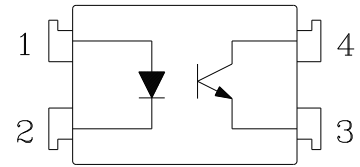


### ● Description

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. Agency Approvals
  - UL1577 / CUL C22.2 No.1 & NTC No.5, File No. E169586
  - VDE EN60747, File No.101347
  - FIMKO EN60065, File No. NCS/FI23149 A2
  - FIMKO EN60950, File No. NCS/FI24584 A1
  - SEMKO EN60065, File No. FI016484
  - SEMKO EN60950, File No. FI016433
  - CQC GB4943/GB8898-2011, File No.CQC10001049555 / CQC08001023986

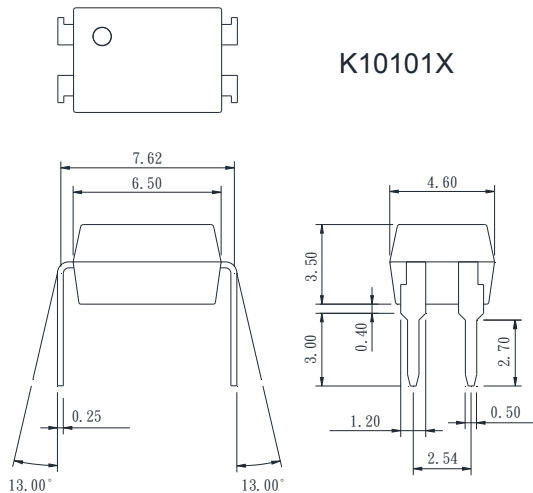
### ● Applications

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

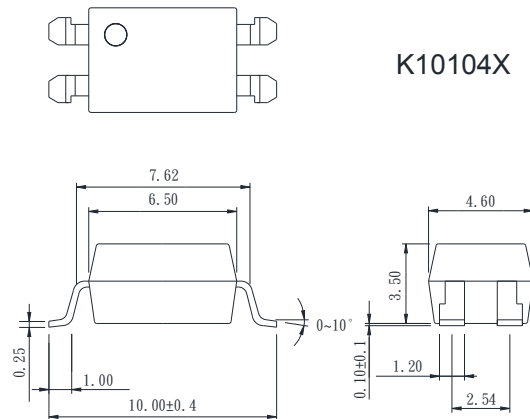
● **Outside Dimension**

Unit : mm

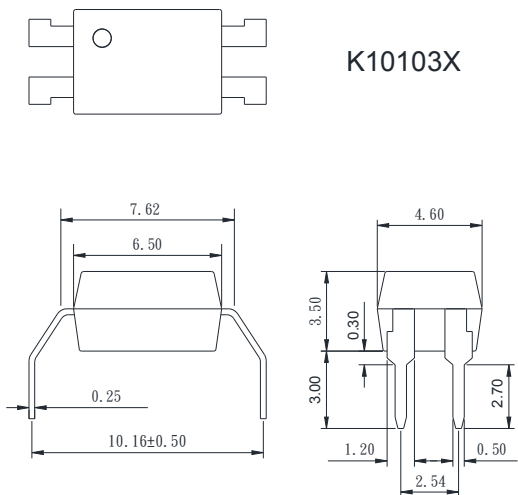
1. Dual-in-line type.



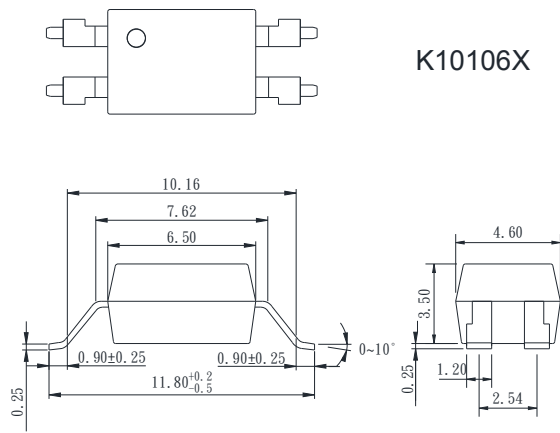
2. Surface mount type.



3. Long creepage distance type

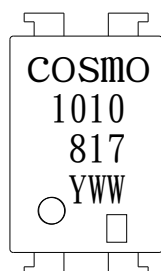


4. Long creepage distance for surface mount type.



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

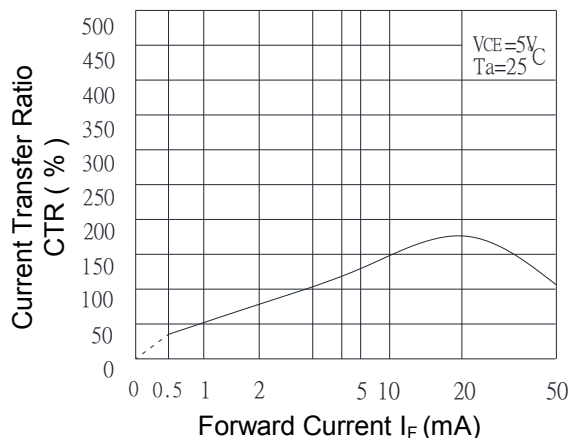
(Ta=25°C)

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	$\mu s$	

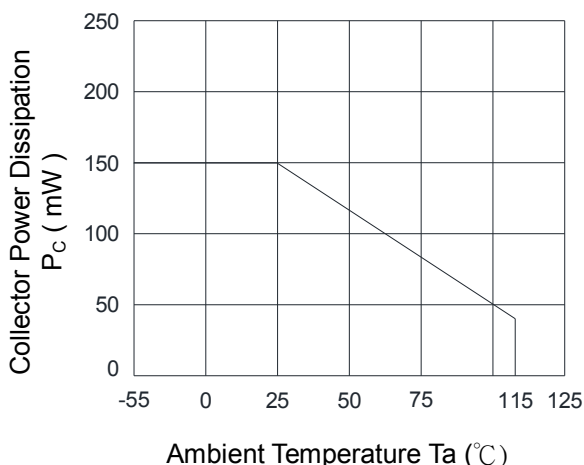
Classification table of current transfer ratio is shown below.

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

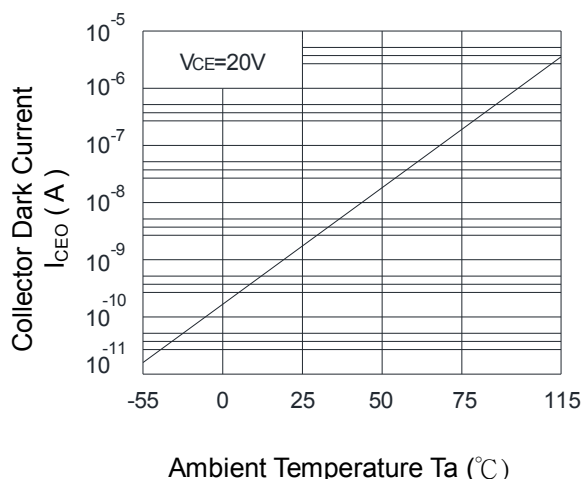
**Fig.1 Current Transfer Ratio vs. Forward Current**



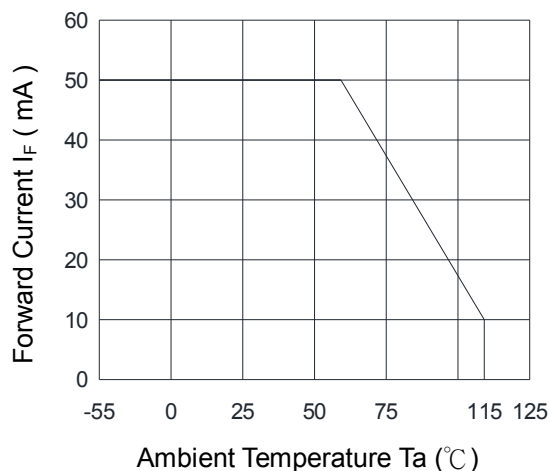
**Fig.2 Collector Power Dissipation vs. Ambient Temperature**



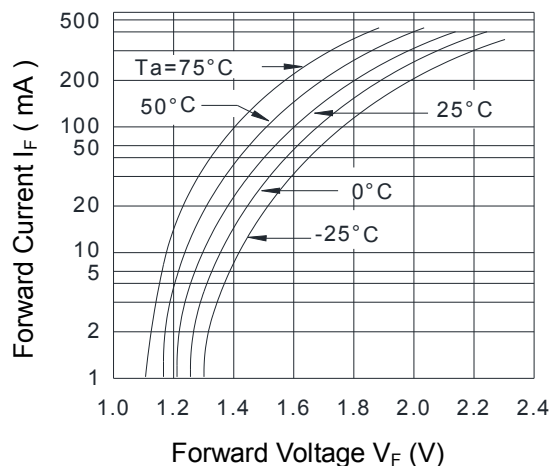
**Fig.3 Collector Dark Current vs. Ambient Temperature**



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

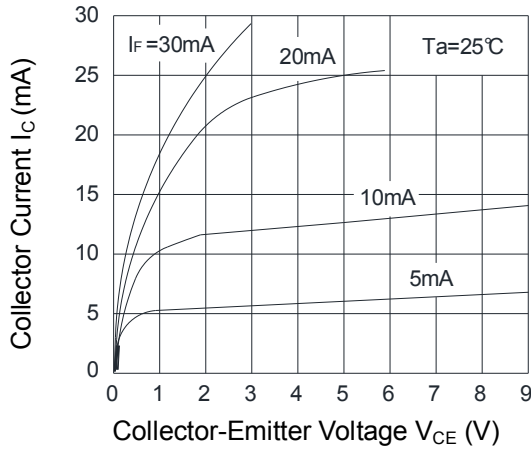


**Fig.5 Forward Current vs. Forward Voltage**

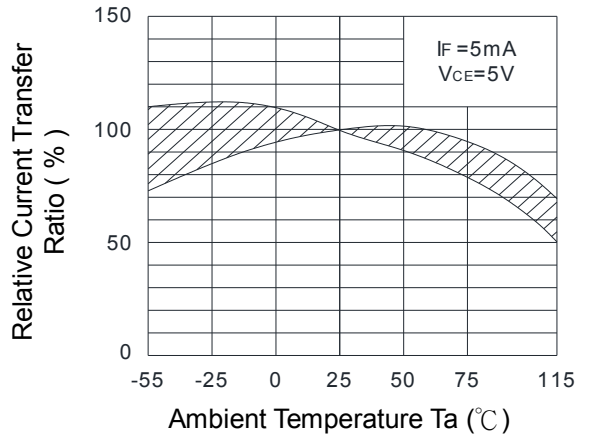




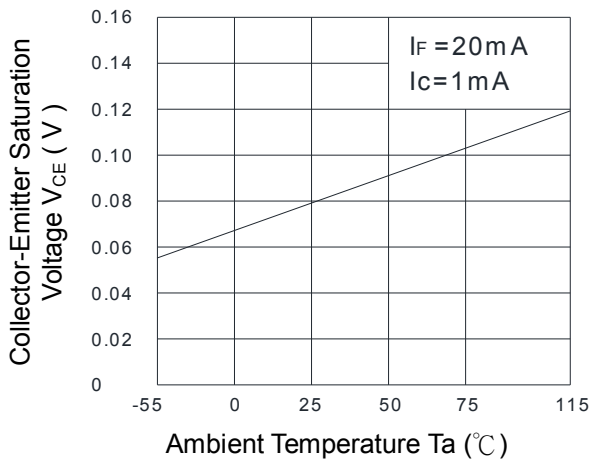
**Fig.6 Collector Current vs. Collector-Emitter Voltage**



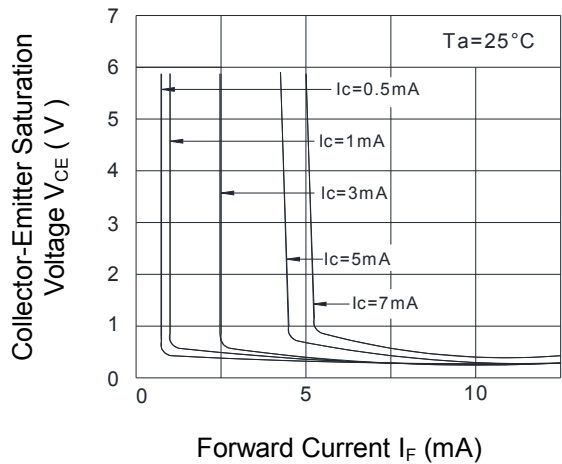
**Fig.7 Relative Current Transfer Ratio vs. Ambient Temperature**



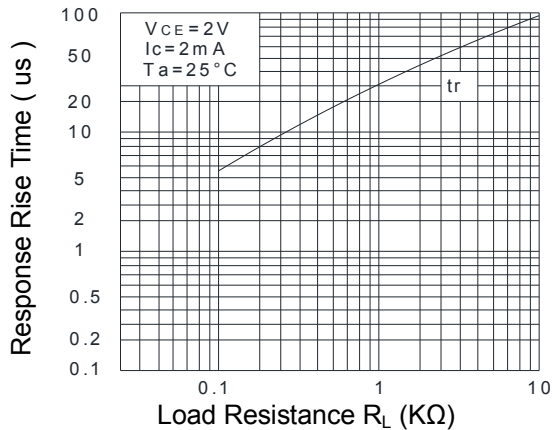
**Fig.8 Collector-Emitter Saturation Voltage vs. Ambient Temperature**



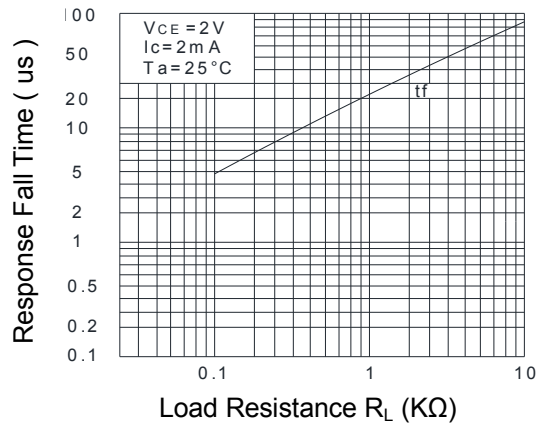
**Fig.9 Collector-Emitter Saturation Voltage vs. Forward Current**



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

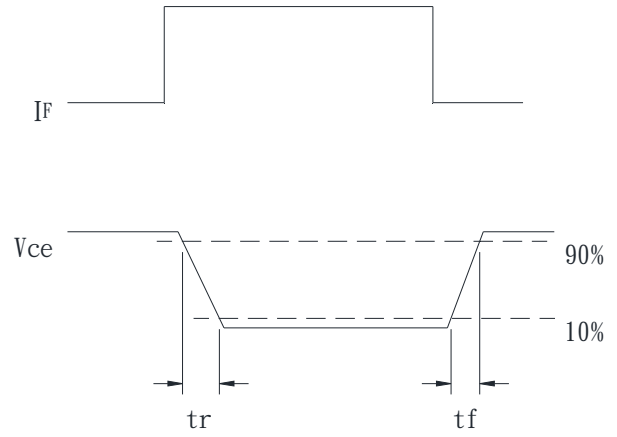
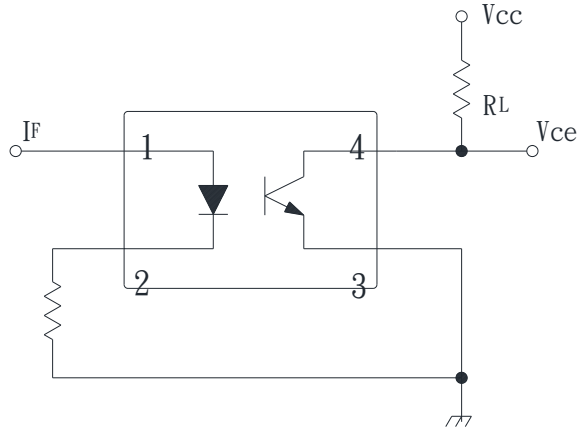


**Fig.11 Response Time (Fall) vs. Load Resistance**





● Test Circuit for Response Time

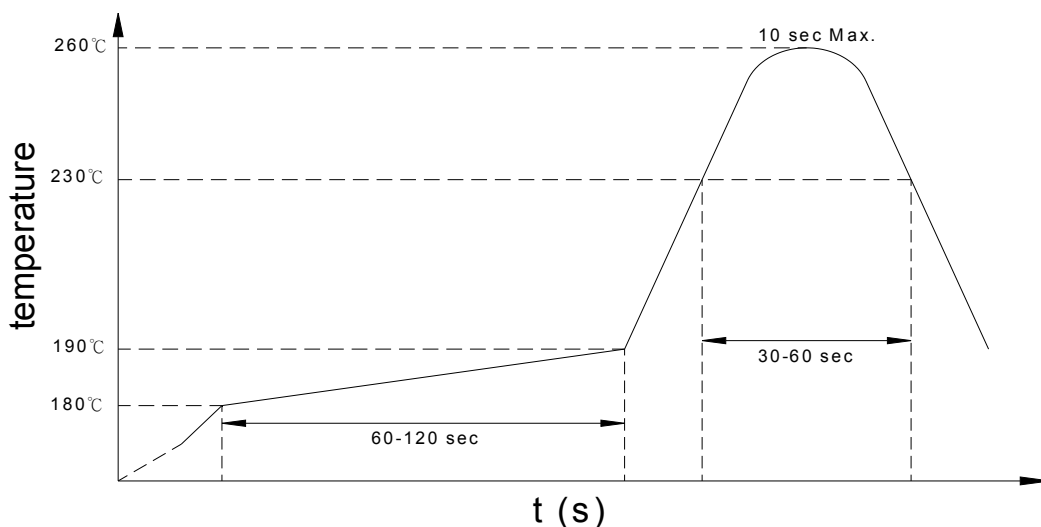


● **Recommended Soldering Conditions**

**(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)

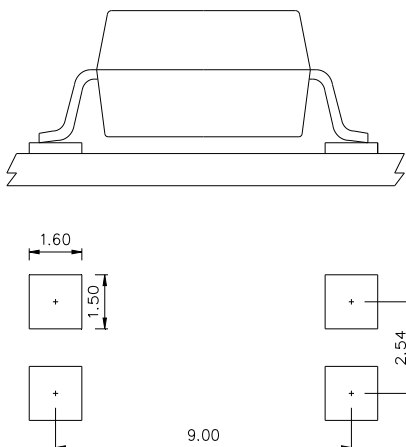
Z = Tape and reel option (TLD, TRU)

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**

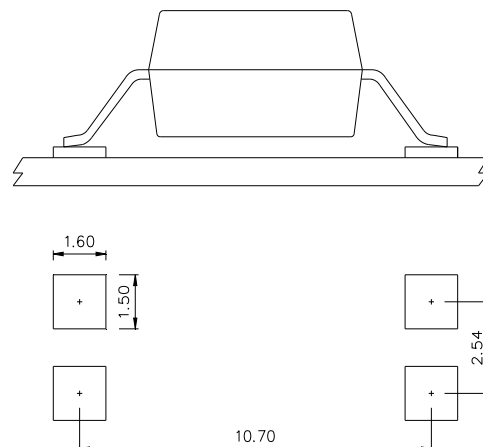
1. Surface mount type.

4 pin SMD



2. Long creepage distance for surface mount type.

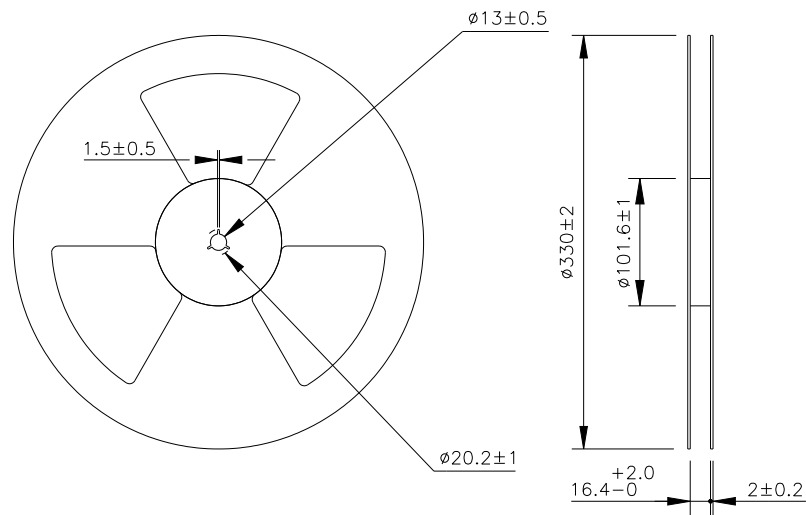
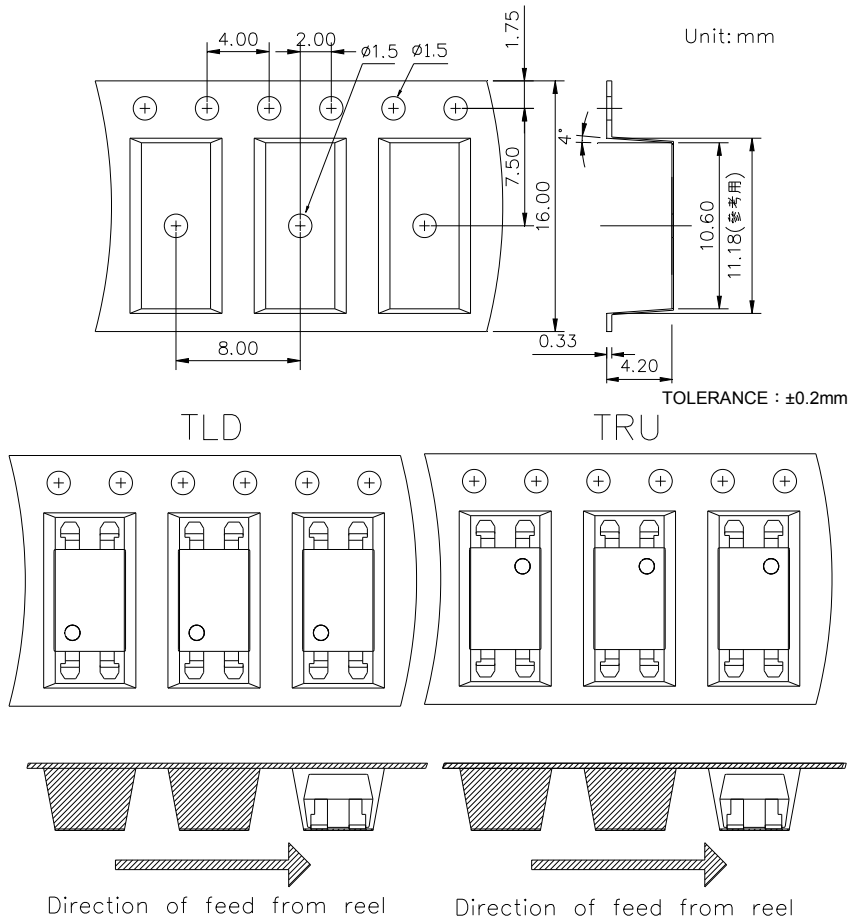
4 pin L



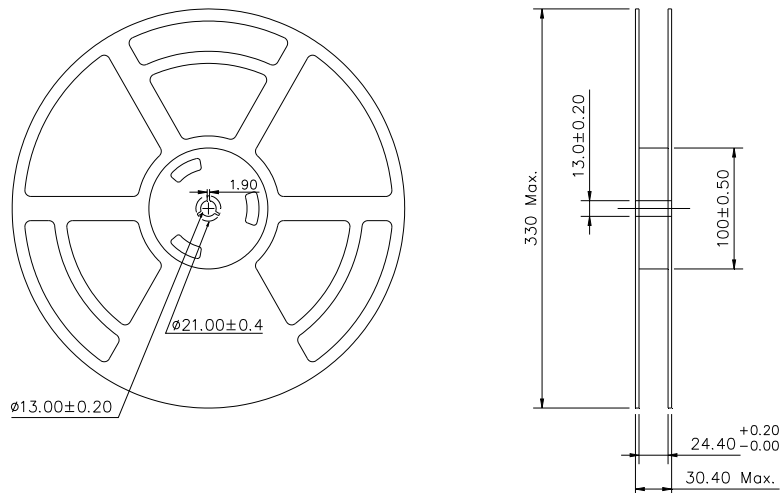
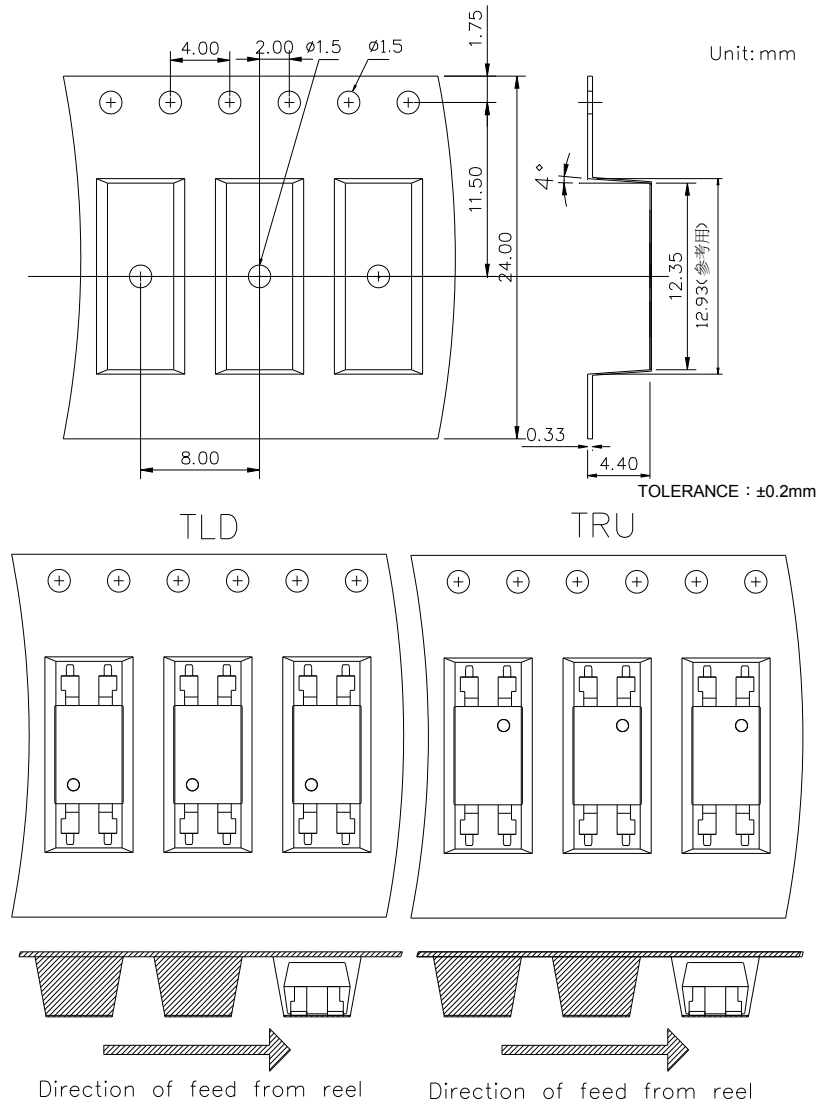
Unit : mm



- 4-pin SMD Carrier Tape & Reel



● 4-pin L Carrier Tape & Reel



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

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- d. Nuclear power control
- e. Equipment used for automotive vehicles, trains, ships...etc.

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