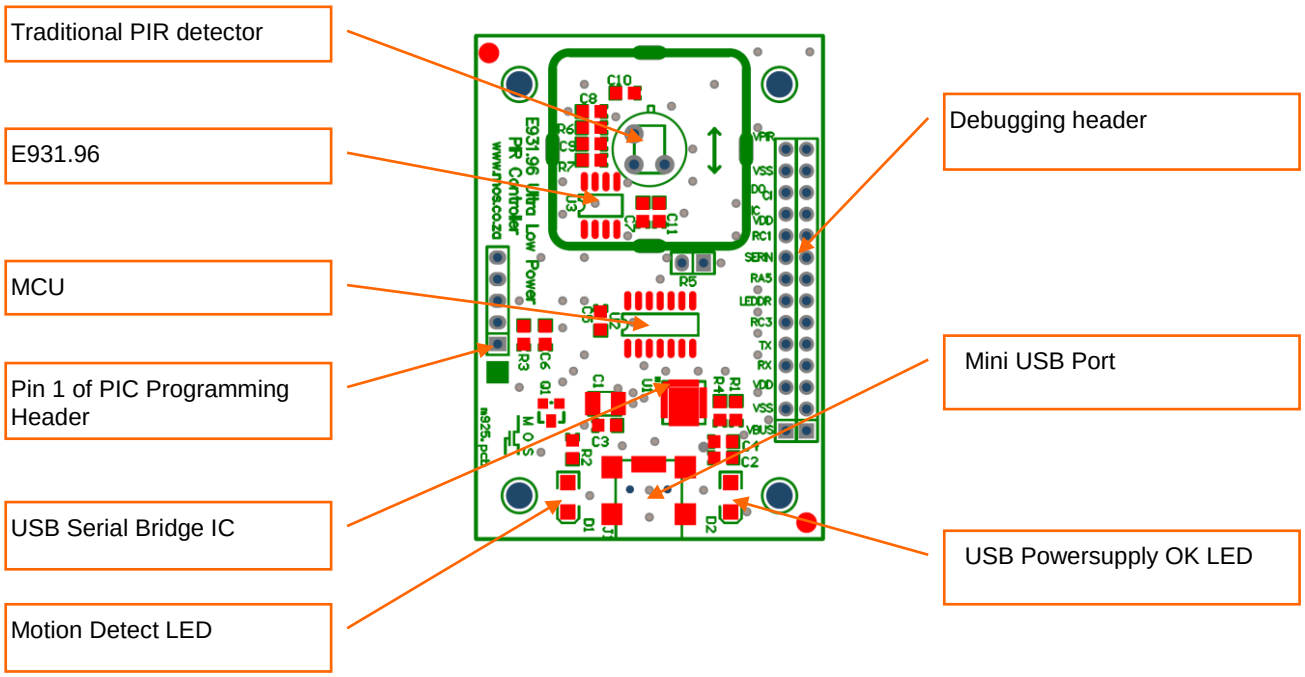
Functional description for E931.96 Ultra Low Power PIR Controller, USB interface evaluation module

MOS (PTY) LTD.
Microsystems On Silicon
Member of ELMOS Semiconductor AG

PCB Version M925

The "E931.96 Ultra Low Power PIR Controller, USB interface" is used to read and write setup data to an E931.96 IC. The module connects to a PC via the USB interface and is controlled by a terminal program.



Notes:

1. **The module is not protected against ESD, avoid potential difference between yourself and the module before use.**

Functional description for E931.96 Ultra Low Power PIR Controller, USB interface evaluation module

PCB Version M925

MOS (PTY) LTD.
Microsystems On Silicon
Member of ELMOS Semiconductor AG

Module Description

1. Power Supply

The SiLab USB to UART Bridge internal regulator generates a stable 3.3V for the circuitry on the module. The various signals and voltages for the test mode selection are generated on the board.

2. Sensor Readout

The Microchip PIC reads the data from the E931.96 via the INT/DOCI pin and writes data to the E931.96 via the SERIN pin.

3. LED Indicators

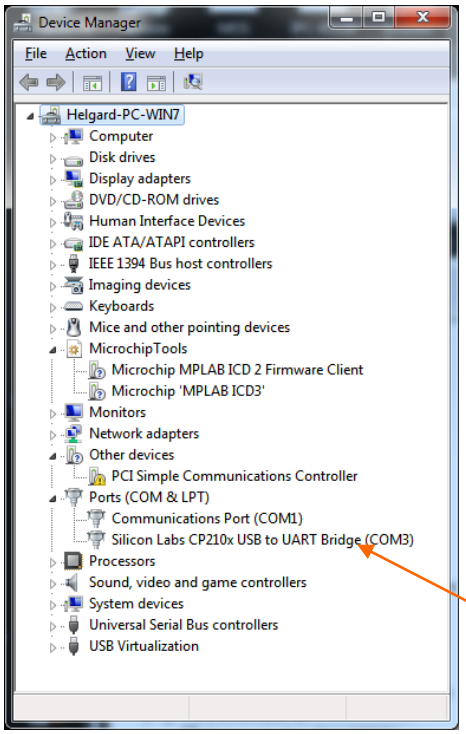
A power LED D2 indicates that the module is powered and connected to the USB port.
LED D1 is controlled by the MCU and will indicate movement with the correct setup.

4. Programming connector

The programming connector can be used to reprogram the MCU. The pins on the programming on the connector are compatible to the MPLAB ICD2 LE and PICKit 2 and PICKit 3 programmers.

5. Debugging header

All of the important IOs between the MCU, E931.96 and USB Bridge are accessible on the debugging connector.



6. USB interface with a Personal Computer (PC)

A CP2102-GM USB to UART Bridge interfaces between a PC and the UART on the MCU.
It may be necessary to install an appropriate driver on the PC if it is not handled automatically by the operating system. The driver can be found here:

http://www.silabs.com/products/mcu/Pages/USBtoUARTBridgeVCPDrivers.aspx

After the driver is installed correctly and the module is plugged in to a USB port on the PC, an additional entry in the Ports category of the Device Manager will show up.

Note the new Com Port number that is assigned to the module, since it will have to be specified when using the terminal software.

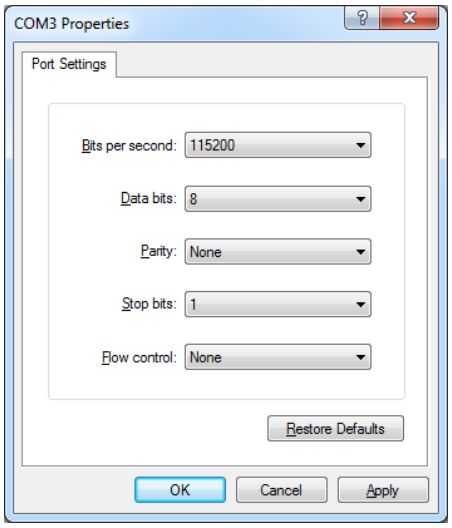
Port used by module

Functional description for E931.96 Ultra Low Power PIR Controller, USB interface evaluation module

MOS (PTY) LTD.
Microsystems On Silicon
Member of ELMOS Semiconductor AG

PCB Version M925

Terminal interface



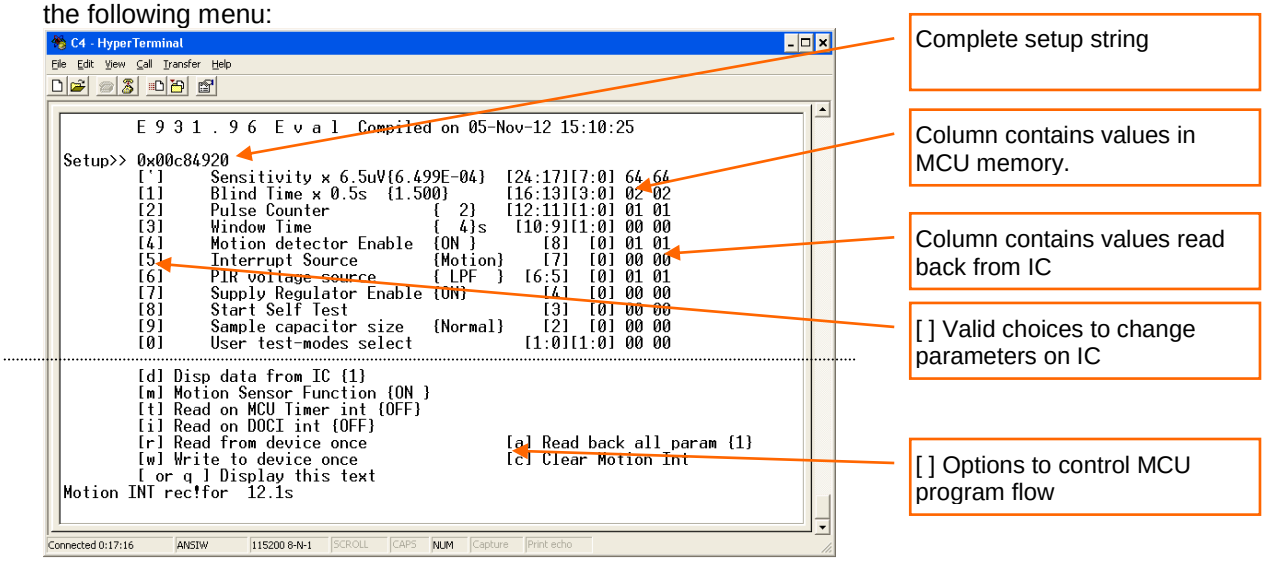
The software on the module is able to interface to a terminal with the following settings for the port.

The data format is as follows:
115200b/s
8 data bits, 1 start bit, 1 stop bit, no parity, no flow control

All information from the MCU are transferred as ASCII characters and end with a <LF><CR combination.

Module use

After the module is plugged in and the terminal program is running, press “spacebar” or “q” to see the following menu:



Note that all of the registers that are described in the datasheet are on the upper half of the terminal display, on the bottom half is controls for program flow.

As an example, to change the pulse count to 4 pulses, press the following:
“2”
Enter a value between 0 and 3 => “3”
The program changes the bit value so setting bits 12 and 11 to 1’s will change the pulse counter to 4.
The value is not yet stored on the E931.96; it is only changed in the MCU memory. To write it to the E931.96 press “w” and then “r” to read back the contents of the E931.96’s memory and redisplay it. The two rightmost columns should display the same values. If not, ensure that ‘a’ is pressed that

will read back all of the memory registers on the E931.96. If a partial read back is done only the PIR voltage register is read back.

Register read back:

To read back the PIR register value the following setup must be done
[4] Motion detector Enable {OFF}
[5] Interrupt Source {FILTER}
Select the source of the PIR register, there are a couple of options, keep in mind that the filter would need to settle first so let the readings run a bit until the value is stable.
[6] PIR voltage source { LPF } {SUPPLY} { TEMP }{ BPF }

[w] Write to device once
[r] Read from device once
Verify that the MCU memory values are the same as the values read back from the IC.

The next step is to setup the MCU software to read and display the data from the IC.
[m] Motion Sensor Function {OFF}

[i] Read on DOCI int {ON }

The DOCI pin may be high at this stage so to ensure that the next interrupt is read the DOCI interrupt is cleared

[c] Clear Motion Int

The readings are being done at this stage but it is not printed on the terminal. To enable the display of any data press “d”

[d] Disp data from IC {1}

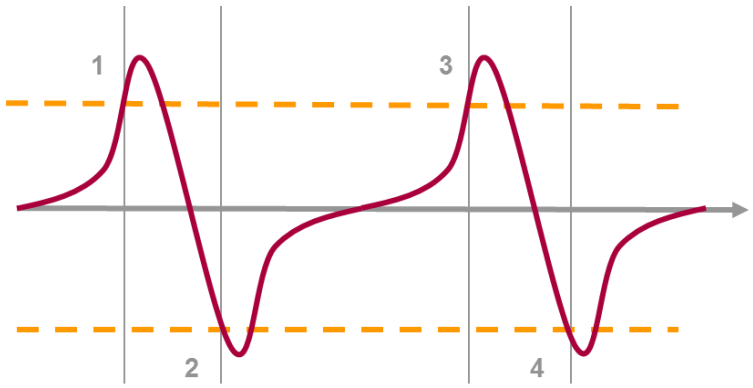
Functional description for E931.96 Ultra Low Power PIR Controller, USB interface evaluation module

MOS (PTY) LTD.
Microsystems On Silicon
Member of ELMOS Semiconductor AG

PCB Version M925

Module setup for motion detection:

The settings below set up the IC for motion sensing. Once the setup is done and written to the IC interrupts will be issued to the MCU to indicate motion. The MCU will display the time since the previous interrupt and illuminate the motion sense LED.



The threshold for motion sensing is usually set between 100 and 200 uV
[`] Sensitivity x 6.5uV{1.234E-04}

Set the other detection parameters as required.
[1] Blind Time x 0.5s {1.500}
[2] Pulse Counter { 2}
[3] Window Time { 4}s

Enable motion detection on the IC
[4] Motion detector Enable {ON }

Set the interrupt source on the IC to motion
[5] Interrupt Source {Motion}

The PIR voltage source can be either on BPF or LPF.
[6] PIR voltage source { LPF } { BPF }

The PIR detector must be powered so the regulator must be enabled.
[7] Supply Regulator Enable {ON}

[w] Write to device once
[r] Read from device once
Verify that the MCU memory values are the same as the values read back from the IC.

The SW on the MCU must also be enabled to process the motion
[m] Motion Sensor Function {ON }

Motion detected will give an output similar to the output below.

Motion INT rec!for 3.0s
Motion INT rec!for 12.0s

Functional description for E931.96 Ultra Low Power PIR Controller, USB interface evaluation module

PCB Version M925

MOS (PTY) LTD.
Microsystems On Silicon
Member of ELMOS Semiconductor AG