

Test Laboratory: Bureau Veritas ADT

M28-11a Band4-Ch165 / D1

DUT: Tablet PC ; Type: T7M

Communication System: 802.11a ; Frequency: 5825 MHz ; Duty Cycle: 1:1 ; Modulation type: BPSK
 Medium: MSL5800 Medium parameters used : $f = 5825$ MHz; $\sigma = 6.1$ mho/m; $\epsilon_r = 49.3$; $\rho = 1000$ kg/m³
 Phantom section: Flat Section ; Separation distance : 0 mm (The back side of the EUT to the Phantom)

DASY5 Configuration:

- Probe: EX3DV3 - SN3504; ConvF(3.95, 3.95, 3.95); Calibrated: 2010/1/26
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn510; Calibrated: 2009/12/16
- Phantom: Flat Phantom ELI4.0; Type: QDOVA001BA; Serial: 1043
- Measurement SW: DASY5, V5.2 Build 157; SEMCAD X Version 14.0 Build 57

Channel 165/Area Scan (8x27x1): Measurement grid: dx=10mm, dy=10mm

Maximum value of SAR (measured) = 0.026 mW/g

Channel 165/Zoom Scan (7x7x9)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=2.5mm

Reference Value = 6.72 V/m; Power Drift = -0.089 dB

Peak SAR (extrapolated) = 0.076 W/kg

SAR(1 g) = 0.032 mW/g; SAR(10 g) = 0.018 mW/g

Maximum value of SAR (measured) = 0.036 mW/g

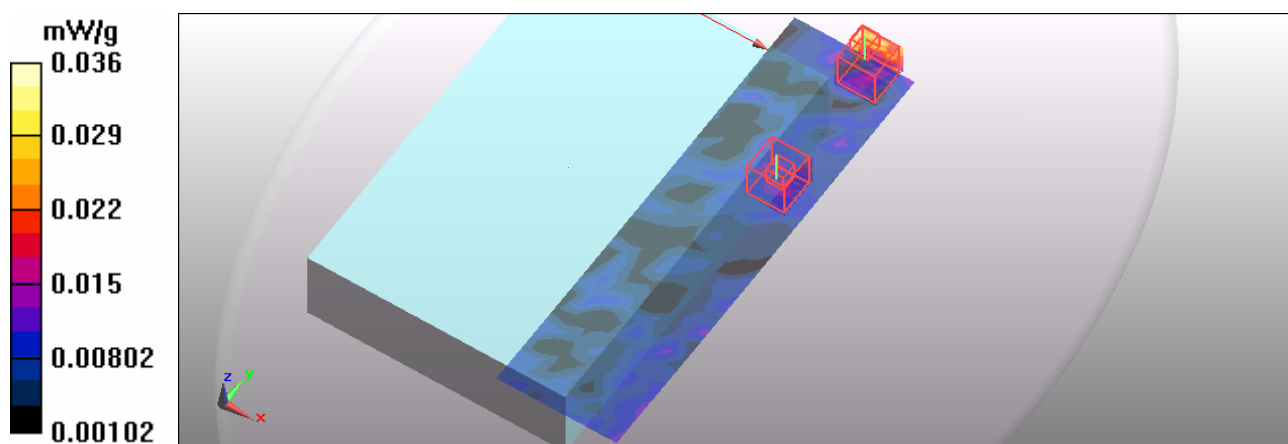
Channel 165/Zoom Scan (7x7x9)/Cube 1: Measurement grid: dx=4mm, dy=4mm, dz=2.5mm

Reference Value = 6.72 V/m; Power Drift = -0.089 dB

Peak SAR (extrapolated) = 0.076 W/kg

SAR(1 g) = 0.031 mW/g; SAR(10 g) = 0.016 mW/g

Maximum value of SAR (measured) = 0.035 mW/g



Test Laboratory: Bureau Veritas ADT

M29-11aN 20M Band4-Ch165 / D1

DUT: Tablet PC ; Type: T7M

Communication System: 11aN 20MHz ; Frequency: 5825 MHz ; Duty Cycle: 1:1 ; Modulation type: BPSK

Medium: MSL5800 Medium parameters used : $f = 5825 \text{ MHz}$; $\sigma = 6.1 \text{ mho/m}$; $\epsilon_r = 49.3$; $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section ; Separation distance : 0 mm (The back side of the EUT to the Phantom)

DASY5 Configuration:

- Probe: EX3DV3 - SN3504; ConvF(3.95, 3.95, 3.95); Calibrated: 2010/1/26
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn510; Calibrated: 2009/12/16
- Phantom: Flat Phantom ELI4.0; Type: QDOVA001BA; Serial: 1043
- Measurement SW: DASY5, V5.2 Build 157; SEMCAD X Version 14.0 Build 57

Channel 165/Area Scan (8x27x1): Measurement grid: $dx=10\text{mm}$, $dy=10\text{mm}$

Maximum value of SAR (measured) = 0.029 mW/g

Channel 165/Zoom Scan (7x7x9)/Cube 0: Measurement grid: $dx=4\text{mm}$, $dy=4\text{mm}$, $dz=2.5\text{mm}$

Reference Value = 7.11 V/m; Power Drift = -0.134 dB

Peak SAR (extrapolated) = 0.074 W/kg

SAR(1 g) = 0.031 mW/g; SAR(10 g) = 0.016 mW/g

Maximum value of SAR (measured) = 0.034 mW/g

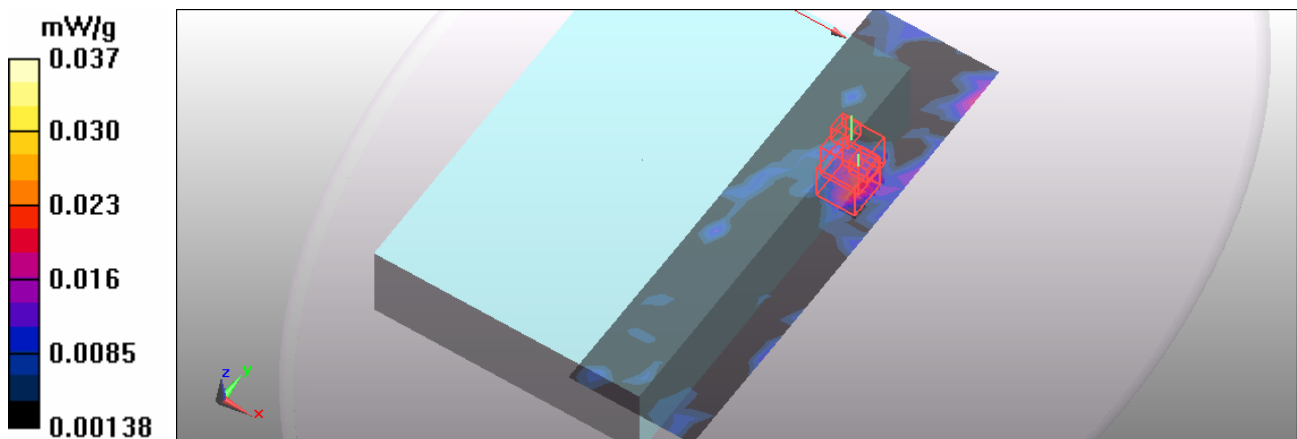
Channel 165/Zoom Scan (7x7x9)/Cube 1: Measurement grid: $dx=4\text{mm}$, $dy=4\text{mm}$, $dz=2.5\text{mm}$

Reference Value = 7.11 V/m; Power Drift = -0.134 dB

Peak SAR (extrapolated) = 0.077 W/kg

SAR(1 g) = 0.032 mW/g; SAR(10 g) = 0.017 mW/g

Maximum value of SAR (measured) = 0.037 mW/g



Test Laboratory: Bureau Veritas ADT

M30-11aN 40M-band4-Ch159 / D1

DUT: Tablet PC ; Type: T7M

Communication System: 11aN 40MHz ; Frequency: 5795 MHz ; Duty Cycle: 1:1 ; Modulation type: BPSK

Medium: MSL5800 Medium parameters used: $f = 5795$ MHz; $\sigma = 6.06$ mho/m; $\epsilon_r = 49.3$; $\rho = 1000$ kg/m³
Phantom section: Flat Section ; Separation distance : 0 mm (The back side of the EUT to the Phantom)

DASY5 Configuration:

- Probe: EX3DV3 - SN3504; ConvF(3.95, 3.95, 3.95); Calibrated: 2010/1/26
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn510; Calibrated: 2009/12/16
- Phantom: Flat Phantom ELI4.0; Type: QDOVA001BA; Serial: 1043
- Measurement SW: DASY5, V5.2 Build 157; SEMCAD X Version 14.0 Build 57

Channel 159/Area Scan (8x27x1): Measurement grid: dx=10mm, dy=10mm

Maximum value of SAR (measured) = 0.033 mW/g

Channel 159/Zoom Scan (7x7x9)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=2.5mm

Reference Value = 6.99 V/m; Power Drift = -0.104 dB

Peak SAR (extrapolated) = 0.075 W/kg

SAR(1 g) = 0.031 mW/g; SAR(10 g) = 0.017 mW/g

Maximum value of SAR (measured) = 0.035 mW/g

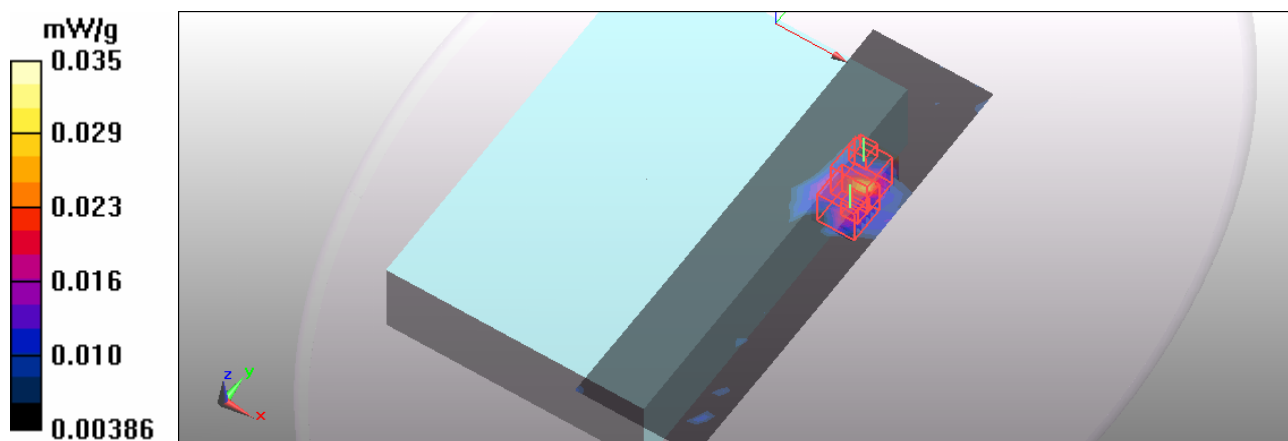
Channel 159/Zoom Scan (7x7x9)/Cube 1: Measurement grid: dx=4mm, dy=4mm, dz=2.5mm

Reference Value = 6.99 V/m; Power Drift = -0.104 dB

Peak SAR (extrapolated) = 0.074 W/kg

SAR(1 g) = 0.030 mW/g; SAR(10 g) = 0.016 mW/g

Maximum value of SAR (measured) = 0.034 mW/g



Test Laboratory: Bureau Veritas ADT

M31-11a Band4-Ch165 / K1

DUT: Tablet PC ; Type: T7M

Communication System: 802.11a ; Frequency: 5825 MHz ; Duty Cycle: 1:1 ; Modulation type: BPSK
 Medium: MSL5800 Medium parameters used : $f = 5825$ MHz; $\sigma = 6.1$ mho/m; $\epsilon_r = 49.3$; $\rho = 1000$ kg/m³
 Phantom section: Flat Section ; Separation distance : 0 mm (The Top side of the EUT to the Phantom)

DASY5 Configuration:

- Probe: EX3DV3 - SN3504; ConvF(3.95, 3.95, 3.95); Calibrated: 2010/1/26
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn510; Calibrated: 2009/12/16
- Phantom: Flat Phantom ELI4.0; Type: QDOVA001BA; Serial: 1043
- Measurement SW: DASY5, V5.2 Build 157; SEMCAD X Version 14.0 Build 57

Channel 165/Area Scan (7x27x1): Measurement grid: dx=10mm, dy=10mm

Maximum value of SAR (measured) = 0.426 mW/g

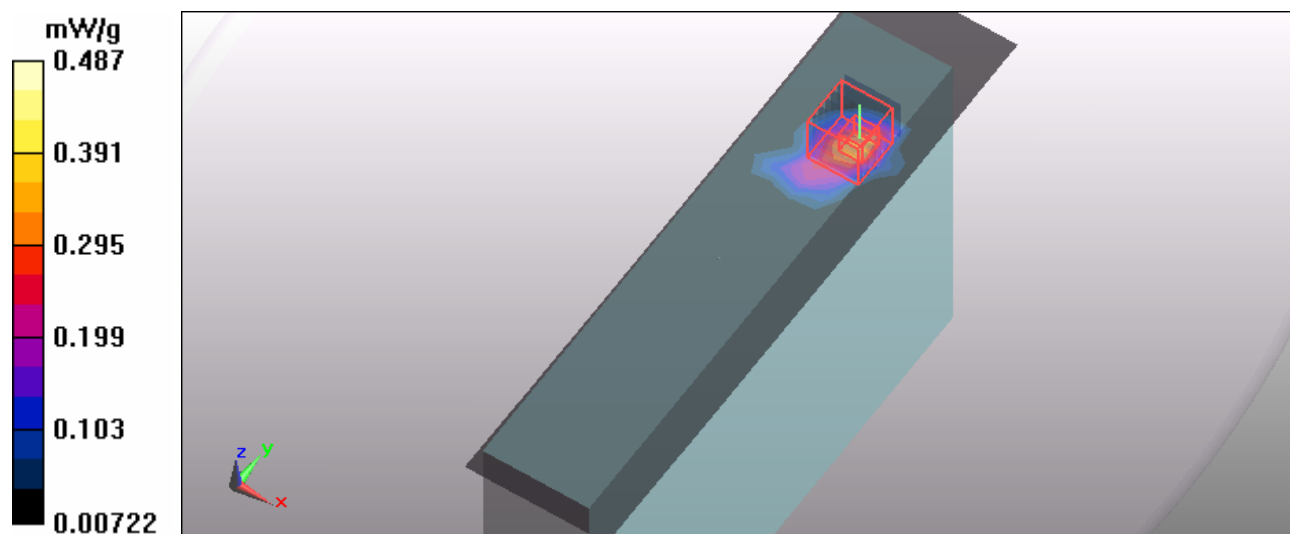
Channel 165/Zoom Scan (7x7x9)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=2.5mm

Reference Value = 6.18 V/m; Power Drift = 0.014 dB

Peak SAR (extrapolated) = 0.944 W/kg

SAR(1 g) = **0.397 mW/g**; SAR(10 g) = 0.201 mW/g

Maximum value of SAR (measured) = 0.487 mW/g



Test Laboratory: Bureau Veritas ADT

M32-11aN 20M Band4-Ch165 / K1

DUT: Tablet PC ; Type: T7M

Communication System: 11aN 20MHz ; Frequency: 5825 MHz ; Duty Cycle: 1:1 ; Modulation type: BPSK

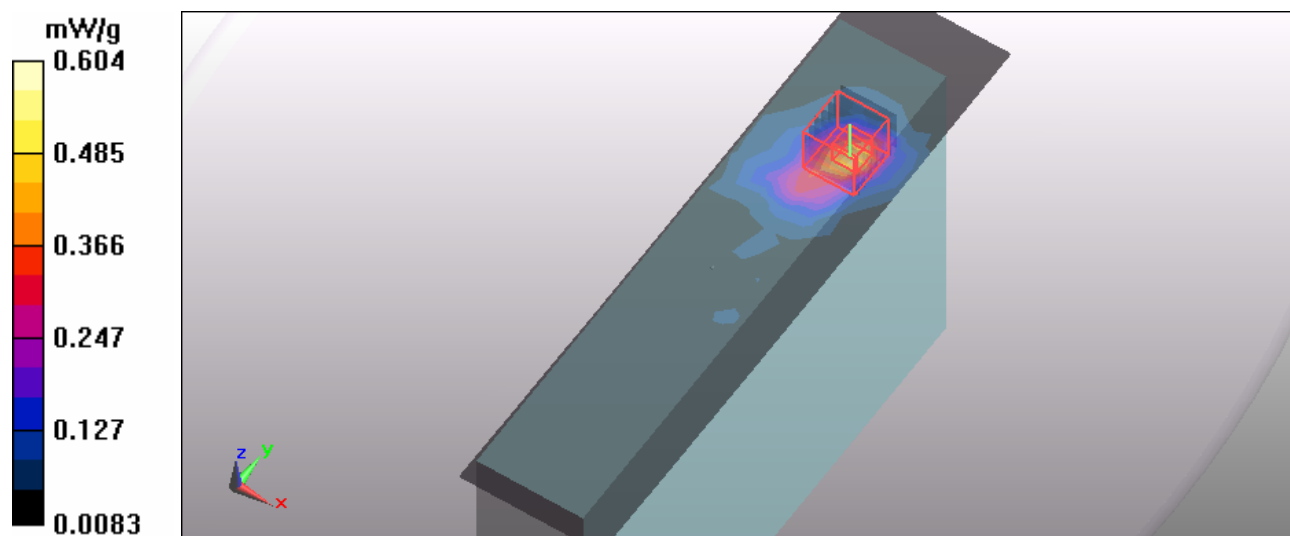
Medium: MSL5800 Medium parameters used : $f = 5825$ MHz; $\sigma = 6.1$ mho/m; $\epsilon_r = 49.3$; $\rho = 1000$ kg/m³
Phantom section: Flat Section ; Separation distance : 0 mm (The Top side of the EUT to the Phantom)

DASY5 Configuration:

- Probe: EX3DV3 - SN3504; ConvF(3.95, 3.95, 3.95); Calibrated: 2010/1/26
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn510; Calibrated: 2009/12/16
- Phantom: Flat Phantom ELI4.0; Type: QDOVA001BA; Serial: 1043
- Measurement SW: DASY5, V5.2 Build 157; SEMCAD X Version 14.0 Build 57

Channel 165/Area Scan (7x27x1): Measurement grid: dx=10mm, dy=10mm
Maximum value of SAR (measured) = 0.533 mW/g

Channel 165/Zoom Scan (7x7x9)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=2.5mm
Reference Value = 4.95 V/m; Power Drift = 0.025 dB
Peak SAR (extrapolated) = 1.58 W/kg
SAR(1 g) = 0.426 mW/g; SAR(10 g) = 0.234 mW/g
Maximum value of SAR (measured) = 0.604 mW/g



Test Laboratory: Bureau Veritas ADT

M33-11aN 40M Band4-Ch159 / K1

DUT: Tablet PC ; Type: T7M

Communication System: 11aN 40MHz ; Frequency: 5795 MHz ; Duty Cycle: 1:1 ; Modulation type: BPSK

Medium: MSL5800 Medium parameters used: $f = 5795 \text{ MHz}$; $\sigma = 6.11 \text{ mho/m}$; $\epsilon_r = 49.5$; $\rho = 1000 \text{ kg/m}^3$
 Phantom section: Flat Section ; Separation distance : 0 mm (The Top side of the EUT to the Phantom)

DASY5 Configuration:

- Probe: EX3DV3 - SN3504; ConvF(3.95, 3.95, 3.95); Calibrated: 2010/1/26
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn510; Calibrated: 2009/12/16
- Phantom: Flat Phantom ELI4.0; Type: QDOVA001BA; Serial: 1043
- Measurement SW: DASY5, V5.2 Build 157; SEMCAD X Version 14.0 Build 57

Channel 159/Area Scan (7x27x1): Measurement grid: $dx=10\text{mm}$, $dy=10\text{mm}$

Maximum value of SAR (measured) = 0.794 mW/g

Channel 159/Zoom Scan (7x7x9)/Cube 0: Measurement grid: $dx=4\text{mm}$, $dy=4\text{mm}$, $dz=2.5\text{mm}$

Reference Value = 4.99 V/m; Power Drift = -0.064 dB

Peak SAR (extrapolated) = 2.11 W/kg

SAR(1 g) = 0.610 mW/g; SAR(10 g) = 0.297 mW/g

Maximum value of SAR (measured) = 0.935 mW/g

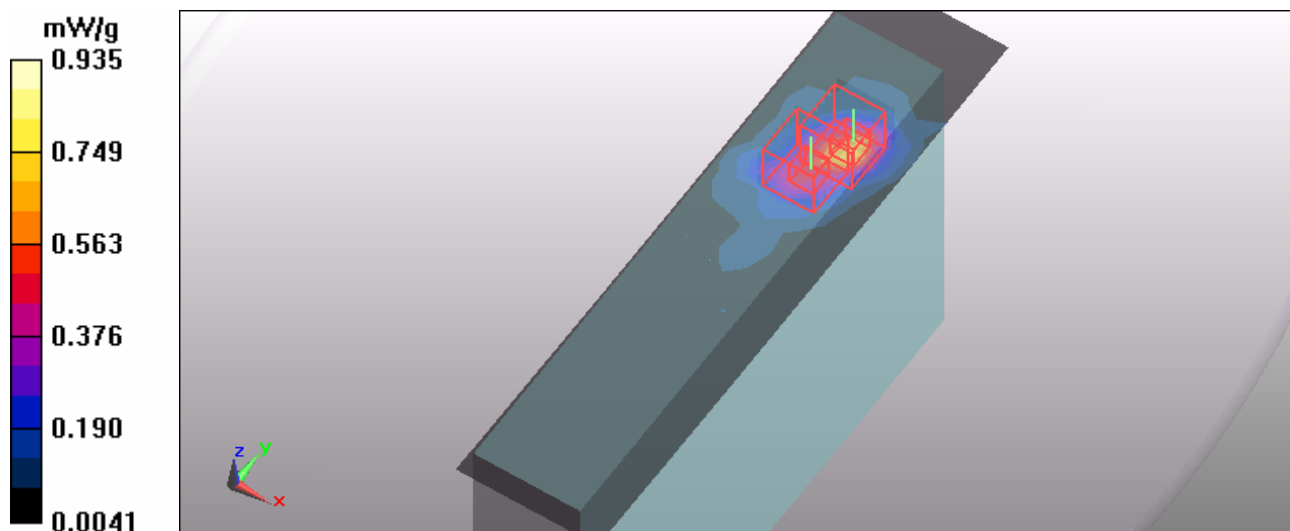
Channel 159/Zoom Scan (7x7x9)/Cube 1: Measurement grid: $dx=4\text{mm}$, $dy=4\text{mm}$, $dz=2.5\text{mm}$

Reference Value = 4.99 V/m; Power Drift = -0.064 dB

Peak SAR (extrapolated) = 1.53 W/kg

SAR(1 g) = 0.445 mW/g; SAR(10 g) = 0.261 mW/g

Maximum value of SAR (measured) = 0.655 mW/g



Test Laboratory: Bureau Veritas ADT

M34-11a Band4-Ch165 / K1

DUT: Tablet PC ; Type: T7M

Communication System: 802.11A ; Frequency: 5825 MHz ; Duty Cycle: 1:1 ; Modulation type: BPSK
 Medium: MSL5800 Medium parameters used : $f = 5825$ MHz; $\sigma = 6.15$ mho/m; $\epsilon_r = 49.5$; $\rho = 1000$ kg/m³
 Phantom section: Flat Section ; Separation distance : 0 mm (The back side of the EUT to the Phantom)

DASY5 Configuration:

- Probe: EX3DV3 - SN3504; ConvF(3.95, 3.95, 3.95); Calibrated: 2010/1/26
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn510; Calibrated: 2009/12/16
- Phantom: ELI 4.0; Type: QDOVA001BA; Serial: 1043
- Measurement SW: DASY5, V5.2 Build 157; SEMCAD X Version 14.0 Build 57

Ch165/Area Scan (8x27x1): Measurement grid: dx=10mm, dy=10mm

Maximum value of SAR (measured) = 0.061 mW/g

Ch165/Zoom Scan (7x7x9)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=2.5mm

Reference Value = 3.97 V/m; Power Drift = 0.327 dB

Peak SAR (extrapolated) = 0.105 W/kg

SAR(1 g) = 0.030 mW/g; SAR(10 g) = 0.016 mW/g

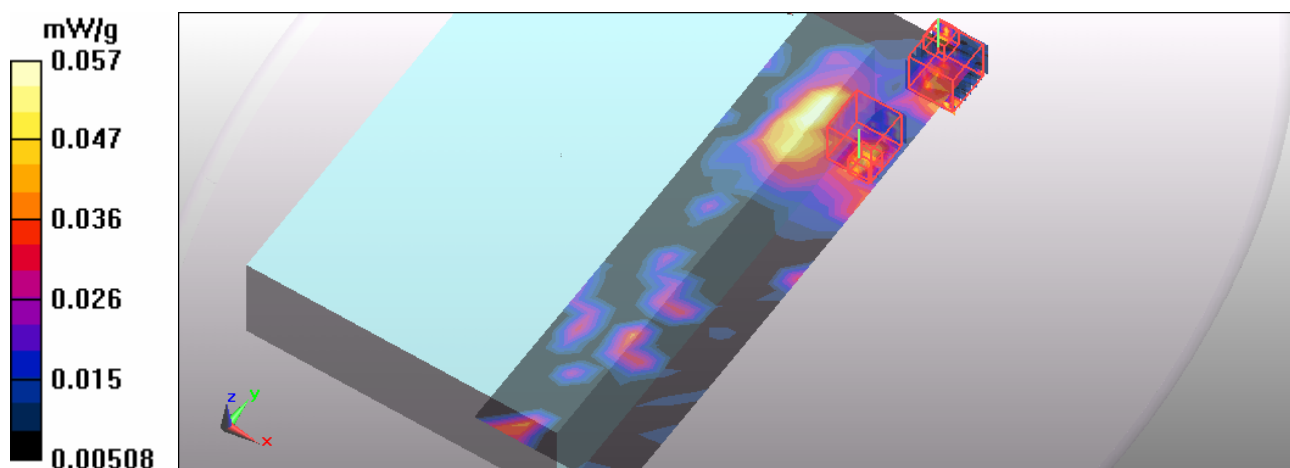
Maximum value of SAR (measured) = 0.057 mW/g

Ch165/Zoom Scan (7x7x9)/Cube 1: Measurement grid: dx=4mm, dy=4mm, dz=2.5mm

Reference Value = 3.97 V/m; Power Drift = 0.327 dB

Peak SAR (extrapolated) = 0.116 W/kg

SAR(1 g) = 0.033 mW/g; SAR(10 g) = 0.023 mW/g



Test Laboratory: Bureau Veritas ADT

M35-11an-20M Band4-Ch165 / K1

DUT: Tablet PC ; Type: T7M

Communication System: 11n 5G span20 ; Frequency: 5825 MHz ; Duty Cycle: 1:1 ; Modulation type: BPSK

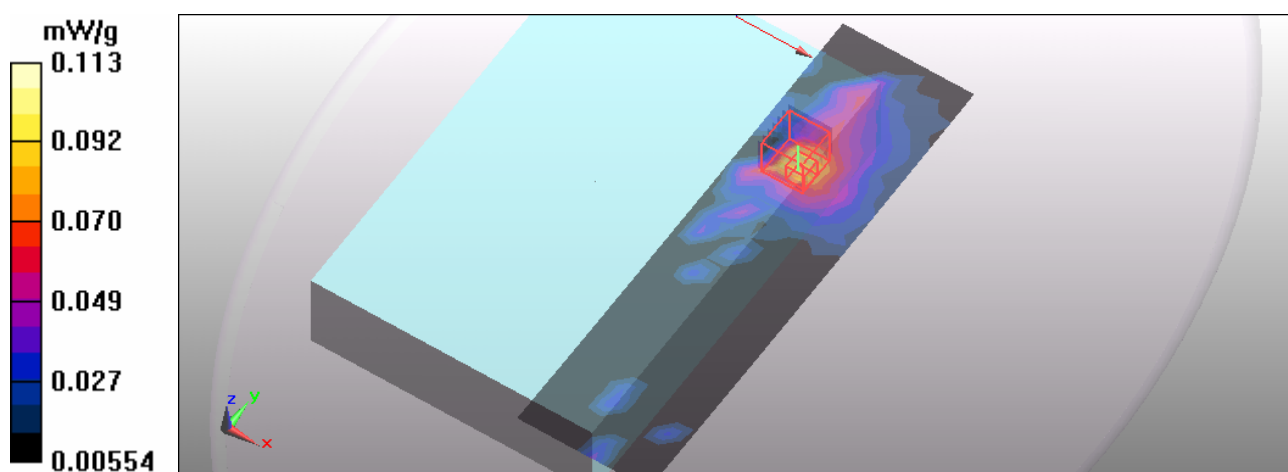
Medium: MSL5800 Medium parameters used : $f = 5825$ MHz; $\sigma = 6.15$ mho/m; $\epsilon_r = 49.5$; $\rho = 1000$ kg/m³
Phantom section: Flat Section ; Separation distance : 0 mm (The back side of the EUT to the Phantom)

DASY5 Configuration:

- Probe: EX3DV3 - SN3504; ConvF(3.95, 3.95, 3.95); Calibrated: 2010/1/26
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn510; Calibrated: 2009/12/16
- Phantom: ELI 4.0; Type: QDOVA001BA; Serial: 1043
- Measurement SW: DASY5, V5.2 Build 157; SEMCAD X Version 14.0 Build 57

Ch165 /Area Scan (8x27x1): Measurement grid: dx=10mm, dy=10mm
Maximum value of SAR (measured) = 0.088 mW/g

Ch165 /Zoom Scan (7x7x9)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=2.5mm
Reference Value = 1.14 V/m; Power Drift = -0.137
Peak SAR (extrapolated) = 0.264 W/kg
SAR(1 g) = 0.061 mW/g; SAR(10 g) = 0.033 mW/g
Maximum value of SAR (measured) = 0.113 mW/g



Test Laboratory: Bureau Veritas ADT

M36-11an 40M Band4-Ch159 / K1

DUT: Tablet PC ; Type: T7M

Communication System: 11n 5G span40 ; Frequency: 5795 MHz ; Duty Cycle: 1:1 ; Modulation type: BPSK

Medium: MSL5800 Medium parameters used: $f = 5795$ MHz; $\sigma = 6.11$ mho/m; $\epsilon_r = 49.5$; $\rho = 1000$ kg/m³
Phantom section: Flat Section ; Separation distance : 0 mm (The back side of the EUT to the Phantom)

DASY5 Configuration:

- Probe: EX3DV3 - SN3504; ConvF(3.95, 3.95, 3.95); Calibrated: 2010/1/26
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn510; Calibrated: 2009/12/16
- Phantom: ELI 4.0; Type: QDOVA001BA; Serial: 1043
- Measurement SW: DASY5, V5.2 Build 157; SEMCAD X Version 14.0 Build 57

Ch159/Area Scan (8x27x1): Measurement grid: dx=10mm, dy=10mm

Maximum value of SAR (measured) = 0.147 mW/g

Ch159/Zoom Scan (7x7x9)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=2.5mm

Reference Value = 6.27 V/m; Power Drift = -0.118 dB

Peak SAR (extrapolated) = 0.307 W/kg

SAR(1 g) = 0.093 mW/g; SAR(10 g) = 0.048 mW/g

Maximum value of SAR (measured) = 0.174 mW/g

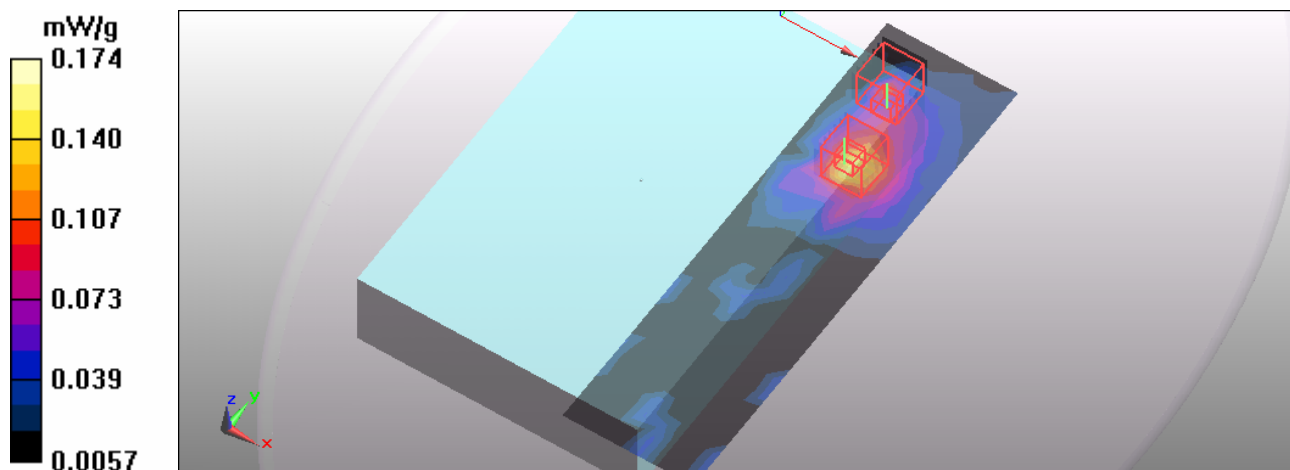
Ch159/Zoom Scan (7x7x9)/Cube 1: Measurement grid: dx=4mm, dy=4mm, dz=2.5mm

Reference Value = 6.27 V/m; Power Drift = -0.118 dB

Peak SAR (extrapolated) = 0.146 W/kg

SAR(1 g) = 0.051 mW/g; SAR(10 g) = 0.017 mW/g

Maximum value of SAR (measured) = 0.107 mW/g



Test Laboratory: Bureau Veritas ADT

M37-11a-band4-Ch165 / L1

DUT: Tablet PC ; Type: T7M

Communication System: 802.11a ; Frequency: 5825 MHz ; Duty Cycle: 1:1 ; Modulation type: BPSK
 Medium: MSL5800 Medium parameters used : $f = 5825$ MHz; $\sigma = 6.15$ mho/m; $\epsilon_r = 49.5$; $\rho = 1000$ kg/m³
 Phantom section: Flat Section ; Separation distance : 0 mm (The Tip side of the EUT to the Phantom)

DASY5 Configuration:

- Probe: EX3DV3 - SN3504; ConvF(3.95, 3.95, 3.95); Calibrated: 2010/1/26
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn510; Calibrated: 2009/12/16
- Phantom: Flat Phantom ELI4.0; Type: QDOVA001BA; Serial: 1043
- Measurement SW: DASY5, V5.2 Build 157; SEMCAD X Version 14.0 Build 57

Channel 165/Area Scan (7x27x1): Measurement grid: dx=10mm, dy=10mm

Maximum value of SAR (measured) = 0.452 mW/g

Channel 165/Zoom Scan (7x7x9)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=2.5mm

Reference Value = 15.1 V/m; Power Drift = -0.154 dB

Peak SAR (extrapolated) = 0.931 W/kg

SAR(1 g) = 0.355 mW/g; SAR(10 g) = 0.232 mW/g

Maximum value of SAR (measured) = 0.489 mW/g

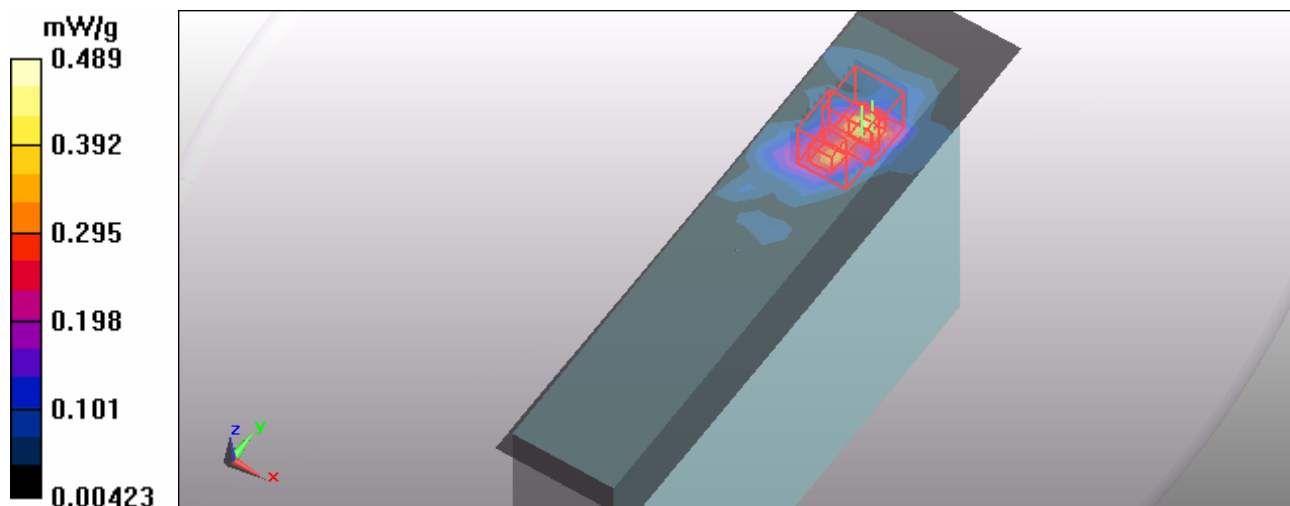
Channel 165/Zoom Scan (7x7x9)/Cube 1: Measurement grid: dx=4mm, dy=4mm, dz=2.5mm

Reference Value = 15.1 V/m; Power Drift = -0.154 dB

Peak SAR (extrapolated) = 1.25 W/kg

SAR(1 g) = 0.320 mW/g; SAR(10 g) = 0.223 mW/g

Maximum value of SAR (measured) = 0.447 mW/g



Test Laboratory: Bureau Veritas ADT

M38-11aN 20M Band4-Ch165 / L1

DUT: Tablet PC ; Type: T7M

Communication System: 11aN 20MHz ; Frequency: 5825 MHz ; Duty Cycle: 1:1 ; Modulation type: BPSK

Medium: MSL5800 Medium parameters used : $f = 5825 \text{ MHz}$; $\sigma = 6.14 \text{ mho/m}$; $\epsilon_r = 49$; $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section ; Separation distance : 0 mm (The Tip side of the EUT to the Phantom)

DASY5 Configuration:

- Probe: EX3DV3 - SN3504; ConvF(3.95, 3.95, 3.95); Calibrated: 2010/1/26
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn510; Calibrated: 2009/12/16
- Phantom: Flat Phantom ELI4.0; Type: QDOVA001BA; Serial: 1043
- Measurement SW: DASY5, V5.2 Build 157; SEMCAD X Version 14.0 Build 57

Channel 165/Area Scan (7x27x1): Measurement grid: $dx=10\text{mm}$, $dy=10\text{mm}$

Maximum value of SAR (measured) = 0.645 mW/g

Channel 165/Zoom Scan (7x7x9)/Cube 0: Measurement grid: $dx=4\text{mm}$, $dy=4\text{mm}$, $dz=2.5\text{mm}$

Reference Value = 15.2 V/m; Power Drift = -0.126 dB

Peak SAR (extrapolated) = 1.4 W/kg

SAR(1 g) = 0.484 mW/g; SAR(10 g) = 0.270 mW/g

Maximum value of SAR (measured) = 0.711 mW/g

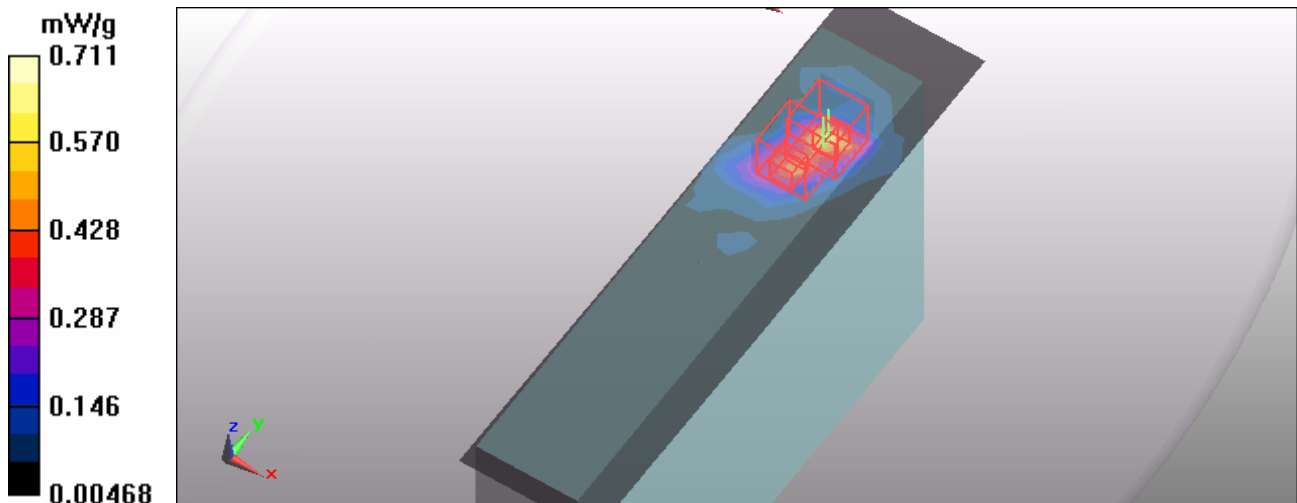
Channel 165/Zoom Scan (7x7x9)/Cube 1: Measurement grid: $dx=4\text{mm}$, $dy=4\text{mm}$, $dz=2.5\text{mm}$

Reference Value = 15.2 V/m; Power Drift = -0.126 dB

Peak SAR (extrapolated) = 1.74 W/kg

SAR(1 g) = 0.410 mW/g; SAR(10 g) = 0.258 mW/g

Maximum value of SAR (measured) = 0.623 mW/g



Test Laboratory: Bureau Veritas ADT

M39-11aN 40M Band4-Ch159 / L1

DUT: Tablet PC ; Type: T7M

Communication System: 11aN 40MHz ; Frequency: 5795 MHz ; Duty Cycle: 1:1 ; Modulation type: BPSK

Medium: MSL5800 Medium parameters used: $f = 5795$ MHz; $\sigma = 6.1$ mho/m; $\epsilon_r = 49$; $\rho = 1000$ kg/m³
Phantom section: Flat Section ; Separation distance : 0 mm (The Tip side of the EUT to the Phantom)

DASY5 Configuration:

- Probe: EX3DV3 - SN3504; ConvF(3.95, 3.95, 3.95); Calibrated: 2010/1/26
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn510; Calibrated: 2009/12/16
- Phantom: Flat Phantom ELI4.0; Type: QDOVA001BA; Serial: 1043
- Measurement SW: DASY5, V5.2 Build 157; SEMCAD X Version 14.0 Build 57

Channel 159/Area Scan (7x27x1): Measurement grid: dx=10mm, dy=10mm

Maximum value of SAR (measured) = 0.957 mW/g

Channel 159/Zoom Scan (7x7x9)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=2.5mm

Reference Value = 4.9 V/m; Power Drift = -0.175 dB

Peak SAR (extrapolated) = 2.18 W/kg

SAR(1 g) = 0.690 mW/g; SAR(10 g) = 0.333 mW/g

Maximum value of SAR (measured) = 1.05 mW/g

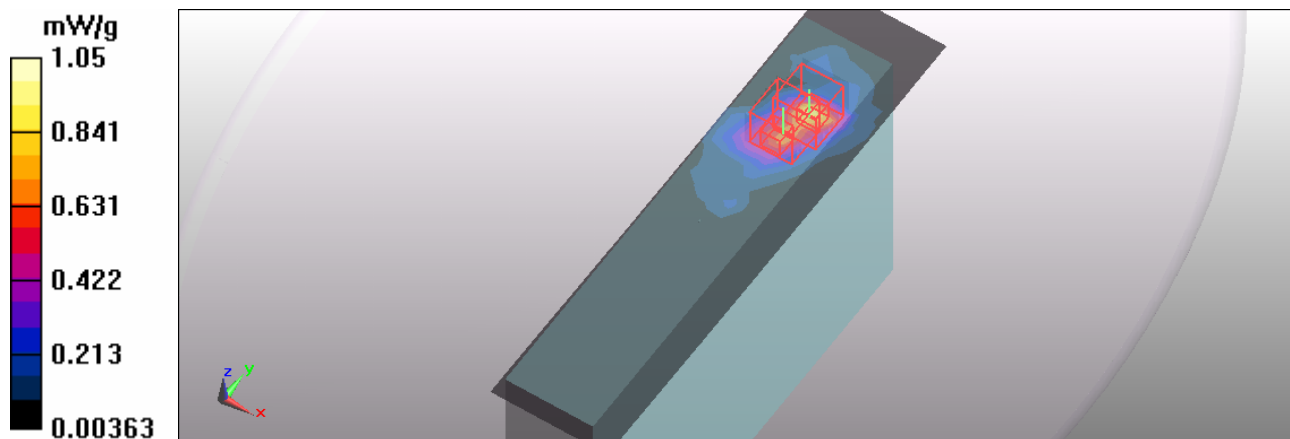
Channel 159/Zoom Scan (7x7x9)/Cube 1: Measurement grid: dx=4mm, dy=4mm, dz=2.5mm

Reference Value = 4.9 V/m; Power Drift = -0.175 dB

Peak SAR (extrapolated) = 2.21 W/kg

SAR(1 g) = 0.550 mW/g; SAR(10 g) = 0.315 mW/g

Maximum value of SAR (measured) = 0.985 mW/g



Test Laboratory: Bureau Veritas ADT

M40-11a Band4-Ch165 / L1

DUT: Tablet PC ; Type: T7M

Communication System: 802.11a ; Frequency: 5825 MHz ; Duty Cycle: 1:1 ; Modulation type: BPSK
 Medium: MSL5800 Medium parameters used : $f = 5825$ MHz; $\sigma = 6.14$ mho/m; $\epsilon_r = 49$; $\rho = 1000$ kg/m³
 Phantom section: Flat Section ; Separation distance : 0 mm (The back side of the EUT to the Phantom)

DASY5 Configuration:

- Probe: EX3DV3 - SN3504; ConvF(3.95, 3.95, 3.95); Calibrated: 2010/1/26
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn510; Calibrated: 2009/12/16
- Phantom: Flat Phantom ELI4.0; Type: QDOVA001BA; Serial: 1043
- Measurement SW: DASY5, V5.2 Build 157; SEMCAD X Version 14.0 Build 57

Channel 165/Area Scan (7x27x1): Measurement grid: dx=10mm, dy=10mm

Maximum value of SAR (measured) = 0.027 mW/g

Channel 165/Zoom Scan (7x7x9)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=2.5mm

Reference Value = 6.19 V/m; Power Drift = -0.156 dB

Peak SAR (extrapolated) = 0.054 W/kg

SAR(1 g) = 0.030 mW/g; SAR(10 g) = 0.012 mW/g

Maximum value of SAR (measured) = 0.034 mW/g

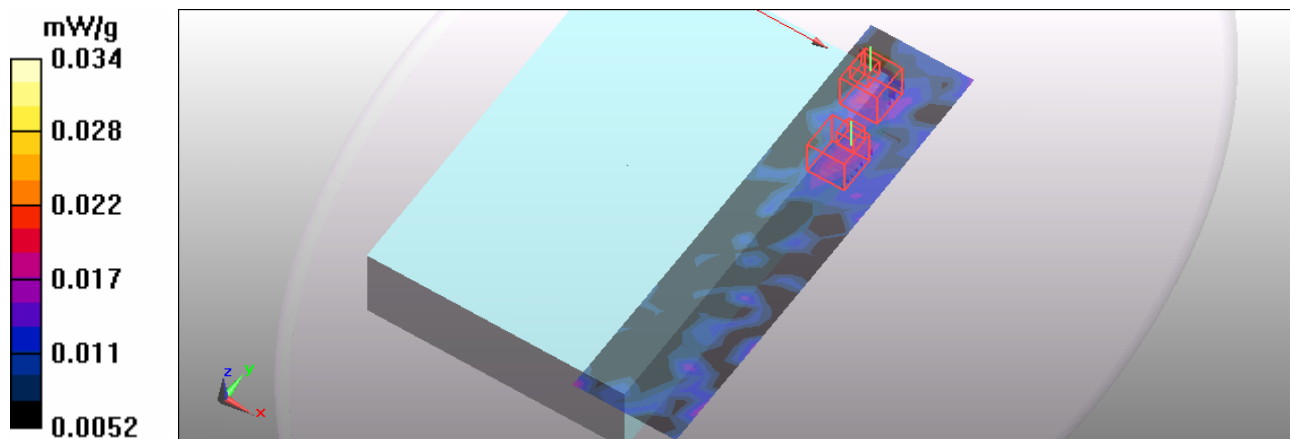
Channel 165/Zoom Scan (7x7x9)/Cube 1: Measurement grid: dx=4mm, dy=4mm, dz=2.5mm

Reference Value = 6.19 V/m; Power Drift = -0.156 dB

Peak SAR (extrapolated) = 0.052 W/kg

SAR(1 g) = 0.029 mW/g; SAR(10 g) = 0.012 mW/g

Maximum value of SAR (measured) = 0.032 mW/g



Test Laboratory: Bureau Veritas ADT

M41-11aN 20M Band4-Ch165 / L1

DUT: Tablet PC ; Type: T7M

Communication System: 11aN 20MHz ; Frequency: 5825 MHz ; Duty Cycle: 1:1 ; Modulation type: BPSK

Medium: MSL5800 Medium parameters used : $f = 5825$ MHz; $\sigma = 6.14$ mho/m; $\epsilon_r = 49$; $\rho = 1000$ kg/m³
Phantom section: Flat Section ; Separation distance : 0 mm (The back side of the EUT to the Phantom)

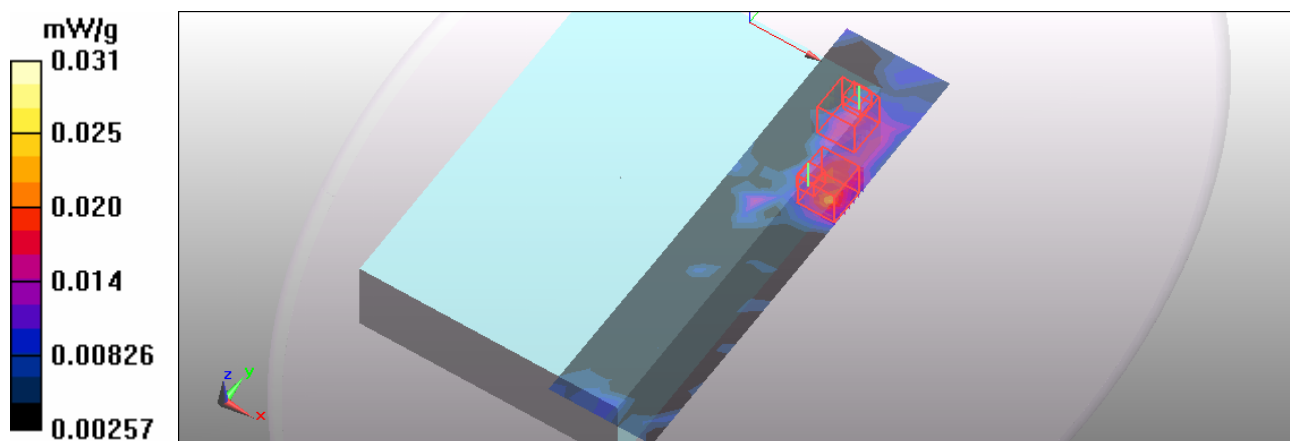
DASY5 Configuration:

- Probe: EX3DV3 - SN3504; ConvF(3.95, 3.95, 3.95); Calibrated: 2010/1/26
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn510; Calibrated: 2009/12/16
- Phantom: Flat Phantom ELI4.0; Type: QDOVA001BA; Serial: 1043
- Measurement SW: DASY5, V5.0 Build 125;

Channel 165/Area Scan (7x27x1): Measurement grid: dx=10mm, dy=10mm
Maximum value of SAR (measured) = 0.027 mW/g

Channel 165/Zoom Scan (7x7x9)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=2.5mm
Reference Value = 6.03 V/m; Power Drift = 0.108 dB
Peak SAR (extrapolated) = 0.052 W/kg
SAR(1 g) = 0.027 mW/g; SAR(10 g) = 0.012 mW/g
Maximum value of SAR (measured) = 0.031 mW/g

Channel 165/Zoom Scan (7x7x9)/Cube 1: Measurement grid: dx=4mm, dy=4mm, dz=2.5mm
Reference Value = 6.03 V/m; Power Drift = 0.108 dB
Peak SAR (extrapolated) = 0.053 W/kg
SAR(1 g) = 0.028 mW/g; SAR(10 g) = 0.012 mW/g
Maximum value of SAR (measured) = 0.031 mW/g



Test Laboratory: Bureau Veritas ADT

M42-11aN 40M Band4-Ch159 / L1

DUT: Tablet PC ; Type: T7M

Communication System: 11aN 40MHz ; Frequency: 5795 MHz ; Duty Cycle: 1:1 ; Modulation type: BPSK

Medium: MSL5800 Medium parameters used: $f = 5795 \text{ MHz}$; $\sigma = 6.1 \text{ mho/m}$; $\epsilon_r = 49$; $\rho = 1000 \text{ kg/m}^3$
Phantom section: Flat Section ; Separation distance : 0 mm (The back side of the EUT to the Phantom)

DASY5 Configuration:

- Probe: EX3DV3 - SN3504; ConvF(3.95, 3.95, 3.95); Calibrated: 2010/1/26
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn510; Calibrated: 2009/12/16
- Phantom: Flat Phantom ELI4.0; Type: QDOVA001BA; Serial: 1043
- Measurement SW: DASY5, V5.2 Build 157; SEMCAD X Version 14.0 Build 57

Channel 159/Area Scan (7x27x1): Measurement grid: $dx=10\text{mm}$, $dy=10\text{mm}$

Maximum value of SAR (measured) = 0.033 mW/g

Channel 159/Zoom Scan (7x7x9)/Cube 0: Measurement grid: $dx=4\text{mm}$, $dy=4\text{mm}$, $dz=2.5\text{mm}$

Reference Value = 6.24 V/m; Power Drift = -0.12 dB

Peak SAR (extrapolated) = 0.098 W/kg

SAR(1 g) = 0.032 mW/g; SAR(10 g) = 0.012 mW/g

Maximum value of SAR (measured) = 0.036 mW/g

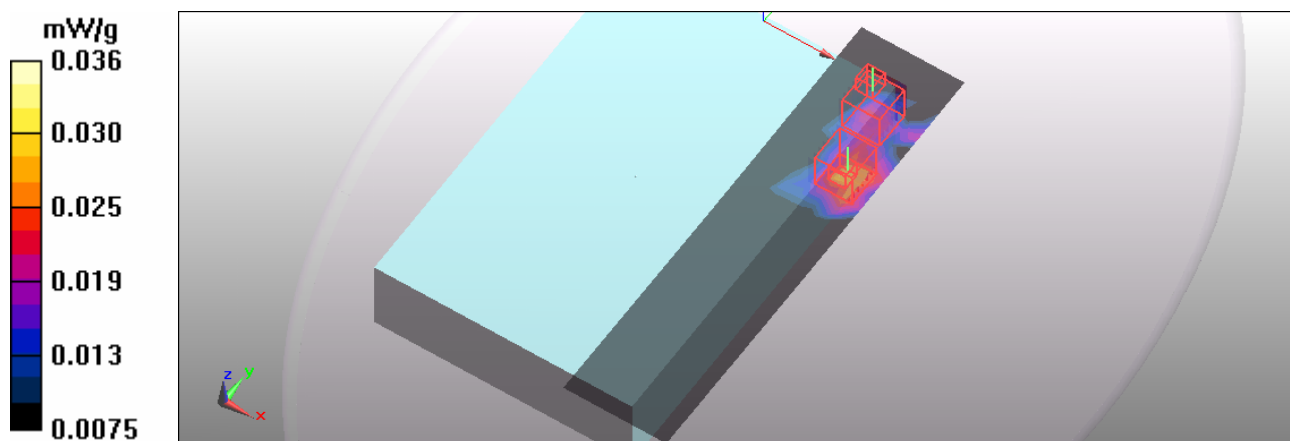
Channel 159/Zoom Scan (7x7x9)/Cube 1: Measurement grid: $dx=4\text{mm}$, $dy=4\text{mm}$, $dz=2.5\text{mm}$

Reference Value = 6.24 V/m; Power Drift = -0.12 dB

Peak SAR (extrapolated) = 0.088 W/kg

SAR(1 g) = 0.029 mW/g; SAR(10 g) = 0.012 mW/g

Maximum value of SAR (measured) = 0.033 mW/g



Test Laboratory: Bureau Veritas ADT

System Validation Check-MSL 2450MHz

DUT: Dipole 2450 MHz ; Type: D2450V2 ; Serial: 716 ; Test Frequency: 2450 MHz

Communication System: CW ; Frequency: 2450 MHz; Duty Cycle: 1:1; Modulation type: CW
 Medium: MSL2450; Medium parameters used : $f = 2450$ MHz; $\sigma = 1.99$ mho/m; $\epsilon_r = 53.5$; $\rho = 1000$ kg/m³ ; Liquid level : 151 mm
 Phantom section: Flat Section ; Separation distance : 10 mm (The feetpoint of the dipole to the Phantom) Air temp. : 23.1 degrees ; Liquid temp. : 21.7 degrees

DASY5 Configuration:

- Probe: EX3DV3 - SN3504; ConvF(7.91, 7.91, 7.91); Calibrated: 2010/1/26
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn510; Calibrated: 2009/12/16
- Phantom: Flat Phantom ELI4.0; Type: QDOVA001BA; Serial: SN:1043
- Measurement SW: DASY4, V4.7 Build 80;

d=10mm, Pin=250mW/Area Scan (5x7x1): Measurement grid: dx=15mm, dy=15mm
 Maximum value of SAR (measured) = 17.1 mW/g

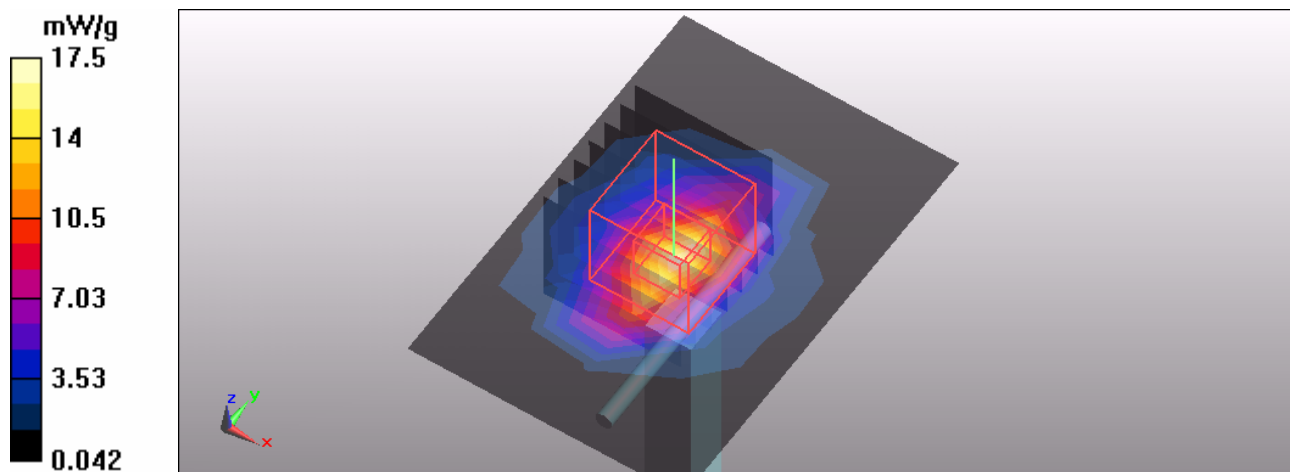
d=10mm, Pin=250mW/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 97 V/m; Power Drift = -0.042 dB

Peak SAR (extrapolated) = 29.6 W/kg

SAR(1 g) = 13 mW/g; SAR(10 g) = 6.02 mW/g

Maximum value of SAR (measured) = 17.5 mW/g



Test Laboratory: Bureau Veritas ADT

System Validation Check-MSL 5GHz

DUT: Dipole 5 GHz ; Type: D5GHzV2 ; Serial: 1019 ; Test Frequency: 5800 MHz

Communication System: CW ; Frequency: 5800 MHz; Duty Cycle: 1:1; Modulation type: CW
 Medium: MSL5800; Medium parameters used: $f = 5800$ MHz; $\sigma = 6.09$ mho/m; $\epsilon_r = 48.7$; $\rho = 1000$ kg/m³ ; Liquid level : 150 mm
 Phantom section: Flat Section ; Separation distance : 10 mm (The feetpoint of the dipole to the Phantom) Air temp. : 23.2 degrees ; Liquid temp. : 21.6 degrees

DASY5 Configuration:

- Probe: EX3DV3 - SN3504; ConvF(3.95, 3.95, 3.95); Calibrated: 2010/1/26
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn510; Calibrated: 2009/12/16
- Phantom: Flat Phantom ELI4.0; Type: QDOVA001BA; Serial: 1043
- Measurement SW: DASY5, V5.2 Build 157; SEMCAD X Version 14.0 Build 57

f=5800, d=10mm, Pin=100mW/Area Scan (6x6x1): Measurement grid: dx=10mm, dy=10mm
 Maximum value of SAR (measured) = 8.13 mW/g

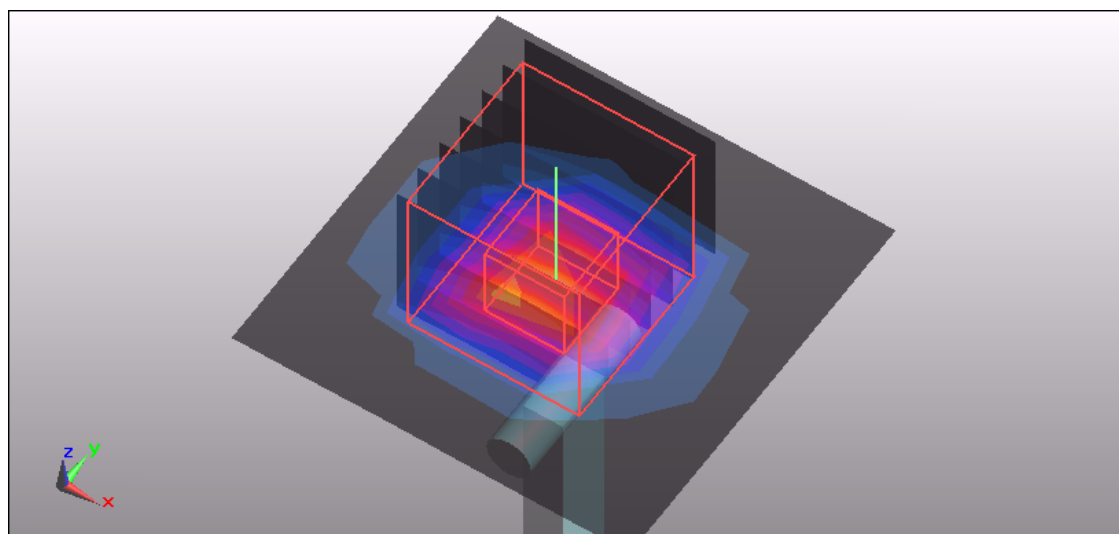
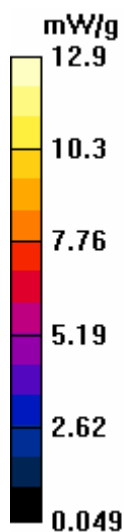
f=5800, d=10mm, Pin=100mW/Zoom Scan (7x7x9)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=2.5mm

Reference Value = 50.3 V/m; Power Drift = 0.030 dB

Peak SAR (extrapolated) = 28.6 W/kg

SAR(1 g) = 6.88 mW/g; SAR(10 g) = 1.92 mW/g

Maximum value of SAR (measured) = 12.9 mW/g



Test Laboratory: Bureau Veritas ADT

System Validation Check-MSL 5GHz

DUT: Dipole 5 GHz ; Type: D5GHzV2 ; Serial: 1019 ; Test Frequency: 5800 MHz

Communication System: CW ; Frequency: 5800 MHz; Duty Cycle: 1:1; Modulation type: CW
 Medium: MSL5800; Medium parameters used: $f = 5800$ MHz; $\sigma = 6.06$ mho/m; $\epsilon_r = 49.3$; $\rho = 1000$ kg/m³ ; Liquid level : 150 mm
 Phantom section: Flat Section ; Separation distance : 10 mm (The feetpoint of the dipole to the Phantom) Air temp. : 22.6 degrees ; Liquid temp. : 21.5 degrees

DASY5 Configuration:

- Probe: EX3DV3 - SN3504; ConvF(3.95, 3.95, 3.95); Calibrated: 2010/1/26
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn510; Calibrated: 2009/12/16
- Phantom: Flat Phantom ELI4.0; Type: QDOVA001BA; Serial: 1043
- Measurement SW: DASY5, V5.2 Build 157; SEMCAD X Version 14.0 Build 57

f=5800, d=10mm, Pin=100mW/Area Scan (6x6x1): Measurement grid: dx=10mm, dy=10mm
 Maximum value of SAR (measured) = 8.2 mW/g

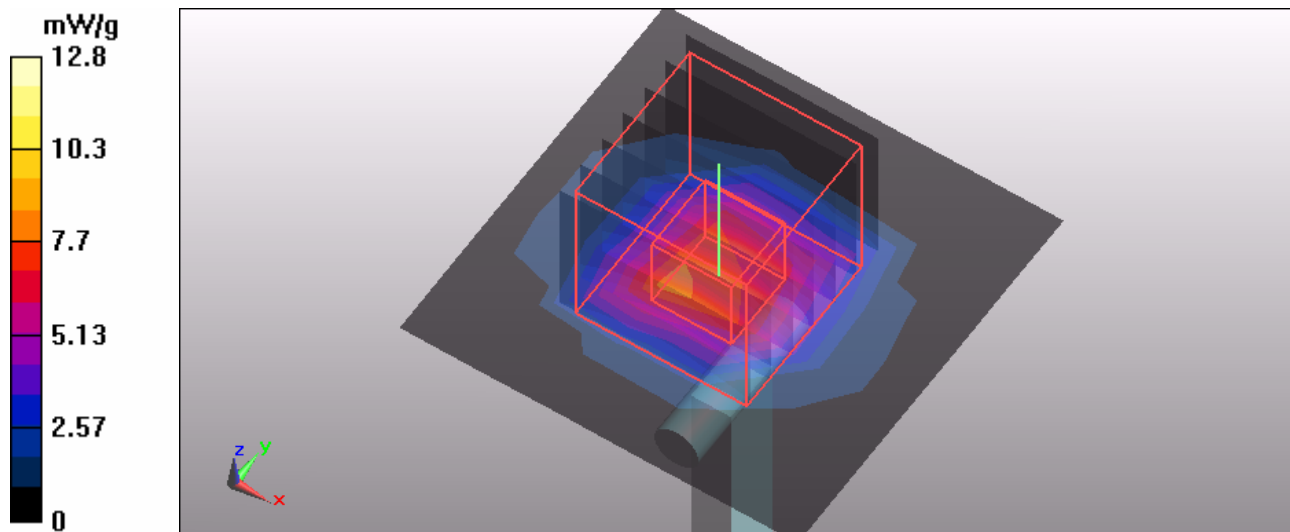
f=5800, d=10mm, Pin=100mW/Zoom Scan (7x7x9)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=2.5mm

Reference Value = 49.3 V/m; Power Drift = -0.035 dB

Peak SAR (extrapolated) = 28.2 W/kg

SAR(1 g) = 6.81 mW/g; SAR(10 g) = 1.89 mW/g

Maximum value of SAR (measured) = 12.8 mW/g



Test Laboratory: Bureau Veritas ADT

System Validation Check-MSL 5GHz

DUT: Dipole 5 GHz ; Type: D5GHzV2 ; Serial: 1019 ; Test Frequency: 5800 MHz

Communication System: CW ; Frequency: 5800 MHz; Duty Cycle: 1:1; Modulation type: CW
 Medium: MSL5800; Medium parameters used: $f = 5800$ MHz; $\sigma = 6.11$ mho/m; $\epsilon_r = 49.5$; $\rho = 1000$ kg/m³ ; Liquid level : 150 mm
 Phantom section: Flat Section ; Separation distance : 10 mm (The feetpoint of the dipole to the Phantom) Air temp. : 23.1 degrees ; Liquid temp. : 21.7 degrees

DASY5 Configuration:

- Probe: EX3DV3 - SN3504; ConvF(3.95, 3.95, 3.95); Calibrated: 2010/1/26
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn510; Calibrated: 2009/12/16
- Phantom: Flat Phantom ELI4.0; Type: QDOVA001BA; Serial: 1043
- Measurement SW: DASY5, V5.2 Build 157; SEMCAD X Version 14.0 Build 57

f=5800, d=10mm, Pin=100mW/Area Scan (6x6x1): Measurement grid: dx=10mm, dy=10mm
 Maximum value of SAR (measured) = 8.18 mW/g

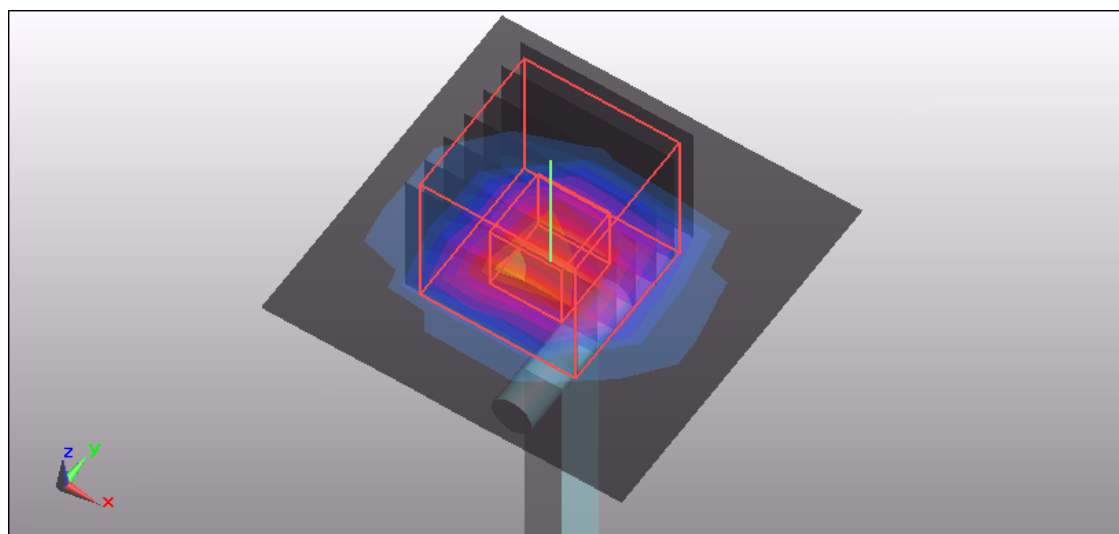
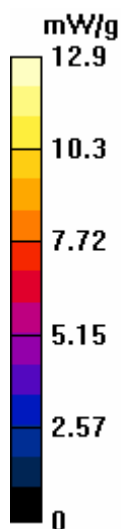
f=5800, d=10mm, Pin=100mW/Zoom Scan (7x7x9)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=2.5mm

Reference Value = 49.7 V/m; Power Drift = -0.013 dB

Peak SAR (extrapolated) = 28.3 W/kg

SAR(1 g) = 6.86 mW/g; SAR(10 g) = 1.91 mW/g

Maximum value of SAR (measured) = 12.9 mW/g



Test Laboratory: Bureau Veritas ADT

System Validation Check-MSL 5GHz

DUT: Dipole 5 GHz ; Type: D5GHzV2 ; Serial: 1019 ; Test Frequency: 5800 MHz

Communication System: CW ; Frequency: 5800 MHz; Duty Cycle: 1:1; Modulation type: CW
 Medium: MSL5800; Medium parameters used: $f = 5800$ MHz; $\sigma = 6.1$ mho/m; $\epsilon_r = 49$; $\rho = 1000$ kg/m³ ;
 Liquid level : 150 mm
 Phantom section: Flat Section ; Separation distance : 10 mm (The feetpoint of the dipole to the Phantom)
 Air temp. : 22.8 degrees ; Liquid temp. : 21.6 degrees

DASY5 Configuration:

- Probe: EX3DV3 - SN3504; ConvF(3.95, 3.95, 3.95); Calibrated: 2010/1/26
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn510; Calibrated: 2009/12/16
- Phantom: Flat Phantom ELI4.0; Type: QDOVA001BA; Serial: 1043
- Measurement SW: DASY5, V5.2 Build 157; SEMCAD X Version 14.0 Build 57

f=5800, d=10mm, Pin=100mW/Area Scan (6x6x1): Measurement grid: dx=10mm, dy=10mm
 Maximum value of SAR (measured) = 8.27 mW/g

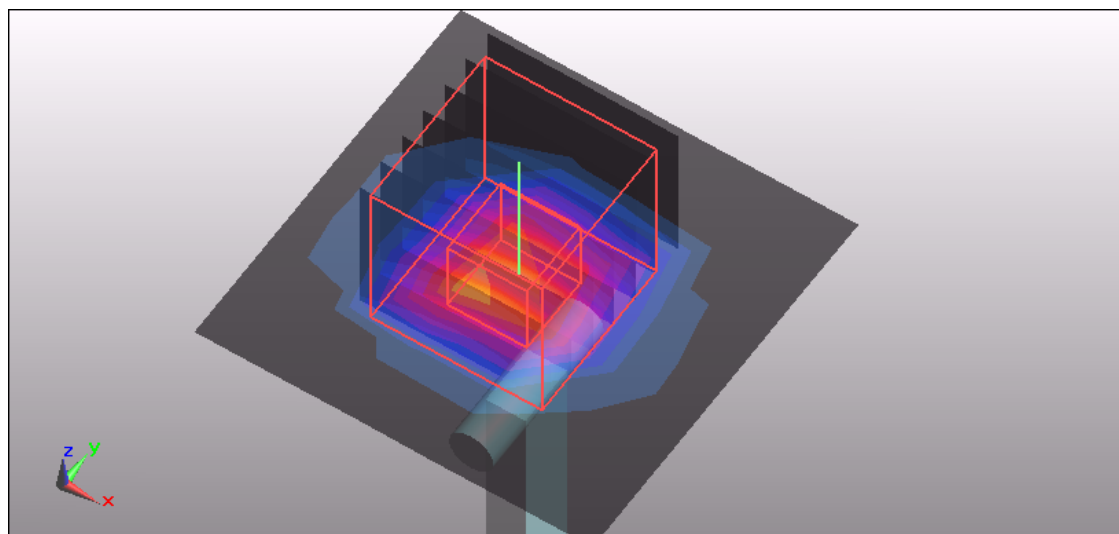
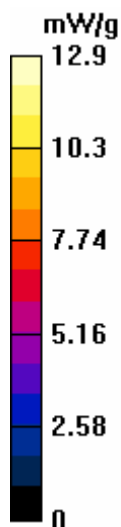
f=5800, d=10mm, Pin=100mW/Zoom Scan (7x7x9)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=2.5mm

Reference Value = 50.2 V/m; Power Drift = -0.019 dB

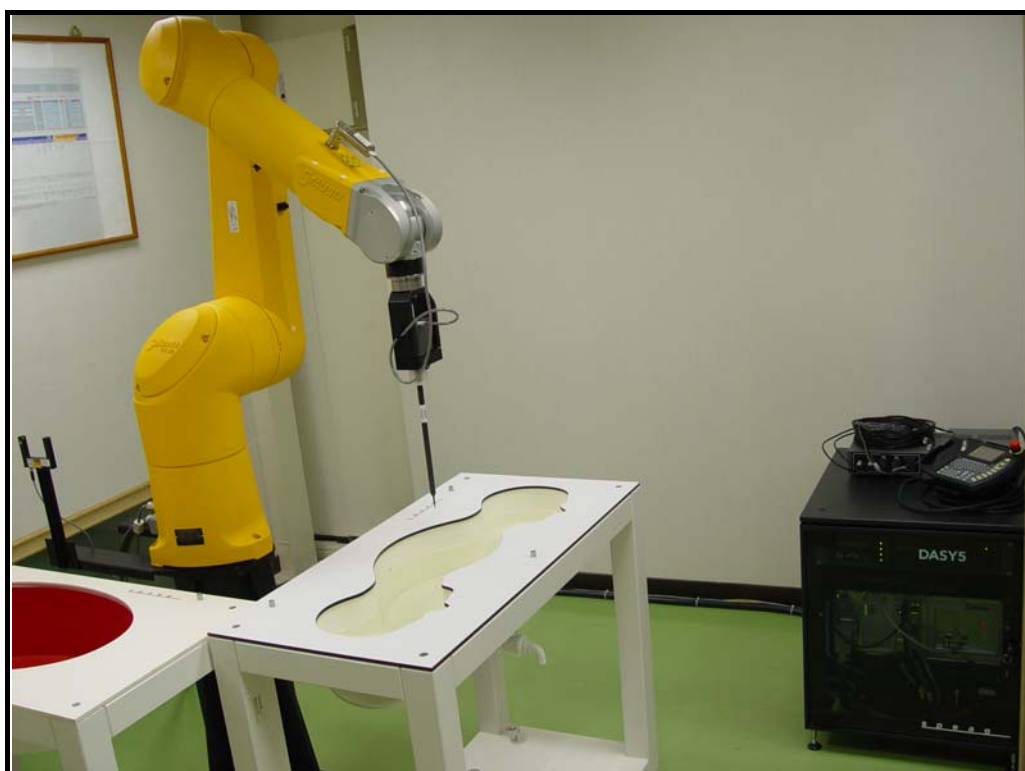
Peak SAR (extrapolated) = 28.7 W/kg

SAR(1 g) = 6.87 mW/g; SAR(10 g) = 1.9 mW/g

Maximum value of SAR (measured) = 12.9 mW/g



APPENDIX B: BV ADT SAR MEASUREMENT SYSTEM



APPENDIX C: PHOTOGRAPHS OF SYSTEM VALIDATION





APPENDIX D: SYSTEM CERTIFICATE & CALIBRATION

D1: PHANTOM

Zeughausstrasse 43, 8004 Zurich, Switzerland
 Phone +41 1 245 9700, Fax +41 1 245 9779
 info@speag.com, http://www.speag.com

Certificate of Conformity / First Article Inspection

Item	Oval Flat Phantom ELI 4.0
Type No	QD OVA 001 B
Series No	1003 and higher
Manufacturer	SPEAG Zeughausstrasse 43 CH-8004 Zürich Switzerland

Tests

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

Test	Requirement	Details	Units tested
Dimensions	Compliant with the standard IEC 62209 – 2 [1] requirements	Dimensions of bottom for 300 MHz – 6 GHz: longitudinal = 600 mm (max. dimension) width = 400 mm (min dimension) depth = 190 mm Shape: ellipse	Prototypes, Samples
Material thickness	Compliant with the standard IEC 62209 – 2 [1] requirements	Bottom plate: 2.0mm +/- 0.2mm	Prototypes, All items
Material parameters	Dielectric parameters for required frequencies	300 MHz – 6 GHz Rel. permittivity = 4 +/-1, Loss tangent ≤ 0.05	Material sample
Material resistivity	The material has been tested to be compatible with the liquids defined in the standards if handled and cleaned according to the instructions. Observe Technical Note for material compatibility.	DEGMBE based simulating liquids	Equivalent phantoms, Material sample
Sagging	Compliant with the requirements according to the standard. Sagging of the flat section when filled with tissue simulating liquid	< 1% typical < 0.8% if filled with 155mm of HSL900 and without DUT below	Prototypes, Sample testing

Standards

- [1] IEC 62209 – 2, Draft Version 0.9, "Evaluation of Human Exposure to Radio Frequency Fields from Handheld and Body-Mounted Wireless Communication Devices in the Frequency Range of 30 MHz to 6 GHz: Human models, Instrumentation and Procedures Part 2: Procedure to determine the Specific Absorption Rate (SAR) for ... including accessories and multiple transmitters", December 2004

Conformity

Based on the sample tests above, we certify that this item is in compliance with the standard [1].

Date 07.07.2005

Signature / Stamp

s p e a g

Schmid & Partner Engineering AG
 Zeughausstrasse 43, 8004 Zurich, Switzerland
 Phone +41 1-245-9700, Fax +41 1-245-9779
 info@speag.com, http://www.speag.com



D2: DOSIMETRIC E-FIELD PROBE



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

Accreditation No.: **SCS 108**

Client **BV-ADT (Auden)**

Certificate No: **EX3-3504_Jan10**

CALIBRATION CERTIFICATE

Object **EX3DV3 - SN:3504**

Calibration procedure(s) **QA CAL-01.v6, QA CAL-14.v3, QA CAL-23.v3 and QA CAL-25.v2
Calibration procedure for dosimetric E-field probes**

Calibration date: **January 26, 2010**

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 E4419B	GB41293874	1-Apr-09 (No. 217-01030)	Apr-10
Power sensor E4412A	MY41495277	1-Apr-09 (No. 217-01030)	Apr-10
Power sensor E4412A	MY41498087	1-Apr-09 (No. 217-01030)	Apr-10
Reference 3 dB Attenuator	SN: S5054 (3c)	31-Mar-09 (No. 217-01026)	Mar-10
Reference 20 dB Attenuator	SN: S5086 (20b)	31-Mar-09 (No. 217-01028)	Mar-10
Reference 30 dB Attenuator	SN: S5129 (30b)	31-Mar-09 (No. 217-01027)	Mar-10
Reference Probe ES3DV2	SN: 3013	30-Dec-09 (No. ES3-3013_Dec09)	Dec-10
DAE4	SN: 660	29-Sep-09 (No. DAE4-660_Sep09)	Sep-10

Secondary Standards	ID #	Check Date (in house)	Scheduled Check
RF generator HP 8648C	US3642U01700	4-Aug-99 (in house check Oct-09)	In house check: Oct-11
Network Analyzer HP 8753E	US37390585	18-Oct-01 (in house check Oct-09)	In house check: Oct10

	Name	Function	Signature
Calibrated by:	Katja Pokovic	Technical Manager	

Approved by:	Fin Bornholt	R&D Director	
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Issued: January 26, 2010

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



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

Accreditation No.: **SCS 108**

Glossary:

TSL	tissue simulating liquid
NORM _{x,y,z}	sensitivity in free space
ConvF	sensitivity in TSL / NORM _{x,y,z}
DCP	diode compression point
CF	crest factor (1/duty_cycle) of the RF signal
A, B, C	modulation dependent linearization parameters
Polarization φ	φ rotation around probe axis
Polarization ϑ	ϑ rotation around an axis that is in the plane normal to probe axis (at measurement center), i.e., $\vartheta = 0$ is normal to probe axis

Calibration is Performed According to the Following Standards:

- IEEE Std 1528-2003, "IEEE Recommended Practice for Determining the Peak Spatial-Averaged Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques", December 2003
- IEC 62209-1, "Procedure to measure the Specific Absorption Rate (SAR) for hand-held devices used in close proximity to the ear (frequency range of 300 MHz to 3 GHz)", February 2005

Methods Applied and Interpretation of Parameters:

- NORM_{x,y,z}**: Assessed for E-field polarization $\vartheta = 0$ ($f \leq 900$ MHz in TEM-cell; $f > 1800$ MHz: R22 waveguide). NORM_{x,y,z} are only intermediate values, i.e., the uncertainties of NORM_{x,y,z} does not effect the E^2 -field uncertainty inside TSL (see below *ConvF*).
- NORM(f)_{x,y,z}** = NORM_{x,y,z} * *frequency_response* (see Frequency Response Chart). This linearization is implemented in DASY4 software versions later than 4.2. The uncertainty of the frequency response is included in the stated uncertainty of *ConvF*.
- DCP_{x,y,z}**: DCP are numerical linearization parameters assessed based on the data of power sweep with CW signal (no uncertainty required). DCP does not depend on frequency nor media.
- A_{x,y,z}; B_{x,y,z}; C_{x,y,z}; VR_{x,y,z}**: A, B, C are numerical linearization parameters assessed based on the data of power sweep for specific modulation signal. The parameters do not depend on frequency nor media. VR is the maximum calibration range expressed in RMS voltage across the diode.
- ConvF and Boundary Effect Parameters**: Assessed in flat phantom using E-field (or Temperature Transfer Standard for $f \leq 800$ 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_{x,y,z} * ConvF whereby the uncertainty corresponds to that given for ConvF. A frequency dependent ConvF is used in DASY version 4.4 and higher which allows extending the validity from ± 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.

Probe EX3DV3

SN:3504

Manufactured:	December 15, 2003
Last calibrated:	January 21, 2009
Recalibrated:	January 26, 2010

Calibrated for DASY Systems

(Note: non-compatible with DASY2 system!)

DASY - Parameters of Probe: EX3DV3 SN:3504**Basic Calibration Parameters**

	Sensor X	Sensor Y	Sensor Z	Unc (k=2)
Norm ($\mu\text{V}/(\text{V}/\text{m})^2$) ^A	0.59	0.62	0.62	$\pm 10.1\%$
DCP (mV) ^B	97.9	95.0	98.0	

Modulation Calibration Parameters

UID	Communication System Name	PAR		A dB	B dBuV	C	VR mV	Unc ^E (k=2)
10000	CW	0.00	X	0.00	0.00	1.00	300	$\pm 1.5\%$
			Y	0.00	0.00	1.00	300	
			Z	0.00	0.00	1.00	300	

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

^A The uncertainties of NormX,Y,Z do not affect the E^2 -field uncertainty inside TSL. (see Pages 5 and 6).

^B Numerical linearization parameter: uncertainty not required.

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

DASY - Parameters of Probe: EX3DV3 SN:3504

Calibration Parameter Determined in Head Tissue Simulating Media

f [MHz]	Validity [MHz] ^c	Permittivity	Conductivity	ConvF X	ConvF Y	ConvF Z	Alpha	Depth Unc (k=2)
900	± 50 / ± 100	41.5 ± 5%	0.97 ± 5%	9.80	9.80	9.80	0.48	0.73 ± 11.0%
1750	± 50 / ± 100	40.1 ± 5%	1.37 ± 5%	8.70	8.70	8.70	0.50	0.67 ± 11.0%
1950	± 50 / ± 100	40.0 ± 5%	1.40 ± 5%	8.20	8.20	8.20	0.38	0.75 ± 11.0%
2450	± 50 / ± 100	39.2 ± 5%	1.80 ± 5%	7.77	7.77	7.77	0.21	1.06 ± 11.0%
2600	± 50 / ± 100	39.0 ± 5%	1.96 ± 5%	7.79	7.79	7.79	0.22	1.16 ± 11.0%
5200	± 50 / ± 100	36.0 ± 5%	4.66 ± 5%	4.87	4.87	4.87	0.45	1.70 ± 13.1%
5300	± 50 / ± 100	35.9 ± 5%	4.76 ± 5%	4.62	4.62	4.62	0.45	1.70 ± 13.1%
5500	± 50 / ± 100	35.6 ± 5%	4.96 ± 5%	4.51	4.51	4.51	0.50	1.70 ± 13.1%
5600	± 50 / ± 100	35.5 ± 5%	5.07 ± 5%	4.25	4.25	4.25	0.55	1.70 ± 13.1%
5800	± 50 / ± 100	35.3 ± 5%	5.27 ± 5%	4.53	4.53	4.53	0.50	1.70 ± 13.1%

^c The validity of ± 100 MHz only applies for DASY v4.4 and higher (see Page 2). The uncertainty is the RSS of the ConvF uncertainty at calibration frequency and the uncertainty for the indicated frequency band.

DASY - Parameters of Probe: EX3DV3 SN:3504

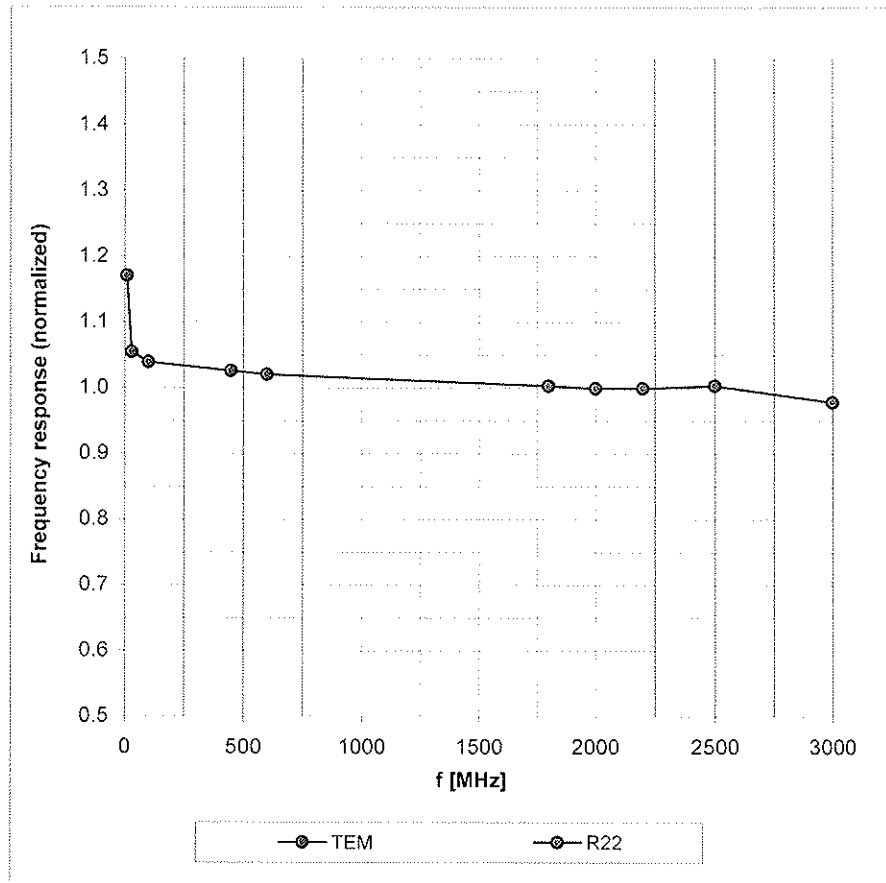
Calibration Parameter Determined in Body Tissue Simulating Media

f [MHz]	Validity [MHz] ^c	Permittivity	Conductivity	ConvF X	ConvF Y	ConvF Z	Alpha	Depth Unc (k=2)
900	± 50 / ± 100	55.0 ± 5%	1.05 ± 5%	9.83	9.83	9.83	0.44	0.76 ± 11.0%
1750	± 50 / ± 100	53.4 ± 5%	1.49 ± 5%	8.64	8.64	8.64	0.44	0.74 ± 11.0%
1950	± 50 / ± 100	53.3 ± 5%	1.52 ± 5%	8.52	8.52	8.52	0.39	0.79 ± 11.0%
2450	± 50 / ± 100	52.7 ± 5%	1.95 ± 5%	7.91	7.91	7.91	0.32	0.86 ± 11.0%
2600	± 50 / ± 100	52.5 ± 5%	2.16 ± 5%	7.80	7.80	7.80	0.27	0.90 ± 11.0%
5200	± 50 / ± 100	49.0 ± 5%	5.30 ± 5%	4.45	4.45	4.45	0.50	1.80 ± 13.1%
5300	± 50 / ± 100	48.5 ± 5%	5.42 ± 5%	4.18	4.18	4.18	0.55	1.80 ± 13.1%
5500	± 50 / ± 100	48.6 ± 5%	5.65 ± 5%	3.91	3.91	3.91	0.60	1.80 ± 13.1%
5600	± 50 / ± 100	48.5 ± 5%	5.77 ± 5%	3.70	3.70	3.70	0.65	1.80 ± 13.1%
5800	± 50 / ± 100	48.2 ± 5%	6.00 ± 5%	3.95	3.95	3.95	0.60	1.75 ± 13.1%

^c The validity of ± 100 MHz only applies for DASY v4.4 and higher (see Page 2). The uncertainty is the RSS of the ConvF uncertainty at calibration frequency and the uncertainty for the indicated frequency band.

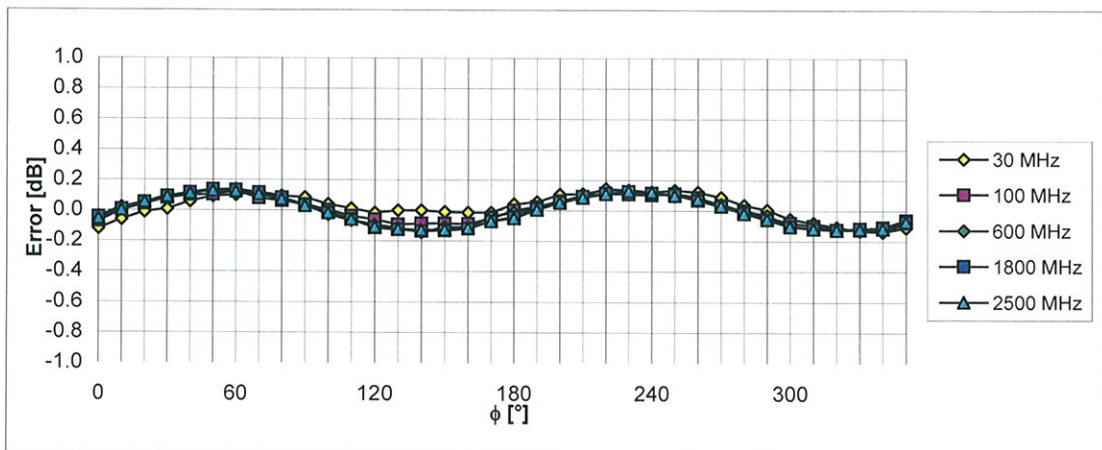
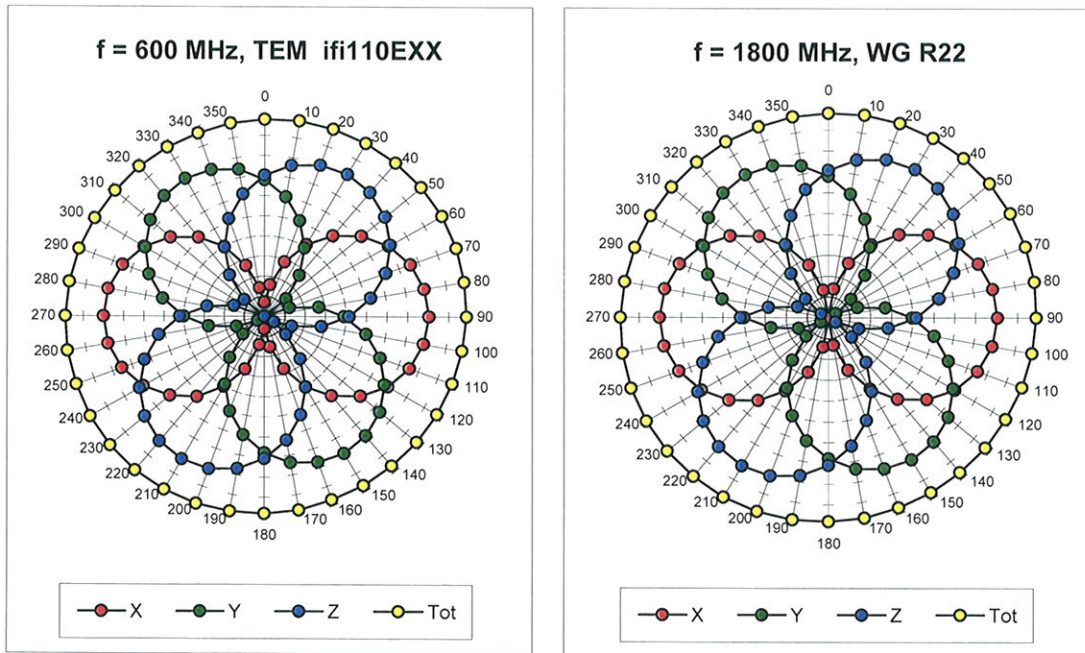
Frequency Response of E-Field

(TEM-Cell:ifi110 EXX, Waveguide: R22)



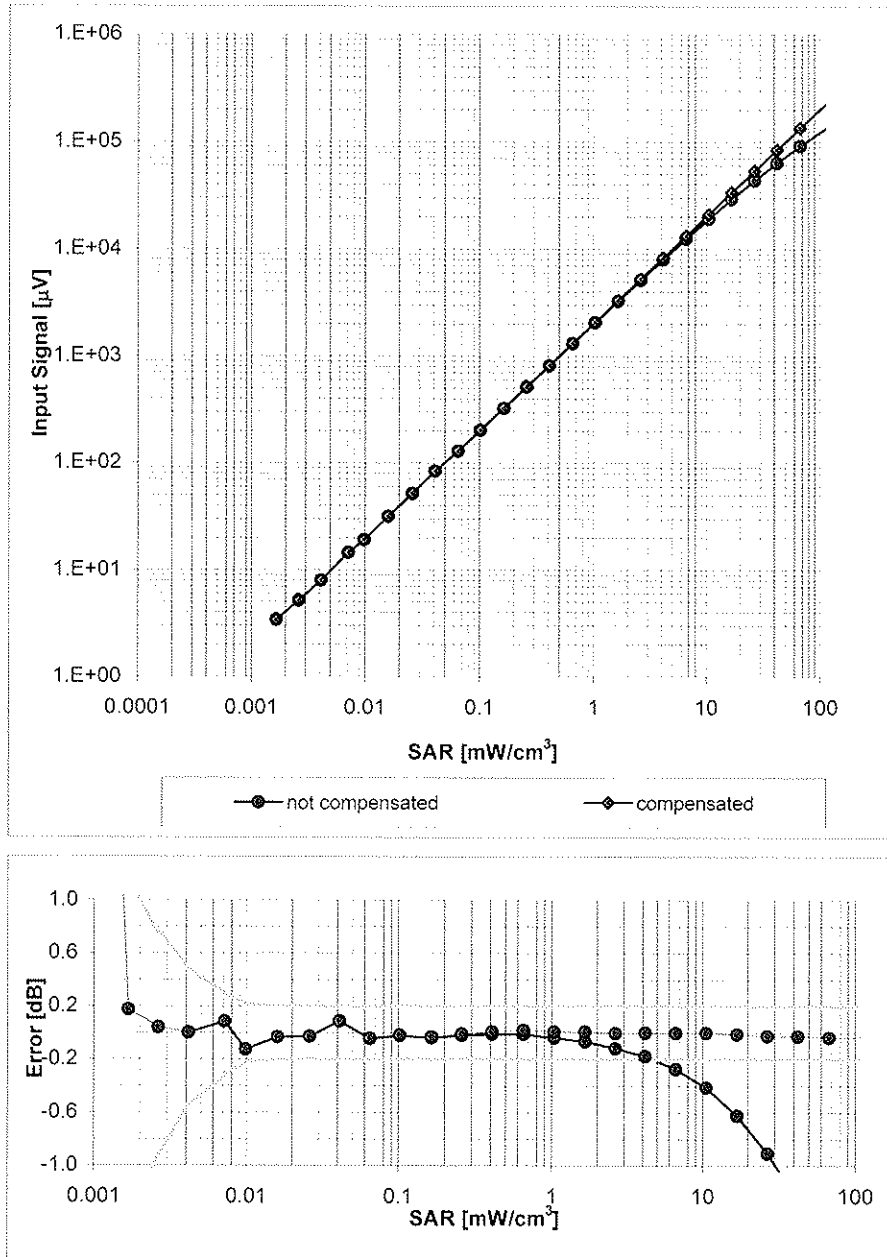
Uncertainty of Frequency Response of E-field: $\pm 6.3\%$ (k=2)

Receiving Pattern (ϕ), $\vartheta = 0^\circ$



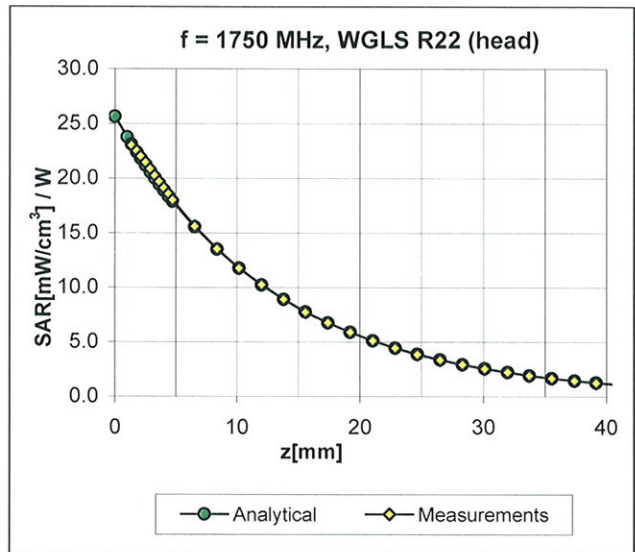
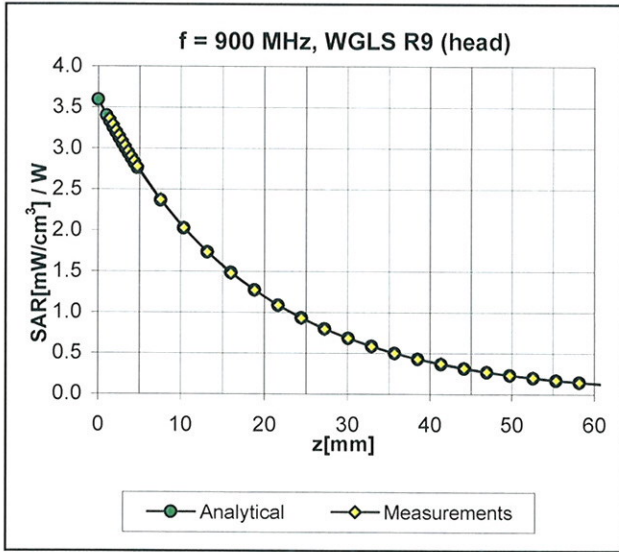
Uncertainty of Axial Isotropy Assessment: $\pm 0.5\%$ ($k=2$)

Dynamic Range $f(SAR_{head})$ (Waveguide R22, $f = 1800$ MHz)



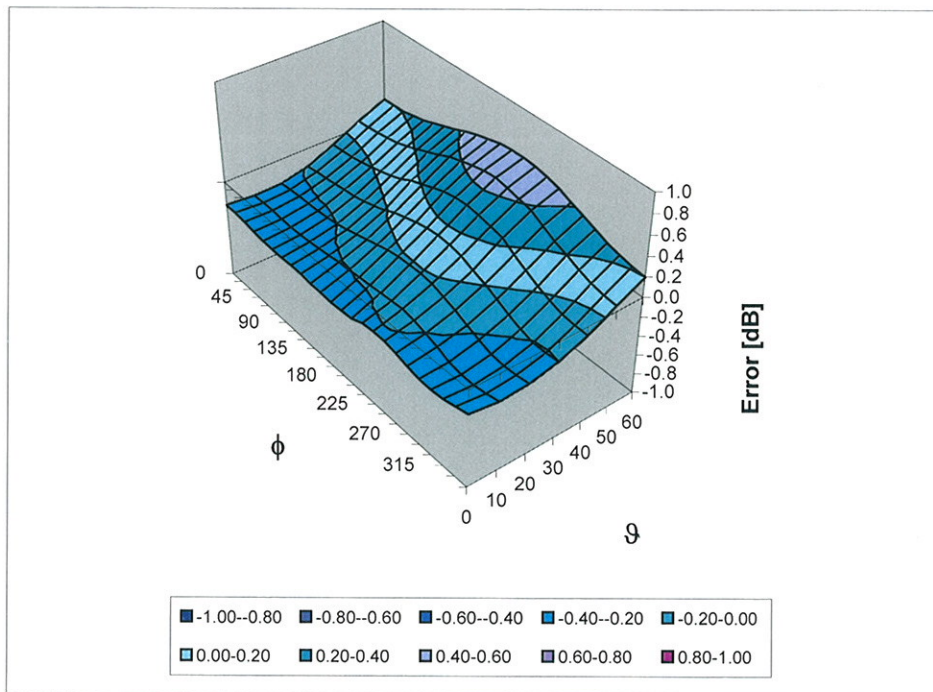
Uncertainty of Linearity Assessment: $\pm 0.6\%$ ($k=2$)

Conversion Factor Assessment



Deviation from Isotropy in HSL

Error (ϕ, ϑ), f = 900 MHz



Uncertainty of Spherical Isotropy Assessment: $\pm 2.6\%$ (k=2)

Other Probe Parameters

Sensor Arrangement	Triangular
Connector Angle (°)	Not applicable
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	2 mm



A D T

D3: DAE

IMPORTANT NOTICE

USAGE OF THE DAE 3

The DAE unit is a delicate, high precision instrument and requires careful treatment by the user. There are no serviceable parts inside the DAE. Special attention shall be given to the following points:

Battery Exchange: The battery cover of the DAE3 unit is connected to a fragile 3-pin battery connector. Customer is responsible to apply utmost caution not to bend or damage the connector when changing batteries.

Shipping of the DAE: Before shipping the DAE to SPEAG for calibration the customer shall remove the batteries and pack the DAE in an antistatic bag. This antistatic bag shall then be packed into a larger box or container which protects the DAE from impacts transportation. The package shall be marked to indicate that a fragile instrument is inside.

E-Stop Failures: Touch detection may be malfunctioning due to broken magnets in the E-stop. Rough handling of the E-stop may lead to damage of these magnets. Touch and collision errors are often caused by dust and dirt accumulated in the E-stop. To prevent E-stop failure, Customer shall always mount the probe to the DAE carefully and keep the DAE unit in a non-dusty environment if not used for measurements.

Repair: Minor repairs are performed at no extra cost during the annual calibration. However, SPEAG reserves the right to charge for any repair especially if rough unprofessional handling caused the defect.

DASY Configuration Files: Since the exact values of the DAE input resistances, as measured during the calibration procedure of a DAE unit, are not used by the DASY software, a nominal value of 200 MOhm is given in the corresponding configuration file.

Important Note:

Warranty and calibration is void if the DAE unit is disassembled partly or fully by the Customer.

Important Note:

Never attempt to grease or oil the E-stop assembly. Cleaning and readjusting of the E-stop assembly is allowed by certified SPEAG personnel only and is part of the annual calibration procedure.

Important Note:

To prevent damage of the DAE probe connector pins, use great care when installing the probe to the DAE. Carefully connect the probe with the connector notch oriented in the mating position. Avoid any rotational movement of the probe body versus the DAE while turning the locking nut of the connector. The same care shall be used when disconnecting the probe from the DAE.



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Multilateral Agreement for the recognition of calibration certificates

Accreditation No.: **SCS 108**

Client **BV-ADT (Auden)**

Certificate No: **DAE3-510_Dec09**

CALIBRATION CERTIFICATE

Object **DAE3 - SD 000 D03 AA - SN: 510**

Calibration procedure(s) **QA CAL-06.v12
Calibration procedure for the data acquisition electronics (DAE)**

Calibration date: **December 16, 2009**

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

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

Calibration Equipment used (M&TE critical for calibration)

Primary Standards	ID #	Cal Date (Certificate No.)	Scheduled Calibration
Keithley Multimeter Type 2001	SN: 0810278	1-Oct-09 (No: 9055)	Oct-10
Secondary Standards	ID #	Check Date (in house)	Scheduled Check
Calibrator Box V1.1	SE UMS 006 AB 1004	05-Jun-09 (in house check)	In house check: Jun-10

Calibrated by:	Name Dominique Steffen	Function Technician	Signature
Approved by:	Name Fin Bomholt	Function R&D Director	Signature

Issued: December 16, 2009

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Accreditation No.: **SCS 108**

Glossary

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

Methods Applied and Interpretation of Parameters

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

DC Voltage Measurement

A/D - Converter Resolution nominal

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

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

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

Calibration Factors	X	Y	Z
High Range	404.187 \pm 0.1% (k=2)	404.248 \pm 0.1% (k=2)	404.614 \pm 0.1% (k=2)
Low Range	3.97892 \pm 0.7% (k=2)	3.96605 \pm 0.7% (k=2)	3.98005 \pm 0.7% (k=2)

Connector Angle

Connector Angle to be used in DASY system	41.5 $^{\circ}$ \pm 1 $^{\circ}$
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Appendix

1. DC Voltage Linearity

High Range		Reading (μV)	Difference (μV)	Error (%)
Channel X	+ Input	199990.9	-2.38	-0.00
Channel X	+ Input	20002.91	2.61	0.01
Channel X	- Input	-19997.79	1.41	-0.01
Channel Y	+ Input	199996.6	-5.01	-0.00
Channel Y	+ Input	20001.94	2.24	0.01
Channel Y	- Input	-19996.34	2.86	-0.01
Channel Z	+ Input	200008.9	-1.41	-0.00
Channel Z	+ Input	20002.05	2.25	0.01
Channel Z	- Input	-19999.79	-0.00	-0.00

Low Range		Reading (μV)	Difference (μV)	Error (%)
Channel X	+ Input	2000.2	0.23	0.01
Channel X	+ Input	199.97	-0.33	-0.16
Channel X	- Input	-199.93	-0.13	0.06
Channel Y	+ Input	2000.4	0.32	0.02
Channel Y	+ Input	199.22	-0.88	-0.44
Channel Y	- Input	-200.89	-0.89	0.45
Channel Z	+ Input	1999.8	-0.20	-0.01
Channel Z	+ Input	198.70	-1.10	-0.55
Channel Z	- Input	-201.24	-1.14	0.57

2. Common mode sensitivity

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

	Common mode Input Voltage (mV)	High Range Average Reading (μV)	Low Range Average Reading (μV)
Channel X	200	18.38	16.64
	- 200	-15.57	-17.08
Channel Y	200	15.00	14.68
	- 200	-16.18	-16.11
Channel Z	200	-8.28	-8.46
	- 200	8.35	7.64

3. Channel separation

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

	Input Voltage (mV)	Channel X (μV)	Channel Y (μV)	Channel Z (μV)
Channel X	200	-	1.05	0.90
Channel Y	200	3.00	-	2.06
Channel Z	200	1.57	0.45	-

4. AD-Converter Values with inputs shorted

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

	High Range (LSB)	Low Range (LSB)
Channel X	15923	16300
Channel Y	16079	15537
Channel Z	16073	16363

5. Input Offset Measurement

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

Input 10M Ω

	Average (μ V)	min. Offset (μ V)	max. Offset (μ V)	Std. Deviation (μ V)
Channel X	-0.00	-0.83	0.76	0.27
Channel Y	-0.64	-1.12	1.85	0.32
Channel Z	-0.15	-1.15	1.76	0.36

6. Input Offset Current

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

7. Input Resistance

	Zeroing (MOhm)	Measuring (MOhm)
Channel X	0.2001	201.0
Channel Y	0.2001	199.9
Channel Z	0.2001	200.4

8. Low Battery Alarm Voltage (verified during pre test)

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

9. Power Consumption (verified during pre test)

Typical values	Switched off (mA)	Stand by (mA)	Transmitting (mA)
Supply (+ Vcc)	+0.0	+6	+14
Supply (- Vcc)	-0.01	-8	-9



D4: SYSTEM VALIDATION DIPOLE



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Multilateral Agreement for the recognition of calibration certificates

Accreditation No.: **SCS 108**

Client **BV-ADT (Auden)**

Certificate No: **D2450V2-716_Mar09**

CALIBRATION CERTIFICATE

Object **D2450V2 - SN: 716**

Calibration procedure(s) **QA CAL-05.v7
Calibration procedure for dipole validation kits**

Calibration date: **March 17, 2009**

Condition of the calibrated item **In Tolerance**

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

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

Calibration Equipment used (M&TE critical for calibration)

Primary Standards	ID #	Cal Date (Calibrated by, Certificate No.)	Scheduled Calibration
Power meter EPM-442A	GB37480704	08-Oct-08 (No. 217-00898)	Oct-09
Power sensor HP 8481A	US37292783	08-Oct-08 (No. 217-00898)	Oct-09
Reference 20 dB Attenuator	SN: 5086 (20g)	01-Jul-08 (No. 217-00864)	Jul-09
Type-N mismatch combination	SN: 5047.2 / 06327	01-Jul-08 (No. 217-00867)	Jul-09
Reference Probe ES3DV2	SN: 3025	28-Apr-08 (No. ES3-3025_Apr08)	Apr-09
DAE4	SN: 601	07-Mar-09 (No. DAE4-601_Mar09)	Mar-10

Secondary Standards	ID #	Check Date (in house)	Scheduled Check
Power sensor HP 8481A	MY41092317	18-Oct-02 (in house check Oct-07)	In house check: Oct-09
RF generator R&S SMT-06	100005	4-Aug-99 (in house check Oct-07)	In house check: Oct-09
Network Analyzer HP 8753E	US37390585 S4206	18-Oct-01 (in house check Oct-08)	In house check: Oct-09

Calibrated by:	Name Jeton Kastrati	Function Laboratory Technician	Signature
Approved by:	Name Katja Pokovic	Function Technical Manager	

Issued: March 18, 2009

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Multilateral Agreement for the recognition of calibration certificates

Accreditation No.: **SCS 108**

Glossary:

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

Calibration is Performed According to the Following Standards:

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

Additional Documentation:

- DASY4/5 System Handbook

Methods Applied and Interpretation of Parameters:

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

Measurement Conditions

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

DASY Version	DASY5	V5.0
Extrapolation	Advanced Extrapolation	
Phantom	Modular Flat Phantom V5.0	
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	38.0 \pm 6 %	1.82 mho/m \pm 6 %
Head TSL temperature during test	(21.0 \pm 0.2) °C	----	----

SAR result with Head TSL

SAR averaged over 1 cm ³ (1 g) of Head TSL	Condition	
SAR measured	250 mW input power	13.5 mW / g
SAR normalized	normalized to 1W	54.0 mW / g
SAR for nominal Head TSL parameters ¹	normalized to 1W	53.3 mW / g \pm 17.0 % (k=2)

SAR averaged over 10 cm ³ (10 g) of Head TSL	condition	
SAR measured	250 mW input power	6.24 mW / g
SAR normalized	normalized to 1W	25.0 mW / g
SAR for nominal Head TSL parameters ¹	normalized to 1W	24.8 mW / g \pm 16.5 % (k=2)

¹ Correction to nominal TSL parameters according to d), chapter "SAR Sensitivities"

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 ± 0.2) °C	54.3 ± 6 %	1.99 mho/m ± 6 %
Body TSL temperature during test	(21.1 ± 0.2) °C	----	----

SAR result with Body TSL

SAR averaged over 1 cm ³ (1 g) of Body TSL	Condition	
SAR measured	250 mW input power	13.3 mW / g
SAR normalized	normalized to 1W	53.2 mW / g
SAR for nominal Body TSL parameters ²	normalized to 1W	52.9 mW /g ± 17.0 % (k=2)

SAR averaged over 10 cm ³ (10 g) of Body TSL	condition	
SAR measured	250 mW input power	6.24 mW / g
SAR normalized	normalized to 1W	25.0 mW / g
SAR for nominal Body TSL parameters ²	normalized to 1W	25.0 mW /g ± 16.5 % (k=2)

² Correction to nominal TSL parameters according to d), chapter "SAR Sensitivities"

Appendix

Antenna Parameters with Head TSL

Impedance, transformed to feed point	$54.9 \Omega + 1.4 j\Omega$
Return Loss	- 26.2 dB

Antenna Parameters with Body TSL

Impedance, transformed to feed point	$50.2 \Omega + 4.3 j\Omega$
Return Loss	- 27.4 dB

General Antenna Parameters and Design

Electrical Delay (one direction)	1.144 ns
----------------------------------	----------

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

The dipole is made of standard semirigid coaxial cable. The center conductor of the feeding line is directly connected to the second arm of the dipole. The antenna is therefore short-circuited for DC-signals.

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

Additional EUT Data

Manufactured by	SPEAG
Manufactured on	September 10, 2002

DASY5 Validation Report for Head TSL

Date/Time: 17.03.2009 15:42:29

Test Laboratory: SPEAG, Zurich, Switzerland

DUT: Dipole 2450 MHz; Type: D2450V2; Serial: D2450V2 - SN716

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

Medium: HSL U10 BB

Medium parameters used: $f = 2450$ MHz; $\sigma = 1.83$ mho/m; $\epsilon_r = 38.1$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

Measurement Standard: DASY5 (IEEE/IEC)

DASY5 Configuration:

- Probe: ES3DV2 - SN3025; ConvF(4.4, 4.4, 4.4); Calibrated: 28.04.2008
- Sensor-Surface: 3.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 07.03.2009
- Phantom: Flat Phantom 5.0 (front); Type: QD000P50AA; Serial: 1001
- Measurement SW: DASY5, V5.0 Build 120; SEMCAD X Version 13.4 Build 45

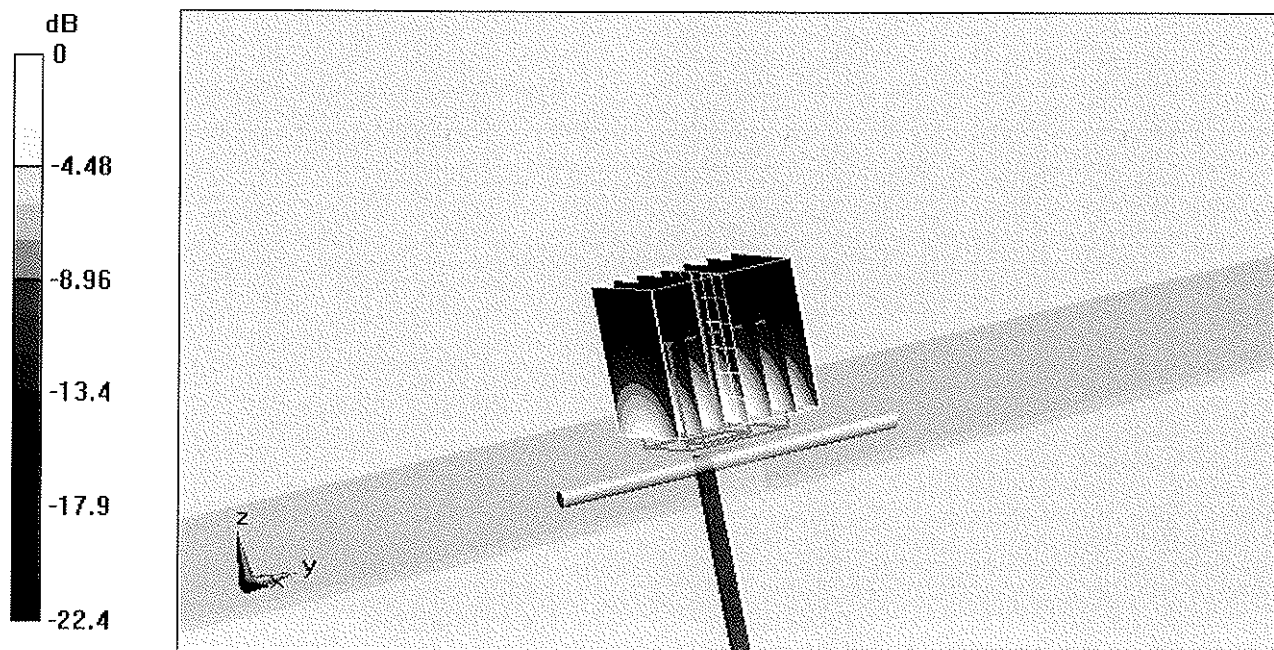
Pin = 250 mW; d = 10 mm/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 96.5 V/m; Power Drift = 0.040 dB

Peak SAR (extrapolated) = 28.2 W/kg

SAR(1 g) = 13.5 mW/g; SAR(10 g) = 6.24 mW/g

Maximum value of SAR (measured) = 16.1 mW/g



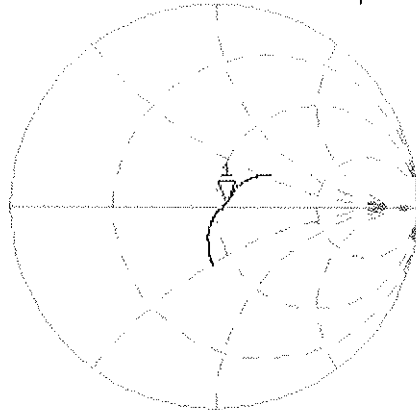
0 dB = 16.1mW/g

Impedance Measurement Plot for Head TSL

17 Mar 2009 11:42:32

CH1 S11 1 U FS 1: 54.941 Ω 1.4121 Ω 91.732 pF 2 450.000 000 MHz

*
De1
Cor



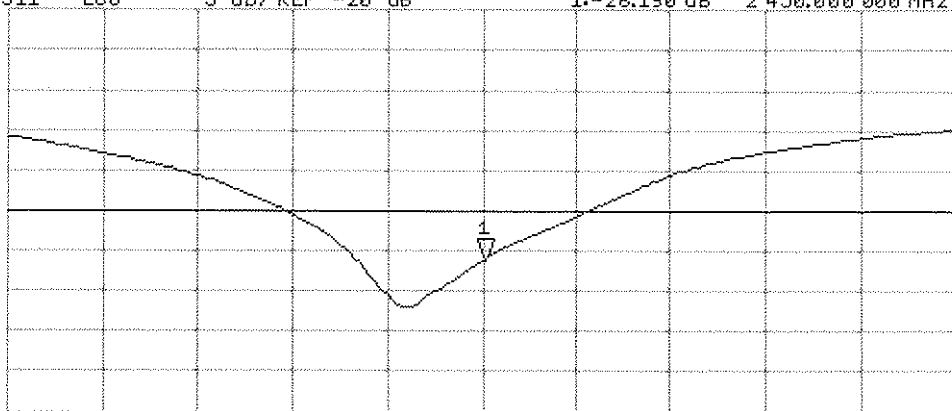
↑

CH2 S11 LOG 5 dB/REF -20 dB 1:-26.190 dB 2 450.000 000 MHz

De1
Cor

Avg
16

↑



START 2 250.000 000 MHz

STOP 2 550.000 000 MHz

DASY5 Validation Report for Body TSL

Date/Time: 10.03.2009 14:20:02

Test Laboratory: SPEAG, Zurich, Switzerland

DUT: Dipole 2450 MHz; Type: D2450V2; Serial: D2450V2 - SN:716

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

Medium: MSL U10 BB

Medium parameters used: $f = 2450$ MHz; $\sigma = 2$ mho/m; $\epsilon_r = 54.4$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

Measurement Standard: DASY5 (IEEE/IEC)

DASY5 Configuration:

- Probe: ES3DV2 - SN3025; ConvF(4.07, 4.07, 4.07); Calibrated: 28.04.2008
- Sensor-Surface: 3.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 07.03.2009
- Phantom: Flat Phantom 5.0 (back); Type: QD000P50AA; Serial: 1002
- Measurement SW: DASY5, V5.0 Build 120; SEMCAD X Version 13.4 Build 45

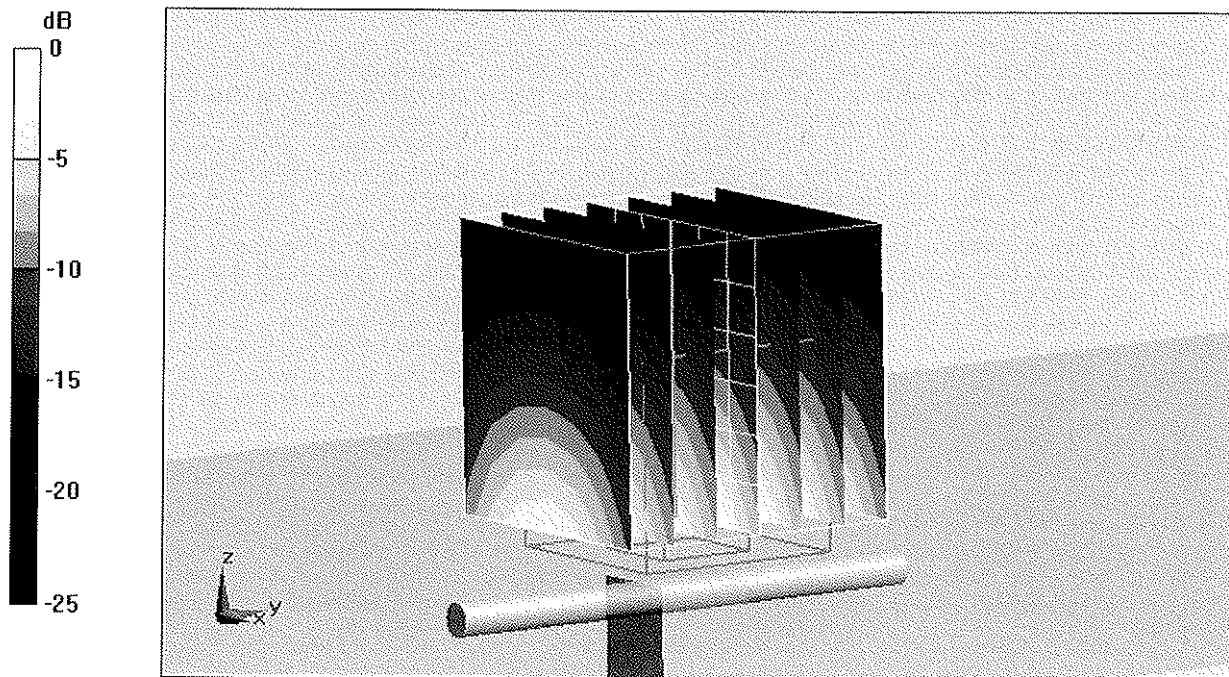
Pin = 250 mW; d = 10 mm/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 93.7 V/m; Power Drift = -0.00384 dB

Peak SAR (extrapolated) = 26.8 W/kg

SAR(1 g) = 13.3 mW/g; SAR(10 g) = 6.24 mW/g

Maximum value of SAR (measured) = 16.5 mW/g



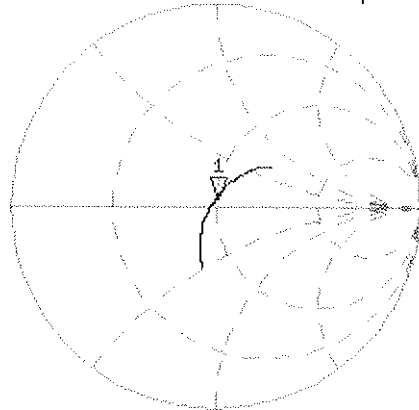
0 dB = 16.5mW/g

Impedance Measurement Plot for Body TSL

10 Mar 2009 09:52:25

CH1 S11 1 U FS 1: 50.232 Ω 4.2793 Ω 277.99 μH 2 450.000 000 MHz

*
De1
Cor



Avg
16

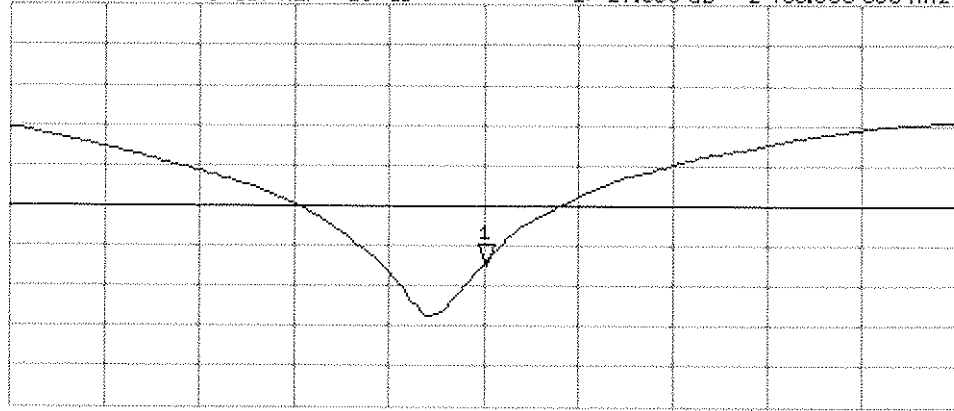
↑

CH2 S11 LOG 5 dB/REF -20 dB 1:-27.386 dB 2 450.000 000 MHz

Cor

Avg
16

↑



START 2 250.000 000 MHz

STOP 2 550.000 000 MHz



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Multilateral Agreement for the recognition of calibration certificates

Accreditation No.: **SCS 108**

Client **BV-ADT (Auden)**

Certificate No: **D5GHzV2-1019_Feb09**

CALIBRATION CERTIFICATE

Object **D5GHzV2 - SN: 1019**

Calibration procedure(s) **QA CAL-22.v1
Calibration procedure for dipole validation kits between 3-6 GHz**

Calibration date: **February 20, 2009**

Condition of the calibrated item **In Tolerance**

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 EPM-442A	GB37480704	08-Oct-08 (No. 217-00898)	Oct-09
Power sensor HP 8481A	US37292783	08-Oct-08 (No. 217-00898)	Oct-09
Reference 20 dB Attenuator	SN: 5086 (20g)	01-Jul-08 (No. 217-00864)	Jul-09
Type-N mismatch combination	SN: 5047.2 / 06327	01-Jul-08 (No. 217-00867)	Jul-09
Reference Probe EX3DV4	SN: 3503	8-Mar-08 (No. EX3-3503_Mar08)	Mar-09
DAE4	SN: 601	14-Mar-08 (No. DAE4-601_Mar08)	Mar-09
Secondary Standards	ID #	Check Date (in house)	Scheduled Check
Power sensor HP 8481A	MY41092317	18-Oct-02 (in house check Oct-07)	In house check: Oct-09
RF generator R&S SMT-06	100005	4-Aug-99 (in house check Oct-07)	In house check: Oct-09
Network Analyzer HP 8753E	US37390585 S4206	18-Oct-01 (in house check Oct-08)	In house check: Oct-09

Calibrated by: **Name** Jeton Kastrati **Function** Laboratory Technician **Signature**

Approved by: **Name** Katja Pokovic **Function** Technical Manager **Signature**

Issued: February 23, 2009

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 108**

Glossary:

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

Calibration is Performed According to the Following Standards:

- a) IEC Std 62209 Part 2, "Evaluation of Human Exposure to Radio Frequency Fields from Handheld and Body-Mounted Wireless Communication Devices in the Frequency Range of 30 MHz to 6 GHz: Human models, Instrumentation, and Procedures"; Part 2: "Procedure to determine the Specific Absorption Rate (SAR) for including accessories and multiple transmitters", Draft Version 0.9, December 2004
- b) Federal Communications Commission Office of Engineering & Technology (FCC OET), "Evaluating Compliance with FCC Guidelines for Human Exposure to Radiofrequency Electromagnetic Fields; Additional Information for Evaluating Compliance of Mobile and Portable Devices with FCC Limits for Human Exposure to Radiofrequency Emissions", Supplement C (Edition 01-01) to Bulletin 65

Additional Documentation:

- c) 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.

Measurement Conditions

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

DASY Version	DASY5	V5.0
Extrapolation	Advanced Extrapolation	
Phantom	Modular Flat Phantom V5.0	
Distance Dipole Center - TSL	10 mm	with Spacer
Area Scan resolution	dx, dy = 10 mm	
Zoom Scan Resolution	dx, dy = 4.0 mm, dz = 2.5 mm	
Frequency	5200 MHz ± 1 MHz 5500 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	35.4 ± 6 %	4.53 mho/m ± 6 %
Head TSL temperature during test	(22.0 ± 0.2) °C	----	----

SAR result with Head TSL at 5200 MHz

SAR averaged over 1 cm³ (1 g) of Head TSL	condition	
SAR measured	100 mW input power	7.60 mW / g
SAR normalized	normalized to 1W	76.0 mW / g
SAR for nominal Head TSL parameters ¹	normalized to 1W	75.7 mW / g ± 19.9 % (k=2)

SAR averaged over 10 cm³ (10 g) of Head TSL	condition	
SAR measured	100 mW input power	2.13 mW / g
SAR normalized	normalized to 1W	21.3 mW / g
SAR for nominal Head TSL parameters ¹	normalized to 1W	21.2 mW / g ± 19.5 % (k=2)

¹ Correction to nominal TSL parameters according to c), chapter "SAR Sensitivities"

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	34.9 ± 6 %	4.80 mho/m ± 6 %
Head TSL temperature during test	(22.0 ± 0.2) °C	----	----

SAR result with Head TSL at 5500 MHz

SAR averaged over 1 cm ³ (1 g) of Head TSL	condition	
SAR measured	100 mW input power	7.66 mW / g
SAR normalized	normalized to 1W	76.6 mW / g
SAR for nominal Head TSL parameters ¹	normalized to 1W	76.2 mW / g ± 19.9 % (k=2)

SAR averaged over 10 cm ³ (10 g) of Head TSL	condition	
SAR measured	100 mW input power	2.15 mW / g
SAR normalized	normalized to 1W	21.5 mW / g
SAR for nominal Head TSL parameters ¹	normalized to 1W	21.4 mW / g ± 19.5 % (k=2)

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	34.3 ± 6 %	5.08 mho/m ± 6 %
Head TSL temperature during test	(22.0 ± 0.2) °C	----	----

SAR result with Head TSL at 5800 MHz

SAR averaged over 1 cm ³ (1 g) of Head TSL	condition	
SAR measured	100 mW input power	7.42 mW / g
SAR normalized	normalized to 1W	74.2 mW / g
SAR for nominal Head TSL parameters ¹	normalized to 1W	73.7 mW / g ± 19.9 % (k=2)

SAR averaged over 10 cm ³ (10 g) of Head TSL	condition	
SAR measured	100 mW input power	2.07 mW / g
SAR normalized	normalized to 1W	20.7 mW / g
SAR for nominal Head TSL parameters ¹	normalized to 1W	20.5 mW / g ± 19.5 % (k=2)

¹ Correction to nominal TSL parameters according to c), chapter "SAR Sensitivities"

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	47.5 ± 6 %	5.25 mho/m ± 6 %
Body TSL temperature during test	(21.2 ± 0.2) °C	----	----

SAR result with Body TSL at 5200 MHz

SAR averaged over 1 cm ³ (1 g) of Body TSL	condition	
SAR measured	100 mW input power	7.69 mW / g
SAR normalized	normalized to 1W	76.9 mW / g
SAR for nominal Body TSL parameters ²	normalized to 1W	76.4 mW / g ± 19.9 % (k=2)

SAR averaged over 10 cm ³ (10 g) of Body TSL	condition	
SAR measured	100 mW input power	2.15 mW / g
SAR normalized	normalized to 1W	21.5 mW / g
SAR for nominal Body TSL parameters ²	normalized to 1W	21.3 mW / g ± 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	46.8 ± 6 %	5.61 mho/m ± 6 %
Body TSL temperature during test	(21.2 ± 0.2) °C	----	----

SAR result with Body TSL at 5500 MHz

SAR averaged over 1 cm ³ (1 g) of Body TSL	condition	
SAR measured	100 mW input power	8.30 mW / g
SAR normalized	normalized to 1W	83.0 mW / g
SAR for nominal Body TSL parameters ²	normalized to 1W	82.4 mW / g ± 19.9 % (k=2)

SAR averaged over 10 cm ³ (10 g) of Body TSL	condition	
SAR measured	100 mW input power	2.30 mW / g
SAR normalized	normalized to 1W	23.0 mW / g
SAR for nominal Body TSL parameters ²	normalized to 1W	22.8 mW / g ± 19.5 % (k=2)

² Correction to nominal TSL parameters according to c), chapter "SAR Sensitivities"

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	46.2 ± 6 %	5.97 mho/m ± 6 %
Body TSL temperature during test	(21.2 ± 0.2) °C	----	----

SAR result with Body TSL at 5800 MHz

SAR averaged over 1 cm ³ (1 g) of Body TSL	condition	
SAR measured	100 mW input power	7.31 mW / g
SAR normalized	normalized to 1W	73.1 mW / g
SAR for nominal Body TSL parameters ²	normalized to 1W	72.5 mW / g ± 19.9 % (k=2)

SAR averaged over 10 cm ³ (10 g) of Body TSL	condition	
SAR measured	100 mW input power	2.01 mW / g
SAR normalized	normalized to 1W	20.1 mW / g
SAR for nominal Body TSL parameters ²	normalized to 1W	19.9 mW / g ± 19.5 % (k=2)

² Correction to nominal TSL parameters according to c), chapter "SAR Sensitivities"

Appendix

Antenna Parameters with Head TSL at 5200 MHz

Impedance, transformed to feed point	51.6 Ω - 6.6 j Ω
Return Loss	-23.5 dB

Antenna Parameters with Head TSL at 5500 MHz

Impedance, transformed to feed point	51.5 Ω - 1.1 j Ω
Return Loss	-34.7 dB

Antenna Parameters with Head TSL at 5800 MHz

Impedance, transformed to feed point	56.9 Ω + 2.3 j Ω
Return Loss	-23.4 dB

Antenna Parameters with Body TSL at 5200 MHz

Impedance, transformed to feed point	51.7 Ω - 5.7 j Ω
Return Loss	-24.7 dB

Antenna Parameters with Body TSL at 5500 MHz

Impedance, transformed to feed point	51.4 Ω + 0.2 j Ω
Return Loss	-37.0 dB

Antenna Parameters with Body TSL at 5800 MHz

Impedance, transformed to feed point	57.0 Ω + 3.5 j Ω
Return Loss	-22.8 dB

General Antenna Parameters and Design

Electrical Delay (one direction)	1.204 ns
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After long term use with 40 W radiated power, only a slight warming of the dipole near the feedpoint can be measured.

The dipole is made of standard semirigid coaxial cable. The center conductor of the feeding line is directly connected to the second arm of the dipole. The antenna is therefore short-circuited for DC-signals.

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

Additional EUT Data

Manufactured by	SPEAG
Manufactured on	February 05, 2004

DASY5 Validation Report for Head TSL

12.02.2009 12:08:48

Test Laboratory: SPEAG, Zurich, Switzerland

DUT: Dipole 5GHz; Type: D5GHz; Serial: D5GHzV2 - SN:1019

Communication System: CW-5GHz; Frequency: 5200 MHz Frequency: 5500 MHz Frequency: 5800 MHz;
Duty Cycle: 1:1

Medium: HSL 5800 MHz

Medium parameters used: $f = 5200$ MHz; $\sigma = 4.53$ mho/m; $\epsilon_r = 35.4$; $\rho = 1000$ kg/m³

Medium parameters used: $f = 5500$ MHz; $\sigma = 4.80$ mho/m; $\epsilon_r = 34.9$; $\rho = 1000$ kg/m³

Medium parameters used: $f = 5800$ MHz; $\sigma = 5.08$ mho/m; $\epsilon_r = 34.3$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

Measurement Standard: DASY5 (IEEE/IEC)

DASY5 Configuration:

- Probe: EX3DV4 - SN3503; ConvF(5.63, 5.63, 5.63)ConvF(5.24, 5.24, 5.24)ConvF(5.04, 5.04, 5.04); Calibrated: 08.03.2008
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 14.03.2008
- Phantom: Flat Phantom 5.0 (front); Type: QD000P50AA; Serial: 1001
- Measurement SW: DASY5, V5.0 Build 120; SEMCAD X Version 13.4 Build 45

d=10mm, Pin=100mW, f=5200 MHz/Area Scan (61x61x1):

Measurement grid: dx=10mm, dy=10mm

Maximum value of SAR (interpolated) = 15.3 mW/g

d=10mm, Pin=100mW, f=5200 MHz/Zoom Scan (8x8x10), dist=2mm (8x8x10)/Cube 0:

Measurement grid: dx=4mm, dy=4mm, dz=2.5mm

Reference Value = 49.6 V/m; Power Drift = 0.123 dB

Peak SAR (extrapolated) = 29.9 W/kg

SAR(1 g) = 7.6 mW/g; SAR(10 g) = 2.13 mW/g

Maximum value of SAR (measured) = 15.8 mW/g

d=10mm, Pin=100mW, f=5500 MHz/Zoom Scan (8x8x10), dist=2mm (8x8x10)/Cube 0:

Measurement grid: dx=4mm, dy=4mm, dz=2.5mm

Reference Value = 48.4 V/m; Power Drift = 0.103 dB

Peak SAR (extrapolated) = 31.4 W/kg

SAR(1 g) = 7.66 mW/g; SAR(10 g) = 2.15 mW/g

Maximum value of SAR (measured) = 16.2 mW/g

d=10mm, Pin=100mW, f=5800 MHz/Zoom Scan (8x8x10), dist=2mm (8x8x10)/Cube 0:

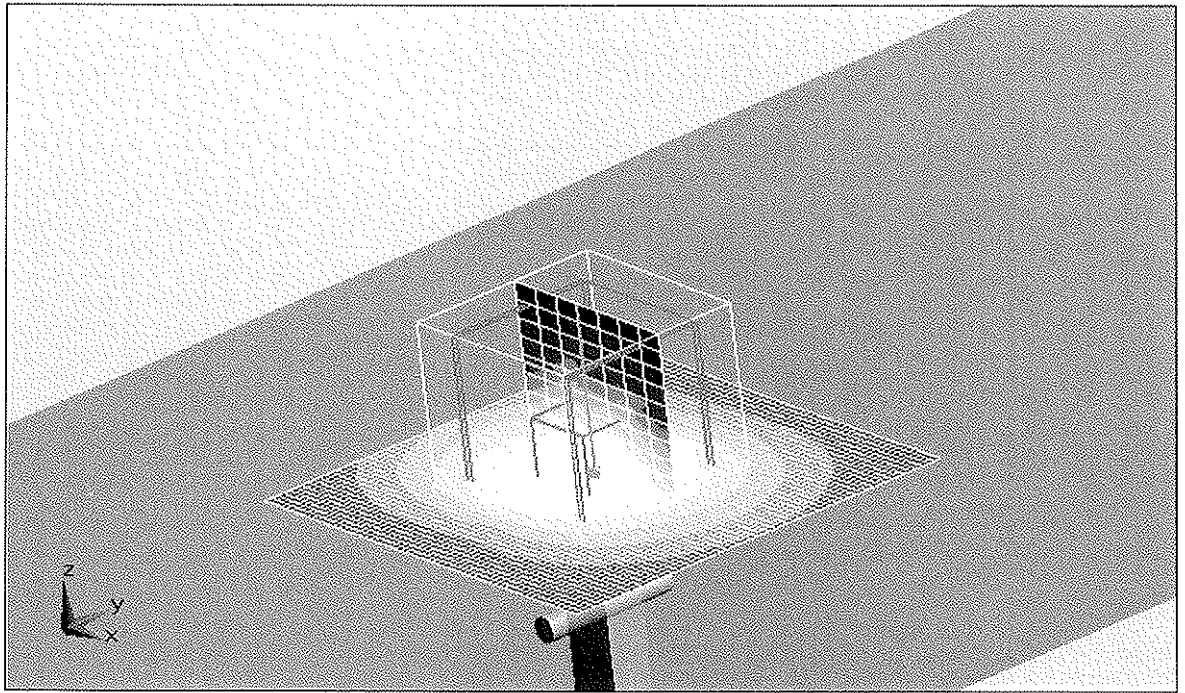
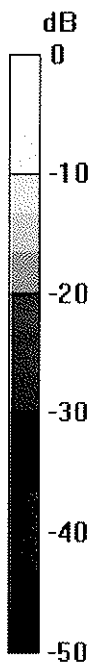
Measurement grid: dx=4mm, dy=4mm, dz=2.5mm

Reference Value = 45.9 V/m; Power Drift = 0.091 dB

Peak SAR (extrapolated) = 32.4 W/kg

SAR(1 g) = 7.42 mW/g; SAR(10 g) = 2.07 mW/g

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



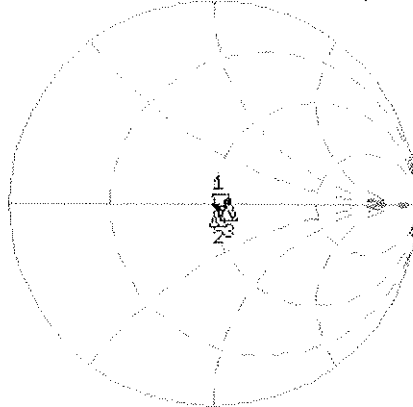
0 dB = 16mW/g

Impedance Measurement Plot for Head TSL

12 Feb 2009 09:59:02

CH1 S11 1 U FS 1: 51.572 Ω -6.6348 Ω 4.6131 pF 5 200.000 000 MHz

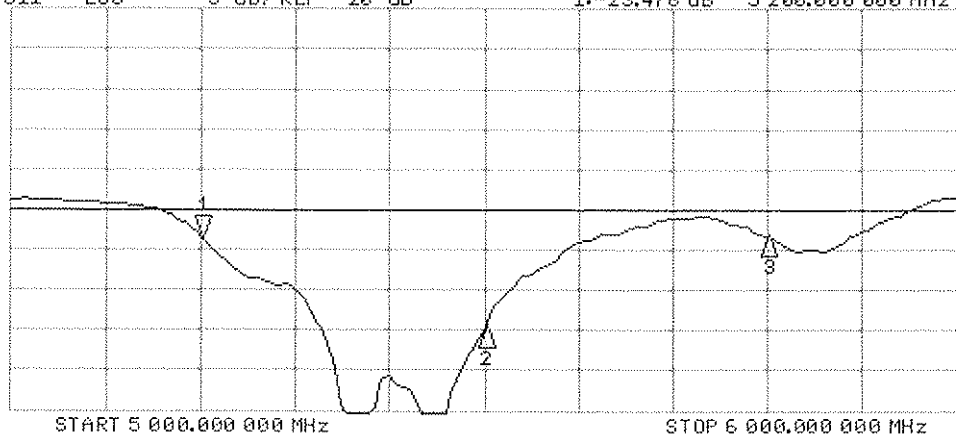
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16
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CH1 Markers
2: 51.502 Ω
-1.0840 Ω
5.50000 GHz
3: 56.875 Ω
2.3320 Ω
5.80000 GHz

CH2 S11 LOG 5 dB/REF -20 dB 1:-23.476 dB 5 200.000 000 MHz

Cor
Avg
16
↑



CH2 Markers
2: -34.773 dB
5.50000 GHz
3: -23.362 dB
5.80000 GHz

DASY5 Validation Report for Body TSL

Date/Time: 20.02.2009 14:55:19

Test Laboratory: SPEAG, Zurich, Switzerland

DUT: Dipole 5GHz; Type: D5GHz; Serial: D5GHzV2 - SN:1019

Communication System: CW-5GHz; Frequency: 5200 MHz Frequency: 5500 MHz Frequency: 5800 MHz;
Duty Cycle: 1:1

Medium: MSL 5800 MHz

Medium parameters used: $f = 5200$ MHz; $\sigma = 5.3$ mho/m; $\epsilon_r = 47.5$; $\rho = 1000$ kg/m³ Medium parameters used: $f = 5500$ MHz; $\sigma = 5.66$ mho/m; $\epsilon_r = 46.8$; $\rho = 1000$ kg/m³ Medium parameters used: $f = 5800$ MHz; $\sigma = 6.03$ mho/m; $\epsilon_r = 46.1$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

Measurement Standard: DASY5 (IEEE/IEC)

DASY5 Configuration:

- Probe: EX3DV4 - SN3503; ConvF(4.95, 4.95, 4.95)ConvF(4.61, 4.61, 4.61)ConvF(4.74, 4.74, 4.74); Calibrated: 08.03.2008
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 14.03.2008
- Phantom: Flat Phantom 5.0 (back); Type: QD000P50AA; Serial: 1002
- Measurement SW: DASY5, V5.0 Build 120; SEMCAD X Version 13.4 Build 45

d=10mm, Pin=100mW, f=5200 MHz/Area Scan (61x61x1): Measurement grid: dx=10mm, dy=10mm

Maximum value of SAR (interpolated) = 16.8 mW/g

d=10mm, Pin=100mW, f=5200 MHz/Zoom Scan (8x8x10), dist=2mm (8x8x10)/Cube 0:

Measurement grid: dx=4mm, dy=4mm, dz=2.5mm

Reference Value = 57.8 V/m; Power Drift = 0.084 dB

Peak SAR (extrapolated) = 28.5 W/kg

SAR(1 g) = 7.69 mW/g; SAR(10 g) = 2.15 mW/g

Maximum value of SAR (measured) = 15.9 mW/g

d=10mm, Pin=100mW, f=5500 MHz/Zoom Scan (8x8x10), dist=2mm (8x8x10)/Cube 0:

Measurement grid: dx=4mm, dy=4mm, dz=2.5mm

Reference Value = 49.4 V/m; Power Drift = -0.00111 dB

Peak SAR (extrapolated) = 33.8 W/kg

SAR(1 g) = 8.3 mW/g; SAR(10 g) = 2.3 mW/g

Maximum value of SAR (measured) = 17.3 mW/g

d=10mm, Pin=100mW, f=5800 MHz/Zoom Scan (8x8x10), dist=2mm (8x8x10)/Cube 0:

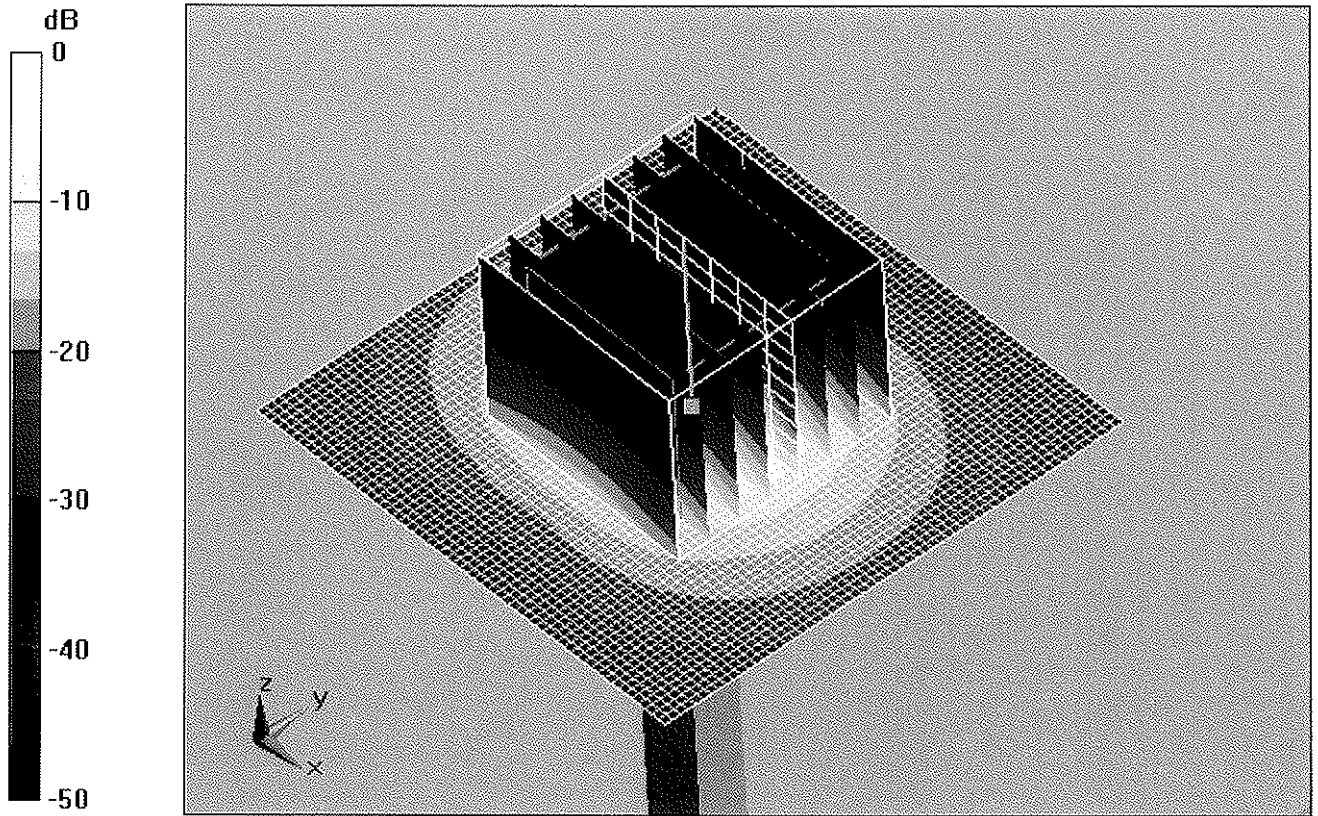
Measurement grid: dx=4mm, dy=4mm, dz=2.5mm

Reference Value = 44.9 V/m; Power Drift = -0.066 dB

Peak SAR (extrapolated) = 31.2 W/kg

SAR(1 g) = 7.31 mW/g; SAR(10 g) = 2.01 mW/g

Maximum value of SAR (measured) = 15.6 mW/g



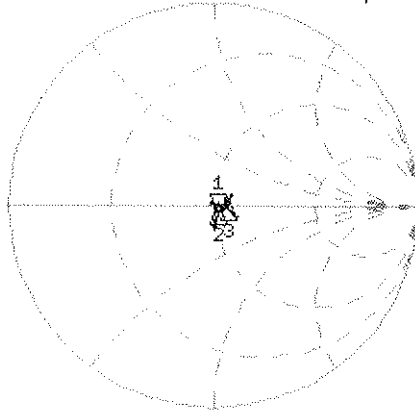
0 dB = 30mW/g

Impedance Measurement Plot for Body TSL

11 Feb 2009 15:11:10

CH1 S11 1 U FS 1: 51.666 Ω -5.7031 Ω 5.3667 pF 5 200.000 000 MHz

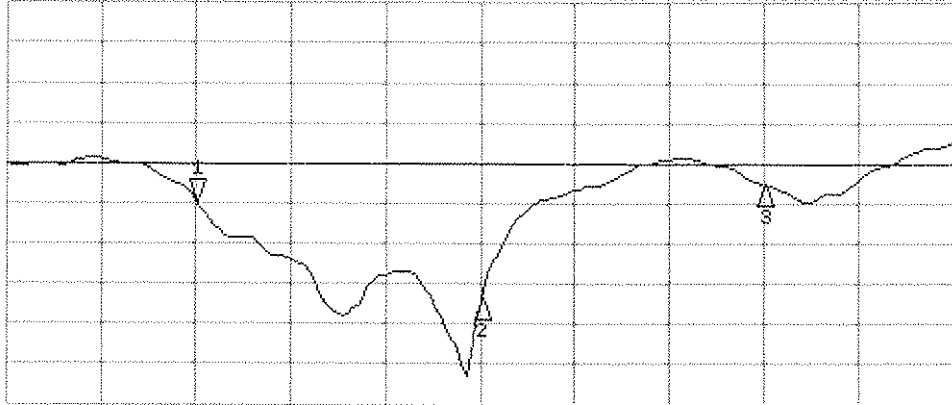
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CH1 Markers
2: 51.420 Ω
0.2070 Ω
5.50000 GHz
3: 56.951 Ω
3.5039 Ω
5.80000 GHz

CH2 S11 LOG 5 dB/REF -20 dB 1: -24.677 dB 5 200.000 000 MHz

Cor
Avg
16
↑



CH2 Markers
2: -36.965 dB
5.50000 GHz
3: -22.761 dB
5.80000 GHz