INTRODUCTION

The PC Universal Remote Receiver is a device that connects to a PC via USB and allows the user to control functions on the PC using an existing remote control. The hardware portion of this project accepts and demodulates the IR signal from the remote. The microprocessor decodes the signal and sends the decoded data to the PC through USB where installed software determines what action is performed for a particular keypress. This means the user has the ability to customize and configure each button on the remote to meet their needs.

MICROPROCESSOR

The CY8C24894 PSoC Microprocessor handles the IR signal decoding and USB communication. The configurable analog blocks are used to clean the received IR signal if necessary and read the bit stream by implementing a comparator with a generic switched-capacitor block. The CY8C24894 also has on-chip full speed USB. These built-in resources help to reduce the amount of additional hardware that would be needed with other microprocessors.

Although the PSoC has an internal oscillator, the accuracy is not acceptable for this device. The IR data stream must be sampled at specific intervals and better accuracy is required to decode the signal. An external crystal with frequency 32.768kHz is used to attain a more accurate clock frequency.

IR RECEIVER

The RPM7140-R is an IR receiver that receives and demodulates the signal and outputs the binary data stream which is fed into the microprocessor for decoding. This sensor does have a bandpass filter with center frequency of 40kHz. Many IR protocols exist and the modulation frequency ranges from 36kHz to 56kHz. This filter was tested and verified to receive signals with carriers well above and below this range. Therefore the RPM7140-R is able to receive and demodulate all IR protocols used for remotes.

USB

The USB connection is mainly for communication but also provides the power for the device. In low power mode the USB will supply 5 ± 0.25V and 100mA which satisfies the voltage and power requirements for the device. A 250mA PTC resettable fuse is attached to the USB supplied voltage to provide circuit protection. If the current reaches 250mA the resettable fuse will trip and protect the circuit until the current decreases allowing normal operation to resume automatically.

DEBUGGING

The CY8C24894 does not have an on chip debugger so headers for programming and reading data from the chip are available. The ISSP, In System Serial Programmer, allows the PSoC to be programmed while on the board. An I²C header with pull-up resistors is also available which can be used to output the desired information. To debug, the device would need...
to be programmed through the ISSP to output debugging information such as the received data stream, decoded data or error codes. This information can be viewed on a computer via the Cypress I²C to USB Bridge. This is not the preferred debugging method but is the best debugging option for this design. The final product would have the layout for the headers and pull-up resistors but would normally not be populated unless debugging was required.