



MOTOROLA

**Florida Corporate
Electromagnetics Research Laboratory**

SAR Measurement Report

For the compliance of Motorola Portable Communications Devices with the American National Standard Institute, ANSI/IEEE C95.1, 1992. Standard for Safety level with respect to Human Exposure to Radiofrequency Electromagnetic Fields 3KHz to 300GHz.

Radio Type Boomerang
Model # A06GFS9850AA
Serial # 00000870BL
Transmitter Freq. (MHz) 901.5
Transmitter Power (Watts) 1.242
Antenna Type internal loop
Battery Type 3V lithium & 1.5V Alkaline
Test Conditions full body; abdomen, muscle
Volume for Spatial Peak SAR Averaging (cm³) 1
Spatial Peak Measured SAR Average (mW/g) 1.14
Transmitter Power Start 1.242 Transmitter Power End .948
Transmitter Peak Power .965 (time averaged over 30 min.)
Equation for max expected SAR value:

(Peak Power/Power End) x measured SAR = max expected SAR mW/g
(1 / 1) x 1.14 = 1.14 mW/g * see attached
If push to talk 50% duty cycle:
max expected SAR/2 = time averaged SAR mW/g
1.14 / 2 = .57 mW/g

Observations: Unit in holster, back against phantom

Performed By : M. Vande Date : 12/14/98

Approved By : Deanna M. Zukowski Date : 12/14/98

Unit back against phantom; with holster.

Calculated estimated time averaged SAR for continuous transmission using following equation:

(Upper Limit of Average Power over 30 minutes/End of test power) x Measured SAR

$$(.965/.948) \times 1.14 = 1.16 \text{ mW/g}$$

1.16 represents the upper limit of the estimated time averaged SAR for continuous transmission

The Boomerang signalling is system imposed, so the following steps are taken to estimate the true volume and time averaged SAR:

Unit is setup for 160ms maximum transmit length. The worst case system imposed scenario is that the Boomerang would transmit once every other frame, or once every 3.75 seconds. (1 protocol frame equals 1.875 seconds). Therefore we take 160ms and divide by 3.75 seconds.

$$.160/3.75 = .043 \text{ derating factor due to system imposed time transmission limitations}$$

This factor is then multiplied by the estimated time average SAR for continuous transmission to give the volume and time averaged SAR

$$.043 \times 1.16 = .05 \text{ mW/g volume and time averaged SAR}$$

File : c:/idx3/SYSTEM/SARMEAS3/data/Normal/98111914_ZOOM.VLT
Start : 19-Nov-98 01:12:48 pm End : 19-Nov-98 01:25:35 pm

Radio Type : Boomerang
Model Number : A06GFS9850AA
Serial Number : 00000870BC
Frequency : 901.5 MHz
Peak Trans. Pwr : .965 W (time averaged over 30 minutes)
Start Trans. Pwr: 1.242 W
Antenna Type :
Antenna Posn. : Internal
Phantom Type : Body
Phantom Posn. : Abdomen
Scan Type : ZOOM/SAR
Probe Name : 040
Field Type : E Field
Orientation : 0 Degrees

Mixture Type = Muscle
Mixture Dielectric Constant = 49.600
Mixture Conductivity = 1.180

Comment :
Unit back against abdomen; aligned parallel to the body
In Holster

Robot : ROBOT

Probe Offset = 0.27 cm
Sensor Factor = 0.0108
Conversion Factor = 1.140

040 Amplifier Channel Settings : 0.183 0.166 0.123

Max Location : X = -0.250, Y = -1.750, Z = 0.000 (cm) Value = 13.653

Measured Values (volts) =
1.208E-002 6.966E-003 4.542E-003 3.061E-003 2.175E-003 1.527E-003
1.101E-003 7.922E-004 5.770E-004 4.480E-004 3.456E-004

Calc. Voltage @ Surface (Vs) = 0.0157

Voltage @ 1.00 cm (Vt) = 0.0059

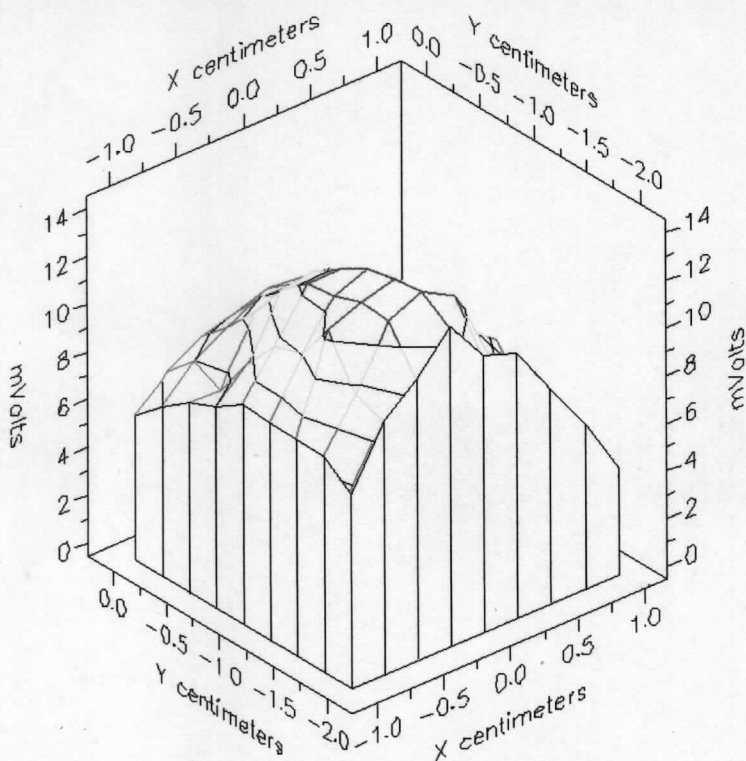
Ave. Voltage (Vs+Vt)/2 = 0.0108

Ave. SAR over 1 g (mW/g) = 1.1400

File : 98111914_ZOOM.VLT

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Boomerang/A06GFS9850AA/00000870BC;901.5MHz;1.242W;/Internal;
Body/Abdomen;ZOOM/SAR;040/E Field/0 DegreesMuscle/49.600/1.180

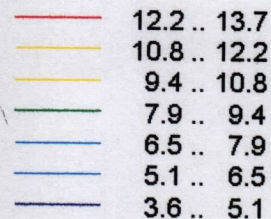
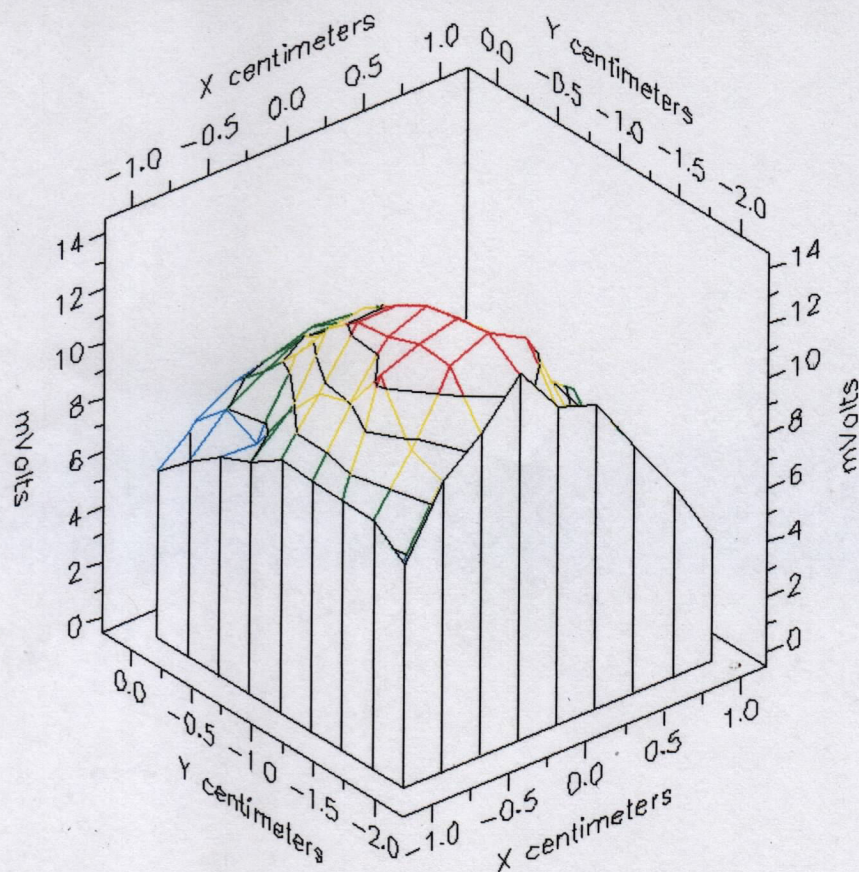


—	12.2 .. 13.7
—	10.8 .. 12.2
—	9.4 .. 10.8
—	7.9 .. 9.4
—	6.5 .. 7.9
—	5.1 .. 6.5
—	3.6 .. 5.1

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Start : 19-Nov-98 01:12:48 pm End : 19-Nov-98 01:25:35 pm

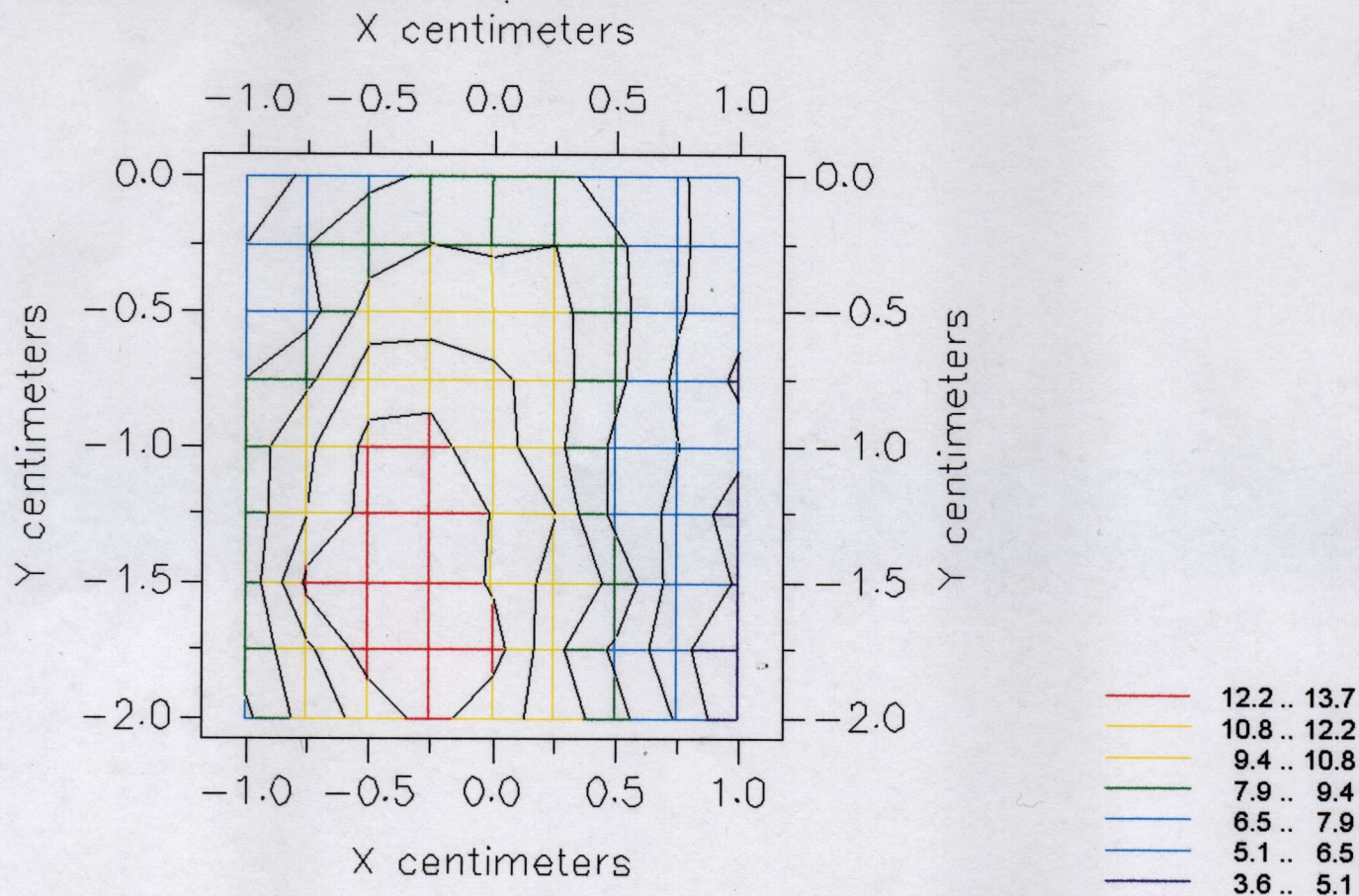
Boomerang/A06GFS9850AA/00000870BC;901.5MHz;1.242W;/Internal;
Body/Abdomen;ZOOM/SAR;040/E Field/0 DegreesMuscle/49.600/1.180



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Boomerang/A06GFS9850AA/00000870BC;901.5MHz;1.242W;/Internal;
Body/Abdomen;ZOOM/SAR;040/E Field/0 DegreesMuscle/49.600/1.180



File ; c:/idx3/SYSTEM/SARMEAS3/data/Normal/98111914_AREA.VLT
Start : 19-Nov-98 01:09:25 pm End : 19-Nov-98 01:12:48 pm

Radio Type : Boomerang
Model Number : A06GFS9850AA
Serial Number : 00000870BC
Frequency : 901.5 MHz
Peak Trans. Pwr : .965 W (time averaged over 30 minutes)
Start Trans. Pwr: 1.242 W
Antenna Type :
Antenna Posn. : Internal
Phantom Type : Body
Phantom Posn. : Abdomen
Scan Type : AREA
Probe Name : 040
Field Type : E Field
Orientation : 0 Degrees

Mixture Type = Muscle
Mixture Dielectric Constant = 49.600
Mixture Conductivity = 1.180

Comment :

Unit back against abdomen; aligned parallel to the body
In Holster

Robot : ROBOT

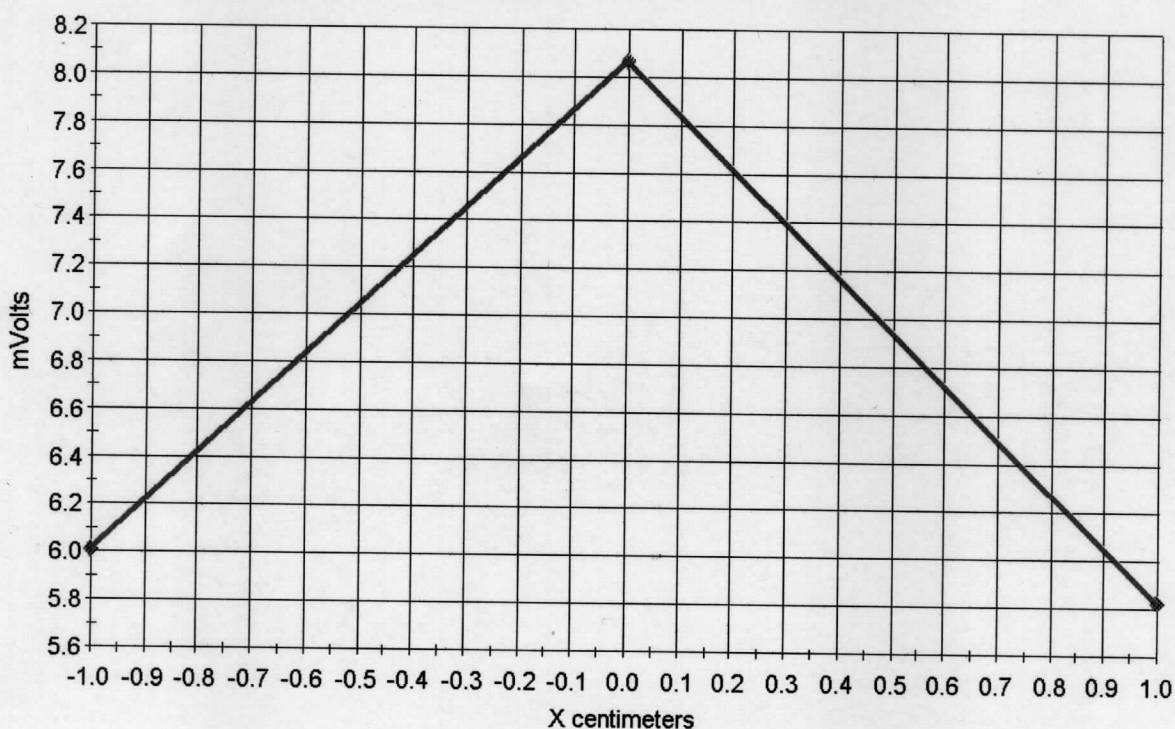
Probe Offset = 0.27 cm
Sensor Factor = 0.0108
Conversion Factor = 1.140

040 Amplifier Channel Settings : 0.183 0.166 0.123

Max Location : X = 0.000, Y = -1.000, Z = 0.000 (cm) Value = 14.212

Area too wide. SAR value not calculated

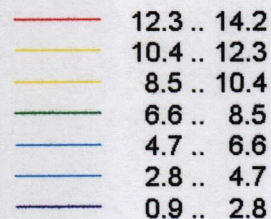
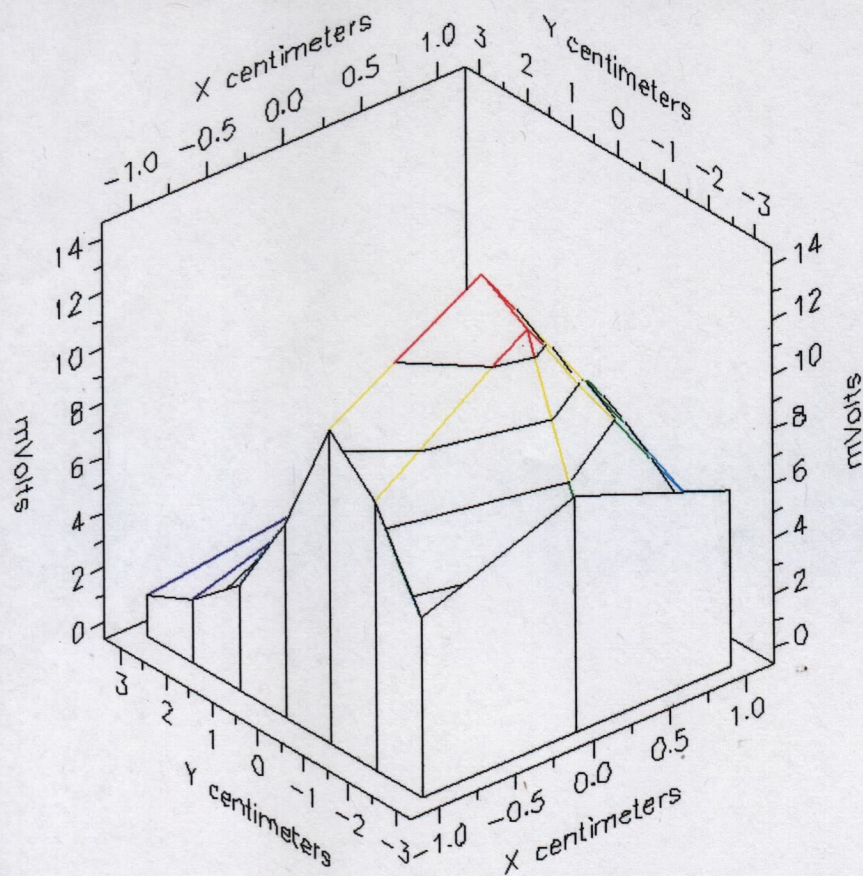
X-Z Plane Slice Y=-3.000
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