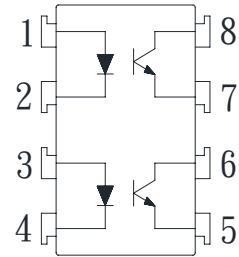


### ● Description

The KP1020 series consist of an infrared emitting diode, optically coupled to a phototransistor detector. They are packaged in an 8-pin DIP package and available in wide-lead spacing and SMD option.

### ● Schematic



1、3. Anode

2、4. Cathode

5、7. Emitter

6、8. Collector

### ● Features

1. Current transfer ratio  
( CTR : Min. 50% at  $I_F=5\text{mA}$   $V_{CE}=5\text{V}$  )
2. High isolation voltage between input and output  
( Viso : 5000Vrms )
3. Pb free and RoHS compliant
4. MSL class 1
5. Agency Approvals
  - UL Approved (No. E169586): UL1577
  - c-UL Approved (No. E169586)
  - VDE Approved (No. 101347): DIN EN60747-5-5
  - FIMKO Approved: EN60065, EN60950, EN60335
  - SEMKO Approved: EN60065, EN60950, EN60335

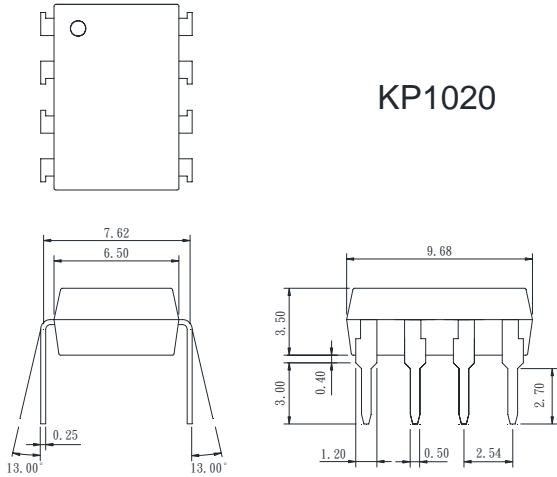
### ● Applications

- System appliances
- Measuring instruments
- Computer terminals
- Programmable controllers
- Medical instruments
- Physical and chemical equipment
- Signal transmission between circuits of different potentials and impedances

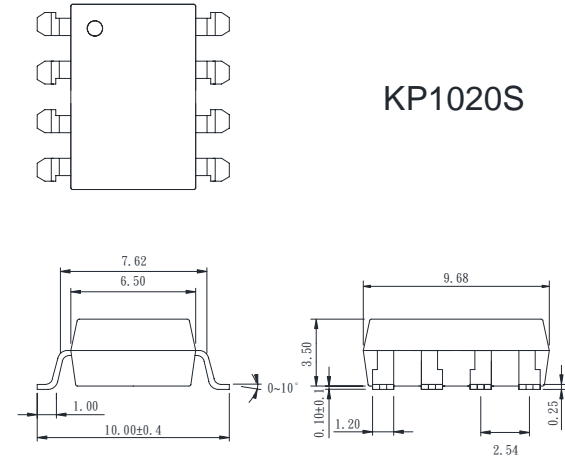
● **Outside Dimension**

Unit : mm

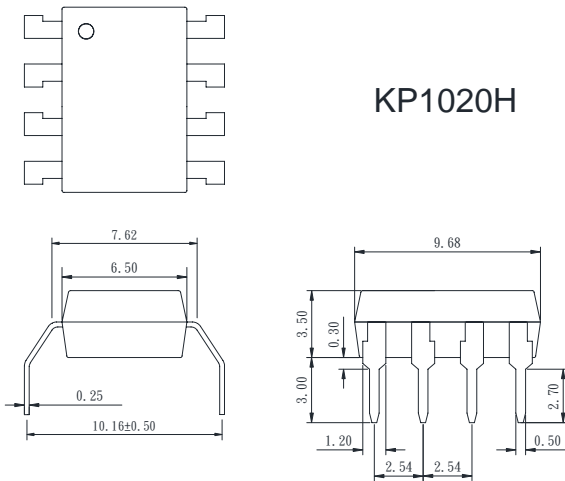
1. Dual-in-line type.



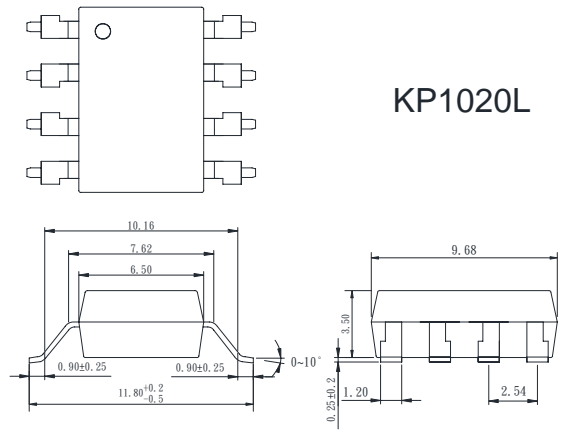
2. Surface mount type.



3. Long creepage distance type

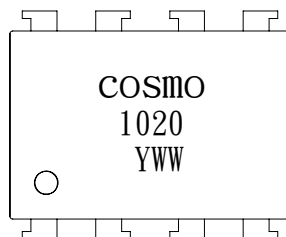


4. Long creepage distance for surface mount type.



TOLERANCE : ±0.2mm

● **Device Marking**



**Notes:**

**COSMO**  
**1020**  
**YWW**

Y: Year code / WW: Week code

### ● Absolute Maximum Ratings

(Ta=25°C)

| Parameter                        |                             | Symbol    | Rating      | Unit |
|----------------------------------|-----------------------------|-----------|-------------|------|
| Input                            | Forward current             | $I_F$     | 50          | mA   |
|                                  | Peak forward current        | $I_{FM}$  | 1           | A    |
|                                  | Reverse voltage             | $V_R$     | 6           | V    |
|                                  | Power dissipation           | $P_D$     | 70          | mW   |
| Output                           | Collector-emitter voltage   | $V_{CEO}$ | 80          | V    |
|                                  | Emitter-collector voltage   | $V_{ECO}$ | 6           | V    |
|                                  | Collector current           | $I_C$     | 50          | mA   |
|                                  | Collector power dissipation | $P_C$     | 150         | mW   |
| Total power dissipation          |                             | $P_{tot}$ | 200         | mW   |
| Isolation voltage 1 minute       |                             | $V_{iso}$ | 5000        | Vrms |
| Operating temperature            |                             | $T_{opr}$ | -55 to +115 | °C   |
| Storage temperature              |                             | $T_{stg}$ | -55 to +125 | °C   |
| Soldering temperature 10 seconds |                             | $T_{sol}$ | 260         | °C   |

### ● Electro-optical Characteristics

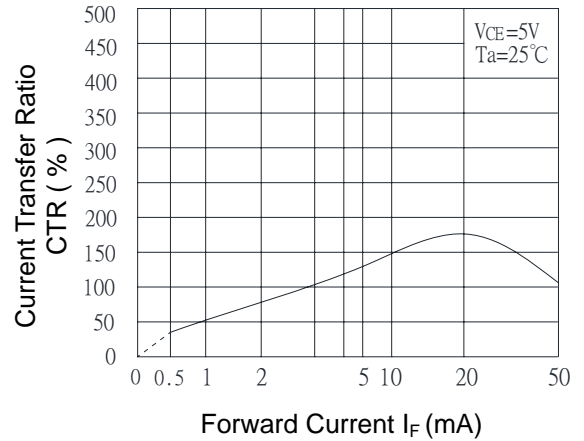
(Ta=25°C)

| Parameter                |                              | Symbol        | Conditions                          | Min.               | Typ.      | Max. | Unit     |
|--------------------------|------------------------------|---------------|-------------------------------------|--------------------|-----------|------|----------|
| Input                    | Forward voltage              | $V_F$         | $I_F=20mA$                          | -                  | 1.2       | 1.4  | V        |
|                          | Peak forward voltage         | $V_{FM}$      | $I_{FM}=0.5A$                       | -                  | -         | 3.0  | V        |
|                          | Reverse current              | $I_R$         | $V_R=4V$                            | -                  | -         | 10   | $\mu A$  |
|                          | Terminal capacitance         | $C_t$         | $V=0, f=1KHz$                       | -                  | 30        | -    | pF       |
| Output                   | Collector dark current       | $I_{CEO}$     | $V_{CE}=20V, I_F=0$                 | -                  | -         | 0.1  | $\mu A$  |
| Transfer characteristics | Current transfer ratio       | CTR           | $I_F=5mA, V_{CE}=5V$                | 50                 | -         | 600  | %        |
|                          | Collector-emitter saturation | $V_{CE(sat)}$ | $I_F=20mA, I_C=1mA$                 | -                  | 0.1       | 0.2  | V        |
|                          | Isolation resistance         | $R_{iso}$     | DC500V                              | $5 \times 10^{10}$ | $10^{11}$ | -    | $\Omega$ |
|                          | Floating capacitance         | $C_f$         | $V=0, f=1MHz$                       | -                  | 0.6       | 1.0  | pF       |
|                          | Cut-off frequency            | $f_C$         | $V_{CC}=5V, I_C=2mA, R_L=100\Omega$ | -                  | 80        | -    | KHz      |
|                          | Response time ( Rise )       | $t_r$         | $V_{CE}=2V, I_C=2mA, R_L=100\Omega$ | -                  | 4         | 18   | $\mu s$  |
|                          | Response time ( Fall )       | $t_f$         |                                     | -                  | 3         | 18   | $\mu s$  |

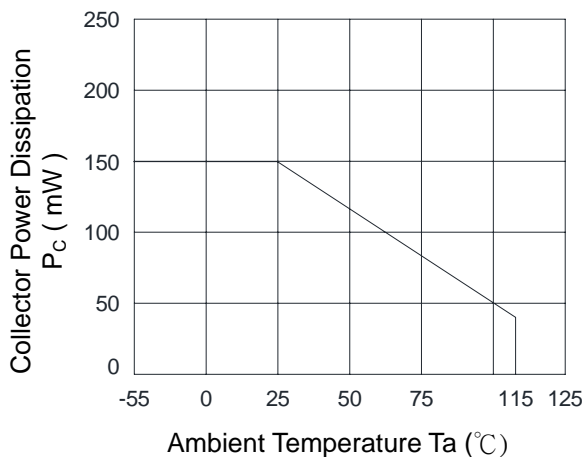
Classification table of current transfer ratio is shown below.

| KP1020 Model No. | CTR (%)  |
|------------------|----------|
| KP1020 E         | 50 ~ 600 |

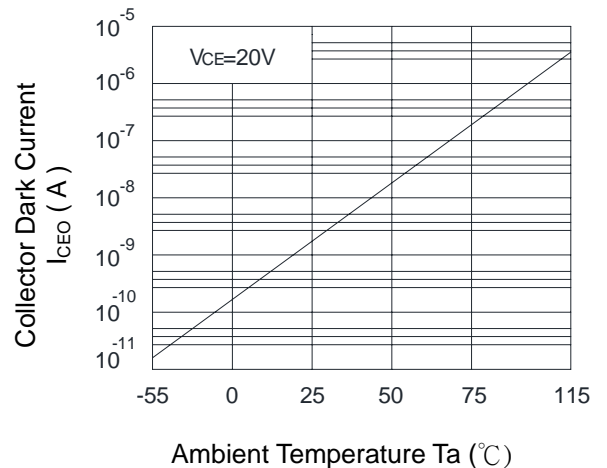
**Fig.1 Current Transfer Ratio vs. Forward Current**



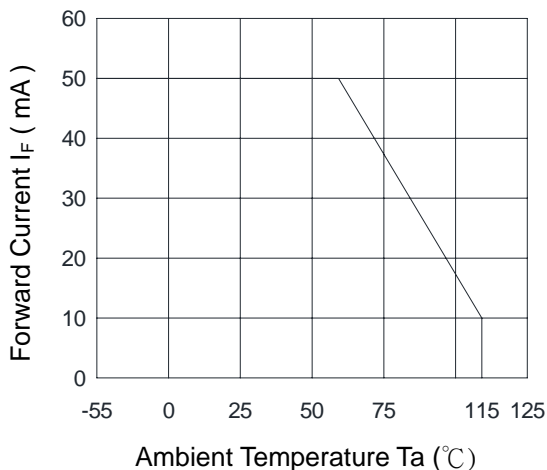
**Fig.2 Collector Power Dissipation vs. Ambient Temperature**



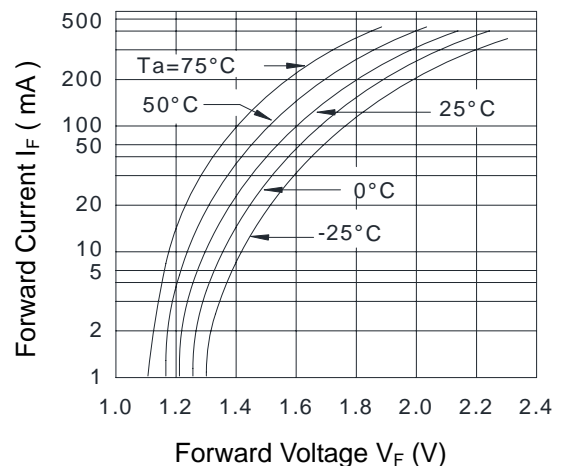
**Fig.3 Collector Dark Current vs. Ambient Temperature**



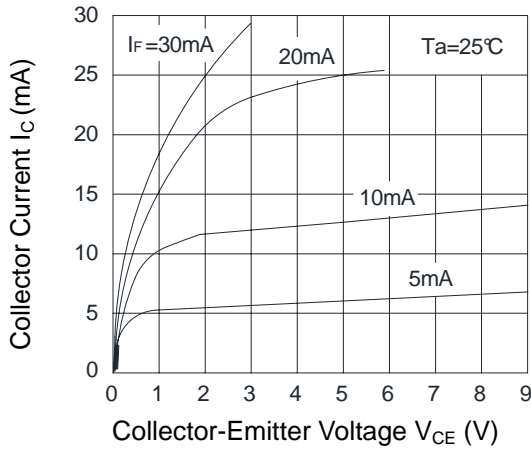
**Fig.4 Forward Current vs. Ambient Temperature**



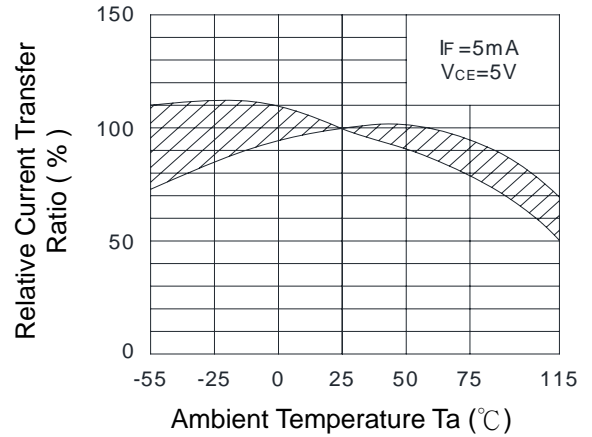
**Fig.5 Forward Current vs. Forward Voltage**



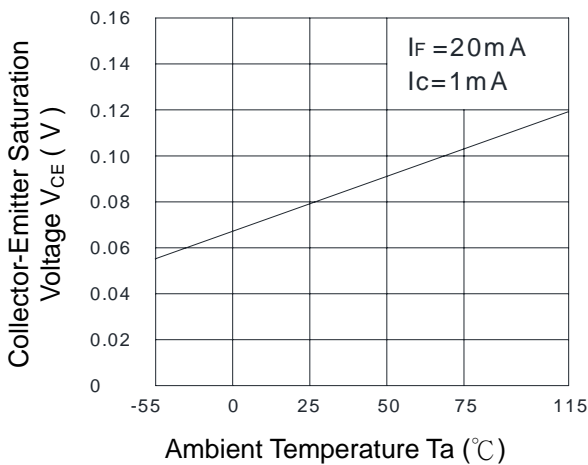
**Fig.6 Collector Current vs. Collector-Emitter Voltage**



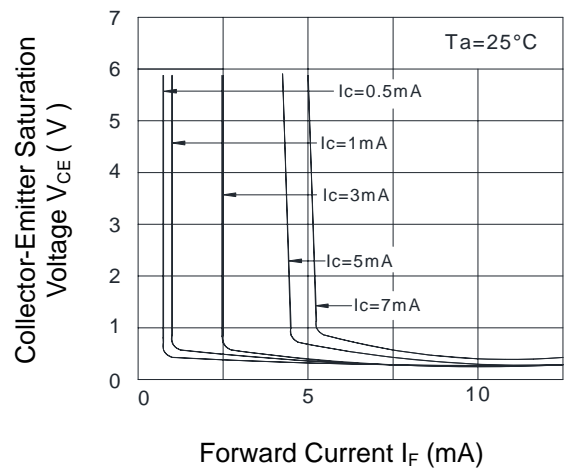
**Fig.7 Relative Current Transfer Ratio vs. Ambient Temperature**



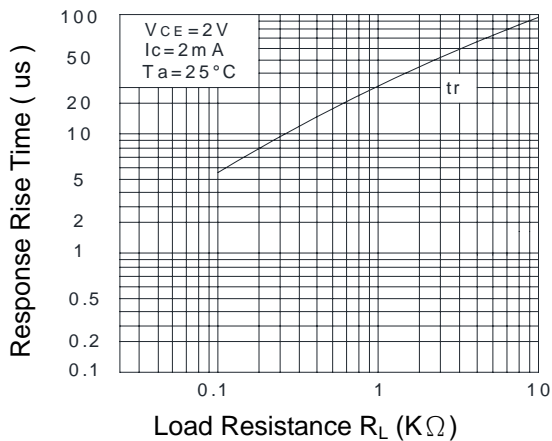
**Fig.8 Collector-Emitter Saturation Voltage vs. Ambient Temperature**



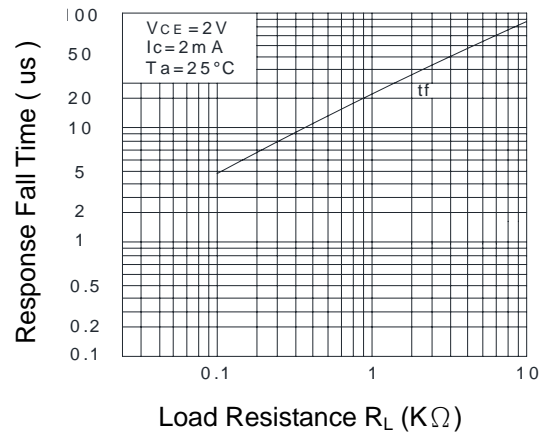
**Fig.9 Collector-Emitter Saturation Voltage vs. Forward Current**



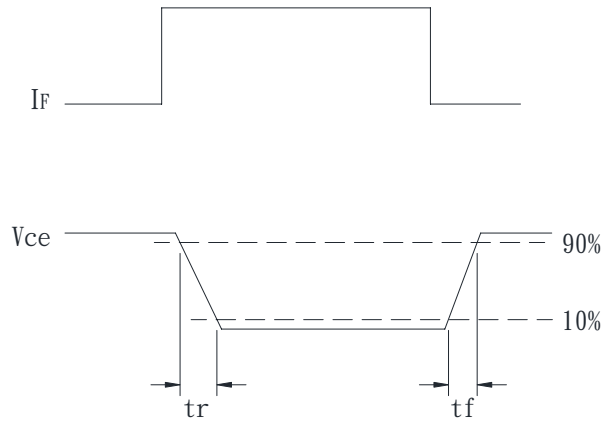
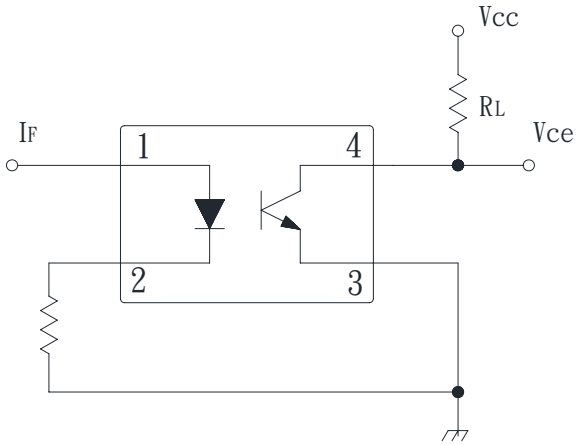
**Fig.10 Response Time ( Rise ) vs. Load Resistance**



**Fig.11 Response Time ( Fall ) vs. Load Resistance**



- **Test Circuit for Response Time**

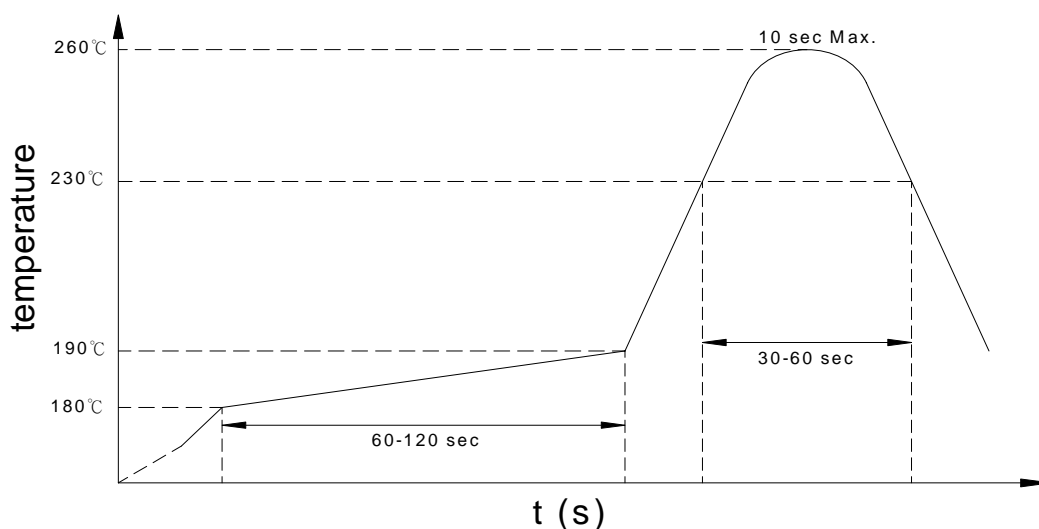


### ● Recommended Soldering Conditions

#### (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**

### KP1020 X Y (Z)

**Notes:**

KP1020 = Part No.

X = Lead form option (0,S,H,L)

Y = CTR rank ( E )

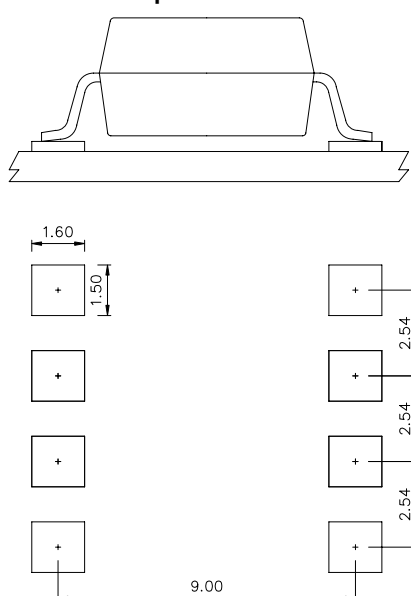
Z = Tape and reel option (TL,TR,TLD,TRU)

| 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 | 1000 units per reel |
| L (TRU) | long creepage distance for surface mount type package + TRU tape & reel option | 1000 units per reel |

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

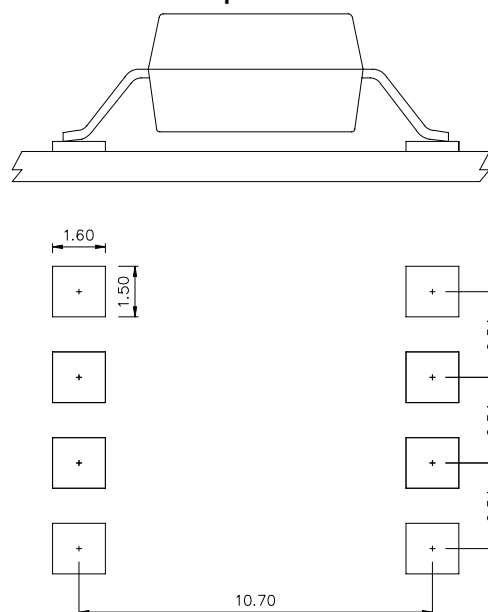
1.Surface mount type.

8 pin SMD



2.Long creepage distance for surface mount type.

8 pin L

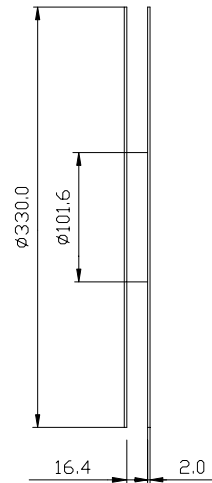
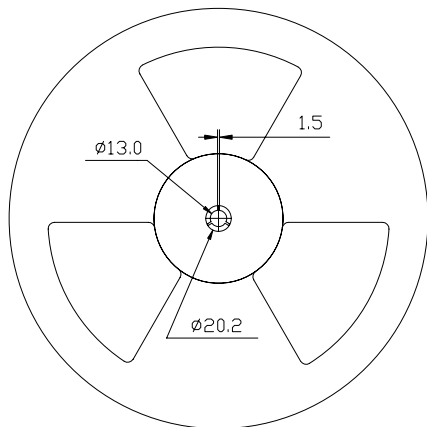
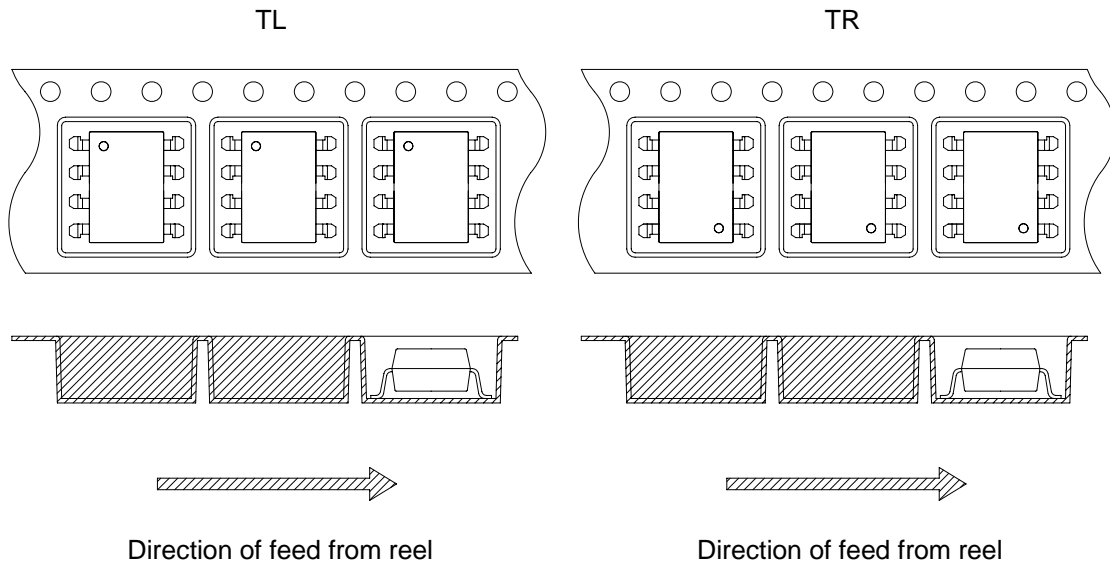
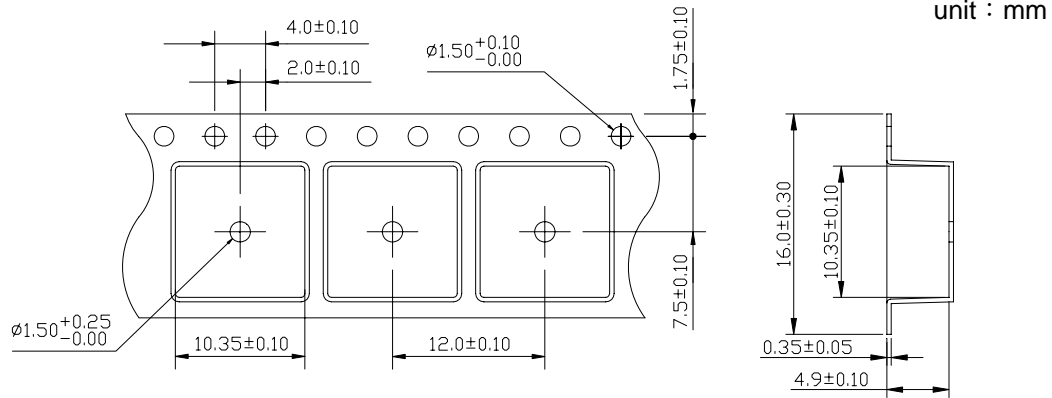


Unit : mm

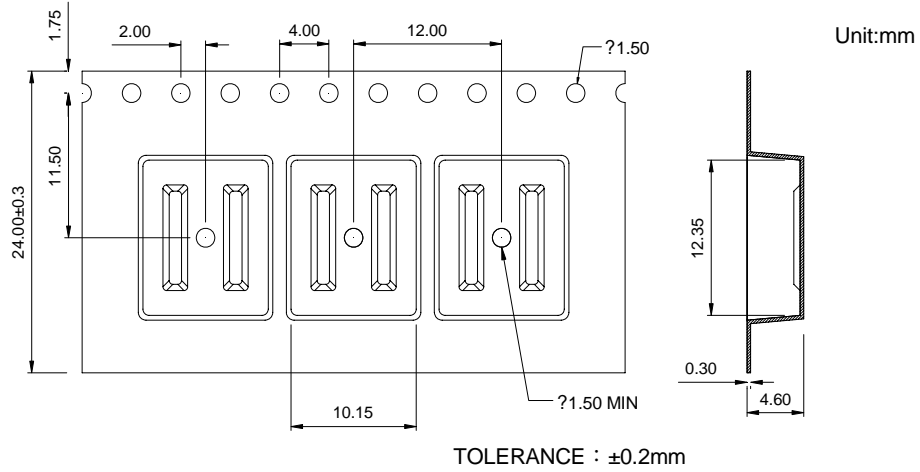
<http://www.cosmo-ic.com>



● **8-pin SMD Carrier Tape & Reel**

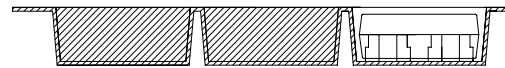
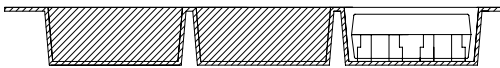
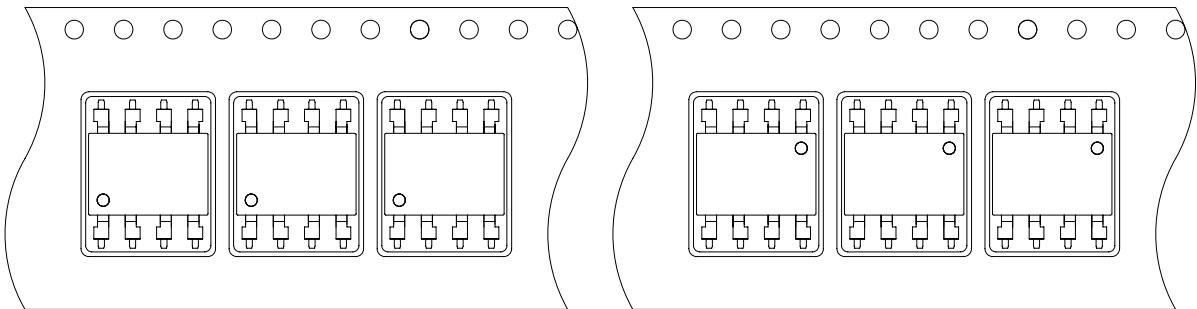


● 8-pin L Carrier Tape & Reel



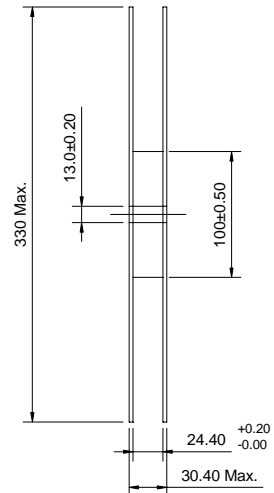
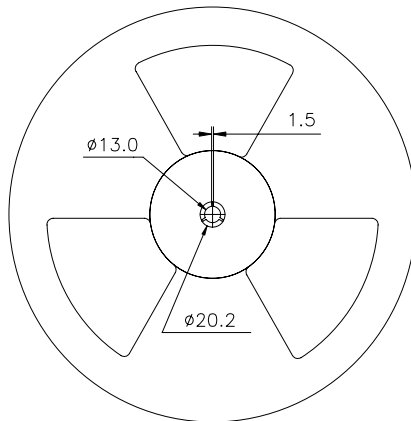
TLD

TRU



Direction of feed from reel

Direction of feed from 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.