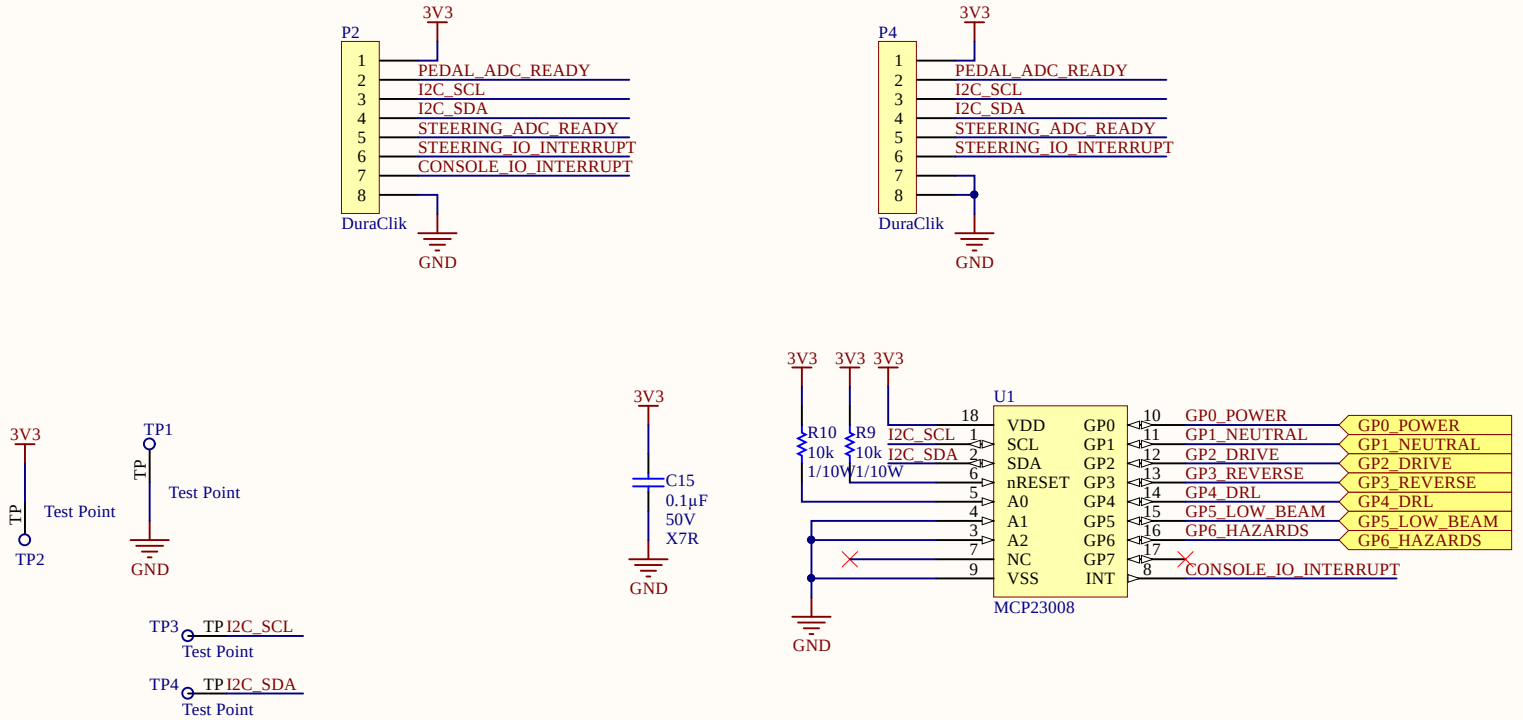
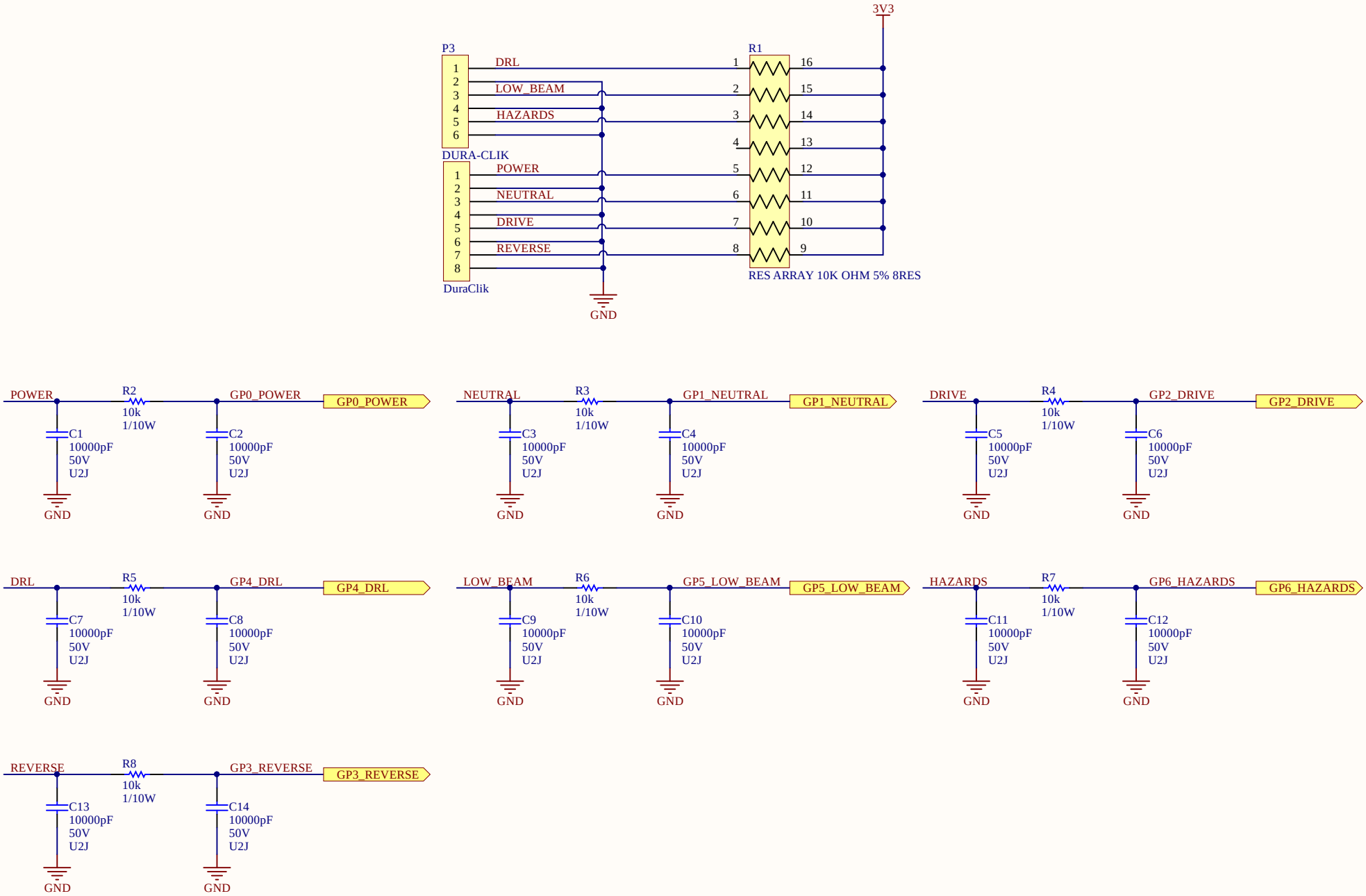


Project:	***MSXII_Center_Console_Switches.PrjPcb***	MIDNIGHT SUN
Title:	**Center Console IO Expander**	
Project Author	Mena Labib	University of Waterloo 200 University Ave W Waterloo, ON, Canada N2L 3E9
Size: Letter	Revision: 1.2	
Date: 2018-05-21	Sheet 1 of 2	Website: www.uwmidsun.com

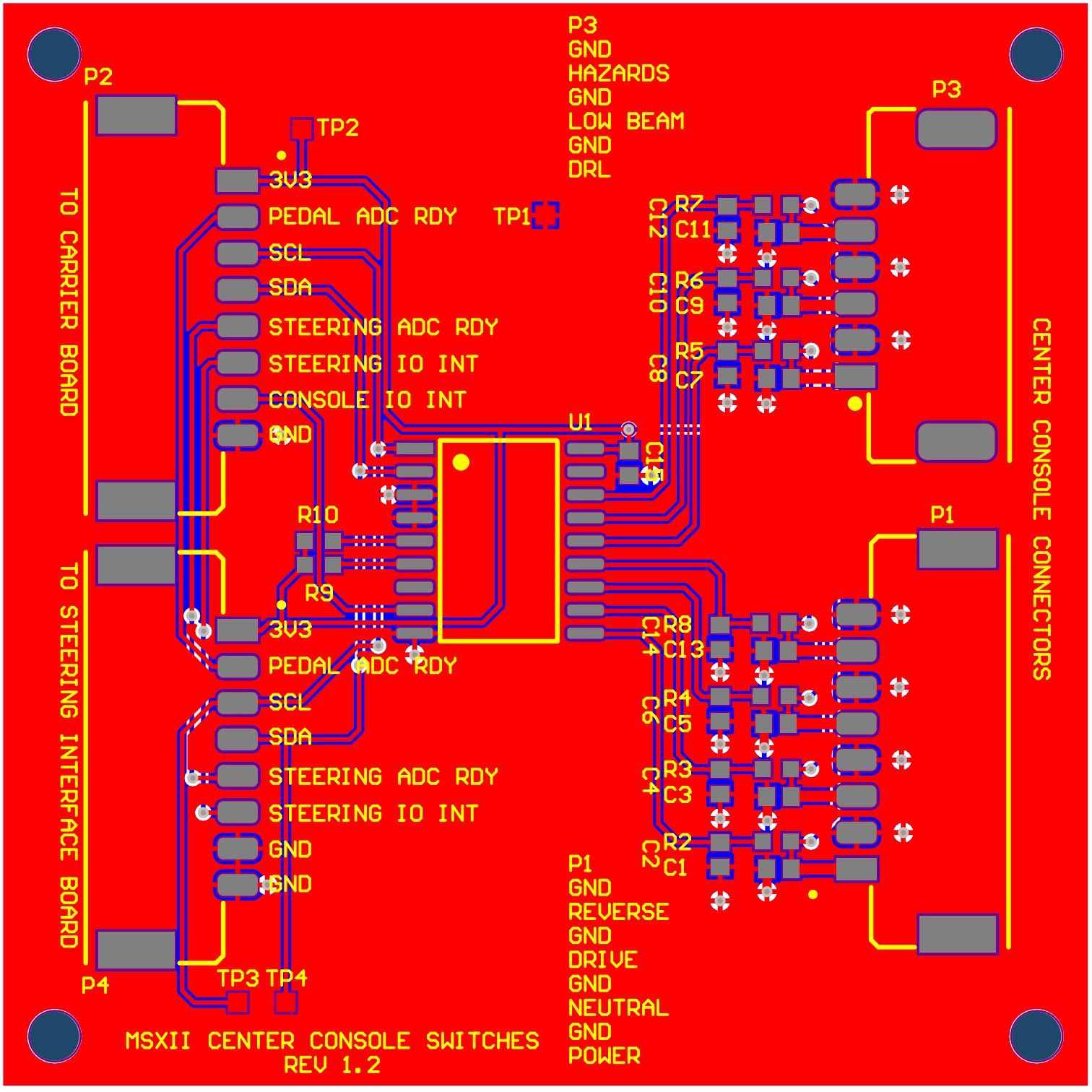


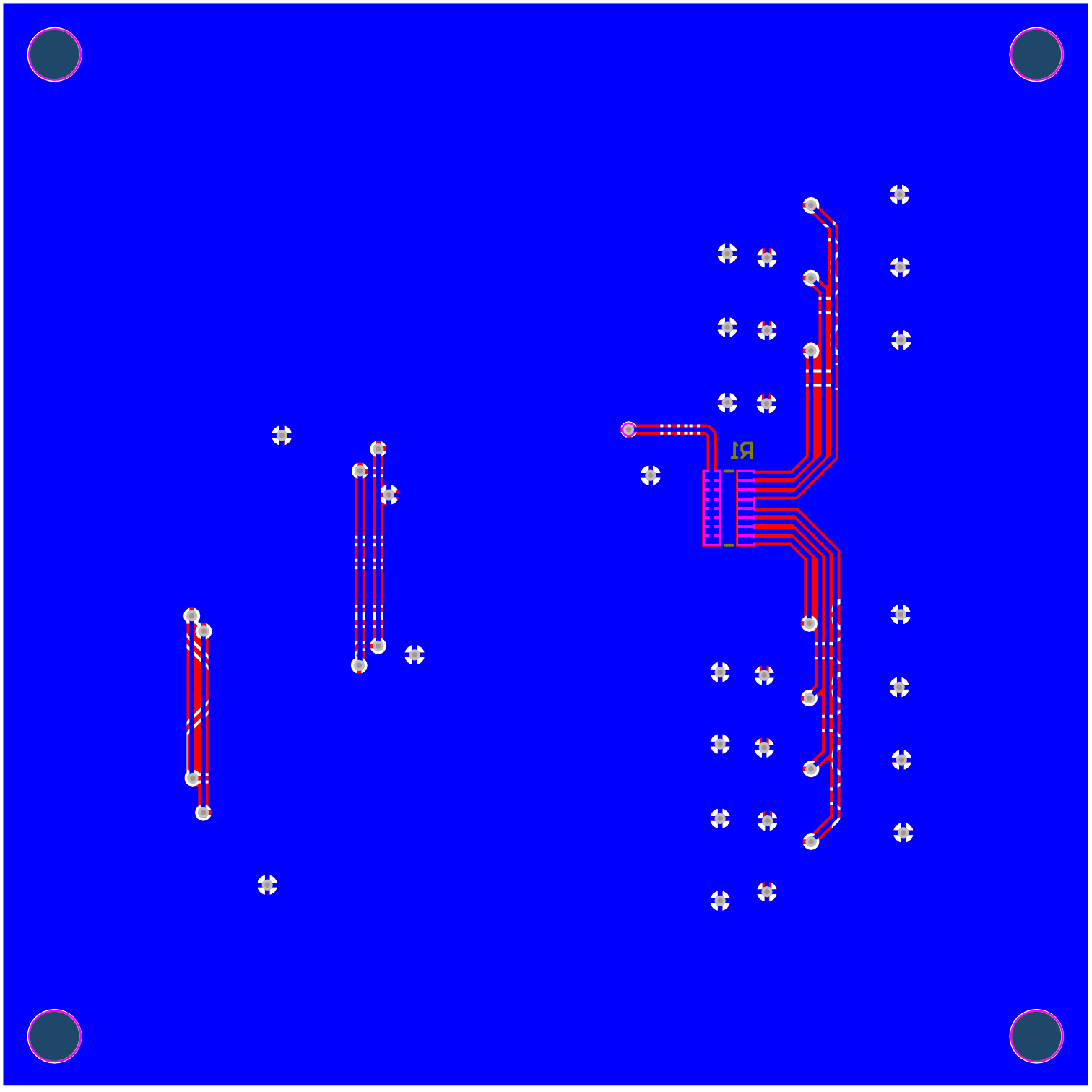
Project: *MSXII_Center_Console_Switches.PrjPcb*		MIDNIGHT SUN
Title: **Center Console Inputs**		
Project Author: Mena Labib		University of Waterloo 200 University Ave W Waterloo, ON, Canada N2L 3E9
Size: Letter	Revision: 1.2	
Date: 2018-05-21	Sheet 2 of 2	Website: www.uwmidsun.com

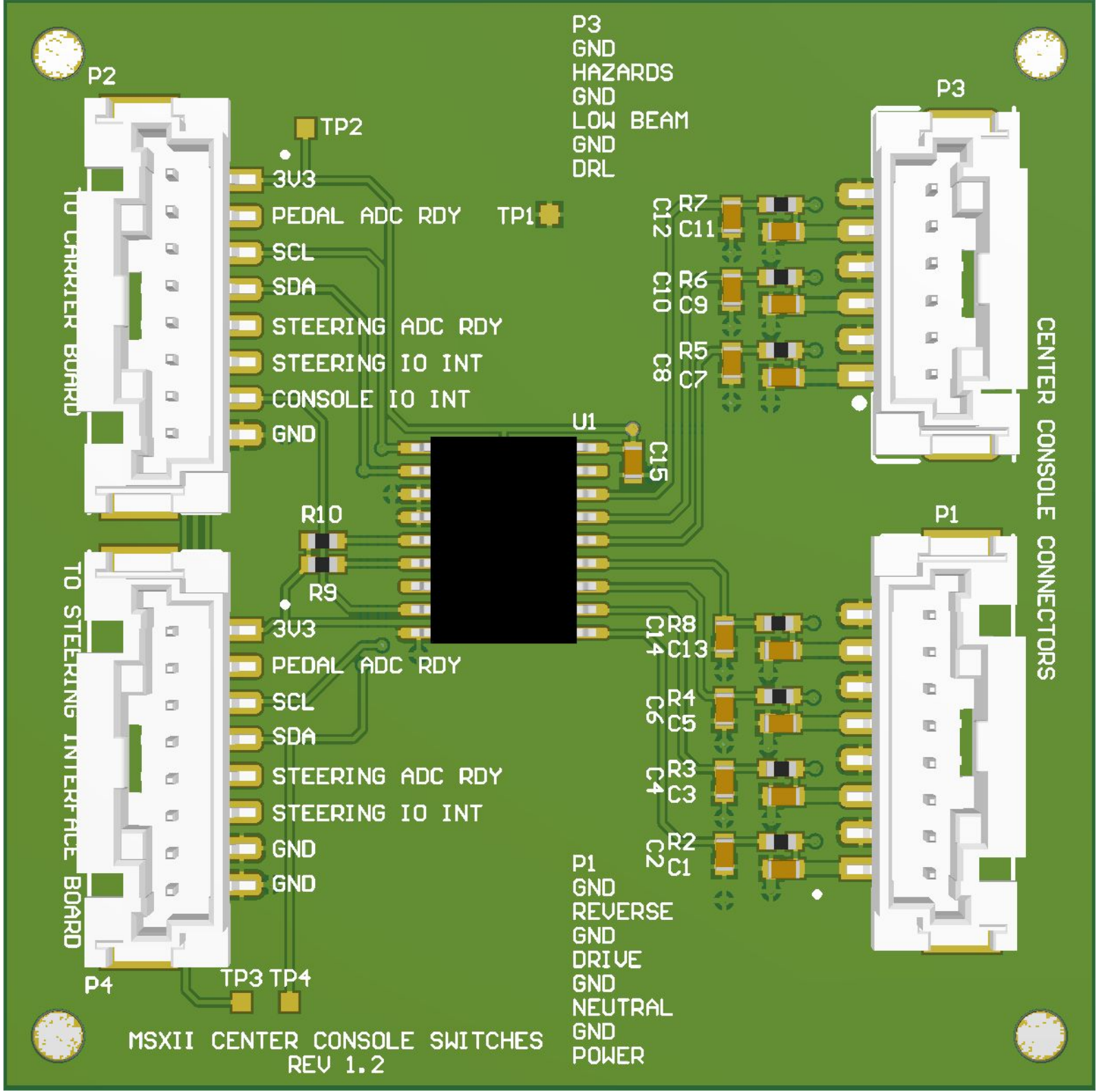
Bill of Materials

Project:	MSXII_Center_Console_Switches.PrjPcb
Revision:	1.2
Project Lead:	Mena Labib
Generated On:	2018-05-21 7:56:10 PM
Production Quantity:	1
Currency	CAD
Total Parts Count:	30

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 10nF 50V 5% X7R 0603	C1	KEMET	C0603C103J5JAC7867	Digi-Key	399-13384-1-ND	0.38	1	$ 0.38
CAP CER 10nF 50V 5% X7R 0603	C2	KEMET	C0603C103J5JAC7867	Digi-Key	399-13384-1-ND	0.38	1	$ 0.38
CAP CER 10nF 50V 5% X7R 0603	C3	KEMET	C0603C103J5JAC7867	Digi-Key	399-13384-1-ND	0.38	1	$ 0.38
CAP CER 10nF 50V 5% X7R 0603	C4	KEMET	C0603C103J5JAC7867	Digi-Key	399-13384-1-ND	0.38	1	$ 0.38
CAP CER 10nF 50V 5% X7R 0603	C5	KEMET	C0603C103J5JAC7867	Digi-Key	399-13384-1-ND	0.38	1	$ 0.38
CAP CER 10nF 50V 5% X7R 0603	C6	KEMET	C0603C103J5JAC7867	Digi-Key	399-13384-1-ND	0.38	1	$ 0.38
CAP CER 10nF 50V 5% X7R 0603	C7	KEMET	C0603C103J5JAC7867	Digi-Key	399-13384-1-ND	0.38	1	$ 0.38
CAP CER 10nF 50V 5% X7R 0603	C8	KEMET	C0603C103J5JAC7867	Digi-Key	399-13384-1-ND	0.38	1	$ 0.38
CAP CER 10nF 50V 5% X7R 0603	C9	KEMET	C0603C103J5JAC7867	Digi-Key	399-13384-1-ND	0.38	1	$ 0.38
CAP CER 10nF 50V 5% X7R 0603	C10	KEMET	C0603C103J5JAC7867	Digi-Key	399-13384-1-ND	0.38	1	$ 0.38
CAP CER 10nF 50V 5% X7R 0603	C11	KEMET	C0603C103J5JAC7867	Digi-Key	399-13384-1-ND	0.38	1	$ 0.38
CAP CER 10nF 50V 5% X7R 0603	C12	KEMET	C0603C103J5JAC7867	Digi-Key	399-13384-1-ND	0.38	1	$ 0.38
CAP CER 10nF 50V 5% X7R 0603	C13	KEMET	C0603C103J5JAC7867	Digi-Key	399-13384-1-ND	0.38	1	$ 0.38
CAP CER 10nF 50V 5% X7R 0603	C14	KEMET	C0603C103J5JAC7867	Digi-Key	399-13384-1-ND	0.38	1	$ 0.38
CAP CER 0.1UF 50V 10% X7R 0603	C15	Kyocera AVX	06035C-104KAT2A	Digi-Key	478-5052-1-ND	0.2	1	$ 0.20
CONN 8POS DURA-CLIK 0.079"	P1	Molex	560020-0820	Digi-Key	WM10868CT-ND	1.84	1	$ 1.84
CONN 8POS DURA-CLIK 0.079"	P2	Molex	560020-0820	Digi-Key	WM10868CT-ND	1.84	1	$ 1.84
CONN 6POS DURA-CLIK 0.079"	P3	Molex	560020-0620	Digi-Key	WM10866CT-ND	1.55	1	$ 1.55
CONN 8POS DURA-CLIK 0.079"	P4	Molex	560020-0820	Digi-Key	WM10868CT-ND	1.84	1	$ 1.84
RES ARRAY 10K OHM 5% 8RES EXB-2HV103JV	R1	Panasonic	EXB-2HV103JV	Digi-Key	Y1103CT-ND	0.36	1	$ 0.36
RES 10K OHM 1% 1/10W 0603	R2	Yageo	RC0603FR-0710KL	Digi-Key	311-10.0KHRCT-ND	0.13	1	$ 0.13
RES 10K OHM 1% 1/10W 0603	R3	Yageo	RC0603FR-0710KL	Digi-Key	311-10.0KHRCT-ND	0.13	1	$ 0.13
RES 10K OHM 1% 1/10W 0603	R4	Yageo	RC0603FR-0710KL	Digi-Key	311-10.0KHRCT-ND	0.13	1	$ 0.13
RES 10K OHM 1% 1/10W 0603	R5	Yageo	RC0603FR-0710KL	Digi-Key	311-10.0KHRCT-ND	0.13	1	$ 0.13
RES 10K OHM 1% 1/10W 0603	R6	Yageo	RC0603FR-0710KL	Digi-Key	311-10.0KHRCT-ND	0.13	1	$ 0.13
RES 10K OHM 1% 1/10W 0603	R7	Yageo	RC0603FR-0710KL	Digi-Key	311-10.0KHRCT-ND	0.13	1	$ 0.13
RES 10K OHM 1% 1/10W 0603	R8	Yageo	RC0603FR-0710KL	Digi-Key	311-10.0KHRCT-ND	0.13	1	$ 0.13
RES 10K OHM 1% 1/10W 0603	R9	Yageo	RC0603FR-0710KL	Digi-Key	311-10.0KHRCT-ND	0.13	1	$ 0.13
RES 10K OHM 1% 1/10W 0603	R10	Yageo	RC0603FR-0710KL	Digi-Key	311-10.0KHRCT-ND	0.13	1	$ 0.13
IC I/O EXPANDER I2C 8B 18SOIC	U1	Microchip	MCP23008T-E/SO	Digi-Key	MCP23008T-E/SOCT-ND	1.34	1	$ 1.34
							Total:	$ 15.46


P2
TO CARRIER BOARD
TO STEERING INTERFACE BOARD
P4
TP2
3V3
PEDAL ADC RDY
TP1
SCL
SDA
STEERING ADC RDY
STEERING IO INT
CONSOLE IO INT
GND
GND
R10
R9
3V3
PEDAL ADC RDY
SCL
SDA
STEERING ADC RDY
STEERING IO INT
GND
GND
TP3
TP4
P3
GND
HAZARDS
GND
LOW BEAM
GND
DRL
U1
C12
R7
C11
C10
R6
C9
C8
R5
C7
C15
C14
R8
C13
C6
R4
C5
C4
R3
C3
C2
R2
C1
P3
CENTER CONSOLE CONNECTORS
P1
P1
GND
REVERSE
GND
DRIVE
GND
NEUTRAL
GND
POWER
MSXII CENTER CONSOLE SWITCHES
REV 1.2


R1


P2
TO CARRIER BOARD
TP2
3V3
PEDAL ADC RDY
TP1
SCL
SDA
STEERING ADC RDY
STEERING IO INT
CONSOLE IO INT
GND
P3
GND
HAZARDS
GND
LOW BEAM
GND
DRL
P3
CENTER CONSOLE CONNECTORS
R7
C12
C11
R6
C10
C9
R5
C8
C7
U1
C15
R10
R9
P1
TO STEERING INTERFACE BOARD
3V3
PEDAL ADC RDY
SCL
SDA
STEERING ADC RDY
STEERING IO INT
GND
GND
R8
C14
C13
R4
C6
C5
R3
C4
C3
R2
C2
C1
P1
GND
REVERSE
GND
DRIVE
GND
NEUTRAL
GND
POWER
P4
TP3
TP4
MSXII CENTER CONSOLE SWITCHES
REV 1.2

Electrical Rules Check Report

Class	Document	Message
Warning	Center Console - IO Expander.SchDoc	GP0_POWER contains IO Pin and Input Port objects (Port GP0_POWER)
Warning	Center Console - IO Expander.SchDoc	GP1_NEUTRAL contains IO Pin and Input Port objects (Port GP1_NEUTRAL)
Warning	Center Console - IO Expander.SchDoc	GP2_DRIVE contains IO Pin and Input Port objects (Port GP2_DRIVE)
Warning	Center Console - IO Expander.SchDoc	GP3_REVERSE contains IO Pin and Input Port objects (Port GP3_REVERSE)
Warning	Center Console - IO Expander.SchDoc	GP4_DRL contains IO Pin and Input Port objects (Port GP4_DRL)
Warning	Center Console - IO Expander.SchDoc	GP5_LOW_BEAM contains IO Pin and Input Port objects (Port GP5_LOW_BEAM)
Warning	Center Console - IO Expander.SchDoc	GP6_HAZARDS contains IO Pin and Input Port objects (Port GP6_HAZARDS)
Warning	Center Console - IO Expander.SchDoc	Net NetR9_2 has no driving source (Pin R9-2,Pin U1-6)
Warning	Center Console - IO Expander.SchDoc	Net NetR10_2 has no driving source (Pin R10-2,Pin U1-5)

Design Rules Verification Report

Filename : C:\Users\Taiping\Documents\MidnightSun\hardware\MSXII_Center_Console_Swi

Warnings 0
Rule Violations 23

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=0.635mm) (Preferred=0.254mm) (All)	0
Power Plane Connect Rule(Relief Connect)(Expansion=0.508mm) (Conductor Width=0.254mm) (Air Gap=0.254mm)	0
Hole Size Constraint (Min=0.025mm) (Max=2.54mm) (All)	4
Hole To Hole Clearance (Gap=0.254mm) (All),(All)	0
Minimum Solder Mask Sliver (Gap=0.254mm) (All),(All)	3
Silk To Solder Mask (Clearance=0.254mm) (IsPad),(All)	6
Silk to Silk (Clearance=0.254mm) (All),(All)	10
Net Antennae (Tolerance=0mm) (All)	0
Height Constraint (Min=0mm) (Max=25.4mm) (Prefered=12.7mm) (All)	0
Total	23

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,57mm) on Multi-Layer Actual Hole Size = 2.7mm
Hole Size Constraint: (2.7mm > 2.54mm) Pad Free-(57mm,3mm) on Multi-Layer Actual Hole Size = 2.7mm
Hole Size Constraint: (2.7mm > 2.54mm) Pad Free-(57mm,57mm) on Multi-Layer Actual Hole Size = 2.7mm

Minimum Solder Mask Sliver (Gap=0.254mm) (All),(All)
Minimum Solder Mask Sliver Constraint: (0.247mm < 0.254mm) Between Pad C15-1(34.6mm,35.2mm) on Top Layer And Via (34.575mm,36.375mm) from
Minimum Solder Mask Sliver Constraint: (0.247mm < 0.254mm) Between Pad R10-1(16.775mm,30.225mm) on Top Layer And Pad
Minimum Solder Mask Sliver Constraint: (0.247mm < 0.254mm) Between Pad R10-2(18.325mm,30.225mm) on Top Layer And Pad

Silk To Solder Mask (Clearance=0.254mm) (IsPad),(All)
Silk To Solder Mask Clearance Constraint: (0.153mm < 0.254mm) Between Pad P1-(52.68mm,29.8mm) on Top Layer And Track
Silk To Solder Mask Clearance Constraint: (0.153mm < 0.254mm) Between Pad P1-(52.68mm,8.6mm) on Top Layer And Track
Silk To Solder Mask Clearance Constraint: (0.153mm < 0.254mm) Between Pad P2-(7.495mm,32.45mm) on Top Layer And Track
Silk To Solder Mask Clearance Constraint: (0.153mm < 0.254mm) Between Pad P2-(7.495mm,53.65mm) on Top Layer And Track
Silk To Solder Mask Clearance Constraint: (0.153mm < 0.254mm) Between Pad P4-(7.495mm,28.925mm) on Top Layer And Track
Silk To Solder Mask Clearance Constraint: (0.153mm < 0.254mm) Between Pad P4-(7.495mm,7.725mm) on Top Layer And Track

Silk to Silk (Clearance=0.254mm) (All),(All)
Silk To Silk Clearance Constraint: (0.25mm < 0.254mm) Between Text "C1" (36.6mm,11.9mm) on Top Overlay And Text "C2" (35.4mm,13.7mm) on Top
Silk To Silk Clearance Constraint: (0.25mm < 0.254mm) Between Text "C13" (36.6mm,23.9mm) on Top Overlay And Text "C14" (35.4mm,26mm) on Top
Silk To Silk Clearance Constraint: (0.25mm < 0.254mm) Between Text "C14" (35.4mm,26mm) on Top Overlay And Text "R8" (36.6mm,25.275mm) on Top
Silk To Silk Clearance Constraint: (0.25mm < 0.254mm) Between Text "C2" (35.4mm,13.7mm) on Top Overlay And Text "R2" (36.6mm,13.3mm) on Top
Silk To Silk Clearance Constraint: (0.25mm < 0.254mm) Between Text "C3" (36.6mm,15.9mm) on Top Overlay And Text "C4" (35.4mm,17.7mm) on Top
Silk To Silk Clearance Constraint: (0.25mm < 0.254mm) Between Text "C4" (35.4mm,17.7mm) on Top Overlay And Text "R3" (36.6mm,17.3mm) on Top
Silk To Silk Clearance Constraint: (0.25mm < 0.254mm) Between Text "C5" (36.6mm,19.8mm) on Top Overlay And Text "C6" (35.4mm,21.6mm) on Top
Silk To Silk Clearance Constraint: (0.25mm < 0.254mm) Between Text "C6" (35.4mm,21.6mm) on Top Overlay And Text "R4" (36.6mm,21.2mm) on Top
Silk To Silk Clearance Constraint: (0.241mm < 0.254mm) Between Text "TP3" (12mm,5.8mm) on Top Overlay And Track
Silk To Silk Clearance Constraint: (0.241mm < 0.254mm) Between Text "TP3" (12mm,5.8mm) on Top Overlay And Track