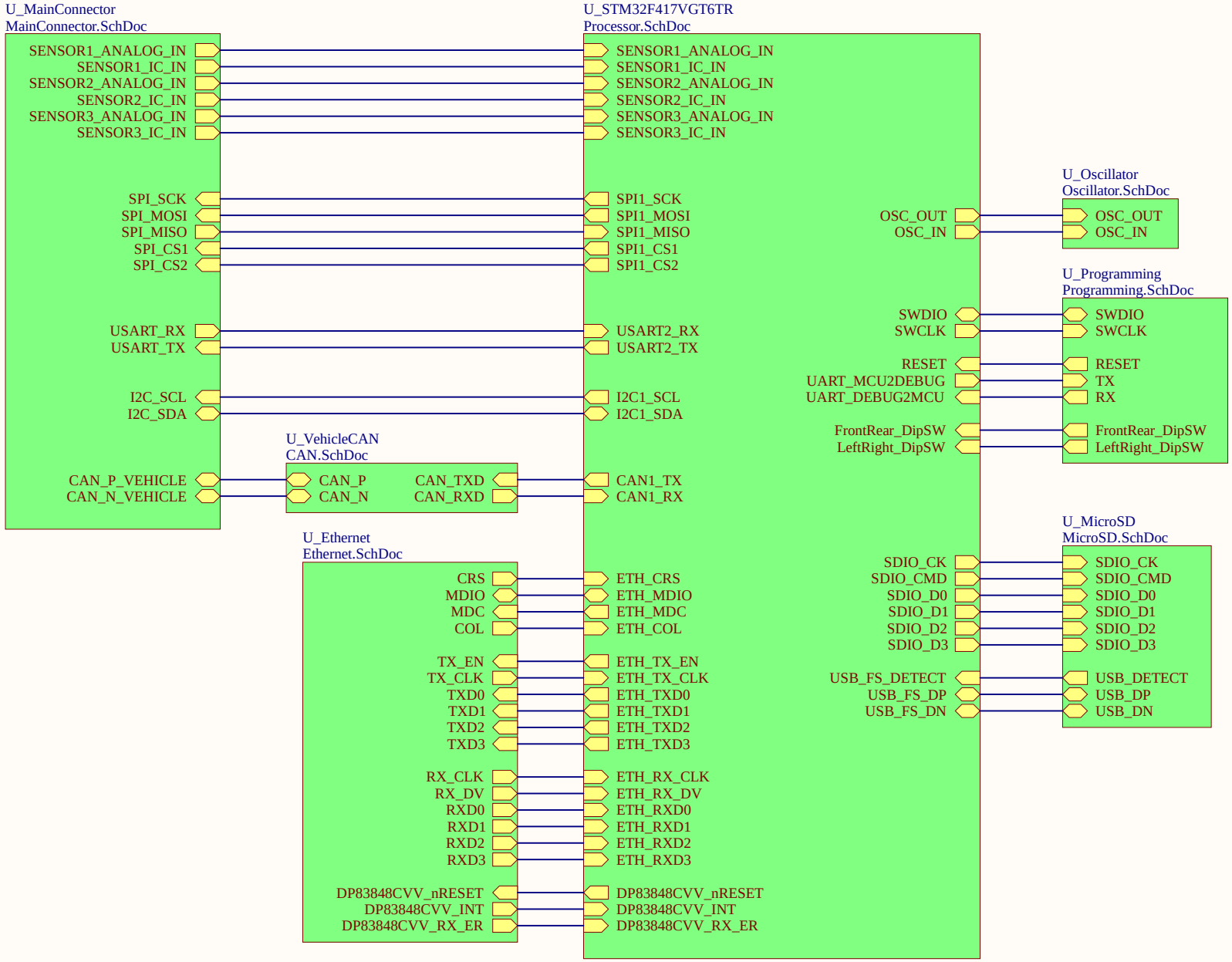
Wheel Sensor Board



U_POWER
Power.SchDoc

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Date: 3/15/2024		Sheet of
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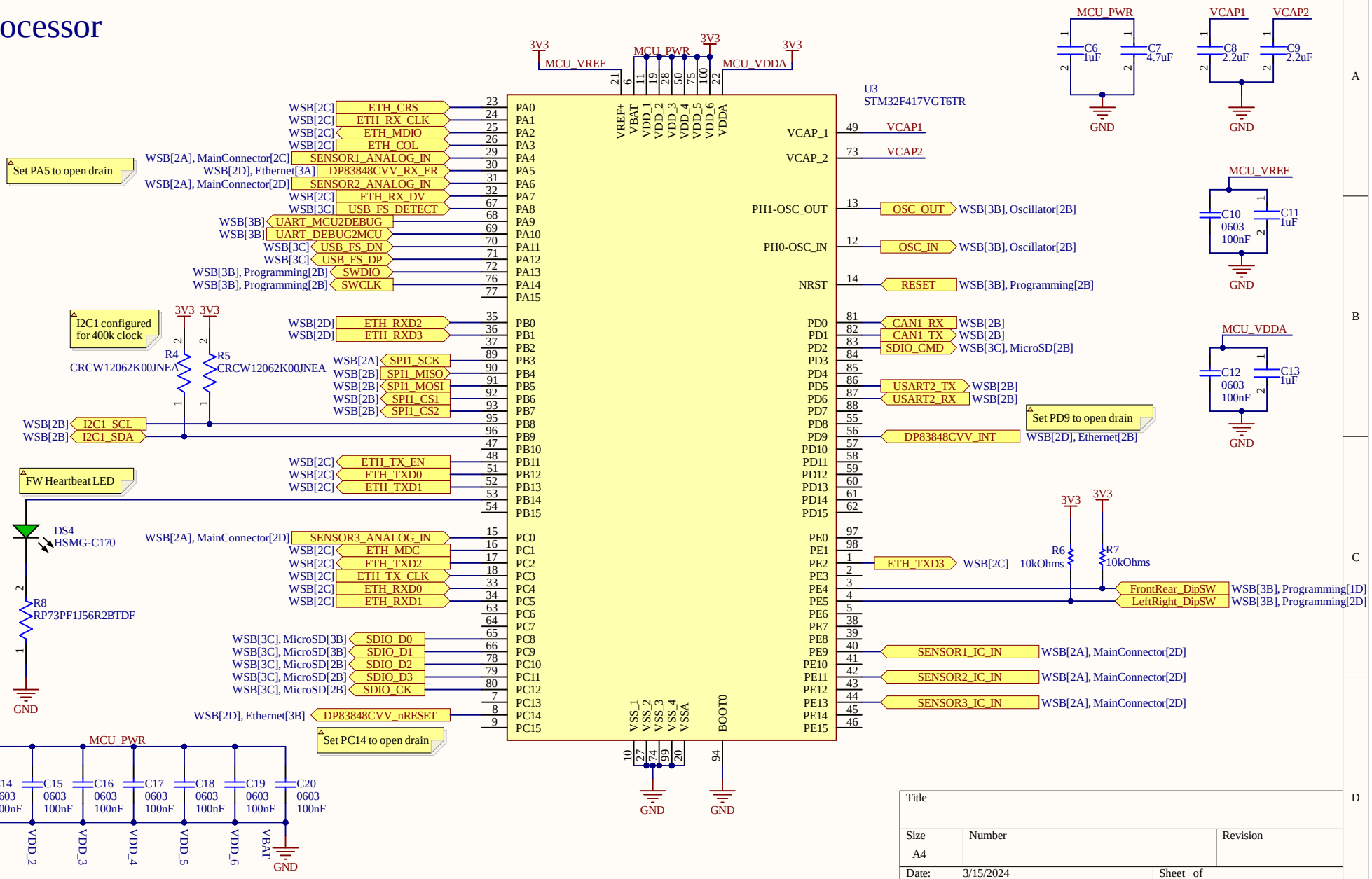
Processor



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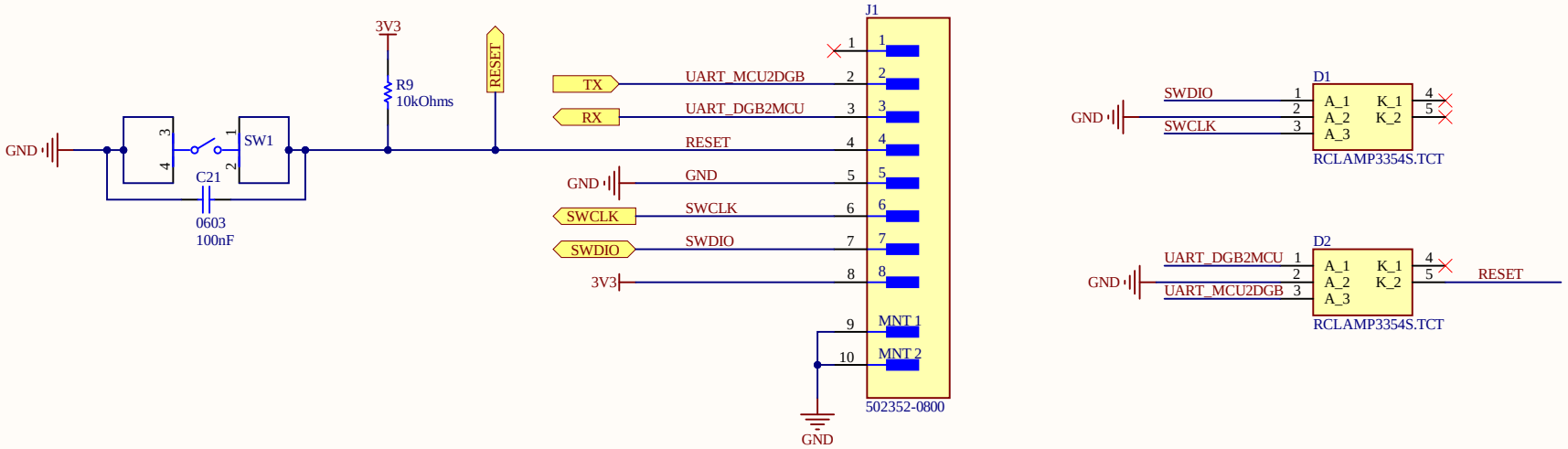
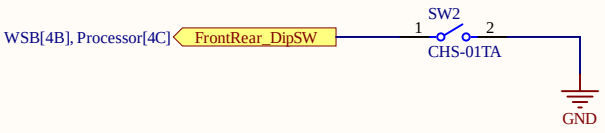
Programming



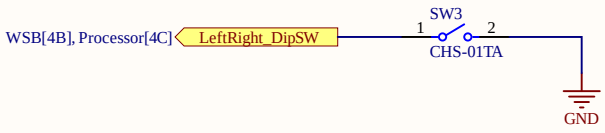
Front/Rear Dip Switch

Close switch to configure as rear WSB



Left/Right Dip Switch

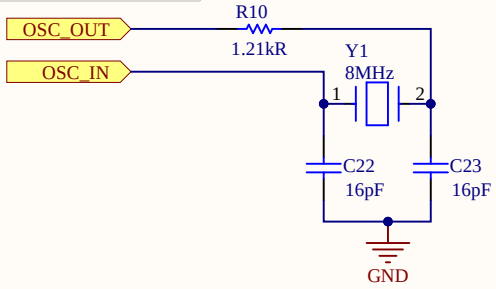
Close switch to configure as right WSB



Title		
Size: A4	Number	Revision
Date: 3/15/2024		Sheet of
File: C:\Users\..\Programming.SchDoc		Drawn By:

Oscillator

Oscillator external resistor must be selected to limit power dissipation to < 100uW. Value selected based value used for existing F7 boards but should be verified experimentally but a general equation in AN2867 is given in section 3.5.3 as:
R_EXT = 1/(2*pi*F_osc*C_L2)
R_EXT = 1/(2*pi*(8*10^6)*(16*10^-12))
R_EXT = 1243



See ST AN2867 Rev 19 and datasheet section 5.3.8 External clock source characteristics for details. MCU datasheet recommends a 10pF estimate for pararsitic capacitance. This is a Pierce Oscillator (variant of Colpitts Oscillator). R_Ext is used to limit inverter output current. See Figure 5 in AN2867.
From AN2867 Section 3.3 with C_L1 = C_L2 and C_L as 18pF:
C_L1 = 2*(C_L - C_s)
C_L1 = 16pF

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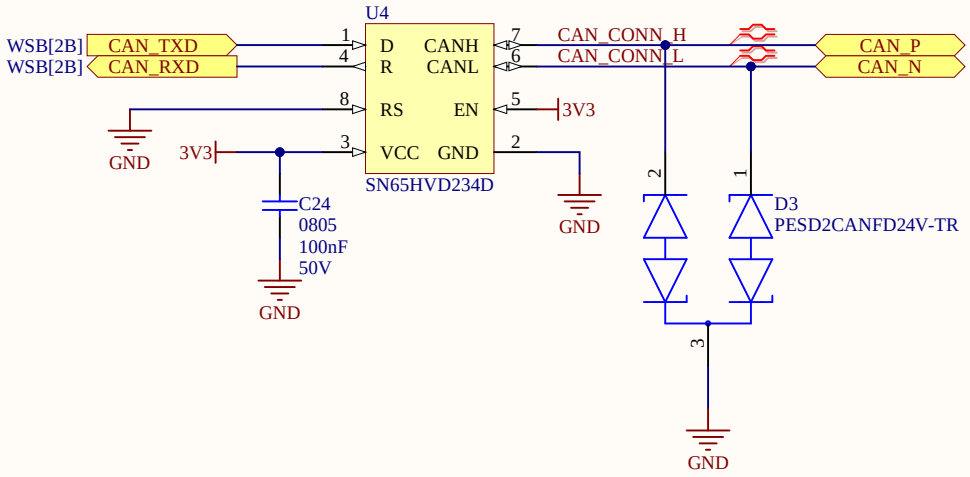
Date: 3/15/2024		Sheet of
File: C:\Users\..\Oscillator.SchDoc		Drawn By:

CAN



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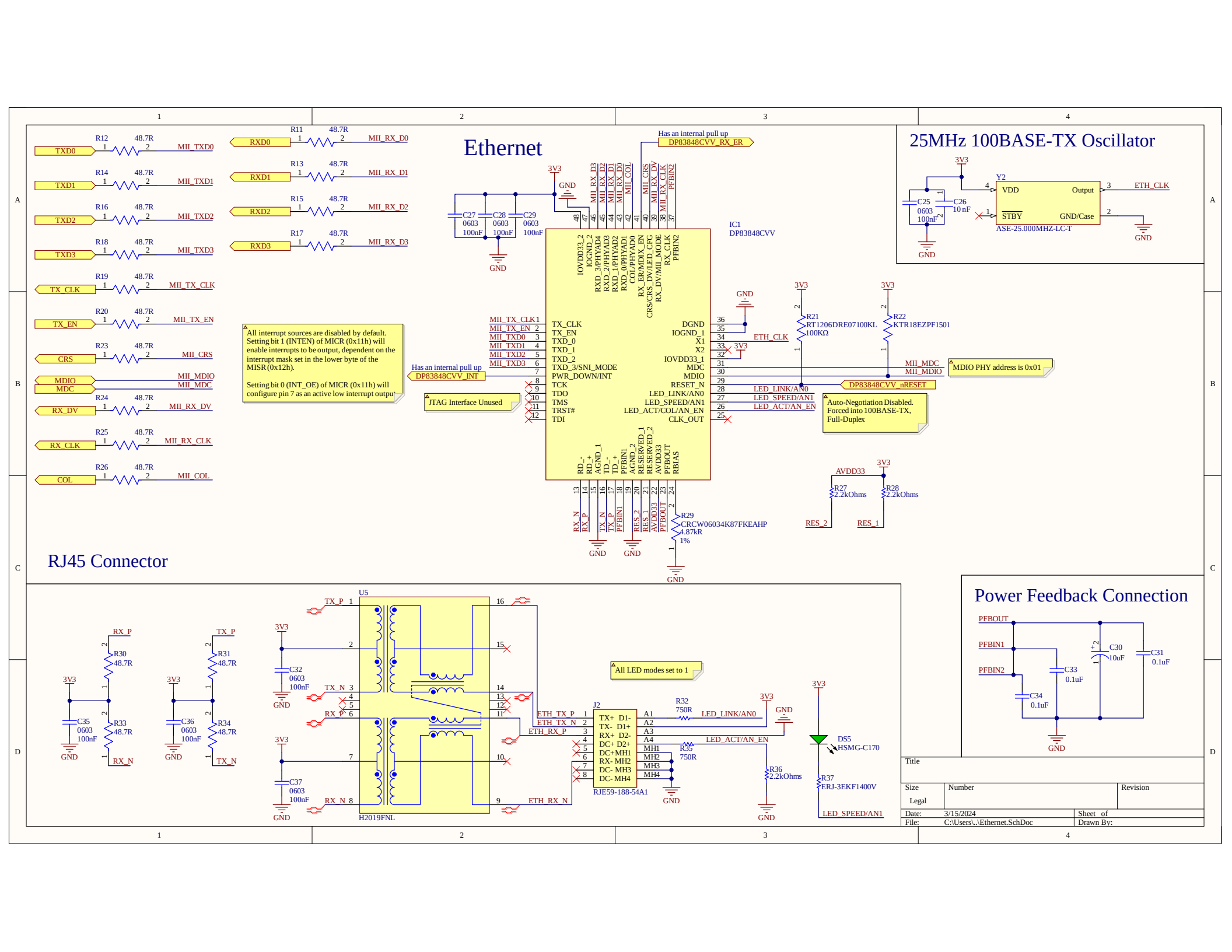
Ethernet
25MHz 100BASE-TX Oscillator
RJ45 Connector
Power Feedback Connection
IC1
DP83848CVV
ASE-25.000MHZ-LC-T
RJE59-188-54A1
H2019FNL
All interrupt sources are disabled by default. Setting bit 1 (INTEN) of MICR (0x11h) will enable interrupts to be output, dependent on the interrupt mask set in the lower byte of the MISR (0x12h).
Setting bit 0 (INT_OE) of MICR (0x11h) will configure pin 7 as an active low interrupt output
JTAG Interface Unused
Auto-Negotiation Disabled. Forced into 100BASE-TX, Full-Duplex
MDIO PHY address is 0x01
All LED modes set to 1
Has an internal pull up
DP83848CVV_RX_ER
DP83848CVV_INT
DP83848CVV_nRESET
Title
Size
Legal
Number
Revision
Date: 3/15/2024
Sheet of
File: C:\Users\..\Ethernet.SchDoc
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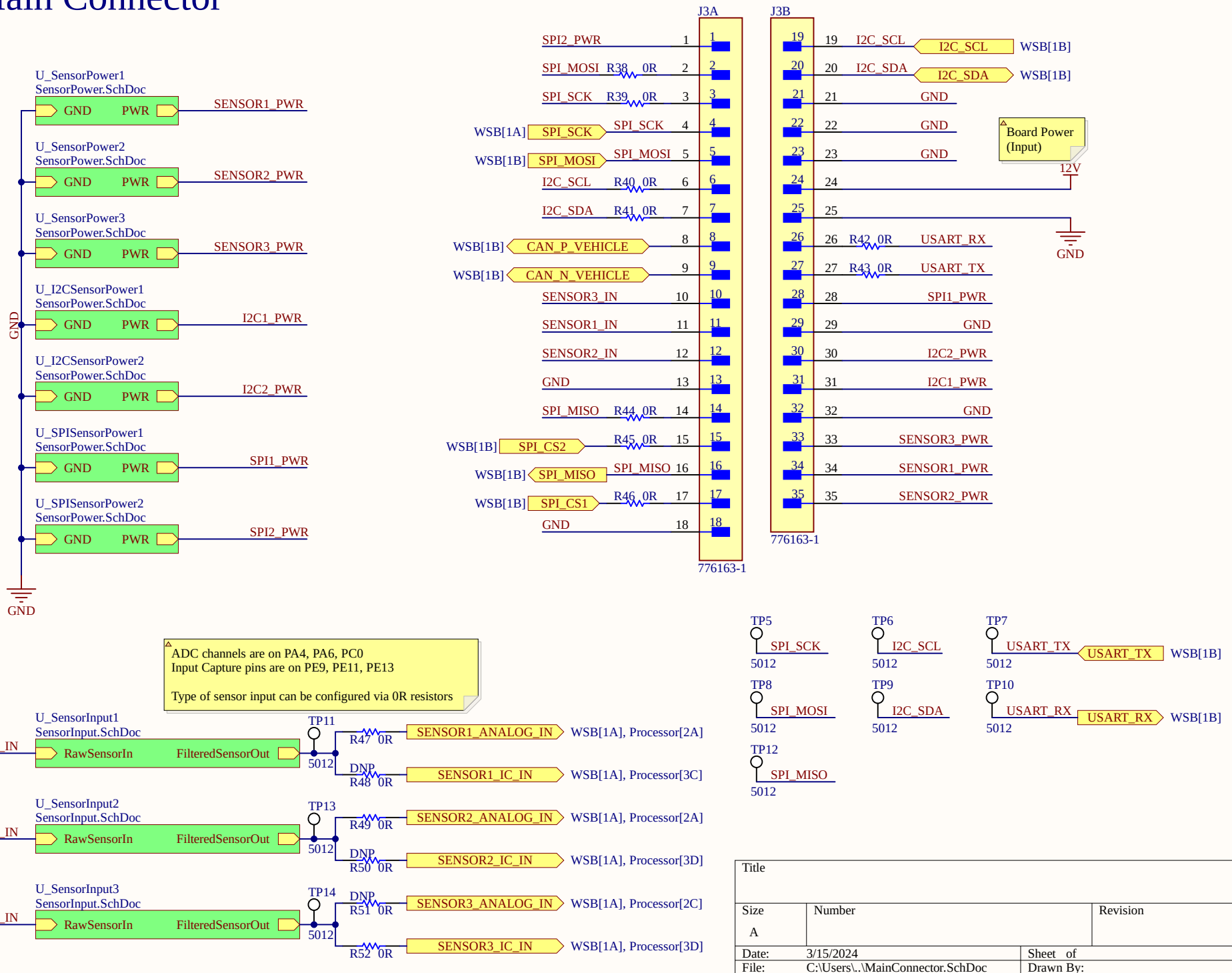
Main Connector



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Size A	Number	Revision
Date: 3/15/2024		Sheet of
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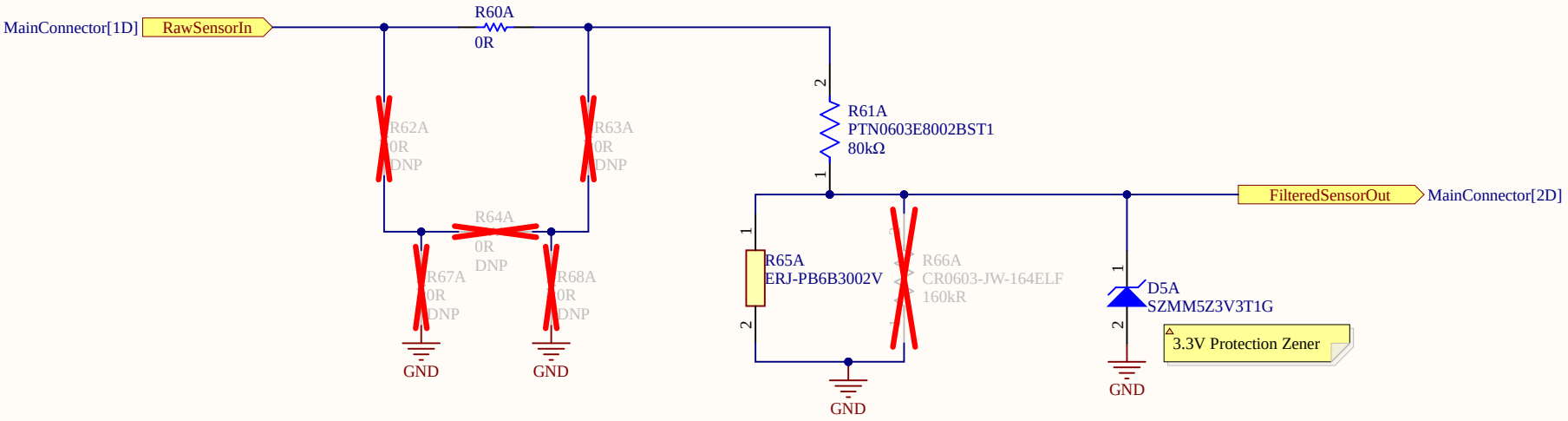
Sensor Input



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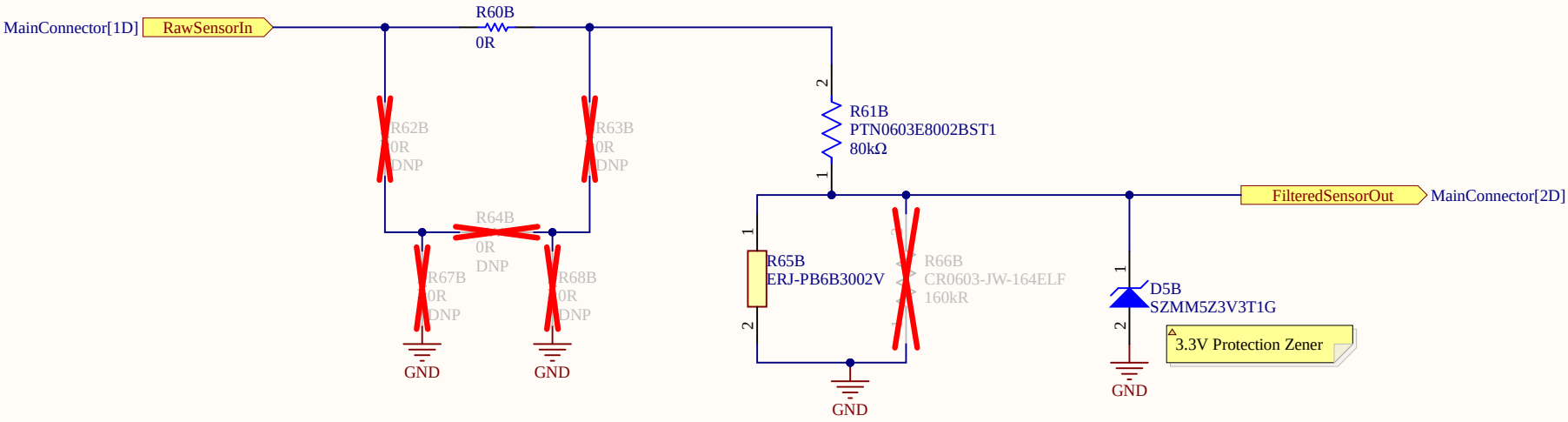
Sensor Input



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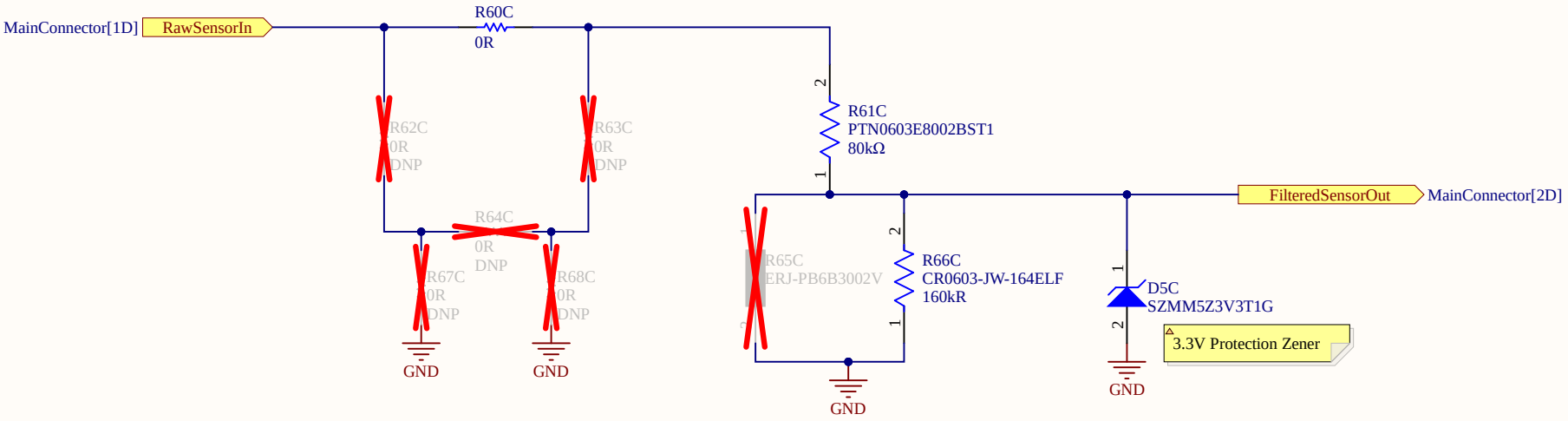
Sensor Input



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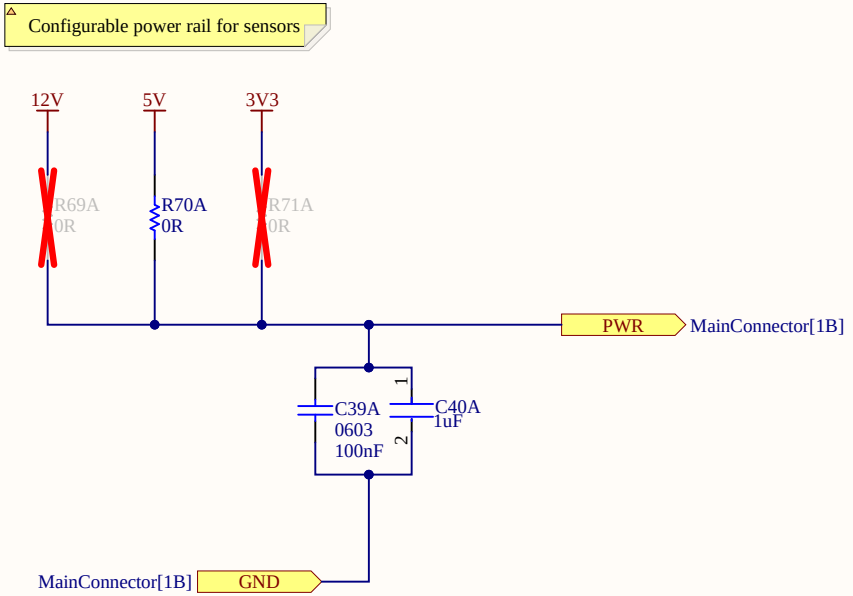
Sensor Power



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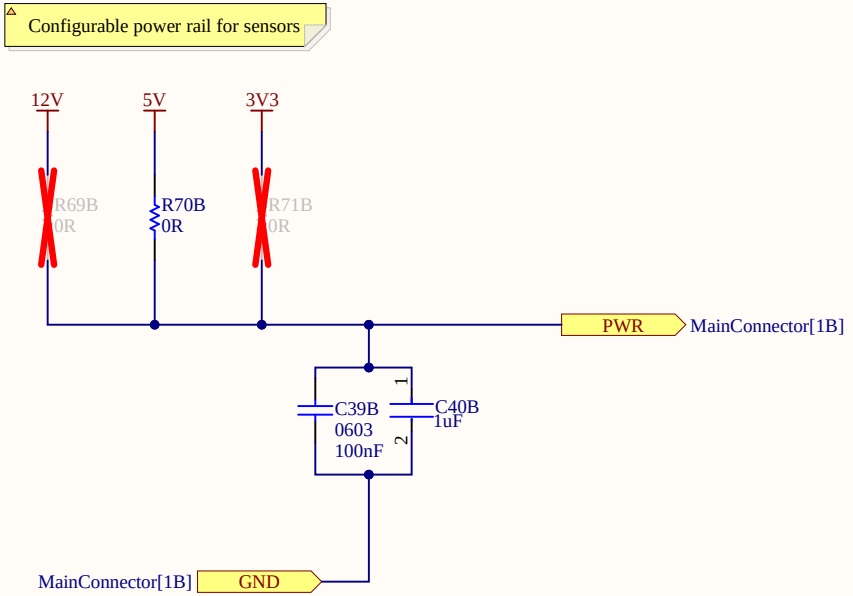
Sensor Power



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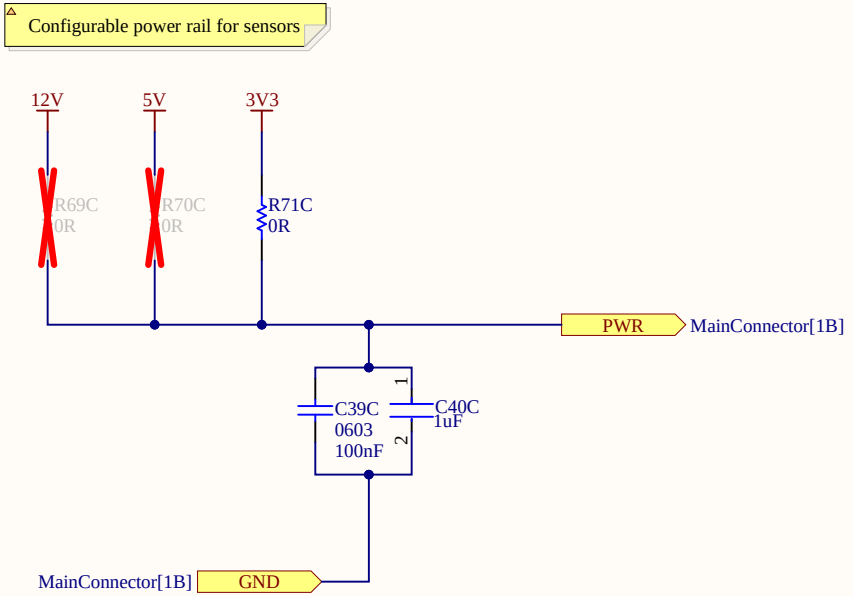

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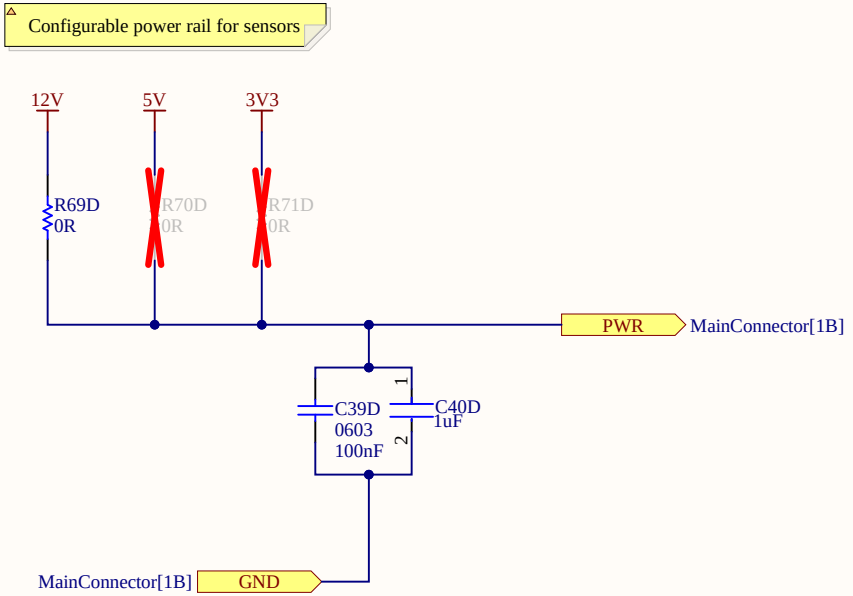

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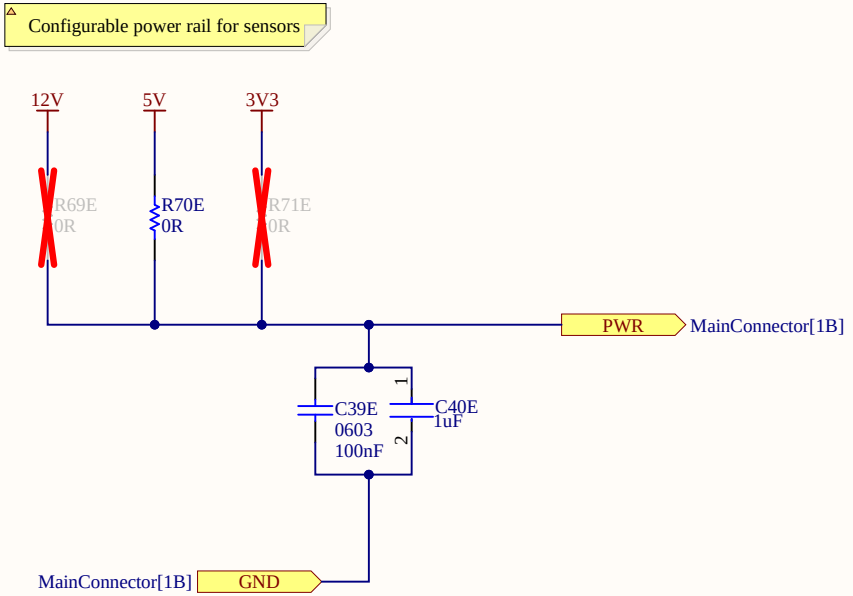

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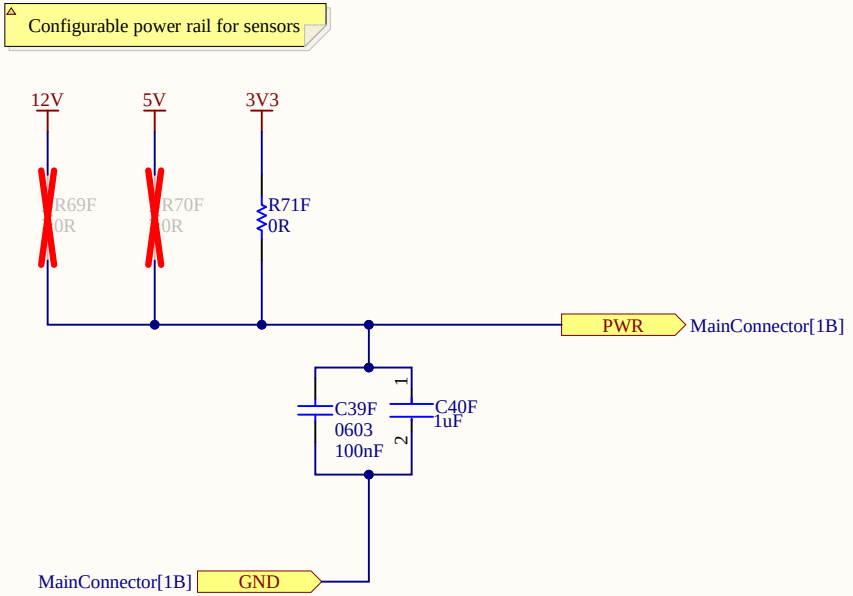

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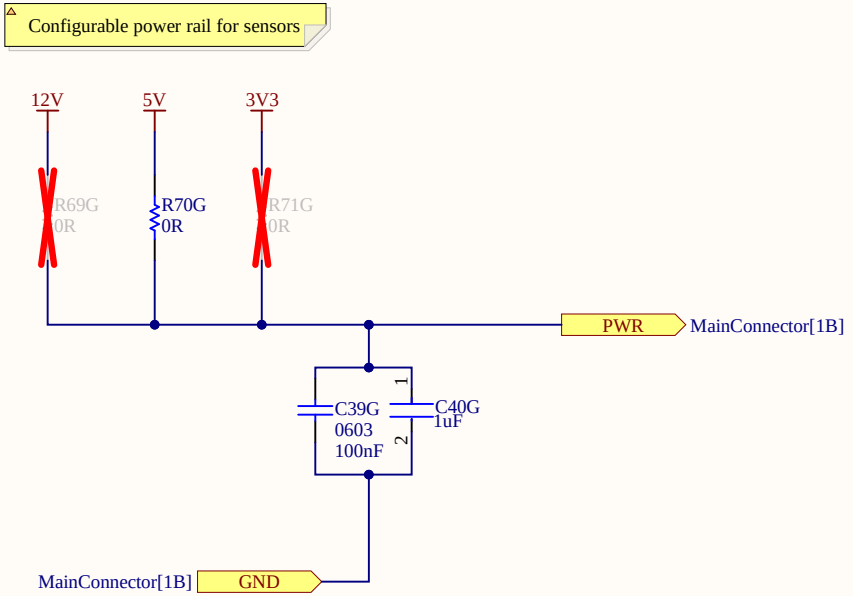

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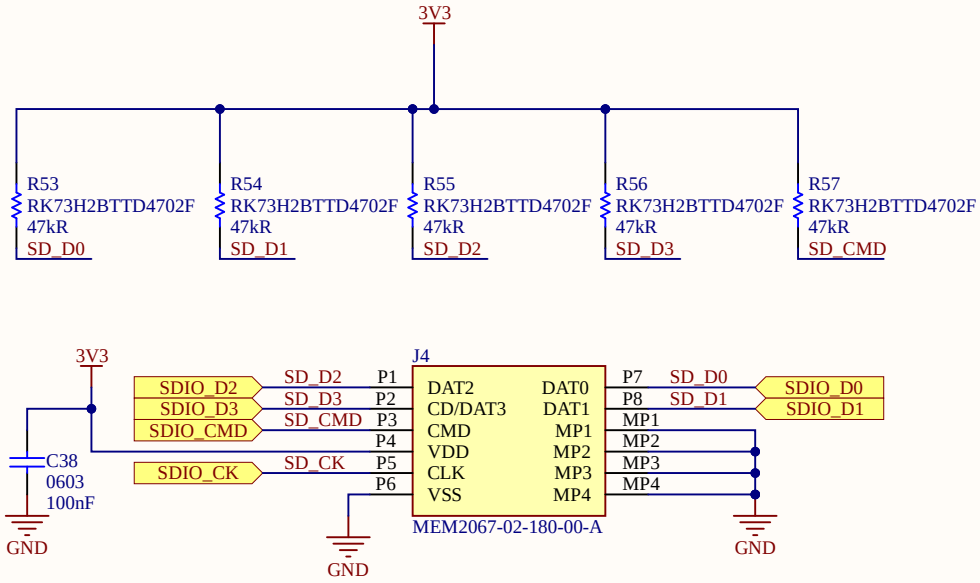
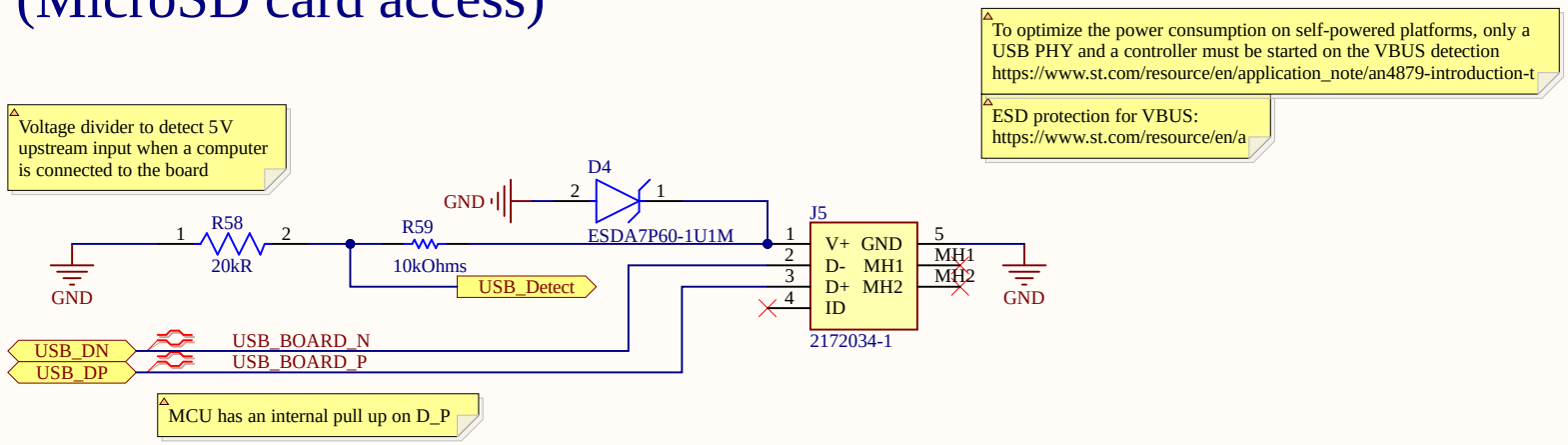
MicroSD (logging)



MiniUSB-B (MicroSD card access)



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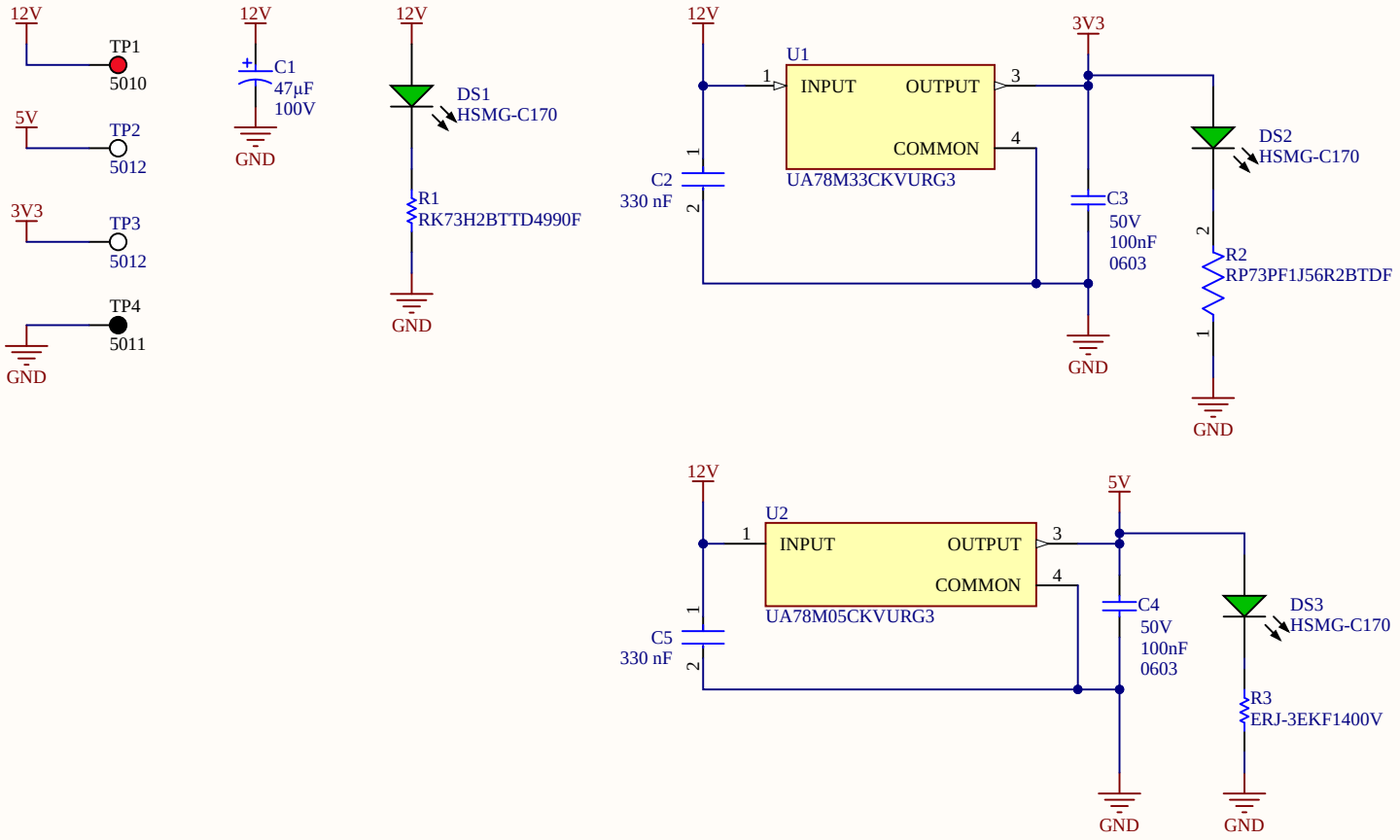
Power



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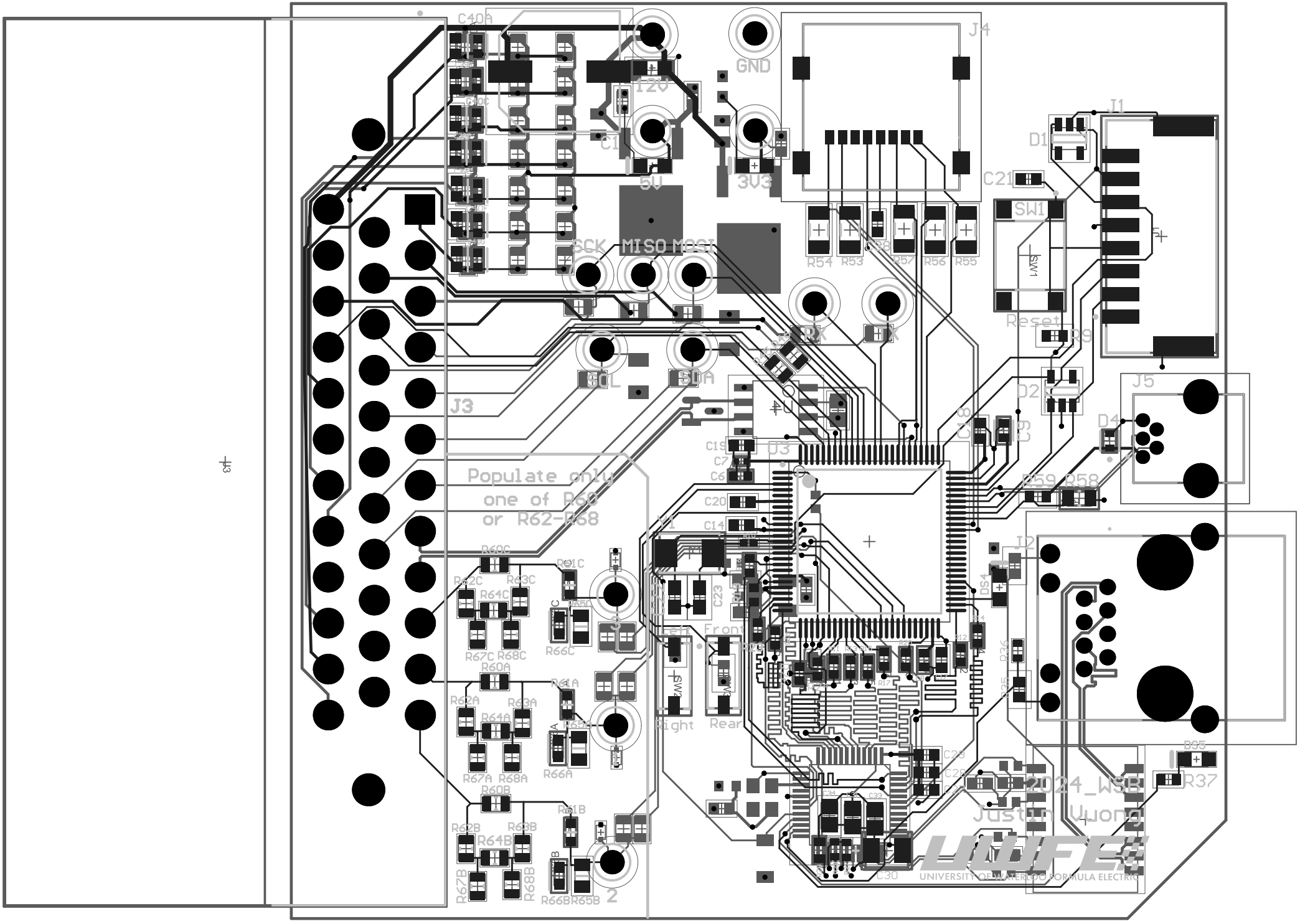
J4
GND
3V3
5V
SCK
MISO
MOSI
SCL
SDA
RX
TX
J3
J5
J1
J2
SW1
Reset
Populate only
one of R60
or R62-R68
Front
Right
Rear
2024_WSB
Justin Yuong
UNIVERSITY OF WATERLOO FORMULA ELECTRIC

Line #	Name	Description	Designator	Revision ID	Revision State	Revision Status	Quantity	Manufacturer 1	Manufacturer Part Number 1	Manufacturer Lifecycle 1	Supplier 1	Supplier Part Number 1	Supplier Unit Price 1	Supplier Subtotal 1
	UUX2A470MNL1GS	Aluminum Electrolytic Capacitor, 47 uF, +/- 20%, 100 VDC, -55 to 105 degC, 2-Pin SMD, RoHS, Tape and Reel	C1		Unknown server		1	Nichicon	UUX2A470MNL1GS	Volume Production	Mouser	647-UUX2A470MNL1GS	0.69	0.69
	CC0805KKX7R7BB334	Surface Mount Ceramic Multilayer Capacitor 0.33uF 10% X7R 16V 0805 Blister T/R	C2, C5		Unknown server		2	Yageo	CC0805KKX7R7BB334	Volume Production	Arrow Electronics	CC0805KKX7R7BB334	0.1088	0.2176
	C0603X104K5RACTU		C3, C4, C10, C12, C14, C15, C16, C17, C18, C19, C20, C21, C25, C27, C28, C29, C32, C35, C36, C37, C38, C39A, C39B, C39C, C39D, C39E, C39F, C39G		Unknown server		28	KEMET	C0603X104K5RACTU	Volume Production	Newark	94M5632	0.026	0.728
	CL10A105KA8NNNC	Cap Ceramic 1uF 25V X5R ±10% Pad SMD 0603 +85°C T/R	C6, C11, C13, C40A, C40B, C40C, C40D, C40E, C40F, C40G		Unknown server		10	Samsung	CL10A105KA8NNNC	Volume Production	Newark	82AC9275	0.005	0.05
	C1005X5R1A475K050BC	CAP CER 4.7UF 10V X5R 0402	C7		Unknown server		1	TDK	C1005X5R1A475K050BC	Volume Production	Mouser	810-C1005X5R1A475KBC	0.3	0.3
	C0603C225K4PACTU	CAP CER 2.2UF 16V X5R 0603	C8, C9		Unknown server		2	KEMET	C0603C225K4PACTU	Volume Production	Arrow Electronics	C0603C225K4PACTU	0.0816	0.1632
	06035A160JAT2A		C22, C23		Unknown server		2	Kyocera AVX	06035A160JAT2A	Volume Production	Arrow Electronics	06035A160JAT2A	0.1376	0.2752
	C0805C104K5RACTU		C24		Unknown server		1	KEMET	C0805C104K5RACTU	Volume Production	Newark	19C6015	0.024	0.024
	CC0603KRX7R9BB103	CAP CER 10000PF 50V X7R 0603	C26		Unknown server		1	Yageo	CC0603KRX7R9BB103	Volume Production	Digikey	311-1085-1-ND	0.1	0.1
	T491B106K025AT	CAP TANT 10UF 10% 25V 1411	C30		Unknown server		1	KEMET	T491B106K025AT	Volume Production	Newark	70R0398	0.295	0.295
	TAJR104K020RNJ		C31, C33, C34		Unknown server		3	Kyocera AVX	TAJR104K020RNJ	Volume Production	Mouser	581-TAJR104K020R	0.58	1.74
	RCLAMP3354S.TCT	TVS Diode (Bi-directional)	D1, D2		Not managed		2				Arrow Electronics, [NoParam]	RCLAMP3354S.TCT, [NoParam]		
	PESD2CANFD24V-TR	TVS DIODE 24VWM 42VC TO236AB	D3		Unknown server		1	Nexperia	PESD2CANFD24V-TR	Volume Production	Newark	67AH3149	0.076	0.076
	ESDA7P60-1U1M	TVS DIODE 5V 11.6V 1610	D4		Unknown server		1	STMicroelectronics	ESDA7P60-1U1M	Volume Production	Arrow Electronics	ESDA7P60-1U1M	0.2921	0.2921
	SZMM5Z3V3T1G	Zener Voltage Regulator, 500 mW, 2-Pin SOD-523, Pb-Free, Tape and Reel	D5A, D5B, D5C		Unknown server		3	ON Semiconductor	SZMM5Z3V3T1G	Volume Production	Mouser	863-SZMM5Z3V3T1G	0.48	1.44
	HSMG-C170	Chip LED, Green, 2.2 V, -40 to 85 degC, 2-Pin SMD, Pb-Free, Tape and Reel	DS1, DS2, DS3, DS4, DS5		Unknown server		5	Broadcom Avago	HSMG-C170	Volume Production	Newark	40K0121	0.085	0.425
	DP83848CVV	Integrated Circuit	IC1		Not managed		1	TI National Semiconductor	DP83848CVV/NOPB	Volume Production	Mouser	926-DP83848CVV/NOPB	6.3	6.3
	502352-0800	CONN HEADER SMD R/A 8POS 2MM	J1		Unknown server		1	Molex	502352-0800	Volume Production	Farnell	2067042	1.93	1.93
	RJE59-188-54A1	Connector	J2		Not managed		1	Amphenol	RJE59-188-54A1		Avnet	92Y3914	7.44	7.44
	776163-1	CONN HEADER R/A 35POS 4MM	J3		Unknown server		1	TE Connectivity	776163-1	Volume Production	Future Electronics	8106536	9.16	9.16
	MEM2067-02-180-00-A	Connector	J4		Not managed		1	Global Connector Technology	MEM2067-02-180-00-A	Volume Production	Future Electronics	7054324	0.545	545
	2172034-1	Connector	J5		Not managed		1	TE Connectivity AMP	2172034-1	Volume Production	Avnet	68AH8515	1.41	1.41
	RK73H2BTTD4990F		R1		Unknown server		1							
	RP73PF1J56R2BTDF	RES SMD 56.2 OHM 0.1% 1/6W 0603	R2, R8		Unknown server		2	TE Connectivity	RP73PF1J56R2BTDF	Volume Production	Mouser	279-RP73PF1J56R2BTDF	0.45	0.9
	ERJ-3EKF1400V		R3, R37		Unknown server		2	Panasonic	ERJ-3EKF1400V	Volume Production	Newark	53W4528	0.002	0.004
	CRCW12062K00JNEA	RES Thick Film, 2kΩ, 5%, 0.25W, 200ppm/°C, 1206	R4, R5		Unknown server		2	Vishay Dale	CRCW12062K00JNEA	Volume Production	Newark	59M6956	0.009	0.018
	RC0603JR-0710KL	Resistor, 10 KOhm, +/- 5%, 100 mW, -55 to 155 degC, 0603 (1608 Metric), RoHS, Tape and Reel	R6, R7, R9, R59		Unknown server		4	Yageo	RC0603JR-0710KL	Volume Production	Newark	98K7286	0.009	0.09
	CR0402-FX-1211GLF		R10		Unknown server		1	Bourns	CR0402-FX-1211GLF	Volume Production	Mouser	652-CR0402FX-1211GLF	0.1	0.1
	CRCW060348R7FKEA	RES Thick Film, 48.7Ω, 1%, 0.1W, 100ppm/°C, 0603	R11, R12, R13, R14, R15, R16, R17, R18, R19, R20, R23, R24, R25, R26, R30, R31, R33, R34		Unknown server		18	Vishay	CRCW060348R7FKEA	Volume Production	Digikey	541-48.7HCT-ND	0.026	0.468
	RT1206DRE07100KL	RES SMD 100K OHM 0.5% 1/4W 1206	R21		Unknown server		1	Yageo	RT1206DRE07100KL	Volume Production	Arrow Electronics	RT1206DRE07100KL	0.016	0.016
	KTR18EZPF1501	Res Thick Film 1206 1.5kΩ 1% 0.1W ±100ppm/°C Automotive Paper T/R	R22		Unknown server		1	Rohm	KTR18EZPF1501	Volume Production	Digikey	RHM1.50KAICT-ND	0.21	0.21
	RC0603FR-072K2L	Thick Film Resistor, 2.2 KOhm, 100 mW, 50 V, +/- 1%, -55 to 155 degC, 2-Pin SMD (0603), RoHS, Tape and Reel	R27, R28, R36		Unknown server		3	Yageo	RC0603FR-072K2L	Volume Production	Avnet	75X0144	0.011	0.11
	CRCW06034K87FKEAHP	RES Thick Film, 4.87kΩ, 1%, 0.33W, 100ppm/°C, 0603	R29		Unknown server		1	Vishay Dale	CRCW06034K87FKEAHP	Volume Production	Digikey	541-CRCW06034K87FKEAHPCT-ND	0.15	0.15
	CRCW0603750RJNEA		R32, R35		Unknown server		2	Vishay Dale	CRCW0603750RJNEA	Volume Production	Newark	51P0331	0.003	0.006
	RC0805JR-100RL	Chip Resistor, 0 Ohm, +/- 5%, 125 mW, -55 to 155 degC, 0805 (2012 Metric), RoHS, Tape and Reel	R38, R39, R40, R41, R42, R43, R44, R45, R46, R47, R48, R49, R50, R51, R52, R60A, R60B, R60C, R69D, R70A, R70B, R70E, R70G, R71C, R71F		Unknown server		25	Yageo	RC0805JR-100RL	Volume Production	Arrow Electronics	RC0805JR-100RL	0.0129	0.3225
	RK73H2BTTD4702F		R53, R54, R55, R56, R57		Unknown server		5	KOA Speer	RK73H2BTTD4702F	Volume Production	Arrow Electronics	RK73H2BTTD4702F	0.0136	0.136
	CRCW080520K0JNEB	RES Thick Film, 20kΩ, 5%, 0.125W, 200ppm/°C, 0805	R58		Unknown server		1	Vishay Dale	CRCW080520K0JNEB	Obsolete	Mouser	71-CRCW080520K0JNEB	0.1	0.1
	PTN0603E8002BST1	RES 80K OHM 0.1% 0.15W 0603	R61A, R61B, R61C		Unknown server		3	Vishay Dale	PTN0603E8002BST1	Volume Production	Mouser	71-PTN0603E8002BST1	0.83	2.49
	ERJ-PB6B3002V	Resistor	R65A, R65B		Not managed		2							
	CR0603-JW-164ELF	Thick Film Chip Resistors 0603 160kΩ 0.1W 5% 200ppm/°C	R66C		Unknown server		1	Bourns	CR0603-JW-164ELF	Volume Production	Mouser	652-CR0603JW-164ELF	0.1	0.1
	PTS645SM43SMTR92LFS	SWITCH TACTILE SPST-NO 0.05A 12V	SW1		Unknown server		1	ITT C&K	PTS645SM43SMTR92LFS	Volume Production	Newark	95W3587	0.183	0.183
	CHS-01TA	SWITCH SLIDE DIP SPST 100MA 6V	SW2, SW3		Unknown server		2	Nidec Copal	CHS-01TA	Volume Production	Mouser	229-CHS-01TA	1.06	2.12
	5010	Test Point, Red, Through Hole, RoHS, Bulk	TP1		Unknown server		1	Keystone Electronics	5010	Volume Production	Future Electronics	9766767	0.285	0.285
	5012	Test Point, White, Through Hole, RoHS, Bulk	TP2, TP3, TP5, TP6, TP7, TP8, TP9, TP10, TP11, TP12, TP13, TP14		Unknown server		12	Keystone Electronics	5012	Volume Production	Future Electronics	6434195	0.31	3.72
	5011	Test Point, Black, Through Hole, RoHS, Bulk	TP4		Unknown server		1	Keystone Electronics	5011	Volume Production	Future Electronics	5322706	0.169	0.169
	UA78M33CKVURG3	IC REG LINEAR 3.3V 500MA TO252-3	U1		Unknown server		1	Texas Instruments	UA78M33CKVURG3	Volume Production	Newark	80K3502	0.198	0.198
	UA78M05CKVURG3	IC REG LINEAR 5V 500MA TO252-3	U2		Unknown server		1							
	STM32F417VGT6TR	RISC Microcontroller, 32-Bit, FLASH, CORTEX-M4 CPU, 168MHz, CMOS, PQFP100	U3		Not managed		1	STMicroelectronics	STM32F417VGT6TR	Volume Production	Mouser	511-STM32F417VGT6TR	15.23	15.23
	SN65HVD234D	3.3V CAN Transceiver with Sleep Mode, 6 mA, -40 to 125 degC, 8-pin SOIC (D), Green (RoHS & no Sb/Br)	U4		Unknown server		1	Texas Instruments	SN65HVD234D	Volume Production	Mouser	595-SN65HVD234D	4.3	4.3
	H2019FNL	Telecom Transformer, 100BASE-TX, 0 to 70 degC, 16-Pin SMD, RoHS	U5		Unknown server		1	Pulse	H2019FNL	Not Recommended for New Design	Mouser	673-H2019FNL	7.77	7.77
	ABM3-8.000MHZ-D2Y-T	Crystal 8MHz ±20ppm 18pF SMD-2 5mm x 3.2mm	Y1		Unknown server		1	Abracon	ABM3-8.000MHZ-D2Y-T	Volume Production	Newark	77R1485	0.466	0.466
	ASE-25.000MHZ-LC-T	XTAL Oscillator 25MHz ±50ppm CMOS 3.3V 4-SMD 3.2mm x 2.5mm	Y2		Unknown server		1	Abracon	ASE-25.000MHZ-LC-T	Volume Production	Newark	84R2104	1.1	1.1