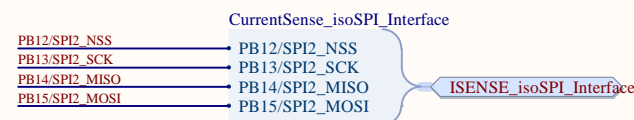
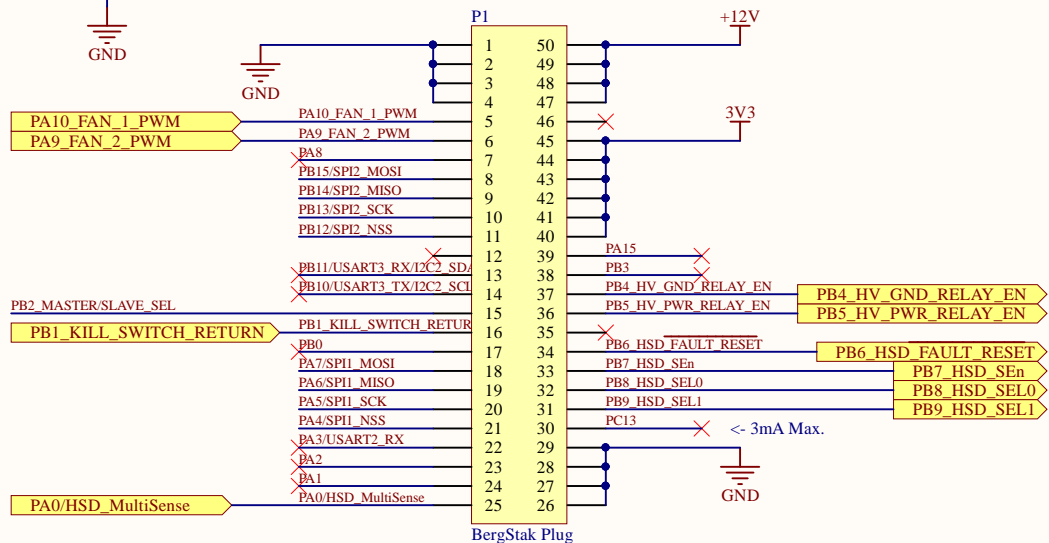





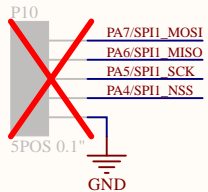
LED is ON if board is configured for the Master battery box.




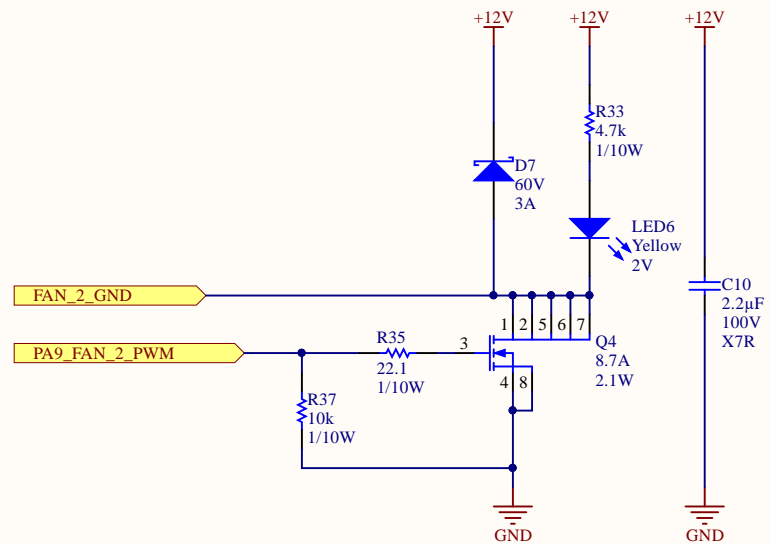
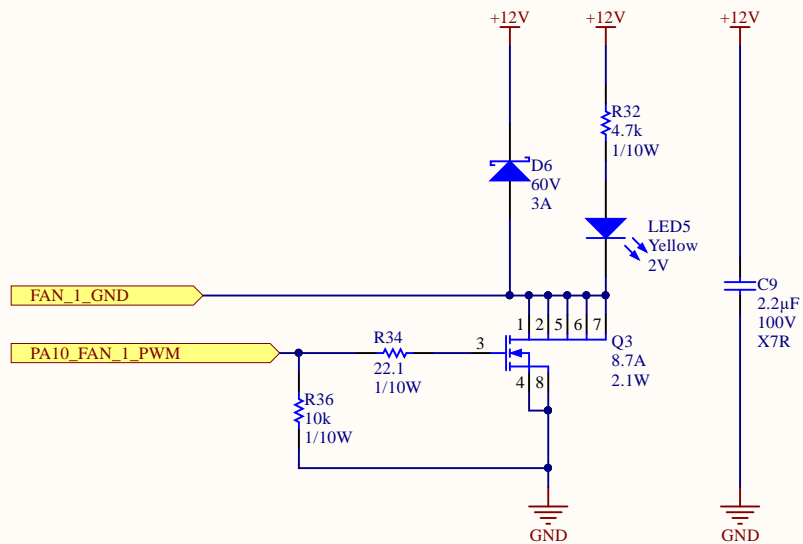
Project: <i>BMS_Carrier_Board.PrjPcb</i>		<div><div>MIDNIGHT</div><div></div><div>SUN</div></div>
Title: <b>Controller Board Interface</b>		
Project Lead: <a href="#">Taiping Li</a>		<div>University of Waterloo 200 University Ave W Waterloo, ON, Canada N2L 3E9</div> <div>Website: <a href="http://www.uwmidsun.com">www.uwmidsun.com</a></div>
Size: <b>Letter</b>	Revision: <b>3.1</b>	
Date: <b>5/21/2018</b>	Sheet 1 of 4	


MODE	POL	PHA	DESCRIPTION
0	0	0	SCK Idles Low, Latches on Rising (1st) Edge
1	0	1	SCK Idles Low, Latches on Falling (2nd) Edge
2	1	0	SCK Idles High, Latches on Falling (1st) Edge
3	1	1	SCK Idles High, Latches on Rising (2nd) Edge

Bias Current I\_BIAS can be adjusted from 0.1mA to 1mA  
Currently set to 1mA

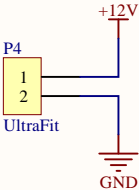
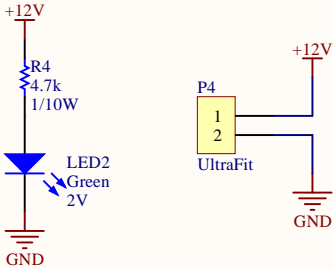


Project: <b>BMS_Carrier_Board.PrjPcb</b>		
Title: <b>BMS Interface</b>		
Project Lead: <a href="#">Taiping Li</a>		University of Waterloo 200 University Ave W Waterloo, ON, Canada N2L 3E9  Website: <a href="http://www.uwmidsun.com">www.uwmidsun.com</a>
Size: <b>Letter</b>	Revision: <b>3.1</b>	
Date: <b>5/21/2018</b>	Sheet <b>3</b> of <b>4</b>	

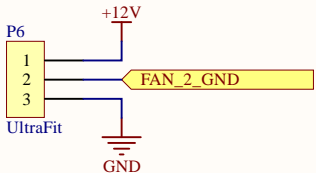
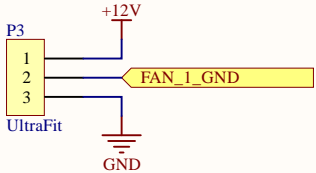
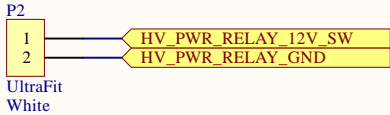


Project: <i>BMS_Carrier_Board.PrjPcb</i>		
Title: <b>BMS Fan and Relay Control</b>		
Project Lead: <u>Taiping Li</u>		University of Waterloo 200 University Ave W Waterloo, ON, Canada N2L 3E9
Size: <b>Letter</b>	Revision: <b>3.1</b>	
Date: <b>5/21/2018</b>	Sheet <b>4</b> of <b>4</b>	
		Website: <a href="http://www.uwmidsun.com">www.uwmidsun.com</a>

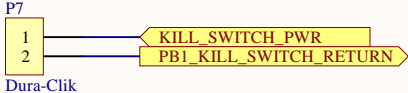
12V Power



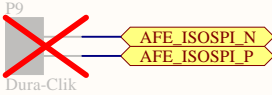
Fan & Relays



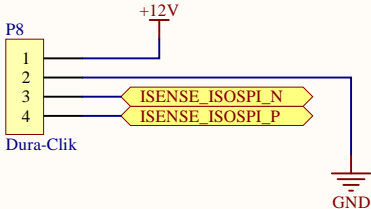
Kill Switch




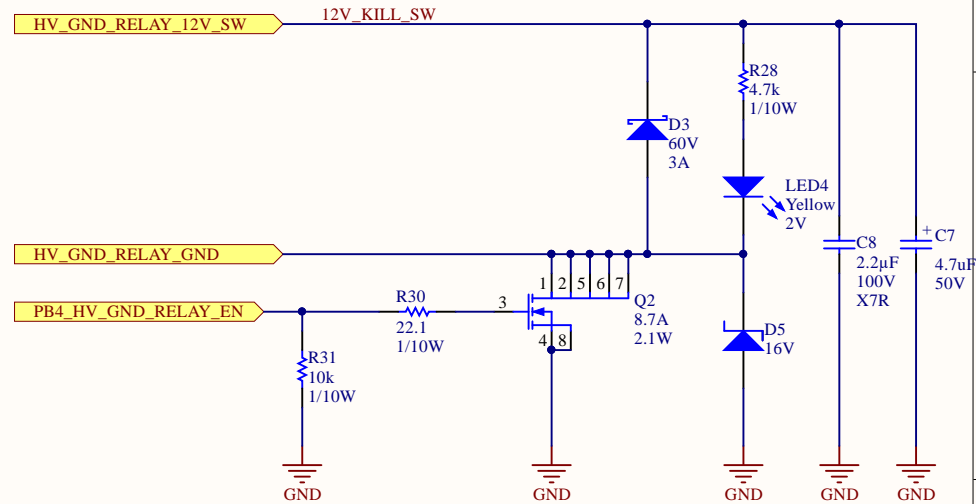
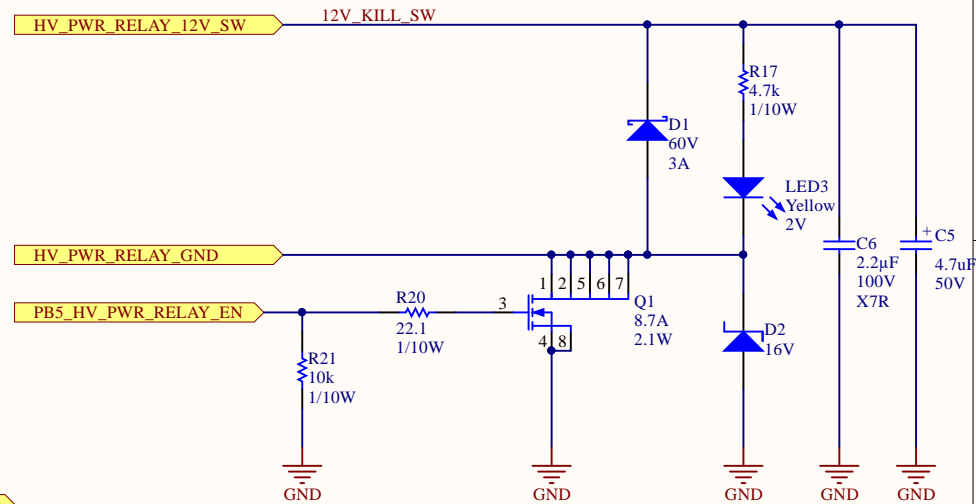
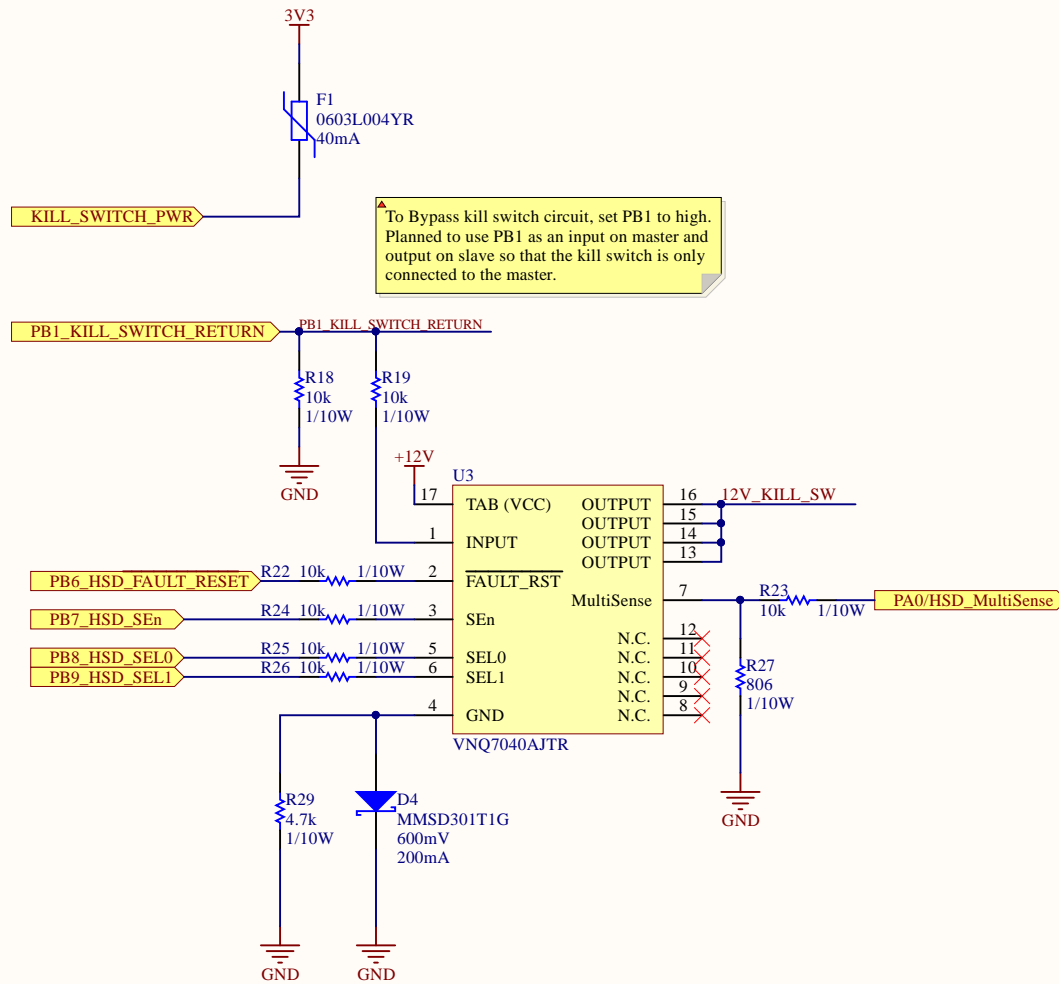
AFE isoSPI



BMS Current Sense



Project: <i>BMS_Carrier_Board.PrjPcb</i>		<div>MIDNIGHTSUN</div>
Title: <b>BMS Fan and Relay Control</b>		
Project Lead: Taiping Li		University of Waterloo 200 University Ave W Waterloo, ON, Canada N2L 3E9
Size: Letter	Revision: 3.1	
Date: 5/21/2018	Sheet4 of 4	
		Website: <a href="http://www.uwmidsun.com">www.uwmidsun.com</a>

Project: **BMS\_Carrier\_Board.PrjPcb**Title: **BMS Fan and Relay Control**

Project Lead: Taiping Li

Size: Letter

Revision: 3.1

Date: 5/21/2018

Sheet 4 of 4

**MIDNIGHT SUN**University of Waterloo  
200 University Ave W  
Waterloo, ON, Canada  
N2L 3E9

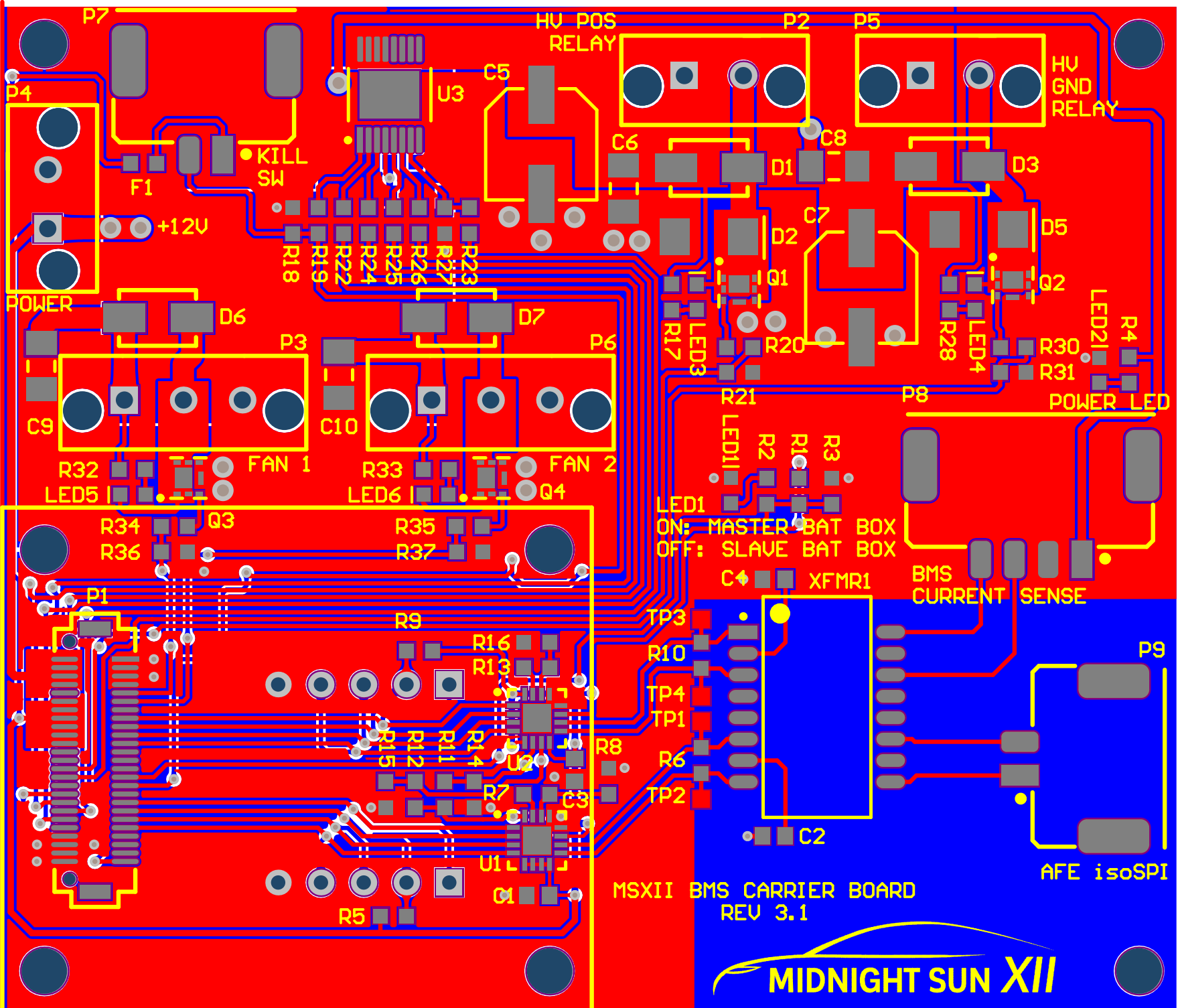
Website: www.uwmidsun.com



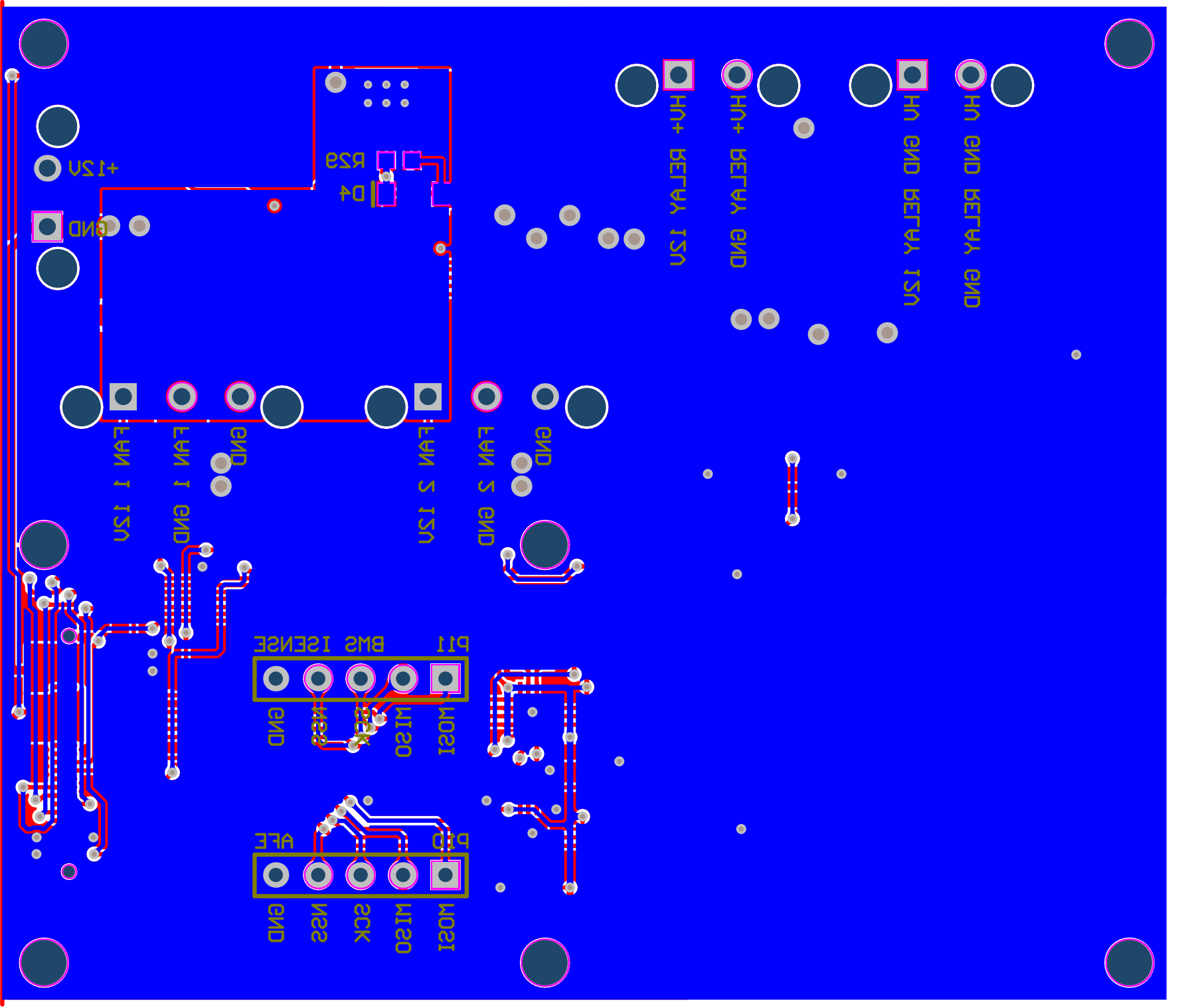
Bill of Materials	
Project:	BMS_Carrier_Board.PrjPcb
Revision:	3.1
Project Lead:	Taiping Li
Generated On:	5/21/2018 12:42:23 AM
Production Quantity:	1
Currency	CAD
Total Parts Count:	70

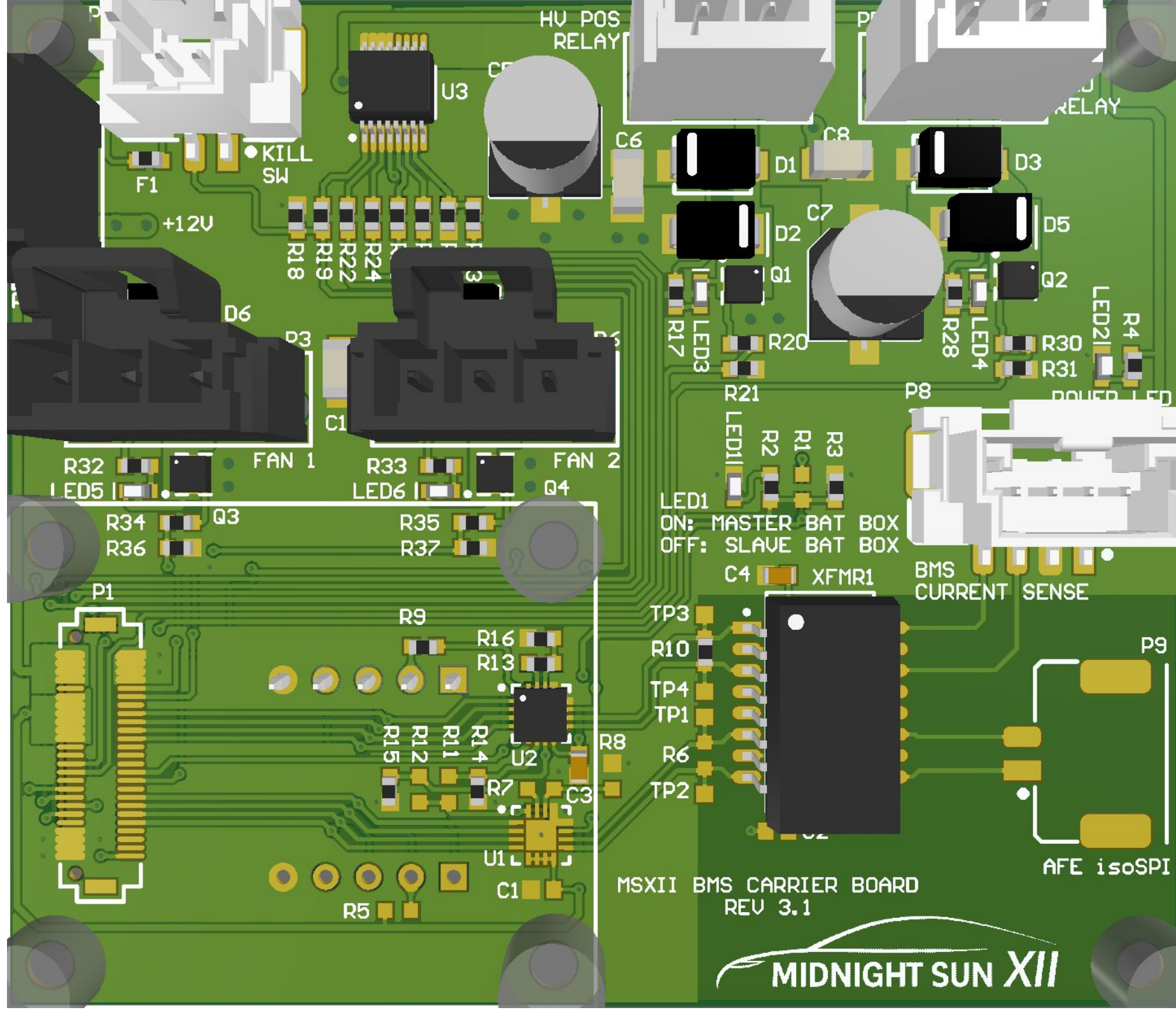


LibRef	Designator	Manufacturer 1	Manufacturer Part Number 1	Supplier 1	Supplier Part Number 1	Supplier Unit Price 1	Supplier Order Qty 1	Supplier Subtotal 1
CAP CER 0.1UF 50V 10% X7R 0603	C3	Kyocera AVX	06035C-104KAT2A	Digi-Key	478-5052-1-ND	0.21	1	\$ 0.21
CAP CER 20PF 50V 45% COG/NPO 0603	C4	Murata	GRM1885C1H200JA01D	Digi-Key	490-1410-1-ND	0.15	1	\$ 0.15
CAP ALUM 4.7UF 20% 50V SMD	C5	Panasonic	EEE-1HA4R7NP	Digi-Key	PCE4304CT-ND	0.55	1	\$ 0.55
CAP CER 2.2UF 100V ±20% X7R 1206	C6	Murata	GRM31CR72A225MA73L	Digi-Key	490-12773-1-ND			
CAP ALUM 4.7UF 20% 50V SMD	C7	Panasonic	EEE-1HA4R7NP	Digi-Key	PCE4304CT-ND	0.55	1	\$ 0.55
CAP CER 2.2UF 100V ±20% X7R 1206	C8	Murata	GRM31CR72A225MA73L	Digi-Key	490-12773-1-ND			
CAP CER 2.2UF 100V ±20% X7R 1206	C9	Murata	GRM31CR72A225MA73L	Digi-Key	490-12773-1-ND			
CAP CER 2.2UF 100V ±20% X7R 1206	C10	Murata	GRM31CR72A225MA73L	Digi-Key	490-12773-1-ND			
DIODE SCHOTTKY 60V 3A SMA	D1	Diodes	B360A-13-F	Digi-Key	B360A-FDICT-ND	0.62	1	\$ 0.62
DIODE ZENER 16V 5W DO-214AA (SMB)	D2	MCC	SMBJ5353B-TP	Digi-Key	SMBJ5353B-TPMSCT-ND	0.88	1	\$ 0.88
DIODE SCHOTTKY 60V 3A SMA	D3	Diodes	B360A-13-F	Digi-Key	B360A-FDICT-ND	0.62	1	\$ 0.62
DIODE SCHOTTKY SMALL SIG 30V 200MA SOD123	D4	ON Semiconductor	MMSD301T1G	Digi-Key	MMSD301T1GOSCT-ND	0.48	1	\$ 0.48
DIODE ZENER 16V 5W DO-214AA (SMB)	D5	MCC	SMBJ5353B-TP	Digi-Key	SMBJ5353B-TPMSCT-ND	0.88	1	\$ 0.88
DIODE SCHOTTKY 60V 3A SMA	D6	Diodes	B360A-13-F	Digi-Key	B360A-FDICT-ND	0.62	1	\$ 0.62
DIODE SCHOTTKY 60V 3A SMA	D7	Diodes	B360A-13-F	Digi-Key	B360A-FDICT-ND	0.62	1	\$ 0.62
FUSE PTC RESET 24V 40MA 0603	F1	Littelfuse	0603L004YR	Digi-Key	F6263CT-ND	3.36	1	\$ 3.36
LED RED CLEAR 2V 0603	LED1	Wurth Electronics	150060RS75000	Digi-Key	732-4978-1-ND	0.18	1	\$ 0.18
LED GREEN CLEAR 2V 0603	LED2	Wurth Electronics	150060VS75000	Digi-Key	732-4980-1-ND	0.18	1	\$ 0.18
LED YELLOW CLEAR 2 1V 0603	LED3	Wurth Electronics	150060YS75000	Digi-Key	732-4981-1-ND	0.18	1	\$ 0.18
LED YELLOW CLEAR 2 1V 0603	LED4	Wurth Electronics	150060YS75000	Digi-Key	732-4981-1-ND	0.18	1	\$ 0.18
LED YELLOW CLEAR 2 1V 0603	LED5	Wurth Electronics	150060YS75000	Digi-Key	732-4981-1-ND	0.18	1	\$ 0.18
LED YELLOW CLEAR 2 1V 0603	LED6	Wurth Electronics	150060YS75000	Digi-Key	732-4981-1-ND	0.18	1	\$ 0.18
CONN 50POS Bergstak Plug 0.02"	P1	Amphenol FCI	10132797-055100LF	Digi-Key	609-5226-1-ND	1.8	1	\$ 1.80
CONN 2POS ULTRA-FIT NATURAL COLOR 0.138"	P2	Molex	1722872102	Digi-Key	WM11722-ND	1.06	1	\$ 1.06
CONN 3POS ULTRA-FIT 0.138"	P3	Molex	1722871103	Digi-Key	WM11702-ND	1.06	1	\$ 1.06
CONN 2POS ULTRA-FIT 0.138"	P4	Molex	1722861302	Digi-Key	WM11673-ND	1.78	1	\$ 1.78
CONN 2POS ULTRA-FIT NATURAL COLOR 0.138"	P5	Molex	1722872102	Digi-Key	WM11722-ND	1.06	1	\$ 1.06
CONN 3POS ULTRA-FIT 0.138"	P6	Molex	1722871103	Digi-Key	WM11702-ND	1.06	1	\$ 1.06
CONN 2POS DURA-CLIK 0.079" VERT	P7	Molex	560020-0220	Digi-Key	WM10862CT-ND	1.06	1	\$ 1.06
CONN 4POS DURA-CLIK 0.079"	P8	Molex	560020-0420	Digi-Key	WM10864CT-ND	2.03	1	\$ 2.03
CONN 5POS HEADR MALE 0.1"	P11	Molex	0022284050	Digi-Key	WM50014-05-ND	0.28	1	\$ 0.28
MOSFET N-CH 30V 8.7A 2.1W 6-PQFN (2x2)	Q1	Infineon	IRLHS6342TRPBF	Digi-Key	IRLHS6342TRPBFCT-ND	0.9	1	\$ 0.90
MOSFET N-CH 30V 8.7A 2.1W 6-PQFN (2x2)	Q2	Infineon	IRLHS6342TRPBF	Digi-Key	IRLHS6342TRPBFCT-ND	0.9	1	\$ 0.90
MOSFET N-CH 30V 8.7A 2.1W 6-PQFN (2x2)	Q3	Infineon	IRLHS6342TRPBF	Digi-Key	IRLHS6342TRPBFCT-ND	0.9	1	\$ 0.90
MOSFET N-CH 30V 8.7A 2.1W 6-PQFN (2x2)	Q4	Infineon	IRLHS6342TRPBF	Digi-Key	IRLHS6342TRPBFCT-ND	0.9	1	\$ 0.90
RES 604 OHM 1% 1/10W 0603	R2	Yageo	RC0603FR-07604RL	Digi-Key	311-604HRCT-ND	0.13	1	\$ 0.13
RES 0.0 OHM 1/4W 0603	R3	Vishay Dale	CRCW0603000020E4HP	Digi-Key	541-0.05BCT-ND	0.22	1	\$ 0.22
RES 4.7K OHM 1% 1/10W 0603	R4	Yageo	RC0603FR-074K7L	Digi-Key	311-4.70KHRCT-ND	0.13	1	\$ 0.13
RES 2K OHM 1% 1/10W 0603	R9	Yageo	RC0603FR-072KL	Digi-Key	311-2.00KHRCT-ND	0.13	1	\$ 0.13
RES 120 OHM 1% 1/10W 0603	R10	Yageo	RC0603FR-07120RL	Digi-Key	311-120HRCT-ND	0.13	1	\$ 0.13
RES 1.4k OHM 1% 1/10W 0603	R13	Yageo	RC0603FR-071K4L	Digi-Key	311-1.40KHRCT-ND	0.13	1	\$ 0.13
RES 0.0 OHM 1/4W 0603	R14	Vishay Dale	CRCW0603000020E4HP	Digi-Key	541-0.05BCT-ND	0.22	1	\$ 0.22
RES 0.0 OHM 1/4W 0603	R15	Vishay Dale	CRCW0603000020E4HP	Digi-Key	541-0.05BCT-ND	0.22	1	\$ 0.22
RES 604 OHM 1% 1/10W 0603	R16	Yageo	RC0603FR-07604RL	Digi-Key	311-604HRCT-ND	0.13	1	\$ 0.13
RES 4.7K OHM 1% 1/10W 0603	R17	Yageo	RC0603FR-074K7L	Digi-Key	311-4.70KHRCT-ND	0.13	1	\$ 0.13
RES 10K OHM 1% 1/10W 0603	R18	Yageo	RC0603FR-0710KL	Digi-Key	311-10.0KHRCT-ND	0.13	1	\$ 0.13
RES 10K OHM 1% 1/10W 0603	R19	Yageo	RC0603FR-0710KL	Digi-Key	311-10.0KHRCT-ND	0.13	1	\$ 0.13
RES 22.1 OHM 1% 1/10W 0603	R20	Yageo	RC0603FR-0722R1L	Digi-Key	311-22.1HRCT-ND	0.13	1	\$ 0.13
RES 10K OHM 1% 1/10W 0603	R21	Yageo	RC0603FR-0710KL	Digi-Key	311-10.0KHRCT-ND	0.13	1	\$ 0.13
RES 10K OHM 1% 1/10W 0603	R22	Yageo	RC0603FR-0710KL	Digi-Key	311-10.0KHRCT-ND	0.13	1	\$ 0.13
RES 10K OHM 1% 1/10W 0603	R23	Yageo	RC0603FR-0710KL	Digi-Key	311-10.0KHRCT-ND	0.13	1	\$ 0.13
RES 10K OHM 1% 1/10W 0603	R24	Yageo	RC0603FR-0710KL	Digi-Key	311-10.0KHRCT-ND	0.13	1	\$ 0.13
RES 10K OHM 1% 1/10W 0603	R25	Yageo	RC0603FR-0710KL	Digi-Key	311-10.0KHRCT-ND	0.13	1	\$ 0.13
RES 10K OHM 1% 1/10W 0603	R26	Yageo	RC0603FR-0710KL	Digi-Key	311-10.0KHRCT-ND	0.13	1	\$ 0.13
RES 806 OHM 1% 1/10W 0603	R27	Yageo	RC0603FR-07806RL	Digi-Key	311-806HRCT-ND	0.13	1	\$ 0.13
RES 4.7K OHM 1% 1/10W 0603	R28	Yageo	RC0603FR-074K7L	Digi-Key	311-4.70KHRCT-ND	0.13	1	\$ 0.13
RES 4.7K OHM 1% 1/10W 0603	R29	Yageo	RC0603FR-074K7L	Digi-Key	311-4.70KHRCT-ND	0.13	1	\$ 0.13
RES 22.1 OHM 1% 1/10W 0603	R30	Yageo	RC0603FR-0722R1L	Digi-Key	311-22.1HRCT-ND	0.13	1	\$ 0.13
RES 10K OHM 1% 1/10W 0603	R31	Yageo	RC0603FR-0710KL	Digi-Key	311-10.0KHRCT-ND	0.13	1	\$ 0.13
RES 4.7K OHM 1% 1/10W 0603	R32	Yageo	RC0603FR-074K7L	Digi-Key	311-4.70KHRCT-ND	0.13	1	\$ 0.13
RES 4.7K OHM 1% 1/10W 0603	R33	Yageo	RC0603FR-074K7L	Digi-Key	311-4.70KHRCT-ND	0.13	1	\$ 0.13
RES 22.1 OHM 1% 1/10W 0603	R34	Yageo	RC0603FR-0722R1L	Digi-Key	311-22.1HRCT-ND	0.13	1	\$ 0.13
RES 22.1 OHM 1% 1/10W 0603	R35	Yageo	RC0603FR-0722R1L	Digi-Key	311-22.1HRCT-ND	0.13	1	\$ 0.13
RES 10K OHM 1% 1/10W 0603	R36	Yageo	RC0603FR-0710KL	Digi-Key	311-10.0KHRCT-ND	0.13	1	\$ 0.13
RES 10K OHM 1% 1/10W 0603	R37	Yageo	RC0603FR-0710KL	Digi-Key	311-10.0KHRCT-ND	0.13	1	\$ 0.13
Test Point	TP3							
Test Point	TP4							
IC ISOSPI COMM INTERFACE LTC6820IUD	U2	Analog Devices / Linear Technology	LTC6820IUD#PBF	Digi-Key	LTC6820IUD#PBF-ND	6.44	1	\$ 6.44
IC DVR HIGH-SIDE 1CH POWERSSO-16	U3	STMicroelectronics	VN7040AJTR	Digi-Key	497-15853-1-ND	2.34	1	\$ 2.34
IC PULSE XFMR 1CT:1CT 350UH SMD	XFMR1	Bourns	PT61018AAPEL-S	Digi-Key	PT61018AAPEL-SCT-ND	2.38	1	\$ 2.38
							Total:	\$ 40.74









## Electrical Rules Check Report

Class	Document	Message
Error	BMS Carrier - Connectors.SchDoc	Net 12V_KILL_SW contains multiple Input Ports (Port HV_GND_RELAY_12V_SW,Port HV_GND_RELAY_12V_SW,Port HV_PWR_RELAY_12V_SW,Port HV_PWR_RELAY_12V_SW)
Error	BMS Carrier - Battery Relay Controls.SchDoc	Net 12V_KILL_SW contains multiple Input Ports (Port HV_GND_RELAY_12V_SW,Port HV_PWR_RELAY_12V_SW)
Error	BMS Carrier - Battery Relay Controls.SchDoc	Net NetD1_1 contains multiple Input Ports (Port HV_PWR_RELAY_GND,Port HV_PWR_RELAY_GND)
Error	BMS Carrier - Battery Relay Controls.SchDoc	Net NetD3_1 contains multiple Input Ports (Port HV_GND_RELAY_GND,Port HV_GND_RELAY_GND)
Error	BMS Carrier - Fan Controls.SchDoc	Net NetD6_1 contains multiple Input Ports (Port FAN_1_GND,Port FAN_1_GND)
Error	BMS Carrier - Fan Controls.SchDoc	Net NetD7_1 contains multiple Input Ports (Port FAN_2_GND,Port FAN_2_GND)
Error	BMS Carrier - Connectors.SchDoc	Net NetF1_2 contains multiple Input Ports (Port KILL_SWITCH_PWR,Port KILL_SWITCH_PWR)
Error	BMS Carrier - Fan Controls.SchDoc	Net PA9_FAN_2_PWM contains multiple Input Ports (Port PA9_FAN_2_PWM,Port PA9_FAN_2_PWM)
Error	BMS Carrier - Fan Controls.SchDoc	Net PA10_FAN_1_PWM contains multiple Input Ports (Port PA10_FAN_1_PWM,Port PA10_FAN_1_PWM)
Error	BMS Carrier - Connectors.SchDoc	Net PB1_KILL_SWITCH_RETURN contains multiple Input Ports (Port PB1_KILL_SWITCH_RETURN,Port PB1_KILL_SWITCH_RETURN)

## Design Rules Verification Report

Filename : C:\Users\Taiping\Documents\MidnightSun\hardware\MSXII\_BMS\_Carrier\_Board\

Warnings 0  
Rule Violations 95

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=0.203mm) (Max=2.54mm) (Preferred=0.203mm) (All)	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=5.08mm) (All)	0
Hole To Hole Clearance (Gap=0.254mm) (All),(All)	0
Minimum Solder Mask Sliver (Gap=0.254mm) (All),(All)	95
Silk To Solder Mask (Clearance=0.254mm) (Disabled)(IsPad),(All)	0
Silk to Silk (Clearance=0.254mm) (Disabled)(All),(All)	0
Net Antennae (Tolerance=0mm) (All)	0
Height Constraint (Min=0mm) (Max=25.4mm) (Preferred=12.7mm) (All)	0
Total	95

<b>Minimum Solder Mask Sliver (Gap=0.254mm) (All),(All)</b>
Minimum Solder Mask Sliver Constraint: (0.105mm < 0.254mm) Between Pad P1-1(1.5mm,19.55mm) on Multi-Layer And Pad P1-(3mm,20.3mm) on Top
Minimum Solder Mask Sliver Constraint: (0.105mm < 0.254mm) Between Pad P1-1(1.5mm,5.45mm) on Multi-Layer And Pad P1-(3mm,4.7mm) on Top Layer
Minimum Solder Mask Sliver Constraint: (0.047mm < 0.254mm) Between Pad Q1-1(40.325mm,41.1mm) on Top Layer And Pad Q1-2(40.325mm,40.45mm)
Minimum Solder Mask Sliver Constraint: (0.047mm < 0.254mm) Between Pad Q1-2(40.325mm,40.45mm) on Top Layer And Pad Q1-3(40.325mm,39.8mm)
Minimum Solder Mask Sliver Constraint: (0.047mm < 0.254mm) Between Pad Q1-3(40.325mm,39.8mm) on Top Layer And Pad Q1-7(41.25mm,40.75mm)
Minimum Solder Mask Sliver Constraint: (0.202mm < 0.254mm) Between Pad Q1-3(40.325mm,39.8mm) on Top Layer And Pad Q1-8(41.25mm,39.71mm)
Minimum Solder Mask Sliver Constraint: (0.047mm < 0.254mm) Between Pad Q1-4(42.175mm,39.8mm) on Top Layer And Pad Q1-5(42.175mm,40.45mm)
Minimum Solder Mask Sliver Constraint: (0.047mm < 0.254mm) Between Pad Q1-4(42.175mm,39.8mm) on Top Layer And Pad Q1-7(41.25mm,40.75mm)
Minimum Solder Mask Sliver Constraint: (0.202mm < 0.254mm) Between Pad Q1-4(42.175mm,39.8mm) on Top Layer And Pad Q1-8(41.25mm,39.71mm)
Minimum Solder Mask Sliver Constraint: (0.047mm < 0.254mm) Between Pad Q1-5(42.175mm,40.45mm) on Top Layer And Pad Q1-6(42.175mm,41.1mm)
Minimum Solder Mask Sliver Constraint: (0.187mm < 0.254mm) Between Pad Q1-7(41.25mm,40.75mm) on Top Layer And Pad Q1-8(41.25mm,39.71mm)
Minimum Solder Mask Sliver Constraint: (0.047mm < 0.254mm) Between Pad Q2-1(56.575mm,41.351mm) on Top Layer And Pad
Minimum Solder Mask Sliver Constraint: (0.047mm < 0.254mm) Between Pad Q2-2(56.575mm,40.701mm) on Top Layer And Pad
Minimum Solder Mask Sliver Constraint: (0.047mm < 0.254mm) Between Pad Q2-3(56.575mm,40.051mm) on Top Layer And Pad
Minimum Solder Mask Sliver Constraint: (0.202mm < 0.254mm) Between Pad Q2-3(56.575mm,40.051mm) on Top Layer And Pad
Minimum Solder Mask Sliver Constraint: (0.047mm < 0.254mm) Between Pad Q2-4(58.425mm,40.051mm) on Top Layer And Pad
Minimum Solder Mask Sliver Constraint: (0.047mm < 0.254mm) Between Pad Q2-4(58.425mm,40.051mm) on Top Layer And Pad
Minimum Solder Mask Sliver Constraint: (0.202mm < 0.254mm) Between Pad Q2-4(58.425mm,40.051mm) on Top Layer And Pad
Minimum Solder Mask Sliver Constraint: (0.047mm < 0.254mm) Between Pad Q2-5(58.425mm,40.701mm) on Top Layer And Pad
Minimum Solder Mask Sliver Constraint: (0.187mm < 0.254mm) Between Pad Q2-7(57.5mm,41.001mm) on Top Layer And Pad Q2-8(57.5mm,39.961mm)
Minimum Solder Mask Sliver Constraint: (0.047mm < 0.254mm) Between Pad Q3-1(7.9mm,28.325mm) on Top Layer And Pad Q3-2(8.55mm,28.325mm) on
Minimum Solder Mask Sliver Constraint: (0.047mm < 0.254mm) Between Pad Q3-2(8.55mm,28.325mm) on Top Layer And Pad Q3-3(9.2mm,28.325mm) on
Minimum Solder Mask Sliver Constraint: (0.047mm < 0.254mm) Between Pad Q3-3(9.2mm,28.325mm) on Top Layer And Pad Q3-7(8.25mm,29.25mm) on
Minimum Solder Mask Sliver Constraint: (0.202mm < 0.254mm) Between Pad Q3-3(9.2mm,28.325mm) on Top Layer And Pad Q3-8(9.29mm,29.25mm) on
Minimum Solder Mask Sliver Constraint: (0.047mm < 0.254mm) Between Pad Q3-4(9.2mm,30.175mm) on Top Layer And Pad Q3-5(8.55mm,30.175mm) on
Minimum Solder Mask Sliver Constraint: (0.047mm < 0.254mm) Between Pad Q3-4(9.2mm,30.175mm) on Top Layer And Pad Q3-7(8.25mm,29.25mm) on
Minimum Solder Mask Sliver Constraint: (0.202mm < 0.254mm) Between Pad Q3-4(9.2mm,30.175mm) on Top Layer And Pad Q3-8(9.29mm,29.25mm) on
Minimum Solder Mask Sliver Constraint: (0.047mm < 0.254mm) Between Pad Q3-5(8.55mm,30.175mm) on Top Layer And Pad Q3-6(7.9mm,30.175mm) on
Minimum Solder Mask Sliver Constraint: (0.187mm < 0.254mm) Between Pad Q3-7(8.25mm,29.25mm) on Top Layer And Pad Q3-8(9.29mm,29.25mm) on
Minimum Solder Mask Sliver Constraint: (0.047mm < 0.254mm) Between Pad Q4-1(25.9mm,28.325mm) on Top Layer And Pad Q4-2(26.55mm,28.325mm)
Minimum Solder Mask Sliver Constraint: (0.047mm < 0.254mm) Between Pad Q4-2(26.55mm,28.325mm) on Top Layer And Pad Q4-3(27.2mm,28.325mm)
Minimum Solder Mask Sliver Constraint: (0.047mm < 0.254mm) Between Pad Q4-3(27.2mm,28.325mm) on Top Layer And Pad Q4-7(26.25mm,29.25mm)
Minimum Solder Mask Sliver Constraint: (0.202mm < 0.254mm) Between Pad Q4-3(27.2mm,28.325mm) on Top Layer And Pad Q4-8(27.29mm,29.25mm)
Minimum Solder Mask Sliver Constraint: (0.047mm < 0.254mm) Between Pad Q4-4(27.2mm,30.175mm) on Top Layer And Pad Q4-5(26.55mm,30.175mm)
Minimum Solder Mask Sliver Constraint: (0.047mm < 0.254mm) Between Pad Q4-4(27.2mm,30.175mm) on Top Layer And Pad Q4-7(26.25mm,29.25mm)
Minimum Solder Mask Sliver Constraint: (0.202mm < 0.254mm) Between Pad Q4-4(27.2mm,30.175mm) on Top Layer And Pad Q4-8(27.29mm,29.25mm)
Minimum Solder Mask Sliver Constraint: (0.047mm < 0.254mm) Between Pad Q4-5(26.55mm,30.175mm) on Top Layer And Pad Q4-6(25.9mm,30.175mm)
Minimum Solder Mask Sliver Constraint: (0.187mm < 0.254mm) Between Pad Q4-7(26.25mm,29.25mm) on Top Layer And Pad Q4-8(27.29mm,29.25mm)
Minimum Solder Mask Sliver Constraint: (0.246mm < 0.254mm) Between Pad R10-1(39mm,19.5mm) on Top Layer And Pad TP3-TP(39mm,20.874mm) on
Minimum Solder Mask Sliver Constraint: (0.022mm < 0.254mm) Between Pad U1-1(27.825mm,8.5mm) on Top Layer And Pad U1-17(29.25mm,7.75mm) on
Minimum Solder Mask Sliver Constraint: (0.047mm < 0.254mm) Between Pad U1-1(27.825mm,8.5mm) on Top Layer And Pad U1-2(27.825mm,8mm) on
Minimum Solder Mask Sliver Constraint: (0.047mm < 0.254mm) Between Pad U1-10(30.675mm,7.5mm) on Top Layer And Pad U1-11(30.675mm,8mm) on
Minimum Solder Mask Sliver Constraint: (0.022mm < 0.254mm) Between Pad U1-10(30.675mm,7.5mm) on Top Layer And Pad U1-17(29.25mm,7.75mm)
Minimum Solder Mask Sliver Constraint: (0.047mm < 0.254mm) Between Pad U1-10(30.675mm,7.5mm) on Top Layer And Pad U1-9(30.675mm,7mm) on
Minimum Solder Mask Sliver Constraint: (0.047mm < 0.254mm) Between Pad U1-11(30.675mm,8mm) on Top Layer And Pad U1-12(30.675mm,8.5mm) on
Minimum Solder Mask Sliver Constraint: (0.022mm < 0.254mm) Between Pad U1-11(30.675mm,8mm) on Top Layer And Pad U1-17(29.25mm,7.75mm) on
Minimum Solder Mask Sliver Constraint: (0.022mm < 0.254mm) Between Pad U1-12(30.675mm,8.5mm) on Top Layer And Pad U1-17(29.25mm,7.75mm)
Minimum Solder Mask Sliver Constraint: (0.047mm < 0.254mm) Between Pad U1-13(30mm,9.175mm) on Top Layer And Pad U1-14(29.5mm,9.175mm) on
Minimum Solder Mask Sliver Constraint: (0.022mm < 0.254mm) Between Pad U1-13(30mm,9.175mm) on Top Layer And Pad U1-17(29.25mm,7.75mm) on
Minimum Solder Mask Sliver Constraint: (0.047mm < 0.254mm) Between Pad U1-14(29.5mm,9.175mm) on Top Layer And Pad U1-15(29mm,9.175mm) on
Minimum Solder Mask Sliver Constraint: (0.022mm < 0.254mm) Between Pad U1-14(29.5mm,9.175mm) on Top Layer And Pad U1-17(29.25mm,7.75mm)
Minimum Solder Mask Sliver Constraint: (0.047mm < 0.254mm) Between Pad U1-15(29mm,9.175mm) on Top Layer And Pad U1-16(28.5mm,9.175mm) on

Minimum Solder Mask Sliver (Gap=0.254mm) (All), (All)

Minimum Solder Mask Sliver Constraint: (0.022mm < 0.254mm) Between Pad U1-15(29mm, 9.175mm) on Top Layer And Pad U1-17(29.25mm, 7.75mm) on

Minimum Solder Mask Sliver Constraint: (0.022mm < 0.254mm) Between Pad U1-16(28.5mm, 9.175mm) on Top Layer And Pad U1-17(29.25mm, 7.75mm)

Minimum Solder Mask Sliver Constraint: (0.022mm < 0.254mm) Between Pad U1-17(29.25mm,7.75mm) on Top Layer And Pad U1-2(27.825mm,8mm) on

Minimum Solder Mask Sliver Constraint: (0.022mm < 0.254mm) Between Pad U1-17(29.25mm, 7.75mm) on Top Layer And Pad U1-3(27.825mm, 7.5mm) o

Minimum Solder Mask Sliver Constraint: (0.022mm ≤ 0.254mm) Between Pad 11-17(29.25mm 7.75mm) on Top Layer And Pad 11-4(27.825mm 7mm) on

Minimum Solder Mask Sliver Constraint: (0.022mm ≤ 0.254mm) Between Pad 11-17(27.25mm, 7.75mm) on Top Layer And Pad 11-4(27.625mm, 7mm) on

Minimum Solder Mask Sliver Constraint: (0.022mm < 0.254mm) Between Pad 11 17/38 25mm 7.75mm on Top Layer And Pad 11 6/28mm 6.325mm on

Minimum Solder Mask Sliver Constraint: (0.022mm < 0.254mm) Between Pad 11-17(27.25mm, 7.75mm) on Top Layer And Pad 11-17(27.25mm, 6.325mm) on

Minimum Solder Mask Sliver Constraint: (0.022mm < 0.254mm) Between Pad U1-17(29.25mm, 7.75mm) on Top Layer And Pad U1-7(29.5mm, 8.525mm) on

Minimum Solder Mask Silver Constraint: (0.022mm < 0.254mm) Between Pad U1-17(29.25mm, 7.75mm) on Top Layer And Pad U1-8(30mm, 6.325mm) on

Minimum Solder Mask Silver Constraint: (0.022mm < 0.254mm) Between Pad U 1-17(29.25mm, 1.15mm) on Top Layer And Pad U 1-9(30.675mm, 1.2mm) on

Minimum Solder Mask Sliver Constraint: (0.047mm < 0.254mm) Between Pad U1-2(27.825mm,8mm) on Top Layer And Pad U1-3(27.825mm,7.5mm) on

Minimum Solder Mask Sliver Constraint: (0.047mm < 0.254mm) Between Pad U1-3(27.825mm,7.5mm) on Top Layer And Pad U1-4(27.825mm,7mm) on

Minimum Solder Mask Sliver Constraint: (0.047mm < 0.254mm) Between Pad U1-5(28.5mm,6.325mm) on Top Layer And Pad U1-6(29mm,6.325mm) on

Minimum Solder Mask Sliver Constraint: (0.047mm < 0.254mm) Between Pad U1-6(29mm,6.325mm) on Top Layer And Pad U1-7(29.5mm,6.325mm) on

Minimum Solder Mask Sliver Constraint: (0.047mm < 0.254mm) Between Pad U1-7(29.5mm,6.325mm) on Top Layer And Pad U1-8(30mm,6.325mm) on

Minimum Solder Mask Sliver Constraint: (0.022mm < 0.254mm) Between Pad U2-1(27.825mm, 15.75mm) on Top Layer And Pad U2-17(29.25mm, 15mm)

Minimum Solder Mask Sliver Constraint: (0.047mm < 0.254mm) Between Pad U-2-1(27.825mm,15.75mm) on Top Layer And Pad

Minimum Solder Mask Sliver Constraint: (0.047mm < 0.254mm) Between Pad U2-10(30.675mm,14.75mm) on Top Layer And Pad

Minimum Solder Mask Sliver Constraint:  $(0.022\text{mm} < 0.254\text{mm})$  Between Pad U2-10(30.675mm, 14.75mm) on Top Layer And Pad U2-17(29.25mm, 15mm)

Minimum Solder Mask Sliver Constraint: (0.047mm ≤ 0.254mm) Between Pad 112-10(30.675mm/14.75mm) on Top Layer And Pad

Minimum Solder Mask Sliver Constraint: (0.047mm ≤ 0.254mm) Between Pad 12-11(30.675mm, 14.75mm) on Top Layer And Pad

Minimum Solder Mask Sliver Constraint: (0.022mm < 0.254mm) Between Pad 112 11(30.675mm, 15.25mm) on Top Layer And Pad 112 17(29.25mm, 15mm)

Minimum Solder Mask Sliver Constraint: (0.022mm < 0.254mm) Between Pad U2-11(30.675mm, 15.25mm) on Top Layer And Pad U2-17(29.25mm, 15mm)

Minimum Solder Mask Silver Constraint: (0.022mm < 0.254mm) Between Pad U2-12(30.675mm, 15.75mm) on Top Layer And Pad U2-17(29.25mm, 15mm)

Minimum Solder Mask Sliver Constraint: (0.047mm < 0.254mm) Between Pad U2-13(30mm, 16.425mm) on Top Layer And Pad U2-14(29.5mm, 16.425mm)

Minimum Solder Mask Sliver Constraint: (0.022mm < 0.254mm) Between Pad U2-13(30mm, 16.425mm) on Top Layer And Pad U2-17(29.25mm, 15mm) on

Minimum Solder Mask Sliver Constraint: (0.047mm < 0.254mm) Between Pad U2-14(29.5mm,16.425mm) on Top Layer And Pad U2-15(29mm,16.425mm)

Minimum Solder Mask Sliver Constraint: (0.022mm < 0.254mm) Between Pad U2-14(29.5mm,16.425mm) on Top Layer And Pad U2-17(29.25mm,15mm)

Minimum Solder Mask Sliver Constraint: (0.047mm < 0.254mm) Between Pad U2-15(29mm,16.425mm) on Top Layer And Pad U2-16(28.5mm,16.425mm)

Minimum Solder Mask Sliver Constraint: (0.022mm < 0.254mm) Between Pad U2-15(29mm,16.425mm) on Top Layer And Pad U2-17(29.25mm,15mm) on

Minimum Solder Mask Sliver Constraint: (0.022mm < 0.254mm) Between Pad U2-16(28.5mm,16.425mm) on Top Layer And Pad U2-17(29.25mm,15mm)

Minimum Solder Mask Sliver Constraint: (0.022mm < 0.254mm) Between Pad U2-17(29.25mm,15mm) on Top Layer And Pad U2-2(27.825mm,15.25mm)

Minimum Solder Mask Sliver Constraint: (0.022mm < 0.254mm) Between Pad U2-17(29.25mm, 15mm) on Top Layer And Pad U2-3(27.825mm, 14.75mm)

Minimum Solder Mask Sliver Constraint: (0.022mm < 0.254mm) Between Pad U2-17(29.25mm, 15mm) on Top Layer And Pad U2-4(27.825mm, 14.25mm)

Minimum Solder Mask Sliver Constraint: (0.022mm ≤ 0.254mm) Between Pad U2-17(29.25mm, 15mm) on Top Layer And Pad U2-5(28.5mm, 13.575mm) on

Minimum Solder Mask Sliver Constraint: (0.022mm < 0.254mm) Between Pad 12-17(27.29mm, 15mm) on Top Layer And Pad 12-6(28.5mm, 13.575mm) on

Minimum Solder Mask Sliver Constraint: (0.022mm < 0.254mm) Between Pad U2-17(27.29mm, 15mm) on Top Layer And Pad U2-6(27mm, 15.375mm) on

Minimum Solder Mask Sliver Constraint: (0.022mm < 0.254mm) Between Pad U2-17(29.25mm, 15mm) on Top Layer And Pad U2-8(29.5mm, 13.575mm) on

Minimum Solder Mask Silver Constraint: (0.022mm  $\leq$  0.254mm) Between Pad U2-17(29.25mm, 15mm) on Top Layer And Pad U2-8(30mm, 13.5/5mm) on

Minimum Solder Mask Silver Constraint: (0.022mm < 0.254mm) Between Pad U2-17(29.25mm, 15mm) on Top Layer And Pad U2-9(30.675mm, 14.25mm)

Minimum Solder Mask Sliver Constraint: (0.047mm < 0.254mm) Between Pad U2-2(27.825mm, 15.25mm) on Top Layer And Pad

Minimum Solder Mask Sliver Constraint: (0.047mm < 0.254mm) Between Pad U-2(27.825mm,14.75mm) on Top Layer And Pad

Minimum Solder Mask Sliver Constraint: (0.047mm < 0.254mm) Between Pad U2-5(28.5mm,13.575mm) on Top Layer And Pad U2-6(29mm,13.575mm) on

Minimum Solder Mask Sliver Constraint: (0.047mm < 0.254mm) Between Pad U2-6(29mm,13.575mm) on Top Layer And Pad U2-7(29.5mm,13.575mm) on

Minimum Solder Mask Sliver Constraint: (0.047mm < 0.254mm) Between Pad U2-7(29.5mm,13.575mm) on Top Layer And Pad U2-8(30mm,13.575mm) on