| | |
|---|---|
| EUT Type: | CDMA/GSM/LTE Phone with BT/WLAN/NFC |
| Liquid Temperature: | 21.3 ℃ |
| Ambient Temperature: | 21.5 ℃ |
| Test Date: | Jun.27 , 2012 |
| Option | Wireless chager cover |
| Separation Distance | 1.0 cm |

**DUT: ADR930LVW; Type: bar; Serial: #1**

Communication System: WIFI 5GHz; Frequency: 5240 MHz;Duty Cycle: 1:1
Medium parameters used (interpolated): f = 5240 MHz; $\sigma$ = 5.33 mho/m; $\varepsilon_r$ = 47.1; $\rho$ = 1000 kg/m$^3$
Phantom section: Flat Section ; Measurement SW: DASY4, V4.7 Build 71; Postprocessing SW: SEMCAD, V1.8 Build 184

DASY4 Configuration:
- Probe: EX3DV4 - SN3797; ConvF(4.1, 4.1, 4.1); Calibrated: 2011-07-25
- Sensor-Surface: 2.5mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn466; Calibrated: 2012-02-21
- Phantom: 800/900 Phantom; Type: SAM

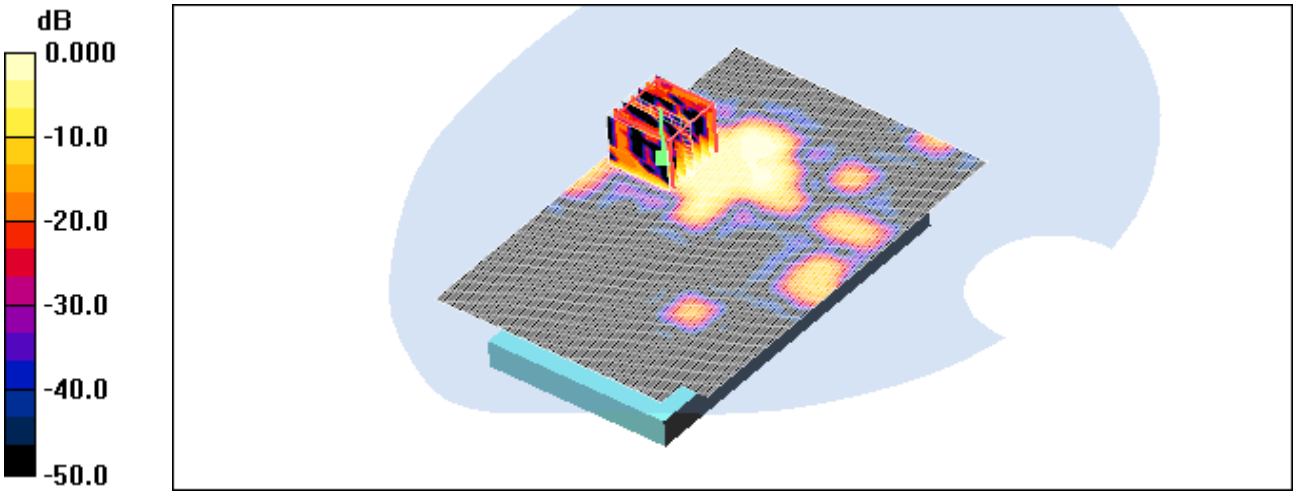
**WIFI 5GHz Body Rear Wireless chager 48ch 6Mbps/Area Scan (101x151x1):** Measurement grid: dx=10mm, dy=10mm

Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (interpolated) = 0.024 mW/g

**WIFI 5GHz Body Rear Wireless chager 48ch 6Mbps/Zoom Scan (7x7x11)/Cube 0:** Measurement grid: dx=4mm, dy=4mm, dz=2mm
Reference Value = 0.432 V/m; Power Drift = 0.07 dB
Peak SAR (extrapolated) = 0.035 W/kg
**SAR(1 g) = 0.00732 mW/g; SAR(10 g) = 0.00231 mW/g**

Info: Interpolated medium parameters used for SAR evaluation.

Maximum value of SAR (measured) = 0.017 mW/g




0 dB = 0.017mW/g

Test Laboratory: HCT CO., LTD

EUT Type: CDMA/GSM/LTE Phone with BT/WLAN/NFC
Liquid Temperature: 21.3 ℃
Ambient Temperature: 21.5 ℃
Test Date: Jun.27 , 2012
Separation Distance 1.0 cm

**DUT: ADR930LVW; Type: bar; Serial: #1**

Communication System: WIFI 5GHz; Frequency: 5260 MHz;Duty Cycle: 1:1
Medium parameters used (interpolated): f = 5260 MHz; $\sigma$ = 5.36 mho/m; $\varepsilon_r$ = 47; $\rho$ = 1000 kg/m$^3$
Phantom section: Flat Section ; Measurement SW: DASY4, V4.7 Build 71; Postprocessing SW: SEMCAD, V1.8 Build 184

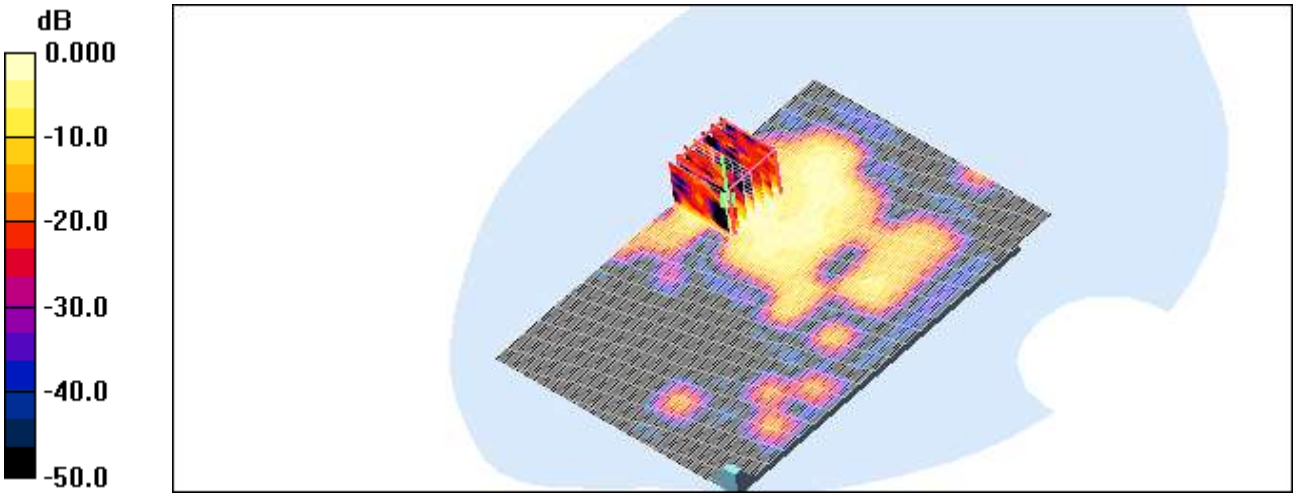
DASY4 Configuration:
- Probe: EX3DV4 - SN3797; ConvF(3.83, 3.83, 3.83); Calibrated: 2011-07-25
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn466; Calibrated: 2012-02-21
- Phantom: 800/900 Phantom; Type: SAM

**WIFI 5GHz Body Rear 52ch 6Mbps/Area Scan (101x151x1):** Measurement grid: dx=10mm, dy=10mm

Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (interpolated) = 0.035 mW/g

**WIFI 5GHz Body Rear 52ch 6Mbps/Zoom Scan (7x7x11)/Cube 0:** Measurement grid: dx=4mm, dy=4mm, dz=2mm
Reference Value = 0.232 V/m; Power Drift = 0.02 dB
Peak SAR (extrapolated) = 0.057 W/kg
**SAR(1 g) = 0.012 mW/g; SAR(10 g) = 0.0036 mW/g**

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




0 dB = 0.033mW/g

Test Laboratory: HCT CO., LTD
EUT Type: CDMA/GSM/LTE Phone with BT/WLAN/NFC
Liquid Temperature: 21.3 ℃
Ambient Temperature: 21.5 ℃
Test Date: Jun.27 , 2012
Separation Distance 1.0 cm

**DUT: ADR930LVW; Type: bar; Serial: #1**

Communication System: WIFI 5GHz; Frequency: 5260 MHz;Duty Cycle: 1:1
Medium parameters used (interpolated): f = 5260 MHz; $\sigma$ = 5.36 mho/m; $\varepsilon_r$ = 47; $\rho$ = 1000 kg/m$^3$
Phantom section: Flat Section ; Measurement SW: DASY4, V4.7 Build 71; Postprocessing SW: SEMCAD, V1.8 Build 184

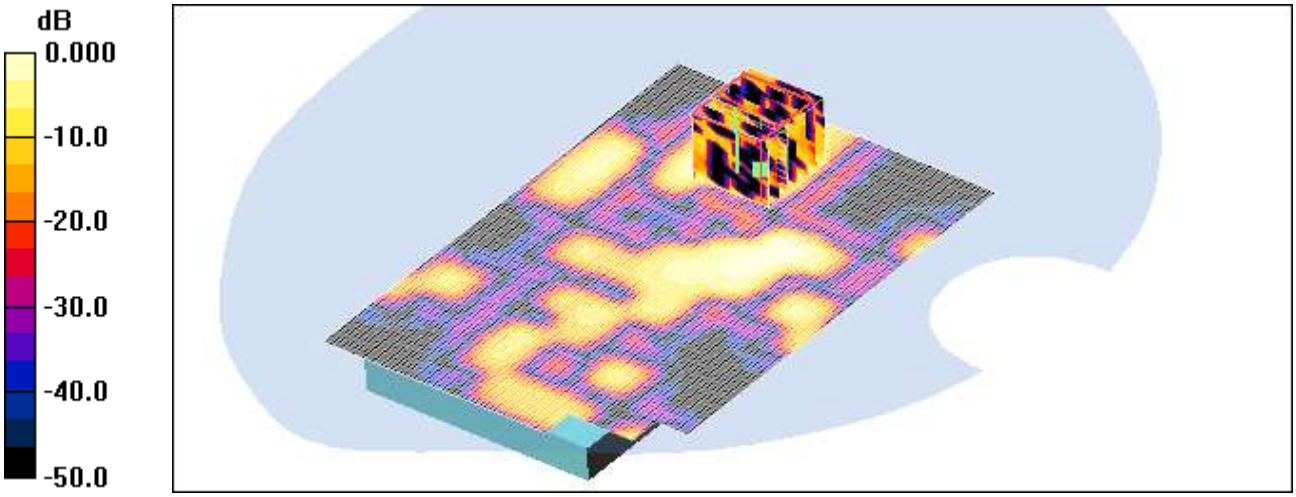
DASY4 Configuration:
- Probe: EX3DV4 - SN3797; ConvF(3.83, 3.83, 3.83); Calibrated: 2011-07-25
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn466; Calibrated: 2012-02-21
- Phantom: 800/900 Phantom; Type: SAM

**WIFI 5GHz Body Front 52ch 6Mbps/Area Scan (101x151x1):** Measurement grid: dx=10mm, dy=10mm

Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (interpolated) = 0.005 mW/g

**WIFI 5GHz Body Front 52ch 6Mbps/Zoom Scan (7x7x11)/Cube 0:** Measurement grid: dx=4mm, dy=4mm, dz=2mm
Reference Value = 0.467 V/m; Power Drift = 0.03 dB
Peak SAR (extrapolated) = 0.041 W/kg
**SAR(1 g) = 0.00292 mW/g; SAR(10 g) = 0.000558 mW/g**

Maximum value of SAR (measured) = 0.005 mW/g




0 dB = 0.005mW/g

| | |
|---|---|
| Test Laboratory: | HCT CO., LTD |
| EUT Type: | CDMA/GSM/LTE Phone with BT/WLAN/NFC |
| Liquid Temperature: | 21.3 ℃ |
| Ambient Temperature: | 21.5 ℃ |
| Test Date: | Jun.27 , 2012 |
| Option | Extended Battery |
| Separation Distance | 1.0 cm |

**DUT: ADR930LVW; Type: bar; Serial: #1**

Communication System: WIFI 5GHz; Frequency: 5260 MHz;Duty Cycle: 1:1
Medium parameters used (interpolated): f = 5260 MHz; $\sigma$ = 5.36 mho/m; $\varepsilon_r$ = 47; $\rho$ = 1000 kg/$m^3$
Phantom section: Flat Section ; Measurement SW: DASY4, V4.7 Build 71; Postprocessing SW: SEMCAD, V1.8 Build 184

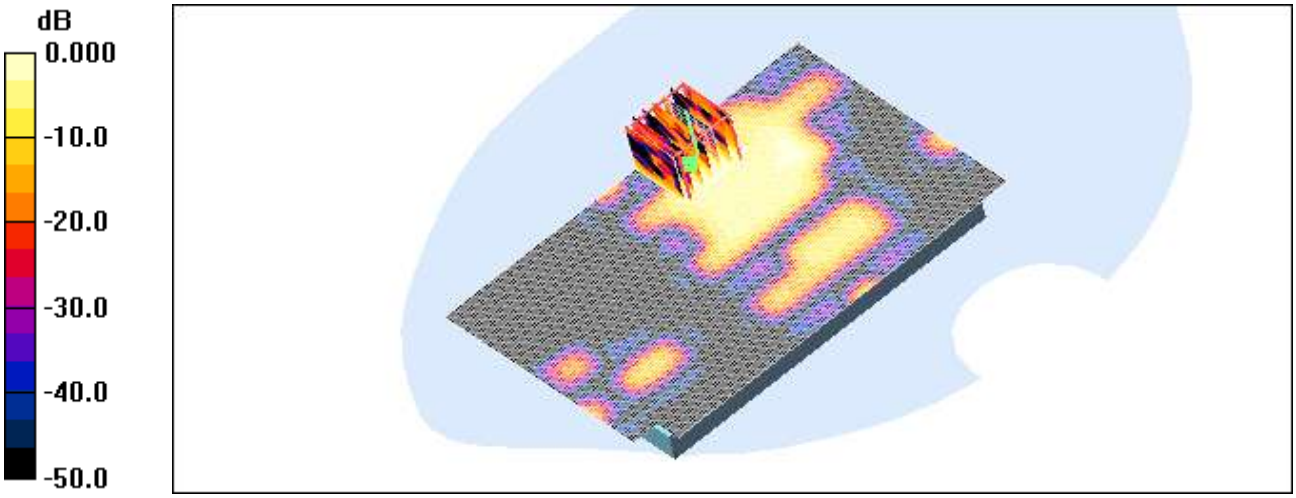
DASY4 Configuration:
- Probe: EX3DV4 - SN3797; ConvF(3.83, 3.83, 3.83); Calibrated: 2011-07-25
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn466; Calibrated: 2012-02-21
- Phantom: 800/900 Phantom; Type: SAM

**WIFI 5GHz Body Rear Extended Battery 52ch 6Mbps/Area Scan (101x151x1):** Measurement grid: dx=10mm, dy=10mm

Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (interpolated) = 0.022 mW/g

**WIFI 5GHz Body Rear Extended Battery 52ch 6Mbps/Zoom Scan (7x7x11)/Cube 0:** Measurement grid: dx=4mm, dy=4mm, dz=2mm
Reference Value = 0.382 V/m; Power Drift = -0.04 dB
Peak SAR (extrapolated) = 0.032 W/kg
**SAR(1 g) = 0.00699 mW/g; SAR(10 g) = 0.0022 mW/g**

Maximum value of SAR (measured) = 0.016 mW/g




0 dB = 0.016mW/g

| | |
|---|---|
| Test Laboratory: | HCT CO., LTD |
| EUT Type: | CDMA/GSM/LTE Phone with BT/WLAN/NFC |
| Liquid Temperature: | 21.3 ℃ |
| Ambient Temperature: | 21.5 ℃ |
| Test Date: | Jun.27 , 2012 |
| Option | Wireless chager cover |
| Separation Distance | 1.0 cm |

**DUT: ADR930LVW; Type: bar; Serial: #1**

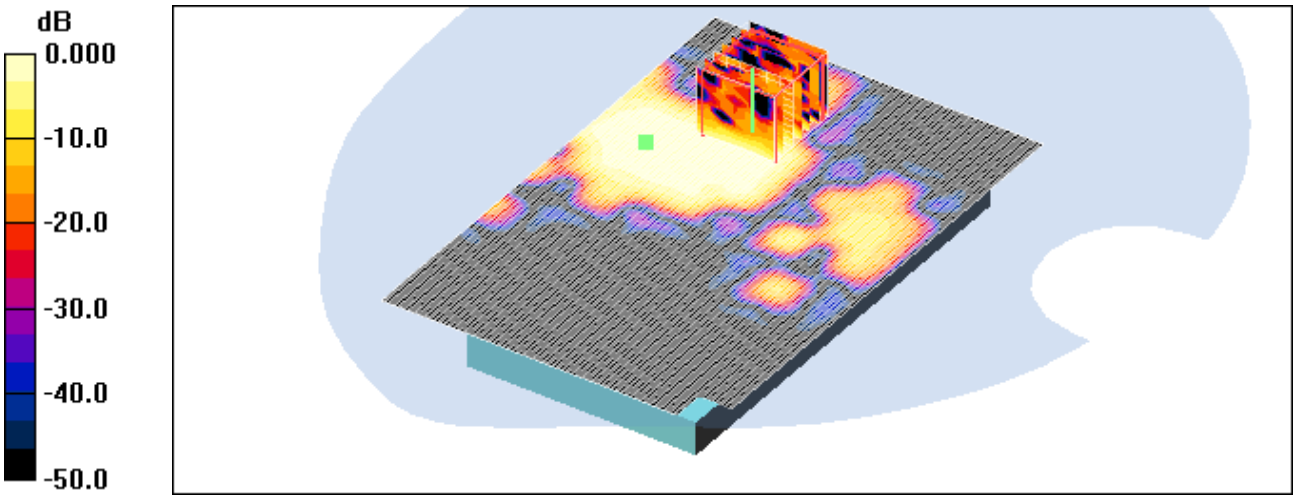
Communication System: WIFI 5GHz; Frequency: 5260 MHz;Duty Cycle: 1:1
Medium parameters used (interpolated): f = 5260 MHz; $\sigma$ = 5.36 mho/m; $\varepsilon_r$ = 47; $\rho$ = 1000 kg/m$^3$
Phantom section: Flat Section ; Measurement SW: DASY4, V4.7 Build 71; Postprocessing SW: SEMCAD, V1.8 Build 184

DASY4 Configuration:
- Probe: EX3DV4 - SN3797; ConvF(3.83, 3.83, 3.83); Calibrated: 2011-07-25
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn466; Calibrated: 2012-02-21
- Phantom: 800/900 Phantom; Type: SAM

**WIFI 5GHz Body Rear Wireless chager cover 52ch 6Mbps/Area Scan (101x151x1):** Measurement grid: dx=10mm, dy=10mm
Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (interpolated) = 0.018 mW/g

**WIFI 5GHz Body Rear Wireless chager cover 52ch 6Mbps/Zoom Scan (7x7x11)/Cube 0:** Measurement grid: dx=4mm, dy=4mm, dz=2mm
Reference Value = 0.612 V/m; Power Drift = -0.06 dB
Peak SAR (extrapolated) = 0.079 W/kg
**SAR(1 g) = 0.00652 mW/g; SAR(10 g) = 0.00197 mW/g**

Maximum value of SAR (measured) = 0.013 mW/g




0 dB = 0.013mW/g

Test Laboratory: HCT CO., LTD
EUT Type: CDMA/GSM/LTE Phone with BT/WLAN/NFC
Liquid Temperature: 21.3 ℃
Ambient Temperature: 21.5 ℃
Test Date: Jun.27 , 2012
Separation Distance 1.0 cm

**DUT: ADR930LVW; Type: bar; Serial: #1**

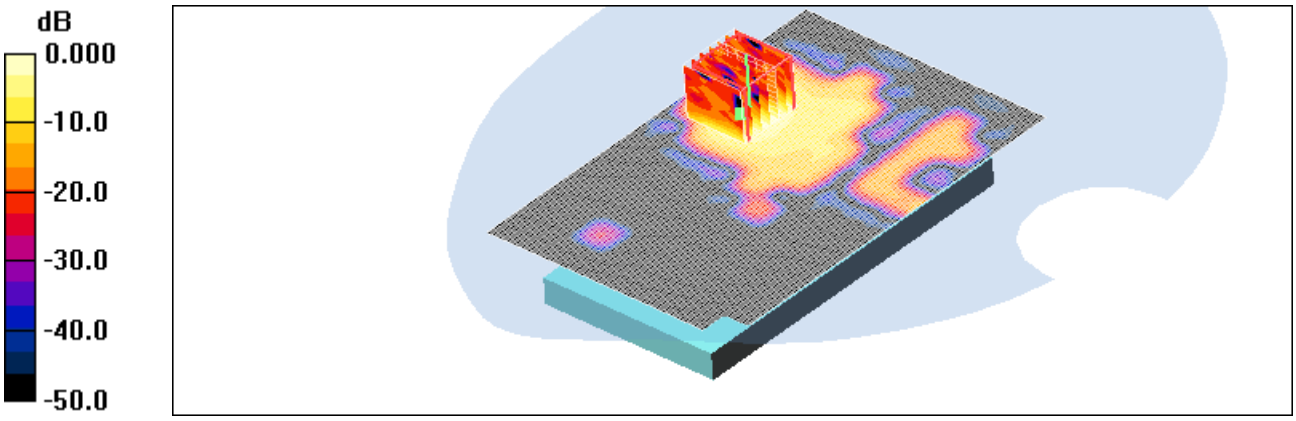
Communication System: WIFI 5GHz; Frequency: 5600 MHz;Duty Cycle: 1:1
Medium parameters used: f = 5600 MHz; $\sigma$ = 5.85 mho/m; $\varepsilon_r$ = 46.2; $\rho$ = 1000 kg/$m^3$
Phantom section: Flat Section ; Measurement SW: DASY4, V4.7 Build 71; Postprocessing SW: SEMCAD, V1.8 Build 184

DASY4 Configuration:
- Probe: EX3DV4 - SN3797; ConvF(3.6, 3.6, 3.6); Calibrated: 2011-07-25
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn466; Calibrated: 2012-02-21
- Phantom: 800/900 Phantom; Type: SAM

**WIFI 5GHz Body Rear 120ch 6Mbps/Area Scan (101x151x1):** Measurement grid: dx=10mm, dy=10mm
Maximum value of SAR (interpolated) = 0.338 mW/g

**WIFI 5GHz Body Rear 120ch 6Mbps/Zoom Scan (7x7x11)/Cube 0:** Measurement grid: dx=4mm, dy=4mm, dz=2mm
Reference Value = 1.54 V/m; Power Drift = 0.050 dB
Peak SAR (extrapolated) = 0.713 W/kg
**SAR(1 g) = 0.181 mW/g; SAR(10 g) = 0.056 mW/g**

Maximum value of SAR (measured) = 0.364 mW/g




0 dB = 0.364mW/g

| | |
|---|---|
| Test Laboratory: | HCT CO., LTD |
| EUT Type: | CDMA/GSM/LTE Phone with BT/WLAN/NFC |
| Liquid Temperature: | 21.3 ℃ |
| Ambient Temperature: | 21.5 ℃ |
| Test Date: | Jun.27 , 2012 |
| Separation Distance | 1.0 cm |

**DUT: ADR930LVW; Type: bar; Serial: #1**

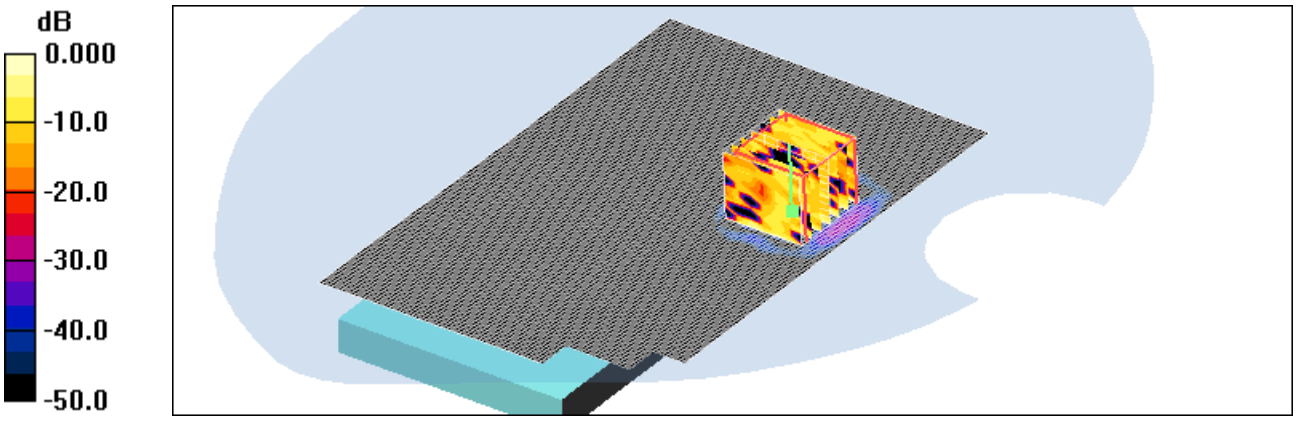
Communication System: WIFI 5GHz; Frequency: 5600 MHz;Duty Cycle: 1:1
Medium parameters used: f = 5600 MHz; $\sigma$ = 5.85 mho/m; $\varepsilon_r$ = 46.2; $\rho$ = 1000 kg/$m^3$
Phantom section: Flat Section ; Measurement SW: DASY4, V4.7 Build 71; Postprocessing SW: SEMCAD, V1.8 Build 184

DASY4 Configuration:
- Probe: EX3DV4 - SN3797; ConvF(3.6, 3.6, 3.6); Calibrated: 2011-07-25
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn466; Calibrated: 2012-02-21
- Phantom: 800/900 Phantom; Type: SAM

**WIFI 5GHz Body Front 120ch 6Mbps/Area Scan (101x151x1):** Measurement grid: dx=10mm, dy=10mm
Maximum value of SAR (interpolated) = 0.034 mW/g

**WIFI 5GHz Body Front 120ch 6Mbps/Zoom Scan (7x7x11)/Cube 0:** Measurement grid: dx=4mm, dy=4mm, dz=2mm
Reference Value = 0.431 V/m; Power Drift = 0.09 dB
Peak SAR (extrapolated) = 0.255 W/kg
**SAR(1 g) = 0.020 mW/g; SAR(10 g) = 0.00463 mW/g**

Maximum value of SAR (measured) = 0.030 mW/g




0 dB = 0.030mW/g

| | |
|---|---|
| Test Laboratory: | HCT CO., LTD |
| EUT Type: | CDMA/GSM/LTE Phone with BT/WLAN/NFC |
| Liquid Temperature: | 21.3 ℃ |
| Ambient Temperature: | 21.5 ℃ |
| Test Date: | Jun.27 , 2012 |
| Option | Extended Battery |
| Separation Distance | 1.0 cm |

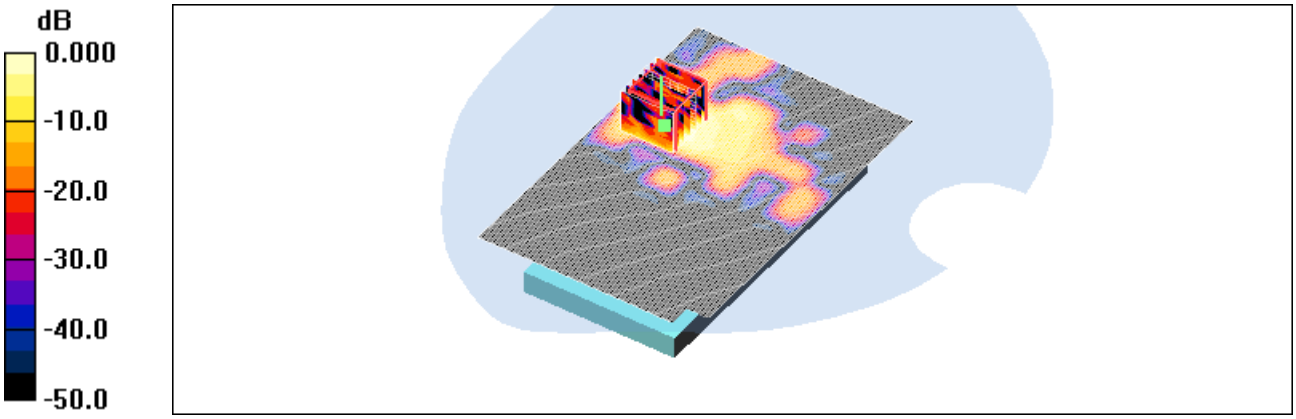
DUT: ADR930LVW; Type: bar; Serial: #1

Communication System: WIFI 5GHz; Frequency: 5600 MHz;Duty Cycle: 1:1
Medium parameters used: f = 5600 MHz; $\sigma$ = 5.85 mho/m; $\varepsilon_r$ = 46.2; $\rho$ = 1000 kg/$m^3$
Phantom section: Flat Section ; Measurement SW: DASY4, V4.7 Build 71; Postprocessing SW: SEMCAD, V1.8 Build 184

DASY4 Configuration:
- Probe: EX3DV4 - SN3797; ConvF(3.6, 3.6, 3.6); Calibrated: 2011-07-25
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn466; Calibrated: 2012-02-21
- Phantom: 800/900 Phantom; Type: SAM

**WIFI 5GHz Body Rear Extended Battery 120ch 6Mbps/Area Scan (101x151x1):** Measurement grid: dx=10mm, dy=10mm
Maximum value of SAR (interpolated) = 0.045 mW/g

**WIFI 5GHz Body Rear Extended Battery 120ch 6Mbps/Zoom Scan (7x7x11)/Cube 0:** Measurement grid: dx=4mm, dy=4mm, dz=2mm
Reference Value = 0.419 V/m; Power Drift = 0.019 dB
Peak SAR (extrapolated) = 0.114 W/kg
**SAR(1 g) = 0.016 mW/g; SAR(10 g) = 0.00522 mW/g**
Maximum value of SAR (measured) = 0.035 mW/g




0 dB = 0.035mW/g

| | |
|---|---|
| Test Laboratory: | HCT CO., LTD |
| EUT Type: | CDMA/GSM/LTE Phone with BT/WLAN/NFC |
| Liquid Temperature: | 21.3 ℃ |
| Ambient Temperature: | 21.5 ℃ |
| Test Date: | Jun.27 , 2012 |
| Option | Wireless chager cover |
| Separation Distance | 1.0 cm |

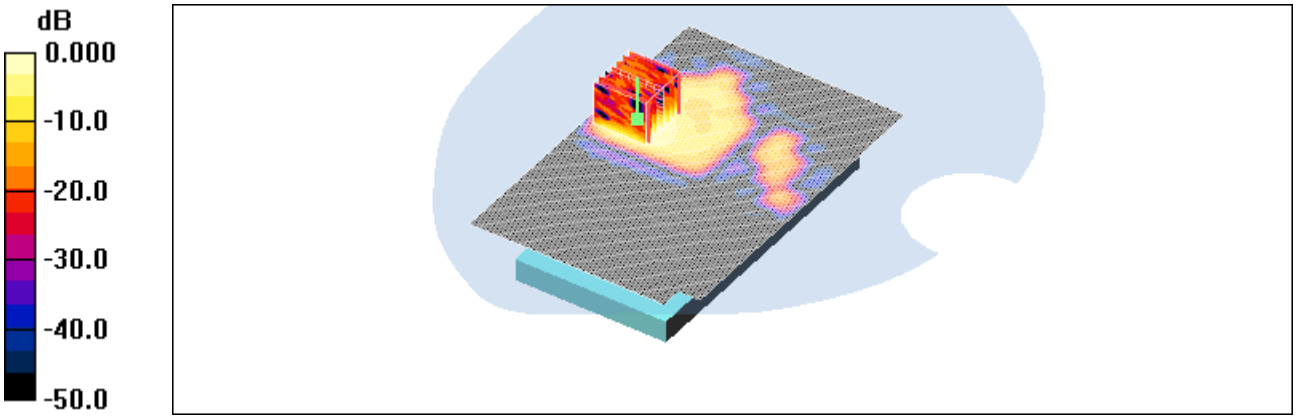
**DUT: ADR930LVW; Type: bar; Serial: #1**

Communication System: WIFI 5GHz; Frequency: 5600 MHz;Duty Cycle: 1:1
Medium parameters used: f = 5600 MHz; $\sigma$ = 5.85 mho/m; $\varepsilon_r$ = 46.2; $\rho$ = 1000 kg/$m^3$
Phantom section: Flat Section ; Measurement SW: DASY4, V4.7 Build 71; Postprocessing SW: SEMCAD, V1.8 Build 184

DASY4 Configuration:
- Probe: EX3DV4 - SN3797; ConvF(3.6, 3.6, 3.6); Calibrated: 2011-07-25
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn466; Calibrated: 2012-02-21
- Phantom: 800/900 Phantom; Type: SAM

**WIFI 5GHz Body Rear Wireless chager cover 120ch 6Mbps/Area Scan (101x151x1):** Measurement grid: dx=10mm, dy=10mm
Maximum value of SAR (interpolated) = 0.411 mW/g

**WIFI 5GHz Body Rear Wireless chager cover 120ch 6Mbps/Zoom Scan (7x7x11)/Cube 0:** Measurement grid: dx=4mm, dy=4mm, dz=2mm
Reference Value = 0.363 V/m; Power Drift = 0.02 dB
Peak SAR (extrapolated) = 0.656 W/kg
**SAR(1 g) = 0.168 mW/g; SAR(10 g) = 0.052 mW/g.**
Maximum value of SAR (measured) = 0.343 mW/g




0 dB = 0.343mW/g

| | |
|---|---|
| Test Laboratory: | HCT CO., LTD |
| EUT Type: | CDMA/GSM/LTE Phone with BT/WLAN/NFC |
| Liquid Temperature: | 21.3 ℃ |
| Ambient Temperature: | 21.5 ℃ |
| Test Date: | Jun.27 , 2012 |
| Separation Distance | 1.0 cm |

**DUT: ADR930LVW; Type: bar; Serial: #1**

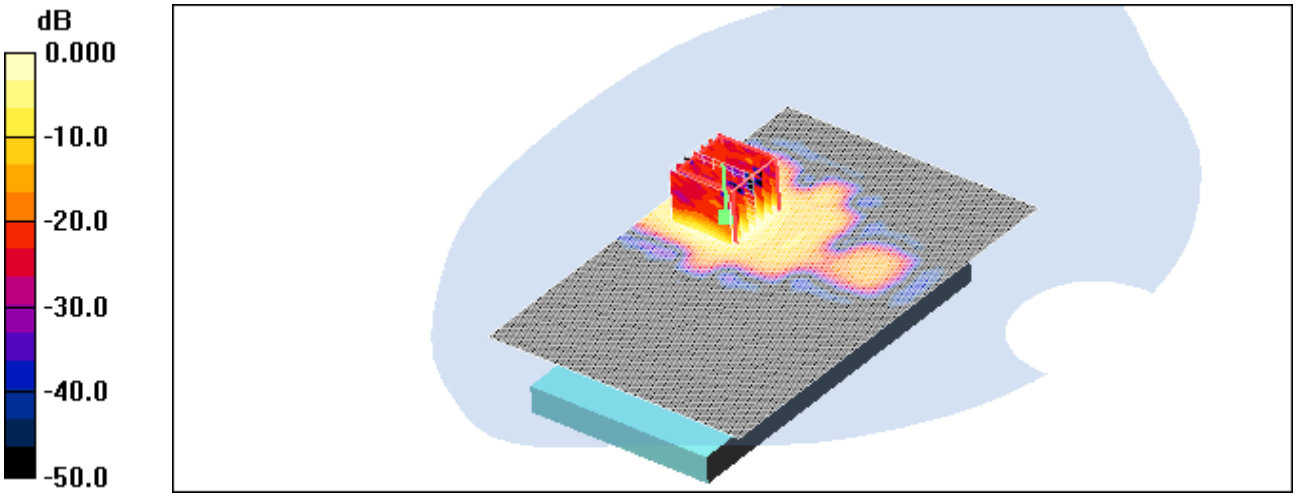
Communication System: WIFI 5GHz; Frequency: 5785 MHz;Duty Cycle: 1:1
Medium parameters used (interpolated): f = 5785 MHz; $\sigma$ = 5.98 mho/m; $\varepsilon_r$ = 45.9; $\rho$ = 1000 kg/m$^3$
Phantom section: Flat Section ; Measurement SW: DASY4, V4.7 Build 71; Postprocessing SW: SEMCAD, V1.8 Build 184

DASY4 Configuration:
- Probe: EX3DV4 - SN3797; ConvF(3.75, 3.75, 3.75); Calibrated: 2011-07-25
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn466; Calibrated: 2012-02-21
- Phantom: 800/900 Phantom; Type: SAM

**WIFI 5GHz 802.11a Body Rear 157ch 6Mbps 1cm/Area Scan (101x151x1):** Measurement grid: dx=10mm, dy=10mm

Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (interpolated) = 0.528 mW/g

**WIFI 5GHz 802.11a Body Rear 157ch 6Mbps 1cm/Zoom Scan (7x7x11)/Cube 0:** Measurement grid: dx=4mm, dy=4mm, dz=2mm
Reference Value = 1.26 V/m; Power Drift = 0.03 dB
Peak SAR (extrapolated) = 1.02 W/kg
**SAR(1 g) = 0.246 mW/g; SAR(10 g) = 0.079 mW/g**
Maximum value of SAR (measured) = 0.506 mW/g




0 dB = 0.506mW/g

| | |
|---|---|
| Test Laboratory: | HCT CO., LTD |
| EUT Type: | CDMA/GSM/LTE Phone with BT/WLAN/NFC |
| Liquid Temperature: | 21.3 ℃ |
| Ambient Temperature: | 21.5 ℃ |
| Test Date: | Jun.27 , 2012 |
| Separation Distance | 1.0 cm |

**DUT: ADR930LVW; Type: bar; Serial: #1**

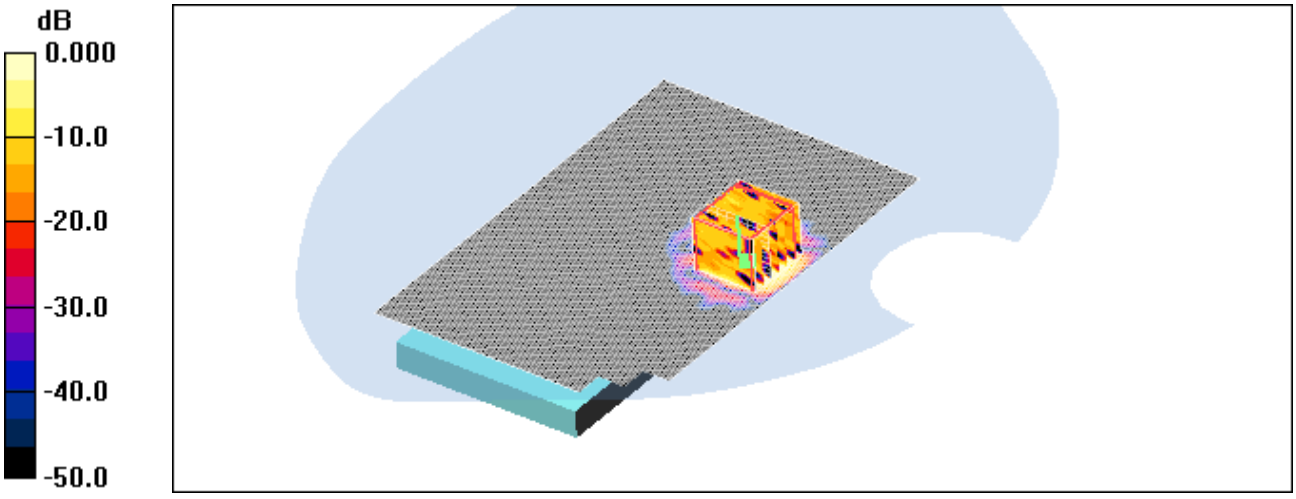
Communication System: WIFI 5GHz; Frequency: 5785 MHz;Duty Cycle: 1:1
Medium parameters used (interpolated): f = 5785 MHz; $\sigma$ = 5.98 mho/m; $\varepsilon_r$ = 45.9; $\rho$ = 1000 kg/m$^3$
Phantom section: Flat Section ; Measurement SW: DASY4, V4.7 Build 71; Postprocessing SW: SEMCAD, V1.8 Build 184

DASY4 Configuration:
- Probe: EX3DV4 - SN3797; ConvF(3.75, 3.75, 3.75); Calibrated: 2011-07-25
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn466; Calibrated: 2012-02-21
- Phantom: 800/900 Phantom; Type: SAM

**WIFI 5GHz 802.11a Body Front 157ch 6Mbps 1cm/Area Scan (101x151x1):** Measurement grid: dx=10mm, dy=10mm

Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (interpolated) = 0.063 mW/g

**WIFI 5GHz 802.11a Body Front 157ch 6Mbps 1cm/Zoom Scan (7x7x11)/Cube 0:** Measurement grid: dx=4mm, dy=4mm, dz=2mm
Reference Value = 0.600 V/m; Power Drift = -0.031 dB
Peak SAR (extrapolated) = 0.437 W/kg
**SAR(1 g) = 0.038 mW/g; SAR(10 g) = 0.010 mW/g**
Maximum value of SAR (measured) = 0.050 mW/g




0 dB = 0.050mW/g

| | |
|---|---|
| Test Laboratory: | HCT CO., LTD |
| EUT Type: | CDMA/GSM/LTE Phone with BT/WLAN/NFC |
| Liquid Temperature: | 21.3 ℃ |
| Ambient Temperature: | 21.5 ℃ |
| Test Date: | Jun.27 , 2012 |
| Option | Extended Battery |
| Separation Distance | 1.0 cm |

**DUT: ADR930LVW; Type: bar; Serial: #1**

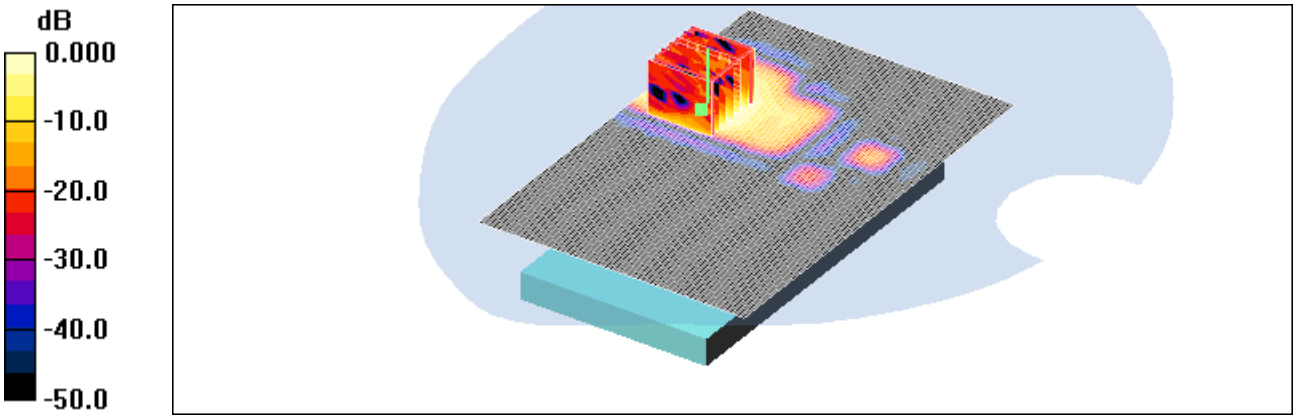
Communication System: WIFI 5GHz; Frequency: 5785 MHz;Duty Cycle: 1:1
Medium parameters used (interpolated): f = 5785 MHz; $\sigma$ = 5.98 mho/m; $\varepsilon_r$ = 45.9; $\rho$ = 1000 kg/m$^3$
Phantom section: Flat Section ; Measurement SW: DASY4, V4.7 Build 71; Postprocessing SW: SEMCAD, V1.8 Build 184

DASY4 Configuration:
- Probe: EX3DV4 - SN3797; ConvF(3.75, 3.75, 3.75); Calibrated: 2011-07-25
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn466; Calibrated: 2012-02-21
- Phantom: 800/900 Phantom; Type: SAM

**WIFI 5GHz 802.11a Body Rear Extended Battery 157ch 6Mbps 1cm/Area Scan (101x151x1):** Measurement grid: dx=10mm, dy=10mm

Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (interpolated) = 0.477 mW/g

**WIFI 5GHz 802.11a Body Rear Extended Battery 157ch 6Mbps 1cm/Zoom Scan (7x7x11)/Cube 0:** Measurement grid: dx=4mm, dy=4mm, dz=2mm
Reference Value = 1.25 V/m; Power Drift =0.04 dB
Peak SAR (extrapolated) = 0.745 W/kg
**SAR(1 g) = 0.186 mW/g; SAR(10 g) = 0.058 mW/g**
Maximum value of SAR (measured) = 0.388 mW/g




0 dB = 0.388mW/g

| | |
|---|---|
| Test Laboratory: | HCT CO., LTD |
| EUT Type: | CDMA/GSM/LTE Phone with BT/WLAN/NFC |
| Liquid Temperature: | 21.3 ℃ |
| Ambient Temperature: | 21.5 ℃ |
| Test Date: | Jun.27 , 2012 |
| Option | Wireless chager cover |
| Separation Distance | 1.0 cm |

**DUT: ADR930LVW; Type: bar; Serial: #1**

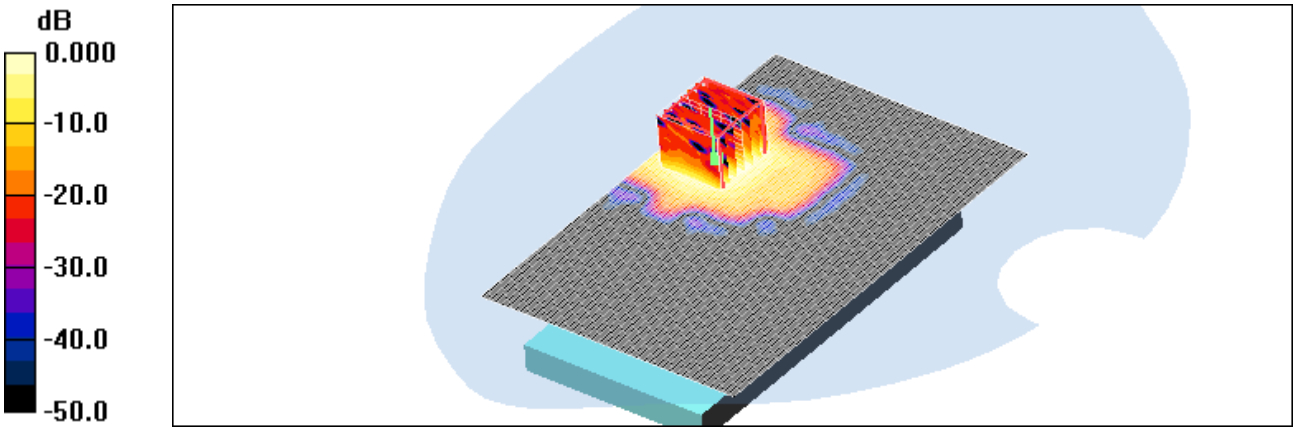
Communication System: WIFI 5GHz; Frequency: 5785 MHz;Duty Cycle: 1:1
Medium parameters used (interpolated): f = 5785 MHz; $\sigma$ = 5.98 mho/m; $\varepsilon_r$ = 45.9; $\rho$ = 1000 kg/m$^3$
Phantom section: Flat Section ; Measurement SW: DASY4, V4.7 Build 71; Postprocessing SW: SEMCAD, V1.8 Build 184

DASY4 Configuration:
- Probe: EX3DV4 - SN3797; ConvF(3.75, 3.75, 3.75); Calibrated: 2011-07-25
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn466; Calibrated: 2012-02-21
- Phantom: 800/900 Phantom; Type: SAM

**WIFI 5GHz 802.11a Body Rear Wireless chager cover 157ch 6Mbps 1cm/Area Scan (101x151x1):** Measurement grid: dx=10mm, dy=10mm

Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (interpolated) = 0.381 mW/g

**WIFI 5GHz 802.11a Body Rear Wireless chager cover 157ch 6Mbps 1cm/Zoom Scan (7x7x11)/Cube 0:**
Measurement grid: dx=4mm, dy=4mm, dz=2mm
Reference Value = 0.927 V/m; Power Drift = 0.032 dB
Peak SAR (extrapolated) = 0.701 W/kg
**SAR(1 g) = 0.175 mW/g; SAR(10 g) = 0.058 mW/g**
Maximum value of SAR (measured) = 0.362 mW/g




0 dB = 0.362mW/g

Test Laboratory: HCT CO., LTD
EUT Type: CDMA/GSM/LTE Phone with BT/WLAN/NFC
Liquid Temperature: 21.2 ℃
Ambient Temperature: 21.4 ℃
Test Date: May 28, 2012

**DUT: ADR930LVW; Type: bar; Serial: #1**

Communication System: CDMA 835MHz FCC; Frequency: 836.52 MHz;Duty Cycle: 1:1
Medium parameters used (interpolated): f = 836.52 MHz; $\sigma$ = 0.875 mho/m; $\varepsilon_r$ = 39.9; $\rho$ = 1000 kg/m$^3$
Phantom section: Left Section ; Measurement SW: DASY4, V4.7 Build 71; Postprocessing SW: SEMCAD, V1.8 Build 184

DASY4 Configuration:
- Probe: EX3DV4 - SN3797; ConvF(8.93, 8.93, 8.93); Calibrated: 2011-07-25
- Sensor-Surface: 2.5mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn466; Calibrated: 2012-02-21
- Phantom: SAM 835/900 MHz; Type: SAM

**Left Touch EVDO 384 /Area Scan (71x111x1):** Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 0.834 mW/g

**Left Touch EVDO 384 /Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 24.3 V/m; Power Drift = 0.181 dB
Peak SAR (extrapolated) = 1.68 W/kg
**SAR(1 g) = 0.691 mW/g; SAR(10 g) = 0.345 mW/g**
Maximum value of SAR (measured) = 0.766 mW/g

**Left Touch EVDO 384 Zoom Scan (5x5x7)/Cube 1:** Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 24.3 V/m; Power Drift = 0.181 dB
Peak SAR (extrapolated) = 1.57 W/kg
SAR(1 g) = 0.679 mW/g; SAR(10 g) = 0.339 mW/g
Maximum value of SAR (measured) = 0.759 mW/g

| | |
|---|---|
| Test Laboratory: | HCT CO., LTD |
| EUT Type: | CDMA/GSM/LTE Phone with BT/WLAN/NFC |
| Liquid Temperature: | 21.1 ℃ |
| Ambient Temperature: | 21.3 ℃ |
| Test Date: | May 29, 2012 |

DUT: ADR930LVW; Type: bar; Serial: #1

Communication System: CDMA 835MHz FCC; Frequency: 836.52 MHz;Duty Cycle: 1:1
Medium parameters used (interpolated): f = 836.52 MHz; $\sigma$ = 1.01 mho/m; $\varepsilon_r$ = 54.8; $\rho$ = 1000 kg/m$^3$
Phantom section: Flat Section ; Measurement SW: DASY4, V4.7 Build 71; Postprocessing SW: SEMCAD, V1.8 Build 184

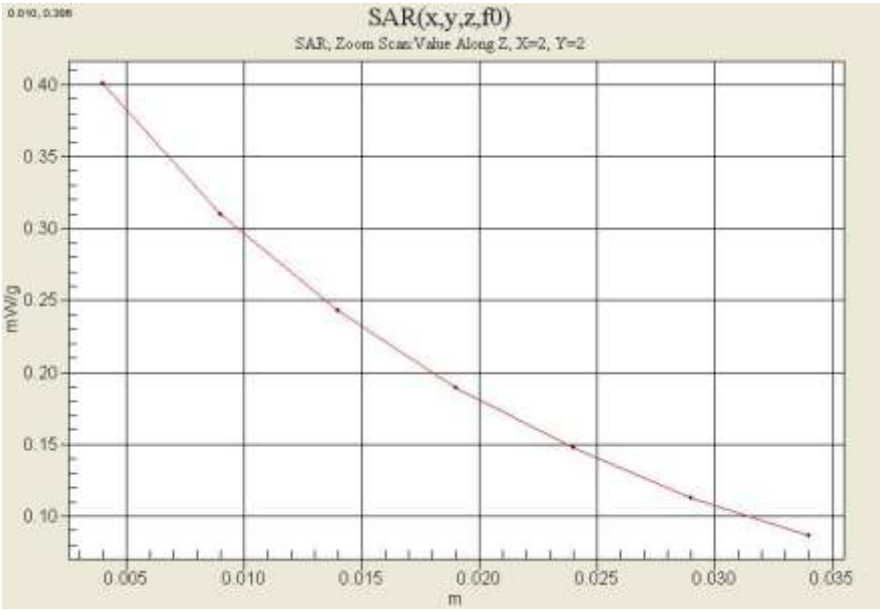
DASY4 Configuration:
- Probe: EX3DV4 - SN3797; ConvF(9.14, 9.14, 9.14); Calibrated: 2011-07-25
- Sensor-Surface: 2.5mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn466; Calibrated: 2012-02-21
- Phantom: SAM 1800/1900 MHz; Type: SAM

**Body rear 384 1XRTT/Area Scan (71x111x1):** Measurement grid: dx=15mm, dy=15mm

Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (interpolated) = 0.407 mW/g

**Body rear 384 1XRTT/Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 15.1 V/m; Power Drift = -0.147 dB
Peak SAR (extrapolated) = 0.488 W/kg
**SAR(1 g) = 0.384 mW/g; SAR(10 g) = 0.293 mW/g**

Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (measured) = 0.401 mW/g



Test Laboratory: HCT CO., LTD
EUT Type: CDMA/GSM/LTE Phone with BT/WLAN/NFC
Liquid Temperature: 21.1 ℃
Ambient Temperature: 21.3 ℃
Test Date: May 30, 2012

**DUT: ADR930LVW; Type: bar; Serial: #1**

Communication System: PCS 1900MHz FCC; Frequency: 1908.75 MHz;Duty Cycle: 1:1
Medium parameters used (interpolated): f = 1908.75 MHz; $\sigma$ = 1.41 mho/m; $\varepsilon_r$ = 40.8; $\rho$ = 1000 kg/m$^3$
Phantom section: Left Section ; Measurement SW: DASY4, V4.7 Build 71; Postprocessing SW: SEMCAD, V1.8 Build 184

DASY4 Configuration:
- Probe: EX3DV4 - SN3797; ConvF(7.6, 7.6, 7.6); Calibrated: 2011-07-25
- Sensor-Surface: 2.5mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn466; Calibrated: 2012-02-21
- Phantom: SAM 1800/1900 MHz; Type: SAM

**Left Tilt EVDO 1175/Area Scan (71x111x1):** Measurement grid: dx=15mm, dy=15mm

Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (interpolated) = 1.16 mW/g

**Left Tilt EVDO 1175/Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 4.28 V/m; Power Drift = -0.022 dB
Peak SAR (extrapolated) = 2.20 W/kg
**SAR(1 g) = 1.03 mW/g; SAR(10 g) = 0.467 mW/g**

Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (measured) = 1.18 mW/g

| | |
|---|---|
| Test Laboratory: | HCT CO., LTD |
| EUT Type: | CDMA/GSM/LTE Phone with BT/WLAN/NFC |
| Liquid Temperature: | 21.2 ℃ |
| Ambient Temperature: | 21.4 ℃ |
| Test Date: | May 31, 2012 |

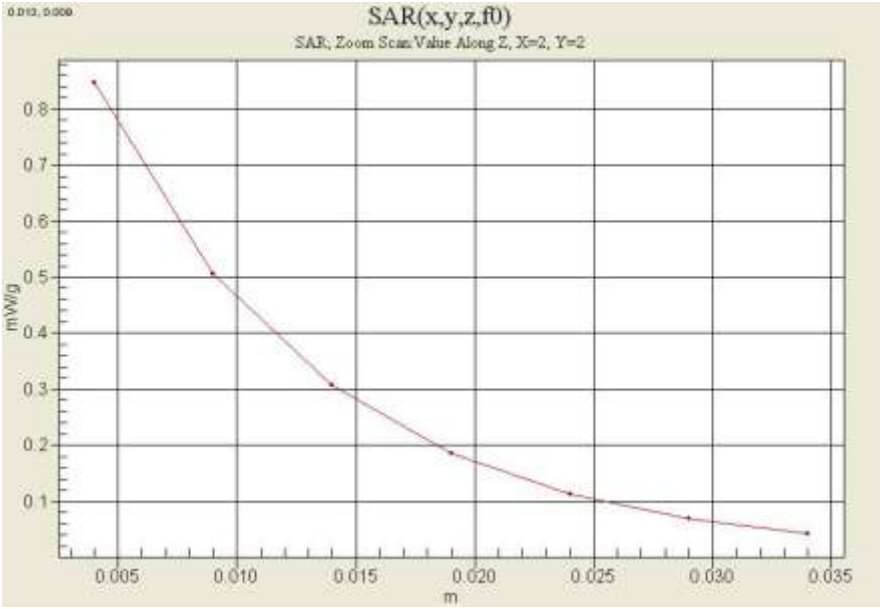
DUT: ADR930LVW; Type: bar; Serial: #1

Communication System: PCS 1900MHz FCC; Frequency: 1880 MHz;Duty Cycle: 1:1
Medium parameters used: f = 1880 MHz; $\sigma$ = 1.5 mho/m; $\varepsilon_r$ = 52; $\rho$ = 1000 kg/m$^3$
Phantom section: Flat Section ; Measurement SW: DASY4, V4.7 Build 71; Postprocessing SW: SEMCAD, V1.8 Build 184

DASY4 Configuration:
- Probe: EX3DV4 - SN3797; ConvF(7.26, 7.26, 7.26); Calibrated: 2011-07-25
- Sensor-Surface: 2.5mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn466; Calibrated: 2012-02-21
- Phantom: 1800/1900 Phantom; Type: SAM

**Body rear 600 1xRTT/Area Scan (71x111x1):** Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 0.783 mW/g

**Body rear 600 1xRTT/Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 4.93 V/m; Power Drift = -0.077 dB
Peak SAR (extrapolated) = 1.37 W/kg
**SAR(1 g) = 0.758 mW/g; SAR(10 g) = 0.389 mW/g**
Maximum value of SAR (measured) = 0.848 mW/g



Test Laboratory: HCT CO., LTD
EUT Type: CDMA/GSM/LTE Phone with BT/WLAN/NFC
Liquid Temperature: 21.2 ℃
Ambient Temperature: 21.4 ℃
Test Date: May 28, 2012

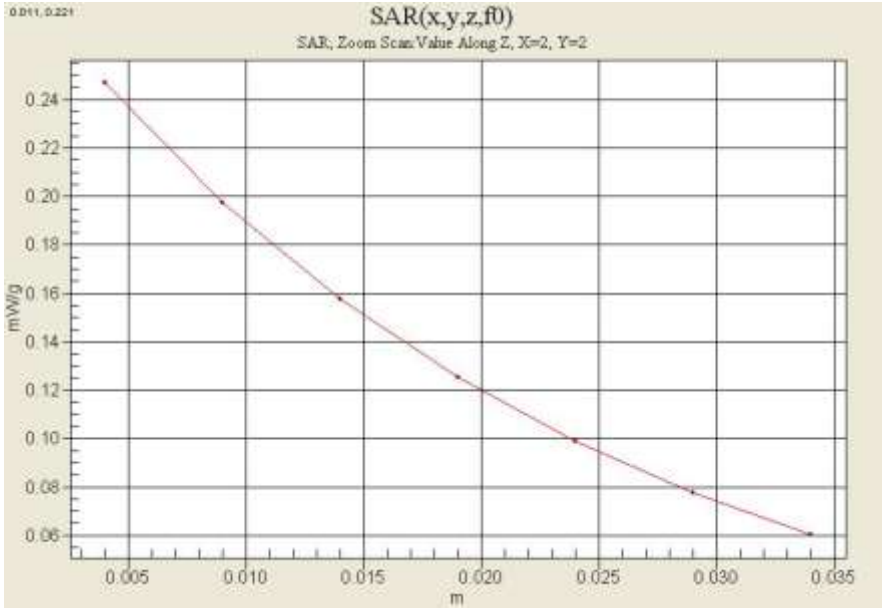
**DUT: ADR930LVW; Type: bar; Serial: #1**

Communication System: GSM 850; Frequency: 836.6 MHz;Duty Cycle: 1:8.3
Medium parameters used (interpolated): f = 836.6 MHz; $\sigma$ = 0.875 mho/m; $\varepsilon_r$ = 39.9; $\rho$ = 1000 kg/m$^3$
Phantom section: Right Section ; Measurement SW: DASY4, V4.7 Build 71; Postprocessing SW: SEMCAD, V1.8 Build 184

DASY4 Configuration:
- Probe: EX3DV4 - SN3797; ConvF(8.93, 8.93, 8.93); Calibrated: 2011-07-25
- Sensor-Surface: 2.5mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn466; Calibrated: 2012-02-21
- Phantom: SAM 835/900 MHz; Type: SAM

**Right touch 190/Area Scan (71x101x1):** Measurement grid: dx=15mm, dy=15mm
Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (interpolated) = 0.252 mW/g

**Right touch 190/Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 16.5 V/m; Power Drift = -0.044 dB
Peak SAR (extrapolated) = 0.294 W/kg
**SAR(1 g) = 0.237 mW/g; SAR(10 g) = 0.180 mW/g**
Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (measured) = 0.247 mW/g



| | |
|---|---|
| Test Laboratory: | HCT CO., LTD |
| EUT Type: | CDMA/GSM/LTE Phone with BT/WLAN/NFC |
| Liquid Temperature: | 21.1 ℃ |
| Ambient Temperature: | 21.3 ℃ |
| Test Date: | May 29, 2012 |

DUT: ADR930LVW; Type: bar; Serial: #1

Communication System: GSM 850; Frequency: 836.6 MHz;Duty Cycle: 1:4.15
Medium parameters used (interpolated): f = 836.6 MHz; $\sigma$ = 1.01 mho/m; $\varepsilon_r$ = 54.8; $\rho$ = 1000 kg/$m^3$
Phantom section: Flat Section ; Measurement SW: DASY4, V4.7 Build 71; Postprocessing SW: SEMCAD, V1.8 Build 184

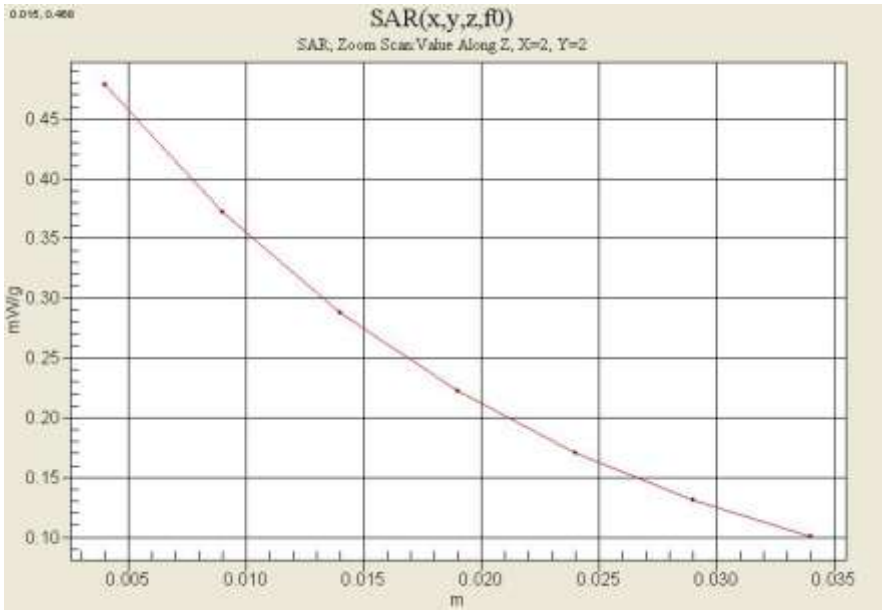
DASY4 Configuration:
- Probe: EX3DV4 - SN3797; ConvF(9.14, 9.14, 9.14); Calibrated: 2011-07-25
- Sensor-Surface: 2.5mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn466; Calibrated: 2012-02-21
- Phantom: 800/900 Phantom; Type: SAM

**Body rear 190 2TX/Area Scan (71x111x1):** Measurement grid: dx=15mm, dy=15mm

Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (interpolated) = 0.506 mW/g

**Body rear 190 2TX/Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 17.9 V/m; Power Drift = -0.083 dB
Peak SAR (extrapolated) = 0.626 W/kg
**SAR(1 g) = 0.472 mW/g; SAR(10 g) = 0.347 mW/g**

Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (measured) = 0.479 mW/g



| | |
|---|---|
| Test Laboratory: | HCT CO., LTD |
| EUT Type: | CDMA/GSM/LTE Phone with BT/WLAN/NFC |
| Liquid Temperature: | 21.2 ℃ |
| Ambient Temperature: | 21.4 ℃ |
| Test Date: | May 31, 2012 |

DUT: ADR930LVW; Type: bar; Serial: #1

Communication System: GSM 1900; Frequency: 1880 MHz;Duty Cycle: 1:4.15
Medium parameters used: f = 1880 MHz; $\sigma$ = 1.5 mho/m; $\varepsilon_r$ = 52; $\rho$ = 1000 kg/m$^3$
Phantom section: Flat Section ; Measurement SW: DASY4, V4.7 Build 71; Postprocessing SW: SEMCAD, V1.8 Build 184

DASY4 Configuration:
- Probe: EX3DV4 - SN3797; ConvF(7.26, 7.26, 7.26); Calibrated: 2011-07-25
- Sensor-Surface: 2.5mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn466; Calibrated: 2012-02-21
- Phantom: 1800/1900 Phantom; Type: SAM

**Body right 661 2TX/Area Scan (51x111x1):** Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 0.069 mW/g

**Body right 661 2TX/Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 4.20 V/m; Power Drift = 0.187 dB
Peak SAR (extrapolated) = 0.103 W/kg
**SAR(1 g) = 0.061 mW/g; SAR(10 g) = 0.035 mW/g**
Maximum value of SAR (measured) = 0.067 mW/g

| | |
|---|---|
| Test Laboratory: | HCT CO., LTD |
| EUT Type: | CDMA/GSM/LTE Phone with BT/WLAN/NFC |
| Liquid Temperature: | 21.2 ℃ |
| Ambient Temperature: | 21.4 ℃ |
| Test Date: | May 31, 2012 |

DUT: ADR930LVW; Type: bar; Serial: #1

Communication System: GSM 1900; Frequency: 1880 MHz;Duty Cycle: 1:4.15
Medium parameters used: f = 1880 MHz; $\sigma$ = 1.5 mho/m; $\varepsilon_r$ = 52; $\rho$ = 1000 kg/m$^3$
Phantom section: Flat Section ; Measurement SW: DASY4, V4.7 Build 71; Postprocessing SW: SEMCAD, V1.8 Build 184

DASY4 Configuration:
- Probe: EX3DV4 - SN3797; ConvF(7.26, 7.26, 7.26); Calibrated: 2011-07-25
- Sensor-Surface: 2.5mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn466; Calibrated: 2012-02-21
- Phantom: 1800/1900 Phantom; Type: SAM

**Body bottom 661 2TX/Area Scan (51x71x1):** Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 0.753 mW/g

**Body bottom 661 2TX/Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 20.3 V/m; Power Drift = -0.038 dB
Peak SAR (extrapolated) = 1.09 W/kg
**SAR(1 g) = 0.598 mW/g; SAR(10 g) = 0.303 mW/g**
Maximum value of SAR (measured) = 0.671 mW/g

| | |
|---|---|
| Test Laboratory: | HCT CO., LTD |
| EUT Type: | CDMA/GSM/LTE Phone with BT/WLAN/NFC |
| Liquid Temperature: | 21.1 ℃ |
| Ambient Temperature: | 21.3 ℃ |
| Test Date: | Jun. 1, 2012 |

**DUT: ADR930LVW; Type: bar; Serial: #1**

Communication System: 2450MHz FCC; Frequency: 2412 MHz;Duty Cycle: 1:1
Medium parameters used (interpolated): f = 2412 MHz; $\sigma$ = 1.84 mho/m; $\varepsilon_r$ = 40.2; $\rho$ = 1000 kg/m$^3$
Phantom section: Left Section ; Measurement SW: DASY4, V4.7 Build 71; Postprocessing SW: SEMCAD, V1.8 Build 184

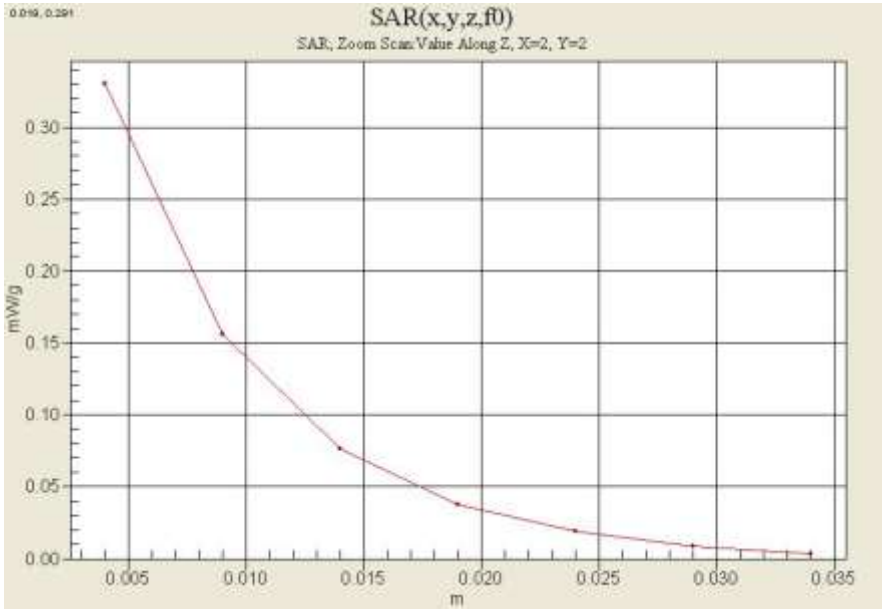
DASY4 Configuration:
- Probe: EX3DV4 - SN3797; ConvF(6.94, 6.94, 6.94); Calibrated: 2011-07-25
- Sensor-Surface: 2.5mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn466; Calibrated: 2012-02-21
- Phantom: 1800/1900 Phantom; Type: SAM

**Left touch 1ch 1Mbps/Area Scan (71x111x1):** Measurement grid: dx=15mm, dy=15mm

Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (interpolated) = 0.316 mW/g

**Left touch 1ch 1Mbps/Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 4.35 V/m; Power Drift = -0.032 dB
Peak SAR (extrapolated) = 0.651 W/kg
**SAR(1 g) = 0.285 mW/g; SAR(10 g) = 0.129 mW/g**

Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (measured) = 0.321 mW/g



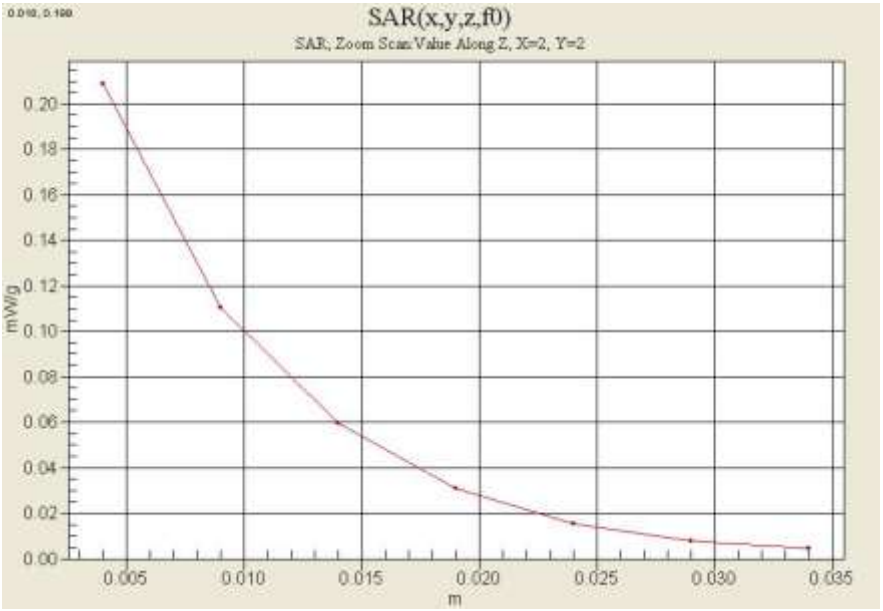
Test Laboratory: HCT CO., LTD
EUT Type: CDMA/GSM/LTE Phone with BT/WLAN/NFC
Liquid Temperature: 21.1 ℃
Ambient Temperature: 21.3 ℃
Test Date: Jun. 1, 2012

**DUT: ADR930LVW; Type: bar; Serial: #1**

Communication System: 2450MHz FCC; Frequency: 2412 MHz;Duty Cycle: 1:1
Medium parameters used (interpolated): f = 2412 MHz; $\sigma$ = 1.88 mho/m; $\varepsilon_r$ = 52; $\rho$ = 1000 kg/m$^3$
Phantom section: Flat Section ; Measurement SW: DASY4, V4.7 Build 71; Postprocessing SW: SEMCAD, V1.8 Build 184

DASY4 Configuration:
- Probe: EX3DV4 - SN3797; ConvF(6.96, 6.96, 6.96); Calibrated: 2011-07-25
- Sensor-Surface: 2.5mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn466; Calibrated: 2012-02-21
- Phantom: 835/900 Phamtom ; Type: SAM

**Body rear 1ch 1Mbps/Area Scan (71x111x1):** Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 0.184 mW/g
**Body rear 1ch 1Mbps/Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 3.98 V/m; Power Drift = 0.09 dB
Peak SAR (extrapolated) = 0.374 W/kg
**SAR(1 g) = 0.184 mW/g; SAR(10 g) = 0.093 mW/g**
Maximum value of SAR (measured) = 0.203 mW/g



Test Laboratory: HCT CO., LTD
EUT Type: CDMA/GSM/LTE Phone with BT/WLAN/NFC
Liquid Temperature: 21.1 ℃
Ambient Temperature: 21.3 ℃
Test Date: Jun. 2, 2012

**DUT: ADR930LVW; Type: bar; Serial: #1**

Communication System: LTE; Frequency: 782 MHz;Duty Cycle: 1:1
Medium parameters used: f = 782.5 MHz; $\sigma$ = 0.895 mho/m; $\varepsilon_r$ = 41.7; $\rho$ = 1000 kg/m$^3$
Phantom section: Left Section ; Measurement SW: DASY4, V4.7 Build 71; Postprocessing SW: SEMCAD, V1.8 Build 184

DASY4 Configuration:
- Probe: EX3DV4 - SN3797; ConvF(9.29, 9.29, 9.29); Calibrated: 2011-07-25
- Sensor-Surface: 2.5mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn466; Calibrated: 2012-02-21
- Phantom: SAM 835/900 MHz; Type: SAM

**Left Touch 10MHz 1RB 49offset QPSK 23230/Area Scan (71x111x1):** Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 1.08 mW/g
**Left Touch 10MHz 1RB 49offset QPSK 23230/Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 29.5 V/m; Power Drift = 0.019 dB
Peak SAR (extrapolated) = 2.07 W/kg
**SAR(1 g) = 0.902 mW/g; SAR(10 g) = 0.463 mW/g**
Maximum value of SAR (measured) = 0.959 mW/g
**Left Touch 10MHz 1RB 49offset QPSK 23230/Zoom Scan (5x5x7)/Cube 1:** Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 29.5 V/m; Power Drift = 0.019 dB
Peak SAR (extrapolated) = 1.96 W/kg
SAR(1 g) = 0.854 mW/g; SAR(10 g) = 0.441 mW/g
Maximum value of SAR (measured) = 0.948 mW/g

| | |
|---|---|
| Test Laboratory: | HCT CO., LTD |
| EUT Type: | CDMA/GSM/LTE Phone with BT/WLAN/NFC |
| Liquid Temperature: | 21.1 ℃ |
| Ambient Temperature: | 21.3 ℃ |
| Test Date: | Jun. 3, 2012 |
| Separation Distance | 1.0 cm |

**DUT: ADR930LVW; Type: bar; Serial: #1**

Communication System: LTE; Frequency: 782 MHz;Duty Cycle: 1:1
Medium parameters used (interpolated): f = 782 MHz; $\sigma$ = 0.975 mho/m; $\varepsilon_r$ = 53.9; $\rho$ = 1000 kg/m$^3$
Phantom section: Flat Section ; Measurement SW: DASY4, V4.7 Build 71; Postprocessing SW: SEMCAD, V1.8 Build 184

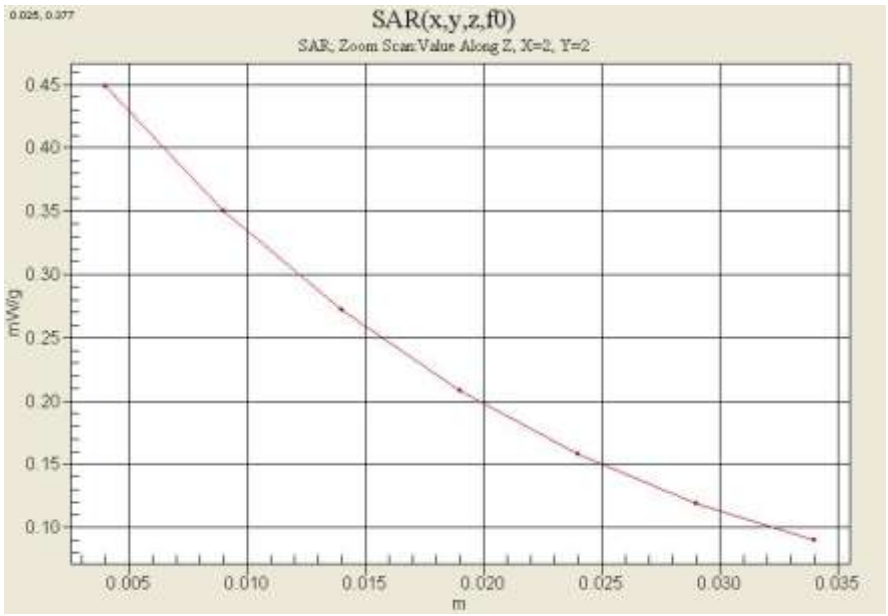
DASY4 Configuration:
- Probe: EX3DV4 - SN3797; ConvF(9.22, 9.22, 9.22); Calibrated: 2011-07-25
- Sensor-Surface: 2.5mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn466; Calibrated: 2012-02-21
- Phantom: SAM 1800/1900 MHz; Type: SAM

**LTE Hotspot Rear 10MHz 1RB 0 offset QPSK 23230/Area Scan (71x111x1):** Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 0.448 mW/g

**LTE Hotspot Rear 10MHz 1RB 0 offset QPSK 23230/Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 18.4 V/m; Power Drift = -0.009 dB
Peak SAR (extrapolated) = 0.543 W/kg
**SAR(1 g) = 0.428 mW/g; SAR(10 g) = 0.326 mW/g**

Maximum value of SAR (measured) = 0.449 mW/g



Test Laboratory: HCT CO., LTD
EUT Type: CDMA/GSM/LTE Phone with BT/WLAN/NFC
Liquid Temperature: 21.3 ℃
Ambient Temperature: 21.5 ℃
Test Date: Jun. 26, 2012

**DUT: ADR930LVW; Type: bar; Serial: #1**

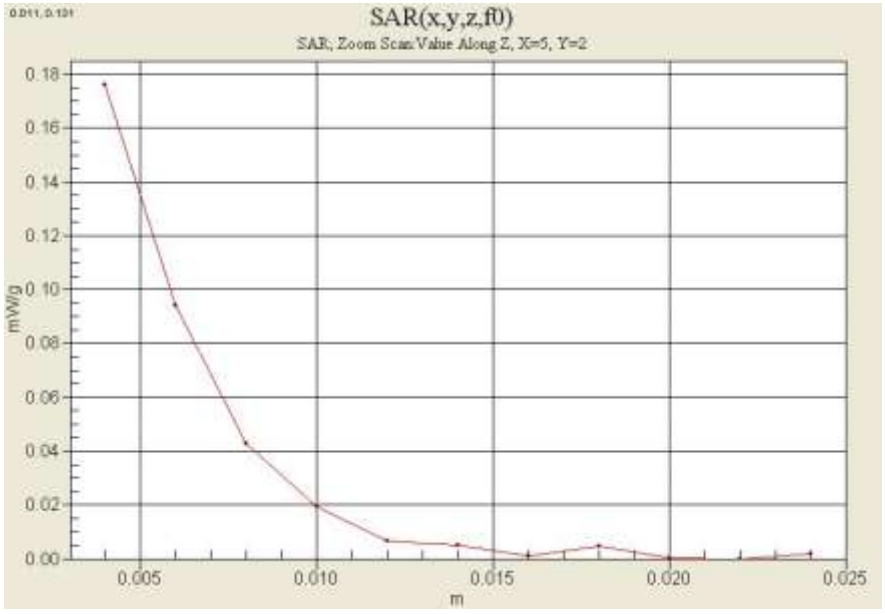
Communication System: WIFI 5GHz; Frequency: 5240 MHz;Duty Cycle: 1:1
Medium parameters used (interpolated): f = 5240 MHz; $\sigma$ = 4.62 mho/m; $\varepsilon_r$ = 36.4; $\rho$ = 1000 kg/m$^3$
Phantom section: Left Section ; Measurement SW: DASY4, V4.7 Build 71; Postprocessing SW: SEMCAD, V1.8 Build 184

DASY4 Configuration:
- Probe: EX3DV4 - SN3797; ConvF(4.73, 4.73, 4.73); Calibrated: 2011-07-25
- Sensor-Surface: 2.5mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn466; Calibrated: 2012-02-21
- Phantom: 800/900 Phantom; Type: SAM

**802.11a Left touch 48ch 6Mbps/Area Scan (91x151x1):** Measurement grid: dx=10mm, dy=10mm

Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (interpolated) = 0.223 mW/g

**802.11a Left touch 48ch 6Mbps/Zoom Scan (7x7x11)/Cube 0:** Measurement grid: dx=4mm, dy=4mm, dz=2mm
Reference Value = 2.65 V/m; Power Drift = -0.08 dB
Peak SAR (extrapolated) = 0.720 W/kg
**SAR(1 g) = 0.145 mW/g; SAR(10 g) = 0.038 mW/g**
Maximum value of SAR (measured) = 0.176 mW/g



| | |
|---|---|
| Test Laboratory: | HCT CO., LTD |
| EUT Type: | CDMA/GSM/LTE Phone with BT/WLAN/NFC |
| Liquid Temperature: | 21.3 ℃ |
| Ambient Temperature: | 21.5 ℃ |
| Test Date: | Jun.27 , 2012 |
| Separation Distance | 1.0 cm |

**DUT: ADR930LVW; Type: bar; Serial: #1**

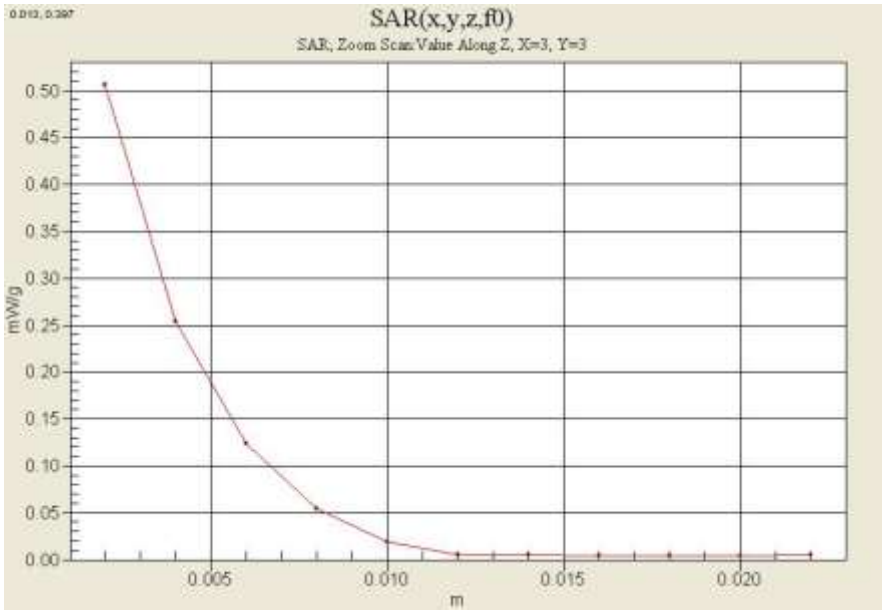
Communication System: WIFI 5GHz; Frequency: 5785 MHz;Duty Cycle: 1:1
Medium parameters used (interpolated): f = 5785 MHz; $\sigma$ = 5.98 mho/m; $\varepsilon_r$ = 45.9; $\rho$ = 1000 kg/m$^3$
Phantom section: Flat Section ; Measurement SW: DASY4, V4.7 Build 71; Postprocessing SW: SEMCAD, V1.8 Build 184

DASY4 Configuration:
- Probe: EX3DV4 - SN3797; ConvF(3.75, 3.75, 3.75); Calibrated: 2011-07-25
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn466; Calibrated: 2012-02-21
- Phantom: 800/900 Phantom; Type: SAM

**WIFI 5GHz 802.11a Body Rear 157ch 6Mbps 1cm/Area Scan (101x151x1):** Measurement grid: dx=10mm, dy=10mm

Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (interpolated) = 0.528 mW/g

**WIFI 5GHz 802.11a Body Rear 157ch 6Mbps 1cm/Zoom Scan (7x7x11)/Cube 0:** Measurement grid: dx=4mm, dy=4mm, dz=2mm
Reference Value = 1.26 V/m; Power Drift = 0.03 dB
Peak SAR (extrapolated) = 1.02 W/kg
**SAR(1 g) = 0.246 mW/g; SAR(10 g) = 0.079 mW/g**
Maximum value of SAR (measured) = 0.506 mW/g



# Attachment 2. – Dipole Validation Plots

# ■ Validation Data (835 MHz Head)

Test Laboratory: HCT CO., LTD

Input Power 100 mW (20 dBm)

Liquid Temp: 21.2 ℃

Test Date: May 28, 2012

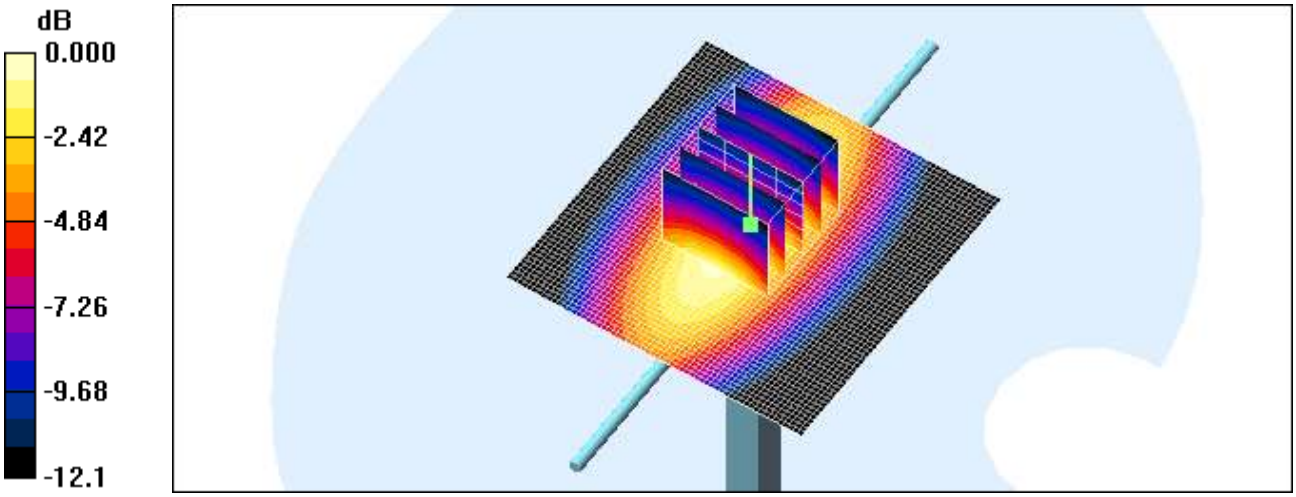
**DUT: Dipole 835 MHz; Type: D835V2; Serial: D835V2 – SN:441**

Communication System: CW; Frequency: 835 MHz;Duty Cycle: 1:1
Medium parameters used: f = 835 MHz; $\sigma$ = 0.874 mho/m; $\varepsilon_r$ = 39.9; $\rho$ = 1000 kg/$m^3$
Phantom section: Flat Section ; Measurement SW: DASY4, V4.7 Build 71; Postprocessing SW: SEMCAD, V1.8 Build 184

DASY4 Configuration:
- Probe: EX3DV4 - SN3797; ConvF(8.93, 8.93, 8.93); Calibrated: 2011-07-25
- Sensor-Surface: 2.5mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn466; Calibrated: 2012-02-21
- Phantom: 800/900 Phantom; Type: SAM

**Validation 835 MHz/Area Scan (61x61x1):** Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 1.04 mW/g

**Validation 835 MHz/Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 33.9 V/m; Power Drift = -0.017 dB
Peak SAR (extrapolated) = 1.61 W/kg
**SAR(1 g) = 0.966 mW/g; SAR(10 g) = 0.583 mW/g**
Maximum value of SAR (measured) = 1.06 mW/g




0 dB = 1.06mW/g

# ■ Validation Data (835 MHz Body)

Test Laboratory: HCT CO., LTD

Input Power 100 mW (20 dBm)

Liquid Temp: 21.1 ℃

Test Date: May 29, 2012

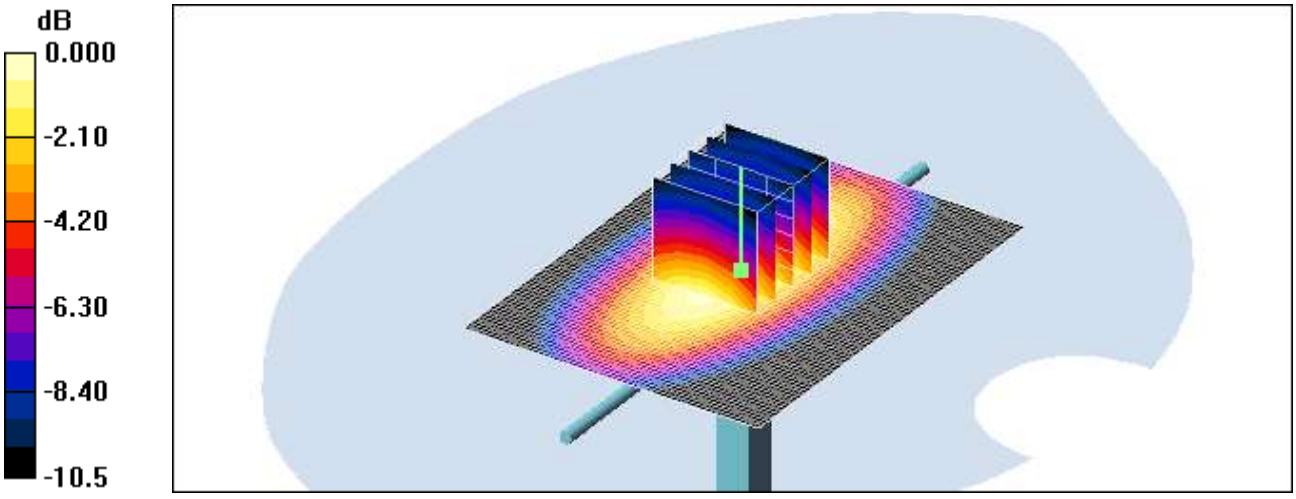
**DUT: Dipole 835 MHz; Type: D835V2; Serial: D835V2 – SN:441**

Communication System: CW; Frequency: 835 MHz;Duty Cycle: 1:1
Medium parameters used: f = 835 MHz; $\sigma$ = 1.01 mho/m; $\varepsilon_r$ = 54.8; $\rho$ = 1000 kg/$m^3$
Phantom section: Flat Section ; Measurement SW: DASY4, V4.7 Build 71; Postprocessing SW: SEMCAD, V1.8 Build 184

DASY4 Configuration:
- Probe: EX3DV4 - SN3797; ConvF(9.14, 9.14, 9.14); Calibrated: 2011-07-25
- Sensor-Surface: 2.5mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn466; Calibrated: 2012-02-21
- Phantom: 800/900 Phantom; Type: SAM

**Validation 835 MHz/Area Scan (61x81x1):** Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 1.03 mW/g

**Validation 835 MHz/Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 31.4 V/m; Power Drift = -0.006 dB
Peak SAR (extrapolated) = 1.44 W/kg
**SAR(1 g) = 0.951 mW/g; SAR(10 g) = 0.621 mW/g**
Maximum value of SAR (measured) = 1.03 mW/g




0 dB = 1.03mW/g

# ■ Validation Data (1900 MHz Head)

Test Laboratory: HCT CO., LTD

Input Power 100 mW (20 dBm)

Liquid Temp: 21.3 ℃

Test Date: May 30, 2012

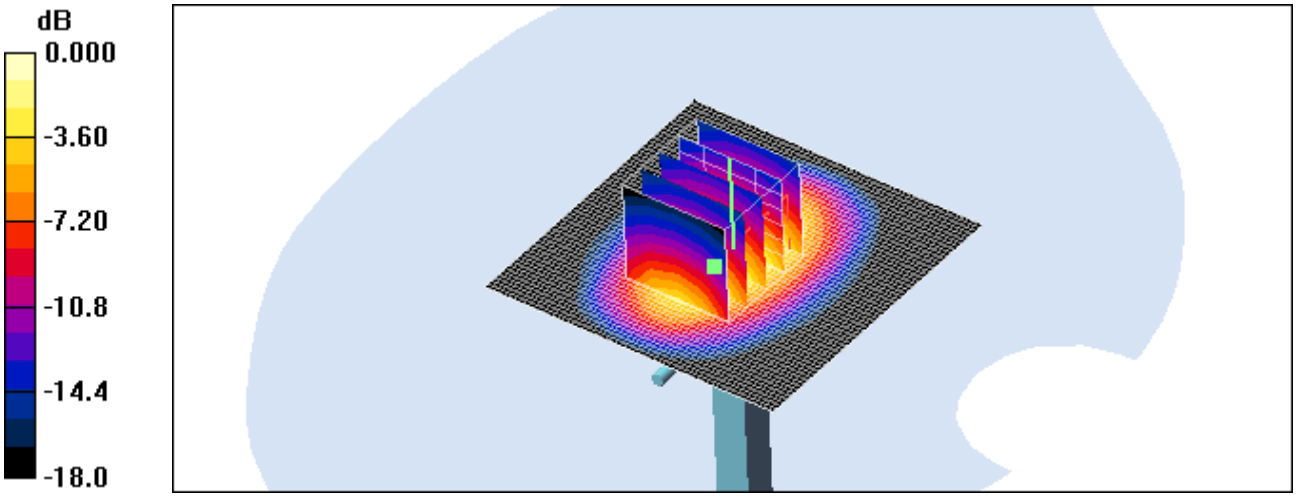
DUT: Dipole 1900 MHz; Type: D1900V2; Serial: D1900V2 – SN:5d032

Communication System: CW; Frequency: 1900 MHz;Duty Cycle: 1:1
Medium parameters used: f = 1900 MHz; $\sigma$ = 1.4 mho/m; $\varepsilon_r$ = 40.8; $\rho$ = 1000 kg/m$^3$
Phantom section: Flat Section ; Measurement SW: DASY4, V4.7 Build 71; Postprocessing SW: SEMCAD, V1.8 Build 184

DASY4 Configuration:
- Probe: EX3DV4 - SN3797; ConvF(7.6, 7.6, 7.6); Calibrated: 2011-07-25
- Sensor-Surface: 2.5mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn466; Calibrated: 2011-03-01
- Phantom: 1800/1900 Phantom; Type: SAM

Dipole 1900MHz Validation/Area Scan (61x61x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 4.56 mW/g

Dipole 1900MHz Validation/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 55.6 V/m; Power Drift = 0.171 dB
Peak SAR (extrapolated) = 7.20 W/kg
SAR(1 g) = 3.99 mW/g; SAR(10 g) = 2.11 mW/g
Maximum value of SAR (measured) = 4.42 mW/g




0 dB = 4.42mW/g

## ■ Validation Data (1900 MHz Body)

Test Laboratory: HCT CO., LTD

Input Power 100 mW (20 dBm)

Liquid Temp: 21.2 ℃

Test Date: May 31, 2012

**DUT: Dipole 1900 MHz; Type: D1900V2; Serial: D1900V2 – SN:5d032**

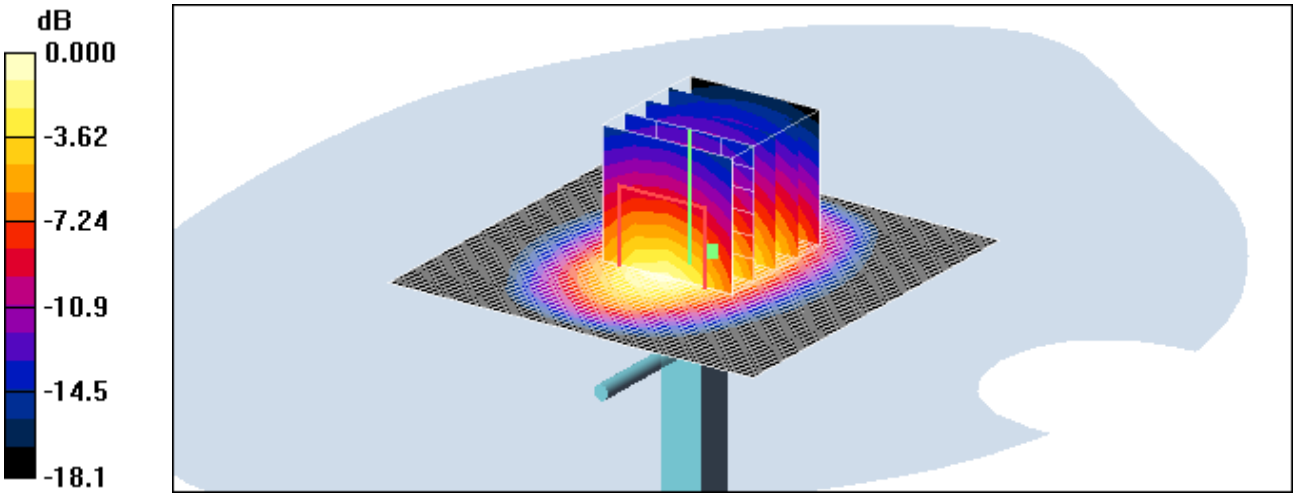
Communication System: CW; Frequency: 1900 MHz;Duty Cycle: 1:1
Medium parameters used: f = 1900 MHz; $\sigma$ = 1.52 mho/m; $\varepsilon_r$ = 51.8; $\rho$ = 1000 kg/$m^3$
Phantom section: Flat Section ; Measurement SW: DASY4, V4.7 Build 71; Postprocessing SW: SEMCAD, V1.8 Build 184

DASY4 Configuration:
- Probe: EX3DV4 - SN3797; ConvF(7.26, 7.26, 7.26); Calibrated: 2011-07-25
- Sensor-Surface: 2.5mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn466; Calibrated: 2012-02-21
- Phantom: 1800/1900 Phantom; Type: SAM

**Dipole 1900MHz Validation/Area Scan (61x61x1):** Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 4.57 mW/g

**Dipole 1900MHz Validation/Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 52.8 V/m; Power Drift = 0.092 dB
Peak SAR (extrapolated) = 7.30 W/kg
**SAR(1 g) = 4.01 mW/g; SAR(10 g) = 2.13 mW/g**

Maximum value of SAR (measured) = 4.43 mW/g




0 dB = 4.43mW/g

# ■ Validation Data (LTE 750 MHz Head)

Test Laboratory: HCT CO., LTD

Input Power 100 mW (20 dBm)

Liquid Temp: 21.1 ℃

Test Date: Jun. 02, 2012

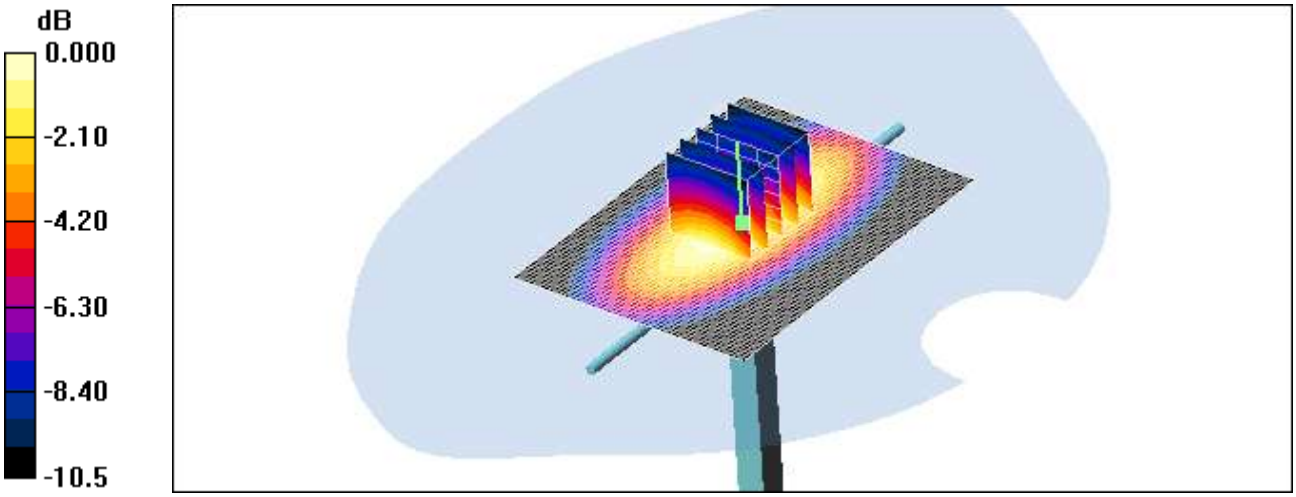
**DUT: Dipole 750 MHz; Type: D750V3; Serial: D750V3 – SN:1014**

Communication System: CW; Frequency: 750 MHz;Duty Cycle: 1:1
Medium parameters used: f = 750 MHz; $\sigma$ = 0.867 mho/m; $\varepsilon_r$ = 42.2; $\rho$ = 1000 kg/$m^3$
Phantom section: Flat Section ; Measurement SW: DASY4, V4.7 Build 71; Postprocessing SW: SEMCAD, V1.8 Build 184

DASY4 Configuration:
- Probe: EX3DV4 – SN3797; ConvF(9.29, 9.29, 9.29); Calibrated: 2011-07-25
- Sensor-Surface: 2.5mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn869; Calibrated: 2011-09-22
- Phantom: 800/900 Phantom; Type: SAM

**Validation 750 MHz/Area Scan (61x81x1):** Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 0.885 mW/g

**Validation 750 MHz/Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 31.3 V/m; Power Drift = -0.005 dB
Peak SAR (extrapolated) = 1.22 W/kg
**SAR(1 g) = 0.818 mW/g; SAR(10 g) = 0.536 mW/g**
Maximum value of SAR (measured) = 0.884 mW/g




0 dB = 0.884mW/g

## ■ Validation Data (LTE 750 MHz Body)

Test Laboratory: HCT CO., LTD

Input Power 100 mW (20 dBm)

Liquid Temp: 21.3 ℃

Test Date: Jun. 03, 2012

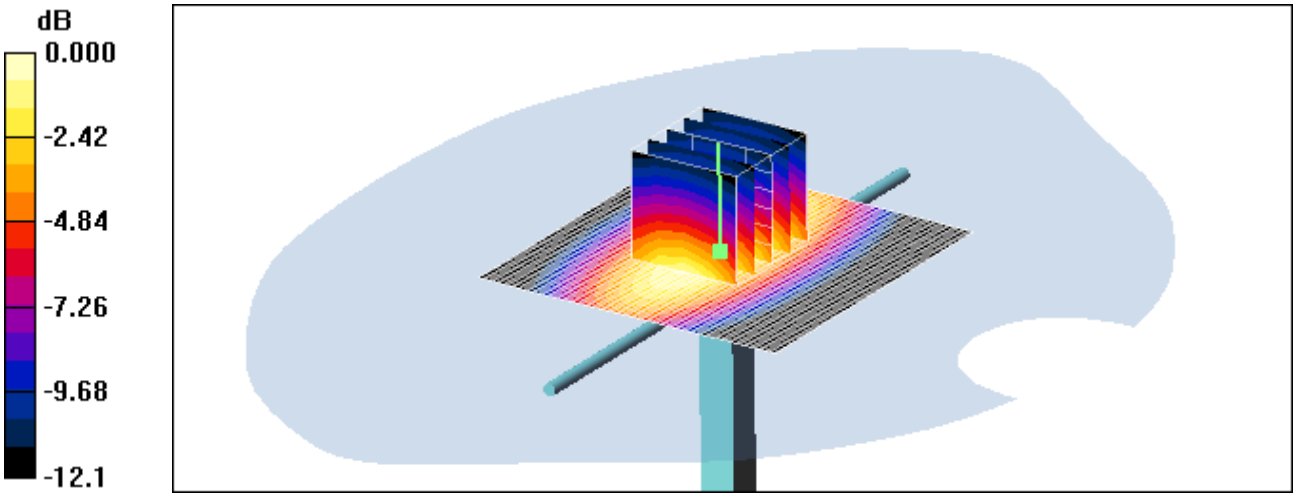
DUT: Dipole 750 MHz; Type: D750V3; Serial: D750V3 – SN:1014

Communication System: CW; Frequency: 750 MHz;Duty Cycle: 1:1
Medium parameters used: f = 750 MHz; $\sigma$ = 0.944 mho/m; $\varepsilon_r$ = 54.4; $\rho$ = 1000 kg/$m^3$
Phantom section: Flat Section ; Measurement SW: DASY4, V4.7 Build 71; Postprocessing SW: SEMCAD, V1.8 Build 184

DASY4 Configuration:
- Probe: EX3DV4 - SN3797; ConvF(9.22, 9.22, 9.22); Calibrated: 2011-07-25
- Sensor-Surface: 2.5mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn466; Calibrated: 2012-02-21
- Phantom: 800/900 Phantom; Type: SAM

**Validation 750MHz/Area Scan (61x61x1):** Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 0.937 mW/g

**Validation 750MHz/Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 30.9 V/m; Power Drift = -0.004 dB
Peak SAR (extrapolated) = 1.44 W/kg
**SAR(1 g) = 0.868 mW/g; SAR(10 g) = 0.525 mW/g**
Maximum value of SAR (measured) = 0.955 mW/g




0 dB = 0.955mW/g

## ■ Validation Data (2450 MHz Head)

Test Laboratory: HCT CO., LTD

Input Power 100 mW (20 dBm)

Liquid Temp: 21.1 ℃

Test Date: Jun. 01, 2012

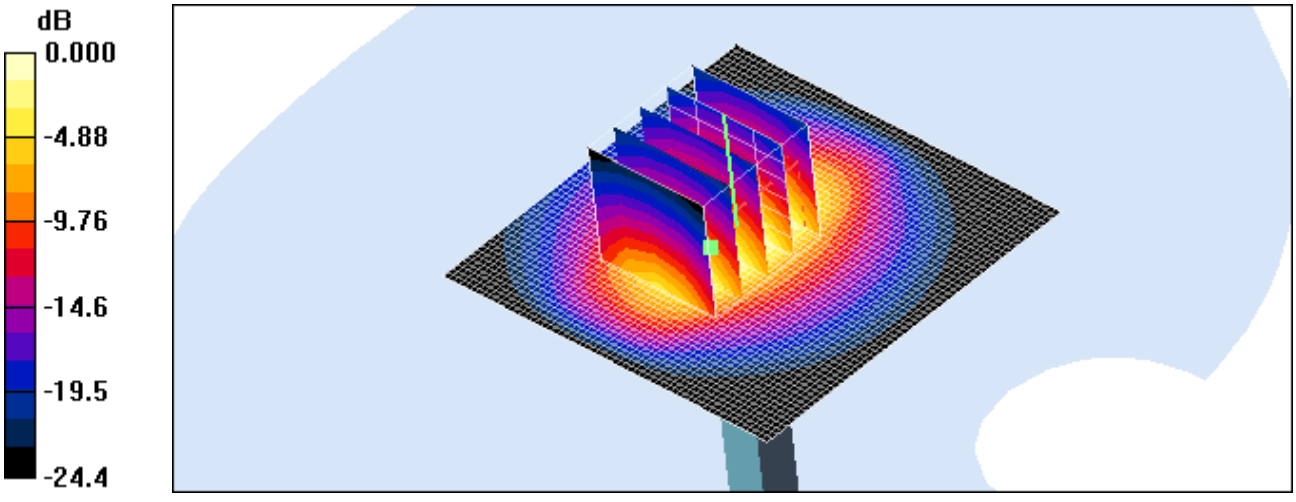
DUT: Dipole 2450 MHz; Type: D2450V2; Serial: D2450V2 – SN:743

Communication System: CW; Frequency: 2450 MHz;Duty Cycle: 1:1
Medium parameters used: f = 2450 MHz; $\sigma$ = 1.88 mho/m; $\varepsilon_r$ = 40; $\rho$ = 1000 kg/$m^3$
Phantom section: Flat Section ; Measurement SW: DASY4, V4.7 Build 71; Postprocessing SW: SEMCAD, V1.8 Build 184

DASY4 Configuration:
- Probe: EX3DV4 - SN3797; ConvF(6.94, 6.94, 6.94); Calibrated: 2011-07-25
- Sensor-Surface: 2.5mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn466; Calibrated: 2012-02-21
- Phantom: 800/900 Phantom; Type: SAM

**Validation 2450MHz/Area Scan (61x61x1):** Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 6.49 mW/g

**Validation 2450MHz/Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 56.0 V/m; Power Drift = 0.073 dB
Peak SAR (extrapolated) = 11.4 W/kg
**SAR(1 g) = 5.33 mW/g; SAR(10 g) = 2.5 mW/g**
Maximum value of SAR (measured) = 5.92 mW/g




0 dB = 5.92mW/g

## ■ Validation Data (2450 MHz Body)

Test Laboratory: HCT CO., LTD

Input Power 100 mW (20 dBm)

Liquid Temp: 21.1 ℃

Test Date: Jun. 01, 2012

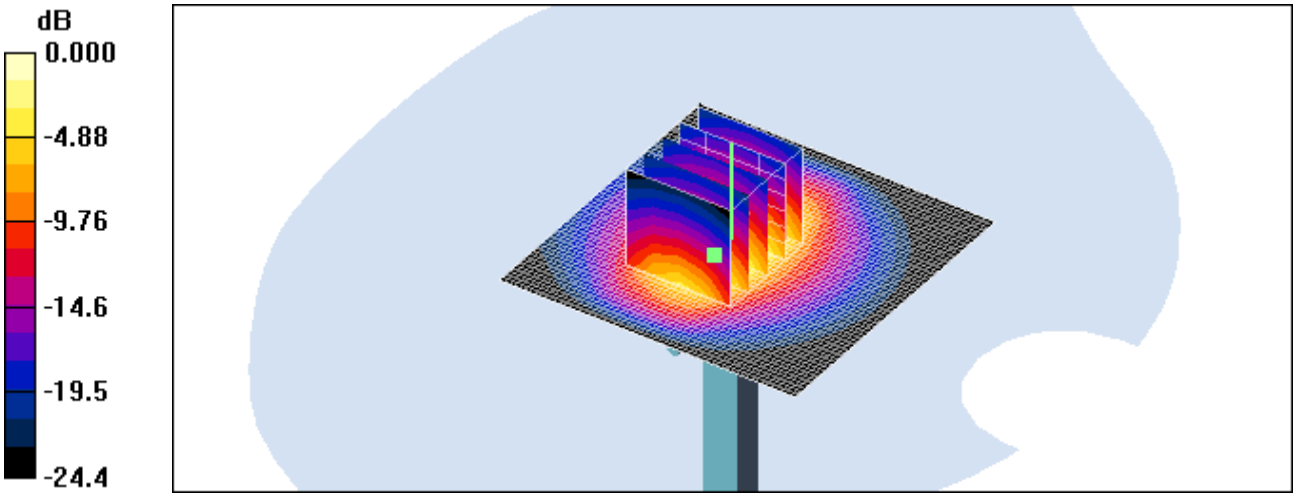
DUT: Dipole 2450 MHz; Type: D2450V2; Serial: D2450V2 – SN:743

Communication System: CW; Frequency: 2450 MHz;Duty Cycle: 1:1
Medium parameters used: f = 2450 MHz; $\sigma$ = 1.94 mho/m; $\varepsilon_r$ = 51.8; $\rho$ = 1000 kg/$m^3$
Phantom section: Flat Section ; Measurement SW: DASY4, V4.7 Build 71; Postprocessing SW: SEMCAD, V1.8 Build 184

DASY4 Configuration:
- Probe: EX3DV4 – SN3797; ConvF(6.96, 6.96, 6.96); Calibrated: 2011-07-25
- Sensor-Surface: 2.5mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn466; Calibrated: 2012-02-21
- Phantom: 800/900 Phantom; Type: SAM

Validation 2450MHz/Area Scan (61x61x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 6.17 mW/g

Validation 2450MHz/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 54.3 V/m; Power Drift = -0.003 dB
Peak SAR (extrapolated) = 10.8 W/kg
SAR(1 g) = 5.1 mW/g; SAR(10 g) = 2.39 mW/g
Maximum value of SAR (measured) = 5.70 mW/g




0 dB = 5.70mW/g

## ■ Validation Data (5.2 GHz Head)

Test Laboratory: HCT CO., LTD

Input Power 100 mW (20 dBm)

Liquid Temp: 21.3 ℃

Test Date: Jun. 26, 2012

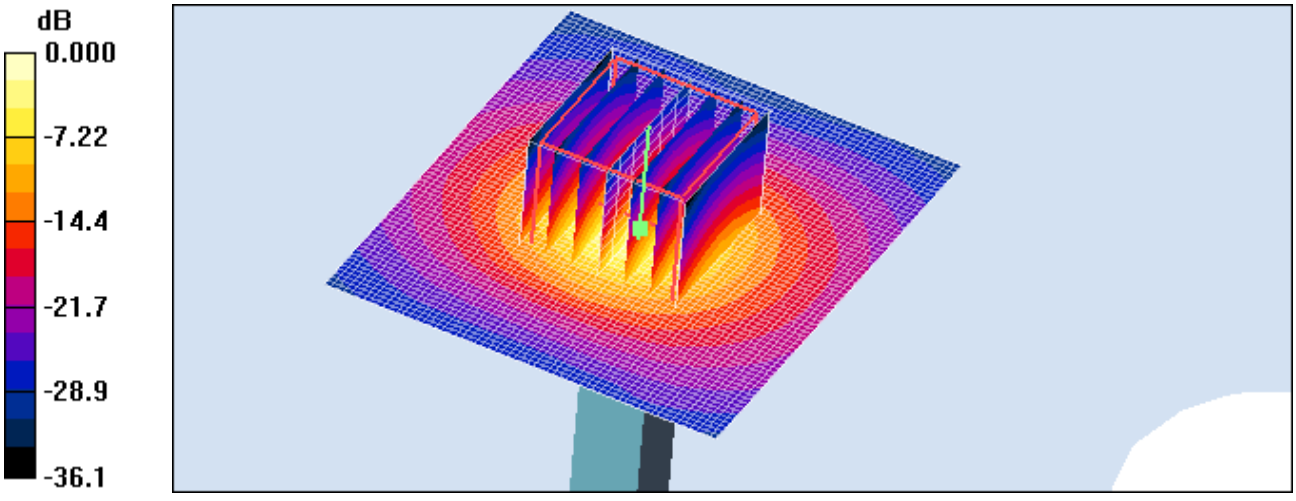
DUT: Dipole 5GHz; Type: D5000V2; Serial: D5000V2 – SN:1107

Communication System: CW; Frequency: 5200 MHz;Duty Cycle: 1:1
Medium parameters used: f = 5200 MHz; $\sigma$ = 4.59 mho/m; $\varepsilon_r$ = 36.6; $\rho$ = 1000 kg/$m^3$
Phantom section: Flat Section ; Measurement SW: DASY4, V4.7 Build 71; Postprocessing SW: SEMCAD, V1.8 Build 184

DASY4 Configuration:
- Probe: EX3DV4 – SN3797; ConvF(4.73, 4.73, 4.73); Calibrated: 2011-07-25
- Sensor-Surface: 2.5mm (Mechanical Surface Detection)Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn466; Calibrated: 2012-02-21
- Phantom: 1800/1900 Phantom; Type: SAM

**Validation 5200MHz/Area Scan (61x71x1):** Measurement grid: dx=10mm, dy=10mm
Maximum value of SAR (interpolated) = 9.58 mW/g

**Validation 5200MHz/Zoom Scan (7x7x11)/Cube 0:** Measurement grid: dx=4mm, dy=4mm, dz=2mm
Reference Value = 45.2 V/m; Power Drift = -0.051 dB
Peak SAR (extrapolated) = 32.7 W/kg
**SAR(1 g) = 8.04 mW/g; SAR(10 g) = 2.29 mW/g**
Maximum value of SAR (measured) = 16.6 mW/g




0 dB = 16.6mW/g

## ■ Validation Data (5.2 GHz Body)

Test Laboratory: HCT CO., LTD

Input Power 100 mW (20 dBm)

Liquid Temp: 21.3 ℃

Test Date: Jun. 27, 2012

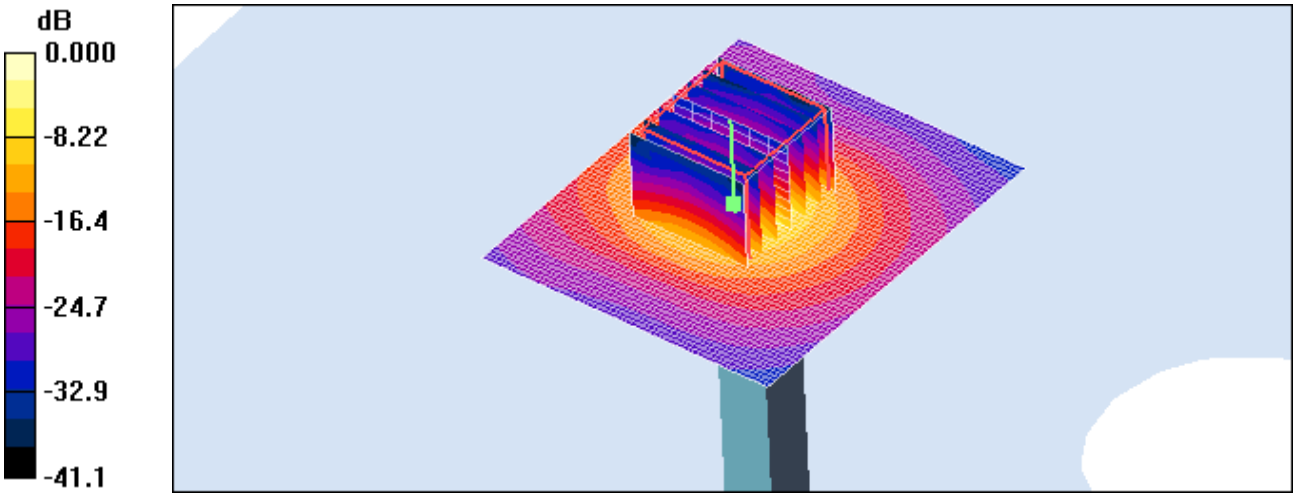
DUT: Dipole 5GHz; Type: D5000V2; Serial: D5000V2 – SN:1107

Communication System: CW; Frequency: 5200 MHz;Duty Cycle: 1:1
Medium parameters used: f = 5200 MHz; $\sigma$ = 5.24 mho/m; $\varepsilon_r$ = 47.2; $\rho$ = 1000 kg/$m^3$
Phantom section: Flat Section ; Measurement SW: DASY4, V4.7 Build 71; Postprocessing SW: SEMCAD, V1.8 Build 184

DASY4 Configuration:
- Probe: EX3DV4 – SN3797; ConvF(4.1, 4.1, 4.1); Calibrated: 2011-07-25
- Sensor-Surface: 2.5mm (Mechanical Surface Detection)Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn466; Calibrated: 2012-02-21
- Phantom: 800/900 Phantom; Type: SAM

Validation 5200MHz/Area Scan (61x71x1): Measurement grid: dx=10mm, dy=10mm
Maximum value of SAR (interpolated) = 9.45 mW/g

Validation 5200MHz/Zoom Scan (7x7x11)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=2mm
Reference Value = 37.1 V/m; Power Drift = 0.084 dB
Peak SAR (extrapolated) = 34.8 W/kg
SAR(1 g) = 7.74 mW/g; SAR(10 g) = 2.12 mW/g
Maximum value of SAR (measured) = 16.5 mW/g




0 dB = 16.5mW/g

## ■ Validation Data (5.5 GHz Head)

Test Laboratory: HCT CO., LTD

Input Power 100 mW (20 dBm)

Liquid Temp: 21.3 ℃

Test Date: Jun. 26, 2012

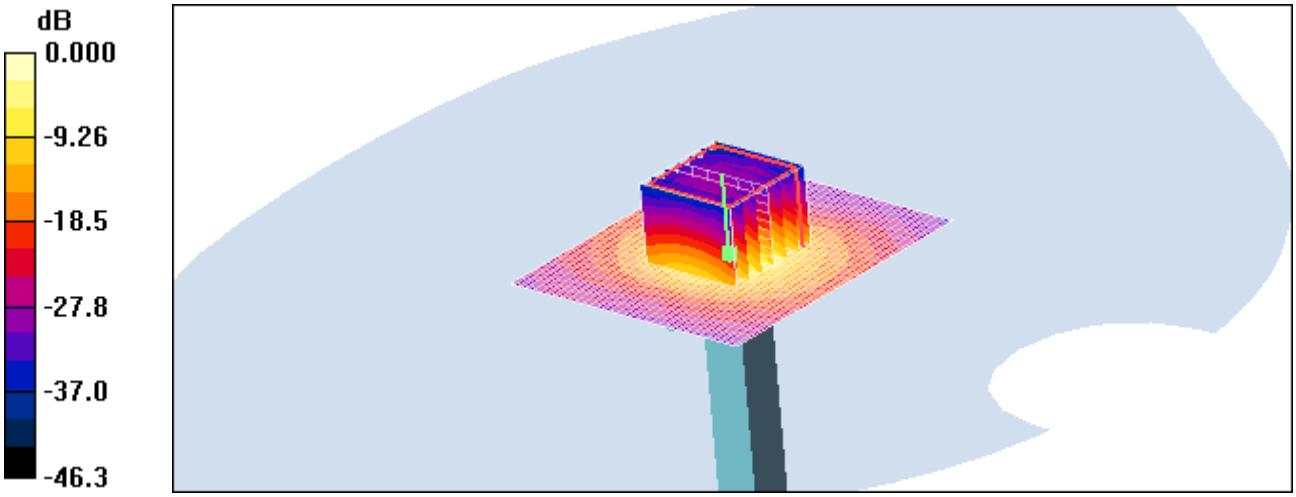
DUT: Dipole 5GHz; Type: D5000V2; Serial: D5000V2 – SN:1107

Communication System: CW; Frequency: 5500 MHz;Duty Cycle: 1:1
Medium parameters used: f = 5500 MHz; $\sigma$ = 4.95 mho/m; $\varepsilon_r$ = 35.8; $\rho$ = 1000 kg/$m^3$
Phantom section: Flat Section ; Measurement SW: DASY4, V4.7 Build 71; Postprocessing SW: SEMCAD, V1.8 Build 184

DASY4 Configuration:
- Probe: EX3DV4 - SN3797; ConvF(4.48, 4.48, 4.48); Calibrated: 2011-07-25
- Sensor-Surface: 2.5mm (Mechanical Surface Detection)Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn466; Calibrated: 2012-02-21
- Phantom: 1800/1900 Phantom; Type: SAM

Validation 5500MHz/Area Scan (61x71x1): Measurement grid: dx=10mm, dy=10mm
Maximum value of SAR (interpolated) = 9.99 mW/g

Validation 5500MHz/Zoom Scan (7x7x11)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=2mm
Reference Value = 44.5 V/m; Power Drift = -0.033 dB
Peak SAR (extrapolated) = 38.6 W/kg
SAR(1 g) = 8.63 mW/g; SAR(10 g) = 2.4 mW/g
Maximum value of SAR (measured) = 17.8 mW/g




0 dB = 17.8mW/g

## ■ Validation Data (5.5 GHz Body)

Test Laboratory: HCT CO., LTD

Input Power 100 mW (20 dBm)

Liquid Temp: 21.3 ℃

Test Date: Jun. 27, 2012

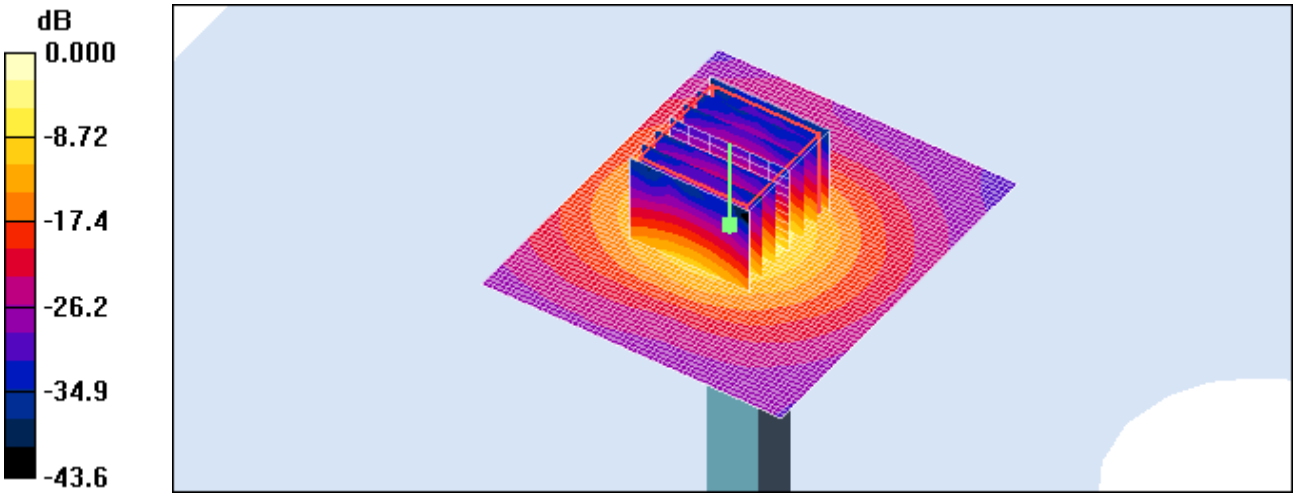
DUT: Dipole 5GHz; Type: D5000V2; Serial: D5000V2 – SN:1107

Communication System: CW; Frequency: 5500 MHz;Duty Cycle: 1:1
Medium parameters used: f = 5500 MHz; $\sigma$ = 5.75 mho/m; $\varepsilon_r$ = 46.3; $\rho$ = 1000 kg/$m^3$
Phantom section: Flat Section ; Measurement SW: DASY4, V4.7 Build 71; Postprocessing SW: SEMCAD, V1.8 Build 184

DASY4 Configuration:
- Probe: EX3DV4 – SN3797; ConvF(3.72, 3.72, 3.72); Calibrated: 2011-07-25
- Sensor-Surface: 2.5mm (Mechanical Surface Detection)Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn466; Calibrated: 2012-02-21
- Phantom: 800/900 Phantom; Type: SAM

Validation 5500MHz/Area Scan (61x71x1): Measurement grid: dx=10mm, dy=10mm
Maximum value of SAR (interpolated) = 10.3 mW/g

Validation 5500MHz/Zoom Scan (7x7x11)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=2mm
Reference Value = 37.6 V/m; Power Drift = 0.023 dB
Peak SAR (extrapolated) = 35.8 W/kg
SAR(1 g) = 8.14 mW/g; SAR(10 g) = 2.22 mW/g
Maximum value of SAR (measured) = 17.6 mW/g




0 dB = 17.6mW/g

## ■ Validation Data (5.8 GHz Head)

Test Laboratory: HCT CO., LTD

Input Power 100 mW (20 dBm)

Liquid Temp: 21.3 ℃

Test Date: Jun. 26, 2012

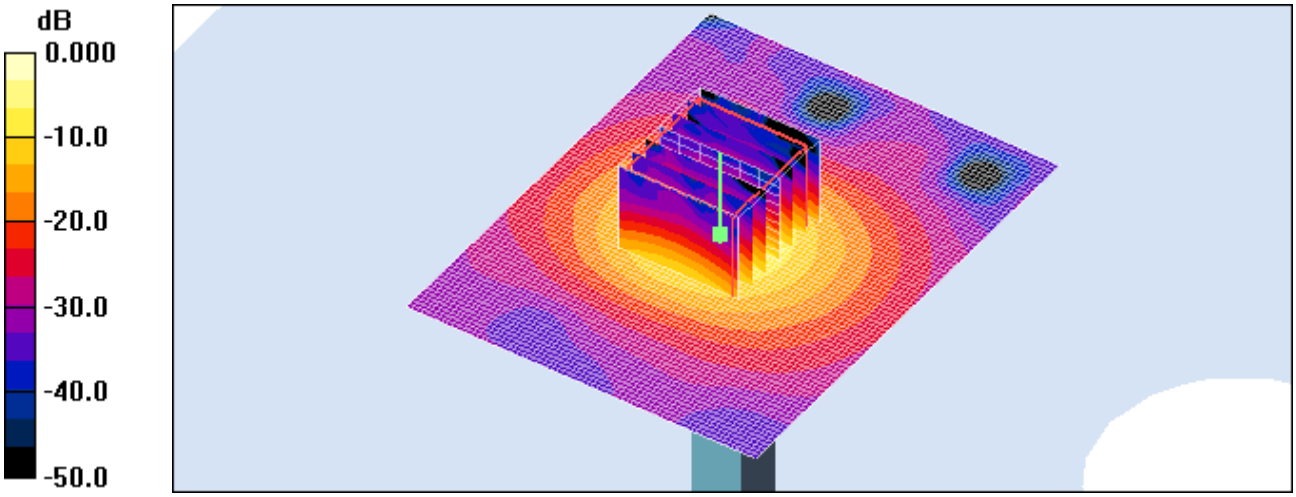
DUT: Dipole 5GHz; Type: D5000V2; Serial: D5000V2 – SN:1107

Communication System: CW; Frequency: 5800 MHz;Duty Cycle: 1:1
Medium parameters used: f = 5800 MHz; $\sigma$ = 5.37 mho/m; $\varepsilon_r$ = 35; $\rho$ = 1000 kg/m$^3$
Phantom section: Flat Section ; Measurement SW: DASY4, V4.7 Build 71; Postprocessing SW: SEMCAD, V1.8 Build 184

DASY4 Configuration:
- Probe: EX3DV4 - SN3797; ConvF(4.26, 4.26, 4.26); Calibrated: 2011-07-25
- Sensor-Surface: 2.5mm (Mechanical Surface Detection)Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn466; Calibrated: 2012-02-21
- Phantom: 800/900 Phantom; Type: SAM

Validation 5800MHz/Area Scan (71x91x1): Measurement grid: dx=10mm, dy=10mm
Maximum value of SAR (interpolated) = 7.99 mW/g

Validation 5800MHz/Zoom Scan (7x7x11)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=2mm
Reference Value = 38.4 V/m; Power Drift = 0.024 dB
Peak SAR (extrapolated) = 42.0 W/kg
SAR(1 g) = 7.95 mW/g; SAR(10 g) = 2.17 mW/g
Maximum value of SAR (measured) = 17.4 mW/g




0 dB = 17.4mW/g

## ■ Validation Data (5.8 GHz Body)

Test Laboratory: HCT CO., LTD

Input Power 100 mW (20 dBm)

Liquid Temp: 21.3 ℃

Test Date: Jun. 27, 2012

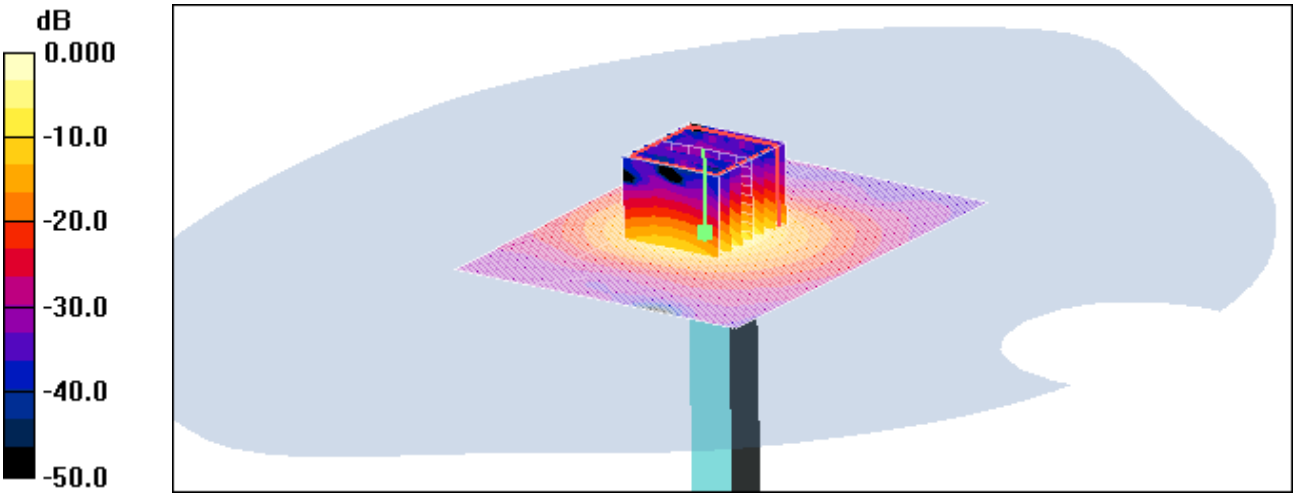
DUT: Dipole 5GHz; Type: D5000V2; Serial: D5000V2 – SN:1107

Communication System: CW; Frequency: 5800 MHz;Duty Cycle: 1:1
Medium parameters used: f = 5800 MHz; $\sigma$ = 6.01 mho/m; $\varepsilon_r$ = 45.9; $\rho$ = 1000 kg/$m^3$
Phantom section: Flat Section ; Measurement SW: DASY4, V4.7 Build 71; Postprocessing SW: SEMCAD, V1.8 Build 184

DASY4 Configuration:
- Probe: EX3DV4 - SN3797; ConvF(3.75, 3.75, 3.75); Calibrated: 2011-07-25
- Sensor-Surface: 2.5mm (Mechanical Surface Detection)Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn466; Calibrated: 2012-02-21
- Phantom: 800/900 Phantom; Type: SAM

Validation 5800MHz/Area Scan (71x91x1): Measurement grid: dx=10mm, dy=10mm
Maximum value of SAR (interpolated) = 8.64 mW/g

Validation 5800MHz/Zoom Scan (7x7x11)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=2mm
Reference Value = 35.6 V/m; Power Drift = -0.042 dB
Peak SAR (extrapolated) = 34.4 W/kg
SAR(1 g) = 7.63 mW/g; SAR(10 g) = 2.12 mW/g
Maximum value of SAR (measured) = 16.5 mW/g




0 dB = 16.5mW/g

## ■ Dielectric Parameter (835 MHz Head)

| | |
|---|---|
| Title | ADR910LVW |
| SubTitle | CDMA835(Head) |
| Test Date | May 28, 2012 |

| Frequency | e' | e'' |
|---|---|---|
| 800000000.0000 | 39.8090 | 18.8205 |
| 805000000.0000 | 39.8076 | 18.9081 |
| 810000000.0000 | 39.8652 | 18.9313 |
| 815000000.0000 | 39.9231 | 18.8738 |
| 820000000.0000 | 39.9532 | 18.9137 |
| 825000000.0000 | 39.9593 | 18.9013 |
| 830000000.0000 | 39.9702 | 18.8665 |
| 835000000.0000 | 39.9163 | 18.8231 |
| 840000000.0000 | 39.8852 | 18.7846 |
| 845000000.0000 | 39.8271 | 18.7589 |
| 850000000.0000 | 39.7028 | 18.7516 |
| 855000000.0000 | 39.6174 | 18.6933 |
| 860000000.0000 | 39.4461 | 18.6899 |
| 865000000.0000 | 39.2725 | 18.5966 |
| 870000000.0000 | 39.1437 | 18.5682 |
| 875000000.0000 | 38.9431 | 18.5653 |
| 880000000.0000 | 38.8399 | 18.4914 |
| 885000000.0000 | 38.6342 | 18.4916 |
| 890000000.0000 | 38.4854 | 18.4570 |
| 895000000.0000 | 38.3571 | 18.4373 |
| 900000000.0000 | 38.2713 | 18.4602 |

## ■ Dielectric Parameter (835 MHz Body)

| | |
|---|---|
| Title | ADR910LVW |
| SubTitle | CDMA 850(Body) |
| Test Date | May 29, 2012 |

| Frequency | e' | e'' |
|---|---|---|
| 800000000.0000 | 54.8538 | 21.6617 |
| 805000000.0000 | 54.8741 | 21.6474 |
| 810000000.0000 | 54.8409 | 21.6406 |
| 815000000.0000 | 54.8046 | 21.6689 |
| 820000000.0000 | 54.8523 | 21.6774 |
| 825000000.0000 | 54.8118 | 21.6729 |
| 830000000.0000 | 54.7867 | 21.7073 |
| 835000000.0000 | 54.7724 | 21.7373 |
| 840000000.0000 | 54.7263 | 21.7235 |
| 845000000.0000 | 54.6547 | 21.7414 |
| 850000000.0000 | 54.5520 | 21.7601 |
| 855000000.0000 | 54.4622 | 21.7360 |
| 860000000.0000 | 54.3819 | 21.6763 |
| 865000000.0000 | 54.2763 | 21.6324 |
| 870000000.0000 | 54.1957 | 21.5799 |
| 875000000.0000 | 54.1291 | 21.5334 |
| 880000000.0000 | 54.0272 | 21.4479 |
| 885000000.0000 | 54.0474 | 21.4010 |
| 890000000.0000 | 53.9857 | 21.3333 |
| 895000000.0000 | 53.9451 | 21.2370 |
| 900000000.0000 | 53.9003 | 21.1956 |

## ■ Dielectric Parameter (1900 MHz Head)

| | |
|---|---|
| Title | ADR910LVW |
| SubTitle | PCS1900(Head) |
| Test Date | May 30, 2012 |

| Frequency | e' | e'' |
|---|---|---|
| 1800000000.0000 | 41.2905 | 12.9860 |
| 1810000000.0000 | 41.2520 | 12.9959 |
| 1820000000.0000 | 41.2441 | 13.0754 |
| 1830000000.0000 | 41.2021 | 13.0998 |
| 1840000000.0000 | 41.1760 | 13.1416 |
| 1850000000.0000 | 41.1492 | 13.1897 |
| 1860000000.0000 | 41.0638 | 13.1879 |
| 1870000000.0000 | 41.0265 | 13.2249 |
| 1880000000.0000 | 40.9504 | 13.2058 |
| 1890000000.0000 | 40.8725 | 13.2096 |
| 1900000000.0000 | 40.8152 | 13.2425 |
| 1910000000.0000 | 40.7729 | 13.2416 |
| 1920000000.0000 | 40.7459 | 13.2577 |
| 1930000000.0000 | 40.7254 | 13.2905 |
| 1940000000.0000 | 40.7080 | 13.3481 |
| 1950000000.0000 | 40.7212 | 13.3696 |
| 1960000000.0000 | 40.7220 | 13.3845 |
| 1970000000.0000 | 40.7241 | 13.4431 |
| 1980000000.0000 | 40.7046 | 13.4687 |
| 1990000000.0000 | 40.6672 | 13.5008 |
| 2000000000.0000 | 40.5746 | 13.5331 |

## ■ Dielectric Parameter (1900 MHz Body)

| | |
|---|---|
| Title | ADR910LVW |
| SubTitle | PCS1900(Body) |
| Test Date | May 31, 2012 |

| Frequency | e' | e'' |
|---|---|---|
| 1850000000.0000 | 52.1409 | 14.2795 |
| 1855000000.0000 | 52.1173 | 14.2973 |
| 1860000000.0000 | 52.0819 | 14.2969 |
| 1865000000.0000 | 52.0909 | 14.3508 |
| 1870000000.0000 | 52.0424 | 14.3549 |
| 1875000000.0000 | 52.0046 | 14.3462 |
| 1880000000.0000 | 51.9847 | 14.3290 |
| 1885000000.0000 | 51.9351 | 14.3062 |
| 1890000000.0000 | 51.8787 | 14.3397 |
| 1895000000.0000 | 51.8385 | 14.3626 |
| 1900000000.0000 | 51.8122 | 14.3446 |
| 1905000000.0000 | 51.7928 | 14.4136 |
| 1910000000.0000 | 51.7729 | 14.4615 |
| 1915000000.0000 | 51.7716 | 14.5214 |
| 1920000000.0000 | 51.7608 | 14.5899 |
| 1925000000.0000 | 51.7905 | 14.6075 |
| 1930000000.0000 | 51.8195 | 14.6434 |
| 1935000000.0000 | 51.8379 | 14.6710 |
| 1940000000.0000 | 51.8378 | 14.7012 |
| 1945000000.0000 | 51.8909 | 14.7147 |
| 1950000000.0000 | 51.9335 | 14.7124 |

## ■ Dielectric Parameter (750 MHz Head)

| | |
|---|---|
| Title | ADR910LVW |
| SubTitle | LTE (Head) |
| Test Date | Jun. 2, 2012 |

| Frequency | e' | e'' |
|---|---|---|
| 750000000.0000 | 42.1969 | 20.7854 |
| 752500000.0000 | 42.1407 | 20.7752 |
| 755000000.0000 | 42.1011 | 20.7380 |
| 757500000.0000 | 42.0699 | 20.7104 |
| 760000000.0000 | 42.0294 | 20.6682 |
| 762500000.0000 | 41.9979 | 20.7038 |
| 765000000.0000 | 41.9766 | 20.6456 |
| 767500000.0000 | 41.9191 | 20.6879 |
| 770000000.0000 | 41.8610 | 20.6171 |
| 772500000.0000 | 41.8465 | 20.6257 |
| 775000000.0000 | 41.8266 | 20.6131 |
| 777500000.0000 | 41.7594 | 20.5906 |
| 780000000.0000 | 41.7492 | 20.5702 |
| 782500000.0000 | 41.6973 | 20.5608 |
| 785000000.0000 | 41.6880 | 20.5848 |
| 787500000.0000 | 41.6653 | 20.5568 |
| 790000000.0000 | 41.6427 | 20.5289 |
| 792500000.0000 | 41.5942 | 20.4859 |
| 795000000.0000 | 41.5522 | 20.5076 |
| 797500000.0000 | 41.5310 | 20.5237 |
| 800000000.0000 | 41.4889 | 20.5015 |

## ■ Dielectric Parameter (750 MHz Body)

| | |
|---|---|
| Title | ADR910LVW |
| SubTitle | LTE (Body) |
| Test Date | Jun. 2, 2012 |

| Frequency | e' | e'' |
|---|---|---|
| 700000000.0000 | 55.0943 | 23.0097 |
| 705000000.0000 | 55.0218 | 23.0175 |
| 710000000.0000 | 54.9666 | 22.9949 |
| 715000000.0000 | 54.8864 | 22.9680 |
| 720000000.0000 | 54.8742 | 22.8763 |
| 725000000.0000 | 54.7894 | 22.8459 |
| 730000000.0000 | 54.6307 | 22.7722 |
| 735000000.0000 | 54.5731 | 22.7590 |
| 740000000.0000 | 54.4965 | 22.7765 |
| 745000000.0000 | 54.4675 | 22.7120 |
| 750000000.0000 | 54.3923 | 22.6332 |
| 755000000.0000 | 54.3542 | 22.5909 |
| 760000000.0000 | 54.2082 | 22.6326 |
| 765000000.0000 | 54.2011 | 22.5333 |
| 770000000.0000 | 54.0744 | 22.4280 |
| 775000000.0000 | 54.0131 | 22.4252 |
| 780000000.0000 | 53.9634 | 22.4011 |
| 785000000.0000 | 53.9187 | 22.4221 |
| 790000000.0000 | 53.8496 | 22.3011 |
| 795000000.0000 | 53.7211 | 22.3054 |
| 800000000.0000 | 53.7205 | 22.2773 |

## ■ Dielectric Parameter ( 2450 MHz Head)

| | |
|---|---|
| Title | ADR910LVW |
| SubTitle | 2450MHz (Head) |
| Test Date | Jun. 1, 2012 |

| Frequency | e' | e'' |
|---|---|---|
| 2400000000.0000 | 40.2339 | 13.6868 |
| 2405000000.0000 | 40.2532 | 13.6847 |
| 2410000000.0000 | 40.1925 | 13.7058 |
| 2415000000.0000 | 40.1410 | 13.6876 |
| 2420000000.0000 | 40.1418 | 13.7558 |
| 2425000000.0000 | 40.1264 | 13.7524 |
| 2430000000.0000 | 40.0977 | 13.7663 |
| 2435000000.0000 | 40.0410 | 13.8133 |
| 2440000000.0000 | 40.0483 | 13.8188 |
| 2445000000.0000 | 40.0059 | 13.8220 |
| 2450000000.0000 | 40.0091 | 13.8311 |
| 2455000000.0000 | 39.9995 | 13.8501 |
| 2460000000.0000 | 39.9726 | 13.8815 |
| 2465000000.0000 | 39.9656 | 13.9175 |
| 2470000000.0000 | 39.9150 | 13.9657 |
| 2475000000.0000 | 39.9030 | 13.9829 |
| 2480000000.0000 | 39.9078 | 14.0253 |
| 2485000000.0000 | 39.8625 | 13.9979 |
| 2490000000.0000 | 39.8614 | 14.0199 |
| 2495000000.0000 | 39.8186 | 14.0334 |
| 2500000000.0000 | 39.8037 | 14.0364 |

## ■ Dielectric Parameter (2450 MHz Body)

| | |
|---|---|
| Title | ADR910LVW |
| SubTitle | 2450MHz (Body) |
| Test Date | Jun. 1, 2012 |

| Frequency | e' | e'' |
|---|---|---|
| 2400000000.0000 | 52.0131 | 13.9783 |
| 2405000000.0000 | 52.0225 | 13.9771 |
| 2410000000.0000 | 51.9702 | 14.0160 |
| 2415000000.0000 | 51.9480 | 14.0248 |
| 2420000000.0000 | 51.9014 | 14.0794 |
| 2425000000.0000 | 51.8694 | 14.0858 |
| 2430000000.0000 | 51.8351 | 14.1256 |
| 2435000000.0000 | 51.8304 | 14.1767 |
| 2440000000.0000 | 51.8149 | 14.1893 |
| 2445000000.0000 | 51.7649 | 14.2423 |
| 2450000000.0000 | 51.7630 | 14.2678 |
| 2455000000.0000 | 51.7587 | 14.3383 |
| 2460000000.0000 | 51.7241 | 14.3346 |
| 2465000000.0000 | 51.7272 | 14.3394 |
| 2470000000.0000 | 51.7244 | 14.4010 |
| 2475000000.0000 | 51.7014 | 14.4056 |
| 2480000000.0000 | 51.7186 | 14.4643 |
| 2485000000.0000 | 51.7006 | 14.4779 |
| 2490000000.0000 | 51.6778 | 14.4904 |
| 2495000000.0000 | 51.6774 | 14.5081 |
| 2500000000.0000 | 51.6918 | 14.4991 |

## ■ Dielectric Parameter ( 5 GHz Head)

| | |
|---|---|
| Title | ADR930LVW |
| SubTitle | 5 GHz (Head) |
| Test Date | Jun. 26, 2012 |

| Frequency | e' | e'' |
|---|---|---|
| 5000000000.0000 | 36.8087 | 15.4244 |
| 5050000000.0000 | 36.7936 | 15.7257 |
| 5100000000.0000 | 36.7534 | 15.5661 |
| 5150000000.0000 | 36.4692 | 15.8705 |
| 5200000000.0000 | 36.5857 | 15.8602 |
| 5250000000.0000 | 36.2912 | 15.8408 |
| 5300000000.0000 | 36.2660 | 16.0699 |
| 5350000000.0000 | 36.2577 | 15.9176 |
| 5400000000.0000 | 36.0014 | 16.0979 |
| 5450000000.0000 | 36.0457 | 16.1287 |
| 5500000000.0000 | 35.8163 | 16.1653 |
| 5550000000.0000 | 35.7096 | 16.2688 |
| 5600000000.0000 | 35.6481 | 16.3047 |
| 5650000000.0000 | 35.4288 | 16.3872 |
| 5700000000.0000 | 35.3252 | 16.4736 |
| 5750000000.0000 | 35.1467 | 16.5885 |
| 5800000000.0000 | 34.9828 | 16.6438 |
| 5850000000.0000 | 34.8617 | 16.7954 |
| 5900000000.0000 | 34.6980 | 16.8645 |
| 5950000000.0000 | 34.5956 | 16.9625 |
| 6000000000.0000 | 34.4497 | 17.0667 |

## ■ Dielectric Parameter (5 GHz Body)

| | |
|---|---|
| Title | ADR930LVW |
| SubTitle | 5 GHz (Body) |
| Test Date | Jun. 27, 2012 |

| Frequency | e' | e'' |
|---|---|---|
| 5000000000.0000 | 47.7693 | 17.6747 |
| 5050000000.0000 | 47.8674 | 18.0148 |
| 5100000000.0000 | 47.5881 | 17.8830 |
| 5150000000.0000 | 47.4178 | 18.4416 |
| 5200000000.0000 | 47.1887 | 18.1137 |
| 5250000000.0000 | 47.0251 | 18.3174 |
| 5300000000.0000 | 46.9421 | 18.3633 |
| 5350000000.0000 | 46.8156 | 18.2501 |
| 5400000000.0000 | 46.6506 | 18.6597 |
| 5450000000.0000 | 46.6269 | 18.2722 |
| 5500000000.0000 | 46.3489 | 18.7991 |
| 5550000000.0000 | 46.4048 | 18.5705 |
| 5600000000.0000 | 46.2349 | 18.7745 |
| 5650000000.0000 | 46.1834 | 18.9025 |
| 5700000000.0000 | 46.1537 | 18.6742 |
| 5750000000.0000 | 46.1076 | 18.4671 |
| 5800000000.0000 | 45.8788 | 18.6239 |
| 5850000000.0000 | 45.3444 | 19.0910 |
| 5900000000.0000 | 45.6027 | 18.9099 |
| 5950000000.0000 | 45.2158 | 19.1418 |
| 6000000000.0000 | 45.4864 | 19.2797 |

# Attachment 3. – Probe Calibration Data

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s p e a g

# USAGE OF ORGANIC SOLVENTS WITH SPEAG PRODUCTS

## INTRODUCTION

SPEAG offers a wide range of simulating liquids. These liquids are based on various ingredients depending on their frequency range. The below compatibility table shows compatibility of SPEAG products used in conjunction with tissue simulating liquids. Proper treatment and maintenance of all SPEAG products is essential regardless of its compliance status.

## COMPATIBILITY TABLE

**Y=** fully compatible with the tissue simulating liquid. Long time exposure is not critical.

**P=** partially compatible. It is essential to keep the exposure time to a minimum and to rinse and clean the item after exposure to the respective tissue simulating liquid. Continuous exposure will reduce the item life-time drastically and will therefore void any warranty. 100 hours per 7 days maximum exposure.

**R=** **restricted** compatibility with the respective tissue simulating liquid. Short time exposure of less then 4 hours is possible given that the item is thoroughly rinsed and dried after each exposure.

**N=** **not compatible** with the respective tissue simulating liquid. Short time exposure will cause irreparable damage to the item exposed.

| SPEAG MSDS / Probes & Phantoms / Liquid Type | 772-SLAAx6yy | | | 772-SLAAx1yy | | 772-SLAAx2yy | | 772-SLAAx6yy | | 772-SLAAx8yy | | 772-SLAAx6yy | | 3rd Party Liquids | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | IB 900 | HSL 175 to HSL 900 | MSL 450 to MSL 900 | HSL 1450 to HSL 2450 | MSL 1450 to MSL 2450 | HSL 3500 - 5800 Broadband | MSL 3500 - 5800 Broadband | HSL 3500 - 5800 Broadband | MSL 3500 - 5800 Broadband | HSL 5000 Broadband | MSL 5000 Broadband | HSL BB 1.5 to HSL BB 1.9 | MSL BB 1.5 to MSL BB 1.9 | Triton Based Liquids | Acids | Solvents |
| Twin SAM Phantom V4.0 | Y | Y | Y | P | P | Y | Y | Y | Y | Y | Y | Y | Y | N | N | N |
| ELI Oval Phantom V4.0 | Y | Y | Y | P | P | Y | Y | Y | Y | Y | Y | Y | Y | N | N | N |
| Flat Phantom V4.x / V5.x | Y | Y | Y | P | P | Y | Y | Y | Y | Y | Y | Y | Y | N | N | N |
| Whole Body Mannequin | Y | Y | Y | R | R | Y | Y | Y | Y | Y | Y | Y | Y | N | N | N |
| SAM HEAD V4.5 | Y | Y | Y | P | P | Y | Y | Y | Y | Y | Y | Y | Y | N | N | N |
| SAM HEAD V4.5 CTIA | Y | Y | Y | N | N | Y | Y | Y | Y | Y | Y | Y | Y | N | N | N |
| SAM HEAD V4.5 BS | | | | | | | | | | | | | | | | |
| SAM HEAD V6.0 / 6.1 | Y | Y | Y | R | R | Y | Y | Y | Y | Y | Y | Y | Y | N | N | N |
| Probe ER3DV6 / ET3DV6R | Y | Y | Y | P | P | Y | Y | Y | Y | Y | Y | Y | Y | N | N | N |
| Probe ES3DVx / EX3DVx | Y | Y | Y | P | P | Y | Y | Y | Y | Y | Y | Y | Y | N | N | N |
| Probe H3DV6 and higher | Y | Y | Y | P | P | Y | Y | Y | Y | Y | Y | Y | Y | N | N | N |
| Probe EU2DVx / HU2DVx | Y | Y | Y | P | P | Y | Y | Y | Y | Y | Y | Y | Y | N | N | N |
| Probe ET1DVx | Y | Y | Y | R | R | Y | Y | Y | Y | Y | Y | Y | Y | N | N | N |
| Probe TLV3 / TLV3 Lab | Y | Y | Y | R | R | Y | Y | Y | Y | Y | Y | Y | Y | N | N | N |
| PEX 130 / 300 Probe Extension | Y | Y | Y | P | P | Y | Y | Y | Y | Y | Y | Y | Y | N | N | N |
| Probes in PMMA enclosures | Y | Y | Y | N | N | Y | Y | Y | Y | Y | Y | Y | Y | N | N | N |
| ASTM Phantom | Y | Y | Y | N | N | Y | Y | Y | Y | Y | Y | Y | Y | N | N | N |
| ELIT 1.5 / 3.0T Phantom | Y | Y | Y | N | N | Y | Y | Y | Y | Y | Y | Y | Y | N | N | N |

**IMPORTANT NOTE FOR PROBES:** The probe shall not be exposed to solvents longer than necessary for the measurements and shall be cleaned daily after use with warm water and stored dry.

**IMPORTANT NOTE FOR PHANTOMS:** Phantoms shall not be exposed to solvents longer than necessary for the measurement. After use, they shall be washed in the inside with clean water and stored dry. Any damaging of the inner surface must be avoided. Once a week, also the outside of the phantom shell shall be washed with clean water and dried.

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

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

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

Accreditation No.: SCS 108

Client HCT (Dymstec) Certificate No: EX3-3797_Jul11

# CALIBRATION CERTIFICATE

Object EX3DV4 - SN:3797

Calibration procedure(s) QA CAL-01.v8, QA CAL-14.v3, QA CAL-23.v4, QA CAL-25.v4
Calibration procedure for dosimetric E-field probes

Calibration date: July 25, 2011

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

All calibrations have been conducted in the closed laboratory facility: environment temperature (22 ± 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 | 31-Mar-11 (No. 217-01372) | Apr-12 |
| Power sensor E4412A | MY41498087 | 31-Mar-11 (No. 217-01372) | Apr-12 |
| Reference 3 dB Attenuator | SN: S5054 (3c) | 29-Mar-11 (No. 217-01369) | Apr-12 |
| Reference 20 dB Attenuator | SN: S5086 (20b) | 29-Mar-11 (No. 217-01367) | Apr-12 |
| Reference 30 dB Attenuator | SN: S5129 (30b) | 29-Mar-11 (No. 217-01370) | Apr-12 |
| Reference Probe ES3DV2 | SN: 3013 | 29-Dec-10 (No. ES3-3013_Dec10) | Dec-11 |
| DAE4 | SN: 654 | 3-May-11 (No. DAE4-654_May11) | May-12 |
| | | | |
| 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-10) | In house check: Oct-11 |

| | Name | Function | Signature |
|---|---|---|---|
| Calibrated by: | Katja Pokovic | Technical Manager | |
| Approved by: | Niels Kuster | Quality Manager | |

Issued: July 25, 2011

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

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Accreditation No.: SCS 108

**Glossary:**

| | |
|---|---|
| TSL | tissue simulating liquid |
| NORMx,y,z | sensitivity in free space |
| ConvF | sensitivity in TSL / NORMx,y,z |
| DCP | diode compression point |
| CF | crest factor (1/duty_cycle) of the RF signal |
| A, B, C | modulation dependent linearization parameters |
| Polarization $\varphi$ | $\varphi$ rotation around probe axis |
| Polarization $\vartheta$ | $\vartheta$ 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:**

a) 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

b) 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:**

- *NORMx,y,z*: Assessed for E-field polarization $\vartheta = 0$ ($f \le 900$ MHz in TEM-cell; $f > 1800$ MHz: R22 waveguide). NORMx,y,z are only intermediate values, i.e., the uncertainties of NORMx,y,z does not affect the $E^2$-field uncertainty inside TSL (see below *ConvF*).
- *NORM(f)x,y,z = NORMx,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*.
- *DCPx,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.
- *PAR*: PAR is the Peak to Average Ratio that is not calibrated but determined based on the signal characteristics
- *Ax,y,z; Bx,y,z; Cx,y,z; VRx,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 $f \le 800$ 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 *NORMx,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 EX3DV4

## SN:3797

Manufactured: April 5, 2011
Calibrated: July 25, 2011

Calibrated for DASY/EASY Systems
(Note: non-compatible with DASY2 system!)

EX3DV4- SN:3797 July 25, 2011

# DASY/EASY - Parameters of Probe: EX3DV4 - SN:3797

## Basic Calibration Parameters

| | Sensor X | Sensor Y | Sensor Z | Unc (k=2) |
|---|---|---|---|---|
| Norm ($\mu V/(V/m)^2$)[A] | 0.63 | 0.59 | 0.57 | ± 10.1 % |
| DCP (mV)[B] | 94.6 | 95.3 | 96.6 | |

## Modulation Calibration Parameters

| UID | Communication System Name | PAR | | A dB | B dB | C dB | VR mV | Unc[E] (k=2) |
|---|---|---|---|---|---|---|---|---|
| 10000 | CW | 0.00 | X | 0.00 | 0.00 | 1.00 | 96.0 | ±2.5 % |
| | | | Y | 0.00 | 0.00 | 1.00 | 126.8 | |
| | | | Z | 0.00 | 0.00 | 1.00 | 126.7 | |

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 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:3797

## Calibration Parameter Determined in Head Tissue Simulating Media

| f (MHz) [C] | Relative Permittivity [F] | Conductivity (S/m) [F] | ConvF X | ConvF Y | ConvF Z | Alpha | Depth (mm) | Unct. (k=2) |
|---|---|---|---|---|---|---|---|---|
| 750 | 41.9 | 0.89 | 9.29 | 9.29 | 9.29 | 0.80 | 0.68 | ± 12.0 % |
| 835 | 41.5 | 0.90 | 8.93 | 8.93 | 8.93 | 0.80 | 0.67 | ± 12.0 % |
| 900 | 41.5 | 0.97 | 8.83 | 8.83 | 8.83 | 0.80 | 0.66 | ± 12.0 % |
| 1450 | 40.5 | 1.20 | 8.30 | 8.30 | 8.30 | 0.59 | 0.78 | ± 12.0 % |
| 1750 | 40.1 | 1.37 | 7.88 | 7.88 | 7.88 | 0.77 | 0.62 | ± 12.0 % |
| 1900 | 40.0 | 1.40 | 7.60 | 7.60 | 7.60 | 0.80 | 0.60 | ± 12.0 % |
| 1950 | 40.0 | 1.40 | 7.44 | 7.44 | 7.44 | 0.78 | 0.61 | ± 12.0 % |
| 2300 | 39.5 | 1.67 | 7.30 | 7.30 | 7.30 | 0.75 | 0.62 | ± 12.0 % |
| 2450 | 39.2 | 1.80 | 6.94 | 6.94 | 6.94 | 0.74 | 0.62 | ± 12.0 % |
| 2600 | 39.0 | 1.96 | 7.16 | 7.16 | 7.16 | 0.59 | 0.72 | ± 12.0 % |
| 5200 | 36.0 | 4.66 | 4.73 | 4.73 | 4.73 | 0.40 | 1.80 | ± 13.1 % |
| 5300 | 35.9 | 4.76 | 4.44 | 4.44 | 4.44 | 0.42 | 1.80 | ± 13.1 % |
| 5500 | 35.6 | 4.96 | 4.48 | 4.48 | 4.48 | 0.42 | 1.80 | ± 13.1 % |
| 5600 | 35.5 | 5.07 | 4.16 | 4.16 | 4.16 | 0.42 | 1.80 | ± 13.1 % |
| 5800 | 35.3 | 5.27 | 4.26 | 4.26 | 4.26 | 0.45 | 1.80 | ± 13.1 % |

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

# DASY/EASY - Parameters of Probe: EX3DV4- SN:3797

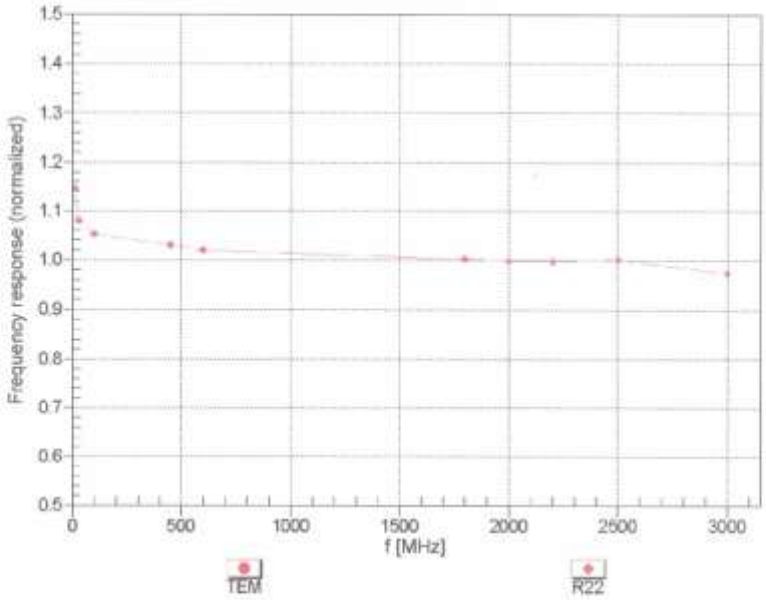
## Calibration Parameter Determined in Body Tissue Simulating Media

| f (MHz) [C] | Relative Permittivity [F] | Conductivity (S/m) [F] | ConvF X | ConvF Y | ConvF Z | Alpha | Depth (mm) | Unct. (k=2) |
|---|---|---|---|---|---|---|---|---|
| 750 | 55.5 | 0.96 | 9.22 | 9.22 | 9.22 | 0.80 | 0.70 | ± 12.0 % |
| 835 | 55.2 | 0.97 | 9.14 | 9.14 | 9.14 | 0.80 | 0.69 | ± 12.0 % |
| 1750 | 53.4 | 1.49 | 7.69 | 7.69 | 7.69 | 0.80 | 0.66 | ± 12.0 % |
| 1900 | 53.3 | 1.52 | 7.26 | 7.26 | 7.26 | 0.80 | 0.64 | ± 12.0 % |
| 2300 | 52.9 | 1.81 | 7.18 | 7.18 | 7.18 | 0.80 | 0.62 | ± 12.0 % |
| 2450 | 52.7 | 1.95 | 6.96 | 6.96 | 6.96 | 0.80 | 0.50 | ± 12.0 % |
| 2600 | 52.5 | 2.16 | 6.90 | 6.90 | 6.90 | 0.80 | 0.50 | ± 12.0 % |
| 5200 | 49.0 | 5.30 | 4.10 | 4.10 | 4.10 | 0.50 | 1.90 | ± 13.1 % |
| 5300 | 48.9 | 5.42 | 3.83 | 3.83 | 3.83 | 0.55 | 1.90 | ± 13.1 % |
| 5500 | 48.6 | 5.65 | 3.72 | 3.72 | 3.72 | 0.55 | 1.90 | ± 13.1 % |
| 5600 | 48.5 | 5.77 | 3.60 | 3.60 | 3.60 | 0.60 | 1.90 | ± 13.1 % |
| 5800 | 48.2 | 6.00 | 3.75 | 3.75 | 3.75 | 0.60 | 1.90 | ± 13.1 % |

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

EX3DV4– SN:3797 July 25, 2011

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



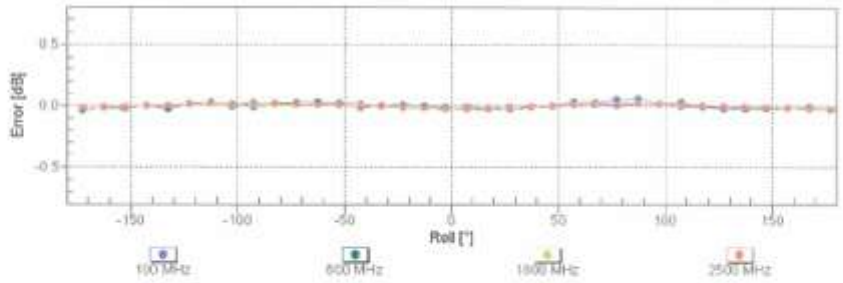

Uncertainty of Frequency Response of E-field: ± 6.3% (k=2)

EX3DV4– SN:3797 July 25, 2011

## Receiving Pattern (ϕ), ϑ = 0°

f=600 MHz,TEM

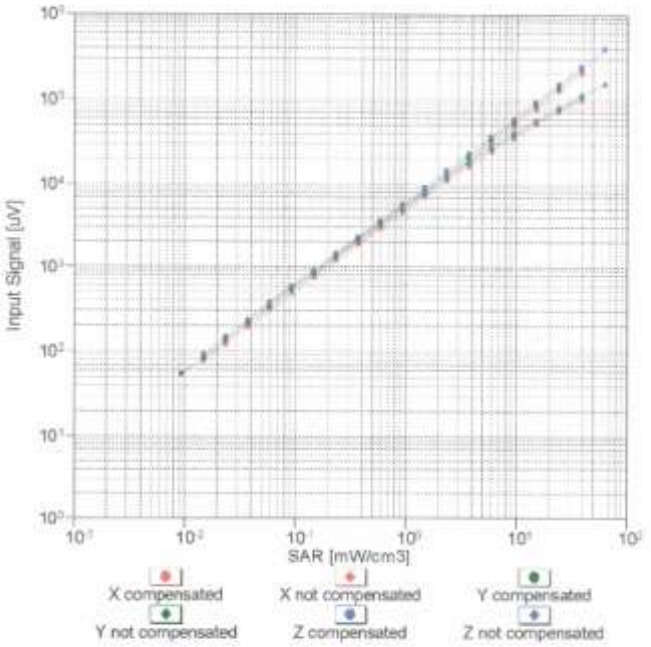

f=1800 MHz,R22

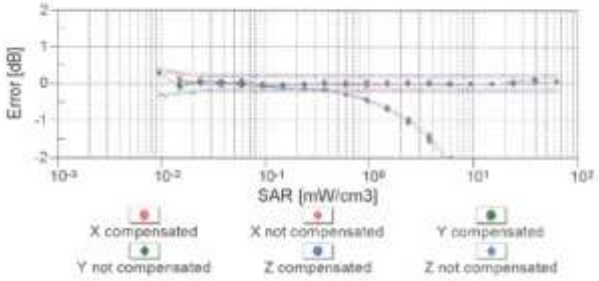




**Uncertainty of Axial Isotropy Assessment: ± 0.5% (k=2)**

EX3DV4- SN:3797 July 25, 2011

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



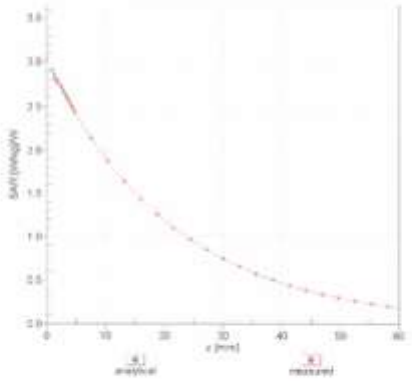




**Uncertainty of Linearity Assessment: ± 0.6% (k=2)**

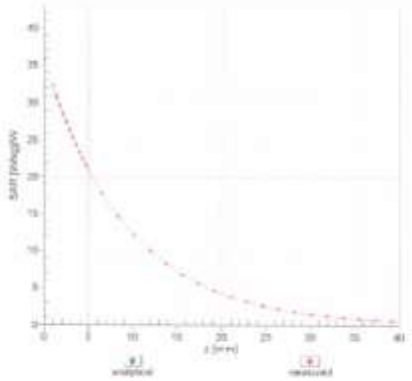
EX3DV4- SN:3797 July 25, 2011

## Conversion Factor Assessment

f = 750 MHz,WGLS R9 (H_convF)

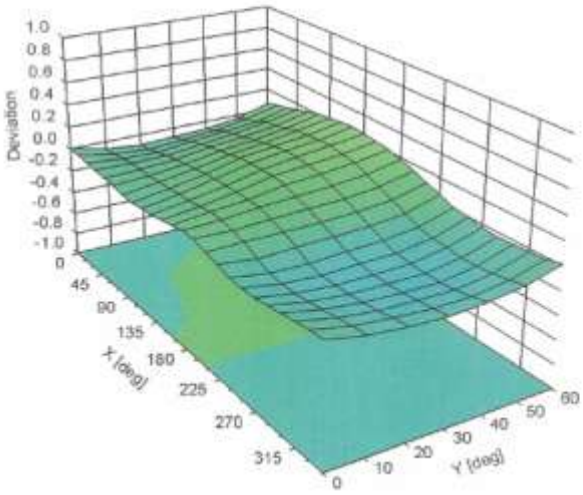


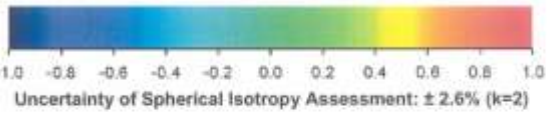
f = 2600 MHz,WGLS R22 (H_convF)



## Deviation from Isotropy in Liquid

Error (ϕ, ϑ), f = 900 MHz




Uncertainty of Spherical Isotropy Assessment: ± 2.6% (k=2)

# DASY/EASY - Parameters of Probe: EX3DV4 - SN:3797

## 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 |

# Attachment 4. – Dipole Calibration Data

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Accreditation No.: SCS 108

Client HCT (Dymstec) Certificate No: D835V2-441_May12

# CALIBRATION CERTIFICATE

Object D835V2 - SN: 441

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

Calibration date: May 16, 2012

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 | 05-Oct-11 (No. 217-01451) | Oct-12 |
| Power sensor HP 8481A | US37292783 | 05-Oct-11 (No. 217-01451) | Oct-12 |
| Reference 20 dB Attenuator | SN: 5058 (20k) | 27-Mar-12 (No. 217-01530) | Apr-13 |
| Type-N mismatch combination | SN: 5047.2 / 06327 | 27-Mar-12 (No. 217-01533) | Apr-13 |
| Reference Probe ES3DV3 | SN: 3205 | 30-Dec-11 (No. ES3-3205_Dec11) | Dec-12 |
| DAE4 | SN: 601 | 04-Jul-11 (No. DAE4-601_Jul11) | Jul-12 |

| Secondary Standards | ID # | Check Date (in house) | Scheduled Check |
|---|---|---|---|
| Power sensor HP 8481A | MY41092317 | 18-Oct-02 (in house check Oct-11) | In house check: Oct-13 |
| RF generator R&S SMT-06 | 100005 | 04-Aug-99 (in house check Oct-11) | In house check: Oct-13 |
| Network Analyzer HP 8753E | US37390585 S4206 | 18-Oct-01 (in house check Oct-11) | In house check: Oct-12 |

| | Name | Function | Signature |
|---|---|---|---|
| Calibrated by: | Israe El-Naouq | Laboratory Technician | |
| Approved by: | Katja Pokovic | Technical Manager | |

Issued: May 16, 2012

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

Certificate No: D835V2-441_May12 Page 1 of 8

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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) 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
b) 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
c) 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:**

d) 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 | V52.8.1 |
| **Extrapolation** | Advanced Extrapolation | |
| **Phantom** | Modular Flat Phantom | |
| **Distance Dipole Center - TSL** | 15 mm | with Spacer |
| **Zoom Scan Resolution** | dx, dy, dz = 5 mm | |
| **Frequency** | 835 MHz ± 1 MHz | |

## Head TSL parameters

The following parameters and calculations were applied.

| | Temperature | Permittivity | Conductivity |
|---|---|---|---|
| **Nominal Head TSL parameters** | 22.0 °C | 41.5 | 0.90 mho/m |
| **Measured Head TSL parameters** | (22.0 ± 0.2) °C | 40.6 ± 6 % | 0.89 mho/m ± 6 % |
| **Head TSL temperature change during test** | < 0.5 °C | ---- | ---- |

## SAR result with Head TSL

| **SAR averaged over 1 cm³ (1 g) of Head TSL** | Condition | |
|---|---|---|
| SAR measured | 250 mW input power | 2.35 mW / g |
| SAR for nominal Head TSL parameters | normalized to 1W | **9.43 mW /g ± 17.0 % (k=2)** |

| **SAR averaged over 10 cm³ (10 g) of Head TSL** | condition | |
|---|---|---|
| SAR measured | 250 mW input power | 1.54 mW / g |
| SAR for nominal Head TSL parameters | normalized to 1W | **6.18 mW /g ± 16.5 % (k=2)** |

## Body TSL parameters

The following parameters and calculations were applied.

| | Temperature | Permittivity | Conductivity |
|---|---|---|---|
| **Nominal Body TSL parameters** | 22.0 °C | 55.2 | 0.97 mho/m |
| **Measured Body TSL parameters** | (22.0 ± 0.2) °C | 54.3 ± 6 % | 1.00 mho/m ± 6 % |
| **Body TSL temperature change during test** | < 0.5 °C | ---- | ---- |

## SAR result with Body TSL

| **SAR averaged over 1 cm³ (1 g) of Body TSL** | Condition | |
|---|---|---|
| SAR measured | 250 mW input power | 2.44 mW / g |
| SAR for nominal Body TSL parameters | normalized to 1W | **9.50 mW / g ± 17.0 % (k=2)** |

| **SAR averaged over 10 cm³ (10 g) of Body TSL** | condition | |
|---|---|---|
| SAR measured | 250 mW input power | 1.60 mW / g |
| SAR for nominal Body TSL parameters | normalized to 1W | **6.27 mW / g ± 16.5 % (k=2)** |

## Appendix

### Antenna Parameters with Head TSL

| | |
|---|---|
| Impedance, transformed to feed point | 51.1 Ω - 5.8 jΩ |
| Return Loss | - 24.6 dB |

### Antenna Parameters with Body TSL

| | |
|---|---|
| Impedance, transformed to feed point | 47.0 Ω - 8.1 jΩ |
| Return Loss | - 21.0 dB |

### General Antenna Parameters and Design

| | |
|---|---|
| Electrical Delay (one direction) | 1.372 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 |
| Manufactured on | March 09, 2001 |

## DASY5 Validation Report for Head TSL

Date: 16.05.2012

Test Laboratory: SPEAG, Zurich, Switzerland

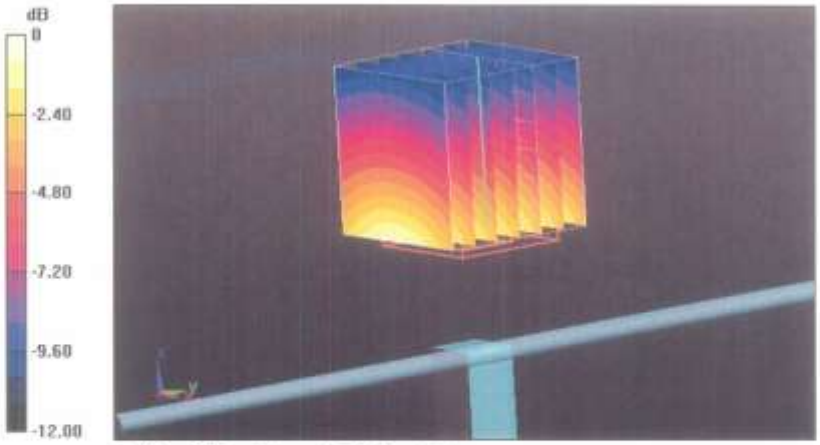
**DUT: Dipole 835 MHz; Type: D835V2; Serial: D835V2 - SN: 441**

Communication System: CW; Frequency: 835 MHz
Medium parameters used: f = 835 MHz; $\sigma$ = 0.89 mho/m; $\varepsilon_r$ = 40.6; $\rho$ = 1000 kg/m$^3$
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY52 Configuration:

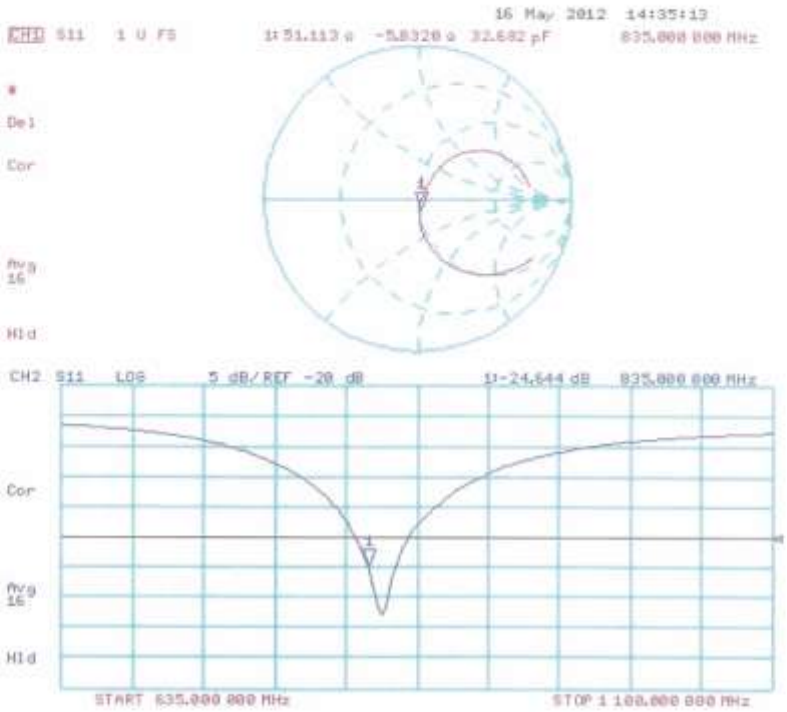
- Probe: ES3DV3 - SN3205; ConvF(6.07, 6.07, 6.07); Calibrated: 30.12.2011;
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 04.07.2011
- Phantom: Flat Phantom 4.9L; Type: QD000P49AA; Serial: 1001
- DASY52 52.8.1(838); SEMCAD X 14.6.5(6469)

**Dipole Calibration for Head Tissue/Pin=250 mW, d=15mm 2/Zoom Scan (7x7x7)/Cube 0:**
Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 57.129 V/m; Power Drift = 0.00 dB
Peak SAR (extrapolated) = 3.474 mW/g
**SAR(1 g) = 2.35 mW/g; SAR(10 g) = 1.54 mW/g**
Maximum value of SAR (measured) = 2.73 mW/g




0 dB = 2.73 mW/g = 8.72 dB mW/g

## Impedance Measurement Plot for Head TSL



## DASY5 Validation Report for Body TSL

Date: 16.05.2012

Test Laboratory: SPEAG, Zurich, Switzerland

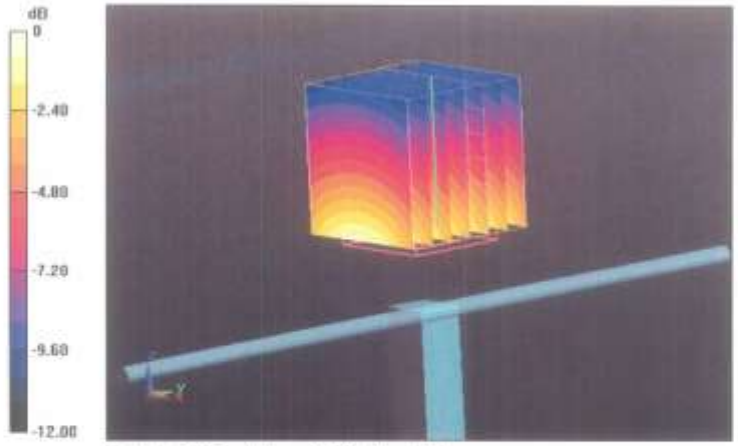
**DUT: Dipole 835 MHz; Type: D835V2; Serial: D835V2 - SN: 441**

Communication System: CW; Frequency: 835 MHz
Medium parameters used: f = 835 MHz; $\sigma$ = 1 mho/m; $\varepsilon_r$ = 54.3; $\rho$ = 1000 kg/m$^3$
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY52 Configuration:

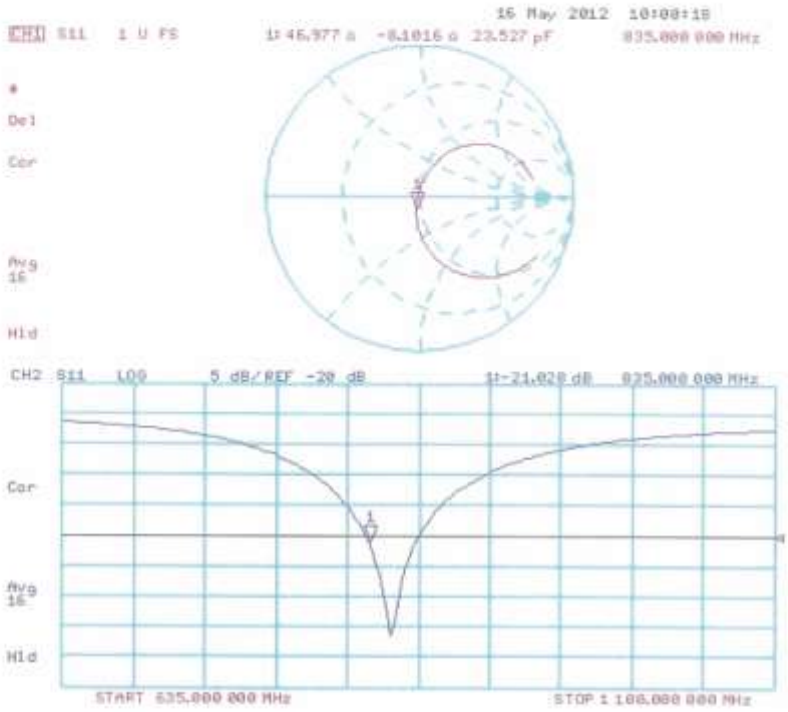
- Probe: ES3DV3 - SN3205; ConvF(6.02, 6.02, 6.02); Calibrated: 30.12.2011;
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 04.07.2011
- Phantom: Flat Phantom 4.9L; Type: QD000P49AA; Serial: 1001
- DASY52 52.8.1(838); SEMCAD X 14.6.5(6469)

**Dipole Calibration for Body Tissue/Pin=250 mW, d=15mm/Zoom Scan (7x7x7)/Cube 0:**
Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 55.054 V/m; Power Drift = 0.03 dB
Peak SAR (extrapolated) = 3.533 mW/g
**SAR(1 g) = 2.44 mW/g; SAR(10 g) = 1.6 mW/g**
Maximum value of SAR (measured) = 2.82 mW/g




0 dB = 2.82 mW/g = 9.00 dB mW/g

## Impedance Measurement Plot for Body TSL



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Accreditation No.: SCS 108

Client HCT (Dymstec)

Certificate No: D1900V2-5d032_Jul11

# CALIBRATION CERTIFICATE

Object D1900V2 - SN: 5d032

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

Calibration date: July 22, 2011

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

All calibrations have been conducted in the closed laboratory facility: environment temperature (22 ± 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 | 06-Oct-10 (No. 217-01266) | Oct-11 |
| Power sensor HP 8481A | US37292783 | 06-Oct-10 (No. 217-01266) | Oct-11 |
| Reference 20 dB Attenuator | SN: S5086 (20b) | 29-Mar-11 (No. 217-01367) | Apr-12 |
| Type-N mismatch combination | SN: 5047.2 / 06327 | 29-Mar-11 (No. 217-01371) | Apr-12 |
| Reference Probe ES3DV3 | SN: 3205 | 29-Apr-11 (No. ES3-3205_Apr11) | Apr-12 |
| DAE4 | SN: 601 | 04-Jul-11 (No. DAE4-601_Jul11) | Jul-12 |

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

| | Name | Function | Signature |
|---|---|---|---|
| Calibrated by: | Dimce Iliev | Laboratory Technician | |
| Approved by: | Katja Pokovic | Technical Manager | |

Issued: August 2, 2011

**Calibration Laboratory of**
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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) 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
b) 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
c) 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:**

d) 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 | V52.6.2 |
| **Extrapolation** | Advanced Extrapolation | |
| **Phantom** | Modular Flat Phantom | |
| **Distance Dipole Center - TSL** | 10 mm | with Spacer |
| **Zoom Scan Resolution** | dx, dy, dz = 5 mm | |
| **Frequency** | 1900 MHz ± 1 MHz | |

## Head TSL parameters

The following parameters and calculations were applied.

| | Temperature | Permittivity | Conductivity |
|---|---|---|---|
| **Nominal Head TSL parameters** | 22.0 °C | 40.0 | 1.40 mho/m |
| **Measured Head TSL parameters** | (22.0 ± 0.2) °C | 39.1 ± 6 % | 1.42 mho/m ± 6 % |
| **Head TSL temperature change during test** | < 0.5 °C | ---- | ---- |

## SAR result with Head TSL

| **SAR averaged over 1 cm³ (1 g) of Head TSL** | Condition | |
|---|---|---|
| SAR measured | 250 mW input power | 10.1 mW / g |
| SAR for nominal Head TSL parameters | normalized to 1W | **39.9 mW /g ± 17.0 % (k=2)** |

| **SAR averaged over 10 cm³ (10 g) of Head TSL** | condition | |
|---|---|---|
| SAR measured | 250 mW input power | 5.29 mW / g |
| SAR for nominal Head TSL parameters | normalized to 1W | **21.0 mW /g ± 16.5 % (k=2)** |

## Body TSL parameters

The following parameters and calculations were applied.

| | Temperature | Permittivity | Conductivity |
|---|---|---|---|
| **Nominal Body TSL parameters** | 22.0 °C | 53.3 | 1.52 mho/m |
| **Measured Body TSL parameters** | (22.0 ± 0.2) °C | 52.3 ± 6 % | 1.53 mho/m ± 6 % |
| **Body TSL temperature change during test** | < 0.5 °C | ---- | ---- |

## SAR result with Body TSL

| **SAR averaged over 1 cm³ (1 g) of Body TSL** | Condition | |
|---|---|---|
| SAR measured | 250 mW input power | 10.3 mW / g |
| SAR for nominal Body TSL parameters | normalized to 1W | **40.9 mW / g ± 17.0 % (k=2)** |

| **SAR averaged over 10 cm³ (10 g) of Body TSL** | condition | |
|---|---|---|
| SAR measured | 250 mW input power | 5.39 mW / g |
| SAR for nominal Body TSL parameters | normalized to 1W | **21.5 mW / g ± 16.5 % (k=2)** |

## Appendix

### Antenna Parameters with Head TSL

| | |
|---|---|
| Impedance, transformed to feed point | 52.6 Ω + 6.5 jΩ |
| Return Loss | - 23.3 dB |

### Antenna Parameters with Body TSL

| | |
|---|---|
| Impedance, transformed to feed point | 46.6 Ω + 6.0 jΩ |
| Return Loss | - 22.9 dB |

### General Antenna Parameters and Design

| | |
|---|---|
| Electrical Delay (one direction) | 1.190 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 | March 17, 2003 |

**DASY5 Validation Report for Head TSL**

Date: 20.07.2011

Test Laboratory: SPEAG, Zurich, Switzerland

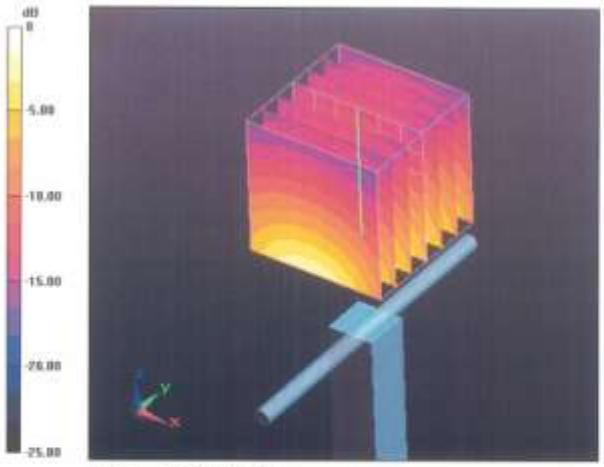
**DUT: Dipole 1900 MHz; Type: D1900V2; Serial: D1900V2 - SN: 5d032**

Communication System: CW; Frequency: 1900 MHz
Medium parameters used: f = 1900 MHz; $\sigma$ = 1.42 mho/m; $\varepsilon_r$ = 39.1; $\rho$ = 1000 kg/m$^3$
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY52 Configuration:

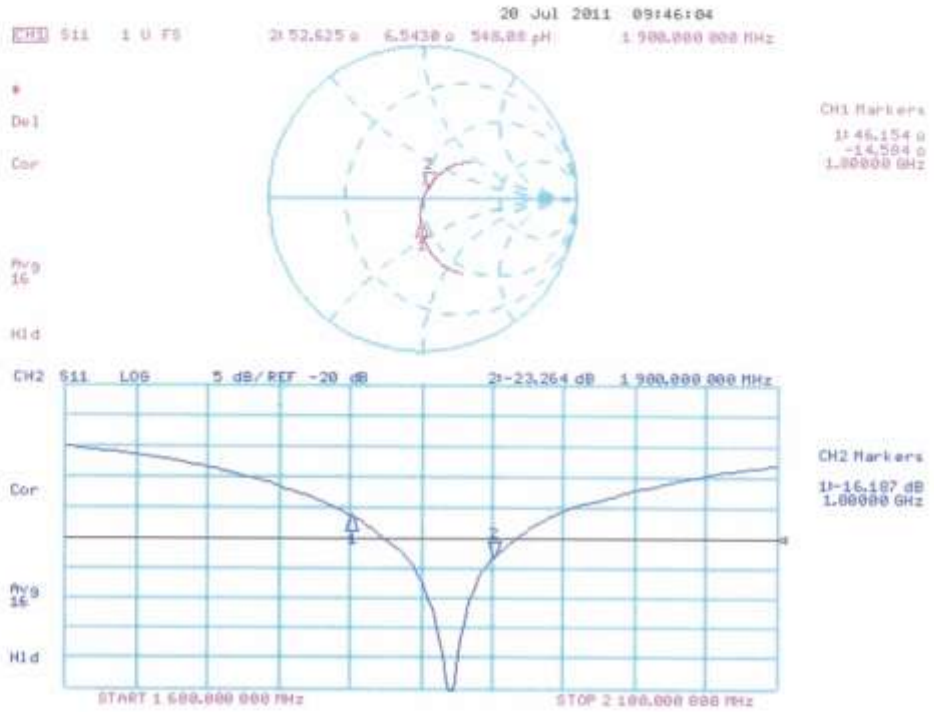
- Probe: ES3DV3 - SN3205; ConvF(5.01, 5.01, 5.01); Calibrated: 29.04.2011
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 04.07.2011
- Phantom: Flat Phantom 5.0 (front); Type: QD000P50AA; Serial: 1001
- DASY52 52.6.2(482); SEMCAD X 14.4.5(3634)

**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 = 98.253 V/m; Power Drift = 0.03 dB
Peak SAR (extrapolated) = 18.469 W/kg
**SAR(1 g) = 10.1 mW/g; SAR(10 g) = 5.29 mW/g**
Maximum value of SAR (measured) = 12.721 mW/g




0 dB = 12.720mW/g

## Impedance Measurement Plot for Head TSL



## DASY5 Validation Report for Body TSL

Date: 22.07.2011

Test Laboratory: SPEAG, Zurich, Switzerland

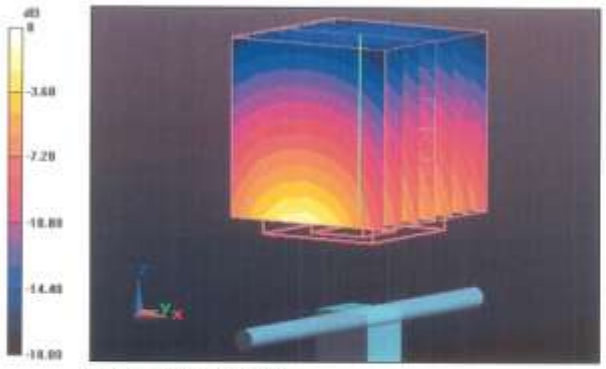
**DUT: Dipole 1900 MHz; Type: D1900V2; Serial: D1900V2 - SN: 5d032**

Communication System: CW; Frequency: 1900 MHz
Medium parameters used: f = 1900 MHz; $\sigma$ = 1.53 mho/m; $\varepsilon_r$ = 52.3; $\rho$ = 1000 kg/m$^3$
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY52 Configuration:

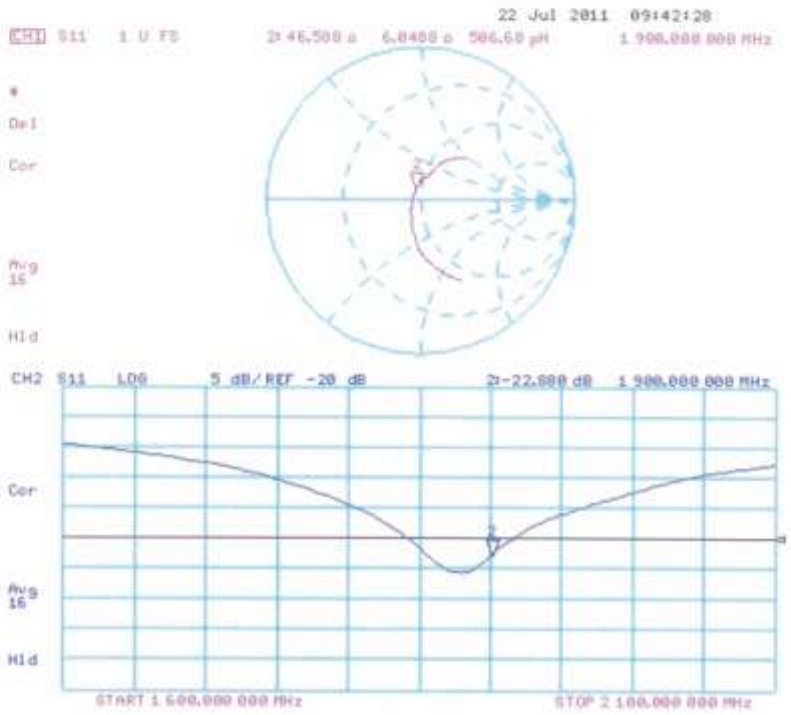
- Probe: ES3DV3 - SN3205; ConvF(4.62, 4.62, 4.62); Calibrated: 29.04.2011
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 04.07.2011
- Phantom: Flat Phantom 5.0 (back); Type: QD000P50AA; Serial: 1002
- DASY52 52.6.2(482); SEMCAD X 14.4.5(3634)

**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 = 95.827 V/m; Power Drift = 0.0078 dB
Peak SAR (extrapolated) = 18.111 W/kg
**SAR(1 g) = 10.3 mW/g; SAR(10 g) = 5.39 mW/g**
Maximum value of SAR (measured) = 12.898 mW/g



0 dB = 12.900mW/g

**Impedance Measurement Plot for Body TSL**



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Accreditation No.: SCS 108

Client HCT (Dymstec) Certificate No: D2450V2-743_Aug11

# CALIBRATION CERTIFICATE

| | |
|---|---|
| Object | D2450V2 - SN: 743 |
| Calibration procedure(s) | QA CAL-05.v8<br>Calibration procedure for dipole validation kits above 700 MHz |
| Calibration date: | August 29, 2011 |

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

All calibrations have been conducted in the closed laboratory facility: environment temperature (22 ± 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 | 06-Oct-10 (No. 217-01266) | Oct-11 |
| Power sensor HP 8481A | US37292783 | 06-Oct-10 (No. 217-01266) | Oct-11 |
| Reference 20 dB Attenuator | SN: S5086 (20b) | 29-Mar-11 (No. 217-01367) | Apr-12 |
| Type-N mismatch combination | SN: 5047.2 / 06327 | 29-Mar-11 (No. 217-01371) | Apr-12 |
| Reference Probe ES3DV3 | SN: 3205 | 29-Apr-11 (No. ES3-3205_Apr11) | Apr-12 |
| DAE4 | SN: 601 | 04-Jul-11 (No. DAE4-601_Jul11) | Jul-12 |

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

| | Name | Function | Signature |
|---|---|---|---|
| Calibrated by: | Dimce Iliev | Laboratory Technician | |
| Approved by: | Katja Pokovic | Technical Manager | |

Issued: August 29, 2011

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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) 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
b) 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
c) 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:**

d) 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 | V52.6.2 |
| **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 ± 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 ± 0.2) °C | 38.4 ± 6 % | 1.85 mho/m ± 6 % |
| **Head TSL temperature change during test** | < 0.5 °C | ---- | ---- |

## SAR result with Head TSL

| **SAR averaged over 1 cm³ (1 g) of Head TSL** | Condition | |
|---|---|---|
| SAR measured | 250 mW input power | 13.7 mW / g |
| SAR for nominal Head TSL parameters | normalized to 1W | **53.8 mW /g ± 17.0 % (k=2)** |

| **SAR averaged over 10 cm³ (10 g) of Head TSL** | condition | |
|---|---|---|
| SAR measured | 250 mW input power | 6.40 mW / g |
| SAR for nominal Head TSL parameters | normalized to 1W | **25.4 mW /g ± 16.5 % (k=2)** |

## 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 | 51.8 ± 6 % | 2.02 mho/m ± 6 % |
| **Body TSL temperature change during test** | < 0.5 °C | ---- | ---- |

## SAR result with Body TSL

| **SAR averaged over 1 cm³ (1 g) of Body TSL** | Condition | |
|---|---|---|
| SAR measured | 250 mW input power | 13.2 mW / g |
| SAR for nominal Body TSL parameters | normalized to 1W | **51.7 mW / g ± 17.0 % (k=2)** |

| **SAR averaged over 10 cm³ (10 g) of Body TSL** | condition | |
|---|---|---|
| SAR measured | 250 mW input power | 6.11 mW / g |
| SAR for nominal Body TSL parameters | normalized to 1W | **24.2 mW / g ± 16.5 % (k=2)** |

## Appendix

### Antenna Parameters with Head TSL

| | |
|---|---|
| Impedance, transformed to feed point | 55.0 Ω + 4.8 jΩ |
| Return Loss | - 23.6 dB |

### Antenna Parameters with Body TSL

| | |
|---|---|
| Impedance, transformed to feed point | 50.3 Ω + 5.8 jΩ |
| Return Loss | - 24.8 dB |

### General Antenna Parameters and Design

| | |
|---|---|
| Electrical Delay (one direction) | 1.160 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 | December 01, 2003 |

**DASY5 Validation Report for Head TSL**

Date: 29.08.2011

Test Laboratory: SPEAG, Zurich, Switzerland

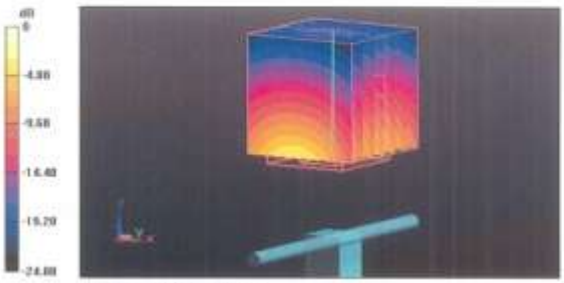
**DUT: Dipole 2450 MHz; Type: D2450V2; Serial: D2450V2 - SN: 743**

Communication System: CW; Frequency: 2450 MHz
Medium parameters used: f = 2450 MHz; $\sigma$ = 1.85 mho/m; $\varepsilon_r$ = 38.4; $\rho$ = 1000 kg/m$^3$
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY52 Configuration:

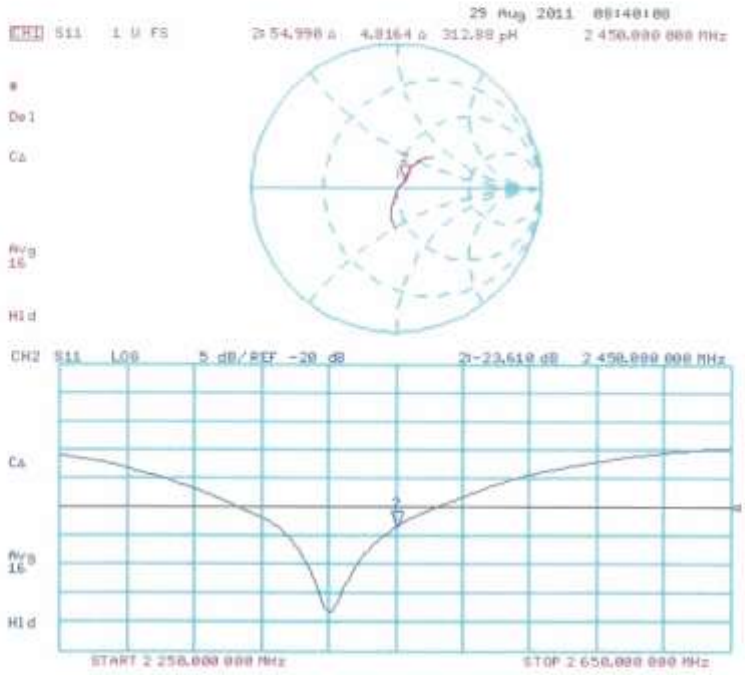
- Probe: ES3DV3 - SN3205; ConvF(4.45, 4.45, 4.45); Calibrated: 29.04.2011
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 04.07.2011
- Phantom: Flat Phantom 5.0 (front); Type: QD000P50AA; Serial: 1001
- DASY52 52.6.2(482); SEMCAD X 14.4.5(3634)

**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 = 101.2 V/m; Power Drift = 0.03 dB
Peak SAR (extrapolated) = 28.291 W/kg
**SAR(1 g) = 13.7 mW/g; SAR(10 g) = 6.4 mW/g**
Maximum value of SAR (measured) = 17.657 mW/g




0 dB = 17.660mW/g

**Impedance Measurement Plot for Head TSL**



**DASY5 Validation Report for Body TSL**

Date: 29.08.2011

Test Laboratory: SPEAG, Zurich, Switzerland

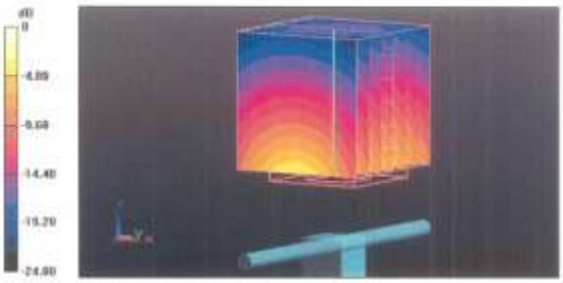
**DUT: Dipole 2450 MHz; Type: D2450V2; Serial: D2450V2 - SN: 743**

Communication System: CW; Frequency: 2450 MHz
Medium parameters used: f = 2450 MHz; $\sigma$ = 2.02 mho/m; $\varepsilon_r$ = 51.8; $\rho$ = 1000 kg/m$^3$
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY52 Configuration:

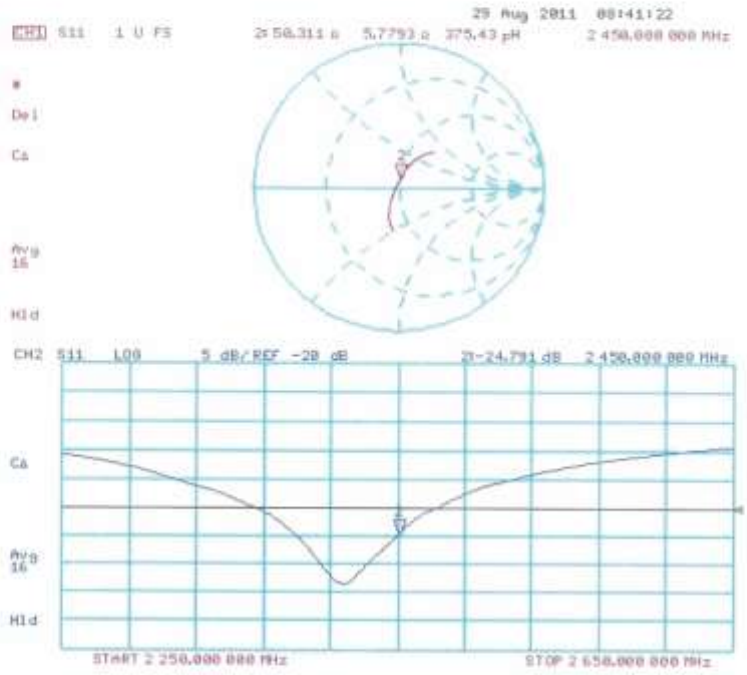
- Probe: ES3DV3 - SN3205; ConvF(4.26, 4.26, 4.26); Calibrated: 29.04.2011
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 04.07.2011
- Phantom: Flat Phantom 5.0 (back); Type: QD000P50AA; Serial: 1002
- DASY52 52.6.2(482); SEMCAD X 14.4.5(3634)

**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 = 95.903 V/m; Power Drift = -0.0051 dB
Peak SAR (extrapolated) = 27.107 W/kg
**SAR(1 g) = 13.2 mW/g; SAR(10 g) = 6.11 mW/g**
Maximum value of SAR (measured) = 17.329 mW/g



0 dB = 17.330mW/g

**Impedance Measurement Plot for Body TSL**



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Accreditation No.: SCS 108

Client HCT (Dymstec) Certificate No: D750V3-1014_Jul11

# CALIBRATION CERTIFICATE

| | |
|---|---|
| Object | D750V3 - SN:1014 |
| Calibration procedure(s) | QA CAL-05.v8<br>Calibration procedure for dipole validation kits above 700 MHz |
| Calibration date: | July 25, 2011 |

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

All calibrations have been conducted in the closed laboratory facility: environment temperature (22 ± 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 | 06-Oct-10 (No. 217-01266) | Oct-11 |
| Power sensor HP 8481A | US37292783 | 06-Oct-10 (No. 217-01266) | Oct-11 |
| Reference 20 dB Attenuator | SN: S5086 (20b) | 29-Mar-11 (No. 217-01367) | Apr-12 |
| Type-N mismatch combination | SN: 5047.2 / 06327 | 29-Mar-11 (No. 217-01371) | Apr-12 |
| Reference Probe ES3DV3 | SN: 3205 | 29-Apr-11 (No. ES3-3205_Apr11) | Apr-12 |
| DAE4 | SN: 601 | 04-Jul-11 (No. DAE4-601_Jul11) | Jul-12 |

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

| | Name | Function | Signature |
|---|---|---|---|
| Calibrated by: | Claudio Leubler | Laboratory Technician | |
| Approved by: | Katja Pokovic | Technical Manager | |

Issued: July 25, 2011

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

Certificate No: D750V3-1014_Jul11 Page 1 of 8

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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) 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
b) 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
c) 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:**

d) 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.

Certificate No: D750V3-1014_Jul11 Page 2 of 8

## Measurement Conditions

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

| | | |
|---|---|---|
| **DASY Version** | DASY5 | V52.6.2 |
| **Extrapolation** | Advanced Extrapolation | |
| **Phantom** | Modular Flat Phantom | |
| **Distance Dipole Center - TSL** | 15 mm | with Spacer |
| **Zoom Scan Resolution** | dx, dy, dz = 5 mm | |
| **Frequency** | 750 MHz ± 1 MHz | |

## Head TSL parameters

The following parameters and calculations were applied.

| | Temperature | Permittivity | Conductivity |
|---|---|---|---|
| **Nominal Head TSL parameters** | 22.0 °C | 41.9 | 0.89 mho/m |
| **Measured Head TSL parameters** | (22.0 ± 0.2) °C | 41.7 ± 6 % | 0.91 mho/m ± 6 % |
| **Head TSL temperature change during test** | < 0.5 °C | --- | --- |

## SAR result with Head TSL

| **SAR averaged over 1 cm³ (1 g) of Head TSL** | Condition | |
|---|---|---|
| SAR measured | 250 mW input power | 2.15 mW / g |
| SAR for nominal Head TSL parameters | normalized to 1W | **8.44 mW /g ± 17.0 % (k=2)** |

| **SAR averaged over 10 cm³ (10 g) of Head TSL** | condition | |
|---|---|---|
| SAR measured | 250 mW input power | 1.40 mW / g |
| SAR for nominal Head TSL parameters | normalized to 1W | **5.52 mW /g ± 16.5 % (k=2)** |

## Body TSL parameters

The following parameters and calculations were applied.

| | Temperature | Permittivity | Conductivity |
|---|---|---|---|
| **Nominal Body TSL parameters** | 22.0 °C | 55.5 | 0.96 mho/m |
| **Measured Body TSL parameters** | (22.0 ± 0.2) °C | 55.2 ± 6 % | 0.96 mho/m ± 6 % |
| **Body TSL temperature change during test** | < 0.5 °C | --- | --- |

## SAR result with Body TSL

| **SAR averaged over 1 cm³ (1 g) of Body TSL** | Condition | |
|---|---|---|
| SAR measured | 250 mW input power | 2.22 mW / g |
| SAR for nominal Body TSL parameters | normalized to 1W | **8.87 mW / g ± 17.0 % (k=2)** |

| **SAR averaged over 10 cm³ (10 g) of Body TSL** | condition | |
|---|---|---|
| SAR measured | 250 mW input power | 1.47 mW / g |
| SAR for nominal Body TSL parameters | normalized to 1W | **5.88 mW / g ± 16.5 % (k=2)** |

## Appendix

### Antenna Parameters with Head TSL

| | |
|---|---|
| Impedance, transformed to feed point | 53.3 Ω + 0.4 jΩ |
| Return Loss | - 30.0 dB |

### Antenna Parameters with Body TSL

| | |
|---|---|
| Impedance, transformed to feed point | 49.0 Ω - 2.7 jΩ |
| Return Loss | - 30.8 dB |

### General Antenna Parameters and Design

| | |
|---|---|
| Electrical Delay (one direction) | 1.040 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 | March 22, 2010 |

**DASY5 Validation Report for Head TSL**

Date: 25.07.2011

Test Laboratory: SPEAG, Zurich, Switzerland

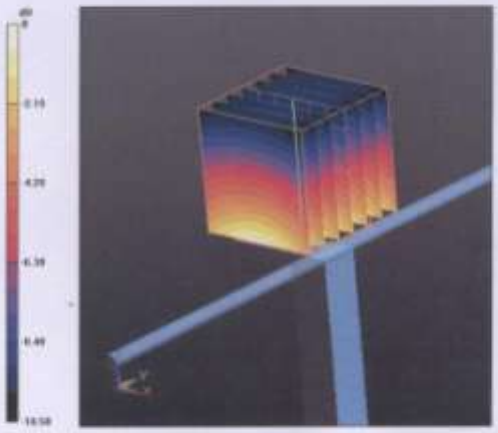
**DUT: Dipole 750 MHz; Type: D750V3; Serial: D750V3 - SN:1014**

Communication System: CW; Frequency: 750 MHz
Medium parameters used: f = 750 MHz; $\sigma$ = 0.91 mho/m; $\varepsilon_r$ = 41.7; $\rho$ = 1000 kg/m$^3$
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY52 Configuration:

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

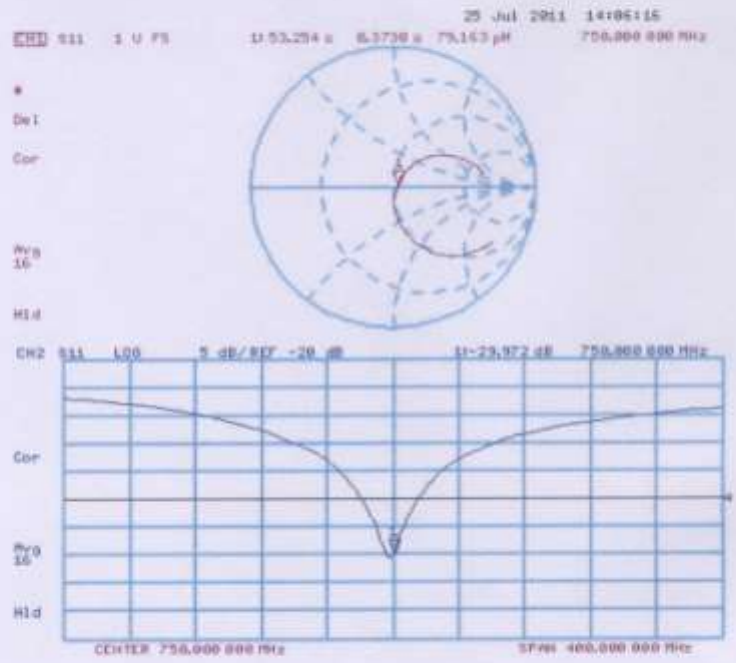
**Dipole Calibration for Head Tissue/Pin=250mW; dip=15mm; dist=3.0mm/Zoom Scan (7x7x7)/Cube 0:** Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 51.352 V/m; Power Drift = 0.06 dB
Peak SAR (extrapolated) = 3.258 W/kg
**SAR(1 g) = 2.15 mW/g; SAR(10 g) = 1.4 mW/g**
Maximum value of SAR (measured) = 2.524 mW/g



0 dB = 2.520mW/g

Certificate No: D750V3-1014_Jul11 Page 5 of 8

## Impedance Measurement Plot for Head TSL



**DASY5 Validation Report for Body TSL**

Date: 25.07.2011

Test Laboratory: SPEAG, Zurich, Switzerland

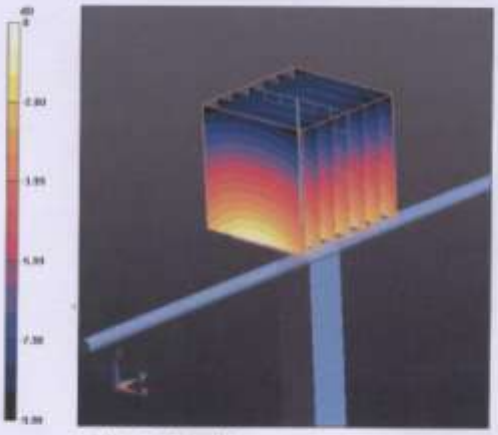
**DUT: Dipole 750 MHz; Type: D750V3; Serial: D750V3 - SN:1014**

Communication System: CW; Frequency: 750 MHz
Medium parameters used: f = 750 MHz; $\sigma$ = 0.96 mho/m; $\varepsilon_r$ = 55.2; $\rho$ = 1000 kg/m$^3$
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY52 Configuration:

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

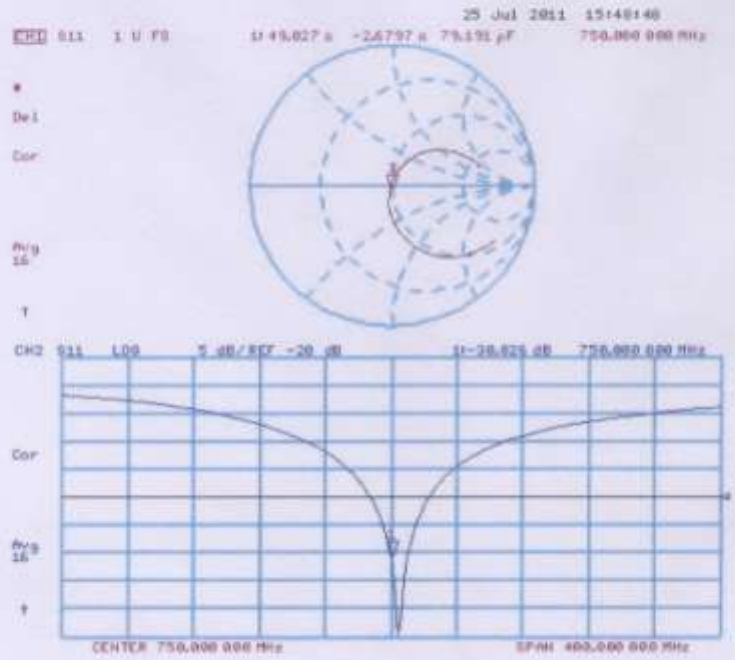
**Dipole Calibration for Body Tissue/Pin=250mW; dip=15mm; dist=3.0mm/Zoom Scan (7x7x7)/Cube 0:** Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 52.652 V/m; Power Drift = 0.03 dB
Peak SAR (extrapolated) = 3.311 W/kg
**SAR(1 g) = 2.22 mW/g; SAR(10 g) = 1.47 mW/g**
Maximum value of SAR (measured) = 2.584 mW/g



0 dB = 2.580mW/g

Certificate No: D750V3-1014_Jul11 Page 7 of 8

## Impedance Measurement Plot for Body TSL



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Accreditation No.: SCS 108

Client HCT (Dymstec) Certificate No: D5GHzV2-1107_Nov11

# CALIBRATION CERTIFICATE

Object D5GHzV2 - SN: 1107

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

Calibration date: November 15, 2011

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

All calibrations have been conducted in the closed laboratory facility: environment temperature (22 ± 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 | 05-Oct-11 (No. 217-01451) | Oct-12 |
| Power sensor HP 8481A | US37292783 | 05-Oct-11 (No. 217-01451) | Oct-12 |
| Reference 20 dB Attenuator | SN: 5086 (20g) | 29-Mar-11 (No. 217-01368) | Apr-12 |
| Type-N mismatch combination | SN: 5047.2 / 06327 | 29-Mar-11 (No. 217-01371) | Apr-12 |
| Reference Probe EX3DV4 | SN: 3503 | 04-Mar-11 (No. EX3-3503_Mar11) | Mar-12 |
| DAE4 | SN: 601 | 04-Jul-11 (No. DAE4-601_Jul11) | Jul-12 |

| Secondary Standards | ID # | Check Date (in house) | Scheduled Check |
|---|---|---|---|
| Power sensor HP 8481A | MY41092317 | 18-Oct-02 (in house check Oct-11) | In house check: Oct-13 |
| RF generator R&S SMT-06 | 100005 | 04-Aug-99 (in house check Oct-11) | In house check: Oct-13 |
| Network Analyzer HP 8753E | US37390585 S4206 | 18-Oct-01 (in house check Oct-11) | In house check: Oct-12 |

| | Name | Function | Signature |
|---|---|---|---|
| Calibrated by: | Dimce Iliev | Laboratory Technician | |
| Approved by: | Katja Pokovic | Technical Manager | |

Issued: November 16, 2011

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Certificate No: D5GHzV2-1107_Nov11 Page 1 of 13

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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) 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
b) 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
c) 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:**

d) 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 | V52.6.2 |
|---|---|---|
| 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<br>5500 MHz ± 1 MHz<br>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 | 34.6 ± 6 % | 4.46 mho/m ± 6 % |
| Head TSL temperature change during test | < 0.5 °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 | 8.10 mW / g |
| SAR for nominal Head TSL parameters | normalized to 1W | **80.3 mW /g ± 17.0 % (k=2)** |

| SAR averaged over 10 cm³ (10 g) of Head TSL | condition | |
|---|---|---|
| SAR measured | 100 mW input power | 2.32 mW / g |
| SAR for nominal Head TSL parameters | normalized to 1W | **22.9 mW /g ± 16.5 % (k=2)** |

## 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 | 34.2 ± 6 % | 4.75 mho/m ± 6 % |
| Head TSL temperature change during test | < 0.5 °C | --- | --- |

## SAR result with Head TSL at 5500 MHz

| SAR averaged over 1 cm³ (1 g) of Head TSL | Condition | |
|---|---|---|
| SAR measured | 100 mW input power | 8.87 mW / g |
| SAR for nominal Head TSL parameters | normalized to 1W | **87.8 mW / g ± 17.0 % (k=2)** |

| SAR averaged over 10 cm³ (10 g) of Head TSL | condition | |
|---|---|---|
| SAR measured | 100 mW input power | 2.52 mW / g |
| SAR for nominal Head TSL parameters | normalized to 1W | **24.9 mW / g ± 16.5 % (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 | 33.7 ± 6 % | 5.03 mho/m ± 6 % |
| **Head TSL temperature change during test** | < 0.5 °C | ---- | ---- |

### SAR result with Head TSL at 5800 MHz

| **SAR averaged over 1 cm³ (1 g) of Head TSL** | Condition | |
|---|---|---|
| SAR measured | 100 mW input power | 7.98 mW / g |
| SAR for nominal Head TSL parameters | normalized to 1W | **78.9 mW / g ± 17.0 % (k=2)** |

| **SAR averaged over 10 cm³ (10 g) of Head TSL** | condition | |
|---|---|---|
| SAR measured | 100 mW input power | 2.27 mW / g |
| SAR for nominal Head TSL parameters | normalized to 1W | **22.4 mW / g ± 16.5 % (k=2)** |

### 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 | 47.7 ± 6 % | 5.48 mho/m ± 6 % |
| **Body TSL temperature change during test** | < 0.5 °C | ---- | ---- |

### SAR result with Body TSL at 5200 MHz

| **SAR averaged over 1 cm³ (1 g) of Body TSL** | Condition | |
|---|---|---|
| SAR measured | 100 mW input power | 7.76 mW / g |
| SAR for nominal Body TSL parameters | normalized to 1W | **77.2 mW / g ± 18.1 % (k=2)** |

| **SAR averaged over 10 cm³ (10 g) of Body TSL** | condition | |
|---|---|---|
| SAR measured | 100 mW input power | 2.16 mW / g |
| SAR for nominal Body TSL parameters | normalized to 1W | **21.5 mW / g ± 17.6 % (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 | 47.2 ± 6 % | 5.87 mho/m ± 6 % |
| **Body TSL temperature change during test** | < 0.5 °C | ---- | ---- |

### SAR result with Body TSL at 5500 MHz

| **SAR averaged over 1 cm³ (1 g) of Body TSL** | Condition | |
|---|---|---|
| SAR measured | 100 mW input power | 8.20 mW / g |
| SAR for nominal Body TSL parameters | normalized to 1W | **81.6 mW / g ± 18.1 % (k=2)** |

| **SAR averaged over 10 cm³ (10 g) of Body TSL** | condition | |
|---|---|---|
| SAR measured | 100 mW input power | 2.27 mW / g |
| SAR for nominal Body TSL parameters | normalized to 1W | **22.6 mW / g ± 17.6 % (k=2)** |

### 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 | 46.6 ± 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 cm³ (1 g) of Body TSL** | Condition | |
|---|---|---|
| SAR measured | 100 mW input power | 7.73 mW / g |
| SAR for nominal Body TSL parameters | normalized to 1W | **76.9 mW / g ± 18.1 % (k=2)** |

| **SAR averaged over 10 cm³ (10 g) of Body TSL** | condition | |
|---|---|---|
| SAR measured | 100 mW input power | 2.14 mW / g |
| SAR for nominal Body TSL parameters | normalized to 1W | **21.2 mW / g ± 17.6 % (k=2)** |

## Appendix

### Antenna Parameters with Head TSL at 5200 MHz

| | |
|---|---|
| Impedance, transformed to feed point | 51.4 Ω - 9.9 jΩ |
| Return Loss | - 20.2 dB |

### Antenna Parameters with Head TSL at 5500 MHz

| | |
|---|---|
| Impedance, transformed to feed point | 53.5 Ω - 6.8 jΩ |
| Return Loss | - 22.6 dB |

### Antenna Parameters with Head TSL at 5800 MHz

| | |
|---|---|
| Impedance, transformed to feed point | 54.3 Ω - 7.3 jΩ |
| Return Loss | - 21.8 dB |

### Antenna Parameters with Body TSL at 5200 MHz

| | |
|---|---|
| Impedance, transformed to feed point | 48.9 Ω - 8.9 jΩ |
| Return Loss | - 20.9 dB |

### Antenna Parameters with Body TSL at 5500 MHz

| | |
|---|---|
| Impedance, transformed to feed point | 52.8 Ω - 4.6 jΩ |
| Return Loss | - 25.6 dB |

### Antenna Parameters with Body TSL at 5800 MHz

| | |
|---|---|
| Impedance, transformed to feed point | 56.8 Ω - 4.6 jΩ |
| Return Loss | - 22.2 dB |

### General Antenna Parameters and Design

| | |
|---|---|
| Electrical Delay (one direction) | 1.196 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 | March 11, 2011 |

## DASY5 Validation Report for Head TSL

Date: 15.11.2011

Test Laboratory: SPEAG, Zurich, Switzerland

**DUT: Dipole 5GHz; Type: D5GHzV2; Serial: D5GHzV2 - SN: 1107**

Communication System: CW; Frequency: 5200 MHz, Frequency: 5500 MHz, Frequency: 5800 MHz
Medium parameters used: f = 5200 MHz; $\sigma$ = 4.46 mho/m; $\varepsilon_r$ = 34.6; $\rho$ = 1000 kg/m$^3$ , Medium parameters used: f = 5500 MHz; $\sigma$ = 4.75 mho/m; $\varepsilon_r$ = 34.2; $\rho$ = 1000 kg/m$^3$ , Medium parameters used: f = 5800 MHz; $\sigma$ = 5.03 mho/m; $\varepsilon_r$ = 33.7; $\rho$ = 1000 kg/m$^3$
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY52 Configuration:

- Probe: EX3DV4 - SN3503; ConvF(5.41, 5.41, 5.41), ConvF(4.91, 4.91, 4.91), ConvF(4.81, 4.81, 4.81); Calibrated: 04.03.2011
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 04.07.2011
- Phantom: Flat Phantom 5.0 (front); Type: QD000P50AA; Serial: 1001
- DASY52 52.6.2(482); SEMCAD X 14.4.5(3634)

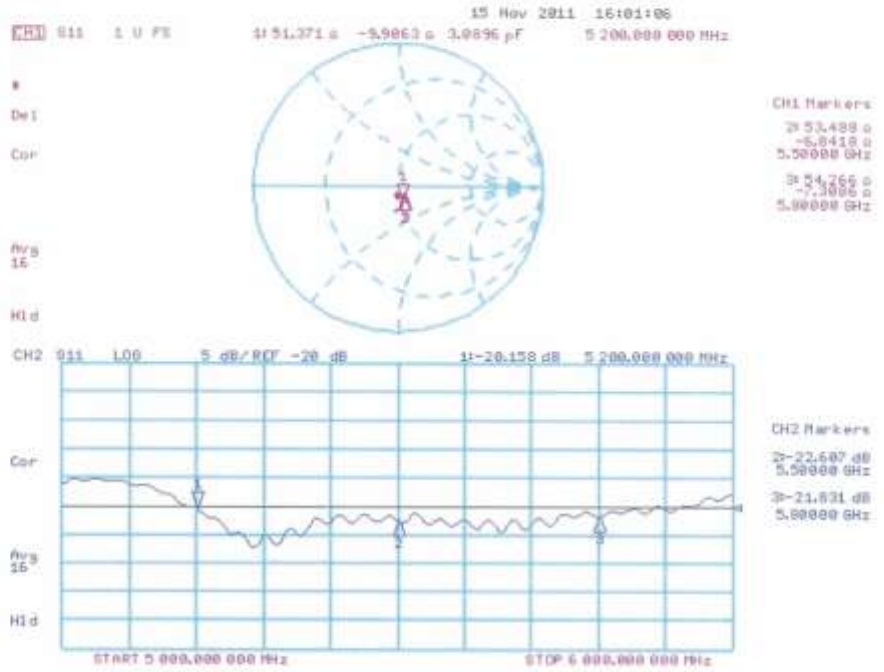
**Dipole Calibration for Head Tissue/Pin=100mW, dist=10mm, f=5200 MHz/Zoom Scan, dist=1.4mm (8x8x7)/Cube 0:** Measurement grid: dx=4mm, dy=4mm, dz=1.4mm
Reference Value = 65.489 V/m; Power Drift = 0.09 dB
Peak SAR (extrapolated) = 30.049 W/kg
**SAR(1 g) = 8.1 mW/g; SAR(10 g) = 2.32 mW/g**
Maximum value of SAR (measured) = 18.742 mW/g

**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 = 67.044 V/m; Power Drift = 0.07 dB
Peak SAR (extrapolated) = 35.139 W/kg
**SAR(1 g) = 8.87 mW/g; SAR(10 g) = 2.52 mW/g**
Maximum value of SAR (measured) = 21.234 mW/g

**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 = 62.486 V/m; Power Drift = 0.03 dB
Peak SAR (extrapolated) = 33.340 W/kg
**SAR(1 g) = 7.98 mW/g; SAR(10 g) = 2.27 mW/g**
Maximum value of SAR (measured) = 19.378 mW/g


0 dB = 19.380mW/g

**Impedance Measurement Plot for Head TSL**



## DASY5 Validation Report for Body TSL

Date: 14.11.2011

Test Laboratory: SPEAG, Zurich, Switzerland

**DUT: Dipole 5GHz; Type: D5GHzV2; Serial: D5GHzV2 - SN: 1107**

Communication System: CW; Frequency: 5200 MHz, Frequency: 5500 MHz, Frequency: 5800 MHz
Medium parameters used: f = 5200 MHz; $\sigma$ = 5.48 mho/m; $\varepsilon_r$ = 47.7; $\rho$ = 1000 kg/m$^3$ , Medium parameters used: f = 5500 MHz; $\sigma$ = 5.87 mho/m; $\varepsilon_r$ = 47.2; $\rho$ = 1000 kg/m$^3$ , Medium parameters used: f = 5800 MHz; $\sigma$ = 6.26 mho/m; $\varepsilon_r$ = 46.6; $\rho$ = 1000 kg/m$^3$
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

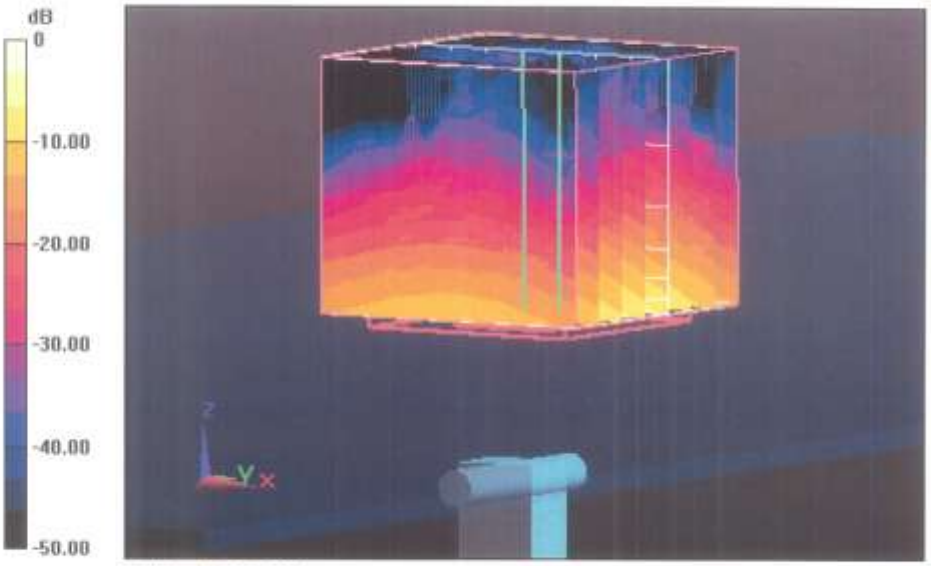
DASY52 Configuration:

- Probe: EX3DV4 - SN3503; ConvF(4.91, 4.91, 4.91), ConvF(4.43, 4.43, 4.43), ConvF(4.38, 4.38, 4.38); Calibrated: 04.03.2011
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 04.07.2011
- Phantom: Flat Phantom 5.0 (back); Type: QD000P50AA; Serial: 1002
- DASY52 52.6.2(482); SEMCAD X 14.4.5(3634)

**Dipole Calibration for Body 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 = 59.430 V/m; Power Drift = -0.01 dB
Peak SAR (extrapolated) = 30.431 W/kg
**SAR(1 g) = 7.76 mW/g; SAR(10 g) = 2.16 mW/g**
Maximum value of SAR (measured) = 17.928 mW/g

**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 = 58.998 V/m; Power Drift = -0.02 dB
Peak SAR (extrapolated) = 35.235 W/kg
**SAR(1 g) = 8.2 mW/g; SAR(10 g) = 2.27 mW/g**
Maximum value of SAR (measured) = 19.488 mW/g

**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 = 55.860 V/m; Power Drift = -0.02 dB
Peak SAR (extrapolated) = 35.929 W/kg
**SAR(1 g) = 7.73 mW/g; SAR(10 g) = 2.14 mW/g**
Maximum value of SAR (measured) = 18.853 mW/g




0 dB = 18.850mW/g

**Impedance Measurement Plot for Body TSL**