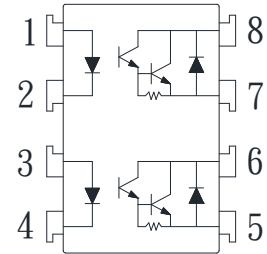


### ● Description

The KP4020 series consist of an infrared-emitting diode in a 8-pin DIP package and available in wide-lead spacing and SMD option. Collector-emitter voltage is 300V. It features a high current transfer ratio, low coupling capacitance and high isolation voltage.

### ● Schematic



1、3. Anode

2、4. Cathode

5、7. Emitter

6、8. Collector

### ● Features

1. Current transfer ratio  
( CTR : Min. 600% at  $I_F=1\text{mA}$   $V_{CE}=2\text{V}$  )
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: EN62368-1, EN60601-1

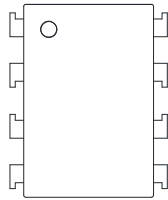
### ● Applications

- System appliances
- Industrial robots
- Copiers, facsimiles, automatic vending machines
- Signal transmission between circuits of different potentials and impedances
- Telephone sets
- Interface with various power supply circuits, power distribution boards
- Numerical control machines

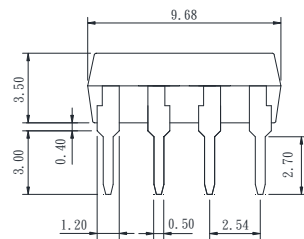
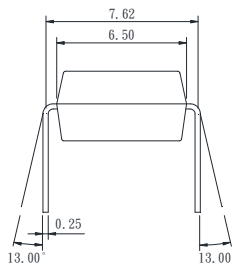
● **Outside Dimension**

Unit : mm

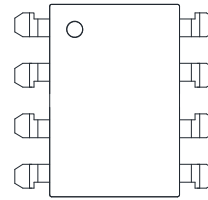
1. Dual-in-line type.



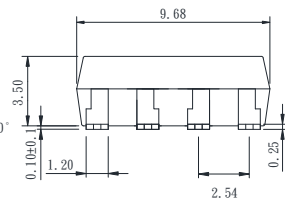
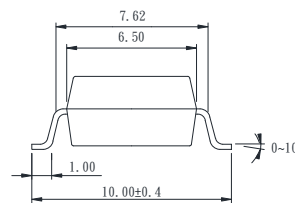
**KP4020**



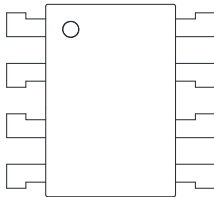
2. Surface mount type.



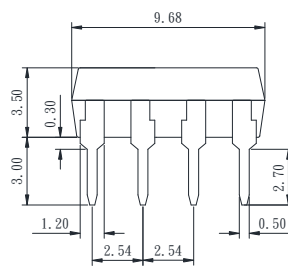
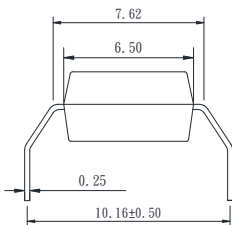
**KP4020S**



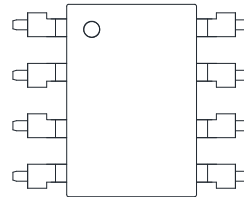
3. Long creepage distance type



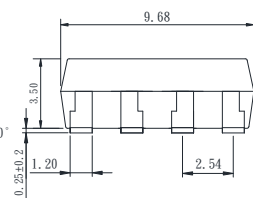
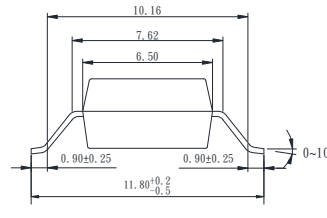
**KP4020H**



4. Long creepage distance for surface mount type.

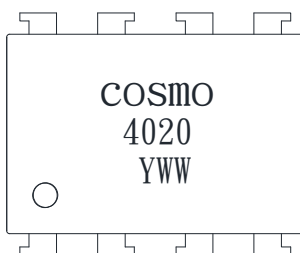


**KP4020L**



TOLERANCE : ±0.2mm

● **Device Marking**



**Notes:**

**COSMO**  
**4020**  
**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	$V_{CEO}$	300	V
	Emitter-collector voltage	$V_{ECO}$	0.1	V
	Collector current	$I_C$	150	mA
	Collector power dissipation	$P_C$	200	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**

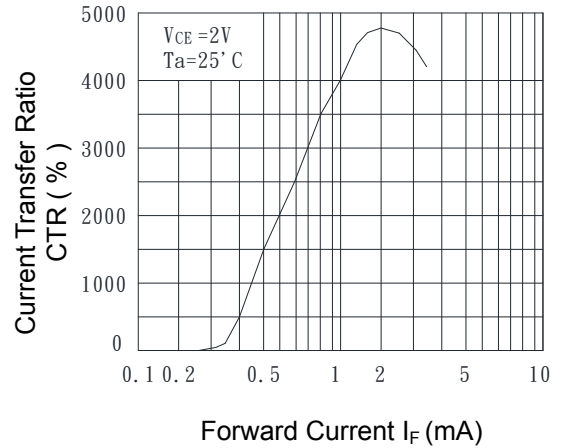
(Ta=25°C)

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	μA
	Terminal capacitance	$C_t$	$V=0, f=1KHz$	-	30	-	pF
Output	Collector dark current	$I_{CEO}$	$V_{CE}=200V, I_F=0$	-	-	1	μA
Transfer characteristics	Current transfer ratio	CTR	$I_F=1mA, V_{CE}=2V$	600	-	9000	%
	Collector-emitter saturation	$V_{CE(sat)}$	$I_F=20mA, I_C=5mA$	-	-	1.5	V
	Isolation resistance	$R_{iso}$	DC500V	$5 \times 10^{10}$	-	-	Ω
	Floating capacitance	$C_f$	$V=0, f=1MHz$	-	0.6	1.0	pF
	Cut-off frequency	$f_C$	$V_{CC}=5V, I_C=2mA, R_L=100\Omega$	-	7	-	KHz
	Response time ( Rise )	$t_r$	$V_{CE}=2V, I_C=2mA, R_L=100\Omega$	-	60	300	μs
	Response time ( Fall )	$t_f$		-	50	250	μs

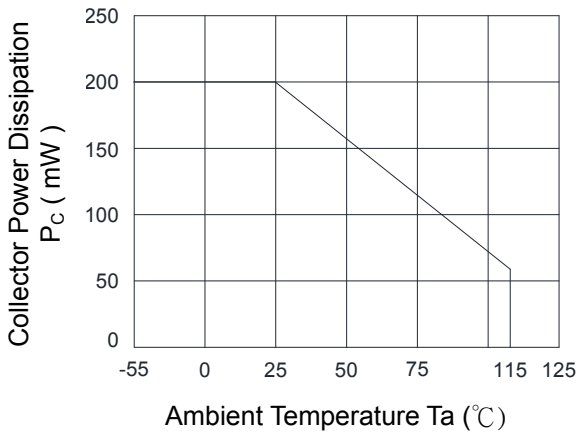
Classification table of current transfer ratio is shown below.

KP4020 Model No.	CTR (%)
KP4020 E	600 ~ 9000

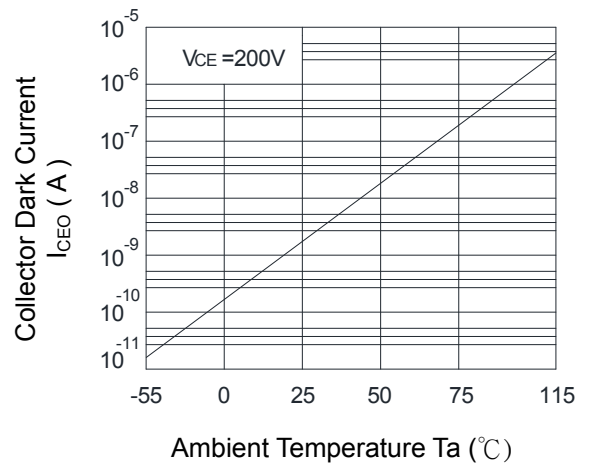
**Fig.1 Current Transfer Ratio vs. Forward Current**



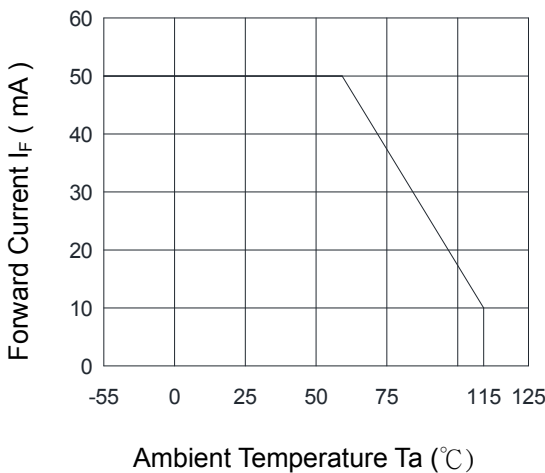
**Fig.2 Collector Power Dissipation vs. Ambient Temperature**



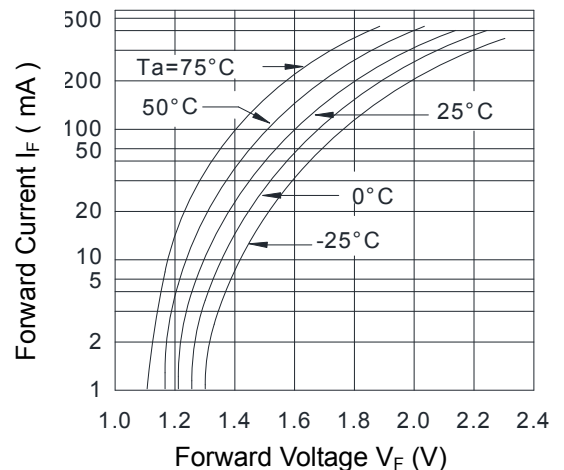
**Fig.3 Collector Dark Current vs. Ambient Temperature**



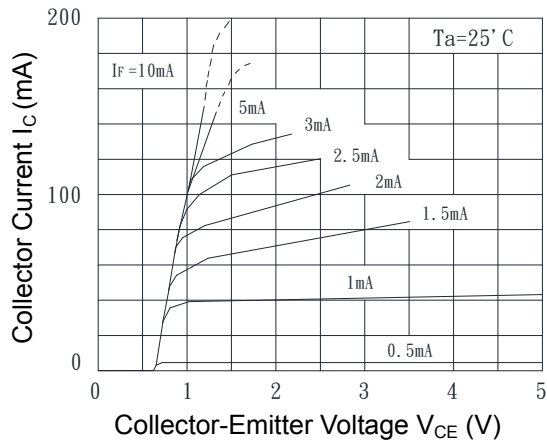
**Fig.4 Forward Current vs. Ambient Temperature**



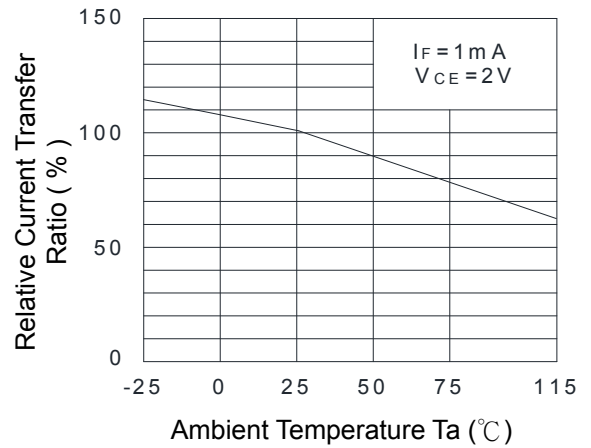
**Fig.5 Forward Current vs. Forward Voltage**



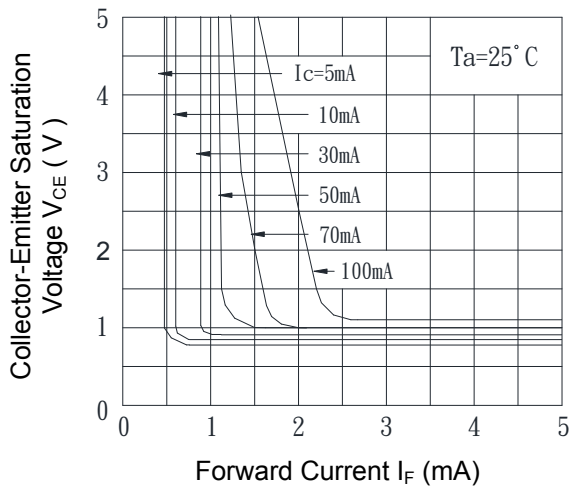
**Fig.6 Collector Current vs. Collector-Emitter Voltage**



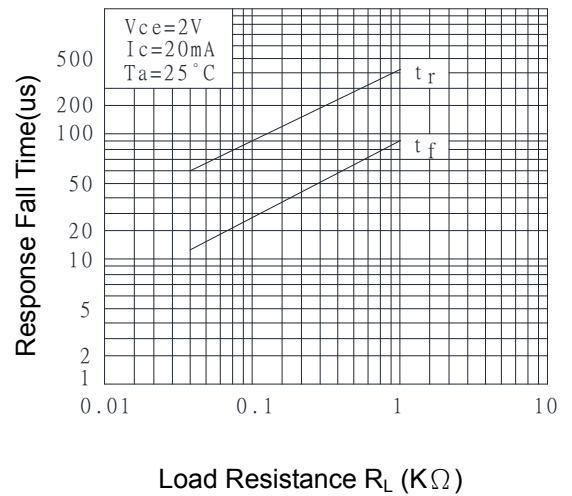
**Fig.7 Relative Current Transfer Ratio vs. Ambient Temperature**



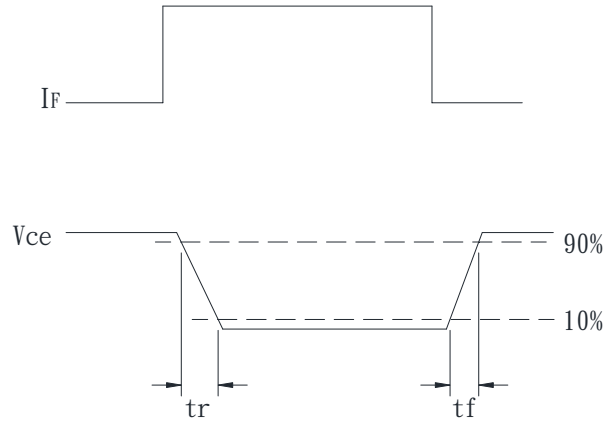
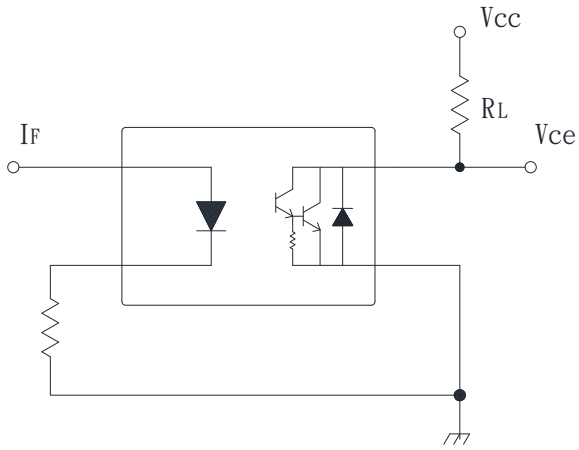
**Fig.8 Collector-Emitter Saturation Voltage vs. Forward Current**



**Fig.9 Response Time vs. Load Resistance**



● **Test Circuit for Response Time**

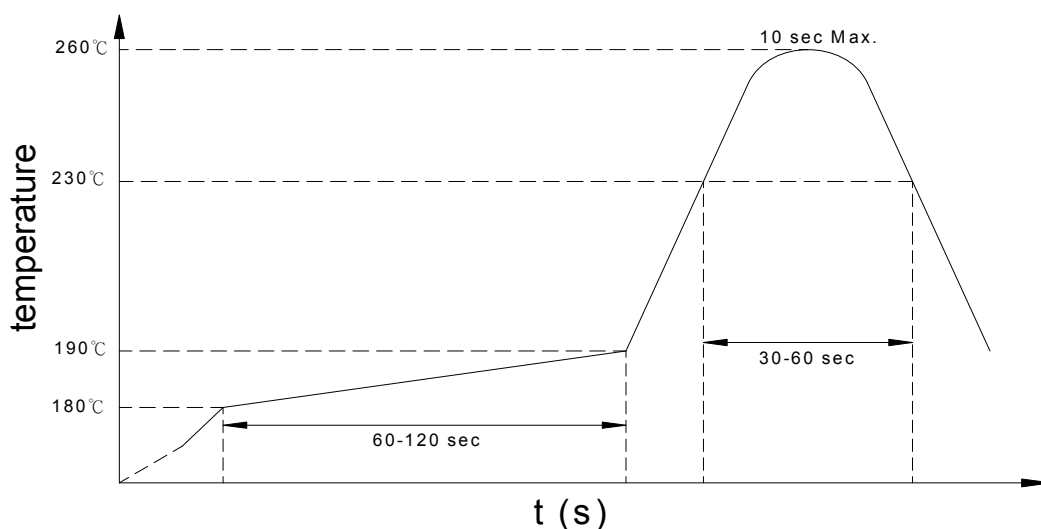


● **Recommended Soldering Conditions**

**(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**

### KP4020 X Y (Z)

**Notes:**

KP4020 = Part No.

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

Y = CTR rank ( E )

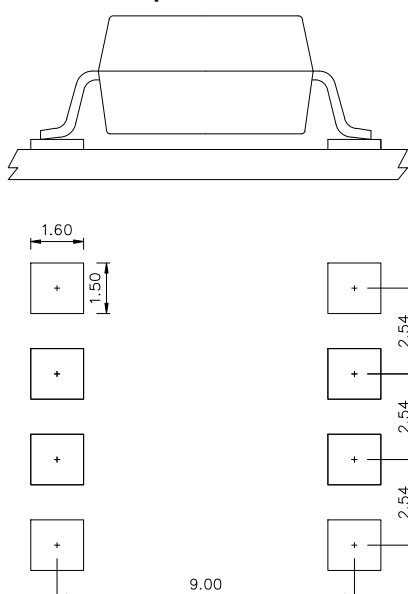
Z = Tape and reel option (TL,TR,TLD,TRU)

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**

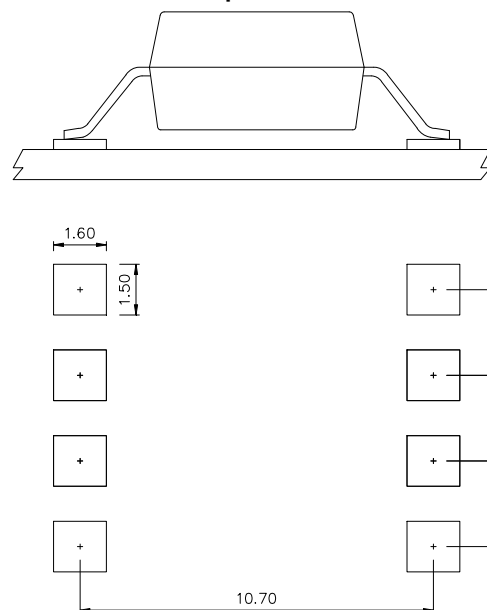
1.Surface mount type.

8 pin SMD



2.Long creepage distance for surface mount type.

8 pin L

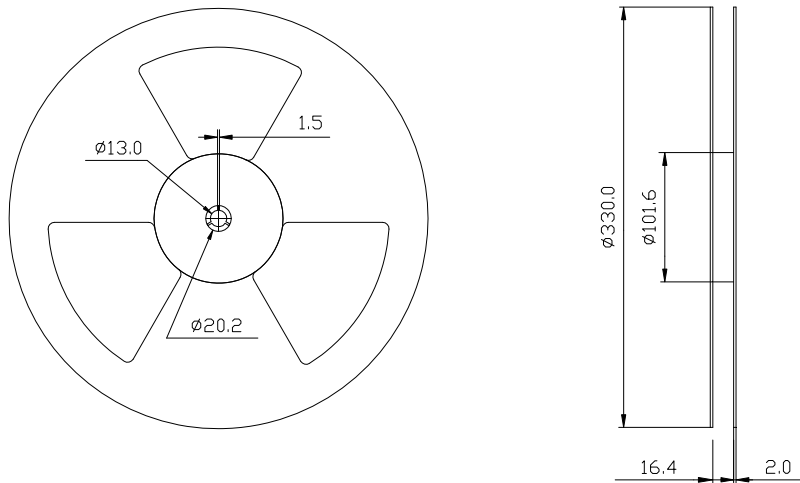
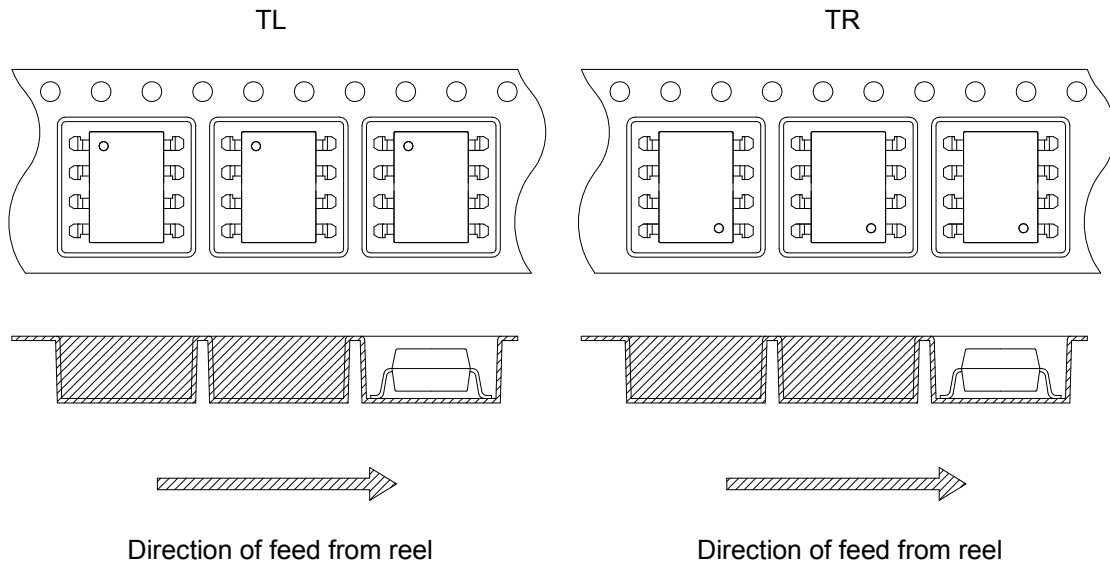
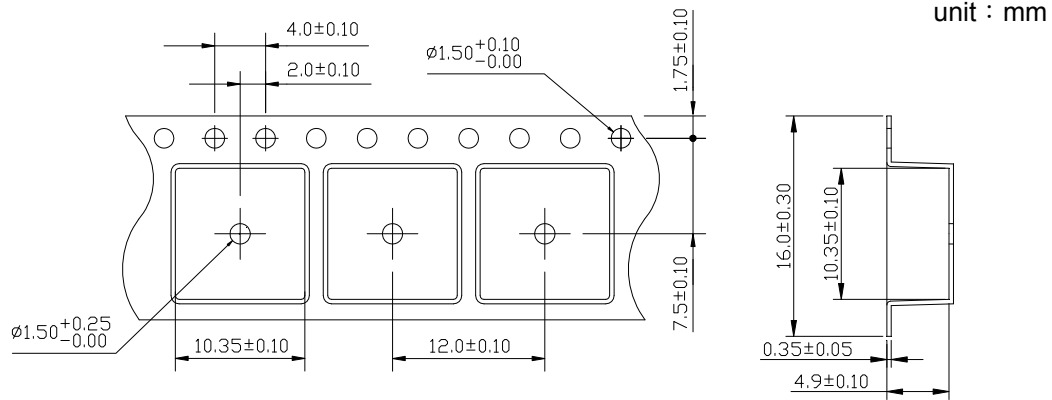


Unit : mm

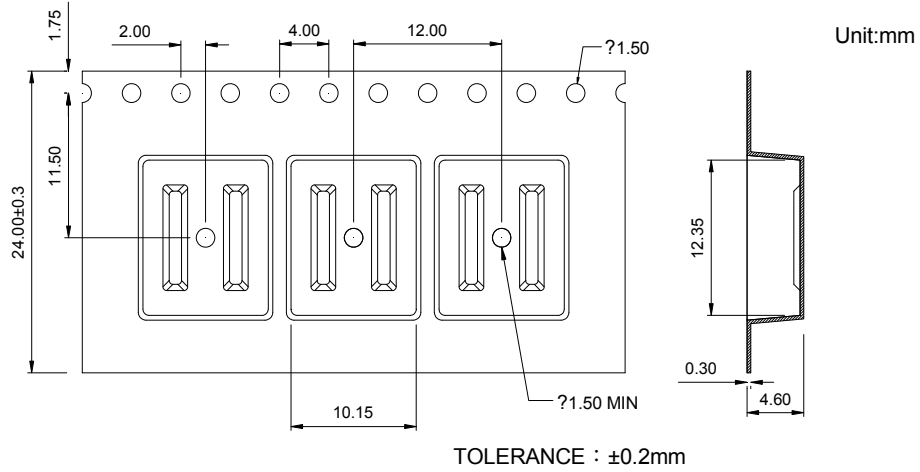
<http://www.cosmo-ic.com>



● **8-pin SMD Carrier Tape & Reel**

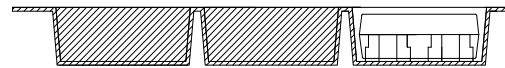
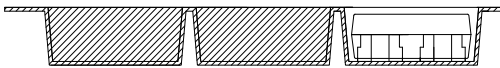
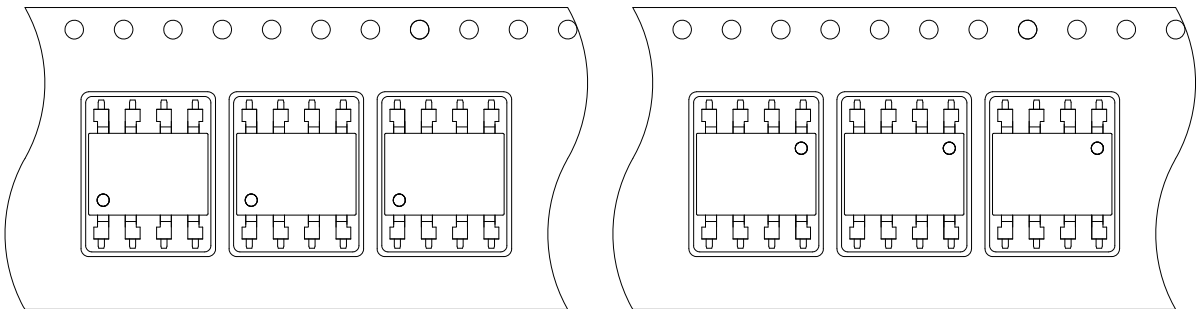


● 8-pin L Carrier Tape & Reel



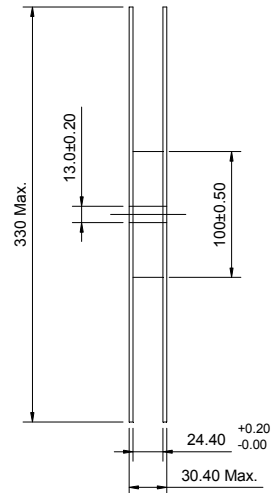
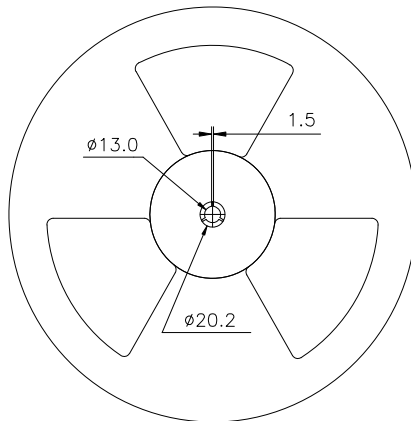
TLD

TRU



Direction of feed from reel

Direction of feed from reel



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- **Application Notice**

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