

**DASY5 Validation Report for Body TSL**

Date: 20.09.2016

Test Laboratory: SPEAG, Zurich, Switzerland

**DUT: Dipole D5GHzV2; Type: D5GHzV2; Serial: D5GHzV2 - SN:1238**

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;  $\sigma = 5.45$  S/m;  $\epsilon_r = 47.5$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Medium parameters used:  $f = 5300$  MHz;  $\sigma = 5.59$  S/m;  $\epsilon_r = 47.3$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Medium parameters used:  $f = 5500$  MHz;  $\sigma = 5.86$  S/m;  $\epsilon_r = 47.0$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Medium parameters used:  $f = 5600$  MHz;  $\sigma = 6.00$  S/m;  $\epsilon_r = 46.8$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Medium parameters used:  $f = 5800$  MHz;  $\sigma = 6.29$  S/m;  $\epsilon_r = 46.4$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Phantom section: Flat Section

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

DASY52 Configuration:

- Probe: EX3DV4 - SN3503; ConvF(4.99, 4.99, 4.99); Calibrated: 30.06.2016, ConvF(4.75, 4.75, 4.75); Calibrated: 30.06.2016, ConvF(4.4, 4.4, 4.4); Calibrated: 30.06.2016, ConvF(4.35, 4.35, 4.35); Calibrated: 30.06.2016, ConvF(4.27, 4.27, 4.27); Calibrated: 30.06.2016;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 30.12.2015
- Phantom: Flat Phantom 5.0 (back); Type: QD000P50AA; Serial: 1002
- DASY52 52.8.8(1258); SEMCAD X 14.6.10(7372)

**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 = 66.67 V/m; Power Drift = -0.06 dB

Peak SAR (extrapolated) = 27.8 W/kg

**SAR(1 g) = 7.48 W/kg; SAR(10 g) = 2.1 W/kg**

Maximum value of SAR (measured) = 17.3 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 = 67.01 V/m; Power Drift = -0.06 dB

Peak SAR (extrapolated) = 29.4 W/kg

**SAR(1 g) = 7.69 W/kg; SAR(10 g) = 2.17 W/kg**

Maximum value of SAR (measured) = 18.0 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 = 67.20 V/m; Power Drift = -0.05 dB

Peak SAR (extrapolated) = 32.4 W/kg

**SAR(1 g) = 8.03 W/kg; SAR(10 g) = 2.23 W/kg**

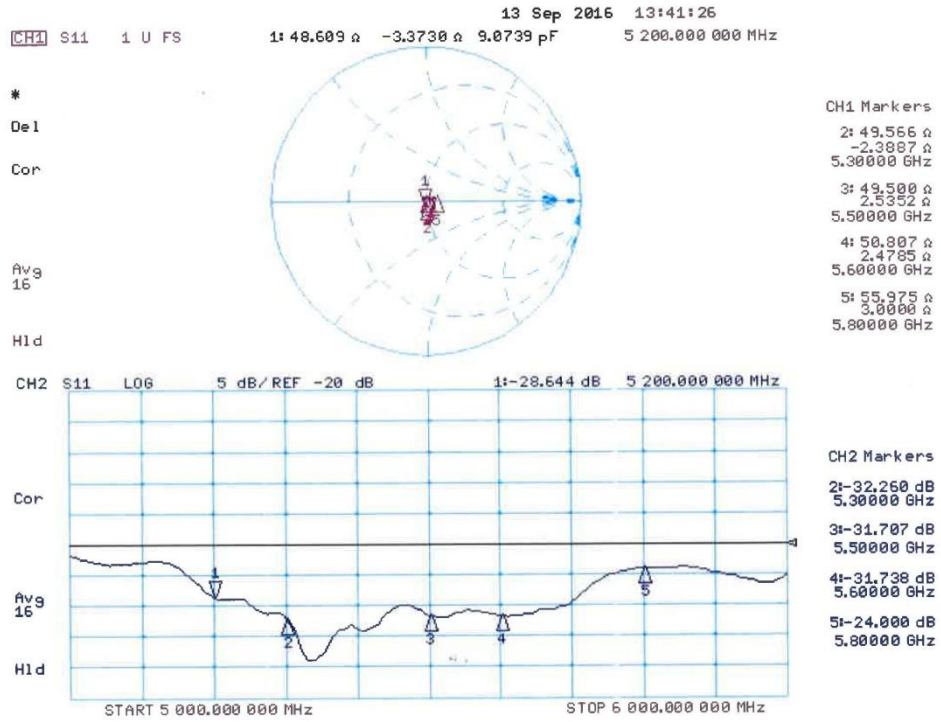
Maximum value of SAR (measured) = 19.2 W/kg

**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 = 66.47 V/m; Power Drift = -0.07 dB  
Peak SAR (extrapolated) = 32.7 W/kg  
**SAR(1 g) = 7.95 W/kg; SAR(10 g) = 2.23 W/kg**  
Maximum value of SAR (measured) = 19.1 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 = 64.40 V/m; Power Drift = -0.08 dB  
Peak SAR (extrapolated) = 33.2 W/kg  
**SAR(1 g) = 7.66 W/kg; SAR(10 g) = 2.13 W/kg**  
Maximum value of SAR (measured) = 18.8 W/kg



**Impedance Measurement Plot for Body TSL**



## ANNEX J Extended Calibration SAR Dipole

Referring to KDB865664 D01, if dipoles are verified in return loss (<-20dBm, within 20% of prior calibration), and in impedance (within 5 ohm of prior calibration), the annual calibration is not necessary and the calibration interval can be extended.

Justification of Extended Calibration SAR Dipole D750V3– serial no.1163

Head						
Date of Measurement	Return-Loss (dB)	Delta (%)	Real Impedance (ohm)	Delta (ohm)	Imaginary Impedance (johm)	Delta (johm)
2016-09-19	-26.8	/	54.5	/	-1.8	/
2017-09-17	-25.4	5.2	53.2	1.3	-2.5	-0.7
2018-09-15	-24.9	7.6	52.7	1.8	-2.8	-1.0

Body						
Date of Measurement	Return-Loss (dB)	Delta (%)	Real Impedance (ohm)	Delta (ohm)	Imaginary Impedance (johm)	Delta (johm)
2016-09-19	-29.0	/	49.8	/	-3.5	/
2017-09-17	-25.2	13.1	46.9	2.9	-2.8	0.7
2018-09-15	-24.4	15.9	45.5	4.3	-3.0	0.5

Justification of Extended Calibration SAR Dipole D1750V2– serial no.1152

Head						
Date of Measurement	Return-Loss (dB)	Delta (%)	Real Impedance (ohm)	Delta (ohm)	Imaginary Impedance (johm)	Delta (johm)
2016-09-09	-42.9	/	50.5	/	-0.5	/
2017-09-08	-40.6	5.4	48.8	1.7	-0.4	0.1
2018-09-06	-38.7	9.8	46.5	4.0	-0.3	0.2

Body						
Date of Measurement	Return-Loss (dB)	Delta (%)	Real Impedance (ohm)	Delta (ohm)	Imaginary Impedance (johm)	Delta (johm)
2016-09-09	-27.6	/	46.3	/	-1.6	/
2017-09-08	-25.8	6.5	45.4	0.9	-1.4	0.2
2018-09-06	-24.6	10.9	44.7	1.6	-1.2	0.4

Justification of Extended Calibration SAR Dipole D5GHzV2– serial no.1238

Head							
Date of Measurement	Frequency	Return-Loss (dB)	Delta (%)	Real Impedance (ohm)	Delta (ohm)	Imaginary Impedance (johm)	Delta (johm)
2016-09-21	5200MHz	-23.6	/	47.1	/	5.80	/
2017-09-20		-21.7	8.1	48.3	1.2	3.38	2.42
2018-09-18		-21.2	10.2	48.7	1.6	3.25	2.55
2016-09-21	5300MHz	-29.8	/	50.5	/	3.20	/
2017-09-20		-27.8	6.7	51.9	1.4	4.51	1.31
2018-09-18		-26.2	12.1	53.3	2.8	4.82	1.62
2016-09-21	5500MHz	-31.2	/	49.0	/	2.50	/
2017-09-20		-29.5	5.4	50.3	1.3	1.24	1.26
2018-09-18		-28.1	9.9	51.4	2.4	1.55	0.95
2016-09-21	5600MHz	-44.1	/	50.0	/	0.60	/
2017-09-20		-42.6	3.4	51.5	1.5	2.55	1.95
2018-09-18		-40.5	8.2	53.3	3.3	3.01	2.41
2016-09-21	5800MHz	-25.1	/	55.6	/	1.90	/
2017-09-20		-23.8	5.2	56.9	1.3	3.04	1.14
2018-09-18		-22.7	9.6	57.3	1.7	2.88	0.98

Body							
Date of Measurement	Frequency	Return-Loss (dB)	Delta (%)	Real Impedance (ohm)	Delta (ohm)	Imaginary Impedance (johm)	Delta (johm)
2016-09-21	5200MHz	-28.6	/	48.6	/	3.40	/
2017-09-20		-26.4	7.7	50.0	1.4	3.72	0.32
2018-09-18		-24.6	14.0	51.2	2.6	3.85	0.45
2016-09-21	5300MHz	-32.3	/	49.6	/	2.40	/
2017-09-20		-30.5	5.6	51.3	1.7	3.64	1.24
2018-09-18		-28.9	10.5	52.6	3.0	3.77	1.37
2016-09-21	5500MHz	-31.7	/	49.5	/	2.50	/
2017-09-20		-29.8	6.0	51.4	1.9	4.25	1.75
2018-09-18		-27.5	13.2	52.8	3.3	4.44	1.94
2016-09-21	5600MHz	-31.7	/	50.8	/	2.50	/
2017-09-20		-29.5	6.9	52.3	1.5	2.91	0.41
2018-09-18		-28.6	9.8	52.9	2.1	3.03	0.53
2016-09-21	5800MHz	-24.0	/	56.0	/	3.00	/
2017-09-20		-22.8	5.0	57.3	1.3	4.23	1.23
2018-09-18		-21.5	10.4	57.8	1.6	4.46	1.46

The Return-Loss is <-20dB, and within 20% of prior calibration; the impedance is within 5 ohm of prior calibration. Therefore the value result should support extended c.