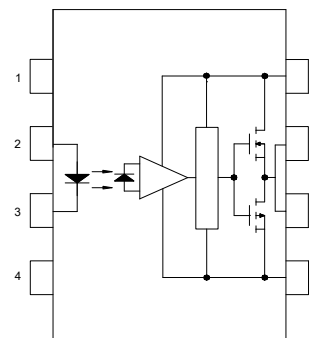


### ● Description

The KTLP350 contain a GaAlAs light emitter diode optically coupled to an integrated circuit with a power output stage.

. KTLP350 series photo coupler is ideally suited for driving IGBT and power MOSFET used in motor control inverter application and inverter power system.

### ● Schematic



- |            |                        |
|------------|------------------------|
| 1. N.C.    | 5. GND                 |
| 2. Anode   | 6. Vo (Voltage Output) |
| 3. Cathode | 7. Vo (Voltage Output) |
| 4. N.C.    | 8. Vcc                 |

### ● Features

1. Input threshold current:  $I_f=5\text{mA}(\text{max.})$
2. Supply current ( $I_{cc}$ ): 3 mA (max.)
3. Supply voltage ( $V_{cc}$ ): 10 – 30V
4. Output current ( $I_O$ ):  $\pm 2.5\text{A}(\text{max.})$
5. Switching time ( $t_{pLH}/t_{pHL}$ ): 0.5 $\mu\text{s}(\text{max.})$
6. Isolation voltage: 5000Vrms(min.)
7. Agency Approvals:
  - UL Approved (No. E169586): UL1577
  - c-UL Approved (No. E169586)
  - VDE Approved (No. 40020973): DIN EN60747-5-5

### ● Applications

- Transistor inverter
- Inverter for air conditioner
- IGBT gate drive
- Power MOSFET gate drive
- IH(Induction Heating)

### ● Truth Table

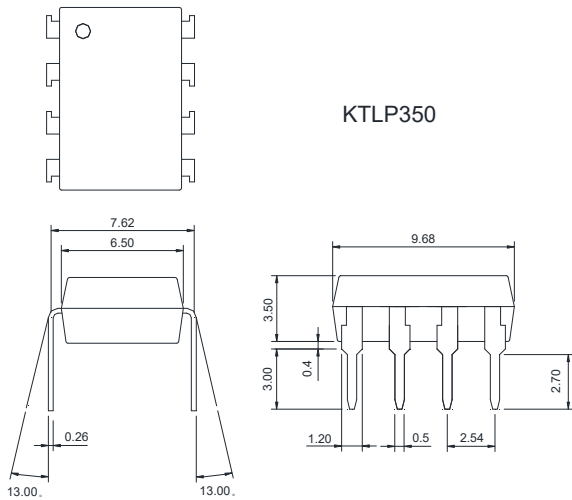
LED	OUTPUT	Q1	Q2
ON	HIGH LEVEL	ON	OFF
OFF	LOW LEVEL	OFF	ON

\* The use of a 0.1 $\mu\text{F}$  bypass capacitor must be connected between pins 8 and 5 is recommended.

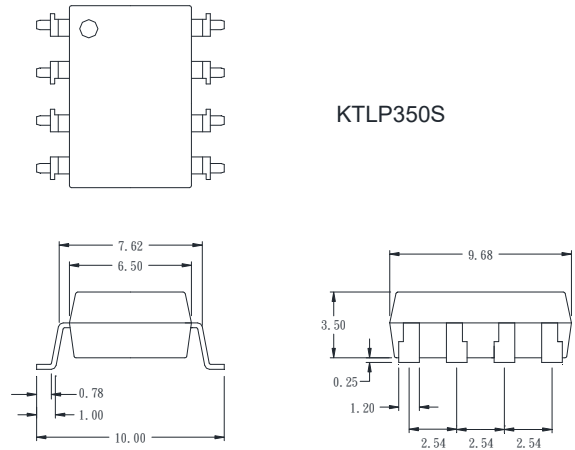
● **Outside Dimension**

Unit : mm

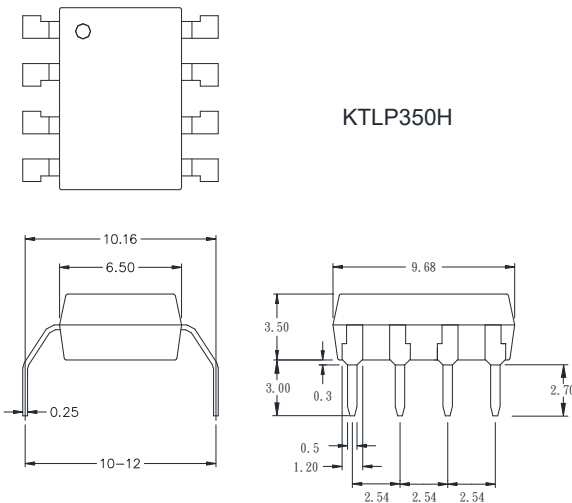
1. Dual-in-line type



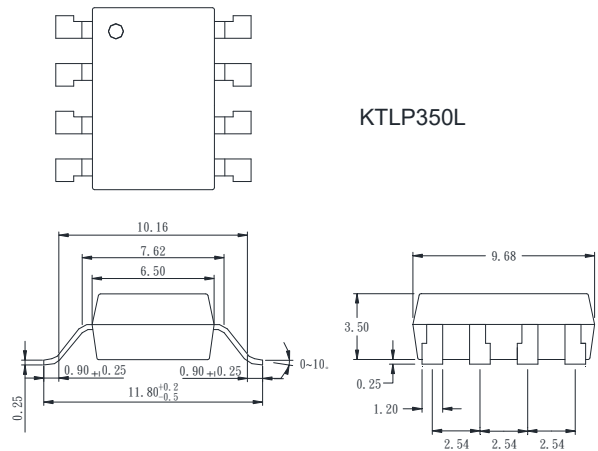
2. Surface mount type



3. Long creepage distance type

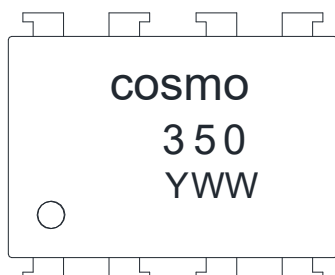


4. Long creepage distance for surface mount type



TOLERANCE: ±0.2mm

● **Device Marking**



**Notes:**

cosmo  
350  
YWW      Y: Year code / WW: Week code

### ● Absolute Maximum Ratings

(Ta = 25°C)

Parameter		Symbol	Rating	Unit
Input	Forward current	$I_F$	20	mA
	Peak transient forward current (*Note 1)	$I_{FPT}$	1	A
	Reverse voltage	$V_R$	5	V
	Junction temperature	$T_j$	125	°C
Output	“H” Peak output current (*Note 2)	$I_{OPH}$	-2.5	A
	“L” Peak output current (*Note 2)	$I_{OPL}$	+2.5	A
	Output voltage	$V_O$	35	V
	Supply voltage	$V_{CC}$	35	V
	Junction temperature	$T_j$	125	°C
Operating frequency (*Note 3)		$f$	50	KhZ
Operating temperature range		$T_{opr}$	-40~110	°C
Storage temperature range		$T_{stg}$	-55~125	°C
Lead soldering temperature(10s) (*Note 4)		$T_{sol}$	260	°C
Isolation voltage (AC, 1min., R.H ≤ 60%) (*Note 5)		BVs	5000	Vrms

\*Note1: Pulse width  $Pw \leq 1\mu s, 300pps$ .

\*Note2: Exponential waveform pulse width  $Pw \leq 0.3\mu s, f \leq 15kHz$ .

\*Note3: Exponential waveform,  $I_{OPH} \geq -2.0A (\leq 0.3\mu s), I_{OPL} \leq +2.0A (\leq 0.3\mu s)$ .

\*Note4: It is 2 mm or more from a lead root.

\*Note5: Device is considered as a two terminal device: Pin1,2,3 and 4 shorted together, and pins 5,6,7 and 8 shorted together.

### ● Recommend Operation Conditions

Parameter	Symbol	Min.	Max.	Unit
Operating Temperature	$T_A$	-40	110	°C
Supply Voltage	$V_{CC}$	10	30	V
Input Current (ON)	$I_{F(ON)}$	7	16	mA
Input Voltage (OFF)	$V_{F(OFF)}$	0	0.8	V

### ● Electrical Characteristics

(Ta = 25°C)

Parameter	Symbol	Test Circuit	Test Condition	Min.	Typ.	Max.	Unit	
Input forward voltage	$V_F$	—	$I_F=10mA, Ta=25^\circ C$	—	1.4	1.8	V	
Input reverse current	$I_R$	—	$V_R=5V, Ta=25^\circ C$	—	—	10	$\mu A$	
Input capacitance	$C_T$	—	$V=0, f=1MHz, Ta=25^\circ C$	—	45	250	pF	
Output current	“H” level	$I_{OPH}$	3	$V_{CC}=30V, I_F=5mA$	—	-1.6	-1.0	A
				$V_{CC}=15V, I_F=5mA$	—	—	-2.0	

	"L" level	$I_{OPL}$	2	$V_{CC}=30V, I_F=0mA$ $V_a=2.5V$	1.0	1.6	—	
				$V_{CC}=15V, I_F=0mA$ $V_a=7.5V$	2.0	—	—	
Output voltage	"H" level	$V_{OH}$	4	$I_F=10mA, I_O=-100mA$	29.7	29.88	—	V
	"L" level	$V_{OL}$	5	$I_F=0mA, I_O=100mA$	—	0.1	0.3	
Supply current	"H" level	$I_{CCH}$	—	$V_{CC}=30V, I_F=10mA,$ $T_a=25^\circ C$	—	1.7	3.0	mA
	"L" level	$I_{CCL}$	—	$V_{CC}=30V, I_F=0mA,$ $T_a=25^\circ C$	—	2.1	3.0	
Threshold input current	"Output L→H"	$I_{FLH}$	—	$V_{CC1}=15V,$ $V_o>1V, I_o=0mA$	—	2.6	5	mA
Threshold input voltage	"Output H→L"	$V_{FHL}$	—	$V_{CC1}=15V,$ $V_o>1V, I_o=0mA$	0.8	—	—	V
Supply voltage		$V_{CC}$	—		10	—	30	V

\*All typical values are at  $T_a=25^\circ C$  (\*A):Duration of  $I_o$  time  $\leq 50\mu s$ (1 Pulse)

### ● Switching Characteristics

( $T_a = 25^\circ C$ )

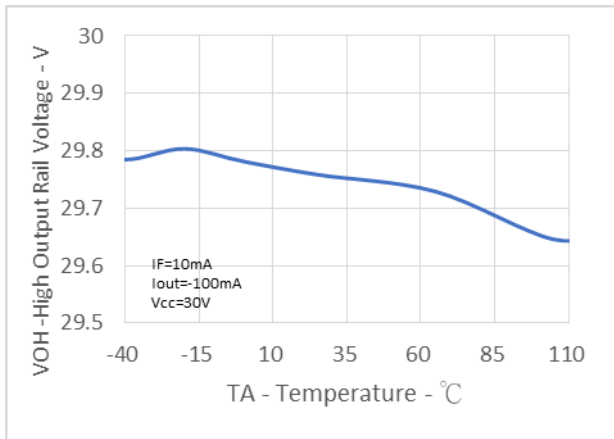
Parameter	Symbol	Test Circuit	Test Condition	Min.	Typ.	Max.	Unit
Propagation delay time	"L→H"	$t_{PLH}$	$I_F=5mA$ (Note8) $V_{CC}=30V$ $R_g=20\Omega, C_g=10nF$	50	120	500	ns
	"H→L"	$t_{PHL}$		50	120	500	
Output rise time	$t_r$	6		—	20	—	
Output fall time	$t_f$			—	15	—	
Common mode transient immunity at high level output	$ C_{MH} $	7	$V_{CM}=1000Vp-p, I_F=5mA$ $V_{CC}=30V, V_o(\min)=26V$ $T_a=25^\circ C$	20	—	—	KV / $\mu s$
Common mode transient immunity at low level output	$ C_{ML} $	7	$V_{CM}=1000Vp-p, I_F=0$ $V_{CC}=30V, V_o(\max)=1V$ $T_a=25^\circ C$	20	—	—	KV / $\mu s$

\*All typical values are at  $T_a=25^\circ C$ .

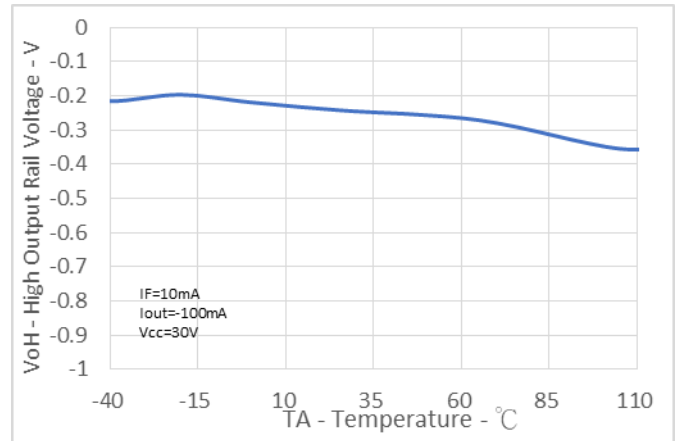
\*Note 8: Input signal rise time (fall time)  $< 0.5\mu s$ .

## TYPICAL PERFORMANCE CURVES & TEST CIRCUITS

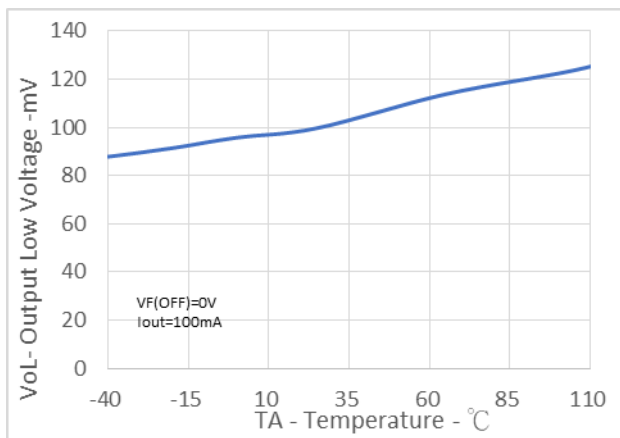
**Fig.1 High output rail voltage vs. Temperature**



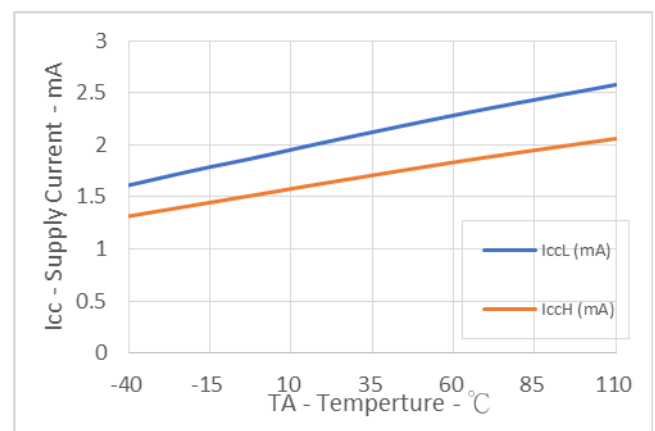
**Fig.2 V<sub>OH</sub> vs. Temperature**



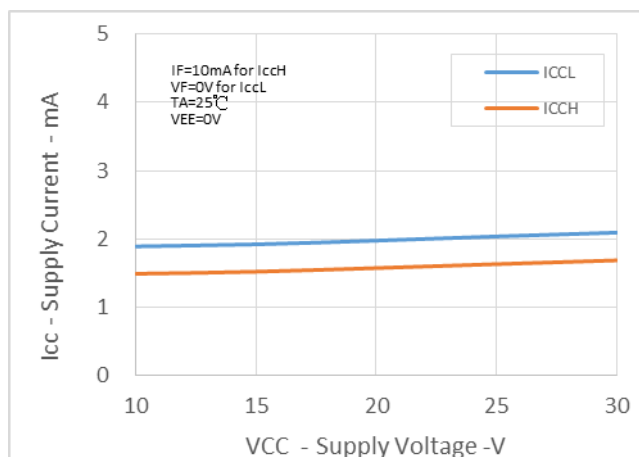
**Fig.3 VOL vs. Temperature**



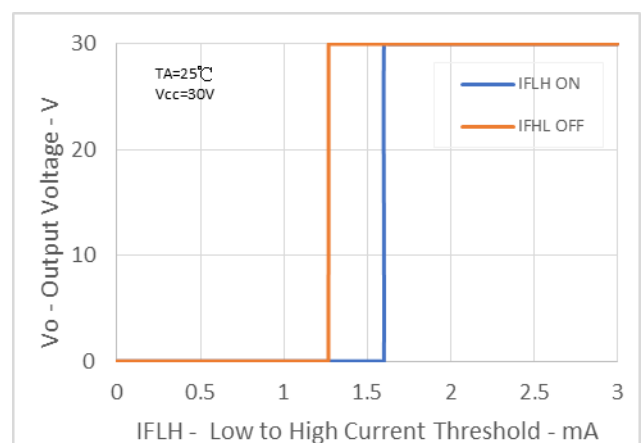
**Fig.4 ICC vs. Temperature**



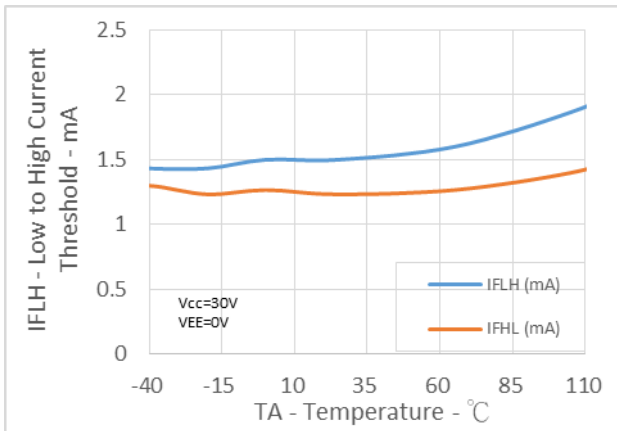
**Fig.5 ICC vs. VCC**



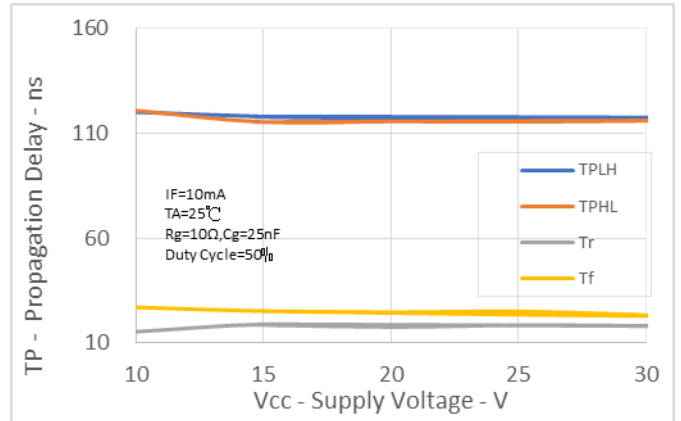
**Fig. 6 IFLH Hysteresis**



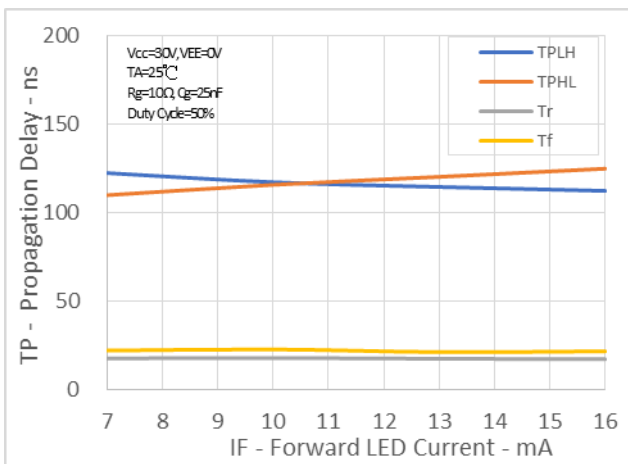
**Fig.7 IFLH vs. Temperature**



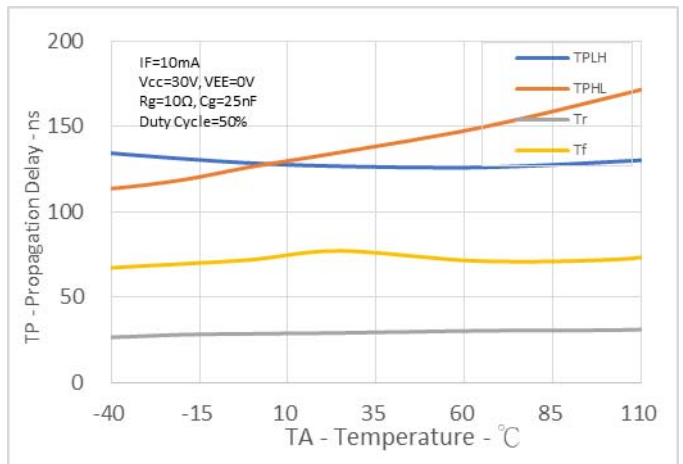
**Fig.8 Propagation Delays vs. VCC**



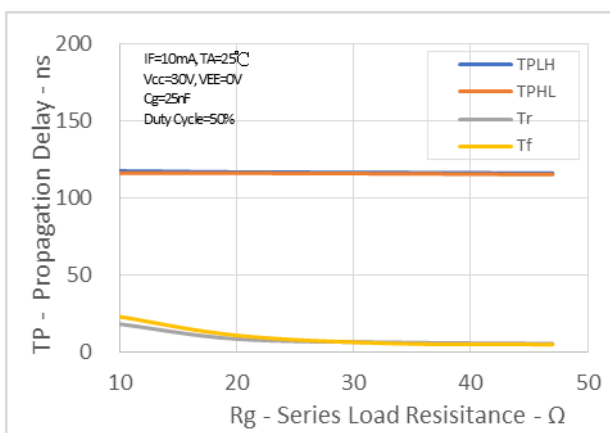
**Fig.9 Propagation Delays vs. IF**



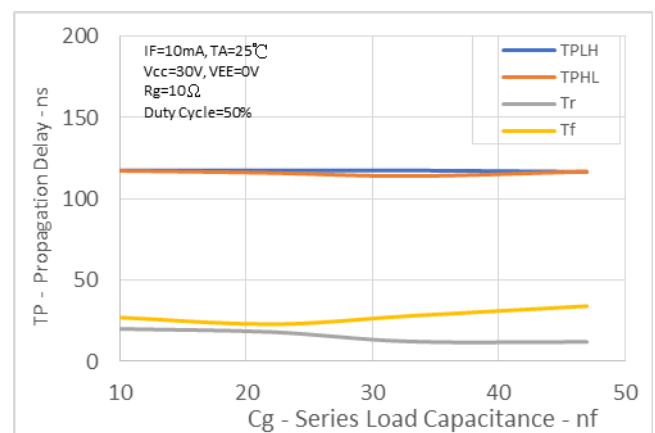
**Fig.10 Propagation Delays vs. Temperature**



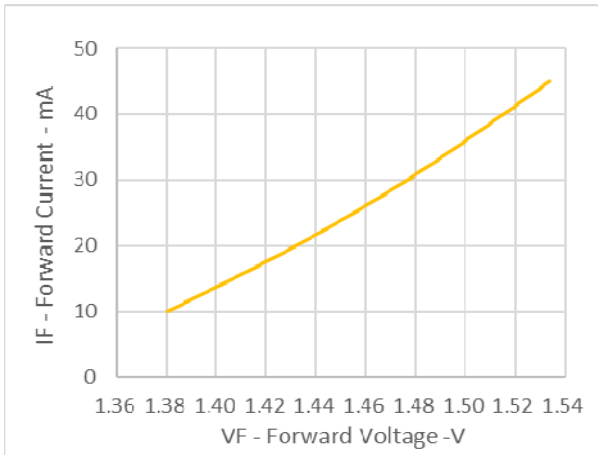
**Fig.11 Propagation Delay vs Rg**



**Fig. 12 Propagation Delay vs. Cg**

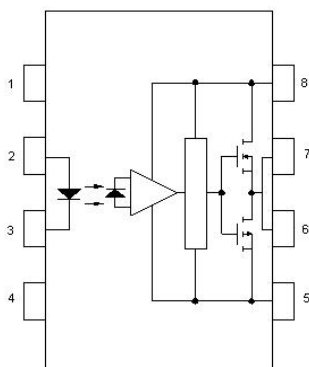


**Fig.13 Input Current vs. Forward Voltage**

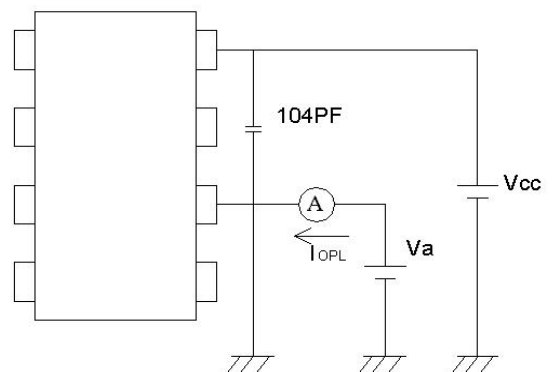


● **Test Circuit**

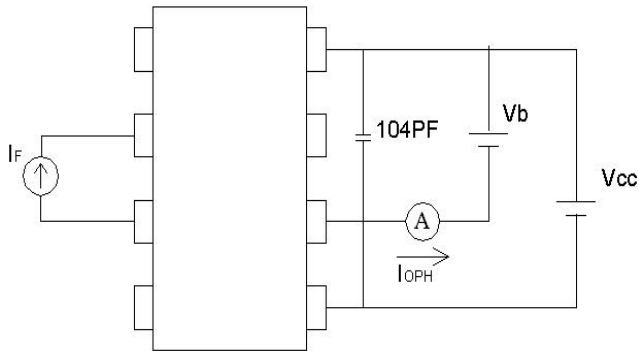
**1. Top View**



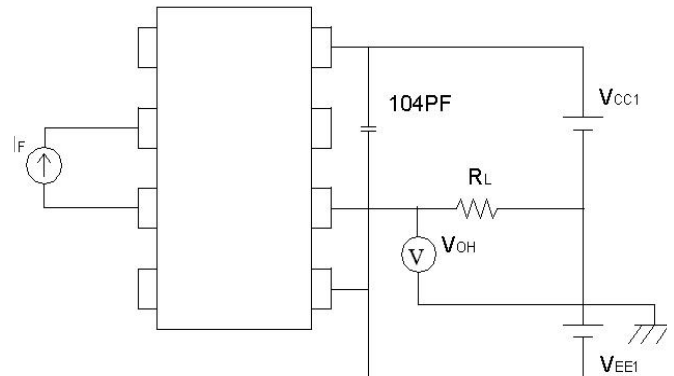
**2. I<sub>OPL</sub> Measure**



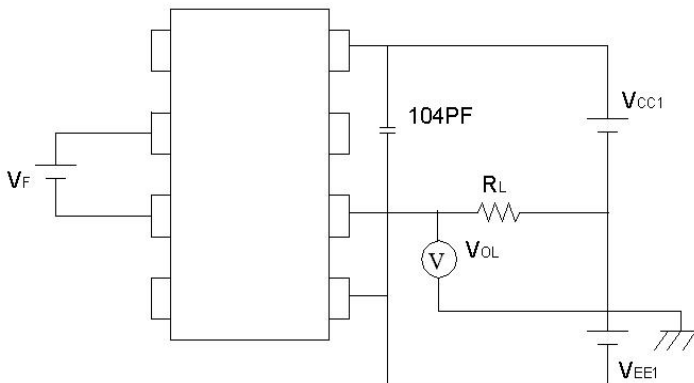
### 3. $I_{OPH}$ Measure



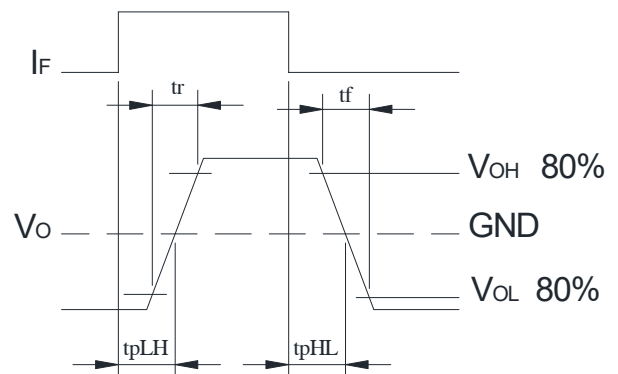
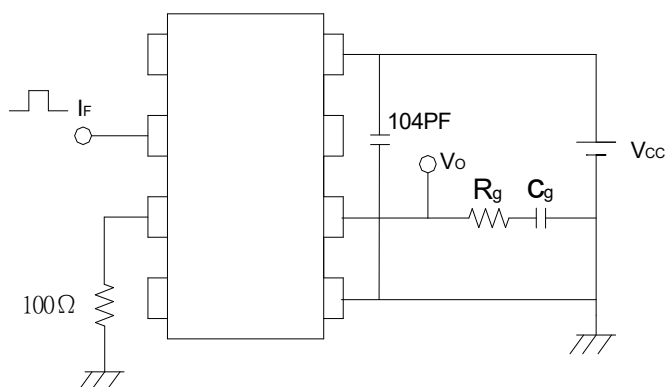
### 4. $V_{OH}$ Measure



### 5. $V_{OL}$ Measure

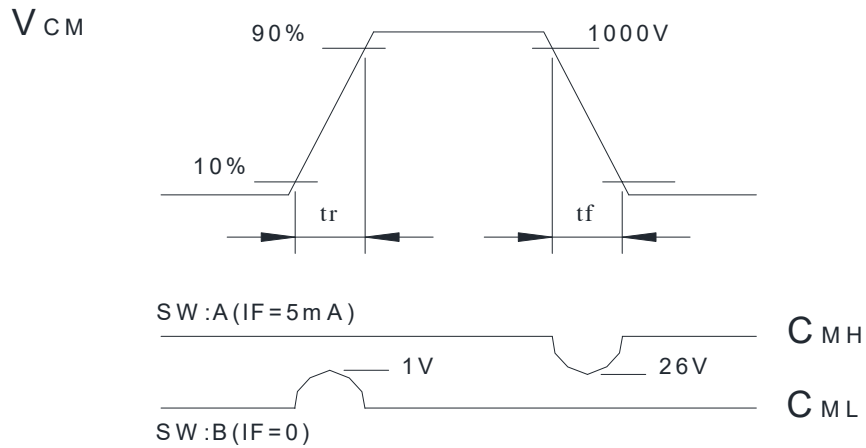


### 6. $tp_{LH}$ , $tp_{HL}$ , $t_r$ , $t_f$ Measure





## 7. $C_{MH}$ , $C_{ML}$ Measure



$$C_{ML} = \frac{1000(v)}{t_r(\mu s)} \quad ; \quad C_{MH} = \frac{1000(v)}{t_f(\mu s)}$$

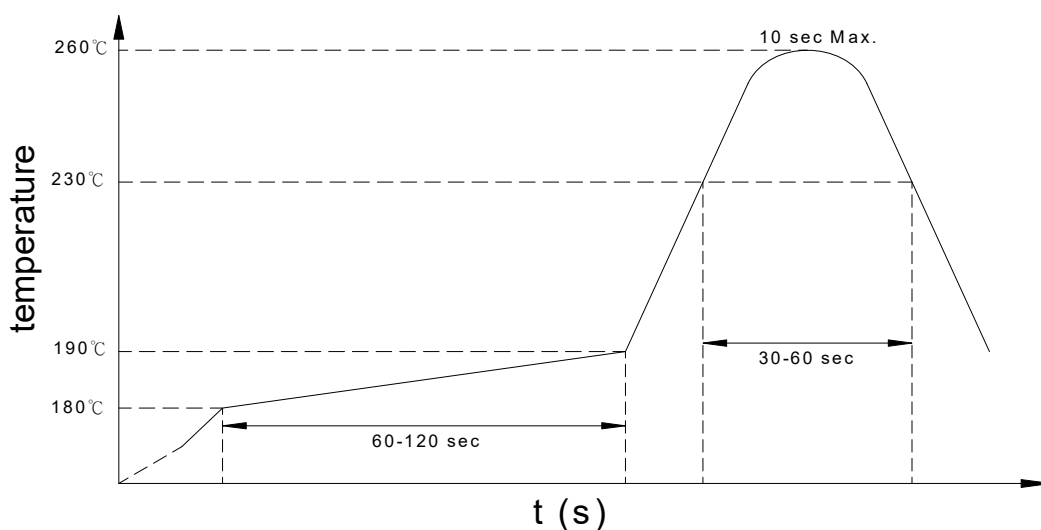
\* $C_{ML}(C_{MH})$  is the maximum rate of rise (fall) of the common mode voltage that can be sustained with the output voltage in the low (high) state.

● **Recommended Soldering Conditions**

**(a) Infrared reflow soldering :**

- Peak reflow soldering : 260°C or below (package surface temperature)
- Time of peak reflow temperature : 10 sec
- Time of temperature higher than 230°C : 30-60 sec
- Time to preheat temperature from 180~190°C : 60-120 sec
- Time(s) of reflow : Two
- Flux : Rosin flux containing small amount of chlorine (The flux with a maximum chlorine content of 0.2 Wt% is recommended.)

**Recommended Temperature Profile of Infrared Reflow**



**(b) Wave soldering :**

- Temperature : 260°C or below (molten solder temperature)
- Time : 10 seconds or less
- Preheating conditions : 120°C or below (package surface temperature)
- Time(s) of reflow : One
- Flux : Rosin flux containing small amount of chlorine (The flux with a maximum chlorine content of 0.2 Wt% is recommended.)

**(c) Cautions :**

- Fluxes : Avoid removing the residual flux with freon-based and chlorine-based cleaning solvent.
- Avoid shorting between portion of frame and leads.

- **Numbering System**

## KTLP350 X (Y)

**Notes:**

KTLP350 = Part No.

X = Lead form option (blank · S · H · L )

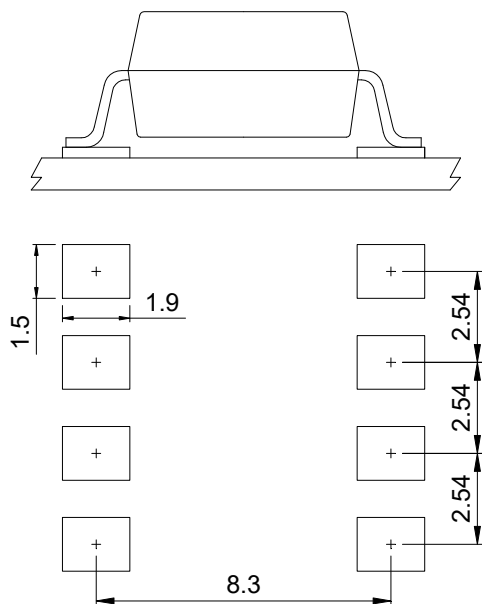
Y = Tape and reel option (TL · TR)

Option	Description	Packing quantity
S (TL)	surface mount type package + TL tape & reel option	1000 units per reel
S (TR)	surface mount type package + TR tape & reel option	1000 units per reel

- **Recommended Pad Layout for Surface Mount Lead Form**

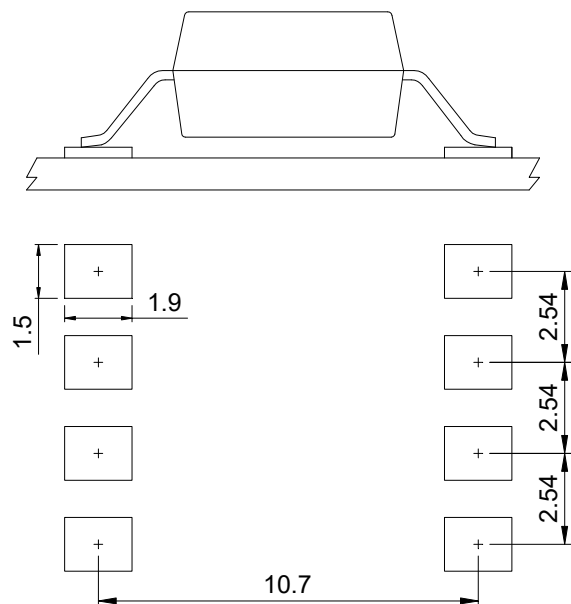
### 1.Surface mount type

8-pin SMD



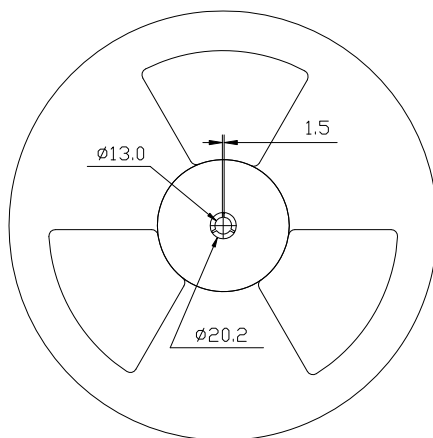
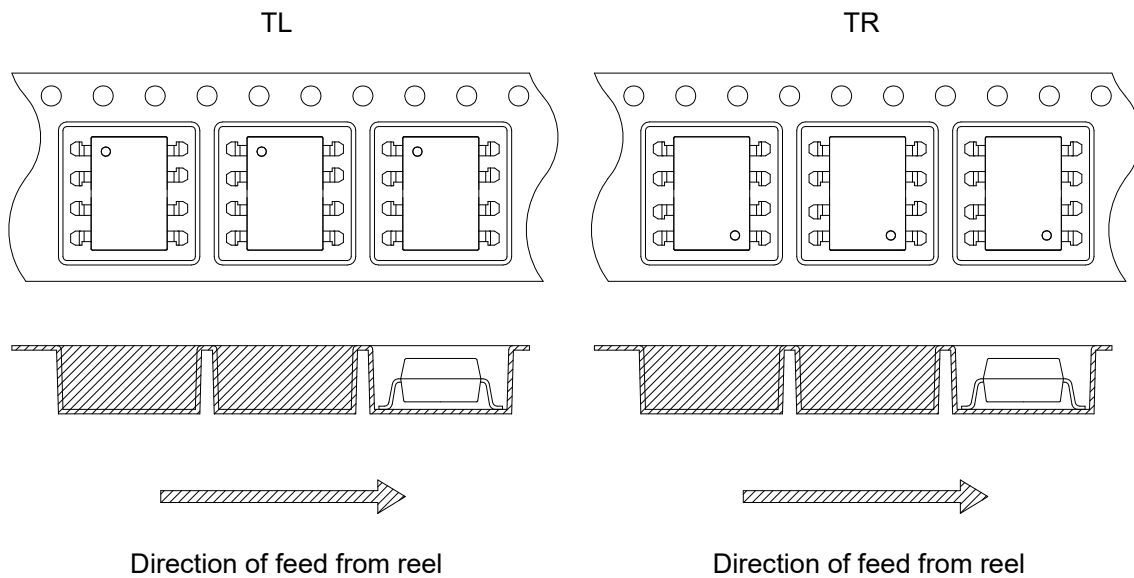
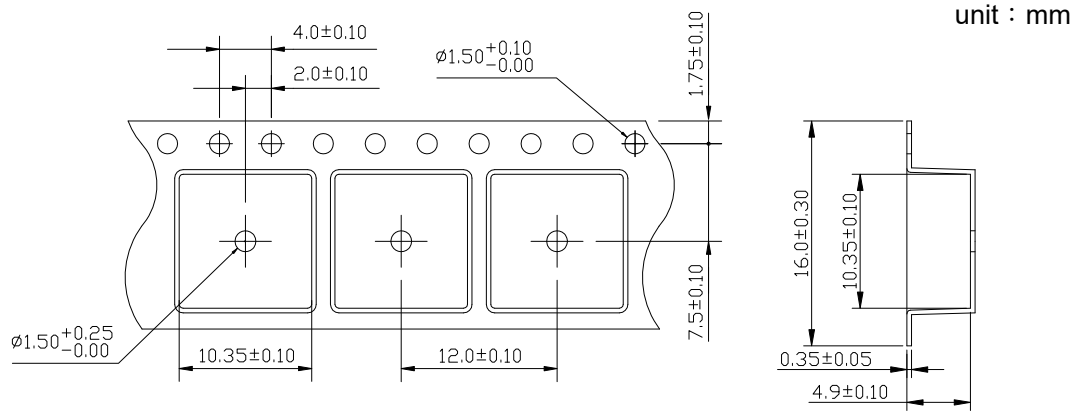
### 2.Long creepage distance for surface mount type

8-pin L

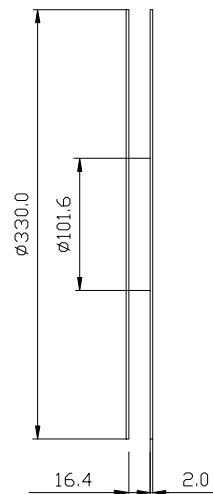


Unit :mm

● 8-pin SMD Carrier Tape & Reel



Quantity : 1000pcs/reel



- **Application Notice**

The statements regarding the suitability of products for certain types of applications are based on cosmo's knowledge of general applications of cosmo products. Such statements are not binding statements about the suitability of products for a particular application. It is the customer's responsibility to verify the specifications are suitable for use in a particular application. Customers are solely responsible for all aspects of their own product design or applications. The parameters provided in the datasheet may vary in different applications and performance may vary over time. All operating parameters (including typical parameters) must be validated by customer's technical experts for different applications. cosmo assumes no liability for customer' product design or applications. Product specifications do not expand or otherwise change cosmo's terms and conditions of purchase, including but not limited to the warranty expressed therein.

When using cosmo products, please comply with safety standards and instructions. cosmo has no liability and responsibility to the damage caused by improper use of the instructions specified in the specifications.

cosmo products are designed for use in general electronic equipment such as telecommunications, office automation equipments, personal computers, test and measurement equipments, consumer electronics, industrial control, instrumentation, audio, video.

cosmo devices shall not be used in equipment that requires higher level of reliability and safety, such as nuclear power control equipment, telecommunication equipment(trunk lines), space application, medical and other life supporting equipments, and equipment for aircraft, military, automotive or any other application that can cause human injury or death.

cosmo reserves the right to change the specifications, data, characteristics, structure, materials and other contents at any time without notice. Please contact cosmo to obtain the latest specification.

cosmo disclaim any and all liability for any errors, inaccuracies or incompleteness contained in any datasheet or in any other disclosure relating to any product.