Wireless Chronic Recording With Cortical Microsystem

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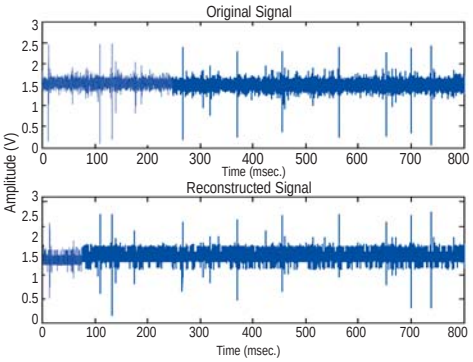
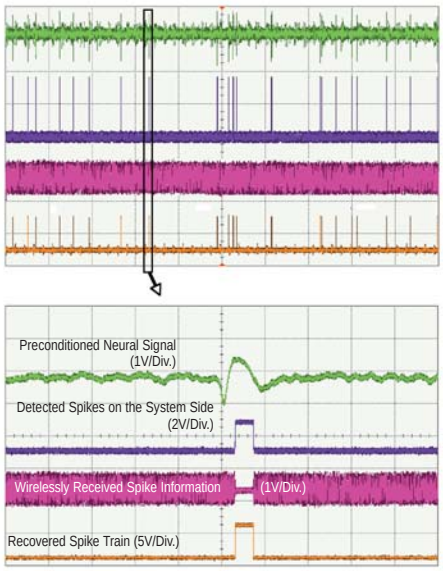
Our cortical microsystem continues to demonstrate increasing performance. Most recently, it was used to record wirelessly from the auditory cortex of two guinea pigs over a 30-day period. Two single-shank probes having sixteen 1250μm^2 IrO sites on 400μm centers were implanted in each animal, with cables leading to a printed-circuit-board version of the penny-size circuit module. Three of the cables were silicon; one was parylene. All were integrated monolithically with the probes and performed well. The neural activity was amplified 1000x, band limited (100Hz–10kHz), and fed to signal processing chips. In the Monitor Mode, the signal from the selected site was sampled at 31.25kb/s, converted to 8b words, organized into data packets, Manchester-encoded, and transmitted to the external world over an on-off-keyed 80MHz telemetry link. In the Scan Mode, the sites were continuously scanned, and when spikes were detected above a user-programmed threshold, the active site addresses were bundled into Manchester-encoded data packets and transmitted. An external system detected, demodulated, and displayed the recorded signals. For 32 sites analyzed statistically, an average 21% of the sites were active with an average signal-to-noise ratio of 4.1. ■





A comparison of the neural activity data at the recording site with the externally recovered signal in the Monitor Mode (left) and Scan Mode (above) for the cortical microsystem.