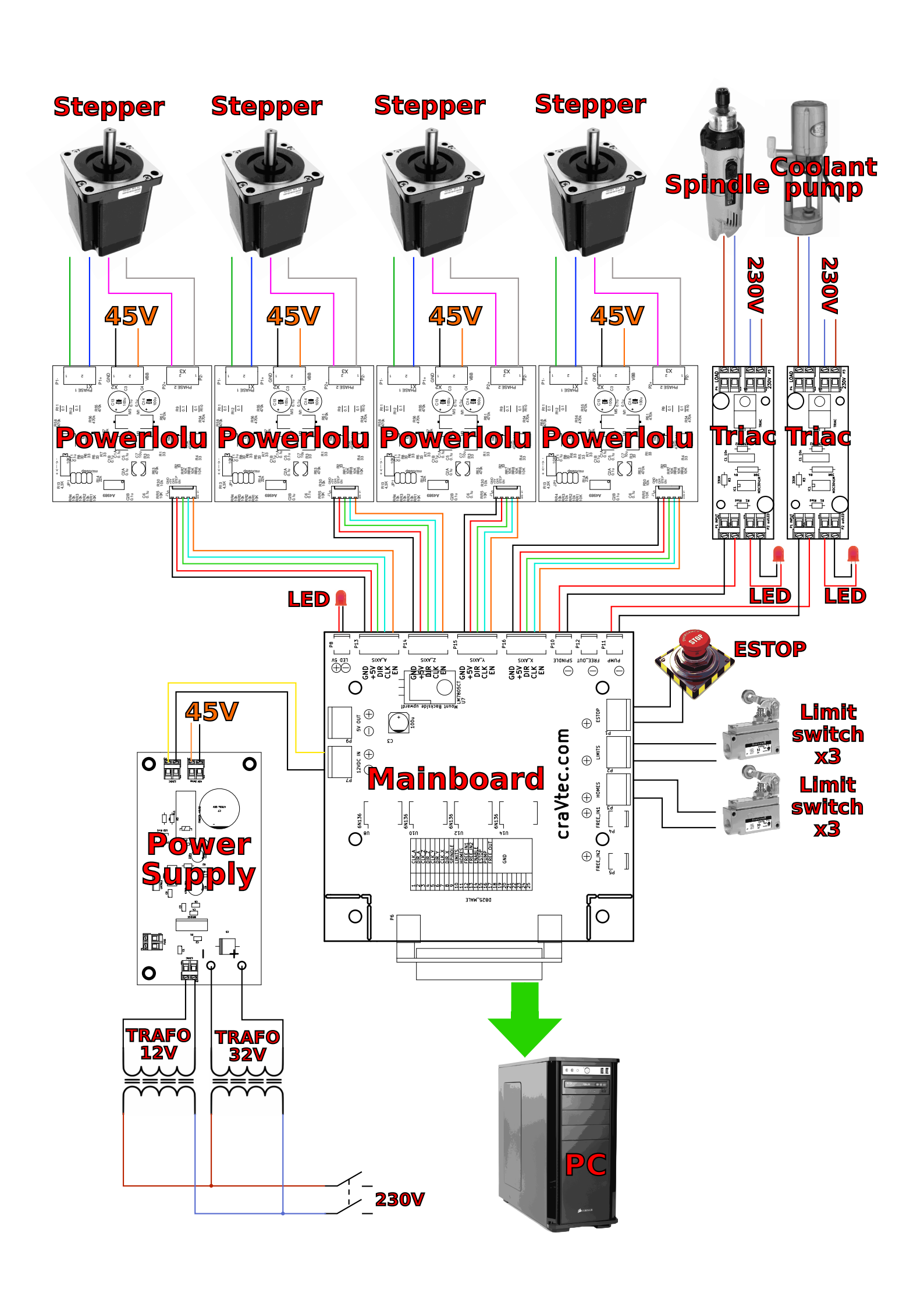
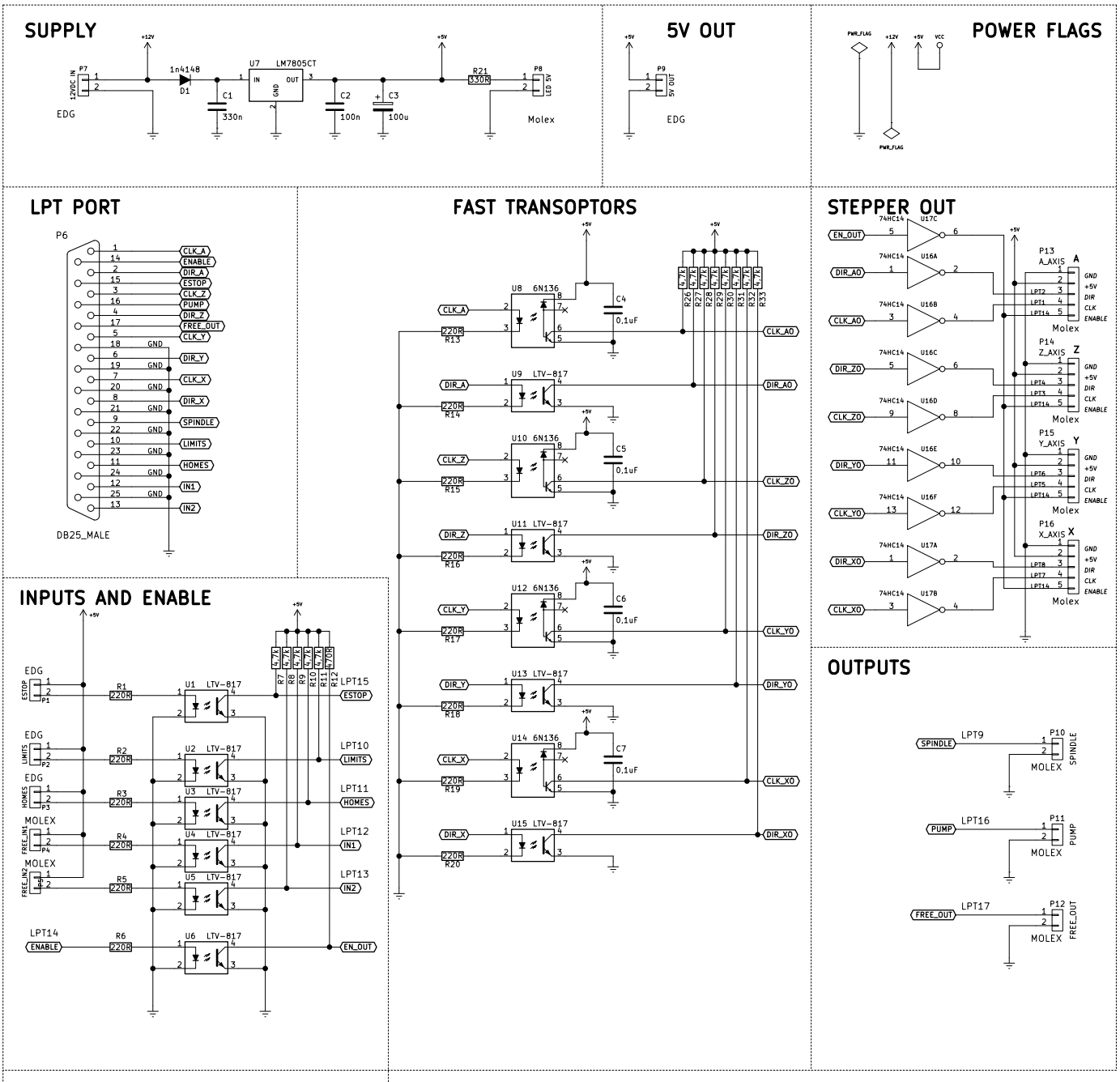

Stepper
Stepper
Stepper
Stepper
Spindle
Coolant pump
45V
45V
45V
45V
230V
230V
Powerlolu
Powerlolu
Powerlolu
Powerlolu
Triac
Triac
LED
LED
LED
ESTOP
45V
Limit switch x3
Limit switch x3
Power Supply
Mainboard
craVtec.com
TRAFO 12V
TRAFO 32V
230V
PC



LPT pin description

LPT PIN NUMBER	DESCRIPTION
1	CLK_A
2	DIR_A
3	CKL_Z
4	DIR_Z
5	CLK_Y
6	DIR_Y
7	CLK_X
8	DIR_X
9	SPINDLE
10	LIMITS
11	HOMES
12	FREE_IN1
13	FREE_IN2
14	ENABLE
15	ESTOP
16	PUMP
17	FREE_OUT
18	
19	
20	
21	
22	GND
23	
24	
25	

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craVtec.com
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Title: Mainboard for LinuxCNC

Size: A3	Date: 2016-01-07	**Rev: 3.0**
KiCad E.D.A.	kicad 4.0.2+e4-6225~ubuntu14.04.1-stable	Id: 1/1

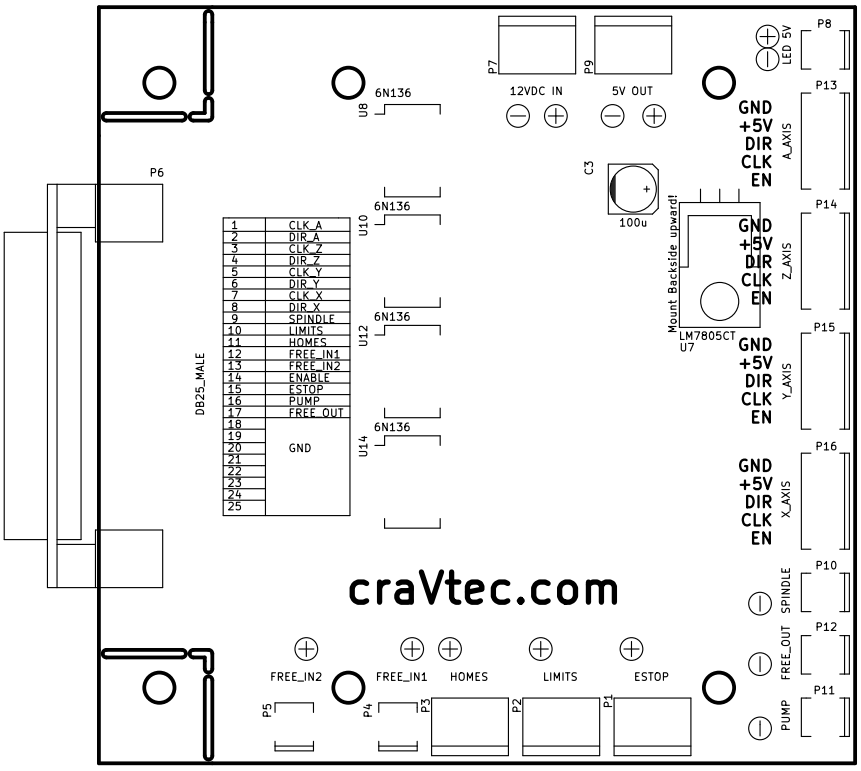
CNC mainboard parts list

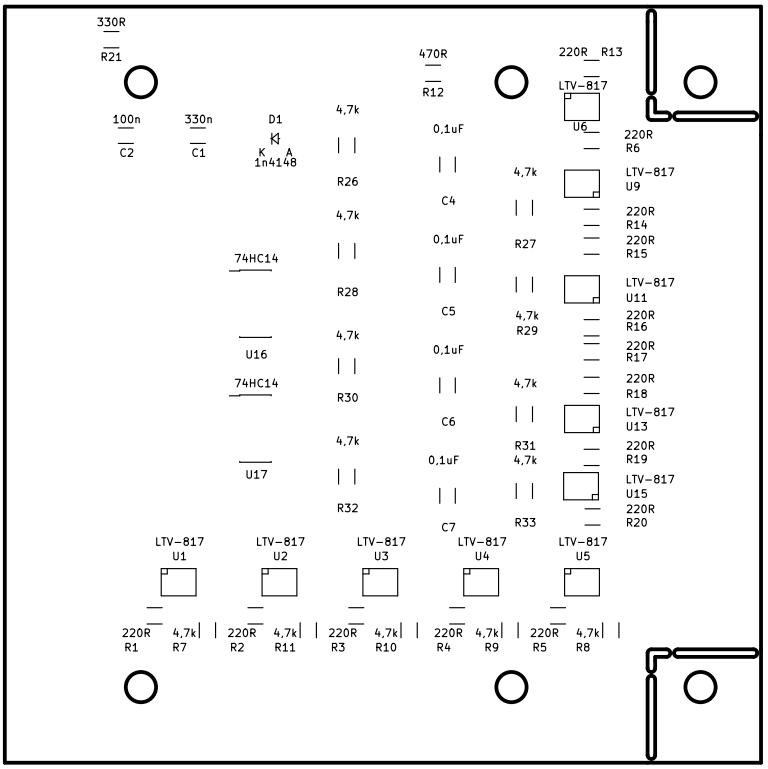
Nr	Reference	Value	Housing	Component
1	C1	330n	SMD_1206	Capacitors
2	C2	100n	SMD_1207	
3	C3	100u	SMD_6.3x5.3	
4	C4	0,1uF	SMD_1206	
5	C5	0,1uF	SMD_1206	
6	C6	0,1uF	SMD_1206	
7	C7	0,1uF	SMD_1206	
8	D1	1n4148	SMD:MiniMELF	Diodes
9	P1	ESTOP	EDG_5,08mm_2pin	Connectors
10	P2	LIMITS	EDG_5,08mm_2pin	
11	P3	HOMES	EDG_5,08mm_2pin	
12	P4	FREE_IN1	MOLEX_2,54mm_2pin_straight	
13	P5	FREE_IN2	MOLEX_2,54mm_2pin_straight	
14	P6	DB25_MALE	DB25_Male	
15	P7	12VDC IN	EDG_5,08mm_2pin	
16	P8	LED 5V	MOLEX_2,54mm_2pin_straight	
17	P9	5V OUT	EDG_5,08mm_2pin	
18	P10	SPINDLE	MOLEX_2,54mm_2pin_straight	
19	P11	COOLING	MOLEX_2,54mm_2pin_straight	
20	P12	FREE_OUT	MOLEX_2,54mm_2pin_straight	
21	P13	A_AXIS	MOLEX_2,54mm_5pin_straight	
22	P14	Y_AXIS	MOLEX_2,54mm_5pin_straight	
23	P15	Z_AXIS	MOLEX_2,54mm_5pin_straight	
24	P16	X_AXIS	MOLEX_2,54mm_5pin_straight	
25	U1	LTV-817	SMD_DIP4	Integrated Circuits
26	U2	LTV-817	SMD_DIP4	
27	U3	LTV-817	SMD_DIP4	
28	U4	LTV-817	SMD_DIP4	
29	U5	LTV-817	SMD_DIP4	
30	U6	LTV-817	SMD_DIP4	
31	U7	LM7805CT	TO-220	
32	U8	6N136	DIP-8_W7.62mm	
33	U9	LTV-817	SMD_DIP4	
34	U10	6N136	DIP-8_W7.62mm	
35	U11	LTV-817	SMD_DIP4	
36	U12	6N136	DIP-8_W7.62mm	
37	U13	LTV-817	SMD_DIP4	
38	U14	6N136	DIP-8_W7.62mm	
39	U15	LTV-817	SMD_DIP4	
40	U16	74HC14	SOIC-14_3.9x8.7mm	
41	U17	74HC14	SOIC-14_3.9x8.7mm	

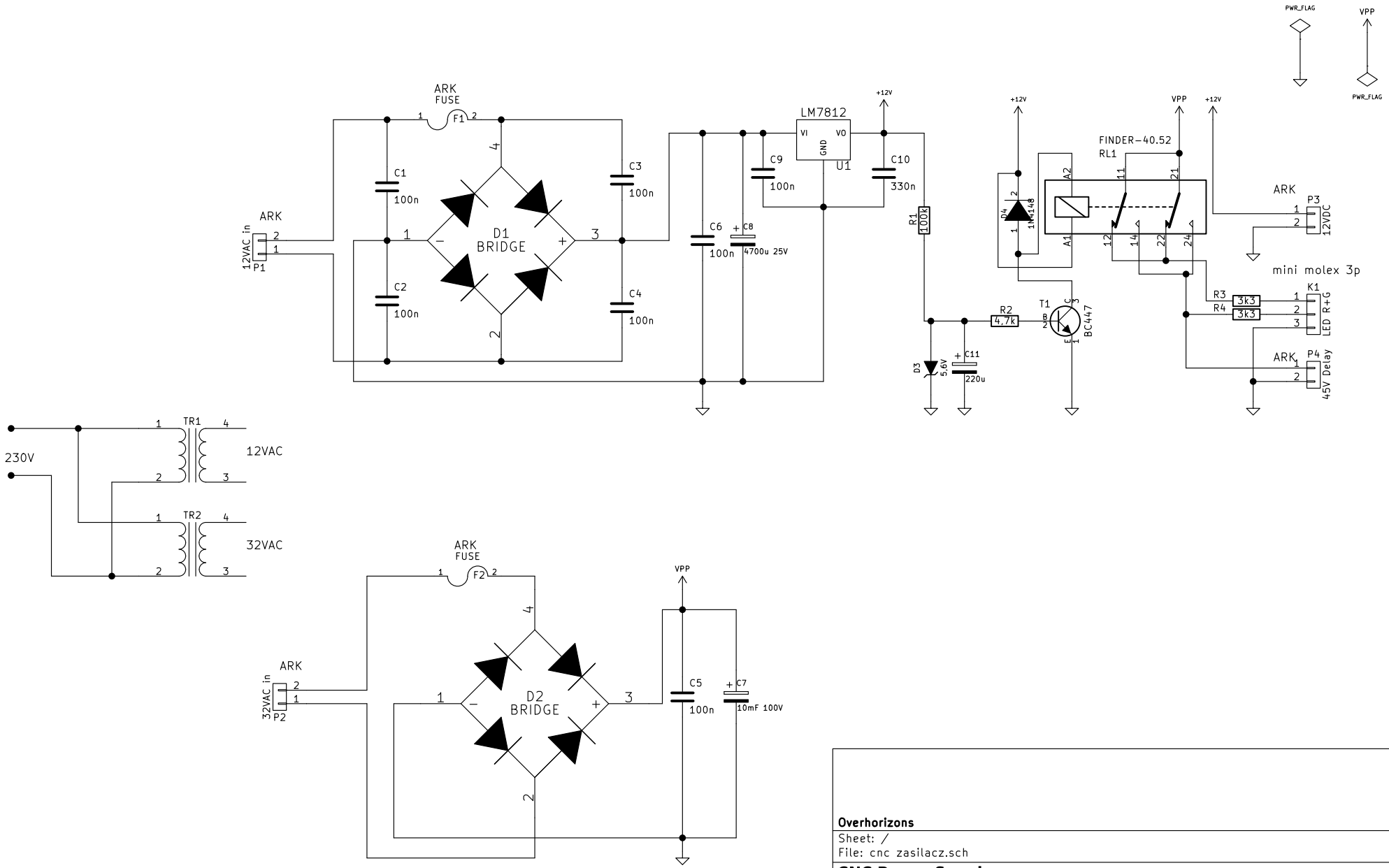
CNC mainboard parts list

Nr	Reference	Value	Housing	Component
42	R1	220R	SMD_1206	Resistors
43	R2	220R	SMD_1206	
44	R3	220R	SMD_1206	
45	R4	220R	SMD_1206	
46	R5	220R	SMD_1206	
47	R6	220R	SMD_1206	
48	R7	4,7k	SMD_1206	
49	R8	4,7k	SMD_1206	
50	R9	4,7k	SMD_1206	
51	R10	4,7k	SMD_1206	
52	R11	4,7k	SMD_1206	
53	R12	4,7k	SMD_1206	
54	R13	220R	SMD_1206	
55	R14	220R	SMD_1206	
56	R15	220R	SMD_1206	
57	R16	220R	SMD_1206	
58	R17	220R	SMD_1206	
59	R18	220R	SMD_1206	
60	R19	220R	SMD_1206	
61	R20	220R	SMD_1206	
62	R21	330R	SMD_1206	
63	R22	-	-	
64	R23	-	-	
65	R24	-	-	
66	R25	-	-	
67	R26	4,7k	SMD_1206	
68	R27	4,7k	SMD_1206	
69	R28	4,7k	SMD_1206	
70	R29	4,7k	SMD_1206	
71	R30	4,7k	SMD_1206	
72	R31	4,7k	SMD_1206	
73	R32	4,7k	SMD_1206	
74	R33	4,7k	SMD_1206	

Mainboard PCB assemble view: top and bottom



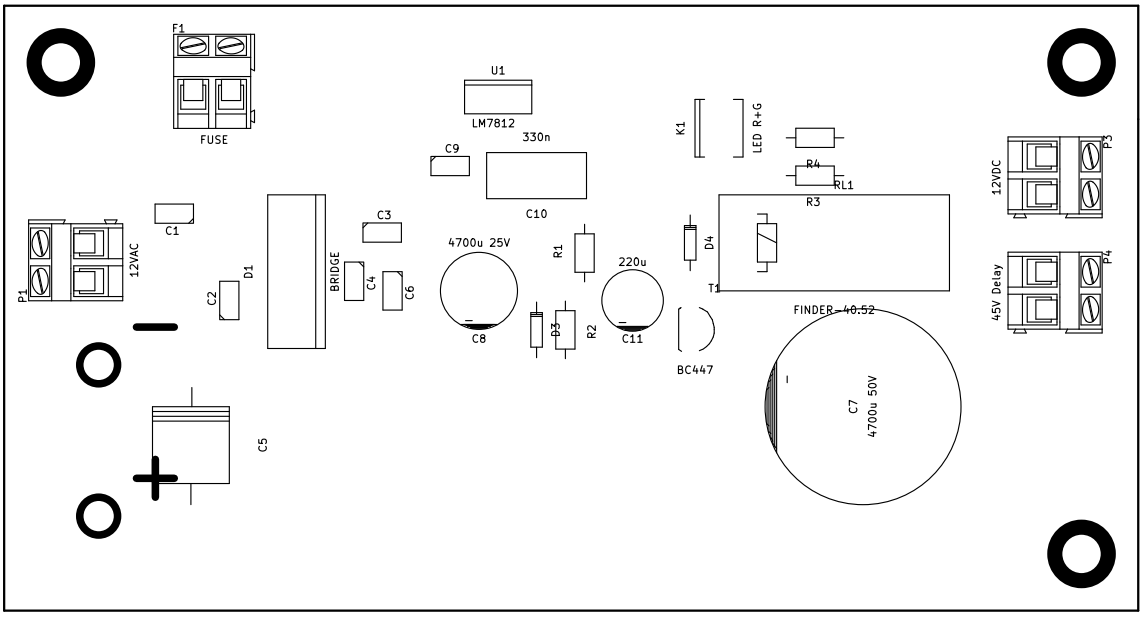




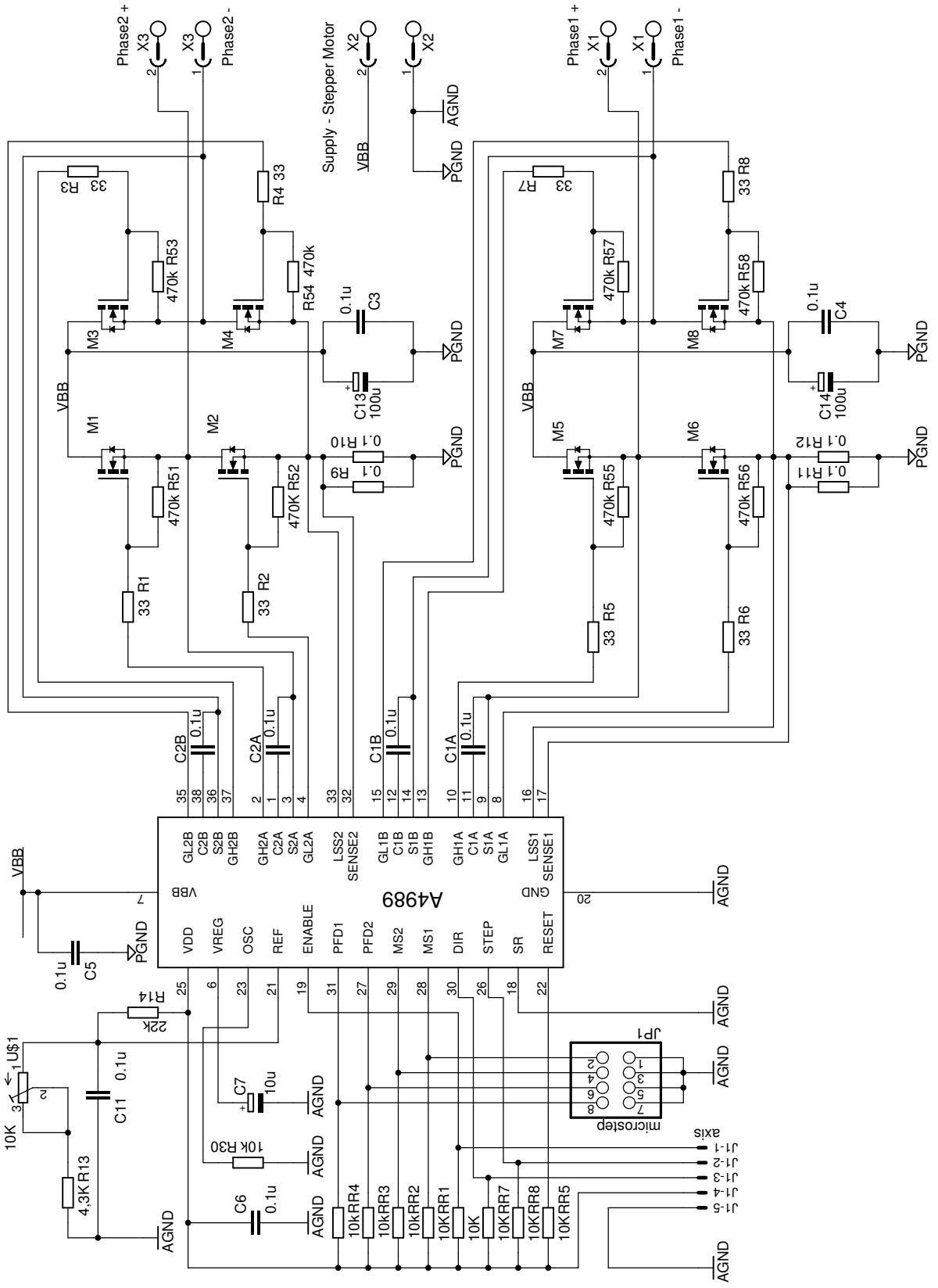
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CNC Power Supply		
Size: A4	Date: 27 jan 2015	**Rev: 2,0**
KiCad E.D.A. kicad 4.0.2+e4-622538ubuntu14.04.1-stable		Id: 1/1

Power supply: parts list and PCB assemble view

Ref.	Value	Housing	Component
C1	100nF	THT ceramic 2,54mm	**Capacitors**
C2	100nF	THT ceramic 2,54mm	
C3	100nF	THT ceramic 2,54mm	
C4	100nF	THT ceramic 2,54mm	
C5	100nF	THT ceramic 2,54mm	
C6	100nF	THT ceramic 2,54mm	
C7	4700u 63V	THT electrolytic 10,16mm	
C8	4700u 25V	THT electrolytic 5,08mm	
C9	100n	THT ceramic 2,54mm	
C10	330n	THT: ceramic 13x6x12mmRM10	
C11	220u	THT electrolytic 3,81mm	
D1	BRIDGE	KBU8K	**Diodes**
D2	BRIDGE	KBPC2510	
D3	5,6V	THT:Diode_DO-35_SOD27_RM10	
D4	1N4148	THT:Diode_DO-35_SOD27_RM10	
F1	FUSE	Connect:ARK300-2	**Sockets**
F2	FUSE	Connect:ARK300-2	
K1	LED R+G	Socket_MOLEX-KK-RM2-54mm_3pin_straight	
P1	12VAC	Connect:ARK300-2	
P2	15-32VAC	PCB holes	
P3	12VDC	Connect:ARK300-2	
P4	45V Delay	Connect:ARK300-2	
R1	100k	THT: Resistor_Horizontal_RM10mm	**Resistors**
R2	4,7k	THT: Resistor_Horizontal_RM10mm	
R3	3k3	THT: Resistor_Horizontal_RM10mm	
R4	3k3	THT: Resistor_Horizontal_RM10mm	
RL1	FINDER-40.52	Relay_DPDT_Schrack-RT2_RM5mm	**Relay**
T1	BC447	TO-92-Free-inline-wide	**Transistor**
U1	LM7812	Discret:LM78XXV TO220	**Voltage regulator**



Powerlolu Schematic



Powerlolu materials list

Nr	Reference	VALUE	Housing	Component
1	A4989	A4989	TSSOP39	INTEGRATED CIRCUIT
2	C1A	0.1u	C1206	CAPACITORS
3	C1B	0.1u	C1206	
4	C2A	0.1u	C1206	
5	C2B	0.1u	C1206	
6	C3	0.1u	C1206	
7	C4	0.1u	C1206	
8	C5	0.1u	C1206	
9	C6	0.1u	C1206	
10	C7	10u	153CLV-0605	
11	C11	0.1u	C1206	
12	C13	100u	E5-10	
13	C14	100u	E5-10	
14	M1	IRLR024N	TO252	TRANSISTORS
15	M2	IRLR024N	TO252	
16	M3	IRLR024N	TO252	
17	M4	IRLR024N	TO252	
18	M5	IRLR024N	TO252	
19	M6	IRLR024N	TO252	
20	M7	IRLR024N	TO252	
21	M8	IRLR024N	TO252	
22	R1	33	R1206	RESISTORS
23	R2	33	R1206	
24	R3	33	R1206	
25	R4	33	R1206	
26	R5	33	R1206	
27	R6	33	R1206	
28	R7	33	R1206	
29	R8	33	R1206	
30	R9	0.1	R2512	
31	R10	0.1	R2512	
32	R11	0.1	R2512	
33	R12	0.1	R2512	
34	R13	4.3K	R1206	
35	R14	22k	R1206	
36	R30	10k	R1206	
37	R51	470k	R1206	
38	R52	470k	R1206	
39	R53	470k	R1206	
40	R54	470k	R1206	
41	R55	470k	R1206	
42	R56	470k	R1206	
43	R57	470k	R1206	
44	R58	470k	R1206	
45	RR1	10k	R1206	
46	RR2	10k	R1206	
47	RR3	10k	R1206	
48	RR4	10k	R1206	
49	RR5	10k	R1206	
50	RR6	10k	R1206	
51	RR7	10k	R1206	
52	RR8	10k	R1206	

Powerlolu materials list

Nr	Reference	VALUE	Housing	Component
53	U$1	10k	RTRIM3296X	POTENTIOMETER
54	J1	DIR EN STEP	1X5 2.54mm	CONNECTORS
55	JP1	MICROSTEP	2X4 2.54mm	
56	X1	PHASE1	EDG 2pin 5.08	
57	X2	SUPPLY	EDG 2pin 5.08	
58	X3	PHASE2	EDG 2pin 5.08	

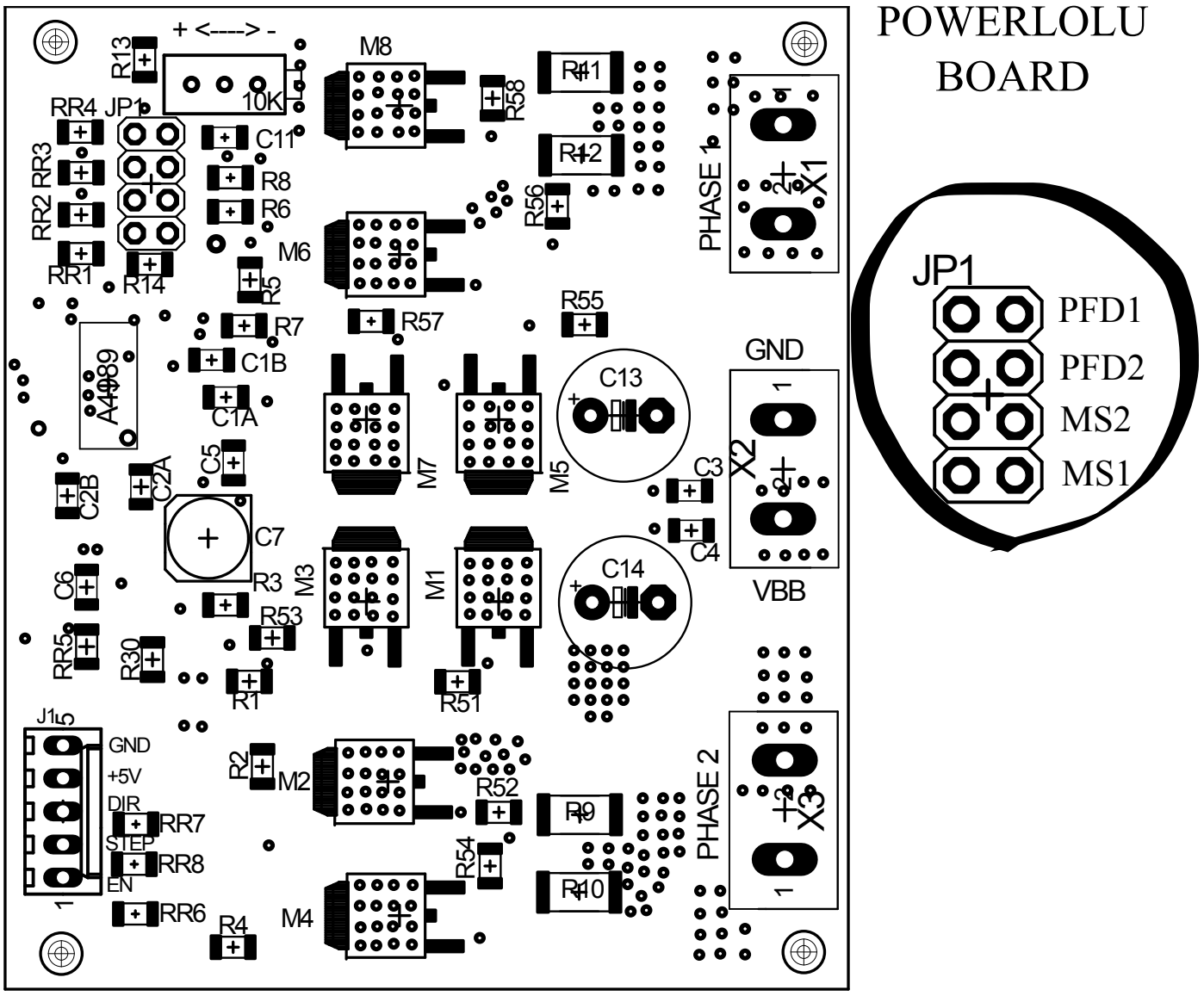


Table 1. Microstep Resolution Truth Table

MS2	MS1	Microstep Resolution
0	0	Full Step
0	1	Half Step
1	0	Quarter Step
1	1	Sixteenth Step

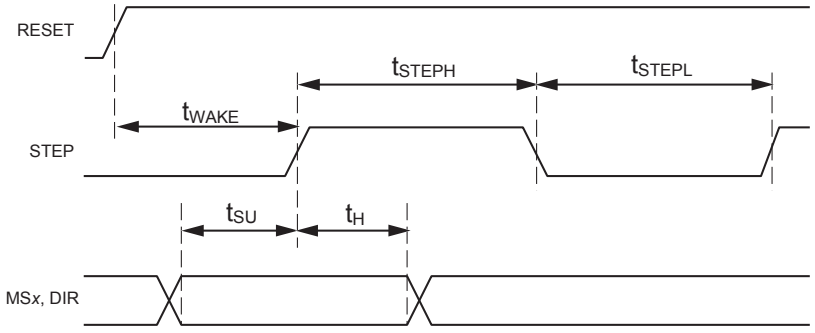
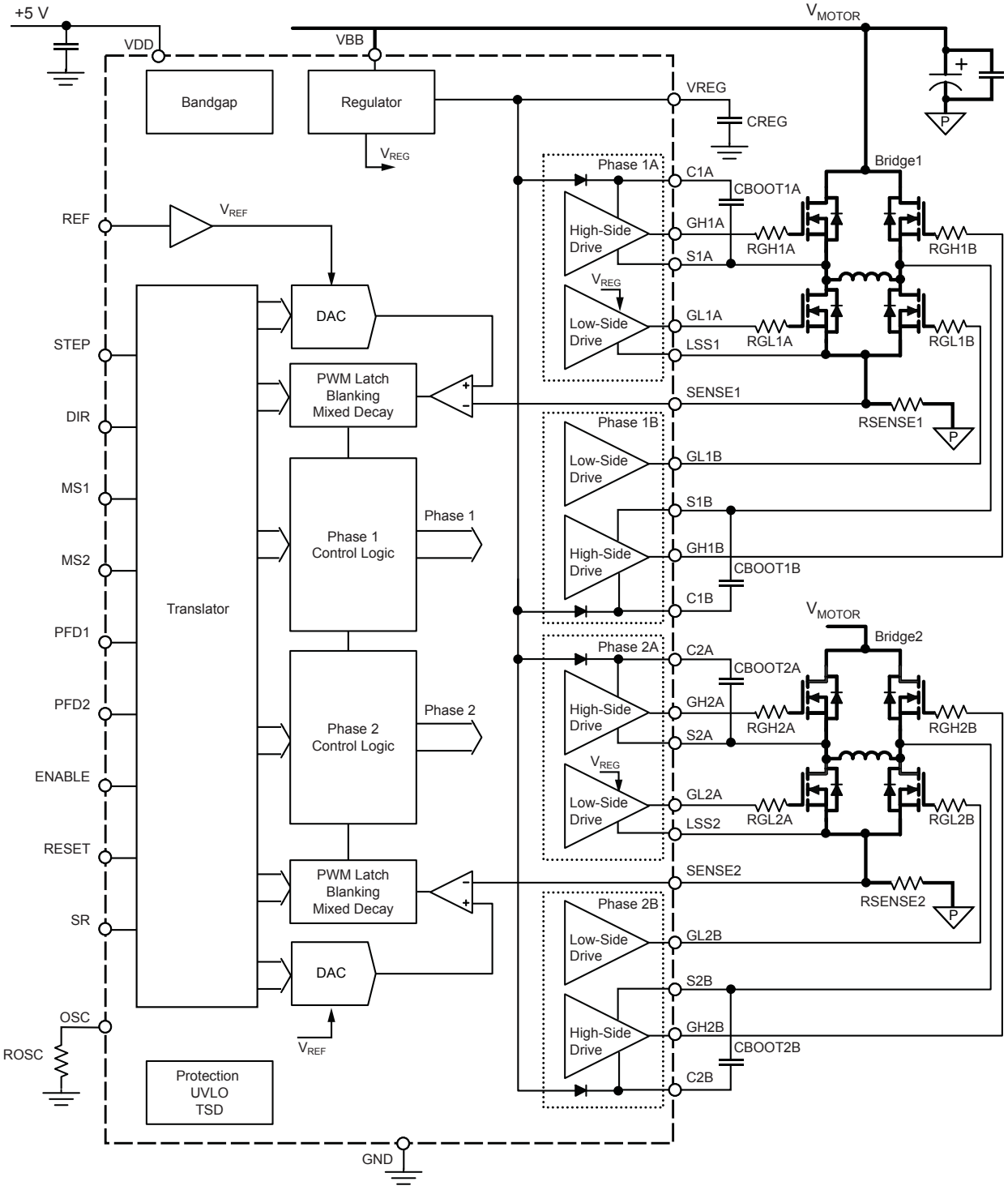


Figure 1. Logic Interface Timing Diagram

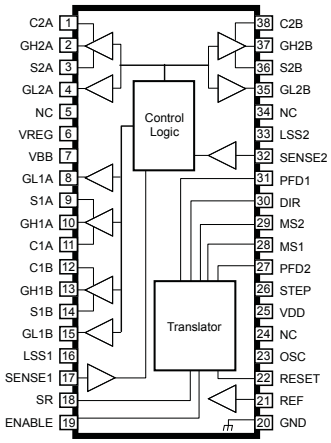
Table 2. Mixed Decay Selection Truth Table

Microstep Setting	Magnitude of Current	PFDx State			
		PFD2 = 0, PFD1 = 0	PFD2 = 0, PFD1 = 1	PFD2 = 1, PFD1 = 0	PFD2 = 1, PFD1 = 1
Full Step (MS2 = 0, MS1 = 0)	Rising	Slow	Slow	Slow	Slow
	Falling	Slow	Slow	Slow	Slow
Half Step (MS2 = 0, MS1 = 1)	Rising	Slow	Slow	Slow	Slow
	Falling	Slow	11%	26%	Fast
1/4 Step (MS2 = 1, MS1 = 0)	Rising	Slow	Step 1: 11%	Step 1: 11%	Step 1: 11%
	Falling	Slow	11%	26%	Fast
1/16 Step (MS2 = 1, MS1 = 1)	Rising	Slow	Steps 1 to 5: 11%	Steps 1 to 5: 11%	Steps 1 to 5: 11%
	Falling	Slow	11%	26%	Fast

Functional Block Diagram



Pin-out Diagram

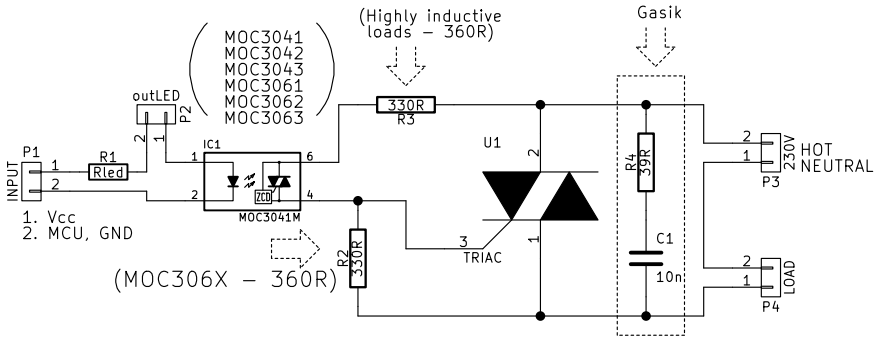


Terminal List Table

Number	Name	Description
1	C2A	Phase 2 bootstrap capacitor drive A connection
2	GH2A	Phase 2 high-side gate drive A
3	S2A	Phase 2 motor connection A
4	GL2A	Phase 2 low-side gate drive A
5	NC	No internal connection
6	VREG	Regulator decoupling capacitor connection
7	VBB	Motor supply voltage
8	GL1A	Phase 1 low-side gate drive A
9	S1A	Phase 1 motor connection A
10	GH1A	Phase 1 high-side gate drive A
11	C1A	Phase 1 bootstrap capacitor drive A connection
12	C1B	Phase 1 bootstrap capacitor drive B connection
13	GH1B	Phase 1 high-side gate drive B
14	S1B	Phase 1 motor connection B
15	GL1B	Phase 1 low-side gate drive B
16	LSS1	Phase 1 low-side source connection
17	SENSE1	Phase 1 bridge current sense input
18	SR	Synchronous rectification enable
19	ENABLE	Output enable
20	GND	Ground
21	REF	Reference voltage
22	RESET	Reset input
23	OSC	Oscillator input, ROSC resistor connection
24	NC	No internal connection
25	VDD	Logic supply voltage
26	STEP	Step input
27	PFD2	Percent Fast Decay input 2
28	MS1	Microstep Select input 1
29	MS2	Microstep Select input 2
30	DIR	Direction input
31	PFD1	Percent Fast Decay input 1
32	SENSE2	Phase 2 bridge current sense input
33	LSS2	Phase 2 low-side source connection
34	NC	No internal connection
35	GL2B	Phase 2 low-side gate drive B
36	S2B	Phase 2 motor connection B
37	GH2B	Phase 2 high-side gate drive B
38	C2B	Phase 2 bootstrap capacitor drive B connection

Triac inductie load with zero switching

Schematic



Materials list

Nr	Reference	Value	Housing	Component
1	C1	10nF MKP	P10 L13 W4 (mm)	Capacitor
2	IC1	MOC3041	DIP6	Inegrated Circuit
3	U1	BTA16	TO220	Triac
4	P1	pin 2x5,08	EDG 2x5,08	Connectors
5	P2	pin 2x5,08	EDG 2x5,08	
6	P3	pin 2x5,08	EDG 2x5,08	
7	P4	pin 2x5,08	EDG 2x5,08	
8	R1	Rled	P10mm	Resistors
9	R2	330r	P10mm	
10	R3	330R/360R	P10mm	
11	R4	39R	P15mm	

Assembly view

