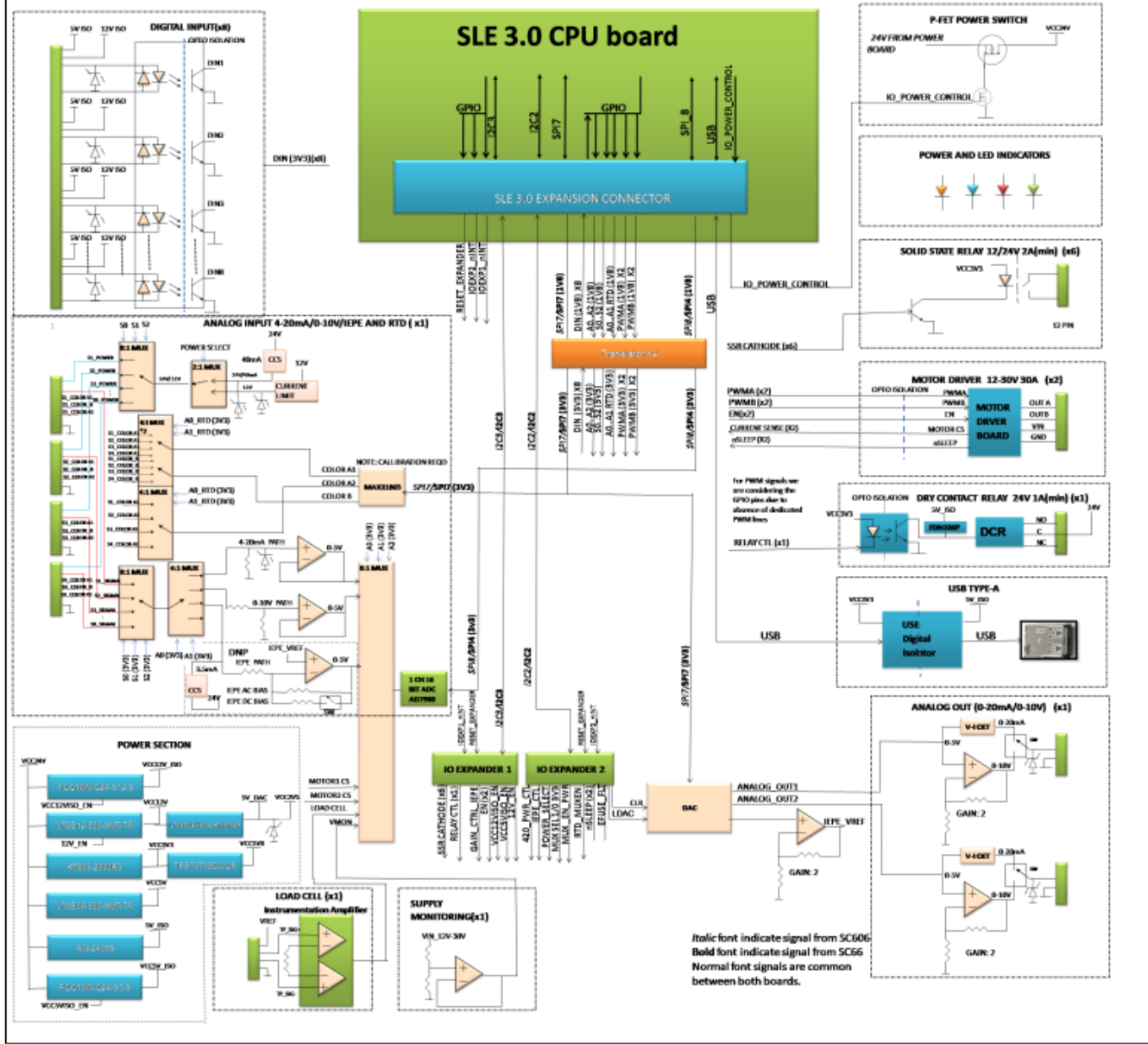


REV.	DATE	DESCRIPTION	ENGINEER
3	7/27/2022		INAME7

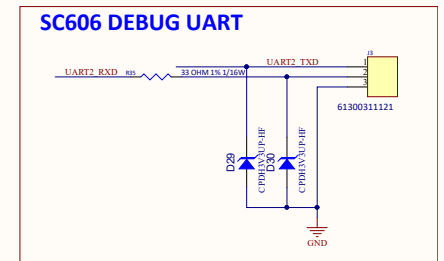
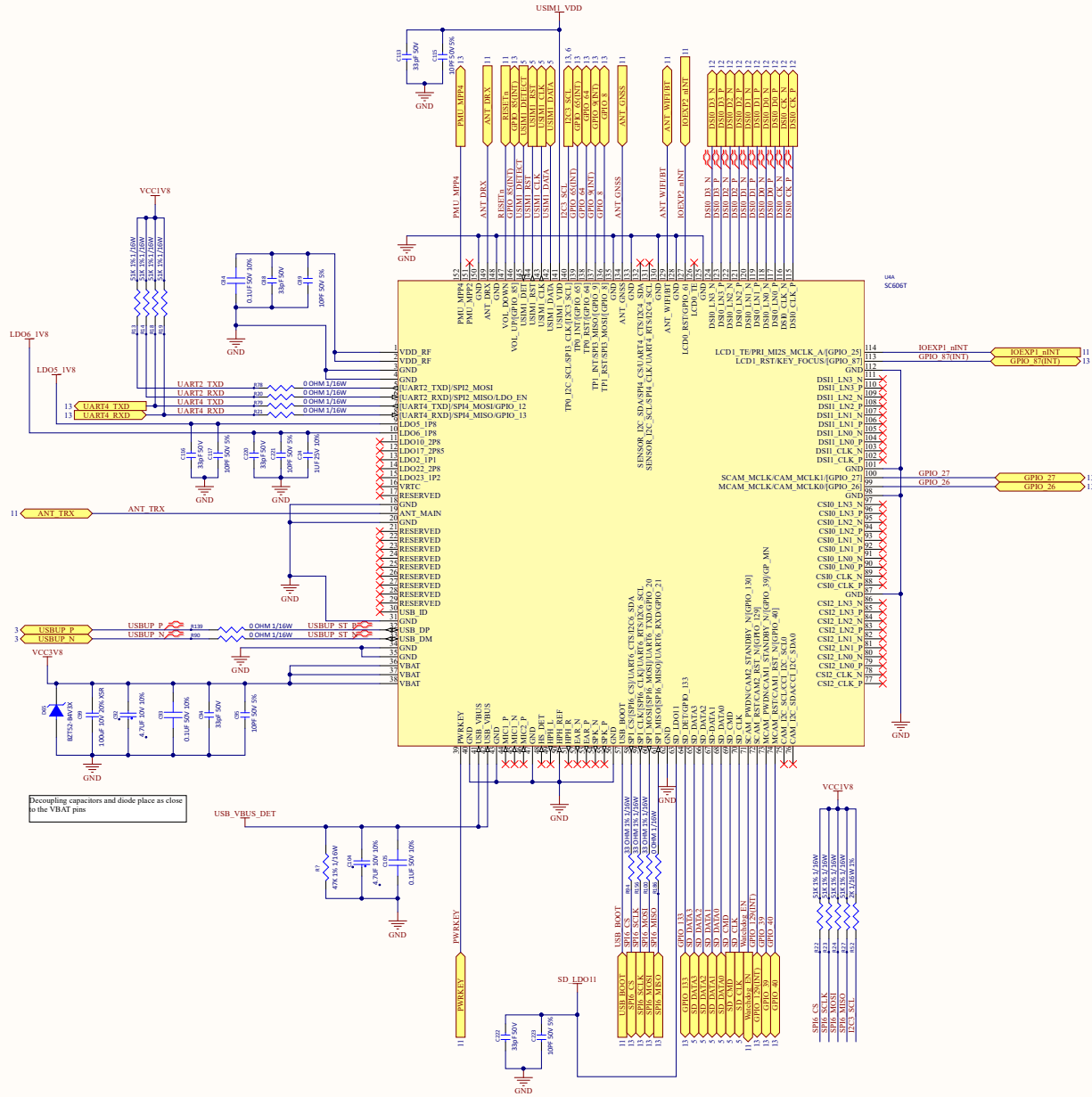
UltraFab SmartSkid IO Board BLOCK DIAGRAM



Italic font indicate signal from SC606
Bold font indicate signal from SC65
 Normal font signals are common between both boards.

	WINDROCK, INC. 1832 MIDPARK ROAD, SUITE 102 KNOXVILLE, TN 37921	TITLE:	INAME7	SCALE:	DO NOT SCALE PRINT
	CODE: OE3P9	PRODUCT FAMILY:	DRAWING NO:	INAME7	REV: 3
PROPRIETARY NOTICE - THE DATA CONTAINED HEREIN IS PROPRIETARY TO WINDROCK INCORPORATED AND SHALL NOT BE DUPLICATED, USED, OR DISCLOSED IN WHOLE OR IN PART FOR ANY PURPOSE OTHER THAN FOR WHICH IT WAS FURNISHED WITHOUT THE EXPRESS PERMISSION OF WINDROCK INCORPORATED.		OWNER: WINDROCK, INC.	ENGINEER: INAME7	DATE: 7/27/2022	SHEET: 1 OF INAME7

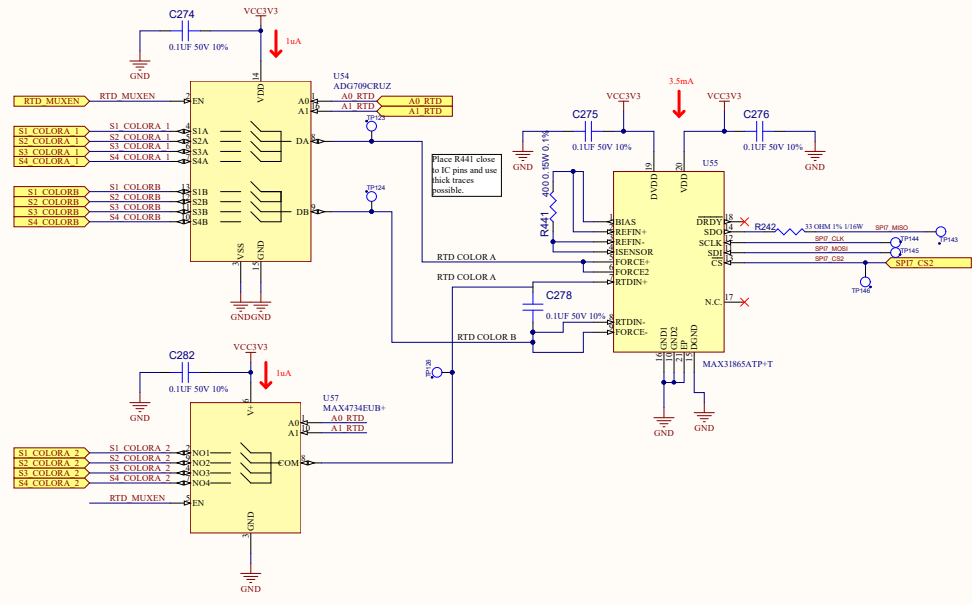
PROCESSOR



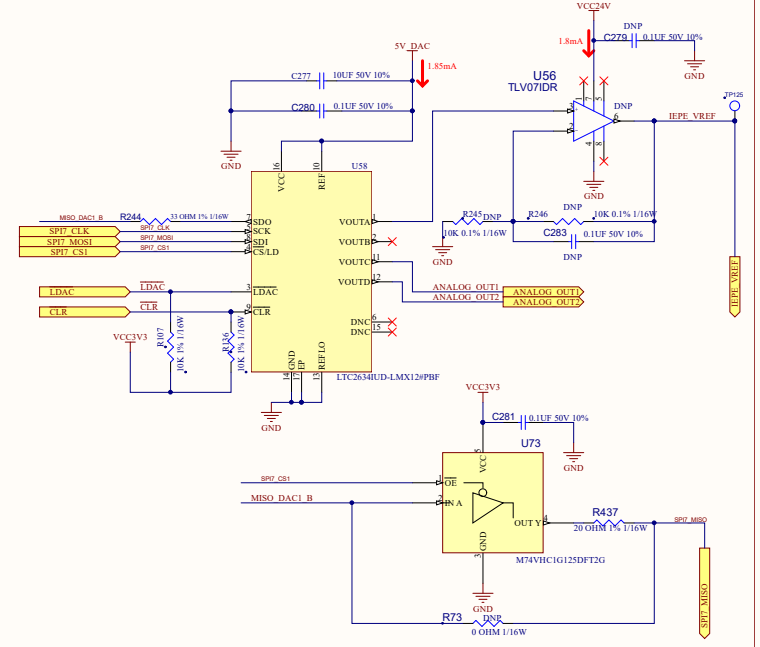
WINDROCK, INC. 1832 MIDPARK ROAD, SUITE 102 KNOXVILLE, TN 37921	TITLE:	#NAME?	SCALE:
	CODE: OE3P9	PRODUCT FAMILY: Smart-IO HW	DO NOT SCALE PRINT
PROPRIETARY NOTICE - THE DATA CONTAINED HEREIN IS PROPRIETARY TO WINDROCK INCORPORATED AND SHALL NOT BE DUPLICATED, USED, OR DISCLOSED IN WHOLE OR IN PART FOR ANY PURPOSE OTHER THAN FOR WHICH IT WAS FURNISHED WITHOUT THE EXPRESS PERMISSION OF WINDROCK INCORPORATED.		DRAWING NO: A4XXXX XX XXXX	REV: 3
ENGINEER: HK		OWNER: WINDROCK, INC.	SHEET SIZE: 0x4x C
DATE: 7/27/2022		SHEET: 2 of #NAME?	

RTD, DAC, ADC

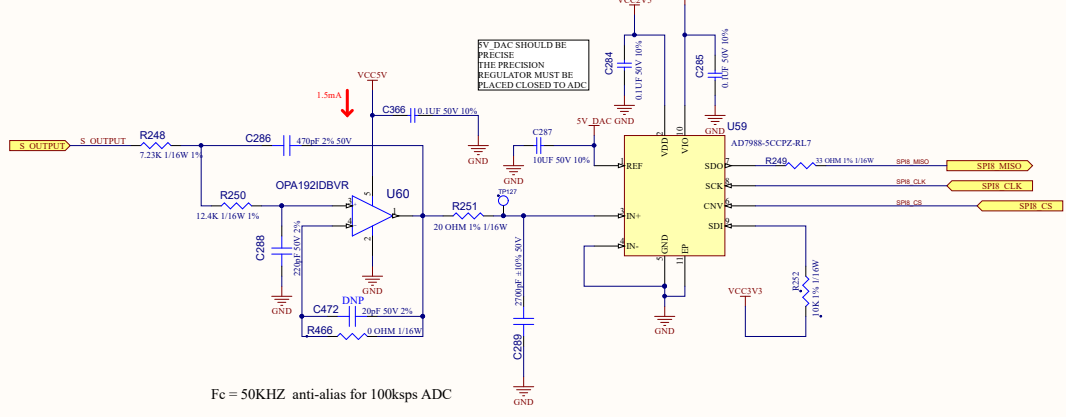
RTD to SPI Interface



SPI to DAC Interface

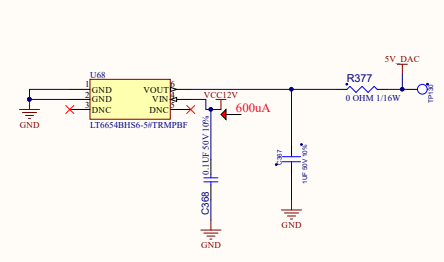


ADC and AA Filter to SPI Interface

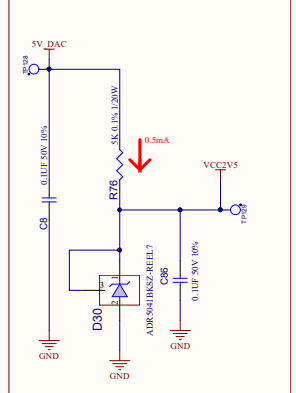


Fc = 50KHZ anti-alias for 100kps ADC

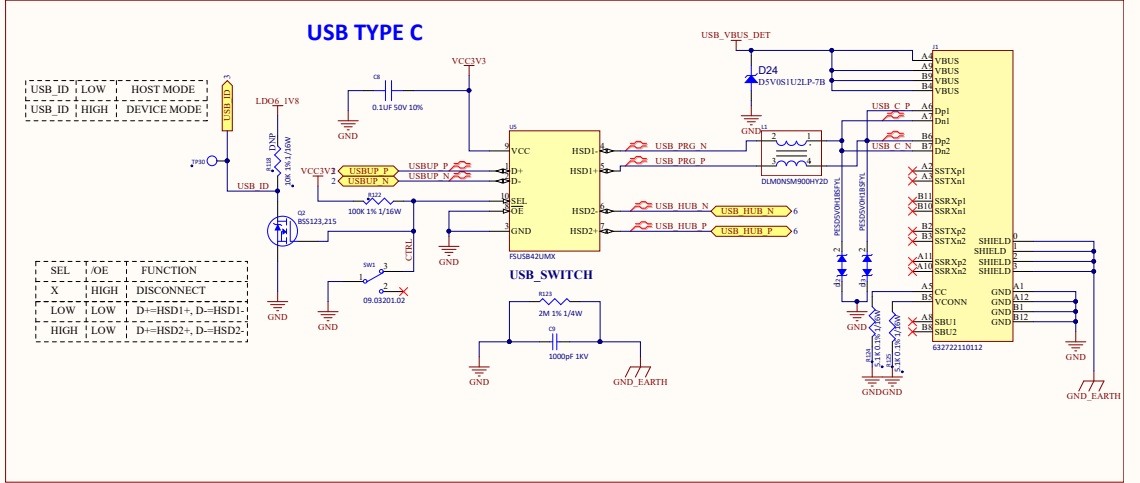
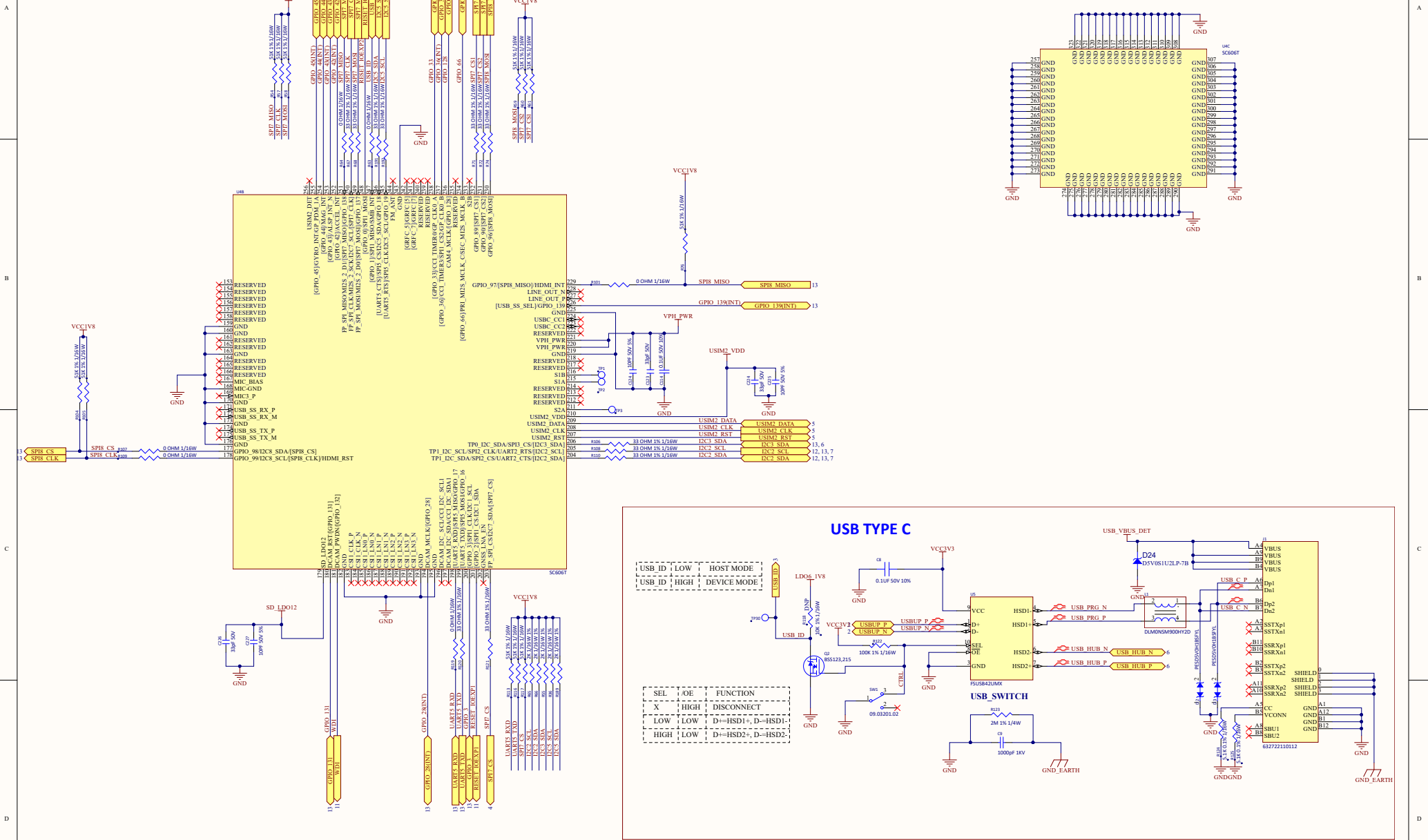
VCC12V TO 5V_DAC



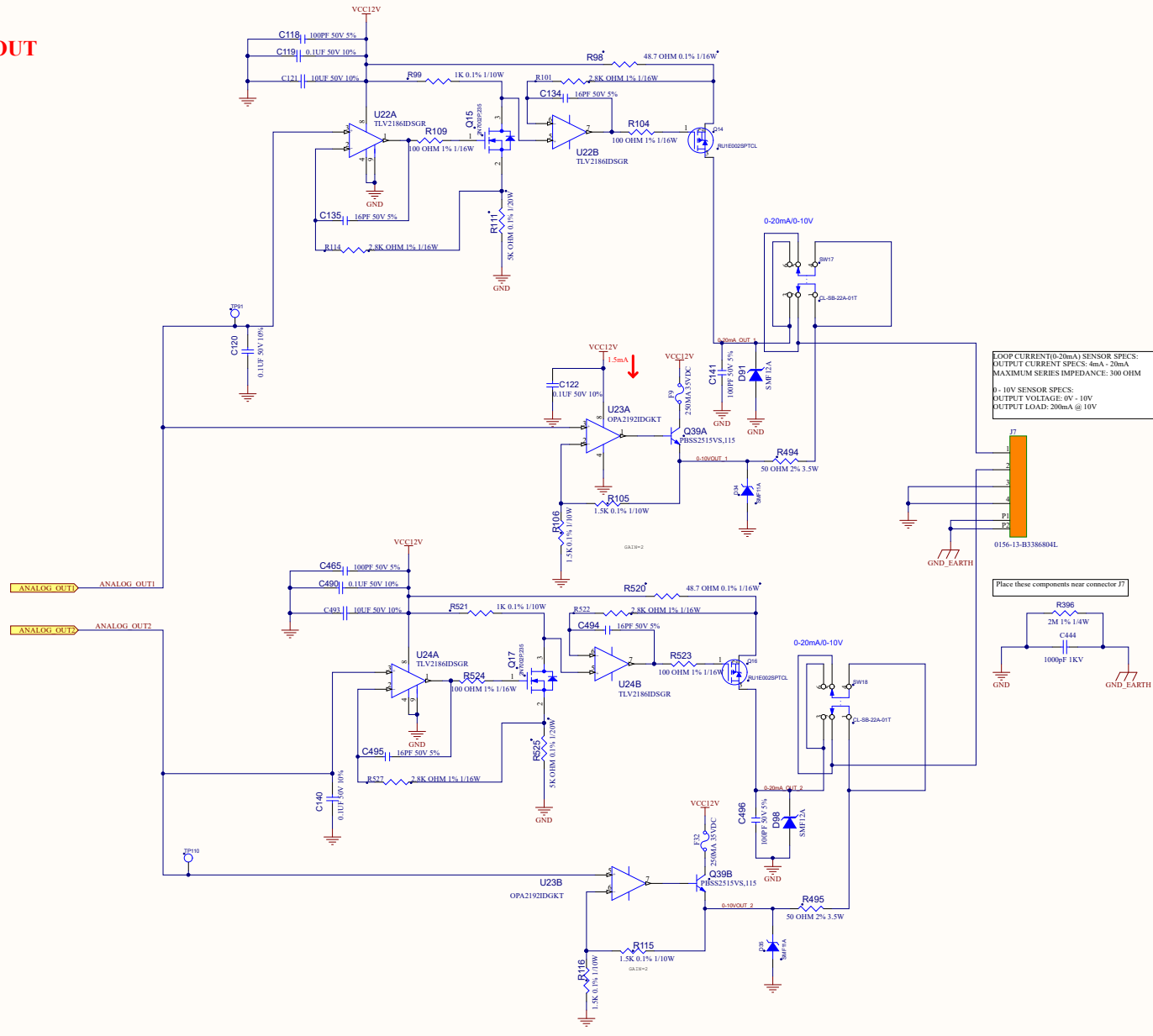
5V_DAC TO 2V5



PROCESSOR IO

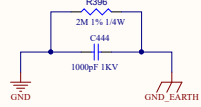


ANALOG OUT



0-20mA/0-10V
 0-10V SENSOR SPECS:
 OUTPUT VOLTAGE: 0V - 10V
 OUTPUT LOAD: 200mA @ 10V

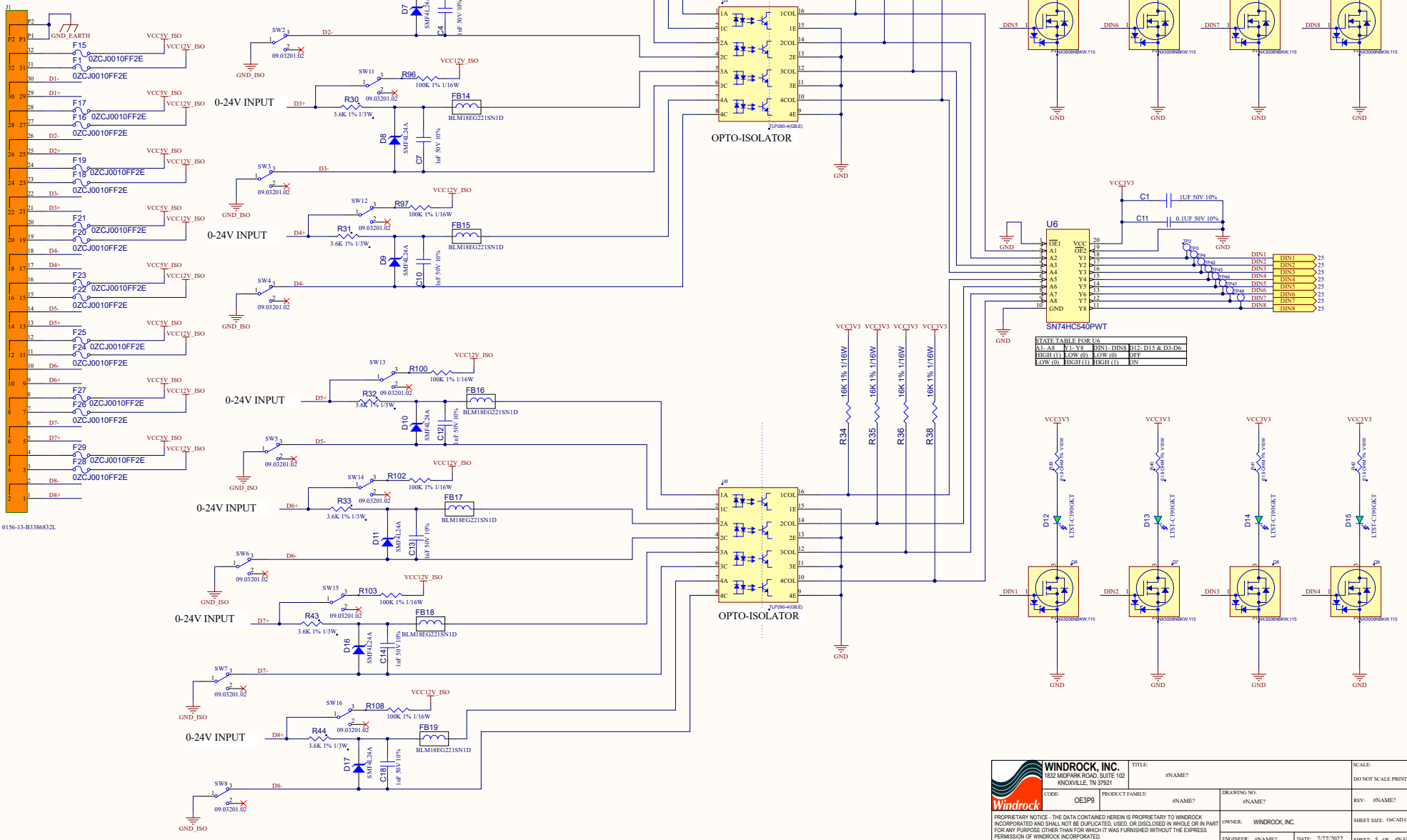
Place these components near connector J7



WINDROCK, INC. 1832 MIDPARK ROAD, SUITE 102 KNOXVILLE, TN 37921	TITLE:	#NAME?	SCALE:
	EXIDE: OE3P9 PRODUCT FAMILY:	#NAME?	DRAWING NO:
PROPRIETARY NOTICE - THE DATA CONTAINED HEREIN IS PROPRIETARY TO WINDROCK INCORPORATED AND SHALL NOT BE DUPLICATED, USED, OR DISCLOSED IN WHOLE OR IN PART FOR ANY PURPOSE OTHER THAN FOR WHICH IT WAS FURNISHED WITHOUT THE EXPRESS PERMISSION OF WINDROCK INCORPORATED.		OWNER: WINDROCK, INC.	SHEET SIZE: 0x4x C
		ENGINEER: #NAME?	DATE: 7/27/2022
			SHEET: 4 of #NAME?

DIGITAL INPUTS

DIGITAL INPUT SENSOR SPECS:
 INPUT IMPEDANCE: 3.6K OHM
 V_{LOGIC HI}: 5V - 24V (Dig+ wrt Dig-)
 V_{LOGIC LO}: 0V - 0.5V (Dig- wrt Dig-)
 PROPAGATION DELAY: 50NSEC MAX
 RISING EDGE: 0V - 5V
 PROPAGATION DELAY: 50NSEC MAX
 FALLING EDGE: 5V - 0V

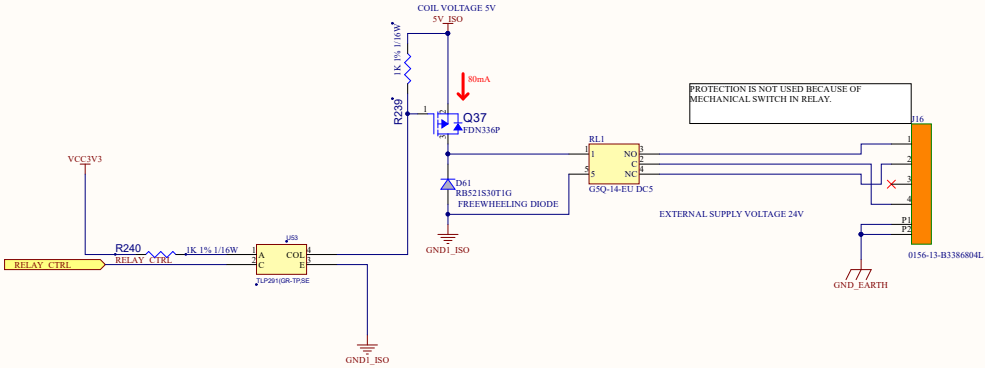


STATE TABLE FOR U6

A1-A8	Y1-Y8	DIN1-DIN8	D12-D15 & D1-D6
HIGH (1)	LOW (0)	LOW (0)	Y1
LOW (0)	HIGH (1)	HIGH (1)	Y2
HIGH (1)	HIGH (1)	DN	Y3
LOW (0)	LOW (0)	DN	Y4
HIGH (1)	LOW (0)	DN	Y5
LOW (0)	HIGH (1)	DN	Y6
HIGH (1)	HIGH (1)	DN	Y7
LOW (0)	LOW (0)	DN	Y8

WINDROCK, INC. 1832 MIDPARK ROAD, SUITE 102 KNOXVILLE, TN 37921	TITLE:	#NAME?	SCALE:
	CODE: OE3P9	PRODUCT FAMILY:	#NAME?
PROPRIETARY NOTICE - THE DATA CONTAINED HEREIN IS PROPRIETARY TO WINDROCK INCORPORATED AND SHALL NOT BE DUPLICATED, USED, OR DISCLOSED IN WHOLE OR IN PART FOR ANY PURPOSE OTHER THAN FOR WHICH IT WAS FURNISHED WITHOUT THE EXPRESS PERMISSION OF WINDROCK INCORPORATED.		DRAWING NO:	REV: #NAME?
		OWNER: WINDROCK, INC.	SHEET SIZE: 0x4-D C
		ENGINEER: #NAME?	DATE: 7/27/2022
			SHEET: 5 OF #NAME?

DRY CONTACT RELAY

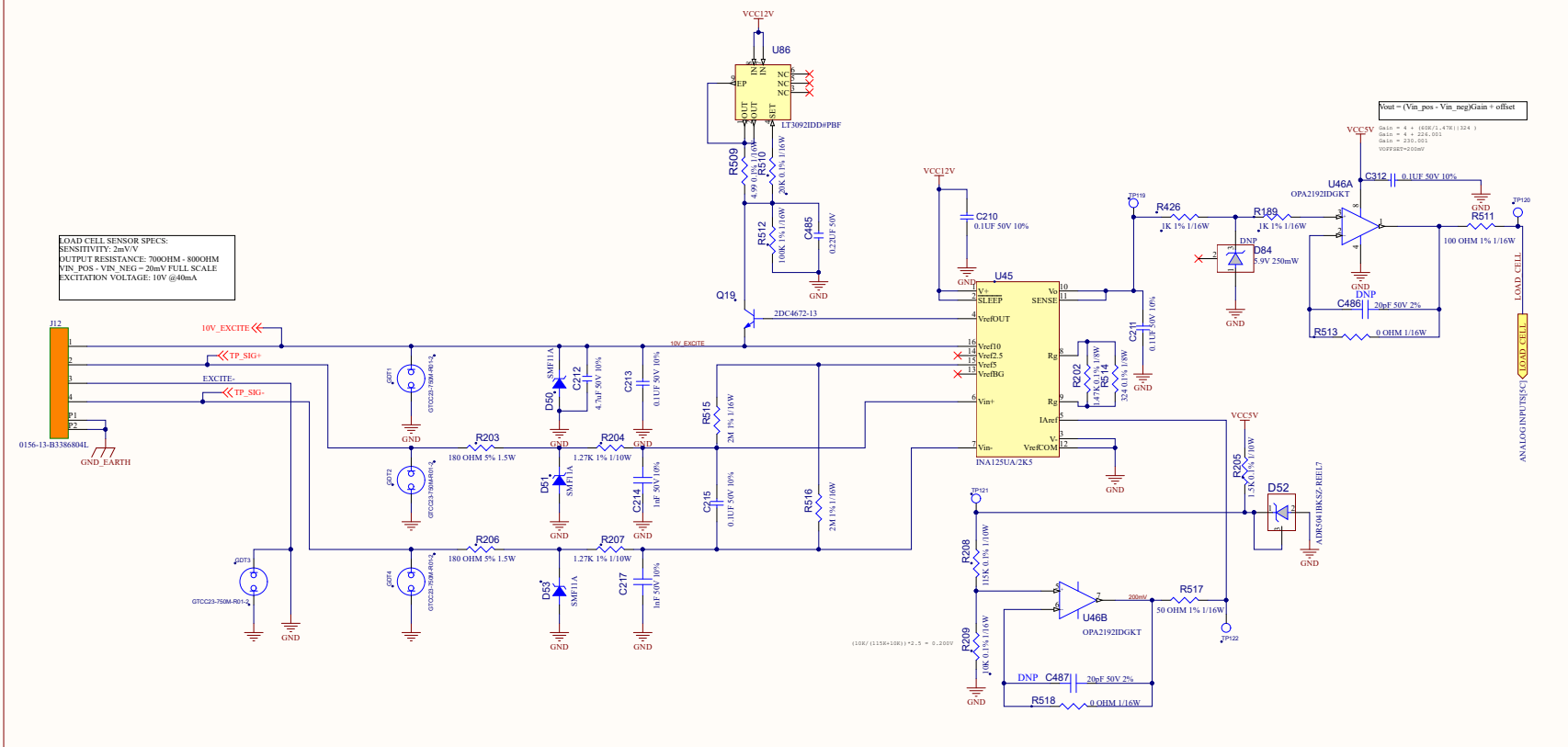



STATE TABLE FOR DCR RL1		
EPD	Relay	Relay
RELAY_CTRL_1 (high)	(1)	pin 2 of RL1 (C) connects to pin 4 of RL1 (NC)
RELAY_CTRL_1 (low)	(0)	pin 2 of RL1 (C) connects to pin 2 of RL1 (NO)

	WINDROCK, INC. 1832 MIDPARK ROAD, SUITE 102 KNOXVILLE, TN 37921	TITLE:	#NAME?	SCALE:	DO NOT SCALE PRINT
	CODE: OE3P9	PRODUCT FAMILY: #NAME?	DRAWING NO: #NAME?	REV: #NAME?	SHEET SIZE: 0x04 C
PROPRIETARY NOTICE - THE DATA CONTAINED HEREIN IS PROPRIETARY TO WINDROCK INCORPORATED AND SHALL NOT BE DUPLICATED, USED, OR DISCLOSED IN WHOLE OR IN PART FOR ANY PURPOSE OTHER THAN FOR WHICH IT WAS FURNISHED WITHOUT THE EXPRESS PERMISSION OF WINDROCK INCORPORATED.		OWNER: WINDROCK, INC.	ENGINEER: #NAME?	DATE: 7/27/2022	PERMITTED BY: #NAME?

LOAD CELL

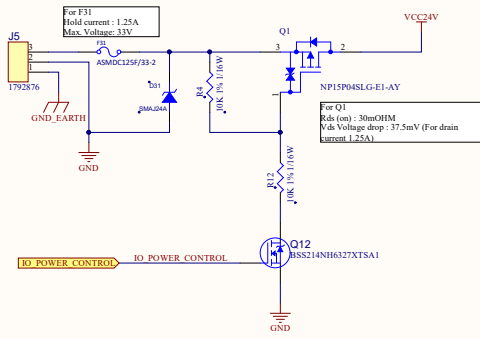
LOAD CELL SENSOR SPECS:
 SENSITIVITY: 2mV/V
 OUTPUT RESISTANCE: 700OHM - 800OHM
 VIN_POS - VIN_NEG = 30mV FULL SCALE
 EXCITATION VOLTAGE: 10V @40mA



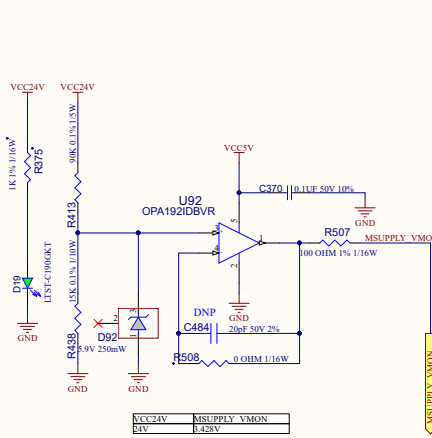
 WINDROCK, INC. 1832 MIDPARK ROAD, SUITE 102 KNOXVILLE, TN 37921	TITLE:	#NAME?	SCALE:
	CODE: OE3P9	PRODUCT FAMILY: #NAME?	DRAWING NO: #NAME?
PROPRIETARY NOTICE - THE DATA CONTAINED HEREIN IS PROPRIETARY TO WINDROCK INCORPORATED AND SHALL NOT BE DUPLICATED, USED, OR DISCLOSED IN WHOLE OR IN PART FOR ANY PURPOSE OTHER THAN FOR WHICH IT WAS FURNISHED WITHOUT THE EXPRESS PERMISSION OF WINDROCK INCORPORATED.		OWNER: WINDROCK, INC.	SHEET SIZE: 0x4x4 C
ENGINEER: #NAME?	DATE: 7/27/2022	SHEET: 7 of #NAME?	

POWER INPUT, SUPPLY MONITORING, USB AND MOTOR DRIVER CONNECTOR

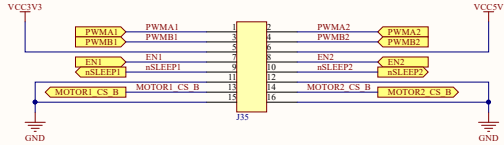
INPUT POWER CONNECTOR AND P-FET POWER SWITCH



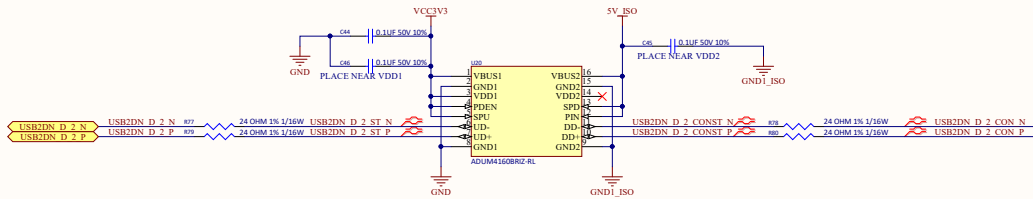
24V SUPPLY MONITORING



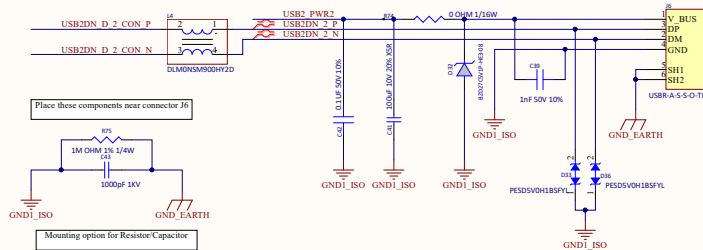
MOTOR DRIVER DAUGHTER BOARD CONNECTOR



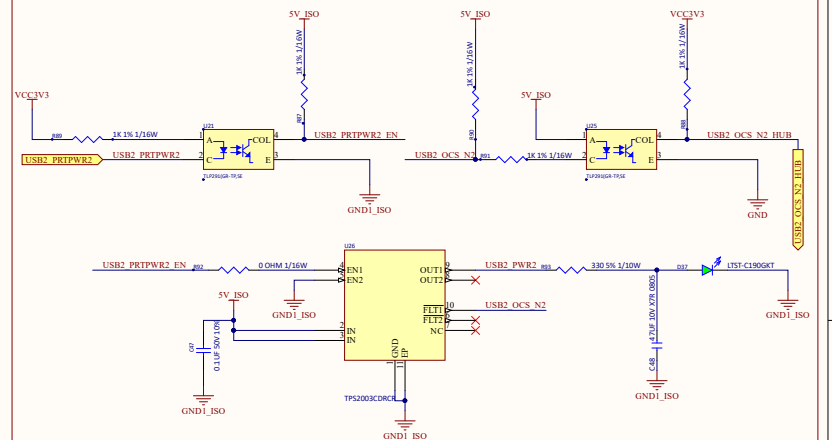
USB SIGNAL ISOLATION



USB TYPE A CONNECTOR

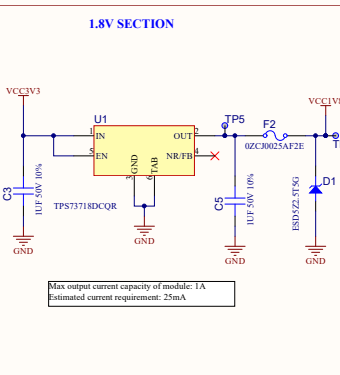
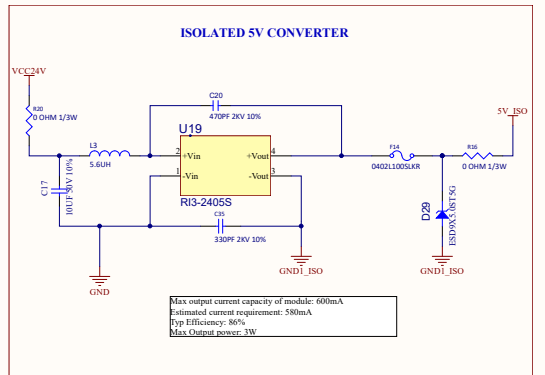
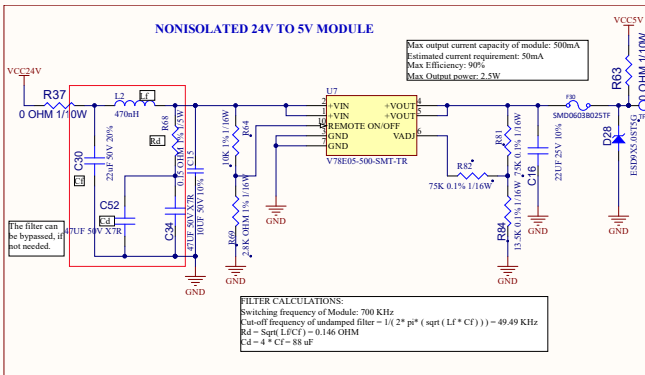
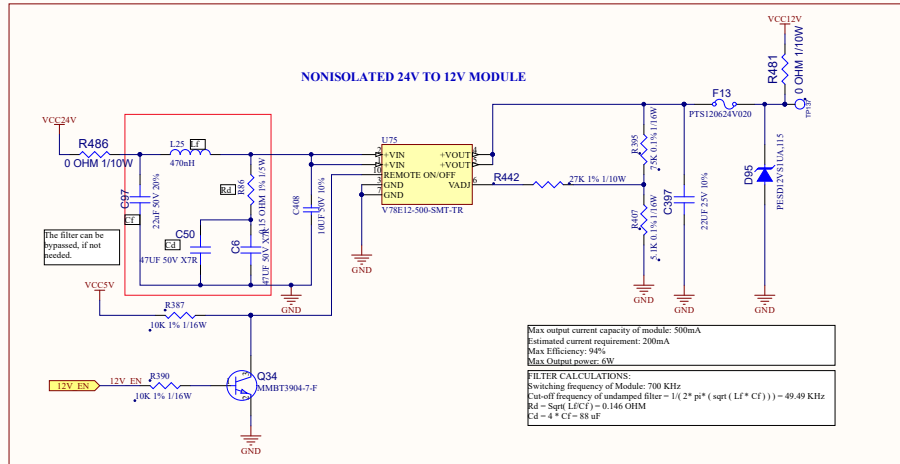
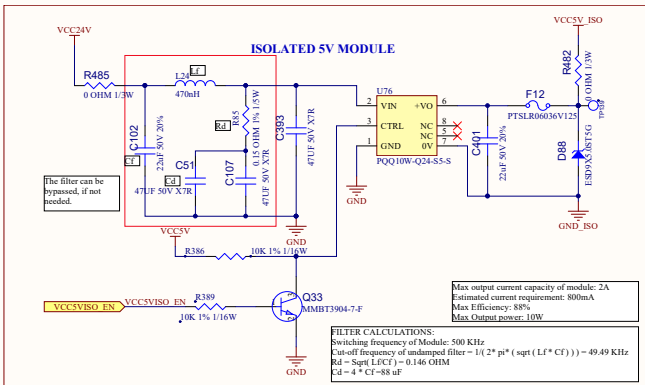
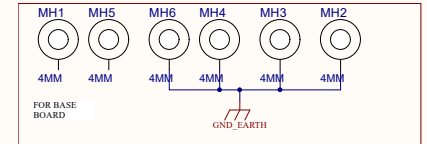
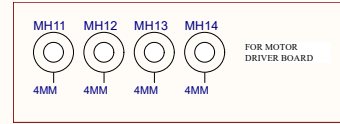
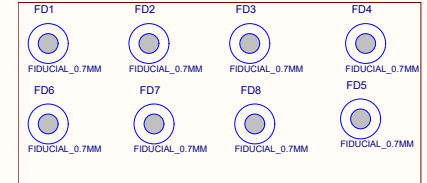
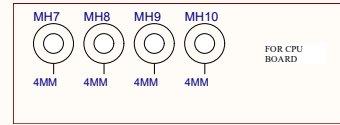
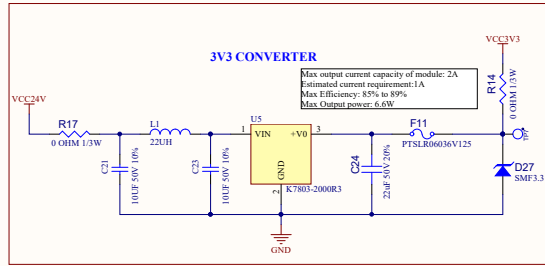
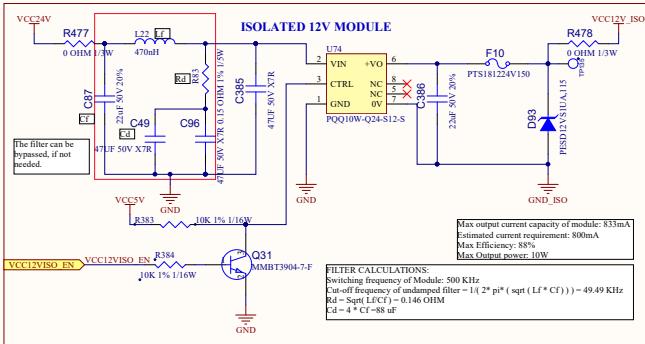


OPTOCOUPLER & PWR SWITCH

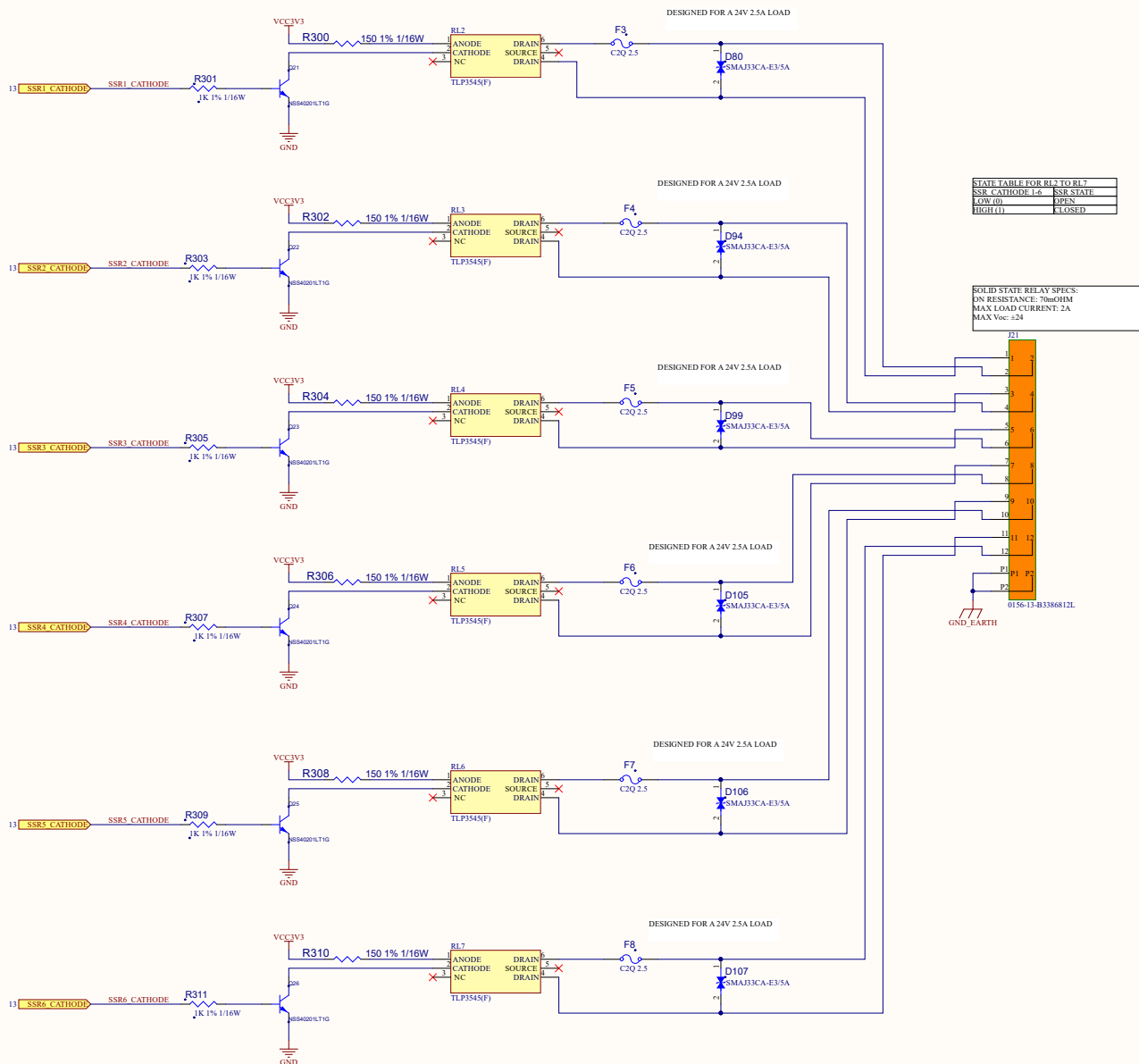


WINDROCK, INC. 1832 MIDPARK ROAD, SUITE 102 KNOXVILLE, TN 37921	TITLE:	3	SCALE:	DO NOT SCALE PRINT
	EVIDE: OE3P9 PRODUCT FAMILY: 3	DRAWING NO:	3	REV: #NAME?
PROPRIETARY NOTICE - THE DATA CONTAINED HEREIN IS PROPRIETARY TO WINDROCK INCORPORATED AND SHALL NOT BE DUPLICATED, USED, OR DISCLOSED IN WHOLE OR IN PART FOR ANY PURPOSE OTHER THAN FOR WHICH IT WAS FURNISHED WITHOUT THE EXPRESS PERMISSION OF WINDROCK INCORPORATED.		OWNER:	WINDROCK, INC.	SHEET: 8 OF 3
ENGINEER:	3	DATE:	7/27/2022	SHEET: 8 OF 3

POWER SECTION

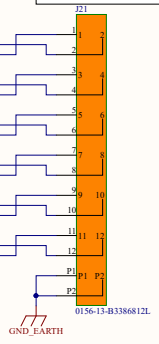


SOLID STATE RELAY

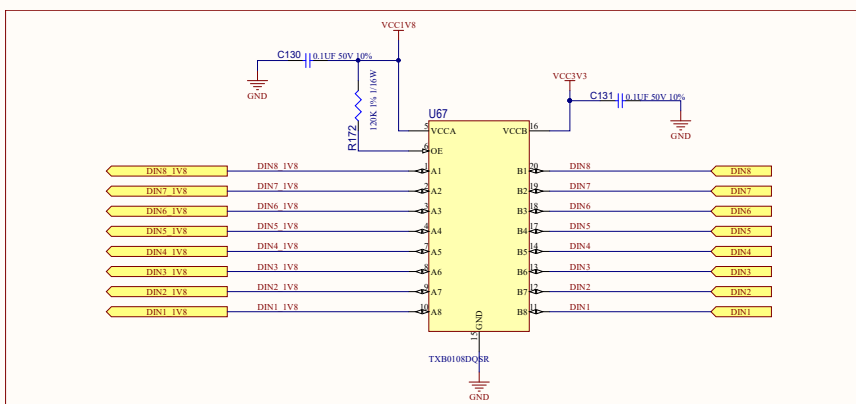
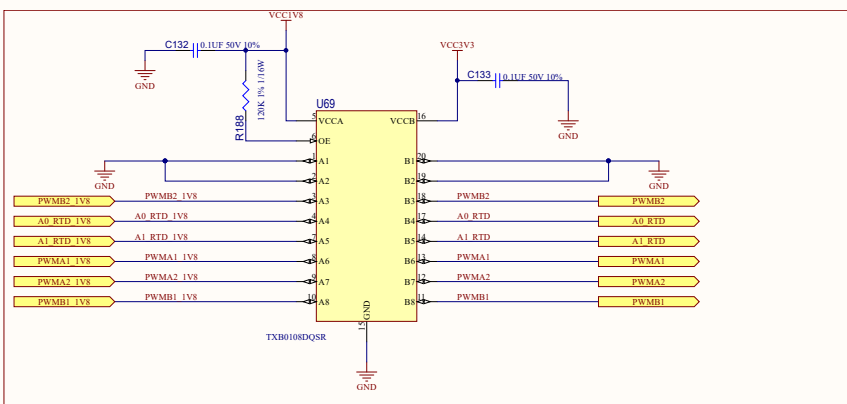
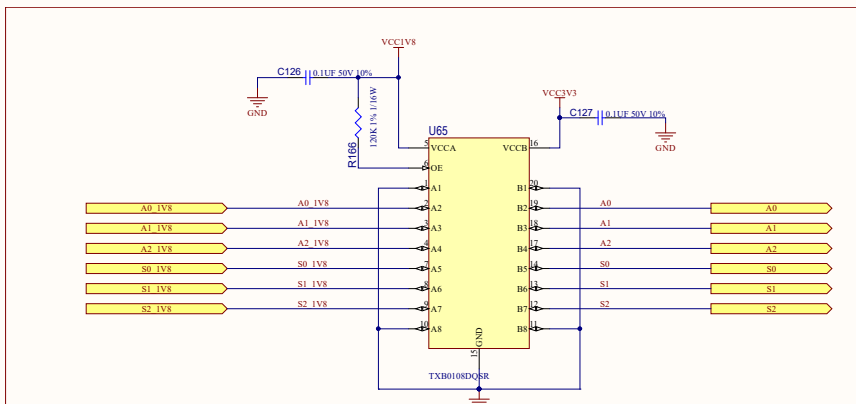
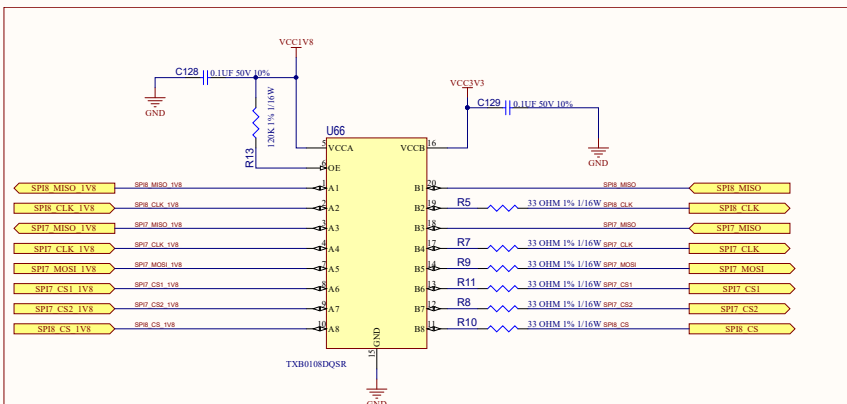


STATE TABLE FOR RL2 TO RL7	
SSR CATHODE I/O	SSR STATE
LOW (0)	OPEN
HIGH (1)	CLOSED

SOLID STATE RELAY SPECS:
 ON RESISTANCE: 70mΩHM
 MAX LOAD CURRENT: 2A
 MAX Vdc: ±24



Bi-Directional Level Translators



MECHANICAL

M.2

MOTOR DRIVER

PEM NUTS

PEM NUTS



MOUNTING SCREWS 5MM LENGTH

STANDOFF



MOUNTING SCREWS 10MM LENGTH

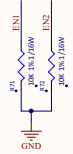
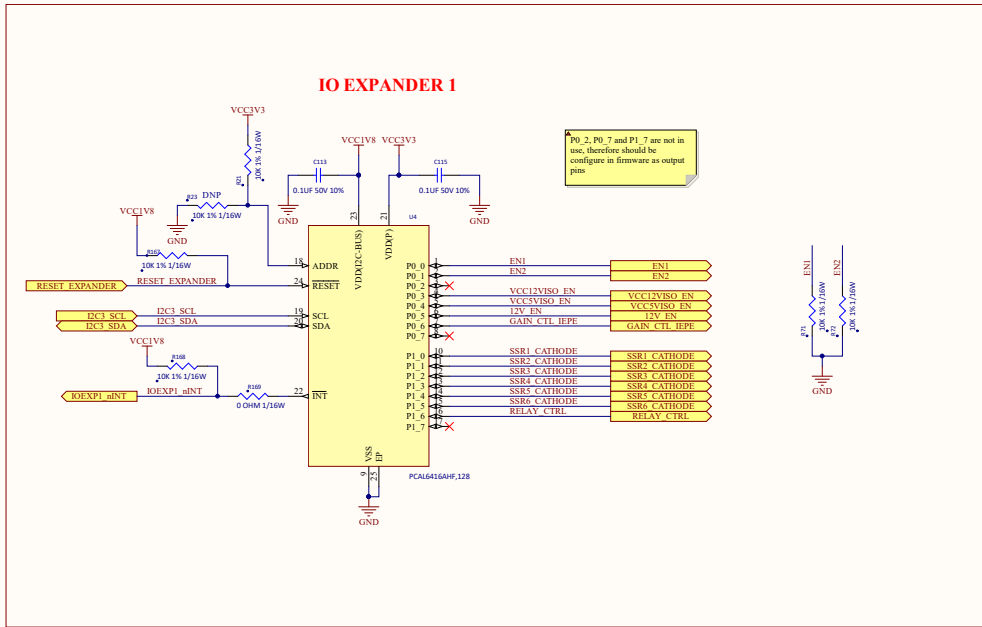
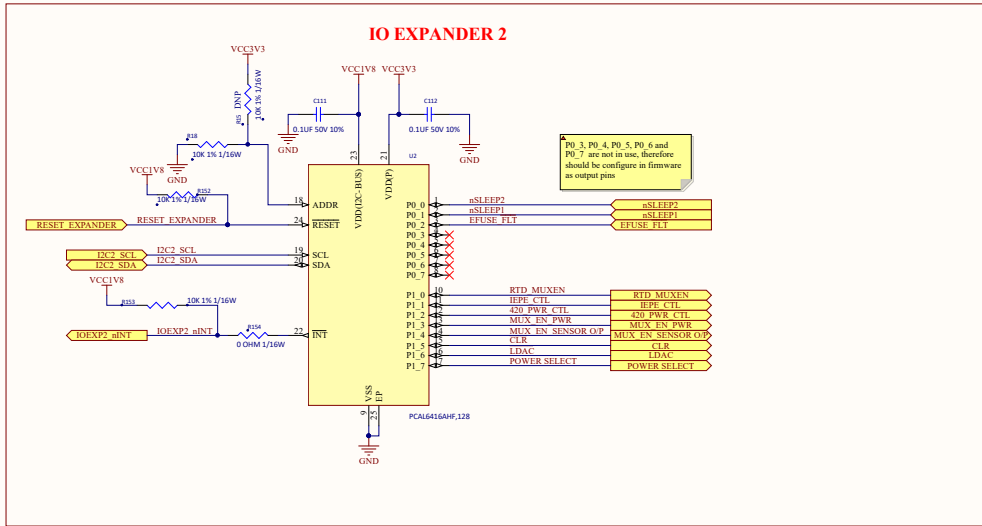


SPACERS



	WINDROCK, INC. 1832 MIDPARK ROAD, SUITE 102 KNOXVILLE, TN 37921	TITLE:	#NAME?	SCALE:
	CODE: OE3P9	PRODUCT FAMILY:	#NAME?	#NAME?
PROPRIETARY NOTICE - THE DATA CONTAINED HEREIN IS PROPRIETARY TO WINDROCK INCORPORATED AND SHALL NOT BE DUPLICATED, USED, OR DISCLOSED IN WHOLE OR IN PART FOR ANY PURPOSE OTHER THAN FOR WHICH IT WAS FURNISHED WITHOUT THE EXPRESS PERMISSION OF WINDROCK INCORPORATED.		OWNER: WINDROCK, INC.	DRAWING NO: #NAME?	REV: #NAME?
		ENGINEER: #NAME?	DATE: 7/27/2022	SHEET SIZE: 0x4D C SHEET: 11 of #NAME?

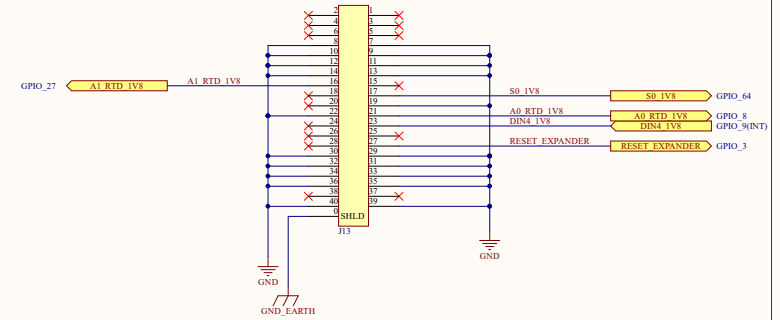
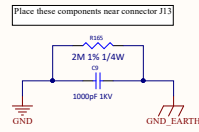
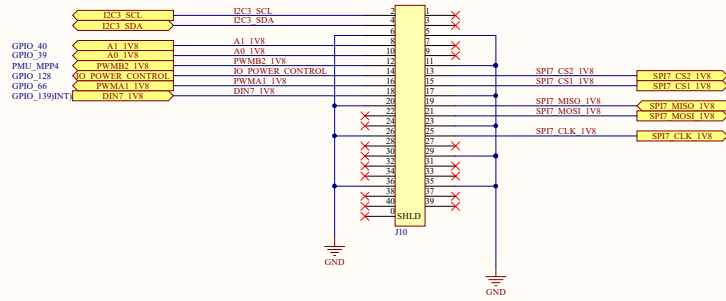
IO EXPANDERS



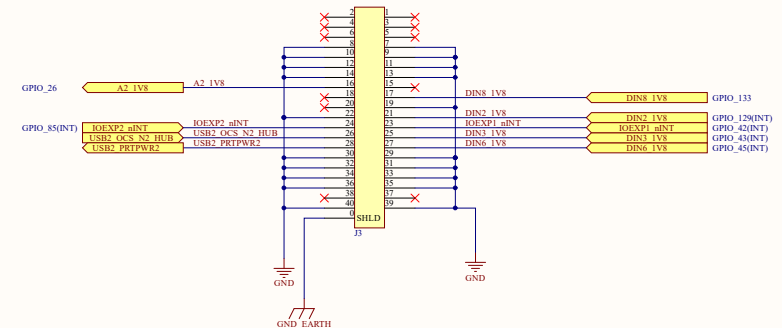
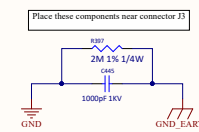
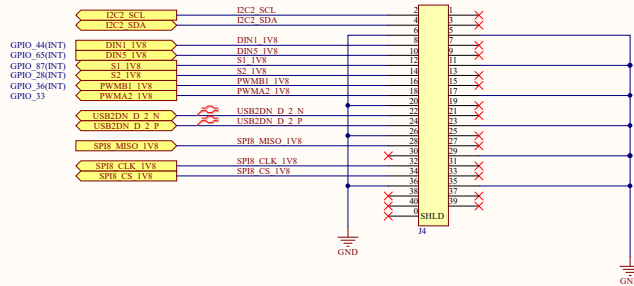
	WINDROCK, INC. 1832 MIDPARK ROAD, SUITE 102 KNOXVILLE, TN 37921	TITLE:	#NAME?	SCALE:
	EXIDE: OE3P9	PRODUCT FAMILY:	#NAME?	DRAWING NO:
PROPRIETARY NOTICE - THE DATA CONTAINED HEREIN IS PROPRIETARY TO WINDROCK INCORPORATED AND SHALL NOT BE DUPLICATED, USED, OR DISCLOSED IN WHOLE OR IN PART FOR ANY PURPOSE OTHER THAN FOR WHICH IT WAS FURNISHED WITHOUT THE EXPRESS PERMISSION OF WINDROCK INCORPORATED.		OWNER: WINDROCK, INC.	#NAME?	REV: #NAME?
		ENGINEER: #NAME?	DATE: 7/27/2022	SHEET SIZE: 0x04 C
				SHEET: 12 of #NAME?

EXPANSION CONNECTORS

EXPANSION BOARD_1

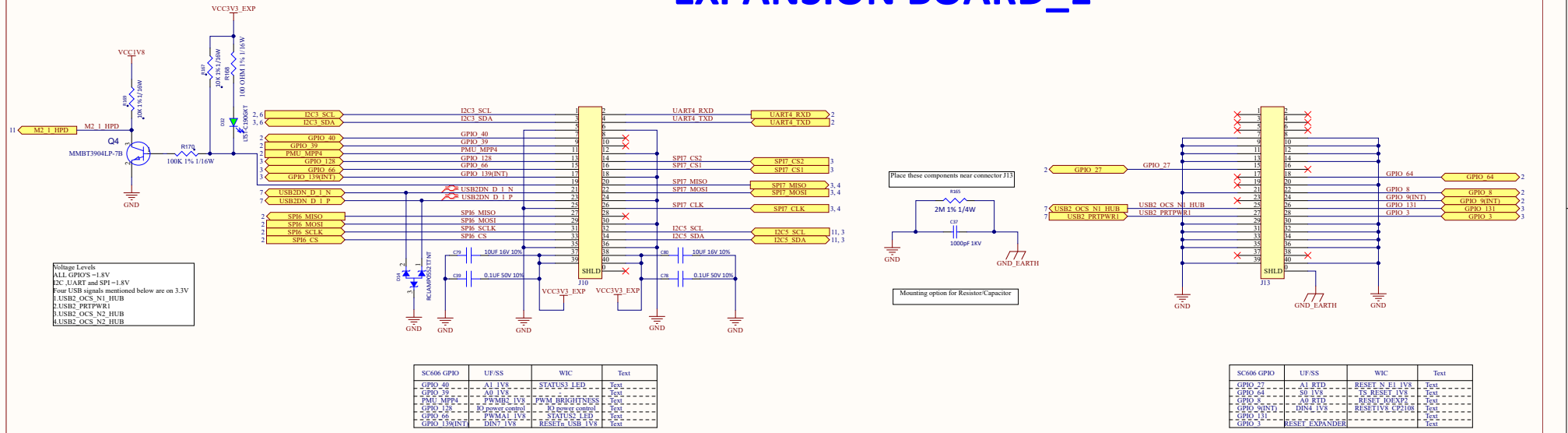


EXPANSION BOARD_2

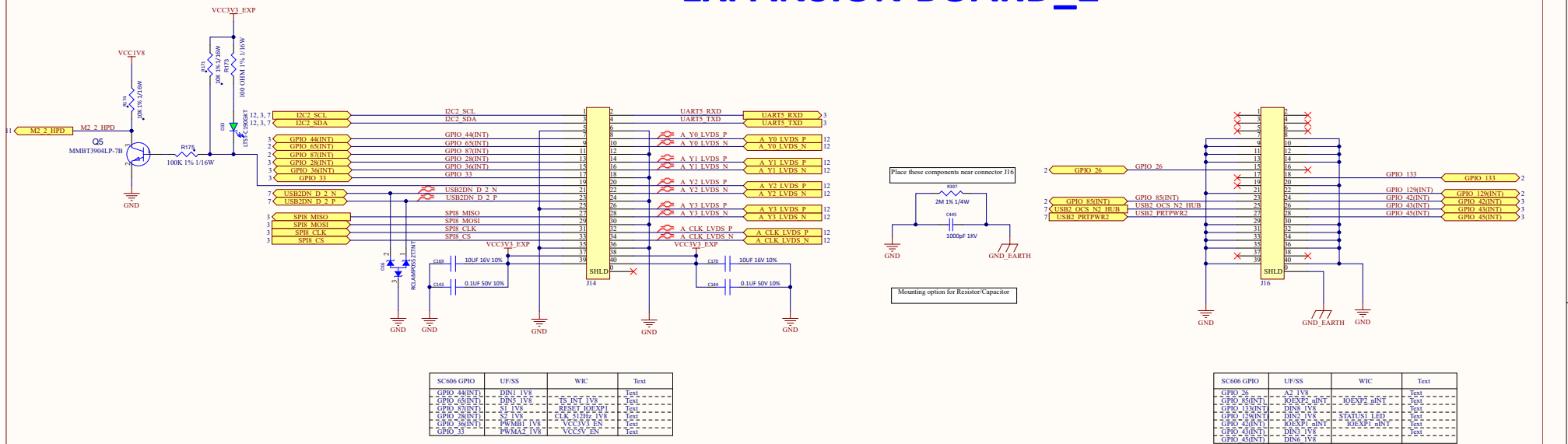


WINDROCK, INC. 1832 MIDPARK ROAD, SUITE 102 KNOXVILLE, TN 37921	TITLE:	#NAME?	SCALE:
	CODE: OE3P9	PRODUCT FAMILY:	#NAME?
PROPRIETARY NOTICE - THE DATA CONTAINED HEREIN IS PROPRIETARY TO WINDROCK INCORPORATED AND SHALL NOT BE DUPLICATED, USED, OR DISCLOSED IN WHOLE OR IN PART FOR ANY PURPOSE OTHER THAN FOR WHICH IT WAS FURNISHED WITHOUT THE EXPRESS PERMISSION OF WINDROCK INCORPORATED.		DRAWING NO:	REV: 3
		OWNER: WINDROCK, INC.	SHEET SIZE: 06x42 C
		ENGINEER: #NAME?	DATE: 7/27/2022
			SHEET: 13 of #NAME?

EXPANSION BOARD_1



EXPANSION BOARD_2



REVISION SHEET

REVISION A0.1
INITIAL RELEASE

REVISION A0.2

BLOCK DIAGRAM:
1. UPDATED BLOCK DIAGRAM

ANALOG INPUTS:
1. COMPONENTS IN IEPE INPUT PATH ARE MADE DNP.
2. MANUFACTURER PART NUMBER OF J2 CHANGED FROM 0156-1312L TO 0156-13-B338632L
3. NOTES UPDATED.
4. STATE TABLES ADDED.
5. C36 ADDED AND MADE DNP ON DVDT PIN OF U42.
6. EFUSE_FLT GPIO ADDED ON PIN 9 OF U42 FOR FAULT INDICATION.
7. D18, D20 AND D22 ARE MADE DNP.
8. J2 REPLACED WITH 36-PIN CONNECTOR AND 4 MORE GROUND CONNECTIONS ARE GIVEN.

RTD,DAC,ADC:
1. IEPE_VREF CIRCUITRY MADE DNP.
2. R436, R447 removed.

ANALOG OUT:
1. NOTES UPDATED
2. MANUFACTURER PART NUMBER OF J7 CHANGED FROM 0156-1304L TO 0156-13-B338604L

DIGITAL INPUTS:
1. NOTES UPDATED
2. MANUFACTURER PART NUMBER OF J1 CHANGED FROM 0156-1312L TO 0156-13-B338632L
3. STATE TABLE ADDED

DRY CONTACT RELAY:
1. MANUFACTURER PART NUMBER OF J16 CHANGED FROM 0156-1304L TO 0156-13-B338604L
2. STATE TABLE ADDED

LOAD CELL:
1. MANUFACTURER PART NUMBER OF J12 CHANGED FROM 0156-1304L TO 0156-13-B338604L

POWER INPUT, VOLTAGE MONITORING, USB:
1. NET LABEL VIN CHANGED TO VCC3V IN VOLTAGE MONITORING SECTION.
2. P-FET POWER SWITCH CIRCUITRY IS ADDED.
3. POWER CONNECTOR J5, F31 AND D31 ADDED.
4. USB SECTION ADDED

POWER SECTION:
1. ISOLATED 3V3 SECTION REMOVED.
2. NON ISOLATED MODULE FOR VCC5V ADDED.
3. NOTES ADDED
4. R477, R478, R482, R485 REPLACED WITH HIGH POWER RATED RESISTORS
5. VCC24V TO 5V_ISO CONVERTER CHANGED TO R13-2405S

SOLID STATE RELAY:
1. MANUFACTURER PART NUMBER OF J21 CHANGED FROM 0156-1312L TO 0156-13-B338612L
2. STATE TABLE ADDED

BI-DIRECTIONAL LEVEL SHIFTERS:
1. SIGNALS RELATED TO RS232/RS485 SECTION REMOVED FROM U69.
2. L20 REMOVED AND SIGNALS ON L20 SHIFTED TO U69.
3. GAIN_CTL_IEPE REMOVED FROM U65.

IO EXPANDER:
1. DC IS PROVIDED TO U2 AND DC3 PROVIDED TO U4
2. U4 IS NAMED AS IO_EXPANDER_1 AND U2 IS NAMED AS IO_EXPANDER_2
3. SIGNALS OVER IO_EXPANDER_1 AND 2 ARE RE-ARRANGED.
4. 3V3_GOOD AND 5V_GOOD SIGNALS ARE REMOVED.
5. R15 AND R18 ARE ADDED ON ADDR PIN OF U2, ADDR_PIN IS PULLED LOW USING R18 AND R15 IS MADE DNP.
6. R21 AND R23 ARE ADDED ON ADDR PIN OF U4, ADDR_PIN IS PULLED HIGH USING R21 AND R23 IS MADE DNP.
7. RESET_EXPANDER SIGNAL IS PROVIDED TO U4 AND U2.
8. SIGNALS MUX_SEL1_3V3, MUX_SEL0_3V3, MUX_RS485/232_3V3 ARE REMOVED.
9. GAIN_CTL_IEPE SIGNAL IS ADDED TO U4.
10. PULL-DOWN RESISTORS ADDED TO EN1 AND EN2 SIGNALS.

EXPANSION CONNECTOR:
1. VCC3V3_EXP REMOVED FROM J4 AND J10.
2. VCC5V REMOVED FROM J13.
3. RS232_1V8 REMOVED FROM J10 AND IO_POWER_CONTROL SIGNAL IS ADDED ON J10.
4. UART5_RTS_1V8, GAIN_CTL_IEPE_1V8 ARE REMOVED AND RESET_EXPANDER IS ADDED ON J13.
5. DC_SCL AND DC_SDA SIGNALS ARE ADDED ON J4.
6. UART5_RXD_1V8, UART5_TXD_1V8 SIGNALS ARE REMOVED FROM J3.
7. EFUSE_FLT SIGNAL IS CONNECTED TO IO_EXPANDER_2.
8. USB2_PRTWR2 AND USB2_OCS_N2_HUB SIGNALS ARE ADDED ON J3.

RS232/RS485
1. SHEET REMOVED FROM THE PROJECT

REVISION A0.3

ANALOG INPUTS:
1. GND CONNECTIONS ON CONNECTOR I2 ARE REARRANGED.
2. U16 CHANGED FROM ADG5404BRUZ TO ADG5404FBRUZ DUE TO SUPPLY CHAIN ISSUE.
3. U10 AND U15 ARE CHANGED FROM DG1408EN-TI-G4 TO ADG5408BRUZ (LATCH-UP PROOF).

RTD,DAC,ADC:
1. U54 CHANGED FROM ADG709HRUZ TO ADG709CRUZ DUE TO SUPPLY CHAIN ISSUE.
2. U57 IS CHANGED FROM ADG704BRMZ-REEL7 TO MAX474EUB+ DUE TO SUPPLY CHAIN ISSUE.
3. R233, R243, R247 PULL UPS ON SPI CS LINES ARE REMOVED.

DIGITAL INPUTS:
1. CHANGES DONE AS PER SUGGESTED DIN SCHEME.

POWER INPUT, VOLTAGE MONITORING, USB:
1. INPUT POWER CONNECTOR IS CHANGED TO 1792876

POWER SECTION:
1. R29, R273 AND R274 ARE REMOVED.
2. NOTES UPDATED

BI-DIRECTIONAL LEVEL SHIFTERS:
1. GND PINS OF U65, U66, U67 AND U69 ARE PULLED UP.
2. UNUSED PINS OF U65 ARE GROUNDED.
3. SIGNALS OF U66 ARE REARRANGED.


REVISION A0.4

ANALOG INPUTS:
1. D18, D20 AND D22 CHANGED FROM PLVA656A,215 TO PLVA659A,215

LOAD CELL:
1. D84 IS CHANGED FROM PLVA656A,215 TO PLVA659A,215 AND MADE DNP

POWER INPUT, VOLTAGE MONITORING, USB:
1. D92 IS CHANGED FROM PLVA656A,215 TO PLVA659A,215.

EXPANSION CONNECTOR:
1. SIGNALS ON EXPANSION CONNECTORS ARE REARRANGED.

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