

## **PIR sensor control chip**

### **Outline**

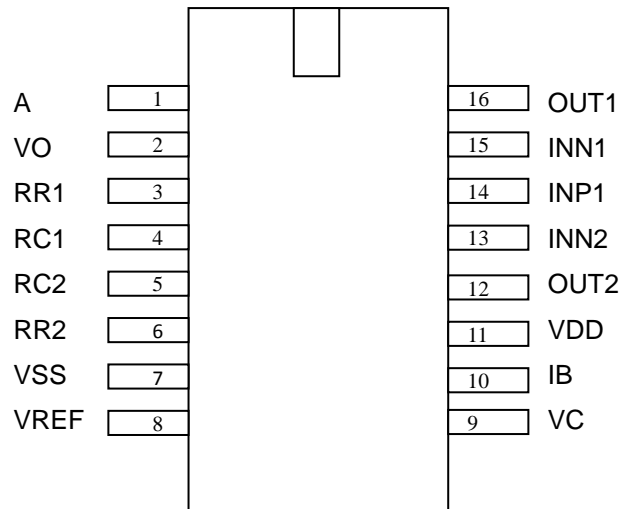
- TT0001 is a CMOS chip designed to human infrared sensor control integrated circuits; it is a kind of high-performance sensor signal processing integrated circuit (IC) which together with PIR sensor and outward elements to constituent PIR switch. It can automatically and quickly open such devices as incandescent lamps, fluorescent lamps, buzzers, automatic valves, electric fans, dryers and automatic hand-washing facilities. IC is especially suitable for enterprises, hotels, shopping malls, warehouses, passages or corridors of houses, automatic lights, lighting systems and alarm systems.
- It can use PHOTO transistor or CDS application. The chip is equipped with amplifiers, comparator, timer, control circuits, system oscillator, and output timing oscillator. Its PIR sensor detects infrared power variation induced by the motion of a human body and transforms it to a voltage variation. If PIR output voltage variation conforms to the criteria, then the lamp is turned on with an adjustable duration.

### **Characteristic**

- Voltage operating range : 1.8V ~ 6.0V
- Low power CMOS technology ( ideal for battery operated PIR devices )
- It also compatible with BISS0001
- CMOS high input impedance operational amplifiers
- Bi-directional level detector / Excellent noise immunity
- Built-in Power up disable & output pulse control logic
- Dual mode : retriggerable & non-retriggerable
- Package for 16 SOP

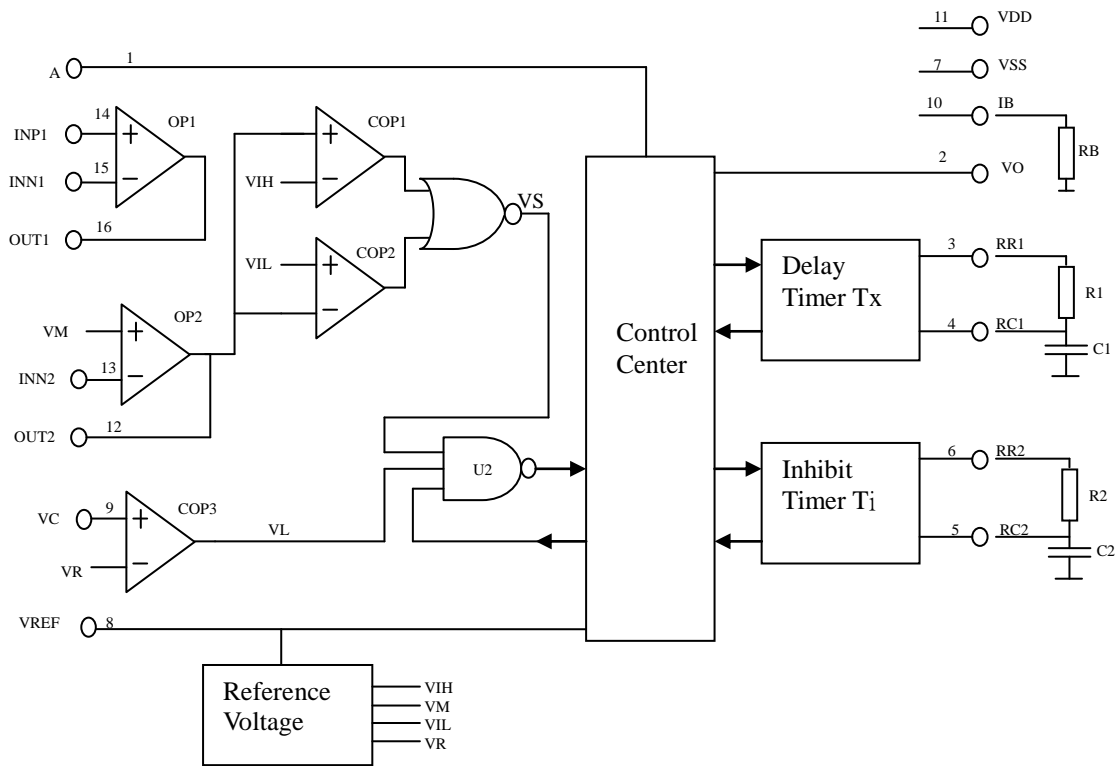
### **Applications**

- Human infrared sensor lights
- Automatic energy-efficient lighting occasions like garden, garage, hallway, stairs
- Monitoring, alarm, doorbell system like home, shops, offices, factories
- Automatic switching system like exhaust fans, ceiling fans

**IC Pin diagram and description**


Compatible with BISS0001

Pin name	Pin Description
A	Retriggerable & non-retriggerable mode select ( A = 0 : non- retriggerable , A = 1 : retriggerable )
VO	Detector output pin ( active high )
RR1	Output pulse width control ( Tx )
RC1	Output pulse width control ( Tx )
RC2	Trigger inhibit control ( Ti )
RR2	Trigger inhibit control ( Ti )
VSS	Ground
VREF	RESET(reference Basic Aapplication Circuit(3)) & voltage reference input
VC	Trigger disable input ( VC > 0.2VDD = enable ; VC < 0.2VDD = disabled )
IB	Op-amp input bias current setting ( RB connect to VSS , RB about = 1.5MΩ )
VDD	Supply voltage ( 1.8V ~ 6.0V )
OUT2	2 <sup>nd</sup> stage Op-amp output
INN2	2 <sup>nd</sup> stage Op-amp inverting input
INP1	1 st stage Op-amp non-inverting input
INN2	1 st stage Op-amp inverting input
OUT1	1 st stage Op-amp output

**IC Internal functional diagram**


**Electrical Characteristics**

- Limiting values**

Parameter	Symbol	Condition	Rating	Unit
Operating Temperature	T <sub>OP</sub>	—	-20	°C
Storage Temperature	T <sub>STG</sub>	—	-65~+150	°C
Supply Voltage	V <sub>IN</sub>	T <sub>a</sub> =25°C	VSS-0.5~VSS+6.5	V
Input Voltage	V <sub>I</sub>	T <sub>a</sub> =25°C	VSS-0.5~VIN+6.0	V

Note : VSS symbolizes for system ground

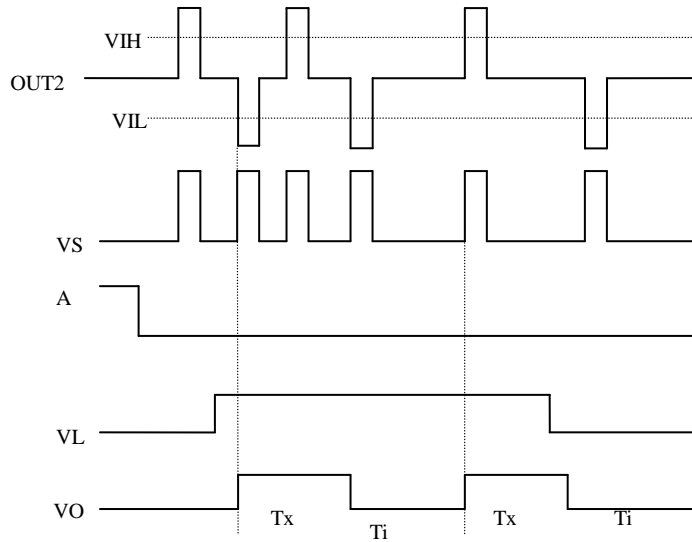
- DC / AC characteristics : ( Test condition at room temperature 25 °C )**

Parameter	Symbol	Test Conditions	Values			Unit	
			Min	Typ	Max		
Operating Voltage	VDD	—	1.8	-	6	V	
Operating Current	IDD	Output no load	RB=1.5MΩ @VDD=3V	-	45	60	uA
			RB=2.0MΩ @VDD=3V	-	40	55	
			RB=1.5MΩ @VDD=5V	-	75	100	
			RB=2.0MΩ @VDD=5V	-	65	90	
Input voltage	VOS	VDD=5V	-		50	mV	
Input current	IOS	VDD=5V	-		50	nA	
Open loop gain	AVN	VDD=5V RL=1.5MΩ	60		-	dB	
common-mode rejection ratio	CMRR	VDD=5V RL=1.5MΩ	60		-	dB	
OP output Hi	VYH	VDD=5V	4.25		-	V	
OP output Low	VYL	RL=500KΩ & 1/2VDD	-		0.75	V	
VC input Hi	VKH	VREF=VDD=5V	1.1		-	V	
VC input Low	VRL		-		0.9	V	
VO output Hi	VOH	VDD=5V IOH=0.5mA	4	4.8	-	V	
VO output Low	VOL	VDD=5V IOL=0.1mA	-	0.1	0.4	V	
A input Hi	VAH	VDD=5V	3.5		-	V	
A input Low	VAL	VDD=5V	-		1.5	V	

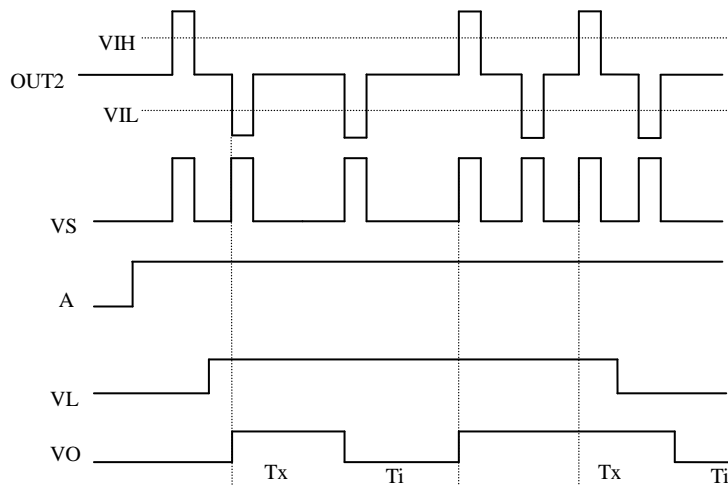
Note : Resistance RB reference basic application circuit

**Function Description**

Non-retrigerrable waveform (A=0)

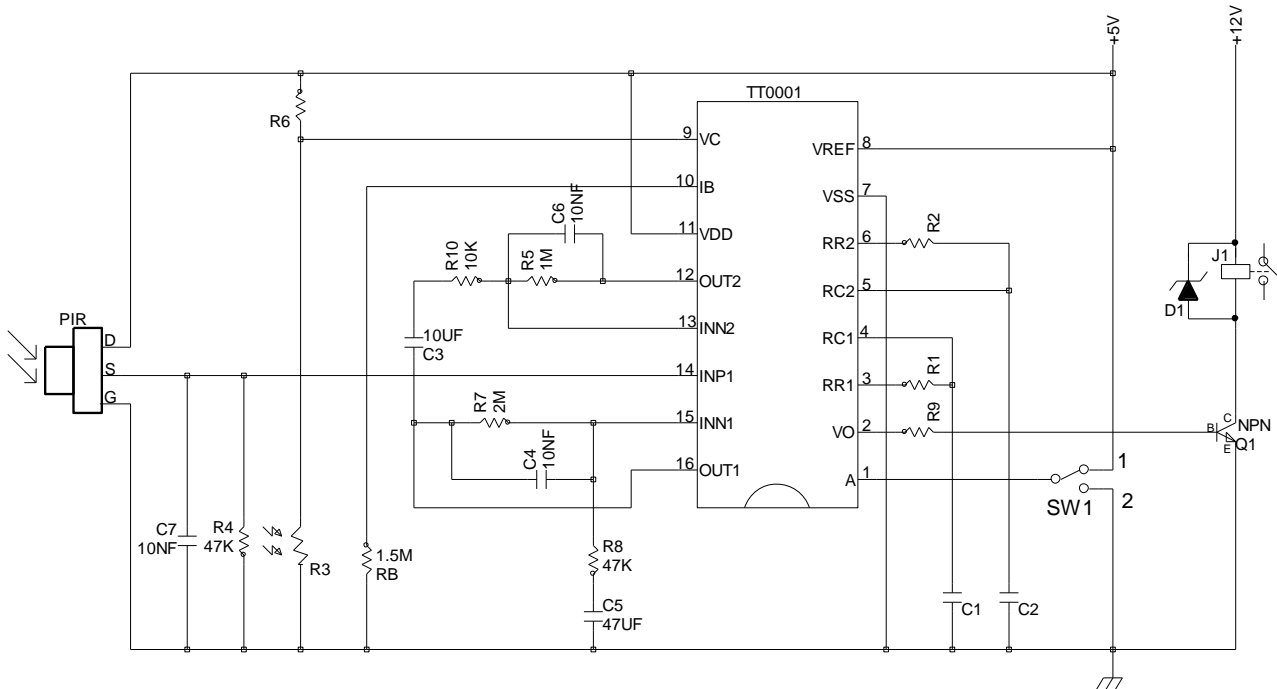


Retrigerrable waveform (A=1)



## Basic Application Circuit (1)

Reference only



**Tx** The delay time and output resistors, capacitors follows :

( Test conditions are not considered stable PIR trigger time, the actual delay time due to steady time increases of PIR application circuit becomes longer )

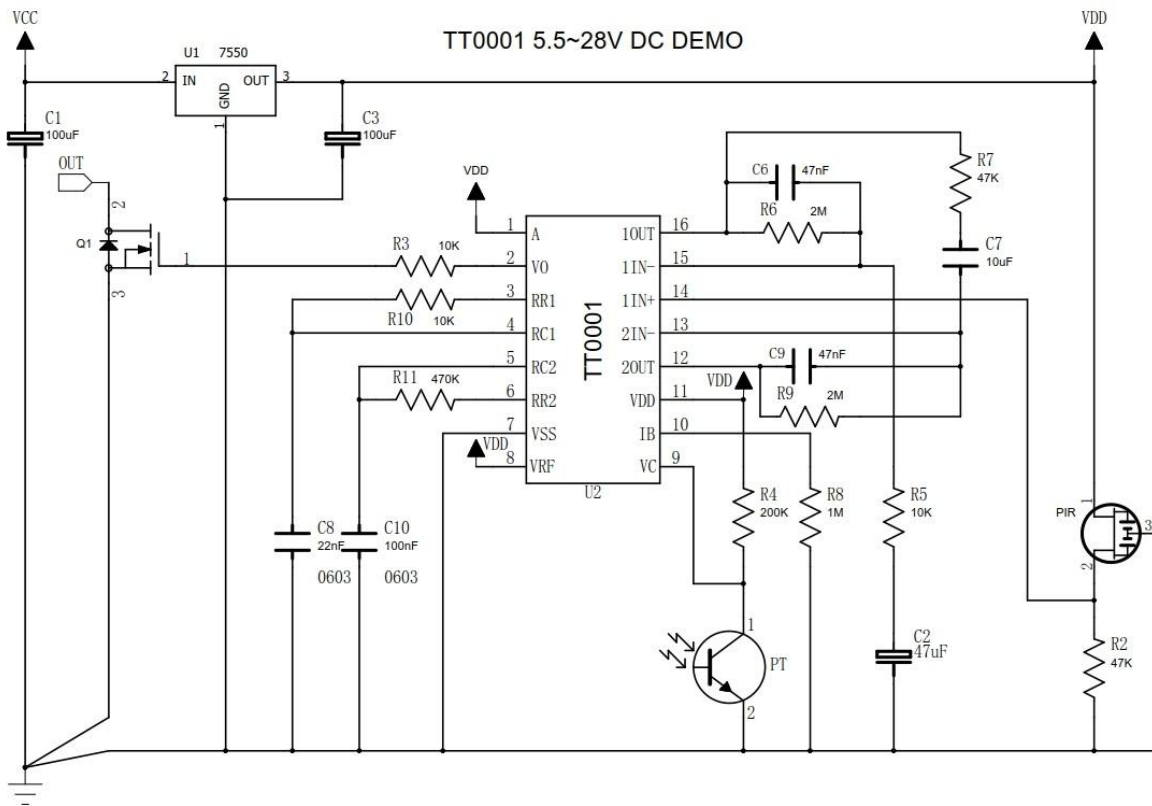
**RR1RC1** — Delay time TX 。  $TX \approx 49152R1C1$ .

**RR2RC2** — Inhibit time 。  $TI \approx 48R2C2$ .

RR1RC1 — delay time TX TX ≈ 49152R1C1				RR2RC2 — inhibit tome TI TI ≈ 48R2C2			
C1	R1	VDD=5V Tx	VDD=3.3V Tx	C2	R2	VDD=5V TI	VDD=3.3V TI
0.01uF	22KΩ	7.1 sec	5.7 sec	0.1uF	300KΩ	1.1 sec	1.0 sec
0.01uF	47KΩ	15 sec	12 sec	0.1uF	430KΩ	1.6 sec	1.3 sec
0.01uF	100KΩ	31 sec	25 sec	0.1uF	620KΩ	2.3 sec	2.0 sec
0.01uF	200KΩ	62 sec	49 sec	0.1uF	1MΩ	3.7 sec	3.1 sec
0.01uF	330KΩ	102 sec	80 sec				
0.01uF	680KΩ	209 sec	164 sec				
0.01uF	1MΩ	308 sec	242 sec				

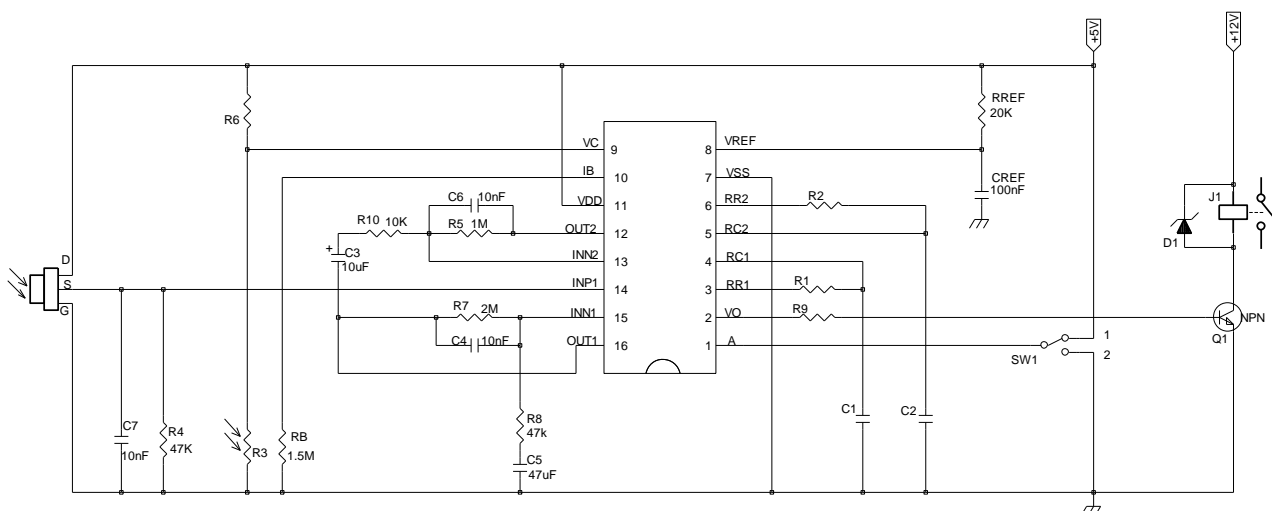
## Basic Application Circuit (2)

Reference only



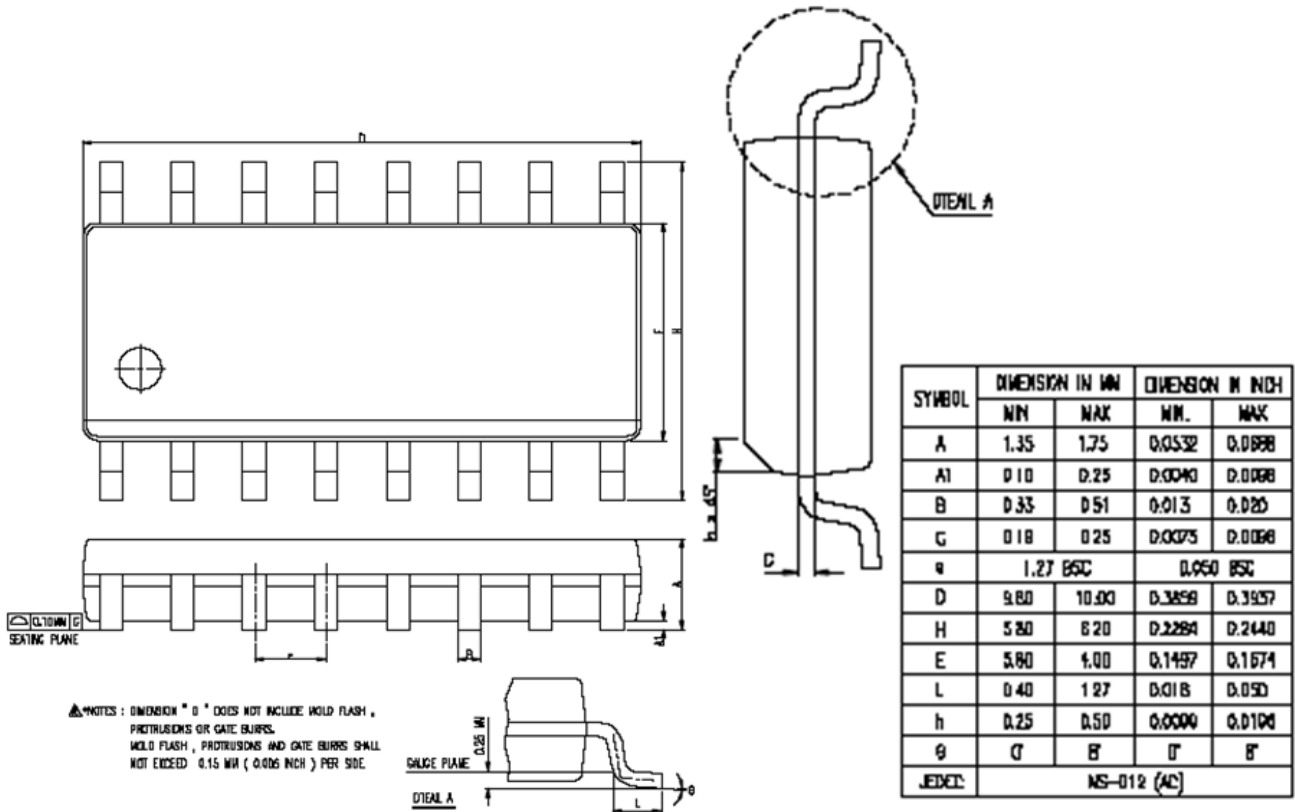
## Basic Application Circuit (3) External Reset

Reference only



**Descriptions of Packaging**

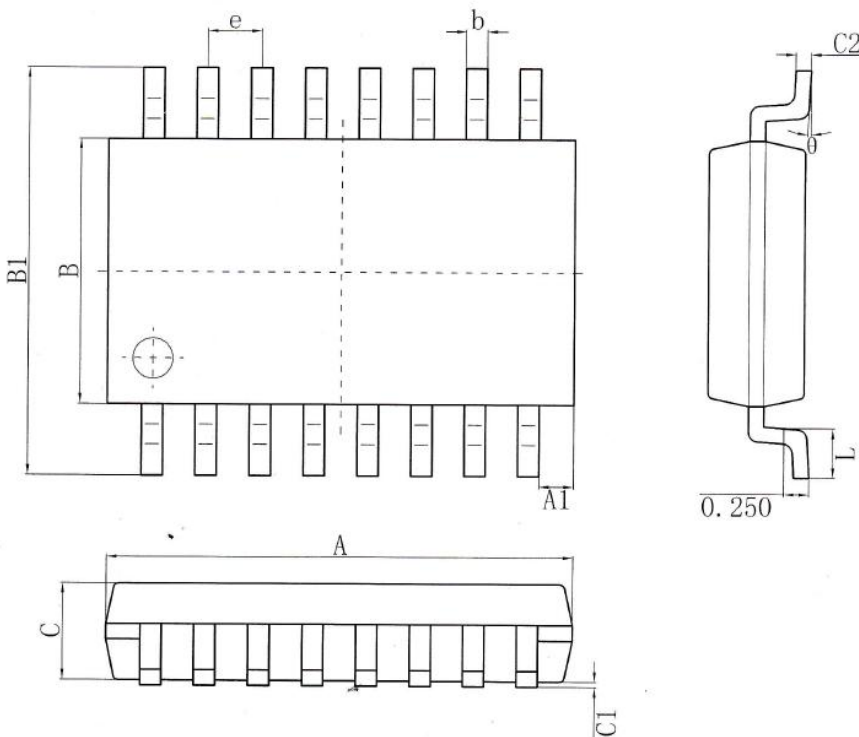
- SOP 16





**• CPC 16**

SYMBOL	MIN.(mm)	MAX.(mm)	SYMBOL	MIN.(mm)	MAX.(mm)
A	4.50	4.70	C	0.85	1.05
A1	0.29	0.39	C1	0.00	0.15
e	0.53(BSC)		C2	0.15	0.18
B	2.50	2.70	L	0.40	0.60
B1	3.85	4.15	θ	0°	8°
b	0.16	0.26			



**Ordering Information****TT0001**

<b>Package Type</b>	<b>Chip Type</b>	<b>Wafer Type</b>
TT0001	—	—

**REVISION HISTORY:**

2015/01/06: Initial version 1.0.

2017/11/22: Add Basic Application Circuit (3) and CPC 16 Package version V1.7.

2020/04/30: Revise incorrect format version V1.8