



Programmable CardBus Digital Receiver

Pocket Watch transforms any portable computer into a high performance multi-channel software defined radio receiver. Applications can be developed with Visual C++ or GCC to command the receiver and process output data.

The *Pocket Watch* accepts two analog input signals through MMCX coax connectors on the outside edge of the card. Each input is AC coupled to either a 14-bit (80 MSPS) or 10-bit (95 MSPS) A/D converter. The sample clock source is software selectable from either the on-board crystal oscillator or an external input that is also supplied through an MMCX connector.

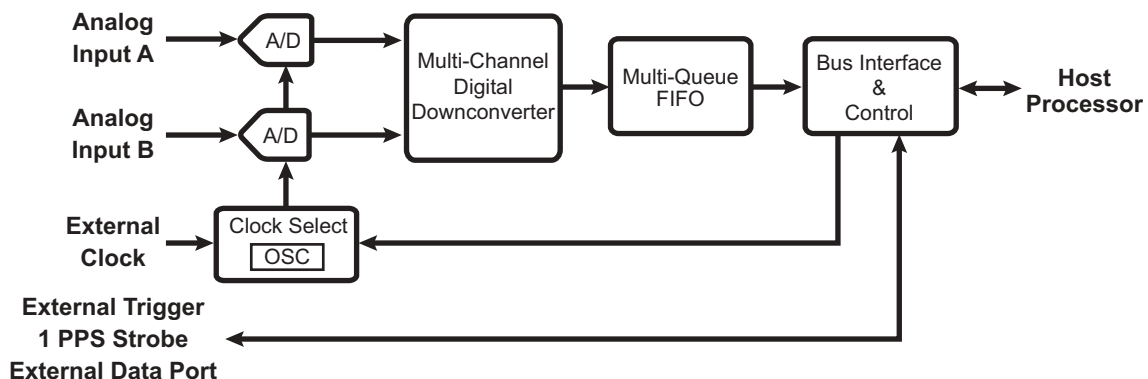
Samples out of the A/D converter are routed to a pool of either four or eight independent digital downconverter channels. Each channel tunes to a signal of interest and performs amplitude adjustment based on gain control settings. Channels can also be combined to obtain a composite output bandwidth beyond the range of a single downconverter.

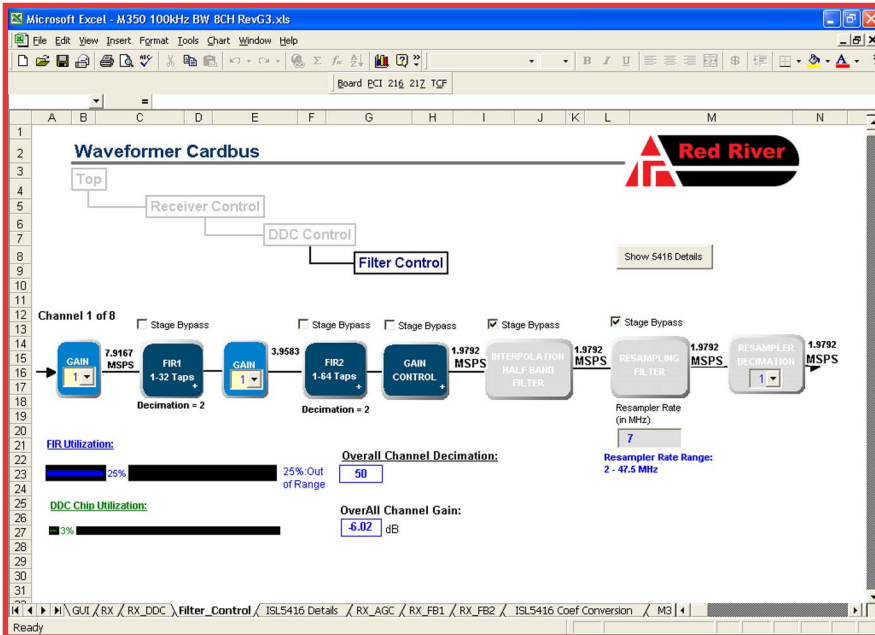
The complex data samples produced by the downconverter are stored in a multi-queue FIFO. The number of queues can be programmed to match the number of active tuner channels in each application. The depth of each queue is also variable, allowing higher sample rate channels to obtain more memory.

The *Pocket Watch* can operate as either a PCI bus master or target, allowing DMA transfers to be initiated either autonomously by the receiver or under direct control of the host. Each FIFO queue is assigned a programmable threshold that signals either the local controller or the host for service. Alternatively, the tuner channels can be routed directly to a dedicated data port on the side of the card.

Time tags can be inserted in the data stream at user defined intervals to perform frame reconstruction or geolocation processing. The internal time of day clock can be loaded over the host bus and synchronized to an external 1 pulse per second strobe. Time of day resolution matches the period of the A/D sample clock.

- ▲ Fits standard PCMCIA Type II socket
- ▲ Dual analog inputs (100 kHz to 125 MHz)
- ▲ 10-bit (95 MSPS) or 14-bit (80 MSPS) A/D
- ▲ Internal or external sample clock
- ▲ Up to 8 independent digital tuners
- ▲ Up to 2.5 MHz single tuner bandwidth
- ▲ Up to 8 MHz composite tuner bandwidth
- ▲ Data time tagging function
- ▲ Input trigger and 1 PPS synchronization
- ▲ PCI bus master with auto DMA features
- ▲ DMA burst or scatter gather operation
- ▲ Includes Waveformer configuration tool
- ▲ Windows and Linux drivers available





The Waveformer configuration tool simplifies receiver programming.

The dedicated data port is designed for direct connection to the upcoming Red River *Pocket FPGA* CardBus product. The link supports simultaneous transfer of up to four downconverter channels running at maximum bandwidth. The *Pocket Watch* and *Pocket FPGA* combination can be installed in any notebook computer with dual CardBus slots to tackle processing intensive tasks without burdening the host computer. The *Pocket FPGA* contains a full Xilinx Virtex-II Pro available for user defined logic, perfect for hosting real-time demodulation algorithms or other signal analysis functions.

Pocket Watch programming is simplified by the *Waveformer* configuration tool that automates the process of setting register values based on the desired performance characteristics of the receiver. The user enters configuration information through a series of menu-driven spreadsheets that accept input based on available register options. The spreadsheets also perform error checking to eliminate configuration conflicts and graphically display key performance parameters in simple block diagrams and frequency response plots. The configuration tool generates a C++ header file containing register values for the complete memory map. These values are uploaded to the card from a single software command supplied with the drivers.

Typical Applications

- ▲ *Signal Intelligence (SIGINT) Collection*
- ▲ *Multi-Mode Software Defined Radio Receiver*
- ▲ *Multi-Channel Narrowband Digital Receiver*
- ▲ *Portable Spectrum Analyzer*
- ▲ *Signal Recorder*

Specification Summary

▲ Receiver

- Dual Analog Inputs
 - 100 kHz to 125 MHz (3 dB) Input
 - 10.5 dBm Input Power (Full Scale)
- 10-bit A/D Converter Option
 - 20 to 95 MSPS Encode Rate
 - 74 dB Spur Free Dynamic Range*
 - 57 dB SINAD*
- 14-bit A/D Converter Option
 - 20 to 80 MSPS Encode Rate
 - 85 dB Spur Free Dynamic Range*
 - 72 dB SINAD*
- 4 or 8 Independent Tuner Channels
 - Intersil ISL5416 Downconverter
 - 2 MHz Maximum Signal Bandwidth
 - 256 kbyte Multi-Queue Data FIFO

▲ Board

- 32-bit/33 MHz CardBus PCI
- External TTL Trigger and 1 PPS
- Sample Clock Time Tag Resolution
- Multi-Channel Auto DMA Engine
- 32 DMA Buffer Addresses per Output

▲ Options

- 10-bit or 14-bit A/D Converter
- Four or Eight Channel Downconverter
- Selectable Oscillator Frequency
- Customization Available by Request

* dBFs (dB Full Scale) at max sample rate and Nyquist input frequency.

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