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ERA/T/UF Christer Törnevik				

Test report: measurements of SAR for the Globalstar FAU

Ericsson EMF research laboratory, Kista Sweden

Test Equipment:

Description	Asset number	Due date
DASY3 DAE3	S/N 304	9908
E-field probe ET3DV5	S/N1334	0001
Dipole validation kit D1800V2	S/N 015	9908
Dielectric probe kit HP85070B	S/N US33020318	0002
Network analyzer HP8752C	S/N 3410A03732	0002
Power meter R&S NRVS	S/N 848888/052	0003
Power sensor R&S NRV-Z5	S/N 828.3818.02	0002

Date: 990629

Measured by: Martin Siegbahn, M. Sc.

1 Introduction

This report presents the Specific Absorption Rate (SAR) measurement data for the Globalstar Fixed Access Unit (FAU). The measurements were conducted at the EMF Research Laboratory at Ericsson Research in Kista Stockholm according to the procedures described in the Ericsson SAR measurement specification[1]. The FAU was operated by Mark Fitter from the Satellite Hardware Group at BA/EML/RF.

2 Device Under Test

The Globalstar FAU of version FP1 (S/N010) was measured with the normal 1600 MHz quadrifilar helix antenna. Measurements were performed for the center frequency of the TX band, channel 250 or 1618 MHz. The output power level of the transmitter was the maximum level of 32 dBm and no power gating was activated, i.e a CW signal was used.

3 Electrical parameters of the tissue simulating liquid.

The parameters of the tissue simulating liquid for 1800 MHz were measured with the dielectric probe kit at 1618 MHz prior to the SAR measurement and the results are shown in the table 1 below.

Parameter	Value
Relative permittivity	41.8 (±5%)
Conductivity (S/m)	1.55 (±10%)

Table 1 The dielectric parameters at 1618 MHz for the tissue simulating liquid.

4 System validation

A system validation measurement for the DASY3 was performed using the 1800 MHz dipole validation kit and the obtained results are displayed in the table 2 below. The results were within 5% from the reference values obtained from the manufacturer of the system.

SAR	Assessed value	Reference value
1g (W/kg)	40.1	38.2
10g (W/kg)	20.2	19.5

Table 2 The system validation results at 1800 MHz and the corresponding reference values.

5 Test setup

The globalstar unit was positioned vertically and horizontally below the flat section of the DASY3 phantom at a distance of 5 cm between the antenna and the phantom shell. The setups for the two orientations are shown in Fig. 1 below.

Horizontal position, 5 cm distance

Vertical position, 5 cm distance

Figure 1. The setup of the Globalstar FAU below the flat section of the DASY3 phantom. The TX antenna is the left antenna as seen from the front side.

6 Test Results

The table below shows the measured 1g and 10g averaged SAR for the two measured positions.

Unit orientation	SAR 1g (W/kg)	SAR 10g (W/kg)
Horizontal	0.7	0.5
Vertical	0.3	0.2

Table 3 The measured 1g and 10g local peak SAR in W/kg for the Globalstar FAU.

The maximum 1g and 10g averaged SAR, 0.7 W/kg and 0.5 W/kg respectively, were found for the horizontal position which is reasonable considering the highest currents at the middle of the helix antenna. For the vertical position the 1g and 10g averaged SAR were only about 0.3 W/kg and 0.2 W/kg.

The measurement uncertainty for the DASY3 is 25%. The exposure limits to be applied for the results are 1.6 W/kg for 1g of tissue [2] and 2.0 W/kg for 10g [3][4].

7 Conclusions

The maximum 1g and 10g SAR measured for the Globalstar FAU with the standard helix antenna were about 0.7 W/kg and 0.5 W/kg respectively when the antenna was placed at a 5 cm distance from the phantom shell which are below the exposure limits.

8 References

[1] C. Törnevik, M. Siegbahn, T. Persson, M. Douglas and R. Plicanic, "Ericsson SAR Measurement Specification", Ericsson Internal Document, March 1999.

[2] ANSI/IEEE C95.1-1992, "Safety levels with respect to human exposure to radio frequency electromagnetic fields, 3 kHz to 300 GHz", The Institute of Electrical and Electronics Engineers Inc., New York, 1991.

[3] ICNIRP, "Guidelines for limiting exposure to time-varying electric, magnetic, and electromagnetic fields (up to 300 GHz)", International Commission on Non-Ionizing Radiation Protection (ICNIRP), Health Physics, vol. 74, pp 494-522, April 1998.

[4] CENELEC CLS/SC111B, "Human exposure to electromagnetic fields: High-frequency (10 kHz - 300 GHz)", European Prestandard ENV 50166-2:1995 E, West European Electrotechnical Standards Body (CENELEC), Jan. 1995.