

December 09, 2005

Attention: Bruno Clavier

TIMCO ENGINEERING INC.
849 NW State Road 45
Newberry, Florida 32669

Subject: Response to the TIMCO Correspondence Reference Number JOB 1881UC5 – RT 24543 for clarification on RIM BlackBerry Wireless Handheld FCC ID L6ARAV20CW

Dear Bruno:

The following addresses your inquiry Correspondence Reference Number JOB 1881UC5 – RT 24543:

1. HAC: No plots/measurements data was provided for RC3, SO3, and full rate mode. Please provide this data.

In our response to the FCC Correspondence Reference # 24544, Confirmation # TC662230, question 2, HAC data was provided for the RC3, SO3, full rate mode. Also, please see response to your question 5 for the data and Annex A for the plot.

2. HAC Appendix A: The HAC plots are blurry and too small to be readable. Please provide clearer plots and include the location of the probe rotation for the max reading.

Since the HAC scans in our response to the FCC correspondence were relative measurements, location of probe rotation was not critical. The purpose was to investigate the effect of different RCs, SOs and data rate settings on the RF emission level. Please see Annex A (page 15) for clearer plot (RC3, SO55) with location of the probe rotation marked with a note.

3. HAC Please show the exclusion blocks on the data provided in Appendix A.

Since the HAC scans in our response to the FCC correspondence were relative measurements, exclusion blocks were not necessary. The purpose was to investigate the effect of different RCs, SOs and data rate settings on the RF emission level. Please see Annex A for clearer plots with exclusion blocks.

4. HAC and SAR: Please provide additional information concerning the rationale for choosing the specific RCs and SOs listed. Is this an exhaustive list of RCs and SOs available with this device? Please explain.

We have chosen different combination of RC, SO and data rate settings to represent the worst case and other scenarios, i.e. basic and enhanced voice service, IS-2000 loopback service, 9.6, 14.4 and 153.6 kbps channel data rate, 1/2 or 1/8 th gating data rate

According to the CTIA Certification Test Plan for HAC, Draft 6, SO3, RC1 and 1/8 gating option represents worst case and must be evaluated.

5. HAC summary table - typo: The first data should be 61.1V/m according to the measurement plot/data.

Please refer to the table below for updated results:

Wireless Device: BlackBerry Wireless Handheld – Model: RAV20CW				
RF Emissions Test				
Mode	f (MHz)	Mode / Configuration	Peak E-Field (V/m)	M-Rating
CDMA 1900	1880.00	RC1 (Radio Config), SO3 (Service Option), Full Rate	61.1	4
	1880.00	RC1, SO2, Full Rate	69.6	3
	1880.00	RC1, SO55, Full Rate	70.0	3
	1880.00	RC3, SO2, Full Rate	69.0	3
	1880.00	RC3, SO55, Full Rate	70.5	3
	1880.00	RC3, SO3, Full Rate	69.6	3

6. HAC and SAR: Please provide information that differentiates the SOs and RCs chosen for testing. Alternatively, please provide references to standard(s), MS protocol rev number, etc.

Definition and specification for different settings:

Service Option (SO) is service capability of the system, e.g.:

- SO1 - Basic Variable Rate Voice Service (8 kbps)
- SO2 – Mobile Station Loopback (8 kbps)
- SO3 - Enhanced Variable Rate Voice Service (8 kbps)
- SO55 - IS-2000 Loopback (8 kbps)

Radio Configuration (RC) in CDMA2000 indicates the channel rate, e.g.:

- RC1 - 9.6 kbps
- RC2 - 14.4 kbps
- RC3 – 153.6 kbps

MS Protocol rev number:

6 (IS-2000-0)

Related standards:

- TIA / EIA-125 –A (SO1 voice service).
- TIA / EIA-126 –D (SO2- S055 loopback service).
- TIA / EIA / IS-2000 (RCs and general CDMA2000).

7. SAR: The probe used for the new measurement is different form the original probe used (S/N 1643 (new) vs. 1642 (original)). Please provide calibration/manufacturer data for s/n 1643.

Both probes are the same model and are used alternately.
 Please see Annex C for probe S/N 1643 calibration data.

8. SAR Please provide dipole validation data for the new measurement (i.e. 10%) etc.

Dipole validation plot was provided in the Annex B of our response to the FCC's questions.

Please refer to the Annex B of this document for the dipole validation plot and table below for the measured data.

f (MHz)	Limits / Measured	SAR (W/kg) 1 g/ 10 g	Dielectric Parameters		Liquid Temp (°C)
			ϵ_r	σ [S/m]	
1900	Measured	42.6 / 22.5	38.38	1.45	23.5
	Recommended Limits	39.5 / 20.7	40.0	1.40	N/A

9. SAR page 22 of 31: The liquid temp value is missing form the plot.

Please see updated SAR plots in Annex B.

10. SAR: According to the new information provided, this device support EVDO: Please provide additional information on the revision number, and RCs etc. supported with this device.

The protocol used to test for 1xEV-DO is 0 (1xEV-DO).

The related standard is TIA / EIA / IS-856.

This protocol is for data transmission.

There are no RCs, SOs associated with 1xEV-DO.

The highest data rate was evaluated and determined to be very lower SAR.

11. SAR summary table: the first row of data for pk 1 and 2 appears to be in errors. The measurements show 1.19 and 0.92W/kg respectively for pk 1 and 2, while the table lists 1.11 and 0.68. Please, revise.

Please see revised SAR values in the table below:

Mode	f (MHz)	Configuration / Mode	1 g SAR (W/kg) Pk1	1 g SAR (W/kg) Pk2
CDMA 1900	1908.50	Right Touch Head ; RC1, SO3; Full Rate	1.19	0.92
	1880.00	Left Touch Head ; RC3, SO3; Full Rate	1.18	1.05
	1851.25	Body-Worn with Holster ; RC3, SO55, Full	1.03	1.08
	1908.50	Right Touch Head ; RC1, SO2; Full Rate	1.26	0.91
	1908.50	Right Touch Head ; RC3, SO55; 1/2 Rate	1.20	
	1908.50	Right Touch Head ; RC1, SO3; 1/8 Rate	1.40	
	1851.25	Body-Worn ; EVDO; 153.6 kbps	0.74	

12. SAR plots are small and difficult to view. Please provide larger plots.

Please see Appendix B for more enlarged SAR plots.

Yours truly,



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Appendix A: HAC plots

Date/Time: 22/11/2005 9:44:03 AM

Test Laboratory: RTS
 File Name: [BB7130_model_RAV20CW_CDMA_1900_mid_ch_RC1_SO3.da4](#)

DUT: BlackBerry Wireless Handheld; Type: Sample
Program Name: HAC E Device

Communication System: CDMA 1900; Frequency: 1880 MHz; Duty Cycle: 1:1
 Medium parameters used: $s = 0$ mho/m, $\epsilon_r = 1$; $\rho = 1000$ kg/m³
 Phantom section: E Device Section

DASY4 Configuration:
 - Probe: ER3DV6 - SN2286; ConvF(1, 1, 1); Calibrated: 07/01/2005
 - Sensor-Surface: 0mm (Fix Surface)Sensor-Surface: (Fix Surface)
 - Electronics: DAE3 Sn472; Calibrated: 03/01/2005
 - Phantom: HAC Test Arch; Type: SD HAC P01 BA;
 - Measurement SW: DASY4, V4.6 Build 23; Postprocessing SW: SEMCAD, V1.8 Build 160

E Scan 10mm above Device Reference/Hearing Aid Compatibility Test (11x11x1):

Measurement grid: dx=5mm, dy=5mm
 Probe Modulation Factor = 1.00
 Reference Value = 38.4 V/m; Power Drift = 0.232 dB
 Maximum value of Total (measured) = 60.3 V/m

E Scan 10mm above Device Reference/Hearing Aid Compatibility Test (101x101x1):

Measurement grid: dx=5mm, dy=5mm
 Maximum value of peak Total field = 61.1 V/m
 Probe Modulation Factor = 1.00
 Reference Value = 38.4 V/m; Power Drift = 0.232 dB
Hearing Aid Near-Field Category: M4 (AWF 0 dB)

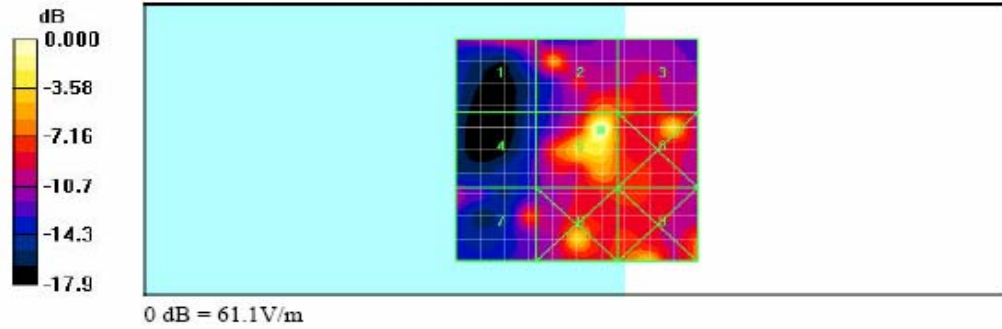
Peak E-field in V/m

Grid 1	Grid 2	Grid 3
24.1	31.3	27.1
Grid 4	Grid 5	Grid 6
16.0	61.1	37.9
Grid 7	Grid 8	Grid 9
25.9	38.7	39.7

Category	AWF (dB)	Limits for E-Field Emissions (V/m)	Limits for H-Field Emissions (A/m)
M1	0	199.5 - 354.8	0.6 - 1.07
	-5	149.6 - 266.1	0.45 - 0.8
M2	0	112.2 - 199.5	0.34 - 0.6
	-5	84.1 - 149.6	0.25 - 0.45

file://C:\Program%20Files\DASY4\DASY4\Print_Templates\BB7130_model_RAV20C... 09/12/2005

M4	0	<63.1	<0.19
	-5	<47.3	<0.15



Date/Time: 22/11/2005 10:14:02 AM

Test Laboratory: RTS

BB7130_model_RAV20CW_CDMA_1900_mid_ch_RC1_SO2

DUT: BlackBerry Wireless Handheld; Type: Sample ; Serial: Not Specified

Communication System: CDMA 1900; Frequency: 1880 MHz; Duty Cycle: 1:1

Medium parameters used: $s = 0$ mho/m, $\epsilon_r = 1$; $\rho = 1000$ kg/m³

Phantom section: E Device Section

DASY4 Configuration:

- Probe: ER3DV6 - SN2286; ConvF(1, 1, 1); Calibrated: 07/01/2005
- Sensor-Surface: 0mm (Fix Surface) Sensor-Surface: (Fix Surface)
- Electronics: DAE3 Sn472; Calibrated: 03/01/2005
- Phantom: HAC Test Arch; Type: SD HAC P01 BA;
- Measurement SW: DASY4, V4.6 Build 23; Postprocessing SW: SEMCAD, V1.8 Build 160

E Scan 10mm above Device Reference/Hearing Aid Compatibility Test (11x11x1):

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

Probe Modulation Factor = 1.00

Reference Value = 60.7 V/m; Power Drift = -0.025 dB

Maximum value of Total (measured) = 70.1 V/m

E Scan 10mm above Device Reference/Hearing Aid Compatibility Test (101x101x1):

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

Maximum value of peak Total field = 69.6 V/m

Probe Modulation Factor = 1.00

Reference Value = 60.7 V/m; Power Drift = -0.025 dB

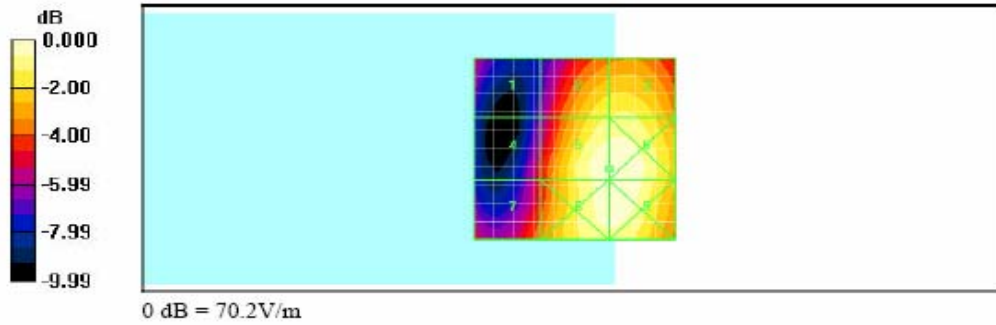
Hearing Aid Near-Field Category: M3 (AWF 0 dB)

Peak E-field in V/m

Grid 1	Grid 2	Grid 3
38.2	60.7	61.5
Grid 4	Grid 5	Grid 6
41.1	69.6	70.2
Grid 7	Grid 8	Grid 9
47.2	68.3	68.8

Category	AWF (dB)	Limits for E-Field Emissions (V/m)	Limits for H-Field Emissions (A/m)
M1	0	199.5 - 354.8	0.6 - 1.07
	-5	149.6 - 266.1	0.45 - 0.8
M2	0	112.2 - 199.5	0.34 - 0.6
	-5	84.1 - 149.6	0.25 - 0.45
M3	0	63.1 - 112.2	0.19 - 0.34
	-5	47.3 - 84.1	0.15 - 0.25

M4	0	<63.1	<0.19
	-5	<47.3	<0.15



Date/Time: 22/11/2005 10:24:41 AM

Test Laboratory: RTS

BB7130_model_RAV20CW_CDMA_1900_mid_ch_RC1_SO55

DUT: BlackBerry Wireless Handheld; Type: Sample ; Serial: Not Specified

Communication System: CDMA 1900; Frequency: 1880 MHz; Duty Cycle: 1:1

Medium parameters used: $s = 0$ mho/m, $\epsilon_r = 1$; $\rho = 1000$ kg/m³

Phantom section: E Device Section

DASY4 Configuration:

- Probe: ER3DV6 - SN2286; ConvF(1, 1, 1); Calibrated: 07/01/2005
- Sensor-Surface: 0mm (Fix Surface) Sensor-Surface: (Fix Surface)
- Electronics: DAE3 Sn472; Calibrated: 03/01/2005
- Phantom: HAC Test Arch; Type: SD HAC P01 BA;
- Measurement SW: DASY4, V4.6 Build 23; Postprocessing SW: SEMCAD, V1.8 Build 160

E Scan 10mm above Device Reference/Hearing Aid Compatibility Test (11x11x1):

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

Probe Modulation Factor = 1.00

Reference Value = 60.0 V/m; Power Drift = 0.017 dB

Maximum value of Total (measured) = 70.5 V/m

E Scan 10mm above Device Reference/Hearing Aid Compatibility Test (101x101x1):

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

Maximum value of peak Total field = 70.0 V/m

Probe Modulation Factor = 1.00

Reference Value = 60.0 V/m; Power Drift = 0.017 dB

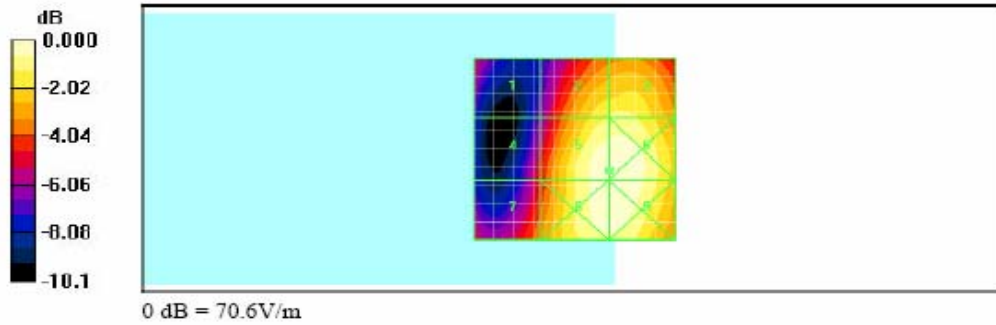
Hearing Aid Near-Field Category: M3 (AWF 0 dB)

Peak E-field in V/m

Grid 1	Grid 2	Grid 3
38.6	61.1	62.0
Grid 4	Grid 5	Grid 6
41.3	70.0	70.6
Grid 7	Grid 8	Grid 9
47.6	69.6	70.1

Category	AWF (dB)	Limits for E-Field Emissions (V/m)	Limits for H-Field Emissions (A/m)
M1	0	199.5 - 354.8	0.6 - 1.07
	-5	149.6 - 266.1	0.45 - 0.8
M2	0	112.2 - 199.5	0.34 - 0.6
	-5	84.1 - 149.6	0.25 - 0.45
M3	0	63.1 - 112.2	0.19 - 0.34
	-5	47.3 - 84.1	0.15 - 0.25

M4	0	<63.1	<0.19
	-5	<47.3	<0.15



Date/Time: 22/11/2005 10:38:55 AM

Test Laboratory: RTS

BB7130_model_RAV20CW_CDMA_1900_mid_ch_RC3_SO2

DUT: BlackBerry Wireless Handheld; Type: Sample ; Serial: Not Specified

Communication System: CDMA 1900; Frequency: 1880 MHz; Duty Cycle: 1:1

Medium parameters used: $s = 0$ mho/m, $\epsilon_r = 1$; $\rho = 1000$ kg/m³

Phantom section: E Device Section

DASY4 Configuration:

- Probe: ER3DV6 - SN2286; ConvF(1, 1, 1); Calibrated: 07/01/2005
- Sensor-Surface: 0mm (Fix Surface) Sensor-Surface: (Fix Surface)
- Electronics: DAE3 Sn472; Calibrated: 03/01/2005
- Phantom: HAC Test Arch; Type: SD HAC P01 BA;
- Measurement SW: DASY4, V4.6 Build 23; Postprocessing SW: SEMCAD, V1.8 Build 160

E Scan 10mm above Device Reference/Hearing Aid Compatibility Test (11x11x1):

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

Probe Modulation Factor = 1.00

Reference Value = 61.0 V/m; Power Drift = -0.067 dB

Maximum value of Total (measured) = 69.5 V/m

E Scan 10mm above Device Reference/Hearing Aid Compatibility Test (101x101x1):

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

Maximum value of peak Total field = 69.0 V/m

Probe Modulation Factor = 1.00

Reference Value = 61.0 V/m; Power Drift = -0.067 dB

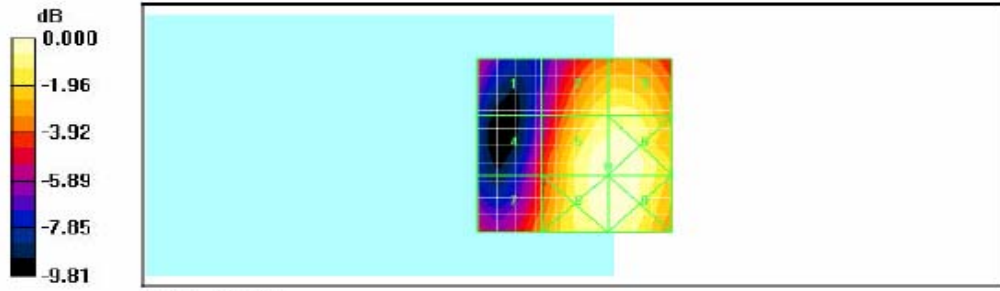
Hearing Aid Near-Field Category: M3 (AWF 0 dB)

Peak E-field in V/m

Grid 1	Grid 2	Grid 3
38.9	61.2	62.2
Grid 4	Grid 5	Grid 6
41.9	69.0	69.6
Grid 7	Grid 8	Grid 9
48.7	68.5	68.8

Category	AWF (dB)	Limits for E-Field Emissions (V/m)	Limits for H-Field Emissions (A/m)
M1	0	199.5 - 354.8	0.6 - 1.07
	-5	149.6 - 266.1	0.45 - 0.8
M2	0	112.2 - 199.5	0.34 - 0.6
	-5	84.1 - 149.6	0.25 - 0.45
M3	0	63.1 - 112.2	0.19 - 0.34
	-5	47.3 - 84.1	0.15 - 0.25

M4	0	<63.1	<0.19
	-5	<47.3	<0.15



Date/Time: 22/11/2005 10:46:32 AM

Test Laboratory: RTS

BB7130_model_RAV20CW_CDMA_1900_mid_ch_RC3_SO55

DUT: BlackBerry Wireless Handheld; Type: Sample ; Serial: Not Specified

Communication System: CDMA 1900; Frequency: 1880 MHz; Duty Cycle: 1:1

Medium parameters used: $s = 0$ mho/m, $\epsilon_r = 1$; $\rho = 1000$ kg/m³

Phantom section: E Device Section

DASY4 Configuration:

- Probe: ER3DV6 - SN2286; ConvF(1, 1, 1); Calibrated: 07/01/2005
- Sensor-Surface: 0mm (Fix Surface) Sensor-Surface: (Fix Surface)
- Electronics: DAE3 Sn472; Calibrated: 03/01/2005
- Phantom: HAC Test Arch; Type: SD HAC P01 BA;
- Measurement SW: DASY4, V4.6 Build 23; Postprocessing SW: SEMCAD, V1.8 Build 160

E Scan 10mm above Device Reference/Hearing Aid Compatibility Test (11x11x1):

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

Probe Modulation Factor = 1.00

Reference Value = 60.2 V/m; Power Drift = 0.030 dB

Maximum value of Total (measured) = 71.1 V/m

E Scan 10mm above Device Reference/Hearing Aid Compatibility Test (101x101x1):

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

Maximum value of peak Total field = 70.5 V/m

Probe Modulation Factor = 1.00

Reference Value = 60.2 V/m; Power Drift = 0.030 dB

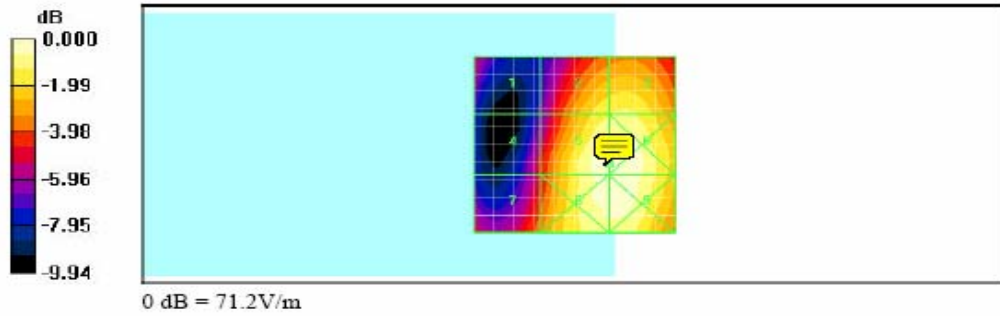
Hearing Aid Near-Field Category: M3 (AWF 0 dB)

Peak E-field in V/m

Grid 1	Grid 2	Grid 3
39.1	61.1	62.1
Grid 4	Grid 5	Grid 6
41.4	70.5	71.2
Grid 7	Grid 8	Grid 9
48.0	69.5	70.0

Category	AWF (dB)	Limits for E-Field Emissions (V/m)	Limits for H-Field Emissions (A/m)
M1	0	199.5 - 354.8	0.6 - 1.07
	-5	149.6 - 266.1	0.45 - 0.8
M2	0	112.2 - 199.5	0.34 - 0.6
	-5	84.1 - 149.6	0.25 - 0.45
M3	0	63.1 - 112.2	0.19 - 0.34
	-5	47.3 - 84.1	0.15 - 0.25

M4	0	<63.1	<0.19
	-5	<47.3	<0.15



Date/Time: 22/11/2005 12:01:04 PM

Test Laboratory: RTS

BB7130_model_RAV20CW_CDMA_1900_mid_ch_RC3_SO3

DUT: BlackBerry Wireless Handheld; Type: Sample ; Serial: Not Specified

Communication System: CDMA 1900; Frequency: 1880 MHz; Duty Cycle: 1:1

Medium parameters used: $s = 0$ mho/m, $\epsilon_r = 1$; $\rho = 1000$ kg/m³

Phantom section: E Device Section

DASY4 Configuration:

- Probe: ER3DV6 - SN2286; ConvF(1, 1, 1); Calibrated: 07/01/2005
- Sensor-Surface: 0mm (Fix Surface) Sensor-Surface: (Fix Surface)
- Electronics: DAE3 Sn472; Calibrated: 03/01/2005
- Phantom: HAC Test Arch; Type: SD HAC P01 BA;
- Measurement SW: DASY4, V4.6 Build 23; Postprocessing SW: SEMCAD, V1.8 Build 160

E Scan 10mm above Device Reference/Hearing Aid Compatibility Test (11x11x1):

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

Probe Modulation Factor = 1.00

Reference Value = 58.9 V/m; Power Drift = -0.100 dB

Maximum value of Total (measured) = 70.1 V/m

E Scan 10mm above Device Reference/Hearing Aid Compatibility Test (101x101x1):

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

Maximum value of peak Total field = 69.6 V/m

Probe Modulation Factor = 1.00

Reference Value = 58.9 V/m; Power Drift = -0.100 dB

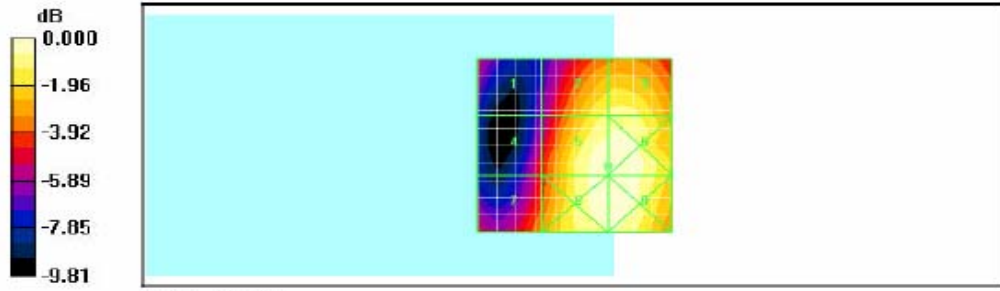
Hearing Aid Near-Field Category: M3 (AWF 0 dB)

Peak E-field in V/m

Grid 1	Grid 2	Grid 3
37.6	59.9	61.2
Grid 4	Grid 5	Grid 6
39.1	69.6	70.3
Grid 7	Grid 8	Grid 9
45.9	69.0	69.4

Category	AWF (dB)	Limits for E-Field Emissions (V/m)	Limits for H-Field Emissions (A/m)
M1	0	199.5 - 354.8	0.6 - 1.07
	-5	149.6 - 266.1	0.45 - 0.8
M2	0	112.2 - 199.5	0.34 - 0.6
	-5	84.1 - 149.6	0.25 - 0.45
M3	0	63.1 - 112.2	0.19 - 0.34
	-5	47.3 - 84.1	0.15 - 0.25

M4	0	<63.1	<0.19
	-5	<47.3	<0.15



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Annex B: Dipole validation and other SAR plots

Date/Time: 17/11/2005 3:13:38 PM

Test Laboratory: RTS

Validation_1900 MHz_Ambient_Temp_24_2_C_Liquid_Temp_23_5_C

DUT: Dipole 1900 MHz; Type: D1900V2; Serial: D1900V2 - SN:545

Communication System: CW; Frequency: 1900 MHz; Duty Cycle: 1:1
Medium parameters used: $f = 1900$ MHz; $\sigma = 1.45$ mho/m; $\epsilon_r = 38.4$; $\rho = 1000$ kg/m³
Phantom section: Flat Section

DASY4 Configuration:

- Probe: ET3DV6 - SN1643; ConvF(5.11, 5.11, 5.11); Calibrated: 15/03/2005
- Sensor-Surface: 4mm (Mechanical And Optical Surface Detection)
- Electronics: DAE3 Sn473; Calibrated: 14/03/2005
- Phantom: SAM 1; Type: SAM 4.0; Serial: 1076
- Measurement SW: DASY4, V4.6 Build 23; Postprocessing SW: SEMCAD, V1.8 Build 160

Unnamed procedure/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 193.1 V/m; Power Drift = -0.075 dB

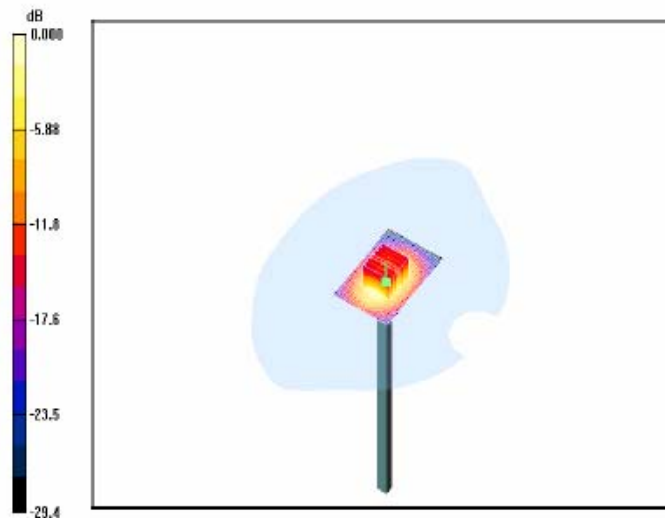
Peak SAR (extrapolated) = 73.3 W/kg

SAR(1 g) = 42.6 mW/g; SAR(10 g) = 22.5 mW/g

Maximum value of SAR (measured) = 48.2 mW/g

Unnamed procedure/Area Scan (41x61x1): Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 51.4 mW/g



Date/Time: 18/11/2005 9:10:42 AM

Test Laboratory: RTS

Right_Side_Touch_CDMA1900_High_Chan_RC1_SO3

Ambient_Temp_24_7_C_Liquid_Temp_23_4_C

DUT: BlackBerry Wireless Handheld; Type: Sample

Communication System: CDMA 1900; Frequency: 1908.5 MHz; Duty Cycle: 1:1

Medium parameters used: $f = 1908.5$ MHz; $s = 1.45$ mho/m; $\epsilon_r = 38.4$; $\rho = 1000$ kg/m³

Phantom section: Right Section

DASY4 Configuration:

- Probe: ET3DV6 - SN1643; ConvF(5.11, 5.11, 5.11); Calibrated: 15/03/2005
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn473; Calibrated: 14/03/2005
- Phantom: SAM 1; Type: SAM 4.0; Serial: 1076
- Measurement SW: DASY4, V4.6 Build 23; Postprocessing SW: SEMCAD, V1.8 Build 160

Touch position - High/Area Scan (61x91x1): Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 1.35 mW/g

Touch position - High/Zoom Scan (7x7x7) (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 15.3 V/m; Power Drift = -0.005 dB

Peak SAR (extrapolated) = 1.69 W/kg

SAR(1 g) = 1.19 mW/g; SAR(10 g) = 0.721 mW/g

Maximum value of SAR (measured) = 1.33 mW/g

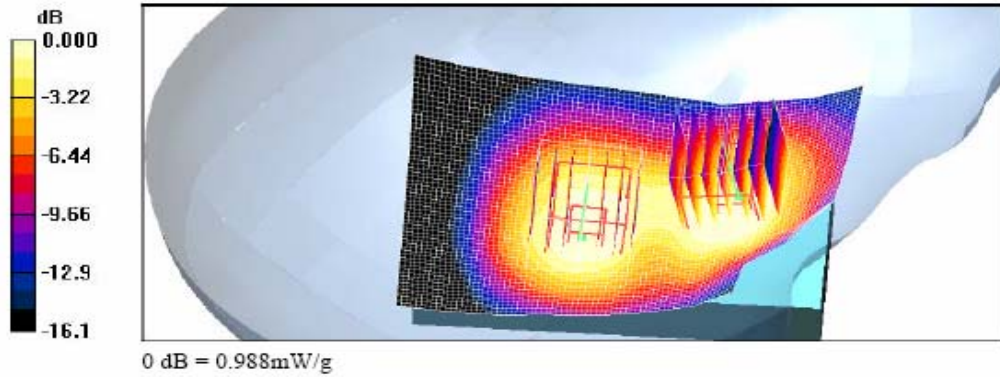
Touch position - High/Zoom Scan (7x7x7) (7x7x7)/Cube 1: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 15.3 V/m; Power Drift = -0.005 dB

Peak SAR (extrapolated) = 1.25 W/kg

SAR(1 g) = 0.921 mW/g; SAR(10 g) = 0.613 mW/g

Maximum value of SAR (measured) = 0.988 mW/g



Date/Time: 18/11/2005 10:04:09 AM

Test Laboratory: RTS

Left_Touch_CDMA1900_Mid_Chan_RC3_SO3

Amb_Temp_24_8_C_Liq_Temp_22_6_C

DUT: BlackBerry Wireless Handheld; Type: Sample

Communication System: CDMA 1900; Frequency: 1880 MHz; Duty Cycle: 1:1

Medium parameters used: $f = 1880$ MHz; $s = 1.45$ mho/m; $\epsilon_r = 38.4$; $\rho = 1000$ kg/m³

Phantom section: Left Section

DASY4 Configuration:

- Probe: ET3DV6 - SN1643; ConvF(5.11, 5.11, 5.11); Calibrated: 15/03/2005
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn473; Calibrated: 14/03/2005
- Phantom: SAM 1; Type: SAM 4.0; Serial: 1076
- Measurement SW: DASY4, V4.6 Build 23; Postprocessing SW: SEMCAD, V1.8 Build 160

Touch position - Middle/Zoom Scan (7x7x7) (7x7x7)/Cube 0: Measurement grid:

$dx=5$ mm, $dy=5$ mm, $dz=5$ mm

Reference Value = 15.1 V/m; Power Drift = -0.509 dB

Peak SAR (extrapolated) = 1.62 W/kg

SAR(1 g) = 1.18 mW/g; SAR(10 g) = 0.744 mW/g

Maximum value of SAR (measured) = 1.30 mW/g

Touch position - Middle/Area Scan (61x91x1): Measurement grid: $dx=15$ mm, $dy=15$ mm

Maximum value of SAR (interpolated) = 1.24 mW/g

Touch position - Middle/Zoom Scan (7x7x7) (7x7x7)/Cube 1: Measurement grid:

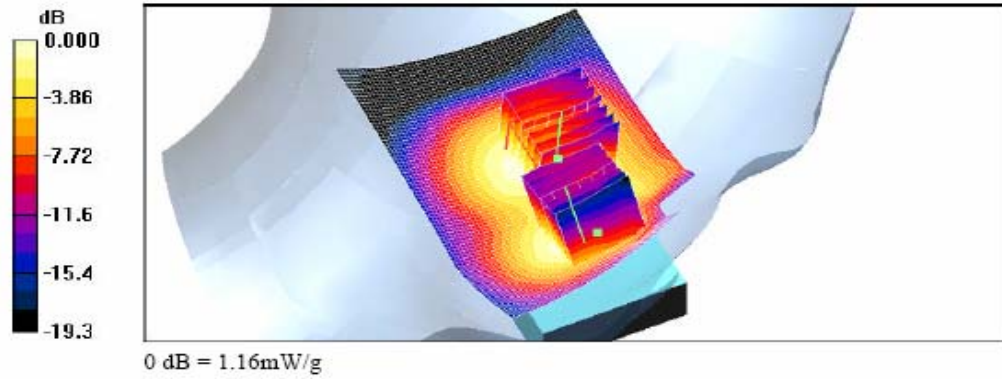
$dx=5$ mm, $dy=5$ mm, $dz=5$ mm

Reference Value = 15.1 V/m; Power Drift = -0.509 dB

Peak SAR (extrapolated) = 1.60 W/kg

SAR(1 g) = 1.05 mW/g; SAR(10 g) = 0.620 mW/g

Maximum value of SAR (measured) = 1.16 mW/g



Date/Time: 18/11/2005 12:11:41 PM

Test Laboratory: RTS

Body Worn LeatherHolster_Back_CDMA
1900_Low_Chan_RC3_S055_Amb_Temp_23_8_C_Liq_Temp_23_1_C

DUT: BlackBerry Wireless Handheld; Type: Sample

Communication System: CDMA 1900; Frequency: 1851.25 MHz; Duty Cycle: 1:1
Medium parameters used: $f = 1851.25$ MHz; $s = 1.57$ mho/m; $\epsilon_r = 51$; $\rho = 1000$ kg/m³
Phantom section: Flat Section

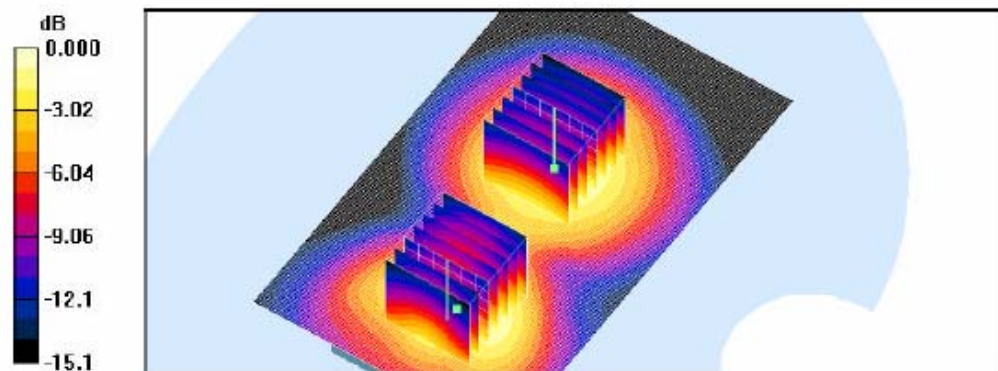
DASY4 Configuration:

- Probe: ET3DV6 - SN1643; ConvF(4.69, 4.69, 4.69); Calibrated: 15/03/2005
- Sensor-Surface: 4mm (Mechanical And Optical Surface Detection)
- Electronics: DAE3 Sn473; Calibrated: 14/03/2005
- Phantom: SAM 2; Type: SAM 4.0; Serial: 1080
- Measurement SW: DASY4, V4.6 Build 23; Postprocessing SW: SEMCAD, V1.8 Build 160

Body Worn/Area Scan (91x151x1): Measurement grid: dx=10mm, dy=10mm
Maximum value of SAR (interpolated) = 1.11 mW/g

Body Worn/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 22.5 V/m; Power Drift = 0.732 dB
Peak SAR (extrapolated) = 1.37 W/kg
SAR(1 g) = 1.03 mW/g; SAR(10 g) = 0.647 mW/g
Maximum value of SAR (measured) = 1.14 mW/g

Body Worn/Zoom Scan (7x7x7)/Cube 1: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 22.5 V/m; Power Drift = 0.732 dB
Peak SAR (extrapolated) = 1.65 W/kg
SAR(1 g) = 1.08 mW/g; SAR(10 g) = 0.670 mW/g
Maximum value of SAR (measured) = 1.17 mW/g



Date/Time: 18/11/2005 2:34:00 PM

Test Laboratory: RTS

Right_Side_Touch_CDMA1900_High_Chan_RC1_SO2_Ambient_Temp_24_2_C

Liq Temp 23.3 C

DUT: BlackBerry Wireless Handheld; Type: Sample ; Serial: Not Specified

Communication System: CDMA 1900; Frequency: 1908.5 MHz; Duty Cycle: 1:1

Medium parameters used: $f = 1908.5$ MHz; $s = 1.45$ mho/m; $\epsilon_r = 38.4$; $\rho = 1000$ kg/m³

Phantom section: Right Section

DASY4 Configuration:

- Probe: ET3DV6 - SN1643; ConvF(5.11, 5.11, 5.11); Calibrated: 15/03/2005
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn473; Calibrated: 14/03/2005
- Phantom: SAM 1; Type: SAM 4.0; Serial: 1076
- Measurement SW: DASY4, V4.6 Build 23; Postprocessing SW: SEMCAD, V1.8 Build 160

Touch position - High/Area Scan (61x91x1): Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 1.41 mW/g

Touch position - High/Zoom Scan (7x7x7) (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 16.1 V/m; Power Drift = -0.083 dB

Peak SAR (extrapolated) = 1.83 W/kg

SAR(1 g) = 1.26 mW/g; SAR(10 g) = 0.756 mW/g

Maximum value of SAR (measured) = 1.40 mW/g

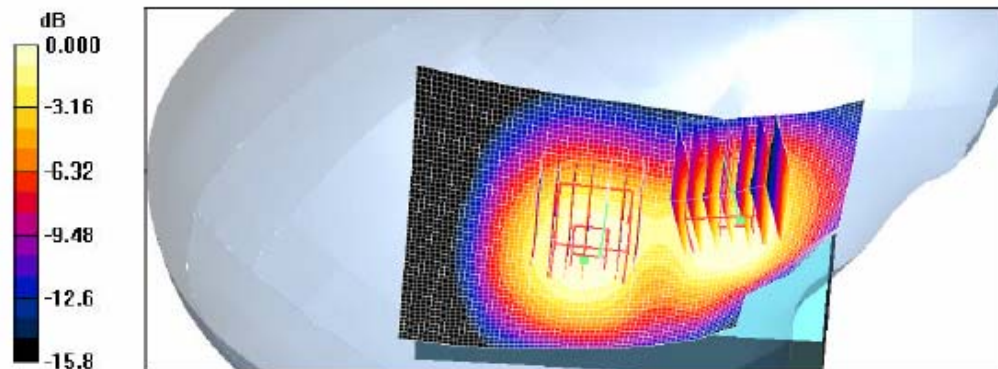
Touch position - High/Zoom Scan (7x7x7) (7x7x7)/Cube 1: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 16.1 V/m; Power Drift = -0.083 dB

Peak SAR (extrapolated) = 1.22 W/kg

SAR(1 g) = 0.907 mW/g; SAR(10 g) = 0.601 mW/g

Maximum value of SAR (measured) = 0.980 mW/g



Date/Time: 21/11/2005 10:36:12 AM

Test Laboratory: RTS

Right_Side_Touch_CDMA1900_High_Chan_RC3_SO55_HalfRate

Ambient_Temp_24_8_C_Liquid_Temp_23_4_C

DUT: BlackBerry Wireless Handheld; Type: Sample

Communication System: CDMA 1900; Frequency: 1908.5 MHz; Duty Cycle: 1:2

Medium parameters used: $f = 1908.5$ MHz; $s = 1.45$ mho/m; $\epsilon_r = 38.4$; $\rho = 1000$ kg/m³

Phantom section: Right Section

DASY4 Configuration:

- Probe: ET3DV6 - SN1643; ConvF(5.11, 5.11, 5.11); Calibrated: 15/03/2005
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn473; Calibrated: 14/03/2005
- Phantom: SAM 1; Type: SAM 4.0; Serial: 1076
- Measurement SW: DASY4, V4.6 Build 23; Postprocessing SW: SEMCAD, V1.8 Build 160

Touch position - High/Area Scan (61x91x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 1.37 mW/g

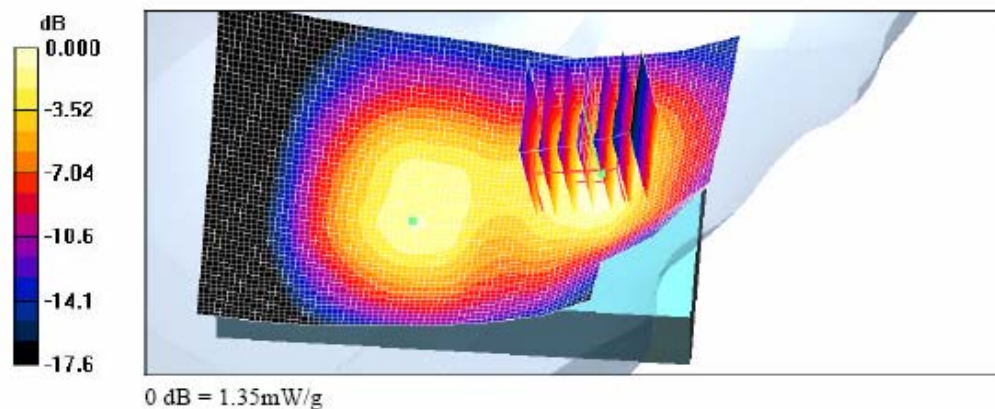
Touch position - High/Zoom Scan (7x7x7) (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 14.0 V/m; Power Drift = -0.092 dB

Peak SAR (extrapolated) = 1.75 W/kg

SAR(1 g) = 1.2 mW/g; SAR(10 g) = 0.709 mW/g

Maximum value of SAR (measured) = 1.35 mW/g



Date/Time: 21/11/2005 9:42:48 AM

Test Laboratory: RTS

Right_Side_Touch_CDMA1900_High_Chan_RC1_SO3_1_8th

Ambient_Temp_24_5_C_Liquid_Temp_23_2_C

DUT: BlackBerry Wireless Handheld; Type: Sample

Communication System: CDMA 1900; Frequency: 1908.5 MHz; Duty Cycle: 1:8

Medium parameters used: $f = 1908.5$ MHz; $s = 1.45$ mho/m; $\epsilon_r = 38.4$; $\rho = 1000$ kg/m³

Phantom section: Right Section

DASY4 Configuration:

- Probe: ET3DV6 - SN1643; ConvF(5.11, 5.11, 5.11); Calibrated: 15/03/2005
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn473; Calibrated: 14/03/2005
- Phantom: SAM 1; Type: SAM 4.0; Serial: 1076
- Measurement SW: DASY4, V4.6 Build 23; Postprocessing SW: SEMCAD, V1.8 Build 160

Touch position - High/Area Scan (61x91x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 1.67 mW/g

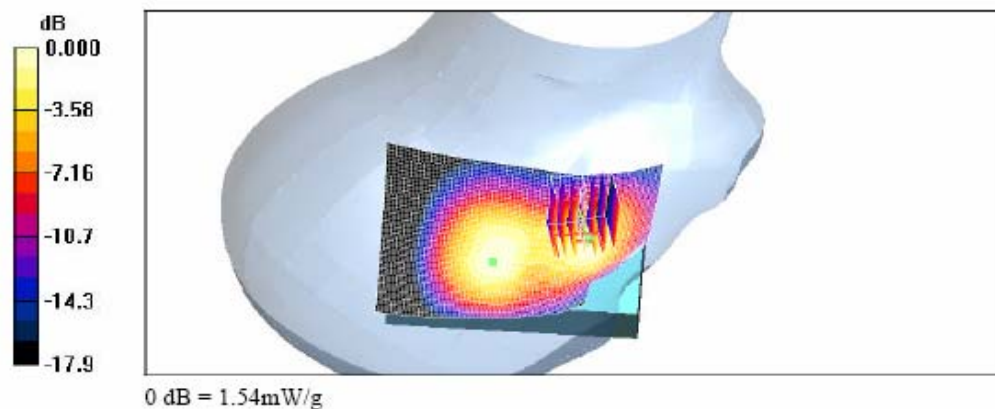
Touch position - High/Zoom Scan (7x7x7) (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 15.7 V/m; Power Drift = -0.342 dB

Peak SAR (extrapolated) = 2.26 W/kg

SAR(1 g) = 1.4 mW/g; SAR(10 g) = 0.807 mW/g

Maximum value of SAR (measured) = 1.54 mW/g



Date/Time: 21/11/2005 4:25:54 PM

Test Laboratory: RTS

**Body Worn_LeatherHolster_Back_CDMA 1900_EVDO_High
Rate_Low_Chan_Amb_Temp_23_4_C_Liq_Temp_22_8_C**

DUT: BlackBerry Wireless Handheld; Type: Sample

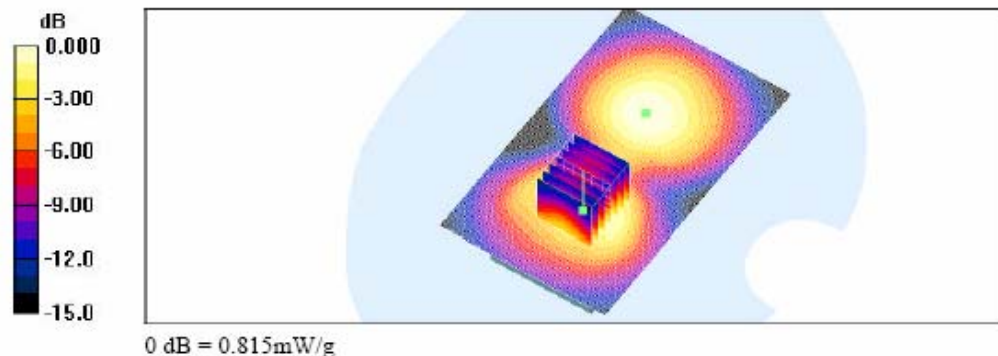
Communication System: CDMA 1900; Frequency: 1851.25 MHz; Duty Cycle: 1:1
Medium parameters used: $f = 1851.25$ MHz; $s = 1.57$ mho/m; $\epsilon_r = 51$; $\rho = 1000$ kg/m³
Phantom section: Flat Section

DASY4 Configuration:

- Probe: ET3DV6 - SN1643; ConvF(4.69, 4.69, 4.69); Calibrated: 15/03/2005
- Sensor-Surface: 4mm (Mechanical And Optical Surface Detection)
- Electronics: DAE3 Sn473; Calibrated: 14/03/2005
- Phantom: SAM 2; Type: SAM 4.0; Serial: 1080
- Measurement SW: DASY4, V4.6 Build 23; Postprocessing SW: SEMCAD, V1.8 Build 160

Body Worn/Area Scan (91x151x1): Measurement grid: dx=10mm, dy=10mm
Maximum value of SAR (interpolated) = 0.820 mW/g

Body Worn/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 16.6 V/m; Power Drift = -0.144 dB
Peak SAR (extrapolated) = 1.00 W/kg
SAR(1 g) = 0.741 mW/g; SAR(10 g) = 0.457 mW/g
Maximum value of SAR (measured) = 0.815 mW/g



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Appendix C: Probe calibration data

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Accreditation No.: **SCS 108**

Client **RIM**

Certificate No: **ET3-1643_Mar05**

CALIBRATION CERTIFICATE

Object **ET3DV6 - SN:1643**

Calibration procedure(s) **QA CAL-01.v5
 Calibration procedure for dosimetric E-field probes**

Calibration date: **March 15, 2005**

Condition of the calibrated item **In Tolerance**

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

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

Calibration Equipment Used (M&TE critical for calibration):

Primary Standards	ID #	Cal Date (Calibrated by Certificate No.)	Scheduled Calibration
Power meter E4419B	GB41293874	5-May-04 (METAS, No. 251-00388)	May-05
Power sensor E4412A	MY41495277	5-May-04 (METAS, No. 251-00388)	May-05
Reference 3 dB Attenuator	SN: S5054 (3c)	13-Aug-04 (METAS, No. 251-00403)	Aug-05
Reference 20 dB Attenuator	SN: S5086 (20b)	3-May-04 (METAS, No. 251-00389)	May-05
Reference 30 dB Attenuator	SN: S5129 (30b)	13-Aug-04 (METAS, No. 251-00404)	Aug-05
Reference Probe ES3DV2	SN: 3013	7-Jan-05 (SPEAG, No. ES3-3013_Jan05)	Jan-06
DAE4	SN: 617	13-Jan-05 (SPEAG, No. DAE4-617_Jan05)	Jan-06

Secondary Standards	ID #	Check Date (in house)	Scheduled Check
Power sensor HP 8481A	MY41092180	18-Sep-02 (SPEAG, in house check Oct-03)	In house check: Oct-05
RF generator HP 8648C	US3642U01700	4-Aug-99 (SPEAG, in house check Dec-03)	In house check: Dec-05
Network Analyzer HP 8753F	US37390585	18-Oct-01 (SPEAG, in house check Nov-04)	In house check: Nov-05

Calibrated by:	Nico Vetterli	Name	Nico Vetterli	Function	Laboratory Technician	Signature	
Approved by:	Katja Pokovic	Name	Katja Pokovic	Function	Technical Manager	Signature	

Issued: March 15, 2005

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Accreditation No.: **SCS 108**

Glossary:

TSL	tissue simulating liquid
NORM _{x,y,z}	sensitivity in free space
ConF	sensitivity in TSL / NORM _{x,y,z}
DCP	diode compression point
Polarization φ	φ rotation around probe axis
Polarization ϑ	ϑ rotation around an axis that is in the plane normal to probe axis (at measurement center), i.e., $\vartheta = 0$ is normal to probe axis

Calibration is Performed According to the Following Standards:

- 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) CENELEC EN 50361, "Basic standard for the measurement of Specific Absorption Rate related to human exposure to electromagnetic fields from mobile phones (300 MHz - 3 GHz), July 2001

Methods Applied and Interpretation of Parameters:

- **NORM_{x,y,z}**: Assessed for E-field polarization $\vartheta = 0$ ($f \leq 900$ MHz in TEM-cell; $f > 1800$ MHz: R22 waveguide). NORM_{x,y,z} are only intermediate values, i.e., the uncertainties of NORM_{x,y,z} does not effect the E^2 -field uncertainty inside TSL (see below *ConvF*).
- **NORM(f)_{x,y,z} = NORM_{x,y,z} * frequency_response** (see Frequency Response Chart). This linearization is implemented in DASY4 software versions later than 4.2. The uncertainty of the frequency response is included in the stated uncertainty of *ConvF*.
- **DCP_{x,y,z}**: DCP are numerical linearization parameters assessed based on the data of power sweep (no uncertainty required). DCP does not depend on frequency nor media.
- **ConvF and Boundary Effect Parameters**: Assessed in flat phantom using E-field (or Temperature Transfer Standard for $f \leq 800$ MHz) and inside waveguide using analytical field distributions based on power measurements for $f > 800$ MHz. The same setups are used for assessment of the parameters applied for boundary compensation (alpha, depth) of which typical uncertainty values are given. These parameters are used in DASY4 software to improve probe accuracy close to the boundary. The sensitivity in TSL corresponds to NORM_{x,y,z} * *ConvF* whereby the uncertainty corresponds to that given for *ConvF*. A frequency dependent *ConvF* is used in DASY version 4.4 and higher which allows extending the validity from ± 50 MHz to ± 100 MHz.
- **Spherical isotropy (3D deviation from isotropy)**: in a field of low gradients realized using a flat phantom exposed by a patch antenna.
- **Sensor Offset**: The sensor offset corresponds to the offset of virtual measurement center from the probe tip (on probe axis). No tolerance required.

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ET3DV6 SN:1643

March 15, 2005

Probe ET3DV6

SN:1643

Manufactured:	November 7, 2001
Last calibrated:	September 21, 2004
Recalibrated:	March 15, 2005

Calibrated for DASY Systems

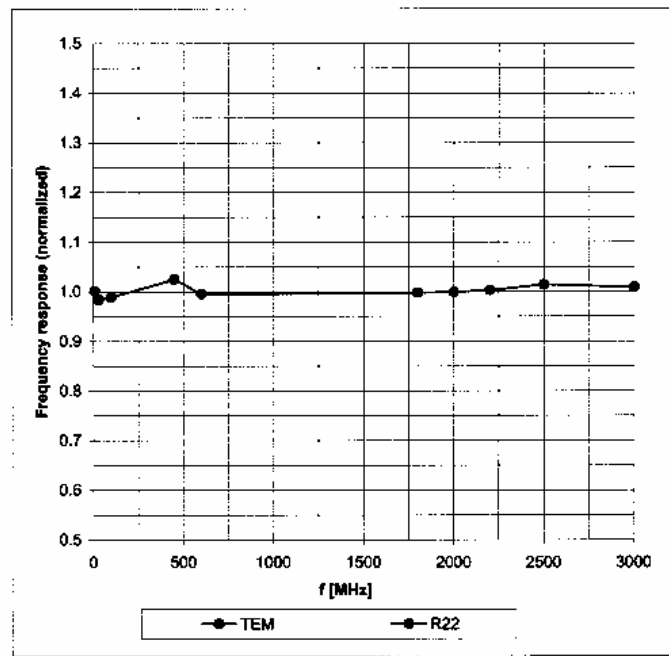
(Note: non-compatible with DASY2 system!)

ET3DV6 SN:1643

March 15, 2005

Frequency Response of E-Field

(TEM-Cell:if1110 EXX, Waveguide: R22)

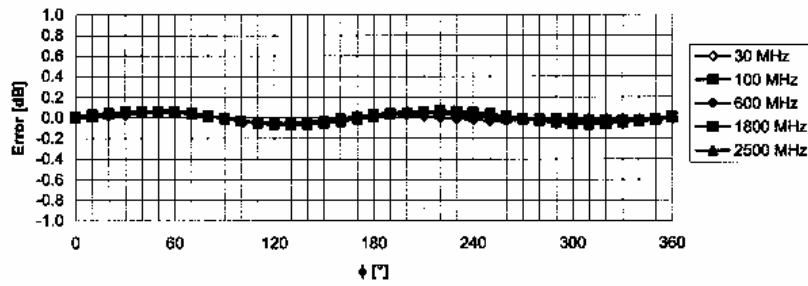
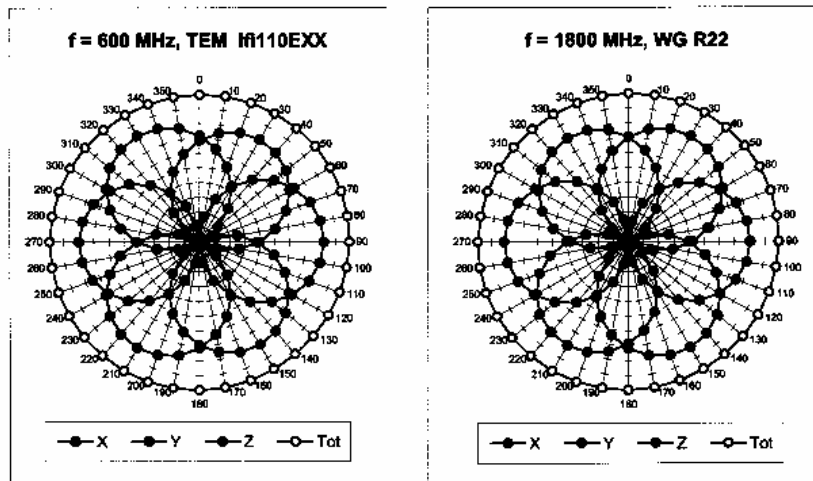


Uncertainty of Frequency Response of E-field: $\pm 6.3\%$ ($k=2$)

ET3DV6 SN:1643

March 15, 2005

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

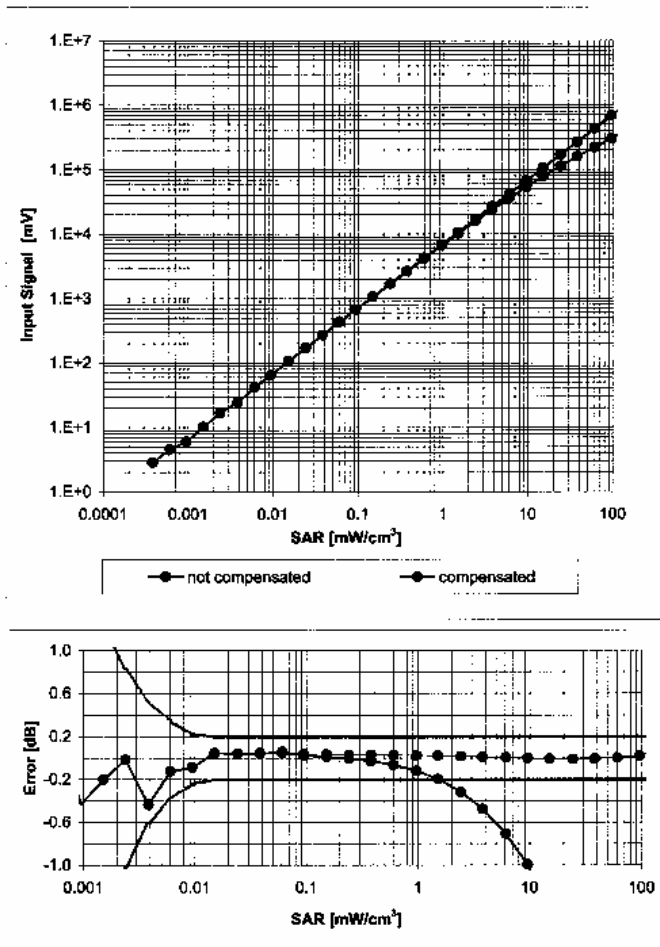


Uncertainty of Axial Isotropy Assessment: $\pm 0.5\%$ ($k=2$)

ET3DV6 SN:1643

March 15, 2005

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

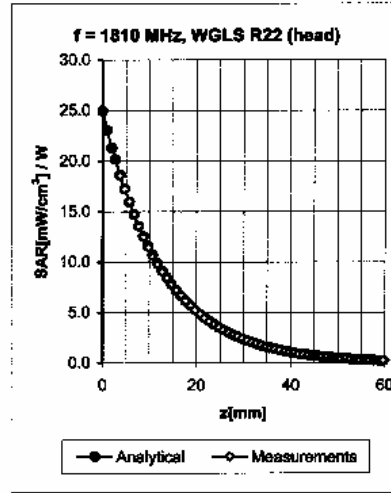
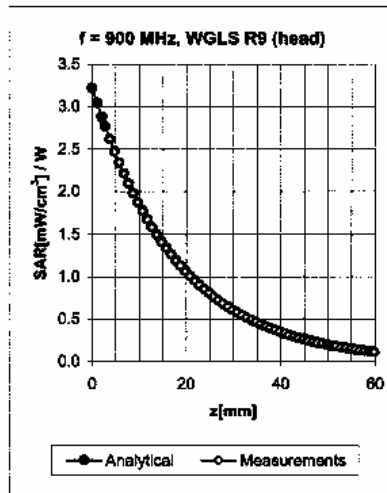


Uncertainty of Linearity Assessment: $\pm 0.6\%$ (k=2)

ET3DV6 SN:1643

March 15, 2005

Conversion Factor Assessment



f [MHz]	Validity [MHz] ^c	TSL	Permittivity	Conductivity	Alpha	Depth	ConvF	Uncertainty
900	± 50 / ± 100	Head	41.5 ± 5%	0.97 ± 5%	0.67	1.77	6.48 ± 11.0% (k=2)	
1810	± 50 / ± 100	Head	40.0 ± 5%	1.40 ± 5%	0.52	2.58	5.11 ± 11.0% (k=2)	
900	± 50 / ± 100	Body	55.0 ± 5%	1.05 ± 5%	0.53	2.09	6.17 ± 11.0% (k=2)	
1810	± 50 / ± 100	Body	53.3 ± 5%	1.52 ± 5%	0.52	2.87	4.69 ± 11.0% (k=2)	

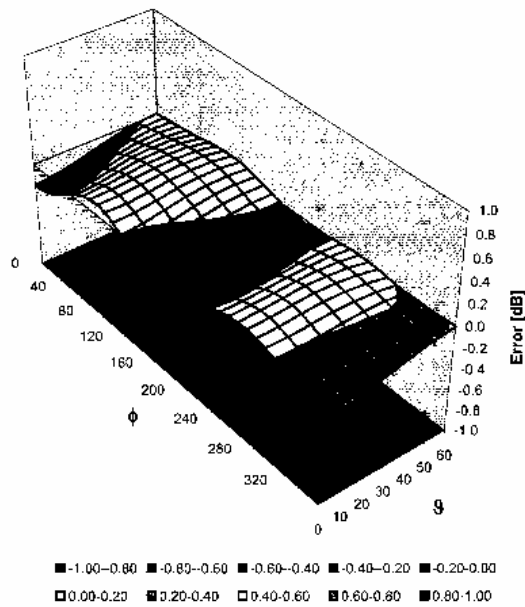
^c The validity of ± 100 MHz only applies for DASY v4.4 and higher (see Page 2). The uncertainty is the RSS of the ConvF uncertainty at calibration frequency and the uncertainty for the indicated frequency band.

ET3DV6 SN:1643

March 15, 2005

Deviation from Isotropy in HSL

Error (ϕ , θ), $f = 900$ MHz



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

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Client

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Certificate No.: **ER3-2286_Jan05**

CALIBRATION CERTIFICATE			
Object	ER3DV6 - SCS 2286		
Calibration procedure(s)	QA/CAL-02.v4 Calibration procedure for E-field probes optimized for close near field evaluations in air		
Calibration date:	January 7, 2005		
Condition of the calibrated item	In Tolerance		
This calibration certificate documents the traceability to national standards, which realize the physical units of measurements (SI). The measurements and the uncertainties with confidence probability are given on the following pages and are part of the certificate.			
All calibrations have been conducted in the closed laboratory facility: environment temperature (22 ± 3)°C and humidity < 70%.			
Calibration Equipment used (M&TE critical for calibration)			
Primary Standards	ID #	Cal Date (Calibrated by, Certificate No.)	Scheduled Calibration
Power meter E4419B	GB41293874	5-May-04 (METAS, No. 251-00388)	May-05
Power sensor E4412A	MY41495277	5-May-04 (METAS, No. 251-00388)	May-05
Reference 3 dB Attenuator	SN: S5054 (3c)	10-Aug-04 (METAS, No. 251-00403)	Aug-05
Reference 20 dB Attenuator	SN: S5086 (20b)	3-May-04 (METAS, No. 251-00389)	May-05
Reference 30 dB Attenuator	SN: S5129 (30b)	10-Aug-04 (METAS, No. 251-00404)	Aug-05
Reference Probe ER3DV6	SN: 2328	6-Oct-04 (SPEAG, No. ER3-2328_Oct04)	Oct-05
DAE4	SN: 617	29-Sep-04 (SPEAG, No. DAE4-617_Sep04)	Sep-05
Secondary Standards	ID #	Check Date (in house)	Scheduled Check
Power sensor HP 8481A	MY41092180	18-Sep-02 (SPEAG, in house check Oct-03)	In house check: Oct 05
RF generator HP 8648C	US3642U01700	4-Aug-99 (SPEAG, in house check Dec-03)	In house check: Dec-05
Network Analyzer HP 8753E	US37390585	18-Oct-01 (SPEAG, in house check Nov-04)	In house check: Nov 05
Calibrated by:	Name Nico Veltori	Function Laboratory Technician	Signature
Approved by:	Name Katja Polovic	Function Technical Manager	Signature
			Issued: January 13, 2005
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Accreditation No.: **SCS 108**

Glossary:

NORM_{x,y,z} sensitivity in free space
DCP diode compression point
Polarization ϕ ϕ rotation around probe axis
Polarization ϑ ϑ rotation around an axis that is in the plane normal to probe axis (at measurement center), i.e., $\vartheta = 0$ is normal to probe axis
Connector Angle information used in DASY system to align probe sensor X to the robot coordinate system

Calibration is Performed According to the Following Standards:

- a) IEEE Std 1309-1996, " IEEE Standard for calibration of electromagnetic field sensors and probes, excluding antennas, from 9 kHz to 40 GHz", 1996.

Methods Applied and Interpretation of Parameters:

- **NORM_{x,y,z}**: Assessed for E-field polarization $\vartheta = 0$ for XY sensors and $\vartheta = 90$ for Z sensor ($f \leq 900$ MHz in TEM-cell; $f > 1800$ MHz: R22 waveguide).
- **NORM(f)_{x,y,z}** = **NORM_{x,y,z}** * *frequency_response* (see Frequency Response Chart).
- **DCP_{x,y,z}**: DCP are numerical linearization parameters assessed based on the data of power sweep (no uncertainty required). DCP does not depend on frequency.
- **Spherical isotropy (3D deviation from isotropy)**: in a locally homogeneous field realized using an open waveguide setup.
- **Sensor Offset**: The sensor offset corresponds to the offset of virtual measurement center from the probe tip (on probe axis). No tolerance required.
- **Connector Angle**: The angle is assessed using the information gained by determining the **NORM_x** (no uncertainty required).

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ER3DV6 SN:2286

January 7, 2005

Probe ER3DV6

SN:2286

Manufactured:	September 19, 2002
Last calibrated:	September 22, 2004
Recalibrated:	January 7, 2005

Calibrated for DASY Systems

(Note: non-compatible with DASY2 system!)

ER3DV6 SN:2286

January 7, 2005

DASY - Parameters of Probe: ER3DV6 SN:2286

Sensitivity in Free Space [$\mu\text{V}/(\text{V}/\text{m})^2$]		Diode Compression ^A	
NormX	2.14 ± 10.1 % (k=2)	DCP X	94 mV
NormY	1.44 ± 10.1 % (k=2)	DCP Y	94 mV
NormZ	1.51 ± 10.1 % (k=2)	DCP Z	95 mV

Frequency Correction

X	0.0
Y	0.0
Z	0.0

Sensor Offset (Probe Tip to Sensor Center)

X	2.5 mm
Y	2.5 mm
Z	2.5 mm

Connector Angle -13 °

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%.

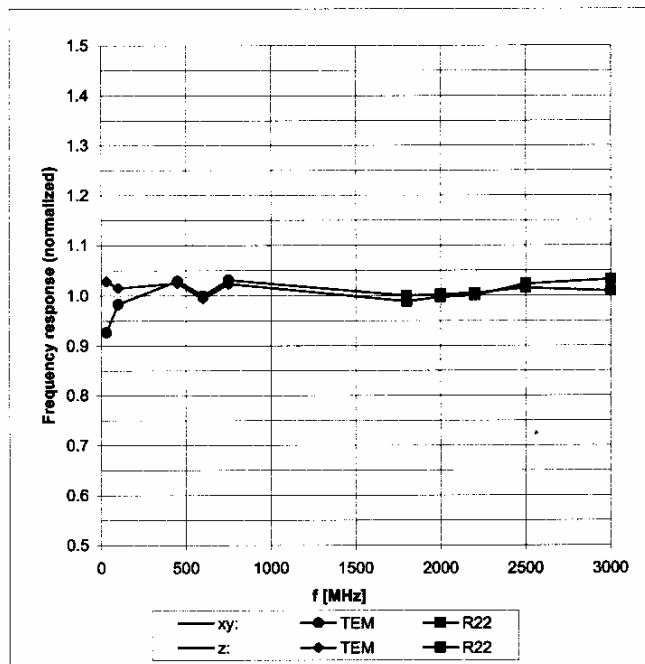
^A numerical linearization parameter: uncertainty not required

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Frequency Response of E-Field

(TEM-Cell:ifi110 EXX, Waveguide R22)

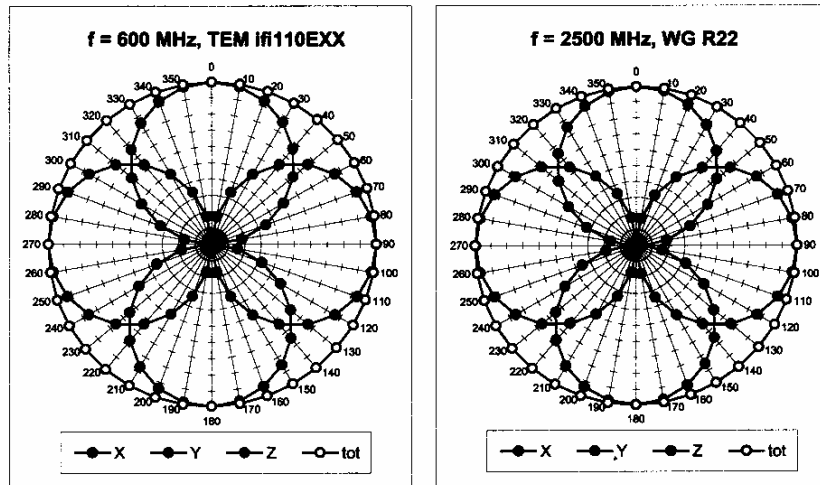


Uncertainty of Frequency Response of E-field: $\pm 6.3\%$ ($k=2$)

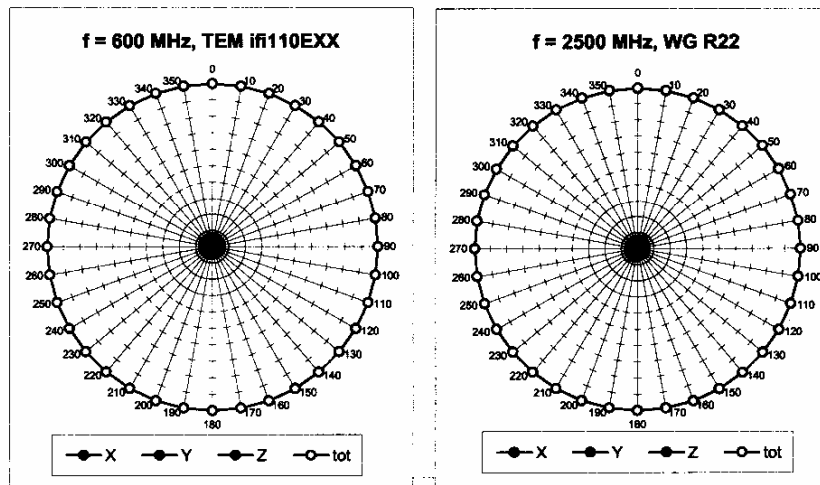
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Receiving Pattern (ϕ), $\vartheta = 0^\circ$



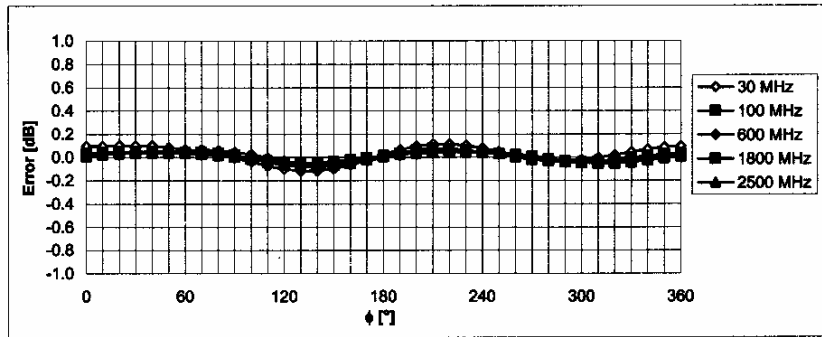
Receiving Pattern (ϕ), $\vartheta = 90^\circ$



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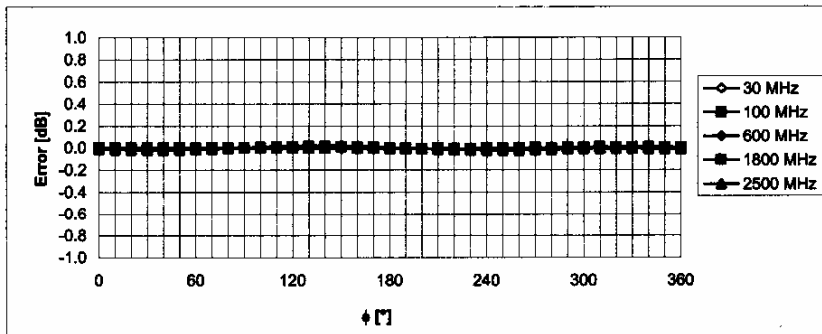
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Receiving Pattern (ϕ), $\vartheta = 0^\circ$



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

Receiving Pattern (ϕ), $\vartheta = 90^\circ$

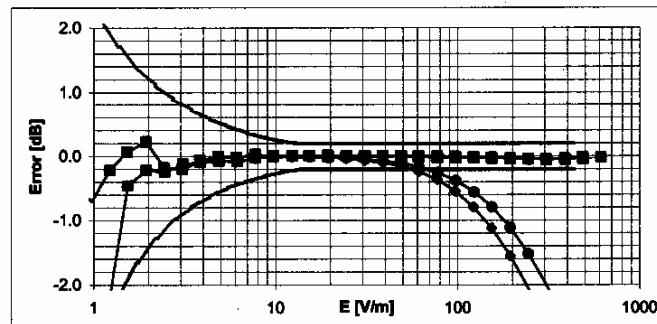
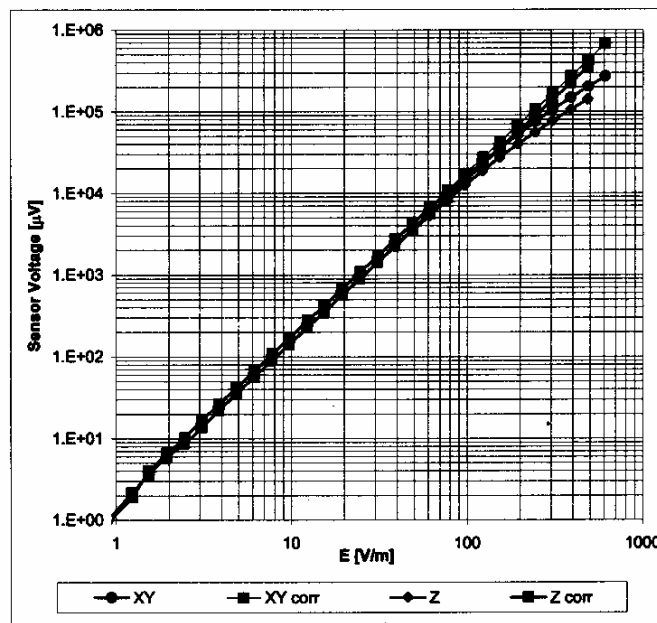


Uncertainty of Axial Isotropy Assessment: $\pm 0.5\%$ ($k=2$)

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Dynamic Range f(E-field) (Waveguide R22, f = 1800 MHz)

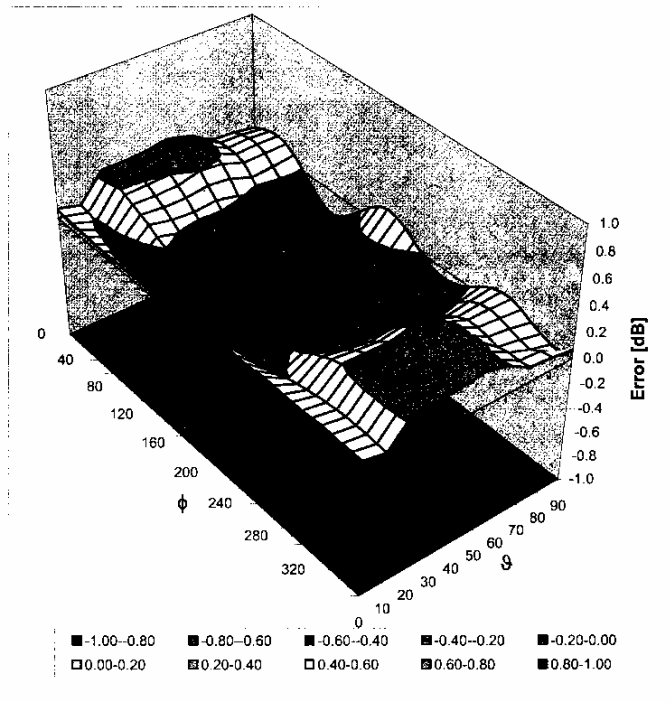


Uncertainty of Linearity Assessment: $\pm 0.6\%$ (k=2)

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Deviation from Isotropy in Air Error (ϕ , θ), $f = 900$ MHz



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