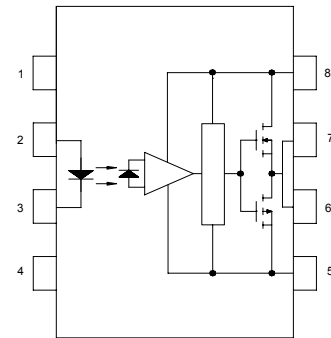


### ● Description

The KTLP250 series consists of an GaAlAs Light emitter diode and an integrated. This unit is 8-lead DIP package. KTLP250 series is suitable for gate driving circuit of IGBT or power MOSFET.

### ● 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. This unit is 8.lead DIP package.
2. Input threshold current:  $I_F=5\text{mA}$  (max.)
3. Supply current ( $I_{CC}$ ): 11mA (max.)
4. Supply voltage ( $V_{CC}$ ): 10 – 35V
5. Output current (IO):  $\pm 1.5\text{A}$  (max.)
6. Switching time ( $t_{pLH}/t_{pHL}$ ): 0.5 $\mu\text{s}$  (max.)
7. Isolation voltage: 5000Vrms (max.)
8. MSL class 1
9. 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

### ● 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.

深圳市大靖科技有限公司

[www.sz-djkj.com](http://www.sz-djkj.com)

专营：COSMO (冠西) 全系列光耦 <http://www.cosmo-ic.com>

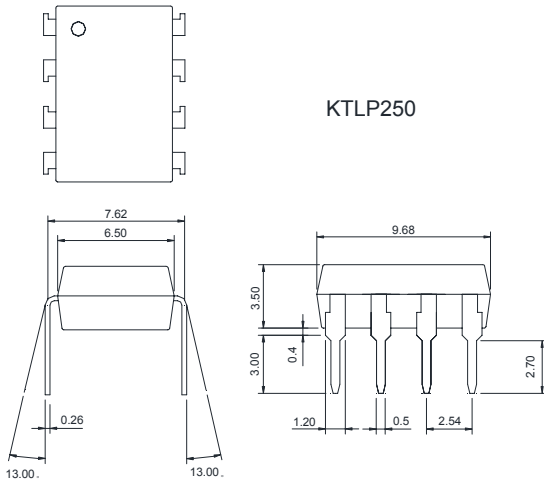
原装正品，国内库存，当天发货，技术支持

电话：0755-23611637/23611737 传真：0755-23611837

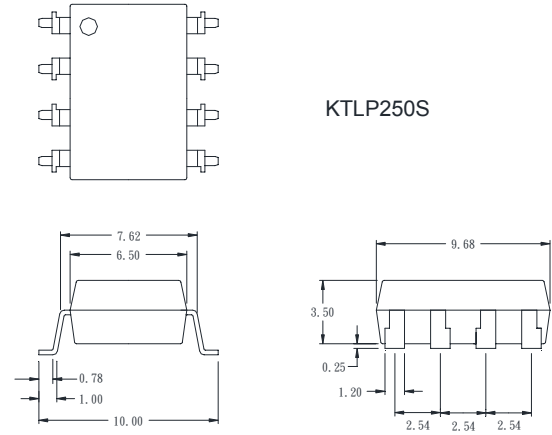
● **Outside Dimension**

Unit : mm

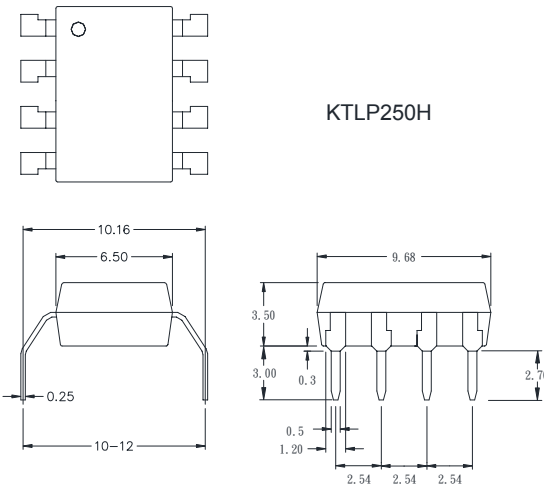
1. Dual-in-line type



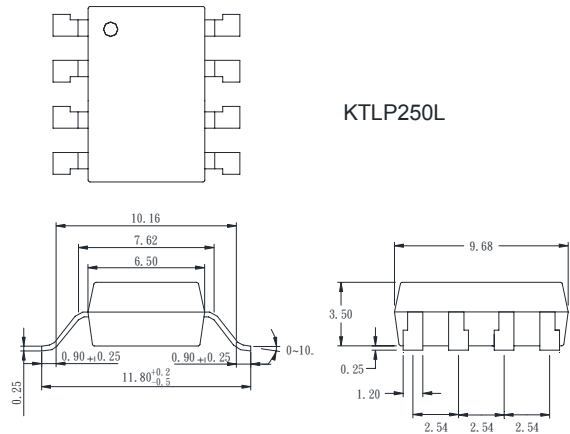
2. Surface mount type



3. Long creepage distance type

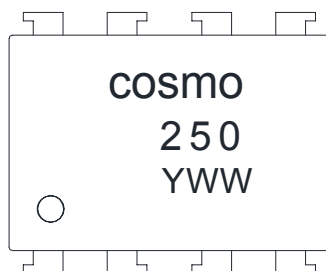


4. Long creepage distance for surface mount type



TOLERANCE:  $\pm 0.2$ mm

● **Device Marking**



**Notes:**

**cosmo**  
**250**  
**YWW**      Y: Year code / WW: Week code

### ● Absolute Maximum Ratings

(Ta = 25°C)

| Parameter  |   | Symbol                   | Rating                      | Unit    |        |
|--|---|--------------------------|-----------------------------|---------|--------|
| Input  | Forward current   | $I_F$                    | 20                          | mA      |        |
|  | Forward current derating (Ta ≥ 70°C)                      | $\Delta I_F / \Delta Ta$ | -0.36                       | mA / °C |        |
|  | 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 (Pw ≤ 2.5μs, f ≤ 15kHz) (*Note 2) |                          | $I_{OPH}$                   | -1.5    | A      |
|  | “L” peak output current (Pw ≤ 2.5μs, f ≤ 15kHz) (*Note 2) |                          | $I_{OPL}$                   | +1.5    | A      |
|  | Output voltage  | (Ta ≤ 70°C)              | $V_O$                       | 35      | V      |
|  |   | (Ta = 85°C)              |                             | 24      |        |
|  | Supply voltage  | (Ta ≤ 70°C)              | $V_{CC}$                    | 35      | V      |
|  |   | (Ta = 85°C)              |                             | 24      |        |
|  | Output voltage derating (Ta ≥ 70°C)                       |                          | $\Delta V_O / \Delta Ta$    | -0.73   | V / °C |
|  | Supply voltage derating (Ta ≥ 70°C)                       |                          | $\Delta V_{CC} / \Delta Ta$ | -0.73   | V / °C |
| Junction temperature                               |   | $T_j$                    | 125                         | °C      |        |
| Operating frequency (*Note 3)                      |   | f                        | 25                          | KhZ     |        |
| Operating temperature range                        |   | Topr                     | -40~115                     | °C      |        |
| Storage temperature range                          |   | Tstg                     | -55~125                     | °C      |        |
| Lead soldering temperature(10s) (*Note 4)          |   | Tsol                     | 260                         | °C      |        |
| Isolation voltage (AC, 1min., R.H ≤ 60%) (*Note 5) |   | BVs                      | 5000                        | Vrms    |        |

\*Note1: Pulse width Pw ≤ 1 μs, 300pps.

\*Note2: Exponential waveform.

\*Note3: Exponential waveform,  $I_{OPH} \leq -1.0A (\leq 2.5 \mu s)$ ,  $I_{OPL} \leq +1.0A (\leq 2.5 \mu s)$ .

\*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.

### ● Electrical Characteristics

(Ta = 25°C)

| Parameter                                  | Symbol                   | Test Circuit | Test Condition               | Min.                 | Typ.                   | Max. | Unit    |   |   |
|--|--------------------------|--------------|------------------------------|----------------------|------------------------|------|---------|---|---|
| Input forward voltage                      | $V_F$                    | —            | $I_F=10mA, Ta=25^\circ C$    | —                    | 1.6                    | 1.8  | V       |   |   |
| Temperature coefficient of forward voltage | $\Delta V_F / \Delta Ta$ | —            | $I_F=10mA$                   | —                    | -2.0                   | —    | mV / °C |   |   |
| Input reverse current                      | $I_R$                    | —            | $V_R=5V, Ta=25^\circ C$      | —                    | —                      | 10   | μA      |   |   |
| Input capacitance                          | $C_T$                    | —            | $V=0, f=1MHz, Ta=25^\circ C$ | —                    | 45                     | 250  | pF      |   |   |
| Output current                             | “H” level                | $I_{OPH}$    | 3                            | $V_{CC}=30V$<br>(*A) | $I_F=10mA$<br>$V_b=4V$ | -0.5 | -1.5    | — | A |

|                            |              |           |   |  |                    |           |       |          |
|----------------------------|--------------|-----------|---|--|--------------------|-----------|-------|----------|
|                            | "L" level    | $I_{OPL}$ | 2 | $I_F=0$<br>$V_a=2.5V$                                    | 0.5                | 2         | —     |          |
| Output voltage             | "H" level    | $V_{OH}$  | 4 | $V_{CC1}=15V, V_{EE1}=-15V$<br>$R_L=200\Omega, I_F=5mA$  | 11                 | 12.8      | —     | V        |
|                            | "L" level    | $V_{OL}$  | 5 | $V_{CC1}=15V, V_{EE1}=-15V$<br>$R_L=200\Omega, V_F=0.8V$ | —                  | -14.2     | -12.5 |          |
| Supply current             | "H" level    | $I_{CCH}$ | — | $V_{CC}=30V, I_F=10mA,$<br>$T_a=25^\circ C$              | —                  | 7         | —     | mA       |
|                            |              |           |   | $V_{CC}=30V, I_F=10mA$                                   | —                  | —         | 11    |          |
|                            | "L" level    | $I_{CCL}$ | — | $V_{CC}=30V, I_F=0mA,$<br>$T_a=25^\circ C$               | —                  | 7.5       | —     |          |
|                            |              |           |   | $V_{CC}=30V, I_F=0mA$                                    | —                  | —         | 11    |          |
| Threshold input current    | "Output L→H" | $I_{FLH}$ | — | $V_{CC1}=15V, V_{EE1}=-15V,$<br>$R_L=200\Omega, V_O>0V$  | —                  | 1.2       | 5     | mA       |
| Threshold input voltage    | "Output H→L" | $V_{FHL}$ | — | $V_{CC1}=15V, V_{EE1}=-15V,$<br>$R_L=200\Omega, V_O<0V$  | 0.8                | —         | —     | V        |
| Supply voltage             |              | $V_{CC}$  | — |  | 10                 | —         | 35    | V        |
| Capacitance (input-output) |              | $C_S$     | — | $V_s=0, f=1MHz, T_a=25^\circ C$                          | —                  | 1.0       | 2.0   | pF       |
| Resistance (input-output)  |              | $R_S$     | — | $V_s=500V, T_a=25^\circ C,$<br>$R.H. \leq 60\%$          | $1 \times 10^{12}$ | $10^{14}$ | —     | $\Omega$ |

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

### ● Switching Characteristics

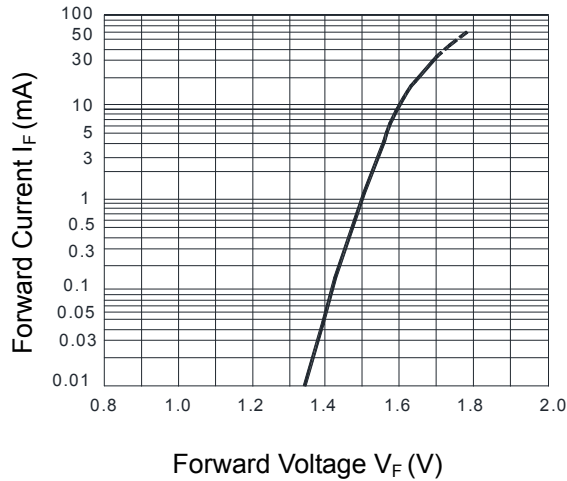
( $T_a = 25^\circ C$ )

| Parameter   | Symbol   | Test Circuit | Test Condition  | Min. | Typ. | Max. | Unit    |              |
|---|----------|--------------|---|------|------|------|---------|--------------|
| Propagation delay time                              | "L→H"    | $t_{PLH}$    | $I_F=8mA$ (Note8)<br>$V_{CC1}=+15V, V_{EE1}=-15V$<br>$R_g=20\Omega, C_g=10nF$ | —    | 0.15 | 0.5  | $\mu s$ |              |
|   | "H→L"    | $t_{PHL}$    |   | —    | 0.15 | 0.5  |         |              |
| Output rise time                                    | $t_r$    | 6            |   |      | —    | —    |         | —            |
| Output fall time                                    | $t_f$    |              |   |      | —    | —    |         | —            |
| Common mode transient immunity at high level output | $C_{MH}$ | 7            | $V_{CM}=600V, I_F=8mA$<br>$V_{CC}=30V, T_a=25^\circ C$                        |      | -5   | —    | —       | KV / $\mu s$ |
| Common mode transient immunity at low level output  | $C_{ML}$ | 7            | $V_{CM}=600V, I_F=0$<br>$V_{CC}=30V, T_a=25^\circ C$                          |      | 5    | —    | —       | KV / $\mu s$ |

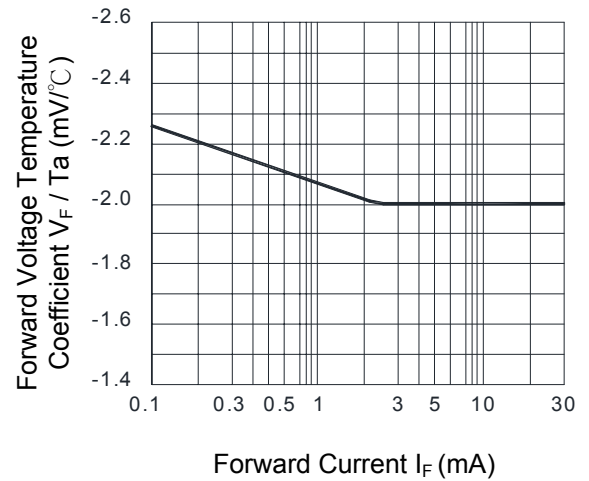
\* All typical values are at  $T_a=25^\circ C$ .

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

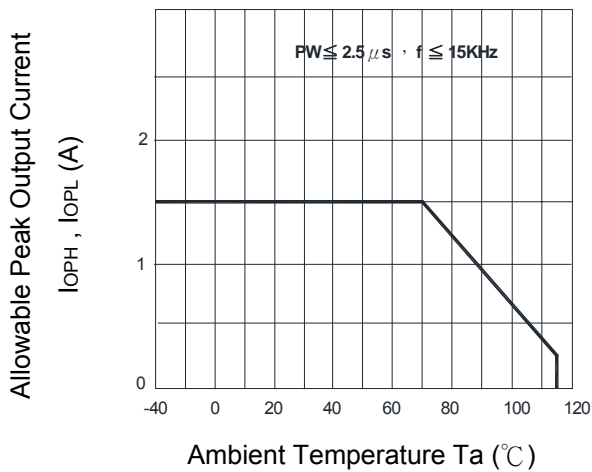
**Fig.1 Forward Current vs. Forward Voltage**



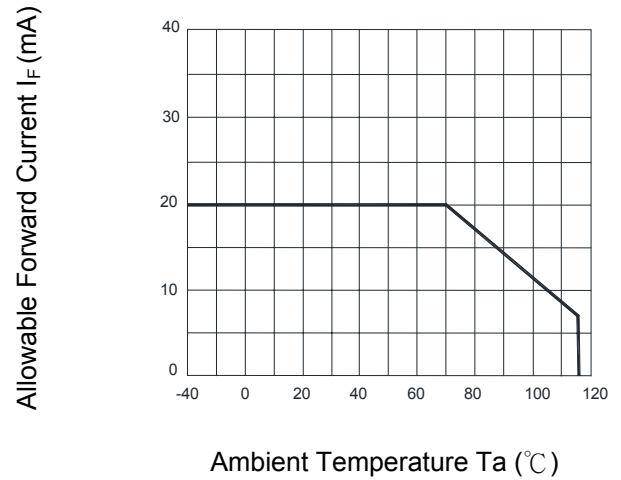
**Fig.2 Forward Voltage Temperature Coefficient  $V_F / T_a$  vs. Forward Current**



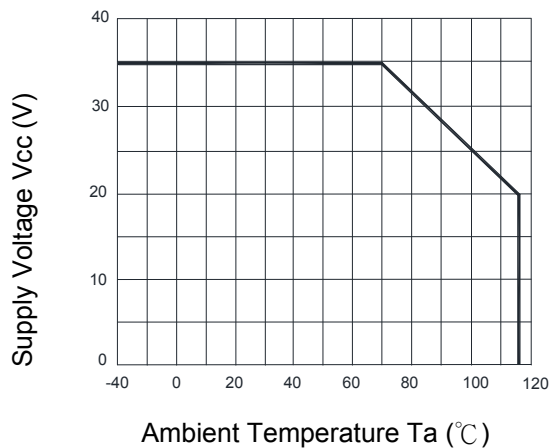
**Fig.3 Allowable Peak Output Current vs. Ambient Temperature**



**Fig.4 Allowable Forward Current vs. Ambient Temperature**

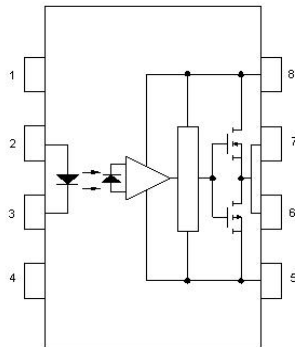


**Fig.5 Supply Voltage vs. Ambient Temperature**

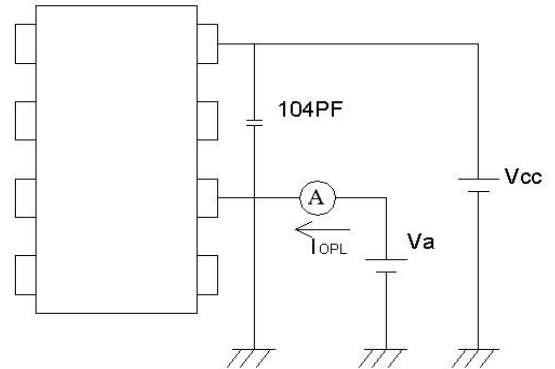


● **Test Circuit**

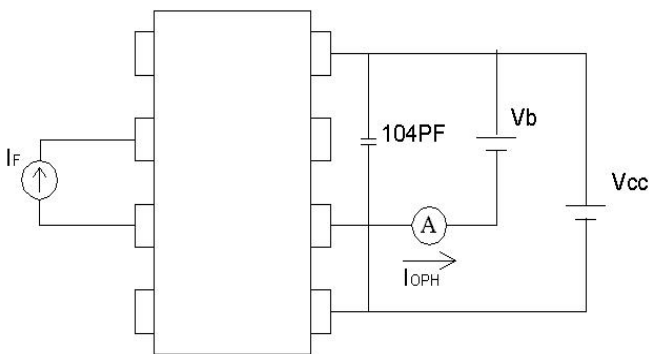
**1. Top View**



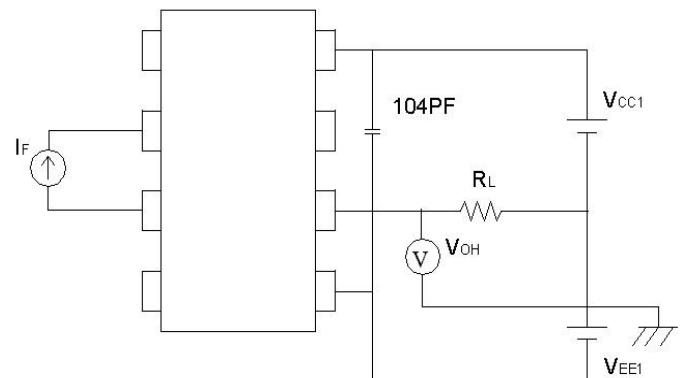
**2.  $I_{OPL}$  Measure**



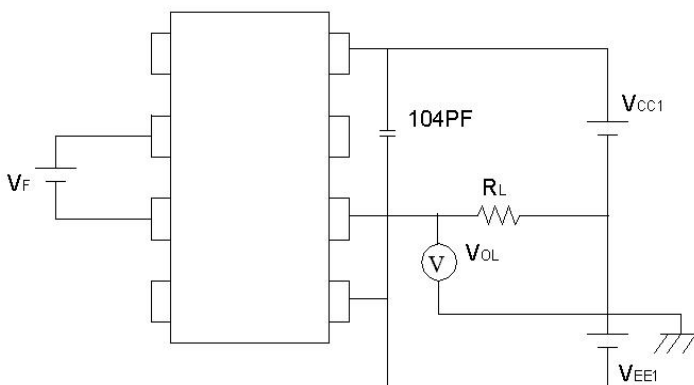
**3.  $I_{OPH}$  Measure**



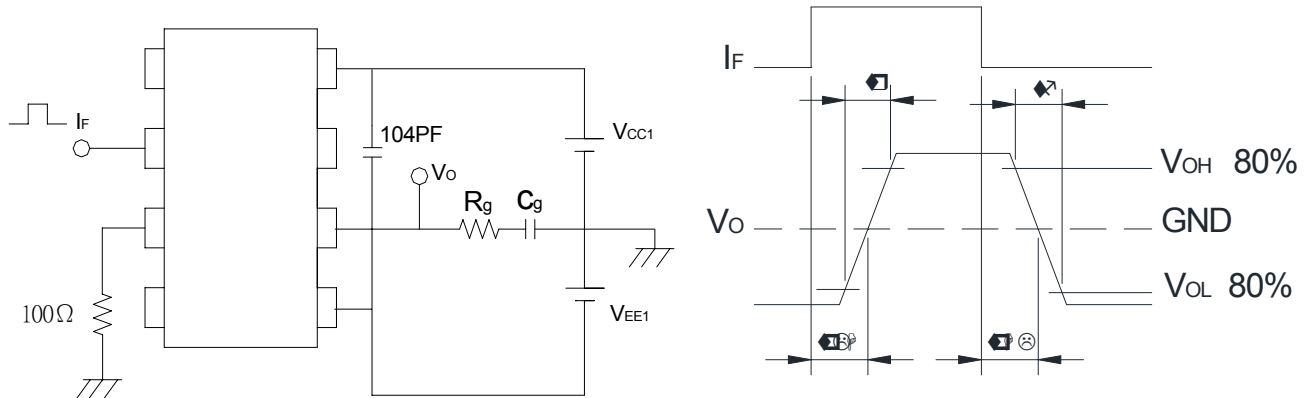
**4.  $V_{OH}$  Measure**



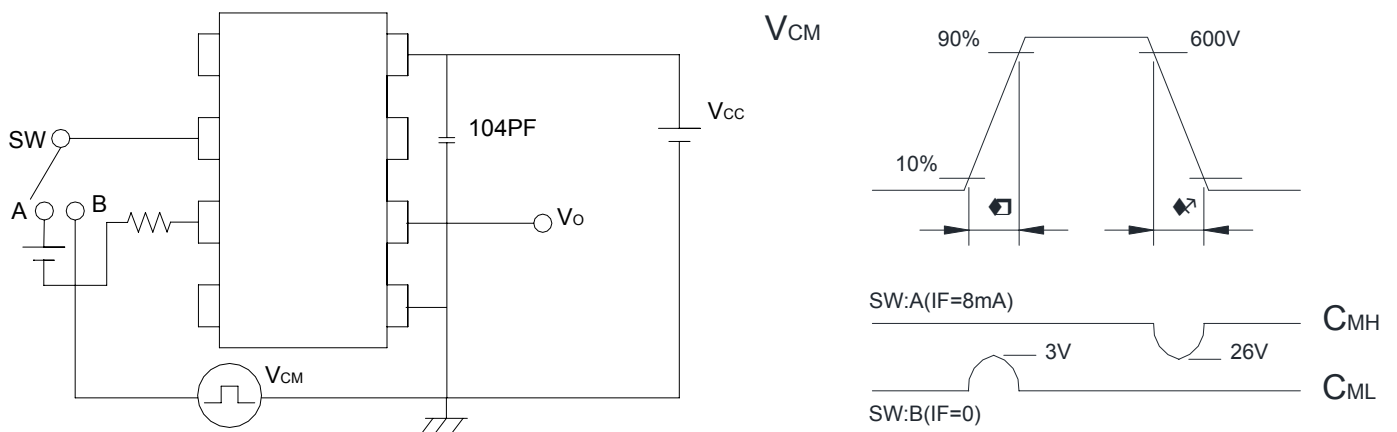
**5.  $V_{OL}$  Measure**



### 6. $t_{pLH}$ , $t_{pHL}$ , $t_r$ , $t_f$ Measure



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



$$C_{ML} = \frac{480(V)}{t_r (\mu s)} ; C_{MH} = \frac{480(V)}{t_f (\mu s)}$$

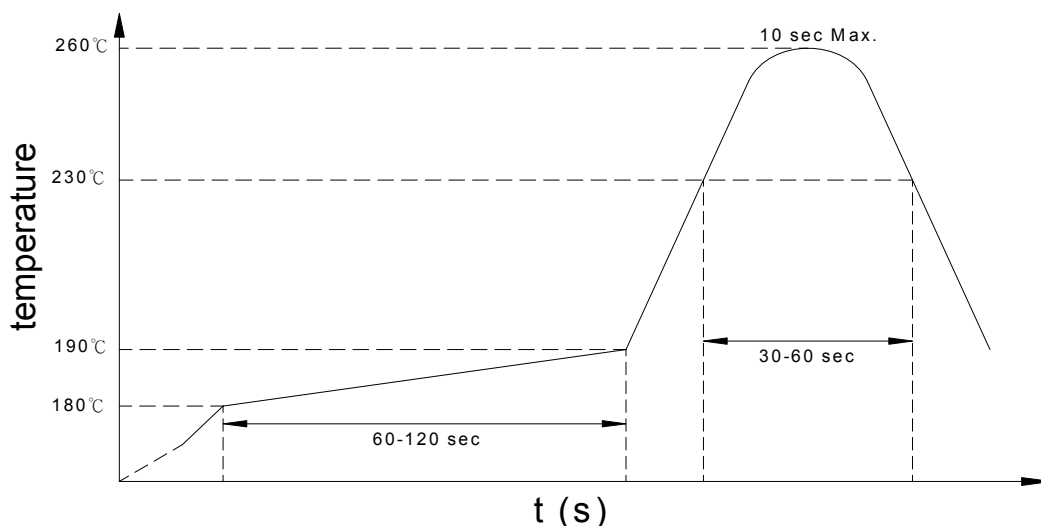
\* $C_{ML}(C_{MH})$  is the maximum rate of rise (fall) of the common mode voltage that can be sustained with the output voltage in the low (high) state.

## ● 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**

## KTLP250 X (Y)

**Notes:**

KP1510 = Part No.

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

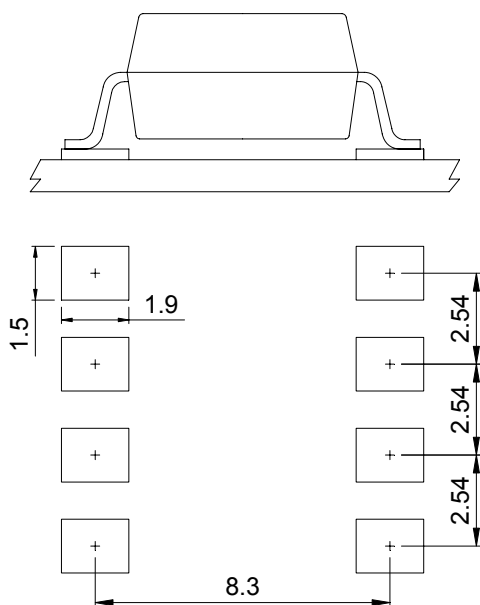
Y = Tape and reel option (TL · TR · TLD · TRU)

| 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 |
| L (TLD) | long creepage distance for surface mount type package + TLD tape & reel option | 800 units per reel  |
| L (TRU) | long creepage distance for surface mount type package + TRU tape & reel option | 800 units per reel  |

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

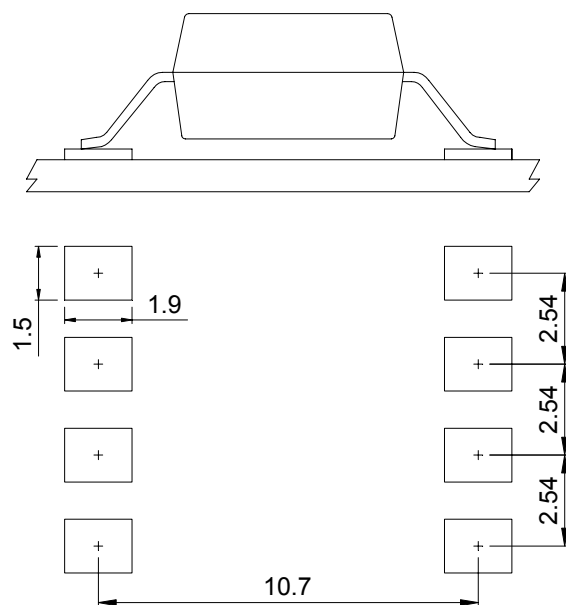
**1.Surface mount type**

8-pin SMD



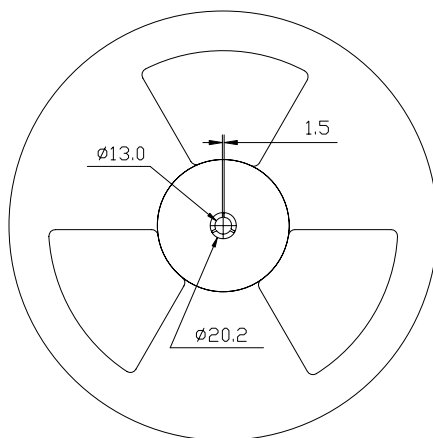
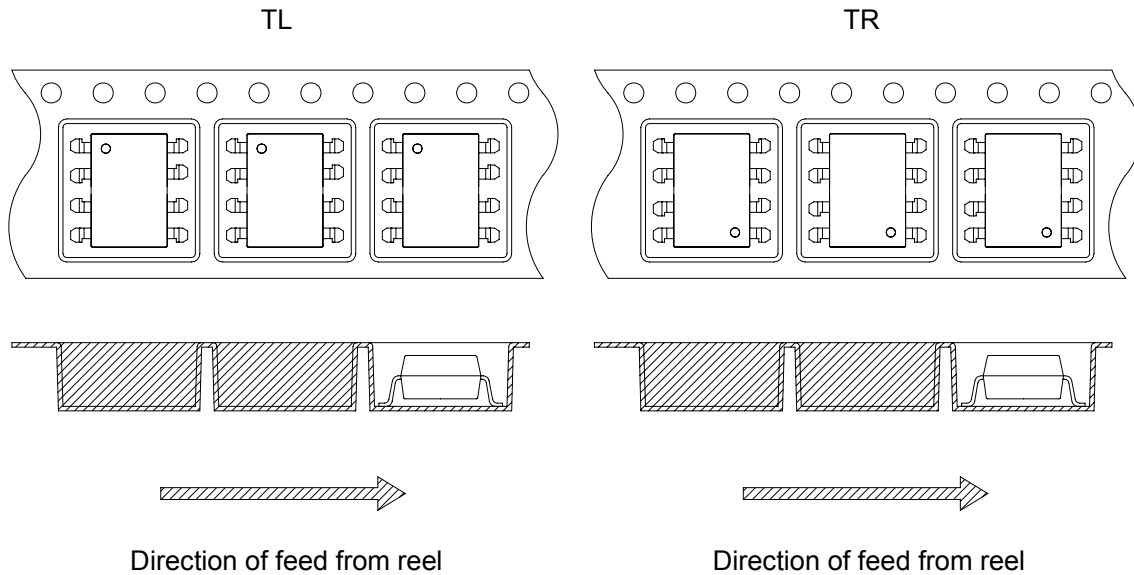
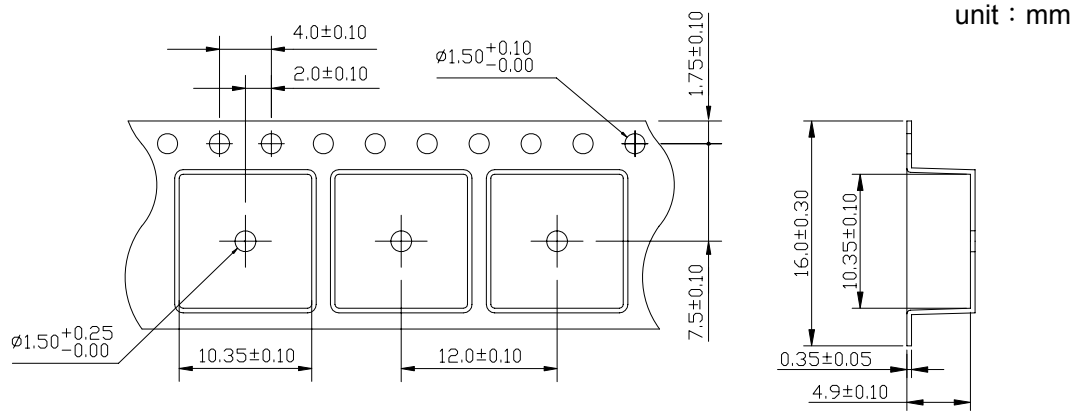
**2.Long creepage distance for surface mount type**

8-pin L

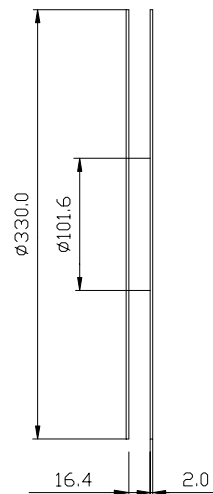


Unit :mm

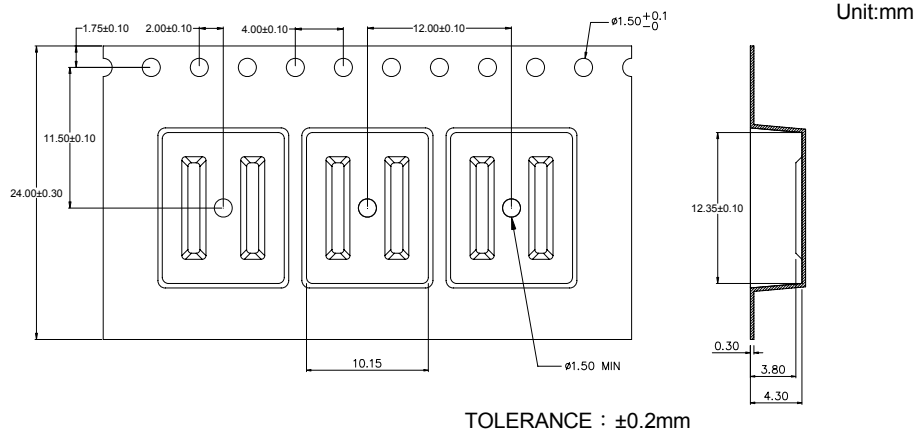
● 8-pin SMD Carrier Tape & Reel



Quantity : 1000pcs/reel

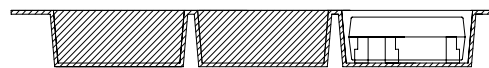
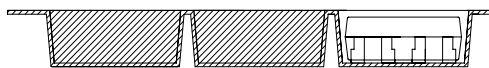
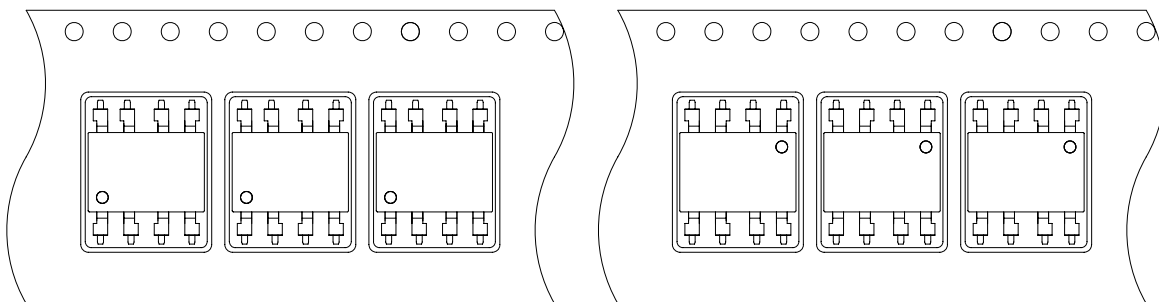


● 8-pin L Carrier Tape & Reel



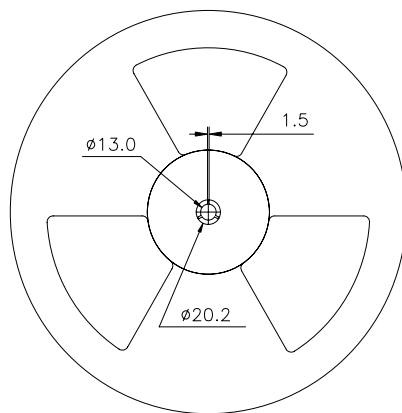
TLD

TRU

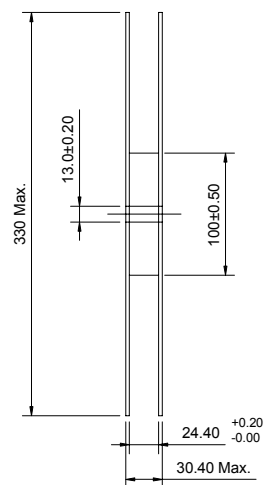


Direction of feed from reel

Direction of feed from reel



Quantity : 800pcs/reel



- **Application Notice**

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