

● 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.

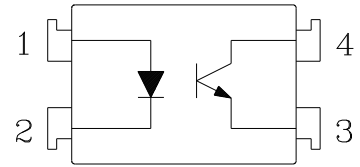
● Features

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

● Schematic

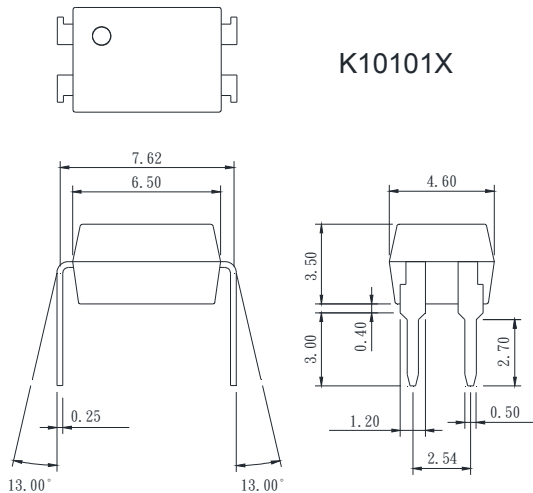


1. Anode
2. Cathode
3. Emitter
4. Collector

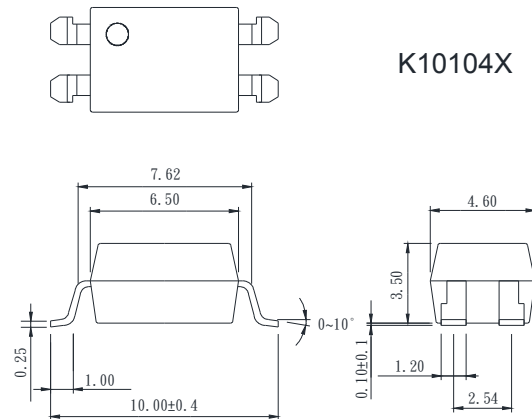
● **Outside Dimension**

Unit : mm

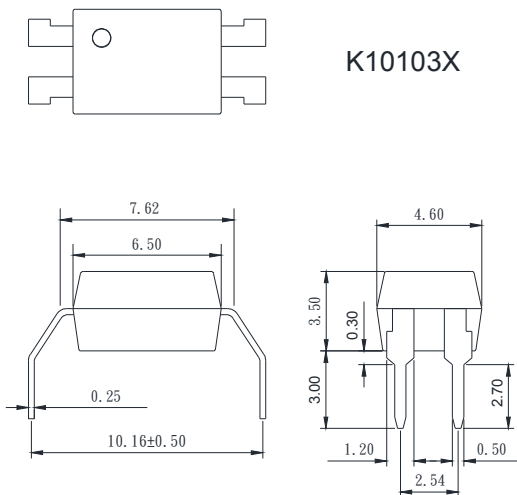
1. Dual-in-line type.



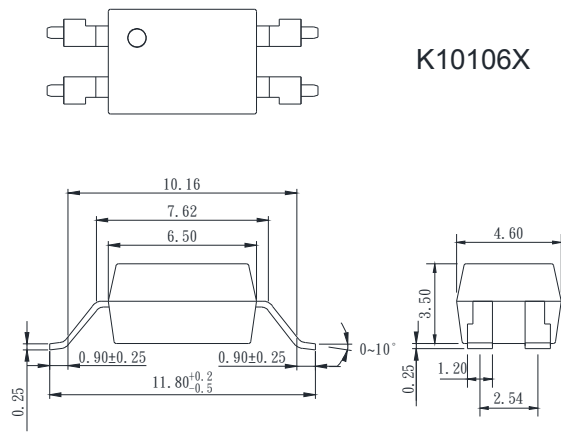
2. Surface mount type.



3. Long creepage distance type

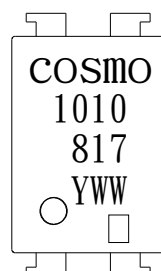


4. Long creepage distance for surface mount type.



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 | μA |
| | Terminal capacitance | C_t | $V=0, f=1KHz$ | - | 30 | - | pF |
| Output | Collector dark current | I_{CEO} | $V_{CE}=20V, I_F=0$ | - | - | 0.1 | μA |
| 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 | 5×10^{10} | 10^{11} | - | Ω |
| | 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 | μs |
| Response time (Fall) | t_f | - | | 3 | 18 | μs | |

Classification table of current transfer ratio is shown below.

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

Fig.1 Current Transfer Ratio vs. Forward Current

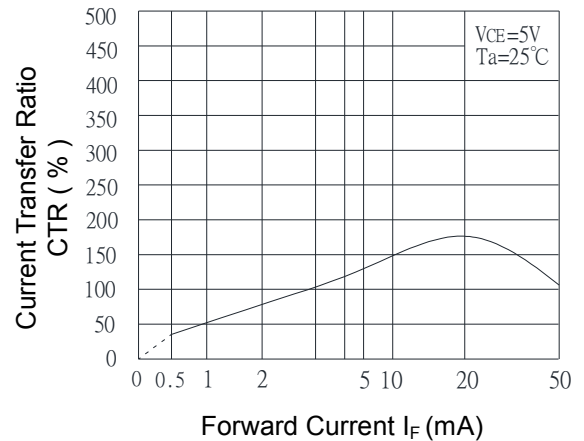


Fig.2 Collector Power Dissipation vs. Ambient Temperature

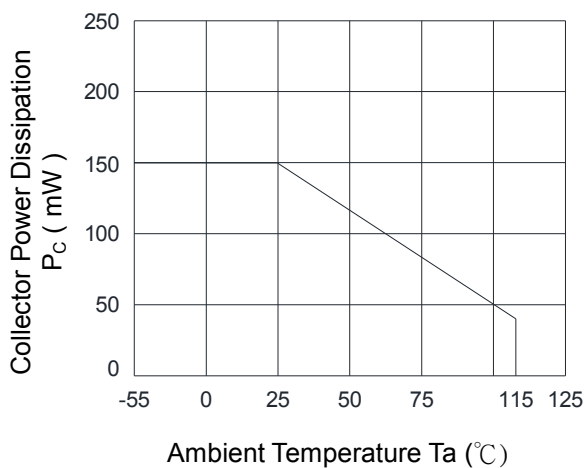


Fig.3 Collector Dark Current vs. Ambient Temperature

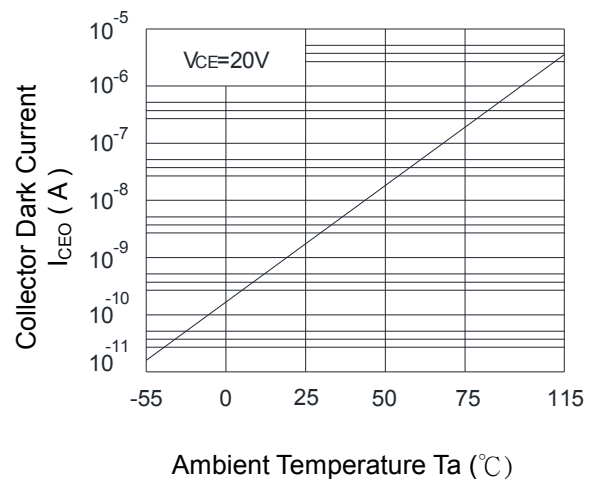


Fig.4 Forward Current vs. Ambient Temperature

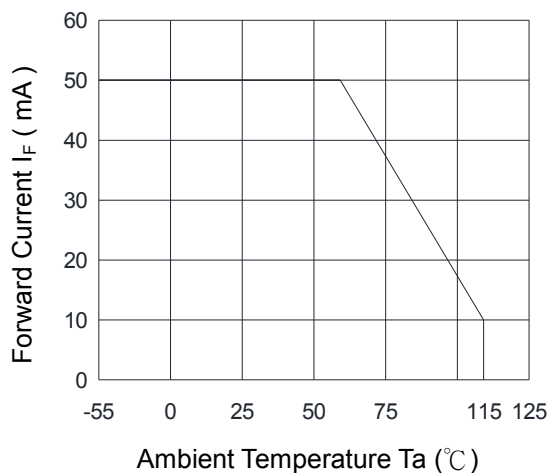


Fig.5 Forward Current vs. Forward Voltage

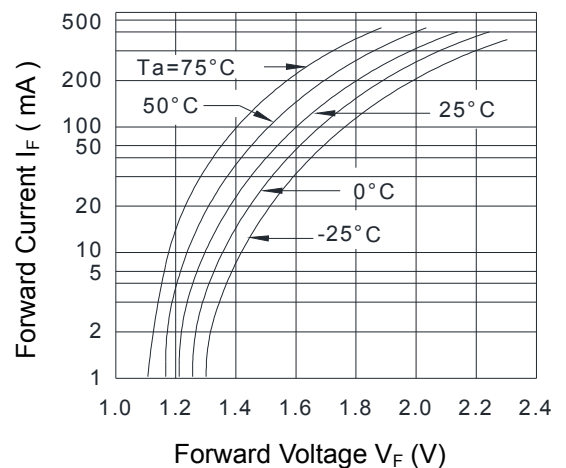


Fig.6 Collector Current vs. Collector-Emitter Voltage

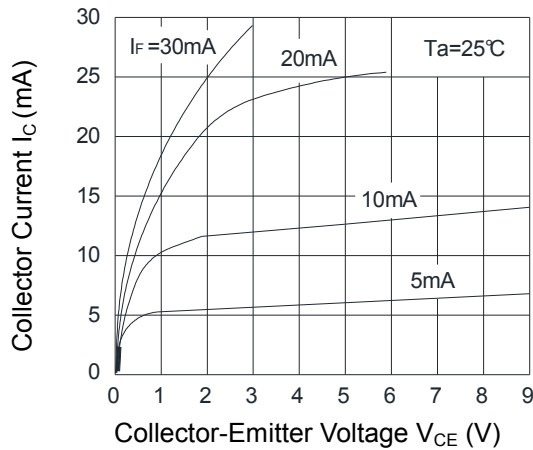


Fig.7 Relative Current Transfer Ratio vs. Ambient Temperature

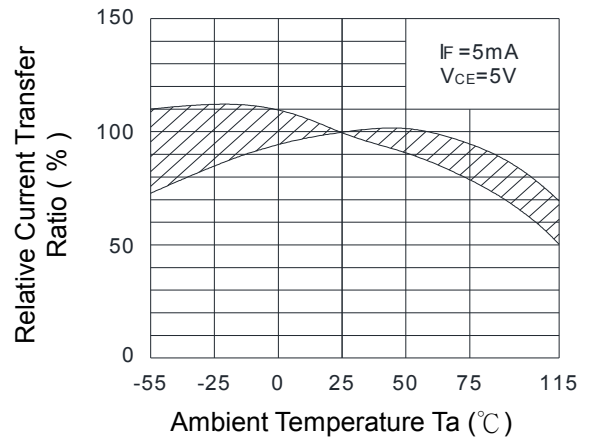


Fig.8 Collector-Emitter Saturation Voltage vs. Ambient Temperature

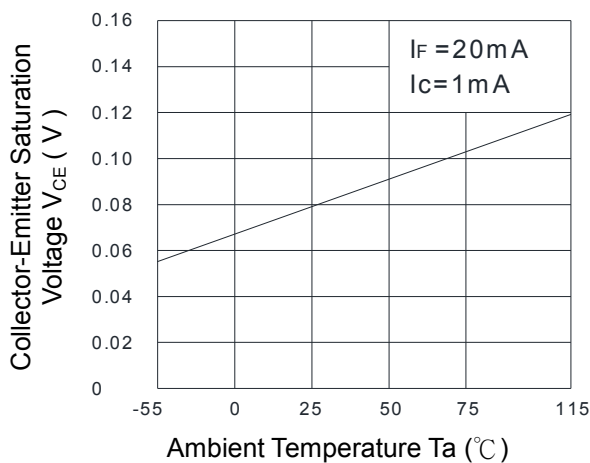


Fig.9 Collector-Emitter Saturation Voltage vs. Forward Current

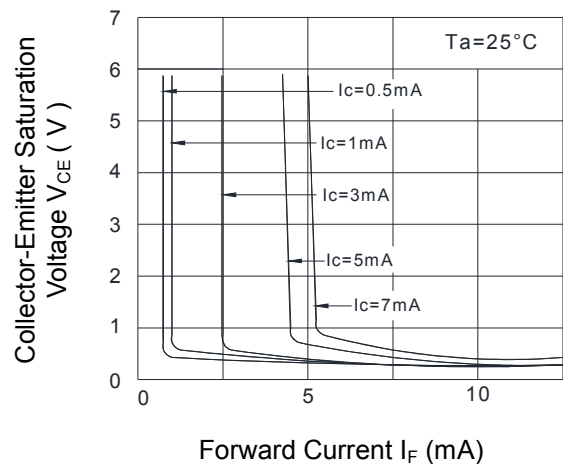


Fig.10 Response Time (Rise) vs. Load Resistance

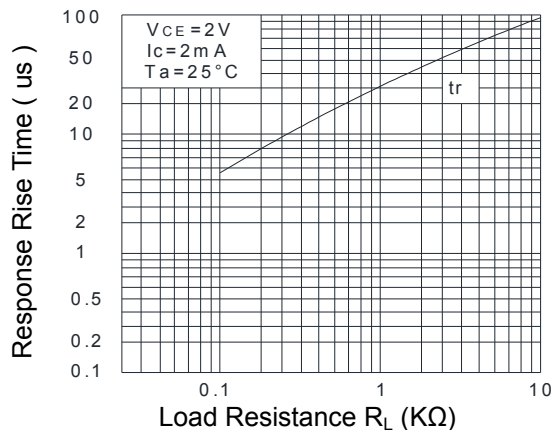
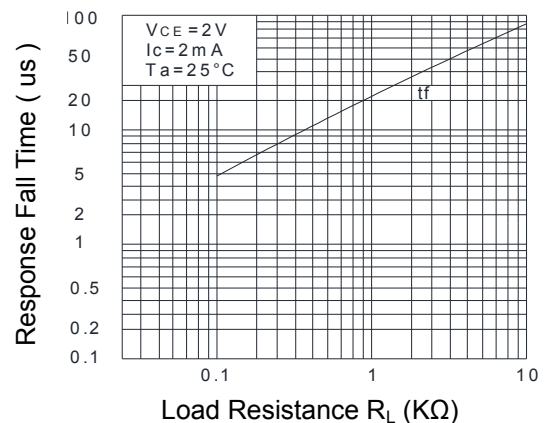
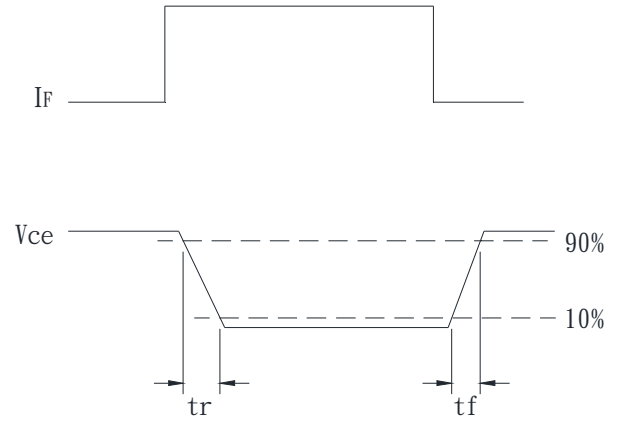
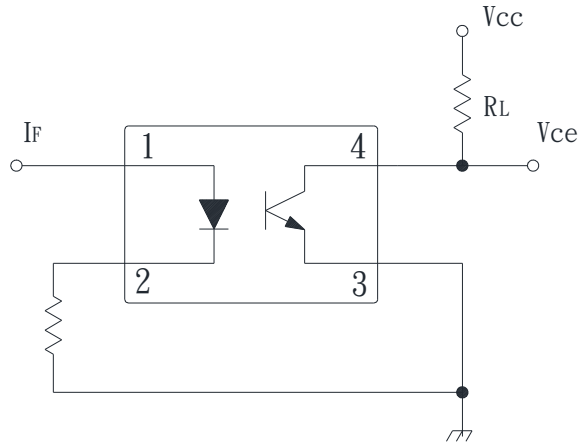


Fig.11 Response Time (Fall) vs. Load Resistance





● Test Circuit for Response Time

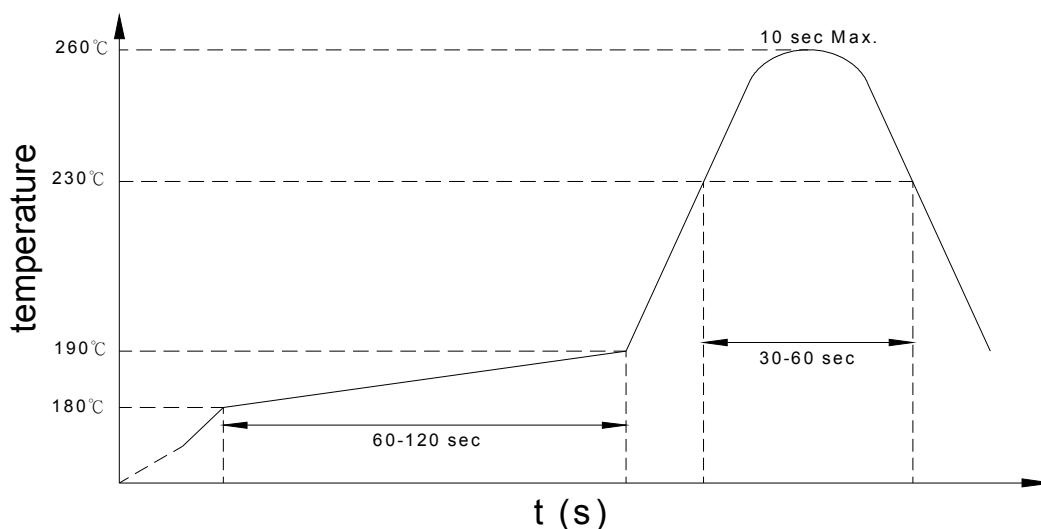


● **Recommended Soldering Conditions**

(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**

K1010 X Y (Z)

Notes:

K1010 = Part No.

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

Y = CTR rank option (A ~ E)

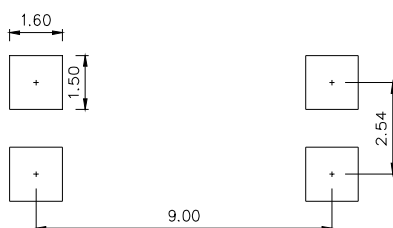
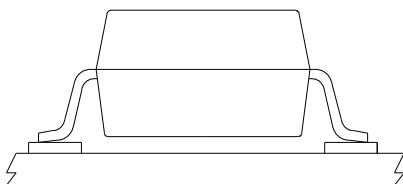
Z = Tape and reel option (TLD, TRU)

| 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**

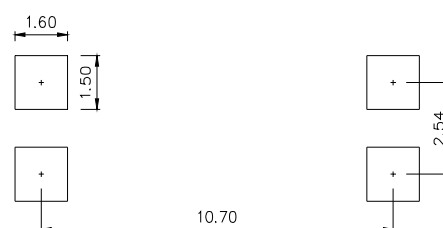
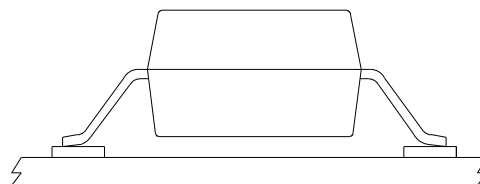
1. Surface mount type.

4 pin SMD



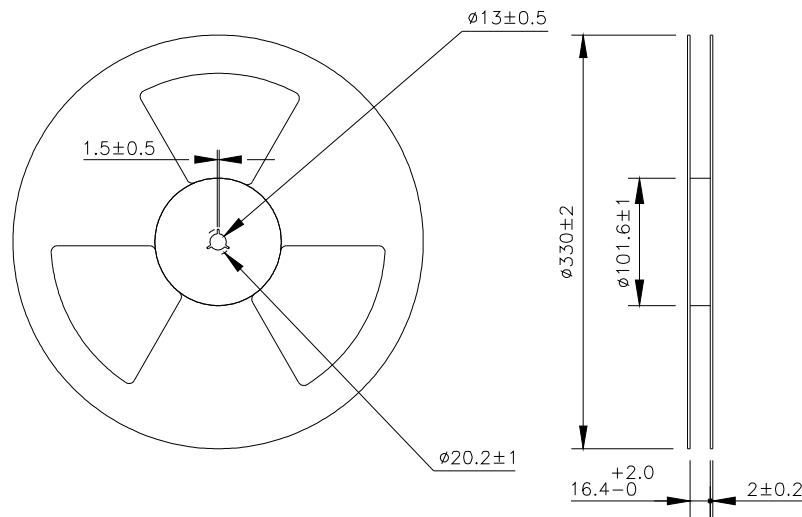
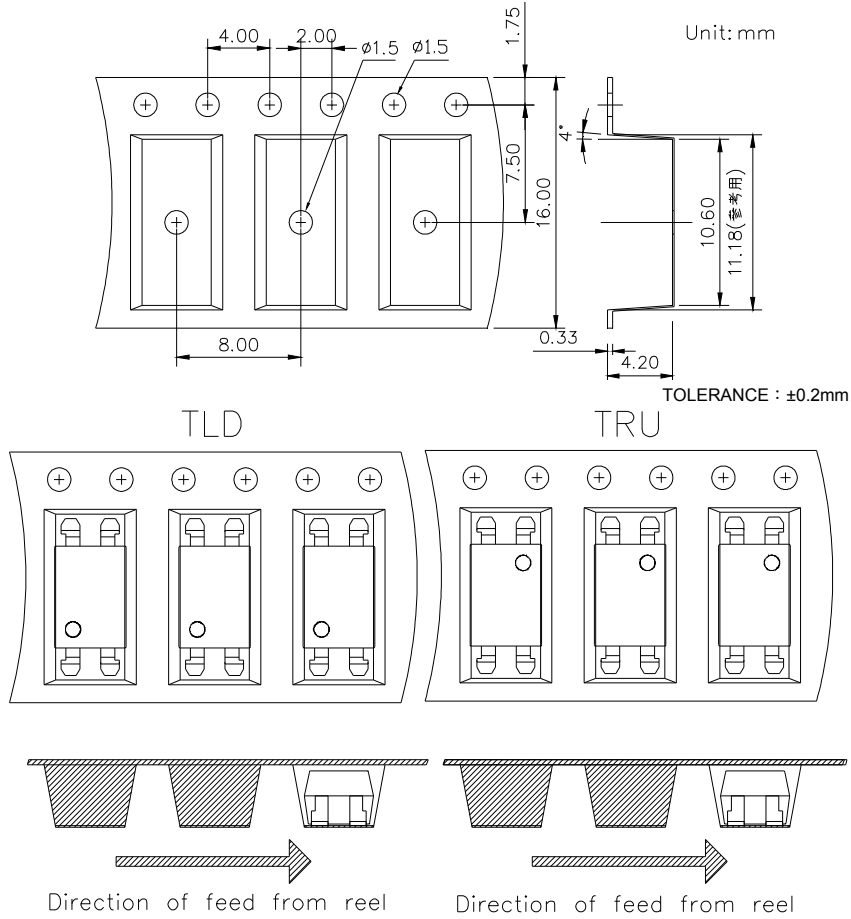
2. Long creepage distance for surface mount type.

4 pin L

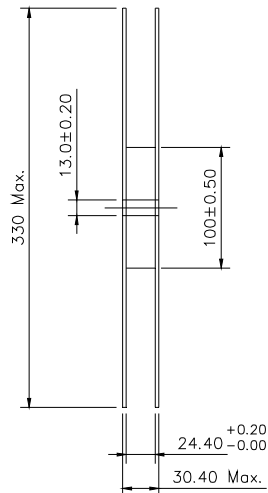
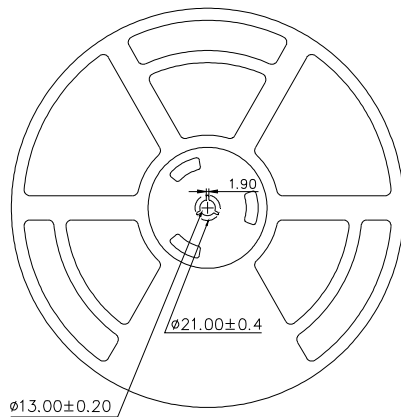
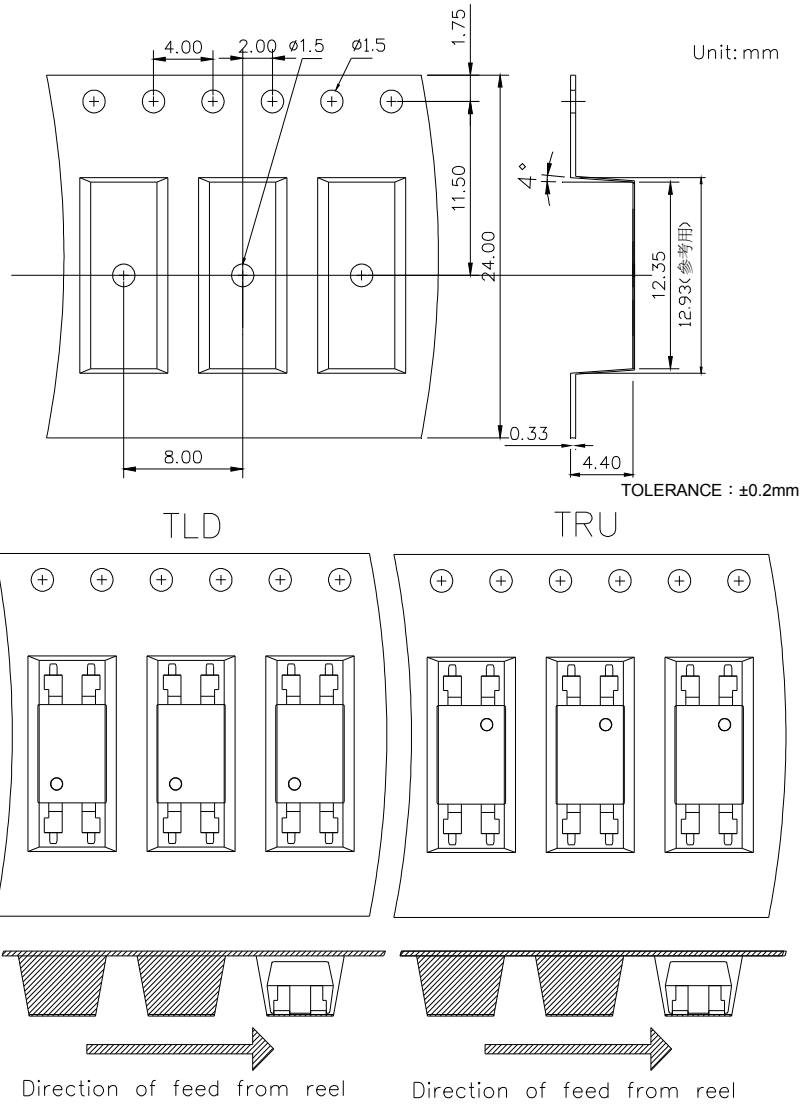


Unit : mm

- 4-pin SMD Carrier Tape & Reel



- 4-pin L Carrier Tape & Reel



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- h. Telecommunication

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