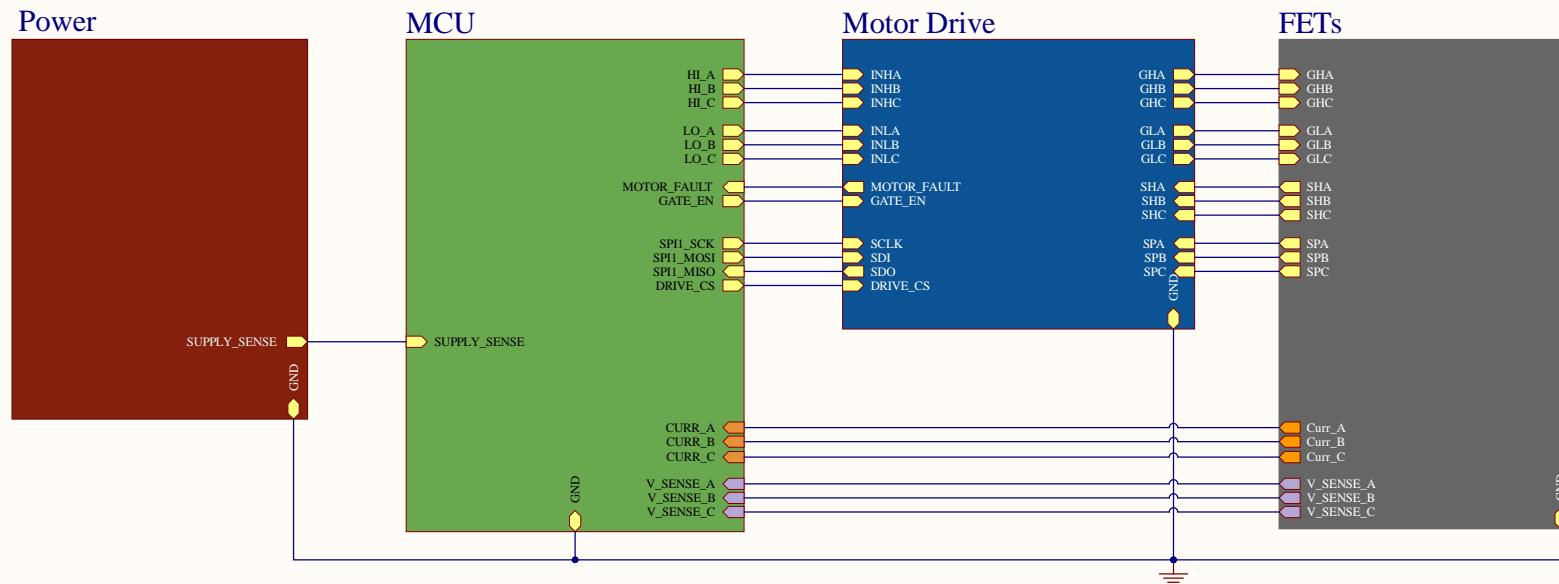


MAXWELL V2.0

An Open Source, three-phase motor controller for robot actuators



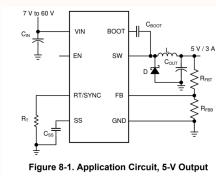
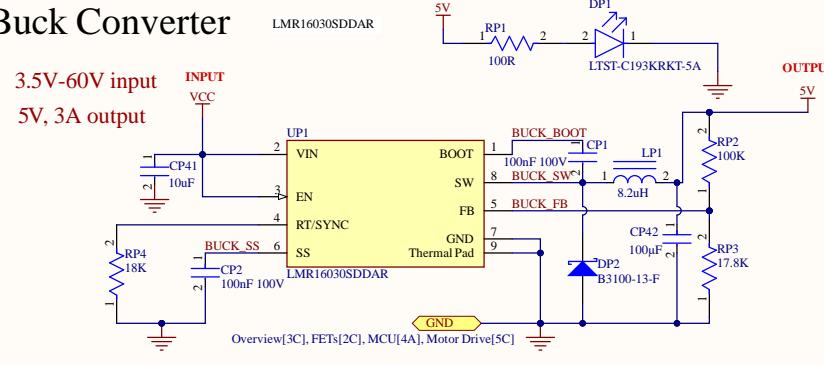
Specifications:

- Up to 60V input
- 20A Continuous current, 100A Peak
- PWM, CAN, and USB control
- Built in 5V BEC for radio receivers
- Sensorless, Sensored and FOC control
- Encoder support:
 - Hall sensors, Rotational encoders, Magnetic encoders (1 built in)

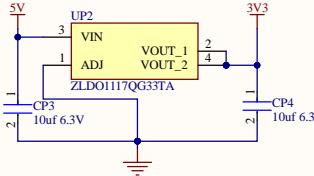
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Size: A2	Document Number: 1	Revision: 1
Date: 19/11/2025	Sheet 1 of 5	
File: Overview.SchDoc		
Drawn By: Sam Scott		ROBOSAM

Power (P)

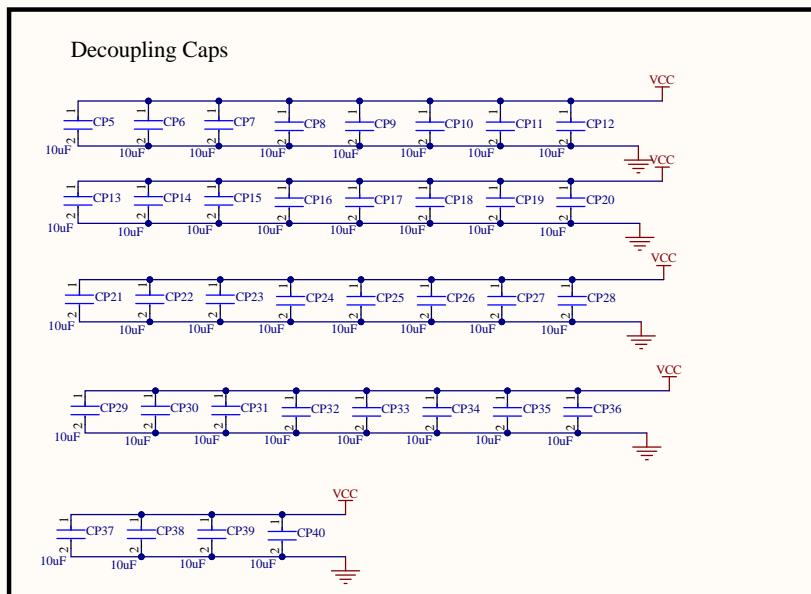
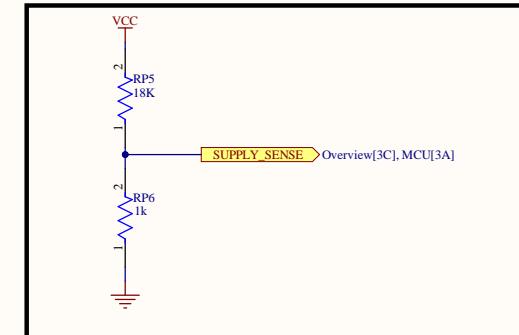
Buck Converter



3.3V Regulator



Supply Sense



Title: Power

Size: A2 Document Number: 2 Revision: 1

Date: 19/11/2025 Sheet 2 of 5

File: Power.SchDoc

Drawn By: Sam Scott

ROBOSAM

[3] MCU - M

STM32F405RGT6 Microcontroller

USB-C Socket

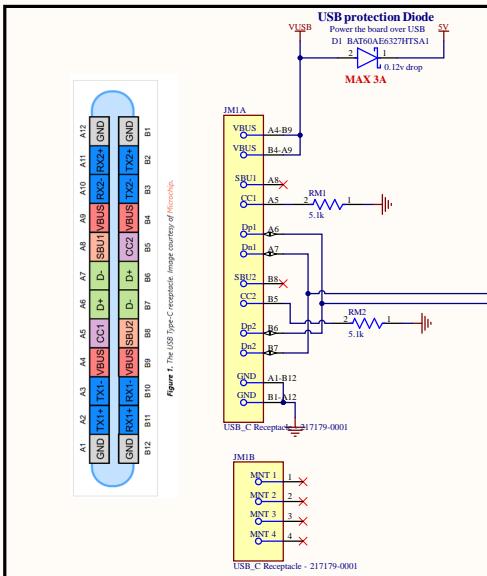
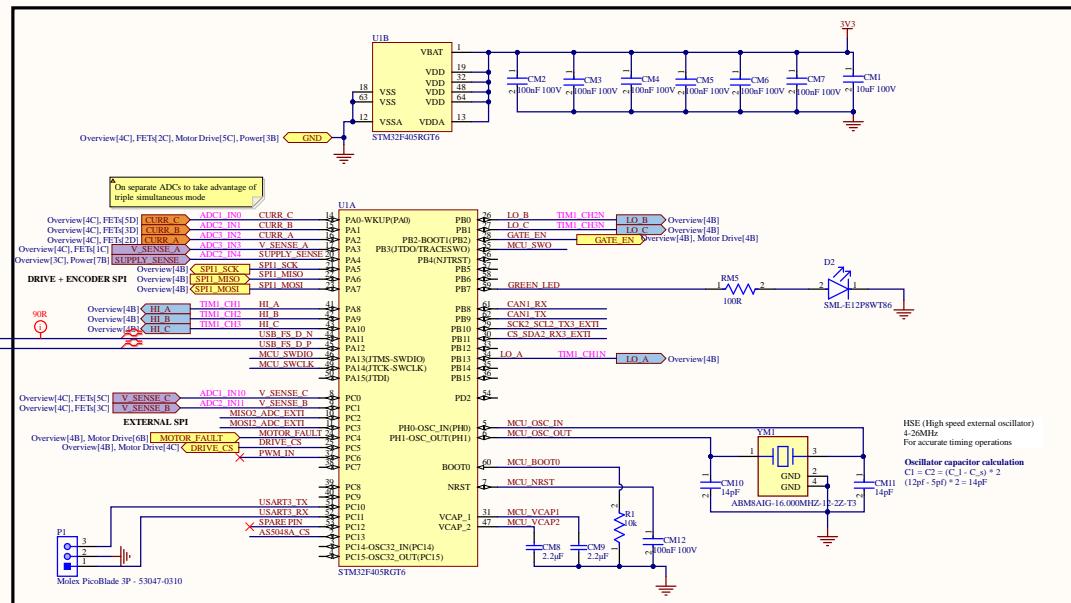
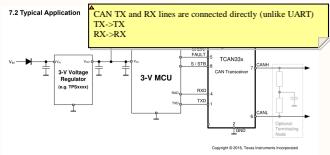


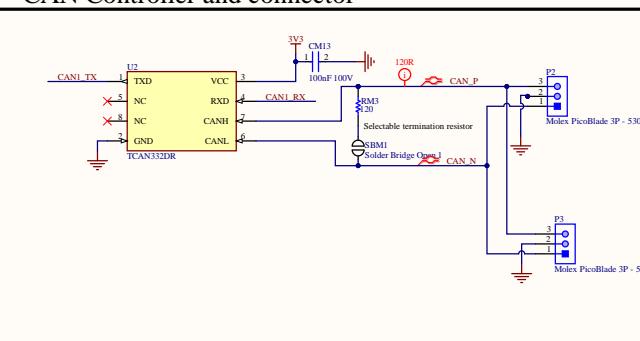
Figure 1. The USS *Type-C* *resets*. Image courtesy of Microtech.



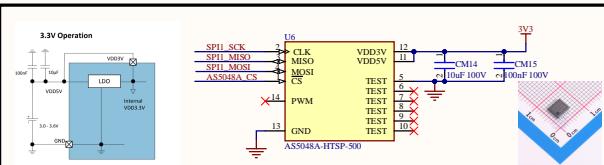
CAN Controller and connector



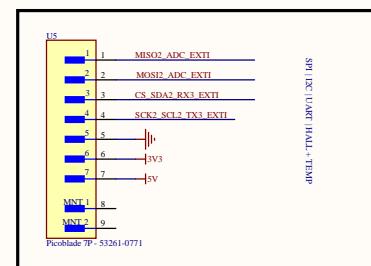
Copyright © 2005, Texas Instruments Incorporated



Absolute position encoder - AS5048A



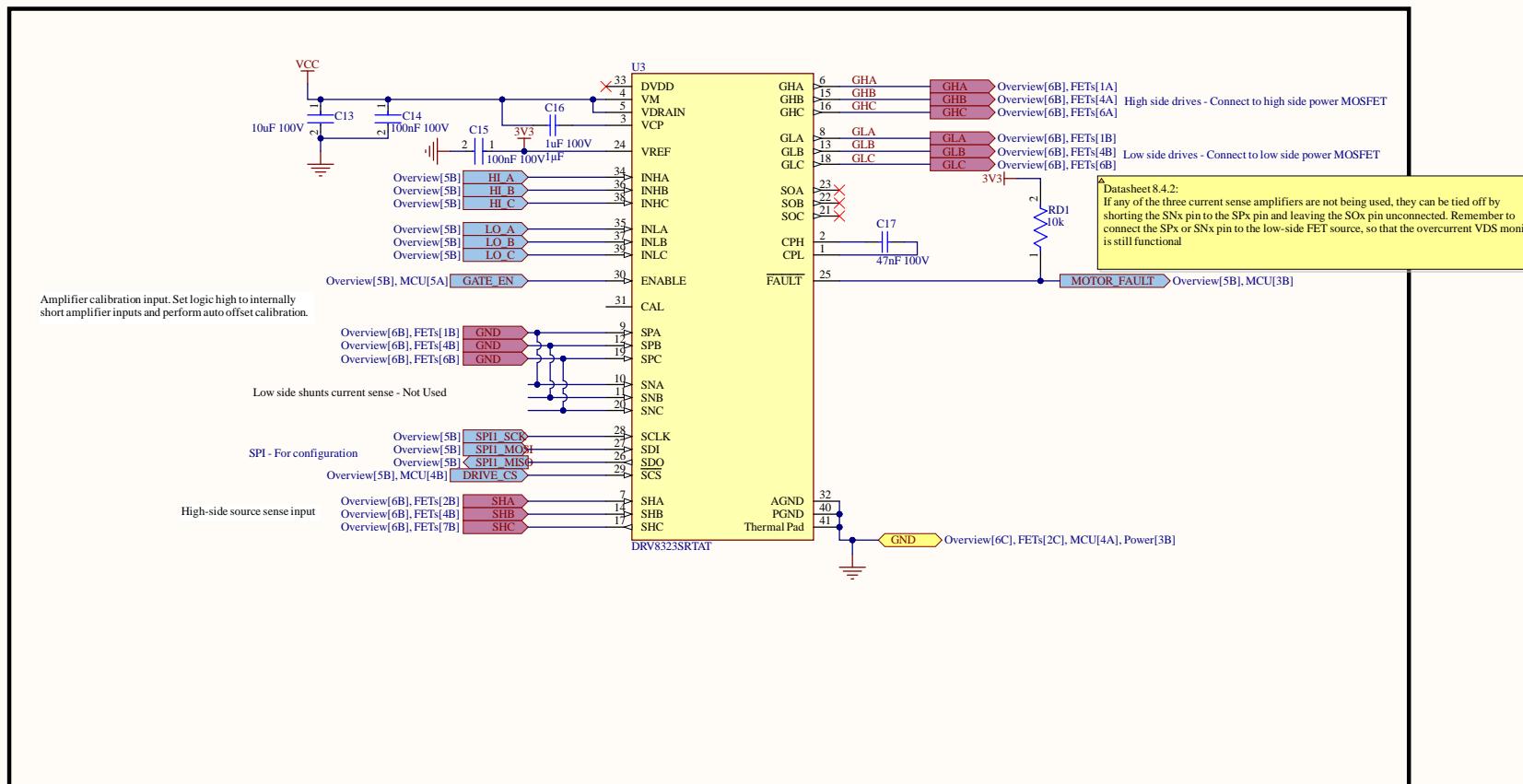
External encoder connector



Now routing second SPI bus to external
to allow external (e.g. hall sensors) +
onboard encoders to work simultaneously

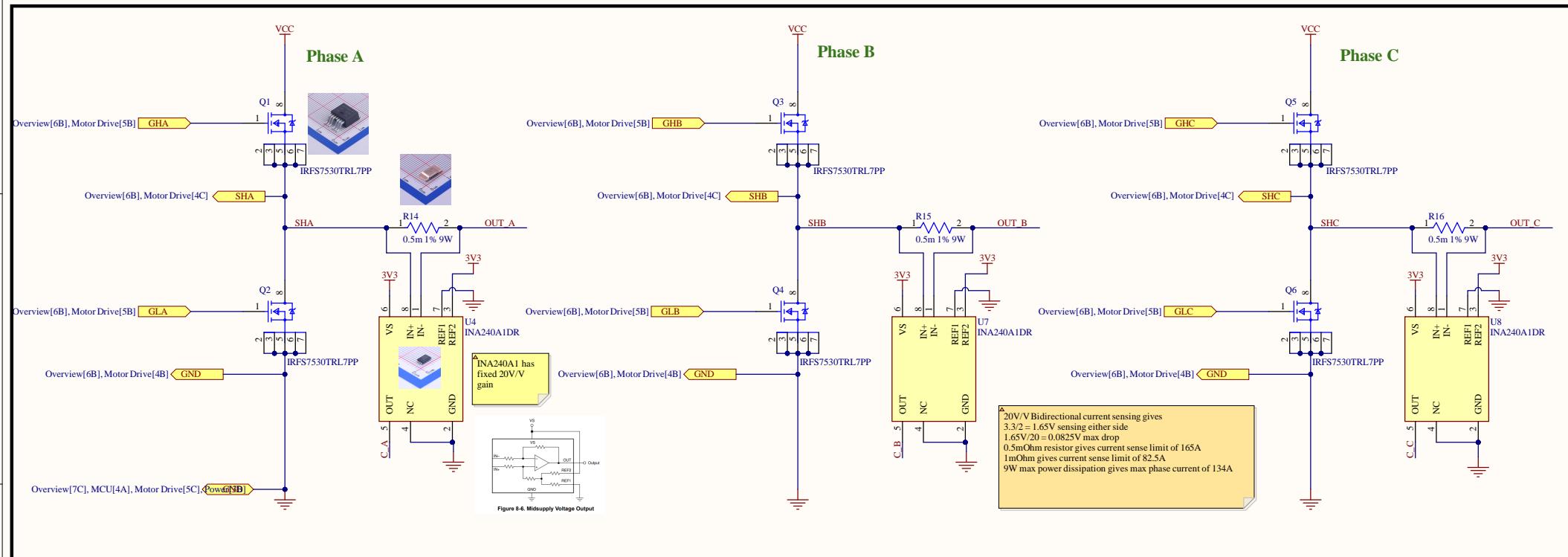
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Size:	A2	Document Number:	3
Date:	19/11/2025	Sheet	3 of 5
File:	MCU.SchDoc		
Drawn By:	Sam Scott		

[4] Motor Drive - D

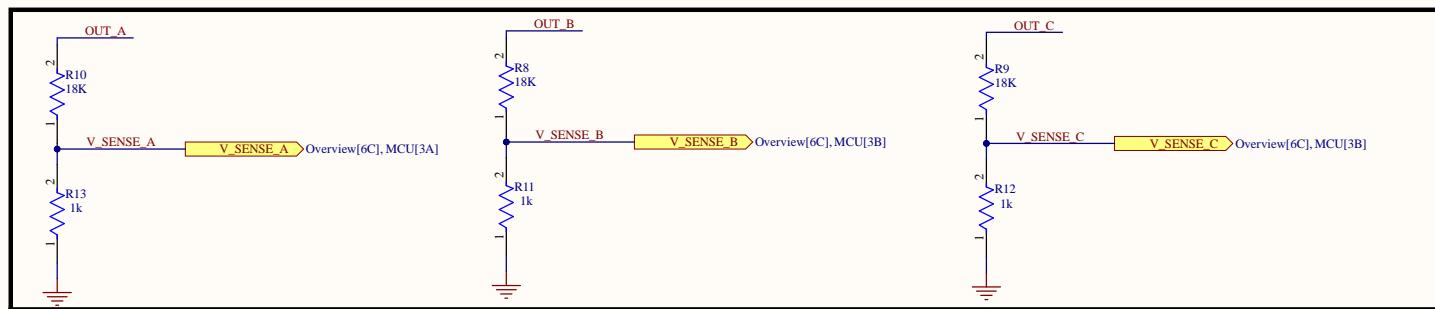


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Date: 19/11/2025	Sheet: 4	of: 5
File: Motor Drive.SchDoc		
Drawn By: Sam Scott		ROBOSAM

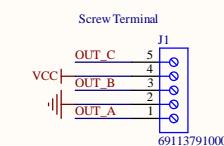
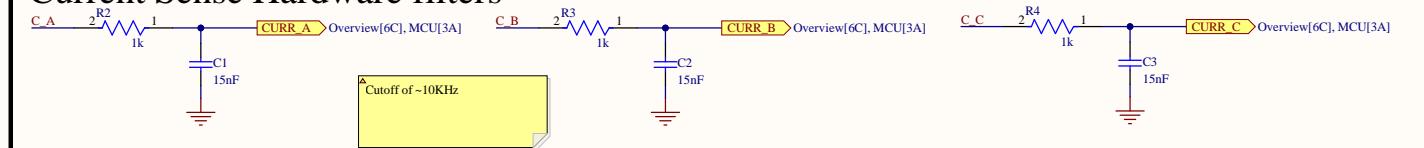
[5] FETs - F



Resistor dividers to detect shunt voltage



Current Sense Hardware filters



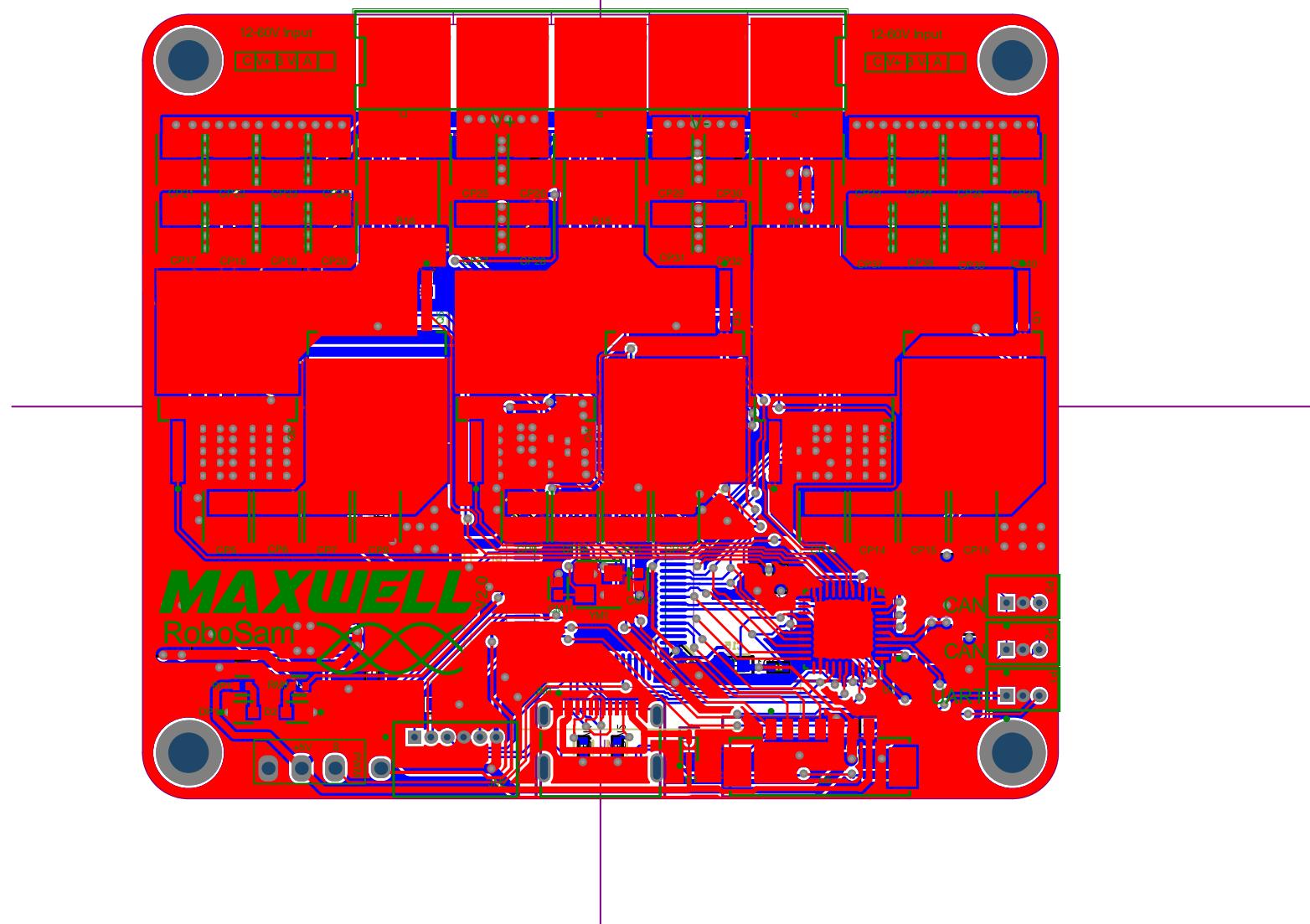
Title: FETs

Size: A2 **Document Number:** 5 **Revision:** 1

Date: 19/11/2025 **Sheet:** 5 **of:** 5

File: FETs.SchDoc

Drawn By: Sam Scott **ROBOSAM**



JLPCB Part #	Name	Description	Designator	Revision ID	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	
C7461361	8.2uH	8.2uH4.5A	LP1			1								
C5156756	10uF	100V 10uF X7S±10% 1210 Multilayer Ceramic Capacitors MLCC- SMD/SMT ROHS- GRM32EC72A106KE05L	CP5, CP6, CP7, CP8, CP9, CP10, CP11, CP12, CP13, CP14, CP15, CP16, CP17, CP18, CP19, CP20, CP21, CP22, CP23, CP24, CP25, CP26, CP27, CP28, CP29, CP30, CP31, CP32, CP33, CP34, CP35, CP36, CP37, CP38, CP39, CP40, CP41			37	Murata	GRM32EC72A106KE05L	Volume Production	Mouser	81-GRM32EC72A106KE05	0.519	19.2	
C2894899	USB_C Receptacle- 217179-0001	USB Connector, USB Type C, USB 2.0, Receptacle, 16 Ways, Surface Mount, Through Hole Mount	JM1			1	Molex	217179-0001	Volume Production	Arrow Electronics	2171790001	0.6714	0.6714	
C2655181	AS5048A-HTSP-500	Rotary Position Sensor 5.5V/3.6V Digital Output 14-Pin TSSOP T/R	U6			1	ams	AS5048A-HTSP-500						
C2060769	INA240A1DR	Op Amp Single Zero Drift Amplifier 5.5V Automotive 8-Pin SOIC/T/R	U4, U7, U8			3	Texas Instruments	INA240A1DRQ1	Volume Production	DigiKey	296-53152-1-ND	4.03	12.09	
C701784	DRV8323SRAT	65-V max 3-phase smart gate driver with current shunt amplifiers 40-WQFN -40 to 125	U3			1	Texas Instruments	DRV8323SRAT	Volume Production	DigiKey	296-47095-1-ND	4.67	4.67	
C596903	ABM8AIG-16.000MHZ-12-2Z-T3	Crystal 16MHz ±20ppm (Tol) ±50ppm (Stability) 12pF FUND 700hm Automotive 4-Pin Mini-SMD T/R	YM1			1	Abracan	ABM8AIG-16.000MHZ-12-2Z-T3	Volume Production	Newark	ABM8AIG-16.000MHZ-12-2Z-T3	0.917	0.917	
C576517	10uF 100V	100V 10uF X7S±10% 1210 Multilayer Ceramic Capacitors MLCC- SMD/SMT ROHS- GRM32EC72A106KE05L	Cl3, CM1, CM14			3	Murata	GRM32EC72A106KE05L	Volume Production	Mouser	81-GRM32EC72A106KE05	1.01	3.03	
C513277	BAT60AE6327HTSA1	SILICON SCHOTTKY DIODE Rectifier Diode, Schottky, 1 Phase, 1 Element, 3A, 10V V(RRM), Silicon	D1			1	Infineon	BAT60AE6327HTSA1	Volume Production	Newark	BAT60AE6327HTSA1	0.4	0.4	
C505276	Picoblade 7P- 53261-0771	1.25mm (.049") Pitch Picoblade Header, Surface Mount, Right Angle, Lead-free, 7 Circuits	U5			1	Molex	53261-0771	Volume Production	Avnet	59JU239	0.503	0.503	
C169433	0.5m 1% 9W	0.5m 9W 3920 resistor	R14, R15, R16			3								
C458857	0402 14pF Capacitor	14pF	CM10, CM11			2	Murata	GM1555C1H140GB01D	Volume Production	DigiKey	490-14443-1-ND	0.11579	0.23158	
C445669	IRFS7530TRL7PP	MOSFET N-CH 60V/240A D2PAK N-Channel 60V 240A (Tc) 375W (Tc) Surface Mount PG-TQ263-7	Q1, Q2, Q3, Q4, Q5, Q6			6	Infineon	IRFS7530TRL7PP	Volume Production	Mouser	942-IRFS7530TRL7PP	3.89	23.34	
C326523	ZLDO1117QG33TA	Power Supply	UP2			1								
C161598	Picoblade BP- 53048-0610	Conn Shrouded Header (4 Sides) HDR6 POS1.25mm Spdler RA Side Entry Thru-Hole Picoblade Tray	JM2			1	Molex	53048-0610	Volume Production	Avnet	0530480610	0.25763	0.25763	
C157741	LTST-C193KRKT-5A	Single-color LEDs; LITEON; LTST-C193KRKT-5A; Red; 130 °, 2.3 V, 0603	DP1			1	Lite-On	LTST-C193KRKT-5A	Volume Production	Mouser	859-LTSTC193KRKT5A	0.17	0.17	
C136648	LMR16030SDAR	SIMPLE SWITCHER Step-Down Converter	UP1			1	Texas Instruments	LMR16030SDAR	Volume Production	DigiKey	296-47797-1-ND	4.16	4.16	
C134447	B3100-13-F	B3100 Series 100V 3 A High Voltage Surface Mount Schottky Barrier Rectifier SMC	DP2			1	Diodes Inc.	B3100-13-F	Volume Production	Mouser	621-B3100-F	0.46	0.46	
C126319	SMLE12P8/WT86	LED Uni-Color Green 2-Pin Chip 0603(1608Metric) T/R	D2			1	ROHM	SMLE12P8/WT86	Volume Production	Mouser	755-SMLE12P8/WT86	0.215	0.215	
C122442	Molex Picoblade 3P- 53047-0310	Conn Shrouded Header (4 Sides) HDR3 POS1.25mm Spdler ST Thru-Hole Picoblade Tray	P1, P2, P3			3	Molex	53047-0310	Volume Production	Avnet	0530470310	0.1089	0.3267	
C114405	0402 15nF capacitor	0402 15nF capacitor	C1, C2, C3			3								
C00143	1210 100uF - 16V Capacitor	100uF- 16V	CP42			1								
C73651	TCAN332DR	16 TCAN332 Tape & Reel (TR) CANbus interface transceiver 120mV 1.45mm -40C-125C	U2			1	Texas Instruments	TCAN332DCNR	Volume Production	Mouser	595-TCAN332DCNR	2.43	2.43	
C25905	5.1K 0402 resistor	5.1K 0402 resistor	RM1, RM2			2								
C25810	18K	0603WAF1802T5E100mW75V	R8, R9, R10, RP4, RP5			5								
C25744	0402 10K resistor	0402 10K resistor	R1, RD1			2								
C25076	0402 100R resistor	0402 100R resistor	RM5, RP1			2								
C22821	17.8K	17.8K	RP3			1								
C22787	0603 120R - 0603WAF1200T5E	120R	RM3			1								
C17074	47nF 100V	47nF 100V	Cl7			1								
C15742	STM32F405RGIT6	MCU 32-bit STM32F ARM Cortex M4F RISC 1024kB Flash 2.5V/3.3V 64-Pin LQFP Tray	U1			1	STMicroelectronics	STM32F405RGIT6	Volume Production	Arrow Electronics	STM32F405RGIT6	7.64	7.64	
C15725	100nF 100V	100V 100nF X7R±10% 0603 Multilayer Ceramic Capacitors MLCC- SMD/SMT ROHS	C14, C15, CM2, CM3, CM4, CM5, CM6, CM7, CM12, CM13, CM15, CP1, CP2			13	Samsung Electro-Mechanics	CL10B104K08NNNC	Volume Production	Mouser	187-CL10B104K08NNNC	0.008	0.104	
C14676	1k	RC0603JR-071KL	R2, R3, R4, R11, R12, R13, RR6			7								
C14675	100K	100K	RP2			1								
C13832	1uF 100V	1uF 100V	C16			1								
C12530	0402 2.2uF capacitor	0402 2.2uF capacitor	CM8, CM9			2								
C1691	10uf 6.3V	6.3V 10uF X5R±20% 0603 Multilayer Ceramic Capacitors MLCC- SMD/SMT ROHS	CP3, CP4			2	Samsung Electro-Mechanics	CL10A106MQ8NNNC	Volume Production	Mouser	187-CL10A106MQ8NNNC	0.011	0.11	
	691137910005		J1			1	Wurth Elektronik	691137910005		RS (Formerly Allied Electronics)	74396041		1.02	1.02
	Solder Bridge Open 1	A solder bridge connection	SBM1			1								