

NOCTIX-1 PROTOTYPE OPERATING INSTRUCTIONS

References

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| VORTEX-1 PIC32 breadboard adapter | https://circuitmaker.com/Projects/Details/VictorHuerlimann/PIC32MZAdapter |
| Demo video | https://www.youtube.com/watch?v=x0f4inyUiuU |
| MCU datasheet | http://www.microchip.com/mymicrochip/filehandler.aspx?ddocname=en566815 |

Required Materials

| Item | Description |
|--------------------------------|--|
| Microchip PIC32MZ1024ECH064 | Microcontroller unit, operated at 200 MHz: https://www.digikey.com/short/wz3h3npv |
| FLIR Lepton 3.5 thermal camera | Thermal camera module: https://www.digikey.com/short/7mpn9ntd |
| FLIR Lepton breakout board V2 | Breakout board hosting the Lepton 3.5 sensor: https://www.digikey.com/short/cp52vcf5 |
| 15 MHz clock source | Can be a signal generator or an external clock module |
| Adafruit ST7789 TFT module | TFT display: https://www.digikey.com/short/4zfqq5rw |
| Microchip PICkit 4 | Programmer for Microchip MCUs/MPUs: https://www.digikey.com/short/jf0nv034 |

Getting Started

First of all, the VORTEX-1 breadboard adapter must be assembled using a SMD soldering station. Alternatively, you can order a ready-to-use, assembled and programmed VORTEX-1 adapter by e-mail to ribes.microsystems@gmail.com. E-mail support concerning setup and operation is also welcome.

Once you have the VORTEX-1 breadboard adapter ready, set up the basic VCC / VSS and OSC1 / OSC2 connections as described in the microcontroller's datasheet. The pinout of the breadboard adapter is mapped 1-to-1 to the microcontroller's pinout.

If you assembled the VORTEX-1 on your own and didn't order a ready-to-use pre-flashed one, you will need to flash the firmware to the device using the Microchip PICkit 4 programmer.

The firmware is available on the Github repository where this document is published: <https://github.com/hvictor/NOCTIX-1.X>

In order to flash the device, perform the following connections between the PICkit 4 programmer and the VORTEX-1. The following connections are also described in the datasheet of the microcontroller.

Warning: you will need to enable low-voltage programming for the PICkit 4 in MPLAB X IDE. The programming voltage must be set to 3.25 - 3.3V.

| Microchip PICkit 4 Pin | VORTEX-1 breadboard adapter Pin |
|-------------------------|---------------------------------|
| ~MCLR | Pin 9 |
| Vpp | Positive rail of the breadboard |
| GND | GND rail of the breadboard |
| PGC (programming clock) | Pin 15 |
| PGD (programming data) | Pin 16 |

After having programmed the device, perform the following connections:

| Device Pin | VORTEX-1 breadboard adapter Pin |
|------------|---------------------------------|
| FLIR SCLK | Pin 49 |
| FLIR CS | Pin 27 |
| FLIR MISO | Pin 6 |
| | |
| TFT SCLK | Pin 4 |
| TFT CS | Pin 29 |
| TFT DC | Pin 30 |
| TFT MISO | Pin 5 |
| TFT MOSI | Pin 22 |

Operate the Prototype

Important: do not forget to pull-up ~MCLR, or else the microcontroller will enter and stay in the RESET state.

If you are using a signal generator, configure it to output a **square wave**, 15 MHz, 3.3V amplitude, 50% duty cycle. Connect the signal output to OSC1 (Pin 31) and the signal ground to OSC2 (Pin 32). Turn the signal generator on, then power the breadboard at 3.3V. A current source of 500 mA should be largely enough.

You should end up with something like this:

