	21.6
				26365	1882.5	23.0	21.4
				26615	1907.5	22.3	21.9
	20 MHz	1	0	26140	1860.0	23.7	22.4
				26365	1882.5	23.5	22.4
				26590	1905.0	23.3	22.9
			49	26140	1860.0	23.3	22.7
				26365	1882.5	23.5	22.9
				26590	1905.0	23.7	23.0
			99	26140	1860.0	23.4	22.5
				26365	1882.5	23.9	22.7
				26590	1905.0	23.6	22.7
		50	0	26140	1860.0	22.3	21.3
				26365	1882.5	22.9	21.3
				26590	1905.0	22.6	21.9
			24	26140	1860.0	22.7	22.0
				26365	1882.5	22.4	21.8
				26590	1905.0	22.5	21.3
			50	26140	1860.0	22.6	21.4
				26365	1882.5	22.5	21.4
				26590	1905.0	22.6	21.8
		100	0	26140	1860.0	22.4	21.9
				26365	1882.5	22.5	21.5
				26590	1905.0	22.8	21.5

Band	Bandwidth	RB Size	RB Offset	Channel	Frequency	QPSK	16QAM
26	1.4 MHz	1	0	26697	814.7	23.6	22.6
				26865	831.5	23.7	22.3
				27033	848.3	23.3	22.3
			3	26697	814.7	23.6	22.4
				26865	831.5	23.8	23.0
				27033	848.3	23.4	22.9
			5	26697	814.7	23.4	22.8
				26865	831.5	23.5	22.7
				27033	848.3	23.7	22.9
		3	0	26697	814.7	23.7	22.4
				26865	831.5	23.4	23.0
				27033	848.3	23.9	22.4
			1	26697	814.7	23.7	22.9
				26865	831.5	23.8	22.6
				27033	848.3	23.5	22.3
			3	26697	814.7	23.7	22.5
				26865	831.5	23.7	22.7
				27033	848.3	23.5	22.3
		6	0	26697	814.7	22.4	21.4
				26865	831.5	22.8	21.8
				27033	848.3	22.8	21.7
	3 MHz	1	0	26705	815.5	23.9	22.3
				26865	831.5	23.4	22.6
				27025	847.5	23.9	22.3
			7	26705	815.5	23.6	22.7
				26865	831.5	23.8	22.6
				27025	847.5	23.4	22.8
			14	26705	815.5	23.8	22.7
				26865	831.5	24.0	22.7
				27025	847.5	23.4	22.7
		8	0	26705	815.5	22.9	21.9
				26865	831.5	22.5	21.5
				27025	847.5	22.8	22.0
			7	26705	815.5	22.5	21.6
				26865	831.5	22.3	21.4
				27025	847.5	22.6	22.0
			14	26705	815.5	22.5	21.4
				26865	831.5	22.9	21.9
				27025	847.5	22.4	21.3
		15	0	26705	815.5	22.7	21.9
				26865	831.5	22.6	21.5
				27025	847.5	23.0	21.9

Band	Bandwidth	RB Size	RB Offset	Channel	Frequency	QPSK	16QAM
26	5 MHz	1	0	26715	816.5	23.4	22.5
26	5 MHz	1	0	26865	831.5	23.7	22.5
26	5 MHz	1	0	27015	846.5	24.0	22.4
26	5 MHz	1	12	26715	816.5	23.9	22.9
26	5 MHz	1	12	26865	831.5	23.7	22.5
26	5 MHz	1	12	27015	846.5	23.6	22.3
26	5 MHz	1	24	26715	816.5	23.6	22.6
26	5 MHz	1	24	26865	831.5	23.3	22.7
26	5 MHz	1	24	27015	846.5	23.4	22.5
26	5 MHz	12	0	26715	816.5	22.8	21.6
26	5 MHz	12	0	26865	831.5	22.5	21.9
26	5 MHz	12	0	27015	846.5	22.4	21.7
26	5 MHz	12	6	26715	816.5	22.6	21.5
26	5 MHz	12	6	26865	831.5	22.9	22.0
26	5 MHz	12	6	27015	846.5	22.6	21.7
26	5 MHz	12	13	26715	816.5	22.4	21.8
26	5 MHz	12	13	26865	831.5	22.4	21.6
26	5 MHz	12	13	27015	846.5	22.7	21.6
26	5 MHz	25	0	26715	816.5	22.9	21.5
26	5 MHz	25	0	26865	831.5	22.4	21.7
26	5 MHz	25	0	27015	846.5	22.5	21.4
26	10 MHz	1	0	26740	819.0	23.9	22.8
26	10 MHz	1	0	26865	831.5	23.5	22.8
26	10 MHz	1	0	26990	844.0	23.3	23.0
26	10 MHz	1	24	26740	819.0	23.7	22.5
26	10 MHz	1	24	26865	831.5	23.8	22.6
26	10 MHz	1	24	26990	844.0	23.9	23.0
26	10 MHz	1	49	26740	819.0	23.9	22.6
26	10 MHz	1	49	26865	831.5	23.7	22.8
26	10 MHz	1	49	26990	844.0	24.0	23.0
26	10 MHz	25	0	26740	819.0	22.4	21.3
26	10 MHz	25	0	26865	831.5	22.9	21.9
26	10 MHz	25	0	26990	844.0	22.4	21.7
26	10 MHz	25	13	26740	819.0	22.8	21.7
26	10 MHz	25	13	26865	831.5	22.5	21.7
26	10 MHz	25	13	26990	844.0	22.5	21.7
26	10 MHz	25	25	26740	819.0	22.9	22.0
26	10 MHz	25	25	26865	831.5	22.7	21.8
26	10 MHz	25	25	26990	844.0	22.5	21.5
26	10 MHz	50	0	26740	819.0	22.6	21.4
26	10 MHz	50	0	26865	831.5	23.0	21.9
26	10 MHz	50	0	26990	844.0	22.6	21.8

Band	Bandwidth	RB Size	RB Offset	Channel	Frequency	QPSK	16QAM
26	15 MHz	1	0	26765	821.5	23.7	23.0
				26865	831.5	23.6	22.3
				26965	841.5	23.5	22.5
			37	26765	821.5	23.5	22.7
				26865	831.5	23.9	22.6
				26965	841.5	24.0	22.8
			74	26765	821.5	23.7	22.8
				26865	831.5	23.7	22.5
				26965	841.5	23.7	22.9
		36	0	26765	821.5	22.8	21.6
				26865	831.5	22.6	21.5
				26965	841.5	22.6	21.7
			19	26765	821.5	22.9	21.4
				26865	831.5	22.4	21.5
				26965	841.5	22.4	21.4
			39	26765	821.5	22.3	21.5
				26865	831.5	22.5	21.9
				26965	841.5	22.4	21.7
		75	0	26765	821.5	22.3	21.9
				26865	831.5	22.5	21.6
				26965	841.5	22.6	21.9

Band	Bandwidth	RB Size	RB Offset	Channel	Frequency	QPSK	16QAM
41 PC3	5 MHz	1	0	39675	2498.5	24.5	23.1
				40148	2545.8	24.6	23.8
				40620	2593.0	24.6	23.5
				41093	2640.3	24.7	23.6
				41565	2687.5	24.6	23.3
			12	39675	2498.5	24.7	23.4
				40148	2545.8	24.3	23.2
				40620	2593.0	24.3	23.3
				41093	2640.3	24.5	23.2
				41565	2687.5	24.6	23.3
			24	39675	2498.5	24.6	23.1
				40148	2545.8	24.3	23.2
				40620	2593.0	24.7	23.6
				41093	2640.3	24.6	23.1
				41565	2687.5	24.7	23.6
		12	0	39675	2498.5	23.3	22.3
				40148	2545.8	23.4	22.3
				40620	2593.0	23.1	22.7
				41093	2640.3	23.4	22.6
				41565	2687.5	23.4	22.2
			6	39675	2498.5	23.2	22.5
				40148	2545.8	23.1	22.7
				40620	2593.0	23.7	22.2
				41093	2640.3	23.5	22.7
				41565	2687.5	23.5	22.4
			13	39675	2498.5	23.6	22.6
				40148	2545.8	23.5	22.8
				40620	2593.0	23.4	22.3
				41093	2640.3	23.2	22.5
				41565	2687.5	23.1	22.2
		25	0	39675	2498.5	23.7	22.4
				40148	2545.8	23.5	22.1
				40620	2593.0	23.8	22.3
				41093	2640.3	23.1	22.4
				41565	2687.5	23.2	22.3

Band	Bandwidth	RB Size	RB Offset	Channel	Frequency	QPSK	16QAM
41 PC3	10 MHz	1	0	39700	2501.0	24.4	23.1
				40160	2547.0	24.5	23.3
				40620	2593.0	24.3	23.3
				41080	2639.0	24.1	23.5
				41540	2685.0	24.2	23.2
			24	39700	2501.0	24.2	23.5
				40160	2547.0	24.5	23.5
				40620	2593.0	24.6	23.3
				41080	2639.0	24.4	23.7
				41540	2685.0	24.5	23.1
			49	39700	2501.0	24.3	23.6
				40160	2547.0	24.3	23.1
				40620	2593.0	24.5	23.1
				41080	2639.0	24.6	23.5
				41540	2685.0	24.6	23.3
		25	0	39700	2501.0	23.6	22.2
				40160	2547.0	23.4	22.4
				40620	2593.0	23.3	22.5
				41080	2639.0	23.3	22.3
				41540	2685.0	23.5	22.6
			13	39700	2501.0	23.6	22.2
				40160	2547.0	23.5	22.7
				40620	2593.0	23.3	22.8
				41080	2639.0	23.3	22.6
				41540	2685.0	23.2	22.4
			25	39700	2501.0	23.2	22.3
				40160	2547.0	23.5	22.6
				40620	2593.0	23.7	22.4
				41080	2639.0	23.7	22.3
				41540	2685.0	23.2	22.3
		50	0	39700	2501.0	23.7	22.3
				40160	2547.0	23.3	22.7
				40620	2593.0	23.1	22.4
				41080	2639.0	23.4	22.7
				41540	2685.0	23.5	22.6

Band	Bandwidth	RB Size	RB Offset	Channel	Frequency	QPSK	16QAM
41 PC3	15 MHz	1	0	39725	2503.5	24.5	23.6
				40173	2548.3	24.2	23.2
				40620	2593.0	24.5	23.3
				41068	2637.8	24.8	23.4
				41515	2682.5	24.2	23.6
			37	39725	2503.5	24.3	23.8
				40173	2548.3	24.8	23.8
				40620	2593.0	24.6	23.3
				41068	2637.8	24.2	23.4
				41515	2682.5	24.2	23.1
			74	39725	2503.5	24.7	23.2
				40173	2548.3	24.3	23.4
				40620	2593.0	24.7	23.2
				41068	2637.8	24.5	23.3
				41515	2682.5	24.5	23.2
		36	0	39725	2503.5	23.1	22.6
				40173	2548.3	23.5	22.2
				40620	2593.0	23.6	22.5
				41068	2637.8	23.5	22.4
				41515	2682.5	23.3	22.1
			19	39725	2503.5	23.8	22.7
				40173	2548.3	23.4	22.5
				40620	2593.0	23.3	22.3
				41068	2637.8	23.2	22.2
				41515	2682.5	23.8	22.7
			39	39725	2503.5	23.6	22.5
				40173	2548.3	23.3	22.6
				40620	2593.0	23.4	22.7
				41068	2637.8	23.3	22.5
				41515	2682.5	23.7	22.7
		75	0	39725	2503.5	23.2	22.3
				40173	2548.3	23.8	22.2
				40620	2593.0	23.5	22.6
				41068	2637.8	23.5	22.2
				41515	2682.5	23.4	22.2

Band	Bandwidth	RB Size	RB Offset	Channel	Frequency	QPSK	16QAM
41 PC3	20 MHz	1	0	39750	2506.0	24.8	23.3
				40185	2549.5	24.1	23.1
				40620	2593.0	24.6	23.7
				41055	2636.5	24.7	23.4
				41490	2680.0	24.3	23.2
			49	39750	2506.0	24.7	23.3
				40185	2549.5	24.1	23.2
				40620	2593.0	24.4	23.4
				41055	2636.5	24.1	23.5
				41490	2680.0	24.4	23.3
			99	39750	2506.0	24.6	23.6
				40185	2549.5	24.1	23.6
				40620	2593.0	24.4	23.4
				41055	2636.5	24.7	23.2
				41490	2680.0	24.6	23.2
		50	0	39750	2506.0	23.5	22.6
				40185	2549.5	23.5	22.3
				40620	2593.0	23.3	22.3
				41055	2636.5	23.4	22.7
				41490	2680.0	23.7	22.5
			24	39750	2506.0	23.3	22.7
				40185	2549.5	23.3	22.2
				40620	2593.0	23.4	22.2
				41055	2636.5	23.3	22.2
				41490	2680.0	23.3	22.7
			50	39750	2506.0	23.5	22.6
				40185	2549.5	23.3	22.7
				40620	2593.0	23.3	22.7
				41055	2636.5	23.2	22.7
				41490	2680.0	23.2	22.2
		100	0	39750	2506.0	23.7	22.4
				40185	2549.5	23.8	22.4
				40620	2593.0	23.4	22.5
				41055	2636.5	23.5	22.4
				41490	2680.0	23.6	22.6

Band	Bandwidth	RB Size	RB Offset	Channel	Frequency	QPSK	16QAM
41 PC2	5 MHz	1	0	39675	2498.5	25.5	24.9
				40148	2545.8	25.7	24.7
				40620	2593.0	25.5	24.5
				41093	2640.3	25.4	24.6
				41565	2687.5	25.5	24.9
			12	39675	2498.5	25.8	24.7
				40148	2545.8	26.0	24.3
				40620	2593.0	25.5	24.4
				41093	2640.3	25.3	24.6
				41565	2687.5	25.4	24.9
			24	39675	2498.5	25.7	24.4
				40148	2545.8	25.5	24.5
				40620	2593.0	25.7	24.4
				41093	2640.3	26.0	24.8
				41565	2687.5	25.4	24.5
		12	0	39675	2498.5	25.0	23.8
				40148	2545.8	24.5	23.7
				40620	2593.0	24.9	23.7
				41093	2640.3	24.9	23.8
				41565	2687.5	24.6	23.4
			6	39675	2498.5	25.0	23.5
				40148	2545.8	24.6	23.8
				40620	2593.0	24.8	24.0
				41093	2640.3	24.6	23.6
				41565	2687.5	24.7	23.7
			13	39675	2498.5	24.4	23.5
				40148	2545.8	24.8	24.0
				40620	2593.0	24.5	23.7
				41093	2640.3	24.5	23.9
				41565	2687.5	24.6	23.6
		25	0	39675	2498.5	25.0	23.4
				40148	2545.8	24.5	23.5
				40620	2593.0	24.4	23.3
				41093	2640.3	24.5	24.0
				41565	2687.5	24.7	23.6

Band	Bandwidth	RB Size	RB Offset	Channel	Frequency	QPSK	16QAM
41 PC2	10 MHz	1	0	39700	2501.0	25.6	24.9
				40160	2547.0	25.4	24.9
				40620	2593.0	25.6	25.0
				41080	2639.0	25.9	24.6
				41540	2685.0	25.7	24.6
			24	39700	2501.0	25.4	24.6
				40160	2547.0	25.3	24.4
				40620	2593.0	25.7	24.9
				41080	2639.0	25.9	24.8
				41540	2685.0	25.4	25.0
			49	39700	2501.0	26.0	24.6
				40160	2547.0	25.9	24.5
				40620	2593.0	25.4	25.0
				41080	2639.0	25.8	24.4
				41540	2685.0	25.6	24.8
		25	0	39700	2501.0	24.9	23.8
				40160	2547.0	24.9	23.9
				40620	2593.0	24.8	23.7
				41080	2639.0	24.6	23.8
				41540	2685.0	24.7	23.9
			13	39700	2501.0	25.0	23.5
				40160	2547.0	24.9	23.9
				40620	2593.0	24.6	23.8
				41080	2639.0	24.9	24.0
				41540	2685.0	24.3	23.7
			25	39700	2501.0	24.6	23.8
				40160	2547.0	24.4	23.3
				40620	2593.0	24.4	23.3
				41080	2639.0	24.3	23.9
				41540	2685.0	24.4	24.0
		50	0	39700	2501.0	24.4	23.8
				40160	2547.0	24.4	23.7
				40620	2593.0	24.7	23.9
				41080	2639.0	24.9	24.0
				41540	2685.0	24.8	23.6

Band	Bandwidth	RB Size	RB Offset	Channel	Frequency	QPSK	16QAM
41 PC2	15 MHz	1	0	39725	2503.5	25.4	24.7
				40173	2548.3	25.5	24.4
				40620	2593.0	26.0	24.7
				41068	2637.8	25.7	24.7
				41515	2682.5	25.8	25.0
			37	39725	2503.5	25.5	24.6
				40173	2548.3	25.6	24.6
				40620	2593.0	26.0	24.4
				41068	2637.8	25.3	24.4
				41515	2682.5	25.5	24.4
			74	39725	2503.5	25.7	24.8
				40173	2548.3	25.9	24.5
				40620	2593.0	25.4	24.7
				41068	2637.8	26.0	24.9
				41515	2682.5	26.0	24.8
		36	0	39725	2503.5	24.5	24.0
				40173	2548.3	24.7	23.4
				40620	2593.0	24.7	23.3
				41068	2637.8	24.7	23.5
				41515	2682.5	24.9	23.7
			19	39725	2503.5	24.6	24.0
				40173	2548.3	24.4	23.8
				40620	2593.0	25.0	24.0
				41068	2637.8	24.5	23.6
				41515	2682.5	24.4	23.6
			39	39725	2503.5	24.6	23.5
				40173	2548.3	25.0	23.9
				40620	2593.0	24.4	23.6
				41068	2637.8	24.6	23.8
				41515	2682.5	24.8	23.6
		75	0	39725	2503.5	25.0	23.3
				40173	2548.3	24.7	23.7
				40620	2593.0	24.3	24.0
				41068	2637.8	24.9	23.5
				41515	2682.5	24.5	23.5

Band	Bandwidth	RB Size	RB Offset	Channel	Frequency	QPSK	16QAM
41 PC2	20 MHz	1	0	39750	2506.0	25.5	24.9
				40185	2549.5	25.6	25.0
				40620	2593.0	25.8	24.7
				41055	2636.5	25.9	24.6
				41490	2680.0	25.9	24.9
			49	39750	2506.0	26.0	25.0
				40185	2549.5	25.8	24.9
				40620	2593.0	25.4	24.5
				41055	2636.5	25.7	24.8
				41490	2680.0	25.4	24.9
			99	39750	2506.0	25.4	24.6
				40185	2549.5	25.6	24.4
				40620	2593.0	25.8	24.6
				41055	2636.5	25.8	24.7
				41490	2680.0	25.4	24.4
		50	0	39750	2506.0	25.0	23.9
				40185	2549.5	24.5	23.4
				40620	2593.0	24.9	24.0
				41055	2636.5	24.5	23.9
				41490	2680.0	24.4	23.8
			24	39750	2506.0	24.6	23.9
				40185	2549.5	25.0	24.0
				40620	2593.0	24.8	23.3
				41055	2636.5	24.3	23.5
				41490	2680.0	25.0	23.3
			50	39750	2506.0	24.3	23.7
				40185	2549.5	24.8	23.8
				40620	2593.0	24.5	23.9
				41055	2636.5	24.6	23.5
				41490	2680.0	24.4	23.9
		100	0	39750	2506.0	24.8	23.7
				40185	2549.5	24.5	23.5
				40620	2593.0	24.9	23.6
				41055	2636.5	25.0	23.4
				41490	2680.0	24.3	23.8

Band	Bandwidth	RB Size	RB Offset	Channel	Frequency	QPSK	16QAM
48	5 MHz	1	0	55265	3552.5	23.9	22.6
				55627	3588.7	24.0	22.4
				55990	3625.0	23.7	22.4
				56352	3661.2	23.8	22.8
				56715	3697.5	23.6	22.7
			12	55265	3552.5	23.9	22.6
				55627	3588.7	23.8	22.9
				55990	3625.0	23.3	23.0
				56352	3661.2	24.0	22.5
				56715	3697.5	23.7	22.5
			24	55265	3552.5	23.5	22.8
				55627	3588.7	23.7	22.9
				55990	3625.0	23.6	22.5
				56352	3661.2	23.4	22.5
				56715	3697.5	23.7	22.9
		12	0	55265	3552.5	22.7	21.5
				55627	3588.7	22.8	21.6
				55990	3625.0	22.6	21.4
				56352	3661.2	22.6	21.8
				56715	3697.5	22.4	21.6
			6	55265	3552.5	22.5	21.3
				55627	3588.7	22.7	21.6
				55990	3625.0	22.5	21.4
				56352	3661.2	22.7	21.7
				56715	3697.5	22.5	21.5
			13	55265	3552.5	23.0	21.5
				55627	3588.7	22.3	21.7
				55990	3625.0	22.7	21.6
				56352	3661.2	22.9	21.4
				56715	3697.5	22.4	21.6
		25	0	55265	3552.5	22.3	21.6
				55627	3588.7	22.5	21.4
				55990	3625.0	22.8	21.4
				56352	3661.2	22.7	21.3
				56715	3697.5	22.6	22.0

Band	Bandwidth	RB Size	RB Offset	Channel	Frequency	QPSK	16QAM
48	10 MHz	1	0	55290	3555.0	23.7	23.0
				55640	3590.0	23.4	22.6
				55990	3625.0	23.6	22.7
				56340	3660.0	23.8	22.4
				56690	3695.0	23.9	22.8
			24	55290	3555.0	23.8	22.9
				55640	3590.0	23.7	22.6
				55990	3625.0	23.8	22.4
				56340	3660.0	23.6	22.8
				56690	3695.0	23.9	22.7
			49	55290	3555.0	23.5	22.8
				55640	3590.0	24.0	22.9
				55990	3625.0	23.6	22.6
				56340	3660.0	23.6	22.5
				56690	3695.0	23.4	22.4
		25	0	55290	3555.0	22.9	21.6
				55640	3590.0	22.6	21.7
				55990	3625.0	22.9	21.5
				56340	3660.0	22.8	21.4
				56690	3695.0	22.6	22.0
			13	55290	3555.0	22.9	21.5
				55640	3590.0	22.4	21.4
				55990	3625.0	22.8	21.7
				56340	3660.0	23.0	21.9
				56690	3695.0	22.9	21.3
			25	55290	3555.0	22.9	21.8
				55640	3590.0	22.5	21.4
				55990	3625.0	22.4	21.6
				56340	3660.0	22.7	21.6
				56690	3695.0	22.7	21.9
		50	0	55290	3555.0	22.8	21.9
				55640	3590.0	22.9	21.8
				55990	3625.0	22.6	21.8
				56340	3660.0	22.7	21.9
				56690	3695.0	22.8	21.6

Band	Bandwidth	RB Size	RB Offset	Channel	Frequency	QPSK	16QAM
48	15 MHz	1	0	55315	3557.5	23.7	22.9
				55652	3591.2	23.6	22.9
				55990	3625.0	23.9	22.6
				56327	3658.7	24.0	22.4
				56665	3692.5	23.5	22.5
			37	55315	3557.5	23.9	22.4
				55652	3591.2	23.4	22.7
				55990	3625.0	23.4	22.9
				56327	3658.7	23.6	22.4
				56665	3692.5	23.4	22.8
			74	55315	3557.5	23.6	22.8
				55652	3591.2	23.9	22.8
				55990	3625.0	23.9	22.3
				56327	3658.7	23.9	22.9
				56665	3692.5	23.7	22.8
		36	0	55315	3557.5	22.8	21.5
				55652	3591.2	22.6	21.5
				55990	3625.0	22.9	21.3
				56327	3658.7	23.0	21.8
				56665	3692.5	23.0	21.7
			19	55315	3557.5	23.0	21.7
				55652	3591.2	22.5	21.6
				55990	3625.0	22.5	21.3
				56327	3658.7	22.8	21.9
				56665	3692.5	22.5	21.5
			39	55315	3557.5	23.0	21.5
				55652	3591.2	22.3	22.0
				55990	3625.0	22.7	21.3
				56327	3658.7	22.3	21.5
				56665	3692.5	22.4	21.8
		75	0	55315	3557.5	22.8	21.6
				55652	3591.2	22.8	21.6
				55990	3625.0	22.8	21.8
				56327	3658.7	22.6	21.4
				56665	3692.5	22.7	21.8

Band	Bandwidth	RB Size	RB Offset	Channel	Frequency	QPSK	16QAM
48	20 MHz	1	0	55340	3560.0	23.7	22.7
				55665	3592.5	24.0	22.4
				55990	3625.0	23.5	22.7
				56315	3657.5	23.6	22.5
				56640	3690.0	23.8	22.5
			49	55340	3560.0	23.3	22.5
				55665	3592.5	23.9	22.6
				55990	3625.0	23.8	22.5
				56315	3657.5	23.9	22.3
				56640	3690.0	23.8	22.4
			99	55340	3560.0	23.8	22.8
				55665	3592.5	23.9	22.9
				55990	3625.0	23.4	22.3
				56315	3657.5	23.6	22.8
				56640	3690.0	24.0	22.7
		50	0	55340	3560.0	22.4	21.9
				55665	3592.5	22.8	21.7
				55990	3625.0	22.5	21.9
				56315	3657.5	22.6	21.4
				56640	3690.0	22.5	21.7
			24	55340	3560.0	22.7	21.6
				55665	3592.5	22.8	21.5
				55990	3625.0	22.9	21.9
				56315	3657.5	22.7	21.6
				56640	3690.0	22.4	21.5
			50	55340	3560.0	22.4	21.7
				55665	3592.5	22.9	21.4
				55990	3625.0	22.8	21.3
				56315	3657.5	22.8	21.5
				56640	3690.0	22.5	21.9
		100	0	55340	3560.0	22.7	21.7
				55665	3592.5	22.6	21.3
				55990	3625.0	22.4	21.6
				56315	3657.5	22.7	21.5
				56640	3690.0	22.7	22.0

Band	Bandwidth	RB Size	RB Offset	Channel	Frequency	QPSK	16QAM
66	1.4 MHz	1	0	131979	1710.7	23.8	22.9
				132322	1745.0	24.0	23.0
				132665	1779.3	23.4	22.3
			3	131979	1710.7	23.9	22.3
				132322	1745.0	23.9	22.7
				132665	1779.3	23.9	22.3
			5	131979	1710.7	23.9	22.8
				132322	1745.0	23.4	22.7
				132665	1779.3	23.9	22.8
		3	0	131979	1710.7	23.4	22.4
				132322	1745.0	23.8	22.8
				132665	1779.3	23.6	22.6
			1	131979	1710.7	23.8	22.4
				132322	1745.0	23.8	22.4
				132665	1779.3	23.8	22.6
			3	131979	1710.7	23.8	22.3
				132322	1745.0	23.3	22.7
				132665	1779.3	23.3	22.4
		6	0	131979	1710.7	22.5	21.4
				132322	1745.0	22.7	22.0
				132665	1779.3	22.7	21.7
	3 MHz	1	0	131987	1711.5	23.8	22.3
				132322	1745.0	23.7	22.9
				132657	1778.5	23.5	22.6
			7	131987	1711.5	23.9	22.3
				132322	1745.0	24.0	22.8
				132657	1778.5	23.3	22.3
			14	131987	1711.5	23.9	22.9
				132322	1745.0	23.5	22.7
				132657	1778.5	23.8	22.5
		8	0	131987	1711.5	22.7	21.4
				132322	1745.0	22.5	21.4
				132657	1778.5	22.9	21.5
			7	131987	1711.5	22.8	21.8
				132322	1745.0	22.5	21.4
				132657	1778.5	22.7	22.0
			14	131987	1711.5	22.6	21.8
				132322	1745.0	22.9	21.7
				132657	1778.5	22.8	21.8
		15	0	131987	1711.5	22.4	21.4
				132322	1745.0	23.0	21.3
				132657	1778.5	23.0	21.9

Band	Bandwidth	RB Size	RB Offset	Channel	Frequency	QPSK	16QAM
66	5 MHz	1	0	131997	1712.5	23.7	22.4
				132322	1745.0	23.6	22.9
				132646	1777.4	23.4	22.6
			12	131997	1712.5	23.6	22.7
				132322	1745.0	23.4	22.9
				132646	1777.4	23.6	22.5
			24	131997	1712.5	23.4	22.3
				132322	1745.0	23.3	22.7
				132646	1777.4	23.9	22.9
		12	0	131997	1712.5	22.8	21.7
				132322	1745.0	22.9	21.9
				132646	1777.4	22.8	21.7
			6	131997	1712.5	22.9	21.7
				132322	1745.0	22.7	21.6
				132646	1777.4	22.4	22.0
			13	131997	1712.5	22.8	21.4
				132322	1745.0	22.6	21.4
				132646	1777.4	22.7	21.9
		25	0	131997	1712.5	22.5	21.3
				132322	1745.0	22.8	21.4
				132646	1777.4	22.5	21.5
	10 MHz	1	0	132033	1716.1	23.9	22.9
				132322	1745.0	23.5	22.5
				132621	1774.9	23.8	22.4
			24	132033	1716.1	23.9	22.8
				132322	1745.0	23.4	22.4
				132621	1774.9	23.7	23.0
			49	132033	1716.1	23.6	22.9
				132322	1745.0	23.8	22.3
				132621	1774.9	23.5	23.0
		25	0	132033	1716.1	22.4	21.9
				132322	1745.0	22.7	21.8
				132621	1774.9	22.9	21.3
			13	132033	1716.1	22.5	21.8
				132322	1745.0	22.9	21.7
				132621	1774.9	22.9	21.3
			25	132033	1716.1	22.7	21.4
				132322	1745.0	22.9	22.0
				132621	1774.9	22.4	21.5
		50	0	132033	1716.1	23.0	21.9
				132322	1745.0	22.9	21.7
				132621	1774.9	22.4	21.5

Band	Bandwidth	RB Size	RB Offset	Channel	Frequency	QPSK	16QAM
66	15 MHz	1	0	132047	1717.5	23.5	22.3
				132322	1745.0	23.9	22.8
				132596	1772.4	23.8	22.9
			37	132047	1717.5	23.4	22.4
				132322	1745.0	24.0	22.6
				132596	1772.4	23.5	22.3
			74	132047	1717.5	23.7	22.6
				132322	1745.0	23.8	22.7
				132596	1772.4	23.6	22.8
		36	0	132047	1717.5	22.8	21.3
				132322	1745.0	22.4	21.4
				132596	1772.4	22.9	22.0
			19	132047	1717.5	22.5	21.6
				132322	1745.0	22.7	21.5
				132596	1772.4	22.4	21.5
			39	132047	1717.5	22.7	21.4
				132322	1745.0	22.8	21.5
				132596	1772.4	22.6	21.7
		75	0	132047	1717.5	23.0	21.7
				132322	1745.0	22.4	21.5
				132596	1772.4	22.7	21.7
	20 MHz	1	0	132072	1720.0	23.9	22.6
				132322	1745.0	23.9	22.7
				132571	1769.9	23.6	22.8
			49	132072	1720.0	23.5	22.4
				132322	1745.0	23.9	22.5
				132571	1769.9	24.0	22.9
			99	132072	1720.0	23.5	22.6
				132322	1745.0	23.3	22.9
				132571	1769.9	23.4	22.4
		50	0	132072	1720.0	22.4	21.3
				132322	1745.0	22.9	21.7
				132571	1769.9	22.9	21.7
			24	132072	1720.0	22.7	21.4
				132322	1745.0	22.8	21.9
				132571	1769.9	22.9	21.6
			50	132072	1720.0	22.9	21.8
				132322	1745.0	22.4	21.6
				132571	1769.9	22.9	21.9
		100	0	132072	1720.0	22.8	21.6
				132322	1745.0	22.8	21.9
				132571	1769.9	22.4	21.5

Band	Bandwidth	RB Size	RB Offset	Channel	Frequency	QPSK	16QAM
71	5 MHz	1	0	133147	665.5	23.5	23.0
				133297	680.5	23.5	22.5
				133447	695.5	23.9	23.0
			12	133147	665.5	23.7	22.4
				133297	680.5	23.9	22.8
				133447	695.5	23.8	22.7
			24	133147	665.5	23.9	22.9
				133297	680.5	23.6	22.9
				133447	695.5	23.9	22.7
		12	0	133147	665.5	23.0	21.6
				133297	680.5	22.5	22.0
				133447	695.5	22.7	21.6
			6	133147	665.5	22.9	21.7
				133297	680.5	22.8	21.4
				133447	695.5	22.9	21.6
			13	133147	665.5	22.6	21.9
				133297	680.5	22.8	21.4
				133447	695.5	22.4	21.8
		25	0	133147	665.5	22.7	21.4
				133297	680.5	22.9	21.3
				133447	695.5	22.9	21.4
	10 MHz	1	0	133172	668.0	23.5	22.5
				133297	680.5	23.8	22.7
				133422	693.0	23.7	22.4
			24	133172	668.0	23.3	22.9
				133297	680.5	23.4	22.5
				133422	693.0	23.6	22.6
			49	133172	668.0	23.9	22.6
				133297	680.5	24.0	22.7
				133422	693.0	23.7	22.7
		25	0	133172	668.0	22.6	21.7
				133297	680.5	22.4	21.6
				133422	693.0	22.7	21.8
			13	133172	668.0	22.5	21.5
				133297	680.5	22.8	21.8
				133422	693.0	22.5	21.9
			25	133172	668.0	22.7	21.3
				133297	680.5	22.9	21.5
				133422	693.0	22.8	21.7
		50	0	133172	668.0	22.3	21.5
				133297	680.5	23.0	21.7
				133422	693.0	22.9	21.6

Band	Bandwidth	RB Size	RB Offset	Channel	Frequency	QPSK	16QAM
71	15 MHz	1	0	133197	670.5	23.7	22.6
				133297	680.5	23.8	22.6
				133397	690.5	23.6	22.5
			37	133197	670.5	23.8	23.0
				133297	680.5	23.7	23.0
				133397	690.5	23.8	23.0
			74	133197	670.5	23.4	22.6
				133297	680.5	23.5	22.9
				133397	690.5	23.5	23.0
		36	0	133197	670.5	22.6	21.7
				133297	680.5	22.9	21.3
				133397	690.5	22.9	21.9
			19	133197	670.5	22.9	21.5
				133297	680.5	22.6	21.7
				133397	690.5	22.6	21.7
			39	133197	670.5	22.9	21.8
				133297	680.5	22.6	21.4
				133397	690.5	22.6	21.5
		75	0	133197	670.5	22.8	21.7
				133297	680.5	22.8	21.8
				133397	690.5	22.6	21.5
	20 MHz	1	0	133222	673.0	23.9	23.0
				133297	680.5	23.5	22.4
				133372	688.0	23.9	22.5
			49	133222	673.0	23.9	22.4
				133297	680.5	23.7	22.8
				133372	688.0	23.7	22.7
			99	133222	673.0	23.8	22.4
				133297	680.5	23.4	22.5
				133372	688.0	23.4	22.4
		50	0	133222	673.0	22.4	21.9
				133297	680.5	22.7	21.4
				133372	688.0	22.6	22.0
			24	133222	673.0	22.7	21.9
				133297	680.5	22.6	21.5
				133372	688.0	22.6	21.3
			50	133222	673.0	22.6	21.4
				133297	680.5	22.5	21.9
				133372	688.0	22.9	21.5
		100	0	133222	673.0	22.8	22.0
				133297	680.5	23.0	21.3
				133372	688.0	22.7	21.8

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	W1	17.89	18.00
			6	2437			17.86	18.00
			11	2462			17.84	18.00
			1	2412		W2	17.89	18.00
			6	2437			17.80	18.00
			11	2462			17.82	18.00
	802.11g	20	1	2412	6 Mbps	W1	Not Required	16.00
			6	2437				16.00
			11	2462				16.00
			1	2412		W2		16.00
			6	2437				16.00
			11	2462				16.00
	802.11n	20	1	2412	MCS0	W1		15.00
			6	2437				15.00
			11	2462				15.00
			1	2412		W2		15.00
			6	2437				15.00
			11	2462				15.00
	802.11n40	40	2	2417	MCS0	W1		13.00
			6	2437				13.00
			10	2457				13.00
			2	2417		W2		13.00
			6	2437				13.00
			10	2457				13.00
5.15-5.25 GHz	802.11a	20	36	5180	6 Mbps	W1	Not Required	15.00
			40	5200				15.00
			44	5220				15.00
			48	5240				15.00
			36	5180		W2		15.00
			40	5200				15.00
			44	5220				15.00
			48	5240				15.00
	802.11n	20	36	5180	MCS0	W1		14.00
			40	5200				14.00
			44	5220				14.00
			48	5240				14.00
			36	5180		W2		14.00
			40	5200				14.00
			44	5220				14.00
			48	5240				14.00
	802.11n	40	36	5180	MCS0	W1		12.00
			40	5200				12.00
			44	5220				12.00
			48	5240				12.00
			36	5180		W2		12.00
			40	5200				12.00
			44	5220				12.00
			48	5240				12.00

Band	Mode	Bandwidth (MHz)	Channel	Frequency (MHz)	Data Rate	Antenna	Avg Power (dBm)	Tune-up Pwr (dBm)
5.25-5.35 GHz	802.11a	20	52	5260	6 Mbps	W1	14.86	15.00
			56	5280			14.96	15.00
			60	5300			14.87	15.00
			64	5320			14.85	15.00
			52	5260		W2	14.91	15.00
			56	5280			14.82	15.00
			60	5300			14.90	15.00
			64	5320			14.91	15.00
	802.11n	20	52	5260	MCS0	W1	Not Required	14.00
			56	5280				14.00
			60	5300				14.00
			64	5320				14.00
			52	5260		W2		14.00
			56	5280				14.00
			60	5300				14.00
			64	5320				14.00
	802.11n	40	54	5270	MCS0	W1		12.00
			56	5280				12.00
			60	5300				12.00
			62	5310				12.00
			54	5270		W2		12.00
			56	5280				12.00
			60	5300				12.00
			62	5310				12.00
5600 MHz	802.11a	20	104	5520	6 Mbps	W1	14.89	15.00
			116	5580			14.85	15.00
			124	5620			14.88	15.00
			136	5680			14.86	15.00
			104	5520		W2	14.83	15.00
			116	5580			14.86	15.00
			124	5620			14.87	15.00
			136	5680			14.89	15.00
	802.11n	20	104	5520	MCS0	W1	Not Required	14.00
			116	5580				14.00
			124	5620				14.00
			136	5680				14.00
			104	5520		W2		14.00
			116	5580				14.00
			124	5620				14.00
			136	5680				14.00
	802.11n	40	104	5520	MCS0	W1		12.00
			116	5580				12.00
			124	5620				12.00
			136	5680				12.00
			104	5520		W2		12.00
			116	5580				12.00
			124	5620				12.00
			136	5680				12.00

Band	Mode	Bandwidth (MHz)	Channel	Frequency (MHz)	Data Rate	Antenna	Avg Power (dBm)	Tune-up Pwr (dBm)
5800 MHz	802.11a	20	149	5745	6 Mbps	W1	20.98	15.00
			153	5765			20.89	15.00
			157	5785			20.81	15.00
			161	5805			20.83	15.00
			165	5825			20.91	15.00
			149	5745		W2	20.89	15.00
			153	5765			20.86	15.00
			157	5785			20.82	15.00
			161	5805			20.93	15.00
			165	5825			20.94	15.00
	802.11n	20	149	5745	MCS0	W1	Not Required	14.00
			153	5765				14.00
			157	5785				14.00
			161	5805				14.00
			165	5825				14.00
			149	5745		W2		14.00
			153	5765				14.00
			157	5785				14.00
			161	5805				14.00
			165	5825				14.00
	802.11n	40	149	5745	MCS0	W1		12.00
			153	5765				12.00
			157	5785				12.00
			161	5805				12.00
			165	5825				12.00
			149	5745		W2		12.00
			153	5765				12.00
			157	5785				12.00
			161	5805				12.00
			165	5825				12.00

10. SAR Test Results

General Note:

1. Per KDB 447498 D01v06, the reported SAR is the measured SAR value adjusted for maximum tune-up tolerance.
   a. Tune-up scaling Factor = tune-up limit power (mW) / EUT RF power (mW), where tune-up limit is the maximum rated power among all production units.
   b. For SAR testing of WLAN signal with non-100% duty cycle, the measured SAR is scaled-up by the duty cycle scaling factor which is equal to "1/(duty cycle)"
   c. For WWAN: Reported SAR(W/kg)= Measured SAR(W/kg)*Tune-up Scaling Factor
   d. For TDD LTE SAR measurement, the duty cycle 1:1.59 (62.9 %) was used perform testing and considering the theoretical duty cycle of 63.3% for extended cyclic prefix in the uplink, and the theoretical duty cycle of 62.9% for normal cyclic prefix in uplink, a scaling factor of extended cyclic prefix 63.3%/62.9% = 1.006 is applied to scale-up the measured SAR result. The Reported TDD LTE SAR = measured SAR (W/kg)* Tune-up Scaling Factor* scaling factor for extended cyclic prefix.
2. Per KDB 447498 D01v06, for each exposure position, testing of other required channels within the operating mode of a frequency band is not required when the *reported* 1-g or 10-g SAR for the mid-band or highest output power channel is:
   - ≤ 0.8 W/kg or 2.0 W/kg, for 1-g or 10-g respectively, when the transmission band is ≤ 100 MHz
   - ≤ 0.6 W/kg or 1.5 W/kg, for 1-g or 10-g respectively, when the transmission band is between 100 MHz and 200 MHz
   - ≤ 0.4 W/kg or 1.0 W/kg, for 1-g or 10-g respectively, when the transmission band is ≥ 200 MHz
3. Per KDB 865664 D01v01r04, for each frequency band, repeated SAR measurement is required only when the measured SAR is ≥0.8W/kg.

UMTS Note:

1. Per KDB 941225 D01v03r01, for SAR testing is measured using a 12.2 kbps RMC with TPC bits configured to all "1's".
2. Per KDB 941225 D01v03r01, RMC 12.2kbps setting is used to evaluate SAR. The maximum output power and tune-up tolerance specified for production units in HSDPA / HSUPA / DC-HSDPA is ≤ ¼ dB higher than RMC 12.2Kbps or when the highest reported SAR of the RMC12.2Kbps is scaled by the ratio of specified maximum output power and tune-up tolerance of HSDPA / HSUPA / DC-HSDPA to RMC12.2Kbps and the adjusted SAR is ≤ 1.2 W/kg, SAR measurement is not required for HSDPA / HSUPA / DC-HSDPA, and according to the following RF output power, the output power results of the secondary modes (HSUPA, HSDPA, DC-HSDPA) are less than ¼ dB higher than the primary modes; therefore, SAR measurement is not required for HSDPA / HSUPA / DC-HSDPA.

LTE Note:

1. Per KDB 941225 D05v02r05, start with the largest channel bandwidth and measure SAR for QPSK with 1 RB allocation, using the RB offset and required test channel combination with the highest maximum output power for RB offsets at the upper edge, middle and lower edge of each required test channel.
2. Per KDB 941225 D05v02r05, 50% RB allocation for QPSK SAR testing follows 1RB QPSK allocation procedure.
3. Per KDB 941225 D05v02r05, For QPSK with 100% RB allocation, SAR is not required when the highest maximum output power for 100 % RB allocation is less than the highest maximum output power in 50% and 1 RB allocations and the highest reported SAR for 1 RB and 50% RB allocation are ≤ 0.8 W/kg. Otherwise, SAR is measured for the highest output power channel; and if the reported SAR is > 1.45 W/kg, the remaining required test channels must also be tested.
4. Per KDB 941225 D05v02r05, 16QAM output power for each RB allocation configuration is > not ½ dB higher than the same configuration in QPSK and the reported SAR for the QPSK configuration is ≤ 1.45 W/kg; Per KDB 941225 D05v02r05, 16QAM SAR testing is not required.
5. Per KDB 941225 D05v02r05, Smaller bandwidth output power for each RB allocation configuration is > not ½ dB higher than the same configuration in the largest supported bandwidth, and the reported SAR for the largest supported bandwidth is ≤ 1.45 W/kg; Per KDB 941225 D05v02r05, smaller bandwidth SAR testing is not required.
6. For LTE B4/B5/B12/B17 the maximum bandwidth does not support three non-overlapping channels, per KDB 941225 D05v02r05, when a device supports overlapping channel assignment in a channel bandwidth configuration, the middle channel of the group of overlapping channels should be selected for testing.
7. LTE band 2/4/5/17/38 SAR test was covered by Band 25/66/26/12/41; according to TCB workshop, SAR test for overlapping LTE bands can be reduced if
   a. The maximum output power, including tolerance, for the smaller band is ≤ the larger band to qualify for the SAR test exclusion.
   b. The channel bandwidth and other operating parameters for the smaller band are fully supported by the larger band.

Plot No.	Band	Mode	Test Position	Gap (mm)	Ch.	Freq. (MHz)	Average Power (dBm)	Tune-Up Limit (dBm)	Measured 1g SAR (W/kg)	Reported 1g SAR (W/kg)
1	WCDMA II_Ant M1	RMC 12.2Kbps	Back	15mm	9262	1852.4	24.19	24.50	0.935	1.00
	WCDMA II_Ant M1	RMC 12.2Kbps		15mm	9400	1880	24.44	24.50	0.873	0.89
	WCDMA II_Ant M1	RMC 12.2Kbps		15mm	9538	1907.6	24.25	24.50	0.912	0.97
	WCDMA II_Ant M2	RMC 12.2Kbps		15mm	9262	1852.4	24.19	24.50	0.921	0.99
	WCDMA II_Ant M3	RMC 12.2Kbps		15mm	9400	1880	24.44	24.50	0.0986	0.10
	WCDMA II_Ant M4	RMC 12.2Kbps		15mm	9262	1852.4	24.19	24.50	0.933	1.00
	WCDMA II_Ant M5	RMC 12.2Kbps		15mm	9400	1880	24.44	24.50	0.0956	0.10
	WCDMA II_Ant M6	RMC 12.2Kbps		15mm	9400	1880	24.44	24.50	0.0972	0.10
	Repeat	RMC 12.2Kbps		15mm	9262	1852.4	24.19	24.50	0.921	0.99
	WCDMA IV_Ant M1	RMC 12.2Kbps		15mm	1312	1712.4	24.48	24.50	0.881	0.89
	WCDMA IV_Ant M1	RMC 12.2Kbps		15mm	1413	1732.6	24.23	24.50	1.07	1.14
2	WCDMA IV_Ant M1	RMC 12.2Kbps		15mm	1513	1752.6	24.18	24.50	1.21	1.30
	WCDMA IV_Ant M2	RMC 12.2Kbps		15mm	1513	1752.6	24.18	24.50	1.15	1.24
	WCDMA IV_Ant M3	RMC 12.2Kbps		15mm	1413	1732.6	24.23	24.50	0.0666	0.07
	WCDMA IV_Ant M4	RMC 12.2Kbps		15mm	1513	1752.6	24.18	24.50	1.19	1.28
	WCDMA IV_Ant M5	RMC 12.2Kbps		15mm	1413	1732.6	24.23	24.50	0.0602	0.06
	WCDMA IV_Ant M6	RMC 12.2Kbps		15mm	1413	1732.6	24.23	24.50	0.0635	0.07
	Repeat	RMC 12.2Kbps		15mm	9262	1852.4	24.19	24.50	1.19	1.28
	WCDMA V_Ant M1	RMC 12.2Kbps		15mm	4132	826.4	24.42	24.50	0.715	0.73
3	WCDMA V_Ant M1	RMC 12.2Kbps		15mm	4183	836.6	24.14	24.50	0.785	0.85
	WCDMA V_Ant M1	RMC 12.2Kbps		15mm	4233	846.6	24.12	24.50	0.743	0.81
	WCDMA V_Ant M2	RMC 12.2Kbps		15mm	4183	836.6	24.14	24.50	0.771	0.84
	WCDMA V_Ant M3	RMC 12.2Kbps		15mm	4183	836.6	24.14	24.50	0.0753	0.08
	WCDMA V_Ant M4	RMC 12.2Kbps		15mm	4183	836.6	24.14	24.50	0.776	0.84
	WCDMA V_Ant M5	RMC 12.2Kbps		15mm	4183	836.6	24.14	24.50	0.0751	0.08
	WCDMA V_Ant M6	RMC 12.2Kbps		15mm	4183	836.6	24.14	24.50	0.0745	0.08
	Repeat	RMC 12.2Kbps		15mm	4183	836.6	24.14	24.50	0.779	0.85

Plot No.	Band	BW (MHz)	Modulation	RB Size	RB offset	Test Position	Gap (mm)	Ch.	Freq. (MHz)	Average Power (dBm)	Tune-Up Limit (dBm)	Measured 1g SAR (W/kg)	Reported 1g SAR (W/kg)
	LTE Band 2_Ant M1	20M	QPSK	1	49	Back	15mm	18900	1880	24.0	24.0	0.513	0.51
	LTE Band 2_Ant M1	20M	QPSK	50	24		15mm	18900	1880	22.5	23.0	0.458	0.51
	LTE Band 2_Ant M2	20M	QPSK	1	49		15mm	18900	1880	24.0	24.0	0.511	0.51
	LTE Band 2_Ant M2	20M	QPSK	50	24		15mm	18900	1880	22.5	23.0	0.451	0.51
	LTE Band 2_Ant M3	20M	QPSK	1	49		15mm	18900	1880	24.0	24.0	0.0889	0.09
	LTE Band 2_Ant M3	20M	QPSK	50	24		15mm	18900	1880	22.5	23.0	0.0764	0.09
	LTE Band 2_Ant M4	20M	QPSK	1	49		15mm	18900	1880	24.0	24.0	0.509	0.51
	LTE Band 2_Ant M4	20M	QPSK	50	24		15mm	18900	1880	22.5	23.0	0.448	0.50
	LTE Band 2_Ant M5	20M	QPSK	1	49		15mm	18900	1880	24.0	24.0	0.0882	0.09
	LTE Band 2_Ant M5	20M	QPSK	50	24		15mm	18900	1880	22.5	23.0	0.0760	0.09
	LTE Band 2_Ant M6	20M	QPSK	1	49		15mm	18900	1880	24.0	24.0	0.0876	0.09
	LTE Band 2_Ant M6	20M	QPSK	50	24		15mm	18900	1880	22.5	23.0	0.0757	0.08
	LTE Band 4_Ant M1	20M	QPSK	1	49		15mm	20175	1732.5	23.5	24.0	0.751	0.76
	LTE Band 4_Ant M1	20M	QPSK	50	24		15mm	20175	1732.5	22.6	23.0	0.688	0.75
	LTE Band 4_Ant M2	20M	QPSK	1	49		15mm	20175	1732.5	23.5	24.0	0.744	0.84
	LTE Band 4_Ant M2	20M	QPSK	50	24		15mm	20175	1732.5	22.6	23.0	0.684	0.75
	LTE Band 4_Ant M3	20M	QPSK	1	49		15mm	20175	1732.5	23.5	24.0	0.0402	0.05
	LTE Band 4_Ant M3	20M	QPSK	50	24		15mm	20175	1732.5	22.6	23.0	0.0346	0.04
	LTE Band 4_Ant M4	20M	QPSK	1	49		15mm	20175	1732.5	23.5	24.0	0.740	0.83
	LTE Band 4_Ant M4	20M	QPSK	50	24		15mm	20175	1732.5	22.6	23.0	0.683	0.75
	LTE Band 4_Ant M5	20M	QPSK	1	49		15mm	20175	1732.5	23.5	24.0	0.0397	0.04
	LTE Band 4_Ant M5	20M	QPSK	50	24		15mm	20175	1732.5	22.6	23.0	0.0341	0.04
	LTE Band 4_Ant M6	20M	QPSK	1	49		15mm	20175	1732.5	23.5	24.0	0.0391	0.04
	LTE Band 4_Ant M6	20M	QPSK	50	24		15mm	20175	1732.5	22.6	23.0	0.0335	0.04
	LTE Band 5_Ant M1	10M	QPSK	1	24		15mm	20525	836.5	23.6	24.0	0.387	0.42
	LTE Band 5_Ant M1	10M	QPSK	25	12		15mm	20525	836.5	22.3	23.0	0.311	0.37
	LTE Band 5_Ant M2	10M	QPSK	1	24		15mm	20525	836.5	23.6	24.0	0.379	0.42
	LTE Band 5_Ant M2	10M	QPSK	25	12		15mm	20525	836.5	22.3	23.0	0.302	0.36
	LTE Band 5_Ant M3	10M	QPSK	1	24		15mm	20525	836.5	23.6	24.0	0.0657	0.07
	LTE Band 5_Ant M3	10M	QPSK	25	12		15mm	20525	836.5	22.3	23.0	0.0587	0.07
	LTE Band 5_Ant M4	10M	QPSK	1	24		15mm	20525	836.5	23.6	24.0	0.377	0.41
	LTE Band 5_Ant M4	10M	QPSK	25	12		15mm	20525	836.5	22.3	23.0	0.297	0.35
	LTE Band 5_Ant M5	10M	QPSK	1	24		15mm	20525	836.5	23.6	24.0	0.0651	0.07
	LTE Band 5_Ant M5	10M	QPSK	25	12		15mm	20525	836.5	22.3	23.0	0.0582	0.07
	LTE Band 5_Ant M6	10M	QPSK	1	24		15mm	20525	836.5	23.6	24.0	0.0647	0.07
	LTE Band 5_Ant M6	10M	QPSK	25	12		15mm	20525	836.5	22.3	23.0	0.0576	0.07

Plot No.	Band	BW (MHz)	Modulation	RB Size	RB offset	Test Position	Gap (mm)	Ch.	Freq. (MHz)	Average Power (dBm)	Tune-Up Limit (dBm)	Measured 1g SAR (W/kg)	Reported 1g SAR (W/kg)
4	LTE Band 7_Ant M1	20M	QPSK	1	49	Back	15mm	21100	2535	24.3	24.8	0.678	0.76
	LTE Band 7_Ant M1	20M	QPSK	50	24		15mm	21100	2535	23.3	23.8	0.587	0.66
	LTE Band 7_Ant M2	20M	QPSK	1	49		15mm	21100	2535	24.3	24.8	0.657	0.74
	LTE Band 7_Ant M2	20M	QPSK	50	24		15mm	21100	2535	23.3	23.8	0.549	0.62
	LTE Band 7_Ant M3	20M	QPSK	1	49		15mm	21100	2535	24.3	24.8	0.257	0.29
	LTE Band 7_Ant M3	20M	QPSK	50	24		15mm	21100	2535	23.3	23.8	0.226	0.25
	LTE Band 7_Ant M4	20M	QPSK	1	49		15mm	21100	2535	24.3	24.8	0.669	0.75
	LTE Band 7_Ant M4	20M	QPSK	50	24		15mm	21100	2535	23.3	23.8	0.558	0.63
	LTE Band 7_Ant M5	20M	QPSK	1	49		15mm	21100	2535	24.3	24.8	0.241	0.27
	LTE Band 7_Ant M5	20M	QPSK	50	24		15mm	21100	2535	23.3	23.8	0.201	0.23
	LTE Band 7_Ant M6	20M	QPSK	1	49		15mm	21100	2535	24.3	24.8	0.249	0.28
	LTE Band 7_Ant M6	20M	QPSK	50	24		15mm	21100	2535	23.3	23.8	0.215	0.24
5	LTE Band 12_Ant M1	10M	QPSK	1	24		15mm	23095	707.5	23.9	24.0	0.503	0.51
	LTE Band 12_Ant M1	10M	QPSK	25	12		15mm	23095	707.5	22.9	23.0	0.439	0.45
	LTE Band 12_Ant M2	10M	QPSK	1	24		15mm	23095	707.5	23.9	24.0	0.489	0.50
	LTE Band 12_Ant M2	10M	QPSK	25	12		15mm	23095	707.5	22.9	23.0	0.422	0.43
	LTE Band 12_Ant M3	10M	QPSK	1	24		15mm	23095	707.5	23.9	24.0	0.0303	0.03
	LTE Band 12_Ant M3	10M	QPSK	25	12		15mm	23095	707.5	22.9	23.0	0.0254	0.03
	LTE Band 12_Ant M4	10M	QPSK	1	24		15mm	23095	707.5	23.9	24.0	0.496	0.51
	LTE Band 12_Ant M4	10M	QPSK	25	12		15mm	23095	707.5	22.9	23.0	0.429	0.44
	LTE Band 12_Ant M5	10M	QPSK	1	24		15mm	23095	707.5	23.9	24.0	0.0257	0.03
	LTE Band 12_Ant M5	10M	QPSK	25	12		15mm	23095	707.5	22.9	23.0	0.0231	0.02
	LTE Band 12_Ant M6	10M	QPSK	1	24		15mm	23095	707.5	23.9	24.0	0.0285	0.03
	LTE Band 12_Ant M6	10M	QPSK	25	12		15mm	23095	707.5	22.9	23.0	0.0243	0.02
6	LTE Band 13_Ant M1	10M	QPSK	1	24		15mm	23230	782	23.9	24.0	0.115	0.12
	LTE Band 13_Ant M1	10M	QPSK	25	12		15mm	23230	782	22.8	23.0	0.101	0.11
	LTE Band 13_Ant M2	10M	QPSK	1	24		15mm	23230	782	23.9	24.0	0.108	0.11
	LTE Band 13_Ant M2	10M	QPSK	25	12		15mm	23230	782	22.8	23.0	0.0957	0.10
	LTE Band 13_Ant M3	10M	QPSK	1	24		15mm	23230	782	23.9	24.0	0.0527	0.05
	LTE Band 13_Ant M3	10M	QPSK	25	12		15mm	23230	782	22.8	23.0	0.0467	0.05
	LTE Band 13_Ant M4	10M	QPSK	1	24		15mm	23230	782	23.9	24.0	0.106	0.11
	LTE Band 13_Ant M4	10M	QPSK	25	12		15mm	23230	782	22.8	23.0	0.0951	0.10
	LTE Band 13_Ant M5	10M	QPSK	1	24		15mm	23230	782	23.9	24.0	0.0511	0.05
	LTE Band 13_Ant M5	10M	QPSK	25	12		15mm	23230	782	22.8	23.0	0.0432	0.05
	LTE Band 13_Ant M6	10M	QPSK	1	24		15mm	23230	782	23.9	24.0	0.0503	0.05
	LTE Band 13_Ant M6	10M	QPSK	25	12		15mm	23230	782	22.8	23.0	0.0422	0.04
7	LTE Band 14_Ant M1	10M	QPSK	1	24		15mm	23330	793	23.8	24.0	0.183	0.19
	LTE Band 14_Ant M1	10M	QPSK	25	12		15mm	23330	793	22.4	23.0	0.121	0.14
	LTE Band 14_Ant M2	10M	QPSK	1	24		15mm	23330	793	23.8	24.0	0.179	0.19
	LTE Band 14_Ant M2	10M	QPSK	25	12		15mm	23330	793	22.4	23.0	0.118	0.14
	LTE Band 14_Ant M3	10M	QPSK	1	24		15mm	23330	793	23.8	24.0	0.0632	0.07
	LTE Band 14_Ant M3	10M	QPSK	25	12		15mm	23330	793	22.4	23.0	0.0572	0.07
	LTE Band 14_Ant M4	10M	QPSK	1	24		15mm	23330	793	23.8	24.0	0.176	0.18
	LTE Band 14_Ant M4	10M	QPSK	25	12		15mm	23330	793	22.4	23.0	0.110	0.13
	LTE Band 14_Ant M5	10M	QPSK	1	24		15mm	23330	793	23.8	24.0	0.0624	0.07
	LTE Band 14_Ant M5	10M	QPSK	25	12		15mm	23330	793	22.4	23.0	0.0568	0.07
	LTE Band 14_Ant M6	10M	QPSK	1	24		15mm	23330	793	23.8	24.0	0.0615	0.06
	LTE Band 14_Ant M6	10M	QPSK	25	12		15mm	23330	793	22.4	23.0	0.0563	0.06

Plot No.	Band	BW (MHz)	Modulation	RB Size	RB offset	Test Position	Gap (mm)	Ch.	Freq. (MHz)	Average Power (dBm)	Tune-Up Limit (dBm)	Measured 1g SAR (W/kg)	Reported 1g SAR (W/kg)
8	LTE Band 25_Ant M1	20M	QPSK	1	49	Back	15mm	26365	1882.5	23.5	24.0	0.555	0.62
	LTE Band 25_Ant M1	20M	QPSK	50	24		15mm	26365	1882.5	22.4	23.0	0.501	0.58
	LTE Band 25_Ant M2	20M	QPSK	1	49		15mm	26365	1882.5	23.5	24.0	0.523	0.59
	LTE Band 25_Ant M2	20M	QPSK	50	24		15mm	26365	1882.5	22.4	23.0	0.486	0.56
	LTE Band 25_Ant M3	20M	QPSK	1	49		15mm	26365	1882.5	23.5	24.0	0.0928	0.10
	LTE Band 25_Ant M3	20M	QPSK	50	24		15mm	26365	1882.5	22.4	23.0	0.0865	0.10
	LTE Band 25_Ant M4	20M	QPSK	1	49		15mm	26365	1882.5	23.5	24.0	0.518	0.58
	LTE Band 25_Ant M4	20M	QPSK	50	24		15mm	26365	1882.5	22.4	23.0	0.477	0.55
	LTE Band 25_Ant M5	20M	QPSK	1	49		15mm	26365	1882.5	23.5	24.0	0.0897	0.10
	LTE Band 25_Ant M5	20M	QPSK	50	24		15mm	26365	1882.5	22.4	23.0	0.0842	0.10
	LTE Band 25_Ant M6	20M	QPSK	1	49		15mm	26365	1882.5	23.5	24.0	0.0884	0.10
	LTE Band 25_Ant M6	20M	QPSK	50	24		15mm	26365	1882.5	22.4	23.0	0.0833	0.10
9	LTE Band 26_Ant M1	15M	QPSK	1	37		15mm	26865	831.5	23.9	24.0	0.428	0.44
	LTE Band 26_Ant M1	15M	QPSK	36	19		15mm	26865	831.5	22.4	23.0	0.354	0.41
	LTE Band 26_Ant M2	15M	QPSK	1	37		15mm	26865	831.5	23.9	24.0	0.419	0.43
	LTE Band 26_Ant M2	15M	QPSK	36	19		15mm	26865	831.5	22.4	23.0	0.349	0.40
	LTE Band 26_Ant M3	15M	QPSK	1	37		15mm	26865	831.5	23.9	24.0	0.0734	0.08
	LTE Band 26_Ant M3	15M	QPSK	36	19		15mm	26865	831.5	22.4	23.0	0.0643	0.07
	LTE Band 26_Ant M4	15M	QPSK	1	37		15mm	26865	831.5	23.9	24.0	0.415	0.42
	LTE Band 26_Ant M4	15M	QPSK	36	19		15mm	26865	831.5	22.4	23.0	0.342	0.39
	LTE Band 26_Ant M5	15M	QPSK	1	37		15mm	26865	831.5	23.9	24.0	0.0721	0.07
	LTE Band 26_Ant M5	15M	QPSK	36	19		15mm	26865	831.5	22.4	23.0	0.0637	0.07
	LTE Band 26_Ant M6	15M	QPSK	1	37		15mm	26865	831.5	23.9	24.0	0.0715	0.07
	LTE Band 26_Ant M6	15M	QPSK	36	19		15mm	26865	831.5	22.4	23.0	0.0631	0.07
10	LTE Band 38_Ant M1	20M	QPSK	1	49		15mm	38000	2595	23.8	24.0	0.217	0.23
	LTE Band 38_Ant M1	20M	QPSK	50	24		15mm	38000	2595	22.9	23.0	0.168	0.17
	LTE Band 38_Ant M2	20M	QPSK	1	49		15mm	38000	2595	23.8	24.0	0.211	0.22
	LTE Band 38_Ant M2	20M	QPSK	50	24		15mm	38000	2595	22.9	23.0	0.161	0.17
	LTE Band 38_Ant M3	20M	QPSK	1	49		15mm	38000	2595	23.8	24.0	0.111	0.12
	LTE Band 38_Ant M3	20M	QPSK	50	24		15mm	38000	2595	22.9	23.0	0.0852	0.09
	LTE Band 38_Ant M4	20M	QPSK	1	49		15mm	38000	2595	23.8	24.0	0.207	0.22
	LTE Band 38_Ant M4	20M	QPSK	50	24		15mm	38000	2595	22.9	23.0	0.153	0.16
	LTE Band 38_Ant M5	20M	QPSK	1	49		15mm	38000	2595	23.8	24.0	0.108	0.11
	LTE Band 38_Ant M5	20M	QPSK	50	24		15mm	38000	2595	22.9	23.0	0.0846	0.09
	LTE Band 38_Ant M6	20M	QPSK	1	49		15mm	38000	2595	23.8	24.0	0.102	0.11
	LTE Band 38_Ant M6	20M	QPSK	50	24		15mm	38000	2595	22.9	23.0	0.0839	0.09
11	LTE Band 41_Ant M1	20M	QPSK	1	49		15mm	40620	2593	25.4	26.0	0.219	0.25
	LTE Band 41_Ant M1	20M	QPSK	50	24		15mm	40620	2593	24.8	25.0	0.167	0.17
	LTE Band 41_Ant M2	20M	QPSK	1	49		15mm	40620	2593	25.4	26.0	0.215	0.25
	LTE Band 41_Ant M2	20M	QPSK	50	24		15mm	40620	2593	24.8	25.0	0.161	0.17
	LTE Band 41_Ant M3	20M	QPSK	1	49		15mm	40620	2593	25.4	26.0	0.112	0.13
	LTE Band 41_Ant M3	20M	QPSK	50	24		15mm	40620	2593	24.8	25.0	0.0986	0.10
	LTE Band 41_Ant M4	20M	QPSK	1	49		15mm	40620	2593	25.4	26.0	0.207	0.24
	LTE Band 41_Ant M4	20M	QPSK	50	24		15mm	40620	2593	24.8	25.0	0.156	0.16
	LTE Band 41_Ant M5	20M	QPSK	1	49		15mm	40620	2593	25.4	26.0	0.108	0.12
	LTE Band 41_Ant M5	20M	QPSK	50	24		15mm	40620	2593	24.8	25.0	0.0975	0.10
	LTE Band 41_Ant M6	20M	QPSK	1	49		15mm	40620	2593	25.4	26.0	0.107	0.12
	LTE Band 41_Ant M6	20M	QPSK	50	24		15mm	40620	2593	24.8	25.0	0.0969	0.10

Plot No.	Band	BW (MHz)	Modulation	RB Size	RB offset	Test Position	Gap (mm)	Ch.	Freq. (MHz)	Average Power (dBm)	Tune-Up Limit (dBm)	Measured 1g SAR (W/kg)	Reported 1g SAR (W/kg)
12	LTE Band 48_Ant M1	20M	QPSK	1	49	Back	15mm	55990	3625	23.8	24.0	0.187	0.20
	LTE Band 48_Ant M1	20M	QPSK	50	24		15mm	55990	3625	22.9	23.0	0.122	0.13
	LTE Band 48_Ant M2	20M	QPSK	1	49		15mm	55990	3625	23.8	24.0	0.185	0.19
	LTE Band 48_Ant M2	20M	QPSK	50	24		15mm	55990	3625	22.9	23.0	0.119	0.12
	LTE Band 48_Ant M3	20M	QPSK	1	49		15mm	55990	3625	23.8	24.0	0.0374	0.04
	LTE Band 48_Ant M3	20M	QPSK	50	24		15mm	55990	3625	22.9	23.0	0.0267	0.03
	LTE Band 48_Ant M4	20M	QPSK	1	49		15mm	55990	3625	23.8	24.0	0.181	0.19
	LTE Band 48_Ant M4	20M	QPSK	50	24		15mm	55990	3625	22.9	23.0	0.115	0.12
	LTE Band 48_Ant M5	20M	QPSK	1	49		15mm	55990	3625	23.8	24.0	0.0371	0.04
	LTE Band 48_Ant M5	20M	QPSK	50	24		15mm	55990	3625	22.9	23.0	0.0263	0.03
	LTE Band 48_Ant M6	20M	QPSK	1	49		15mm	55990	3625	23.8	24.0	0.0368	0.04
	LTE Band 48_Ant M6	20M	QPSK	50	24		15mm	55990	3625	22.9	23.0	0.0259	0.03
	LTE Band 66_Ant M1	20M	QPSK	1	49		15mm	132072	1720	23.5	24.0	0.675	0.76
	LTE Band 66_Ant M1	20M	QPSK	1	49		15mm	132322	1745	23.9	24.0	0.795	0.81
13	LTE Band 66_Ant M1	20M	QPSK	1	49		15mm	132571	1770	24.0	24.0	0.808	0.81
	LTE Band 66_Ant M1	20M	QPSK	50	24		15mm	132571	1770	22.8	23.0	0.734	0.77
	LTE Band 66_Ant M2	20M	QPSK	1	49		15mm	132571	1770	24.0	24.0	0.796	0.80
	LTE Band 66_Ant M2	20M	QPSK	50	24		15mm	132571	1770	22.8	23.0	0.731	0.77
	LTE Band 66_Ant M3	20M	QPSK	1	49		15mm	132322	1745	23.9	24.0	0.0478	0.05
	LTE Band 66_Ant M3	20M	QPSK	50	24		15mm	132322	1745	22.8	23.0	0.0418	0.04
	LTE Band 66_Ant M4	20M	QPSK	1	49		15mm	132571	1770	24.0	24.0	0.794	0.79
	LTE Band 66_Ant M4	20M	QPSK	50	24		15mm	132571	1770	22.8	23.0	0.729	0.76
	LTE Band 66_Ant M5	20M	QPSK	1	49		15mm	132322	1745	23.9	24.0	0.0472	0.05
	LTE Band 66_Ant M5	20M	QPSK	50	24		15mm	132322	1745	22.8	23.0	0.0411	0.04
	LTE Band 66_Ant M6	20M	QPSK	1	49		15mm	132322	1745	23.9	24.0	0.0469	0.05
	LTE Band 66_Ant M6	20M	QPSK	50	24		15mm	132322	1745	22.8	23.0	0.0407	0.04
	Repeat	20M	QPSK	1	49		15mm	132571	1770	24.0	24.0	0.791	0.79
14	LTE Band 71_Ant M1	20M	QPSK	1	49		15mm	133222	680.5	23.7	24.0	0.420	0.45
	LTE Band 71_Ant M1	20M	QPSK	50	24		15mm	133222	680.5	22.6	23.0	0.376	0.41
	LTE Band 71_Ant M2	20M	QPSK	1	49		15mm	133222	680.5	23.7	24.0	0.415	0.44
	LTE Band 71_Ant M2	20M	QPSK	50	24		15mm	133222	680.5	22.6	23.0	0.371	0.41
	LTE Band 71_Ant M3	20M	QPSK	1	49		15mm	133222	680.5	23.7	24.0	0.0936	0.10
	LTE Band 71_Ant M3	20M	QPSK	50	24		15mm	133222	680.5	22.6	23.0	0.0859	0.09
	LTE Band 71_Ant M4	20M	QPSK	1	49		15mm	133222	680.5	23.7	24.0	0.411	0.44
	LTE Band 71_Ant M4	20M	QPSK	50	24		15mm	133222	680.5	22.6	23.0	0.368	0.40
	LTE Band 71_Ant M5	20M	QPSK	1	49		15mm	133222	680.5	23.7	24.0	0.0927	0.10
	LTE Band 71_Ant M5	20M	QPSK	50	24		15mm	133222	680.5	22.6	23.0	0.0854	0.09
	LTE Band 71_Ant M6	20M	QPSK	1	49		15mm	133222	680.5	23.7	24.0	0.0923	0.10
	LTE Band 71_Ant M6	20M	QPSK	50	24		15mm	133222	680.5	22.6	23.0	0.0850	0.09

Plot No.	Band	BW (MHz)	Modulation	Test Position	Gap (mm)	Ch.	Freq. (MHz)	Average Power (dBm)	Tune-Up Limit (dBm)	Measured 1g SAR (W/kg)	Reported 1g SAR (W/kg)
	2.45 GHz Ant W1	20M	CCK	Back	15mm	6	2437	17.89	18.0	0.0027	<0.01
15	2.45 GHz Ant W2	20M	CCK		15mm	6	2437	17.89	18.0	0.0453	0.05
	5.25 GHz Ant W1	20M	OFDM		15mm	60	5300	14.87	15.0	0.00120	<0.01
16	5.25 GHz Ant W2	20M	OFDM		15mm	60	5300	14.87	15.0	0.131	0.14
	5.60 GHz Ant W1	20M	OFDM		15mm	124	5620	14.88	15.0	0.00409	<0.01
17	5.60 GHz Ant W2	20M	OFDM		15mm	124	5620	14.88	15.0	0.358	0.37
	5.75 GHz Ant W1	20M	OFDM		15mm	157	5785	14.81	15.0	0.000767	<0.01
18	5.75 GHz Ant W2	20M	OFDM		15mm	157	5785	14.81	15.0	0.266	0.28

11. Simultaneous Transmission Analysis

The FR1 data is located in report number SAR.20230608. The data listed in the tables below was extracted from the report filed with this report.

Sim-Tx configuration

No.	Simultaneous Transmission Configuration	Exposure Positions
		Body
1	UMTS + 2.4 GHz Wifi W1 + 2.4 GHz WiFi W2	Yes
2	UMTS + 5 GHz Wifi W1 + 5 GHz WiFi W2	Yes
3	LTE + 2.4 GHz Wifi W1 + 2.4 GHz WiFi W2	Yes
4	LTE + 5 GHz Wifi W1 + 5 GHz WiFi W2	Yes
5	FR1 + 2.4 GHz Wifi W1 + 2.4 GHz WiFi W2	Yes
6	FR1 + 5 GHz Wifi W1 + 5 GHz WiFi W2	Yes

General Note:

1. The following summations represent the absolute worst cases for simultaneous transmission with WWAN and WLAN.
2. The Scaled SAR summation is calculated based on the same configuration and test position.

Body Exposure Conditions

WWAN Band	Antenna	Exposure Position	1 WWAN 1g SAR (W/kg)	2 2.4GHz Wi-Fi W1 1g SAR (W/kg)	3 2.4GHz Wi-Fi W2 1g SAR (W/kg)	4 5GHz Wi-Fi W1 1g SAR (W/kg)	5 5GHz Wi-Fi W2 1g SAR (W/kg)	1+2+3 Summed 1g SAR (W/kg)	1+4+5 Summed 1g SAR (W/kg)
WCDMA Band 2	M1	Back	1.00	0.01	0.05	0.01	0.37	1.06	1.38
	M2		0.99	0.01	0.05	0.01	0.37	1.05	1.37
	M3		0.10	0.01	0.05	0.01	0.37	0.16	0.48
	M4		1.00	0.01	0.05	0.01	0.37	1.06	1.38
	M5		0.10	0.01	0.05	0.01	0.37	0.16	0.48
	M6		0.10	0.01	0.05	0.01	0.37	0.16	0.48
WCDMA Band 4	M1		1.30	0.01	0.05	0.01	0.37	1.36	1.68
	M2		1.24	0.01	0.05	0.01	0.37	1.30	1.62
	M3		0.07	0.01	0.05	0.01	0.37	0.13	0.45
	M4		1.28	0.01	0.05	0.01	0.37	1.34	1.66
	M5		0.06	0.01	0.05	0.01	0.37	0.12	0.44
	M6		0.07	0.01	0.05	0.01	0.37	0.13	0.45
WCDMA Band 5	M1		0.85	0.01	0.05	0.01	0.37	0.91	1.23
	M2		0.84	0.01	0.05	0.01	0.37	0.90	1.22
	M3		0.08	0.01	0.05	0.01	0.37	0.14	0.46
	M4		0.84	0.01	0.05	0.01	0.37	0.90	1.22
	M5		0.08	0.01	0.05	0.01	0.37	0.14	0.46
	M6		0.08	0.01	0.05	0.01	0.37	0.14	0.46
LTE Band 2	M1		0.51	0.01	0.05	0.01	0.37	0.57	0.89
	M2		0.51	0.01	0.05	0.01	0.37	0.57	0.89
	M3		0.09	0.01	0.05	0.01	0.37	0.15	0.47
	M4		0.51	0.01	0.05	0.01	0.37	0.57	0.89
	M5		0.09	0.01	0.05	0.01	0.37	0.15	0.47
	M6		0.09	0.01	0.05	0.01	0.37	0.15	0.47
LTE Band 4	M1		0.84	0.01	0.05	0.01	0.37	0.90	1.22
	M2		0.83	0.01	0.05	0.01	0.37	0.89	1.21
	M3		0.05	0.01	0.05	0.01	0.37	0.11	0.43
	M4		0.83	0.01	0.05	0.01	0.37	0.89	1.21
	M5		0.04	0.01	0.05	0.01	0.37	0.10	0.42
	M6		0.04	0.01	0.05	0.01	0.37	0.10	0.42
LTE Band 5	M1		0.42	0.01	0.05	0.01	0.37	0.48	0.80
	M2		0.42	0.01	0.05	0.01	0.37	0.48	0.80
	M3		0.07	0.01	0.05	0.01	0.37	0.13	0.45
	M4		0.41	0.01	0.05	0.01	0.37	0.47	0.79
	M5		0.07	0.01	0.05	0.01	0.37	0.13	0.45
	M6		0.07	0.01	0.05	0.01	0.37	0.13	0.45
LTE Band 7	M1		0.76	0.01	0.05	0.01	0.37	0.82	1.14
	M2		0.74	0.01	0.05	0.01	0.37	0.80	1.12
	M3		0.29	0.01	0.05	0.01	0.37	0.35	0.67
	M4		0.75	0.01	0.05	0.01	0.37	0.81	1.13
	M5		0.27	0.01	0.05	0.01	0.37	0.33	0.65
	M6		0.28	0.01	0.05	0.01	0.37	0.34	0.66
LTE Band 12	M1		0.51	0.01	0.05	0.01	0.37	0.57	0.89
	M2		0.50	0.01	0.05	0.01	0.37	0.56	0.88
	M3		0.03	0.01	0.05	0.01	0.37	0.09	0.41
	M4		0.51	0.01	0.05	0.01	0.37	0.57	0.89
	M5		0.03	0.01	0.05	0.01	0.37	0.09	0.41
	M6		0.03	0.01	0.05	0.01	0.37	0.09	0.41

WWAN Band	Antenna	Exposure Position	1 WWAN 1g SAR (W/kg)	2 2.4GHz Wi-Fi W1 1g SAR (W/kg)	3 2.4GHz Wi-Fi W2 1g SAR (W/kg)	4 5GHz Wi-Fi W1 1g SAR (W/kg)	5 5GHz Wi-Fi W2 1g SAR (W/kg)	**1+2+3 Summed 1g SAR (W/kg)**	**1+4+5 Summed 1g SAR (W/kg)**
LTE Band 13	M1	Back	0.12	0.01	0.05	0.01	0.37	0.18	0.50
	M2		0.11	0.01	0.05	0.01	0.37	0.17	0.49
	M3		0.05	0.01	0.05	0.01	0.37	0.11	0.43
	M4		0.11	0.01	0.05	0.01	0.37	0.17	0.49
	M5		0.05	0.01	0.05	0.01	0.37	0.11	0.43
	M6		0.05	0.01	0.05	0.01	0.37	0.11	0.43
LTE Band 14	M1		0.19	0.01	0.05	0.01	0.37	0.25	0.57
	M2		0.19	0.01	0.05	0.01	0.37	0.25	0.57
	M3		0.07	0.01	0.05	0.01	0.37	0.13	0.45
	M4		0.18	0.01	0.05	0.01	0.37	0.24	0.56
	M5		0.07	0.01	0.05	0.01	0.37	0.13	0.45
	M6		0.06	0.01	0.05	0.01	0.37	0.12	0.44
LTE Band 25	M1		0.62	0.01	0.05	0.01	0.37	0.68	1.00
	M2		0.59	0.01	0.05	0.01	0.37	0.65	0.97
	M3		0.10	0.01	0.05	0.01	0.37	0.16	0.48
	M4		0.58	0.01	0.05	0.01	0.37	0.64	0.96
	M5		0.10	0.01	0.05	0.01	0.37	0.16	0.48
	M6		0.10	0.01	0.05	0.01	0.37	0.16	0.48
LTE Band 26	M1		0.44	0.01	0.05	0.01	0.37	0.50	0.82
	M2		0.43	0.01	0.05	0.01	0.37	0.49	0.81
	M3		0.08	0.01	0.05	0.01	0.37	0.14	0.46
	M4		0.42	0.01	0.05	0.01	0.37	0.48	0.80
	M5		0.07	0.01	0.05	0.01	0.37	0.13	0.45
	M6		0.07	0.01	0.05	0.01	0.37	0.13	0.45
LTE Band 38	M1		0.23	0.01	0.05	0.01	0.37	0.29	0.61
	M2		0.22	0.01	0.05	0.01	0.37	0.28	0.60
	M3		0.12	0.01	0.05	0.01	0.37	0.18	0.50
	M4		0.22	0.01	0.05	0.01	0.37	0.28	0.60
	M5		0.11	0.01	0.05	0.01	0.37	0.17	0.49
	M6		0.11	0.01	0.05	0.01	0.37	0.17	0.49
LTE Band 41	M1		0.25	0.01	0.05	0.01	0.37	0.31	0.63
	M2		0.25	0.01	0.05	0.01	0.37	0.31	0.63
	M3		0.13	0.01	0.05	0.01	0.37	0.19	0.51
	M4		0.24	0.01	0.05	0.01	0.37	0.30	0.62
	M5		0.12	0.01	0.05	0.01	0.37	0.18	0.50
	M6		0.12	0.01	0.05	0.01	0.37	0.18	0.50
LTE Band 48	M1		0.20	0.01	0.05	0.01	0.37	0.26	0.58
	M2		0.19	0.01	0.05	0.01	0.37	0.25	0.57
	M3		0.04	0.01	0.05	0.01	0.37	0.10	0.42
	M4		0.19	0.01	0.05	0.01	0.37	0.25	0.57
	M5		0.04	0.01	0.05	0.01	0.37	0.10	0.42
	M6		0.04	0.01	0.05	0.01	0.37	0.10	0.42
LTE Band 66	M1		0.81	0.01	0.05	0.01	0.37	0.87	1.19
	M2		0.80	0.01	0.05	0.01	0.37	0.86	1.18
	M3		0.05	0.01	0.05	0.01	0.37	0.11	0.43
	M4		0.79	0.01	0.05	0.01	0.37	0.85	1.17
	M5		0.05	0.01	0.05	0.01	0.37	0.11	0.43
	M6		0.05	0.01	0.05	0.01	0.37	0.11	0.43

WWAN Band	Antenna	Exposure Position	1	2	3	4	5	1+2+3 Summed 1g SAR (W/kg)	1+4+5 Summed 1g SAR (W/kg)
			WWAN 1g SAR (W/kg)	2.4GHz Wi-Fi W1 1g SAR (W/kg)	2.4GHz Wi-Fi W2 1g SAR (W/kg)	5GHz Wi-Fi W1 1g SAR (W/kg)	5GHz Wi-Fi W2 1g SAR (W/kg)		
LTE Band 71	M1	Back	0.45	0.01	0.05	0.01	0.37	0.51	0.83
	M2		0.44	0.01	0.05	0.01	0.37	0.50	0.82
	M3		0.10	0.01	0.05	0.01	0.37	0.16	0.48
	M4		0.44	0.01	0.05	0.01	0.37	0.50	0.82
	M5		0.10	0.01	0.05	0.01	0.37	0.16	0.48
	M6		0.10	0.01	0.05	0.01	0.37	0.16	0.48
FR1 Band n2	M1		0.22	0.01	0.05	0.01	0.37	0.28	0.60
	M2		0.21	0.01	0.05	0.01	0.37	0.27	0.59
	M3		0.01	0.01	0.05	0.01	0.37	0.07	0.39
	M4		0.22	0.01	0.05	0.01	0.37	0.28	0.60
	M5		0.01	0.01	0.05	0.01	0.37	0.07	0.39
	M6		0.01	0.01	0.05	0.01	0.37	0.07	0.39
FR1 Band n5	M1		0.26	0.01	0.05	0.01	0.37	0.32	0.64
	M2		0.25	0.01	0.05	0.01	0.37	0.31	0.63
	M3		0.05	0.01	0.05	0.01	0.37	0.11	0.43
	M4		0.23	0.01	0.05	0.01	0.37	0.29	0.61
	M5		0.04	0.01	0.05	0.01	0.37	0.10	0.42
	M6		0.04	0.01	0.05	0.01	0.37	0.10	0.42
FR1 Band n7	M1		0.45	0.01	0.05	0.01	0.37	0.51	0.83
	M2		0.41	0.01	0.05	0.01	0.37	0.47	0.79
	M3		0.14	0.01	0.05	0.01	0.37	0.20	0.52
	M4		0.43	0.01	0.05	0.01	0.37	0.49	0.81
	M5		0.14	0.01	0.05	0.01	0.37	0.20	0.52
	M6		0.13	0.01	0.05	0.01	0.37	0.19	0.51
FR1 Band n12	M1		0.33	0.01	0.05	0.01	0.37	0.39	0.71
	M2		0.31	0.01	0.05	0.01	0.37	0.37	0.69
	M3		0.08	0.01	0.05	0.01	0.37	0.14	0.46
	M4		0.31	0.01	0.05	0.01	0.37	0.37	0.69
	M5		0.07	0.01	0.05	0.01	0.37	0.13	0.45
	M6		0.07	0.01	0.05	0.01	0.37	0.13	0.45
FR1 Band n25	M1		0.43	0.01	0.05	0.01	0.37	0.49	0.81
	M2		0.39	0.01	0.05	0.01	0.37	0.45	0.77
	M3		0.04	0.01	0.05	0.01	0.37	0.10	0.42
	M4		0.42	0.01	0.05	0.01	0.37	0.48	0.80
	M5		0.04	0.01	0.05	0.01	0.37	0.10	0.42
	M6		0.04	0.01	0.05	0.01	0.37	0.10	0.42
FR1 Band n38	M1		0.48	0.01	0.05	0.01	0.37	0.54	0.86
	M2		0.45	0.01	0.05	0.01	0.37	0.51	0.83
	M3		0.09	0.01	0.05	0.01	0.37	0.15	0.47
	M4		0.44	0.01	0.05	0.01	0.37	0.50	0.82
	M5		0.09	0.01	0.05	0.01	0.37	0.15	0.47
	M6		0.09	0.01	0.05	0.01	0.37	0.15	0.47
FR1 Band n48	M1		0.11	0.01	0.05	0.01	0.37	0.17	0.49
	M2		0.10	0.01	0.05	0.01	0.37	0.16	0.48
	M3		0.02	0.01	0.05	0.01	0.37	0.08	0.40
	M4		0.11	0.01	0.05	0.01	0.37	0.17	0.49
	M5		0.01	0.01	0.05	0.01	0.37	0.07	0.39
	M6		0.01	0.01	0.05	0.01	0.37	0.07	0.39

WWAN Band	Antenna	Exposure Position	1 WWAN 1g SAR (W/kg)	2 2.4GHz Wi-Fi W1 1g SAR (W/kg)	3 2.4GHz Wi-Fi W2 1g SAR (W/kg)	4 5GHz Wi-Fi W1 1g SAR (W/kg)	5 5GHz Wi-Fi W2 1g SAR (W/kg)	**1+2+3 Summed 1g SAR (W/kg)**	**1+4+5 Summed 1g SAR (W/kg)**
FR1 Band n66	M1	Back	0.35	0.01	0.05	0.01	0.37	0.41	0.73
	M2		0.31	0.01	0.05	0.01	0.37	0.37	0.69
	M3		0.02	0.01	0.05	0.01	0.37	0.08	0.40
	M4		0.33	0.01	0.05	0.01	0.37	0.39	0.71
	M5		0.02	0.01	0.05	0.01	0.37	0.08	0.40
	M6		0.02	0.01	0.05	0.01	0.37	0.08	0.40
FR1 Band n71	M1		0.29	0.01	0.05	0.01	0.37	0.35	0.67
	M2		0.24	0.01	0.05	0.01	0.37	0.30	0.62
	M3		0.05	0.01	0.05	0.01	0.37	0.11	0.43
	M4		0.26	0.01	0.05	0.01	0.37	0.32	0.64
	M5		0.04	0.01	0.05	0.01	0.37	0.10	0.42
	M6		0.04	0.01	0.05	0.01	0.37	0.10	0.42
FR1 Band n77	M1		0.15	0.01	0.05	0.01	0.37	0.21	0.53
	M2		0.13	0.01	0.05	0.01	0.37	0.19	0.51
	M3		0.03	0.01	0.05	0.01	0.37	0.09	0.41
	M4		0.14	0.01	0.05	0.01	0.37	0.20	0.52
	M5		0.05	0.01	0.05	0.01	0.37	0.11	0.43
	M6		0.05	0.01	0.05	0.01	0.37	0.11	0.43

The worst case summation is WCDMA Band 4 with 5 GHz WiFi (MIMO). The value is 1.68 W/kg which is above the limit. Therefore, the separation ratio must be performed.

The separation ratio is calculated below.

Distance between M1-W1 185 mm
Distance between M1-W2 52 mm

Simultaneous Separation Ratio Calculation is based on each antenna pair. The formula is listed below.

$(SAR_1 + SAR_2)^{1.5}/R_i \leq 0.04$ rounded to two digits

M1 Maximum power is 1.30 W/kg
W1 Maximum power for WiFi is 0.01 W/kg
W2 Maximum power for WiFi is 0.37 W/kg

M1-W1 $(1.30+0.01)^{1.5}/185 = 0.01$
M1-W2 $(1.30+0.37)^{1.5}/52 = 0.04$

LTE UL CA	Antenna	Exposure Position	1	2	3	4	5	6	1+2+3+4 Summed 1g SAR (W/kg)	1+2+5+6 Summed 1g SAR (W/kg)
			1^{ST} UL	2^{nd} UL	2.4GHz Wi-Fi W1	2.4GHz Wi-Fi W2	5GHz Wi-Fi W1	5GHz Wi-Fi W2		
			1g SAR (W/kg)	1g SAR (W/kg)	1g SAR (W/kg)	1g SAR (W/kg)	1g SAR (W/kg)	1g SAR (W/kg)		
12A-4A	M1	Back	0.51	0.84	0.01	0.05	0.01	0.37	1.41	1.73
	M2		0.50	0.83	0.01	0.05	0.01	0.37	1.39	1.71
	M3		0.03	0.05	0.01	0.05	0.01	0.37	0.14	0.46
	M4		0.51	0.83	0.01	0.05	0.01	0.37	1.40	1.72
	M5		0.03	0.04	0.01	0.05	0.01	0.37	0.13	0.45
	M6		0.03	0.07	0.01	0.05	0.01	0.37	0.16	0.48
12A-2A	M1		0.51	0.51	0.01	0.05	0.01	0.37	1.08	1.40
	M2		0.50	0.51	0.01	0.05	0.01	0.37	1.07	1.39
	M3		0.03	0.09	0.01	0.05	0.01	0.37	0.18	0.50
	M4		0.51	0.51	0.01	0.05	0.01	0.37	1.08	1.40
	M5		0.03	0.09	0.01	0.05	0.01	0.37	0.18	0.50
	M6		0.03	0.09	0.01	0.05	0.01	0.37	0.18	0.50
13A-2A	M1		0.12	0.51	0.01	0.05	0.01	0.37	0.69	1.01
	M2		0.11	0.51	0.01	0.05	0.01	0.37	0.68	1.00
	M3		0.05	0.09	0.01	0.05	0.01	0.37	0.20	0.52
	M4		0.11	0.51	0.01	0.05	0.01	0.37	0.68	1.00
	M5		0.05	0.09	0.01	0.05	0.01	0.37	0.20	0.52
	M6		0.05	0.09	0.01	0.05	0.01	0.37	0.20	0.52
13A-4A	M1		0.12	0.84	0.01	0.05	0.01	0.37	1.02	1.34
	M2		0.11	0.83	0.01	0.05	0.01	0.37	1.00	1.32
	M3		0.05	0.05	0.01	0.05	0.01	0.37	0.16	0.48
	M4		0.11	0.83	0.01	0.05	0.01	0.37	1.00	1.32
	M5		0.05	0.04	0.01	0.05	0.01	0.37	0.15	0.47
	M6		0.05	0.07	0.01	0.05	0.01	0.37	0.18	0.50
5A-2A	M1		0.42	0.51	0.01	0.05	0.01	0.37	0.99	1.31
	M2		0.42	0.51	0.01	0.05	0.01	0.37	0.99	1.31
	M3		0.07	0.09	0.01	0.05	0.01	0.37	0.22	0.54
	M4		0.41	0.51	0.01	0.05	0.01	0.37	0.98	1.30
	M5		0.07	0.09	0.01	0.05	0.01	0.37	0.22	0.54
	M6		0.07	0.09	0.01	0.05	0.01	0.37	0.22	0.54
5A-4A	M1		0.42	0.84	0.01	0.05	0.01	0.37	1.32	1.64
	M2		0.42	0.83	0.01	0.05	0.01	0.37	1.31	1.63
	M3		0.07	0.05	0.01	0.05	0.01	0.37	0.18	0.50
	M4		0.41	0.83	0.01	0.05	0.01	0.37	1.30	1.62
	M5		0.07	0.04	0.01	0.05	0.01	0.37	0.17	0.49
	M6		0.07	0.07	0.01	0.05	0.01	0.37	0.20	0.52
66A-2A	M1		0.81	0.51	0.01	0.05	0.01	0.37	1.38	1.70
	M2		0.80	0.51	0.01	0.05	0.01	0.37	1.37	1.69
	M3		0.05	0.09	0.01	0.05	0.01	0.37	0.20	0.52
	M4		0.79	0.51	0.01	0.05	0.01	0.37	1.36	1.68
	M5		0.05	0.09	0.01	0.05	0.01	0.37	0.20	0.52
	M6		0.05	0.09	0.01	0.05	0.01	0.37	0.20	0.52
66A-5A	M1		0.81	0.42	0.01	0.05	0.01	0.37	1.29	1.61
	M2		0.80	0.42	0.01	0.05	0.01	0.37	1.28	1.60
	M3		0.05	0.07	0.01	0.05	0.01	0.37	0.18	0.50
	M4		0.79	0.41	0.01	0.05	0.01	0.37	1.26	1.58
	M5		0.05	0.07	0.01	0.05	0.01	0.37	0.18	0.50
	M6		0.05	0.07	0.01	0.05	0.01	0.37	0.18	0.50
7A-5A	M1		0.76	0.42	0.01	0.05	0.01	0.37	1.24	1.56
	M2		0.74	0.42	0.01	0.05	0.01	0.37	1.22	1.54
	M3		0.29	0.07	0.01	0.05	0.01	0.37	0.42	0.74
	M4		0.75	0.41	0.01	0.05	0.01	0.37	1.22	1.54
	M5		0.27	0.07	0.01	0.05	0.01	0.37	0.40	0.72
	M6		0.28	0.07	0.01	0.05	0.01	0.37	0.41	0.73

LTE UL CA	Antenna	Exposure Position	1 1ST UL 1g SAR (W/kg)	2 2nd UL 1g SAR (W/kg)	3 2.4GHz Wi-Fi W1 1g SAR (W/kg)	4 2.4GHz Wi-Fi W2 1g SAR (W/kg)	5 5GHz Wi-Fi W1 1g SAR (W/kg)	6 5GHz Wi-Fi W2 1g SAR (W/kg)	**1+2+3+4 Summed 1g SAR (W/kg)**	**1+2+5+6 Summed 1g SAR (W/kg)**
12A-n66A	M1	Back	0.51	0.35	0.01	0.05	0.01	0.37	0.92	1.24
	M2		0.50	0.31	0.01	0.05	0.01	0.37	0.87	1.19
	M3		0.03	0.02	0.01	0.05	0.01	0.37	0.11	0.43
	M4		0.51	0.33	0.01	0.05	0.01	0.37	0.90	1.22
	M5		0.03	0.02	0.01	0.05	0.01	0.37	0.11	0.43
	M6		0.03	0.02	0.01	0.05	0.01	0.37	0.11	0.43
12A-n2A	M1		0.51	0.22	0.01	0.05	0.01	0.37	0.79	1.11
	M2		0.50	0.21	0.01	0.05	0.01	0.37	0.77	1.09
	M3		0.03	0.01	0.01	0.05	0.01	0.37	0.10	0.42
	M4		0.51	0.22	0.01	0.05	0.01	0.37	0.79	1.11
	M5		0.03	0.01	0.01	0.05	0.01	0.37	0.10	0.42
	M6		0.03	0.01	0.01	0.05	0.01	0.37	0.10	0.42
13A-n66A	M1		0.12	0.35	0.01	0.05	0.01	0.37	0.53	0.85
	M2		0.11	0.31	0.01	0.05	0.01	0.37	0.48	0.80
	M3		0.05	0.02	0.01	0.05	0.01	0.37	0.13	0.45
	M4		0.11	0.33	0.01	0.05	0.01	0.37	0.50	0.82
	M5		0.05	0.02	0.01	0.05	0.01	0.37	0.13	0.45
	M6		0.05	0.02	0.01	0.05	0.01	0.37	0.13	0.45
13A-n2A	M1		0.12	0.22	0.01	0.05	0.01	0.37	0.40	0.72
	M2		0.11	0.21	0.01	0.05	0.01	0.37	0.38	0.70
	M3		0.05	0.01	0.01	0.05	0.01	0.37	0.12	0.44
	M4		0.11	0.22	0.01	0.05	0.01	0.37	0.39	0.71
	M5		0.05	0.01	0.01	0.05	0.01	0.37	0.12	0.44
	M6		0.05	0.01	0.01	0.05	0.01	0.37	0.12	0.44
2A-n5A	M1		0.51	0.26	0.01	0.05	0.01	0.37	0.83	1.15
	M2		0.51	0.25	0.01	0.05	0.01	0.37	0.82	1.14
	M3		0.09	0.05	0.01	0.05	0.01	0.37	0.20	0.52
	M4		0.51	0.23	0.01	0.05	0.01	0.37	0.80	1.12
	M5		0.09	0.04	0.01	0.05	0.01	0.37	0.19	0.51
	M6		0.09	0.04	0.01	0.05	0.01	0.37	0.19	0.51
2A-n71A	M1		0.51	0.29	0.01	0.05	0.01	0.37	0.86	1.18
	M2		0.51	0.24	0.01	0.05	0.01	0.37	0.81	1.13
	M3		0.09	0.05	0.01	0.05	0.01	0.37	0.20	0.52
	M4		0.51	0.26	0.01	0.05	0.01	0.37	0.83	1.15
	M5		0.09	0.04	0.01	0.05	0.01	0.37	0.19	0.51
	M6		0.09	0.04	0.01	0.05	0.01	0.37	0.19	0.51
5A-n66A	M1		0.42	0.35	0.01	0.05	0.01	0.37	0.83	1.15
	M2		0.42	0.31	0.01	0.05	0.01	0.37	0.79	1.11
	M3		0.07	0.02	0.01	0.05	0.01	0.37	0.15	0.47
	M4		0.41	0.33	0.01	0.05	0.01	0.37	0.80	1.12
	M5		0.07	0.02	0.01	0.05	0.01	0.37	0.15	0.47
	M6		0.07	0.02	0.01	0.05	0.01	0.37	0.15	0.47
5A-n2A	M1		0.42	0.22	0.01	0.05	0.01	0.37	0.70	1.02
	M2		0.42	0.21	0.01	0.05	0.01	0.37	0.69	1.01
	M3		0.07	0.01	0.01	0.05	0.01	0.37	0.14	0.46
	M4		0.41	0.22	0.01	0.05	0.01	0.37	0.69	1.01
	M5		0.07	0.01	0.01	0.05	0.01	0.37	0.14	0.46
	M6		0.07	0.01	0.01	0.05	0.01	0.37	0.14	0.46
66A-n5A	M1		0.81	0.26	0.01	0.05	0.01	0.37	1.13	1.45
	M2		0.80	0.25	0.01	0.05	0.01	0.37	1.11	1.43
	M3		0.05	0.05	0.01	0.05	0.01	0.37	0.16	0.48
	M4		0.79	0.23	0.01	0.05	0.01	0.37	1.08	1.40
	M5		0.05	0.04	0.01	0.05	0.01	0.37	0.15	0.47
	M6		0.05	0.04	0.01	0.05	0.01	0.37	0.15	0.47

LTE UL CA	Antenna	Exposure Position	1	2	3	4	5	6	1+2+3+4 Summed 1g SAR (W/kg)	1+2+5+6 Summed 1g SAR (W/kg)
			1ST UL	2nd UL	2.4GHz Wi-Fi W1	2.4GHz Wi-Fi W2	5GHz Wi-Fi W1	5GHz Wi-Fi W2		
			1g SAR (W/kg)	1g SAR (W/kg)	1g SAR (W/kg)	1g SAR (W/kg)	1g SAR (W/kg)	1g SAR (W/kg)		
66A-n71A	M1	Back	0.81	0.29	0.01	0.05	0.01	0.37	1.16	1.48
	M2		0.80	0.24	0.01	0.05	0.01	0.37	1.10	1.42
	M3		0.05	0.05	0.01	0.05	0.01	0.37	0.16	0.48
	M4		0.79	0.26	0.01	0.05	0.01	0.37	1.11	1.43
	M5		0.05	0.04	0.01	0.05	0.01	0.37	0.15	0.47
	M6		0.05	0.04	0.01	0.05	0.01	0.37	0.15	0.47
7A-n5A	M1		0.76	0.26	0.01	0.05	0.01	0.37	1.08	1.40
	M2		0.74	0.25	0.01	0.05	0.01	0.37	1.05	1.37
	M3		0.29	0.05	0.01	0.05	0.01	0.37	0.40	0.72
	M4		0.75	0.23	0.01	0.05	0.01	0.37	1.04	1.36
	M5		0.27	0.04	0.01	0.05	0.01	0.37	0.37	0.69
	M6		0.28	0.04	0.01	0.05	0.01	0.37	0.38	0.70
7A-n71A	M1		0.76	0.29	0.01	0.05	0.01	0.37	1.11	1.43
	M2		0.74	0.24	0.01	0.05	0.01	0.37	1.04	1.36
	M3		0.29	0.05	0.01	0.05	0.01	0.37	0.40	0.72
	M4		0.75	0.26	0.01	0.05	0.01	0.37	1.07	1.39
	M5		0.27	0.04	0.01	0.05	0.01	0.37	0.37	0.69
	M6		0.28	0.04	0.01	0.05	0.01	0.37	0.38	0.70

The worst case value above the limit for each of the antennas M1, M2, M3 and M4 are 1.73 W/kg, 1.63 W/kg, 1.72 W/kg & 1.68 W/kg, respectively. Therefore the separation ratio is performed below.

The separation ratio is calculated below.

Distance between M1-W1	185 mm
Distance between M1-W2	52 mm
Distance between M2-W1	40 mm
Distance between M2-W2	180 mm
Distance between M4-W1	69 mm
Distance between M4-W2	173 mm

Simultaneous Separation Ratio Calculation is based on each antenna pair. The formula is listed below.

$(SAR_1 + SAR_2)^{1.5}/R_i \leq 0.04$ rounded to two digits

M1 Maximum power is 1.35 W/kg
M2 Maximum power is 1.31 W/kg
M4 Maximum power is 1.34 W/kg
W1 Maximum power for WiFi is 0.01 W/kg
W1 Maximum power for WiFi is 0.37 W/kg

M1-W1 $(1.35+0.01)^{1.5}/185 = 0.01$
M1-W2 $(1.35+0.37)^{1.5}/52 = 0.04$
M2-W1 $(1.31+0.01)^{1.5}/40 = 0.04$
M2-W2 $(1.31+0.37)^{1.5}/180 = 0.01$
M4-W1 $(1.34+0.01)^{1.5}/69 = 0.02$
M4-W2 $(1.34+0.37)^{1.5}/173 = 0.01$

12. Test Equipment List

Table 12.1 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	02/14/2024	02/14/2023	1217
SPEAG E-Field Probe EX3DV4	01/17/2024	01/17/2023	7530
Speag Validation Dipole D750V2	06/04/2024	06/04/2021	1053
Speag Validation Dipole D900V2	06/04/2024	06/04/2021	1d128
Speag Validation Dipole D1750V2	06/03/2024	06/03/2021	1061
Speag Validation Dipole D1900V2	06/04/2024	06/04/2021	5d147
Speag Validation Dipole D2550V2	06/03/2024	06/03/2021	1003
Speag Validation Dipole D3500V2	04/13/2024	04/13/2021	1061
Speag Validation Dipole D3700V2	04/13/2024	04/13/2021	1024
Speag Validation Dipole D2450V2	06/03/2024	06/03/2021	881
Speag Validation Dipole D5GHzV2	06/08/2024	06/08/2021	1119
Agilent N1911A Power Meter	03/14/2024	03/14/2023	GB45100254
Agilent N1922A Power Sensor	03/13/2024	03/13/2023	MY45240464
Agilent (HP) 8596E Spectrum Analyzer	03/13/2024	03/13/2023	3826A01468
Agilent (HP) 83752A Synthesized Sweeper	03/14/2024	03/14/2023	3610A01048
Agilent (HP) 8753C Vector Network Analyzer	03/14/2024	03/14/2023	3135A01724
Agilent (HP) 85047A S-Parameter Test Set	03/14/2024	03/14/2023	2904A00595
Copper Mountain R140 Vector Reflectometer	03/13/2024	03/13/2023	21390004
Anritsu MT8820C	N/A	N/A	6201381721
Aprel Dielectric Probe Assembly	N/A	N/A	0011
Head Equivalent Matter (750 MHz)	N/A	N/A	N/A
Head Equivalent Matter (900 MHz)	N/A	N/A	N/A
Head Equivalent Matter (1750 MHz)	N/A	N/A	N/A
Head Equivalent Matter (1900 MHz)	N/A	N/A	N/A
Head Equivalent Matter (2450 MHz)	N/A	N/A	N/A
Head Equivalent Matter (2550 MHz)	N/A	N/A	N/A
Head Equivalent Matter (3-6 GHz)	N/A	N/A	N/A

13. 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.

14. References

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

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

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

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

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

[6] Industry Canada, RSS – 102 Issue 5, Radio Frequency Exposure Compliance of Radiocommunication Apparatus (All Frequency Bands), March 2015.

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

Appendix A – System Validation Plots and Data

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Test Result for UIM Dielectric Parameter
Tue 13/Jun/2023
Freq Frequency(GHz)
FCC_eH Limits for Head Epsilon
FCC_sH Limits for Head Sigma
Test_e Epsilon of UIM
Test_s Sigma of UIM
****

Freq	FCC_eH	FCC_sH	Test_e	Test_s
0.6500	42.46	0.88	42.01	0.85
0.6600	42.41	0.88	41.96	0.85
0.6700	42.36	0.89	41.92	0.86
0.6730	42.345	0.89	41.905	0.86*
0.6800	42.31	0.89	41.87	0.86
0.6805	42.307	0.89	41.867	0.86*
0.6880	42.262	0.89	41.822	0.86*
0.6900	42.25	0.89	41.81	0.86
0.7000	42.20	0.89	41.76	0.86
0.7040	42.18	0.89	41.732	0.864*
0.7075	42.163	0.89	41.708	0.868*
0.7100	42.15	0.89	41.69	0.87
0.7110	42.145	0.89	41.685	0.871*
0.7200	42.10	0.89	41.64	0.88
0.7300	42.05	0.89	41.57	0.89
0.7400	41.99	0.89	41.51	0.89
0.7500	41.94	0.89	41.46	0.90
0.7600	41.89	0.89	41.40	0.91
0.7700	41.84	0.89	41.34	0.92
0.7800	41.79	0.90	41.28	0.92
0.7820	41.778	0.90	41.268	0.922*
0.7900	41.73	0.90	41.22	0.93
0.7930	41.715	0.90	41.208	0.93*
0.8000	41.68	0.90	41.18	0.93

* value interpolated

****
Test Result for UIM Dielectric Parameter
Mon 12/Jun/2023
Freq Frequency(GHz)
eH Limits for Head Epsilon
sH Limits for Head Sigma
Test_e Epsilon of UIM
Test_s Sigma of UIM
****

Freq	eH	sH	Test_e	Test_s
0.8000	41.68	0.90	41.52	0.89
0.8100	41.63	0.90	41.47	0.90
0.8200	41.58	0.90	41.41	0.91
0.8215	41.573	0.90	41.418	0.91*
0.8225	41.568	0.90	41.423	0.91*
0.8264	41.548	0.90	41.442	0.91*
0.8300	41.53	0.90	41.46	0.91
0.8315	41.526	0.902	41.456	0.912*
0.8324	41.523	0.902	41.453	0.912*
0.8366	41.51	0.907	41.44	0.917*
0.8375	41.508	0.908	41.438	0.918*
0.8376	41.507	0.908	41.437	0.918*
0.8400	41.50	0.91	41.43	0.92
0.8415	41.50	0.912	41.427	0.922*
0.8426	41.50	0.913	41.425	0.923*
0.8466	41.50	0.917	41.417	0.927*
0.8500	41.50	0.92	41.41	0.93
0.8600	41.50	0.93	41.39	0.94
0.8700	41.50	0.94	41.37	0.95
0.8800	41.50	0.95	41.36	0.96
0.8850	41.50	0.955	41.355	0.965*
0.8900	41.50	0.96	41.35	0.97
0.8975	41.50	0.968	41.343	0.978*
0.9000	41.50	0.97	41.34	0.98
0.9100	41.50	0.98	41.33	0.99
0.9200	41.49	0.98	41.32	0.99

* value interpolated

****
Test Result for UIM Dielectric Parameter
Fri 16/Jun/2023
Freq Frequency(GHz)
eH Limits for Head Epsilon
sH Limits for Head Sigma
Test_e Epsilon of UIM
Test_s Sigma of UIM
****

Freq	eH	sH	Test_e	Test_s
1.7000	40.16	1.34	39.34	1.36
1.7100	40.14	1.35	39.32	1.37
1.7124	40.138	1.35	39.315	1.372*
1.7200	40.13	1.35	39.30	1.38
1.7300	40.11	1.36	39.28	1.38
1.7326	40.105	1.363	39.275	1.383*
1.7400	40.09	1.37	39.26	1.39
1.7450	40.085	1.37	39.25	1.395*
1.7500	40.08	1.37	39.24	1.40
1.7524	40.075	1.372	39.235	1.402*
1.7526	40.075	1.373	39.235	1.403*
1.7600	40.06	1.38	39.22	1.41
1.7674	40.053	1.38	39.205	1.417*
1.7700	40.05	1.38	39.20	1.42
1.7800	40.03	1.39	39.18	1.42
1.7828	40.027	1.39	39.174	1.423*
1.7900	40.02	1.39	39.16	1.43

* value interpolated

****
Test Result for UIM Dielectric Parameter
Thu 15/Jun/2023
Freq Frequency(GHz)
eH Limits for Head Epsilon
sH Limits for Head Sigma
Test_e Epsilon of UIM
Test_s Sigma of UIM
****

Freq	eH	sH	Test_e	Test_s
1.8500	40.00	1.40	39.97	1.37
1.8524	40.00	1.40	39.65	1.372*
1.8600	40.00	1.40	39.95	1.38
1.8700	40.00	1.40	39.93	1.38
1.8800	40.00	1.40	39.91	1.39
1.8825	40.00	1.40	39.905	1.39*
1.8900	40.00	1.40	39.89	1.39
1.9000	40.00	1.40	39.87	1.39
1.9050	40.00	1.40	39.86	1.395*
1.9076	40.00	1.40	39.855	1.398*
1.9100	40.00	1.40	39.85	1.40
1.9200	40.00	1.40	39.84	1.41

* value interpolated

****
Test Result for UIM Dielectric Parameter
Mon 19/Jun/2023
Freq Frequency(GHz)
FCC_eH Limits for Head Epsilon
FCC_sH Limits for Head Sigma
Test_e Epsilon of UIM
Test_s Sigma of UIM
****

Freq	FCC_eH	FCC_sH	Test_e	Test_s
2.4900	39.15	1.84	39.09	1.86
2.5000	39.14	1.85	39.07	1.87
2.5060	39.128	1.862	39.052	1.876*
2.5100	39.12	1.87	39.04	1.88
2.5200	39.11	1.88	39.02	1.90
2.5300	39.10	1.89	39.00	1.91
2.5350	39.095	1.895	38.985	1.915*
2.5400	39.09	1.90	38.97	1.92
2.5500	39.07	1.91	38.95	1.94
2.5600	39.06	1.92	38.93	1.95
2.5700	39.05	1.93	38.90	1.96
2.5800	39.03	1.94	38.88	1.98
2.5900	39.02	1.95	38.85	1.99
2.5930	39.017	1.953	38.853	1.99*
2.5950	39.015	1.955	38.855	1.99*
2.6000	39.01	1.96	38.86	1.99
2.6100	39.00	1.97	38.84	2.00
2.6200	38.98	1.99	38.83	2.01
2.6300	38.97	2.00	38.81	2.02
2.6400	38.96	2.01	38.79	2.03
2.6500	38.95	2.02	38.77	2.04
2.6600	38.93	2.03	38.76	2.05
2.6700	38.92	2.04	38.74	2.06
2.6800	38.91	2.05	38.72	2.07
2.6900	38.89	2.06	38.70	2.08
2.7000	38.88	2.07	38.69	2.09

* value interpolated

****
Test Result for UIM Dielectric Parameter
Tue 20/Jun/2023
Freq Frequency(GHz)
FCC_eH Limits for Head Epsilon
FCC_sH Limits for Head Sigma
Test_e Epsilon of UIM
Test_s Sigma of UIM
****

Freq	FCC_eH	FCC_sH	Test_e	Test_s
3.4800	37.95	2.89	37.05	2.94
3.4900	37.94	2.90	37.03	2.95
3.5000	37.93	2.91	37.00	2.96
3.5100	37.92	2.92	36.98	2.97
3.5200	37.91	2.93	36.96	2.98
3.5300	37.89	2.94	36.93	2.99
3.5400	37.88	2.95	36.90	3.84
3.5500	37.87	2.96	36.87	3.86
3.5600	37.86	2.97	36.85	3.88
3.5700	37.85	2.98	36.83	3.91
3.5800	37.84	2.99	36.81	3.93
3.5900	37.83	3.00	36.78	3.95
3.6000	37.81	3.02	36.76	3.97
3.6100	37.80	3.03	36.74	3.00
3.6200	37.79	3.04	36.73	3.01
3.6250	37.785	3.045	36.715	3.015*
3.6300	37.78	3.05	36.70	3.02
3.6400	37.77	3.06	36.67	3.03
3.6500	37.76	3.07	36.64	3.04
3.6600	37.75	3.08	36.62	3.05
3.6700	37.73	3.09	36.60	3.06
3.6800	37.72	3.10	36.58	3.07
3.6900	37.71	3.11	36.55	3.08
3.7000	37.70	3.12	36.53	3.09
3.7100	37.69	3.13	36.50	3.10
3.7200	37.68	3.14	36.48	3.11

* value interpolated

****
Test Result for UIM Dielectric Parameter
Thu 22/Jun/2023
Freq Frequency(GHz)
FCC_eH Limits for Head Epsilon
FCC_sH Limits for Head Sigma
Test_e Epsilon of UIM
Test_s Sigma of UIM
****

Freq	FCC_eH	FCC_sH	Test_e	Test_s
2.4100	39.26	1.76	38.44	1.76
2.4120	39.258	1.762	38.436	1.762*
2.4200	39.25	1.77	38.42	1.77
2.4300	39.24	1.78	38.40	1.78
2.4370	39.226	1.787	38.393	1.794*
2.4400	39.22	1.79	38.39	1.80
2.4420	39.216	1.792	38.38	1.802*
2.4500	39.20	1.80	38.34	1.81
2.4600	39.19	1.81	38.34	1.82
2.4620	39.186	1.812	38.336	1.822*
2.4700	39.17	1.82	38.32	1.83
2.4720	39.168	1.822	38.316	1.836*
2.4800	39.16	1.83	38.30	1.86

* value interpolated

****
Test Result for UIM Dielectric Parameter
Wed 21/Jun/2023
Freq Frequency(GHz)
FCC_eH Limits for Head Epsilon
FCC_sH Limits for Head Sigma
Test_e Epsilon of UIM
Test_s Sigma of UIM
****

Freq	FCC_eH	FCC_sH	Test_e	Test_s
5.1000	36.10	4.55	34.94	4.56
5.1200	36.08	4.57	34.92	4.58
5.1400	36.05	4.59	34.89	4.60
5.1600	36.03	4.61	34.87	4.63
5.1800	36.01	4.63	34.85	4.65
5.2000	35.99	4.65	34.82	4.67
5.2200	35.96	4.68	34.80	4.69
5.2400	35.94	4.70	34.78	4.71
5.2500	35.93	4.71	34.765	4.725*
5.2600	35.92	4.72	34.75	4.74
5.2800	35.89	4.74	34.72	4.76
5.3000	35.87	4.76	34.69	4.78
5.3200	35.85	4.78	34.67	4.80
5.3400	35.83	4.80	34.65	4.83
5.3600	35.80	4.82	34.63	4.85
5.3800	35.78	4.84	34.60	4.87
5.4000	35.76	4.86	34.58	4.89
5.4200	35.73	4.88	34.56	4.92
5.4400	35.71	4.90	34.55	4.94
5.4600	35.69	4.92	34.52	4.96
5.4800	35.67	4.94	34.49	4.98
5.5000	35.64	4.96	34.46	5.00
5.5200	35.62	4.98	34.44	5.02
5.5400	35.60	5.00	34.42	5.04
5.5600	35.57	5.02	34.40	5.07
5.5800	35.55	5.04	34.37	5.09
5.6000	35.53	5.07	34.35	5.11
5.6200	35.51	5.09	34.32	5.13
5.6400	35.48	5.11	34.30	5.16
5.6600	35.46	5.13	34.28	5.18
5.6800	35.44	5.15	34.26	5.20
5.7000	35.41	5.17	34.23	5.22
5.7200	35.39	5.19	34.21	5.25
5.7400	35.37	5.21	34.19	5.27
5.7450	35.365	5.215	34.185	5.275*
5.7500	35.36	5.22	34.18	5.28*
5.7600	35.35	5.23	34.17	5.29
5.7800	35.32	5.25	34.15	5.31
5.7850	35.315	5.255	34.14	5.315*
5.8000	35.30	5.27	34.11	5.33
5.8200	35.28	5.29	34.09	5.36
5.8250	35.273	5.295	34.085	5.365*
5.8400	35.25	5.31	34.07	5.38
5.8600	35.23	5.33	34.05	5.40

* value interpolated

RF Exposure Lab

Plot 1

DUT: Dipole 750 MHz D750V3; Type: D750V3; Serial: D750V3 - SN 1053

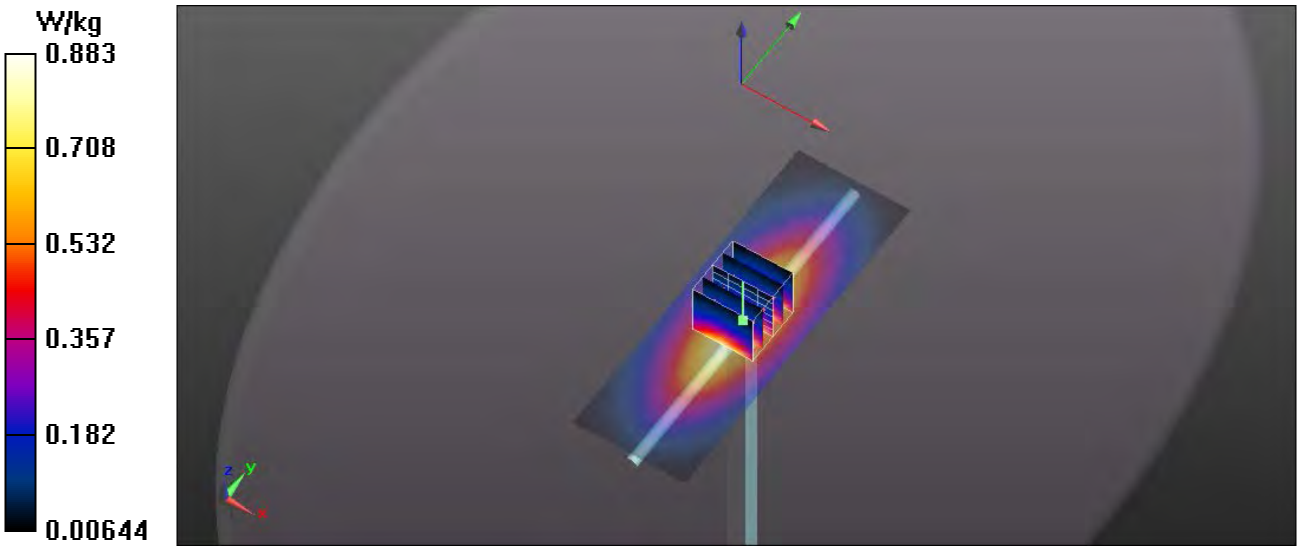
Communication System: CW; Frequency: 750 MHz; Duty Cycle: 1:1
Medium: HSL750; Medium parameters used (interpolated): f = 750 MHz; σ = 0.9 S/m; ε_r = 41.46; ρ = 1000 kg/m^3
Phantom section: Flat Section

Test Date: Date: 6/13/2023; Ambient Temp: 23 °C; Tissue Temp: 21 °C
Probe: EX3DV4 – SN7530; ConvF(9.62, 9.26, 10.37); Calibrated: 1/17/2023;
Sensor-Surface: 2mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1217; Calibrated: 2/14/2023
Phantom: ELI v5.0; Type: QDOVA002AA; Serial: 2037
Measurement SW: DASY52, Version 52.10 (0); SEMCAD X Version 14.6.10 (7417)

Procedure Notes:

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

750 MHz Head/Verification /Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 31.949 V/m; Power Drift = -0.03 dB
Peak SAR (extrapolated) = 1.691 mW/g
P_{in}= 100 mW
SAR(1 g) = 0.858 mW/g; SAR(10 g) = 0.552 mW/g
Maximum value of SAR (measured) = 0.888 W/kg



RF Exposure Lab

Plot 2

DUT: Dipole 900 MHz D900V2; Type: D900V2; Serial: D900V2 - SN:1d128

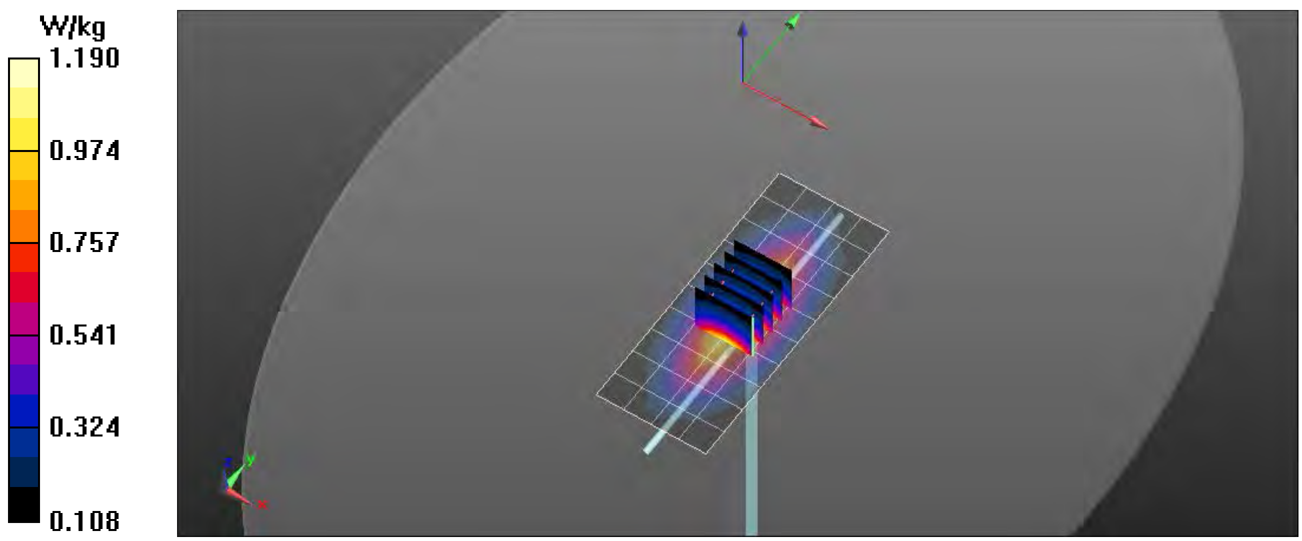
Communication System: CW; Frequency: 900 MHz; Duty Cycle: 1:1
Medium: HSL900; Medium parameters used: f = 900 MHz; σ = 0.98 S/m; ε_r = 41.34; ρ = 1000 kg/m^3
Phantom section: Flat Section

Test Date: Date: 6/12/2023; Ambient Temp: 23 °C; Tissue Temp: 21 °C
Probe: EX3DV4 – SN7530; ConvF(9.5, 9.25, 9.3); Calibrated: 1/17/2023;
Sensor-Surface: 2mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1217; Calibrated: 2/14/2023
Phantom: ELI v5.0; Type: QDOVA002AA; Serial: 2037
Measurement SW: DASY52, Version 52.10 (0); SEMCAD X Version 14.6.10 (7417)

Procedure Notes:

900 MHz Head/Verification/Area Scan (5x11x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (measured) = 1.19 W/kg

900 MHz Head/Verification/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 31.568 V/m; Power Drift = -0.02 dB
Peak SAR (extrapolated) = 1.43 W/kg
P_{in}= 100 mW
SAR(1 g) = 1.15 W/kg; SAR(10 g) = 0.712 W/kg
Maximum value of SAR (measured) = 1.2 W/kg



RF Exposure Lab

Plot 3

DUT: Dipole 1750 MHz D1750V2; Type: D1750V2; Serial: D1750V2 - SN:1061

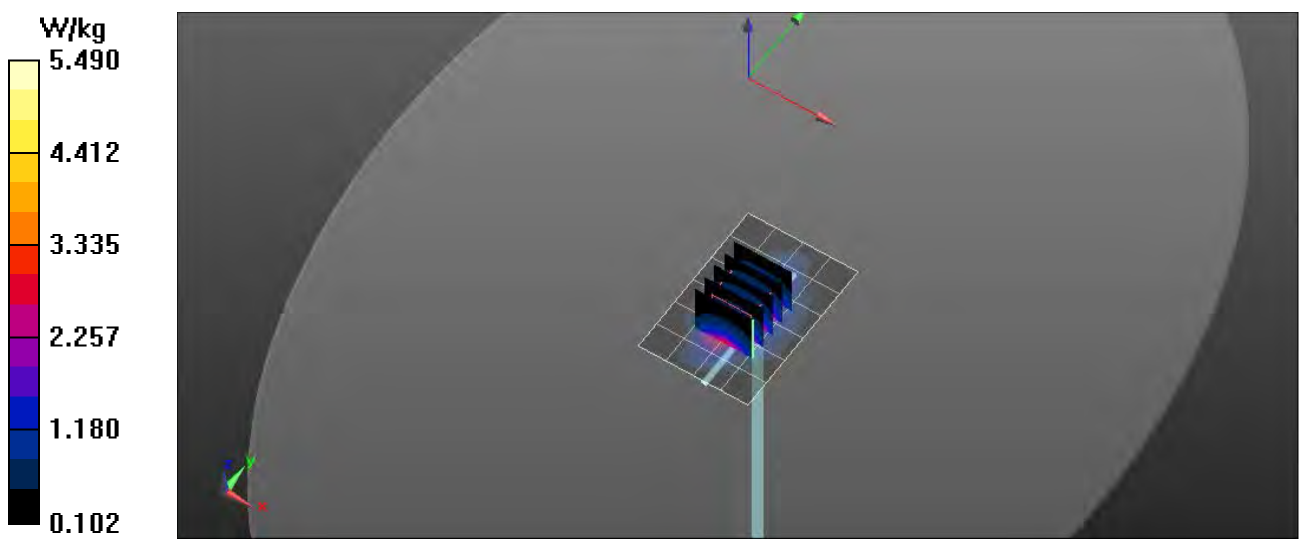
Communication System: CW; Frequency: 1750 MHz; Duty Cycle: 1:1
Medium: HSL1750; Medium parameters used: f = 1750 MHz; σ = 1.4 S/m; ε_r = 39.24; ρ = 1000 kg/m^3
Phantom section: Flat Section

Test Date: Date: 6/16/2023; Ambient Temp: 23 °C; Tissue Temp: 21 °C
Probe: EX3DV4 – SN7530; ConvF(8.28, 8.22, 8.47); Calibrated: 1/17/2023;
Sensor-Surface: 2mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1217; Calibrated: 2/14/2023
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 Head/Verification/Area Scan (5x7x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (measured) = 5.38 W/kg

1750 MHz Head/Verification/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 33.639 V/m; Power Drift = -0.02 dB
Peak SAR (extrapolated) = 6.87 W/kg
P_{in}= 100 mW
SAR(1 g) = 3.78 W/kg; SAR(10 g) = 1.97 W/kg
Maximum value of SAR (measured) = 5.47 W/kg



RF Exposure Lab

Plot 4

DUT: Dipole 1900 MHz D1900V2; Type: D1900V2; Serial: D1900V2 - SN: 5d147

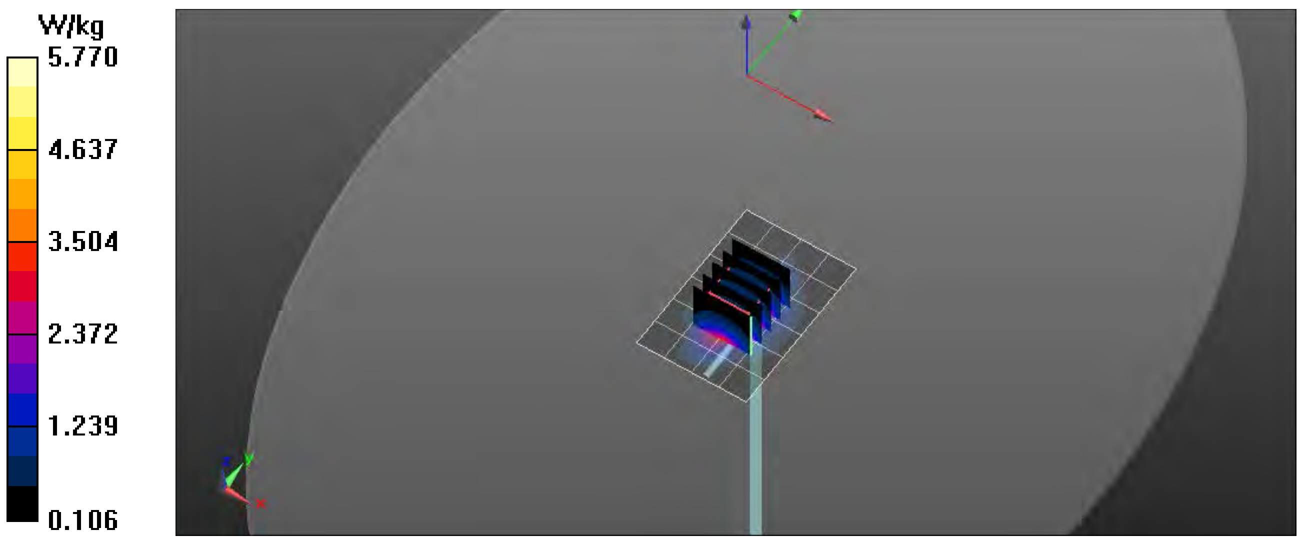
Communication System: CW; Frequency: 1900 MHz; Duty Cycle: 1:1
Medium: HSL1900; Medium parameters used: f = 1900 MHz; σ = 1.39 S/m; ε_r = 39.87; ρ = 1000 kg/m^3
Phantom section: Flat Section

Test Date: Date: 6/15/2023; Ambient Temp: 23 °C; Tissue Temp: 21 °C
Probe: EX3DV4 – SN7530; ConvF(8.14, 8.08, 8.31); Calibrated: 1/17/2023;
Sensor-Surface: 2mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1217; Calibrated: 2/14/2023
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 Head/Verification/Area Scan (5x7x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (measured) = 5.52 W/kg

1900 MHz Head/Verification/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 32.186 V/m; Power Drift = -0.03 dB
Peak SAR (extrapolated) = 7.25 W/kg
P_{in}= 100 mW
SAR(1 g) = 4.15 W/kg; SAR(10 g) = 2.16 W/kg
Maximum value of SAR (measured) = 5.79 W/kg



RF Exposure Lab

Plot 5

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

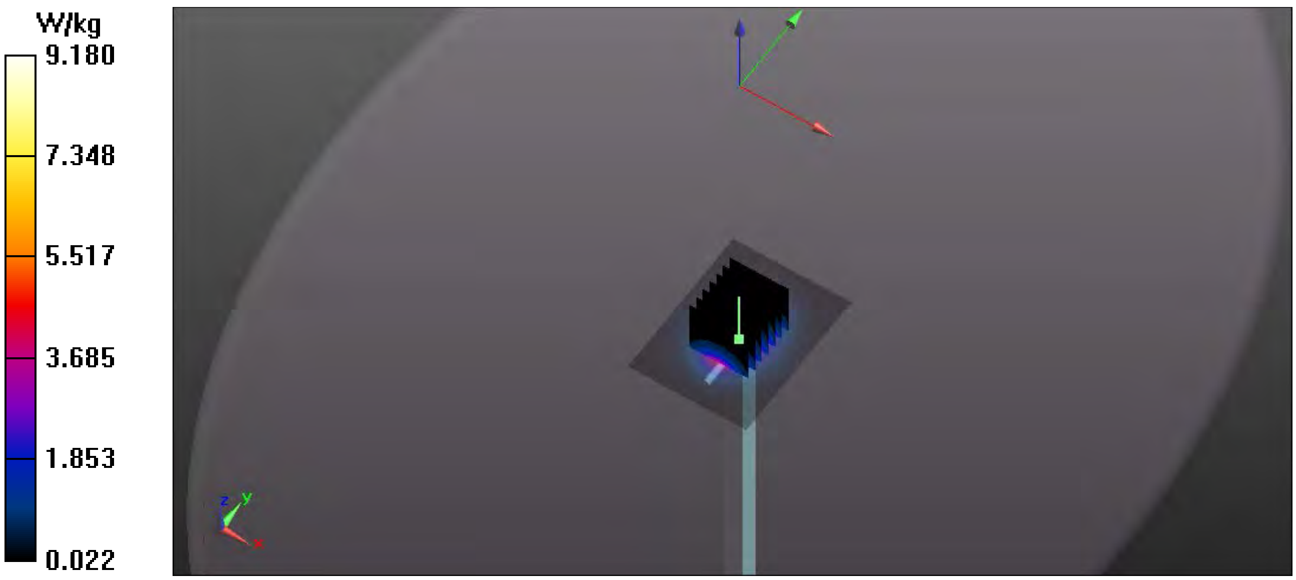
Communication System: CW; Frequency: 2550 MHz; Duty Cycle: 1:1
Medium: HSL2550; Medium parameters used: f = 2550 MHz; σ = 1.94 S/m; ε_r = 38.95; ρ = 1000 kg/m^3
Phantom section: Flat Section

Test Date: Date: 6/19/2023; Ambient Temp: 23 °C; Tissue Temp: 21 °C
Probe: EX3DV4 – SN7530; ConvF(7.54, 7.33, 7.61); Calibrated: 1/17/2023;
Sensor-Surface: 2mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1217; Calibrated: 2/14/2023
Phantom: ELI v5.0; Type: QDOVA002AA; Serial: 2037
Measurement SW: DASY52, Version 52.10 (0); SEMCAD X Version 14.6.10 (7417)

Procedure Notes:

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

2550 MHz Head/Verification/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 54.541 V/m; Power Drift = -0.02 dB
Peak SAR (extrapolated) = 11.5 W/kg
P_{in}= 100 mW
SAR(1 g) = 5.64 W/kg; SAR(10 g) = 2.48 W/kg
Maximum value of SAR (measured) = 8.98 W/kg



RF Exposure Lab

Plot 6

DUT: Dipole D3500V2; Type: D3500V2; Serial: D3500V2 - SN: 1061

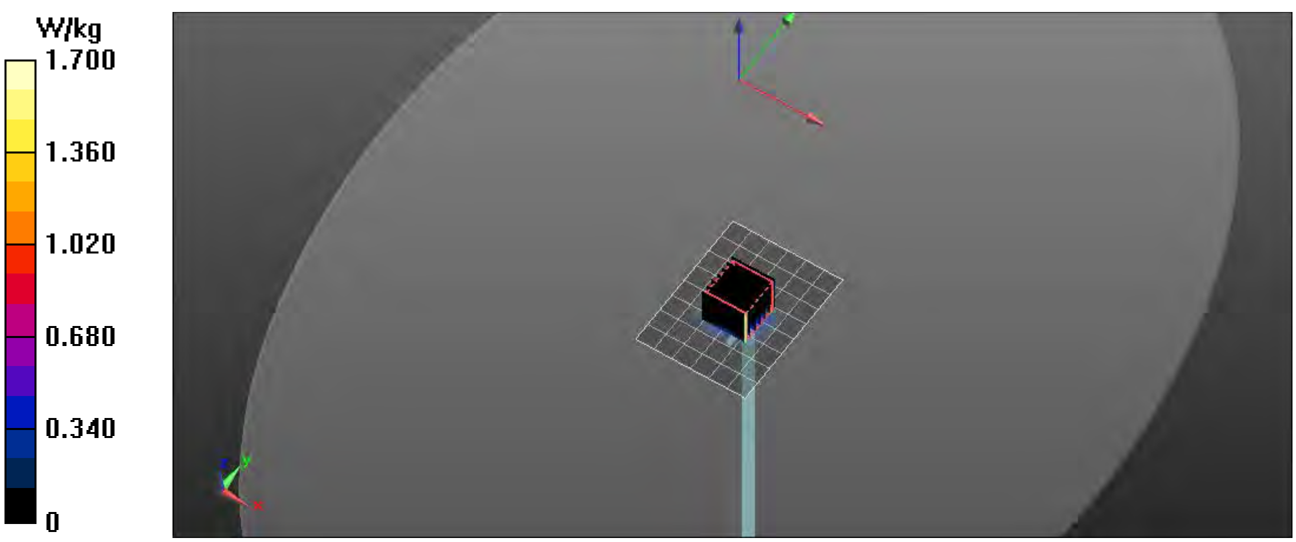
Communication System: CW; Frequency: 3500 MHz; Duty Cycle: 1:1
Medium: HSL 3-6 GHz; Medium parameters used: f = 3500 MHz; σ = 2.96 S/m; ε_r = 37; ρ = 1000 kg/m^3
Phantom section: Flat Section

Test Date: Date: 6/20/2023; Ambient Temp: 23 °C; Tissue Temp: 21 °C
Probe: EX3DV4 – SN7530; ConvF(6.65, 6.65, 6.76); Calibrated: 1/17/2023;
Sensor-Surface: 2mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1217; Calibrated: 2/14/2023
Phantom: ELI v5.0; Type: QDOVA002AA; Serial: 2037
Measurement SW: DASY52, Version 52.10 (0); SEMCAD X Version 14.6.10 (7417)

Procedure Notes:

3500 MHz Head/Verification/Area Scan (7x9x1): Measurement grid: dx=10mm, dy=10mm
Maximum value of SAR (measured) = 1.62 W/kg

3500 MHz Head/Verification/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=4mm
Reference Value = 14.849 V/m; Power Drift = -0.04 dB
Peak SAR (extrapolated) = 3.64 W/kg
P_{in}= 10 mW
SAR(1 g) = 0.678 W/kg; SAR(10 g) = 0.256 W/kg
Maximum value of SAR (measured) = 1.68 W/kg



RF Exposure Lab

Plot 7

DUT: Dipole D3700V2; Type: D3700V2; Serial: D3700V2 - SN:1024

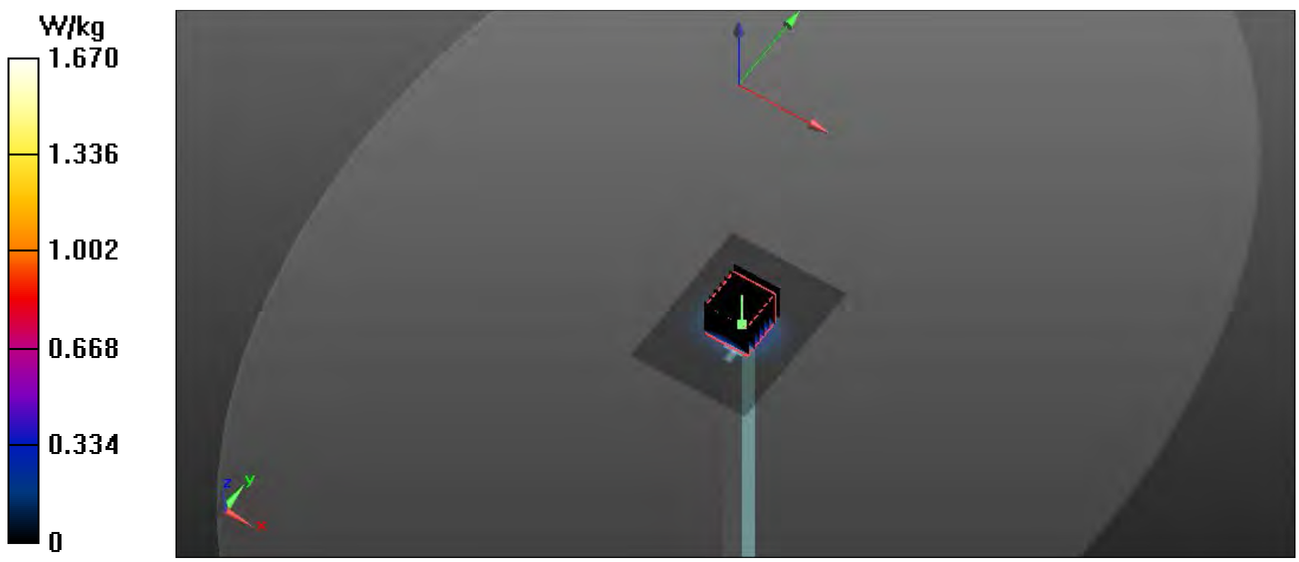
Communication System: CW; Frequency: 3700 MHz; Duty Cycle: 1:1
Medium: HSL 3-6 GHz; Medium parameters used: f = 3700 MHz; σ = 3.09 S/m; ε_r = 36.53; ρ = 1000 kg/m^3
Phantom section: Flat Section

Test Date: Date: 6/20/2023; Ambient Temp: 23 °C; Tissue Temp: 21 °C
Probe: EX3DV4 – SN7530; ConvF(6.51, 6.52, 6.65); Calibrated: 1/17/2023;
Sensor-Surface: 2mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1217; Calibrated: 2/14/2023
Phantom: ELI v5.0; Type: QDOVA002AA; Serial: 2037
Measurement SW: DASY52, Version 52.10 (0); SEMCAD X Version 14.6.10 (7417)

Procedure Notes:

3700 MHz Head/Verification/Area Scan (61x81x1): Interpolated grid: dx=1.000 mm, dy=1.000 mm
Maximum value of SAR (interpolated) = 1.63 W/kg

3700 MHz Head/Verification/Zoom Scan (7x7x12)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=2mm
Reference Value = 15.328 V/m; Power Drift = -0.03 dB
Peak SAR (extrapolated) = 3.35 W/kg
P_{in}= 10 mW
SAR(1 g) = 0.695 W/kg; SAR(10 g) = 0.252 W/kg
Maximum value of SAR (measured) = 1.71 W/kg



RF Exposure Lab

Plot 8

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

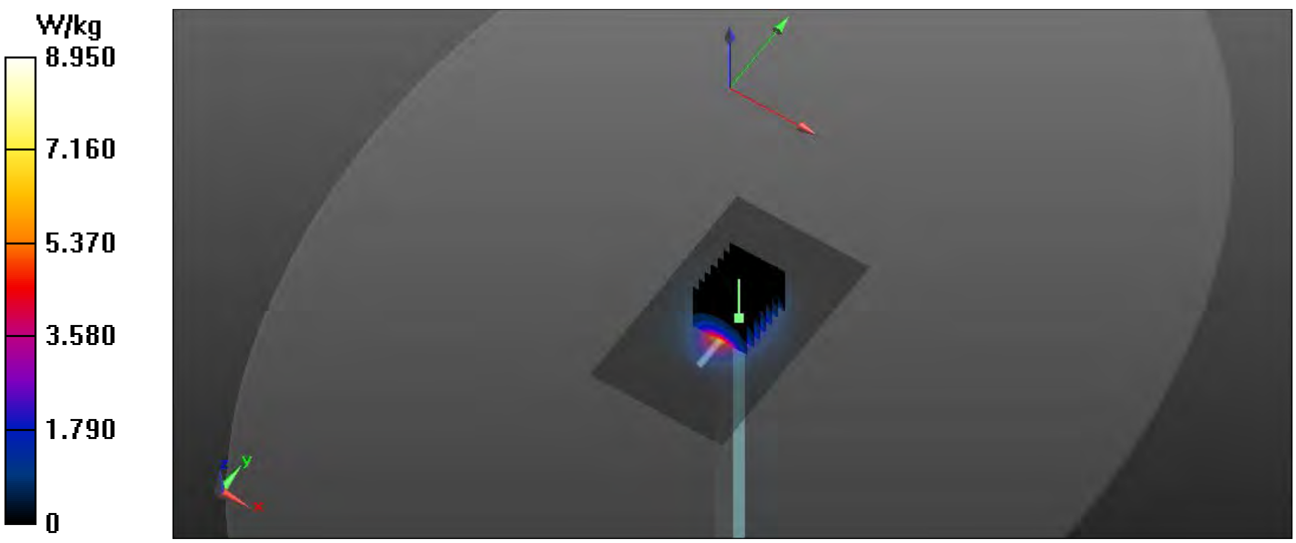
Communication System: CW; Frequency: 2450 MHz; Duty Cycle: 1:1
Medium: HSL2450; Medium parameters used: f = 2450 MHz; σ = 1.81 S/m; ε_r = 38.34; ρ = 1000 kg/m^3
Phantom section: Flat Section

Test Date: Date: 6/22/2023; Ambient Temp: 23 °C; Tissue Temp: 21 °C
Probe: EX3DV4 – SN7530; ConvF(7.18, 7.11, 7.21); Calibrated: 1/17/2023;
Sensor-Surface: 2mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1217; Calibrated: 2/14/2023
Phantom: ELI v5.0; Type: QDOVA002AA; Serial: 2037
Measurement SW: DASY52, Version 52.10 (0); SEMCAD X Version 14.6.10 (7417)

Procedure Notes:

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

2450 MHz Head/Verification/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 56.025 V/m; Power Drift = -0.03 dB
Peak SAR (extrapolated) = 11.05 W/kg
P_{in}= 100 mW
SAR(1 g) = 5.46 W/kg; SAR(10 g) = 2.52 W/kg
Maximum value of SAR (measured) = 8.96 W/kg



RF Exposure Lab

Plot 9

DUT: Dipole D5GHzV2; Type: D5GHzV2; Serial: D5GHzV2 - SN: 1119

Communication System: CW; Frequency: 5250 MHz; Duty Cycle: 1:1
Medium: HSL 3-6 GHz; Medium parameters used (interpolated): f = 5250 MHz; σ = 4.725 S/m; ε_r = 34.765; ρ = 1000 kg/m^3
Phantom section: Flat Section

Test Date: Date: 6/21/2023; Ambient Temp: 23 °C; Tissue Temp: 21 °C
Probe: EX3DV4 – SN7530; ConvF(5.26, 5.2, 5.38); Calibrated: 1/17/2023;
Sensor-Surface: 2mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1217; Calibrated: 2/14/2023
Phantom: ELI v5.0; Type: QDOVA002AA; Serial: 2037
Measurement SW: DASY52, Version 52.10 (0); SEMCAD X Version 14.6.10 (7417)

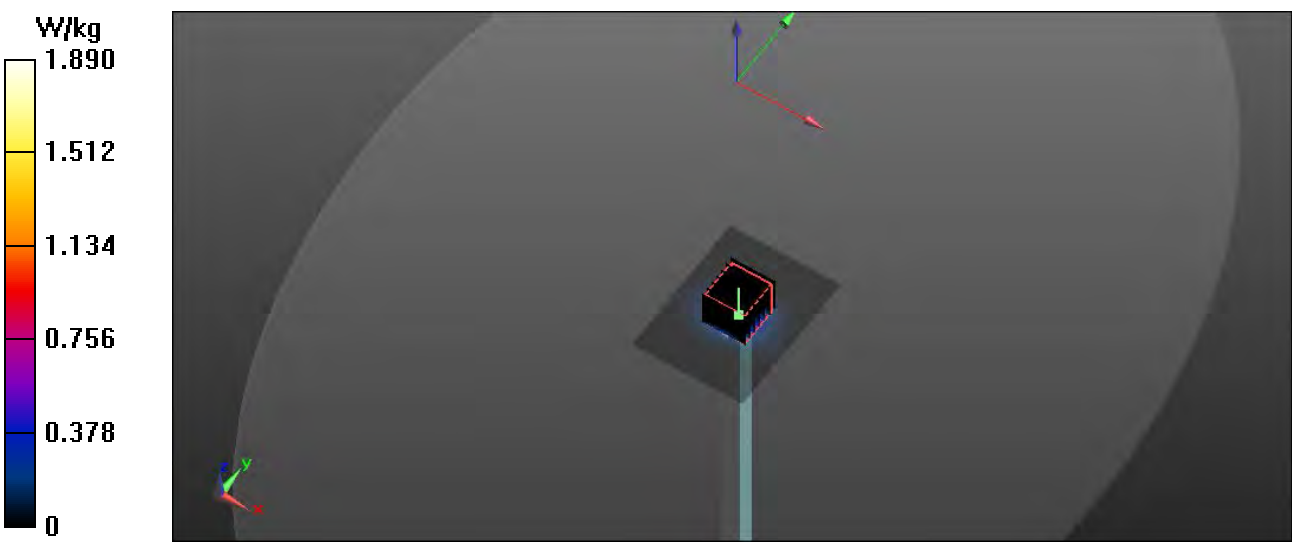
Procedure Notes:

5250 MHz Head/Verification/Area Scan (61x81x1): Interpolated grid: dx=1.000 mm, dy=1.000 mm

Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (interpolated) = 1.47 W/kg

5250 MHz Head/Verification/Zoom Scan (7x7x12)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=2mm
Reference Value = 15.267 V/m; Power Drift = -0.02 dB
Peak SAR (extrapolated) = 3.22 W/kg
Pin=10 mW
SAR(1 g) = 0.803 W/kg; SAR(10 g) = 0.226 W/kg

Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (measured) = 1.88 W/kg



RF Exposure Lab

Plot 10

DUT: Dipole D5GHzV2; Type: D5GHzV2; Serial: D5GHzV2 - SN: 1119

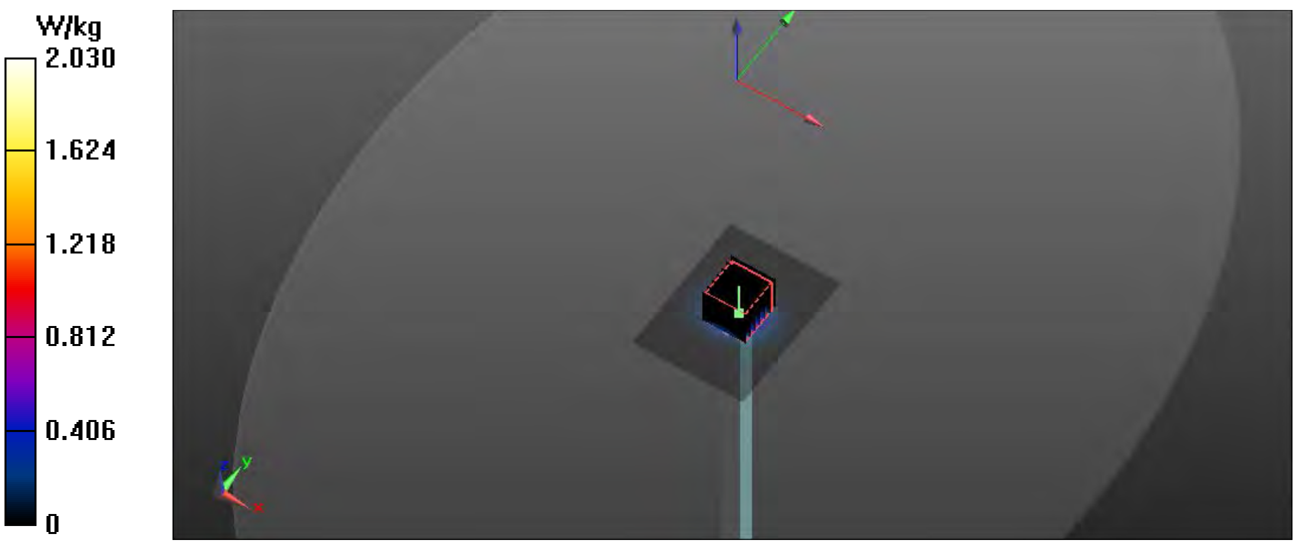
Communication System: CW; Frequency: 5600 MHz; Duty Cycle: 1:1
Medium: HSL 3-6 GHz; Medium parameters used: f = 5600 MHz; σ = 5.11 S/m; ε_r = 34.35; ρ = 1000 kg/m^3
Phantom section: Flat Section

Test Date: Date: 6/21/2023; Ambient Temp: 23 °C; Tissue Temp: 21 °C
Probe: EX3DV4 – SN7530; ConvF(4.49, 4.39, 4.63); Calibrated: 1/17/2023;
Sensor-Surface: 2mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1217; Calibrated: 2/14/2023
Phantom: ELI v5.0; Type: QDOVA002AA; Serial: 2037
Measurement SW: DASY52, Version 52.10 (0); SEMCAD X Version 14.6.10 (7417)

Procedure Notes:

Head Verification/5600 MHz/Area Scan (61x81x1): Interpolated grid: dx=1.000 mm, dy=1.000 mm
Maximum value of SAR (interpolated) = 1.72 W/kg

Head Verification/5600 MHz/Zoom Scan (7x7x12)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=2mm
Reference Value = 15.398 V/m; Power Drift = -0.02 dB
Peak SAR (extrapolated) = 3.59 W/kg
Pin=10 mW
SAR(1 g) = 0.835 W/kg; SAR(10 g) = 0.241 W/kg
Maximum value of SAR (measured) = 2.01 W/kg



RF Exposure Lab

Plot 11

DUT: Dipole D5GHzV2; Type: D5GHzV2; Serial: D5GHzV2 - SN: 1119

Communication System: CW; Frequency: 5750 MHz; Duty Cycle: 1:1
Medium: HSL 3-6 GHz; Medium parameters used (interpolated): f = 5750 MHz; σ = 5.28 S/m; ε_r = 34.18; ρ = 1000 kg/m^3
Phantom section: Flat Section

Test Date: Date: 6/21/2023; Ambient Temp: 23 °C; Tissue Temp: 21 °C
Probe: EX3DV4 – SN7530; ConvF(4.6, 4.58, 4.72); Calibrated: 1/17/2023;
Sensor-Surface: 2mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1217; Calibrated: 2/14/2023
Phantom: ELI v5.0; Type: QDOVA002AA; Serial: 2037
Measurement SW: DASY52, Version 52.10 (0); SEMCAD X Version 14.6.10 (7417)

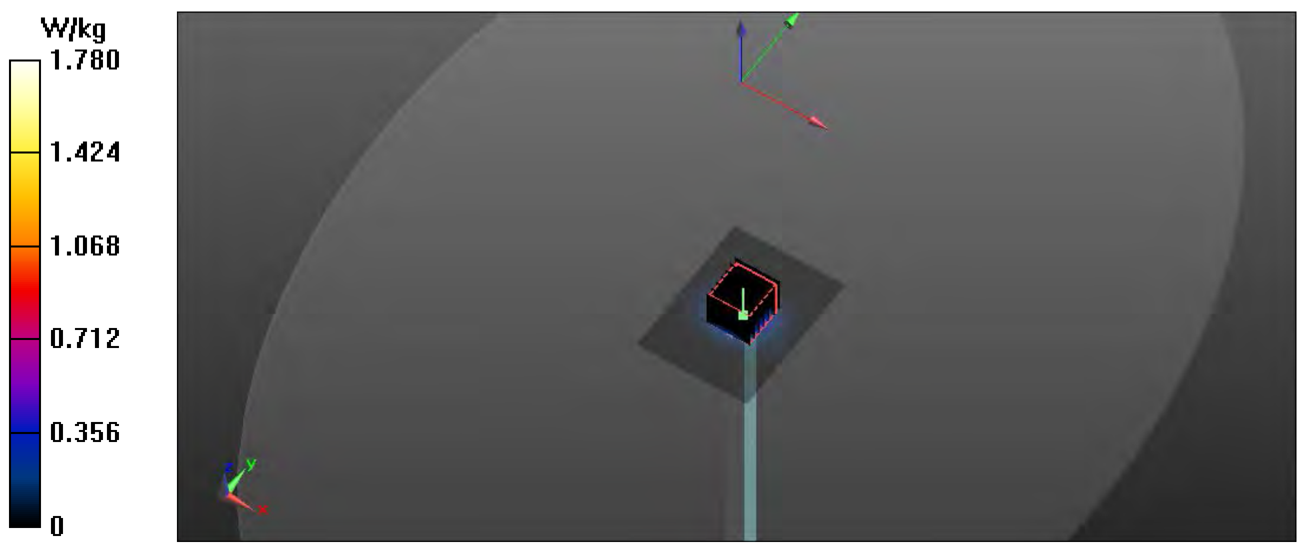
Procedure Notes:

5750 MHz Head/Verification/Area Scan (61x81x1): Interpolated grid: dx=1.000 mm, dy=1.000 mm

Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (interpolated) = 1.61 W/kg

5750 MHz Head/Verification/Zoom Scan (7x7x12)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=2mm
Reference Value = 14.521 V/m; Power Drift = -0.02 dB
Peak SAR (extrapolated) = 2.34 W/kg
Pin=10 mW
SAR(1 g) = 0.805 W/kg; SAR(10 g) = 0.233 W/kg

Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (measured) = 1.78 W/kg



Appendix B – SAR Test Data Plots

RF Exposure Lab

Plot 1

DUT: PRO360-5G; Type: Wireless TV Video Case; Serial: AVWPRO31222008397

Communication System: UMTS (WCDMA); Frequency: 1852.4 MHz; Duty Cycle: 1:1
Medium: HSL1900; Medium parameters used (interpolated): f = 1852.4 MHz; σ = 1.372 S/m; ε_r = 39.65; ρ = 1000 kg/m^3
Phantom section: Flat Section

Test Date: Date: 6/15/2023; Ambient Temp: 23 °C; Tissue Temp: 21 °C

Probe: EX3DV4 - SN7530; ConvF(8.14, 8.08, 8.31); Calibrated: 1/17/2023
Sensor-Surface: 2mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1217; Calibrated: 2/14/2023
Phantom: ELI v5.0; Type: QDOVA002AA; Serial: 2037
Measurement SW: DASY52, Version 52.10 (0); SEMCAD X Version 14.6.10 (7417)

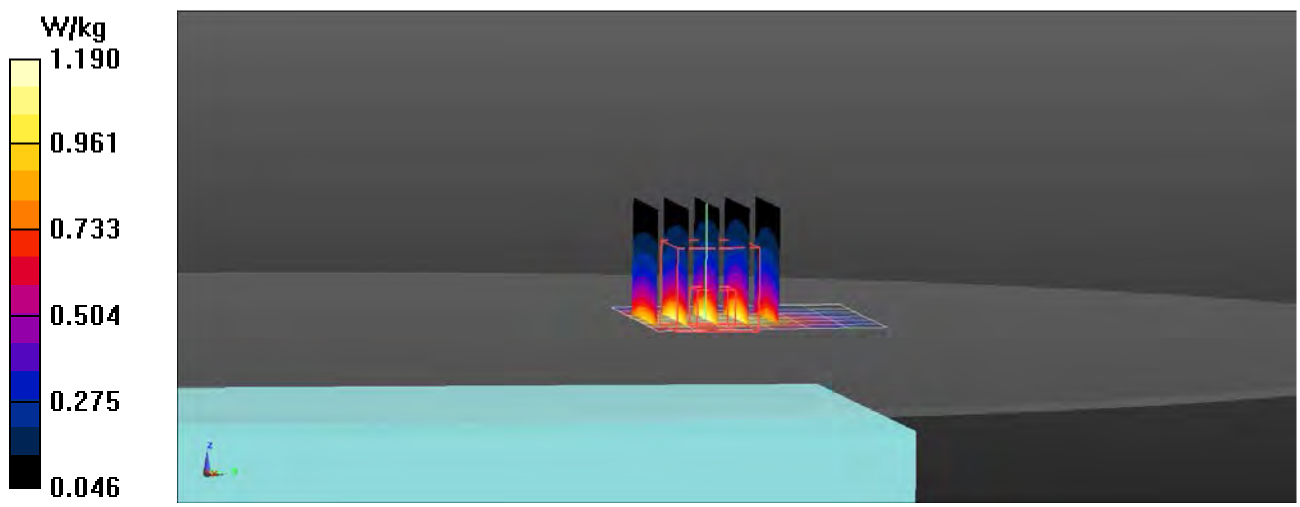
Procedure Notes:

UMTS B2/Ant M1 Low/Area Scan (7x7x1): Measurement grid: dx=10mm, dy=10mm

Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (measured) = 1.15 W/kg

UMTS B2/Ant M1 Low/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 11.61 V/m; Power Drift = 0.00 dB
Peak SAR (extrapolated) = 1.39 W/kg
SAR(1 g) = 0.935 W/kg; SAR(10 g) = 0.596 W/kg

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



RF Exposure Lab

Plot 2

DUT: PRO360-5G; Type: Wireless TV Video Case; Serial: AVWPRO31222008397

Communication System: UMTS (WCDMA); Frequency: 1752.6 MHz; Duty Cycle: 1:1
Medium: HSL1750; Medium parameters used (interpolated): f = 1752.6 MHz; σ = 1.403 S/m; ε_r = 39.235; ρ = 1000 kg/m^3
Phantom section: Flat Section

Test Date: Date: 6/16/2023; Ambient Temp: 23 °C; Tissue Temp: 21 °C

Probe: EX3DV4 - SN7530; ConvF(8.28, 8.22, 8.47); Calibrated: 1/17/2023
Sensor-Surface: 2mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1217; Calibrated: 2/14/2023
Phantom: ELI v5.0; Type: QDOVA002AA; Serial: 2037
Measurement SW: DASY52, Version 52.10 (0); SEMCAD X Version 14.6.10 (7417)

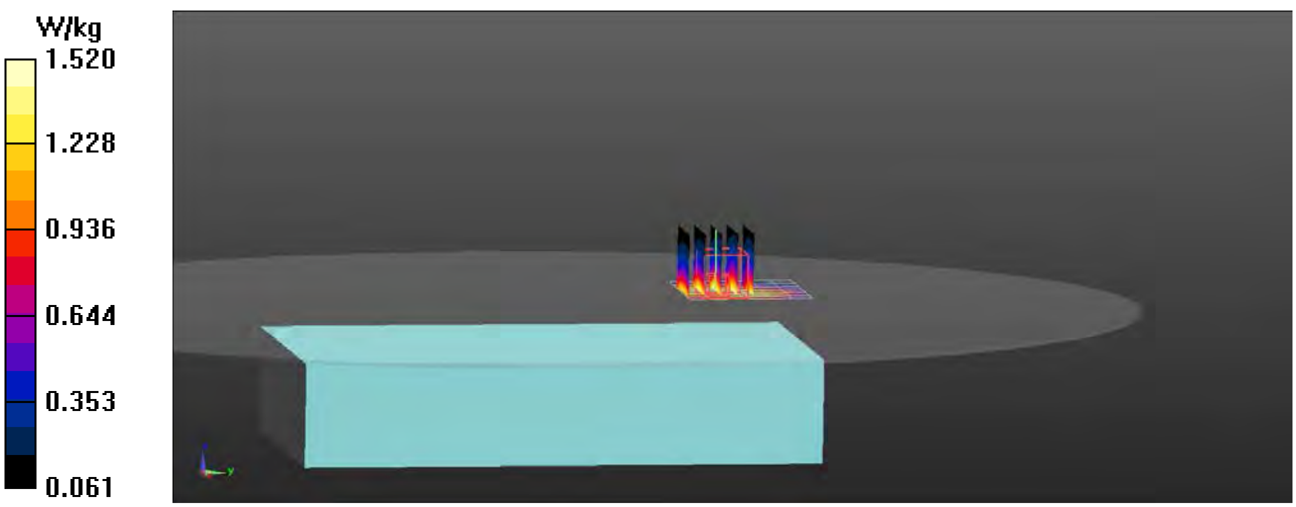
Procedure Notes:

UMTS B4/Ant M1 High/Area Scan (7x7x1): Measurement grid: dx=10mm, dy=10mm

Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (measured) = 1.50 W/kg

UMTS B4/Ant M1 High/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 13.04 V/m; Power Drift = 0.06 dB
Peak SAR (extrapolated) = 1.81 W/kg
SAR(1 g) = 1.21 W/kg; SAR(10 g) = 0.794 W/kg

Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (measured) = 1.52 W/kg



RF Exposure Lab

Plot 3

DUT: PRO360-5G; Type: Wireless TV Video Case; Serial: AVWPRO31222008397

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

Test Date: Date: 6/12/2023; Ambient Temp: 23 °C; Tissue Temp: 21 °C

Probe: EX3DV4 - SN7530; ConvF(9.5, 9.25, 9.3); Calibrated: 1/17/2023
Sensor-Surface: 2mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1217; Calibrated: 2/14/2023
Phantom: ELI v5.0; Type: QDOVA002AA; Serial: 2037
Measurement SW: DASY52, Version 52.10 (0); SEMCAD X Version 14.6.10 (7417)

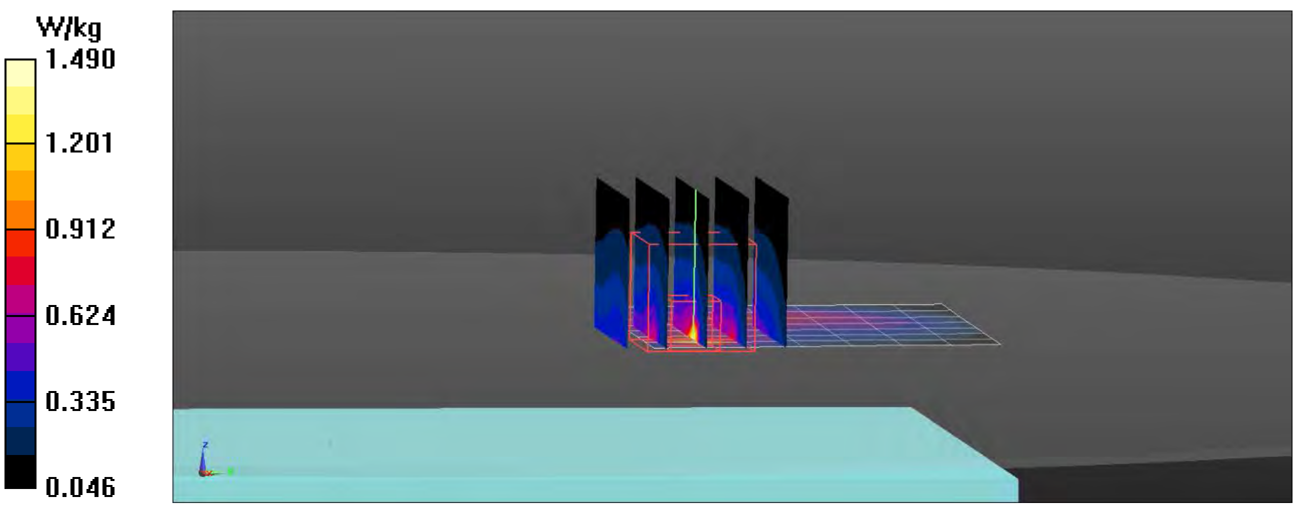
Procedure Notes:

UMTS B5/Ant M1 Mid/Area Scan (8x8x1): Measurement grid: dx=10mm, dy=10mm

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

UMTS B5/Ant M1 Mid/Zoom Scan (6x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 10.29 V/m; Power Drift = -0.01 dB
Peak SAR (extrapolated) = 1.81 W/kg
SAR(1 g) = 0.785 W/kg; SAR(10 g) = 0.419 W/kg

Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (measured) = 1.49 W/kg



RF Exposure Lab

Plot 4

DUT: PRO360-5G; Type: Wireless TV Video Case; Serial: AVWPRO31222008397

Communication System: LTE (SC-FDMA, 1 RB, 20 MHz, QPSK); Frequency: 2535 MHz; Duty Cycle: 1:1
Medium: HSL2550; Medium parameters used (interpolated): f = 2535 MHz; σ = 1.915 S/m; ε_r = 38.985; ρ = 1000 kg/m^3
Phantom section: Flat Section

Test Date: Date: 6/19/2023; Ambient Temp: 23 °C; Tissue Temp: 21 °C

Probe: EX3DV4 - SN7530; ConvF(7.54, 7.33, 7.61); Calibrated: 1/17/2023
Sensor-Surface: 2mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1217; Calibrated: 2/14/2023
Phantom: ELI v5.0; Type: QDOVA002AA; Serial: 2037
Measurement SW: DASY52, Version 52.10 (0); SEMCAD X Version 14.6.10 (7417)

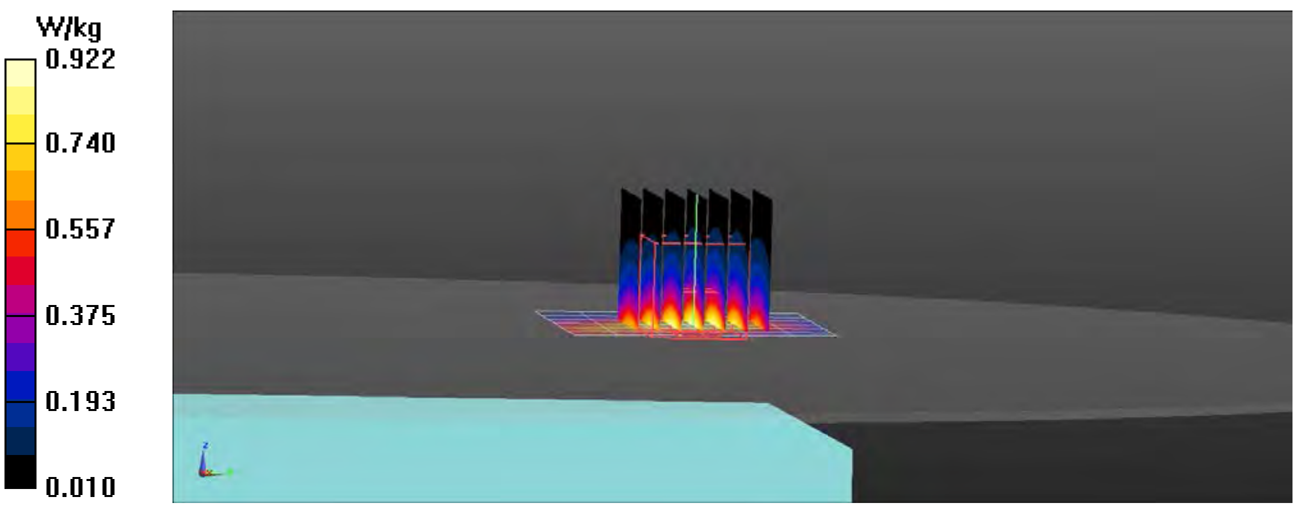
Procedure Notes:

B7 LTE/Ant M1 Mid 1 RB 49 Offset/Area Scan (7x7x1): Measurement grid: dx=10mm, dy=10mm

Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (measured) = 0.888 W/kg

B7 LTE/Ant M1 Mid 1 RB 49 Offset/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 7.845 V/m; Power Drift = 0.03 dB
Peak SAR (extrapolated) = 1.16 W/kg
SAR(1 g) = 0.678 W/kg; SAR(10 g) = 0.385 W/kg

Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (measured) = 0.922 W/kg



RF Exposure Lab

Plot 5

DUT: PRO360-5G; Type: Wireless TV Video Case; Serial: AVWPRO31222008397

Communication System: LTE (SC-FDMA, 1 RB, 10 MHz, QPSK); Frequency: 707.5 MHz; Duty Cycle: 1:1
Medium: HSL750; Medium parameters used (interpolated): f = 707.5 MHz; σ = 0.868 S/m; ε_r = 41.708; ρ = 1000 kg/m^3
Phantom section: Flat Section

Test Date: Date: 6/13/2023; Ambient Temp: 23 °C; Tissue Temp: 21 °C

Probe: EX3DV4 - SN7530; ConvF(9.62, 9.26, 10.37); Calibrated: 1/17/2023
Sensor-Surface: 2mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1217; Calibrated: 2/14/2023
Phantom: ELI v5.0; Type: QDOVA002AA; Serial: 2037
Measurement SW: DASY52, Version 52.10 (0); SEMCAD X Version 14.6.10 (7417)

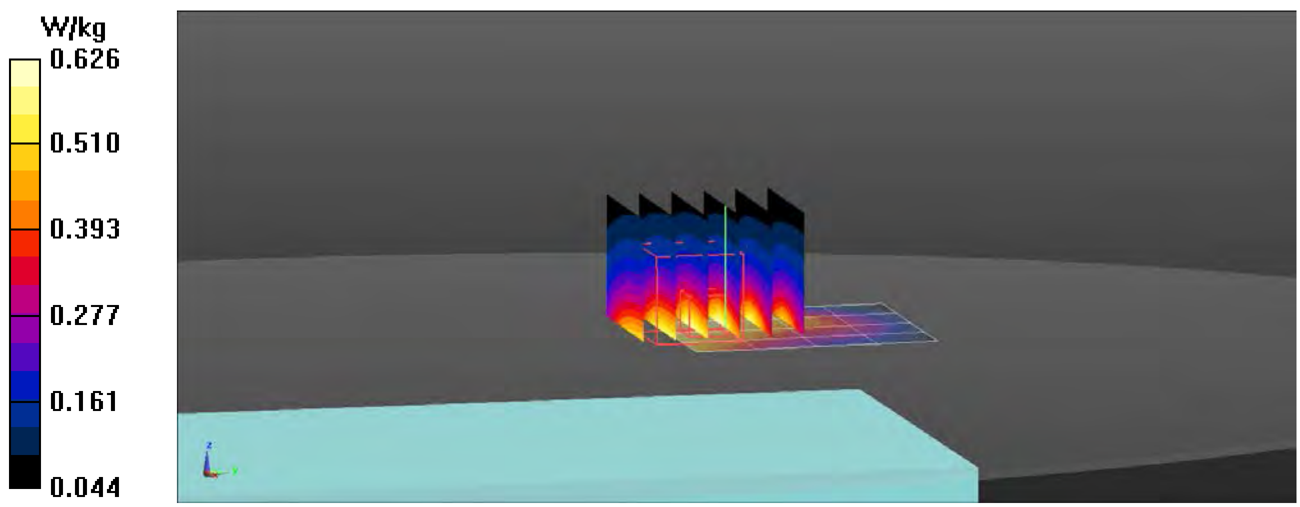
Procedure Notes:

B12 LTE/Ant M1 Mid 1 RB 24 Offset/Area Scan (5x5x1): Measurement grid: dx=15mm, dy=15mm

Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (measured) = 0.602 W/kg

B12 LTE/Ant M1 Mid 1 RB 24 Offset/Zoom Scan (6x6x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 10.96 V/m; Power Drift = 0.04 dB
Peak SAR (extrapolated) = 0.731 W/kg
SAR(1 g) = 0.503 W/kg; SAR(10 g) = 0.343 W/kg

Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (measured) = 0.626 W/kg



RF Exposure Lab

Plot 6

DUT: PRO360-5G; Type: Wireless TV Video Case; Serial: AVWPRO31222008397

Communication System: LTE (SC-FDMA, 1 RB, 10 MHz, QPSK); Frequency: 782 MHz; Duty Cycle: 1:1
Medium: HSL750; Medium parameters used (interpolated): f = 782 MHz; σ = 0.922 S/m; ε_r = 41.268; ρ = 1000 kg/m^3
Phantom section: Flat Section

Test Date: Date: 6/13/2023; Ambient Temp: 23 °C; Tissue Temp: 21 °C

Probe: EX3DV4 - SN7530; ConvF(9.62, 9.26, 10.37); Calibrated: 1/17/2023
Sensor-Surface: 2mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1217; Calibrated: 2/14/2023
Phantom: ELI v5.0; Type: QDOVA002AA; Serial: 2037
Measurement SW: DASY52, Version 52.10 (0); SEMCAD X Version 14.6.10 (7417)

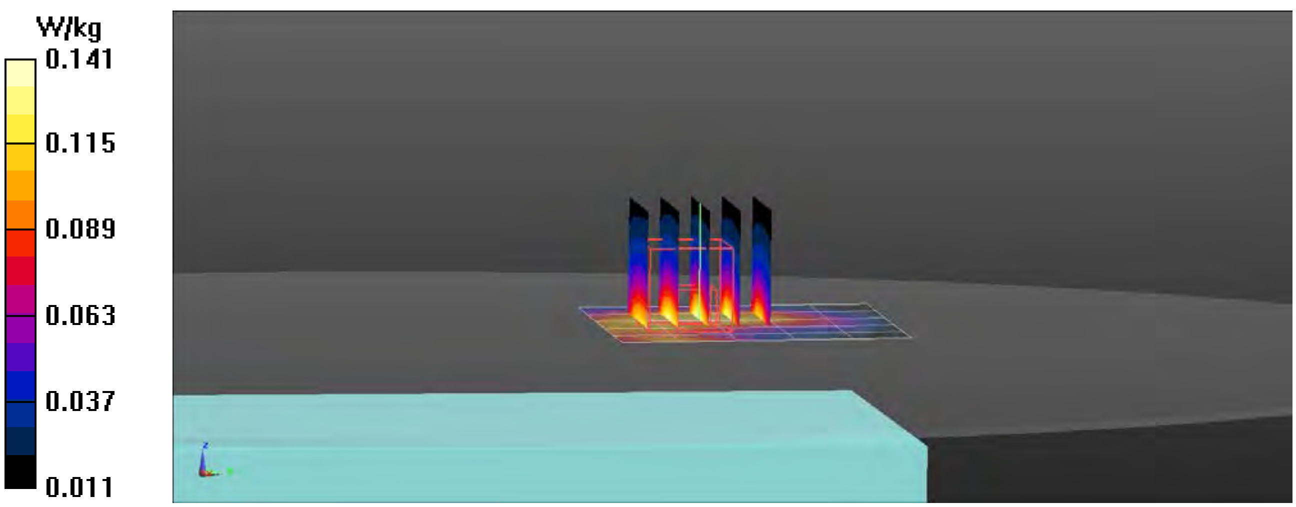
Procedure Notes:

B13 LTE/Ant M1 Mid 1 RB 24 Offset/Area Scan (6x6x1): Measurement grid: dx=15mm, dy=15mm

Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (measured) = 0.137 W/kg

B13 LTE/Ant M1 Mid 1 RB 24 Offset/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 7.030 V/m; Power Drift = -0.05 dB
Peak SAR (extrapolated) = 0.165 W/kg
SAR(1 g) = 0.115 W/kg; SAR(10 g) = 0.076 W/kg

Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (measured) = 0.141 W/kg



RF Exposure Lab

Plot 7

DUT: PRO360-5G; Type: Wireless TV Video Case; Serial: AVWPRO31222008397

Communication System: LTE (SC-FDMA, 1 RB, 10 MHz, QPSK); Frequency: 793 MHz; Duty Cycle: 1:1
Medium: HSL750; Medium parameters used (interpolated): f = 793 MHz; σ = 0.93 S/m; ε_r = 41.208; ρ = 1000 kg/m^3
Phantom section: Flat Section

Test Date: Date: 6/13/2023; Ambient Temp: 23 °C; Tissue Temp: 21 °C

Probe: EX3DV4 - SN7530; ConvF(9.62, 9.26, 10.37); Calibrated: 1/17/2023
Sensor-Surface: 2mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1217; Calibrated: 2/14/2023
Phantom: ELI v5.0; Type: QDOVA002AA; Serial: 2037
Measurement SW: DASY52, Version 52.10 (0); SEMCAD X Version 14.6.10 (7417)

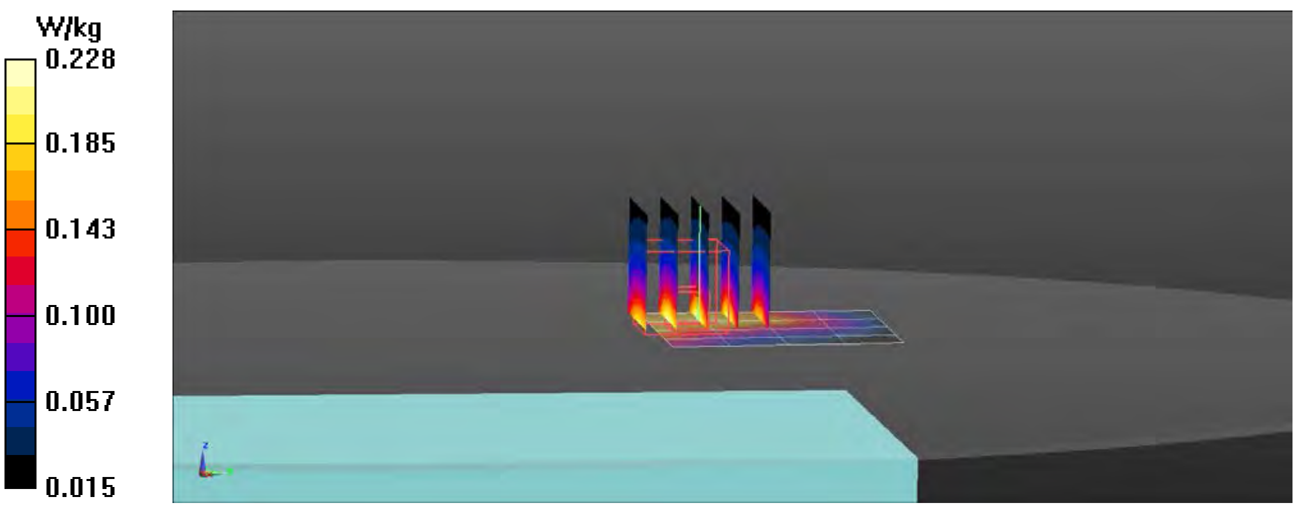
Procedure Notes:

B14 LTE/Ant M1 Mid 1 RB 24 Offset/Area Scan (5x5x1): Measurement grid: dx=15mm, dy=15mm

Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (measured) = 0.221 W/kg

B14 LTE/Ant M1 Mid 1 RB 24 Offset/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 5.646 V/m; Power Drift = 0.04 dB
Peak SAR (extrapolated) = 0.267 W/kg
SAR(1 g) = 0.183 W/kg; SAR(10 g) = 0.119 W/kg

Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (measured) = 0.228 W/kg



RF Exposure Lab

Plot 8

DUT: PRO360-5G; Type: Wireless TV Video Case; Serial: AVWPRO31222008397

Communication System: LTE (SC-FDMA, 1 RB, 20 MHz, QPSK); Frequency: 1882.5 MHz; Duty Cycle: 1:1
Medium: HSL1900; Medium parameters used (interpolated): f = 1882.5 MHz; σ = 1.39 S/m; ε_r = 39.905; ρ = 1000 kg/m^3
Phantom section: Flat Section

Test Date: Date: 6/15/2023; Ambient Temp: 23 °C; Tissue Temp: 21 °C

Probe: EX3DV4 - SN7530; ConvF(8.14, 8.08, 8.31); Calibrated: 1/17/2023
Sensor-Surface: 2mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1217; Calibrated: 2/14/2023
Phantom: ELI v5.0; Type: QDOVA002AA; Serial: 2037
Measurement SW: DASY52, Version 52.10 (0); SEMCAD X Version 14.6.10 (7417)

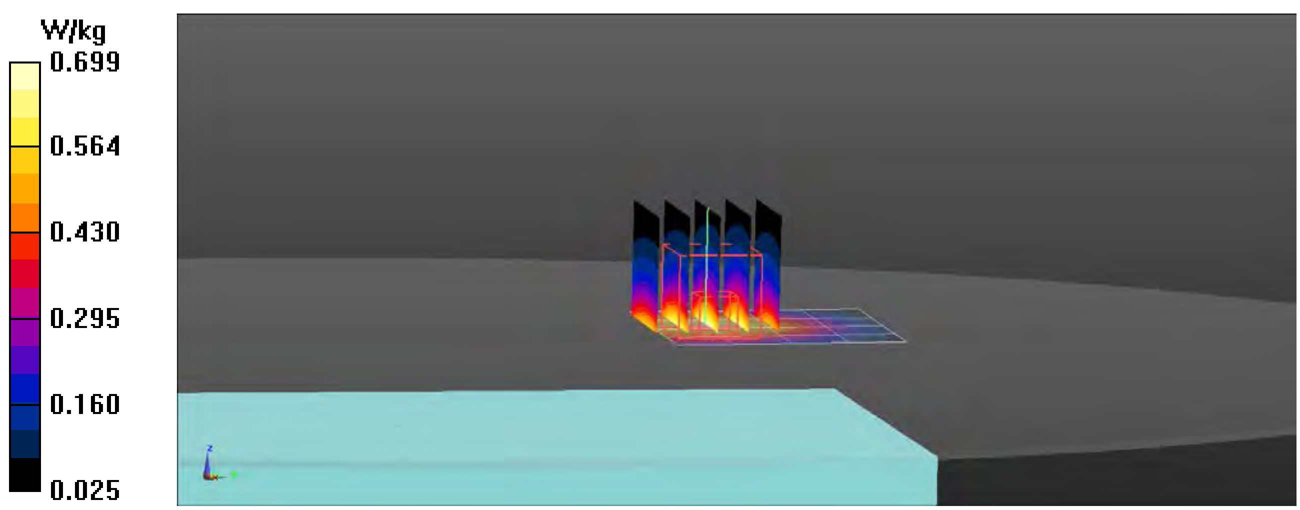
Procedure Notes:

B25 LTE/Ant M1 Mid 1 RB 49 Offset/Area Scan (5x5x1): Measurement grid: dx=15mm, dy=15mm

Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (measured) = 0.685 W/kg

B25 LTE/Ant M1 Mid 1 RB 49 Offset/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 9.047 V/m; Power Drift = 0.06 dB
Peak SAR (extrapolated) = 0.821 W/kg
SAR(1 g) = 0.555 W/kg; SAR(10 g) = 0.353 W/kg

Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (measured) = 0.699 W/kg



RF Exposure Lab

Plot 9

DUT: PRO360-5G; Type: Wireless TV Video Case; Serial: AVWPRO31222008397

Communication System: LTE (SC-FDMA, 1 RB, 10 MHz, QPSK); Frequency: 831.5 MHz; Duty Cycle: 1:1
Medium: HSL835; Medium parameters used (interpolated): f = 831.5 MHz; σ = 0.912 S/m; ε_r = 41.456; ρ = 1000 kg/m^3
Phantom section: Flat Section

Test Date: Date: 6/12/2023; Ambient Temp: 23 °C; Tissue Temp: 21 °C

Probe: EX3DV4 - SN7530; ConvF(9.5, 9.25, 9.3); Calibrated: 1/17/2023
Sensor-Surface: 2mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1217; Calibrated: 2/14/2023
Phantom: ELI v5.0; Type: QDOVA002AA; Serial: 2037
Measurement SW: DASY52, Version 52.10 (0); SEMCAD X Version 14.6.10 (7417)

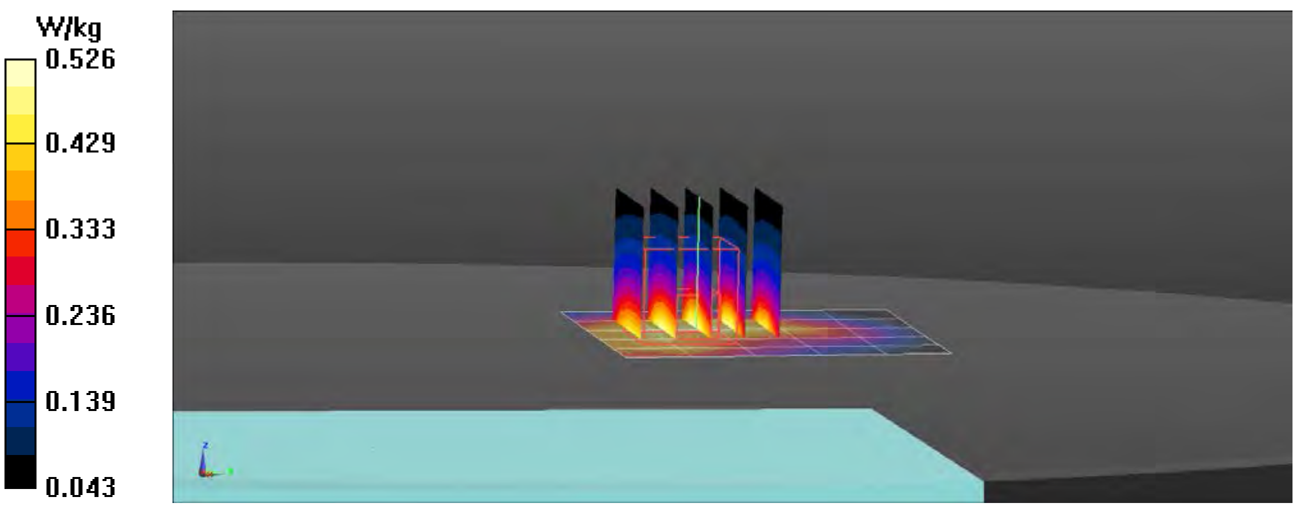
Procedure Notes:

B26 LTE/Ant M1 Mid 1 RB 24 Offset/Area Scan (6x6x1): Measurement grid: dx=15mm, dy=15mm

Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (measured) = 0.504 W/kg

B26 LTE/Ant M1 Mid 1 RB 24 Offset/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 10.16 V/m; Power Drift = 0.02 dB
Peak SAR (extrapolated) = 0.616 W/kg
SAR(1 g) = 0.428 W/kg; SAR(10 g) = 0.284 W/kg

Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (measured) = 0.526 W/kg



RF Exposure Lab

Plot 10

DUT: PRO360-5G; Type: Wireless TV Video Case; Serial: AVWPRO31222008397

Communication System: LTE (SC-FDMA, 1 RB, 20 MHz, QPSK); Frequency: 2595 MHz; Duty Cycle: 1:1
Medium: HSL2550; Medium parameters used (interpolated): f = 2595 MHz; σ = 1.99 S/m; ε_r = 38.855; ρ = 1000 kg/m^3
Phantom section: Flat Section

Test Date: Date: 6/19/2023; Ambient Temp: 23 °C; Tissue Temp: 21 °C

Probe: EX3DV4 - SN7530; ConvF(7.54, 7.33, 7.61); Calibrated: 1/17/2023
Sensor-Surface: 2mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1217; Calibrated: 2/14/2023
Phantom: ELI v5.0; Type: QDOVA002AA; Serial: 2037
Measurement SW: DASY52, Version 52.10 (0); SEMCAD X Version 14.6.10 (7417)

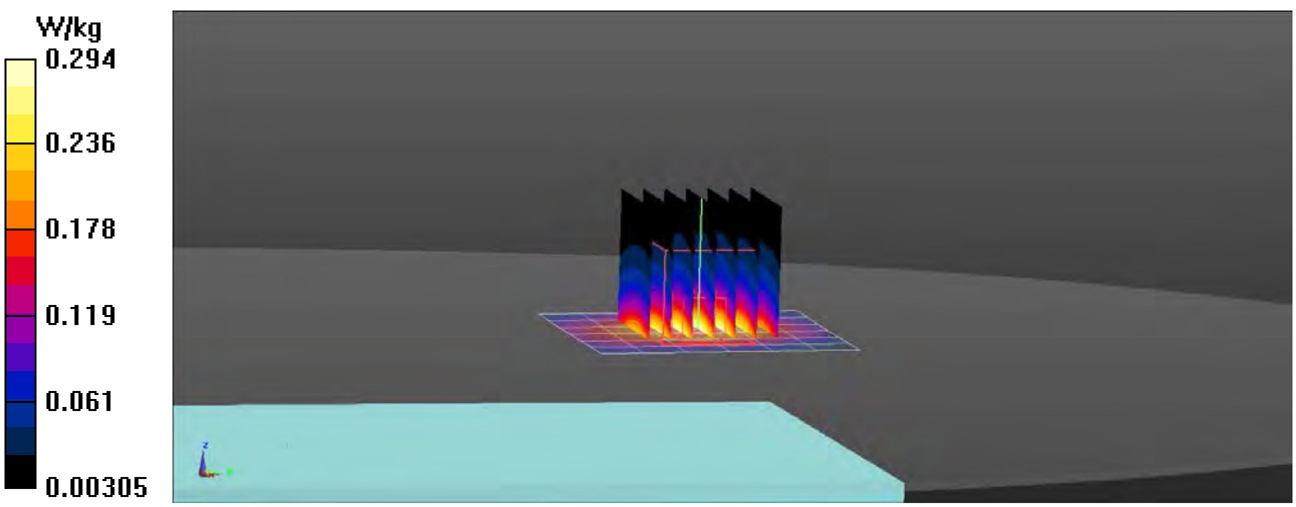
Procedure Notes:

B38 LTE/Ant M1 Mid 1 RB 49 Offset/Area Scan (7x7x1): Measurement grid: dx=10mm, dy=10mm

Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (measured) = 0.284 W/kg

B38 LTE/Ant M1 Mid 1 RB 49 Offset/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 3.998 V/m; Power Drift = -0.02 dB
Peak SAR (extrapolated) = 0.370 W/kg
SAR(1 g) = 0.217 W/kg; SAR(10 g) = 0.123 W/kg

Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (measured) = 0.294 W/kg



RF Exposure Lab

Plot 11

DUT: PRO360-5G; Type: Wireless TV Video Case; Serial: AVWPRO31222008397

Communication System: LTE (SC-FDMA, 1 RB, 20 MHz, QPSK); Frequency: 2593 MHz; Duty Cycle: 1:1
Medium: HSL2550; Medium parameters used (interpolated): f = 2593 MHz; σ = 1.99 S/m; ε_r = 38.853; ρ = 1000 kg/m^3
Phantom section: Flat Section

Test Date: Date: 6/19/2023; Ambient Temp: 23 °C; Tissue Temp: 21 °C

Probe: EX3DV4 - SN7530; ConvF(7.54, 7.33, 7.61) @ 2593 MHz; Calibrated: 1/17/2023
Sensor-Surface: 2mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1217; Calibrated: 2/14/2023
Phantom: ELI v5.0; Type: QDOVA002AA; Serial: 2037
Measurement SW: DASY52, Version 52.10 (0); SEMCAD X Version 14.6.10 (7417)

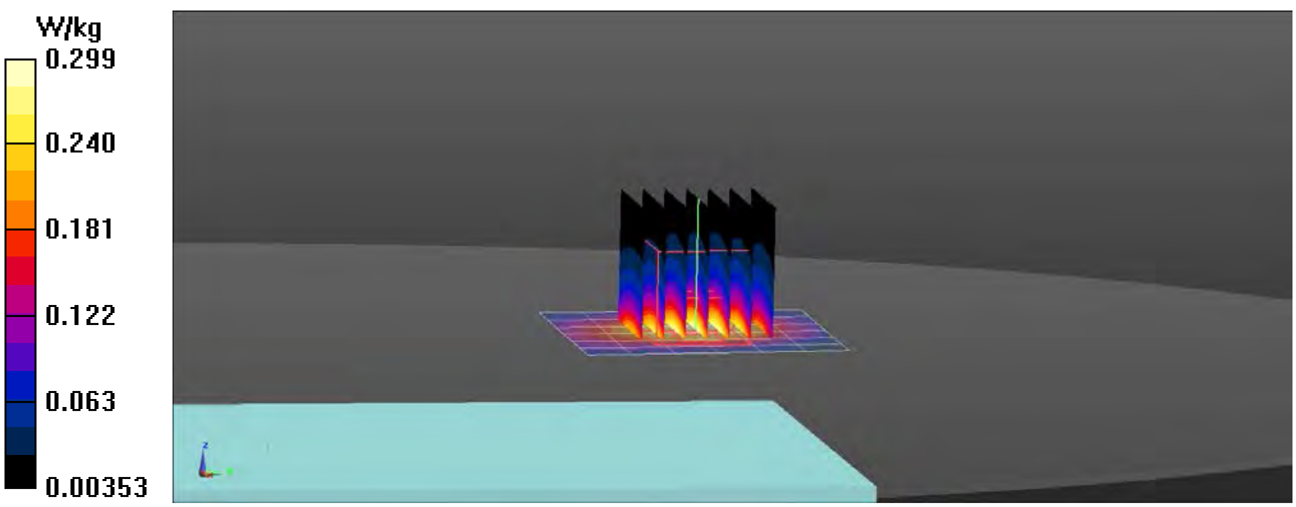
Procedure Notes:

B41 LTE/Ant M1 Mid 1 RB 49 Offset/Area Scan (7x7x1): Measurement grid: dx=10mm, dy=10mm

Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (measured) = 0.288 W/kg

B41 LTE/Ant M1 Mid 1 RB 49 Offset/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 3.934 V/m; Power Drift = -0.04 dB
Peak SAR (extrapolated) = 0.377 W/kg
SAR(1 g) = 0.219 W/kg; SAR(10 g) = 0.123 W/kg

Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (measured) = 0.299 W/kg



RF Exposure Lab

Plot 12

DUT: PRO360-5G; Type: Wireless TV Video Case; Serial: AVWPRO31222008397

Communication System: LTE (SC-FDMA, 1 RB, 20 MHz, QPSK); Frequency: 3625 MHz; Duty Cycle: 1:1
Medium: HSL3-6GHz; Medium parameters used (interpolated): f = 3625 MHz; σ = 3.015 S/m; ε_r = 36.715; ρ = 1000 kg/m^3
Phantom section: Flat Section

Test Date: Date: 6/20/2023; Ambient Temp: 23 °C; Tissue Temp: 21 °C

Probe: EX3DV4 - SN7530; ConvF(6.51, 6.52, 6.65); Calibrated: 1/17/2023
Sensor-Surface: 2mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1217; Calibrated: 2/14/2023
Phantom: ELI v5.0; Type: QDOVA002AA; Serial: 2037
Measurement SW: DASY52, Version 52.10 (0); SEMCAD X Version 14.6.10 (7417)

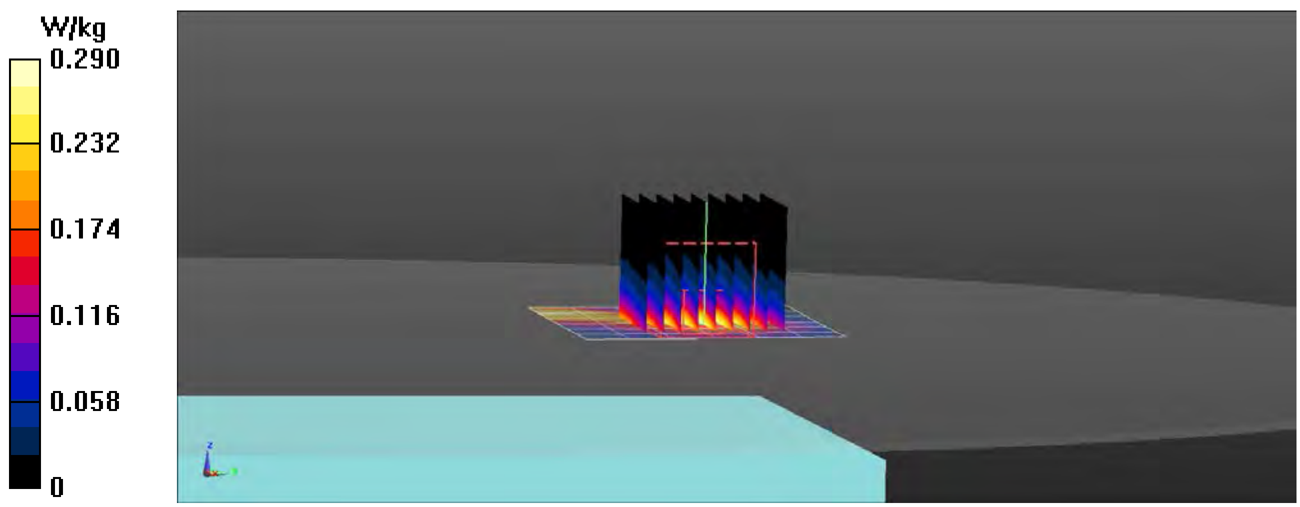
Procedure Notes:

B48 LTE/Ant M1 Mid 1 RB 49 Offset/Area Scan (7x7x1): Measurement grid: dx=10mm, dy=10mm

Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (measured) = 0.282 W/kg

B48 LTE/Ant M1 Mid 1 RB 49 Offset/Zoom Scan (8x9x16)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=2mm
Reference Value = 1.708 V/m; Power Drift = -0.05 dB
Peak SAR (extrapolated) = 0.413 W/kg
SAR(1 g) = 0.187 W/kg; SAR(10 g) = 0.089 W/kg

Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (measured) = 0.290 W/kg



RF Exposure Lab

Plot 13

DUT: PRO360-5G; Type: Wireless TV Video Case; Serial: AVWPRO31222008397

Communication System: LTE (SC-FDMA, 1 RB, 20 MHz, QPSK); Frequency: 1770 MHz; Duty Cycle: 1:1
Medium: HSL1750; Medium parameters used: f = 1770 MHz; σ = 1.42 S/m; ε_r = 39.2; ρ = 1000 kg/m^3
Phantom section: Flat Section

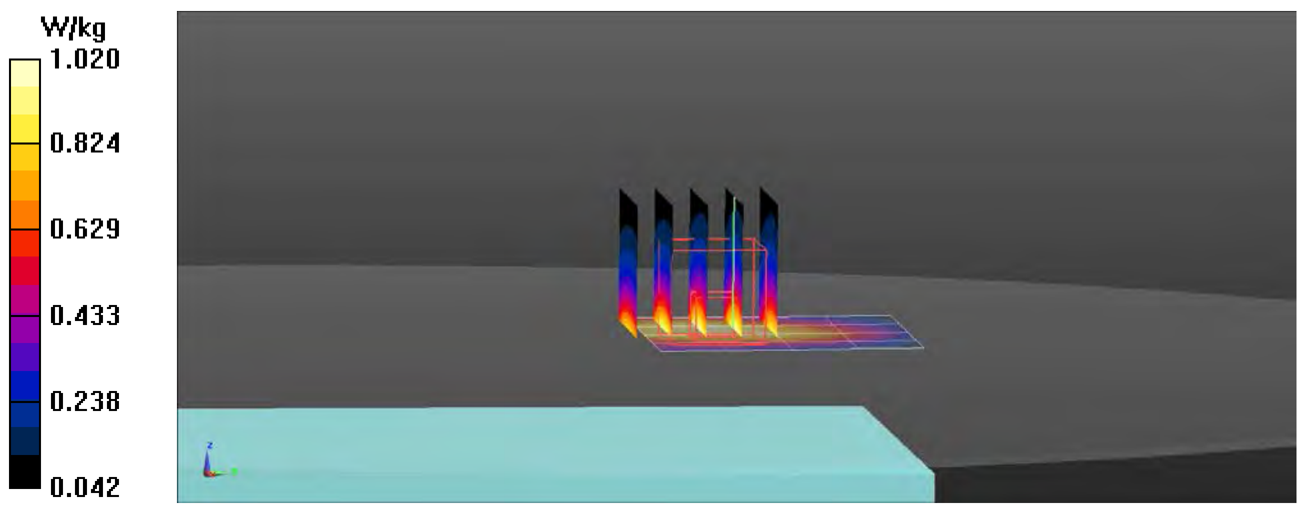
Test Date: Date: 6/16/2023; Ambient Temp: 23 °C; Tissue Temp: 21 °C

Probe: EX3DV4 - SN7530; ConvF(8.28, 8.22, 8.47); Calibrated: 1/17/2023
Sensor-Surface: 2mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1217; Calibrated: 2/14/2023
Phantom: ELI v5.0; Type: QDOVA002AA; Serial: 2037
Measurement SW: DASY52, Version 52.10 (0); SEMCAD X Version 14.6.10 (7417)

Procedure Notes:

B66 LTE/Ant M1 High 1 RB 49 Offset/Area Scan (5x5x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (measured) = 0.985 W/kg

B66 LTE/Ant M1 High 1 RB 49 Offset/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 13.11 V/m; Power Drift = 0.02 dB
Peak SAR (extrapolated) = 1.20 W/kg
SAR(1 g) = 0.808 W/kg; SAR(10 g) = 0.528 W/kg
Maximum value of SAR (measured) = 1.02 W/kg



RF Exposure Lab

Plot 14

DUT: PRO360-5G; Type: Wireless TV Video Case; Serial: AVWPRO31222008397

Communication System: LTE (SC-FDMA, 1 RB, 20 MHz, QPSK); Frequency: 680.5 MHz; Duty Cycle: 1:1
Medium: HSL600; Medium parameters used (interpolated): f = 680.5 MHz; σ = 0.86 S/m; ε_r = 41.867; ρ = 1000 kg/m^3
Phantom section: Flat Section

Test Date: Date: 6/13/2023; Ambient Temp: 23 °C; Tissue Temp: 21 °C

Probe: EX3DV4 - SN7530; ConvF(9.62, 9.26, 10.37); Calibrated: 1/17/2023
Sensor-Surface: 2mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1217; Calibrated: 2/14/2023
Phantom: ELI v5.0; Type: QDOVA002AA; Serial: 2037
Measurement SW: DASY52, Version 52.10 (0); SEMCAD X Version 14.6.10 (7417)

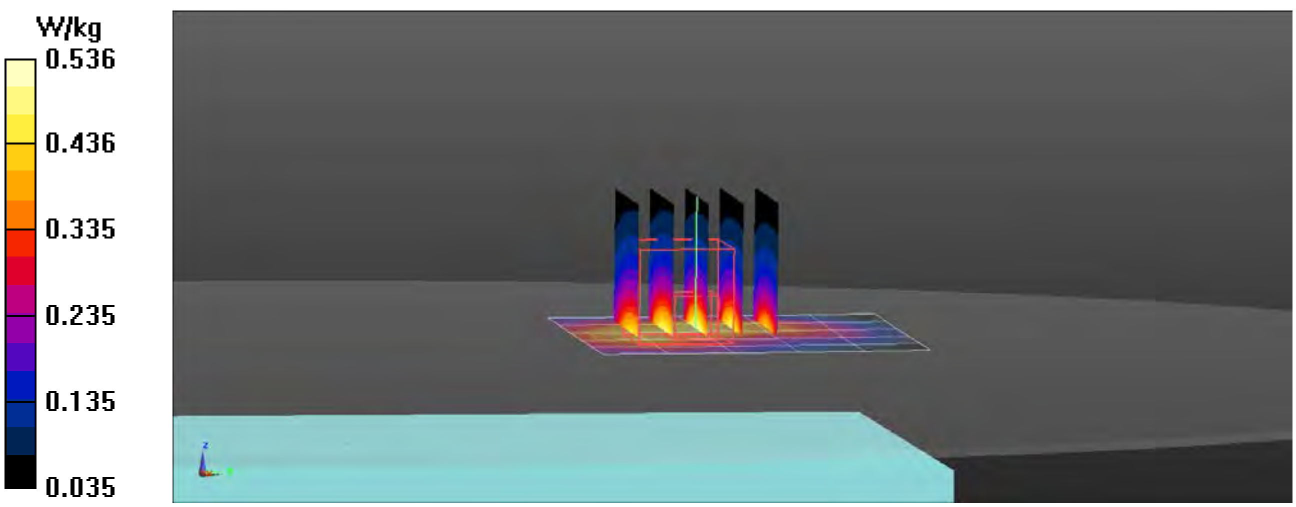
Procedure Notes:

B71 LTE/Ant M1 Mid 1 RB 49 Offset/Area Scan (6x6x1): Measurement grid: dx=15mm, dy=15mm

Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (measured) = 0.489 W/kg

B71 LTE/Ant M1 Mid 1 RB 49 Offset/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 9.499 V/m; Power Drift = -0.01 dB
Peak SAR (extrapolated) = 0.627 W/kg
SAR(1 g) = 0.420 W/kg; SAR(10 g) = 0.276 W/kg

Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (measured) = 0.536 W/kg



RF Exposure Lab

Plot 15

DUT: PRO360-5G; Type: Wireless TV Video Case; Serial: AVWPRO31222008397

Communication System: WiFi 802.11b (DSSS, 1 Mbps); Frequency: 2437 MHz; Duty Cycle: 1:1
Medium: HSL2450; Medium parameters used (interpolated): f = 2437 MHz; σ = 1.794 S/m; ε_r = 38.393; ρ = 1000 kg/m^3
Phantom section: Flat Section

Test Date: Date: 6/22/2023; Ambient Temp: 23 °C; Tissue Temp: 21 °C

Probe: EX3DV4 - SN7530; ConvF(7.18, 7.11, 7.21); Calibrated: 1/17/2023
Sensor-Surface: 2mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1217; Calibrated: 2/14/2023
Phantom: ELI v5.0; Type: QDOVA002AA; Serial: 2037
Measurement SW: DASY52, Version 52.10 (0); SEMCAD X Version 14.6.10 (7417)

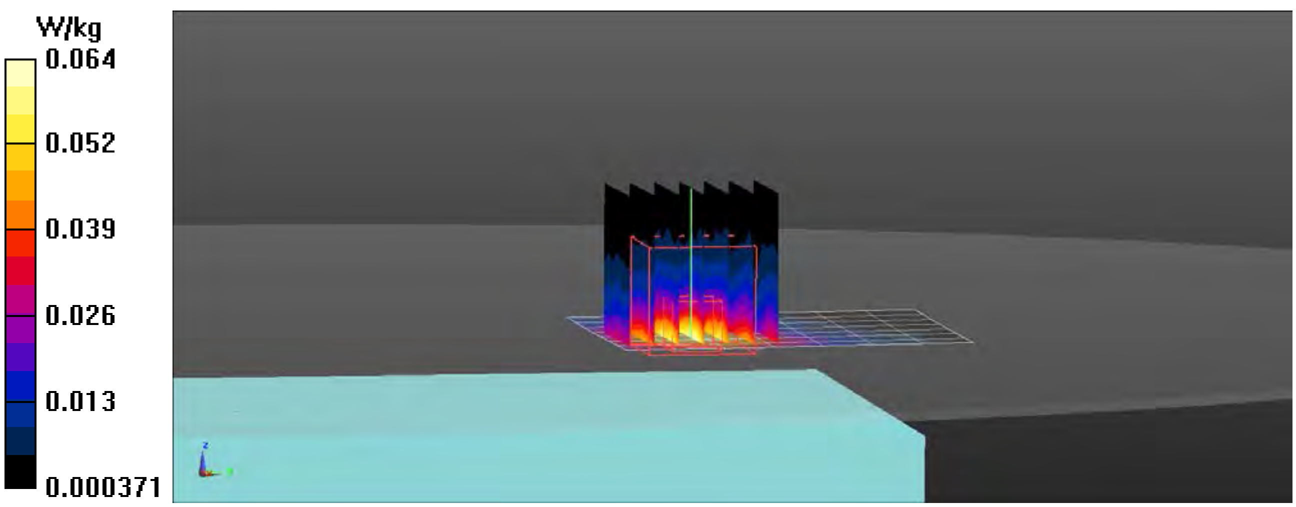
Procedure Notes:

2450 MHz/Ant W2 Mid/Area Scan (8x8x1): Measurement grid: dx=10mm, dy=10mm

Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (measured) = 0.0624 W/kg

2450 MHz/Ant W2 Mid/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 1.038 V/m; Power Drift = 0.06 dB
Peak SAR (extrapolated) = 0.0820 W/kg
SAR(1 g) = 0.045 W/kg; SAR(10 g) = 0.024 W/kg

Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (measured) = 0.0643 W/kg



RF Exposure Lab

Plot 16

DUT: PRO360-5G; Type: Wireless TV Video Case; Serial: AVWPRO31222008397

Communication System: WiFi 802.11a (OFDM, 6 Mbps); Frequency: 5300 MHz; Duty Cycle: 1:1
Medium: HSL3-6GHz; Medium parameters used: f = 5300 MHz; σ = 4.78 S/m; ε_r = 34.69; ρ = 1000 kg/m^3
Phantom section: Flat Section

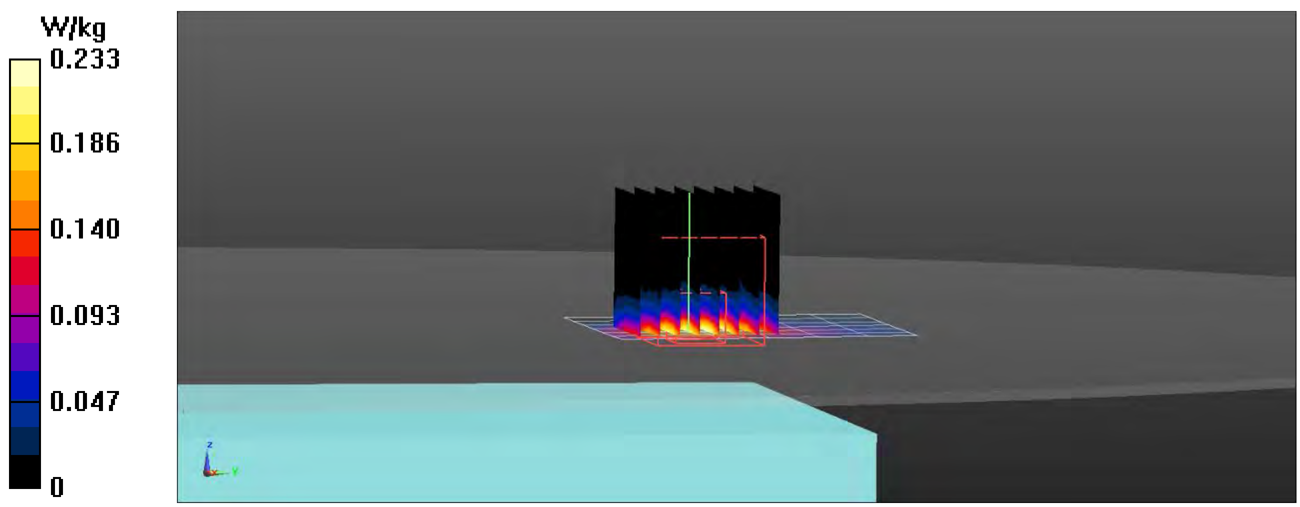
Test Date: Date: 6/21/2023; Ambient Temp: 23 °C; Tissue Temp: 21 °C

Probe: EX3DV4 - SN7530; ConvF(5.26, 5.2, 5.38); Calibrated: 1/17/2023
Sensor-Surface: 2mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1217; Calibrated: 2/14/2023
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/Ant W2 60/Area Scan (7x7x1): Measurement grid: dx=10mm, dy=10mm
Maximum value of SAR (measured) = 0.233 W/kg

5200 MHz/Ant W2 60/Zoom Scan (8x8x16)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=2mm
Reference Value = 0.8250 V/m; Power Drift = 0.03 dB
Peak SAR (extrapolated) = 0.413 W/kg
SAR(1 g) = 0.131 W/kg; SAR(10 g) = 0.053 W/kg
Maximum value of SAR (measured) = 0.233 W/kg



RF Exposure Lab

Plot 17

DUT: PRO360-5G; Type: Wireless TV Video Case; Serial: AVWPRO31222008397

Communication System: WiFi 802.11a (OFDM, 6 Mbps); Frequency: 5620 MHz; Duty Cycle: 1:1
Medium: HSL3-6GHz; Medium parameters used: f = 5620 MHz; σ = 5.13 S/m; ε_r = 34.32; ρ = 1000 kg/m^3
Phantom section: Flat Section

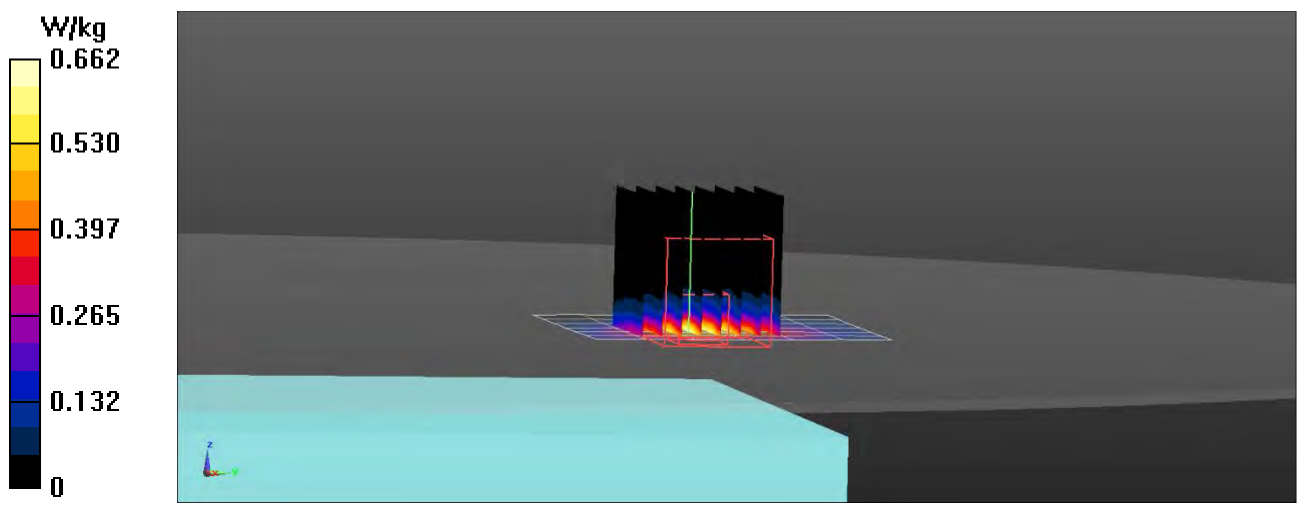
Test Date: Date: 6/21/2023; Ambient Temp: 23 °C; Tissue Temp: 21 °C

Probe: EX3DV4 - SN7530; ConvF(4.49, 4.39, 4.63); Calibrated: 1/17/2023
Sensor-Surface: 2mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1217; Calibrated: 2/14/2023
Phantom: ELI v5.0; Type: QDOVA002AA; Serial: 2037
Measurement SW: DASY52, Version 52.10 (0); SEMCAD X Version 14.6.10 (7417)

Procedure Notes:

5600 MHz/Ant W2 124/Area Scan (7x7x1): Measurement grid: dx=10mm, dy=10mm
Maximum value of SAR (measured) = 0.597 W/kg

5600 MHz/Ant W2 124/Zoom Scan (8x8x16)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=2mm
Reference Value = 0.8680 V/m; Power Drift = -0.07 dB
Peak SAR (extrapolated) = 1.22 W/kg
SAR(1 g) = 0.358 W/kg; SAR(10 g) = 0.141 W/kg
Maximum value of SAR (measured) = 0.662 W/kg



RF Exposure Lab

Plot 18

DUT: PRO360-5G; Type: Wireless TV Video Case; Serial: AVWPRO31222008397

Communication System: WiFi 802.11a (OFDM, 6 Mbps); Frequency: 5785 MHz; Duty Cycle: 1:1
Medium: HSL3-6GHz; Medium parameters used (interpolated): f = 5785 MHz; σ = 5.315 S/m; ε_r = 34.14; ρ = 1000 kg/m^3
Phantom section: Flat Section

Test Date: Date: 6/21/2023; Ambient Temp: 23 °C; Tissue Temp: 21 °C

Probe: EX3DV4 - SN7530; ConvF(4.6, 4.58, 4.72); Calibrated: 1/17/2023
Sensor-Surface: 2mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1217; Calibrated: 2/14/2023
Phantom: ELI v5.0; Type: QDOVA002AA; Serial: 2037
Measurement SW: DASY52, Version 52.10 (0); SEMCAD X Version 14.6.10 (7417)

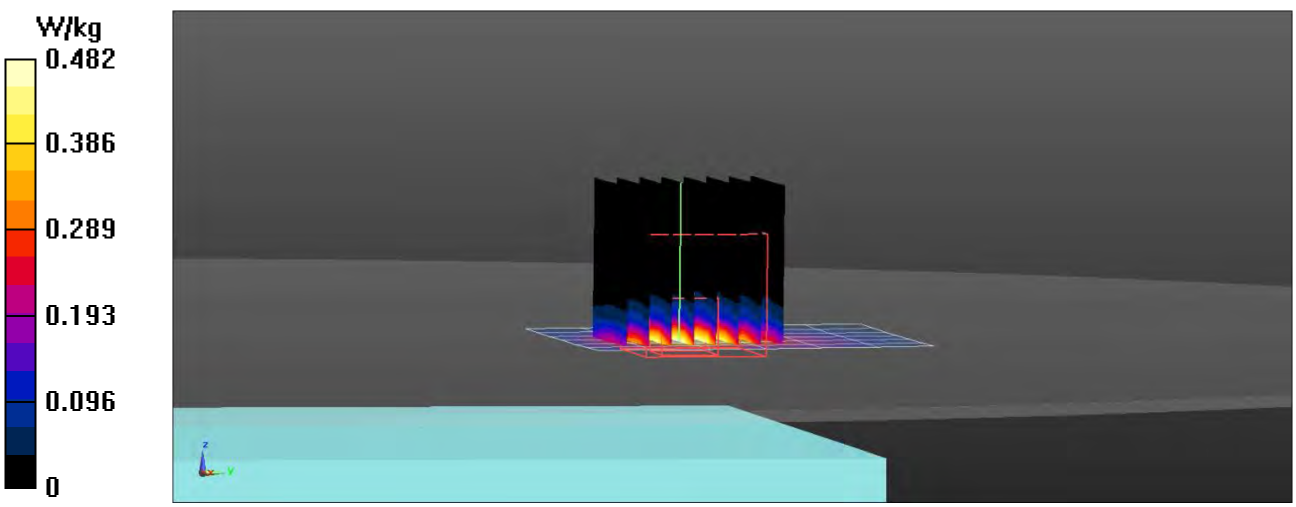
Procedure Notes:

5800 MHz/Ant W2 157/Area Scan (7x7x1): Measurement grid: dx=10mm, dy=10mm

Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (measured) = 0.526 W/kg

5800 MHz/Ant W2 157/Zoom Scan (8x8x16)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=2mm
Reference Value = 1.163 V/m; Power Drift = -0.02 dB
Peak SAR (extrapolated) = 0.912 W/kg
SAR(1 g) = 0.266 W/kg; SAR(10 g) = 0.105 W/kg

Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (measured) = 0.482 W/kg



Appendix C – SAR Test Setup Photos

Photo Removed

Test Position Back 15 mm Gap

Note: Power cable removed for testing.

Photo Removed

Front of Device

Photo Removed

Cable Side of Device

Photo Removed

Tested Side of the Device with Battery Removed

Photo Removed

Battery

Appendix D – Probe Calibration Data Sheets

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

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

Accredited by the Swiss Accreditation Service (SAS)
The Swiss Accreditation Service is one of the signatories to the EA Multilateral Agreement for the recognition of calibration certificates

Accreditation No.: SCS 0108

Client **RF Exposure Lab**

Certificate No **EX-7530_Jan23**

CALIBRATION CERTIFICATE

Object	EX3DV4 - SN:7530
Calibration procedure(s)	QA CAL-01.v10, QA CAL-12.v10, QA CAL-14.v7, QA CAL-23.v6, QA CAL-25.v8 Calibration procedure for dosimetric E-field probes
Calibration date	January 17, 2023

This calibration certificate documents the traceability to national standards, which realize the physical units of measurements (SI).
The measurements and the uncertainties with confidence probability are given on the following pages and are part of the certificate.

All calibrations have been conducted in the closed laboratory facility: environment temperature (22 ± 3)°C and humidity < 70%.

Calibration Equipment used (M&TE critical for calibration)

Primary Standards	ID	Cal Date (Certificate No.)	Scheduled Calibration
Power meter NRP	SN: 104778	04-Apr-22 (No. 217-03525/03524)	Apr-23
Power sensor NRP-Z91	SN: 103244	04-Apr-22 (No. 217-03524)	Apr-23
OCP DAK-3.5 (weighted)	SN: 1249	20-Oct-22 (OCP-DAK3.5-1249_Oct22)	Oct-23
OCP DAK-12	SN: 1016	20-Oct-22 (OCP-DAK12-1016_Oct22)	Oct-23
Reference 20 dB Attenuator	SN: CC2552 (20x)	04-Apr-22 (No. 217-03527)	Apr-23
DAE4	SN: 660	10-Oct-22 (No. DAE4-660_Oct22)	Oct-23
Reference Probe ES3DV2	SN: 3013	06-Jan-23 (No. ES3-3013_Jan23)	Jan-24

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

	Name	Function	Signature
Calibrated by	Joanna Lleshaj	Laboratory Technician	
Approved by	Sven Kühn	Technical Manager	

Issued: January 23, 2023

Glossary

TSL	tissue simulating liquid
NORMx,y,z	sensitivity in free space
ConvF	sensitivity in TSL / NORMx,y,z
DCP	diode compression point
CF	crest factor (1/duty_cycle) of the RF signal
A, B, C, D	modulation dependent linearization parameters
Polarization φ	φ rotation around probe axis
Polarization ϑ	ϑ rotation around an axis that is in the plane normal to probe axis (at measurement center), i.e., $\vartheta = 0$ is normal to probe axis
Connector Angle	information used in DASY system to align probe sensor X to the robot coordinate system

Calibration is Performed According to the Following Standards:

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

Methods Applied and Interpretation of Parameters:

- *NORMx,y,z*: Assessed for E-field polarization $\vartheta = 0$ ($f \leq 900$ MHz in TEM-cell; $f > 1800$ MHz: R22 waveguide). NORMx,y,z are only intermediate values, i.e., the uncertainties of NORMx,y,z does not affect the E^2-field uncertainty inside TSL (see below *ConvF*).
- *NORM(f)x,y,z = NORMx,y,z * frequency_response* (see Frequency Response Chart). This linearization is implemented in DASY4 software versions later than 4.2. The uncertainty of the frequency response is included in the stated uncertainty of ConvF.
- *DCPx,y,z*: DCP are numerical linearization parameters assessed based on the data of power sweep with CW signal. DCP does not depend on frequency nor media.
- *PAR*: PAR is the Peak to Average Ratio that is not calibrated but determined based on the signal characteristics
- *Ax,y,z; Bx,y,z; Cx,y,z; Dx,y,z; VRx,y,z: A, B, C, D* are numerical linearization parameters assessed based on the data of power sweep for specific modulation signal. The parameters do not depend on frequency nor media. VR is the maximum calibration range expressed in RMS voltage across the diode.
- *ConvF and Boundary Effect Parameters*: Assessed in flat phantom using E-field (or Temperature Transfer Standard for $f \leq 800$ MHz) and inside waveguide using analytical field distributions based on power measurements for $f > 800$ MHz. The same setups are used for assessment of the parameters applied for boundary compensation (alpha, depth) of which typical uncertainty values are given. These parameters are used in DASY4 software to improve probe accuracy close to the boundary. The sensitivity in TSL corresponds to *NORMx,y,z * ConvF* whereby the uncertainty corresponds to that given for *ConvF*. A frequency dependent *ConvF* is used in DASY version 4.4 and higher which allows extending the validity from ± 50 MHz to ± 100 MHz.
- *Spherical isotropy (3D deviation from isotropy)*: in a field of low gradients realized using a flat phantom exposed by a patch antenna.
- *Sensor Offset*: The sensor offset corresponds to the offset of virtual measurement center from the probe tip (on probe axis). No tolerance required.
- *Connector Angle*: The angle is assessed using the information gained by determining the *NORMx* (no uncertainty required).

Parameters of Probe: EX3DV4 - SN:7530

Basic Calibration Parameters

	Sensor X	Sensor Y	Sensor Z	Unc ($k = 2$)
Norm ($\mu V/(V/m)^2$) [A]	0.42	0.53	0.42	±10.1%
DCP (mV) [B]	96.0	95.0	98.0	±4.7%

Calibration Results for Modulation Response

UID	Communication System Name		A dB	B $dB\sqrt{\mu V}$	C	D dB	VR mV	Max dev.	Max Unc[E] $k = 2$
0	CW	X	0.00	0.00	1.00	0.00	128.4	±2.5%	±4.7%
		Y	0.00	0.00	1.00		120.9		
		Z	0.00	0.00	1.00		104.7		

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

[A] The uncertainties of Norm X,Y,Z do not affect the E^2-field uncertainty inside TSL (see Page 5).
[B] Linearization parameter uncertainty for maximum specified field strength.
[E] Uncertainty is determined using the max. deviation from linear response applying rectangular distribution and is expressed for the square of the field value.

Parameters of Probe: EX3DV4 - SN:7530

Other Probe Parameters

Sensor Arrangement	Triangular
Connector Angle	35.7°
Mechanical Surface Detection Mode	enabled
Optical Surface Detection Mode	disabled
Probe Overall Length	337 mm
Probe Body Diameter	10 mm
Tip Length	9 mm
Tip Diameter	2.5 mm
Probe Tip to Sensor X Calibration Point	1 mm
Probe Tip to Sensor Y Calibration Point	1 mm
Probe Tip to Sensor Z Calibration Point	1 mm
Recommended Measurement Distance from Surface	1.4 mm

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

Parameters of Probe: EX3DV4 - SN:7530

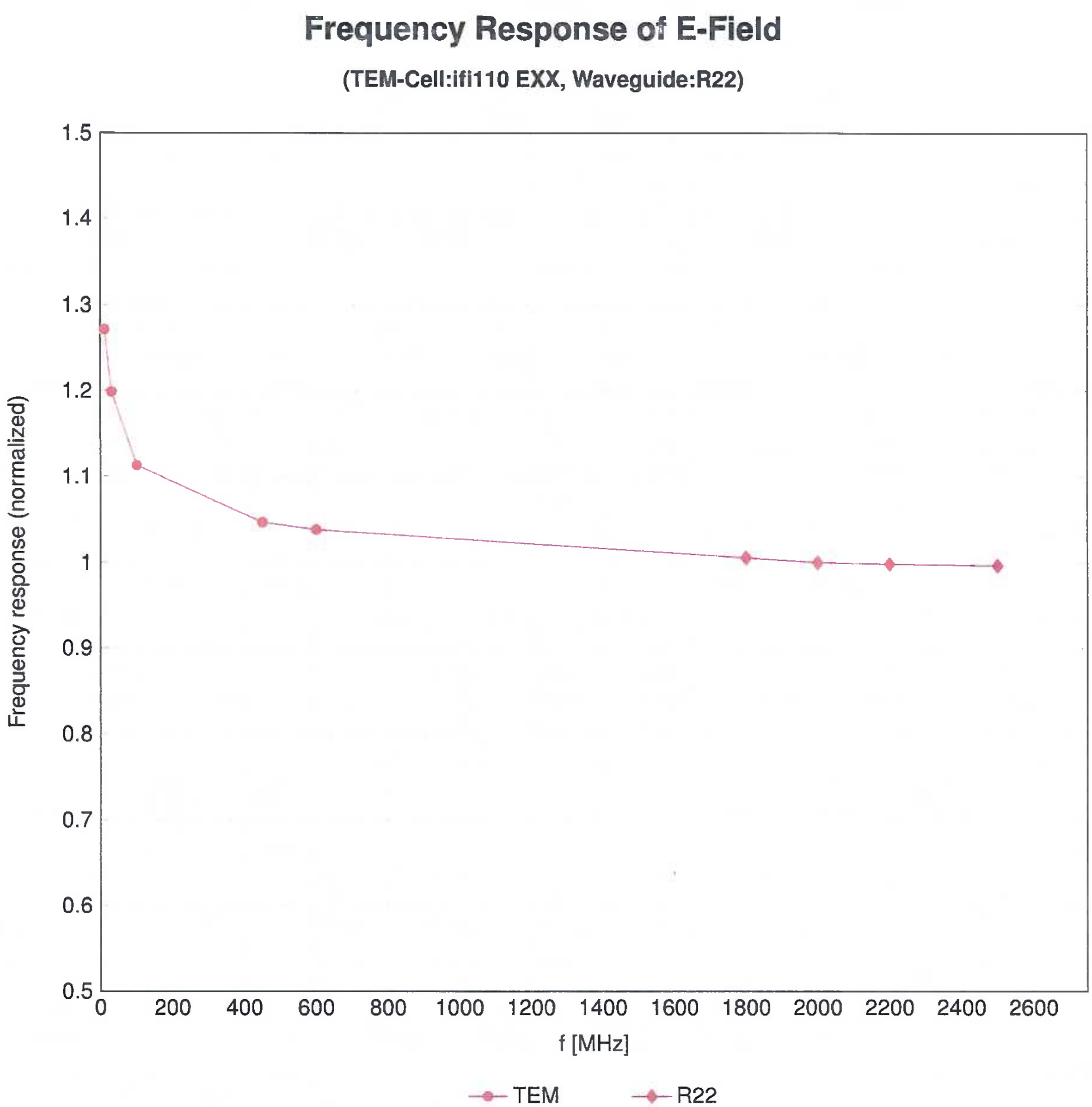
Calibration Parameter Determined in Head Tissue Simulating Media

f (MHz)[C]	Relative Permittivity[F]	Conductivity[F] (S/m)	ConvF X	ConvF Y	ConvF Z	Alpha[G]	Depth[G] (mm)	Unc ($k = 2$)
13	55.0	0.75	22.02	22.02	22.02	0.00	1.25	±13.3%
30	55.0	0.75	19.87	19.87	19.87	0.00	1.25	±13.3%
750	41.9	0.89	9.62	9.26	10.37	0.35	1.27	±12.0%
900	41.5	0.97	9.50	9.25	9.30	0.35	1.27	±12.0%
1300	40.8	1.14	8.19	8.15	8.38	0.40	1.27	±12.0%
1750	40.1	1.37	8.28	8.22	8.47	0.28	1.27	±12.0%
1900	40.0	1.40	8.14	8.08	8.31	0.29	1.27	±12.0%
2300	39.5	1.67	7.59	7.55	7.71	0.30	1.27	±12.0%
2450	39.2	1.80	7.18	7.11	7.21	0.32	1.27	±12.0%
2600	39.0	1.96	7.54	7.33	7.61	0.32	1.27	±12.0%
3300	38.2	2.71	6.92	6.92	7.03	0.35	1.27	±14.0%
3500	37.9	2.91	6.65	6.65	6.76	0.36	1.27	±14.0%
3700	37.7	3.12	6.51	6.52	6.65	0.37	1.27	±14.0%
3900	37.5	3.32	6.83	6.80	6.94	0.37	1.27	±14.0%
4200	37.1	3.63	6.47	6.47	6.61	0.37	1.27	±14.0%
4600	36.7	4.04	6.22	6.23	6.35	0.40	1.27	±14.0%
4950	36.3	4.40	5.65	5.58	5.83	0.43	1.36	±14.0%
5250	35.9	4.71	5.26	5.20	5.38	0.34	1.62	±14.0%
5600	35.5	5.07	4.49	4.39	4.63	0.41	1.67	±14.0%
5750	35.4	5.22	4.60	4.58	4.72	0.43	1.75	±14.0%

[C] Frequency validity above 300 MHz of ±100 MHz only applies for DASY v4.4 and higher (see Page 2), else it is restricted to ±50 MHz. The uncertainty is the RSS of the ConvF uncertainty at calibration frequency and the uncertainty for the indicated frequency band. Frequency validity below 300 MHz is ±10, 25, 40, 50 and 70 MHz for ConvF assessments at 30, 64, 128, 150 and 220 MHz respectively. Validity of ConvF assessed at 6 MHz is 4–9 MHz, and ConvF assessed at 13 MHz is 9–19 MHz. Above 5 GHz frequency validity can be extended to ±110 MHz.

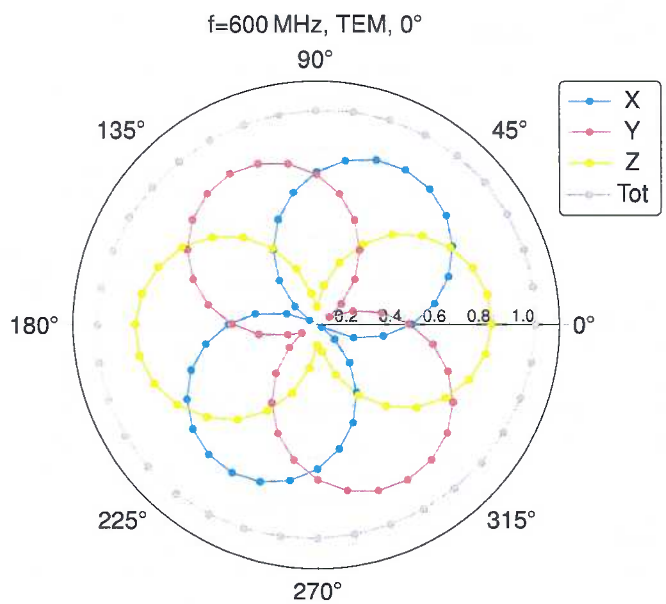
[F] The probes are calibrated using tissue simulating liquids (TSL) that deviate for ε and σ by less than ±5% from the target values (typically better than ±3%) and are valid for TSL with deviations of up to ±10%. If TSL with deviations from the target of less than ±5% are used, the calibration uncertainties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

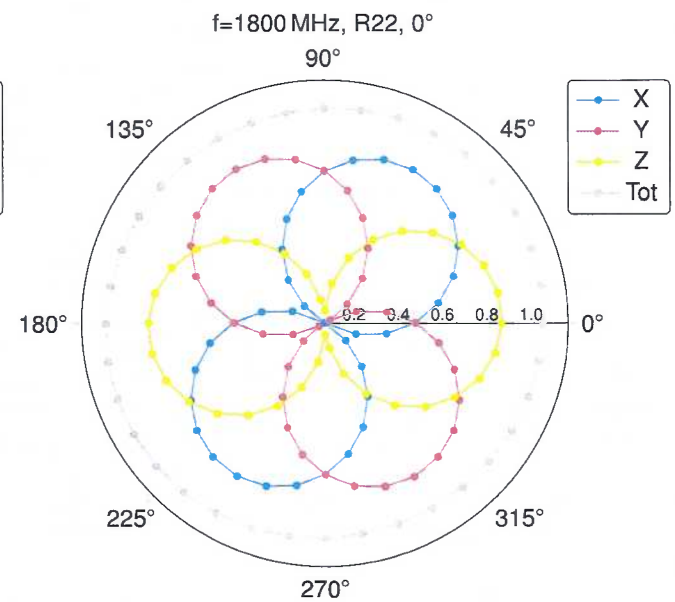
[G] Alpha/Depth are determined during calibration. SPEAG warrants that the remaining deviation due to the boundary effect after compensation is always less than ±1% for frequencies below 3 GHz and below ±2% for frequencies between 3–6 GHz at any distance larger than half the probe tip diameter from the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

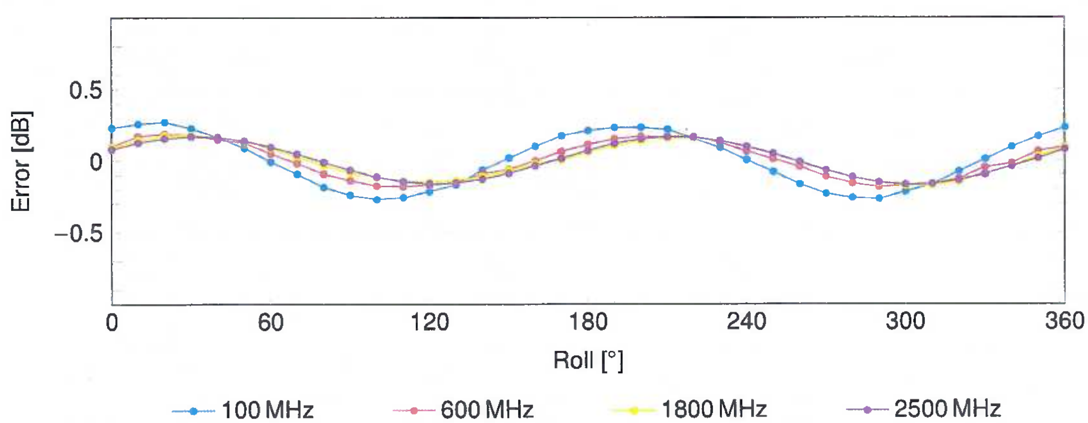


Uncertainty of Frequency Response of E-field: ±6.3% (k=2)

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



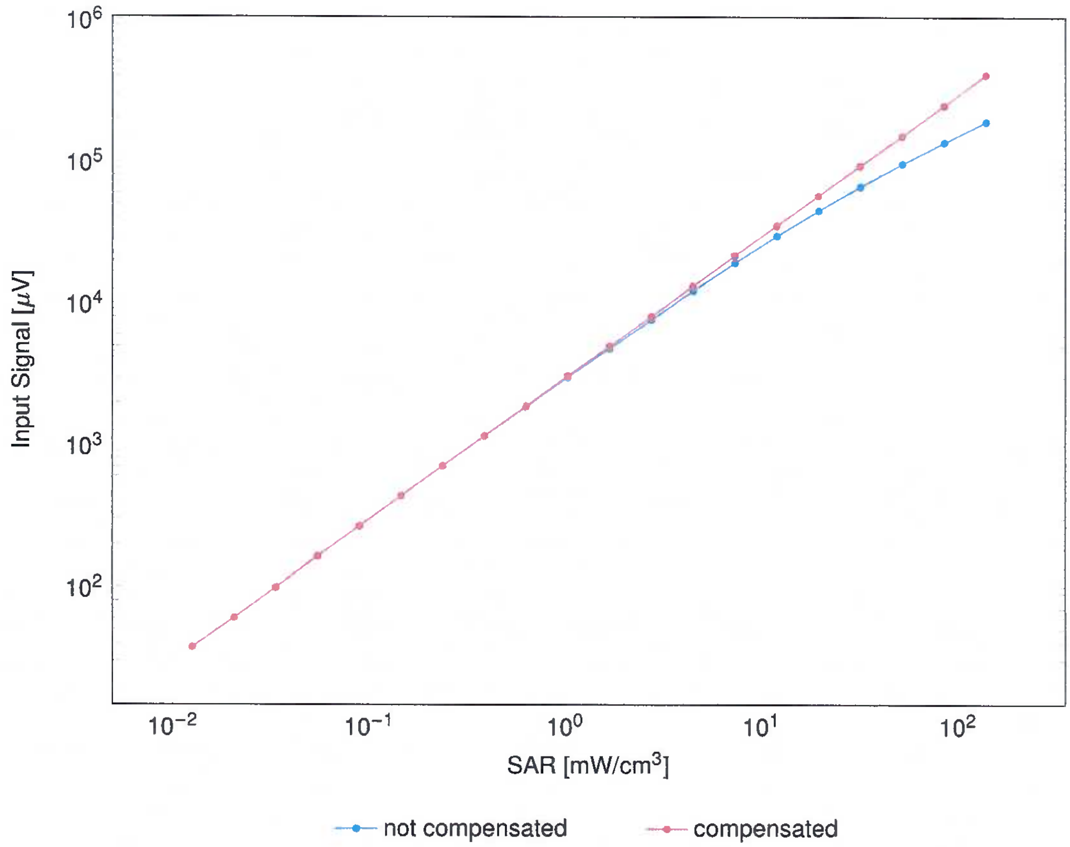


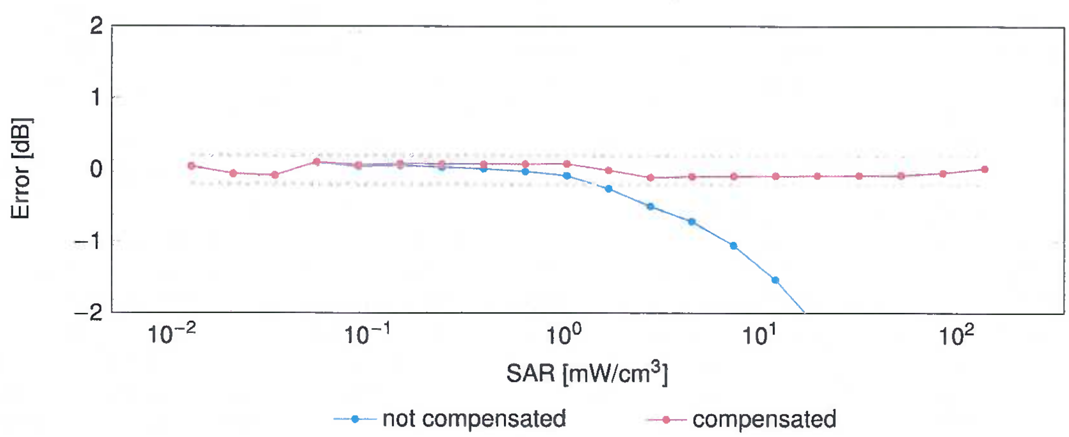


Uncertainty of Axial Isotropy Assessment: ±0.5% (k=2)

Dynamic Range f(SAR_{head})

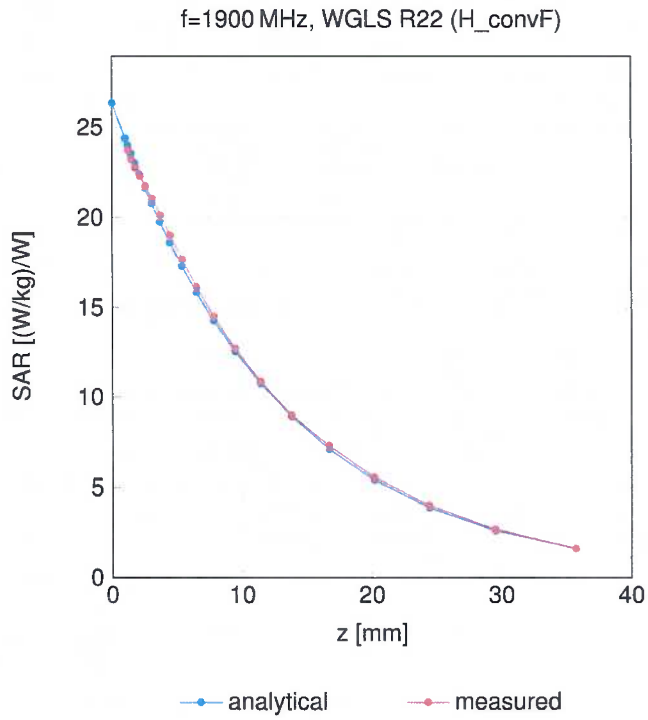
(TEM cell, f_{eval} = 1900 MHz)



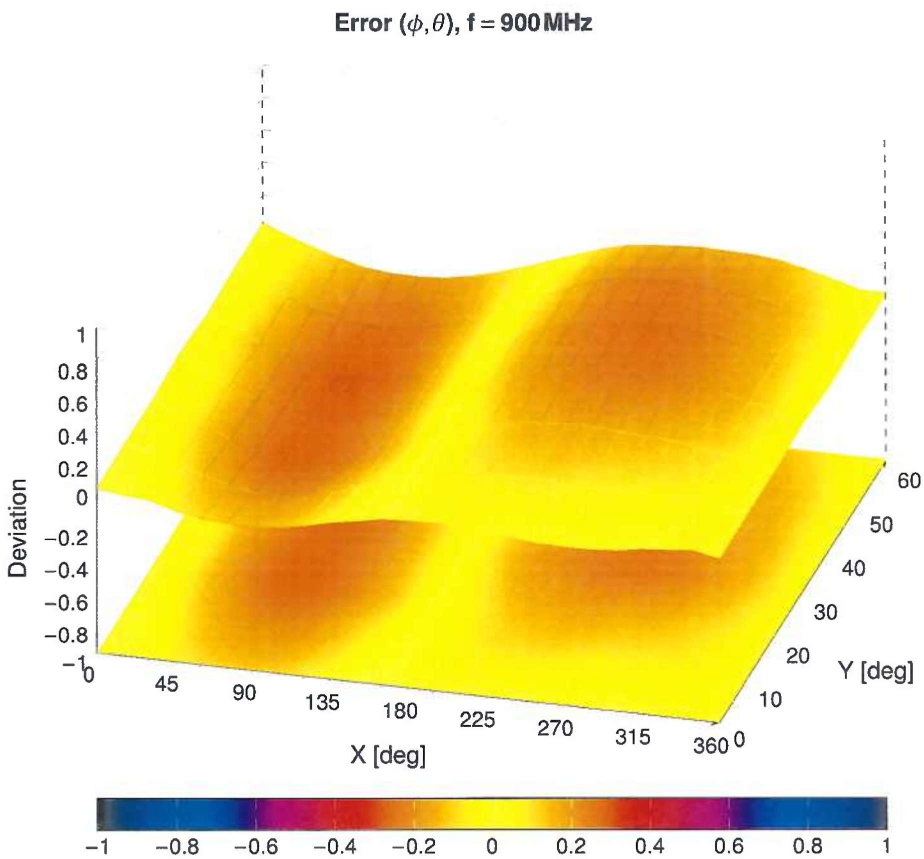


Uncertainty of Linearity Assessment: ±0.6% (k=2)

Conversion Factor Assessment



Deviation from Isotropy in Liquid



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

Appendix E – Dipole Calibration Data Sheets

jm

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: D750V3-1053_Jun21

CALIBRATION CERTIFICATE

Object	D750V3 - SN:1053
Calibration procedure(s)	QA CAL-05.v11 Calibration Procedure for SAR Validation Sources between 0.7-3 GHz
Calibration date:	June 04, 2021

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	09-Apr-21 (No. 217-03291/03292)	Apr-22
Power sensor NRP-Z91	SN: 103244	09-Apr-21 (No. 217-03291)	Apr-22
Power sensor NRP-Z91	SN: 103245	09-Apr-21 (No. 217-03292)	Apr-22
Reference 20 dB Attenuator	SN: BH9394 (20k)	09-Apr-21 (No. 217-03343)	Apr-22
Type-N mismatch combination	SN: 310982 / 06327	09-Apr-21 (No. 217-03344)	Apr-22
Reference Probe EX3DV4	SN: 7349	28-Dec-20 (No. EX3-7349_Dec20)	Dec-21
DAE4	SN: 601	02-Nov-20 (No. DAE4-601_Nov20)	Nov-21

Secondary Standards	ID #	Check Date (in house)	Scheduled Check
Power meter E4419B	SN: GB39512475	30-Oct-14 (in house check Oct-20)	In house check: Oct-22
Power sensor HP 8481A	SN: US37292783	07-Oct-15 (in house check Oct-20)	In house check: Oct-22
Power sensor HP 8481A	SN: MY41092317	07-Oct-15 (in house check Oct-20)	In house check: Oct-22
RF generator R&S SMT-06	SN: 100972	15-Jun-15 (in house check Oct-20)	In house check: Oct-22
Network Analyzer Agilent E8358A	SN: US41080477	31-Mar-14 (in house check Oct-20)	In house check: Oct-21

	Name	Function	Signature
Calibrated by:	Michael Weber	Laboratory Technician	M.Weber
Approved by:	Katja Pokovic	Technical Manager	

Issued: June 8, 2021

Glossary:

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

Calibration is Performed According to the Following Standards:

a) IEEE Std 1528-2013, "IEEE Recommended Practice for Determining the Peak Spatial-Averaged Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques", June 2013
b) IEC 62209-1, "Measurement procedure for the assessment of Specific Absorption Rate (SAR) from hand-held and body-mounted devices used next to the ear (frequency range of 300 MHz to 6 GHz)", July 2016
c) IEC 62209-2, "Procedure to determine the Specific Absorption Rate (SAR) for wireless communication devices used in close proximity to the human body (frequency range of 30 MHz to 6 GHz)", March 2010
d) KDB 865664, "SAR Measurement Requirements for 100 MHz to 6 GHz"

Additional Documentation:

e) DASY4/5 System Handbook

Methods Applied and Interpretation of Parameters:

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

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

Measurement Conditions

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

DASY Version	DASY5	V52.10.4
Extrapolation	Advanced Extrapolation	
Phantom	Modular Flat Phantom	
Distance Dipole Center - TSL	15 mm	with Spacer
Zoom Scan Resolution	dx, dy, dz = 5 mm	
Frequency	750 MHz ± 1 MHz	

Head TSL parameters

The following parameters and calculations were applied.

	Temperature	**Permittivity**	**Conductivity**
Nominal Head TSL parameters	22.0 °C	41.9	0.89 mho/m
Measured Head TSL parameters	(22.0 ± 0.2) °C	42.7 ± 6 %	0.91 mho/m ± 6 %
Head TSL temperature change during test	< 0.5 °C	----	----

SAR result with Head TSL

SAR averaged over 1 cm^3 (1 g) of Head TSL	Condition	
SAR measured	250 mW input power	2.17 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**8.57 W/kg ± 17.0 % (k=2)**

SAR averaged over 10 cm^3 (10 g) of Head TSL	condition	
SAR measured	250 mW input power	1.41 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**5.58 W/kg ± 16.5 % (k=2)**

Appendix (Additional assessments outside the scope of SCS 0108)

Antenna Parameters with Head TSL

Impedance, transformed to feed point	56.5 Ω + 0.1 jΩ
Return Loss	- 24.3 dB

General Antenna Parameters and Design

Electrical Delay (one direction)	1.035 ns

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

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

Additional EUT Data

Manufactured by	SPEAG

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

D750V3 SN: 1053 - Head						
Date of Measurement	Return Loss (dB)	Δ%	Impedance Real (Ω)	ΔΩ	Impedance Imaginary (jΩ)	ΔΩ
6/4/2021	-24.3		56.5		0.1	
6/4/2022	-26.2	7.8	57.9	1.4	0.3	0.2
6/6/2023	-25.6	5.3	55.2	-1.3	0.4	0.3

DASY5 Validation Report for Head TSL

Date: 04.06.2021

Test Laboratory: SPEAG, Zurich, Switzerland

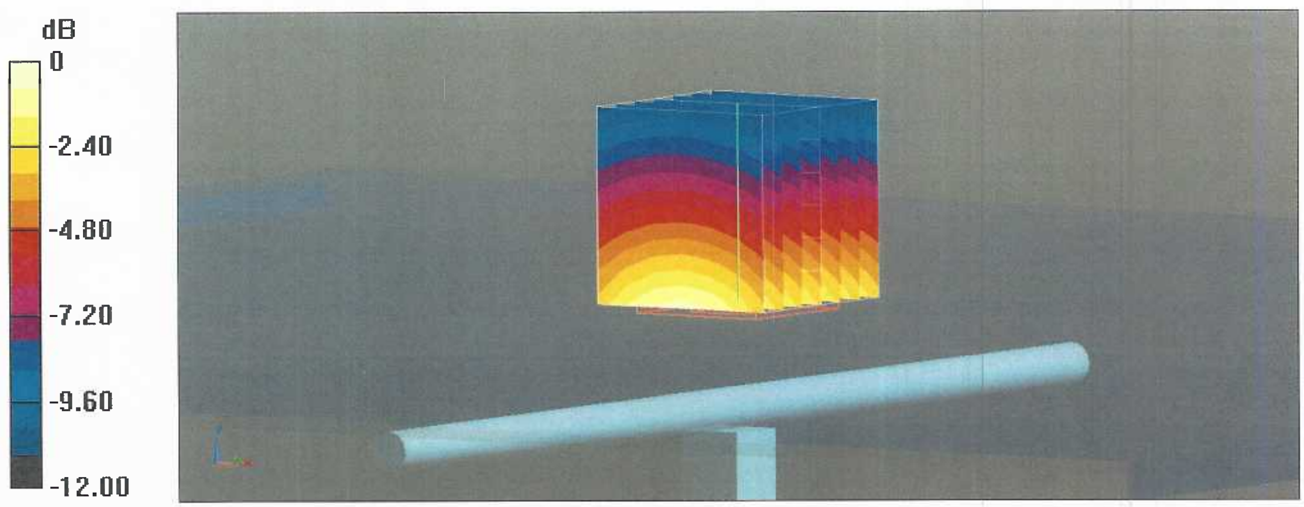
DUT: Dipole 750 MHz; Type: D750V3; Serial: D750V3 - SN:1053

Communication System: UID 0 - CW; Frequency: 750 MHz
Medium parameters used: f = 750 MHz; $\sigma = 0.91$ S/m; $\varepsilon_r = 42.7$; $\rho = 1000$ kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2011)

DASY52 Configuration:

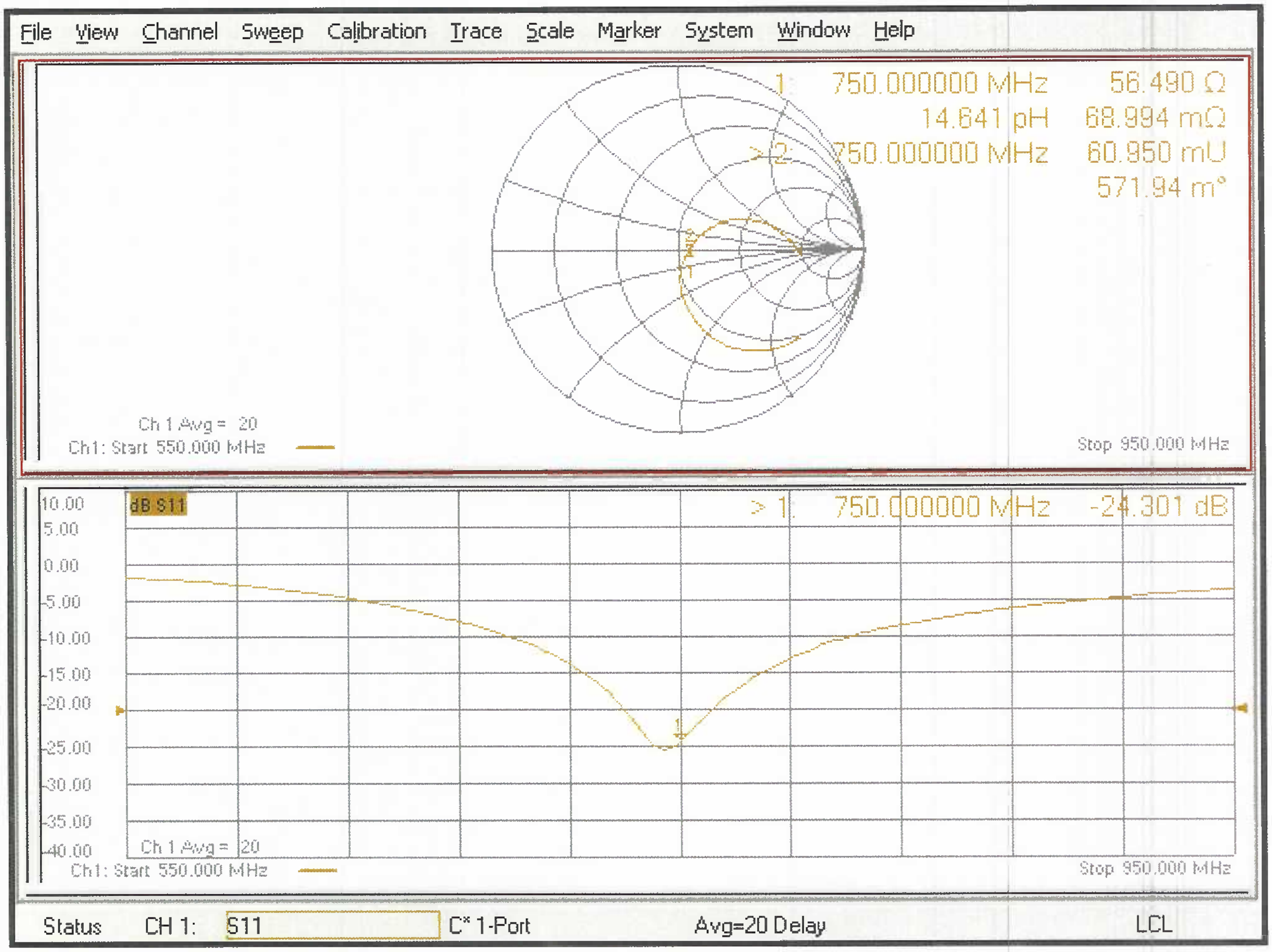
- Probe: EX3DV4 - SN7349; ConvF(10.11, 10.11, 10.11) @ 750 MHz; Calibrated: 28.12.2020
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 02.11.2020
- Phantom: Flat Phantom 4.9 (front); Type: QD 00L P49 AA; Serial: 1001
- DASY52 52.10.4(1527); SEMCAD X 14.6.14(7483)

Dipole Calibration for Head Tissue/Pin=250 mW, d=15mm/Zoom Scan (7x7x7)/Cube 0:
Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 59.74 V/m; Power Drift = 0.01 dB
Peak SAR (extrapolated) = 3.30 W/kg
SAR(1 g) = 2.17 W/kg; SAR(10 g) = 1.41 W/kg
Smallest distance from peaks to all points 3 dB below: Larger than measurement grid (> 30mm)
Ratio of SAR at M2 to SAR at M1 = 65.5%
Maximum value of SAR (measured) = 2.93 W/kg



0 dB = 2.93 W/kg = 4.67 dBW/kg

Impedance Measurement Plot for Head TSL



Jm

Calibration Laboratory of
Schmid & Partner
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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: D900V2-1d128_Jun21

CALIBRATION CERTIFICATE

Object: D900V2 - SN:1d128

Calibration procedure(s): QA CAL-05.v11
Calibration Procedure for SAR Validation Sources between 0.7-3 GHz

Calibration date: June 04, 2021

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	09-Apr-21 (No. 217-03291/03292)	Apr-22
Power sensor NRP-Z91	SN: 103244	09-Apr-21 (No. 217-03291)	Apr-22
Power sensor NRP-Z91	SN: 103245	09-Apr-21 (No. 217-03292)	Apr-22
Reference 20 dB Attenuator	SN: BH9394 (20k)	09-Apr-21 (No. 217-03343)	Apr-22
Type-N mismatch combination	SN: 310982 / 06327	09-Apr-21 (No. 217-03344)	Apr-22
Reference Probe EX3DV4	SN: 7349	28-Dec-20 (No. EX3-7349_Dec20)	Dec-21
DAE4	SN: 601	02-Nov-20 (No. DAE4-601_Nov20)	Nov-21

Secondary Standards	ID #	Check Date (in house)	Scheduled Check
Power meter E4419B	SN: GB39512475	30-Oct-14 (in house check Oct-20)	In house check: Oct-22
Power sensor HP 8481A	SN: US37292783	07-Oct-15 (in house check Oct-20)	In house check: Oct-22
Power sensor HP 8481A	SN: MY41092317	07-Oct-15 (in house check Oct-20)	In house check: Oct-22
RF generator R&S SMT-06	SN: 100972	15-Jun-15 (in house check Oct-20)	In house check: Oct-22
Network Analyzer Agilent E8358A	SN: US41080477	31-Mar-14 (in house check Oct-20)	In house check: Oct-21

	Name	Function	Signature
Calibrated by:	Michael Weber	Laboratory Technician	M.Weber
Approved by:	Katja Pokovic	Technical Manager	

Issued: June 8, 2021

Glossary:

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

Calibration is Performed According to the Following Standards:

a) IEEE Std 1528-2013, "IEEE Recommended Practice for Determining the Peak Spatial-Averaged Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques", June 2013
b) IEC 62209-1, "Measurement procedure for the assessment of Specific Absorption Rate (SAR) from hand-held and body-mounted devices used next to the ear (frequency range of 300 MHz to 6 GHz)", July 2016
c) IEC 62209-2, "Procedure to determine the Specific Absorption Rate (SAR) for wireless communication devices used in close proximity to the human body (frequency range of 30 MHz to 6 GHz)", March 2010
d) KDB 865664, "SAR Measurement Requirements for 100 MHz to 6 GHz"

Additional Documentation:

e) DASY4/5 System Handbook

Methods Applied and Interpretation of Parameters:

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

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

Measurement Conditions

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

DASY Version	DASY5	V52.10.4
Extrapolation	Advanced Extrapolation	
Phantom	Modular Flat Phantom	
Distance Dipole Center - TSL	15 mm	with Spacer
Zoom Scan Resolution	dx, dy, dz = 5 mm	
Frequency	900 MHz ± 1 MHz	

Head TSL parameters

The following parameters and calculations were applied.

	Temperature	**Permittivity**	**Conductivity**
Nominal Head TSL parameters	22.0 °C	41.5	0.97 mho/m
Measured Head TSL parameters	(22.0 ± 0.2) °C	42.3 ± 6 %	0.96 mho/m ± 6 %
Head TSL temperature change during test	< 0.5 °C	----	----

SAR result with Head TSL

SAR averaged over 1 cm^3 (1 g) of Head TSL	Condition	
SAR measured	250 mW input power	2.76 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**11.2 W/kg ± 17.0 % (k=2)**

SAR averaged over 10 cm^3 (10 g) of Head TSL	condition	
SAR measured	250 mW input power	1.77 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**7.14 W/kg ± 16.5 % (k=2)**

Appendix (Additional assessments outside the scope of SCS 0108)

Antenna Parameters with Head TSL

Impedance, transformed to feed point	51.0 Ω - 0.6 jΩ
Return Loss	- 38.5 dB

General Antenna Parameters and Design

Electrical Delay (one direction)	1.412 ns

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

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

Additional EUT Data

Manufactured by	SPEAG

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

D900V2 SN: 1d128 - Head

Date of Measurement	Return Loss (dB)	Δ%	Impedance Real (Ω)	ΔΩ	Impedance Imaginary (jΩ)	ΔΩ
6/4/2021	-38.5		51.0		-0.6	
6/4/2022	-37.2	-3.4	52.3	1.3	-0.8	-0.2
6/6/2023	-36.8	-4.4	52.9	1.9	-0.7	-0.1

DASY5 Validation Report for Head TSL

Date: 04.06.2021

Test Laboratory: SPEAG, Zurich, Switzerland

DUT: Dipole 900 MHz; Type: D900V2; Serial: D900V2 - SN:1d128

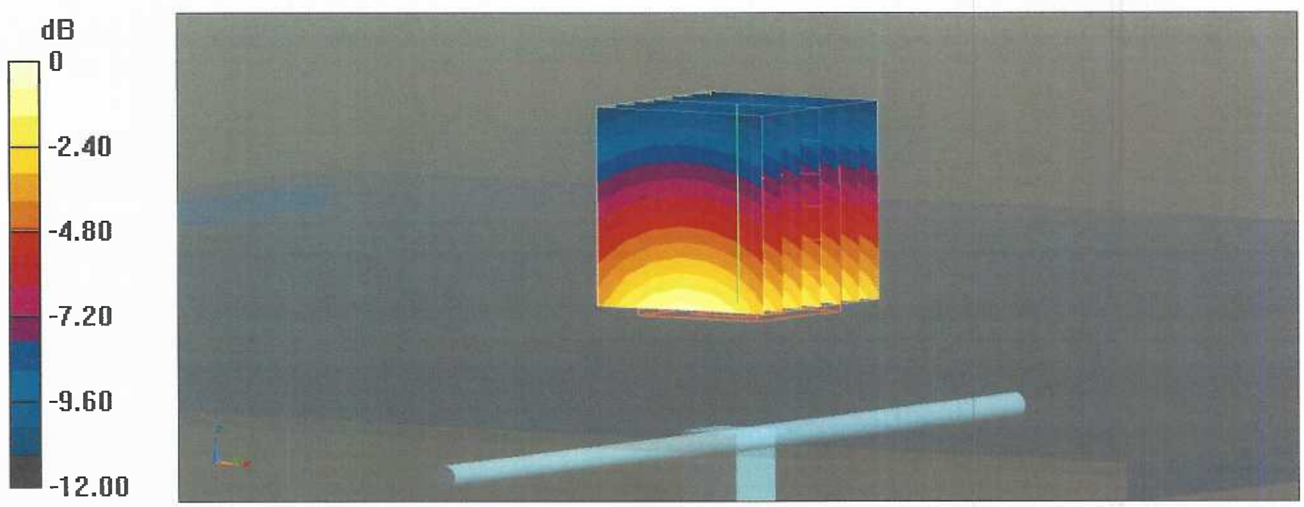
Communication System: UID 0 - CW; Frequency: 900 MHz
Medium parameters used: f = 900 MHz; σ = 0.96 S/m; ε_r = 42.3; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2011)

DASY52 Configuration:

- Probe: EX3DV4 - SN7349; ConvF(9.62, 9.62, 9.62) @ 900 MHz; Calibrated: 28.12.2020
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 02.11.2020
- Phantom: Flat Phantom 4.9 (front); Type: QD 00L P49 AA; Serial: 1001
- DASY52 52.10.4(1527); SEMCAD X 14.6.14(7483)

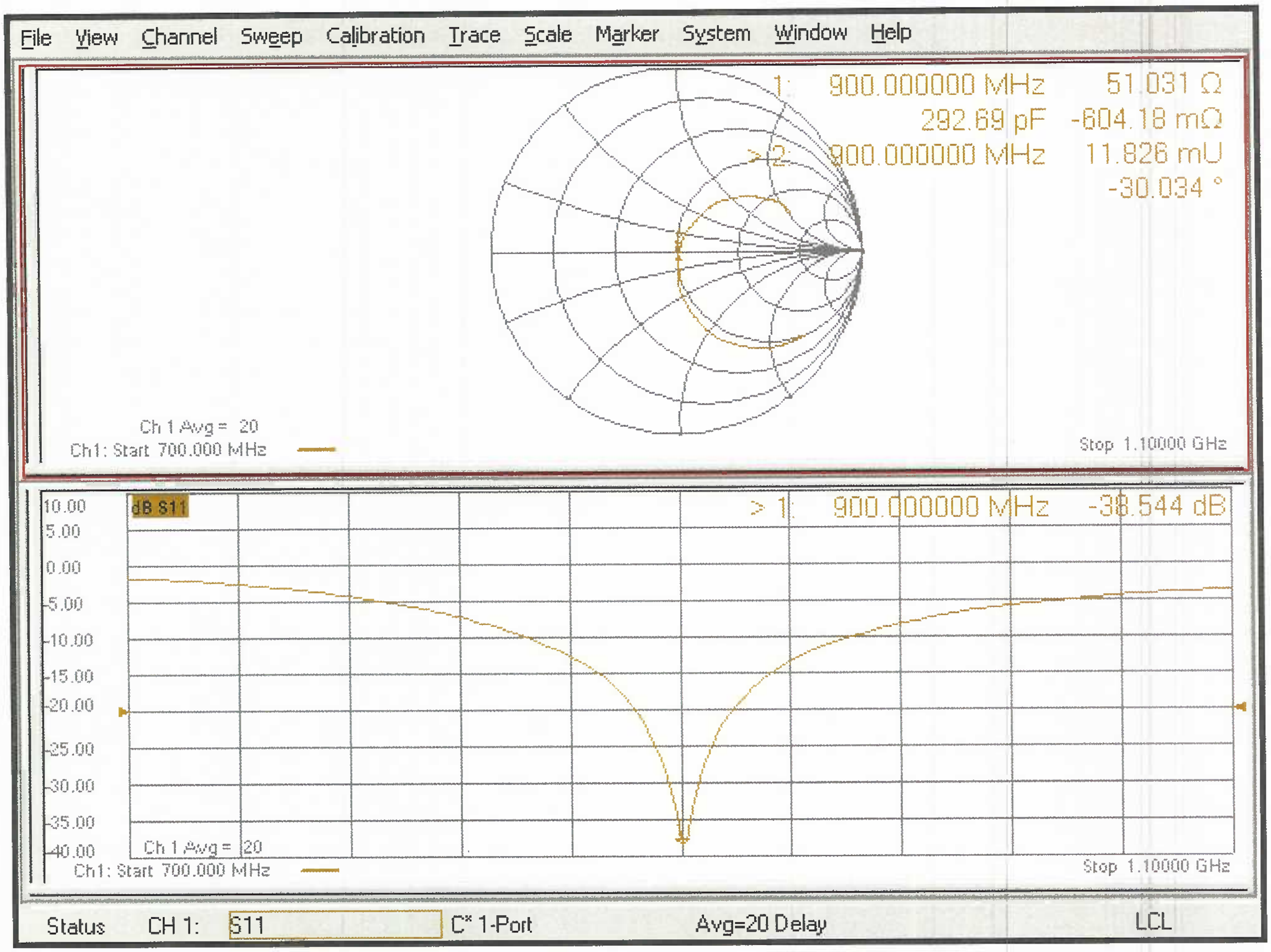
Dipole Calibration for Head Tissue/Pin=250 mW, d=15mm/Zoom Scan (7x7x7)/Cube 0:

Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 65.79 V/m; Power Drift = 0.03 dB
Peak SAR (extrapolated) = 4.23 W/kg
SAR(1 g) = 2.76 W/kg; SAR(10 g) = 1.77 W/kg
Smallest distance from peaks to all points 3 dB below = 16 mm
Ratio of SAR at M2 to SAR at M1 = 65%
Maximum value of SAR (measured) = 3.74 W/kg



0 dB = 3.74 W/kg = 5.73 dBW/kg

Impedance Measurement Plot for Head TSL



Calibration Laboratory of
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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: D1750V2-1061_Jun21

CALIBRATION CERTIFICATE

Object	D1750V2 - SN:1061
Calibration procedure(s)	QA CAL-05.v11 Calibration Procedure for SAR Validation Sources between 0.7-3 GHz
Calibration date:	June 03, 2021

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	09-Apr-21 (No. 217-03291/03292)	Apr-22
Power sensor NRP-Z91	SN: 103244	09-Apr-21 (No. 217-03291)	Apr-22
Power sensor NRP-Z91	SN: 103245	09-Apr-21 (No. 217-03292)	Apr-22
Reference 20 dB Attenuator	SN: BH9394 (20k)	09-Apr-21 (No. 217-03343)	Apr-22
Type-N mismatch combination	SN: 310982 / 06327	09-Apr-21 (No. 217-03344)	Apr-22
Reference Probe EX3DV4	SN: 7349	28-Dec-20 (No. EX3-7349_Dec20)	Dec-21
DAE4	SN: 601	02-Nov-20 (No. DAE4-601_Nov20)	Nov-21

Secondary Standards	ID #	Check Date (in house)	Scheduled Check
Power meter E4419B	SN: GB39512475	30-Oct-14 (in house check Oct-20)	In house check: Oct-22
Power sensor HP 8481A	SN: US37292783	07-Oct-15 (in house check Oct-20)	In house check: Oct-22
Power sensor HP 8481A	SN: MY41092317	07-Oct-15 (in house check Oct-20)	In house check: Oct-22
RF generator R&S SMT-06	SN: 100972	15-Jun-15 (in house check Oct-20)	In house check: Oct-22
Network Analyzer Agilent E8358A	SN: US41080477	31-Mar-14 (in house check Oct-20)	In house check: Oct-21

	Name	Function	Signature
Calibrated by:	Jeffrey Katzman	Laboratory Technician	
Approved by:	Katja Pokovic	Technical Manager	

Issued: June 8, 2021

Glossary:

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

Calibration is Performed According to the Following Standards:

a) IEEE Std 1528-2013, “IEEE Recommended Practice for Determining the Peak Spatial-Averaged Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques”, June 2013
b) IEC 62209-1, “Measurement procedure for the assessment of Specific Absorption Rate (SAR) from hand-held and body-mounted devices used next to the ear (frequency range of 300 MHz to 6 GHz)”, July 2016
c) IEC 62209-2, "Procedure to determine the Specific Absorption Rate (SAR) for wireless communication devices used in close proximity to the human body (frequency range of 30 MHz to 6 GHz)", March 2010
d) KDB 865664, “SAR Measurement Requirements for 100 MHz to 6 GHz”

Additional Documentation:

e) DASY4/5 System Handbook

Methods Applied and Interpretation of Parameters:

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

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

Measurement Conditions

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

DASY Version	DASY5	V52.10.4
Extrapolation	Advanced Extrapolation	
Phantom	Modular Flat Phantom	
Distance Dipole Center - TSL	10 mm	with Spacer
Zoom Scan Resolution	dx, dy, dz = 5 mm	
Frequency	1750 MHz ± 1 MHz	

Head TSL parameters

The following parameters and calculations were applied.

	Temperature	**Permittivity**	**Conductivity**
Nominal Head TSL parameters	22.0 °C	40.1	1.37 mho/m
Measured Head TSL parameters	(22.0 ± 0.2) °C	40.7 ± 6 %	1.37 mho/m ± 6 %
Head TSL temperature change during test	< 0.5 °C	----	----

SAR result with Head TSL

SAR averaged over 1 cm^3 (1 g) of Head TSL	Condition	
SAR measured	250 mW input power	9.38 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**37.7 W/kg ± 17.0 % (k=2)**

SAR averaged over 10 cm^3 (10 g) of Head TSL	condition	
SAR measured	250 mW input power	4.93 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**19.8 W/kg ± 16.5 % (k=2)**

Appendix (Additional assessments outside the scope of SCS 0108)

Antenna Parameters with Head TSL

Impedance, transformed to feed point	49.4 Ω + 0.0 jΩ
Return Loss	- 44.5 dB

General Antenna Parameters and Design

Electrical Delay (one direction)	1.221 ns

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

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

Additional EUT Data

Manufactured by	SPEAG

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

D1750V2 SN: 1061 - Head

Date of Measurement	Return Loss (dB)	Δ%	Impedance Real (Ω)	ΔΩ	Impedance Imaginary (jΩ)	ΔΩ
6/3/2021	-44.5		49.4		0.0	
6/4/2022	-42.3	-4.9	47.9	-1.5	-0.2	-0.2
6/6/2023	-43.6	-2.0	48.5	-0.9	-0.3	-0.3

DASY5 Validation Report for Head TSL

Date: 03.06.2021

Test Laboratory: SPEAG, Zurich, Switzerland

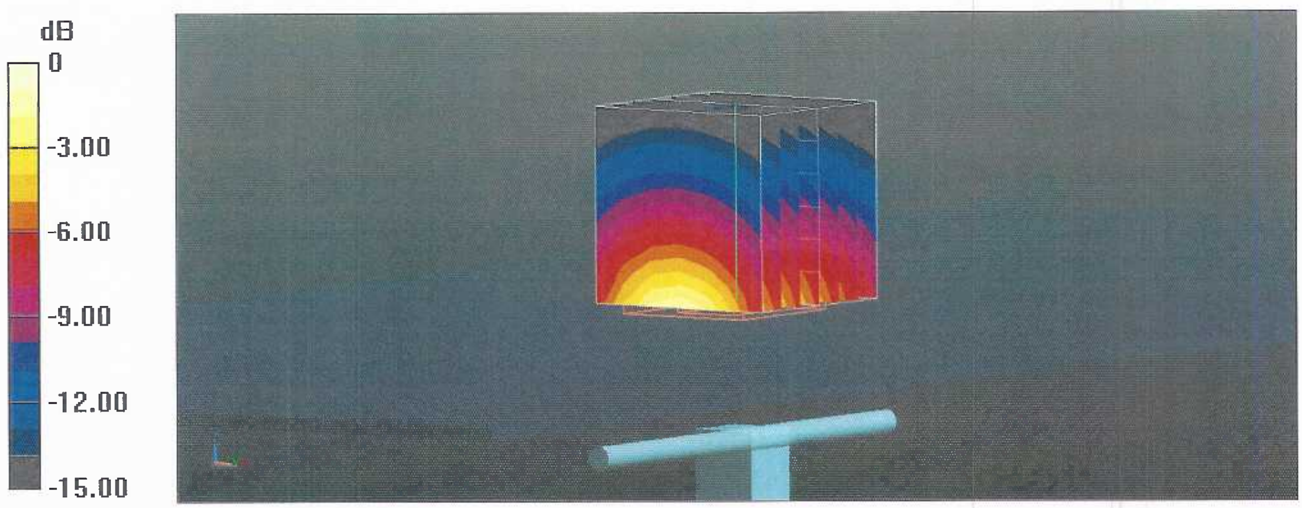
DUT: Dipole 1750 MHz; Type: D1750V2; Serial: D1750V2 - SN:1061

Communication System: UID 0 - CW; Frequency: 1750 MHz
Medium parameters used: f = 1750 MHz; σ = 1.37 S/m; ε_r = 40.7; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2011)

DASY52 Configuration:

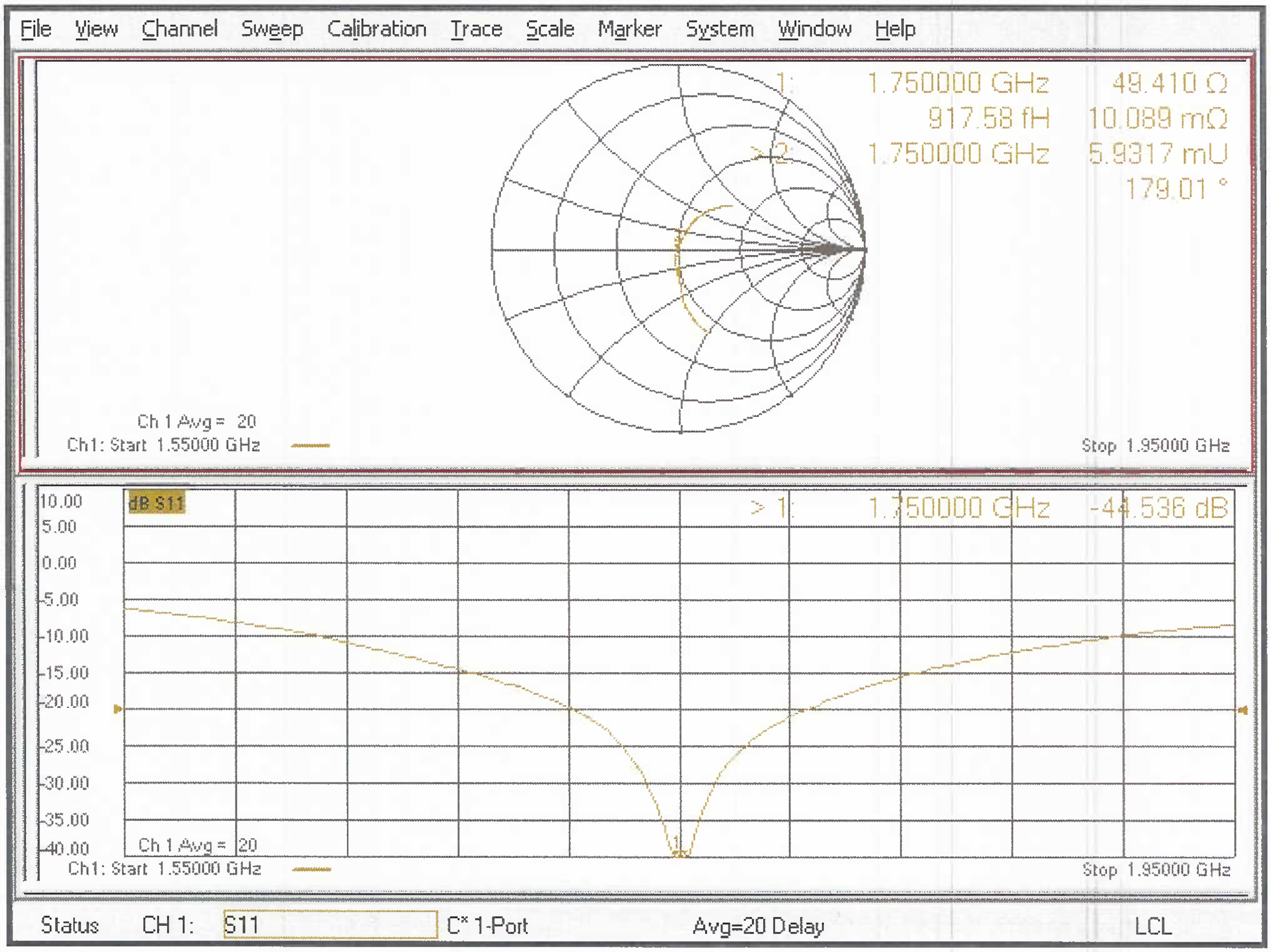
- Probe: EX3DV4 - SN7349; ConvF(8.67, 8.67, 8.67) @ 1750 MHz; Calibrated: 28.12.2020
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 02.11.2020
- Phantom: Flat Phantom 5.0 (front); Type: QD 000 P50 AA; Serial: 1001
- DASY52 52.10.4(1527); SEMCAD X 14.6.14(7483)

Dipole Calibration for Head Tissue/Pin=250 mW, d=10mm/Zoom Scan (7x7x7)/Cube 0:
Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 107.4 V/m; Power Drift = 0.08 dB
Peak SAR (extrapolated) = 17.5 W/kg
SAR(1 g) = 9.38 W/kg; SAR(10 g) = 4.93 W/kg
Smallest distance from peaks to all points 3 dB below = 9.1 mm
Ratio of SAR at M2 to SAR at M1 = 54%
Maximum value of SAR (measured) = 14.6 W/kg



0 dB = 14.6 W/kg = 11.64 dBW/kg

Impedance Measurement Plot for Head TSL



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Accreditation No.: SCS 0108

Client **RF Exposure Lab**

Certificate No: D1900V2-5d147_Jun21

CALIBRATION CERTIFICATE

Object	D1900V2 - SN:5d147
Calibration procedure(s)	QA CAL-05.v11 Calibration Procedure for SAR Validation Sources between 0.7-3 GHz
Calibration date:	June 04, 2021

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	09-Apr-21 (No. 217-03291/03292)	Apr-22
Power sensor NRP-Z91	SN: 103244	09-Apr-21 (No. 217-03291)	Apr-22
Power sensor NRP-Z91	SN: 103245	09-Apr-21 (No. 217-03292)	Apr-22
Reference 20 dB Attenuator	SN: BH9394 (20k)	09-Apr-21 (No. 217-03343)	Apr-22
Type-N mismatch combination	SN: 310982 / 06327	09-Apr-21 (No. 217-03344)	Apr-22
Reference Probe EX3DV4	SN: 7349	28-Dec-20 (No. EX3-7349_Dec20)	Dec-21
DAE4	SN: 601	02-Nov-20 (No. DAE4-601_Nov20)	Nov-21

Secondary Standards	ID #	Check Date (in house)	Scheduled Check
Power meter E4419B	SN: GB39512475	30-Oct-14 (in house check Oct-20)	In house check: Oct-22
Power sensor HP 8481A	SN: US37292783	07-Oct-15 (in house check Oct-20)	In house check: Oct-22
Power sensor HP 8481A	SN: MY41092317	07-Oct-15 (in house check Oct-20)	In house check: Oct-22
RF generator R&S SMT-06	SN: 100972	15-Jun-15 (in house check Oct-20)	In house check: Oct-22
Network Analyzer Agilent E8358A	SN: US41080477	31-Mar-14 (in house check Oct-20)	In house check: Oct-21

	Name	Function	Signature
Calibrated by:	Michael Weber	Laboratory Technician	M.Weber
Approved by:	Katja Pokovic	Technical Manager	

Issued: June 8, 2021

Glossary:

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

Calibration is Performed According to the Following Standards:

a) IEEE Std 1528-2013, "IEEE Recommended Practice for Determining the Peak Spatial-Averaged Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques", June 2013
b) IEC 62209-1, "Measurement procedure for the assessment of Specific Absorption Rate (SAR) from hand-held and body-mounted devices used next to the ear (frequency range of 300 MHz to 6 GHz)", July 2016
c) IEC 62209-2, "Procedure to determine the Specific Absorption Rate (SAR) for wireless communication devices used in close proximity to the human body (frequency range of 30 MHz to 6 GHz)", March 2010
d) KDB 865664, "SAR Measurement Requirements for 100 MHz to 6 GHz"

Additional Documentation:

e) DASY4/5 System Handbook

Methods Applied and Interpretation of Parameters:

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

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

Measurement Conditions

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

DASY Version	DASY5	V52.10.4
Extrapolation	Advanced Extrapolation	
Phantom	Modular Flat Phantom	
Distance Dipole Center - TSL	10 mm	with Spacer
Zoom Scan Resolution	dx, dy, dz = 5 mm	
Frequency	1900 MHz ± 1 MHz	

Head TSL parameters

The following parameters and calculations were applied.

	Temperature	**Permittivity**	**Conductivity**
Nominal Head TSL parameters	22.0 °C	40.0	1.40 mho/m
Measured Head TSL parameters	(22.0 ± 0.2) °C	40.9 ± 6 %	1.41 mho/m ± 6 %
Head TSL temperature change during test	< 0.5 °C	----	----

SAR result with Head TSL

SAR averaged over 1 cm^3 (1 g) of Head TSL	Condition	
SAR measured	250 mW input power	10.1 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**40.4 W/kg ± 17.0 % (k=2)**

SAR averaged over 10 cm^3 (10 g) of Head TSL	condition	
SAR measured	250 mW input power	5.28 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**21.1 W/kg ± 16.5 % (k=2)**

Appendix (Additional assessments outside the scope of SCS 0108)

Antenna Parameters with Head TSL

Impedance, transformed to feed point	53.3 Ω + 5.4 jΩ
Return Loss	- 24.2 dB

General Antenna Parameters and Design

Electrical Delay (one direction)	1.192 ns

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

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

Additional EUT Data

Manufactured by	SPEAG

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

D1900V2 SN: 5d147 - Head

Date of Measurement	Return Loss (dB)	Δ%	Impedance Real (Ω)	ΔΩ	Impedance Imaginary (jΩ)	ΔΩ
6/4/2021	-24.2		53.3		5.4	
6/4/2022	-25.6	5.8	52.6	-0.7	5.7	0.3
6/6/2023	-26.2	8.3	54.6	1.3	5.5	0.1

DASY5 Validation Report for Head TSL

Date: 04.06.2021

Test Laboratory: SPEAG, Zurich, Switzerland

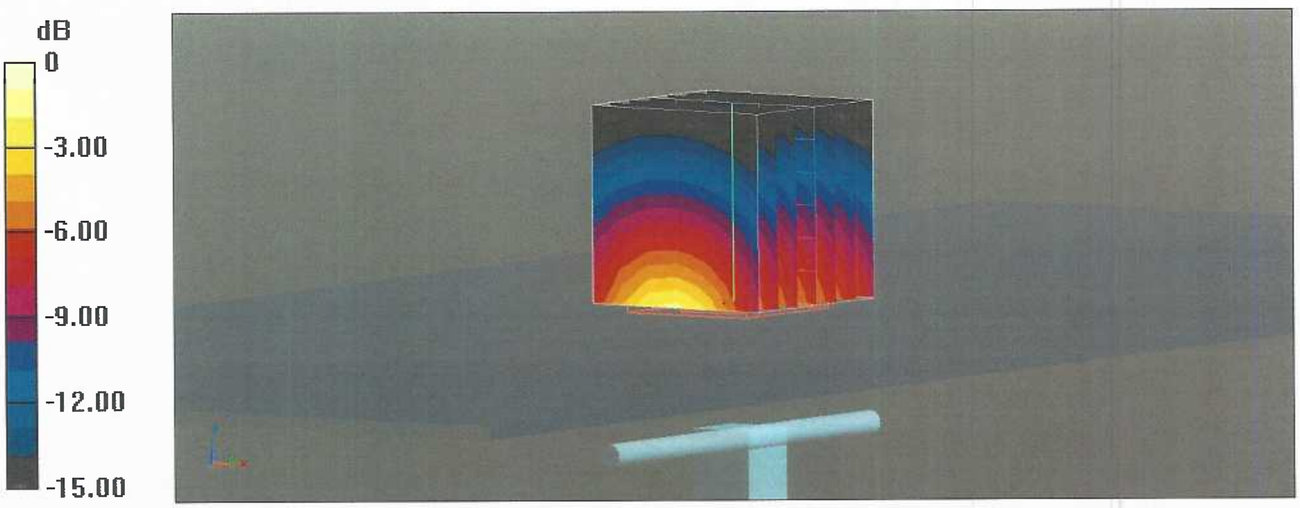
DUT: Dipole 1900 MHz; Type: D1900V2; Serial: D1900V2 - SN:5d147

Communication System: UID 0 - CW; Frequency: 1900 MHz
Medium parameters used: f = 1900 MHz; σ = 1.41 S/m; ε_r = 40.9; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2011)

DASY52 Configuration:

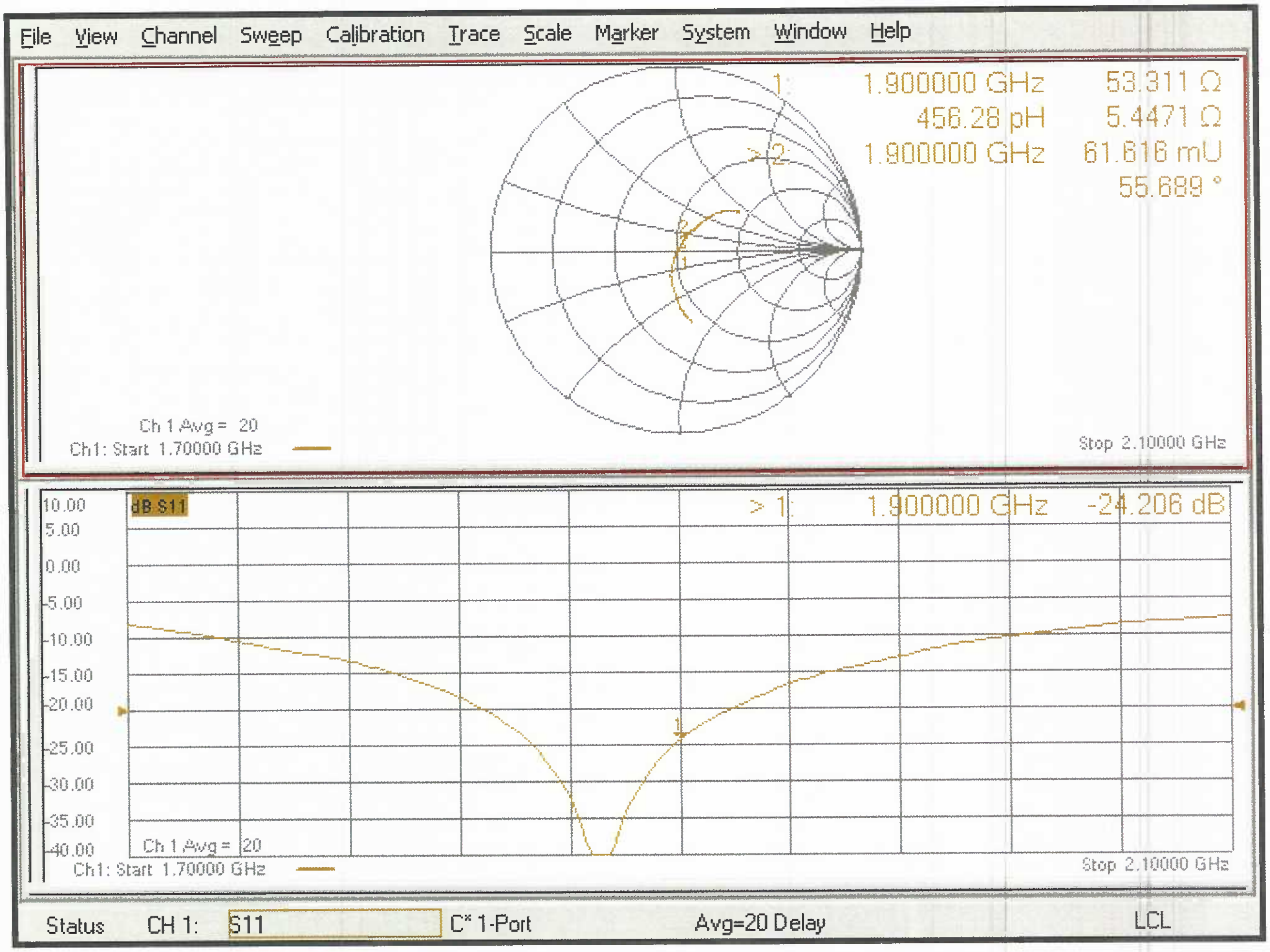
- Probe: EX3DV4 - SN7349; ConvF(8.43, 8.43, 8.43) @ 1900 MHz; Calibrated: 28.12.2020
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 02.11.2020
- Phantom: Flat Phantom 5.0 (front); Type: QD 000 P50 AA; Serial: 1001
- DASY52 52.10.4(1527); SEMCAD X 14.6.14(7483)

Dipole Calibration for Head Tissue/Pin=250 mW, d=10mm/Zoom Scan (7x7x7)/Cube 0:
Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 110.2 V/m; Power Drift = 0.04 dB
Peak SAR (extrapolated) = 18.7 W/kg
SAR(1 g) = 10.1 W/kg; SAR(10 g) = 5.28 W/kg
Smallest distance from peaks to all points 3 dB below = 10 mm
Ratio of SAR at M2 to SAR at M1 = 54.6%
Maximum value of SAR (measured) = 15.6 W/kg



0 dB = 15.6 W/kg = 11.93 dBW/kg

Impedance Measurement Plot for Head TSL



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Accreditation No.: SCS 0108

Client RF Exposure Lab

Certificate No: D2550V2-1003_Jun21

CALIBRATION CERTIFICATE

Object	D2550V2 - SN:1003
Calibration procedure(s)	QA CAL-05.v11 Calibration Procedure for SAR Validation Sources between 0.7-3 GHz
Calibration date:	June 03, 2021

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	09-Apr-21 (No. 217-03291/03292)	Apr-22
Power sensor NRP-Z91	SN: 103244	09-Apr-21 (No. 217-03291)	Apr-22
Power sensor NRP-Z91	SN: 103245	09-Apr-21 (No. 217-03292)	Apr-22
Reference 20 dB Attenuator	SN: BH9394 (20k)	09-Apr-21 (No. 217-03343)	Apr-22
Type-N mismatch combination	SN: 310982 / 06327	09-Apr-21 (No. 217-03344)	Apr-22
Reference Probe EX3DV4	SN: 7349	28-Dec-20 (No. EX3-7349_Dec20)	Dec-21
DAE4	SN: 601	02-Nov-20 (No. DAE4-601_Nov20)	Nov-21

Secondary Standards	ID #	Check Date (in house)	Scheduled Check
Power meter E4419B	SN: GB39512475	30-Oct-14 (in house check Oct-20)	In house check: Oct-22
Power sensor HP 8481A	SN: US37292783	07-Oct-15 (in house check Oct-20)	In house check: Oct-22
Power sensor HP 8481A	SN: MY41092317	07-Oct-15 (in house check Oct-20)	In house check: Oct-22
RF generator R&S SMT-06	SN: 100972	15-Jun-15 (in house check Oct-20)	In house check: Oct-22
Network Analyzer Agilent E8358A	SN: US41080477	31-Mar-14 (in house check Oct-20)	In house check: Oct-21

	Name	Function	Signature
Calibrated by:	Jeffrey Katzman	Laboratory Technician	
Approved by:	Katja Pokovic	Technical Manager	

Issued: June 8, 2021

Glossary:

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

Calibration is Performed According to the Following Standards:

a) IEEE Std 1528-2013, "IEEE Recommended Practice for Determining the Peak Spatial-Averaged Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques", June 2013
b) IEC 62209-1, "Measurement procedure for the assessment of Specific Absorption Rate (SAR) from hand-held and body-mounted devices used next to the ear (frequency range of 300 MHz to 6 GHz)", July 2016
c) IEC 62209-2, "Procedure to determine the Specific Absorption Rate (SAR) for wireless communication devices used in close proximity to the human body (frequency range of 30 MHz to 6 GHz)", March 2010
d) KDB 865664, "SAR Measurement Requirements for 100 MHz to 6 GHz"

Additional Documentation:

e) DASY4/5 System Handbook

Methods Applied and Interpretation of Parameters:

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

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

Measurement Conditions

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

DASY Version	DASY5	V52.10.4
Extrapolation	Advanced Extrapolation	
Phantom	Modular Flat Phantom	
Distance Dipole Center - TSL	10 mm	with Spacer
Zoom Scan Resolution	dx, dy, dz = 5 mm	
Frequency	2550 MHz ± 1 MHz	

Head TSL parameters

The following parameters and calculations were applied.

	Temperature	**Permittivity**	**Conductivity**
Nominal Head TSL parameters	22.0 °C	39.1	1.91 mho/m
Measured Head TSL parameters	(22.0 ± 0.2) °C	37.3 ± 6 %	1.98 mho/m ± 6 %
Head TSL temperature change during test	< 0.5 °C	----	----

SAR result with Head TSL

SAR averaged over 1 cm^3 (1 g) of Head TSL	Condition	
SAR measured	250 mW input power	14.2 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**55.3 W/kg ± 17.0 % (k=2)**

SAR averaged over 10 cm^3 (10 g) of Head TSL	condition	
SAR measured	250 mW input power	6.28 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**24.7 W/kg ± 16.5 % (k=2)**

Appendix (Additional assessments outside the scope of SCS 0108)

Antenna Parameters with Head TSL

Impedance, transformed to feed point	49.4 Ω - 3.5 jΩ
Return Loss	- 29.0 dB

General Antenna Parameters and Design

Electrical Delay (one direction)	1.156 ns

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

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

Additional EUT Data

Manufactured by	SPEAG

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

D2550V2 SN: 1003 - Head						
Date of Measurement	Return Loss (dB)	Δ%	Impedance (Ω)	ΔΩ	Impedance Imaginary (jΩ)	ΔΩ
6/3/2021	-29.0		49.4		-3.5	
6/4/2022	-28.6	-1.4	48.5	-0.9	-3.8	-0.3
6/6/2023	-27.3	-5.9	47.1	-2.3	-4.1	-0.6

DASY5 Validation Report for Head TSL

Date: 03.06.2021

Test Laboratory: SPEAG, Zurich, Switzerland

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

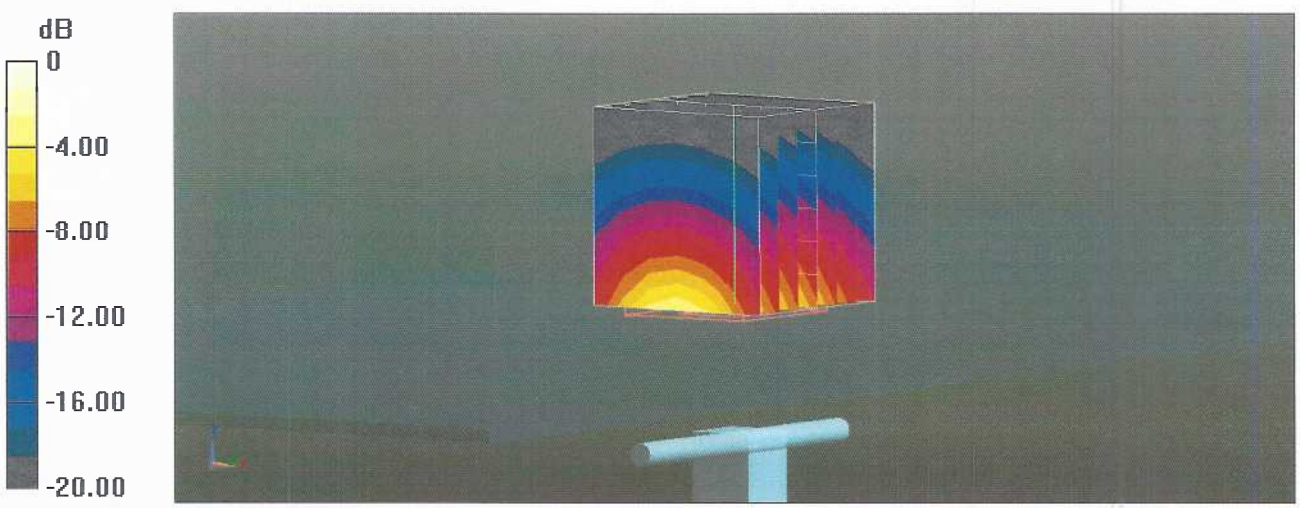
Communication System: UID 0 - CW; Frequency: 2550 MHz
Medium parameters used: f = 2550 MHz; σ = 1.98 S/m; ε_r = 37.3; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2011)

DASY52 Configuration:

- Probe: EX3DV4 - SN7349; ConvF(7.85, 7.85, 7.85) @ 2550 MHz; Calibrated: 28.12.2020
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 02.11.2020
- Phantom: Flat Phantom 5.0 (front); Type: QD 000 P50 AA; Serial: 1001
- DASY52 52.10.4(1527); SEMCAD X 14.6.14(7483)

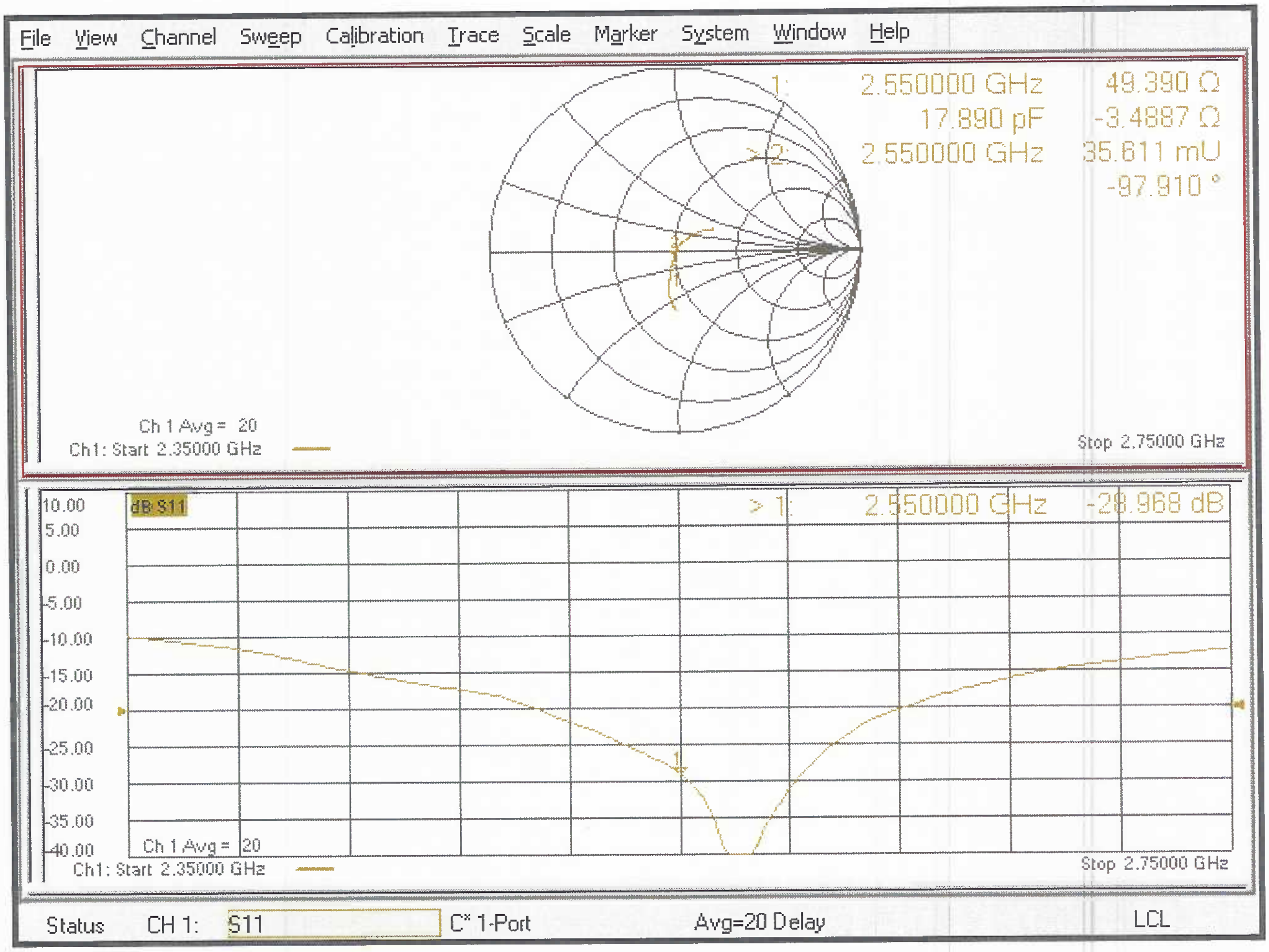
Dipole Calibration for Head Tissue/Pin=250 mW, d=10mm/Zoom Scan (7x7x7)/Cube 0:

Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 117.6 V/m; Power Drift = 0.07 dB
Peak SAR (extrapolated) = 29.9 W/kg
SAR(1 g) = 14.2 W/kg; SAR(10 g) = 6.28 W/kg
Smallest distance from peaks to all points 3 dB below = 8.5 mm
Ratio of SAR at M2 to SAR at M1 = 47.1%
Maximum value of SAR (measured) = 24.3 W/kg



0 dB = 24.3 W/kg = 13.86 dBW/kg

Impedance Measurement Plot for Head TSL



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Accreditation No.: SCS 0108

Client **RF Exposure Lab**

Certificate No: D3500V2-1061_Apr21

CALIBRATION CERTIFICATE

Object	D3500V2 - SN:1061
Calibration procedure(s)	QA CAL-22.v6 Calibration Procedure for SAR Validation Sources between 3-10 GHz
Calibration date:	April 13, 2021

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	09-Apr-21 (No. 217-03291/03292)	Apr-22
Power sensor NRP-Z91	SN: 103244	09-Apr-21 (No. 217-03291)	Apr-22
Power sensor NRP-Z91	SN: 103245	09-Apr-21 (No. 217-03292)	Apr-22
Reference 20 dB Attenuator	SN: BH9394 (20k)	09-Apr-21 (No. 217-03343)	Apr-22
Type-N mismatch combination	SN: 310982 / 06327	09-Apr-21 (No. 217-03344)	Apr-22
Reference Probe EX3DV4	SN: 3503	30-Dec-20 (No. EX3-3503_Dec20)	Dec-21
DAE4	SN: 601	02-Nov-20 (No. DAE4-601_Nov20)	Nov-21

Secondary Standards	ID #	Check Date (in house)	Scheduled Check
Power meter E4419B	SN: GB39512475	30-Oct-14 (in house check Oct-20)	In house check: Oct-22
Power sensor HP 8481A	SN: US37292783	07-Oct-15 (in house check Oct-20)	In house check: Oct-22
Power sensor HP 8481A	SN: MY41092317	07-Oct-15 (in house check Oct-20)	In house check: Oct-22
RF generator R&S SMT-06	SN: 100972	15-Jun-15 (in house check Oct-20)	In house check: Oct-22
Network Analyzer Agilent E8358A	SN: US41080477	31-Mar-14 (in house check Oct-20)	In house check: Oct-21

	Name	Function	Signature
Calibrated by:	Michael Weber	Laboratory Technician	M.Weber
Approved by:	Katja Pokovic	Technical Manager	

Issued: April 15, 2021

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Accreditation No.: SCS 0108

Glossary:

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

Calibration is Performed According to the Following Standards:

a) IEEE Std 1528-2013, "IEEE Recommended Practice for Determining the Peak Spatial-Averaged Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques", June 2013
b) IEC 62209-1, "Measurement procedure for the assessment of Specific Absorption Rate (SAR) from hand-held and body-mounted devices used next to the ear (frequency range of 300 MHz to 6 GHz)", July 2016
c) IEC 62209-2, "Procedure to determine the Specific Absorption Rate (SAR) for wireless communication devices used in close proximity to the human body (frequency range of 30 MHz to 6 GHz)", March 2010
d) KDB 865664, "SAR Measurement Requirements for 100 MHz to 6 GHz"

Additional Documentation:

e) DASY4/5 System Handbook

Methods Applied and Interpretation of Parameters:

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

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

Measurement Conditions

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

DASY Version	DASY5	V52.10.4
Extrapolation	Advanced Extrapolation	
Phantom	Modular Flat Phantom	
Distance Dipole Center - TSL	10 mm	with Spacer
Zoom Scan Resolution	dx, dy = 4 mm, dz = 1.4 mm	Graded Ratio = 1.4 (Z direction)
Frequency	3500 MHz ± 1 MHz	

Head TSL parameters

The following parameters and calculations were applied.

	Temperature	**Permittivity**	**Conductivity**
Nominal Head TSL parameters	22.0 °C	37.9	2.91 mho/m
Measured Head TSL parameters	(22.0 ± 0.2) °C	37.3 ± 6 %	2.93 mho/m ± 6 %
Head TSL temperature change during test	< 0.5 °C	----	----

SAR result with Head TSL

SAR averaged over 1 cm^3 (1 g) of Head TSL	Condition	
SAR measured	100 mW input power	6.73 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**67.0 W/kg ± 19.9 % (k=2)**

SAR averaged over 10 cm^3 (10 g) of Head TSL	condition	
SAR measured	100 mW input power	2.52 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**25.1 W/kg ± 19.5 % (k=2)**

Appendix (Additional assessments outside the scope of SCS 0108)

Antenna Parameters with Head TSL

Impedance, transformed to feed point	53.5 Ω - 5.3 jΩ
Return Loss	- 24.2 dB

General Antenna Parameters and Design

Electrical Delay (one direction)	1.134 ns

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

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

Additional EUT Data

Manufactured by	SPEAG

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

D3500V2 SN: 1061 - Head						
Date of Measurement	Return Loss (dB)	Δ%	Impedance Real (Ω)	ΔΩ	Impedance Imaginary (jΩ)	ΔΩ
4/13/2021	-24.2		53.5		-5.3	
4/22/2022	-23.9	-1.2	51.9	-1.6	-4.8	0.5
4/13/2023	-25.1	5.0	54.2	2.3	-5.9	-1.1

DASY5 Validation Report for Head TSL

Date: 13.04.2021

Test Laboratory: SPEAG, Zurich, Switzerland

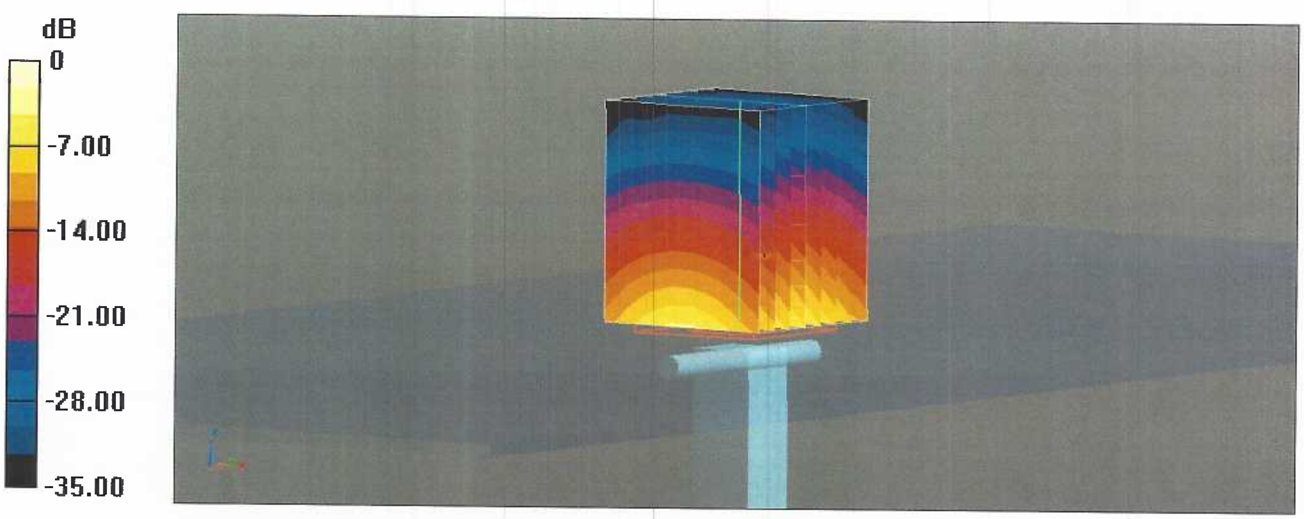
DUT: Dipole 3500 MHz; Type: D3500V2; Serial: D3500V2 - SN: 1061

Communication System: UID 0 - CW; Frequency: 3500 MHz
Medium parameters used: f = 3500 MHz; $\sigma = 2.93$ S/m; $\varepsilon_r = 37.3$; $\rho = 1000$ kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2011)

DASY52 Configuration:

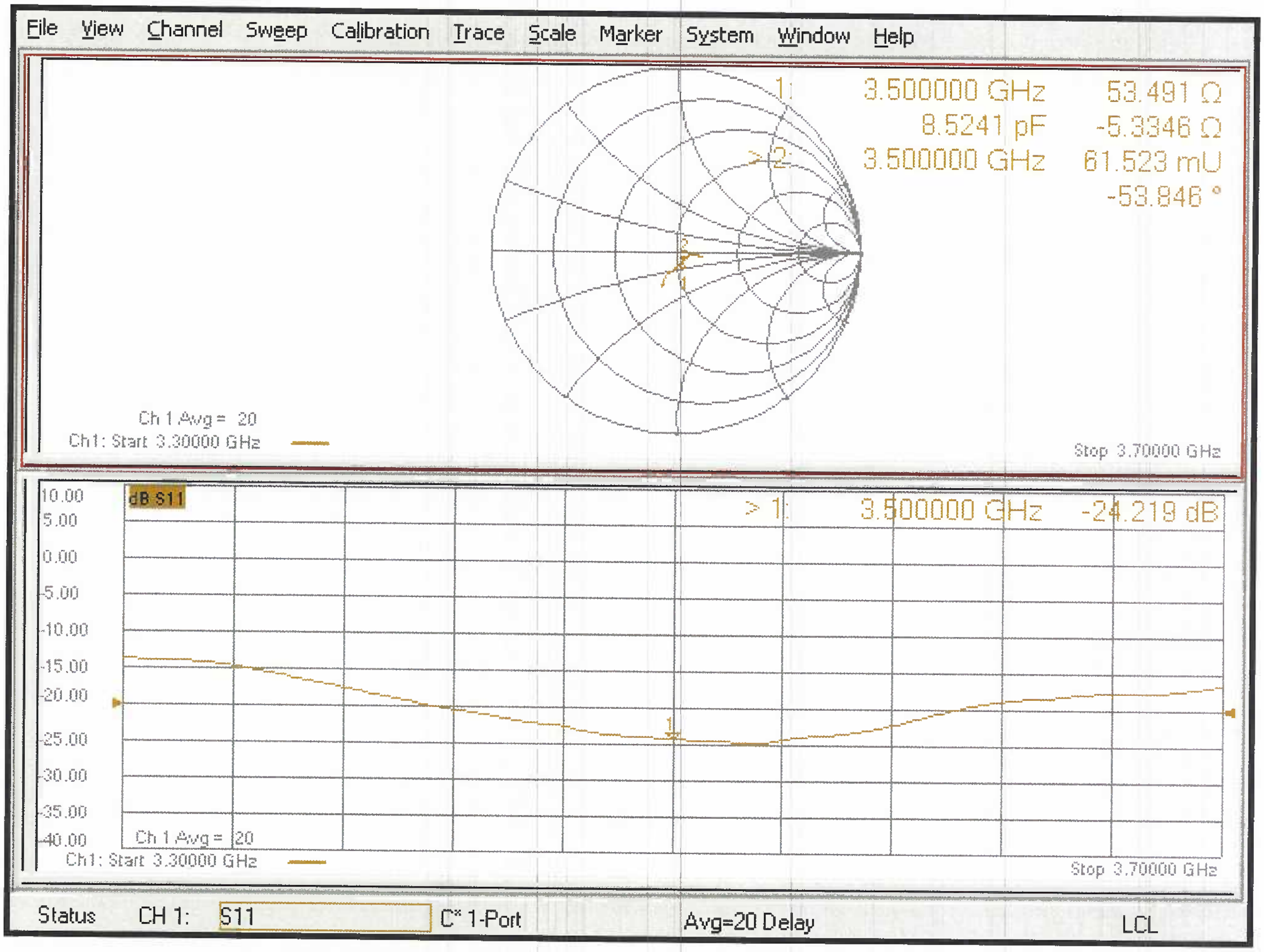
- Probe: EX3DV4 - SN3503; ConvF(7.91, 7.91, 7.91) @ 3500 MHz; Calibrated: 30.12.2020
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 02.11.2020
- Phantom: Flat Phantom 5.0 (front); Type: QD 000 P50 AA; Serial: 1001
- DASY52 52.10.4(1527); SEMCAD X 14.6.14(7483)

Dipole Calibration for Head Tissue/Pin=100 mW, d=10mm 3500/Zoom Scan, dist=1.4mm (8x8x8)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=1.4mm
Reference Value = 72.28 V/m; Power Drift = 0.02 dB
Peak SAR (extrapolated) = 18.2 W/kg
SAR(1 g) = 6.73 W/kg; SAR(10 g) = 2.52 W/kg
Smallest distance from peaks to all points 3 dB below = 8 mm
Ratio of SAR at M2 to SAR at M1 = 74.3%
Maximum value of SAR (measured) = 12.7 W/kg



0 dB = 12.7 W/kg = 11.05 dBW/kg

Impedance Measurement Plot for Head TSL



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Accreditation No.: SCS 0108

Client **RF Exposure Lab**

Certificate No: D3700V2-1024_Apr21

CALIBRATION CERTIFICATE

Object: D3700V2 - SN:1024

Calibration procedure(s): QA CAL-22.v6
Calibration Procedure for SAR Validation Sources between 3-10 GHz

Calibration date: April 13, 2021

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	09-Apr-21 (No. 217-03291/03292)	Apr-22
Power sensor NRP-Z91	SN: 103244	09-Apr-21 (No. 217-03291)	Apr-22
Power sensor NRP-Z91	SN: 103245	09-Apr-21 (No. 217-03292)	Apr-22
Reference 20 dB Attenuator	SN: BH9394 (20k)	09-Apr-21 (No. 217-03343)	Apr-22
Type-N mismatch combination	SN: 310982 / 06327	09-Apr-21 (No. 217-03344)	Apr-22
Reference Probe EX3DV4	SN: 3503	30-Dec-20 (No. EX3-3503_Dec20)	Dec-21
DAE4	SN: 601	02-Nov-20 (No. DAE4-601_Nov20)	Nov-21

Secondary Standards	ID #	Check Date (in house)	Scheduled Check
Power meter E4419B	SN: GB39512475	30-Oct-14 (in house check Oct-20)	In house check: Oct-22
Power sensor HP 8481A	SN: US37292783	07-Oct-15 (in house check Oct-20)	In house check: Oct-22
Power sensor HP 8481A	SN: MY41092317	07-Oct-15 (in house check Oct-20)	In house check: Oct-22
RF generator R&S SMT-06	SN: 100972	15-Jun-15 (in house check Oct-20)	In house check: Oct-22
Network Analyzer Agilent E8358A	SN: US41080477	31-Mar-14 (in house check Oct-20)	In house check: Oct-21

	Name	Function	Signature
Calibrated by:	Michael Weber	Laboratory Technician	M.Weber
Approved by:	Katja Pokovic	Technical Manager	

Issued: April 15, 2021

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Zeughausstrasse 43, 8004 Zurich, Switzerland

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Accreditation No.: SCS 0108

Glossary:

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

Calibration is Performed According to the Following Standards:

a) IEEE Std 1528-2013, "IEEE Recommended Practice for Determining the Peak Spatial-Averaged Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques", June 2013
b) IEC 62209-1, "Measurement procedure for the assessment of Specific Absorption Rate (SAR) from hand-held and body-mounted devices used next to the ear (frequency range of 300 MHz to 6 GHz)", July 2016
c) IEC 62209-2, "Procedure to determine the Specific Absorption Rate (SAR) for wireless communication devices used in close proximity to the human body (frequency range of 30 MHz to 6 GHz)", March 2010
d) KDB 865664, "SAR Measurement Requirements for 100 MHz to 6 GHz"

Additional Documentation:

e) DASY4/5 System Handbook

Methods Applied and Interpretation of Parameters:

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

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

Measurement Conditions

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

DASY Version	DASY5	V52.10.4
Extrapolation	Advanced Extrapolation	
Phantom	Modular Flat Phantom	
Distance Dipole Center - TSL	10 mm	with Spacer
Zoom Scan Resolution	dx, dy = 4 mm, dz = 1.4 mm	Graded Ratio = 1.4 (Z direction)
Frequency	3700 MHz ± 1 MHz	

Head TSL parameters

The following parameters and calculations were applied.

	Temperature	**Permittivity**	**Conductivity**
Nominal Head TSL parameters	22.0 °C	37.7	3.12 mho/m
Measured Head TSL parameters	(22.0 ± 0.2) °C	37.0 ± 6 %	3.09 mho/m ± 6 %
Head TSL temperature change during test	< 0.5 °C	----	----

SAR result with Head TSL

SAR averaged over 1 cm^3 (1 g) of Head TSL	Condition	
SAR measured	100 mW input power	6.85 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**68.3 W/kg ± 19.9 % (k=2)**

SAR averaged over 10 cm^3 (10 g) of Head TSL	condition	
SAR measured	100 mW input power	2.47 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**24.6 W/kg ± 19.5 % (k=2)**

Appendix (Additional assessments outside the scope of SCS 0108)

Antenna Parameters with Head TSL

Impedance, transformed to feed point	46.1 Ω + 2.2 jΩ
Return Loss	- 26.7 dB

General Antenna Parameters and Design

Electrical Delay (one direction)	1.127 ns

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

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

Additional EUT Data

Manufactured by	SPEAG

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

D3700V2 SN: 1024 - Head						
Date of Measurement	Return Loss (dB)	Δ%	Impedance (Ω)	ΔΩ	Impedance Imaginary (jΩ)	ΔΩ
4/13/2021	-26.7		46.1		2.2	
4/13/2022	-25.3	-5.2	44.5	-1.6	1.8	-0.4
4/13/2023	-27.5	8.7	47.2	2.7	2.5	0.7

DASY5 Validation Report for Head TSL

Date: 13.04.2021

Test Laboratory: SPEAG, Zurich, Switzerland

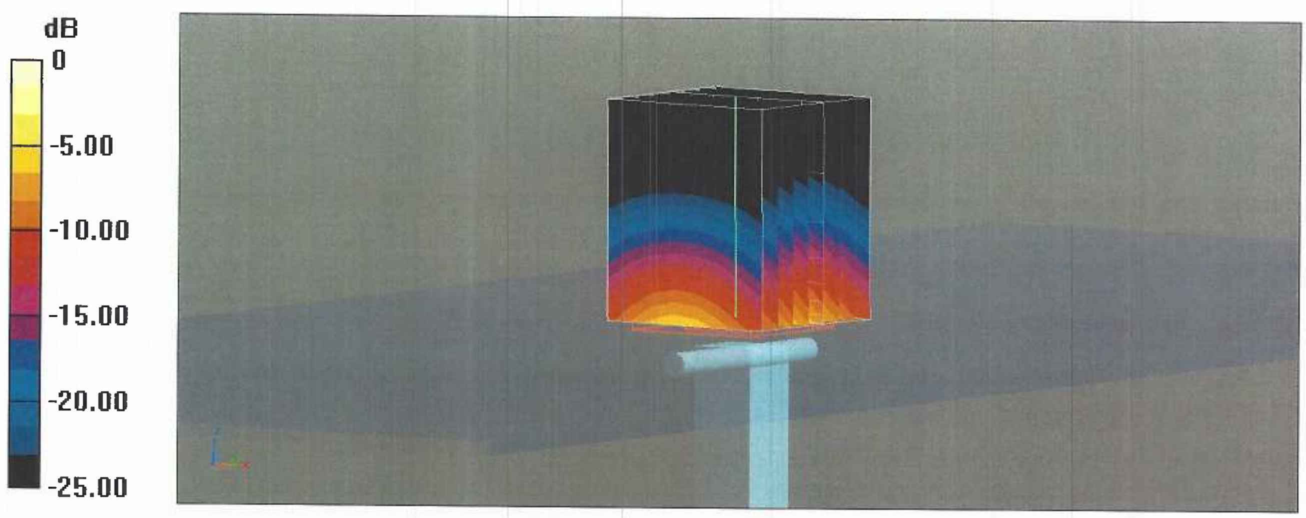
DUT: Dipole 3700 MHz; Type: D3700V2; Serial: D3700V2 - SN: 1024

Communication System: UID 0 - CW; Frequency: 3700 MHz
Medium parameters used: f = 3700 MHz; σ = 3.09 S/m; ε_r = 37; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2011)

DASY52 Configuration:

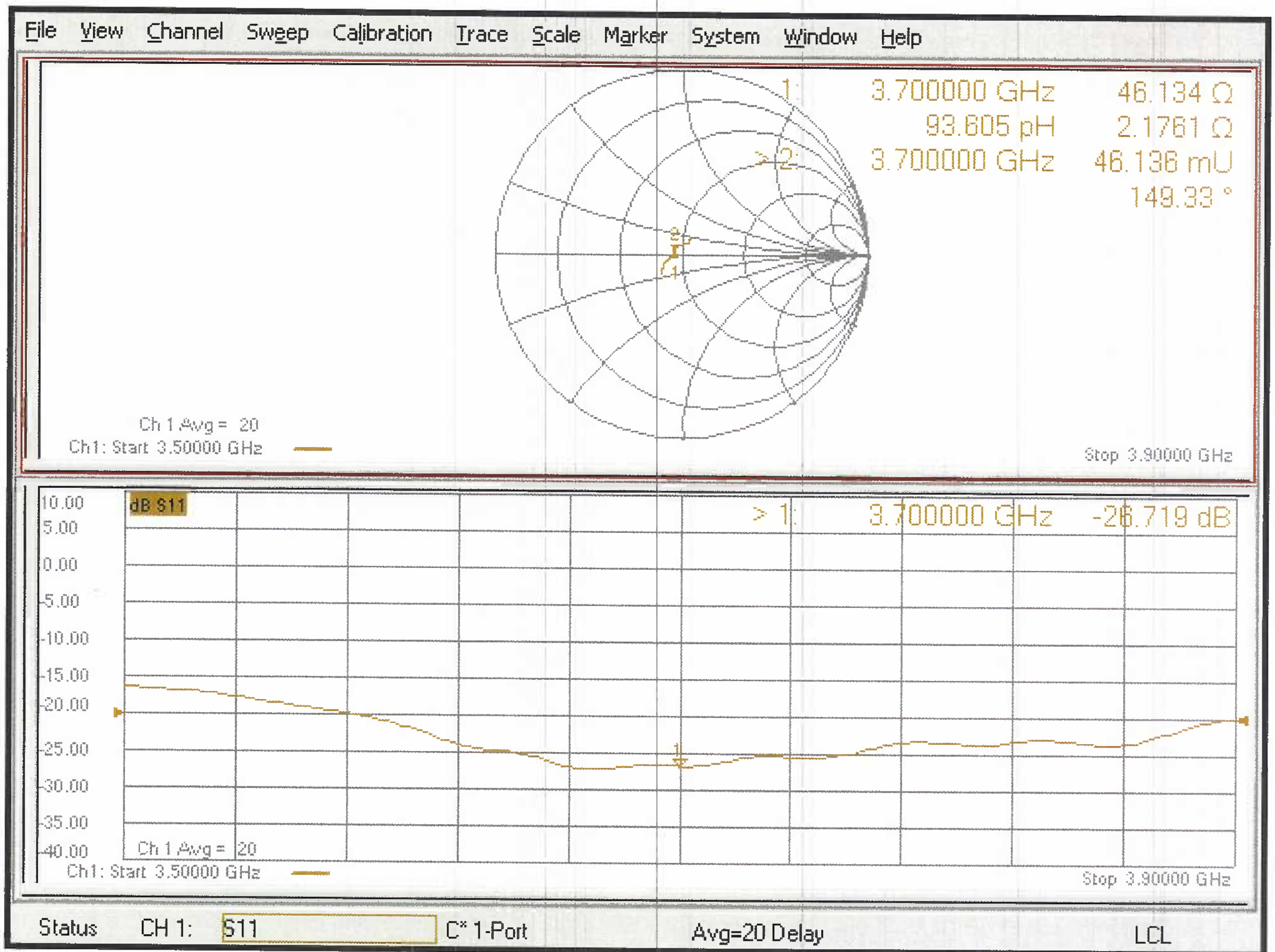
- Probe: EX3DV4 - SN3503; ConvF(7.73, 7.73, 7.73) @ 3700 MHz; Calibrated: 30.12.2020
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 02.11.2020
- Phantom: Flat Phantom 5.0 (front); Type: QD 000 P50 AA; Serial: 1001
- DASY52 52.10.4(1527); SEMCAD X 14.6.14(7483)

Dipole Calibration for Head Tissue/Pin=100 mW, d=10mm 3700/Zoom Scan, dist=1.4mm (8x8x8)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=1.4mm
Reference Value = 71.95 V/m; Power Drift = 0.04 dB
Peak SAR (extrapolated) = 19.6 W/kg
SAR(1 g) = 6.85 W/kg; SAR(10 g) = 2.47 W/kg
Smallest distance from peaks to all points 3 dB below = 8 mm
Ratio of SAR at M2 to SAR at M1 = 73.2%
Maximum value of SAR (measured) = 13.7 W/kg



0 dB = 13.7 W/kg = 11.36 dBW/kg

Impedance Measurement Plot for Head TSL



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Accreditation No.: SCS 0108

Client **RF Exposure Lab**

Certificate No: D2450V2-881_Jun21

CALIBRATION CERTIFICATE

Object: D2450V2 - SN:881

Calibration procedure(s): QA CAL-05.v11
Calibration Procedure for SAR Validation Sources between 0.7-3 GHz

Calibration date: June 03, 2021

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	09-Apr-21 (No. 217-03291/03292)	Apr-22
Power sensor NRP-Z91	SN: 103244	09-Apr-21 (No. 217-03291)	Apr-22
Power sensor NRP-Z91	SN: 103245	09-Apr-21 (No. 217-03292)	Apr-22
Reference 20 dB Attenuator	SN: BH9394 (20k)	09-Apr-21 (No. 217-03343)	Apr-22
Type-N mismatch combination	SN: 310982 / 06327	09-Apr-21 (No. 217-03344)	Apr-22
Reference Probe EX3DV4	SN: 7349	28-Dec-20 (No. EX3-7349_Dec20)	Dec-21
DAE4	SN: 601	02-Nov-20 (No. DAE4-601_Nov20)	Nov-21

Secondary Standards	ID #	Check Date (in house)	Scheduled Check
Power meter E4419B	SN: GB39512475	30-Oct-14 (in house check Oct-20)	In house check: Oct-22
Power sensor HP 8481A	SN: US37292783	07-Oct-15 (in house check Oct-20)	In house check: Oct-22
Power sensor HP 8481A	SN: MY41092317	07-Oct-15 (in house check Oct-20)	In house check: Oct-22
RF generator R&S SMT-06	SN: 100972	15-Jun-15 (in house check Oct-20)	In house check: Oct-22
Network Analyzer Agilent E8358A	SN: US41080477	31-Mar-14 (in house check Oct-20)	In house check: Oct-21

	Name	Function	Signature
Calibrated by:	Jeffrey Katzman	Laboratory Technician	(signature)
Approved by:	Katja Pokovic	Technical Manager	(signature)

Issued: June 8, 2021

Glossary:

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

Calibration is Performed According to the Following Standards:

a) IEEE Std 1528-2013, “IEEE Recommended Practice for Determining the Peak Spatial-Averaged Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques”, June 2013
b) IEC 62209-1, “Measurement procedure for the assessment of Specific Absorption Rate (SAR) from hand-held and body-mounted devices used next to the ear (frequency range of 300 MHz to 6 GHz)”, July 2016
c) IEC 62209-2, "Procedure to determine the Specific Absorption Rate (SAR) for wireless communication devices used in close proximity to the human body (frequency range of 30 MHz to 6 GHz)", March 2010
d) KDB 865664, “SAR Measurement Requirements for 100 MHz to 6 GHz”

Additional Documentation:

e) DASY4/5 System Handbook

Methods Applied and Interpretation of Parameters:

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

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

Measurement Conditions

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

DASY Version	DASY5	V52.10.4
Extrapolation	Advanced Extrapolation	
Phantom	Modular Flat Phantom	
Distance Dipole Center - TSL	10 mm	with Spacer
Zoom Scan Resolution	dx, dy, dz = 5 mm	
Frequency	2450 MHz ± 1 MHz	

Head TSL parameters

The following parameters and calculations were applied.

	Temperature	**Permittivity**	**Conductivity**
Nominal Head TSL parameters	22.0 °C	39.2	1.80 mho/m
Measured Head TSL parameters	(22.0 ± 0.2) °C	37.7 ± 6 %	1.87 mho/m ± 6 %
Head TSL temperature change during test	< 0.5 °C	----	----

SAR result with Head TSL

SAR averaged over 1 cm^3 (1 g) of Head TSL	Condition	
SAR measured	250 mW input power	13.9 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**54.1 W/kg ± 17.0 % (k=2)**

SAR averaged over 10 cm^3 (10 g) of Head TSL	condition	
SAR measured	250 mW input power	6.34 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**25.0 W/kg ± 16.5 % (k=2)**

Appendix (Additional assessments outside the scope of SCS 0108)

Antenna Parameters with Head TSL

Impedance, transformed to feed point	54.3 Ω + 4.3 jΩ
Return Loss	- 24.7 dB

General Antenna Parameters and Design

Electrical Delay (one direction)	1.156 ns

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

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

Additional EUT Data

Manufactured by	SPEAG

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

D2450V2 SN: 829 - Head

Date of Measurement	Return Loss (dB)	Δ%	Impedance Real (Ω)	ΔΩ	Impedance Imaginary (jΩ)	ΔΩ
6/3/2021	-24.7		54.3		4.3	
6/3/2022	-25.3	2.4	55.2	0.9	4.1	-0.2
6/6/2023	-26.2	6.1	53.1	-1.2	4.2	-0.1

DASY5 Validation Report for Head TSL

Date: 03.06.2021

Test Laboratory: SPEAG, Zurich, Switzerland

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

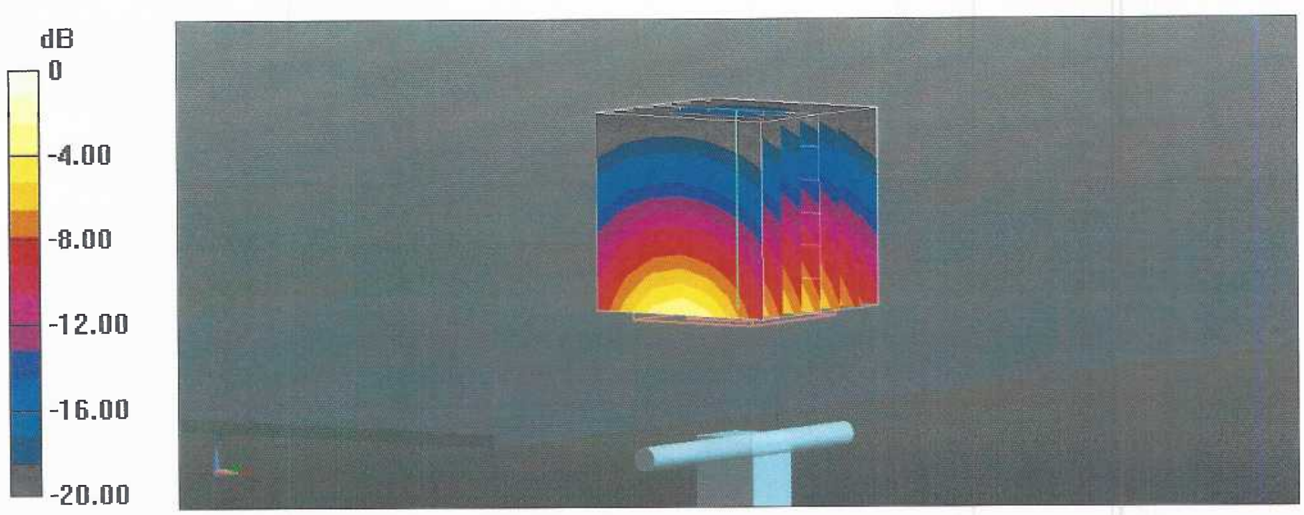
Communication System: UID 0 - CW; Frequency: 2450 MHz
Medium parameters used: f = 2450 MHz; σ = 1.87 S/m; ε_r = 37.7; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2011)

DASY52 Configuration:

- Probe: EX3DV4 - SN7349; ConvF(7.96, 7.96, 7.96) @ 2450 MHz; Calibrated: 28.12.2020
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 02.11.2020
- Phantom: Flat Phantom 5.0 (front); Type: QD 000 P50 AA; Serial: 1001
- DASY52 52.10.4(1527); SEMCAD X 14.6.14(7483)

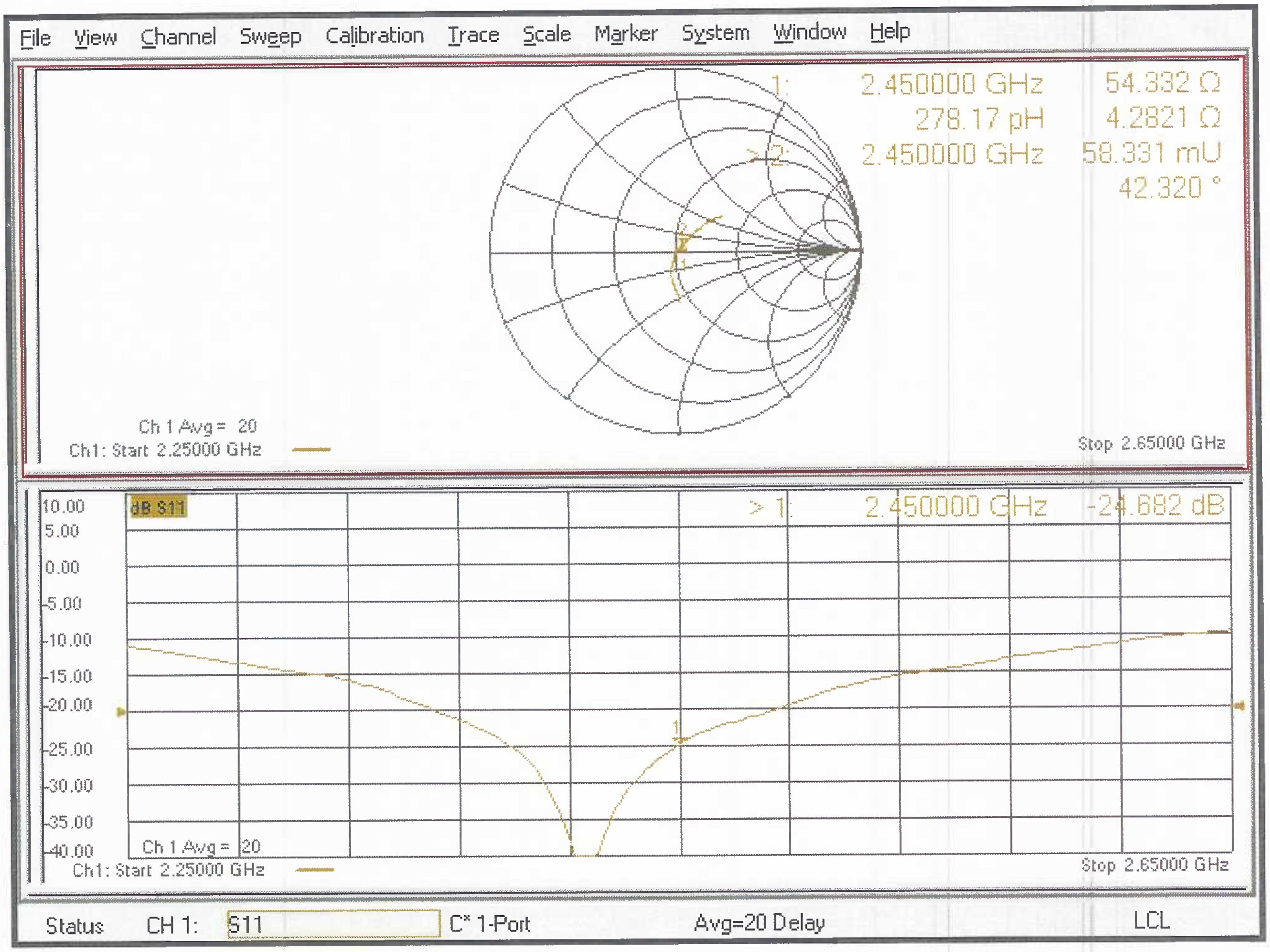
Dipole Calibration for Head Tissue/Pin=250 mW, d=10mm/Zoom Scan (7x7x7)/Cube 0:

Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 119.0 V/m; Power Drift = 0.05 dB
Peak SAR (extrapolated) = 28.0 W/kg
SAR(1 g) = 13.9 W/kg; SAR(10 g) = 6.34 W/kg
Smallest distance from peaks to all points 3 dB below = 9 mm
Ratio of SAR at M2 to SAR at M1 = 49.5%
Maximum value of SAR (measured) = 23.1 W/kg



0 dB = 23.1 W/kg = 13.64 dBW/kg

Impedance Measurement Plot for Head TSL



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Accreditation No.: SCS 0108

Client **RF Exposure Lab**

Certificate No: D5GHzV2-1119_Jun21

CALIBRATION CERTIFICATE

Object	D5GHzV2 - SN:1119
Calibration procedure(s)	QA CAL-22.v6 Calibration Procedure for SAR Validation Sources between 3-10 GHz
Calibration date:	June 08, 2021

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	09-Apr-21 (No. 217-03291/03292)	Apr-22
Power sensor NRP-Z91	SN: 103244	09-Apr-21 (No. 217-03291)	Apr-22
Power sensor NRP-Z91	SN: 103245	09-Apr-21 (No. 217-03292)	Apr-22
Reference 20 dB Attenuator	SN: BH9394 (20k)	09-Apr-21 (No. 217-03343)	Apr-22
Type-N mismatch combination	SN: 310982 / 06327	09-Apr-21 (No. 217-03344)	Apr-22
Reference Probe EX3DV4	SN: 3503	30-Dec-20 (No. EX3-3503_Dec20)	Dec-21
DAE4	SN: 601	02-Nov-20 (No. DAE4-601_Nov20)	Nov-21

Secondary Standards	ID #	Check Date (in house)	Scheduled Check
Power meter E4419B	SN: GB39512475	30-Oct-14 (in house check Oct-20)	In house check: Oct-22
Power sensor HP 8481A	SN: US37292783	07-Oct-15 (in house check Oct-20)	In house check: Oct-22
Power sensor HP 8481A	SN: MY41092317	07-Oct-15 (in house check Oct-20)	In house check: Oct-22
RF generator R&S SMT-06	SN: 100972	15-Jun-15 (in house check Oct-20)	In house check: Oct-22
Network Analyzer Agilent E8358A	SN: US41080477	31-Mar-14 (in house check Oct-20)	In house check: Oct-21

	Name	Function	Signature
Calibrated by:	Michael Weber	Laboratory Technician	M.Weber
Approved by:	Katja Pokovic	Technical Manager	

Issued: June 8, 2021

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

Glossary:

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

Calibration is Performed According to the Following Standards:

a) IEEE Std 1528-2013, "IEEE Recommended Practice for Determining the Peak Spatial-Averaged Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques", June 2013
b) IEC 62209-1, "Measurement procedure for the assessment of Specific Absorption Rate (SAR) from hand-held and body-mounted devices used next to the ear (frequency range of 300 MHz to 6 GHz)", July 2016
c) IEC 62209-2, "Procedure to determine the Specific Absorption Rate (SAR) for wireless communication devices used in close proximity to the human body (frequency range of 30 MHz to 6 GHz)", March 2010
d) KDB 865664, "SAR Measurement Requirements for 100 MHz to 6 GHz"

Additional Documentation:

e) DASY4/5 System Handbook

Methods Applied and Interpretation of Parameters:

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

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

Measurement Conditions

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

DASY Version	DASY5	V52.10.4
Extrapolation	Advanced Extrapolation	
Phantom	Modular Flat Phantom V5.0	
Distance Dipole Center - TSL	10 mm	with Spacer
Zoom Scan Resolution	dx, dy = 4.0 mm, dz = 1.4 mm	Graded Ratio = 1.4 (Z direction)
Frequency	5250 MHz ± 1 MHz 5600 MHz ± 1 MHz 5750 MHz ± 1 MHz	

Head TSL parameters at 5250 MHz

The following parameters and calculations were applied.

	Temperature	**Permittivity**	**Conductivity**
Nominal Head TSL parameters	22.0 °C	35.9	4.71 mho/m
Measured Head TSL parameters	(22.0 ± 0.2) °C	34.6 ± 6 %	4.59 mho/m ± 6 %
Head TSL temperature change during test	< 0.5 °C	----	----

SAR result with Head TSL at 5250 MHz

SAR averaged over 1 cm^3 (1 g) of Head TSL	Condition	
SAR measured	100 mW input power	8.02 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**79.5 W/kg ± 19.9 % (k=2)**

SAR averaged over 10 cm^3 (10 g) of Head TSL	condition	
SAR measured	100 mW input power	2.32 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**22.9 W/kg ± 19.5 % (k=2)**

Head TSL parameters at 5600 MHz

The following parameters and calculations were applied.

	Temperature	**Permittivity**	**Conductivity**
Nominal Head TSL parameters	22.0 °C	35.5	5.07 mho/m
Measured Head TSL parameters	(22.0 ± 0.2) °C	34.1 ± 6 %	4.95 mho/m ± 6 %
Head TSL temperature change during test	< 0.5 °C	----	----

SAR result with Head TSL at 5600 MHz

SAR averaged over 1 cm^3 (1 g) of Head TSL	Condition	
SAR measured	100 mW input power	8.40 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**83.2 W/kg ± 19.9 % (k=2)**

SAR averaged over 10 cm^3 (10 g) of Head TSL	condition	
SAR measured	100 mW input power	2.41 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**23.8 W/kg ± 19.5 % (k=2)**

Head TSL parameters at 5750 MHz

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Head TSL parameters	22.0 °C	35.4	5.22 mho/m
Measured Head TSL parameters	(22.0 ± 0.2) °C	33.9 ± 6 %	5.10 mho/m ± 6 %
Head TSL temperature change during test	< 0.5 °C	----	----

SAR result with Head TSL at 5750 MHz

SAR averaged over 1 cm^3 (1 g) of Head TSL	Condition	
SAR measured	100 mW input power	8.13 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**80.5 W/kg ± 19.9 % (k=2)**

SAR averaged over 10 cm^3 (10 g) of Head TSL	condition	
SAR measured	100 mW input power	2.33 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**23.0 W/kg ± 19.5 % (k=2)**

Appendix (Additional assessments outside the scope of SCS 0108)

Antenna Parameters with Head TSL at 5250 MHz

Impedance, transformed to feed point	51.9 Ω - 7.3 jΩ
Return Loss	- 22.6 dB

Antenna Parameters with Head TSL at 5600 MHz

Impedance, transformed to feed point	56.8 Ω - 1.3 jΩ
Return Loss	- 23.8 dB

Antenna Parameters with Head TSL at 5750 MHz

Impedance, transformed to feed point	56.9 Ω - 1.8 jΩ
Return Loss	- 23.5 dB

General Antenna Parameters and Design

Electrical Delay (one direction)	1.206 ns

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

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

Additional EUT Data

Manufactured by	SPEAG

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

D5GHzV2 SN: 1085 - Head

Date of Measurement	Frequency	Return Loss (dB)	Δ%	Impedance Real (Ω)	ΔΩ	Impedance Imaginary (jΩ)	ΔΩ
6/8/2021	5250 MHz	-22.6		51.9		-7.3	
6/5/2022		-22.9	1.3	52.6	0.7	-7.7	-0.4
6/8/2023		-22.7	0.4	52.9	1.0	-7.5	-0.2
6/8/2021	5600 MHz	-23.8		56.8		-1.3	
6/5/2022		-24.6	3.4	55.2	-1.6	-1.6	-0.3
6/8/2023		-24.2	1.7	56.9	0.1	-1.5	-0.2
6/8/2021	5750 MHz	-23.5		56.9		-1.8	
6/5/2022		-24.8	5.5	56.2	-0.7	-2.5	-0.7
6/8/2023		-22.8	-3.0	57.3	0.4	-2.2	-0.4

DASY5 Validation Report for Head TSL

Date: 08.06.2021

Test Laboratory: SPEAG, Zurich, Switzerland

DUT: Dipole D5GHzV2; Type: D5GHzV2; Serial: D5GHzV2 - SN:1119

Communication System: UID 0 - CW; Frequency: 5250 MHz, Frequency: 5600 MHz, Frequency: 5750 MHz
Medium parameters used: f = 5250 MHz; σ = 4.59 S/m; ε_r = 34.6; ρ = 1000 kg/m^3 ,
Medium parameters used: f = 5600 MHz; σ = 4.95 S/m; ε_r = 34.1; ρ = 1000 kg/m^3 ,
Medium parameters used: f = 5750 MHz; σ = 5.1 S/m; ε_r = 33.9; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2011)

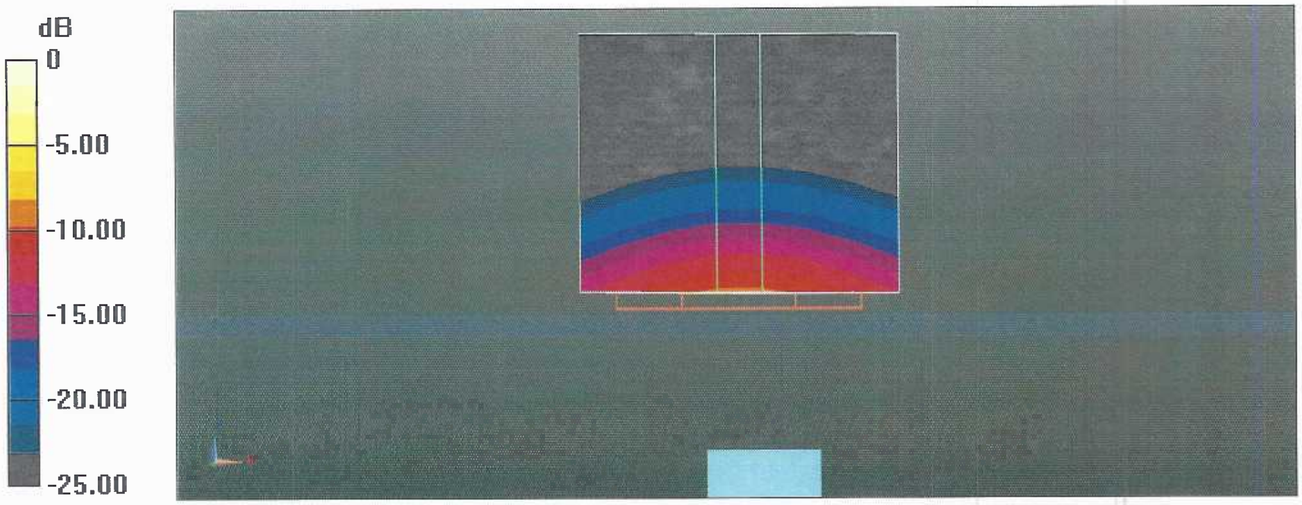
DASY52 Configuration:

- Probe: EX3DV4 - SN3503; ConvF(5.5, 5.5, 5.5) @ 5250 MHz, ConvF(5.1, 5.1, 5.1) @ 5600 MHz, ConvF(5.08, 5.08, 5.08) @ 5750 MHz; Calibrated: 30.12.2020
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 02.11.2020
- Phantom: Flat Phantom 5.0 (front); Type: QD 000 P50 AA; Serial: 1001
- DASY52 52.10.4(1527); SEMCAD X 14.6.14(7483)

Dipole Calibration for Head Tissue/Pin=100mW, dist=10mm, f=5250 MHz/Zoom Scan, dist=1.4mm (8x8x7)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=1.4mm
Reference Value = 76.83 V/m; Power Drift = 0.07 dB
Peak SAR (extrapolated) = 27.1 W/kg
SAR(1 g) = 8.02 W/kg; SAR(10 g) = 2.32 W/kg
Smallest distance from peaks to all points 3 dB below = 7.2 mm
Ratio of SAR at M2 to SAR at M1 = 70.7%
Maximum value of SAR (measured) = 17.7 W/kg

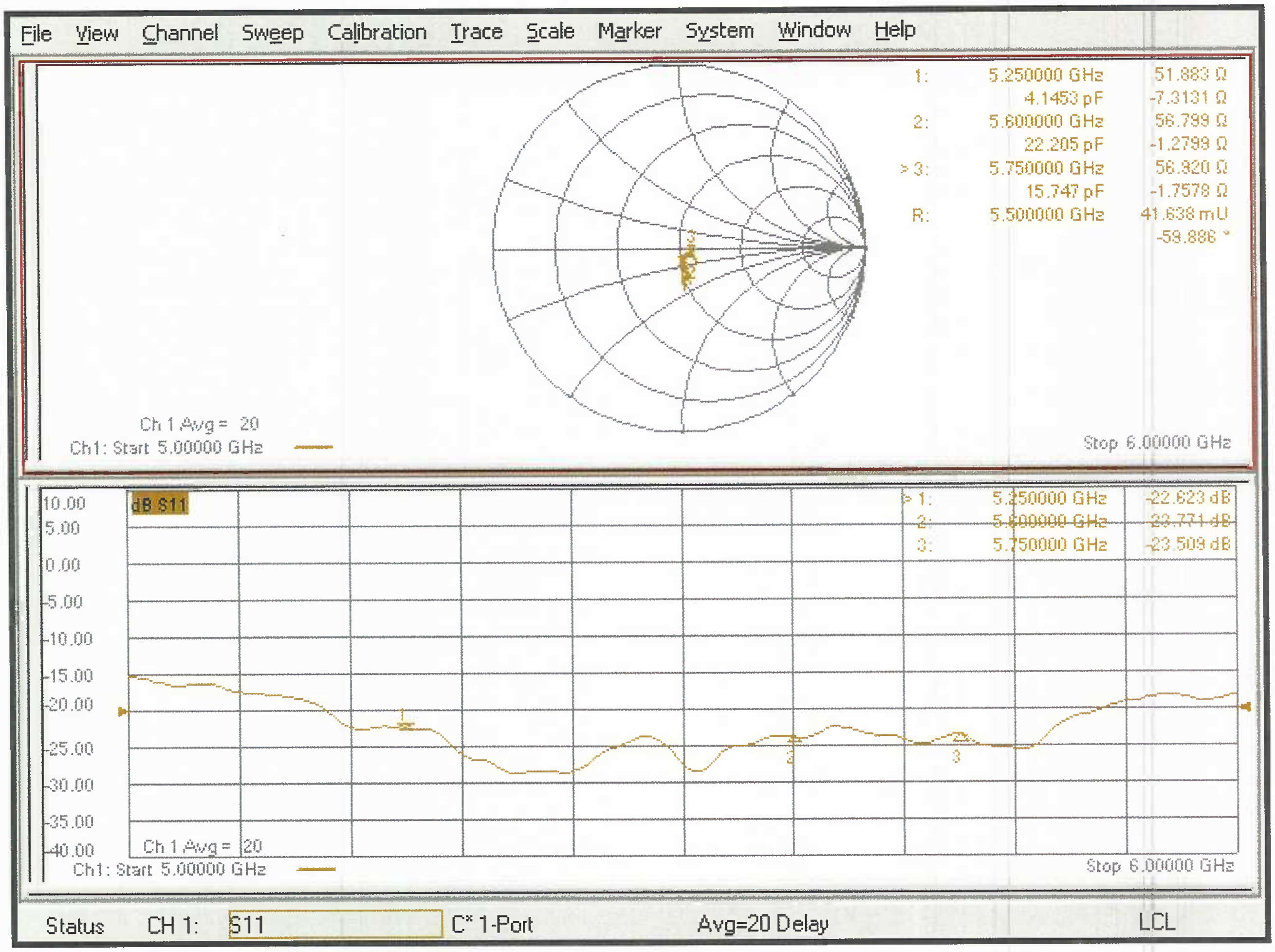
Dipole Calibration for Head Tissue/Pin=100mW, dist=10mm, f=5600 MHz/Zoom Scan, dist=1.4mm (8x8x7)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=1.4mm
Reference Value = 76.09 V/m; Power Drift = 0.05 dB
Peak SAR (extrapolated) = 30.6 W/kg
SAR(1 g) = 8.4 W/kg; SAR(10 g) = 2.41 W/kg
Smallest distance from peaks to all points 3 dB below = 7.5 mm
Ratio of SAR at M2 to SAR at M1 = 68.4%
Maximum value of SAR (measured) = 19.1 W/kg

Dipole Calibration for Head Tissue/Pin=100mW, dist=10mm, f=5750 MHz/Zoom Scan, dist=1.4mm (8x8x7)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=1.4mm
Reference Value = 75.64 V/m; Power Drift = 0.02 dB
Peak SAR (extrapolated) = 31.8 W/kg
SAR(1 g) = 8.13 W/kg; SAR(10 g) = 2.33 W/kg
Smallest distance from peaks to all points 3 dB below = 7.4 mm
Ratio of SAR at M2 to SAR at M1 = 65.4%
Maximum value of SAR (measured) = 19.3 W/kg



0 dB = 19.3 W/kg = 12.86 dBW/kg

Impedance Measurement Plot for Head TSL



Appendix F – DAE Calibration Data Sheets

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

S **Schweizerischer Kalibrierdienst**
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Accreditation No.: SCS 0108

Client **RF Exposure Lab**

Certificate No: DAE4-1217_Feb23

CALIBRATION CERTIFICATE

Object	DAE4 - SD 000 D04 BJ - SN: 1217
Calibration procedure(s)	QA CAL-06.v30 Calibration procedure for the data acquisition electronics (DAE)
Calibration date:	February 14, 2023

This calibration certificate documents the traceability to national standards, which realize the physical units of measurements (SI).
The measurements and the uncertainties with confidence probability are given on the following pages and are part of the certificate.

All calibrations have been conducted in the closed laboratory facility: environment temperature (22 ± 3)°C and humidity < 70%.

Calibration Equipment used (M&TE critical for calibration)

Primary Standards	ID #	Cal Date (Certificate No.)	Scheduled Calibration
Keithley Multimeter Type 2001	SN: 0810278	29-Aug-22 (No:34389)	Aug-23

Secondary Standards	ID #	Check Date (in house)	Scheduled Check
Auto DAE Calibration Unit	SE UWS 053 AA 1001	27-Jan-23 (in house check)	In house check: Jan-24
Calibrator Box V2.1	SE UMS 006 AA 1002	27-Jan-23 (in house check)	In house check: Jan-24

	Name	Function	Signature
Calibrated by:	Adrian Gehring	Laboratory Technician	
Approved by:	Sven Kühn	Technical Manager	i.V.

Issued: February 14, 2023

Glossary

DAE	data acquisition electronics
Connector angle	information used in DASY system to align probe sensor X to the robot coordinate system.

Methods Applied and Interpretation of Parameters

- *DC Voltage Measurement:* Calibration Factor assessed for use in DASY system by comparison with a calibrated instrument traceable to national standards. The figure given corresponds to the full scale range of the voltmeter in the respective range.
- *Connector angle*: The angle of the connector is assessed measuring the angle mechanically by a tool inserted. Uncertainty is not required.
- The following parameters as documented in the Appendix contain technical information as a result from the performance test and require no uncertainty.
  - *DC Voltage Measurement Linearity:* Verification of the Linearity at +10% and -10% of the nominal calibration voltage. Influence of offset voltage is included in this measurement.
  - *Common mode sensitivity:* Influence of a positive or negative common mode voltage on the differential measurement.
  - *Channel separation:* Influence of a voltage on the neighbor channels not subject to an input voltage.
  - *AD Converter Values with inputs shorted:* Values on the internal AD converter corresponding to zero input voltage
  - *Input Offset Measurement*: Output voltage and statistical results over a large number of zero voltage measurements.
  - *Input Offset Current:* Typical value for information; Maximum channel input offset current, not considering the input resistance.
  - *Input resistance:* Typical value for information: DAE input resistance at the connector, during internal auto-zeroing and during measurement.
  - *Low Battery Alarm Voltage:* Typical value for information. Below this voltage, a battery alarm signal is generated.
  - *Power consumption:* Typical value for information. Supply currents in various operating modes.

DC Voltage Measurement

A/D - Converter Resolution nominal

High Range: 1LSB = 6.1μV , full range = -100...+300 mV

Low Range: 1LSB = 61nV , full range = -1.......+3mV

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

Calibration Factors	X	Y	Z
High Range	403.728 ± 0.02% (k=2)	404.159 ± 0.02% (k=2)	403.544 ± 0.02% (k=2)
Low Range	3.96075 ± 1.50% (k=2)	3.99910 ± 1.50% (k=2)	3.95128 ± 1.50% (k=2)

Connector Angle

Connector Angle to be used in DASY system	282.0 ° ± 1 °

Appendix (Additional assessments outside the scope of SCS0108)

1. DC Voltage Linearity

High Range		Reading (μV)	Difference (μV)	Error (%)
Channel X	+ Input	199998.06	3.61	0.00
Channel X	+ Input	20004.03	1.44	0.01
Channel X	- Input	-19999.29	1.91	-0.01
Channel Y	+ Input	199998.59	4.10	0.00
Channel Y	+ Input	20003.11	0.68	0.00
Channel Y	- Input	-20001.61	-0.37	0.00
Channel Z	+ Input	199993.34	-1.05	-0.00
Channel Z	+ Input	20000.75	-1.64	-0.01
Channel Z	- Input	-20002.31	-0.99	0.00

Low Range		Reading (μV)	Difference (μV)	Error (%)
Channel X	+ Input	2003.09	1.39	0.07
Channel X	+ Input	202.30	0.39	0.19
Channel X	- Input	-197.64	0.35	-0.18
Channel Y	+ Input	2002.61	1.16	0.06
Channel Y	+ Input	201.33	-0.48	-0.24
Channel Y	- Input	-198.30	-0.26	0.13
Channel Z	+ Input	2002.06	0.74	0.04
Channel Z	+ Input	200.23	-1.45	-0.72
Channel Z	- Input	-199.25	-1.07	0.54

2. Common mode sensitivity

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

	Common mode Input Voltage (mV)	High Range Average Reading (μV)	Low Range Average Reading (μV)
Channel X	200	-1.27	-3.91
	- 200	5.04	3.07
Channel Y	200	17.98	17.91
	- 200	-19.51	-19.36
Channel Z	200	-13.62	-13.42
	- 200	11.84	11.45

3. Channel separation

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

	Input Voltage (mV)	Channel X (μV)	Channel Y (μV)	Channel Z (μV)
Channel X	200	-	0.66	-4.91
Channel Y	200	7.42	-	0.76
Channel Z	200	10.20	5.17	-

4. AD-Converter Values with inputs shorted

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

	High Range (LSB)	Low Range (LSB)
Channel X	16287	14305
Channel Y	15792	14215
Channel Z	16818	15854

5. Input Offset Measurement

DASY measurement parameters: Auto Zero Time: 3 sec; Measuring time: 3 sec
Input 10MΩ

	Average (μV)	min. Offset (μV)	max. Offset (μV)	Std. Deviation (μV)
Channel X	0.55	-0.41	1.58	0.43
Channel Y	-0.44	-2.12	0.86	0.55
Channel Z	-0.77	-2.07	0.55	0.49

6. Input Offset Current

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

7. Input Resistance (Typical values for information)

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

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

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

9. Power Consumption (Typical values for information)

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

Appendix G – Phantom Calibration Data Sheets

Schmid & Partner Engineering AG **s p e a g**

Zeughausstrasse 43, 8004 Zurich, Switzerland
Phone +41 44 245 9700, Fax +41 44 245 9779
info@speag.com, http://www.speag.com

Certificate of Conformity / First Article Inspection

Item	Oval Flat Phantom ELI 4.0
Type No	QD OVA 001 B
Series No	1003 and higher
Manufacturer	Untersee Composites Knebelstrasse 8 CH-8268 Mannenbach, Switzerland

Tests
Complete tests were made on the prototype units QD OVA 001 AA 1001, QD OVA 001 AB 1002, pre-series units QD OVA 001 BA 1003-1005 as well as on the series units QD OVA 001 BB, 1006 ff.

Test	Requirement	Details	Units tested
Material thickness	Compliant with the standard requirements	Bottom plate: 2.0mm +/- 0.2mm	all
Material parameters	Dielectric parameters for required frequencies	< 6 GHz: Rel. permittivity = 4 +/-1, Loss tangent ≤ 0.05	Material sample
Material resistivity	The material has been tested to be compatible with the liquids defined in the standards if handled and cleaned according to the instructions.	DGBE based simulating liquids. Observe Technical Note for material compatibility.	Equivalent phantoms, Material sample
Shape	Thickness of bottom material, Internal dimensions, Sagging compatible with standards from minimum frequency	Bottom elliptical 600 x 400 mm Depth 190 mm, Shape is within tolerance for filling height up to 155 mm, Eventual sagging is reduced or eliminated by support via DUT	Prototypes, Sample testing

Standards

[1] CENELEC EN 50361-2001, « Basic standard for the measurement of the Specific Absorption Rate related to human exposure to electromagnetic fields from mobile phones (300 MHz – 3 GHz) », July 2001

[2] IEEE 1528-2003, "Recommended Practice for Determining the Peak Spatial-Average Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques, December 2003

[3] IEC 62209 – 1, "Specific Absorption Rate (SAR) in the frequency range of 300 MHz to 3 GHz – Measurement Procedure, Part 1: Hand-held mobile wireless communication devices", February 2005

[4] IEC 62209 – 2, Draft, "Human Exposure to Radio Frequency Fields from Handheld and Body-Mounted Wireless Communication Devices – Human models, Instrumentation and Procedures – Part 2: Procedure to determine the Specific Absorption Rate (SAR) in the head and body for 30 MHz to 6 GHz Handheld and Body-Mounted Devices used in close proximity to the Body.", February 2005

[5] OET Bulletin 65, Supplement C, "Evaluating Compliance with FCC Guidelines for Human Exposure to Radiofrequency Electromagnetic Fields", Edition January 2001

Based on the tests above, we certify that this item is in compliance with the standards [1] to [5] if operated according to the specific requirements and considering the thickness. The dimensions are fully compliant with [4] from 30 MHz to 6 GHz. For the other standards, the minimum lower frequency limit is limited due to the dimensional requirements ([1]: 450 MHz, [2]: 300 MHz, [3]: 800 MHz, [5]: 375 MHz) and possibly further by the dimensions of the DUT.

Date 28.4.2008 **Signature / Stamp**

s p e a g
Schmid & Partner Engineering AG
Zeughausstrasse 43, 8004 Zurich, Switzerland
Phone +41 44 245 9700, Fax +41 44 245 9779
info@speag.com, http://www.speag.com

Appendix H – Validation Summary

Per FCC KDB 865664 D02 v01r02, SAR system validation status should be documented to confirm measurement accuracy. The SAR systems (including SAR probes, system components and software versions) used for this device were validated against its performance specifications prior to the SAR measurements. Reference dipoles were used with the required tissue equivalent media for system validation according to the procedures outlined in FCC KDB 865664 D01 v01r04 and IEEE 1528-2013. Since SAR probe calibrations are frequency dependent, each probe calibration point was validated at a frequency within the valid frequency range of the probe calibration point using the system that normally operates with the probe for routine SAR measurements and according to the required tissue equivalent media.

A tabulated summary of the system validation status including the validation date(s), measurement frequencies, SAR probes and tissue dielectric parameters has been included.

Table H-1
SAR System Validation Summary

SAR System #	Freq. (MHz)	Date	Probe S/N	Probe Type	Probe Cal. Point		Cond. (σ)	Perm. (ε_r)	CW Validation			Modulation Validation		
									Sens-itivity	Probe Linearity	Probe Isotropy	Modulation Type	Duty Factor	PAR
3	750	2/06/2023	7530	EX3DV4	750	Head	0.91	41.18	Pass	Pass	Pass	QPSK	Pass	Pass
3	900	2/06/2023	7530	EX3DV4	900	Head	0.99	41.29	Pass	Pass	Pass	WCDMA	Pass	Pass
3	900	2/06/2023	7530	EX3DV4	900	Head	0.99	41.29	Pass	Pass	Pass	QPSK	Pass	Pass
3	1750	2/07/2023	7530	EX3DV4	1750	Head	1.38	39.58	Pass	Pass	Pass	WCDMA	Pass	Pass
3	1750	2/07/2023	7530	EX3DV4	1750	Head	1.38	39.58	Pass	Pass	Pass	QPSK	Pass	Pass
3	1900	2/07/2023	7530	EX3DV4	1900	Head	1.42	39.17	Pass	Pass	Pass	WCDMA	Pass	Pass
3	1900	2/07/2023	7530	EX3DV4	1900	Head	1.42	39.17	Pass	Pass	Pass	QPSK	Pass	Pass
3	2550	2/08/2023	7530	EX3DV4	2550	Head	1.94	38.47	Pass	Pass	Pass	QPSK	Pass	Pass
3	3500	2/08/2023	7530	EX3DV4	3500	Head	2.96	37.11	Pass	Pass	Pass	QPSK	Pass	Pass
3	3700	2/08/2023	7530	EX3DV4	3700	Head	3.15	36.84	Pass	Pass	Pass	QPSK	Pass	Pass
3	2450	2/09/2023	7530	EX3DV4	3900	Head	1.83	38.49	Pass	Pass	Pass	DSS/OFDM	Pass	Pass
3	5250	2/10/2023	7530	EX3DV4	5250	Head	4.75	35.21	Pass	Pass	Pass	OFDM	Pass	Pass
3	5600	2/10/2023	7530	EX3DV4	5600	Head	5.11	34.95	Pass	Pass	Pass	OFDM	Pass	Pass
3	5750	2/10/2023	7530	EX3DV4	5750	Head	5.27	34.72	Pass	Pass	Pass	OFDM	Pass	Pass