

FCC SAR Test Report

Report No. : SA161114C10
Applicant : Verifone, Inc.
Address : 1400 West Stanford Ranch Road Suite 200 Rocklin CA 95765 USA
Product : Point of Sale Terminal
FCC ID : B32V400M3G
Brand : Verifone
Model No. : V400m Plus 3G
Standards : FCC 47 CFR Part 2 (2.1093) / IEEE C95.1:1992 / IEEE Std 1528:2013
KDB 865664 D01 v01r04 / KDB 865664 D02 v01r02 / KDB 248227 D01 v02r02
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Test Location : No. 19, Hwa Ya 2nd Rd, Wen Hwa Vil, Kwei Shan Dist., Taoyuan City 33383, Taiwan (R.O.C)

CERTIFICATION: The above equipment have been tested by **Bureau Veritas Consumer Products Services (H.K.) Ltd., Taoyuan Branch – Lin Kou Laboratories**, and found compliance with the requirement of the above standards. The test record, data evaluation & Equipment Under Test (EUT) configurations represented herein are true and accurate accounts of the measurements of the sample's SAR characteristics under the conditions specified in this report. It should not be reproduced except in full, without the written approval of our laboratory. The client should not use it to claim product certification, approval, or endorsement by TAF or any government agencies.

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Release Control Record

Report No.	Reason for Change	Date Issued
SA161114C10	Initial release	Dec. 19, 2016

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1. Summary of Maximum SAR Value

Equipment Class	Mode	Highest Reported Extremity SAR _{10g} (0 cm Gap) (W/kg)	Highest Reported Body SAR _{1g} (0 cm Gap) (W/kg)
PCB	GSM850	1.27	1.19
	GSM1900	2.30	0.84
	WCDMA II	3.10	1.20
	WCDMA V	1.21	1.12
DTS	2.4G WLAN	0.85	0.05
NII	5.3G WLAN	0.53	0.00
	5.6G WLAN	0.40	0.00
	5.8G WLAN	0.62	0.00
DSS	Bluetooth	0.00	0.00
DXX	NFC	N/A	N/A
Highest Simultaneous Transmission SAR		Extremity (W/kg)	Body (W/kg)
PCB + DTS		3.16	1.25
PCB + NII		3.10	1.20
PCB + DSS		3.10	1.20

Note:

- The SAR limit (**Head & Body: SAR_{1g} 1.6 W/kg, Extremity: SAR_{10g} 4.0 W/kg**) for general population / uncontrolled exposure is specified in FCC 47 CFR part 2 (2.1093) and ANSI/IEEE C95.1-1992.

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2. Description of Equipment Under Test

EUT Type	Point of Sale Terminal
FCC ID	B32V400M3G
Brand Name	Verifone
Model Name	V400m Plus 3G
Tx Frequency Bands (Unit: MHz)	GSM850 : 824.2 ~ 848.8 GSM1900 : 1850.2 ~ 1909.8 WCDMA Band II : 1852.4 ~ 1907.6 WCDMA Band V : 826.4 ~ 846.6 WLAN : 2412 ~ 2462, 5180 ~ 5240, 5260 ~ 5320, 5500 ~ 5700, 5745 ~ 5825 Bluetooth : 2402 ~ 2480 NFC : 13.56
Uplink Modulations	GSM & GPRS : GMSK EDGE : 8PSK WCDMA : QPSK 802.11b : DSSS 802.11a/g/n/ac : OFDM Bluetooth : GFSK, $\pi/4$ -DQPSK, 8-DPSK NFC : ASK
Maximum Tune-up Conducted Power (Unit: dBm)	GSM850 : 33.0 GSM1900 : 30.0 WCDMA Band II : 23.5 WCDMA Band V : 23.5 WLAN 2.4G : 16.0 WLAN 5.3G : 12.5 WLAN 5.6G : 12.5 WLAN 5.8G : 12.5 Bluetooth : 8.5
Antenna Type	WWAN : Fixed Internal Antenna BT/WLAN : PCB Antenna NFC: Loop Antenna (Peak Antenna Gain : -0.4 dBi for 2.4GHz, 3.15 dBi for 5GHz)
EUT Stage	Identical Prototype

Note:

- The above EUT information is declared by manufacturer and for more detailed features description please refers to the manufacturer's specifications or User's Manual.

List of Accessory:

Battery	Brand Name	Verifone
	Model Name	BPK475-001
	Power Rating	3.85Vdc, 2890mAh
	Type	Li-ion

3. SAR Measurement System

3.1 Definition of Specific Absorption Rate (SAR)

SAR is related to the rate at which energy is absorbed per unit mass in an object exposed to a radio field. The SAR distribution in a biological body is complicated and is usually carried out by experimental techniques or numerical modeling. The standard recommends limits for two tiers of groups, occupational/controlled and general population/uncontrolled, based on a person's awareness and ability to exercise control over his or her exposure. In general, occupational/controlled exposure limits are higher than the limits for general population/uncontrolled.

The SAR definition is the time derivative (rate) of the incremental energy (dW) absorbed by (dissipated in) an incremental mass (dm) contained in a volume element (dv) of a given density (ρ). The equation description is as below:

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

SAR is expressed in units of Watts per kilogram (W/kg)

SAR measurement can be related to the electrical field in the tissue by

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

Where: σ is the conductivity of the tissue, ρ is the mass density of the tissue and E is the RMS electrical field strength.

3.2 SPEAG DASY System

DASY system consists of high precision robot, probe alignment sensor, phantom, robot controller, controlled measurement server and near-field probe. The robot includes six axes that can move to the precision position of the DASY4/5 software defined. The DASY software can define the area that is detected by the probe. The robot is connected to controlled box. Controlled measurement server is connected to the controlled robot box. The DAE includes amplifier, signal multiplexing, AD converter, offset measurement and surface detection. It is connected to the Electro-optical coupler (ECO). The ECO performs the conversion from the optical into digital electric signal of the DAE and transfers data to the PC.

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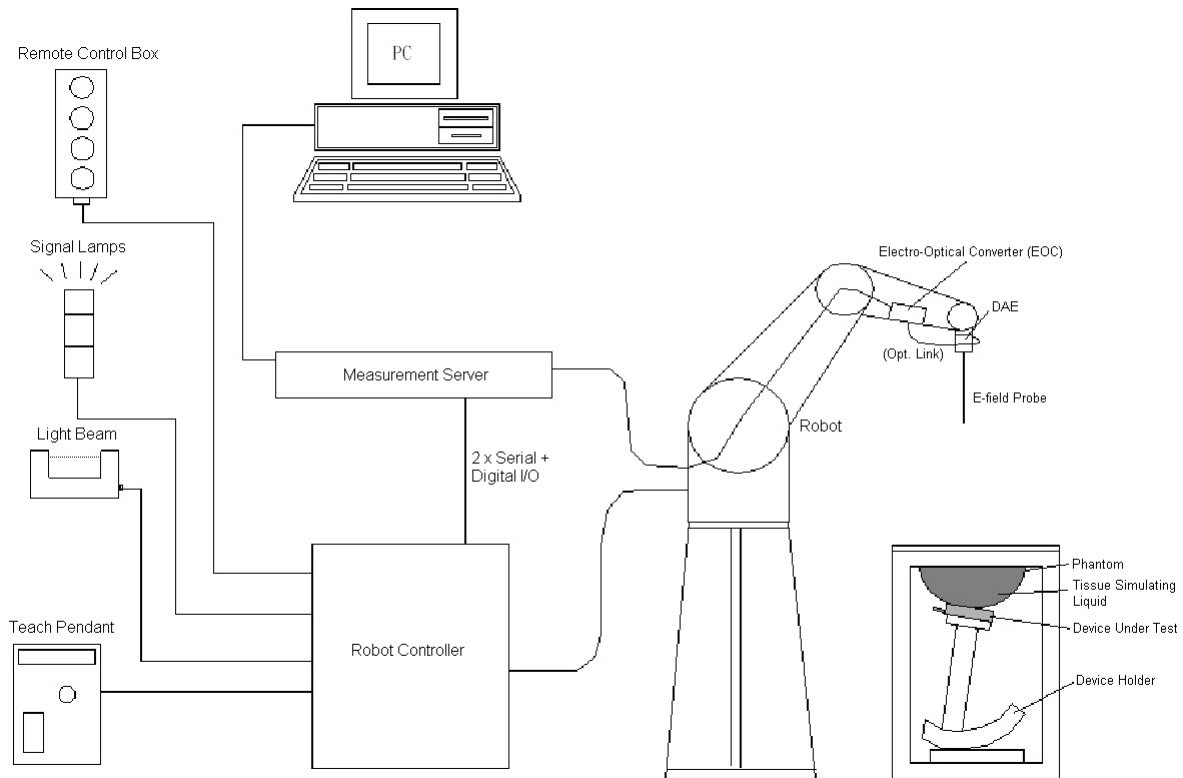


Fig-3.1 DASY System Setup

3.2.1 Robot

The DASY system uses the high precision robots from Stäubli SA (France). For the 6-axis controller system, the robot controller version (DASY4: CS7MB; DASY5: CS8c) from Stäubli is used. The Stäubli robot series have many features that are important for our application:

- High precision (repeatability ± 0.035 mm)
- High reliability (industrial design)
- Jerk-free straight movements
- Low ELF interference (the closed metallic construction shields against motor control fields)



Fig-3.2 DASY4



Fig-3.3 DASY5

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3.2.2 Probes

The SAR measurement is conducted with the dosimetric probe. The probe is specially designed and calibrated for use in liquid with high permittivity. The dosimetric probe has special calibration in liquid at different frequency.

Model	EX3DV4	
Construction	Symmetrical design with triangular core. Built-in shielding against static charges. PEEK enclosure material (resistant to organic solvents, e.g., DGBE).	
Frequency	10 MHz to 6 GHz Linearity: ± 0.2 dB	
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: 337 mm (Tip: 20 mm) Tip diameter: 2.5 mm (Body: 12 mm) Typical distance from probe tip to dipole centers: 1 mm	

Model	ES3DV3	
Construction	Symmetrical design with triangular core. Interleaved sensors. Built-in shielding against static charges. PEEK enclosure material (resistant to organic solvents, e.g., DGBE).	
Frequency	10 MHz to 4 GHz Linearity: ± 0.2 dB	
Directivity	± 0.2 dB in HSL (rotation around probe axis) ± 0.3 dB in tissue material (rotation normal to probe axis)	
Dynamic Range	5 μ W/g to 100 mW/g Linearity: ± 0.2 dB	
Dimensions	Overall length: 337 mm (Tip: 20 mm) Tip diameter: 3.9 mm (Body: 12 mm) Distance from probe tip to dipole centers: 2.0 mm	

Model	ET3DV6	
Construction	Symmetrical design with triangular core Built-in optical fiber for surface detection system. Built-in shielding against static charges. PEEK enclosure material (resistant to organic solvents, e.g., DGBE)	
Frequency	10 MHz to 2.3 GHz; Linearity: ± 0.2 dB	
Directivity	± 0.2 dB in TSL (rotation around probe axis) ± 0.4 dB in TSL (rotation normal to probe axis)	
Dynamic Range	5 μ W/g to 100 mW/g; Linearity: ± 0.2 dB	
Dimensions	Overall length: 337 mm (Tip: 16 mm) Tip diameter: 6.8 mm (Body: 12 mm) Distance from probe tip to dipole centers: 2.7 mm	

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3.2.3 Data Acquisition Electronics (DAE)

Model	DAE3, DAE4	
Construction	Signal amplifier, multiplexer, A/D converter and control logic. Serial optical link for communication with DASY embedded system (fully remote controlled). Two step probe touch detector for mechanical surface detection and emergency robot stop.	
Measurement Range	-100 to +300 mV (16 bit resolution and two range settings: 4mV, 400mV)	
Input Offset Voltage	< 5µV (with auto zero)	
Input Bias Current	< 50 fA	
Dimensions	60 x 60 x 68 mm	

3.2.4 Phantoms

Model	Twin SAM	
Construction	The shell corresponds to the specifications of the Specific Anthropomorphic Mannequin (SAM) phantom defined in IEEE 1528 and IEC 62209-1. 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 evaporation of the liquid. Reference markings on the phantom allow the complete setup of all predefined phantom positions and measurement grids by teaching three points with the robot.	
Material	Vinylester, glass fiber reinforced (VE-GF)	
Shell Thickness	2 ± 0.2 mm (6 ± 0.2 mm at ear point)	
Dimensions	Length: 1000 mm Width: 500 mm Height: adjustable feet	
Filling Volume	approx. 25 liters	

Model	ELI	
Construction	Phantom for compliance testing of handheld and body-mounted wireless devices in the frequency range of 30 MHz to 6 GHz. ELI is fully compatible with the IEC 62209-2 standard and all known tissue simulating liquids. ELI has been optimized regarding its performance and can be integrated into our standard phantom tables. A cover prevents evaporation of the liquid. Reference markings on the phantom allow installation of the complete setup, including all predefined phantom positions and measurement grids, by teaching three points. The phantom is compatible with all SPEAG dosimetric probes and dipoles.	
Material	Vinylester, glass fiber reinforced (VE-GF)	
Shell Thickness	2.0 ± 0.2 mm (bottom plate)	
Dimensions	Major axis: 600 mm Minor axis: 400 mm	
Filling Volume	approx. 30 liters	

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3.2.5 Device Holder

Model	Mounting Device	
Construction	In combination with the Twin SAM Phantom or ELI4, the Mounting Device enables the rotation of the mounted transmitter device in spherical coordinates. Rotation point is the ear opening point. Transmitter devices can be easily and accurately positioned according to IEC, IEEE, FCC or other specifications. The device holder can be locked for positioning at different phantom sections (left head, right head, flat).	
Material	POM	

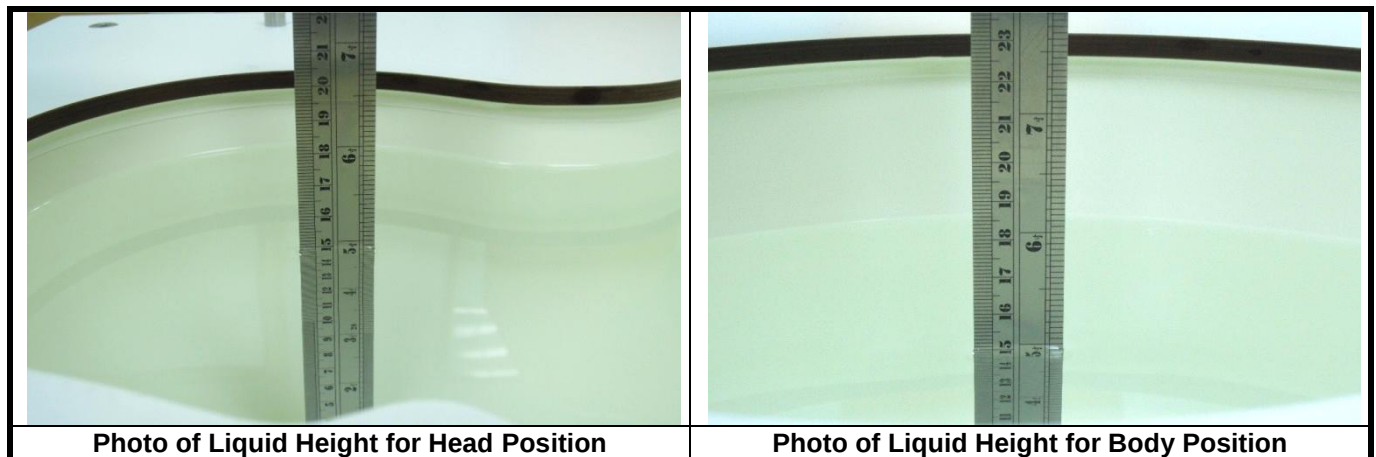
Model	Laptop Extensions Kit	
Construction	Simple but effective and easy-to-use extension for Mounting Device that facilitates the testing of larger devices according to IEC 62209-2 (e.g., laptops, cameras, etc.). It is lightweight and fits easily on the upper part of the Mounting Device in place of the phone positioner.	
Material	POM, Acrylic glass, Foam	

3.2.6 System Validation Dipoles

Model	D-Serial	
Construction	Symmetrical dipole with 1/4 balun. Enables measurement of feed point impedance with NWA. Matched for use near flat phantoms filled with tissue simulating solutions.	
Frequency	750 MHz to 5800 MHz	
Return Loss	> 20 dB	
Power Capability	> 100 W (f < 1GHz), > 40 W (f > 1GHz)	

3.2.7 Tissue Simulating Liquids

For SAR measurement of the field distribution inside the phantom, the phantom must be filled with homogeneous tissue simulating liquid to a depth of at least 15 cm. For head SAR testing, the liquid height from the ear reference point (ERP) of the phantom to the liquid top surface is larger than 15 cm. For body SAR testing, the liquid height from the center of the flat phantom to the liquid top surface is larger than 15 cm. The nominal dielectric values of the tissue simulating liquids in the phantom and the tolerance of 5% are listed in Table-3.1.



The dielectric properties of the head tissue simulating liquids are defined in IEEE 1528, and KDB 865664 D01 Appendix A. For the body tissue simulating liquids, the dielectric properties are defined in KDB 865664 D01 Appendix A. The dielectric properties of the tissue simulating liquids were verified prior to the SAR evaluation using a dielectric assessment kit and a network analyzer.

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Table-3.1 Targets of Tissue Simulating Liquid

Frequency (MHz)	Target Permittivity	Range of $\pm 5\%$	Target Conductivity	Range of $\pm 5\%$
For Head				
750	41.9	39.8 ~ 44.0	0.89	0.85 ~ 0.93
835	41.5	39.4 ~ 43.6	0.90	0.86 ~ 0.95
900	41.5	39.4 ~ 43.6	0.97	0.92 ~ 1.02
1450	40.5	38.5 ~ 42.5	1.20	1.14 ~ 1.26
1640	40.3	38.3 ~ 42.3	1.29	1.23 ~ 1.35
1750	40.1	38.1 ~ 42.1	1.37	1.30 ~ 1.44
1800	40.0	38.0 ~ 42.0	1.40	1.33 ~ 1.47
1900	40.0	38.0 ~ 42.0	1.40	1.33 ~ 1.47
2000	40.0	38.0 ~ 42.0	1.40	1.33 ~ 1.47
2300	39.5	37.5 ~ 41.5	1.67	1.59 ~ 1.75
2450	39.2	37.2 ~ 41.2	1.80	1.71 ~ 1.89
2600	39.0	37.1 ~ 41.0	1.96	1.86 ~ 2.06
3500	37.9	36.0 ~ 39.8	2.91	2.76 ~ 3.06
5200	36.0	34.2 ~ 37.8	4.66	4.43 ~ 4.89
5300	35.9	34.1 ~ 37.7	4.76	4.52 ~ 5.00
5500	35.6	33.8 ~ 37.4	4.96	4.71 ~ 5.21
5600	35.5	33.7 ~ 37.3	5.07	4.82 ~ 5.32
5800	35.3	33.5 ~ 37.1	5.27	5.01 ~ 5.53
For Body				
750	55.5	52.7 ~ 58.3	0.96	0.91 ~ 1.01
835	55.2	52.4 ~ 58.0	0.97	0.92 ~ 1.02
900	55.0	52.3 ~ 57.8	1.05	1.00 ~ 1.10
1450	54.0	51.3 ~ 56.7	1.30	1.24 ~ 1.37
1640	53.8	51.1 ~ 56.5	1.40	1.33 ~ 1.47
1750	53.4	50.7 ~ 56.1	1.49	1.42 ~ 1.56
1800	53.3	50.6 ~ 56.0	1.52	1.44 ~ 1.60
1900	53.3	50.6 ~ 56.0	1.52	1.44 ~ 1.60
2000	53.3	50.6 ~ 56.0	1.52	1.44 ~ 1.60
2300	52.9	50.3 ~ 55.5	1.81	1.72 ~ 1.90
2450	52.7	50.1 ~ 55.3	1.95	1.85 ~ 2.05
2600	52.5	49.9 ~ 55.1	2.16	2.05 ~ 2.27
3500	51.3	48.7 ~ 53.9	3.31	3.14 ~ 3.48
5200	49.0	46.6 ~ 51.5	5.30	5.04 ~ 5.57
5300	48.9	46.5 ~ 51.3	5.42	5.15 ~ 5.69
5500	48.6	46.2 ~ 51.0	5.65	5.37 ~ 5.93
5600	48.5	46.1 ~ 50.9	5.77	5.48 ~ 6.06
5800	48.2	45.8 ~ 50.6	6.00	5.70 ~ 6.30

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The following table gives the recipes for tissue simulating liquids.

Table-3.2 Recipes of Tissue Simulating Liquid

Tissue Type	Bactericide	DGBE	HEC	NaCl	Sucrose	Triton X-100	Water	Diethylene Glycol Mono-hexylether
H750	0.2	-	0.2	1.5	56.0	-	42.1	-
H835	0.2	-	0.2	1.5	57.0	-	41.1	-
H900	0.2	-	0.2	1.4	58.0	-	40.2	-
H1450	-	43.3	-	0.6	-	-	56.1	-
H1640	-	45.8	-	0.5	-	-	53.7	-
H1750	-	47.0	-	0.4	-	-	52.6	-
H1800	-	44.5	-	0.3	-	-	55.2	-
H1900	-	44.5	-	0.2	-	-	55.3	-
H2000	-	44.5	-	0.1	-	-	55.4	-
H2300	-	44.9	-	0.1	-	-	55.0	-
H2450	-	45.0	-	0.1	-	-	54.9	-
H2600	-	45.1	-	0.1	-	-	54.8	-
H3500	-	8.0	-	0.2	-	20.0	71.8	-
H5G	-	-	-	-	-	17.2	65.5	17.3
B750	0.2	-	0.2	0.8	48.8	-	50.0	-
B835	0.2	-	0.2	0.9	48.5	-	50.2	-
B900	0.2	-	0.2	0.9	48.2	-	50.5	-
B1450	-	34.0	-	0.3	-	-	65.7	-
B1640	-	32.5	-	0.3	-	-	67.2	-
B1750	-	31.0	-	0.2	-	-	68.8	-
B1800	-	29.5	-	0.4	-	-	70.1	-
B1900	-	29.5	-	0.3	-	-	70.2	-
B2000	-	30.0	-	0.2	-	-	69.8	-
B2300	-	31.0	-	0.1	-	-	68.9	-
B2450	-	31.4	-	0.1	-	-	68.5	-
B2600	-	31.8	-	0.1	-	-	68.1	-
B3500	-	28.8	-	0.1	-	-	71.1	-
B5G	-	-	-	-	-	10.7	78.6	10.7

3.3 SAR System Verification

The system check verifies that the system operates within its specifications. It is performed daily or before every SAR measurement. The system check uses normal SAR measurements in the flat section of the phantom with a matched dipole at a specified distance. The system verification setup is shown as below.

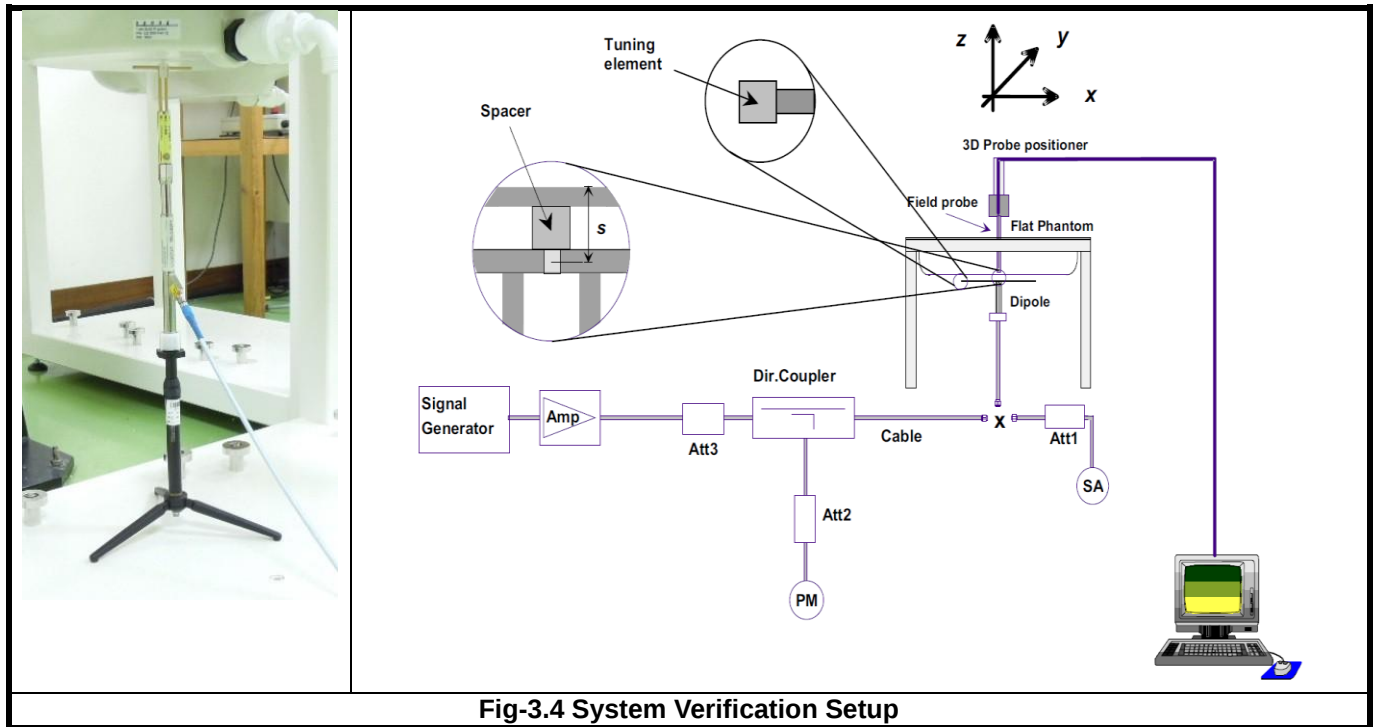


Fig-3.4 System Verification Setup

The validation dipole is placed beneath the flat phantom with the specific spacer in place. The distance spacer is touch the phantom surface with a light pressure at the reference marking and be oriented parallel to the long side of the phantom. The spectrum analyzer measures the forward power at the location of the system check dipole connector. The signal generator is adjusted for the desired forward power (250 mW is used for 700 MHz to 3 GHz, 100 mW is used for 3.5 GHz to 6 GHz) at the dipole connector and the power meter is read at that level. After connecting the cable to the dipole, the signal generator is readjusted for the same reading at power meter.

After system check testing, the SAR result will be normalized to 1W forward input power and compared with the reference SAR value derived from validation dipole certificate report. The deviation of system check should be within 10 %.

3.4 SAR Measurement Procedure

According to the SAR test standard, the recommended procedure for assessing the peak spatial-average SAR value consists of the following steps:

- Power reference measurement
- Area scan
- Zoom scan
- Power drift measurement

The SAR measurement procedures for each of test conditions are as follows:

- Make EUT to transmit maximum output power
- Measure conducted output power through RF cable
- Place the EUT in the specific position of phantom
- Perform SAR testing steps on the DASY system
- Record the SAR value

3.4.1 Area & Zoom Scan Procedure

First Area Scan is used to locate the approximate location(s) of the local peak SAR value(s). The measurement grid within an Area Scan is defined by the grid extent, grid step size and grid offset. Next, in order to determine the EM field distribution in a three-dimensional spatial extension, Zoom Scan is required. The Zoom Scan is performed around the highest E-field value to determine the averaged SAR-distribution over 10 g. According to KDB 865664 D01, the resolution for Area and Zoom scan is specified in the table below.

Items	<= 2 GHz	2-3 GHz	3-4 GHz	4-5 GHz	5-6 GHz
Area Scan ($\Delta x, \Delta y$)	<= 15 mm	<= 12 mm	<= 12 mm	<= 10 mm	<= 10 mm
Zoom Scan ($\Delta x, \Delta y$)	<= 8 mm	<= 5 mm	<= 5 mm	<= 4 mm	<= 4 mm
Zoom Scan (Δz)	<= 5 mm	<= 5 mm	<= 4 mm	<= 3 mm	<= 2 mm
Zoom Scan Volume	>= 30 mm	>= 30 mm	>= 28 mm	>= 25 mm	>= 22 mm

Note:

When zoom scan is required and report SAR is <= 1.4 W/kg, the zoom scan resolution of $\Delta x / \Delta y$ (2-3GHz: <= 8 mm, 3-4GHz: <= 7 mm, 4-6GHz: <= 5 mm) may be applied.

3.4.2 Volume Scan Procedure

The volume scan is used for assess overlapping SAR distributions for antennas transmitting in different frequency bands. It is equivalent to an oversized zoom scan used in standalone measurements. The measurement volume will be used to enclose all the simultaneous transmitting antennas. For antennas transmitting simultaneously in different frequency bands, the volume scan is measured separately in each frequency band. In order to sum correctly to compute the 1g aggregate SAR, the EUT remain in the same test position for all measurements and all volume scan use the same spatial resolution and grid spacing. When all volume scan were completed, the software, SEMCAD postprocessor can combine and subsequently superpose these measurement data to calculating the multiband SAR.

3.4.3 Power Drift Monitoring

All SAR testing is under the EUT install full charged battery and transmit maximum output power. In DASY measurement software, the power reference measurement and power drift measurement procedures are used for monitoring the power drift of EUT during SAR test. Both these procedures measure the field at a specified reference position before and after the SAR testing. The software will calculate the field difference in dB. If the power drift more than 5%, the SAR will be retested.

3.4.4 Spatial Peak SAR Evaluation

The procedure for spatial peak SAR evaluation has been implemented according to the test standard. It can be conducted for 1g and 10g, as well as for user-specific masses. The DASY software includes all numerical procedures necessary to evaluate the spatial peak SAR value.

The base for the evaluation is a "cube" measurement. The measured volume must include the 1g and 10g cubes with the highest averaged SAR values. For that purpose, the center of the measured volume is aligned to the interpolated peak SAR value of a previously performed area scan.

The entire evaluation of the spatial peak values is performed within the post-processing engine (SEMCAD). The system always gives the maximum values for the 1g and 10g cubes. The algorithm to find the cube with highest averaged SAR is divided into the following stages:

- (a) Extraction of the measured data (grid and values) from the Zoom Scan
- (b) Calculation of the SAR value at every measurement point based on all stored data (A/D values and measurement parameters)
- (c) Generation of a high-resolution mesh within the measured volume
- (d) Interpolation of all measured values from the measurement grid to the high-resolution grid
- (e) Extrapolation of the entire 3-D field distribution to the phantom surface over the distance from sensor to surface
- (f) Calculation of the averaged SAR within masses of 1g and 10g

3.4.5 SAR Averaged Methods

In DASY, the interpolation and extrapolation are both based on the modified Quadratic Shepard's method. The interpolation scheme combines a least-square fitted function method and a weighted average method which are the two basic types of computational interpolation and approximation.

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. The uncertainty increases with the extrapolation distance. To keep the uncertainty within 1% for the 1 g and 10 g cubes, the extrapolation distance should not be larger than 5 mm.

4. SAR Measurement Evaluation

4.1 EUT Configuration and Setting

<Connections between EUT and System Simulator>

For WWAN SAR testing, the EUT was linked and controlled by base station emulator (Agilent E5515C is used for GSM/WCDMA/CDMA, and Anritsu MT8820C is used for LTE). Communication between the EUT and the emulator was established by air link. The distance between the EUT and the communicating antenna of the emulator is larger than 50 cm and the output power radiated from the emulator antenna is at least 30 dB smaller than the output power of EUT. The EUT was set from the emulator to radiate maximum output power during SAR testing.

<Considerations Related to GSM / GPRS / EDGE for Setup and Testing>

The maximum multi-slot capability supported by this device is as below.

1. This EUT is class B device
2. This EUT supports GPRS multi-slot class 12 (max. uplink: 4, max. downlink: 4, total timeslots: 5)
3. This EUT supports EDGE multi-slot class 12 (max. uplink: 4, max. downlink: 4, total timeslots: 5)

For GSM850 frequency band, the power control level is set to 5 for GSM mode and GPRS (GMSK: CS1), and set to 8 for EDGE (GMSK: MCS1, 8PSK: MCS9). For GSM1900 frequency band, the power control level is set to 0 for GSM mode and GPRS (GMSK: CS1), and set to 2 for EDGE (GMSK: MCS1, 8PSK: MCS9).

SAR test reduction for GPRS and EDGE modes is determined by the source-based time-averaged output power specified for production units, including tune-up tolerance. The data mode with highest specified time-averaged output power should be tested for SAR compliance in the applicable exposure conditions. For modes with the same specified maximum output power and tolerance, the higher number time-slot configuration should be tested.

<Considerations Related to WCDMA for Setup and Testing>

Release 5 HSDPA Data Devices

The 3G SAR test reduction procedure is applied to body SAR with 12.2 kbps RMC as the primary mode. Otherwise, body SAR for HSDPA is measured using an FRC with H-Set 1 in Sub-test 1 and a 12.2 kbps RMC configured in Test Loop Mode 1, for the highest reported SAR configuration in 12.2 kbps RMC without HSDPA. 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 below. The CQI value is determined by the UE category, transport block size, number of HS-PDSCHs and modulation used in the H-set.

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Sub-test	β_c	β_d	β_d (SF)	β_c / β_d	$\beta_{hs}^{(1)}$	CM (dB) ⁽²⁾	MPR
1	2 / 15	15 / 15	64	2 / 15	4 / 15	0.0	0
2	12 / 15 ⁽³⁾	15 / 15 ⁽³⁾	64	12 / 15 ⁽³⁾	24 / 15	1.0	0
3	15 / 15	8 / 15	64	15 / 8	30 / 15	1.5	0.5
4	15 / 15	4 / 15	64	15 / 4	30 / 15	1.5	0.5

Note 1: Δ_{ACK} , Δ_{NACK} and $\Delta_{CQI} = 8 \Leftrightarrow A_{hs} = \beta_{hs} / \beta_c = 30 / 15 \Leftrightarrow \beta_{hs} = 30 / 15 * \beta_c$.
Note 2: CM = 1 for $\beta_c / \beta_d = 12 / 15$, $\beta_{hs} / \beta_c = 24 / 15$.
Note 3: For subtest 2 the β_c / β_d ratio of 12 / 15 for the TFC during the measurement period (TF1, TF0) is achieved by setting the signaled gain factors for the reference TFC (TF1, TF1) to $\beta_c = 11 / 15$ and $\beta_d = 15 / 15$.

Release 6 HSPA Data Devices

The 3G SAR test reduction procedure is applied to body SAR with 12.2 kbps RMC as the primary mode. Otherwise, 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 below.

Sub-test	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	$\beta_{ed1}: 47/15$ $\beta_{ed2}: 47/15$	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 Table 5.1g.
Note 6: β_{ed} cannot be set directly; it is set by Absolute Grant Value.

<Considerations Related to WLAN for Setup and Testing>

In general, various vendor specific external test software and chipset based internal test modes are typically used for SAR measurement. These chipset based test mode utilities are generally hardware and manufacturer dependent, and often include substantial flexibility to reconfigure or reprogram a device. A Wi-Fi device must be configured to transmit continuously at the required data rate, channel bandwidth and signal modulation, using the highest transmission duty factor supported by the test mode tools for SAR measurement. The test frequencies established using test mode must correspond to the actual channel frequencies. When 802.11 frame gaps are accounted for in the transmission, a maximum transmission duty factor of 92 - 96% is typically achievable in most test mode configurations. A minimum transmission duty factor of 85% is required to avoid certain hardware and device implementation issues related to wide range SAR scaling. In addition, a periodic transmission duty factor is required for current generation SAR systems to measure SAR correctly. The reported SAR must be scaled to 100% transmission duty factor to determine compliance at the maximum tune-up tolerance limit.

According to KDB 248227 D01, this device has installed WLAN engineering testing software which can provide continuous transmitting RF signal. During WLAN SAR testing, this device was operated to transmit continuously at the maximum transmission duty with specified transmission mode, operating frequency, lowest data rate, and maximum output power.

Initial Test Configuration

An initial test configuration is determined for OFDM transmission modes in 2.4 GHz and 5 GHz bands according to the channel bandwidth, modulation and data rate combination(s) with the highest maximum output power specified for production units in each standalone and aggregated frequency band. When the same maximum power is specified for multiple transmission modes in a frequency band, the largest channel bandwidth, lowest order modulation, lowest data rate and lowest order 802.11a/g/n/ac mode is used for SAR measurement, on the highest measured output power channel in the initial test configuration, for each frequency band.

Subsequent Test Configuration

SAR measurement requirements for the remaining 802.11 transmission mode configurations that have not been tested in the initial test configuration are determined separately for each standalone and aggregated frequency band, in each exposure condition, according to the maximum output power specified for production units. Additional power measurements may be required to determine if SAR measurements are required for subsequent highest output power channels in a subsequent test configuration. When the highest reported SAR for the initial test configuration according to the initial test position or fixed exposure position requirements, is adjusted by the ratio of the subsequent test configuration to initial test configuration specified maximum output power and the adjusted SAR is ≤ 1.2 W/kg, SAR is not required for that subsequent test configuration.

SAR Test Configuration and Channel Selection

When multiple channel bandwidth configurations in a frequency band have the same specified maximum output power, the initial test configuration is using largest channel bandwidth, lowest order modulation, lowest data rate, and lowest order 802.11 mode (i.e., 802.11a is chosen over 802.11n then 802.11ac or 802.11g is chosen over 802.11n). After an initial test configuration is determined, if multiple test channels have the same measured maximum output power, the channel chosen for SAR measurement is determined according to the following.

- 1) The channel closest to mid-band frequency is selected for SAR measurement.
- 2) For channels with equal separation from mid-band frequency; for example, high and low channels or two mid-band channels, the higher frequency (number) channel is selected for SAR measurement.

Test Reduction for U-NII-1 (5.2 GHz) and U-NII-2A (5.3 GHz) Bands

For devices that operate in both U-NII bands using the same transmitter and antenna(s), SAR test reduction is determined according to the following.

- 1) When the same maximum output power is specified for both bands, begin SAR measurement in U-NII-2A band by applying the OFDM SAR requirements. If the highest reported SAR for a test configuration is ≤ 1.2 W/kg, SAR is not required for U-NII-1 band for that configuration (802.11 mode and exposure condition).
- 2) When different maximum output power is specified for the bands, begin SAR measurement in the band with higher specified maximum output power. The highest reported SAR for the tested configuration is adjusted by the ratio of lower to higher specified maximum output power for the two bands. When the adjusted SAR is ≤ 1.2 W/kg, SAR is not required for the band with lower maximum output power in that test configuration.

<Considerations Related to Bluetooth for Setup and Testing>

This device has installed Bluetooth engineering testing software which can provide continuous transmitting RF signal. During Bluetooth SAR testing, this device was operated to transmit continuously at the maximum transmission duty with specified transmission mode, operating frequency, lowest data rate, and maximum output power.

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4.2 EUT Testing Position

This hand-held device was test on the limbs and body exposure conditions. Body SAR was tested on the Rear Face (the edge closest to transmitting antenna) with 0 cm separation distance. Limbs SAR was tested on the Rear Face, Left Side and Right Side without separation distance.

4.2.1 Simultaneous Transmission Possibilities

The simultaneous transmission possibilities for this device are listed as below.

Simultaneous TX Combination	Capable Transmit Configurations	Body	Extremity
1	GSM850 (Data) + WLAN (Data)	Yes	Yes
2	GSM1900 (Data) + WLAN (Data)	Yes	Yes
3	WCDMA II (Data) + WLAN (Data)	Yes	Yes
4	WCDMA V (Data) + WLAN (Data)	Yes	Yes
5	GSM850 (Data) + BT (Data)	Yes	Yes
6	GSM1900 (Data) + BT (Data)	Yes	Yes
7	WCDMA II (Data) + BT (Data)	Yes	Yes
8	WCDMA V (Data) + BT (Data)	Yes	Yes

Note:

1. The 2.4G WLAN and 5G WLAN cannot transmit simultaneously.
2. This device does not support voice transmission capability.

4.3 Tissue Verification

The measuring results for tissue simulating liquid are shown as below.

Test Date	Tissue Type	Frequency (MHz)	Liquid Temp. (°C)	Measured Conductivity (σ)	Measured Permittivity (ϵ_r)	Target Conductivity (σ)	Target Permittivity (ϵ_r)	Conductivity Deviation (%)	Permittivity Deviation (%)
Nov. 28, 2016	Extremity	835	23.3	1.014	54.813	0.97	55.2	4.54	-0.70
Nov. 28, 2016	Extremity	1900	23.1	1.563	50.973	1.52	53.3	2.83	-4.37
Dec. 19, 2016	Extremity	1900	23.3	1.561	51.868	1.52	53.3	2.70	-2.69
Dec. 19, 2016	Extremity	1900	23.3	1.561	51.868	1.52	53.3	2.70	-2.69
Dec. 09, 2016	Extremity	2450	23.6	2.024	50.672	1.95	52.7	3.79	-3.85
Dec. 10, 2016	Extremity	2450	23.6	2.049	53.714	1.95	52.7	5.08	1.92
Dec. 09, 2016	Extremity	5250	23.6	5.468	49.230	5.36	48.0	2.01	2.56
Dec. 09, 2016	Extremity	5600	23.6	5.832	48.608	5.77	48.5	1.07	0.22
Dec. 09, 2016	Extremity	5800	23.3	6.053	46.721	6.00	48.2	0.88	-3.07
Nov. 28, 2016	Body	835	23.3	1.014	54.813	0.97	55.2	4.54	-0.70
Nov. 28, 2016	Body	1900	23.1	1.563	50.973	1.52	53.3	2.83	-4.37
Dec. 19, 2016	Body	1900	23.3	1.566	52.151	1.52	53.3	3.03	-2.16
Dec. 10, 2016	Body	2450	23.6	2.049	53.714	1.95	52.7	5.08	1.92
Dec. 09, 2016	Body	5250	23.6	5.468	49.230	5.36	48.0	2.01	2.56
Dec. 09, 2016	Body	5600	23.6	5.832	48.608	5.77	48.5	1.07	0.22
Dec. 09, 2016	Body	5800	23.6	6.081	48.651	6.00	48.2	1.35	0.94

Note:

The dielectric properties of the tissue simulating liquid must be measured within 24 hours before the SAR testing and within $\pm 5\%$ of the target values. Liquid temperature during the SAR testing must be within $\pm 2^\circ\text{C}$.

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4.4 System Validation

The SAR measurement system was validated according to procedures in KDB 865664 D01. The validation status in tabulated summary is as below.

Test Date	Probe S/N	Calibration Point		Measured Conductivity (σ)	Measured Permittivity (ϵ_r)	Validation for CW			Validation for Modulation		
						Sensitivity Range	Probe Linearity	Probe Isotropy	Modulation Type	Duty Factor	PAR
Nov. 28, 2016	7350	Extremity	835	1.014	54.813	Pass	Pass	Pass	GMSK	Pass	N/A
Nov. 28, 2016	7350	Extremity	1900	1.563	50.973	Pass	Pass	Pass	GMSK	Pass	N/A
Dec. 19, 2016	3661	Extremity	1900	1.561	51.868	Pass	Pass	Pass	GMSK	Pass	N/A
Dec. 19, 2016	1790	Extremity	1900	1.561	51.868	Pass	Pass	Pass	GMSK	Pass	N/A
Dec. 09, 2016	3650	Extremity	2450	2.024	50.672	Pass	Pass	Pass	OFDM	N/A	Pass
Dec. 10, 2016	3661	Extremity	2450	2.049	53.714	Pass	Pass	Pass	OFDM	N/A	Pass
Dec. 09, 2016	3661	Extremity	5250	5.468	49.230	Pass	Pass	Pass	OFDM	N/A	Pass
Dec. 09, 2016	3661	Extremity	5600	5.832	48.608	Pass	Pass	Pass	OFDM	N/A	Pass
Dec. 09, 2016	3650	Extremity	5800	6.053	46.721	Pass	Pass	Pass	OFDM	N/A	Pass
Nov. 28, 2016	7350	Body	835	1.014	54.813	Pass	Pass	Pass	GMSK	Pass	N/A
Nov. 28, 2016	7350	Body	1900	1.563	50.973	Pass	Pass	Pass	GMSK	Pass	N/A
Dec. 19, 2016	1790	Body	1900	1.561	51.868	Pass	Pass	Pass	GMSK	Pass	N/A
Dec. 10, 2016	3661	Body	2450	2.049	53.714	Pass	Pass	Pass	OFDM	N/A	Pass
Dec. 09, 2016	3661	Body	5250	5.468	49.230	Pass	Pass	Pass	OFDM	N/A	Pass
Dec. 09, 2016	3661	Body	5600	5.832	48.608	Pass	Pass	Pass	OFDM	N/A	Pass
Dec. 09, 2016	3661	Body	5800	6.081	48.651	Pass	Pass	Pass	OFDM	N/A	Pass

4.5 System Verification

The measuring result for system verification is tabulated as below.

Note:

Comparing to the reference SAR value provided by SPEAG, the validation data should be within its specification of 10 %. The result indicates the system check can meet the variation criterion and the plots can be referred to Appendix A of this report.

Test Date	Mode	Frequency (MHz)	1W Target SAR-10g (W/kg)	Measured SAR-10g (W/kg)	Normalized to 1W SAR-1g (W/kg)	Deviation (%)	Dipole S/N	Probe S/N	DAE S/N
Nov. 28, 2016	Extremity	835	6.28	1.47	5.88	-6.37	4d121	7350	1305
Nov. 28, 2016	Extremity	1900	21.40	5.21	20.84	-2.62	5d036	7350	1305
Dec. 19, 2016	Extremity	1900	21.40	5.01	20.04	-6.36	5d036	3661	1235
Dec. 19, 2016	Extremity	1900	21.40	5.27	21.08	-1.50	5d036	1790	1277
Dec. 09, 2016	Extremity	2450	24.10	5.76	23.04	-4.40	737	3650	861
Dec. 10, 2016	Extremity	2450	24.10	5.68	22.72	-5.73	737	3661	1235
Dec. 09, 2016	Extremity	5250	21.70	2.23	22.30	2.76	1019	3661	1235
Dec. 09, 2016	Extremity	5600	22.30	2.17	21.70	-2.69	1019	3661	1235
Dec. 09, 2016	Extremity	5800	21.40	2.23	22.30	4.21	1019	3650	861

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Test Date	Mode	Frequency (MHz)	1W Target SAR-1g (W/kg)	Measured SAR-1g (W/kg)	Normalized to 1W SAR-1g (W/kg)	Deviation (%)	Dipole S/N	Probe S/N	DAE S/N
Nov. 28, 2016	Body	835	9.57	2.24	8.96	-6.37	4d121	7350	1305
Nov. 28, 2016	Body	1900	40.70	10.00	40.00	-1.72	5d036	7350	1305
Dec. 19, 2016	Body	1900	40.70	10.20	40.80	0.25	5d036	1790	1277
Dec. 10, 2016	Body	2450	51.10	12.20	48.80	-4.50	737	3661	1235
Dec. 09, 2016	Body	5250	77.60	7.76	77.60	0.00	1019	3661	1235
Dec. 09, 2016	Body	5600	79.60	7.67	76.70	-3.64	1019	3661	1235
Dec. 09, 2016	Body	5800	77.30	7.72	77.20	-0.13	1019	3661	1235

4.6 Maximum Output Power

4.6.1 Maximum Conducted Power

The maximum conducted average power (Unit: dBm) including tune-up tolerance is shown as below.

Mode	Maximum Burst-Averaged Output Power		Maximum Frame-Averaged Output Power	
	GSM850	GSM1900	GSM850	GSM1900
GSM (GMSK, 1Tx-slot)	33.0	30.0	24.0	21.0
GPRS (GMSK, 1Tx-slot)	32.5	29.5	23.5	20.5
GPRS (GMSK, 2Tx-slot)	30.0	28.0	24.0	22.0
GPRS (GMSK, 3Tx-slot)	28.0	25.0	23.7	20.7
GPRS (GMSK, 4Tx-slot)	28.0	24.0	25.0	21.0
EDGE (8PSK, 1Tx-slot)	27.0	26.0	18.0	17.0
EDGE (8PSK, 2Tx-slot)	24.0	23.0	18.0	17.0
EDGE (8PSK, 3Tx-slot)	23.0	21.0	18.7	16.7
EDGE (8PSK, 4Tx-slot)	21.0	20.0	18.0	17.0

Note:

- SAR testing was performed on the maximum frame-averaged power mode.
- The frame-averaged power is linearly proportion to the slot number configured and it is linearly scaled the maximum burst-averaged power based on time slots. The calculated method is shown as below:

$$\text{Frame-averaged power} = 10 \times \log (\text{Burst-averaged power mW} \times \text{Slot used} / 8)$$

Mode	WCDMA Band II	WCDMA Band V
RMC 12.2K	23.5	23.5
HSDPA	23.5	23.5
HSUPA	23.5	23.5

Mode	2.4G WLAN	5.2G WLAN	5.3G WLAN	5.6G WLAN	5.8G WLAN
802.11b	16.0	N/A	N/A	N/A	N/A
802.11g	14.0	N/A	N/A	N/A	N/A
802.11a	N/A	12.5	12.5	12.5	12.5
802.11n HT20	12.5	11.5	11.5	11.5	11.5
802.11n HT40	N/A	11.5	11.5	11.5	11.5
802.11ac VHT80	N/A	9.0	9.0	9.0	9.0

Mode	2.4G Bluetooth
Bluetooth	8.5

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4.6.2 Measured Conducted Power Result

The measuring conducted average power (Unit: dBm) is shown as below.

Band	GSM850			GSM1900		
Channel	128	189	251	512	661	810
Frequency (MHz)	824.2	836.4	848.8	1850.2	1880.0	1909.8
Maximum Burst-Averaged Output Power						
GSM (GMSK, 1Tx-slot)	32.48	32.46	32.40	29.37	29.51	29.48
GPRS (GMSK, 1Tx-slot)	32.46	32.44	32.31	29.31	29.49	29.41
GPRS (GMSK, 2Tx-slot)	29.69	29.58	29.55	26.46	26.58	26.51
GPRS (GMSK, 3Tx-slot)	27.83	27.79	27.68	24.64	24.80	24.76
GPRS (GMSK, 4Tx-slot)	26.55	26.65	26.58	23.47	23.60	23.53
EDGE (8PSK, 1Tx-slot)	26.58	26.56	26.53	25.20	25.41	25.34
EDGE (8PSK, 2Tx-slot)	23.52	23.50	23.42	22.14	22.36	22.31
EDGE (8PSK, 3Tx-slot)	22.89	22.81	22.66	20.43	20.61	20.56
EDGE (8PSK, 4Tx-slot)	20.61	20.53	20.43	19.01	19.22	19.17

Band	WCDMA Band II			WCDMA Band V			3GPP MPR (dB)
Channel	9262	9400	9538	4132	4182	4233	
Frequency (MHz)	1852.4	1880.0	1907.6	826.4	836.4	846.6	
RMC 12.2K	23.41	23.48	23.33	23.31	23.12	23.29	-
HSDPA Subtest-1	23.36	23.42	23.21	23.29	23.10	23.24	0
HSDPA Subtest-2	23.14	23.24	23.08	23.07	22.86	22.99	0
HSDPA Subtest-3	22.94	22.99	22.86	22.86	22.62	22.79	0.5
HSDPA Subtest-4	22.66	22.76	22.65	22.62	22.36	22.51	0.5
HSUPA Subtest-1	23.20	23.29	23.13	22.41	22.18	22.28	0
HSUPA Subtest-2	21.18	21.25	21.13	21.14	20.90	21.03	2
HSUPA Subtest-3	22.00	22.09	21.95	21.80	21.61	21.72	1
HSUPA Subtest-4	21.42	21.49	21.40	21.03	21.09	21.27	2
HSUPA Subtest-5	23.10	23.20	22.97	23.20	23.01	23.18	0

<WLAN 2.4G>

Mode	802.11b		
Channel / Frequency (MHz)	1 (2412)	6 (2437)	11 (2462)
Average Power	14.85	15.44	15.92

<WLAN 5.3G>

Mode	802.11a			
Channel / Frequency (MHz)	52 (5260)	56 (5280)	60 (5300)	64 (5320)
Average Power	11.49	11.26	11.40	12.03

<WLAN 5.6G>

Mode	802.11a			
Channel / Frequency (MHz)	100 (5500)	116 (5580)	132 (5660)	140 (5700)
Average Power	12.13	11.39	10.44	10.56

<WLAN 5.8G>

Mode	802.11a		
Channel / Frequency (MHz)	149 (5745)	157 (5785)	165 (5825)
Average Power	10.92	10.75	10.74

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<Bluetooth>

Mode	Bluetooth		
Channel / Frequency (MHz)	0 (2402)	39 (2441)	78 (2480)
Average Power	7.06	8.17	6.62

4.7 SAR Testing Results

4.7.1 SAR Test Reduction Considerations

<KDB 447498 D01, General RF Exposure Guidance>

Testing of other required channels within the operating mode of a frequency band is not required when the reported SAR for the mid-band or highest output power channel is:

- (1) ≤ 0.8 W/kg or 2.0 W/kg, for 1-g or 10-g respectively, when the transmission band is ≤ 100 MHz
- (2) ≤ 0.6 W/kg or 1.5 W/kg, for 1-g or 10-g respectively, when the transmission band is between 100 MHz and 200 MHz
- (3) ≤ 0.4 W/kg or 1.0 W/kg, for 1-g or 10-g respectively, when the transmission band is ≥ 200 MHz

<KDB 941225 D01, 3G SAR Measurement 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 $\leq 1/4$ 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.

<KDB 248227 D01, SAR Guidance for Wi-Fi Transmitters>

- (1) For handsets operating next to ear, hotspot mode or mini-tablet configurations, the initial test position procedures were applied. The test position with the highest extrapolated peak SAR will be used as the initial test position. When the reported SAR of initial test position is ≤ 0.4 W/kg, SAR testing for remaining test positions is not required. Otherwise, SAR is evaluated at the subsequent highest peak SAR positions until the reported SAR result is ≤ 0.8 W/kg or all test positions are measured.
- (2) For WLAN 2.4 GHz, the highest measured maximum output power channel for DSSS was selected for SAR measurement. When the reported SAR is ≤ 0.8 W/kg, no further SAR testing is required. Otherwise, SAR is evaluated at the next highest measured output power channel. When any reported SAR is > 1.2 W/kg, SAR is required for the third channel. For OFDM modes (802.11g/n), SAR is not required when the highest reported SAR for DSSS is adjusted by the ratio of OFDM to DSSS specified maximum output power and it is ≤ 1.2 W/kg.
- (3) For WLAN 5 GHz, the initial test configuration was selected according to the transmission mode with the highest maximum output power. When the reported SAR of initial test configuration is > 0.8 W/kg, SAR is required for the subsequent highest measured output power channel until the reported SAR result is ≤ 1.2 W/kg or all required channels are measured. For other transmission modes, SAR is not required when the highest reported SAR for initial test configuration is adjusted by the ratio of subsequent test configuration to initial test configuration specified maximum output power and it is ≤ 1.2 W/kg.

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4.7.2 SAR Results for Extremity Exposure Condition (Separation Distance is 0 cm Gap)

Plot No.	Band	Mode	Test Position	Ch.	Max. Tune-up Power (dBm)	Measured Conducted Power (dBm)	Scaling Factor	Power Drift (dB)	Measured SAR-10g (W/kg)	Scaled SAR-10g (W/kg)
01	GSM850	GPRS12	Rear Face	189	28.0	26.65	1.36	0.02	0.582	0.79
	GSM850	GPRS12	Left Side	189	28.0	26.65	1.36	-0.13	0.152	0.21
	GSM850	GPRS12	Right Side	189	28.0	26.65	1.36	0.13	0.934	1.27
02	GSM1900	GPRS10	Rear Face	661	28.0	26.58	1.39	0.05	0.315	0.44
	GSM1900	GPRS10	Left Side	661	28.0	26.58	1.39	0.01	0.067	0.09
	GSM1900	GPRS10	Right Side	661	28.0	26.58	1.39	-0.09	1.54	2.14
	GSM1900	GPRS10	Right Side	512	28.0	26.46	1.43	-0.11	1.42	2.02
	GSM1900	GPRS10	Right Side	810	28.0	26.51	1.41	-0.02	1.63	2.30
03	WCDMA II	RMC12.2K	Rear Face	9400	23.5	23.48	1.00	0.05	0.522	0.52
	WCDMA II	RMC12.2K	Left Side	9400	23.5	23.48	1.00	-0.06	0.127	0.13
	WCDMA II	RMC12.2K	Right Side	9400	23.5	23.48	1.00	0.13	3.09	3.10
	WCDMA II	RMC12.2K	Right Side	9400	23.5	23.48	1.00	-0.01	3.06	3.07
	WCDMA II	RMC12.2K	Right Side	9262	23.5	23.41	1.02	0.08	2.71	2.77
	WCDMA II	RMC12.2K	Right Side	9538	23.5	23.33	1.04	0.02	2.82	2.93
04	WCDMA V	RMC12.2K	Rear Face	4132	23.5	23.31	1.04	0.03	0.722	0.75
	WCDMA V	RMC12.2K	Left Side	4132	23.5	23.31	1.04	-0.13	0.231	0.24
	WCDMA V	RMC12.2K	Right Side	4132	23.5	23.31	1.04	0.17	1.16	1.21

Plot No.	Band	Mode	Test Position	Ch.	Max. Tune-up Power (dBm)	Measured Conducted Power (dBm)	Scaling Factor	Power Drift (dB)	Measured SAR-10g (W/kg)	Scaled SAR-10g (W/kg)
05	2.4G WLAN	802.11b	Rear Face	11	16.0	15.92	1.02	-0.06	0.027	0.03
	2.4G WLAN	802.11b	Left Side	11	16.0	15.92	1.02	0.03	0.835	0.85
	2.4G WLAN	802.11b	Right Side	11	16.0	15.92	1.02	-0.02	0.054	0.06
06	5.3G WLAN	802.11a	Rear Face	64	12.5	12.03	1.11	0	0.00000102	0.00
	5.3G WLAN	802.11a	Left Side	64	12.5	12.03	1.11	-0.01	0.472	0.53
	5.3G WLAN	802.11a	Right Side	64	12.5	12.03	1.11	0	0	0.00
07	5.6G WALN	802.11a	Rear Face	100	12.5	12.13	1.09	0	0	0.00
	5.6G WALN	802.11a	Left Side	100	12.5	12.13	1.09	0.15	0.371	0.40
	5.6G WALN	802.11a	Right Side	100	12.5	12.13	1.09	0	0	0.00
08	5.8G WLAN	802.11a	Rear Face	149	12.5	10.92	1.44	0.01	0.000111	0.00
	5.8G WLAN	802.11a	Left Side	149	12.5	10.92	1.44	-0.12	0.434	0.62
	5.8G WLAN	802.11a	Right Side	149	12.5	10.92	1.44	0.09	0.00287	0.00

Plot No.	Band	Test Position	Ch.	Max. Tune-up Power (dBm)	Measured Conducted Power (dBm)	Scaling Factor	Power Drift (dB)	Measured SAR-10g (W/kg)	Scaled SAR-10g (W/kg)
	Bluetooth	Rear Face	39	8.5	8.17	1.08	0.01	0	0.00
	Bluetooth	Left Side	39	8.5	8.17	1.08	0.03	0	0.00
	Bluetooth	Right Side	39	8.5	8.17	1.08	-0.01	0	0.00

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4.7.3 SAR Results for Body Exposure Condition (Separation Distance is 0 cm Gap)

Plot No.	Band	Mode	Test Position	Ch.	Max. Tune-up Power (dBm)	Measured Conducted Power (dBm)	Scaling Factor	Power Drift (dB)	Measured SAR-1g (W/kg)	Scaled SAR-1g (W/kg)
09	GSM850	GPRS12	Rear Face	189	28.0	26.65	1.36	0.02	0.849	1.16
	GSM850	GPRS12	Rear Face	128	28.0	26.55	1.40	-0.18	0.852	1.19
	GSM850	GPRS12	Rear Face	128	28.0	26.55	1.40	0.11	0.845	1.18
	GSM850	GPRS12	Rear Face	251	28.0	26.58	1.39	0.05	0.854	1.18
10	GSM1900	GPRS10	Rear Face	661	28.0	26.58	1.39	-0.06	0.574	0.80
	GSM1900	GPRS10	Rear Face	512	28.0	26.46	1.43	-0.04	0.525	0.75
	GSM1900	GPRS10	Rear Face	810	28.0	26.51	1.41	0.14	0.599	0.84
	WCDMA II	RMC12.2K	Rear Face	9400	23.5	23.48	1.00	-0.02	1.02	1.02
11	WCDMA II	RMC12.2K	Rear Face	9262	23.5	23.41	1.02	0.05	1.18	1.20
	WCDMA II	RMC12.2K	Rear Face	9262	23.5	23.41	1.02	-0.07	1.14	1.16
	WCDMA II	RMC12.2K	Rear Face	9538	23.5	23.33	1.04	0.09	1.01	1.05
	WCDMA II	HSDPA Subtest-1	Rear Face	9400	23.5	23.42	1.02	-0.14	0.916	0.93
	WCDMA II	HSDPA Subtest-1	Rear Face	9262	23.5	23.36	1.03	-0.08	0.992	1.02
	WCDMA II	HSDPA Subtest-1	Rear Face	9538	23.5	23.21	1.07	0.03	0.974	1.04
	WCDMA II	HSUPA Subtest-1	Rear Face	9400	23.5	23.29	1.05	-0.11	0.887	0.93
	WCDMA II	HSUPA Subtest-1	Rear Face	9262	23.5	23.20	1.07	0.06	0.972	1.04
	WCDMA II	HSUPA Subtest-1	Rear Face	9538	23.5	23.13	1.09	0.01	0.928	1.01
	WCDMA V	RMC12.2K	Rear Face	4132	23.5	23.31	1.04	0.03	1.05	1.10
	WCDMA V	RMC12.2K	Rear Face	4182	23.5	23.12	1.09	0.06	0.976	1.07
12	WCDMA V	RMC12.2K	Rear Face	4233	23.5	23.29	1.05	-0.10	1.07	1.12
	WCDMA V	RMC12.2K	Rear Face	4233	23.5	23.29	1.05	0.04	1.03	1.08

Plot No.	Band	Mode	Test Position	Ch.	Max. Tune-up Power (dBm)	Measured Conducted Power (dBm)	Scaling Factor	Power Drift (dB)	Measured SAR-1g (W/kg)	Scaled SAR-1g (W/kg)
13	2.4G WLAN	802.11b	Rear Face	11	16.0	15.92	1.02	-0.06	0.049	0.05
14	5.3G WLAN	802.11a	Rear Face	64	12.5	12.03	1.11	0	0.0000113	0.00
	5.6G WALN	802.11a	Rear Face	100	12.5	12.13	1.09	0	0	0.00
15	5.8G WLAN	802.11a	Rear Face	149	12.5	10.92	1.44	0.01	0.00105	0.00

Plot No.	Band	Test Position	Ch.	Max. Tune-up Power (dBm)	Measured Conducted Power (dBm)	Scaling Factor	Power Drift (dB)	Measured SAR-1g (W/kg)	Scaled SAR-1g (W/kg)
	Bluetooth	Rear Face	39	8.5	8.17	1.08	0.01	0	0.00

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4.7.4 SAR Measurement Variability

According to KDB 865664 D01, SAR measurement variability was assessed for each frequency band, which is determined by the SAR probe calibration point and tissue-equivalent medium used for the device measurements. When both head and body tissue-equivalent media are required for SAR measurements in a frequency band, the variability measurement procedures should be applied to the tissue medium with the highest measured SAR, using the highest measured SAR configuration for that tissue-equivalent medium. Alternatively, if the highest measured SAR for both head and body tissue-equivalent media are ≤ 1.45 W/kg and the ratio of these highest SAR values, i.e., largest divided by smallest value, is ≤ 1.10 , the highest SAR configuration for either head or body tissue-equivalent medium may be used to perform the repeated measurement. These additional measurements are repeated after the completion of all measurements requiring the same head or body tissue-equivalent medium in a frequency band. The test device should be returned to ambient conditions (normal room temperature) with the battery fully charged before it is re-mounted on the device holder for the repeated measurement(s) to minimize any unexpected variations in the repeated results.

SAR repeated measurement procedure:

1. When the highest measured SAR is < 0.80 W/kg, repeated measurement is not required.
2. When the highest measured SAR is ≥ 0.80 W/kg, repeat that measurement once.
3. If the ratio of largest to smallest SAR for the original and first repeated measurements is > 1.20 , or when the original or repeated measurement is ≥ 1.45 W/kg, perform a second repeated measurement.
4. If the ratio of largest to smallest SAR for the original, first and second repeated measurements is > 1.20 , and the original, first or second repeated measurement is ≥ 1.5 W/kg, perform a third repeated measurement.

Band	Mode	Exposure Condition	Test Position	Ch.	Original Measured SAR-1g (W/kg)	1st Repeated SAR-1g (W/kg)	L/S Ratio	2nd Repeated SAR-1g (W/kg)	L/S Ratio	3rd Repeated SAR-1g (W/kg)	L/S Ratio
WCDMA II	RMC12.2K	Extremity	Right Side	9400	3.09	3.06	1.01	N/A	N/A	N/A	N/A
WCDMA V	RMC12.2K	Extremity	Right Side	4132	1.16	1.13	1.03	N/A	N/A	N/A	N/A
GSM850	GPRS12	Body	Rear Face	128	0.852	0.845	1.01	N/A	N/A	N/A	N/A
WCDMA II	RMC12.2K	Body	Rear Face	9262	1.18	1.14	1.04	N/A	N/A	N/A	N/A
WCDMA V	RMC12.2K	Body	Rear Face	4233	1.07	1.03	1.04	N/A	N/A	N/A	N/A

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<SAR Summation Analysis>

Simultaneous transmission SAR test exclusion is determined for each operating configuration and exposure condition according to the reported standalone SAR of each applicable simultaneous transmitting antenna. When the sum of SAR_{1g} of all simultaneously transmitting antennas in an operating mode and exposure condition combination is within the SAR limit (SAR_{1g} 1.6 W/kg), the simultaneous transmission SAR is not required. When the sum of SAR_{1g} is greater than the SAR limit (SAR_{1g} 1.6 W/kg), SAR test exclusion is determined by the SPLSR.

No.	Conditions (SAR1 + SAR2)	Exposure Condition	Test Position	Max. SAR1	Max. SAR2	SAR Summation	SPLSR Analysis
01	GSM850 + WLAN (DTS)	Extremity	Rear Face	0.79	0.03	0.82	Σ 10g SAR < 4.0, Not required
			Left Side	0.21	0.85	1.06	Σ 10g SAR < 4.0, Not required
			Right Side	1.27	0.06	1.33	Σ 10g SAR < 4.0, Not required
02	GSM850 + WLAN (NII)	Extremity	Rear Face	0.79	0.00	0.79	Σ 10g SAR < 4.0, Not required
			Left Side	0.21	0.53	0.74	Σ 10g SAR < 4.0, Not required
			Right Side	1.27	0.00	1.27	Σ 10g SAR < 4.0, Not required
03	GSM850 + BT (DSS)	Extremity	Rear Face	0.79	0.00	0.79	Σ 10g SAR < 4.0, Not required
			Left Side	0.21	0.00	0.21	Σ 10g SAR < 4.0, Not required
			Right Side	1.27	0.00	1.27	Σ 10g SAR < 4.0, Not required
04	GSM850 + WLAN (DTS)	Body	Rear Face	1.19	0.05	1.24	Σ SAR < 1.6, Not required
05	GSM850 + WLAN (NII)	Body	Rear Face	1.19	0.00	1.19	Σ SAR < 1.6, Not required
06	GSM850 + BT (DSS)	Body	Rear Face	1.19	0.00	1.19	Σ SAR < 1.6, Not required

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No.	Conditions (SAR1 + SAR2)	Exposure Condition	Test Position	Max. SAR1	Max. SAR2	SAR Summation	SPLSR Analysis
07	GSM1900 + WLAN (DTS)	Extremity	Rear Face	0.44	0.03	0.47	Σ 10g SAR < 4.0, Not required
			Left Side	0.09	0.85	0.94	Σ 10g SAR < 4.0, Not required
			Right Side	2.30	0.06	2.36	Σ 10g SAR < 4.0, Not required
08	GSM1900 + WLAN (NII)	Extremity	Rear Face	0.44	0.00	0.44	Σ 10g SAR < 4.0, Not required
			Left Side	0.09	0.53	0.62	Σ 10g SAR < 4.0, Not required
			Right Side	2.30	0.00	2.30	Σ 10g SAR < 4.0, Not required
09	GSM1900 + BT (DSS)	Extremity	Rear Face	0.44	0.00	0.44	Σ 10g SAR < 4.0, Not required
			Left Side	0.09	0.00	0.09	Σ 10g SAR < 4.0, Not required
			Right Side	2.30	0.00	2.30	Σ 10g SAR < 4.0, Not required
10	GSM1900 + WLAN (DTS)	Body	Rear Face	0.84	0.05	0.89	Σ SAR < 1.6, Not required
11	GSM1900 + WLAN (NII)	Body	Rear Face	0.84	0.00	0.84	Σ SAR < 1.6, Not required
12	GSM1900 + BT (DSS)	Body	Rear Face	0.84	0.00	0.84	Σ SAR < 1.6, Not required

No.	Conditions (SAR1 + SAR2)	Exposure Condition	Test Position	Max. SAR1	Max. SAR2	SAR Summation	SPLSR Analysis
13	WCDMA II + WLAN (DTS)	Extremity	Rear Face	0.52	0.03	0.55	Σ 10g SAR < 4.0, Not required
			Left Side	0.13	0.85	0.98	Σ 10g SAR < 4.0, Not required
			Right Side	3.10	0.06	3.16	Σ 10g SAR < 4.0, Not required
14	WCDMA II + WLAN (NII)	Extremity	Rear Face	0.52	0.00	0.52	Σ 10g SAR < 4.0, Not required
			Left Side	0.13	0.53	0.66	Σ 10g SAR < 4.0, Not required
			Right Side	3.10	0.00	3.10	Σ 10g SAR < 4.0, Not required
15	WCDMA II + BT (DSS)	Extremity	Rear Face	0.52	0.00	0.52	Σ 10g SAR < 4.0, Not required
			Left Side	0.13	0.00	0.13	Σ 10g SAR < 4.0, Not required
			Right Side	3.10	0.00	3.10	Σ 10g SAR < 4.0, Not required
16	WCDMA II + WLAN (DTS)	Body	Rear Face	1.20	0.05	1.25	Σ SAR < 1.6, Not required
17	WCDMA II + WLAN (NII)	Body	Rear Face	1.20	0.00	1.20	Σ SAR < 1.6, Not required
18	WCDMA II + BT (DSS)	Body	Rear Face	1.20	0.00	1.20	Σ SAR < 1.6, Not required

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No.	Conditions (SAR1 + SAR2)	Exposure Condition	Test Position	Max. SAR1	Max. SAR2	SAR Summation	SPLSR Analysis
19	WCDMA V + WLAN (DTS)	Extremity	Rear Face	0.75	0.03	0.78	Σ 10g SAR < 4.0, Not required
			Left Side	0.24	0.85	1.09	Σ 10g SAR < 4.0, Not required
			Right Side	1.21	0.06	1.27	Σ 10g SAR < 4.0, Not required
20	WCDMA V + WLAN (NII)	Extremity	Rear Face	0.75	0.00	0.75	Σ 10g SAR < 4.0, Not required
			Left Side	0.24	0.53	0.77	Σ 10g SAR < 4.0, Not required
			Right Side	1.21	0.00	1.21	Σ 10g SAR < 4.0, Not required
21	WCDMA V + BT (DSS)	Extremity	Rear Face	0.75	0.00	0.75	Σ 10g SAR < 4.0, Not required
			Left Side	0.24	0.00	0.24	Σ 10g SAR < 4.0, Not required
			Right Side	1.21	0.00	1.21	Σ 10g SAR < 4.0, Not required
22	WCDMA V + WLAN (DTS)	Body	Rear Face	1.12	0.05	1.17	Σ SAR < 1.6, Not required
23	WCDMA V + WLAN (NII)	Body	Rear Face	1.12	0.00	1.12	Σ SAR < 1.6, Not required
24	WCDMA V + BT (DSS)	Body	Rear Face	1.12	0.00	1.12	Σ SAR < 1.6, Not required

Test Engineer : Eric Wu, and Sam Onn

5. Calibration of Test Equipment

Equipment	Manufacturer	Model	SN	Cal. Date	Cal. Interval
System Validation Dipole	SPEAG	D835V2	4d121	Aug. 25, 2016	1 Year
System Validation Dipole	SPEAG	D1900V2	5d036	Jan. 22, 2016	1 Year
System Validation Dipole	SPEAG	D2450V2	737	Aug. 26, 2016	1 Year
System Validation Dipole	SPEAG	D5GHzV2	1019	Aug. 23, 2016	1 Year
Dosimetric E-Field Probe	SPEAG	EX3DV4	3650	Jul. 25, 2016	1 Year
Dosimetric E-Field Probe	SPEAG	EX3DV4	7350	Dec. 17, 2015	1 Year
Dosimetric E-Field Probe	SPEAG	EX3DV4	3661	May. 11, 2016	1 Year
Dosimetric E-Field Probe	SPEAG	ET3DV6	1790	Jun. 24, 2016	1 Year
Data Acquisition Electronics	SPEAG	DAE4	861	Jun. 16, 2016	1 Year
Data Acquisition Electronics	SPEAG	DAE4	1305	Dec. 11, 2015	1 Year
Data Acquisition Electronics	SPEAG	DAE4	1235	Sep. 27, 2016	1 Year
Data Acquisition Electronics	SPEAG	DAE4	1277	Jul. 22, 2016	1 Year
Wireless Communication Test Set	Agilent	E5515C	MY50260642	Nov. 19, 2015	2 Years
Spectrum Analyzer	R&S	FSL6	102006	Mar. 25, 2016	1 Year
ENA Series Network Analyzer	Agilent	E5071C	MY46214281	Jun. 13, 2016	1 Year
MXG Analog Signal Generator	Agilent	N5181A	MY50143868	Jul. 07, 2016	1 Year
Power Meter	Anritsu	ML2495A	1218009	Jul. 06, 2016	1 Year
Power Sensor	Anritsu	MA2411B	1207252	Jul. 06, 2016	1 Year
Thermometer	YFE	YF-160A	150601220	May. 04, 2016	1 Year

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6. Measurement Uncertainty

Source of Uncertainty	Tolerance (± %)	Probability Distribution	Divisor	Ci (1g)	Ci (10g)	Standard Uncertainty (± %, 1g)	Standard Uncertainty (± %, 10g)	Vi
Measurement System								
Probe Calibration	6.0	Normal	1	1	1	6.0	6.0	∞
Axial Isotropy	4.7	Rectangular	√3	0.707	0.707	1.9	1.9	∞
Hemispherical Isotropy	9.6	Rectangular	√3	0.707	0.707	3.9	3.9	∞
Boundary Effect	1.0	Rectangular	√3	1	1	0.6	0.6	∞
Linearity	4.7	Rectangular	√3	1	1	2.7	2.7	∞
System Detection Limits	0.25	Rectangular	√3	1	1	0.14	0.14	∞
Readout Electronics	0.3	Normal	1	1	1	0.3	0.3	∞
Response Time	0.0	Rectangular	√3	1	1	0.0	0.0	∞
Integration Time	1.7	Rectangular	√3	1	1	1.0	1.0	∞
RF Ambient Conditions - Noise	3.0	Rectangular	√3	1	1	1.7	1.7	∞
RF Ambient Conditions - Reflections	3.0	Rectangular	√3	1	1	1.7	1.7	∞
Probe Positioner Mechanical Tolerance	0.4	Rectangular	√3	1	1	0.2	0.2	∞
Probe Positioning with Respect to Phantom Shell	2.9	Rectangular	√3	1	1	1.7	1.7	∞
Extrapolation, interpolation, and integration algorithms for max. SAR evaluation	2.0	Rectangular	√3	1	1	1.2	1.2	∞
Test Sample Related								
Test Sample Positioning	1.5 / 0.7	Normal	1	1	1	1.5	0.7	32
Device Holder Uncertainty	4.2 / 1.8	Normal	1	1	1	4.2	1.8	32
Output Power Variation - SAR Drift Measurement	5.0	Rectangular	√3	1	1	2.9	2.9	∞
Phantom and Tissue Parameters								
Phantom Uncertainty (Shape and Thickness Tolerances)	7.2	Rectangular	√3	1	1	4.2	4.2	∞
Liquid Conductivity - Deviation from Target Values	5.0	Rectangular	√3	0.64	0.43	1.8	1.2	∞
Liquid Conductivity - Measurement Uncertainty	1.0	Normal	1	0.64	0.43	0.6	0.4	25
Liquid Permittivity - Deviation from Target Values	5.0	Rectangular	√3	0.60	0.49	1.7	1.4	∞
Liquid Permittivity - Measurement Uncertainty	0.5	Normal	1	0.60	0.49	0.3	0.2	25
Combined Standard Uncertainty						± 11.2 %	± 10.4 %	
Expanded Uncertainty (K=2)						± 22.4 %	± 20.8 %	

Uncertainty budget for the frequency range of 300 MHz to 3 GHz

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Source of Uncertainty	Tolerance ($\pm$ %)	Probability Distribution	Divisor	Ci (1g)	Ci (10g)	Standard Uncertainty ($\pm$ %, 1g)	Standard Uncertainty ($\pm$ %, 10g)	Vi
Measurement System								
Probe Calibration	6.55	Normal	1	1	1	6.55	6.55	∞
Axial Isotropy	4.7	Rectangular	$\sqrt{3}$	0.707	0.707	1.9	1.9	∞
Hemispherical Isotropy	9.6	Rectangular	$\sqrt{3}$	0.707	0.707	3.9	3.9	∞
Boundary Effect	2.0	Rectangular	$\sqrt{3}$	1	1	1.2	1.2	∞
Linearity	4.7	Rectangular	$\sqrt{3}$	1	1	2.7	2.7	∞
System Detection Limits	0.25	Rectangular	$\sqrt{3}$	1	1	0.14	0.14	∞
Readout Electronics	0.3	Normal	1	1	1	0.3	0.3	∞
Response Time	0.0	Rectangular	$\sqrt{3}$	1	1	0.0	0.0	∞
Integration Time	1.7	Rectangular	$\sqrt{3}$	1	1	1.0	1.0	∞
RF Ambient Conditions - Noise	3.0	Rectangular	$\sqrt{3}$	1	1	1.7	1.7	∞
RF Ambient Conditions - Reflections	3.0	Rectangular	$\sqrt{3}$	1	1	1.7	1.7	∞
Probe Positioner Mechanical Tolerance	0.4	Rectangular	$\sqrt{3}$	1	1	0.2	0.2	∞
Probe Positioning with Respect to Phantom Shell	6.7	Rectangular	$\sqrt{3}$	1	1	3.9	3.9	∞
Extrapolation, interpolation, and integration algorithms for max. SAR evaluation	4.0	Rectangular	$\sqrt{3}$	1	1	2.3	2.3	∞
Test Sample Related								
Test Sample Positioning	1.5 / 0.7	Normal	1	1	1	1.5	0.7	32
Device Holder Uncertainty	4.2 / 1.8	Normal	1	1	1	4.2	1.8	32
Output Power Variation - SAR Drift Measurement	5.0	Rectangular	$\sqrt{3}$	1	1	2.9	2.9	∞
Phantom and Tissue Parameters								
Phantom Uncertainty (Shape and Thickness Tolerances)	7.6	Rectangular	$\sqrt{3}$	1	1	4.4	4.4	∞
Liquid Conductivity - Deviation from Target Values	5.0	Rectangular	$\sqrt{3}$	0.64	0.43	1.8	1.2	∞
Liquid Conductivity - Measurement Uncertainty	1.0	Normal	1	0.64	0.43	0.6	0.4	25
Liquid Permittivity - Deviation from Target Values	5.0	Rectangular	$\sqrt{3}$	0.60	0.49	1.7	1.4	∞
Liquid Permittivity - Measurement Uncertainty	0.5	Normal	1	0.60	0.49	0.3	0.2	25
Combined Standard Uncertainty						± 12.3 %	± 11.5 %	
Expanded Uncertainty (K=2)						± 24.6 %	± 23.0 %	

Uncertainty budget for the frequency range of 3 GHz to 6 GHz

FCC SAR Test Report

7. Information on the Testing Laboratories

We, Bureau Veritas Consumer Products Services (H.K.) Ltd., Taoyuan Branch, were founded in 1988 to provide our best service in EMC, Radio, Telecom and Safety consultation. Our laboratories are accredited and approved according to ISO/IEC 17025.

If you have any comments, please feel free to contact us at the following:

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The road map of all our labs can be found in our web site also.

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Appendix A. SAR Plots of System Verification

The plots for system verification with largest deviation for each SAR system combination are shown as follows.

System Check_B835_161128**DUT: Dipole 835 MHz; Type: D835V2; SN: 4d121**

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

Medium: B07T10N3_1128 Medium parameters used: $f = 835$ MHz; $\sigma = 1.014$ S/m; $\epsilon_r = 54.813$; $\rho = 1000$ kg/m³

Ambient Temperature : 23.7 °C ; Liquid Temperature : 23.3 °C

DASY5 Configuration:

- Probe: EX3DV4 - SN7350; ConvF(9.83, 9.83, 9.83); Calibrated: 2015/12/17;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1305; Calibrated: 2015/12/11
- Phantom: Twin SAM Phantom_1654; Type: QD000P40;
- Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7373)

Pin=250mW/Area Scan (61x61x1): Interpolated grid: dx=1.500 mm, dy=1.500 mm

Maximum value of SAR (interpolated) = 3.00 W/kg

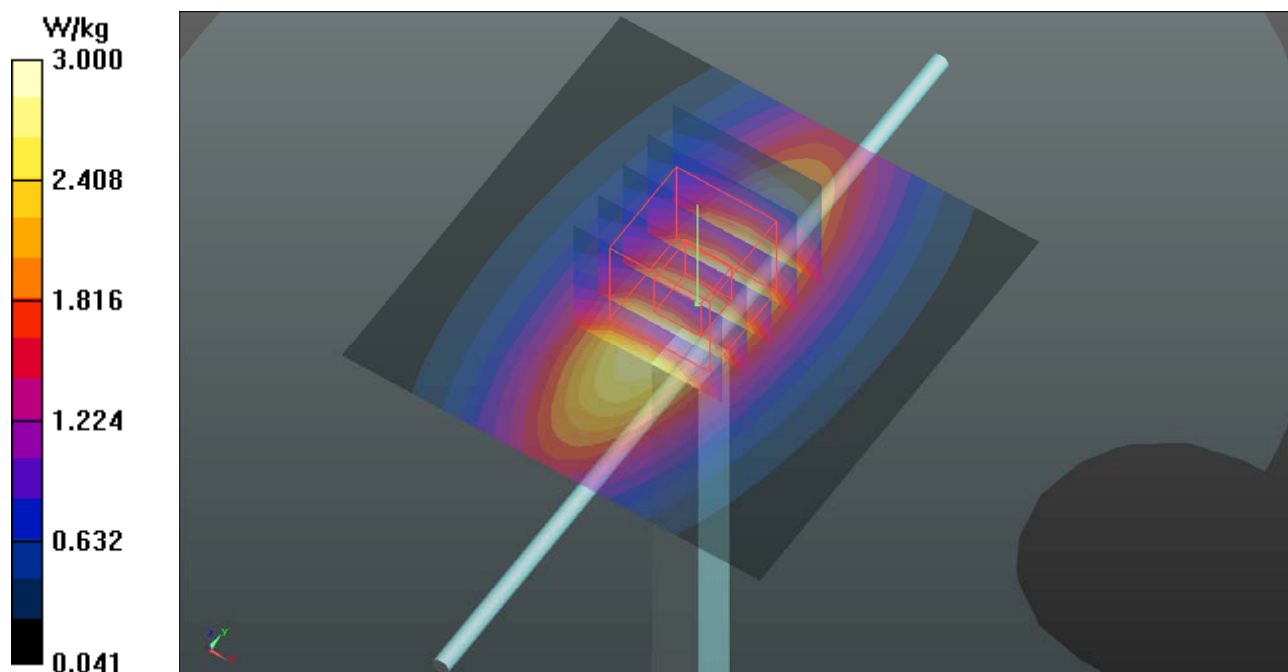
Pin=250mW/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 56.69 V/m; Power Drift = -0.07 dB

Peak SAR (extrapolated) = 3.36 W/kg

SAR(1 g) = 2.24 W/kg; SAR(10 g) = 1.47 W/kg

Maximum value of SAR (measured) = 2.99 W/kg



System Check_B1900_161219**DUT: Dipole 1900 MHz; Type: D1900V2; SN: 5d036**

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

Medium: B16T20N1_1219 Medium parameters used: $f = 1900$ MHz; $\sigma = 1.561$ S/m; $\epsilon_r = 51.868$; $\rho = 1000$ kg/m³

Ambient Temperature : 23.7 °C ; Liquid Temperature : 23.3 °C

DASY5 Configuration:

- Probe: EX3DV4 - SN3661; ConvF(7.79, 7.79, 7.79); Calibrated: 2016/05/11;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1235; Calibrated: 2016/09/27
- Phantom: Twin SAM Phantom_1822; Type: QD000P40;
- Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7373)

Pin=250mW/Area Scan (61x61x1): Interpolated grid: dx=1.500 mm, dy=1.500 mm

Maximum value of SAR (interpolated) = 14.9 W/kg

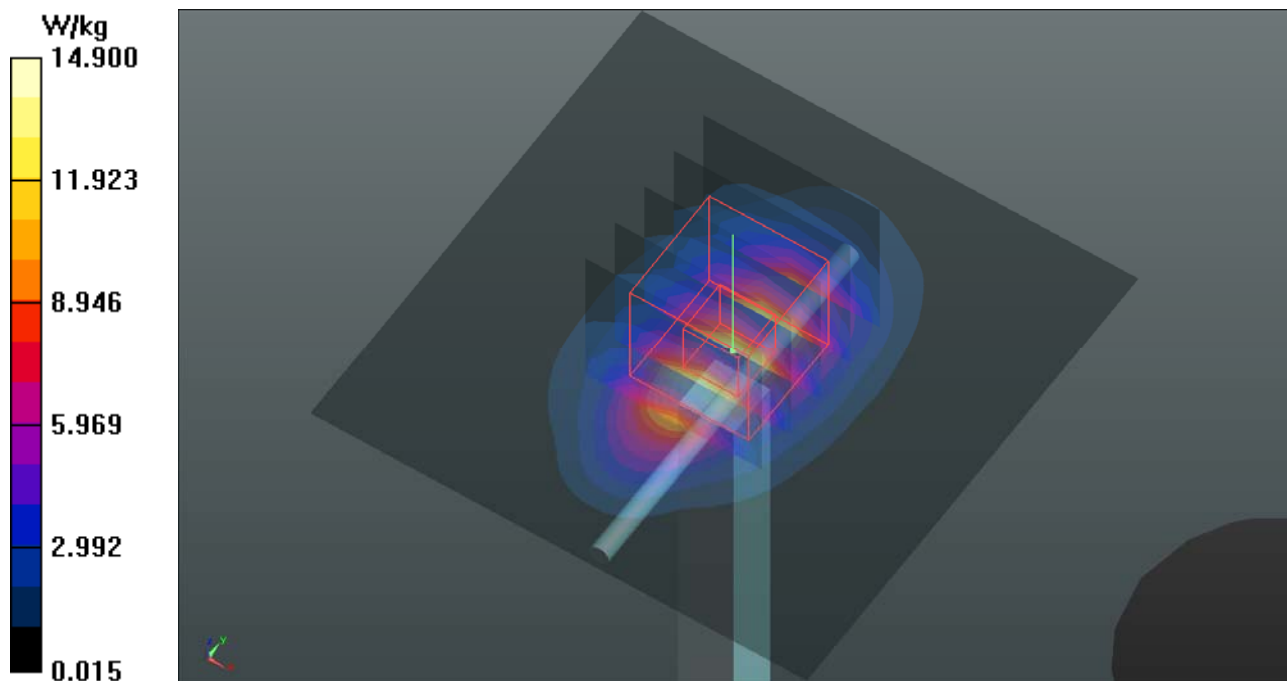
Pin=250mW/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 100.1 V/m; Power Drift = -0.15 dB

Peak SAR (extrapolated) = 17.7 W/kg

SAR(1 g) = 9.66 W/kg; SAR(10 g) = 5.01 W/kg

Maximum value of SAR (measured) = 15.0 W/kg



System Check_B2450_161210**DUT: Dipole 2450 MHz; Type: D2450V2; SN: 737**

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

Medium: B19T27N2_1210 Medium parameters used: $f = 2450$ MHz; $\sigma = 2.049$ S/m; $\epsilon_r = 53.714$; $\rho = 1000$ kg/m³

Ambient Temperature : 23.8 °C ; Liquid Temperature : 23.6 °C

DASY5 Configuration:

- Probe: EX3DV4 - SN3661; ConvF(7.44, 7.44, 7.44); Calibrated: 2016/05/11;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1235; Calibrated: 2016/09/27
- Phantom: Twin SAM Phantom_1822; Type: QD000P40;
- Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7373)

Pin=250mW/Area Scan (81x81x1): Interpolated grid: dx=1.200 mm, dy=1.200 mm

Maximum value of SAR (interpolated) = 18.6 W/kg

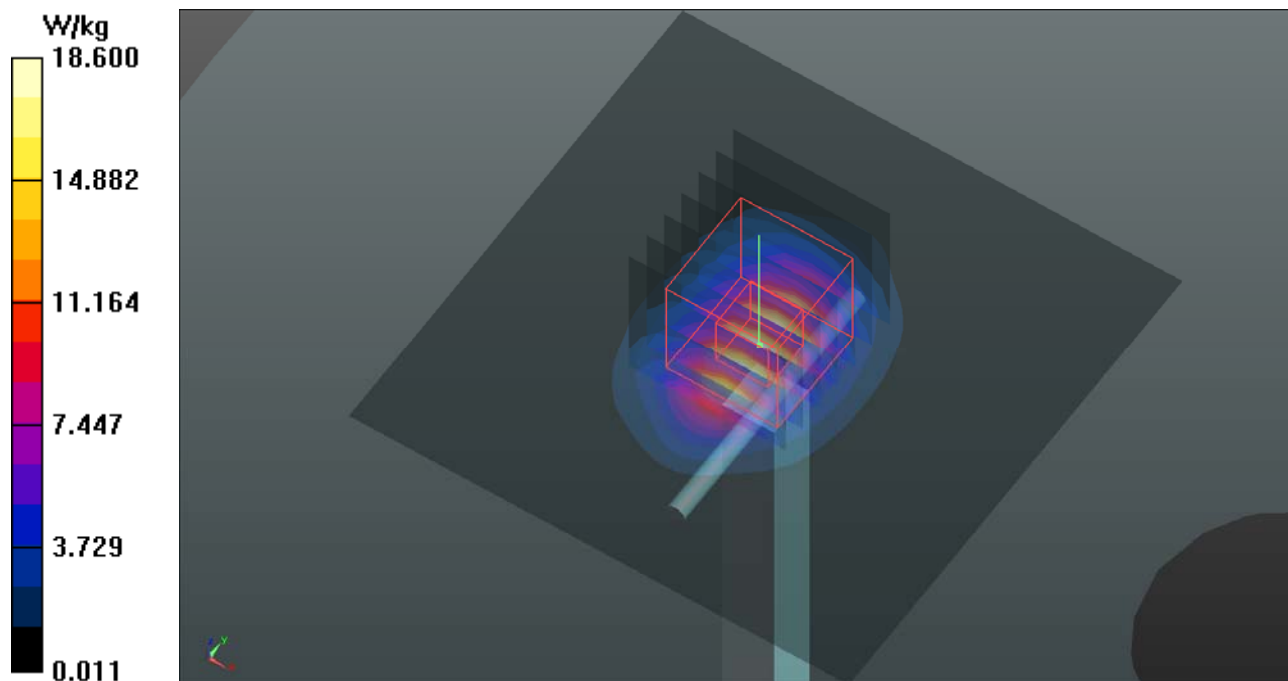
Pin=250mW/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 96.29 V/m; Power Drift = -0.03 dB

Peak SAR (extrapolated) = 25.2 W/kg

SAR(1 g) = 12.2 W/kg; SAR(10 g) = 5.68 W/kg

Maximum value of SAR (measured) = 18.8 W/kg



System Check_B5250_161209**DUT: Dipole 5 GHz; Type: D5GHzV2; SN: 1019**

Communication System: CW; Frequency: 5300 MHz; Duty Cycle: 1:1

Medium: B34T60N1_1209 Medium parameters used: $f = 5300$ MHz; $\sigma = 5.468$ S/m; $\epsilon_r = 49.23$; $\rho = 1000$ kg/m³

Ambient Temperature : 23.8 °C ; Liquid Temperature : 23.6 °C

DASY5 Configuration:

- Probe: EX3DV4 - SN3661; ConvF(4.69, 4.69, 4.69); Calibrated: 2016/05/11;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1235; Calibrated: 2016/09/27
- Phantom: Twin SAM Phantom_1822; Type: QD000P40;
- Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7373)

Pin=100mW/Area Scan (91x91x1): Interpolated grid: dx=1.000 mm, dy=1.000 mm

Maximum value of SAR (interpolated) = 17.9 W/kg

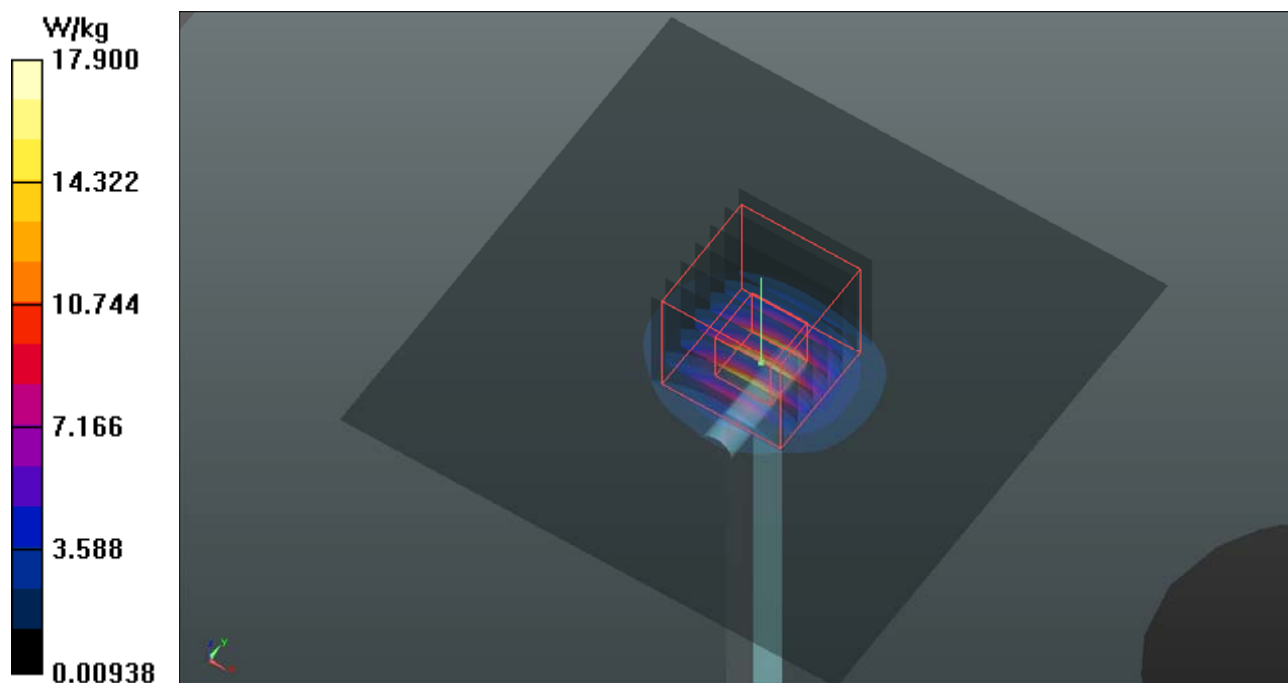
Pin=100mW/Zoom Scan (7x7x12)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=2mm

Reference Value = 58.47 V/m; Power Drift = -0.07 dB

Peak SAR (extrapolated) = 29.7 W/kg

SAR(1 g) = 7.76 W/kg; SAR(10 g) = 2.23 W/kg

Maximum value of SAR (measured) = 19.2 W/kg



System Check_B5600_161209**DUT: Dipole 5 GHz; Type: D5GHzV2; SN: 1019**

Communication System: CW; Frequency: 5600 MHz; Duty Cycle: 1:1

Medium: B34T60N1_1209 Medium parameters used: $f = 5600$ MHz; $\sigma = 5.832$ S/m; $\epsilon_r = 48.608$; $\rho = 1000$ kg/m³

Ambient Temperature : 23.8 °C ; Liquid Temperature : 23.6 °C

DASY5 Configuration:

- Probe: EX3DV4 - SN3661; ConvF(4.28, 4.28, 4.28); Calibrated: 2016/05/11;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1235; Calibrated: 2016/09/27
- Phantom: Twin SAM Phantom_1822; Type: QD000P40;
- Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7373)

Pin=100mW/Area Scan (91x91x1): Interpolated grid: dx=1.000 mm, dy=1.000 mm

Maximum value of SAR (interpolated) = 18.4 W/kg

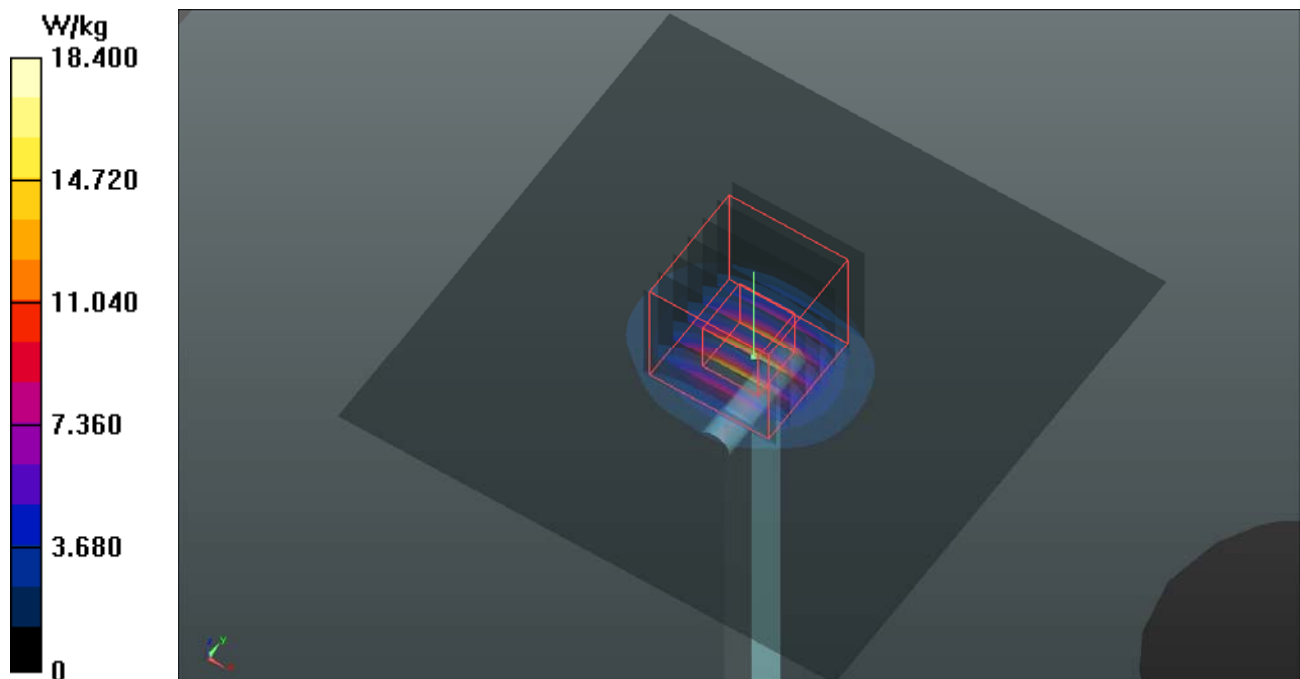
Pin=100mW/Zoom Scan (7x7x12)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=2mm

Reference Value = 58.83 V/m; Power Drift = -0.03 dB

Peak SAR (extrapolated) = 31.7 W/kg

SAR(1 g) = 7.67 W/kg; SAR(10 g) = 2.17 W/kg

Maximum value of SAR (measured) = 19.3 W/kg



System Check_B5800_161209**DUT: Dipole 5 GHz; Type: D5GHzV2; SN: 1019**

Communication System: CW; Frequency: 5800 MHz; Duty Cycle: 1:1

Medium: B34T60N1_1209 Medium parameters used: $f = 5800$ MHz; $\sigma = 6.053$ S/m; $\epsilon_r = 46.721$; $\rho = 1000$ kg/m³

Ambient Temperature : 23.9 °C ; Liquid Temperature : 23.3 °C

DASY5 Configuration:

- Probe: EX3DV4 - SN3650; ConvF(4.36, 4.36, 4.36); Calibrated: 2016/07/25;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn861; Calibrated: 2016/06/16
- Phantom: Twin SAM Phantom_1823; Type: QD000P40CD;
- Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7373)

Pin=100mW/Area Scan (91x91x1): Interpolated grid: dx=1.000 mm, dy=1.000 mm

Maximum value of SAR (interpolated) = 15.9 W/kg

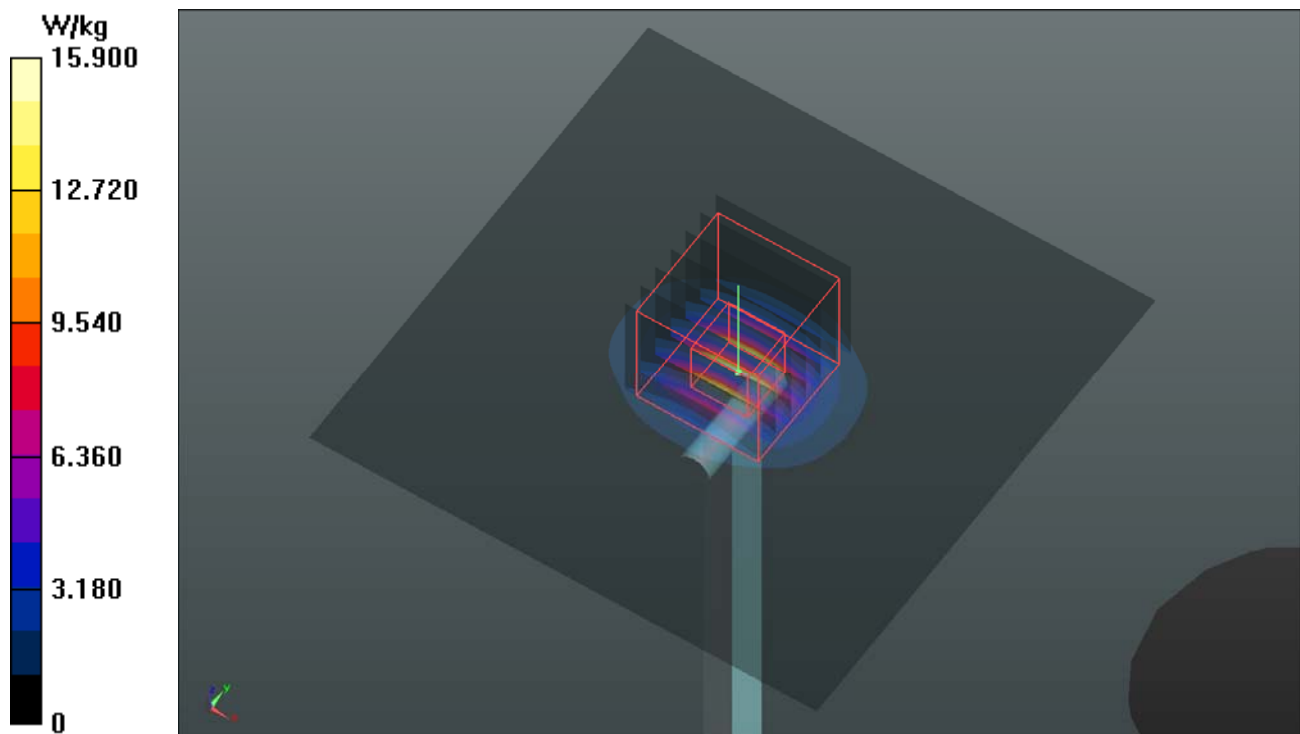
Pin=100mW/Zoom Scan (7x7x12)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=2mm

Reference Value = 59.25 V/m; Power Drift = -0.03 dB

Peak SAR (extrapolated) = 33.1 W/kg

SAR(1 g) = 8 W/kg; SAR(10 g) = 2.23 W/kg

Maximum value of SAR (measured) = 17.4 W/kg



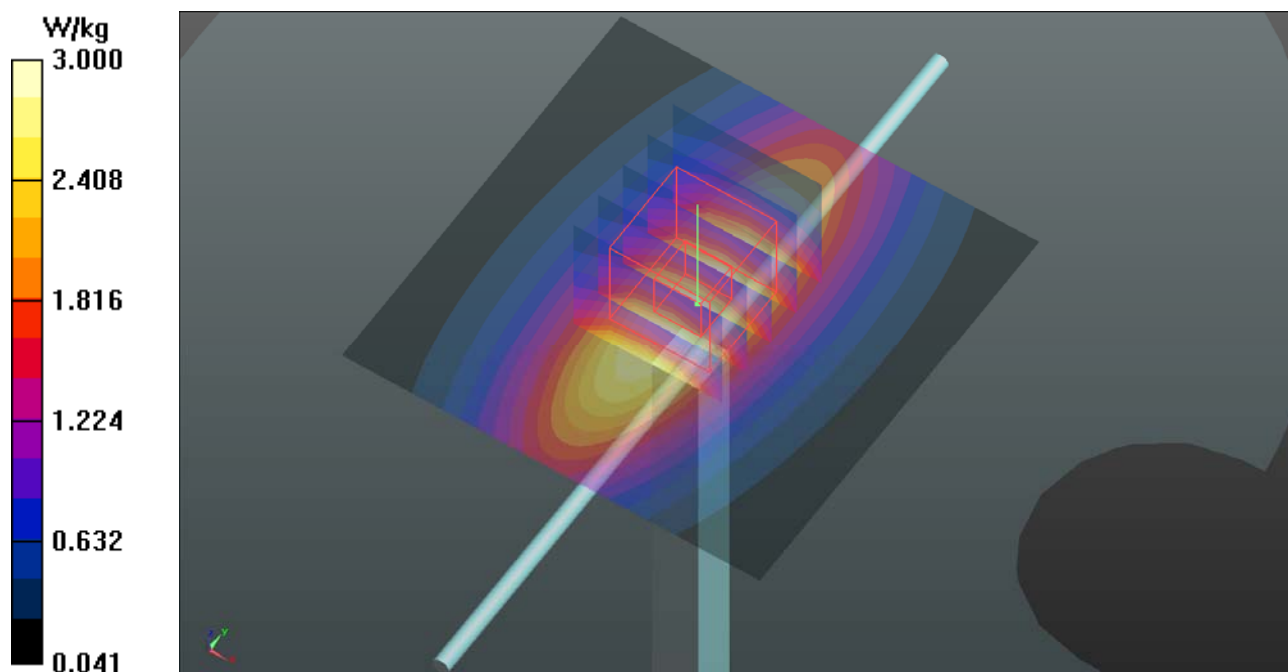
System Check_B835_161128**DUT: Dipole 835 MHz; Type: D835V2; SN: 4d121**

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

Medium: B07T10N3_1128 Medium parameters used: $f = 835 \text{ MHz}$; $\sigma = 1.014 \text{ S/m}$; $\epsilon_r = 54.813$; $\rho = 1000 \text{ kg/m}^3$ Ambient Temperature : 23.7°C ; Liquid Temperature : 23.3°C

DASY5 Configuration:

- Probe: EX3DV4 - SN7350; ConvF(9.83, 9.83, 9.83); Calibrated: 2015/12/17;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1305; Calibrated: 2015/12/11
- Phantom: Twin SAM Phantom_1654; Type: QD000P40;
- Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7373)

Pin=250mW/Area Scan (61x61x1): Interpolated grid: $dx=1.500 \text{ mm}$, $dy=1.500 \text{ mm}$ Maximum value of SAR (interpolated) = 3.00 W/kg **Pin=250mW/Zoom Scan (5x5x7)/Cube 0:** Measurement grid: $dx=8\text{mm}$, $dy=8\text{mm}$, $dz=5\text{mm}$ Reference Value = 56.69 V/m ; Power Drift = -0.07 dB Peak SAR (extrapolated) = 3.36 W/kg **SAR(1 g) = 2.24 W/kg ; SAR(10 g) = 1.47 W/kg** Maximum value of SAR (measured) = 2.99 W/kg 

System Check_B1900_161128**DUT: Dipole 1900 MHz; Type: D1900V2; SN: 5d036**

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

Medium: B16T20N1_1128 Medium parameters used: $f = 1900$ MHz; $\sigma = 1.563$ S/m; $\epsilon_r = 50.973$; $\rho = 1000$ kg/m³

Ambient Temperature : 23.5 °C ; Liquid Temperature : 23.1 °C

DASY5 Configuration:

- Probe: EX3DV4 - SN7350; ConvF(8.04, 8.04, 8.04); Calibrated: 2015/12/17;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1305; Calibrated: 2015/12/11
- Phantom: Twin SAM Phantom_1654; Type: QD000P40;
- Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7373)

Pin=250mW/Area Scan (61x61x1): Interpolated grid: dx=1.500 mm, dy=1.500 mm

Maximum value of SAR (interpolated) = 15.3 W/kg

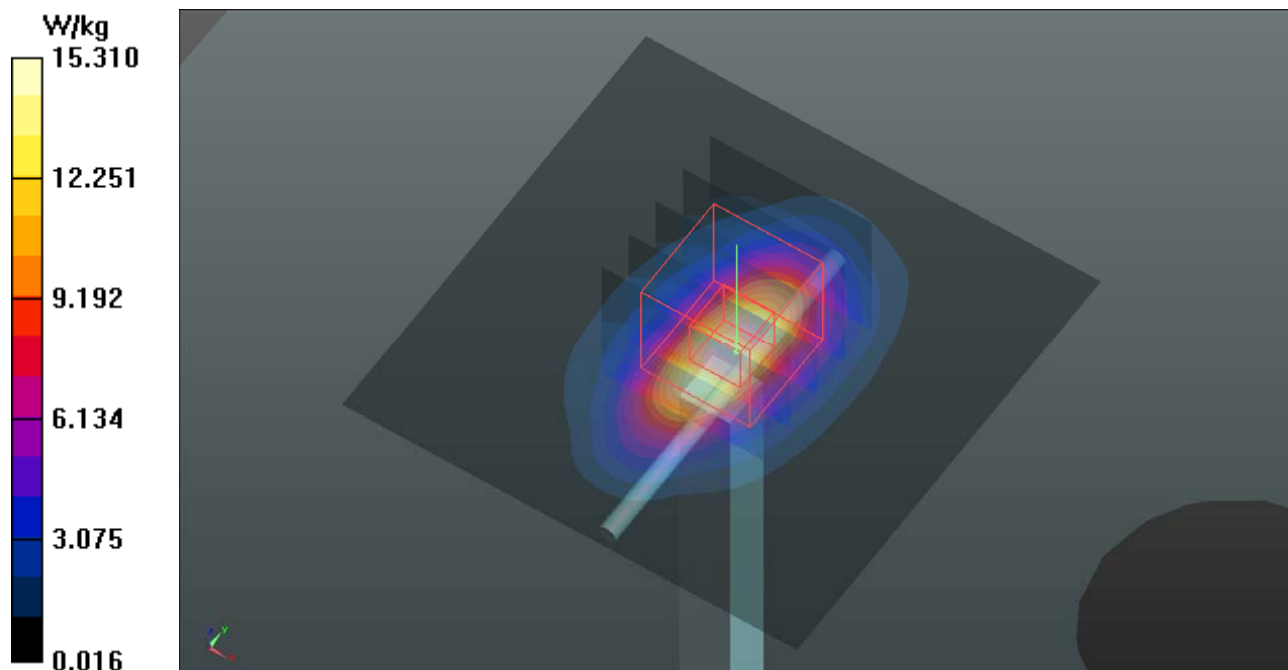
Pin=250mW/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 101.2 V/m; Power Drift = -0.18 dB

Peak SAR (extrapolated) = 18.4 W/kg

SAR(1 g) = 10 W/kg; SAR(10 g) = 5.21 W/kg

Maximum value of SAR (measured) = 15.5 W/kg



System Check_B2450_161210**DUT: Dipole 2450 MHz; Type: D2450V2; SN: 737**

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

Medium: B19T27N2_1210 Medium parameters used: $f = 2450$ MHz; $\sigma = 2.049$ S/m; $\epsilon_r = 53.714$; $\rho = 1000$ kg/m³

Ambient Temperature : 23.8 °C ; Liquid Temperature : 23.6 °C

DASY5 Configuration:

- Probe: EX3DV4 - SN3661; ConvF(7.44, 7.44, 7.44); Calibrated: 2016/05/11;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1235; Calibrated: 2016/09/27
- Phantom: Twin SAM Phantom_1822; Type: QD000P40;
- Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7373)

Pin=250mW/Area Scan (81x81x1): Interpolated grid: dx=1.200 mm, dy=1.200 mm

Maximum value of SAR (interpolated) = 18.6 W/kg

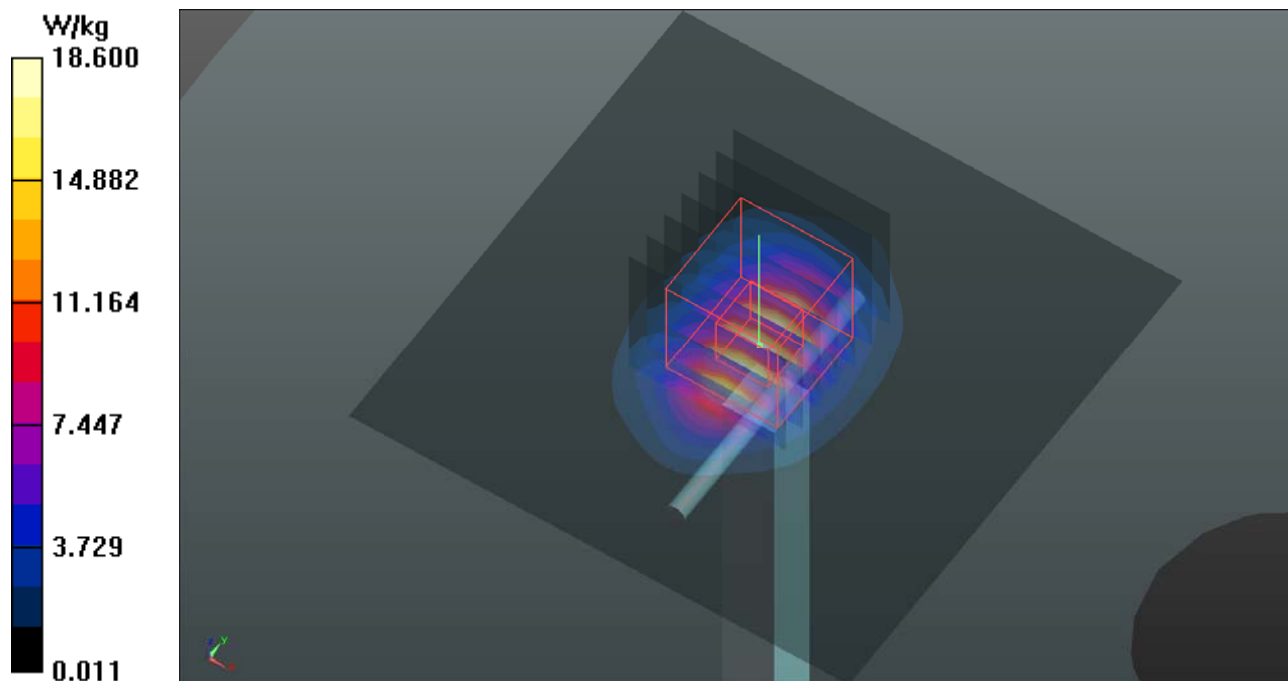
Pin=250mW/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 96.29 V/m; Power Drift = -0.03 dB

Peak SAR (extrapolated) = 25.2 W/kg

SAR(1 g) = 12.2 W/kg; SAR(10 g) = 5.68 W/kg

Maximum value of SAR (measured) = 18.8 W/kg



System Check_B5250_161209**DUT: Dipole 5 GHz; Type: D5GHzV2; SN: 1019**

Communication System: CW; Frequency: 5300 MHz; Duty Cycle: 1:1

Medium: B34T60N1_1209 Medium parameters used: $f = 5300$ MHz; $\sigma = 5.468$ S/m; $\epsilon_r = 49.23$; $\rho = 1000$ kg/m³

Ambient Temperature : 23.8 °C ; Liquid Temperature : 23.6 °C

DASY5 Configuration:

- Probe: EX3DV4 - SN3661; ConvF(4.69, 4.69, 4.69); Calibrated: 2016/05/11;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1235; Calibrated: 2016/09/27
- Phantom: Twin SAM Phantom_1822; Type: QD000P40;
- Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7373)

Pin=100mW/Area Scan (91x91x1): Interpolated grid: dx=1.000 mm, dy=1.000 mm

Maximum value of SAR (interpolated) = 17.9 W/kg

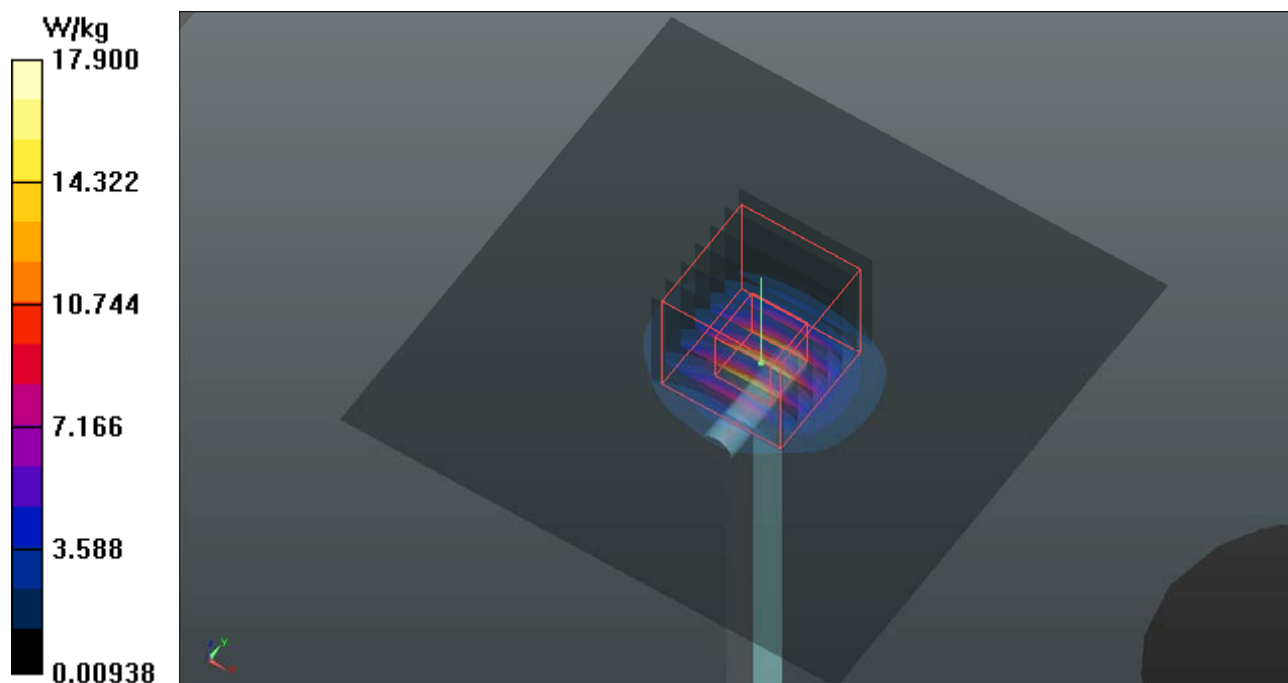
Pin=100mW/Zoom Scan (7x7x12)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=2mm

Reference Value = 58.47 V/m; Power Drift = -0.07 dB

Peak SAR (extrapolated) = 29.7 W/kg

SAR(1 g) = 7.76 W/kg; SAR(10 g) = 2.23 W/kg

Maximum value of SAR (measured) = 19.2 W/kg



System Check_B5600_161209**DUT: Dipole 5 GHz; Type: D5GHzV2; SN: 1019**

Communication System: CW; Frequency: 5600 MHz; Duty Cycle: 1:1

Medium: B34T60N1_1209 Medium parameters used: $f = 5600$ MHz; $\sigma = 5.832$ S/m; $\epsilon_r = 48.608$; $\rho = 1000$ kg/m³

Ambient Temperature : 23.8 °C ; Liquid Temperature : 23.6 °C

DASY5 Configuration:

- Probe: EX3DV4 - SN3661; ConvF(4.28, 4.28, 4.28); Calibrated: 2016/05/11;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1235; Calibrated: 2016/09/27
- Phantom: Twin SAM Phantom_1822; Type: QD000P40;
- Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7373)

Pin=100mW/Area Scan (91x91x1): Interpolated grid: dx=1.000 mm, dy=1.000 mm

Maximum value of SAR (interpolated) = 18.4 W/kg

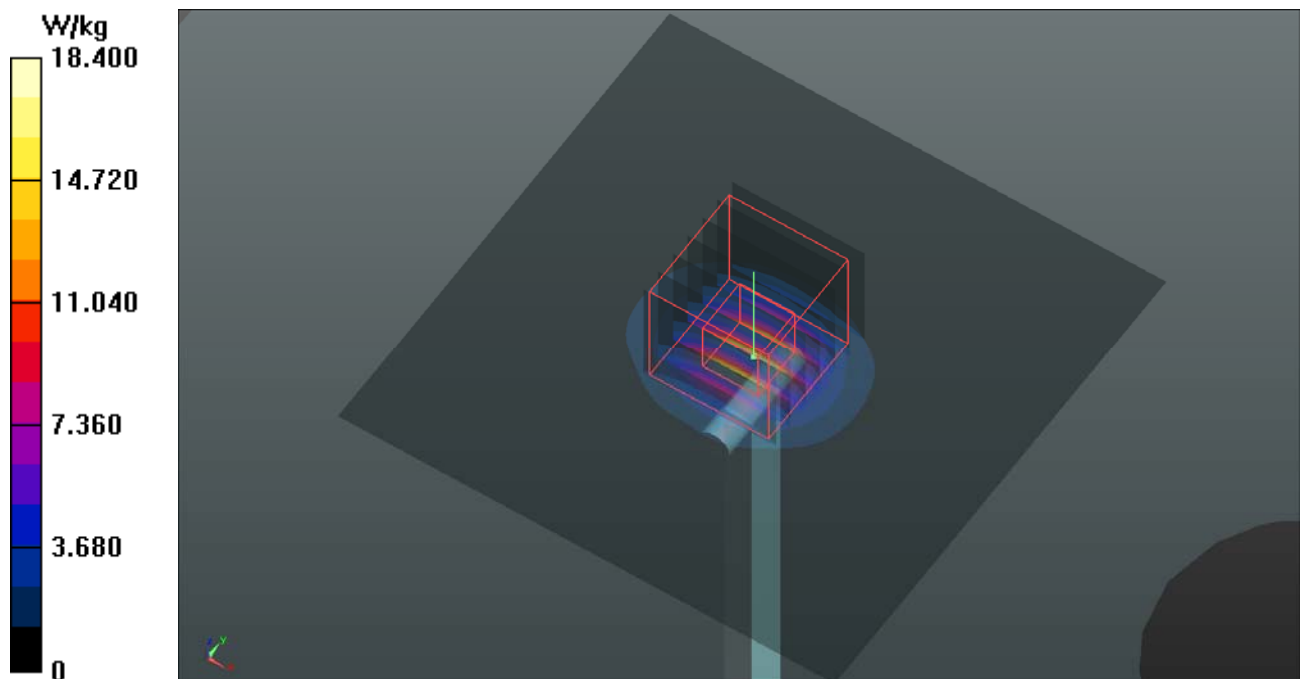
Pin=100mW/Zoom Scan (7x7x12)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=2mm

Reference Value = 58.83 V/m; Power Drift = -0.03 dB

Peak SAR (extrapolated) = 31.7 W/kg

SAR(1 g) = 7.67 W/kg; SAR(10 g) = 2.17 W/kg

Maximum value of SAR (measured) = 19.3 W/kg



System Check_B5800_161209**DUT: Dipole 5 GHz; Type: D5GHzV2; SN: 1019**

Communication System: CW; Frequency: 5800 MHz; Duty Cycle: 1:1

Medium: B34T60N1_1209 Medium parameters used: $f = 5800$ MHz; $\sigma = 6.081$ S/m; $\epsilon_r = 48.651$; $\rho = 1000$ kg/m³

Ambient Temperature : 23.8 °C ; Liquid Temperature : 23.6 °C

DASY5 Configuration:

- Probe: EX3DV4 - SN3661; ConvF(4.37, 4.37, 4.37); Calibrated: 2016/05/11;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1235; Calibrated: 2016/09/27
- Phantom: Twin SAM Phantom_1822; Type: QD000P40;
- Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7373)

Pin=100mW/Area Scan (91x91x1): Interpolated grid: dx=1.000 mm, dy=1.000 mm

Maximum value of SAR (interpolated) = 19.1 W/kg

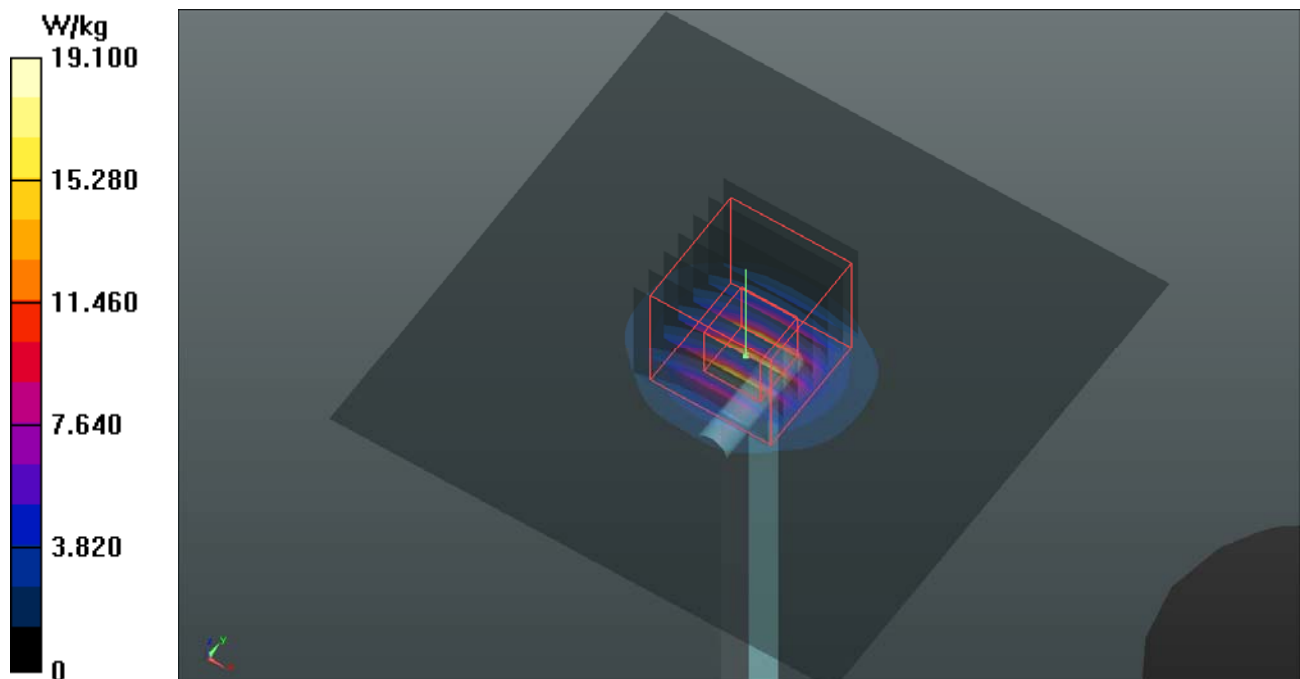
Pin=100mW/Zoom Scan (7x7x12)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=2mm

Reference Value = 56.52 V/m; Power Drift = -0.13 dB

Peak SAR (extrapolated) = 37.4 W/kg

SAR(1 g) = 7.72 W/kg; SAR(10 g) = 2.16 W/kg

Maximum value of SAR (measured) = 20.6 W/kg



Appendix B. SAR Plots of SAR Measurement

The SAR plots for highest measured SAR in each exposure configuration, wireless mode and frequency band combination, and measured SAR > 1.5 W/kg are shown as follows.

P01 GSM850_GPRS12_Right Side_0cm_Ch189**DUT: 161114C10**

Communication System: GPRS12; Frequency: 836.4 MHz; Duty Cycle: 1:2

Medium: B07T10N3_1128 Medium parameters used: $f = 836.4$ MHz; $\sigma = 1.016$ S/m; $\epsilon_r = 54.794$; $\rho = 1000$ kg/m³

Ambient Temperature : 23.7 °C ; Liquid Temperature : 23.3 °C

DASY5 Configuration:

- Probe: EX3DV4 - SN7350; ConvF(9.83, 9.83, 9.83); Calibrated: 2015/12/17;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1305; Calibrated: 2015/12/11
- Phantom: Twin SAM Phantom_1654; Type: QD000P40;
- Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7373)

- Area Scan (71x121x1): Interpolated grid: dx=1.500 mm, dy=1.500 mm

Maximum value of SAR (interpolated) = 2.78 W/kg

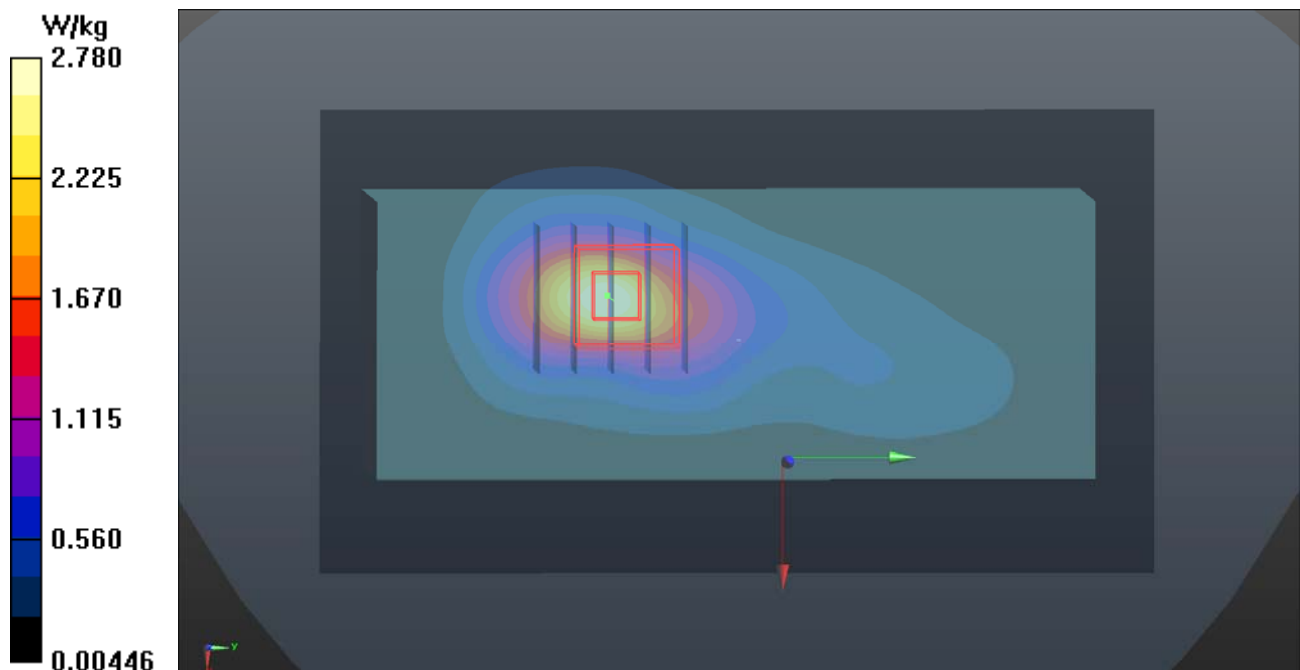
- Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 30.43 V/m; Power Drift = 0.13 dB

Peak SAR (extrapolated) = 3.38 W/kg

SAR(1 g) = 1.77 W/kg; SAR(10 g) = 0.934 W/kg

Maximum value of SAR (measured) = 2.81 W/kg



P02 GSM1900_GPRS10_Right Side_0cm_Ch810**DUT: 161114C10**

Communication System: GPRS10; Frequency: 1909.8 MHz; Duty Cycle: 1:4

Medium: B16T20N1_1219 Medium parameters used: $f = 1910$ MHz; $\sigma = 1.573$ S/m; $\epsilon_r = 52.128$; $\rho = 1000$ kg/m³

Ambient Temperature : 23.7 °C ; Liquid Temperature : 23.3 °C

DASY5 Configuration:

- Probe: ET3DV6 - SN1790; ConvF(4.74, 4.74, 4.74); Calibrated: 2016/06/24;
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1277; Calibrated: 2016/07/22
- Phantom: Twin SAM Phantom_1496; Type: QD000P40CA;
- Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7373)

- Area Scan (71x121x1): Interpolated grid: dx=1.500 mm, dy=1.500 mm

Maximum value of SAR (interpolated) = 2.95 W/kg

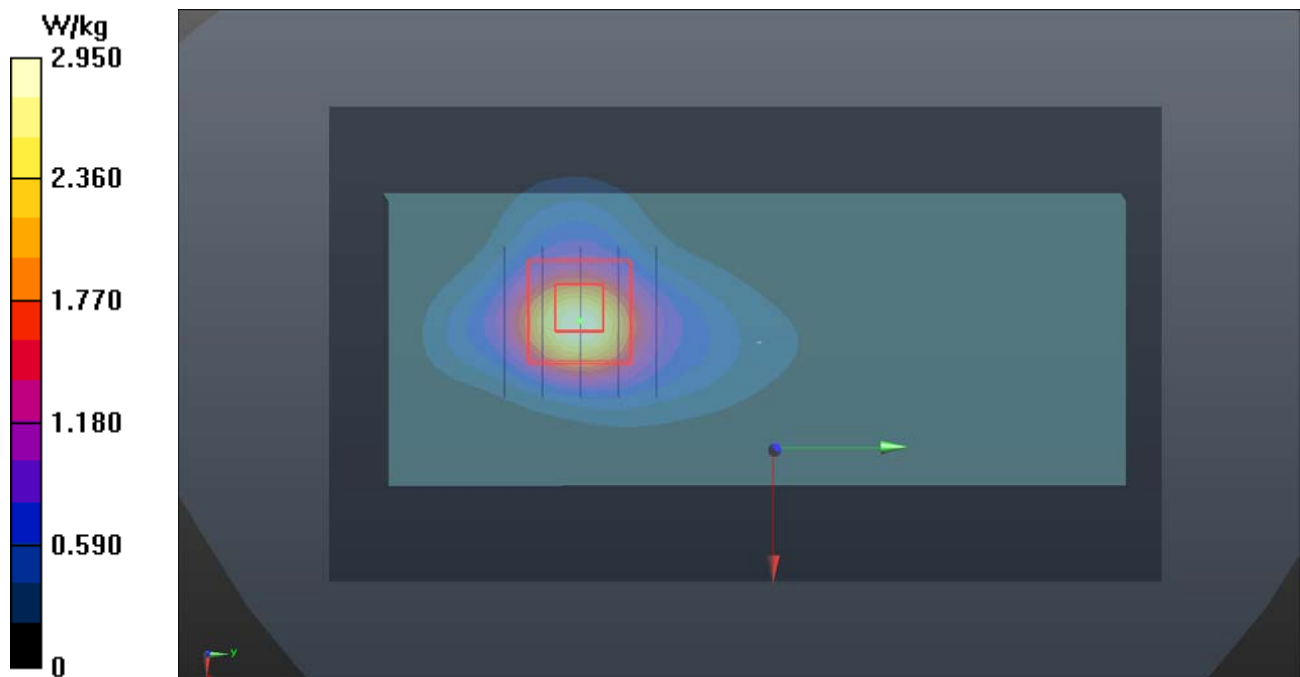
- Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 13.96 V/m; Power Drift = -0.02 dB

Peak SAR (extrapolated) = 5.03 W/kg

SAR(1 g) = 3.17 W/kg; SAR(10 g) = 1.63 W/kg

Maximum value of SAR (measured) = 3.57 W/kg



P03 WCDMA II_RMC12.2K_Right Side_0cm_Ch9400**DUT: 161114C10**

Communication System: WCDMA; Frequency: 1880 MHz; Duty Cycle: 1:1

Medium: B16T20N1_1219 Medium parameters used: $f = 1880$ MHz; $\sigma = 1.542$ S/m; $\epsilon_r = 51.89$; $\rho = 1000$ kg/m³

Ambient Temperature : 23.7 °C ; Liquid Temperature : 23.3 °C

DASY5 Configuration:

- Probe: EX3DV4 - SN3661; ConvF(7.79, 7.79, 7.79); Calibrated: 2016/05/11;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1235; Calibrated: 2016/09/27
- Phantom: Twin SAM Phantom_1822; Type: QD000P40;
- Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7373)

- Area Scan (71x121x1): Interpolated grid: dx=1.500 mm, dy=1.500 mm

Maximum value of SAR (interpolated) = 10.9 W/kg

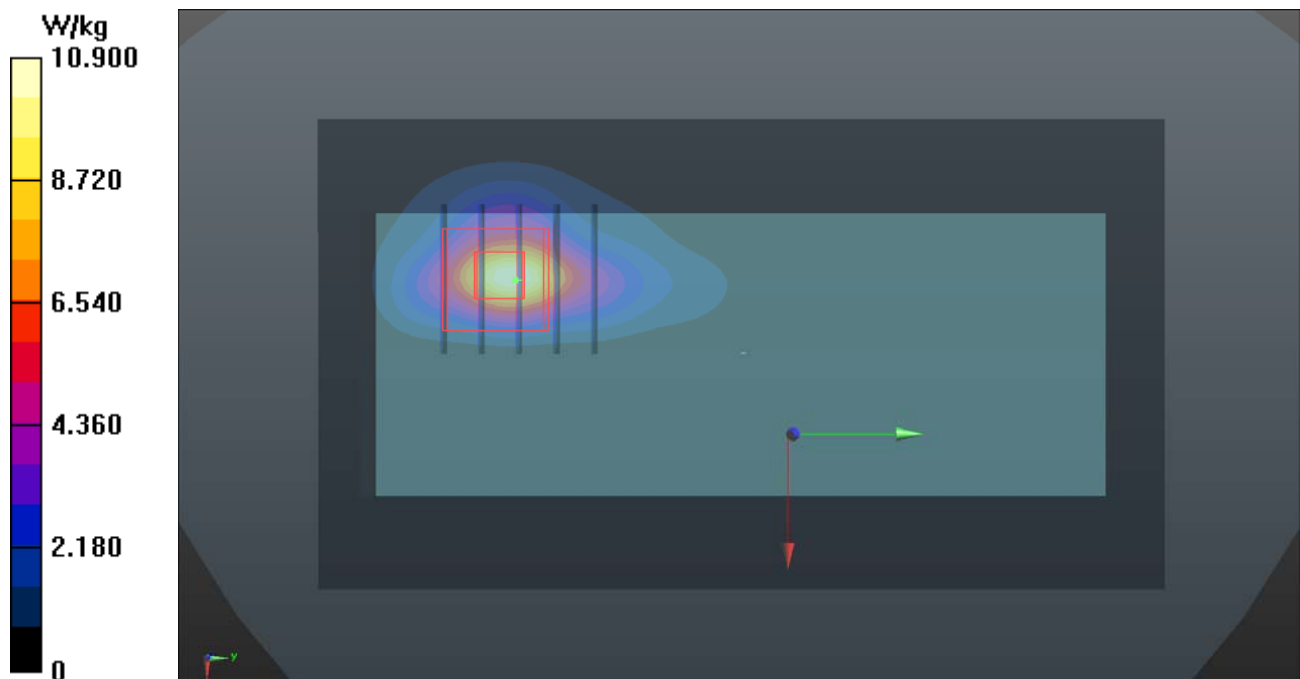
- Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 12.33 V/m; Power Drift = 0.13 dB

Peak SAR (extrapolated) = 13.1 W/kg

SAR(1 g) = 6.87 W/kg; SAR(10 g) = 3.09 W/kg

Maximum value of SAR (measured) = 10.2 W/kg



P04 WCDMA V_RMC12.2K_Right Side_0cm_Ch4132**DUT: 161114C10**

Communication System: WCDMA; Frequency: 826.4 MHz; Duty Cycle: 1:1

Medium: B07T10N3_1128 Medium parameters used: $f = 826.4$ MHz; $\sigma = 1.006$ S/m; $\epsilon_r = 54.895$; $\rho = 1000$ kg/m³

Ambient Temperature : 23.7 °C ; Liquid Temperature : 23.3 °C

DASY5 Configuration:

- Probe: EX3DV4 - SN7350; ConvF(9.83, 9.83, 9.83); Calibrated: 2015/12/17;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1305; Calibrated: 2015/12/11
- Phantom: Twin SAM Phantom_1654; Type: QD000P40;
- Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7373)

- Area Scan (71x121x1): Interpolated grid: dx=1.500 mm, dy=1.500 mm

Maximum value of SAR (interpolated) = 3.62 W/kg

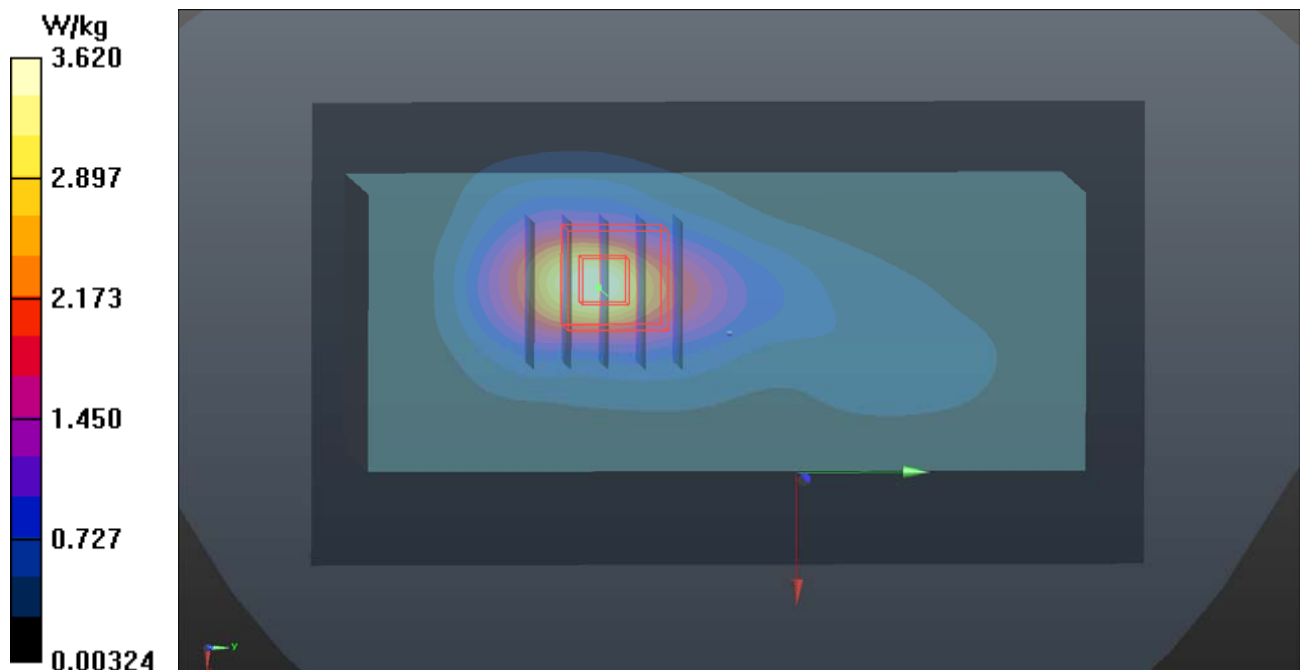
- Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 29.52 V/m; Power Drift = 0.17 dB

Peak SAR (extrapolated) = 4.45 W/kg

SAR(1 g) = 2.23 W/kg; SAR(10 g) = 1.16 W/kg

Maximum value of SAR (measured) = 3.64 W/kg



P05 2.4G WLAN_802.11b_Left Side_0cm_Ch11**DUT: 161114C10**

Communication System: WLAN_2.4G; Frequency: 2462 MHz; Duty Cycle: 1:1

Medium: B19T27N2_1209 Medium parameters used: $f = 2462$ MHz; $\sigma = 2.037$ S/m; $\epsilon_r = 50.637$; $\rho = 1000$ kg/m³

Ambient Temperature : 23.9 °C ; Liquid Temperature : 23.6 °C

DASY5 Configuration:

- Probe: EX3DV4 - SN3650; ConvF(7.36, 7.36, 7.36); Calibrated: 2016/07/25;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn861; Calibrated: 2016/06/16
- Phantom: Twin SAM Phantom_1823; Type: QD000P40CD;
- Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7373)

- Area Scan (91x151x1): Interpolated grid: dx=1.200 mm, dy=1.200 mm

Maximum value of SAR (interpolated) = 2.58 W/kg

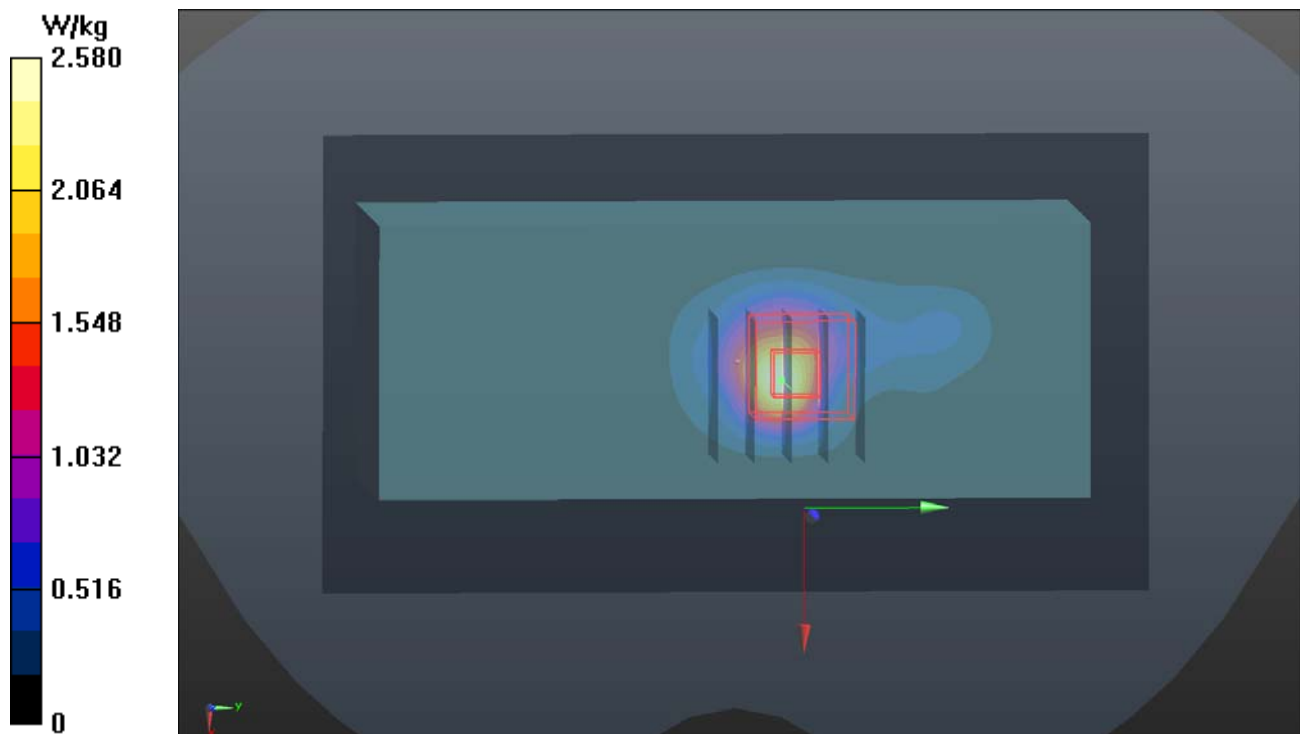
- Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 21.01 V/m; Power Drift = 0.03 dB

Peak SAR (extrapolated) = 7.84 W/kg

SAR(1 g) = 2.53 W/kg; SAR(10 g) = 0.835 W/kg

Maximum value of SAR (measured) = 5.24 W/kg



P06 5.3G WLAN_802.11a_Left Side_0cm_Ch64**DUT: 161114C10**

Communication System: WLAN_5G; Frequency: 5320 MHz; Duty Cycle: 1:1.09

Medium: B34T60N1_1209 Medium parameters used: $f = 5320$ MHz; $\sigma = 5.429$ S/m; $\epsilon_r = 49.203$; $\rho = 1000$ kg/m³

Ambient Temperature : 23.8 °C ; Liquid Temperature : 23.6 °C

DASY5 Configuration:

- Probe: EX3DV4 - SN3661; ConvF(4.69, 4.69, 4.69); Calibrated: 2016/05/11;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1235; Calibrated: 2016/09/27
- Phantom: Twin SAM Phantom_1822; Type: QD000P40;
- Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7373)

- Area Scan (101x181x1): Interpolated grid: dx=1.000 mm, dy=1.000 mm

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

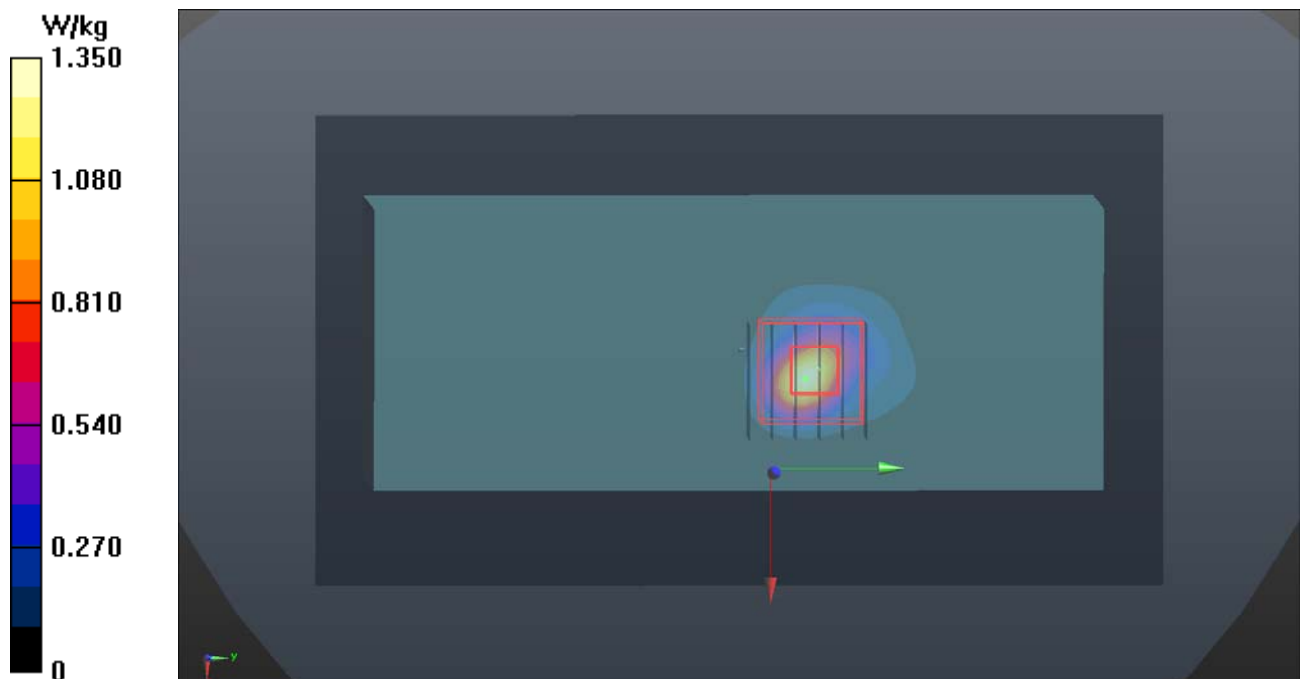
- Zoom Scan (6x6x12)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=2mm

Reference Value = 13.51 V/m; Power Drift = -0.01 dB

Peak SAR (extrapolated) = 14.8 W/kg

SAR(1 g) = 2.46 W/kg; SAR(10 g) = 0.472 W/kg

Maximum value of SAR (measured) = 7.96 W/kg



P07 5.6G WLAN_802.11a_Left Side_0cm_Ch100**DUT: 161114C10**

Communication System: WLAN_5G; Frequency: 5500 MHz; Duty Cycle: 1:1.09

Medium: B34T60N1_1209 Medium parameters used: $f = 5500$ MHz; $\sigma = 5.741$ S/m; $\epsilon_r = 48.824$; $\rho = 1000$ kg/m³

Ambient Temperature : 23.8 °C ; Liquid Temperature : 23.6 °C

DASY5 Configuration:

- Probe: EX3DV4 - SN3661; ConvF(4.28, 4.28, 4.28); Calibrated: 2016/05/11;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1235; Calibrated: 2016/09/27
- Phantom: Twin SAM Phantom_1822; Type: QD000P40;
- Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7373)

- Area Scan (101x181x1): Interpolated grid: dx=1.000 mm, dy=1.000 mm

Maximum value of SAR (interpolated) = 0.961 W/kg

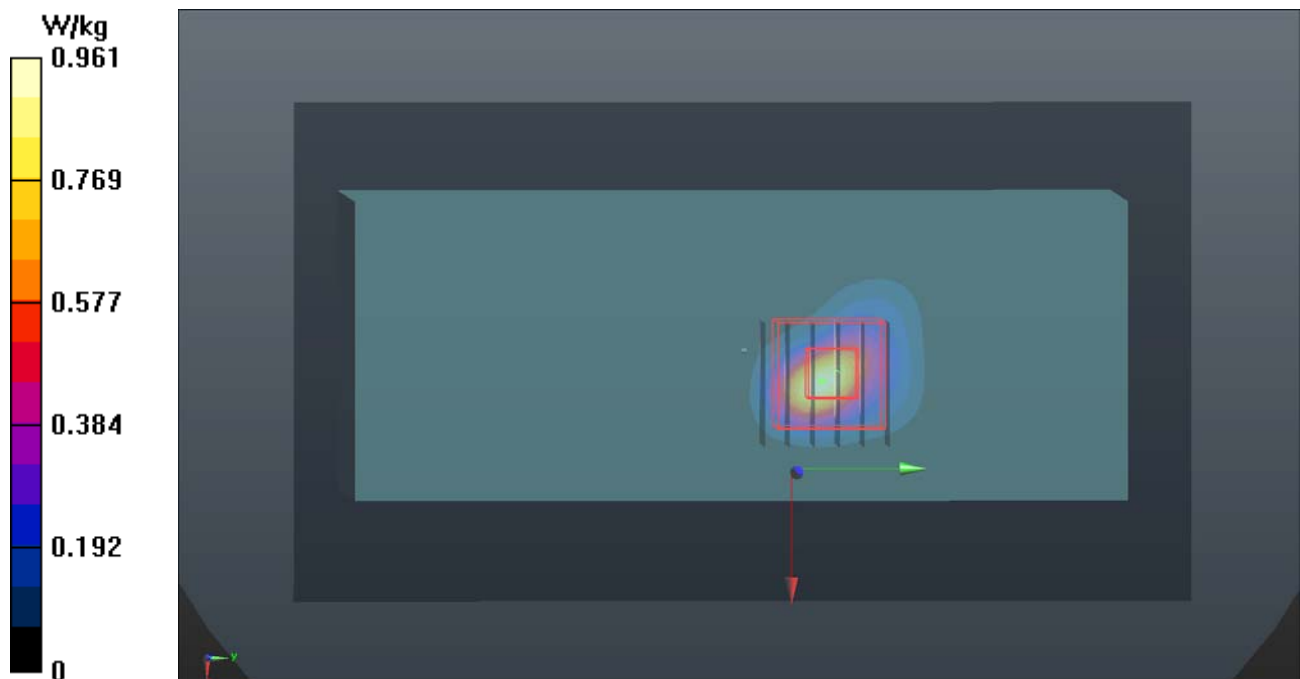
- Zoom Scan (6x6x12)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=2mm

Reference Value = 9.484 V/m; Power Drift = 0.15 dB

Peak SAR (extrapolated) = 11.4 W/kg

SAR(1 g) = 1.87 W/kg; SAR(10 g) = 0.371 W/kg

Maximum value of SAR (measured) = 5.60 W/kg



P08 5.8G WLAN_802.11a_Left Side_0cm_Ch149**DUT: 161114C10**

Communication System: WLAN_5G; Frequency: 5745 MHz; Duty Cycle: 1:1.09

Medium: B34T60N1_1209 Medium parameters used: $f = 5745$ MHz; $\sigma = 5.96$ S/m; $\epsilon_r = 46.578$; $\rho = 1000$ kg/m³

Ambient Temperature : 23.9 °C ; Liquid Temperature : 23.3 °C

DASY5 Configuration:

- Probe: EX3DV4 - SN3650; ConvF(4.36, 4.36, 4.36); Calibrated: 2016/07/25;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn861; Calibrated: 2016/06/16
- Phantom: Twin SAM Phantom_1823; Type: QD000P40CD;
- Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7373)

- Area Scan (101x181x1): Interpolated grid: dx=1.000 mm, dy=1.000 mm

Maximum value of SAR (interpolated) = 1.51 W/kg

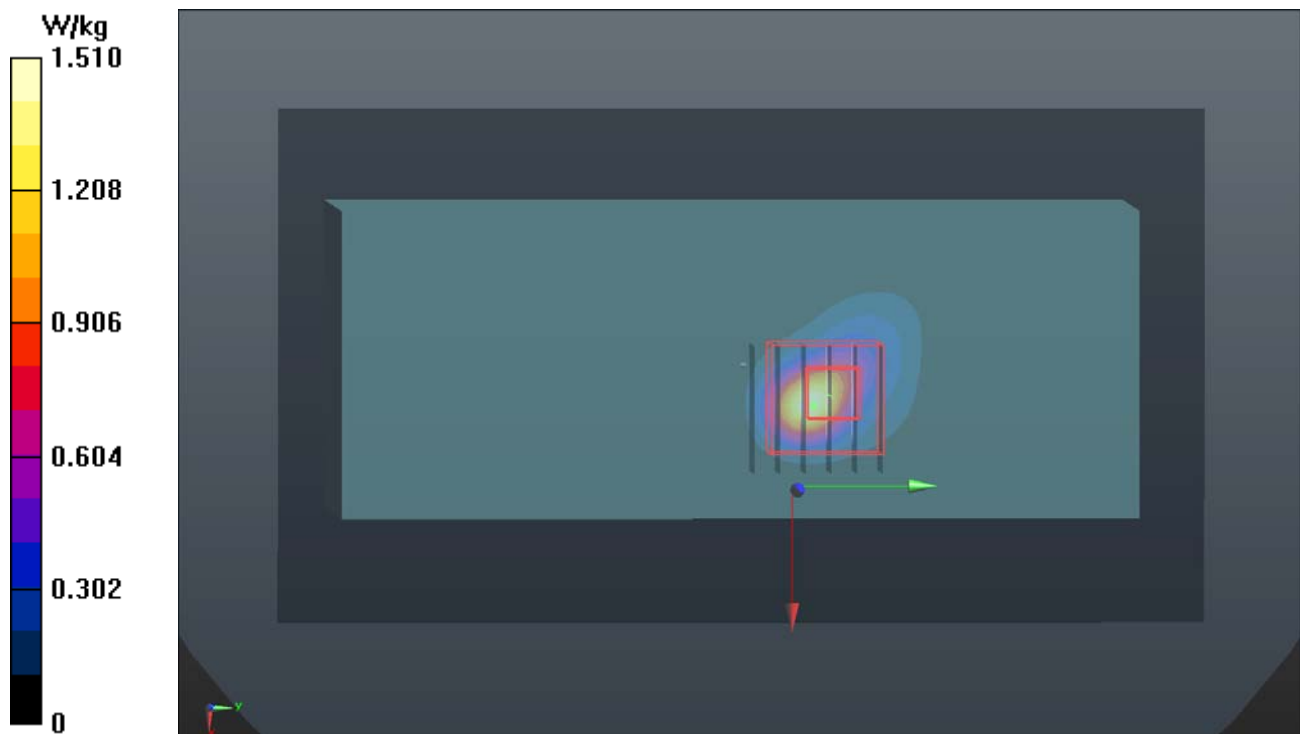
- Zoom Scan (6x6x12)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=2mm

Reference Value = 8.798 V/m; Power Drift = -0.12 dB

Peak SAR (extrapolated) = 13.7 W/kg

SAR(1 g) = 2.2 W/kg; SAR(10 g) = 0.434 W/kg

Maximum value of SAR (measured) = 7.32 W/kg



P09 GSM850_GPRS12_Rear Face_0cm_Ch128**DUT: 161114C10**

Communication System: GPRS12; Frequency: 824.2 MHz; Duty Cycle: 1:2

Medium: B07T10N3_1128 Medium parameters used: $f = 824.2$ MHz; $\sigma = 1.003$ S/m; $\epsilon_r = 54.915$; $\rho = 1000$ kg/m³

Ambient Temperature : 23.7 °C ; Liquid Temperature : 23.3 °C

DASY5 Configuration:

- Probe: EX3DV4 - SN7350; ConvF(9.83, 9.83, 9.83); Calibrated: 2015/12/17;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1305; Calibrated: 2015/12/11
- Phantom: Twin SAM Phantom_1654; Type: QD000P40;
- Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7373)

- Area Scan (71x121x1): Interpolated grid: dx=1.500 mm, dy=1.500 mm

Maximum value of SAR (interpolated) = 1.14 W/kg

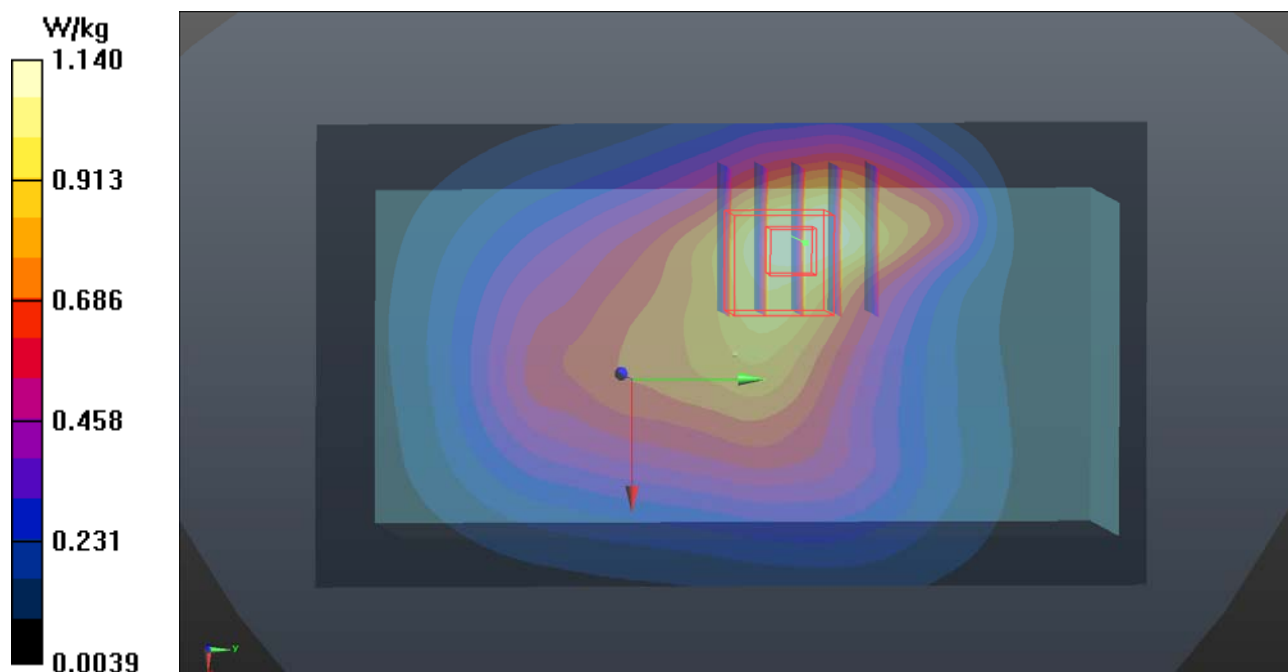
- Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 29.94 V/m; Power Drift = -0.18 dB

Peak SAR (extrapolated) = 1.24 W/kg

SAR(1 g) = 0.852 W/kg; SAR(10 g) = 0.587 W/kg

Maximum value of SAR (measured) = 1.11 W/kg



P10 GSM1900_GPRS10_Rear Face_0cm_Ch810**DUT: 161114C10**

Communication System: GPRS10; Frequency: 1909.8 MHz; Duty Cycle: 1:4

Medium: B16T20N1_1219 Medium parameters used: $f = 1910$ MHz; $\sigma = 1.573$ S/m; $\epsilon_r = 52.128$; $\rho = 1000$ kg/m³

Ambient Temperature : 23.7 °C ; Liquid Temperature : 23.3 °C

DASY5 Configuration:

- Probe: ET3DV6 - SN1790; ConvF(4.74, 4.74, 4.74); Calibrated: 2016/06/24;
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1277; Calibrated: 2016/07/22
- Phantom: Twin SAM Phantom_1496; Type: QD000P40CA;
- Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7373)

- Area Scan (71x121x1): Interpolated grid: dx=1.500 mm, dy=1.500 mm

Maximum value of SAR (interpolated) = 0.654 W/kg

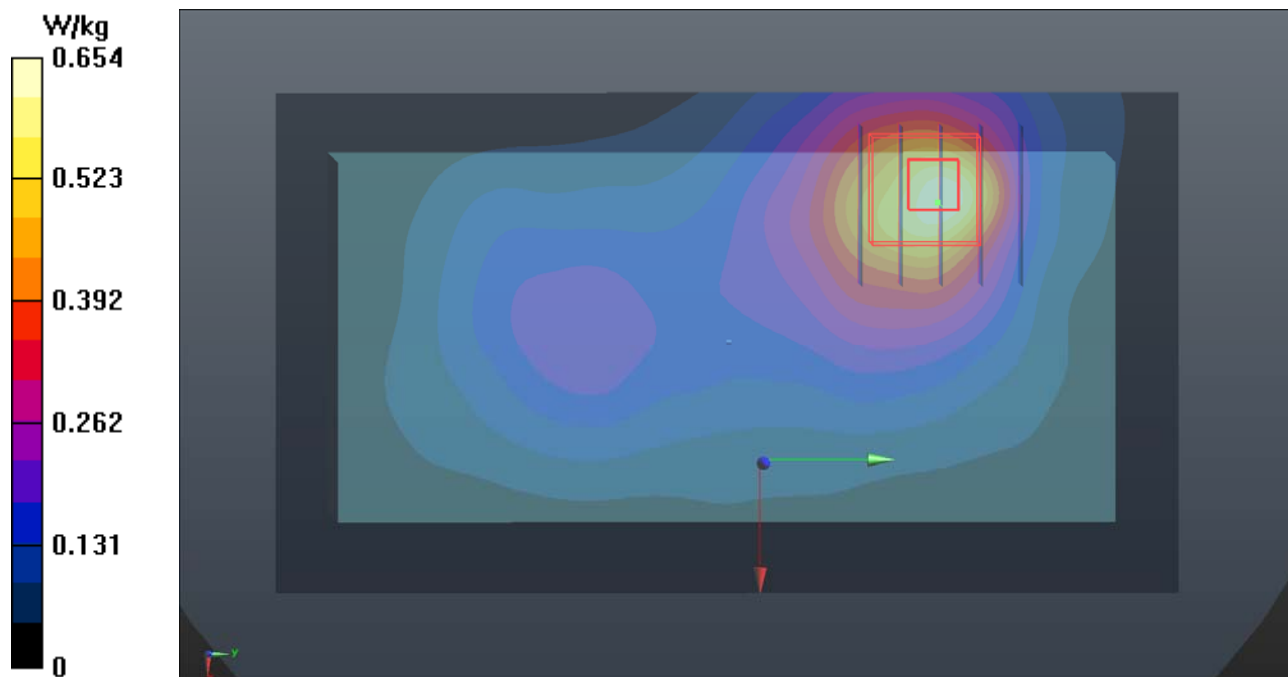
- Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 10.58 V/m; Power Drift = 0.14 dB

Peak SAR (extrapolated) = 0.967 W/kg

SAR(1 g) = 0.599 W/kg; SAR(10 g) = 0.348 W/kg

Maximum value of SAR (measured) = 0.631 W/kg



P11 WCDMA II_RMC12.2K_Rear Face_0cm_Ch9262**DUT: 161114C10**

Communication System: WCDMA; Frequency: 1852.4 MHz; Duty Cycle: 1:1

Medium: B16T20N1_1219 Medium parameters used: $f = 1852.4$ MHz; $\sigma = 1.531$ S/m; $\epsilon_r = 52.246$; $\rho = 1000$ kg/m³

Ambient Temperature : 23.7 °C ; Liquid Temperature : 23.3 °C

DASY5 Configuration:

- Probe: ET3DV6 - SN1790; ConvF(4.74, 4.74, 4.74); Calibrated: 2016/06/24;
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1277; Calibrated: 2016/07/22
- Phantom: Twin SAM Phantom_1496; Type: QD000P40CA;
- Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7373)

- Area Scan (71x121x1): Interpolated grid: dx=1.500 mm, dy=1.500 mm

Maximum value of SAR (interpolated) = 1.37 W/kg

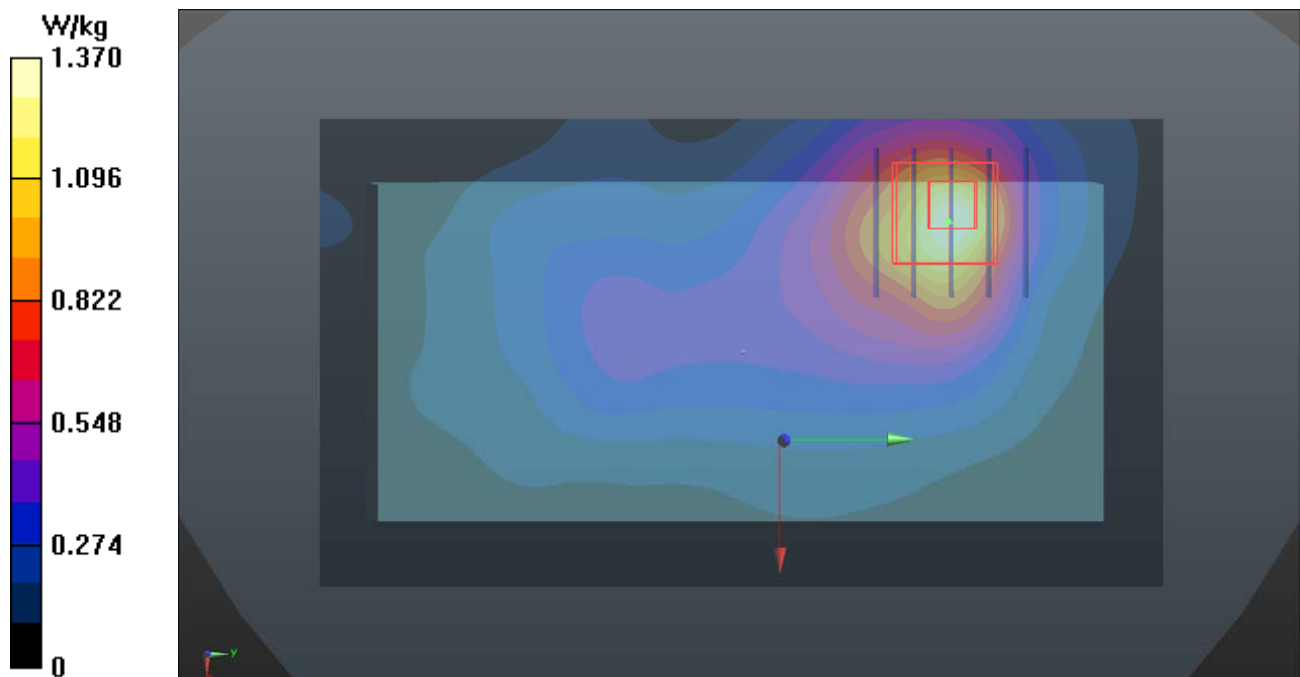
- Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 16.75 V/m; Power Drift = 0.05 dB

Peak SAR (extrapolated) = 1.83 W/kg

SAR(1 g) = 1.18 W/kg; SAR(10 g) = 0.700 W/kg

Maximum value of SAR (measured) = 1.25 W/kg



P12 WCDMA V_RMC12.2K_Rear Face_0cm_Ch4233**DUT: 161114C10**

Communication System: WCDMA; Frequency: 846.6 MHz; Duty Cycle: 1:1

Medium: B07T10N3_1128 Medium parameters used: $f = 847$ MHz; $\sigma = 1.026$ S/m; $\epsilon_r = 54.691$; $\rho = 1000$ kg/m³

Ambient Temperature : 23.7 °C ; Liquid Temperature : 23.3 °C

DASY5 Configuration:

- Probe: EX3DV4 - SN7350; ConvF(9.83, 9.83, 9.83); Calibrated: 2015/12/17;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1305; Calibrated: 2015/12/11
- Phantom: Twin SAM Phantom_1654; Type: QD000P40;
- Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7373)

- **Area Scan (71x121x1):** Interpolated grid: dx=1.500 mm, dy=1.500 mm

Maximum value of SAR (interpolated) = 1.44 W/kg

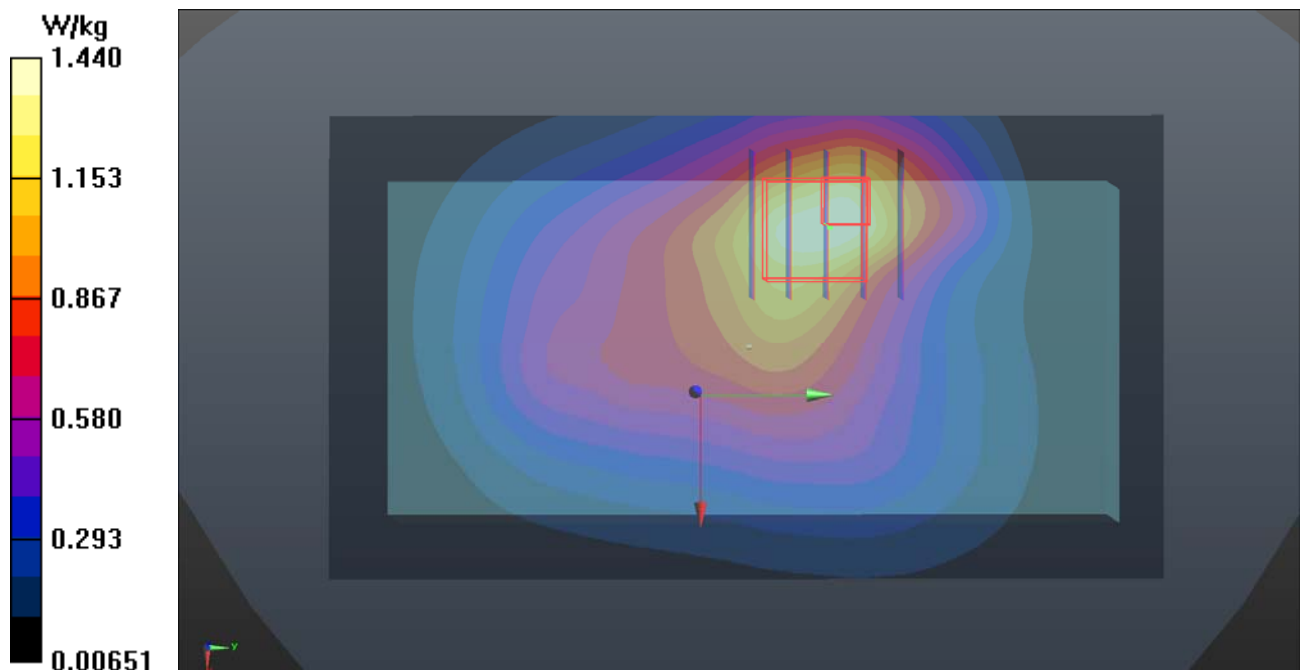
- **Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 30.72 V/m; Power Drift = -0.10 dB

Peak SAR (extrapolated) = 1.87 W/kg

SAR(1 g) = 1.07 W/kg; SAR(10 g) = 0.731 W/kg

Maximum value of SAR (measured) = 1.40 W/kg



P13 2.4G WLAN_802.11b_Rear Face_0cm_Ch11**DUT: 161114C10**

Communication System: WLAN_2.4G; Frequency: 2462 MHz; Duty Cycle: 1:1

Medium: B19T27N2_1210 Medium parameters used: $f = 2462$ MHz; $\sigma = 2.063$ S/m; $\epsilon_r = 53.685$; $\rho = 1000$ kg/m³

Ambient Temperature : 23.8 °C ; Liquid Temperature : 23.6 °C

DASY5 Configuration:

- Probe: EX3DV4 - SN3661; ConvF(7.44, 7.44, 7.44); Calibrated: 2016/05/11;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1235; Calibrated: 2016/09/27
- Phantom: Twin SAM Phantom_1822; Type: QD000P40;
- Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7373)

- Area Scan (101x151x1): Interpolated grid: dx=1.200 mm, dy=1.200 mm

Maximum value of SAR (interpolated) = 0.0775 W/kg

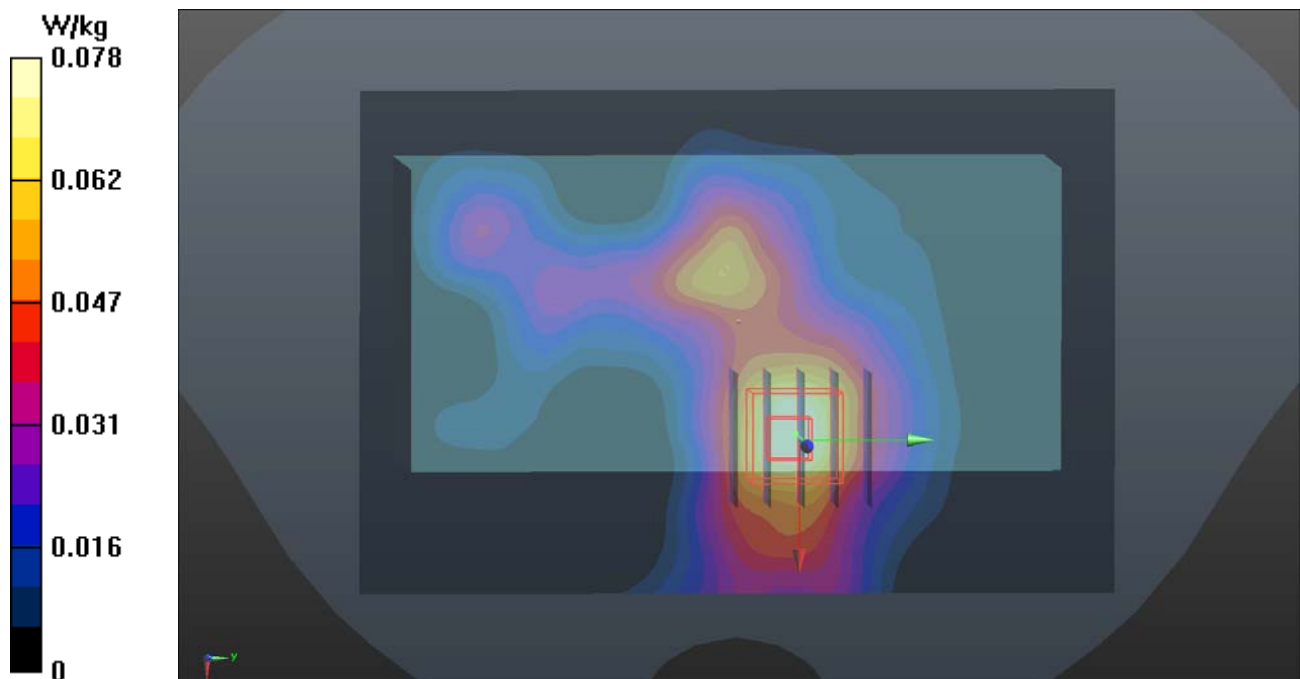
- Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 4.551 V/m; Power Drift = -0.06 dB

Peak SAR (extrapolated) = 0.0890 W/kg

SAR(1 g) = 0.049 W/kg; SAR(10 g) = 0.027 W/kg

Maximum value of SAR (measured) = 0.0736 W/kg



P14 5.3G WLAN_802.11a_Rear Face_0cm_Ch64**DUT: 161114C10**

Communication System: WLAN_5G; Frequency: 5320 MHz; Duty Cycle: 1:1.09

Medium: B34T60N1_1209 Medium parameters used: $f = 5320$ MHz; $\sigma = 5.429$ S/m; $\epsilon_r = 49.203$; $\rho = 1000$ kg/m³

Ambient Temperature : 23.8 °C ; Liquid Temperature : 23.6 °C

DASY5 Configuration:

- Probe: EX3DV4 - SN3661; ConvF(4.69, 4.69, 4.69); Calibrated: 2016/05/11;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1235; Calibrated: 2016/09/27
- Phantom: Twin SAM Phantom_1822; Type: QD000P40;
- Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7373)

- Area Scan (121x181x1): Interpolated grid: dx=1.000 mm, dy=1.000 mm

Maximum value of SAR (interpolated) = 0.0184 W/kg

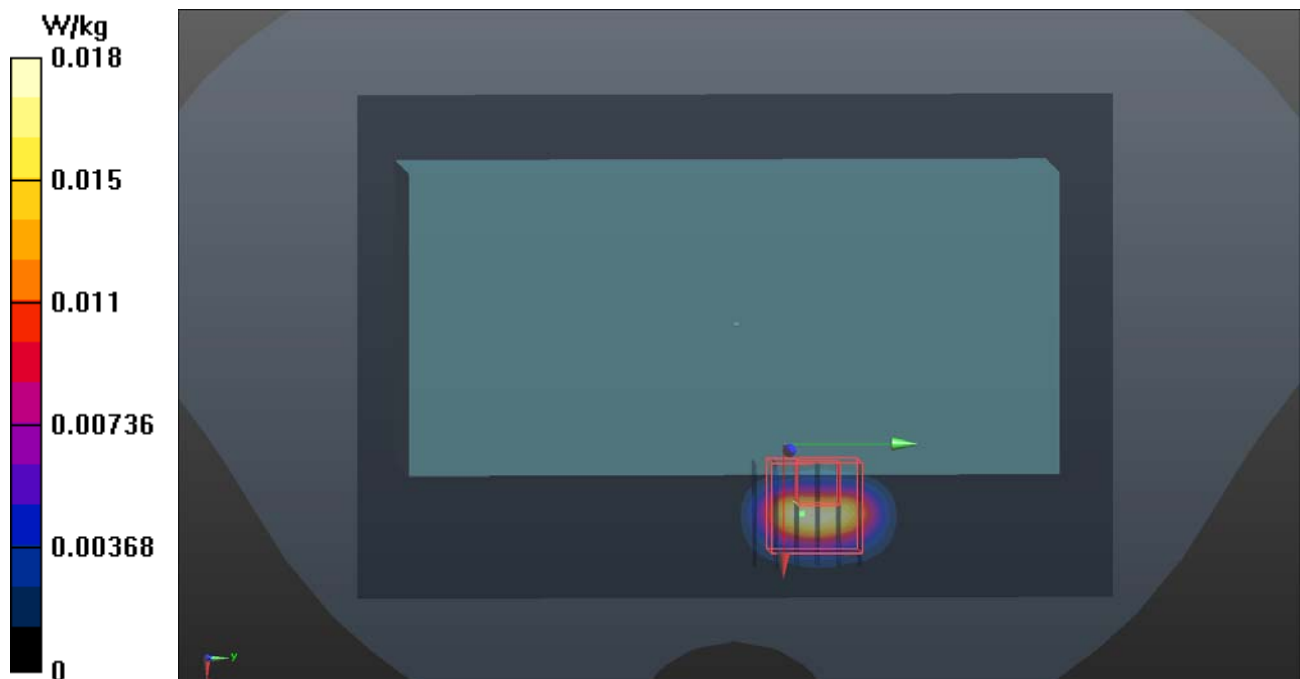
- Zoom Scan (6x6x12)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=2mm

Reference Value = 0 V/m; Power Drift = 0.00 dB

Peak SAR (extrapolated) = 0.00185 W/kg

SAR(1 g) = 0.0000113 W/kg; SAR(10 g) = 0.00000102 W/kg

Maximum value of SAR (measured) = 0.0136 W/kg



P15 5.8G WLAN_802.11a_Rear Face_0cm_Ch149**DUT: 161114C10**

Communication System: WLAN_5G; Frequency: 5745 MHz; Duty Cycle: 1:1.09

Medium: B34T60N1_1209 Medium parameters used: $f = 5745$ MHz; $\sigma = 6.132$ S/m; $\epsilon_r = 48.628$; $\rho = 1000$ kg/m³

Ambient Temperature : 23.8 °C ; Liquid Temperature : 23.6 °C

DASY5 Configuration:

- Probe: EX3DV4 - SN3661; ConvF(4.37, 4.37, 4.37); Calibrated: 2016/05/11;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1235; Calibrated: 2016/09/27
- Phantom: Twin SAM Phantom_1822; Type: QD000P40;
- Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7373)

- Area Scan (121x181x1): Interpolated grid: dx=1.000 mm, dy=1.000 mm

Maximum value of SAR (interpolated) = 0.0203 W/kg

- Zoom Scan (6x6x12)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=2mm

Reference Value = 0 V/m; Power Drift = 0.01 dB

Peak SAR (extrapolated) = 0.196 W/kg

SAR(1 g) = 0.00105 W/kg; SAR(10 g) = 0.000111 W/kg

Maximum value of SAR (measured) = 0.196 W/kg

