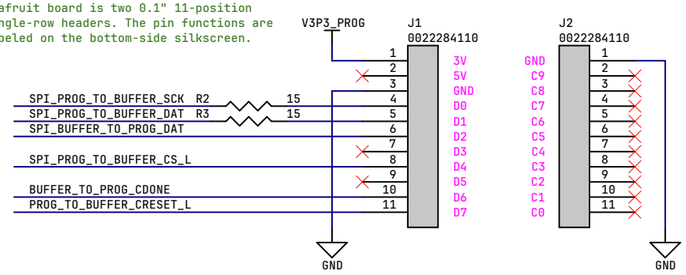
Oxide Ignition Adapter

PCBA CPN: 913-0000091

Repo: oxidecomputer/hardware-ignition-adapter

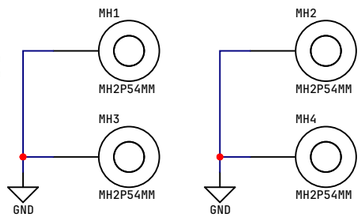
Adafruit FT232H Breakout
Product ID: 2264

For BOM correctness, the interface to the Adafruit board is two 0.1" 11-position single-row headers. The pin functions are labeled on the bottom-side silkscreen.



Mounting Holes

The Adafruit board has four 2.5mm mounting holes tied to GND. We duplicate the pattern on the adapter board so it's clear how to line up the two boards.

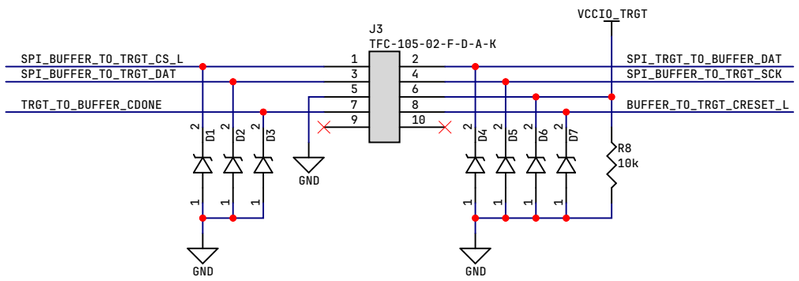


iCEprog SPI Header

This board cheats and uses the target VSENSE pin to power the buffers instead of sensing and replicating the target IO voltage. We don't have time to design and test the voltage sense circuit now.

Because of this, we include a 3.32k bleed resistor on VCCIO_TRGT. When the programmer is unplugged, the bleed resistor pulls VCCIO_TRGT to ground and keeps the buffers off. When the programmer is plugged in, the bleed resistor draws 1 mA from VSENSE. If the programmer is hot-unplugged from a powered target, it will bleed VCCIO_TRGT in less than 100ms.

All ESD diodes are UCLAMP3301P.TCT 3.3V unidirectional TVS diodes. Normally, we'd place these as close as possible to the connector pins, but we want to keep all the components on the top side of the PCB, so we place them by the buffer inputs instead.



CRESET Notes:

In Oxide designs, the iCE40's CRESET_L signal is typically controlled by an open-drain output. We don't want to connect CRESET directly to an FT232 GPIO pin. If the FT232 GPIO pin is high, and the programmer is plugged into a target that is held in reset because of a power fault, it will crowbar the CRESET line.

On Gimlet and Sidecar, the CRESET pin is driven by the open-drain output of a TPS3780A dual comparator and has a 10k pull up resistor.

On PSC, the CRESET pin is driven by the open-drain power good output from an NCV8164 LDO, and has a 10k pull up resistor on the target.

On Cosmo, the CRESET pin is driven by the open-drain power good output of a TPS386596L33 power supply supervisor, and has a 10k pull up resistor.

Level Shifting Buffers

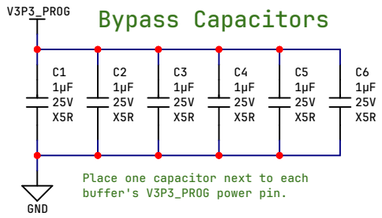
Data Sheet: SN74LVC2T45 (PDF)

Table 7-1. Function Table (Each Transceiver)(1)

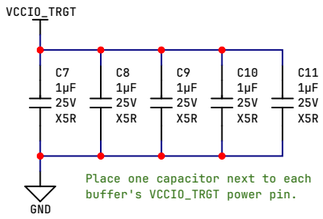
INPUT DIR	OPERATION
L	B data to A bus
H	A data to B bus

(1) Input circuits of the data I/Os always are active.

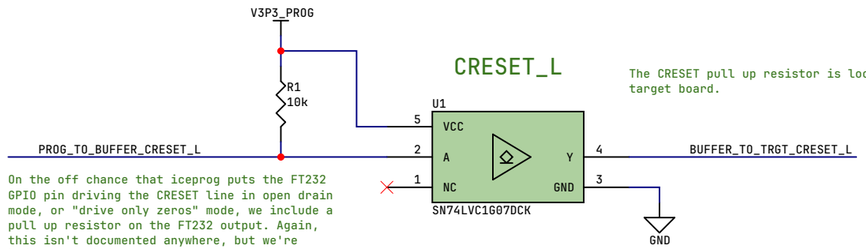
Bypass Capacitors



Place one capacitor next to each buffer's V3P3_PROG power pin.

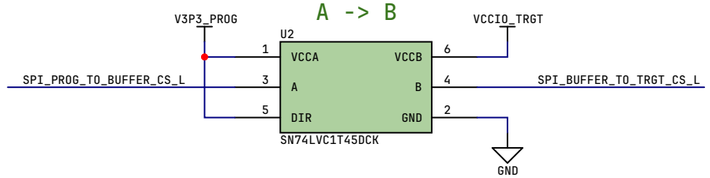


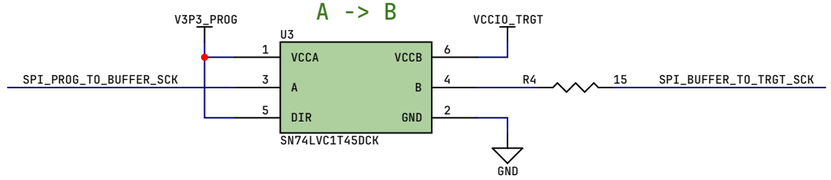
Place one capacitor next to each buffer's VCCIO_TRGT power pin.

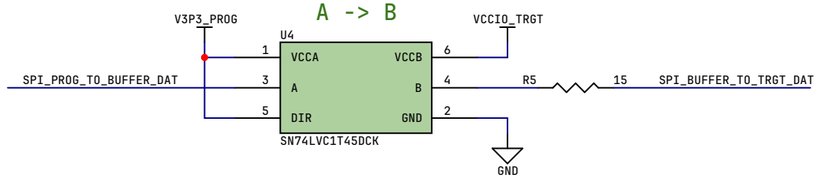


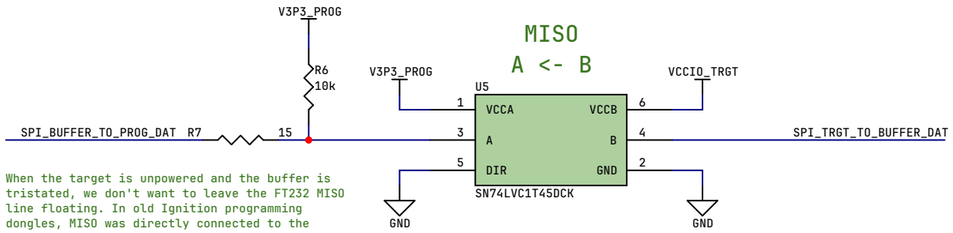
The CRESET pull up resistor is located on the target board.

On the off chance that iceprog puts the FT232 GPIO pin driving the CRESET line in open drain mode, or "drive only zeros" mode, we include a pull up resistor on the FT232 output. Again, this isn't documented anywhere, but we're hedging our bets.

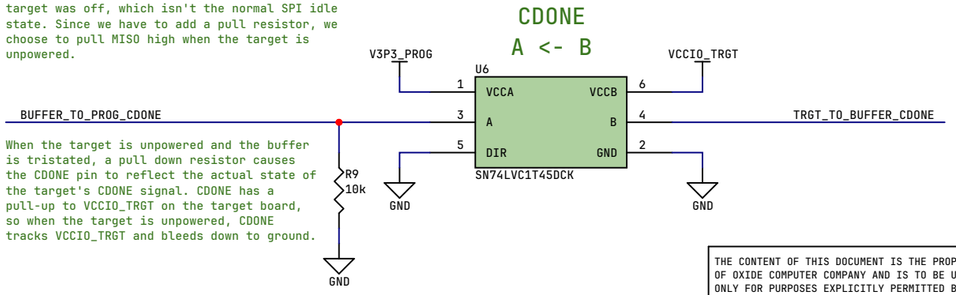








When the target is unpowered and the buffer is tristated, we don't want to leave the FT232 MISO line floating. In old Ignition programming dongles, MISO was directly connected to the target, so it floated near ground when the target was off, which isn't the normal SPI idle state. Since we have to add a pull resistor, we choose to pull MISO high when the target is unpowered.



When the target is unpowered and the buffer is tristated, a pull down resistor causes the CDONE pin to reflect the actual state of the target's CDONE signal. CDONE has a pull-up to VCCIO_TRGT on the target board, so when the target is unpowered, CDONE tracks VCCIO_TRGT and bleeds down to ground.

0xide

BOARD NAME	ignition-adapter.PrjPcb
DWG NO.	913-xxxxxxx
TITLE	ignition-adapter.SchDoc
SIZE	17x11
DATE	8/28/2025
CAGE #	9BZ23
REV	
SHEET	1 OF 1