MCP2221 USB Raw HID I/O Expander Library Alire Crate for GNAT Ada

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by Philip Munts
President, Munts Technologies
http://tech.munts.com

MCP2221 USB Raw HID I/O Expander

The **Microchip MCP2221** is a **PIC16F1455** microcontroller that has been preprogrammed with firmware to implement *two* USB devices: a USB serial port and a raw HID device that acts as an I/O expander providing one **I²C** bus controller (master only) and four **GPIO** pins (**`GP0`**, **`GP1`**, **`GP2`**, and **`GP3`**).

The GPIO pins **`GP1`**, **`GP2`**, and **`GP3`** can be configured for some alternate functions, including 10-bit A/D inputs or 5-bit D/A outputs:

```
GP1:  GPIO ADC1
GP2:  GPIO ADC2 DAC1
GP3:  GPIO ADC3 DAC2
```

The original MCP2221 has been replaced by an updated version: the **MCP2221A**. The only difference between the older MCP2221 and the newer MCP2221A is that the latter supports some higher baud rates on the USB serial port device. Since this crate only deals with the raw HID I/O expander functions, it will work fine with either the older MCP2221 or the newer MCP2221A.

About this Crate

This crate contains a subset of the ***Linux Simple I/O Library*** Ada packages that are relevant for building programs for the MCP2221 I/O expander.

This crate can be built directly or indirectly (as a dependency) on Linux and Microsoft Windows 10 64-bit.

This crate includes a project for building two test programs that display some information about the connected MCP2221 USB Raw HID I/O Expander, each using one of:

- raw HID (Human Interface Device) via **HIDAPI**,
- raw HID via **libusb**

You can study these two test programs to learn how to write client programs (in **`src/programs/`** in the library crate project directory) using each of the two transport methods.

Cross-Compiling

You can cross-compile this crate or a program using this crate for a Linux target computer by just copying the target configuration project file (**`.cgpr`**) from the cross-toolchain to **`default.cgpr`** in the Alire project directory. For example, to cross-compile for a Raspberry Pi 1 microcomputer running ***MuntsOS Embedded Linux***, using the MuntsOS cross-toolchain for the Raspberry Pi 1, just copy **`RaspberryPi1.cgpr`** to **`default.cgpr`**.

Web Links

MCP2221A datasheet:
https://www.microchip.com/content/dam/mchp/documents/APID/ProductDocuments/DataSheets/MCP2221A-Data-Sheet-DS20005565D.pdf

MCP2221 Ada example programs:
http://git.munts.com/libsimpleio/ada/programs/mcp2221

Linux Simple I/O Library:
https://github.com/pmunts/libsimpleio

Buy an MCP2221A breakout board:
https://www.adafruit.com/product/4471
https://www.tindie.com/products/pmunts/usb-grove-adapter

HIDAPI library for HID (Human Interface Device) device access:
https://github.com/libusb/hidapi

libusb library for USB device access:
https://github.com/libusb/libusb