

Ceramic Heating Controller

Features

- High watt density Alumina Heaters
- High current pulse trigger for SCR
- Quickly Heating-Up and Quickly Lost-Heat-Recover
- Dual voltage 120VAC / 240VAC
- Internal 5v zener
- Insensitive to environment temperature
- Auto power off (Optional)
- DIP-8 and SOIC-8 package

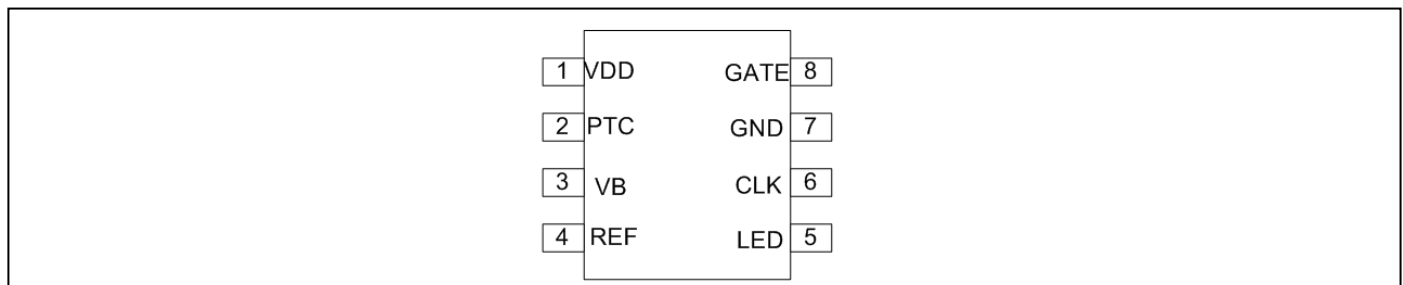
Description

The PT8A330X is specially designed for ceramic heating control system. It can set the temperature continuously .It can drive SCR directly and detect the heater temperature without extra temperature sensor. It has one key, two keys and no key for function setting and has one LED for working state indication. Build-in timer will automatically power off after turn on for 1 hour @ 60Hz or 1.2 hour @ 50Hz (for PT8A3300/1/4/5).

Applications

- Ceramic heating controller

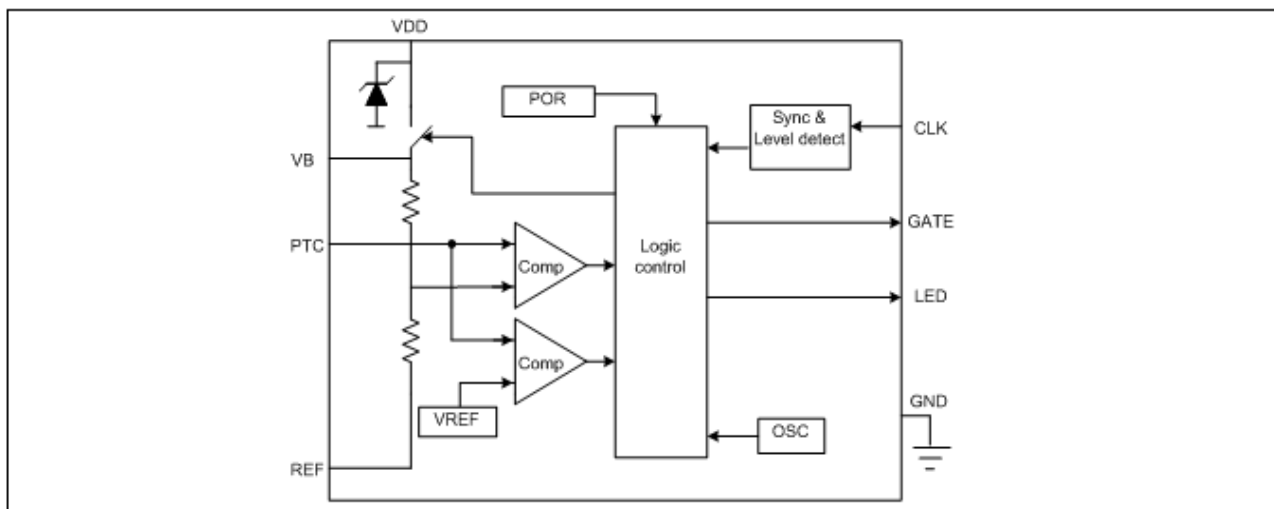
Pin Configuration



Pin Description

Name	Pin No.	Type	Description
VDD	1	power	Power input or can be used as OFF push button input
PTC	2	I	Temperature sensor input and ON push button input in two key option or ON/OFF toggle button in one key option
VB	3	O	Sampling bias voltage
REF	4	O	Reference for internal comparator
LED	5	O	LED driver output
CLK	6	I	Clock input from AC power line
GND	7	power	Power Ground
GATE	8	O	SCR trigger output, active high

Block Diagram



Maximum Ratings

Storage Temperature	-55°C to +150°C
Supply Voltage to Ground Potential (Input & V _{DD} Only).....	-0.5V to +6.5V
Supply Voltage to Ground Potential (Output s Only)	-0.5V to +6.5V
DC Input Voltage	-0.5V to +6.5V
Input/Output Current	50mA
Input/Output Current(Pin VDD, VBonly).....	200mA
Power Dissipation	500mW

Note:

Stresses greater than those listed under MAXIMUM RATINGS may cause permanent damage to the device. This is a stress rating only and functional operation of the device at these or any other conditions above those indicated in the operational sections of this specification is not implied. Exposure to absolute maximum rating conditions for extended periods may affect reliability.

Recommended operation conditions

Symbol	Description	Min	Type	Max	Unit
T _A	Operation Temperature	-20	-	+85	°C
V _{DD}	Supply voltage	4.0	4.5	5.0	V

Electrical Characteristics ($V_{DD} = 4.5$, $T_A = -20 \sim 85^\circ\text{C}$, unless otherwise noted)

DC Electrical Characteristics

Symbol	Description	Test Conditions		Min	Type	Max	Unit
I_{IH}	Input high current	PIN: PTC ,CLK	$V_{IN} = V_{DD}$	-	-	5	μA
I_{IL}	Input low current	PIN: PTC ,CLK, REF	$V_{IN} = \text{GND}$	-	-	-5	μA
R_{REF}	The resistor between REF and GND	PIN: REF	$V_{IN} = 1\text{V}$	20	47	80	K Ohms
I_{OH}	Output High Current	PIN: GATE	$V_{DD} = 4.5\text{V}$ $V_{OUT} = 2.5\text{V}$	-15	-	-	mA
I_{OL}	Output Low Current	PIN: GATE	$V_{DD} = 4.5\text{V}$ $V_{OUT} = 0.5\text{V}$	4.0	-	-	mA
$I_{VB_{SHORT}}$	Output short current	PIN: VB, VB short to GND		IC No break	-	-	mA
R_{ON_VB}	Resistor of switch on	PIN: VDD to VB	$V_{DD} = 4.5\text{V}$ $I_{OUT} = 100\text{mA}$	-	-	15	Ohms
R_{OFF_VB}	Resistor of switch off	PIN: VDD to VB	$V_{DD} = 4.5\text{V}$ $I_{OUT} < 1\mu\text{A}$	5M	-	—	Ohms
R_{ON_TS}	Resistor of Rma_TSet	PIN: VB to REF	$V_{DD} = 4.5\text{V}$ $I_{OUT} = 50\mu\text{A}$	35	-	65	K ohms
I_{OH}	Output High Current	PIN: LED	$V_{DD} = 4.5\text{V}$ $V_{OUT} = 3.5\text{V}$	-3	-	-	mA
I_{OL}	Output Low Current	PIN: LED	$V_{DD} = 4.5\text{V}$ $V_{OUT} = 1.5\text{V}$	5	-	-	mA

Power Supply Characteristics

Symbol	Description	Test Conditions	Min	Type	Max	Unit
V_{POR}	Voltage of POR	-	2.0	-	3.0	V
V_{KON}	Input Threshold Voltage of PTC Pin for key detecting	$R_{ON} = 10\text{ohm}$	0.8	1	1.1	V
I_{DD}	Current consumption	No loading, $V_{DD} = 4.5\text{V}$ (Internal zener doesn't work)	-	200	400	μA
V_{DD}	Supply voltage	$I_{DD} = 0.3 \sim 10\text{mA}$ (according to the zener inside) Control function normal	4.0	-	5.5	V
TPO_{off}	Power off timer	$F_{CLK} = 50\text{Hz}$	1.15	1.2	1.25	Hour

Line Clock Synchronization Characteristics

Symbol	Description	Test Conditions	Min	Type	Max	Unit
F_{CLK}	Frequency of CLK	-	-	50/60	-	Hz
V_{LEVEL}	Input voltage of CLK Pin	-	1.69	1.88	2.07	V
V_{TCLK}	Compare Threshold Voltage of CLK Pin	Low level, AC=220V/50Hz $V_{DD} = 4.5V$,	-200	-250	-300	mV
		High level, AC=220V/50Hz $V_{DD} = 4.5V$,	-100	-150	-200	mV
		Low level, AC=110V/60Hz $V_{DD} = 4.5V$	-240	-190	-140	mV
		High level, AC=110V/60Hz $V_{DD} = 4.5V$	-140	-90	-60	mV

VB and GATE Pulse Characteristics

Symbol	Description	Test Conditions	Min	Type	Max	Unit
T_{al_VB}	Width of VB pulse	$T_A = 25\text{ }^{\circ}\text{C}$, $V_{DD} = 4.5V$	80	100	120	μs
		$V_{DD} = 4.5V$ $T_A = -20 \sim 85\text{ }^{\circ}\text{C}$	60	-	150	μs
T_{al_GATE}	Width of Gate trigger pulse	$T_A = 25\text{ }^{\circ}\text{C}$, $V_{DD} = 4.5V$	160	200	240	μs
		$V_{DD} = 4.5V$ $T_A = -20 \sim 85\text{ }^{\circ}\text{C}$	120	-	300	μs

EMC Electrical Characteristics

Symbol	Description	Test Conditions	Min	Type	Max	Unit
EFT	IEC61000-4-4 Transient/Bursts	EN/IEC61000-4-4 is Electrical fast transient / burst immunity test, requirement > 1000V pulse amplitude ($T_r=5\text{ns}$, $T_w=50\text{ns}$, $Z=50\text{ ohms}$, burst duration 15 ms, burst period 300 ms, burst frequency 2,5 kHz)	2000	-	-	V_{PP}

Temperature Control Characteristics

Symbol	Description	Test Conditions		Min	Type	Max	Unit
VT	Normal heat-up Threshold Voltage	V _{DD} = 4.5V V _{REF} =0.7V Test GATE output about 50% heating power		-	0.5(V _B - V _{REF})	-	V
VTH	Fast heat-up Threshold Voltage	PT8A330xL (x: 0~7)	V _{DD} =4.5V V _{REF} =0.7V Test GATE output about 50% heating power	VT +0.4%(V _B - V _{REF})	VT +0.6%(V _B -V _{REF})	VT +0.8%(V _B - V _{REF})	V
		PT8A330xH (x: 0~7)		VT +1.9%(V _B - V _{REF})	VT +2.1%(V _B -V _{REF})	VT +2.3%(V _B - V _{REF})	
VT(-50C)	ON/OFF key detection Threshold Voltage on Pin PTC	V _{DD} = 4.5V V _{REF} =0.7V Test GATE output about 50% heating power		-	0.27(V _B - V _{REF})	-	V
V _{OS_COMP}	Input Offset Voltage of Comparator	Pin: PTC		-3mV	-	+3mV	mV
T-heat	Heating cycle time	F _{CLK} = 50Hz		-	200	-	ms

Function description

- **Input Button**

One key: (Only for PT8A3304/5/6/7(H/L))

The PTC input will toggle Heating-on and Heating-off key function. Once Heating-on the heater will rise to the desired temperature.

Two key: (Only for PT8A3300/1/2/3(H/L))

Have two buttons to toggle Heating-on and Heating-off respectively.

- **One LED Indicator**

Flash: (Only for PT8A3300/2/4/6)

When turn -on, the LED will flash (1.5Hz @50Hz power CLK) to indicate the heater is being heated, and keep lighting while reaching the desired temperature

Constant (Only for PT8A3301/3/5/7)

The LED will keep lighting after turn-on

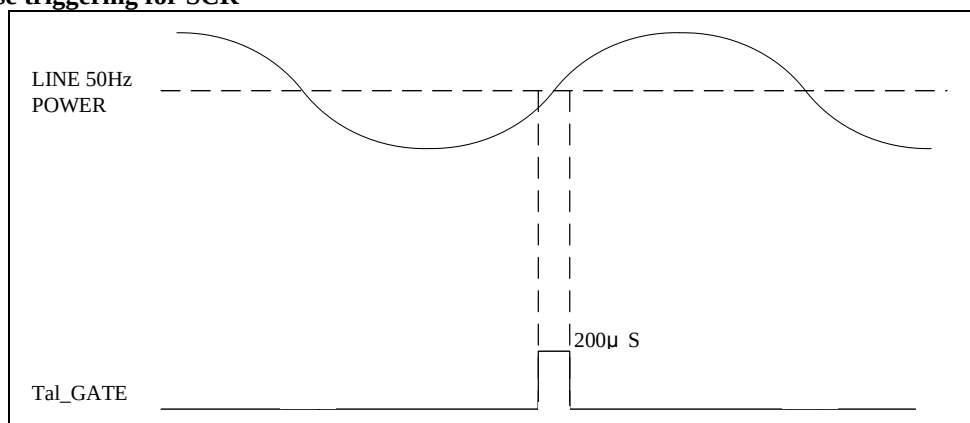
- **Reset**

After power on the chip will be reset by POR circuit, LED is disabled. GATE is low level.

- **Timer**

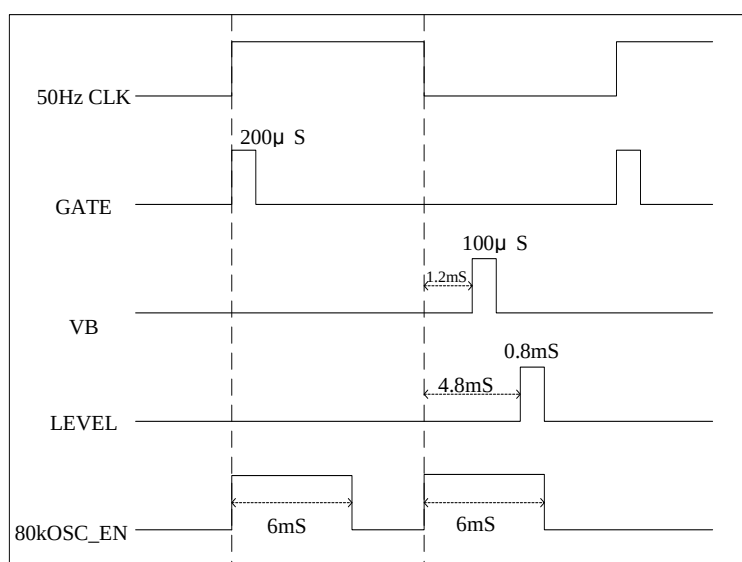
Once push down the ON button and without pushing down the OFF button during the heating-on state, the internal timer will start to count ,After 216000 clock period, the IC will power off the heater until pushing down the ON button again. For the 60Hz CLK signal, the maximal heating time is about 1 hour; and 1.2 hour for 50Hz (for PT8A3300/1/4/5).

High Current pulse triggering for SCR



- High trigger peak current ($>15\text{mA}$), enough to trigger 20A SCR
- Pulse triggering current to reduce the false self trigger by the leakage of SCR at high temperature environment.
- Tal_GATE = 200us

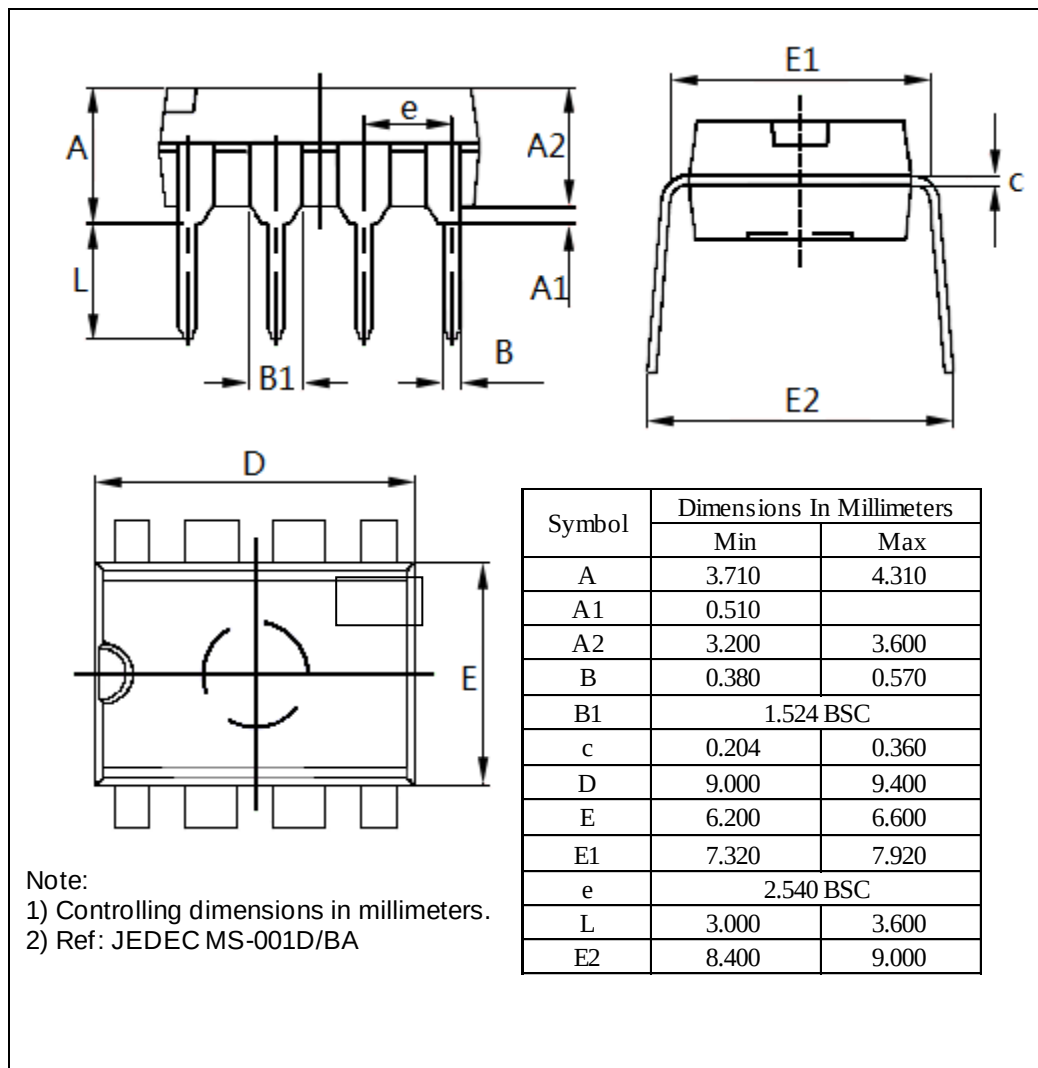
Timing



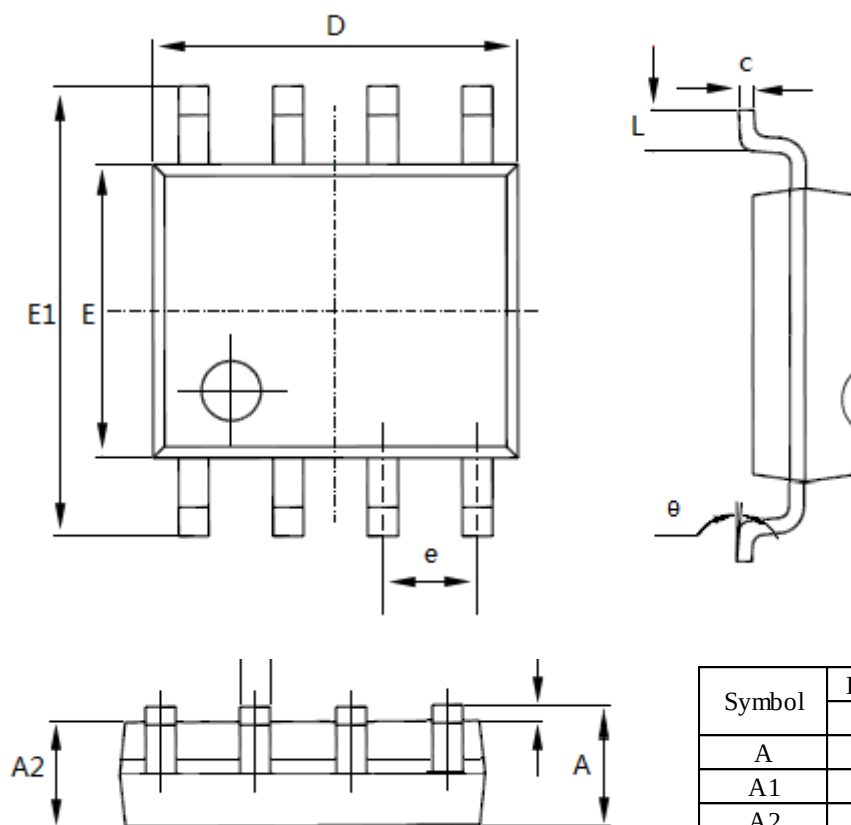
The circuit diagram illustrates a 120/240 VAC LED driver for an alumina heater. The input is connected to a transformer (L) and a diode bridge (D1, D2, D4, D5). The output of the bridge is connected to an SCR (QS) and a diode (D3). The SCR is connected to the alumina heater. The diode bridge output is also connected to a network of resistors (R1, R2, R3, R4, R8, R9, R10, R11, R12, R13) and capacitors (C1, C2, C3). A switch (S1) and a push-button (S2) are connected to the circuit. The PT8A330X LED driver IC is connected to the circuit, with its output driving two LEDs (LED1, LED2) in series with resistors (R6, R7). A note indicates a modification for two key options: adding resistor R3 (510) and switch S1 (SW-PB) in series with the LED driver's VDD pin.

Mechanical Information

PE (DIP-8)



WE (SOIC-8)



Note:

- 1) Controlling dimensions in millimeters.
- 2) Ref: JEDEC MS-012E/AA

Symbol	Dimensions In Millimeters	
	Min	Max
A	1.350	1.750
A1	0.100	0.250
A2	1.350	1.550
b	0.330	0.510
c	0.170	0.250
D	4.700	5.100
E	3.800	4.000
E1	5.800	6.200
e	1.27 BSC	
L	0.400	1.270
θ	0°	8°

Ordering Information

Part No.	Package Code	Package
PT8A330xLPE*	P	Lead free 8-pin DIP
PT8A330xLWE*	W	Lead free and Green 8-pin SOIC
PT8A330xHPE*	P	Lead free 8-pin DIP
PT8A330xHWE*	W	Lead free and Green 8-pin SOIC

Note: *

- “x” shows 0~7 with different function see *Function Comparison Table*.
- E = Pb-free or Pb-free & Green
- Adding X Suffix= Tape/Reel
- *Contact Pericom for availability.

Function Comparison Table

Part No.	LED	Timer	Switch On/OFF		**VTH – VT
PT8A3300H*	Flash	Y	-	Two Key	High overshoot when preheat
PT8A3300L*	Flash	Y	-	Two Key	Low overshoot when preheat
PT8A3301H*	Constant	Y	-	Two Key	High overshoot when preheat
PT8A3301L*	Constant	Y	-	Two Key	Low overshoot when preheat
PT8A3302H*	Flash	N	-	Two Key	High overshoot when preheat
PT8A3302L*	Flash	N	-	Two Key	Low overshoot when preheat
PT8A3303H*	Constant	N	-	Two Key	High overshoot when preheat
PT8A3303L*	Constant	N	-	Two Key	Low overshoot when preheat
PT8A3304H*	Flash	Y	One Key	-	High overshoot when preheat
PT8A3304L	Flash	Y	One Key	-	Low overshoot when preheat
PT8A3305H	Constant	Y	One Key	-	High overshoot when preheat
PT8A3305L	Constant	Y	One Key	-	Low overshoot when preheat
PT8A3306H*	Flash	N	One Key	-	High overshoot when preheat
PT8A3306L*	Flash	N	One Key	-	Low overshoot when preheat
PT8A3307H	Constant	N	One Key	-	High overshoot when preheat
PT8A3307L	Constant	N	One Key	-	Low overshoot when preheat

Note:

- *Contact Pericom for availability.
- ** Refer to page 4