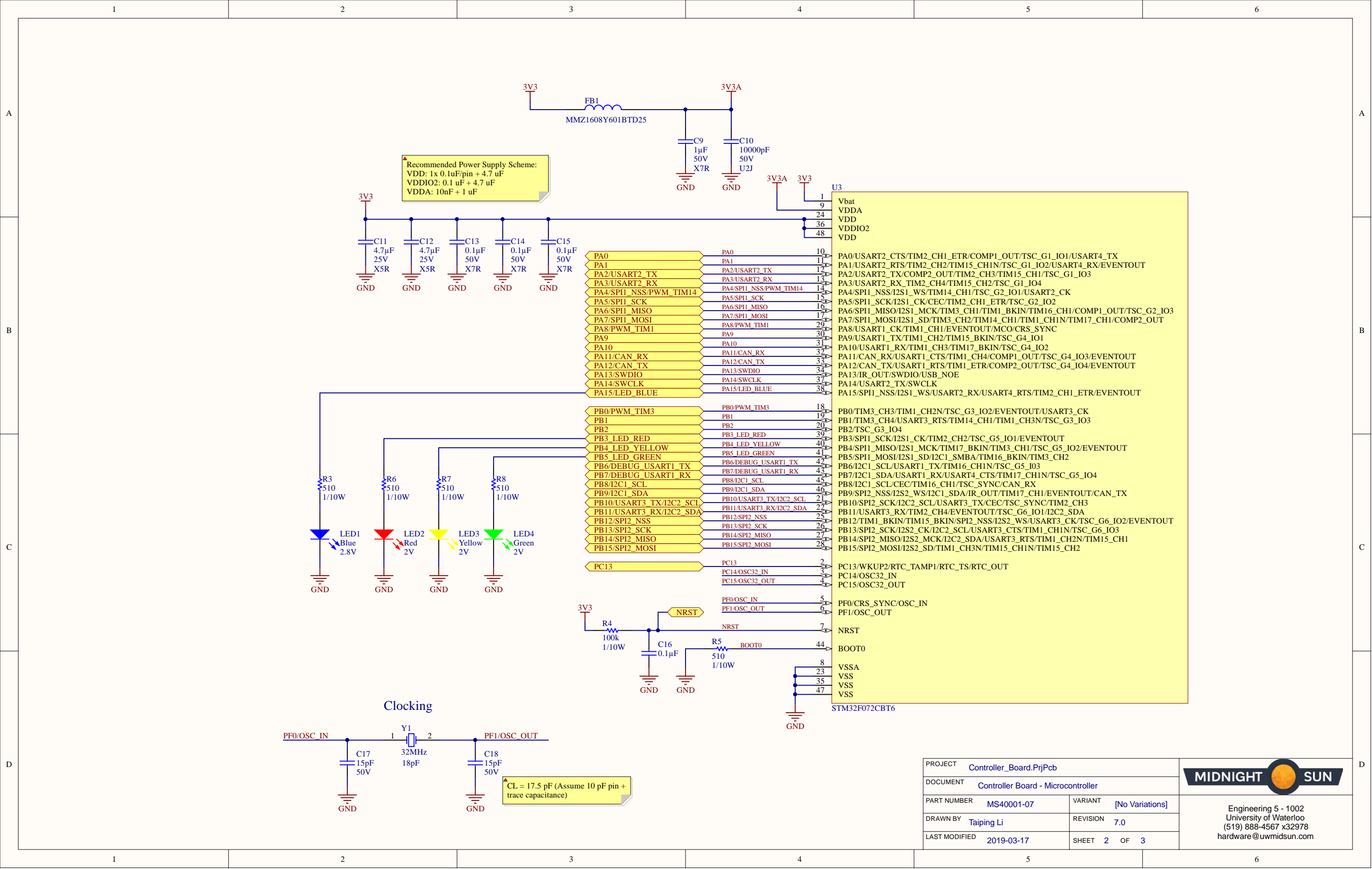


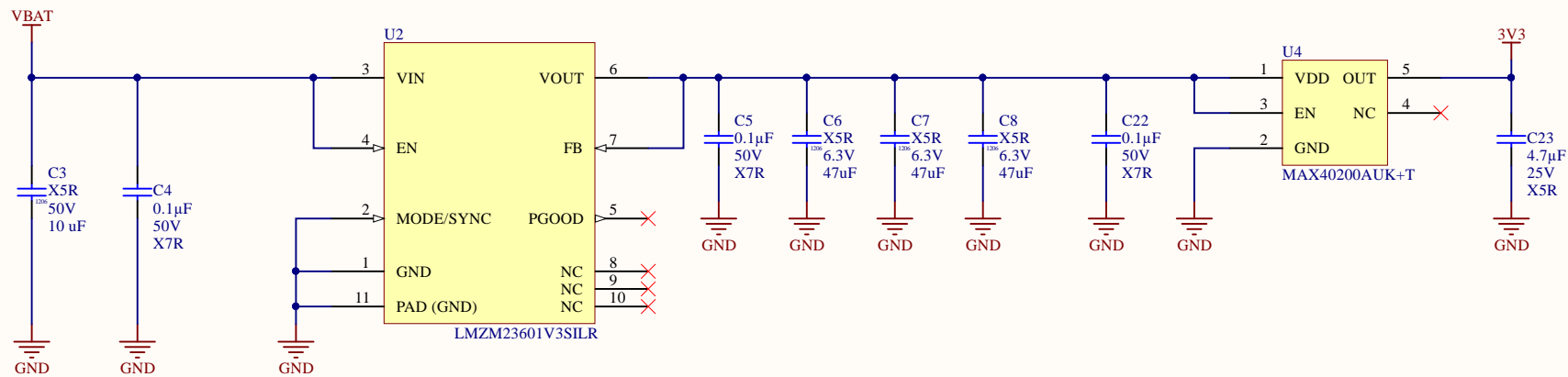
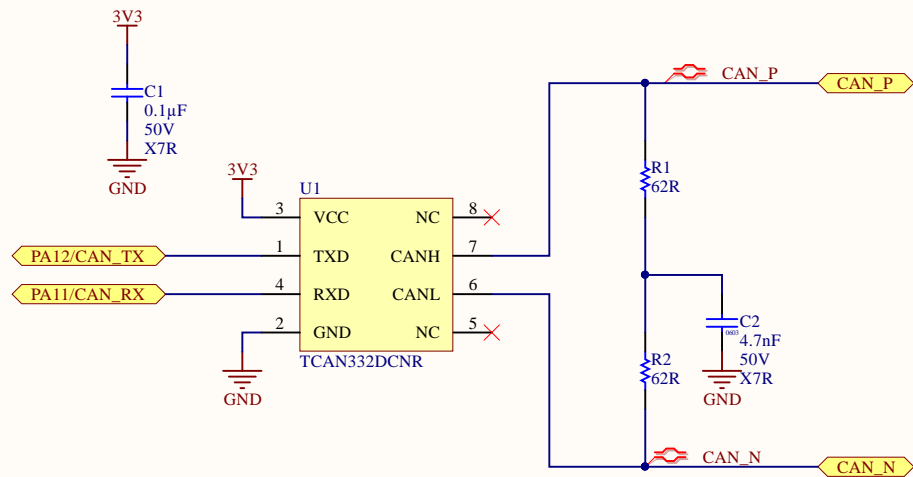
PROJECT	Controller_Board.PrjPcb	
DOCUMENT	Controller Board - Connectors	
PART NUMBER	MS40001-07	VARIANT [No Variations]
DRAWN BY	Taiping Li	REVISION 7.0
LAST MODIFIED	2019-03-17	SHEET 1 OF 3

MIDNIGHT

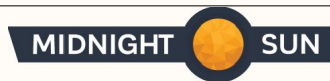
SUN

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





PROJECT	Controller_Board.PrjPcb	
DOCUMENT	Controller Board - Power & CAN	
PART NUMBER	MS40001-07	VARIANT [No Variations]
DRAWN BY	Taiping Li	REVISION 7.0
LAST MODIFIED	2019-03-17	SHEET 3 OF 3



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hardware@uwmidsun.com

Bill of Materials

Project:	Controller_Board.PrjPcb
Revision:	7
Project Lead:	Taiping Li
Generated On:	2019-03-17 18:35
Production Quantity:	1
Currency:	CAD
Total Parts Count:	48



LibRef	Designator	Manufacturer 1	Manufacturer Part Number 1	Supplier 1	Supplier Part Number 1	Supplier Unit Price 1	Quantity	Supplier Subtotal 1
CAP CER 0.1UF 50V 10% X7R 0603	C1, C4, C5, C13, C14, C15, C16, C21, C22	Kyocera AVX	06035C-104KAT2A	Digi-Key	478-5052-1-ND	0.21338	9	\$ 1.92
CAP CER 4.7nF 50V 10% X7R 0603	C2	Murata	GCM188R71H472KA37D	Digi-Key	490-4932-1-ND	0.28007	1	\$ 0.28
CAP CER 10uF 50V 20% X5R 1206	C3, C20	Murata	GRT31CR61H106ME01L	Digi-Key	490-12457-1-ND	0.73351	2	\$ 1.47
CAP CER 47uF 6.3V X5R 1206	C6, C7, C8	Samsung	CL31A476MQHNNNE	Digi-Key	1276-1167-1-ND	0.56013	3	\$ 1.68
CAP CER 1UF 50V 10% X7R 0603	C9	Taiyo Yuden	UMK107AB7105KA-T	Digi-Key	587-3247-1-ND	0.37342	1	\$ 0.37
CAP CER 10nF 50V 5% X7R 0603	C10, C19	KEMET	C0603C103J5JACTU	Digi-Key	399-13384-1-ND	0.48011	2	\$ 0.96
CAP CER 4.7UF 25V 10% X5R 0603	C11, C12, C23	Murata	GRM188R61E475KE11D	Digi-Key	490-7203-1-ND	0.49345	3	\$ 1.48
CAP CER 15PF 50V ±5% NPO 0603	C17, C18	Yageo	CC0603JRNPO9BN150	Digi-Key	311-1060-1-ND	0.13336	2	\$ 0.27
DIODE TVS 24VWM 70VC SOT23	D1, D2	Nexperia	PESD1CAN,215	Digi-Key	1727-3817-1-ND	0.65349	2	\$ 1.31
DIODE SCHOTTKY 30V 1A POWERDI123	D3	Diodes	DFLS130L-7	Digi-Key	DFLS130LDICT-ND	0.66682	1	\$ 0.67
FB 600 OHM 1LN 0603	FB1	TDK	MMZ1608Y601BTD25	Digi-Key	445-172850-1-ND	0.13336	1	\$ 0.13
CONN 10POS HEADR MALE 0.05"	J1	Amphenol FCI	20021121-00010C4LF	Digi-Key	609-3695-1-ND	1.12	1	\$ 1.12
LED BLUE CLEAR 2.8V 0603	LED1	Vishay Lite-On	LTST-C193TBKT-5A	Digi-Key	160-1827-1-ND	0.62682	1	\$ 0.63
LED RED CLEAR 2V 0603	LED2	Würth Electronics	150060RS75000	Digi-Key	732-4978-1-ND	0.18671	1	\$ 0.19
LED YELLOW CLEAR 2.1V 0603	LED3	Würth Electronics	150060YS75000	Digi-Key	732-4981-1-ND	0.18671	1	\$ 0.19
LED GREEN CLEAR 2V 0603	LED4	Würth Electronics	150060VS75000	Digi-Key	732-4980-1-ND	0.18671	1	\$ 0.19
CONN 2POS DURA-CLIK 0.079" VERT	P1, P2	Molex	560020-0220	Digi-Key	WM10862CT-ND	1.04	2	\$ 2.08
CONN 50POS Bergstak Receptacle 0.02"	P3	Amphenol FCI	10132798-052100LF	Digi-Key	609-5227-1-ND	1.85	1	\$ 1.85
RES 62 OHM 0.1% 1/10W 0603	R1, R2	Panasonic	ERA3AEB620V	Digi-Key	P62DBCT-ND	0.46678	2	\$ 0.93
RES 510 OHM 5% 1/10W 0603	R3, R5, R6, R7, R8	Yageo	RC0603JR-07510RL	Digi-Key	311-510GRCT-ND	0.13336	5	\$ 0.67
RES 100K OHM 5% 1/8W 0603	R4	Yageo	RC0603JR-07100KL	Digi-Key	311-100KGRCT-ND	0.13336	1	\$ 0.13
IC CAN Transceiver TCAN332DR	U1	Texas Instruments	TCAN332DCNR	Digi-Key	296-47355-1-ND	3.03	1	\$ 3.03
IC DC DC 3.3V 1A 10-uSIP	U2	Texas Instruments	LMZM23601V3SILR	Digi-Key	296-51381-1-ND	7.68	1	\$ 7.68
IC MCU 32BIT 128KB FLASH 48LQFP	U3	STMicroelectronics	STM32F072CBT6	Digi-Key	497-14645-ND	4.75	1	\$ 4.75
IC IDEAL DIODE CURRENT SWITCH SOT23-5	U4	Maxim	MAX40200AUK+T	Digi-Key	MAX40200AUK+TCT-ND	1.19	1	\$ 1.19
CRYSTAL 32 MHz 18PF 2-SMD	Y1	Abracon	ABM7-32.000MHZ-D2Y-T	Digi-Key	535-9850-1-ND	1.33	1	\$ 1.33
							Total:	\$ 36.49

CAN
CAN
I

P2

P1

- PA15 BLUE
- PB3 RED
- PB4 YELLOW
- PB5 GREEN



D1



D2

- NC
- NC
- GND
- GND
- 3V3

J1

- nRST
- PB7 RX
- PB6 TX
- SWCLK
- SWDIO

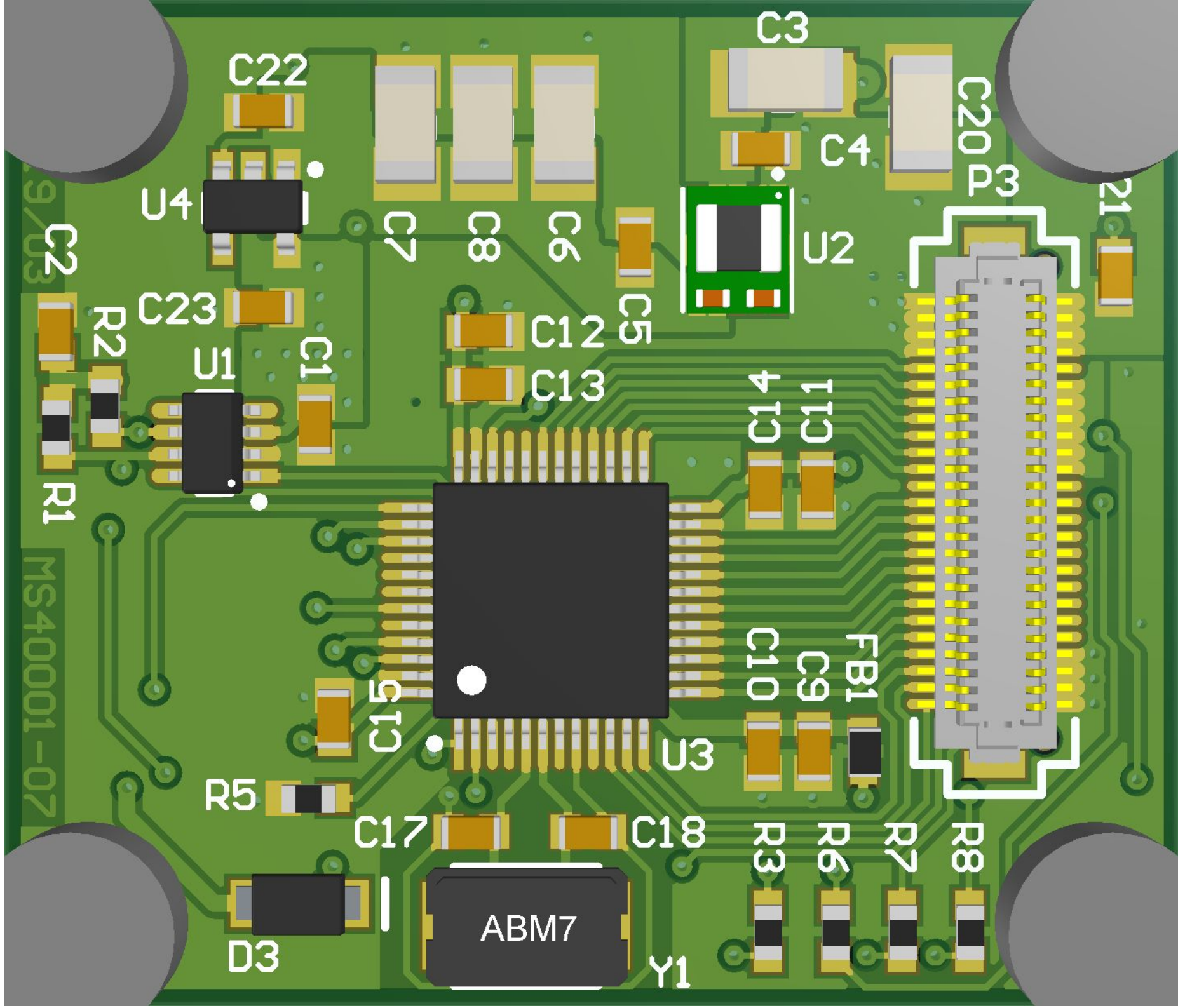
C16
R4

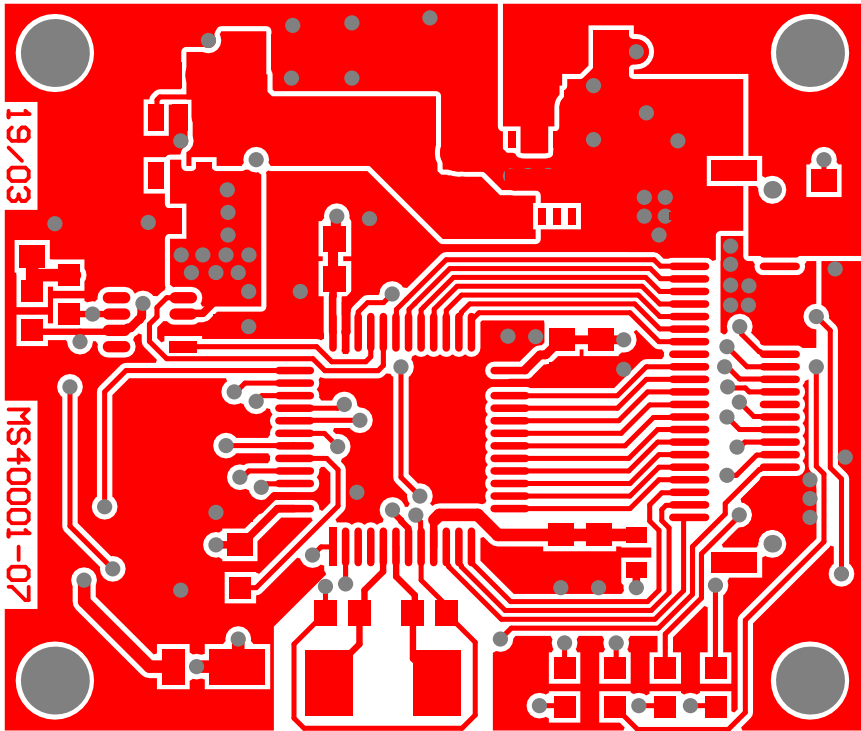


C19

CONTROLLER BOARD
REV 7

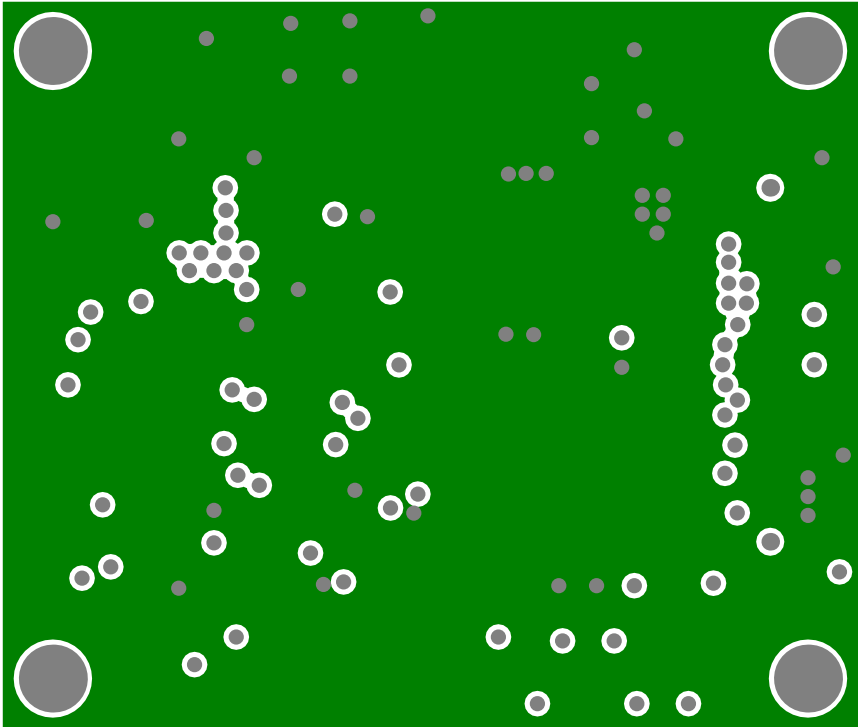


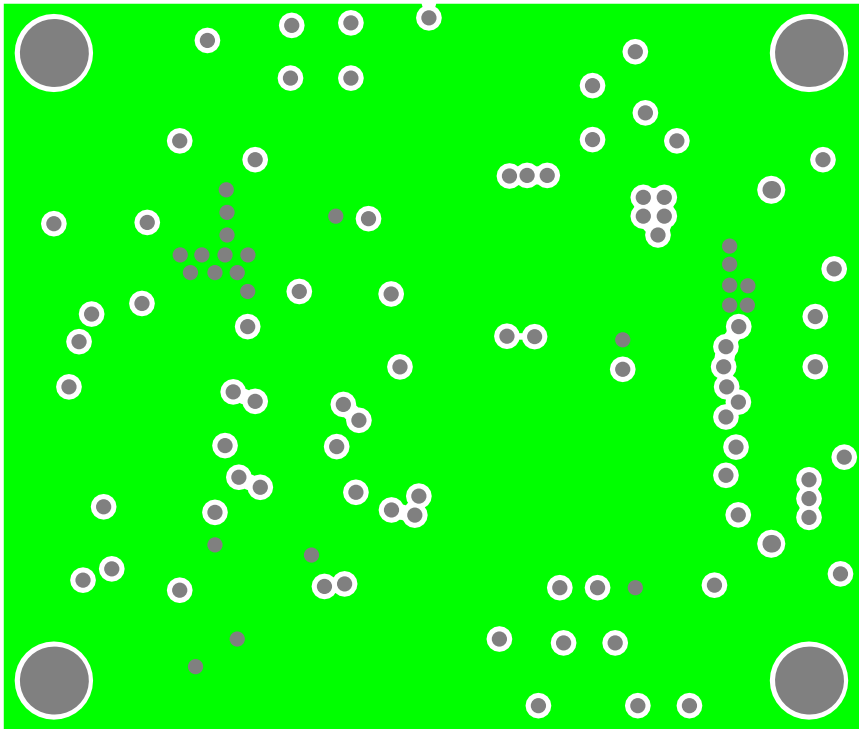


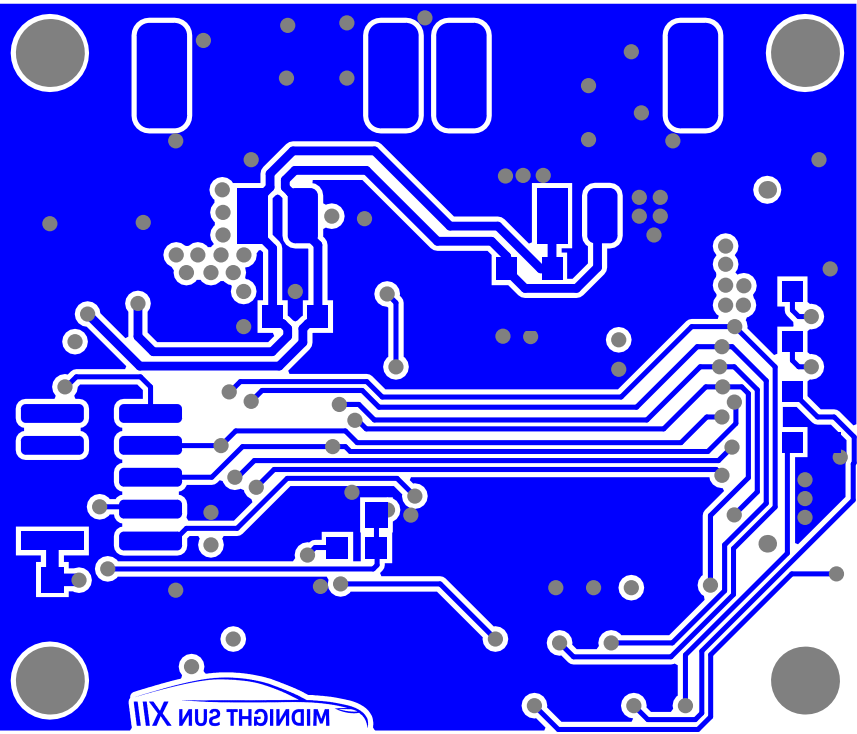


19/03

MS40001-07







WIDIGHT SUH XII

Electrical Rules Check Report

Class	Document	Message
Warning	Controller Board - Microcontroller.SchDoc	Net BOOT0 has no driving source (Pin R5-2,Pin U3-44)
No Report	Controller_Board.SchDoc	Net PC14/OSC32_IN has only one pin (Pin U3-3)
No Report	Controller_Board.SchDoc	Net PC15/OSC32_OUT has only one pin (Pin U3-4)

Design Rules Verification Report

Filename : C:\Users\Taiping\Documents\Midnight Sun\hardware\MSXII_ControllerBoard\Cont

Warnings 0
Rule Violations 13

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=0.152mm) (Max=5mm) (Preferred=0.2mm) (All)	0
Power Plane Connect Rule(Direct Connect)(Expansion=0mm) (Conductor Width=0.254mm) (Air Gap=0.254mm)	0
Hole Size Constraint (Min=0.025mm) (Max=3mm) (All)	0
Hole To Hole Clearance (Gap=0.254mm) (All),(All)	0
Minimum Solder Mask Sliver (Gap=0mm) (All),(All)	0
Silk To Solder Mask (Clearance=0.15mm) (IsPad),(All)	13
Silk to Silk (Clearance=0.15mm) (All),(All)	0
Net Antennae (Tolerance=0mm) (All)	0
Height Constraint (Min=0mm) (Max=25.4mm) (Preferred=12.7mm) (All)	0
Total	13

Silk To Solder Mask (Clearance=0.15mm) (IsPad),(All)	
Silk To Solder Mask Clearance Constraint: (Collision < 0.15mm) Between Arc (2.6mm,6.79mm) on Bottom Overlay And Pad C 19-1(2.6mm,6.525mm) on	
Silk To Solder Mask Clearance Constraint: (0.005mm < 0.15mm) Between Arc (23.05mm,24.795mm) on Top Overlay And Pad C 4-2(23.2mm,25.5mm) on	
Silk To Solder Mask Clearance Constraint: (0.149mm < 0.15mm) Between Pad P1-3(6.95mm,26.6mm) on Bottom Layer And Track	
Silk To Solder Mask Clearance Constraint: (0.149mm < 0.15mm) Between Pad P2-3(18.85mm,26.6mm) on Bottom Layer And Track	
Silk To Solder Mask Clearance Constraint: (0.116mm < 0.15mm) Between Pad U2-11(21.85mm,22.525mm) on Top Layer And Track	
Silk To Solder Mask Clearance Constraint: (0.116mm < 0.15mm) Between Pad U2-11(21.85mm,22.525mm) on Top Layer And Track	
Silk To Solder Mask Clearance Constraint: (Collision < 0.15mm) Between Pad U3-47(12.025mm,9.85mm) on Top Layer And Text "C 15"	
Silk To Solder Mask Clearance Constraint: (Collision < 0.15mm) Between Pad U3-48(12.025mm,9.35mm) on Top Layer And Text "C 15"	
Silk To Solder Mask Clearance Constraint: (0.125mm < 0.15mm) Between Pad U4-1(8.425mm,24.925mm) on Top Layer And Track	
Silk To Solder Mask Clearance Constraint: (0.125mm < 0.15mm) Between Pad U4-2(7.475mm,24.925mm) on Top Layer And Track	
Silk To Solder Mask Clearance Constraint: (0.125mm < 0.15mm) Between Pad U4-3(6.525mm,24.925mm) on Top Layer And Track	
Silk To Solder Mask Clearance Constraint: (0.125mm < 0.15mm) Between Pad U4-4(6.525mm,22.625mm) on Top Layer And Track	
Silk To Solder Mask Clearance Constraint: (0.125mm < 0.15mm) Between Pad U4-5(8.425mm,22.625mm) on Top Layer And Track	