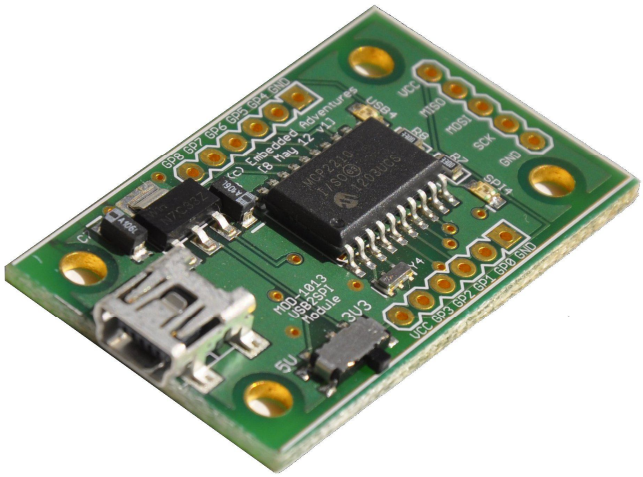
Device: MOD-1013

This document version: v1

Matches module version: v1

Date: 12 August 2012

Description: MCP2210 USB2SPI module



Contents

Introduction

The MOD-1013 is an MCP2210 based driverless USB2SPI module.

Features

The MOD-1013 features the MCP210 from Microchip. Since it presents itself as a standard HID device, no drivers are required for Windows XP / Vista / 7, Linux or Mac OS.

It supports all four SPI modes (which are creatively named mode 0, 1, 2 and 3), bit rates from 1,500bps to 12Mbps, includes various configurable timing parameters around how data is delivered, 9 pins that can be either configured as Chip Select lines or as general purpose IO, and 256 bytes of EEPROM data.

Hackability

The MOD-1013 is 100% hackable.

At Embedded Adventures, we believe you have the most fun when you have the most control over your hardware. For the MOD-1013 we provide a datasheet, complete schematic and sample programs from Microchip. After that, it's all up to you. We'd love to hear about the projects you're using it for – send us information and photos to myproject@embeddedadventures.com

Construction

It's all pre-built! Just add female or male header pins, or solder directly to the board, and away you go.

Connections

The MOD-1013 has three connection ports.

PIN	Description
VCC	Positive supply. 3.3V – 5.5V is provided depending on switch settings
MISO	Master In Slave Out – data in to the board
MOSI	Master Out Slave In – data out from the board
SCK	Serial clock
GND	Ground

The two side connectors break out the general purpose outputs, which can be configured as Chip Select lines, IO lines, or other functions.

PIN	Description		
VCC	Positive supply. 3.3V – 5.5V is provided depending on switch settings		
	IO (0)	**Chip Select (1)**	**Dedicated function (2)**
GP8	IO8*	CS8	SPI bus release request pin
GP7	IO7	CS7	SPI bus release acknowledge Pin*
GP6	IO6	CS6	Interrupt input pin*
GP5	IO5	CS5	USBCFG (active low) (USB LED)*
GP4	IO4	CS4	LOWPWR (active low)*

PIN	Description		
VCC	Positive supply. 3.3V – 5.5V is provided depending on switch settings		
	IO (0)	**Chip Select (1)**	**Dedicated function (2)**
GP3	IO3	CS3	SPI traffic indication (active low) (SPI LED)*
GP2	IO2	CS2	SSPND (active low)*
GP1	IO1	CS1*	None
GP0	IO0*	CS0	None
GND	Ground		

* indicated factory (default) setting. Note that the default setting can be changed, such that on power up, the MCP2210 is configured just the way you like it.

Power

The MOD-1013 is powered by the USB bus and can supply a small amount of current to your project. Technically this current should be drawn *after* the MCP2210 has connected ("enumerated") to the USB bus, and only 100mA, but most USB ports will handle random devices sucking current so long as you keep the level to 250mA or

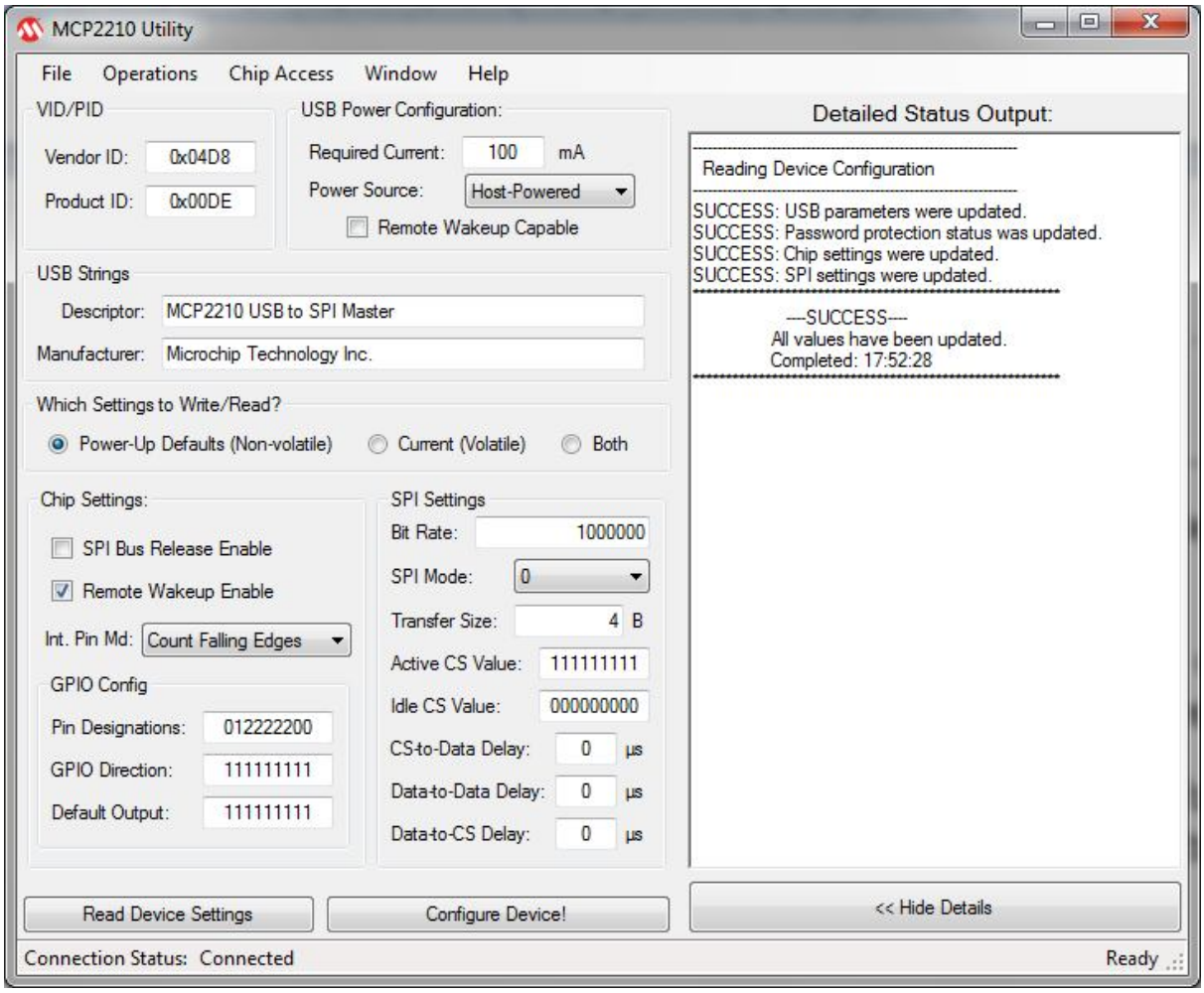
less. If you're trying to play by the rules, then you should change the default current request to (for example) 250mA. Up to 500mA is available from the bus.

Using the MOD-1013

Configuring the MOD-1013

Microsoft provides a MCP2210 configuration utility, called the imaginatively named MCP2210 Utility.

With it you can change the default settings, or adjust the current settings, reprogram the USB strings that the device enumerates with and even the VID/PID for enumeration.

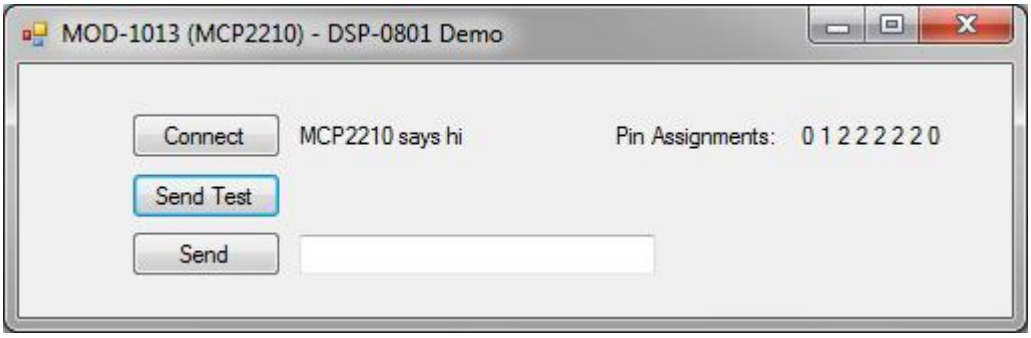


The MCP2210 Utility.

For the pin designations, 0 means GPIO function, 1 means chip select, and 2 means dedicated function.

Talking to the MCP2210

Some sample VB and C# applications are available on the Embedded Adventures website, as well as a sample app that can talk to the DSP-0801 display. It's not exactly going to win any prizes for prettiness, but it does show you how to communicate with the MCP2210 and does actually do something useful.



MOD-1013 demo app

Install the program (ignore the "untrusted" publisher warning, it's just a demo), or load the project up in Visual Studio.

Connect a DSP-0801 to the MOD-1013 as follows:

MOD-1013	DSP-0801
VCC	VCC
MOSI	SIN
SCK	CLK
GND	GND
GP0	LAT

You will also need to connect BL on the DSP-0801 to GND. Of course, it would be nice if the application blanked the display while updating it – this is left as an exercise to the reader[1].

Press the connect button – it should say "MCP2210 says hi"[2] if the MOD-1013 is connected. Then you can press Send Test it will light up all digits.

Using a routine stolen from dsp0801.c, you can type in upper case letters and numbers and send those to the display with the Send button.

[1] Hint: connected BL to GP1, set GP1 as an IO pin, set it high while sending data and set it low afterwards.
[2] Everyone's a comedian.

Chip selects

Chip select lines allow you to send and receive data from multiple devices. The MOSI/MISO/SCK lines are common to all devices and a "chip select" line on each device typically is pulled low to indicate the device you want to chat with.

Let's say you want to talk to two different devices, using CS0 and CS1.

To set this up, first of all you need to make sure these pins are designated as CS0 and CS1 (=1 in the configuration utility).

If your devices are any way normal, they will expect CS0 or CS1 to go low when they are being talked to.

Let's say you want to talk to the device connected to CS0

> To do this, the active CS value for CS0 needs to be 0 and the idle CS value for CS0 needs to be 1. The active *and* idle CS values for CS1 need to be 1.
>
> When the MCP2210 goes to send and receive data, it will change the CS pins appropriately – in our example case here, it will pull CS0 low and leave CS1 high throughout the transaction.

Now, you want to talk to the device connected to CS1

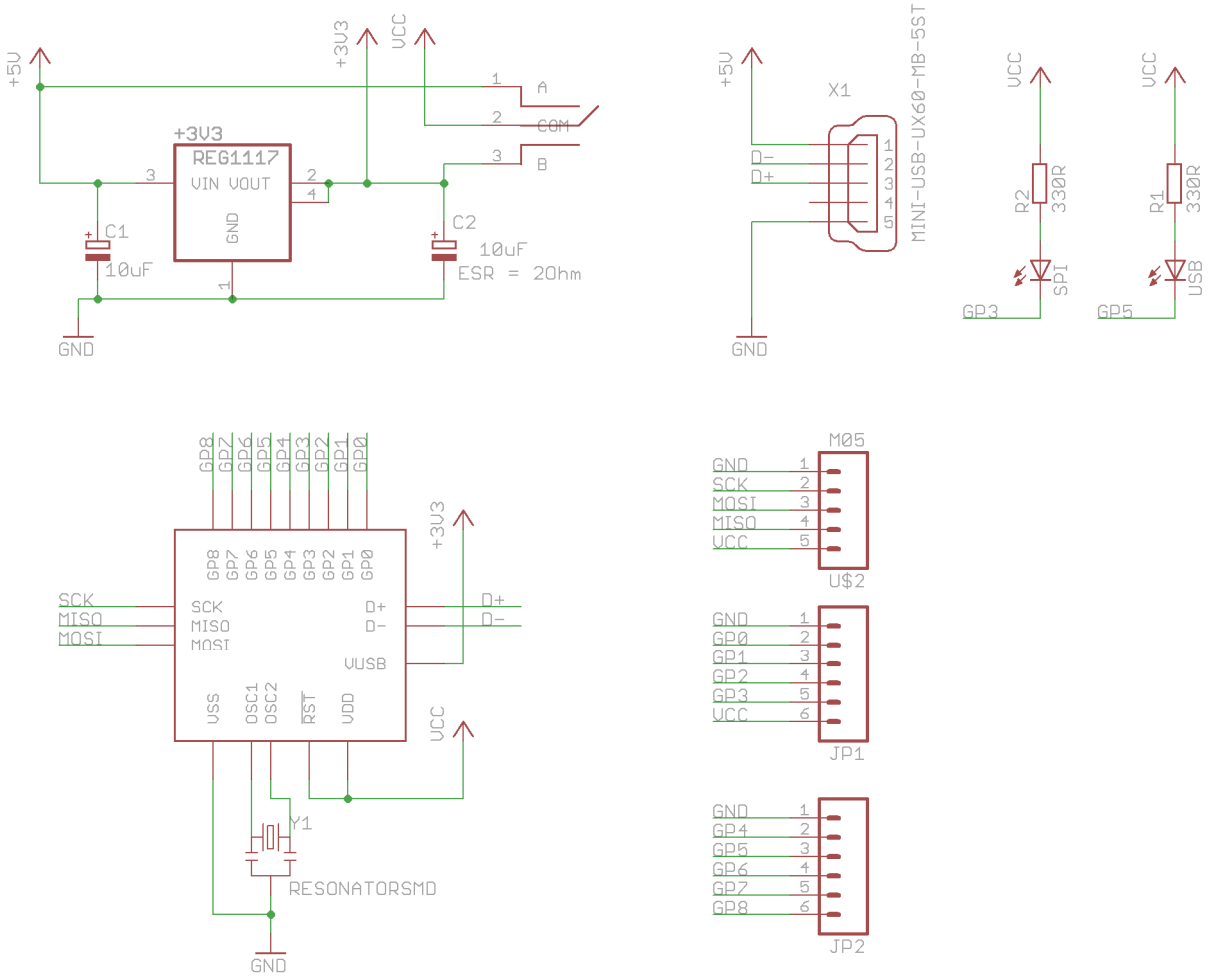
> To do this, the active *and* idle CS value for CS0 need to be 1. The idle value for CS1 needs to be 1, and the active value for CS0 needs to be 0.

It's a bit clunkier than it needs to be, but it works.

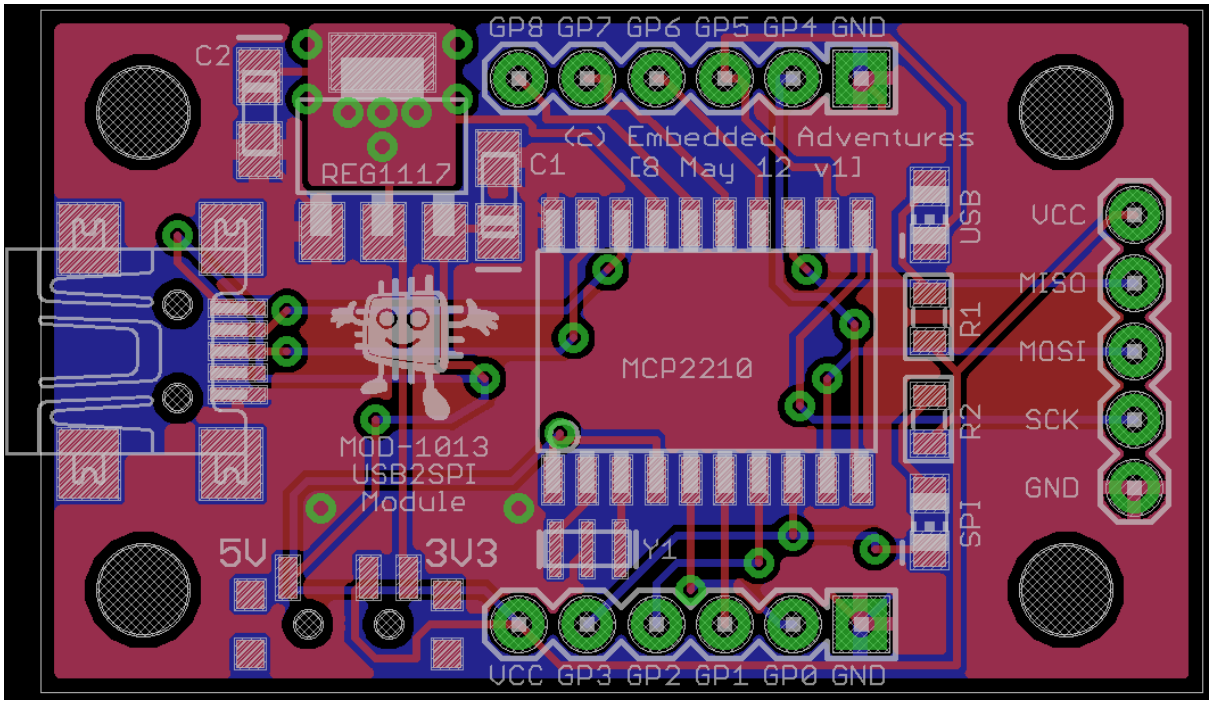
Schematic

The schematic of the MOD-1013 shows it is a pretty typical implementation of the MCP2210, except that we have designed it to run at either 3.3V or 5V depending on what is important to you.

LEDs are connected to GP3 (for SPI traffic indication) and GP5 (for USB bus connection). Of course, you can change these and turn these LEDs on and off at will according to your application.


+5V
+3V3
VCC
REG1117
VIN VOUT
GND
C1
10uF
C2
10uF
ESR = 20hm
A
COM
B
X1
D-
D+
MINI-USB-UX60-MB-5ST
R2
330R
R1
330R
SPI
USB
GP3
GP5
GP8 GP7 GP6 GP5 GP4 GP3 GP2 GP1 GP0
SCK
MISO
MOSI
D+
D-
VUSB
VSS
OSC1
OSC2
RST
VDD
Y1
RESONATORSMD
M05
U$2
JP1
JP2

PCB


GP8 GP7 GP6 GP5 GP4 GND
C2
REG1117
C1
(c) Embedded Adventures
[8 May 12 v1]
USB
VCC
MISO
MOSI
SCK
GND
R1
R2
SPI
MCP2210
MOD-1013
USB2SPI
Module
5V
3V3
Y1
VCC GP3 GP2 GP1 GP0 GND

Versions

Version	Date	Comments
Version 1.0	12 Aug 2012	Initial Version for board v1