SAR Data Report 02050956

```
  Start        :  9-May-02 05:20:46 pm
  End          :  9-May-02 05:26:49 pm
  Code Version : 4.08
  Robot Version: 4.08

Product Data:
  Type             : SAMSUNG
  Model Number     : SCH-A591
  Serial Number    : 2
  Frequency        : 824.70 MHz
  Transmit Pwr     : 0.280 W
  Antenna Type     : Helical
  Antenna Posn.    : In

Measurement Data:
  Phantom Name        : SAM-FLAT
  Phantom Type        : Uniphantom
  Tissue Type         : Muscle
  Tissue Dielectric   : 57.260
  Tissue Conductivity : 0.970
  Tissue Density      : 1.000
  Robot Name          : CRS

Probe Data:
  Probe Name              : PCT002
  Probe Type              : E Fld Triangle
  Frequency               : 835 MHz
  Tissue Type             : Muscle
  Calibrated Dielectric   : 55.700
  Calibrated Conductivity :  0.990
  Calibrated Density      :  1.000
  Probe Offset            :  2.400 mm
  Conversion Factor       :  4.900
  Probe Sensitivity :  3.597   3.474   3.049   mV/(mW/cm^2)
  Amplifier Gains   :  20.00   20.00   20.00

Sample:
  Rate:         6000 Samples/Sec
  Count:        100 Samples
  NIDAQ Gain:   5

Comments:
  CDMA MODE CH-1013
  Body
  CF=1; Amb. Temp= 21.3 'C; Liq. Temp=21.2 'C



Area Scan - Max Peak SAR Value at x=-1.0 y=-15.0 = 0.39 W/kg

Zoom Scan - Max Peak SAR Value at x=0.0 y=-14.0 z=0.0 = 0.60 W/kg

Max 1g SAR at x=0.0 y=-14.0 z=0.0 = 0.40 W/kg

Max 10g SAR at x=0.0 y=-14.0 z=0.0 = 0.26 W/kg
```

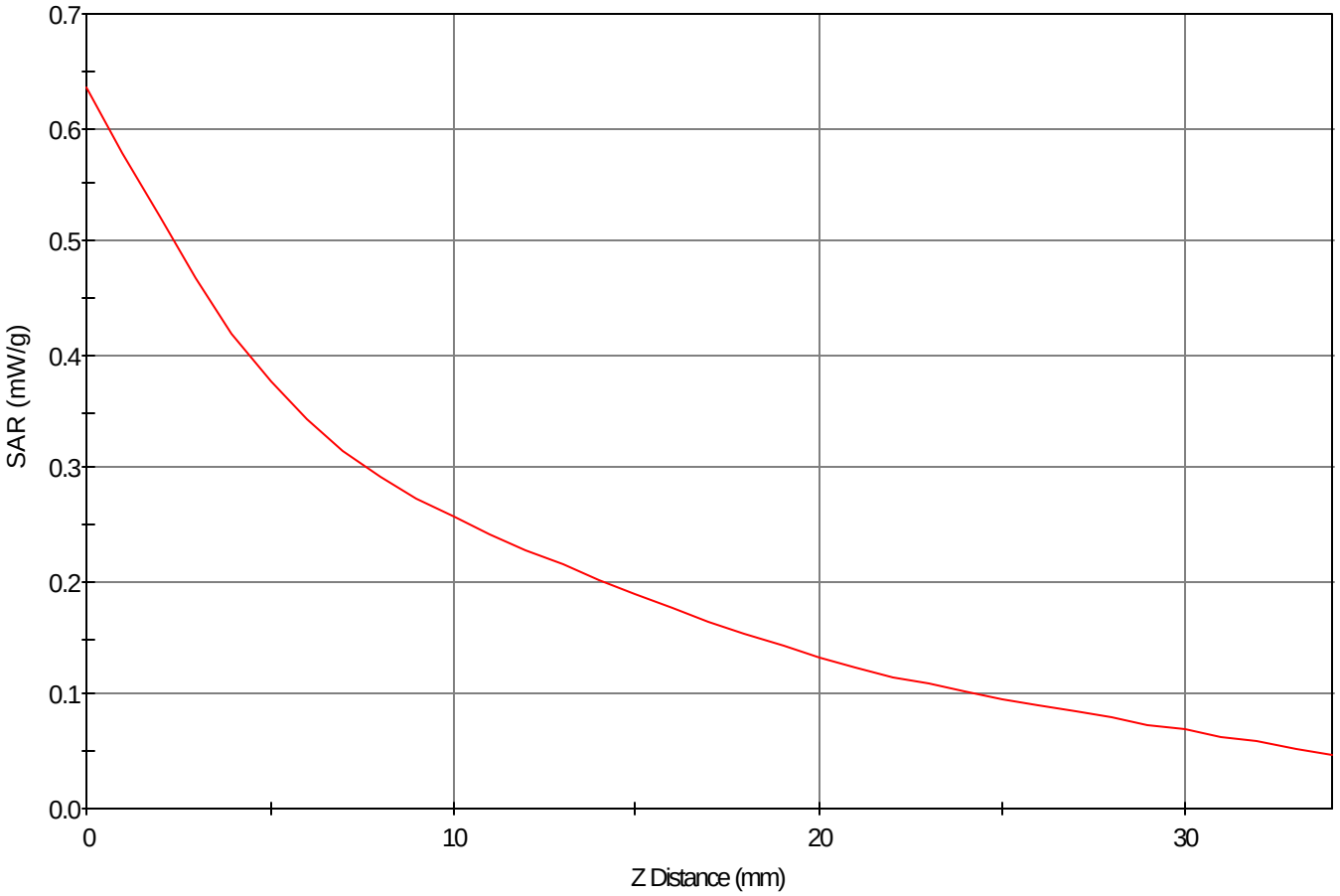
SAR Data Report 02050958

```
  Start        :  9-May-02 05:35:05 pm
  End          :  9-May-02 05:41:06 pm
  Code Version : 4.08
  Robot Version: 4.08

Product Data:
  Type             : SAMSUNG
  Model Number     : SCH-A591
  Serial Number    : 2
  Frequency        : 835.89 MHz
  Transmit Pwr     : 0.280 W
  Antenna Type     : Helical
  Antenna Posn.    : In

Measurement Data:
  Phantom Name        : SAM-FLAT
  Phantom Type        : Uniphantom
  Tissue Type         : Muscle
  Tissue Dielectric   : 57.260
  Tissue Conductivity : 0.970
  Tissue Density      : 1.000
  Robot Name          : CRS

Probe Data:
  Probe Name              : PCT002
  Probe Type              : E Fld Triangle
  Frequency               : 835 MHz
  Tissue Type             : Muscle
  Calibrated Dielectric   : 55.700
  Calibrated Conductivity :  0.990
  Calibrated Density      :  1.000
  Probe Offset            :  2.400 mm
  Conversion Factor       :  4.900
  Probe Sensitivity :  3.597   3.474   3.049   mV/(mW/cm^2)
  Amplifier Gains   :  20.00   20.00   20.00

Sample:
  Rate:         6000 Samples/Sec
  Count:        100 Samples
  NIDAQ Gain:   5

Comments:
  CDMA MODE CH-363
  Body
  CF=1; Amb. Temp= 21.3 'C; Liq. Temp=21.2 'C



Area Scan - Max Peak SAR Value at x=-1.0 y=-15.0 = 0.38 W/kg

Zoom Scan - Max Peak SAR Value at x=-1.0 y=-10.0 z=0.0 = 0.58 W/kg

Max 1g SAR at x=0.0 y=-13.0 z=0.0 = 0.39 W/kg

Max 10g SAR at x=0.0 y=-14.0 z=0.0 = 0.25 W/kg
```

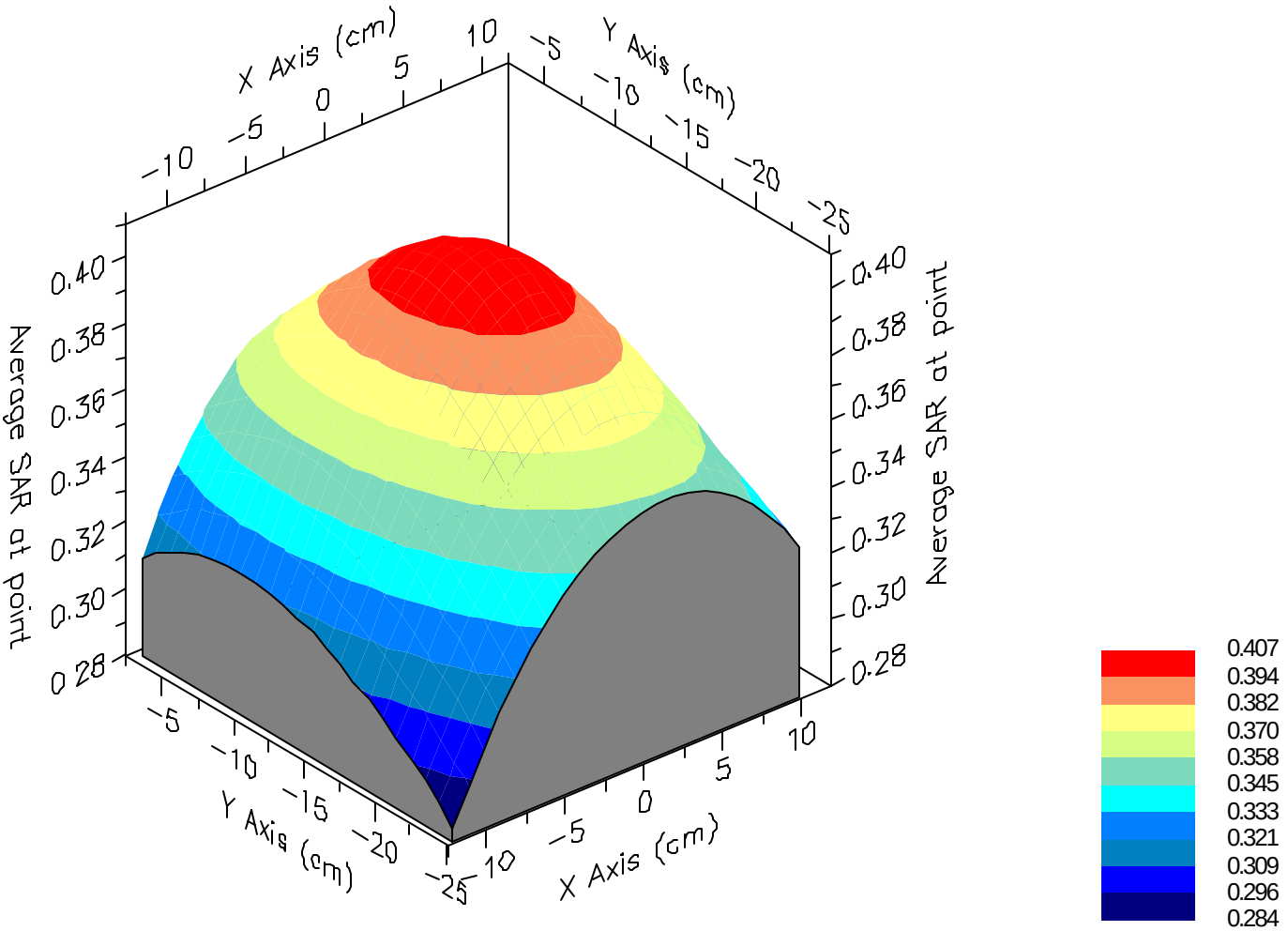
SAR Data Report 02050960

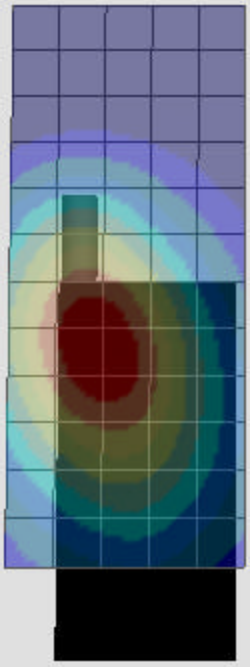
```
  Start        :  9-May-02 05:48:42 pm
  End          :  9-May-02 05:54:44 pm
  Code Version : 4.08
  Robot Version: 4.08

Product Data:
  Type             : SAMSUNG
  Model Number     : SCH-A591
  Serial Number    : 2
  Frequency        : 848.31 MHz
  Transmit Pwr     : 0.280 W
  Antenna Type     : Helical
  Antenna Posn.    : In

Measurement Data:
  Phantom Name        : SAM-FLAT
  Phantom Type        : Uniphantom
  Tissue Type         : Muscle
  Tissue Dielectric   : 57.260
  Tissue Conductivity : 0.970
  Tissue Density      : 1.000
  Robot Name          : CRS

Probe Data:
  Probe Name              : PCT002
  Probe Type              : E Fld Triangle
  Frequency               : 835 MHz
  Tissue Type             : Muscle
  Calibrated Dielectric   : 55.700
  Calibrated Conductivity :  0.990
  Calibrated Density      :  1.000
  Probe Offset            :  2.400 mm
  Conversion Factor       :  4.900
  Probe Sensitivity :  3.597   3.474   3.049   mV/(mW/cm^2)
  Amplifier Gains   :  20.00   20.00   20.00

Sample:
  Rate:         6000 Samples/Sec
  Count:        100 Samples
  NIDAQ Gain:   5

Comments:
  CDMA MODE CH-777
  Body
  CF=1; Amb. Temp= 21.3 'C; Liq. Temp=21.2 'C



Area Scan - Max Peak SAR Value at x=-1.0 y=-14.0 = 0.39 W/kg

Zoom Scan - Max Peak SAR Value at x=-1.0 y=-14.0 z=0.0 = 0.64 W/kg

Max 1g SAR at x=0.0 y=-14.0 z=0.0 = 0.41 W/kg

Max 10g SAR at x=0.0 y=-15.0 z=0.0 = 0.26 W/kg
```

SAR - Z Axis
at Hotspot x:-1.0 y:-14.0



1g SAR Values





4. Probe Calibration Process

Dosimetric Assessment Procedure

Each E-Probe/Probe amplifier combination has unique calibration parameters. A TEM calibration procedure is conducted to determine the proper amplifier settings to enter in the probe parameters. The amplifier settings are determined for a given frequency by subjecting the Probe to a known E-field density (1mW/cm^2) using an RF Signal generator, TEM cell, and RF Power Meter. The SAR measurement software is used for Probe calibration.

Free Space Assessment

The free space E-field from amplified probe outputs is determined in a test chamber. This calibration can be performed in a TEM cell if the frequency is below 1 GHz and in a waveguide or some other methodologies above 1 GHz for free space. For the free space calibration, we place the probe in the volumetric center of the cavity and at the proper orientation with the field. We then rotate the probe 360 degrees until the three channels show the maximum reading. The power density readings equates to 1mW/cm^2.

Temperature Assessment *

E-field temperature correlation calibration is performed in a flat phantom filled with the appropriate simulated brain tissue. The measured free space E-field in the medium correlates to temperature rise in a dielectric medium. For temperature correlation calibration a RF transparent thermistor-based temperature probe is used in conjunction with the E-field probe (see Fig. 4.2).

$$SAR = C\frac{\Delta T}{\Delta t}$$

where:

Δt = exposure time (30 seconds),

C = heat capacity of tissue (brain or muscle),

ΔT = temperature increase due to RF exposure.

SAR is proportional to $\Delta T / \Delta t$, the initial rate of tissue heating, before thermal diffusion takes place. Now it's possible to quantify the electric field in the simulated tissue by equating the thermally derived SAR to the E- field;

$$SAR = \frac{|E|^2 \cdot \sigma}{\rho}$$

where:

σ = simulated tissue conductivity,

ρ = Tissue density (1.25 g/cm^3 for brain tissue)

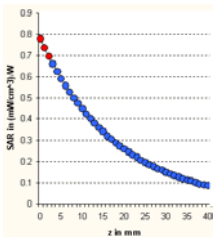


Figure 4.1 E-Field and Temperature measurements at 900MHz

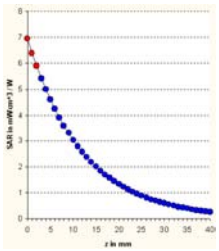


Figure 4.2 E-Field and temperature measurements at 1.9GHz

NOTE: The temperature calibration was not performed by PCTEST. For information use only.

6.1 Test Data (Continued)

6.2 CELLULAR CDMA Radiated Measurements

Field Strength of SPURIOUS Radiation

OPERATING FREQUENCY: 824.70 MHz
CHANNEL: 1013 (Low)
MEASURED OUTPUT POWER: 23.973 dBm = 0.250 W
MODULATION SIGNAL: CDMA (Internal)
DISTANCE: 3 meters
LIMIT: 43 + 10 $\log_{10}$ (W) = 36.97 dBc

FREQ. (MHz)	LEVEL @ ANTENNA TERMINALS (dBm)	SUBSTITUTE ANTENNA GAIN (dBd)	CORRECT GENERATOR LEVEL (dBm)	POL (H/V)	(dBc)
1649.40	-53.38	6.10	-47.28	H	71.2
2474.10	-53.68	6.70	-46.98	H	70.9
3298.80	-58.98	6.80	-52.18	H	76.1
4123.50	-71.98	6.50	-65.48	H	89.4

NOTES:

Radiated Spurious Emission Measurements by Substitution Method according to ANSI/TIA/EIA-603-A-2001, Aug. 15, 2001:

The EUT was placed on a wooden turn table 3-meters from the receive antenna. The receive antenna height and turntable rotation was adjusted for the highest reading on the receive spectrum analyzer. A half-wave dipole was substituted in place of the EUT. This dipole antenna was driven by a signal generator and the level of the signal generator was adjusted to obtain the same receive spectrum analyzer reading. This spurious level is recorded. For readings above 1GHz, the above procedure is repeated using horn antennas and the difference between the gain of the horn and an isotropic or dipole antenna are taken into consideration.

6.1 Test Data (Continued)

6.3 CELLULAR CDMA Radiated Measurements

Field Strength of SPURIOUS Radiation

OPERATING FREQUENCY: 835.89 MHz
CHANNEL: 0363 (Mid)
MEASURED OUTPUT POWER: 23.973 dBm = 0.250 W
MODULATION SIGNAL: CDMA (Internal)
DISTANCE: 3 meters
LIMIT: 43 + 10 $\log_{10}$ (W) = 36.97 dBc

FREQ. (MHz)	LEVEL @ ANTENNA TERMINALS (dBm)	SUBSTITUTE ANTENNA GAIN (dBd)	CORRECT GENERATOR LEVEL (dBm)	POL (H/V)	(dBc)
1671.78	-56.78	6.10	-50.68	H	74.6
2507.67	-60.48	6.70	-53.78	H	77.7
3343.56	-67.88	6.80	-61.08	H	85.0
4179.45	-79.18	6.50	-72.68	H	96.6

NOTES:

Radiated Spurious Emission Measurements by Substitution Method according to ANSI/TIA/EIA-603-A-2001, Aug. 15, 2001:

The EUT was placed on a wooden turn table 3-meters from the receive antenna. The receive antenna height and turntable rotation was adjusted for the highest reading on the receive spectrum analyzer. A half-wave dipole was substituted in place of the EUT. This dipole antenna was driven by a signal generator and the level of the signal generator was adjusted to obtain the same receive spectrum analyzer reading. This spurious level is recorded. For readings above 1GHz, the above procedure is repeated using horn antennas and the difference between the gain of the horn and an isotropic or dipole antenna are taken into consideration.

6.1 Test Data (Continued)

6.4 CELLULAR CDMA Radiated Measurements

Field Strength of SPURIOUS Radiation

OPERATING FREQUENCY: 848.31 MHz
CHANNEL: 0777 (High)
MEASURED OUTPUT POWER: 23.973 dBm = 0.250 W
MODULATION SIGNAL: CDMA (Internal)
DISTANCE: 3 meters
LIMIT: 43 + 10 $\log_{10}$ (W) = 36.97 dBc

FREQ. (MHz)	LEVEL @ ANTENNA TERMINALS (dBm)	SUBSTITUTE ANTENNA GAIN (dBd)	CORRECT GENERATOR LEVEL (dBm)	POL (H/V)	(dBc)
1696.62	-50.68	6.10	-44.58	H	68.5
2544.93	-53.28	6.70	-46.58	H	70.5
3393.24	-61.58	6.80	-54.78	H	78.7
4241.55	-70.38	6.50	-63.88	H	87.8

NOTES:

Radiated Spurious Emission Measurements by Substitution Method according to ANSI/TIA/EIA-603-A-2001, Aug. 15, 2001:

The EUT was placed on a wooden turn table 3-meters from the receive antenna. The receive antenna height and turntable rotation was adjusted for the highest reading on the receive spectrum analyzer. A half-wave dipole was substituted in place of the EUT. This dipole antenna was driven by a signal generator and the level of the signal generator was adjusted to obtain the same receive spectrum analyzer reading. This spurious level is recorded. For readings above 1GHz, the above procedure is repeated using horn antennas and the difference between the gain of the horn and an isotropic or dipole antenna are taken into consideration.