

Light Pipe  
LP1

Title: **Smart Sensor Simulator 2**

Subtitle: Relays and Ports

Date: 10/21/2020 Time: 2:41:24 PM

File: Teensy Connections for SSS2 Rev 6.SchDoc

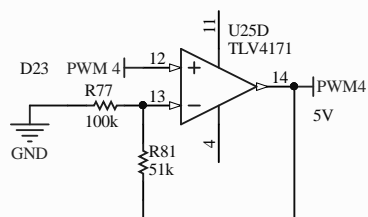
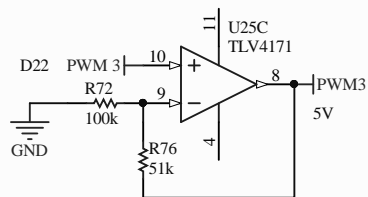
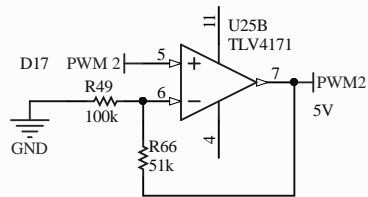
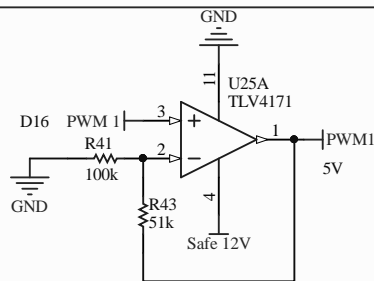
Revision: 6

Sheet 2 of 7

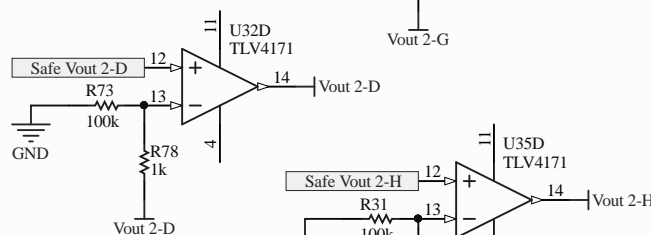
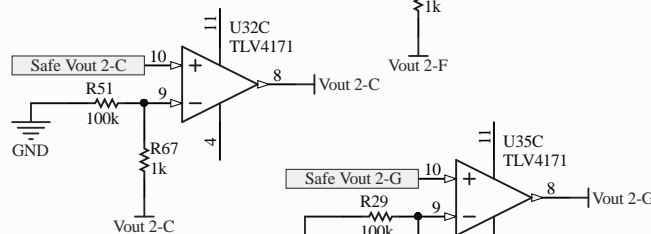
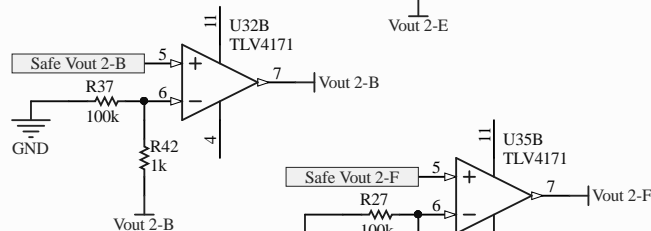
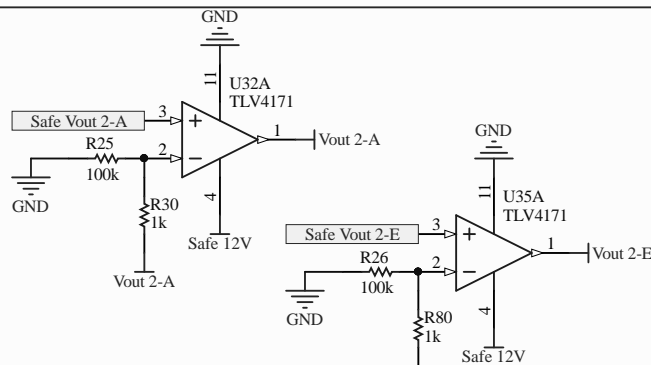
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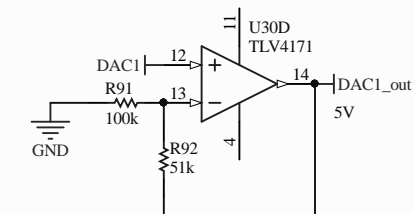
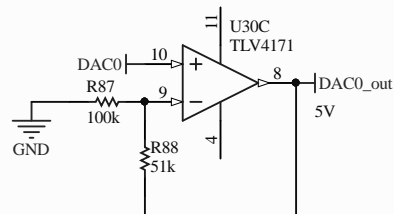
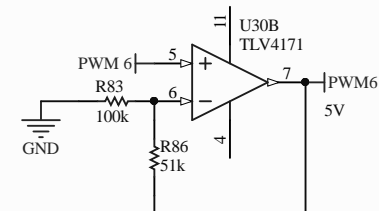
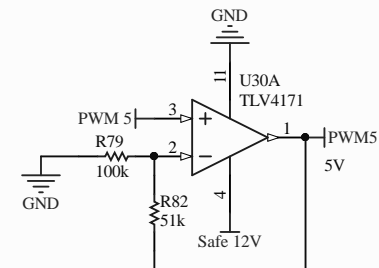




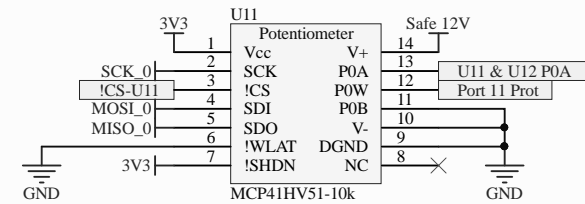
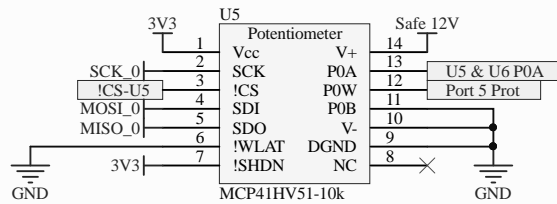
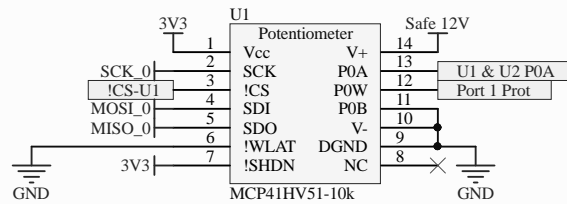
Up to 5V Output Amplifiers



Up to 5V Output Amplifiers

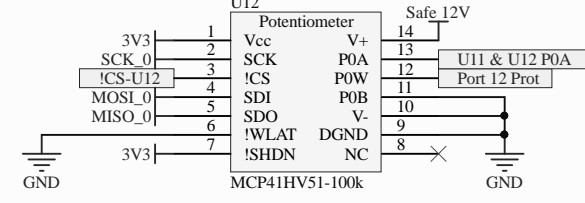
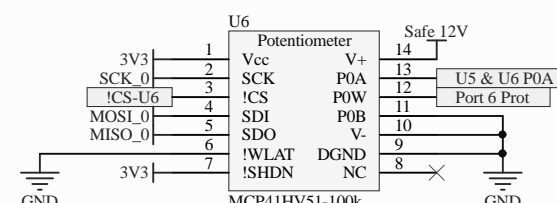
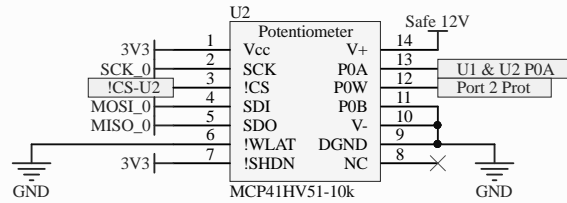


A



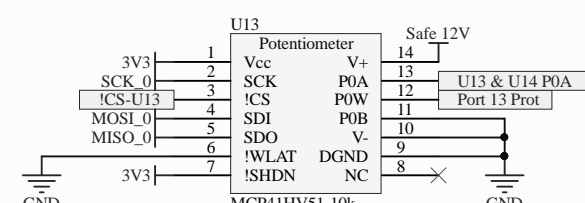
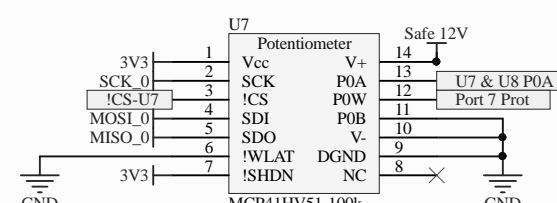
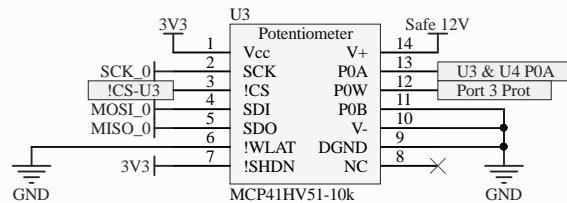
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B



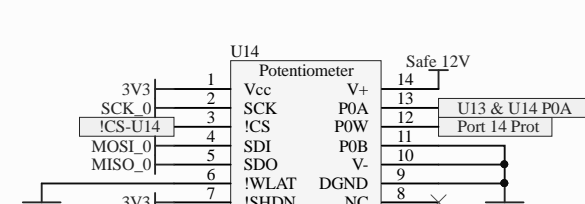
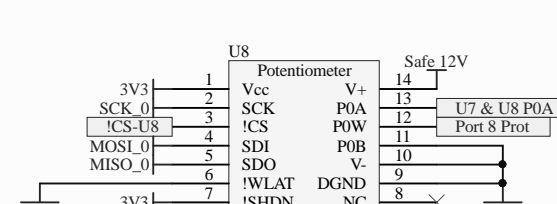
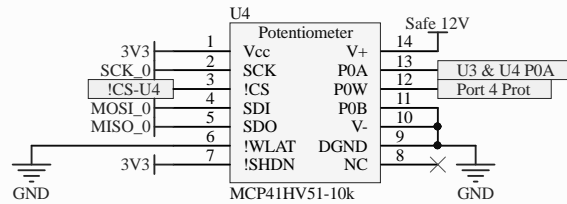
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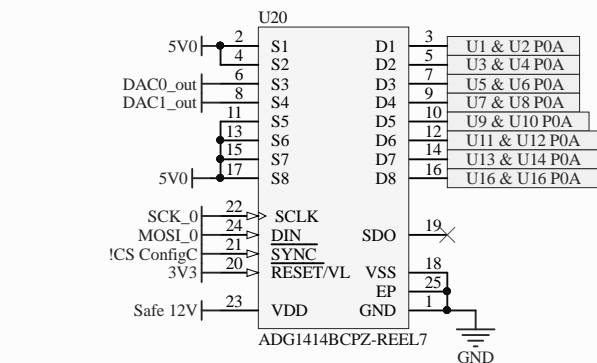


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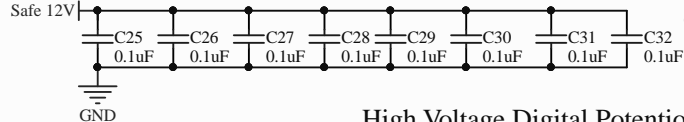
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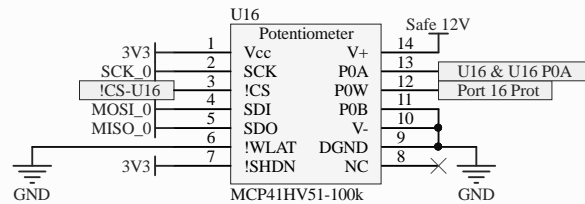
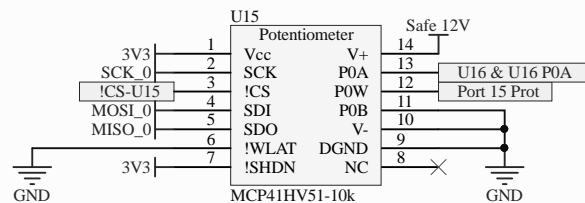
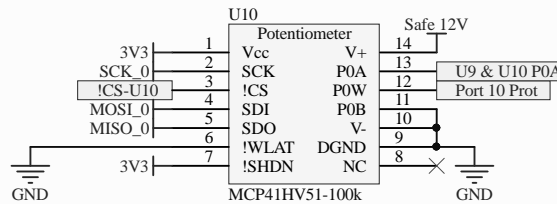
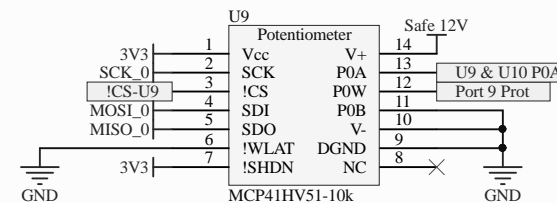
D



### Connecting Switch



### High Voltage Digital Potentiometers over SPI



Title: **Smart Sensor Simulator 2**

Subtitle: Digital Potentiometers

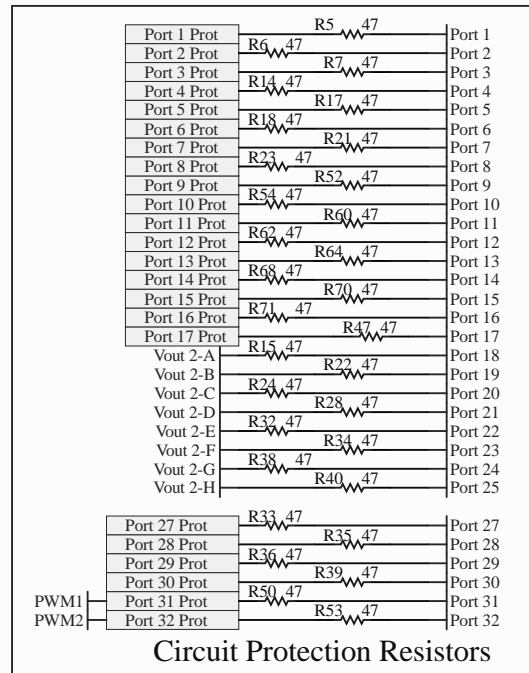
Date: 10/21/2020 Time: 2:41:25 PM

File: High Voltage Digital Pots Rev 6.SchDoc

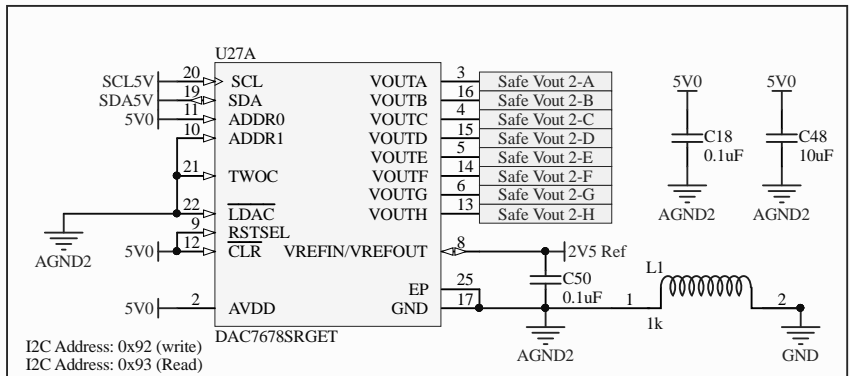
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Sheet 4 of 7  
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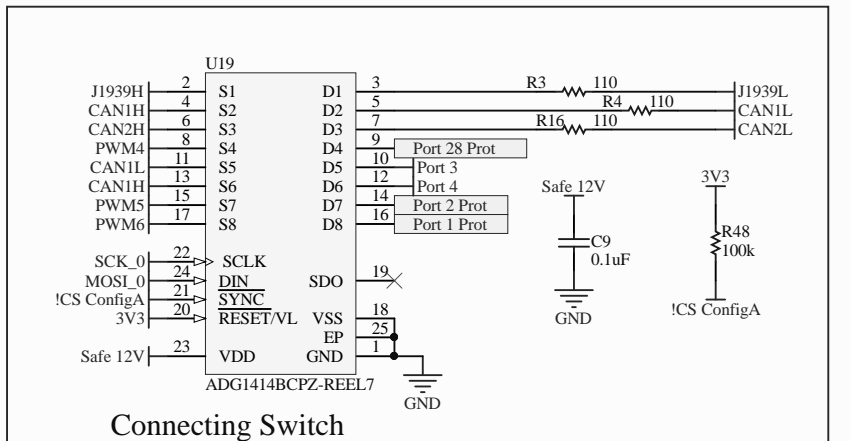




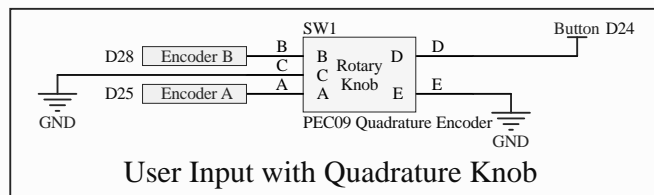
Circuit Protection Resistors



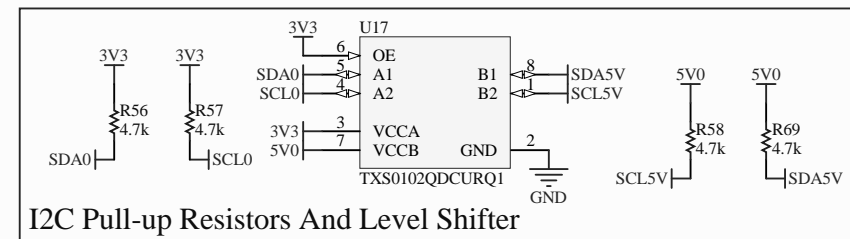
Digital to Analog Output



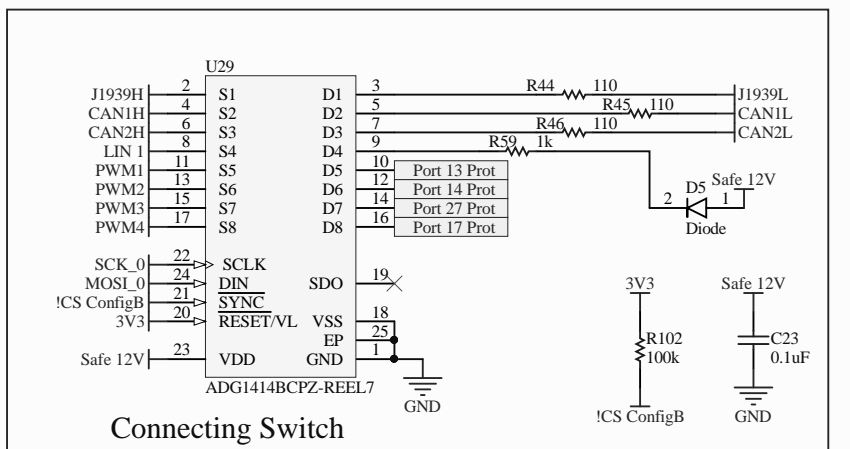
Connecting Switch



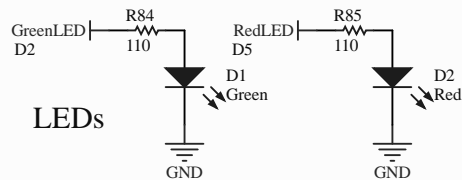
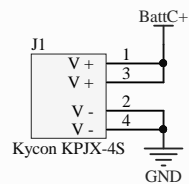
User Input with Quadrature Knob



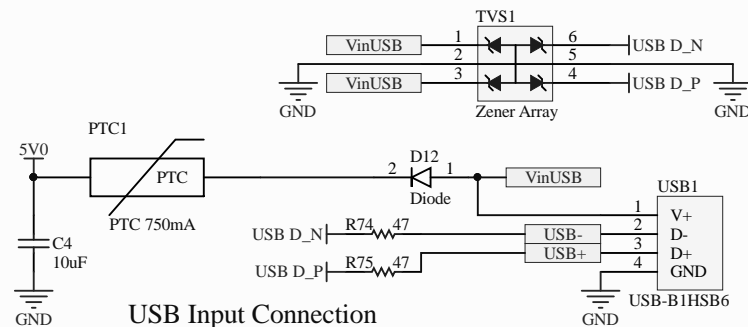
I2C Pull-up Resistors And Level Shifter



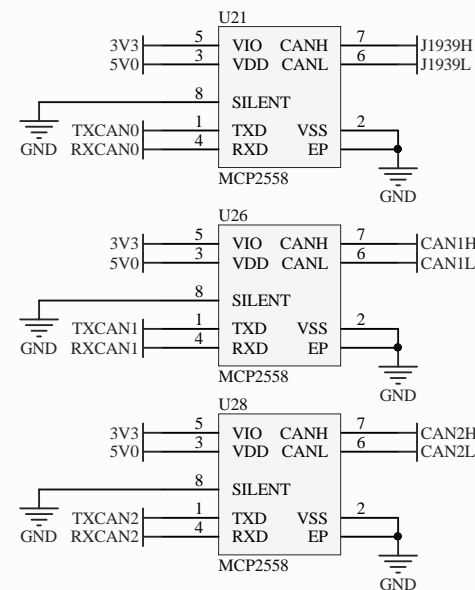
Connecting Switch



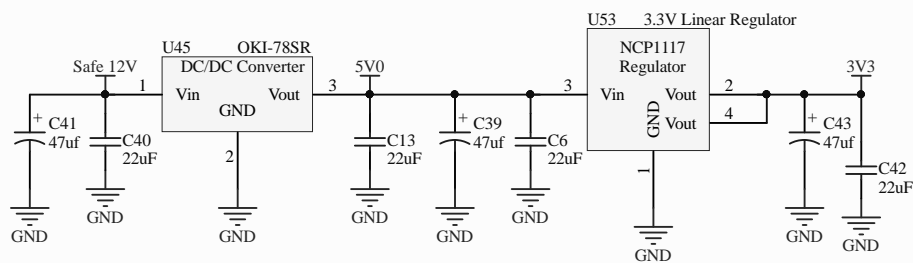
LEDs



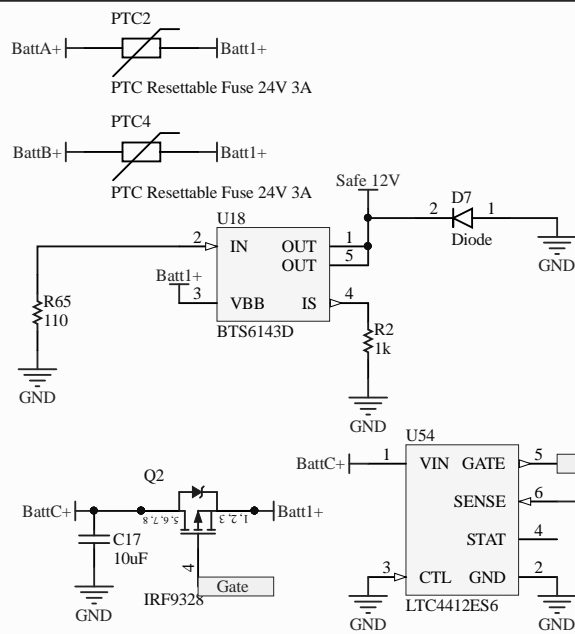
USB Input Connection



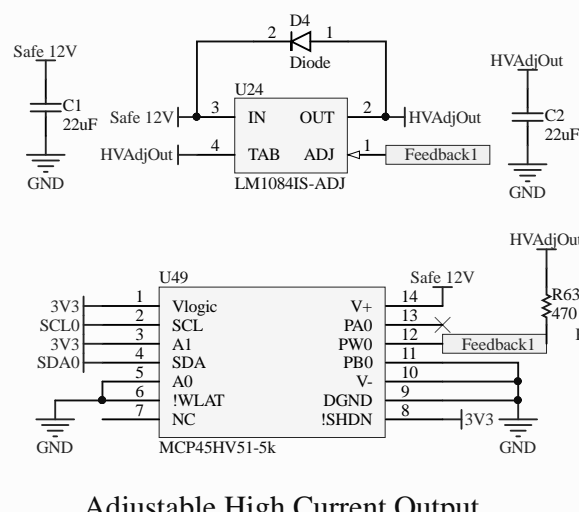
CAN Transceivers



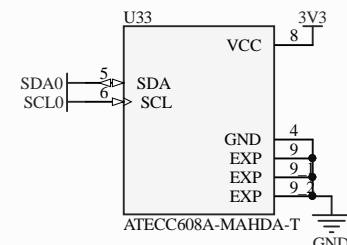
Voltage Regulator



Power Input with Reverse Polarity Protection



Adjustable High Current Output



Security Module

Title: **Smart Sensor Simulator 2**

Subtitle: Power, CAN, USB

Revision: 6

Date: 10/21/2020 Time: 2:41:26 PM

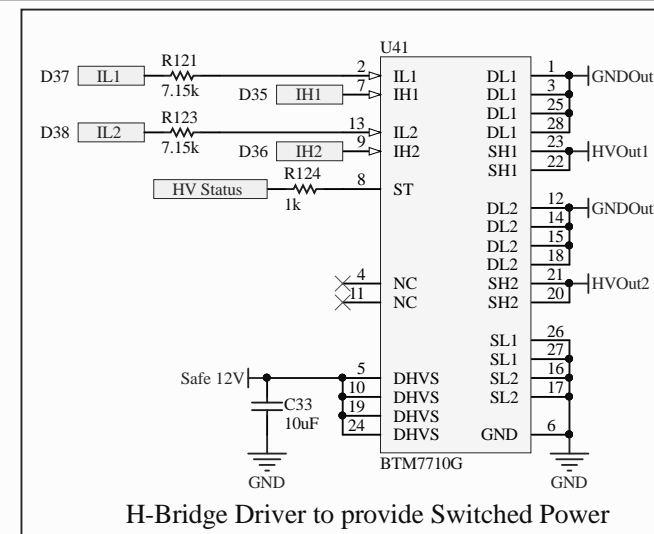
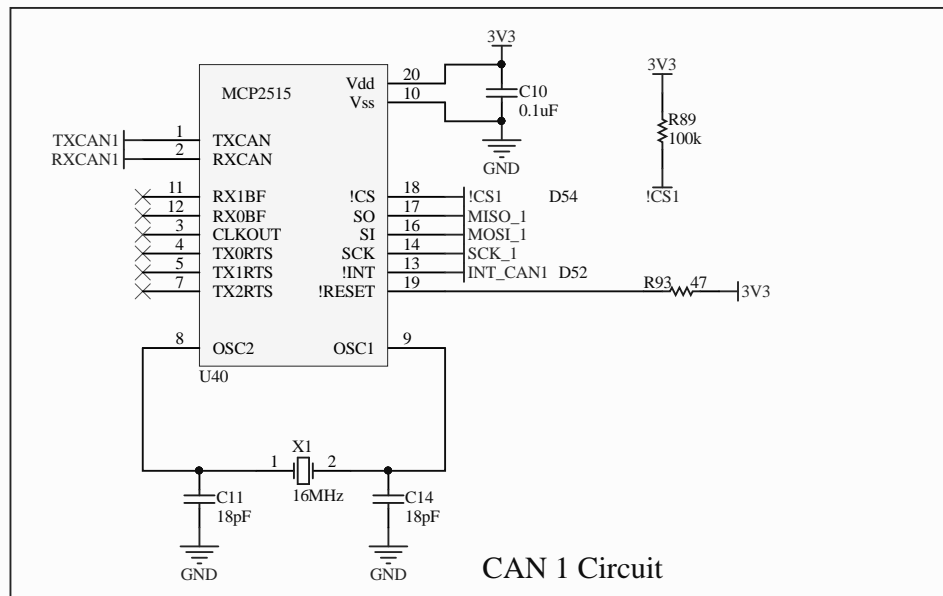
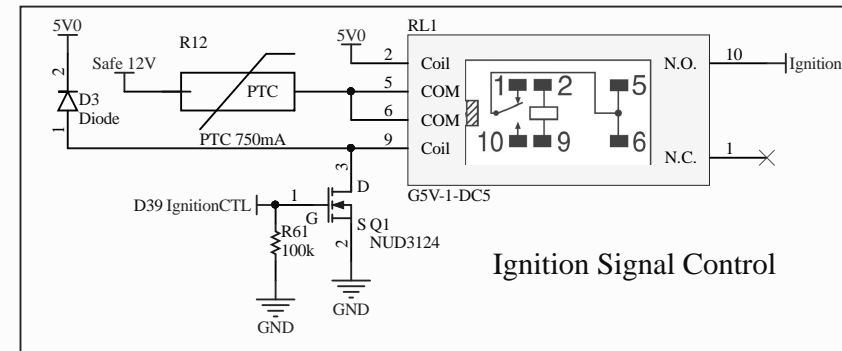
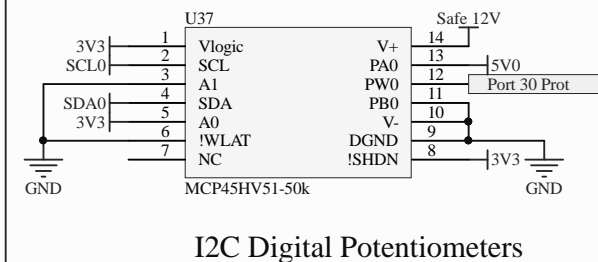
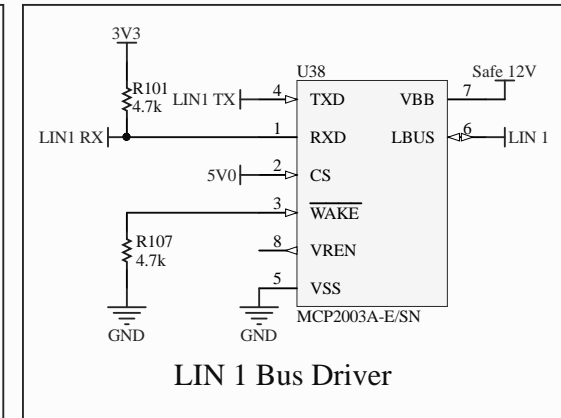
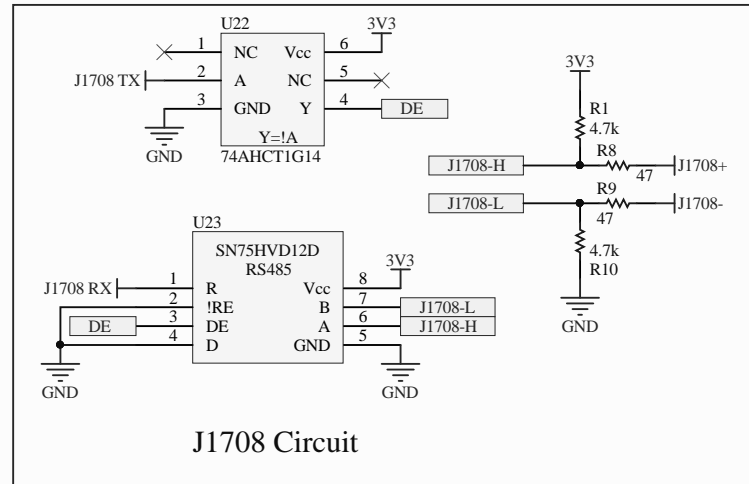
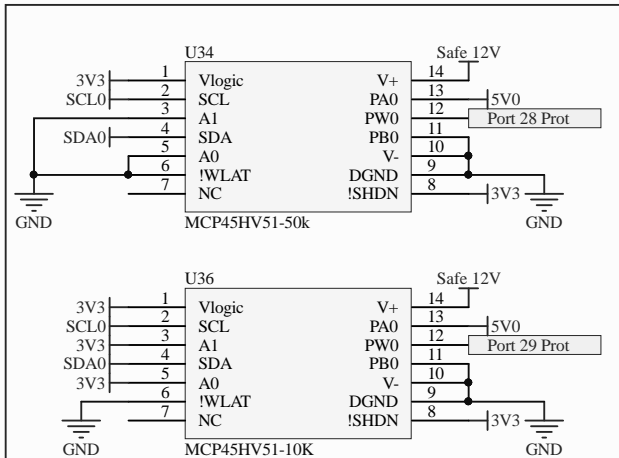
Sheet 6 of 7

File: Power Input and Protection Rev 6a.SchDoc

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Comment	Description	Designator	Footprint	Quantity	Supplier 1	Supplier Part Number 1	Manufacturer	PartNumber
	CAP CER 0.1UF 50V X7R 0603, CAP CER 0.1UF 50V 10% X7R 0603	C3, C5, C7, C8, C9, C10, C12, C15, C18, C19, C20, C21, C23, C25, C26, C27, C28, C29, C30, C31, C32	0603	490	Digi-Key	490-3255-1, ND	Murata Electronics	GRM188R72TA04KA35D
1k	Ferrite Bead 800mH 100MHz 5A Monolithic 0805 SMD, Ferrite Beads Multi-Layer Power 1KOhm 25% 100MHz 1	L1, L2, L5, R2, R30, R42, R59, R67, R78, R80, R90, R96, R100, R124	0608	14	Digi-Key	P1.00KHT-ND	Panasonic Electronic Components	ERJ-3EF1001V
2.2uf	2.2uF ±10% 6.3V Ceramic Capacitor X5R 0603 (1608 Metric)	C16	0608	1	Digi-Key	W21-3386-1-ND	Taiyo Yuden	JKM107BJ225K4HT
3.3V Linear Regulator	Linear Voltage Regulator IC Positive Fixed 1 Output 3.3V 1A SOT-223	U53	SOT-223	1	Digi-Key	NCP1117S33T3GQ5CT-ND	ON Semiconductor	NCP1117S33T3G
4.7k	RES SMD 4.7K OHM 1% 1/10W 0603	R1, R10, R56, R57, R58, R69, R101, R107	0608	8	Digi-Key	P4.70KHCT-ND	Panasonic Electronic Components	ERJ-3EF4701V
7.15k	RES SMD 7.15K OHM 1% 1/10W 0603	R21, R123	0608	2	Digi-Key	P7.15KHCT-ND	Panasonic Electronic Components	ERJ-3EF7151V
10 Pos Mini-Fit Jr.	10 Positions Header - Shrouded Connector 0.165in (4.20mm) Through Hole - Right Angle Gold	J10	10 pos Mini-Fit Jr. R/A Header	1	Digi-Key	WM21367-ND	Molex	39-30-1102
10k	10 kOhms ±1% 0.1W, 1/10W Chip Resistor 0603 (1608 Metric) Automotive AEC-Q200, High Voltage Thick Film	R95	RM10.0KAYCT-ND	1	Digi-Key	490-12233-1-ND	Rohm Semiconductor	KTR032PF1002
10uF	10uF ±20% 25V Ceramic Capacitor X5R 0603 (1608 Metric)	C4, C17, C33, C48	0608	4	Digi-Key	887-1086-1-ND	Murata Electronics North America	GRT188R61E100ME13D
16MHz	CRYSTAL 16MHz 18PF SMD	X1, X2	XTAL 2-pad	2	Digi-Key	WM21371-ND	TXC CORPORATION	7A-16.000AAJ-T
18 Pos Mini Fit Jr	18 Positions Header - Shrouded Connector 0.165in (4.20mm) Through Hole - Right Angle Gold	J18	18 pos Mini-Fit Jr. R/A Header	1	Digi-Key	399-1052-1-ND	Molex	39-30-1189
18pf	CAP CER 18PF 50V 5% NPO 0603	C11, C14, C24, C34	0608	4	Digi-Key	490-12451-1-ND	Kemet	C0403C180J6GACTU
22uF	22uF ±20% 25V Ceramic Capacitor X5R 1206 (3216 Metric)	C1, C2, C6, C13, C40, C42	1206	6	Digi-Key	WM21374-ND	Murata Electronics North America	GRT31C861E222ME01L
24 Pos Mini-Fit Jr.	24 Positions Header Shrouded Connector 0.165in (4.20mm) Through Hole Right Angle Gold	J24	24 pos Mini-Fit Jr. R/A Header	1	Digi-Key	XC2292CT-ND	Molex	39-30-1242
32.768 KHz	Canned Oscillator	X3	XTAL 2-pad Small	1	Digi-Key	P47.000KCT-ND	ECS Inc.	ECX-327-CDM-1249
47 Ohms ±5% 0.25W, 1/4W Chip Resistor 0603 (1608 Metric) Automotive AEC-Q200, Pulse Withstanding Thick Film	47 Ohms ±5% 0.25W, 1/4W Chip Resistor 0603 (1608 Metric) Automotive AEC-Q200, Pulse Withstanding Thick Film	R66, R67, R88, R9, R14, R15, R17, R18, R21, R22, R23, R24, R28, R32, R33, R34, R35, R36, R38, R39, R40	0608	36	Digi-Key	1189-1854-ND	Panasonic Electronic Components	ERJ-3EF3870V
47uF	47uF 50V Aluminum Electrolytic Capacitors Radial, Can 5000 hrs @ 105°C	C22, C39, C41, C43	Elecr. Can 2.5 x 6.3mm	4	Digi-Key	P51.0KHCT-ND	Rubycon	50YX47MEFC6.3X01
51k	RES SMD 51K OHM 1% 1/10W 0603	R43, R66, R76, R81, R82, R86, R89, R92	0608	8	Digi-Key	P51.0KHCT-ND	Panasonic Electronic Components	ERJ-3EF5102V
74AHCT1G14	IC SCHMITT TRIGG INV GATE SOT353	U22	SOT-353	1	Digi-Key	74AHCT1G14SE-7DKCT-ND	Diodes Incorporated	74AHCT1G14SE-7
100k	100 kOhms ±1% 0.1W, 1/10W Chip Resistor 0603 (1608 Metric) Automotive AEC-Q200 Thick Film	R11, R13, R19, R20, R25, R26, R27, R29, R31, R37, R41, R48, R49, R51, R55, R61, R72, R73, R77, R78	0608	25	Digi-Key	P100KHCT-ND	Panasonic Electronic Components	ERJ-3EF1003V
110	RES SMD 110 OHM 1% 1/10W 0603	R3, R4, R16, R44, R45, R46, R65, R84, R85	0608	9	Digi-Key	74AHCT1G14SE-7DKCT-ND	Panasonic Electronic Components	ERJ-3EF1100V
330	330 Ohms ±1% 0.1W, 1/10W Chip Resistor 0603 (1608 Metric) Automotive AEC-Q200, High Voltage Thick Film	R94	0608	1	Digi-Key	RMH330ACT-ND	Rohm Semiconductor	KTR032PF3300
470	RES SMD 470 OHM 1% 1/10W 0603	R63	0608	1	Digi-Key	P470HCT-ND	Panasonic Electronic Components	ERJ-3EF4700V
ADG1414BCPZ-REEL7	9.5 Ohm RON +/-15 V / ±12 V / ±5 CMOS Serially-Controlled Octal SPST Switch, -40 to 125 degC, 24-pin OFN	U19	ADL-CP-24-3 M	3	Digi-Key	ADG1414BCPZ-REEL7TR-ND	Analog Devices	ADG1414BCPZ-REEL7
ATECC608A-MAHDA-T	Authentication Chip 8-UFN -2x3	U33	SOM9P200X300X60-9N	1	Digi-Key	ATECC608A-MAHDA-T-ND	Microchip Technology	ATECC608A-MAHDA-T
BR12.5	Linear Battery Non-Rechargeable (Primary) 3V Coin, 12.5mm	U10	3V Coin Cell BR-1225-0CN	1	Digi-Key	BTM7170G-ND	Panasonic	BR-12.25-0CN
BTM7170G	1T1RHIC, 4.5 to 42V, -40 to 150 degC, PG-DSO-28-22, Reel, Green	U41	INF-PG-DSO-28-22 M	1	Digi-Key	BTM7170GUMA1CT-ND	Infineon	BTM7170GUMA1
BTSA143D	PROFET Smart Highside Power Switch, 1 Channel, 10 A Load Current, -40 to 150 degC, PG-TQ252-5-11, Reel, Green	U18	INF-PG-TQ252-5-11, N	1	Digi-Key	BTSA143DNC1-ND	Infineon	BTSA143DAUMA1
DC7678RSRCT	12-Bit, Octal Channel, Ultra-Low Glitch, Voltage Output, 2-Wire Interface DAC with 2.5 V Internal Reference, -40 to 125 degC	U27	TI-REG24-2700X2700T_V	1	Digi-Key	296-27743-1	Texas Instruments	DC7678RSRCT
Diode	Diode Schottky 40V 2A Surface Mount DO-214AC (SMA), Default Diode	D2, D4, D6, D8, D7, D8, D9, D10, D11, D12, D13	CS232	11	Digi-Key	CCS15530J3CT-ND	Thybris Semiconductor and Storage	CCS15530J3CT-ND
EL2-SMD	General Purpose Relay DPDT (2 Form C) Surface Mount	RELAY - EE2	RELAY - EE2	2	Digi-Key	296-27743-1	TEME	EL2-SMD
GSV-1-DC5	OMRON RELAY GENERAL PURPOSE SPDT 1A 5V	R1, R2, R3, R4	OMRON GSV Relay	4	Digi-Key	2773-ND	Omron Electronics Inc-EMC Div	GSV-1-DC5
Green	Green 570nm LED Indication - Discrete 2.2V 0805 (2012 Metric)	D1	0805 Polarized	1	Digi-Key	475-1410-1-ND	OSRAM Opto Semiconductors Inc	LSR971-KN-1
IF9F932B	MOSFET P-CH 30V 12A B SOIC	G2	SOIC-8	1	Digi-Key	IRF9328PBFCT-ND	Infineon Technologies	IRF9328PBF
J18C50BD	Connector Header Surface Mount 10 position 0.050" (1.27mm)	J2	J26 to 10-pin Header	1	Digi-Key	117775-ND	QMC Tech	J2021-10C3000
Kepn KPJX-45	(Power) Position Circular Connector Jack, Female Sockets Solder	J1	2092 KPJX-45-5-ND	1	Digi-Key	492-1859-ND	Kyam, Inc.	KPJX 45.5
Light Pipe	Light Pipe 2 High Clear Rigid Round with Dorned Top, 3mm Board Mount, Press Fit, Right Angle	U1	LightPipe - Dual	1	Digi-Key	492-1859-ND	Bivar Inc.	IP-230
LM1084I5-ADJ	Linear Voltage Regulator IC Positive Adjustable 1 Output 1.2 V - 15 V 5A DPAK/TO-263-3	TS3B_M	TS3B_M	1	Digi-Key	LM1084I5-ADJ/NOPB-ND	Texas Instruments	LM1084I5-ADJ/NOPB
LT4412ISE	Low Loss PowerPath(TM) Controller, 2.5 to 28 V Vin, 6-pin SOT23 (5x6-4), -40 to 85 degC	U54	LT-56-6-SOT23-M	1	Digi-Key	LT4412ISE6-T#PBFCT-ND	Linear Technology	LT4412ISE6
MC2P4HW51-10K	778-BR Single, ±36V (±18V) Digital POT with SPI Serial Interface and Volatile Memory	U42, U3, U4, U5, U9, U11, U13, U15	TSSOP-ST14-M	9	Digi-Key	MC2P4HW51-103E/ST-ND	Microchip Technology	MC2P4HW51-103E/ST
MC2P4HW51-100K	778-BR Single, ±36V (±18V) Digital POT with SPI Serial Interface and Volatile Memory	U42, U3, U4, U5, U9, U11, U13, U15	TSSOP-ST14-M	1	Digi-Key	MC2P4HW51-104E/ST-ND	Microchip Technology	MC2P4HW51-104E/ST
MC2P4HW51-50K	Digital Potentiometer 5kOhm 1 Circuit 256 Taps I²C Interface 14-TSSOP	U49	TSSOP-ST14-M	1	Digi-Key	MC2P4HW51-502E/ST-ND	Microchip Technology	MC2P4HW51-502E/ST
MC2P4HW51-10K	Digital Potentiometer 10kOhm 1 Circuit 256 Taps I²C Interface 14-TSSOP	U86	TSSOP-ST14-M	1	Digi-Key	MC2P4HW51-103E/ST-ND	Microchip Technology	MC2P4HW51-103E/ST
MC2P4HW51-50k	Digital Potentiometer 100kOhm 1 Circuit 256 Taps I²C Interface 14-TSSOP	U34, U37	TSSOP-ST14-M	2	Digi-Key	MC2P4HW51-104E/ST-ND	Microchip Technology	MC2P4HW51-104E/ST
MC2P2003A-ESN	UNJ2602 Transceiver, 8-Pin SOIC, Extended Temperature, Tape and Reel	U18	SOIC-8NB_N	1	Digi-Key	MC2P2003A-ESN-ND	Microchip	MC2P2003A-ESN
MC2P215	IC CAN CONTROLLER W/SPI 20TSSOP	U1	TI-TSSOP20	1	Digi-Key	MC2P215-1/ST-ND	Microchip	MC2P215-1/ST
MC2P2558	Microchip CAN FD Transceiver with Silent Mode	U27, U28, U29	TDFN	3	Digi-Key	MC2P2558FDT-HWMNCT-ND	Microchip Technology, Microchip	MC2P2558FDT-HWMN
MK66FX10M0VMD18	Kinetis MK66-180MHz Cortex-M4F MCU, 1.2MB Flash, 256KB SRAM, 2xUSB, Ethernet, 144-MAPBGA	U39	"BGA144C100P12X12_1300X"	1	Digi-Key	568-13335-ND	NXP USA Inc.	MK66FX10M0VMD18
MKL02232VFG4	32 Bit Microcontroller, Kinetis L Series Ultra Low Power, ARM Cortex-M0+, 48 MHz, 32 KB, 4 KB, 16	U3	"QFN60300X300X65-1N"	1	PJRC	IC_MKL02232_QFN16	PJRC	Pre Programmed MKL02232VFG4
NAD314	IC INDR 3000 DRV AUTO SOT23	U1	ONSG-SOT-23-3-1B-08V	6	Digi-Key	8111-2196-5-ND	Infineon Semiconductor	MDA01-2AL1TG
OKL1785R	Linear Regulator Buck-Boost DC-DC Converter 1 Output 5V 1.5A 7V - 36V Input	U31	788a	1	Digi-Key	8111-2196-5-ND	Murata Power Solutions	OKL1785R-5/1.5-W36C
PEC09 Quadrature Encoder	ENCODER INCREMENTAL W/SWITCH 9MM	SW1	PEC09 Series Encoder	1	Digi-Key	507-1805-1-ND	Bourns Inc.	PEC09-2220F-50002
PTC 750mA	PTC RESISTIBLE 0.75A 16V CHIP 1206	PTC1, R12	1206	2	Digi-Key	507-1805-1-ND	Bel Fuse Inc.	QZC0075AF4E
PTC Resettable Fuse 24V	PTC Resettable Fuse 24V 3A 3h Surface Mount 2920 (7351 Metric), Concave	PTC2, PTC4	2920	2	Digi-Key	MF-LSMF 300/24X-2CT-ND	Bourns Inc.	MF-LSMF 300/24X-2
PT5646	Tactile Switch SPST-NO Side Actuated Through Hole, Right Angle	Prog	Vertical Tactile Switch	1	Digi-Key	QW0994-ND	C & K Components	PT5646X31.2-US
Rd	Red 633nm LED Indication - Discrete 2V 0805 (2012 Metric)	U25	0805 Polarized	1	Digi-Key	475-1378-1-ND	OSRAM Opto Semiconductors Inc	LSR74-NB-1
SN75HVD12D (3.3V RS485)	IC RS485 TXRX 3.3V 8-SOIC	U23	SOIC-8	1	Digi-Key	296-37893-1-ND	Texas Instruments	SN75HVD08BR
Solder Jumper		J2	Solder Jumper	1				
TU147117P	Quad Low Power J-FET Input General Purpose Operational Amplifier, 7 to 36 V, 0 to 70 degC, 14-pin SOP (PW14), G	U30, U32, U35	TI-PW14-M	4	Digi-Key	296-4866-1-ND	Texas Instruments	TU147117PWR
TS5010200C0R001	Voltage Level Translator Bidirectional 1 Circuit 2-Channel 2Mbps USB	U1	TS5010200C0R001	1	Digi-Key	490-3255-1-ND	Texas Instruments	TS5010200C0R001
US8-RJ45B	US8-RJ45 Ethernet Connector (RJ45) 10/100/1000 Mbps, RJ45, RJ45, RJ45	USB1	USB-R Connector	1	Digi-Key	F2098R3-ND	On-Shore Technology Inc	US8-RJ45B