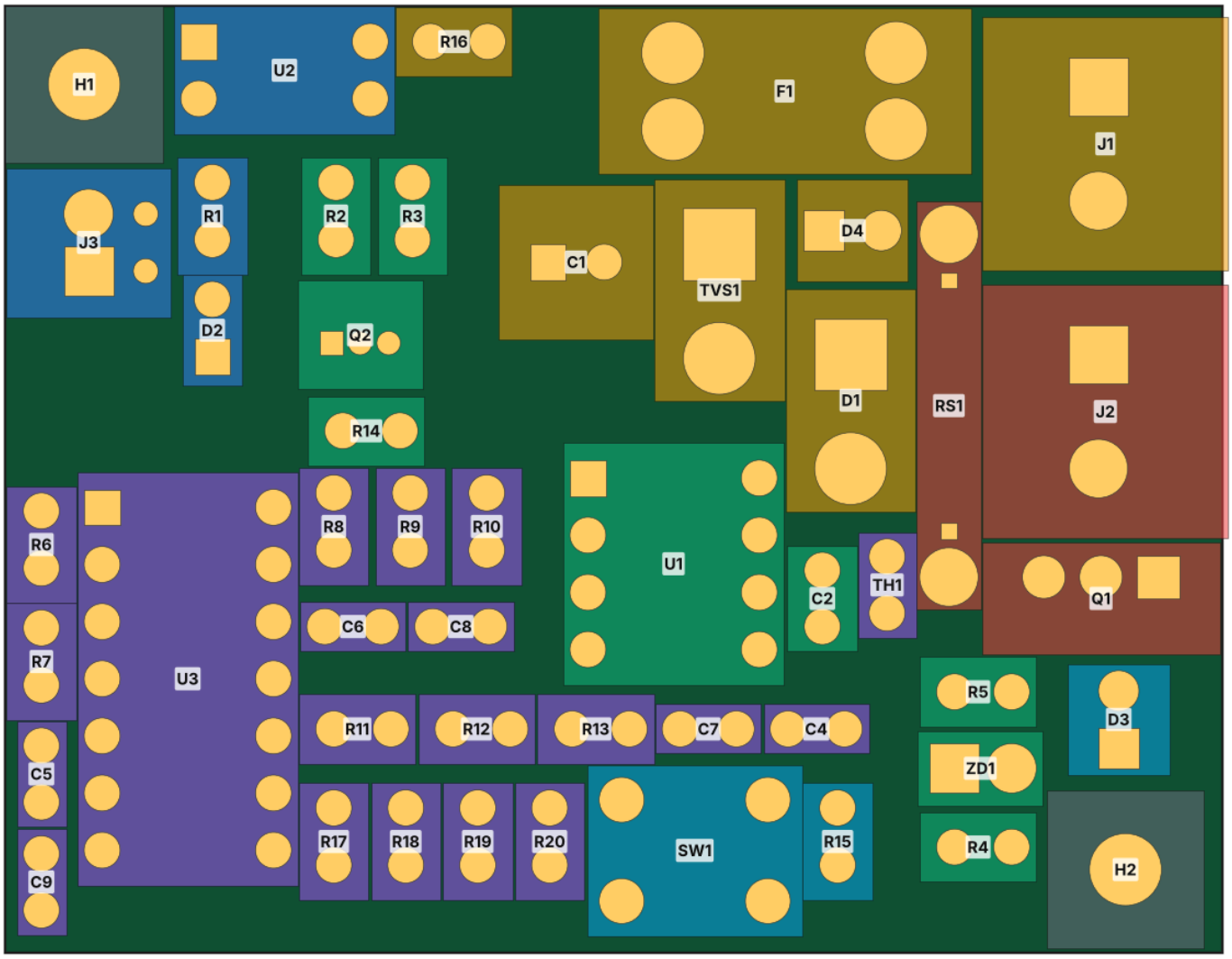
Heater Driver v4 — Component Placement & Assembly Guide

12 V / 100 W (8.33 A) · rev 4.0 · board 54 × 42 mm, 2 layers · 46 parts on 48 footprints · generated from heater_driver_v4.kicad_pcb

100 % THROUGH-HOLE. Every component is a through-hole part, so you only need a soldering iron (60–80 W tip for J1/J2/RS1/F1), 0.8 mm solder and flush cutters. Fit the parts in the numbered order below (lowest first) so the board lies flat while you solder. Square pad = pin 1 / cathode / + on every part.

Board map (top side, parts coloured by subsystem)



top view, board edge 54 × 42 mm - origin (0,0) = bottom-left corner

1 Isolated PWM input 2 Overcurrent + over-temp latch 3 Gate drive 4 Power in + protection 5 Power stage 6 UI Mechanical

Solder order & shopping list

Step	Parts
1. Resistors (standing)	R1, R2, R3, R4, R5, R6, R7, R8, R9, R10, R11, R12, R13, R14, R15, R16, R17, R18, R19, R20
2. Small diodes	D2, ZD1
3. Ceramic capacitors	C2, C4, C5, C6, C7, C8, C9
4. ICs / sockets	U1, U2, U3
5. Transistor Q2, LEDs, NTC	D3, D4, Q2, TH1
6. Switch	SW1
7. Big diodes TVS1, D1	D1, TVS1
8. Electrolytic C1	C1
9. MOSFET Q1, shunt RS1	Q1, RS1
10. Fuse holder, terminals	F1, J1, J2, J3

Complete placement table

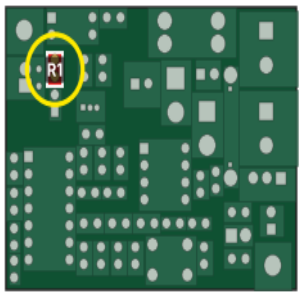
#	Ref	Value	Part number	Package (THT)	X mm	Y mm	Subsystem	Orientation / polarity
1	**R1**	330	Yageo MFR-25FBF52-330R	1/4 W axial, standing (2.54 mm)	9.2	31.7	1 Isolated PWM input	Not polarized. Mounted standing (2.54 mm): body upright over the pad inside the silkscreen circle, bend the top lead down into the other pad.
1	**R2**	1k	Yageo MFR-25FBF52-1K	1/4 W axial, standing (2.54 mm)	14.7	31.7	3 Gate drive	Not polarized. Mounted standing (2.54 mm): body upright over the pad inside the silkscreen circle, bend the top lead down into the other pad.
1	**R3**	4.7k	Yageo MFR-25FBF52-4K7	1/4 W axial, standing (2.54 mm)	18.1	31.7	3 Gate drive	Not polarized. Mounted standing (2.54 mm): body upright over the pad inside the silkscreen circle, bend the top lead down into the other pad.
1	**R4**	10	Yageo MFR-25FBF52-10R	1/4 W axial, standing (2.54 mm)	42.2	4.7	3 Gate drive	Not polarized. Mounted standing (2.54 mm): body upright over the pad inside the silkscreen circle, bend the top lead down into the other pad.
1	**R5**	10k	Yageo MFR-25FBF52-10K	1/4 W axial, standing (2.54 mm)	42.2	11.6	3 Gate drive	Not polarized. Mounted standing (2.54 mm): body upright over the pad inside the silkscreen circle, bend the top lead down into the other pad.
1	**R6**	100k 1%	Yageo MFR-25FBF52-100K	1/4 W axial, standing (2.54 mm)	1.6	17.1	2 Overcurrent + over-temp latch	Not polarized. Mounted standing (2.54 mm): body upright over the pad inside the silkscreen circle, bend the top lead down into the other pad.
1	**R7**	1k 1%	Yageo MFR-25FBF52-1K	1/4 W axial, standing (2.54 mm)	1.6	11.9	2 Overcurrent + over-temp latch	Not polarized. Mounted standing (2.54 mm): body upright over the pad inside the silkscreen circle, bend the top lead down into the other pad.
1	**R8**	1k	Yageo MFR-25FBF52-1K	1/4 W axial, standing (2.54 mm)	14.6	17.9	2 Overcurrent + over-temp latch	Not polarized. Mounted standing (2.54 mm): body upright over the pad inside the silkscreen circle, bend the top lead down into the other pad.
1	**R9**	100k	Yageo MFR-25FBF52-100K	1/4 W axial, standing (2.54 mm)	18.0	17.9	2 Overcurrent + over-temp latch	Not polarized. Mounted standing (2.54 mm): body upright over the pad inside the silkscreen circle, bend the top lead down into the other pad.
1	**R10**	100k	Yageo MFR-25FBF52-100K	1/4 W axial, standing (2.54 mm)	21.4	17.9	2 Overcurrent + over-temp latch	Not polarized. Mounted standing (2.54 mm): body upright over the pad inside the silkscreen circle, bend the top lead down into the other pad.
1	**R11**	100k	Yageo MFR-25FBF52-100K	1/4 W axial, standing (2.54 mm)	14.6	9.9	2 Overcurrent + over-temp latch	Not polarized. Mounted standing (2.54 mm): body upright over the pad inside the silkscreen circle, bend the top lead down into the other pad.
1	**R12**	100k	Yageo MFR-25FBF52-100K	1/4 W axial, standing (2.54 mm)	19.9	9.9	2 Overcurrent + over-temp latch	Not polarized. Mounted standing (2.54 mm): body upright over the pad inside the silkscreen circle, bend the top lead down into the other pad.
1	**R13**	100k	Yageo MFR-25FBF52-100K	1/4 W axial, standing (2.54 mm)	25.2	9.9	2 Overcurrent + over-temp latch	Not polarized. Mounted standing (2.54 mm): body upright over the pad inside the silkscreen circle, bend the top lead down into the other pad.
1	**R14**	4.7k	Yageo MFR-25FBF52-4K7	1/4 W axial, standing (2.54 mm)	15.0	23.2	3 Gate drive	Not polarized. Mounted standing (2.54 mm): body upright over the pad inside the silkscreen circle, bend the top lead down into the other pad.

1	**R15**	2.2k	Yageo MFR-25FBF52-2K2	1/4 W axial, standing (2.54 mm)	37.0	3.9	6 UI	Not polarized. Mounted standing (2.54 mm): body upright over the pad inside the silkscreen circle, bend the top lead down into the other pad.
1	**R16**	2.2k	Yageo MFR-25FBF52-2K2	1/4 W axial, standing (2.54 mm)	18.9	40.5	4 Power in + protection	Not polarized. Mounted standing (2.54 mm): body upright over the pad inside the silkscreen circle, bend the top lead down into the other pad.
1	**R17**	22k	Yageo MFR-25FBF52-22K	1/4 W axial, standing (2.54 mm)	14.6	3.9	2 Overcurrent + over-temp latch	Not polarized. Mounted standing (2.54 mm): body upright over the pad inside the silkscreen circle, bend the top lead down into the other pad.
1	**R18**	10k 1%	Yageo MFR-25FBF52-10K	1/4 W axial, standing (2.54 mm)	17.8	3.9	2 Overcurrent + over-temp latch	Not polarized. Mounted standing (2.54 mm): body upright over the pad inside the silkscreen circle, bend the top lead down into the other pad.
1	**R19**	100k 1%	Yageo MFR-25FBF52-100K	1/4 W axial, standing (2.54 mm)	21.0	3.9	2 Overcurrent + over-temp latch	Not polarized. Mounted standing (2.54 mm): body upright over the pad inside the silkscreen circle, bend the top lead down into the other pad.
1	**R20**	11k 1%	Yageo MFR-25FBF52-11K	1/4 W axial, standing (2.54 mm)	24.2	3.9	2 Overcurrent + over-temp latch	Not polarized. Mounted standing (2.54 mm): body upright over the pad inside the silkscreen circle, bend the top lead down into the other pad.
2	**D2**	1N4148	onsemi 1N4148	DO-35, standing	9.2	26.5	1 Isolated PWM input	⚠ POLARIZED, mounted standing. Body sits on the SQUARE pad: put the BANDED end (cathode) down into the square pad, bend the other lead back down into the round pad.
2	**ZD1**	1N4744A	onsemi 1N4744A	DO-41, standing	42.2	8.2	3 Gate drive	⚠ POLARIZED, mounted standing. Body sits on the SQUARE pad: put the BANDED end (cathode) down into the square pad, bend the other lead back down into the round pad.
3	**C2**	1uF 50V X7R	TDK FG28X7R1H105KRT06	radial MLCC (2.5 mm)	36.3	14.5	3 Gate drive	Not polarized. Push down until the coating just touches the board.
3	**C4**	100nF	KEMET C320C104K5R5TA	ceramic disc (2.5 mm)	34.8	9.9	2 Overcurrent + over-temp latch	Not polarized. Push down until the coating just touches the board.
3	**C5**	1nF	KEMET C315C102K5R5TA	ceramic disc (2.5 mm)	1.6	6.7	2 Overcurrent + over-temp latch	Not polarized. Push down until the coating just touches the board.
3	**C6**	4.7nF	KEMET C315C472K5R5TA	ceramic disc (2.5 mm)	14.2	14.5	2 Overcurrent + over-temp latch	Not polarized. Push down until the coating just touches the board.
3	**C7**	47nF	KEMET C320C473K5R5TA	ceramic disc (2.5 mm)	30.0	9.9	2 Overcurrent + over-temp latch	Not polarized. Push down until the coating just touches the board.
3	**C8**	10nF	KEMET C315C103K5R5TA	ceramic disc (2.5 mm)	19.0	14.5	2 Overcurrent + over-temp latch	Not polarized. Push down until the coating just touches the board.
3	**C9**	100nF	KEMET C320C104K5R5TA	ceramic disc (2.5 mm)	1.6	1.9	2 Overcurrent + over-temp latch	Not polarized. Push down until the coating just touches the board.
4	**U1**	TC4427ACPA	Microchip TC4427ACPA (DIP-8)	DIP-8	25.9	21.1	3 Gate drive	⚠ Pin 1 = SQUARE pad, top-left. Notch / dot on the IC toward the notch on the silkscreen. A DIP socket is fine.
4	**U2**	PC817	Sharp PC817X / Everlight EL817	DIP-4	8.6	40.5	1 Isolated PWM input	⚠ Pin 1 = SQUARE pad, top-left. Notch / dot on the IC toward the notch on the silkscreen. A DIP socket is fine.
4	**U3**	LM339N	TI LM339N (DIP-14)	DIP-14	4.3	19.8	2 Overcurrent + over-temp latch	⚠ Pin 1 = SQUARE pad, top-left. Notch / dot on the IC toward the notch on the silkscreen. A DIP socket is fine.
5	**D3**	RED FAULT	Kingbright WP7104ID	3 mm LED	49.5	9.1	6 UI	⚠ POLARIZED LED. Short leg / flat edge (cathode, K) into the SQUARE pad. Long leg into the round pad.
5	**D4**	GRN HEAT	Kingbright WP7104GD	3 mm LED	36.4	32.1	4 Power in + protection	⚠ POLARIZED LED. Short leg / flat edge (cathode, K) into the SQUARE pad. Long leg into the round pad.
5	**Q2**	2N7000	onsemi 2N7000	TO-92	14.5	27.1	3 Gate drive	⚠ Pin 1 = SOURCE = SQUARE pad (left). FLAT face of the TO-92 matches the flat side of the

								silkscreen outline (facing down, toward R14).
5	**TH1**	10k NTC	Vishay NTCLE100E3103JB0	NTC disc (2.5 mm)	39.2	15.1	2 Overcurrent + over-temp latch	Not polarized. Leave ~3 mm of lead and bend the bead so it leans against the RS1 strap / Q1 copper (a dab of thermal epoxy is ideal).
6	**SW1**	RESET	Omron B3F-1000	6 mm tact switch	27.4	6.8	6 UI	6 mm tact switch: the legs only fit in two ways, both are correct. Press flat before soldering.
7	**D1**	1N5822	onsemi 1N5822	DO-201AD, standing	37.6	26.6	4 Power in + protection	⚠ POLARIZED, mounted standing. Body sits on the SQUARE pad: put the BANDED end (cathode) down into the square pad, bend the other lead back down into the round pad.
7	**TVS1**	1.5KE18A	Littelfuse 1.5KE18A	DO-201AD, standing	31.7	31.5	4 Power in + protection	⚠ POLARIZED, mounted standing. Body sits on the SQUARE pad: put the BANDED end (cathode) down into the square pad, bend the other lead back down into the round pad.
8	**C1**	100uF 25V	Panasonic EEU-FR1E101 (low ESR, 6.3x11.2)	electrolytic 6.3 mm (2.5 mm)	24.1	30.7	4 Power in + protection	⚠ POLARIZED. Long lead (+) into the SQUARE pad marked "+". The stripe on the can is the minus (-) side.
9	**Q1**	IRFB7430PBF	Infineon IRFB7430PBF (alt: IRLB3034PBF)	TO-220, vertical	51.2	16.7	5 Power stage	⚠ Pin 1 = GATE = SQUARE pad (rightmost). Printed face toward J2 (up), METAL TAB faces DOWN toward R5/ZD1. Stand it straight, no heatsink needed (~0.1 W).
9	**RS1**	10mR 3W	TT Electronics/IRC OAR3R010FLF	OAR-3 open-air strap (15.24 mm)	41.9	16.7	5 Power stage	Not polarized. Open-air metal strap: push fully down so it stands vertical, solder both legs with plenty of solder (8 A flows here). The two small copper squares next to the legs are the Kelvin sense points - do not bridge them.
10	**F1**	15A ATM	Keystone 3568 + Littelfuse 0297015 (15A ATM)	mini blade fuse holder	39.6	36.6	4 Power in + protection	Fuse holder: 4 pins, fits one way. Plug in a 15 A ATM mini blade fuse only after the step-6 checks.
10	**J1**	PWR IN 12V	Phoenix 1729128 (MKDS 1,5/2-5,08, 13.5A)	5.08 mm screw terminal	48.6	38.5	4 Power in + protection	Wire openings face the board edge. Seat flat and solder both pins generously (J1/J2 carry 8 A).
10	**J2**	HEATER OUT	Phoenix 1729128 (MKDS 1,5/2-5,08, 13.5A)	5.08 mm screw terminal	48.6	26.6	5 Power stage	Wire openings face the board edge. Seat flat and solder both pins generously (J1/J2 carry 8 A).
10	**J3**	PWM IN	Phoenix 1725656 (MPT 0,5/2-2,54)	2.54 mm screw terminal	3.7	30.3	1 Isolated PWM input	Wire openings face the board edge. Seat flat and solder both pins generously (J1/J2 carry 8 A).
99	**H1**	M3		M3 hole	3.5	38.6	Mechanical	M3 mounting hole (no part). Use M3 nylon or metal standoffs.
99	**H2**	M3		M3 hole	49.8	3.7	Mechanical	M3 mounting hole (no part). Use M3 nylon or metal standoffs.

X/Y = position of the part origin (pin 1 for through-hole parts) measured from the bottom-left board corner, Y up.

Where each component goes (one card per part, in solder order)



R1

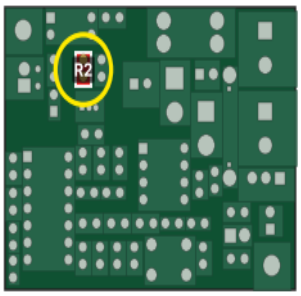
330

Yageo MFR-25FBF52-330R

1/4 W axial, standing (2.54 mm)

X 9.2 / Y 31.7 mm · step 1

Not polarized. Mounted standing (2.54 mm): body upright over the pad inside the silkscreen circle, bend the top lead down into the other pad.



R2

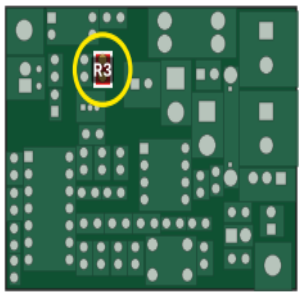
1k

Yageo MFR-25FBF52-1K

1/4 W axial, standing (2.54 mm)

X 14.7 / Y 31.7 mm · step 1

Not polarized. Mounted standing (2.54 mm): body upright over the pad inside the silkscreen circle, bend the top lead down into the other pad.



R3

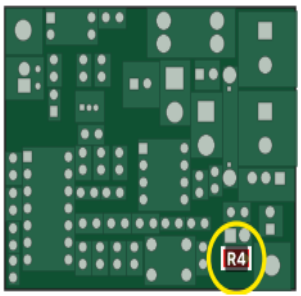
4.7k

Yageo MFR-25FBF52-4K7

1/4 W axial, standing (2.54 mm)

X 18.1 / Y 31.7 mm · step 1

Not polarized. Mounted standing (2.54 mm): body upright over the pad inside the silkscreen circle, bend the top lead down into the other pad.



R4

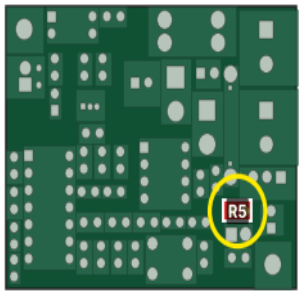
10

Yageo MFR-25FBF52-10R

1/4 W axial, standing (2.54 mm)

X 42.2 / Y 4.7 mm · step 1

Not polarized. Mounted standing (2.54 mm): body upright over the pad inside the silkscreen circle, bend the top lead down into the other pad.



R5

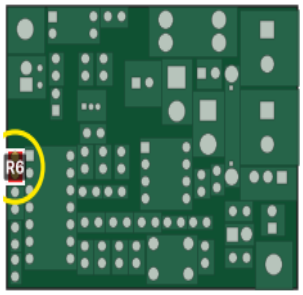
10k

Yageo MFR-25FBF52-10K

1/4 W axial, standing (2.54 mm)

X 42.2 / Y 11.6 mm · step 1

Not polarized. Mounted standing (2.54 mm): body upright over the pad inside the silkscreen circle, bend the top lead down into the other pad.



R6

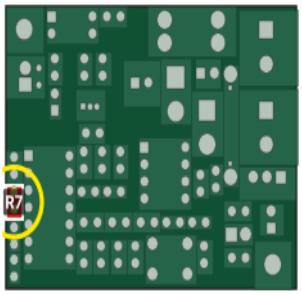
100k 1%

Yageo MFR-25FBF52-100K

1/4 W axial, standing (2.54 mm)

X 1.6 / Y 17.1 mm · step 1

Not polarized. Mounted standing (2.54 mm): body upright over the pad inside the silkscreen circle, bend the top lead down into the other pad.



R7

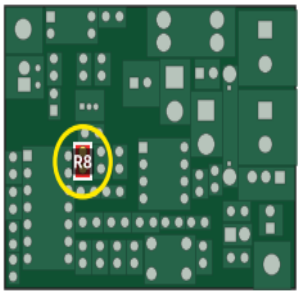
1k 1%

Yageo MFR-25FBF52-1K

1/4 W axial, standing (2.54 mm)

X 1.6 / Y 11.9 mm · step 1

Not polarized. Mounted standing (2.54 mm): body upright over the pad inside the silkscreen circle, bend the top lead down into the other pad.



R8

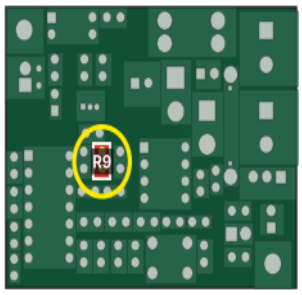
1k

Yageo MFR-25FBF52-1K

1/4 W axial, standing (2.54 mm)

X 14.6 / Y 17.9 mm · step 1

Not polarized. Mounted standing (2.54 mm): body upright over the pad inside the silkscreen circle, bend the top lead down into the other pad.



R9

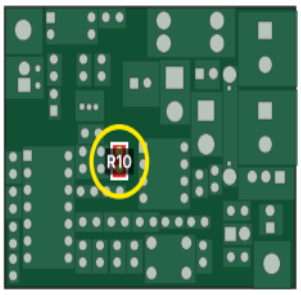
100k

Yageo MFR-25FBF52-100K

1/4 W axial, standing (2.54 mm)

X 18.0 / Y 17.9 mm · step 1

Not polarized. Mounted standing (2.54 mm): body upright over the pad inside the silkscreen circle, bend the top lead down into the other pad.



R10

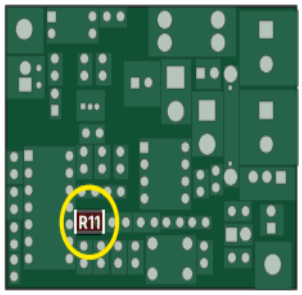
100k

Yageo MFR-25FBF52-100K

1/4 W axial, standing (2.54 mm)

X 21.4 / Y 17.9 mm · step 1

Not polarized. Mounted standing (2.54 mm): body upright over the pad inside the silkscreen circle, bend the top lead down into the other pad.



R11

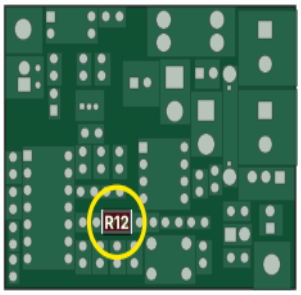
100k

Yageo MFR-25FBF52-100K

1/4 W axial, standing (2.54 mm)

X 14.6 / Y 9.9 mm · step 1

Not polarized. Mounted standing (2.54 mm): body upright over the pad inside the silkscreen circle, bend the top lead down into the other pad.



R12

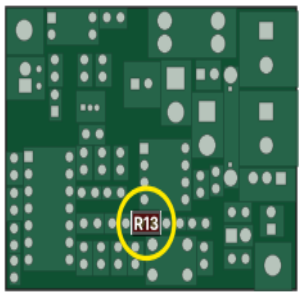
100k

Yageo MFR-25FBF52-100K

1/4 W axial, standing (2.54 mm)

X 19.9 / Y 9.9 mm · step 1

Not polarized. Mounted standing (2.54 mm): body upright over the pad inside the silkscreen circle, bend the top lead down into the other pad.



R13

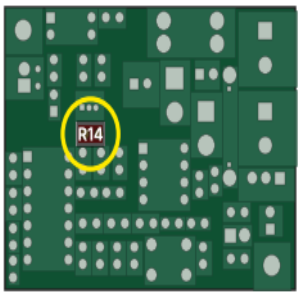
100k

Yageo MFR-25FBF52-100K

1/4 W axial, standing (2.54 mm)

X 25.2 / Y 9.9 mm · step 1

Not polarized. Mounted standing (2.54 mm): body upright over the pad inside the silkscreen circle, bend the top lead down into the other pad.



R14

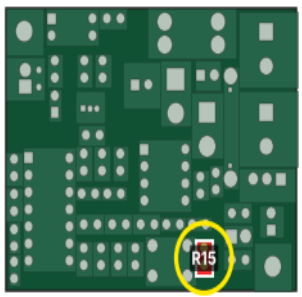
4.7k

Yageo MFR-25FBF52-4K7

1/4 W axial, standing (2.54 mm)

X 15.0 / Y 23.2 mm · step 1

Not polarized. Mounted standing (2.54 mm): body upright over the pad inside the silkscreen circle, bend the top lead down into the other pad.



R15

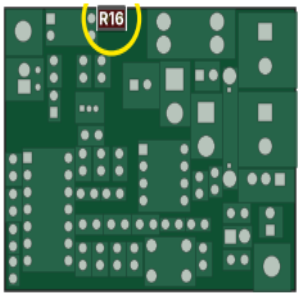
2.2k

Yageo MFR-25FBF52-2K2

1/4 W axial, standing (2.54 mm)

X 37.0 / Y 3.9 mm · step 1

Not polarized. Mounted standing (2.54 mm): body upright over the pad inside the silkscreen circle, bend the top lead down into the other pad.



R16

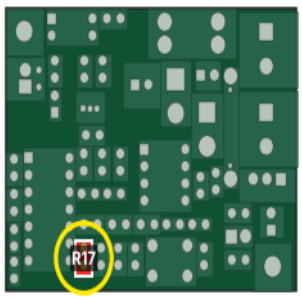
2.2k

Yageo MFR-25FBF52-2K2

1/4 W axial, standing (2.54 mm)

X 18.9 / Y 40.5 mm · step 1

Not polarized. Mounted standing (2.54 mm): body upright over the pad inside the silkscreen circle, bend the top lead down into the other pad.



R17

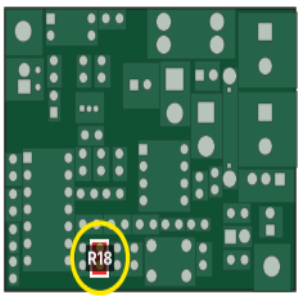
22k

Yageo MFR-25FBF52-22K

1/4 W axial, standing (2.54 mm)

X 14.6 / Y 3.9 mm · step 1

Not polarized. Mounted standing (2.54 mm): body upright over the pad inside the silkscreen circle, bend the top lead down into the other pad.



R18

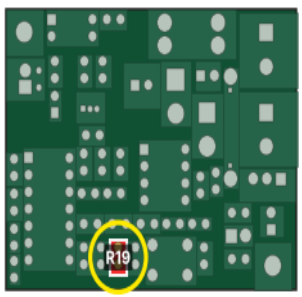
10k 1%

Yageo MFR-25FBF52-10K

1/4 W axial, standing (2.54 mm)

X 17.8 / Y 3.9 mm · step 1

Not polarized. Mounted standing (2.54 mm): body upright over the pad inside the silkscreen circle, bend the top lead down into the other pad.



R19

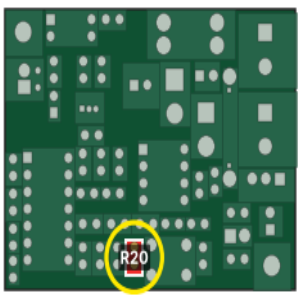
100k 1%

Yageo MFR-25FBF52-100K

1/4 W axial, standing (2.54 mm)

X 21.0 / Y 3.9 mm · step 1

Not polarized. Mounted standing (2.54 mm): body upright over the pad inside the silkscreen circle, bend the top lead down into the other pad.



R20

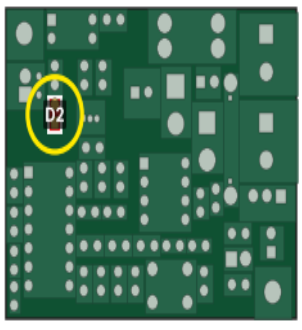
11k 1%

Yageo MFR-25FBF52-11K

1/4 W axial, standing (2.54 mm)

X 24.2 / Y 3.9 mm · step 1

Not polarized. Mounted standing (2.54 mm): body upright over the pad inside the silkscreen circle, bend the top lead down into the other pad.



D2

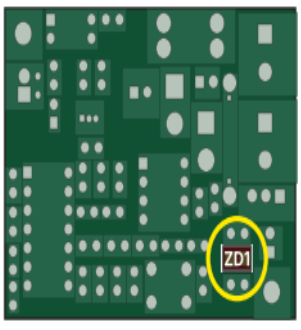
1N4148

onsemi 1N4148

DO-35, standing

X 9.2 / Y 26.5 mm · step 2

⚠ POLARIZED, mounted standing. Body sits on the SQUARE pad: put the BANDED end (cathode) down into the square pad, bend the other lead back down into the round pad.



ZD1

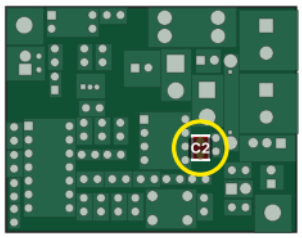
1N4744A

onsemi 1N4744A

DO-41, standing

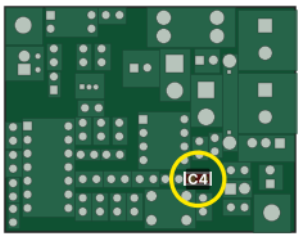
X 42.2 / Y 8.2 mm · step 2

⚠ POLARIZED, mounted standing. Body sits on the SQUARE pad: put the BANDED end (cathode) down into the square pad, bend the other lead back down into the round pad.



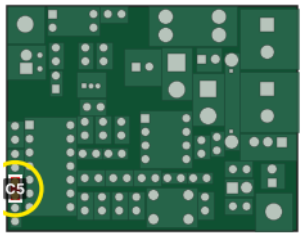
C2

1uF 50V X7R
TDK FG28X7R1H105KRT06
radial MLCC (2.5 mm)
X 36.3 / Y 14.5 mm · step 3
Not polarized. Push down until the coating just touches the board.



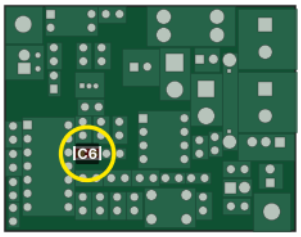
C4

100nF
KEMET C320C104K5R5TA
ceramic disc (2.5 mm)
X 34.8 / Y 9.9 mm · step 3
Not polarized. Push down until the coating just touches the board.



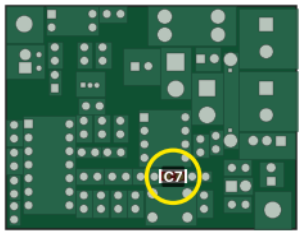
C5

1nF
KEMET C315C102K5R5TA
ceramic disc (2.5 mm)
X 1.6 / Y 6.7 mm · step 3
Not polarized. Push down until the coating just touches the board.



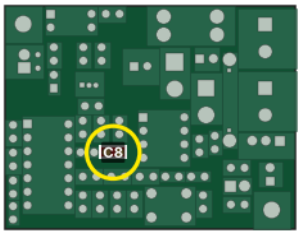
C6

4.7nF
KEMET C315C472K5R5TA
ceramic disc (2.5 mm)
X 14.2 / Y 14.5 mm · step 3
Not polarized. Push down until the coating just touches the board.



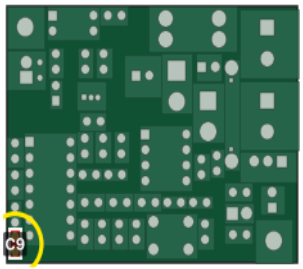
C7

47nF
KEMET C320C473K5R5TA
ceramic disc (2.5 mm)
X 30.0 / Y 9.9 mm · step 3
Not polarized. Push down until the coating just touches the board.



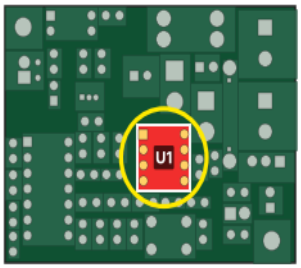
C8

10nF
KEMET C315C103K5R5TA
ceramic disc (2.5 mm)
X 19.0 / Y 14.5 mm · step 3
Not polarized. Push down until the coating just touches the board.



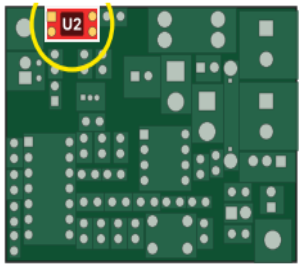
C9

100nF
KEMET C320C104K5R5TA
ceramic disc (2.5 mm)
X 1.6 / Y 1.9 mm · step 3
Not polarized. Push down until the coating just touches the board.



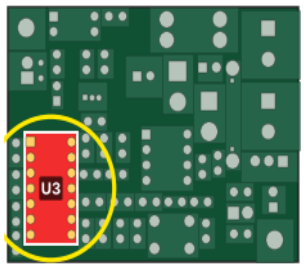
U1

TC4427ACPA
Microchip TC4427ACPA (DIP-8)
DIP-8
X 25.9 / Y 21.1 mm · step 4
⚠ Pin 1 = SQUARE pad, top-left. Notch / dot on the IC toward the notch on the silkscreen. A DIP socket is fine.



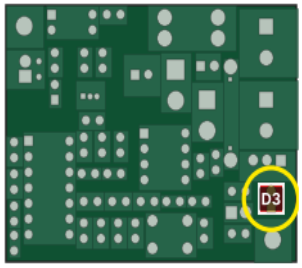
U2

PC817
Sharp PC817X / Everlight EL817
DIP-4
X 8.6 / Y 40.5 mm · step 4
⚠ Pin 1 = SQUARE pad, top-left. Notch / dot on the IC toward the notch on the silkscreen. A DIP socket is fine.



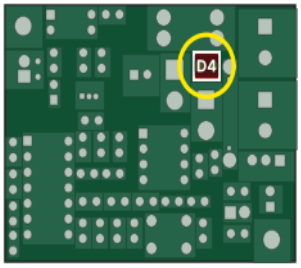
U3

LM339N
TI LM339N (DIP-14)
DIP-14
X 4.3 / Y 19.8 mm · step 4
⚠ Pin 1 = SQUARE pad, top-left. Notch / dot on the IC toward the notch on the silkscreen. A DIP socket is fine.



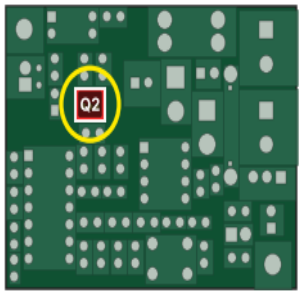
D3

RED FAULT
Kingbright WP7104ID
3 mm LED
X 49.5 / Y 9.1 mm · step 5
⚠ POLARIZED LED. Short leg / flat edge (cathode, K) into the SQUARE pad. Long leg into the round pad.



D4

GRN HEAT
Kingbright WP7104GD
3 mm LED
X 36.4 / Y 32.1 mm · step 5
⚠ POLARIZED LED. Short leg / flat edge (cathode, K) into the SQUARE pad. Long leg into the round pad.



Q2

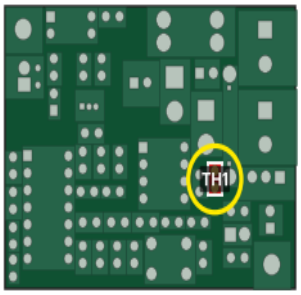
2N7000

onsemi 2N7000

TO-92

X 14.5 / Y 27.1 mm · step 5

⚠ Pin 1 = SOURCE = SQUARE pad (left). FLAT face of the TO-92 matches the flat side of the silkscreen outline (facing down, toward R14).



TH1

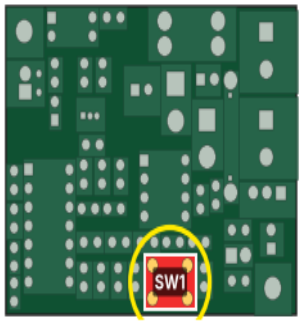
10k NTC

Vishay NTCLE100E3103JB0

NTC disc (2.5 mm)

X 39.2 / Y 15.1 mm · step 5

Not polarized. Leave ~3 mm of lead and bend the bead so it leans against the RS1 strap / Q1 copper (a dab of thermal epoxy is ideal).



SW1

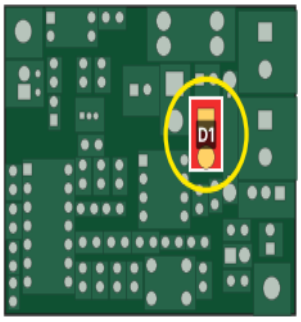
RESET

Omron B3F-1000

6 mm tact switch

X 27.4 / Y 6.8 mm · step 6

6 mm tact switch: the legs only fit in two ways, both are correct. Press flat before soldering.



D1

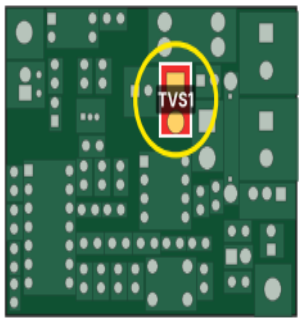
1N5822

onsemi 1N5822

DO-201AD, standing

X 37.6 / Y 26.6 mm · step 7

⚠ POLARIZED, mounted standing. Body sits on the SQUARE pad: put the BANDED end (cathode) down into the square pad, bend the other lead back down into the round pad.



TVS1

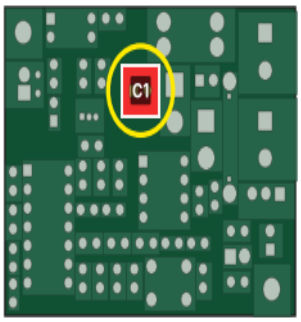
1.5KE18A

Littelfuse 1.5KE18A

DO-201AD, standing

X 31.7 / Y 31.5 mm · step 7

⚠ POLARIZED, mounted standing. Body sits on the SQUARE pad: put the BANDED end (cathode) down into the square pad, bend the other lead back down into the round pad.



C1

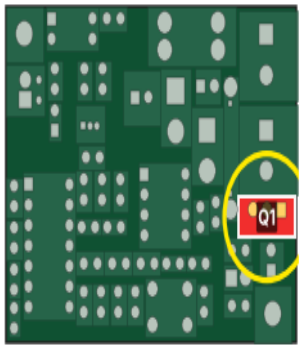
100uF 25V

Panasonic EEU-FR1E101 (low ESR, 6.3x11.2)

electrolytic 6.3 mm (2.5 mm)

X 24.1 / Y 30.7 mm · step 8

⚠ POLARIZED. Long lead (+) into the SQUARE pad marked "+". The stripe on the can is the minus (-) side.



Q1

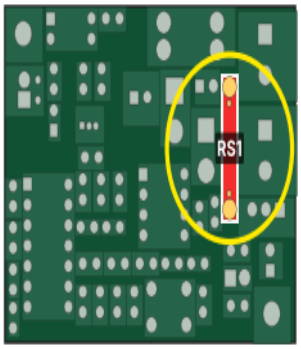
IRFB7430PBF

Infineon IRFB7430PBF (alt: IRLB3034PBF)

TO-220, vertical

X 51.2 / Y 16.7 mm · step 9

⚠ Pin 1 = GATE = SQUARE pad (rightmost). Printed face toward J2 (up), METAL TAB faces DOWN toward R5/ZD1. Stand it straight, no heatsink needed (~0.1 W).



RS1

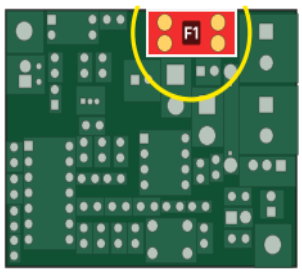
10mR 3W

TT Electronics/IRC OAR3R010FLF

OAR-3 open-air strap (15.24 mm)

X 41.9 / Y 16.7 mm · step 9

Not polarized. Open-air metal strap: push fully down so it stands vertical, solder both legs with plenty of solder (8 A flows here). The two small copper squares next to the legs are the Kelvin sense points - do not bridge them.



F1

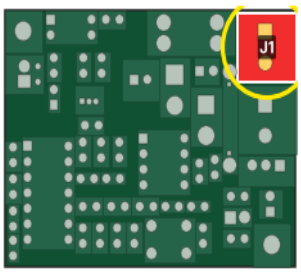
15A ATM

Keystone 3568 + Littelfuse 0297015 (15A ATM)

mini blade fuse holder

X 39.6 / Y 36.6 mm · step 10

Fuse holder: 4 pins, fits one way. Plug in a 15 A ATM mini blade fuse only after the step-6 checks.



J1

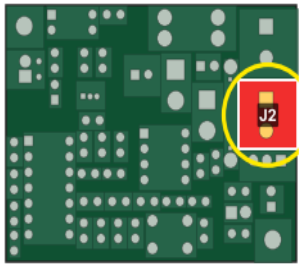
PWR IN 12V

Phoenix 1729128 (MKDS 1,5/2-5,08, 13.5A)

5.08 mm screw terminal

X 48.6 / Y 38.5 mm · step 10

Wire openings face the board edge. Seat flat and solder both pins generously (J1/J2 carry 8 A).



J2

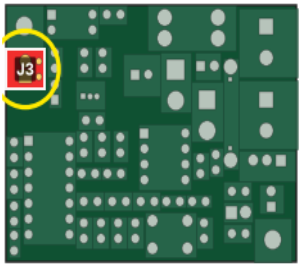
HEATER OUT

Phoenix 1729128 (MKDS 1,5/2-5,08, 13.5A)

5.08 mm screw terminal

X 48.6 / Y 26.6 mm · step 10

Wire openings face the board edge. Seat flat and solder both pins generously (J1/J2 carry 8 A).



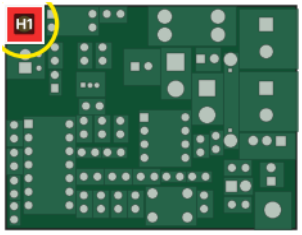
J3

PWM IN

Phoenix 1725656 (MPT 0,5/2-2,54) 2.54 mm screw terminal

X 3.7 / Y 30.3 mm · step 10

Wire openings face the board edge. Seat flat and solder both pins generously (J1/J2 carry 8 A).



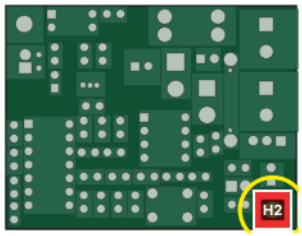
H1

M3

M3 hole

X 3.5 / Y 38.6 mm · step 99

M3 mounting hole (no part). Use M3 nylon or metal standoffs.



H2

M3

M3 hole

X 49.8 / Y 3.7 mm · step 99

M3 mounting hole (no part). Use M3 nylon or metal standoffs.

Before first power-up

1. Inspect every joint; no bridges between the IC pins or the RS1 sense squares and the big pads.
2. Check every polarity marked ⚠ above against this guide (C1, D1–D4, ZD1, TVS1, U1–U3, Q1, Q2).
3. Follow *heater_driver_v4_test_checklist.pdf* steps 1–12 with the fuse REMOVED / current-limited supply, then fit the 15 A ATM fuse.
4. Wire: J1 = 12 V supply (+12V / GND as printed underneath), J2 = heater, J3 = MCU PWM (PWM+ / PWM- = MCU ground; it is isolated).