

## **A 16-Channel Analog Front End for Multi-Neuron Recordings**

Obeid I, Morizio JC, Nicolelis MAL, Wolf PD

A 16 channel analog front end integrated circuit, custom made for multi-neuron recordings, has been designed, manufactured, and tested. Each channel consists of two stages: a single ended bandpass filter and a differential gain stage. Each single ended bandpass filter uses one off chip capacitor together with the gain-bandwidth product of the op-amp to set single poles at 200Hz and 54kHz with a user selectable gain of either 25x or 50x. The differential stages provide 10x gain and allow the user to select one of the 16 channels as the reference. Op-amps are based on a simple two stage design, and the whole chip is manufactured using the MOSIS AMI 0.5 $\mu$ m 3 metal layer, double poly CMOS process. The die measures 3.3mm x 3.0mm. The part operates from a single 5V supply and consumes 1mW per channel. The chip is designed to buffer, amplify, and filter signals directly from electrodes implanted in the brain and is intended to be a precursor to a single chip solution to the wireless multi-channel neuron recording problem.