CORE 64 INTERACTIVE CORE MEMORY BADGE V0.3 DUAL BOARD (LOGIC)

Sheet: Power

File: Interactive Core Memory Badge (Logic) Power v0.3.sch

Sheet: IO Expansion

File: Interactive Core Memory Badge (Logic) IO Expansion V0.3.sch

Sheet: Core Array Driver

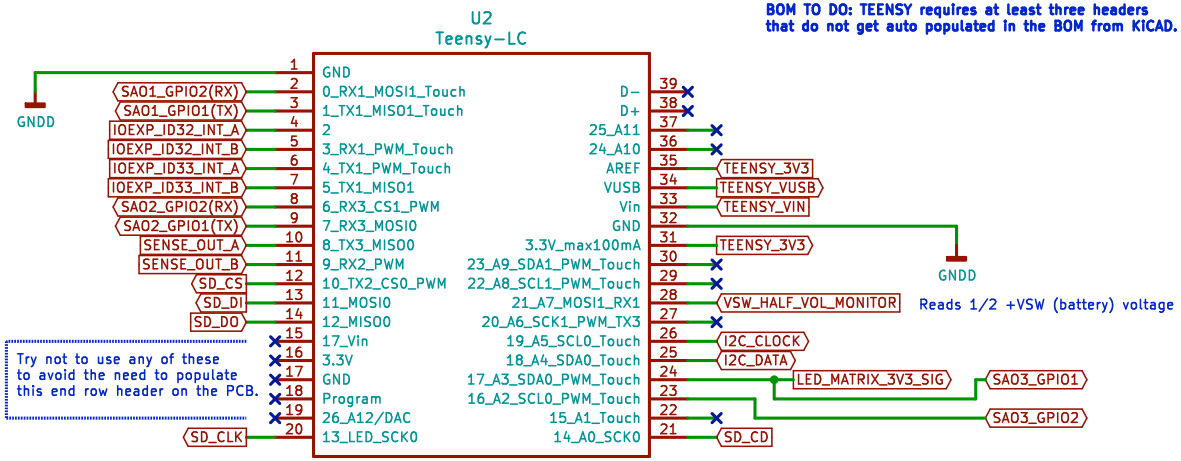
File: Interactive Core Memory Badge (Logic) Driver v0.3.sch

Sheet: SENSE

File: Interactive Core Memory Badge (Logic) Sense v0.3.sch

TEENSY MCU CONNECTIONS

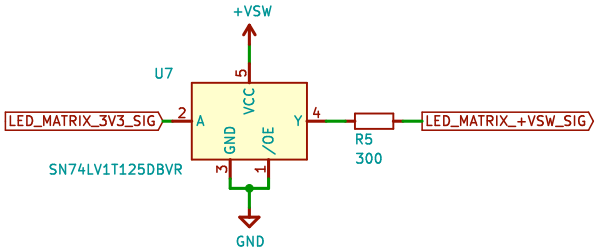
Teensy LC has incoming USB power/programming on board.
***** CUT THE USB-VIN bridge. *****



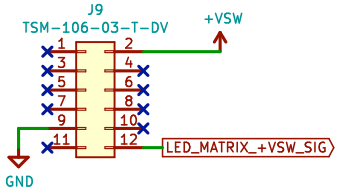
Reads 1/2 +VSW (battery) voltage

BOM TO DO: TEENSY requires at least three headers that do not get auto populated in the BOM from KICAD.

LED ARRAY DRIVE LEVEL SHIFT

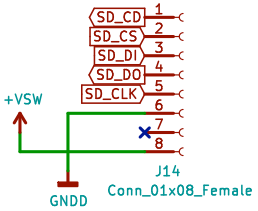


PARTIAL RASPI HEADER FOR LED ARRAY



MicroSD Card (OPTIONAL)

Suggested: https://www.adafruit.com/product/254



I2C ADDRESS TABLE
Required
IO EXPANDER 1: 0x26 (38 decimal)
IO EXPANDER 2: 0x27 (39 decimal)
HALL SENSOR 1: 0x30 (48 decimal)
HALL SENSOR 2: 0x31 (49 decimal)
HALL SENSOR 3: 0x32 (50 decimal)
HALL SENSOR 4: 0x33 (51 decimal)
EEPROM: 0b1010111, 0x57 (87 decimal)
Optional
OLED: 0x3C (60 decimal)
ANDIXOR GPIO Expander MCP23017 0x20 (32 decimal)
ANDIXOR EEPROM AT24C32r 0x50 (80 decimal)

All 7-bit addresses should be greater than 0x07 and less than 0x78 (120).

Andy Geppert – Machine Ideas, LLC

Sheet: /

File: Interactive Core Memory Badge (Logic) Main v0.3.sch

Title: Core 64 – Main Sheet Index

Size: A4	Date: 2020-04-24	**Rev: 0.3**
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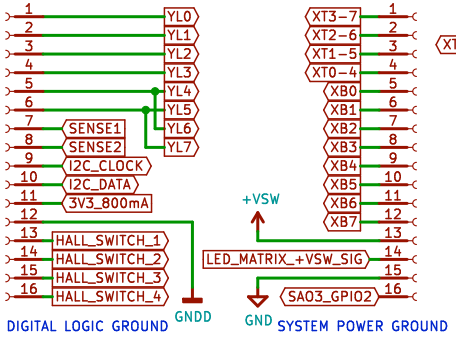
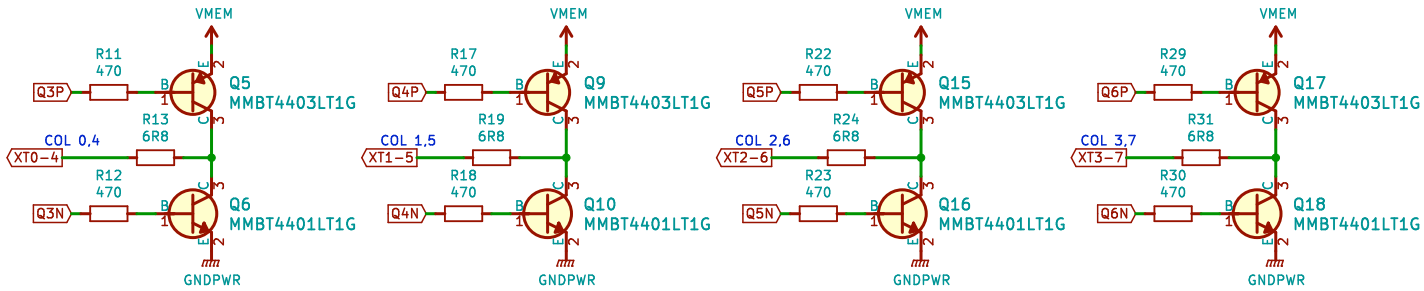
CORE BOARD INTERCONNECTS

YL: 6
SENSE: 2
SPARE: 2
GND, 3V3: 2
MHS: 4 (hall switches)
TOTAL=16
J1
SSW-116-22-F-S-VS

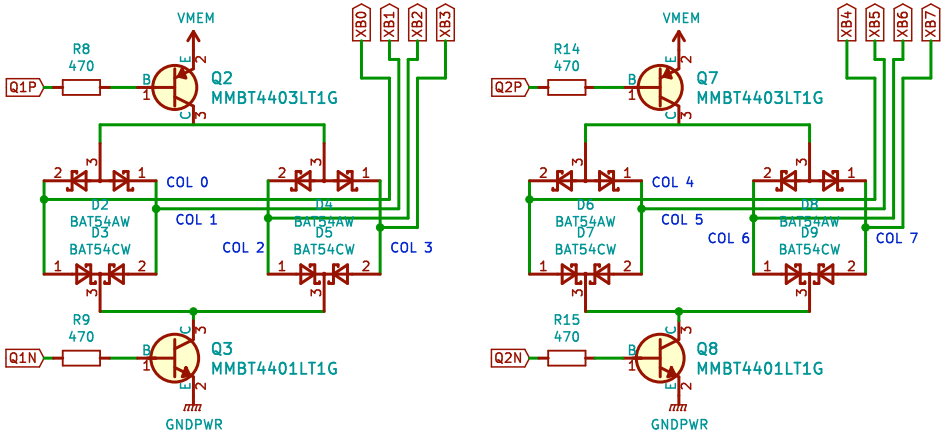
XT: 4
XB :8
LED MATRIX: 3
(V+, SIGNAL, GND)
SPARE: 1 (SAO3)
TOTAL=16
J2
SSW-116-22-F-S-VS



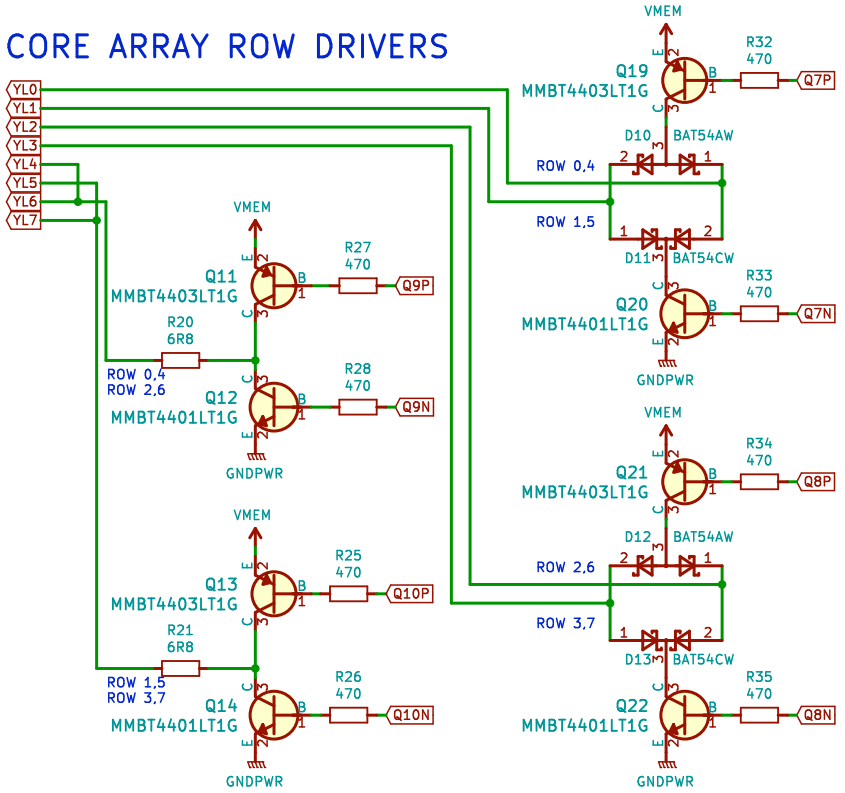
CORE ARRAY TOP COLUMN DRIVERS



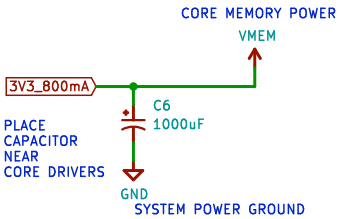
CORE ARRAY BOTTOM COLUMN DRIVERS



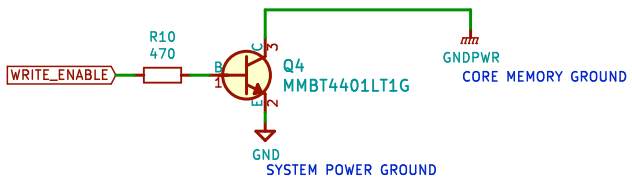
CORE ARRAY ROW DRIVERS



CORE ARRAY POWER



CORE ARRAY ENABLE



Drive Transistor current: 3.3/470=7mA (too much for Teensy LC)
Matrix 1/2 select current: 3.3/6.8= 485 mA (does not acccount for voltage drop in transistors)

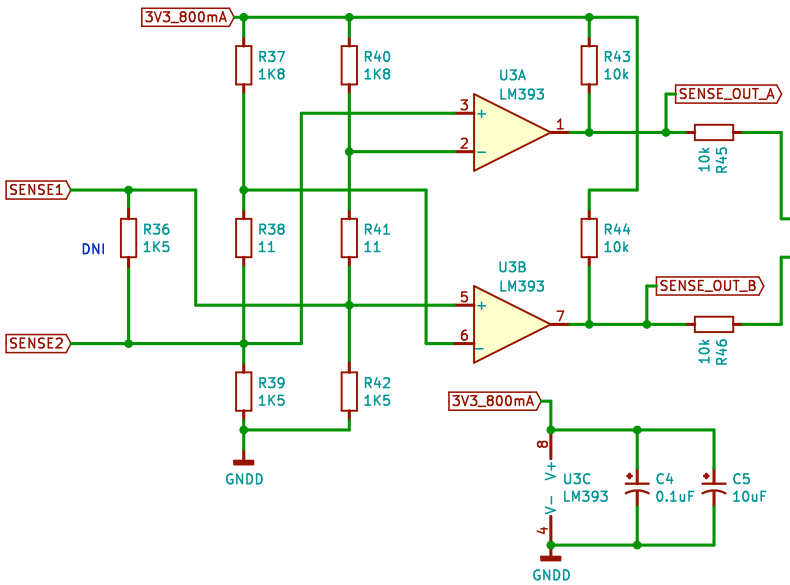
Andy Geppert – Machine Ideas, LLC

Sheet: /Core Array Driver/
File: Interactive Core Memory Badge (Logic) Driver v0.3.sch

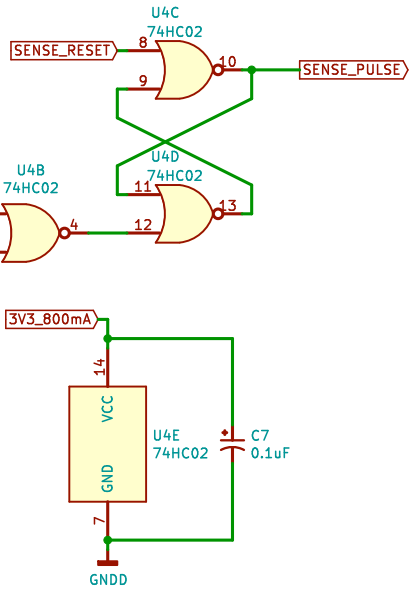
Title: Core 64 – Core Array Driver

Size: A	Date: 2020-04-24	**Rev: 0.3**
KiCad E.D.A. eeschema (5.1.2-1)-1		Id: 2/5

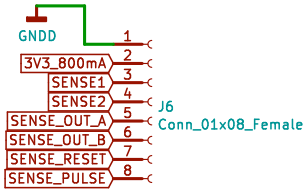
SENSE SIGNAL PROCESSING



SENSE SIGNAL RS LATCH



SENSE DEBUG SOCKET



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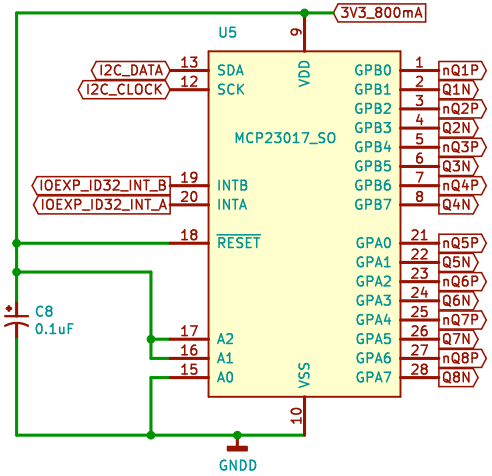
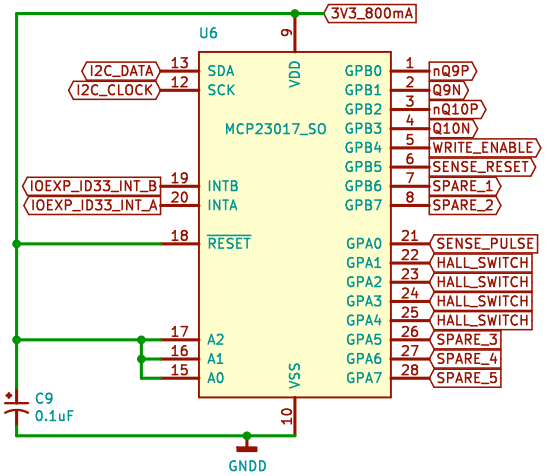
Sheet: /SENSE/		
File: Interactive Core Memory Badge (Logic) Sense v0.3.sch		
Title: Core 64 – Sense		
Size: A4	Date: 2020-04-24	**Rev: 0.3**
KiCad E.D.A. eeschema (5.1.2-1)-1		Id: 3/5

IO EXPANDER FOR CORE DRIVE ARRAY

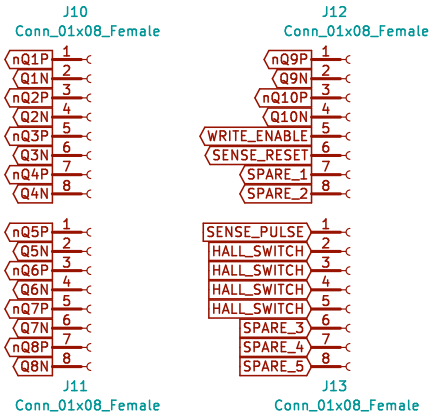
I2C ID: 0100110 (7-bit address) 0x26 (38 decimal)



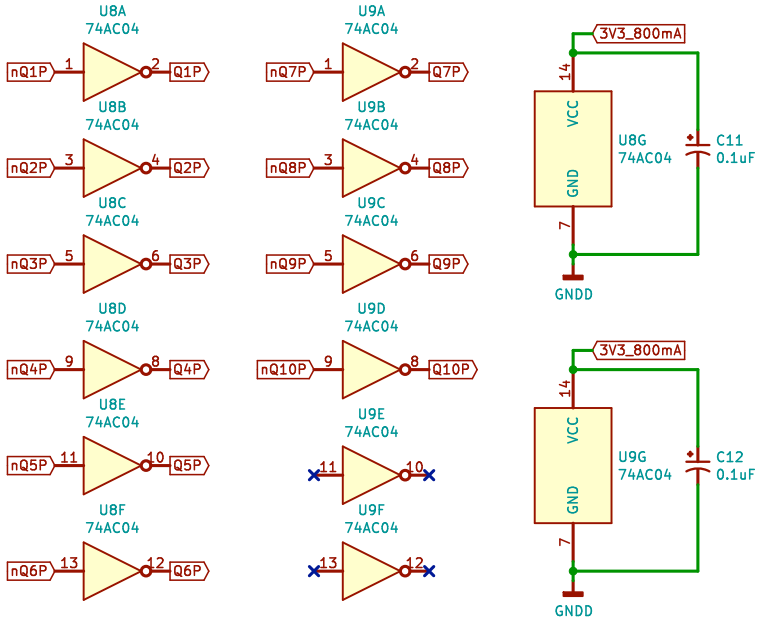
I2C ID: 0100111 (7-bit address) 0x27 (39 decimal)



IO Expansion/debug header if room...

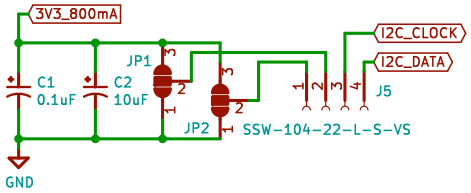


INVERT DRIVE SIGNALS FOR PNP TRANSISTORS

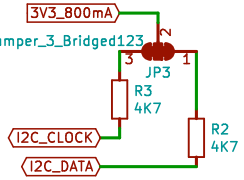


OLED DISPLAY (OPTIONAL)

0.96" (128x64)
I2C 4-pins, ADDRESS: 0x3C (60 decimal)
Alternate is 0x3D, not 0x7A or 0x78 (wrong 8-bit)!

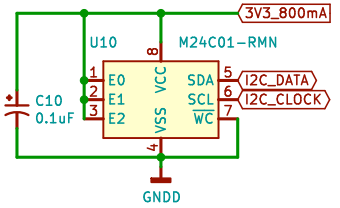


I2C PULL-UPS

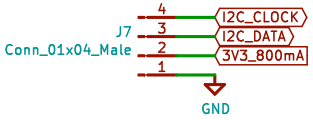


BOARD I.D. AND S/N

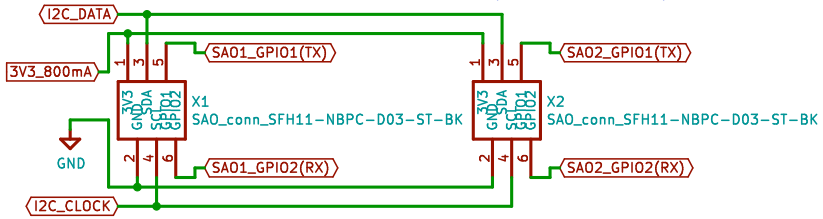
EEPROM I2C ADDRESS: 0b1010111, 0x57 (87 decimal)



QWIIC CONNECTOR



SUPERIOR ADD-ON SOCKETS (OPTIONAL)



A.K.A. SAO v1.69bis (https://hackaday.io/project/52950-shitty-add-ons) using Sullins SFH11-NBPC-D03-ST-BK
https://www.digikey.com/product-detail/en/sullins-connector-solutions/SFH11-NBPC-D03-ST-BK/S9717-ND/4558818

Sheet: /IO Expansion/
File: Interactive Core Memory Badge (Logic) IO Expansion V0.3.sch

Title: Core 64 - IO Expansion

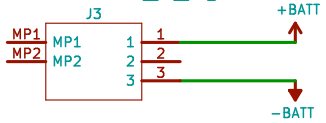
Size: A4	Date: 2020-04-24	**Rev: v0.3**
KiCad E.D.A. eeschema (5.1.2-1)-1		Id: 4/5

TEENSY LC OR 3.2 AND ALKALINE/NIMH BATTERY PACK
*** MUST CUT VIN-VUSB TRACE ON TEENSY ***
THIS IS THE STANDARD MANUFACTURED KIT CONFIGURATION

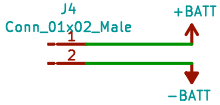
TWO POWER MODES SELECTED BY DOUBLE-THROW SWITCH:

MODE 1
BUILT-IN BATTERY PACK (Keystone 2482CN) WITH 4X "AAA" ALKALINE OR NIMH CELLS
...or 3-4 "AA" alkaline/NiMh, or 1S LiPo, but the logic board does not recharge these batteries automatically from USB power.
CONNECTED TO 3 PIN input for Battery Pack
On PCB: SMT CONN, 3 TERM, HORZ, 2mm spacing, detent lock
Such as: Keystone 976, JST PA BM03B-PASS-1-TFT(LF)(SN), Adafruit 4391 (JST PH 3-pin aka STEMMA)
from KAWEEI Technology CW2001-03T-H01-BD-A,

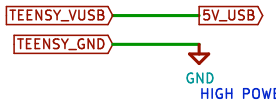
BM03B-PASS-1-TFT__LF__SN_



ALTERNATE CONNECTOR - Generic SMT 2-pin .1" header option for everything else.



MODE 2
USB 5V through Teensy LC or 3.2
VUSB is 5V from USB cable.

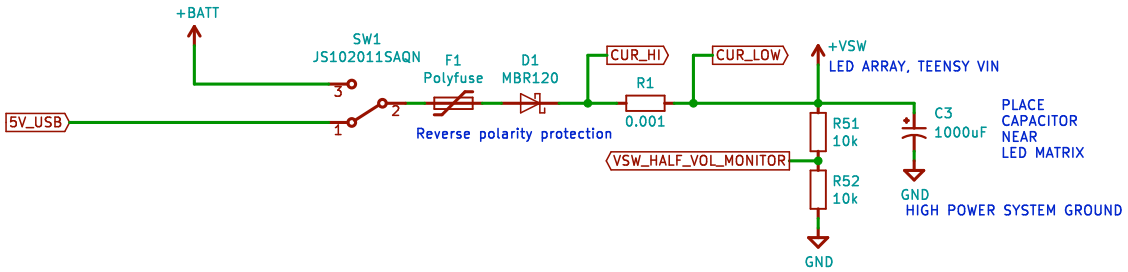


BOTH MODES REQUIRE:
VIN must be supplied TO the Teensy
(because VIN-VUSB is cut) and the
Core 64 Logic Board provides it here.

HACKER POWER OPTION: ADAFRUIT FEATHER WITH REQUIRED LIPO
*** MUST REMOVE ALKALINE/NIMH BATTERY PACK ***
USER MODIFICATION REQUIRED

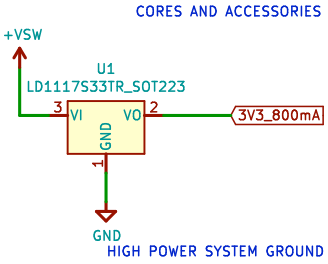
HACKER UPGRADE TO USE FEATHER-TEENSY ADAPTER BOARD REQUIRES:
A) REPLACE THE ALKALINE/NIMH BATTERY PACK WITH 1S LIPO IN THE SAME POWER PORT, OR THE ALTERNATE PORT.
-or-
B) REMOVE THE ALKALINE/NIMH BATTERY PACK AND CONNECT 1S LIPO DIRECTLY TO FEATHER JST-PH BATTERY/CHARGING PORT.

POWER SWITCH, POWER PROTECTION, VOLTAGE & CURRENT MONITOR

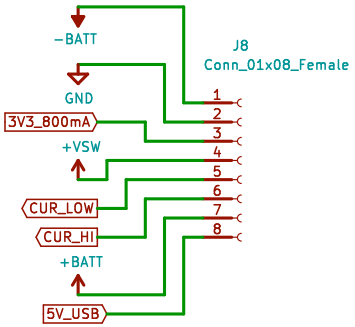


3.3V POWER SUPPLY

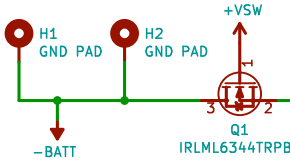
CORES AND ACCESSORIES



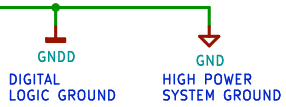
POWER RAILS



REVERSE POLARITY PROTECTION



ALL SYSTEM STAR GROUNDING



REVERSE POLARITY DETECTION AND SYSTEM
CURRENT MEASUREMENT CLOSE TO BATTERY.

REF: https://www.instructables.com/id/Reverse-polarity-protection-for-your-circuit-with/
IRLML6344TRPBF https://www.digikey.com/product-detail/en/infineon-technologies/IRLML6344TRPBF/IRLML6344TRPBFCT-ND/2538168

Andy Geppert - Machine Ideas, LLC

Sheet: /Power/
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Title: Core 64 - Power Schematic

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