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## DASY/EASY – Parameters of Probe: EX3DV4 – SN: 7745

### Basic Calibration Parameters

|                                      | Sensor X | Sensor Y | Sensor Z | Unc (k=2) |
|--------------------------------------|----------|----------|----------|-----------|
| Norm( $\mu V/(V/m)^2$ ) <sup>A</sup> | 0.54     | 0.55     | 0.58     | ±10.0%    |
| DCP(mV) <sup>B</sup>                 | 113.7    | 115.2    | 113.5    |           |

### Calibration Results for Modulation Response

| UID       | Communication System Name   |   | A<br>dB | B<br>dB $\sqrt{\mu V}$ | C     | D<br>dB | VR<br>mV | Max<br>Dev. | Max<br>Unc <sup>E</sup><br>(k=2) |
|-----------|-----------------------------|---|---------|------------------------|-------|---------|----------|-------------|----------------------------------|
| 0         | CW                          | X | 0.0     | 0.0                    | 1.0   | 0.00    | 200.4    | ±2.1%       | ±4.7%                            |
|           |                             | Y | 0.0     | 0.0                    | 1.0   |         | 200.7    |             |                                  |
|           |                             | Z | 0.0     | 0.0                    | 1.0   |         | 202.4    |             |                                  |
| 10352-AAA | Pulse Waveform (200Hz, 10%) | X | 2.00    | 62.00                  | 7.00  | 10.00   | 60       | ±2.5%       | ±9.6%                            |
|           |                             | Y | 1.43    | 60.00                  | 6.12  |         | 60       |             |                                  |
|           |                             | Z | 2.00    | 62.00                  | 7.00  |         | 60       |             |                                  |
| 10353-AAA | Pulse Waveform (200Hz, 20%) | X | 0.87    | 60.00                  | 4.66  | 6.99    | 80       | ±2.7%       | ±9.6%                            |
|           |                             | Y | 0.84    | 60.00                  | 4.82  |         | 80       |             |                                  |
|           |                             | Z | 0.88    | 60.00                  | 4.89  |         | 80       |             |                                  |
| 10354-AAA | Pulse Waveform (200Hz, 40%) | X | 78.00   | 74.00                  | 7.00  | 3.98    | 95       | ±2.2%       | ±9.6%                            |
|           |                             | Y | 20.00   | 72.00                  | 7.00  |         | 95       |             |                                  |
|           |                             | Z | 24.00   | 72.00                  | 7.00  |         | 95       |             |                                  |
| 10355-AAA | Pulse Waveform (200Hz, 60%) | X | 13.79   | 152.35                 | 10.86 | 2.22    | 120      | ±1.9%       | ±9.6%                            |
|           |                             | Y | 17.46   | 141.75                 | 7.58  |         | 120      |             |                                  |
|           |                             | Z | 16.46   | 101.70                 | 0.36  |         | 120      |             |                                  |
| 10387-AAA | QPSK Waveform, 1 MHz        | X | 0.41    | 60.40                  | 8.77  | 1.00    | 150      | ±3.8%       | ±9.6%                            |
|           |                             | Y | 0.41    | 60.00                  | 7.87  |         | 150      |             |                                  |
|           |                             | Z | 0.44    | 60.00                  | 7.62  |         | 150      |             |                                  |
| 10388-AAA | QPSK Waveform, 10 MHz       | X | 1.08    | 63.08                  | 11.29 | 0.00    | 150      | ±1.4%       | ±9.6%                            |
|           |                             | Y | 0.94    | 60.97                  | 9.25  |         | 150      |             |                                  |
|           |                             | Z | 0.97    | 60.81                  | 9.08  |         | 150      |             |                                  |
| 10396-AAA | 64-QAM Waveform, 100 kHz    | X | 1.83    | 65.85                  | 16.67 | 3.01    | 150      | ±1.1%       | ±9.6%                            |
|           |                             | Y | 1.73    | 63.65                  | 14.80 |         | 150      |             |                                  |
|           |                             | Z | 1.75    | 63.51                  | 14.45 |         | 150      |             |                                  |
| 10414-AAA | WLAN CCDF, 64-QAM, 40MHz    | X | 3.71    | 65.98                  | 14.72 | 0.00    | 150      | ±4.1%       | ±9.6%                            |
|           |                             | Y | 3.47    | 64.92                  | 13.70 |         | 150      |             |                                  |
|           |                             | Z | 3.53    | 64.76                  | 13.58 |         | 150      |             |                                  |

Note: For details on UID parameters see Appendix

The reported uncertainty of measurement is stated as the standard uncertainty of Measurement multiplied by the coverage factor  $k=2$ , which for a normal distribution Corresponds to a coverage probability of approximately 95%.

<sup>A</sup> The uncertainties of Norm X, Y, Z do not affect the  $E^2$ -field uncertainty inside TSL (see Page 5).

<sup>B</sup> Numerical linearization parameter: uncertainty not required.

<sup>E</sup> Uncertainty is determined using the max. deviation from linear response applying rectangular distribution and is expressed for the square of the field value.

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## DASY/EASY – Parameters of Probe: EX3DV4 – SN: 7745

### Sensor Model Parameters

|   | C1<br>fF | C2<br>fF | $\alpha$<br>$V^{-1}$ | T1<br>$ms.V^{-2}$ | T2<br>$ms.V^{-1}$ | T3<br>ms | T4<br>$V^{-2}$ | T5<br>$V^{-1}$ | T6   |
|---|----------|----------|----------------------|-------------------|-------------------|----------|----------------|----------------|------|
| X | 8.88     | 61.82    | 30.93                | 3.75              | 0.00              | 4.90     | 0.46           | 0.00           | 1.01 |
| Y | 7.83     | 54.88    | 30.82                | 2.44              | 0.00              | 4.90     | 0.41           | 0.00           | 1.01 |
| Z | 8.42     | 59.58    | 31.24                | 3.58              | 0.00              | 4.90     | 0.53           | 0.00           | 1.01 |

### Other Probe Parameters

|                                               |            |
|-----------------------------------------------|------------|
| Sensor Arrangement                            | Triangular |
| Connector Angle (°)                           | 31.2       |
| Mechanical Surface Detection Mode             | enabled    |
| Optical Surface Detection Mode                | disable    |
| Probe Overall Length                          | 337mm      |
| Probe Body Diameter                           | 10mm       |
| Tip Length                                    | 9mm        |
| Tip Diameter                                  | 2.5mm      |
| Probe Tip to Sensor X Calibration Point       | 1mm        |
| Probe Tip to Sensor Y Calibration Point       | 1mm        |
| Probe Tip to Sensor Z Calibration Point       | 1mm        |
| Recommended Measurement Distance from Surface | 1.4mm      |



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## DASY/EASY – Parameters of Probe: EX3DV4 – SN:7745

### Calibration Parameter Determined in Head Tissue Simulating Media

| f [MHz] <sup>C</sup> | Relative Permittivity <sup>F</sup> | Conductivity (S/m) <sup>F</sup> | ConvF X | ConvF Y | ConvF Z | Alpha <sup>G</sup> | Depth <sup>G</sup> (mm) | Unct. (k=2) |
|----------------------|------------------------------------|---------------------------------|---------|---------|---------|--------------------|-------------------------|-------------|
| 750                  | 41.9                               | 0.89                            | 9.71    | 9.71    | 9.71    | 0.16               | 1.35                    | ± 12.7%     |
| 835                  | 41.5                               | 0.90                            | 9.33    | 9.33    | 9.33    | 0.16               | 1.34                    | ± 12.7%     |
| 1750                 | 40.1                               | 1.37                            | 8.18    | 8.18    | 8.18    | 0.21               | 1.10                    | ± 12.7%     |
| 1900                 | 40.0                               | 1.40                            | 7.88    | 7.88    | 7.88    | 0.27               | 1.00                    | ± 12.7%     |
| 2100                 | 39.8                               | 1.49                            | 7.80    | 7.80    | 7.80    | 0.22               | 1.11                    | ± 12.7%     |
| 2300                 | 39.5                               | 1.67                            | 7.74    | 7.74    | 7.74    | 0.52               | 0.70                    | ± 12.7%     |
| 2450                 | 39.2                               | 1.80                            | 7.50    | 7.50    | 7.50    | 0.54               | 0.71                    | ± 12.7%     |
| 2600                 | 39.0                               | 1.96                            | 7.33    | 7.33    | 7.33    | 0.64               | 0.65                    | ± 12.7%     |
| 3300                 | 38.2                               | 2.71                            | 7.00    | 7.00    | 7.00    | 0.44               | 0.88                    | ± 13.9%     |
| 3500                 | 37.9                               | 2.91                            | 6.85    | 6.85    | 6.85    | 0.39               | 1.03                    | ± 13.9%     |
| 3700                 | 37.7                               | 3.12                            | 6.70    | 6.70    | 6.70    | 0.37               | 1.07                    | ± 13.9%     |
| 3900                 | 37.5                               | 3.32                            | 6.56    | 6.56    | 6.56    | 0.35               | 1.35                    | ± 13.9%     |
| 4100                 | 37.2                               | 3.53                            | 6.54    | 6.54    | 6.54    | 0.30               | 1.38                    | ± 13.9%     |
| 4600                 | 36.7                               | 4.04                            | 6.26    | 6.26    | 6.26    | 0.40               | 1.30                    | ± 13.9%     |
| 4800                 | 36.4                               | 4.25                            | 6.16    | 6.16    | 6.16    | 0.40               | 1.35                    | ± 13.9%     |
| 4950                 | 36.3                               | 4.40                            | 5.95    | 5.95    | 5.95    | 0.45               | 1.25                    | ± 13.9%     |
| 5250                 | 35.9                               | 4.71                            | 5.34    | 5.34    | 5.34    | 0.40               | 1.40                    | ± 13.9%     |
| 5600                 | 35.5                               | 5.07                            | 4.65    | 4.65    | 4.65    | 0.40               | 1.52                    | ± 13.9%     |
| 5750                 | 35.4                               | 5.22                            | 4.77    | 4.77    | 4.77    | 0.40               | 1.52                    | ± 13.9%     |

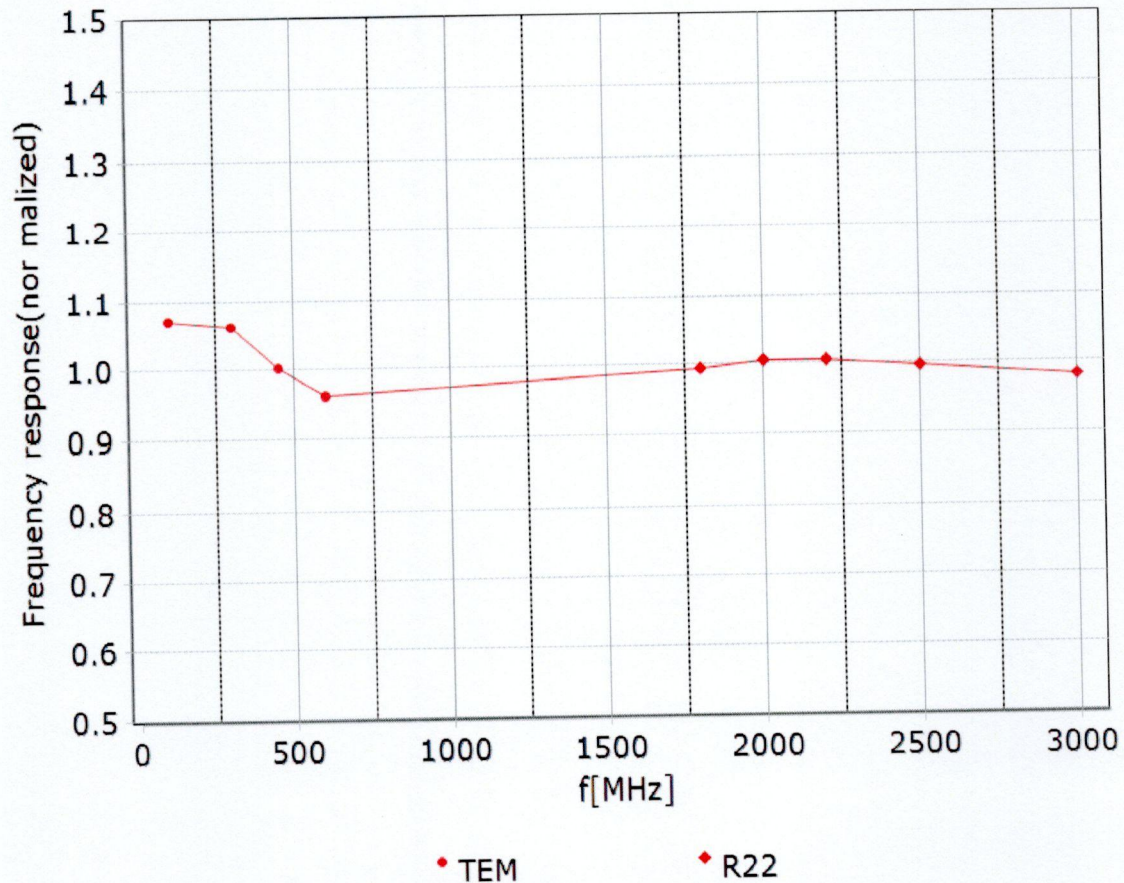
<sup>C</sup> Frequency validity above 300 MHz of ±100MHz only applies for DASY v4.4 and higher (Page 2), else it is restricted to ±50MHz. The uncertainty is the RSS of ConvF uncertainty at calibration frequency and the uncertainty for the indicated frequency band. Frequency validity below 300 MHz is ± 10, 25, 40, 50 and 70 MHz for ConvF assessments at 30, 64, 128, 150 and 220 MHz respectively. Above 5 GHz frequency validity can be extended to ± 110 MHz.

<sup>F</sup> At frequency up to 6 GHz, the validity of tissue parameters ( $\epsilon$  and  $\sigma$ ) can be relaxed to ±10% if liquid compensation formula is applied to measured SAR values. The uncertainty is the RSS of the ConvF uncertainty for indicated target tissue parameters.

<sup>G</sup> Alpha/Depth are determined during calibration. SPEAG warrants that the remaining deviation due to the boundary effect after compensation is always less than ± 1% for frequencies below 3 GHz and below ± 2% for the frequencies between 3-6 GHz at any distance larger than half the probe tip diameter from the boundary.

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## Frequency Response of E-Field (TEM-Cell: ifi110 EXX, Waveguide: R22)

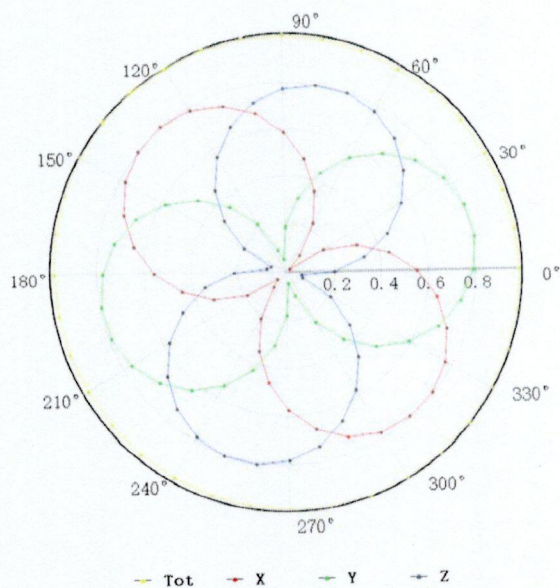


Uncertainty of Frequency Response of E-field:  $\pm 7.4\%$  ( $k=2$ )

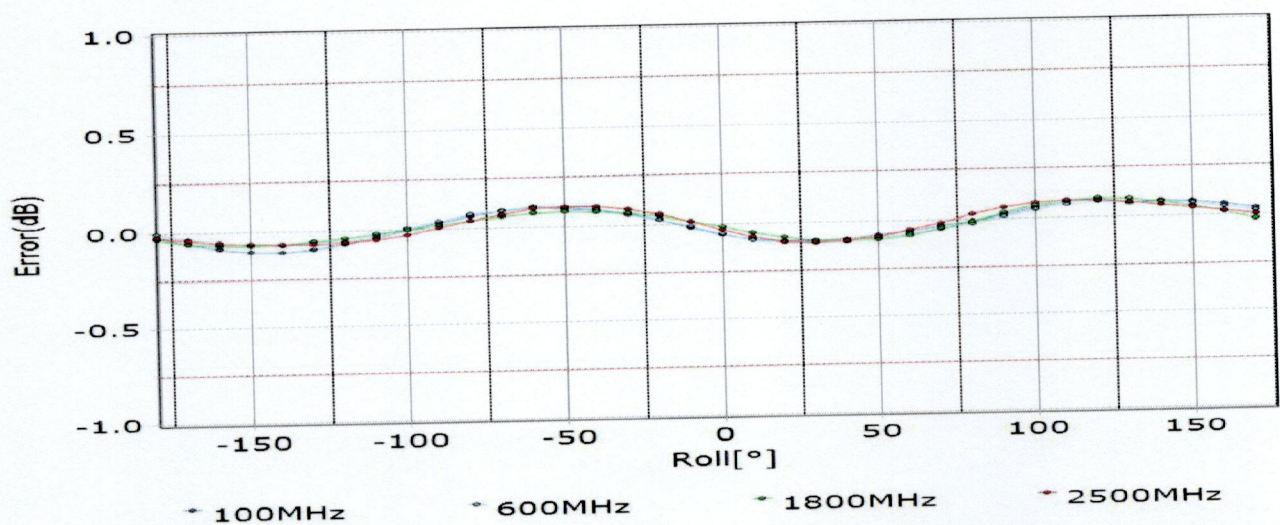
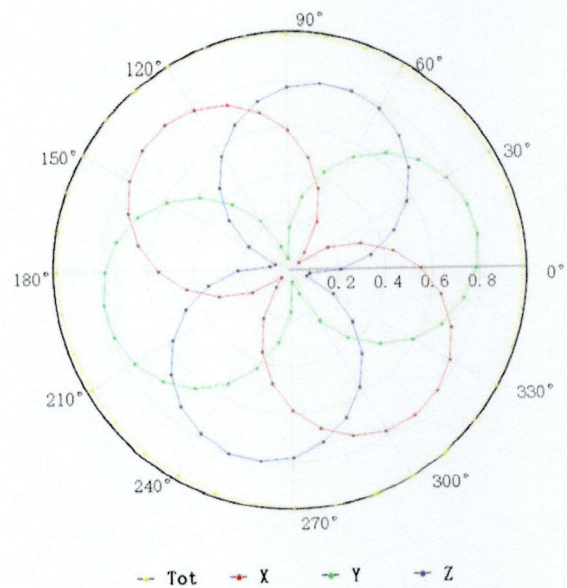
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## Receiving Pattern ( $\Phi$ ), $\theta=0^\circ$

**f=600 MHz, TEM**



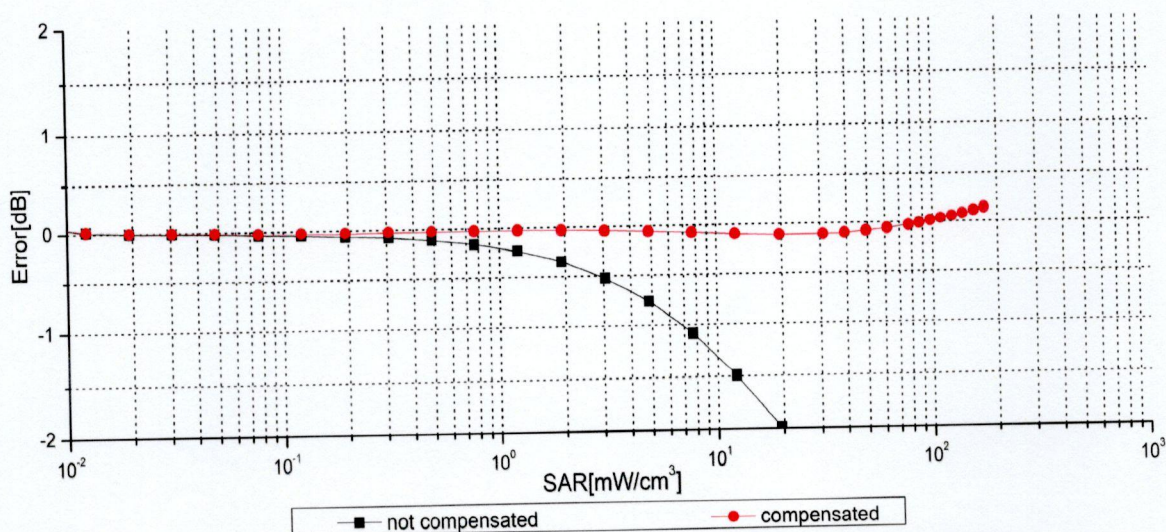
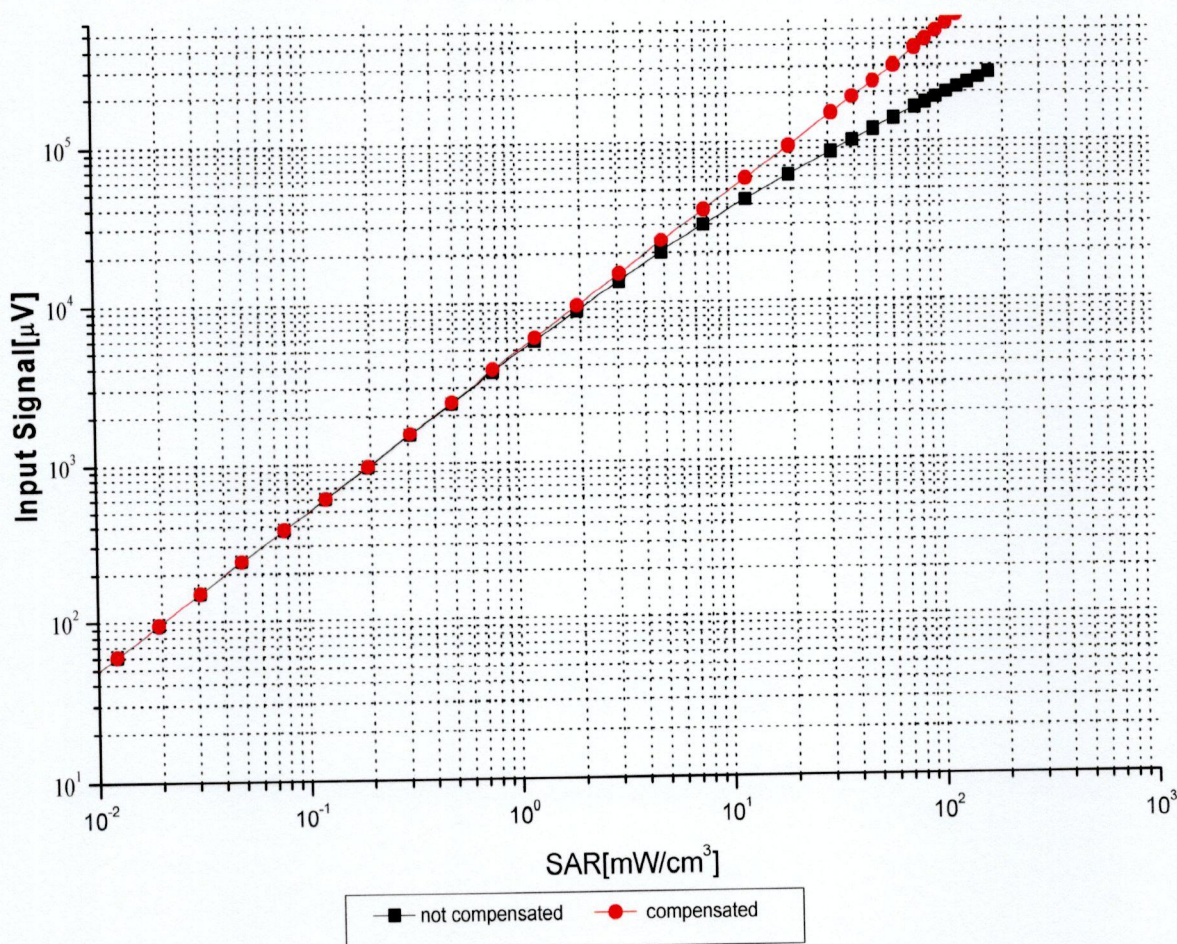
**f=1800 MHz, R22**



Uncertainty of Axial Isotropy Assessment:  $\pm 1.2\%$  ( $k=2$ )

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## Dynamic Range f(SAR<sub>head</sub>) (TEM cell, f = 900 MHz)



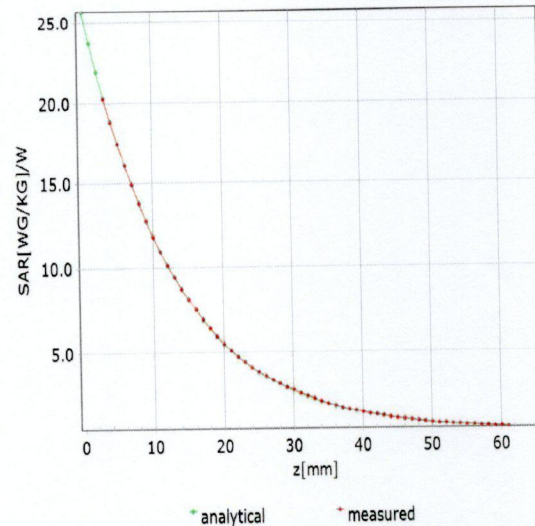
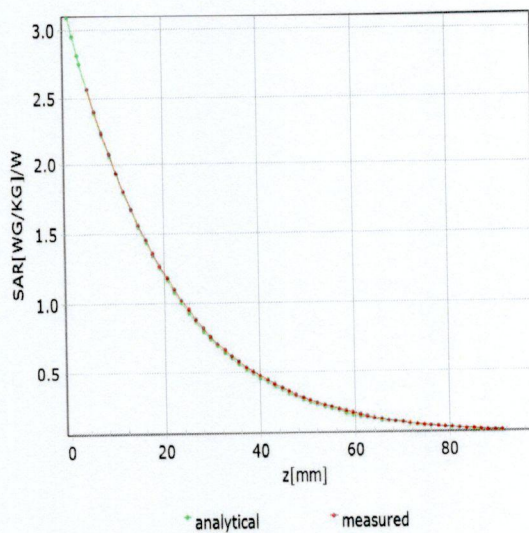
Uncertainty of Linearity Assessment:  $\pm 0.9\%$  ( $k=2$ )

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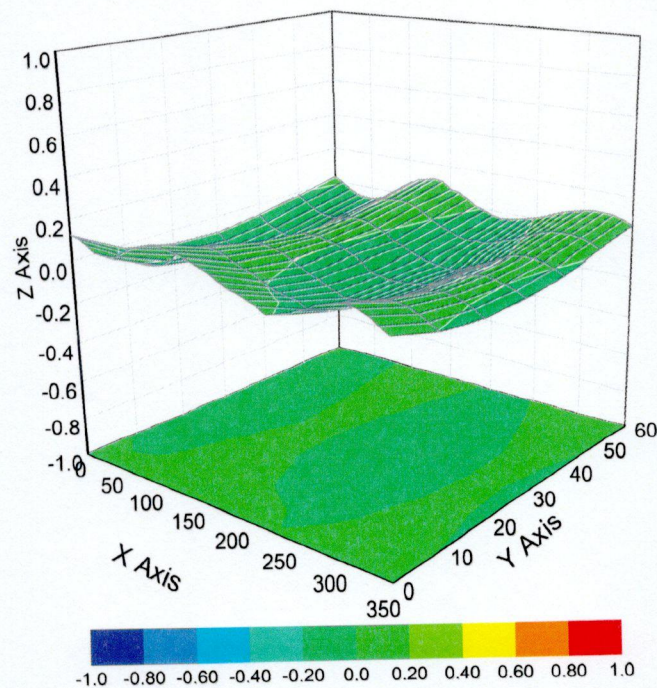
## Conversion Factor Assessment

**f=750 MHz,WGLS R9(H\_convF)**

**f=1750 MHz,WGLS R22(H\_convF)**



## Deviation from Isotropy in Liquid



**Uncertainty of Spherical Isotropy Assessment:  $\pm 3.2\%$  ( $k=2$ )**