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Supplement to SAR Test Report for Motorola portable cellular phone (FCC ID GKRMPX001)

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## Summary of FCC request for additional information

There was a request for additional information regarding Motorola's SAR Test Report for Motorola portable cellular phone (FCC ID GKRMPX001). The requested information is addressed below in the same numbering sequence received.

3) Please describe any use conditions and device test settings where GSM and LAN transmit at the same time, or describe device settings to prevent this if applicable.

**RESPONSE:** GSM850, GSM900, GSM1800, GSM1900 can transmit simultaneously with WLAN.

4) For any cotransmitting conditions of 3), please describe how reported SAR results are applicable for exposure evaluation.

**RESPONSE:** The reported SAR values represent the maximum measured values for each transmitting mode/band. A sum of the GSM and Wi-Fi value would represent an overestimate of the SAR for a simultaneous transmitting condition.

| f<br>(MHz)         | Description | Conducted<br>Output<br>Power<br>(dBm) | Cheek / Touch Position |               |                        |                          |                    |               |                        |                          |
|--------------------|-------------|---------------------------------------|------------------------|---------------|------------------------|--------------------------|--------------------|---------------|------------------------|--------------------------|
|                    |             |                                       | Left Head              |               |                        |                          | Right Head         |               |                        |                          |
|                    |             |                                       | Measured<br>(W/kg)     | Drift<br>(dB) | Extrapolated<br>(W/kg) | Simulate<br>Temp<br>(°C) | Measured<br>(W/kg) | Drift<br>(dB) | Extrapolated<br>(W/kg) | Simulate<br>Temp<br>(°C) |
| Digital<br>850MHz  | Channel 128 | 33.11                                 |                        |               |                        |                          |                    |               |                        |                          |
|                    | Channel 190 | 33.27                                 | 0.305                  | 0.28          | 0.31                   | 19.6                     | 0.264              | -0.5          | 0.30                   | 19.6                     |
|                    | Channel 251 | 33.17                                 |                        |               |                        |                          |                    |               |                        |                          |
| Digital<br>1900MHz | Channel 512 | 30.14                                 |                        |               |                        |                          |                    |               |                        |                          |
|                    | Channel 661 | 30.11                                 | 0.112                  | 0.57          | 0.11                   | 19.6                     | 0.143              | -0.53         | 0.16                   | 19.0                     |
|                    | Channel 810 | 29.96                                 |                        |               |                        |                          |                    |               |                        |                          |
| WiFi<br>2400Mhz    | Channel 1   | 14.77                                 |                        |               |                        |                          |                    |               |                        |                          |
|                    | Channel 6   | 14.77                                 | 0.0262                 | 0.07          | 0.03                   | 19.0                     | 0.0197             | -0.15         | 0.02                   | 19.8                     |
|                    | Channel 11  | 14.77                                 |                        |               |                        |                          |                    |               |                        |                          |

**Table 1: SAR measurement results for the portable cellular telephone FCC ID GKRMPX001 at highest possible output power. Measured against the left head in the Cheek/Touch Position.**

Combining the SAR values of the GSM modes and the Wi-Fi yields the following SAR values. These values are an overestimate of the SAR since these maxima don't occur in the same location on the phone.

| f<br>(MHz)         | Description | Conducted<br>Output<br>Power<br>(dBm) | Cheek / Touch Position |                    |
|--------------------|-------------|---------------------------------------|------------------------|--------------------|
|                    |             |                                       | Left Head              | Right Head         |
|                    |             |                                       | Measured<br>(W/kg)     | Measured<br>(W/kg) |
| Digital<br>850MHz  | Channel 128 | 33.11                                 |                        |                    |
|                    | Channel 190 | 33.27                                 | <b>0.33</b>            | <b>0.32</b>        |
|                    | Channel 251 | 33.17                                 |                        |                    |
| Digital<br>1900MHz | Channel 512 | 30.14                                 |                        |                    |
|                    | Channel 661 | 30.11                                 | <b>0.14</b>            | <b>0.18</b>        |
|                    | Channel 810 | 29.96                                 |                        |                    |

**Table 2: SAR measurement results for the portable cellular telephone FCC ID GKRMPX001 at highest possible output power. Measured against the left head in the Cheek/Touch Position.**

| f<br>(MHz)         | Description | Conducted<br>Output<br>Power<br>(dBm) | 15° Tilt Position  |               |                        |                          |                    |               |                        |                          |
|--------------------|-------------|---------------------------------------|--------------------|---------------|------------------------|--------------------------|--------------------|---------------|------------------------|--------------------------|
|                    |             |                                       | Left Head          |               |                        |                          | Right Head         |               |                        |                          |
|                    |             |                                       | Measured<br>(W/kg) | Drift<br>(dB) | Extrapolated<br>(W/kg) | Simulate<br>Temp<br>(°C) | Measured<br>(W/kg) | Drift<br>(dB) | Extrapolated<br>(W/kg) | Simulate<br>Temp<br>(°C) |
| Digital<br>850MHz  | Channel 128 | 33.11                                 |                    |               |                        |                          |                    |               |                        |                          |
|                    | Channel 190 | 33.27                                 | <b>0.105</b>       | <b>-0.01</b>  | <b>0.11</b>            | <b>19.8</b>              | <b>0.107</b>       | <b>-0.26</b>  | <b>0.11</b>            | <b>19.4</b>              |
|                    | Channel 251 | 33.17                                 |                    |               |                        |                          |                    |               |                        |                          |
| Digital<br>1900MHz | Channel 512 | 30.14                                 |                    |               |                        |                          |                    |               |                        |                          |
|                    | Channel 661 | 30.11                                 | <b>0.055</b>       | <b>-0.09</b>  | <b>0.06</b>            | <b>19.3</b>              | <b>0.0484</b>      | <b>-0.05</b>  | <b>0.05</b>            | <b>19.0</b>              |
|                    | Channel 810 | 29.96                                 |                    |               |                        |                          |                    |               |                        |                          |
| WiFi<br>2400Mhz    | Channel 1   | 14.77                                 |                    |               |                        |                          |                    |               |                        |                          |
|                    | Channel 6   | 14.77                                 | <b>0.0064</b>      | <b>0.62</b>   | <b>0.01</b>            | <b>19.8</b>              | <b>0.0076</b>      | <b>-0.33</b>  | <b>0.01</b>            | <b>19.8</b>              |
|                    | Channel 11  | 14.77                                 |                    |               |                        |                          |                    |               |                        |                          |

**Table 3: SAR measurement results for the portable cellular telephone FCC ID IHDT56EV1 at highest possible output power. Measured against the left head in the 15° Tilt Position.**

Combining the SAR values of the GSM modes and the Wi-Fi yields the following SAR values. These values are an overestimate of the SAR since these maxima don't occur in the same location on the phone.

| f<br>(MHz)         | Description | Conducted<br>Output<br>Power<br>(dBm) | 15° Tilt Position  |                    |
|--------------------|-------------|---------------------------------------|--------------------|--------------------|
|                    |             |                                       | Left Head          | Right Head         |
|                    |             |                                       | Measured<br>(W/kg) | Measured<br>(W/kg) |
| Digital<br>850MHz  | Channel 128 | 33.11                                 |                    |                    |
|                    | Channel 190 | 33.27                                 | <b>0.12</b>        | <b>0.12</b>        |
|                    | Channel 251 | 33.17                                 |                    |                    |
| Digital<br>1900MHz | Channel 512 | 30.14                                 |                    |                    |
|                    | Channel 661 | 30.11                                 | <b>0.07</b>        | <b>0.06</b>        |
|                    | Channel 810 | 29.96                                 |                    |                    |

**Table 4: SAR measurement results for the portable cellular telephone FCC ID IHDT56EV1 at highest possible output power. Measured against the left head in the 15° Tilt Position.**

| f<br>(MHz)         | Description | Conducted<br>Output<br>Power<br>(dBm) | Body Worn GSM      |               |                        |                          |                           |               |                        |                          |
|--------------------|-------------|---------------------------------------|--------------------|---------------|------------------------|--------------------------|---------------------------|---------------|------------------------|--------------------------|
|                    |             |                                       | with SYN1070A      |               |                        |                          | with SYN1070A & Bluetooth |               |                        |                          |
|                    |             |                                       | Measured<br>(W/kg) | Drift<br>(dB) | Extrapolated<br>(W/kg) | Simulate<br>Temp<br>(°C) | Measured<br>(W/kg)        | Drift<br>(dB) | Extrapolated<br>(W/kg) | Simulate<br>Temp<br>(°C) |
| Digital<br>850MHz  | Channel 128 | 33.11                                 |                    |               |                        |                          |                           |               |                        |                          |
|                    | Channel 190 | 33.27                                 | <b>0.626</b>       | <b>-0.11</b>  | <b>0.64</b>            | <b>20.0</b>              | <b>0.678</b>              | <b>-0.11</b>  | <b>0.70</b>            | <b>20.0</b>              |
|                    | Channel 251 | 33.17                                 |                    |               |                        |                          |                           |               |                        |                          |
| Digital<br>1900MHz | Channel 512 | 30.14                                 |                    |               |                        |                          |                           |               |                        |                          |
|                    | Channel 661 | 30.11                                 | <b>0.617</b>       | <b>0.00</b>   | <b>0.62</b>            | <b>19.5</b>              | <b>0.513</b>              | <b>-0.12</b>  | <b>0.53</b>            | <b>19.5</b>              |
|                    | Channel 810 | 29.96                                 |                    |               |                        |                          |                           |               |                        |                          |

**Table 5: SAR measurement results for the portable cellular telephone FCC ID GKRMPX001 at highest possible output power. Measured against the body.**

| f<br>(MHz)      | Description | Conducted<br>Output Power<br>(dBm) | Body Worn WiFi     |               |                        |                       |                          |               |                        |                       |
|-----------------|-------------|------------------------------------|--------------------|---------------|------------------------|-----------------------|--------------------------|---------------|------------------------|-----------------------|
|                 |             |                                    | with SYN1070A      |               |                        |                       | with SYN1070A & SNN5751A |               |                        |                       |
|                 |             |                                    | Measured<br>(W/kg) | Drift<br>(dB) | Extrapolated<br>(W/kg) | Simulate<br>Temp (°C) | Measured<br>(W/kg)       | Drift<br>(dB) | Extrapolated<br>(W/kg) | Simulate<br>Temp (°C) |
| WiFi<br>2400Mhz | Channel 1   | 14.77                              |                    |               |                        |                       |                          |               |                        |                       |
|                 | Channel 6   | 14.77                              | <b>0.186</b>       | <b>0.04</b>   | <b>0.19</b>            | <b>19.8</b>           | <b>0.167</b>             | <b>-0.03</b>  | <b>0.17</b>            | <b>19.5</b>           |
|                 | Channel 11  | 14.77                              |                    |               |                        |                       |                          |               |                        |                       |

**Table 6: SAR measurement results for the portable cellular telephone FCC ID GKRMPX001 at highest possible output power. Measured against the body.**

Combining the SAR values of the GSM modes and the Wi-Fi yields the following SAR values. These values are an overestimate of the SAR since these maxima don't occur in the same location on the phone.

| f<br>(MHz)         | Description | Conducted<br>Output<br>Power<br>(dBm) | 15° Tilt Position  |                    |
|--------------------|-------------|---------------------------------------|--------------------|--------------------|
|                    |             |                                       | w/o BT             | w/ BT              |
|                    |             |                                       | Measured<br>(W/kg) | Measured<br>(W/kg) |
| Digital<br>850MHz  | Channel 128 | 33.11                                 |                    |                    |
|                    | Channel 190 | 33.27                                 | <b>0.83</b>        | <b>0.89</b>        |
|                    | Channel 251 | 33.17                                 |                    |                    |
| Digital<br>1900MHz | Channel 512 | 30.14                                 |                    |                    |
|                    | Channel 661 | 30.11                                 | <b>0.81</b>        | <b>0.72</b>        |
|                    | Channel 810 | 29.96                                 |                    |                    |

**Table 4: SAR measurement results for the portable cellular telephone FCC ID IHDT56EV1 at highest possible output power. Measured against the left head in the 15° Tilt Position.**

5) Please describe intended use positions while transmitting in landscape mode.

**RESPONSE:** The intended use position while transmitting in landscape mode would be handheld use.

6) Please describe any special setup and test considerations for DASY3 off-vertical probe axis scanning, including explanation/justification that peak SAR locations have been captured.

**RESPONSE:** Determination of the need for off-vertical probe axis scanning is determined from the measurement location points. If evaluation of the locations result in a measurement surface, in the area scan, that is off-horizontal by more than 20degrees, the probe is tilted along the M-B line away from the angle of the surface. This brings the angle of the probe axis closer to normal to the measurement surface. The SAR plots of the cube scans from the resulting measurements are included in Appendix A. These cube plots demonstrate that the peak SAR locations have been captured.

The setup and test considerations for the DASY3 off-vertical probe axis scanning is given below.

This document outlines the method utilized by the EME SAR Laboratories for measuring units exhibiting a boundary effect when using the DASY3 system.

- DASY SAM-Expanded Phantom Definition.

This phantom definition contains the boundaries and coarse grid definitions allowing for scans in both the front and back of the SAM head incorporating a probe tilted 20 degrees.

The origins and boundaries of the tilted sections should not be changed.  
Additional user defined reference points may be added to the configuration file for re-locating reference/drift measurements.

## 6.0 Procedure:

- 6.1 Determine test conditions per the type of required test (left head vs. right head, cheek touch vs. 15 Degree tilt).
- 6.2 Position device against head phantom.
- 6.3 Perform the SAR measurement process per the appropriate procedure,
  - 6.3.1 When selecting the phantom in the DASY software, choose the "SAM-Expanded" phantom definition.
  - 6.3.2 There are 2 additional Sections available for each side in the "SAM-Expanded" configuration file. They are intended for reducing probe slide & boundary effects during measurement of devices with high SAR locations near the edges of the phantom by tilting the probe.
  - 6.3.3 The sections are defined as "Rt. Tilt Back 20", "Rt. Tilt Front 20", "Lt. Tilt Back 20", and "Lt. Tilt Front 20".
  - 6.3.4 When a "Back 20" section is selected, the job(s) are performed with the probe tilted at a 20 degree angle toward the back of the head, roughly along the MB line. This section should be used when the hot spot is located near the back of the head and significant probe slide is noticed.
  - 6.3.5 Likewise, when a "Front 20" section is selected, the job(s) are performed with the probe tilted 20 degrees forward, for measurements in the mouth region of the SAM.
  - 6.3.6 Additional special considerations:

- 6.3.6.1 **The origins and boundaries of the tilted sections should not be changed.**
- 6.3.7 Perform scans.
  - 6.3.7.1 The cube scan should incorporate the same tilt as defined in the coarse scan.
  - 6.3.7.2 Different jobs within the same test sequence can be performed with different probe orientations by selecting the corresponding section (within the same head) for each specific job.
- 6.3.8 **Caution:** The “origin” of the tilted probe sections does not necessarily correspond exactly with the ERP. This is due to the convention used by DASYS when the probe is tilted.

## **Appendix A**

### **Cube Scans from Off-Vertical Probe Axis Scans**

s/n: 4400007088915

Ch# 190 Pwr Step: 5 ota

Type of Modulation: 800 gsm

DEVICE POSITION: CHEEK

Accessory Model #: none

Antenna Position: INTERNAL

Battery Model #: SNN5750A

R4 TP-1131 SUGAR SAM Expanded (Rev. 2)-9Jan03 Phantom; LH Front Tilt 20 Section; Position: (80°,180°); Frequency: 837 MHz

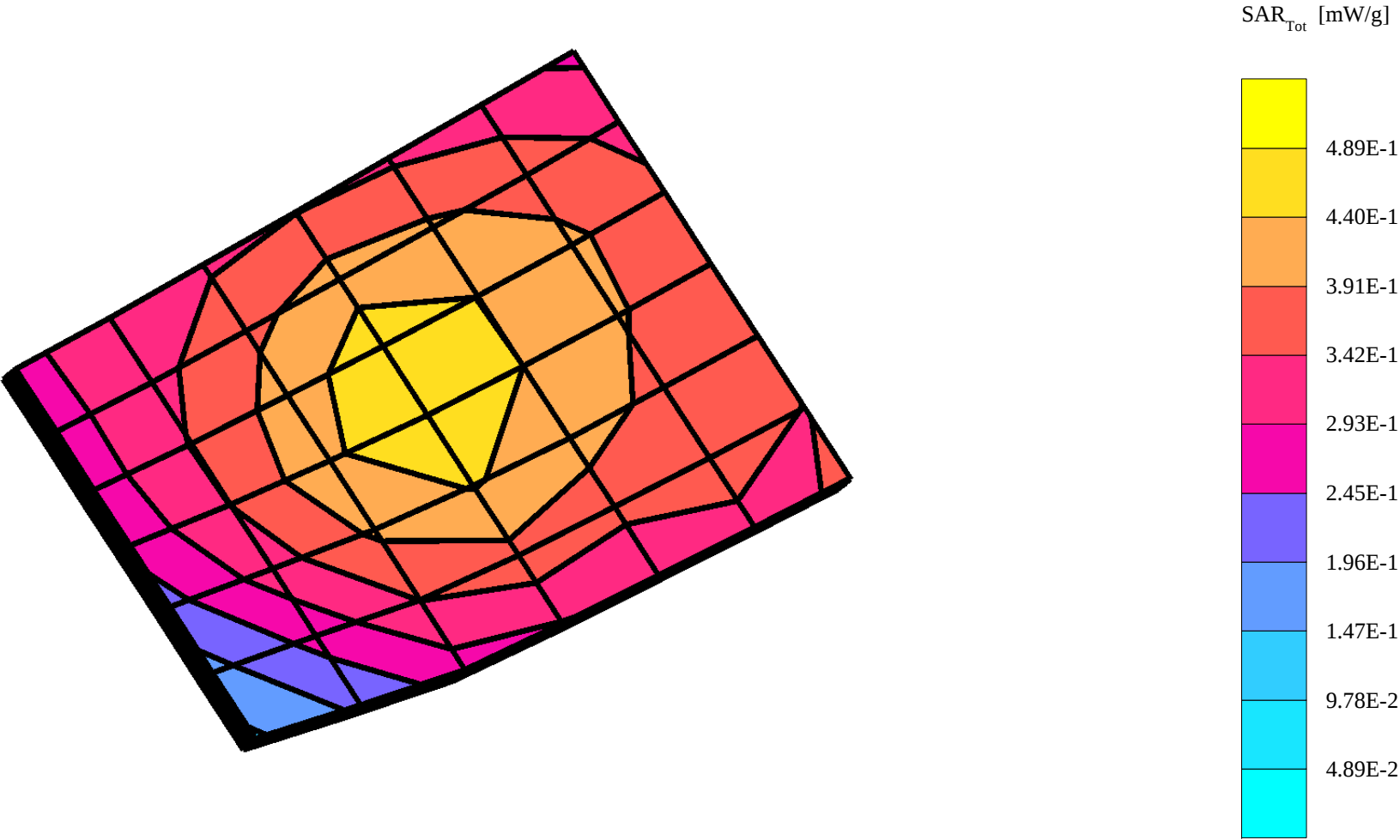
Probe: ET3DV6 - SN1514-IEEE Head2; ConvF(6.08,6.08,6.08); Crest factor: 8.0; 835 MHz Head & Body:  $\sigma = 0.92 \text{ mho/m}$   $\epsilon_r = 43.2$   $\rho = 1.00 \text{ g/cm}^3$

Cube 7x7x7: SAR (1g): 0.305 mW/g, SAR (10g): 0.204 mW/g, (Worst-case extrapolation)

Cube 7x7x7: Dx = 5.0, Dy = 5.0, Dz = 5.0

Penetration depth: 12.4 (10.5, 14.9) [mm]

Powerdrift: 0.28 dB



s/n: 4400007088915

Ch# 190 Pwr Step: 5 ota

Type of Modulation: 800 gsm

DEVICE POSITION: CHEEK

Accessory Model #: none

Antenna Position: INTERNAL

Battery Model #: SNN5750A

R4 TP-1131 SUGAR SAM Expanded (Rev. 2)-9Jan03 Phantom; RH Front Tilt 20 Section; Position: (80°,180°); Frequency: 837 MHz

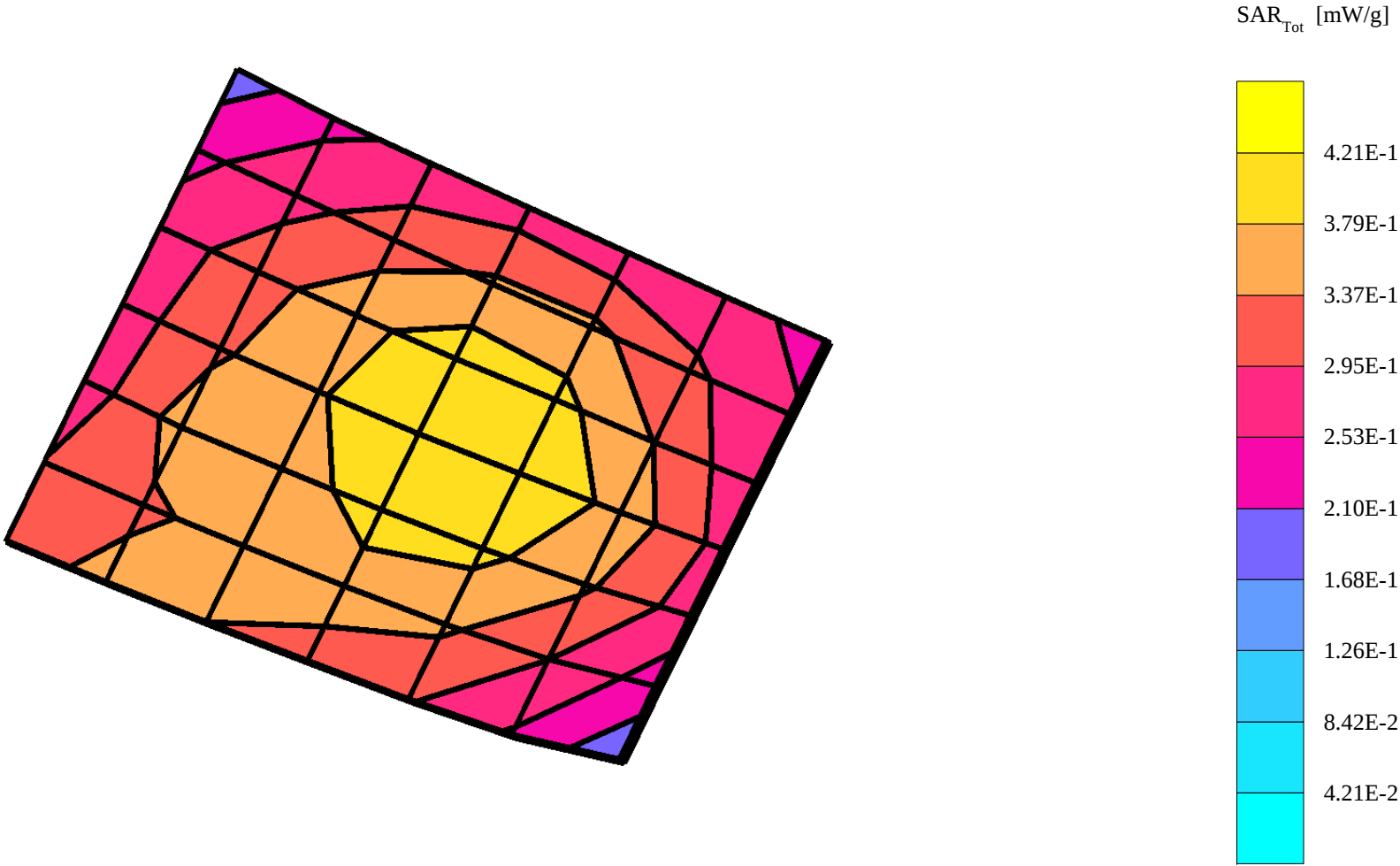
Probe: ET3DV6 - SN1514-IEEE Head2; ConvF(6.08,6.08,6.08); Crest factor: 8.0; 835 MHz Head & Body:  $\sigma = 0.92$  mho/m  $\epsilon_r = 43.2$   $\rho = 1.00$  g/cm<sup>3</sup>

Cube 7x7x7: SAR (1g): 0.264 mW/g, SAR (10g): 0.176 mW/g, (Worst-case extrapolation)

Cube 7x7x7: Dx = 5.0, Dy = 5.0, Dz = 5.0

Penetration depth: 13.9 (11.0, 17.8) [mm]

Powerdrift: -0.50 dB



s/n: 4400007088915

Ch# 661 / Pwr Step: 0

Antenna Position: Internal

Type of Modulation: GSM 1900

Battery Model #: SNN5750A

DEVICE POSITION (cheek or rotated): Cheek

Accesspry Model #: N/A

Simulate Temp when Measured: 19.5 C

Simulate Temp After Test: 19.6C

R4 TP-1250 GLYCOL SAM Expanded (Rev. 2)-9Jan03 Phantom; LH Front Tilt 20 Section; Position: (80°,180°); Frequency: 1880 MHz

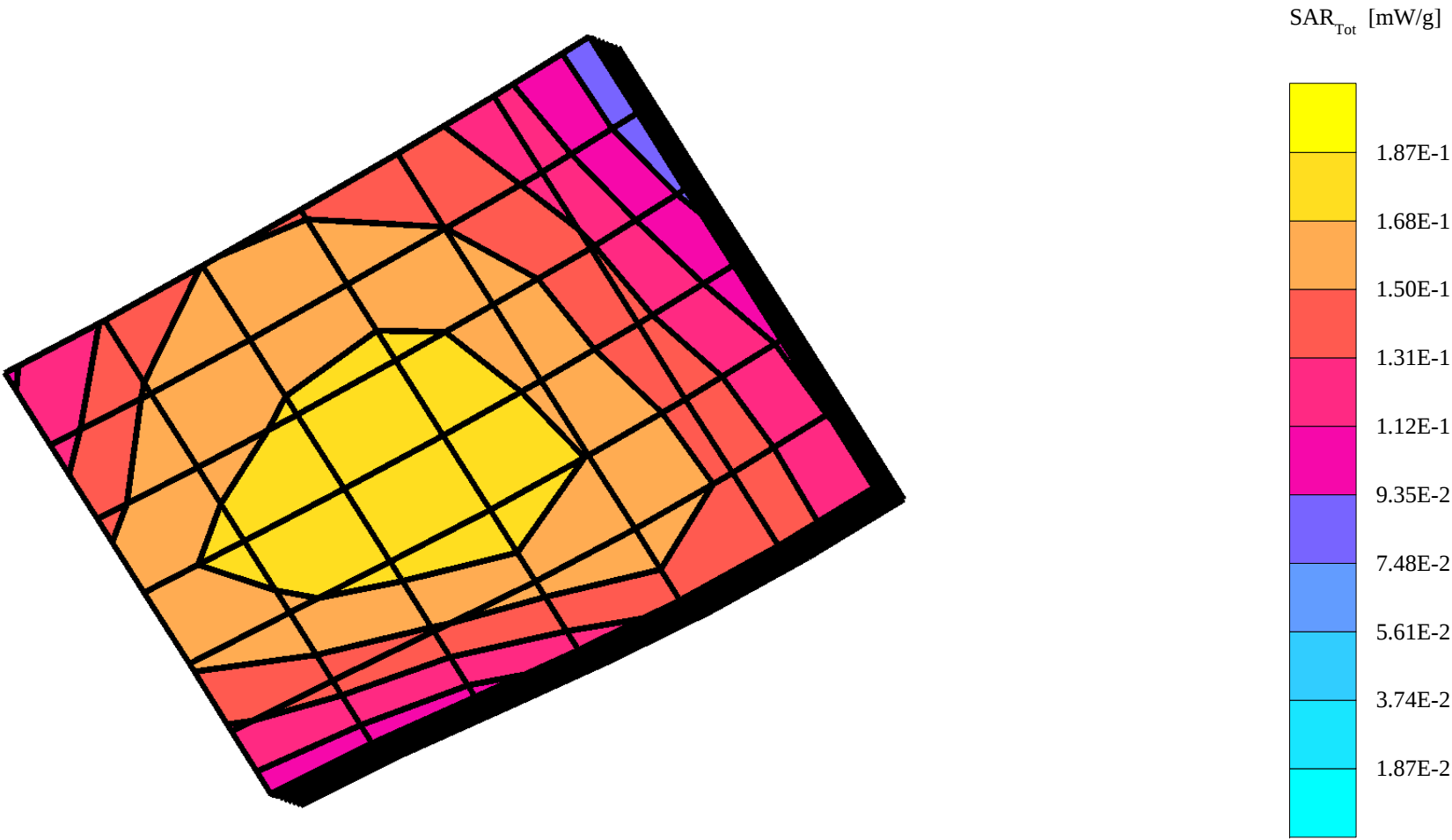
Probe: ET3DV6 - SN1514-IEEE Head2; ConvF(5.03,5.03,5.03); Crest factor: 8.0; 1880 MHz Head & Body:  $\sigma = 1.44 \text{ mho/m}$   $\epsilon_r = 38.5$   $\rho = 1.00 \text{ g/cm}^3$

Cube 7x7x7: SAR (1g): 0.112 mW/g, SAR (10g): 0.0739 mW/g, (Worst-case extrapolation)

Cube 7x7x7: Dx = 5.0, Dy = 5.0, Dz = 5.0

Penetration depth: 12.2 (10.4, 15.0) [mm]

Powerdrift: 0.57 dB



s/n: 4400007088915

Ch# 661 / Pwr Step: 0

Type of Modulation: gsm

DEVICE POSITION (cheek

tilted probe

Antenna Position: non

Battery Model #: snn5750a

R4 TP-1250 GLYCOL SAM Expanded (Rev. 2)-9Jan03 Phantom; RH Front Tilt 20 Section; Position: (80°,180°); Frequency: 1880 MHz

Probe: ET3DV6 - SN1514-IEEE Head2; ConvF(5.03,5.03,5.03); Crest factor: 8.0; 1880 MHz Head & Body:  $\sigma = 1.46 \text{ mho/m}$   $\epsilon_r = 38.0$   $\rho = 1.00 \text{ g/cm}^3$

Cube 7x7x7: SAR (1g): 0.143 mW/g, SAR (10g): 0.0884 mW/g, (Worst-case extrapolation)

Cube 7x7x7: Dx = 5.0, Dy = 5.0, Dz = 5.0

Penetration depth: 11.0 (8.7, 14.8) [mm]

Powerdrift: -0.53 dB

