## Glossary:

| | |
|---|---|
| NORMx,y,z | sensitivity in free space |
| DCP | diode compression point |
| CF | crest factor (1/duty_cycle) of the RF signal |
| A, B, C, D | modulation dependent linearization parameters |
| En | incident E-field orientation normal to probe axis |
| Ep | incident E-field orientation parallel to probe axis |
| Polarization φ | φ rotation around probe axis |
| Polarization ϑ | ϑ rotation around an axis that is in the plane normal to probe axis (at measurement center), i.e., ϑ = 0 is normal to probe axis |
| Connector Angle | information used in DASY system to align probe sensor X to the robot coordinate system |

## Calibration is Performed According to the Following Standards:

a) IEEE Std 1309-2005, " IEEE Standard for calibration of electromagnetic field sensors and probes, excluding antennas, from 9 kHz to 40 GHz", December 2005
b) CTIA Test Plan for Hearing Aid Compatibility, Rev 3.1.1, May 2017

## Methods Applied and Interpretation of Parameters:

- *NORMx,y,z:* Assessed for E-field polarization ϑ = 0 for XY sensors and ϑ = 90 for Z sensor (f ≤ 900 MHz in TEM-cell; f > 1800 MHz: R22 waveguide).
- *NORM(f)x,y,z = NORMx,y,z * frequency_response* (see Frequency Response Chart).
- *DCPx,y,z:* DCP are numerical linearization parameters assessed based on the data of power sweep with CW signal (no uncertainty required). DCP does not depend on frequency nor media.
- *PAR:* PAR is the Peak to Average Ratio that is not calibrated but determined based on the signal characteristics
- *Ax,y,z; Bx,y,z; Cx,y,z; Dx,y,z; VRx,y,z*: *A, B, C, D* are numerical linearization parameters assessed based on the data of power sweep for specific modulation signal. The parameters do not depend on frequency nor media. *VR* is the maximum calibration range expressed in RMS voltage across the diode.
- *Spherical isotropy (3D deviation from isotropy)*: in a locally homogeneous field realized using an open waveguide setup.
- *Sensor Offset*: The sensor offset corresponds to the offset of virtual measurement center from the probe tip (on probe axis). No tolerance required.
- *Connector Angle*: The angle is assessed using the information gained by determining the *NORMx* (no uncertainty required).

# DASY/EASY - Parameters of Probe: ER3DV6 - SN:2368

## Basic Calibration Parameters

| | Sensor X | Sensor Y | Sensor Z | Unc (k=2) |
|---|---|---|---|---|
| Norm ($\mu V/(V/m)^2$) | 1.71 | 1.62 | 1.82 | ± 10.1 % |
| DCP (mV)[B] | 98.5 | 100.0 | 102.3 | |

## Calibration results for Frequency Response (30 MHz – 3 GHz)

| Frequency MHz | Target E-Field V/m | Measured E-field (En) V/m | Deviation E-normal in % | Measured E-field (Ep) V/m | Deviation E-normal in % | Unc (k=2) % |
|---|---|---|---|---|---|---|
| 30 | 77.1 | 76.4 | -1.0% | 77.3 | 0.3% | ± 5.1% |
| 100 | 77.1 | 78.5 | 1.9% | 77.8 | 0.9% | ± 5.1% |
| 450 | 77.2 | 78.7 | 2.0% | 77.9 | 1.0% | ± 5.1 % |
| 600 | 77.1 | 78.4 | 1.6% | 77.7 | 0.7% | ± 5.1 % |
| 750 | 77.1 | 78.2 | 1.5% | 77.8 | 0.9% | ± 5.1 % |
| | | | | | | |
| 1800 | 142.9 | 141.4 | -1.0% | 140.9 | -1.5% | ± 5.1 % |
| 2000 | 135.1 | 134.2 | -0.7% | 133.5 | -1.2% | ± 5.1 % |
| 2200 | 127.6 | 125.8 | -1.4% | 127.2 | -0.3% | ± 5.1 % |
| 2500 | 125.4 | 125.6 | 0.2% | 127.1 | 1.4% | ± 5.1 % |
| 3000 | 79.4 | 77.9 | -1.8% | 80.9 | 2.0% | ± 5.1 % |

## Calibration Results for Modulation Response

| UID | Communication System Name | | A dB | B dB√μV | C | D dB | VR mV | Max dev. | Unc[E] (k=2) |
|---|---|---|---|---|---|---|---|---|---|
| 0 | CW | X | 0.0 | 0.0 | 1.0 | 0.00 | 166.4 | ±3.0 % | ± 4.7 % |
| | | Y | 0.0 | 0.0 | 1.0 | | 199.3 | | |
| | | Z | 0.0 | 0.0 | 1.0 | | 204.0 | | |
| 10021-DAC | GSM-FDD (TDMA, GMSK) | X | 20.94 | 99.5 | 28.1 | 9.39 | 136.2 | ±2.2 % | ± 4.7 % |
| | | Y | 8.73 | 84.8 | 23.0 | | 114.6 | | |
| | | Z | 26.26 | 99.6 | 28.0 | | 146.5 | | |
| 10172-CAG | LTE-TDD (SC-FDMA, 1 RB, 20 MHz, QPSK) | X | 7.82 | 75.6 | 27.3 | 9.21 | 106.2 | ±3.8 % | ± 4.7 % |
| | | Y | 9.12 | 81.0 | 30.1 | | 130.7 | | |
| | | Z | 11.49 | 85.4 | 31.1 | | 145.0 | | |
| 10173-CAG | LTE-TDD (SC-FDMA, 1 RB, 20 MHz, 16-QAM) | X | 8.29 | 76.5 | 27.8 | 9.48 | 105.5 | ±3.8 % | ± 4.7 % |
| | | Y | 9.50 | 81.4 | 30.3 | | 130.8 | | |
| | | Z | 12.51 | 87.3 | 32.1 | | 145.8 | | |

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%.

[B] Numerical linearization parameter: uncertainty not required.
[E] Uncertainty is determined using the max. deviation from linear response applying rectangular distribution and is expressed for the square of the field value.

# DASY/EASY - Parameters of Probe: ER3DV6 - SN:2368

## Sensor Frequency Model Parameters

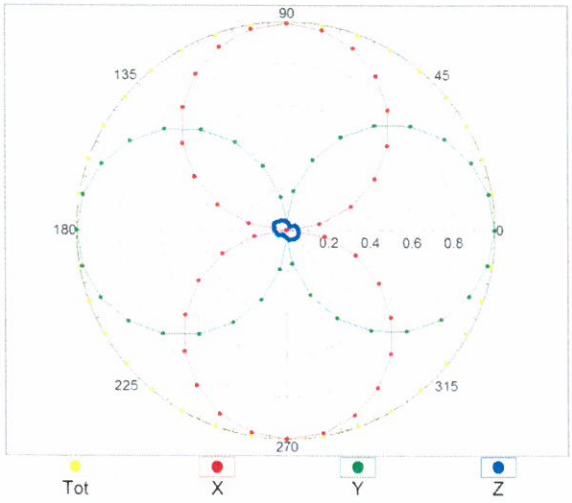
| | Sensor X | Sensor Y | Sensor Z |
|---|---|---|---|
| Frequency Corr. (LF) | -1.72 | -1.37 | 0.42 |
| Frequency Corr. (HF) | 0.00 | 0.00 | 0.00 |

## Other Probe Parameters

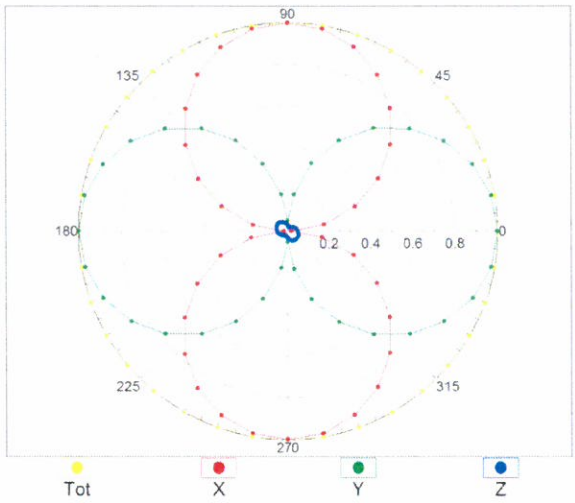
| | |
|---|---|
| Sensor Arrangement | Rectangular |
| Connector Angle (°) | -67 |
| Mechanical Surface Detection Mode | enabled |
| Optical Surface Detection Mode | disabled |
| Probe Overall Length | 337 mm |
| Probe Body Diameter | 10 mm |
| Tip Length | 10 mm |
| Tip Diameter | 8 mm |
| Probe Tip to Sensor X Calibration Point | 2.5 mm |
| Probe Tip to Sensor Y Calibration Point | 2.5 mm |
| Probe Tip to Sensor Z Calibration Point | 2.5 mm |

# Receiving Pattern (ϕ), ϑ = 0°

f=600 MHz,TEM,0°

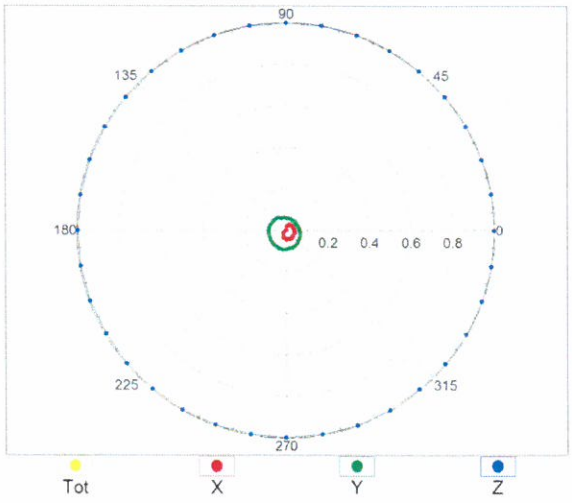



f=2500 MHz,R22,0°

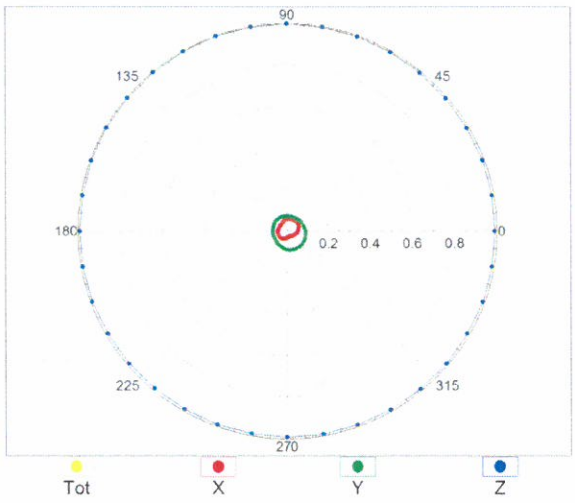



# Receiving Pattern (ϕ), ϑ = 90°

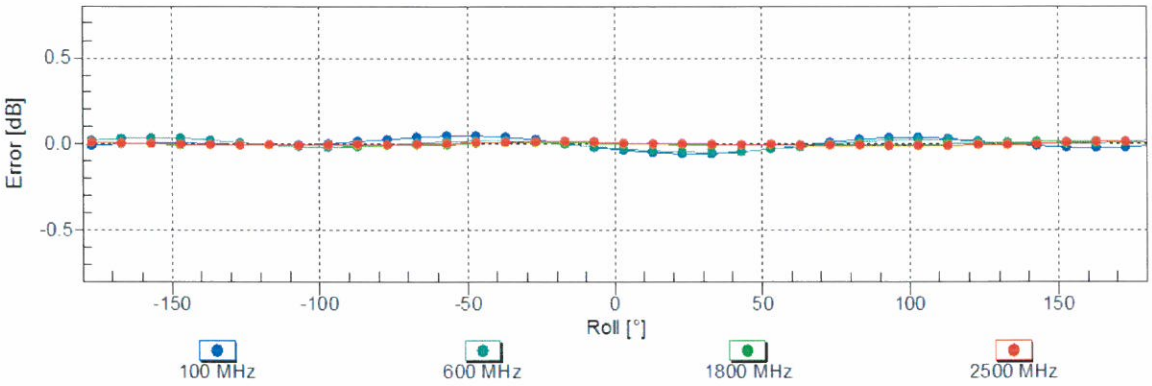
f=600 MHz,TEM,90°




f=2500 MHz,R22,90°

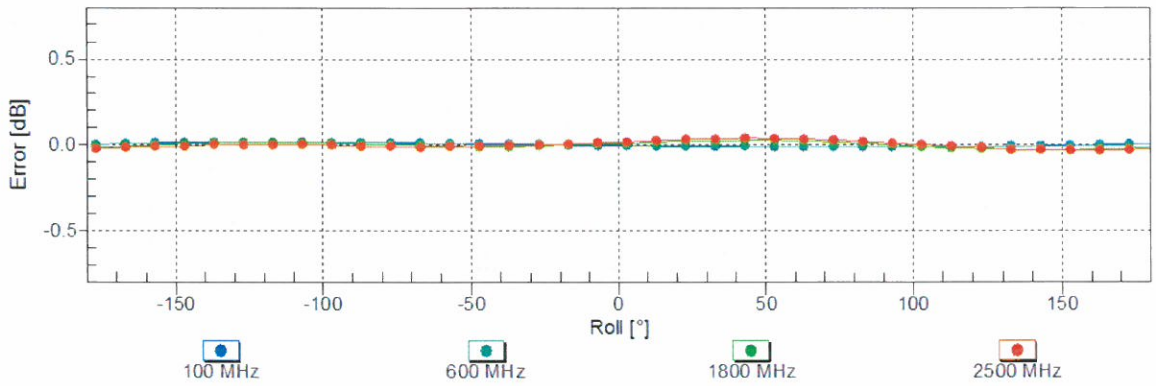


# Receiving Pattern (ϕ), ϑ = 0°



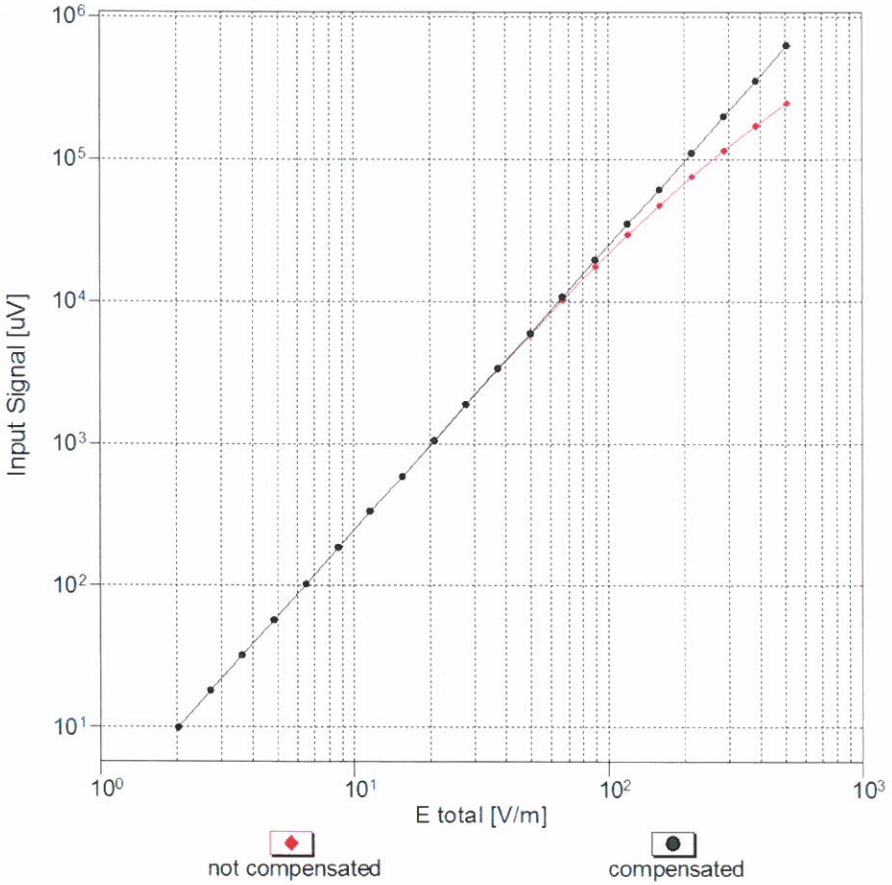

**Uncertainty of Axial Isotropy Assessment: ± 0.5% (k=2)**

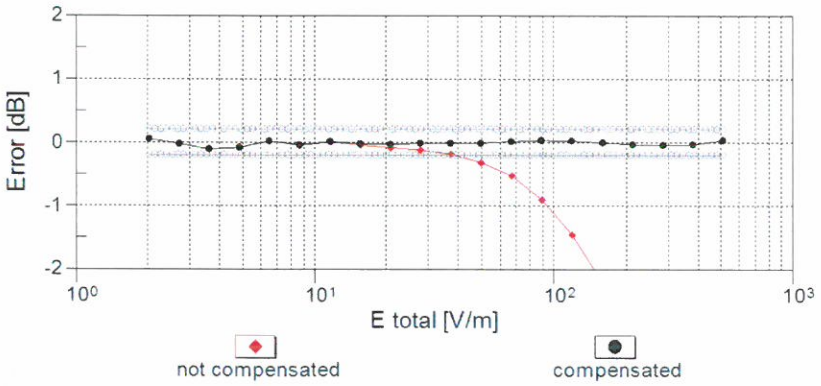
# Receiving Pattern (ϕ), ϑ = 90°




**Uncertainty of Axial Isotropy Assessment: ± 0.5% (k=2)**

# Dynamic Range f(E-field)
**(TEM cell, f = 900 MHz)**

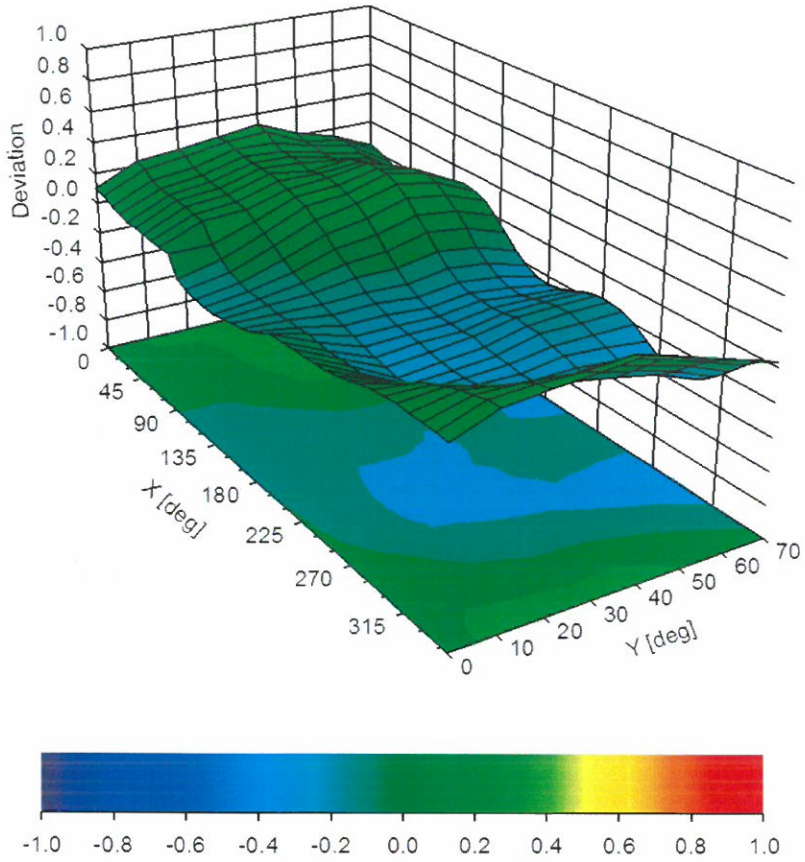



**Uncertainty of Linearity Assessment: ± 0.6% (k=2)**

# Deviation from Isotropy in Air

**Error (ϕ, ϑ), f = 900 MHz**







**Uncertainty of Spherical Isotropy Assessment: ± 2.6% (k=2)**