

# FCC SAR Test Report (Class II Permissive Change)

Product Name : 802.11a/b/g/n/ac RTL8822CE Combo module  
Model No. : RTL8822CE

Applicant : Realtek Semiconductor Corp.

Address : No. 2, Innovation Road II, Hsinchu Science Park Hsinchu 300 Taiwan

Date of Receipt : 2020/04/11

Issued Date : 2020/05/21

Report No. : 2040272R-E3082130003

Report Version : V1.0



The test results relate only to the samples tested.

The test results shown in the test report are traceable to the national/international standard through the calibration report of the equipment and evaluated measurement uncertainty herein.

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The test report shall not be reproduced without the written approval of DEKRA Testing and Certification Co., Ltd.

Measurement uncertainties evaluated for each testing system and associated connections are given here to provide the system information for reference. Compliance determinations do not take into account measurement uncertainties for each testing system, but are based on the results of the compliance measurement.

# Test Report

Issued Date: 2020/05/21

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Product Name : 802.11a/b/g/n/ac RTL8822CE Combo module  
 Applicant : Realtek Semiconductor Corp.  
 Address : No. 2, Innovation Road II, Hsinchu Science Park Hsinchu 300  
 Taiwan  
 Manufacturer : Realtek Semiconductor Corp.  
 Model No. : RTL8822CE  
 Trade Name : Realtek  
 FCC ID : TX2-RTL8822CE  
 Applicable Standard : IEEE 1528-2013  
 KDB 447498 D01 v06  
 KDB 865664 D01 v01r04

Measurement procedures : 47CFR § 2.1093  
 KDB 248227 D01 v02r02  
 KDB 616217 D04 v01r02

Test Result : Max. SAR Measurement (1g)

Band	Body SAR (1g) - SPEED	Body SAR (1g) - INPAQ
2.4 GHz	0.112 W/kg	0.159 W/kg
5 GHz	0.414 W/kg	0.232 W/kg

Application Type : Certification

The above equipment has been tested by DEKRA, 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.

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## 1. General Information

### 1.1 EUT Description

Product Name	802.11a/b/g/n/ac RTL8822CE Combo module				
Trade Name	Realtek				
Model No.	RTL8822CE				
FCC ID	TX2-RTL8822CE				
TX Frequency	802.11b/g/n/ac-20MHz: 2412-2472MHz 802.11n/ac-40MHz: 2422-2462MHz 802.11a/n/ac-20MHz: 5180-5320MHz, 5500-5720MHz, 5745-5825MHz 802.11n/ac-40MHz: 5190-5310MHz, 5510-5710MHz, 5755-5795MHz 802.11ac-80MHz: 5210-5290MHz, 5530-5690MHz, 5775MHz BT: 1MHz, BLE: 2MHz				
Number of Channels	802.11b/g/n-20: 13, n-40MHz: 9 802.11a/n/ac-20: 25; 802.11n/ac-40: 12; 802.11ac-80MHz: 6 BT: 79 , BLE: 40				
Data Rate	802.11b: 1-11Mbps, 802.11a/g: 6-54Mbps, 802.11n: up to 300Mbps 802.11ac-80MHz: up to 866.7Mbps BT: 3Mbps, BLE: 1Mbps				
Channel separation	802.11b/g/n/ac-20MHz: 5 MHz, 802.11a/n-20/ac-20MHz: 20MHz 802.11n-40/ac-40MHz: 40MHz, 802.11ac-80MHz: 80MHz BT : 1MHz , BLE : 2MHz				
Type of Modulation	802.11b: DSSS, DBPSK, DQPSK, CCK 802.11a/g/n/ac: OFDM, BPSK, QPSK, 16QAM, 64QAM, 256QAM FHSS: GFSK(1Mbps) / $\pi$ /4DQPSK(2Mbps) / 8DPSK(3Mbps)				
Antenna Type	PIFA				
Device Category	Portable				
RF Exposure Environment	Uncontrolled				
Summary of test result – Reported 1g SAR (W/Kg)					
Test configuration	DTS(Main)	DTS(Aux)	U-NII(Main)	U-NII(Aux)	DTS(BT)
Body-Standalone (SPEED)	0.092	0.112	0.377	0.414	0.074
Body-Standalone (INPAQ)	0.159	0.095	0.232	0.156	0.118
Test configuration	DTS (Main + Aux)		U-NII (Main + Aux)		U-NII (Main) + DTS(BT)
Body-Simultaneous (SPEED)	0.187		0.791		0.451
Body-Simultaneous (INPAQ)	0.254		0.388		0.350
When BT and WIFI transmitter does simultaneously transmitter, WIFI will transmit on Main and BT will transmit on Aux					

Note: (1) This is to request a Class II permissive change for FCC ID: TX2-RTL8822CE, originally granted on 11/02/2018.

The major change filed under this application is:

Change #1: Additional Chassis added, ASUSTeK, model number: TM420I, J420I, R432I.

Brand	Model	Difference
ASUS	TM420I	All models are electrically identical, different model names are for marketing purpose.
	J420I	
	R432I	

Change #2: Reduce the Output Power through firmware, and SAR measurement were evaluated. (Only reduce Wi-Fi Output Power, Bluetooth Output Power haven't changes).

Change #3: Addition two antennas, the antenna type is same, the antenna gain is lower than the original application.

(2) The identification of test sample is TM420I.

### 1.2 Antenna List

No.	Manufacturer	Part No.	Antenna type	Peak Gain
1	INPAQ (For: NB)	WA-P-LBLB-04-081(Main) WA-P-LBLB-04-081(Aux)	PIFA	-1.37dBi for 2.4GHz -1dBi for 5.15~5.25GHz -1.21dBi for 5.25~5.35GHz -0.04dBi for 5.47~5.725GHz -0.04dBi for 5.725~5.850GHz
	INPAQ (For: PAD)	WA-P-LBLB-04-081(Main) WA-P-LBLB-04-081(Aux)	PIFA	-1.53dBi for 2.4GHz -1.58dBi for 5.15~5.25GHz -1.04dBi for 5.25~5.35GHz -0.1dBi for 5.47~5.725GHz -0.1dBi for 5.725~5.850GHz
2	SPEED (For: NB)	F-0G-XZ-0231-000-00(Main) F-0G-XZ-0231-000-00(Aux)	PIFA	0.71dBi for 2.4GHz -0.25dBi for 5.15~5.25GHz -0.19dBi for 5.25~5.35GHz 1.2dBi for 5.47~5.725GHz 1.1dBi for 5.725~5.850GHz
	SPEED (For: PAD)	F-0G-XZ-0231-000-00(Main) F-0G-XZ-0231-000-00(Aux)	PIFA	2.52dBi for 2.4GHz 1.82dBi for 5.15~5.25GHz 1.33dBi for 5.25~5.35GHz 2.74dBi for 5.47~5.725GHz 1.73dBi for 5.725~5.850GHz

### 1.3 SAR Test Exclusion Calculation

According to KDB Publication 447498 D01, section 4.3.1, per the calculations of item 1 ( $\text{Power(mW)}/\text{separation (mm)} \cdot \sqrt{f(\text{GHz})} \leq 3.0$ ), SAR is required as shown in the table below where calculated values are greater than 3.0 :

According to KDB Publication 616217 D04, section 4.2.a), When between the antenna and user is more than 25mm, 25mm bystander SAR is not required for antenna in laptop display screens.

#### NB Mode SAR exclusion calculations for WiFi-SISO and Bluetooth for antenna < 50mm from the user :

Antenna	Tx	Frequency (MHz)	Output Power		Separation distances (mm)						Calculated Threshold Value ( $\leq 3.0$ SAR is not required)					
			dBm	mW	Back	Right	Left	Top	Bottom	Front	Back	Right	Left	Top	Bottom	Front
Main	WiFi	2462	13	20	2	50	255	3	214	225	6.3	0.6	>50mm	6.3	>50mm	>50mm
Main	WiFi	5240	13	20	2	50	255	3	214	225	9.1	0.9	>50mm	9.1	>50mm	>50mm
Main	WiFi	5320	13	20	2	50	255	3	214	225	9.2	0.9	>50mm	9.2	>50mm	>50mm
Main	WiFi	5700	13	20	2	50	255	3	214	225	9.5	1.0	>50mm	9.5	>50mm	>50mm
Main	WiFi	5825	13	20	2	50	255	3	214	225	9.6	1.0	>50mm	9.6	>50mm	>50mm

#### NB Mode SAR exclusion calculations for WiFi-SISO and Bluetooth for antenna > 50mm from the user :

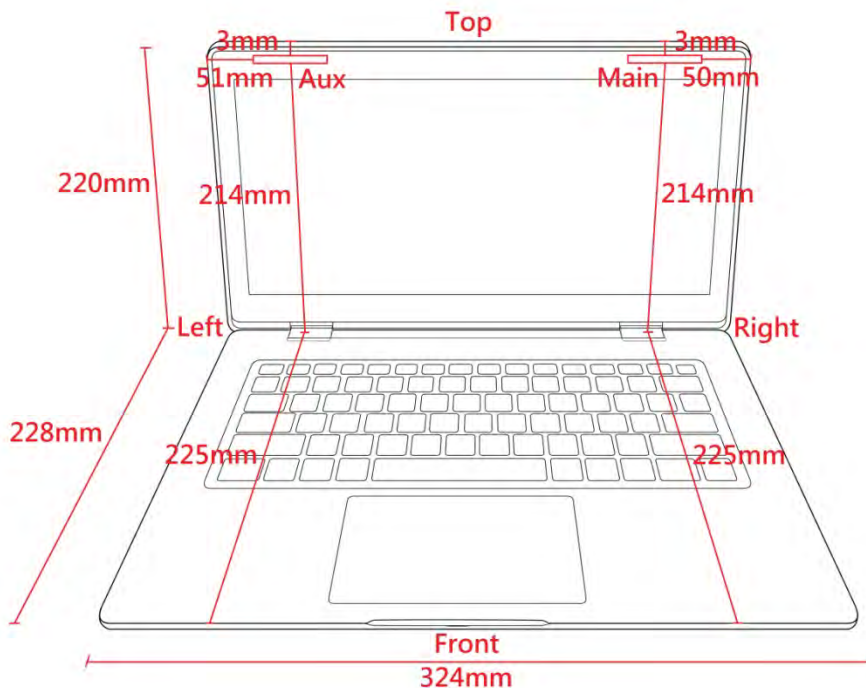
Antenna	Tx	Frequency (MHz)	Output Power		Separation distances (mm)						Calculated Threshold Value (SAR test exclusion power,mW)					
			dBm	mW	Back	Right	Left	Top	Bottom	Front	Back	Right	Left	Top	Bottom	Front
Main	WiFi	2462	13	20	2	50	255	3	214	225	<50mm	95.6	2145.6	<50mm	1735.6	1845.6
Main	WiFi	5240	13	20	2	50	255	3	214	225	<50mm	65.5	2115.5	<50mm	1705.5	1815.5
Main	WiFi	5320	13	20	2	50	255	3	214	225	<50mm	65.0	2115.0	<50mm	1705.0	1815.0
Main	WiFi	5700	13	20	2	50	255	3	214	225	<50mm	62.8	2112.8	<50mm	1702.8	1812.8
Main	WiFi	5825	13	20	2	50	255	3	214	225	<50mm	62.2	2112.2	<50mm	1702.2	1812.2

**NB Mode SAR exclusion calculations for WiFi-SISO and Bluetooth for antenna < 50mm from the user :**

Antenna	Tx	Frequency (MHz)	Output Power		Separation distances (mm)						Calculated Threshold Value (≤3.0 SAR is not required)					
			dBm	mW	Back	Right	Left	Top	Bottom	Front	Back	Right	Left	Top	Bottom	Front
Aux	WiFi	2462	13	20	2	252	51	3	214	225	6.3	>50mm	>50mm	6.3	>50mm	>50mm
Aux	WiFi	5240	13	20	2	252	51	3	214	225	9.1	>50mm	>50mm	9.1	>50mm	>50mm
Aux	WiFi	5320	13	20	2	252	51	3	214	225	9.2	>50mm	>50mm	9.2	>50mm	>50mm
Aux	WiFi	5700	13	20	2	252	51	3	214	225	9.5	>50mm	>50mm	9.5	>50mm	>50mm
Aux	WiFi	5825	13	20	2	252	51	3	214	225	9.6	>50mm	>50mm	9.6	>50mm	>50mm
Aux	BT	2480	13	20	2	252	51	3	214	225	6.3	>50mm	>50mm	6.3	>50mm	>50mm

**NB Mode SAR exclusion calculations for WiFi-SISO and Bluetooth for antenna > 50mm from the user :**

Antenna	Tx	Frequency (MHz)	Output Power		Separation distances (mm)						Calculated Threshold Value (SAR test exclusion power,mW)					
			dBm	mW	Back	Right	Left	Top	Bottom	Front	Back	Right	Left	Top	Bottom	Front
Aux	WiFi	2462	13	20	2	252	51	3	214	225	<50mm	2115.6	105.6	<50mm	1735.6	1845.6
Aux	WiFi	5240	13	20	2	252	51	3	214	225	<50mm	2085.5	75.5	<50mm	1705.5	1815.5
Aux	WiFi	5320	13	20	2	252	51	3	214	225	<50mm	2085.0	75.0	<50mm	1705.0	1815.0
Aux	WiFi	5700	13	20	2	252	51	3	214	225	<50mm	2082.8	72.8	<50mm	1702.8	1812.8
Aux	WiFi	5825	13	20	2	252	51	3	214	225	<50mm	2082.2	72.2	<50mm	1702.2	1812.2
Aux	BT	2480	13	20	2	252	51	3	214	225	<50mm	2115.3	105.3	<50mm	1735.3	1845.3



**PAD Mode SAR exclusion calculations for WiFi-SISO and Bluetooth for antenna < 50mm from the user :**

Antenna	Tx	Frequency (MHz)	Output Power		Separation distances (mm)						Calculated Threshold Value ( $\leq 3.0$ SAR is not required)					
			dBm	mW	Back	Right	Left	Top	Bottom	Front	Back	Right	Left	Top	Bottom	Front
Main	WiFi	2462	13	20	15	50	255	3	208	3	2.1	0.6	>50mm	6.3	>50mm	6.3
Main	WiFi	5240	13	20	15	50	255	3	208	3	3.0	0.9	>50mm	9.1	>50mm	9.1
Main	WiFi	5320	13	20	15	50	255	3	208	3	3.1	0.9	>50mm	9.2	>50mm	9.2
Main	WiFi	5700	13	20	15	50	255	3	208	3	3.2	1.0	>50mm	9.5	>50mm	9.5
Main	WiFi	5825	13	20	15	50	255	3	208	3	3.2	1.0	>50mm	9.6	>50mm	9.6

**PAD Mode SAR exclusion calculations for WiFi-SISO and Bluetooth for antenna > 50mm from the user :**

Antenna	Tx	Frequency (MHz)	Output Power		Separation distances (mm)						Calculated Threshold Value (SAR test exclusion power,mW)					
			dBm	mW	Back	Right	Left	Top	Bottom	Front	Back	Right	Left	Top	Bottom	Front
Main	WiFi	2462	13	20	15	50	255	3	208	3	<50mm	95.6	2145.6	<50mm	1675.6	<50mm
Main	WiFi	5240	13	20	15	50	255	3	208	3	<50mm	65.5	2115.5	<50mm	1645.5	<50mm
Main	WiFi	5320	13	20	15	50	255	3	208	3	<50mm	65.0	2115.0	<50mm	1645.0	<50mm
Main	WiFi	5700	13	20	15	50	255	3	208	3	<50mm	62.8	2112.8	<50mm	1642.8	<50mm
Main	WiFi	5825	13	20	15	50	255	3	208	3	<50mm	62.2	2112.2	<50mm	1642.2	<50mm

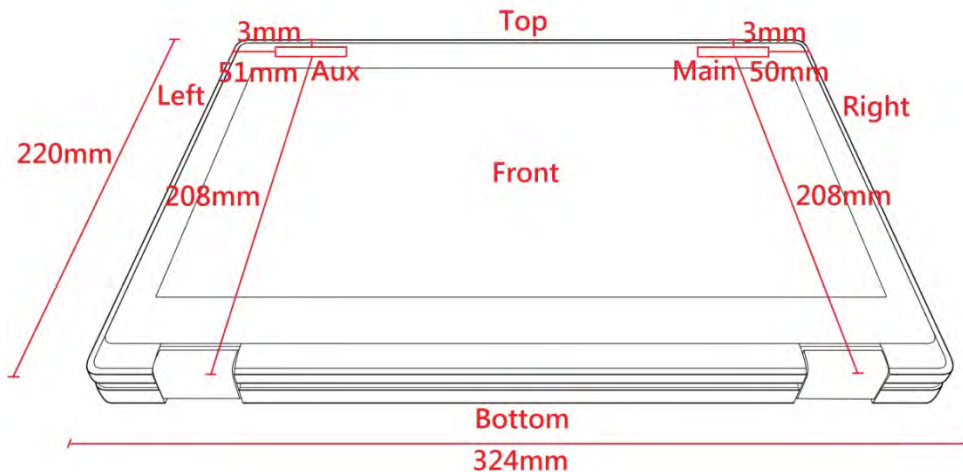


**PAD Mode SAR exclusion calculations for WiFi-SISO and Bluetooth for antenna < 50mm from the user :**

Antenna	Tx	Frequency (MHz)	Output Power		Separation distances (mm)						Calculated Threshold Value ( $\leq 3.0$ SAR is not required)					
			dBm	mW	Back	Right	Left	Top	Bottom	Front	Back	Right	Left	Top	Bottom	Front
Aux	WiFi	2462	13	20	15	252	51	3	208	3	2.1	>50mm	>50mm	6.3	>50mm	6.3
Aux	WiFi	5240	13	20	15	252	51	3	208	3	3.0	>50mm	>50mm	9.1	>50mm	9.1
Aux	WiFi	5320	13	20	15	252	51	3	208	3	3.1	>50mm	>50mm	9.2	>50mm	9.2
Aux	WiFi	5700	13	20	15	252	51	3	208	3	3.2	>50mm	>50mm	9.5	>50mm	9.5
Aux	WiFi	5825	13	20	15	252	51	3	208	3	3.2	>50mm	>50mm	9.6	>50mm	9.6
Aux	BT	2480	13	20	15	252	51	3	208	3	2.1	>50mm	>50mm	6.3	>50mm	6.3

**PAD Mode SAR exclusion calculations for WiFi-SISO and Bluetooth for antenna > 50mm from the user :**

Antenna	Tx	Frequency (MHz)	Output Power		Separation distances (mm)						Calculated Threshold Value (SAR test exclusion power, mW)					
			dBm	mW	Back	Right	Left	Top	Bottom	Front	Back	Right	Left	Top	Bottom	Front
Aux	WiFi	2462	13	20	15	252	51	3	208	3	<50mm	2115.6	105.6	<50mm	1675.6	<50mm
Aux	WiFi	5240	13	20	15	252	51	3	208	3	<50mm	2085.5	75.5	<50mm	1645.5	<50mm
Aux	WiFi	5320	13	20	15	252	51	3	208	3	<50mm	2085.0	75.0	<50mm	1645.0	<50mm
Aux	WiFi	5700	13	20	15	252	51	3	208	3	<50mm	2082.8	72.8	<50mm	1642.8	<50mm
Aux	WiFi	5825	13	20	15	252	51	3	208	3	<50mm	2082.2	72.2	<50mm	1642.2	<50mm
Aux	BT	2480	13	20	15	252	51	3	208	3	<50mm	2115	105	<50mm	1675	<50mm



## 1.4 Test Environment

Ambient conditions in the laboratory:

Test Date: Apr. 30, 2020 Antenna: SPEED

Items	Required	Actual
Temperature (°C)	18-25	22.9 ± 2
Humidity (%RH)	30-70	52

Test Date: May. 01, 2020 Antenna: INPAQ

Items	Required	Actual
Temperature (°C)	18-25	22.5 ± 2
Humidity (%RH)	30-70	52

Test Date: May. 02, 2020 Antenna: INPAQ

Items	Required	Actual
Temperature (°C)	18-25	22.4 ± 2
Humidity (%RH)	30-70	52

Test Date: May. 06, 2020 Antenna: SPEED

Items	Required	Actual
Temperature (°C)	18-25	22.9 ± 2
Humidity (%RH)	30-70	51

**USA : FCC Registration Number: TW3023**

**Canada : IC Registration Number: 4075A**

Site Description : Accredited by TAF  
Accredited Number: 3023

Test Laboratory : DEKRA Testing and Certification Co., Ltd  
Address : No.5-22, Ruishukeng, Linkou Dist.,  
New Taipei City 24451, Taiwan, R.O.C.

Phone number : 886-2-8601-3788

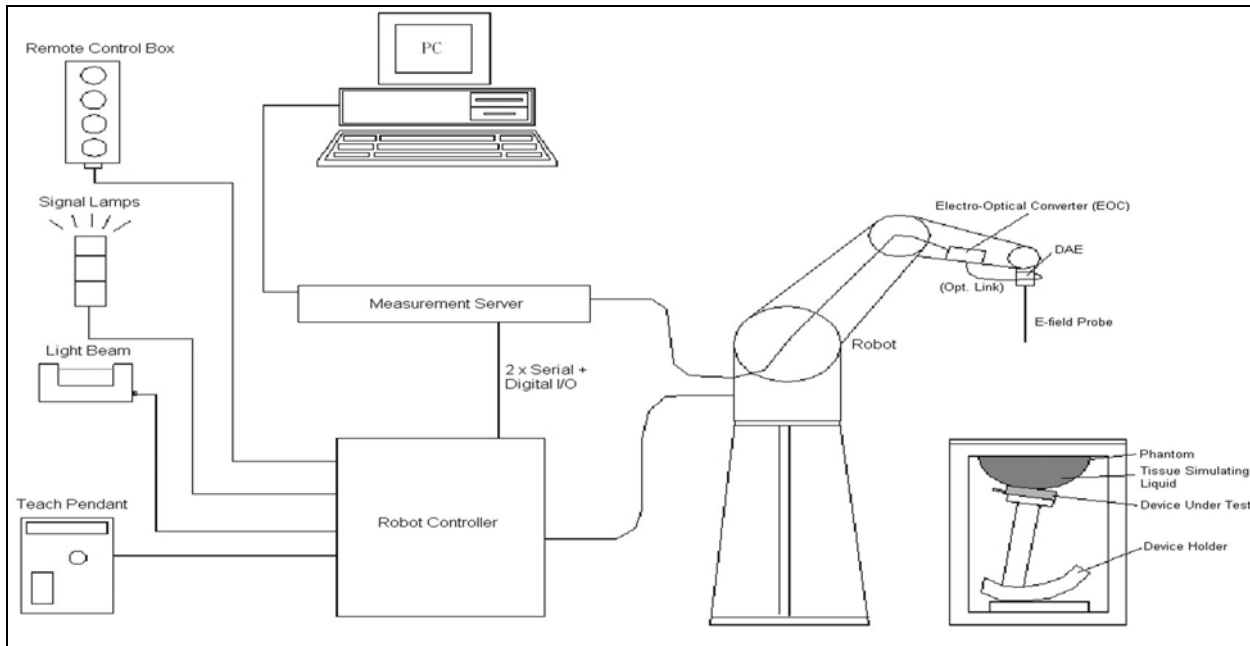
Fax number : 886-2-8601-3789

Email address : [info.tw@dekra.com](mailto:info.tw@dekra.com)

Website : <http://www.dekra.com.tw>

## 2. SAR Measurement System

### 2.1 DASY5 System Description



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

- A standard high precision 6-axis robot with controller, teach pendant and software. An arm extension for accommodating the data acquisition electronics (DAE).
- A data acquisition electronics (DAE) which performs the signal amplification, signal multiplexing, AD-conversion, offset measurements, mechanical surface detection, collision detection, etc. The unit is battery powered with standard or rechargeable batteries. The signal is optically transmitted to the EOC.
- The Electro-optical converter (EOC) performs the conversion from optical to electrical signals for the digital communication to the DAE. To use optical surface detection, a special version of the EOC is required. The EOC signal is transmitted to the measurement server.
- The Light Beam used is for probe alignment. This improves the (absolute) accuracy of the probe positioning.
- A computer running WinXP and the DASY5 software.
- Remote control and teach pendant as well as additional circuitry for robot safety such as warning lamps, etc.
- The phantom, the device holder and other accessories according to the targeted measurement.

### **2.1.1 Applications**

Predefined procedures and evaluations for automated compliance testing with all worldwide standards, e.g., IEEE 1528, OET 65, IEC 62209-1, IEC 62209-2, EN 50360, EN 50383 and others.

### **2.1.2 Area Scans**

Area scans are defined prior to the measurement process being executed with a user defined variable spacing between each measurement point (integral) allowing low uncertainty measurements to be conducted. Scans defined for FCC applications utilize a  $10\text{mm}^2$  step integral, with 1mm interpolation used to locate the peak SAR area used for zoom scan assessments.

When an Area Scan has measured all reachable points, it computes the field maxima found in the scanned area, within a range of the global maximum. The range (in dB) is specified in the standards for compliance testing. For example, a 2 dB range is required in IEEE 1528-2013, EN 50361 and IEC 62209 standards, whereby 3 dB is a requirement when compliance is assessed in accordance with the ARIB standard (Japan).

### **2.1.3 Zoom Scan (Cube Scan Averaging)**

Zoom Scans are used to assess the peak spatial SAR values within a cubic averaging volume containing 1 g and 10 g of simulated tissue. A density of  $1000\text{ kg/m}^3$  is used to represent the head and body tissue density and not the phantom liquid density, in order to be consistent with the definition of the liquid dielectric properties, i.e. the side length of the 1 g cube is 10mm, with the side length of the 10 g cube 21,5mm.

The zoom scan integer steps can be user defined so as to reduce uncertainty, but normal practice for typical test applications (including FCC) utilize a physical step of  $5\times 5\times 7$  (8mmx8mmx5mm) providing a volume of 32mm in the X & Y axis, and 30mm in the Z axis.

### **2.1.4 Uncertainty of Inter-/Extrapolation and Averaging**

In order to evaluate the uncertainty of the interpolation, extrapolation and averaged SAR calculation algorithms of the Postprocessor, DASY5 allows the generation of measurement grids which are artificially predefined by analytically based test functions. Therefore, the grids of area scans and zoom scans can be filled with uncertainty test data, according to the SAR benchmark functions of IEEE 1528. The three analytical functions shown in equations as below are used to describe the possible range of the expected SAR distributions for the tested handsets. The field gradients are covered by the spatially flat

distribution f1, the spatially steep distribution f3 and f2 accounts for H-field cancellation on the phantom/tissue surface.

$$f_1(x, y, z) = Ae^{-\frac{z}{2a}} \cos^2 \left( \frac{\pi \sqrt{x'^2 + y'^2}}{2 \cdot 5a} \right)$$


$$f_2(x, y, z) = Ae^{-\frac{z}{a}} \frac{a^2}{a^2 + x'^2} \left( 3 - e^{-\frac{2z}{a}} \right) \cos^2 \left( \frac{\pi y'}{2 \cdot 3a} \right)$$

$$f_3(x, y, z) = A \frac{a^2}{\frac{a^2}{4} + x'^2 + y'^2} \left( e^{-\frac{2z}{a}} + \frac{a^2}{2(a + 2z)^2} \right)$$

## 2.2 DASY5 E-Field Probe

The SAR measurement is conducted with the dosimetric probe manufactured by SPEAG. 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. SPEAG conducts the probe calibration in compliance with international and national standards (e.g. IEEE 1528, EN 62209-1, IEC 62209, etc.) under ISO 17025. The calibration data are in Appendix D.

### 2.2.1 Isotropic E-Field Probe Specification

<b>Model</b>	Ex3DV4	
<b>Construction</b>	Symmetrical design with triangular core Built-in shielding against static charges PEEK enclosure material (resistant to organic solvents, e.g., DGBE)	
<b>Frequency</b>	10 MHz to 6 GHz Linearity: ± 0.2 dB (30 MHz to 6 GHz)	
<b>Directivity</b>	± 0.3 dB in HSL (rotation around probe axis) ± 0.5 dB in tissue material (rotation normal to probe axis)	
<b>Dynamic Range</b>	10 µW/g to 100 mW/g Linearity: ± 0.2 dB (noise: typically < 1 µW/g)	
<b>Dimensions</b>	Overall length: 330 mm (Tip: 20 mm) Tip diameter: 2.5 mm (Body: 12 mm) Typical distance from probe tip to dipole centers: 1 mm	
<b>Application</b>	High precision dosimetric measurements in any exposure scenario (e.g., very strong gradient fields). Only probe which enables compliance testing for frequencies up to 6 GHz with precision of better 30%.	

### 2.3 Boundary Detection Unit and Probe Mounting Device

The DASY probes use a precise connector and an additional holder for the probe, consisting of a plastic tube and a flexible silicon ring to center the probe. The connector at the DAE is flexibly mounted and held in the default position with magnets and springs. Two switching systems in the connector mount detect frontal and lateral probe collisions and trigger the necessary software response.



### 2.4 DATA Acquisition Electronics (DAE) and Measurement Server

The data acquisition electronics (DAE) consists of a highly sensitive electrometer-grade preamplifier with auto-zeroing, a channel and gain-switching multiplexer, a fast 16 bit AD-converter and a command decoder and control logic unit.

Transmission to the measurement server is accomplished through an optical downlink for data and status information as well as an optical uplink for commands and the clock.

The input impedance of the DAE4 is 200M Ohm; the inputs are symmetrical and floating. Common mode rejection is above 80dB.



The DASY5 measurement server is based on a PC/104 CPU board with a 400MHz intel ULV Celeron, 128MB chipdisk and 128MB RAM. The necessary circuits for communication with the DAE electronics box, as well as the 16 bit AD converter system for optical detection and digital I/O interface are contained on the DASY5 I/O board, which is directly connected to the PC/104 bus of the CPU board.



## 2.5 Robot

The DASY5 system uses the high precision robots TX90 XL type out of the newer series from Stäubli SA (France). For the 6-axis controller DASY5 system, the CS8C robot controller version from Stäubli is used.

The XL robot series have many features that are important for our application:

- High precision (repeatability 0.02 mm)
- High reliability (industrial design)
- Jerk-free straight movements
- Low ELF interference (the closed metallic construction shields against motor control fields)
- 6-axis controller



## 2.6 Light Beam Unit

The light beam switch allows automatic "tooling" of the probe. During the process, the actual position of the probe tip with respect to the robot arm is measured, as well as the probe length and the horizontal probe offset. The software then corrects all movements, such that the robot coordinates are valid for the probe tip.

The repeatability of this process is better than 0.1 mm. If a position has been taught with an aligned probe, the same position will be reached with another aligned probe within 0.1 mm, even if the other probe has different dimensions. During probe rotations, the probe tip will keep its actual position.



## 2.7 Device Holder

The DASY5 device holder is designed to cope with different positions given in the standard. It has two scales for the device rotation (with respect to the body axis) and the device inclination (with respect to the line between the ear reference points). The rotation center for both scales is the ear reference point (EPR).

Thus the device needs no repositioning when changing the angles.

The DASY5 device holder has been made out of low-loss POM material having the following dielectric parameters: relative permittivity  $\epsilon_r = 3$  and loss tangent  $\delta = 0.02$ . The amount of dielectric material has been reduced in the closest vicinity of the device, since measurements have suggested that the influence of the clamp on the test results could thus be lowered.



## 2.8 SAM Twin Phantom

The SAM twin phantom is a fiberglass shell phantom with 2mm shell thickness (except the ear region where shell thickness increases to 6mm). It has three measurement areas:

- Left head
- Right head
- Flat phantom



The bottom plate contains three pair of bolts for locking the device holder. The device holder positions are adjusted to the standard measurement positions in the three sections. A white cover is provided to tap the phantom during off-periods to prevent water evaporation and changes in the liquid parameters. On the phantom top, three reference markers are provided to identify the phantom position with respect to the robot.



### 3. Tissue Simulating Liquid

#### 3.1 The composition of the tissue simulating liquid

INGREDIENT (% Weight)	2450MHz Head	5200MHz Head	5800MHz Head
<b>Water</b>	46.7	67.63	68.29
<b>Salt</b>	0.00	0.00	0.00
<b>Sugar</b>	0.00	0.00	0.00
<b>HEC</b>	0.00	0.00	0.00
<b>Preventol</b>	0.00	0.00	0.00
<b>DGBE</b>	53.3	3.38	2.44
<b>Triton X-100</b>	0.00	28.99	29.27

#### 3.2 Tissue Calibration Result

The dielectric parameters of the liquids were verified prior to the SAR evaluation using APREL Dielectric Probe Kit and Agilent E5071C Vector Network Analyzer.

Head Tissue Simulate Measurement Antenna: SPEED				
Frequency [MHz]	Description	Dielectric Parameters		Tissue Temp. [°C]
		$\epsilon_r$	$\sigma$ [s/m]	
2450 MHz	Reference result ± 5% window	39.2 37.24 to 41.16	1.8 1.71 to 1.89	N/A
	06-May-20	39.77	1.84	22.1
2412 MHz	Low Channel	39.88	1.79	22.1
2437 MHz	Mid Channel	39.81	1.82	22.1
2480 MHz	High Channel	39.67	1.88	22.1

Head Tissue Simulate Measurement Antenna: SPEED				
Frequency [MHz]	Description	Dielectric Parameters		Tissue Temp. [°C]
		$\epsilon_r$	$\sigma$ [s/m]	
5200MHz	Reference result ± 5% window	36.00 34.20 to 37.80	4.66 4.43 to 4.89	N/A
	30-Apr-20	36.71	4.51	21.9
5210 MHz	Channel 42	36.68	4.52	21.9

Head Tissue Simulate Measurement Antenna: SPEED				
Frequency [MHz]	Description	Dielectric Parameters		Tissue Temp. [°C]
		$\epsilon_r$	$\sigma$ [s/m]	
5300MHz	Reference result $\pm 5\%$ window	35.9 34.11 to 37.70	4.76 4.52 to 5.00	N/A
	30-Apr-20	36.43	4.65	21.9
5290 MHz	Channel 58	36.46	4.63	21.9

Head Tissue Simulate Measurement Antenna: SPEED				
Frequency [MHz]	Description	Dielectric Parameters		Tissue Temp. [°C]
		$\epsilon_r$	$\sigma$ [s/m]	
5600MHz	Reference result $\pm 5\%$ window	35.5 33.73 to 37.28	5.07 4.82 to 5.32	N/A
	30-Apr-20	35.60	5.05	21.9
5530 MHz	Low Channel	35.79	4.96	21.9
5610 MHz	Mid Channel	35.58	5.07	21.9
5690 MHz	High Channel	35.36	5.17	21.9

Head Tissue Simulate Measurement Antenna: SPEED				
Frequency [MHz]	Description	Dielectric Parameters		Tissue Temp. [°C]
		$\epsilon_r$	$\sigma$ [s/m]	
5800MHz	Reference result $\pm 5\%$ window	35.3 33.54 to 37.07	5.27 5.01 to 5.53	N/A
	30-Apr-20	35.05	5.31	21.9
5775 MHz	Channel 155	35.13	5.28	21.9

Head Tissue Simulate Measurement Antenna: INPAQ				
Frequency [MHz]	Description	Dielectric Parameters		Tissue Temp. [°C]
		$\epsilon_r$	$\sigma$ [s/m]	
2450 MHz	Reference result $\pm 5\%$ window	39.2 37.24 to 41.16	1.8 1.71 to 1.89	N/A
	02-May-20	39.81	1.83	21.2
2402 MHz	Channel 0	40.36	1.77	21.2
2437 MHz	Channel 06	39.85	1.81	21.2

Head Tissue Simulate Measurement Antenna: INPAQ				
Frequency [MHz]	Description	Dielectric Parameters		Tissue Temp. [°C]
		$\epsilon_r$	$\sigma$ [s/m]	
5300MHz	Reference result $\pm 5\%$ window	35.9 34.11 to 37.70	4.76 4.52 to 5.00	N/A
	01-May-20	36.56	4.66	22.1
5290 MHz	Channel 58	36.58	4.65	22.1

Head Tissue Simulate Measurement Antenna: INPAQ				
Frequency [MHz]	Description	Dielectric Parameters		Tissue Temp. [°C]
		$\epsilon_r$	$\sigma$ [s/m]	
5600MHz	Reference result $\pm 5\%$ window	35.5 33.73 to 37.28	5.07 4.82 to 5.32	N/A
	01-May-20	35.73	5.07	22.1
5530 MHz	Channel 106	35.92	4.98	22.1

Head Tissue Simulate Measurement Antenna: INPAQ				
Frequency [MHz]	Description	Dielectric Parameters		Tissue Temp. [°C]
		$\epsilon_r$	$\sigma$ [s/m]	
5800MHz	Reference result $\pm 5\%$ window	35.3 33.54 to 37.07	5.27 5.01 to 5.53	N/A
	01-May-20	35.18	5.33	22.1
5775 MHz	Channel 155	35.25	5.30	22.1

### 3.3 Tissue Dielectric Parameters for Head and Body Phantoms

The head tissue dielectric parameters recommended by the IEC 62209-1 have been incorporated in the following table. These head parameters are derived from planar layer models simulating the highest expected SAR for the dielectric properties and tissue thickness variations in a human head. Other head tissue parameters that have not been specified are interpolated according to the head parameters specified in IEC 62209-1

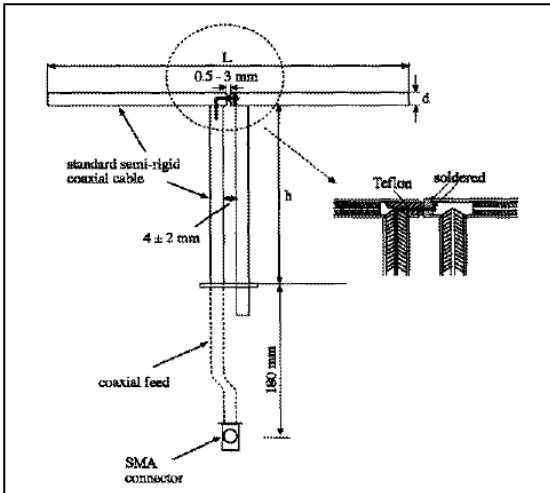
Target Frequency (MHz)	Head	
	$\epsilon_r$	$\sigma$ (S/m)
300	45.3	0.87
450	43.5	0.87
750	41.9	0.89
835	41.5	0.90
900	41.5	0.97
1450	40.5	1.20
1640	40.2	1.31
1750	40.1	1.37
1800 – 2000	40.0	1.40
2450	39.2	1.80
3000	38.5	2.40
5000	36.2	4.45
5200	36.0	4.66
5400	35.8	4.86
5600	35.3	5.27
5800	35.3	5.27
6000	35.1	5.48

( $\epsilon_r$  = relative permittivity,  $\sigma$  = conductivity and  $\rho = 1000 \text{ kg/m}^3$ )

## 4. SAR Measurement Procedure

### 4.1 SAR System Check

#### 4.1.1 Dipoles



The dipoles used is based on the IEEE-1528 standard, and is complied with mechanical and electrical specifications in line with the requirements of both IEEE and FCC Supplement C. the table below provides details for the mechanical and electrical specifications for the dipoles.

Frequency	L (mm)	h (mm)	d (mm)
2450MHz	51.5	30.4	3.6
5200M~5800MHz	20.6	40.3	3.6

#### 4.1.2 System Check Result

##### Antenna: SPEED

System Performance Check at 2450MHz				
Dipole Kit: D2450V2				
Frequency [MHz]	Description	SAR [w/kg] 1g	SAR [w/kg] 10g	Tissue Temp. [°C]
2450 MHz	Reference result ± 10% window	53.1 47.79 to 58.41	24.6 22.14 to 27.06	N/A
	06-May-20	51.6	23.8	22.1

Note: (1) The power level is used 250mW  
 (2) All SAR values are normalized to 1W forward power.  
 (3) The reference result is from Appendix E.

**Antenna: SPEED**

<b>System Performance Check at 5200MHz</b>				
<b>Dipole Kit: D5GHzV2</b>				
Frequency [MHz]	Description	SAR [w/kg] 1g	SAR [w/kg] 10g	Tissue Temp. [°C]
5200 MHz	Reference result ± 10% window	81.4 73.26 to 89.54	23.2 20.88 to 25.52	N/A
	30-Apr-20	77.3	22.1	21.9
Note: (1) The power level is used 100mW (2) All SAR values are normalized to 1W forward power. (3) The reference result is from Appendix E.				

**Antenna: SPEED**

<b>System Performance Check at 5300MHz</b>				
<b>Dipole Kit: D5GHzV2</b>				
Frequency [MHz]	Description	SAR [w/kg] 1g	SAR [w/kg] 10g	Tissue Temp. [°C]
5300 MHz	Reference result ± 10% window	83.0 74.70 to 91.30	23.8 21.42 to 26.18	N/A
	30-Apr-20	81.3	23.3	21.9
Note: (1) The power level is used 100mW (2) All SAR values are normalized to 1W forward power. (3) The reference result is from Appendix E.				

**Antenna: SPEED**

<b>System Performance Check at 5600MHz</b>				
<b>Dipole Kit: D5GHzV2</b>				
Frequency [MHz]	Description	SAR [w/kg] 1g	SAR [w/kg] 10g	Tissue Temp. [°C]
5600 MHz	Reference result ± 10% window	86.7 78.03 to 95.37	24.5 22.05 to 26.95	N/A
	30-Apr-20	87.2	24.8	21.9
Note: (1) The power level is used 100mW (2) All SAR values are normalized to 1W forward power. (3) The reference result is from Appendix E.				

**Antenna: SPEED**

<b>System Performance Check at 5800MHz</b>				
<b>Dipole Kit: D5GHzV2</b>				
Frequency [MHz]	Description	SAR [w/kg] 1g	SAR [w/kg] 10g	Tissue Temp. [°C]
5800 MHz	Reference result ± 10% window	83.1 74.79 to 91.41	23.5 21.15 to 25.85	N/A
	30-Apr-20	78.2	22.1	21.9
Note: (1) The power level is used 100mW (2) All SAR values are normalized to 1W forward power. (3) The reference result is from Appendix E.				

**Antenna: INPAQ**

<b>System Performance Check at 2450MHz</b>				
<b>Dipole Kit: D2450V2</b>				
Frequency [MHz]	Description	SAR [w/kg] 1g	SAR [w/kg] 10g	Tissue Temp. [°C]
2450 MHz	Reference result ± 10% window	53.1 47.79 to 58.41	24.6 22.14 to 27.06	N/A
	02-May-20	55.6	25.8	21.2
Note: (1) The power level is used 250mW (2) All SAR values are normalized to 1W forward power. (3) The reference result is from Appendix E.				

**Antenna: INPAQ**

<b>System Performance Check at 5300MHz</b>				
<b>Dipole Kit: D5GHzV2</b>				
Frequency [MHz]	Description	SAR [w/kg] 1g	SAR [w/kg] 10g	Tissue Temp. [°C]
5300 MHz	Reference result ± 10% window	83.0 74.70 to 91.30	23.8 21.42 to 26.18	N/A
	01-May-20	86.7	24.2	22.1
Note: (1) The power level is used 100mW (2) All SAR values are normalized to 1W forward power. (3) The reference result is from Appendix E.				

**Antenna: INPAQ**

<b>System Performance Check at 5600MHz</b>				
<b>Dipole Kit: D5GHzV2</b>				
Frequency [MHz]	Description	SAR [w/kg] 1g	SAR [w/kg] 10g	Tissue Temp. [°C]
5600 MHz	Reference result ± 10% window	86.7 78.03 to 95.37	24.5 22.05 to 26.95	N/A
	01-May-20	87.3	24.7	22.1
Note: (1) The power level is used 100mW (2) All SAR values are normalized to 1W forward power. (3) The reference result is from Appendix E.				

**Antenna: INPAQ**

<b>System Performance Check at 5800MHz</b>				
<b>Dipole Kit: D5GHzV2</b>				
Frequency [MHz]	Description	SAR [w/kg] 1g	SAR [w/kg] 10g	Tissue Temp. [°C]
5800 MHz	Reference result ± 10% window	83.1 74.79 to 91.41	23.5 21.15 to 25.85	N/A
	01-May-20	86.3	24.2	22.1
Note: (1) The power level is used 100mW (2) All SAR values are normalized to 1W forward power. (3) The reference result is from Appendix E.				



## 4.2 SAR Measurement Procedure

The Dasy5 calculates SAR using the following equation,

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

$\sigma$ : represents the simulated tissue conductivity

$\rho$ : represents the tissue density

The EUT is set to transmit at the required power in line with product specification, at each frequency relating to the LOW, MID, and HIGH channel settings.

Pre-scans are made on the device to establish the location for the transmitting antenna, using a large area scan in either air or tissue simulation fluid.

The EUT is placed against the Universal Phantom where the maximum area scan dimensions are larger than the physical size of the resonating antenna. When the scan size is not large enough to cover the peak SAR distribution, it is modified by either extending the area scan size in both the X and Y directions, or the device is shifted within the predefined area.

The area scan is then run to establish the peak SAR location (interpolated resolution set at  $1\text{mm}^2$ ) which is then used to orient the center of the zoom scan. The zoom scan is then executed and the 1g and 10g averages are derived from the zoom scan volume (interpolated resolution set at  $1\text{mm}^3$ ).

## 5. SAR Exposure Limits

SAR assessments have been made in line with the requirements of IEEE-1528, FCC Supplement C, and comply with ANSI/IEEE C95.1-1992 “Uncontrolled Environments” limits. These limits apply to a location which is deemed as “Uncontrolled Environment” which can be described as a situation where the general public may be exposed to an RF source with no prior knowledge or control over their exposure.

### Limits for General Population/Uncontrolled Exposure (W/kg)

Type Exposure	Uncontrolled Environment Limit
Spatial Peak SAR (1g cube tissue for brain or body)	<b>1.60 W/kg</b>
Spatial Average SAR (whole body)	<b>0.08 W/kg</b>
Spatial Peak SAR (10g for hands, feet, ankles and wrist)	<b>4.00 W/kg</b>

## 6. Test Equipment List

Instrument	Manufacturer	Model No.	Serial No.	Last Calibration	Next Calibration
Stäubli Robot TX60L	Stäubli	TX60L	F09/5BL1A1/A06	2009/05/18	only once
Controller	Speag	CS8c	N/A	2009/05/18	only once
Reference Dipole 2450MHz	Speag	D2450V2	930	2019/11/21	2022/11/20
Reference Dipole 5GHz	Speag	D5GHzV2	1041	2017/05/26	2020/05/25
SAM Twin Phantom	Speag	QD000 P40 CA	Tp 1515	N/A	N/A
Device Holder	Speag	N/A	N/A	N/A	N/A
Data Acquisition Electronic	Speag	DAE4	1207	2019/11/14	2020/11/13
E-Field Probe	Speag	EX3DV4	3698	2019/11/22	2020/11/21
SAR Software	Speag	DASY52	V52.10.0.1446	N/A	N/A
Aprél Dipole Spaccer	Aprél	ALS-DS-U	QTK-295	N/A	N/A
Power Amplifier	Mini-Circuit	ZHL-42	D051404-20	N/A	N/A
Directional Coupler	Agilent	87300C	MY44300353	N/A	N/A <sup>1</sup>
Attenuator	Woken	WATT-218FS-10	N/A	N/A	N/A <sup>1</sup>
Attenuator	Mini-Circuit	BW-S20W2+	N/A	N/A	N/A <sup>1</sup>
Vector Network	Agilent	E5071C	MY46106342	2019/09/09	2020/09/08
Signal Generator	Anritsu	MG3694A	041902	2019/08/23	2020/08/22
Power Meter	Anritsu	ML2487A	6K00001447	2019/10/24	2020/10/23
Wide Bandwidth Sensor	Anritsu	MA2411B	1339194	2019/10/24	2020/10/23

Note: 1. System Check, the path loss measured by the network analyzer, includes the signal generator, amplifier, cable, attenuator and directional coupler.

Note:

Per KDB 865664 D01 requirements for dipole calibration, the following are recommended FCC procedures for SAR dipole calibration.

1. After a dipole is damaged and properly repaired to meet required specifications
2. When the measured SAR deviates from the calibrated SAR value by more than 10% due to changes in physical, mechanical, electrical or other relevant dipole conditions;
3. When the most recent return-loss, measured at least annually, deviates by more than 20% from the previous measurement (i.e. 0.2 of the dB value) or not meeting the required -20 dB return-loss specification

	Frequency	Tissue	Return loss	Limit	Verified Date
Calibration	5200	Head	-21.63dB	Within 20%	2017.05.26
Measurement	5200	Head	-24.03dB		2018.05.25
Measurement	5200	Head	-23.75dB		2019.05.25

	Frequency	Tissue	Return loss	Limit	Verified Date
Calibration	5300	Head	-29.02dB	Within 20%	2017.05.26
Measurement	5300	Head	-30.41dB		2018.05.25
Measurement	5300	Head	-27.09dB		2019.05.25

	Frequency	Tissue	Return loss	Limit	Verified Date
Calibration	5600	Head	-25.73dB	Within 20%	2017.05.26
Measurement	5600	Head	-24.74dB		2018.05.25
Measurement	5600	Head	-23.33dB		2019.05.25

	Frequency	Tissue	Return loss	Limit	Verified Date
Calibration	5800	Head	-24.65dB	Within 20%	2017.05.26
Measurement	5800	Head	-23.05dB		2018.05.25
Measurement	5800	Head	-20.12dB		2019.05.25

4. When the most recent measurement of the real or imaginary parts of the impedance, measured at least annually, deviates by more than  $5 \Omega$  from the previous measurement:

	Frequency	Tissue	Impedance	Limit	Verified Date
Calibration	5200	Head	49.84	Within $5 \Omega$	2017.05.26
Measurement	5200	Head	50.84		2018.05.25
Measurement	5200	Head	51.81		2019.05.25

	Frequency	Tissue	Impedance	Limit	Verified Date
Calibration	5300	Head	47.97	Within $5 \Omega$	2017.05.26
Measurement	5300	Head	51.87		2018.05.25
Measurement	5300	Head	51.84		2019.05.25

	Frequency	Tissue	Impedance	Limit	Verified Date
Calibration	5600	Head	55.19	Within $5 \Omega$	2017.05.26
Measurement	5600	Head	51.14		2018.05.25
Measurement	5600	Head	54.82		2019.05.25

	Frequency	Tissue	Impedance	Limit	Verified Date
Calibration	5800	Head	56.20	Within $5 \Omega$	2017.05.26
Measurement	5800	Head	53.52		2018.05.25
Measurement	5800	Head	54.96		2019.05.25

## 7. Measurement Uncertainty

DASY5 Uncertainty (According to IEEE 1528-2013) Measurement uncertainty for 30 MHz to 3 GHz								
Error Description	Uncert. value	Prob. Dist.	Div.	(ci) 1g	(ci) 10g	Std. Unc. (1g)	Std. Unc. (10g)	(vi) V <sub>eff</sub>
<b>Measurement System</b>								
Probe Calibration	±6%	N	1	1	1	±6.0%	±6.0%	∞
Axial Isotropy	±4.7%	R	$\sqrt{3}$	0.7	0.7	±1.9%	±1.9%	∞
Hemispherical Isotropy	±9.6%	R	$\sqrt{3}$	0.7	0.7	±3.9%	±3.9%	∞
Boundary Effects	±1.0%	R	$\sqrt{3}$	1	1	±0.6%	±0.6%	∞
Linearity	±4.7%	R	$\sqrt{3}$	1	1	±2.7%	±2.7%	∞
System Detection Limits	±1.0%	R	$\sqrt{3}$	1	1	±0.6%	±0.6%	∞
Modulation Response	±2.4%	R	$\sqrt{3}$	1	1	±1.4%	±1.4%	∞
Readout Electronics	±0.3%	N	1	1	1	±0.3%	±0.3%	∞
Response Time	±0.8%	R	$\sqrt{3}$	1	1	±0.5%	±0.5%	∞
Integration Time	±2.6%	R	$\sqrt{3}$	1	1	±1.5%	±1.5%	∞
RF Ambient Noise	±3.0%	R	$\sqrt{3}$	1	1	±1.7%	±1.7%	∞
RF Ambient Reflections	±3.0%	R	$\sqrt{3}$	1	1	±1.7%	±1.7%	∞
Probe Positioner	±0.4%	R	$\sqrt{3}$	1	1	±0.2%	±0.2%	∞
Probe Positioning	±2.9%	R	$\sqrt{3}$	1	1	±1.7%	±1.7%	∞
Max. SAR Eval.	±4.0%	R	$\sqrt{3}$	1	1	±1.2%	±1.2%	∞
<b>Test Sample Related</b>								
Device Positioning	±2.9%	N	1	1	1	±2.9%	±2.9%	145
Device Holder	±3.6%	N	1	1	1	±3.6%	±3.6%	5
Power Drift	±5.0%	R	$\sqrt{3}$	1	1	±2.9%	±2.9%	∞
Power Scaling	±0%	R	$\sqrt{3}$	1	1	±0.0%	±0.0%	
<b>Phantom and Setup</b>								
Phantom Uncertainty	±6.1%	R	$\sqrt{3}$	1	1	±3.5%	±3.5%	∞
SAR correction	±1.9%	R	$\sqrt{3}$	1	0.84	±1.1%	±0.9%	∞
Liquid Conductivity (meas.)	±2.5%	R	$\sqrt{3}$	0.78	0.71	±1.1%	±1.0%	∞
Liquid Permittivity (meas.)	±2.5%	R	$\sqrt{3}$	0.26	0.26	±0.3%	±0.4%	∞
Temp. unc. - Conductivity	±3.4%	R	$\sqrt{3}$	0.78	0.71	±1.5%	±1.4%	∞
Temp. unc. - Permittivity	±0.4%	R	$\sqrt{3}$	0.23	0.26	±0.1%	±0.1%	∞
<b>Combined Std. Uncertainty</b>						±11.2%	±11.1%	361
<b>Expanded STD Uncertainty</b>						±22.3%	±22.2%	

<b>DASY5 Uncertainty (According to IEEE 1528-2013)</b> <b>Measurement uncertainty for 3GHz to 6 GHz</b>								
Error Description	Uncert. value	Prob. Dist.	Div.	(ci) 1g	(ci) 10g	Std. Unc. (1g)	Std. Unc. (10g)	(vi) V <sub>eff</sub>
<b>Measurement System</b>								
Probe Calibration	±6.55%	N	1	1	1	±6.55%	±6.55%	∞
Axial Isotropy	±4.7%	R	$\sqrt{3}$	0.7	0.7	±1.9%	±1.9%	∞
Hemispherical Isotropy	±9.6%	R	$\sqrt{3}$	0.7	0.7	±3.9%	±3.9%	∞
Boundary Effects	±2.0%	R	$\sqrt{3}$	1	1	±1.2%	±1.2%	∞
Linearity	±4.7%	R	$\sqrt{3}$	1	1	±2.7%	±2.7%	∞
System Detection Limits	±1.0%	R	$\sqrt{3}$	1	1	±0.6%	±0.6%	∞
Modulation Response	±2.4%	R	$\sqrt{3}$	1	1	±1.4%	±1.4%	∞
Readout Electronics	±0.3%	N	1	1	1	±0.3%	±0.3%	∞
Response Time	±0.8%	R	$\sqrt{3}$	1	1	±0.5%	±0.5%	∞
Integration Time	±2.6%	R	$\sqrt{3}$	1	1	±1.5%	±1.5%	∞
RF Ambient Noise	±3.0%	R	$\sqrt{3}$	1	1	±1.7%	±1.7%	∞
RF Ambient Reflections	±3.0%	R	$\sqrt{3}$	1	1	±1.7%	±1.7%	∞
Probe Positioner	±0.8%	R	$\sqrt{3}$	1	1	±0.5%	±0.5%	∞
Probe Positioning	±6.7%	R	$\sqrt{3}$	1	1	±3.9%	±3.9%	∞
Post-processing	±4.0%	R	$\sqrt{3}$	1	1	±2.3%	±2.3%	∞
<b>Test Sample Related</b>								
Device Positioning	±2.9%	N	1	1	1	±2.9%	±2.9%	145
Device Holder	±3.6%	N	1	1	1	±3.6%	±3.6%	5
Power Drift	±5.0%	R	$\sqrt{3}$	1	1	±2.9%	±2.9%	∞
Power Scaling	±0%	R	$\sqrt{3}$	1	1	±0.0%	±0.0%	
<b>Phantom and Setup</b>								
Phantom Uncertainty	±6.6%	R	$\sqrt{3}$	1	1	±3.8%	±3.8%	∞
SAR correction	±1.9%	R	$\sqrt{3}$	1	1	±1.1%	±0.9%	∞
Liquid Conductivity (meas.)	±2.5%	R	$\sqrt{3}$	1	0.84	±1.1%	±1.0%	∞
Liquid Permittivity (meas.)	±2.5%	R	$\sqrt{3}$	0.26	0.26	±0.3%	±0.4%	∞
Temp. unc. - Conductivity	±3.4%	R	$\sqrt{3}$	0.78	0.71	±1.5%	±1.4%	∞
Temp. unc. - Permittivity	±0.4%	R	$\sqrt{3}$	0.23	0.26	±0.1%	±0.1%	∞
<b>Combined Std. Uncertainty</b>						±12.3%	±12.2%	748
<b>Expanded STD Uncertainty</b>						±24.6%	±24.5%	

### 8. Conducted Power Measurement (Including tolerance allowed for production unit)

WLAN 2.4G 2TX SISO (SPEED)											
	Frequency	Mode	BW	SISO-Main(TX1)				SISO-Aux(TX2)			
				CH	PK Power	AV Power	AV Target	CH	PK Power	AV Power	AV Target
DSSS/OFDM mode specified maximum output power at an antenna port	WLAN 2.4GHz	b	20	1	15.05	12.94	13	1	14.98	12.91	13
				6	14.84	12.95	13	6	14.79	12.93	13
				11	14.84	12.91	13	11	15.17	12.91	13
				12	14.96	12.88	13	12	15.20	12.86	13
				13	12.47	10.47	10.5	13	12.43	10.41	10.5
		g	20	1	22.45	12.94	13	1	22.79	12.95	13
				6	22.24	12.91	13	6	22.57	12.84	13
				11	22.28	12.98	13	11	22.58	12.98	13
				12	21.07	11.48	11.5	12	21.46	11.39	11.5
				13	17.91	8.37	8.5	13	18.28	8.49	8.5
		n(HT)	20	1	12.87	12.85	13	1	22.01	12.99	13
				6	21.58	12.78	13	6	21.64	12.80	13
				11	21.70	12.89	13	11	21.78	12.97	13
				12	20.31	11.38	11.5	12	20.52	11.43	11.5
				13	17.18	8.32	8.5	13	17.36	8.37	8.5
			40	3	22.13	12.98	13	3	22.07	12.86	13
				6	21.92	12.90	13	6	22.18	12.98	13
				9	21.87	12.84	13	9	21.86	12.83	13
				10	20.52	11.31	11.5	10	20.88	11.47	11.5
				11	17.17	8.00	8	11	17.32	7.89	8



WLAN 5G 2TX SISO (SPEED)																			
OFDM mode specified maximum output power at an antenna port	Frequency	Mode	BW	SISO-Main(TX1)			SISO-Aux(TX2)			Frequency	Mode	BW	SISO-Main(TX1)			SISO-Aux(TX2)			
				CH	AV	AV	CH	AV	AV				CH	AV	AV	CH	AV	AV	
				Power	Target	Power	Target	Power	Target				Power	Target	Power	Target	Power	Target	
U-NII-1 (5150~5250MHz)	a	20	36	12.92	13	36	12.89	13	U-NII-2A (5250~5350MHz)	a	20	52	12.97	13	52	12.98	13		
			40	12.85	13	40	12.99	13				56	12.94	13	56	12.99	13		
			44	12.93	13	44	12.94	13				60	12.94	13	60	12.95	13		
			48	12.98	13	48	12.97	13				64	12.92	13	64	12.92	13		
	n(HT)	20	36	12.86	13	36	12.83	13		n(HT)	20	52	12.99	13	52	12.97	13		
			40	12.91	13	40	12.96	13				56	12.98	13	56	12.99	13		
			44	12.99	13	44	12.91	13				60	12.91	13	60	12.95	13		
			48	12.97	13	48	12.98	13				64	12.99	13	64	12.86	13		
	40	40	38	12.90	13	38	12.86	13		40	40	54	12.94	13	54	12.97	13		
			46	12.86	13	46	12.99	13				62	12.99	13	62	12.92	13		
	ac	80	42	12.82	13	42	12.84	13		ac	80	58	12.99	13	58	12.72	13		
	U-NII-1 + U-NII-2A																		
	U-NII-2C (5470~5650MHz)	a	20	100	12.90	13	100	12.78		13	5.65 GHz & U-NII-3 (5725~5850MHz)	a	20	132	12.98	13	132	12.99	13
				112	12.97	13	112	12.95		13				149	12.99	13	149	12.95	13
				116	12.89	13	116	12.99		13				165	12.86	13	165	12.85	13
				128	12.95	13	128	12.98		13				132	12.98	13	132	12.98	13
n(HT)		20	100	12.98	13	100	12.87	13	n(HT)	20		149	12.99	13	149	12.99	13		
			112	12.80	13	112	12.85	13				165	12.83	13	165	12.97	13		
			116	12.97	13	116	12.90	13				134	12.97	13	134	12.90	13		
			128	12.92	13	128	12.93	13				151	12.95	13	151	12.96	13		
40		40	102	12.84	13	102	12.91	13	ac	80		159	12.89	13	159	12.95	13		
			110	12.93	13	110	12.90	13				20	144	12.91	13	144	12.95	13	
			118	12.96	13	118	12.99	13				40	142	12.99	13	142	12.97	13	
			126	12.98	13	126	12.94	13				138	12.83	13	138	12.98	13		
ac		80	106	12.84	13	106	12.99	13	155	12.98		13	155	12.89	13				
			122	12.78	13	122	12.96	13											

WLAN 2.4G 2TX SISO (INPAQ)											
	Frequency	Mode	BW	SISO-Main(TX1)				SISO-Aux(TX2)			
				CH	PK Power	AV Power	AV Target	CH	PK Power	AV Power	AV Target
DSSS/OFDM mode specified maximum output power at an antenna port	WLAN 2.4GHz	b	20	1	14.82	12.82	13	1	14.91	12.85	13
				6	14.96	12.99	13	6	14.98	12.99	13
				11	14.87	12.92	13	11	14.87	12.89	13
				12	14.86	12.85	13	12	14.81	12.86	13
				13	14.47	10.47	10.5	13	12.60	10.49	10.5
		g	20	1	22.70	12.91	13	1	22.89	12.95	13
				6	22.59	12.98	13	6	22.84	12.96	13
				11	22.41	12.96	13	11	22.62	12.85	13
				12	21.01	11.21	11.5	12	21.14	11.19	11.5
				13	18.16	8.32	8.5	13	18.42	8.48	8.5
		n(HT)	20	1	21.98	12.97	13	1	21.87	12.99	13
				6	21.69	12.94	13	6	21.84	12.96	13
				11	21.43	12.80	13	11	21.66	12.81	13
				12	20.14	11.25	11.5	12	20.52	11.41	11.5
				13	17.04	8.27	8.5	13	17.33	8.33	8.5
			40	3	21.97	12.91	13	3	22.14	12.98	13
				6	21.84	12.99	13	6	22.11	12.93	13
				9	21.77	12.92	13	9	22.01	12.99	13
				10	20.43	11.41	11.5	10	20.39	11.36	11.5
				11	17.06	7.99	8	11	17.12	7.91	8

WLAN 5G 2TX SISO (INPAQ)																					
OFDM mode specified maximum output power at an antenna port	Frequency	Mode	BW	SISO-Main(TX1)			SISO-Aux(TX2)			Frequency	Mode	BW	SISO-Main(TX1)			SISO-Aux(TX2)					
				CH	AV	AV	CH	AV	AV				CH	AV	AV	CH	AV	AV	CH	AV	AV
					Power	Target		Power	Target					Power	Target		Power	Target		Power	Target
U-NII-1 (5150~5250MHz)	a	20	36	12.88	13	36	12.86	13	U-NII-2A (5250~5350MHz)	a	20	52	12.95	13	52	12.84	13				
			40	12.91	13	40	12.81	13				56	12.94	13	56	12.74	13				
			44	12.92	13	44	12.87	13				60	12.89	13	60	12.92	13				
			48	12.83	13	48	12.78	13				64	12.88	13	64	12.76	13				
	n(HT)	20	36	12.95	13	36	12.80	13		n(HT)	20	52	12.79	13	52	12.95	13				
			40	12.83	13	40	12.96	13				56	12.90	13	56	12.93	13				
			44	12.91	13	44	12.97	13				60	12.79	13	60	12.79	13				
			48	12.88	13	48	12.90	13				64	12.88	13	64	12.88	13				
	40	38	12.88	13	38	12.90	13	40		54	12.85	13	54	12.96	13						
		46	12.86	13	46	12.95	13			62	12.97	13	62	12.81	13						
	ac	80	42	12.87	13	42	12.89	13		ac	80	58	12.91	13	58	12.94	13				
	U-NII-1 + U-NII-2A																				
	U-NII-2C (5470~5650MHz)	a	20	100	12.95	13	100	12.80	13	5.65 GHz & U-NII-3 (5725~5850MHz)	a	20	132	12.95	13	132	12.81	13			
				112	12.92	13	112	12.89	13				149	12.92	13	149	12.90	13			
				116	12.94	13	116	12.86	13				165	12.92	13	165	12.91	13			
128				12.87	13	128	12.75	13	n(HT)				20	132	12.91	13	132	12.91	13		
100		12.84	13	100	12.90	13	149	12.89			13	149		12.84	13						
112		12.90	13	112	12.97	13	165	12.93			13	165		12.88	13						
116		12.72	13	116	12.78	13	134	12.71			13	134		12.90	13						
n(HT)		20	128	12.85	13	128	12.85	13	40		151	12.92	13	151	12.91	13					
			40	102	12.94	13	102	12.87			13	ac	80	159	12.81	13	159	12.82	13		
				110	12.76	13	110	12.96			13			20	144	12.89	13	144	12.76	13	
				118	12.88	13	118	12.95			13			40	142	12.78	13	142	12.89	13	
126		12.85		13	126	12.79	13	138	12.87		13			138	12.93	13					
ac		80	106	12.96	13	106	12.98	13	80	155	12.89	13	155	12.95	13						
			122	12.86	13	122	12.96	13													

**BT Only\_Aux (INPAQ)**

Bluetooth mode maximum output power	Frequency	Mode	Modulation	SISO-Main(TX1)				SISO-Aux(TX2)			
				CH	PK Power	AV Power	AV Target	CH	PK Power	AV Power	AV Target
BT 2.4GHz	BR	GFSK	0	N/A	N/A	N/A	0	7.99	6.92	13.00	
			39	N/A	N/A	N/A	39	6.99	5.79	13.00	
			78	N/A	N/A	N/A	78	7.31	6.21	13.00	
	EDR	8DPSK	0	N/A	N/A	N/A	0	7.94	4.64	10.00	
			39	N/A	N/A	N/A	39	6.92	3.49	10.00	
			78	N/A	N/A	N/A	78	7.21	3.81	10.00	
	BLE	GFSK	0	N/A	N/A	N/A	0	5.59	3.91	12.00	
			19	N/A	N/A	N/A	19	4.96	2.95	12.00	
			39	N/A	N/A	N/A	39	4.71	2.75	12.00	

**BT Only\_Aux (SPEED)**

Bluetooth mode maximum output power	Frequency	Mode	Modulation	SISO-Main(TX1)				SISO-Aux(TX2)			
				CH	PK Power	AV Power	AV Target	CH	PK Power	AV Power	AV Target
BT 2.4GHz	BR	GFSK	0	N/A	N/A	N/A	0	6.51	5.41	13.00	
			39	N/A	N/A	N/A	39	6.91	5.93	13.00	
			78	N/A	N/A	N/A	78	6.22	5.98	13.00	
	EDR	8DPSK	0	N/A	N/A	N/A	0	7.50	4.08	10.00	
			39	N/A	N/A	N/A	39	6.26	2.52	10.00	
			78	N/A	N/A	N/A	78	6.37	2.85	10.00	
	BLE	GFSK	0	N/A	N/A	N/A	0	5.15	3.45	12.00	
			19	N/A	N/A	N/A	19	4.62	2.91	12.00	
			39	N/A	N/A	N/A	39	4.18	2.12	12.00	

## 9. Test Results

### 9.1 SAR Test Results Summary

SAR MEASUREMENT								
Ambient Temperature (°C) : 22.9 ± 2					Relative Humidity (%): 51			
Liquid Temperature (°C) : 22.1 ± 2					Depth of Liquid (cm):>15			
Test Position Body	Antenna Position	Frequency		Conducted Power (dBm)		SAR 1g (W/kg)		Limit (W/kg)
		Channel	MHz	Measurement	Tune-up Limit	Measurement	Tune-up Scaled	
Test Mode: 802.11b - SPEED Main Antenna								
Back(PAD)	Fixed	1	2412	12.94	13	0.080	0.081	1.6
Back(PAD)	Fixed	6	2437	12.95	13	0.091	0.092	1.6
Back(PAD)	Fixed	11	2462	12.91	13	0.077	0.079	1.6
Top(PAD)	Fixed	6	2437	12.95	13	0.061	0.062	1.6
Test Mode: 802.11b - SPEED Aux Antenna								
Back(PAD)	Fixed	6	2437	12.93	13	0.093	0.095	1.6
Top(PAD)	Fixed	1	2412	12.91	13	0.107	0.109	1.6
Top(PAD)	Fixed	6	2437	12.93	13	0.096	0.098	1.6
Top(PAD)	Fixed	11	2462	12.91	13	0.110	0.112	1.6
Test Mode: BT - 1M SPEED Aux Antenna								
Top(PAD)	Fixed	78	2480	5.98	13	0.015	0.074	1.6
Note : 1. When the highest reported SAR for DSSS is adjusted by the ratio of OFDM to DSSS specified maximum output power and the adjusted SAR is ≤ 1.2 W/kg, SAR is not required. 2. When the reported SAR of the highest measured maximum output power channel for the exposure configuration is ≤ 0.8 W/kg, no further SAR testing is required for 802.11b DSSS in that exposure configuration.								

SAR MEASUREMENT								
Ambient Temperature (°C) : 22.4 ± 2					Relative Humidity (%) : 52			
Liquid Temperature (°C) : 21.2 ± 2					Depth of Liquid (cm) : >15			
Test Position Body	Antenna Position	Frequency		Conducted Power (dBm)		SAR 1g (W/kg)		Limit (W/kg)
		Channel	MHz	Measurement	Tune-up Limit	Measurement	Tune-up Scaled	
Test Mode: 802.11b - INPAQ Main Antenna								
Back(PAD)	Fixed	6	2437	12.99	13	0.109	0.109	1.6
Top(PAD)	Fixed	6	2437	12.99	13	0.159	0.159	1.6
Test Mode: 802.11b - INPAQ Aux Antenna								
Back(PAD)	Fixed	6	2437	12.99	13	0.078	0.078	1.6
Top(PAD)	Fixed	6	2437	12.99	13	0.095	0.095	1.6
Test Mode: BT - 1M INPAQ Aux Antenna								
Back(PAD)	Fixed	0	2402	6.92	13	0.029	0.118	1.6
<p>Note : 1. When the highest reported SAR for DSSS is adjusted by the ratio of OFDM to DSSS specified maximum output power and the adjusted SAR is ≤ 1.2 W/kg, SAR is not required.</p> <p>2. When the reported SAR of the highest measured maximum output power channel for the exposure configuration is ≤ 0.8 W/kg, no further SAR testing is required for 802.11b DSSS in that exposure configuration.</p>								

SAR MEASUREMENT								
Ambient Temperature (°C) : 22.9 ± 2				Relative Humidity (%): 52				
Liquid Temperature (°C) : 21.9 ± 2				Depth of Liquid (cm):>15				
Test Position Body	Antenna Position	Frequency		Conducted Power (dBm)		SAR 1g (W/kg)		Limit (W/kg)
		Channel	MHz	Measurement	Tune-up Limit	Measurement	Tune-up Scaled	
<b>Test Mode: 802.11ac80M - SPEED Main Antenna</b>								
Back(PAD)	Fixed	58	5290	12.99	13	0.156	0.156	1.6
Back(PAD)	Fixed	106	5530	12.84	13	0.167	0.173	1.6
Back(PAD)	Fixed	155	5775	12.98	13	0.144	0.145	1.6
Top(PAD)	Fixed	42	5210	12.82	13	0.258	0.269	1.6
Top(PAD)	Fixed	58	5290	12.99	13	0.219	0.220	1.6
Top(PAD)	Fixed	106	5530	12.84	13	0.284	0.295	1.6
Top(PAD)	Fixed	122	5610	12.78	13	0.264	0.278	1.6
Top(PAD)	Fixed	138	5690	12.83	13	0.363	0.377	1.6
Top(PAD)	Fixed	155	5775	12.98	13	0.265	0.266	1.6
<b>Test Mode: 802.11ac80M - SPEED Aux Antenna</b>								
Back(PAD)	Fixed	58	5290	12.72	13	0.130	0.139	1.6
Back(PAD)	Fixed	106	5530	12.99	13	0.204	0.204	1.6
Back(PAD)	Fixed	155	5775	12.89	13	0.121	0.124	1.6
Top(PAD)	Fixed	42	5210	12.84	13	0.212	0.220	1.6
Top(PAD)	Fixed	58	5290	12.72	13	0.221	0.236	1.6
Top(PAD)	Fixed	106	5530	12.99	13	0.304	0.305	1.6
Top(PAD)	Fixed	122	5610	12.96	13	0.380	0.384	1.6
Top(PAD)	Fixed	138	5690	12.98	13	0.412	0.414	1.6
Top(PAD)	Fixed	155	5775	12.89	13	0.247	0.253	1.6
<p>Note : 1. When multiple transmission modes (802.11 n) have the same specified maximum output power, largest channel bandwidth, lowest order modulation and lowest data rate, the lowest order 802.11 mode is selected</p> <p>2. When the reported SAR of the highest measured maximum output power channel for the exposure configuration is ≤ 0.8 W/kg, no further SAR testing is required in that exposure configuration.</p> <p>3. When the reported SAR of the highest measured maximum U-NII-2A for the exposure configuration is ≤ 1.2 W/kg, SAR is not required for U-NII-1 band.</p>								

SAR MEASUREMENT								
Ambient Temperature (°C) : 22.5 ± 2				Relative Humidity (%) : 52				
Liquid Temperature (°C) : 22.1 ± 2				Depth of Liquid (cm) : >15				
Test Position Body	Antenna Position	Frequency		Conducted Power (dBm)		SAR 1g (W/kg)		Limit (W/kg)
		Channel	MHz	Measurement	Tune-up Limit	Measurement	Tune-up Scaled	
<b>Test Mode: 802.11ac80M - INPAQ Main Antenna</b>								
Back(PAD)	Fixed	58	5290	12.91	13	0.110	0.112	1.6
Back(PAD)	Fixed	106	5530	12.96	13	0.095	0.096	1.6
Back(PAD)	Fixed	155	5775	12.89	13	0.117	0.120	1.6
Top(PAD)	Fixed	58	5290	12.91	13	0.193	0.197	1.6
Top(PAD)	Fixed	106	5530	12.96	13	0.172	0.174	1.6
Top(PAD)	Fixed	155	5775	12.89	13	0.226	0.232	1.6
<b>Test Mode: 802.11ac80M - INPAQ Aux Antenna</b>								
Back(PAD)	Fixed	58	5290	12.94	13	0.112	0.114	1.6
Back(PAD)	Fixed	106	5530	12.98	13	0.090	0.090	1.6
Back(PAD)	Fixed	155	5775	12.95	13	0.102	0.103	1.6
Top(PAD)	Fixed	58	5290	12.94	13	0.154	0.156	1.6
Top(PAD)	Fixed	106	5530	12.98	13	0.133	0.134	1.6
Top(PAD)	Fixed	155	5775	12.95	13	0.146	0.148	1.6
<p>Note : 1. When multiple transmission modes (802.11 n) have the same specified maximum output power, largest channel bandwidth, lowest order modulation and lowest data rate, the lowest order 802.11 mode is selected</p> <p>2. When the reported SAR of the highest measured maximum output power channel for the exposure configuration is ≤ 0.8 W/kg, no further SAR testing is required in that exposure configuration.</p> <p>3. When the reported SAR of the highest measured maximum U-NII-2A for the exposure configuration is ≤ 1.2 W/kg, SAR is not required for U-NII-1 band.</p>								



## 9.2 Simultaneous Transmission

Simultaneous Transmission Configurations	
1	WLAN 2.4GHz Main + WLAN 2.4GHz Aux
2	WLAN 2.4GHz Main + BT Aux
3	WLAN 5GHz Main + BT Aux
4	WLAN 5GHz Main + WLAN 5GHz Aux

### 9.2.1 Simultaneous transmission of MIMO in 802.11 test exclusion considerations

Antenna: SPEED						
Frequency (GHz)	Test Position (Body)	WLAN Main SAR (W/Kg)	WLAN Aux SAR W/Kg)	Simultaneous Transmission (W/Kg)	Antenna pair in mm	Peak location separation ratio
2.4	Back(PAD)	0.092	0.095	0.187	N/A	N/A
2.4	Top(PAD)	0.062	0.112	0.174	N/A	N/A
5	Back(PAD)	0.173	0.204	0.377	N/A	N/A
5	Top(PAD)	0.377	0.414	0.791	N/A	N/A

Antenna: INPAQ						
Frequency (GHz)	Test Position (Body)	WLAN Main SAR (W/Kg)	WLAN Aux SAR W/Kg)	Simultaneous Transmission (W/Kg)	Antenna pair in mm	Peak location separation ratio
2.4	Back(PAD)	0.109	0.078	0.187	N/A	N/A
2.4	Top(PAD)	0.159	0.095	0.254	N/A	N/A
5	Back(PAD)	0.120	0.114	0.234	N/A	N/A
5	Top(PAD)	0.232	0.156	0.388	N/A	N/A

Note : The sum of value is less than 1.6W/Kg or the ratio is determined by  $(SAR1 + SAR2)1.5/R_i$ , rounded to two decimal digits, and must be  $\leq 0.04$  for all antenna pairs in the configuration to qualify for SAR test exclusion.

### 9.2.2.2 simultaneous transmission of Wi-Fi and other wireless technologies

When the sum of SAR is larger than the limit, The ratio is determined by  $(SAR1 + SAR2)^{1.5}/R_i$ , rounded to two decimal digits, and must be  $\leq 0.04$  for all antenna pairs in the configuration to qualify for 1-g SAR test exclusion. The estimation result as below:

#### For SPEED DTS Band:

Mode	WLAN Main SAR (W/Kg)	BT SAR (W/Kg)	Simultaneous Transmission (W/Kg)	Antenna pair in mm	Peak location separation ratio
Back(PAD)	0.092	0.074	0.166	N/A	N/A
Top(PAD)	0.062	0.074	0.136	N/A	N/A

The sum of value is less than 1.6W/Kg, thus simultaneous SAR testing is not needed.

#### For SPEED U-NII Band:

Mode	WLAN Main SAR (W/Kg)	BT SAR (W/Kg)	Simultaneous Transmission (W/Kg)	Antenna pair in mm	Peak location separation ratio
Back(PAD)	0.173	0.074	0.247	N/A	N/A
Top(PAD)	0.377	0.074	0.451	N/A	N/A

The sum of value is less than 1.6W/Kg, thus simultaneous SAR testing is not needed.

#### For INPAQ DTS Band:

Mode	WLAN Main SAR (W/Kg)	BT SAR (W/Kg)	Simultaneous Transmission (W/Kg)	Antenna pair in mm	Peak location separation ratio
Back(PAD)	0.109	0.118	0.227	N/A	N/A
Top(PAD)	0.159	0.118	0.277	N/A	N/A

The sum of value is less than 1.6W/Kg, thus simultaneous SAR testing is not needed.

#### For INPAQ U-NII Band:

Mode	WLAN Main SAR (W/Kg)	BT SAR (W/Kg)	Simultaneous Transmission (W/Kg)	Antenna pair in mm	Peak location separation ratio
Back(PAD)	0.120	0.118	0.238	N/A	N/A
Top(PAD)	0.232	0.118	0.350	N/A	N/A

The sum of value is less than 1.6W/Kg, thus simultaneous SAR testing is not needed.

## 10. SAR measurement variability

- 1) Repeated measurement is not required when the original highest measured SAR is < 0.80 W/kg; steps 2) through 4) do not apply.
- 2) When the original highest measured SAR is  $\geq 0.80$  W/kg, repeat that measurement once.
- 3) Perform a second repeated measurement only 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  $\geq 1.45$  W/kg (~ 10% from the 1-g SAR limit).
- 4) Perform a third repeated measurement only if the original, first or second repeated measurement is  $\geq 1.5$  W/kg and the ratio of largest to smallest SAR for the original, first and second repeated measurements is > 1.20.

### Antenna: SPEED

Frequency		SAR 1g (W/kg)						
Channel	MHz	Original	First Repeated		Second Repeated		Third Repeated	
			Value	Ratio	Value	Ratio	Value	Ratio
11	2462	0.110	N/A	N/A	N/A	N/A	N/A	N/A
138	5690	0.412	N/A	N/A	N/A	N/A	N/A	N/A

### Antenna: INPAQ

Frequency		SAR 1g (W/kg)						
Channel	MHz	Original	First Repeated		Second Repeated		Third Repeated	
			Value	Ratio	Value	Ratio	Value	Ratio
6	2437	0.159	N/A	N/A	N/A	N/A	N/A	N/A
155	5775	0.226	N/A	N/A	N/A	N/A	N/A	N/A

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**Appendix**

**Appendix A. SAR System Check Data**

**Appendix B. SAR measurement Data**

**Appendix C. Test Setup Photographs & EUT Photographs**

**Appendix D. Probe Calibration Data**

**Appendix E. Dipole Calibration Data**

## Appendix A. SAR System Check Data

Test Laboratory: DEKRA

Date/Time: 2020/05/02

### System Performance Check 2450MHz-Head

**DUT: Dipole 2450 MHz; Type: D2450V2**

Communication System: UID 0, CW; Frequency: 2450 MHz;

Communication System PAR: 0 dB

Medium parameters used:  $f = 2450$  MHz;  $\sigma = 1.83$  S/m;  $\epsilon_r = 39.81$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Phantom section: Flat Section

Ambient Temperature (°C) : 22.4, Liquid Temperature (°C) : 21.2

Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2011)

DASY5 Configuration:

- Probe: EX3DV4 - SN3698; ConvF(7.06, 7.06, 7.06); Calibrated: 2019/11/22;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1207; Calibrated: 2019/11/14
- Phantom: SAM with left table; Type: SAM;
- Measurement SW: DASY52, Version 52.10 (0); SEMCAD X Version 14.6.10 (7417)

**Configuration/2450MHz\_Body/Area Scan (8x9x1):** Measurement grid: dx=12mm, dy=12mm

Maximum value of SAR (measured) = 17.5 W/kg

**Configuration/2450MHz\_Body/Zoom Scan (7x7x7) (7x7x7)/Cube 0:**

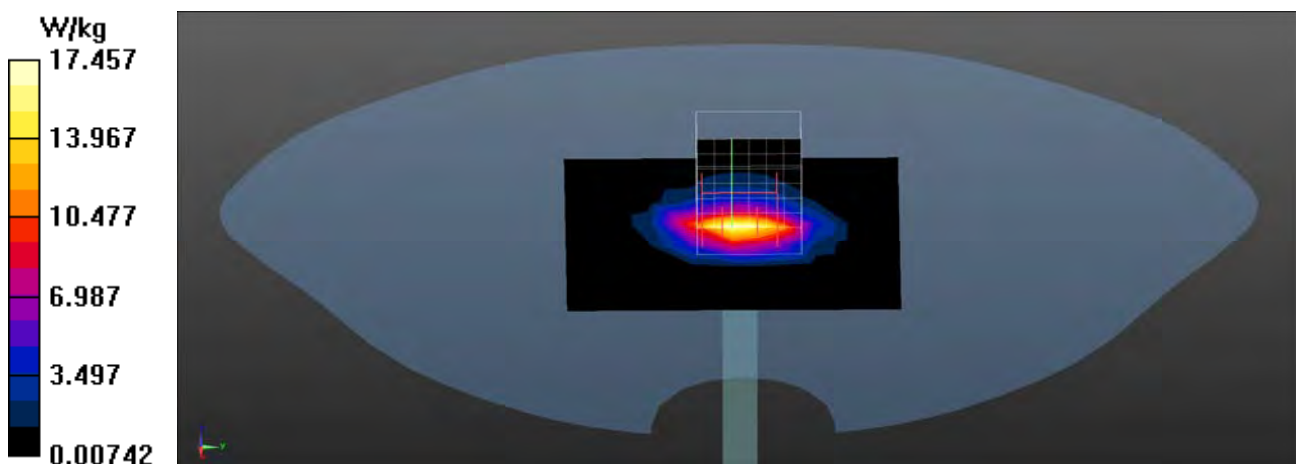
Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 101.4 V/m; Power Drift = 0.03 dB

Peak SAR (extrapolated) = 28.9 W/kg

**SAR(1 g) = 13.9 W/kg; SAR(10 g) = 6.45 W/kg**

Maximum value of SAR (measured) = 18.1 W/kg



Test Laboratory: DEKRA

Date/Time: 2020/05/06

**System Performance Check\_2450MHz-Head****DUT: Dipole 2450 MHz; Type: D2450V2**

Communication System: UID 0, CW; Frequency: 2450 MHz;

Communication System PAR: 0 dB

Medium parameters used:  $f = 2450$  MHz;  $\sigma = 1.84$  S/m;  $\epsilon_r = 39.77$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Phantom section: Flat Section

Ambient Temperature (°C) : 22.9, Liquid Temperature (°C) : 22.1

Measurement Standard: DASYS (IEEE/IEC/ANSI C63.19-2011)

DASY5 Configuration:

- Probe: EX3DV4 - SN3698; ConvF(7.06, 7.06, 7.06); Calibrated: 2019/11/22;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1207; Calibrated: 2019/11/14
- Phantom: SAM with left table; Type: SAM;
- Measurement SW: DASYS2, Version 52.10 (0); SEMCAD X Version 14.6.10 (7417)

**Configuration/2450MHz\_Body/Area Scan (8x9x1):** Measurement grid: dx=12mm, dy=12mm

Maximum value of SAR (measured) = 16.8 W/kg

**Configuration/2450MHz\_Body/Zoom Scan (7x7x7) (7x7x7)/Cube 0:**

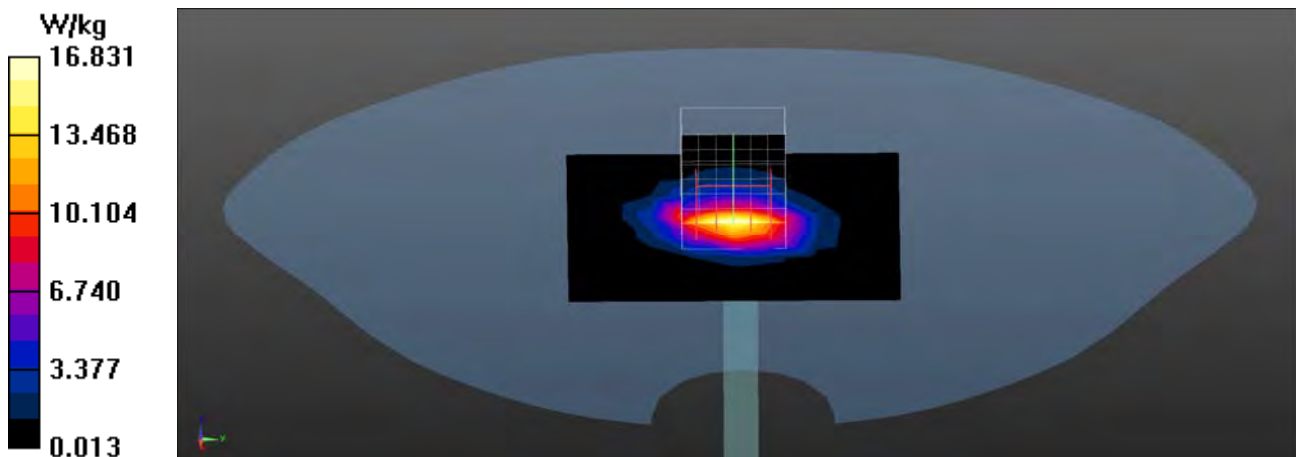
Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 100.1 V/m; Power Drift = 0.10 dB

Peak SAR (extrapolated) = 25.6 W/kg

**SAR(1 g) = 12.9 W/kg; SAR(10 g) = 5.95 W/kg**

Maximum value of SAR (measured) = 18.3 W/kg



Test Laboratory: DEKRA

Date/Time: 2020/04/30

**System Performance Check 5200MHz-Head****DUT: Dipole 5GHz; Type: D5GHzV2**

Communication System: UID 0, CW; Frequency: 5200 MHz;

Communication System PAR: 0 dB

Medium parameters used:  $f = 5200$  MHz;  $\sigma = 4.51$  S/m;  $\epsilon_r = 36.71$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Phantom section: Flat Section

Ambient Temperature (°C) : 22.9, Liquid Temperature (°C) : 21.9

Measurement Standard: DASYS (IEEE/IEC/ANSI C63.19-2011)

DASY5 Configuration:

- Probe: EX3DV4 - SN3698; ConvF(4.73, 4.73, 4.73); Calibrated: 2019/11/22;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1207; Calibrated: 2019/11/14
- Phantom: SAM with right table; Type: SAM;
- Measurement SW: DASY52, Version 52.10 (0); SEMCAD X Version 14.6.10 (7417)

**Configuration/5200MHz\_Body/Area Scan (8x8x1):** Measurement grid: dx=10mm, dy=10mm

Maximum value of SAR (measured) = 11.7 W/kg

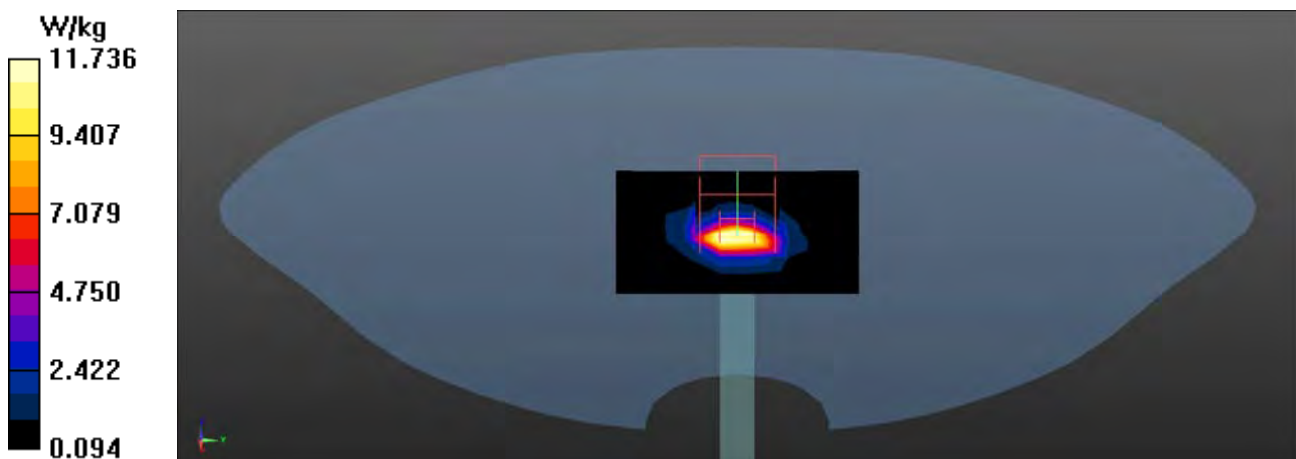
**Configuration/5200MHz\_Body/Zoom Scan (7x7x12), dist=1.4mm****(7x7x12)/Cube 0:** Measurement grid: dx=4mm, dy=4mm, dz=2mm

Reference Value = 70.19 V/m; Power Drift = -0.11 dB

Peak SAR (extrapolated) = 28.8 W/kg

**SAR(1 g) = 7.73 W/kg; SAR(10 g) = 2.21 W/kg**

Maximum value of SAR (measured) = 18.0 W/kg



Test Laboratory: DEKRA

Date/Time: 2020/04/30

**System Performance Check 5300MHz-Head****DUT: Dipole 5GHz; Type: D5GHzV2**

Communication System: UID 0, CW; Frequency: 5300 MHz;

Communication System PAR: 0 dB

Medium parameters used:  $f = 5300$  MHz;  $\sigma = 4.65$  S/m;  $\epsilon_r = 36.43$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Phantom section: Flat Section

Ambient Temperature (°C) : 22.9, Liquid Temperature (°C) : 21.9

Measurement Standard: DASYS (IEEE/IEC/ANSI C63.19-2011)

DASY5 Configuration:

- Probe: EX3DV4 - SN3698; ConvF(4.73, 4.73, 4.73); Calibrated: 2019/11/22;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1207; Calibrated: 2019/11/14
- Phantom: SAM with right table; Type: SAM;
- Measurement SW: DASYS2, Version 52.10 (0); SEMCAD X Version 14.6.10 (7417)

**Configuration/5300MHz\_Body/Area Scan (8x8x1):** Measurement grid: dx=10mm, dy=10mm

Maximum value of SAR (measured) = 12.9 W/kg

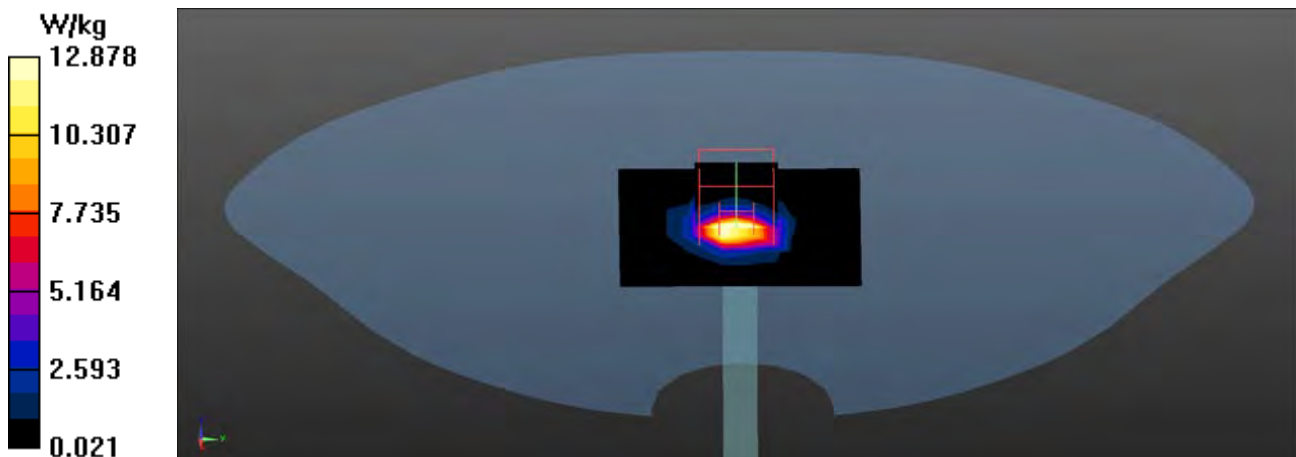
**Configuration/5300MHz\_Body/Zoom Scan (7x7x12), dist=1.4mm****(7x7x12)/Cube 0:** Measurement grid: dx=4mm, dy=4mm, dz=2mm

Reference Value = 70.66 V/m; Power Drift = 0.00 dB

Peak SAR (extrapolated) = 29.0 W/kg

**SAR(1 g) = 8.13 W/kg; SAR(10 g) = 2.33 W/kg**

Maximum value of SAR (measured) = 20.5 W/kg





Test Laboratory: DEKRA

Date/Time: 2020/04/30

**System Performance Check 5600MHz-Head****DUT: Dipole 5GHz; Type: D5GHzV2**

Communication System: UID 0, CW; Frequency: 5600 MHz;

Communication System PAR: 0 dB

Medium parameters used:  $f = 5600$  MHz;  $\sigma = 5.05$  S/m;  $\epsilon_r = 35.6$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Phantom section: Flat Section

Ambient Temperature (°C) : 22.9, Liquid Temperature (°C) : 21.9

Measurement Standard: DASYS (IEEE/IEC/ANSI C63.19-2011)

DASY5 Configuration:

- Probe: EX3DV4 - SN3698; ConvF(4.43, 4.43, 4.43); Calibrated: 2019/11/22;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1207; Calibrated: 2019/11/14
- Phantom: SAM with right table; Type: SAM;
- Measurement SW: DASYS2, Version 52.10 (0); SEMCAD X Version 14.6.10 (7417)

**Configuration/5600MHz\_Body/Area Scan (8x8x1):** Measurement grid: dx=10mm, dy=10mm

Maximum value of SAR (measured) = 14.1 W/kg

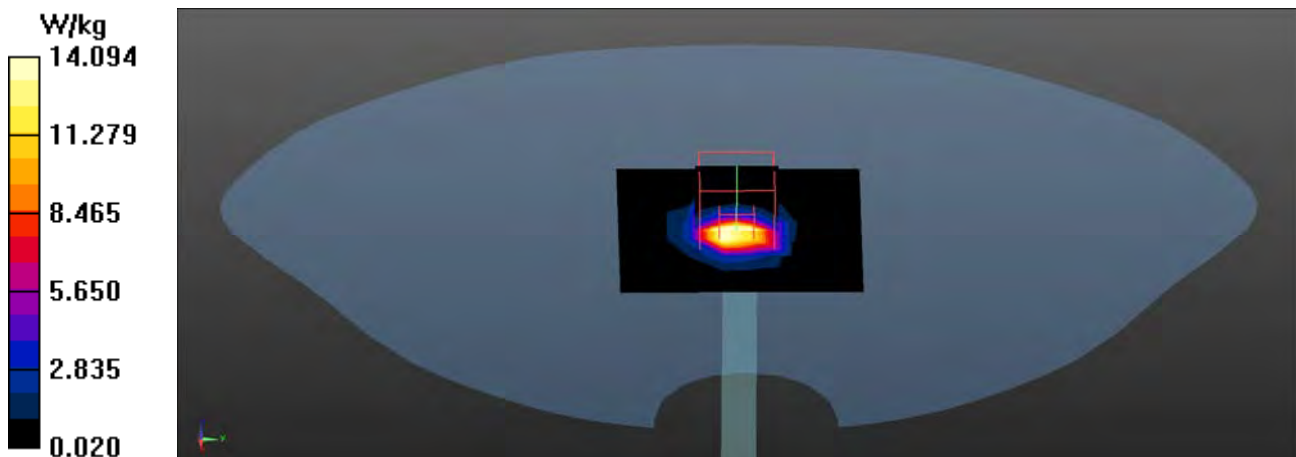
**Configuration/5600MHz\_Body/Zoom Scan (7x7x12), dist=1.4mm****(7x7x12)/Cube 0:** Measurement grid: dx=4mm, dy=4mm, dz=2mm

Reference Value = 73.08 V/m; Power Drift = -0.07 dB

Peak SAR (extrapolated) = 35.2 W/kg

**SAR(1 g) = 8.72 W/kg; SAR(10 g) = 2.48 W/kg**

Maximum value of SAR (measured) = 22.6 W/kg



Test Laboratory: DEKRA

Date/Time: 2020/04/30

**System Performance Check 5800MHz-Head****DUT: Dipole 5GHz; Type: D5GHzV2**

Communication System: UID 0, CW; Frequency: 5800 MHz;

Communication System PAR: 0 dB

Medium parameters used:  $f = 5800$  MHz;  $\sigma = 5.31$  S/m;  $\epsilon_r = 35.05$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Phantom section: Flat Section

Ambient Temperature (°C) : 22.9, Liquid Temperature (°C) : 21.9

Measurement Standard: DASYS (IEEE/IEC/ANSI C63.19-2011)

DASY5 Configuration:

- Probe: EX3DV4 - SN3698; ConvF(4.6, 4.6, 4.6); Calibrated: 2019/11/22;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1207; Calibrated: 2019/11/14
- Phantom: SAM with right table; Type: SAM;
- Measurement SW: DASYS2, Version 52.10 (0); SEMCAD X Version 14.6.10 (7417)

**Configuration/5800MHz\_Body/Area Scan (8x8x1):** Measurement grid: dx=10mm, dy=10mm

Maximum value of SAR (measured) = 13.4 W/kg

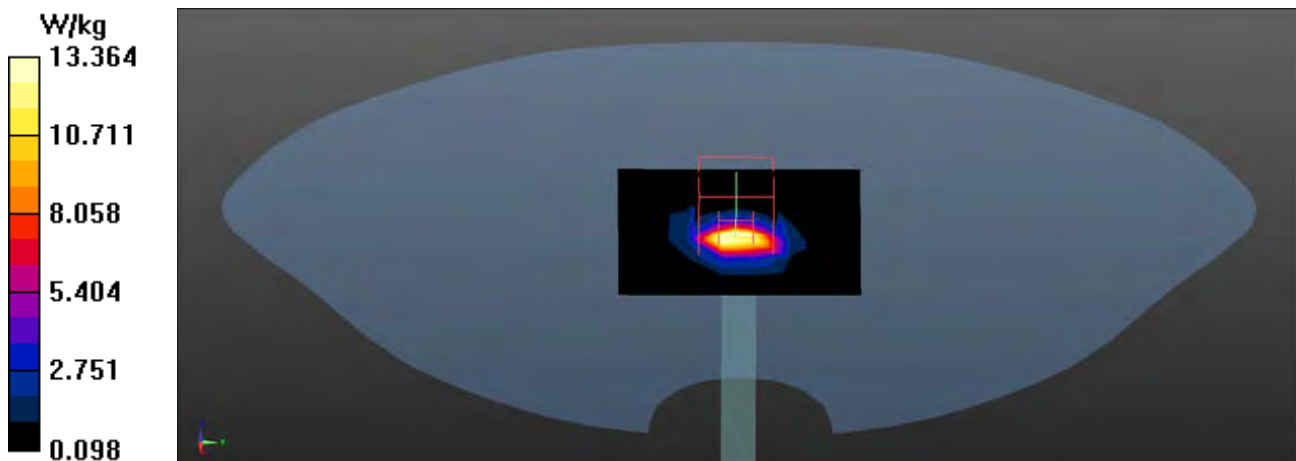
**Configuration/5800MHz\_Body/Zoom Scan (7x7x12), dist=1.4mm****(7x7x12)/Cube 0:** Measurement grid: dx=4mm, dy=4mm, dz=2mm

Reference Value = 64.37 V/m; Power Drift = -0.12 dB

Peak SAR (extrapolated) = 31.5 W/kg

**SAR(1 g) = 7.82 W/kg; SAR(10 g) = 2.21 W/kg**

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



Test Laboratory: DEKRA

Date/Time: 2020/05/01

**System Performance Check 5300MHz-Head****DUT: Dipole 5GHz; Type: D5GHzV2**

Communication System: UID 0, CW; Frequency: 5300 MHz;

Communication System PAR: 0 dB

Medium parameters used:  $f = 5300$  MHz;  $\sigma = 4.66$  S/m;  $\epsilon_r = 36.56$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Phantom section: Flat Section

Ambient Temperature (°C) : 22.5, Liquid Temperature (°C) : 22.1

Measurement Standard: DASYS (IEEE/IEC/ANSI C63.19-2011)

DASY5 Configuration:

- Probe: EX3DV4 - SN3698; ConvF(4.73, 4.73, 4.73); Calibrated: 2019/11/22;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1207; Calibrated: 2019/11/14
- Phantom: SAM with right table; Type: SAM;
- Measurement SW: DASYS2, Version 52.10 (0); SEMCAD X Version 14.6.10 (7417)

**Configuration/5300MHz\_Body/Area Scan (8x8x1):** Measurement grid: dx=10mm, dy=10mm

Maximum value of SAR (measured) = 13.1 W/kg

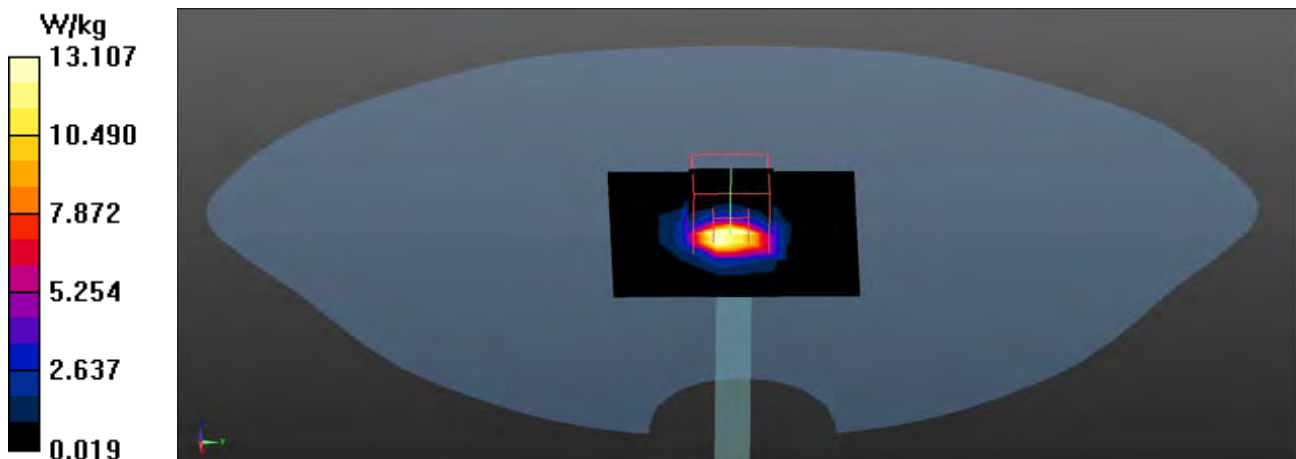
**Configuration/5300MHz\_Body/Zoom Scan (7x7x12), dist=1.4mm****(7x7x12)/Cube 0:** Measurement grid: dx=4mm, dy=4mm, dz=2mm

Reference Value = 72.69 V/m; Power Drift = -0.13 dB

Peak SAR (extrapolated) = 32.9 W/kg

**SAR(1 g) = 8.67 W/kg; SAR(10 g) = 2.42 W/kg**

Maximum value of SAR (measured) = 21.1 W/kg



Test Laboratory: DEKRA

Date/Time: 2020/05/01

**System Performance Check 5600MHz-Head****DUT: Dipole 5GHz; Type: D5GHzV2**

Communication System: UID 0, CW; Frequency: 5600 MHz;

Communication System PAR: 0 dB

Medium parameters used:  $f = 5600$  MHz;  $\sigma = 5.07$  S/m;  $\epsilon_r = 35.73$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Phantom section: Flat Section

Ambient Temperature (°C) : 22.5, Liquid Temperature (°C) : 22.1

Measurement Standard: DASYS (IEEE/IEC/ANSI C63.19-2011)

DASY5 Configuration:

- Probe: EX3DV4 - SN3698; ConvF(4.43, 4.43, 4.43); Calibrated: 2019/11/22;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1207; Calibrated: 2019/11/14
- Phantom: SAM with right table; Type: SAM;
- Measurement SW: DASYS2, Version 52.10 (0); SEMCAD X Version 14.6.10 (7417)

**Configuration/5600MHz\_Body/Area Scan (8x8x1):** Measurement grid: dx=10mm, dy=10mm

Maximum value of SAR (measured) = 14.5 W/kg

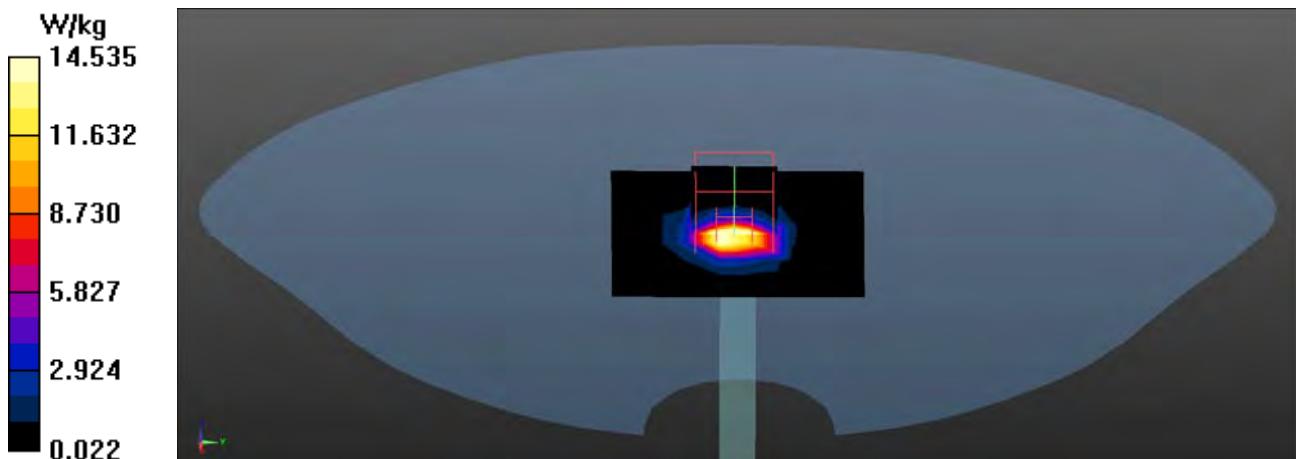
**Configuration/5600MHz\_Body/Zoom Scan (7x7x12), dist=1.4mm****(7x7x12)/Cube 0:** Measurement grid: dx=4mm, dy=4mm, dz=2mm

Reference Value = 73.94 V/m; Power Drift = -0.06 dB

Peak SAR (extrapolated) = 35.4 W/kg

**SAR(1 g) = 8.73 W/kg; SAR(10 g) = 2.47 W/kg**

Maximum value of SAR (measured) = 23.4 W/kg



Test Laboratory: DEKRA

Date/Time: 2020/05/01

**System Performance Check 5800MHz-Head****DUT: Dipole 5GHz; Type: D5GHzV2**

Communication System: UID 0, CW; Frequency: 5800 MHz;

Communication System PAR: 0 dB

Medium parameters used:  $f = 5800$  MHz;  $\sigma = 5.33$  S/m;  $\epsilon_r = 35.18$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Phantom section: Flat Section

Ambient Temperature (°C) : 22.5, Liquid Temperature (°C) : 22.1

Measurement Standard: DASYS (IEEE/IEC/ANSI C63.19-2011)

DASY5 Configuration:

- Probe: EX3DV4 - SN3698; ConvF(4.6, 4.6, 4.6); Calibrated: 2019/11/22;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1207; Calibrated: 2019/11/14
- Phantom: SAM with right table; Type: SAM;
- Measurement SW: DASYS2, Version 52.10 (0); SEMCAD X Version 14.6.10 (7417)

**Configuration/5800MHz\_Body/Area Scan (8x8x1):** Measurement grid: dx=10mm, dy=10mm

Maximum value of SAR (measured) = 13.5 W/kg

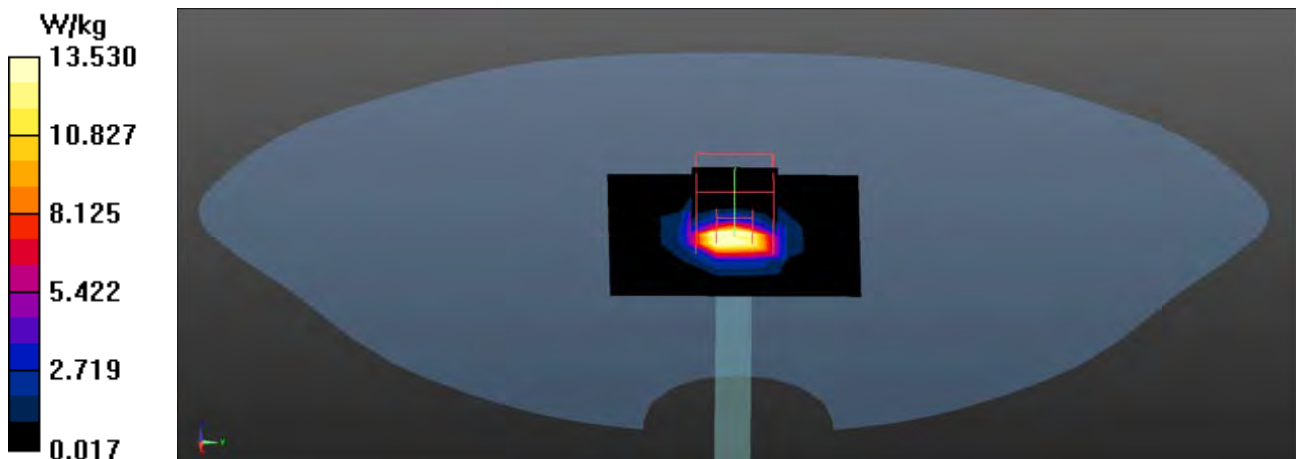
**Configuration/5800MHz\_Body/Zoom Scan (7x7x12), dist=1.4mm****(7x7x12)/Cube 0:** Measurement grid: dx=4mm, dy=4mm, dz=2mm

Reference Value = 73.98 V/m; Power Drift = -0.03 dB

Peak SAR (extrapolated) = 38.6 W/kg

**SAR(1 g) = 8.63 W/kg; SAR(10 g) = 2.42 W/kg**

Maximum value of SAR (measured) = 22.7 W/kg



## Appendix B. SAR measurement Data

Test Laboratory: DEKRA

Date/Time: 2020/05/06

### 802.11b\_1-Back(PAD) Main-SPEED

**DUT: Notebook PC; Type: TM420I**

Communication System: UID 0, WLAN 2.4G; Frequency: 2412 MHz;

Communication System PAR: 0 dB

Medium parameters used:  $f = 2412$  MHz;  $\sigma = 1.79$  S/m;  $\epsilon_r = 39.88$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Phantom section: Flat Section

Ambient Temperature (°C) : 22.9, Liquid Temperature (°C) : 22.1

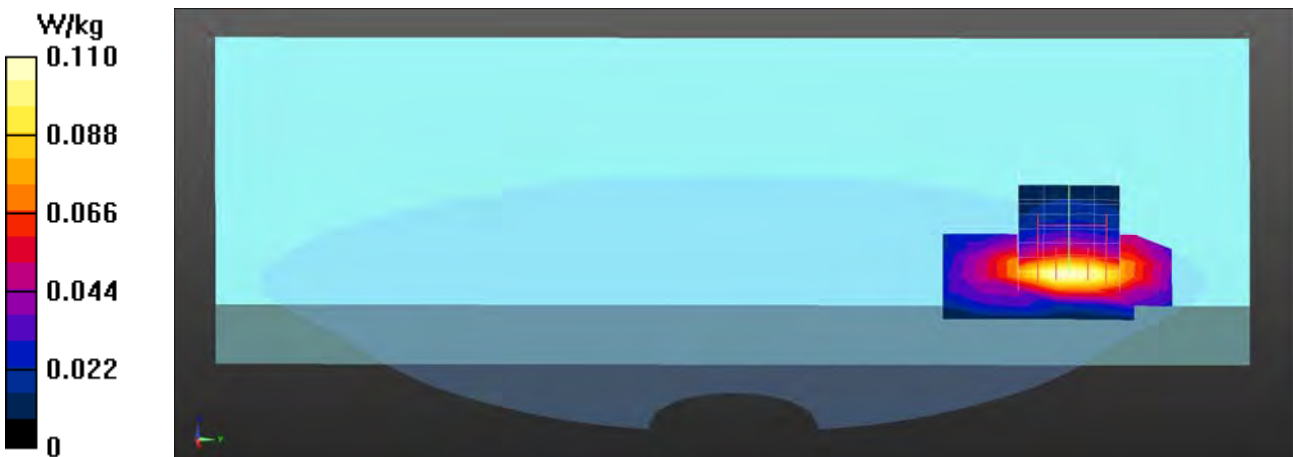
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2011)

DASY5 Configuration:

- Probe: EX3DV4 - SN3698; ConvF(7.06, 7.06, 7.06); Calibrated: 2019/11/22;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1207; Calibrated: 2019/11/14
- Phantom: SAM with left table; Type: SAM;
- Measurement SW: DASY52, Version 52.10 (0); SEMCAD X Version 14.6.10 (7417)

**Configuration/Body/Area Scan (7x7x1):** Measurement grid: dx=12mm, dy=12mm  
Maximum value of SAR (measured) = 0.110 W/kg

**Configuration/Body/Zoom Scan (5x5x7) (5x5x7)/Cube 0:** Measurement grid:  
dx=8mm, dy=8mm, dz=5mm  
Reference Value = 1.874 V/m; Power Drift = -0.07 dB  
Peak SAR (extrapolated) = 0.135 W/kg  
**SAR(1 g) = 0.080 W/kg; SAR(10 g) = 0.048 W/kg**  
Maximum value of SAR (measured) = 0.113 W/kg



Test Laboratory: DEKRA

Date/Time: 2020/05/06

**802.11b\_6-Back(PAD) Main-SPEED****DUT: Notebook PC; Type: TM420I**

Communication System: UID 0, WLAN 2.4G; Frequency: 2437 MHz;

Communication System PAR: 0 dB

Medium parameters used:  $f = 2437$  MHz;  $\sigma = 1.82$  S/m;  $\epsilon_r = 39.81$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Phantom section: Flat Section

Ambient Temperature (°C) : 22.9, Liquid Temperature (°C) : 22.1

Measurement Standard: DASYS (IEEE/IEC/ANSI C63.19-2011)

DASY5 Configuration:

- Probe: EX3DV4 - SN3698; ConvF(7.06, 7.06, 7.06); Calibrated: 2019/11/22;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1207; Calibrated: 2019/11/14
- Phantom: SAM with left table; Type: SAM;
- Measurement SW: DASYS52, Version 52.10 (0); SEMCAD X Version 14.6.10 (7417)

**Configuration/Body/Area Scan (7x24x1):** Measurement grid: dx=12mm, dy=12mm  
Maximum value of SAR (measured) = 0.125 W/kg**Configuration/Body/Zoom Scan (5x5x7) (5x5x7)/Cube 0:** Measurement grid:  
dx=8mm, dy=8mm, dz=5mm

Reference Value = 1.995 V/m; Power Drift = -0.03 dB

Peak SAR (extrapolated) = 0.152 W/kg

**SAR(1 g) = 0.091 W/kg; SAR(10 g) = 0.054 W/kg**

Maximum value of SAR (measured) = 0.127 W/kg



Test Laboratory: DEKRA

Date/Time: 2020/05/06

**802.11b\_11-Back(PAD) Main-SPEED****DUT: Notebook PC; Type: TM420I**

Communication System: UID 0, WLAN 2.4G; Frequency: 2462 MHz;

Communication System PAR: 0 dB

Medium parameters used:  $f = 2462$  MHz;  $\sigma = 1.86$  S/m;  $\epsilon_r = 39.73$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Phantom section: Flat Section

Ambient Temperature (°C) : 22.9, Liquid Temperature (°C) : 22.1

Measurement Standard: DASYS5 (IEEE/IEC/ANSI C63.19-2011)

DASY5 Configuration:

- Probe: EX3DV4 - SN3698; ConvF(7.06, 7.06, 7.06); Calibrated: 2019/11/22;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1207; Calibrated: 2019/11/14
- Phantom: SAM with left table; Type: SAM;
- Measurement SW: DASYS52, Version 52.10 (0); SEMCAD X Version 14.6.10 (7417)

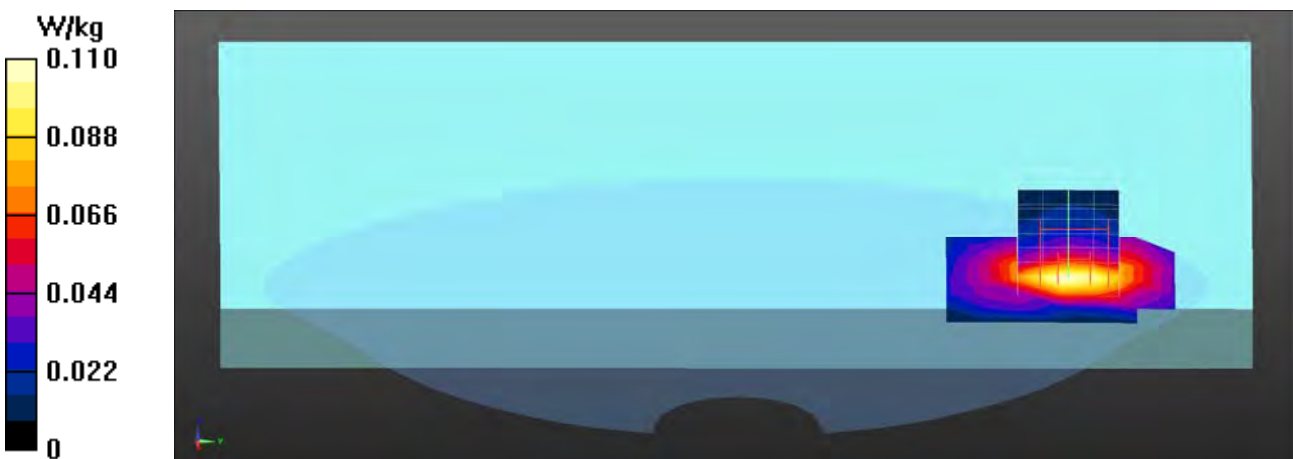
**Configuration/Body/Area Scan (7x7x1):** Measurement grid: dx=12mm, dy=12mm  
Maximum value of SAR (measured) = 0.110 W/kg**Configuration/Body/Zoom Scan (5x5x7) (5x5x7)/Cube 0:** Measurement grid:  
dx=8mm, dy=8mm, dz=5mm

Reference Value = 1.900 V/m; Power Drift = -0.06 dB

Peak SAR (extrapolated) = 0.131 W/kg

**SAR(1 g) = 0.077 W/kg; SAR(10 g) = 0.047 W/kg**

Maximum value of SAR (measured) = 0.109 W/kg





Test Laboratory: DEKRA

Date/Time: 2020/05/06

**802.11b\_6-Top(PAD) Main-SPEED****DUT: Notebook PC; Type: TM420I**

Communication System: UID 0, WLAN 2.4G; Frequency: 2437 MHz;

Communication System PAR: 0 dB

Medium parameters used:  $f = 2437$  MHz;  $\sigma = 1.82$  S/m;  $\epsilon_r = 39.81$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Phantom section: Flat Section

Ambient Temperature (°C) : 22.9, Liquid Temperature (°C) : 22.1

Measurement Standard: DASYS (IEEE/IEC/ANSI C63.19-2011)

DASY5 Configuration:

- Probe: EX3DV4 - SN3698; ConvF(7.06, 7.06, 7.06); Calibrated: 2019/11/22;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1207; Calibrated: 2019/11/14
- Phantom: SAM with left table; Type: SAM;
- Measurement SW: DASYS2, Version 52.10 (0); SEMCAD X Version 14.6.10 (7417)

**Configuration/Body/Area Scan (7x24x1):** Measurement grid: dx=12mm, dy=12mm  
Maximum value of SAR (measured) = 0.125 W/kg**Configuration/Body/Zoom Scan (5x5x7) (5x5x7)/Cube 0:** Measurement grid:  
dx=8mm, dy=8mm, dz=5mm

Reference Value = 2.147 V/m; Power Drift = -0.06 dB

Peak SAR (extrapolated) = 0.213 W/kg

**SAR(1 g) = 0.061 W/kg; SAR(10 g) = 0.034 W/kg**

Maximum value of SAR (measured) = 0.131 W/kg



Test Laboratory: DEKRA

Date/Time: 2020/05/06

**802.11b\_6-Back(PAD) Aux-SPEED****DUT: Notebook PC; Type: TM420I**

Communication System: UID 0, WLAN 2.4G; Frequency: 2437 MHz;

Communication System PAR: 0 dB

Medium parameters used:  $f = 2437$  MHz;  $\sigma = 1.82$  S/m;  $\epsilon_r = 39.81$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Phantom section: Flat Section

Ambient Temperature (°C) : 22.9, Liquid Temperature (°C) : 22.1

Measurement Standard: DASYS5 (IEEE/IEC/ANSI C63.19-2011)

DASY5 Configuration:

- Probe: EX3DV4 - SN3698; ConvF(7.06, 7.06, 7.06); Calibrated: 2019/11/22;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1207; Calibrated: 2019/11/14
- Phantom: SAM with left table; Type: SAM;
- Measurement SW: DASYS52, Version 52.10 (0); SEMCAD X Version 14.6.10 (7417)

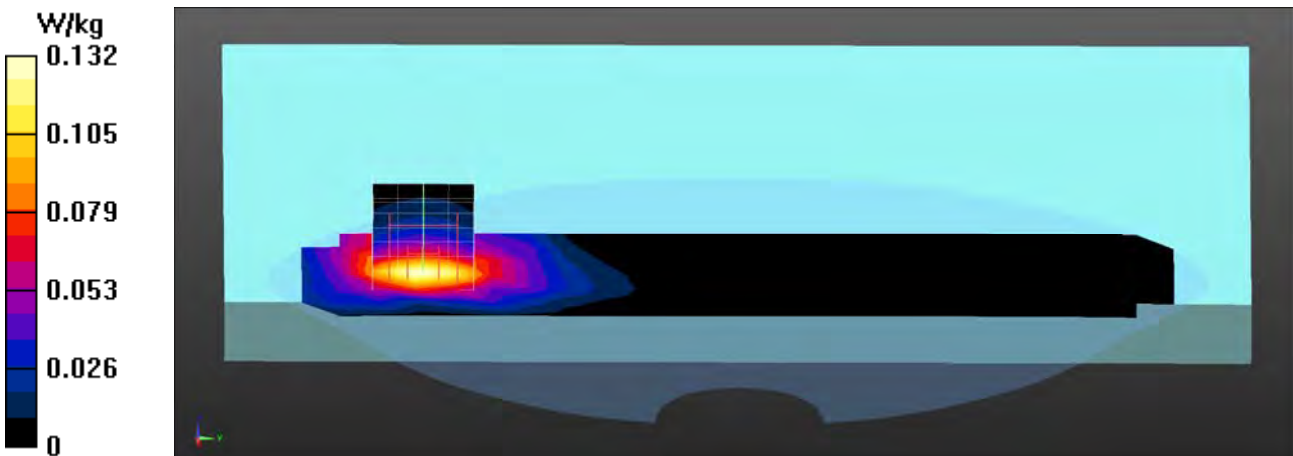
**Configuration/Body/Area Scan (7x24x1):** Measurement grid: dx=12mm, dy=12mm  
Maximum value of SAR (measured) = 0.132 W/kg**Configuration/Body/Zoom Scan (5x5x7) (5x5x7)/Cube 0:** Measurement grid:  
dx=8mm, dy=8mm, dz=5mm

Reference Value = 2.277 V/m; Power Drift = -0.08 dB

Peak SAR (extrapolated) = 0.157 W/kg

**SAR(1 g) = 0.093 W/kg; SAR(10 g) = 0.056 W/kg**

Maximum value of SAR (measured) = 0.133 W/kg



Test Laboratory: DEKRA

Date/Time: 2020/05/06

**802.11b\_1-Top(PAD) Aux-SPEED****DUT: Notebook PC; Type: TM420I**

Communication System: UID 0, WLAN 2.4G; Frequency: 2412 MHz;

Communication System PAR: 0 dB

Medium parameters used:  $f = 2412$  MHz;  $\sigma = 1.79$  S/m;  $\epsilon_r = 39.88$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Phantom section: Flat Section

Ambient Temperature (°C) : 22.9, Liquid Temperature (°C) : 22.1

Measurement Standard: DASYS (IEEE/IEC/ANSI C63.19-2011)

DASY5 Configuration:

- Probe: EX3DV4 - SN3698; ConvF(7.06, 7.06, 7.06); Calibrated: 2019/11/22;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1207; Calibrated: 2019/11/14
- Phantom: SAM with left table; Type: SAM;
- Measurement SW: DASYS2, Version 52.10 (0); SEMCAD X Version 14.6.10 (7417)

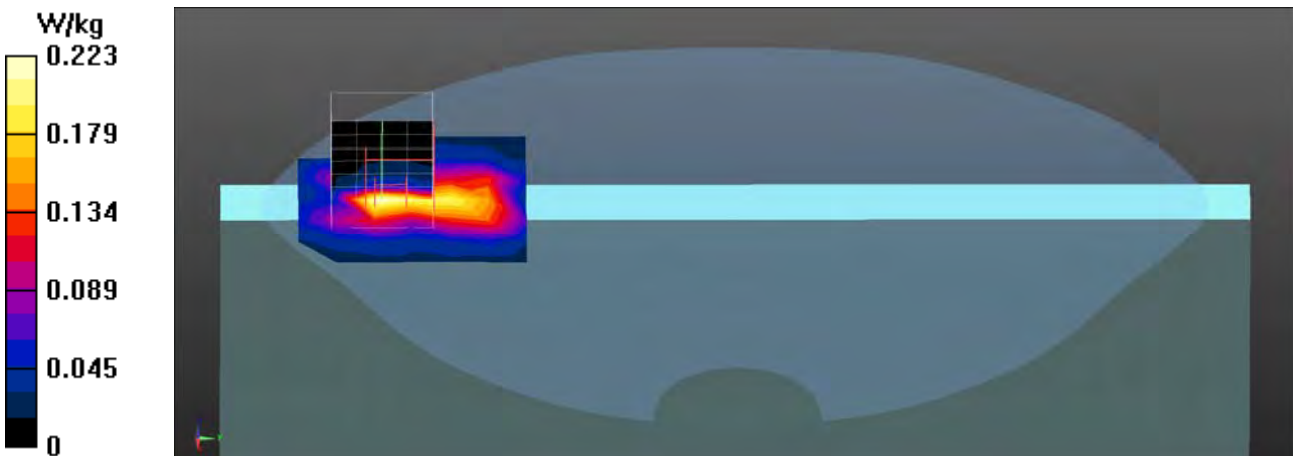
**Configuration/Body/Area Scan (7x7x1):** Measurement grid: dx=12mm, dy=12mm  
Maximum value of SAR (measured) = 0.223 W/kg**Configuration/Body/Zoom Scan (5x5x7) (5x5x7)/Cube 0:** Measurement grid:  
dx=8mm, dy=8mm, dz=5mm

Reference Value = 2.276 V/m; Power Drift = -0.05 dB

Peak SAR (extrapolated) = 0.377 W/kg

**SAR(1 g) = 0.107 W/kg; SAR(10 g) = 0.054 W/kg**

Maximum value of SAR (measured) = 0.236 W/kg



Test Laboratory: DEKRA

Date/Time: 2020/05/06

**802.11b\_6-Top(PAD) Aux-SPEED****DUT: Notebook PC; Type: TM420I**

Communication System: UID 0, WLAN 2.4G; Frequency: 2437 MHz;

Communication System PAR: 0 dB

Medium parameters used:  $f = 2437$  MHz;  $\sigma = 1.82$  S/m;  $\epsilon_r = 39.81$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Phantom section: Flat Section

Ambient Temperature (°C) : 22.9, Liquid Temperature (°C) : 22.1

Measurement Standard: DASYS (IEEE/IEC/ANSI C63.19-2011)

DASY5 Configuration:

- Probe: EX3DV4 - SN3698; ConvF(7.06, 7.06, 7.06); Calibrated: 2019/11/22;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1207; Calibrated: 2019/11/14
- Phantom: SAM with left table; Type: SAM;
- Measurement SW: DASYS2, Version 52.10 (0); SEMCAD X Version 14.6.10 (7417)

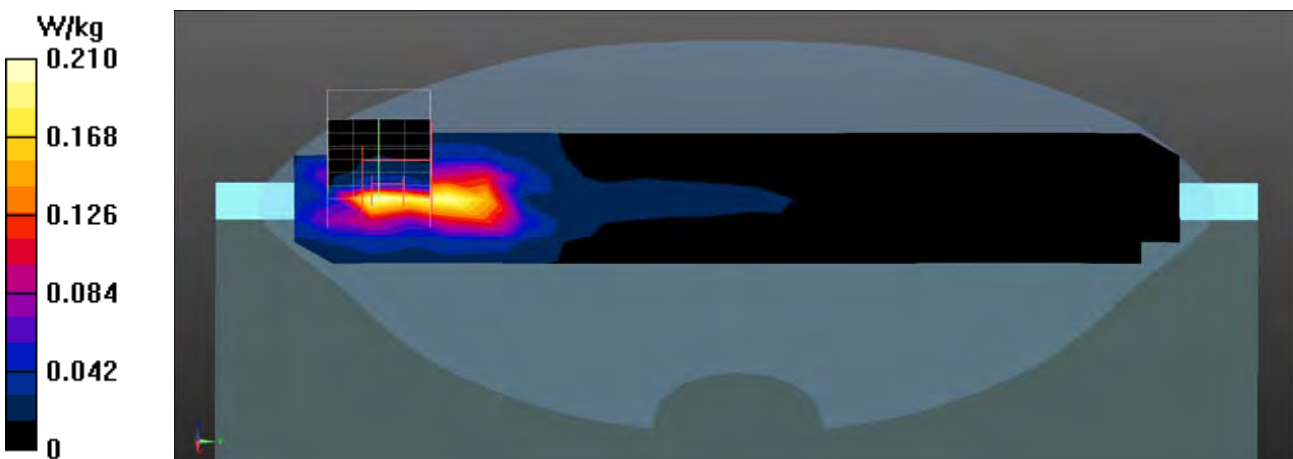
**Configuration/Body/Area Scan (7x24x1):** Measurement grid: dx=12mm, dy=12mm  
Maximum value of SAR (measured) = 0.210 W/kg**Configuration/Body/Zoom Scan (5x5x7) (5x5x7)/Cube 0:** Measurement grid:  
dx=8mm, dy=8mm, dz=5mm

Reference Value = 2.215 V/m; Power Drift = 0.00 dB

Peak SAR (extrapolated) = 0.364 W/kg

**SAR(1 g) = 0.096 W/kg; SAR(10 g) = 0.048 W/kg**

Maximum value of SAR (measured) = 0.220 W/kg



Test Laboratory: DEKRA

Date/Time: 2020/05/06

**802.11b\_11-Top(PAD) Main-SPEED****DUT: Notebook PC; Type: TM420I**

Communication System: UID 0, WLAN 2.4G; Frequency: 2462 MHz;

Communication System PAR: 0 dB

Medium parameters used:  $f = 2462$  MHz;  $\sigma = 1.86$  S/m;  $\epsilon_r = 39.73$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Phantom section: Flat Section

Ambient Temperature (°C) : 22.9, Liquid Temperature (°C) : 22.1

Measurement Standard: DASYS (IEEE/IEC/ANSI C63.19-2011)

DASY5 Configuration:

- Probe: EX3DV4 - SN3698; ConvF(7.06, 7.06, 7.06); Calibrated: 2019/11/22;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1207; Calibrated: 2019/11/14
- Phantom: SAM with left table; Type: SAM;
- Measurement SW: DASYS2, Version 52.10 (0); SEMCAD X Version 14.6.10 (7417)

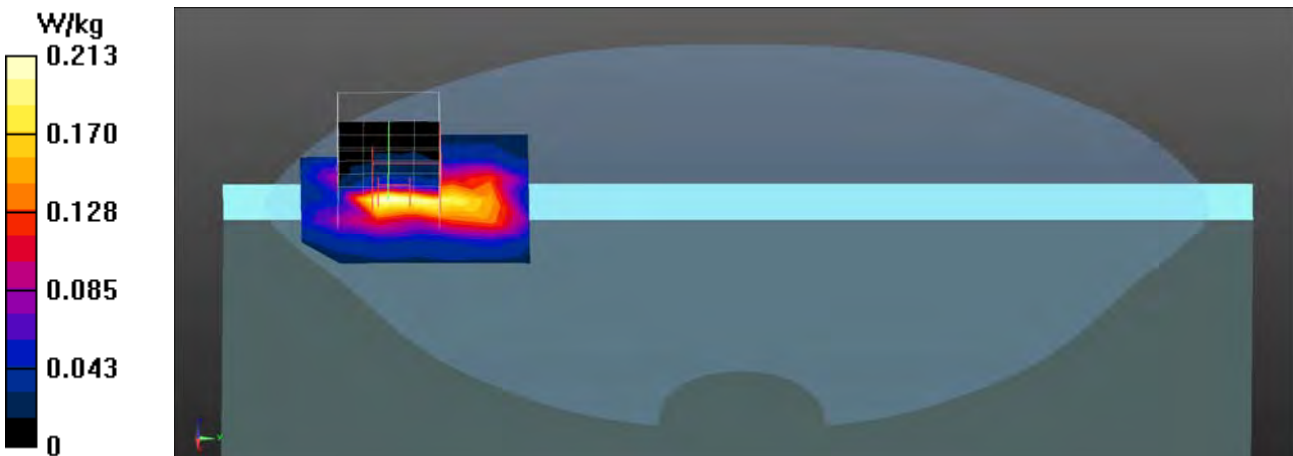
**Configuration/Body/Area Scan (7x7x1):** Measurement grid: dx=12mm, dy=12mm  
Maximum value of SAR (measured) = 0.213 W/kg**Configuration/Body/Zoom Scan (5x5x7) (5x5x7)/Cube 0:** Measurement grid:  
dx=8mm, dy=8mm, dz=5mm

Reference Value = 2.272 V/m; Power Drift = -0.07 dB

Peak SAR (extrapolated) = 0.375 W/kg

**SAR(1 g) = 0.110 W/kg; SAR(10 g) = 0.055 W/kg**

Maximum value of SAR (measured) = 0.241 W/kg



Test Laboratory: DEKRA

Date/Time: 2020/05/06

**BT-1M\_78-Top(PAD) Aux-SPEED****DUT: Notebook PC; Type: TM420I**

Communication System: UID 0, BT 1M&amp;3M&amp;BLE; Frequency: 2480 MHz;

Communication System PAR: 0 dB

Medium parameters used:  $f = 2480$  MHz;  $\sigma = 1.88$  S/m;  $\epsilon_r = 39.67$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Phantom section: Flat Section

Ambient Temperature (°C) : 22.9, Liquid Temperature (°C) : 22.1

Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2011)

DASY5 Configuration:

- Probe: EX3DV4 - SN3698; ConvF(7.06, 7.06, 7.06); Calibrated: 2019/11/22;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1207; Calibrated: 2019/11/14
- Phantom: SAM with left table; Type: SAM;
- Measurement SW: DASY52, Version 52.10 (0); SEMCAD X Version 14.6.10 (7417)

**Configuration/Body/Area Scan (7x24x1):** Measurement grid: dx=12mm, dy=12mm  
Maximum value of SAR (measured) = 0.0238 W/kg

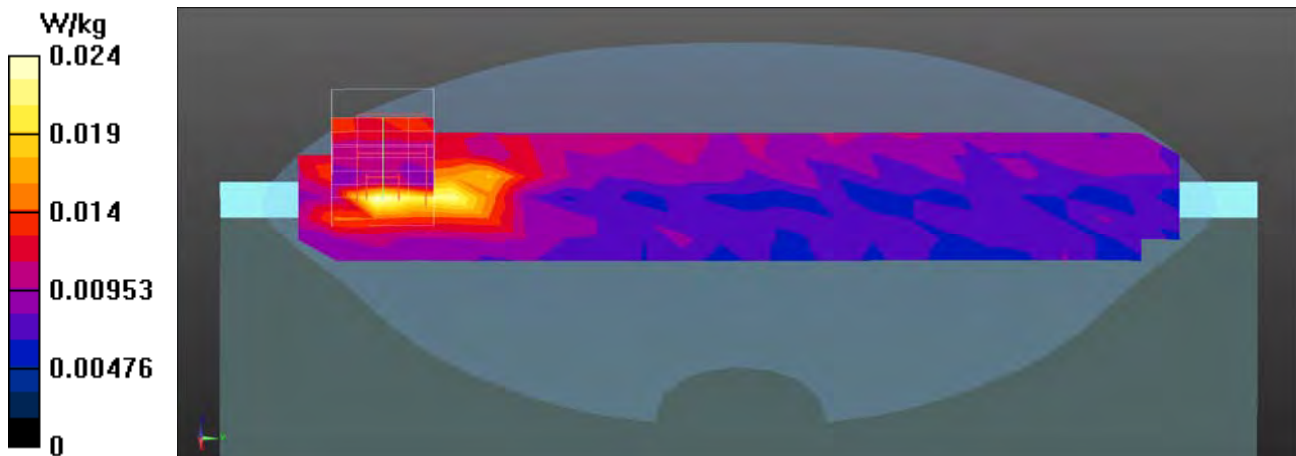
**Configuration/Body/Zoom Scan (5x5x7) (5x5x7)/Cube 0:** Measurement grid:  
dx=8mm, dy=8mm, dz=5mm

Reference Value = 1.977 V/m; Power Drift = -0.08 dB

Peak SAR (extrapolated) = 0.0420 W/kg

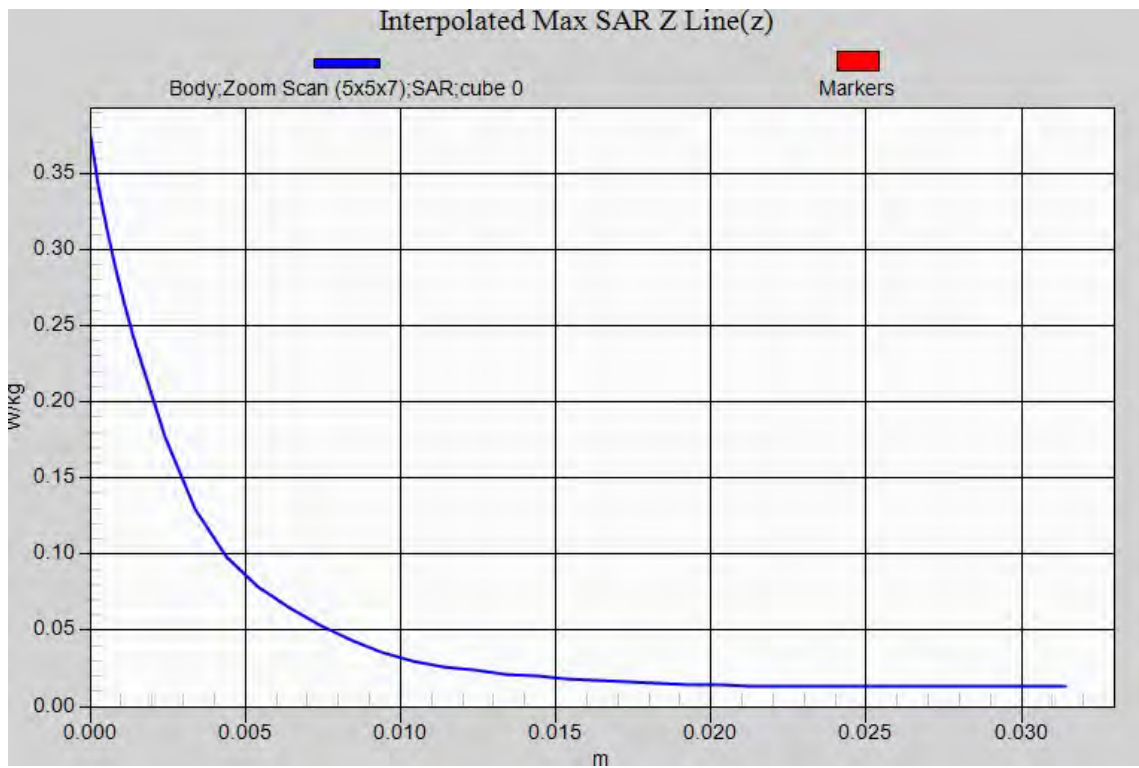
**SAR(1 g) = 0.015 W/kg; SAR(10 g) = 0.012 W/kg**

Maximum value of SAR (measured) = 0.0225 W/kg



### 802.11b EUT Top (PAD) (SPEED Aux Antenna), Z-Axis plot

Channel: 11



Test Laboratory: DEKRA

Date/Time: 2020/05/02

**802.11b\_6-Back(PAD) Main-INPAQ****DUT: Notebook PC; Type: TM420I**

Communication System: UID 0, WLAN 2.4G; Frequency: 2437 MHz;

Communication System PAR: 0 dB

Medium parameters used:  $f = 2437$  MHz;  $\sigma = 1.81$  S/m;  $\epsilon_r = 39.85$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Phantom section: Flat Section

Ambient Temperature (°C) : 22.4, Liquid Temperature (°C) : 21.2

Measurement Standard: DASYS (IEEE/IEC/ANSI C63.19-2011)

DASY5 Configuration:

- Probe: EX3DV4 - SN3698; ConvF(7.06, 7.06, 7.06); Calibrated: 2019/11/22;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1207; Calibrated: 2019/11/14
- Phantom: SAM with left table; Type: SAM;
- Measurement SW: DASYS2, Version 52.10 (0); SEMCAD X Version 14.6.10 (7417)

**Configuration/Body/Area Scan (7x24x1):** Measurement grid: dx=12mm, dy=12mm  
Maximum value of SAR (measured) = 0.157 W/kg**Configuration/Body/Zoom Scan (5x5x7) (5x5x7)/Cube 0:** Measurement grid:  
dx=8mm, dy=8mm, dz=5mm

Reference Value = 1.996 V/m; Power Drift = -0.12 dB

Peak SAR (extrapolated) = 0.186 W/kg

**SAR(1 g) = 0.109 W/kg; SAR(10 g) = 0.065 W/kg**

Maximum value of SAR (measured) = 0.152 W/kg





Test Laboratory: DEKRA

Date/Time: 2020/05/02

**802.11b\_6-Top(PAD) Main-INPAQ****DUT: Notebook PC; Type: TM420I**

Communication System: UID 0, WLAN 2.4G; Frequency: 2437 MHz;

Communication System PAR: 0 dB

Medium parameters used:  $f = 2437$  MHz;  $\sigma = 1.81$  S/m;  $\epsilon_r = 39.85$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Phantom section: Flat Section

Ambient Temperature (°C) : 22.4, Liquid Temperature (°C) : 21.2

Measurement Standard: DASYS (IEEE/IEC/ANSI C63.19-2011)

DASY5 Configuration:

- Probe: EX3DV4 - SN3698; ConvF(7.06, 7.06, 7.06); Calibrated: 2019/11/22;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1207; Calibrated: 2019/11/14
- Phantom: SAM with left table; Type: SAM;
- Measurement SW: DASYS2, Version 52.10 (0); SEMCAD X Version 14.6.10 (7417)

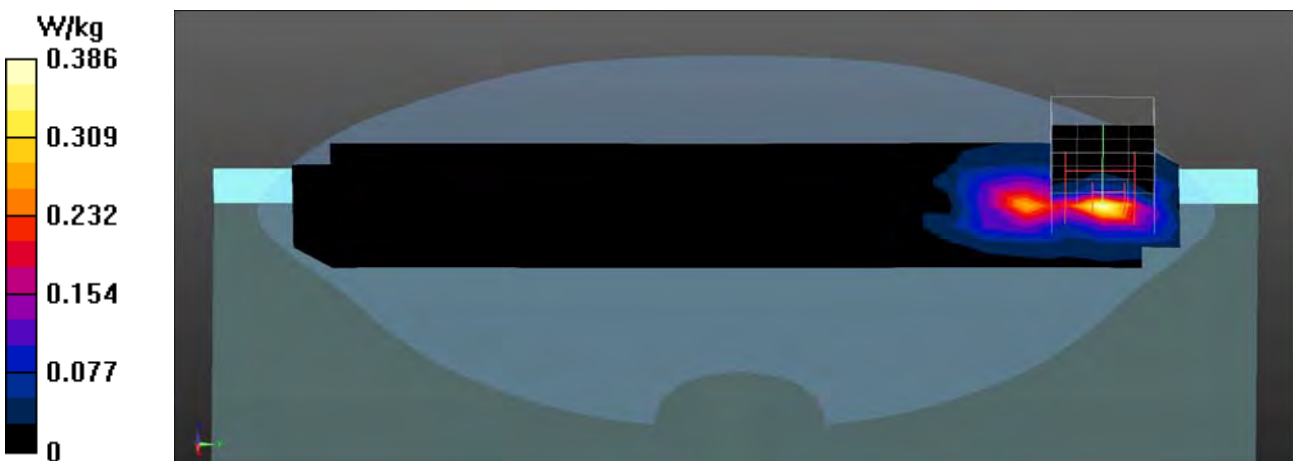
**Configuration/Body/Area Scan (7x24x1):** Measurement grid: dx=12mm, dy=12mm  
Maximum value of SAR (measured) = 0.386 W/kg**Configuration/Body/Zoom Scan (5x5x7) (5x5x7)/Cube 0:** Measurement grid:  
dx=8mm, dy=8mm, dz=5mm

Reference Value = 1.898 V/m; Power Drift = -0.11 dB

Peak SAR (extrapolated) = 0.597 W/kg

**SAR(1 g) = 0.159 W/kg; SAR(10 g) = 0.067 W/kg**

Maximum value of SAR (measured) = 0.400 W/kg



Test Laboratory: DEKRA

Date/Time: 2020/05/02

**802.11b\_6-Back(PAD) Aux-INPAQ****DUT: Notebook PC; Type: TM420I**

Communication System: UID 0, WLAN 2.4G; Frequency: 2437 MHz;

Communication System PAR: 0 dB

Medium parameters used:  $f = 2437$  MHz;  $\sigma = 1.81$  S/m;  $\epsilon_r = 39.85$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Phantom section: Flat Section

Ambient Temperature (°C) : 22.4, Liquid Temperature (°C) : 21.2

Measurement Standard: DASYS (IEEE/IEC/ANSI C63.19-2011)

DASY5 Configuration:

- Probe: EX3DV4 - SN3698; ConvF(7.06, 7.06, 7.06); Calibrated: 2019/11/22;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1207; Calibrated: 2019/11/14
- Phantom: SAM with left table; Type: SAM;
- Measurement SW: DASYS2, Version 52.10 (0); SEMCAD X Version 14.6.10 (7417)

**Configuration/Body/Area Scan (7x24x1):** Measurement grid: dx=12mm, dy=12mm

Maximum value of SAR (measured) = 0.109 W/kg

**Configuration/Body/Zoom Scan (5x5x7) (5x5x7)/Cube 0:** Measurement grid:

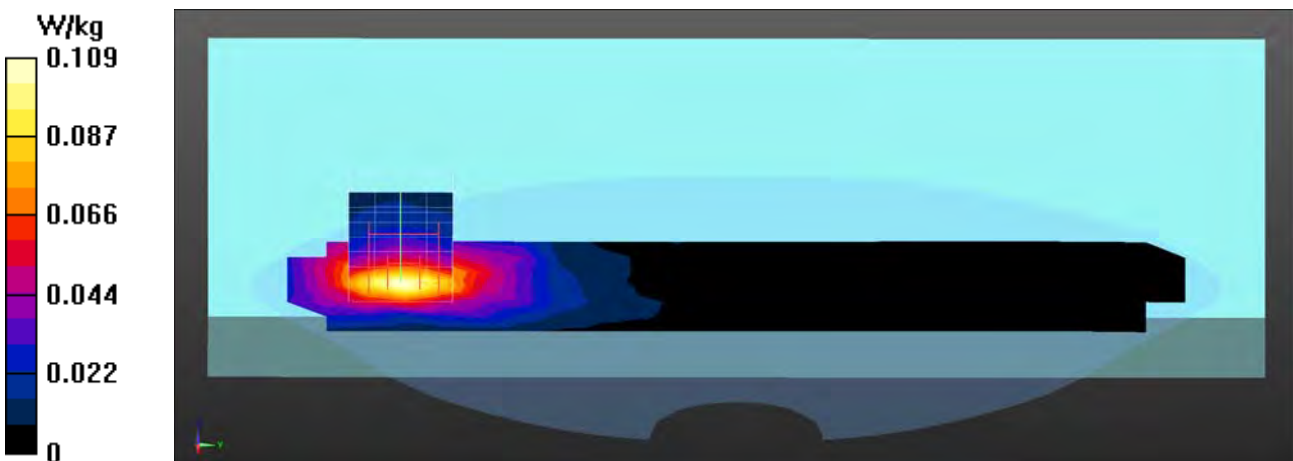
dx=8mm, dy=8mm, dz=5mm

Reference Value = 1.918 V/m; Power Drift = -0.14 dB

Peak SAR (extrapolated) = 0.129 W/kg

**SAR(1 g) = 0.078 W/kg; SAR(10 g) = 0.047 W/kg**

Maximum value of SAR (measured) = 0.112 W/kg



Test Laboratory: DEKRA

Date/Time: 2020/05/02

**802.11b\_6-Top(PAD) Aux-INPAQ****DUT: Notebook PC; Type: TM420I**

Communication System: UID 0, WLAN 2.4G; Frequency: 2437 MHz;

Communication System PAR: 0 dB

Medium parameters used:  $f = 2437$  MHz;  $\sigma = 1.81$  S/m;  $\epsilon_r = 39.85$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Phantom section: Flat Section

Ambient Temperature (°C) : 22.4, Liquid Temperature (°C) : 21.2

Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2011)

DASY5 Configuration:

- Probe: EX3DV4 - SN3698; ConvF(7.06, 7.06, 7.06); Calibrated: 2019/11/22;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1207; Calibrated: 2019/11/14
- Phantom: SAM with left table; Type: SAM;
- Measurement SW: DASY52, Version 52.10 (0); SEMCAD X Version 14.6.10 (7417)

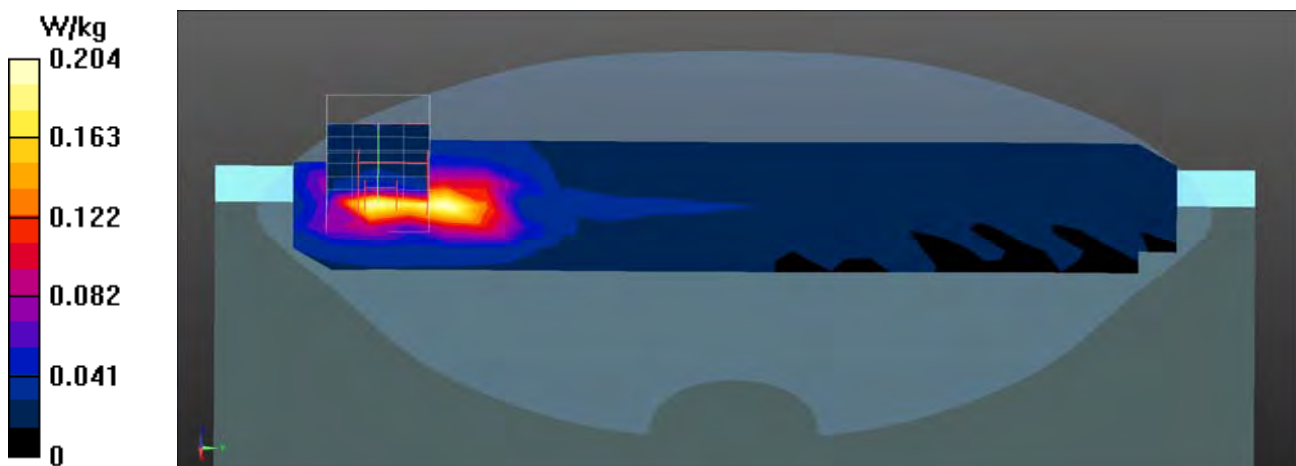
**Configuration/Body/Area Scan (7x26x1):** Measurement grid: dx=12mm, dy=12mm  
Maximum value of SAR (measured) = 0.204 W/kg**Configuration/Body/Zoom Scan (5x5x7) (5x5x7)/Cube 0:** Measurement grid:  
dx=8mm, dy=8mm, dz=5mm

Reference Value = 3.041 V/m; Power Drift = -0.07 dB

Peak SAR (extrapolated) = 0.325 W/kg

**SAR(1 g) = 0.095 W/kg; SAR(10 g) = 0.054 W/kg**

Maximum value of SAR (measured) = 0.202 W/kg



Test Laboratory: DEKRA

Date/Time: 2020/05/02

**BT1M\_0-Top(PAD) Aux-INPAQ****DUT: Notebook PC; Type: TM420I**

Communication System: UID 0, BT 1M&amp;3M&amp;BLE; Frequency: 2402 MHz;

Communication System PAR: 0 dB

Medium parameters used:  $f = 2402$  MHz;  $\sigma = 1.77$  S/m;  $\epsilon_r = 40.36$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Phantom section: Flat Section

Ambient Temperature (°C) : 22.4, Liquid Temperature (°C) : 21.2

Measurement Standard: DASYS (IEEE/IEC/ANSI C63.19-2011)

DASY5 Configuration:

- Probe: EX3DV4 - SN3698; ConvF(7.06, 7.06, 7.06); Calibrated: 2019/11/22;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1207; Calibrated: 2019/11/14
- Phantom: SAM with left table; Type: SAM;
- Measurement SW: DASYS2, Version 52.10 (0); SEMCAD X Version 14.6.10 (7417)

**Configuration/Body/Area Scan (7x24x1):** Measurement grid: dx=12mm, dy=12mm

Maximum value of SAR (measured) = 0.0512 W/kg

**Configuration/Body/Zoom Scan (5x5x7) (5x5x7)/Cube 0:** Measurement grid:

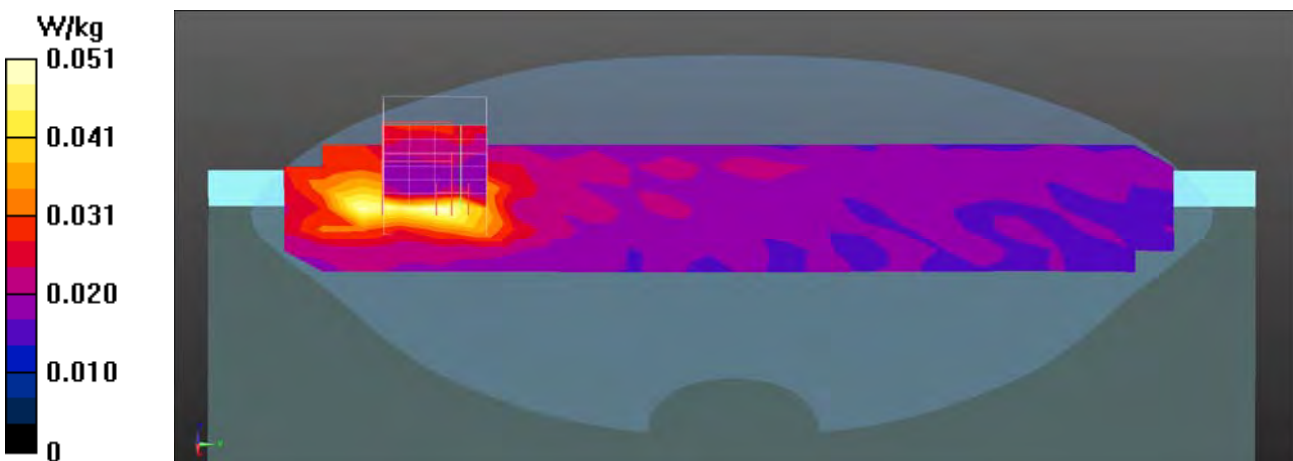
dx=8mm, dy=8mm, dz=5mm

Reference Value = 3.312 V/m; Power Drift = -0.05 dB

Peak SAR (extrapolated) = 0.0890 W/kg

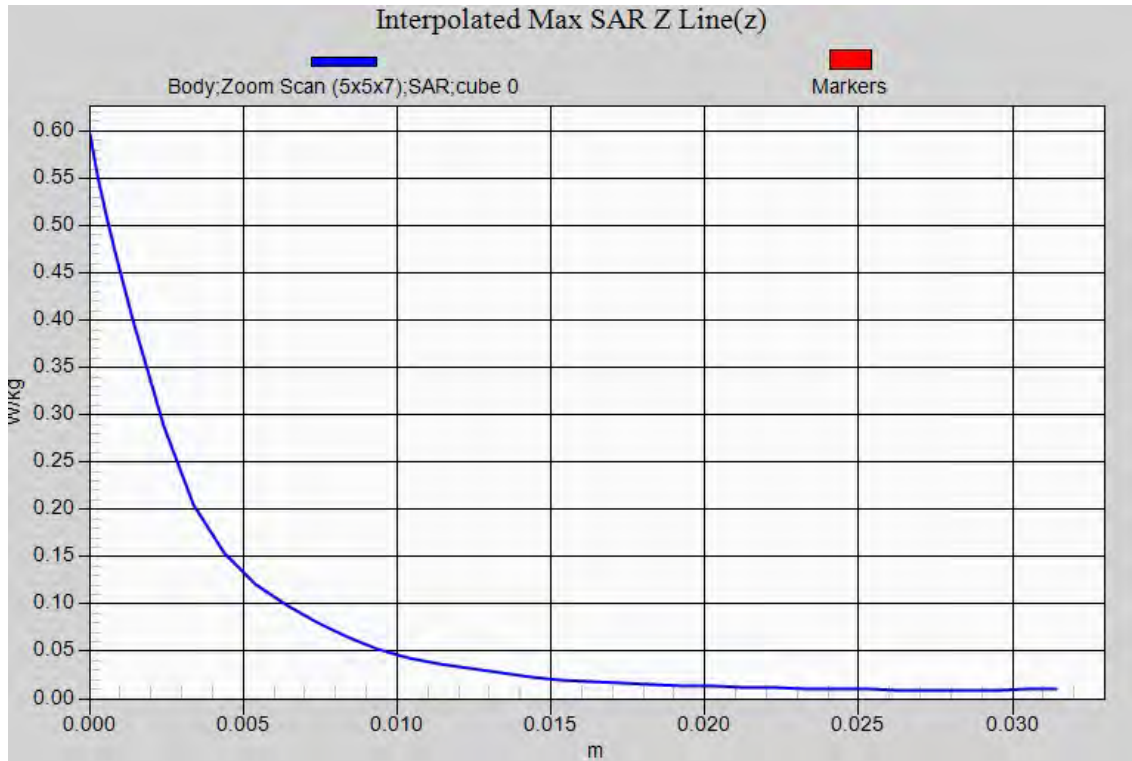
**SAR(1 g) = 0.029 W/kg; SAR(10 g) = 0.024 W/kg**

Maximum value of SAR (measured) = 0.0491 W/kg



### 802.11b EUT Top (PAD) (INPAQ Main Antenna), Z-Axis plot

Channel: 6



Test Laboratory: DEKRA

Date/Time: 2020/04/30

**802.11ac80M\_58-Back(PAD) Main-SPEED****DUT: Notebook PC; Type: TM420I**

Communication System: UID 0, WLAN 5G; Frequency: 5290 MHz;

Communication System PAR: 0 dB

Medium parameters used:  $f = 5290$  MHz;  $\sigma = 4.63$  S/m;  $\epsilon_r = 36.46$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Phantom section: Flat Section

Ambient Temperature (°C) : 22.9, Liquid Temperature (°C) : 21.9

Measurement Standard: DASYS5 (IEEE/IEC/ANSI C63.19-2011)

DASY5 Configuration:

- Probe: EX3DV4 - SN3698; ConvF(4.73, 4.73, 4.73); Calibrated: 2019/11/22;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1207; Calibrated: 2019/11/14
- Phantom: SAM with right table; Type: SAM;
- Measurement SW: DASY52, Version 52.10 (0); SEMCAD X Version 14.6.10 (7417)

**Configuration/Body/Area Scan (7x29x1):** Measurement grid: dx=10mm, dy=10mm

Maximum value of SAR (measured) = 0.301 W/kg

**Configuration/Body/Zoom Scan (7x7x12) (7x7x12)/Cube 0:** Measurement grid:

dx=4mm, dy=4mm, dz=2mm

Reference Value = 2.055 V/m; Power Drift = -0.07 dB

Peak SAR (extrapolated) = 0.487 W/kg

**SAR(1 g) = 0.156 W/kg; SAR(10 g) = 0.076 W/kg**

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



Test Laboratory: DEKRA

Date/Time: 2020/04/30

**802.11ac80M\_106-Back(PAD) Main-SPEED****DUT: Notebook PC; Type: TM420I**

Communication System: UID 0, WLAN 5G; Frequency: 5530 MHz;

Communication System PAR: 0 dB

Medium parameters used:  $f = 5530$  MHz;  $\sigma = 4.96$  S/m;  $\epsilon_r = 35.79$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Phantom section: Flat Section

Ambient Temperature (°C) : 22.9, Liquid Temperature (°C) : 21.9

Measurement Standard: DASYS (IEEE/IEC/ANSI C63.19-2011)

DASY5 Configuration:

- Probe: EX3DV4 - SN3698; ConvF(4.43, 4.43, 4.43); Calibrated: 2019/11/22;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1207; Calibrated: 2019/11/14
- Phantom: SAM with right table; Type: SAM;
- Measurement SW: DASYS52, Version 52.10 (0); SEMCAD X Version 14.6.10 (7417)

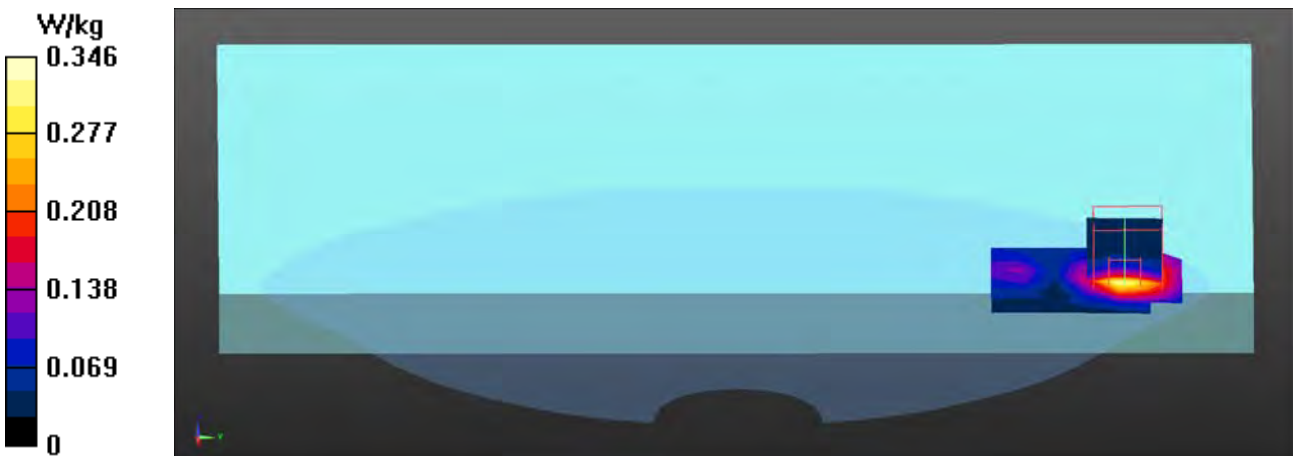
**Configuration/Body/Area Scan (7x7x1):** Measurement grid: dx=10mm, dy=10mm  
Maximum value of SAR (measured) = 0.346 W/kg**Configuration/Body/Zoom Scan (7x7x12) (7x7x12)/Cube 0:** Measurement grid:  
dx=4mm, dy=4mm, dz=2mm

Reference Value = 2.468 V/m; Power Drift = -0.01dB

Peak SAR (extrapolated) = 0.555 W/kg

**SAR(1 g) = 0.167 W/kg; SAR(10 g) = 0.083 W/kg**

Maximum value of SAR (measured) = 0.340 W/kg



Test Laboratory: DEKRA

Date/Time: 2020/04/30

**802.11ac80M\_155-Back(PAD) Main-SPEED****DUT: Notebook PC; Type: TM420I**

Communication System: UID 0, WLAN 5G; Frequency: 5775 MHz;

Communication System PAR: 0 dB

Medium parameters used:  $f = 5775$  MHz;  $\sigma = 5.28$  S/m;  $\epsilon_r = 35.13$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Phantom section: Flat Section

Ambient Temperature (°C) : 22.9, Liquid Temperature (°C) : 21.9

Measurement Standard: DASYS (IEEE/IEC/ANSI C63.19-2011)

DASY5 Configuration:

- Probe: EX3DV4 - SN3698; ConvF(4.6, 4.6, 4.6); Calibrated: 2019/11/22;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1207; Calibrated: 2019/11/14
- Phantom: SAM with right table; Type: SAM;
- Measurement SW: DASYS52, Version 52.10 (0); SEMCAD X Version 14.6.10 (7417)

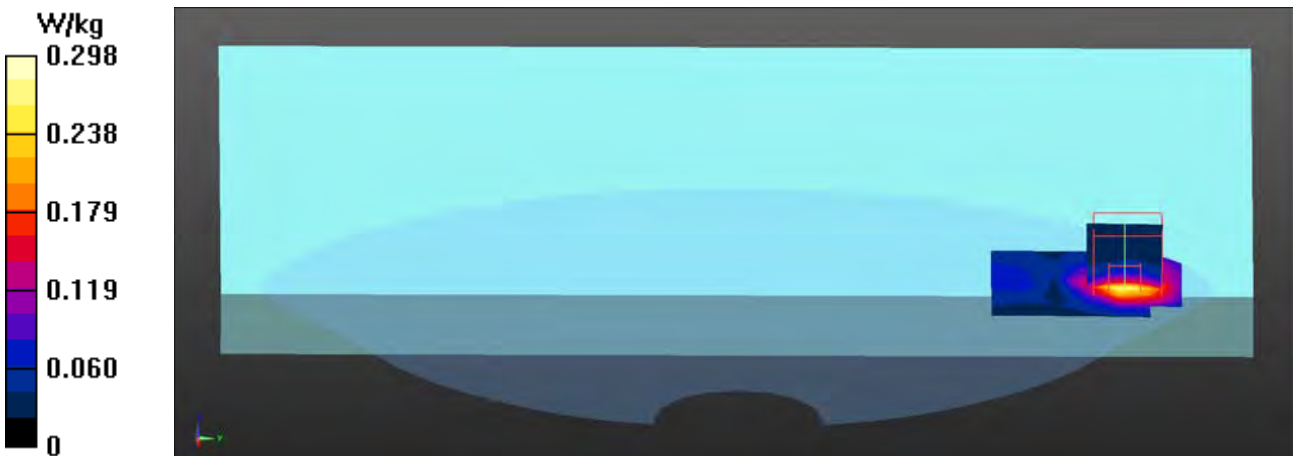
**Configuration/Body/Area Scan (7x7x1):** Measurement grid: dx=10mm, dy=10mm  
Maximum value of SAR (measured) = 0.298 W/kg**Configuration/Body/Zoom Scan (7x7x12) (7x7x12)/Cube 0:** Measurement grid:  
dx=4mm, dy=4mm, dz=2mm

Reference Value = 2.155 V/m; Power Drift = -0.05 dB

Peak SAR (extrapolated) = 0.516 W/kg

**SAR(1 g) = 0.144 W/kg; SAR(10 g) = 0.071 W/kg**

Maximum value of SAR (measured) = 0.292 W/kg





Test Laboratory: DEKRA

Date/Time: 2020/04/30

**802.11ac80M\_42-Top(PAD) Main-SPEED****DUT: Notebook PC; Type: TM420I**

Communication System: UID 0, WLAN 5G; Frequency: 5210 MHz;

Communication System PAR: 0 dB

Medium parameters used:  $f = 5210$  MHz;  $\sigma = 4.52$  S/m;  $\epsilon_r = 36.68$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Phantom section: Flat Section

Ambient Temperature (°C) : 22.9, Liquid Temperature (°C) : 21.9

Measurement Standard: DASYS5 (IEEE/IEC/ANSI C63.19-2011)

DASY5 Configuration:

- Probe: EX3DV4 - SN3698; ConvF(4.73, 4.73, 4.73); Calibrated: 2019/11/22;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1207; Calibrated: 2019/11/14
- Phantom: SAM with right table; Type: SAM;
- Measurement SW: DASY52, Version 52.10 (0); SEMCAD X Version 14.6.10 (7417)

**Configuration/Body/Area Scan (7x7x1):** Measurement grid: dx=10mm, dy=10mm  
Maximum value of SAR (measured) = 0.542 W/kg

**Configuration/Body/Zoom Scan (7x7x12) (7x7x12)/Cube 0:** Measurement grid:  
dx=4mm, dy=4mm, dz=2mm

Reference Value = 2.346 V/m; Power Drift = -0.02 dB

Peak SAR (extrapolated) = 1.23 W/kg

**SAR(1 g) = 0.258 W/kg; SAR(10 g) = 0.112 W/kg**

Maximum value of SAR (measured) = 0.545 W/kg



Test Laboratory: DEKRA

Date/Time: 2020/04/30

**802.11ac80M\_58-Top(PAD) Main-SPEED****DUT: Notebook PC; Type: TM420I**

Communication System: UID 0, WLAN 5G; Frequency: 5290 MHz;

Communication System PAR: 0 dB

Medium parameters used:  $f = 5290$  MHz;  $\sigma = 4.63$  S/m;  $\epsilon_r = 36.46$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Phantom section: Flat Section

Ambient Temperature (°C) : 22.9, Liquid Temperature (°C) : 21.9

Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2011)

DASY5 Configuration:

- Probe: EX3DV4 - SN3698; ConvF(4.73, 4.73, 4.73); Calibrated: 2019/11/22;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1207; Calibrated: 2019/11/14
- Phantom: SAM with right table; Type: SAM;
- Measurement SW: DASY52, Version 52.10 (0); SEMCAD X Version 14.6.10 (7417)

**Configuration/Body/Area Scan (7x29x1):** Measurement grid: dx=10mm, dy=10mm  
Maximum value of SAR (measured) = 0.439 W/kg**Configuration/Body/Zoom Scan (7x7x12) (7x7x12)/Cube 0:** Measurement grid:  
dx=4mm, dy=4mm, dz=2mm

Reference Value = 2.307 V/m; Power Drift = -0.08 dB

Peak SAR (extrapolated) = 0.959 W/kg

**SAR(1 g) = 0.219 W/kg; SAR(10 g) = 0.092 W/kg**

Maximum value of SAR (measured) = 0.476 W/kg



Test Laboratory: DEKRA

Date/Time: 2020/04/30

**802.11ac80M\_106-Top(PAD) Main-SPEED****DUT: Notebook PC; Type: TM420I**

Communication System: UID 0, WLAN 5G; Frequency: 5530 MHz;

Communication System PAR: 0 dB

Medium parameters used:  $f = 5530$  MHz;  $\sigma = 4.96$  S/m;  $\epsilon_r = 35.79$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Phantom section: Flat Section

Ambient Temperature (°C) : 22.9, Liquid Temperature (°C) : 21.9

Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2011)

DASY5 Configuration:

- Probe: EX3DV4 - SN3698; ConvF(4.43, 4.43, 4.43); Calibrated: 2019/11/22;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1207; Calibrated: 2019/11/14
- Phantom: SAM with right table; Type: SAM;
- Measurement SW: DASY52, Version 52.10 (0); SEMCAD X Version 14.6.10 (7417)

**Configuration/Body/Area Scan (7x7x1):** Measurement grid: dx=10mm, dy=10mm  
Maximum value of SAR (measured) = 0.639 W/kg**Configuration/Body/Zoom Scan (7x7x12) (7x7x12)/Cube 0:** Measurement grid:  
dx=4mm, dy=4mm, dz=2mm

Reference Value = 2.400 V/m; Power Drift = -0.02 dB

Peak SAR (extrapolated) = 1.26 W/kg

**SAR(1 g) = 0.284 W/kg; SAR(10 g) = 0.113 W/kg**

Maximum value of SAR (measured) = 0.627 W/kg



Test Laboratory: DEKRA

Date/Time: 2020/04/30

**802.11ac80M\_122-Top(PAD) Main-SPEED****DUT: Notebook PC; Type: TM420I**

Communication System: UID 0, WLAN 5G; Frequency: 5610 MHz;

Communication System PAR: 0 dB

Medium parameters used:  $f = 5610$  MHz;  $\sigma = 5.07$  S/m;  $\epsilon_r = 35.58$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Phantom section: Flat Section

Ambient Temperature (°C) : 22.9, Liquid Temperature (°C) : 21.9

Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2011)

DASY5 Configuration:

- Probe: EX3DV4 - SN3698; ConvF(4.43, 4.43, 4.43); Calibrated: 2019/11/22;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1207; Calibrated: 2019/11/14
- Phantom: SAM with right table; Type: SAM;
- Measurement SW: DASY52, Version 52.10 (0); SEMCAD X Version 14.6.10 (7417)

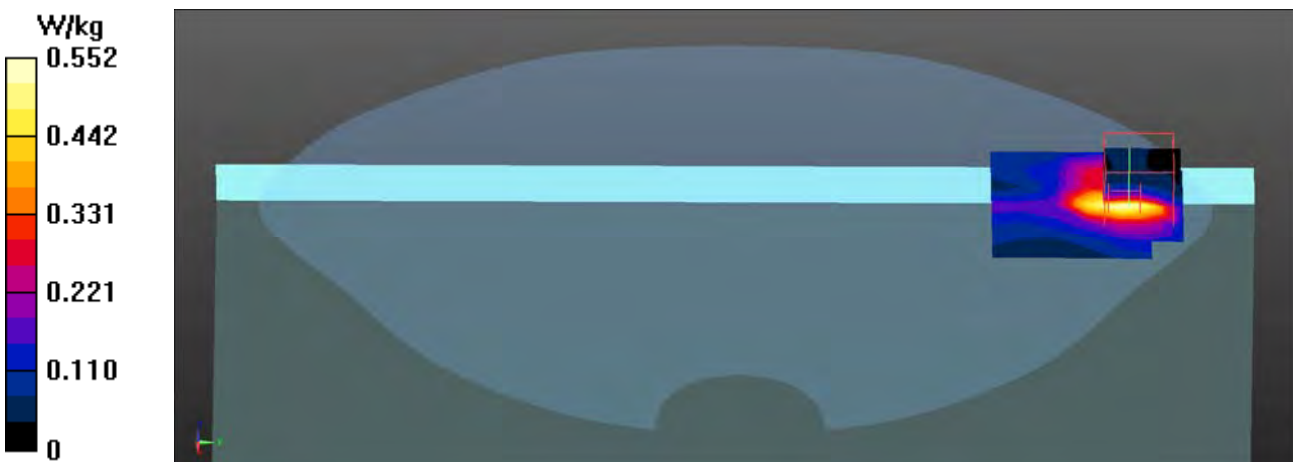
**Configuration/Body/Area Scan (7x7x1):** Measurement grid: dx=10mm, dy=10mm  
Maximum value of SAR (measured) = 0.552 W/kg**Configuration/Body/Zoom Scan (7x7x12) (7x7x12)/Cube 0:** Measurement grid:  
dx=4mm, dy=4mm, dz=2mm

Reference Value = 2.252 V/m; Power Drift = -0.09 dB

Peak SAR (extrapolated) = 1.25 W/kg

**SAR(1 g) = 0.264 W/kg; SAR(10 g) = 0.106 W/kg**

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



Test Laboratory: DEKRA

Date/Time: 2020/04/30

**802.11ac80M\_138-Top(PAD) Main-SPEED****DUT: Notebook PC; Type: TM420I**

Communication System: UID 0, WLAN 5G; Frequency: 5690 MHz;

Communication System PAR: 0 dB

Medium parameters used:  $f = 5690$  MHz;  $\sigma = 5.17$  S/m;  $\epsilon_r = 35.36$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Phantom section: Flat Section

Ambient Temperature (°C) : 22.9, Liquid Temperature (°C) : 21.9

Measurement Standard: DASYS5 (IEEE/IEC/ANSI C63.19-2011)

DASY5 Configuration:

- Probe: EX3DV4 - SN3698; ConvF(4.43, 4.43, 4.43); Calibrated: 2019/11/22;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1207; Calibrated: 2019/11/14
- Phantom: SAM with right table; Type: SAM;
- Measurement SW: DASYS52, Version 52.10 (0); SEMCAD X Version 14.6.10 (7417)

**Configuration/Body/Area Scan (7x7x1):** Measurement grid: dx=10mm, dy=10mm  
Maximum value of SAR (measured) = 0.816 W/kg**Configuration/Body/Zoom Scan (7x7x12) (7x7x12)/Cube 0:** Measurement grid:  
dx=4mm, dy=4mm, dz=2mm

Reference Value = 2.555 V/m; Power Drift = -0.05 dB

Peak SAR (extrapolated) = 1.57 W/kg

**SAR(1 g) = 0.363 W/kg; SAR(10 g) = 0.147 W/kg**

Maximum value of SAR (measured) = 0.830 W/kg



Test Laboratory: DEKRA

Date/Time: 2020/04/30

**802.11ac80M\_155-Top(PAD) Main-SPEED****DUT: Notebook PC; Type: TM420I**

Communication System: UID 0, WLAN 5G; Frequency: 5775 MHz;

Communication System PAR: 0 dB

Medium parameters used:  $f = 5775$  MHz;  $\sigma = 5.28$  S/m;  $\epsilon_r = 35.13$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Phantom section: Flat Section

Ambient Temperature (°C) : 22.9, Liquid Temperature (°C) : 21.9

Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2011)

DASY5 Configuration:

- Probe: EX3DV4 - SN3698; ConvF(4.6, 4.6, 4.6); Calibrated: 2019/11/22;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1207; Calibrated: 2019/11/14
- Phantom: SAM with right table; Type: SAM;
- Measurement SW: DASY52, Version 52.10 (0); SEMCAD X Version 14.6.10 (7417)

**Configuration/Body/Area Scan (7x7x1):** Measurement grid: dx=10mm, dy=10mm  
Maximum value of SAR (measured) = 0.598 W/kg**Configuration/Body/Zoom Scan (7x7x12) (7x7x12)/Cube 0:** Measurement grid:  
dx=4mm, dy=4mm, dz=2mm

Reference Value = 2.330 V/m; Power Drift = -0.05 dB

Peak SAR (extrapolated) = 1.19 W/kg

**SAR(1 g) = 0.265 W/kg; SAR(10 g) = 0.113 W/kg**

Maximum value of SAR (measured) = 0.600 W/kg



Test Laboratory: DEKRA

Date/Time: 2020/04/30

**802.11ac80M\_58-Back(PAD) Aux-SPEED****DUT: Notebook PC; Type: TM420I**

Communication System: UID 0, WLAN 5G; Frequency: 5290 MHz;

Communication System PAR: 0 dB

Medium parameters used:  $f = 5290$  MHz;  $\sigma = 4.63$  S/m;  $\epsilon_r = 36.46$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Phantom section: Flat Section

Ambient Temperature (°C) : 22.9, Liquid Temperature (°C) : 21.9

Measurement Standard: DASYS5 (IEEE/IEC/ANSI C63.19-2011)

DASY5 Configuration:

- Probe: EX3DV4 - SN3698; ConvF(4.73, 4.73, 4.73); Calibrated: 2019/11/22;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1207; Calibrated: 2019/11/14
- Phantom: SAM with right table; Type: SAM;
- Measurement SW: DASYS52, Version 52.10 (0); SEMCAD X Version 14.6.10 (7417)

**Configuration/Body/Area Scan (7x7x1):** Measurement grid: dx=10mm, dy=10mm  
Maximum value of SAR (measured) = 0.260 W/kg**Configuration/Body/Zoom Scan (7x7x12) (7x7x12)/Cube 0:** Measurement grid:  
dx=4mm, dy=4mm, dz=2mm

Reference Value = 2.197 V/m; Power Drift = -0.07 dB

Peak SAR (extrapolated) = 0.420 W/kg

**SAR(1 g) = 0.130 W/kg; SAR(10 g) = 0.063 W/kg**

Maximum value of SAR (measured) = 0.259 W/kg



Test Laboratory: DEKRA

Date/Time: 2020/04/30

**802.11ac80M\_106-Back(PAD) Aux-SPEED****DUT: Notebook PC; Type: TM420I**

Communication System: UID 0, WLAN 5G; Frequency: 5530 MHz;

Communication System PAR: 0 dB

Medium parameters used:  $f = 5530$  MHz;  $\sigma = 4.96$  S/m;  $\epsilon_r = 35.79$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Phantom section: Flat Section

Ambient Temperature (°C) : 22.9, Liquid Temperature (°C) : 21.9

Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2011)

DASY5 Configuration:

- Probe: EX3DV4 - SN3698; ConvF(4.43, 4.43, 4.43); Calibrated: 2019/11/22;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1207; Calibrated: 2019/11/14
- Phantom: SAM with right table; Type: SAM;
- Measurement SW: DASY52, Version 52.10 (0); SEMCAD X Version 14.6.10 (7417)

**Configuration/Body/Area Scan (7x29x1):** Measurement grid: dx=10mm, dy=10mm  
Maximum value of SAR (measured) = 0.435 W/kg**Configuration/Body/Zoom Scan (7x7x12) (7x7x12)/Cube 0:** Measurement grid:  
dx=4mm, dy=4mm, dz=2mm

Reference Value = 2.464 V/m; Power Drift = -0.04 dB

Peak SAR (extrapolated) = 0.710 W/kg

**SAR(1 g) = 0.204 W/kg; SAR(10 g) = 0.093 W/kg**

Maximum value of SAR (measured) = 0.430 W/kg





Test Laboratory: DEKRA

Date/Time: 2020/04/30

**802.11ac80M\_155-Back(PAD) Aux-SPEED****DUT: Notebook PC; Type: TM420I**

Communication System: UID 0, WLAN 5G; Frequency: 5775 MHz;

Communication System PAR: 0 dB

Medium parameters used:  $f = 5775$  MHz;  $\sigma = 5.28$  S/m;  $\epsilon_r = 35.13$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Phantom section: Flat Section

Ambient Temperature (°C) : 22.9, Liquid Temperature (°C) : 21.9

Measurement Standard: DASYS5 (IEEE/IEC/ANSI C63.19-2011)

DASY5 Configuration:

- Probe: EX3DV4 - SN3698; ConvF(4.6, 4.6, 4.6); Calibrated: 2019/11/22;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1207; Calibrated: 2019/11/14
- Phantom: SAM with right table; Type: SAM;
- Measurement SW: DASYS52, Version 52.10 (0); SEMCAD X Version 14.6.10 (7417)

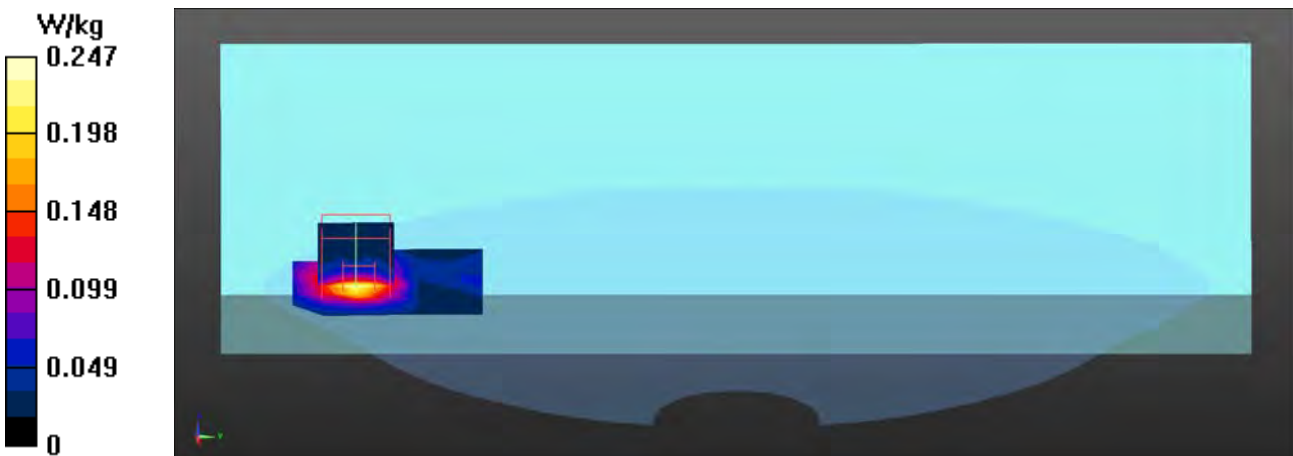
**Configuration/Body/Area Scan (7x7x1):** Measurement grid: dx=10mm, dy=10mm  
Maximum value of SAR (measured) = 0.247 W/kg**Configuration/Body/Zoom Scan (7x7x12) (7x7x12)/Cube 0:** Measurement grid:  
dx=4mm, dy=4mm, dz=2mm

Reference Value = 2.244 V/m; Power Drift = -0.09 dB

Peak SAR (extrapolated) = 0.437 W/kg

**SAR(1 g) = 0.121 W/kg; SAR(10 g) = 0.059 W/kg**

Maximum value of SAR (measured) = 0.254 W/kg



Test Laboratory: DEKRA

Date/Time: 2020/04/30

**802.11ac80M\_42-Top(PAD) Aux-SPEED****DUT: Notebook PC; Type: TM420I**

Communication System: UID 0, WLAN 5G; Frequency: 5210 MHz;

Communication System PAR: 0 dB

Medium parameters used:  $f = 5210$  MHz;  $\sigma = 4.52$  S/m;  $\epsilon_r = 36.68$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Phantom section: Flat Section

Ambient Temperature (°C) : 22.9, Liquid Temperature (°C) : 21.9

Measurement Standard: DASYS (IEEE/IEC/ANSI C63.19-2011)

DASY5 Configuration:

- Probe: EX3DV4 - SN3698; ConvF(4.73, 4.73, 4.73); Calibrated: 2019/11/22;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1207; Calibrated: 2019/11/14
- Phantom: SAM with right table; Type: SAM;
- Measurement SW: DASY52, Version 52.10 (0); SEMCAD X Version 14.6.10 (7417)

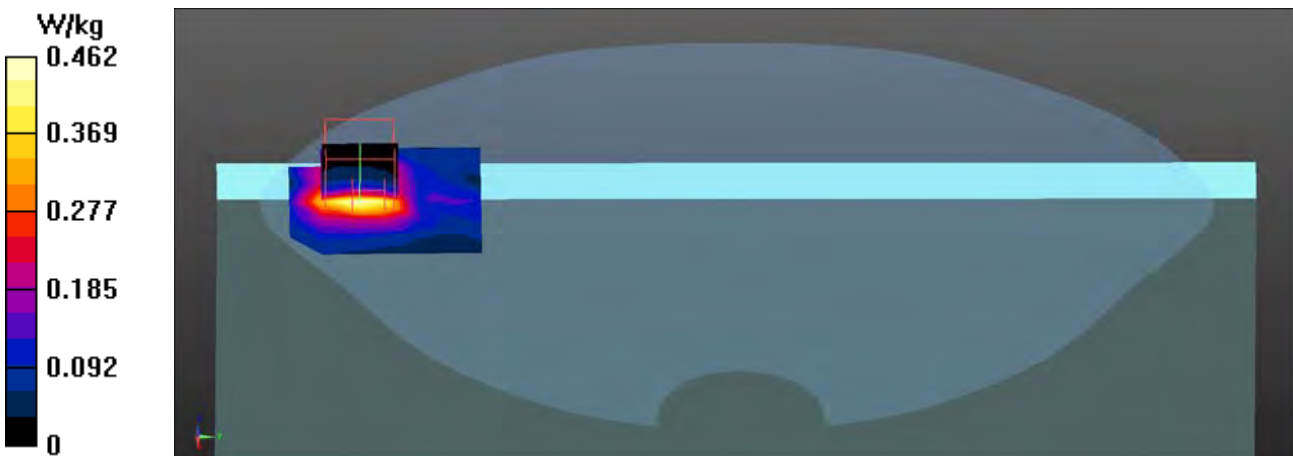
**Configuration/Body/Area Scan (7x7x1):** Measurement grid: dx=10mm, dy=10mm  
Maximum value of SAR (measured) = 0.462 W/kg**Configuration/Body/Zoom Scan (7x7x12) (7x7x12)/Cube 0:** Measurement grid:  
dx=4mm, dy=4mm, dz=2mm

Reference Value = 2.220 V/m; Power Drift = -0.08 dB

Peak SAR (extrapolated) = 0.944 W/kg

**SAR(1 g) = 0.212 W/kg; SAR(10 g) = 0.105 W/kg**

Maximum value of SAR (measured) = 0.458 W/kg



Test Laboratory: DEKRA

Date/Time: 2020/04/30

**802.11ac80M\_58-Top(PAD) Aux-SPEED****DUT: Notebook PC; Type: TM420I**

Communication System: UID 0, WLAN 5G; Frequency: 5290 MHz;

Communication System PAR: 0 dB

Medium parameters used:  $f = 5290$  MHz;  $\sigma = 4.63$  S/m;  $\epsilon_r = 36.46$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Phantom section: Flat Section

Ambient Temperature (°C) : 22.9, Liquid Temperature (°C) : 21.9

Measurement Standard: DASYS (IEEE/IEC/ANSI C63.19-2011)

DASY5 Configuration:

- Probe: EX3DV4 - SN3698; ConvF(4.73, 4.73, 4.73); Calibrated: 2019/11/22;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1207; Calibrated: 2019/11/14
- Phantom: SAM with right table; Type: SAM;
- Measurement SW: DASYS2, Version 52.10 (0); SEMCAD X Version 14.6.10 (7417)

**Configuration/Body/Area Scan (7x7x1):** Measurement grid: dx=10mm, dy=10mm  
Maximum value of SAR (measured) = 0.491 W/kg**Configuration/Body/Zoom Scan (7x7x12) (7x7x12)/Cube 0:** Measurement grid:  
dx=4mm, dy=4mm, dz=2mm

Reference Value = 2.353 V/m; Power Drift = -0.13 dB

Peak SAR (extrapolated) = 1.13 W/kg

**SAR(1 g) = 0.221 W/kg; SAR(10 g) = 0.098 W/kg**

Maximum value of SAR (measured) = 0.475 W/kg



Test Laboratory: DEKRA

Date/Time: 2020/04/30

**802.11ac80M\_106-Top(PAD) Aux-SPEED****DUT: Notebook PC; Type: TM420I**

Communication System: UID 0, WLAN 5G; Frequency: 5530 MHz;

Communication System PAR: 0 dB

Medium parameters used:  $f = 5530$  MHz;  $\sigma = 4.96$  S/m;  $\epsilon_r = 35.79$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Phantom section: Flat Section

Ambient Temperature (°C) : 22.9, Liquid Temperature (°C) : 21.9

Measurement Standard: DASYS5 (IEEE/IEC/ANSI C63.19-2011)

DASY5 Configuration:

- Probe: EX3DV4 - SN3698; ConvF(4.43, 4.43, 4.43); Calibrated: 2019/11/22;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1207; Calibrated: 2019/11/14
- Phantom: SAM with right table; Type: SAM;
- Measurement SW: DASYS52, Version 52.10 (0); SEMCAD X Version 14.6.10 (7417)

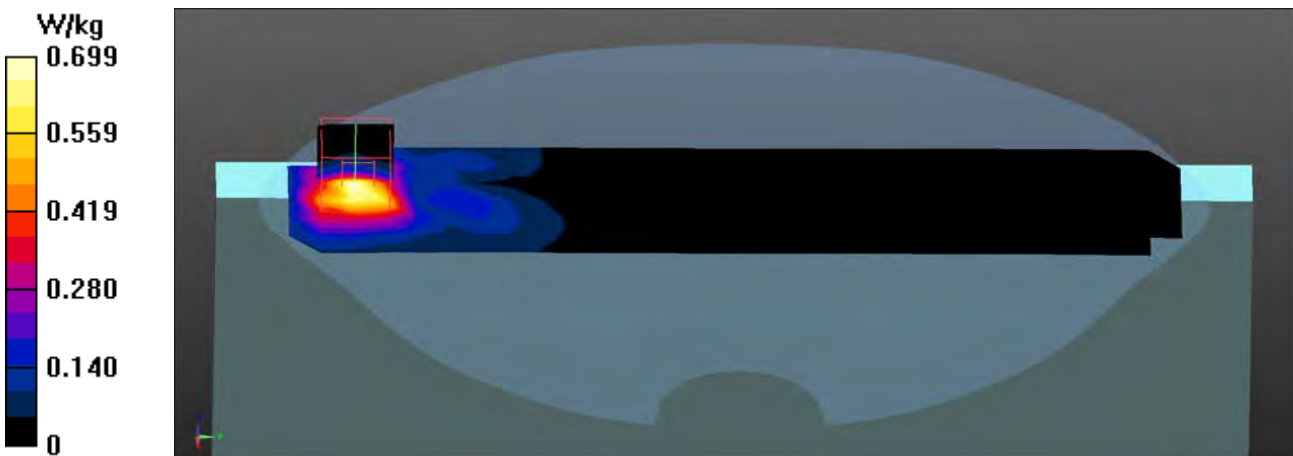
**Configuration/Body/Area Scan (7x29x1):** Measurement grid: dx=10mm, dy=10mm  
Maximum value of SAR (measured) = 0.699 W/kg**Configuration/Body/Zoom Scan (7x7x12) (7x7x12)/Cube 0:** Measurement grid:  
dx=4mm, dy=4mm, dz=2mm

Reference Value = 2.250 V/m; Power Drift = -0.06 dB

Peak SAR (extrapolated) = 1.51 W/kg

**SAR(1 g) = 0.304 W/kg; SAR(10 g) = 0.143 W/kg**

Maximum value of SAR (measured) = 0.687 W/kg



Test Laboratory: DEKRA

Date/Time: 2020/04/30

**802.11ac80M\_122-Top(PAD) Aux-SPEED****DUT: Notebook PC; Type: TM420I**

Communication System: UID 0, WLAN 5G; Frequency: 5610 MHz;

Communication System PAR: 0 dB

Medium parameters used:  $f = 5610$  MHz;  $\sigma = 5.07$  S/m;  $\epsilon_r = 35.58$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Phantom section: Flat Section

Ambient Temperature (°C) : 22.9, Liquid Temperature (°C) : 21.9

Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2011)

DASY5 Configuration:

- Probe: EX3DV4 - SN3698; ConvF(4.43, 4.43, 4.43); Calibrated: 2019/11/22;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1207; Calibrated: 2019/11/14
- Phantom: SAM with right table; Type: SAM;
- Measurement SW: DASY52, Version 52.10 (0); SEMCAD X Version 14.6.10 (7417)

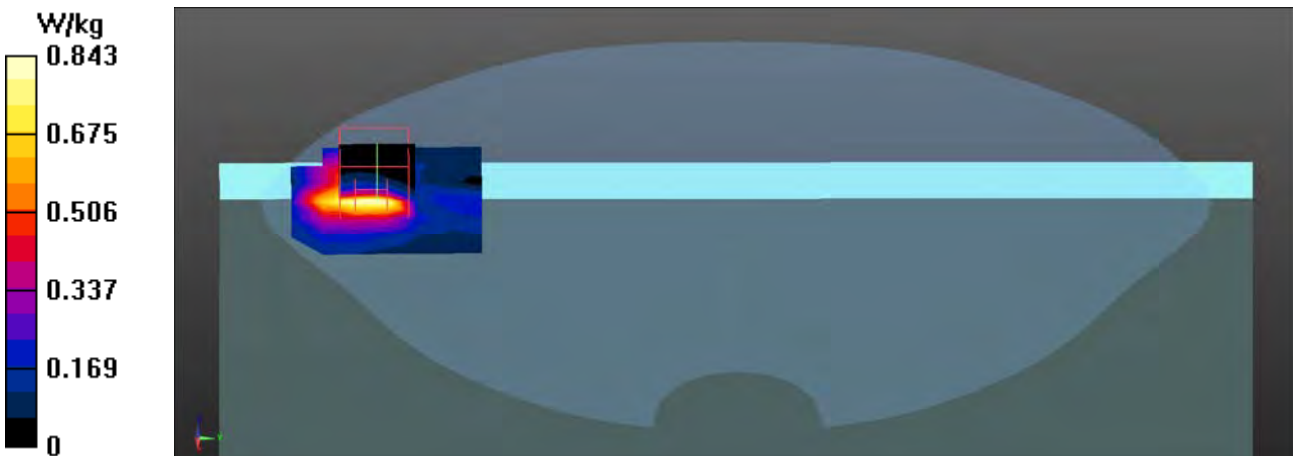
**Configuration/Body/Area Scan (7x7x1):** Measurement grid: dx=10mm, dy=10mm  
Maximum value of SAR (measured) = 0.843 W/kg**Configuration/Body/Zoom Scan (7x7x12) (7x7x12)/Cube 0:** Measurement grid:  
dx=4mm, dy=4mm, dz=2mm

Reference Value = 2.382 V/m; Power Drift = -0.05 dB

Peak SAR (extrapolated) = 1.59 W/kg

**SAR(1 g) = 0.380 W/kg; SAR(10 g) = 0.145 W/kg**

Maximum value of SAR (measured) = 0.924 W/kg



Test Laboratory: DEKRA

Date/Time: 2020/04/30

**802.11ac80M\_138-Top(PAD) Aux-SPEED****DUT: Notebook PC; Type: TM420I**

Communication System: UID 0, WLAN 5G; Frequency: 5690 MHz;

Communication System PAR: 0 dB

Medium parameters used:  $f = 5690$  MHz;  $\sigma = 5.17$  S/m;  $\epsilon_r = 35.36$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Phantom section: Flat Section

Ambient Temperature (°C) : 22.9, Liquid Temperature (°C) : 21.9

Measurement Standard: DASYS5 (IEEE/IEC/ANSI C63.19-2011)

DASY5 Configuration:

- Probe: EX3DV4 - SN3698; ConvF(4.43, 4.43, 4.43); Calibrated: 2019/11/22;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1207; Calibrated: 2019/11/14
- Phantom: SAM with right table; Type: SAM;
- Measurement SW: DASYS52, Version 52.10 (0); SEMCAD X Version 14.6.10 (7417)

**Configuration/Body/Area Scan (7x7x1):** Measurement grid: dx=10mm, dy=10mm  
Maximum value of SAR (measured) = 0.980 W/kg

**Configuration/Body/Zoom Scan (7x7x12) (7x7x12)/Cube 0:** Measurement grid:  
dx=4mm, dy=4mm, dz=2mm  
Reference Value = 2.440 V/m; Power Drift = -0.04 dB  
Peak SAR (extrapolated) = 1.76 W/kg  
**SAR(1 g) = 0.412 W/kg; SAR(10 g) = 0.153 W/kg**  
Maximum value of SAR (measured) = 1.01 W/kg



Test Laboratory: DEKRA

Date/Time: 2020/04/30

**802.11ac80M\_155-Top(PAD) Aux-SPEED****DUT: Notebook PC; Type: TM420I**

Communication System: UID 0, WLAN 5G; Frequency: 5775 MHz;

Communication System PAR: 0 dB

Medium parameters used:  $f = 5775$  MHz;  $\sigma = 5.28$  S/m;  $\epsilon_r = 35.13$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Phantom section: Flat Section

Ambient Temperature (°C) : 22.9, Liquid Temperature (°C) : 21.9

Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2011)

DASY5 Configuration:

- Probe: EX3DV4 - SN3698; ConvF(4.6, 4.6, 4.6); Calibrated: 2019/11/22;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1207; Calibrated: 2019/11/14
- Phantom: SAM with right table; Type: SAM;
- Measurement SW: DASY52, Version 52.10 (0); SEMCAD X Version 14.6.10 (7417)

**Configuration/Body/Area Scan (7x7x1):** Measurement grid: dx=10mm, dy=10mm  
Maximum value of SAR (measured) = 0.588 W/kg**Configuration/Body/Zoom Scan (7x7x12) (7x7x12)/Cube 0:** Measurement grid:  
dx=4mm, dy=4mm, dz=2mm

Reference Value = 2.114 V/m; Power Drift = -0.03 dB

Peak SAR (extrapolated) = 1.09 W/kg

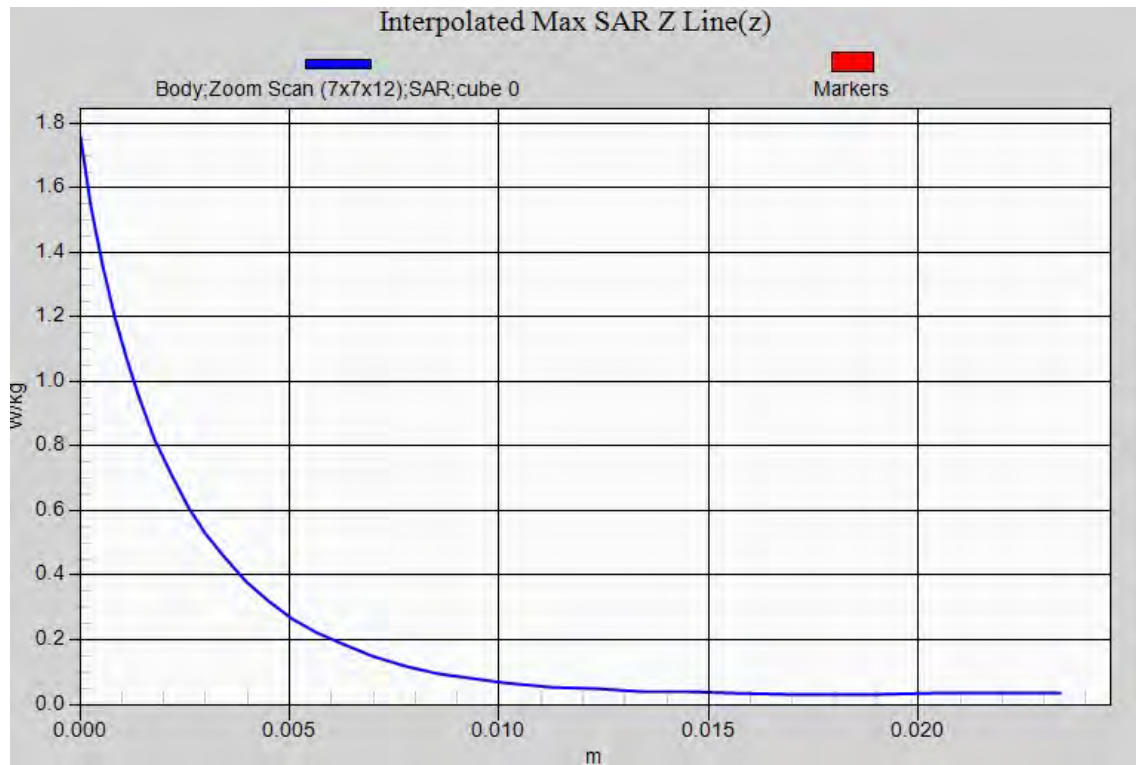
**SAR(1 g) = 0.247 W/kg; SAR(10 g) = 0.102 W/kg**

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



### 802.11ac80 EUT Top (PAD) (SPEED Aux Antenna), Z-Axis plot

Channel: 138





Test Laboratory: DEKRA

Date/Time: 2020/05/01

**802.11ac80M\_58-Back(PAD) Main-INPAQ****DUT: Notebook PC; Type: TM420I**

Communication System: UID 0, WLAN 5G; Frequency: 5290 MHz;

Communication System PAR: 0 dB

Medium parameters used:  $f = 5290$  MHz;  $\sigma = 4.65$  S/m;  $\epsilon_r = 36.58$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Phantom section: Flat Section

Ambient Temperature (°C) : 22.5, Liquid Temperature (°C) : 22.1

Measurement Standard: DASYS (IEEE/IEC/ANSI C63.19-2011)

DASY5 Configuration:

- Probe: EX3DV4 - SN3698; ConvF(4.73, 4.73, 4.73); Calibrated: 2019/11/22;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1207; Calibrated: 2019/11/14
- Phantom: SAM with right table; Type: SAM;
- Measurement SW: DASYS2, Version 52.10 (0); SEMCAD X Version 14.6.10 (7417)

**Configuration/Body/Area Scan (7x9x1):** Measurement grid: dx=10mm, dy=10mm

Maximum value of SAR (measured) = 0.192 W/kg

**Configuration/Body/Zoom Scan (7x7x12) (7x7x12)/Cube 0:** Measurement grid:

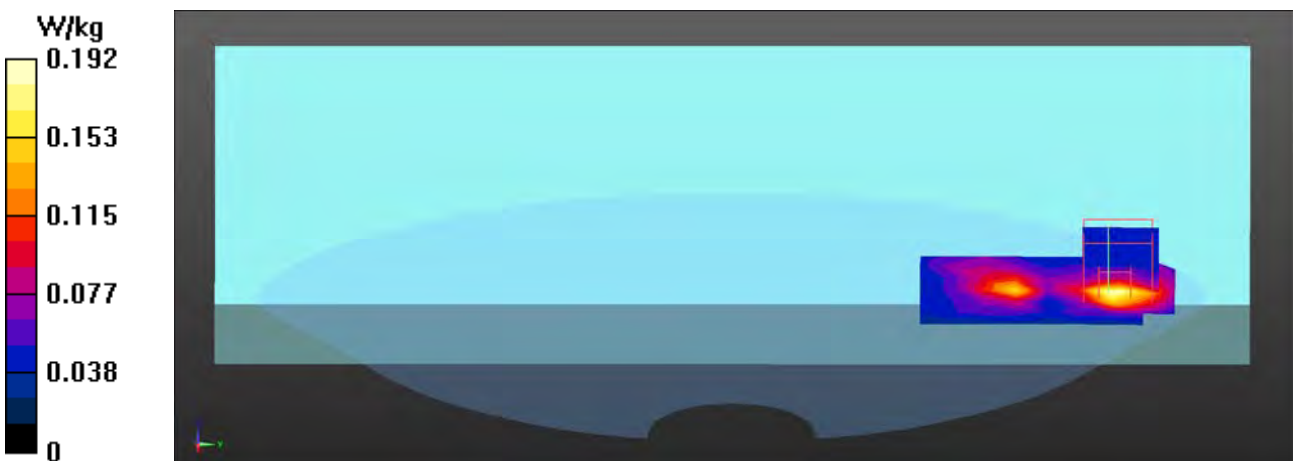
dx=4mm, dy=4mm, dz=2mm

Reference Value = 2.867 V/m; Power Drift = -0.06 dB

Peak SAR (extrapolated) = 0.313 W/kg

**SAR(1 g) = 0.110 W/kg; SAR(10 g) = 0.068 W/kg**

Maximum value of SAR (measured) = 0.190 W/kg



Test Laboratory: DEKRA

Date/Time: 2020/05/01

**802.11ac80M\_106-Back(PAD) Main-INPAQ****DUT: Notebook PC; Type: TM420I**

Communication System: UID 0, WLAN 5G; Frequency: 5530 MHz;

Communication System PAR: 0 dB

Medium parameters used:  $f = 5530$  MHz;  $\sigma = 4.98$  S/m;  $\epsilon_r = 35.92$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Phantom section: Flat Section

Ambient Temperature (°C) : 22.5, Liquid Temperature (°C) : 22.1

Measurement Standard: DASYS (IEEE/IEC/ANSI C63.19-2011)

DASY5 Configuration:

- Probe: EX3DV4 - SN3698; ConvF(4.43, 4.43, 4.43); Calibrated: 2019/11/22;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1207; Calibrated: 2019/11/14
- Phantom: SAM with right table; Type: SAM;
- Measurement SW: DASYS2, Version 52.10 (0); SEMCAD X Version 14.6.10 (7417)

**Configuration/Body/Area Scan (7x29x1):** Measurement grid: dx=10mm, dy=10mm  
Maximum value of SAR (measured) = 0.158 W/kg**Configuration/Body/Zoom Scan (7x7x12) (7x7x12)/Cube 0:** Measurement grid:  
dx=4mm, dy=4mm, dz=2mm  
Reference Value = 2.949 V/m; Power Drift = -0.12 dB  
Peak SAR (extrapolated) = 0.258 W/kg  
**SAR(1 g) = 0.095 W/kg; SAR(10 g) = 0.064 W/kg**  
Maximum value of SAR (measured) = 0.160 W/kg

Test Laboratory: DEKRA

Date/Time: 2020/05/01

**802.11ac80M\_155-Back(PAD) Main-INPAQ****DUT: Notebook PC; Type: TM420I**

Communication System: UID 0, WLAN 5G; Frequency: 5775 MHz;

Communication System PAR: 0 dB

Medium parameters used:  $f = 5775$  MHz;  $\sigma = 5.3$  S/m;  $\epsilon_r = 35.25$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Phantom section: Flat Section

Ambient Temperature (°C) : 22.5, Liquid Temperature (°C) : 22.1

Measurement Standard: DASYS (IEEE/IEC/ANSI C63.19-2011)

DASY5 Configuration:

- Probe: EX3DV4 - SN3698; ConvF(4.6, 4.6, 4.6); Calibrated: 2019/11/22;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1207; Calibrated: 2019/11/14
- Phantom: SAM with right table; Type: SAM;
- Measurement SW: DASYS2, Version 52.10 (0); SEMCAD X Version 14.6.10 (7417)

**Configuration/Body/Area Scan (7x9x1):** Measurement grid: dx=10mm, dy=10mm

Maximum value of SAR (measured) = 0.189 W/kg

**Configuration/Body/Zoom Scan (7x7x12) (7x7x12)/Cube 0:** Measurement grid:

dx=4mm, dy=4mm, dz=2mm

Reference Value = 2.916 V/m; Power Drift = -0.08 dB

Peak SAR (extrapolated) = 0.385 W/kg

**SAR(1 g) = 0.117 W/kg; SAR(10 g) = 0.073 W/kg**

Maximum value of SAR (measured) = 0.209 W/kg



Test Laboratory: DEKRA

Date/Time: 2020/05/01

**802.11ac80M\_58-Top(PAD) Main-INPAQ****DUT: Notebook PC; Type: TM420I**

Communication System: UID 0, WLAN 5G; Frequency: 5290 MHz;

Communication System PAR: 0 dB

Medium parameters used:  $f = 5290$  MHz;  $\sigma = 4.65$  S/m;  $\epsilon_r = 36.58$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Phantom section: Flat Section

Ambient Temperature (°C) : 22.5, Liquid Temperature (°C) : 22.1

Measurement Standard: DASYS (IEEE/IEC/ANSI C63.19-2011)

DASY5 Configuration:

- Probe: EX3DV4 - SN3698; ConvF(4.73, 4.73, 4.73); Calibrated: 2019/11/22;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1207; Calibrated: 2019/11/14
- Phantom: SAM with right table; Type: SAM;
- Measurement SW: DASYS2, Version 52.10 (0); SEMCAD X Version 14.6.10 (7417)

**Configuration/Body/Area Scan (7x10x1):** Measurement grid: dx=10mm, dy=10mm  
Maximum value of SAR (measured) = 0.453 W/kg**Configuration/Body/Zoom Scan (7x7x12) (7x7x12)/Cube 0:** Measurement grid:  
dx=4mm, dy=4mm, dz=2mm  
Reference Value = 2.215 V/m; Power Drift = -0.12 dB  
Peak SAR (extrapolated) = 1.26 W/kg  
**SAR(1 g) = 0.193 W/kg; SAR(10 g) = 0.089 W/kg**  
Maximum value of SAR (measured) = 0.554 W/kg

Test Laboratory: DEKRA

Date/Time: 2020/05/01

**802.11ac80M\_106-Top(PAD) Main-INPAQ****DUT: Notebook PC; Type: TM420I**

Communication System: UID 0, WLAN 5G; Frequency: 5530 MHz;

Communication System PAR: 0 dB

Medium parameters used:  $f = 5530$  MHz;  $\sigma = 4.98$  S/m;  $\epsilon_r = 35.92$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Phantom section: Flat Section

Ambient Temperature (°C) : 22.5, Liquid Temperature (°C) : 22.1

Measurement Standard: DASYS (IEEE/IEC/ANSI C63.19-2011)

DASY5 Configuration:

- Probe: EX3DV4 - SN3698; ConvF(4.43, 4.43, 4.43); Calibrated: 2019/11/22;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1207; Calibrated: 2019/11/14
- Phantom: SAM with right table; Type: SAM;
- Measurement SW: DASYS2, Version 52.10 (0); SEMCAD X Version 14.6.10 (7417)

**Configuration/Body/Area Scan (7x29x1):** Measurement grid: dx=10mm, dy=10mm  
Maximum value of SAR (measured) = 0.419 W/kg**Configuration/Body/Zoom Scan (7x7x12) (7x7x12)/Cube 0:** Measurement grid:  
dx=4mm, dy=4mm, dz=2mm  
Reference Value = 2.170 V/m; Power Drift = -0.09 dB  
Peak SAR (extrapolated) = 1.25 W/kg  
**SAR(1 g) = 0.172 W/kg; SAR(10 g) = 0.079 W/kg**  
Maximum value of SAR (measured) = 0.510 W/kg

Test Laboratory: DEKRA

Date/Time: 2020/05/01

**802.11ac80M\_155-Top(PAD) Main-INPAQ****DUT: Notebook PC; Type: TM420I**

Communication System: UID 0, WLAN 5G; Frequency: 5775 MHz;

Communication System PAR: 0 dB

Medium parameters used:  $f = 5775$  MHz;  $\sigma = 5.3$  S/m;  $\epsilon_r = 35.25$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Phantom section: Flat Section

Ambient Temperature (°C) : 22.5, Liquid Temperature (°C) : 22.1

Measurement Standard: DASYS (IEEE/IEC/ANSI C63.19-2011)

DASY5 Configuration:

- Probe: EX3DV4 - SN3698; ConvF(4.6, 4.6, 4.6); Calibrated: 2019/11/22;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1207; Calibrated: 2019/11/14
- Phantom: SAM with right table; Type: SAM;
- Measurement SW: DASYS2, Version 52.10 (0); SEMCAD X Version 14.6.10 (7417)

**Configuration/Body/Area Scan (7x10x1):** Measurement grid: dx=10mm, dy=10mm  
Maximum value of SAR (measured) = 0.608 W/kg**Configuration/Body/Zoom Scan (7x7x12) (7x7x12)/Cube 0:** Measurement grid:  
dx=4mm, dy=4mm, dz=2mm

Reference Value = 1.981 V/m; Power Drift = 0.03 dB

Peak SAR (extrapolated) = 1.98 W/kg

**SAR(1 g) = 0.226 W/kg; SAR(10 g) = 0.102 W/kg**

Maximum value of SAR (measured) = 0.736 W/kg



Test Laboratory: DEKRA

Date/Time: 2020/05/01

**802.11ac80M\_58-Back(PAD) Aux-INPAQ****DUT: Notebook PC; Type: TM420I**

Communication System: UID 0, WLAN 5G; Frequency: 5290 MHz;

Communication System PAR: 0 dB

Medium parameters used:  $f = 5290$  MHz;  $\sigma = 4.65$  S/m;  $\epsilon_r = 36.58$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Phantom section: Flat Section

Ambient Temperature (°C) : 22.5, Liquid Temperature (°C) : 22.1

Measurement Standard: DASYS (IEEE/IEC/ANSI C63.19-2011)

DASY5 Configuration:

- Probe: EX3DV4 - SN3698; ConvF(4.73, 4.73, 4.73); Calibrated: 2019/11/22;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1207; Calibrated: 2019/11/14
- Phantom: SAM with right table; Type: SAM;
- Measurement SW: DASYS2, Version 52.10 (0); SEMCAD X Version 14.6.10 (7417)

**Configuration/Body/Area Scan (7x8x1):** Measurement grid: dx=10mm, dy=10mm

Maximum value of SAR (measured) = 0.184 W/kg

**Configuration/Body/Zoom Scan (7x7x12) (7x7x12)/Cube 0:** Measurement grid:

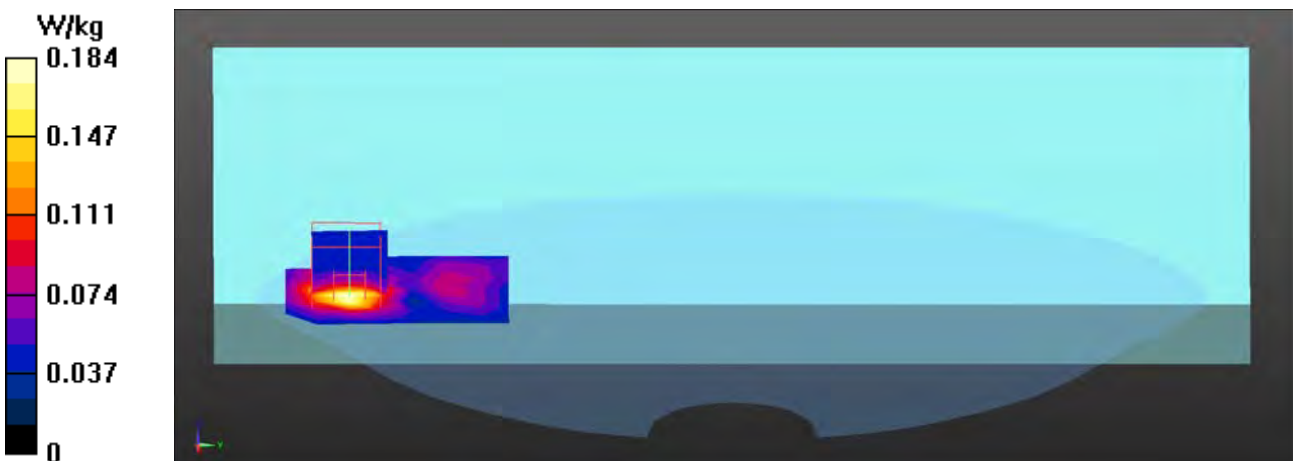
dx=4mm, dy=4mm, dz=2mm

Reference Value = 2.766 V/m; Power Drift = -0.05 dB

Peak SAR (extrapolated) = 0.338 W/kg

**SAR(1 g) = 0.112 W/kg; SAR(10 g) = 0.064 W/kg**

Maximum value of SAR (measured) = 0.208 W/kg



Test Laboratory: DEKRA

Date/Time: 2020/05/01

**802.11ac80M\_106-Back(PAD) Aux-INPAQ****DUT: Notebook PC; Type: TM420I**

Communication System: UID 0, WLAN 5G; Frequency: 5530 MHz;

Communication System PAR: 0 dB

Medium parameters used:  $f = 5530$  MHz;  $\sigma = 4.98$  S/m;  $\epsilon_r = 35.92$ ;  $\rho = 1000$  kg/m<sup>3</sup>

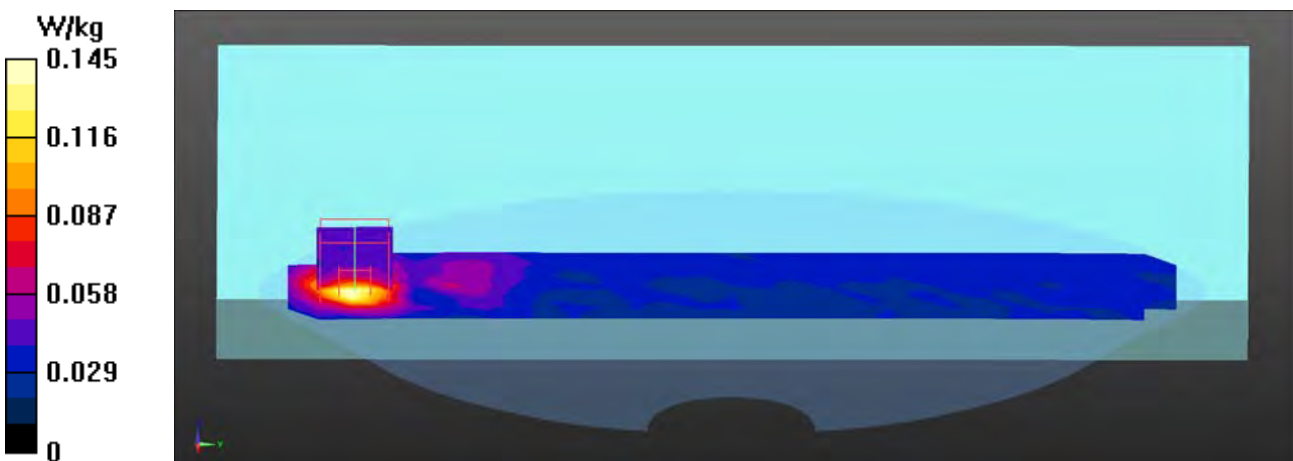
Phantom section: Flat Section

Ambient Temperature (°C) : 22.5, Liquid Temperature (°C) : 22.1

Measurement Standard: DASYS (IEEE/IEC/ANSI C63.19-2011)

DASY5 Configuration:

- Probe: EX3DV4 - SN3698; ConvF(4.43, 4.43, 4.43); Calibrated: 2019/11/22;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1207; Calibrated: 2019/11/14
- Phantom: SAM with right table; Type: SAM;
- Measurement SW: DASYS2, Version 52.10 (0); SEMCAD X Version 14.6.10 (7417)

**Configuration/Body/Area Scan (7x29x1):** Measurement grid: dx=10mm, dy=10mm  
Maximum value of SAR (measured) = 0.145 W/kg**Configuration/Body/Zoom Scan (7x7x12) (7x7x12)/Cube 0:** Measurement grid:  
dx=4mm, dy=4mm, dz=2mm  
Reference Value = 2.789 V/m; Power Drift = -0.03 dB  
Peak SAR (extrapolated) = 0.249 W/kg  
**SAR(1 g) = 0.090 W/kg; SAR(10 g) = 0.058 W/kg**  
Maximum value of SAR (measured) = 0.154 W/kg



Test Laboratory: DEKRA

Date/Time: 2020/05/01

**802.11ac80M\_155-Back(PAD) Aux-INPAQ****DUT: Notebook PC; Type: TM420I**

Communication System: UID 0, WLAN 5G; Frequency: 5775 MHz;

Communication System PAR: 0 dB

Medium parameters used:  $f = 5775$  MHz;  $\sigma = 5.3$  S/m;  $\epsilon_r = 35.25$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Phantom section: Flat Section

Ambient Temperature (°C) : 22.5, Liquid Temperature (°C) : 22.1

Measurement Standard: DASYS (IEEE/IEC/ANSI C63.19-2011)

DASY5 Configuration:

- Probe: EX3DV4 - SN3698; ConvF(4.6, 4.6, 4.6); Calibrated: 2019/11/22;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1207; Calibrated: 2019/11/14
- Phantom: SAM with right table; Type: SAM;
- Measurement SW: DASYS2, Version 52.10 (0); SEMCAD X Version 14.6.10 (7417)

**Configuration/Body/Area Scan (7x8x1):** Measurement grid: dx=10mm, dy=10mm

Maximum value of SAR (measured) = 0.167 W/kg

**Configuration/Body/Zoom Scan (7x7x12) (7x7x12)/Cube 0:** Measurement grid:

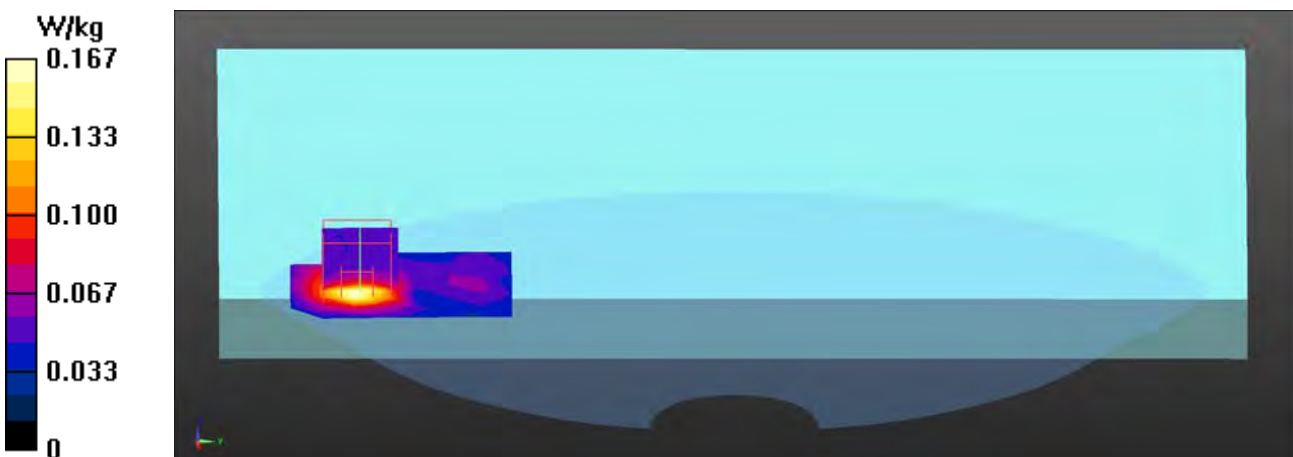
dx=4mm, dy=4mm, dz=2mm

Reference Value = 2.773 V/m; Power Drift = -0.05 dB

Peak SAR (extrapolated) = 0.331 W/kg

**SAR(1 g) = 0.102 W/kg; SAR(10 g) = 0.066 W/kg**

Maximum value of SAR (measured) = 0.180 W/kg



Test Laboratory: DEKRA

Date/Time: 2020/05/01

**802.11ac80M\_58-Top(PAD) Aux-INPAQ****DUT: Notebook PC; Type: TM420I**

Communication System: UID 0, WLAN 5G; Frequency: 5290 MHz;

Communication System PAR: 0 dB

Medium parameters used:  $f = 5290$  MHz;  $\sigma = 4.65$  S/m;  $\epsilon_r = 36.58$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Phantom section: Flat Section

Ambient Temperature (°C) : 22.5, Liquid Temperature (°C) : 22.1

Measurement Standard: DASYS (IEEE/IEC/ANSI C63.19-2011)

DASY5 Configuration:

- Probe: EX3DV4 - SN3698; ConvF(4.73, 4.73, 4.73); Calibrated: 2019/11/22;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1207; Calibrated: 2019/11/14
- Phantom: SAM with right table; Type: SAM;
- Measurement SW: DASYS2, Version 52.10 (0); SEMCAD X Version 14.6.10 (7417)

**Configuration/Body/Area Scan (7x8x1):** Measurement grid: dx=10mm, dy=10mm

Maximum value of SAR (measured) = 0.294 W/kg

**Configuration/Body/Zoom Scan (7x7x12) (7x7x12)/Cube 0:** Measurement grid:

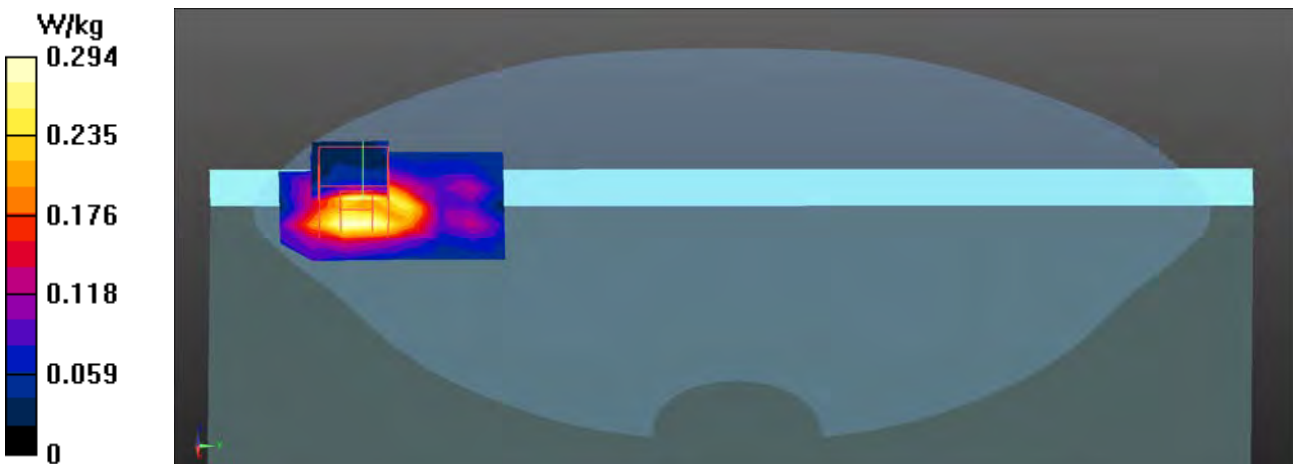
dx=4mm, dy=4mm, dz=2mm

Reference Value = 2.478 V/m; Power Drift = -0.02 dB

Peak SAR (extrapolated) = 0.619 W/kg

**SAR(1 g) = 0.154 W/kg; SAR(10 g) = 0.079 W/kg**

Maximum value of SAR (measured) = 0.327 W/kg



Test Laboratory: DEKRA

Date/Time: 2020/05/01

**802.11ac80M\_106-Top(PAD) Aux-INPAQ****DUT: Notebook PC; Type: TM420I**

Communication System: UID 0, WLAN 5G; Frequency: 5530 MHz;

Communication System PAR: 0 dB

Medium parameters used:  $f = 5530$  MHz;  $\sigma = 4.98$  S/m;  $\epsilon_r = 35.92$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Phantom section: Flat Section

Ambient Temperature (°C) : 22.5, Liquid Temperature (°C) : 22.1

Measurement Standard: DASYS (IEEE/IEC/ANSI C63.19-2011)

DASY5 Configuration:

- Probe: EX3DV4 - SN3698; ConvF(4.43, 4.43, 4.43); Calibrated: 2019/11/22;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1207; Calibrated: 2019/11/14
- Phantom: SAM with right table; Type: SAM;
- Measurement SW: DASYS52, Version 52.10 (0); SEMCAD X Version 14.6.10 (7417)

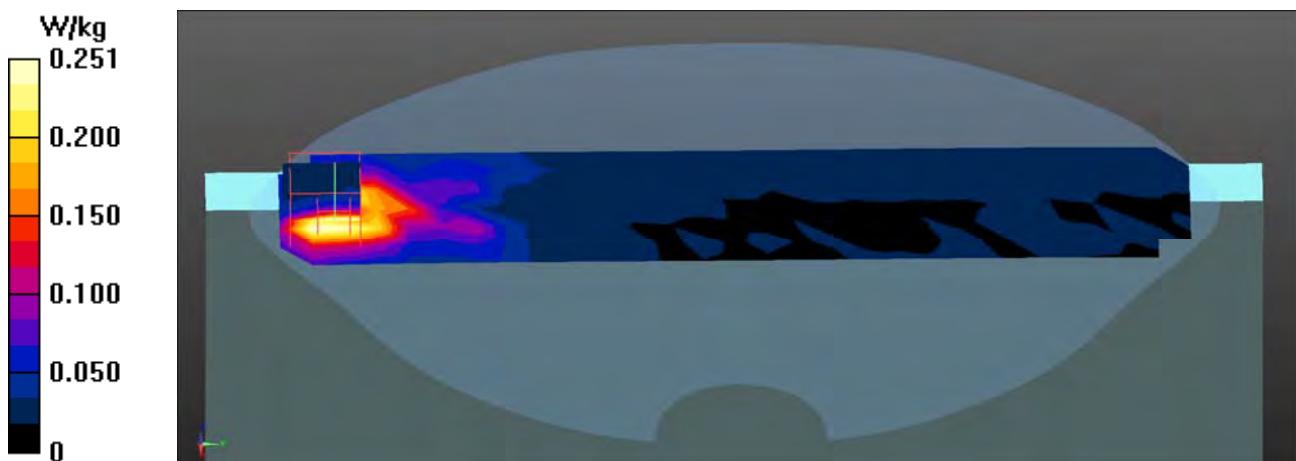
**Configuration/Body/Area Scan (7x29x1):** Measurement grid: dx=10mm, dy=10mm  
Maximum value of SAR (measured) = 0.251 W/kg**Configuration/Body/Zoom Scan (7x7x12) (7x7x12)/Cube 0:** Measurement grid:  
dx=4mm, dy=4mm, dz=2mm

Reference Value = 2.174 V/m; Power Drift = -0.05 dB

Peak SAR (extrapolated) = 0.519 W/kg

**SAR(1 g) = 0.133 W/kg; SAR(10 g) = 0.062 W/kg**

Maximum value of SAR (measured) = 0.288 W/kg



Test Laboratory: DEKRA

Date/Time: 2020/05/01

**802.11ac80M\_155-Top(PAD) Aux-INPAQ****DUT: Notebook PC; Type: TM420I**

Communication System: UID 0, WLAN 5G; Frequency: 5775 MHz;

Communication System PAR: 0 dB

Medium parameters used:  $f = 5775$  MHz;  $\sigma = 5.3$  S/m;  $\epsilon_r = 35.25$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Phantom section: Flat Section

Ambient Temperature (°C) : 22.5, Liquid Temperature (°C) : 22.1

Measurement Standard: DASYS (IEEE/IEC/ANSI C63.19-2011)

DASY5 Configuration:

- Probe: EX3DV4 - SN3698; ConvF(4.6, 4.6, 4.6); Calibrated: 2019/11/22;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1207; Calibrated: 2019/11/14
- Phantom: SAM with right table; Type: SAM;
- Measurement SW: DASYS2, Version 52.10 (0); SEMCAD X Version 14.6.10 (7417)

**Configuration/Body/Area Scan (7x8x1):** Measurement grid: dx=10mm, dy=10mm

Maximum value of SAR (measured) = 0.290 W/kg

**Configuration/Body/Zoom Scan (7x7x12) (7x7x12)/Cube 0:** Measurement grid:

dx=4mm, dy=4mm, dz=2mm

Reference Value = 2.675 V/m; Power Drift = -0.03 dB

Peak SAR (extrapolated) = 0.624 W/kg

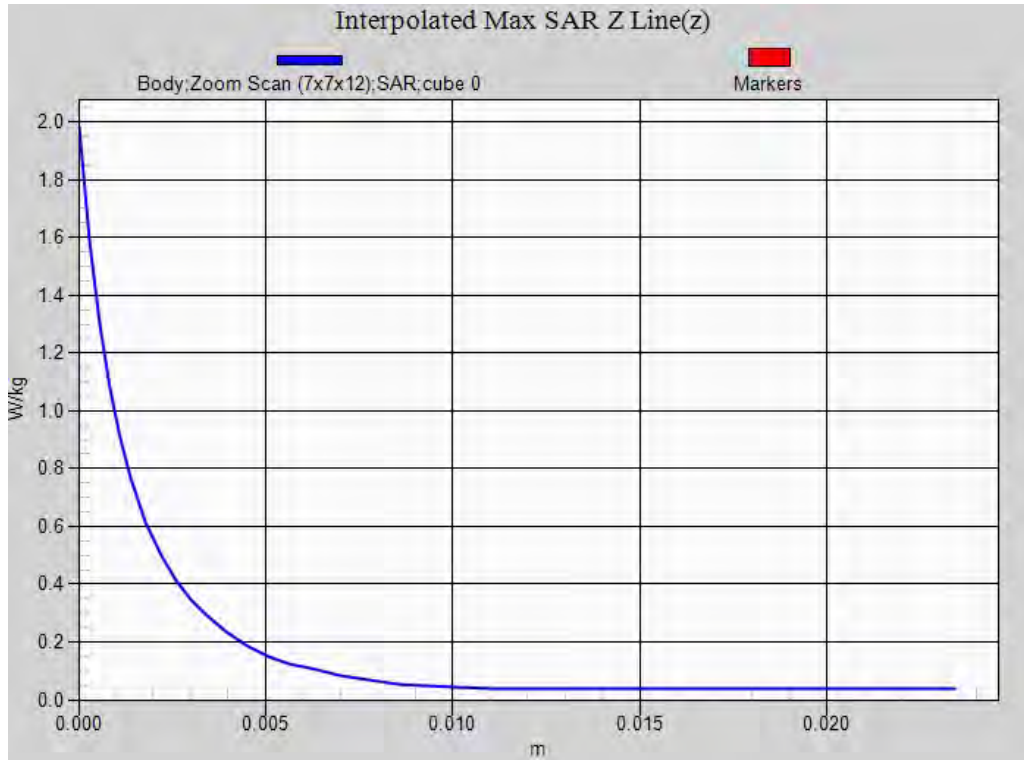
**SAR(1 g) = 0.146 W/kg; SAR(10 g) = 0.074 W/kg**

Maximum value of SAR (measured) = 0.294 W/kg



**802.11ac80 EUT Top (PAD) (INPAQ Main Antenna), Z-Axis plot**

**Channel: 155**





## Appendix D. Probe Calibration Data

Object: EX3DV4 - SN:3698

115511

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



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

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

Accreditation No.: **SCS 0108**

Client **DEKRA (Auden)**

Certificate No: **EX3-3698\_Nov19**

## CALIBRATION CERTIFICATE

Object **EX3DV4 - SN:3698**

Calibration procedure(s) **QA CAL-01.v9, QA CAL-12.v9, QA CAL-14.v5, QA CAL-23.v5,  
QA CAL-25.v7  
Calibration procedure for dosimetric E-field probes**

Calibration date: **November 22, 2019**

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

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

Calibration Equipment used (M&TE critical for calibration)

Primary Standards	ID	Cal Date (Certificate No.)	Scheduled Calibration
Power meter NRP	SN: 104778	03-Apr-19 (No. 217-02892/02893)	Apr-20
Power sensor NRP-Z91	SN: 103244	03-Apr-19 (No. 217-02892)	Apr-20
Power sensor NRP-Z91	SN: 103245	03-Apr-19 (No. 217-02893)	Apr-20
Reference 20 dB Attenuator	SN: S5277 (20x)	04-Apr-19 (No. 217-02894)	Apr-20
DAE4	SN: 660	07-Oct-19 (No. DAE4-660_Oct19)	Oct-20
Reference Probe ES3DV2	SN: 3013	31-Dec-18 (No. ES3-3013_Dec18)	Dec-19
Secondary Standards	ID	Check Date (in house)	Scheduled Check
Power meter E4419B	SN: GB41293874	06-Apr-16 (in house check Jun-18)	In house check: Jun-20
Power sensor E4412A	SN: MY41498087	06-Apr-16 (in house check Jun-18)	In house check: Jun-20
Power sensor E4412A	SN: 000110210	06-Apr-16 (in house check Jun-18)	In house check: Jun-20
RF generator HP 8648C	SN: US3642U01700	04-Aug-99 (in house check Jun-18)	In house check: Jun-20
Network Analyzer E8358A	SN: US41080477	31-Mar-14 (in house check Oct-19)	In house check: Oct-20

	Name	Function	Signature
Calibrated by:	Jeton Kastrati	Laboratory Technician	
Approved by:	Katja Pokovic	Technical Manager	
			Issued: November 25, 2019

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



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Multilateral Agreement for the recognition of calibration certificates

Accreditation No.: **SCS 0108**

**Glossary:**

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

**Calibration is Performed According to the Following Standards:**

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

**Methods Applied and Interpretation of Parameters:**

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



# DASY/EASY - Parameters of Probe: EX3DV4 - SN:3698

## Basic Calibration Parameters

	Sensor X	Sensor Y	Sensor Z	Unc (k=2)
Norm ( $\mu\text{V}/(\text{V}/\text{m})^2$ ) <sup>A</sup>	0.40	0.35	0.37	$\pm 10.1 \%$
DCP (mV) <sup>B</sup>	98.3	103.1	98.2	

## Calibration Results for Modulation Response

UID	Communication System Name		A dB	B dB $\sqrt{\mu\text{V}}$	C	D dB	VR mV	Max dev.	Max Unc <sup>E</sup> (k=2)
0	CW	X	0.00	0.00	1.00	0.00	136.7	$\pm 3.0 \%$	$\pm 4.7 \%$
		Y	0.00	0.00	1.00		130.6		
		Z	0.00	0.00	1.00		132.1		
10352- AAA	Pulse Waveform (200Hz, 10%)	X	14.35	84.40	18.73	10.00	60.0	$\pm 2.4 \%$	$\pm 9.6 \%$
		Y	15.00	86.68	19.60		60.0		
		Z	15.00	85.28	19.17		60.0		
10353- AAA	Pulse Waveform (200Hz, 20%)	X	15.00	85.61	17.77	6.99	80.0	$\pm 1.5 \%$	$\pm 9.6 \%$
		Y	15.00	87.72	18.78		80.0		
		Z	15.00	86.38	18.22		80.0		
10354- AAA	Pulse Waveform (200Hz, 40%)	X	15.00	84.68	15.56	3.98	95.0	$\pm 1.0 \%$	$\pm 9.6 \%$
		Y	15.00	90.79	18.74		95.0		
		Z	15.00	85.75	16.13		95.0		
10355- AAA	Pulse Waveform (200Hz, 60%)	X	1.00	65.31	7.89	2.22	120.0	$\pm 1.2 \%$	$\pm 9.6 \%$
		Y	15.00	95.11	19.39		120.0		
		Z	14.27	82.33	13.06		120.0		
10387- AAA	QPSK Waveform, 1 MHz	X	0.45	60.00	5.61	0.00	150.0	$\pm 3.8 \%$	$\pm 9.6 \%$
		Y	0.47	60.00	6.65		150.0		
		Z	0.44	60.00	5.34		150.0		
10388- AAA	QPSK Waveform, 10 MHz	X	1.99	67.57	15.28	0.00	150.0	$\pm 1.4 \%$	$\pm 9.6 \%$
		Y	2.24	69.53	16.59		150.0		
		Z	1.98	67.70	15.44		150.0		
10396- AAA	64-QAM Waveform, 100 kHz	X	2.82	69.46	18.12	3.01	150.0	$\pm 0.6 \%$	$\pm 9.6 \%$
		Y	3.24	73.17	19.88		150.0		
		Z	2.91	70.06	18.45		150.0		
10399- AAA	64-QAM Waveform, 40 MHz	X	3.35	67.01	15.62	0.00	150.0	$\pm 2.5 \%$	$\pm 9.6 \%$
		Y	3.49	67.79	16.15		150.0		
		Z	3.32	66.94	15.64		150.0		
10414- AAA	WLAN CCDF, 64-QAM, 40MHz	X	4.66	65.69	15.53	0.00	150.0	$\pm 4.6 \%$	$\pm 9.6 \%$
		Y	4.74	66.11	15.77		150.0		
		Z	4.62	65.64	15.53		150.0		

Note: For details on UID parameters see Appendix

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

<sup>A</sup> The uncertainties of Norm X,Y,Z do not affect the E<sup>2</sup>-field uncertainty inside TSL (see Pages 5 and 6).

<sup>B</sup> Numerical linearization parameter: uncertainty not required.

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

## DASY/EASY - Parameters of Probe: EX3DV4 - SN:3698

### Sensor Model Parameters

	C1 fF	C2 fF	$\alpha$ V <sup>-1</sup>	T1 ms.V <sup>-2</sup>	T2 ms.V <sup>-1</sup>	T3 ms	T4 V <sup>-2</sup>	T5 V <sup>-1</sup>	T6
X	35.2	265.12	36.15	13.79	1.03	5.05	0.00	0.56	1.01
Y	34.5	250.90	33.97	12.38	0.67	5.04	1.57	0.18	1.01
Z	33.4	252.11	36.27	12.92	1.06	5.05	0.28	0.52	1.01

### Other Probe Parameters

Sensor Arrangement	Triangular
Connector Angle (°)	45.7
Mechanical Surface Detection Mode	enabled
Optical Surface Detection Mode	disabled
Probe Overall Length	337 mm
Probe Body Diameter	10 mm
Tip Length	9 mm
Tip Diameter	2.5 mm
Probe Tip to Sensor X Calibration Point	1 mm
Probe Tip to Sensor Y Calibration Point	1 mm
Probe Tip to Sensor Z Calibration Point	1 mm
Recommended Measurement Distance from Surface	1.4 mm

## DASY/EASY - Parameters of Probe: EX3DV4 - SN:3698

### Calibration Parameter Determined in Head Tissue Simulating Media

f (MHz) <sup>C</sup>	Relative Permittivity <sup>F</sup>	Conductivity (S/m) <sup>F</sup>	ConvF X	ConvF Y	ConvF Z	Alpha <sup>G</sup>	Depth <sup>G</sup> (mm)	Unc (k=2)
450	43.5	0.87	9.82	9.82	9.82	0.16	1.30	± 13.3 %
750	41.9	0.89	9.03	9.03	9.03	0.46	0.80	± 12.0 %
835	41.5	0.90	8.91	8.91	8.91	0.44	0.80	± 12.0 %
900	41.5	0.97	8.67	8.67	8.67	0.41	0.80	± 12.0 %
1450	40.5	1.20	8.25	8.25	8.25	0.50	0.80	± 12.0 %
1640	40.2	1.31	8.02	8.02	8.02	0.32	0.86	± 12.0 %
1750	40.1	1.37	7.92	7.92	7.92	0.38	0.86	± 12.0 %
1950	40.0	1.40	7.59	7.59	7.59	0.26	0.86	± 12.0 %
2300	39.5	1.67	7.33	7.33	7.33	0.33	0.90	± 12.0 %
2450	39.2	1.80	7.06	7.06	7.06	0.32	0.90	± 12.0 %
2600	39.0	1.96	6.96	6.96	6.96	0.40	0.90	± 12.0 %
3500	37.9	2.91	6.38	6.38	6.38	0.35	1.30	± 13.1 %
3700	37.7	3.12	6.22	6.22	6.22	0.35	1.30	± 13.1 %
5250	35.9	4.71	4.73	4.73	4.73	0.40	1.80	± 13.1 %
5600	35.5	5.07	4.43	4.43	4.43	0.40	1.80	± 13.1 %
5800	35.3	5.27	4.60	4.60	4.60	0.40	1.80	± 13.1 %

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

<sup>F</sup> At frequencies below 3 GHz, the validity of tissue parameters ( $\epsilon$  and  $\sigma$ ) can be relaxed to ± 10% if liquid compensation formula is applied to measured SAR values. At frequencies above 3 GHz, the validity of tissue parameters ( $\epsilon$  and  $\sigma$ ) is restricted to ± 5%. The uncertainty is the RSS of the ConvF uncertainty for indicated target tissue parameters.

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

## DASY/EASY - Parameters of Probe: EX3DV4 - SN:3698

### Calibration Parameter Determined in Body Tissue Simulating Media

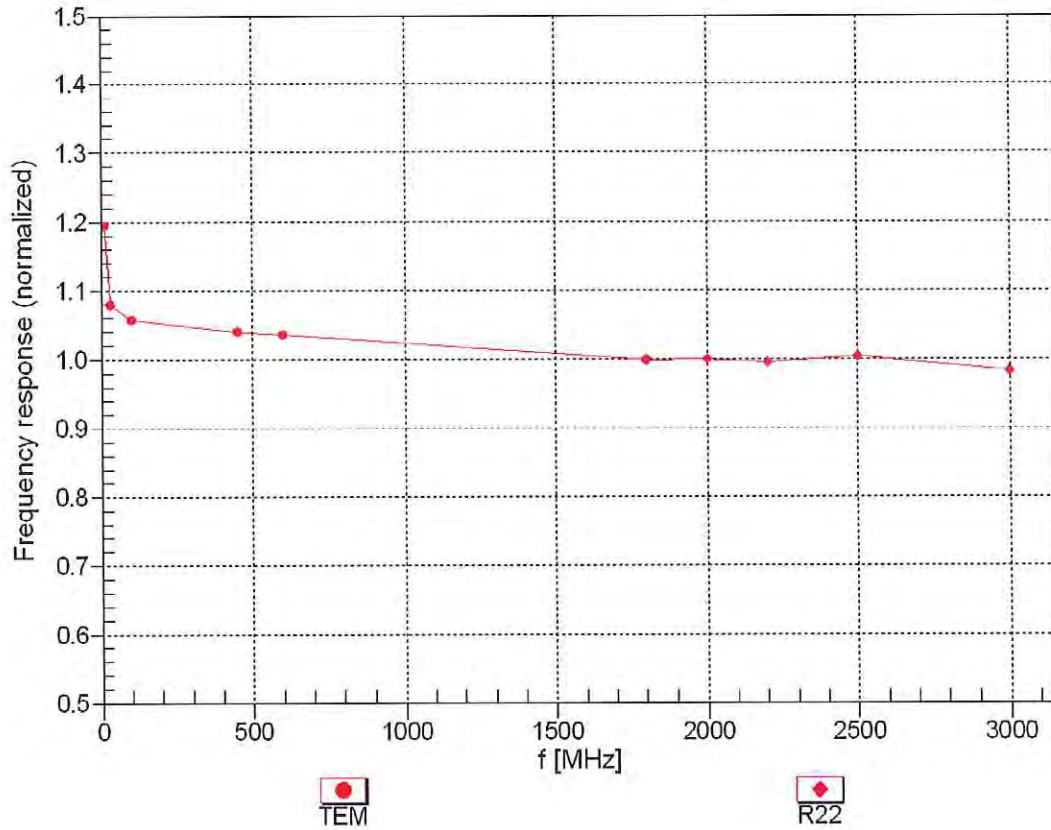
f (MHz) <sup>C</sup>	Relative Permittivity <sup>F</sup>	Conductivity (S/m) <sup>F</sup>	ConvF X	ConvF Y	ConvF Z	Alpha <sup>G</sup>	Depth <sup>G</sup> (mm)	Unc (k=2)
2450	52.7	1.95	7.14	7.14	7.14	0.34	0.80	± 12.0 %
5250	48.9	5.36	4.18	4.18	4.18	0.50	1.90	± 13.1 %
5600	48.5	5.77	3.78	3.78	3.78	0.50	1.90	± 13.1 %
5800	48.2	6.00	3.91	3.91	3.91	0.50	1.90	± 13.1 %

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

<sup>F</sup> At frequencies below 3 GHz, the validity of tissue parameters ( $\epsilon$  and  $\sigma$ ) can be relaxed to ± 10% if liquid compensation formula is applied to measured SAR values. At frequencies above 3 GHz, the validity of tissue parameters ( $\epsilon$  and  $\sigma$ ) is restricted to ± 5%. The uncertainty is the RSS of the ConvF uncertainty for indicated target tissue parameters.

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

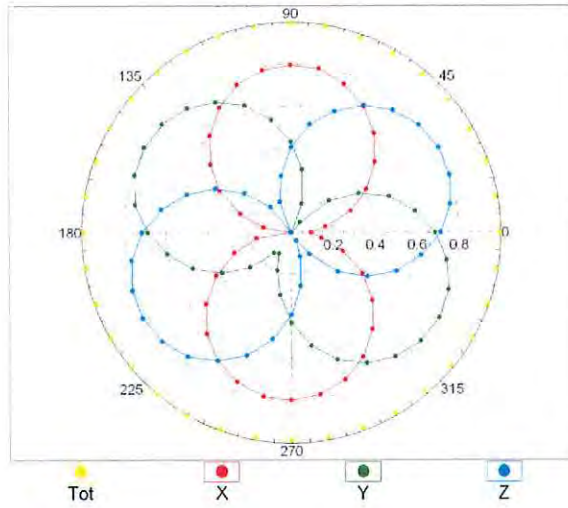
### Frequency Response of E-Field (TEM-Cell:ifi1110 EXX, Waveguide: R22)



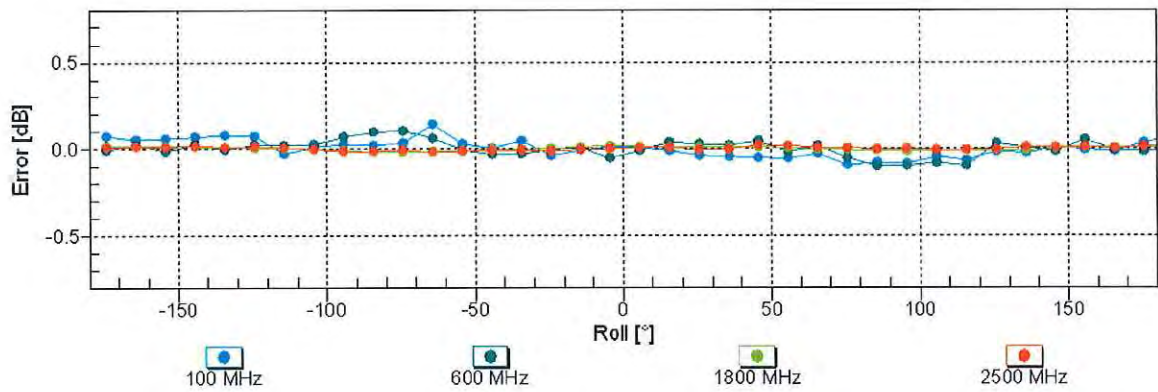
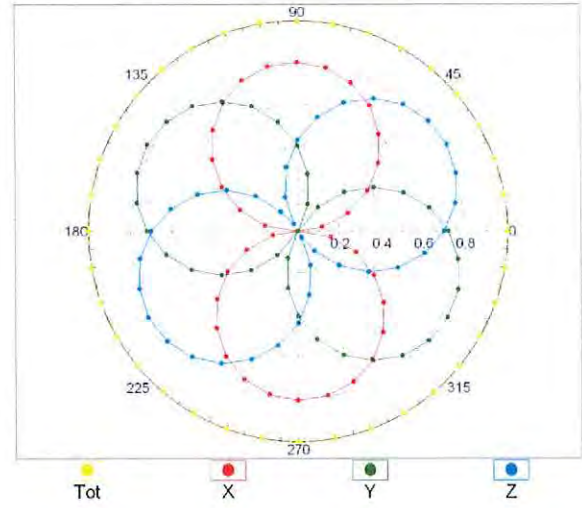
Uncertainty of Frequency Response of E-field:  $\pm 6.3\%$  (k=2)

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

f=600 MHz, TEM

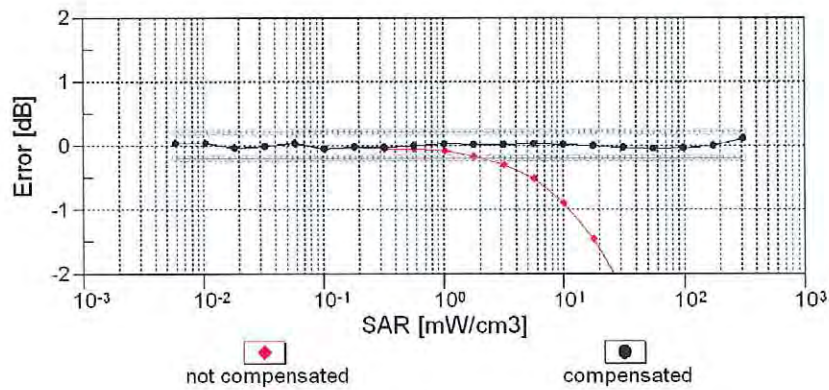
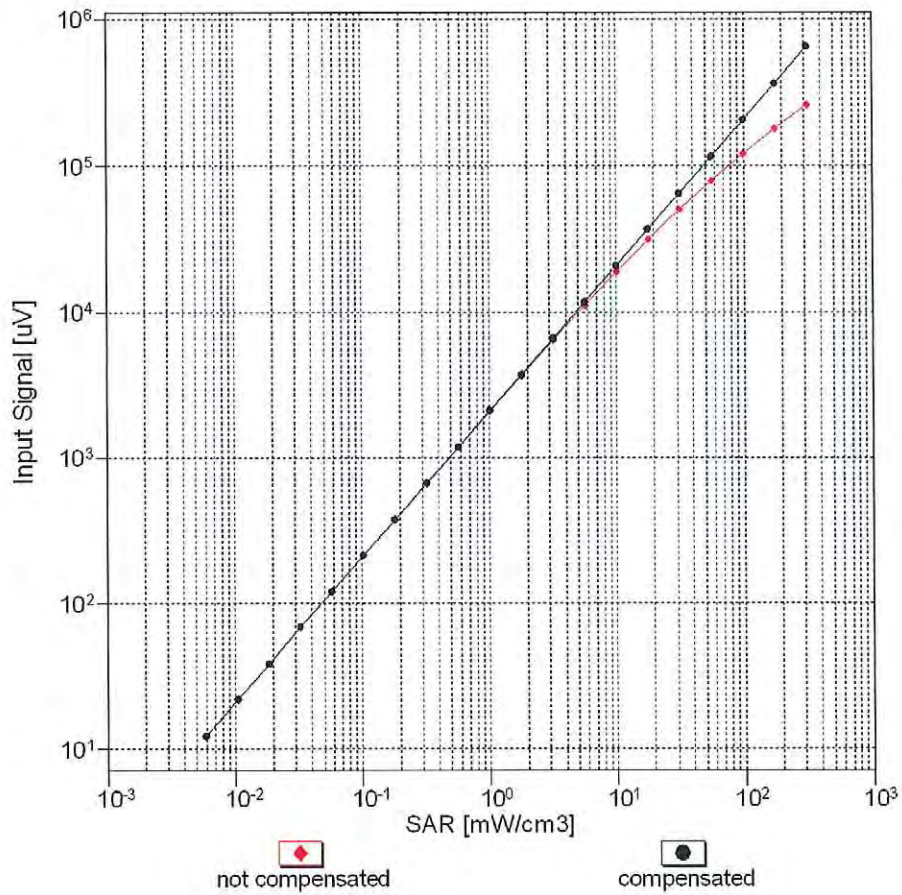


f=1800 MHz, R22



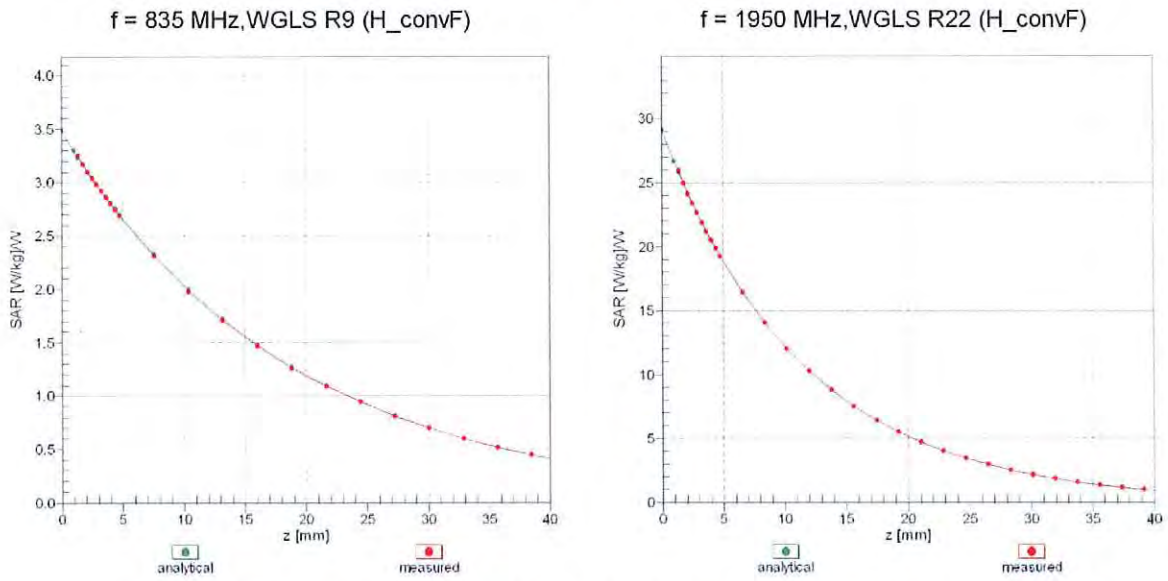
Uncertainty of Axial Isotropy Assessment:  $\pm 0.5\%$  ( $k=2$ )

### Dynamic Range $f(SAR_{head})$ (TEM cell , $f_{eval}= 1900$ MHz)



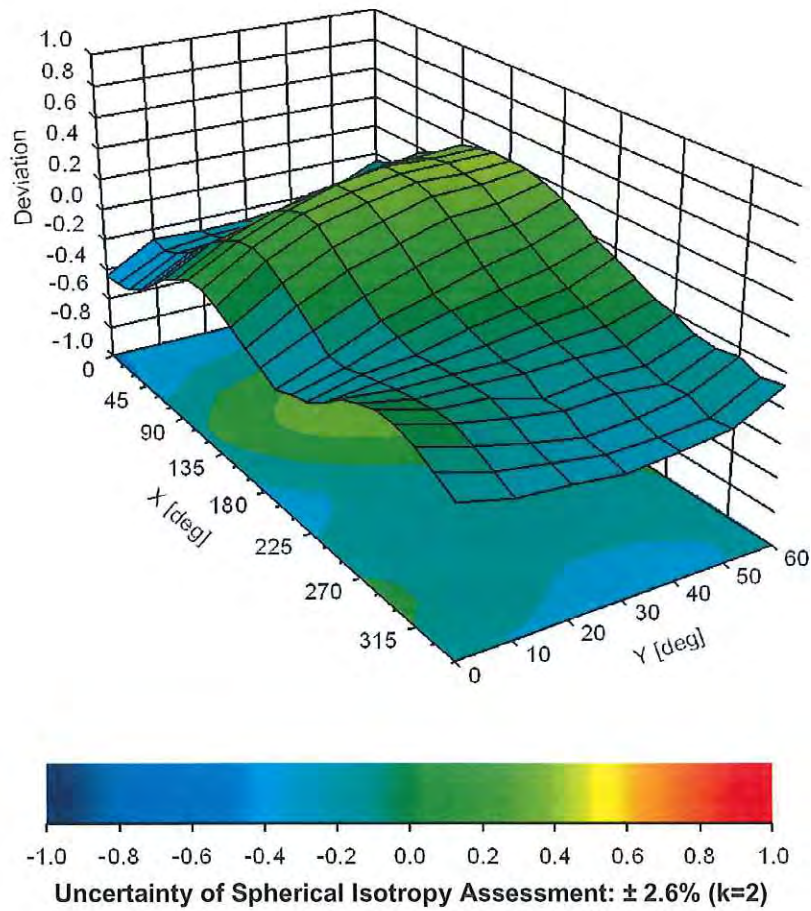
Uncertainty of Linearity Assessment: ± 0.6% (k=2)

## Conversion Factor Assessment



## Deviation from Isotropy in Liquid

Error ( $\phi, \theta$ ), f = 900 MHz





## Appendix: Modulation Calibration Parameters

UID	Rev	Communication System Name	Group	PAR (dB)	Unc <sup>F</sup> (k=2)
0		CW	CW	0.00	± 4.7 %
10010	CAA	SAR Validation (Square, 100ms, 10ms)	Test	10.00	± 9.6 %
10011	CAB	UMTS-FDD (WCDMA)	WCDMA	2.91	± 9.6 %
10012	CAB	IEEE 802.11b WiFi 2.4 GHz (DSSS, 1 Mbps)	WLAN	1.87	± 9.6 %
10013	CAB	IEEE 802.11g WiFi 2.4 GHz (DSSS-OFDM, 6 Mbps)	WLAN	9.46	± 9.6 %
10021	DAC	GSM-FDD (TDMA, GMSK)	GSM	9.39	± 9.6 %
10023	DAC	GPRS-FDD (TDMA, GMSK, TN 0)	GSM	9.57	± 9.6 %
10024	DAC	GPRS-FDD (TDMA, GMSK, TN 0-1)	GSM	6.56	± 9.6 %
10025	DAC	EDGE-FDD (TDMA, 8PSK, TN 0)	GSM	12.62	± 9.6 %
10026	DAC	EDGE-FDD (TDMA, 8PSK, TN 0-1)	GSM	9.55	± 9.6 %
10027	DAC	GPRS-FDD (TDMA, GMSK, TN 0-1-2)	GSM	4.80	± 9.6 %
10028	DAC	GPRS-FDD (TDMA, GMSK, TN 0-1-2-3)	GSM	3.55	± 9.6 %
10029	DAC	EDGE-FDD (TDMA, 8PSK, TN 0-1-2)	GSM	7.78	± 9.6 %
10030	CAA	IEEE 802.15.1 Bluetooth (GFSK, DH1)	Bluetooth	5.30	± 9.6 %
10031	CAA	IEEE 802.15.1 Bluetooth (GFSK, DH3)	Bluetooth	1.87	± 9.6 %
10032	CAA	IEEE 802.15.1 Bluetooth (GFSK, DH5)	Bluetooth	1.16	± 9.6 %
10033	CAA	IEEE 802.15.1 Bluetooth (PI/4-DQPSK, DH1)	Bluetooth	7.74	± 9.6 %
10034	CAA	IEEE 802.15.1 Bluetooth (PI/4-DQPSK, DH3)	Bluetooth	4.53	± 9.6 %
10035	CAA	IEEE 802.15.1 Bluetooth (PI/4-DQPSK, DH5)	Bluetooth	3.83	± 9.6 %
10036	CAA	IEEE 802.15.1 Bluetooth (8-DPSK, DH1)	Bluetooth	8.01	± 9.6 %
10037	CAA	IEEE 802.15.1 Bluetooth (8-DPSK, DH3)	Bluetooth	4.77	± 9.6 %
10038	CAA	IEEE 802.15.1 Bluetooth (8-DPSK, DH5)	Bluetooth	4.10	± 9.6 %
10039	CAB	CDMA2000 (1xRTT, RC1)	CDMA2000	4.57	± 9.6 %
10042	CAB	IS-54 / IS-136 FDD (TDMA/FDM, PI/4-DQPSK, Halfrate)	AMPS	7.78	± 9.6 %
10044	CAA	IS-91/EIA/TIA-553 FDD (FDMA, FM)	AMPS	0.00	± 9.6 %
10048	CAA	DECT (TDD, TDMA/FDM, GFSK, Full Slot, 24)	DECT	13.80	± 9.6 %
10049	CAA	DECT (TDD, TDMA/FDM, GFSK, Double Slot, 12)	DECT	10.79	± 9.6 %
10056	CAA	UMTS-TDD (TD-SCDMA, 1.28 Mcps)	TD-SCDMA	11.01	± 9.6 %
10058	DAC	EDGE-FDD (TDMA, 8PSK, TN 0-1-2-3)	GSM	6.52	± 9.6 %
10059	CAB	IEEE 802.11b WiFi 2.4 GHz (DSSS, 2 Mbps)	WLAN	2.12	± 9.6 %
10060	CAB	IEEE 802.11b WiFi 2.4 GHz (DSSS, 5.5 Mbps)	WLAN	2.83	± 9.6 %
10061	CAB	IEEE 802.11b WiFi 2.4 GHz (DSSS, 11 Mbps)	WLAN	3.60	± 9.6 %
10062	CAC	IEEE 802.11a/h WiFi 5 GHz (OFDM, 6 Mbps)	WLAN	8.68	± 9.6 %
10063	CAC	IEEE 802.11a/h WiFi 5 GHz (OFDM, 9 Mbps)	WLAN	8.63	± 9.6 %
10064	CAC	IEEE 802.11a/h WiFi 5 GHz (OFDM, 12 Mbps)	WLAN	9.09	± 9.6 %
10065	CAC	IEEE 802.11a/h WiFi 5 GHz (OFDM, 18 Mbps)	WLAN	9.00	± 9.6 %
10066	CAC	IEEE 802.11a/h WiFi 5 GHz (OFDM, 24 Mbps)	WLAN	9.38	± 9.6 %
10067	CAC	IEEE 802.11a/h WiFi 5 GHz (OFDM, 36 Mbps)	WLAN	10.12	± 9.6 %
10068	CAC	IEEE 802.11a/h WiFi 5 GHz (OFDM, 48 Mbps)	WLAN	10.24	± 9.6 %
10069	CAC	IEEE 802.11a/h WiFi 5 GHz (OFDM, 54 Mbps)	WLAN	10.56	± 9.6 %
10071	CAB	IEEE 802.11g WiFi 2.4 GHz (DSSS/OFDM, 9 Mbps)	WLAN	9.83	± 9.6 %
10072	CAB	IEEE 802.11g WiFi 2.4 GHz (DSSS/OFDM, 12 Mbps)	WLAN	9.62	± 9.6 %
10073	CAB	IEEE 802.11g WiFi 2.4 GHz (DSSS/OFDM, 18 Mbps)	WLAN	9.94	± 9.6 %
10074	CAB	IEEE 802.11g WiFi 2.4 GHz (DSSS/OFDM, 24 Mbps)	WLAN	10.30	± 9.6 %
10075	CAB	IEEE 802.11g WiFi 2.4 GHz (DSSS/OFDM, 36 Mbps)	WLAN	10.77	± 9.6 %
10076	CAB	IEEE 802.11g WiFi 2.4 GHz (DSSS/OFDM, 48 Mbps)	WLAN	10.94	± 9.6 %
10077	CAB	IEEE 802.11g WiFi 2.4 GHz (DSSS/OFDM, 54 Mbps)	WLAN	11.00	± 9.6 %
10081	CAB	CDMA2000 (1xRTT, RC3)	CDMA2000	3.97	± 9.6 %
10082	CAB	IS-54 / IS-136 FDD (TDMA/FDM, PI/4-DQPSK, Fullrate)	AMPS	4.77	± 9.6 %
10090	DAC	GPRS-FDD (TDMA, GMSK, TN 0-4)	GSM	6.56	± 9.6 %
10097	CAB	UMTS-FDD (HSDPA)	WCDMA	3.98	± 9.6 %
10098	CAB	UMTS-FDD (HSUPA, Subtest 2)	WCDMA	3.98	± 9.6 %
10099	DAC	EDGE-FDD (TDMA, 8PSK, TN 0-4)	GSM	9.55	± 9.6 %
10100	CAE	LTE-FDD (SC-FDMA, 100% RB, 20 MHz, QPSK)	LTE-FDD	5.67	± 9.6 %
10101	CAE	LTE-FDD (SC-FDMA, 100% RB, 20 MHz, 16-QAM)	LTE-FDD	6.42	± 9.6 %
10102	CAE	LTE-FDD (SC-FDMA, 100% RB, 20 MHz, 64-QAM)	LTE-FDD	6.60	± 9.6 %
10103	CAG	LTE-TDD (SC-FDMA, 100% RB, 20 MHz, QPSK)	LTE-TDD	9.29	± 9.6 %
10104	CAG	LTE-TDD (SC-FDMA, 100% RB, 20 MHz, 16-QAM)	LTE-TDD	9.97	± 9.6 %
10105	CAG	LTE-TDD (SC-FDMA, 100% RB, 20 MHz, 64-QAM)	LTE-TDD	10.01	± 9.6 %
10108	CAG	LTE-FDD (SC-FDMA, 100% RB, 10 MHz, QPSK)	LTE-FDD	5.80	± 9.6 %

10109	CAG	LTE-FDD (SC-FDMA, 100% RB, 10 MHz, 16-QAM)	LTE-FDD	6.43	± 9.6 %
10110	CAG	LTE-FDD (SC-FDMA, 100% RB, 5 MHz, QPSK)	LTE-FDD	5.75	± 9.6 %
10111	CAG	LTE-FDD (SC-FDMA, 100% RB, 5 MHz, 16-QAM)	LTE-FDD	6.44	± 9.6 %
10112	CAG	LTE-FDD (SC-FDMA, 100% RB, 10 MHz, 64-QAM)	LTE-FDD	6.59	± 9.6 %
10113	CAG	LTE-FDD (SC-FDMA, 100% RB, 5 MHz, 64-QAM)	LTE-FDD	6.62	± 9.6 %
10114	CAC	IEEE 802.11n (HT Greenfield, 13.5 Mbps, BPSK)	WLAN	8.10	± 9.6 %
10115	CAC	IEEE 802.11n (HT Greenfield, 81 Mbps, 16-QAM)	WLAN	8.46	± 9.6 %
10116	CAC	IEEE 802.11n (HT Greenfield, 135 Mbps, 64-QAM)	WLAN	8.15	± 9.6 %
10117	CAC	IEEE 802.11n (HT Mixed, 13.5 Mbps, BPSK)	WLAN	8.07	± 9.6 %
10118	CAC	IEEE 802.11n (HT Mixed, 81 Mbps, 16-QAM)	WLAN	8.59	± 9.6 %
10119	CAC	IEEE 802.11n (HT Mixed, 135 Mbps, 64-QAM)	WLAN	8.13	± 9.6 %
10140	CAE	LTE-FDD (SC-FDMA, 100% RB, 15 MHz, 16-QAM)	LTE-FDD	6.49	± 9.6 %
10141	CAE	LTE-FDD (SC-FDMA, 100% RB, 15 MHz, 64-QAM)	LTE-FDD	6.53	± 9.6 %
10142	CAE	LTE-FDD (SC-FDMA, 100% RB, 3 MHz, QPSK)	LTE-FDD	5.73	± 9.6 %
10143	CAE	LTE-FDD (SC-FDMA, 100% RB, 3 MHz, 16-QAM)	LTE-FDD	6.35	± 9.6 %
10144	CAE	LTE-FDD (SC-FDMA, 100% RB, 3 MHz, 64-QAM)	LTE-FDD	6.65	± 9.6 %
10145	CAF	LTE-FDD (SC-FDMA, 100% RB, 1.4 MHz, QPSK)	LTE-FDD	5.76	± 9.6 %
10146	CAF	LTE-FDD (SC-FDMA, 100% RB, 1.4 MHz, 16-QAM)	LTE-FDD	6.41	± 9.6 %
10147	CAF	LTE-FDD (SC-FDMA, 100% RB, 1.4 MHz, 64-QAM)	LTE-FDD	6.72	± 9.6 %
10149	CAE	LTE-FDD (SC-FDMA, 50% RB, 20 MHz, 16-QAM)	LTE-FDD	6.42	± 9.6 %
10150	CAE	LTE-FDD (SC-FDMA, 50% RB, 20 MHz, 64-QAM)	LTE-FDD	6.60	± 9.6 %
10151	CAG	LTE-TDD (SC-FDMA, 50% RB, 20 MHz, QPSK)	LTE-TDD	9.28	± 9.6 %
10152	CAG	LTE-TDD (SC-FDMA, 50% RB, 20 MHz, 16-QAM)	LTE-TDD	9.92	± 9.6 %
10153	CAG	LTE-TDD (SC-FDMA, 50% RB, 20 MHz, 64-QAM)	LTE-TDD	10.05	± 9.6 %
10154	CAG	LTE-FDD (SC-FDMA, 50% RB, 10 MHz, QPSK)	LTE-FDD	5.75	± 9.6 %
10155	CAG	LTE-FDD (SC-FDMA, 50% RB, 10 MHz, 16-QAM)	LTE-FDD	6.43	± 9.6 %
10156	CAG	LTE-FDD (SC-FDMA, 50% RB, 5 MHz, QPSK)	LTE-FDD	5.79	± 9.6 %
10157	CAG	LTE-FDD (SC-FDMA, 50% RB, 5 MHz, 16-QAM)	LTE-FDD	6.49	± 9.6 %
10158	CAG	LTE-FDD (SC-FDMA, 50% RB, 10 MHz, 64-QAM)	LTE-FDD	6.62	± 9.6 %
10159	CAG	LTE-FDD (SC-FDMA, 50% RB, 5 MHz, 64-QAM)	LTE-FDD	6.56	± 9.6 %
10160	CAE	LTE-FDD (SC-FDMA, 50% RB, 15 MHz, QPSK)	LTE-FDD	5.82	± 9.6 %
10161	CAE	LTE-FDD (SC-FDMA, 50% RB, 15 MHz, 16-QAM)	LTE-FDD	6.43	± 9.6 %
10162	CAE	LTE-FDD (SC-FDMA, 50% RB, 15 MHz, 64-QAM)	LTE-FDD	6.58	± 9.6 %
10166	CAF	LTE-FDD (SC-FDMA, 50% RB, 1.4 MHz, QPSK)	LTE-FDD	5.46	± 9.6 %
10167	CAF	LTE-FDD (SC-FDMA, 50% RB, 1.4 MHz, 16-QAM)	LTE-FDD	6.21	± 9.6 %
10168	CAF	LTE-FDD (SC-FDMA, 50% RB, 1.4 MHz, 64-QAM)	LTE-FDD	6.79	± 9.6 %
10169	CAE	LTE-FDD (SC-FDMA, 1 RB, 20 MHz, QPSK)	LTE-FDD	5.73	± 9.6 %
10170	CAE	LTE-FDD (SC-FDMA, 1 RB, 20 MHz, 16-QAM)	LTE-FDD	6.52	± 9.6 %
10171	AAE	LTE-FDD (SC-FDMA, 1 RB, 20 MHz, 64-QAM)	LTE-FDD	6.49	± 9.6 %
10172	CAG	LTE-TDD (SC-FDMA, 1 RB, 20 MHz, QPSK)	LTE-TDD	9.21	± 9.6 %
10173	CAG	LTE-TDD (SC-FDMA, 1 RB, 20 MHz, 16-QAM)	LTE-TDD	9.48	± 9.6 %
10174	CAG	LTE-TDD (SC-FDMA, 1 RB, 20 MHz, 64-QAM)	LTE-TDD	10.25	± 9.6 %
10175	CAG	LTE-FDD (SC-FDMA, 1 RB, 10 MHz, QPSK)	LTE-FDD	5.72	± 9.6 %
10176	CAG	LTE-FDD (SC-FDMA, 1 RB, 10 MHz, 16-QAM)	LTE-FDD	6.52	± 9.6 %
10177	CAI	LTE-FDD (SC-FDMA, 1 RB, 5 MHz, QPSK)	LTE-FDD	5.73	± 9.6 %
10178	CAG	LTE-FDD (SC-FDMA, 1 RB, 5 MHz, 16-QAM)	LTE-FDD	6.52	± 9.6 %
10179	CAG	LTE-FDD (SC-FDMA, 1 RB, 10 MHz, 64-QAM)	LTE-FDD	6.50	± 9.6 %
10180	CAG	LTE-FDD (SC-FDMA, 1 RB, 5 MHz, 64-QAM)	LTE-FDD	6.50	± 9.6 %
10181	CAE	LTE-FDD (SC-FDMA, 1 RB, 15 MHz, QPSK)	LTE-FDD	5.72	± 9.6 %
10182	CAE	LTE-FDD (SC-FDMA, 1 RB, 15 MHz, 16-QAM)	LTE-FDD	6.52	± 9.6 %
10183	AAE	LTE-FDD (SC-FDMA, 1 RB, 15 MHz, 64-QAM)	LTE-FDD	6.50	± 9.6 %
10184	CAE	LTE-FDD (SC-FDMA, 1 RB, 3 MHz, QPSK)	LTE-FDD	5.73	± 9.6 %
10185	CAE	LTE-FDD (SC-FDMA, 1 RB, 3 MHz, 16-QAM)	LTE-FDD	6.51	± 9.6 %
10186	AAE	LTE-FDD (SC-FDMA, 1 RB, 3 MHz, 64-QAM)	LTE-FDD	6.50	± 9.6 %
10187	CAF	LTE-FDD (SC-FDMA, 1 RB, 1.4 MHz, QPSK)	LTE-FDD	5.73	± 9.6 %
10188	CAF	LTE-FDD (SC-FDMA, 1 RB, 1.4 MHz, 16-QAM)	LTE-FDD	6.52	± 9.6 %
10189	AAF	LTE-FDD (SC-FDMA, 1 RB, 1.4 MHz, 64-QAM)	LTE-FDD	6.50	± 9.6 %
10193	CAC	IEEE 802.11n (HT Greenfield, 6.5 Mbps, BPSK)	WLAN	8.09	± 9.6 %
10194	CAC	IEEE 802.11n (HT Greenfield, 39 Mbps, 16-QAM)	WLAN	8.12	± 9.6 %
10195	CAC	IEEE 802.11n (HT Greenfield, 65 Mbps, 64-QAM)	WLAN	8.21	± 9.6 %
10196	CAC	IEEE 802.11n (HT Mixed, 6.5 Mbps, BPSK)	WLAN	8.10	± 9.6 %
10197	CAC	IEEE 802.11n (HT Mixed, 39 Mbps, 16-QAM)	WLAN	8.13	± 9.6 %
10198	CAC	IEEE 802.11n (HT Mixed, 65 Mbps, 64-QAM)	WLAN	8.27	± 9.6 %
10219	CAC	IEEE 802.11n (HT Mixed, 7.2 Mbps, BPSK)	WLAN	8.03	± 9.6 %

10220	CAC	IEEE 802.11n (HT Mixed, 43.3 Mbps, 16-QAM)	WLAN	8.13	± 9.6 %
10221	CAC	IEEE 802.11n (HT Mixed, 72.2 Mbps, 64-QAM)	WLAN	8.27	± 9.6 %
10222	CAC	IEEE 802.11n (HT Mixed, 15 Mbps, BPSK)	WLAN	8.06	± 9.6 %
10223	CAC	IEEE 802.11n (HT Mixed, 90 Mbps, 16-QAM)	WLAN	8.48	± 9.6 %
10224	CAC	IEEE 802.11n (HT Mixed, 150 Mbps, 64-QAM)	WLAN	8.08	± 9.6 %
10225	CAB	UMTS-FDD (HSPA+)	WCDMA	5.97	± 9.6 %
10226	CAB	LTE-TDD (SC-FDMA, 1 RB, 1.4 MHz, 16-QAM)	LTE-TDD	9.49	± 9.6 %
10227	CAB	LTE-TDD (SC-FDMA, 1 RB, 1.4 MHz, 64-QAM)	LTE-TDD	10.26	± 9.6 %
10228	CAB	LTE-TDD (SC-FDMA, 1 RB, 1.4 MHz, QPSK)	LTE-TDD	9.22	± 9.6 %
10229	CAD	LTE-TDD (SC-FDMA, 1 RB, 3 MHz, 16-QAM)	LTE-TDD	9.48	± 9.6 %
10230	CAD	LTE-TDD (SC-FDMA, 1 RB, 3 MHz, 64-QAM)	LTE-TDD	10.25	± 9.6 %
10231	CAD	LTE-TDD (SC-FDMA, 1 RB, 3 MHz, QPSK)	LTE-TDD	9.19	± 9.6 %
10232	CAG	LTE-TDD (SC-FDMA, 1 RB, 5 MHz, 16-QAM)	LTE-TDD	9.48	± 9.6 %
10233	CAG	LTE-TDD (SC-FDMA, 1 RB, 5 MHz, 64-QAM)	LTE-TDD	10.25	± 9.6 %
10234	CAG	LTE-TDD (SC-FDMA, 1 RB, 5 MHz, QPSK)	LTE-TDD	9.21	± 9.6 %
10235	CAG	LTE-TDD (SC-FDMA, 1 RB, 10 MHz, 16-QAM)	LTE-TDD	9.48	± 9.6 %
10236	CAG	LTE-TDD (SC-FDMA, 1 RB, 10 MHz, 64-QAM)	LTE-TDD	10.25	± 9.6 %
10237	CAG	LTE-TDD (SC-FDMA, 1 RB, 10 MHz, QPSK)	LTE-TDD	9.21	± 9.6 %
10238	CAF	LTE-TDD (SC-FDMA, 1 RB, 15 MHz, 16-QAM)	LTE-TDD	9.48	± 9.6 %
10239	CAF	LTE-TDD (SC-FDMA, 1 RB, 15 MHz, 64-QAM)	LTE-TDD	10.25	± 9.6 %
10240	CAF	LTE-TDD (SC-FDMA, 1 RB, 15 MHz, QPSK)	LTE-TDD	9.21	± 9.6 %
10241	CAB	LTE-TDD (SC-FDMA, 50% RB, 1.4 MHz, 16-QAM)	LTE-TDD	9.82	± 9.6 %
10242	CAB	LTE-TDD (SC-FDMA, 50% RB, 1.4 MHz, 64-QAM)	LTE-TDD	9.86	± 9.6 %
10243	CAB	LTE-TDD (SC-FDMA, 50% RB, 1.4 MHz, QPSK)	LTE-TDD	9.46	± 9.6 %
10244	CAD	LTE-TDD (SC-FDMA, 50% RB, 3 MHz, 16-QAM)	LTE-TDD	10.06	± 9.6 %
10245	CAD	LTE-TDD (SC-FDMA, 50% RB, 3 MHz, 64-QAM)	LTE-TDD	10.06	± 9.6 %
10246	CAD	LTE-TDD (SC-FDMA, 50% RB, 3 MHz, QPSK)	LTE-TDD	9.30	± 9.6 %
10247	CAG	LTE-TDD (SC-FDMA, 50% RB, 5 MHz, 16-QAM)	LTE-TDD	9.91	± 9.6 %
10248	CAG	LTE-TDD (SC-FDMA, 50% RB, 5 MHz, 64-QAM)	LTE-TDD	10.09	± 9.6 %
10249	CAG	LTE-TDD (SC-FDMA, 50% RB, 5 MHz, QPSK)	LTE-TDD	9.29	± 9.6 %
10250	CAG	LTE-TDD (SC-FDMA, 50% RB, 10 MHz, 16-QAM)	LTE-TDD	9.81	± 9.6 %
10251	CAG	LTE-TDD (SC-FDMA, 50% RB, 10 MHz, 64-QAM)	LTE-TDD	10.17	± 9.6 %
10252	CAG	LTE-TDD (SC-FDMA, 50% RB, 10 MHz, QPSK)	LTE-TDD	9.24	± 9.6 %
10253	CAF	LTE-TDD (SC-FDMA, 50% RB, 15 MHz, 16-QAM)	LTE-TDD	9.90	± 9.6 %
10254	CAF	LTE-TDD (SC-FDMA, 50% RB, 15 MHz, 64-QAM)	LTE-TDD	10.14	± 9.6 %
10255	CAF	LTE-TDD (SC-FDMA, 50% RB, 15 MHz, QPSK)	LTE-TDD	9.20	± 9.6 %
10256	CAB	LTE-TDD (SC-FDMA, 100% RB, 1.4 MHz, 16-QAM)	LTE-TDD	9.96	± 9.6 %
10257	CAB	LTE-TDD (SC-FDMA, 100% RB, 1.4 MHz, 64-QAM)	LTE-TDD	10.08	± 9.6 %
10258	CAB	LTE-TDD (SC-FDMA, 100% RB, 1.4 MHz, QPSK)	LTE-TDD	9.34	± 9.6 %
10259	CAD	LTE-TDD (SC-FDMA, 100% RB, 3 MHz, 16-QAM)	LTE-TDD	9.98	± 9.6 %
10260	CAD	LTE-TDD (SC-FDMA, 100% RB, 3 MHz, 64-QAM)	LTE-TDD	9.97	± 9.6 %
10261	CAD	LTE-TDD (SC-FDMA, 100% RB, 3 MHz, QPSK)	LTE-TDD	9.24	± 9.6 %
10262	CAG	LTE-TDD (SC-FDMA, 100% RB, 5 MHz, 16-QAM)	LTE-TDD	9.83	± 9.6 %
10263	CAG	LTE-TDD (SC-FDMA, 100% RB, 5 MHz, 64-QAM)	LTE-TDD	10.16	± 9.6 %
10264	CAG	LTE-TDD (SC-FDMA, 100% RB, 5 MHz, QPSK)	LTE-TDD	9.23	± 9.6 %
10265	CAG	LTE-TDD (SC-FDMA, 100% RB, 10 MHz, 16-QAM)	LTE-TDD	9.92	± 9.6 %
10266	CAG	LTE-TDD (SC-FDMA, 100% RB, 10 MHz, 64-QAM)	LTE-TDD	10.07	± 9.6 %
10267	CAG	LTE-TDD (SC-FDMA, 100% RB, 10 MHz, QPSK)	LTE-TDD	9.30	± 9.6 %
10268	CAF	LTE-TDD (SC-FDMA, 100% RB, 15 MHz, 16-QAM)	LTE-TDD	10.06	± 9.6 %
10269	CAF	LTE-TDD (SC-FDMA, 100% RB, 15 MHz, 64-QAM)	LTE-TDD	10.13	± 9.6 %
10270	CAF	LTE-TDD (SC-FDMA, 100% RB, 15 MHz, QPSK)	LTE-TDD	9.58	± 9.6 %
10274	CAB	UMTS-FDD (HSUPA, Subtest 5, 3GPP Rel8.10)	WCDMA	4.87	± 9.6 %
10275	CAB	UMTS-FDD (HSUPA, Subtest 5, 3GPP Rel8.4)	WCDMA	3.96	± 9.6 %
10277	CAA	PHS (QPSK)	PHS	11.81	± 9.6 %
10278	CAA	PHS (QPSK, BW 884MHz, Rolloff 0.5)	PHS	11.81	± 9.6 %
10279	CAA	PHS (QPSK, BW 884MHz, Rolloff 0.38)	PHS	12.18	± 9.6 %
10290	AAB	CDMA2000, RC1, SO55, Full Rate	CDMA2000	3.91	± 9.6 %
10291	AAB	CDMA2000, RC3, SO55, Full Rate	CDMA2000	3.46	± 9.6 %
10292	AAB	CDMA2000, RC3, SO32, Full Rate	CDMA2000	3.39	± 9.6 %
10293	AAB	CDMA2000, RC3, SO3, Full Rate	CDMA2000	3.50	± 9.6 %
10295	AAB	CDMA2000, RC1, SO3, 1/8th Rate 25 fr.	CDMA2000	12.49	± 9.6 %
10297	AAD	LTE-FDD (SC-FDMA, 50% RB, 20 MHz, QPSK)	LTE-FDD	5.81	± 9.6 %
10298	AAD	LTE-FDD (SC-FDMA, 50% RB, 3 MHz, QPSK)	LTE-FDD	5.72	± 9.6 %
10299	AAD	LTE-FDD (SC-FDMA, 50% RB, 3 MHz, 16-QAM)	LTE-FDD	6.39	± 9.6 %

10300	AAD	LTE-FDD (SC-FDMA, 50% RB, 3 MHz, 64-QAM)	LTE-FDD	6.60	± 9.6 %
10301	AAA	IEEE 802.16e WiMAX (29:18, 5ms, 10MHz, QPSK, PUSC)	WiMAX	12.03	± 9.6 %
10302	AAA	IEEE 802.16e WiMAX (29:18, 5ms, 10MHz, QPSK, PUSC, 3 CTRL symbols)	WiMAX	12.57	± 9.6 %
10303	AAA	IEEE 802.16e WiMAX (31:15, 5ms, 10MHz, 64QAM, PUSC)	WiMAX	12.52	± 9.6 %
10304	AAA	IEEE 802.16e WiMAX (29:18, 5ms, 10MHz, 64QAM, PUSC)	WiMAX	11.86	± 9.6 %
10305	AAA	IEEE 802.16e WiMAX (31:15, 10ms, 10MHz, 64QAM, PUSC, 15 symbols)	WiMAX	15.24	± 9.6 %
10306	AAA	IEEE 802.16e WiMAX (29:18, 10ms, 10MHz, 64QAM, PUSC, 18 symbols)	WiMAX	14.67	± 9.6 %
10307	AAA	IEEE 802.16e WiMAX (29:18, 10ms, 10MHz, QPSK, PUSC, 18 symbols)	WiMAX	14.49	± 9.6 %
10308	AAA	IEEE 802.16e WiMAX (29:18, 10ms, 10MHz, 16QAM, PUSC)	WiMAX	14.46	± 9.6 %
10309	AAA	IEEE 802.16e WiMAX (29:18, 10ms, 10MHz, 16QAM, AMC 2x3, 18 symbols)	WiMAX	14.58	± 9.6 %
10310	AAA	IEEE 802.16e WiMAX (29:18, 10ms, 10MHz, QPSK, AMC 2x3, 18 symbols)	WiMAX	14.57	± 9.6 %
10311	AAD	LTE-FDD (SC-FDMA, 100% RB, 15 MHz, QPSK)	LTE-FDD	6.06	± 9.6 %
10313	AAA	iDEN 1:3	iDEN	10.51	± 9.6 %
10314	AAA	iDEN 1:6	iDEN	13.48	± 9.6 %
10315	AAB	IEEE 802.11b WiFi 2.4 GHz (DSSS, 1 Mbps, 96pc duty cycle)	WLAN	1.71	± 9.6 %
10316	AAB	IEEE 802.11g WiFi 2.4 GHz (ERP-OFDM, 6 Mbps, 96pc duty cycle)	WLAN	8.36	± 9.6 %
10317	AAC	IEEE 802.11a WiFi 5 GHz (OFDM, 6 Mbps, 96pc duty cycle)	WLAN	8.36	± 9.6 %
10352	AAA	Pulse Waveform (200Hz, 10%)	Generic	10.00	± 9.6 %
10353	AAA	Pulse Waveform (200Hz, 20%)	Generic	6.99	± 9.6 %
10354	AAA	Pulse Waveform (200Hz, 40%)	Generic	3.98	± 9.6 %
10355	AAA	Pulse Waveform (200Hz, 60%)	Generic	2.22	± 9.6 %
10356	AAA	Pulse Waveform (200Hz, 80%)	Generic	0.97	± 9.6 %
10387	AAA	QPSK Waveform, 1 MHz	Generic	5.10	± 9.6 %
10388	AAA	QPSK Waveform, 10 MHz	Generic	5.22	± 9.6 %
10396	AAA	64-QAM Waveform, 100 kHz	Generic	6.27	± 9.6 %
10399	AAA	64-QAM Waveform, 40 MHz	Generic	6.27	± 9.6 %
10400	AAD	IEEE 802.11ac WiFi (20MHz, 64-QAM, 99pc duty cycle)	WLAN	8.37	± 9.6 %
10401	AAD	IEEE 802.11ac WiFi (40MHz, 64-QAM, 99pc duty cycle)	WLAN	8.60	± 9.6 %
10402	AAD	IEEE 802.11ac WiFi (80MHz, 64-QAM, 99pc duty cycle)	WLAN	8.53	± 9.6 %
10403	AAB	CDMA2000 (1xEV-DO, Rev. 0)	CDMA2000	3.76	± 9.6 %
10404	AAB	CDMA2000 (1xEV-DO, Rev. A)	CDMA2000	3.77	± 9.6 %
10406	AAB	CDMA2000, RC3, SO32, SCH0, Full Rate	CDMA2000	5.22	± 9.6 %
10410	AAG	LTE-TDD (SC-FDMA, 1 RB, 10 MHz, QPSK, UL Subframe=2,3,4,7,8,9, Subframe Conf=4)	LTE-TDD	7.82	± 9.6 %
10414	AAA	WLAN CCDF, 64-QAM, 40MHz	Generic	8.54	± 9.6 %
10415	AAA	IEEE 802.11b WiFi 2.4 GHz (DSSS, 1 Mbps, 99pc duty cycle)	WLAN	1.54	± 9.6 %
10416	AAA	IEEE 802.11g WiFi 2.4 GHz (ERP-OFDM, 6 Mbps, 99pc duty cycle)	WLAN	8.23	± 9.6 %
10417	AAB	IEEE 802.11a/h WiFi 5 GHz (OFDM, 6 Mbps, 99pc duty cycle)	WLAN	8.23	± 9.6 %
10418	AAA	IEEE 802.11g WiFi 2.4 GHz (DSSS-OFDM, 6 Mbps, 99pc duty cycle, Long preamble)	WLAN	8.14	± 9.6 %
10419	AAA	IEEE 802.11g WiFi 2.4 GHz (DSSS-OFDM, 6 Mbps, 99pc duty cycle, Short preamble)	WLAN	8.19	± 9.6 %
10422	AAB	IEEE 802.11n (HT Greenfield, 7.2 Mbps, BPSK)	WLAN	8.32	± 9.6 %
10423	AAB	IEEE 802.11n (HT Greenfield, 43.3 Mbps, 16-QAM)	WLAN	8.47	± 9.6 %
10424	AAB	IEEE 802.11n (HT Greenfield, 72.2 Mbps, 64-QAM)	WLAN	8.40	± 9.6 %
10425	AAB	IEEE 802.11n (HT Greenfield, 15 Mbps, BPSK)	WLAN	8.41	± 9.6 %
10426	AAB	IEEE 802.11n (HT Greenfield, 90 Mbps, 16-QAM)	WLAN	8.45	± 9.6 %
10427	AAB	IEEE 802.11n (HT Greenfield, 150 Mbps, 64-QAM)	WLAN	8.41	± 9.6 %
10430	AAD	LTE-FDD (OFDMA, 5 MHz, E-TM 3.1)	LTE-FDD	8.28	± 9.6 %
10431	AAD	LTE-FDD (OFDMA, 10 MHz, E-TM 3.1)	LTE-FDD	8.38	± 9.6 %
10432	AAC	LTE-FDD (OFDMA, 15 MHz, E-TM 3.1)	LTE-FDD	8.34	± 9.6 %
10433	AAC	LTE-FDD (OFDMA, 20 MHz, E-TM 3.1)	LTE-FDD	8.34	± 9.6 %
10434	AAA	W-CDMA (BS Test Model 1, 64 DPCH)	WCDMA	8.60	± 9.6 %
10435	AAF	LTE-TDD (SC-FDMA, 1 RB, 20 MHz, QPSK, UL Subframe=2,3,4,7,8,9)	LTE-TDD	7.82	± 9.6 %
10447	AAD	LTE-FDD (OFDMA, 5 MHz, E-TM 3.1, Clipping 44%)	LTE-FDD	7.56	± 9.6 %
10448	AAD	LTE-FDD (OFDMA, 10 MHz, E-TM 3.1, Clipping 44%)	LTE-FDD	7.53	± 9.6 %
10449	AAC	LTE-FDD (OFDMA, 15 MHz, E-TM 3.1, Clipping 44%)	LTE-FDD	7.51	± 9.6 %
10450	AAC	LTE-FDD (OFDMA, 20 MHz, E-TM 3.1, Clipping 44%)	LTE-FDD	7.48	± 9.6 %

10451	AAA	W-CDMA (BS Test Model 1, 64 DPCH, Clipping 44%)	WCDMA	7.59	± 9.6 %
10456	AAB	IEEE 802.11ac WiFi (160MHz, 64-QAM, 99pc duty cycle)	WLAN	8.63	± 9.6 %
10457	AAA	UMTS-FDD (DC-HSDPA)	WCDMA	6.62	± 9.6 %
10458	AAA	CDMA2000 (1xEV-DO, Rev. B, 2 carriers)	CDMA2000	6.55	± 9.6 %
10459	AAA	CDMA2000 (1xEV-DO, Rev. B, 3 carriers)	CDMA2000	8.25	± 9.6 %
10460	AAA	UMTS-FDD (WCDMA, AMR)	WCDMA	2.39	± 9.6 %
10461	AAB	LTE-TDD (SC-FDMA, 1 RB, 1.4 MHz, QPSK, UL Subframe=2,3,4,7,8,9)	LTE-TDD	7.82	± 9.6 %
10462	AAB	LTE-TDD (SC-FDMA, 1 RB, 1.4 MHz, 16-QAM, UL Subframe=2,3,4,7,8,9)	LTE-TDD	8.30	± 9.6 %
10463	AAB	LTE-TDD (SC-FDMA, 1 RB, 1.4 MHz, 64-QAM, UL Subframe=2,3,4,7,8,9)	LTE-TDD	8.56	± 9.6 %
10464	AAC	LTE-TDD (SC-FDMA, 1 RB, 3 MHz, QPSK, UL Subframe=2,3,4,7,8,9)	LTE-TDD	7.82	± 9.6 %
10465	AAC	LTE-TDD (SC-FDMA, 1 RB, 3 MHz, 16-QAM, UL Subframe=2,3,4,7,8,9)	LTE-TDD	8.32	± 9.6 %
10466	AAC	LTE-TDD (SC-FDMA, 1 RB, 3 MHz, 64-QAM, UL Subframe=2,3,4,7,8,9)	LTE-TDD	8.57	± 9.6 %
10467	AAF	LTE-TDD (SC-FDMA, 1 RB, 5 MHz, QPSK, UL Subframe=2,3,4,7,8,9)	LTE-TDD	7.82	± 9.6 %
10468	AAF	LTE-TDD (SC-FDMA, 1 RB, 5 MHz, 16-QAM, UL Subframe=2,3,4,7,8,9)	LTE-TDD	8.32	± 9.6 %
10469	AAF	LTE-TDD (SC-FDMA, 1 RB, 5 MHz, 64-QAM, UL Subframe=2,3,4,7,8,9)	LTE-TDD	8.56	± 9.6 %
10470	AAF	LTE-TDD (SC-FDMA, 1 RB, 10 MHz, QPSK, UL Subframe=2,3,4,7,8,9)	LTE-TDD	7.82	± 9.6 %
10471	AAF	LTE-TDD (SC-FDMA, 1 RB, 10 MHz, 16-QAM, UL Subframe=2,3,4,7,8,9)	LTE-TDD	8.32	± 9.6 %
10472	AAF	LTE-TDD (SC-FDMA, 1 RB, 10 MHz, 64-QAM, UL Subframe=2,3,4,7,8,9)	LTE-TDD	8.57	± 9.6 %
10473	AAE	LTE-TDD (SC-FDMA, 1 RB, 15 MHz, QPSK, UL Subframe=2,3,4,7,8,9)	LTE-TDD	7.82	± 9.6 %
10474	AAE	LTE-TDD (SC-FDMA, 1 RB, 15 MHz, 16-QAM, UL Subframe=2,3,4,7,8,9)	LTE-TDD	8.32	± 9.6 %
10475	AAE	LTE-TDD (SC-FDMA, 1 RB, 15 MHz, 64-QAM, UL Subframe=2,3,4,7,8,9)	LTE-TDD	8.57	± 9.6 %
10477	AAF	LTE-TDD (SC-FDMA, 1 RB, 20 MHz, 16-QAM, UL Subframe=2,3,4,7,8,9)	LTE-TDD	8.32	± 9.6 %
10478	AAF	LTE-TDD (SC-FDMA, 1 RB, 20 MHz, 64-QAM, UL Subframe=2,3,4,7,8,9)	LTE-TDD	8.57	± 9.6 %
10479	AAB	LTE-TDD (SC-FDMA, 50% RB, 1.4 MHz, QPSK, UL Subframe=2,3,4,7,8,9)	LTE-TDD	7.74	± 9.6 %
10480	AAB	LTE-TDD (SC-FDMA, 50% RB, 1.4 MHz, 16-QAM, UL Subframe=2,3,4,7,8,9)	LTE-TDD	8.18	± 9.6 %
10481	AAB	LTE-TDD (SC-FDMA, 50% RB, 1.4 MHz, 64-QAM, UL Subframe=2,3,4,7,8,9)	LTE-TDD	8.45	± 9.6 %
10482	AAC	LTE-TDD (SC-FDMA, 50% RB, 3 MHz, QPSK, UL Subframe=2,3,4,7,8,9)	LTE-TDD	7.71	± 9.6 %
10483	AAC	LTE-TDD (SC-FDMA, 50% RB, 3 MHz, 16-QAM, UL Subframe=2,3,4,7,8,9)	LTE-TDD	8.39	± 9.6 %
10484	AAC	LTE-TDD (SC-FDMA, 50% RB, 3 MHz, 64-QAM, UL Subframe=2,3,4,7,8,9)	LTE-TDD	8.47	± 9.6 %
10485	AAF	LTE-TDD (SC-FDMA, 50% RB, 5 MHz, QPSK, UL Subframe=2,3,4,7,8,9)	LTE-TDD	7.59	± 9.6 %
10486	AAF	LTE-TDD (SC-FDMA, 50% RB, 5 MHz, 16-QAM, UL Subframe=2,3,4,7,8,9)	LTE-TDD	8.38	± 9.6 %
10487	AAF	LTE-TDD (SC-FDMA, 50% RB, 5 MHz, 64-QAM, UL Subframe=2,3,4,7,8,9)	LTE-TDD	8.60	± 9.6 %
10488	AAF	LTE-TDD (SC-FDMA, 50% RB, 10 MHz, QPSK, UL Subframe=2,3,4,7,8,9)	LTE-TDD	7.70	± 9.6 %
10489	AAF	LTE-TDD (SC-FDMA, 50% RB, 10 MHz, 16-QAM, UL Subframe=2,3,4,7,8,9)	LTE-TDD	8.31	± 9.6 %
10490	AAF	LTE-TDD (SC-FDMA, 50% RB, 10 MHz, 64-QAM, UL Subframe=2,3,4,7,8,9)	LTE-TDD	8.54	± 9.6 %
10491	AAE	LTE-TDD (SC-FDMA, 50% RB, 15 MHz, QPSK, UL Subframe=2,3,4,7,8,9)	LTE-TDD	7.74	± 9.6 %

10492	AAE	LTE-TDD (SC-FDMA, 50% RB, 15 MHz, 16-QAM, UL Subframe=2,3,4,7,8,9)	LTE-TDD	8.41	± 9.6 %
10493	AAE	LTE-TDD (SC-FDMA, 50% RB, 15 MHz, 64-QAM, UL Subframe=2,3,4,7,8,9)	LTE-TDD	8.55	± 9.6 %
10494	AAF	LTE-TDD (SC-FDMA, 50% RB, 20 MHz, QPSK, UL Subframe=2,3,4,7,8,9)	LTE-TDD	7.74	± 9.6 %
10495	AAF	LTE-TDD (SC-FDMA, 50% RB, 20 MHz, 16-QAM, UL Subframe=2,3,4,7,8,9)	LTE-TDD	8.37	± 9.6 %
10496	AAF	LTE-TDD (SC-FDMA, 50% RB, 20 MHz, 64-QAM, UL Subframe=2,3,4,7,8,9)	LTE-TDD	8.54	± 9.6 %
10497	AAB	LTE-TDD (SC-FDMA, 100% RB, 1.4 MHz, QPSK, UL Subframe=2,3,4,7,8,9)	LTE-TDD	7.67	± 9.6 %
10498	AAB	LTE-TDD (SC-FDMA, 100% RB, 1.4 MHz, 16-QAM, UL Subframe=2,3,4,7,8,9)	LTE-TDD	8.40	± 9.6 %
10499	AAB	LTE-TDD (SC-FDMA, 100% RB, 1.4 MHz, 64-QAM, UL Subframe=2,3,4,7,8,9)	LTE-TDD	8.68	± 9.6 %
10500	AAC	LTE-TDD (SC-FDMA, 100% RB, 3 MHz, QPSK, UL Subframe=2,3,4,7,8,9)	LTE-TDD	7.67	± 9.6 %
10501	AAC	LTE-TDD (SC-FDMA, 100% RB, 3 MHz, 16-QAM, UL Subframe=2,3,4,7,8,9)	LTE-TDD	8.44	± 9.6 %
10502	AAC	LTE-TDD (SC-FDMA, 100% RB, 3 MHz, 64-QAM, UL Subframe=2,3,4,7,8,9)	LTE-TDD	8.52	± 9.6 %
10503	AAF	LTE-TDD (SC-FDMA, 100% RB, 5 MHz, QPSK, UL Subframe=2,3,4,7,8,9)	LTE-TDD	7.72	± 9.6 %
10504	AAF	LTE-TDD (SC-FDMA, 100% RB, 5 MHz, 16-QAM, UL Subframe=2,3,4,7,8,9)	LTE-TDD	8.31	± 9.6 %
10505	AAF	LTE-TDD (SC-FDMA, 100% RB, 5 MHz, 64-QAM, UL Subframe=2,3,4,7,8,9)	LTE-TDD	8.54	± 9.6 %
10506	AAF	LTE-TDD (SC-FDMA, 100% RB, 10 MHz, QPSK, UL Subframe=2,3,4,7,8,9)	LTE-TDD	7.74	± 9.6 %
10507	AAF	LTE-TDD (SC-FDMA, 100% RB, 10 MHz, 16-QAM, UL Subframe=2,3,4,7,8,9)	LTE-TDD	8.36	± 9.6 %
10508	AAF	LTE-TDD (SC-FDMA, 100% RB, 10 MHz, 64-QAM, UL Subframe=2,3,4,7,8,9)	LTE-TDD	8.55	± 9.6 %
10509	AAE	LTE-TDD (SC-FDMA, 100% RB, 15 MHz, QPSK, UL Subframe=2,3,4,7,8,9)	LTE-TDD	7.99	± 9.6 %
10510	AAE	LTE-TDD (SC-FDMA, 100% RB, 15 MHz, 16-QAM, UL Subframe=2,3,4,7,8,9)	LTE-TDD	8.49	± 9.6 %
10511	AAE	LTE-TDD (SC-FDMA, 100% RB, 15 MHz, 64-QAM, UL Subframe=2,3,4,7,8,9)	LTE-TDD	8.51	± 9.6 %
10512	AAF	LTE-TDD (SC-FDMA, 100% RB, 20 MHz, QPSK, UL Subframe=2,3,4,7,8,9)	LTE-TDD	7.74	± 9.6 %
10513	AAF	LTE-TDD (SC-FDMA, 100% RB, 20 MHz, 16-QAM, UL Subframe=2,3,4,7,8,9)	LTE-TDD	8.42	± 9.6 %
10514	AAF	LTE-TDD (SC-FDMA, 100% RB, 20 MHz, 64-QAM, UL Subframe=2,3,4,7,8,9)	LTE-TDD	8.45	± 9.6 %
10515	AAA	IEEE 802.11b WiFi 2.4 GHz (DSSS, 2 Mbps, 99pc duty cycle)	WLAN	1.58	± 9.6 %
10516	AAA	IEEE 802.11b WiFi 2.4 GHz (DSSS, 5.5 Mbps, 99pc duty cycle)	WLAN	1.57	± 9.6 %
10517	AAA	IEEE 802.11b WiFi 2.4 GHz (DSSS, 11 Mbps, 99pc duty cycle)	WLAN	1.58	± 9.6 %
10518	AAB	IEEE 802.11a/h WiFi 5 GHz (OFDM, 9 Mbps, 99pc duty cycle)	WLAN	8.23	± 9.6 %
10519	AAB	IEEE 802.11a/h WiFi 5 GHz (OFDM, 12 Mbps, 99pc duty cycle)	WLAN	8.39	± 9.6 %
10520	AAB	IEEE 802.11a/h WiFi 5 GHz (OFDM, 18 Mbps, 99pc duty cycle)	WLAN	8.12	± 9.6 %
10521	AAB	IEEE 802.11a/h WiFi 5 GHz (OFDM, 24 Mbps, 99pc duty cycle)	WLAN	7.97	± 9.6 %
10522	AAB	IEEE 802.11a/h WiFi 5 GHz (OFDM, 36 Mbps, 99pc duty cycle)	WLAN	8.45	± 9.6 %
10523	AAB	IEEE 802.11a/h WiFi 5 GHz (OFDM, 48 Mbps, 99pc duty cycle)	WLAN	8.08	± 9.6 %
10524	AAB	IEEE 802.11a/h WiFi 5 GHz (OFDM, 54 Mbps, 99pc duty cycle)	WLAN	8.27	± 9.6 %
10525	AAB	IEEE 802.11ac WiFi (20MHz, MCS0, 99pc duty cycle)	WLAN	8.36	± 9.6 %
10526	AAB	IEEE 802.11ac WiFi (20MHz, MCS1, 99pc duty cycle)	WLAN	8.42	± 9.6 %
10527	AAB	IEEE 802.11ac WiFi (20MHz, MCS2, 99pc duty cycle)	WLAN	8.21	± 9.6 %
10528	AAB	IEEE 802.11ac WiFi (20MHz, MCS3, 99pc duty cycle)	WLAN	8.36	± 9.6 %
10529	AAB	IEEE 802.11ac WiFi (20MHz, MCS4, 99pc duty cycle)	WLAN	8.36	± 9.6 %
10531	AAB	IEEE 802.11ac WiFi (20MHz, MCS6, 99pc duty cycle)	WLAN	8.43	± 9.6 %
10532	AAB	IEEE 802.11ac WiFi (20MHz, MCS7, 99pc duty cycle)	WLAN	8.29	± 9.6 %
10533	AAB	IEEE 802.11ac WiFi (20MHz, MCS8, 99pc duty cycle)	WLAN	8.38	± 9.6 %
10534	AAB	IEEE 802.11ac WiFi (40MHz, MCS0, 99pc duty cycle)	WLAN	8.45	± 9.6 %

10535	AAB	IEEE 802.11ac WiFi (40MHz, MCS1, 99pc duty cycle)	WLAN	8.45	± 9.6 %
10536	AAB	IEEE 802.11ac WiFi (40MHz, MCS2, 99pc duty cycle)	WLAN	8.32	± 9.6 %
10537	AAB	IEEE 802.11ac WiFi (40MHz, MCS3, 99pc duty cycle)	WLAN	8.44	± 9.6 %
10538	AAB	IEEE 802.11ac WiFi (40MHz, MCS4, 99pc duty cycle)	WLAN	8.54	± 9.6 %
10540	AAB	IEEE 802.11ac WiFi (40MHz, MCS6, 99pc duty cycle)	WLAN	8.39	± 9.6 %
10541	AAB	IEEE 802.11ac WiFi (40MHz, MCS7, 99pc duty cycle)	WLAN	8.46	± 9.6 %
10542	AAB	IEEE 802.11ac WiFi (40MHz, MCS8, 99pc duty cycle)	WLAN	8.65	± 9.6 %
10543	AAB	IEEE 802.11ac WiFi (40MHz, MCS9, 99pc duty cycle)	WLAN	8.65	± 9.6 %
10544	AAB	IEEE 802.11ac WiFi (80MHz, MCS0, 99pc duty cycle)	WLAN	8.47	± 9.6 %
10545	AAB	IEEE 802.11ac WiFi (80MHz, MCS1, 99pc duty cycle)	WLAN	8.55	± 9.6 %
10546	AAB	IEEE 802.11ac WiFi (80MHz, MCS2, 99pc duty cycle)	WLAN	8.35	± 9.6 %
10547	AAB	IEEE 802.11ac WiFi (80MHz, MCS3, 99pc duty cycle)	WLAN	8.49	± 9.6 %
10548	AAB	IEEE 802.11ac WiFi (80MHz, MCS4, 99pc duty cycle)	WLAN	8.37	± 9.6 %
10550	AAB	IEEE 802.11ac WiFi (80MHz, MCS6, 99pc duty cycle)	WLAN	8.38	± 9.6 %
10551	AAB	IEEE 802.11ac WiFi (80MHz, MCS7, 99pc duty cycle)	WLAN	8.50	± 9.6 %
10552	AAB	IEEE 802.11ac WiFi (80MHz, MCS8, 99pc duty cycle)	WLAN	8.42	± 9.6 %
10553	AAB	IEEE 802.11ac WiFi (80MHz, MCS9, 99pc duty cycle)	WLAN	8.45	± 9.6 %
10554	AAC	IEEE 802.11ac WiFi (160MHz, MCS0, 99pc duty cycle)	WLAN	8.48	± 9.6 %
10555	AAC	IEEE 802.11ac WiFi (160MHz, MCS1, 99pc duty cycle)	WLAN	8.47	± 9.6 %
10556	AAC	IEEE 802.11ac WiFi (160MHz, MCS2, 99pc duty cycle)	WLAN	8.50	± 9.6 %
10557	AAC	IEEE 802.11ac WiFi (160MHz, MCS3, 99pc duty cycle)	WLAN	8.52	± 9.6 %
10558	AAC	IEEE 802.11ac WiFi (160MHz, MCS4, 99pc duty cycle)	WLAN	8.61	± 9.6 %
10560	AAC	IEEE 802.11ac WiFi (160MHz, MCS6, 99pc duty cycle)	WLAN	8.73	± 9.6 %
10561	AAC	IEEE 802.11ac WiFi (160MHz, MCS7, 99pc duty cycle)	WLAN	8.56	± 9.6 %
10562	AAC	IEEE 802.11ac WiFi (160MHz, MCS8, 99pc duty cycle)	WLAN	8.69	± 9.6 %
10563	AAC	IEEE 802.11ac WiFi (160MHz, MCS9, 99pc duty cycle)	WLAN	8.77	± 9.6 %
10564	AAA	IEEE 802.11g WiFi 2.4 GHz (DSSS-OFDM, 9 Mbps, 99pc duty cycle)	WLAN	8.25	± 9.6 %
10565	AAA	IEEE 802.11g WiFi 2.4 GHz (DSSS-OFDM, 12 Mbps, 99pc duty cycle)	WLAN	8.45	± 9.6 %
10566	AAA	IEEE 802.11g WiFi 2.4 GHz (DSSS-OFDM, 18 Mbps, 99pc duty cycle)	WLAN	8.13	± 9.6 %
10567	AAA	IEEE 802.11g WiFi 2.4 GHz (DSSS-OFDM, 24 Mbps, 99pc duty cycle)	WLAN	8.00	± 9.6 %
10568	AAA	IEEE 802.11g WiFi 2.4 GHz (DSSS-OFDM, 36 Mbps, 99pc duty cycle)	WLAN	8.37	± 9.6 %
10569	AAA	IEEE 802.11g WiFi 2.4 GHz (DSSS-OFDM, 48 Mbps, 99pc duty cycle)	WLAN	8.10	± 9.6 %
10570	AAA	IEEE 802.11g WiFi 2.4 GHz (DSSS-OFDM, 54 Mbps, 99pc duty cycle)	WLAN	8.30	± 9.6 %
10571	AAA	IEEE 802.11b WiFi 2.4 GHz (DSSS, 1 Mbps, 90pc duty cycle)	WLAN	1.99	± 9.6 %
10572	AAA	IEEE 802.11b WiFi 2.4 GHz (DSSS, 2 Mbps, 90pc duty cycle)	WLAN	1.99	± 9.6 %
10573	AAA	IEEE 802.11b WiFi 2.4 GHz (DSSS, 5.5 Mbps, 90pc duty cycle)	WLAN	1.98	± 9.6 %
10574	AAA	IEEE 802.11b WiFi 2.4 GHz (DSSS, 11 Mbps, 90pc duty cycle)	WLAN	1.98	± 9.6 %
10575	AAA	IEEE 802.11g WiFi 2.4 GHz (DSSS-OFDM, 6 Mbps, 90pc duty cycle)	WLAN	8.59	± 9.6 %
10576	AAA	IEEE 802.11g WiFi 2.4 GHz (DSSS-OFDM, 9 Mbps, 90pc duty cycle)	WLAN	8.60	± 9.6 %
10577	AAA	IEEE 802.11g WiFi 2.4 GHz (DSSS-OFDM, 12 Mbps, 90pc duty cycle)	WLAN	8.70	± 9.6 %
10578	AAA	IEEE 802.11g WiFi 2.4 GHz (DSSS-OFDM, 18 Mbps, 90pc duty cycle)	WLAN	8.49	± 9.6 %
10579	AAA	IEEE 802.11g WiFi 2.4 GHz (DSSS-OFDM, 24 Mbps, 90pc duty cycle)	WLAN	8.36	± 9.6 %
10580	AAA	IEEE 802.11g WiFi 2.4 GHz (DSSS-OFDM, 36 Mbps, 90pc duty cycle)	WLAN	8.76	± 9.6 %
10581	AAA	IEEE 802.11g WiFi 2.4 GHz (DSSS-OFDM, 48 Mbps, 90pc duty cycle)	WLAN	8.35	± 9.6 %
10582	AAA	IEEE 802.11g WiFi 2.4 GHz (DSSS-OFDM, 54 Mbps, 90pc duty cycle)	WLAN	8.67	± 9.6 %
10583	AAB	IEEE 802.11a/h WiFi 5 GHz (OFDM, 6 Mbps, 90pc duty cycle)	WLAN	8.59	± 9.6 %
10584	AAB	IEEE 802.11a/h WiFi 5 GHz (OFDM, 9 Mbps, 90pc duty cycle)	WLAN	8.60	± 9.6 %
10585	AAB	IEEE 802.11a/h WiFi 5 GHz (OFDM, 12 Mbps, 90pc duty cycle)	WLAN	8.70	± 9.6 %
10586	AAB	IEEE 802.11a/h WiFi 5 GHz (OFDM, 18 Mbps, 90pc duty cycle)	WLAN	8.49	± 9.6 %
10587	AAB	IEEE 802.11a/h WiFi 5 GHz (OFDM, 24 Mbps, 90pc duty cycle)	WLAN	8.36	± 9.6 %

10588	AAB	IEEE 802.11a/h WiFi 5 GHz (OFDM, 36 Mbps, 90pc duty cycle)	WLAN	8.76	± 9.6 %
10589	AAB	IEEE 802.11a/h WiFi 5 GHz (OFDM, 48 Mbps, 90pc duty cycle)	WLAN	8.35	± 9.6 %
10590	AAB	IEEE 802.11a/h WiFi 5 GHz (OFDM, 54 Mbps, 90pc duty cycle)	WLAN	8.67	± 9.6 %
10591	AAB	IEEE 802.11n (HT Mixed, 20MHz, MCS0, 90pc duty cycle)	WLAN	8.63	± 9.6 %
10592	AAB	IEEE 802.11n (HT Mixed, 20MHz, MCS1, 90pc duty cycle)	WLAN	8.79	± 9.6 %
10593	AAB	IEEE 802.11n (HT Mixed, 20MHz, MCS2, 90pc duty cycle)	WLAN	8.64	± 9.6 %
10594	AAB	IEEE 802.11n (HT Mixed, 20MHz, MCS3, 90pc duty cycle)	WLAN	8.74	± 9.6 %
10595	AAB	IEEE 802.11n (HT Mixed, 20MHz, MCS4, 90pc duty cycle)	WLAN	8.74	± 9.6 %
10596	AAB	IEEE 802.11n (HT Mixed, 20MHz, MCS5, 90pc duty cycle)	WLAN	8.71	± 9.6 %
10597	AAB	IEEE 802.11n (HT Mixed, 20MHz, MCS6, 90pc duty cycle)	WLAN	8.72	± 9.6 %
10598	AAB	IEEE 802.11n (HT Mixed, 20MHz, MCS7, 90pc duty cycle)	WLAN	8.50	± 9.6 %
10599	AAB	IEEE 802.11n (HT Mixed, 40MHz, MCS0, 90pc duty cycle)	WLAN	8.79	± 9.6 %
10600	AAB	IEEE 802.11n (HT Mixed, 40MHz, MCS1, 90pc duty cycle)	WLAN	8.88	± 9.6 %
10601	AAB	IEEE 802.11n (HT Mixed, 40MHz, MCS2, 90pc duty cycle)	WLAN	8.82	± 9.6 %
10602	AAB	IEEE 802.11n (HT Mixed, 40MHz, MCS3, 90pc duty cycle)	WLAN	8.94	± 9.6 %
10603	AAB	IEEE 802.11n (HT Mixed, 40MHz, MCS4, 90pc duty cycle)	WLAN	9.03	± 9.6 %
10604	AAB	IEEE 802.11n (HT Mixed, 40MHz, MCS5, 90pc duty cycle)	WLAN	8.76	± 9.6 %
10605	AAB	IEEE 802.11n (HT Mixed, 40MHz, MCS6, 90pc duty cycle)	WLAN	8.97	± 9.6 %
10606	AAB	IEEE 802.11n (HT Mixed, 40MHz, MCS7, 90pc duty cycle)	WLAN	8.82	± 9.6 %
10607	AAB	IEEE 802.11ac WiFi (20MHz, MCS0, 90pc duty cycle)	WLAN	8.64	± 9.6 %
10608	AAB	IEEE 802.11ac WiFi (20MHz, MCS1, 90pc duty cycle)	WLAN	8.77	± 9.6 %
10609	AAB	IEEE 802.11ac WiFi (20MHz, MCS2, 90pc duty cycle)	WLAN	8.57	± 9.6 %
10610	AAB	IEEE 802.11ac WiFi (20MHz, MCS3, 90pc duty cycle)	WLAN	8.78	± 9.6 %
10611	AAB	IEEE 802.11ac WiFi (20MHz, MCS4, 90pc duty cycle)	WLAN	8.70	± 9.6 %
10612	AAB	IEEE 802.11ac WiFi (20MHz, MCS5, 90pc duty cycle)	WLAN	8.77	± 9.6 %
10613	AAB	IEEE 802.11ac WiFi (20MHz, MCS6, 90pc duty cycle)	WLAN	8.94	± 9.6 %
10614	AAB	IEEE 802.11ac WiFi (20MHz, MCS7, 90pc duty cycle)	WLAN	8.59	± 9.6 %
10615	AAB	IEEE 802.11ac WiFi (20MHz, MCS8, 90pc duty cycle)	WLAN	8.82	± 9.6 %
10616	AAB	IEEE 802.11ac WiFi (40MHz, MCS0, 90pc duty cycle)	WLAN	8.82	± 9.6 %
10617	AAB	IEEE 802.11ac WiFi (40MHz, MCS1, 90pc duty cycle)	WLAN	8.81	± 9.6 %
10618	AAB	IEEE 802.11ac WiFi (40MHz, MCS2, 90pc duty cycle)	WLAN	8.58	± 9.6 %
10619	AAB	IEEE 802.11ac WiFi (40MHz, MCS3, 90pc duty cycle)	WLAN	8.86	± 9.6 %
10620	AAB	IEEE 802.11ac WiFi (40MHz, MCS4, 90pc duty cycle)	WLAN	8.87	± 9.6 %
10621	AAB	IEEE 802.11ac WiFi (40MHz, MCS5, 90pc duty cycle)	WLAN	8.77	± 9.6 %
10622	AAB	IEEE 802.11ac WiFi (40MHz, MCS6, 90pc duty cycle)	WLAN	8.68	± 9.6 %
10623	AAB	IEEE 802.11ac WiFi (40MHz, MCS7, 90pc duty cycle)	WLAN	8.82	± 9.6 %
10624	AAB	IEEE 802.11ac WiFi (40MHz, MCS8, 90pc duty cycle)	WLAN	8.96	± 9.6 %
10625	AAB	IEEE 802.11ac WiFi (40MHz, MCS9, 90pc duty cycle)	WLAN	8.96	± 9.6 %
10626	AAB	IEEE 802.11ac WiFi (80MHz, MCS0, 90pc duty cycle)	WLAN	8.83	± 9.6 %
10627	AAB	IEEE 802.11ac WiFi (80MHz, MCS1, 90pc duty cycle)	WLAN	8.88	± 9.6 %
10628	AAB	IEEE 802.11ac WiFi (80MHz, MCS2, 90pc duty cycle)	WLAN	8.71	± 9.6 %
10629	AAB	IEEE 802.11ac WiFi (80MHz, MCS3, 90pc duty cycle)	WLAN	8.85	± 9.6 %
10630	AAB	IEEE 802.11ac WiFi (80MHz, MCS4, 90pc duty cycle)	WLAN	8.72	± 9.6 %
10631	AAB	IEEE 802.11ac WiFi (80MHz, MCS5, 90pc duty cycle)	WLAN	8.81	± 9.6 %
10632	AAB	IEEE 802.11ac WiFi (80MHz, MCS6, 90pc duty cycle)	WLAN	8.74	± 9.6 %
10633	AAB	IEEE 802.11ac WiFi (80MHz, MCS7, 90pc duty cycle)	WLAN	8.83	± 9.6 %
10634	AAB	IEEE 802.11ac WiFi (80MHz, MCS8, 90pc duty cycle)	WLAN	8.80	± 9.6 %
10635	AAB	IEEE 802.11ac WiFi (80MHz, MCS9, 90pc duty cycle)	WLAN	8.81	± 9.6 %
10636	AAC	IEEE 802.11ac WiFi (160MHz, MCS0, 90pc duty cycle)	WLAN	8.83	± 9.6 %
10637	AAC	IEEE 802.11ac WiFi (160MHz, MCS1, 90pc duty cycle)	WLAN	8.79	± 9.6 %
10638	AAC	IEEE 802.11ac WiFi (160MHz, MCS2, 90pc duty cycle)	WLAN	8.86	± 9.6 %
10639	AAC	IEEE 802.11ac WiFi (160MHz, MCS3, 90pc duty cycle)	WLAN	8.85	± 9.6 %
10640	AAC	IEEE 802.11ac WiFi (160MHz, MCS4, 90pc duty cycle)	WLAN	8.98	± 9.6 %
10641	AAC	IEEE 802.11ac WiFi (160MHz, MCS5, 90pc duty cycle)	WLAN	9.06	± 9.6 %
10642	AAC	IEEE 802.11ac WiFi (160MHz, MCS6, 90pc duty cycle)	WLAN	9.06	± 9.6 %
10643	AAC	IEEE 802.11ac WiFi (160MHz, MCS7, 90pc duty cycle)	WLAN	8.89	± 9.6 %
10644	AAC	IEEE 802.11ac WiFi (160MHz, MCS8, 90pc duty cycle)	WLAN	9.05	± 9.6 %
10645	AAC	IEEE 802.11ac WiFi (160MHz, MCS9, 90pc duty cycle)	WLAN	9.11	± 9.6 %
10646	AAG	LTE-TDD (SC-FDMA, 1 RB, 5 MHz, QPSK, UL Subframe=2,7)	LTE-TDD	11.96	± 9.6 %
10647	AAF	LTE-TDD (SC-FDMA, 1 RB, 20 MHz, QPSK, UL Subframe=2,7)	LTE-TDD	11.96	± 9.6 %
10648	AAA	CDMA2000 (1x Advanced)	CDMA2000	3.45	± 9.6 %
10652	AAE	LTE-TDD (OFDMA, 5 MHz, E-TM 3.1, Clipping 44%)	LTE-TDD	6.91	± 9.6 %
10653	AAE	LTE-TDD (OFDMA, 10 MHz, E-TM 3.1, Clipping 44%)	LTE-TDD	7.42	± 9.6 %
10654	AAD	LTE-TDD (OFDMA, 15 MHz, E-TM 3.1, Clipping 44%)	LTE-TDD	6.96	± 9.6 %



10655	AAE	LTE-TDD (OFDMA, 20 MHz, E-TM 3.1, Clipping 44%)	LTE-TDD	7.21	± 9.6 %
10658	AAA	Pulse Waveform (200Hz, 10%)	Test	10.00	± 9.6 %
10659	AAA	Pulse Waveform (200Hz, 20%)	Test	6.99	± 9.6 %
10660	AAA	Pulse Waveform (200Hz, 40%)	Test	3.98	± 9.6 %
10661	AAA	Pulse Waveform (200Hz, 60%)	Test	2.22	± 9.6 %
10662	AAA	Pulse Waveform (200Hz, 80%)	Test	0.97	± 9.6 %
10670	AAA	Bluetooth Low Energy	Bluetooth	2.19	± 9.6 %
10671	AAA	IEEE 802.11ax (20MHz, MCS0, 90pc duty cycle)	WLAN	9.09	± 9.6 %
10672	AAA	IEEE 802.11ax (20MHz, MCS1, 90pc duty cycle)	WLAN	8.57	± 9.6 %
10673	AAA	IEEE 802.11ax (20MHz, MCS2, 90pc duty cycle)	WLAN	8.78	± 9.6 %
10674	AAA	IEEE 802.11ax (20MHz, MCS3, 90pc duty cycle)	WLAN	8.74	± 9.6 %
10675	AAA	IEEE 802.11ax (20MHz, MCS4, 90pc duty cycle)	WLAN	8.90	± 9.6 %
10676	AAA	IEEE 802.11ax (20MHz, MCS5, 90pc duty cycle)	WLAN	8.77	± 9.6 %
10677	AAA	IEEE 802.11ax (20MHz, MCS6, 90pc duty cycle)	WLAN	8.73	± 9.6 %
10678	AAA	IEEE 802.11ax (20MHz, MCS7, 90pc duty cycle)	WLAN	8.78	± 9.6 %
10679	AAA	IEEE 802.11ax (20MHz, MCS8, 90pc duty cycle)	WLAN	8.89	± 9.6 %
10680	AAA	IEEE 802.11ax (20MHz, MCS9, 90pc duty cycle)	WLAN	8.80	± 9.6 %
10681	AAA	IEEE 802.11ax (20MHz, MCS10, 90pc duty cycle)	WLAN	8.62	± 9.6 %
10682	AAA	IEEE 802.11ax (20MHz, MCS11, 90pc duty cycle)	WLAN	8.83	± 9.6 %
10683	AAA	IEEE 802.11ax (20MHz, MCS0, 99pc duty cycle)	WLAN	8.42	± 9.6 %
10684	AAA	IEEE 802.11ax (20MHz, MCS1, 99pc duty cycle)	WLAN	8.26	± 9.6 %
10685	AAA	IEEE 802.11ax (20MHz, MCS2, 99pc duty cycle)	WLAN	8.33	± 9.6 %
10686	AAA	IEEE 802.11ax (20MHz, MCS3, 99pc duty cycle)	WLAN	8.28	± 9.6 %
10687	AAA	IEEE 802.11ax (20MHz, MCS4, 99pc duty cycle)	WLAN	8.45	± 9.6 %
10688	AAA	IEEE 802.11ax (20MHz, MCS5, 99pc duty cycle)	WLAN	8.29	± 9.6 %
10689	AAA	IEEE 802.11ax (20MHz, MCS6, 99pc duty cycle)	WLAN	8.55	± 9.6 %
10690	AAA	IEEE 802.11ax (20MHz, MCS7, 99pc duty cycle)	WLAN	8.29	± 9.6 %
10691	AAA	IEEE 802.11ax (20MHz, MCS8, 99pc duty cycle)	WLAN	8.25	± 9.6 %
10692	AAA	IEEE 802.11ax (20MHz, MCS9, 99pc duty cycle)	WLAN	8.29	± 9.6 %
10693	AAA	IEEE 802.11ax (20MHz, MCS10, 99pc duty cycle)	WLAN	8.25	± 9.6 %
10694	AAA	IEEE 802.11ax (20MHz, MCS11, 99pc duty cycle)	WLAN	8.57	± 9.6 %
10695	AAA	IEEE 802.11ax (40MHz, MCS0, 90pc duty cycle)	WLAN	8.78	± 9.6 %
10696	AAA	IEEE 802.11ax (40MHz, MCS1, 90pc duty cycle)	WLAN	8.91	± 9.6 %
10697	AAA	IEEE 802.11ax (40MHz, MCS2, 90pc duty cycle)	WLAN	8.61	± 9.6 %
10698	AAA	IEEE 802.11ax (40MHz, MCS3, 90pc duty cycle)	WLAN	8.89	± 9.6 %
10699	AAA	IEEE 802.11ax (40MHz, MCS4, 90pc duty cycle)	WLAN	8.82	± 9.6 %
10700	AAA	IEEE 802.11ax (40MHz, MCS5, 90pc duty cycle)	WLAN	8.73	± 9.6 %
10701	AAA	IEEE 802.11ax (40MHz, MCS6, 90pc duty cycle)	WLAN	8.86	± 9.6 %
10702	AAA	IEEE 802.11ax (40MHz, MCS7, 90pc duty cycle)	WLAN	8.70	± 9.6 %
10703	AAA	IEEE 802.11ax (40MHz, MCS8, 90pc duty cycle)	WLAN	8.82	± 9.6 %
10704	AAA	IEEE 802.11ax (40MHz, MCS9, 90pc duty cycle)	WLAN	8.56	± 9.6 %
10705	AAA	IEEE 802.11ax (40MHz, MCS10, 90pc duty cycle)	WLAN	8.69	± 9.6 %
10706	AAA	IEEE 802.11ax (40MHz, MCS11, 90pc duty cycle)	WLAN	8.66	± 9.6 %
10707	AAA	IEEE 802.11ax (40MHz, MCS0, 99pc duty cycle)	WLAN	8.32	± 9.6 %
10708	AAA	IEEE 802.11ax (40MHz, MCS1, 99pc duty cycle)	WLAN	8.55	± 9.6 %
10709	AAA	IEEE 802.11ax (40MHz, MCS2, 99pc duty cycle)	WLAN	8.33	± 9.6 %
10710	AAA	IEEE 802.11ax (40MHz, MCS3, 99pc duty cycle)	WLAN	8.29	± 9.6 %
10711	AAA	IEEE 802.11ax (40MHz, MCS4, 99pc duty cycle)	WLAN	8.39	± 9.6 %
10712	AAA	IEEE 802.11ax (40MHz, MCS5, 99pc duty cycle)	WLAN	8.67	± 9.6 %
10713	AAA	IEEE 802.11ax (40MHz, MCS6, 99pc duty cycle)	WLAN	8.33	± 9.6 %
10714	AAA	IEEE 802.11ax (40MHz, MCS7, 99pc duty cycle)	WLAN	8.26	± 9.6 %
10715	AAA	IEEE 802.11ax (40MHz, MCS8, 99pc duty cycle)	WLAN	8.45	± 9.6 %
10716	AAA	IEEE 802.11ax (40MHz, MCS9, 99pc duty cycle)	WLAN	8.30	± 9.6 %
10717	AAA	IEEE 802.11ax (40MHz, MCS10, 99pc duty cycle)	WLAN	8.48	± 9.6 %
10718	AAA	IEEE 802.11ax (40MHz, MCS11, 99pc duty cycle)	WLAN	8.24	± 9.6 %
10719	AAA	IEEE 802.11ax (80MHz, MCS0, 90pc duty cycle)	WLAN	8.81	± 9.6 %
10720	AAA	IEEE 802.11ax (80MHz, MCS1, 90pc duty cycle)	WLAN	8.87	± 9.6 %
10721	AAA	IEEE 802.11ax (80MHz, MCS2, 90pc duty cycle)	WLAN	8.76	± 9.6 %
10722	AAA	IEEE 802.11ax (80MHz, MCS3, 90pc duty cycle)	WLAN	8.55	± 9.6 %
10723	AAA	IEEE 802.11ax (80MHz, MCS4, 90pc duty cycle)	WLAN	8.70	± 9.6 %
10724	AAA	IEEE 802.11ax (80MHz, MCS5, 90pc duty cycle)	WLAN	8.90	± 9.6 %
10725	AAA	IEEE 802.11ax (80MHz, MCS6, 90pc duty cycle)	WLAN	8.74	± 9.6 %
10726	AAA	IEEE 802.11ax (80MHz, MCS7, 90pc duty cycle)	WLAN	8.72	± 9.6 %
10727	AAA	IEEE 802.11ax (80MHz, MCS8, 90pc duty cycle)	WLAN	8.66	± 9.6 %

10728	AAA	IEEE 802.11ax (80MHz, MCS9, 90pc duty cycle)	WLAN	8.65	± 9.6 %
10729	AAA	IEEE 802.11ax (80MHz, MCS10, 90pc duty cycle)	WLAN	8.64	± 9.6 %
10730	AAA	IEEE 802.11ax (80MHz, MCS11, 90pc duty cycle)	WLAN	8.67	± 9.6 %
10731	AAA	IEEE 802.11ax (80MHz, MCS0, 99pc duty cycle)	WLAN	8.42	± 9.6 %
10732	AAA	IEEE 802.11ax (80MHz, MCS1, 99pc duty cycle)	WLAN	8.46	± 9.6 %
10733	AAA	IEEE 802.11ax (80MHz, MCS2, 99pc duty cycle)	WLAN	8.40	± 9.6 %
10734	AAA	IEEE 802.11ax (80MHz, MCS3, 99pc duty cycle)	WLAN	8.25	± 9.6 %
10735	AAA	IEEE 802.11ax (80MHz, MCS4, 99pc duty cycle)	WLAN	8.33	± 9.6 %
10736	AAA	IEEE 802.11ax (80MHz, MCS5, 99pc duty cycle)	WLAN	8.27	± 9.6 %
10737	AAA	IEEE 802.11ax (80MHz, MCS6, 99pc duty cycle)	WLAN	8.36	± 9.6 %
10738	AAA	IEEE 802.11ax (80MHz, MCS7, 99pc duty cycle)	WLAN	8.42	± 9.6 %
10739	AAA	IEEE 802.11ax (80MHz, MCS8, 99pc duty cycle)	WLAN	8.29	± 9.6 %
10740	AAA	IEEE 802.11ax (80MHz, MCS9, 99pc duty cycle)	WLAN	8.48	± 9.6 %
10741	AAA	IEEE 802.11ax (80MHz, MCS10, 99pc duty cycle)	WLAN	8.40	± 9.6 %
10742	AAA	IEEE 802.11ax (80MHz, MCS11, 99pc duty cycle)	WLAN	8.43	± 9.6 %
10743	AAA	IEEE 802.11ax (160MHz, MCS0, 90pc duty cycle)	WLAN	8.94	± 9.6 %
10744	AAA	IEEE 802.11ax (160MHz, MCS1, 90pc duty cycle)	WLAN	9.16	± 9.6 %
10745	AAA	IEEE 802.11ax (160MHz, MCS2, 90pc duty cycle)	WLAN	8.93	± 9.6 %
10746	AAA	IEEE 802.11ax (160MHz, MCS3, 90pc duty cycle)	WLAN	9.11	± 9.6 %
10747	AAA	IEEE 802.11ax (160MHz, MCS4, 90pc duty cycle)	WLAN	9.04	± 9.6 %
10748	AAA	IEEE 802.11ax (160MHz, MCS5, 90pc duty cycle)	WLAN	8.93	± 9.6 %
10749	AAA	IEEE 802.11ax (160MHz, MCS6, 90pc duty cycle)	WLAN	8.90	± 9.6 %
10750	AAA	IEEE 802.11ax (160MHz, MCS7, 90pc duty cycle)	WLAN	8.79	± 9.6 %
10751	AAA	IEEE 802.11ax (160MHz, MCS8, 90pc duty cycle)	WLAN	8.82	± 9.6 %
10752	AAA	IEEE 802.11ax (160MHz, MCS9, 90pc duty cycle)	WLAN	8.81	± 9.6 %
10753	AAA	IEEE 802.11ax (160MHz, MCS10, 90pc duty cycle)	WLAN	9.00	± 9.6 %
10754	AAA	IEEE 802.11ax (160MHz, MCS11, 90pc duty cycle)	WLAN	8.94	± 9.6 %
10755	AAA	IEEE 802.11ax (160MHz, MCS0, 99pc duty cycle)	WLAN	8.64	± 9.6 %
10756	AAA	IEEE 802.11ax (160MHz, MCS1, 99pc duty cycle)	WLAN	8.77	± 9.6 %
10757	AAA	IEEE 802.11ax (160MHz, MCS2, 99pc duty cycle)	WLAN	8.77	± 9.6 %
10758	AAA	IEEE 802.11ax (160MHz, MCS3, 99pc duty cycle)	WLAN	8.69	± 9.6 %
10759	AAA	IEEE 802.11ax (160MHz, MCS4, 99pc duty cycle)	WLAN	8.58	± 9.6 %
10760	AAA	IEEE 802.11ax (160MHz, MCS5, 99pc duty cycle)	WLAN	8.49	± 9.6 %
10761	AAA	IEEE 802.11ax (160MHz, MCS6, 99pc duty cycle)	WLAN	8.58	± 9.6 %
10762	AAA	IEEE 802.11ax (160MHz, MCS7, 99pc duty cycle)	WLAN	8.49	± 9.6 %
10763	AAA	IEEE 802.11ax (160MHz, MCS8, 99pc duty cycle)	WLAN	8.53	± 9.6 %
10764	AAA	IEEE 802.11ax (160MHz, MCS9, 99pc duty cycle)	WLAN	8.54	± 9.6 %
10765	AAA	IEEE 802.11ax (160MHz, MCS10, 99pc duty cycle)	WLAN	8.54	± 9.6 %
10766	AAA	IEEE 802.11ax (160MHz, MCS11, 99pc duty cycle)	WLAN	8.51	± 9.6 %
10767	AAA	5G NR (CP-OFDM, 1 RB, 5 MHz, QPSK, 15 kHz)	5G NR FR1 TDD	7.99	± 9.6 %
10768	AAA	5G NR (CP-OFDM, 1 RB, 10 MHz, QPSK, 15 kHz)	5G NR FR1 TDD	8.01	± 9.6 %
10769	AAA	5G NR (CP-OFDM, 1 RB, 15 MHz, QPSK, 15 kHz)	5G NR FR1 TDD	8.01	± 9.6 %
10770	AAA	5G NR (CP-OFDM, 1 RB, 20 MHz, QPSK, 15 kHz)	5G NR FR1 TDD	8.02	± 9.6 %
10771	AAA	5G NR (CP-OFDM, 1 RB, 25 MHz, QPSK, 15 kHz)	5G NR FR1 TDD	8.02	± 9.6 %
10772	AAA	5G NR (CP-OFDM, 1 RB, 30 MHz, QPSK, 15 kHz)	5G NR FR1 TDD	8.23	± 9.6 %
10773	AAA	5G NR (CP-OFDM, 1 RB, 40 MHz, QPSK, 15 kHz)	5G NR FR1 TDD	8.03	± 9.6 %
10774	AAA	5G NR (CP-OFDM, 1 RB, 50 MHz, QPSK, 15 kHz)	5G NR FR1 TDD	8.02	± 9.6 %
10776	AAA	5G NR (CP-OFDM, 50% RB, 10 MHz, QPSK, 15 kHz)	5G NR FR1 TDD	8.30	± 9.6 %
10778	AAA	5G NR (CP-OFDM, 50% RB, 20 MHz, QPSK, 15 kHz)	5G NR FR1 TDD	8.34	± 9.6 %
10780	AAA	5G NR (CP-OFDM, 50% RB, 30 MHz, QPSK, 15 kHz)	5G NR FR1 TDD	8.38	± 9.6 %
10781	AAA	5G NR (CP-OFDM, 50% RB, 40 MHz, QPSK, 15 kHz)	5G NR FR1 TDD	8.38	± 9.6 %
10782	AAA	5G NR (CP-OFDM, 50% RB, 50 MHz, QPSK, 15 kHz)	5G NR FR1 TDD	8.43	± 9.6 %

10783	AAA	5G NR (CP-OFDM, 100% RB, 5 MHz, QPSK, 15 kHz)	5G NR FR1 TDD	8.31	± 9.6 %
10784	AAA	5G NR (CP-OFDM, 100% RB, 10 MHz, QPSK, 15 kHz)	5G NR FR1 TDD	8.29	± 9.6 %
10785	AAA	5G NR (CP-OFDM, 100% RB, 15 MHz, QPSK, 15 kHz)	5G NR FR1 TDD	8.40	± 9.6 %
10786	AAA	5G NR (CP-OFDM, 100% RB, 20 MHz, QPSK, 15 kHz)	5G NR FR1 TDD	8.35	± 9.6 %
10787	AAA	5G NR (CP-OFDM, 100% RB, 25 MHz, QPSK, 15 kHz)	5G NR FR1 TDD	8.44	± 9.6 %
10788	AAA	5G NR (CP-OFDM, 100% RB, 30 MHz, QPSK, 15 kHz)	5G NR FR1 TDD	8.39	± 9.6 %
10789	AAA	5G NR (CP-OFDM, 100% RB, 40 MHz, QPSK, 15 kHz)	5G NR FR1 TDD	8.37	± 9.6 %
10790	AAA	5G NR (CP-OFDM, 100% RB, 50 MHz, QPSK, 15 kHz)	5G NR FR1 TDD	8.39	± 9.6 %
10791	AAA	5G NR (CP-OFDM, 1 RB, 5 MHz, QPSK, 30 kHz)	5G NR FR1 TDD	7.83	± 9.6 %
10792	AAA	5G NR (CP-OFDM, 1 RB, 10 MHz, QPSK, 30 kHz)	5G NR FR1 TDD	7.92	± 9.6 %
10793	AAA	5G NR (CP-OFDM, 1 RB, 15 MHz, QPSK, 30 kHz)	5G NR FR1 TDD	7.95	± 9.6 %
10794	AAA	5G NR (CP-OFDM, 1 RB, 20 MHz, QPSK, 30 kHz)	5G NR FR1 TDD	7.82	± 9.6 %
10795	AAA	5G NR (CP-OFDM, 1 RB, 25 MHz, QPSK, 30 kHz)	5G NR FR1 TDD	7.84	± 9.6 %
10796	AAA	5G NR (CP-OFDM, 1 RB, 30 MHz, QPSK, 30 kHz)	5G NR FR1 TDD	7.82	± 9.6 %
10797	AAA	5G NR (CP-OFDM, 1 RB, 40 MHz, QPSK, 30 kHz)	5G NR FR1 TDD	8.01	± 9.6 %
10798	AAA	5G NR (CP-OFDM, 1 RB, 50 MHz, QPSK, 30 kHz)	5G NR FR1 TDD	7.89	± 9.6 %
10799	AAA	5G NR (CP-OFDM, 1 RB, 60 MHz, QPSK, 30 kHz)	5G NR FR1 TDD	7.93	± 9.6 %
10801	AAA	5G NR (CP-OFDM, 1 RB, 80 MHz, QPSK, 30 kHz)	5G NR FR1 TDD	7.89	± 9.6 %
10802	AAA	5G NR (CP-OFDM, 1 RB, 90 MHz, QPSK, 30 kHz)	5G NR FR1 TDD	7.87	± 9.6 %
10803	AAA	5G NR (CP-OFDM, 1 RB, 100 MHz, QPSK, 30 kHz)	5G NR FR1 TDD	7.93	± 9.6 %
10805	AAA	5G NR (CP-OFDM, 50% RB, 10 MHz, QPSK, 30 kHz)	5G NR FR1 TDD	8.34	± 9.6 %
10806	AAA	5G NR (CP-OFDM, 50% RB, 15 MHz, QPSK, 30 kHz)	5G NR FR1 TDD	8.37	± 9.6 %
10809	AAA	5G NR (CP-OFDM, 50% RB, 30 MHz, QPSK, 30 kHz)	5G NR FR1 TDD	8.34	± 9.6 %
10810	AAA	5G NR (CP-OFDM, 50% RB, 40 MHz, QPSK, 30 kHz)	5G NR FR1 TDD	8.34	± 9.6 %
10812	AAA	5G NR (CP-OFDM, 50% RB, 60 MHz, QPSK, 30 kHz)	5G NR FR1 TDD	8.35	± 9.6 %
10817	AAA	5G NR (CP-OFDM, 100% RB, 5 MHz, QPSK, 30 kHz)	5G NR FR1 TDD	8.35	± 9.6 %
10818	AAA	5G NR (CP-OFDM, 100% RB, 10 MHz, QPSK, 30 kHz)	5G NR FR1 TDD	8.34	± 9.6 %
10819	AAA	5G NR (CP-OFDM, 100% RB, 15 MHz, QPSK, 30 kHz)	5G NR FR1 TDD	8.33	± 9.6 %
10820	AAA	5G NR (CP-OFDM, 100% RB, 20 MHz, QPSK, 30 kHz)	5G NR FR1 TDD	8.30	± 9.6 %
10821	AAA	5G NR (CP-OFDM, 100% RB, 25 MHz, QPSK, 30 kHz)	5G NR FR1 TDD	8.41	± 9.6 %
10822	AAA	5G NR (CP-OFDM, 100% RB, 30 MHz, QPSK, 30 kHz)	5G NR FR1 TDD	8.41	± 9.6 %
10823	AAA	5G NR (CP-OFDM, 100% RB, 40 MHz, QPSK, 30 kHz)	5G NR FR1 TDD	8.36	± 9.6 %
10824	AAA	5G NR (CP-OFDM, 100% RB, 50 MHz, QPSK, 30 kHz)	5G NR FR1 TDD	8.39	± 9.6 %

10825	AAA	5G NR (CP-OFDM, 100% RB, 60 MHz, QPSK, 30 kHz)	5G NR FR1 TDD	8.41	± 9.6 %
10827	AAA	5G NR (CP-OFDM, 100% RB, 80 MHz, QPSK, 30 kHz)	5G NR FR1 TDD	8.42	± 9.6 %
10828	AAA	5G NR (CP-OFDM, 100% RB, 90 MHz, QPSK, 30 kHz)	5G NR FR1 TDD	8.43	± 9.6 %
10829	AAA	5G NR (CP-OFDM, 100% RB, 100 MHz, QPSK, 30 kHz)	5G NR FR1 TDD	8.40	± 9.6 %
10830	AAA	5G NR (CP-OFDM, 1 RB, 10 MHz, QPSK, 60 kHz)	5G NR FR1 TDD	7.63	± 9.6 %
10831	AAA	5G NR (CP-OFDM, 1 RB, 15 MHz, QPSK, 60 kHz)	5G NR FR1 TDD	7.73	± 9.6 %
10832	AAA	5G NR (CP-OFDM, 1 RB, 20 MHz, QPSK, 60 kHz)	5G NR FR1 TDD	7.74	± 9.6 %
10833	AAA	5G NR (CP-OFDM, 1 RB, 25 MHz, QPSK, 60 kHz)	5G NR FR1 TDD	7.70	± 9.6 %
10834	AAA	5G NR (CP-OFDM, 1 RB, 30 MHz, QPSK, 60 kHz)	5G NR FR1 TDD	7.75	± 9.6 %
10835	AAA	5G NR (CP-OFDM, 1 RB, 40 MHz, QPSK, 60 kHz)	5G NR FR1 TDD	7.70	± 9.6 %
10836	AAA	5G NR (CP-OFDM, 1 RB, 50 MHz, QPSK, 60 kHz)	5G NR FR1 TDD	7.66	± 9.6 %
10837	AAA	5G NR (CP-OFDM, 1 RB, 60 MHz, QPSK, 60 kHz)	5G NR FR1 TDD	7.68	± 9.6 %
10839	AAA	5G NR (CP-OFDM, 1 RB, 80 MHz, QPSK, 60 kHz)	5G NR FR1 TDD	7.70	± 9.6 %
10840	AAA	5G NR (CP-OFDM, 1 RB, 90 MHz, QPSK, 60 kHz)	5G NR FR1 TDD	7.67	± 9.6 %
10841	AAA	5G NR (CP-OFDM, 1 RB, 100 MHz, QPSK, 60 kHz)	5G NR FR1 TDD	7.71	± 9.6 %
10843	AAA	5G NR (CP-OFDM, 50% RB, 15 MHz, QPSK, 60 kHz)	5G NR FR1 TDD	8.49	± 9.6 %
10844	AAA	5G NR (CP-OFDM, 50% RB, 20 MHz, QPSK, 60 kHz)	5G NR FR1 TDD	8.34	± 9.6 %
10846	AAA	5G NR (CP-OFDM, 50% RB, 30 MHz, QPSK, 60 kHz)	5G NR FR1 TDD	8.41	± 9.6 %
10854	AAA	5G NR (CP-OFDM, 100% RB, 10 MHz, QPSK, 60 kHz)	5G NR FR1 TDD	8.34	± 9.6 %
10855	AAA	5G NR (CP-OFDM, 100% RB, 15 MHz, QPSK, 60 kHz)	5G NR FR1 TDD	8.36	± 9.6 %
10856	AAA	5G NR (CP-OFDM, 100% RB, 20 MHz, QPSK, 60 kHz)	5G NR FR1 TDD	8.37	± 9.6 %
10857	AAA	5G NR (CP-OFDM, 100% RB, 25 MHz, QPSK, 60 kHz)	5G NR FR1 TDD	8.35	± 9.6 %
10858	AAA	5G NR (CP-OFDM, 100% RB, 30 MHz, QPSK, 60 kHz)	5G NR FR1 TDD	8.36	± 9.6 %
10859	AAA	5G NR (CP-OFDM, 100% RB, 40 MHz, QPSK, 60 kHz)	5G NR FR1 TDD	8.34	± 9.6 %
10860	AAA	5G NR (CP-OFDM, 100% RB, 50 MHz, QPSK, 60 kHz)	5G NR FR1 TDD	8.41	± 9.6 %
10861	AAA	5G NR (CP-OFDM, 100% RB, 60 MHz, QPSK, 60 kHz)	5G NR FR1 TDD	8.40	± 9.6 %
10863	AAA	5G NR (CP-OFDM, 100% RB, 80 MHz, QPSK, 60 kHz)	5G NR FR1 TDD	8.41	± 9.6 %
10864	AAA	5G NR (CP-OFDM, 100% RB, 90 MHz, QPSK, 60 kHz)	5G NR FR1 TDD	8.37	± 9.6 %
10865	AAA	5G NR (CP-OFDM, 100% RB, 100 MHz, QPSK, 60 kHz)	5G NR FR1 TDD	8.41	± 9.6 %
10866	AAA	5G NR (DFT-s-OFDM, 1 RB, 100 MHz, QPSK, 30 kHz)	5G NR FR1 TDD	5.68	± 9.6 %
10868	AAA	5G NR (DFT-s-OFDM, 100% RB, 100 MHz, QPSK, 30 kHz)	5G NR FR1 TDD	5.89	± 9.6 %
10869	AAA	5G NR (DFT-s-OFDM, 1 RB, 100 MHz, QPSK, 120 kHz)	5G NR FR2 TDD	5.75	± 9.6 %
10870	AAA	5G NR (DFT-s-OFDM, 100% RB, 100 MHz, QPSK, 120 kHz)	5G NR FR2 TDD	5.86	± 9.6 %

10871	AAA	5G NR (DFT-s-OFDM, 1 RB, 100 MHz, 16QAM, 120 kHz)	5G NR FR2 TDD	5.75	± 9.6 %
10872	AAA	5G NR (DFT-s-OFDM, 100% RB, 100 MHz, 16QAM, 120 kHz)	5G NR FR2 TDD	6.52	± 9.6 %
10873	AAA	5G NR (DFT-s-OFDM, 1 RB, 100 MHz, 64QAM, 120 kHz)	5G NR FR2 TDD	6.61	± 9.6 %
10874	AAA	5G NR (DFT-s-OFDM, 100% RB, 100 MHz, 64QAM, 120 kHz)	5G NR FR2 TDD	6.65	± 9.6 %
10875	AAA	5G NR (CP-OFDM, 1 RB, 100 MHz, QPSK, 120 kHz)	5G NR FR2 TDD	7.78	± 9.6 %
10876	AAA	5G NR (CP-OFDM, 100% RB, 100 MHz, QPSK, 120 kHz)	5G NR FR2 TDD	8.39	± 9.6 %
10877	AAA	5G NR (CP-OFDM, 1 RB, 100 MHz, 16QAM, 120 kHz)	5G NR FR2 TDD	7.95	± 9.6 %
10878	AAA	5G NR (CP-OFDM, 100% RB, 100 MHz, 16QAM, 120 kHz)	5G NR FR2 TDD	8.41	± 9.6 %
10879	AAA	5G NR (CP-OFDM, 1 RB, 100 MHz, 64QAM, 120 kHz)	5G NR FR2 TDD	8.12	± 9.6 %
10880	AAA	5G NR (CP-OFDM, 100% RB, 100 MHz, 64QAM, 120 kHz)	5G NR FR2 TDD	8.38	± 9.6 %
10881	AAA	5G NR (DFT-s-OFDM, 1 RB, 50 MHz, QPSK, 120 kHz)	5G NR FR2 TDD	5.75	± 9.6 %
10882	AAA	5G NR (DFT-s-OFDM, 100% RB, 50 MHz, QPSK, 120 kHz)	5G NR FR2 TDD	5.96	± 9.6 %
10883	AAA	5G NR (DFT-s-OFDM, 1 RB, 50 MHz, 16QAM, 120 kHz)	5G NR FR2 TDD	6.57	± 9.6 %
10884	AAA	5G NR (DFT-s-OFDM, 100% RB, 50 MHz, 16QAM, 120 kHz)	5G NR FR2 TDD	6.53	± 9.6 %
10885	AAA	5G NR (DFT-s-OFDM, 1 RB, 50 MHz, 64QAM, 120 kHz)	5G NR FR2 TDD	6.61	± 9.6 %
10886	AAA	5G NR (DFT-s-OFDM, 100% RB, 50 MHz, 64QAM, 120 kHz)	5G NR FR2 TDD	6.65	± 9.6 %
10887	AAA	5G NR (CP-OFDM, 1 RB, 50 MHz, QPSK, 120 kHz)	5G NR FR2 TDD	7.78	± 9.6 %
10888	AAA	5G NR (CP-OFDM, 100% RB, 50 MHz, QPSK, 120 kHz)	5G NR FR2 TDD	8.35	± 9.6 %
10889	AAA	5G NR (CP-OFDM, 1 RB, 50 MHz, 16QAM, 120 kHz)	5G NR FR2 TDD	8.02	± 9.6 %
10890	AAA	5G NR (CP-OFDM, 100% RB, 50 MHz, 16QAM, 120 kHz)	5G NR FR2 TDD	8.40	± 9.6 %
10891	AAA	5G NR (CP-OFDM, 1 RB, 50 MHz, 64QAM, 120 kHz)	5G NR FR2 TDD	8.13	± 9.6 %
10892	AAA	5G NR (CP-OFDM, 100% RB, 50 MHz, 64QAM, 120 kHz)	5G NR FR2 TDD	8.41	± 9.6 %

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



## Appendix E. Dipole Calibration

	Instrument	Manufacturer	Model No.	Serial No.
	Reference Dipole 450MHz	Speag	D450V3	1108
	Reference Dipole 750MHz	Speag	D750V3	1031
	Reference Dipole 835Mhz	Speag	ALS-D-835	QTK-315
	Reference Dipole 900MHz	Speag	D900V2	1d176
	Reference Dipole 1450MHz	Speag	D1450V2	1056
	Reference Dipole 1640MHz	Speag	D1640V2	329
	Reference Dipole 1750MHz	Speag	D1750V2	1113
	Reference Dipole 1800MHz	Speag	D1800V2	2d221
	Reference Dipole 1900MHz	Speag	D1900V2	5d184
	Reference Dipole 1950MHz	Speag	D1950V3	1213
	Reference Dipole 2300MHz	Speag	D2300V2	1045
X	Reference Dipole 2450MHz	Speag	D2450V2	930
	Reference Dipole 2600MHz	Speag	ALS-D-2600	QTK-225
	Reference Dipole 3500MHz	Speag	ALS-D-3500	QTK-228
	Reference Dipole 3700MHz	Speag	D3700V2	1056
X	Reference Dipole 5GHz	Speag	D5GHzV2	1041

Note: The test dipole antenna marked with "X" are used to measure the final test results.

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



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

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Multilateral Agreement for the recognition of calibration certificates

Accreditation No.: **SCS 0108**

Client **DEKRA (Auden)**

Certificate No: **D2450V2-930\_Nov19**

# CALIBRATION CERTIFICATE

Object: **D2450V2 - SN:930**

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


Calibration date: **November 21, 2019**


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

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

Calibration Equipment used (M&TE critical for calibration)

Primary Standards	ID #	Cal Date (Certificate No.)	Scheduled Calibration
Power meter NRP	SN: 104778	03-Apr-19 (No. 217-02892/02893)	Apr-20
Power sensor NRP-Z91	SN: 103244	03-Apr-19 (No. 217-02892)	Apr-20
Power sensor NRP-Z91	SN: 103245	03-Apr-19 (No. 217-02893)	Apr-20
Reference 20 dB Attenuator	SN: 5058 (20k)	04-Apr-19 (No. 217-02894)	Apr-20
Type-N mismatch combination	SN: 5047.2 / 06327	04-Apr-19 (No. 217-02895)	Apr-20
Reference Probe EX3DV4	SN: 7349	29-May-19 (No. EX3-7349_May19)	May-20
DAE4	SN: 601	30-Apr-19 (No. DAE4-601_Apr19)	Apr-20
Secondary Standards	ID #	Check Date (in house)	Scheduled Check
Power meter E4419B	SN: GB39512475	30-Oct-14 (in house check Feb-19)	In house check: Oct-20
Power sensor HP 8481A	SN: US37292783	07-Oct-15 (in house check Oct-18)	In house check: Oct-20
Power sensor HP 8481A	SN: MY41092317	07-Oct-15 (in house check Oct-18)	In house check: Oct-20
RF generator R&S SMT-06	SN: 100972	15-Jun-15 (in house check Oct-18)	In house check: Oct-20
Network Analyzer Agilent E8358A	SN: US41080477	31-Mar-14 (in house check Oct-19)	In house check: Oct-20

Calibrated by: **Claudio Leubler** (Name), **Laboratory Technician** (Function),  (Signature)

Approved by: **Katja Pokovic** (Name), **Technical Manager** (Function),  (Signature)

Issued: November 25, 2019

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Multilateral Agreement for the recognition of calibration certificates

**Glossary:**

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

**Calibration is Performed According to the Following Standards:**

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

**Additional Documentation:**

- DASY4/5 System Handbook

**Methods Applied and Interpretation of Parameters:**

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

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



## Measurement Conditions

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

DASY Version	DASY5	V52.10.3
Extrapolation	Advanced Extrapolation	
Phantom	Modular Flat Phantom	
Distance Dipole Center - TSL	10 mm	with Spacer
Zoom Scan Resolution	dx, dy, dz = 5 mm	
Frequency	2450 MHz $\pm$ 1 MHz	

## Head TSL parameters

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Head TSL parameters	22.0 °C	39.2	1.80 mho/m
Measured Head TSL parameters	(22.0 $\pm$ 0.2) °C	38.2 $\pm$ 6 %	1.84 mho/m $\pm$ 6 %
Head TSL temperature change during test	< 0.5 °C	----	----

## SAR result with Head TSL

SAR averaged over 1 cm <sup>3</sup> (1 g) of Head TSL	Condition	
SAR measured	250 mW input power	13.5 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	<b>53.1 W/kg <math>\pm</math> 17.0 % (k=2)</b>

SAR averaged over 10 cm <sup>3</sup> (10 g) of Head TSL	condition	
SAR measured	250 mW input power	6.22 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	<b>24.6 W/kg <math>\pm</math> 16.5 % (k=2)</b>

## Body TSL parameters

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Body TSL parameters	22.0 °C	52.7	1.95 mho/m
Measured Body TSL parameters	(22.0 $\pm$ 0.2) °C	50.8 $\pm$ 6 %	2.01 mho/m $\pm$ 6 %
Body TSL temperature change during test	< 0.5 °C	----	----

## SAR result with Body TSL

SAR averaged over 1 cm <sup>3</sup> (1 g) of Body TSL	Condition	
SAR measured	250 mW input power	13.3 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	<b>52.0 W/kg <math>\pm</math> 17.0 % (k=2)</b>

SAR averaged over 10 cm <sup>3</sup> (10 g) of Body TSL	condition	
SAR measured	250 mW input power	6.17 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	<b>24.3 W/kg <math>\pm</math> 16.5 % (k=2)</b>

## Appendix (Additional assessments outside the scope of SCS 0108)

### Antenna Parameters with Head TSL

Impedance, transformed to feed point	54.4 $\Omega$ + 3.8 j $\Omega$
Return Loss	- 25.2 dB

### Antenna Parameters with Body TSL

Impedance, transformed to feed point	51.2 $\Omega$ + 5.1 j $\Omega$
Return Loss	- 25.8 dB

### General Antenna Parameters and Design

Electrical Delay (one direction)	1.158 ns
----------------------------------	----------

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

The dipole is made of standard semirigid coaxial cable. The center conductor of the feeding line is directly connected to the second arm of the dipole. The antenna is therefore short-circuited for DC-signals. On some of the dipoles, small end caps are added to the dipole arms in order to improve matching when loaded according to the position as explained in the "Measurement Conditions" paragraph. The SAR data are not affected by this change. The overall dipole length is still according to the Standard.

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

### Additional EUT Data

Manufactured by	SPEAG
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# DASY5 Validation Report for Head TSL

Date: 21.11.2019

Test Laboratory: SPEAG, Zurich, Switzerland

**DUT: Dipole 2450 MHz; Type: D2450V2; Serial: D2450V2 - SN:930**

Communication System: UID 0 - CW; Frequency: 2450 MHz

Medium parameters used:  $f = 2450$  MHz;  $\sigma = 1.84$  S/m;  $\epsilon_r = 38.2$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Phantom section: Flat Section

Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2011)

DASY52 Configuration:

- Probe: EX3DV4 - SN7349; ConvF(7.9, 7.9, 7.9) @ 2450 MHz; Calibrated: 29.05.2019
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 30.04.2019
- Phantom: Flat Phantom 5.0 (front); Type: QD 000 P50 AA; Serial: 1001
- DASY52 52.10.3(1513); SEMCAD X 14.6.13(7474)

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

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

Reference Value = 117.5 V/m; Power Drift = 0.07 dB

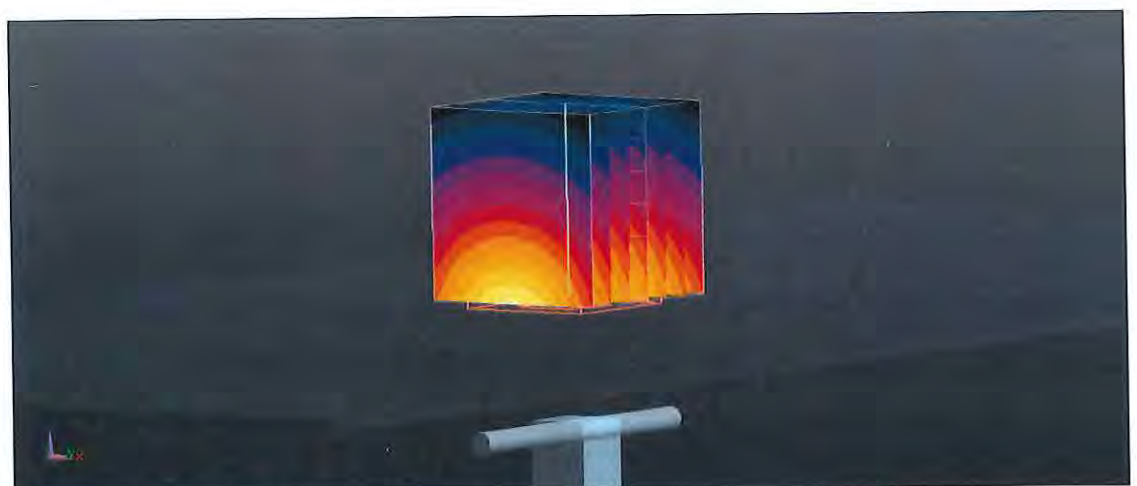
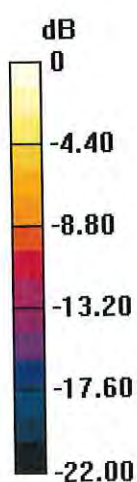
Peak SAR (extrapolated) = 26.6 W/kg

**SAR(1 g) = 13.5 W/kg; SAR(10 g) = 6.22 W/kg**

Smallest distance from peaks to all points 3 dB below = 9 mm

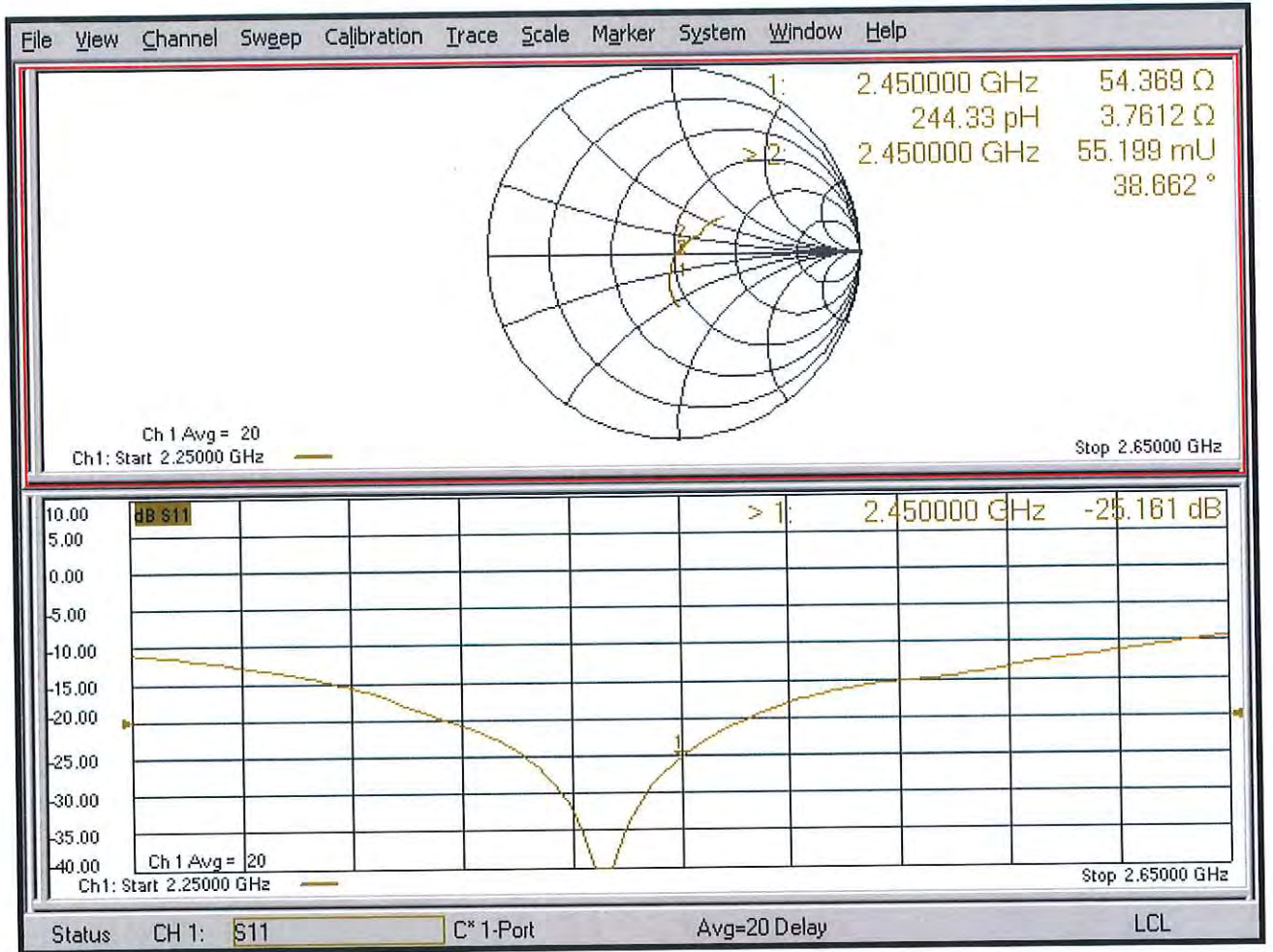
Ratio of SAR at M2 to SAR at M1 = 50.8%

Maximum value of SAR (measured) = 22.0 W/kg



0 dB = 22.0 W/kg = 13.42 dBW/kg

# Impedance Measurement Plot for Head TSL



# DASY5 Validation Report for Body TSL

Date: 21.11.2019

Test Laboratory: SPEAG, Zurich, Switzerland

**DUT: Dipole 2450 MHz; Type: D2450V2; Serial: D2450V2 - SN:930**

Communication System: UID 0 - CW; Frequency: 2450 MHz

Medium parameters used:  $f = 2450$  MHz;  $\sigma = 2.01$  S/m;  $\epsilon_r = 50.8$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Phantom section: Flat Section

Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2011)

DASY52 Configuration:

- Probe: EX3DV4 - SN7349; ConvF(7.94, 7.94, 7.94) @ 2450 MHz; Calibrated: 29.05.2019
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 30.04.2019
- Phantom: Flat Phantom 5.0 (back); Type: QD 000 P50 AA; Serial: 1002
- DASY52 52.10.3(1513); SEMCAD X 14.6.13(7474)

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

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

Reference Value = 110.8 V/m; Power Drift = -0.03 dB

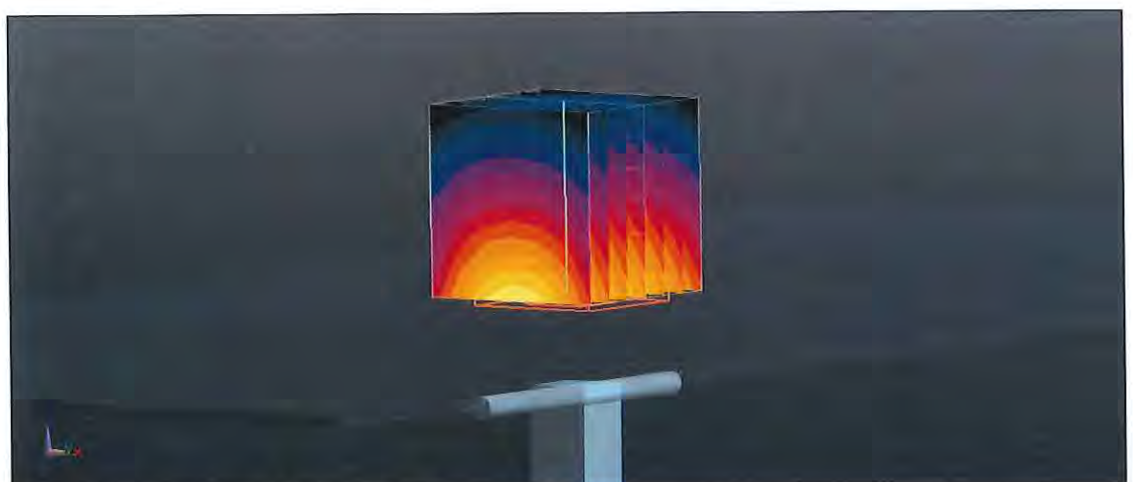
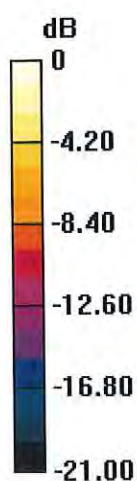
Peak SAR (extrapolated) = 26.5 W/kg

**SAR(1 g) = 13.3 W/kg; SAR(10 g) = 6.17 W/kg**

Smallest distance from peaks to all points 3 dB below = 8.5 mm

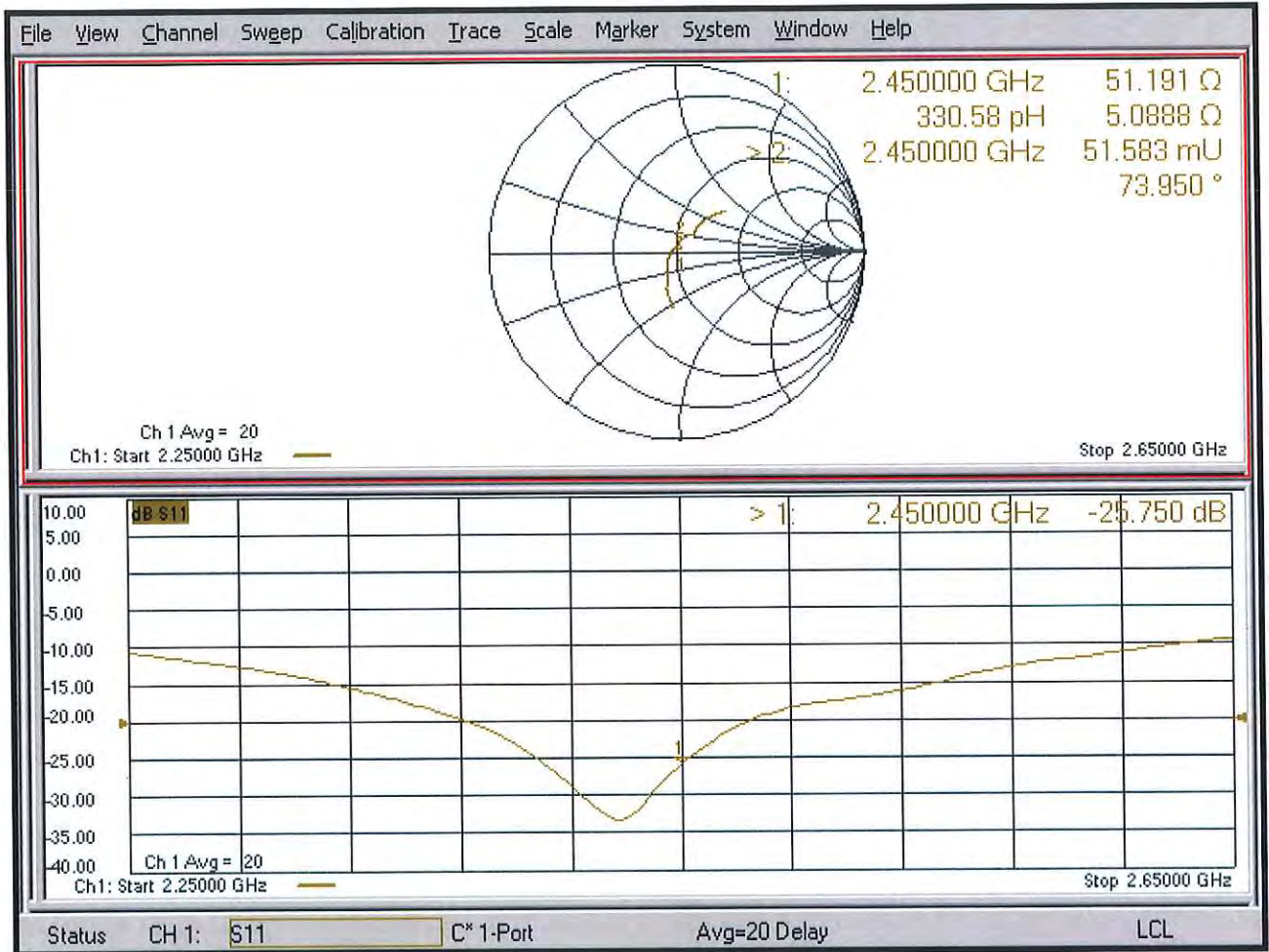
Ratio of SAR at M2 to SAR at M1 = 51%

Maximum value of SAR (measured) = 21.9 W/kg



0 dB = 21.9 W/kg = 13.40 dBW/kg

# Impedance Measurement Plot for Body TSL



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



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

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Multilateral Agreement for the recognition of calibration certificates

Accreditation No.: **SCS 0108**

Client **DEKRA (Auden)**

Certificate No: **D5GHzV2-1041\_May17**

## CALIBRATION CERTIFICATE

Object **D5GHzV2 - SN:1041**

Calibration procedure(s) **QA CAL-22.v2**  
**Calibration procedure for dipole validation kits between 3-6 GHz**

Calibration date: **May 26, 2017**

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

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

Calibration Equipment used (M&TE critical for calibration)

Primary Standards	ID #	Cal Date (Certificate No.)	Scheduled Calibration
Power meter NRP	SN: 104778	04-Apr-17 (No. 217-02521/02522)	Apr-18
Power sensor NRP-Z91	SN: 103244	04-Apr-17 (No. 217-02521)	Apr-18
Power sensor NRP-Z91	SN: 103245	04-Apr-17 (No. 217-02522)	Apr-18
Reference 20 dB Attenuator	SN: 5058 (20k)	07-Apr-17 (No. 217-02528)	Apr-18
Type-N mismatch combination	SN: 5047.2 / 06327	07-Apr-17 (No. 217-02529)	Apr-18
Reference Probe EX3DV4	SN: 3503	31-Dec-16 (No. EX3-3503_Dec16)	Dec-17
DAE4	SN: 601	28-Mar-17 (No. DAE4-601_Mar17)	Mar-18

Secondary Standards	ID #	Check Date (in house)	Scheduled Check
Power meter EPM-442A	SN: GB37480704	07-Oct-15 (in house check Oct-16)	In house check: Oct-18
Power sensor HP 8481A	SN: US37292783	07-Oct-15 (in house check Oct-16)	In house check: Oct-18
Power sensor HP 8481A	SN: MY41092317	07-Oct-15 (in house check Oct-16)	In house check: Oct-18
RF generator R&S SMT-06	SN: 100972	15-Jun-15 (in house check Oct-16)	In house check: Oct-18
Network Analyzer HP 8753E	SN: US37390585	18-Oct-01 (in house check Oct-16)	In house check: Oct-17

Calibrated by:	Name <b>Johannes Kurikka</b>	Function <b>Laboratory Technician</b>	Signature 
Approved by:	Name <b>Katja Pokovic</b>	Function <b>Technical Manager</b>	Signature 

Issued: June 14, 2017

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### Glossary:

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

### Calibration is Performed According to the Following Standards:

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

### Additional Documentation:

- DASY4/5 System Handbook

### Methods Applied and Interpretation of Parameters:

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

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



## Measurement Conditions

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

DASY Version	DASY5	V52.10.0
Extrapolation	Advanced Extrapolation	
Phantom	Modular Flat Phantom V5.0	
Distance Dipole Center - TSL	10 mm	with Spacer
Zoom Scan Resolution	dx, dy = 4.0 mm, dz = 1.4 mm	Graded Ratio = 1.4 (Z direction)
Frequency	5200 MHz ± 1 MHz 5300 MHz ± 1 MHz 5500 MHz ± 1 MHz 5600 MHz ± 1 MHz 5800 MHz ± 1 MHz	

## Head TSL parameters at 5200 MHz

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Head TSL parameters	22.0 °C	36.0	4.66 mho/m
Measured Head TSL parameters	(22.0 ± 0.2) °C	34.8 ± 6 %	4.55 mho/m ± 6 %
Head TSL temperature change during test	< 0.5 °C	----	----

## SAR result with Head TSL at 5200 MHz

SAR averaged over 1 cm <sup>3</sup> (1 g) of Head TSL	Condition	
SAR measured	100 mW input power	8.20 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	<b>81.4 W/kg ± 19.9 % (k=2)</b>

SAR averaged over 10 cm <sup>3</sup> (10 g) of Head TSL	condition	
SAR measured	100 mW input power	2.34 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	<b>23.2 W/kg ± 19.5 % (k=2)</b>

## Head TSL parameters at 5300 MHz

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Head TSL parameters	22.0 °C	35.9	4.76 mho/m
Measured Head TSL parameters	(22.0 ± 0.2) °C	34.7 ± 6 %	4.64 mho/m ± 6 %
Head TSL temperature change during test	< 0.5 °C	----	----

## SAR result with Head TSL at 5300 MHz

SAR averaged over 1 cm <sup>3</sup> (1 g) of Head TSL	Condition	
SAR measured	100 mW input power	8.36 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	<b>83.0 W / kg ± 19.9 % (k=2)</b>

SAR averaged over 10 cm <sup>3</sup> (10 g) of Head TSL	condition	
SAR measured	100 mW input power	2.40 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	<b>23.8 W/kg ± 19.5 % (k=2)</b>

### Head TSL parameters at 5500 MHz

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Head TSL parameters	22.0 °C	35.6	4.96 mho/m
Measured Head TSL parameters	(22.0 ± 0.2) °C	34.4 ± 6 %	4.84 mho/m ± 6 %
Head TSL temperature change during test	< 0.5 °C	----	----

### SAR result with Head TSL at 5500 MHz

SAR averaged over 1 cm <sup>3</sup> (1 g) of Head TSL	Condition	
SAR measured	100 mW input power	8.47 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	<b>84.0 W/kg ± 19.9 % (k=2)</b>

SAR averaged over 10 cm <sup>3</sup> (10 g) of Head TSL	condition	
SAR measured	100 mW input power	2.40 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	<b>23.8 W/kg ± 19.5 % (k=2)</b>

### Head TSL parameters at 5600 MHz

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Head TSL parameters	22.0 °C	35.5	5.07 mho/m
Measured Head TSL parameters	(22.0 ± 0.2) °C	34.2 ± 6 %	4.95 mho/m ± 6 %
Head TSL temperature change during test	< 0.5 °C	----	----

### SAR result with Head TSL at 5600 MHz

SAR averaged over 1 cm <sup>3</sup> (1 g) of Head TSL	Condition	
SAR measured	100 mW input power	8.75 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	<b>86.7 W/kg ± 19.9 % (k=2)</b>

SAR averaged over 10 cm <sup>3</sup> (10 g) of Head TSL	condition	
SAR measured	100 mW input power	2.48 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	<b>24.5 W/kg ± 19.5 % (k=2)</b>

## Head TSL parameters at 5800 MHz

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Head TSL parameters	22.0 °C	35.3	5.27 mho/m
Measured Head TSL parameters	(22.0 ± 0.2) °C	34.0 ± 6 %	5.16 mho/m ± 6 %
Head TSL temperature change during test	< 0.5 °C	----	----

## SAR result with Head TSL at 5800 MHz

SAR averaged over 1 cm <sup>3</sup> (1 g) of Head TSL	Condition	
SAR measured	100 mW input power	8.38 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	<b>83.1 W/kg ± 19.9 % (k=2)</b>

SAR averaged over 10 cm <sup>3</sup> (10 g) of Head TSL	condition	
SAR measured	100 mW input power	2.37 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	<b>23.5 W/kg ± 19.5 % (k=2)</b>

### Body TSL parameters at 5200 MHz

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Body TSL parameters	22.0 °C	49.0	5.30 mho/m
Measured Body TSL parameters	(22.0 ± 0.2) °C	47.6 ± 6 %	5.44 mho/m ± 6 %
Body TSL temperature change during test	< 0.5 °C	----	----

### SAR result with Body TSL at 5200 MHz

SAR averaged over 1 cm <sup>3</sup> (1 g) of Body TSL	Condition	
SAR measured	100 mW input power	7.51 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	74.7 W/kg ± 19.9 % (k=2)

SAR averaged over 10 cm <sup>3</sup> (10 g) of Body TSL	condition	
SAR measured	100 mW input power	2.11 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	21.0 W/kg ± 19.5 % (k=2)

### Body TSL parameters at 5300 MHz

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Body TSL parameters	22.0 °C	48.9	5.42 mho/m
Measured Body TSL parameters	(22.0 ± 0.2) °C	47.4 ± 6 %	5.57 mho/m ± 6 %
Body TSL temperature change during test	< 0.5 °C	----	----

### SAR result with Body TSL at 5300 MHz

SAR averaged over 1 cm <sup>3</sup> (1 g) of Body TSL	Condition	
SAR measured	100 mW input power	7.81 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	77.7 W/kg ± 19.9 % (k=2)

SAR averaged over 10 cm <sup>3</sup> (10 g) of Body TSL	condition	
SAR measured	100 mW input power	2.20 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	21.9 W/kg ± 19.5 % (k=2)

### Body TSL parameters at 5500 MHz

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Body TSL parameters	22.0 °C	48.6	5.65 mho/m
Measured Body TSL parameters	(22.0 ± 0.2) °C	47.0 ± 6 %	5.84 mho/m ± 6 %
Body TSL temperature change during test	< 0.5 °C	----	----

### SAR result with Body TSL at 5500 MHz

SAR averaged over 1 cm <sup>3</sup> (1 g) of Body TSL	Condition	
SAR measured	100 mW input power	8.14 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	<b>81.0 W/kg ± 19.9 % (k=2)</b>

SAR averaged over 10 cm <sup>3</sup> (10 g) of Body TSL	condition	
SAR measured	100 mW input power	2.26 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	<b>22.4 W/kg ± 19.5 % (k=2)</b>

### Body TSL parameters at 5600 MHz

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Body TSL parameters	22.0 °C	48.5	5.77 mho/m
Measured Body TSL parameters	(22.0 ± 0.2) °C	46.9 ± 6 %	5.98 mho/m ± 6 %
Body TSL temperature change during test	< 0.5 °C	----	----

### SAR result with Body TSL at 5600 MHz

SAR averaged over 1 cm <sup>3</sup> (1 g) of Body TSL	Condition	
SAR measured	100 mW input power	8.13 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	<b>80.9 W/kg ± 19.9 % (k=2)</b>

SAR averaged over 10 cm <sup>3</sup> (10 g) of Body TSL	condition	
SAR measured	100 mW input power	2.28 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	<b>22.6 W/kg ± 19.5 % (k=2)</b>

## Body TSL parameters at 5800 MHz

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Body TSL parameters	22.0 °C	48.2	6.00 mho/m
Measured Body TSL parameters	(22.0 ± 0.2) °C	46.5 ± 6 %	6.26 mho/m ± 6 %
Body TSL temperature change during test	< 0.5 °C	----	----

## SAR result with Body TSL at 5800 MHz

SAR averaged over 1 cm <sup>3</sup> (1 g) of Body TSL	Condition	
SAR measured	100 mW input power	7.87 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	<b>78.3 W/kg ± 19.9 % (k=2)</b>

SAR averaged over 10 cm <sup>3</sup> (10 g) of Body TSL	condition	
SAR measured	100 mW input power	2.19 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	<b>21.7 W/kg ± 19.5 % (k=2)</b>

## Appendix (Additional assessments outside the scope of SCS 0108)

### Antenna Parameters with Head TSL at 5200 MHz

Impedance, transformed to feed point	49.8 $\Omega$ - 8.3 j $\Omega$
Return Loss	- 21.6 dB

### Antenna Parameters with Head TSL at 5300 MHz

Impedance, transformed to feed point	48.0 $\Omega$ - 2.8 j $\Omega$
Return Loss	- 29.0 dB

### Antenna Parameters with Head TSL at 5500 MHz

Impedance, transformed to feed point	51.0 $\Omega$ - 4.4 j $\Omega$
Return Loss	- 26.9 dB

### Antenna Parameters with Head TSL at 5600 MHz

Impedance, transformed to feed point	55.2 $\Omega$ - 1.6 j $\Omega$
Return Loss	- 25.7 dB

### Antenna Parameters with Head TSL at 5800 MHz

Impedance, transformed to feed point	56.2 $\Omega$ + 0.5 j $\Omega$
Return Loss	- 24.6 dB

### Antenna Parameters with Body TSL at 5200 MHz

Impedance, transformed to feed point	49.0 $\Omega$ - 6.2 j $\Omega$
Return Loss	- 24.0 dB

### Antenna Parameters with Body TSL at 5300 MHz

Impedance, transformed to feed point	48.4 $\Omega$ - 2.1 j $\Omega$
Return Loss	- 31.5 dB

### Antenna Parameters with Body TSL at 5500 MHz

Impedance, transformed to feed point	49.9 $\Omega$ - 2.3 j $\Omega$
Return Loss	- 32.6 dB

### Antenna Parameters with Body TSL at 5600 MHz

Impedance, transformed to feed point	56.5 $\Omega$ - 0.4 j $\Omega$
Return Loss	- 24.3 dB

### Antenna Parameters with Body TSL at 5800 MHz

Impedance, transformed to feed point	56.2 $\Omega$ + 0.1 j $\Omega$
Return Loss	- 24.7 dB

### General Antenna Parameters and Design

Electrical Delay (one direction)	1.199 ns
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After long term use with 100W radiated power, only a slight warming of the dipole near the feedpoint can be measured.

The dipole is made of standard semirigid coaxial cable. The center conductor of the feeding line is directly connected to the second arm of the dipole. The antenna is therefore short-circuited for DC-signals. On some of the dipoles, small end caps are added to the dipole arms in order to improve matching when loaded according to the position as explained in the "Measurement Conditions" paragraph. The SAR data are not affected by this change. The overall dipole length is still according to the Standard.

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

### Additional EUT Data

Manufactured by	SPEAG
Manufactured on	December 30, 2005



## DASY5 Validation Report for Head TSL

Date: 19.05.2017

Test Laboratory: SPEAG, Zurich, Switzerland

**DUT: Dipole D5GHzV2; Type: D5GHzV2; Serial: D5GHzV2 - SN:1041**

Communication System: UID 0 - CW; Frequency: 5200 MHz, Frequency: 5300 MHz, Frequency: 5500 MHz, Frequency: 5600 MHz, Frequency: 5800 MHz

Medium parameters used:  $f = 5200$  MHz;  $\sigma = 4.55$  S/m;  $\epsilon_r = 34.8$ ;  $\rho = 1000$  kg/m<sup>3</sup>, Medium parameters used:  $f = 5300$  MHz;  $\sigma = 4.64$  S/m;  $\epsilon_r = 34.7$ ;  $\rho = 1000$  kg/m<sup>3</sup>, Medium parameters used:  $f = 5500$  MHz;  $\sigma = 4.84$  S/m;  $\epsilon_r = 34.4$ ;  $\rho = 1000$  kg/m<sup>3</sup>, Medium parameters used:  $f = 5600$  MHz;  $\sigma = 4.95$  S/m;  $\epsilon_r = 34.2$ ;  $\rho = 1000$  kg/m<sup>3</sup>, Medium parameters used:  $f = 5800$  MHz;  $\sigma = 5.16$  S/m;  $\epsilon_r = 34$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Phantom section: Flat Section

Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2011)

DASY52 Configuration:

- Probe: EX3DV4 - SN3503; ConvF(5.76, 5.76, 5.76); Calibrated: 31.12.2016, ConvF(5.35, 5.35, 5.35); Calibrated: 31.12.2016, ConvF(5.2, 5.2, 5.2); Calibrated: 31.12.2016, ConvF(5.09, 5.09, 5.09); Calibrated: 31.12.2016, ConvF(5.01, 5.01, 5.01); Calibrated: 31.12.2016;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 28.03.2017
- Phantom: Flat Phantom 5.0 (front); Type: QD000P50AA; Serial: 1001
- DASY52 52.10.0(1446); SEMCAD X 14.6.10(7417)

### **Dipole Calibration for Head Tissue/Pin=100mW, dist=10mm, f=5200 MHz/Zoom Scan,**

**dist=1.4mm (8x8x7)/Cube 0:** Measurement grid: dx=4mm, dy=4mm, dz=1.4mm

Reference Value = 73.20 V/m; Power Drift = -0.08 dB

Peak SAR (extrapolated) = 30.6 W/kg

**SAR(1 g) = 8.2 W/kg; SAR(10 g) = 2.34 W/kg**

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

### **Dipole Calibration for Head Tissue/Pin=100mW, dist=10mm, f=5300 MHz/Zoom Scan,**

**dist=1.4mm (8x8x7)/Cube 0:** Measurement grid: dx=4mm, dy=4mm, dz=1.4mm

Reference Value = 74.01 V/m; Power Drift = -0.06 dB

Peak SAR (extrapolated) = 30.3 W/kg

**SAR(1 g) = 8.36 W/kg; SAR(10 g) = 2.4 W/kg**

Maximum value of SAR (measured) = 19.4 W/kg

### **Dipole Calibration for Head Tissue/Pin=100mW, dist=10mm, f=5500 MHz/Zoom Scan,**

**dist=1.4mm (8x8x7)/Cube 0:** Measurement grid: dx=4mm, dy=4mm, dz=1.4mm

Reference Value = 73.45 V/m; Power Drift = -0.06 dB

Peak SAR (extrapolated) = 33.2 W/kg

**SAR(1 g) = 8.47 W/kg; SAR(10 g) = 2.4 W/kg**

Maximum value of SAR (measured) = 20.2 W/kg

**Dipole Calibration for Head Tissue/Pin=100mW, dist=10mm, f=5600 MHz/Zoom Scan,**

**dist=1.4mm (8x8x7)/Cube 0:** Measurement grid: dx=4mm, dy=4mm, dz=1.4mm

Reference Value = 74.23 V/m; Power Drift = -0.02 dB

Peak SAR (extrapolated) = 34.9 W/kg

**SAR(1 g) = 8.75 W/kg; SAR(10 g) = 2.48 W/kg**

Maximum value of SAR (measured) = 21.0 W/kg

**Dipole Calibration for Head Tissue/Pin=100mW, dist=10mm, f=5800 MHz/Zoom Scan,**

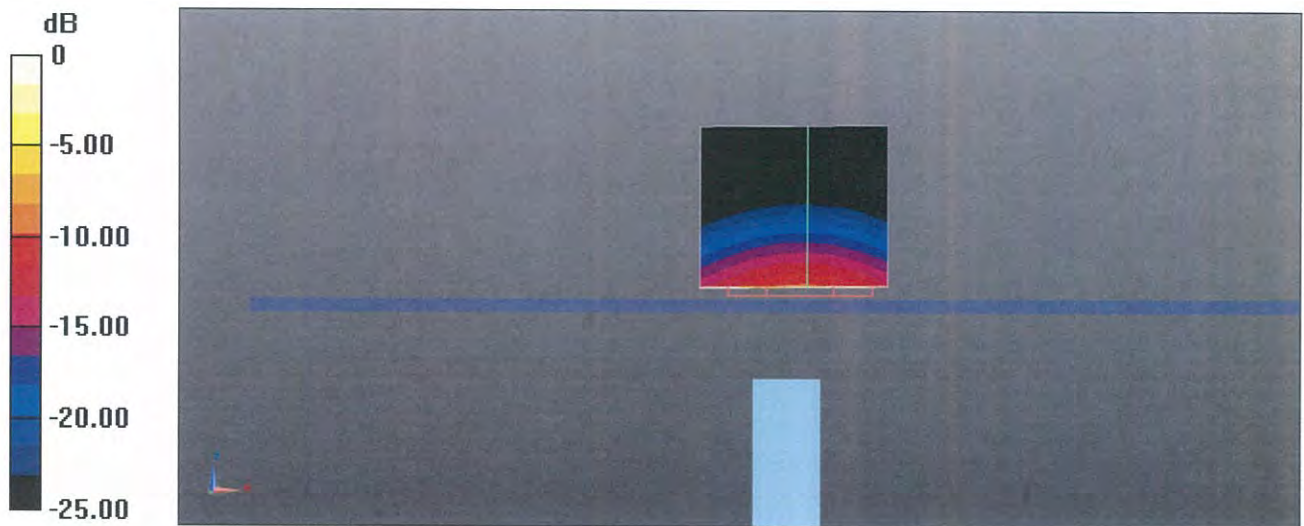
**dist=1.4mm (8x8x7)/Cube 0:** Measurement grid: dx=4mm, dy=4mm, dz=1.4mm

Reference Value = 72.19 V/m; Power Drift = -0.02 dB

Peak SAR (extrapolated) = 34.5 W/kg

**SAR(1 g) = 8.38 W/kg; SAR(10 g) = 2.37 W/kg**

Maximum value of SAR (measured) = 20.4 W/kg



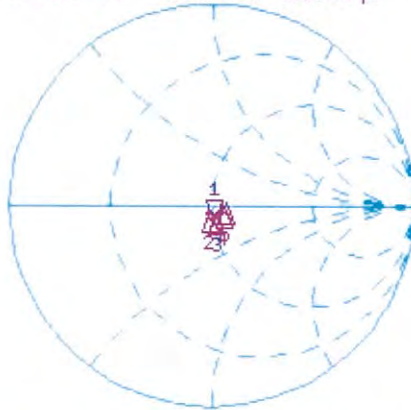
0 dB = 19.2 W/kg = 12.83 dBW/kg

# Impedance Measurement Plot for Head TSL

19 May 2017 14:58:37

CH1 S11 1 U FS 1: 49.844  $\Omega$  -8.3047  $\Omega$  3.6855 pF 5 200.000 000 MHz

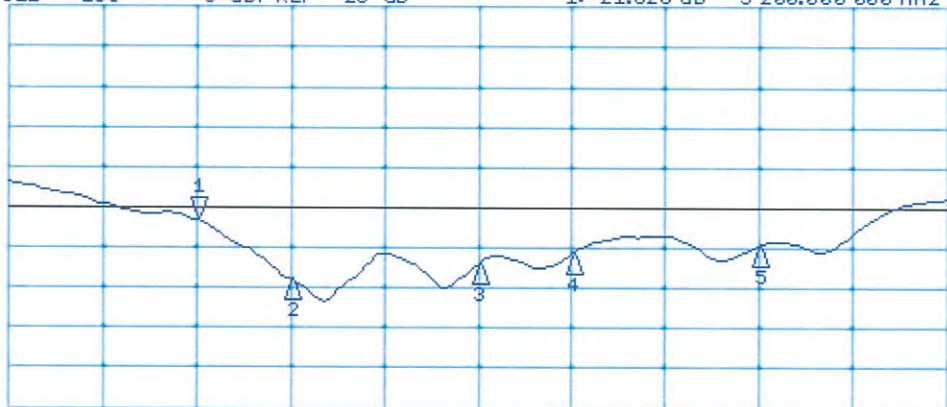
\*  
De1  
Cor  
Avg  
16  
H1d



CH1 Markers  
2: 47.969  $\Omega$   
-2.8145  $\Omega$   
5.30000 GHz  
3: 51.016  $\Omega$   
-4.4473  $\Omega$   
5.50000 GHz  
4: 55.191  $\Omega$   
-1.6074  $\Omega$   
5.60000 GHz  
5: 56.201  $\Omega$   
0.4648  $\Omega$   
5.80000 GHz

CH2 S11 LOG 5 dB/REF -20 dB 1: -21.626 dB 5 200.000 000 MHz

Cor  
Avg  
16  
H1d



CH2 Markers  
2: -29.023 dB  
5.30000 GHz  
3: -26.913 dB  
5.50000 GHz  
4: -25.729 dB  
5.60000 GHz  
5: -24.647 dB  
5.80000 GHz

Test Laboratory: SPEAG, Zurich, Switzerland

**DUT: Dipole D5GHzV2; Type: D5GHzV2; Serial: D5GHzV2 - SN:1041**

Communication System: UID 0 - CW; Frequency: 5200 MHz, Frequency: 5300 MHz, Frequency: 5500 MHz, Frequency: 5600 MHz, Frequency: 5800 MHz

Medium parameters used:  $f = 5200$  MHz;  $\sigma = 5.44$  S/m;  $\epsilon_r = 47.6$ ;  $\rho = 1000$  kg/m<sup>3</sup>, Medium parameters used:  $f = 5300$  MHz;  $\sigma = 5.57$  S/m;  $\epsilon_r = 47.4$ ;  $\rho = 1000$  kg/m<sup>3</sup>, Medium parameters used:  $f = 5500$  MHz;  $\sigma = 5.84$  S/m;  $\epsilon_r = 47$ ;  $\rho = 1000$  kg/m<sup>3</sup>, Medium parameters used:  $f = 5600$  MHz;  $\sigma = 5.98$  S/m;  $\epsilon_r = 46.9$ ;  $\rho = 1000$  kg/m<sup>3</sup>, Medium parameters used:  $f = 5800$  MHz;  $\sigma = 6.26$  S/m;  $\epsilon_r = 46.5$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Phantom section: Flat Section

Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2011)

DASY52 Configuration:

- Probe: EX3DV4 - SN3503; ConvF(5.29, 5.29, 5.29); Calibrated: 31.12.2016, ConvF(5.04, 5.04, 5.04); Calibrated: 31.12.2016, ConvF(4.62, 4.62, 4.62); Calibrated: 31.12.2016, ConvF(4.57, 4.57, 4.57); Calibrated: 31.12.2016, ConvF(4.48, 4.48, 4.48); Calibrated: 31.12.2016;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 28.03.2017
- Phantom: Flat Phantom 5.0 (back); Type: QD 000 P50 AA; Serial: 1002
- DASY52 52.10.0(1446); SEMCAD X 14.6.10(7417)

**Dipole Calibration for Body Tissue/Pin=100mW, dist=10mm, f=5200MHz/Zoom Scan,**

**dist=1.4mm (8x8x7)/Cube 0:** Measurement grid: dx=4mm, dy=4mm, dz=1.4mm

Reference Value = 64.73 V/m; Power Drift = -0.02 dB

Peak SAR (extrapolated) = 28.4 W/kg

**SAR(1 g) = 7.51 W/kg; SAR(10 g) = 2.11 W/kg**

Maximum value of SAR (measured) = 18.0 W/kg

**Dipole Calibration for Body Tissue/Pin=100mW, dist=10mm, f=5300 MHz/Zoom Scan,**

**dist=1.4mm (8x8x7)/Cube 0:** Measurement grid: dx=4mm, dy=4mm, dz=1.4mm

Reference Value = 65.52 V/m; Power Drift = -0.01 dB

Peak SAR (extrapolated) = 30.2 W/kg

**SAR(1 g) = 7.81 W/kg; SAR(10 g) = 2.2 W/kg**

Maximum value of SAR (measured) = 18.7 W/kg

**Dipole Calibration for Body Tissue/Pin=100mW, dist=10mm, f=5500 MHz/Zoom Scan,**

**dist=1.4mm (8x8x7)/Cube 0:** Measurement grid: dx=4mm, dy=4mm, dz=1.4mm

Reference Value = 66.13 V/m; Power Drift = -0.01 dB

Peak SAR (extrapolated) = 33.6 W/kg

**SAR(1 g) = 8.14 W/kg; SAR(10 g) = 2.26 W/kg**

Maximum value of SAR (measured) = 20.1 W/kg

**Dipole Calibration for Body Tissue/Pin=100mW, dist=10mm, f=5600 MHz/Zoom Scan,**

**dist=1.4mm (8x8x7)/Cube 0:** Measurement grid: dx=4mm, dy=4mm, dz=1.4mm

Reference Value = 65.80 V/m; Power Drift = -0.03 dB

Peak SAR (extrapolated) = 33.7 W/kg

**SAR(1 g) = 8.13 W/kg; SAR(10 g) = 2.28 W/kg**

Maximum value of SAR (measured) = 20.0 W/kg

**Dipole Calibration for Body Tissue/Pin=100mW, dist=10mm, f=5800 MHz/Zoom Scan,**

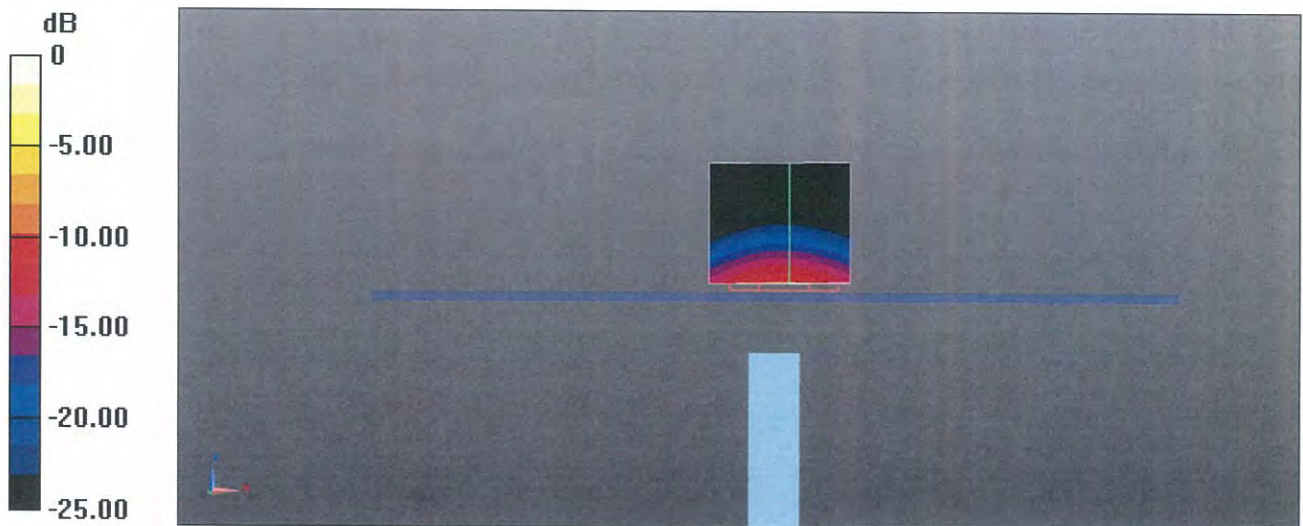
**dist=1.4mm (8x8x7)/Cube 0:** Measurement grid: dx=4mm, dy=4mm, dz=1.4mm

Reference Value = 63.89 V/m; Power Drift = -0.02 dB

Peak SAR (extrapolated) = 34.5 W/kg

**SAR(1 g) = 7.87 W/kg; SAR(10 g) = 2.19 W/kg**

Maximum value of SAR (measured) = 19.9 W/kg



0 dB = 18.0 W/kg = 12.55 dBW/kg

# Impedance Measurement Plot for Body TSL

