Visible hemispherical cameras are routinely used to determine cloud characteristics such as cloud cover and cloud type using sky images obtained during daylight. Some cameras with enhanced sensitivity are available which can also measure scattered light during nighttime to infer cloud cover from reflected light on clouds. The algorithms used to analyse these sky images can retrieve fractional cloud cover with relatively high precision, and to some extent also cloud type. We report here on the development of a far infrared hemispherical sky imager capable of measuring the infrared sky emissivity. The system consists of a commercial camera with 640 x 480 micro bolometers, sensitive in the wavelength range 8 to 14 μm. The sky hemisphere is imaged on the detector using a gold-plated spherical convex mirror with the camera placed at its focus. Sky images are taken every minute, 24 hours a day. The camera was absolutely calibrated using the reference blackbody cavity of the Infrared Radiometry Section of the World Radiation Center, yielding sky emissivities with uncertainties estimated at ±2 K. Sky images are analysed with respect to radiative transfer model calculations to determine fractional cloud cover and cloud height using the observed effective temperature in conjunction with the appropriate temperature profile. The system will be used to complement shortwave and longwave radiation measurements in order to quantify cloud properties and their effect on the surface radiation budget.