

## Real Time Clock with Alarm

### Introduction

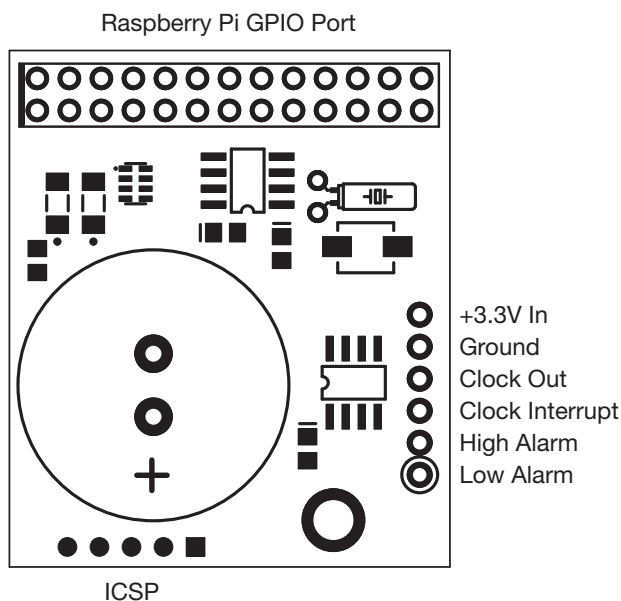
The RTC Alarm Pi is a real-time clock expansion board for the Raspberry Pi and is based around the PCF8563 Real-Time Clock IC from NXP. The PCF8563 is controlled via the I2C port on the Raspberry Pi and includes an interrupt based alarm output which can be set to pull high at a specified date and time.

Backup power for the The RTC Alarm Pi is provided via a 1 farad super-capacitor in place of the lithium coin cell found on most other Real-Time Clock boards. This has the advantage that it will recharge when the Raspberry Pi is switched on and will not need to be replaced at regular intervals reducing cost and waste. A trimming capacitor is used on the RTC Alarm Pi to fine tune the 32.768 kHz quartz crystal frequency for greater accuracy.

A Microchip PIC12LF1822 micro-controller is included on the RTC Alarm Pi connected to the PCF8563 interrupt pin. When the interrupt is pulled high the micro-controller sets the High Alarm pin high and the Low Alarm pin low for 500 milliseconds. Connecting the Low Alarm pin to the reset pin on the Raspberry Pi allows you to put the Raspberry Pi into a low power sleep mode and then reset it at a set date and time waking the Raspberry Pi up. An ICSP (in circuit serial programming) port is included on the top of the RTC Alarm Pi giving you the option to reprogram the PIC micro-controller for your own needs. A wiring diagram for the PIC Micro-controller ICSP port can be found on page 2 of this data-sheet.

A 3.3V input port is also provided allowing you to power the real-time clock and micro-controller while the Raspberry Pi is switched off.

### Board Layout



### Features

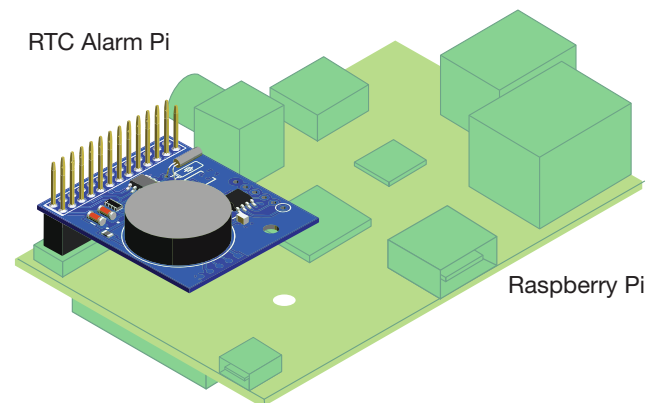
- PCF8563 Real-Time Clock
- Microchip PIC12LF1822 micro-controller with ICSP port
- Controlled from the Raspberry Pi I<sup>2</sup>C interface.
- Stackable with other Raspberry Pi accessory boards.
- Mounting hole for use with the expansion board mounting kit (sold separately)
- External 3.3V power input for powering the RTC Alarm Pi while the Raspberry Pi is powered down.

### Electrical Characteristics

Vdd (3.3V input pin).....	3.3V
Maximum current on the output pins.....	±20 mA
I <sup>2</sup> C SDA/SCL voltage .....	3.3 V
I <sup>2</sup> C port current .....	100 mA

### Installation

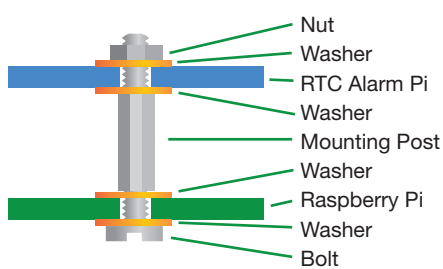
The RTC Alarm Pi can be installed on the Raspberry Pi by pressing the 26 way connector down onto the Raspberry Pi GPIO port as shown in the illustration below.



## Installing the optional mounting kit

An optional mounting kit is available for securing the RTC Alarm Pi to your Raspberry Pi. Installation for the mounting kit is as follows:

1. Place a washer on the bolt and push it up through the mounting hole on the underside of the Raspberry Pi.
2. Place a washer on the bolt on top of the Raspberry Pi and screw the mounting post down until it is hand tight. (Over tightening can cause serious damage to the Raspberry Pi)
3. Add a washer to the top of the mounting post and push the RTC Alarm Pi down onto the GPIO port and mounting post.
4. Place the final washer down onto the mounting post and screw the nut down tight against the RTC Alarm Pi.



## PIC Micro-controller ICSP Port

The RTC Alarm Pi includes an In Circuit Serial Programming port for reprogramming the Microchip PIC12LF1822 micro-controller.

The PIC12LF1822 is an 8 bit 8 pin micro-controller from Microchip. It includes an internal DC - 32MHz oscillator, 1.8 to 3.6V operation and a minimum power consumption of 20nA in sleep mode. A full data-sheet for the micro-controller can be found on <http://ww1.microchip.com/downloads/jp/DeviceDoc/jp547368.pdf>

The ICSP pads can be found on the edge of the board next to the backup capacitor. You can reprogram the PIC micro-controller using an ICSP programmer such as the Microchip PICKIT 3 or MikroProg from Mikroelectronica. The illustration below shows the function of each ICSP pad which correspond to the pin-outs on the MikroProg programming cable.

**(Warning: the Vcc supply on the ICSP port should not exceed 3.3V. Higher voltages could cause damage to the RTC Alarm Pi and your Raspberry Pi)**

