We are reporting on a study of the near-field sensitivity and resolution of a metal-dielectric probe (MDP). The propagation of the electromagnetic field across the probe was studied experimentally by means of time-domain terahertz spectroscopy and numerically simulated by CST MicroWave Studio 2008. Several localised areas at the probe end facet were distinguished and showed to be sensitive to the local dielectric properties and local anisotropy of the sample. Contrast and sensitivity measurements were conducted in several configurations of a MDP; the results were confirmed by simulations. The acquired data were analysed by using singular value decomposition that enabled separating independent physical phenomena in the measured datasets and filtering external disturbances out of the signal. Independent components corresponding to the changes in the output terahertz pulse upon varying the probe-sample distance and reflecting the local anisotropy in a ferroelectric barium titanate (BaTiO3) crystal were extracted and identified. The domain structure with characteristic dimensions of about 5 um was resolved during imaging experiments on the ferroelectric BaTiO3 sample, i.e. the resolved structures were ten times smaller than the characteristic dimensions of the end facet of the probe and forty times smaller than the shortest wavelength employed. Sensitivity of the MDP to refractive index was examined employing samples with bare surfaces and consequently with Mylar-covered surfaces. The thin coverage of Mylar film slightly decreased the sensitivity of the probe to the refractive index of the sample underneath, but it still allowed distinguishing among samples. Effort has been put forth to manufacture a metal-dielectric dual probe consisting of two joined MDP with the aim to enhance the resolution at imaging. Imaging experiments demonstrated the sensitivity of the dual probe on a sample with metal-dielectric contrast.