Athena Design Rev. A1 Schematic

RVR Lab, Rice University, Houston TX

The first RISC-V development board at Rice University, featuring the SiFive FE310 microprocessor, Athena is a prototyping and experimental platform for education and research at Rice. It is intended to be used in undergraduate lab courses and in VIP projects, therefore the design focus is on debug capability and I/O access.

July 25, 2022

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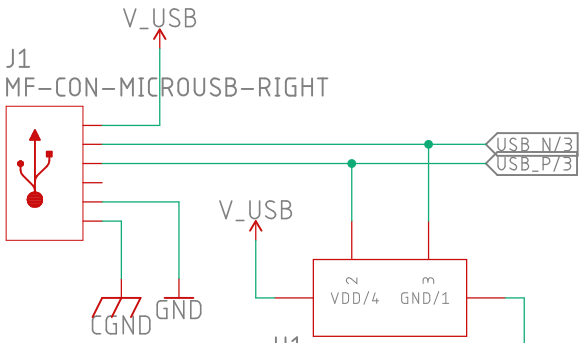
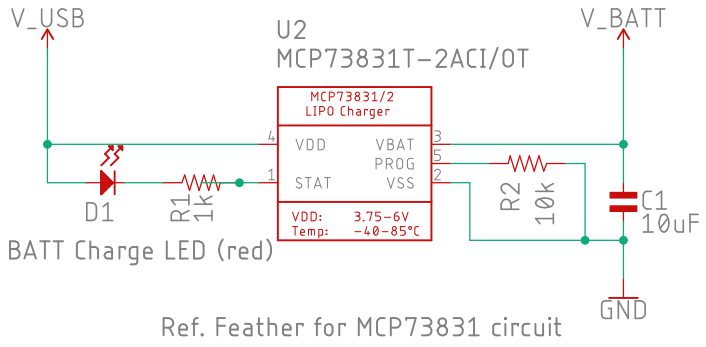
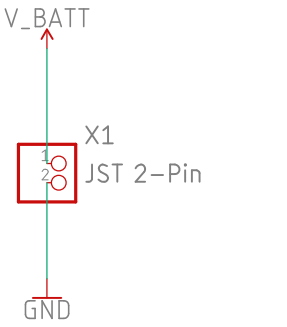
3	Debug Control: MK22 Processor
4	Main Processor: SiFive FE310, the RISC-V MCU
5	Peripherals: Oscillators, Flash Memory
6	I/O Headers: mikroBus-Compatible, GPIO, and Power; Mechanical

Designed in EAGLE 9.6.2.

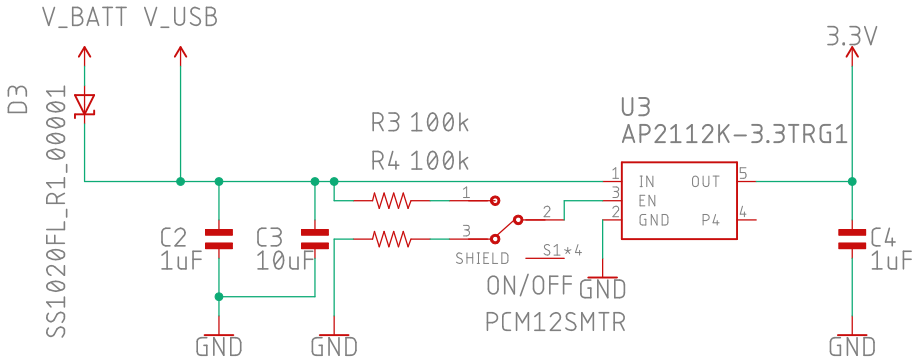
USB & Battery Charging

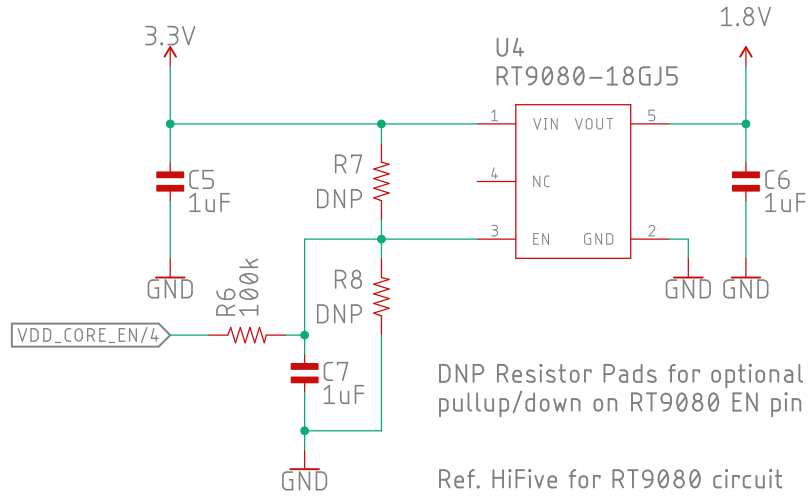




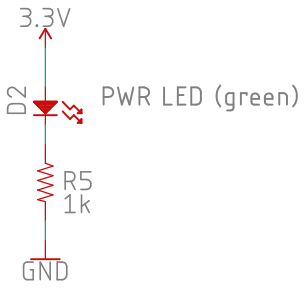


Power & Filtering



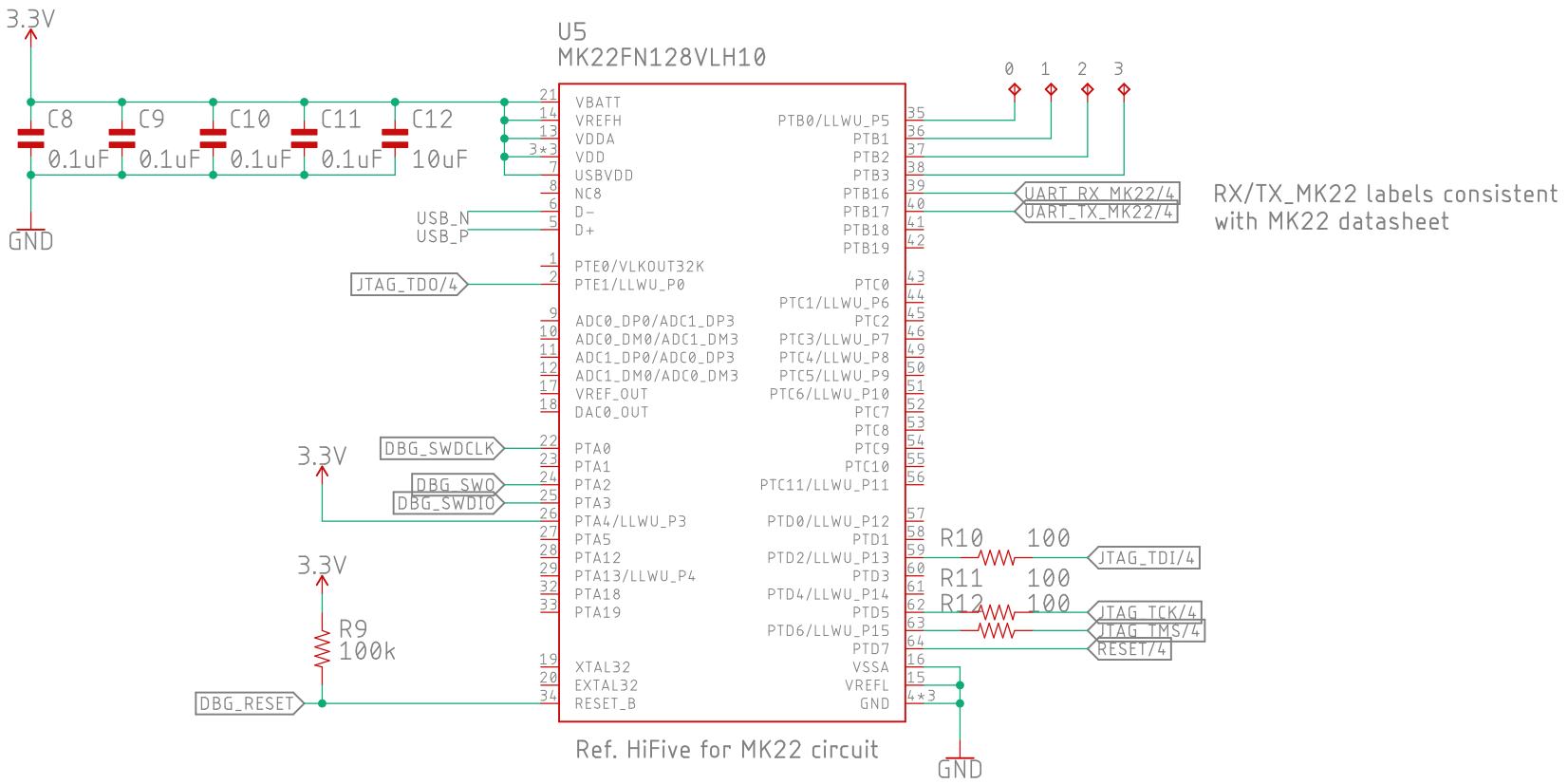


Dropout voltage of D3 will reduce operating range of batt. Replace w/auto-switching power mux in next rev. See TPS2115A

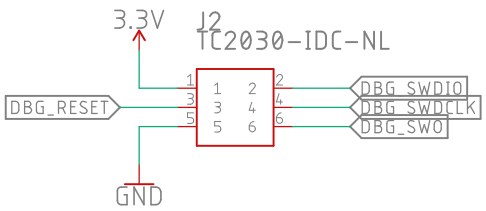


Title:	Power		
Proj:	Athena-A1		
Author:	Jennifer Hellar		REV: A1
Date:	7/25/2022 3:54 PM	Sheet:	2/6

MK22 Processor (USB/JTAG/UART controller)

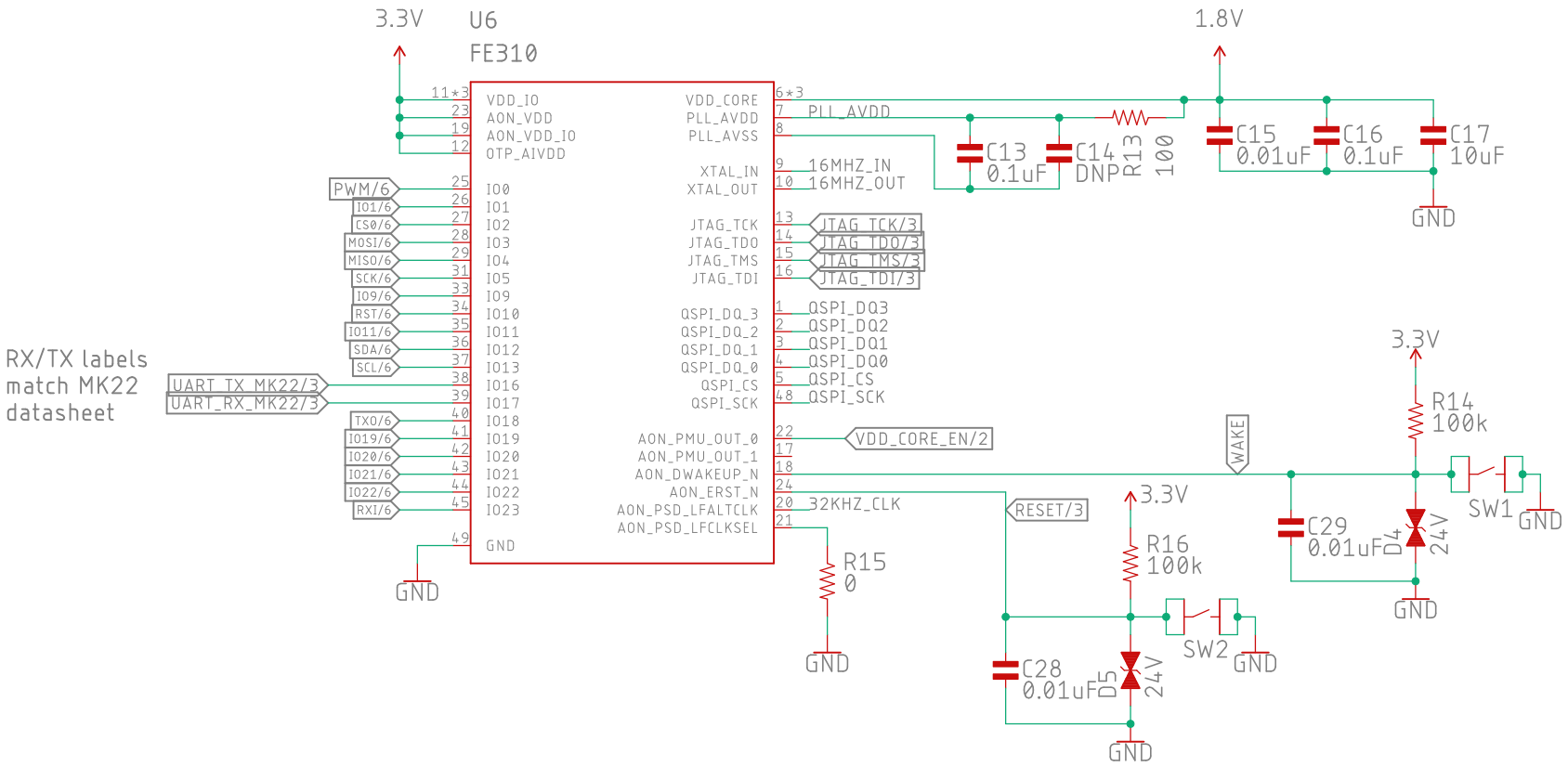


J2 6pin Tag-Connect, MK22 Debug

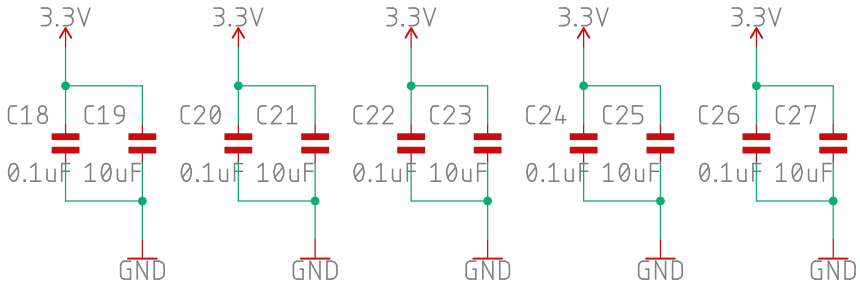


Title:	MK22 Controller (Nest)		
Proj:	Athena-A1		
Author:	Jennifer Hellar	REV:	A1
Date:	7/25/2022 3:54 PM	Sheet:	3/6

Main Processor: FE310

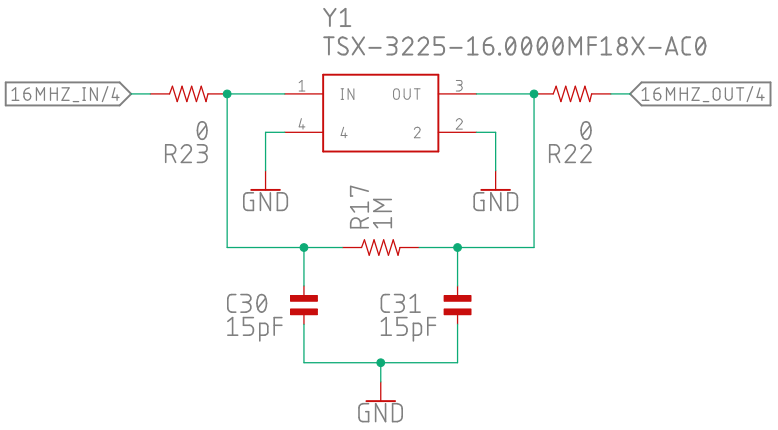


Power pin capacitors

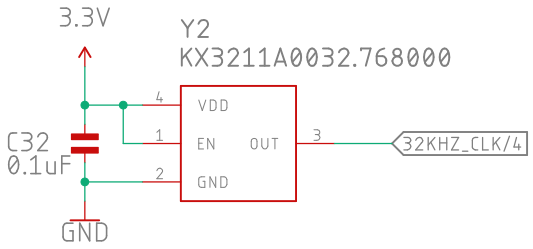


Title:	FE310 Microcontroller (Owl)		
Proj:	Athena-A1		
Author:	Jennifer Hellar	REV:	A1
Date:	7/25/2022 3:54 PM	Sheet:	4/6

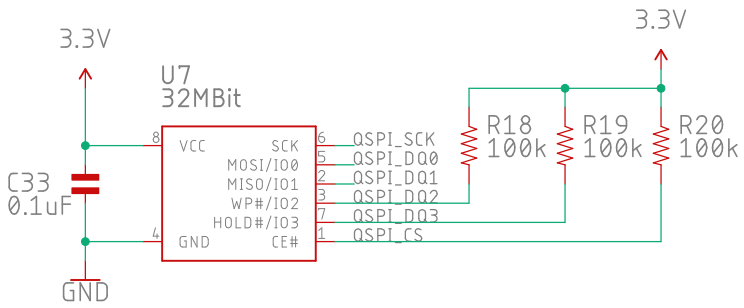
16MHz TSX-3225 Crystal



32kHz KX3211 Oscillator



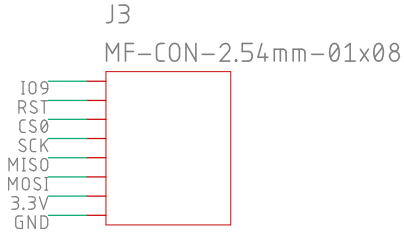
32MBit Flash Memory



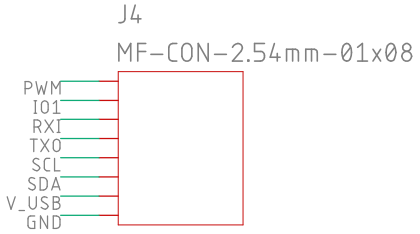
Ref. to HiFive for Flash circuit
Prod: IS25LP032D-JBLE

Title:	Oscillators and Memory (Owl)		
Proj:	Athena-A1		
Author:	Jennifer Hellar		REV: A1
Date:	7/25/2022 3:54 PM	Sheet:	5/6

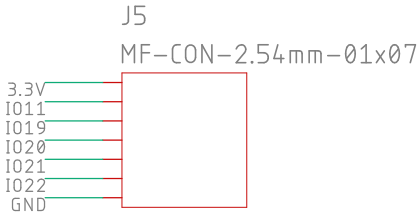
mikroBus Left Header



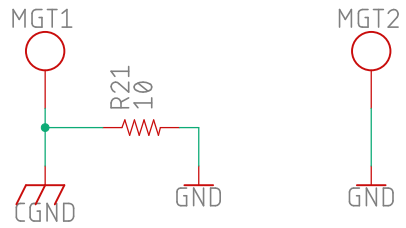
mikroBus Right Header



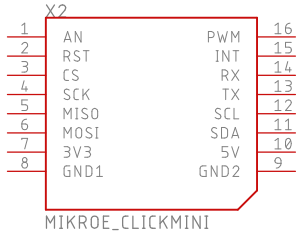
GPIO Header



Mechanical & Grounds



Top-left pin of mikroBus std is an analog input. FE310 has no internal ADC, so this is GPIO instead. Recommend adding an I2C ADC chip (e.g. ADC121C027) in next rev.



Title:	I/O Headers (Owl)		
Proj:	Athena-A1		
Author:	Jennifer Hellar		REV: A1
Date:	7/25/2022 3:54 PM	Sheet:	6/6