

HP Z3801A Outer Oven Controller

Circuit Description

The controller's purpose is to maintain the outer oven at a constant temperature, typically 50C. Circuitry in the SE corner of the Z3801A PSU board, with component references 101 onwards (e.g. R101 etc), performs this function.

A thermistor inside the oven senses temperature and via amplifiers, power is applied to the heater until the temperature has caused the thermistor resistance fall and become equal to the value of R101+R102, about 16.2K ohms. Power to the heater is then reduced as the temperature stabilises.

U101 is a voltage reference, and provides a highly stable supply for the bridge network comprising R101 to 104 and the external thermistor.

Op-amp **U102** senses imbalance in the bridge, and its output voltage is used to drive U104. This 'demand' voltage is available at TP102, and also to an external processor via connector P2 pin 9.

U104, together with L102,CR102 and C110 is a switching regulator, which in this context behaves as a power op-amp, providing output of 5-18v at up to 1 amp. The output voltage is fed back to the input via R109 and R113 in parallel, and is summed with the demand voltage via R110. The regulator output voltage adjusts so that the input voltage at U104 pin 2 is exactly 1.24v, the same as its internal reference zener diode. The relationship between the control voltage at TP102 and the heater voltage at TP104 is approximately: $V_{TP104} = 18.0 - V_{TP102} \times 1.125$

U103 is an interface to an external processor. Applying 0v to connector P2 pin 8 disables the oven controller by saturating U102; a voltage greater than 2.4v opens the analogue switch and the oven controller operates normally.

Test points

TP101 Precision reference 5.000v +/-5mv

TP102 Control voltage, typically 3.5v. During warm-up, the value is 0.1v. A maximum of 14.2v equates to no current to the oven heater.

TP103 Heater 5v supply from Datel DC-DC converter.

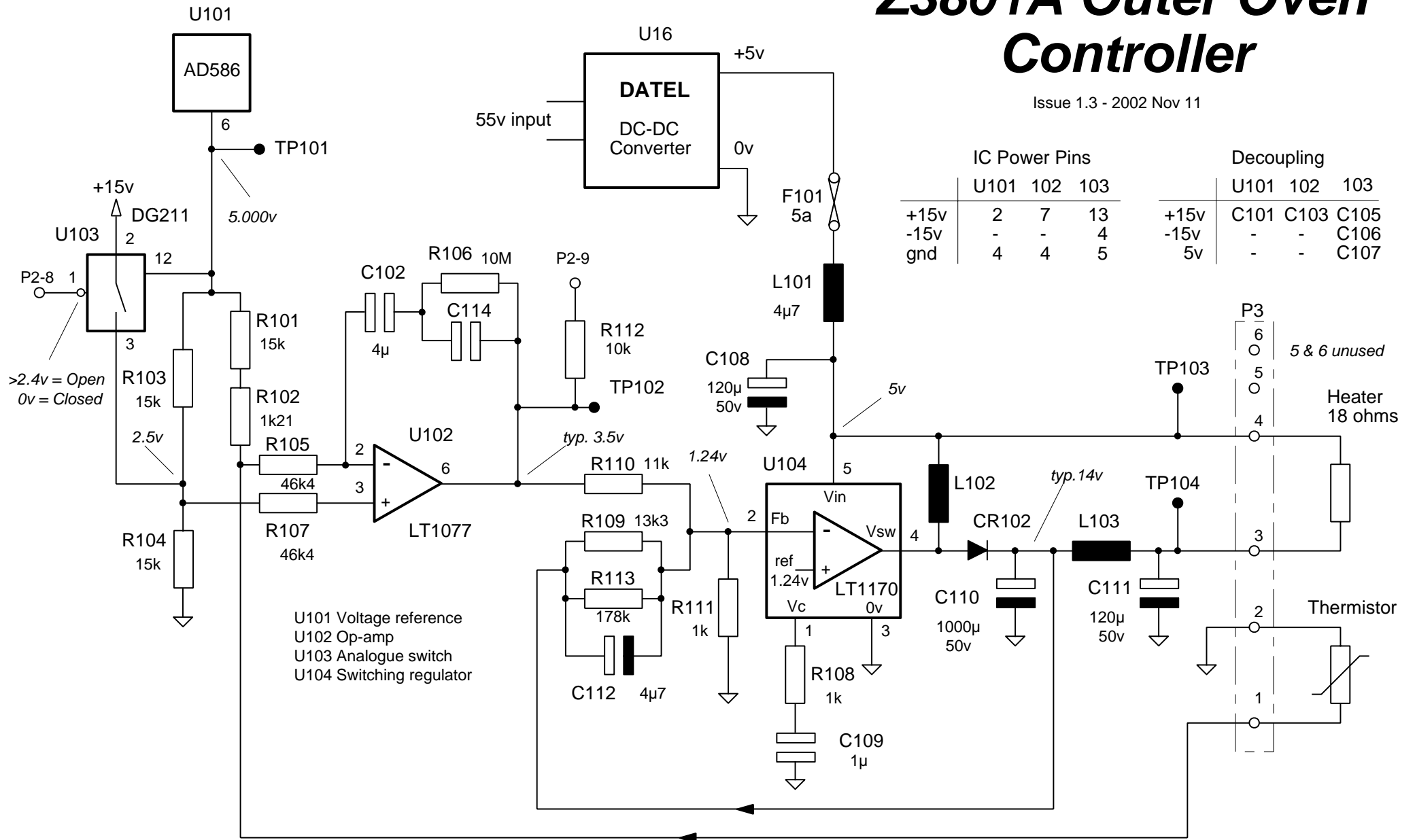
TP104 Heater controlled supply, typically 14v.

Data Sheets

LT1170 : Regulator	http://www.linear-tech.com/pdf/117012ff.pdf
LT1077 : Op-ap	http://www.linear-tech.com/pdf/1077fa.pdf
AD596 : 5v reference	http://www.analog.com/productSelection/pdf/AD586_d.pdf
DG211 : Analog switch	http://www.intersil.com/data/fn/fn3/fn3118/FN3118.pdf

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	IC Power Pins			Decoupling		
	U101	102	103	U101	102	103
+15v	2	7	13	+15v	C101	C103
-15v	-	-	4	-15v	-	C106
gnd	4	4	5	5v	-	C107

