Water Filled Radiator

Features

- ON/OFF and TIMER Input Button (PT8A3410/11)
- VR and NTC1 input for precise ADC
- 5 LED Indicator (PT8A3410/11) or 2 LED Indicator (PT8A3412/13)
- Lead free DIP-16 and SOIC-16

Description

The PT8A341x is specially designed for water filled radiator control system. It can drive two relays respectively and detect the heater's temperature with NTC sensor's input. It has two ADC input for temperature setting and detecting, and has LEDs for user interface.

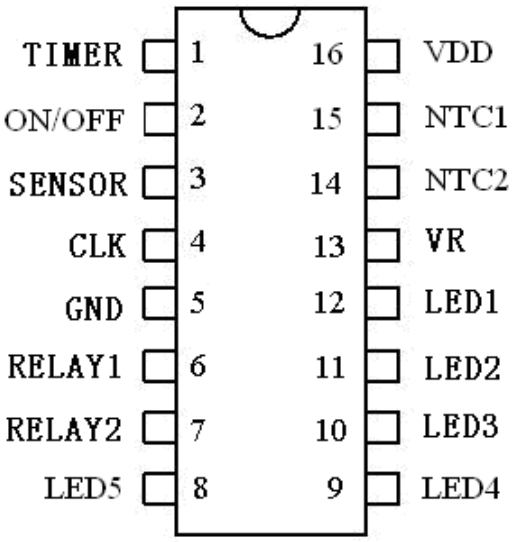
Advantages

- Manual Resetting Thermal Cut Out
- Over-Heating Cut Out Auto Resetting
- No water Over-Heating Cut Out NTC
- NTC sensor open/close Cut Out 105T
- 105T Steady Heating (No ON/OFF)
- Trip Over Safety
- Auto Self-Check
- Special Relay Drive Technology, expand the total work-life

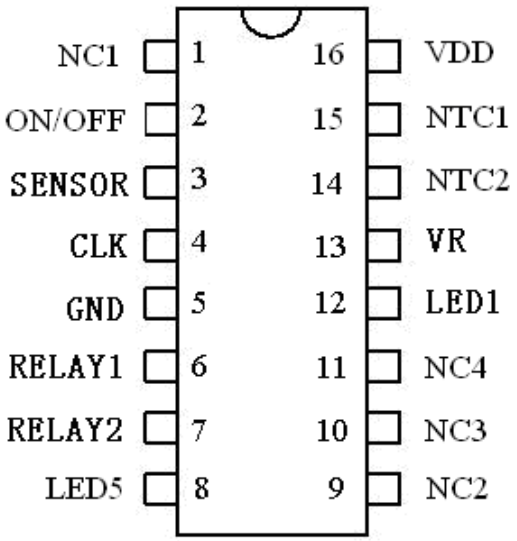
Application

- Water Filled Radiator

Pin Configuration



PT8A3410/11



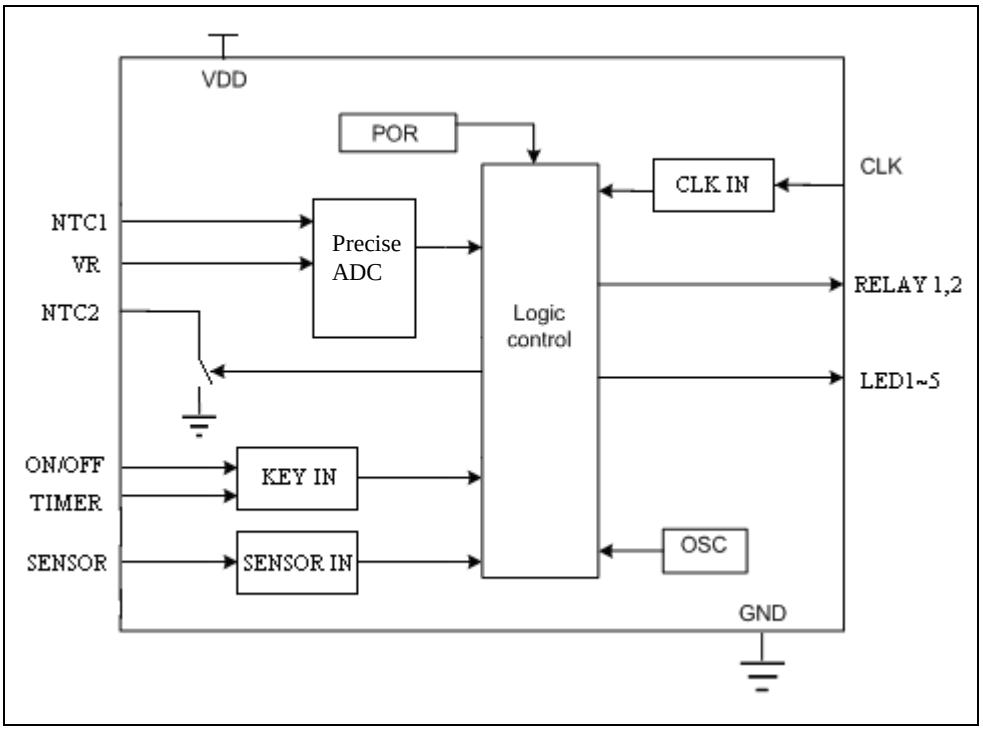
PT8A3412/13

Pin Description

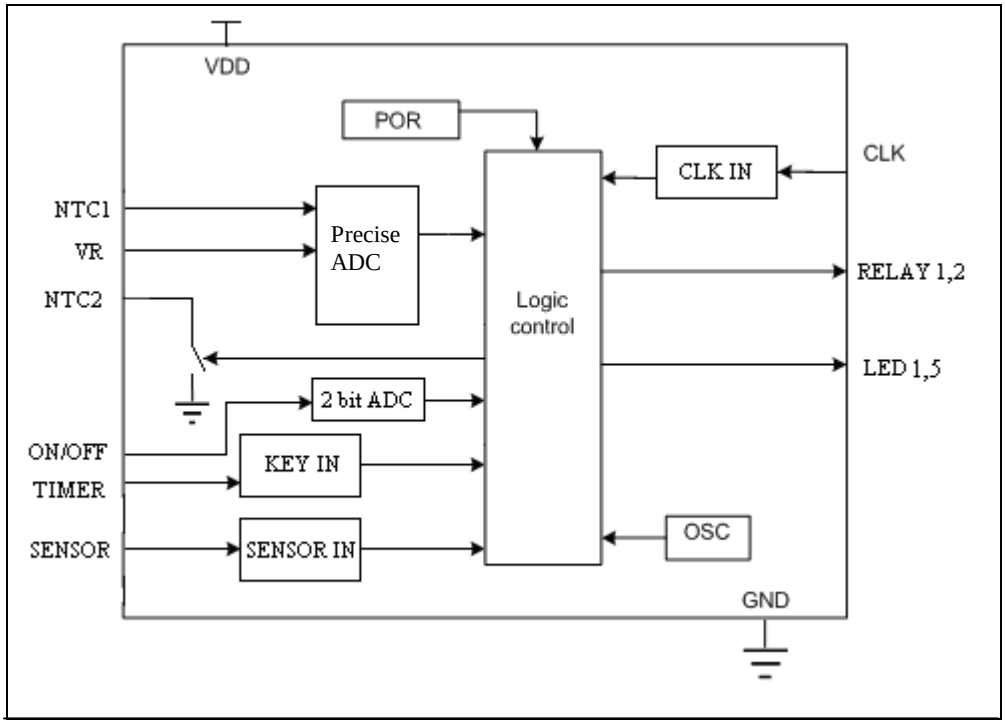
Pin No.	Name	Type	Description
1	TIMER(3410/11)	I	PT8A3410/11: The timer mode switch input(internal up-pull)
	NC1(3412/13)	-	PT8A3412/13: N/A
2	ON/OFF	I	PT8A3410/11: On/off switch input(internal up-pull) PT8A3412/13: Level ADC input
3	SENSOR	I	Trip detection input
4	CLK	I	Clock input from AC power line
5	GND	Power	Power ground
6	RELEY1	O	Low power Relay drive output
7	RELAY2	O	High power Relay drive output
8	LED5	O	On/off state indication
9	LED4(3410/11)	O	PT8A3410/11: 8 hour timer work indication
	NC2(3412/13)	-	PT8A3412/13: N/A
10	LED3(3410/11)	O	PT8A3410/11: 4 hour timer work indication
	NC3(3412/13)	-	PT8A3412/13: N/A
11	LED2(3410/11)	O	PT8A3410/11: 2 hour timer work indication
	NC4(3412/13)	-	PT8A3412/13: N/A
12	LED1	O	Work state indication
13	VR	I	Temperature adjusting voltage input , to connect the adjustable resistor
14	NTC2	O	NTC open detection
15	NTC1	I	NTC sensor voltage input
16	VDD	Power	Power supply

Block Diagram

PT8A3410/11



PT8A3412/13



Maximum Ratings

Storage Temperature	-55°C to +150°C
Ambient Temperature with Power applied	-20°C to +85°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, GND only)	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

Sym	Parameter	Pin	Min	Typ	Max	Unit
V_{DD}	Supply voltage	VDD	4.5	5.0	5.5	V
T_A	Operating temperature	-	-20	-	85	℃

DC Electrical Characteristics (V_{DD} = 5.0V, T_A = -20 ~ 85 ℃, unless otherwise noted)

DC Input Electrical Characteristics

Symbol	Description	Test Conditions		Min	Type	Max	Unit
I_{IH}	Input high current	Pin: CLK, SENSOR,	$V_{IN} = V_{DD}$	-	-	1	μA
		Pin: VR, NTC1		-	-	1	μA
		Pin: TIMER, ON/OFF		-	-	1	μA
I_{IL}	Input low current	Pin: CLK, SENSOR,	V_{IN} = GND	-1	-	-	μA
		Pin: VR, NTC1		-1	-	-	μA
		Pin: TIMER, ON/OFF		-	-60	-	μA
V_-	Smitt low threshold	Pin: SENSOR		$0.22V_{DD}$	$0.3V_{DD}$	$0.38V_{DD}$	NA
V_+	Smitt high threshold	Pin: SENSOR		$0.4\ V_{DD}$	0.5VDD	$0.6\ V_{DD}$	NA
V_{TH}	Input threshold voltage	Pin: TIMER, ON/OFF(PT8A3410/11)		$0.3\ V_{DD}$	-	$0.7\ V_{DD}$	NA

DC Output Electrical Characteristics

Symbol	Description	Test Conditions		Min	Type	Max	Unit
I_{OH1}	Output High Current	PIN: RELAY1,2	V_{DD} = 5V V_{OUT} = 1V	-0.4		-1.2	mA
I_{OL1}	Output Low Current		V_{DD} = 5V V_{OUT} =0.5V	5			mA
I_{OH2}	Output High Current	PIN: LED1~5	V_{DD} = 5V V_{OUT} = 4.5V	-5			mA
I_{OL2}	Output Low Current		V_{DD} = 5V V_{OUT} =0.5V	2			mA
I_{OL3}	Output Low Current	PIN: NTC2	V_{DD} = 5V V_{OUT} =0.5V	10			mA

Power Supply Characteristics

Symbol	Description	Test Conditions	Min	Type	Max	Unit
V_{POR}	Voltage of power on reset	-	2	2.5	3	V
V_{NTCO}	Threshold voltage of NTC open	-	0.8	1	1.2	V
V_{NTCS}	Threshold voltage of NTC short circuit	-	4.5	4.7	4.9	V
I_{DD}	Current consumption	No loading, V_{DD} = 5V	-	300	400	μA

ON/OFF input level (PT8A3412/13)

Input level(V)	Working state
0<X<1.5	OFF
1.5<X<2.5	L
2.5<X<3.5	M
3.5<X<4.5	H

TIMER (PT8A3410/11)

Symbol	Description	Test Conditions	Min	Type	Max	Unit
T_{2h}	-	Set timer=2 hour,50Hz	1.9	2	2.1	hour
		Set timer=2 hour,60Hz	1.9	2	2.1	hour

ADC (Pin: VR, NTC1)

Symbol	Description	Test Conditions	Min	Type	Max	Unit
V_{PRE}	1 bit precision, the ADC has 10bit totally	V_{DD} = 5V	4	5	6	mV
V_{REF}	Reference voltage	-	-	5	-	V

Functional Description

- **Two Input Button**
  ON/OFF:
  PT8A3410/11: It is toggled ON state or OFF state
  PT8A3412/13: It is a 2 bit ADC input to set the work states

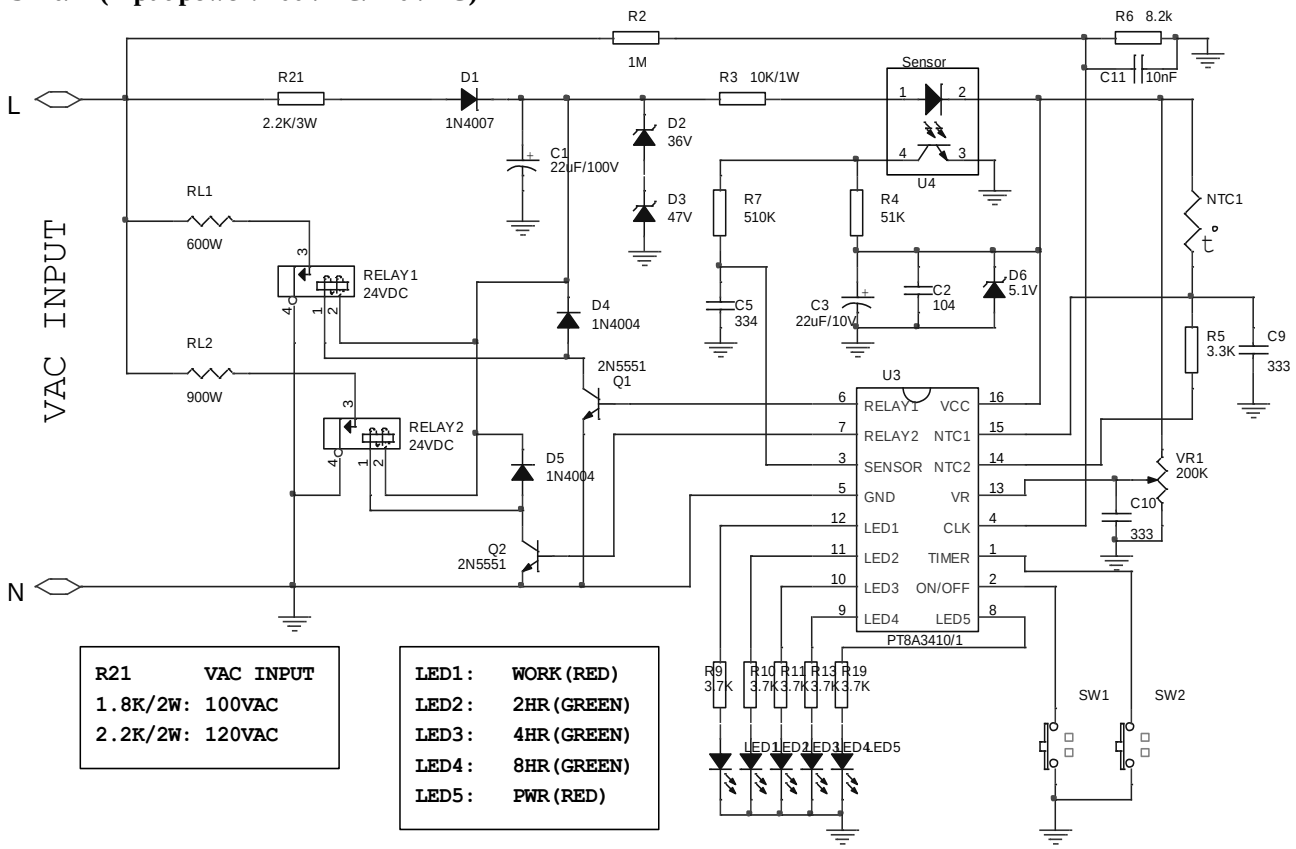
  TIMER:

  It can switch 2,4,6,8,10,12,14 hours timer state (PT8A3410/11)

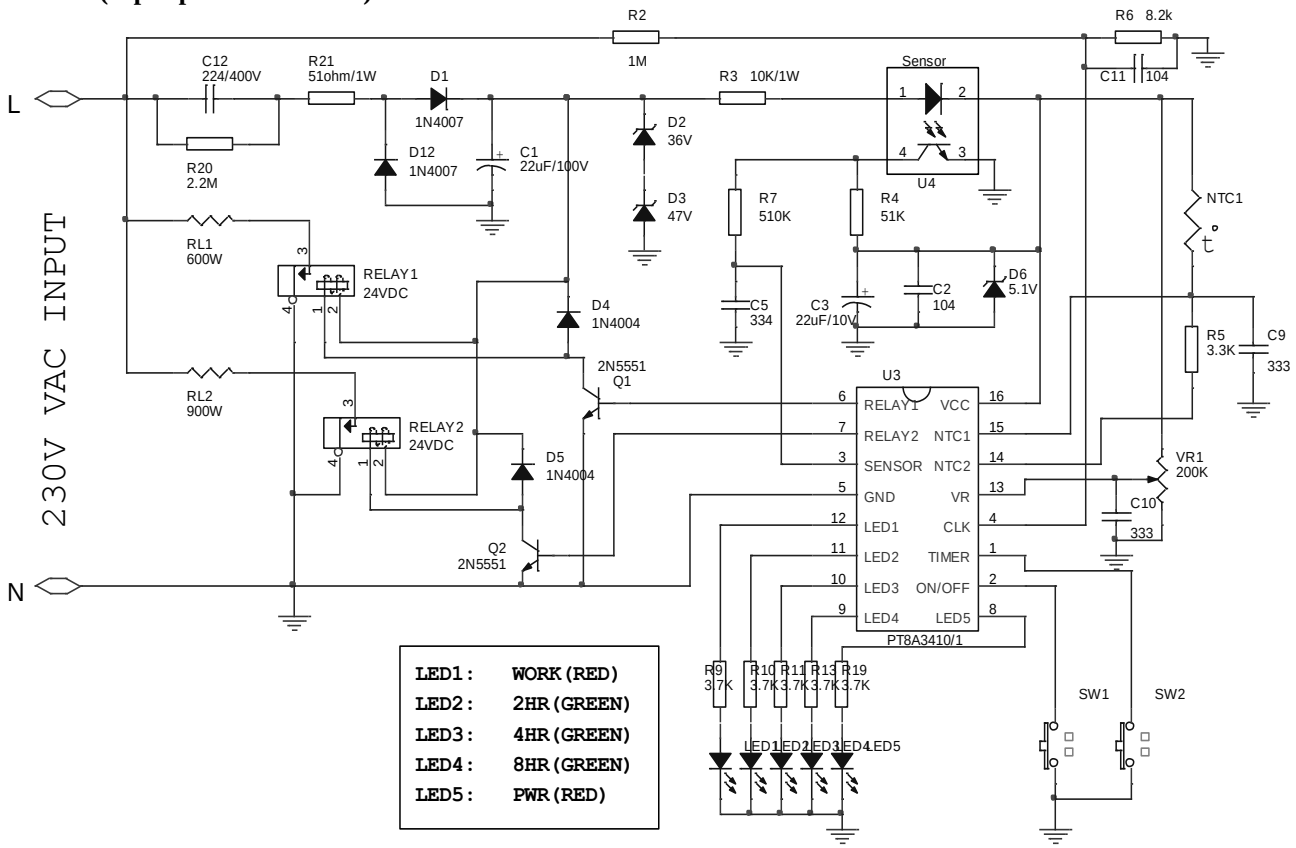
- **5 LED Indicator**
  LED1: Work state indication
  LED2: 2 hour timer work indication (PT8A3410/11)
  LED3: 4 hour timer work indication (PT8A3410/11)
  LED4: 8 hour timer work indication (PT8A3410/11)
  LED5: On/off state indication

Application Circuit

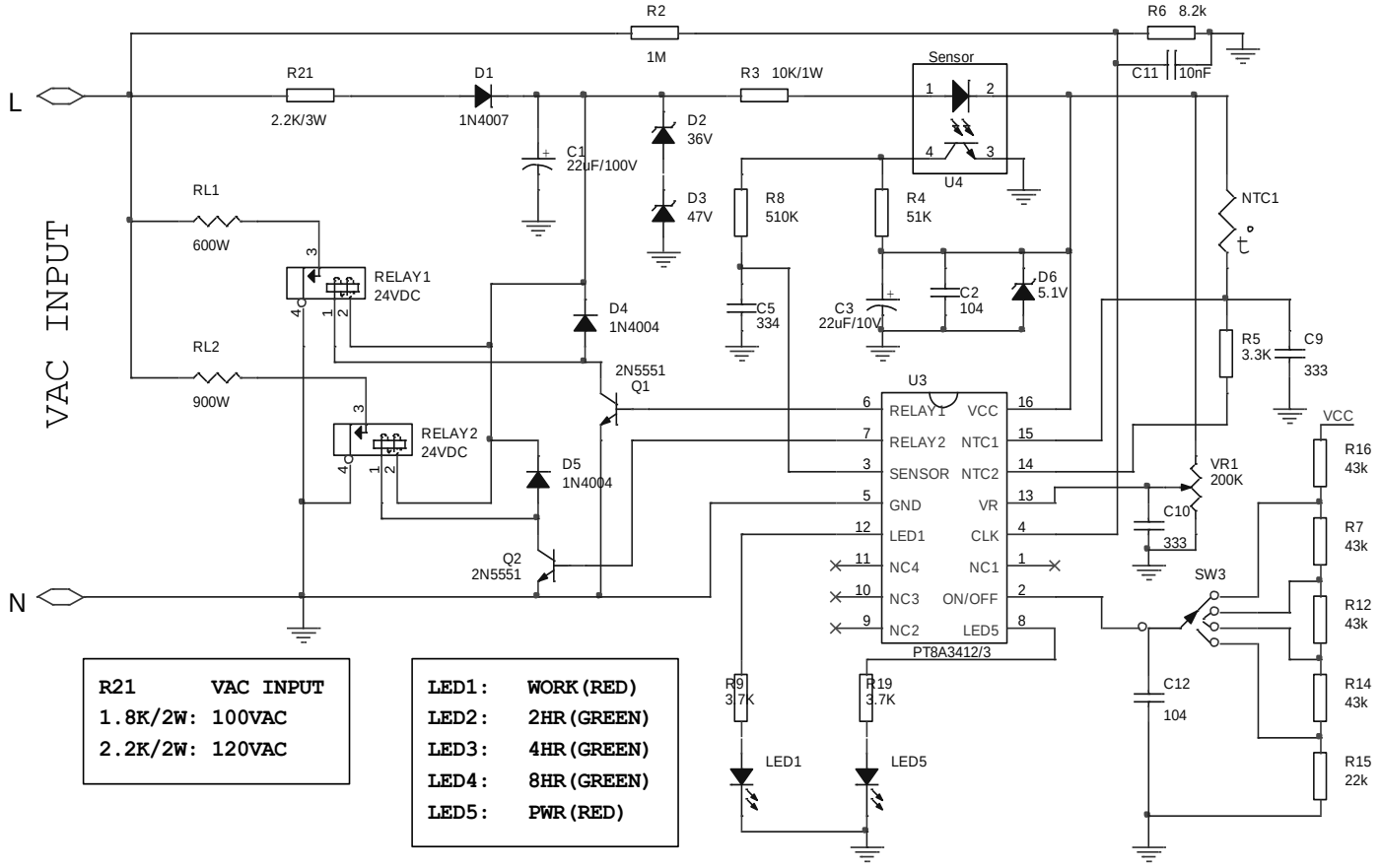
PT8A3410/11(Input power: 100VAC/120VAC)



PT8A3410/11(Input power: 230VAC)



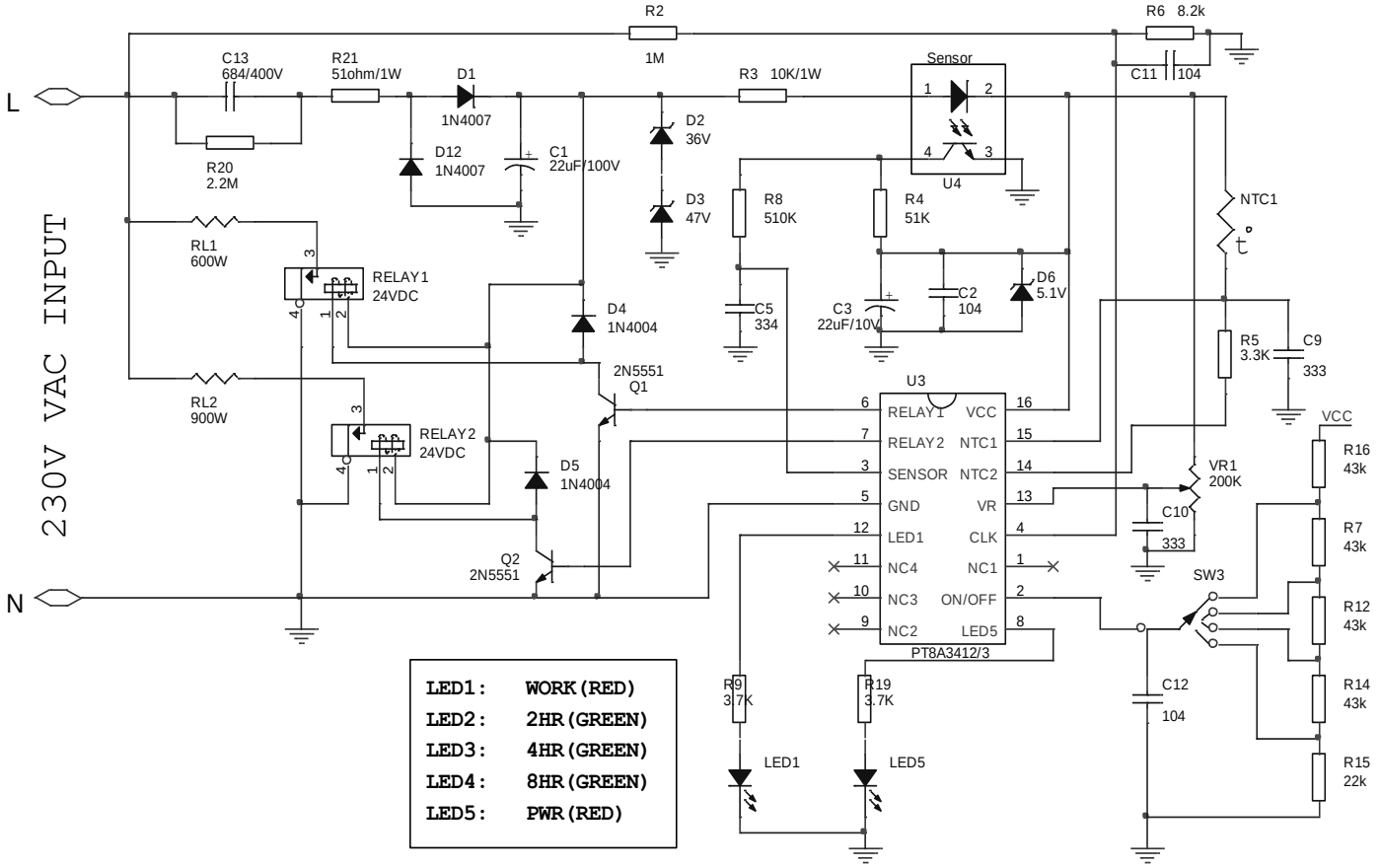
PT8A3412/13(Input power: 100VAC/120VAC)



R21	VAC INPUT
1.8K/2W:	100VAC
2.2K/2W:	120VAC

LED1:	WORK(RED)
LED2:	2HR(GREEN)
LED3:	4HR(GREEN)
LED4:	8HR(GREEN)
LED5:	PWR(RED)

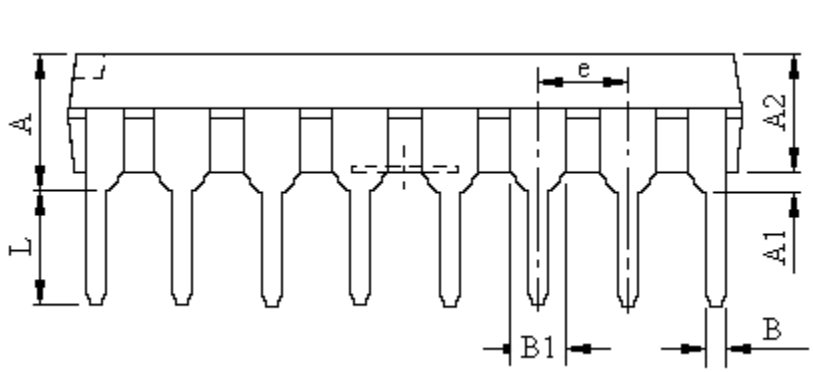
PT8A3412/13(Input power: 230VAC)

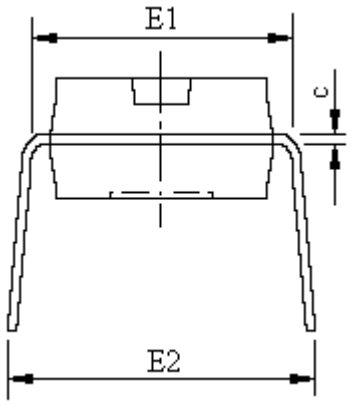


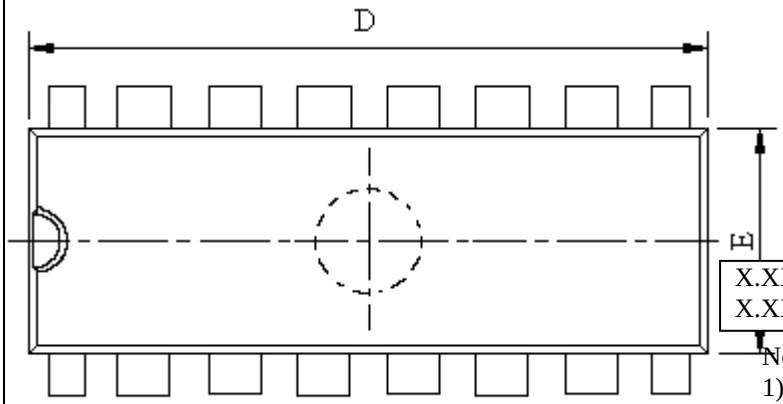
LED1:	WORK(RED)
LED2:	2HR(GREEN)
LED3:	4HR(GREEN)
LED4:	8HR(GREEN)
LED5:	PWR(RED)

Mechanical Information

PE (Lead free DIP-16)







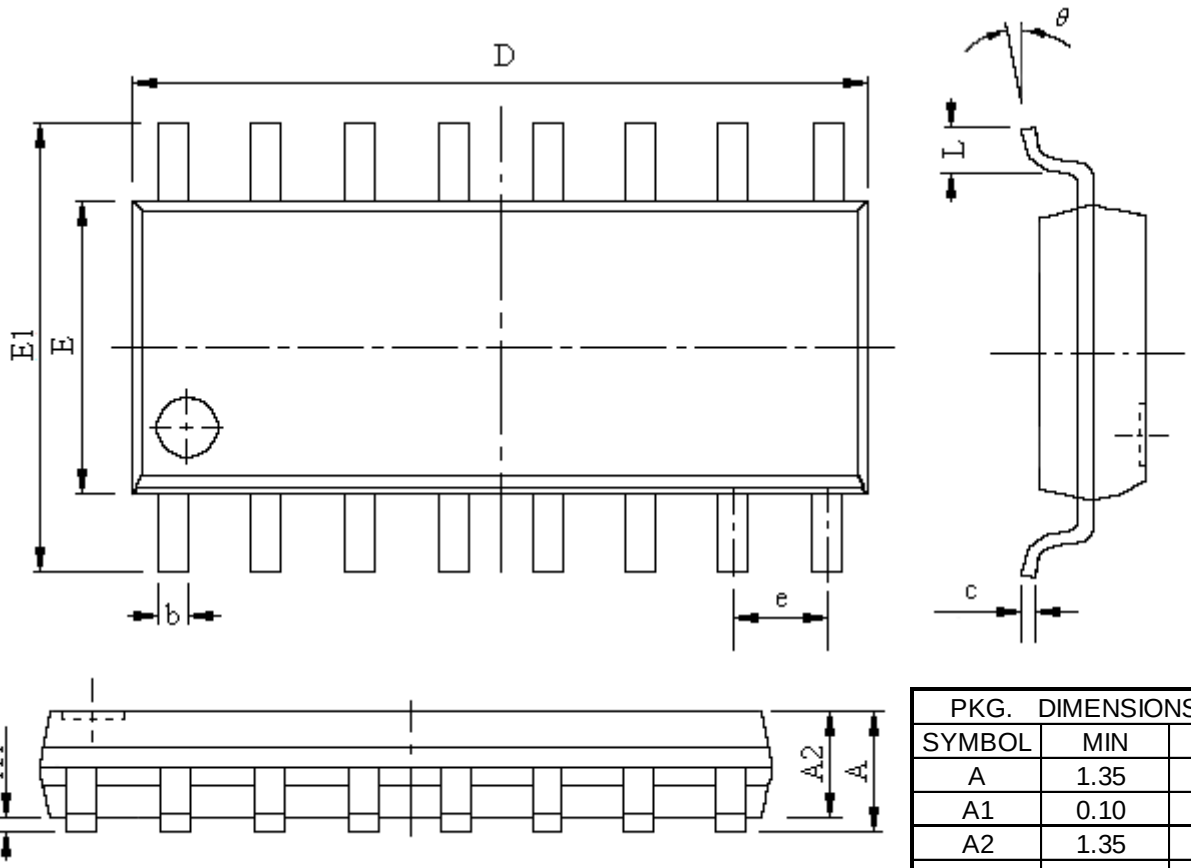
DENOTES DIMENSIONS
IN MILLIMETERS

Note:
1) Controlling dimensions in millimeters.
2) Ref: JEDEC MS-001D/BB

PKG.	DIMENSIONS(MM)	
SYMBOL	Min	Max
A	3.71	4.31
A1	0.51	
A2	3.20	3.60
B	0.38	0.57
B1	1.52 BSC	
c	0.20	0.36
D	18.80	19.20
E	6.20	6.60
E1	7.32	7.92
e	2.54 BSC	
L	3.00	3.60
E2	8.40	9.00

Note:
1) Controlling dimensions in inches.
2) Ref: JEDEC MS-001 AB

WE (Lead free SOIC-16)



PKG. DIMENSIONS(MM)		
SYMBOL	MIN	MAX
A	1.35	1.75
A1	0.10	0.25
A2	1.35	1.55
b	0.33	0.51
c	0.17	0.25
D	9.80	10.20
E	3.80	4.00
E1	5.80	6.20
e	1.27 BSC	
L	0.40	1.27
θ	0°	8°

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

Ordering Information

Part No.	Package Code	Package
PT8A341xPE	P	Lead free DIP-16
PT8A341xWE	W	Lead free SOIC-16

Note:
- "x" shows 0~4 with different function, see *below Function Comparison Table*.
- E = Pb-free
- Adding X Suffix= Tape/Reel

Function Comparison Table

P/N	Difference Description	Frequency
PT8A3410	Control on/off and timer with key	50Hz
PT8A3411		60Hz
PT8A3412	Control temperature range and off with VR	50Hz
PT8A3413		60Hz