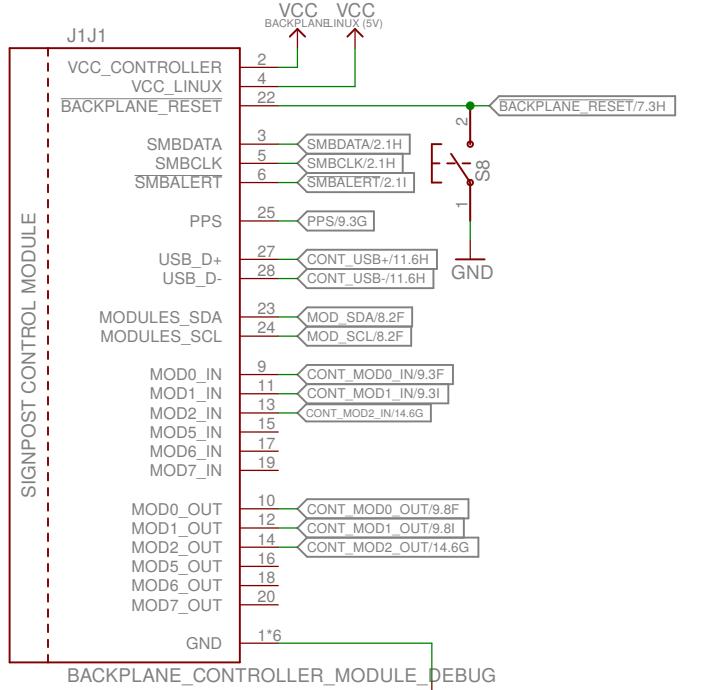
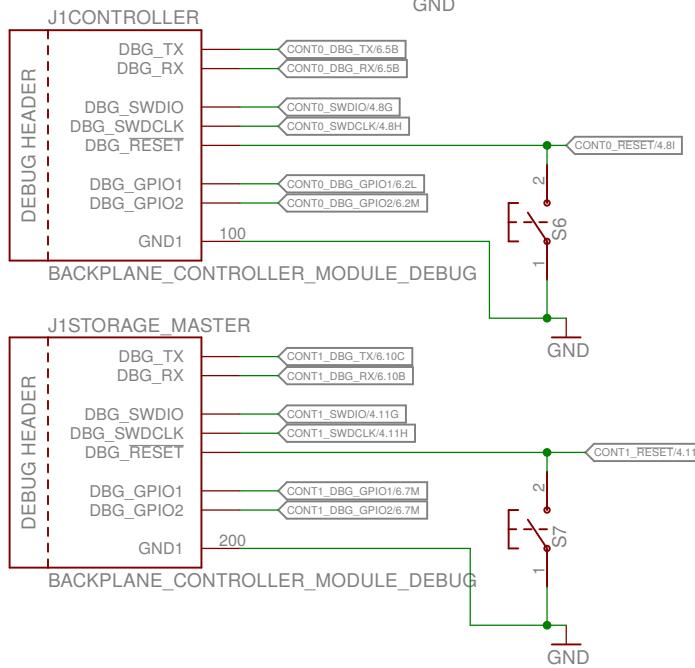
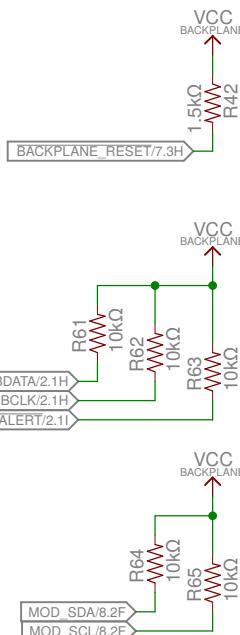


Special Modules



Pull-up/downs



Signpost Debug Backplane

REV:
B

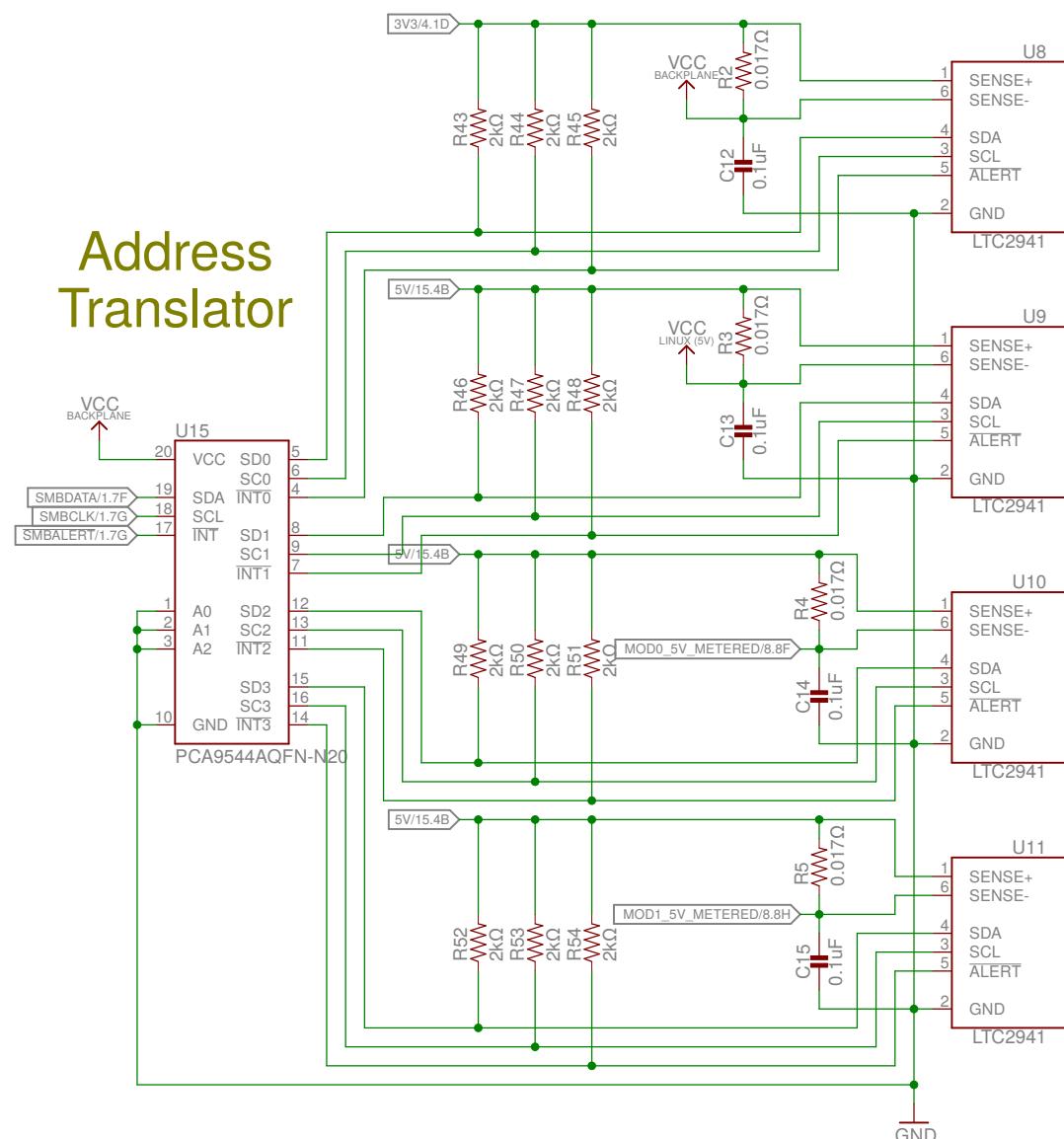
Author: Joshua Adkins and Pat Pannuto

Date: 2/1/17 7:34 PM

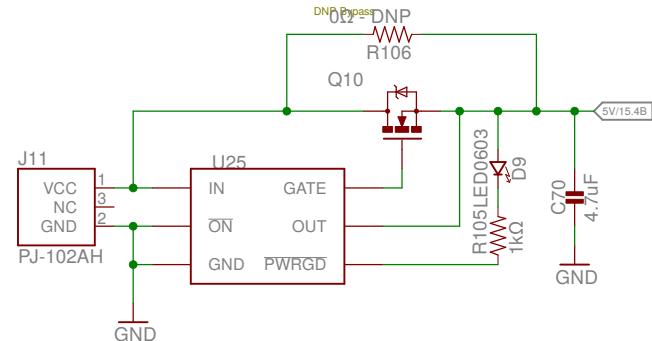
Sheet: 1/15

POWER SUPPLY

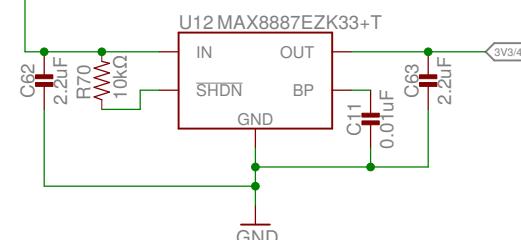
Coulomb Counters



5V Barrel Jack



3V3 Regulator



M Signpost Debug Backplane

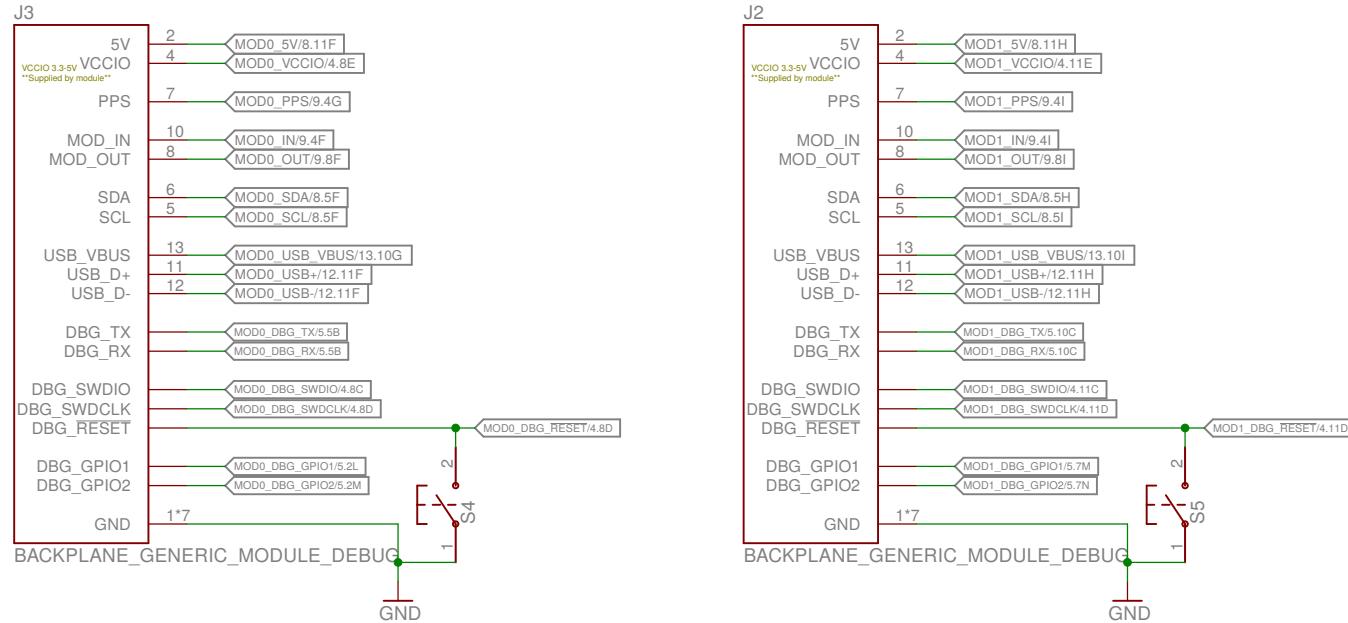
REV:
B

Author: Joshua Adkins and Pat Pannuto

Date: 2/1/17 7:34 PM

Sheet: 2/15

Generic Modules



Signpost Debug Backplane

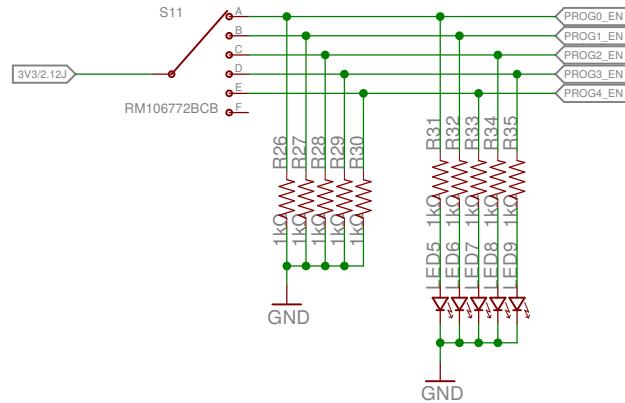
REV:
B

Author: Joshua Adkins and Pat Pannuto

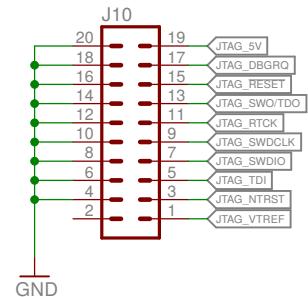
Date: 2/1/17 7:34 PM

Sheet: 3/15

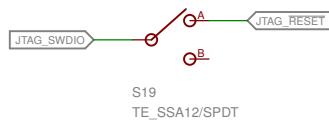
One-Hot Enable Lines



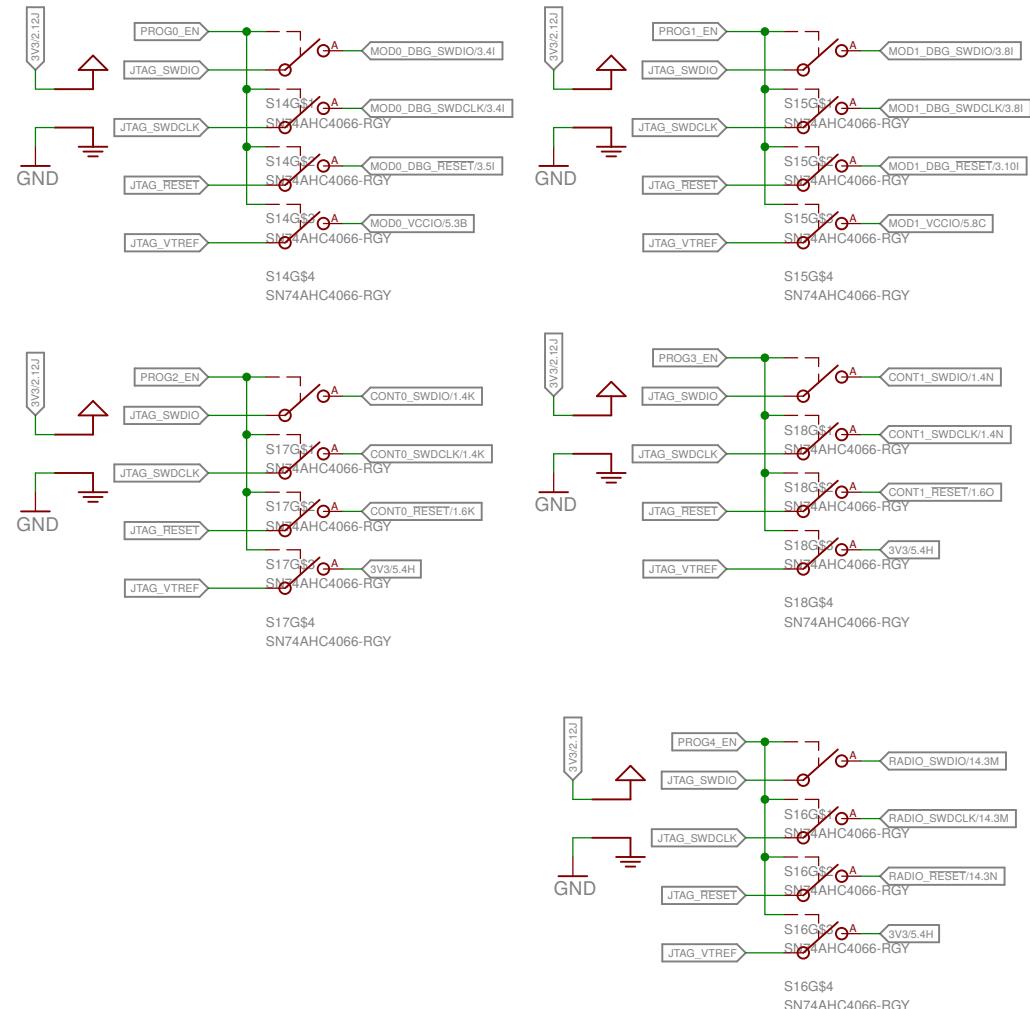
JTAG Header



Ties SWDIO to Reset



Signal Enable ICs



M Signpost Debug Backplane

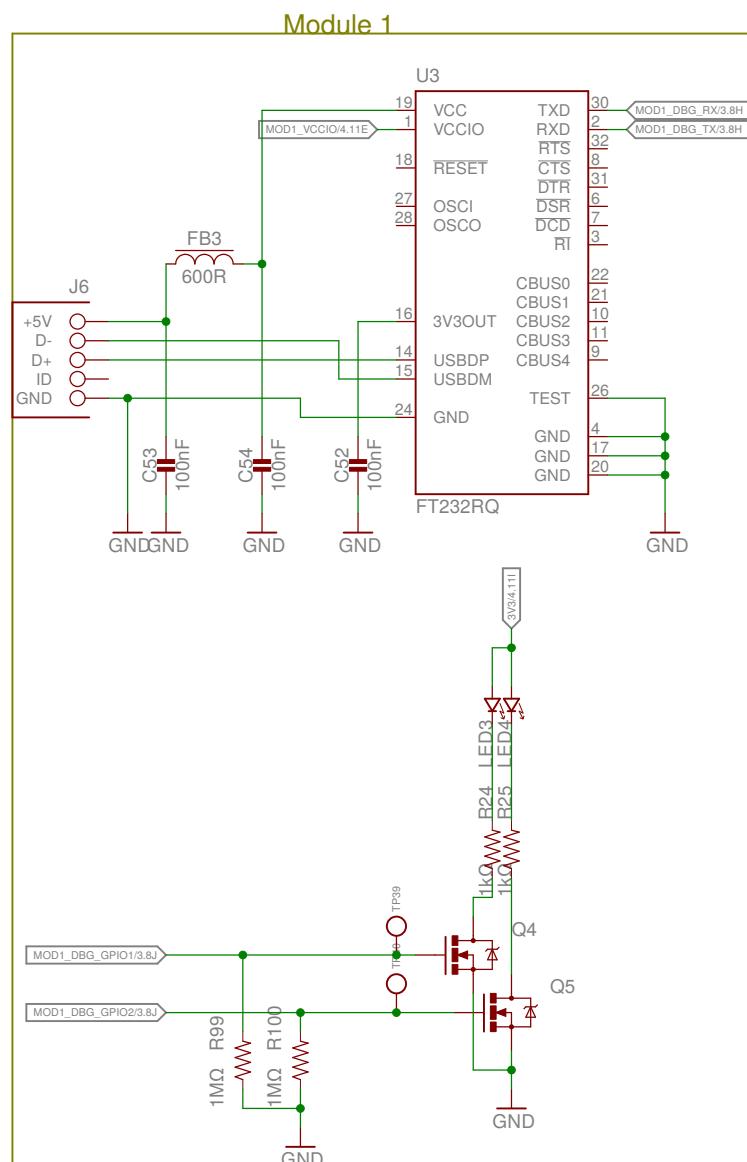
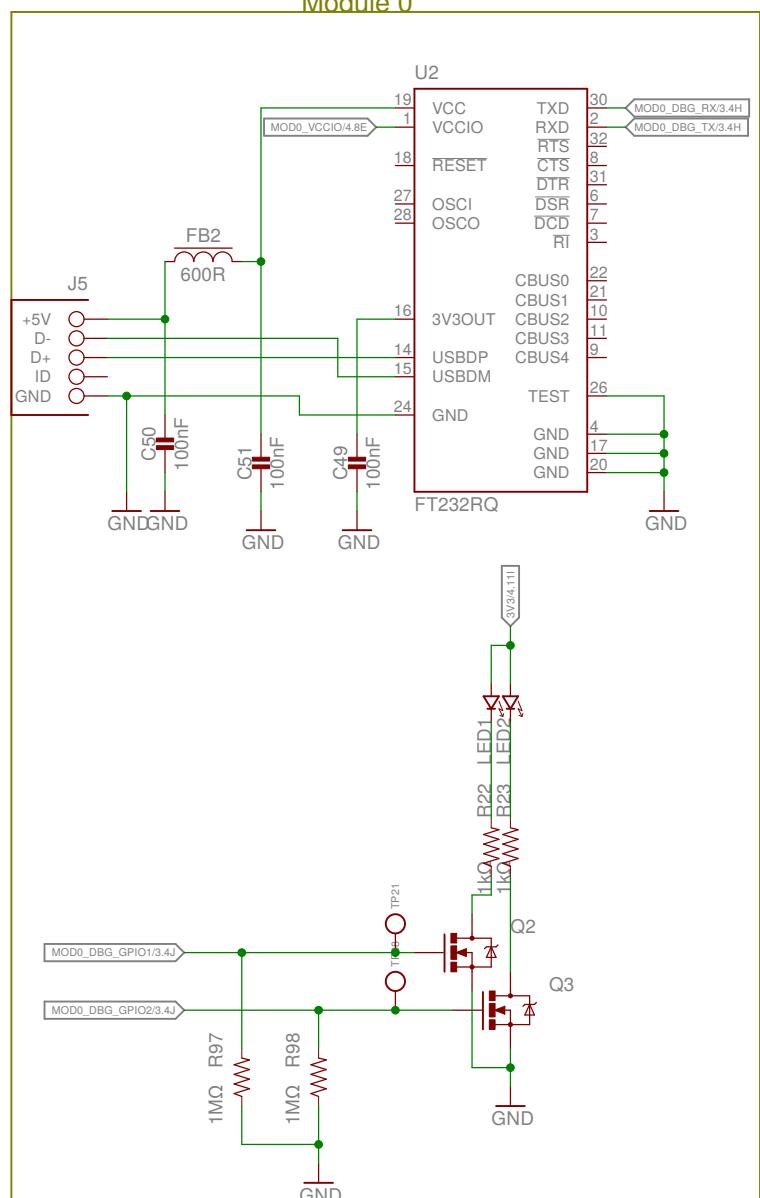
REV:
B

Author: Joshua Adkins and Pat Pannuto

Date: 2/1/17 7:34 PM

Sheet: 4/15

Module Debugging



M Signpost Debug Backplane

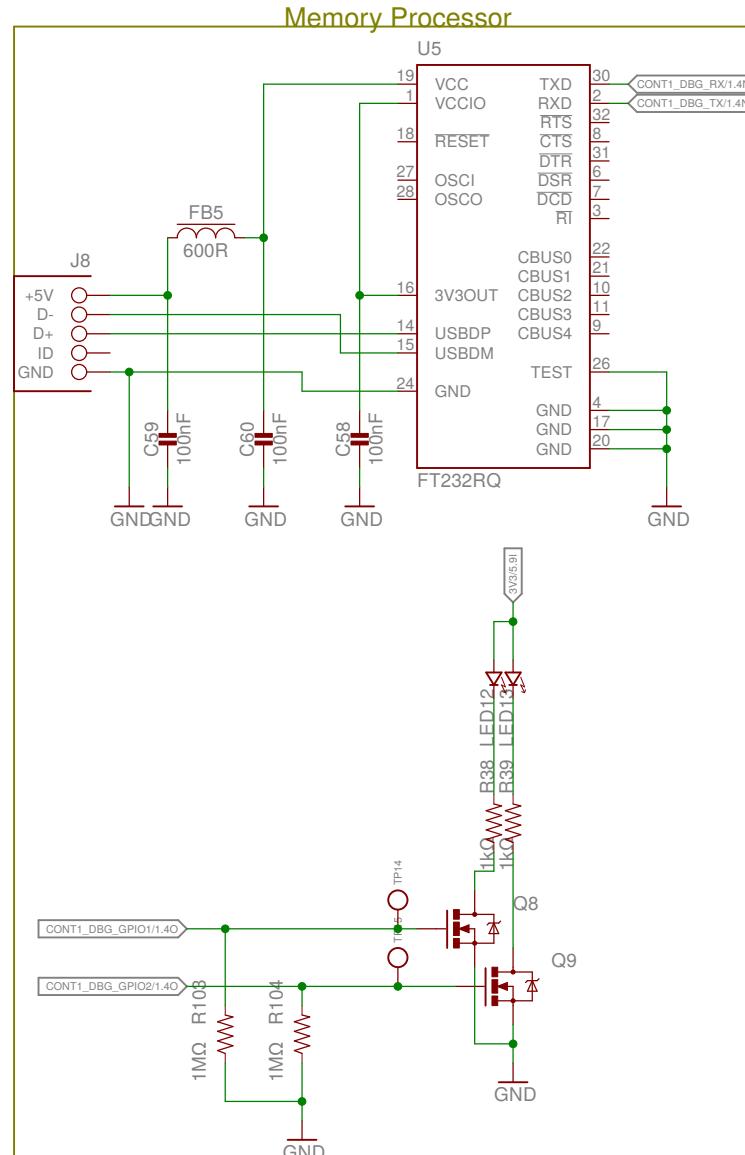
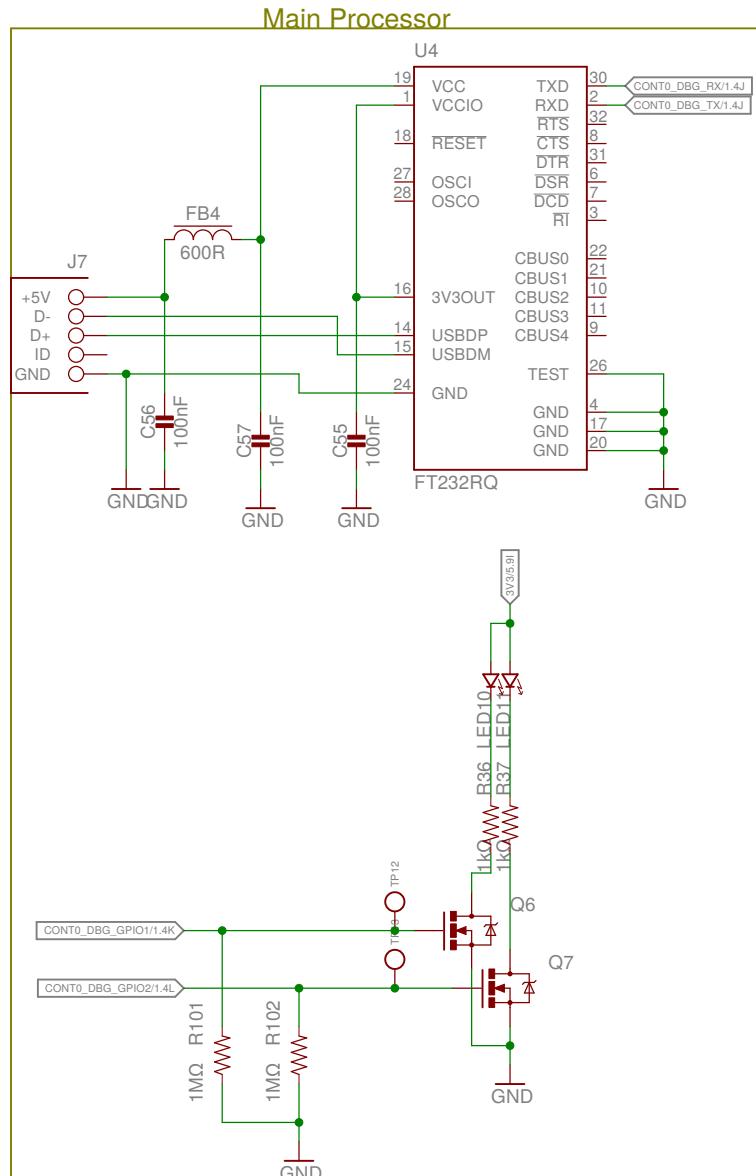
REV:
B

Author: Joshua Adkins and Pat Pannuto

Date: 2/1/17 7:34 PM

Sheet: 5/15

Controller Debugging



Signpost Debug Backplane

REV:
B

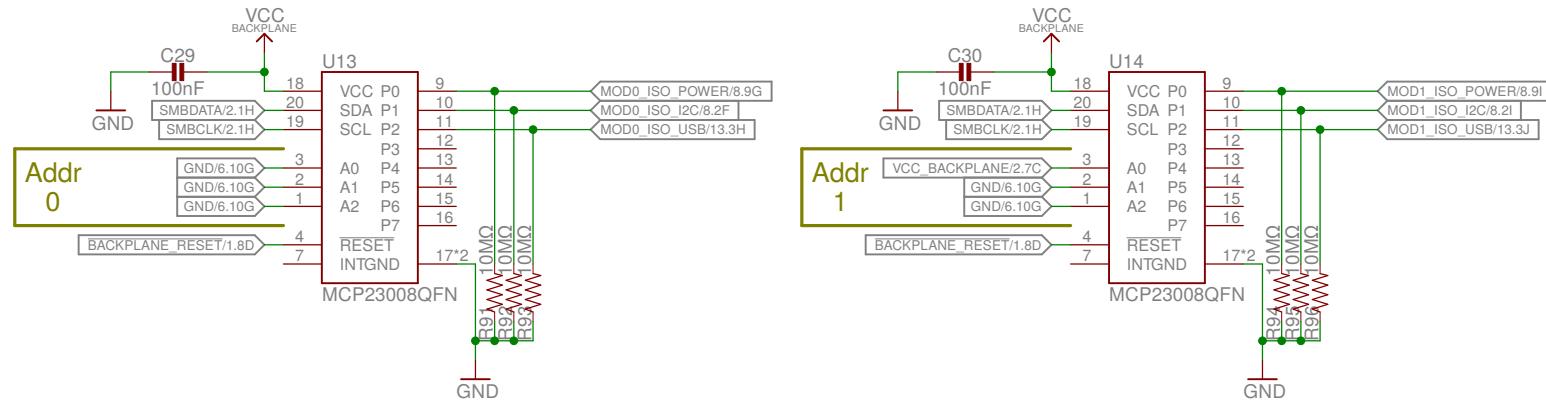
Author: Joshua Adkins and Pat Pannuto

Date: 2/1/17 7:34 PM

Sheet: 6/15

Isolation Control

I2C to GPIO for Isolation. Connected to SMBUS



Signpost Debug Backplane

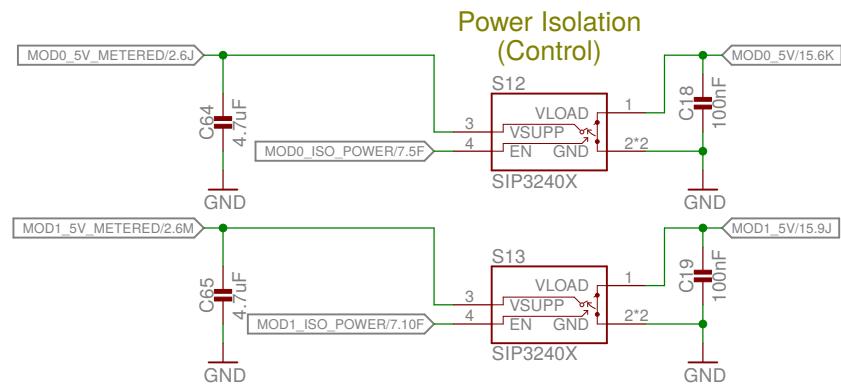
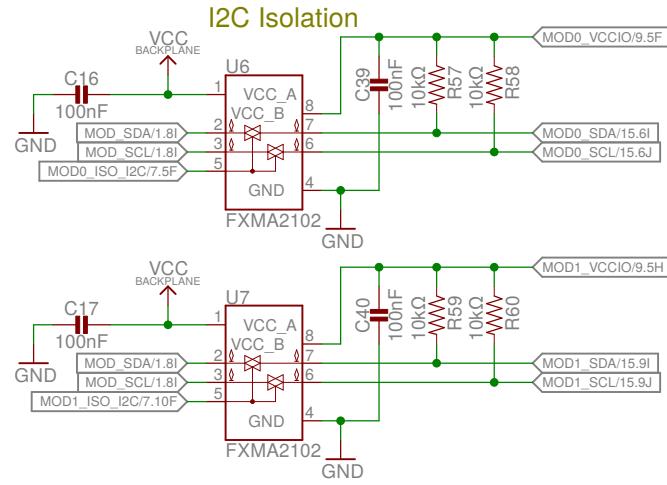
REV:
B

Author: Joshua Adkins and Pat Pannuto

Date: 2/1/17 7:34 PM

Sheet: 7/15

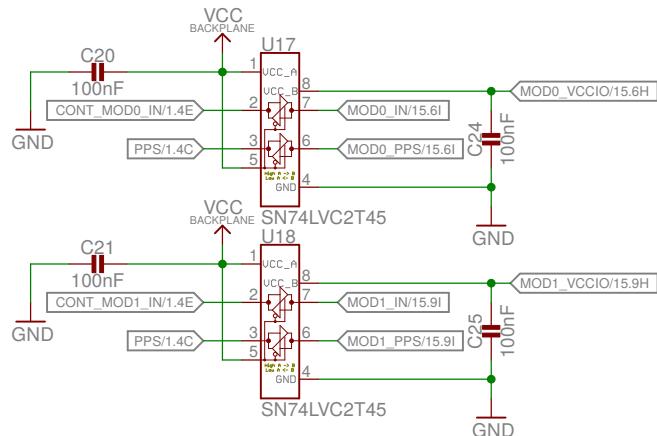
Module Isolation



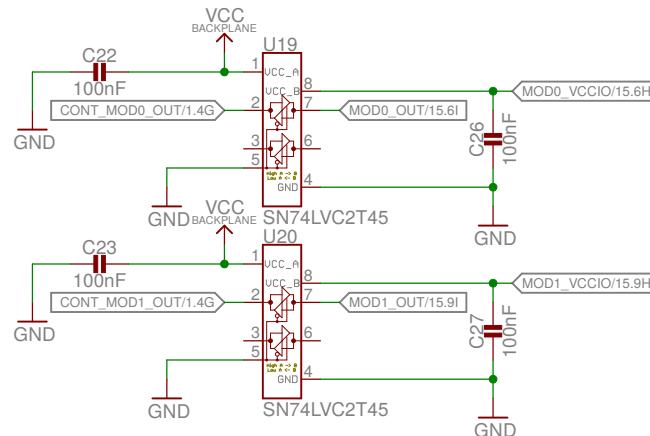
Module Isolation

MOD_IN, MOD_OUT, PPS

Buffer / Level
Backplane --> Module



Buffer / Level
Backplane <-- Module



Signpost Debug Backplane

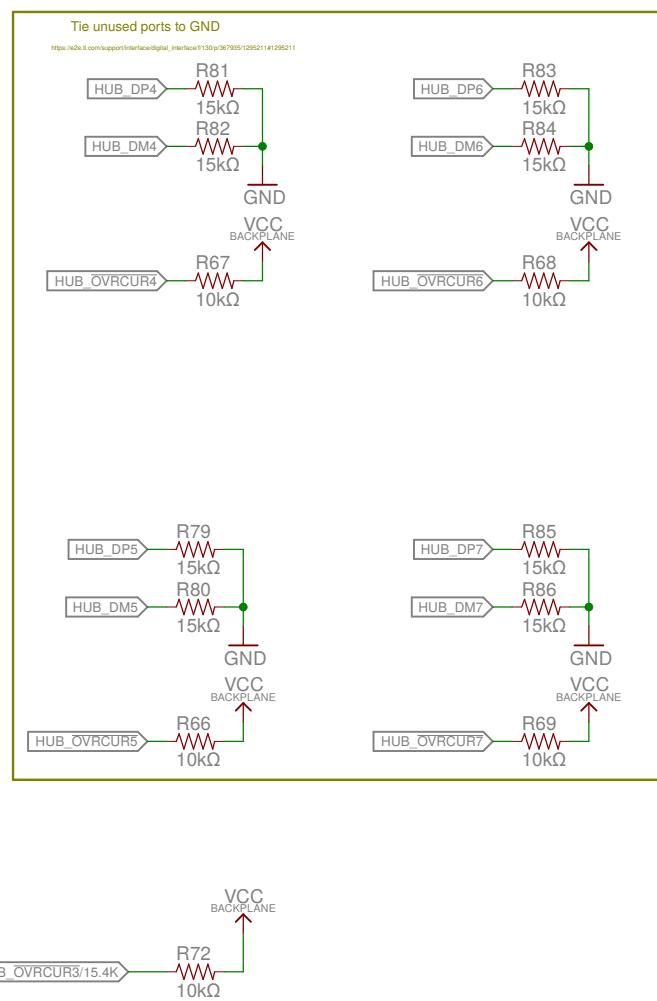
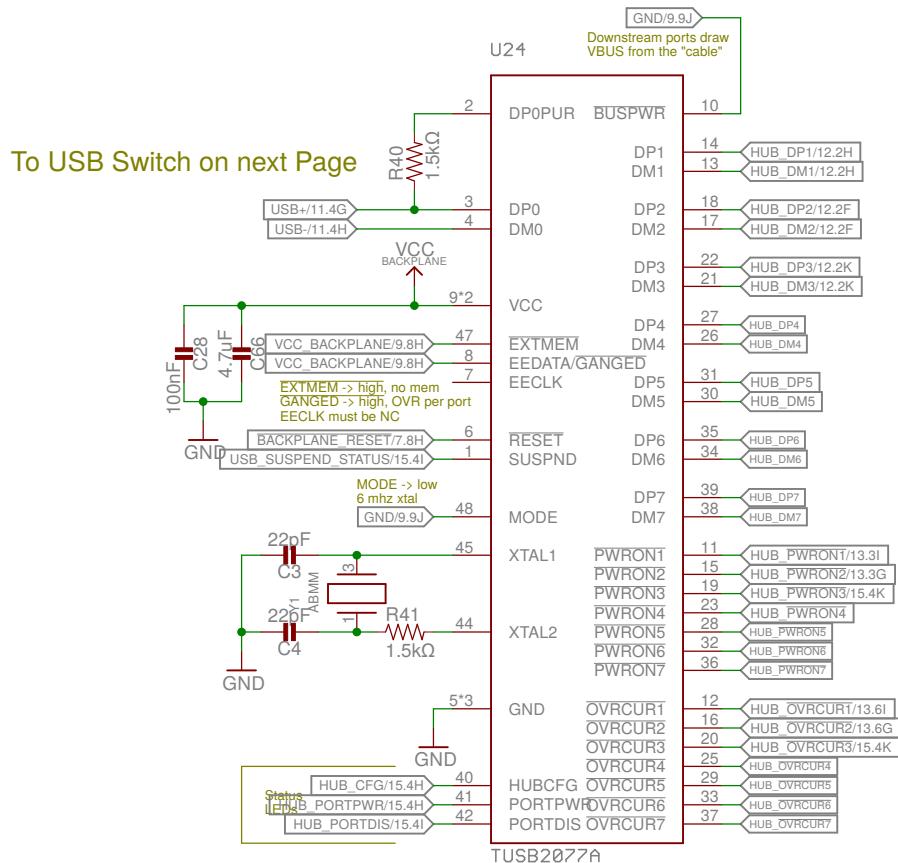
REV:
B

Author: Joshua Adkins and Pat Pannuto

Date: 2/1/17 7:34 PM

Sheet: 9/15

USB Hub



Signpost Debug Backplane

REV:
B

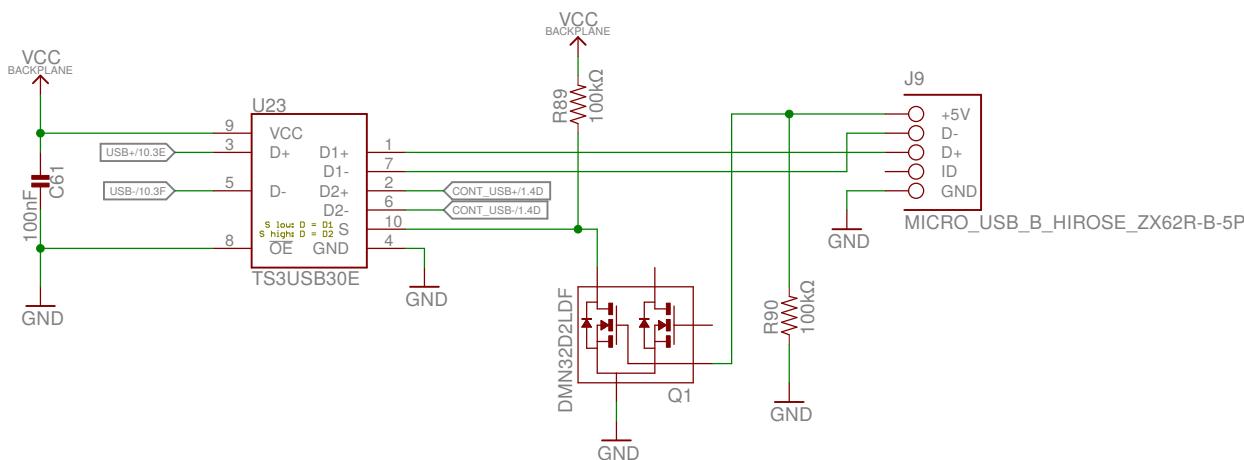
Author: Joshua Adkins and Pat Pannuto

Date: 2/1/17 7:34 PM

Sheet: 10/15

USB SWITCH

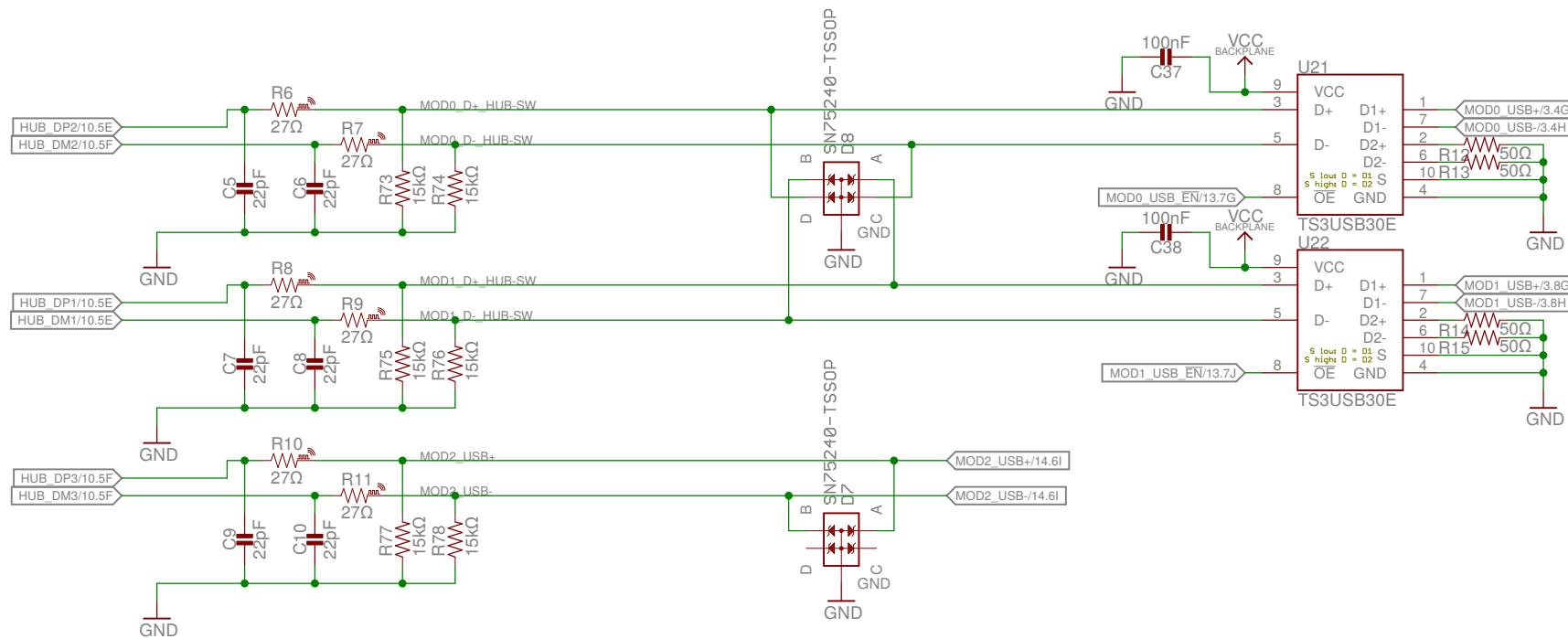
Allows USB port to act as host
instead of the Controller.
Useful for Debuggin Module USB.



Signpost Debug Backplane

REV:
B

Author: Joshua Adkins and Pat Pannuto



Transient voltage protection



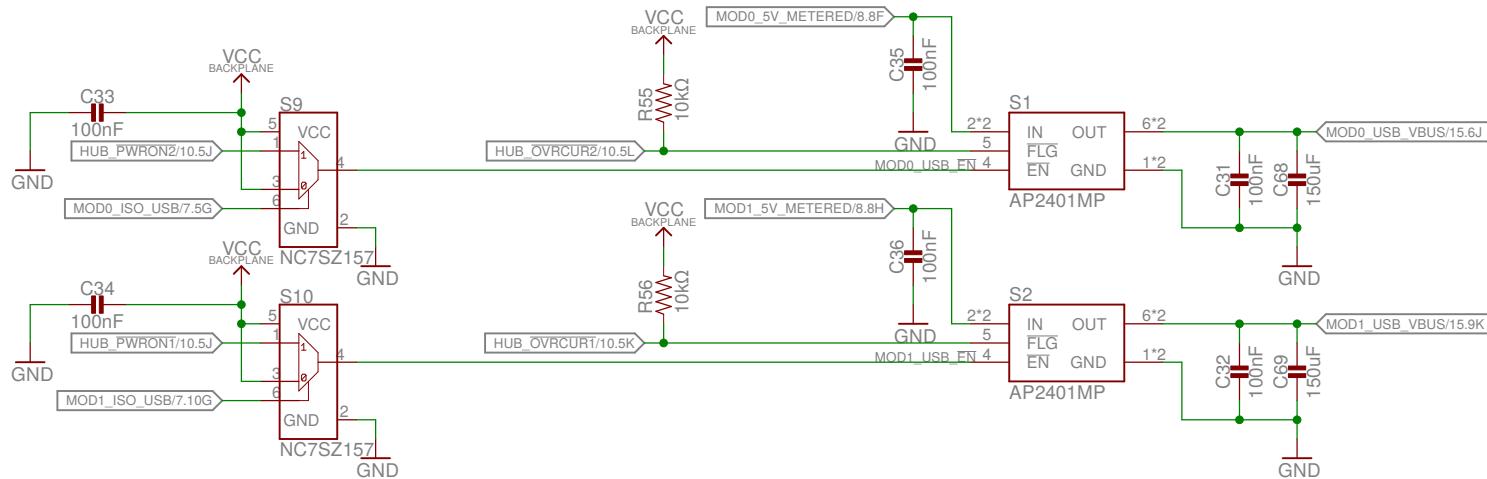
Signpost Debug Backplane

REV:
B

Author: Joshua Adkins and Pat Pannuto

Date: 2/1/17 7:34 PM

Sheet: 12/15



Signpost Debug Backplane

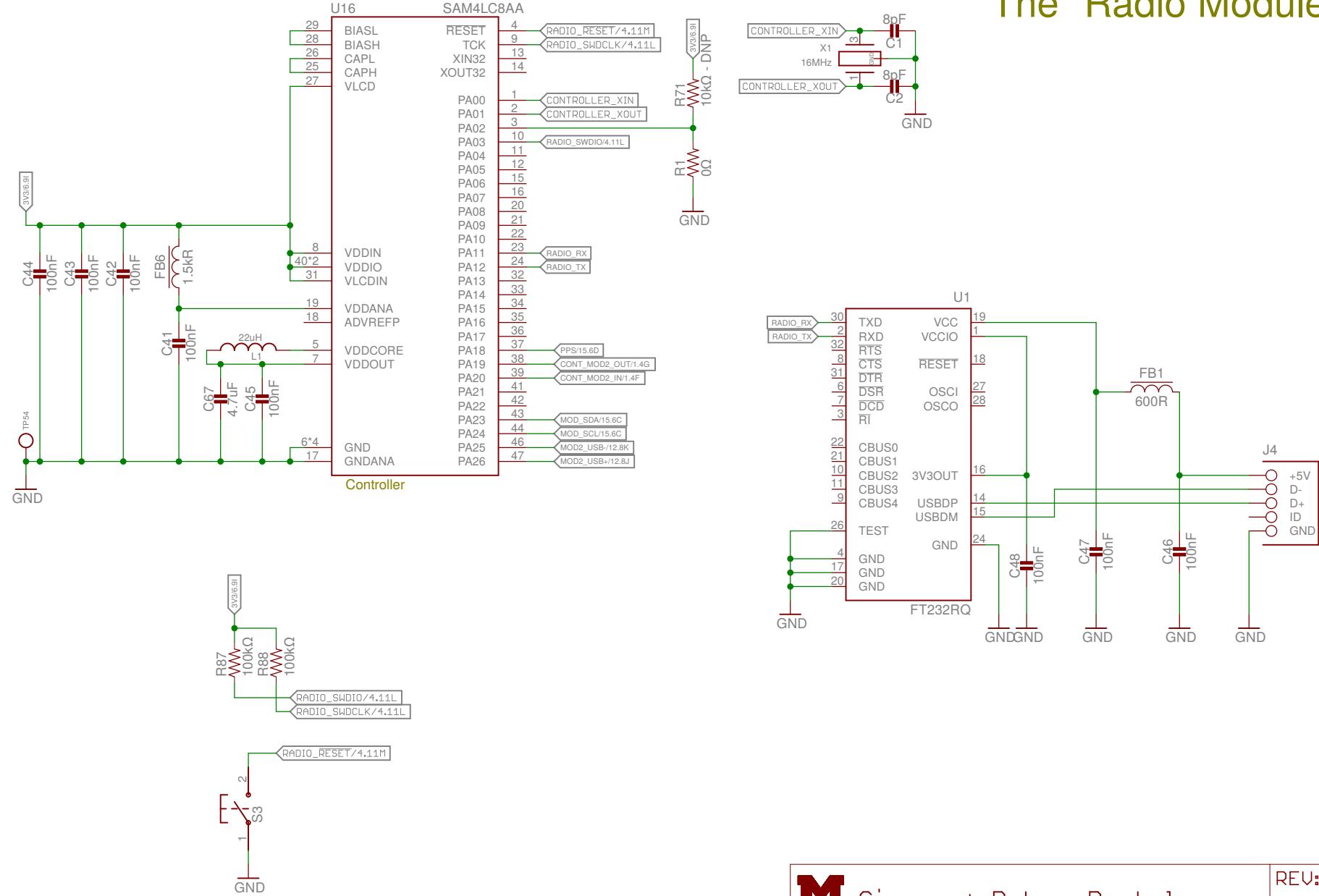
REV:
B

Author: Joshua Adkins and Pat Pannuto

Date: 2/1/17 7:34 PM

Sheet: 13/15

The "Radio Module"



M Signpost Debug Backplane

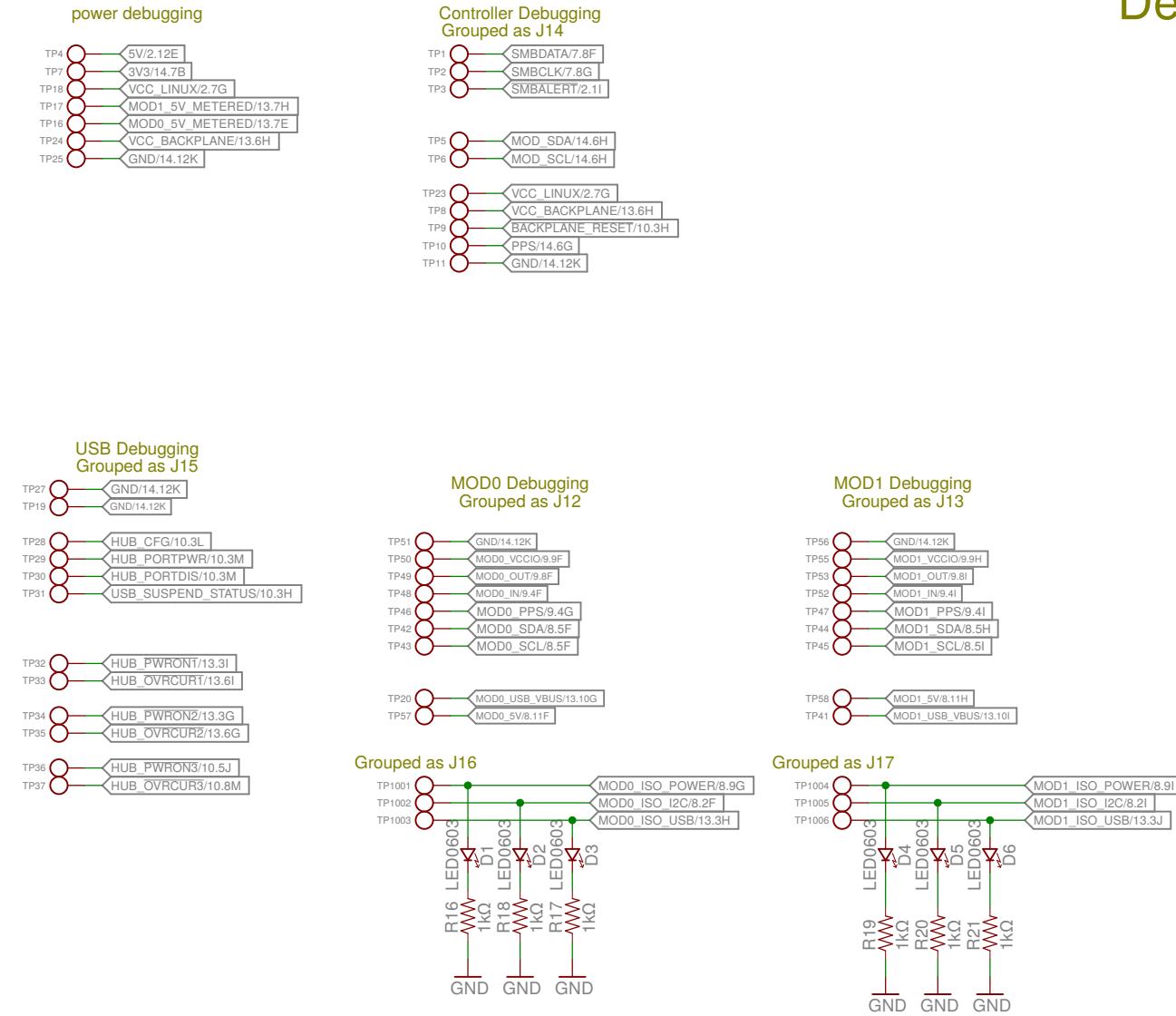
Author: Joshua Adkins and Pat Pannuto

Date: 2/1/17 7:34 PM

REV:
B

Sheet: 14/15

Debugging



M Signpost Debug Backplane

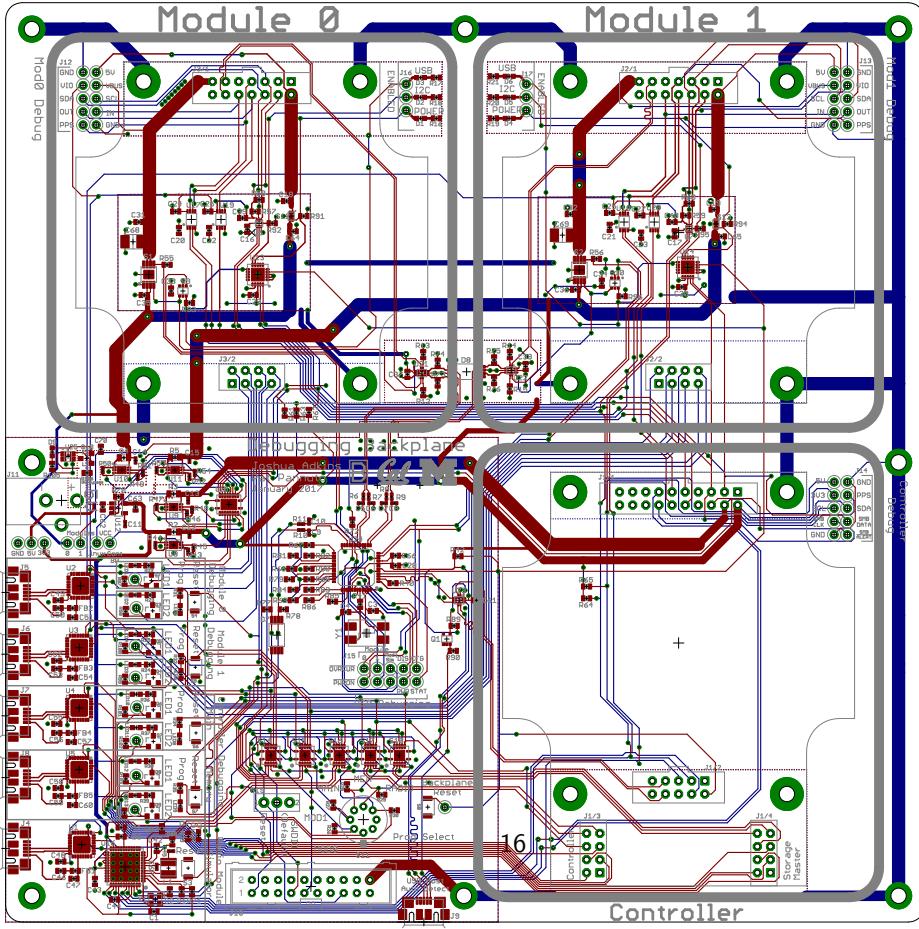
REV:
B

Author: Joshua Adkins and Pat Pannuto

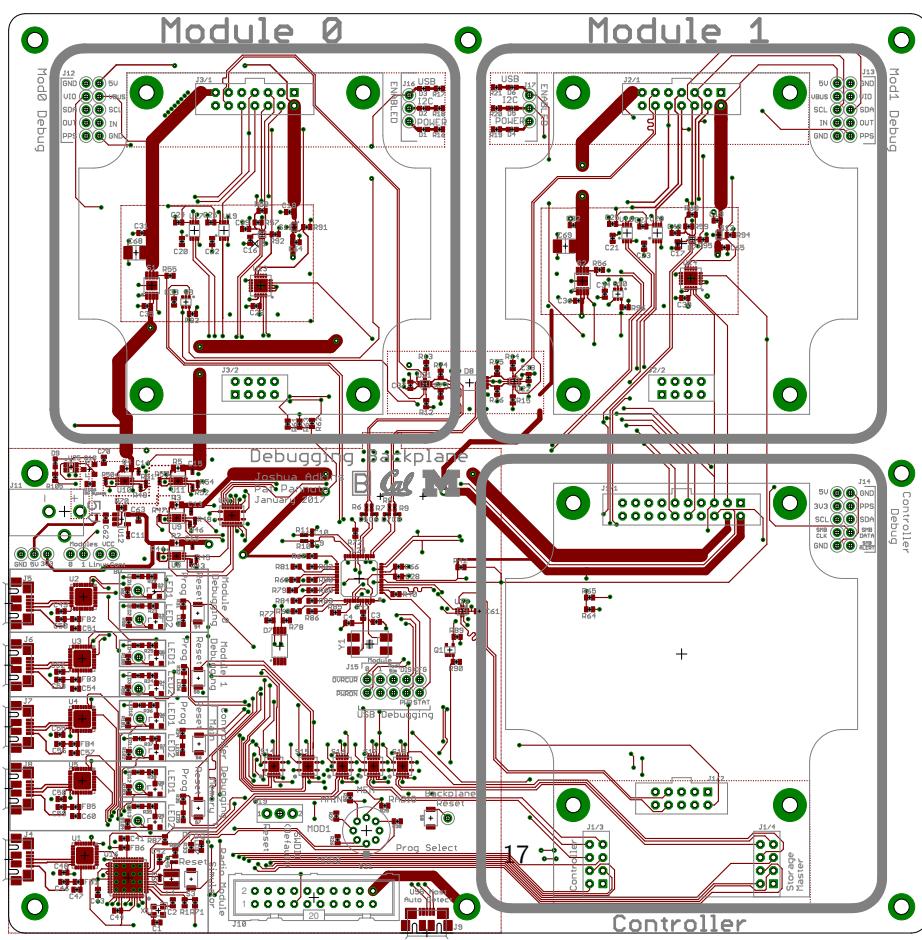
Date: 2/1/17 7:34 PM

Sheet: 15/15

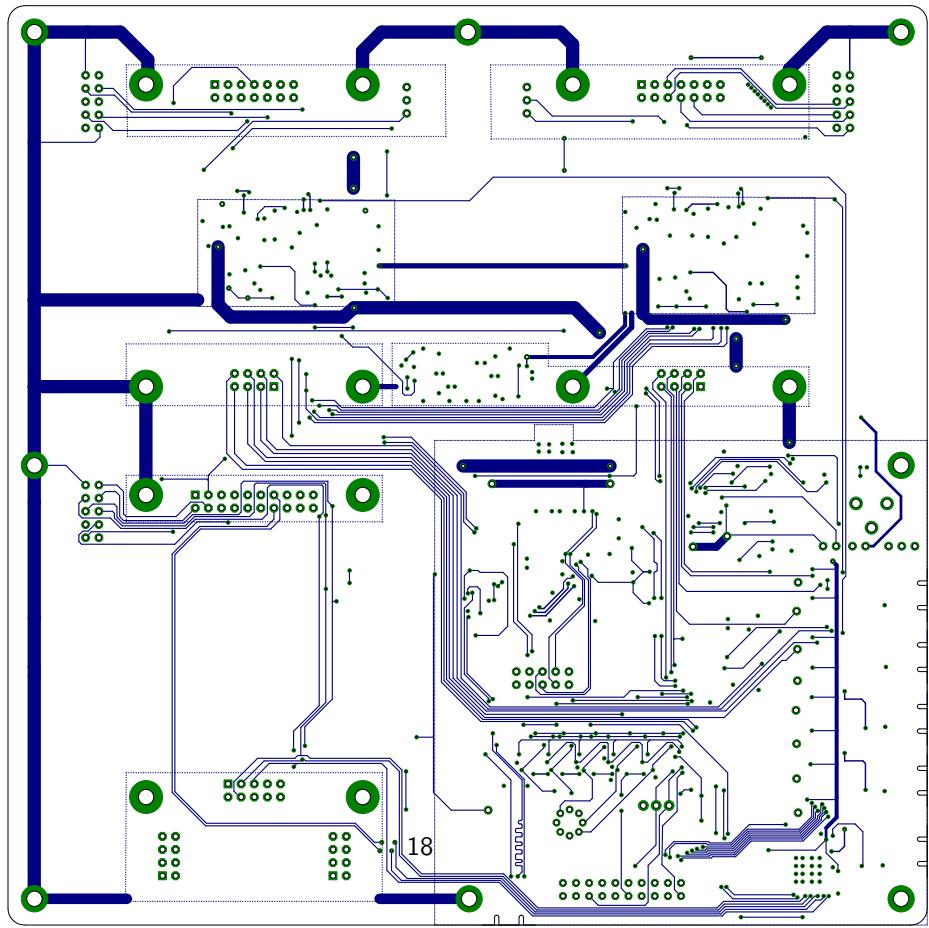
Top and Bottom Layers



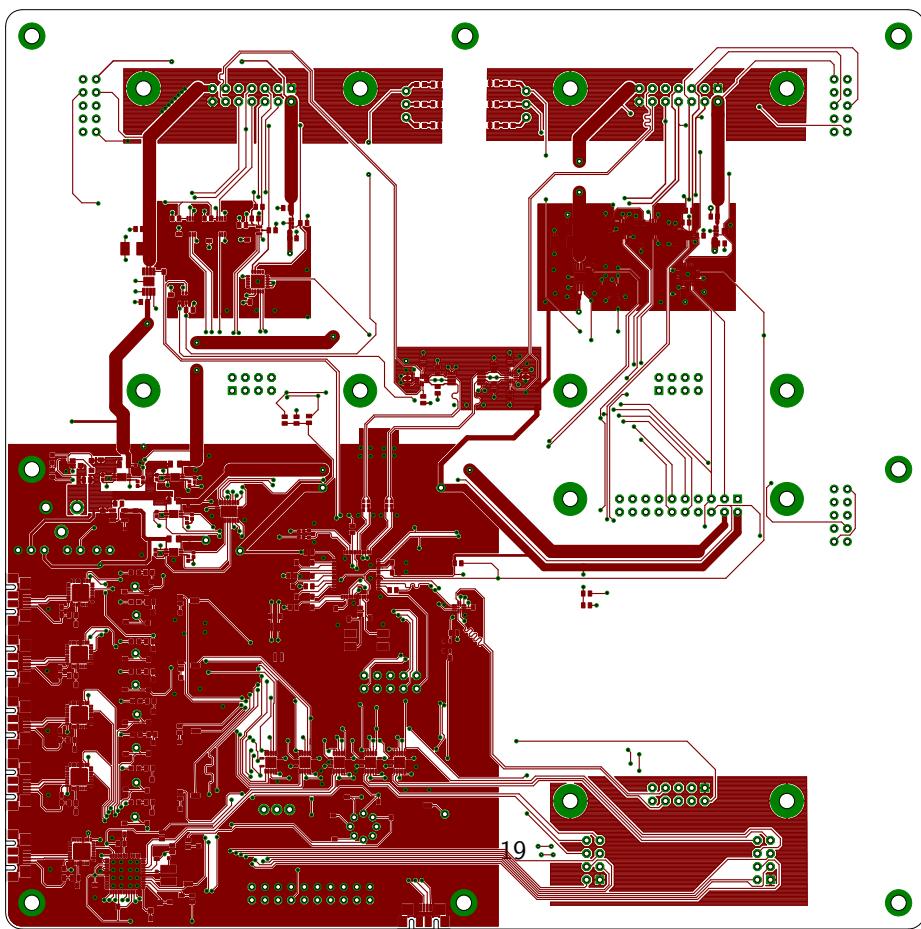
Top Layer



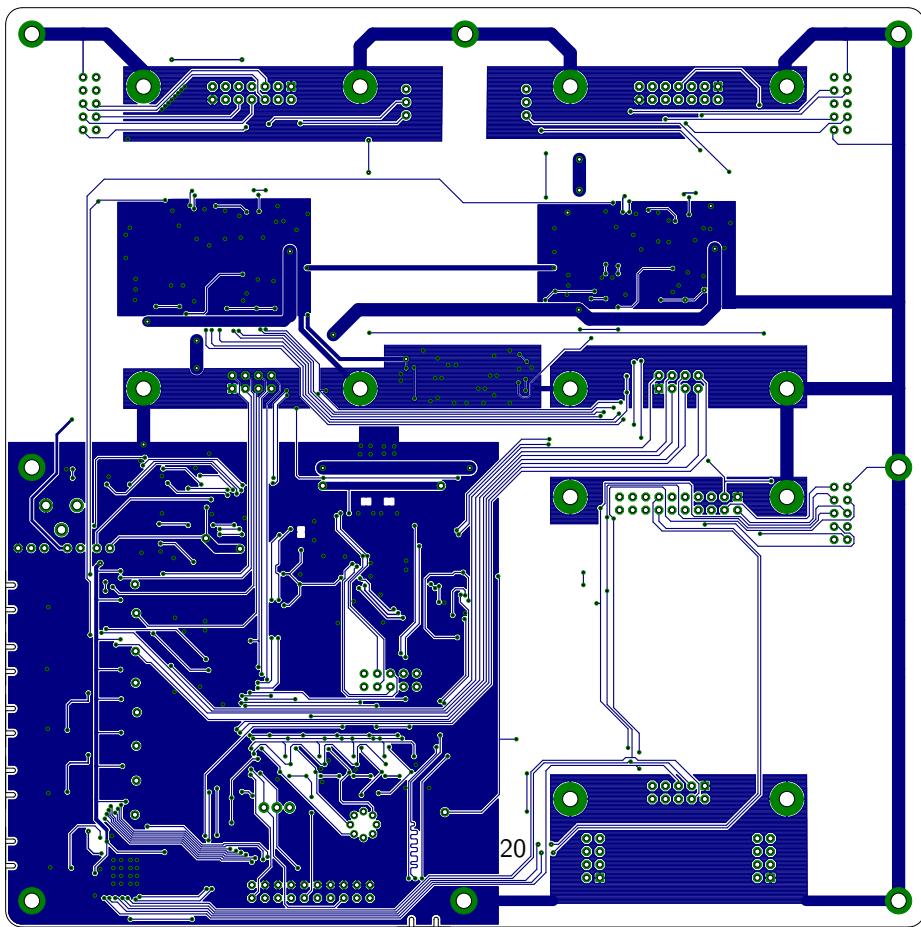
Bottom Layer



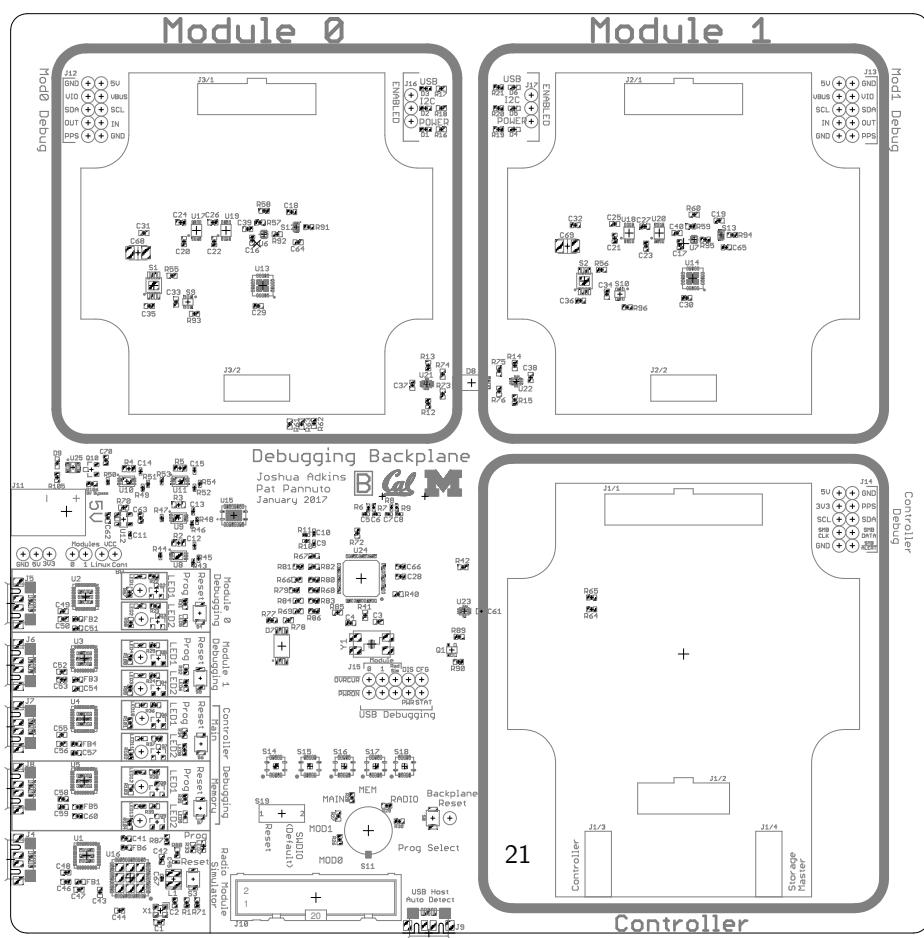
Top Copper Layer



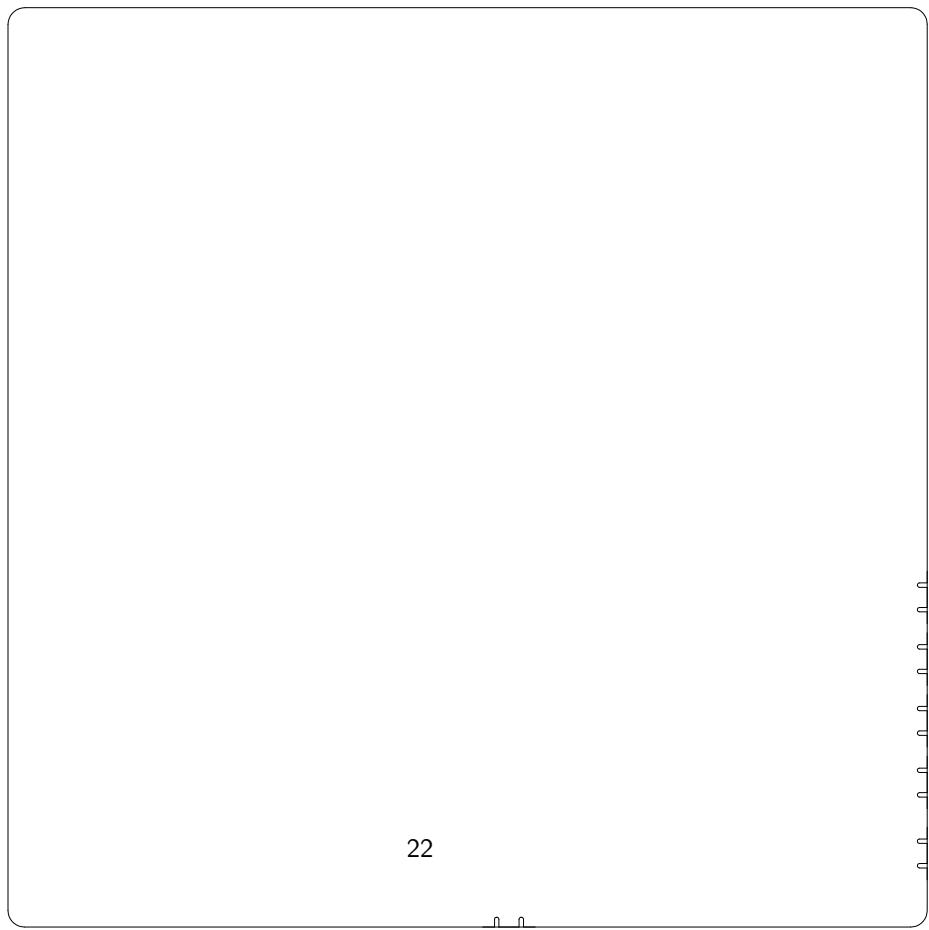
Bottom Copper Layer



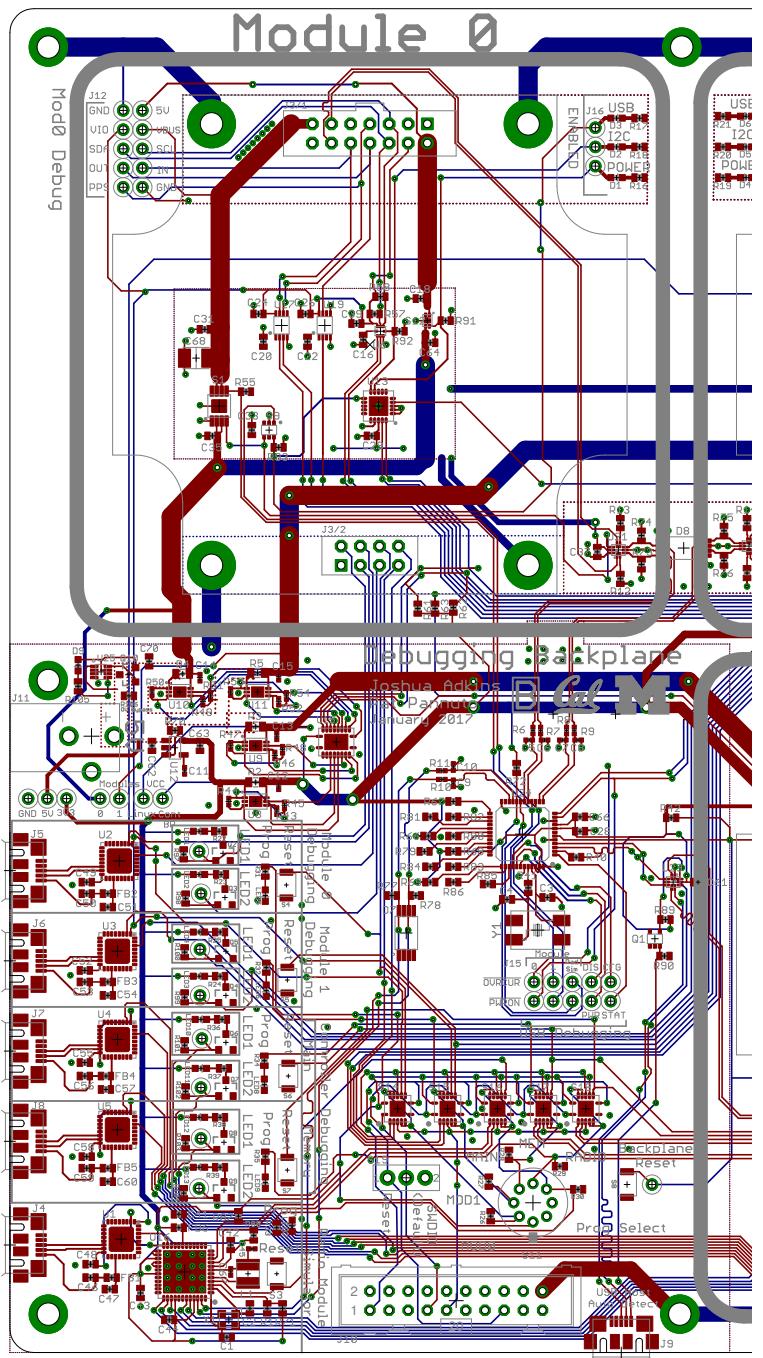
Top Paste Layer with Silkscreen



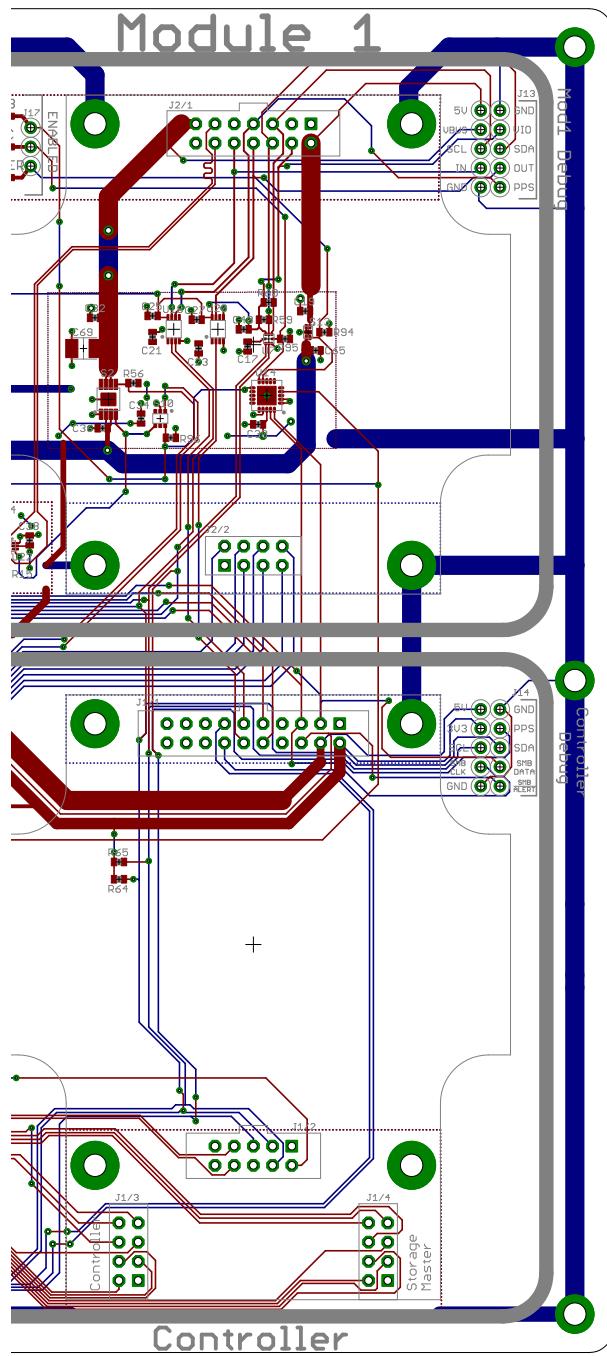
Bottom Paste Layer with Silkscreen



Top and Bottom Layers 1:1 Scale



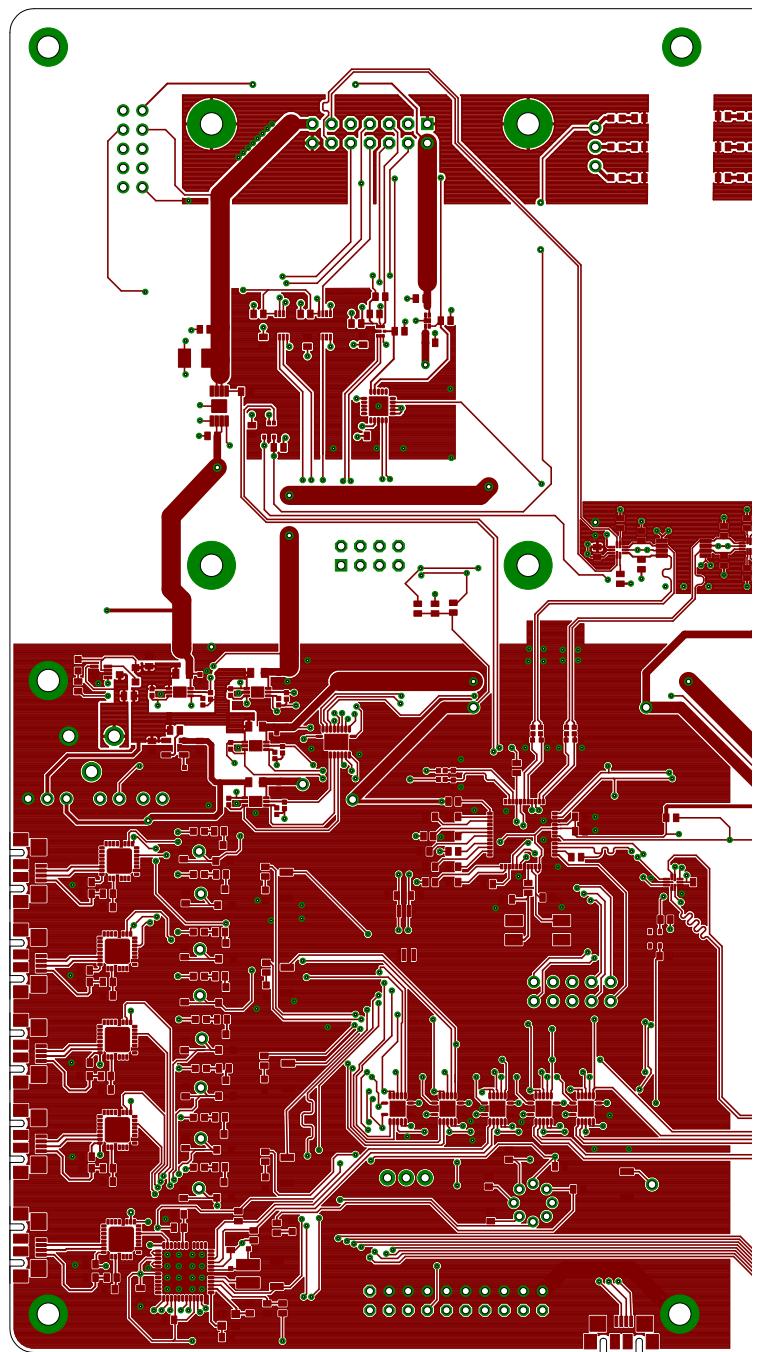
Top and Bottom Layers 1:1 Scale



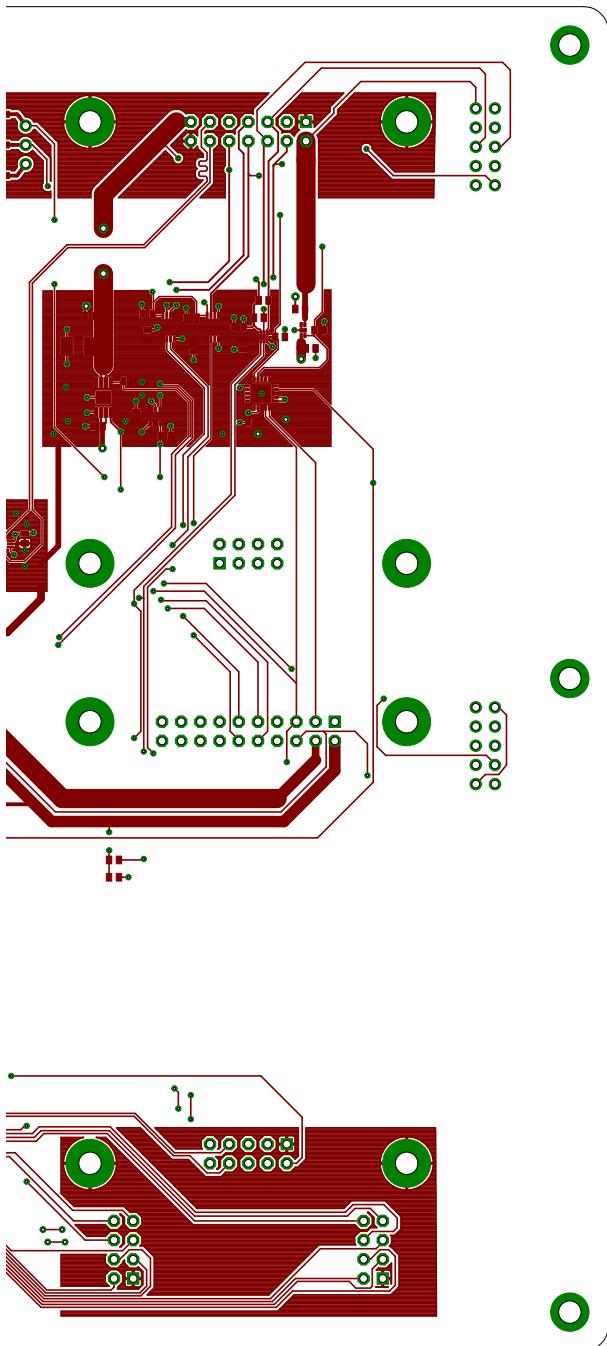
Top and Bottom Layers 1:1 Scale

Top and Bottom Layers 1:1 Scale

Top Layer 1:1 Scale



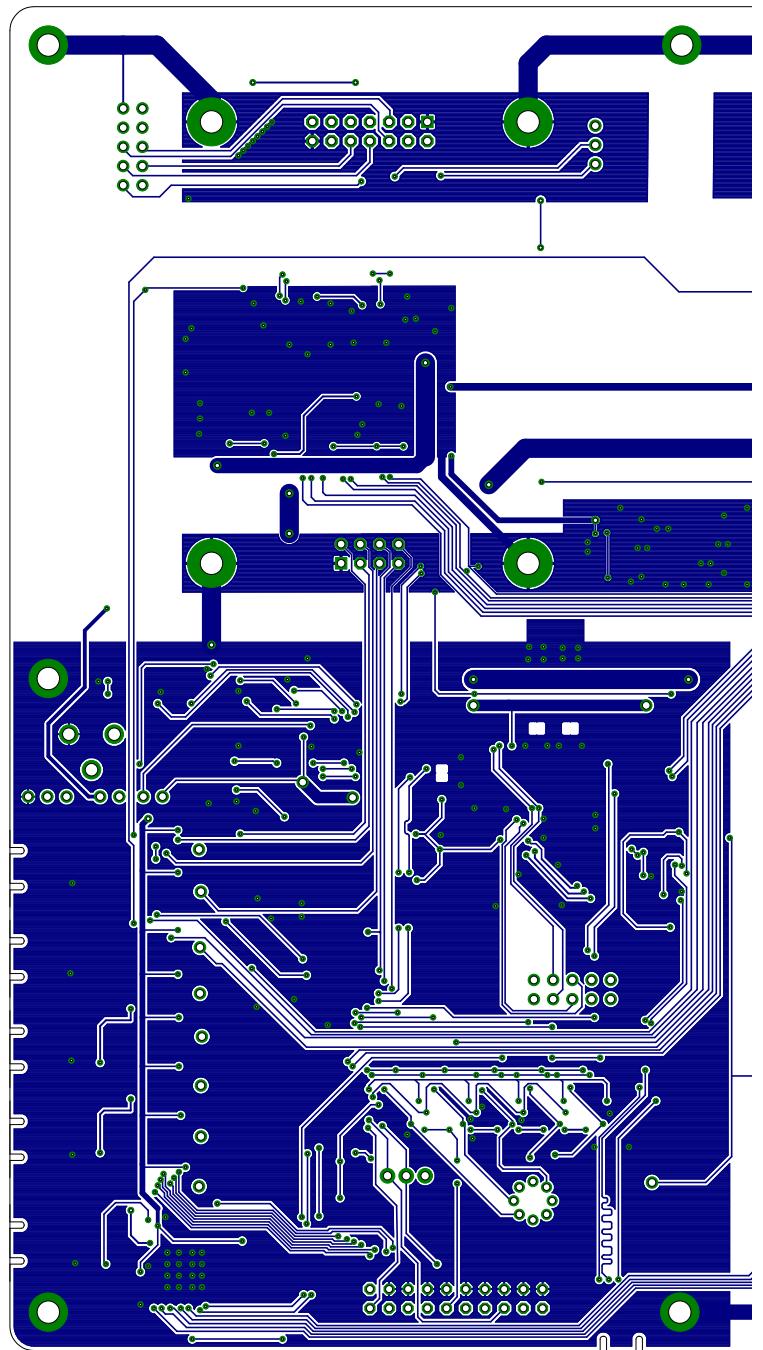
Top Layer 1:1 Scale



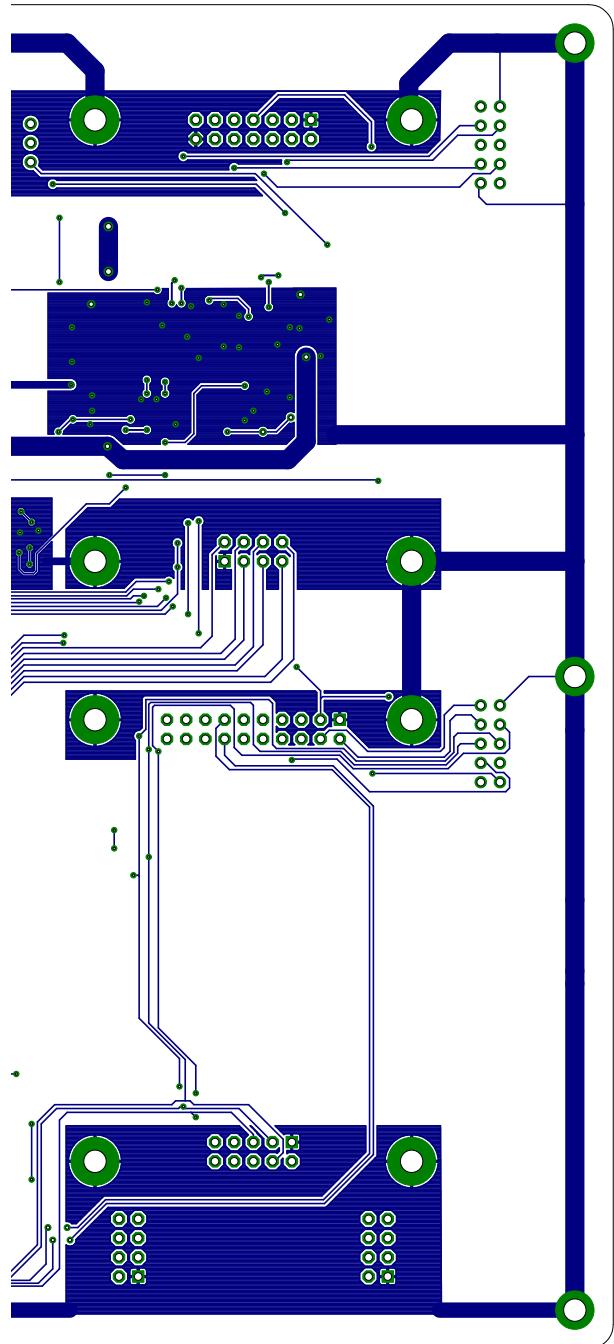
Top Layer 1:1 Scale

Top Layer 1:1 Scale

Bottom Copper Layer 1:1 Scale



Bottom Copper Layer 1:1 Scale



Bottom Copper Layer 1:1 Scale

Bottom Copper Layer 1:1 Scale

debug_backplane_bom

| Part | Value |
|------|--------|
| C1 | 8pF |
| C2 | 8pF |
| C3 | 22pF |
| C4 | 22pF |
| C5 | 22pF |
| C6 | 22pF |
| C7 | 22pF |
| C8 | 22pF |
| C9 | 22pF |
| C10 | 22pF |
| C11 | 0.01uF |
| C12 | 0.1uF |
| C13 | 0.1uF |
| C14 | 0.1uF |
| C15 | 0.1uF |
| C16 | 100nF |
| C17 | 100nF |
| C18 | 100nF |
| C19 | 100nF |
| C20 | 100nF |
| C21 | 100nF |
| C22 | 100nF |
| C23 | 100nF |
| C24 | 100nF |
| C25 | 100nF |
| C26 | 100nF |
| C27 | 100nF |
| C28 | 100nF |
| C29 | 100nF |
| C30 | 100nF |
| C31 | 100nF |
| C32 | 100nF |
| C33 | 100nF |
| C34 | 100nF |
| C35 | 100nF |
| C36 | 100nF |
| C37 | 100nF |
| C38 | 100nF |
| C39 | 100nF |
| C40 | 100nF |
| C41 | 100nF |
| C42 | 100nF |
| C43 | 100nF |
| C44 | 100nF |
| C45 | 100nF |
| C46 | 100nF |
| C47 | 100nF |
| C48 | 100nF |

debug_backplane_bom

| | |
|-----|-----------------------------------|
| C49 | 100nF |
| C50 | 100nF |
| C51 | 100nF |
| C52 | 100nF |
| C53 | 100nF |
| C54 | 100nF |
| C55 | 100nF |
| C56 | 100nF |
| C57 | 100nF |
| C58 | 100nF |
| C59 | 100nF |
| C60 | 100nF |
| C61 | 100nF |
| C62 | 2.2uF |
| C63 | 2.2uF |
| C64 | 4.7uF |
| C65 | 4.7uF |
| C66 | 4.7uF |
| C67 | 4.7uF |
| C68 | 150uF |
| C69 | 150uF |
| C70 | 4.7uF |
| D1 | LED0603 |
| D2 | LED0603 |
| D3 | LED0603 |
| D4 | LED0603 |
| D5 | LED0603 |
| D6 | LED0603 |
| D7 | SN75240-TSSOP |
| D8 | SN75240-TSSOP |
| D9 | LED0603 |
| FB1 | 600R |
| FB2 | 600R |
| FB3 | 600R |
| FB4 | 600R |
| FB5 | 600R |
| FB6 | 1.5KR |
| J1 | BACKPLANE_CONTROLLER_MODULE_DEBUG |
| J2 | BACKPLANE_GENERIC_MODULE_DEBUG |
| J3 | BACKPLANE_GENERIC_MODULE_DEBUG |
| J4 | MICRO_USB_B_HIROSE_ZX62R-B-5P |
| J5 | MICRO_USB_B_HIROSE_ZX62R-B-5P |
| J6 | MICRO_USB_B_HIROSE_ZX62R-B-5P |
| J7 | MICRO_USB_B_HIROSE_ZX62R-B-5P |
| J8 | MICRO_USB_B_HIROSE_ZX62R-B-5P |
| J9 | MICRO_USB_B_HIROSE_ZX62R-B-5P |
| J10 | |
| J11 | PJ-102AH |
| J12 | Debug Header |

debug_backplane_bom

| | |
|-------|--------------------|
| J13 | Debug Header |
| J14 | Debug Header |
| J15 | Debug Header |
| J16 | Debug Header |
| J17 | Debug Header |
| L1 | 22uH |
| LED1 | LED0603 |
| LED2 | LED0603 |
| LED3 | LED0603 |
| LED4 | LED0603 |
| LED5 | LED0603 |
| LED6 | LED0603 |
| LED7 | LED0603 |
| LED8 | LED0603 |
| LED9 | LED0603 |
| LED10 | LED0603 |
| LED11 | LED0603 |
| LED12 | LED0603 |
| LED13 | LED0603 |
| Q1 | DMN32D2LDF |
| Q2 | MOSFET-NCHANNELSMD |
| Q3 | MOSFET-NCHANNELSMD |
| Q4 | MOSFET-NCHANNELSMD |
| Q5 | MOSFET-NCHANNELSMD |
| Q6 | MOSFET-NCHANNELSMD |
| Q7 | MOSFET-NCHANNELSMD |
| Q8 | MOSFET-NCHANNELSMD |
| Q9 | MOSFET-NCHANNELSMD |
| Q10 | MOSFET-NCHANNELSMD |
| R1 | 0 |
| R2 | 0.017 |
| R3 | 0.017 |
| R4 | 0.017 |
| R5 | 0.017 |
| R6 | 27 |
| R7 | 27 |
| R8 | 27 |
| R9 | 27 |
| R10 | 27 |
| R11 | 27 |
| R12 | 50 |
| R13 | 50 |
| R14 | 50 |
| R15 | 50 |
| R16 | 1k |
| R17 | 1k |
| R18 | 1k |
| R19 | 1k |
| R20 | 1k |

debug_backplane_bom

| | |
|-----|------|
| R21 | 1k |
| R22 | 1k |
| R23 | 1k |
| R24 | 1k |
| R25 | 1k |
| R26 | 1k |
| R27 | 1k |
| R28 | 1k |
| R29 | 1k |
| R30 | 1k |
| R31 | 1k |
| R32 | 1k |
| R33 | 1k |
| R34 | 1k |
| R35 | 1k |
| R36 | 1k |
| R37 | 1k |
| R38 | 1k |
| R39 | 1k |
| R40 | 1.5k |
| R41 | 1.5k |
| R42 | 1.5k |
| R43 | 2k |
| R44 | 2k |
| R45 | 2k |
| R46 | 2k |
| R47 | 2k |
| R48 | 2k |
| R49 | 2k |
| R50 | 2k |
| R51 | 2k |
| R52 | 2k |
| R53 | 2k |
| R54 | 2k |
| R55 | 10k |
| R56 | 10k |
| R57 | 10k |
| R58 | 10k |
| R59 | 10k |
| R60 | 10k |
| R61 | 10k |
| R62 | 10k |
| R63 | 10k |
| R64 | 10k |
| R65 | 10k |
| R66 | 10k |
| R67 | 10k |
| R68 | 10k |
| R69 | 10k |

debug_backplane_bom

| | |
|------|-------------|
| R70 | 10k |
| R71 | 10k - DNP |
| R72 | 10k |
| R73 | 15k |
| R74 | 15k |
| R75 | 15k |
| R76 | 15k |
| R77 | 15k |
| R78 | 15k |
| R79 | 15k |
| R80 | 15k |
| R81 | 15k |
| R82 | 15k |
| R83 | 15k |
| R84 | 15k |
| R85 | 15k |
| R86 | 15k |
| R87 | 100k |
| R88 | 100k |
| R89 | 100k |
| R90 | 100k |
| R91 | 10M |
| R92 | 10M |
| R93 | 10M |
| R94 | 10M |
| R95 | 10M |
| R96 | 10M |
| R97 | 1M |
| R98 | 1M |
| R99 | 1M |
| R100 | 1M |
| R101 | 1M |
| R102 | 1M |
| R103 | 1M |
| R104 | 1M |
| R105 | 1k |
| R106 | 0 - DNP |
| S1 | AP2401MP |
| S2 | AP2401MP |
| S3 | B3U-1000P |
| S4 | B3U-1000P |
| S5 | B3U-1000P |
| S6 | B3U-1000P |
| S7 | B3U-1000P |
| S8 | B3U-1000P |
| S9 | NC7SZ157 |
| S10 | NC7SZ157 |
| S11 | RM106772BCB |
| S12 | SIP3240X |

debug_backplane_bom

| | |
|-------------------|--------------------|
| S13 | SIP3240X |
| S14 | SN74AHC4066-RGY |
| S15 | SN74AHC4066-RGY |
| S16 | SN74AHC4066-RGY |
| S17 | SN74AHC4066-RGY |
| S18 | SN74AHC4066-RGY |
| S19 | TE_SSA12/SPDT |
| TP_GND | TEST_POINT_0.040IN |
| TP_5V | TEST_POINT_0.040IN |
| TP_3V3 | TEST_POINT_0.040IN |
| TP_Mod0_VCC | TEST_POINT_0.040IN |
| TP_Mod1_VCC | TEST_POINT_0.040IN |
| TP_Linux_VCC | TEST_POINT_0.040IN |
| TP_Controller_VCC | TEST_POINT_0.040IN |
| TP_LED1 | TEST_POINT_0.040IN |
| TP_LED2 | TEST_POINT_0.040IN |
| U1 | FT232RQ |
| U2 | FT232RQ |
| U3 | FT232RQ |
| U4 | FT232RQ |
| U5 | FT232RQ |
| U6 | FXMA2102 |
| U7 | FXMA2102 |
| U8 | LTC2941 |
| U9 | LTC2941 |
| U10 | LTC2941 |
| U11 | LTC2941 |
| U12 | MAX8887EZK33+T |
| U13 | MCP23008QFN |
| U14 | MCP23008QFN |
| U15 | PCA9544AQFN-N20 |
| U16 | SAM4LC8AA |
| U17 | SN74LVC2T45 |
| U18 | SN74LVC2T45 |
| U19 | SN74LVC2T45 |
| U20 | SN74LVC2T45 |
| U21 | TS3USB30E |
| U22 | TS3USB30E |
| U23 | TS3USB30E |
| U24 | TUSB2077A |
| U25 | LTC4360 |
| X1 | 16MHz |
| Y1 | ABMM |

debug_backplane_bom

debug_backplane_bom

| | |
|-----------------------------------|------------------------------------|
| CAPACITOR0603_CAP | 0603_CAP |
| CAPACITOR0402_CAP | 0402_CAP |
| CAPACITOR1210_CAP | 1210_CAP |
| CAPACITOR1210_CAP | 1210_CAP |
| CAPACITOR0603_CAP | 0603_CAP |
| LED0603 | LED-0603 |
| SN75240-TSSOP | TSSOP-8 |
| SN75240-TSSOP | TSSOP-8 |
| LED0603 | LED-0603 |
| FERRITE_BEAD0603 | 0603_CAP |
| BACKPLANE_CONTROLLER_MODULE_DEBUG | BACKPLANE_MODULE_20PIN_10PIN_DEBUG |
| BACKPLANE_GENERIC_MODULE_DEBUG | BACKPLANE_MODULE_14PIN_8PIN |
| BACKPLANE_GENERIC_MODULE_DEBUG | BACKPLANE_MODULE_14PIN_8PIN |
| MICRO_USB_B_HIROSE_ZX62R-B-5P | USB_MICRO_B-HIROSE-ZX62R-B-5P |
| ML20 | ML20 |
| PJ-102AH | PJ-102AH |
| 2x5 - 0.1" header | 2x5 - 0.1" header |

debug_backplane_bom

debug_backplane_bom

debug_backplane_bom

| | |
|------------------|-----------|
| RESISTOR0603_RES | 0603-RES |
| AP2401MP | MSOP-8EP |
| AP2401MP | MSOP-8EP |
| B3U-1000P | B3U-1000P |
| NC7SZ157 | SC70-6 |
| NC7SZ157 | SC70-6 |
| RM106772BCB | RM-SWITCH |
| SIP3240X | TDFN4 |

debug_backplane_bom

| | |
|--------------------|-------------------|
| SIP3240X | TDFN4 |
| SN74AHC4066-RGY | S-PVQFN-N14-3.5MM |
| TE_SSA12/SPDT | TE_SSA12/SPDT |
| TEST_POINT_0.040IN | TESTPOINT_0.040IN |
| FT232RQ | QFN32 |
| FXMA2102 | UMLP-8 |
| FXMA2102 | UMLP-8 |
| LTC2941 | DFN-6-2MMX3MM |
| MAX8887EZK33+T | SOT-23-5 |
| MCP23008QFN | QFN-20-4MM |
| MCP23008QFN | QFN-20-4MM |
| PCA9544AQFN-N20 | QFN-N20 |
| SAM4LC8AA | QFN-48-7MM |
| SN74LVC2T45 | VFSOP-8 |
| TS3USB30E | UQFN-10 |
| TS3USB30E | UQFN-10 |
| TS3USB30E | UQFN-10 |
| TUSB2077A | LQFP-48 |
| LTC4360 | SC70-8 |
| FH1600015 | FHXXX |
| ABMM | ABMM |

debug_backplane_bom

debug_backplane_bom

debug_backplane_bom

| | |
|-------------------------------------------------------------------|-----------------------|
| LHQ3NP Inductor | 609-3243-ND |
| LED | 609-3243-ND |
| LED | 609-3243-ND |
| LED | 3M9448-ND |
| LED | 3M9448-ND |
| LED | 490-5350-1-ND |
| LED | 160-1447-1-ND |
| LED | 160-1446-1-ND |
| LED | 160-1446-1-ND |
| LED | 160-1447-1-ND |
| LED | 160-1827-1-ND |
| LED | 160-1447-1-ND |
| LED | 160-1446-1-ND |
| Common source dual n-channel mosfet | DMN32D2LDF-7DICT-ND |
| Generic NMOS footprint | SI2302CDS-T1-E3DKR-ND |
| Resistor | 311-0.0GRCT-ND |
| Resistor | WSLPB-.017CT-ND |
| Resistor with keepout, for inline on high-speed traces (e.g. USB) | 311-27JRCT-ND |
| Resistor with keepout, for inline on high-speed traces (e.g. USB) | 311-27JRCT-ND |
| Resistor with keepout, for inline on high-speed traces (e.g. USB) | 311-27JRCT-ND |
| Resistor with keepout, for inline on high-speed traces (e.g. USB) | 311-27JRCT-ND |
| Resistor with keepout, for inline on high-speed traces (e.g. USB) | 311-27JRCT-ND |
| Resistor with keepout, for inline on high-speed traces (e.g. USB) | 311-27JRCT-ND |
| Resistor with keepout, for inline on high-speed traces (e.g. USB) | 311-27JRCT-ND |
| Resistor | 311-47GRCT-ND |
| Resistor | 311-1.0KGRCT-ND |

debug_backplane_bom

debug_backplane_bom

debug_backplane_bom

| | |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------|
| High power (2.4 A) high-side switch | SIP32402ADNP-T1GE4CT-ND 296-15258-1-ND 296-15258-1-ND 296-15258-1-ND 296-15258-1-ND 296-15258-1-ND |
| SWITCH SLIDE SPDT 2POS SSA SER | 450-1602-ND |
| 0.040in Test Point | 36-5001-ND |
| 0.040in Test Point | 36-5000-ND |
| 0.040in Test Point | 36-5000-ND |
| 0.040in Test Point | 36-5003-ND |
| 0.040in Test Point | 36-5002-ND |
| 0.040in Test Point | 36-5004-ND |
| Source: http://www.ftdichip.com/Documents/DataSheets/DS_FT232R_v1768-1307-ND | |
| Dual Supply, 2-Bit Voltage Translator / Buffer / Repeater / Isolator for I2C | FXMA2102UMXCT-ND |
| Dual Supply, 2-Bit Voltage Translator / Buffer / Repeater / Isolator for I2C | FXMA2102UMXCT-ND |
| I2C Battery Gas Gauge | LTC2941IDCB#TRMPBFCT-ND |
| IC REG LDO 3.3V 0.3A TSOT23-5 | MAX8887EZK33+TCT-ND |
| GPIO Extender via I2C - 8 Pin | MCP23008-E/ML-ND |
| GPIO Extender via I2C - 8 Pin | MCP23008-E/ML-ND |
| 1-4 I2C/SMBUS Multiplexer with interrupt for power supply coulomb coun | 296-20960-1-ND |
| Atmel SAM4L microcontroller. ARM Cortex M4 with 512 KB Flash and 6 | ATSAM4LC8AA-MU-ND |
| Bidirectional Buffer / Level Converter 2 Circuits | 296-17014-1-ND |
| Bidirectional Buffer / Level Converter 2 Circuits | 296-17014-1-ND |
| Bidirectional Buffer / Level Converter 2 Circuits | 296-17014-1-ND |
| Bidirectional Buffer / Level Converter 2 Circuits | 296-17014-1-ND |
| USB Mux with OE control and ESD | 296-24684-1-ND |
| USB Mux with OE control and ESD | 296-24684-1-ND |
| USB Mux with OE control and ESD | 296-24684-1-ND |
| Full Speed USB Hub - 7 Port | 296-37871-1-ND |
| An overvoltage protection IC. Clamps at 5.5V | LTC4360CSC8-1#TRMPBFCT-ND |
| Pericom Type FH 16 MHz 2.5 x 2.0 mm | FH1600015CT-ND |
| Low-Profile SMD crystal | 535-10156-1-ND |

debug_backplane_bom

DIGIKEY2 DIGIKEY3 DIGIKEY4 DNP Notes

debug_backplane_bom

S9194-ND S7072-ND S7072-ND
S7072-ND
S7072-ND

debug_backplane_bom

DNP

DNP

debug_backplane_bom

As Labeled on board - under J11
As Labeled on board - under J12
As Labeled on board - under J13
As Labeled on board - under J14
As Labeled on board - under J15
As Labeled on board - under J16
As Labeled on board - under J17
As Labeled on board - near Q2-9
As Labeled on board - near Q2-9