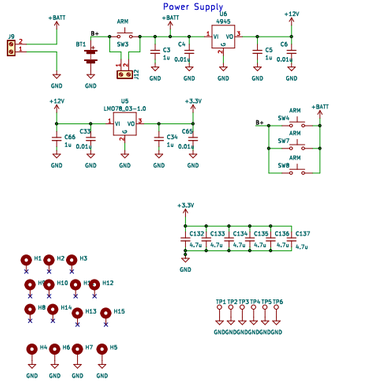
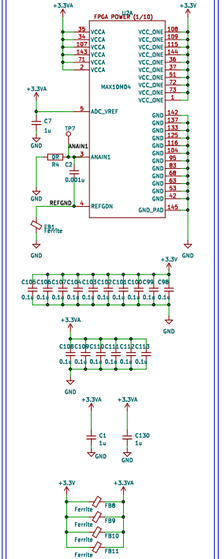
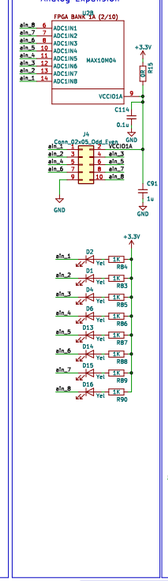
Power Supply



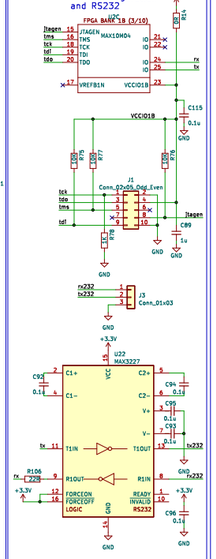
FPGA Power



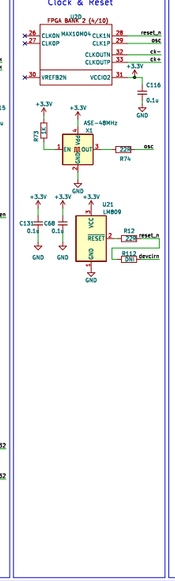
Analog Expansion



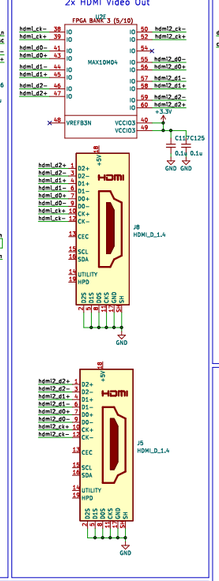
FPGA Configuration and RS232



Clock & Reset

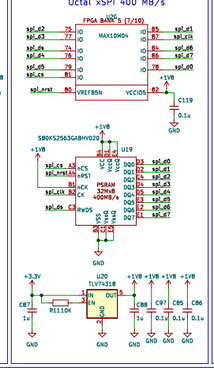


2x HDMI Video Out

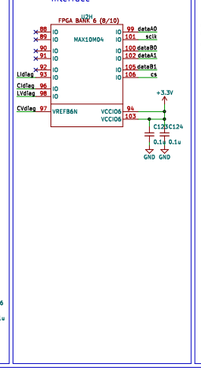


High Voltage Control

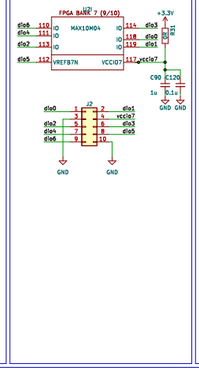
32MB Capture Buffer Octal xSPI 400 MB/s



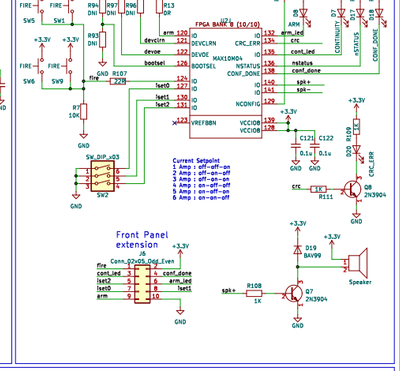
4x 3msps 12bit ADC Interface



Serial Test Comms SPI, I2C, UART Reconfigurable



Low speed Front Panel and Config

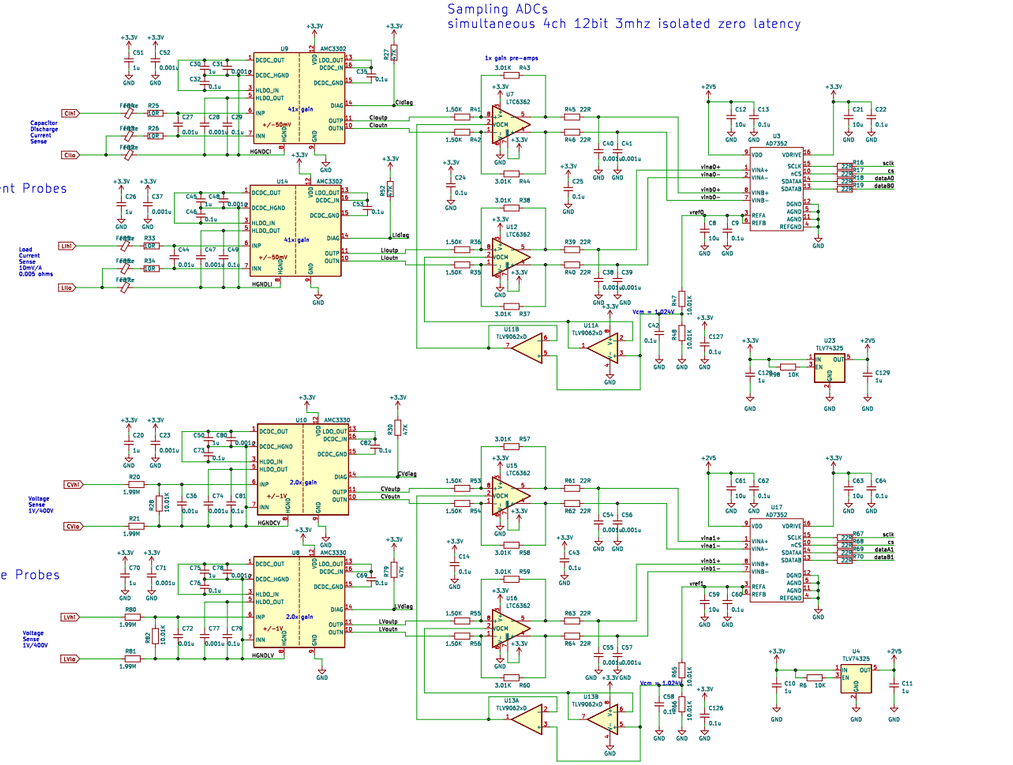


Front Panel extension

ToDo:
X – Add well placed buttons
N – ADC in battery voltage (do externally), add VIN0?
X – Fixup Amp Polarities and gain.
  – Calc all resistor values
N – Split into Sheets/Zones
X – Finalize Parts Lists (DK and JLC)
X – Add Decoupling everywhere
  – Add Test points and ground clips
  – more LED Outputs (inc FPGA config)
  – I/O Connectors maximize

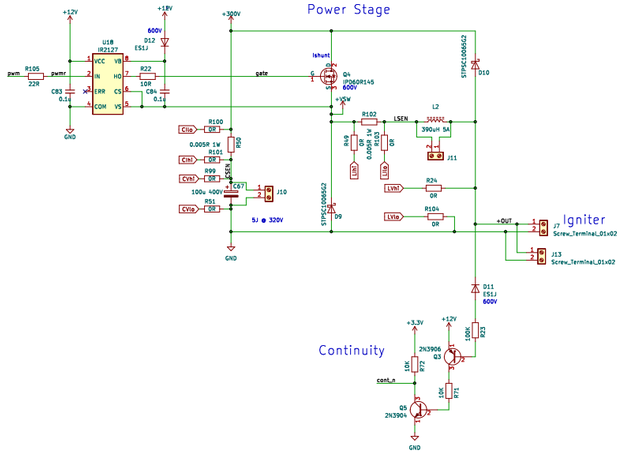
Sampling ADCs
simultaneous 4ch 12bit 3mhz isolated zero latency

Current Probes

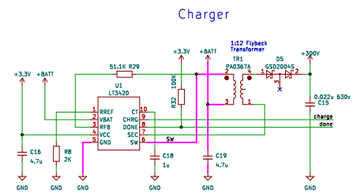


Voltage Probes

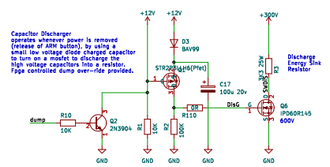
Power Stage



Charger



Discharge



Digitial FPGA Model Rocket Launch Controller

Features:
– Handheld Launch Controller
– Capacitive discharge ignition (CDI)
– Digital current controlled
– High efficiency over 1000 launches on AA batteries (lithium)
– Feild programmable gate array FPGA controlled
– Simple controls for safe operation
– Trace capture for test and analysis

Specifications
– 5 Joule firing pulse energy, capactive discharge
– battery 10000 Joule energy (2x AA Lithium, L91 energizer)
– Programmable 1 to 5 Amp ignitier current
– press ARM button to connect battery to charge capacitor,
– A maximum 0.8 Amp battery current gives 2 to 4 second charge time.
– automatic internal discharge if/when ARM button is release.
– burnthrought detection. Fire button debounce.
– Continuity LED on if igniter connected, blinking if disconnected.
– Fire button signals FPGA to generate PWM for set current.
– MAX10 FPGA based control logic.
– 3 Mhz 12b ADCs feedback capacitor and output IVs.
– 32 Mbyte memory with Octal xSPI 400 MB/s trace buffer
– Serial Port (test and trace buffer access) reconfigurable
– Dual HDMI outputs
– Rs232 port

Eric Pearson, Cambridge Rocket Club

Sheet:	
File:	fpga_blaster.kicad_sch
Title:	Ultimate 5 Amp Model Rocket Launch Controller
Size: D	Date: 2024-04-23
KiCad E.D.A.	kicad 7.0.1
Rev:	v1.0
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