

# Wireless Implantable MicroSystem for Multi-Channel Neural Recording: The Spike Detector Module

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A wireless implantable microsystem for recording and processing the neural signals sensed and preconditioned by multi-channel active recording microprobes is being developed. This microsystem is powered and controlled through a wireless inductive RF link and transmits the preconditioned/processed neural activity to the outside world (Fig. 1). Such a system will be a most critical element in both treating some of mankind’s most debilitating disorders and studying the nervous system at the cellular level.

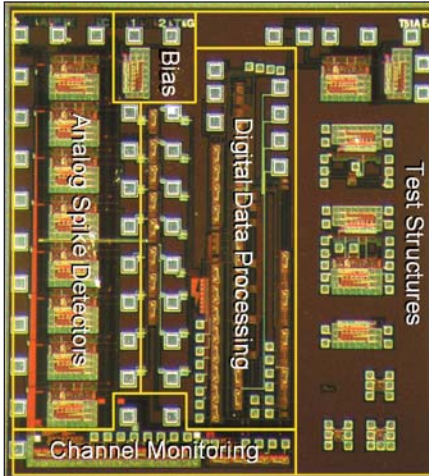


Fig. 2 – Die photograph of the SD-8 chip

Active microprobes obtain neural signals from a specific subset of the input sites (channels) and, after preconditioning, deliver them to the Neural Processing Unit (NPU), which is responsible for either spike detection on all the input channels received from the active probes (Scan Mode) or selecting a single-channel for high-precision neural recording (Monitor Mode). The bidirectional Telemetry Module retrieves the energy required for the operation of the whole system and also the data and clock needed to control the system, all from a signal received through an inductive link. There is also a back telemetry block on this module that is in charge of sending the neural information to the outside world.

The *Eight-Channel Spike Detector Test Module (SD-8)* (Fig. 2) is the first test chip that has been designed, fabricated, and tested for this system. It has been designed in such a way that it can be considered both as a smaller-scale test version of the NPU and as one of the modules that will be used in the full-version of the NPU.

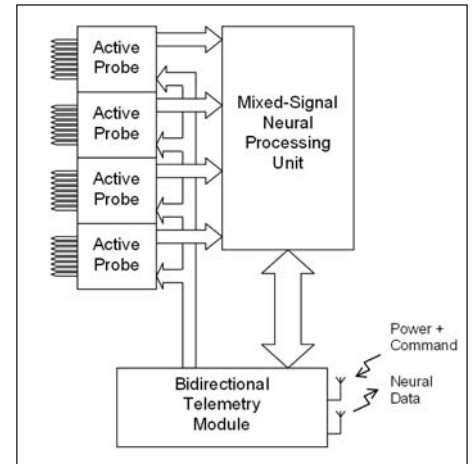


Fig. 1 – General architecture of the system