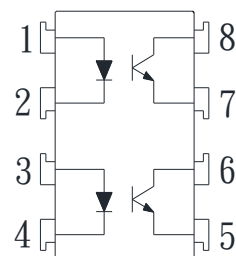


● Description

The KP1020 series consist of an infrared emitting diode, optically coupled to a phototransistor detector. They are packaged in an 8-pin DIP package and available in wide-lead spacing and SMD option.

● Schematic



- 1 、 3. Anode
- 2 、 4. Cathode
- 5 、 7. Emitter
- 6 、 8. 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

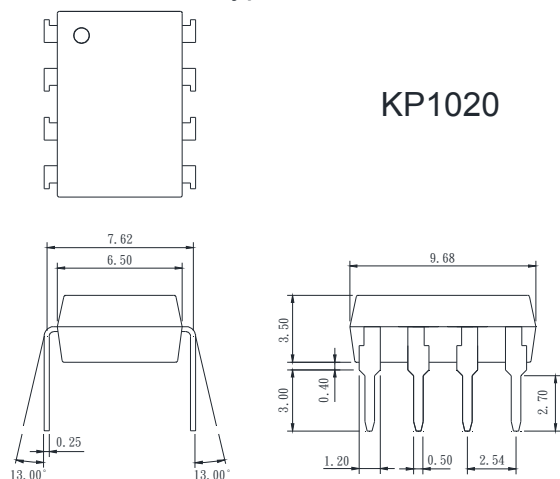
● Applications

- 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

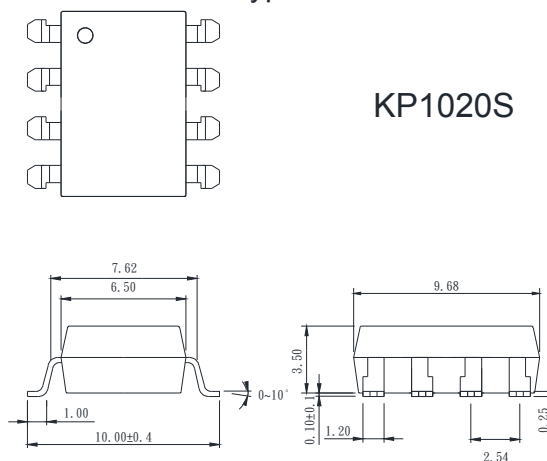
Unit : mm

1. Dual-in-line type.



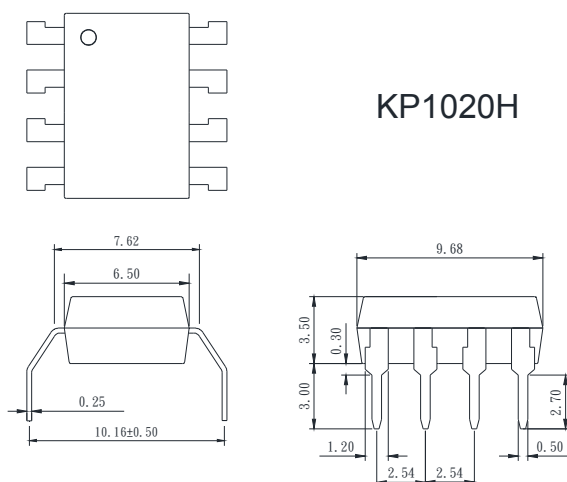
KP1020

2. Surface mount type.



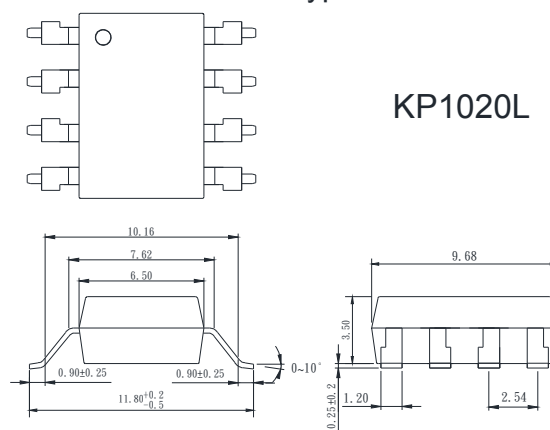
KP1020S

3. Long creepage distance type



KP1020H

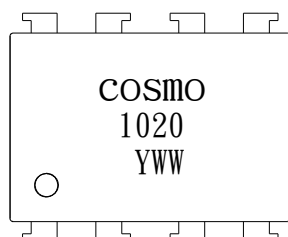
4. Long creepage distance for surface mount type.



KP1020L

TOLERANCE : ±0.2mm

● Device Marking



Notes:

COSMO
1020
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}	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

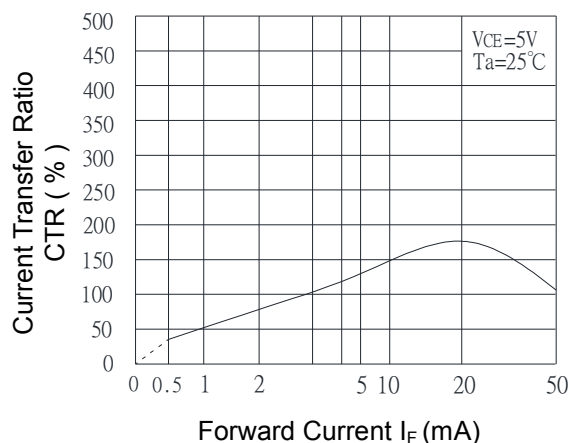
(Ta=25°C)

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	%
	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

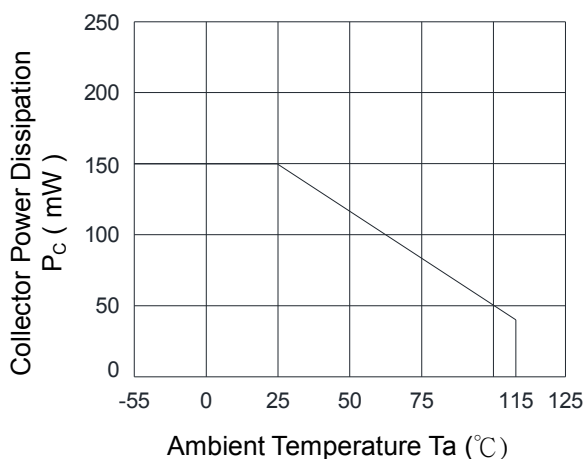
Classification table of current transfer ratio is shown below.

KP1020 Model No.	CTR (%)
KP1020 E	50 ~ 600

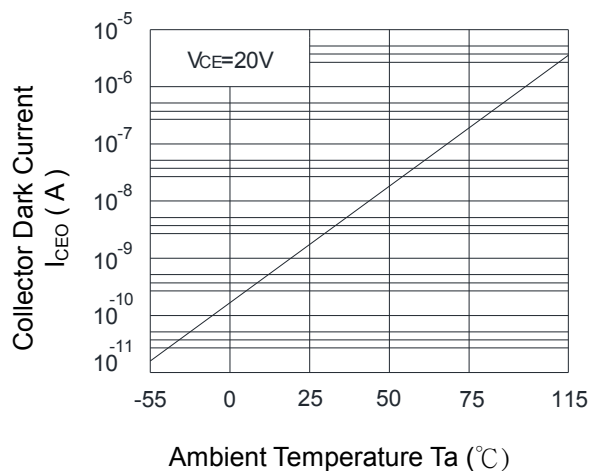
**Fig.1 Current Transfer Ratio
vs. Forward Current**



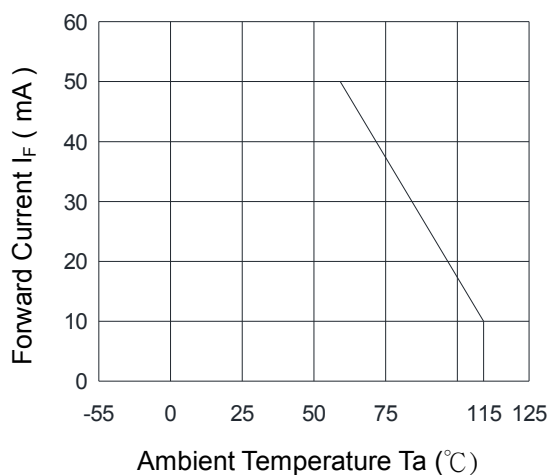
**Fig.2 Collector Power Dissipation
vs. Ambient Temperature**



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



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



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

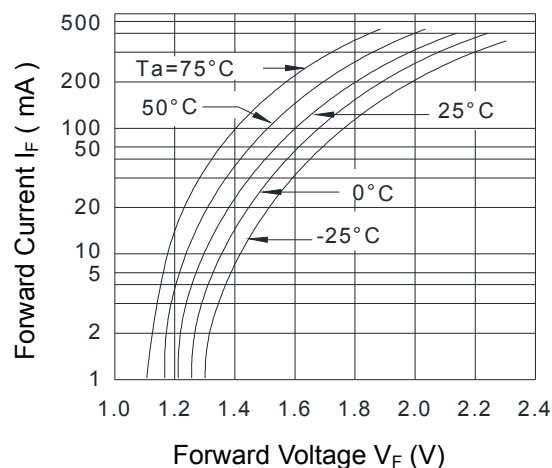


Fig.6 Collector Current vs. Collector-Emitter Voltage

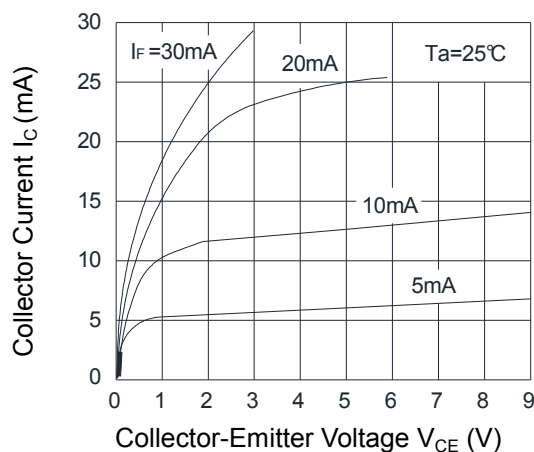


Fig.7 Relative Current Transfer Ratio vs. Ambient Temperature

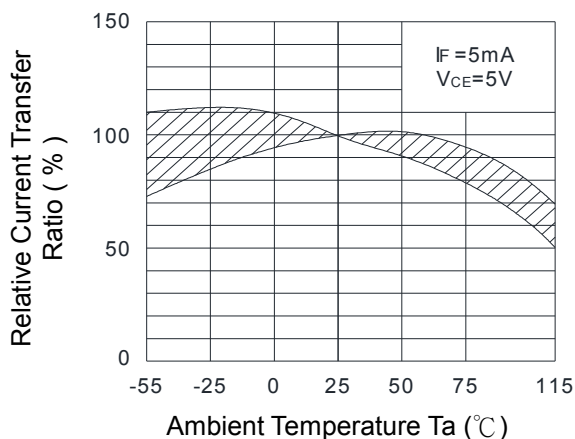


Fig.8 Collector-Emitter Saturation Voltage vs. Ambient Temperature

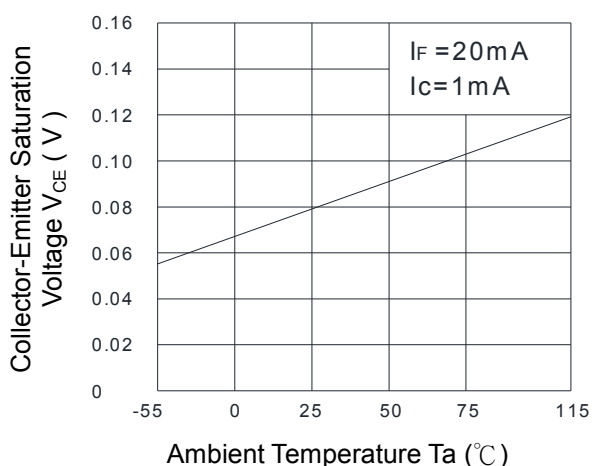


Fig.9 Collector-Emitter Saturation Voltage vs. Forward Current

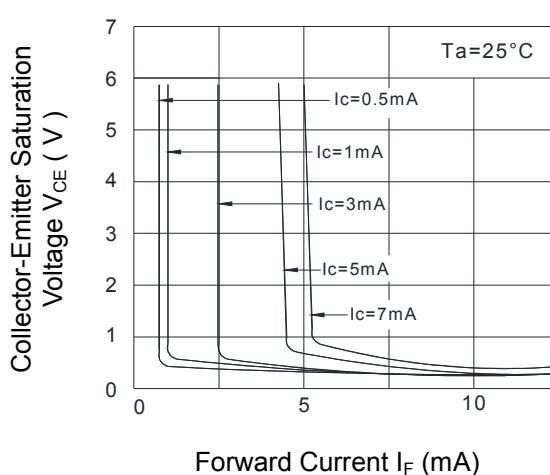


Fig.10 Response Time (Rise) vs. Load Resistance

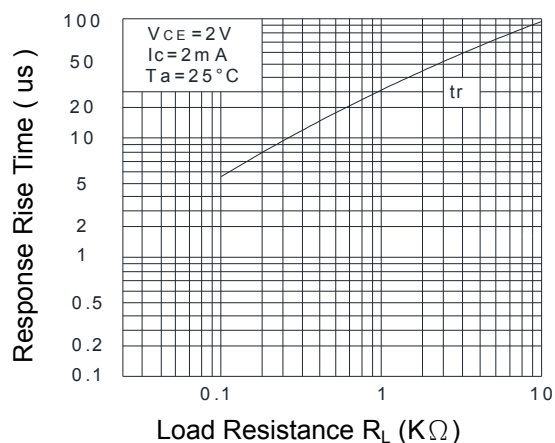
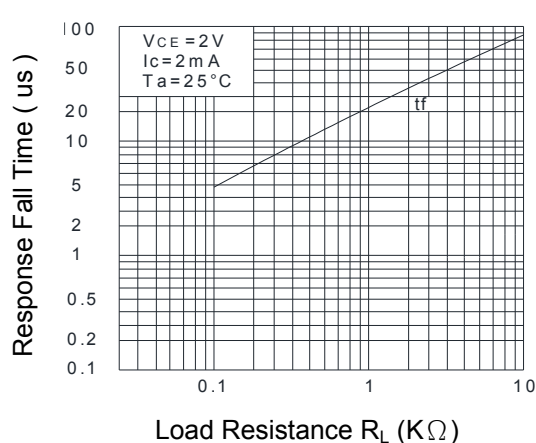
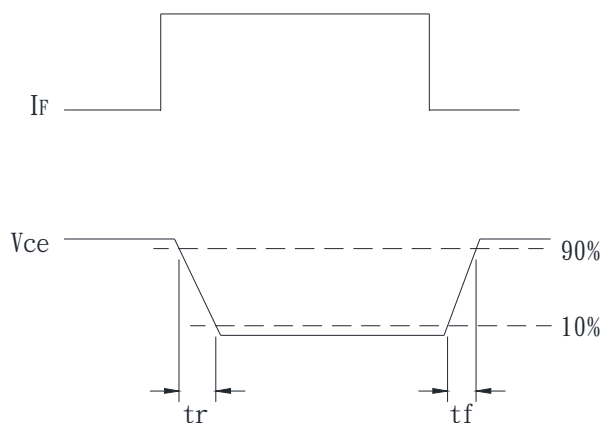
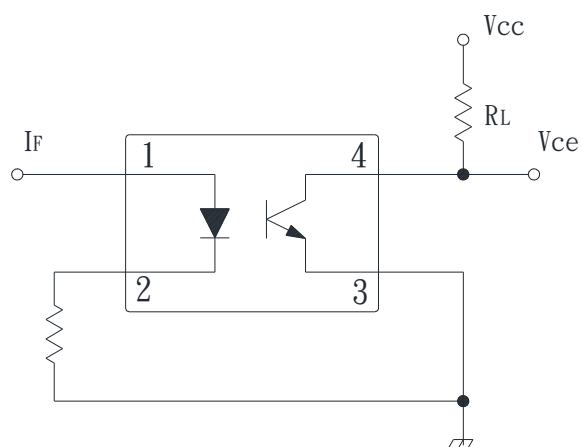


Fig.11 Response Time (Fall) vs. Load Resistance



- **Test Circuit for Response Time**

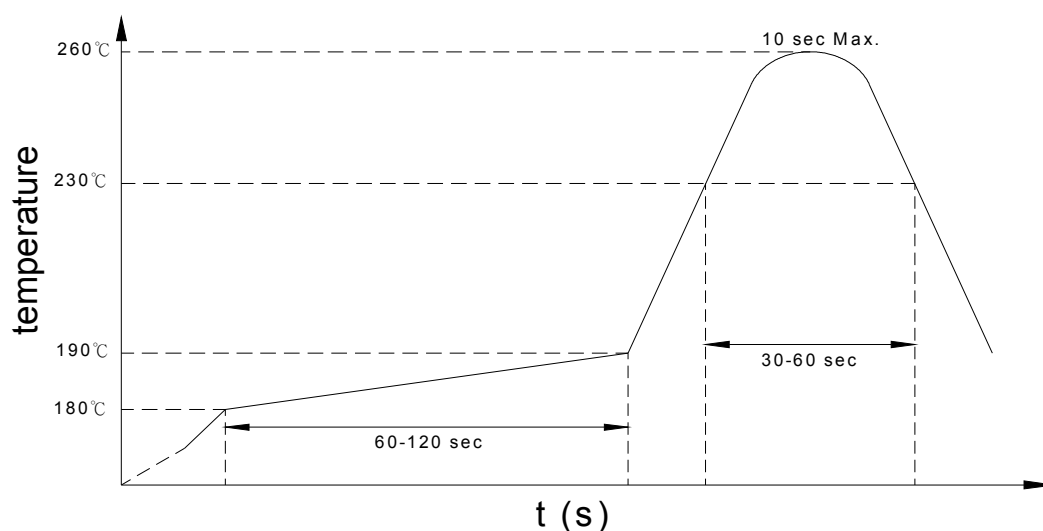


● Recommended Soldering Conditions

(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

KP1020 X Y (Z)

Notes:

KP1020 = Part No.

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

Y = CTR rank (E)

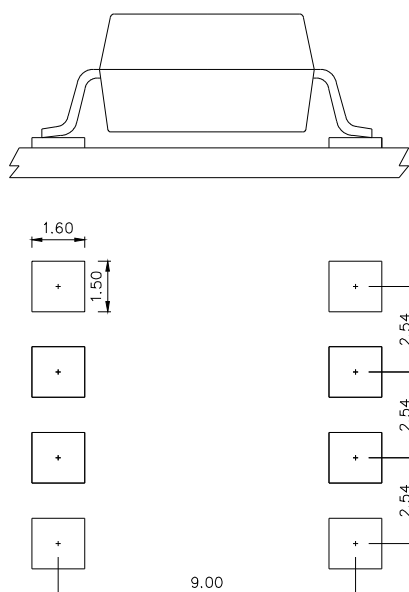
Z = Tape and reel option (TL,TR,TLD,TRU)

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

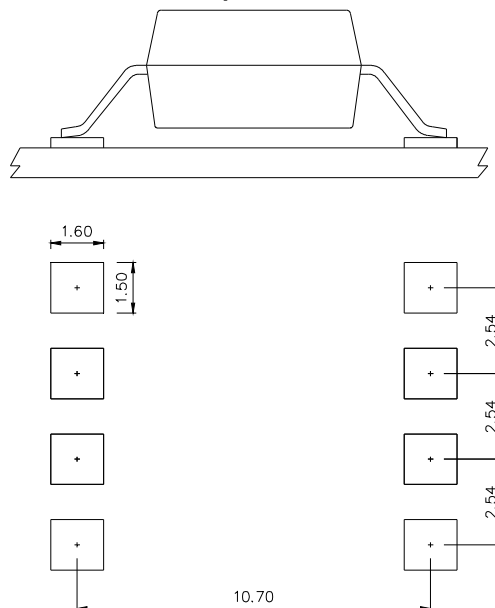
1.Surface mount type.

8 pin SMD



2.Long creepage distance for surface mount type.

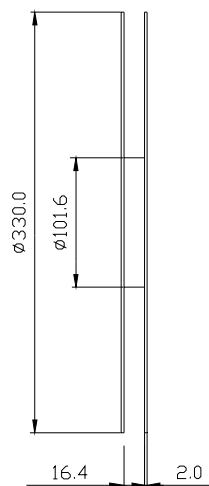
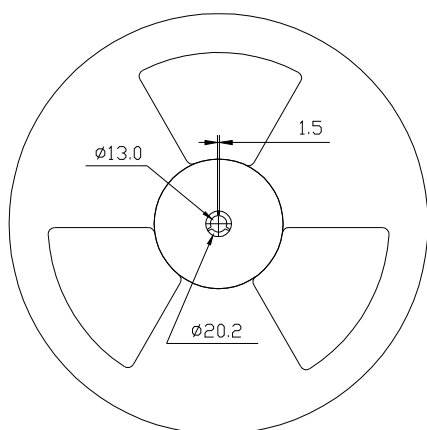
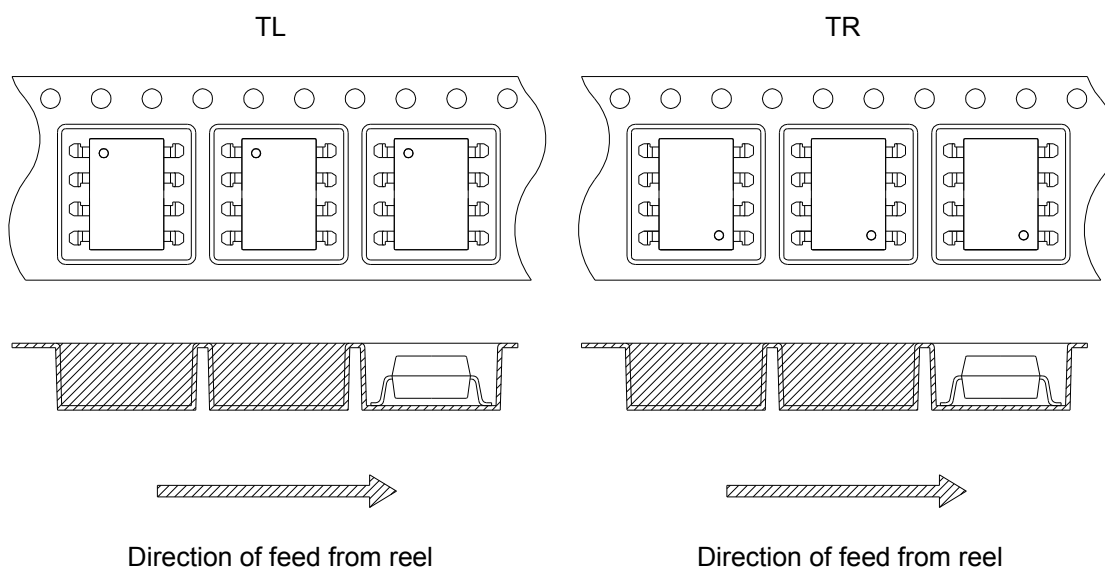
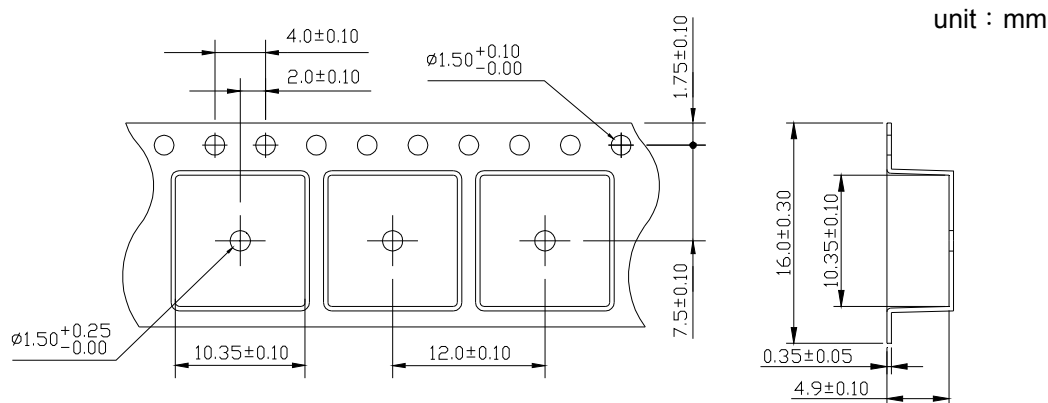
8 pin L



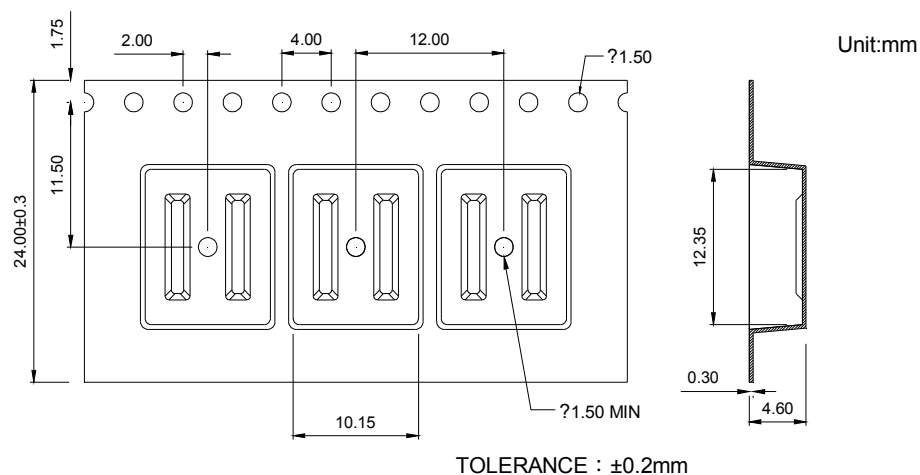
Unit : mm

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

● 8-pin SMD Carrier Tape & Reel

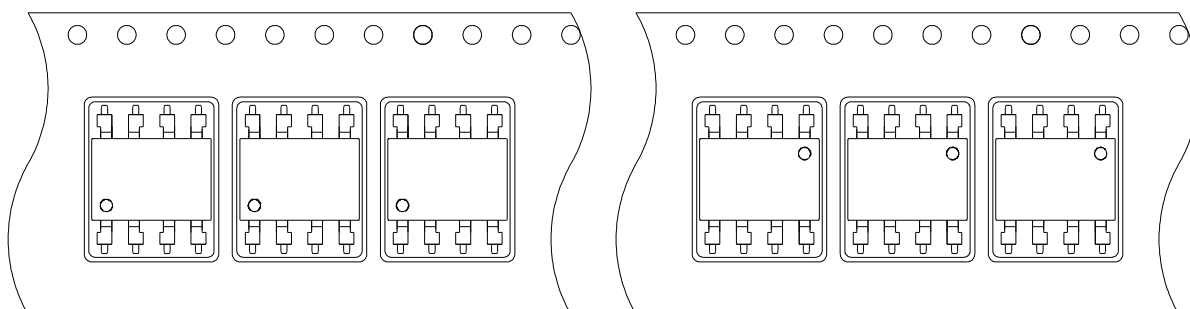


● 8-pin L Carrier Tape & Reel



TLD

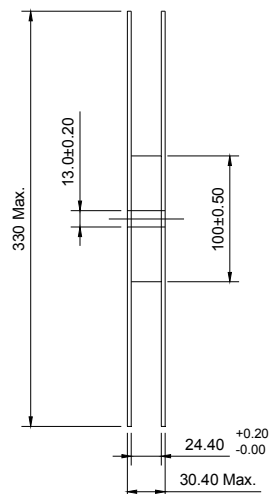
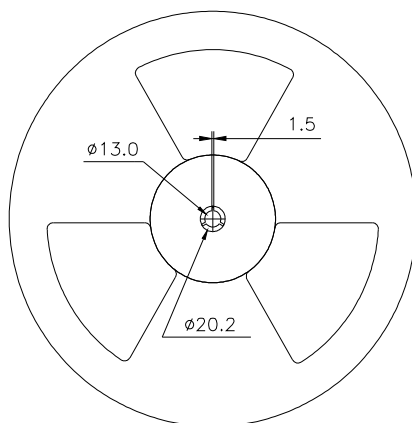
TRU



Direction of feed from reel



Direction of feed from reel



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

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- e. Equipment used for automotive vehicles, trains, ships...etc.

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