

## PIR Sensor Light Switch Controller

### Features

- 2-stage operational amplifier for filter
- CDS to disable output during daytime
- Timings are fully adjustable with external RC components
- High level output for relay and triac drive with optical-coupler
- Built-in noise rejection circuit
- On-chip regulator
- Force on function
- Both AC and DC operating
- Operating voltage: 5V
- Few external components
- Lead free DIP-16 and SOIC-16 package

### Application

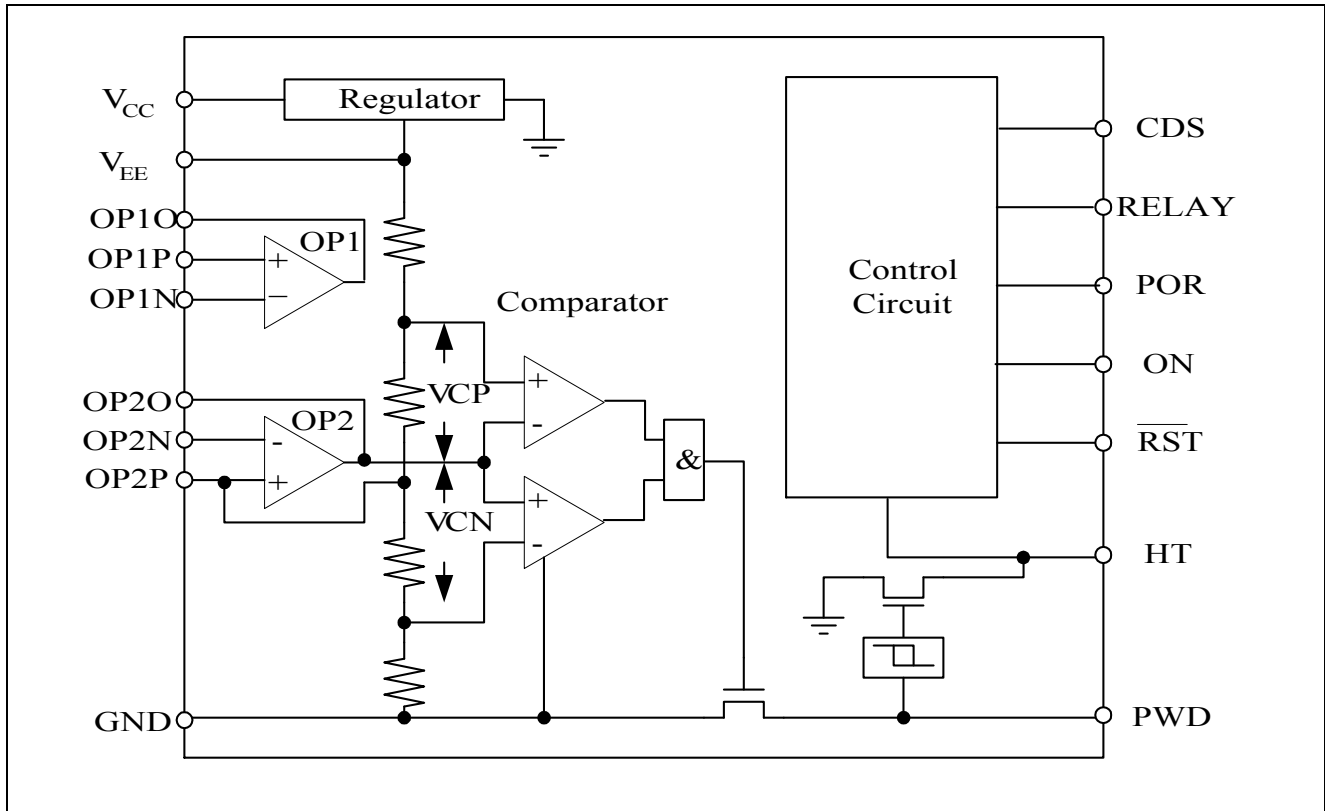
- Energy saving auto-switch in Garden, kitchen, bathroom, corridor, storage or yard

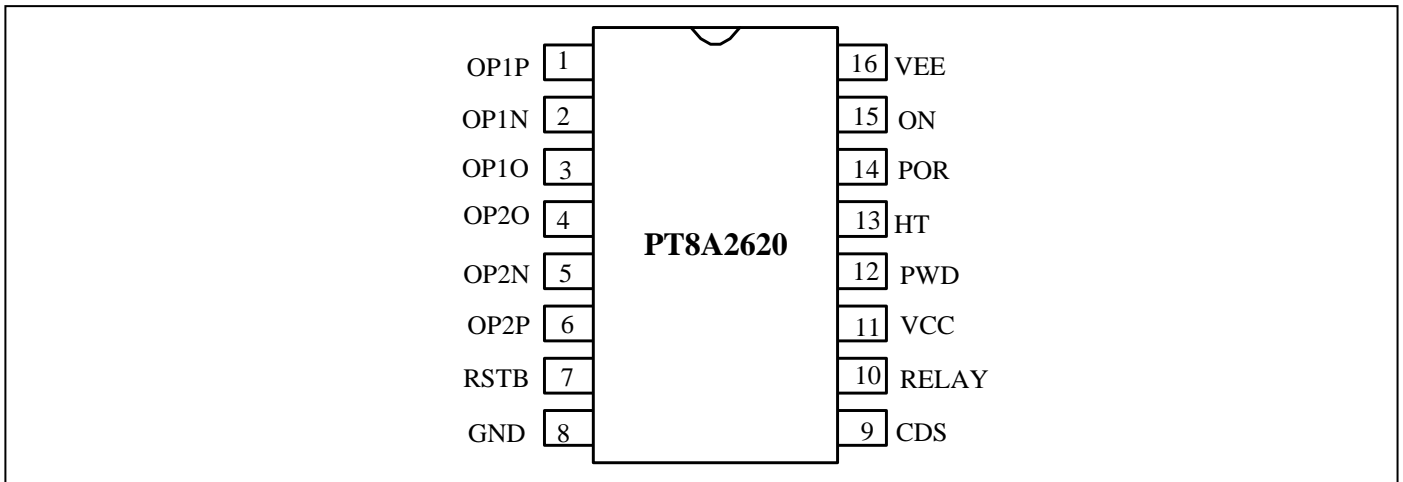
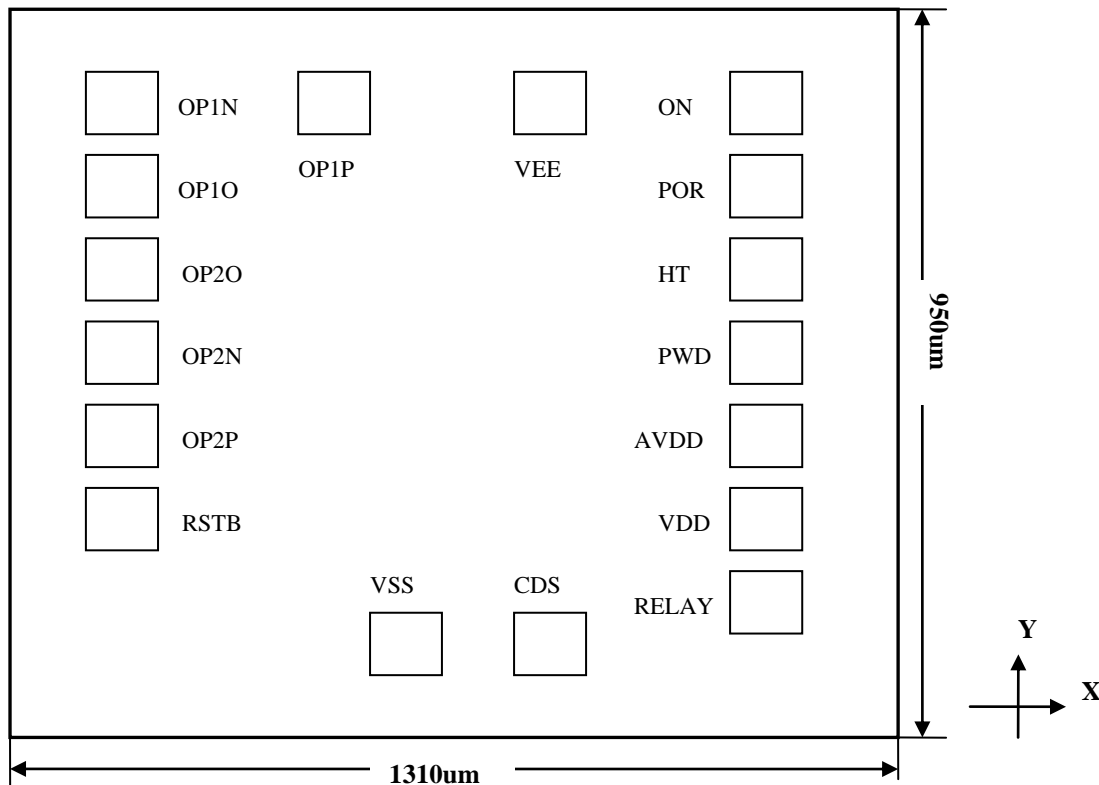
### Description

The PT8A2620 is a CMOS mixed signal LSI designed for low cost applications using PIR as motion sensor.

The PIR sensor detects infrared power variations caused by motion of a human body and transfer to a voltage variation. If the PIR output voltage variation conforms to criteria, the lamp is turned on for an adjustable duration. CDS can enable or disable output with external voltage divider.

### Block Diagram



**Pin Configuration**

**Pad location**
**PT8A2620DE**


Pad Coordinate					
Pad name	X coordinate	Y coordinate	PAD name	X coordinate	Y coordinate
OP1P	429.00	747.50	VEE	648.20	747.50
OP1N	150.10	736.60	ON	1009.80	720.20
OP1O	150.10	639.60	POR	1009.80	623.20
OP2O	150.10	542.60	HT	1009.80	526.20
OP2N	150.10	445.60	PWD	1009.80	431.00
OP2P	150.10	384.60	AVDD	1009.80	332.20
RSTB	150.10	253.40	VDD	1009.80	237.00
VSS	569.50	113.00	RELAY	1009.80	138.20
			CDS	736.70	113.00

Note: Substrate is connected to VSS

**Pin and Pad Description**

Pin No.	Pin Name	Pad Name	I/O	Description
1	OP1P	OP1P	I	Non-inverted input of first operational amplifier, connected directly to source of PIR sensor
2	OP1N	OP1N	I	Inverted input of first operational amplifier
3	OP1O	OP1O	O	Output of first operational amplifier
4	OP2O	OP2O	O	Output of second operational amplifier
5	OP2N	OP2N	I	Inverting input of second operational amplifier
6	OP2P	OP2P	I	Noninverting input of second operational amplifier, internal 1.8V default.
7	RSTB	RSTB	I	Reset input, active low.
8	GND	VSS	-	Ground
9	CDS	CDS	I	Schmitt, connected to a CDS voltage divider for daytime/night auto-detection. Low input to this pin can disable PIR input. CDS should be connected to VCC when not using this function.
10	RELAY	RELAY	O	RELAY drive output through an external NPN transistor, active high. The output active duration is controlled by the HT pin
11	VCC	AVDD VDD	-	Power supply
12	PWD	PWD	I/O	Schmitt input/open drain output, pulse width detection*
13	HT	HT	I/O	Schmitt input/open drain output, hold time, external RC to set output ON time duration. Use a VR to make variable ON time.
14	POR	POR	I	Power on reset, reset the chip in about 40s after power on with an external RC.
15	ON	ON	I	Schmitt, force on control input, active low.
16	VEE	VEE	O	Internal voltage regulator output, 3.6V with respect to ground. Connected to the drain of PIR sensor

## Maximum Ratings

Storage Temperature .....	-40°C to +125°C
Supply Voltage to Ground Potential (Input & V <sub>CC</sub> Only).....	-0.5V to +6.0V
Supply Voltage to Ground Potential (Outputs & D/O Only).....	-0.5V to +6.0V
DC Input Voltage .....	-0.5V to +6.0V
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

Sym	Parameter	Min	Typ	Max	Unit
V <sub>CC</sub>	Operating Voltage	4.75	5.0	6.0	V
T <sub>A</sub>	Operating temperature	-25	25	70	°C

## DC Electrical Characteristics

Symbol	Description	Test Conditions	Min	Type	Max	Unit
I <sub>IH</sub>	Input high leakage current (ON,POR, CDS)	V <sub>IH</sub> =4.5V	-1	-	1	μA
	Input high leakage current (RSTB)		-6	-	-1	μA
I <sub>IL</sub>	Input low leakage current (ON,POR, CDS)	V <sub>IL</sub> =0.5V	-1	-	1	μA
	Input low leakage current (RSTB)		-15	-	-8	μA
I <sub>OL</sub>	Output Sink Current(HT)	V <sub>OL</sub> =0.5V	30	-	-	mA
	Output Sink Current(PWD)		10	-	-	mA
	Output Sink Current(RELAY)		5	-	-	mA
I <sub>OH</sub>	Output Source Current (RELAY)	V <sub>OH</sub> =4.5V	-10	-	-	mA
V <sub>TH1</sub>	“H” Transfer Voltage (POR,CDS,PWD,HT)	-	3.0	3.3	3.6	V
V <sub>TL1</sub>	“L” Transfer Voltage (POR,CDS,PWD,HT)	-	1.4	1.7	2.0	V
V <sub>TH2</sub>	“H” Transfer Voltage (ON)	-	2.7	3.0	3.3	V
V <sub>TL2</sub>	“L” Transfer Voltage (ON)	-	1.6	1.9	2.2	V
V <sub>TH3</sub>	“H” Transfer Voltage (RSTB)	-	2.8	3.1	3.4	V
V <sub>TL3</sub>	“L” Transfer Voltage (RSTB)	-	1.4	1.7	2.0	V

Note: These specifications apply for V<sub>CC</sub> = 5.0V and -25 °C ≤ T<sub>A</sub> ≤ 70 °C, unless otherwise specified.

## AC Electrical Characteristics

### Voltage regulation circuit

Symbol	Parameter	Test Condition	Min.	Typ.	Max.	Unit
V <sub>EE</sub>	Regulator Output Voltage	No load	3.2	3.6	4.0	V
V <sub>OP2P</sub>	Noninverting input of OP2	No load	1.5	-	2.0	V
ΔV <sub>O</sub>	Line regulation	4.5 ≤ V <sub>CC</sub> ≤ 5.5V, I <sub>L</sub> = 1mA	-	-	100	mV
ΔV <sub>LDR</sub>	Load regulation	V <sub>CC</sub> = 5V, 0.5mA ≤ I <sub>L</sub> ≤ 2mA	-	-	30	mV
I <sub>L</sub>	Regulator Output current	V <sub>CC</sub> = 5V	4	-	-	mA

### Operational amplifier and windows comparator

Parameter	Description	Test condition	Min	TYP	Max	Unit
BW	3dB band width	-	10	-	-	KHz
V <sub>TH</sub>	Threshold of windows comparator	V <sub>CC</sub> = 5V	1.9	2.05	2.2	V
V <sub>TL</sub>		V <sub>CC</sub> = 5V	1.4	1.55	1.7	V

### Power Dissipation

Symbol	Description	Test condition	Min	Typ	Max	Unit
I <sub>CC</sub>	Power supply current	V <sub>CC</sub> = 5V, other Input Pins = GND-, all output floating.	-	-	200	μA

## Functional description

### Pulse width detection (PWD) or Noise rejection circuit

Pulse width detection can be used to filter the noise in order to prevent error trigger from the system. The default criteria of the width must be more than 400ms which can be set with an external RC.

### Hold time (HT)

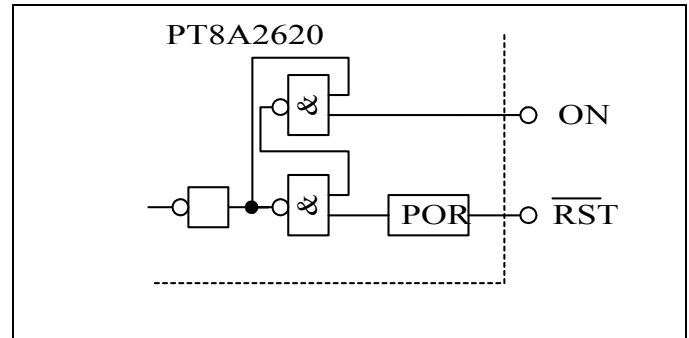
Hold time, in other word, the output active duration, it can be set with an external RC. One various resistor can be used to changed the related output duration.

### Force on function

The IC can force the controlled lamp to on state by turning off the power supply for a brief period of time. During this brief power interruption, the power to the IC must be maintained. Shown in the schematic, with ON input discharged to low while RST maintains at high, the lamp output can be set to on until a RST input is low (longer period of power down). This feature may cause not intended lamp on situation during brief power interruption. Tie ON to  $V_{CC}$  to disable this feature.

### Force On Function

### Trigger Timing

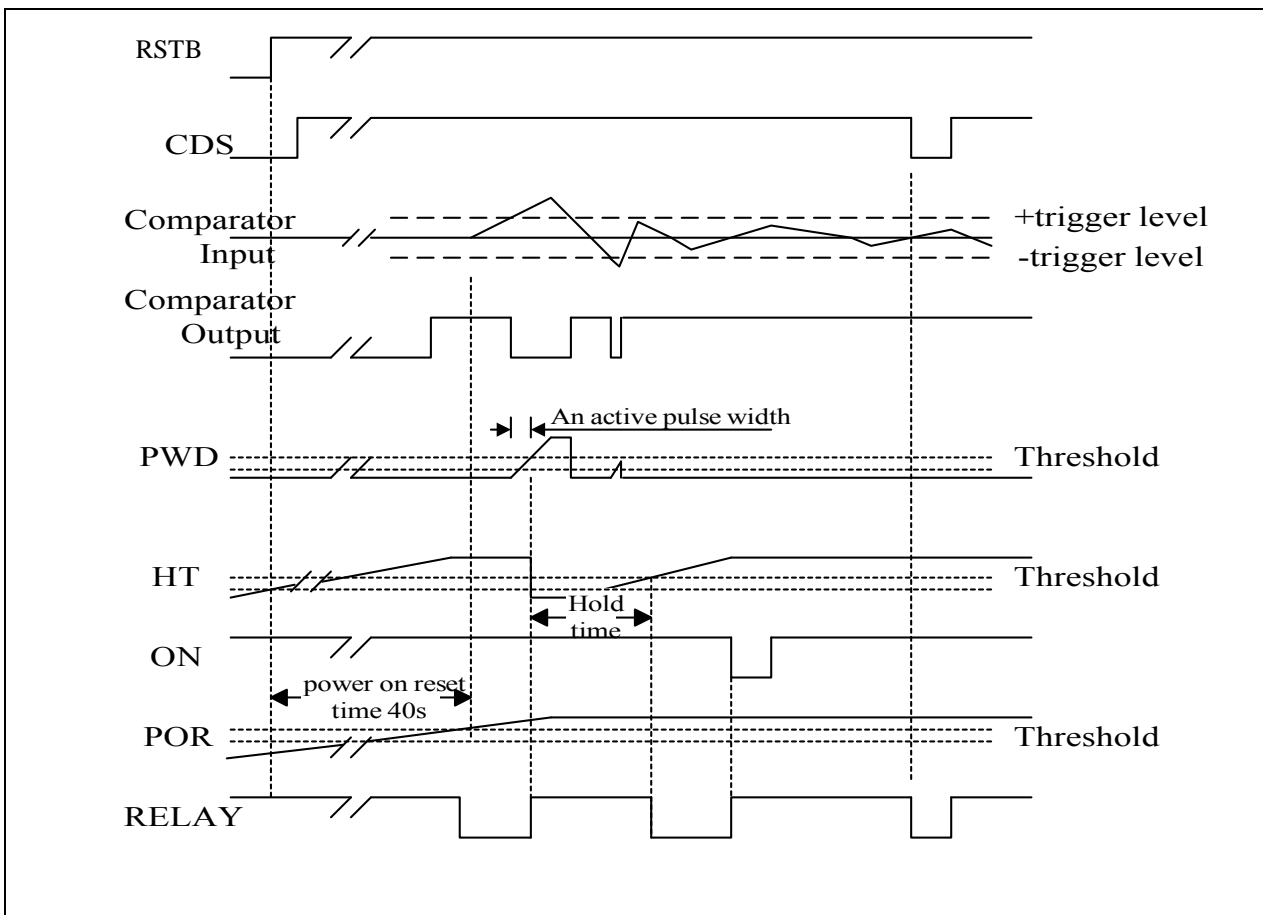


### Power on Reset (POR)

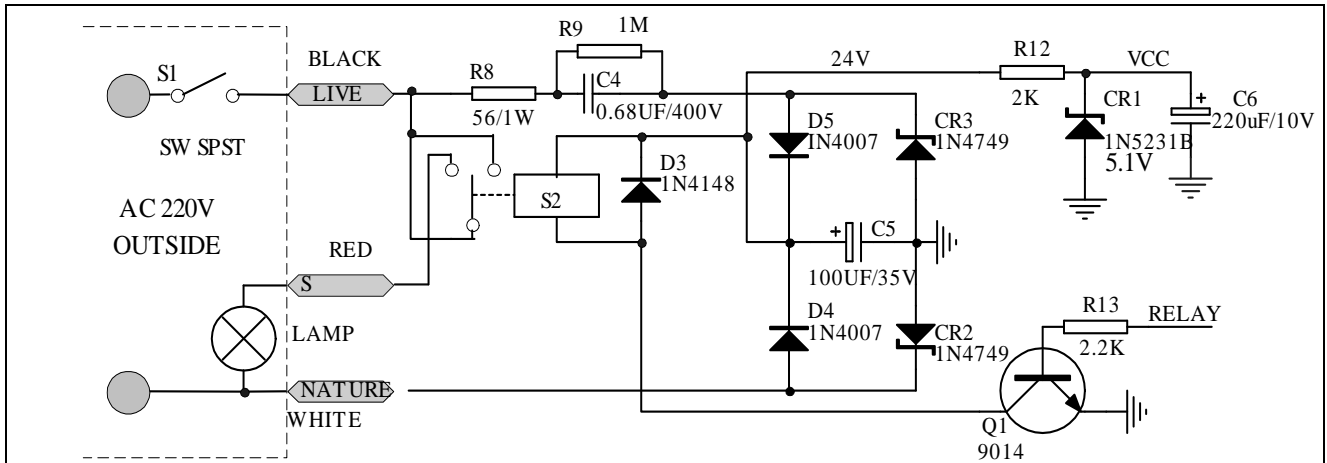
The external PIR sensor requires a period of up to 40 seconds to stabilize, so a power on reset circuit is required to ensure proper operations. During this power on reset period, the lamp is on to indicate proper operation.

### Retrigger

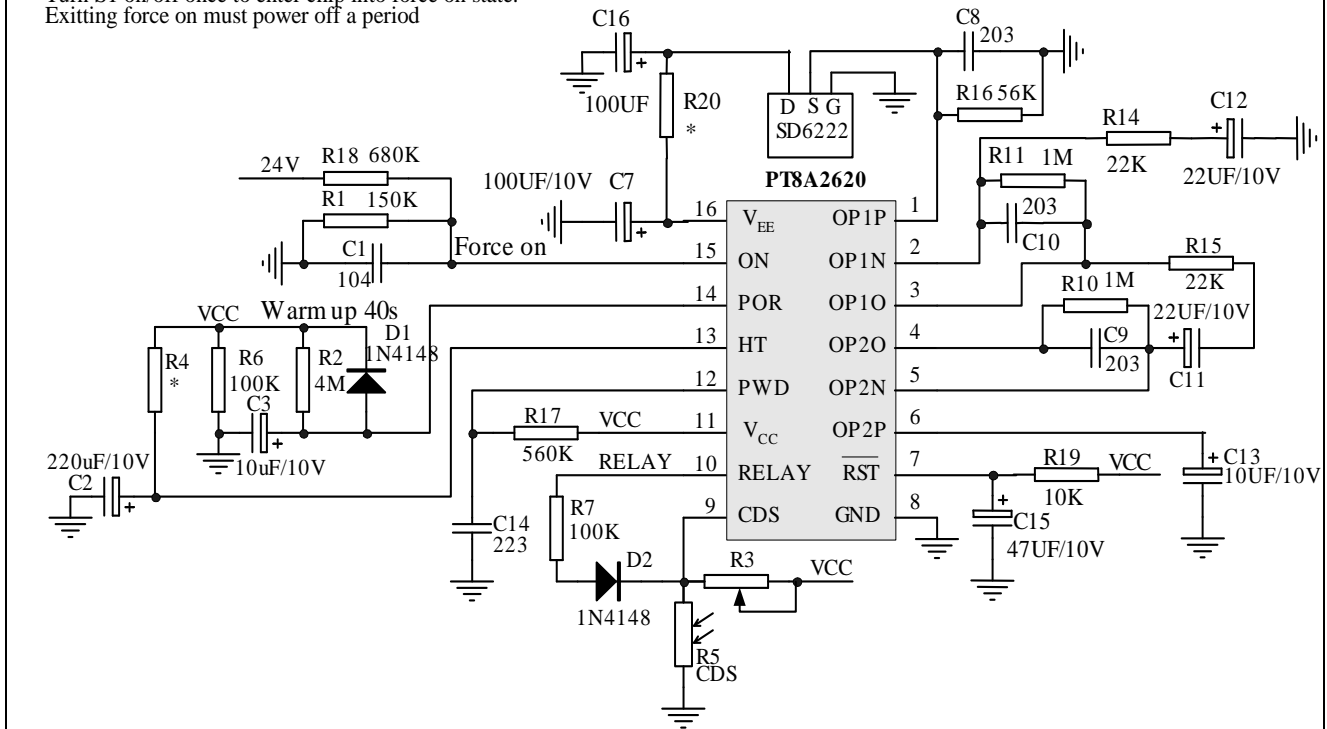
If another PIR signal is attained with valid duration, the circuit will be retriggered, and the hold time will be restarted from this time.



### Application Circuit

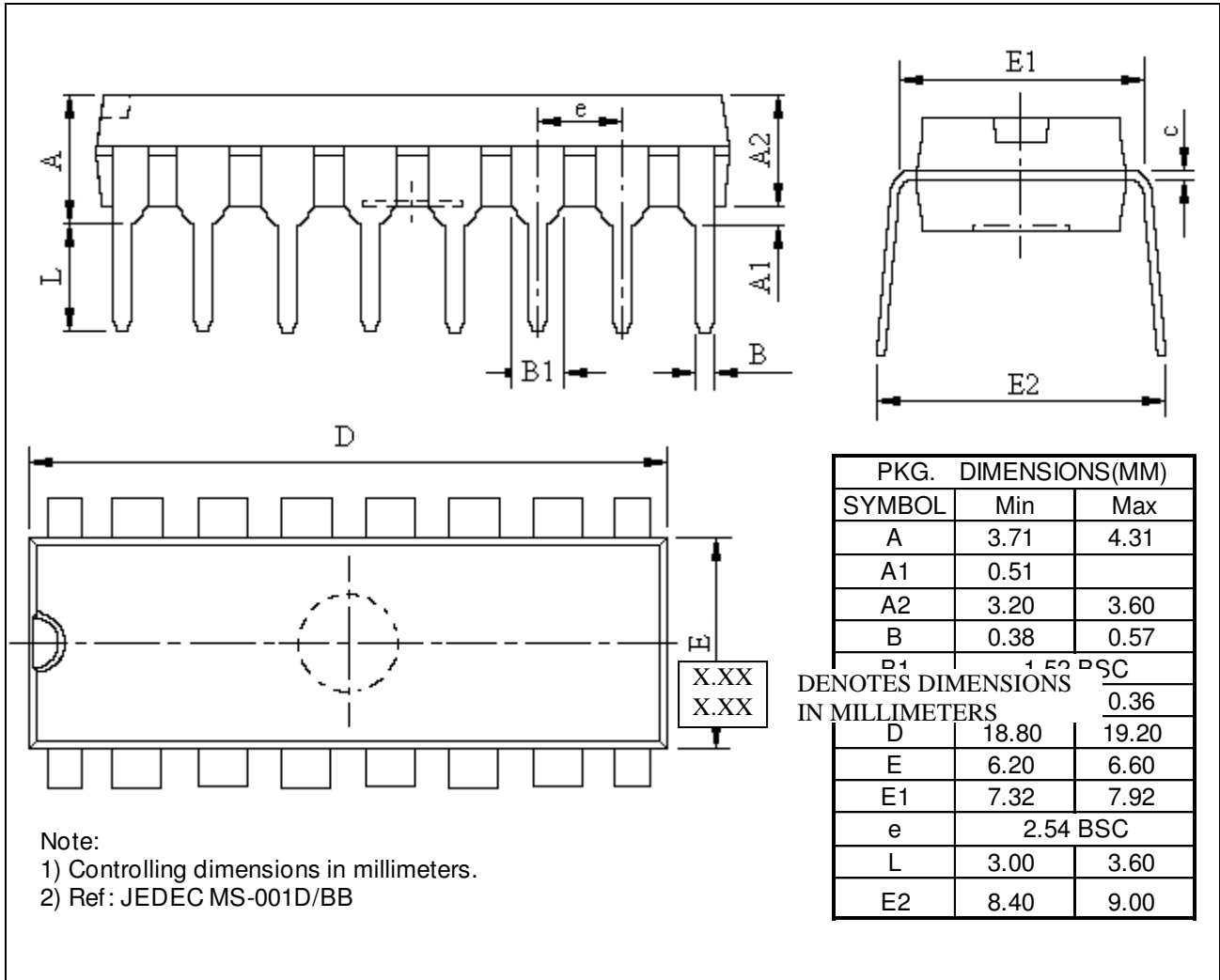


Turn S1 on/off once to enter chip into force on state.  
Exiting force on must power off a period

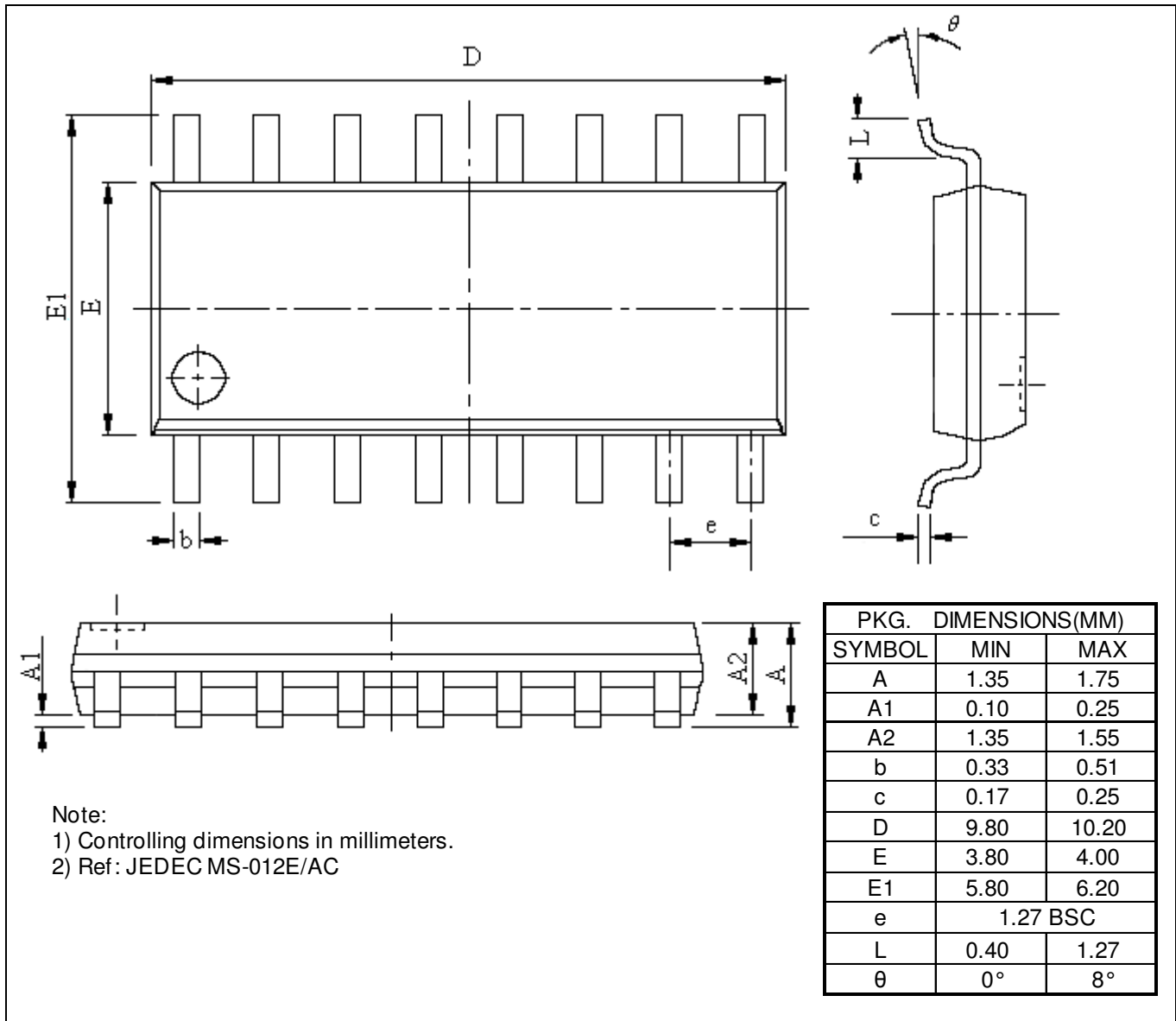


**Mechanical Information**

PE (Lead free DIP-16)



WE (Lead free SOIC-16)



### Ordering Information

Part No.	Package Code	Package
PT8A2620PE	P	Lead free 16-pin DIP
PT8A2620WE	W	Lead free 16-pin SOIC
PT8A2620DE*	DE	Die form

**Note:**

- E = Pb-free
- Adding X Suffix= Tape/Reel
- \*Contact Pericom for availability

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