We present a spatially resolved spectral analysis of full observations of the remnant of the supernova of 1006 AD. This remnant shows both nonthermal X-ray emission from bright limbs, generally interpreted as synchrotron emission from the loss-steepened tail of the nonthermal electron population also responsible for radio emission, and thermal emission from elsewhere in the remnant. In earlier work, we showed that the spatially integrated spectrum was well described by a theoretical synchrotron model in which shock acceleration of electrons was limited by escape, in combination with thermal models indicating high levels of iron from ejecta. Here we use new spatially resolved subsets of the earlier theoretical nonthermal models for the analysis. We find that emission from the bright limbs remains well described by those models, and refine the values for the characteristic break frequency. We show that differences between the northeast and southwest nonthermal limbs are small, too small to account easily for the presence of the northeast limb, but not the southwest, in TeV gamma-rays. Comparison of spectra of the nonthermal limbs and other regions confirms that simple cylindrically symmetric nonthermal models cannot describe the emission, and we put limits on nonthermal contributions to emission from the center and the northwest and southeast limbs. We can rule out solar-abundance models in all regions, finding evidence for elevated abundances. However, more sophisticated models will be required to accurately characterize these abundances.