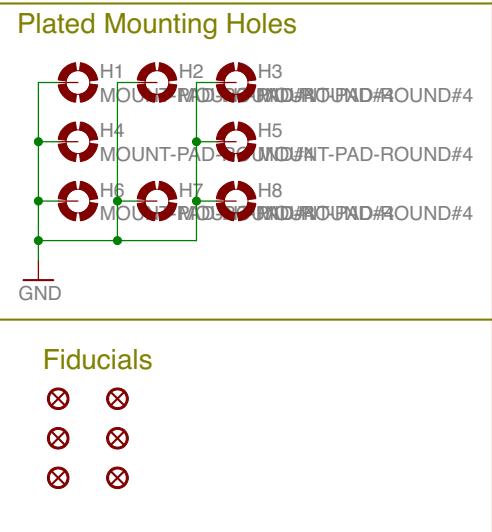
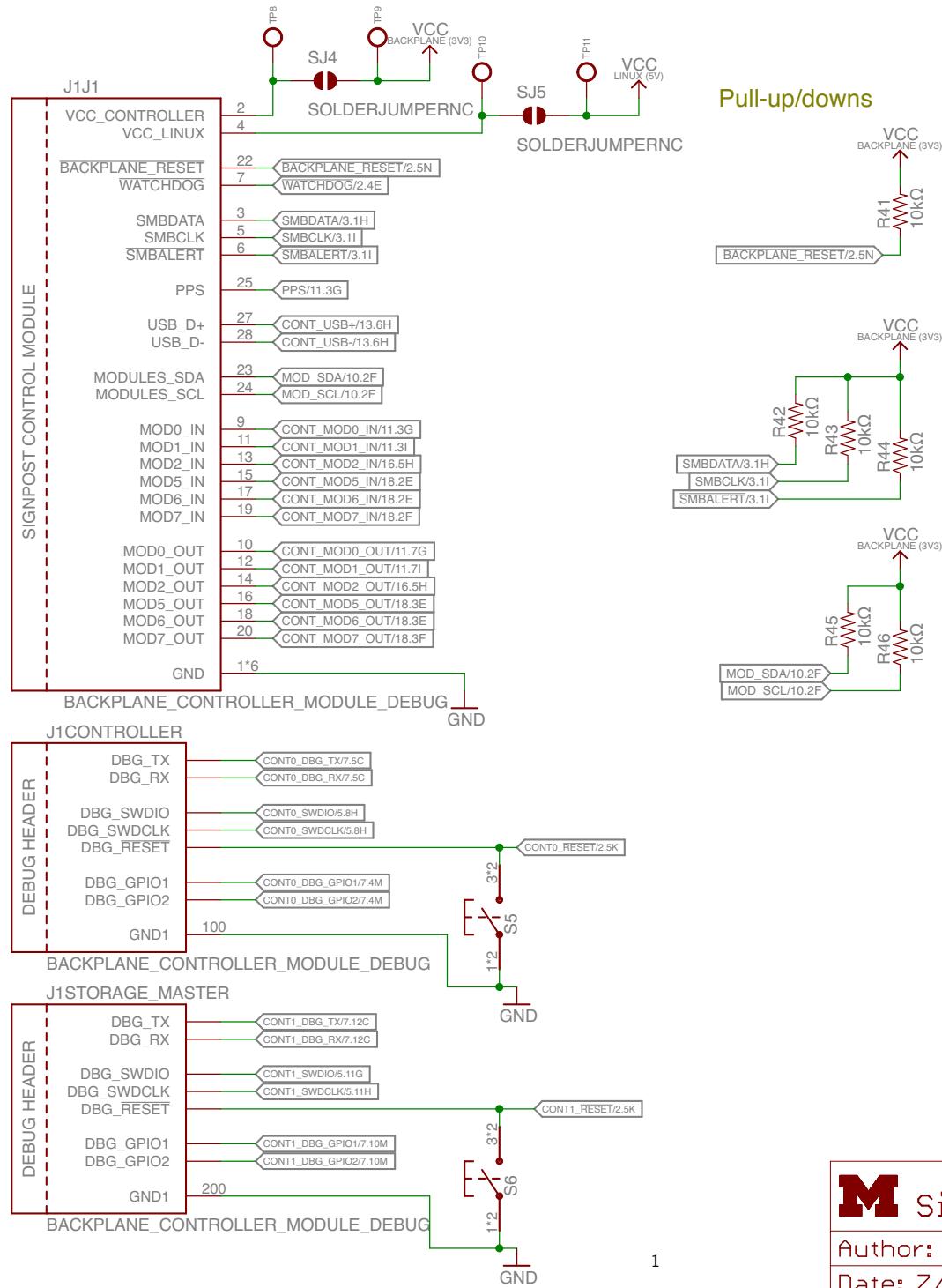


Special Modules



M

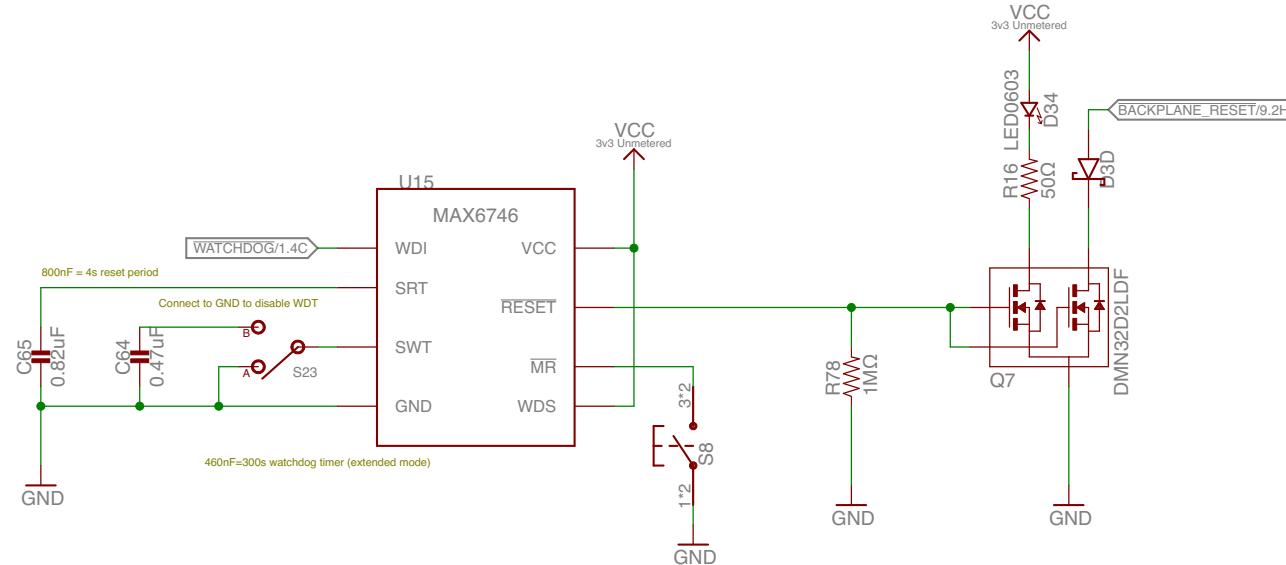
Signpost Debug Backplane

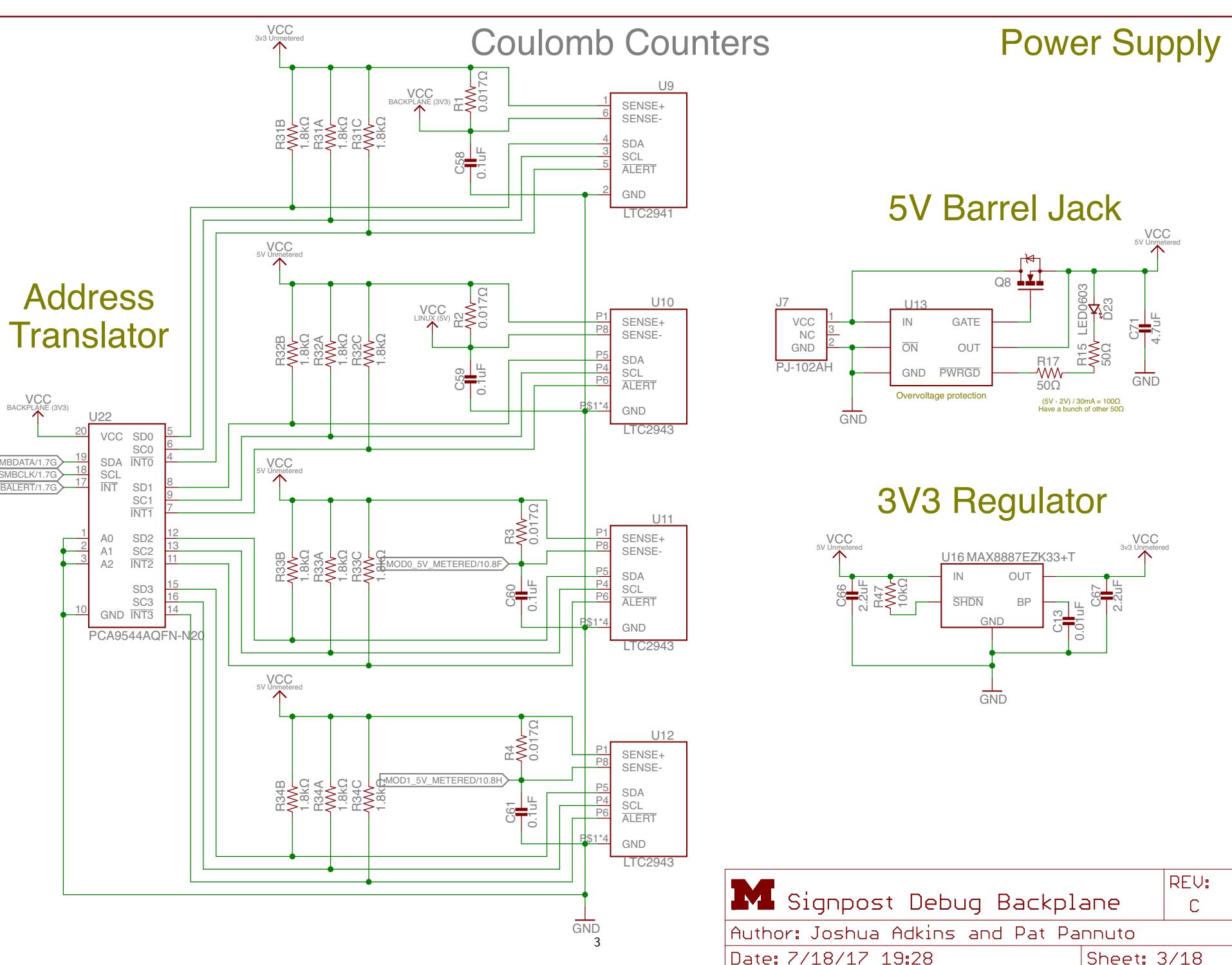
REV:
C

Author: Joshua Adkins and Pat Pannuto

Date: 7/18/17 19:28

Sheet: 1/18





M

Signpost Debug Backplane

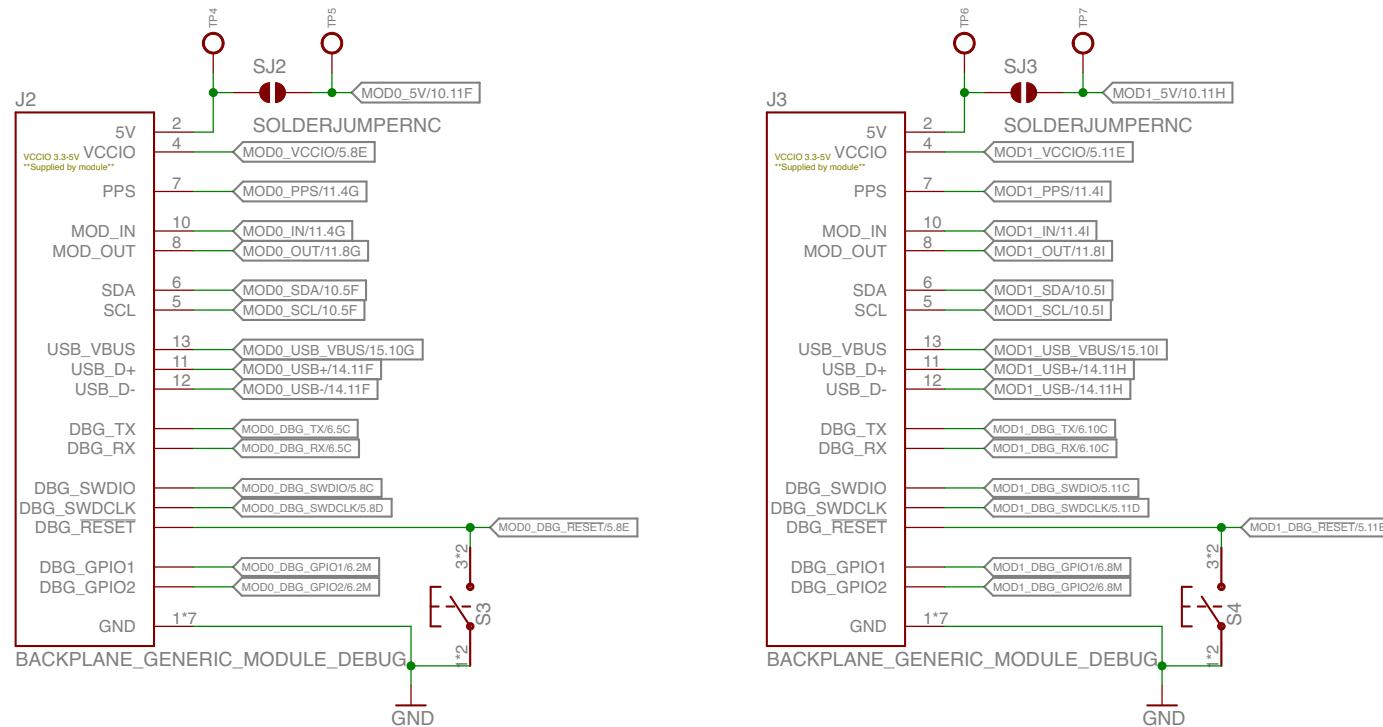
REV:
C

Author: Joshua Adkins and Pat Pannuto

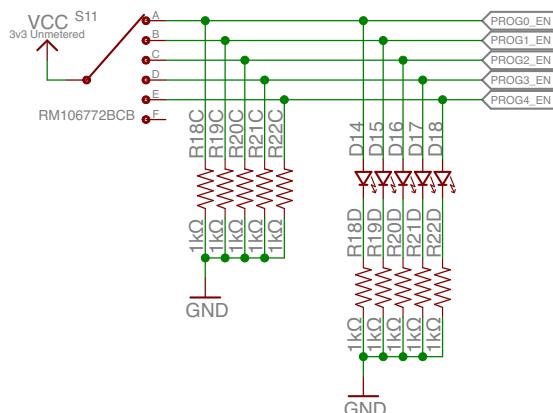
Date: 7/18/17 19:28

Sheet: 3/18

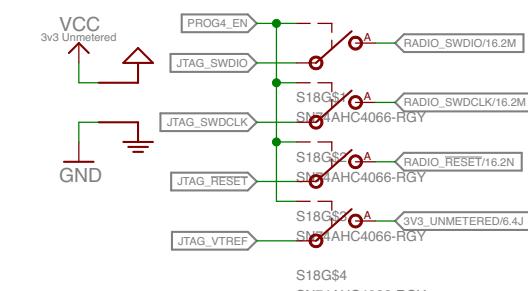
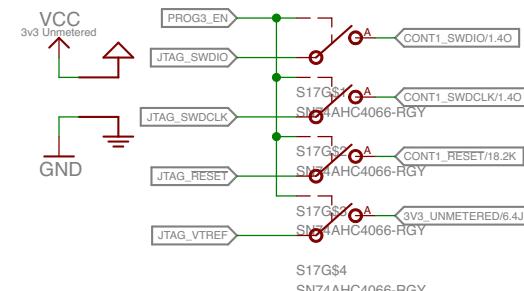
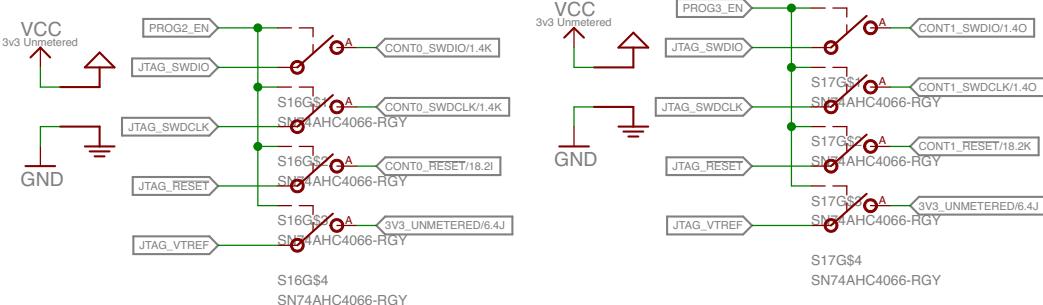
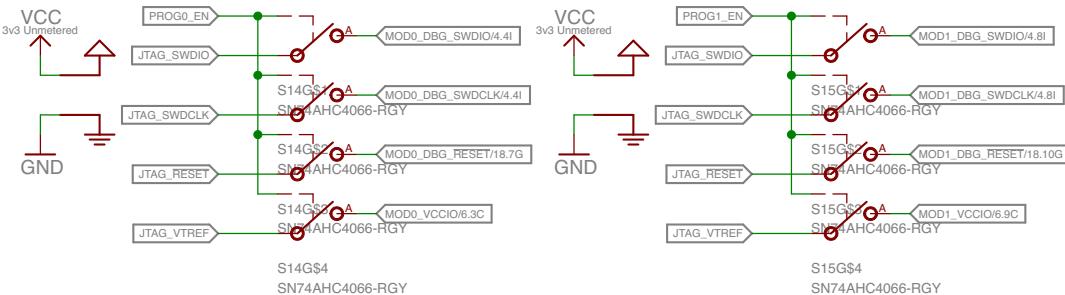
Generic Modules



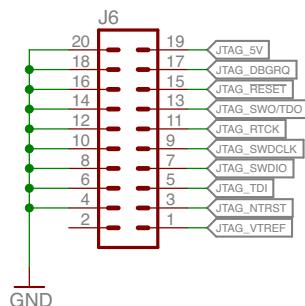
One-Hot Enable Lines



Signal Enable ICs



JTAG Header

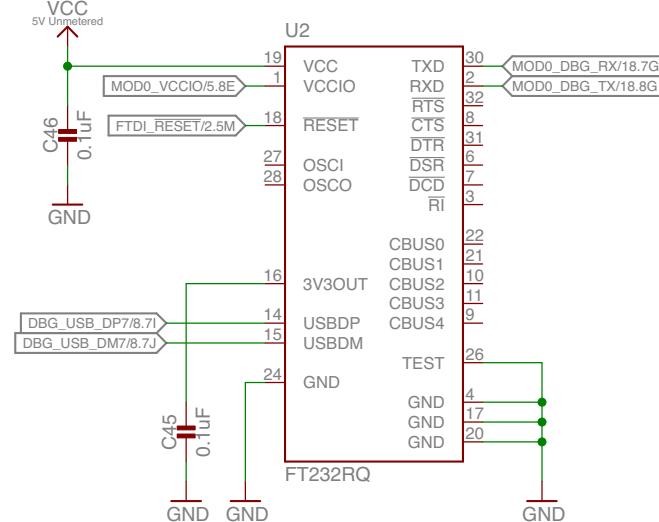


Ties SWDIO to Reset

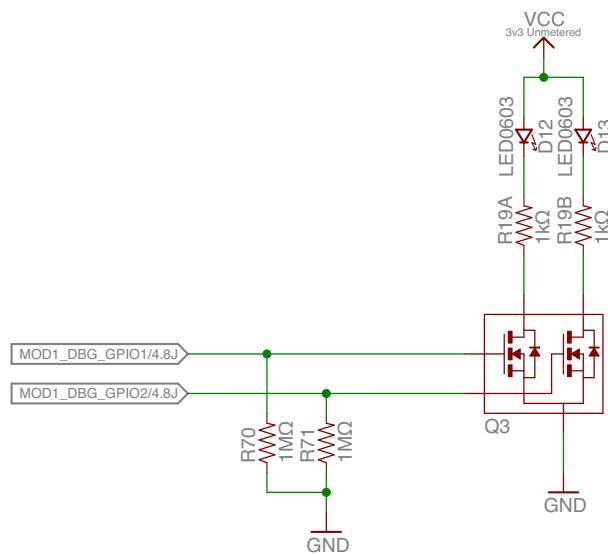
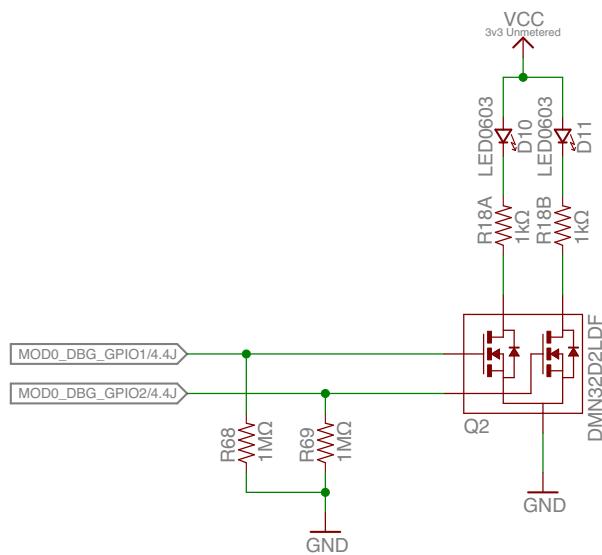
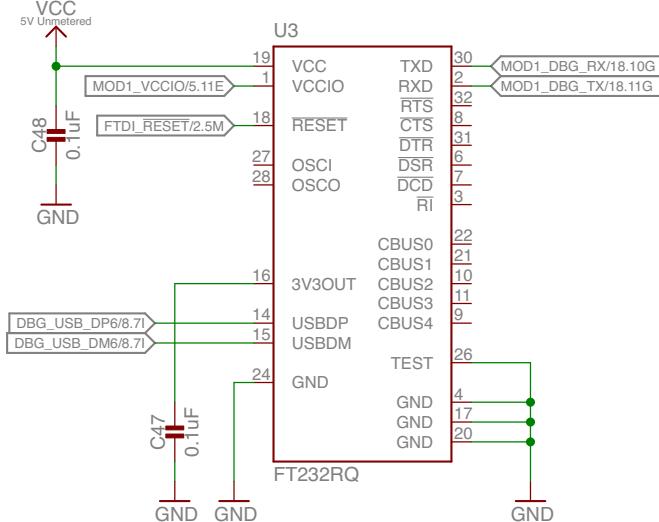


Module Debugging

Module 0



Module 1



Signpost Debug Backplane

REV:
C

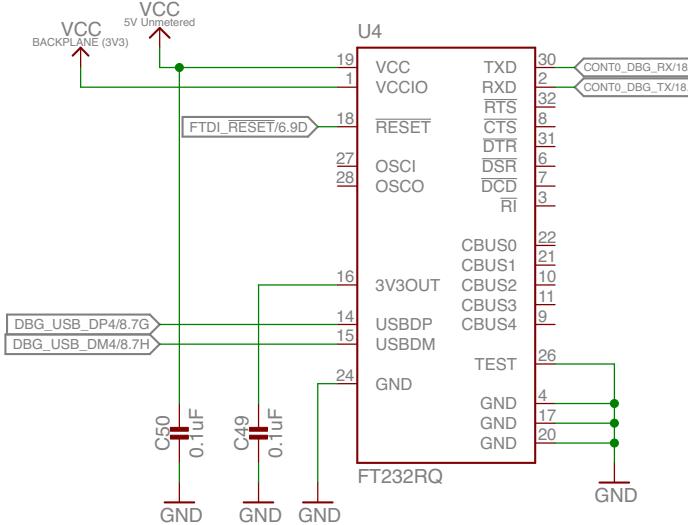
Author: Joshua Adkins and Pat Pannuto

Date: 7/18/17 19:28

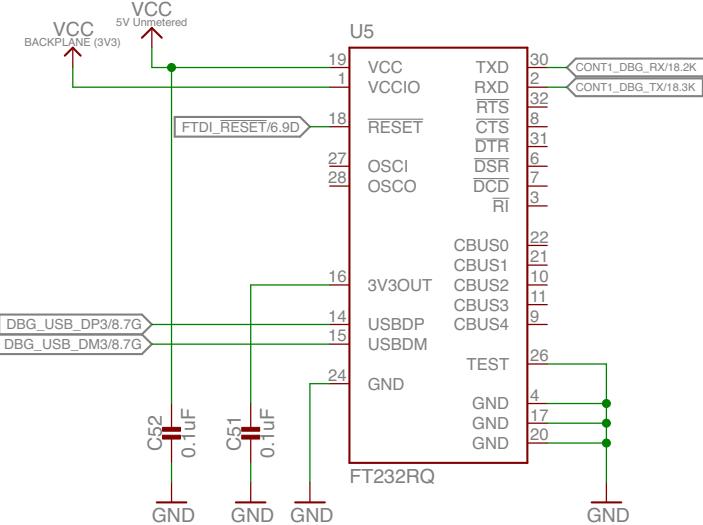
Sheet: 6/18

Controller Debugging

Controller



Storage Master



Signpost Debug Backplane

REV:
C

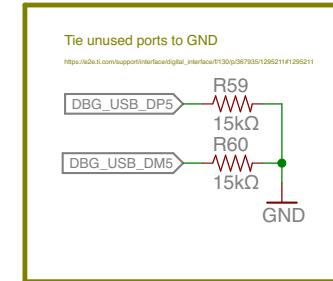
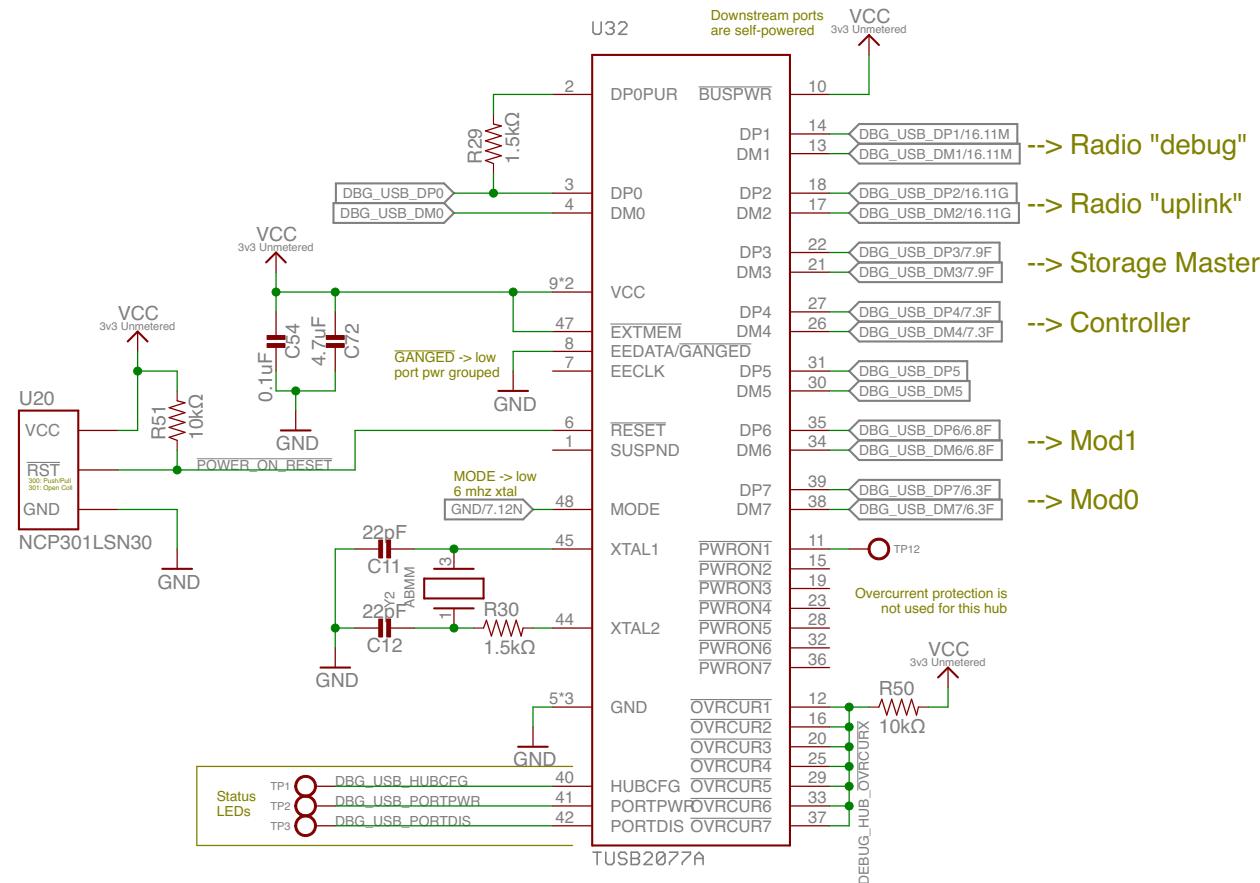
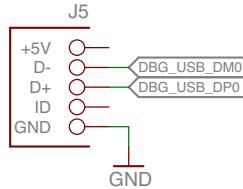
Author: Joshua Adkins and Pat Pannuto

Date: 7/18/17 19:28

Sheet: 7/18

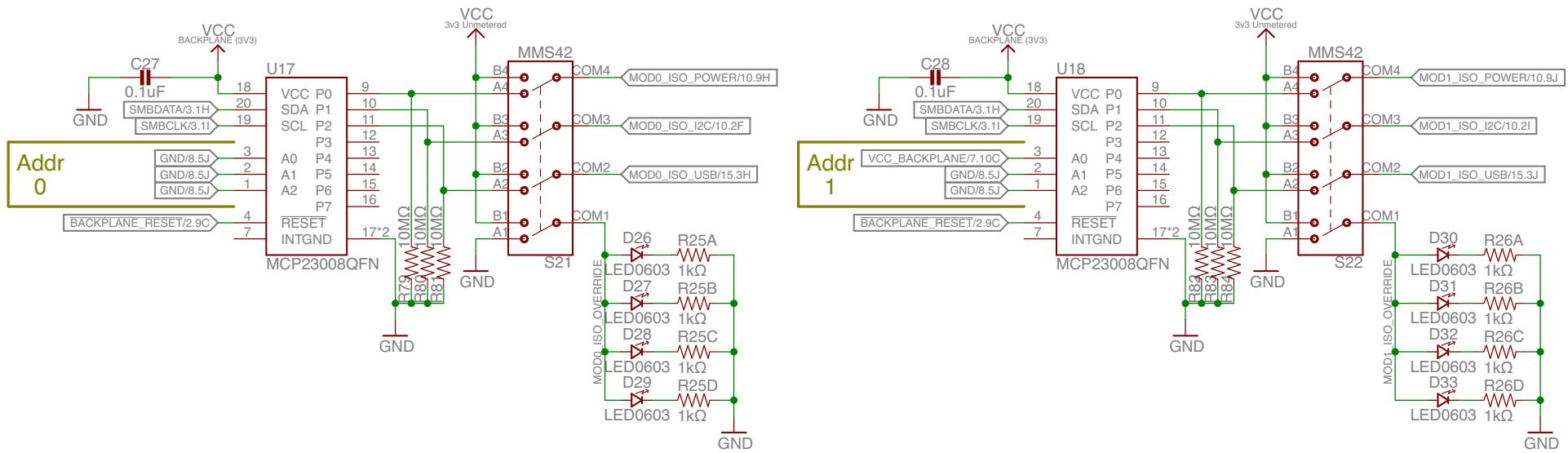
Debugging USB Hub

This aggregates all of the debug USB ports behind one on-board hub for ease of use

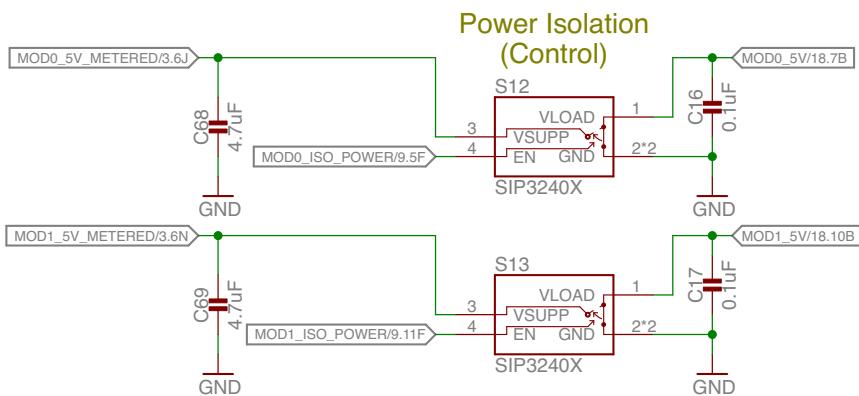
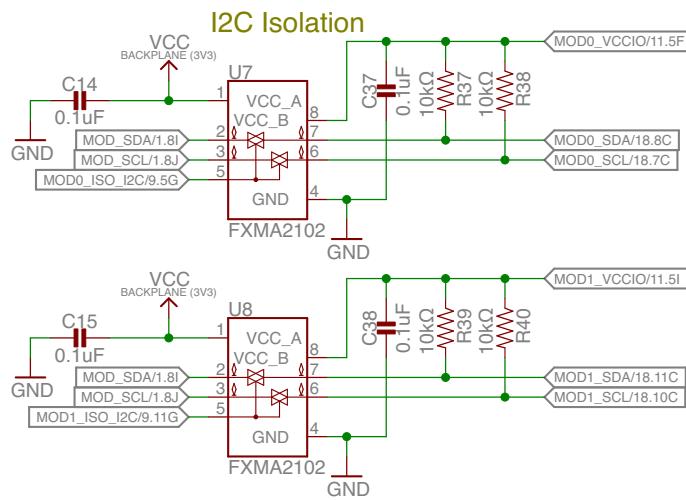


Isolation Control

I2C to GPIO for Isolation. Connected to SMBUS



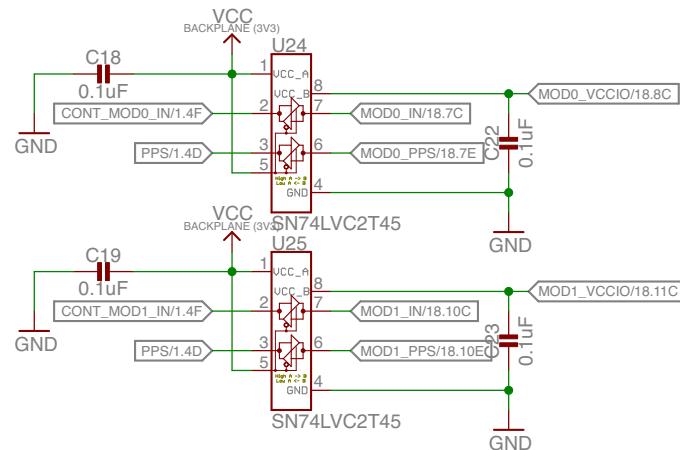
Module Isolation



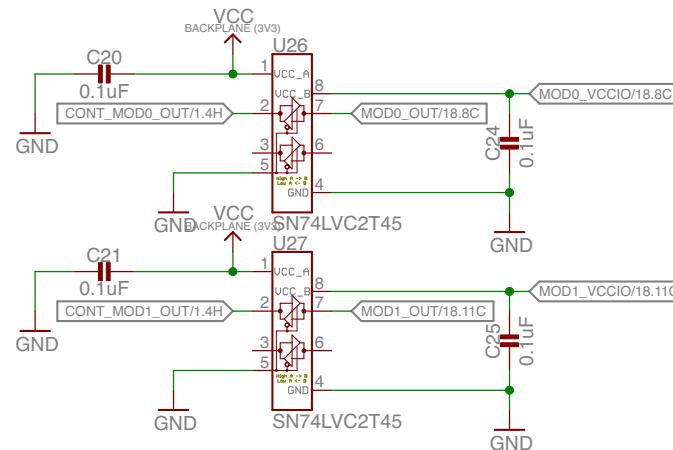
Module Isolation

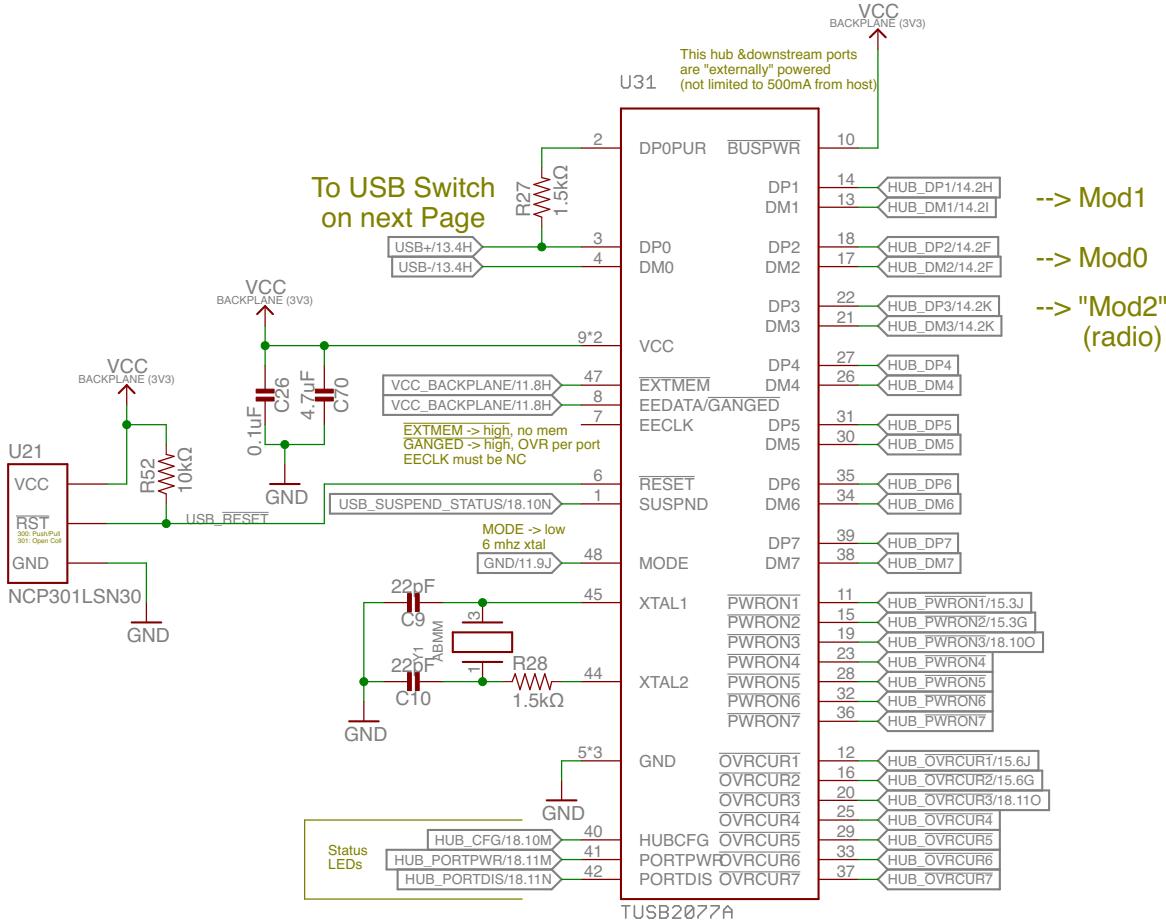
MOD_IN, MOD_OUT, PPS

Buffer / Level
Backplane --> Module

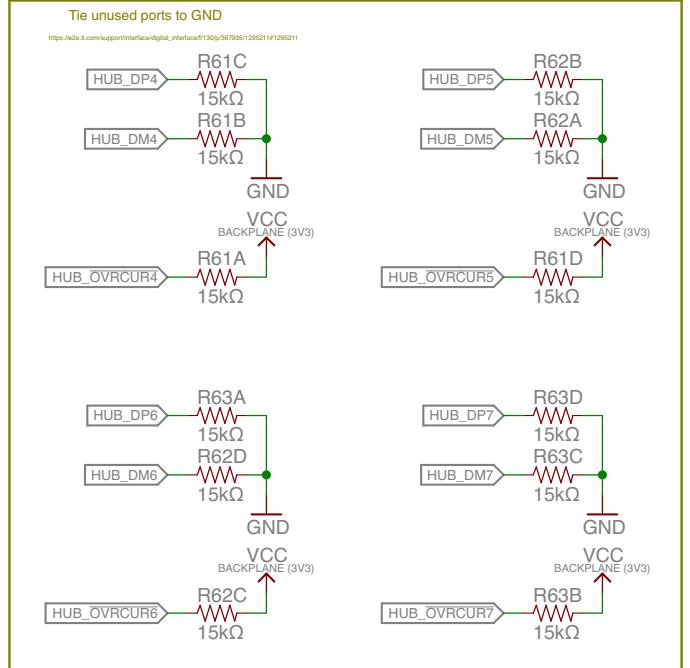


Buffer / Level
Backplane <-- Module





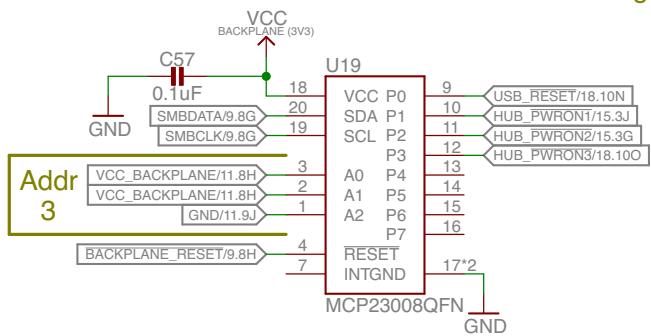
--> Mod1
--> Mod0
--> "Mod2"
(radio)



VCC
BACKPLANE (3V3)
R49
10kΩ

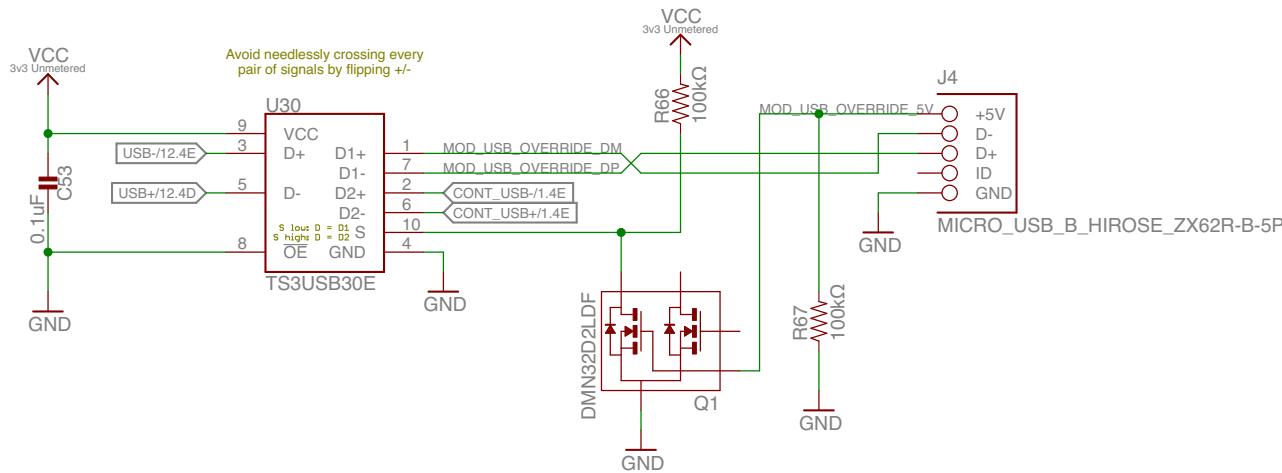
Port 3 is going to the "radio chip".
It doesn't have isolation, still needs a pullup

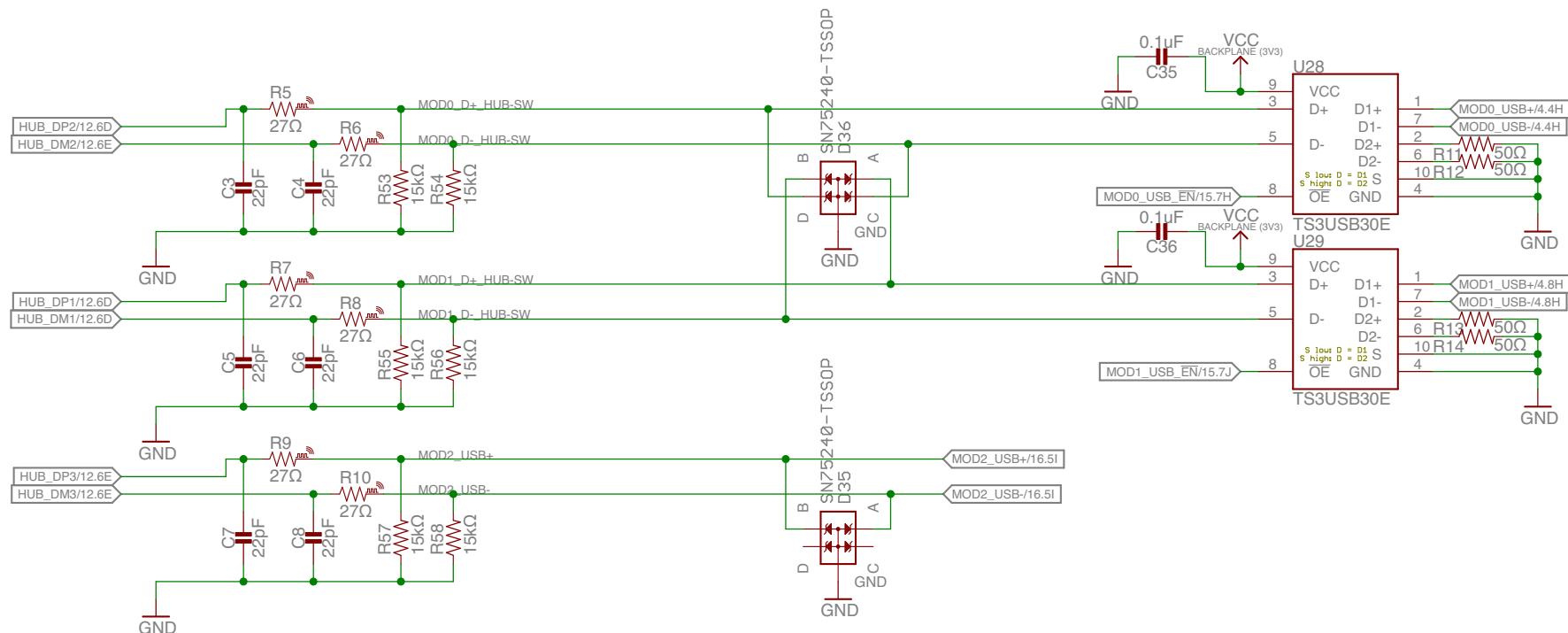
GPIO Extender for controller access to Hub signals



USB SWITCH

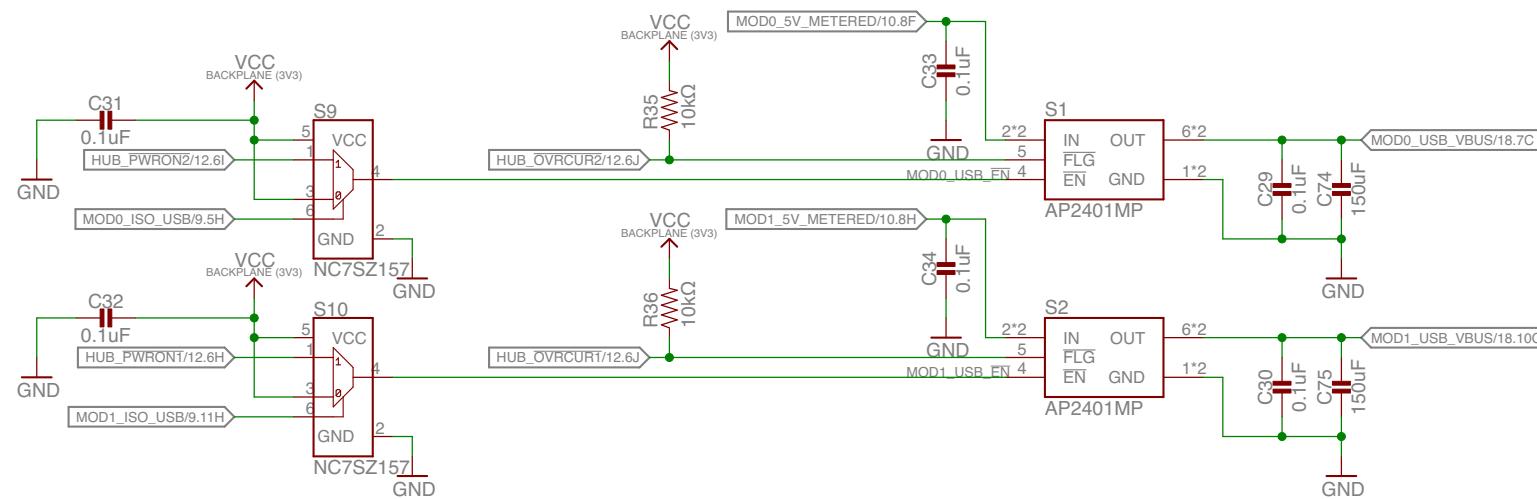
Allows USB port to act as host
instead of the Controller.
Useful for Debugging Module USB.





Transient voltage protection





Signpost Debug Backplane

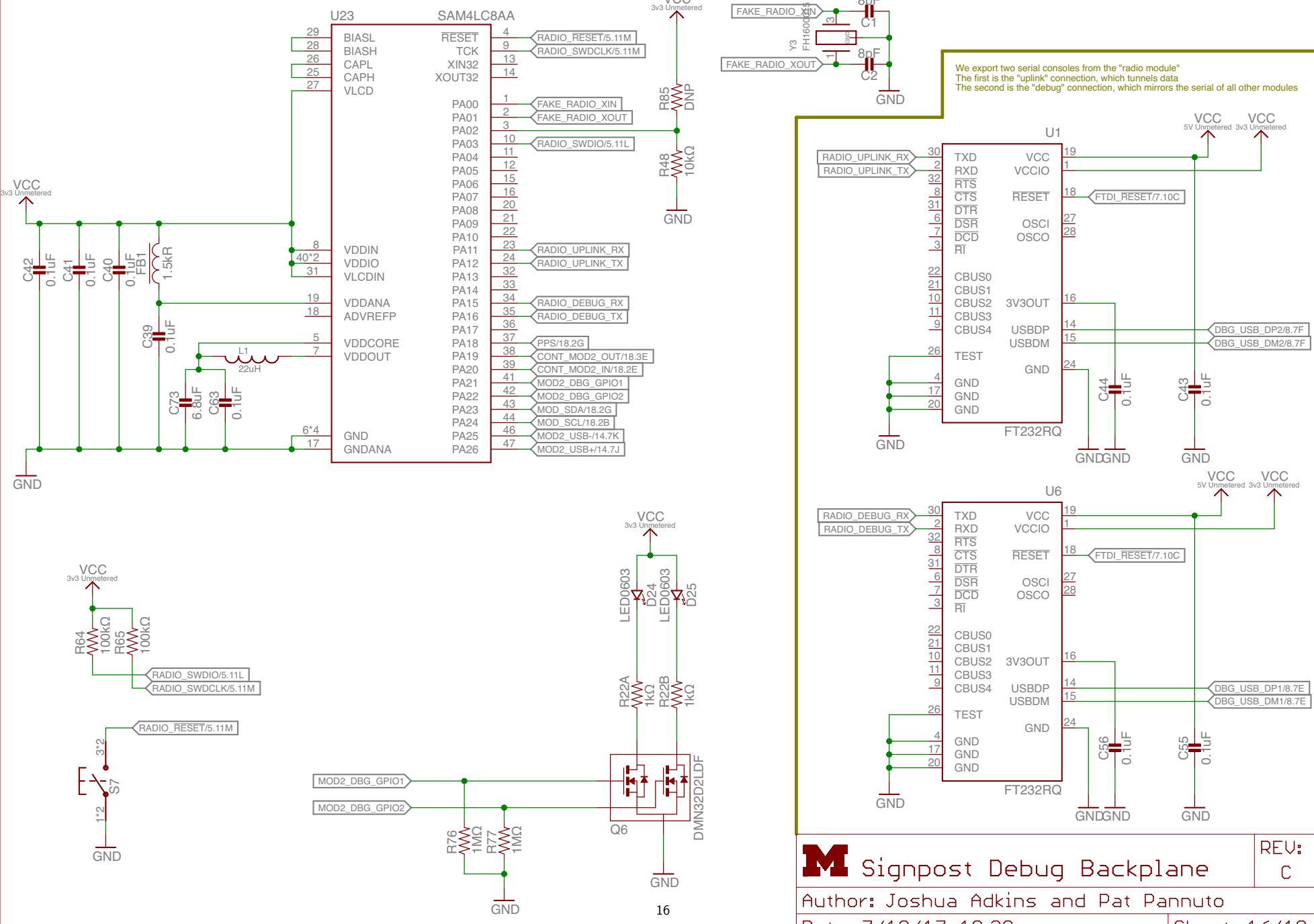
REV:
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Sheet: 15/18

The "Radio Module"



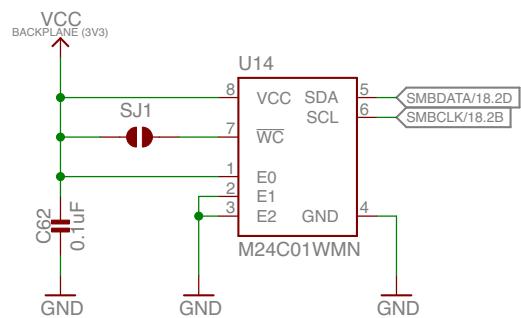
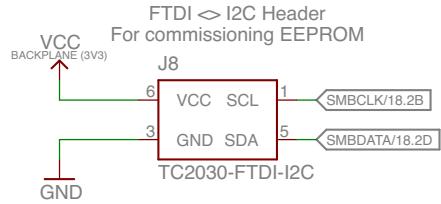
Signpost Debug Backplane

REV:
C

Author: Joshua Adkins and Pat Pannuto

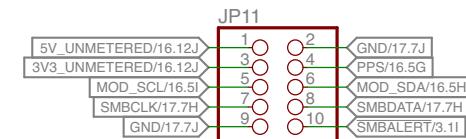
Date: 7/18/17 19:28

Sheet: 16/18

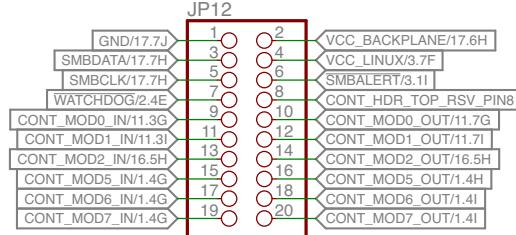


Debugging

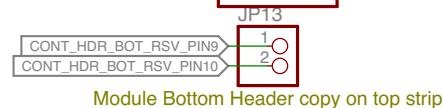
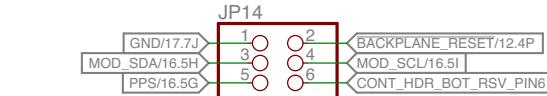
Controller Debugging



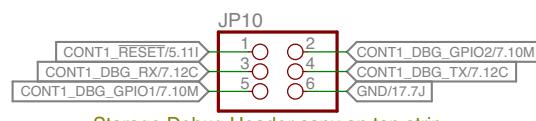
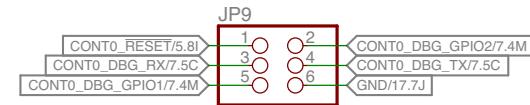
Header adjacent to module



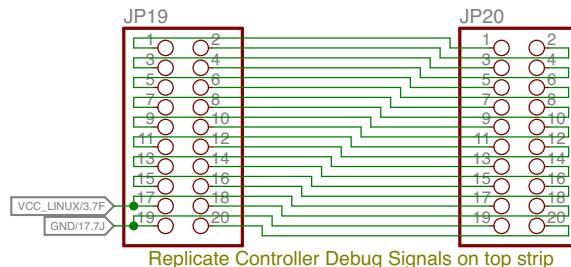
Module Top Header copy on top strip



Module Bottom Header copy on top strip

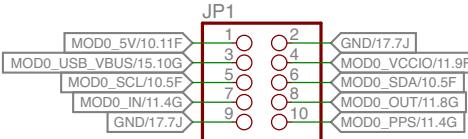


Storage Debug Header copy on top strip

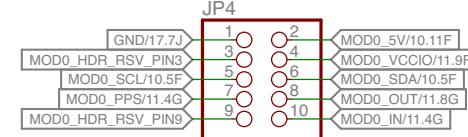


Replicate Controller Debug Signals on top strip

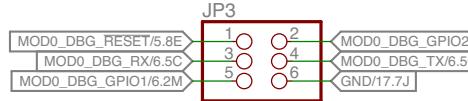
MOD0 Debugging



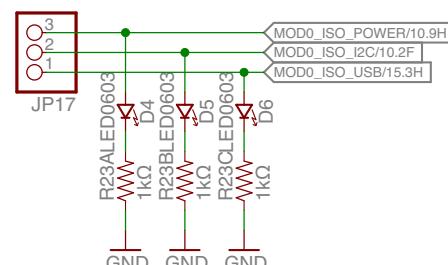
Header adjacent to module



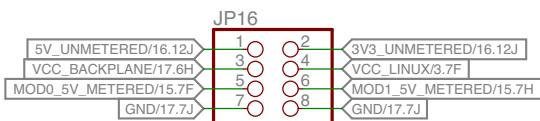
Module header copy on top strip
(no USB b/c can't put stubs on those traces)



Module debug header copy on top strip

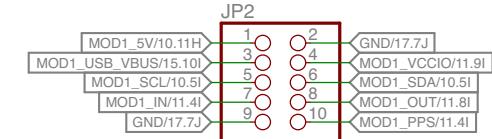


Power debugging

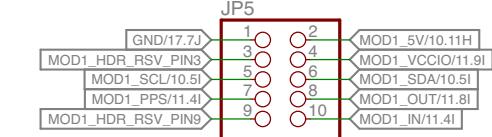


18

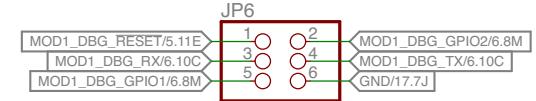
MOD1 Debugging



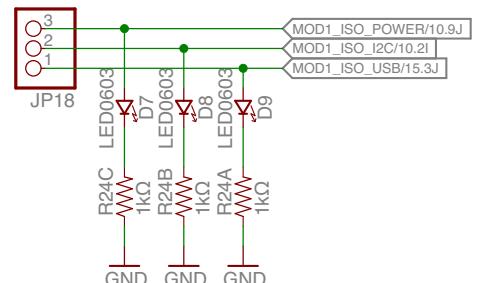
Header adjacent to module



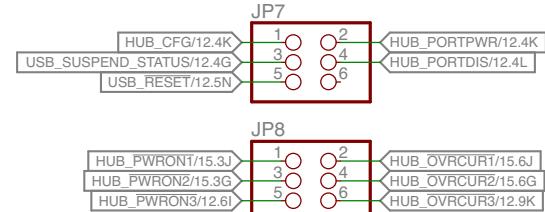
Module header copy on top strip
(no USB b/c can't put stubs on those traces)



Module debug header copy on top strip



USB Debugging



Signpost Debug Backplane

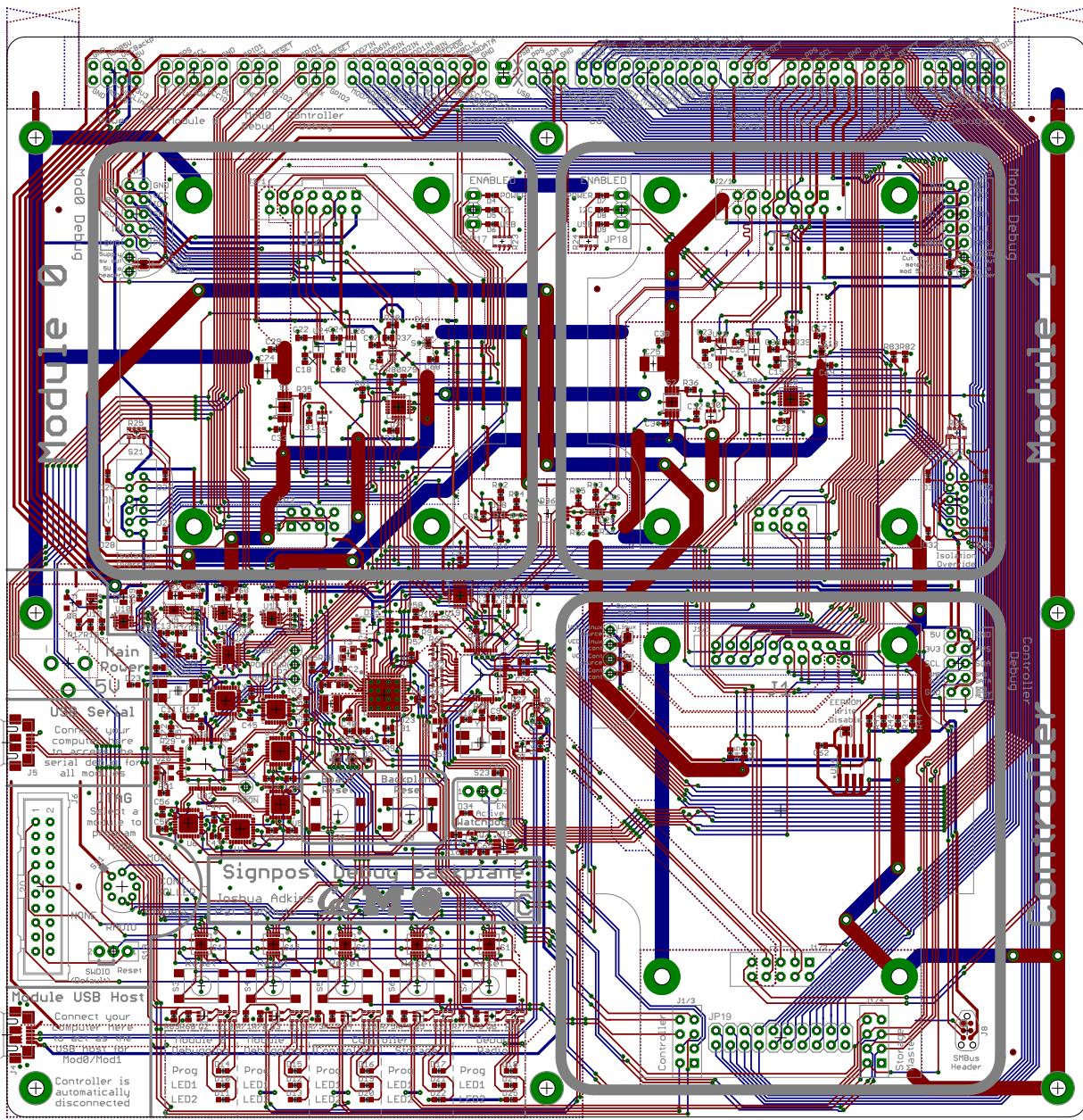
REV:
C

Author: Joshua Adkins and Pat Pannuto

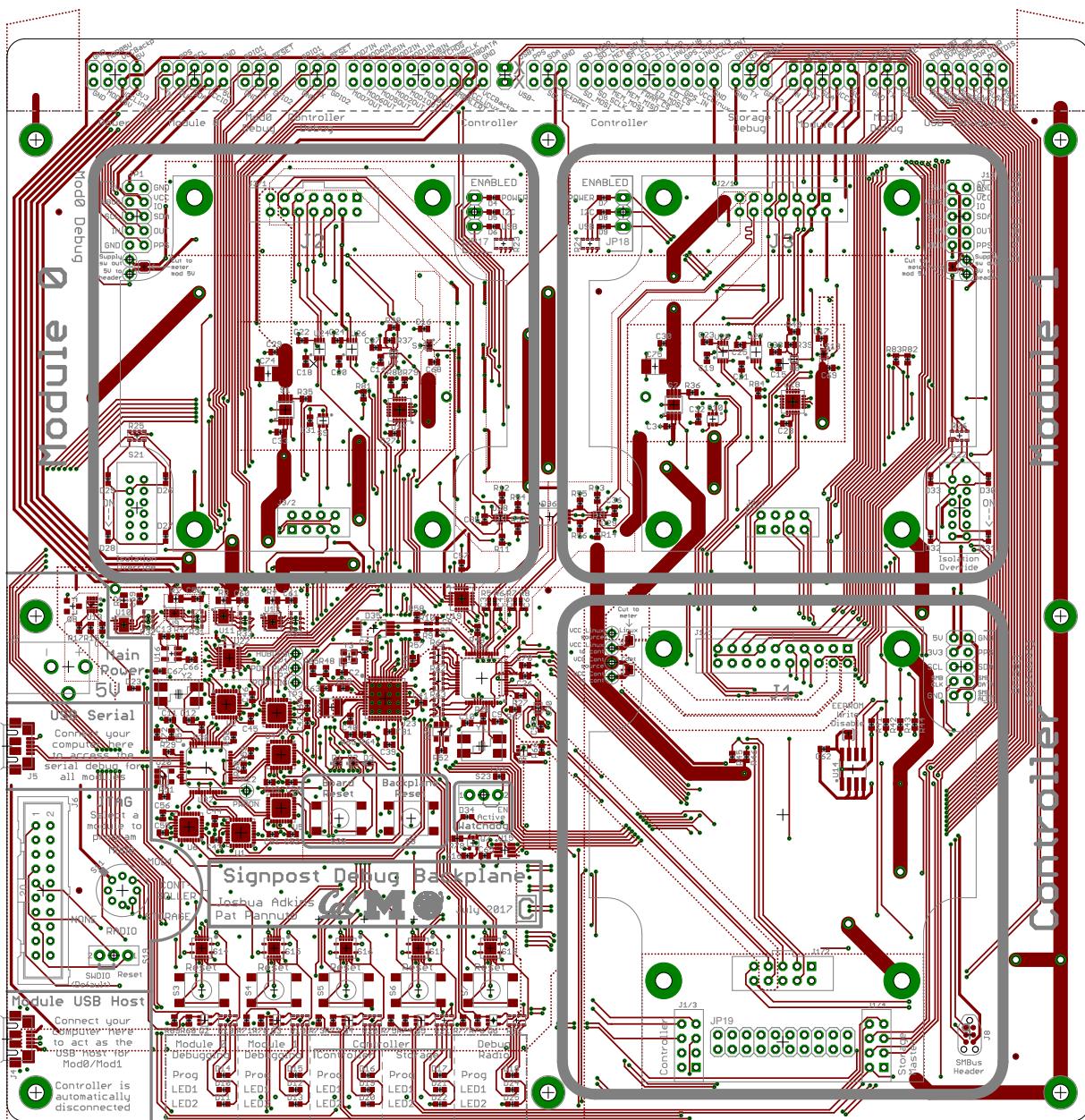
Date: 7/18/17 19:28

Sheet: 18/18

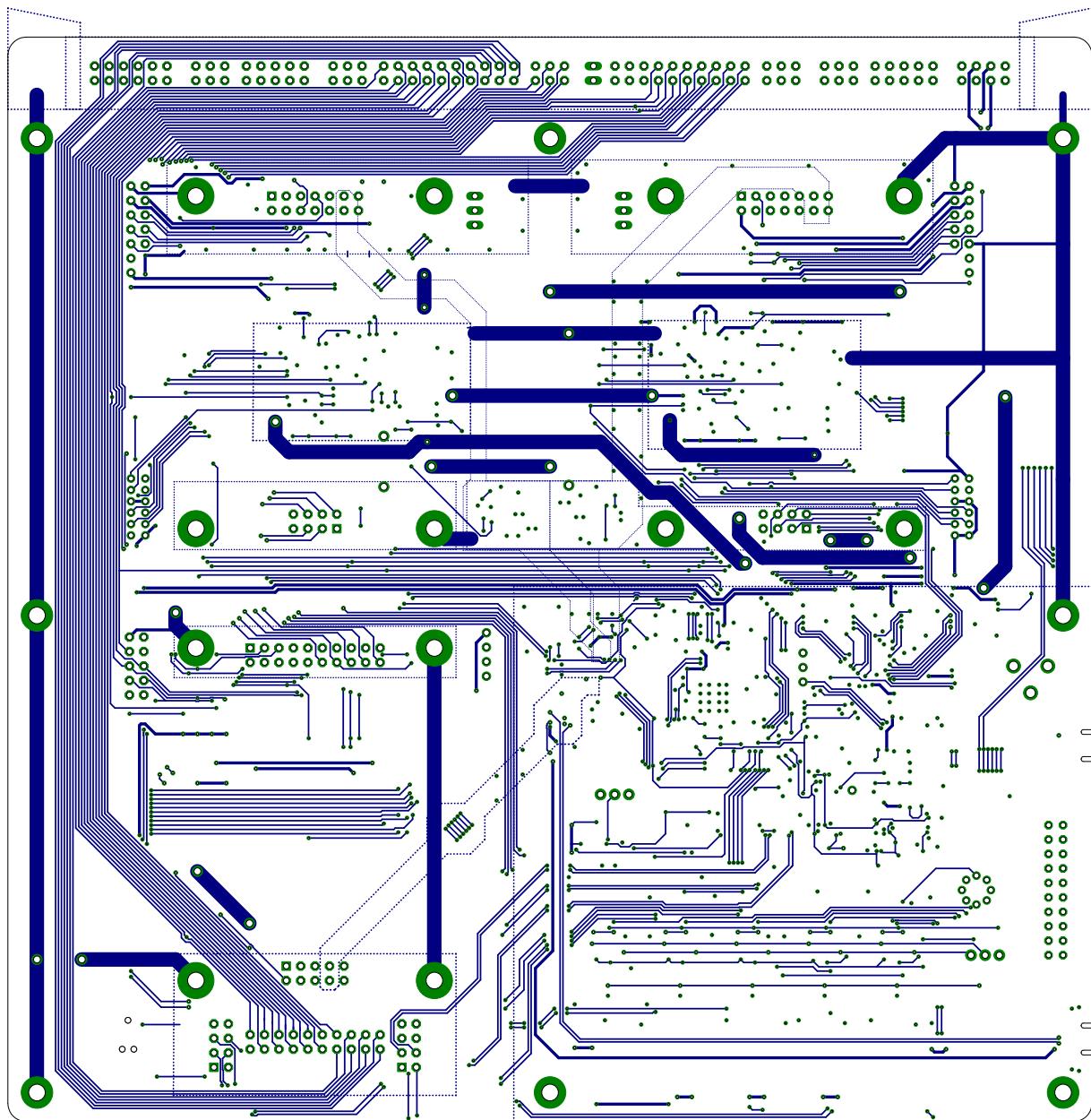
Top and Bottom Layers



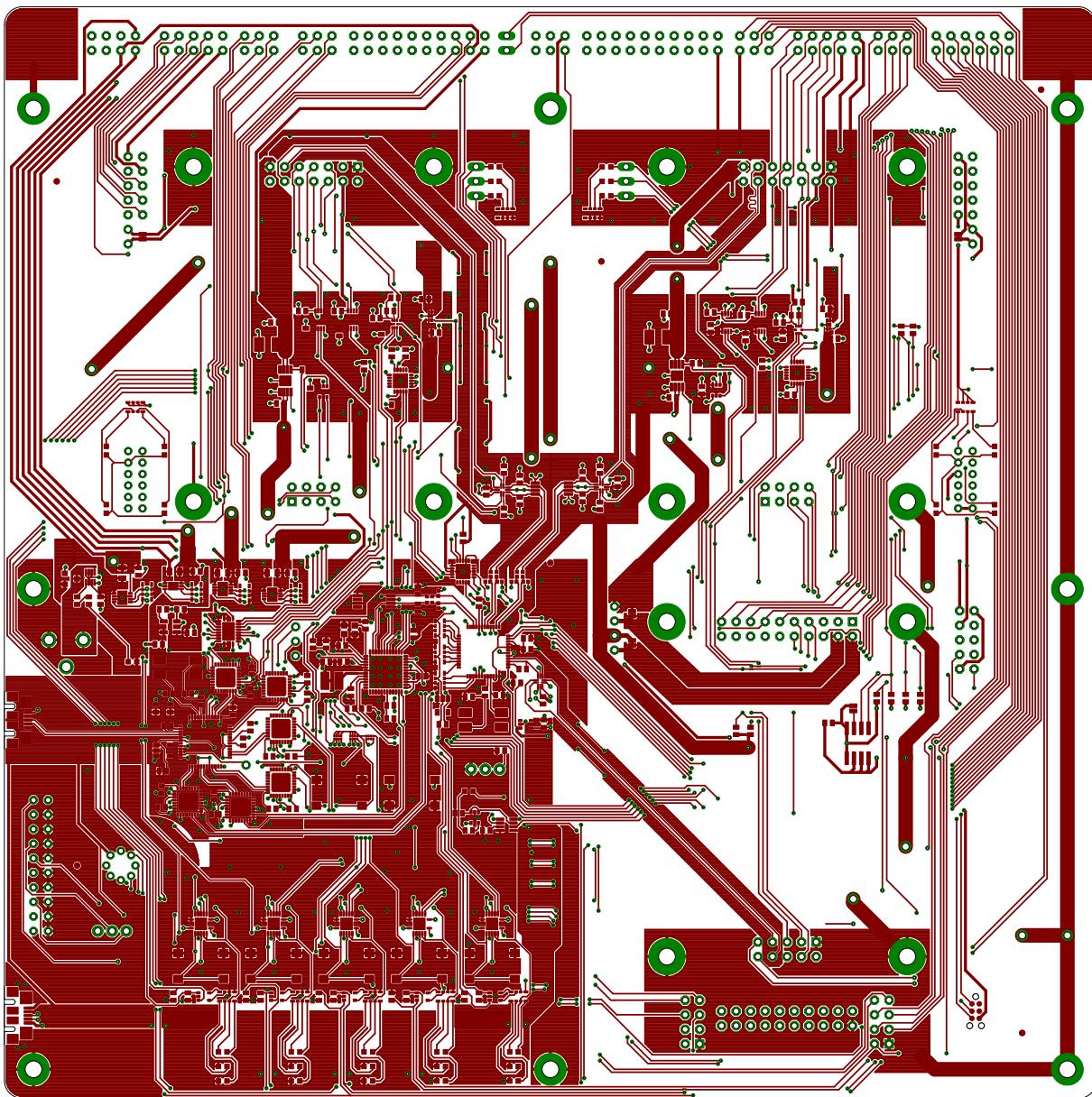
Top Layer



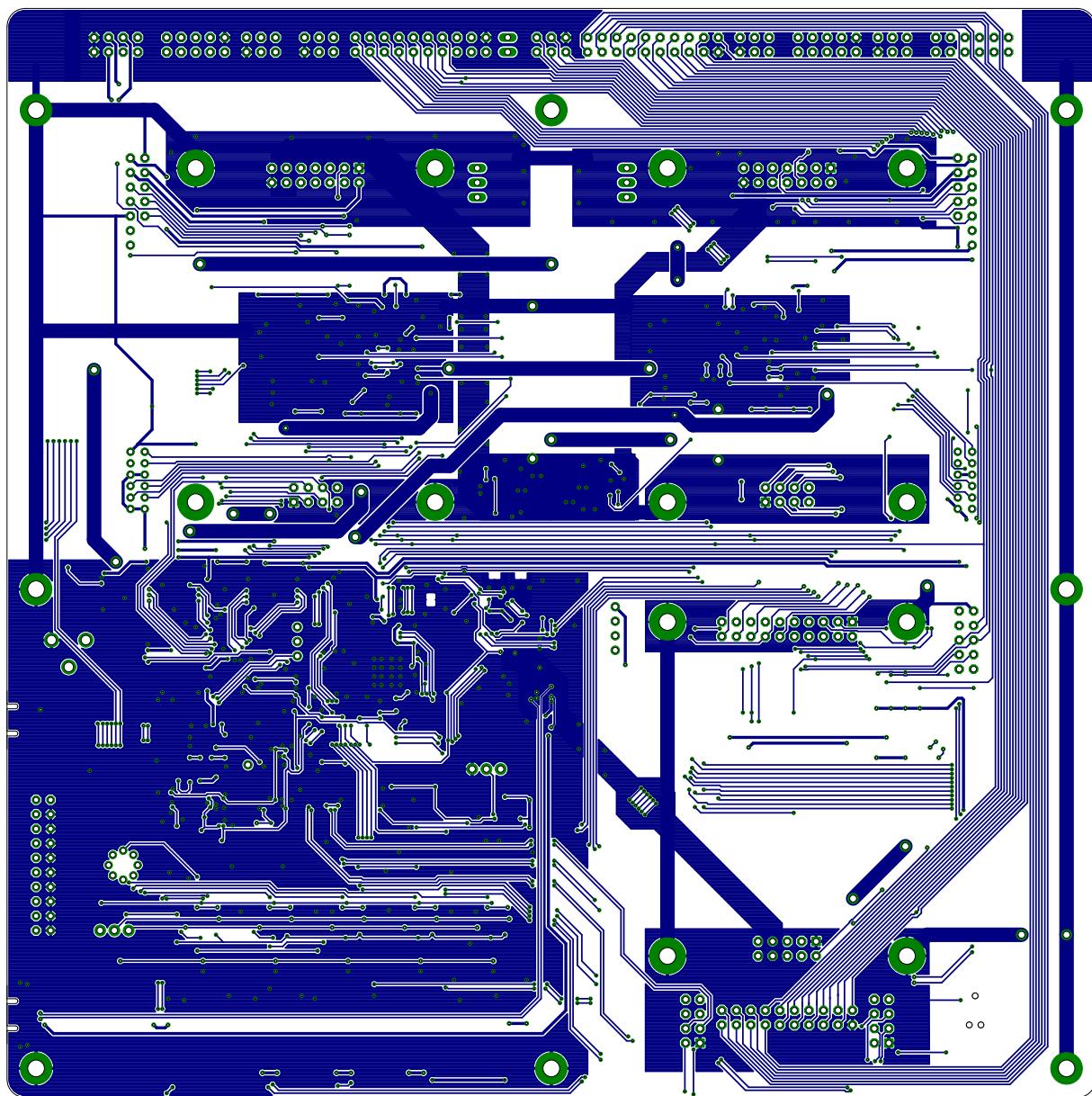
Bottom Layer



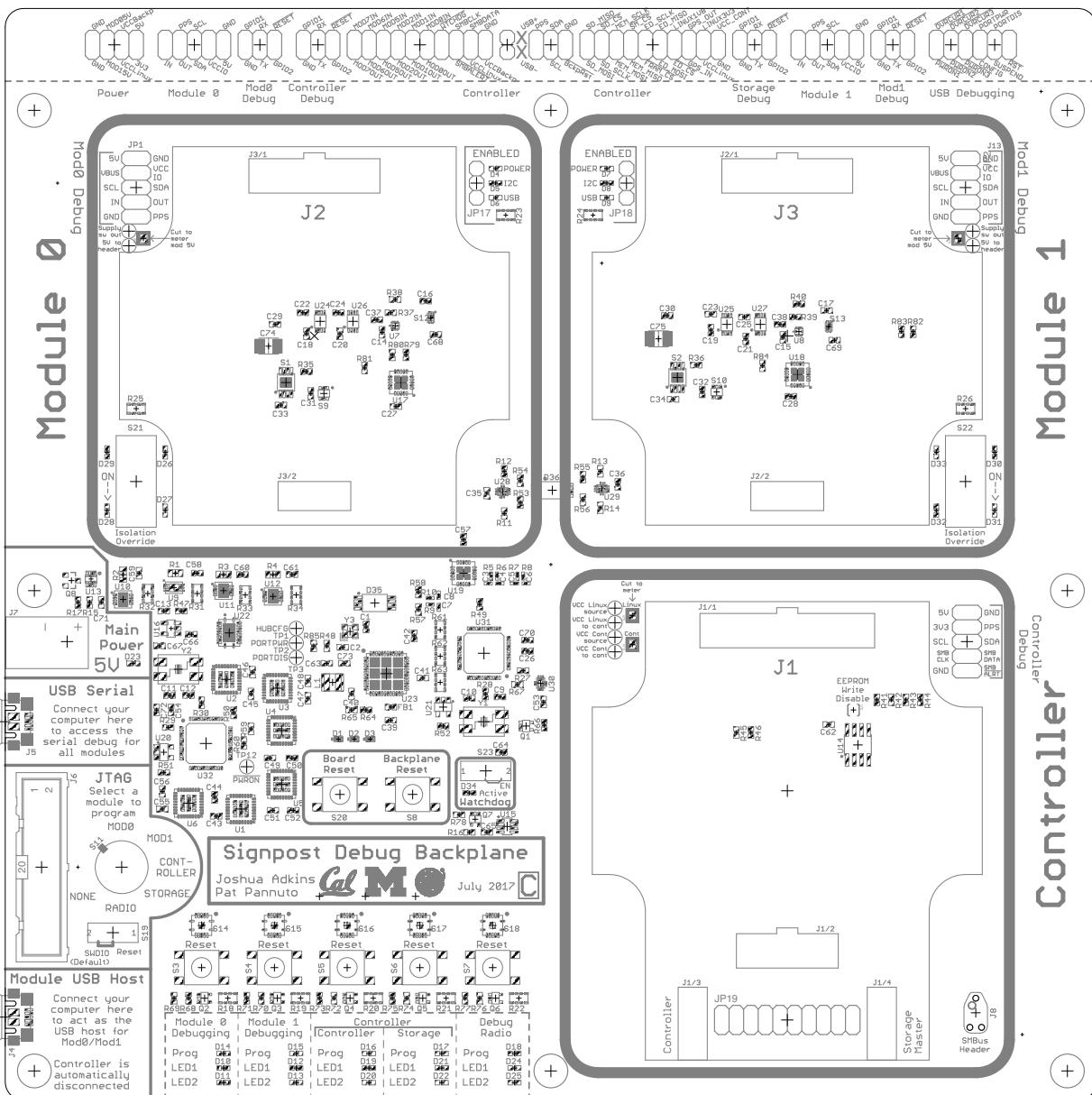
Top Copper Layer



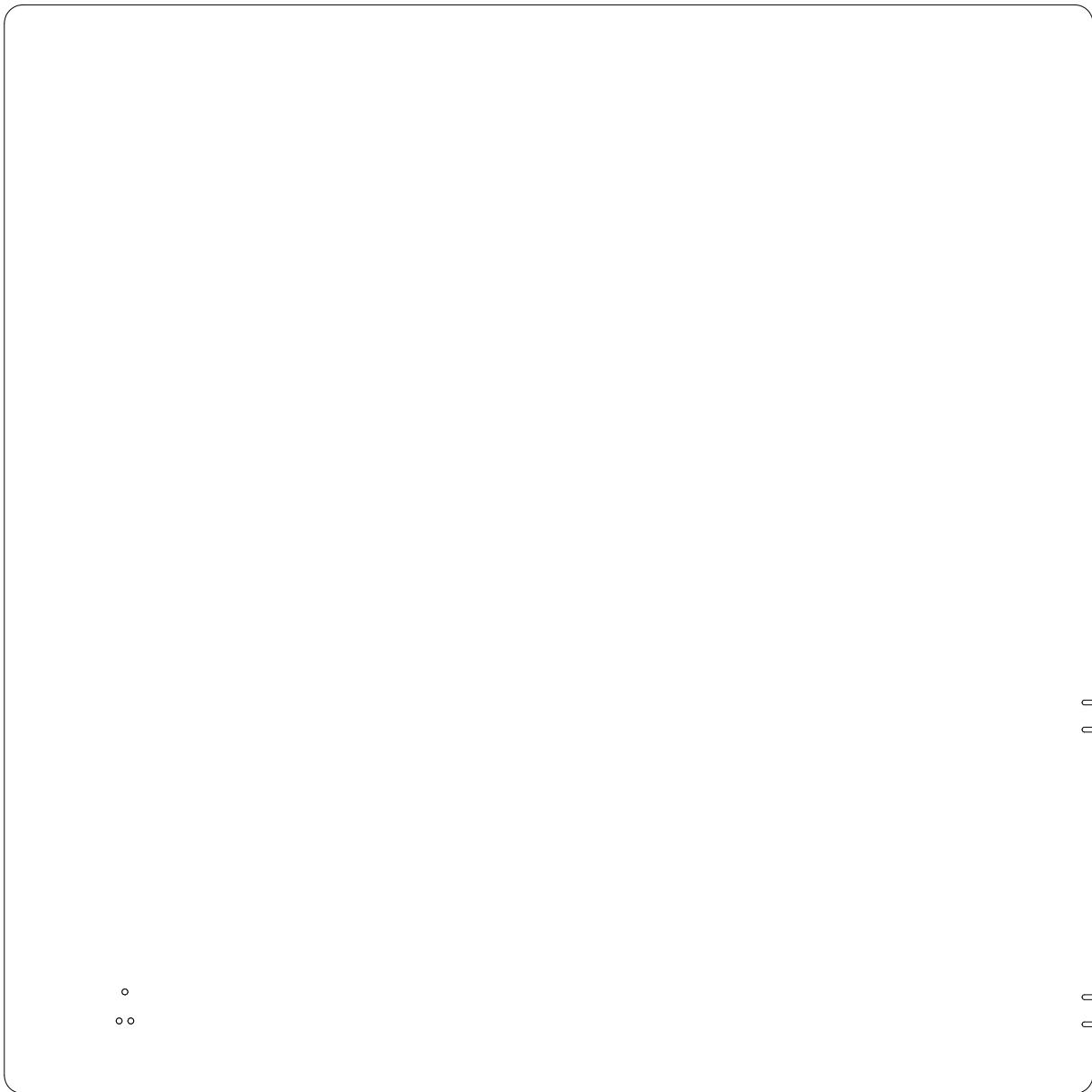
Bottom Copper Layer

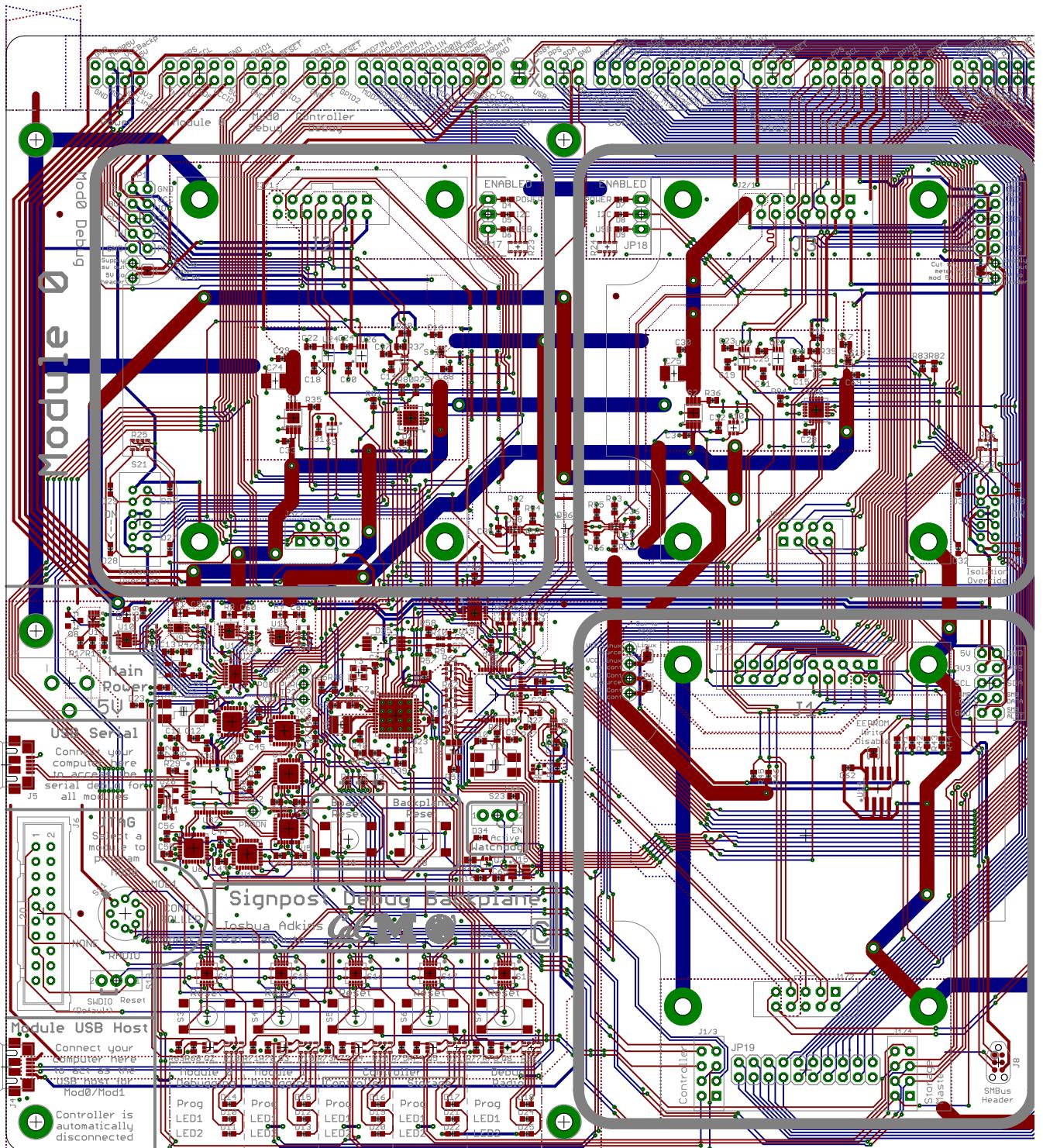


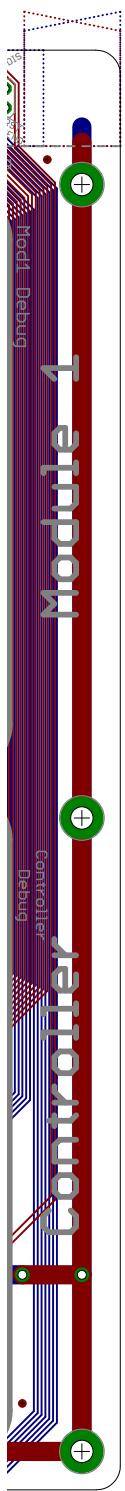
Top Paste Layer with Silkscreen



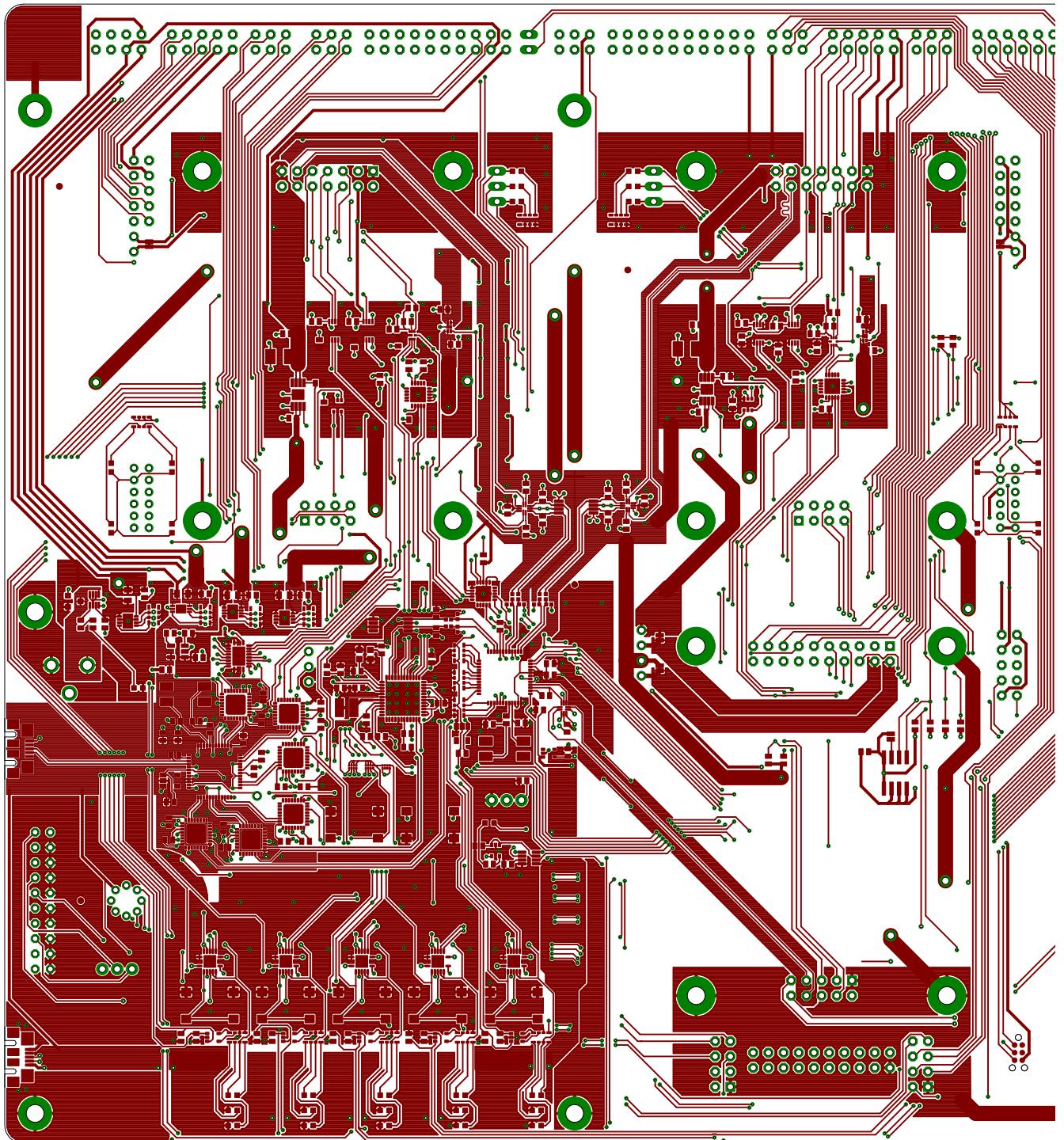
Bottom Paste Layer with Silkscreen



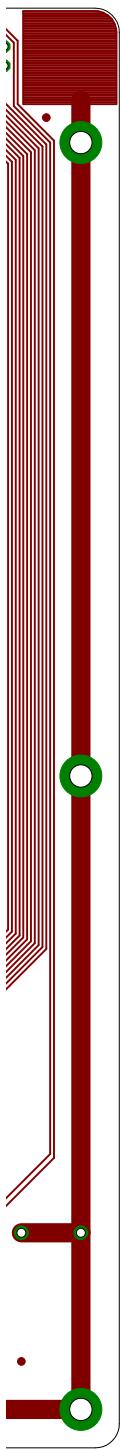




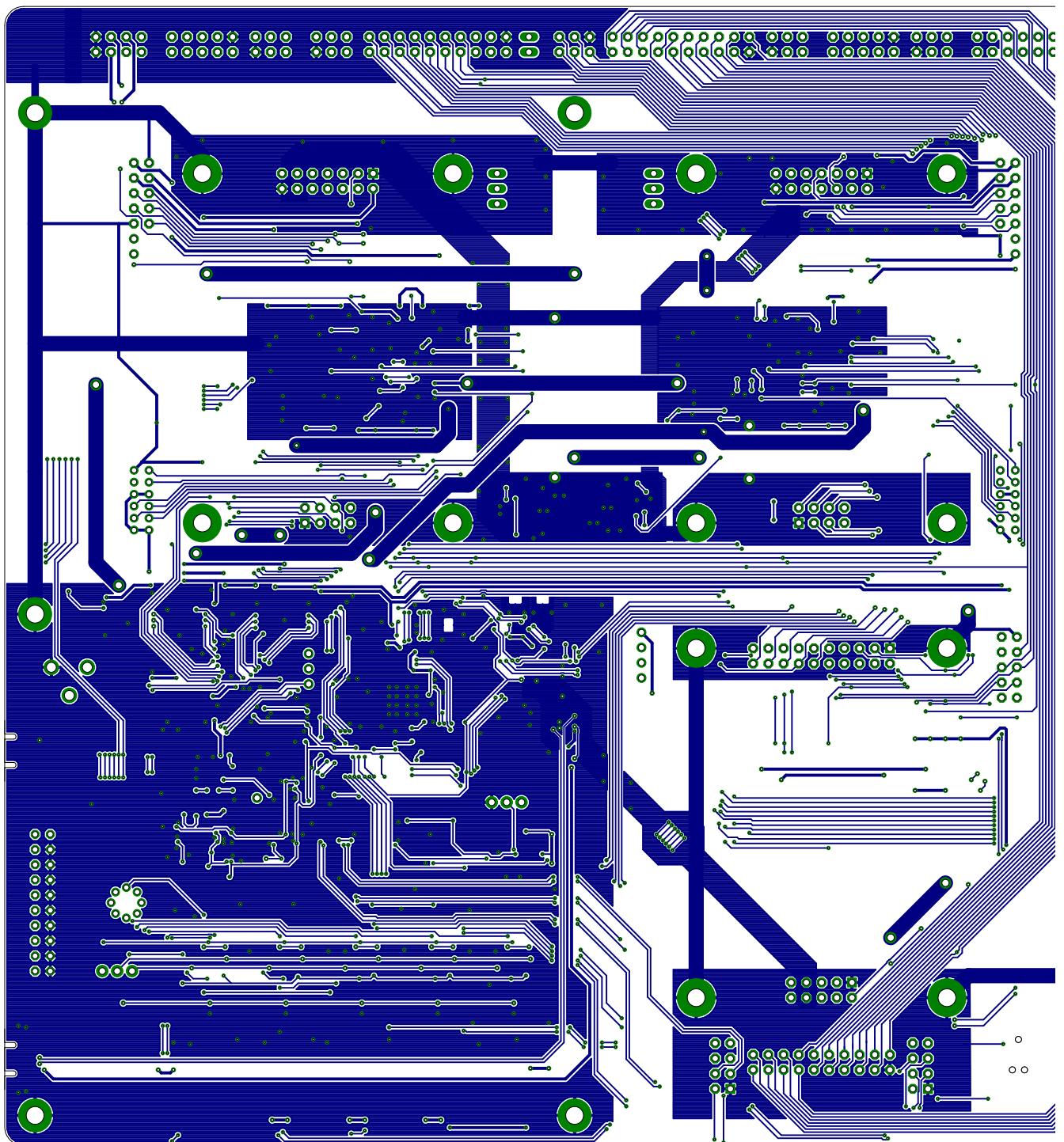
Top Layer 1:1 Scale



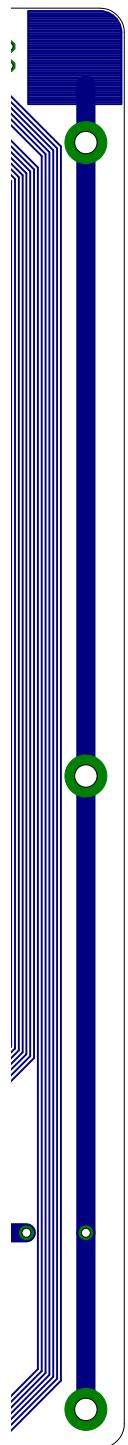
Top Layer 1:1 Scale



Bottom Copper Layer 1:1 Scale



Bottom Copper Layer 1:1 Scale



Qty	Parts	Value	Do Not Insert	Can Substitute?	Device	Package	Description	DIGIKEY	DIGIKEY2	DIGIKEY3	DIGIKEY4	MANUFACTURER	MPN	NOTES	
2	C1, C2	8uf			CAPACITOR, CAP	0603_CAP	CAP CER 8PF .50V 200V NPO 0603	490-8670-ND				Murata	GRM1885CL1RBP0001D		
6	C3, C4, C5, C6, C7, C8	22pf			CAPACITOR, CAP	0402_CAP	CAP CER 22PF .50V CCG/NPO 0402	490-5868-1-ND				Murata	GRM1555CH210J010D		
4	C9, C10, C11, C12	22pf			CAPACITOR, CAP	0603_CAP	CAP CER 22PF .50V CCG/NPO 0603	1276-1023-1-ND				Samsung	CL10C220BFRNNN		
1	C13	0.01uf			CAPACITOR, CAP	0603_CAP	CAP CER 10000PF .50V X7R 0603	490-1512-2-ND				Murata	GRM1885CH210J010D		
50	C14, C15, C16, C17, C18, C19, C20, C21	1.0uf			CAPACITOR, CAP	0603_CAP	CAP CER 10000PF .50V X7R 0603	490-1512-2-ND				Murata	GRM1885CH210J010D		
1	C26	0.47uf			CAPACITOR, CAP	0603_CAP	CAP CER 0.47UF .10V X5R 0603	490-1553-1-ND				Murata	GRM188613A47XKA61D		
1	C65	0.82uf			CAPACITOR, CAP	0603_CAP	CAP CER 0.82UF .23UF X5R 0603	490-11493-1-ND				Murata	GRM188613C23XKE15D		
2	C66, C67	4.7uf			CAPACITOR, CAP	0603_CAP	CAP CER 2.2UF .16V 10% X5R 0603	490-3296-1-ND				Murata	GRM188613C22XKE15D		
5	C68, C69, C70, C71, C72	4.7uf			CAPACITOR, CAP	0603_CAP	CAP CER 2.2UF .16V 10% X5R 0603	1276-1023-1-ND				Samsung	CL605KX500S5XK80AB		
1	C73	6.8uf			CAPACITOR, CAP	0603_CAP	CAP CER 6.8UF .6.3V X5R 0603	495-7400-1-ND				TDK	CL32A157MGUVNNE		
2	C74, C75	150uf			CAPACITOR, CAP	1210_CAP	CAP CER 150UF .6.3V X5R 1210	1276-3367-1-ND				Samsung	CL32A157MGUVNNE		
3	D1, D2, D3	DIODE, SCHOTTKY, ARRAY-4HM08			DIODE, SCHOTTKY, ARRAY-HM08		Array of 4 Schottky Diodes	R8521258A30T61CT-ND				Rohm Semiconductor	RB51258A30T61CT		
12	D4, D5, D6, D7, D9, D11, D13, D20, D21, D22, D23, D24, D25	LED0603			LED, SMD	0603	LED RED CLEAR 0603 SMD	160-1447-1-ND				Lite-On	LTS1-C151K1KT		
13	D14, D15, D16, D17, D18, D26, D27, 2QE0603	LED0603			LED, SMD	0603	LED BLUE CLEAR 0603 SMD	160-1827-2-ND				Lite-On	LTS1-C151K1KT-5A		
2	D35, B36	SN75240-TSSOP	N		SN75240-TSSOP	TSSOP-8	TVS Diodes [suggested for TI USB Hub] (2.29E-6596-1-ND)	SN75240PWB				Texas Instruments	SN75240PWB		
1	F81	1.5ohm			FERRITE BEAD	1.5 KOHM 0603	FERRITE BEAD 1.5 KOHM 0603 1IN	490-5216-1-ND				Murata	BLM18HE152SN1D		
	H2, H3, H4, H5, H6, H7, HB	MOUNT-PAD-ROUNDIN	X				MOUNT-PAD-ROUNDIN								
1	J1				BACKPLANE_CONTROLLER_MODULE_DEBUG	N	BACKPLANE_CONTROLLER_PTH 10 pins + PTH 8 pins	S9194-ND	S7072-N	S7072-N	S7072-N	Sullins Connector		J1 is 4 physical parts	
2	J2, J3				BACKPLANE_GENERIC_MODULE_DEBUG	N	BACKPLANE_GENERIC_PTH 14 pins + A backplane header for the debug module	S9195-ND				Sullins Connector			
2	J4, J5				MICRO_USB_B_HIROSE_ZX62R-B-5P	N	MICRO_USB_B_HIROSE_ZX62R-B_HIROSE_ZX62R-B 5P	H11574CT-ND				Hirose Electric Co Ltd	ZX62R-B-5P		
1	J6				MIL-DTL-23282	N	MIL-DTL-23282	S9172-ND				Sullins Connector	SHB11-PRFC-D10-5T-BK		
1	J7	P+102AH				N	P+102AH	P+102AH				Coilcraft	P+102AH		
1	J8		X		TC2030-F101-I2C	TC2030-IDC-ND	UMV FT2030 I2C TDI to I2C pogo pin adapter.	S9170-ND							
5	JP1, JP2, JP4, JP5, JP11				PINHOD-2X3	PTH 10 pins	PIN HEADER	A34268-05-ND				TE Connectivity	9-146261-0-05		
3	JP12, JP13, JP20				PINHOD-2X10	PTH 20 pins	PIN HEADER	A34268-10-ND				TE Connectivity	9-146261-0-10		
1	JP14				PINHOD-1X2	PTH 2 pins	PIN HEADER	A34268-01-ND				TE Connectivity	9-146261-0-01		
6	JP15, JP21, JP22, JP23, JP24, JP25		X		FIDUCIAL1X2	-	Fiducial Alignment Points	-							
1	JP16				PINHOD-2X4	PTH 8 pins	PIN HEADER	A34268-04-ND				TE Connectivity	9-146261-0-04		
2	JP17, JP18				PINHOD-1X3	PTH 3 pins	PIN HEADER	732-5318-ND				Wurth Electronics	61300001121		
3	JP19, JP5, JP7, JP8, JP9, JP10, JP14				PINHOD-2X3	PTH 6 pins	PIN HEADER	A34268-06-ND				TE Connectivity	9-146261-0-06		
1	JL1				LH33NP	SMD	LH33NP Inductor	490-5330-1-ND				Diodes Incorporated	DMN32D202M0		
7	Q1, Q2, Q3, Q4, Q5, Q6, Q7	DMN32D21DF			TM32D21DF	SOT353	Common source inductor for channel receiver	DMN32D21DF-70DCT-ND				Vishay Siliconix	SOT353-1-13		
1	Q8, R1, R2, R3, R4	0.017A			TM32D21DF	SOT353	Common source inductor for channel receiver	DMN32D21DF-70DCT-ND				Vishay Siliconix	SOT353-1-13		
7	R11, R12, R13, R14, R15, R16, R17	500			RESISTOR,0603	RES	RES 0603 0.033 OHM 1% 1/W 0603	1W19W-01CT-ND				Rohm	TR03E2ZP09R		
9	R18, R19, R20, R21, R22, R23, R24, R25	100K			RESISTOR,0603	RES	RES 0603 49.0 OHM 1% 1/W 0603	R94949-1CT-ND				Panasonic	EX9-38V102Z		
4	R47, R48, R49, R50, R51, R52, R53, R54	1.8K			RESISTOR,0603	RES	RES 0603 1.8K OHM 1% 1/W 0603	91902CT-ND				Yageo	RCW032P10K5L		
4	R53, R56, R57, R58, R59, R60, R61, R62, R63, R64	10K			RESISTOR,0603	RES	RES 0603 10K OHM 1% 1/W 0603	91982CT-ND				Panasonic	ERJ-3EV1010V		
6	R56, R7, R8, R9, R10	270			RESISTOR-HIGH_SPEED0402_0402_RHS-HIGH_SPEED	RES	RES 270 OHM 5% 1/WV 0402	P10KGCT-ND				Vishay Dale	CRWV0402ZT0RNED		
8	R57, R58, R59, R60, R61, R62, R63, R64	10K			RESISTOR-HIGH_SPEED0402_0402_RHS-HIGH_SPEED	RES	RES 10K OHM 5% 1/WV 0402	91983CT-ND				Panasonic	EX9-38V103V		
3	R61, R62, R63	15K			RESISTOR-ARRAY-41206	RES	RES ARRAY 4 RES 10K CHM 1206	91935CT-ND				Samsung	RC1005F104R		
4	R64, R65, R66, R67	100K			RESISTOR-0603	RES	RES 0603 100 OHM 5% 1/W 0603	R9102CT-ND				Rohm	ESR03E2P1016		
11	R68, R69, R70, R71, R72, R73, R74, R75	10K			RESISTOR-0603	RES	RES 0603 10K OHM 5% 1/W 0603	R9103CT-ND				Rohm	ESR03E2ZP1016		
2	R76, R77, R78	100			RESISTOR-0603	RES	RES 0603 100 OHM 5% 1/W 0603	R9104CT-ND				Vishay	TR03E2ZP1016		
1	R80				DNP	N	RESISTOR-0603	-							
2	S1, S2		X		AP2401MP	N	USB Power Switch	Diodes Incorporated	AP2401MP-13C0T-ND						
7	S3, S4, S5, S6, S7, S8, S20	PT56453M435MTR92			PT56453M435MTR92	PT5645	Tactile Switch SMD-Top Actuated Surface Mount	CK&K	PT56453M435MTR92 LFS						
2	S9, S10, S11	NC52235			NC52235	N	NC52235	Farnell On Semiconductor	PT56453M435MTR92						
1	S11				RM106772BCB	RM-SWITCH	Rotary Switch 6 Position SP6T 500mA (DC) CX010703-ND	CK&K	PT56453M435MTR92						
2	S12, S13	SIP3240X			SIP3240X	TDFN4	High power (2.4 A) slide switch	Vishay Siliconix	PT56402A20NP-T1GE4CT-ND						
5	S14, S15, S16, S17, S18	SN74HC4066-RGY			SN74HC4066-RGY	N	SN74HC4066-RGY 14-16V 14-Pin DIP	Texas Instruments	SN74AHC4066RGY						
2	S19, S20	TE1-55A12Z/PO1			TE1-55A12Z/PO1	TE	TE1-55A12Z/PO1	TE Connectivity	941-S4121						
2	S21, S22	MM542			MM542	N	MM542	ATMEL	MM542						
1	SJ1		X		SOLDERJUMPER	SJ-25-NO	Solder Jumper Normally Open	ATPEM Inc	MM542						
4	SJ3, SJ4, SJ5, SJ6	SOLDERJUMPER			SOLDERJUMPER	SJ-25-NO	Solder Jumper Normally Closed	Keystone Electronics	5001						
6	U1, U2, U3, U4, U5, U6	FT232RQ			QFN42	N	FT232RQ	FTDI	FT232RQ						
2	U7, U8	FMAX2102			UMLP-8	N	Dual Supply, 2-Bit Voltage Translator / Buffer FMAX2102-ND	Farnell On Semiconductor	PT56453M435MTR92						
1	U9				LTCA943	N	LTCA943	Linear Technology	LTCA943DOPNPBF						
3	U10, U11, U12	LTCA943			LTCA943	N	LTCA943	Linear Technology	LTCA943DOPNPBF						
1	U13				LTCA943	N	LTCA943	Linear Technology	LTCA943DOPNPBF						
1	U14				M24201WKN	SOIC-8	1K 102°C Serial EEPROM	STMicroelectronics	M24201-102CNGTP						
1	U15				M24201WKN	SOIC-8	1K 102°C Serial EEPROM with adjustable temperature threshold	Maxim Integrated	MAX102CNGTP						
1	U16				M24201WKN	SOIC-8	1K 102°C Serial EEPROM with adjustable temperature threshold	Maxim Integrated	MAX102CNGTP						
3	U17, U18, U19	SA4M14C8A			SA4M14C8A	N	SA4M14C8A	Atmel	ATSAM4L14C-AU						
1	U20, U21	PCB0315N30			PCB0315N30	N	PCB0315N30	QFN-48-7MM	ATSAM4L14C-AU						
1	U22				PCB0315N30	N	PCB0315N30	QFN-48-7MM	ATSAM4L14C-AU						
1	U23				PCB0315N30	N	PCB0315N30	QFN-48-7MM	ATSAM4L14C-AU						
4	U24, U25, U26, U27	SN74LV27245			SN74LV27245	N	SN74LV27245	VFSOP-8	Bidirectional Buffer / Level Converter 2	Cir29-1701-1-N			Texas Instruments	SN74LV27245DUR	
3	U28, U29, U30	TS215303E			TS215303E	N	TS215303E	UQFN-10	USB Max with OE control and ESD	296-24684-1-ND			Texas Instruments	TS315303EWSR	
2	U31, U32	TS215307TA			TS215307TA	N	TS215307TA	UQFN-10	Full-duplex serial port	296-24684-2-ND			Texas Instruments	TS315307TA	
2	Y1, Y2	ABMM	N		ABMM	SMD	Low-Profile SMD crystal	Abracon LLC	ABMM-6.000MHz-B2-2						
1	Y3	FH1600015	N		FH1600015	SMD	Pericom Type FH 16 MHz 2.5 x 2.0 mm	Diodes Incorporated	FH1600015CT						

Note: Any part marked "Can Substitute" can be substituted for any equal size/value parts

Must be 5% or better

SFH11-PRFC-D10-5T-BK and SFH11-PRFC-D10-5T-BK and PPT04241FBM-RC

J1 is 4 physical parts

J2 is each 2 physical parts

Solder Jumper. DO NOT bridge this connection

Solder Jumper. Please bridge these connections

Power-on-Reset with Open Collector output - 2.9-3.1V threshold okay