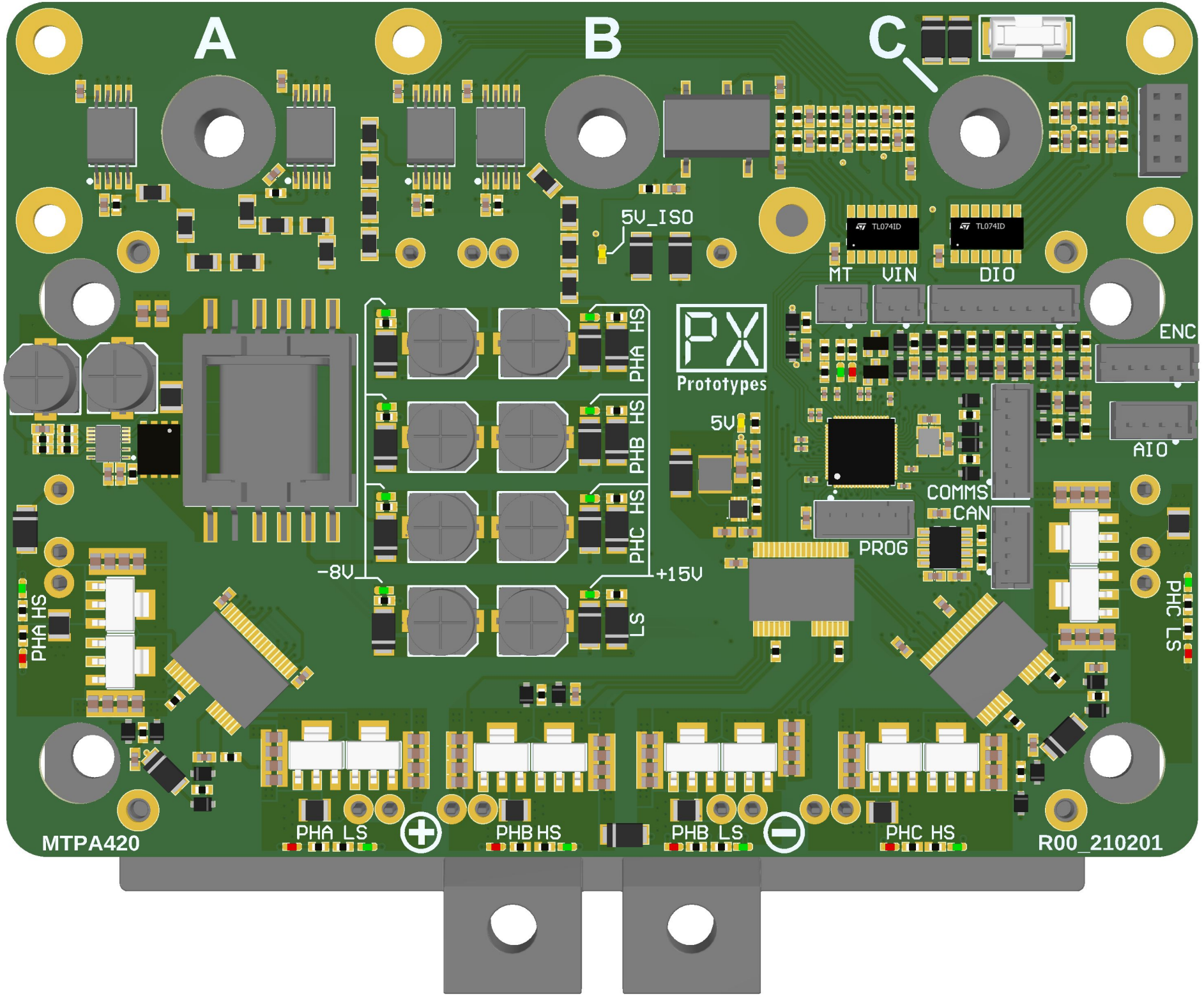
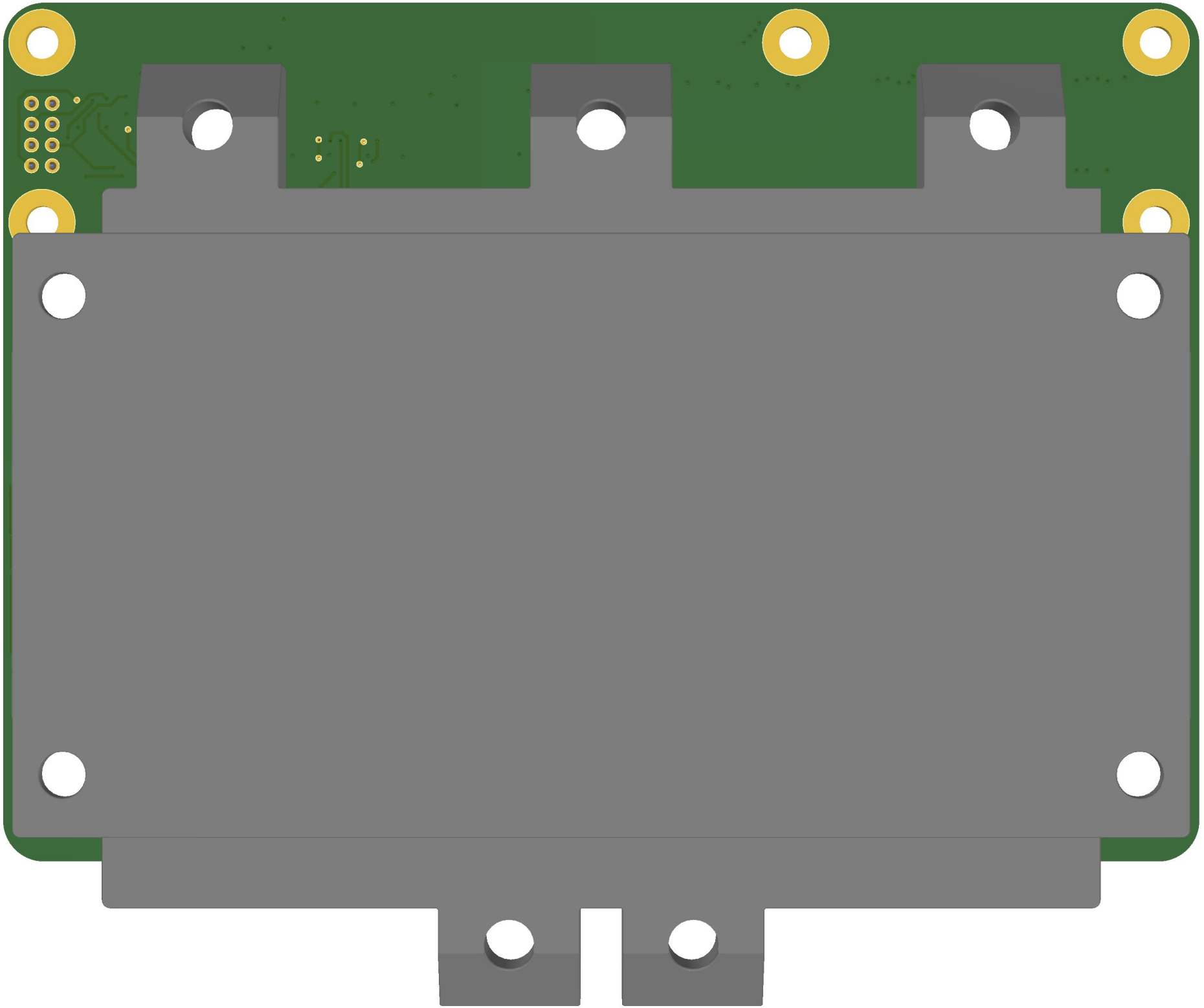
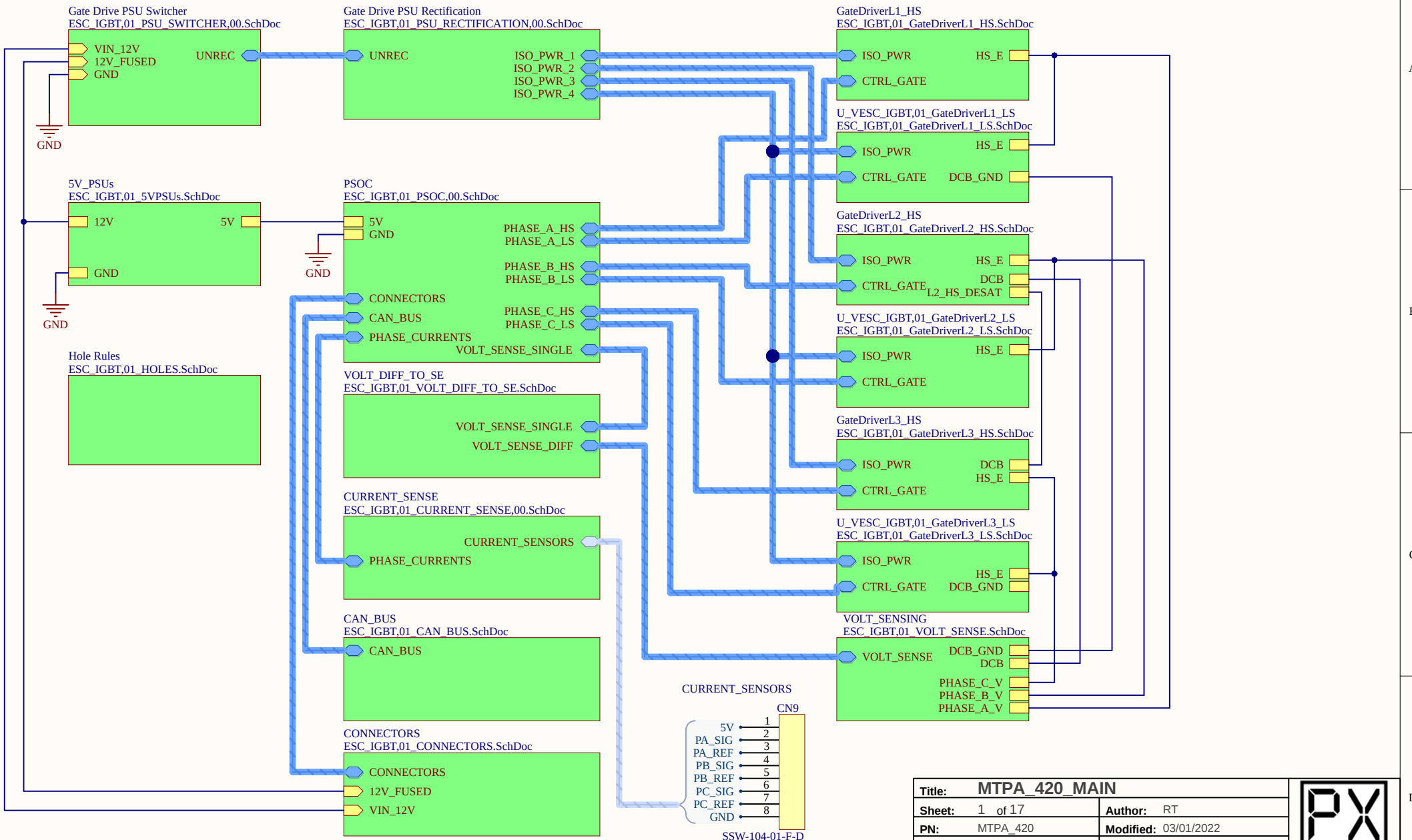
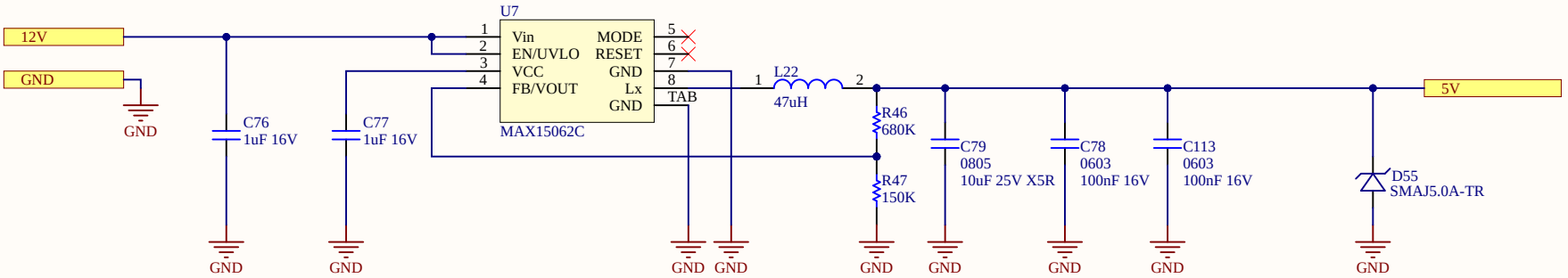

A
B
C
5V_ISO
TL074ID
TL074ID
MT
VIN
DIO
ENC
AIO
PX
Prototypes
5V
COMMS
CAN
PROG
PHA HS
PHB HS
PHC HS
LS
-8V
+15V
PHA HS
PHC LS
PHA LS
PHB HS
PHB LS
PHC HS
MTPA420
R00_210201

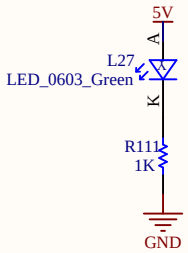




Title:	MTPA_420_MAIN		
Sheet:	1 of 17	**Author:**	RT
PN:	MTPA_420	**Modified:**	03/01/2022
Revision:	0.01	**Checked:**	RT
		Dated:	10/01/2021

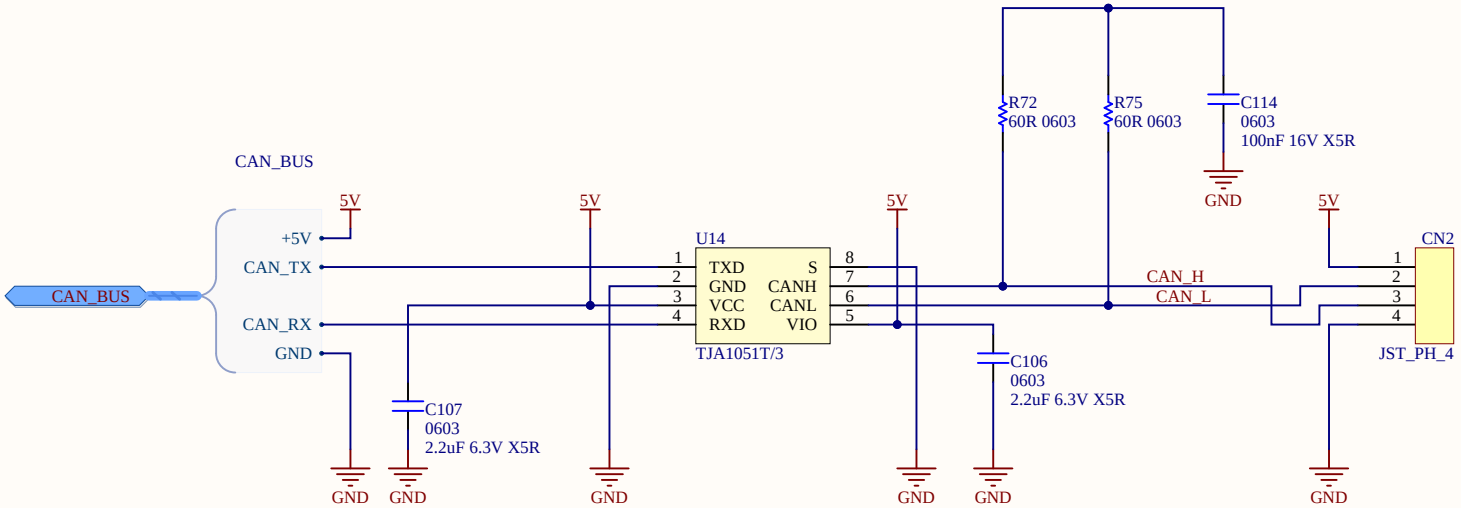
PX Prototypes





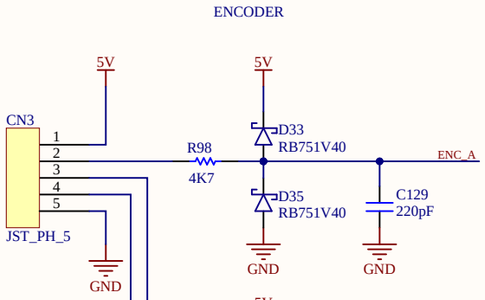
Title:	MTPA_420_5V_POWER		
Sheet:	2 of 17	**Author:**	RT
PN:	MTPA_420	**Modified:**	03/01/2022
Revision:	0.01	**Checked:**	RT
		Dated:	10/01/2021

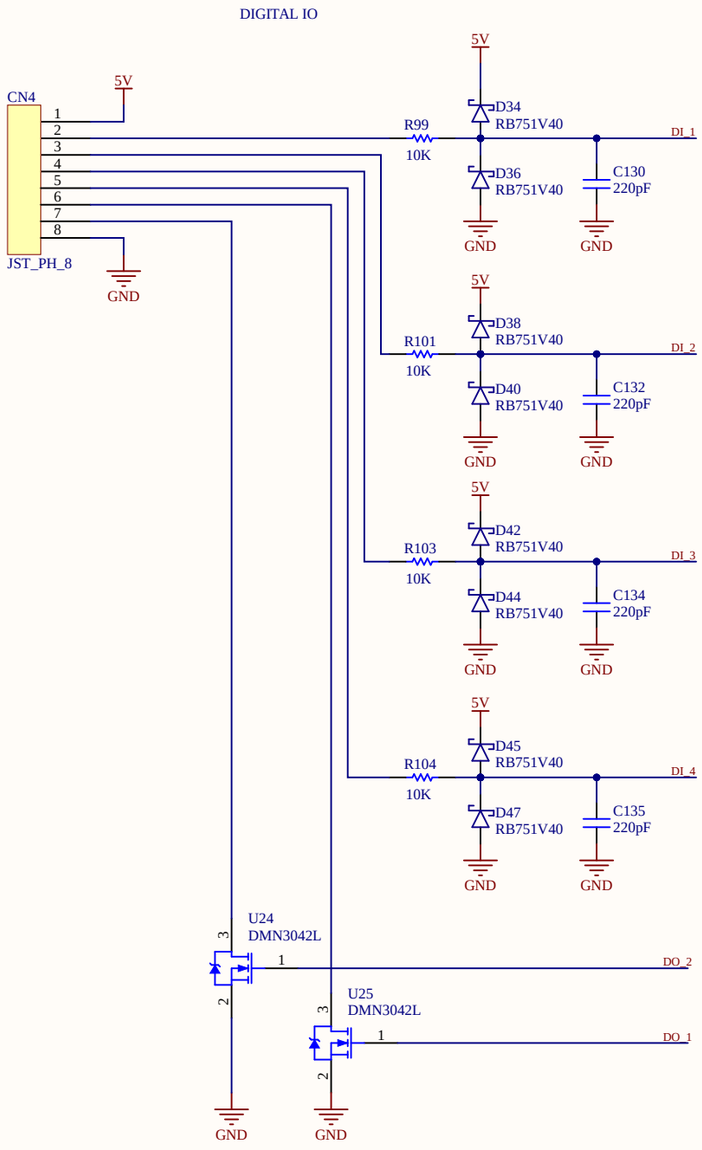
PX Prototypes

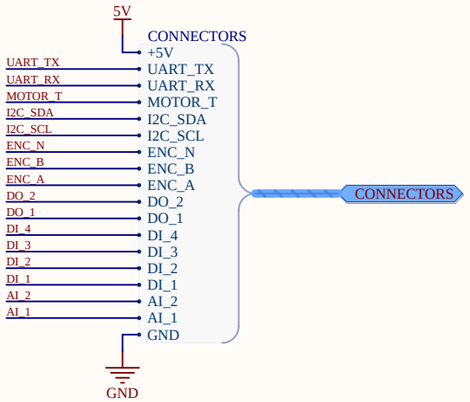


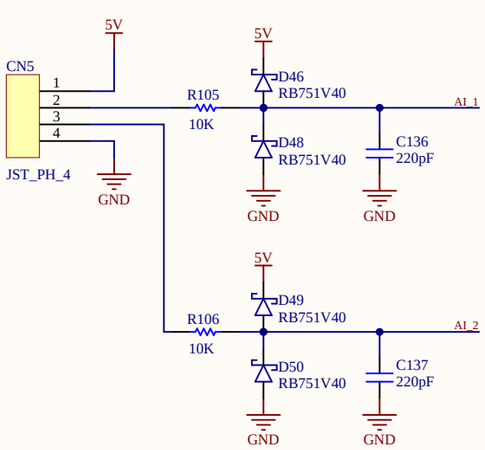
Title:	MTPA_420_CAN		
Sheet:	3 of 17	**Author:**	RT
PN:	MTPA_420	**Modified:**	03/01/2022
Revision:	0.01	**Checked:**	RT
		Dated:	10/01/2021

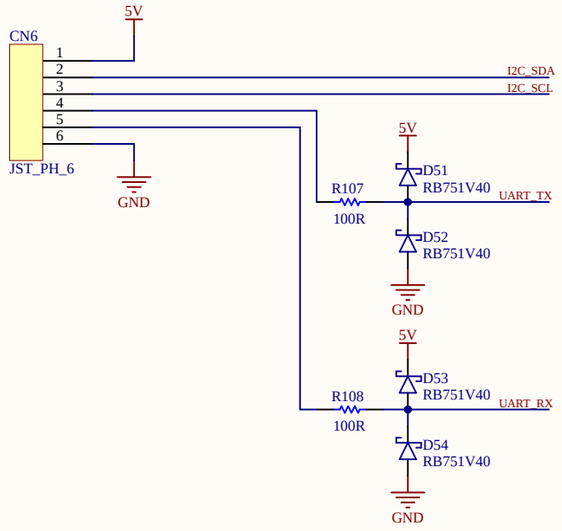
PX Prototypes

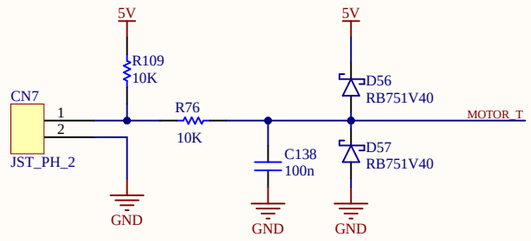


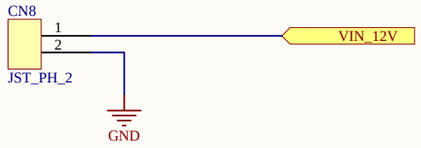




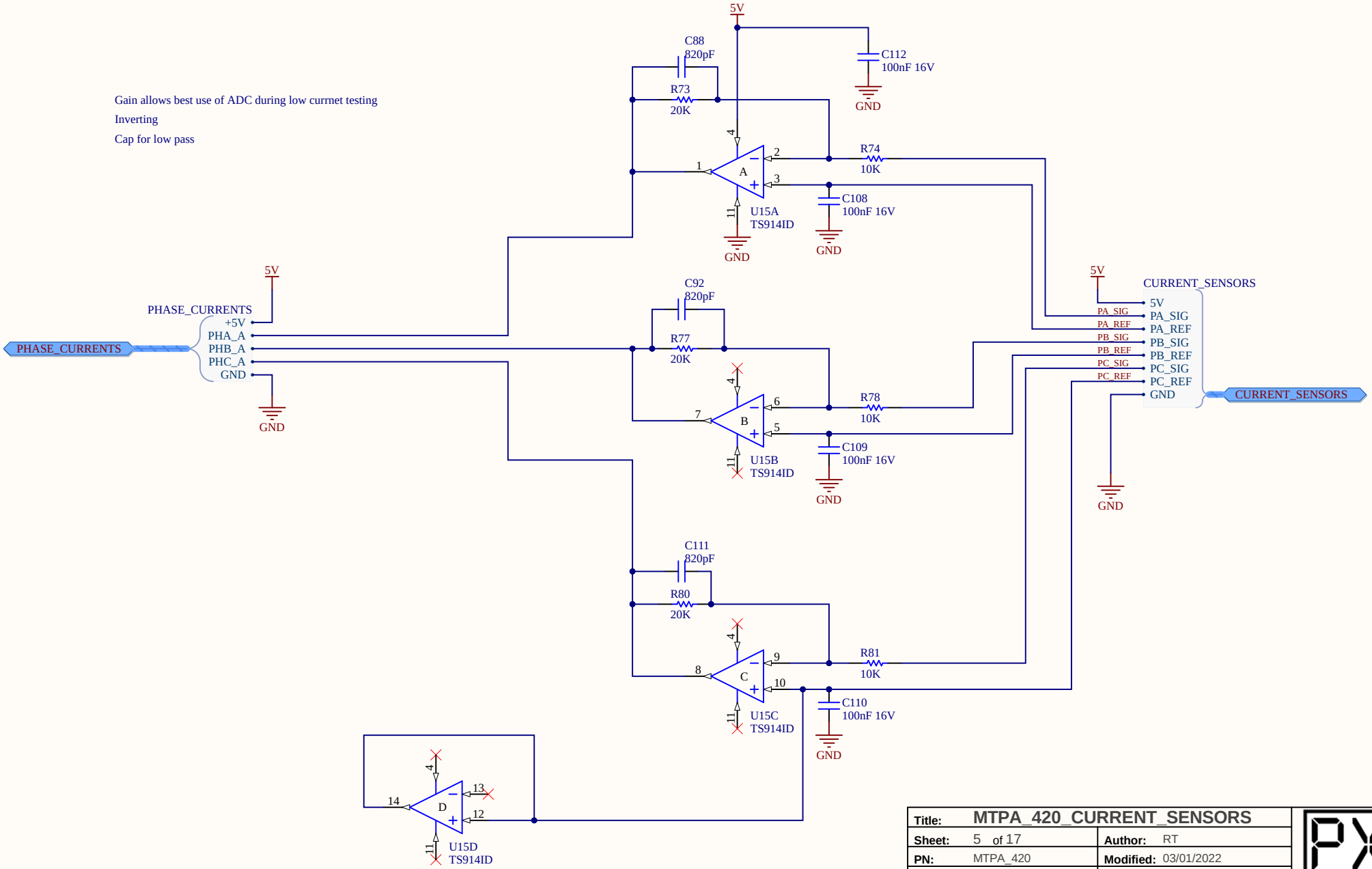






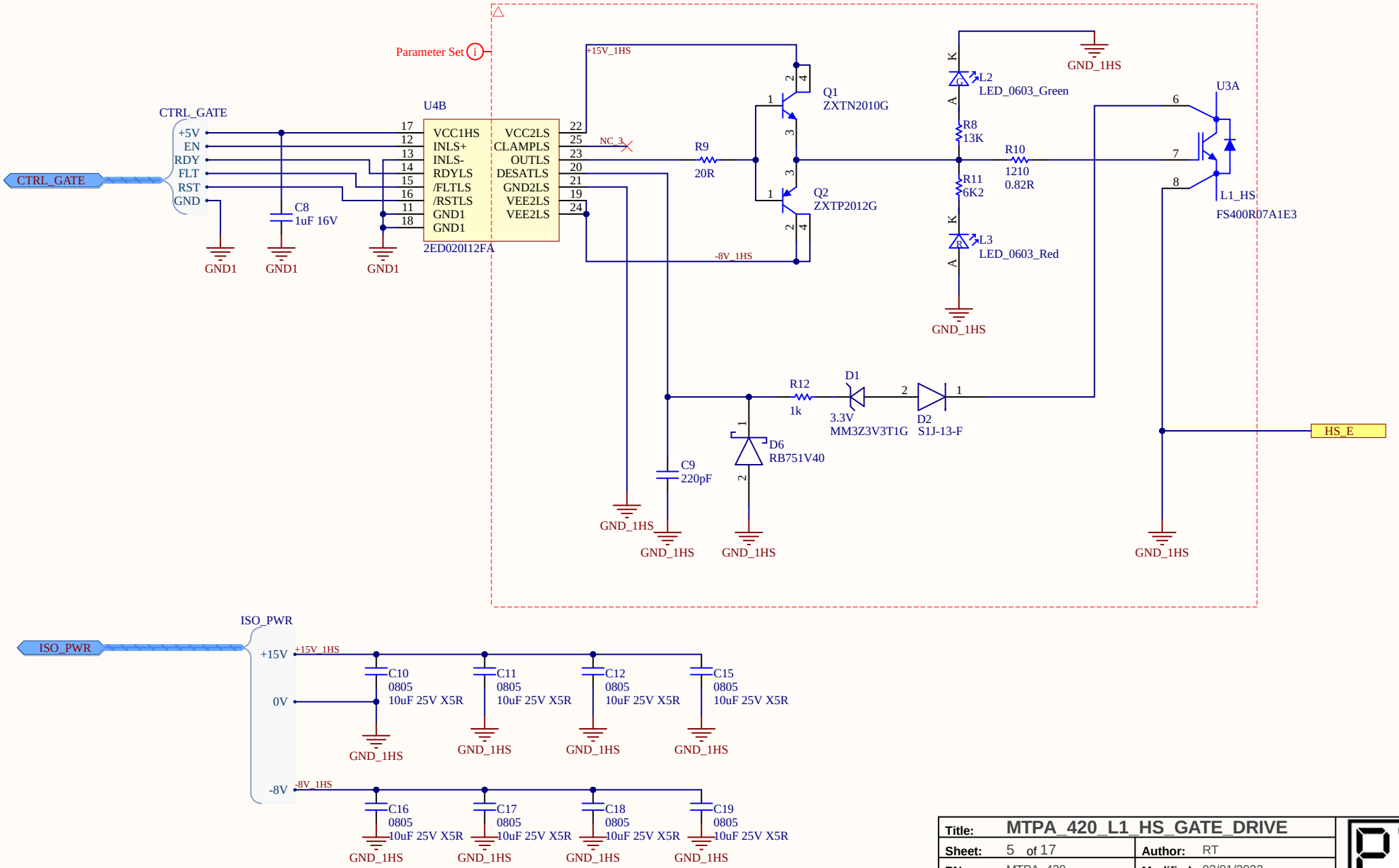


Title:	MTPA_420_CONNECTORS		
Sheet:	4 of 17	**Author:**	RT
PN:	MTPA_420	**Modified:**	03/01/2022
Revision:	0.01	**Checked:**	RT
		Dated:	10/01/2021



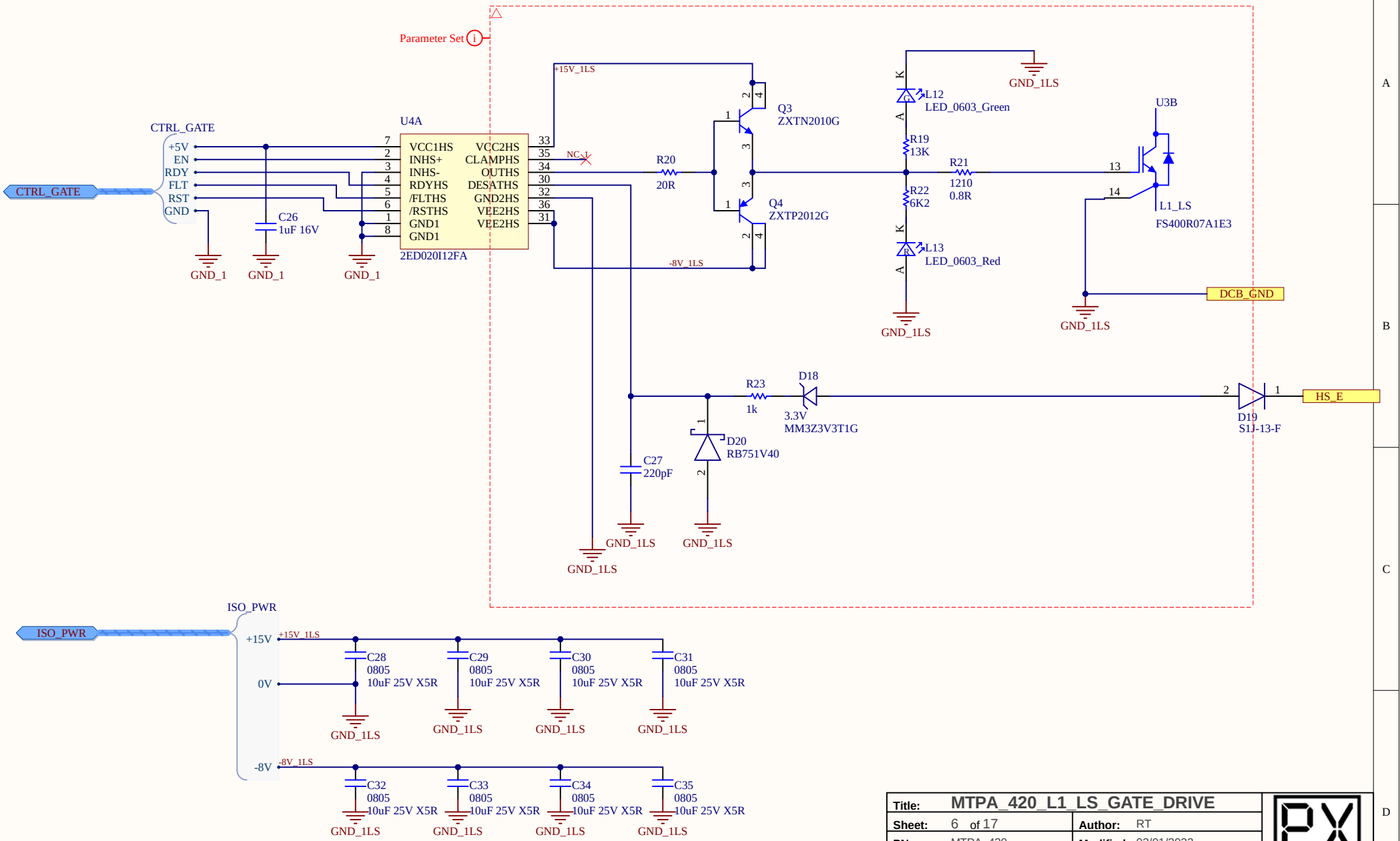
Title:	MTPA_420_CURRENT_SENSORS		
Sheet:	5 of 17	**Author:**	RT
PN:	MTPA_420	**Modified:**	03/01/2022
Revision:	0.01	**Checked:**	RT
		Dated:	10/01/2021

PX Prototypes



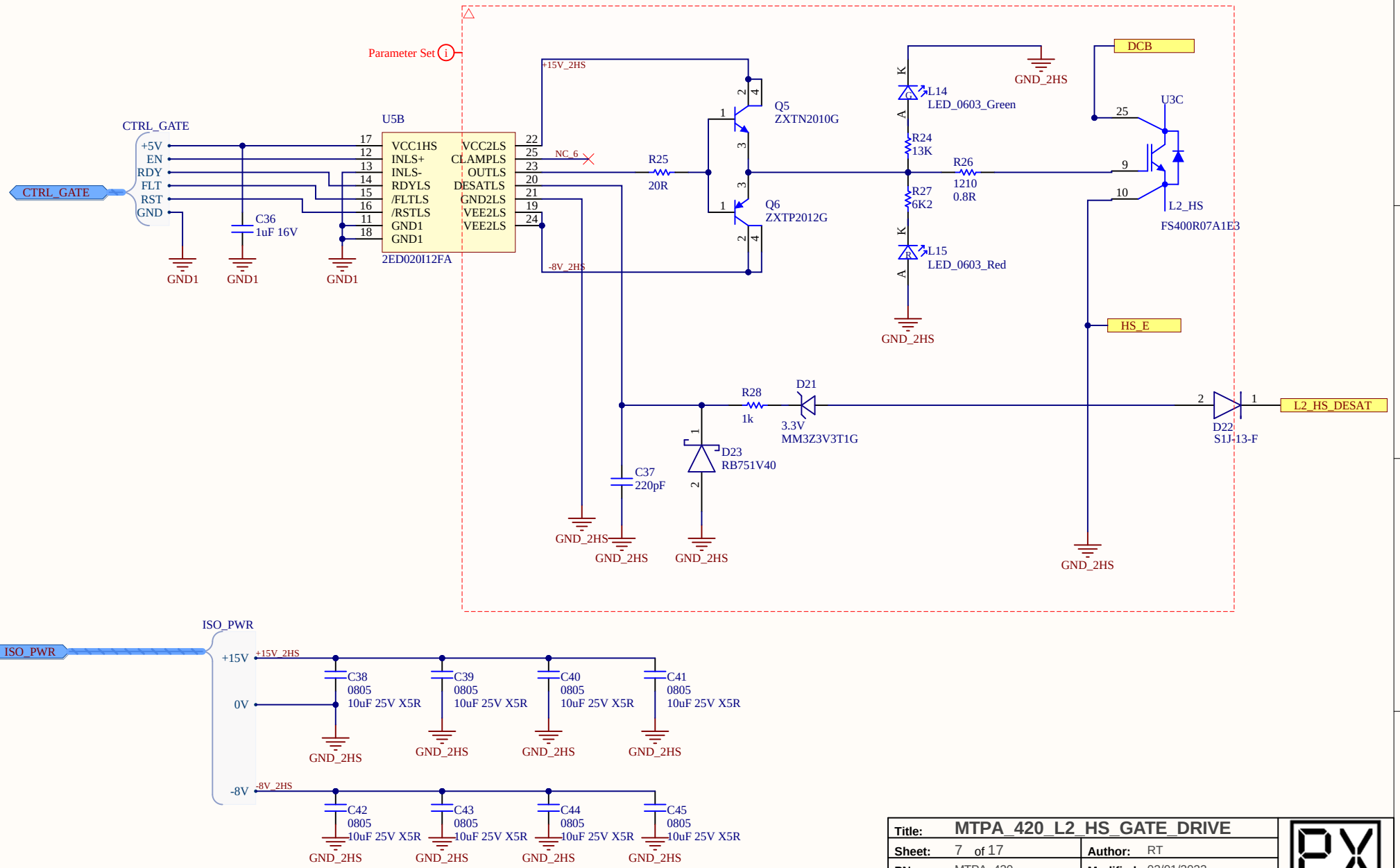
Title:	MTPA_420_L1_HS_GATE_DRIVE		
Sheet:	5 of 17	**Author:**	RT
PN:	MTPA_420	**Modified:**	03/01/2022
Revision:	0.01	**Checked:**	RT
		Dated:	10/01/2021

PX Prototypes



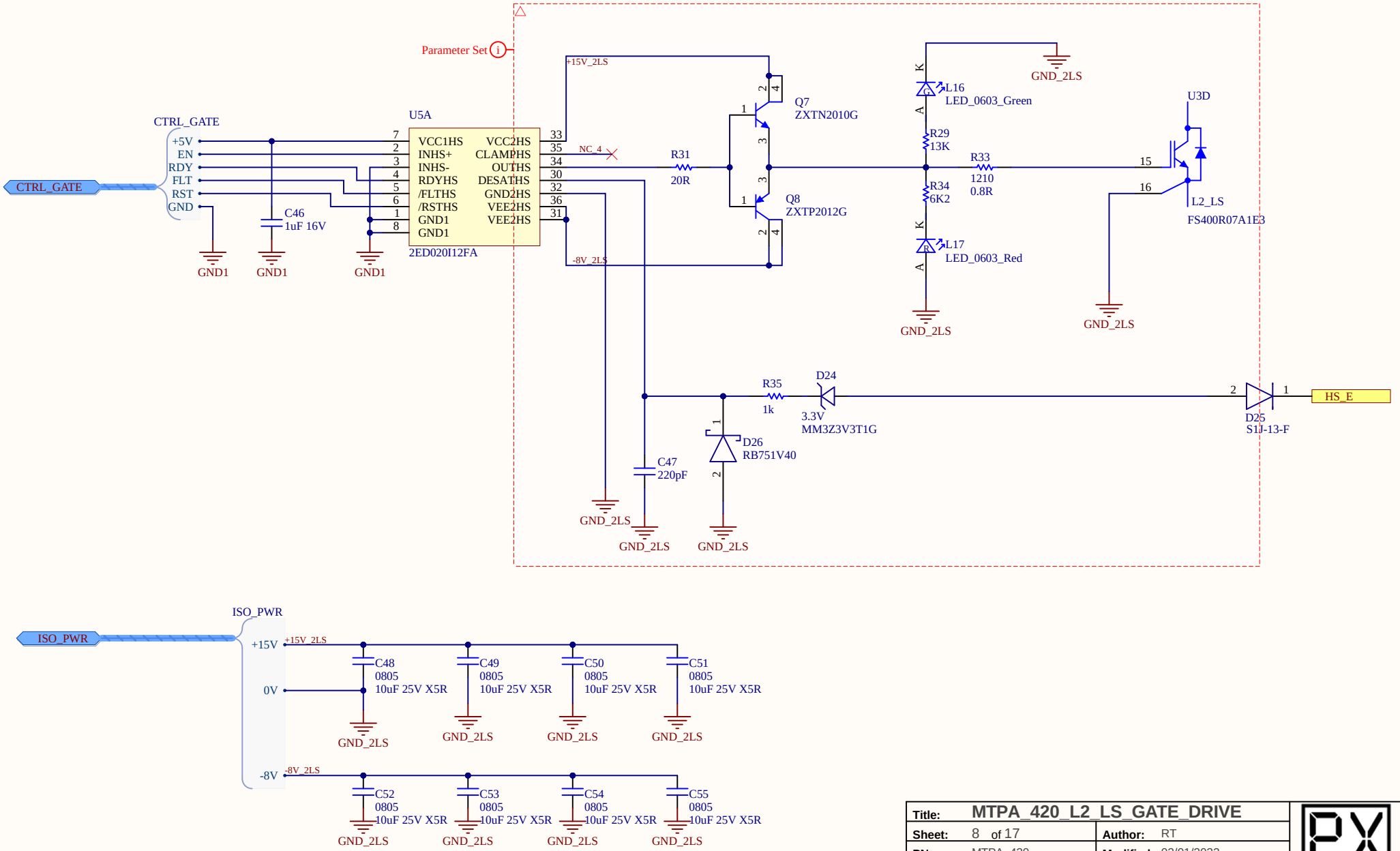
Title:	MTPA_420_L1_LS_GATE_DRIVE		
Sheet:	6 of 17	**Author:**	RT
PN:	MTPA_420	**Modified:**	03/01/2022
Revision:	0.01	**Checked:**	RT
		Dated:	10/01/2021

PX Prototypes



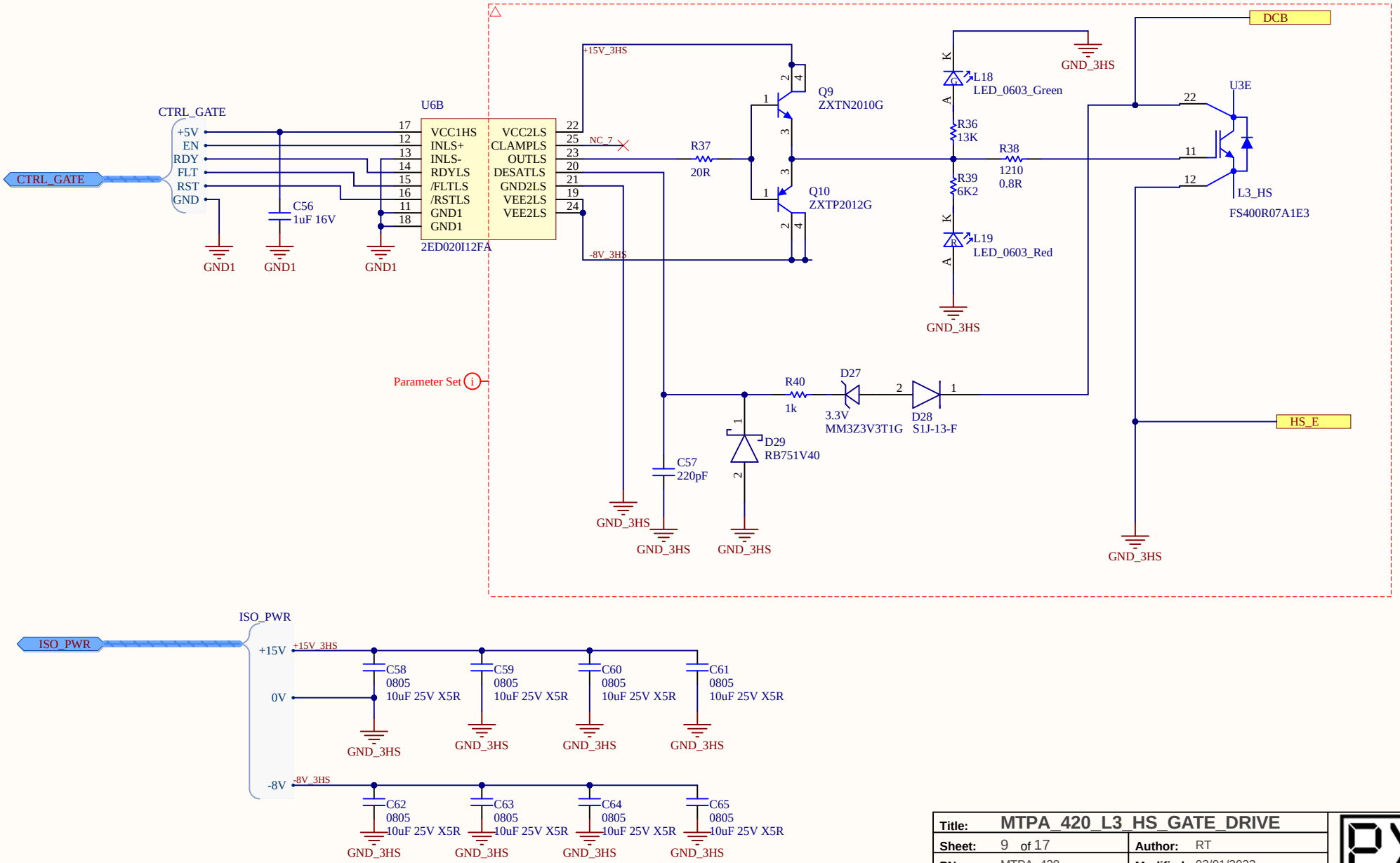
Title:	MTPA_420_L2_HS_GATE_DRIVE		
Sheet:	7 of 17	**Author:**	RT
PN:	MTPA_420	**Modified:**	03/01/2022
Revision:	0.01	**Checked:**	RT
		Dated:	10/01/2021

PX Prototypes



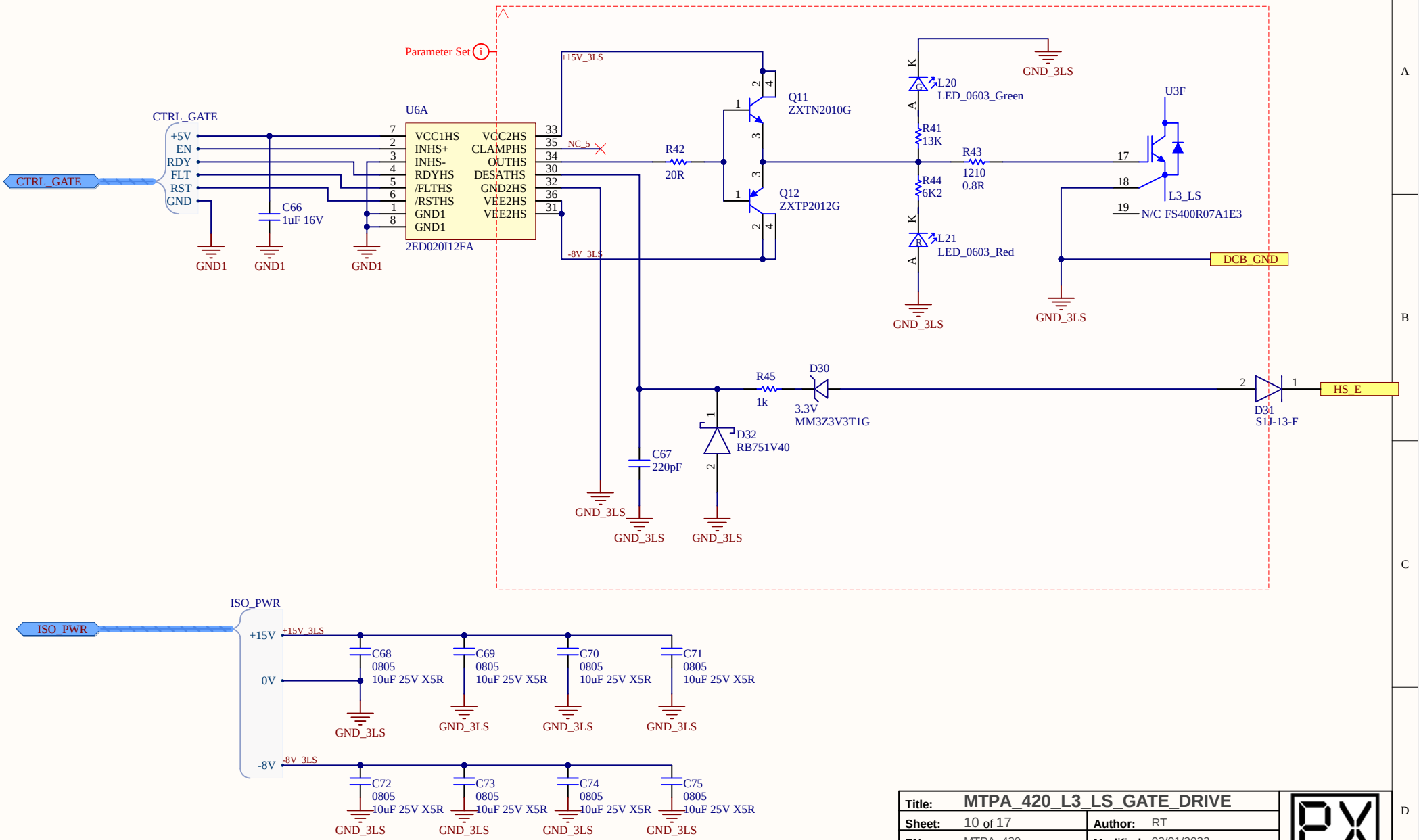
Title:	MTPA_420_L2_LS_GATE_DRIVE		
Sheet:	8 of 17	**Author:**	RT
PN:	MTPA_420	**Modified:**	03/01/2022
Revision:	0.01	**Checked:**	RT
		Dated:	10/01/2021

PX Prototypes



Title:	MTPA_420_L3_HS_GATE_DRIVE		
Sheet:	9 of 17	**Author:**	RT
PN:	MTPA_420	**Modified:**	03/01/2022
Revision:	0.01	**Checked:**	RT
		Dated:	10/01/2021

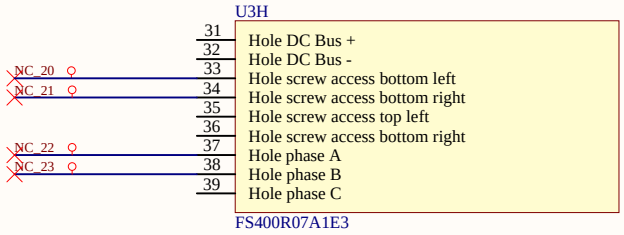
PX Prototypes



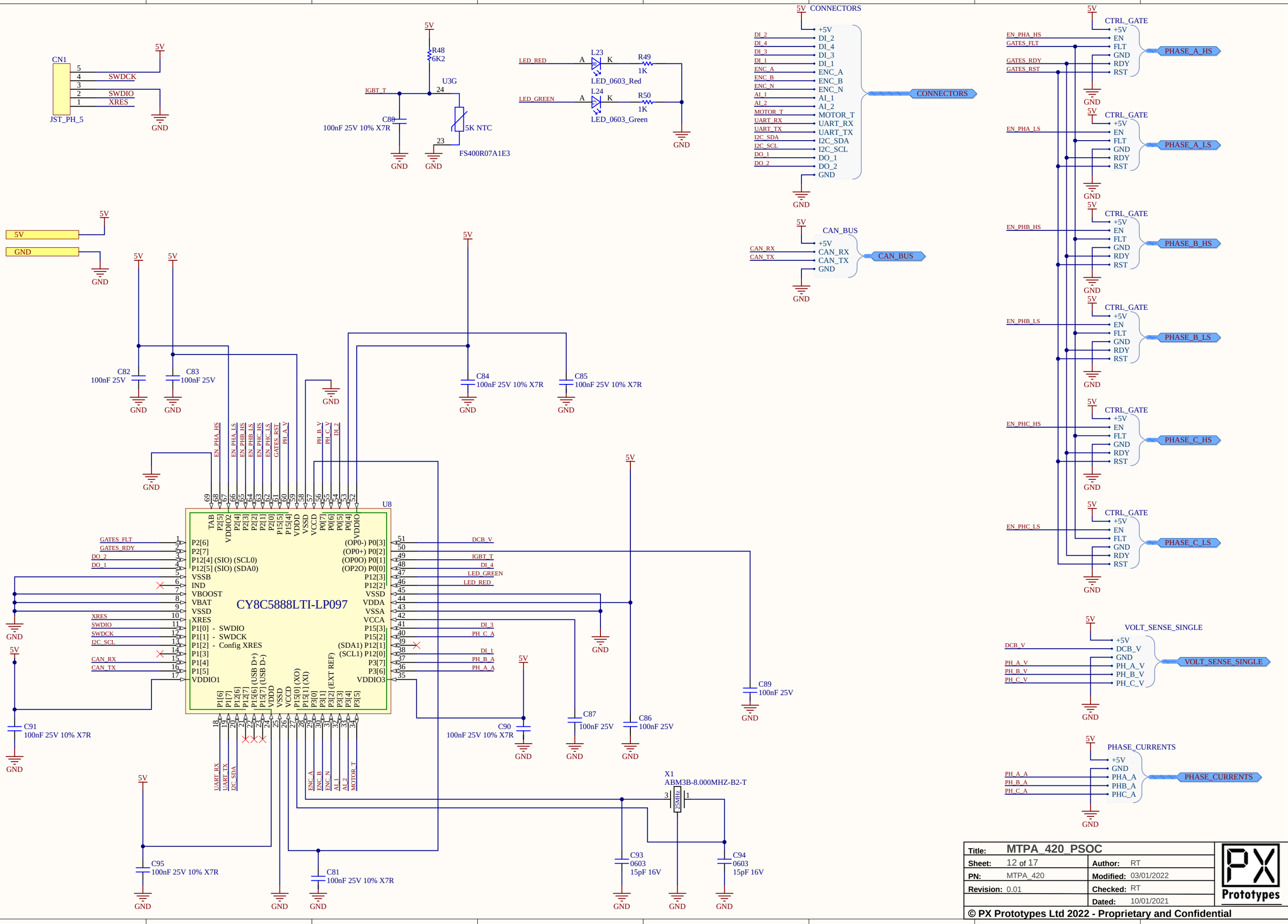
Title:	MTPA_420_L3_LS_GATE_DRIVE		
Sheet:	10 of 17	**Author:**	RT
PN:	MTPA_420	**Modified:**	03/01/2022
Revision:	0.01	**Checked:**	RT
		Dated:	10/01/2021

PX Prototypes

Used to apply design rules to some holes

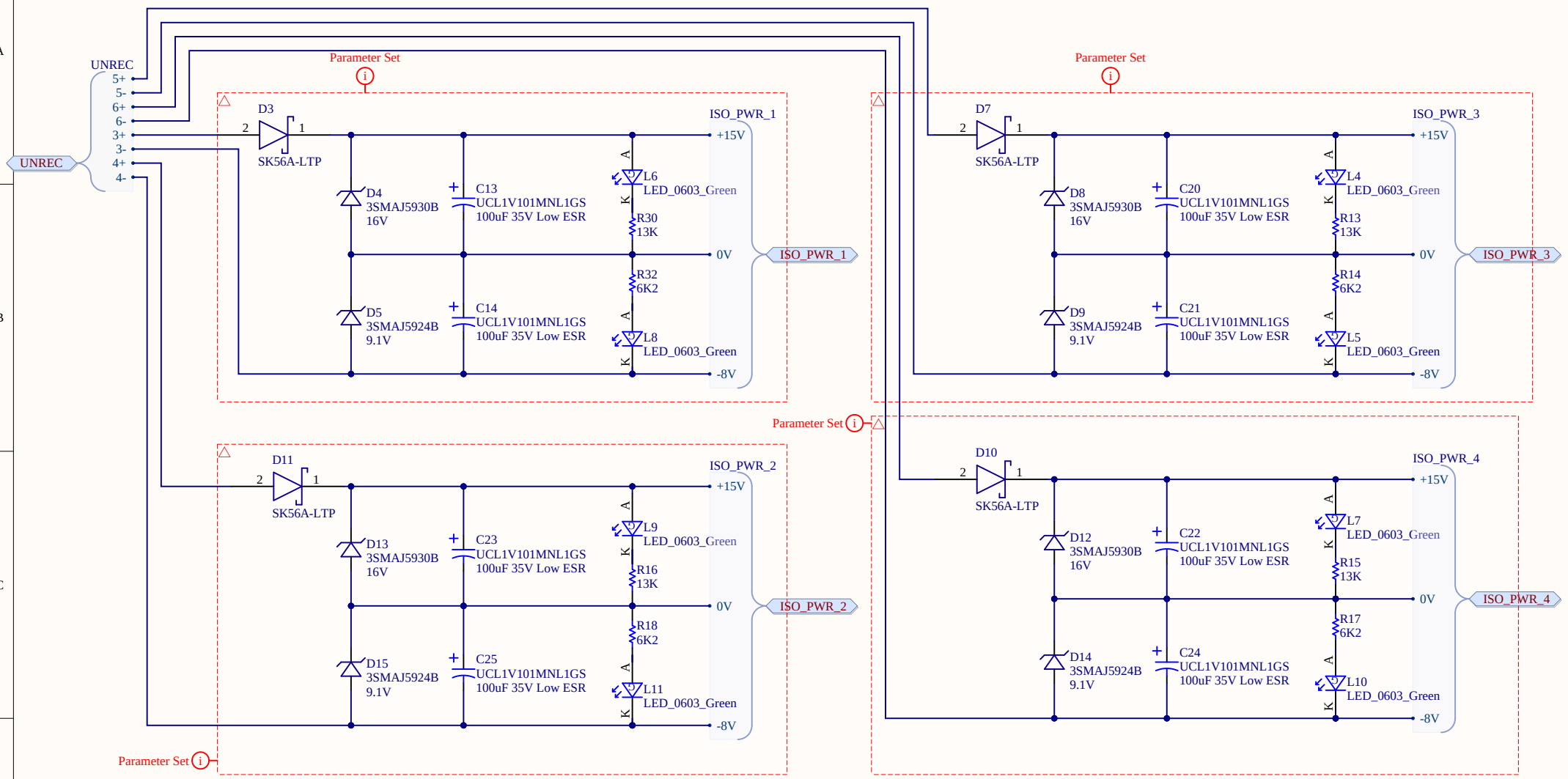


Title:	MTPA_420_HOLE_RULES		
Sheet:	11 of 17	**Author:**	RT
PN:	MTPA_420	**Modified:**	03/01/2022
Revision:	0.01	**Checked:**	RT
		Dated:	10/01/2021



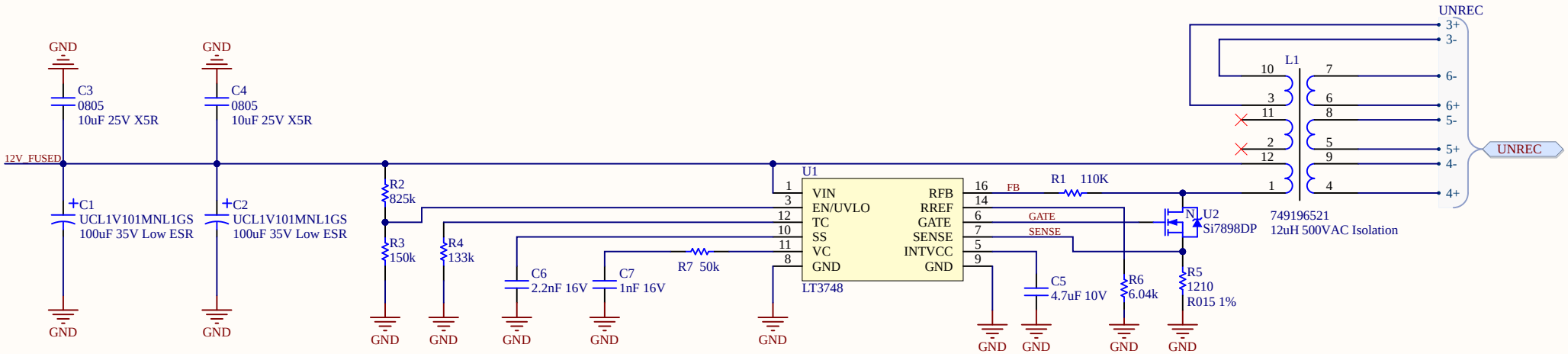
Title:	MTPA_420_PSOC
Sheet:	12 of 17
Author:	RT
PN:	MTPA_420
Modified:	03/01/2022
Revision:	0.01
Checked:	RT
Dated:	10/01/2021

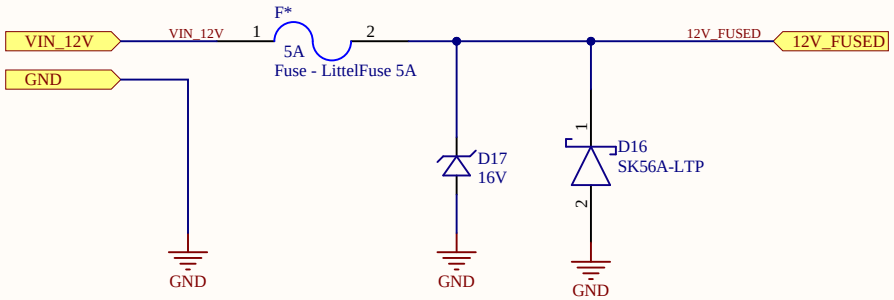
PX Prototypes



Title:	MTPA_420_PSU_RECTIFICATION		
Sheet:	13 of 17	**Author:**	RT
PN:	0.01	**Modified:**	03/01/2022
Revision:	0.01	**Checked:**	RT
		Dated:	10/01/2021

PX Prototypes





Design with reference to LT3748 datasheet

12V in, 25V out, max load 1A

Selected 1:1 transformer to minimise FET Vds max

Estimated Vds = 39V

Estimated diode Vr = 39V

Ilim = 6.7A

Transformer min 10.24uH, max 18uH

Datasheet suggests Rfb = 287k but LT spice sim suggests 130K. 110K Was ideal

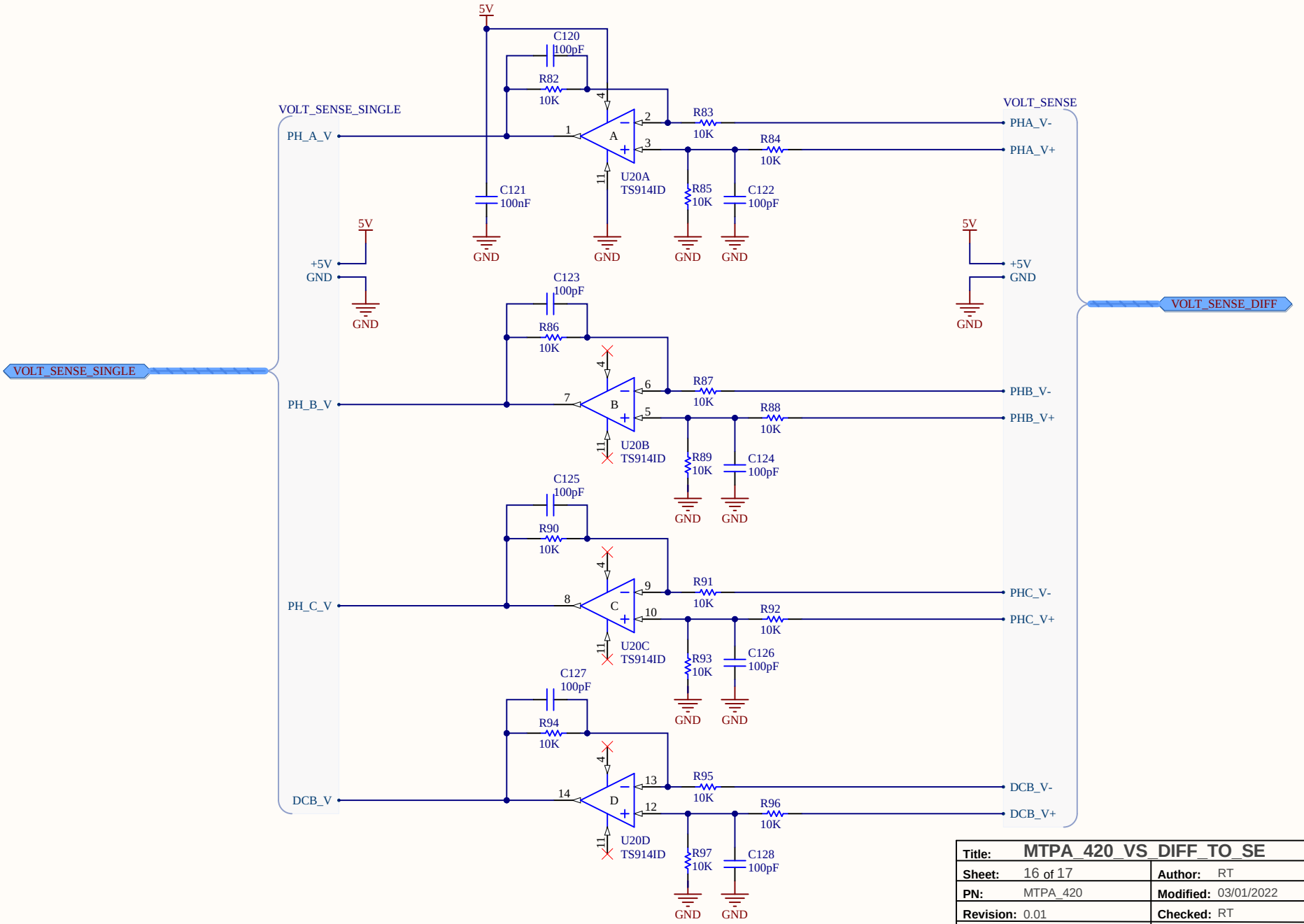
VC network determined from LT spice sim

PU2 .36W at max load

PR5 .15W at max load could probably be smaller footprint

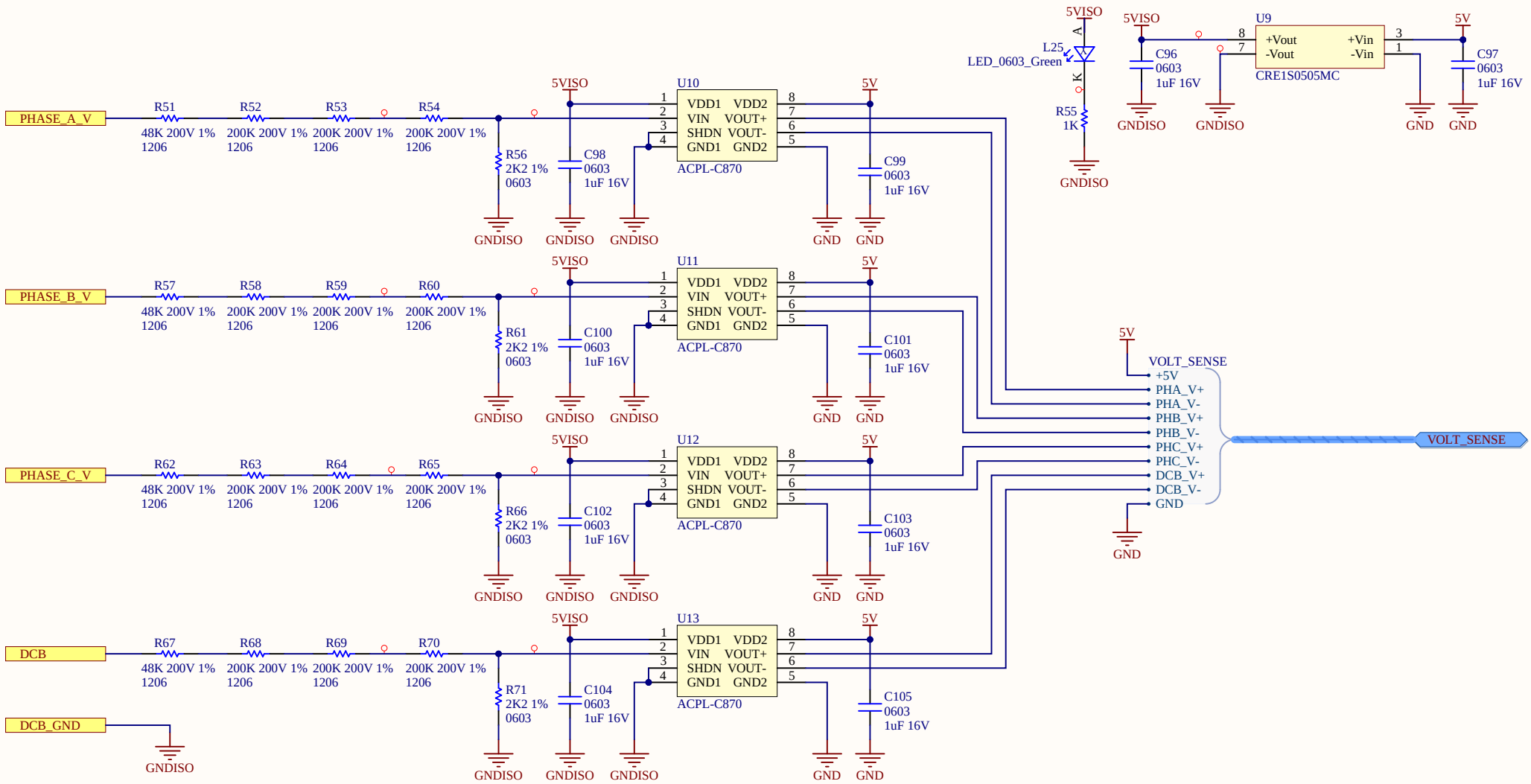
Title:	MTPA_420_PSU_SWITCHER		
Sheet:	15 of 17	**Author:**	RT
PN:	MTPA_420	**Modified:**	03/01/2022
Revision:	0.01	**Checked:**	RT
		Dated:	10/01/2021

PX Prototypes



Title:	MTPA_420_VS_DIFF_TO_SE		
Sheet:	16 of 17	**Author:**	RT
PN:	MTPA_420	**Modified:**	03/01/2022
Revision:	0.01	**Checked:**	RT
		Dated:	10/01/2021

PX Prototypes



Title:	MTPA_420_VOLT_SENSE		
Sheet:	17 of 17	**Author:**	RT
PN:	MTPA_420	**Modified:**	03/01/2022
Revision:	0.01	**Checked:**	RT
		Dated:	10/01/2021

PX Prototypes

Description	Designator	Quantity	Price	Supplier	Value	Manufacturer	Package	Manufacturer PN	Supplier PN
UCL1V101MNL1GS 100uF 35V 8.3mm x 10mm 60mOhm	C1, C2, C13, C14, C20, C21, C22, C23, C24, C25	10	0.63	Digikey	100uF 35V Low ESR	Nichicon		UCL1V101MNL1GS	493-3954-1-ND
Capacitor	C3, C4, C10, C11, C12, C15, C16, C17, C18, C19, C28, C29, C30, C31, C32, C33, C34, C35, C36, C39, C40, C41, C42, C43, C44, C45, C48, C49, C50, C51, C52, C53, C54, C55, C58, C59, C60, C61, C62, C63, C64, C65, C66, C69, C70, C71, C72, C73, C74, C75, C79	51			10uF 25V X5R	Samsung	0805	CL21A106KAFN3N	
Capacitor	C5	1			4.7uF 10V		0603		
Capacitor	C6	1			2.2nF 16V		0603		
Capacitor	C7	1			1nF 16V		0603		
Capacitor	C8, C26, C36, C46, C56, C66, C76, C77, C96, C97, C98, C99, C100, C101, C102, C103, C104, C105	18			1uF 16V		0603		
Capacitor	C9, C27, C37, C47, C57, C67, C129, C130, C131, C132, C133, C134, C135, C136, C137	15			220pF		0603		
Capacitor	C78, C108, C109, C110, C112, C113	6			100nF 16V		0603		
5M Capacitor	C80, C81, C82, C83, C84, C85, C86, C87, C89, C90, C91, C95	12		Farnell	100nF		0402		1867948
Capacitor	C88, C92, C111	3			620pF		0603		
Capacitor	C93, C94	2			15pF 16V		0603		
Capacitor	C106, C107	2			2.2uF 6.3V X5R		0603		
Capacitor	C114	1			100nF 16V X5R		0603		
Capacitor	C120, C122, C123, C124, C125, C126, C127, C128	8			100pF		0603		
Capacitor	C121	1			100nF		0603		
Capacitor	C138	1			100n		0603		
2mm Pitch JST	CN1, CN3	2			JST_PH_5		TH		
JST_PH_4	CN2	1			JST_PH_4	JST	TH	JST_PH_4	
2mm Pitch JST	CN4	1			JST_PH_8		TH		
2mm Pitch JST	CN5	1			JST_PH_4		TH		
2mm Pitch JST	CN6	1			JST_PH_6		TH		
2mm Pitch JST	CN7, CN8	2			JST_PH_2		TH		
2x4 Female Header	CN9	1		Digikey		Samtec	TH	SSW-104-01-F-D	SAM10017-ND
3.3V Zener SOD-323	D1, D18, D21, D24, D27, D30	6			3.3V	On Semi		MM3Z3V3T1G	
General Diode 800V 1A SMA	D2, D19, D22, D25, D28, D31	6				Diodes Inc		S1J-13-F	
Schottky 5A 60V	D3, D7, D10, D11, D16	5	0.28			MCCSemi		5KS6A-LTP	
3W Zenner	D4, D8, D12, D13, D17	5			16V	MCCSemi		3SMAJ5930B	
3W Zenner	D5, D9, D14, D15	4			9.1V	MCCSemi		3SMAJ5930B	
Schottky 40V SOD-323	D6, D20, D23, D26, D29, D32, D33, D34, D35, D36, D37, D38, D39, D40, D41, D42, D43, D44, D45, D46, D47, D48, D49, D50, D51, D52, D53, D54, D56, D57	38				Nexperia		RB751V40	
5V TVS	D55	1			5V	MCCSemi		SMAJ5.0A-TR	
5A Fuse in SMD Socket	F*	1	1.85			LittleFuse		0154005.DR	
Wurth 6 coil SM transformer. 12uH 1.7A	L1	1	7.28	Digikey		Wurth		749196521	
Green LED	L2, L4, L5, L6, L7, L8, L9, L10, L11, L12, L14, L16, L18, L20, L24	15	0.061		LED Green	Osram	0603		
Red LED	L3, L13, L15, L17, L19, L21, L23	7	0.102		LED Red	Osram	0603		
Power Inductor (SMD), 47µH, 500 mA, shielded 3.9mm x 3.9mm x 1.7mm	L22	1				Coilcraft		LPS4018_473MR	
Yellow LED	L25, L27	2	0.092		LED Yellow	Kingbright	0603		
NPN Bipolar Transistor	Q1, Q3, Q5, Q7, Q9, Q11	6				Diodes Inc		ZXTN2010G	
PNP Bipolar Transistor	Q2, Q4, Q6, Q8, Q10, Q12	6	0.62			Diodesinc		ZXTP2012G	
Resistor	R1	1			110K		0603		
Resistor	R2	1			825k		0603		
Resistor	R3, R47	2			150k		0603		
Resistor	R4	1			133k		0603		
Resistor	R5	1		Digikey	8015 1%	Panasonic	1210	ERJ-L14KF20MU	P20NACT-ND
Resistor	R6	1			6.04k		0603		
Resistor	R7	1			50k		0603		
Resistor	R8, R13, R15, R16, R19, R24, R29, R30, R36, R41	10			13K		0603		
Resistor	R9, R20, R25, R31, R37, R42	6			20R		0603		
Resistor	R10	1		Digikey	0.82R	TE Connectivity	1210	RL73H2ER82FTD	A138587CT-ND
Resistor	R11, R14, R17, R18, R22, R27, R32, R34, R39, R44, R48	11			6K2		0603		
Resistor	R12, R23, R28, R35, R40, R45, R49, R50, R55, R111	10			1k		0603		
Resistor	R21, R26, R33, R38, R43	5			0.8R		1210		
Resistor	R46	1			680K		0603		
Resistor	R51, R57, R62, R67	4		Digikey	48K 200V 1%	Stackpole	1206	RMCF1206JT47K0	RMCF1206JT47K0CT-ND
Resistor	R52, R53, R54, R58, R59, R60, R63, R64, R65, R68, R69, R70	12		Digikey	200K 200V 1%	Stackpole	1206	RMCF1206JT200K	RMCF1206JT200KCT-ND
Resistor	R56, R61, R66, R71	4			2K2 1%		0603		
Resistor	R72, R75	2			60R 0603		0603		
Resistor	R73, R77, R80	3			20K		0603		
Resistor	R74, R76, R78, R81, R82, R83, R84, R85, R86, R87, R88, R89, R90, R91, R92, R93, R94, R95, R96, R97, R99, R101, R103, R104, R105, R106, R109	27			10K		0603		
Resistor	R98, R100, R102	3			4K7		0603		
Resistor	R107, R108	2			100R		0603		
100V Isolated Flyback Controller	U1	1				LT	SM	LT3748	
N channel MOSFET 150V	U2	1	1.31	Digikey		Vishay		SI7898DP	
3 Phase Full Bridge, 650V, 400A HybridPACK1	U3	1				Infinion		FS400R07A1E3	
Dual IGBT Driver IC	U4, U5, U6	3				Infinion		2ED020I12FA	
Switching regulator adjustable output	U7	1		Digikey		Maxim	SM	MAX15062C	MAX15062CATA+TCT-ND
CY8CS688LTI-LP097 QFN68	U8	1	13.20	Farnell		Cypress Semiconductor	QFN-68	CY8CS688LTI-LP097	2830759
5V Isolated Reg	U9	1				Murata		CRE1S0505MC	CRE1S0505MC
Analogue Isolator	U10, U11, U12, U13	4				Broadcom		ACPL-C870	ACPL-C870
CAN Transceiver	U14	1				NXP		TJA1051T/3	TJA1051T/3
Low-Noise J-FET Quad Operational Amplifier	U15, U20	2	1.59	Farnell		ST Microelectronics		TS914ID	
MOSFET N-Channel SOT-23 Logic Level 5A	U24, U25	2	0.038	Digikey		Diodes Inc		DMN3042L	
8MHz crystal	X1	1	0.561	Farnell		Epson		X1E0000210132 TSX-3225 25 MHz 8 6PF	