ERICSSON

To: Greg Czumak
Federal Communications Commission

From: Jim Sponsler
Date: 9-4-98

Correspondence ID 3040; Ericsson AXATR-387-A2

Attached is a response to the request for additional information concerning SAR for the AXATR-387-A2 submittal.

The report generated covers all four (4) concerns raised. These included conducting SAR measurements at the low, mid and high bands, validation of the dipole kit for the SAR system, a description of the procedures for measuring the output power and photos.

If you have any questions, please contact me or John Rothgeb.

Sincerley,

Jim

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Prepared (also subject responsible if other)		No.		
EUS/TR/XR/P Mark Douglas 919-472-6334		EUS/TR/X-98:1508		
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Appendix to “Test Report: Dosimetric Assessment Measurements for the Ericsson KF 788 Dual Band and Dual Mode Telephone.”

1. Introduction

In this appendix, additional information is provided about SAR measurements and measurement procedures for the KF 788. The measurements were conducted at the experimental dosimetry chamber at Ericsson, Inc. in Research Triangle Park, North Carolina, USA.

2. Measurement System

2.1 Brain tissue simulating liquid data

The constitutive parameters (relative permittivity, ε_r, and conductivity, σ) of the brain tissue simulating liquid are according to data provided by C. Gabriel and presented in [1]. The liquid was prepared according to the recipe in [1], and its constitutive parameters were measured immediately before performing any SAR measurements. The parameters were measured using a dielectric probe kit and a Hewlett-Packard HP 8752C network analyzer. Table 1 lists the parameters of the brain tissue simulating liquid at 900 MHz. These values are very close to the values given in [1] (ε_r = 42.5, σ = 0.85 S/m). At 837 MHz (the middle of the AMPS transmit band), the corresponding values are ε_r = 42.5 and σ = 0.79 S/m.

Frequency (MHz)	900
Relative permittivity, ε_r	41.8
Conductivity, σ (S/m)	0.849

Table 1: Constitutive parameters of the brain tissue simulating liquid.

2.2 Dipole Validation

After measuring the constitutive parameters of the brain tissue simulating liquid and immediately before performing the SAR measurements of the device under test (DUT), the measurement system was validated. The validation test is a SAR measurement of a dipole antenna at a fixed distance (15 mm) below the solution surface of a flat phantom.

Schmid and Partner Engineering AG (SPEAG) supplied the dipole antenna and the flat phantom (the flat section of the DASY generic twin phantom) [1]. A reference measurement of the SAR of the dipole antenna under the flat phantom is also provided. Table 2 is a comparison between the measured SAR and the reference measurement at 900 MHz, using an output power of 1 W. The measured values are in very good agreement with the reference values.

	SAR 1g (W/kg)	SAR 10g (W/kg)
measured	**9.12**	**5.99**
reference	**9.24**	**6.06**

Table 2: SAR measurement results for the validation dipole.

3. Output power

Immediately after each SAR measurement, the output power of the device is measured and recorded. Internal software allows the device to be programmed through the keypad to transmit in the given mode (AMPS or D-AMPS) at the maximum power level. After the transmitter is set and the SAR is measured, the output power is then measured by a Hewlett-Packard 437B power meter, which is connected to the antenna port using a special adapter after the antenna is removed.

4. Test results

The output power and SAR of the DUT (KF 788, serial number UA200HTJF2, with an AMP dual band 30mm stub antenna) were measured at three frequencies, corresponding to the low, middle and high frequencies of the AMPS band. The DUT was set to transmit in AMPS mode at the maximum power level. The results are shown in Table 3. The SAR values are peak SAR averaged over 1g and 10g of tissue. These values are all compliant with the SAR limit [2].

Device	Mode	Frequency (MHz)	Output Power (dBm)	SAR 1g (W/kg)	SAR 10g (W/kg)
KF 788	**AMPS**	**824**	**25.92**	**1.51**	**0.995**
	AMPS	**837**	**25.90**	**1.44**	**0.938**
	AMPS	**849**	**24.47**	**0.990**	**0.657**

Table 3: SAR measurement results for the Ericsson KF 788 telephone.

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5. Plots and Photographs

Figures 1-3 show plots of the SAR data taken by the DASY3 system. The remaining figures show the KF 788 device and the positioning of the device under the DASY3 phantom.

Ditto Emilia w/AMP stub

Generic Twin Phantom; Left Hand Section; Position: (80°,65°); Frequency: 824 [MHz]
Probe: ET3DV5 - SN1324; ConvF(4.99,4.99,4.99); Crest factor: 1.0; Brain 835 MHz: σ = 0.79 [mho/m] ε_r = 42.5 ρ = 1.03 [g/cm^3]
Cube 5x5x7: SAR (1g): 1.51 [mW/g], SAR (10g): 0.995 [mW/g], (Worst-case extrapolation)
Coarse: Dx = 20.0, Dy = 20.0, Dz = 10.0
Powerdrift: -0.17 dB
SN: UA200HTJF2

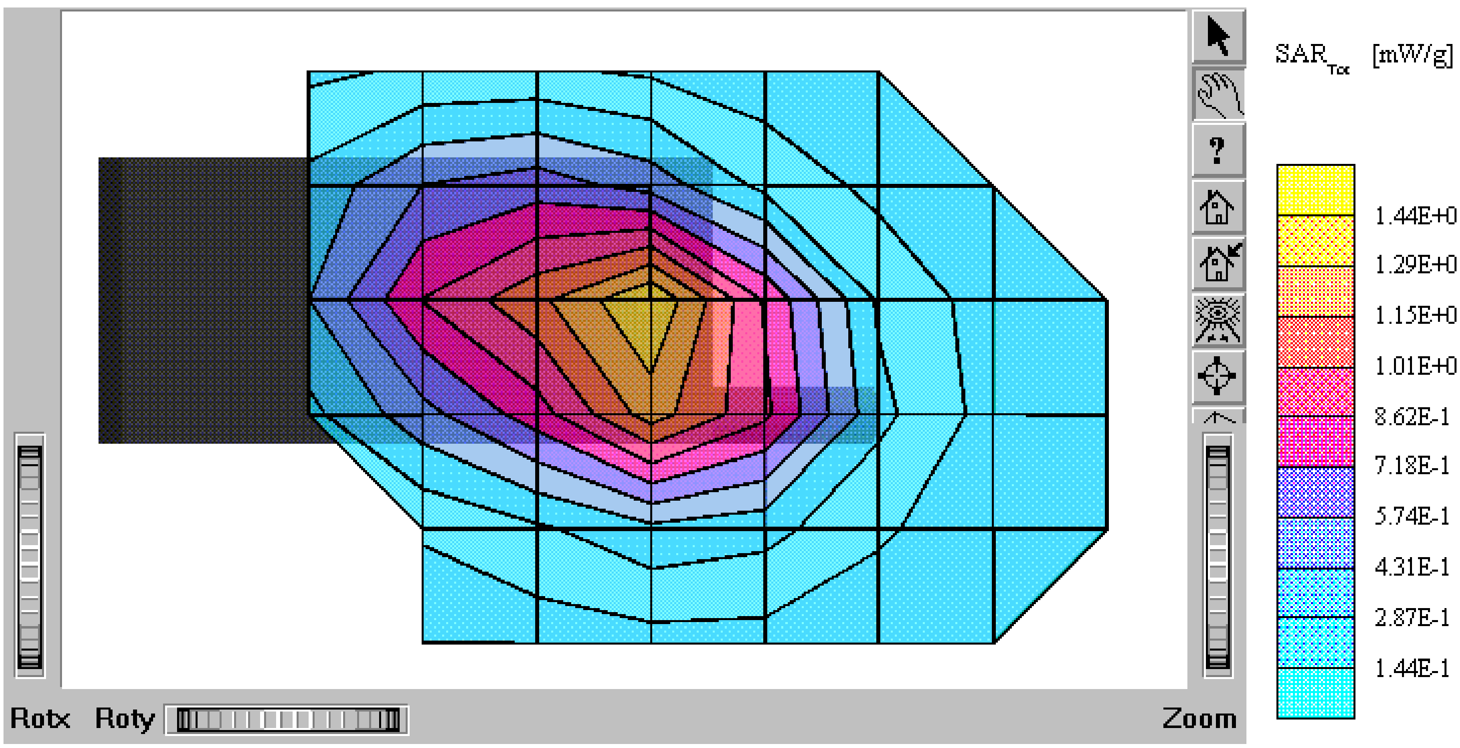

Fig. 1: Plot of SAR distribution of KF 788 at 824 MHz.

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Ditto Emilia w/AMP stub

Generic Twin Phantom; Left Hand Section; Position: (80°,65°); Frequency: 837 [MHz]
Probe: ET3DV5 - SN1324; ConvF(4.99,4.99,4.99); Crest factor: 1.0; Brain 835 MHz: σ = 0.79 [mho/m] ε_r = 42.5 ρ = 1.03 [g/cm^3]
Cube 5x5x7: SAR (1g): 1.44 [mW/g], SAR (10g): 0.938 [mW/g], (Worst-case extrapolation)
Coarse: Dx = 20.0, Dy = 20.0, Dz = 10.0
Powerdrift: -0.79 dB
SN: UA200HTJF2

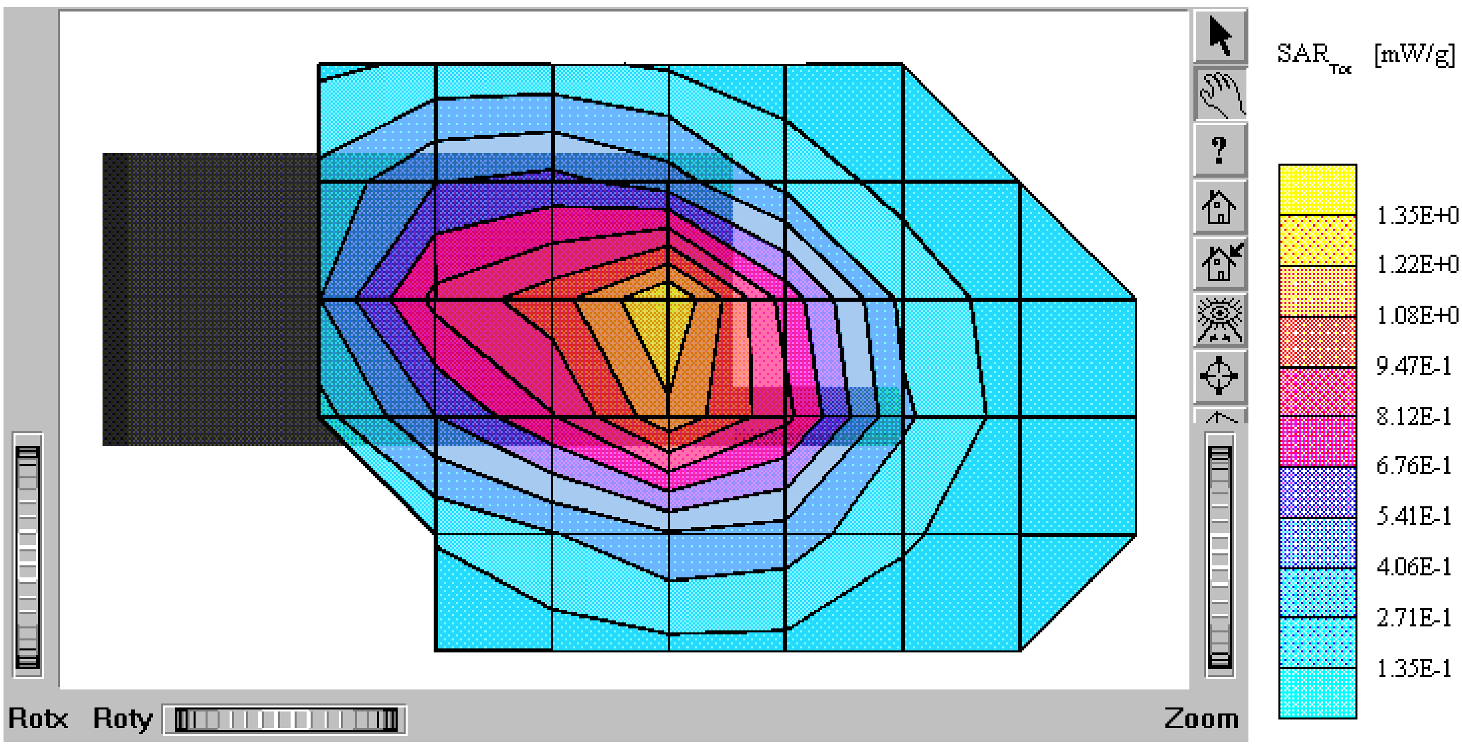

Fig. 2: Plot of SAR distribution of KF 788 at 837 MHz.

Ditto Emilia w/AMP stub

Generic Twin Phantom; Left Hand Section; Position: (80°,65°); Frequency: 849 [MHz]
Probe: ET3DV5 - SN1324; ConvF(4.99,4.99,4.99); Crest factor: 1.0; Brain 835 MHz: σ = 0.79 [mho/m] ε_r = 42.5 ρ = 1.03 [g/cm^3]
Cube 5x5x7: SAR (1g): 0.990 [mW/g], SAR (10g): 0.657 [mW/g], (Worst-case extrapolation)
Coarse: Dx = 20.0, Dy = 20.0, Dz = 10.0
Powerdrift: -0.95 dB
SN: UA200HTJF2

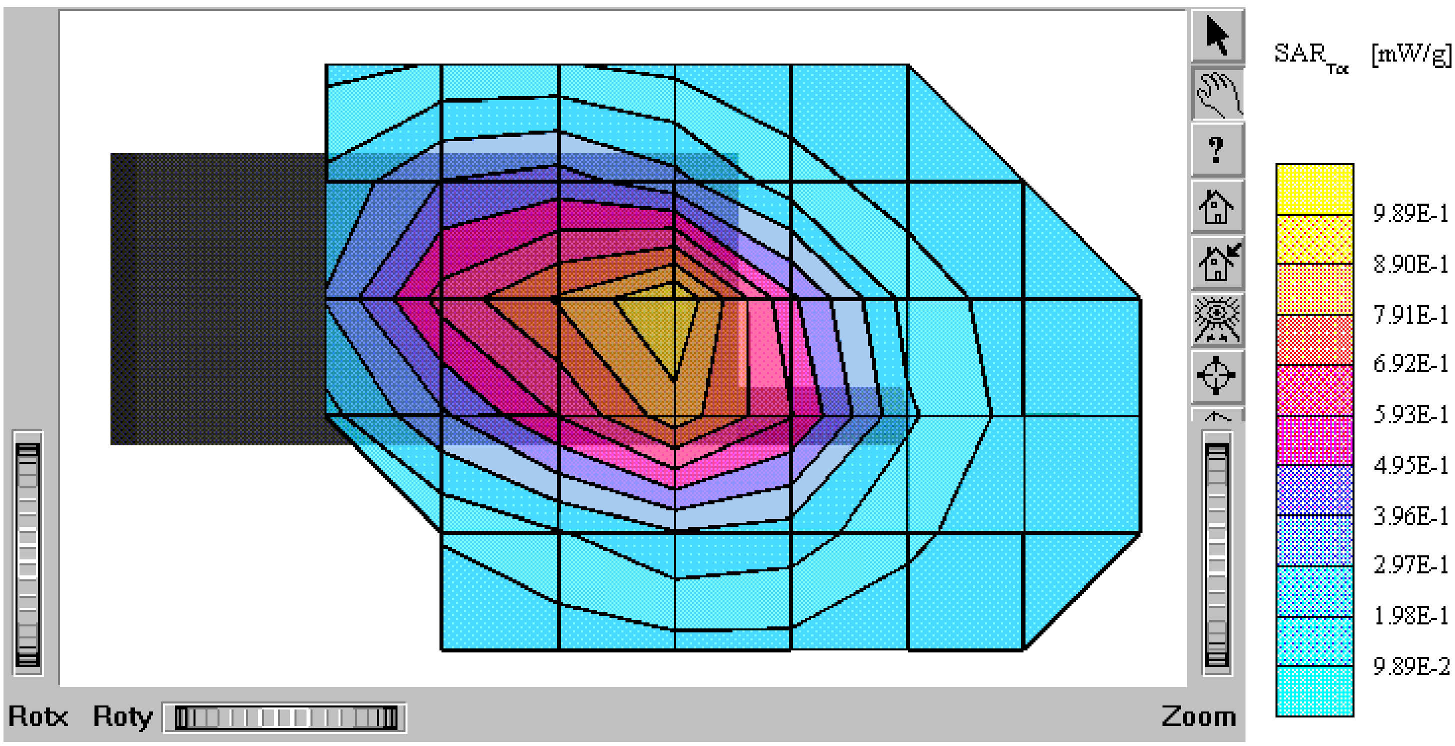

Fig. 3: Plot of SAR distribution of KF 788 at 849 MHz.

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Fig. 4: Front view of the KF 788.

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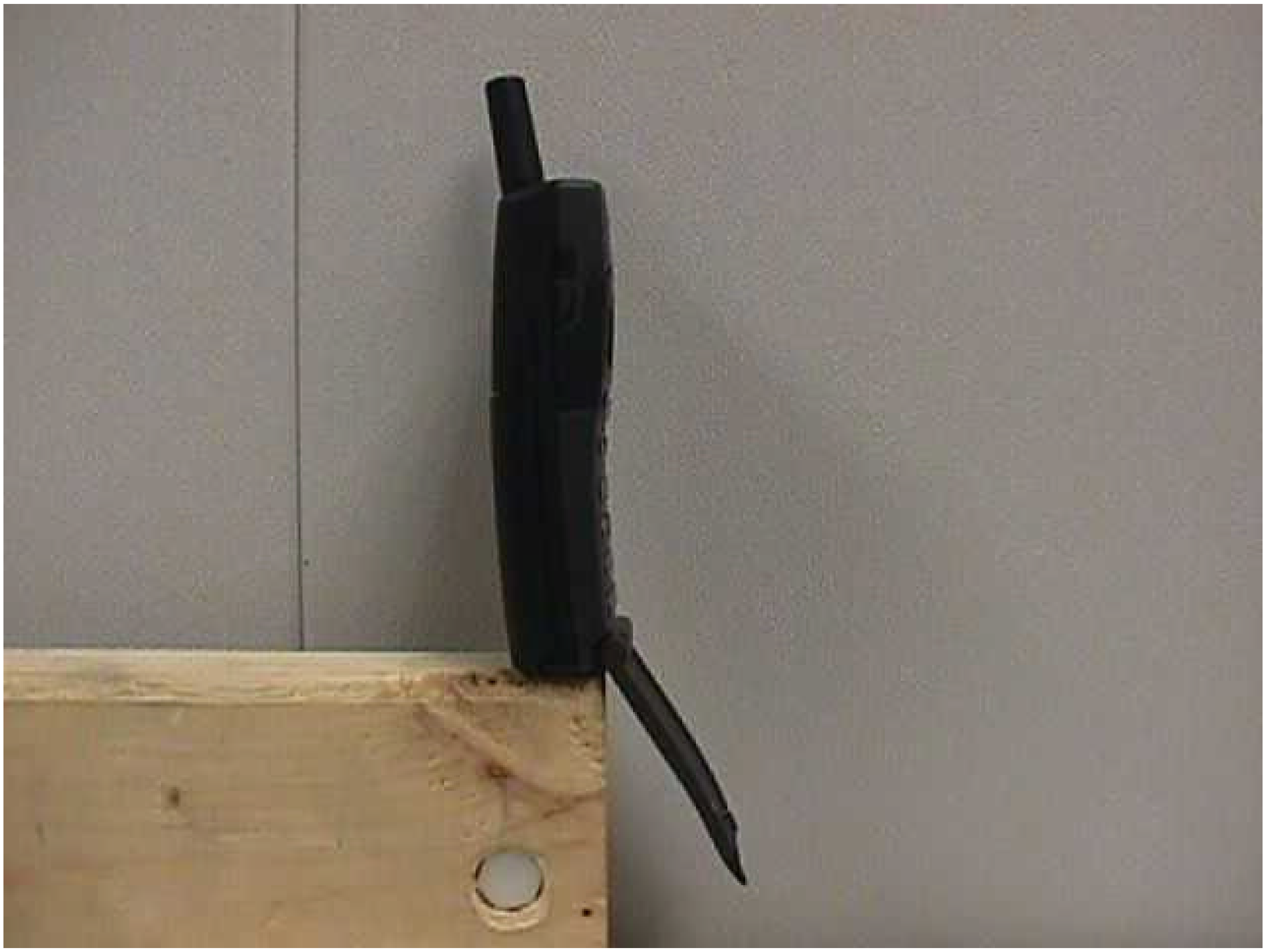

Fig. 5: Side view of the KF 788.

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Fig. 6: KF 788 position under the left side of the DASY3 head phantom, face view.

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Fig. 7: KF 788 position under the left side of the DASY3 head phantom, top view.

References

[1] Schmid & Partner Engineering AG, “Preliminary Manual: DASY3 V1.0 for Windows 95,” Zurich, Switzerland, Dec. 1997.

[2] Federal Communications Commission, “Guidelines for Evaluating the Environmental Effects of Radiofrequency Radiation,” Report and Order, ET Docket 93-62, FCC 96-326, 1996.