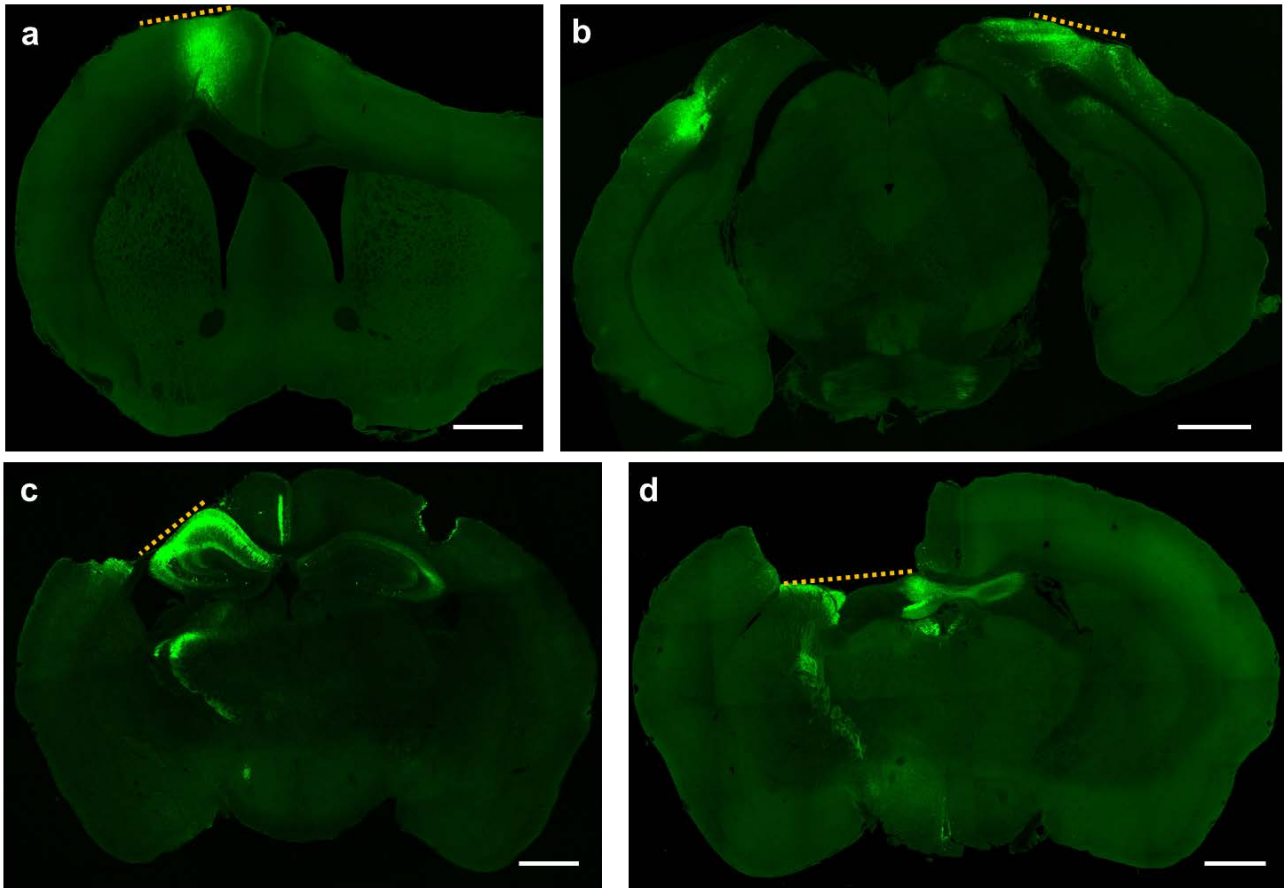
Population imaging of neural activity in awake behaving mice

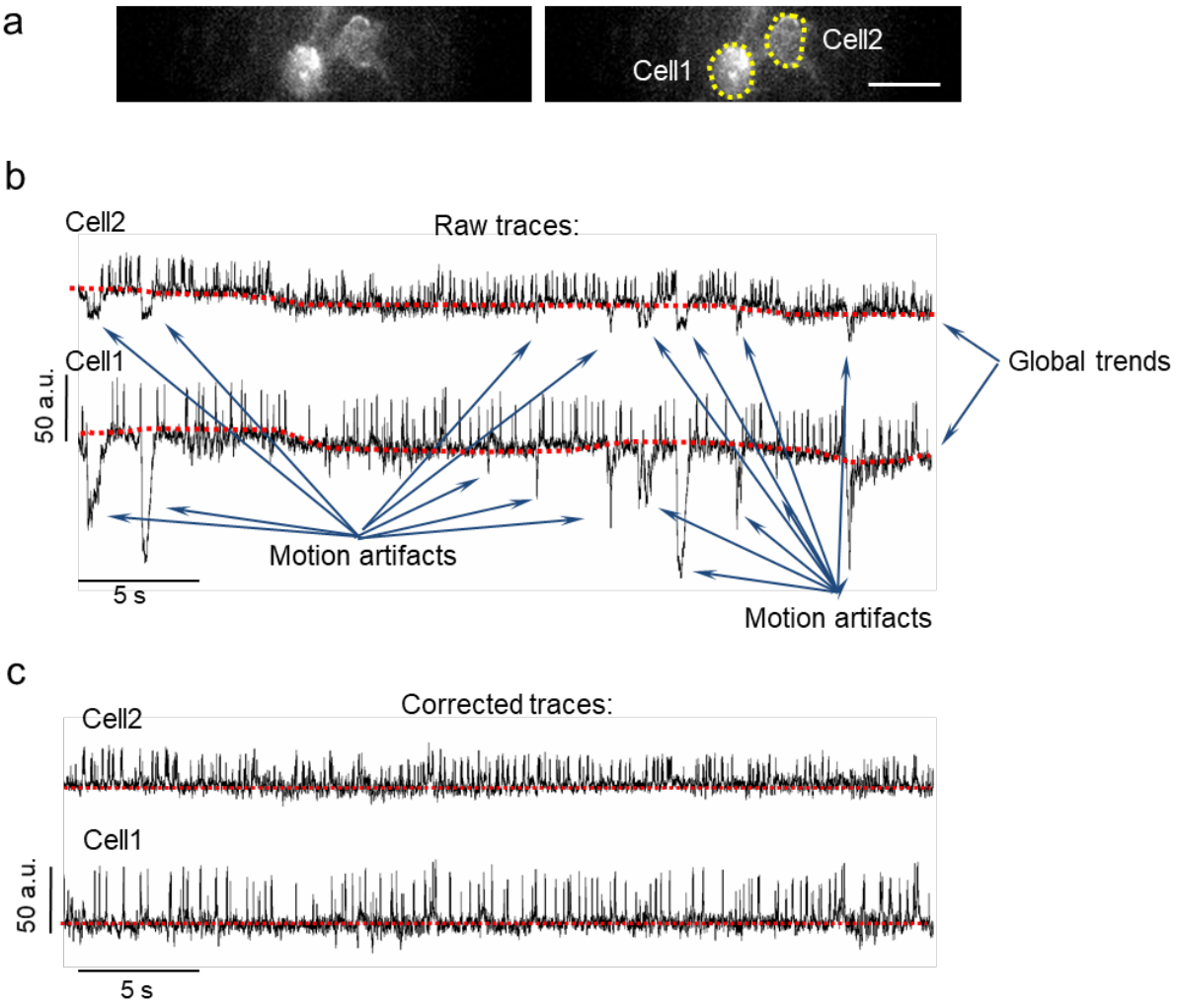
Supplementary Information

Supplementary Methods Figure 1. Fluorescence images of mouse brain sections prepared after *in vivo* imaging.



Fluorescence images of brain slices expressing SomArchon in (**a**) motor cortex (a representative slice selected from n = 12 slices from 2 mice), (**b**) visual cortex (a representative slice selected from n = 12 slices from 2 mice), (**c**) hippocampus (a representative slice selected from n = 24 slices from 4 mice), and (**d**) striatum (a representative slice selected from n =12 slices from 2 mice). Dotted line indicates the position of optical imaging window used for *in vivo* imaging. Scale bars, 1 mm.

Supplementary Methods Figure 2. Processing of raw optical voltage traces to remove motion artifacts and global trends.



Raw voltage traces were processed to remove motion artifacts and global trends. Motion resulted in sharp coordinated changes in fluorescence intensity across all static regions of interest for a given field of view. In addition, global trends in baseline fluorescence were observed due to slow photobleaching or slight drift in focus. (**b**) Here, we present raw voltage traces for two cells imaged in the same field of view (as seen in **a**). Both traces demonstrate collateral shifts in fluorescence for both traces as well as common global trend in the baseline shift. (**c**) The motion artifacts in **b** were removed to yield corrected traces.