

Heating Controller

Features

- Full power output at 120VAC and 240VAC
- Auto temperature control with NTC
- NTC open protection
- Multi mode LED indicator
- Pulse trigger for high current SCR/TRIAC (up to 100mA)
- Auto Heating off after heating timer timeout (1hour)
- Internal Zener
- Low cost 8-Pin DIP and SOIC package

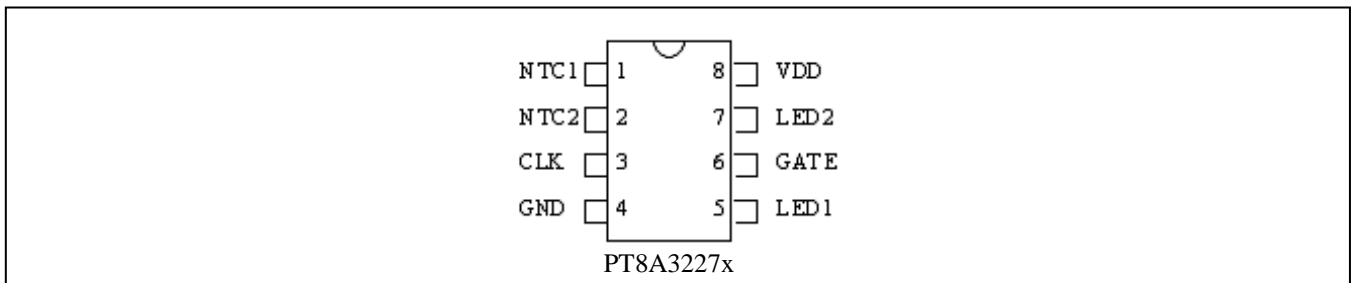
Description

The PT8A3227x are mixed signal CMOS LSI chips designed as heating controller with help of external NTC (Negative Temperature Component). NTC open protection is implemented for device safety.

Applications

- Curler
- Straightener

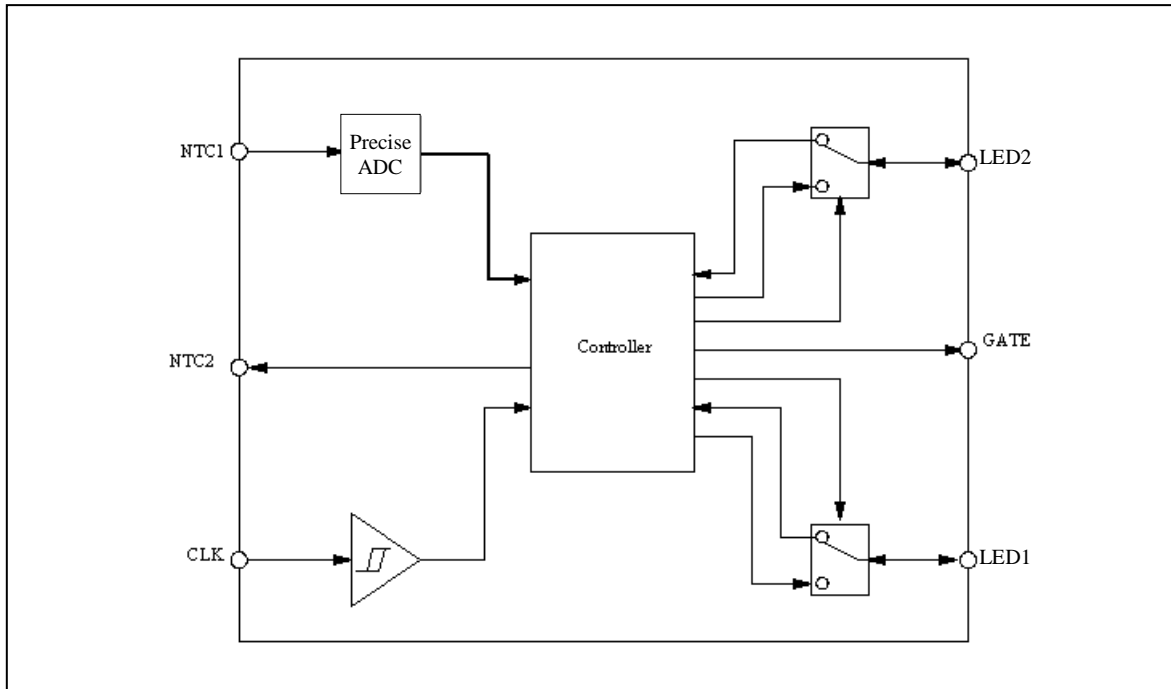
Pin Configuration



Pin Description

Part No.	Pin No.	I/O	Description
NTC1	1	I	NTC voltage input, NTC open detection input
NTC2	2	O	Output signal for NTC open detection
CLK	3	I	Clock input from power line
LED1	5	I/O	LED1 driving output
GATE	6	O	SCR/TRIAC trigger output
LED2	7	I/O	LED2 driving output
GND	4	Power	Ground and Power
VDD	8		

Block Diagram



Maximum Ratings

Storage Temperature	-65°C to +150°C
Supply Voltage to Ground Potential (Input & V _{DD} Only).....	-0.5V to +5.5V
Supply Voltage to Ground Potential (Outputs Only)	-0.5V to +5.5V
DC Input Voltage	-0.5V to +5.5V
DC Output Current	20mA
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	Pin	Parameter	Min	Typ	Max	Unit
Frequency	CLK	Input CLK Frequency	-	50/60	-	Hz
T _A	-	Operating temperature	-20	-	85	°C

AC Electrical Characteristics

(T_A = -20 ~ 85 °C, unless otherwise noted)

Symbol	Description	Test Conditions	Min	Type	Max	Unit
F _{CLK}	Frequency of CLK	-	-	50/60	-	Hz
T _{GATE}	Width of trigger pulse	V _{DD} =4.0~5.5V	240	300	360	µS
Timer	Power off timer	F _{CLK} = 50Hz/60Hz	59	60	61	Minute

DC Electrical Characteristics ($V_{DD} = 4.0 \sim 5.5$, $T_A = -20 \sim 85$ °C, unless otherwise noted)

Symbol	Description	Test Conditions		Min	Type	Max	Unit
I_{IH}	Input high current	PIN: CLK	$V_{IN} = V_{DD}$	-	-	1	μA
		PIN: NTC1	$V_{IN} = V_{DD}$	-	-	1	μA
		PIN: NTC2	$V_{IN} = V_{DD}$, Output High impedance	-	-	1	μA
I_{IL}	Input low current	PIN: CLK	$V_{IN} = GND$	-	-	-1	μA
		PIN: NTC1	$V_{IN} = GND$	-	-	-1	μA
		PIN: NTC2	$V_{IN} = GND$, Output High impedance	-	-	-1	μA
I_{OH}	Output High current	PIN: GATE	$V_{DD} = 4.5V, V_{out} = 0.7V$, pulse following rise edge	-3.5	-4.5	-5.5	mA
			$V_{DD} = 4.5V, V_{out} = 0.7V$, pulse following fall edge	-60	-75	-	mA
		PIN: LED1	$V_{DD} = 4.5V, V_{out} = 1.9V$	-1	-	-	mA
		PIN: LED2	$V_{DD} = 4.5V, V_{out} = 3.1V$	-45	-	-180	μA
I_{OL}	Output Low current	PIN: NTC2	$V_{DD} = 4.5V$ $V_{out} = 0.5V$	4.5	-	-	mA
		PIN: GATE	$V_{DD} = 4.5V$ $V_{out} = 0.5V$	4.5	-	-	mA
		PIN: LED2	$V_{DD} = 4.5V, V_{out} = 2.6V$	1	-	-	mA
V_{NTC1}	Input Voltage1 of NTC1 Pin	$V_{DD} = 4.5V$		1.960	1.980	2.000	V
V_{NTC2}	Input Voltage2 of NTC1 Pin	$V_{DD} = 4.5V$		2.095	2.115	2.135	V
V_{NTC3}	Input Voltage3 of NTC1 Pin	$V_{DD} = 4.5V$		2.230	2.250	2.270	V
V_{NTCO}	Input NTC open Voltage of NTC1 Pin	-		1.1	1.28	1.4	V
$V_{T_{CLK}}$	Input Threshold Voltage of CLK Pin for detect Power level	VTL_Level $V_{DD} = 4.5V$		1.7	1.9	2.1	V
	Input Threshold Voltage of CLK Pin in CLK rise edge	VTL_CLK1	$V_{DD} = 4.5V$ VT_Level2 is high	-180	-226	-275	mV
		VTH_CLK1		-141	-176	-211	mV
		VTL_CLK1	$V_{DD} = 4.5V$ VT_Level2 is low	-135	-168	-201	mV
		VTH_CLK1		-95	-118	-141	mV
	Input Threshold Voltage of CLK Pin in CLK fall edge	VTL_CLK2	$V_{DD} = 4.5V$ VT_Level2 is high	154	192	230	mV
		VTH_CLK2		194	242	290	mV
		VTL_CLK2	$V_{DD} = 4.5V$ VT_Level2 is low	96	120	144	mV
VTH_CLK2		136		170	204	mV	
V_{POR}	Voltage of POR	-		2.7		3.7	V
V_Z	Voltage of Zener	$I_{DD} = 500\mu A \sim 10mA$		4.5	5.0	5.5	V
I_{DD}	Current consumption	NTC1, CLK pin tied to ground $V_{DD} = 4.5V$		-	-	500	μA

Functional Description

- **State description**

- **Reset**

The device will be of reset state after power-on.

- **Heating on**

The device will be in heating-on state after power on.

- **Heating off**

This device enters heating-off state after its power-on reset enabled or heating timer timeout.

- **NTC open protection**

When NTC is open, NTC1 pin will be pulled low in the NTC open detection period.

- **Timer**

If the timer is enabled, the IC will be auto heating-off after working 1 hour in any case of 50Hz and 60 Hz.

- **Control signal output**

When working in Heating-on state, Gate/LED output will be related to NTC1 input and CLK input amplitude.

Effect of NTC and $V_{T_{CLK}}$ (Level 2) on GATE and LED indication

Working State	NTC (NTC open detection)	NTC (Normal temp detection)	LED			
			Flash		No Flash	
			Mode1		Mode1	
			LED1	LED2	LED1	LED2
ON	$V_{NTCO} \sim V_{DD}$	$0 \sim V_{NTC1}$	Flash1*	On	On	Off
		$V_{NTC1} \sim V_{DD}$	On	Flash1	On	On
Off		X	Off	Off	Off	Off
X	$0 \sim V_{NTCO}$	X	Flash2*	Invert LED1	Flash2	Invert LED1

*Note: 1) X means any input.

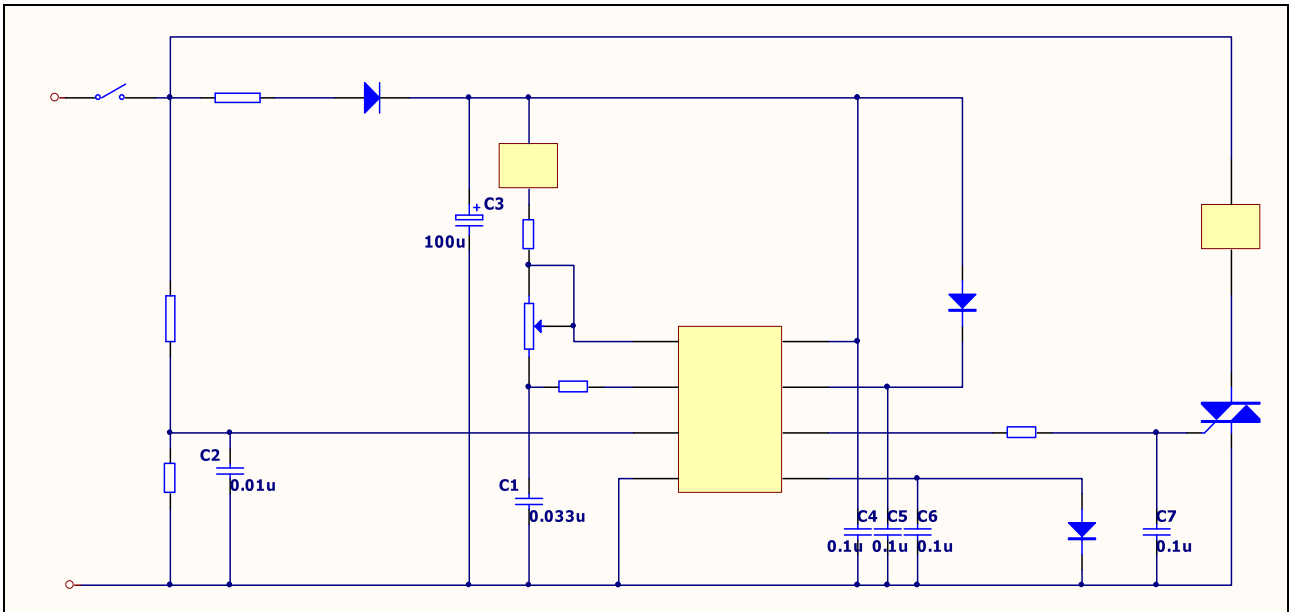
2) Flash1 frequency is 1/32 clock from pin CLK.

3) Flash2 frequency is 1/8 clock from pin CLK.

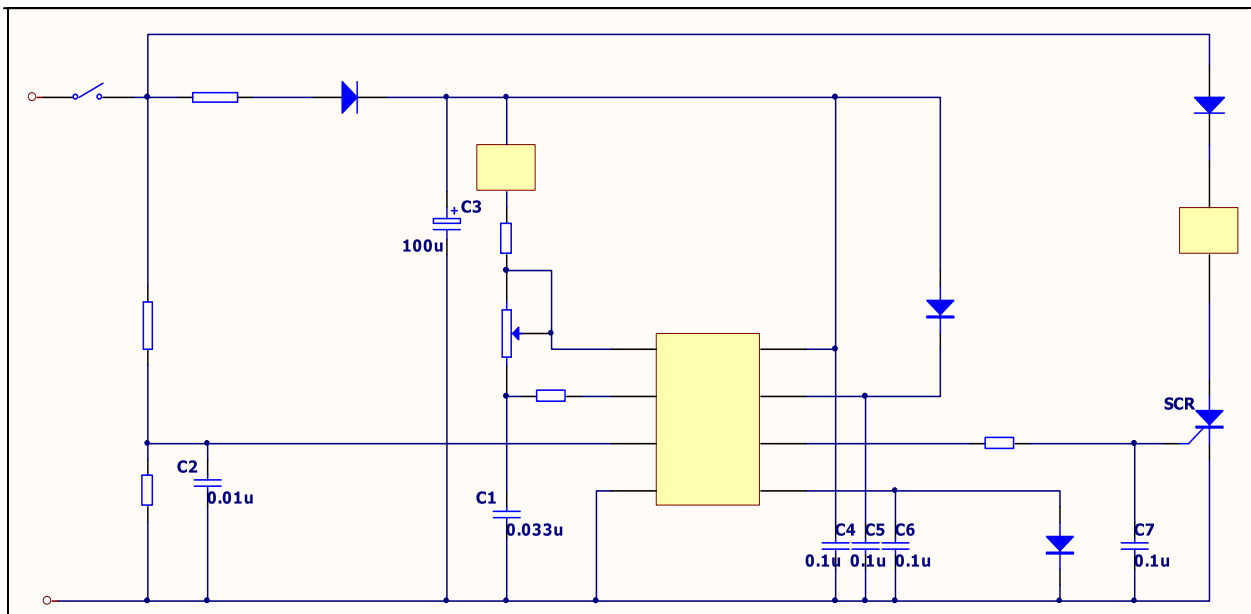
Working State	NTC (NTC open detection)	NTC (Normal temp detection)	GATE (trigger to SCR/TRIAC)
ON	$V_{NTCO} \sim V_{DD}$	$0 \sim V_{NTC1}$	100%
		$V_{NTC1} \sim V_{NTC2}$	50%
		$V_{NTC2} \sim V_{NTC3}$	25%
		$V_{NTC3} \sim V_{DD}$	0
Off		X	0
X	$0 \sim V_{NTCO}$	X	0

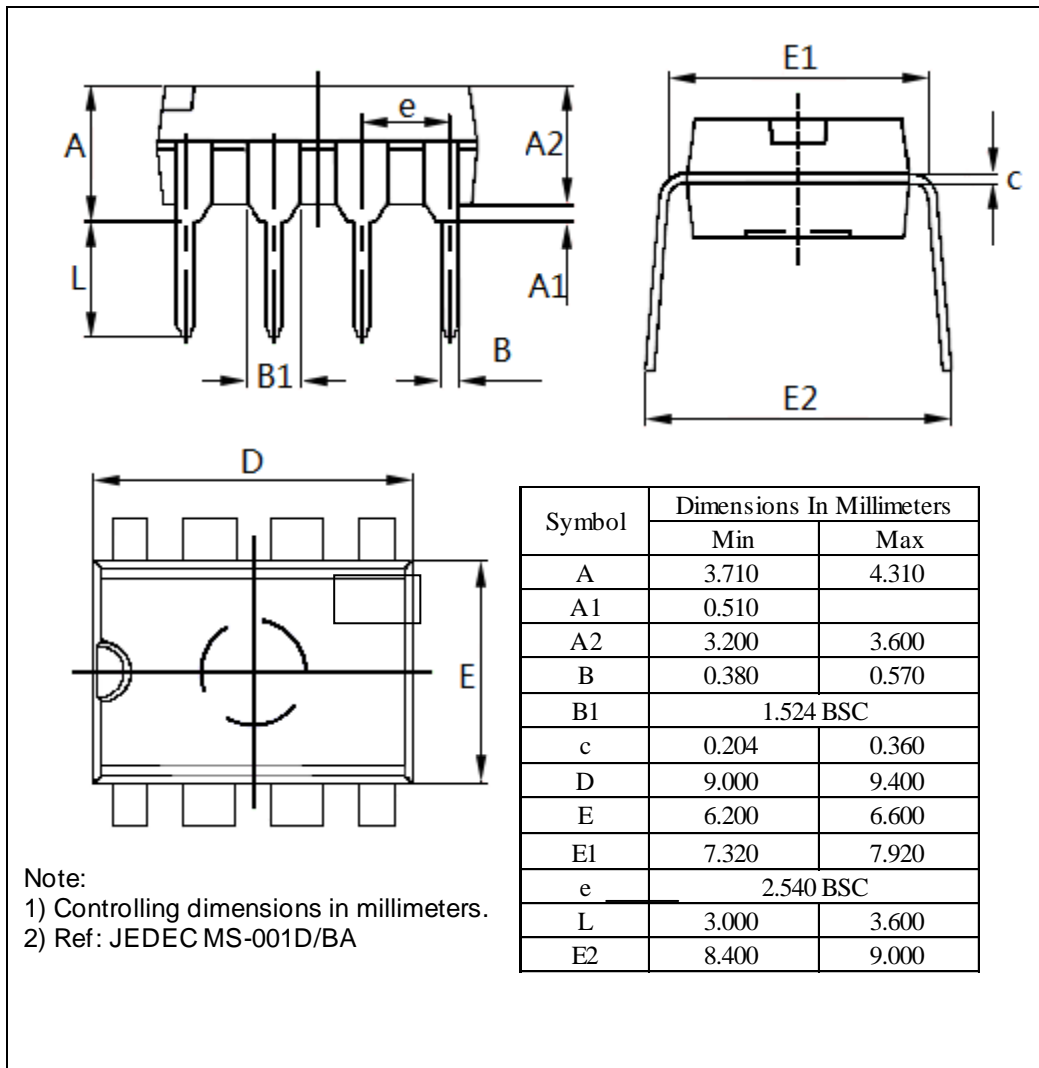
Application Circuit

1. Application circuit for PT8A3227x with TRIAC driving

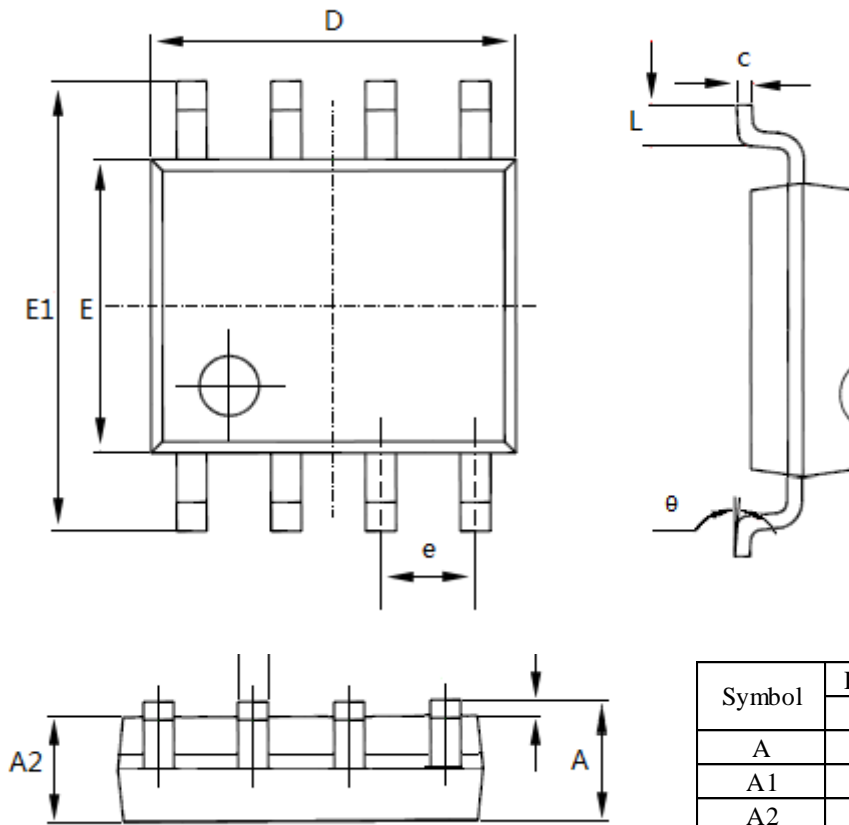


2. Application circuit for PT8A3227x with SCR driving



Mechanical Information
PE (Lead free DIP-8)


WE (Lead free and Green 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
PT8A3227xPE	P	Lead free 8-Pin DIP
PT8A3227xWE	W	Lead free and Green 8-Pin SOIC

Note: “x” shows different suffix. See *Function Comparison Table*.

- E = Pb-free or Pb-free & Green
- Adding X Suffix= Tape/Reel

Function Comparison Table

Part No.	LED		Timer	Switch (Key)	Pulse width(μS)
	Flash	Mode			
PT8A3227	Y	1	Y	No	300
PT8A3227A	N	1	Y	No	300
PT8A3227D*	Y	1	N	No	300
PT8A3227E*	N	1	N	No	300

*Note: Contact Pericom for availability.