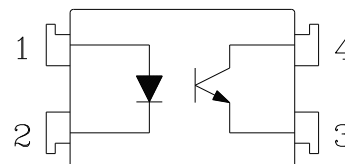


### ● Description

The K1010 series consist of an infrared emitting diode, optically coupled to a phototransistor detector. They are packaged in a 4-pin DIP package and available in wide-lead spacing and SMD option.

### ● Schematic



- 1. Anode
- 2. Cathode
- 3. Emitter
- 4. 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
  - CQC Approved: GB8898-2011, GB4943.1-2011

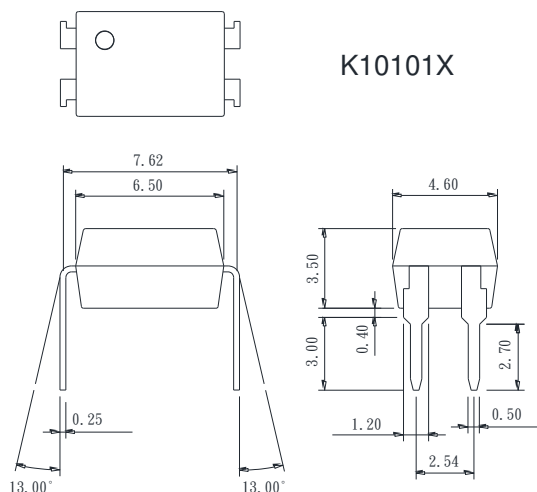
### ● Applications

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

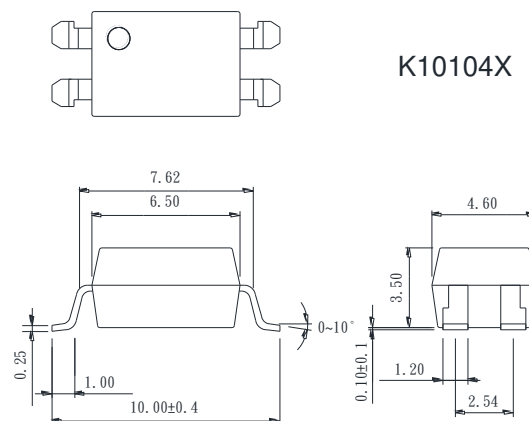
### ● Outside Dimension

Unit : mm

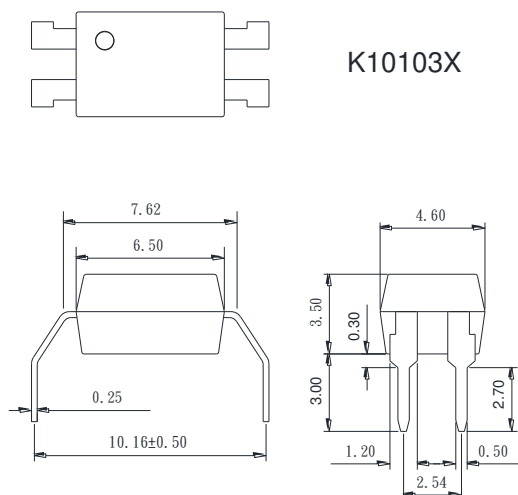
#### 1. Dual-in-line type.



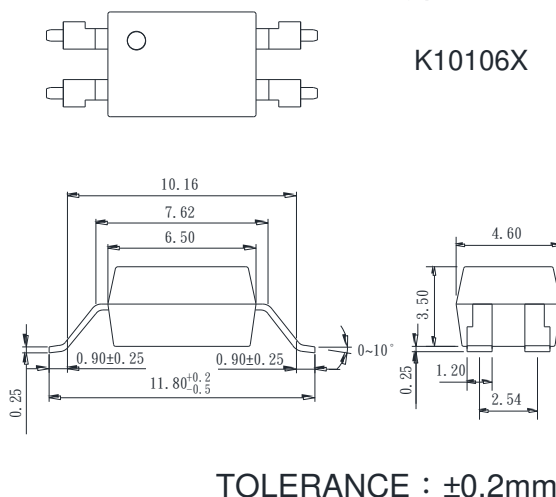
#### 2. Surface mount type.



#### 3. Long creepage distance type

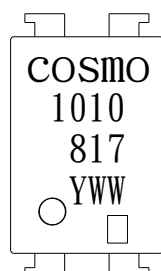


#### 4. Long creepage distance for surface mount type.



TOLERANCE : ±0.2mm

### ● Device Marking



#### Notes:

cosmo  
1010  
817  
YWW



Y: Year code / WW: Week code

□: CTR rank

### ● 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

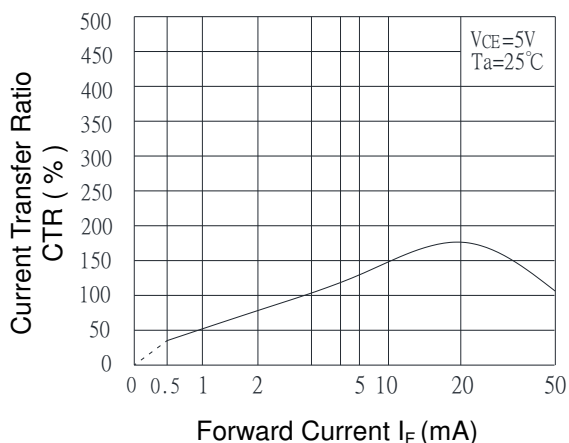
(Ta=25°C)

| 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  | %        |
|                          |                              |               | $I_F=1mA, V_{CE}=5V$                | 15                 | -         | -    |          |
|                          | 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   | $\mu s$  |

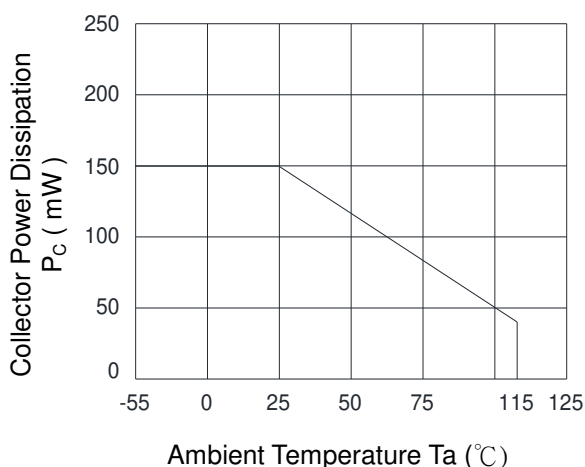
Classification table of current transfer ratio is shown below.

| K1010 Model No. | CTR ( % ) | Marking of Classification |
|-----------------|-----------|---------------------------|
| K1010 A         | 80 ~ 160  | A                         |
| K1010 B         | 130 ~ 260 | B                         |
| K1010 C         | 200 ~ 400 | C                         |
| K1010 D         | 300 ~ 600 | D                         |
| K1010 E         | 50 ~ 600  | Blank,A,B,C,D,E           |

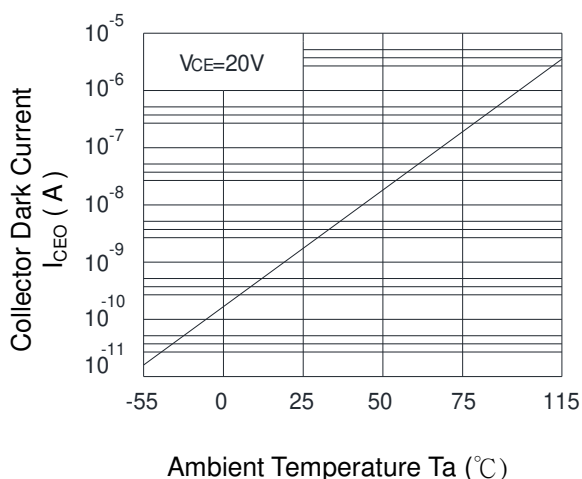
**Fig.1 Current Transfer Ratio  
vs. Forward Current**



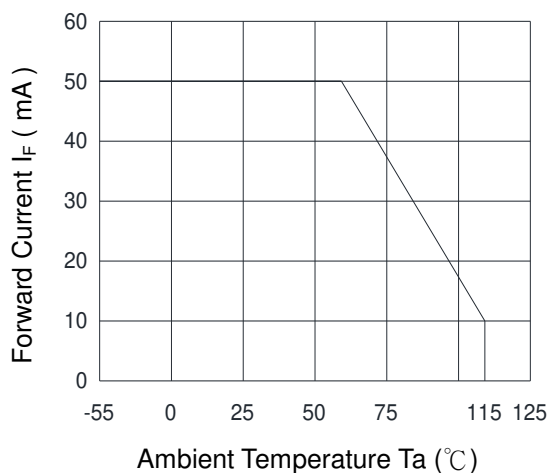
**Fig.2 Collector Power Dissipation  
vs. Ambient Temperature**



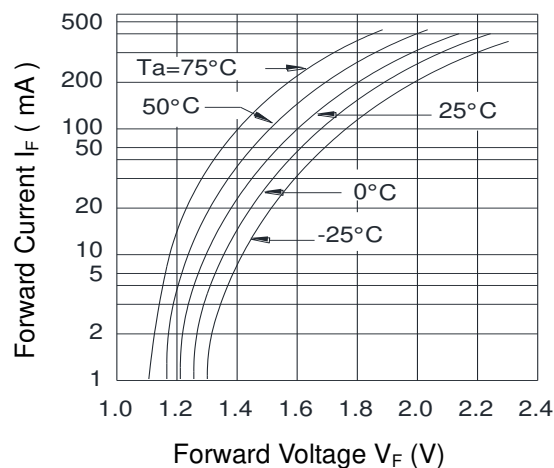
**Fig.3 Collector Dark Current  
vs. Ambient Temperature**



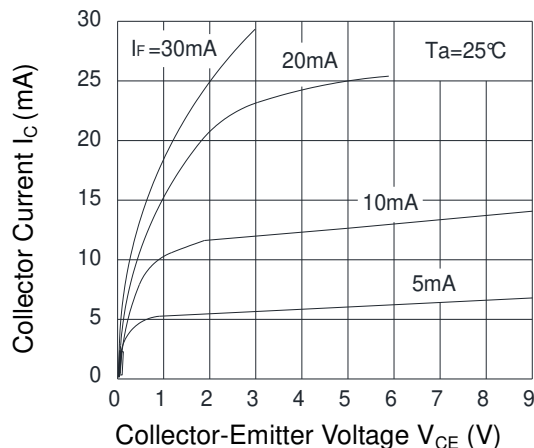
**Fig.4 Forward Current  
vs. Ambient Temperature**



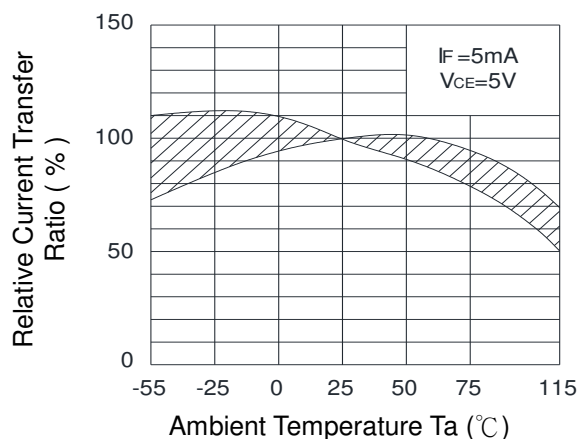
**Fig.5 Forward Current  
vs. Forward Voltage**



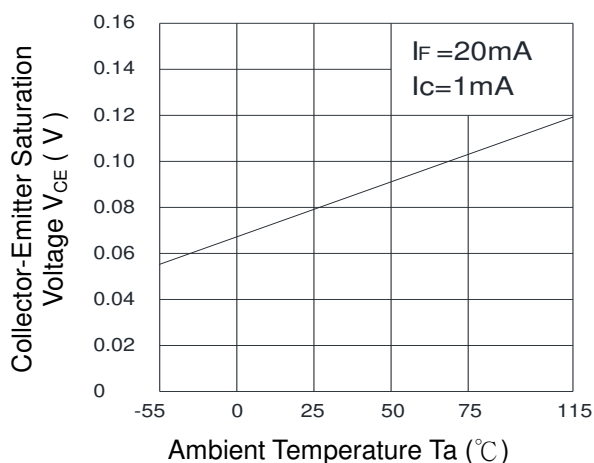
**Fig.6 Collector Current vs. Collector-Emitter Voltage**



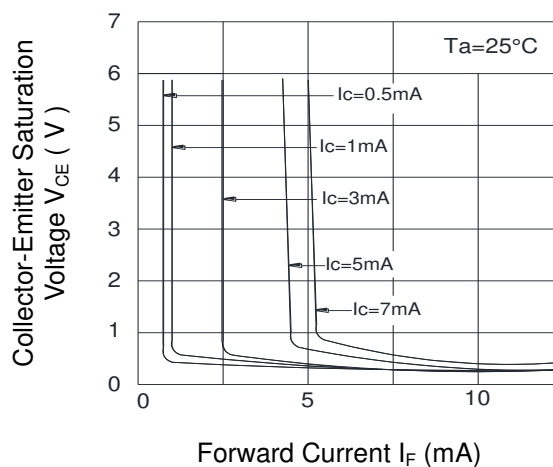
**Fig.7 Relative Current Transfer Ratio vs. Ambient Temperature**



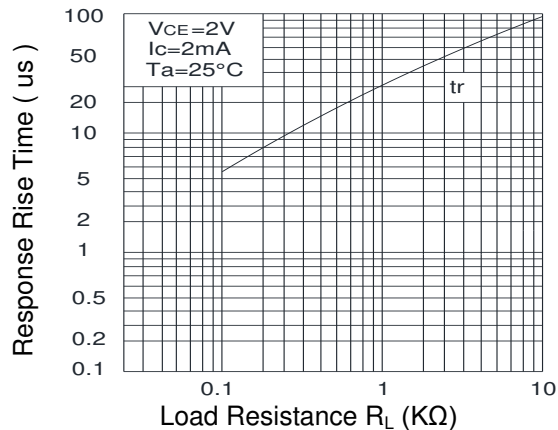
**Fig.8 Collector-Emitter Saturation Voltage vs. Ambient Temperature**



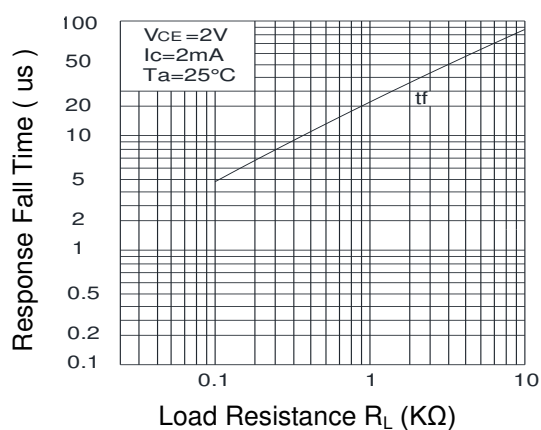
**Fig.9 Collector-Emitter Saturation Voltage vs. Forward Current**



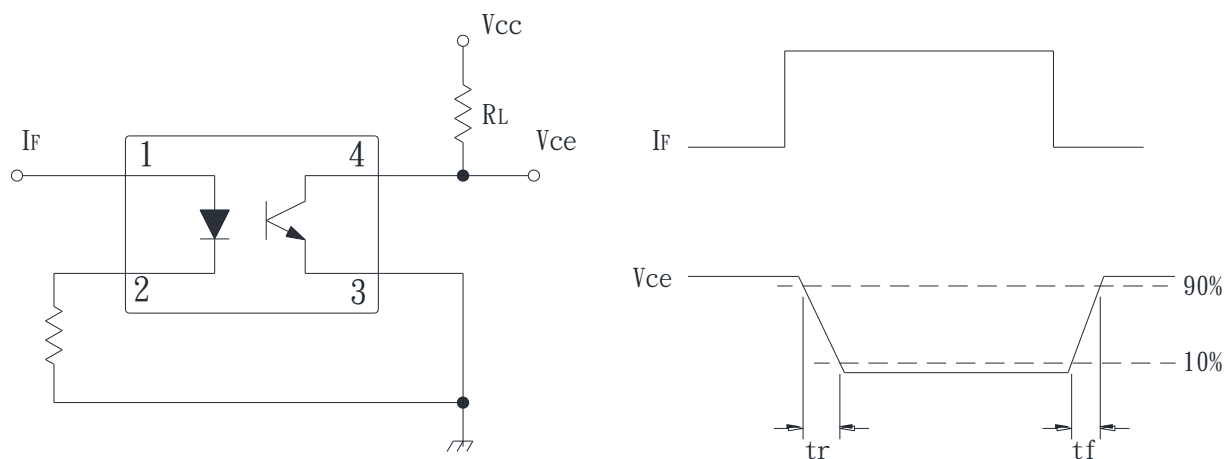
**Fig.10 Response Time (Rise) vs. Load Resistance**



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



- **Test Circuit for Response Time**

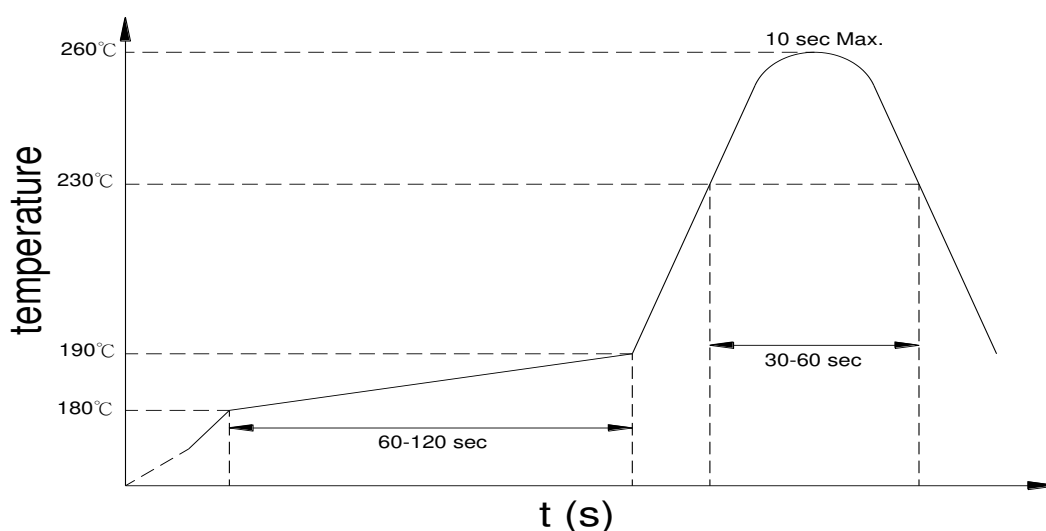


## ● Recommended Soldering Conditions

### (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

**K1010 X Y (Z)**

**Notes:**

K1010 = Part No.

X = Lead form option (1,3,4,6)

Y = CTR rank option (A ~ E)

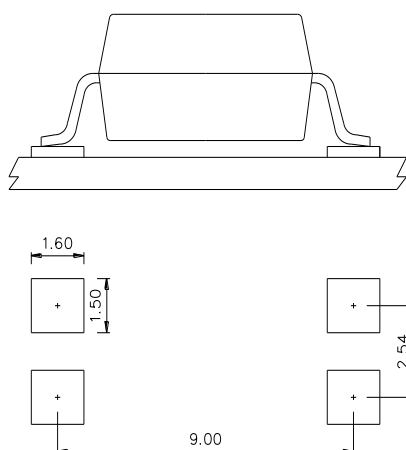
Z = Tape and reel option (TLD, TRU)

| Option  | Description                                                                    | Packing quantity    |
|---------|--------------------------------------------------------------------------------|---------------------|
| 4 (TLD) | surface mount type package + TLD tape & reel option                            | 2000 units per reel |
| 4 (TRU) | surface mount type package + TRU tape & reel option                            | 2000 units per reel |
| 6 (TLD) | long creepage distance for surface mount type package + TLD tape & reel option | 2000 units per reel |
| 6 (TRU) | long creepage distance for surface mount type package + TRU tape & reel option | 2000 units per reel |

- Recommended Pad Layout for Surface Mount Lead Form

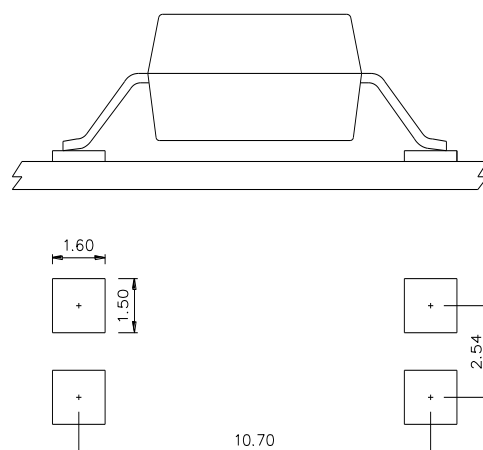
1.Surface mount type.

4 pin SMD



2.Long creepage distance for surface mount type.

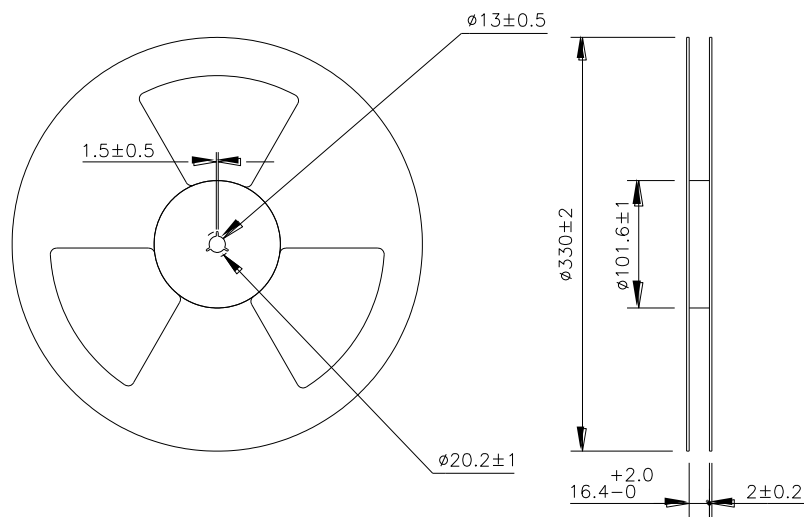
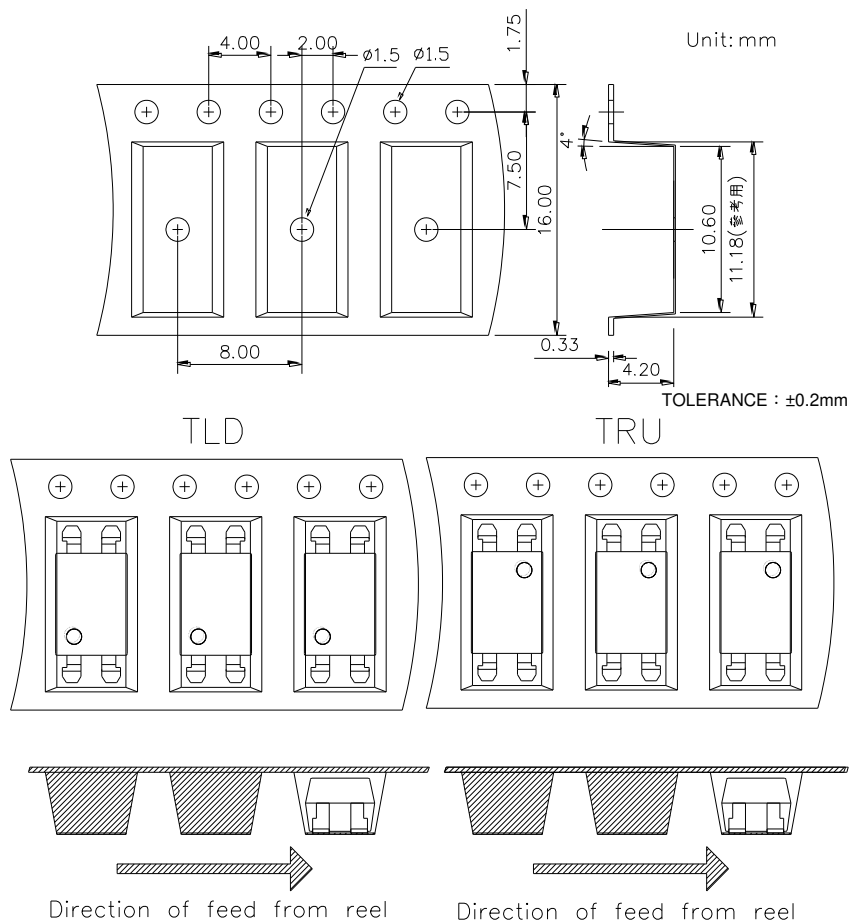
4 pin L



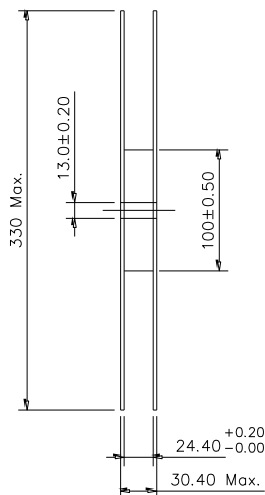
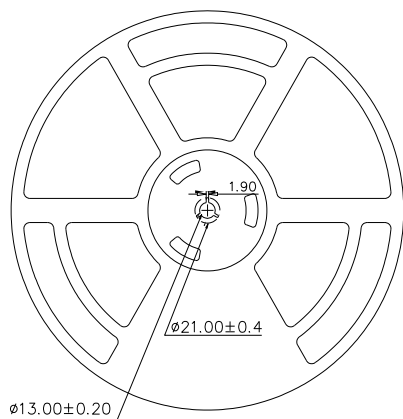
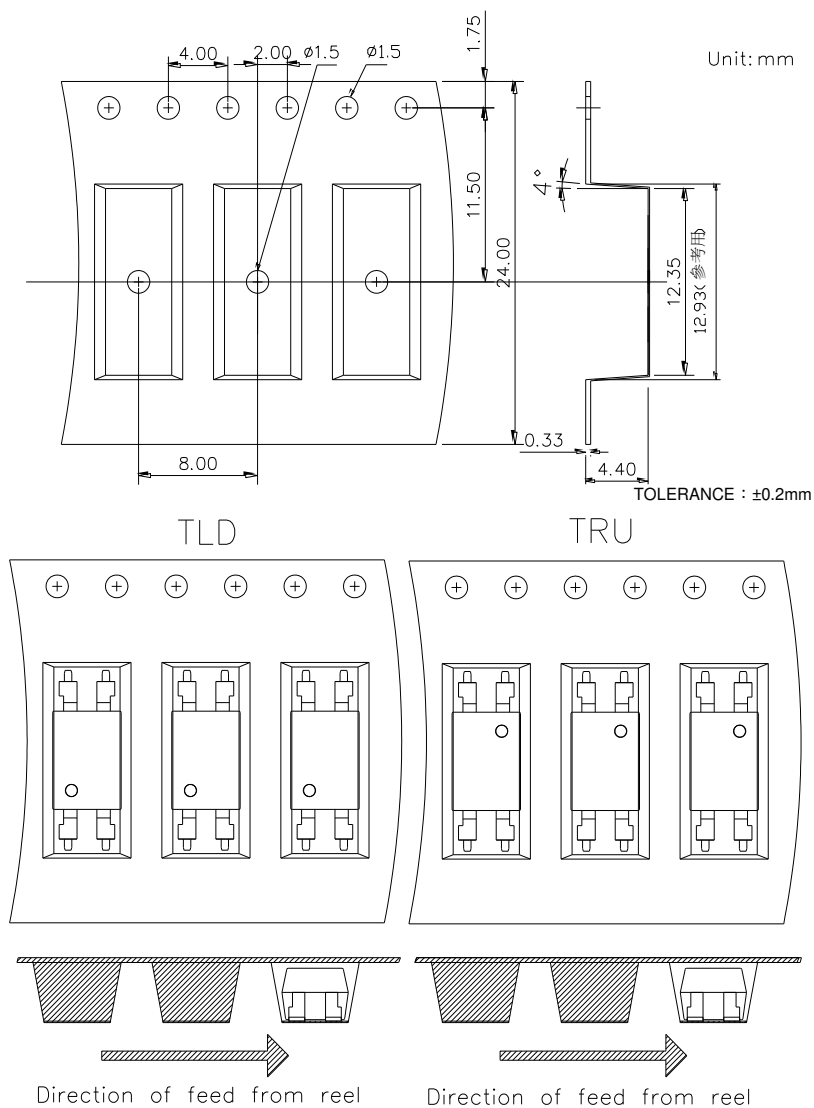
Unit : mm



- 4-pin SMD Carrier Tape & Reel



- 4-pin L Carrier Tape & Reel



## ● Application Notice

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- d. Instrumentation
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- f. Measurement equipment
- g. Consumer electronics
- h. Telecommunication

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