

NOCTIX-1 PROTOTYPE OPERATING INSTRUCTIONS

References

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.

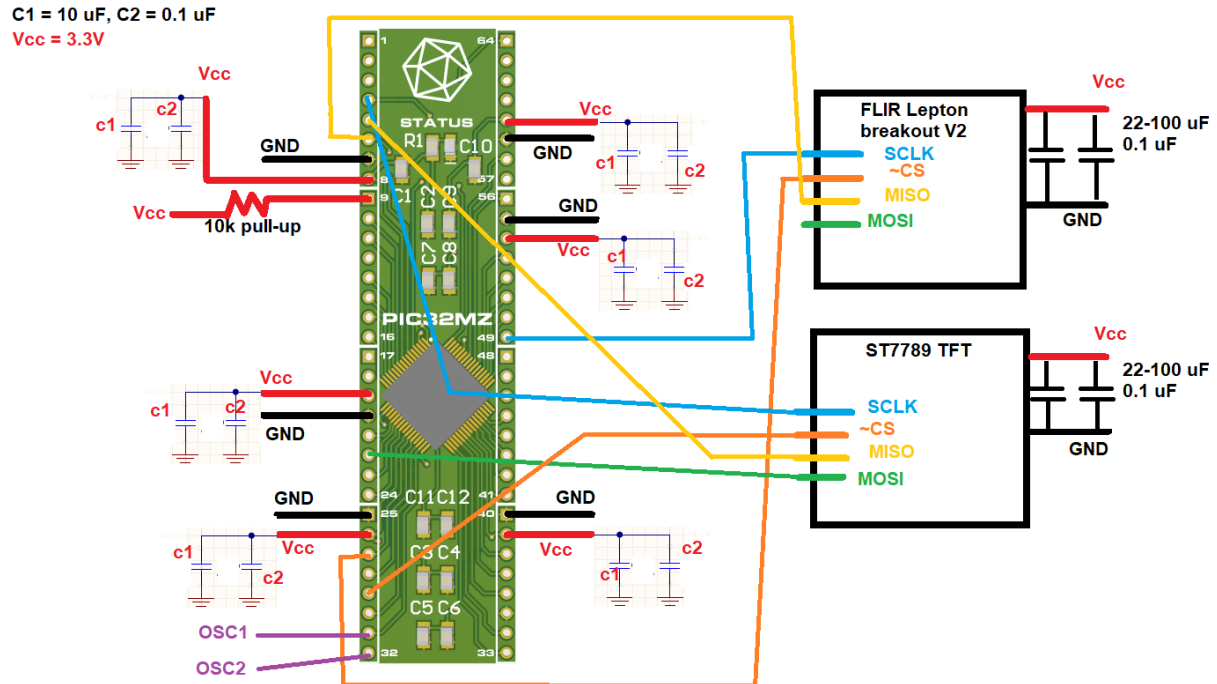
Microchip PICkit 4 Pin	VORTEX-1 breadboard adapter Pin
~MCLR	Pin 9
Vpp	Positive rail of the breadboard
GND	GND rail of the breadboard
PGC (programming clock)	Pin 15
PGD (programming data)	Pin 16

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

Schematic of the VORTEX-1 and Pin assignment

The following picture will help you to determine how to make the required connections:



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:

