Cardinal cell types are hypothesized to play a key role in determining a neuron's function within a circuit. Based on this premise, we investigate whether a neuron's transcriptomic signature influences its activity. Employing a deep-learning architecture, we demonstrate that cell-class information is embedded within a neuron's calcium imaging activity in the intact brains of behaving animals. Leveraging their genetic fingerprint, we subsequently develop a classifier capable of distinguishing cardinal cell types from visual areas during the presentation of both simple and complex stimuli.