**********Draft**********

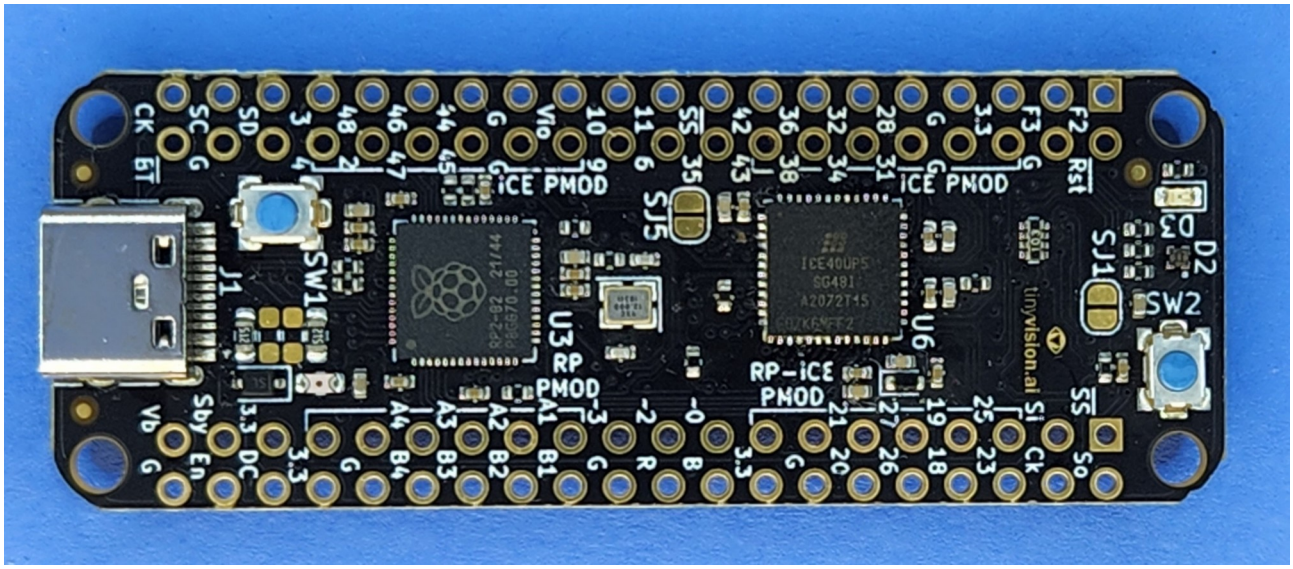
Pico-Ice

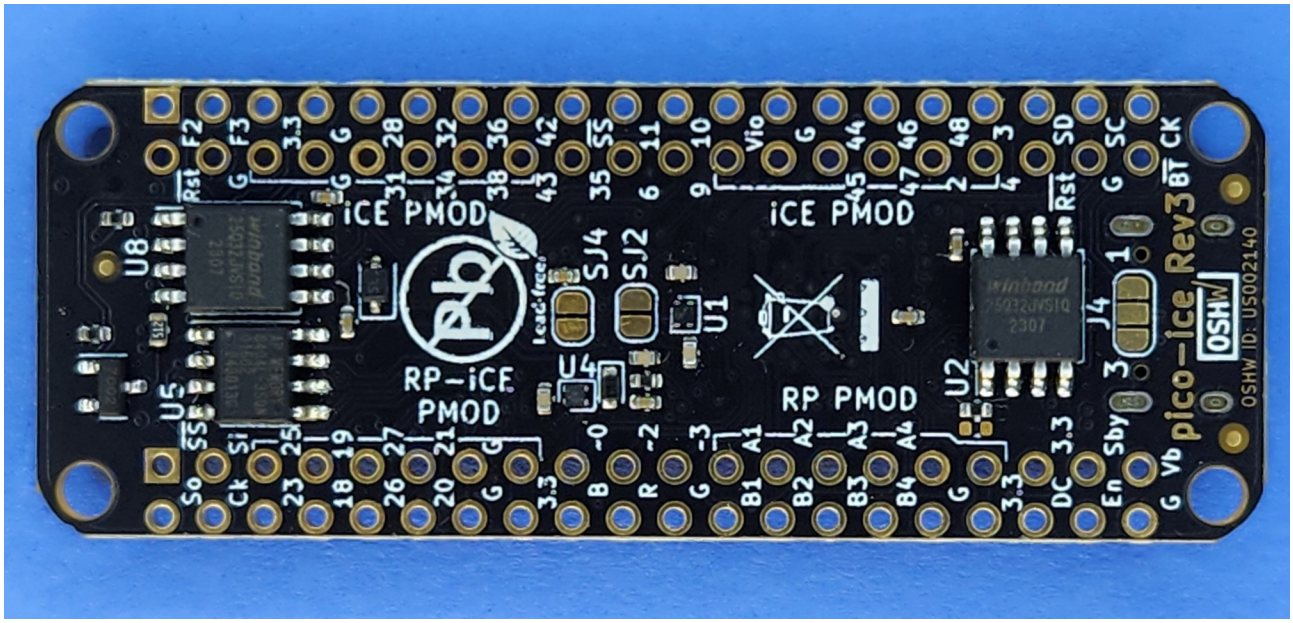
Designed and built by tinyVision

07/30/24

**********Draft**********

The pico-ice is a small, low cost board with the Raspberry Pi Pico processor (RP2040) and a Lattice Semiconductor iCE40UP5K FPGA. The board features independent flash for the FPGA and RP2040, low power SSRAM, a couple of pushbuttons and a 3 color LED with *all* FPGA and RP2040 pins brought out to easy to use 0.1" header pins (arranged as Pmod's) for fast prototyping.



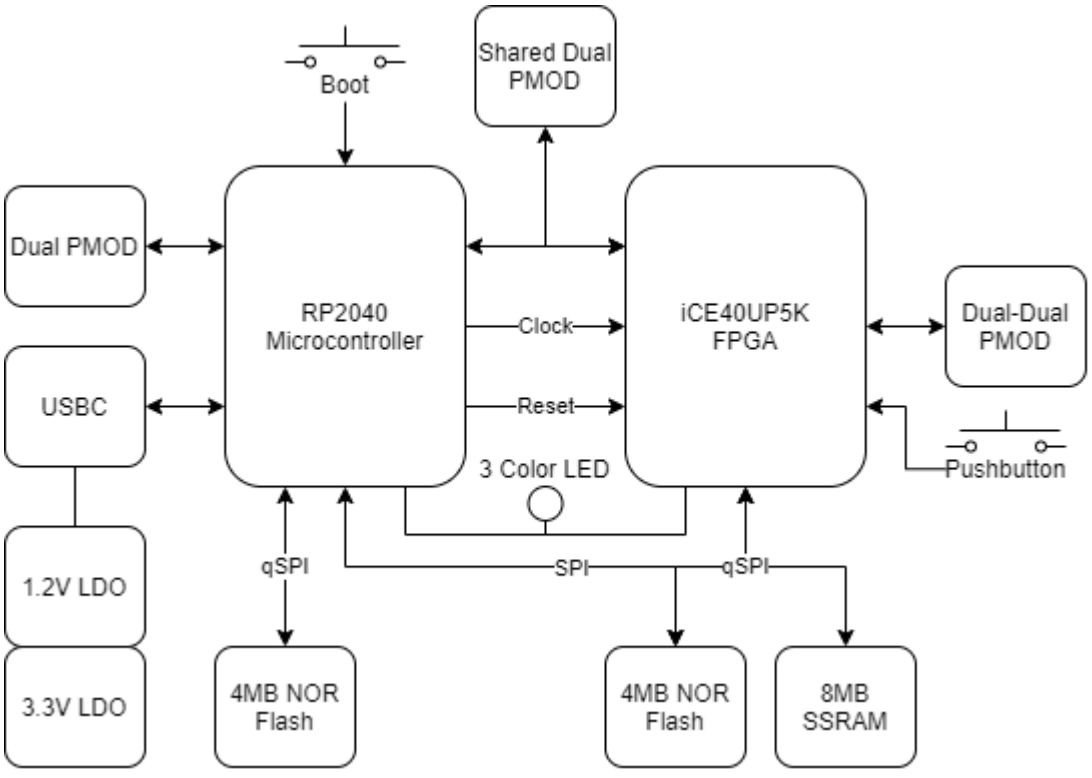


Board Hardware Features:

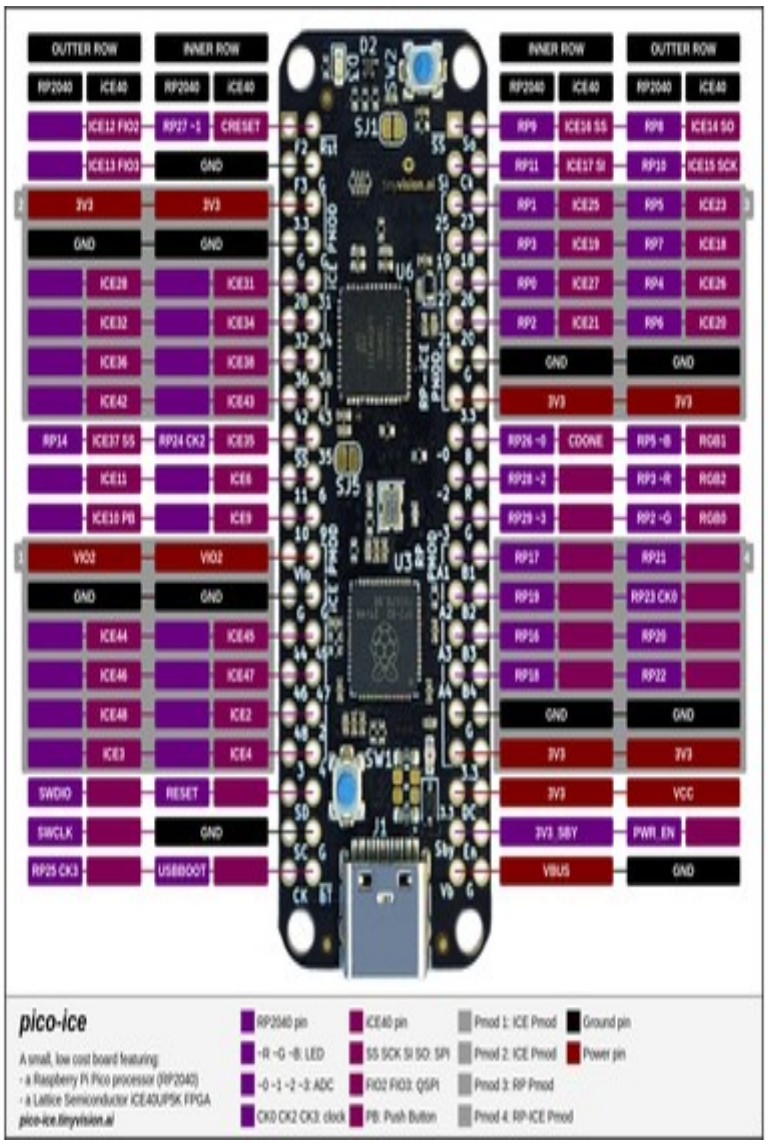
- Raspberry Pi RP2040 processor
- Lattice UltraPlus ICE40UP5K FPGA with 5.3k LUTs, 1Mb SPRAM, 120Kb DPRAM, 8 Multipliers
- *ALL* RP2040 and 32 FPGA GPIO on 0.1” headers
- 4MB SPI Flash
- 8MB low power qSPI SRAM
- RGB LED, shared between the RP2040 and FPGA
- 2 pushbuttons, 1 dedicated and 1 primarily for processor reset during development but can be repurposed for user applications when not used for reset
- On board 3.3V and 1.2V Regulators, can supply 3.3V to your project
- Open source schematic and layout using KiCAD design tools
- 4 layer board with a solid ground plane for good signal integrity

Board Firmware features:

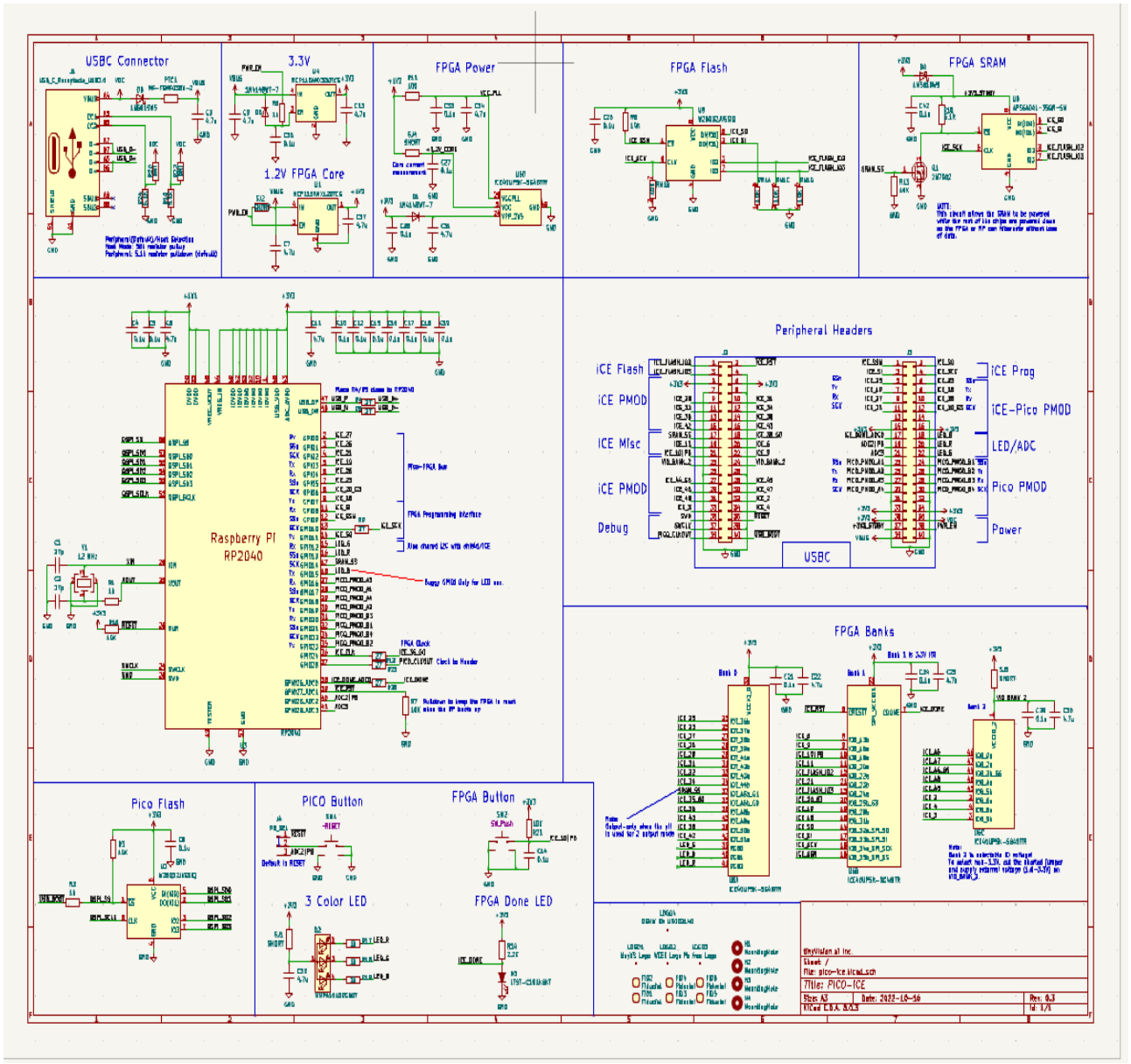
- FPGA clock supplied by the RP2040, easy to program FPGA clock under SW control
- RP2040 can program the FPGA in various ways
- Examples for communicating to the FPGA from USB to UART or SPI
- Support for ultra low power sleeep mode: can shut down the RP2040 and FPGA while keeping the SRAM powered

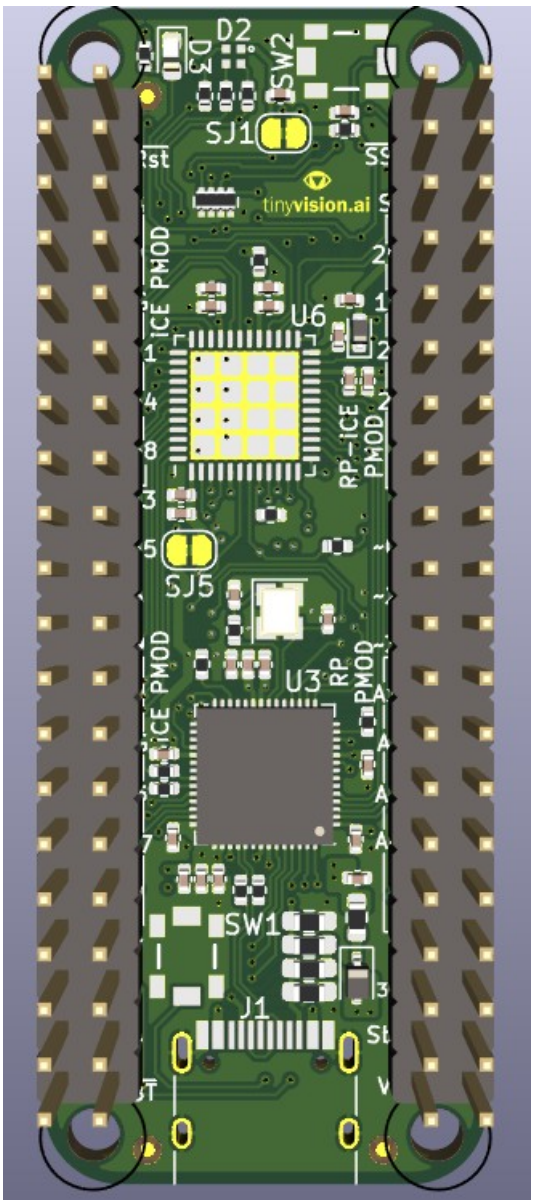


PIN description PMODS



The pico-ice is a 4 layer board, was designed using KiCad.


USBC Connector
3.3V
1.2V FPGA Core
FPGA Power
FPGA Flash
FPGA SRAM
Raspberry PI
RP2040
Peripheral Headers
iCE Flash
iCE PMOD
iCE MIsc
iCE PMOD
Debug
iCE Prog
iCE-Pico PMOD
LED/ADC
Pico PMOD
Power
USBC
FPGA Banks
Pico Flash
PICO Button
FPGA Button
3 Color LED
FPGA Done LED
Title: PICO-ICE
Rev: 0.3


D2
D3
SW2
SJ1
tinyvision.ai
U6
RP-iCE PMOD
SJ5
U3
RP PMOD
SW1
J1