



SAR TEST REPORT

Product Name	LTE Wingle
Model Name	E8372h-517
FCC ID	QISE8372H-517
Applicant	Huawei Technologies Co., Ltd.
Manufacturer	Huawei Technologies Co., Ltd.
Date of issue	June 18, 2015

TA Technology (Shanghai) Co., Ltd.

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GENERAL SUMMARY

Reference Standard(s)	FCC 47CFR §2.1093 Radiofrequency Radiation Exposure Evaluation: Portable Devices ANSI C95.1, 1992: Safety Levels with Respect to Human Exposure to Radio Frequency Electromagnetic Fields, 3 kHz to 300 GHz.(IEEE Std C95.1-1991) IEEE Std 1528™-2003: IEEE Recommended Practice for Determining the Peak Spatial-Average Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques. KDB 865664 D01 SAR measurement 100 MHz to 6 GHz v01r03 SAR Measurement Requirements for 100 MHz to 6 GHz KDB 447498 D01 Mobile Portable RF Exposure v05r02: Mobile and Portable Device RF Exposure Procedures and Equipment Authorization Policies KDB 941225 D01 SAR test for 3G devices v03: SAR Measurement Procedures CDMA 20001x RTT, 1x Ev-Do, WCDMA, HSDPA/HSPA KDB 941225 D05 SAR for LTE Devices v02r03 SAR Test Considerations for LTE Handsets and Data Modems KDB 447498 D02 SAR Procedures for Dongle Xmtr v02: SAR Measurement Procedures for USB Dongle Transmitters. KDB 248227 D01 802.11 Wi-Fi SAR v02: SAR Guidance for IEEE 802.11 (Wi-Fi) Transmitters.
Conclusion	This portable wireless equipment has been measured in all cases requested by the relevant standards. Test results in Chapter 7 of this test report are below limits specified in the relevant standards for the tested bands only. General Judgment: Pass
Comment	The test result only responds to the measured sample.

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1. General Information

1.1. Notes of the Test Report

TA Technology (Shanghai) Co., Ltd. has obtained the accreditation of China National Accreditation Service for Conformity Assessment (CNAS), and accreditation number: L2264.

TA Technology (Shanghai) Co., Ltd. guarantees the reliability of the data presented in this test report, which is the results of measurements and tests performed for the items under test on the date and under the conditions stated in this test report and is based on the knowledge and technical facilities available at TA Technology (Shanghai) Co., Ltd. at the time of execution of the test.

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If the electronic report is inconsistent with the printed one, it should be subject to the latter.

1.2. Testing Laboratory

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1.3. Applicant Information

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1.4. Manufacturer Information

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1.5. Information of EUT

General Information

Device Type:	Portable Device		
Exposure Category:	Uncontrolled Environment / General Population		
Permissive Change:	Class II Permissive Change		
IMEI:	004401723817660		
Hardware Version:	CL1E8372HM		
Software Version:	21.200.15.00.00		
Antenna Type:	Internal Antenna		
Device Operating Configurations:			
tested Mode(s):	GSM 850/ GSM 1900; UMTS Band II/IV/V; LTE Band 2/4/5/7/12/17; 802.11b/g/n HT20/HT40;		
Test Modulation:	(GSM)GMSK; (UMTS)QPSK; (LTE) QPSK, 16QAM; (WIFI)DSSS/OFDM;		
Device Class:	B		
HSDPA UE Category:	10		
HSUPA UE Category:	6		
HSPA+ UE Downlink Category:	14		
DC-HSDPA Category:	24		
LTE UE Category:	4		
GPRS Multislot Class(12):	Max Number of Timeslots in Uplink	4	
	Max Number of Timeslots in Downlink	4	
	Max Total Timeslot	5	
EGPRS Multislot Class(12):	Max Number of Timeslots in Uplink	4	
	Max Number of Timeslots in Downlink	4	
	Max Total Timeslot	5	
Operating Frequency Range(s):	Mode	T(x)	R(x)
	GSM 850	824.2 ~ 848.8	869.2 ~ 893.8
	GSM 1900	1850.2 ~ 1909.8	1930.2 ~ 1989.8
	UMTS Band II	1852.4 ~ 1907.6	1932.4~ 1987.6
	UMTS Band IV	1712.4 ~ 1752.6	2112.4 ~ 2152.6
	UMTS Band V	826.4 ~ 846.6	871.4 ~ 891.6
	LTE FDD 2(5MHz)	1852.5 ~ 1907.5	1932.5 ~ 1987.5
	LTE FDD 2(10MHz)	1855 ~ 1905	1935 ~ 1985
	LTE FDD 2(15MHz)	1857.5 ~ 1902.5	1937.5 ~ 1982.5
	LTE FDD 2(20MHz)	1860 ~ 1900	1940 ~ 1980
	LTE FDD 4(5MHz)	1712.5 ~ 1752.5	2112.5 ~ 2152.5
	LTE FDD 4(10MHz)	1715 ~ 1750	2115 ~ 2150

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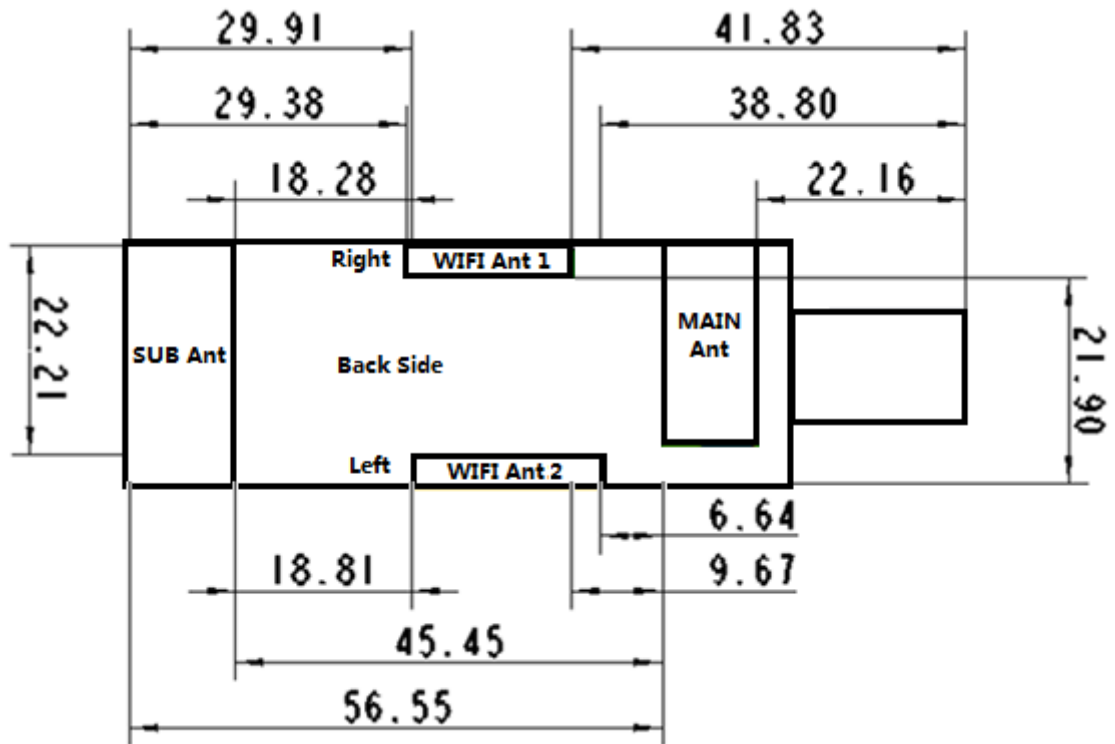
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	LTE FDD 4(15MHz)	1717.5 ~ 1747.5	2117.5 ~ 2147.5
	LTE FDD 4(20MHz)	1720 ~ 1745	2120 ~ 2145
	LTE FDD 5(5MHz)	826.5 ~ 846.5	871.5 ~ 891.5
	LTE FDD 5(10MHz)	829 ~ 844	874 ~ 889
	LTE FDD 7(5MHz)	2502.5 ~ 2567.5	2622.5 ~ 2687.5
	LTE FDD 7(10MHz)	2505 ~ 2565	2625 ~ 2685
	LTE FDD 7(15MHz)	2507.5 ~ 2562.5	2627.5 ~ 2682.5
	LTE FDD 7(20MHz)	2510 ~ 2560	2630 ~ 2680
	LTE FDD 12(5MHz)	701.5 ~ 713.5	731.5 ~ 743.5
	LTE FDD 12(10MHz)	704 ~ 711	734 ~ 741
	LTE FDD 17(5MHz)	706.5 ~ 713.5	736.5 ~ 743.5
	LTE FDD 17(10MHz)	709 ~ 711	739 ~ 741
	WIFI	2412 ~2442	2412 ~2442
Power Class:	GSM 850: 4		
	GSM 1900: 1		
	UMTS Band II/IV/V: 3		
	LTE Band 2/4/5/7/12/17: 3		
Power Level:	GSM 850: level 5		
	GSM 1900: level 0		
	UMTS Band II/IV/V: all up bits		
	LTE Band 2/4/5/7/12/17: max power		
Used Host Products:	Lenovo Y-450		

E8372h-517 is a variant model of E8372h-510. The report number of E8372h-510 is RHA1412-0127SAR. This report changes Model Name and Software Version. The detailed product change description please refers to the ANNEX N.

1.6. EUT Antenna Locations



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1.7. The Maximum Reported SAR_{1g}

Body SAR Configuration

Mode	Test Position	Channel /Frequency(MHz)	Limit SAR _{1g} 1.6 W/kg	
			Measured SAR _{1g} (W/kg)	Reported SAR _{1g} (W/kg)
GPRS 850 (E8372h-510)	Test Position 1/ Back Side	190/836.6	0.42	0.51
EGPRS 1900 (E8372h-510)	Test Position 1/ Back Side	661/1880	0.57	0.79
UMTS Band II (E8372h-517)	Test Position 1/ Back Side	9400/1880	0.47	0.57
UMTS Band IV (E8372h-517)	Test Position 1/ Back Side	1413/1732.6	0.47	0.53
UMTS Band V (E8372h-510)	Test Position 1/ Back Side	4182/836.4	0.62	0.71
LTE Band 2 (E8372h-510)	Test Position 1/ Back Side	18900/1880	1.09	1.19
LTE Band 4 (E8372h-510)	Test Position 1/ Back Side	20175/1732.5	0.66	0.92
LTE Band 5 (E8372h-517)	Test Position 1/ Back Side	20525/836.5	0.40	0.48
LTE Band 7 (E8372h-517)	Test Position 1/ Back Side	21350/2560	0.65	0.73
LTE Band 12 (E8372h-517)	Test Position 1/ Back Side	23130/711	0.49	0.57
LTE Band 17 (E8372h-517)	Test Position 1/ Back Side	23800/711	0.46	0.52
WiFi Antenna 1 (E8372h-517)	Test Position 2/ Front Side	4/2427	0.18	0.24
WiFi Antenna 2 (E8372h-517)	Test Position 1/ Back Side	4/2427	0.30	0.40
WiFi MIMO (E8372h-517)	Test Position 2/ Front Side	4/2427	0.19	0.24

1.8. Test Date

The test performed from June 2, 2015 to June 13, 2015.

2. SAR Measurements System Configuration

2.1. SAR Measurement Set-up

The DASY5 system for performing compliance tests consists of the following items:

- A standard high precision 6-axis robot (Stäubli RX family) with controller and software. An arm extension for accommodating the data acquisition electronics (DAE).
- A dosimetric probe, i.e. an isotropic E-field probe optimized and calibrated for usage in tissue simulating liquid. The probe is equipped with an optical surface detector system.
- A data acquisition electronic (DAE) which performs the signal amplification, signal multiplexing, AD-conversion, offset measurements, mechanical surface detection, collision detection, etc. The unit is battery powered with standard or rechargeable batteries. The signal is optically transmitted to the EOC.
- A unit to operate the optical surface detector which is connected to the EOC.
- The Electro-Optical Coupler (EOC) performs the conversion from the optical into a digital electric signal of the DAE. The EOC is connected to the DASY5 measurement server.
- The DASY5 measurement server, which performs all real-time data evaluation for field measurements and surface detection, controls robot movements and handles safety operation. A computer operating Windows 2003
- DASY5 software and SEMCAD data evaluation software.
- Remote control with teach panel and additional circuitry for robot safety such as warning lamps, etc.
- The generic twin phantom enabling the testing of left-hand and right-hand usage.
- The device holder for handheld mobile phones.
- Tissue simulating liquid mixed according to the given recipes.
- System validation dipoles allowing to validate the proper functioning of the system.

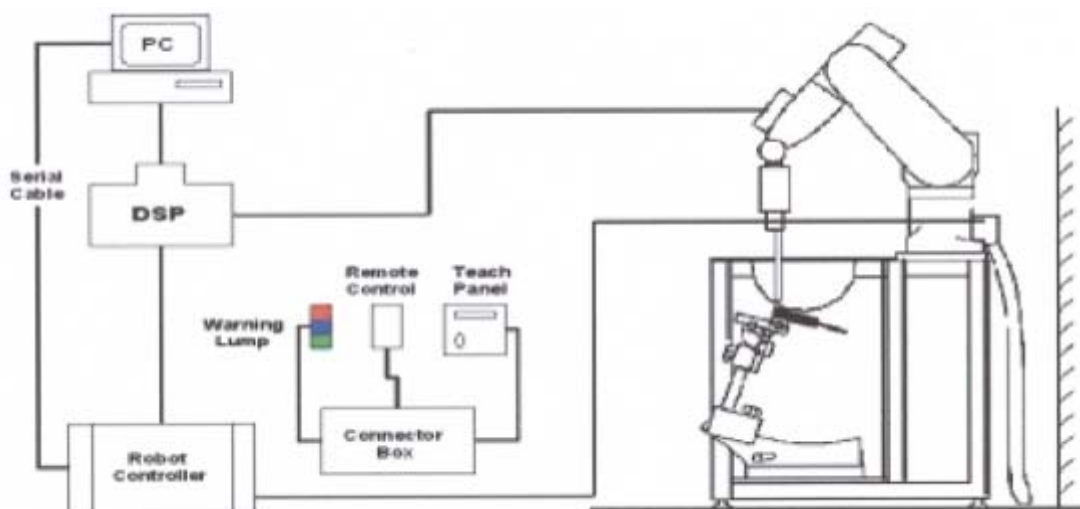


Figure 1. SAR Lab Test Measurement Set-up

2.2. DASY5 E-field Probe System

The SAR measurements were conducted with the dosimetric probe EX3DV4 (manufactured by SPEAG), designed in the classical triangular configuration and optimized for dosimetric evaluation.

2.2.1. EX3DV4 Probe Specification

Construction	Symmetrical design with triangular core Built-in shielding against static charges PEEK enclosure material (resistant to organic solvents, e.g., DGBE)
Calibration	ISO/IEC 17025 calibration service available
Frequency	10 MHz to > 6 GHz Linearity: ± 0.2 dB (30 MHz to 6 GHz)
Directivity	± 0.3 dB in HSL (rotation around probe axis) ± 0.5 dB in tissue material (rotation normal to probe axis)
Dynamic Range	10 μ W/g to > 100 mW/g Linearity: ± 0.2 dB (noise: typically < 1 μ W/g)
Dimensions	Overall length: 330 mm (Tip: 20 mm) Tip diameter: 2.5 mm (Body: 12 mm) Typical distance from probe tip to dipole centers: 1 mm
Application	High precision dosimetric measurements in any exposure scenario (e.g., very strong gradient fields). Only probe which enables compliance testing for frequencies up to 6 GHz with precision of better 30%.



Figure 2. EX3DV4 E-field Probe



Figure 3. EX3DV4 E-field probe

2.2.2. E-field Probe Calibration

Each probe is calibrated according to a dosimetric assessment procedure with accuracy better than $\pm 10\%$. The spherical isotropy was evaluated and found to be better than $\pm 0.25\text{dB}$. The sensitivity parameters (NormX, NormY, NormZ), the diode compression parameter (DCP) and the conversion factor (ConvF) of the probe are tested.

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 wave guide above 1 GHz for free space. For the free space calibration, the probe is placed in the volumetric center of the cavity and at the proper orientation with the field. The probe is then rotated 360 degrees.

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.

Or

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

Where:

σ = Simulated tissue conductivity,

ρ = Tissue density (kg/m^3).

2.3. Other Test Equipment

2.3.1. Device Holder for Transmitters

Construction: Simple but effective and easy-to-use extension for Mounting Device that facilitates the testing of larger devices according to IEC 62209-2 (e.g., laptops, cameras, etc.) It is lightweight and fits easily on the upper part of the Mounting Device in place of the phone positioner. The extension is fully compatible with the Twin SAM, ELI4 and SAM v6.0 Phantoms.

Material: POM, Acrylic glass, Foam

2.3.2. Phantom

The Generic Twin Phantom is constructed of a fiberglass shell integrated in a wooden Figure. 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.

Shell Thickness	2±0.1 mm
Filling Volume	Approx. 20 liters
Dimensions	810 x 1000 x 500 mm (H x L x W) Aailable Special



Figure 4 Generic Twin Phantom

2.4. Scanning Procedure

The DASY5 installation includes predefined files with recommended procedures for measurements and validation. 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 “surface check” measurement tests the optical surface detection system of the DASY5 system

by repeatedly detecting the surface with the optical and mechanical surface detector and comparing the results. The output gives the detecting heights of both systems, the difference between the two systems and the standard deviation of the detection repeatability. Air bubbles or refraction in the liquid due to separation of the sugar-water mixture gives poor repeatability (above $\pm 0.1\text{mm}$). To prevent wrong results tests are only executed when the liquid is free of air bubbles. The difference between the optical surface detection and the actual surface depends on the probe and is specified with each probe. (It does not depend on the surface reflectivity or the probe angle to the surface within $\pm 30^\circ$.)

- **Area Scan**

The Area Scan is used as a fast scan in two dimensions to find the area of high field values before running a detailed measurement around the hot spot. Before starting the area scan a grid spacing is set according to FCC KDB Publication 865664. During scan the distance of the probe to the phantom remains unchanged.

After finishing area scan, the field maxima within a range of 2 dB will be ascertained.

- **Zoom Scan**

After the maximum interpolated values were calculated between the points in the cube, the SAR was averaged over the spatial volume (1g or 10g) using a 3D-Spline interpolation algorithm. The 3D-spline is composed of three one-dimensional splines with the "Not a knot" condition (in x, y, and z directions). The volume was then integrated with the trapezoidal algorithm.

- **Spatial Peak Detection**

The procedure for spatial peak SAR evaluation has been implemented and can determine values of masses of 1g and 10g, as well as for user-specific masses. The DASY5 system allows evaluations that combine measured data and robot positions, such as:

- maximum search
- extrapolation
- boundary correction
- peak search for averaged SAR

During a maximum search, global and local maxima searches are automatically performed in 2-D after each Area Scan measurement with at least 6 measurement points. It is based on the evaluation of the local SAR gradient calculated by the Quadratic Shepard's method. The algorithm will find the global maximum and all local maxima within -2 dB of the global maxima for all SAR distributions.

Extrapolation routines are used to obtain SAR values between the lowest measurement points and the inner phantom surface. The extrapolation distance is determined by the surface detection distance and the probe sensor offset. Several measurements at different distances are necessary for the extrapolation. Extrapolation routines require at least 10 measurement points in 3-D space.

They are used in the Zoom Scan to obtain SAR values between the lowest measurement points and the inner phantom surface. The routine uses the modified Quadratic Shepard's method for extrapolation.

- A Z-axis scan measures the total SAR value at the x-and y-position of the maximum SAR value found during the cube scan. The probe is moved away in z-direction from the bottom of the SAM phantom in 5mm steps.

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Table 1: Area and Zoom Scan Resolutions per FCC KDB Publication 865664 D01

Frequency	Maximum Area Scan Resolution (mm) (Δx_{area}, Δy_{area})	Maximum Zoom Scan Resolution (mm) (Δx_{zoom}, Δy_{zoom})	Maximum Zoom Scan Spatial Resolution (mm) $\Delta z_{\text{zoom}}(n)$	Minimum Zoom Scan Volume (mm) (x, y, z)
≤ 2 GHz	≤ 15	≤ 8	≤ 5	≥ 30
2-3 GHz	≤ 12	≤ 5	≤ 5	≥ 30
3-4 GHz	≤ 12	≤ 5	≤ 4	≥ 28
4-5 GHz	≤ 10	≤ 4	≤ 3	≥ 25
5-6 GHz	≤ 10	≤ 4	≤ 2	≥ 22

2.5. Data Storage and Evaluation

2.5.1. Data Storage

The DASY5 software stores the acquired data from the data acquisition electronics as raw data (in microvolt readings from the probe sensors), together with all necessary software parameters for the data evaluation (probe calibration data, liquid parameters and device frequency and modulation data) in measurement files with the extension “.DAE4”. The software evaluates the desired unit and format for output each time the data is visualized or exported. This allows verification of the complete software setup even after the measurement and allows correction of incorrect parameter settings. For example, if a measurement has been performed with a wrong crest factor parameter in the device setup, the parameter can be corrected afterwards and the data can be re-evaluated.

The measured data can be visualized or exported in different units or formats, depending on the selected probe type ([V/m], [A/m], [°C], [mW/g], [mW/cm²], [dBrel], etc.). Some of these units are not available in certain situations or show meaningless results, e.g., a SAR output in a lossless media will always be zero. Raw data can also be exported to perform the evaluation with other software packages.

2.5.2. Data Evaluation by SEMCAD

The SEMCAD software automatically executes the following procedures to calculate the field units from the microvolt readings at the probe connector. The parameters used in the evaluation are stored in the configuration modules of the software:

Probe parameters:	- Sensitivity	Normi, a_{i0} , a_{i1} , a_{i2}
	- Conversion factor	ConvF _i
	- Diode compression point	Dcp _i
Device parameters:	- Frequency	f
	- Crest factor	cf
Media parameters:	- Conductivity	
	- Density	

These parameters must be set correctly in the software. They can be found in the component documents or they can be imported into the software from the configuration files issued for the DASY5 components. In the direct measuring mode of the multimeter option, the parameters of the actual system setup are used. In the scan visualization and export modes, the parameters stored in the corresponding document files are used.

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.

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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 as:

$$V_i = U_i + U_i^2 \cdot c f / d c p_i$$

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: $E_i = (V_i / Norm_i \cdot ConvF)^{1/2}$

H-field probes: $H_i = (V_i)^{1/2} \cdot (a_{i0} + a_{i1} f + a_{i2} f^2) / f$

With V_i = compensated signal of channel i (i = x, y, z)

$Norm_i$ = sensor sensitivity of channel i (i = x, y, z)
[mV/(V/m)²] for E-field Probes

$ConvF$ = sensitivity enhancement in solution

a_{ij} = sensor sensitivity factors for H-field probes

f = carrier frequency [GHz]

E_i = electric field strength of channel i in V/m

H_i = magnetic field strength of channel i in A/m

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

$$E_{tot} = (E_x^2 + E_y^2 + E_z^2)^{1/2}$$

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

$$SAR = (E_{tot})^2 \cdot \sigma / (\rho \cdot 1000)$$

with SAR = local specific absorption rate in mW/g

E_{tot} = total field strength in V/m

= conductivity in [mho/m] or

[Siemens/m]

= equivalent tissue density in

g/cm³

Note that the density is normally set to 1 (or 1.06), to account for actual brain density rather than the density of the simulation liquid. The power flow density is calculated assuming the excitation field to be a free space field.

$$P_{pwe} = E_{tot}^2 / 3770 \quad \text{or} \quad P_{pwe} = H_{tot}^2 \cdot 37.7$$

with P_{pwe} = equivalent power density of a plane wave in mW/cm²

E_{tot} = total electric field strength in V/m

H_{tot} = total magnetic field strength in A/m

3. Laboratory Environment

Table 2: The Requirements of the Ambient Conditions

Temperature	Min. = 18°C, Max. = 25 °C
Relative humidity	Min. = 30%, Max. = 70%
Ground system resistance	< 0.5 Ω
Ambient noise is checked and found very low and in compliance with requirement of standards.	
Reflection of surrounding objects is minimized and in compliance with requirement of standards.	

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4. Tissue-equivalent Liquid

4.1. Tissue-equivalent Liquid Ingredients

The liquid is consisted of water, salt, Glycol, Sugar, Preventol and Cellulose. The liquid has previously been proven to be suited for worst-case. Table 3 shows the detail solution. It's satisfying the latest tissue dielectric parameters requirements proposed by the KDB 865664 D01.

Table 3: Composition of the Body Tissue Equivalent Matter

MIXTURE%	FREQUENCY(Body) 750MHz		
Water	52.49		
Sugar	45		
Salt	1.41		
Preventol	0.1		
Cellulose	1.0		
Dielectric Parameters Target Value	f=750MHz	$\epsilon=55.5$	$\sigma=0.96$

MIXTURE%	FREQUENCY(Body) 835MHz		
Water	52.5		
Sugar	45		
Salt	1.4		
Preventol	0.1		
Cellulose	1.0		
Dielectric Parameters Target Value	f=835MHz	$\epsilon=55.2$	$\sigma=0.97$

MIXTURE%	FREQUENCY(Body) 1750MHz		
Water	69.91		
Glycol	29.97		
Salt	0.12		
Dielectric Parameters Target Value	f=1750MHz	$\epsilon=53.4$	$\sigma=1.49$

MIXTURE%	FREQUENCY (Body) 1900MHz		
Water	69.91		
Glycol monobutyl	29.96		
Salt	0.13		
Dielectric Parameters Target Value	f=1900MHz	$\epsilon=53.3$	$\sigma=1.52$

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MIXTURE%	FREQUENCY(Body) 2450MHz		
Water	73.2		
Glycol	26.7		
Salt	0.1		
Dielectric Parameters Target Value	f=2450MHz	$\epsilon=52.7$	$\sigma=1.95$

MIXTURE%	FREQUENCY (Body) 2600MHz		
Water	72.6		
Glycol monobutyl	27.3		
Salt	0.1		
Dielectric Parameters Target Value	f=2600MHz	$\epsilon=52.5$	$\sigma=2.16$

4.2. Tissue-equivalent Liquid Properties

Table 4: Dielectric Performance of Tissue Simulating Liquid

Frequency	Test Date	Temp ℃	Measured Dielectric Parameters		Target Dielectric Parameters		Limit (Within $\pm 5\%$)	
			ϵ_r	$\sigma(\text{s/m})$	ϵ_r	$\sigma(\text{s/m})$	Dev $\epsilon_r(\%)$	Dev $\sigma(\%)$
750MHz	2015-6-11	21.5	54.3	0.97	55.5	0.96	-2.16	1.04
835MHz	2015-6-10	21.5	55.1	1.00	55.2	0.97	-0.18	3.09
1750MHz	2015-6-13	21.5	53.3	1.50	53.4	1.49	-0.19	0.67
1900MHz	2015-6-12	21.5	52.5	1.52	53.3	1.52	-1.50	0.00
2450MHz	2015-6-2	21.5	52.1	1.99	52.7	1.95	-1.14	2.05
2600MHz	2015-6-8	21.5	52.5	2.10	52.5	2.16	0.00	1.04

5. System Check

5.1. Description of System Check

The manufacturer calibrates the probes annually. Dielectric parameters of the tissue simulants were measured every day using the dielectric probe kit and the network analyzer. A system check measurement was made following the determination of the dielectric parameters of the simulant, using the dipole validation kit. A power level of 250 mW was supplied to the dipole antenna, which was placed under the flat section of the twin SAM phantom. The system check results (dielectric parameters and SAR values) are given in the table 5.

System check results have to be equal or near the values determined during dipole calibration with the relevant liquids and test system ($\pm 10\%$).

System check is performed regularly on all frequency bands where tests are performed with the DASY5 system.

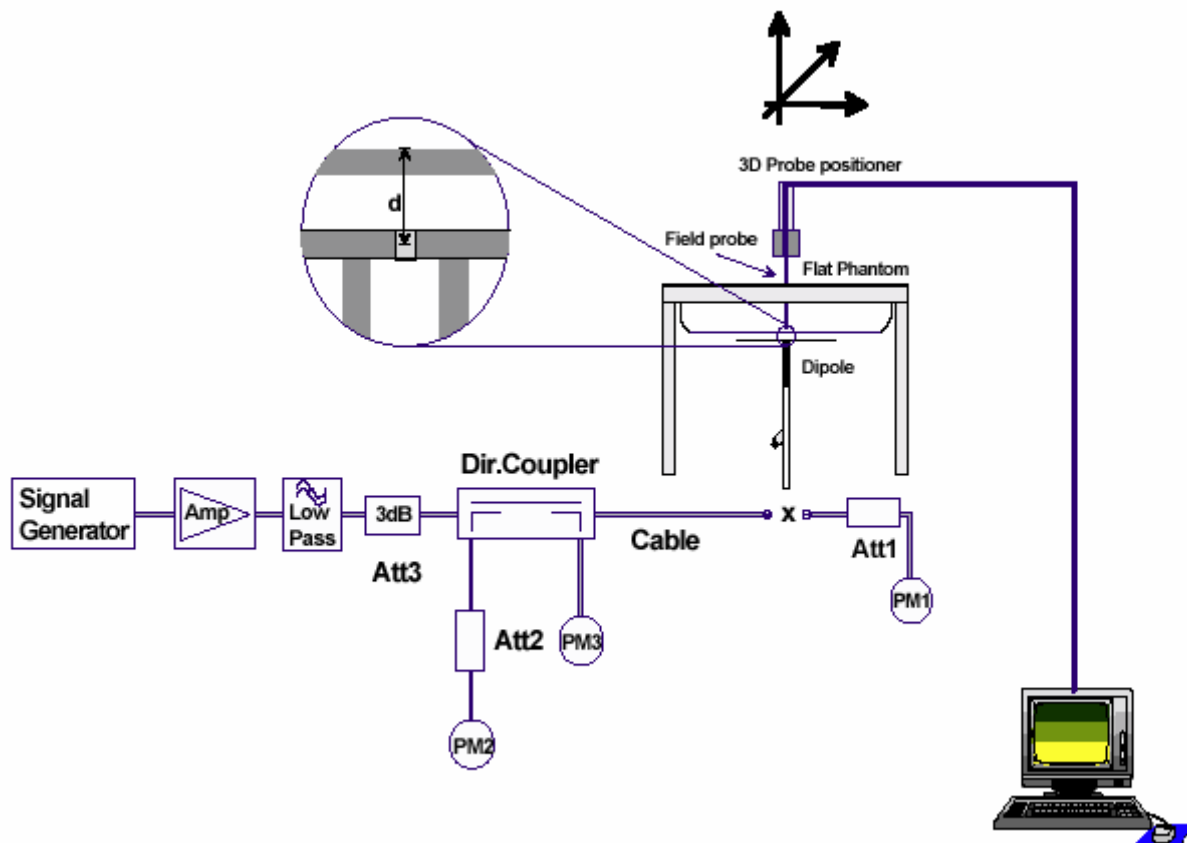


Figure 5. System Check Set-up

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Justification for Extended SAR Dipole Calibrations

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 865664 D01:

Dipole D1750V2 SN: 1033				
Body Liquid				
Date of Measurement	Return Loss(dB)	Δ %	Impedance (Ω)	$\Delta\Omega$
1/26/2014	-24.3	/	45.8	/
1/25/2015	-23.5	3.3%	48.5	2.7 Ω

5.2. System Check Results

6. Operational Conditions during Test

6.1. General Description of Test Procedures

Connection to the EUT is established via air interface with CMW 500, and the EUT is set to maximum output power by CMW500. The antenna connected to the output of the base station simulator shall be placed at least 50 cm away from the EUT. The signal transmitted by the simulator to the antenna feeding point shall be lower than the output power level of the EUT by at least 30 dB.

The measurements were performed in combination with a host product (Lenovo Y-450). Lenovo Y-450 laptop has both horizontal and vertical USB slots.

6.2. Test Configuration

6.2.1. GSM Test Configuration

For the body SAR tests for GSM 850 and GSM 1900, a communication link is set up with a System Simulator (SS) by air link. The EUT is commanded to operate at maximum transmitting power. Since the GPRS class is 12 for this EUT, it has at most 4 timeslots in uplink and at most 4 timeslots in downlink, the maximum total timeslot is 5. Since the EGPRS class is 12 for this EUT, it has at most 4 timeslots in uplink and at most 4 timeslots in downlink, the maximum total timeslot is 5.

According to specification 3GPP TS 51.010, the maximum power of the GSM can do the power reduction for the multi-slot. The allowed power reduction in the multi-slot configuration is as following:

Table 6: The allowed power reduction in the multi-slot configuration

Number of timeslots in uplink assignment	Permissible nominal reduction of maximum output power,(dB)
1	0
2	0 to 3,0
3	1,8 to 4,8
4	3,0 to 6,0

6.2.2. UMTS Test Configuration

6.2.2.1. 3G SAR Test Reduction Procedure

In the following procedures, the mode tested for SAR is referred to as the primary mode. The equivalent modes considered for SAR test reduction are denoted as secondary modes. Both primary and secondary modes must be in the same frequency band. When the maximum output power and tune-up tolerance specified for production units in a secondary mode is $\leq \frac{1}{4}$ dB higher than the primary mode or when the highest reported SAR of the primary mode is scaled by the ratio of specified maximum output power and tune-up tolerance of secondary to primary mode and the adjusted SAR is ≤ 1.2 W/kg, SAR measurement is not required for the secondary mode. This is referred to as the 3G SAR test reduction procedure in the following SAR test guidance, where the primary mode is identified in the applicable wireless mode test procedures and the secondary mode is wireless mode being considered for SAR test reduction by that procedure. When the 3G SAR test reduction procedure is not satisfied, it is identified as “otherwise” in the applicable procedures; SAR measurement is required for the secondary mode.

6.2.2.2. Output Power Verification

Maximum output power is verified on the high, middle and low channels according to procedures described in section 5.2 of 3GPP TS 34.121, using the appropriate RMC or AMR with TPC (transmit power control) set to all “1’s” for WCDMA/HSDPA or by applying the required inner loop power control procedures to maintain maximum output power while HSUPA is active. Results for all applicable physical channel configurations (DPCCH, DPDCHn and spreading codes, HSDPA, HSPA) are required in the SAR report. All configurations that are not supported by the handset or cannot be measured due to technical or equipment limitations must be clearly identified.

6.2.2.3. SAR Measurement

SAR for body exposure configurations is measured according to the ‘Body-Worn Accessory SAR’ procedures in the ‘WCDMA Handsets’ section. The 3G SAR test reduction procedure is applied to HSPA body SAR with 12.2 kbps RMC as the primary mode. Body SAR for HSPA is measured with E-DCH Sub-test 5, using H-Set 1 and QPSK for FRC and a 12.2 kbps RMC configured in Test Loop Mode 1 and power control algorithm 2, according to the highest reported body SAR configuration in 12.2 kbps RMC without HSPA. When VOIP applies to head exposure, the 3G SAR test reduction procedure is applied with 12.2 kbps RMC as the primary mode; otherwise, the same HSPA configuration used for body SAR measurements are applied to head exposure testing.

Due to inner loop power control requirements in HSPA, a communication test set is required for output power and SAR tests. The 12.2 kbps RMC, FRC H-set 1 and E-DCH configurations for HSPA are configured according to the β values indicated in Table 7 and other applicable procedures described in the ‘WCDMA Handset’ and ‘Release 5 HSDPA Data Devices’ sections of this document.

6.2.2.4. Release 5 HSDPA Data Devices

The following procedures are applicable to HSDPA data devices operating under 3GPP Release 5. SAR is required for devices in body-worn accessory and other body exposure conditions, including handsets and data modems operating in various electronic devices. HSDPA operates in conjunction with WCDMA and requires an active DPCCH. The default test configuration is to measure SAR in WCDMA with HSDPA remain inactive, to establish a radio link between the test device and a

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communication test set using a 12.2 kbps RMC configured in Test Loop Mode 1. SAR for HSDPA is selectively measured using the highest reported SAR configuration in WCDMA, with an FRC in H-set 1 and a 12.2 kbps RMC. SAR is selectively confirmed for other physical channel configurations (DPCCH & DPDCHn) according to exposure conditions, device operating capabilities and maximum output power specified for production units, including tune-up tolerance by applying the 3G SAR test reduction procedures. Maximum output power is verified according to the applicable versions of 3GPP TS 34.121. SAR must be measured based on these maximum output conditions and requirements, with respect to the UE Categories, and explained in the SAR report. When Maximum Power Reduction (MPR) applies, the implementations must be clearly identified in the SAR report to support test results according to Cubic Metric (CM) and, as appropriate, Enhanced MPR (E-MPR) requirements.

HSDPA is configured according to the applicable UE category of a test device. The number of HS-DSCH/HS-PDSCHs, HARQ processes, minimum inter-TTI interval, transport block sizes and RV coding sequence are defined by the H-set. To maintain a consistent test configuration and stable transmission conditions, QPSK is used in the H-set for SAR testing. HS-DPCCH should be configured with a CQI feedback cycle of 4 ms and a CQI repetition factor of 2 to maintain a constant rate of active CQI slots. DPCCH and DPDCH gain factors(β_c , β_d), and HS-DPCCH power offset parameters (Δ_{ACK} , Δ_{NACK} , Δ_{CQI}) are set according to values indicated in Table 6. The CQI value is determined by the UE category, transport block size, number of HS-PDSCHs and modulation used in the H-set.

Table 7: Subtests for UMTS Release 5 HSDPA

Sub-set	β_c	β_d	β_d (SF)	β_c/β_d	β_{hs} (note 1, note 2)	CM(dB) (note 3)	MPR(dB)
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

Note1: Δ_{ACK} , Δ_{NACK} and $\Delta_{CQI}=8 \Leftrightarrow A_{hs} = \beta_{hs}/\beta_c=30/15 \Leftrightarrow \beta_{hs}=30/15*\beta_c$

Note2: CM=1 for $\beta_c/\beta_d=12/15$, $\beta_{hs}/\beta_c=24/15$.

Note3: For subtest 2 the $\beta_c\beta_d$ ratio of 12/15 for the TFC during the measurement period(TF1,TF0) is achieved by setting the signaled gain factors for the reference TFC (TFC1,TF1) to $\beta_c=11/15$ and $\beta_d=15/15$.

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6.2.2.5. Release 6 HSPA Data Devices

The following procedures are applicable to HSPA (HSUPA/HSDPA) data devices operating under 3GPP Release 6. SAR is required for devices in body-worn accessory and other body exposure conditions, including handsets and data modems operating in various electronic devices. HSUPA operates in conjunction with WCDMA and HSDPA. SAR is initially measured in WCDMA test configurations with HSPA remain inactive. The default test configuration is to establish a radio link between the test device and a communication test set to configure a 12.2 kbps RMC in Test Loop Mode 1. SAR for HSPA is selectively measured with HS-DPCCH, E-DPCCH and E-DPDCH, all enabled, along with a 12.2 kbps RMC using the highest reported SAR configuration in WCDMA with 12.2 kbps RMC only.

An FRC is configured according to HS-DPCCH Sub-test 1 using H-set 1 and QPSK. HSPA is configured according to E-DCH Sub-test 5 requirements. SAR for other HSPA sub-test configurations is confirmed selectively according to exposure conditions, E-DCH UE Category and maximum output power of production units, by applying the 3G SAR test reduction procedure. Maximum output power is verified according to procedures in applicable versions of 3GPP TS 34.121. SAR must be measured based on these maximum output conditions and requirements, with respect to the UE Categories for HS-DPCCH and HSPA, and explained in the SAR report. When Maximum Power Reduction (MPR) applies, the implementations must be clearly identified in the SAR report to support test results according to Cubic Metric (CM) and, as appropriate, Enhanced MPR (E-MPR) requirements.

Table 8: Sub-Test 5 Setup for Release 6 HSUPA

Sub-set	β_c	β_d	β_d (SF)	β_c/β_d	$\beta_{hs}^{(1)}$	β_{ec}	β_{ed}	β_{ed} (SF)	β_{ed} (codes)	CM ⁽²⁾ (dB)	MPR (dB)	AG ⁽⁴⁾ Index	E-TFCI
1	11/15 ⁽³⁾	15/15 ⁽³⁾	64	11/15 ⁽³⁾	22/15	209/225	1039/225	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_{ed1} 47/15 β_{ed2} 47/15	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 ⁽⁴⁾	15/15 ⁽⁴⁾	64	15/15 ⁽⁴⁾	30/15	24/15	134/15	4	1	1.0	0.0	21	81

Note 1: Δ_{ACK} , Δ_{NACK} and $\Delta_{CQI} = 8 \Leftrightarrow A_{hs} = \beta_{hs}/\beta_c = 30/15 \Leftrightarrow \beta_{hs} = 30/15 * \beta_c$.

Note 2: CM = 1 for $\beta_c/\beta_d = 12/15$, $\beta_{hs}/\beta_c = 24/15$. 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 signaled gain factors for the reference TFC (TF1, TF1) to $\beta_c = 10/15$ and $\beta_d = 15/15$.

Note 4: For subtest 5 the β_c/β_d ratio of 15/15 for the TFC during the measurement period (TF1, TF0) is achieved by setting the signaled gain factors for the reference TFC (TF1, TF1) to $\beta_c = 14/15$ and $\beta_d = 15/15$.

Note 5: Testing UE using E-DPDCH Physical Layer category 1 Sub-test 3 is not required according to TS 25.306 Figure 5.1g.

Note 6: β_{ed} can not be set directly; it is set by Absolute Grant Value.

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Table 9: HSPA UE category

UE E-DCH Category	Maximum E-DCH Codes Transmitted	Number of HARQ Processes	E-DCH TTI (ms)	Minimum Spreading Factor	Maximum E-DCH Transport Block Bits	Max Rate (Mbps)
1	1	4	10	4	7110	0.7296
2	2	8	2	4	2798	1.4592
	2	4	10	4	14484	
3	2	4	10	4	14484	1.4592
4	2	8	2	2	5772	2.9185
	2	4	10	2	20000	2.00
5	2	4	10	2	20000	2.00
6 (No DPDCH)	4	8	2	2 SF2 & 2 SF4	11484	5.76
	4	4	10		20000	2.00
7 (No DPDCH)	4	8	2	2 SF2 & 2 SF4	22996	?
	4	4	10		20000	?

NOTE: When 4 codes are transmitted in parallel, two codes shall be transmitted with SF2 and two with SF4.
 UE Categories 1 to 6 supports QPSK only. UE Category 7 supports QPSK and 16QAM.
 (TS25.306-7.3.0)

6.2.2.6. HSPA, HSPA+ and DC-HSDPA SAR Guidance

SAR test exclusion may apply to 3GPP Rel. 6 HSPA, Rel. 7 HSPA+ and Rel. 8 DC-HSDPA. When SAR measurement is required for HSPA, HSPA+ or DC-HSDPA, a KDB inquiry is required to confirm that the wireless mode configurations in the test setup have remained stable throughout the SAR measurements. Without prior KDB confirmation to determine the SAR results are acceptable, a PBA is required for TCB approval.

SAR test exclusion for HSPA, HSPA+ and DC-HSDPA is determined according to the following:

- 1) The HSPA procedures are applied to configure 3GPP Rel. 6 HSPA devices in the required sub-test mode(s) to determine SAR test exclusion.
- 2) SAR is required for Rel. 7 HSPA+ when SAR is required for Rel. 6 HSPA; otherwise, the 3G SAR test reduction procedure is applied to (uplink) HSPA+ with 12.2 kbps RMC as the primary mode. Power is measured for HSPA+ that supports uplink 16 QAM according to configurations in Table C.11.1.4 of 3GPP TS 34.121-1 to determine SAR test reduction.
- 3) SAR is required for Rel. 8 DC-HSDPA when SAR is required for Rel. 5 HSDPA; otherwise, the 3G SAR test reduction procedure is applied to DC-HSDPA with 12.2 kbps RMC as the primary mode. Power is measured for DC-HSDPA according to the H-Set 12, FRC configuration in Table C.8.1.12 of 3GPP TS 34.121-1 to determine SAR test reduction. A primary and a secondary serving HS-DSCH Cell are required to perform the power measurement and for the results to be acceptable.
- 4) Regardless of whether a PBA is required, the following information must be verified and included in the SAR report for devices supporting HSPA, HSPA+ or DC-HSDPA: a) The output power measurement results and applicable release version(s) of 3GPP TS 34.121

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- i) Power measurement difficulties due to test equipment setup or availability must be resolved between the grantee and its test lab.
- b) The power measurement results are in agreement with the individual device implementation and specifications. When Enhanced MPR (E-MPR) applies, the normal MPR targets may be modified according to the Cubic Metric (CM) measured by the device, which must be taken into consideration.
- c) The UE category, operating parameters, such as the β and Δ values used to configure the device for testing, power setback procedures described in 3GPP TS 34.121 for the power measurements, and HSPA/HSPA+ channel conditions (active and stable) for the entire duration of the measurement according to the required E-TFCI and AG index values.
- 5) When SAR measurement is required, the test configurations, procedures and power measurement results must be clearly described to confirm that the required test parameters are used, including E-TFCI and AG index stability and output power conditions.

Table 10: HS-DSCH UE category

Table 5.1a: FDD HS-DSCH physical layer categories

HS-DSCH category	Maximum number of HS-DSCH codes received	Minimum inter-TTI interval	Maximum number of bits of an HS-DSCH transport block received within an HS-DSCH TTI NOTE 1	Total number of soft channel bits	Supported modulations without MIMO operation or dual cell operation	Supported modulations with MIMO operation and without dual cell operation	Supported modulations with dual cell operation	
Category 1	5	3	7298	19200	QPSK, 16QAM	Not applicable (MIMO not supported)	Not applicable (dual cell operation not supported)	
Category 2	5	3	7298	28800				
Category 3	5	2	7298	28800				
Category 4	5	2	7298	38400				
Category 5	5	1	7298	57600				
Category 6	5	1	7298	67200				
Category 7	10	1	14411	115200				
Category 8	10	1	14411	134400				
Category 9	15	1	20251	172800				
Category 10	15	1	27952	172800				
Category 11	5	2	3630	14400	QPSK			
Category 12	5	1	3630	28800				
Category 13	15	1	35280	259200	QPSK, 16QAM, 64QAM			
Category 14	15	1	42192	259200				
Category 15	15	1	23370	345600	QPSK, 16QAM			
Category 16	15	1	27952	345600				
Category 17 NOTE 2	15	1	35280	259200	QPSK, 16QAM, 64QAM	–		
			23370	345600	–	QPSK, 16QAM		
Category 18 NOTE 3	15	1	42192	259200	QPSK, 16QAM, 64QAM	–		
			27952	345600	–	QPSK, 16QAM		
Category 19	15	1	35280	518400	QPSK, 16QAM, 64QAM			
Category 20	15	1	42192	518400				
Category 21	15	1	23370	345600	-	-	QPSK, 16QAM	
Category 22	15	1	27952	345600			QPSK, 16QAM, 64QAM	
Category 23	15	1	35280	518400				
Category 24	15	1	42192	518400				

6.2.3. LTE Test Configuration

LTE modes were tested according to FCC KDB 941225 D05 publication. Please see notes after the tabulated SAR data for required test configurations. Establishing connections with base station simulators ensure a consistent means for testing SAR and are recommended for evaluating SAR [4]. The R&S CMW500 was used for LTE output power measurements and SAR testing. Max power control was used so the UE transmits with maximum output power during SAR testing. SAR must be measured with the maximum TTI (transmit time interval) supported by the device in each LTE configuration.

A) Spectrum Plots for RB Configurations

A properly configured base station simulator was used for SAR tests and power measurements. Therefore, spectrum plots for RB configurations were not required to be included in this report.

B) MPR

MPR is permanently implemented for this device by the manufacturer. The specific manufacturer target MPR is indicated alongside the SAR results. MPR is enabled for this device, according to 3GPP TS36.101 Section 6.2.3 – 6.2.5 under Table 6.2.3-1.

C) A-MPR

A-MPR (Additional MPR) has been disabled for all SAR tests by setting NS=01 on the base station simulator.

D) Largest channel bandwidth standalone SAR test requirements

1) QPSK with 1 RB allocation

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. When the reported SAR is ≤ 0.8 W/kg, testing of the remaining RB offset configurations and required test channels is not required for 1 RB allocation; otherwise, SAR is required for the remaining required test channels and only for the RB offset configuration with the highest output power for that channel. When the reported SAR of a required test channel is > 1.45 W/kg, SAR is required for all three RB offset configurations for that required test channel.

2) QPSK with 50% RB allocation

The procedures required for 1 RB allocation in 1) are applied to measure the SAR for QPSK with 50% RB allocation.

3) QPSK with 100% RB allocation

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 in 1) and 2) 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) Higher order modulations

For each modulation besides QPSK; e.g., 16-QAM, 64-QAM, apply the QPSK procedures in above sections to determine the QAM configurations that may need SAR measurement. For each configuration identified as required for testing, SAR is required only when the highest maximum output power for the configuration in the higher order modulation is $> \frac{1}{2}$ dB higher than the same configuration in QPSK or when the reported SAR for the QPSK configuration is > 1.45 W/kg.

E) Other channel bandwidth standalone SAR test requirements

For the other channel bandwidths used by the device in a frequency band, apply all the procedures required for the largest channel bandwidth in section A) to determine the channels and RB configurations that need SAR testing and only measure SAR when the highest maximum output power of a configuration requiring testing in the smaller channel bandwidth is $> \frac{1}{2}$ dB higher than the equivalent channel configurations in the largest channel bandwidth configuration or the *reported* SAR of a configuration for the largest channel bandwidth is > 1.45 W/kg.

6.2.4. WiFi Test Configuration

SAR test reduction for 802.11 Wi-Fi transmission mode configurations are considered separately for DSSS and OFDM. An initial test position is determined to reduce the number of tests required for certain exposure configurations with multiple test positions. An initial test configuration is determined for each frequency band and aggregated band according to maximum output power, channel bandwidth, wireless mode configurations and other operating parameters to streamline the measurement requirements. For 2.4 GHz DSSS, either the initial test position or DSSS procedure is applied to reduce the number of SAR tests; these are mutually exclusive. For OFDM, an initial test position is only applicable to next to the ear, UMPC mini-tablet and hotspot mode configurations, which is tested using the initial test configuration to facilitate test reduction. For other exposure conditions with a fixed test position, SAR test reduction is determined using only the initial test configuration.

The multiple test positions require SAR measurements in head, hotspot mode or UMPC mini-tablet configurations may be reduced according to the highest reported SAR determined using the *initial test position(s)* by applying the DSSS or OFDM SAR measurement procedures in the required wireless mode test configuration(s). The *initial test position(s)* is measured using the highest measured maximum output power channel in the required wireless mode test configuration(s). When the *reported* SAR for the *initial test position* is:

- a) ≤ 0.4 W/kg, further SAR measurement is not required for the other test positions in that exposure configuration and wireless mode combination within the frequency band or aggregated band. DSSS and OFDM configurations are considered separately according to the required SAR procedures.
- b) 0.4 W/kg, SAR is repeated using the same wireless mode test configuration tested in the *initial test position* to measure the subsequent next closet/smallest test separation distance and maximum coupling test position, on the highest maximum output power channel, until the *reported* SAR is ≤ 0.8 W/kg or all required test positions are tested.
 - ✧ For subsequent test positions with equivalent test separation distance or when exposure is dominated by coupling conditions, the position for maximum coupling condition should be tested.
 - ✧ When it is unclear, all equivalent conditions must be tested.
- c) For all positions/configurations tested using the *initial test position* and subsequent test positions, when the *reported* SAR is > 0.8 W/kg, measure the SAR for these positions/configurations on the subsequent next highest measured output power channel(s) until the *reported* SAR is ≤ 1.2 W/kg or all required test channels are considered.
 - ✧ The additional power measurements required for this step should be limited to those necessary for identifying subsequent highest output power channels to apply the test reduction.

To determine the initial test position, Area Scans were performed to determine the position with the Maximum Value of SAR (measured). The position that produced the highest Maximum Value of SAR is considered the worst case position; thus used as the initial test position.

6.3. Measurement Variability

Per FCC KDB Publication 865664 D01, SAR measurement variability was assessed for each frequency band, which was determined by the SAR probe calibration point and tissue-equivalent medium used for the device measurements. When both head and body tissue-equivalent media were required for SAR measurements in a frequency band, the variability measurement procedures were applied to the tissue medium with the highest measured SAR, using the highest measured SAR configuration for that tissue-equivalent medium. These additional measurements were repeated after the completion of all measurements requiring the same head or body tissue-equivalent medium in a frequency band. The test device was returned to ambient conditions (normal room temperature) with the battery fully charged before it was re-mounted on the device holder for the repeated measurement(s) to minimize any unexpected variations in the repeated results.

SAR Measurement Variability was assessed using the following procedures for each frequency band:

- 1) When the original highest measured SAR is ≥ 0.80 W/kg, the measurement was repeated once.
- 2) A second repeated measurement was performed only if the ratio of largest to smallest SAR for the original and first repeated measurements was > 1.20 or when the original or repeated measurement was ≥ 1.45 W/kg ($\sim 10\%$ from the 1-g SAR limit).
- 3) A third repeated measurement was performed only if the original, first or second repeated measurement was ≥ 1.5 W/kg and the ratio of largest to smallest SAR for the original, first and second repeated measurements is > 1.20 .
- 4) Repeated measurements are not required when the original highest measured SAR is < 0.80 W/kg

6.4. Test Positions

The measurements were performed in combination with a host product (Lenovo Y-450). Lenovo Y-450 laptop has both horizontal and vertical USB slots.

According to KDB 447498 D02, a test distance of 5mm or less, should be considered for the orientation that can satisfy such requirements.

According to the Antenna Locations diagrams, the antenna is without 1 cm from the tip of the dongle (the end without the USB connector); the tip of the dongle should not be tested.

For each channel, the EUT is tested at the following 4 test positions:

- Test Position 1: The EUT is connected to the portable computer with horizontal USB slot. The back side of the EUT towards to the bottom of the flat phantom. The distance from back side of the EUT to the bottom of the flat phantom is 5mm. (ANNEX M Picture 9)
- Test Position 2: The EUT is connected to the portable computer through a 19 cm USB cable. The front side of the EUT towards the bottom of the flat phantom. The distance from front side of the EUT to the bottom of the flat phantom is 5mm. (ANNEX M Picture 10)
- Test Position 3: The EUT is connected to the portable computer through a 19 cm USB cable. The left side of the EUT towards the bottom of the flat phantom. The distance from left side of the EUT to the bottom of the flat phantom is 5mm. (ANNEX M Picture 11)
- Test Position 4: The EUT is connected to the portable computer with vertical USB slot. The right side of the EUT towards the bottom of the flat phantom. The distance from right side of the EUT to the bottom of the flat phantom is 5mm. (ANNEX M Picture 12)

6.5. Picture of Host Product

The measurements were performed in combination with a host product (Lenovo Y-450).



Picture 1-a: Lenovo Y-450 Close



Picture 1-b: Lenovo Y-450 Open



Picture 1-c: Lenovo Y-450 with horizontal USB slot



Picture 1-d: Lenovo Y-450 with vertical USB slot



Picture 1-e: a 19 cm USB cable

Picture 1: Computer as a test assistant

GSM 850		Burst Conducted Power(dBm)			/	Average power(dBm)		
		Channel/Frequency(MHz)				Channel/Frequency(MHz)		
		128/824.2	190/836.6	251/848.8		128/824.2	190/836.6	251/848.8
GPRS (GMSK)	1Txslot	32.18	32.22	32.14	-9.03dB	23.15	23.19	23.11
	2Txslots	30.15	30.15	30.08	-6.02dB	24.13	24.13	24.06
	3Txslots	28.17	28.16	28.15	-4.26dB	23.91	23.90	23.89
	4Txslots	26.68	26.67	26.64	-3.01dB	23.67	23.66	23.63
EGPRS (GMSK)	1Txslot	32.21	32.18	32.16	-9.03dB	23.18	21.09	23.13
	2Txslots	30.12	30.11	30.02	-6.02dB	24.10	24.09	24.00
	3Txslots	28.23	28.19	28.13	-4.26dB	23.97	23.93	23.87
	4Txslots	26.57	26.63	26.61	-3.01dB	23.56	23.62	23.60
EGPRS (8PSK)	1Txslot	25.52	25.61	25.57	-9.03dB	16.49	16.58	16.54
	2Txslots	23.33	23.47	23.42	-6.02dB	17.31	17.45	17.40
	3Txslots	21.10	21.21	21.20	-4.26dB	16.84	16.95	16.94
	4Txslots	19.23	19.39	19.31	-3.01dB	16.22	16.38	16.30
GSM 1900		Burst Conducted Power(dBm)			/	Average power(dBm)		
		Channel/Frequency(MHz)				Channel/Frequency(MHz)		
		512/1850.2	661/1880	810/1909.8		512/1850.2	661/1880	810/1909.8
GPRS (GMSK)	1Txslot	28.71	28.63	28.63	-9.03dB	19.68	19.60	19.60
	2Txslots	26.58	26.52	26.56	-6.02dB	20.56	20.50	20.54
	3Txslots	24.66	24.57	24.56	-4.26dB	20.40	20.31	20.30
	4Txslots	22.62	22.54	22.50	-3.01dB	19.61	19.53	19.49
EGPRS (GMSK)	1Txslot	28.78	28.66	28.60	-9.03dB	19.75	19.63	19.57
	2Txslots	26.61	26.57	26.62	-6.02dB	20.59	20.55	20.60
	3Txslots	24.64	24.52	24.58	-4.26dB	20.38	20.26	20.32
	4Txslots	22.57	22.61	22.53	-3.01dB	19.56	19.60	19.52
EGPRS (8PSK)	1Txslot	24.76	24.90	24.86	-9.03dB	15.73	15.87	15.83
	2Txslots	23.19	23.15	23.23	-6.02dB	17.17	17.13	17.21
	3Txslots	20.76	20.73	20.83	-4.26dB	16.50	16.47	16.57
	4Txslots	18.70	18.86	18.78	-3.01dB	15.69	15.85	15.77
Note:								

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1) Division Factors

To average the power, the division factor is as follows:

1Txslot = 1 transmit time slot out of 8 time slots

=> conducted power divided by (8/1) => -9.03 dB

2Txslots = 2 transmit time slots out of 8 time slots

=> conducted power divided by (8/2) => -6.02 dB

3Txslots = 3 transmit time slots out of 8 time slots

=> conducted power divided by (8/3) => -4.26 dB

4Txslots = 4 transmit time slots out of 8 time slots

=> conducted power divided by (8/4) => -3.01 dB

2) Average power numbers

The maximum power numbers are marks in bold.

UMTS Band II		Conducted Power (dBm)		
		Channel/Frequency(MHz)		
		9262/1852.4	9400/1880	9538/1907.6
RMC	12.2kbps RMC	21.54	21.78	21.91
	64kbps RMC	21.54	21.79	21.89
	144kbps RMC	21.58	21.80	21.87
	384kbps RMC	21.57	21.78	21.87
HSDPA	Sub - Test 1	21.51	21.79	21.83
	Sub - Test 2	21.26	21.52	21.58
	Sub - Test 3	20.70	20.96	20.97
	Sub - Test 4	20.66	20.92	20.95
HSUPA	Sub - Test 1	20.79	20.98	21.18
	Sub - Test 2	19.04	19.13	19.15
	Sub - Test 3	20.08	19.63	19.85
	Sub - Test 4	19.11	19.36	19.28
	Sub - Test 5	21.22	21.40	21.50
DC-HSDPA	Sub - Test 1	21.52	21.78	21.82
	Sub - Test 2	21.29	21.53	21.57
	Sub - Test 3	20.69	20.97	20.98
	Sub - Test 4	20.69	20.91	20.96
UMTS Band IV		Conducted Power (dBm)		
		Channel/Frequency(MHz)		
		1312/1712.4	1413/1732.6	1513/1752.6
RMC	12.2kbps RMC	22.30	22.31	22.23
	64kbps RMC	22.27	22.37	22.27
	144kbps RMC	22.25	22.35	22.16
	384kbps RMC	22.28	22.34	22.15
HSDPA	Sub - Test 1	22.04	22.07	22.01

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	Sub - Test 2	21.82	21.86	21.77
	Sub - Test 3	21.26	21.28	21.17
	Sub - Test 4	21.26	21.27	21.18
HSUPA	Sub - Test 1	21.54	21.38	21.32
	Sub - Test 2	19.11	19.36	19.25
	Sub - Test 3	19.96	20.60	20.62
	Sub - Test 4	19.40	19.46	19.50
	Sub - Test 5	22.04	22.08	21.76
DC-HSDPA	Sub - Test 1	22.03	22.08	22.02
	Sub - Test 2	21.81	21.85	21.78
	Sub - Test 3	21.25	21.27	21.19
	Sub - Test 4	21.24	21.29	21.16
UMTS Band V		Conducted Power (dBm)		
		Channel/Frequency(MHz)		
		4132/826.4	4182/836.4	4233/846.6
RMC	12.2kbps RMC	22.93	22.93	22.91
	64kbps RMC	22.91	22.94	22.85
	144kbps RMC	22.95	22.95	22.91
	384kbps RMC	22.94	22.98	22.91
HSDPA	Sub - Test 1	22.95	22.91	22.84
	Sub - Test 2	22.65	22.65	22.62
	Sub - Test 3	21.97	22.01	21.95
	Sub - Test 4	21.95	21.99	21.91
HSUPA	Sub - Test 1	22.00	22.12	22.25
	Sub - Test 2	19.92	20.17	19.96
	Sub - Test 3	21.13	21.42	21.25
	Sub - Test 4	19.65	20.30	20.18
	Sub - Test 5	22.41	22.52	22.33
DC-HSDPA	Sub - Test 1	22.96	22.89	22.85
	Sub - Test 2	22.64	22.66	22.63
	Sub - Test 3	21.94	22.02	21.94
	Sub - Test 4	21.96	21.98	21.92

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LTE FDD Band 2				Conducted Power(dBm)		
Bandwidth	Modulation	RB size	RB offset	Channel/Frequency(MHz)		
				18625/1852.5	18900/1880	19175/1907.5
5MHz	QPSK	1	0	21.53	21.32	21.07
		1	13	22.42	21.8	21.93
		1	24	21.63	21.14	21.35
		12	0	21.03	20.6	20.66
		12	6	21.27	20.79	21.16
		12	13	21.04	20.45	21.16
		25	0	21.01	20.43	21.46
	16QAM	1	0	20.59	20.61	20.58
		1	13	21.36	21.07	21.77
		1	24	20.54	20.88	21.04
		12	0	20.08	19.88	20.12
		12	6	20.26	20.04	20.78
		12	13	19.92	19.85	20.41
		25	0	19.95	19.78	20.52
Bandwidth	Modulation	RB size	RB offset	Channel/Frequency(MHz)		
				18650/1855	18900/1880	19150/1905
10MHz	QPSK	1	0	22.4	22.3	21.72
		1	25	22.52	22.16	21.92
		1	49	21.72	22.36	22.26
		25	0	21.22	20.95	20.51
		25	13	21.14	20.95	20.84
		25	25	20.97	21.06	21.31
		50	0	21.14	20.8	21.04
	16QAM	1	0	21.46	21.54	20.52
		1	25	21.23	21.44	21.02
		1	49	20.54	21.96	21.35
		25	0	20.05	19.88	19.49
		25	13	19.80	19.97	20.05
		25	25	19.57	20.22	20.69
		50	0	19.88	19.89	20.21
Bandwidth	Modulation	RB size	RB offset	Channel/Frequency(MHz)		
				18675/1857.5	18900/1880	19125/1902.5
15MHz	QPSK	1	0	22.14	22.03	22.39
		1	38	21.82	22.01	21.76
		1	74	21.14	22.6	22.2
		36	0	20.94	20.97	20.69
		36	18	20.73	21.12	20.47
		36	39	20.49	21.55	21.12
		75	0	20.77	21.44	21.22
	16QAM	1	0	21.44	20.97	21.03

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		1	38	20.81	21.01	20.64
		1	74	20.57	21.75	21.09
		36	0	19.86	19.73	19.36
		36	18	19.53	19.93	19.18
		36	39	19.26	20.48	20.13
		75	0	19.62	20.29	19.99
Bandwidth	Modulation	RB size	RB offset	Channel/Frequency(MHz)		
				18700/1860	18900/1880	19100/1900
20MHz	QPSK	1	0	22.40	21.81	22.1
		1	50	21.43	21.56	21.28
		1	99	21.74	22.62	22.55
		50	0	20.77	20.67	21.11
		50	25	20.63	20.91	20.8
		50	50	20.6	21.64	21.05
		100	0	20.68	21.49	21.1
	16QAM	1	0	21.58	21.10	21.62
		1	50	20.56	20.90	20.60
		1	99	20.82	22.00	21.91
		50	0	19.56	19.70	19.92
		50	25	19.32	19.75	19.60
		50	50	19.37	20.69	20.13
		100	0	19.44	20.37	19.98

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LTE FDD Band 4				Conducted Power(dBm)		
Bandwidth	Modulation	RB size	RB offset	Channel/Frequency(MHz)		
				19975/1712.5	20175/1732.5	20375/1752.5
5MHz	QPSK	1	0	21.06	21.61	21.15
		1	13	21.66	22.25	21.63
		1	24	21.42	21.56	22.27
		12	0	20.12	20.81	20.36
		12	6	20.36	20.98	20.56
		12	13	20.31	20.72	20.31
		25	0	20.19	20.75	20.35
	16QAM	1	0	21.09	21.49	21.13
		1	13	21.60	22.09	21.71
		1	24	21.34	21.41	22.26
		12	0	20.15	20.66	20.20
		12	6	20.42	20.85	20.39
		12	13	20.40	20.58	20.15
		25	0	20.33	20.65	20.15
Bandwidth	Modulation	RB size	RB offset	Channel/Frequency(MHz)		
				20000/1715	20175/1732.5	20350/1750
10MHz	QPSK	1	0	21.4	21.96	21.38
		1	25	21.89	22.07	21.46
		1	49	21.61	21.41	22.43
		25	0	20.15	20.37	20.15
		25	13	20.3	20.61	20.1
		25	25	20.12	20.39	20.17
		50	0	20.05	20.42	20.02
	16QAM	1	0	21.49	22.18	21.49
		1	25	22.01	22.21	21.51
		1	49	21.79	21.57	22.38
		25	0	20.06	20.29	20.11
		25	13	20.17	20.54	20.01
		25	25	20.01	20.29	20.07
		50	0	20.13	20.33	20.11
Bandwidth	Modulation	RB size	RB offset	Channel/Frequency(MHz)		
				20025/1717.5	20175/1732.5	20325/1747.5
15MHz	QPSK	1	0	21.42	21.99	21.54
		1	38	21.74	22	21.54
		1	74	21.65	21.18	22.35
		36	0	20.19	20.52	20.44
		36	18	20.41	20.69	20.3
		36	39	20.34	20.45	20.03
		75	0	20.32	20.59	20.19
	16QAM	1	0	21.33	21.97	21.87

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		1	38	21.69	21.99	21.81
		1	74	21.61	21.17	22.55
		36	0	20.06	20.43	20.27
		36	18	20.29	20.58	20.21
		36	39	20.23	20.36	20.13
		75	0	20.20	20.49	20.10
Bandwidth	Modulation	RB size	RB offset	Channel/Frequency(MHz)		
				20050/1720	20175/1732.5	20300/1745
20MHz	QPSK	1	0	21.53	22.18	21.79
		1	50	21.73	21.82	21.37
		1	99	22.21	21.58	21.35
		50	0	20.29	20.51	20.4
		50	25	20.27	20.55	20.28
		50	50	20.53	20.43	20.16
		100	0	20.42	20.53	20.23
	16QAM	1	0	21.76	22.28	22.02
		1	50	21.92	21.90	21.63
		1	99	22.38	21.63	21.51
		50	0	20.15	20.39	20.26
		50	25	20.11	20.43	20.14
		50	50	20.40	20.29	20.01
		100	0	20.27	20.37	20.08

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LTE FDD Band 5				Conducted Power(dBm)		
Bandwidth	Modulation	RB size	RB offset	Channel/Frequency(MHz)		
				20425/826.5	20525/836.5	20625/846.5
5MHz	QPSK	1	0	22.38	22.21	22.24
		1	13	23.01	23.27	22.32
		1	24	22.36	22.67	21.64
		12	0	22.01	21.74	21.44
		12	6	22.24	22.09	21.41
		12	13	21.83	21.93	21.02
		25	0	21.96	21.75	21.18
	16QAM	1	0	22.49	22.10	22.44
		1	13	22.92	23.26	22.56
		1	24	22.20	22.68	21.92
		12	0	21.85	21.79	21.39
		12	6	22.07	22.14	21.35
		12	13	21.65	21.98	20.97
		25	0	21.80	21.80	21.16
Bandwidth	Modulation	RB size	RB offset	Channel/Frequency(MHz)		
				20450/829	20525/836.5	20600/844
10MHz	QPSK	1	0	23.06	22.6	22.6
		1	25	22.93	23.23	23.23
		1	49	22.39	22.93	22.93
		25	0	21.7	21.41	21.41
		25	13	21.66	21.75	21.75
		25	25	21.36	21.80	21.8
		50	0	21.54	21.59	21.59
	16QAM	1	0	23.17	22.85	23.22
		1	25	23.01	23.43	22.97
		1	49	22.59	23.04	22.11
		25	0	21.69	21.44	21.77
		25	13	21.66	21.78	21.65
		25	25	21.37	21.83	21.07
		50	0	21.50	21.58	21.38

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LTE FDD Band 7				Conducted Power(dBm)		
Bandwidth	Modulation	RB size	RB offset	Channel/Frequency(MHz)		
				20775/2502.5	21100/2535	21425/2567.5
5MHz	QPSK	1	0	21.46	21.45	21.16
		1	13	22.15	22.17	21.63
		1	24	21.34	21.69	21.19
		12	0	20.94	20.97	20.56
		12	6	21.19	21.22	20.69
		12	13	20.88	21.06	20.69
		25	0	20.85	21.01	20.68
	16QAM	1	0	21.42	21.16	21.09
		1	13	22.03	21.91	21.54
		1	24	21.32	21.43	21.13
		12	0	20.77	20.74	20.12
		12	6	20.89	21.03	20.36
		12	13	20.72	20.9	20.37
		25	0	20.55	20.77	20.33
Bandwidth	Modulation	RB size	RB offset	Channel/Frequency(MHz)		
				20800/2505	21100/2535	21400/2565
10MHz	QPSK	1	0	21.94	22.04	21.79
		1	25	22.37	22.35	21.96
		1	49	22.12	21.97	21.36
		25	0	20.89	20.96	20.85
		25	13	21.27	21.24	20.86
		25	25	21.24	21.18	20.73
		50	0	21.01	21	21.05
	16QAM	1	0	21.94	21.99	21.64
		1	25	22.27	22.31	21.8
		1	49	21.89	21.89	21.09
		25	0	20.81	20.87	20.87
		25	13	21.07	21.15	20.86
		25	25	21.03	21.1	20.73
		50	0	20.9	20.93	20.72
Bandwidth	Modulation	RB size	RB offset	Channel/Frequency(MHz)		
				20825/2507.5	21100/2535	21375/2562.5
15MHz	QPSK	1	0	21.75	21.99	22.15
		1	38	22.41	22.11	21.77
		1	74	22.01	21.98	21.22
		36	0	21.07	20.96	21.03
		36	18	21.38	21.11	20.99
		36	39	21.36	21.19	20.67
		75	0	21.21	21	20.81
	16QAM	1	0	21.82	22.06	22.06

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		1	38	22.16	22.19	21.76
		1	74	21.72	21.98	21.04
		36	0	20.71	20.94	20.96
		36	18	21.2	21.1	20.91
		36	39	21.18	21.17	20.59
		75	0	21.02	20.97	20.71
Bandwidth	Modulation	RB size	RB offset	Channel/Frequency(MHz)		
				20850/2510	21100/2535	21350/2560
20MHz	QPSK	1	0	21.89	21.77	22.27
		1	50	22.09	21.68	21.53
		1	99	21.75	22.07	21.12
		50	0	20.75	20.58	20.94
		50	25	20.89	20.66	20.63
		50	50	20.85	20.95	20.44
		100	0	20.8	20.71	20.71
	16QAM	1	0	22.26	22.16	22.32
		1	50	22.5	22.06	21.76
		1	99	22.07	22.4	21.25
		50	0	20.83	20.55	20.82
		50	25	20.92	20.63	20.51
		50	50	20.84	20.93	20.32
		100	0	20.81	20.67	20.58

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7.2. Conducted Power Results (E8372h-517)

GSM 850		Burst Conducted Power(dBm)			/	Average power(dBm)		
		Channel/Frequency(MHz)				Channel/Frequency(MHz)		
		128/824.2	190/836.6	251/848.8		128/824.2	190/836.6	251/848.8
GPRS (GMSK)	1Txslot	31.87	32.04	31.86	-9.03dB	22.84	23.01	22.83
	2Txslots	29.93	30.12	29.93	-6.02dB	23.91	24.10	23.91
	3Txslots	27.89	28.12	27.95	-4.26dB	23.63	23.86	23.69
	4Txslots	26.42	26.56	26.40	-3.01dB	23.41	23.55	23.39
EGPRS (GMSK)	1Txslot	31.71	31.68	31.66	-9.03dB	22.68	22.65	22.63
	2Txslots	29.62	29.61	29.52	-6.02dB	23.60	23.59	23.50
	3Txslots	27.73	27.69	27.63	-4.26dB	23.47	23.43	23.37
	4Txslots	26.07	26.13	26.11	-3.01dB	23.06	23.12	23.10
EGPRS (8PSK)	1Txslot	25.21	25.64	25.51	-9.03dB	16.18	16.61	16.48
	2Txslots	22.74	23.12	23.39	-6.02dB	16.72	17.10	17.37
	3Txslots	20.87	21.25	21.38	-4.26dB	16.61	16.99	17.12
	4Txslots	19.36	19.80	20.04	-3.01dB	16.35	16.79	17.03
GSM 1900		Burst Conducted Power(dBm)			/	Average power(dBm)		
		Channel/Frequency(MHz)				Channel/Frequency(MHz)		
		512/1850.2	661/1880	810/1909.8		512/1850.2	661/1880	810/1909.8
GPRS (GMSK)	1Txslot	29.45	29.51	29.47	-9.03dB	20.42	20.48	20.44
	2Txslots	27.43	27.45	27.38	-6.02dB	21.41	21.43	21.36
	3Txslots	25.39	25.41	25.32	-4.26dB	21.13	21.15	21.06
	4Txslots	23.43	23.45	23.33	-3.01dB	20.42	20.44	20.32
EGPRS (GMSK)	1Txslot	29.30	29.18	29.12	-9.03dB	20.27	20.15	20.09
	2Txslots	27.13	27.09	27.14	-6.02dB	21.11	21.07	21.12
	3Txslots	25.16	25.04	25.10	-4.26dB	20.90	20.78	20.84
	4Txslots	23.09	23.13	23.05	-3.01dB	20.08	20.12	20.04
EGPRS (8PSK)	1Txslot	25.55	25.41	25.35	-9.03dB	16.52	16.38	16.32
	2Txslots	23.53	23.25	23.26	-6.02dB	17.51	17.23	17.24
	3Txslots	21.27	21.05	21.16	-4.26dB	17.01	16.79	16.90
	4Txslots	18.90	18.82	18.84	-3.01dB	15.89	15.81	15.83

Note:

1) Division Factors

To average the power, the division factor is as follows:

1Txslot = 1 transmit time slot out of 8 time slots

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=> conducted power divided by (8/1) => -9.03 dB
 2Txslots = 2 transmit time slots out of 8 time slots
 => conducted power divided by (8/2) => -6.02 dB
 3Txslots = 3 transmit time slots out of 8 time slots
 => conducted power divided by (8/3) => -4.26 dB
 4Txslots = 4 transmit time slots out of 8 time slots
 => conducted power divided by (8/4) => -3.01 dB

2) Average power numbers

The maximum power numbers are marks in bold.

UMTS Band II		Conducted Power (dBm)		
		Channel/Frequency(MHz)		
		9262/1852.4	9400/1880	9538/1907.6
RMC	12.2kbps RMC	22.47	22.20	22.10
	64kbps RMC	22.36	22.07	21.98
	144kbps RMC	22.47	22.14	21.99
	384kbps RMC	22.34	22.15	22.03
HSDPA	Sub - Test 1	22.58	22.28	22.10
	Sub - Test 2	22.44	22.07	22.16
	Sub - Test 3	22.47	22.29	22.10
	Sub - Test 4	22.38	22.35	22.11
HSUPA	Sub - Test 1	21.35	21.21	20.91
	Sub - Test 2	19.98	19.91	19.60
	Sub - Test 3	20.77	20.52	20.08
	Sub - Test 4	19.86	19.83	19.55
	Sub - Test 5	21.41	21.24	21.07
DC-HSDPA	Sub - Test 1	22.29	22.00	21.96
	Sub - Test 2	22.23	21.96	21.91
	Sub - Test 3	22.07	21.77	21.81
	Sub - Test 4	22.10	21.81	21.84
UMTS Band IV		Conducted Power (dBm)		
		Channel/Frequency(MHz)		
		1312/1712.4	1413/1732.6	1513/1752.6
RMC	12.2kbps RMC	22.57	22.44	22.62
	64kbps RMC	22.46	22.31	22.50
	144kbps RMC	22.57	22.38	22.51
	384kbps RMC	22.44	22.39	22.55
HSDPA	Sub - Test 1	22.68	22.52	22.62
	Sub - Test 2	22.54	22.31	22.68
	Sub - Test 3	22.23	22.18	22.40

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	Sub - Test 4	22.48	22.37	22.44
HSUPA	Sub - Test 1	21.45	21.45	21.43
	Sub - Test 2	19.95	19.92	19.88
	Sub - Test 3	20.87	20.76	20.60
	Sub - Test 4	19.78	19.81	19.69
	Sub - Test 5	21.51	21.48	21.59
DC-HSDPA	Sub - Test 1	22.39	22.24	22.48
	Sub - Test 2	22.33	22.20	22.43
	Sub - Test 3	22.17	22.01	22.33
	Sub - Test 4	22.20	22.05	22.36
UMTS Band V		Conducted Power (dBm)		
		Channel/Frequency(MHz)		
		4132/826.4	4182/836.4	4233/846.6
RMC	12.2kbps RMC	22.36	22.74	22.55
	64kbps RMC	22.20	22.69	22.49
	144kbps RMC	22.27	22.58	22.42
	384kbps RMC	22.32	22.66	22.42
HSDPA	Sub - Test 1	22.36	22.81	22.61
	Sub - Test 2	22.27	22.79	22.57
	Sub - Test 3	22.40	22.68	22.55
	Sub - Test 4	22.39	22.69	22.50
HSUPA	Sub - Test 1	21.25	21.62	21.56
	Sub - Test 2	19.92	20.33	20.28
	Sub - Test 3	20.49	20.79	20.77
	Sub - Test 4	19.95	20.44	20.37
	Sub - Test 5	21.31	21.67	21.59
DC-HSDPA	Sub - Test 1	22.13	22.59	22.36
	Sub - Test 2	22.10	22.52	22.30
	Sub - Test 3	21.97	22.45	22.22
	Sub - Test 4	21.99	22.43	22.23

LTE FDD Band 2				Conducted Power(dBm)		
Bandwidth	Modulation	RB size	RB offset	Channel/Frequency(MHz)		
				18625/1852.5	18900/1880	19175/1907.5
5MHz	QPSK	1	0	22.94	22.91	22.53
		1	13	22.32	22.57	22.49
		1	24	22.68	22.51	21.84
		12	0	21.74	21.82	21.35
		12	6	21.65	21.72	21.37
		12	13	21.64	21.63	21.43

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	16QAM	25	0	21.65	21.66	21.42
		1	0	22.41	22.04	22.28
		1	13	22.15	22.11	22.19
		1	24	22.31	22.15	21.92
		12	0	20.84	20.91	20.52
		12	6	20.77	20.82	20.56
		12	13	20.75	20.76	20.60
		25	0	20.73	20.79	20.58
Bandwidth	Modulation	RB size	RB offset	Channel/Frequency(MHz)		
				18650/1855	18900/1880	19150/1905
10MHz	QPSK	1	0	22.95	22.92	22.54
		1	25	22.33	22.58	22.50
		1	49	22.69	22.52	21.85
		25	0	21.75	21.83	21.36
		25	13	21.66	21.73	21.38
		25	25	21.65	21.64	21.44
		50	0	21.66	21.67	21.43
	16QAM	1	0	22.43	22.05	22.29
		1	25	22.17	22.12	22.20
		1	49	22.32	22.17	21.94
		25	0	20.85	20.93	20.54
		25	13	20.78	20.83	20.57
		25	25	20.76	20.77	20.61
		50	0	20.75	20.80	20.60
Bandwidth	Modulation	RB size	RB offset	Channel/Frequency(MHz)		
				18675/1857.5	18900/1880	19125/1902.5
15MHz	QPSK	1	0	22.96	22.93	22.55
		1	38	22.34	22.59	22.51
		1	74	22.70	22.53	21.86
		36	0	21.76	21.84	21.37
		36	18	21.67	21.74	21.39
		36	39	21.66	21.65	21.45
		75	0	21.67	21.68	21.44
	16QAM	1	0	22.45	22.06	22.30
		1	38	22.19	22.13	22.21
		1	74	22.33	22.19	21.96
		36	0	20.86	20.95	20.56
		36	18	20.79	20.84	20.58
		36	39	20.77	20.78	20.62
		75	0	20.77	20.81	20.62

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Bandwidth	Modulation	RB size	RB offset	Channel/Frequency(MHz)		
				18700/1860	18900/1880	19100/1900
20MHz	QPSK	1	0	22.67	22.84	22.56
		1	50	22.35	22.60	22.52
		1	99	22.71	22.64	21.77
		50	0	21.77	21.85	21.38
		50	25	21.68	21.75	21.40
		50	50	21.67	21.66	21.46
		100	0	21.68	21.69	21.45
	16QAM	1	0	22.47	22.07	22.31
		1	50	22.21	22.14	22.22
		1	99	22.34	22.21	21.98
		50	0	20.87	20.97	20.58
		50	25	20.80	20.85	20.59
		50	50	20.78	20.79	20.63
		100	0	20.79	20.82	20.64

LTE TDD Band 4				Conducted Power(dBm)		
Bandwidth	Modulation	RB size	RB offset	Channel/Frequency(MHz)		
				19975/1712.5	20175/1732.5	20375/1752.5
5MHz	QPSK	1	0	22.91	22.94	22.79
		1	13	22.84	22.44	22.81
		1	24	22.79	22.80	22.83
		12	0	21.93	21.51	21.44
		12	6	21.82	21.42	21.53
		12	13	21.73	21.35	21.87
		25	0	21.80	21.50	21.63
	16QAM	1	0	22.89	22.90	22.68
		1	13	22.88	22.44	22.59
		1	24	22.89	22.81	22.77
		12	0	21.89	21.37	21.27
		12	6	21.72	21.29	21.54
		12	13	21.60	21.25	21.75
		25	0	21.64	21.40	21.48
Bandwidth	Modulation	RB size	RB offset	Channel/Frequency(MHz)		
				20000/1715	20175/1732.5	20350/1750
10MHz	QPSK	1	0	22.92	22.95	22.80
		1	25	22.85	22.45	22.82
		1	49	22.80	22.81	22.84
		25	0	21.94	21.52	21.45

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		25	13	21.83	21.43	21.54
		25	25	21.74	21.36	21.88
		50	0	21.81	21.51	21.64
	16QAM	1	0	22.91	22.91	22.69
		1	25	22.90	22.45	22.60
		1	49	22.90	22.83	22.79
		25	0	21.90	21.39	21.29
		25	13	21.73	21.30	21.55
		25	25	21.61	21.26	21.76
		50	0	21.66	21.41	21.50
Bandwidth	Modulation	RB size	RB offset	Channel/Frequency(MHz)		
				20025/1717.5	20175/1732.5	20325/1747.5
15MHz	QPSK	1	0	22.93	22.96	22.81
		1	38	22.86	22.46	22.83
		1	74	22.81	22.82	22.85
		36	0	21.95	21.53	21.46
		36	18	21.84	21.44	21.55
		36	39	21.75	21.37	21.89
		75	0	21.82	21.52	21.65
	16QAM	1	0	22.93	22.92	22.70
		1	38	22.92	22.46	22.61
		1	74	22.91	22.85	22.81
		36	0	21.91	21.41	21.31
		36	18	21.74	21.31	21.56
		36	39	21.62	21.27	21.77
		75	0	21.68	21.42	21.52
Bandwidth	Modulation	RB size	RB offset	Channel/Frequency(MHz)		
				20050/1720	20175/1732.5	20300/1745
20MHz	QPSK	1	0	22.94	22.97	22.82
		1	50	22.87	22.47	22.84
		1	99	22.82	22.83	22.86
		50	0	21.96	21.54	21.47
		50	25	21.85	21.45	21.56
		50	50	21.76	21.38	21.90
		100	0	21.83	21.53	21.66
	16QAM	1	0	22.53	22.51	22.29
		1	50	22.52	22.05	22.20
		1	99	22.50	22.45	22.41
		50	0	21.50	21.01	20.91
		50	25	21.33	20.90	21.15

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		50	50	21.21	20.86	21.36
		100	0	21.28	21.01	21.12

LTE FDD Band 5				Conducted Power(dBm)		
Bandwidth	Modulation	RB size	RB offset	Channel/Frequency(MHz)		
				20425/826.5	20525/836.5	20625/846.5
5MHz	QPSK	1	0	23.20	23.02	23.16
		1	13	23.36	23.42	23.20
		1	24	23.19	23.13	22.72
		12	0	21.97	21.84	22.04
		12	6	21.89	21.72	21.80
		12	13	21.86	21.66	21.59
		25	0	22.00	21.75	21.82
	16QAM	1	0	21.74	22.91	23.13
		1	13	23.07	22.98	23.03
		1	24	22.94	22.78	22.44
		12	0	21.53	21.64	21.61
		12	6	21.51	21.56	21.49
		12	13	21.49	21.55	21.27
		25	0	21.53	21.61	21.38
Bandwidth	Modulation	RB size	RB offset	Channel/Frequency(MHz)		
				20450/829	20525/836.5	20600/844
10MHz	QPSK	1	0	23.21	23.05	23.17
		1	25	23.38	23.43	23.22
		1	49	23.22	23.15	22.75
		25	0	21.98	21.87	22.05
		25	13	21.91	21.73	21.82
		25	25	21.89	21.68	21.60
		50	0	22.01	21.76	21.84
	16QAM	1	0	21.76	22.73	22.96
		1	25	22.90	22.81	22.84
		1	49	22.75	22.79	22.46
		25	0	21.55	21.66	21.64
		25	13	21.52	21.59	21.50
		25	25	21.51	21.56	21.29
		50	0	21.56	21.63	21.39

LTE FDD Band 7				Conducted Power(dBm)		
Bandwidth	Modulation	RB size	RB offset	Channel/Frequency(MHz)		
				20775/2502.5	21100/2535	21425/2567.5

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5MHz	QPSK	1	0	22.02	22.45	22.57
		1	13	22.52	22.17	22.44
		1	24	22.58	22.05	21.41
		12	0	21.20	21.21	21.59
		12	6	21.28	21.12	21.51
		12	13	21.48	21.14	20.97
		25	0	21.39	21.22	21.24
	16QAM	1	0	21.85	22.08	22.15
		1	13	22.29	22.15	22.28
		1	24	22.08	22.11	21.13
		12	0	21.10	21.15	21.51
		12	6	21.35	21.16	21.34
		12	13	21.50	21.11	20.85
		25	0	21.36	21.20	21.11
Bandwidth	Modulation	RB size	RB offset	Channel/Frequency(MHz)		
				20800/2505	21100/2535	21400/2565
10MHz	QPSK	1	0	22.01	22.42	22.56
		1	25	22.50	22.16	22.42
		1	49	22.55	22.03	21.38
		25	0	21.19	21.18	21.58
		25	13	21.26	21.11	21.49
		25	25	21.45	21.12	20.96
		50	0	21.38	21.21	21.22
	16QAM	1	0	21.83	22.36	22.12
		1	25	22.26	22.12	22.27
		1	49	22.07	22.10	21.11
		25	0	21.08	21.13	21.48
		25	13	21.34	21.13	21.33
		25	25	21.48	21.10	20.83
		50	0	21.33	21.18	21.10
Bandwidth	Modulation	RB size	RB offset	Channel/Frequency(MHz)		
				20825/2507.5	21100/2535	21375/2562.5
15MHz	QPSK	1	0	22.00	22.39	22.55
		1	38	22.48	22.15	22.40
		1	74	22.52	22.01	21.35
		36	0	21.18	21.15	21.57
		36	18	21.24	21.10	21.47
		36	39	21.42	21.10	20.95
		75	0	21.37	21.20	21.20
	16QAM	1	0	21.81	22.34	22.39

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		1	38	22.23	22.09	22.26
		1	74	22.06	22.09	21.09
		36	0	21.06	21.11	21.45
		36	18	21.33	21.10	21.32
		36	39	21.46	21.09	20.81
		75	0	21.30	21.16	21.09
Bandwidth	Modulation	RB size	RB offset	Channel/Frequency(MHz)		
				20850/2510	21100/2535	21350/2560
20MHz	QPSK	1	0	21.99	22.36	22.54
		1	50	22.46	22.14	22.38
		1	99	22.49	21.99	21.32
		50	0	21.17	21.12	21.56
		50	25	21.22	21.09	21.45
		50	50	21.39	21.08	20.94
		100	0	21.36	21.19	21.18
	16QAM	1	0	21.79	22.02	22.06
		1	50	22.20	21.76	21.95
		1	99	22.05	22.08	21.07
		50	0	21.04	21.09	21.42
		50	25	21.32	21.07	21.31
		50	50	21.14	21.08	20.79
		100	0	21.27	21.14	21.08

LTE TDD Band 12				Conducted Power(dBm)		
Bandwidth	Modulation	RB size	RB offset	Channel/Frequency(MHz)		
				23035/701.5	23095/707.5	23155/713.5
5MHz	QPSK	1	0	23.02	23.16	22.69
		1	13	23.04	23.20	23.24
		1	24	22.64	23.13	22.76
		12	0	21.88	21.72	21.65
		12	6	21.75	21.72	21.68
		12	13	21.61	21.82	21.76
		25	0	21.66	21.69	21.72
	16QAM	1	0	21.43	21.67	21.04
		1	13	21.41	21.46	21.67
		1	24	21.08	21.60	21.05
		12	0	20.24	20.02	20.05
		12	6	20.14	20.02	20.07
		12	13	20.00	20.05	20.10

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		25	0	20.06	20.01	20.04
Bandwidth	Modulation	RB size	RB offset	Channel/Frequency(MHz)		
				23060/704	23095/707.5	23130/711
10MHz	QPSK	1	0	23.09	23.19	22.75
		1	25	23.06	23.24	23.31
		1	49	22.67	23.18	22.77
		25	0	21.92	21.78	21.67
		25	13	21.80	21.79	21.71
		25	25	21.67	21.83	21.80
		50	0	21.73	21.71	21.77
	16QAM	1	0	21.44	21.70	21.10
		1	25	21.43	21.50	21.73
		1	49	21.11	21.65	21.12
		25	0	20.28	20.02	20.00
		25	13	20.19	20.03	20.09
		25	25	20.01	20.08	20.16
		50	0	20.08	20.05	20.10

LTE FDD Band 17				Conducted Power(dBm)		
Bandwidth	Modulation	RB size	RB offset	Channel/Frequency(MHz)		
				23755/706.5	23790/710	23825/713.5
5MHz	QPSK	1	0	22.93	22.79	22.86
		1	13	23.22	23.08	23.31
		1	24	22.91	22.98	22.70
		12	0	21.64	21.72	21.76
		12	6	21.69	21.81	21.75
		12	13	21.73	21.69	21.87
		25	0	21.61	21.56	21.75
	16QAM	1	0	21.42	21.40	21.31
		1	13	21.16	20.66	21.32
		1	24	20.59	20.99	20.66
		12	0	20.11	20.02	20.26
		12	6	20.18	20.11	20.34
		12	13	20.22	20.18	20.38
		25	0	20.06	20.02	20.18
Bandwidth	Modulation	RB size	RB offset	Channel/Frequency(MHz)		
				23780/709	23790/710	23800/711
10MHz	QPSK	1	0	22.97	22.82	22.92
		1	25	23.27	23.12	23.38
		1	49	22.96	23.03	22.75

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		25	0	21.70	21.78	21.82
		25	13	21.76	21.88	21.82
		25	25	21.81	21.77	21.95
		50	0	21.68	21.63	21.82
	16QAM	1	0	21.45	21.43	21.39
		1	25	21.20	20.70	21.37
		1	49	20.64	21.04	20.72
		25	0	20.16	20.09	20.33
		25	13	20.24	20.17	20.40
		25	25	20.29	20.25	20.45
		50	0	20.14	20.08	20.26

Wi-Fi 2.4GHz		Channel	Average Power (dBm) for Data Rates (Mbps)							
			1	2	5.5	11	/	/	/	/
802.11b	Ant 1	1	13.32	13.13	13.09	13.07	/	/	/	/
		4	13.44	13.19	13.16	13.09	/	/	/	/
		7	13.35	13.07	13.03	12.96	/	/	/	/
	Ant 2	1	13.37	13.09	13.04	12.98	/	/	/	/
		4	13.46	13.17	13.13	13.11	/	/	/	/
		7	13.43	13.25	13.19	13.12	/	/	/	/
		Channel	6	9	12	18	24	36	48	54
802.11g	Ant 1	1	11.44	11.24	11.21	11.15	11.08	10.95	10.92	10.90
		4	11.49	11.20	11.16	11.12	11.09	11.01	10.96	10.88
		7	11.55	11.32	11.27	11.23	11.16	11.10	11.05	11.00
	Ant 2	1	11.41	11.21	11.12	11.07	11.02	10.97	10.94	10.86
		4	11.60	11.24	11.19	11.14	11.11	11.06	10.99	10.87
		7	11.52	11.33	11.27	11.22	11.20	11.08	11.03	10.93
		Channel	MCS0	MCS1	MCS2	MCS3	MCS4	MCS5	MCS6	MCS7
802.11n 20M:(SISO)	Ant 1	1	9.96	9.82	9.79	9.74	9.68	9.64	9.55	9.52
		4	10.24	10.15	10.07	10.03	10.01	9.95	9.91	9.82
		7	10.06	10.21	10.15	10.09	10.02	9.95	9.89	9.85
	Ant 2	1	9.98	9.97	9.91	9.87	9.84	9.80	9.78	9.70
		4	10.27	10.11	10.05	10.02	9.97	9.91	9.85	9.82
		7	10.14	10.18	10.13	10.09	10.05	10.00	9.95	9.88
		Channel	MCS0	MCS1	MCS2	MCS3	MCS4	MCS5	MCS6	MCS7
802.11n 40M(SISO)	Ant 1	3 (2422)	9.91	9.89	9.84	9.81	9.70	9.64	9.53	9.50
		4 (2427)	10.05	9.90	9.82	9.75	9.72	9.63	9.59	9.50
		5 (2432)	10.07	9.95	9.89	9.84	9.78	9.71	9.60	9.53
	Ant 2	3 (2422)	9.99	9.48	9.43	9.37	9.33	9.21	9.12	9.04

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		4 (2427)	10.03	9.66	9.60	9.55	9.47	9.39	9.32	9.14
		5 (2432)	10.06	9.74	9.65	9.52	9.40	9.35	9.32	9.18
		Channel	MCS8	MCS9	MCS10	MCS11	MCS12	MCS13	MCS14	MCS15
802.11n 20M:(MIMO)	Ant 1	1	9.82	9.58	9.53	9.50	9.44	9.37	9.24	9.21
		4	9.98	9.79	9.69	9.65	9.61	9.58	9.50	9.45
		7	9.84	9.87	9.81	9.76	9.72	9.65	9.59	9.54
	Ant 2	1	9.85	9.55	9.52	9.43	9.38	9.33	9.28	9.25
		4	9.95	9.71	9.64	9.59	9.54	9.51	9.46	9.39
		7	9.91	9.82	9.73	9.67	9.62	9.60	9.48	9.43
	Sum	1	12.85	12.58	12.54	12.48	12.42	12.36	12.27	12.24
		4	12.98	12.76	12.68	12.63	12.59	12.56	12.49	12.43
		7	12.89	12.86	12.78	12.73	12.68	12.64	12.55	12.5
		Channel	MCS8	MCS9	MCS10	MCS11	MCS12	MCS13	MCS14	MCS15
802.11n 40M:(MIMO)	Ant 1	3 (2422)	9.51	9.54	9.49	9.43	9.32	9.28	9.20	9.13
		4 (2427)	9.92	9.62	9.57	9.52	9.50	9.41	9.36	9.26
		5 (2432)	9.89	9.81	9.74	9.69	9.60	9.52	9.49	9.44
	Ant 2	3 (2422)	9.64	9.43	9.36	9.32	9.28	9.19	9.10	9.01
		4 (2427)	9.97	9.58	9.53	9.47	9.44	9.39	9.34	9.28
		5 (2432)	9.95	9.75	9.69	9.63	9.56	9.48	9.41	9.35
	Sum	3 (2422)	12.59	12.5	12.44	12.39	12.31	12.25	12.16	12.08
		4 (2427)	12.96	12.61	12.56	12.51	12.48	12.41	12.36	12.28
		5 (2432)	12.93	12.79	12.73	12.67	12.59	12.51	12.46	12.41

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7.3. Standalone SAR Test Exclusion Considerations

Per FCC KDB 447498 D01, the SAR exclusion threshold for distances <50mm is defined by the following equation:

$$\frac{(\text{max. power of channel, including tune-up tolerance, mW})}{(\text{min. test separation distance, mm})} * \sqrt{\text{Frequency (GHz)}} \leq 3.0$$

Band	Configuration	Frequency (MHz)	Maximum Power (dBm)	Separation Distance (mm)	Calculation Result	SAR Exclusion Thresholds	Standalone SAR
Wifi 2.4GHz Antenna 1	Body	2462	14.7	5	9.30	3.0	Yes
Wifi 2.4GHz Antenna 2	Body	2462	14.7	5	9.30	3.0	Yes

Test Position	Channel/ Frequency (MHz)	Time slot	Duty Cycle	Maximum Allowed Power (dBm)	Conducted Power (dBm)	Drift $\pm 0.21\text{dB}$	Limit SAR _{1g} 1.6 W/kg			
						Drift (dB)	Measured SAR _{1g} (W/kg)	Scaling Factor	Reported SAR _{1g} (W/kg)	Graph Results
Lenovo Y-450 (Distance 5mm)										
Test Position 1	190/836.6	2Txslots	1:4.15	31	30.12	0.190	0.246	1.22	0.301	Figure.23
Note: 1.The value with blue color is the maximum SAR Value of each test band.										

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7.4.2. GSM 1900

Table 13: SAR Values [GSM 1900 (GPRS/EGPRS)] (E8372h-510)

Test Position	Channel/ Frequency (MHz)	Time slot	Duty Cycle	Maximum Allowed Power (dBm)	Conducted Power (dBm)	Drift ± 0.21dB	Limit SAR _{1g} 1.6 W/kg			
						Drift (dB)	Measured SAR _{1g} (W/kg)	Scaling Factor	Reported SAR _{1g} (W/kg)	Graph Results
Lenovo Y-450 (Distance 5mm)										
Test Position 1	661/1880	2Txslots	1:4.15	28	26.52	-0.040	0.520	1.41	0.731	/
Test Position 2	661/1880	2Txslots	1:4.15	28	26.52	-0.090	0.389	1.41	0.547	/
Test Position 3	661/1880	2Txslots	1:4.15	28	26.52	0.020	0.292	1.41	0.411	/
Test Position 4	661/1880	2Txslots	1:4.15	28	26.52	0.068	0.075	1.41	0.106	/
Worst Case Position of GPRS with EGPRS (GMSK, Distance 5mm)										
Test Position 1	661/1880	2Txslots	1:4.15	28	26.57	-0.060	0.571	1.39	0.794	Figure.13

Note: 1.The value with blue color is the maximum SAR Value of each test band.

- Per FCC KDB Publication 447498 D01, if the reported (scaled) SAR measured at the middle channel or highest output power channel for each test configuration is ≤ 0.8 W/kg then testing at the other channels is not required for such test configuration(s).
- When multiple slots are used, SAR should be tested to account for the maximum source-based time-averaged output power.

Table 14: SAR Values [GSM 1900 (GPRS/EGPRS)] (E8372h-517)

Test Position	Channel/ Frequency (MHz)	Time slot	Duty Cycle	Maximum Allowed Power (dBm)	Conducted Power (dBm)	Drift ± 0.21dB	Limit SAR _{1g} 1.6 W/kg			
						Drift (dB)	Measured SAR _{1g} (W/kg)	Scaling Factor	Reported SAR _{1g} (W/kg)	Graph Results
Lenovo Y-450 (Distance 5mm)										
Test Position 1	661/1880	2Txslots	1:4.15	28	27.45	0.190	0.552	1.14	0.627	Figure.24

Note: 1.The value with blue color is the maximum SAR Value of each test band.

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7.4.3. UMTS Band II

Table 15: SAR Values [UMTS Band II (WCDMA/HSDPA/HSUPA)] (E8372h-510)

Test Position	Channel/ Frequency (MHz)	Channel Type	Duty Cycle	Maximum Allowed Power (dBm)	Conducted Power (dBm)	Drift ± 0.21dB	Limit SAR _{1g} 1.6 W/kg			
						Drift (dB)	Measured SAR _{1g} (W/kg)	Scaling Factor	Reported SAR _{1g} (W/kg)	Graph Results
Lenovo Y-450 (Distance 5mm)										
Test Position 1	9400/1880	RMC 12.2k	1:1	23	21.78	0.025	0.418	1.32	0.554	Figure.14
Test Position 2	9400/1880	RMC 12.2k	1:1	23	21.78	0.112	0.289	1.32	0.383	/
Test Position 3	9400/1880	RMC 12.2k	1:1	23	21.78	0.035	0.334	1.32	0.442	/
Test Position 4	9400/1880	RMC 12.2k	1:1	23	21.78	0.080	0.117	1.32	0.155	/

Note: 1.The value with blue color is the maximum SAR Value of each test band.

2. Per FCC KDB Publication 447498 D01, if the reported (scaled) SAR measured at the middle channel or highest output power channel for each test configuration is ≤ 0.8 W/kg then testing at the other channels is not required for such test configuration(s).

3. When the maximum output power and tune-up tolerance specified for production units in a secondary mode is $\leq \frac{1}{4}$ dB higher than the primary mode, SAR measurement is not required for the secondary mode.

Table 16: SAR Values [UMTS Band II (WCDMA/HSDPA/HSUPA)] (E8372h-517)

Test Position	Channel/ Frequency (MHz)	Channel Type	Duty Cycle	Maximum Allowed Power (dBm)	Conducted Power (dBm)	Drift ± 0.21dB	Limit SAR _{1g} 1.6 W/kg			
						Drift (dB)	Measured SAR _{1g} (W/kg)	Scaling Factor	Reported SAR _{1g} (W/kg)	Graph Results
Lenovo Y-450 (Distance 5mm)										
Test Position 1	9400/1880	RMC 12.2k	1:1	23	22.20	-0.060	0.470	1.20	0.565	Figure.25

Note: 1.The value with blue color is the maximum SAR Value of each test band.

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7.4.4. UMTS Band IV

Table 17: SAR Values [UMTS Band IV (WCDMA/HSDPA/HSUPA)] (E8372h-510)

Test Position	Channel/ Frequency (MHz)	Channel Type	Duty Cycle	Maximum Allowed Power (dBm)	Conducted Power (dBm)	Drift ± 0.21dB	Limit SAR _{1g} 1.6 W/kg			
						Drift (dB)	Measured SAR _{1g} (W/kg)	Scaling Factor	Reported SAR _{1g} (W/kg)	Graph Results
Lenovo Y-450 (Distance 5mm)										
Test Position 1	1413/1732.6	RMC 12.2k	1:1	23	22.31	-0.031	0.448	1.17	0.525	Figure.15
Test Position 2	1413/1732.6	RMC 12.2k	1:1	23	22.31	-0.022	0.331	1.17	0.388	/
Test Position 3	1413/1732.6	RMC 12.2k	1:1	23	22.31	0.022	0.393	1.17	0.461	/
Test Position 4	1413/1732.6	RMC 12.2k	1:1	23	22.31	0.033	0.122	1.17	0.143	/

Note: 1.The value with blue color is the maximum SAR Value of each test band.

- Per FCC KDB Publication 447498 D01, if the reported (scaled) SAR measured at the middle channel or highest output power channel for each test configuration is ≤ 0.8 W/kg then testing at the other channels is not required for such test configuration(s).
- When the maximum output power and tune-up tolerance specified for production units in a secondary mode is $\leq \frac{1}{4}$ dB higher than the primary mode, SAR measurement is not required for the secondary mode.

Table 18: SAR Values [UMTS Band IV (WCDMA/HSDPA/HSUPA)] (E8372h-517)

Test Position	Channel/ Frequency (MHz)	Channel Type	Duty Cycle	Maximum Allowed Power (dBm)	Conducted Power (dBm)	Drift ± 0.21dB	Limit SAR _{1g} 1.6 W/kg			
						Drift (dB)	Measured SAR _{1g} (W/kg)	Scaling Factor	Reported SAR _{1g} (W/kg)	Graph Results
Lenovo Y-450 (Distance 5mm)										
Test Position 1	1413/1732.6	RMC 12.2k	1:1	23	22.44	-0.060	0.467	1.14	0.531	Figure.26

Note: 1.The value with blue color is the maximum SAR Value of each test band.

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Test Position	Channel/ Frequency (MHz)	Channel Type	Duty Cycle	Maximum Allowed Power (dBm)	Conducted Power (dBm)	Drift ± 0.21dB	Limit SAR _{1g} 1.6 W/kg			
						Drift (dB)	Measured SAR _{1g} (W/kg)	Scaling Factor	Reported SAR _{1g} (W/kg)	Graph Results
Lenovo Y-450 (Distance 5mm)										
Test Position 1	4182/836.4	RMC 12.2k	1:1	23.5	22.74	0.170	0.396	1.19	0.472	Figure.27
Note: 1.The value with blue color is the maximum SAR Value of each test band.										

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7.4.6. LTE Band 2

Table 21: SAR Values (LTE Band 2/20M) (E8372h-510)

Test Position	Channel/ Frequency (MHz)	Modulation Type	Duty Cycle	Maximum Allowed Power (dBm)	Conducted Power (dBm)	Drift ± 0.21dB	Limit SAR _{1g} 1.6 W/kg			
						Drift (dB)	Measured SAR _{1g} (W/kg)	Scaling Factor	Reported SAR _{1g} (W/kg)	Graph Results
Test position of Body (1RB, QPSK, Distance 5mm)										
Test Position 1	19100/1900	99%Offset	1:1	23	22.55	0.021	0.621	1.11	0.689	/
	18900/1880	99%Offset	1:1	23	22.62	0.030	1.090	1.09	1.190	Figure.17
	18700/1860	0 Offset	1:1	23	22.4	0.023	0.566	1.15	0.650	/
Test Position 2	19100/1900	99%Offset	1:1	23	22.55	-0.027	0.482	1.11	0.535	/
	18900/1880	99%Offset	1:1	23	22.62	-0.120	0.928	1.09	1.013	/
	18700/1860	0 Offset	1:1	23	22.4	-0.031	0.343	1.15	0.394	/
Test Position 3	19100/1900	99%Offset	1:1	23	22.55	-0.030	0.530	1.11	0.588	/
	18900/1880	99%Offset	1:1	23	22.62	-0.023	0.960	1.09	1.048	/
	18700/1860	0 Offset	1:1	23	22.4	-0.140	0.352	1.15	0.404	/
Test Position 4	18900/1880	99%Offset	1:1	23	22.62	-0.180	0.300	1.09	0.327	/
Test position of Body (50% RB, QPSK, Distance 5mm)										
Test Position 1	19100/1900	0%Offset	1:1	22	21.11	0.021	0.532	1.23	0.653	/
	18900/1880	99%Offset	1:1	22	21.64	0.046	0.786	1.09	0.854	/
	18700/1860	0%Offset	1:1	22	20.77	-0.024	0.570	1.33	0.757	/
Test Position 2	18900/1880	99%Offset	1:1	22	21.64	-0.070	0.680	1.09	0.739	/
Test Position 3	18900/1880	99%Offset	1:1	22	21.64	0.050	0.711	1.09	0.772	/
Test Position 4	18900/1880	99%Offset	1:1	22	21.64	0.056	0.255	1.09	0.277	/
Test position of Body (100% RB, QPSK, Distance 5mm)										
Test Position 1	18900/1880	0 Offset	1:1	22	21.49	-0.025	0.809	1.12	0.910	/
Test Position 2	18900/1880	0 Offset	1:1	22	21.49	-0.104	0.690	1.12	0.776	/
Test Position 3	18900/1880	0 Offset	1:1	22	21.49	0.031	0.667	1.12	0.750	/
Test position of Body (1 st Repeated SAR, 1RB, QPSK, Distance 5mm)										
Test Position 1	18900/1880	99%Offset	1:1	23	22.62	0.03	1.020	1.09	1.113	/

Note: 1. The value with blue color is the maximum SAR Value of each test band.

- Per FCC KDB Publication 447498 D01, if the reported (scaled) SAR measured at the middle channel or highest output power channel for each test configuration is ≤ 0.8 W/kg then testing at the other channels is not required for such test configuration(s).
- For QPSK with 100% RB allocation, SAR is 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.

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Table 22: SAR Measurement Variability Results [LTE Band 2]

Test Position	Channel/ Frequency (MHz)	Measured SAR (1g)	1 st Repeated SAR (1g)	Ratio	2 nd Repeated SAR (1g)	3 rd Repeated SAR (1g)
Test Position 1	18900/1880	1.090	1.020	1.07	N/A	N/A

Note: 1) When the original highest measured SAR is ≥ 0.80 W/kg, the measurement was repeated once.
 2) A second repeated measurement was preformed only if the ratio of largest to smallest SAR for the original and first repeated measurements was > 1.20 or when the original or repeated measurement was ≥ 1.45 W/kg (~ 10% from the 1-g SAR limit).
 3) A third repeated measurement was performed only if the original, first or second repeated measurement was ≥ 1.5 W/kg and the ratio of largest to smallest SAR for the original, first and second repeated measurements is > 1.20 .
 4) Repeated measurements are not required when the original highest measured SAR is < 0.80 W/kg

Table 23: SAR Values (LTE Band 2/20M) (E8372h-517)

Test Position	Channel/ Frequency (MHz)	Modulation Type	Duty Cycle	Maximum Allowed Power (dBm)	Conducted Power (dBm)	Drift ± 0.21dB	Limit SAR _{1g} 1.6 W/kg			
						Drift (dB)	Measured SAR _{1g} (W/kg)	Scaling Factor	Reported SAR _{1g} (W/kg)	Graph Results
Test position of Body (1RB, QPSK, Distance 5mm)										
Test Position 1	18900/1880	99%Offset	1:1	23	22.64	0.140	0.978	1.09	1.063	Figure.28
Note: 1.The value with blue color is the maximum SAR Value of each test band.										

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Test Position	Channel/ Frequency (MHz)	Modulation Type	Duty Cycle	Maximum Allowed Power (dBm)	Conducted Power (dBm)	Drift $\pm 0.21\text{dB}$	Limit SAR _{1g} 1.6 W/kg			
						Drift (dB)	Measured SAR _{1g} (W/kg)	Scaling Factor	Reported SAR _{1g} (W/kg)	Graph Results
Test position of Body (100% RB, QPSK, Distance 5mm)										
Test Position 1	20175/1732.5	0 Offset	1:1	22	21.53	-0.040	0.748	1.11	0.833	Figure.29
Note: 1.The value with blue color is the maximum SAR Value of each test band.										

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Test Position	Channel/ Frequency (MHz)	Modulation Type	Duty Cycle	Maximum Allowed Power (dBm)	Conducted Power (dBm)	Drift ± 0.21dB	Limit SAR _{1g} 1.6 W/kg			
						Drift (dB)	Measured SAR _{1g} (W/kg)	Scaling Factor	Reported SAR _{1g} (W/kg)	Graph Results
Test position of Body (50% RB, QPSK, Distance 5mm)										
Test Position 1	20525/836.5	99% Offset	1:1	22.5	21.68	0.030	0.395	1.21	0.477	Figure.30
Note: 1. The value with blue color is the maximum SAR Value of each test band.										

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Test Position	Channel/ Frequency (MHz)	Modulation Type	Duty Cycle	Maximum Allowed Power (dBm)	Conducted Power (dBm)	Drift $\pm 0.21\text{dB}$	Limit SAR _{1g} 1.6 W/kg			
						Drift (dB)	Measured SAR _{1g} (W/kg)	Scaling Factor	Reported SAR _{1g} (W/kg)	Graph Results
Test position of Body (1RB, QPSK, Distance 5mm)										
Test Position 1	21350/2560	0 Offset	1:1	23	22.54	0.190	0.654	1.11	0.727	Figure.31
Note: 1. The value with blue color is the maximum SAR Value of each test band.										

7.4.10. LTE Band 12

Test Position	Channel/ Frequency (MHz)	Modulation Type	Duty Cycle	Maximum Allowed Power (dBm)	Conducted Power (dBm)	Drift ± 0.21dB	Limit SAR _{1g} 1.6 W/kg			
						Drift (dB)	Measured SAR _{1g} (W/kg)	Scaling Factor	Reported SAR _{1g} (W/kg)	Graph Results
Test position of Body (1RB, QPSK, Distance 5mm)										
Test Position 1	23130/711	50% Offset	1:1	24	23.31	0.140	0.490	1.17	0.574	Figure.32
Test Position 2	23130/711	50% Offset	1:1	24	23.31	0.050	0.335	1.17	0.393	/
Test Position 3	23130/711	50% Offset	1:1	24	23.31	0.032	0.254	1.17	0.298	/
Test Position 4	23130/711	50% Offset	1:1	24	23.31	0.050	0.100	1.17	0.117	/
Test position of Body (50% RB, QPSK, Distance 5mm)										
Test Position 1	23060/704	0 Offset	1:1	22.5	21.92	0.110	0.437	1.14	0.499	/
Test Position 2	23060/704	0 Offset	1:1	22.5	21.92	0.130	0.317	1.14	0.362	/
Test Position 3	23060/704	0 Offset	1:1	22.5	21.92	0.027	0.200	1.14	0.229	/
Test Position 4	23060/704	0 Offset	1:1	22.5	21.92	0.022	0.089	1.14	0.102	/

Note: 1. The value with blue color is the maximum SAR Value of each test band.
2. Per FCC KDB Publication 447498 D01, if the reported (scaled) SAR measured at the middle channel or highest output power channel for each test configuration is ≤ 0.8 W/kg then testing at the other channels is not required for such test configuration(s).

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Test Position	Channel/ Frequency (MHz)	Modulation Type	Duty Cycle	Maximum Allowed Power (dBm)	Conducted Power (dBm)	Drift ± 0.21dB	Limit SAR _{1g} 1.6 W/kg			
						Drift (dB)	Measured SAR _{1g} (W/kg)	Scaling Factor	Reported SAR _{1g} (W/kg)	Graph Results
Test position of Body (1RB, QPSK, Distance 5mm)										
Test Position 1	23800/711	50% Offset	1:1	23.5	23.38	0.140	0.506	1.03	0.520	Figure.33
Test Position 2	23800/711	50% Offset	1:1	23.5	23.38	0.045	0.431	1.03	0.443	/
Test Position 3	23800/711	50% Offset	1:1	23.5	23.38	-0.067	0.212	1.03	0.218	/
Test Position 4	23800/711	50% Offset	1:1	23.5	23.38	0.050	0.099	1.03	0.102	/
Test position of Body (50% RB, QPSK, Distance 5mm)										
Test Position 1	23800/711	99% Offset	1:1	22.5	21.95	0.023	0.459	1.14	0.521	/
Test Position 2	23800/711	99% Offset	1:1	22.5	21.95	-0.040	0.368	1.14	0.418	/
Test Position 3	23800/711	99% Offset	1:1	22.5	21.95	0.052	0.192	1.14	0.218	/
Test Position 4	23800/711	99% Offset	1:1	22.5	21.95	0.059	0.098	1.14	0.111	/

Note: 1. The value with blue color is the maximum SAR Value of each test band.

2. Per FCC KDB Publication 447498 D01, if the reported (scaled) SAR measured at the middle channel or highest output power channel for each test configuration is ≤ 0.8 W/kg then testing at the other channels is not required for such test configuration(s).

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2. Per FCC KDB Publication 447498 D01, if the reported (scaled) SAR measured at the middle channel or highest output power channel for each test configuration is ≤ 0.8 W/kg then testing at the other channels is optional for such test configuration(s).
3. Highest reported SAR is ≤ 0.4 W/kg. Therefore, further SAR measurements within this exposure condition are not required.
- Highest reported SAR is > 0.4 W/kg. Due to the highest reported SAR for this test position, other test positions in Head exposure condition were evaluated until a SAR ≤ 0.8 W/kg was reported.

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Simultaneous Transmission Conditions

Air-Interface	Band (MHz)	Type	Simultaneous Transmissions Note: Not to be tested	Voice Over Digital Transport (Data)
GSM	850	Data	Yes WiFi Antenna 1 and WiFi Antenna 2	NA
	1900	Data		
WCDMA	Band II	Data	Yes WiFi Antenna 1 and WiFi Antenna 2	NA
	Band IV	Data		
	Band V	Data		
LTE	FDD 2	Data	Yes WiFi Antenna 1 and WiFi Antenna 2	NA
	FDD 4	Data		
	FDD 5	Data		
	FDD 7	Data		
	FDD 12	Data		
	FDD 17	Data		
WiFi Antenna 1	2.4G	Data	Yes GSM, WCDMA , LTE , WiFi Antenna 2	NA
WiFi Antenna 2	2.4G	Data	Yes GSM, WCDMA , LTE , WiFi Antenna 1	NA

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Simultaneous transimition SAR For WiFi Antenna 1 and Antenna 2 and GSM/UMTS/LTE

SAR _{1g} (W/kg) Test Position	GSM 850	GSM 1900	UMTS II	UMTS IV	UMTS V	LTE 2	LTE 4	LTE 5	LTE 7	LTE 12	LTE 17	WiFi Ant 1	MAX. ΣSAR _{1g}	Peak location separation ratio
Test Position 1	0.514	0.794	0.565	0.531	0.709	1.190	0.919	0.477	0.727	0.574	0.521	0.242	1.432	No
Test Position 2	0.369	0.547	0.383	0.388	0.536	1.013	0.734	0.393	0.481	0.393	0.443	0.242	1.255	No
Test Position 3	0.270	0.411	0.442	0.461	0.372	1.048	0.778	0.338	0.458	0.298	0.218	0.242	1.290	No
Test Position 4	0.085	0.106	0.155	0.143	0.130	0.327	0.218	0.121	0.117	0.117	0.111	0.242	0.569	No

Note: 1. The value with blue color is the maximum ΣSAR_{1g} Value.
2. MAX. ΣSAR_{1g} = Unlicensed SAR_{MAX} + Licensed SAR_{MAX}

MAX. ΣSAR_{1g} = 1.432 W/kg < 1.6 W/kg, So the Simultaneous transimition SAR with volum scan are not required for WiFi Antenna 1 and GSM/UMTS/LTE antenna.

SAR _{1g} (W/kg) Test Position	GSM 850	GSM 1900	UMTS II	UMTS IV	UMTS V	LTE 2	LTE 4	LTE 5	LTE 7	LTE 12	LTE 17	WiFi Ant 2	MAX. ΣSAR _{1g}	Peak location separation ratio
Test Position 1	0.514	0.794	0.565	0.531	0.709	1.190	0.919	0.477	0.727	0.574	0.521	0.403	1.593	No
Test Position 2	0.369	0.547	0.383	0.388	0.536	1.013	0.734	0.393	0.481	0.393	0.443	0.400	1.413	No
Test Position 3	0.270	0.411	0.442	0.461	0.372	1.048	0.778	0.338	0.458	0.298	0.218	0.403	1.451	No
Test Position 4	0.085	0.106	0.155	0.143	0.130	0.327	0.218	0.121	0.117	0.117	0.111	0.403	0.730	No

Note: 1. The value with blue color is the maximum ΣSAR_{1g} Value.
2. MAX. ΣSAR_{1g} = Unlicensed SAR_{MAX} + Licensed SAR_{MAX}

MAX. ΣSAR_{1g} = 1.593 W/kg < 1.6 W/kg, So the Simultaneous transimition SAR with volum scan are not required for WiFi Antenna 2 and GSM/UMTS/LTE antenna.

SAR _{1g} (W/kg) Test Position	GSM 850	GSM 1900	UMTS II	UMTS IV	UMTS V	LTE 2	LTE 4	LTE 5	LTE 7	LTE 12	LTE 17	MIMO	MAX. ΣSAR _{1g}	Peak location separation ratio
Test Position 1	0.514	0.794	0.565	0.531	0.709	1.190	0.919	0.477	0.727	0.574	0.521	0.241	1.431	No
Test Position 2	0.369	0.547	0.383	0.388	0.536	1.013	0.734	0.393	0.481	0.393	0.443	0.241	1.254	No
Test Position 3	0.270	0.411	0.442	0.461	0.372	1.048	0.778	0.338	0.458	0.298	0.218	0.241	1.289	No
Test Position 4	0.085	0.106	0.155	0.143	0.130	0.327	0.218	0.121	0.117	0.117	0.111	0.241	0.568	No

Note: 1. The value with blue color is the maximum ΣSAR_{1g} Value.
2. MAX. ΣSAR_{1g} = Unlicensed SAR_{MAX} + Licensed SAR_{MAX}

MAX. ΣSAR_{1g} = 1.431 W/kg < 1.6 W/kg, So the Simultaneous transimition SAR with volum scan are not required for WiFi MIMO and GSM/UMTS/LTE antenna.

8. Measurement Uncertainty

The measured SAR were <1.5 W/kg for all frequency bands, therefore per KDB Publication 865664 D01v01, the extensive SAR measurement uncertainty analysis described in IEEE Std 1528-2003 is not required in SAR reports.

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9. Main Test Instruments

Table 33: List of Main Instruments

No.	Name	Type	Serial Number	Calibration Date	Expiration Time	Valid Period
01	Network analyzer	Agilent 8753E	US37390326	2014-9-1	2015-8-30	1 year
02	Dielectric Probe Kit	Agilent 85070E	US44020115	No Calibration Requested		
03	Power meter	Agilent E4417A	GB41291714	2015-3-7	2016-3-6	1 year
04	Power sensor	Agilent N8481H	MY50350004	2014-9-22	2015-9-21	1 year
05	Power sensor	E9327A	US40441622	2015-1-1	2015-12-31	1 year
06	Signal Generator	HP 8341B	2730A00804	2014-9-1	2015-8-30	1 year
07	Dual directional coupler	778D-012	50519	2015-3-23	2016-3-22	1 year
08	Dual directional coupler	777D	50146	2015-3-23	2016-3-22	1 year
09	Amplifier	IXA-020	0401	No Calibration Requested		
10	Wideband radio communication tester	CMW 500	113645	2014-8-15	2015-8-14	1 year
11	E-field Probe	EX3DV4	3677	2015-1-30	2016-1-29	1 year
12	DAE	DAE4	1291	2014-11-14	2015-11-13	1 year
13	Validation Kit 750MHz	D750V3	1017	2014-8-28	2017-8-27	3 years
14	Validation Kit 835MHz	D835V2	4d020	2014-8-28	2017-8-27	3 years
15	Validation Kit 1750MHz	D1750V2	1033	2014-1-26	2017-1-25	3 years
16	Validation Kit 1900MHz	D1900V2	5d060	2014-9-1	2017-8-30	3 years
17	Validation Kit 2450MHz	D2450V2	786	2014-9-1	2017-8-30	3 years
18	Validation Kit 2600MHz	D2600V2	1025	2014-12-8	2017-12-7	3 years
19	Temperature Probe	JM222	AA1009129	2015-3-11	2016-3-10	1 year
20	Hygrothermograph	WS-1	64591	2014-9-25	2015-9-24	1 year

*****END OF REPORT *****

ANNEX A: Test Layout



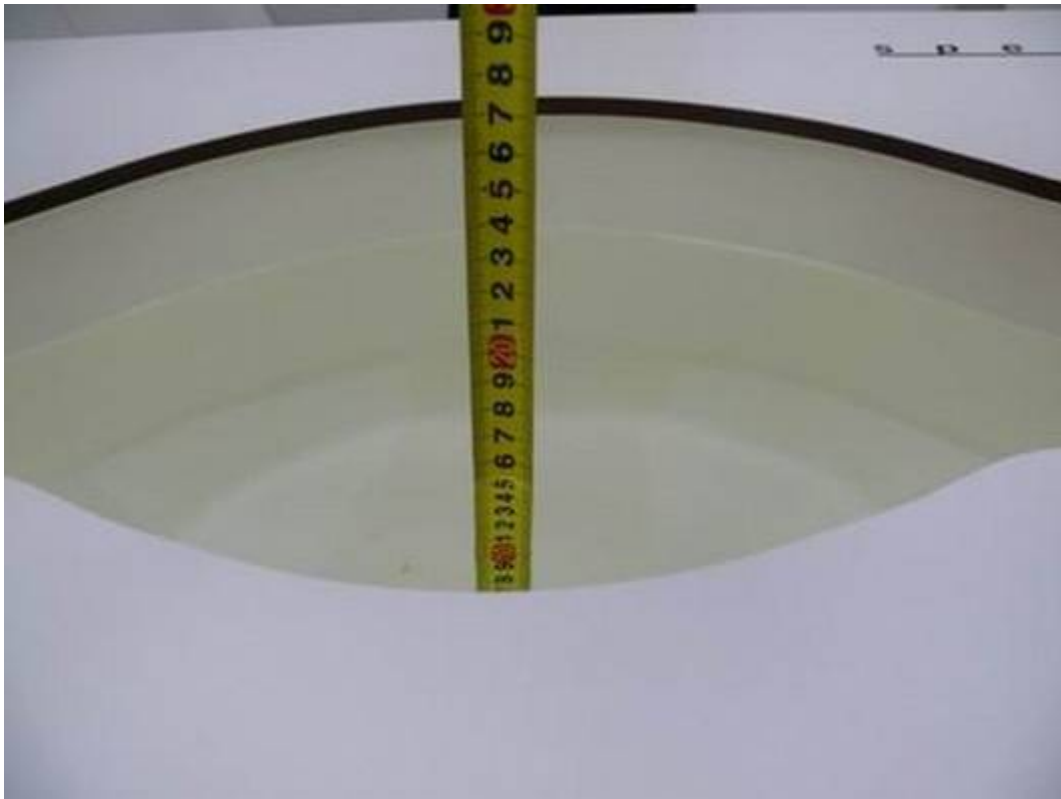
Picture 2: Specific Absorption Rate Test Layout



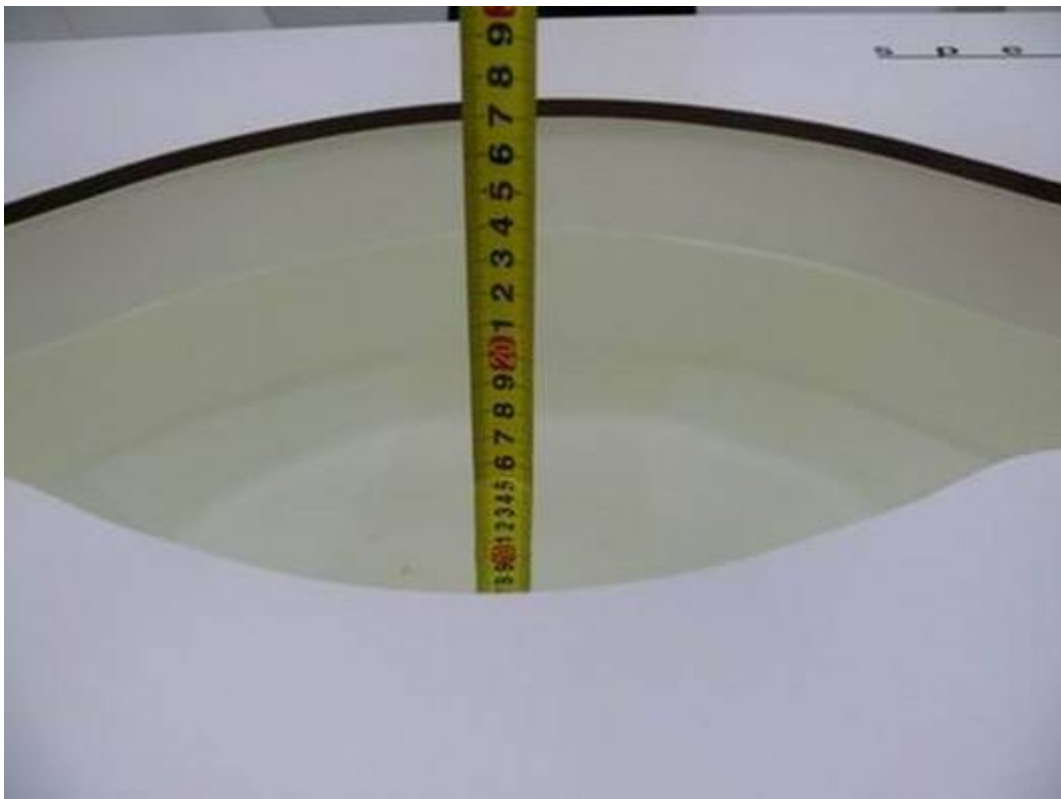
Picture 3: Liquid depth in the Flat Phantom (750 MHz, 15.3cm depth)



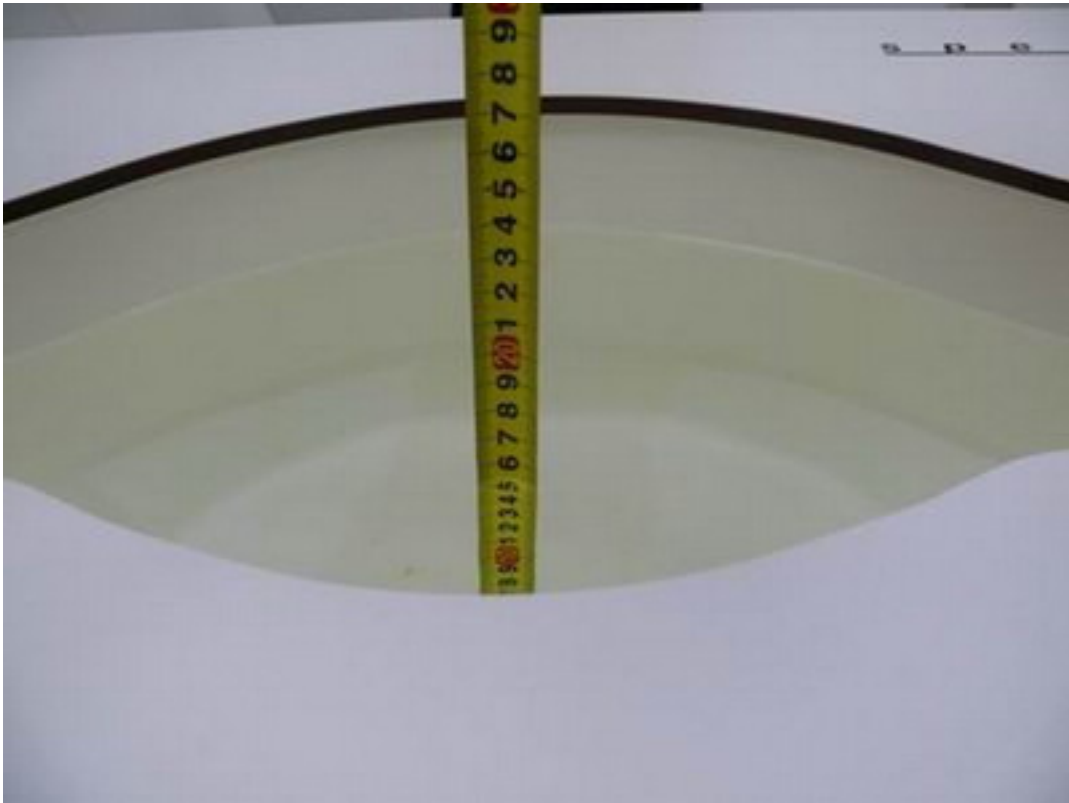
Picture 4: Liquid depth in the Flat Phantom (835 MHz, 15.4cm depth)



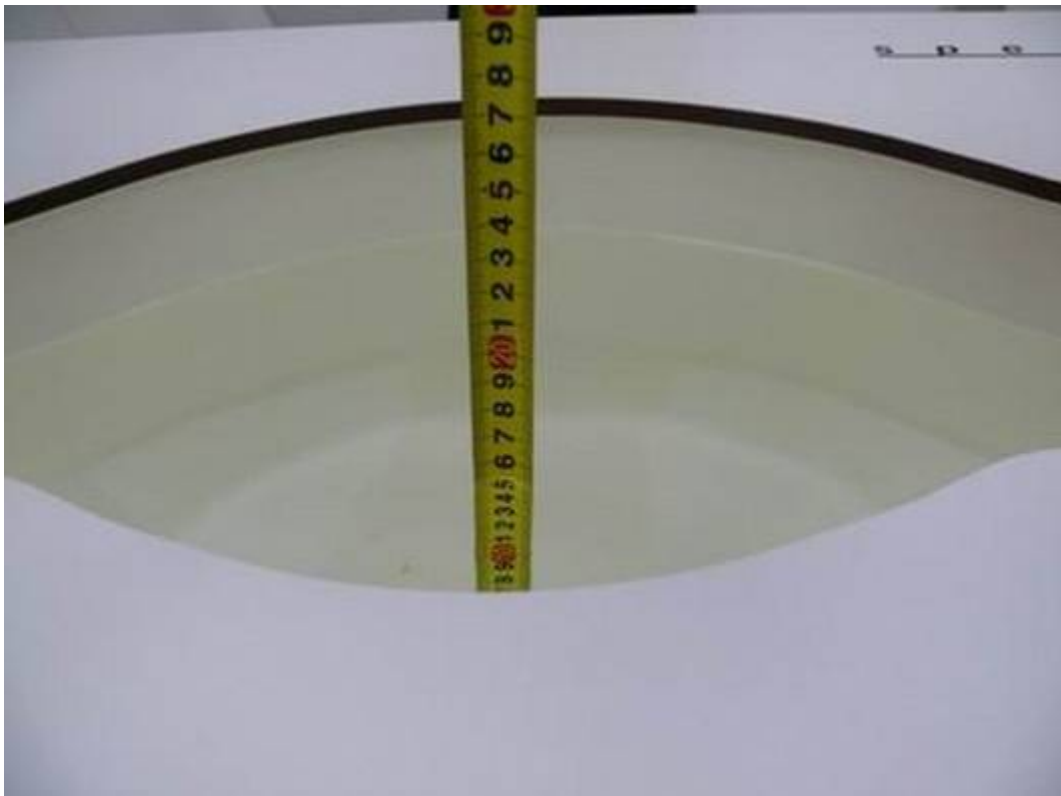
Picture 5: Liquid depth in the Flat Phantom (1750 MHz, 15.2cm depth)



Picture 6: Liquid depth in the Flat Phantom (1900 MHz, 15.2cm depth)



Picture 7: Liquid depth in the flat Phantom (2450 MHz, 15.3cm depth)



Picture 8: Liquid depth in the Flat Phantom (2600 MHz, 15.3cm depth)

ANNEX B: System Check Results

System Performance Check at 750 MHz Body TSL

DUT: Dipole 750 MHz; Type: D750V3; Serial: D750V3 - SN: 1017

Date: 6/11/2015

Communication System: CW (0); Frequency: 750 MHz; Duty Cycle: 1:1

Medium parameters used: $f = 750 \text{ MHz}$; $\sigma = 0.97 \text{ S/m}$; $\epsilon_r = 54.3$; $\rho = 1000 \text{ kg/m}^3$

Ambient Temperature: 22.3°C Liquid Temperature: 21.5°C

Phantom section: Flat Section

DASY5 Configuration:

Sensor-Surface: 4mm (Mechanical Surface Detection)

Probe: EX3DV4 - SN3677; ConvF(9.53, 9.53, 9.53); Calibrated: 1/30/2015;

Electronics: DAE4 Sn1291; Calibrated: 11/14/2014

Phantom: SAM1; Type: SAM; Serial: TP-1534

Measurement SW: DASY52, Version 52.8 (7); SEMCAD X Version 14.6.10 (7164)

d=15mm, Pin=250mW/Area Scan (41x121x1): Interpolated grid: $dx=1.500 \text{ mm}$, $dy=1.500 \text{ mm}$

Maximum value of SAR (interpolated) = 2.36 W/kg

d=15mm, Pin=250mW/Zoom Scan (7x7x7)/Cube 0: Measurement grid: $dx=5\text{mm}$, $dy=5\text{mm}$, $dz=5\text{mm}$

Reference Value = 48.998 V/m ; Power Drift = 0.04 dB

Peak SAR (extrapolated) = 3.24 W/kg

SAR(1 g) = 2.22 W/kg ; SAR(10 g) = 1.49 W/kg

Maximum value of SAR (measured) = 2.39 W/kg

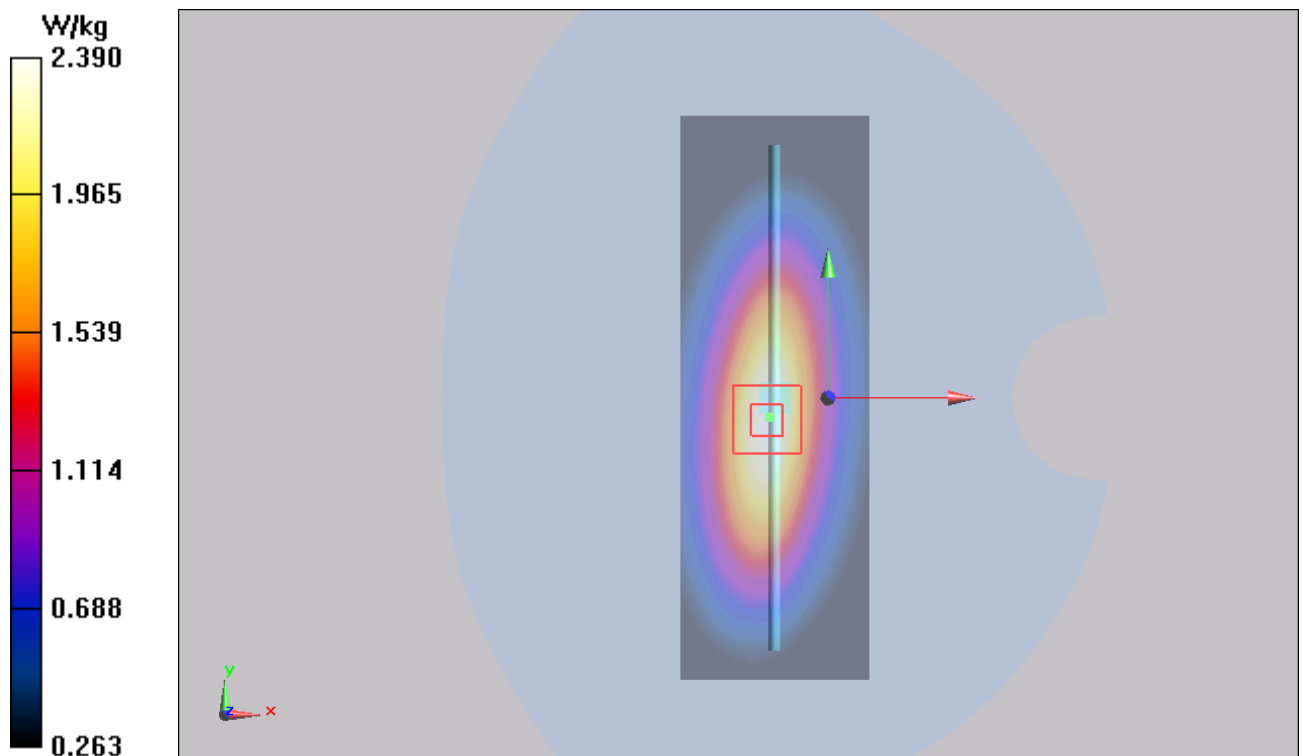


Figure 6 System Performance Check 750MHz 250mW

System Performance Check at 835 MHz

DUT: Dipole 835 MHz; Type: D835V2; Serial: D835V2 - SN: 4d020

Date: 6/10/2015

Communication System: CW; Frequency: 835 MHz; Duty Cycle: 1:1

Medium parameters used: $f = 835 \text{ MHz}$; $\sigma = 1.00 \text{ mho/m}$; $\epsilon_r = 55.1$; $\rho = 1000 \text{ kg/m}^3$

Ambient Temperature: 22.3°C Liquid Temperature: 21.5°C

Phantom section: Flat Section

DASY5 Configuration:

Sensor-Surface: 4mm (Mechanical Surface Detection)

Probe: EX3DV4 - SN3677; ConvF(9.45, 9.45, 9.45); Calibrated: 1/30/2015;

Electronics: DAE4 Sn1291; Calibrated: 11/14/2014

Phantom: SAM1; Type: SAM; Serial: TP-1534

Measurement SW: DASY5, V5.2 Build 162; SEMCAD X Version 14.0 Build 59

d=15mm, Pin=250mW/Area Scan (41x121x1): Measurement grid: $dx=15\text{mm}$, $dy=15\text{mm}$

Maximum value of SAR (interpolated) = 2.61 mW/g

d=15mm, Pin=250mW/Zoom Scan (7x7x7)/Cube 0: Measurement grid: $dx=5\text{mm}$, $dy=5\text{mm}$, $dz=5\text{mm}$

Reference Value = 52.09 V/m ; Power Drift = -0.11 dB

Peak SAR (extrapolated) = 3.48 W/kg

SAR(1 g) = 2.46 mW/g ; SAR(10 g) = 1.67 mW/g

Maximum value of SAR (measured) = 2.73 mW/g

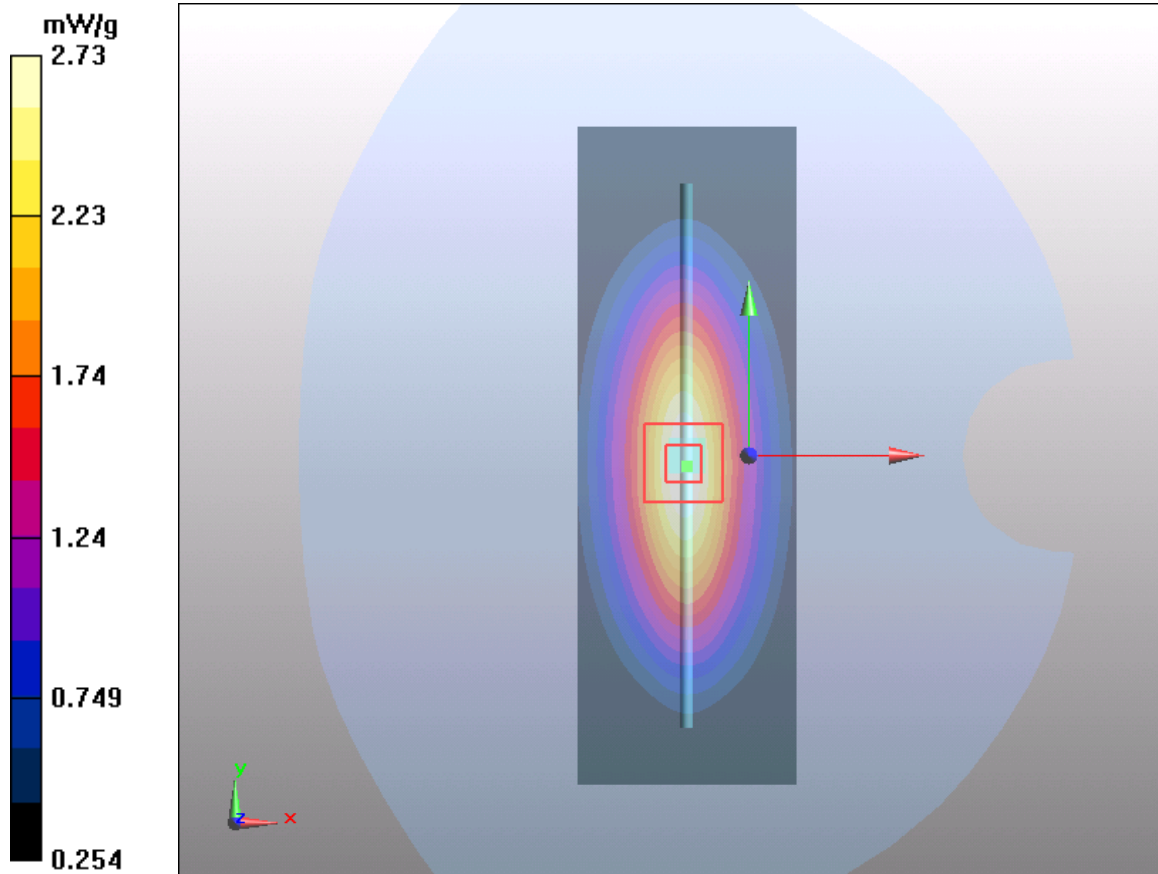


Figure 7 System Performance Check 835MHz 250mW

System Performance Check at 1750 MHz Body TSL

DUT: Dipole 1750 MHz; Type: D1750V2; Serial: D1750V2 - SN: 1033

Date: 6/13/2015

Communication System: CW; Frequency: 1750 MHz; Duty Cycle: 1:1

Medium parameters used: $f = 1750$ MHz; $\sigma = 1.50$ mho/m; $\epsilon_r = 53.3$; $\rho = 1000$ kg/m³

Ambient Temperature: 22.3 °C Liquid Temperature: 21.7 °C

DASY5 Configuration:

Sensor-Surface: 4mm (Mechanical Surface Detection)

Probe: EX3DV4 - SN3677; ConvF(7.74, 7.74, 7.74); Calibrated: 1/30/2015;

Electronics: DAE4 Sn1291; Calibrated: 11/14/2014

Phantom: SAM2; Type: SAM; Serial: TP-1524

Measurement SW: DASY52, Version 52.8 (7); SEMCAD X Version 14.6.10 (7164)

d=10mm, Pin=250mW/Area Scan (51x81x1): Measurement grid: dx=1.500 mm, dy=1.500 mm

Maximum value of SAR (interpolated) = 10.6 mW/g

d=10mm, Pin=250mW/Area Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 77.7 V/m; Power Drift = 0.04 dB

Peak SAR (extrapolated) = 16.8 W/kg

SAR(1 g) = 9.27 mW/g; SAR(10 g) = 4.95 mW/g

Maximum value of SAR (measured) = 10.8 mW/g

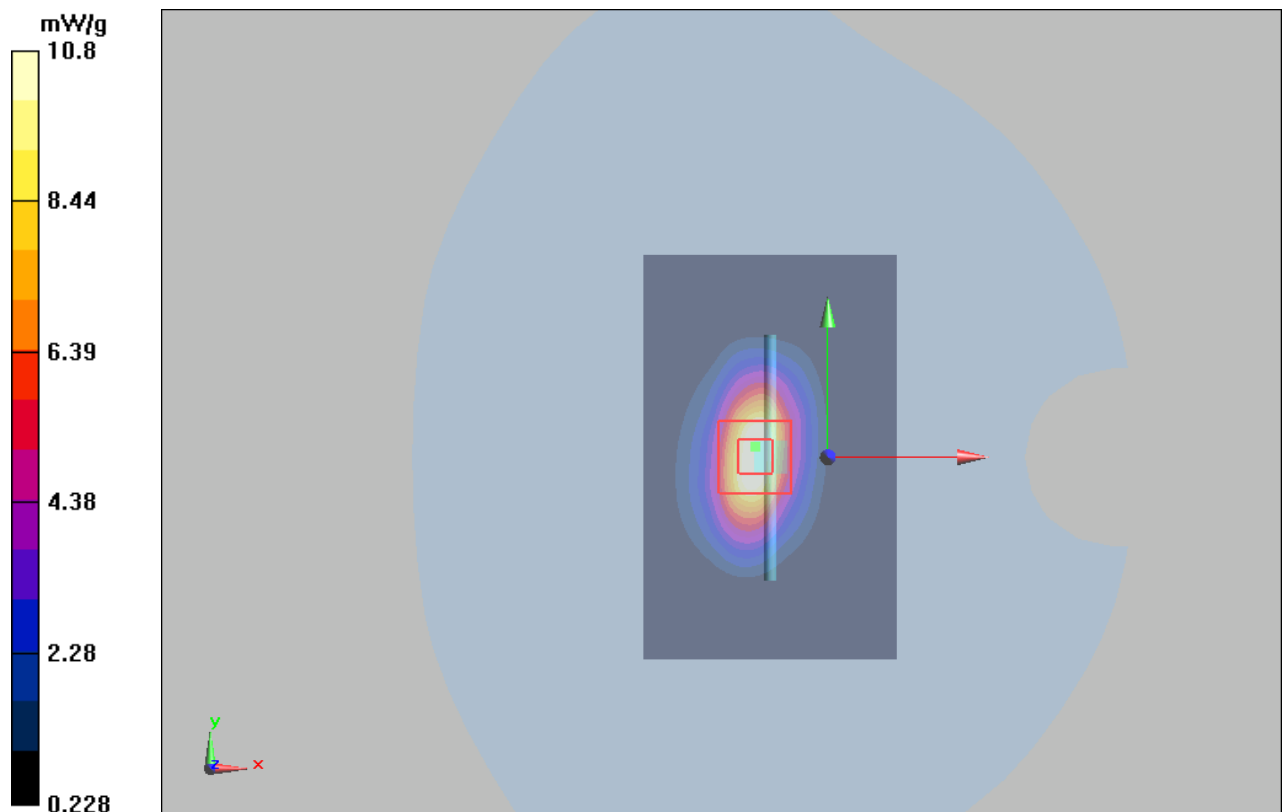


Figure 8 System Performance Check 1750MHz 250mW

System Performance Check at 1900 MHz Body TSL

DUT: Dipole 1900 MHz; Type: D1900V2; Serial: D1900V2 - SN: 5d060

Date: 6/12/2015

Communication System: CW; Frequency: 1900 MHz; Duty Cycle: 1:1

Medium parameters used: $f = 1900$ MHz; $\sigma = 1.52$ mho/m; $\epsilon_r = 52.5$; $\rho = 1000$ kg/m³

Ambient Temperature: 22.3 °C Liquid Temperature: 21.5 °C

Phantom section: Flat Section

DASY5 Configuration:

Sensor-Surface: 4mm (Mechanical Surface Detection)

Probe: EX3DV4 - SN3677; ConvF(7.57, 7.57, 7.57); Calibrated: 1/30/2015;

Electronics: DAE4 Sn1291; Calibrated: 11/14/2014

Phantom: SAM2; Type: SAM; Serial: TP-1524

Measurement SW: DASY52, Version 52.8 (7); SEMCAD X Version 14.6.10 (7164)

d=10mm, Pin=250mW/Area Scan (41x71x1): Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 11.9 mW/g

d=10mm, Pin=250mW/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 80.8 V/m; Power Drift = -0.06 dB

Peak SAR (extrapolated) = 17.6 W/kg

SAR(1 g) = 9.83 mW/g; SAR(10 g) = 5.2 mW/g

Maximum value of SAR (measured) = 11.52 mW/g

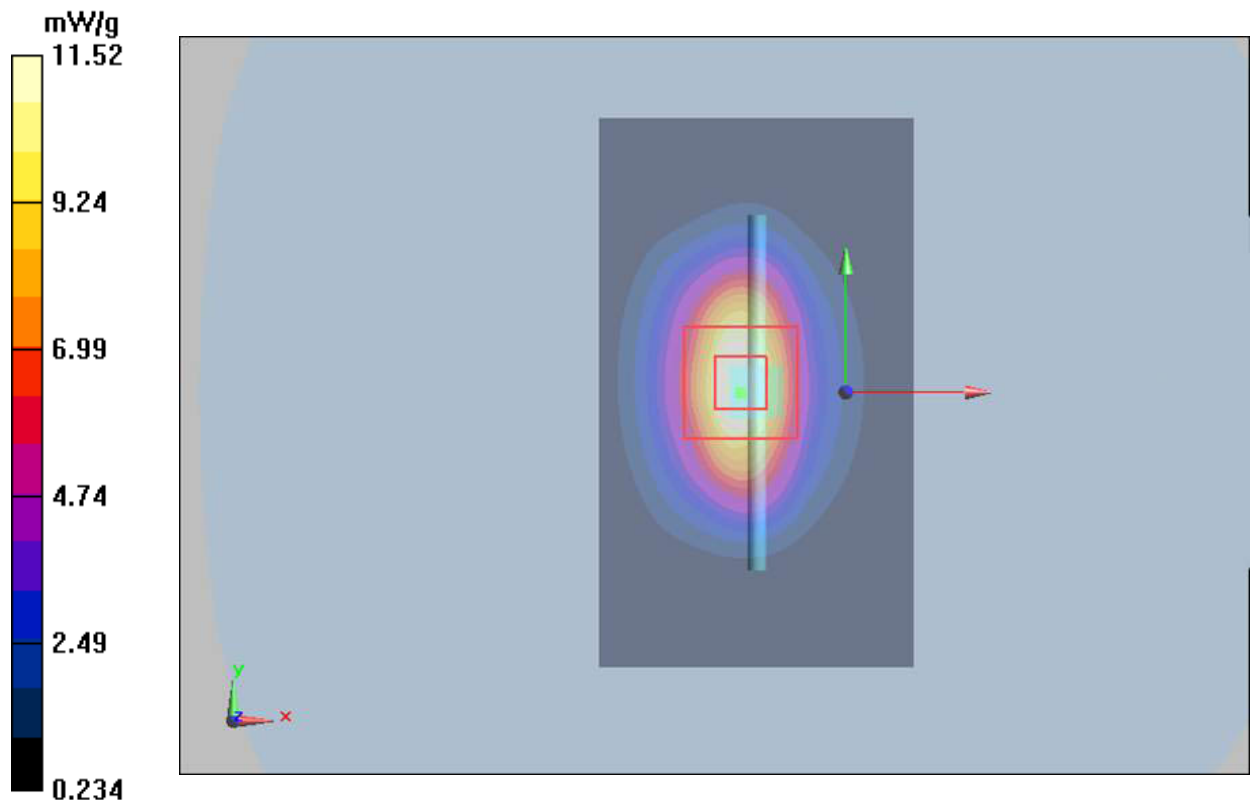


Figure 9 System Performance Check 1900MHz 250mW

System Performance Check at 2450 MHz Body TSL

DUT: Dipole 2450 MHz; Type: D2450V2; Serial: D2450V2 - SN: 786

Date: 6/2/2015

Communication System: CW; Frequency: 2450 MHz; Duty Cycle: 1:1

Medium parameters used: $f = 2450$ MHz; $\sigma = 1.99$ mho/m; $\epsilon_r = 52.1$; $\rho = 1000$ kg/m³

Ambient Temperature: 22.3 °C Liquid Temperature: 21.5 °C

Phantom section: Flat Section

DASY5 Configuration:

Sensor-Surface: 4mm (Mechanical Surface Detection)

Probe: EX3DV4 - SN3677; ConvF(7.42, 7.42, 7.42); Calibrated: 1/30/2015;

Electronics: DAE4 Sn1291; Calibrated: 11/14/2014

Phantom: SAM 2; Type: QD000P40CD; Serial: TP1667

Measurement SW: DASY52, Version 52.8 (5); SEMCAD X Version 14.6.8 (7028)

d=10mm, Pin=250mW/Area Scan (41x71x1): Measurement grid: dx=1.200 mm, dy=1.200 mm

Maximum value of SAR (interpolated) = 16 mW/g

d=10mm, Pin=250mW/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 81.2 V/m; Power Drift = 0.034 dB

Peak SAR (extrapolated) = 25.4 W/kg

SAR(1 g) = 12.52 mW/g; SAR(10 g) = 6.25 mW/g

Maximum value of SAR (measured) = 14.49 mW/g

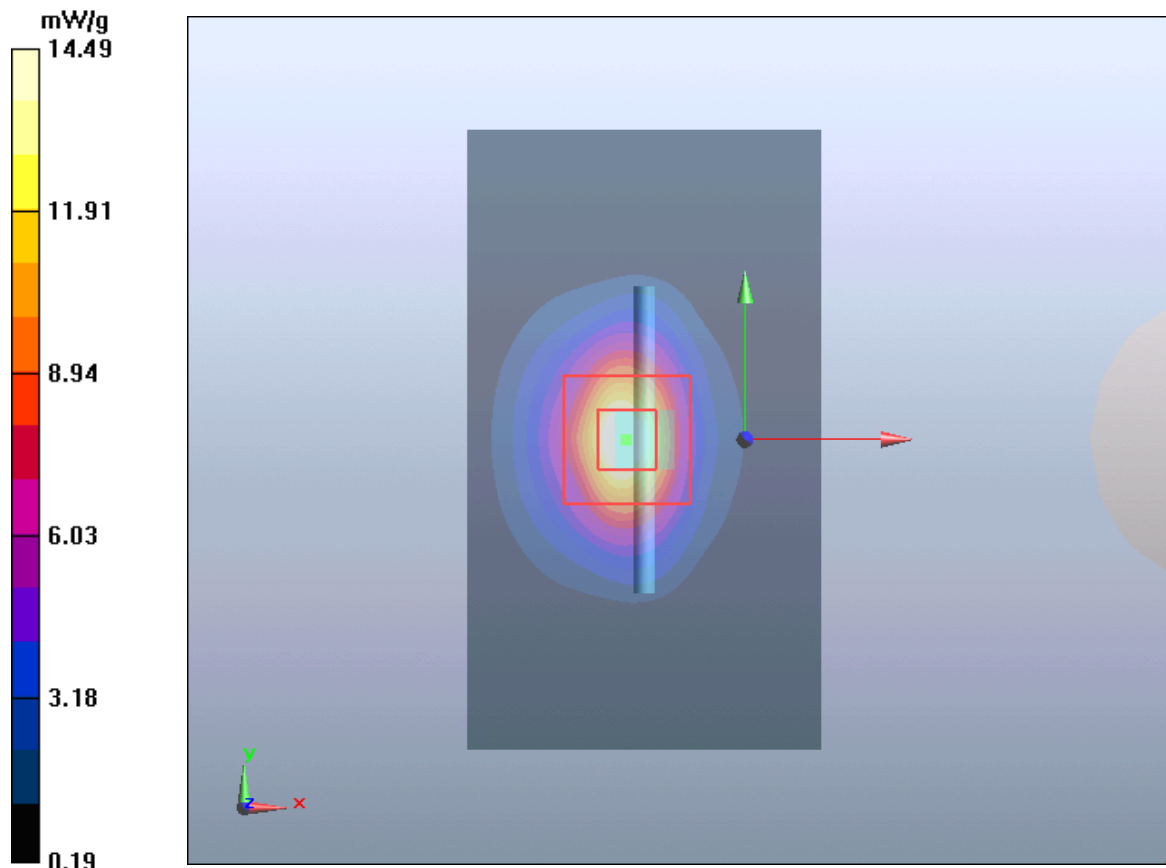


Figure 10 System Performance Check 2450MHz 250mW

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System Performance Check at 2600 MHz

DUT: Dipole 2600 MHz; Type: D2600V2; Serial: D2600V2 - SN: 1025

Date: 6/8/2015

Communication System: CW; Frequency: 2600 MHz; Duty Cycle: 1:1

Medium parameters used: $f = 2600$ MHz; $\sigma = 2.10$ mho/m; $\epsilon_r = 52.5$; $\rho = 1000$ kg/m³

Ambient Temperature: 22.3 °C Liquid Temperature: 21.5 °C

Phantom section: Flat Section

DASY5 Configuration:

Probe: EX3DV4 - SN3677; ConvF(7.29, 7.29, 7.29); Calibrated: 1/30/2015;

Electronics: DAE4 Sn1291; Calibrated: 11/14/2014

Phantom: SAM2; Type: SAM; Serial: TP-1524

Measurement SW: DASY5, V5.2 Build 162; SEMCAD X Version 14.0 Build 59

d=10mm, Pin=250mW /Area Scan (41x71x1): Measurement grid: dx=1.200 mm, dy=1.200 mm

Maximum value of SAR (interpolated) = 17.4 mW/g

d=10mm, Pin=250mW/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 72 V/m; Power Drift = -0.015 dB

Peak SAR (extrapolated) = 28.4 W/kg

SAR(1 g) = 13.47 mW/g; SAR(10 g) = 5.92 mW/g

Maximum value of SAR (measured) = 15.67 mW/g

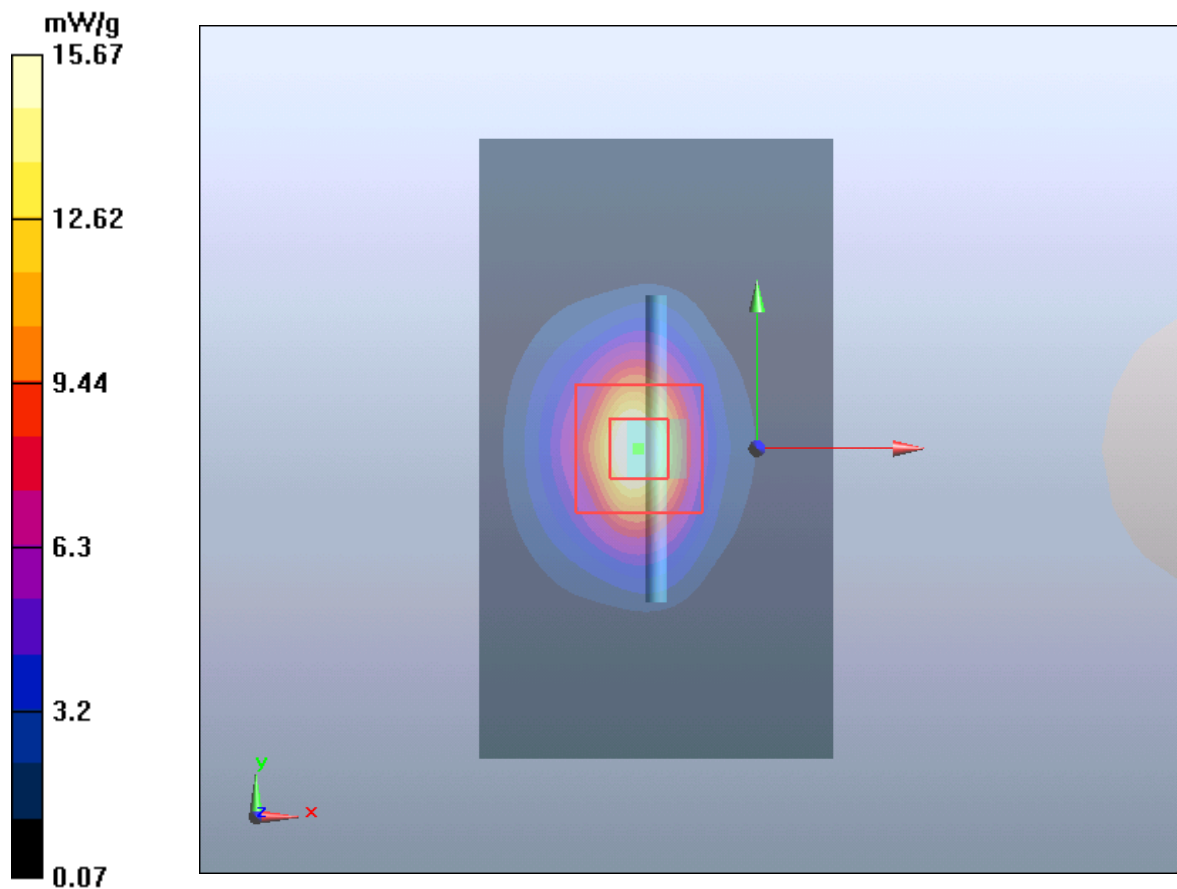


Figure 11 System Performance Check 2600MHz 250mW

ANNEX C: Highest Graph Results (E8372h-510)

GSM 850 GPRS (2TXslots) with Test Position 1 Middle

Date: 1/2/2015

Communication System: UID 0, GPRS 2TX (0); Frequency: 836.6 MHz; Duty Cycle: 1:4.14954

Medium parameters used: $f = 837$ MHz; $\sigma = 0.992$ S/m; $\epsilon_r = 55.882$; $\rho = 1000$ kg/m³

Ambient Temperature: 22.3 °C Liquid Temperature: 21.5 °C

Phantom section: Flat Section

DASY5 Configuration:

Sensor-Surface: 4mm (Mechanical Surface Detection)

Probe: EX3DV4 - SN3977; ConvF(9.74, 9.74, 9.74); Calibrated: 2/17/2014;

Electronics: DAE4 Sn1291; Calibrated: 11/14/2014

Phantom: SAM1; Type: SAM; Serial: TP-1534

Measurement SW: DASY52, Version 52.8 (7); SEMCAD X Version 14.6.10 (7164)

Test Position 1 Middle/Area Scan (31x71x1): Interpolated grid: dx=1.500 mm, dy=1.500 mm

Maximum value of SAR (interpolated) = 0.479 W/kg

Test Position 1 Middle/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 15.838 V/m; Power Drift = 0.03 dB

Peak SAR (extrapolated) = 0.684 W/kg

SAR(1 g) = 0.423 W/kg; SAR(10 g) = 0.260 W/kg

Maximum value of SAR (measured) = 0.417 W/kg

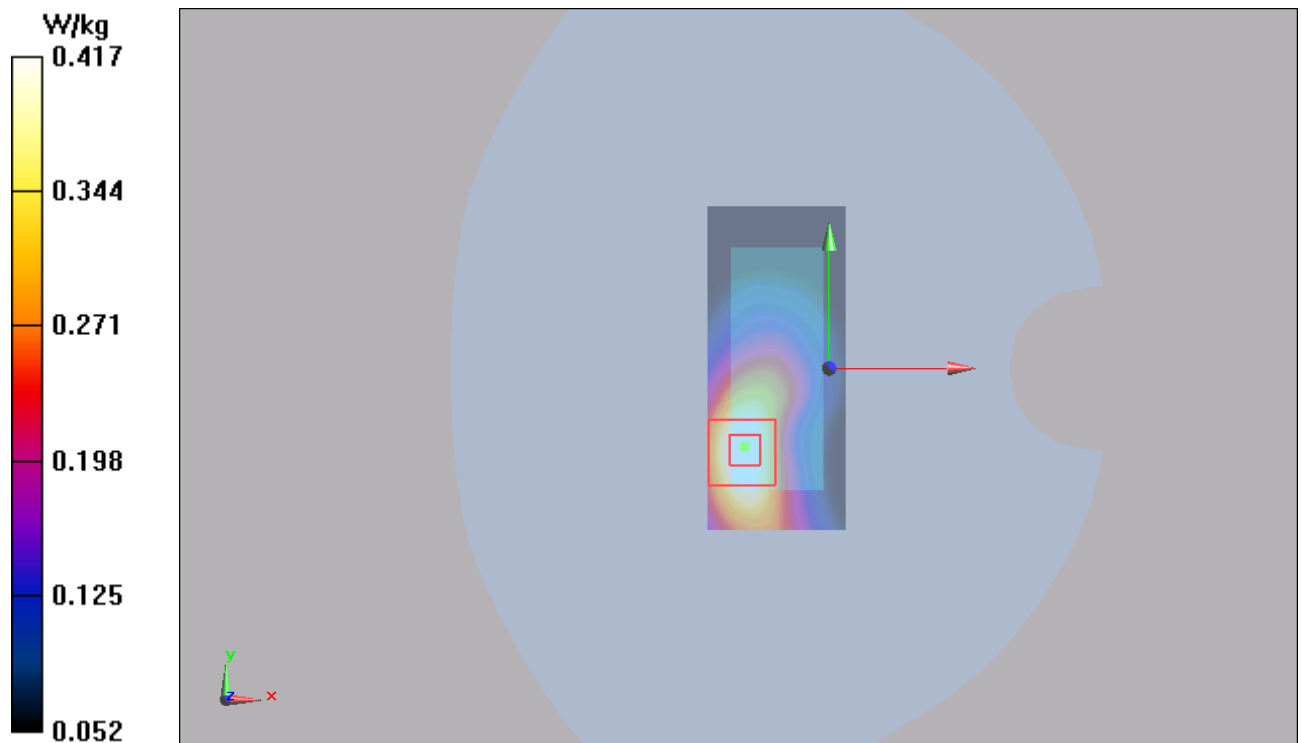


Figure 12 GSM 850 GPRS (2TXslots) with Test Position 1 Channel 190

GSM 1900 EGPRS (2TXslots) with Test Position 1 Middle

Date: 1/1/2015

Communication System: UID 0, EGPRS 2TX (0); Frequency: 1880 MHz; Duty Cycle: 1:4.14954

Medium parameters used: $f = 1880$ MHz; $\sigma = 1.504$ S/m; $\epsilon_r = 53.137$; $\rho = 1000$ kg/m³

Ambient Temperature: 22.3 °C Liquid Temperature: 21.5 °C

Phantom section: Flat Section

DASY5 Configuration:

Sensor-Surface: 4mm (Mechanical Surface Detection)

Probe: EX3DV4 - SN3977; ConvF(7.37, 7.37, 7.37); Calibrated: 2/17/2014;

Electronics: DAE4 Sn1291; Calibrated: 11/14/2014

Phantom: SAM 2; Type: SAM;

Measurement SW: DASY52, Version 52.8 (7); SEMCAD X Version 14.6.10 (7164)

Test Position 1 Middle/Area Scan (31x71x1): Interpolated grid: dx=1.500 mm, dy=1.500 mm

Maximum value of SAR (interpolated) = 0.624 W/kg

Test Position 1 Middle/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 13.586 V/m; Power Drift = -0.06 dB

Peak SAR (extrapolated) = 1.08 W/kg

SAR(1 g) = 0.571 W/kg; SAR(10 g) = 0.293 W/kg

Maximum value of SAR (measured) = 0.566 W/kg

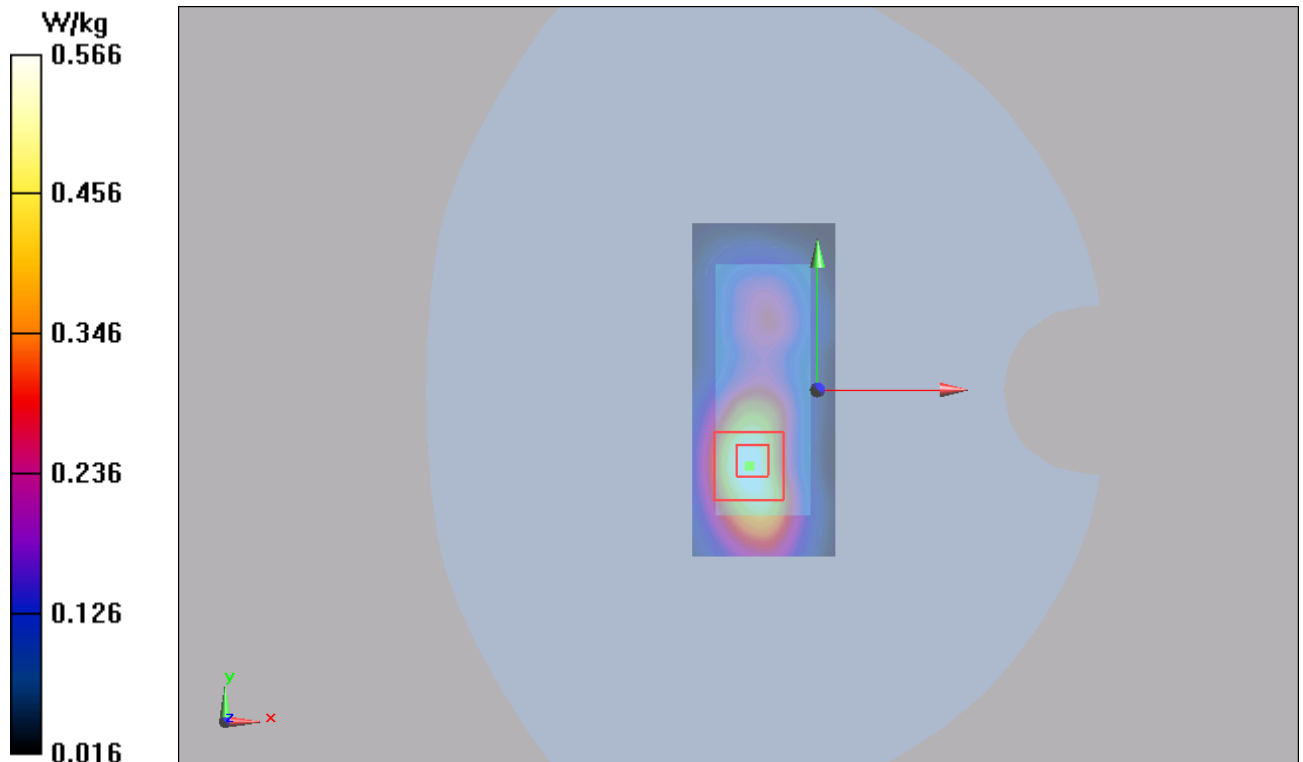


Figure 13 GSM 1900 EGPRS (2TXslots) with Test Position 1 Channel 661

UMTS Band II with Test Position 1 Middle

Date: 1/1/2015

Communication System: UID 0, WCDMA (0); Frequency: 1880 MHz; Duty Cycle: 1:1

Medium parameters used: $f = 1880$ MHz; $\sigma = 1.504$ S/m; $\epsilon_r = 53.137$; $\rho = 1000$ kg/m³

Ambient Temperature: 22.3 °C Liquid Temperature: 21.5 °C

Phantom section: Flat Section

DASY5 Configuration:

Sensor-Surface: 4mm (Mechanical Surface Detection)

Probe: EX3DV4 - SN3977; ConvF(7.37, 7.37, 7.37); Calibrated: 2/17/2014;

Electronics: DAE4 Sn1291; Calibrated: 11/14/2014

Phantom: SAM 2; Type: SAM;

Measurement SW: DASY52, Version 52.8 (7); SEMCAD X Version 14.6.10 (7164)

Test Position 1 Middle/Area Scan (31x71x1): Interpolated grid: dx=1.500 mm, dy=1.500 mm

Maximum value of SAR (interpolated) = 0.483 W/kg

Test Position 1 Middle/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 17.082 V/m; Power Drift = 0.025 dB

Peak SAR (extrapolated) = 0.722 W/kg

SAR(1 g) = 0.418 W/kg; SAR(10 g) = 0.235 W/kg

Maximum value of SAR (measured) = 0.437 W/kg

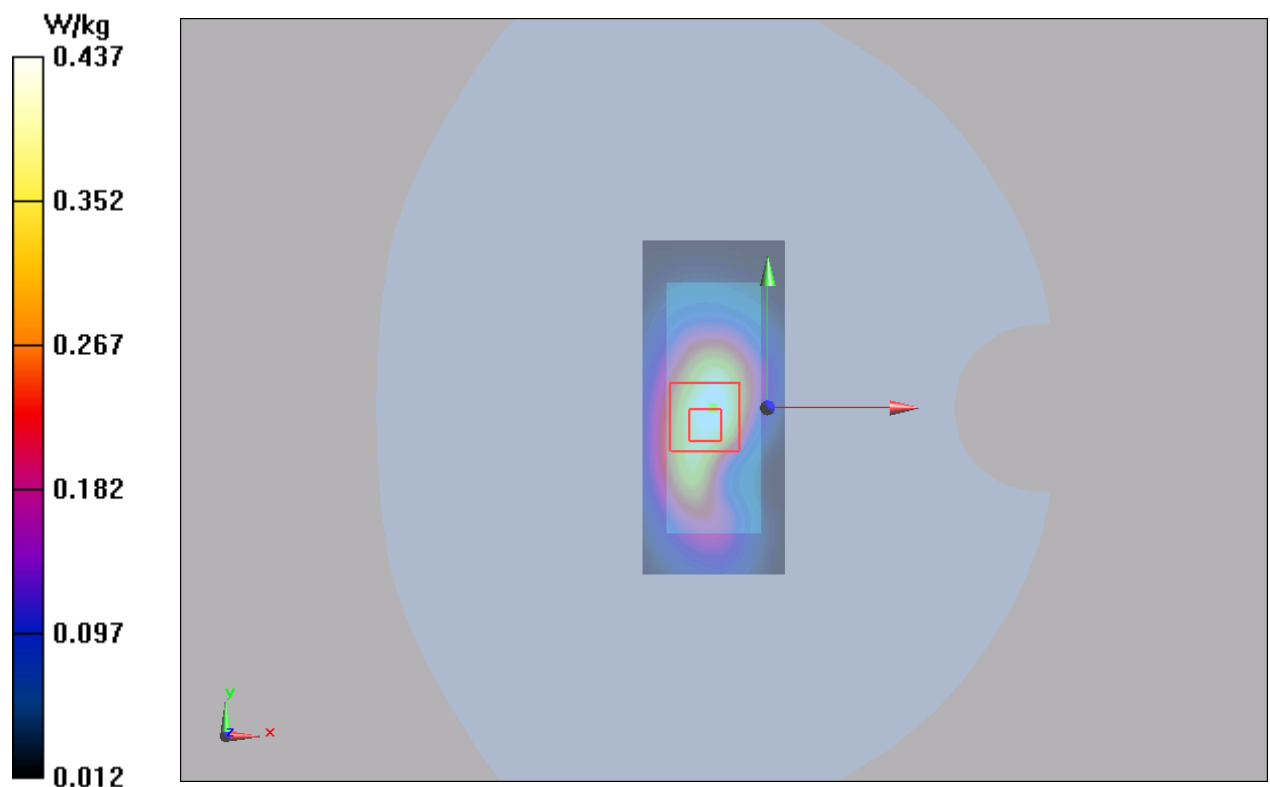


Figure 14 UMTS Band II with Test Position 1 Channel 9400

UMTS Band IV with Test Position 1 Middle

Date: 1/2/2015

Communication System: UID 0, WCDMA (0); Frequency: 1732.6 MHz; Duty Cycle: 1:1

Medium parameters used: $f = 1733$ MHz; $\sigma = 1.489$ S/m; $\epsilon_r = 52.919$; $\rho = 1000$ kg/m³

Ambient Temperature: 22.3 °C Liquid Temperature: 21.5 °C

Phantom section: Flat Section

DASY5 Configuration:

Sensor-Surface: 4mm (Mechanical Surface Detection)

Probe: EX3DV4 - SN3977; ConvF(7.69, 7.69, 7.69); Calibrated: 2/17/2014;

Electronics: DAE4 Sn1291; Calibrated: 11/14/2014

Phantom: SAM 2; Type: SAM;

Measurement SW: DASY52, Version 52.8 (7); SEMCAD X Version 14.6.10 (7164)

Test Position 1 Middle/Area Scan (31x71x1): Interpolated grid: dx=1.500 mm, dy=1.500 mm

Maximum value of SAR (interpolated) = 0.532 W/kg

Test Position 1 Middle/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 18.982 V/m; Power Drift = -0.031 dB

Peak SAR (extrapolated) = 0.720 W/kg

SAR(1 g) = 0.448 W/kg; SAR(10 g) = 0.257 W/kg

Maximum value of SAR (measured) = 0.453 W/kg

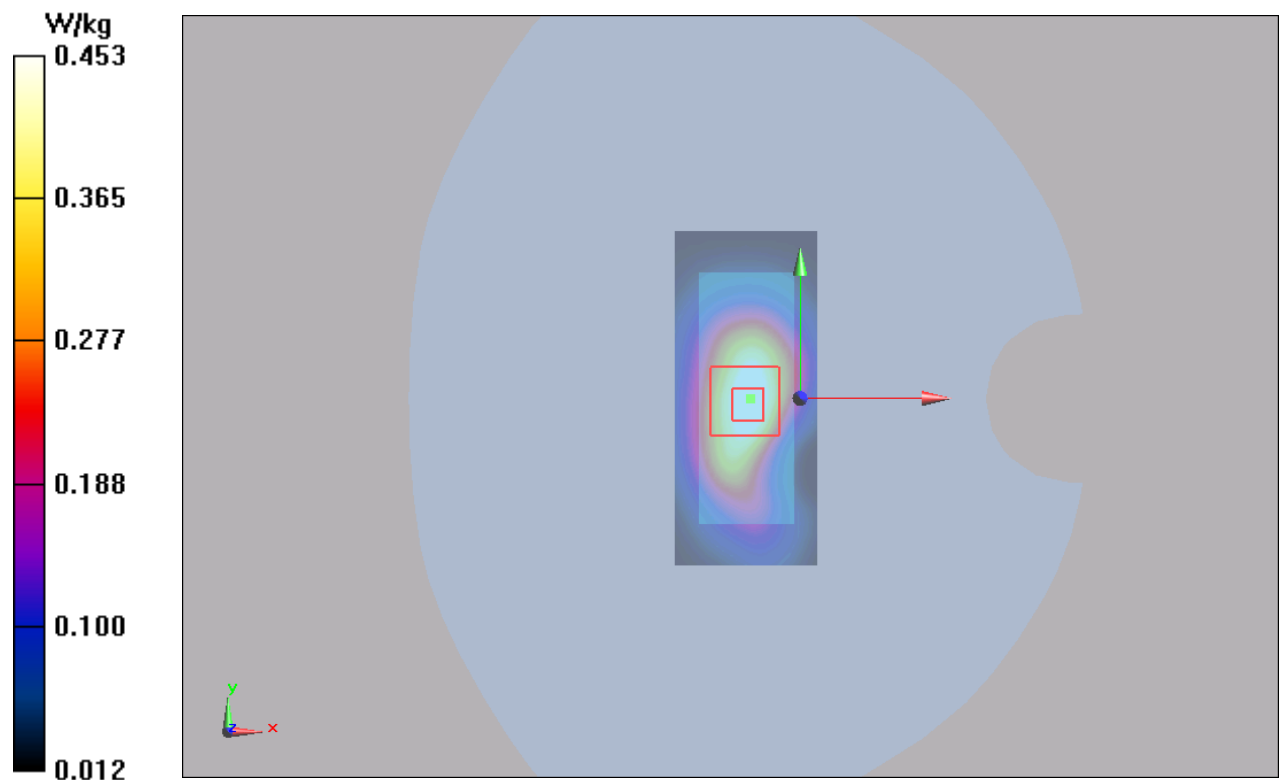


Figure 15 UMTS Band IV with Test Position 1 Channel 1413

UMTS Band V with Test Position 1 Middle

Date: 1/2/2015

Communication System: UID 0, WCDMA (0); Frequency: 836.4 MHz; Duty Cycle: 1:1

Medium parameters used (interpolated): $f = 836.4$ MHz; $\sigma = 0.992$ S/m; $\epsilon_r = 55.885$; $\rho = 1000$ kg/m³

Ambient Temperature: 22.3 °C Liquid Temperature: 21.5 °C

Phantom section: Flat Section

DASY5 Configuration:

Sensor-Surface: 4mm (Mechanical Surface Detection)

Probe: EX3DV4 - SN3977; ConvF(9.74, 9.74, 9.74); Calibrated: 2/17/2014;

Electronics: DAE4 Sn1291; Calibrated: 11/14/2014

Phantom: SAM1; Type: SAM; Serial: TP-1534

Measurement SW: DASY52, Version 52.8 (7); SEMCAD X Version 14.6.10 (7164)

Test Position 1 Middle/Area Scan (31x71x1): Interpolated grid: $dx=1.500$ mm, $dy=1.500$ mm

Maximum value of SAR (interpolated) = 0.702 W/kg

Test Position 1 Middle/Zoom Scan (5x5x7)/Cube 0: Measurement grid: $dx=8$ mm, $dy=8$ mm, $dz=5$ mm

Reference Value = 18.880 V/m; Power Drift = -0.12 dB

Peak SAR (extrapolated) = 1.04 W/kg

SAR(1 g) = 0.622 W/kg; SAR(10 g) = 0.365 W/kg

Maximum value of SAR (measured) = 0.626 W/kg

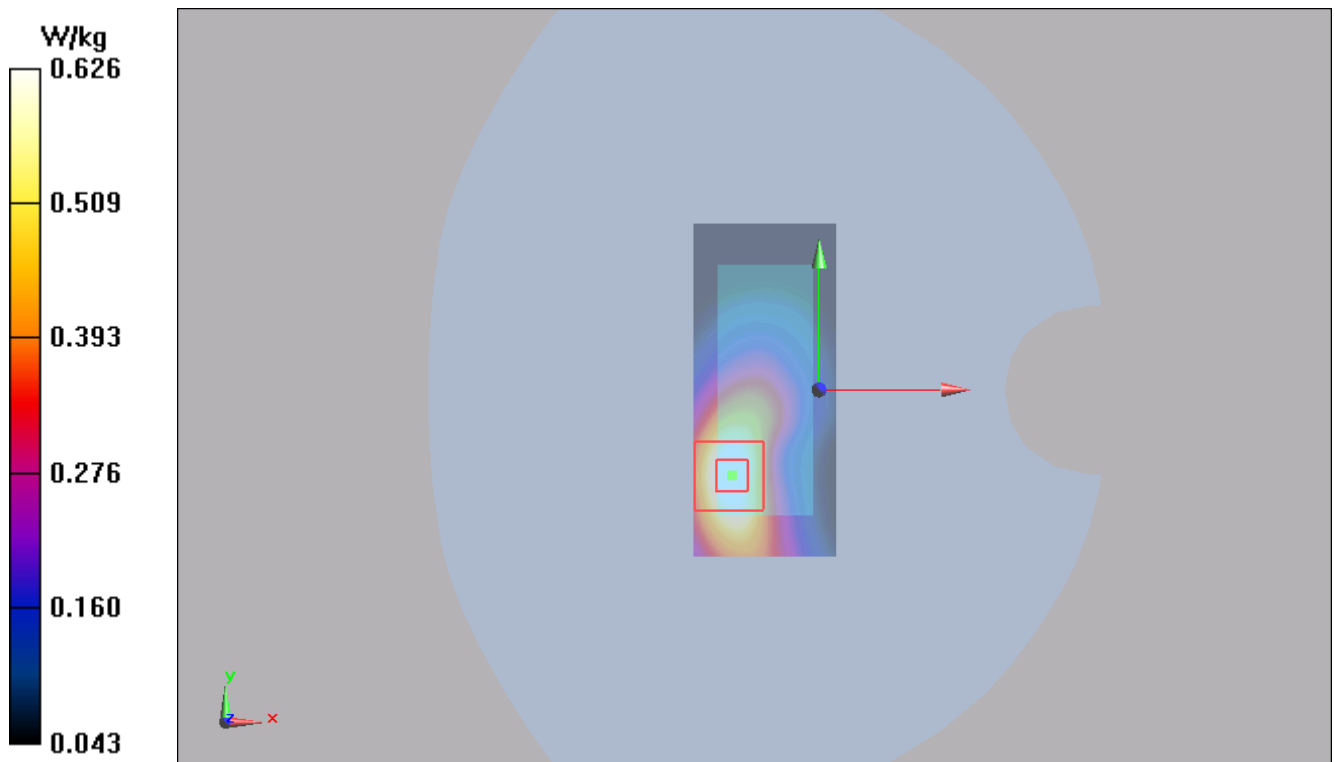


Figure 16 UMTS Band V with Test Position 1 Channel 4182

LTE Band 2 with Test Position 1 Middle (1RB)

Date: 1/1/2015

Communication System: UID 0, LTE (0); Frequency: 1880 MHz; Duty Cycle: 1:1

Medium parameters used: $f = 1880$ MHz; $\sigma = 1.504$ S/m; $\epsilon_r = 53.137$; $\rho = 1000$ kg/m³

Ambient Temperature: 22.3 °C Liquid Temperature: 21.5 °C

Phantom section: Flat Section

DASY5 Configuration:

Sensor-Surface: 4mm (Mechanical Surface Detection)

Probe: EX3DV4 - SN3977; ConvF(7.37, 7.37, 7.37); Calibrated: 2/17/2014;

Electronics: DAE4 Sn1291; Calibrated: 11/14/2014

Phantom: SAM 2; Type: SAM;

Measurement SW: DASY52, Version 52.8 (7); SEMCAD X Version 14.6.10 (7164)

Test Position 1 Middle/Area Scan (31x71x1): Interpolated grid: dx=1.500 mm, dy=1.500 mm

Maximum value of SAR (interpolated) = 1.35 W/kg

Test Position 1 Middle/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 17.809 V/m; Power Drift = 0.030 dB

Peak SAR (extrapolated) = 1.83 W/kg

SAR(1 g) = 1.09 W/kg; SAR(10 g) = 0.620 W/kg

Maximum value of SAR (measured) = 1.08 W/kg

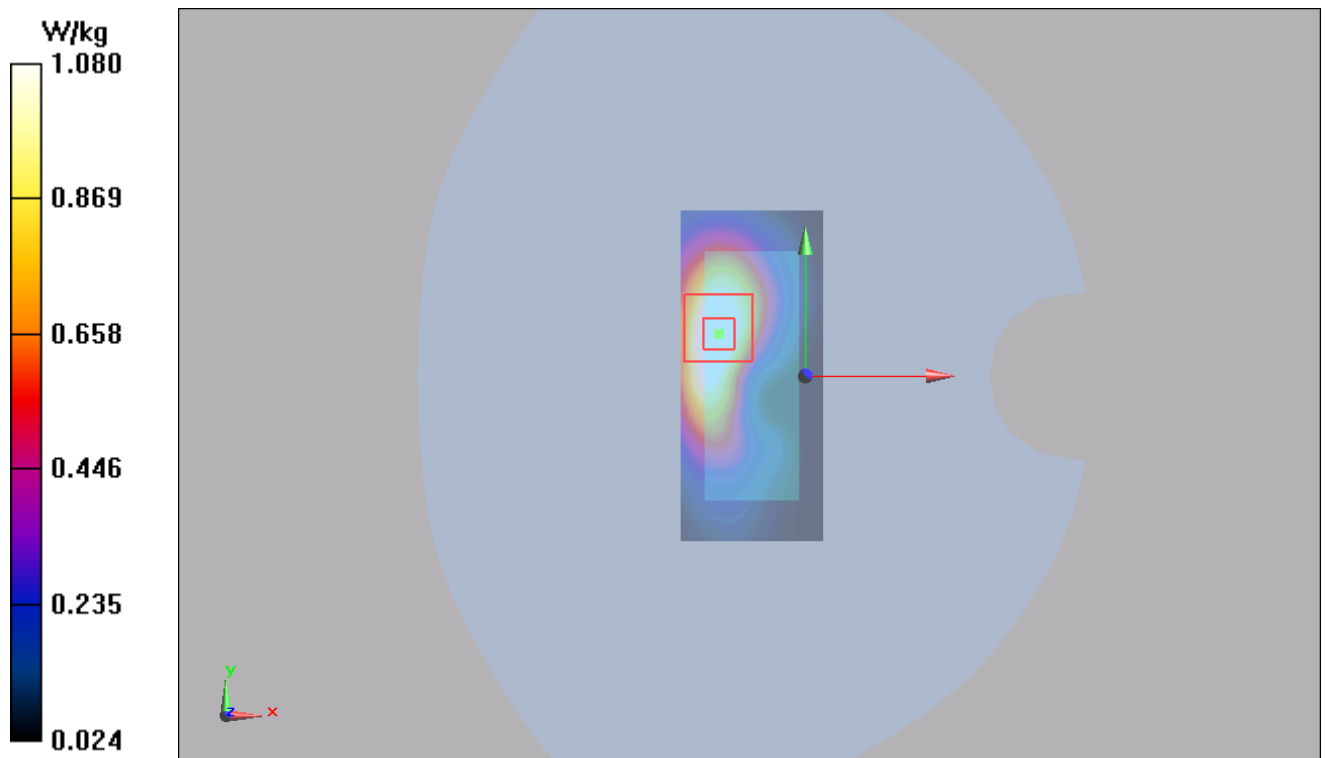


Figure 17 LTE Band 2 with Test Position 1 Channel 18900

LTE Band 4 with Test Position 1 Low (1RB)

Date: 1/2/2015

Communication System: UID 0, LTE (0); Frequency: 1720 MHz; Duty Cycle: 1:1

Medium parameters used: $f = 1720$ MHz; $\sigma = 1.477$ S/m; $\epsilon_r = 53.021$; $\rho = 1000$ kg/m³

Ambient Temperature: 22.3 °C Liquid Temperature: 21.5 °C

Phantom section: Flat Section

DASY5 Configuration:

Sensor-Surface: 4mm (Mechanical Surface Detection)

Probe: EX3DV4 - SN3977; ConvF(7.69, 7.69, 7.69); Calibrated: 2/17/2014;

Electronics: DAE4 Sn1291; Calibrated: 11/14/2014

Phantom: SAM 2; Type: SAM;

Measurement SW: DASY52, Version 52.8 (7); SEMCAD X Version 14.6.10 (7164)

Test Position 1 Low/Area Scan (41x71x1): Interpolated grid: dx=1.500 mm, dy=1.500 mm

Maximum value of SAR (interpolated) = 0.853 W/kg

Test Position 1 Low/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 20.408 V/m; Power Drift = -0.037 dB

Peak SAR (extrapolated) = 1.08 W/kg

SAR(1 g) = 0.674 W/kg; SAR(10 g) = 0.387 W/kg

Maximum value of SAR (measured) = 0.681 W/kg

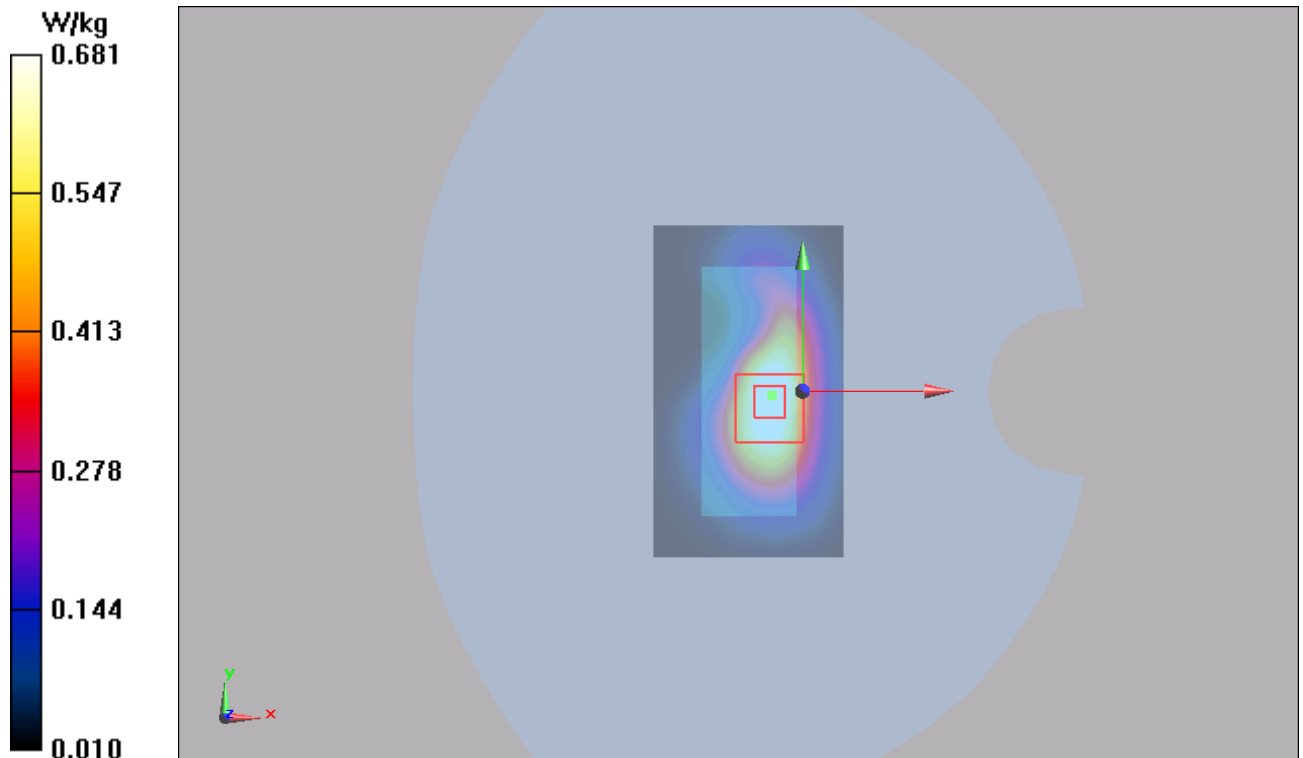


Figure 18 LTE Band 4 with Test Position 1 Channel 20050

LTE Band 4 with Test Position 1 Middle (100%RB)

Date: 1/2/2015

Communication System: UID 0, LTE (0); Frequency: 1732.5 MHz; Duty Cycle: 1:1

Medium parameters used (interpolated): $f = 1732.5$ MHz; $\sigma = 1.488$ S/m; $\epsilon_r = 52.928$; $\rho = 1000$ kg/m³

Ambient Temperature: 22.3 °C Liquid Temperature: 21.5 °C

Phantom section: Flat Section

DASY5 Configuration:

Sensor-Surface: 4mm (Mechanical Surface Detection)

Probe: EX3DV4 - SN3977; ConvF(7.69, 7.69, 7.69); Calibrated: 2/17/2014;

Electronics: DAE4 Sn1291; Calibrated: 11/14/2014

Phantom: SAM 2; Type: SAM; Measurement SW: DASY52, Version 52.8 (7); SEMCAD X Version 14.6.10 (7164)

Test Position 1 Middle/Area Scan (41x71x1): Interpolated grid: dx=1.500 mm, dy=1.500 mm

Maximum value of SAR (interpolated) = 0.798 W/kg

Test Position 1 Middle/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 20.688 V/m; Power Drift = 0.02 dB

Peak SAR (extrapolated) = 1.03 W/kg

SAR(1 g) = 0.655 W/kg; SAR(10 g) = 0.404 W/kg

Maximum value of SAR (measured) = 0.676 W/kg

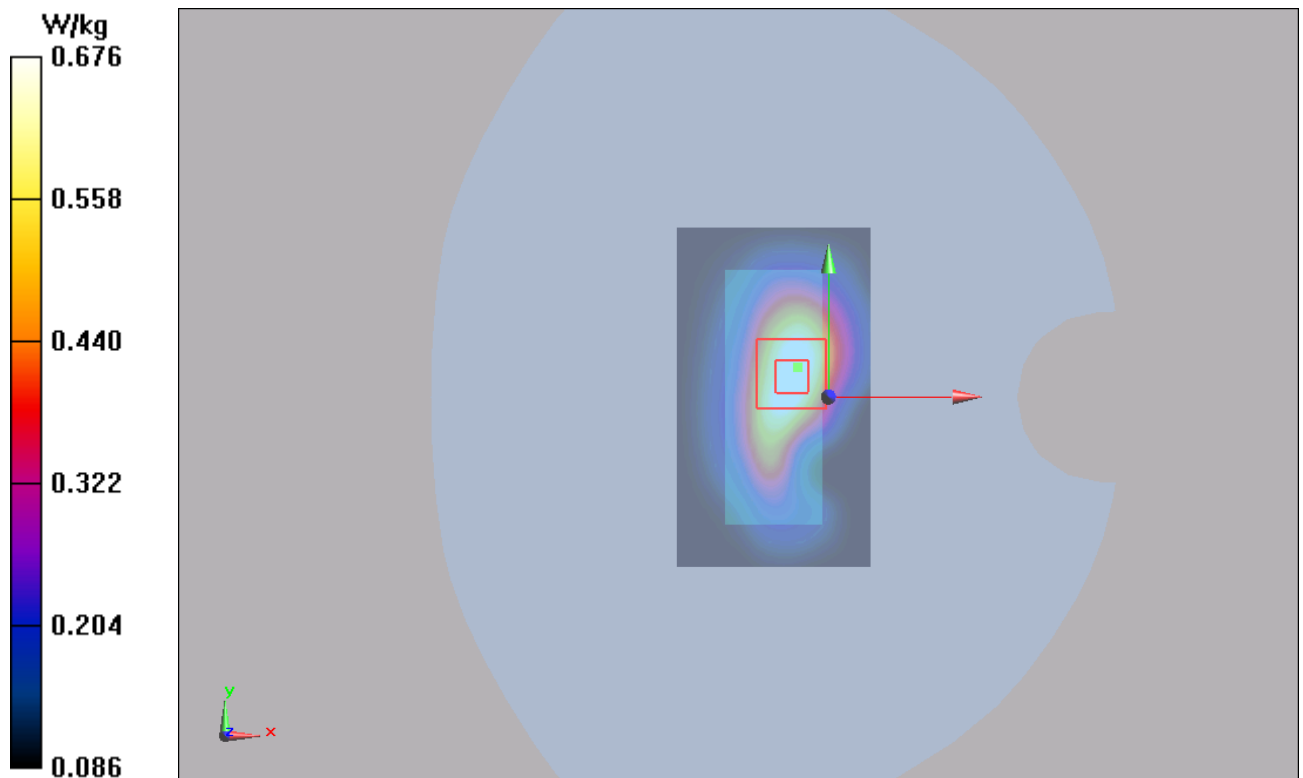


Figure 19 LTE Band 4 with Test Position 1 Channel 20175

LTE Band 5 with Test Position 1 Middle (1RB)

Date: 1/2/2015

Communication System: UID 0, LTE (0); Frequency: 836.5 MHz; Duty Cycle: 1:1

Medium parameters used (interpolated): $f = 836.5$ MHz; $\sigma = 0.992$ S/m; $\epsilon_r = 55.884$; $\rho = 1000$ kg/m³

Ambient Temperature: 22.3 °C Liquid Temperature: 21.5 °C

Phantom section: Flat Section

DASY5 Configuration:

Sensor-Surface: 4mm (Mechanical Surface Detection)

Probe: EX3DV4 - SN3977; ConvF(9.74, 9.74, 9.74); Calibrated: 2/17/2014;

Electronics: DAE4 Sn1291; Calibrated: 11/14/2014

Phantom: SAM1; Type: SAM; Serial: TP-1534

Measurement SW: DASY52, Version 52.8 (7); SEMCAD X Version 14.6.10 (7164)

Test Position 1 Middle/Area Scan (31x71x1): Interpolated grid: dx=1.500 mm, dy=1.500 mm

Maximum value of SAR (interpolated) = 0.412 W/kg

Test Position 1 Middle/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 15.787 V/m; Power Drift = -0.09 dB

Peak SAR (extrapolated) = 0.669 W/kg

SAR(1 g) = 0.387 W/kg; SAR(10 g) = 0.227 W/kg

Maximum value of SAR (measured) = 0.425 W/kg

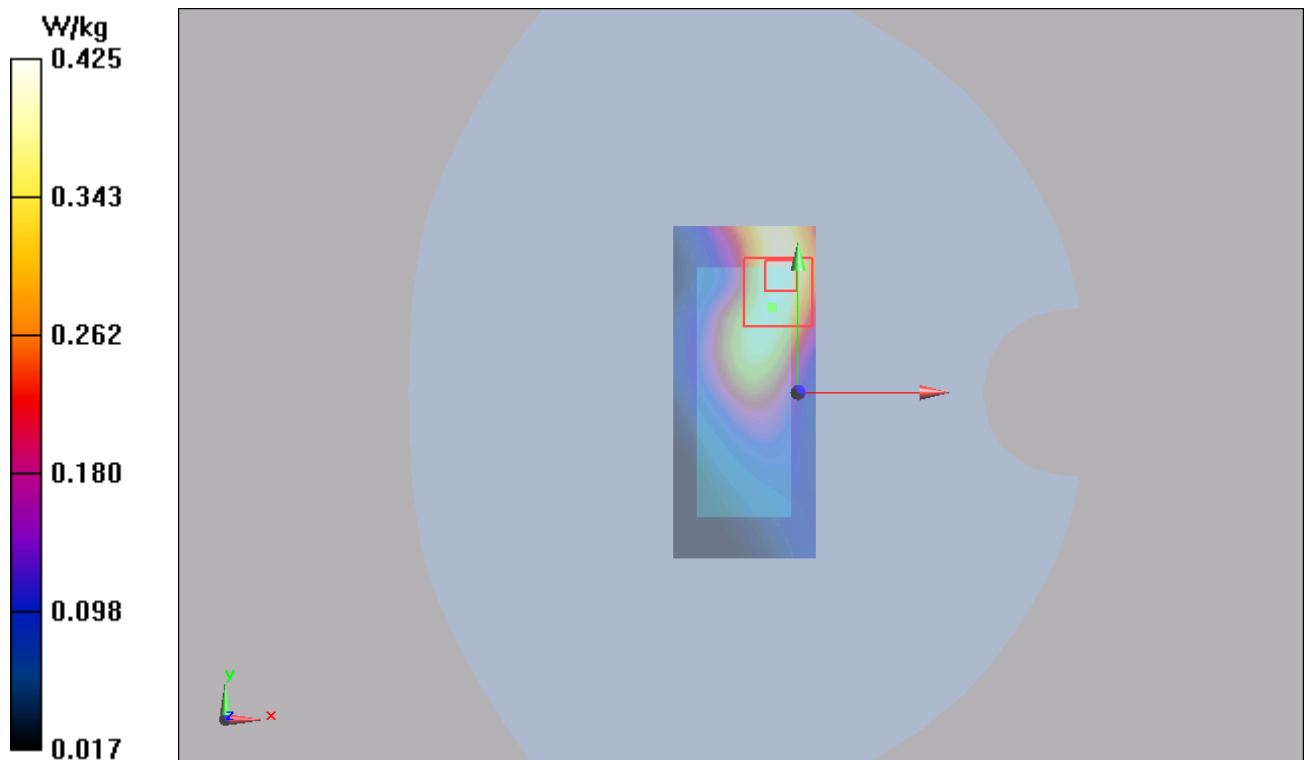


Figure 20 LTE Band 5 with Test Position 1 Channel 20525

LTE Band 5 with Test Position 1 Middle (50%RB)

Date: 1/2/2015

Communication System: UID 0, LTE (0); Frequency: 836.5 MHz; Duty Cycle: 1:1

Medium parameters used (interpolated): $f = 836.5$ MHz; $\sigma = 0.992$ S/m; $\epsilon_r = 55.884$; $\rho = 1000$ kg/m³

Ambient Temperature: 22.3 °C Liquid Temperature: 21.5 °C

Phantom section: Flat Section

DASY5 Configuration:

Sensor-Surface: 4mm (Mechanical Surface Detection)

Probe: EX3DV4 - SN3977; ConvF(9.74, 9.74, 9.74); Calibrated: 2/17/2014;

Electronics: DAE4 Sn1291; Calibrated: 11/14/2014

Phantom: SAM1; Type: SAM; Serial: TP-1534

Measurement SW: DASY52, Version 52.8 (7); SEMCAD X Version 14.6.10 (7164)

Test Position 2 Middle/Area Scan (31x71x1): Interpolated grid: dx=1.500 mm, dy=1.500 mm

Maximum value of SAR (interpolated) = 0.417 W/kg

Test Position 2 Middle/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 10.898 V/m; Power Drift = 0.033 dB

Peak SAR (extrapolated) = 0.607 W/kg

SAR(1 g) = 0.385 W/kg; SAR(10 g) = 0.233 W/kg

Maximum value of SAR (measured) = 0.397 W/kg

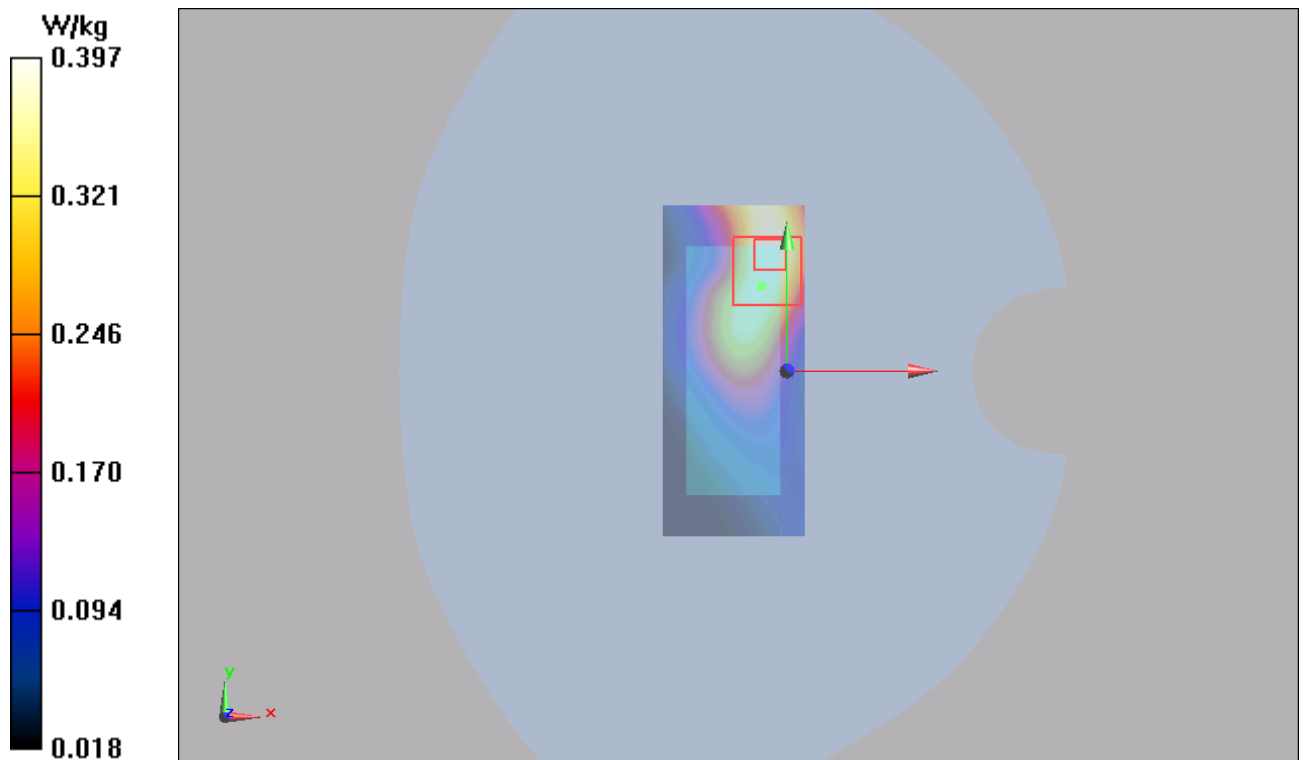


Figure 21 LTE Band 5 with Test Position 1 Channel 20525

LTE Band 7 with Test Position 1 High (1RB)

Date/Time: 1/4/2015

Communication System: UID 0, LTE (0); Frequency: 2560 MHz; Duty Cycle: 1:1

Medium parameters used: $f = 2560$ MHz; $\sigma = 2.144$ S/m; $\epsilon_r = 52.442$; $\rho = 1000$ kg/m³

Ambient Temperature: 22.3 °C Liquid Temperature: 21.5 °C

Phantom section: Flat Section

DASY5 Configuration:

Sensor-Surface: 4mm (Mechanical Surface Detection)

Probe: EX3DV4 - SN3977; ConvF(6.68, 6.68, 6.68); Calibrated: 2/17/2014;

Electronics: DAE4 Sn1291; Calibrated: 11/14/2014

Phantom: SAM 2; Type: SAM;

Measurement SW: DASY52, Version 52.8 (7); SEMCAD X Version 14.6.10 (7164)

Test Position 1 High/Area Scan (41x91x1): Interpolated grid: dx=1.200 mm, dy=1.200 mm

Maximum value of SAR (interpolated) = 0.596 W/kg

Test Position 1 High/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 15.015 V/m; Power Drift = 0.02 dB

Peak SAR (extrapolated) = 1.10 W/kg

SAR(1 g) = 0.582 W/kg; SAR(10 g) = 0.309 W/kg

Maximum value of SAR (measured) = 0.587 W/kg

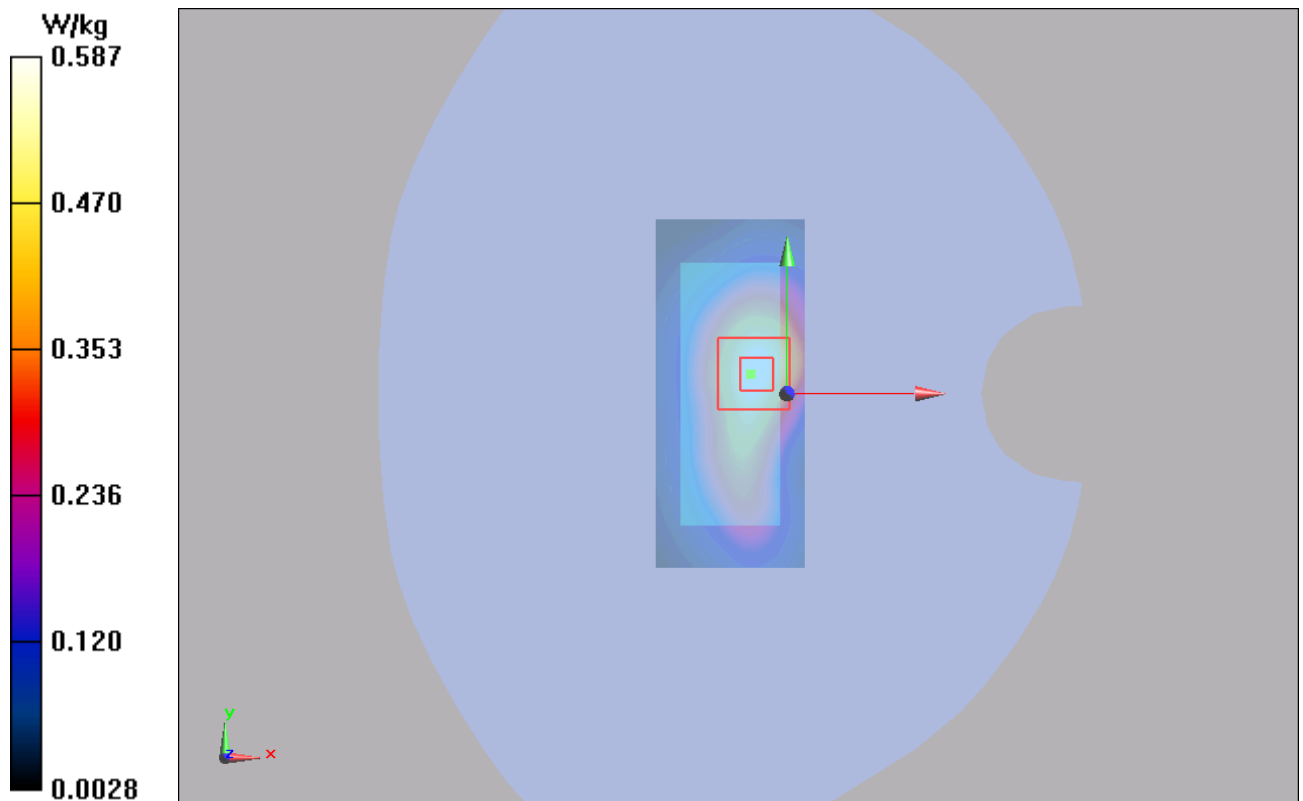


Figure 22 LTE Band 7 with Test Position 1 Channel 21350

ANNEX D: Highest Graph Results (E8372h-517)

GSM 850 GPRS (2TXslots) with Test Position 1 Middle

Date: 6/3/2015

Communication System: UID 0, GPRS 2TX (0); Frequency: 836.6 MHz; Duty Cycle: 1:4.14954

Medium parameters used: $f = 837$ MHz; $\sigma = 1.019$ S/m; $\epsilon_r = 55.015$; $\rho = 1000$ kg/m³

Ambient Temperature: 22.3 °C Liquid Temperature: 21.5 °C

Phantom section: Flat Section

DASY5 Configuration:

Sensor-Surface: 4mm (Mechanical Surface Detection)

Probe: EX3DV4 - SN3677; ConvF(9.45, 9.45, 9.45); Calibrated: 1/30/2015;

Electronics: DAE4 Sn1291; Calibrated: 11/14/2014

Phantom: SAM1; Type: SAM; Serial: TP-1534

Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

Test Position 1 Middle /Area Scan (41x81x1): Interpolated grid: dx=1.500 mm, dy=1.500 mm

Maximum value of SAR (interpolated) = 0.266 W/kg

Test Position 1 Middle /Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 14.55 V/m; Power Drift = 0.19 dB

Peak SAR (extrapolated) = 0.389 W/kg

SAR(1 g) = 0.246 W/kg; SAR(10 g) = 0.150 W/kg

Maximum value of SAR (measured) = 0.263 W/kg

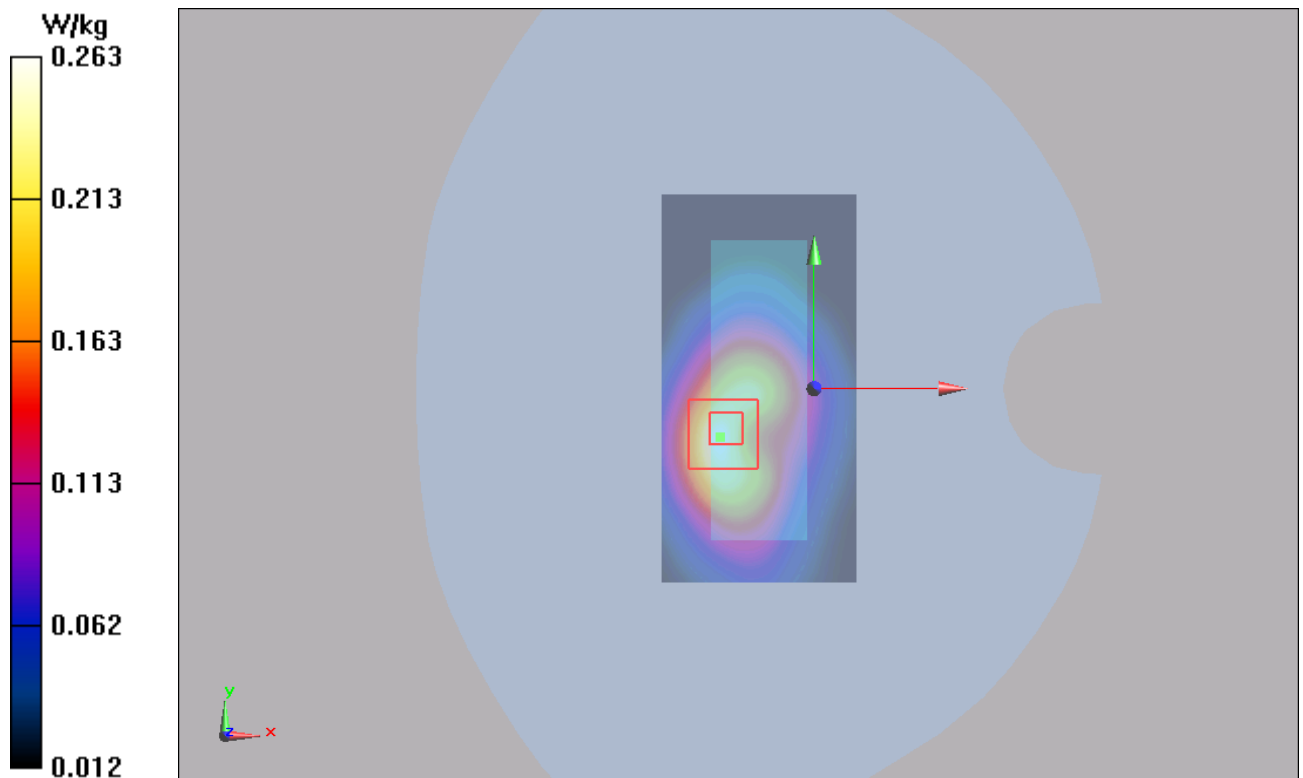


Figure 23 GSM 850 GPRS (2TXslots) with Test Position 1 Channel 190

GSM 1900 EGPRS (2TXslots) with Test Position 1 Middle

Date: 6/12/2015

Communication System: UID 0, EGPRS 2TX (0); Frequency: 1880 MHz; Duty Cycle: 1:4.14954

Medium parameters used: $f = 1880$ MHz; $\sigma = 1.5$ S/m; $\epsilon_r = 52.509$; $\rho = 1000$ kg/m³

Ambient Temperature: 22.3 °C Liquid Temperature: 21.5 °C

Phantom section: Flat Section

DASY5 Configuration:

Sensor-Surface: 4mm (Mechanical Surface Detection)

Probe: EX3DV4 - SN3677; ConvF(7.57, 7.57, 7.57); Calibrated: 1/30/2015;

Electronics: DAE4 Sn1291; Calibrated: 11/14/2014

Phantom: SAM 12; Type: SAM V4.0; Serial: TP-1246

Measurement SW: DASY5, Version 4.7 (80); SEMCAD X Version 14.6.10 (7331)

Test Position 1 Middle /Area Scan (41x81x1): Interpolated grid: dx=1.500 mm, dy=1.500 mm

Maximum value of SAR (interpolated) = 0.621 W/kg

Test Position 1 Middle /Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 13.47 V/m; Power Drift = 0.19 dB

Peak SAR (extrapolated) = 0.983 W/kg

SAR(1 g) = 0.552 W/kg; SAR(10 g) = 0.291 W/kg

Maximum value of SAR (measured) = 0.520 W/kg

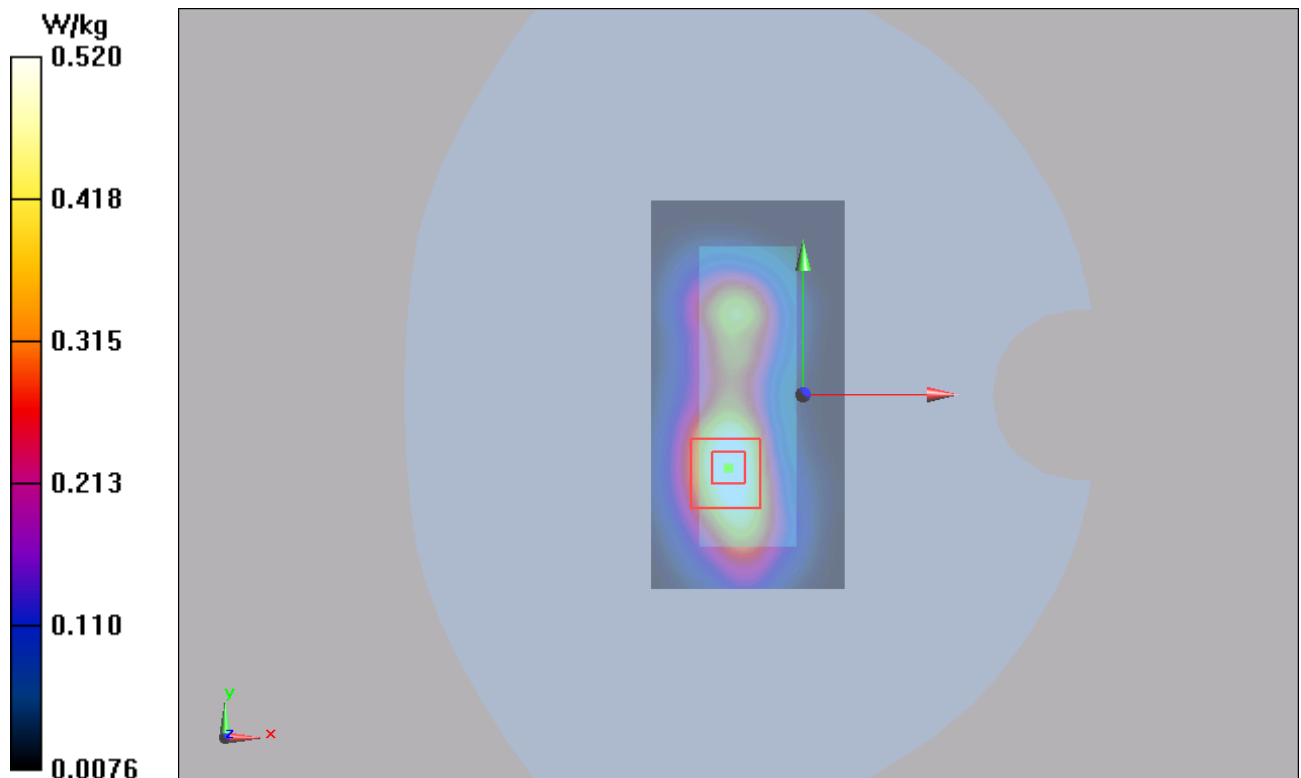


Figure 24 GSM 1900 EGPRS (2TXslots) with Test Position 1 Channel 661

UMTS Band II with Test Position 1 Middle

Date: 6/12/2015

Communication System: UID 0, WCDMA (0); Frequency: 1880 MHz; Duty Cycle: 1:1

Medium parameters used: $f = 1880$ MHz; $\sigma = 1.504$ S/m; $\epsilon_r = 53.137$; $\rho = 1000$ kg/m³

Ambient Temperature: 22.3 °C Liquid Temperature: 21.5 °C

Phantom section: Flat Section

DASY5 Configuration:

Sensor-Surface: 4mm (Mechanical Surface Detection)

Probe: EX3DV4 - SN3677; ConvF(7.57, 7.57, 7.57); Calibrated: 1/30/2015;

Electronics: DAE4 Sn1291; Calibrated: 11/14/2014

Phantom: SAM 12; Type: SAM V4.0; Serial: TP-1246

Measurement SW: DASY5, Version 4.7 (80); SEMCAD X Version 14.6.10 (7331)

Test Position 1 Middle /Area Scan (41x81x1): Interpolated grid: dx=1.500 mm, dy=1.500 mm

Maximum value of SAR (interpolated) = 0.547 W/kg

Test Position 1 Middle /Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 18.13 V/m; Power Drift = -0.06 dB

Peak SAR (extrapolated) = 0.747 W/kg

SAR(1 g) = 0.470 W/kg; SAR(10 g) = 0.287 W/kg

Maximum value of SAR (measured) = 0.483 W/kg

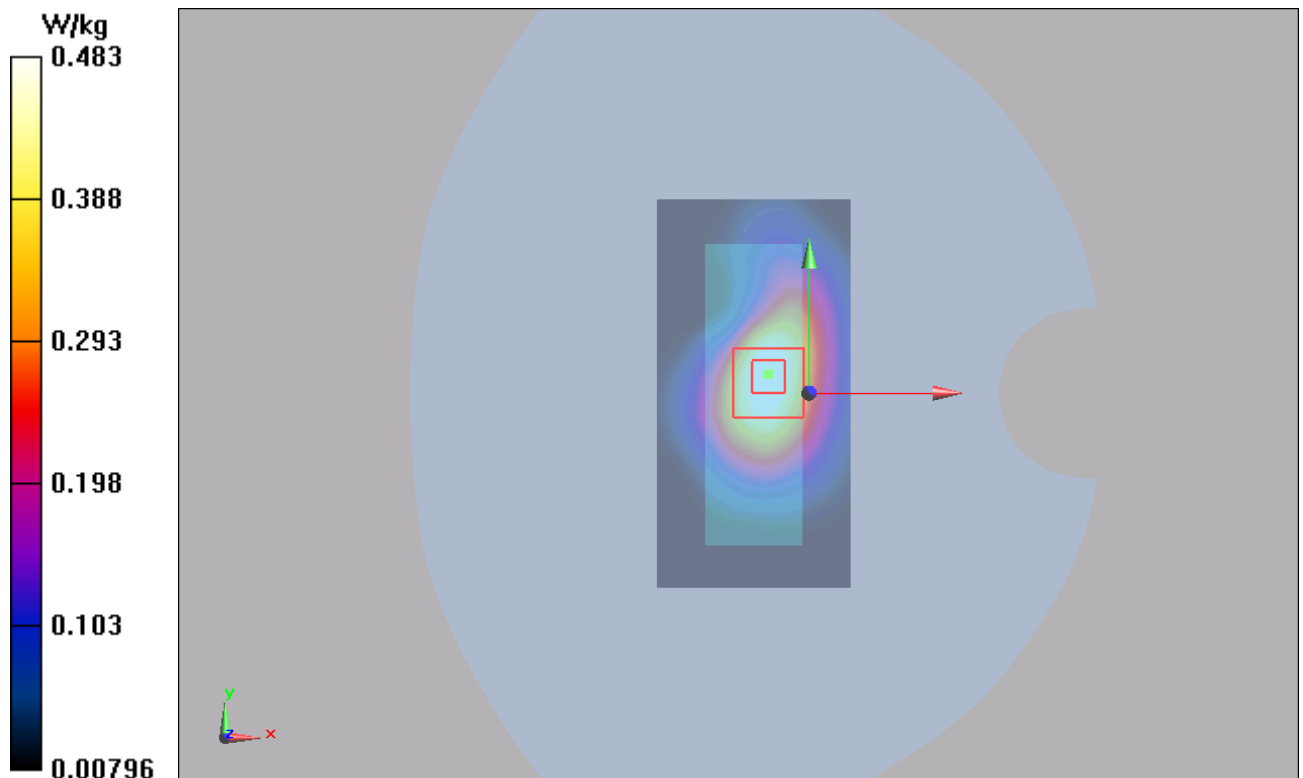


Figure 25 UMTS Band II with Test Position 1 Channel 9400

UMTS Band IV with Test Position 1 Middle

Date: 6/13/2015

Communication System: UID 0, WCDMA (0); Frequency: 1732.6 MHz; Duty Cycle: 1:1

Medium parameters used: $f = 1733$ MHz; $\sigma = 1.489$ S/m; $\epsilon_r = 52.919$; $\rho = 1000$ kg/m³

Ambient Temperature: 22.3 °C Liquid Temperature: 21.5 °C

Phantom section: Flat Section

DASY5 Configuration:

Sensor-Surface: 4mm (Mechanical Surface Detection)

Probe: EX3DV4 - SN3677; ConvF(7.74, 7.74, 7.74); Calibrated: 1/30/2015;

Electronics: DAE4 Sn1291; Calibrated: 11/14/2014

Phantom: SAM 12; Type: SAM V4.0; Serial: TP-1246

Measurement SW: DASY5, Version 4.7 (80); SEMCAD X Version 14.6.10 (7331)

Test Position 1 Middle /Area Scan (41x81x1): Interpolated grid: dx=1.500 mm, dy=1.500 mm

Maximum value of SAR (interpolated) = 0.530 W/kg

Test Position 1 Middle /Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 17.93 V/m; Power Drift = -0.06 dB

Peak SAR (extrapolated) = 0.721 W/kg

SAR(1 g) = 0.467 W/kg; SAR(10 g) = 0.278 W/kg

Maximum value of SAR (measured) = 0.468 W/kg

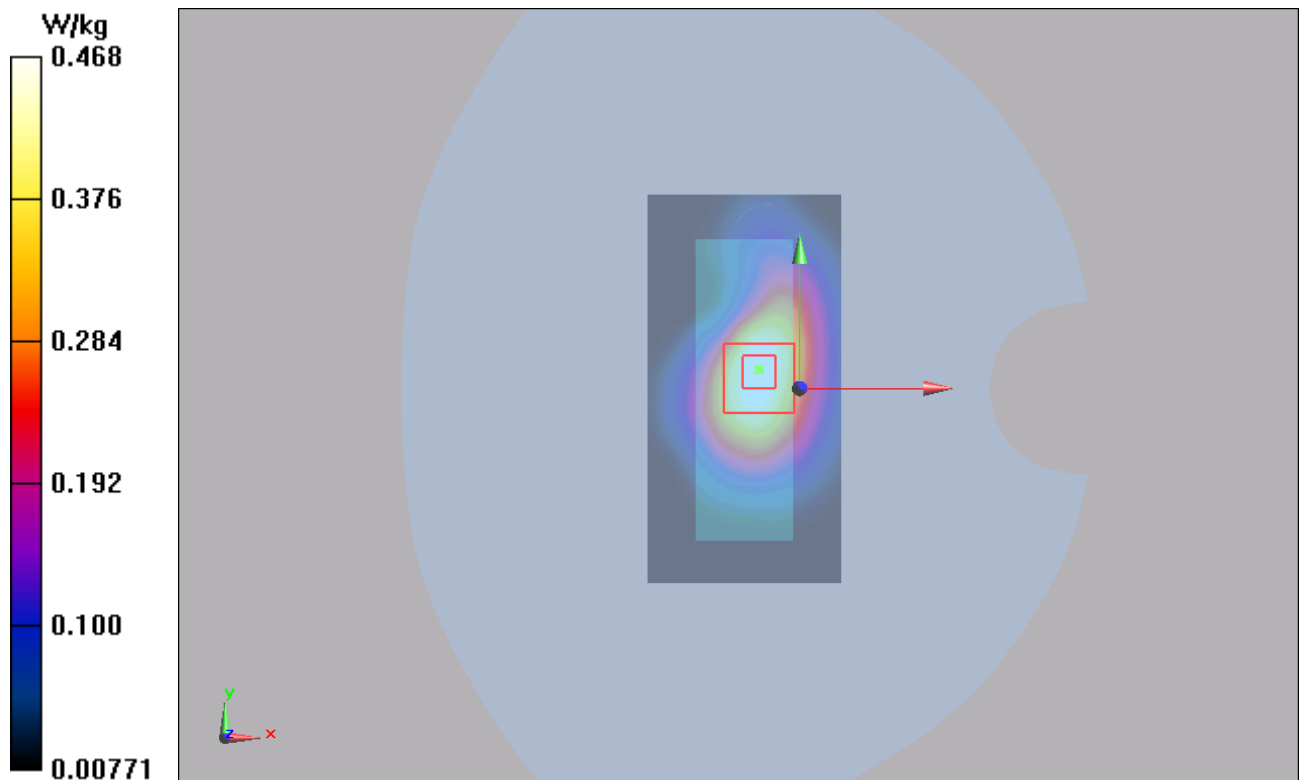


Figure 26 UMTS Band IV with Test Position 1 Channel 1413

UMTS Band V with Test Position 1 Middle

Date: 6/10/2015

Communication System: UID 0, WCDMA (0); Frequency: 836.4 MHz; Duty Cycle: 1:1

Medium parameters used: $f = 837$ MHz; $\sigma = 1.019$ S/m; $\epsilon_r = 55.015$; $\rho = 1000$ kg/m³

Ambient Temperature: 22.3 °C Liquid Temperature: 21.5 °C

Phantom section: Flat Section

DASY5 Configuration:

Sensor-Surface: 4mm (Mechanical Surface Detection)

Probe: EX3DV4 - SN3677; ConvF(9.45, 9.45, 9.45); Calibrated: 1/30/2015;

Electronics: DAE4 Sn1291; Calibrated: 11/14/2014

Phantom: SAM 11; Type: SAM V4.0; Serial: TP-1246

Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

Test Position 1 Middle /Area Scan (41x81x1): Interpolated grid: dx=1.500 mm, dy=1.500 mm

Maximum value of SAR (interpolated) = 0.447 W/kg

Test Position 1 Middle /Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 17.20 V/m; Power Drift = 0.17 dB

Peak SAR (extrapolated) = 0.612 W/kg

SAR(1 g) = 0.396 W/kg; SAR(10 g) = 0.246 W/kg

Maximum value of SAR (measured) = 0.416 W/kg

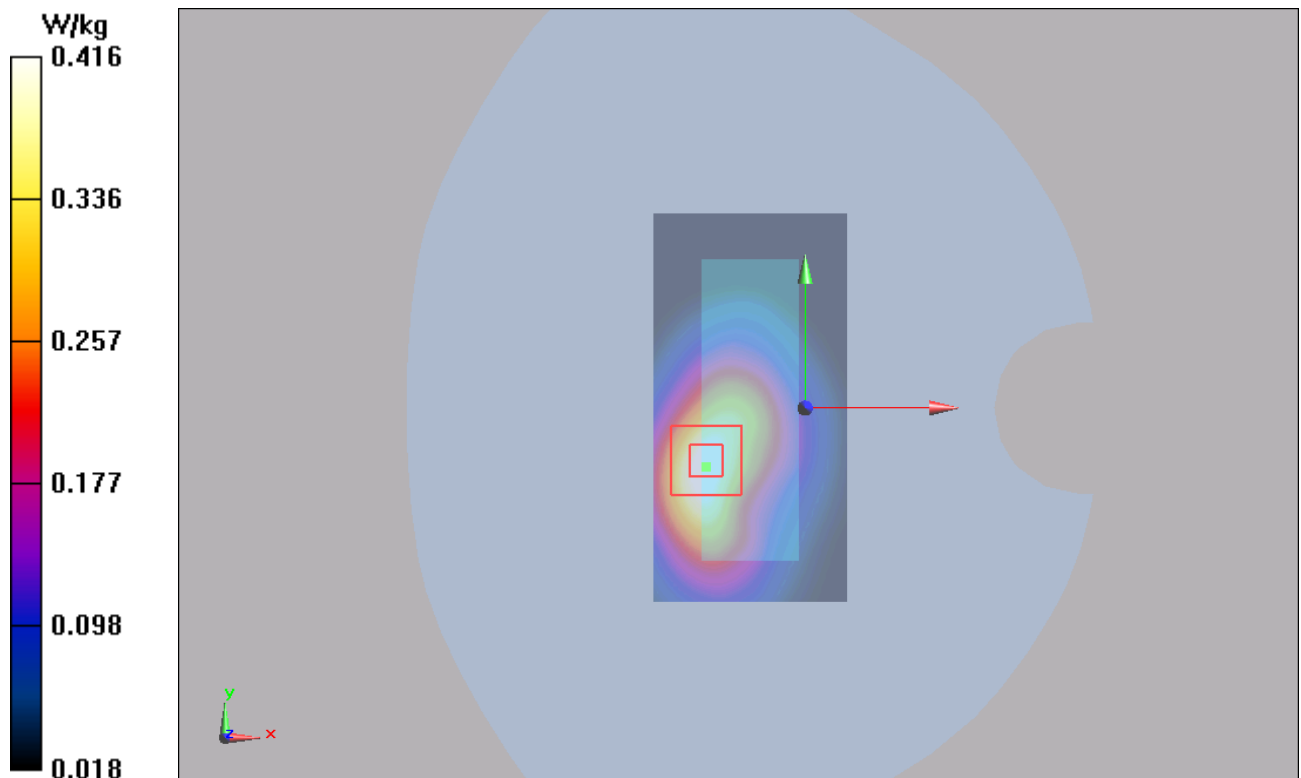


Figure 27 UMTS Band V with Test Position 1 Channel 4182

LTE Band 2 with Test Position 1 Middle (1RB)

Date: 6/12/2015

Communication System: UID 0, LTE (0); Frequency: 1880 MHz; Duty Cycle: 1:1

Medium parameters used: $f = 1880$ MHz; $\sigma = 1.504$ S/m; $\epsilon_r = 53.137$; $\rho = 1000$ kg/m³

Ambient Temperature: 22.3 °C Liquid Temperature: 21.5 °C

Phantom section: Flat Section

DASY5 Configuration:

Sensor-Surface: 4mm (Mechanical Surface Detection)

Probe: EX3DV4 - SN3677; ConvF(7.57, 7.57, 7.57); Calibrated: 1/30/2015;

Electronics: DAE4 Sn1291; Calibrated: 11/14/2014

Phantom: SAM 2; Type: SAM;

Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

Test Position 1 Middle/Area Scan (31x71x1): Interpolated grid: dx=1.500 mm, dy=1.500 mm

Maximum value of SAR (interpolated) = 1.18 W/kg

Test Position 1 Middle/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 25.00 V/m; Power Drift = 0.14 dB

Peak SAR (extrapolated) = 1.57 W/kg

SAR(1 g) = 0.978 W/kg; SAR(10 g) = 0.579 W/kg

Maximum value of SAR (measured) = 0.948 W/kg

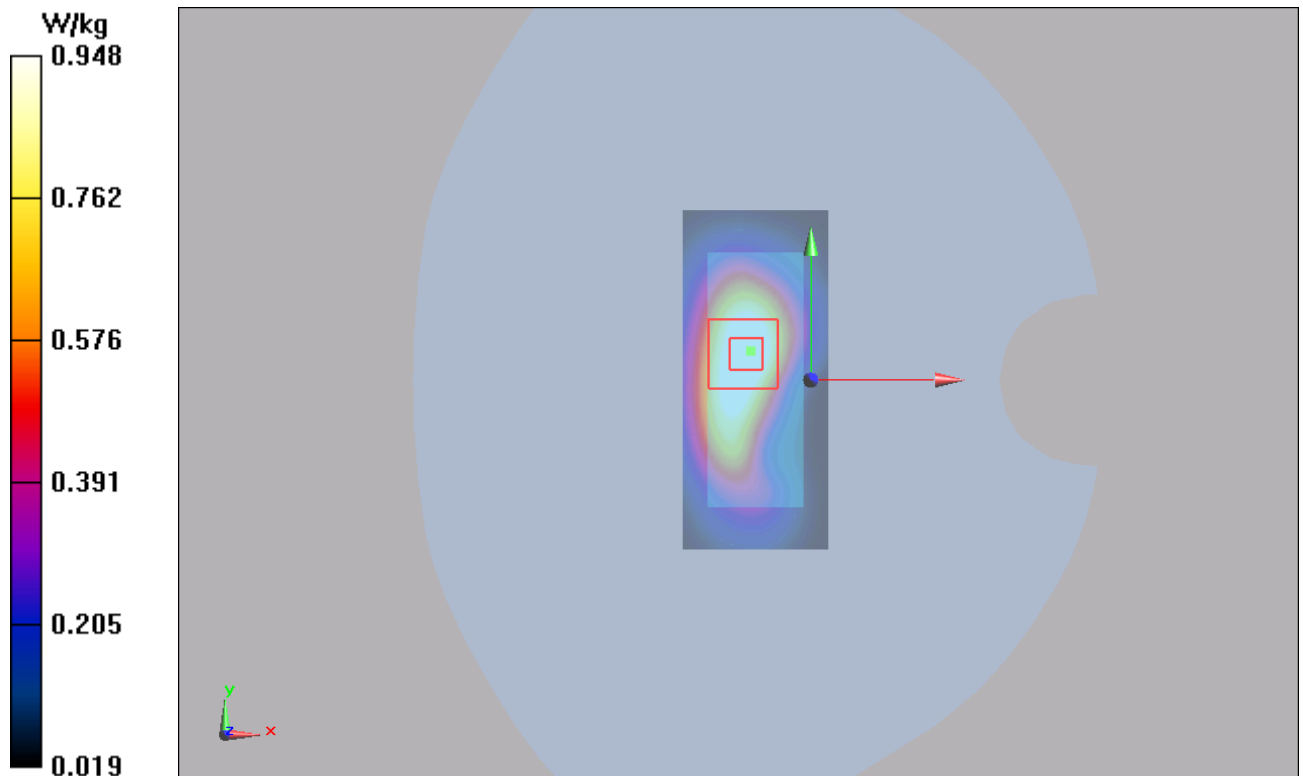


Figure 28 LTE Band 2 with Test Position 1 Channel 18900

LTE Band 4 with Test Position 1 Low (100%RB)

Date: 6/13/2015

Communication System: UID 0, LTE (0); Frequency: 1732.5 MHz; Duty Cycle: 1:1

Medium parameters used (interpolated): $f = 1732.5$ MHz; $\sigma = 1.488$ S/m; $\epsilon_r = 52.928$; $\rho = 1000$ kg/m³

Ambient Temperature: 22.3 °C Liquid Temperature: 21.5 °C

Phantom section: Flat Section

DASY5 Configuration:

Sensor-Surface: 4mm (Mechanical Surface Detection)

Probe: EX3DV4 - SN3677; ConvF(7.74, 7.74, 7.74); Calibrated: 1/30/2015;

Electronics: DAE4 Sn1291; Calibrated: 11/14/2014

Phantom: SAM 2; Type: SAM;

Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

Test Position 1 Low /Area Scan (41x81x1): Interpolated grid: dx=1.500 mm, dy=1.500 mm

Maximum value of SAR (interpolated) = 0.857 W/kg

Test Position 1 Low /Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 22.71 V/m; Power Drift = -0.04 dB

Peak SAR (extrapolated) = 1.16 W/kg

SAR(1 g) = 0.748 W/kg; SAR(10 g) = 0.447 W/kg

Maximum value of SAR (measured) = 0.752 W/kg

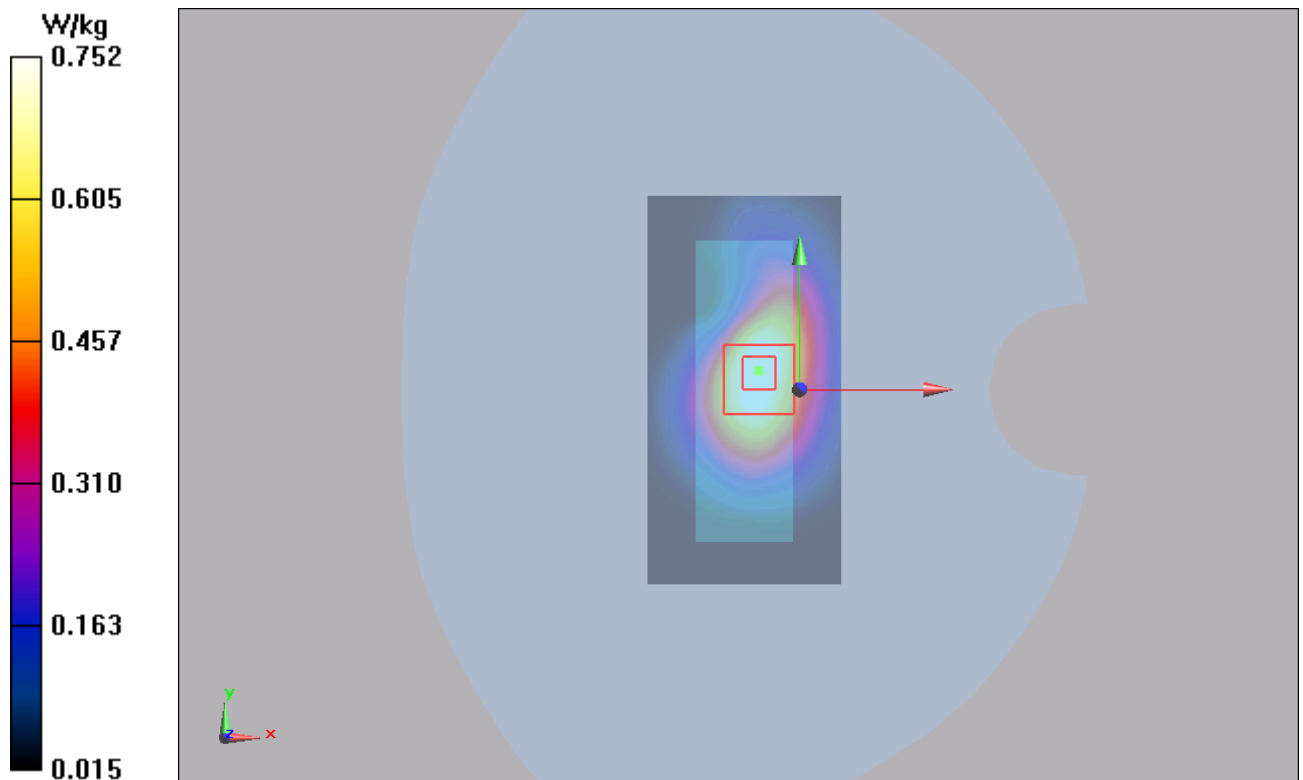


Figure 29 LTE Band 4 with Test Position 1 Channel 20050

LTE Band 5 with Test Position 1 Middle (50%RB)

Date: 6/10/2015

Communication System: UID 0, LTE (0); Frequency: 836.5 MHz; Duty Cycle: 1:1

Medium parameters used (interpolated): $f = 836.5$ MHz; $\sigma = 1.019$ S/m; $\epsilon_r = 55.025$; $\rho = 1000$ kg/m³

Ambient Temperature: 22.3 °C Liquid Temperature: 21.5 °C

Phantom section: Flat Section

DASY5 Configuration:

Sensor-Surface: 4mm (Mechanical Surface Detection)

Probe: EX3DV4 - SN3677; ConvF(9.45, 9.45, 9.45); Calibrated: 1/30/2015;

Electronics: DAE4 Sn1291; Calibrated: 11/14/2014

Phantom: SAM1; Type: SAM; Serial: TP-1534

Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

Test Position 1 Middle/Area Scan (41x81x1): Interpolated grid: dx=1.500 mm, dy=1.500 mm

Maximum value of SAR (interpolated) = 0.416 W/kg

Test Position 1 Middle/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 19.13 V/m; Power Drift = 0.03 dB

Peak SAR (extrapolated) = 0.618 W/kg

SAR(1 g) = 0.395 W/kg; SAR(10 g) = 0.240 W/kg

Maximum value of SAR (measured) = 0.406 W/kg

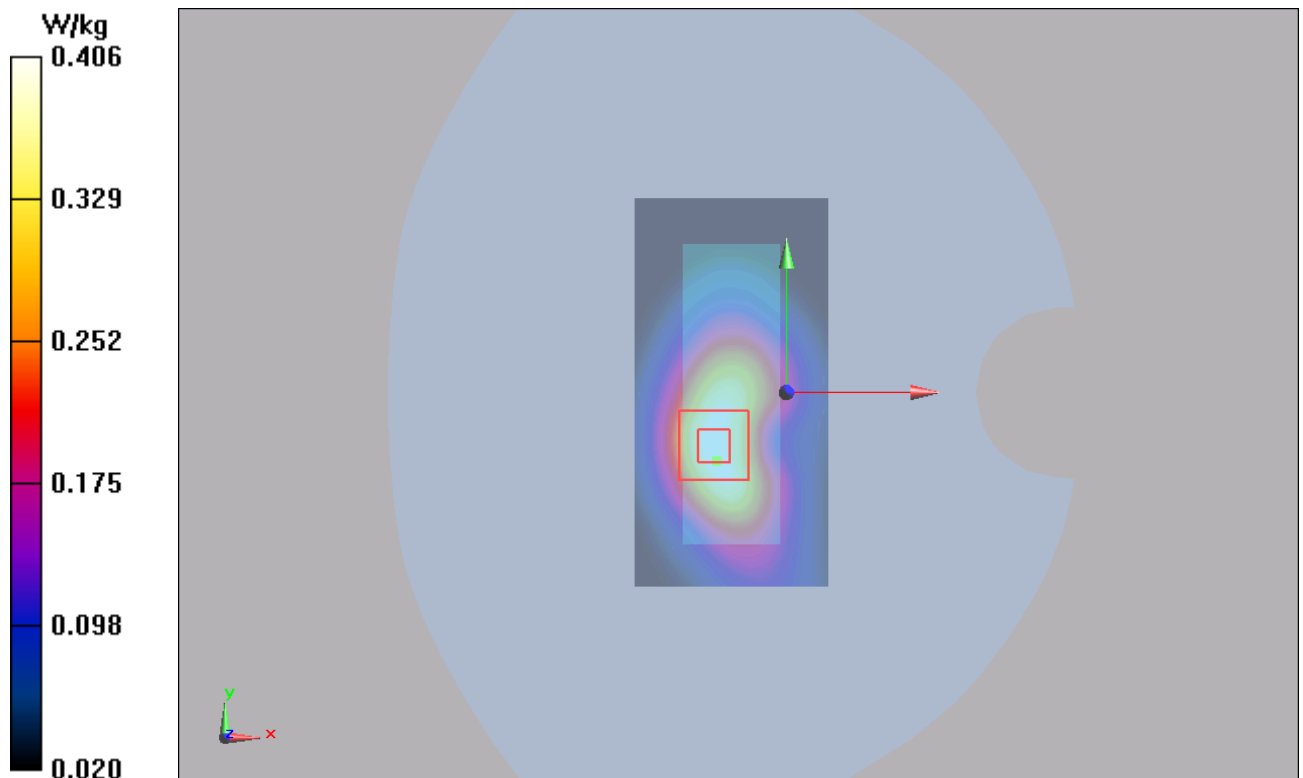


Figure 30 LTE Band 5 with Test Position 1 Channel 20525

LTE Band 7 with Test Position 1 High (1RB)

Date: 6/8/2015

Communication System: UID 0, LTE (0); Frequency: 2560 MHz; Duty Cycle: 1:1

Medium parameters used: $f = 2560$ MHz; $\sigma = 2.151$ S/m; $\epsilon_r = 52.442$; $\rho = 1000$ kg/m³

Ambient Temperature: 22.3 °C Liquid Temperature: 21.5 °C

Phantom section: Flat Section

DASY5 Configuration:

Sensor-Surface: 4mm (Mechanical Surface Detection)

Probe: EX3DV4 - SN3677; ConvF(7.29, 7.29, 7.29); Calibrated: 1/30/2015;

Electronics: DAE4 Sn1291; Calibrated: 11/14/2014

Phantom: SAM 2; Type: SAM;

Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

Test Position 1 High /Area Scan (51x101x1): Interpolated grid: dx=1.200 mm, dy=1.200 mm

Maximum value of SAR (interpolated) = 0.746 W/kg

Test Position 1 High /Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 15.23 V/m; Power Drift = 0.19 dB

Peak SAR (extrapolated) = 1.37 W/kg

SAR(1 g) = 0.654 W/kg; SAR(10 g) = 0.341 W/kg

Maximum value of SAR (measured) = 0.727 W/kg

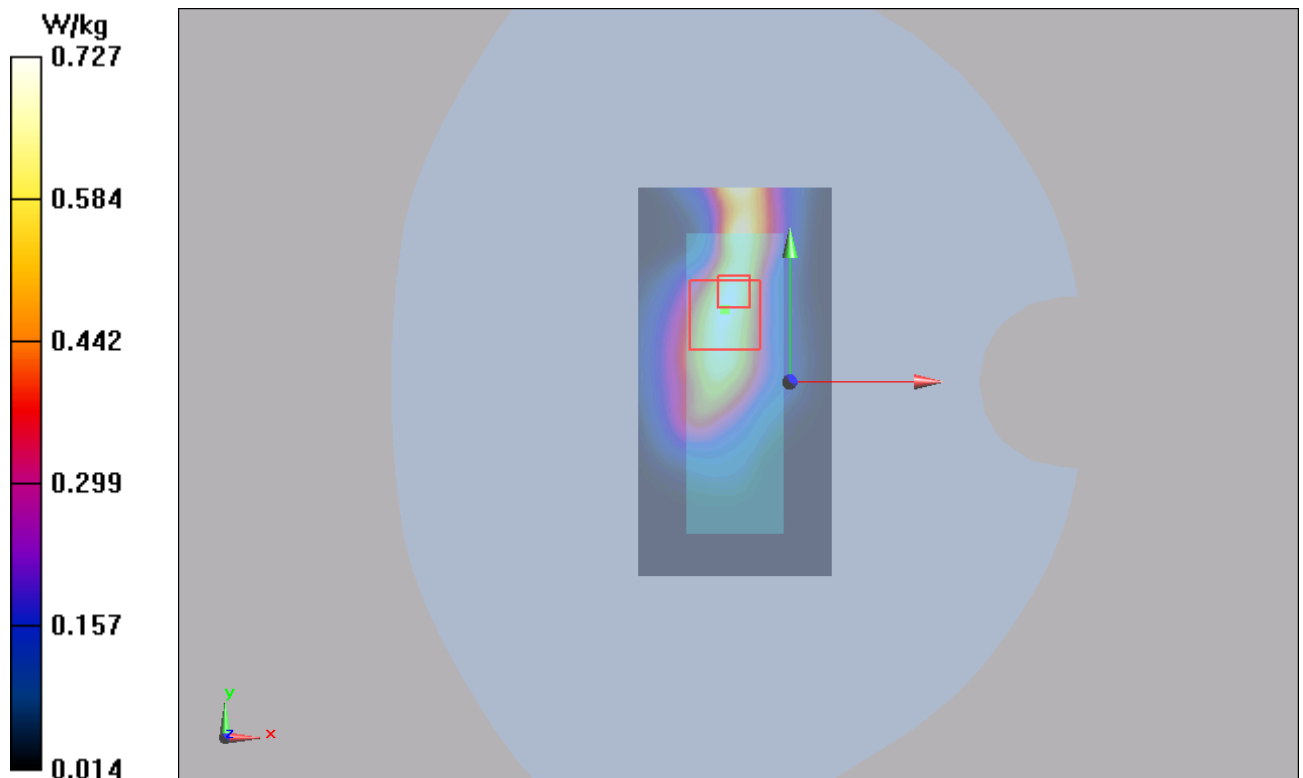


Figure 31 LTE Band 7 with Test Position 1 Channel 21350

LTE Band 12 with Test Position 1 High (1RB)

Date: 6/11/2015

Communication System: UID 0, LTE (0); Frequency: 711 MHz; Duty Cycle: 1:1

Medium parameters used: $f = 711 \text{ MHz}$; $\sigma = 0.932 \text{ S/m}$; $\epsilon_r = 54.73$; $\rho = 1000 \text{ kg/m}^3$

Ambient Temperature: 22.3°C Liquid Temperature: 21.5°C

Phantom section: Flat Section

DASY5 Configuration:

Sensor-Surface: 4mm (Mechanical Surface Detection)

Probe: EX3DV4 - SN3677; ConvF(9.53, 9.53, 9.53); Calibrated: 1/30/2015;

Electronics: DAE4 Sn1291; Calibrated: 11/14/2014

Phantom: SAM1; Type: SAM; Serial: TP-1534

Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

Test Position 1 High/Area Scan (41x81x1): Interpolated grid: $dx=1.500 \text{ mm}$, $dy=1.500 \text{ mm}$

Maximum value of SAR (interpolated) = 0.495 W/kg

Test Position 1 High/Zoom Scan (5x5x7)/Cube 0: Measurement grid: $dx=8\text{mm}$, $dy=8\text{mm}$, $dz=5\text{mm}$

Reference Value = 20.87 V/m ; Power Drift = 0.14 dB

Peak SAR (extrapolated) = 0.762 W/kg

SAR(1 g) = 0.490 W/kg ; SAR(10 g) = 0.303 W/kg

Maximum value of SAR (measured) = 0.507 W/kg

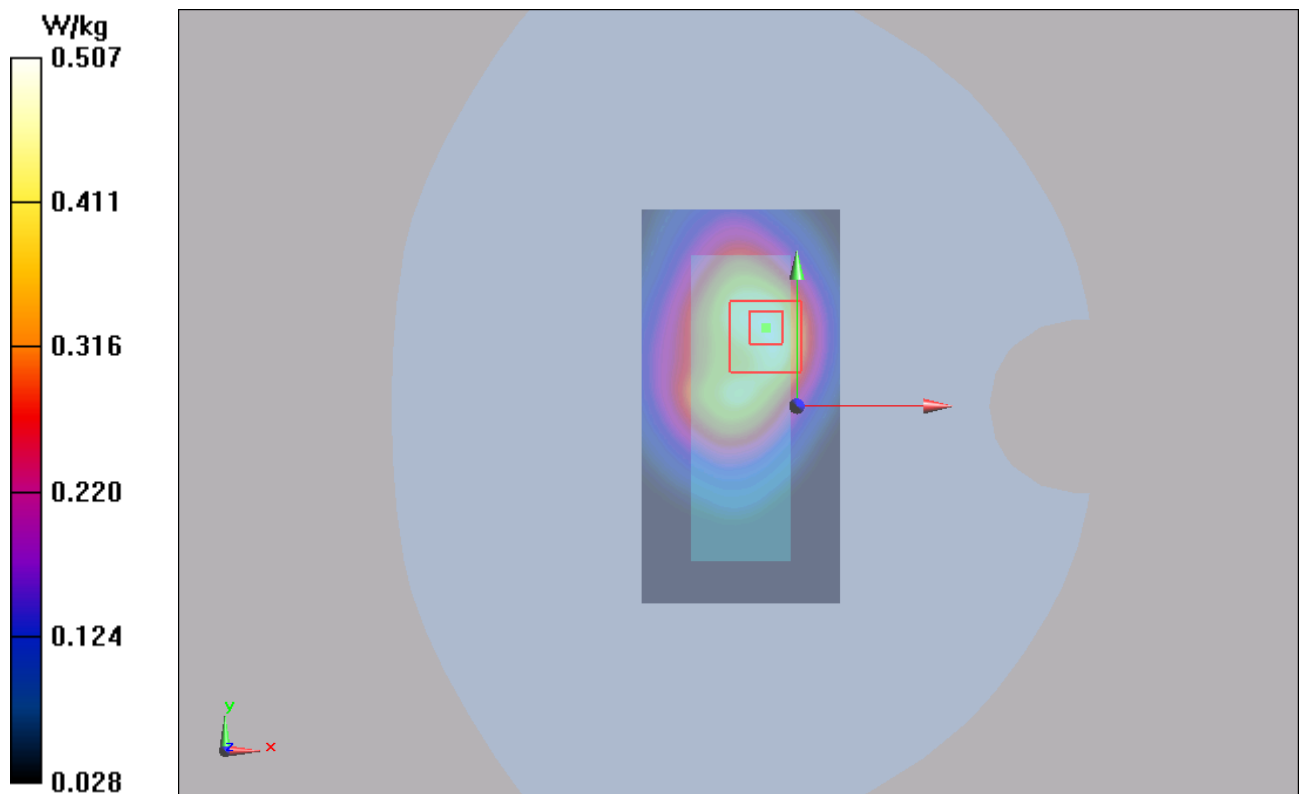


Figure 32 LTE Band 12 with Test Position 1 Channel 23130

LTE Band 17 with Test Position 1 High (50%RB)

Date: 6/11/2015

Communication System: UID 0, LTE (0); Frequency: 711 MHz; Duty Cycle: 1:1

Medium parameters used: $f = 711 \text{ MHz}$; $\sigma = 0.932 \text{ S/m}$; $\epsilon_r = 54.73$; $\rho = 1000 \text{ kg/m}^3$

Ambient Temperature: 22.3°C Liquid Temperature: 21.5°C

Phantom section: Flat Section

DASY5 Configuration:

Sensor-Surface: 4mm (Mechanical Surface Detection)

Probe: EX3DV4 - SN3677; ConvF(9.53, 9.53, 9.53); Calibrated: 1/30/2015;

Electronics: DAE4 Sn1291; Calibrated: 11/14/2014

Phantom: SAM1; Type: SAM; Serial: TP-1534

Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

Test Position 1 High /Area Scan (41x81x1): Interpolated grid: $dx=1.500 \text{ mm}$, $dy=1.500 \text{ mm}$

Maximum value of SAR (interpolated) = 0.502 W/kg

Test Position 1 High /Zoom Scan (5x5x7)/Cube 0: Measurement grid: $dx=8\text{mm}$, $dy=8\text{mm}$, $dz=5\text{mm}$

Reference Value = 18.50 V/m ; Power Drift = 0.023 dB

Peak SAR (extrapolated) = 0.716 W/kg

SAR(1 g) = 0.459 W/kg ; SAR(10 g) = 0.281 W/kg

Maximum value of SAR (measured) = 0.493 W/kg

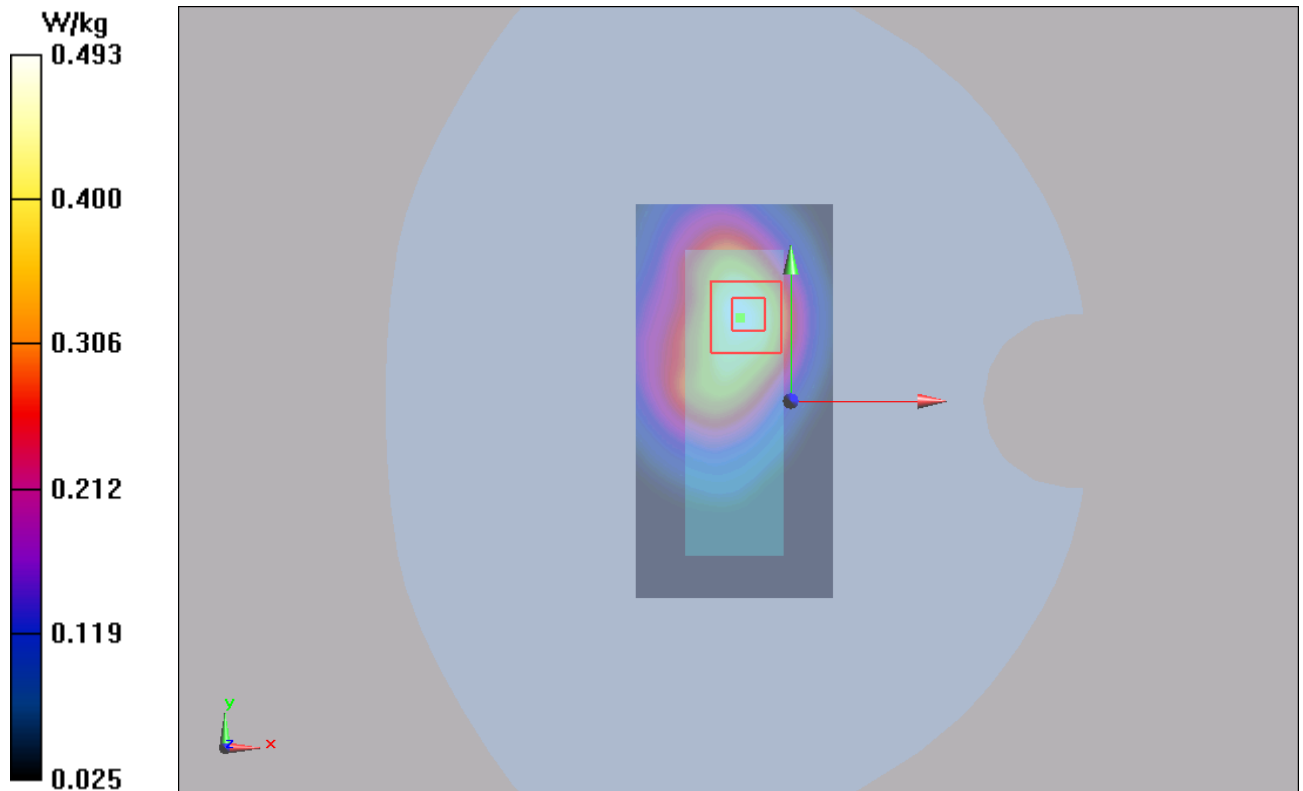


Figure 33 LTE Band 17 with Test Position 1 Channel 23800

802.11b Test Position 2 CH4 (Ant 1)

Date: 6/2/2015

Communication System: UID 0, 802.11b (0); Frequency: 2427 MHz; Duty Cycle: 1:1

Medium parameters used: $f = 2427$ MHz; $\sigma = 1.965$ S/m; $\epsilon_r = 52.205$; $\rho = 1000$ kg/m³

Ambient Temperature: 22.3 °C Liquid Temperature: 21.5 °C

Phantom section: Flat Section

DASY5 Configuration:

Sensor-Surface: 4mm (Mechanical Surface Detection)

Probe: EX3DV4 - SN3677; ConvF(7.42, 7.42, 7.42); Calibrated: 1/30/2015;

Electronics: DAE4 Sn1291; Calibrated: 11/14/2014

Phantom: SAM 2; Type: SAM;

Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

Test Position 2 CH4/Area Scan (41x91x1): Interpolated grid: dx=1.200 mm, dy=1.200 mm

Maximum value of SAR (interpolated) = 0.232 W/kg

Test Position 2 CH4/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 9.803 V/m; Power Drift = -0.046 dB

Peak SAR (extrapolated) = 0.340 W/kg

SAR(1 g) = 0.181 W/kg; SAR(10 g) = 0.099 W/kg

Maximum value of SAR (measured) = 0.188 W/kg

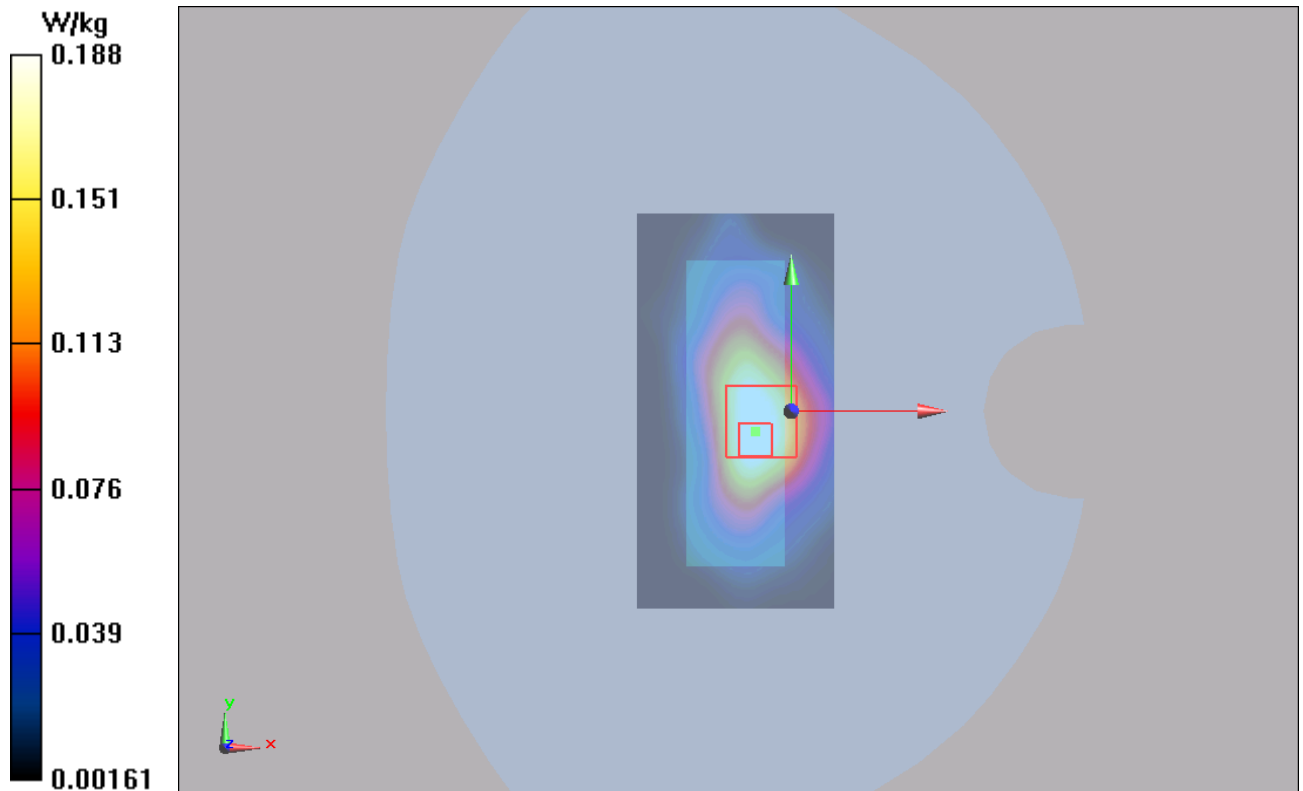


Figure 34 802.11b Test Position 2 Channel 4

802.11b Test Position 1 CH4 (Ant 2)

Date: 6/2/2015

Communication System: UID 0, 802.11b (0); Frequency: 2427 MHz; Duty Cycle: 1:1

Medium parameters used: $f = 2427$ MHz; $\sigma = 1.965$ S/m; $\epsilon_r = 52.205$; $\rho = 1000$ kg/m³

Ambient Temperature: 22.3 °C Liquid Temperature: 21.5 °C

Phantom section: Flat Section

DASY5 Configuration:

Sensor-Surface: 4mm (Mechanical Surface Detection)

Probe: EX3DV4 - SN3677; ConvF(7.42, 7.42, 7.42); Calibrated: 1/30/2015;

Electronics: DAE4 Sn1291; Calibrated: 11/14/2014

Phantom: SAM 2; Type: SAM;

Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

Test Position 1 CH4/Area Scan (41x91x1): Interpolated grid: dx=1.200 mm, dy=1.200 mm

Maximum value of SAR (interpolated) = 0.344 W/kg

Test Position 1 CH4/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 11.76 V/m; Power Drift = -0.056 dB

Peak SAR (extrapolated) = 0.563 W/kg

SAR(1 g) = 0.303 W/kg; SAR(10 g) = 0.166 W/kg

Maximum value of SAR (measured) = 0.309 W/kg

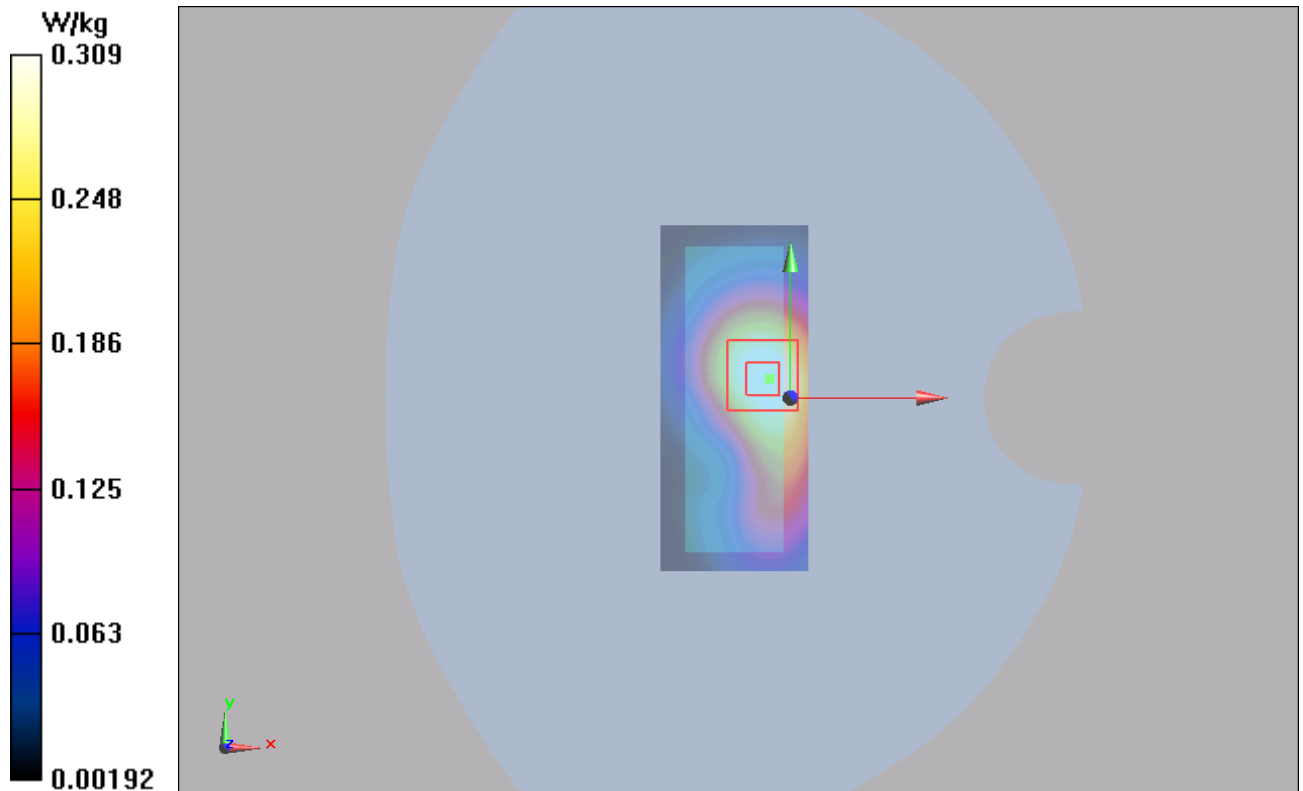


Figure 35 802.11b Test Position 1 Channel 4

802.11n Test Position 2 CH4 (MIMO)

Date: 6/2/2015

Communication System: UID 0, 802.11n HT20 (0); Frequency: 2427 MHz; Duty Cycle: 1:1

Medium parameters used: $f = 2427$ MHz; $\sigma = 1.965$ S/m; $\epsilon_r = 52.205$; $\rho = 1000$ kg/m³

Ambient Temperature: 22.3 °C Liquid Temperature: 21.5 °C

Phantom section: Flat Section

DASY5 Configuration:

Sensor-Surface: 4mm (Mechanical Surface Detection)

Probe: EX3DV4 - SN3677; ConvF(7.42, 7.42, 7.42); Calibrated: 1/30/2015;

Electronics: DAE4 Sn1291; Calibrated: 11/14/2014

Phantom: SAM 2; Type: SAM;

Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

Test Position 2 CH4 /Area Scan (51x101x1): Interpolated grid: dx=1.200 mm, dy=1.200 mm

Maximum value of SAR (interpolated) = 0.116 W/kg

Test Position 2 CH4 /Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 6.455 V/m; Power Drift = 0.15 dB

Peak SAR (extrapolated) = 0.642 W/kg

SAR(1 g) = 0.190 W/kg; SAR(10 g) = 0.080 W/kg

Maximum value of SAR (measured) = 0.642 W/kg

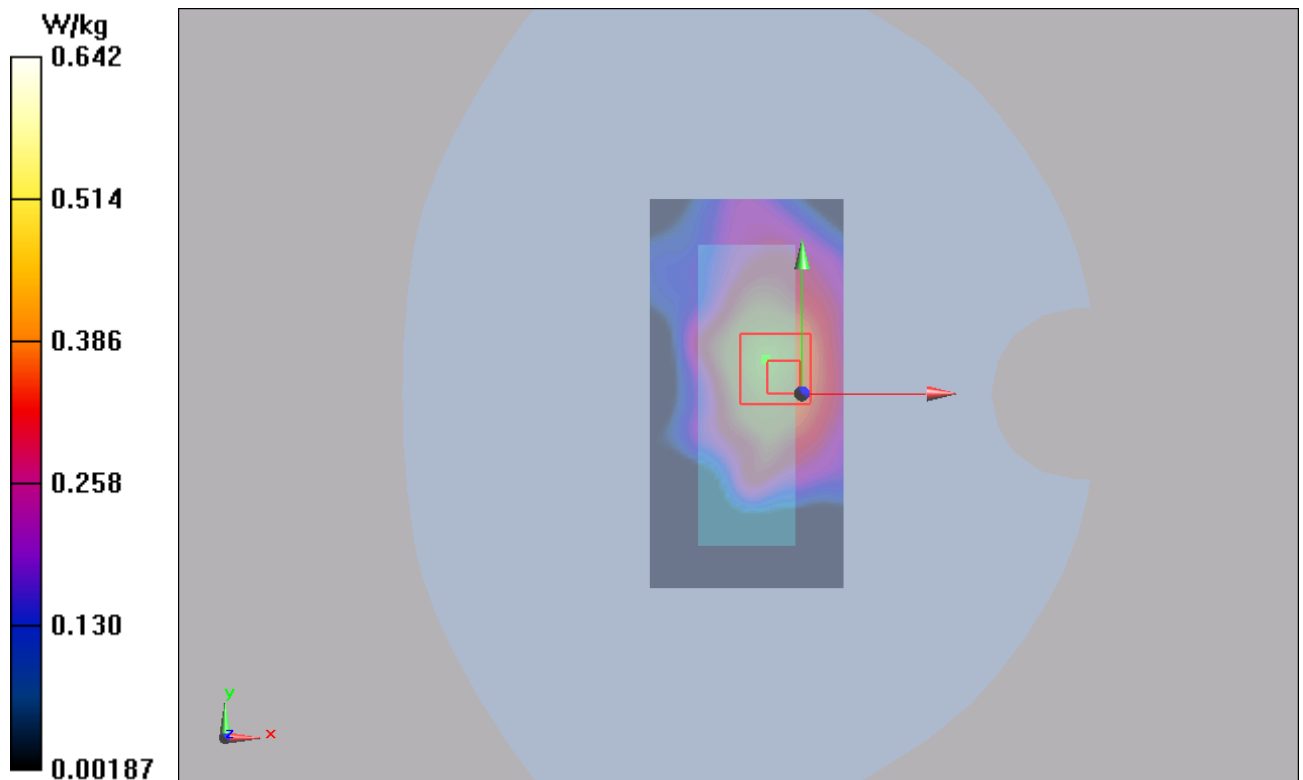


Figure 36 802.11n Test Position 2 Channel 4

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ANNEX E: Probe Calibration Certificate



Add: No.51 Xueyuan Road, Haidian District, Beijing, 100191, China
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Client **TA-ShangHai**

Certificate No: Z15-97010

CALIBRATION CERTIFICATE

Object **EX3DV4 - SN:3677**

Calibration Procedure(s) **FD-Z11-2-004-01**
Calibration Procedures for Dosimetric E-field Probes

Calibration date: **January 30, 2015**

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(Calibrated by, Certificate No.)	Scheduled Calibration
Power Meter NRP2	101919	01-Jul-14 (CTTL, No.J14X02146)	Jun-15
Power sensor NRP-Z91	101547	01-Jul-14 (CTTL, No.J14X02146)	Jun-15
Power sensor NRP-Z91	101548	01-Jul-14 (CTTL, No.J14X02146)	Jun-15
Reference10dBAttenuator	18N50W-10dB	13-Mar-14(TMC,No.JZ14-1103)	Mar-16
Reference20dBAttenuator	18N50W-20dB	13-Mar-14(TMC,No.JZ14-1104)	Mar-16
Reference Probe EX3DV4	SN 3617	28-Aug-14(SPEAG,No.EX3-3617_Aug14)	Aug-15
DAE4	SN 777	17-Sep-14 (SPEAG, DAE4-777_Sep14)	Sep -15
Secondary Standards	ID #	Cal Date(Calibrated by, Certificate No.)	Scheduled Calibration
SignalGeneratorMG3700A	6201052605	01-Jul-14 (CTTL, No.J14X02145)	Jun-15
Network Analyzer E5071C	MY46110673	15-Feb-14 (TMC, No.JZ14-781)	Feb-15

	Name	Function	Signature
Calibrated by:	Yu Zongying	SAR Test Engineer	
Reviewed by:	Qi Dianyuan	SAR Project Leader	
Approved by:	Lu Bingsong	Deputy Director of the laboratory	

Issued: January 31, 2015

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

Certificate No: Z15-97010

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Glossary:

TSL	tissue simulating liquid
NORM _{x,y,z}	sensitivity in free space
ConvF	sensitivity in TSL / NORM _{x,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 $\theta=0$ 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:

- 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
- IEC 62209-1, "Procedure to measure the Specific Absorption Rate (SAR) for hand-held devices used in close proximity to the ear (frequency range of 300MHz to 3GHz)", February 2005

Methods Applied and Interpretation of Parameters:

- NORM_{x,y,z}:** Assessed for E-field polarization $\theta=0$ ($f \leq 900\text{MHz}$ in TEM-cell; $f > 1800\text{MHz}$: waveguide). NORM_{x,y,z} are only intermediate values, i.e., the uncertainties of NORM_{x,y,z} does not effect the E^2 -field uncertainty inside TSL (see below ConvF).
- NORM(f)_{x,y,z} = NORM_{x,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.
- DCP_{x,y,z}:** DCP are numerical linearization parameters assessed based on the data of power sweep (no uncertainty required). DCP does not depend on frequency nor media.
- PAR:** PAR is the Peak to Average Ratio that is not calibrated but determined based on the signal characteristics.
- A_{x,y,z}; B_{x,y,z}; C_{x,y,z}; VR_{x,y,z}; A,B,C** 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 $f \leq 800\text{MHz}$) and inside waveguide using analytical field distributions based on power measurements for $f > 800\text{MHz}$. The same setups are used for assessment of the parameters applied for boundary compensation (alpha, depth) of which typical uncertainty valued are given. These parameters are used in DASY4 software to improve probe accuracy close to the boundary. The sensitivity in TSL corresponds to NORM_{x,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 $\pm 50\text{MHz}$ to $\pm 100\text{MHz}$.
- 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 NORM_x (no uncertainty required).



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Probe EX3DV4

SN: 3677

Calibrated: January 30, 2015

Calibrated for DASY/EASY Systems

(Note: non-compatible with DASY2 system!)

TA Technology (Shanghai) Co., Ltd.

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DASY/EASY – Parameters of Probe: EX3DV4 – SN: 3677

Basic Calibration Parameters

	Sensor X	Sensor Y	Sensor Z	Unc (k=2)
Norm($\mu V/(V/m)^2$) ^A	0.41	0.46	0.40	±10.8%
DCP(mV) ^B	101.9	102.0	104.6	

Modulation Calibration Parameters

UID	Communication System Name		A dB	B dB $\sqrt{\mu V}$	C	D dB	VR mV	Unc ^E (k=2)
0	CW	X	0.0	0.0	1.0	0.00	182.5	±2.3%
		Y	0.0	0.0	1.0		198.5	
		Z	0.0	0.0	1.0		179.8	

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

^A The uncertainties of Norm X, Y, Z do not affect the E²-field uncertainty inside TSL (see Page 5 and Page 6).

^B Numerical linearization parameter: uncertainty not required.

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

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DASY/EASY – Parameters of Probe: EX3DV4 – SN: 3677

Calibration Parameter Determined in Head Tissue Simulating Media

f [MHz] ^C	Relative Permittivity ^F	Conductivity (S/m) ^F	ConvF X	ConvF Y	ConvF Z	Alpha ^G	Depth ^G (mm)	Unct. (k=2)
750	41.9	0.89	9.79	9.79	9.79	0.30	0.84	± 12%
835	41.5	0.90	9.30	9.30	9.30	0.19	1.05	± 12%
1750	40.1	1.37	8.02	8.02	8.02	0.21	1.14	± 12%
1900	40.0	1.40	7.94	7.94	7.94	0.24	1.04	± 12%
2450	39.2	1.80	7.22	7.22	7.22	0.65	0.68	± 12%
2600	39.0	1.96	6.94	6.94	6.94	0.33	0.95	± 12%
5200	36.0	4.66	5.55	5.55	5.55	0.42	1.18	± 13%
5300	35.9	4.76	5.35	5.35	5.35	0.45	1.05	± 13%
5600	35.5	5.07	5.05	5.05	5.05	0.42	1.26	± 13%
5800	35.3	5.27	5.01	5.01	5.01	0.48	1.13	± 13%

^C Frequency validity of ±100MHz only applies for DASY v4.4 and higher (Page 2), else it is restricted to ±50MHz. The uncertainty is the RSS of ConvF uncertainty at calibration frequency and the uncertainty for the indicated frequency band.

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

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



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DASY/EASY – Parameters of Probe: EX3DV4 – SN: 3677

Calibration Parameter Determined in Body Tissue Simulating Media

f [MHz] ^C	Relative Permittivity ^F	Conductivity (S/m) ^F	ConvF X	ConvF Y	ConvF Z	Alpha ^G	Depth ^G (mm)	Unct. (k=2)
750	55.5	0.96	9.53	9.53	9.53	0.15	1.46	± 12%
835	55.2	0.97	9.45	9.45	9.45	0.17	1.35	± 12%
1750	53.4	1.49	7.74	7.74	7.74	0.18	1.36	± 12%
1900	53.3	1.52	7.57	7.57	7.57	0.18	1.31	± 12%
2450	52.7	1.95	7.42	7.42	7.42	0.37	1.08	± 12%
2600	52.5	2.16	7.29	7.29	7.29	0.40	0.97	± 12%
5200	49.0	5.30	4.96	4.96	4.96	0.45	1.42	± 13%
5300	48.9	5.42	4.76	4.76	4.76	0.46	1.48	± 13%
5600	48.5	5.77	4.36	4.36	4.36	0.49	1.80	± 13%
5800	48.2	6.00	4.45	4.45	4.45	0.50	1.20	± 13%

^C Frequency validity of ±100MHz only applies for DASY v4.4 and higher (Page 2), else it is restricted to ±50MHz. The uncertainty is the RSS of ConvF uncertainty at calibration frequency and the uncertainty for the indicated frequency band.

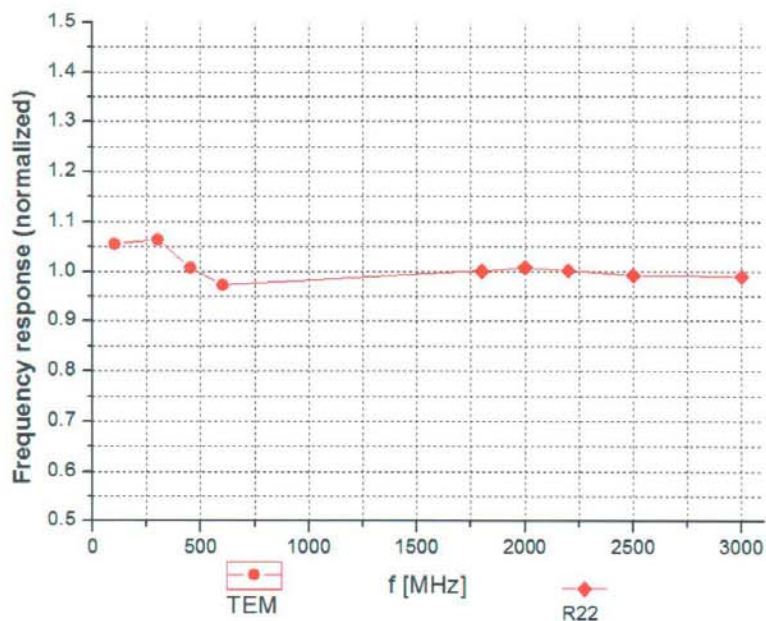
^F At frequency below 3 GHz, the validity of tissue parameters (ϵ and σ) can be relaxed to ±10% if liquid compensation formula is applied to measured SAR values. At frequencies above 3 GHz, the validity of tissue parameters (ϵ and σ) is restricted to ±5%. The uncertainty is the RSS of the ConvF uncertainty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

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



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



Uncertainty of Frequency Response of E-field: $\pm 7.5\%$ (k=2)

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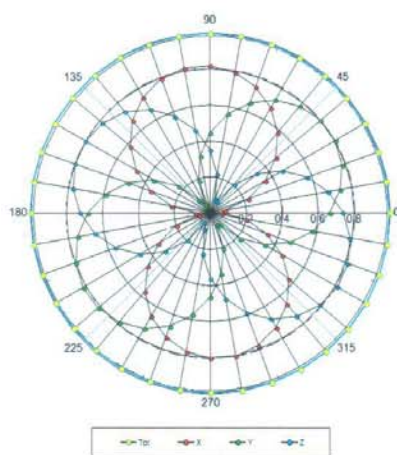
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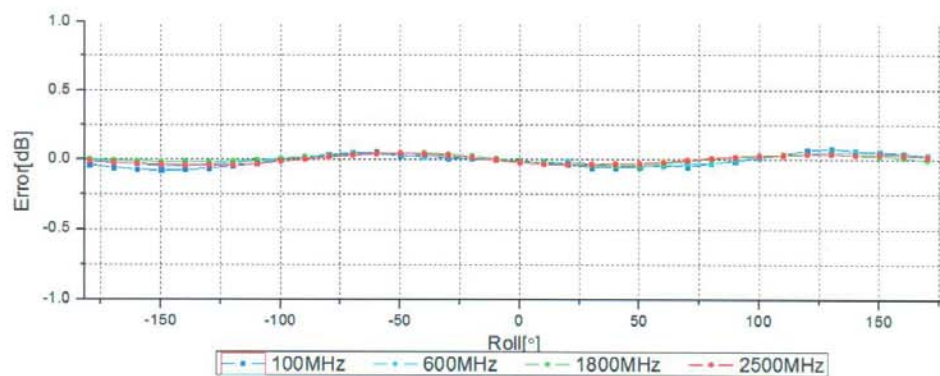
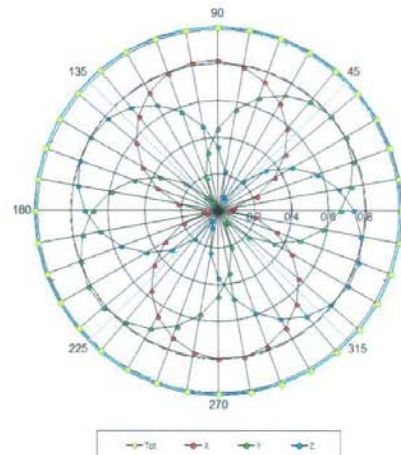
Add: No.51 Xueyuan Road, Haidian District, Beijing, 100191, China
Tel: +86-10-62304633-2079 Fax: +86-10-62304633-2504
E-mail: cttl@chinattl.com Http://www.chinattl.cn

Receiving Pattern (Φ), $\theta=0^\circ$

f=600 MHz, TEM



f=1800 MHz, R22



Uncertainty of Axial Isotropy Assessment: $\pm 0.9\%$ ($k=2$)

TA Technology (Shanghai) Co., Ltd. Test Report

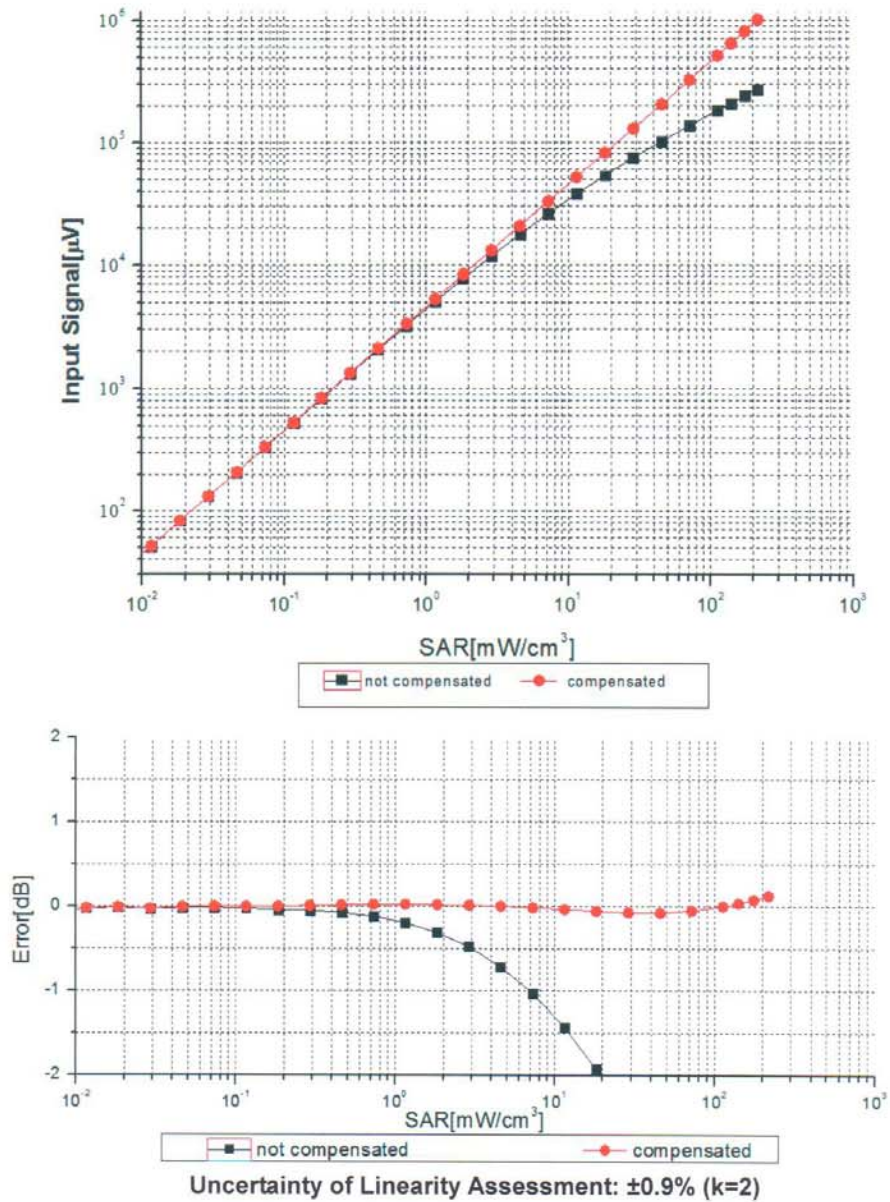
Report No. RHA1505-0047SAR02

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Add: No.51 Xueyuan Road, Haidian District, Beijing, 100191, China
Tel: +86-10-62304633-2079 Fax: +86-10-62304633-2504
E-mail: cttl@chinattl.com Http://www.chinattl.cn

Dynamic Range $f(\text{SAR}_{\text{head}})$ (TEM cell, $f = 900 \text{ MHz}$)



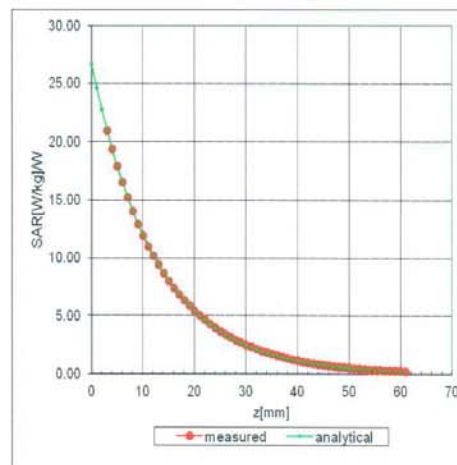
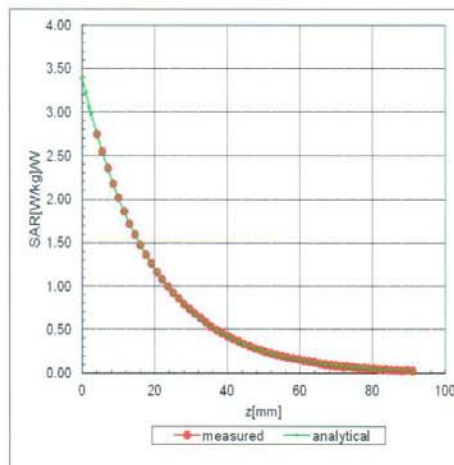


Add: No.51 Xueyuan Road, Haidian District, Beijing, 100191, China
Tel: +86-10-62304633-2079 Fax: +86-10-62304633-2504
E-mail: cttl@chinattl.com Http://www.chinattl.cn

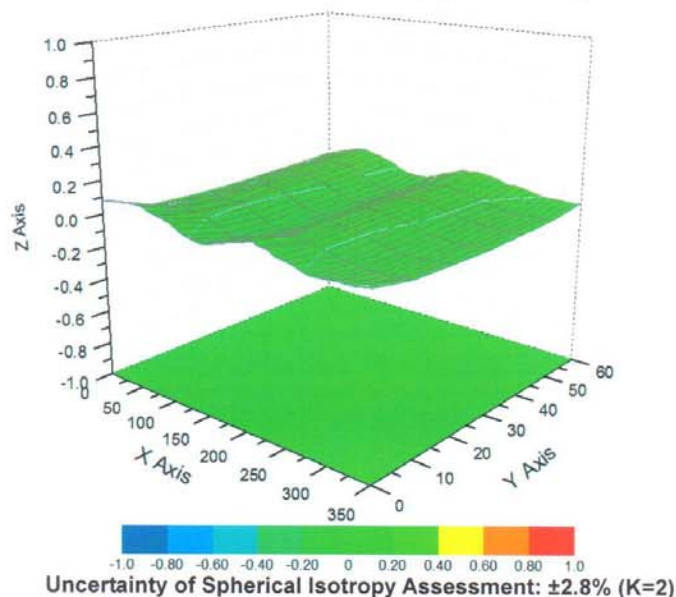
Conversion Factor Assessment

f=835 MHz, WGLS R9(H_convF)

f=1750 MHz, WGLS R22(H_convF)



Deviation from Isotropy in Liquid



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DASY/EASY – Parameters of Probe: EX3DV4 – SN: 3677

Other Probe Parameters

Sensor Arrangement	Triangular
Connector Angle (°)	116.7
Mechanical Surface Detection Mode	enabled
Optical Surface Detection Mode	disable
Probe Overall Length	337mm
Probe Body Diameter	10mm
Tip Length	9mm
Tip Diameter	2.5mm
Probe Tip to Sensor X Calibration Point	1mm
Probe Tip to Sensor Y Calibration Point	1mm
Probe Tip to Sensor Z Calibration Point	1mm
Recommended Measurement Distance from Surface	1.4mm

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ANNEX F: D750V3 Dipole Calibration Certificate

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



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

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

Accreditation No.: SCS 108

Client TMC-Shanghai (Auden)

Certificate No: D750V3-1045_Sep11

CALIBRATION CERTIFICATE

Object D750V3 - SN: 1045

Calibration procedure(s) QA CAL-05.v8
Calibration procedure for dipole validation kits above 700 MHz

Calibration date: September 29, 2011

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 $(22 \pm 3)^\circ\text{C}$ and humidity $< 70\%$.

Calibration Equipment used (M&TE critical for calibration)

Primary Standards	ID #	Cal Date (Certificate No.)	Scheduled Calibration
Power meter E4419B	GB41293874	31-Mar-11 (No. 217-01372)	Apr-12
Power sensor E4412A	MY41498087	31-Mar-11 (No. 217-01372)	Apr-12
Reference 3 dB Attenuator	SN: S5054 (3c)	29-Mar-11 (No. 217-01369)	Apr-12
Reference 20 dB Attenuator	SN: S5086 (20b)	29-Mar-11 (No. 217-01367)	Apr-12
Type-N mismatch combination	SN: 5047.2 / 06327	29-Mar-11 (No. 217-01371)	Apr-12
Reference Probe ES3DV3	SN: 3205	29-Apr-11 (No. ES3-3205_Apr11)	Apr-12
DAE4	SN: 601	04-Jul-11 (No. DAE4-601_Jul11)	Jul-12

Secondary Standards	ID #	Check Date (in house)	Scheduled Check
Power sensor HP 8481A	MY41092317	18-Oct-02 (in house check Oct-09)	In house check: Oct-11
RF generator R&S SMT-06	100005	04-Aug-99 (in house check Oct-09)	In house check: Oct-11
Network Analyzer HP 8753E	US37390585 S4206	18-Oct-01 (in house check Oct-10)	In house check: Oct-11

Calibrated by: Name Dimce Iliev Function Laboratory Technician Signature

Approved by: Katja Pokovic Technical Manager

Issued: October 3, 2011

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

Certificate No: D750V3-1045_Sep11

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



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

Accredited by the Swiss Accreditation Service (SAS)

The Swiss Accreditation Service is one of the signatories to the EA
Multilateral Agreement for the recognition of calibration certificates

Accreditation No.: **SCS 108**

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:

- IEEE Std 1528-2003, "IEEE Recommended Practice for Determining the Peak Spatial-Averaged Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques", December 2003
- IEC 62209-1, "Procedure to measure the Specific Absorption Rate (SAR) for hand-held devices used in close proximity to the ear (frequency range of 300 MHz to 3 GHz)", February 2005
- Federal Communications Commission Office of Engineering & Technology (FCC OET), "Evaluating Compliance with FCC Guidelines for Human Exposure to Radiofrequency Electromagnetic Fields; Additional Information for Evaluating Compliance of Mobile and Portable Devices with FCC Limits for Human Exposure to Radiofrequency Emissions", Supplement C (Edition 01-01) to Bulletin 65

Additional Documentation:

- 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.

TA Technology (Shanghai) Co., Ltd.

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Measurement Conditions

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

DASY Version	DASY5	V52.6.2
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 $\pm$ 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 $\pm$ 0.2) °C	42.3 $\pm$ 6 %	0.92 mho/m $\pm$ 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	2.14 mW / g
SAR for nominal Head TSL parameters	normalized to 1W	8.36 mW / g $\pm$ 17.0 % (k=2)

SAR averaged over 10 cm ³ (10 g) of Head TSL	condition	
SAR measured	250 mW input power	1.40 mW / g
SAR for nominal Head TSL parameters	normalized to 1W	5.49 mW / g $\pm$ 16.5 % (k=2)

Body TSL parameters

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Body TSL parameters	22.0 °C	55.5	0.96 mho/m
Measured Body TSL parameters	(22.0 $\pm$ 0.2) °C	55.6 $\pm$ 6 %	0.96 mho/m $\pm$ 6 %
Body TSL temperature change during test	< 0.5 °C	----	----

SAR result with Body TSL

SAR averaged over 1 cm ³ (1 g) of Bgdy TSL	Condition	
SAR measured	250 mW input power	2.20 mW / g
SAR for nominal Body TSL parameters	normalized to 1W	8.80 mW / g $\pm$ 17.0 % (k=2)

SAR averaged over 10 cm ³ (10 g) of Body TSL	condition	
SAR measured	250 mW input power	1.45 mW / g
SAR for nominal Body TSL parameters	normalized to 1W	5.80 mW / g $\pm$ 16.5 % (k=2)

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Appendix

Antenna Parameters with Head TSL

Impedance, transformed to feed point	54.2 Ω - 2.3 j Ω
Return Loss	- 26.8 dB

Antenna Parameters with Body TSL

Impedance, transformed to feed point	49.5 Ω - 4.1 j Ω
Return Loss	- 27.5 dB

General Antenna Parameters and Design

Electrical Delay (one direction)	1.036 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.

No excessive force must be applied to the dipole arms, because they might bend or the soldered connections near the feedpoint may be damaged.

Additional EUT Data

Manufactured by	SPEAG
Manufactured on	September 02, 2011

DASY5 Validation Report for Head TSL

Date: 29.09.2011

Test Laboratory: SPEAG, Zurich, Switzerland

DUT: Dipole 750 MHz; Type: D750V3; Serial: D750V3 - SN: 1045

Communication System: CW; Frequency: 750 MHz

Medium parameters used: $f = 750 \text{ MHz}$; $\sigma = 0.92 \text{ mho/m}$; $\epsilon_r = 42.3$; $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section

Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY52 Configuration:

- Probe: ES3DV3 - SN3205; ConvF(6.33, 6.33, 6.33); Calibrated: 29.04.2011
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 04.07.2011
- Phantom: Flat Phantom 4.9L; Type: QD000P49AA; Serial: 1001
- DASY52 52.6.2(482); SEMCAD X 14.4.5(3634)

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

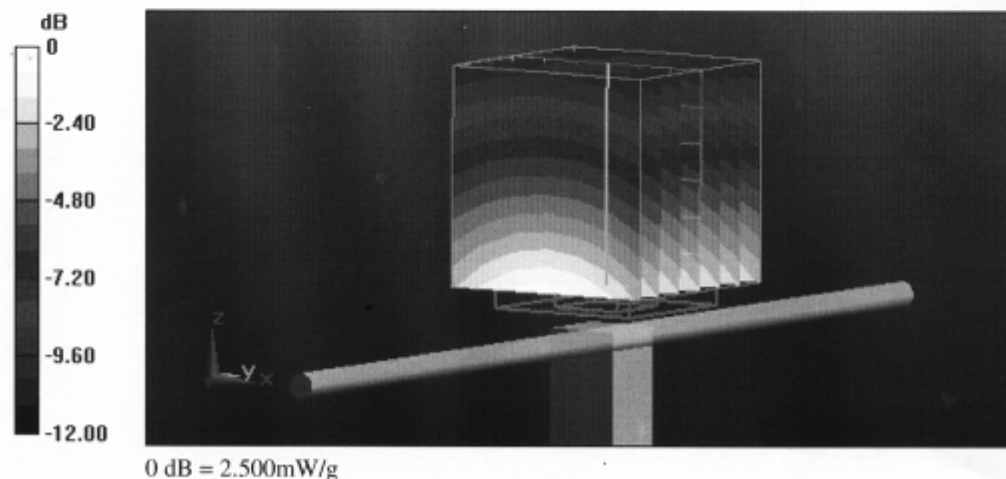
Measurement grid: $dx=5\text{mm}$, $dy=5\text{mm}$, $dz=5\text{mm}$

Reference Value = 53.433 V/m; Power Drift = 0.0062 dB

Peak SAR (extrapolated) = 3.216 W/kg

SAR(1 g) = 2.14 mW/g; SAR(10 g) = 1.4 mW/g

Maximum value of SAR (measured) = 2.501 mW/g

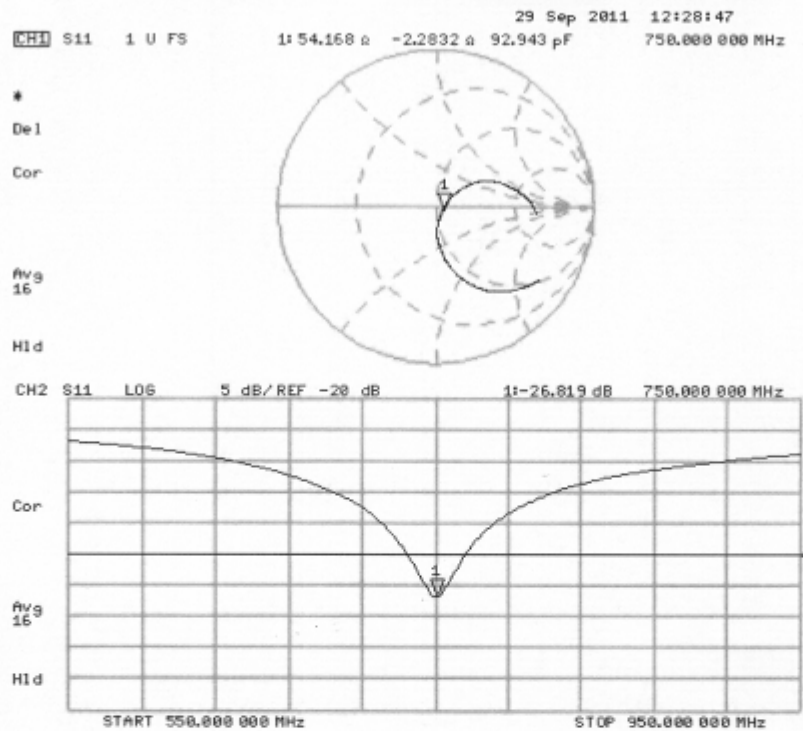


TA Technology (Shanghai) Co., Ltd.
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Impedance Measurement Plot for Head TSL



DASY5 Validation Report for Body TSL

Date: 29.09.2011

Test Laboratory: SPEAG, Zurich, Switzerland

DUT: Dipole 750 MHz; Type: D750V3; Serial: D750V3 - SN: 1045

Communication System: CW; Frequency: 750 MHz

Medium parameters used: $f = 750$ MHz; $\sigma = 0.96$ mho/m; $\epsilon_r = 55.6$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY52 Configuration:

- Probe: ES3DV3 - SN3205; ConvF(6.12, 6.12, 6.12); Calibrated: 29.04.2011
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 04.07.2011
- Phantom: Flat Phantom 4.9L; Type: QD000P49AA; Serial: 1001
- DASY52 52.6.2(482); SEMCAD X 14.4.5(3634)

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

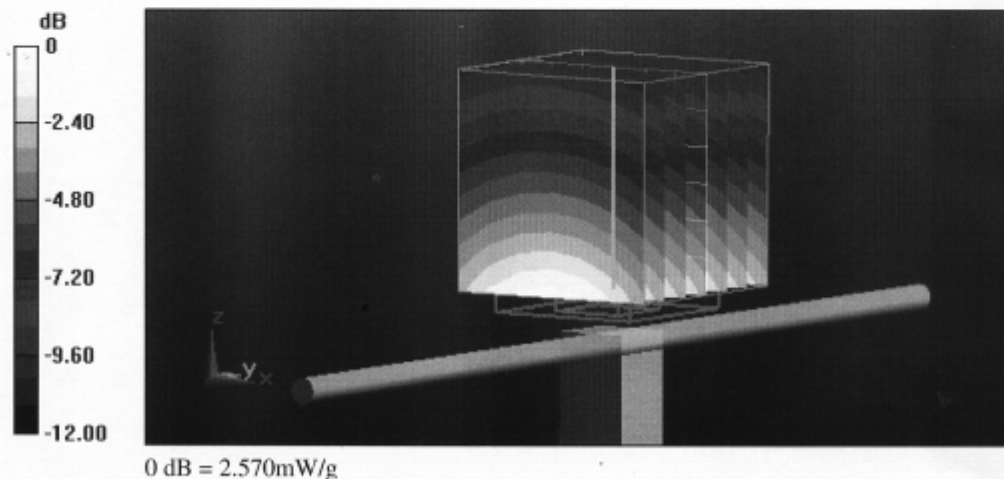
Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 52.850 V/m; Power Drift = 0.0065 dB

Peak SAR (extrapolated) = 3.269 W/kg

SAR(1 g) = 2.2 mW/g; SAR(10 g) = 1.45 mW/g

Maximum value of SAR (measured) = 2.566 mW/g

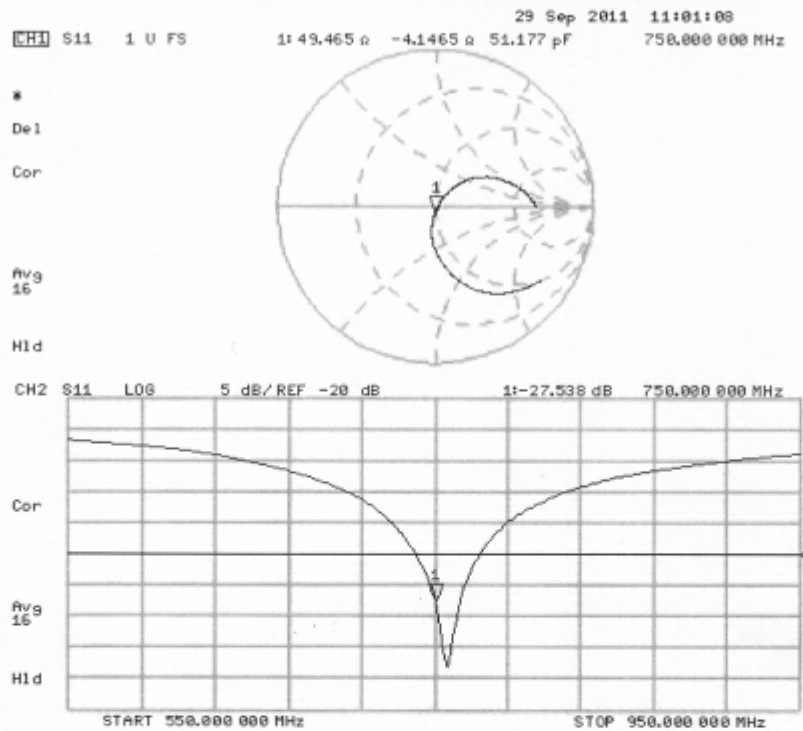


TA Technology (Shanghai) Co., Ltd.
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Impedance Measurement Plot for Body TSL



TA Technology (Shanghai) Co., Ltd.
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ANNEX G: D835V2 Dipole Calibration Certificate



Add: No.51 Xueyuan Road, Haidian District, Beijing, 100191, China
Tel: +86-10-62304633-2079 Fax: +86-10-62304633-2504
E-mail: cttl@chinattl.com Http://www.chinattl.cn



Client **TA(Shanghai)** Certificate No: **Z14-97073**

CALIBRATION CERTIFICATE

Object **D835V2 - SN: 4d020**

Calibration Procedure(s) **TMC-OS-E-02-194**
Calibration procedure for dipole validation kits

Calibration date: **August 28, 2014**

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

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

Calibration Equipment used (M&TE critical for calibration)

Primary Standards	ID #	Cal Date(Calibrated by, Certificate No.)	Scheduled Calibration
Power Meter NRVD	102083	11-Sep-13 (TMC, No.JZ13-443)	Sep-14
Power sensor NRV-Z5	100595	11-Sep-13 (TMC, No. JZ13-443)	Sep -14
Reference Probe ES3DV3	SN 3149	5- Sep-13 (SPEAG, No.ES3-3149_Sep13)	Sep-14
DAE3	SN 536	23-Jan-14 (SPEAG, DAE3-536_Jan14)	Jan -15
Signal Generator E4438C	MY49070393	13-Nov-13 (TMC, No.JZ13-394)	Nov-14
Network Analyzer E8362B	MY43021135	19-Oct-13 (TMC, No.JZ13-278)	Oct-14

	Name	Function	Signature
Calibrated by:	Zhao Jing	SAR Test Engineer	
Reviewed by:	Qi Dianyuan	SAR Project Leader	
Approved by:	Lu Bingsong	Deputy Director of the laboratory	

Issued: September 4, 2014

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Certificate No: Z14-97073

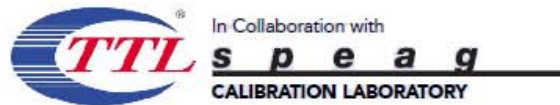
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TA Technology (Shanghai) Co., Ltd.

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E-mail: cttd@chinattl.com Http://www.chinattl.cn



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:

- 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
- IEC 62209-1, "Procedure to measure the Specific Absorption Rate (SAR) For hand-held devices used in close proximity to the ear (frequency range of 300MHz to 3GHz)", February 2005
- KDB865664, SAR Measurement Requirements for 100 MHz to 6 GHz

Additional Documentation:

- 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%.

TA Technology (Shanghai) Co., Ltd.

Test Report

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E-mail: cttl@chinattl.com Http://www.chinattl.cn



Measurement Conditions

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

DASY Version	DASY52	52.8.8.1222
Extrapolation	Advanced Extrapolation	
Phantom	Triple Flat Phantom 5.1C	
Distance Dipole Center - TSL	15 mm	with Spacer
Zoom Scan Resolution	dx, dy, dz = 5 mm	
Frequency	835 MHz $\pm$ 1 MHz	

Head TSL parameters

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Head TSL parameters	22.0 °C	41.5	0.90 mho/m
Measured Head TSL parameters	(22.0 $\pm$ 0.2) °C	42.5 $\pm$ 6 %	0.91 mho/m $\pm$ 6 %
Head TSL temperature change during test	<1.0 °C	----	----

SAR result with Head TSL

SAR averaged over 1 cm³ (1 g) of Head TSL	Condition	
SAR measured	250 mW input power	2.39 mW / g
SAR for nominal Head TSL parameters	normalized to 1W	9.54 mW/g $\pm$ 20.8 % (k=2)
SAR averaged over 10 cm³ (10 g) of Head TSL	Condition	
SAR measured	250 mW input power	1.57 mW / g
SAR for nominal Head TSL parameters	normalized to 1W	6.26 mW/g $\pm$ 20.4 % (k=2)

Body TSL parameters

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Body TSL parameters	22.0 °C	55.2	0.97 mho/m
Measured Body TSL parameters	(22.0 $\pm$ 0.2) °C	56.7 $\pm$ 6 %	0.97 mho/m $\pm$ 6 %
Body TSL temperature change during test	<1.0 °C	----	----

SAR result with Body TSL

SAR averaged over 1 cm³ (1 g) of Body TSL	Condition	
SAR measured	250 mW input power	2.37 mW / g
SAR for nominal Body TSL parameters	normalized to 1W	9.54 mW/g $\pm$ 20.8 % (k=2)
SAR averaged over 10 cm³ (10 g) of Body TSL	Condition	
SAR measured	250 mW input power	1.57 mW / g
SAR for nominal Body TSL parameters	normalized to 1W	6.31 mW/g $\pm$ 20.4 % (k=2)

TA Technology (Shanghai) Co., Ltd.

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In Collaboration with
s p e a g
CALIBRATION LABORATORY

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Tel: +86-10-62304633-2079 Fax: +86-10-62304633-2504
E-mail: cttl@chinatl.com Http://www.chinatl.cn



Appendix

Antenna Parameters with Head TSL

Impedance, transformed to feed point	$48.6\Omega + 2.75j\Omega$
Return Loss	- 30.1dB

Antenna Parameters with Body TSL

Impedance, transformed to feed point	$54.0\Omega + 5.88j\Omega$
Return Loss	- 23.3dB

General Antenna Parameters and Design

Electrical Delay (one direction)	1.242 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
-----------------	-------