

Generic Controller Dedicated to Telemetry-Controlled Microsystems

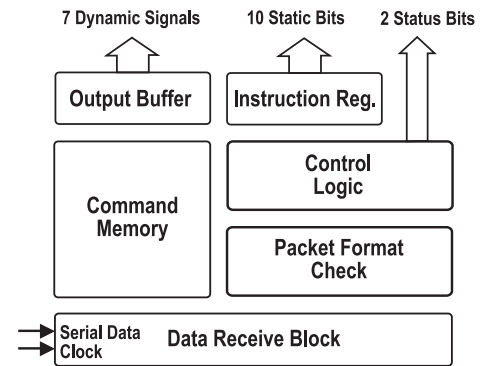
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Telemetry-controlled wireless microsystems are of increasing interest in a wide variety of applications. In general, such systems are usually controlled via a wireless link that allows for the transfer of a serial stream of digital information required to control microsystem operation. To meet the requirements of a safe asynchronous data transfer through the wireless link, the main data bits are accompanied by parity bits and usually follow a start pulse that informs the microsystem that data is about to arrive.

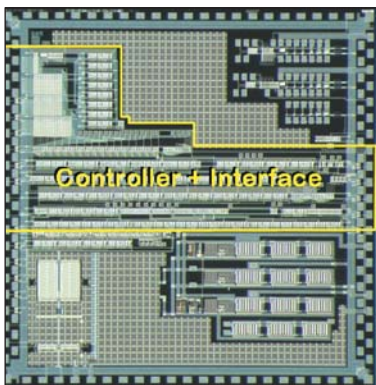
A generic controller has been designed that is capable of receiving these data packets through a serial link, checking the accuracy of their structure and contents. In addition, having defined a specific structure for the arriving data packet, the controller also decodes the received data packets and executes the received commands. Based on a *microprogrammed* central processing unit (CPU) architecture, the controller has a read-only mask-programmable *microprogram memory* that defines *flexible* commands. Executing received commands, the controller is capable of generating

up to 7 dynamic control signals with arbitrary transitions between 0 and 1 over 16 cycles of the master clock, up to 10 static bits, and 3 status bits indicating the start and the end of command execution, and the occurrence of a parity error.

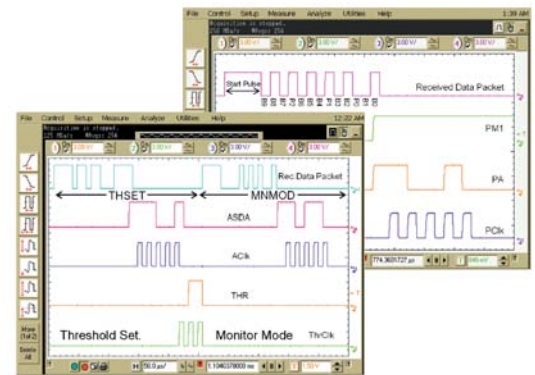
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Simplified block diagram of the controller.



Micrograph of the bidirectional telemetry chip containing the controller and an application-specific interface.



Samples of the controller's functional test results.

The controller has been employed in a telemetry-controlled inductively-powered multi-channel neural recording system, consisting of four multi-channel neural recording active probes and a mixed-signal neural processing chip in addition to the bidirectional telemetry chip.