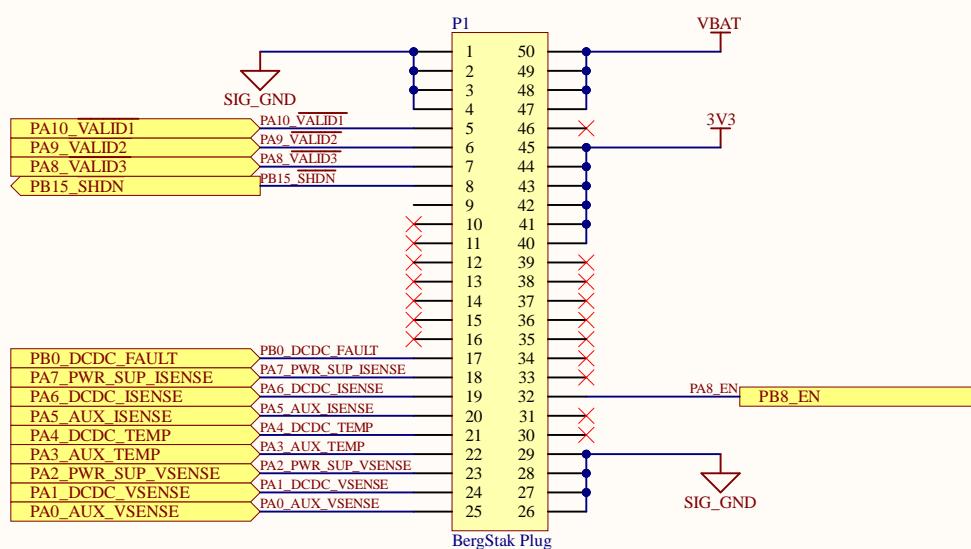
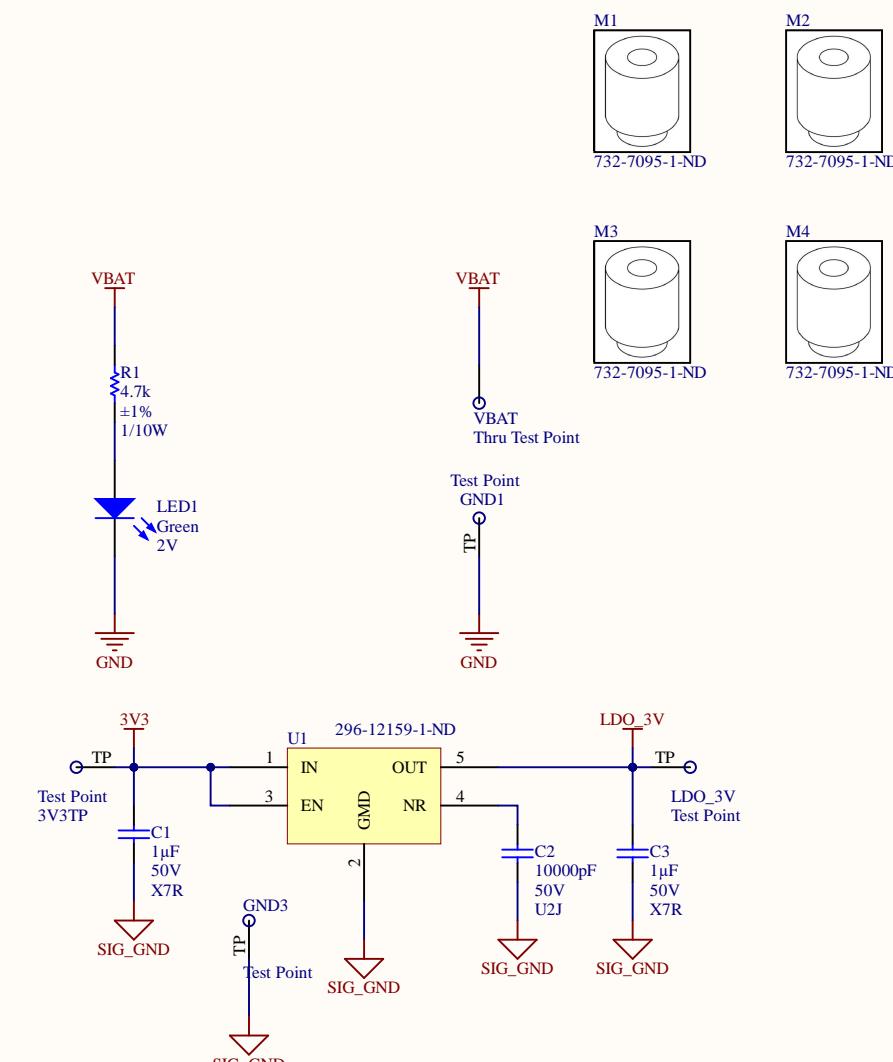
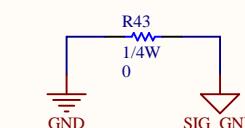
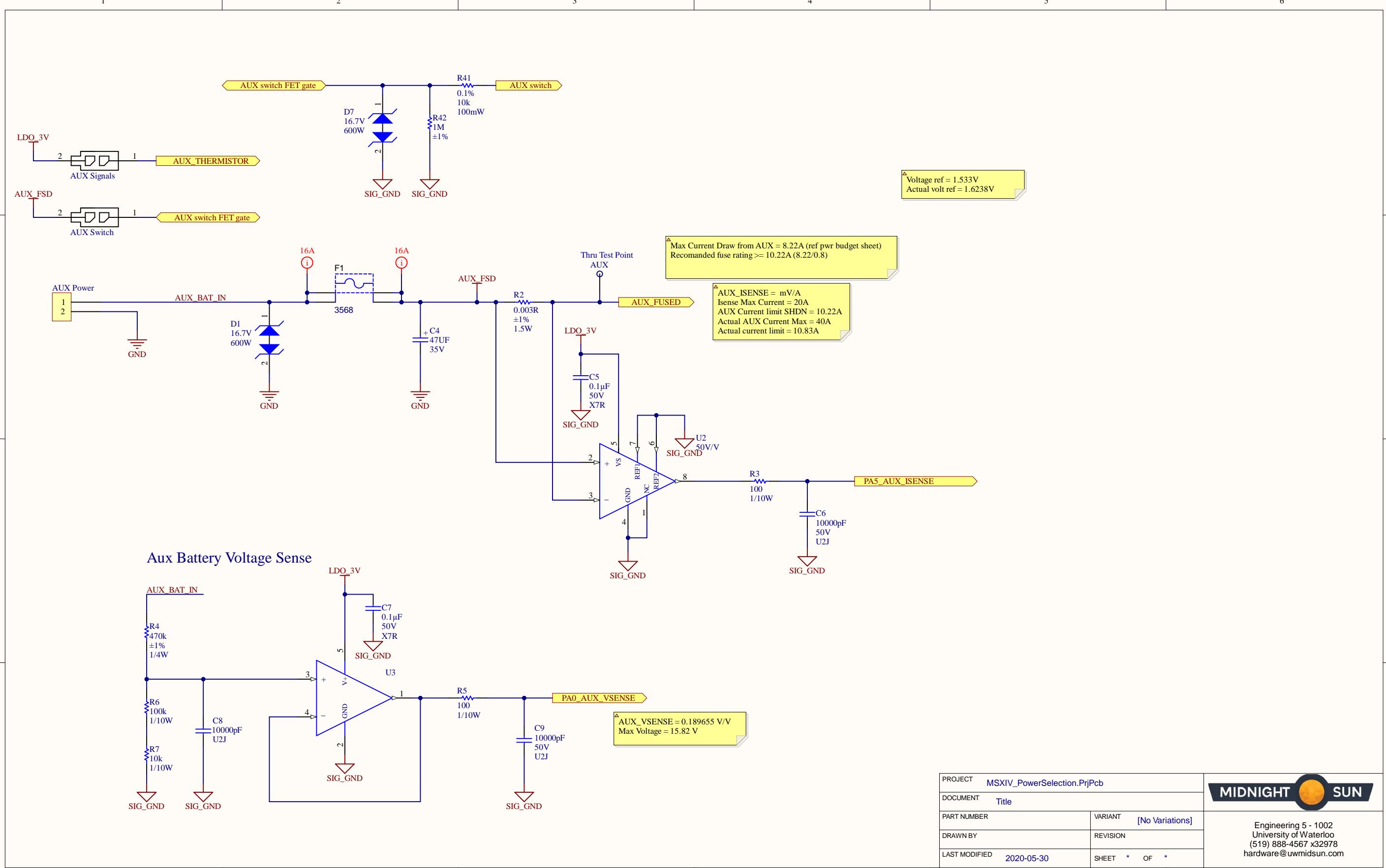


A



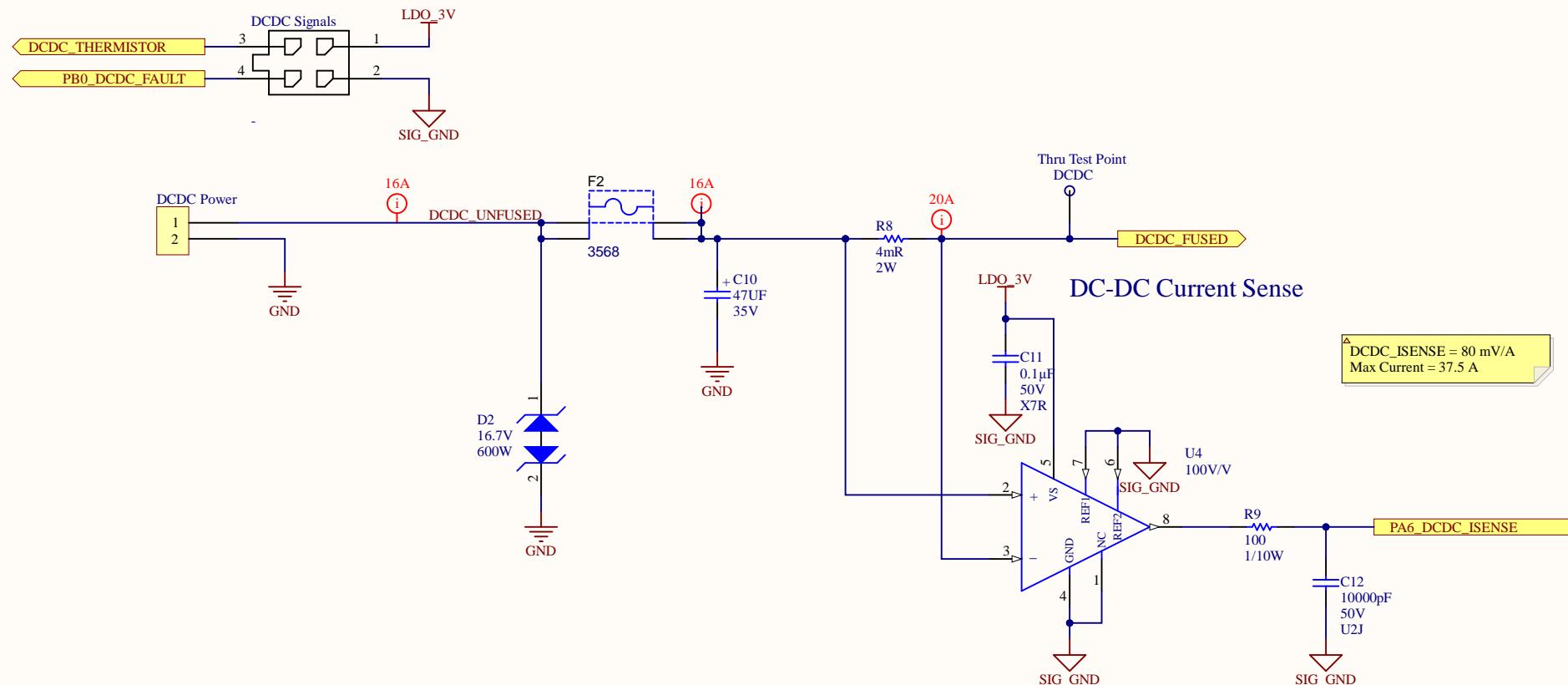
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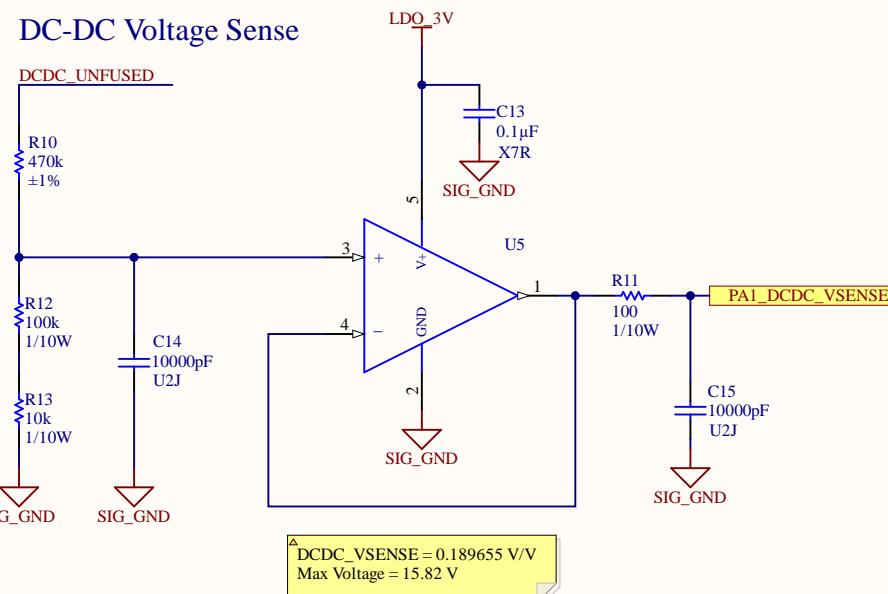


PROJECT	MSXIV_PowerSelection.PrbPcb	MIDNIGHT SUN	
DOCUMENT	Title		
PART NUMBER	VARIANT [No Variations]		
DRAWN BY	REVISION		
LAST MODIFIED	2020-05-30		
SHEET *	OF *		

A



B

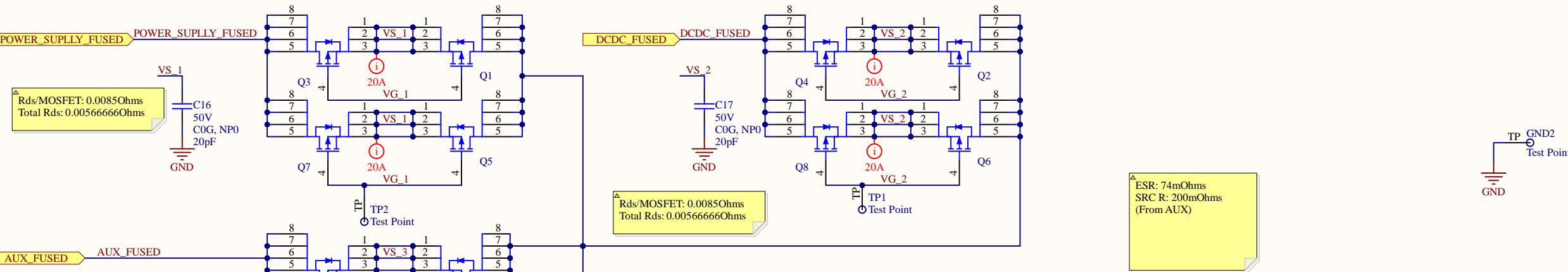


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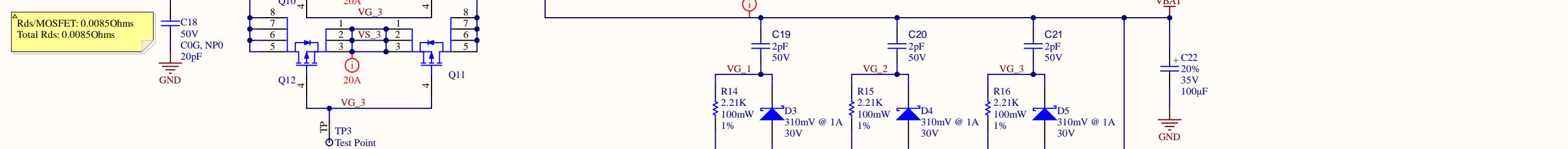
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DOCUMENT	Title	
PART NUMBER	VARIANT [No Variations]	
DRAWN BY	REVISION	
LAST MODIFIED	2020-05-30	SHEET * OF *

Engineering 5 - 1002
University of Waterloo
(519) 888-4567 x32978
hardware@uwmidsun.com

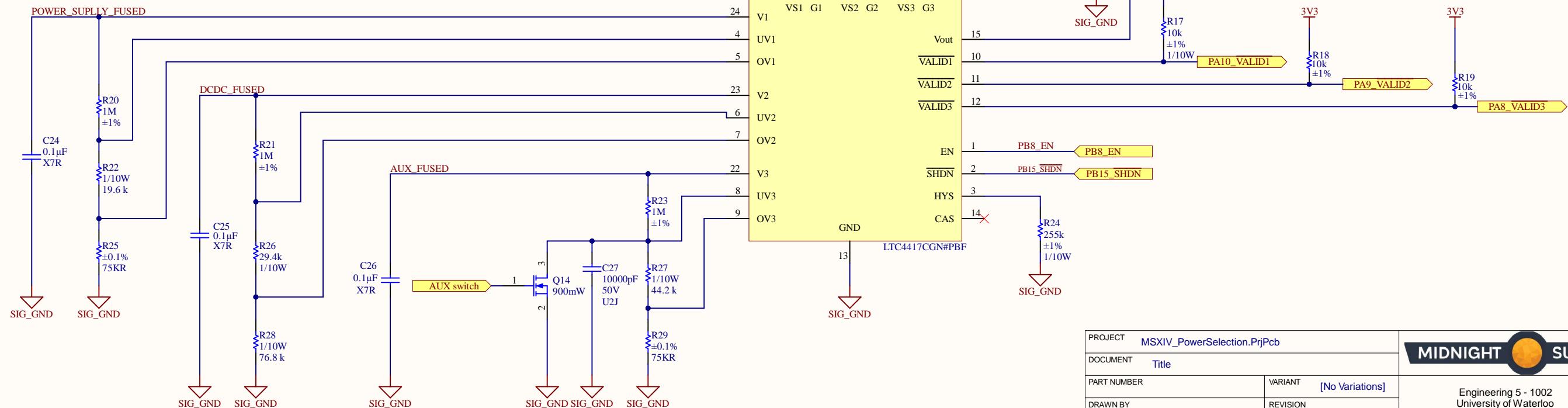
A



B



C

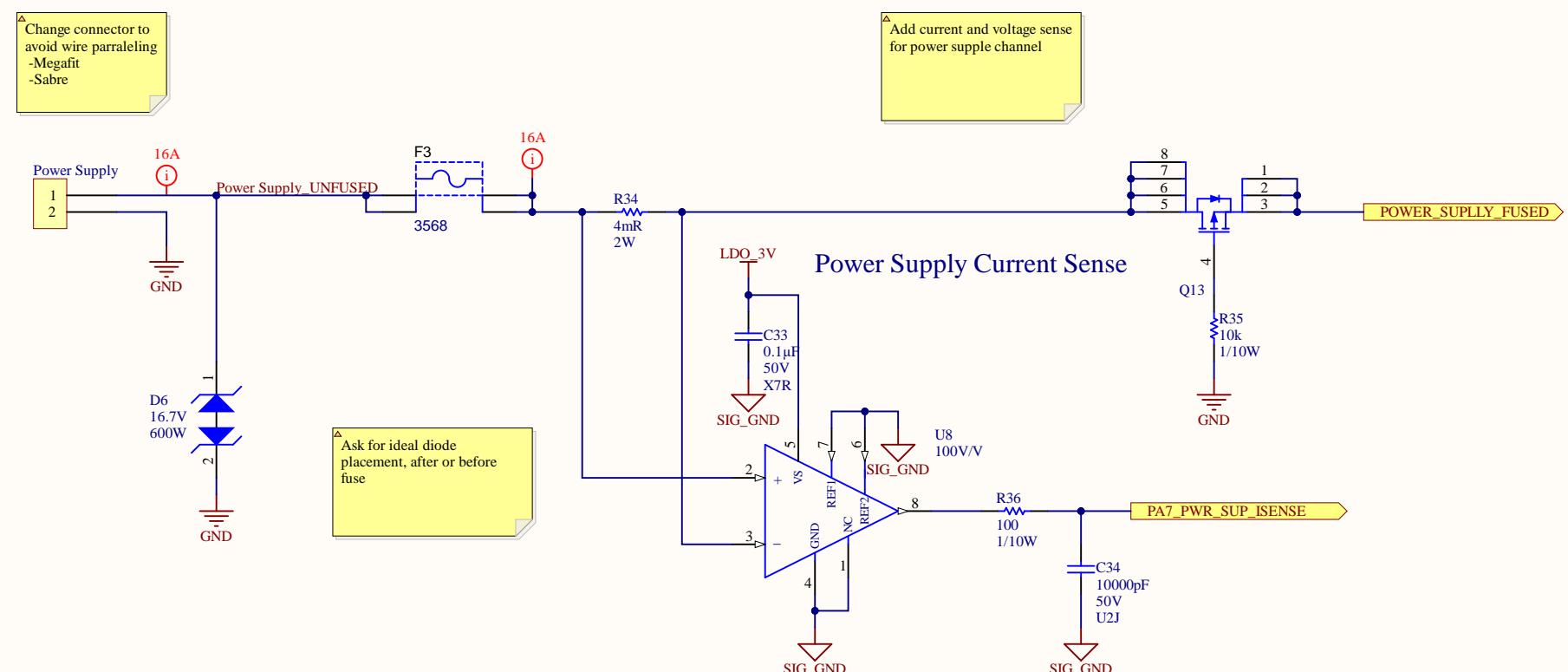


PROJECT	MSXIV_PowerSelection.PrbPcb
DOCUMENT	Title
PART NUMBER	VARIANT [No Variations]
DRAWN BY	REVISION
LAST MODIFIED	2020-05-30
SHEET *	OF *

MIDNIGHT SUN

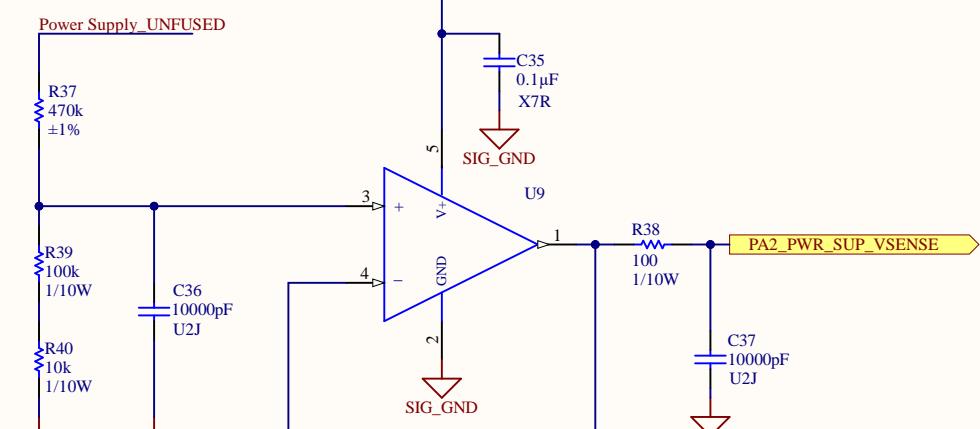
Engineering 5 - 1002
University of Waterloo
(519) 888-4567 x32978
hardware@uwmidsun.com

A



B

Power Supply Voltage Sense



C

PROJECT	MSXIV_PowerSelection.PjPcb	MIDNIGHT SUN
DOCUMENT	Title	
PART NUMBER	VARIANT [No Variations]	
DRAWN BY	REVISION	
LAST MODIFIED	2020-05-30	SHEET * OF *

D

A

B

C

D

A

A

B

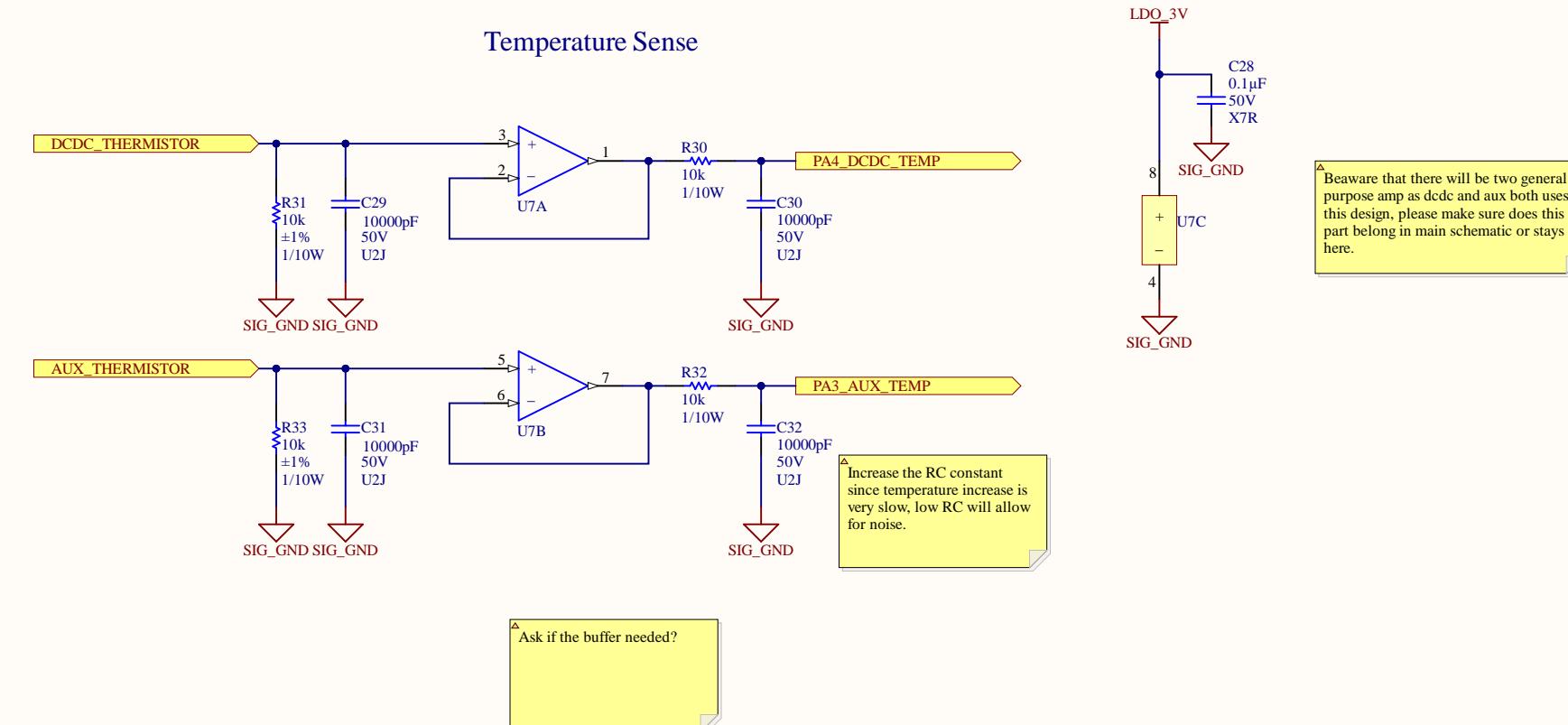
B

C

C

D

D



PROJECT	MSXIV_PowerSelection.PnjPcb
DOCUMENT	Title
PART NUMBER	VARIANT [No Variations]
DRAWN BY	REVISION
LAST MODIFIED	2020-05-30
SHEET *	OF *

Bill of Materials

Project:	MSXIV_PowerSelection.PjPcb
Revision:	<Parameter ProjectRevision not found>
Project Lead:	<Parameter ProjectAuthor not found>
Generated On:	2020-05-30 12:17 AM
Production Quantity:	1
Currency	CAD
Total Parts Count:	130

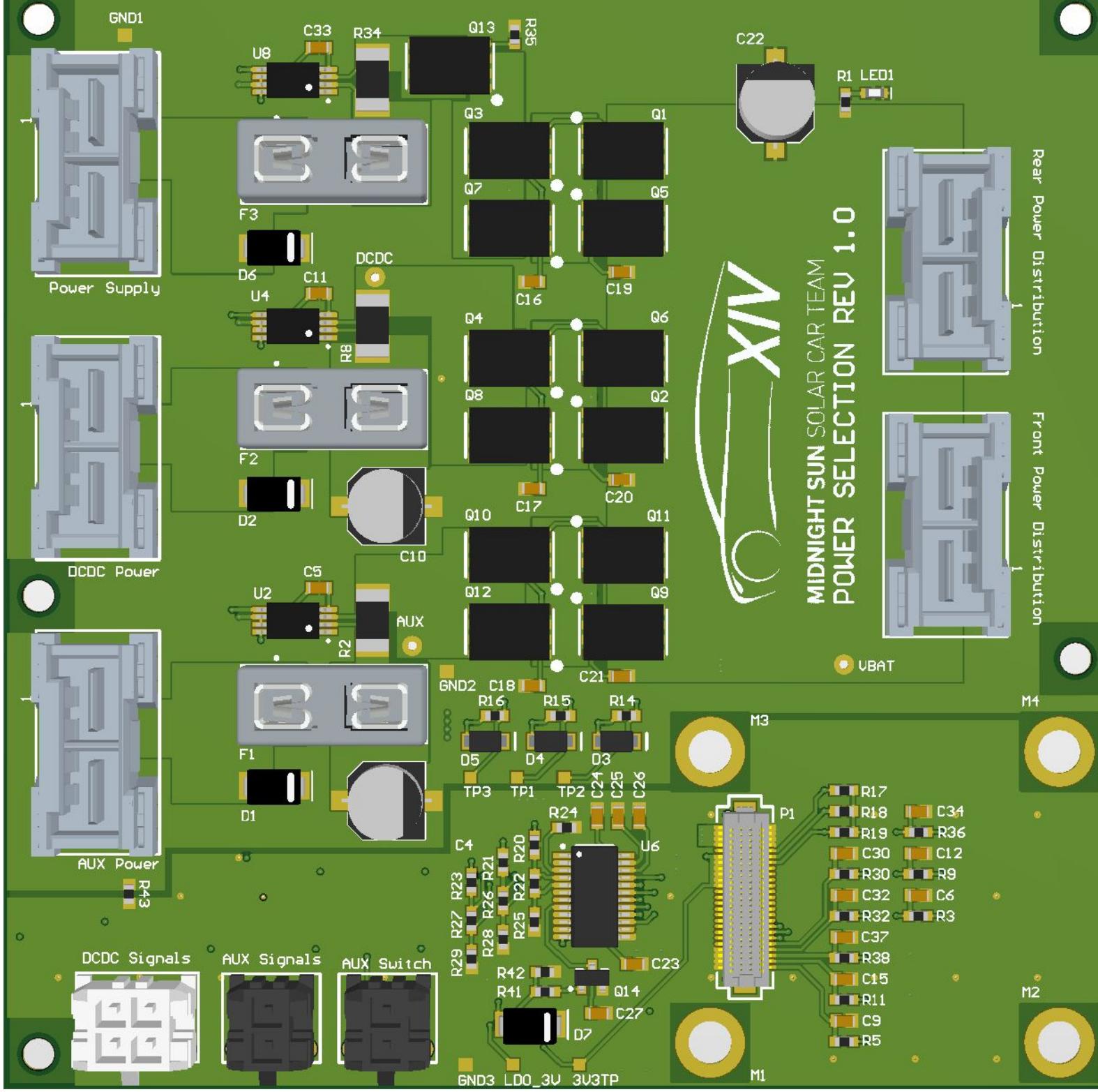
MIDNIGHT SUN

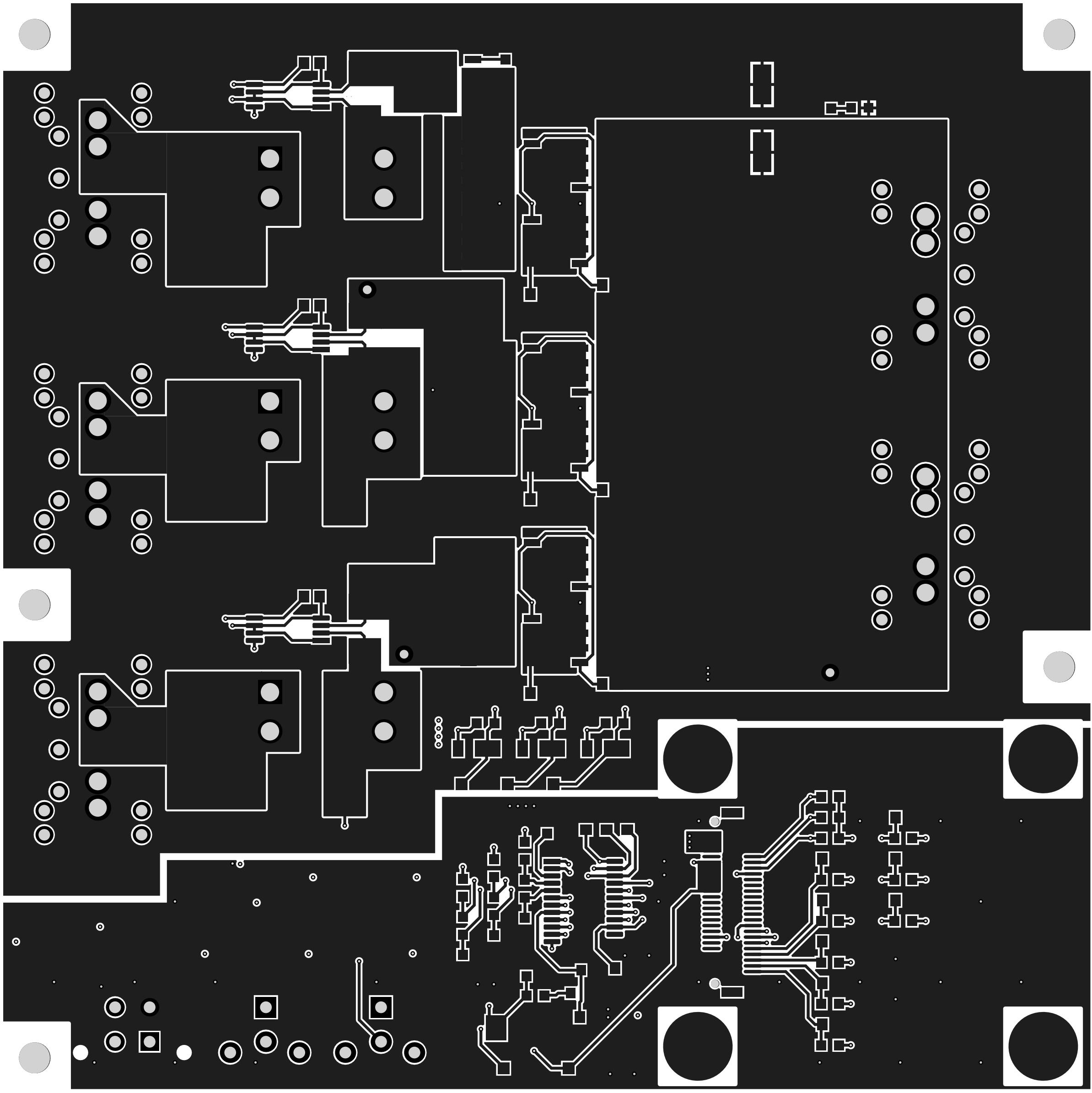


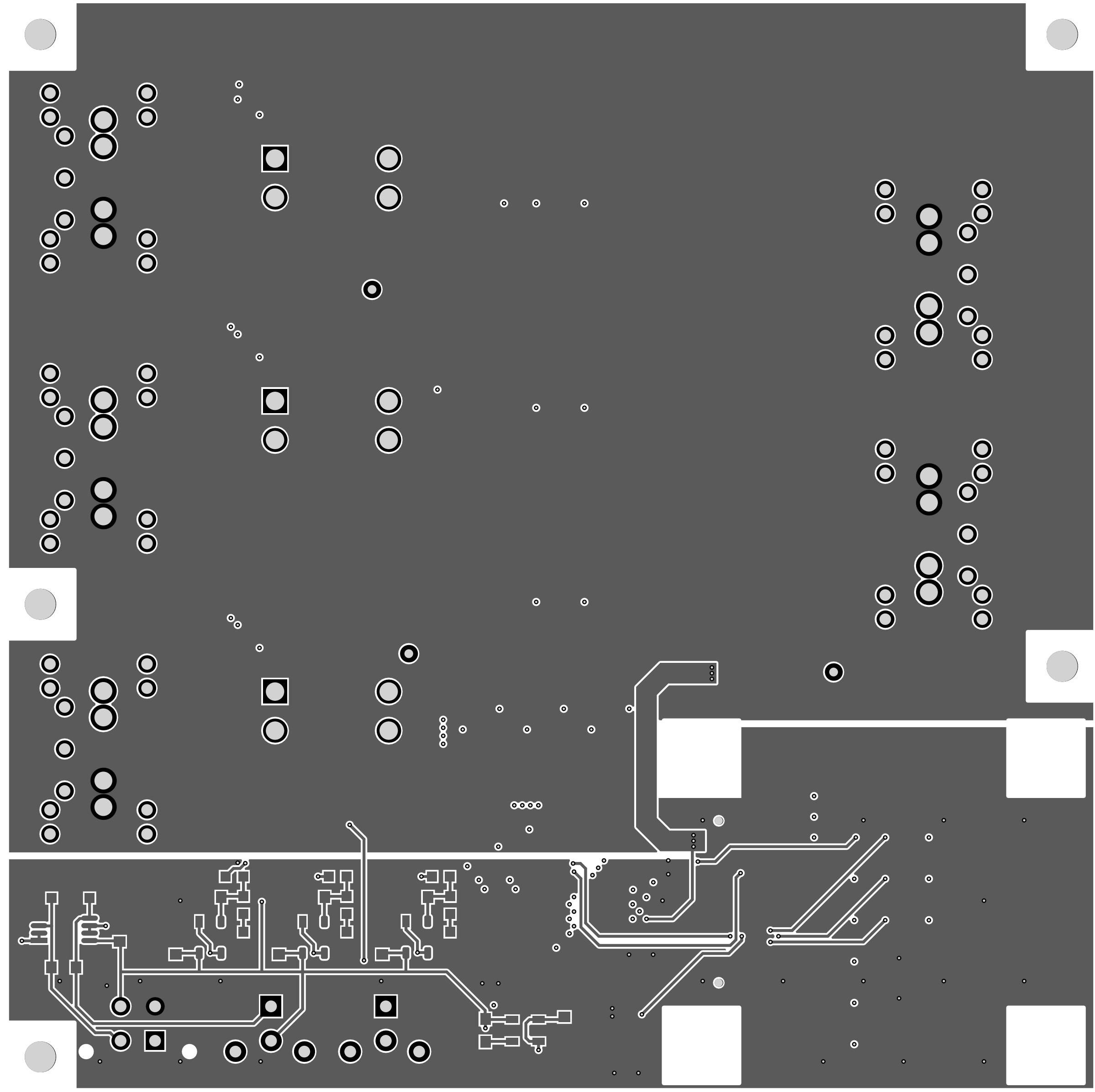
LibRef	Designator	Manufacturer 1	Manufacturer Part Number 1	Supplier 1	Supplier Part Number 1	Supplier Unit Price 1	Quantity	Supplier Subtotal 1
CMP-002-00071-4	Power, Front Power Distribution, Power Supply, P	TE Connectivity	2042274-1	Farnell	1871344		5	
CONN 2POS MICRO-FIT 3mm	AUX Signals, AUX Switch			Digi-Key	WM10657-ND		2	
Thru Test Point	AUX, DCDC, VBAT						3	
CAP CER 1UF 50V 10% X7R 0603	C1, C3	Taiyo Yuden	UMK107AB7105KA-T	Digi-Key	587-3247-1-ND		2	
CAP CER 10nF 50V 5% X7R 0603	C9, C12, C14, C15, C27, C29, C30, C31, C32, C	KEMET	C0603C103J5JAC7867	Digi-Key	399-13384-1-ND		15	
CAP ALUM 47UF 20% 35V SMD	C4, C10			Digi-Key	PCE3961CT-ND		2	
CAP CER 0.1UF 50V 10% X7R 0603	C7, C11, C13, C23, C24, C25, C26, C28, C33,	AVX Corporation	06035C104KAT2A	Digi-Key	478-5052-1-ND		11	
CMP-013-0033-1	C16, C17, C18	Murata	GRM1885C1H200JA01D	RS Components	1694105		3	
CMP-001-00085-4	C19, C20, C21	TDK	CGA3E2C0G1H020C080AA	Digi-Key	445-5616-1-ND	0.26236	3	\$ 0.79
CMP-013-0003-1	C22	Panasonic	EEE-1VA101XP	RS Components	1763750		1	
DIODE TVS 15VWMM 24.4VC DO-214AA (SMB)	D1, D2, D6, D7	Fairchild/ON Semiconductor	SMBJ15CA	Digi-Key	SMBJ15CAFSC-ND		4	
DIODE SCHOTTKY 30V 1A POWERDI123	D3, D4, D5			Digi-Key	DFLS130LDICT-ND		3	
CMP-003-0105-1	DCDC Signals	Molex	430450427	Avnet	430450427		1	
CMP-005-00014-1	F1, F2, F3	Keystone Electronics	3568	Newark	22M2715	1.42	3	\$ 4.27
LED GREEN CLEAR 2V 0603	LED1			Digi-Key	732-4980-1-ND		1	
STANDOFF RND M2.5X0.45 STEEL 5MM	M1, M2, M3, M4			Digi-Key	732-7095-1-ND		4	
CONN 50POS Bergstak Plug 0.02"	P1	Amphenol FCI	10132797-055100LF	Digi-Key	609-5226-1-ND		1	
MOSFET P-CH PWR56 40V 4.9 MOHM	Q2, Q3, Q4, Q5, Q6, Q7, Q8, Q9, Q10, Q11, Q12, Q13			Digi-Key	DWS9508L-F085OSCT-ND		13	
CMP-003-0074-1	Q14	Diodes	DMN3023L-7	Newark	07AH3765		1	
RES 4.7K OHM 1% 1/10W 0603	R1	Yageo	RC0603FR-074K7L	Digi-Key	311-4.70KHRCT-ND		1	
RES 0.003 OHM 1% 1.5W 2010	R2	Stackpole Electronics Inc.	CSNL2010FT3L00	Digi-Key	CSNL2010FT3L00CT-ND		1	
RES 100 OHM 1% 1/10W 0603	R3, R5, R9, R11, R36, R38	Yageo	RC0603FR-07100RL	Digi-Key	311-100HRCT-ND		6	
RES 470K OHM 1% 1/4W 0603	R4, R10, R37	Panasonic Electronic Components	ERJ-PA3F4703V	Digi-Key	P470KBYCT-ND		3	
RES 100K OHM 5% 1/8W 0603	R6, R12, R39	Yageo	RC0603JR-07100KL	Digi-Key	311-100KGRCT-ND		3	
RES 10K OHM 1% 1/10W 0603	R13, R17, R18, R19, R30, R31, R32, R33, R35	Yageo	RC0603FR-0710KL	Digi-Key	311-10.0KHRCT-ND		11	
RES 4m OHM 1% 2W 2010	R8, R34			Digi-Key	P-TLR2HWDT4L00F75CT-ND		2	
RES 2.21K OHM 1% 1/10W 0603	R14, R15, R16			Digi-Key	YAG3586CT-ND		3	
RES 1M OHM 1% 1/10W 0603	R20, R21, R23, R42	Yageo	RC0603FR-071ML	Digi-Key	311-1.00MHRCT-ND		4	
RES 19.6K OHM 1% 1/10W 0603	R22			Digi-Key	RMCF0603FT19K6CT-ND		1	
RES 255K OHM 1% 1/10W 0603	R24	Yageo	RC0603FR-07255KL	Digi-Key	311-255KHRCT-ND		1	
RES SMD 75K OHM 0.1% 1/10W 0603	R25, R29			Digi-Key	P75KDBCT-ND		2	
RES 29.4K OHM 1% 1/10W 0603	R26	Yageo	RC0603FR-0729K4L	Digi-Key	311-29.4KHRCT-ND		1	
RES SMD 44.2K OHM 1% 1/10W 0603	R27			Digi-Key	P44.2KHCT-ND		1	
RES 76.8K OHM 1% 1/10W 0603	R28			Digi-Key	RMCF0603FT76K8CT-ND		1	
CMP-010-0039-1	R41	Panasonic	ERA-3AEB103V	Newark	01X1282		1	
CMP-010-0000-1	R43	Vishay Dale	CRCW06030000Z0EAHP	RS Components	1701982		1	
IC REG LINEAR 3V 200MA SOT23-5	U1			Digi-Key	296-12159-1-ND		1	
IC CURRENT AMPLIFIER INA240 8-TSSOP	U2	Texas Instruments	INA240A3PWR	Digi-Key	296-45090-1-ND		1	
C OP AMP GEN PURPOSE RR 10MHZ SOT-23-5	U3, U5, U9	Texas Instruments	TLV316QDBVRQ1	Digi-Key	296-45323-1-ND		3	
IC CURRENT AMPLIFIER INA240 8-TSSOP	U4, U8	Texas Instruments	INA240A3PWR	Digi-Key	296-45090-1-ND		2	
C OR CONTROLLER SOURCE SELECT 24SSOP	U6	Linear Technology	LTC4417CGN#PBF	Digi-Key	LTC4417CGN#PBF-ND		1	
IC OP AMP DUAL GP RR 10MHZ 8-VSSOP	U7			Digi-Key	296-47349-1-ND		1	
							Total:	\$ 5.06

**MIDNIGHT SUN SOLAR CAR TEAM
POWER SELECTION REV 1.0**

XIV







Design Rules Verification Report

Filename : D:\Josh9\Documents\Midnight Sun\hardware\MSXIV_PowerSelection\Power Sel

Warnings 0

Rule Violations 222

Warnings	
Total	0

Rule Violations	
Clearance Constraint (Gap=0.152mm) (All),(All)	0
Short-Circuit Constraint (Allowed=No) (All),(All)	0
Un-Routed Net Constraint (All)	0
Modified Polygon (Allow modified: No), (Allow shelved: No)	0
Width Constraint (Min=0.254mm) (Max =0.254mm) (Preferred=0.254mm) (All)	0
Power Plane Connect Rule(Direct Connect)(Expansion=0.508mm) (Conductor Width=0.254mm) (Air Gap=0.254mm)	0
Power Plane Connect Rule(Direct Connect)(Expansion=0.508mm) (Conductor Width=0.254mm) (Air Gap=0.254mm)	0
Hole Size Constraint (Min=0.025mm) (Max =2.54mm) (All)	9
Hole To Hole Clearance (Gap=0.254mm) (All),(All)	0
Minimum Solder Mask Sliver (Gap=0.254mm) (All),(All)	11
Silk To Solder Mask (Clearance=0.254mm) (IsPad),(All)	196
Silk to Silk (Clearance=0.254mm) (All),(All)	6
Net Antennae (Tolerance=0mm) (All)	0
Height Constraint (Min=0mm) (Max =25.4mm) (Preferred=12.7mm) (All)	0
Total	222

Hole Size Constraint (Min=0.025mm) (Max=2.54mm) (All)	
Hole Size Constraint: (2.7mm > 2.54mm) Pad Free-(3mm,3mm) on Multi-Layer Actual Hole Size = 2.7mm	
Hole Size Constraint: (2.7mm > 2.54mm) Pad Free-(3mm,42.4mm) on Multi-Layer Actual Hole Size = 2.7mm	
Hole Size Constraint: (2.7mm > 2.54mm) Pad Free-(3mm,92mm) on Multi-Layer Actual Hole Size = 2.7mm	
Hole Size Constraint: (2.7mm > 2.54mm) Pad Free-(92mm,37mm) on Multi-Layer Actual Hole Size = 2.7mm	
Hole Size Constraint: (2.7mm > 2.54mm) Pad Free-(92mm,92mm) on Multi-Layer Actual Hole Size = 2.7mm	
Hole Size Constraint: (3.7mm > 2.54mm) Pad M1-(60.6mm,4mm) on Multi-Layer Actual Hole Size = 3.7mm	
Hole Size Constraint: (3.7mm > 2.54mm) Pad M2-(90.6mm,4mm) on Multi-Layer Actual Hole Size = 3.7mm	
Hole Size Constraint: (3.7mm > 2.54mm) Pad M3-(60.6mm,29mm) on Multi-Layer Actual Hole Size = 3.7mm	
Hole Size Constraint: (3.7mm > 2.54mm) Pad M4-(90.6mm,29mm) on Multi-Layer Actual Hole Size = 3.7mm	

Minimum Solder Mask Sliver (Gap=0.254mm) (All),(All)	
Minimum Solder Mask Sliver Constraint: (0.21mm < 0.254mm) Between Pad DCDC-TH_TP(31.9mm,69.8mm) on Multi-Layer And Pad	
Minimum Solder Mask Sliver Constraint: (0.105mm < 0.254mm) Between Pad P1-(62.1mm,23.55mm) on Multi-Layer And Pad P1-(63.6mm,24.3mm) on Top	
Minimum Solder Mask Sliver Constraint: (0.105mm < 0.254mm) Between Pad P1-(62.1mm,9.45mm) on Multi-Layer And Pad P1-(63.6mm,8.7mm) on Top	
Minimum Solder Mask Sliver Constraint: (0.147mm < 0.254mm) Between Pad U1-1(46.4mm,6.25mm) on Bottom Layer And Pad U1-2(46.4mm,5.3mm) or	
Minimum Solder Mask Sliver Constraint: (0.147mm < 0.254mm) Between Pad U1-2(46.4mm,5.3mm) on Bottom Layer And Pad U1-3(46.4mm,4.35mm) or	
Minimum Solder Mask Sliver Constraint: (0.147mm < 0.254mm) Between Pad U3-1(34.85mm,14.8mm) on Bottom Layer And Pad U3-2(35.8mm,14.8mm)	
Minimum Solder Mask Sliver Constraint: (0.147mm < 0.254mm) Between Pad U3-2(35.8mm,14.8mm) on Bottom Layer And Pad U3-3(36.75mm,14.8mm)	
Minimum Solder Mask Sliver Constraint: (0.147mm < 0.254mm) Between Pad U5-1(25.85mm,14.775mm) on Bottom Layer And Pad	
Minimum Solder Mask Sliver Constraint: (0.147mm < 0.254mm) Between Pad U5-2(26.8mm,14.775mm) on Bottom Layer And Pad	
Minimum Solder Mask Sliver Constraint: (0.147mm < 0.254mm) Between Pad U9-1(16.85mm,14.775mm) on Bottom Layer And Pad	
Minimum Solder Mask Sliver Constraint: (0.147mm < 0.254mm) Between Pad U9-2(17.8mm,14.775mm) on Bottom Layer And Pad	

Silk To Solder Mask (Clearance=0.254mm) (IsPad),(All)
Silk To Solder Mask Clearance Constraint: (0.179mm < 0.254mm) Between Pad Q8-5(40.71mm,58.11mm) on Top Layer And Track
Silk To Solder Mask Clearance Constraint: (0.179mm < 0.254mm) Between Pad Q8-6(40.71mm,56.84mm) on Top Layer And Track
Silk To Solder Mask Clearance Constraint: (0.179mm < 0.254mm) Between Pad Q8-7(40.71mm,55.57mm) on Top Layer And Track
Silk To Solder Mask Clearance Constraint: (0.179mm < 0.254mm) Between Pad Q8-8(40.71mm,54.3mm) on Top Layer And Track
Silk To Solder Mask Clearance Constraint: (0.179mm < 0.254mm) Between Pad Q9-1(50.4mm,41.2mm) on Top Layer And Track
Silk To Solder Mask Clearance Constraint: (0.179mm < 0.254mm) Between Pad Q9-2(50.4mm,39.93mm) on Top Layer And Track
Silk To Solder Mask Clearance Constraint: (0.179mm < 0.254mm) Between Pad Q9-3(50.4mm,38.66mm) on Top Layer And Track
Silk To Solder Mask Clearance Constraint: (0.179mm < 0.254mm) Between Pad Q9-4(50.4mm,37.39mm) on Top Layer And Track
Silk To Solder Mask Clearance Constraint: (0.179mm < 0.254mm) Between Pad Q9-5(55.89mm,37.39mm) on Top Layer And Track
Silk To Solder Mask Clearance Constraint: (0.179mm < 0.254mm) Between Pad Q9-6(55.89mm,38.66mm) on Top Layer And Track
Silk To Solder Mask Clearance Constraint: (0.179mm < 0.254mm) Between Pad Q9-7(55.89mm,39.93mm) on Top Layer And Track
Silk To Solder Mask Clearance Constraint: (0.179mm < 0.254mm) Between Pad Q9-8(55.89mm,41.2mm) on Top Layer And Track
Silk To Solder Mask Clearance Constraint: (0.216mm < 0.254mm) Between Pad Rear Power Distribution-0(76.6mm,63.7mm) on Multi-Layer And Track
Silk To Solder Mask Clearance Constraint: (0.216mm < 0.254mm) Between Pad Rear Power Distribution-0(76.6mm,65.8mm) on Multi-Layer And Track
Silk To Solder Mask Clearance Constraint: (0.216mm < 0.254mm) Between Pad Rear Power Distribution-0(76.6mm,76.4mm) on Multi-Layer And Track
Silk To Solder Mask Clearance Constraint: (0.216mm < 0.254mm) Between Pad Rear Power Distribution-0(76.6mm,78.5mm) on Multi-Layer And Track
Silk To Solder Mask Clearance Constraint: (0.248mm < 0.254mm) Between Pad Rear Power Distribution-0(85.05mm,63.7mm) on Multi-Layer And Track
Silk To Solder Mask Clearance Constraint: (0.248mm < 0.254mm) Between Pad Rear Power Distribution-0(85.05mm,65.8mm) on Multi-Layer And Track
Silk To Solder Mask Clearance Constraint: (0.248mm < 0.254mm) Between Pad Rear Power Distribution-0(85.05mm,76.4mm) on Multi-Layer And Track
Silk To Solder Mask Clearance Constraint: (0.248mm < 0.254mm) Between Pad Rear Power Distribution-0(85.05mm,78.5mm) on Multi-Layer And Track
Silk To Solder Mask Clearance Constraint: (0.225mm < 0.254mm) Between Pad TP1-TP(44.1mm,26.8mm) on Top Layer And Text "TP1"
Silk To Solder Mask Clearance Constraint: (0.225mm < 0.254mm) Between Pad TP2-TP(48.1mm,26.8mm) on Top Layer And Text "TP2"
Silk To Solder Mask Clearance Constraint: (0.225mm < 0.254mm) Between Pad TP3-TP(40.1mm,26.8mm) on Top Layer And Text "TP3"
Silk To Solder Mask Clearance Constraint: (0.236mm < 0.254mm) Between Pad U1-1(46.4mm,6.25mm) on Bottom Layer And Track
Silk To Solder Mask Clearance Constraint: (0.125mm < 0.254mm) Between Pad U1-1(46.4mm,6.25mm) on Bottom Layer And Track
Silk To Solder Mask Clearance Constraint: (0.125mm < 0.254mm) Between Pad U1-2(46.4mm,5.3mm) on Bottom Layer And Track
Silk To Solder Mask Clearance Constraint: (0.236mm < 0.254mm) Between Pad U1-3(46.4mm,4.35mm) on Bottom Layer And Track
Silk To Solder Mask Clearance Constraint: (0.125mm < 0.254mm) Between Pad U1-3(46.4mm,4.35mm) on Bottom Layer And Track
Silk To Solder Mask Clearance Constraint: (0.125mm < 0.254mm) Between Pad U1-4(44.1mm,4.35mm) on Bottom Layer And Track
Silk To Solder Mask Clearance Constraint: (0.236mm < 0.254mm) Between Pad U1-4(44.1mm,4.35mm) on Bottom Layer And Track
Silk To Solder Mask Clearance Constraint: (0.125mm < 0.254mm) Between Pad U1-5(44.1mm,6.25mm) on Bottom Layer And Track
Silk To Solder Mask Clearance Constraint: (0.236mm < 0.254mm) Between Pad U1-5(44.1mm,6.25mm) on Bottom Layer And Track
Silk To Solder Mask Clearance Constraint: (0.225mm < 0.254mm) Between Pad U7-1(2.9mm,13.125mm) on Bottom Layer And Track
Silk To Solder Mask Clearance Constraint: (0.242mm < 0.254mm) Between Pad U7-2(2.9mm,13.775mm) on Bottom Layer And Track
Silk To Solder Mask Clearance Constraint: (0.242mm < 0.254mm) Between Pad U7-3(2.9mm,14.425mm) on Bottom Layer And Track
Silk To Solder Mask Clearance Constraint: (0.242mm < 0.254mm) Between Pad U7-4(2.9mm,15.075mm) on Bottom Layer And Track
Silk To Solder Mask Clearance Constraint: (0.225mm < 0.254mm) Between Pad U7-5(7.3mm,15.075mm) on Bottom Layer And Track
Silk To Solder Mask Clearance Constraint: (0.225mm < 0.254mm) Between Pad U7-6(7.3mm,14.425mm) on Bottom Layer And Track
Silk To Solder Mask Clearance Constraint: (0.225mm < 0.254mm) Between Pad U7-7(7.3mm,13.775mm) on Bottom Layer And Track
Silk To Solder Mask Clearance Constraint: (0.225mm < 0.254mm) Between Pad U7-8(7.3mm,13.125mm) on Bottom Layer And Track

Silk to Silk (Clearance=0.254mm) (All),(All)
Silk To Silk Clearance Constraint: (0.248mm < 0.254mm) Between Text "1" (2.35mm,33.45mm) on Top Overlay And Track
Silk To Silk Clearance Constraint: (0.248mm < 0.254mm) Between Text "1" (2.35mm,58.75mm) on Top Overlay And Track
Silk To Silk Clearance Constraint: (0.248mm < 0.254mm) Between Text "1" (2.35mm,83.15mm) on Top Overlay And Track
Silk To Silk Clearance Constraint: (0.248mm < 0.254mm) Between Text "1" (86.55mm,44.85mm) on Top Overlay And Track
Silk To Silk Clearance Constraint: (0.248mm < 0.254mm) Between Text "1" (86.55mm,67.45mm) on Top Overlay And Track
Silk To Silk Clearance Constraint: (0.198mm < 0.254mm) Between Text "AUX Power" (6.5mm,19mm) on Top Overlay And Track

