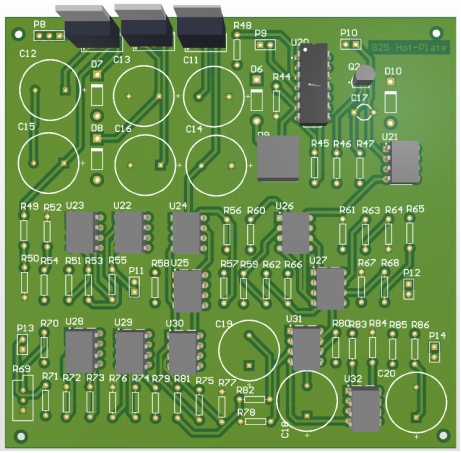
Electronic and Telecommunication Engineering

Hot Plate Controller Data-Sheet

1 Overview



- 230V AC Input
- Calibrated up-to 210 °C
- Manual re-calibration to suit varying room temperatures
- Upto 2.5kW
- PID Error Control

2 Description

- Use PID error controlling to provide the best transient time.
- A high precision PT100 temperature sensor is used to get temperature readings.
- The room temperature reference can be manually adjusted for better adaptation.
- Can control a devices with 2.5KW power rating.(Tested)
- The industrial grade BTA41 Triac can handle 9kW. And maximum of 600V voltage.
- Current input rating up to 10A.
- AC power is isolated using a MOC3021 optocoupler with zero-crossing.
- The design is purely analog and consist of 741 and LM339 comparators.

3 General specification

	Unit	Value
Input Type	V(rms)	230 AC
Maximum current	A	10
Dimensions	$mm * mm * mm$	50*150*180 (without cable)
Weight	g	450
Temperature range	°C	upto 210
number of inputs	$--$	2

The following sections are extracted from LM339N datasheet and 741 opamp datasheet.

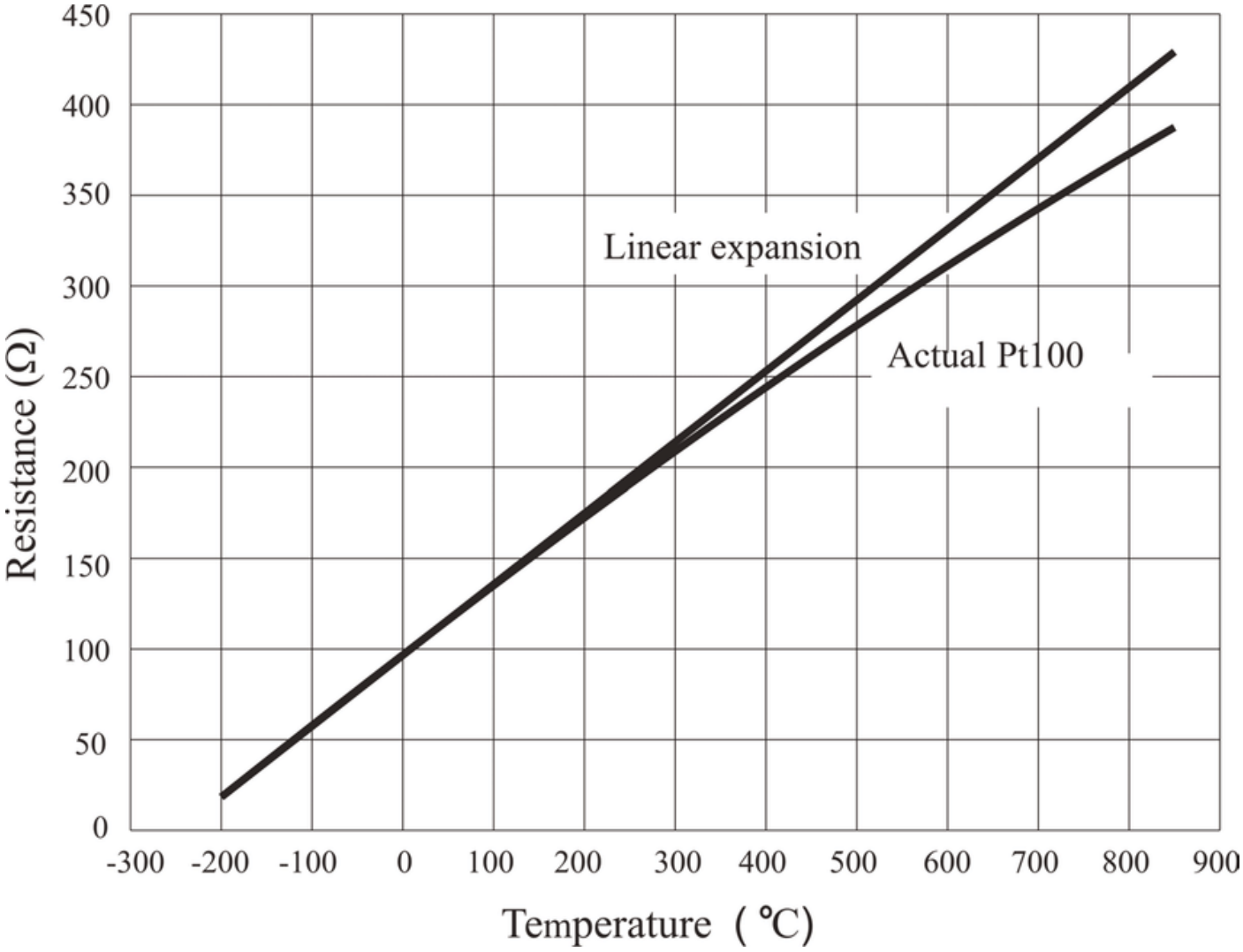


Figure 1: Pt100 temperature vs resistance

Low Power Low Offset Voltage Quad Comparators **LM339**

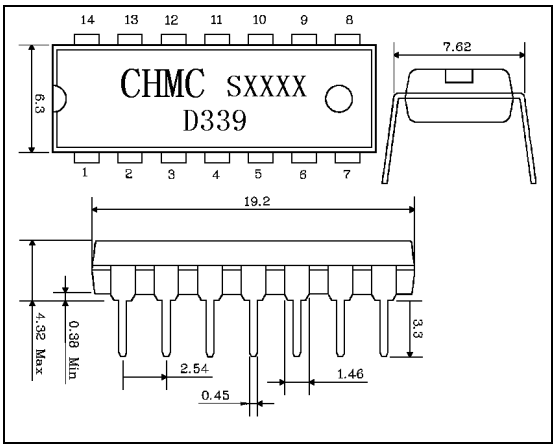
DESCRIPTION：

The LM339 consists of four independent precision voltage comparators.These were designed specifically to operate from a signal power supply over a wide range of voltage.Operation from split power supplies is also possible and the low power supply current drain is independent of the magnitude of the power supply voltage.The LM339 also have a unique characteristic in that the input common-mode voltage range includes ground,even though operated from a single power supply voltage.

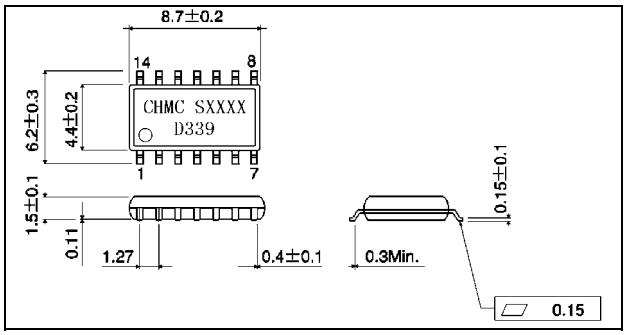
FEATURE：

- Low input biasing current：25nA（TYP.）.
- Low input offset current：±5.0nA（TYP.）.
- Low output saturation voltage：130mV.
- Output voltage compatible with TTL,CMOS.

Outline Drawing

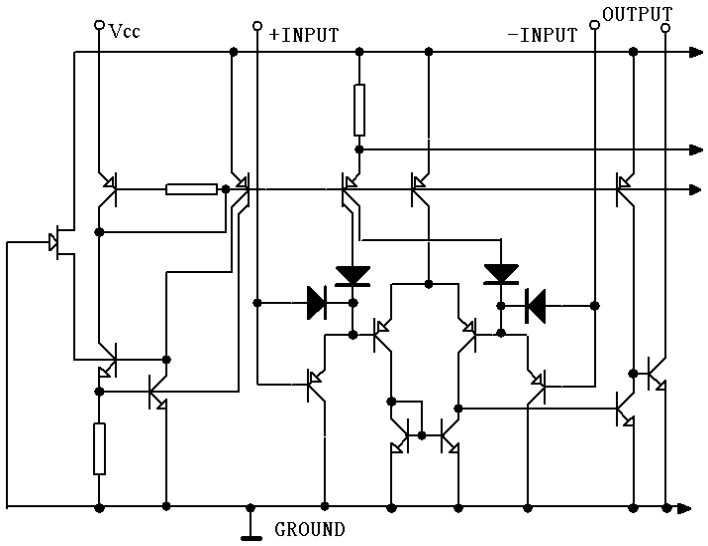


DIP14

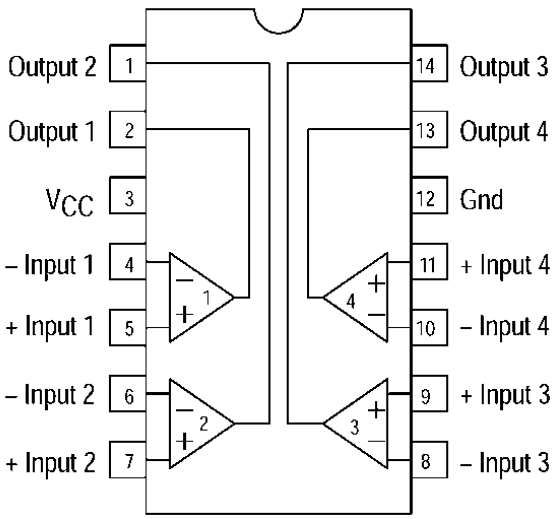


SOP14

PIN CONFIGURATION



BLOCK DIAGRAM

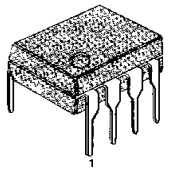


LM741/E/I SINGLE OPERATIONAL AMPLIFIER

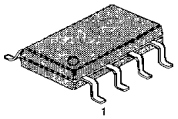
SINGLE OPERATIONAL AMPLIFIERS

The LM741 series are general purpose operational amplifiers which feature improved performance over industry standards like the LM709. It is intended for a wide range of analog applications.
The high gain and wide range of operating voltage provide superior performance in integrator, summing amplifier, and general feedback applications.

8 DIP



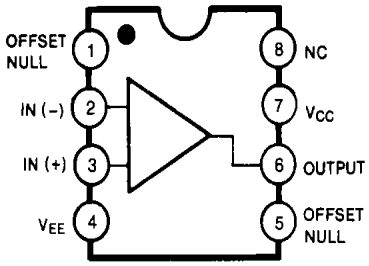
8 SOP



FEATURES

- Short circuit protection
- Excellent temperature stability
- Internal frequency compensation
- High Input voltage range
- Null of offset

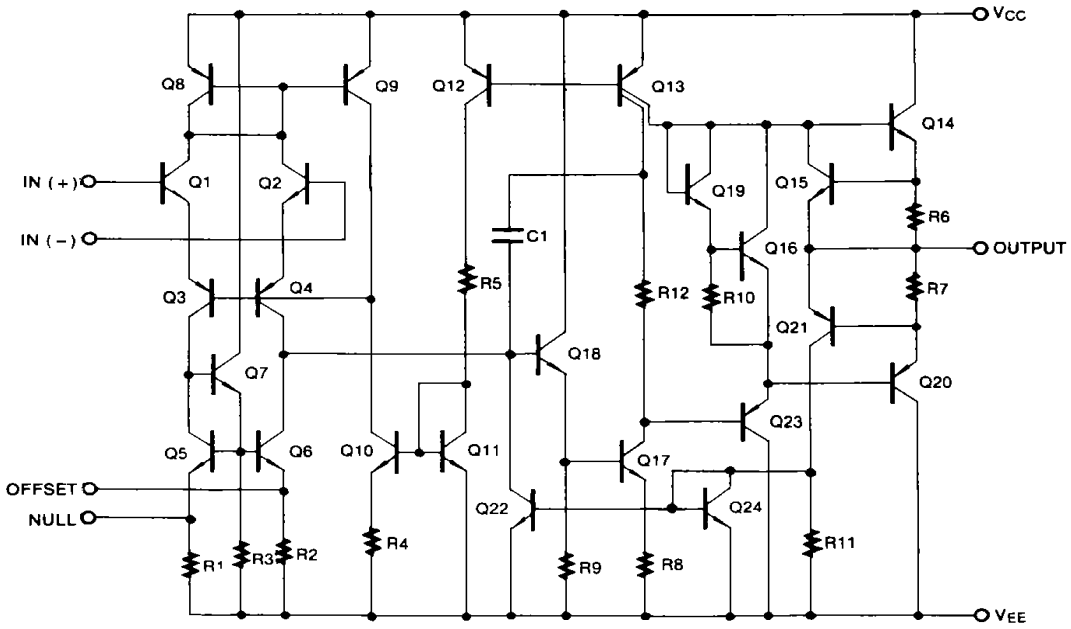
BLOCK DIAGRAM



ORDERING INFORMATION

Device	Package	Operating Temperature
LM741N LM741EN	8 DIP	0 ~ + 70°C
LM741M LM741EM	8 SOP	
LM741IN LM741EIN	8 DIP	-40 ~ +85 °C
LM741IM LM741EIM	8 SOP	

SCHEMATIC DIAGRAM



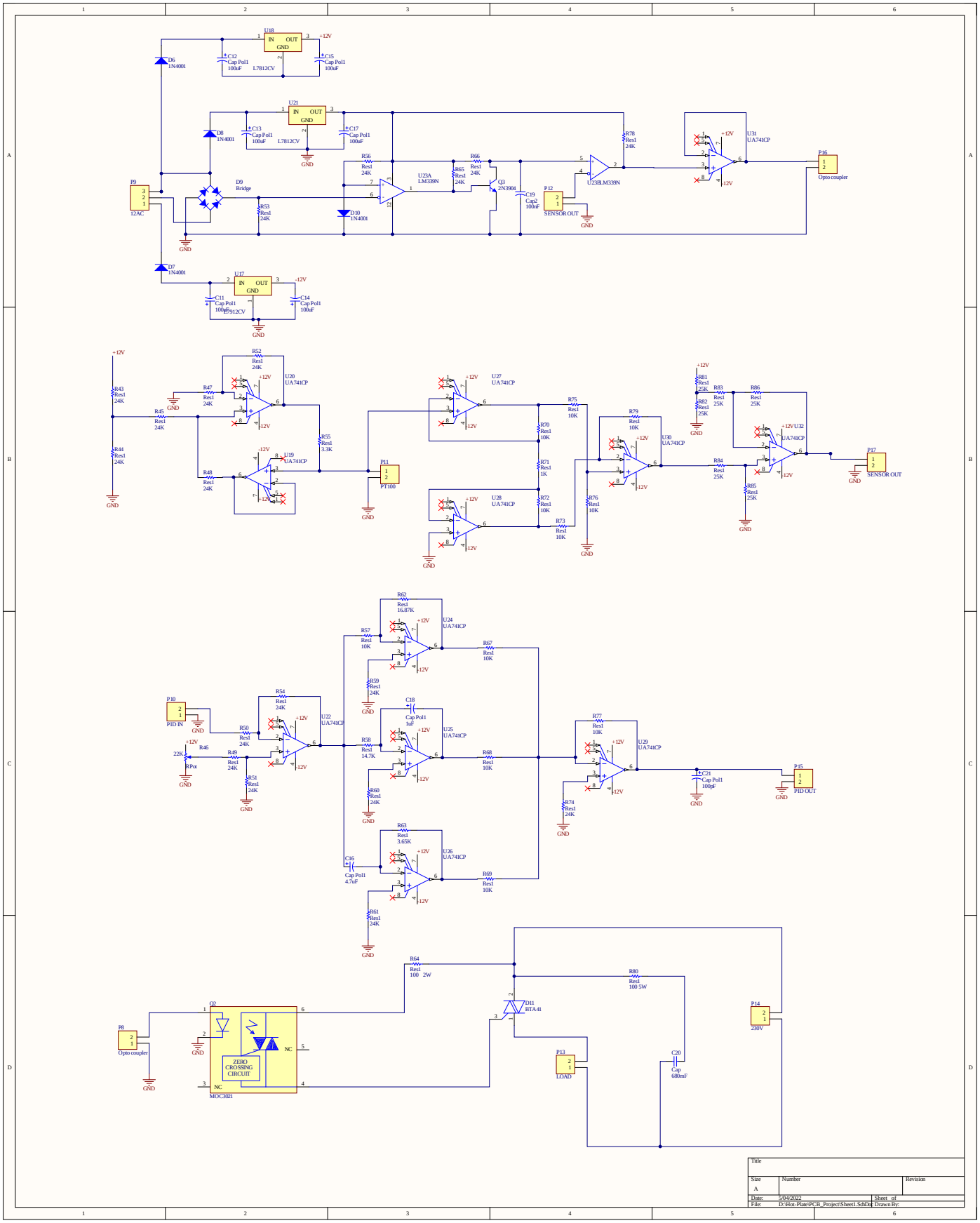


Figure 2: Schematic

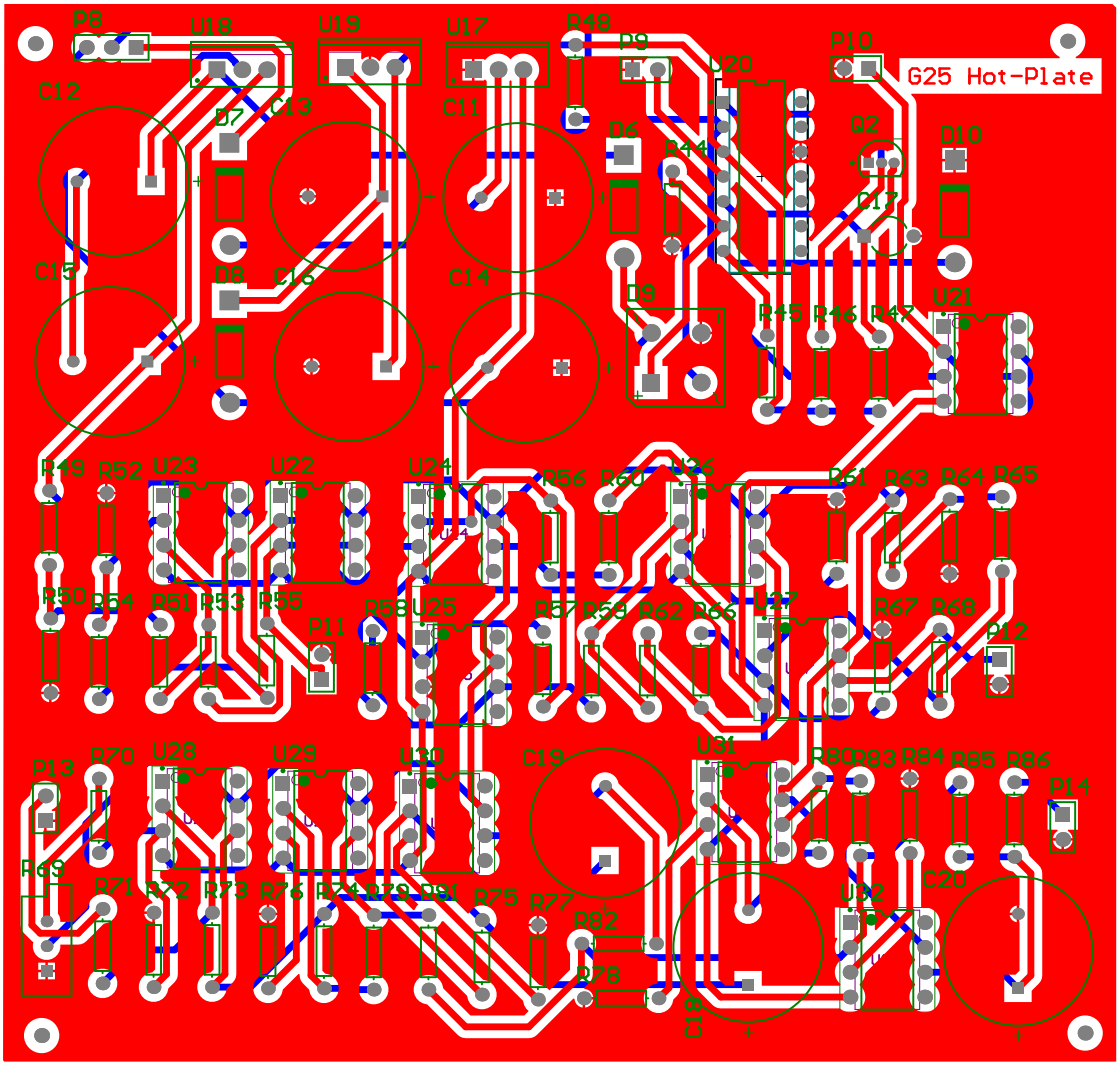


Figure 3: PCB

Comment	Description	Designator	Footprint	LibRef	Quantity
Cap Pol1	Polarized Capacitor (Radial)	C11, C12, C13, C14, C15, C16, C17, C18, C21	RB7.6-15	Cap Pol1	9
Cap2	Capacitor	C19	CAPR5-4X5	Cap2	1
Cap	Capacitor	C20	RAD-0.3	Cap	1
1N4001	1 Amp General Purpose Rectifier	D6, D7, D8, D10	DO-41	Diode 1N4001	4
Bridge	Full Wave Diode Bridge	D9	D-38	Bridge1	1
BTA41	TRIAC ALTERNISTOR 600V TO220AB	D11	FP-TO-220AB-MFG	CMP-12193-000008-1	1
Opto coupler	Header, 2-Pin	P8, P16	HDR1X2	Header 2	2
12AC	Header, 3-Pin	P9	HDR1X3	Header 3	1
PID IN	Header, 2-Pin	P10	HDR1X2	Header 2	1
PT100	Header, 2-Pin	P11	HDR1X2	Header 2	1
SENSOR OUT	Header, 2-Pin	P12, P17	HDR1X2	Header 2	2
LOAD	Header, 2-Pin	P13	HDR1X2	Header 2	1
230V	Header, 2-Pin	P14	HDR1X2	Header 2	1
PID OUT	Header, 2-Pin	P15	HDR1X2	Header 2	1
MOC3021	OPTOISOLATOR 4.17KV TRIAC 6DIP	Q2	FP-646BX-MFG	CMP-07144-000005-1	1
2N3904	NPN Bipolar Transistor	Q3	ONSC-TO-92-3-29-11	NPN	1
Res1	Resistor	R43, R44, R45, R47, R48, R49, R50, R51, R52, R53, R54, R55, R56, R57, R58, R59, R60, R61, R62, R63, R64, R65, R66, R67, R68, R69, R70, R71, R72, R73, R74, R75, R76, R77, R78, R79, R80, R81, R82, R83, R84, R85, R86	AXIAL-0.3	Res1	43
RPot	Potentiometer	R46	VR5	RPot	1
L7912CV	Negative Voltage Regulator, -12V, 3-Pin TO-220	U17	TO-220	CMP-0244-00457-1	1
L7812CV	Positive Voltage Regulator, 12V, 3-Pin TO-220	U18, U21	TO220	CMP-0244-00450-1	2
UA741CP	General-Purpose Operational Amplifier, 7 to 36 V, 0 to 70 degC, 8-pin DIP (P8), Pb-Free (RoHS)	U19, U20, U22, U24, U25, U26, U27, U28, U29, U30, U31, U32	P0008A	CMP-0017-00973-2	12
LM339N	IC QUAD DIFF COMPARATOR 14-DIP	U23	FP-N0014A-MFG	CMP-0055-00143-4	1

Figure 4: BOM