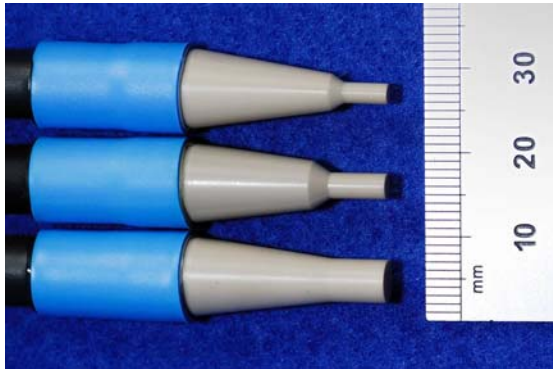


IXP Measuring Probe Family

For the measurement of E and H field in air and in lossy liquids for SAR testing of wireless devices

After ten years of continuing development driven by system and standards requirements, IndexSAR can offer a range of probes for the measurement of E and H fields in both free space and lossy materials. IXP probes exhibit excellent isotropy, axial and spherical, combined with high linearity. When used with the IXA-020 amplifier and associated software they can be used for a wide range of standalone applications including field surveys and dosimetry investigations.



- **400 MHz to 6GHz range**
- **Isotropic measurements of E-fields in air and liquid**
- **Wide range of calibrations available**

SAR probe dimensions (mm)	IXP- 010	IXP- 250	IXP- 050	IXP- 020
Overall length (mm)	350m	350	350	350
Tip length (mm)	6	6	10	10
Body diameter (mm)	12	12	12	12
Tip diameter (mm)	1.0	2.5	5.2	5.2
Distance from probe tip to dipole centres (mm)	0.5	1.39	2.7	2.7

SAR Probe Construction

Each probe contains three orthogonal dipole sensors arranged on a triangular prism core, protected against static charges by built-in shielding, and covered at the tip by PEEK cylindrical enclosure material. No adhesives are used in the immersed section. Outer case materials are PEEK and heat-shrink sleeving.

Calibration

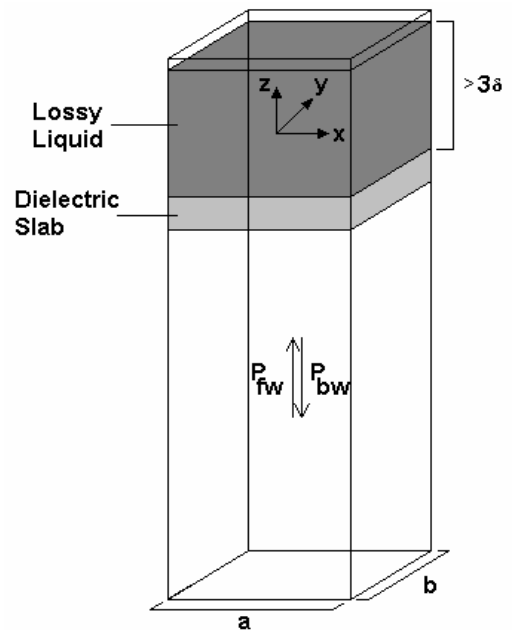
All Indexsar probes are calibrated independently at standard frequencies of 900 and 1800MHz, in brain and body liquids at CW (Many other frequencies and modulation schemes can be accommodated to order). Great care is taken in the calibration of Indexsar probes, A waveguide method is used for all rotational isotropy callibrations. According to IEC/CENELEC, this calibration technique provides excellent accuracy, with standard uncertainty of less than 3.6% depending on the frequency and medium. The calibration itself is reduced to power measurements traceable to a standard calibration procedure.

Waveguide calibration procedure

The calibration method is based on setting up a calculable specific absorption rate (SAR) in a vertically-mounted waveguide section. The waveguide has an air-filled, launcher section and a liquid-filled section separated by a matching window that is designed to minimise reflections at the liquid interface. A TE_{01} mode is launched into the waveguide by means of a N-type-to-waveguide adapter. The power delivered to the liquid section is calculated from the forward power and reflection coefficient measured at the input to the waveguide. At the centre of the cross-section of the waveguide, the local spot SAR in the liquid as a function of distance from the window is given by functions set out in IEEE1528 as below:

Because of the low cut-off frequency, the field inside the liquid nearly propagates as a TEM wave. The depth of the medium (greater than three penetration depths) ensures that reflections at the upper surface of the liquid are negligible. The power absorbed in the liquid is determined by measuring the waveguide forward and reflected power. Equation (4) shows the relationship between the SAR at the cross-sectional centre of the lossy waveguide and the longitudinal distance (z) from the dielectric separator

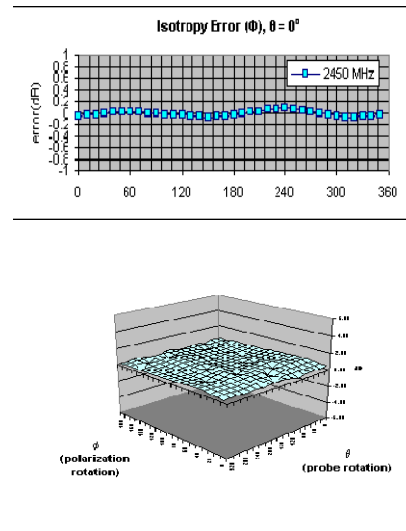
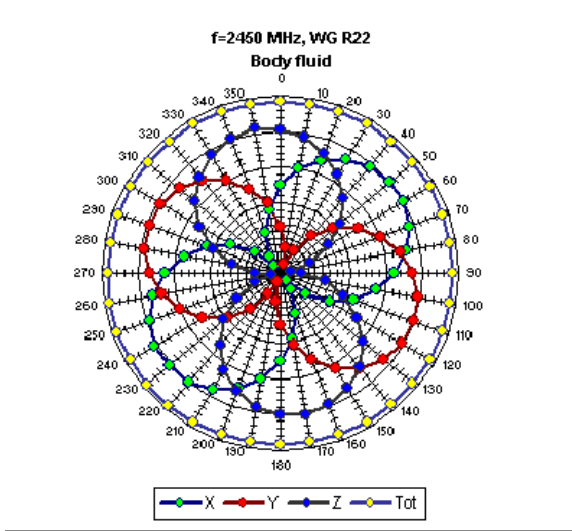
$$SAR(z) = \frac{4(P_f - P_b)}{\rho ab \delta} e^{-2z/\delta}$$



IXP-050/050L typical rotational (2D) isotropy (x,y,z and combined axes)

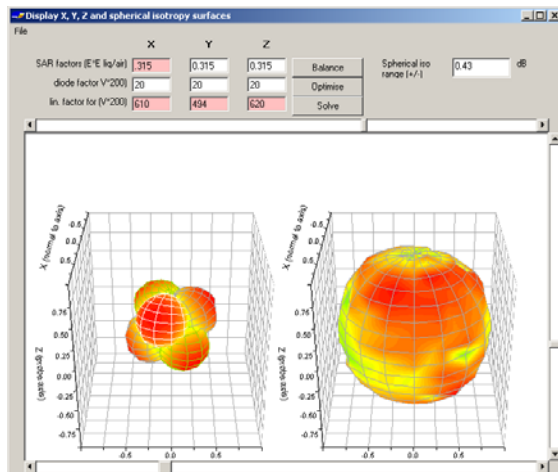
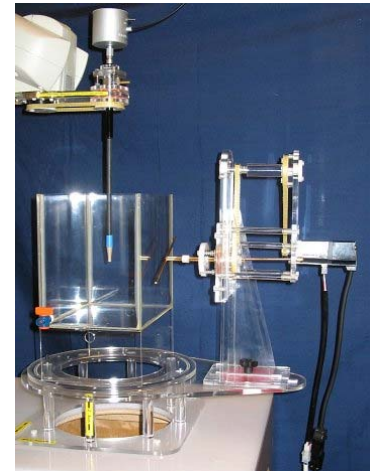
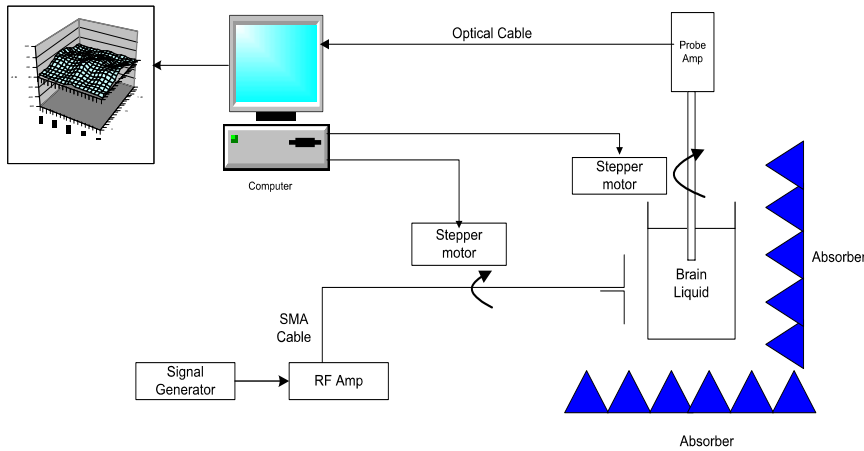
Measured in waveguide

F= 2450MHz WG R22

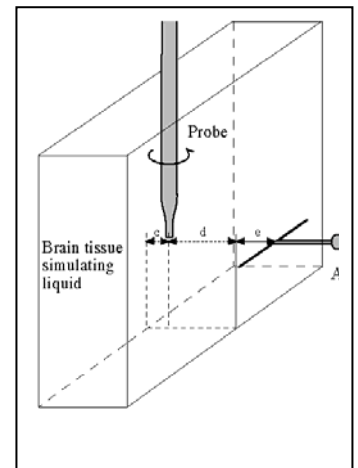


An example of the rotational isotropy of probe obtained by rotating the probe in a liquid-filled waveguide at 2450 MHz. Similar distributions are obtained at the other test frequencies (1800 and 1900 MHz) both in head liquids and body fluids

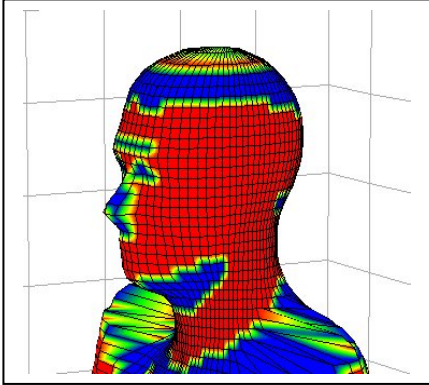
Spherical (3D) Isotropy



3D Representation



IXP-020 5mm SAR probe for vertical phantom test systems



The IXP-020 SAR probe has been designed for use in SAR systems using vertical or "real" SAM phantoms. This unique probe allows the system to present the probe tip perpendicular (within $\pm 20^\circ$) to the SAM surface as required in the draft standard IEC 62209



HAC Probes

Designed to meet the ANSI C 69.19 HAC standard

RF 835-1880MHz



IXP-090 E-field "air" probe



IXP-070 H – Field Probe

Audio



Axial and radial T-coil sensors
IXP-100

General purpose E-field probe 30MHz -3GHz



IXA-020 Probe amplifier



3 x Independent channel amplifier
accepts all IXP probes
Fast sampling time = 500Hz

