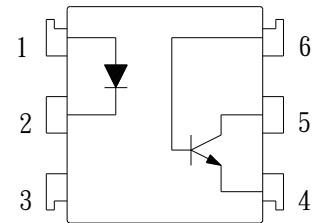


### ● Description

The K2010 series consist of an infrared emitting diode, optically coupled to a phototransistor detector. They are packaged in a 6-pin DIP package and available in wide-lead spacing and SMD option.

### ● Schematic



1. Anode
2. Cathode
3. NC
4. Emitter
5. Collector
6. Base

### ● Features

1. Current transfer ratio  
( CTR : Min. 60% at  $I_F=2\text{mA}$   $V_{CE}=5\text{V}$  )
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

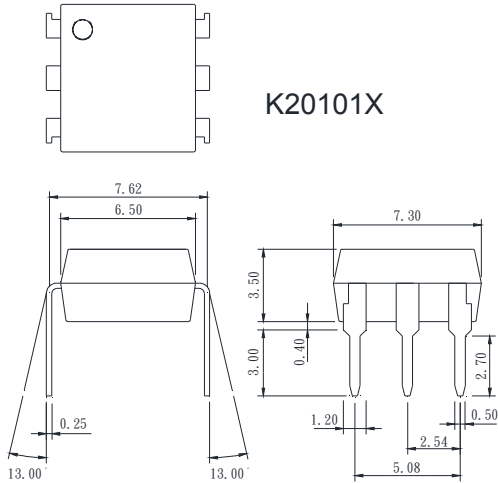
### ● Applications

- Registers, copies, automatic vending machines
- System appliances, measuring instruments
- Computer terminals, programmable controllers
- Communications, telephone, etc
- Electric home appliances, such as oil fan heaters, microwave oven, washer, refrigerator, air conditioner
- Medical instruments, physical and chemical equipment
- Signal transmission between circuits of different potentials and impedances
- Facsimile equipment, audio, video
- Switching power supply, laser beam printer

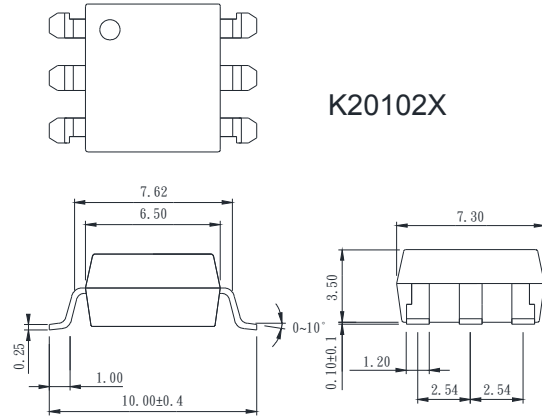
● **Outside Dimension**

Unit : mm

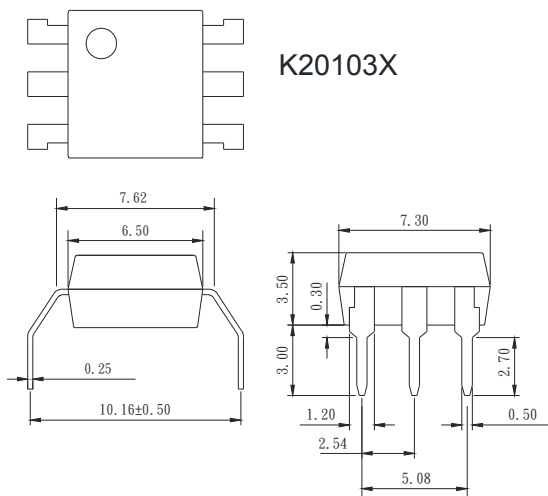
1. Dual-in-line type.



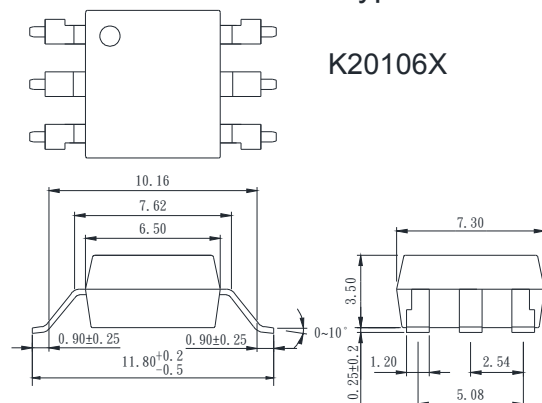
2. Surface mount type.



3. Long creepage distance type

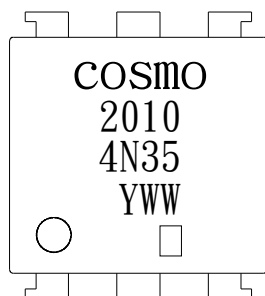


4. Long creepage distance for surface mount type.



TOLERANCE : ±0.2mm

● **Device Marking**



**Notes:**

**COSMO**  
**2010**  
**4N35**  
**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-base voltage	$V_{CBO}$	60	V
	Emitter-base voltage	$V_{EBO}$	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

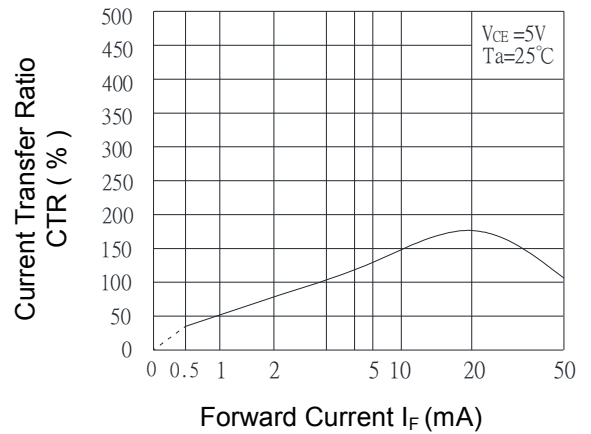
(Ta=25°C)

Parameter		Symbol	Conditions	Min.	Typ.	Max.	Unit
Input	Forward voltage	$V_F$	$I_F=20mA$	-	1.2	1.4	V
	Peak forward voltage	$V_{FM}$	$I_{FM}=0.5A$	-	-	3.5	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	$I_F=2mA, V_{CE}=5V$	60	-	600	%
	Collector-emitter saturation	$V_{CE(sat)}$	$I_F=20mA, I_C=1mA$	-	0.1	0.3	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 )	$t_r$	$V_{CE}=2V, I_C=2mA, R_L=100\Omega$	-	5	20	$\mu s$
	Response time ( Fall )	$t_f$		-	4	20	$\mu s$

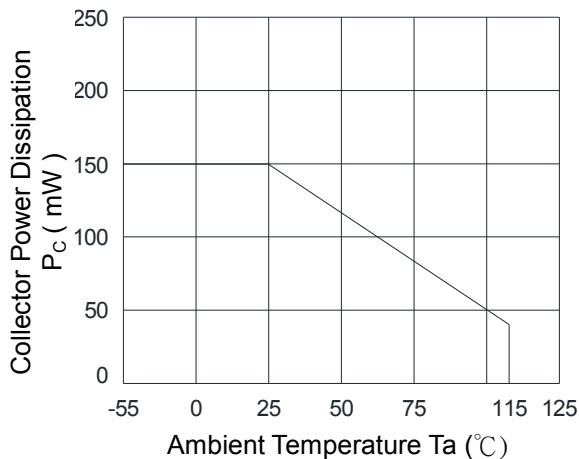
Classification table of current transfer ratio is shown below.

K2010 Model No.	CTR (%)
K2010 A	60 ~ 160
K2010 B	130 ~ 260
K2010 C	200 ~ 400
K2010 D	300 ~ 600
K2010 E	60 ~ 600

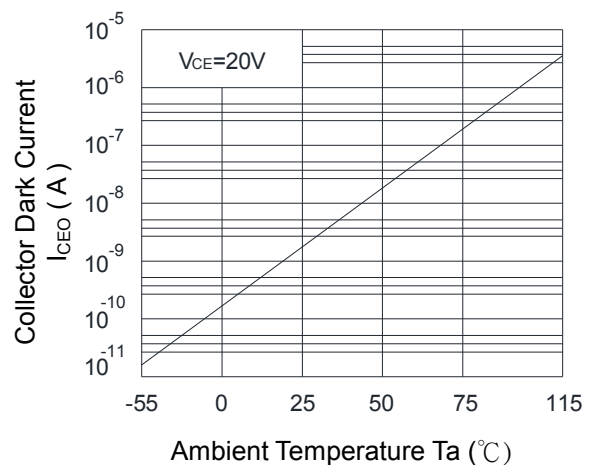
**Fig.1 Current Transfer Ratio vs. Forward Current**



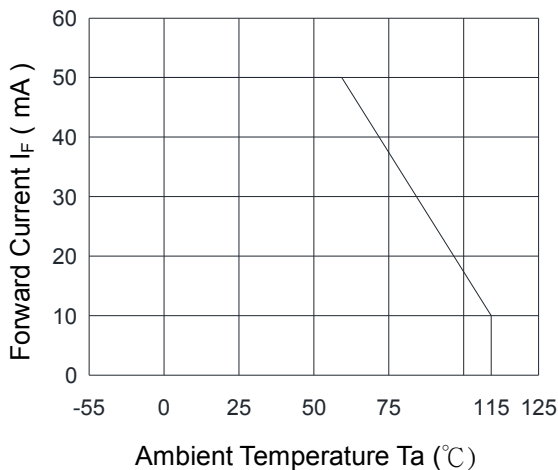
**Fig.2 Collector Power Dissipation vs. Ambient Temperature**



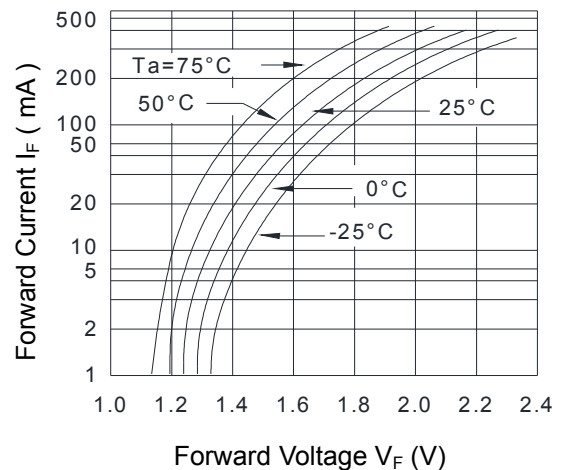
**Fig.3 Collector Dark Current vs. Ambient Temperature**



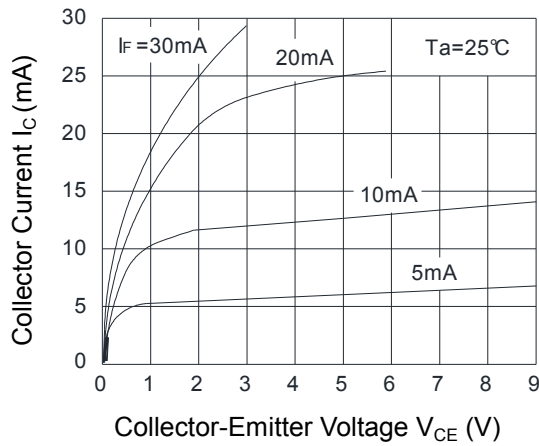
**Fig.4 Forward Current vs. Ambient Temperature**



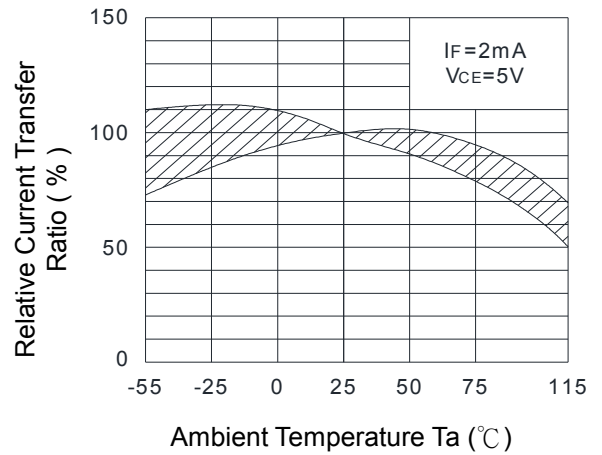
**Fig.5 Forward Current vs. Forward Voltage**



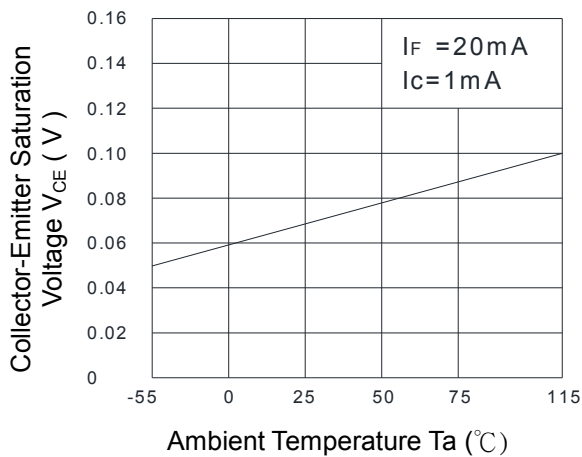
**Fig.6 Collector Current vs. Collector-Emitter Voltage**



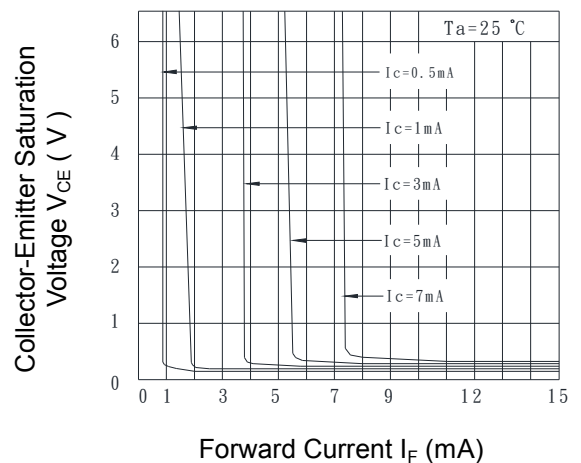
**Fig.7 Relative Current Transfer Ratio vs. Ambient Temperature**



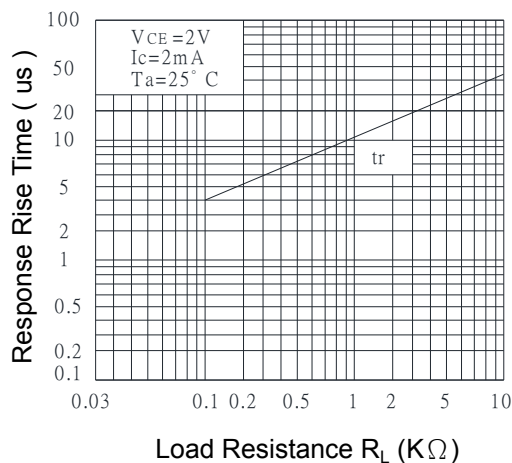
**Fig.8 Collector-Emitter Saturation Voltage vs. Ambient Temperature**



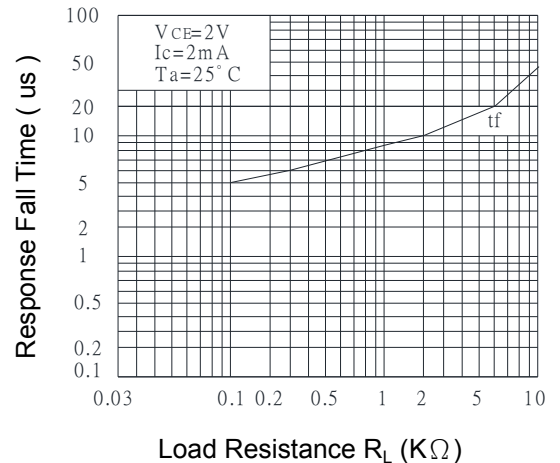
**Fig.9 Collector-Emitter Saturation Voltage vs. Forward Current**



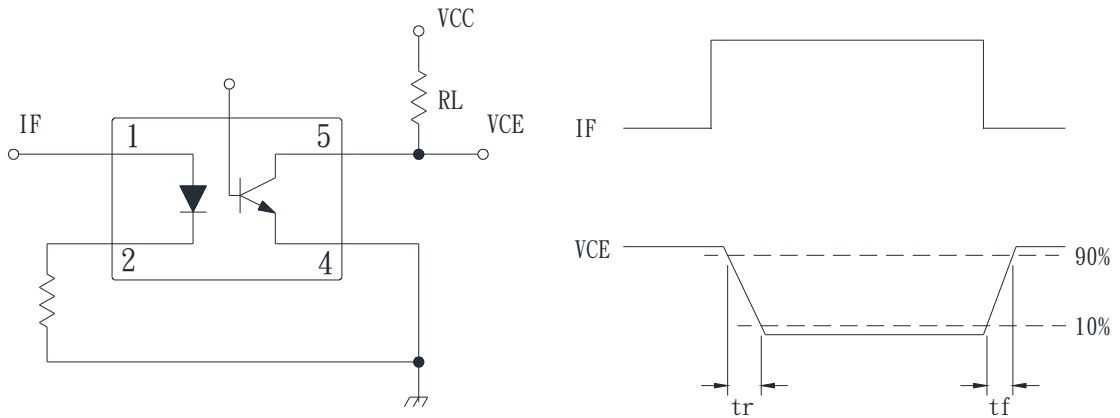
**Fig.10 Response Time (Rise) vs. Load Resistance**



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



● **Test Circuit for Response Time**

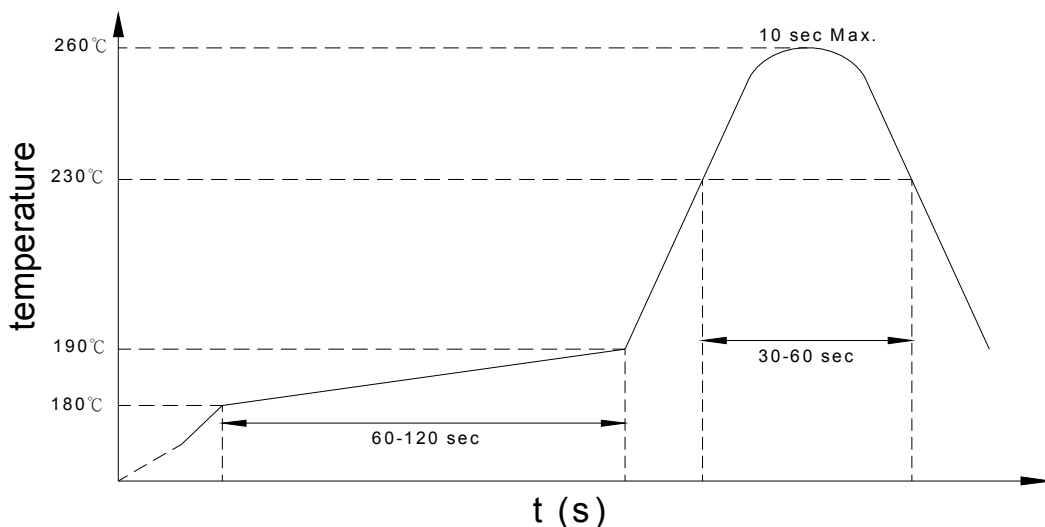


### ● Recommended Soldering Conditions

#### (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**

### K2010 X Y (Z)

**Notes:**

K2010 = Part No.

X = Lead form option (1,2,3,6)

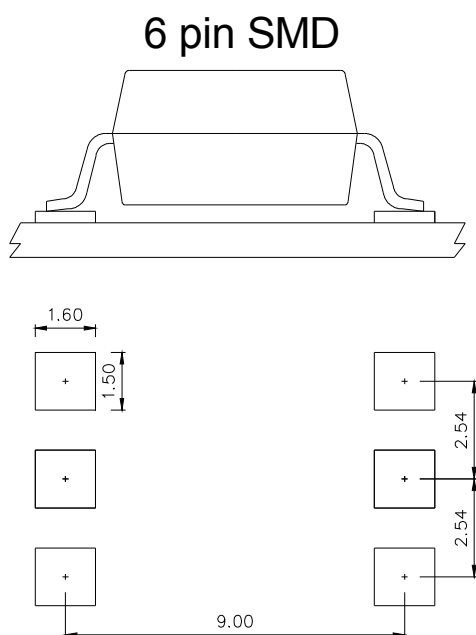
Y = CTR rank option (A ~ E)

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

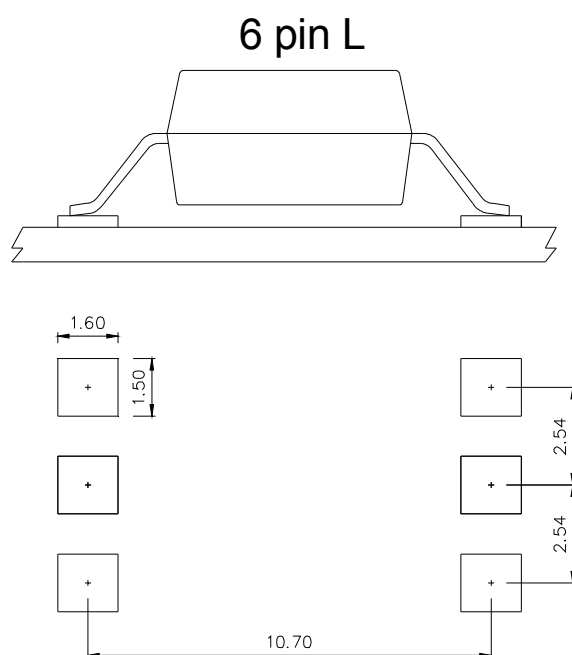
Option	Description	Packing quantity
2 (TL)	surface mount type package + TL tape & reel option	1000 units per reel
2 (TR)	surface mount type package + TR tape & reel option	1000 units per reel
6 (TLD)	long creepage distance for surface mount type package + TLD tape & reel option	1000 units per reel
6 (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.



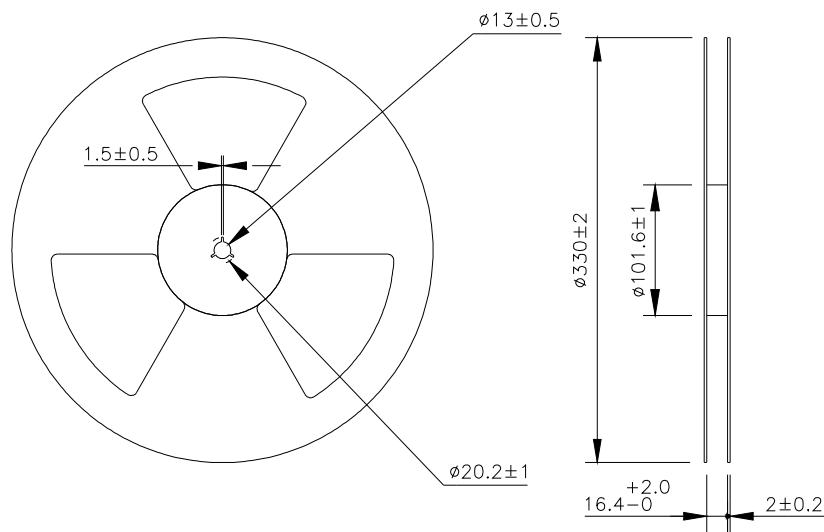
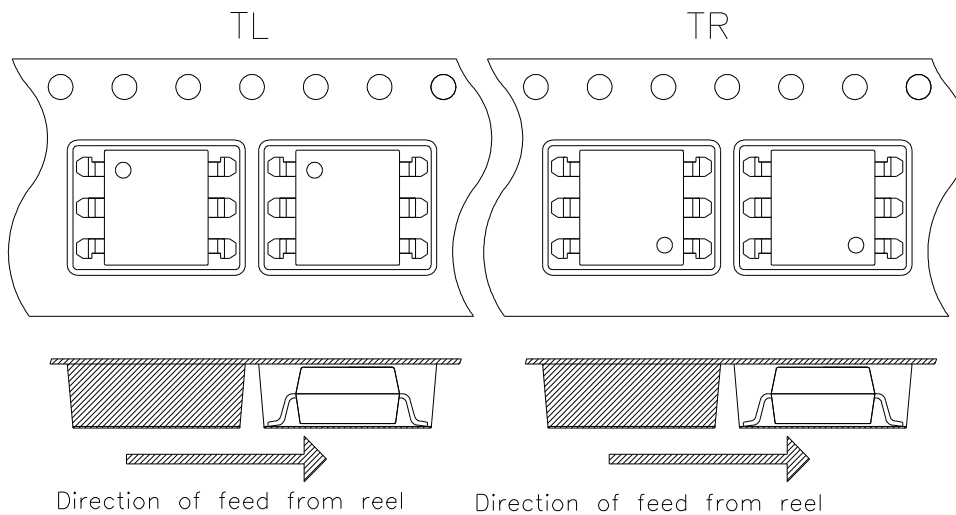
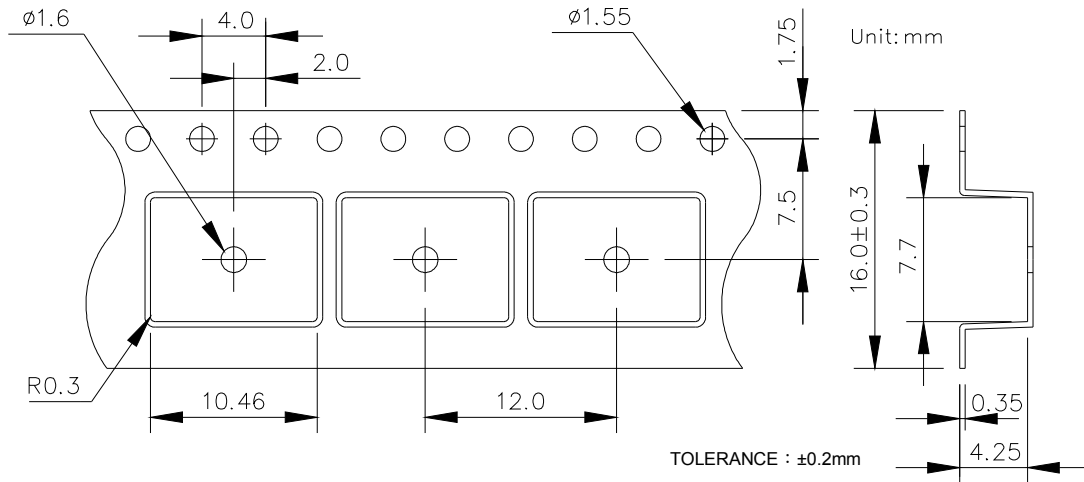
2.Long creepage distance for surface mount type.



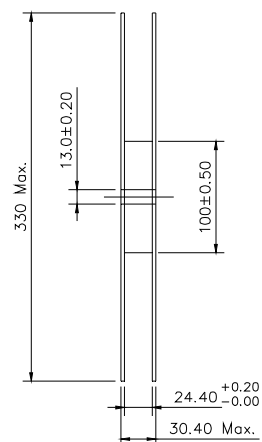
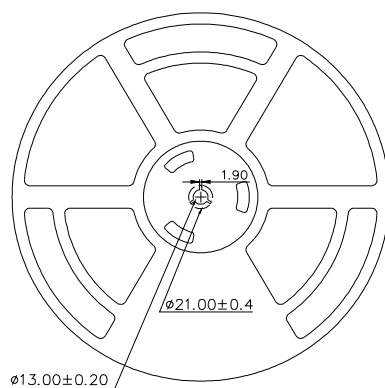
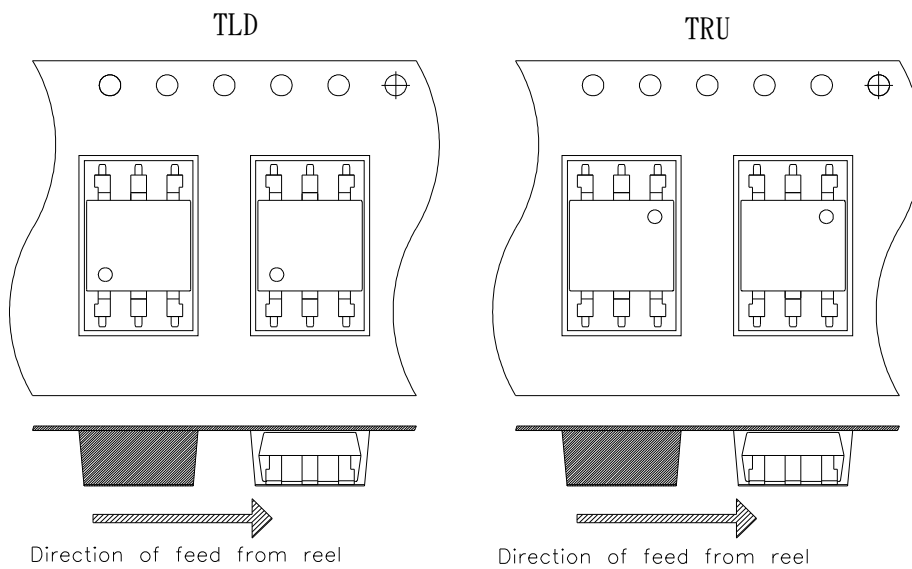
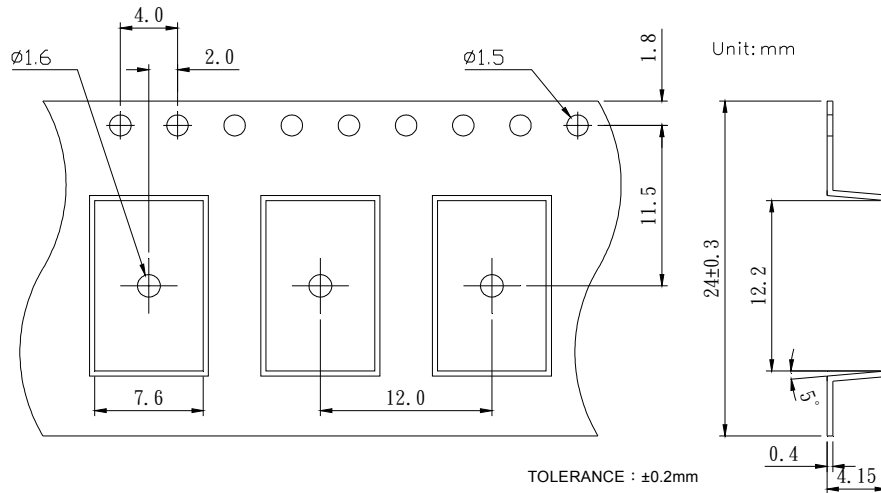
Unit : mm



● **6-pin SMD Carrier Tape & Reel**



● 6-pin L Carrier Tape & Reel



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