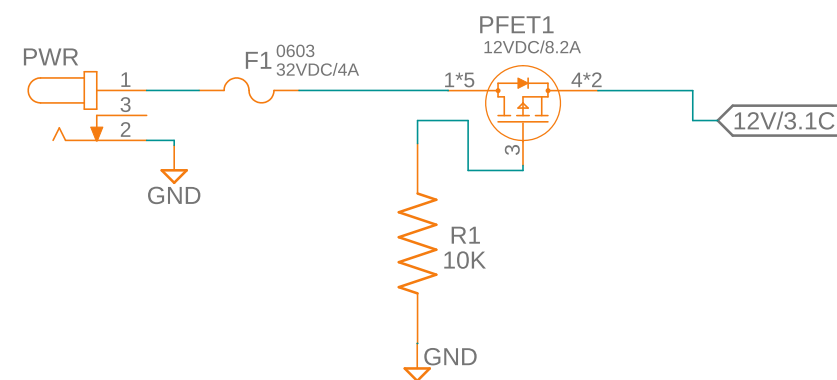


POWER SOURCE

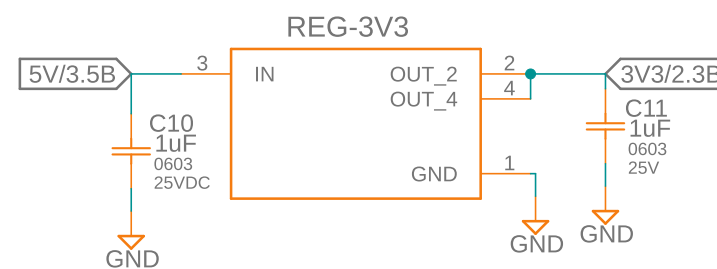


PMOSFET CONFIG
* DRAIN - PIN 1, 2,5, 6, 7
* GATE - PIN 3
* SOURCE - PIN 4, 8

REGULATOR - 5V



REGULATOR - 3V3



NOTES:

Expect Temp rise for PFET1
* $I_{max} = 4A$; $R_{ds} = 19m\Omega$
* $V_{drop} = 4A * 19m\Omega = 70mV$
* $P_{loss} = 4A * 4A * 19m\Omega = 0.304W$
* $T_j \text{ range} = -55^\circ C - 150^\circ C$
* $R_{ja} = 270^\circ C/W$
* $Trise = R_{ja} * P_{loss} = 70.5^\circ C$
* $T_j = T_{atm} + Trise = 25^\circ C + 70.5^\circ C = 95.5^\circ C$

Expect Temp rise for REG-5V
* $T_j \text{ range} = -40^\circ C - 150^\circ C$
* $R_{ja} = 65^\circ C/W$
* $P_{loss} = 0.7W @ 1.5A$ (datasheet)
* $Trise = R_{ja} * P_{loss}$
* $T_j = T_{atm} + Trise = 25^\circ C + 48.75^\circ C = 73.75^\circ C$

Expect Temp rise for REG-3V3
* $T_j \text{ range} = -40^\circ C - 125^\circ C$
* $R_{ja} = 62.9^\circ C/W$
* $V_{drop} = 1.7V$
* $P_{loss} = 1.275W @ 0.75A$
* $Trise = R_{ja} * P_{loss} = 80.25^\circ C$
* $T_j = T_{atm} + Trise = 25^\circ C + 80.25^\circ C = 105.25^\circ C$

CAL POLY M.E.

TITLE: PCBA_MAIN v96

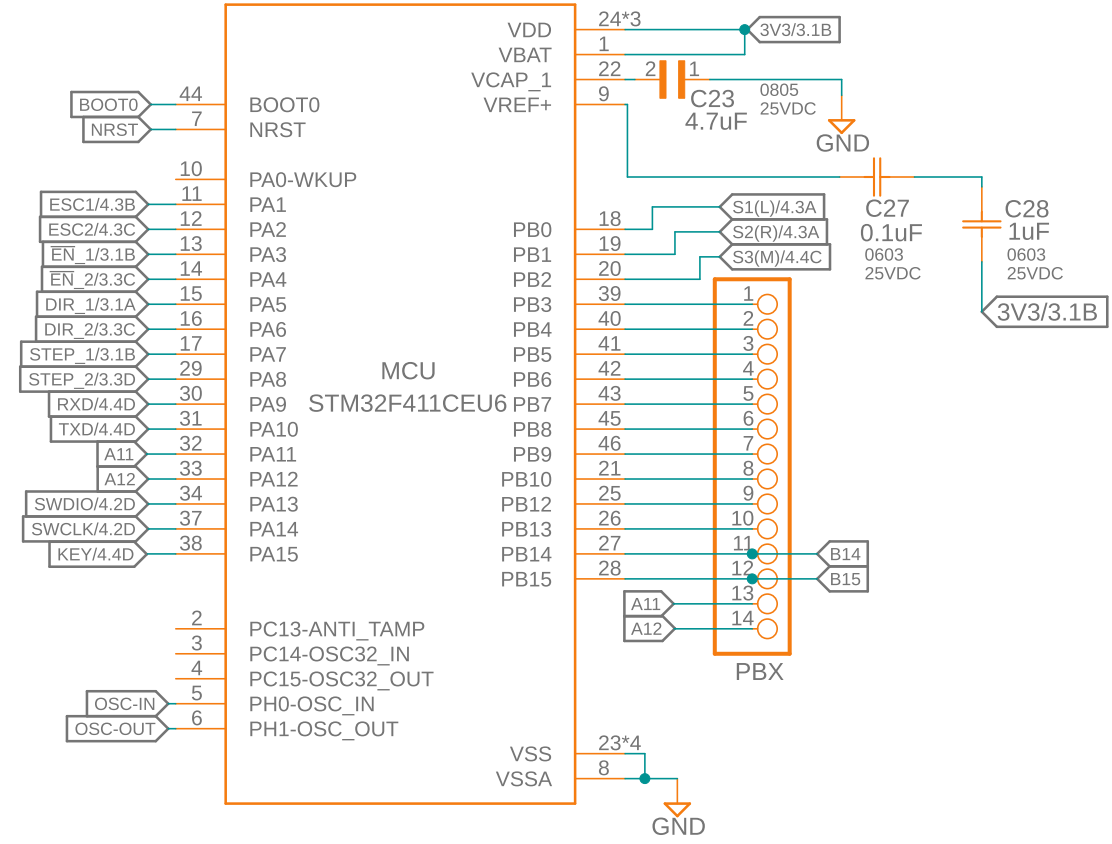
Drawn By: VINH VO, JOHNATHAN LAM

REV: REV1

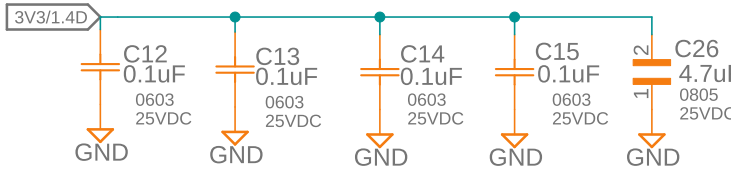
Date: 5/13/2024 12:00 AM

Sheet: 1/4

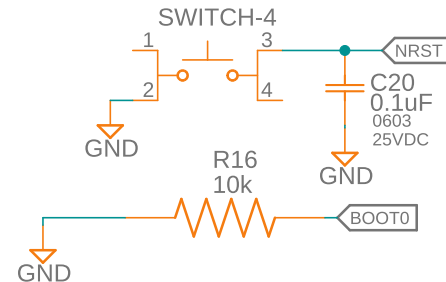
STM32F411CEU6



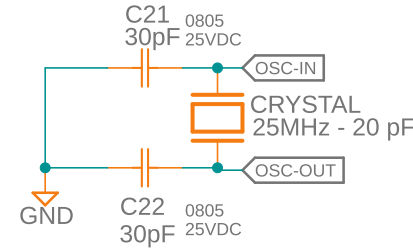
BYPASS CAPACITORS



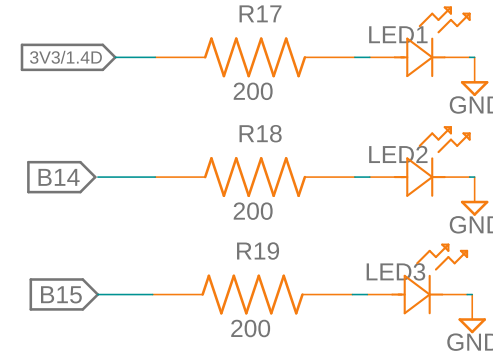
RESET CIRCUIT & BOOT0



OSCILLATOR



INDICATOR LED



NOTES:

CRYSTAL AND CAPACITOR

- * C21, C22 = 30 pF
- * CL = 20 pF
- * Cstray = 5 pF
- * CL = (C21*C22)/(C21+C22) + Cstray
- * C21, C22 = 2*CL - 2* Cstray

LED Notation

- * LED1: MCU Ppwer
- * LED2: Extra LED
- * LED3: Extra LED

Bypass Capacitors

- * C12 -> C15 as close as possible to the MCU's pwr pin

CAL POLY M.E.

TITLE: PCBA_MAIN v96

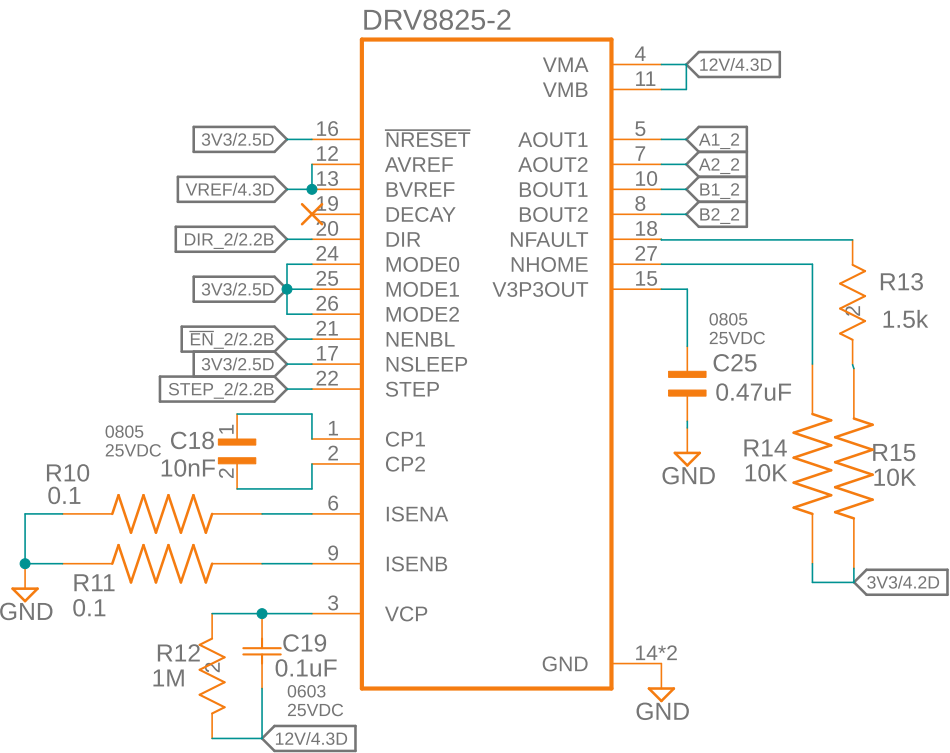
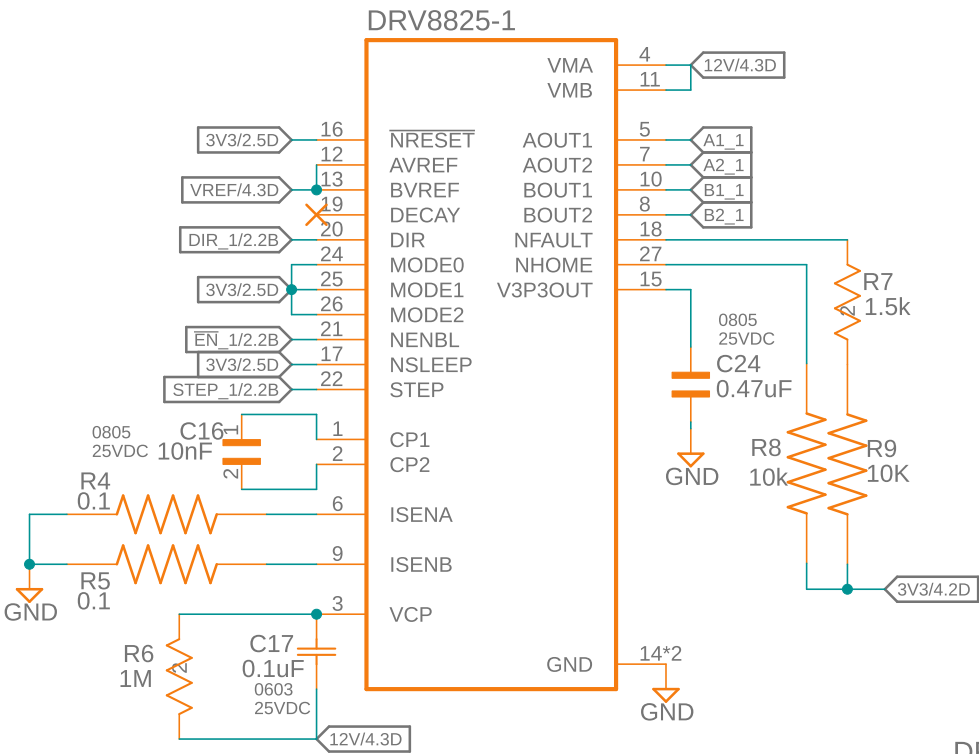
Drawn By: VINH VO, JOHNATHAN LAM

REV: REV1

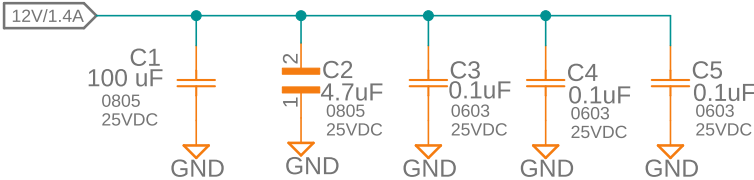
Date: 5/13/2024 12:00 AM

Sheet: 2/4

DRV8825

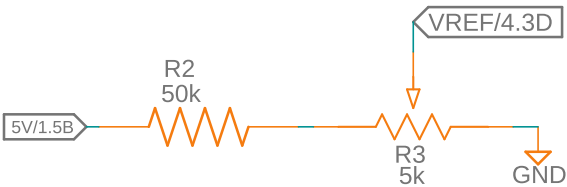


BYPASS CAPACITORS

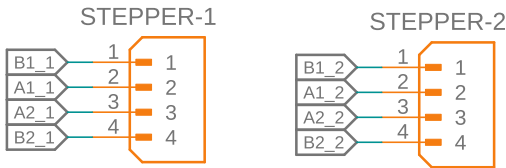


Bypass Capacitors
* Put C1, C2, C3, C4, C5 near Drv8825 pwr pin

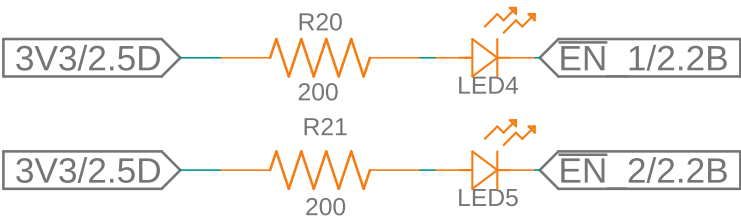
VREF



STEPPER CONNECTORS



INDICATOR LED



NOTES:

VREF Calculation:

- * Vin = 5V
- * R3 = 0 Ohm - 5k Ohm
- * VREFmin = 0V
- * VREFmax = Vin * R3/(R3 + R2)
- = 5V * (5k/55k)
- = 0.45V

Drv8825 Currents Limit

- * VREF = 0V - 0.45V
- * Rsense = R4, R5, R10, R11
- = 0.1 Ohm
- * Imax = VREF/(5*Rsense)
- = VREF/(5*0.1)
- = 0A - 0.9A

Expect Temp rise for Drv8825

- * Tj range = -40°C - 150°C
- * Rja = 31.6°C/W
- * Vmax = 12V, Imax = 0.9A,
- * Pmax = 10.8
- * Trise = 341.28°C
- * Tj = Tatm + Trise
- = 25°C + 341.28°C
- = 366.28°C -> Fin Required

CAL POLY M.E.

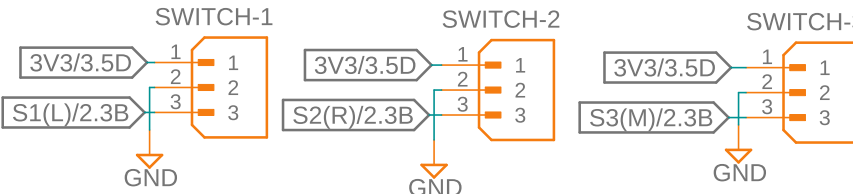
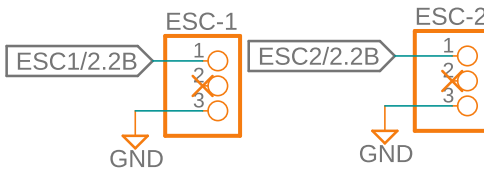

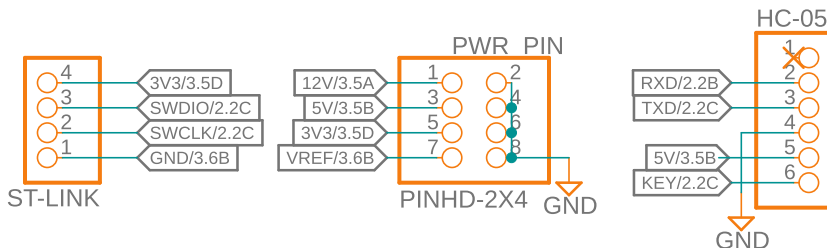
TITLE: PCBA_MAIN v96

Drawn By: VINH VO, JOHNATHAN LAM

Date: 5/13/2024 12:00 AM

REV: REV1

Sheet: 3/4

	1	2	3	4	5	6
A	LIMIT SWITCH CONNECTORS					A
						
B	ESC PIN					B
						
C	TEST PADS					C
						
D	EXTRA PINS					D
						
E	<div>NOTES:</div> <div><div>Limit Switches</div><div>* These are B3B-XH female connectors that are used to connect 3 limit switches (left, right, middle)</div></div> <div><div>ESC Pin Header</div><div>* This Pin Headers connect GND and PWM Pins from the MCU to external ESCs for running BLDC motors</div></div> <div><div>External Pin & Test Pad</div><div>* Includes some external and potential pin that can be used for debugging and testing purpose</div></div>				<div>CAL POLY M.E.</div> <div><div>TITLE:PCBA_MAIN v96</div><div><div>Drawn By:VINH VO, JOHNATHAN LAM</div><div>REV:REV1</div></div><div><div>Date:5/13/2024 12:00 AM</div><div>Sheet:4/4</div></div></div>	