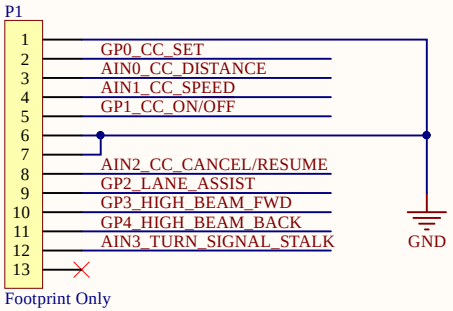
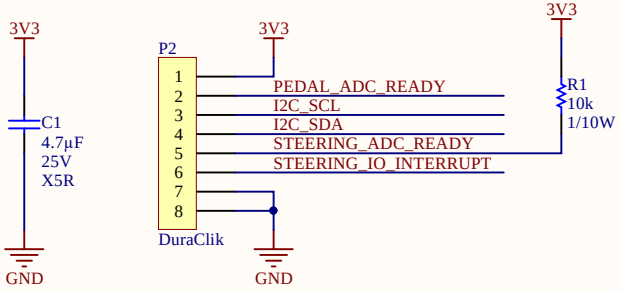
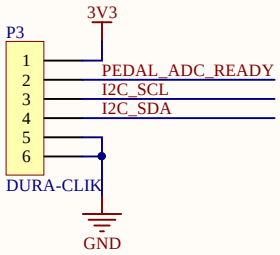
Steering Stalk Connector



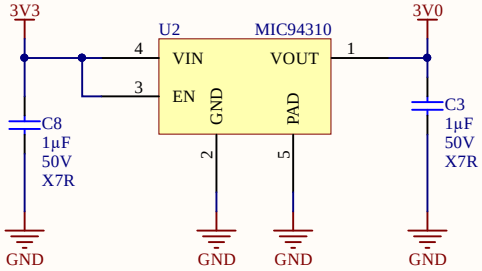
From Center Console Board



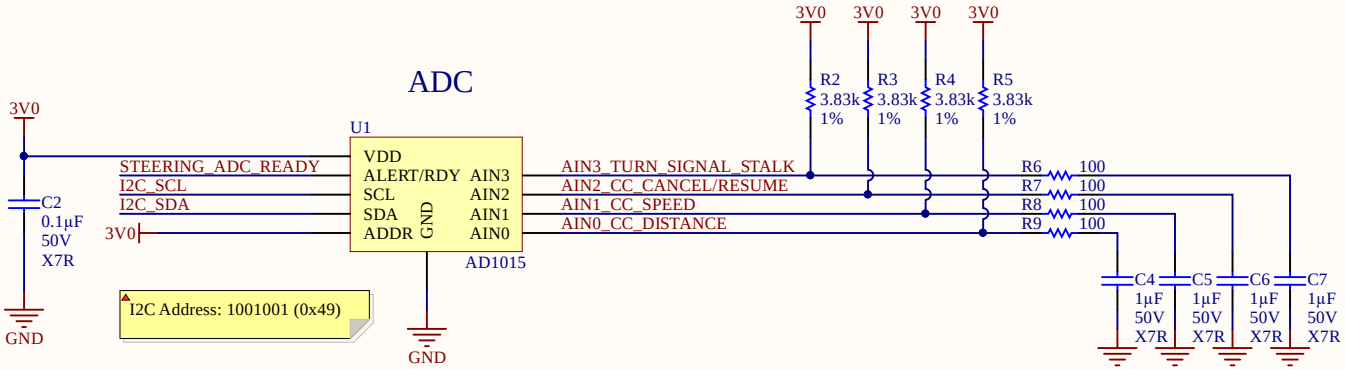
To Pedal Interface Board



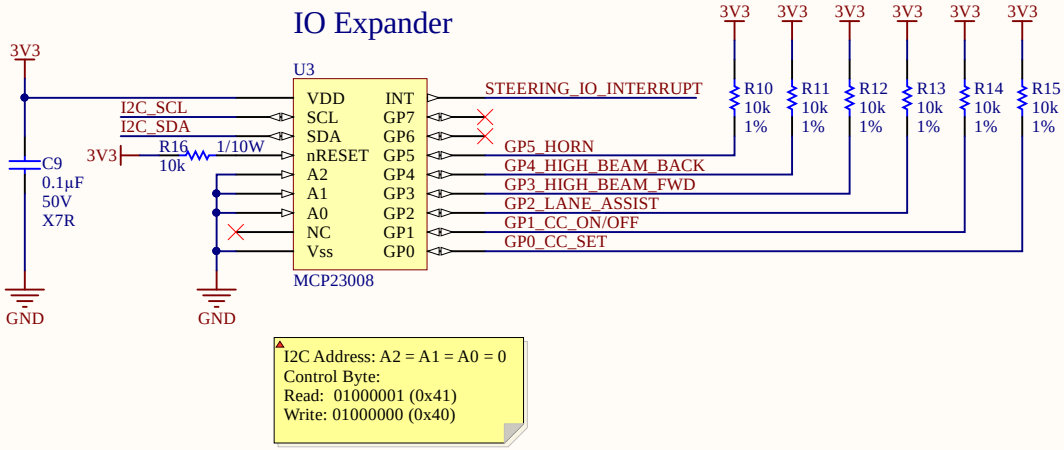
Power Supply

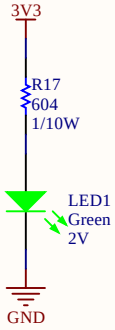


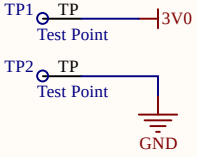
ADC

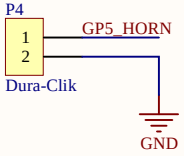


IO Expander







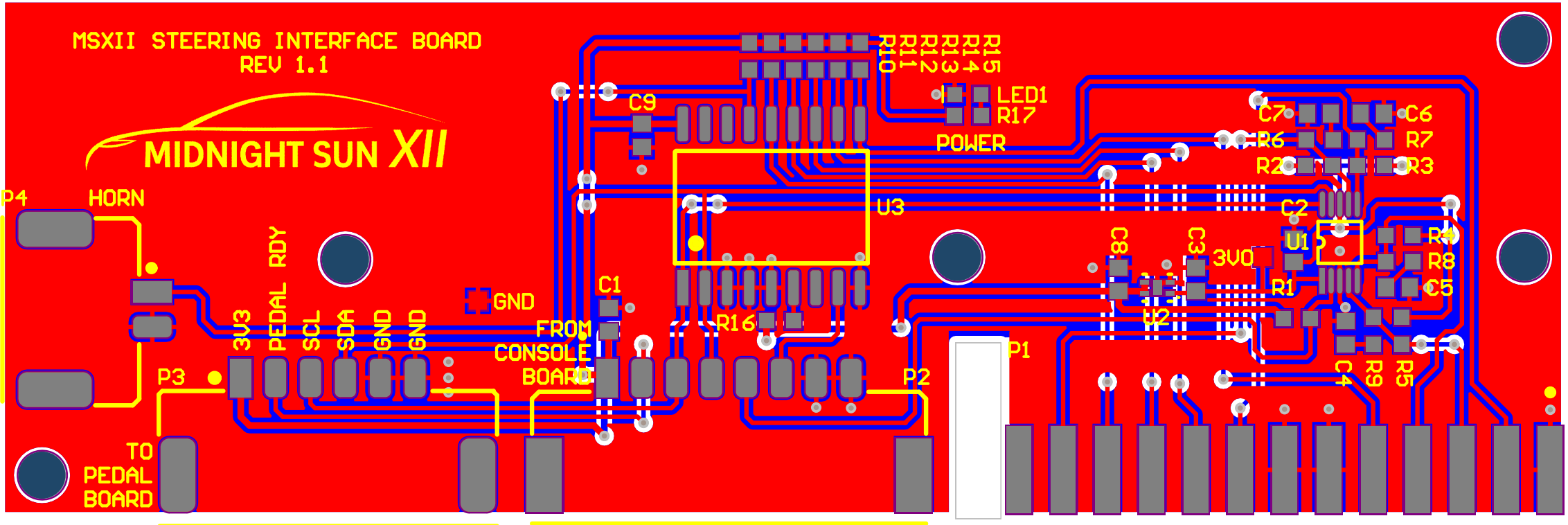


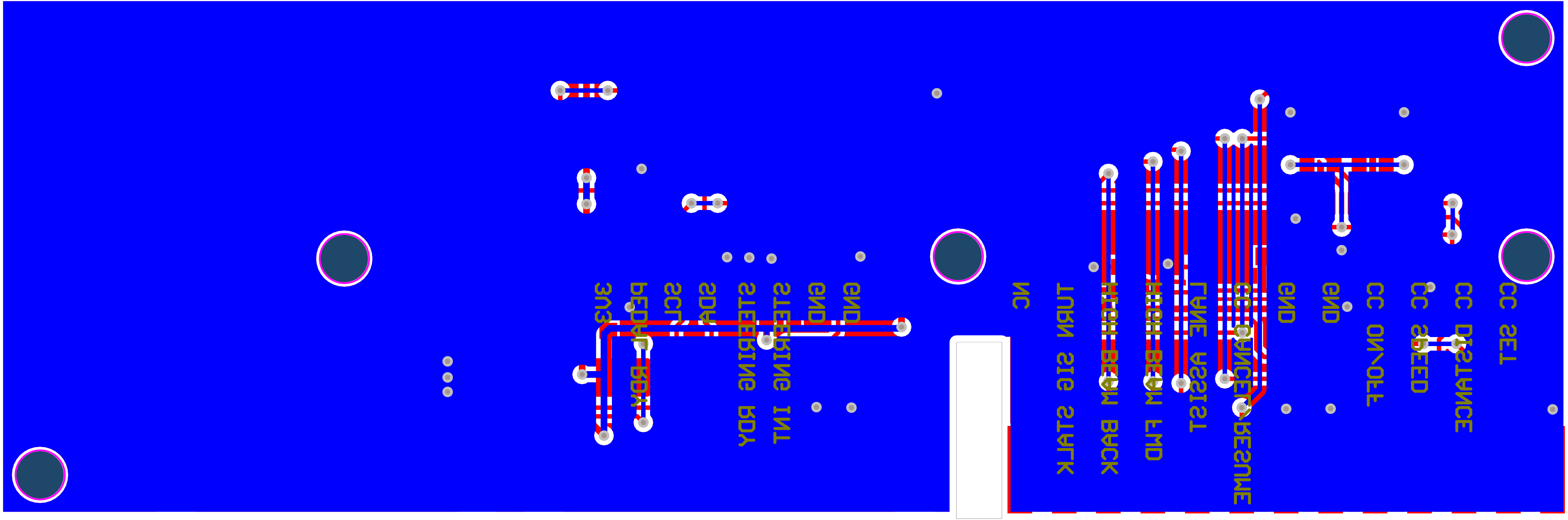
Project: *MSXII_SteeringWheelInterfaceBoard.PrjPcb*		MIDNIGHT SUN
Title: **Steering Wheel Interface Board**		
Project Author Taiping Li		University of Waterloo 200 University Ave W Waterloo, ON, Canada N2L 3E9
Size: Letter	Revision: 1.1	
Date: 5/20/2018	Sheet 1 of 1	Website: www.uwmidsun.com

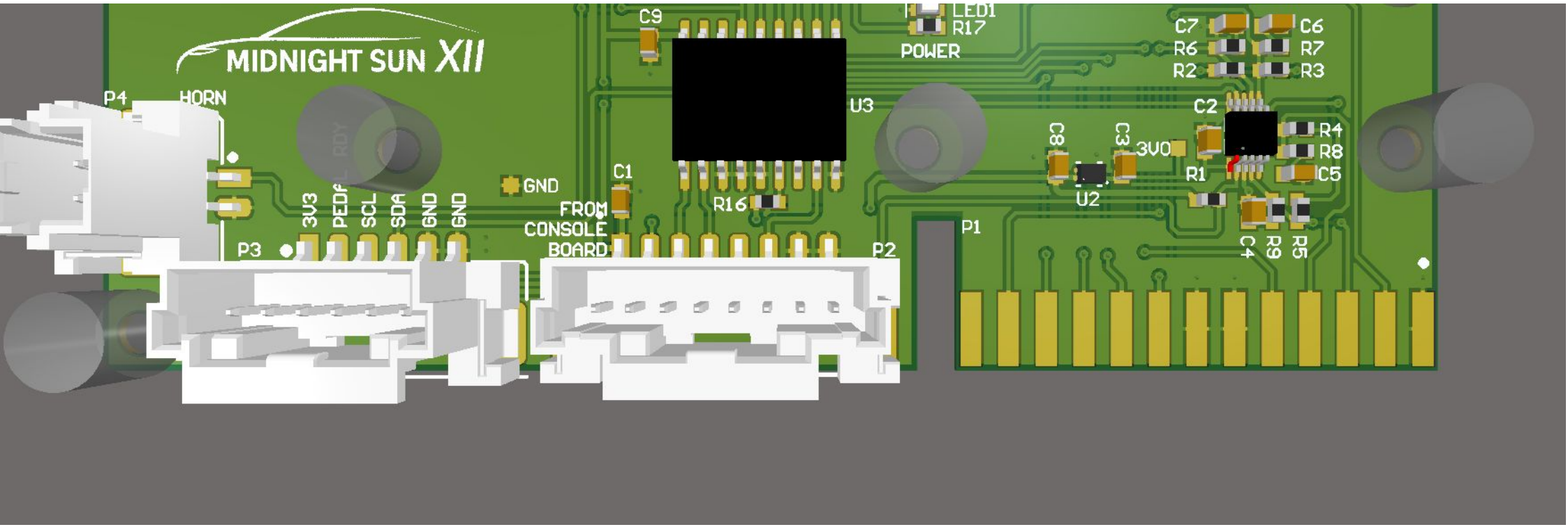
Bill of Materials

Project:	SXII_SteeringWheelInterfaceBoard.PrjPcb
Revision:	1.1
Project Lead:	Taiping Li
Generated On:	5/20/2018 11:34:29 PM
Production Quantity:	1
Currency	CAD
Total Parts Count:	33

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 4.7UF 25V 10% X5R 0603	C1	Murata	GRM188R61E475KE11D	Digi-Key	490-7203-1-ND	0.53	1	$ 0.53
CAP CER 0.1UF 50V 10% X7R 0603	C2	Kyocera AVX	06035C-104KAT2A	Digi-Key	478-5052-1-ND	0.21	1	$ 0.21
CAP CER 1UF 50V 10% X7R 0603	C3	Taiyo Yuden	UMK107AB7105KA-T	Digi-Key	587-3247-1-ND	0.37	1	$ 0.37
CAP CER 1UF 50V 10% X7R 0603	C4	Taiyo Yuden	UMK107AB7105KA-T	Digi-Key	587-3247-1-ND	0.37	1	$ 0.37
CAP CER 1UF 50V 10% X7R 0603	C5	Taiyo Yuden	UMK107AB7105KA-T	Digi-Key	587-3247-1-ND	0.37	1	$ 0.37
CAP CER 1UF 50V 10% X7R 0603	C6	Taiyo Yuden	UMK107AB7105KA-T	Digi-Key	587-3247-1-ND	0.37	1	$ 0.37
CAP CER 1UF 50V 10% X7R 0603	C7	Taiyo Yuden	UMK107AB7105KA-T	Digi-Key	587-3247-1-ND	0.37	1	$ 0.37
CAP CER 1UF 50V 10% X7R 0603	C8	Taiyo Yuden	UMK107AB7105KA-T	Digi-Key	587-3247-1-ND	0.37	1	$ 0.37
CAP CER 0.1UF 50V 10% X7R 0603	C9	Kyocera AVX	06035C-104KAT2A	Digi-Key	478-5052-1-ND	0.21	1	$ 0.21
LED GREEN CLEAR 2V 0603	LED1	Wurth Electronics	150060VS75000	Digi-Key	732-4980-1-ND	0.18	1	$ 0.18
CONN 8POS DURA-CLIK 0.079"	P2	Molex	560020-0820	Digi-Key	WM10868CT-ND	1.85	1	$ 1.85
CONN 6POS DURA-CLIK 0.079"	P3	Molex	560020-0620	Digi-Key	WM10866CT-ND	1.56	1	$ 1.56
CONN 2POS DURA-CLIK 0.079" VERT	P4	Molex	560020-0220	Digi-Key	WM10862CT-ND	1.06	1	$ 1.06
RES 10K OHM 1% 1/10W 0603	R1	Yageo	RC0603FR-0710KL	Digi-Key	311-10.0KHRCT-ND	0.13	1	$ 0.13
RES 3.83K OHM 1% 1/10W 0603	R2	Yageo	RC0603FR-073K83L	Digi-Key	311-3.83KHRCT-ND	0.13	1	$ 0.13
RES 3.83K OHM 1% 1/10W 0603	R3	Yageo	RC0603FR-073K83L	Digi-Key	311-3.83KHRCT-ND	0.13	1	$ 0.13
RES 3.83K OHM 1% 1/10W 0603	R4	Yageo	RC0603FR-073K83L	Digi-Key	311-3.83KHRCT-ND	0.13	1	$ 0.13
RES 3.83K OHM 1% 1/10W 0603	R5	Yageo	RC0603FR-073K83L	Digi-Key	311-3.83KHRCT-ND	0.13	1	$ 0.13
RES 100 OHM 1% 1/10W 0603	R6	Yageo	RC0603FR-07100RL	Digi-Key	311-100HRCT-ND	0.13	1	$ 0.13
RES 100 OHM 1% 1/10W 0603	R7	Yageo	RC0603FR-07100RL	Digi-Key	311-100HRCT-ND	0.13	1	$ 0.13
RES 100 OHM 1% 1/10W 0603	R8	Yageo	RC0603FR-07100RL	Digi-Key	311-100HRCT-ND	0.13	1	$ 0.13
RES 100 OHM 1% 1/10W 0603	R9	Yageo	RC0603FR-07100RL	Digi-Key	311-100HRCT-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
RES 10K OHM 1% 1/10W 0603	R11	Yageo	RC0603FR-0710KL	Digi-Key	311-10.0KHRCT-ND	0.13	1	$ 0.13
RES 10K OHM 1% 1/10W 0603	R12	Yageo	RC0603FR-0710KL	Digi-Key	311-10.0KHRCT-ND	0.13	1	$ 0.13
RES 10K OHM 1% 1/10W 0603	R13	Yageo	RC0603FR-0710KL	Digi-Key	311-10.0KHRCT-ND	0.13	1	$ 0.13
RES 10K OHM 1% 1/10W 0603	R14	Yageo	RC0603FR-0710KL	Digi-Key	311-10.0KHRCT-ND	0.13	1	$ 0.13
RES 10K OHM 1% 1/10W 0603	R15	Yageo	RC0603FR-0710KL	Digi-Key	311-10.0KHRCT-ND	0.13	1	$ 0.13
RES 10K OHM 1% 1/10W 0603	R16	Yageo	RC0603FR-0710KL	Digi-Key	311-10.0KHRCT-ND	0.13	1	$ 0.13
RES 604 OHM 1% 1/10W 0603	R17	Yageo	RC0603FR-07604RL	Digi-Key	311-604HRCT-ND	0.13	1	$ 0.13
IC ADC 12-BIT VSSOP-10	U1	Texas Instruments	ADS1015IDGSR	Digi-Key	296-41185-1-ND	3.55	1	$ 3.55
IC REG LDO 3V 0.2A 4-TDFN	U2	Microchip	MIC94310-PYMT-TR	Digi-Key	576-4761-1-ND	0.37	1	$ 0.37
IC I/O EXPANDER I2C 8B 18SOIC	U3	Microchip	MCP23008T-E/SO	Digi-Key	MCP23008T-E/SOCT-ND	1.35	1	$ 1.35
							Total:	$ 15.30


MSXII STEERING INTERFACE BOARD
REV 1.1
MIDNIGHT SUN XII
P4
HORN
P3
3V3
PEDAL RDY
SCL
SDA
GND
GND
GND
TO
PEDAL
BOARD
FROM
CONSOLE
BOARD
C1
C9
R16
U3
R10
R11
R12
R13
R14
R15
LED1
R17
POWER
P2
P1
C7
C6
R6
R7
R2
R3
C2
U1
R4
R8
C5
R1
C8
C3
3V0
U2
C4
R9
R5


3V3
PEDAL RDY
SCL
SDA
STEERING RDY
STEERING INT
GND
GND
NC
TURN SIG STALK
HIGH BEAM BACK
HIGH BEAM FWD
LANE ASSIST
CC CANCEL/RESUME
GND
GND
CC ON/OFF
CC SPEED
CC DISTANCE
CC SET


MIDNIGHT SUN XII
P4
HORN
P3
3V3
PEDF
SCL
SDA
GND
GND
GND
C1
FROM
CONSOLE
BOARD
C9
U3
R16
P2
P1
LED1
R17
POWER
C7
C6
R6
R7
R2
R3
C2
R4
R8
C5
C8
C3
3V0
R1
U2
C4
R9
R5

Electrical Rules Check Report

Class	Document	Message
Warning	Steering Wheel Interface.SchDoc	Net NetR16_2 has no driving source (Pin R16-2,Pin U3-6)

Design Rules Verification Report

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

Warnings 0
Rule Violations 59

Warnings	
Total	0

Rule Violations	
Clearance Constraint (Gap=0.254mm) (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=0.508mm) (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)	5
Hole To Hole Clearance (Gap=0.254mm) (All),(All)	0
Minimum Solder Mask Sliver (Gap=0.254mm) (All),(All)	18
Silk To Solder Mask (Clearance=0.254mm) (IsPad),(All)	27
Silk to Silk (Clearance=0.254mm) (All),(All)	9
Net Antennae (Tolerance=0mm) (All)	0
Height Constraint (Min=0mm) (Max=25.4mm) (Prefered=12.7mm) (All)	0
Total	59

Hole Size Constraint (Min=0.025mm) (Max=2.54mm) (All)
Hole Size Constraint: (2.7mm > 2.54mm) Pad Free-(19.9mm,14.88mm) on Multi-Layer Actual Hole Size = 2.7mm
Hole Size Constraint: (2.7mm > 2.54mm) Pad Free-(2.5mm,2.5mm) on Multi-Layer Actual Hole Size = 2.7mm
Hole Size Constraint: (2.7mm > 2.54mm) Pad Free-(55.002mm,15mm) on Multi-Layer Actual Hole Size = 2.7mm
Hole Size Constraint: (2.7mm > 2.54mm) Pad Free-(87.5mm,15mm) on Multi-Layer Actual Hole Size = 2.7mm
Hole Size Constraint: (2.7mm > 2.54mm) Pad Free-(87.5mm,27.5mm) on Multi-Layer Actual Hole Size = 2.7mm

Minimum Solder Mask Sliver (Gap=0.254mm) (All),(All)
Minimum Solder Mask Sliver Constraint: (0.188mm < 0.254mm) Between Pad LED1-1(56.342mm,24.339mm) on Top Layer And Pad
Minimum Solder Mask Sliver Constraint: (0.188mm < 0.254mm) Between Pad LED1-2(54.842mm,24.339mm) on Top Layer And Pad
Minimum Solder Mask Sliver Constraint: (0.217mm < 0.254mm) Between Pad R10-1(43.06mm,27.3mm) on Top Layer And Pad R11-1(44.33mm,27.3mm)
Minimum Solder Mask Sliver Constraint: (0.217mm < 0.254mm) Between Pad R10-2(43.06mm,25.75mm) on Top Layer And Pad
Minimum Solder Mask Sliver Constraint: (0.217mm < 0.254mm) Between Pad R11-1(44.33mm,27.3mm) on Top Layer And Pad R12-1(45.6mm,27.3mm) on
Minimum Solder Mask Sliver Constraint: (0.217mm < 0.254mm) Between Pad R11-2(44.33mm,25.75mm) on Top Layer And Pad R12-2(45.6mm,25.75mm)
Minimum Solder Mask Sliver Constraint: (0.217mm < 0.254mm) Between Pad R12-1(45.6mm,27.3mm) on Top Layer And Pad R13-1(46.87mm,27.3mm) on
Minimum Solder Mask Sliver Constraint: (0.217mm < 0.254mm) Between Pad R12-2(45.6mm,25.75mm) on Top Layer And Pad R13-2(46.87mm,25.75mm)
Minimum Solder Mask Sliver Constraint: (0.217mm < 0.254mm) Between Pad R13-1(46.87mm,27.3mm) on Top Layer And Pad R14-1(48.14mm,27.3mm)
Minimum Solder Mask Sliver Constraint: (0.217mm < 0.254mm) Between Pad R13-2(46.87mm,25.75mm) on Top Layer And Pad
Minimum Solder Mask Sliver Constraint: (0.217mm < 0.254mm) Between Pad R14-1(48.14mm,27.3mm) on Top Layer And Pad R15-1(49.41mm,27.3mm)
Minimum Solder Mask Sliver Constraint: (0.217mm < 0.254mm) Between Pad R14-2(48.14mm,25.75mm) on Top Layer And Pad
Minimum Solder Mask Sliver Constraint: (0.147mm < 0.254mm) Between Pad U2-1(67.178mm,12.95mm) on Top Layer And Pad
Minimum Solder Mask Sliver Constraint: (0.012mm < 0.254mm) Between Pad U2-1(67.178mm,12.95mm) on Top Layer And Pad
Minimum Solder Mask Sliver Constraint: (0.012mm < 0.254mm) Between Pad U2-2(67.178mm,13.55mm) on Top Layer And Pad
Minimum Solder Mask Sliver Constraint: (0.147mm < 0.254mm) Between Pad U2-3(65.738mm,13.55mm) on Top Layer And Pad
Minimum Solder Mask Sliver Constraint: (0.022mm < 0.254mm) Between Pad U2-3(65.738mm,13.55mm) on Top Layer And Pad
Minimum Solder Mask Sliver Constraint: (0.022mm < 0.254mm) Between Pad U2-4(65.738mm,12.95mm) on Top Layer And Pad

Silk To Solder Mask (Clearance=0.254mm) (IsPad),(All)
Silk To Solder Mask Clearance Constraint: (0.188mm < 0.254mm) Between Arc (67.686mm,12.696mm) on Top Overlay And Pad
Silk To Solder Mask Clearance Constraint: (0.042mm < 0.254mm) Between Pad 3V0-TP(72.5mm,15mm) on Top Layer And Text "3V0"
Silk To Solder Mask Clearance Constraint: (0.246mm < 0.254mm) Between Pad C2-1(74.3mm,14.729mm) on Top Layer And Text "U1" (74mm,15.5mm) on
Silk To Solder Mask Clearance Constraint: (Collision < 0.254mm) Between Pad C2-2(74.3mm,16.079mm) on Top Layer And Text "U1" (74mm,15.5mm) on
Silk To Solder Mask Clearance Constraint: (0.209mm < 0.254mm) Between Pad LED1-2(54.842mm,24.339mm) on Top Layer And Track
Silk To Solder Mask Clearance Constraint: (0.153mm < 0.254mm) Between Pad P2-(31.3mm,2.5mm) on Top Layer And Track
Silk To Solder Mask Clearance Constraint: (0.153mm < 0.254mm) Between Pad P2-(52.5mm,2.5mm) on Top Layer And Track
Silk To Solder Mask Clearance Constraint: (0.18mm < 0.254mm) Between Pad P4-3(3.25mm,16.605mm) on Top Layer And Track
Silk To Solder Mask Clearance Constraint: (0.241mm < 0.254mm) Between Pad P4-3(3.25mm,7.405mm) on Top Layer And Track
Silk To Solder Mask Clearance Constraint: (0.193mm < 0.254mm) Between Pad U1-1(75.93mm,13.65mm) on Top Layer And Track
Silk To Solder Mask Clearance Constraint: (0.175mm < 0.254mm) Between Pad U1-1(75.93mm,13.65mm) on Top Layer And Track
Silk To Solder Mask Clearance Constraint: (0.243mm < 0.254mm) Between Pad U1-10(75.93mm,18.05mm) on Top Layer And Track
Silk To Solder Mask Clearance Constraint: (0.195mm < 0.254mm) Between Pad U1-10(75.93mm,18.05mm) on Top Layer And Track
Silk To Solder Mask Clearance Constraint: (0.206mm < 0.254mm) Between Pad U1-2(76.43mm,13.65mm) on Top Layer And Track
Silk To Solder Mask Clearance Constraint: (0.206mm < 0.254mm) Between Pad U1-3(76.93mm,13.65mm) on Top Layer And Track
Silk To Solder Mask Clearance Constraint: (0.206mm < 0.254mm) Between Pad U1-4(77.43mm,13.65mm) on Top Layer And Track
Silk To Solder Mask Clearance Constraint: (0.206mm < 0.254mm) Between Pad U1-5(77.93mm,13.65mm) on Top Layer And Track
Silk To Solder Mask Clearance Constraint: (0.25mm < 0.254mm) Between Pad U1-5(77.93mm,13.65mm) on Top Layer And Track
Silk To Solder Mask Clearance Constraint: (0.195mm < 0.254mm) Between Pad U1-6(77.93mm,18.05mm) on Top Layer And Track
Silk To Solder Mask Clearance Constraint: (0.25mm < 0.254mm) Between Pad U1-6(77.93mm,18.05mm) on Top Layer And Track
Silk To Solder Mask Clearance Constraint: (0.195mm < 0.254mm) Between Pad U1-7(77.43mm,18.05mm) on Top Layer And Track
Silk To Solder Mask Clearance Constraint: (0.195mm < 0.254mm) Between Pad U1-8(76.93mm,18.05mm) on Top Layer And Track
Silk To Solder Mask Clearance Constraint: (0.195mm < 0.254mm) Between Pad U1-9(76.43mm,18.05mm) on Top Layer And Track
Silk To Solder Mask Clearance Constraint: (0.25mm < 0.254mm) Between Pad U2-1(67.178mm,12.95mm) on Top Layer And Track
Silk To Solder Mask Clearance Constraint: (0.25mm < 0.254mm) Between Pad U2-2(67.178mm,13.55mm) on Top Layer And Track
Silk To Solder Mask Clearance Constraint: (0.25mm < 0.254mm) Between Pad U2-3(65.738mm,13.55mm) on Top Layer And Track
Silk To Solder Mask Clearance Constraint: (0.25mm < 0.254mm) Between Pad U2-4(65.738mm,12.95mm) on Top Layer And Track

Silk to Silk (Clearance=0.254mm) (All),(All)
Silk To Silk Clearance Constraint: (Collision < 0.254mm) Between Arc (33.5mm,10.48mm) on Top Overlay And Text "FROM

CONSOLE

BOARD" (28.4mm,7.6mm) on Top Overlay Silk Text to Silk Clearance [0mm]

Silk to Silk (Clearance=0.254mm) (All),(All)
Silk To Silk Clearance Constraint: (0.235mm < 0.254mm) Between Text "LED1" (57.4mm,23.935mm) on Top Overlay And Text "R17" (57.4mm,22.75mm)
Silk To Silk Clearance Constraint: (0.244mm < 0.254mm) Between Text "P3" (9.25mm,7.75mm) on Top Overlay And Track
Silk To Silk Clearance Constraint: (0.218mm < 0.254mm) Between Text "P3" (9.25mm,7.75mm) on Top Overlay And Track
Silk To Silk Clearance Constraint: (0.25mm < 0.254mm) Between Text "R10" (50.576mm,27.677mm) on Top Overlay And Text "R11"
Silk To Silk Clearance Constraint: (0.25mm < 0.254mm) Between Text "R11" (51.776mm,27.677mm) on Top Overlay And Text "R12"
Silk To Silk Clearance Constraint: (0.25mm < 0.254mm) Between Text "R12" (52.976mm,27.677mm) on Top Overlay And Text "R13"
Silk To Silk Clearance Constraint: (0.25mm < 0.254mm) Between Text "R13" (54.176mm,27.677mm) on Top Overlay And Text "R14"
Silk To Silk Clearance Constraint: (0.25mm < 0.254mm) Between Text "R14" (55.376mm,27.677mm) on Top Overlay And Text "R15"