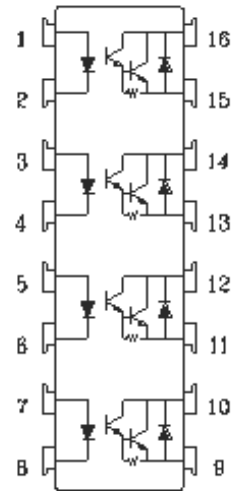


● Description

The KP4040 series consist of an infrared-emitting diode in a 16-pin DIP package and available in wide-lead spacing and SMD option. It features a high current transfer ratio, low coupling capacitance and high isolation voltage.

● Schematic



- 1、3、5、7 Anode
- 2、4、6、8 Cathode
- 9、11、13、15 Emitter
- 10、12、14、16 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: EN60065, EN60950, EN60335
 - SEMKO Approved: EN60065, EN60950, EN60335

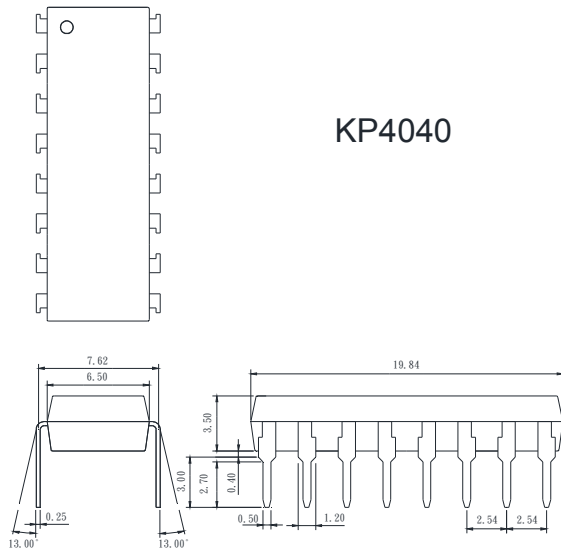
● Applications

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

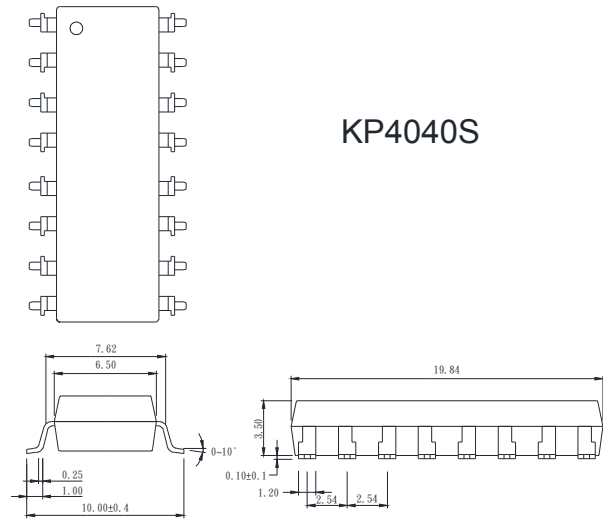
● **Outside Dimension**

Unit : mm

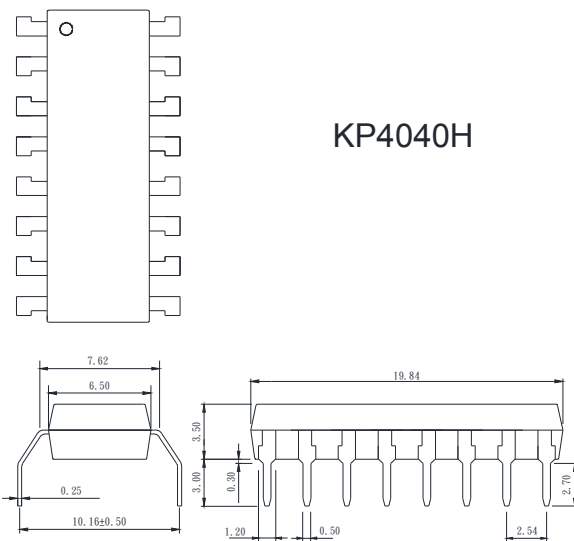
1. Dual-in-line type.



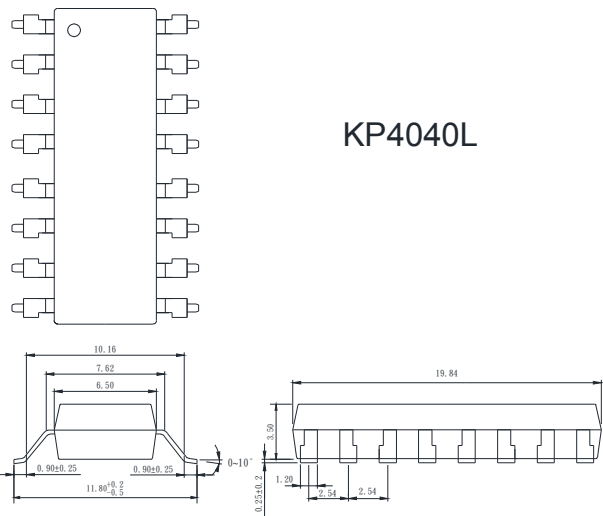
2. Surface mount type.



3. Long creepage distance type

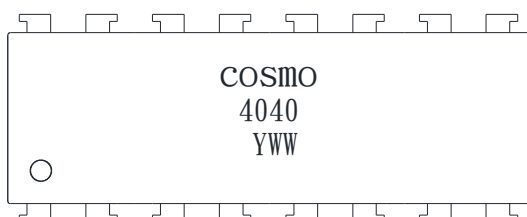


4. Long creepage distance for surface mount type.



TOLERANCE : ±0.2mm

● **Device Marking**



Notes:

COSMO
4040
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	5×10^{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	$V_{CE}=2V, I_C=20mA, R_L=100\Omega$	-	60	300	μs
	Response time (Fall)	t_f		-	50	250	μs

Classification table of current transfer ratio is shown below.

KP4040 Model No.	CTR (%)
KP4040 E	600 ~9000

Fig.1 Current Transfer Ratio vs. Forward Current

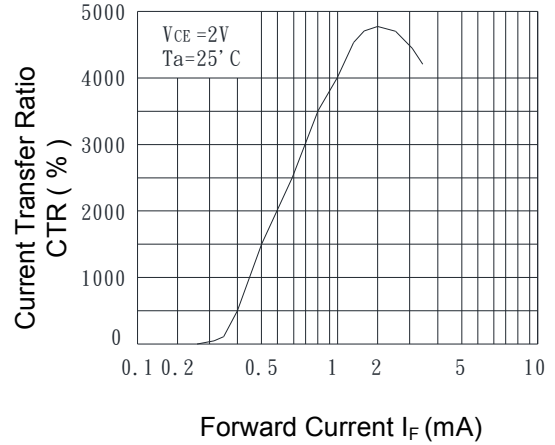


Fig.2 Collector Power Dissipation vs. Ambient Temperature

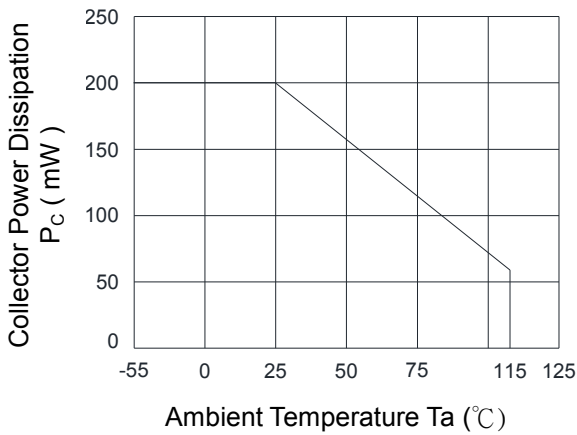


Fig.3 Collector Dark Current vs. Ambient Temperature

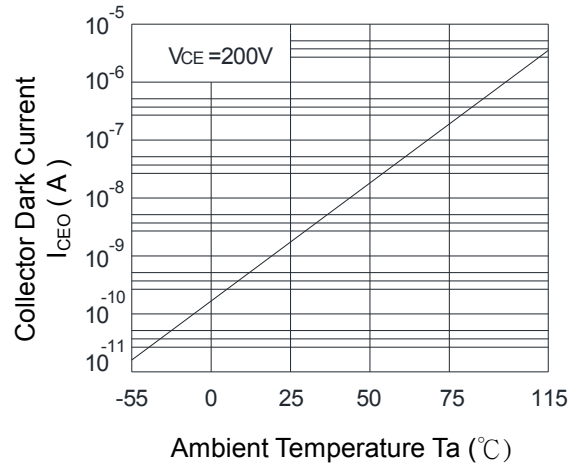


Fig.4 Forward Current vs. Ambient Temperature

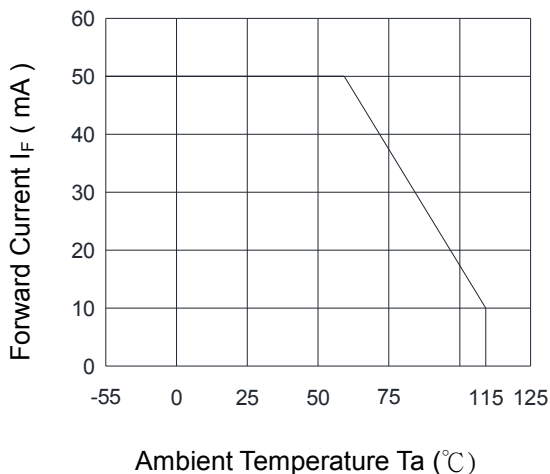


Fig.5 Forward Current vs. Forward Voltage

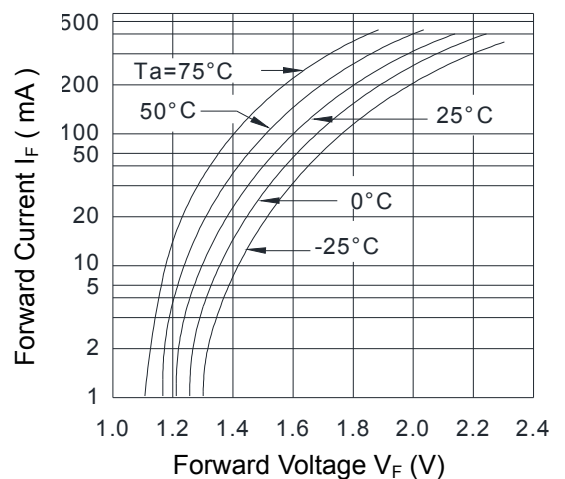


Fig.6 Collector Current vs. Collector-Emitter Voltage

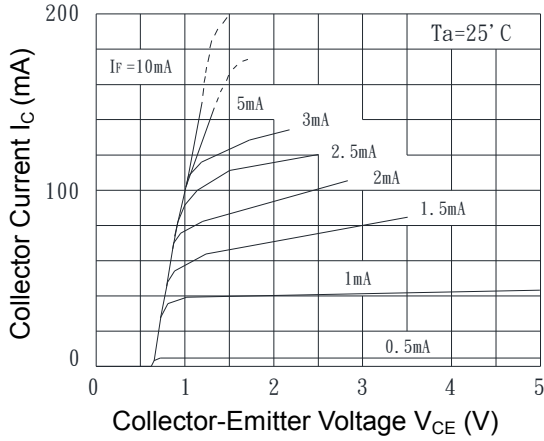


Fig.7 Relative Current Transfer Ratio vs. Ambient Temperature

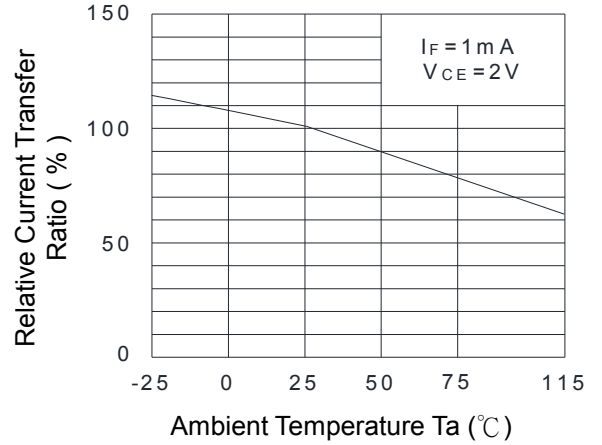


Fig.8 Collector-Emitter Saturation Voltage vs. Forward Current

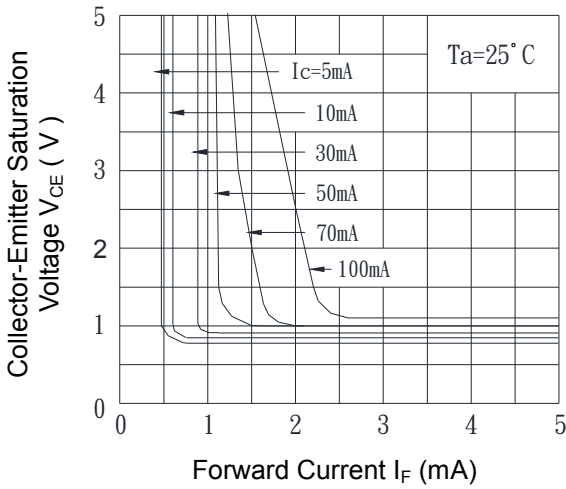
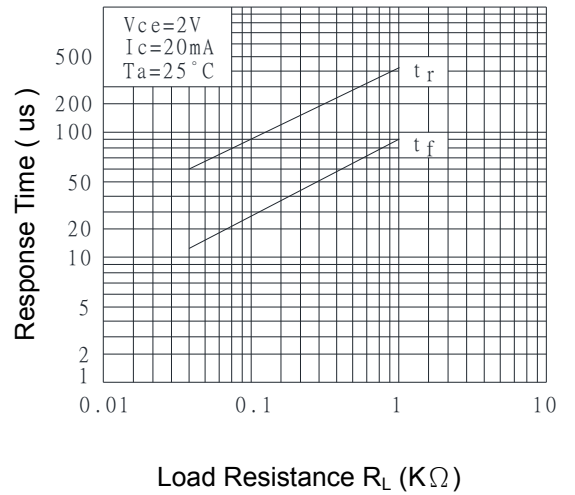
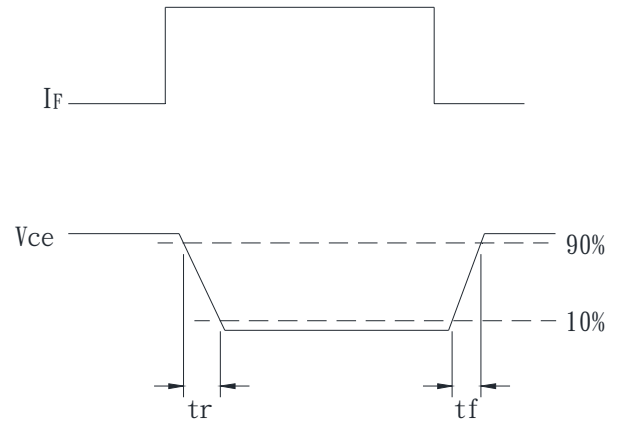
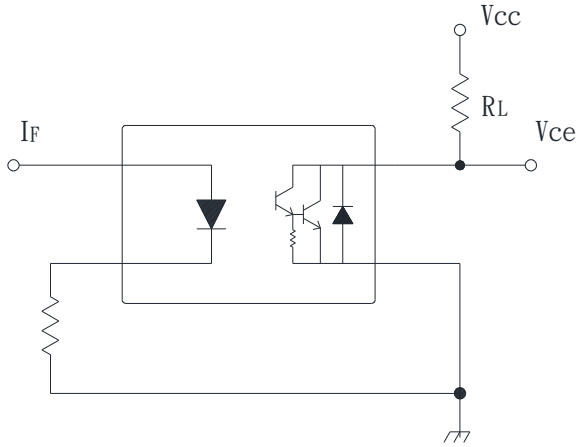


Fig.9 Response Time vs. Load Resistance



- Test Circuit for Response Time

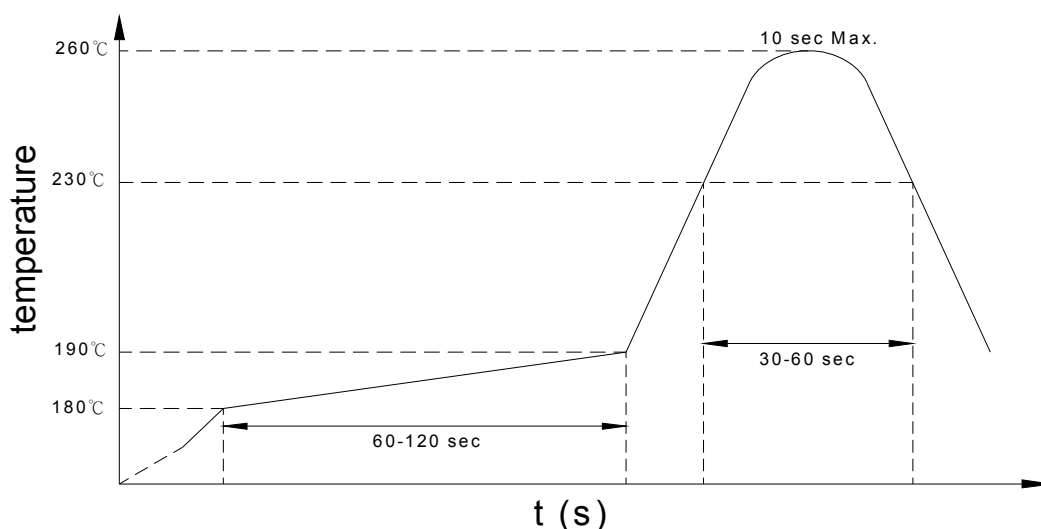


● Recommended Soldering Conditions

(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**

KP4040 X Y (Z)

Notes:

KP4040 = Part No.

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

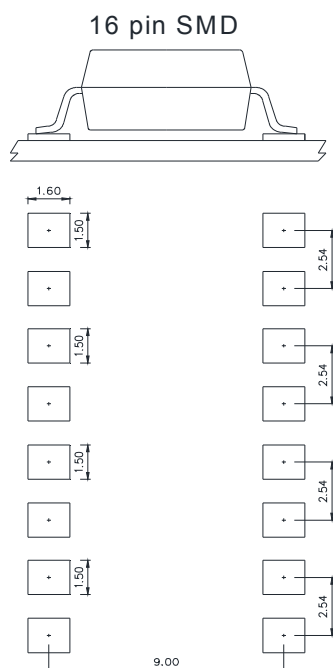
Y = CTR rank (E)

Z = Tape and reel option (TL,TR)

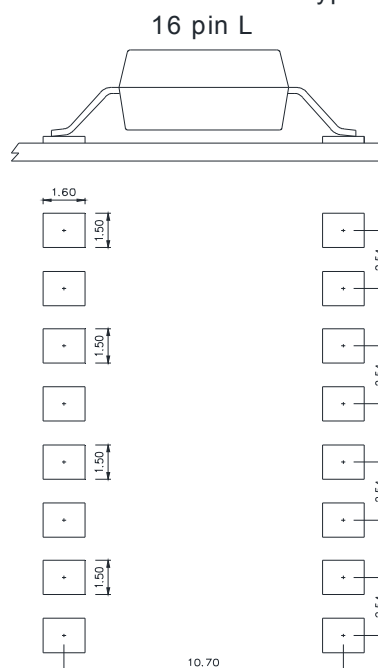
Option	Description	Packing quantity
S (TL)	surface mount type package + TL tape & reel option	800 units per reel
S (TR)	surface mount type package + TR tape & reel option	800 units per reel
L (TL)	long creepage distance for surface mount type package + TL tape & reel option	800 units per reel
L (TR)	long creepage distance for surface mount type package + TR tape & reel option	800 units per reel

- **Recommended Pad Layout for Surface Mount Lead Form**

1.Surface mount type.

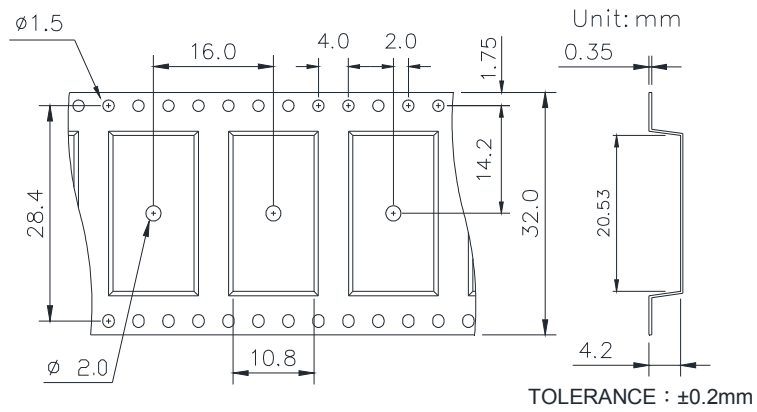


2.Long creepage distance for surface mount type.



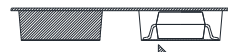
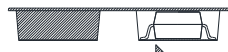
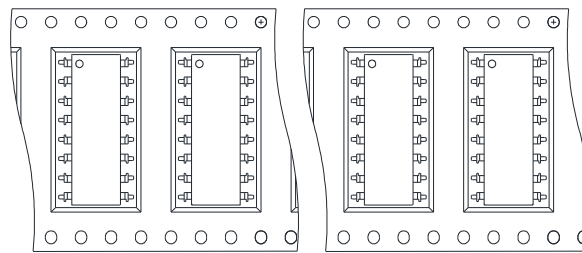
Unit : mm

● 16-pin SMD Carrier Tape & Reel



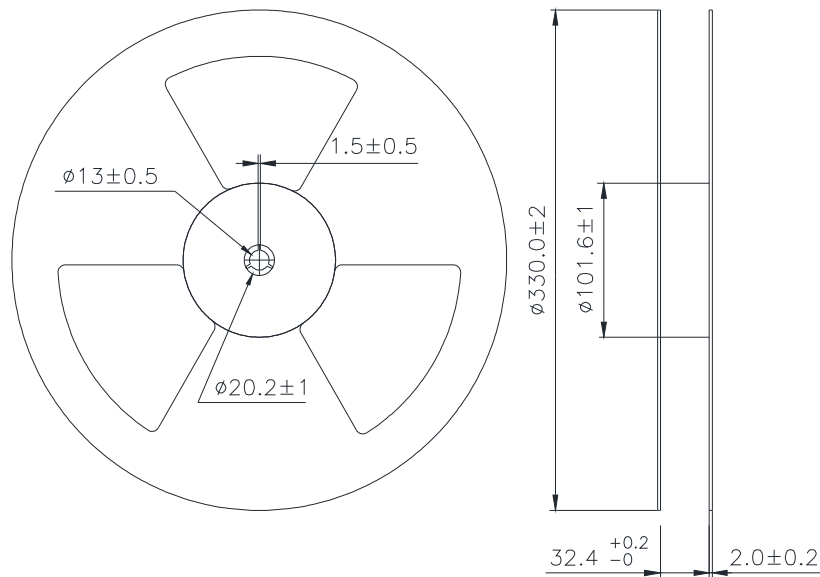
TL

TR

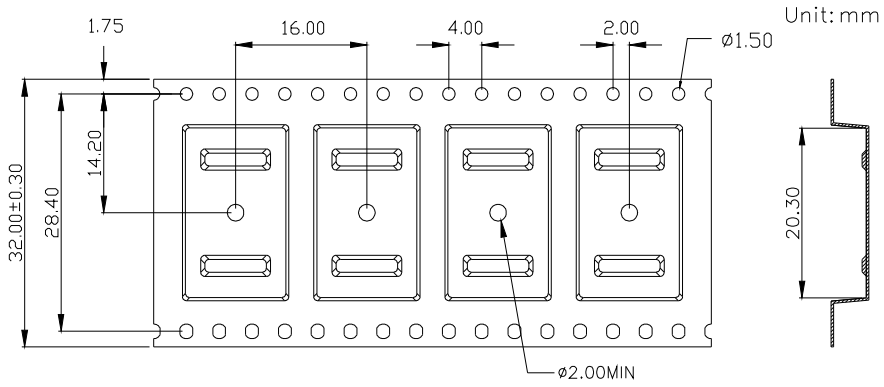


Direction of feed from reel

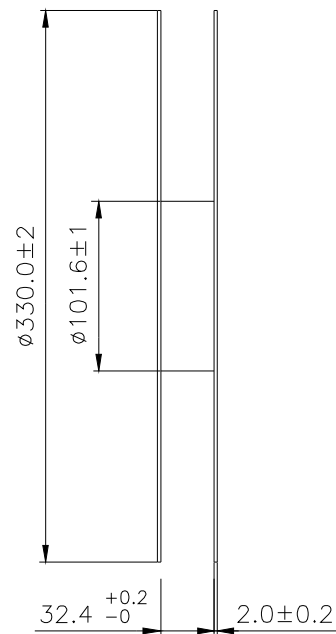
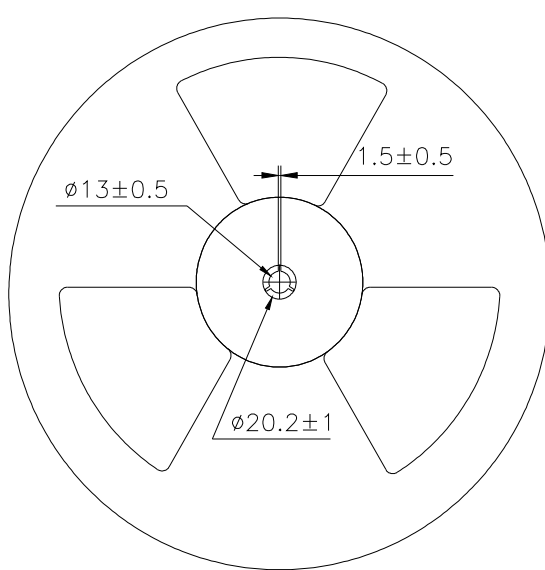
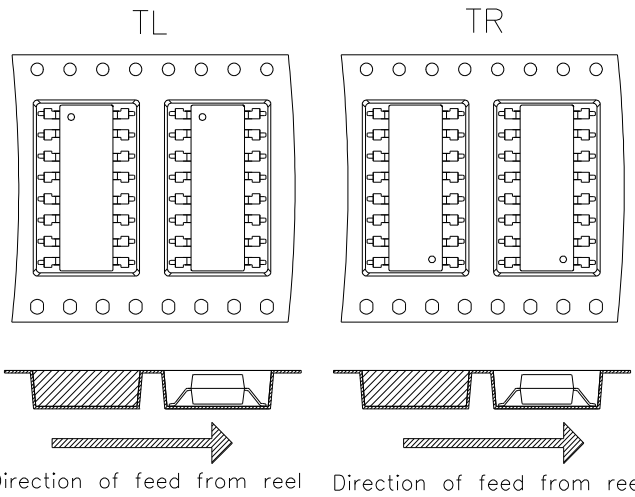
Direction of feed from reel



● 16-pin L Carrier Tape & Reel



TOLERANCE : ±0.2mm



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

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