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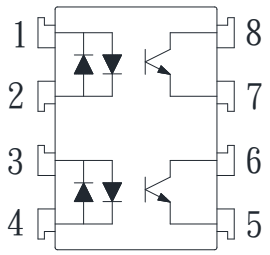
KP3020 Series

8PIN PHOTOTRANSISTOR PHOTOCOUPLER

Description

The KP3020 series consist of two infrared emitting diodes, connected in inverse parallel, 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、2. Anode, Cathode

3、4. Anode, Cathode

5、7. Emitter

6、8. Collector

Features

1. Current transfer ratio
   (CTR：Min. 60% at I_F=±1mA V_{CE}=5V)
2. High isolation voltage between input and output
   (Viso：5000Vrms)
3. Compact dual-in-line package.
4. AC input
5. Pb free and RoHS compliant
6. MSL class 1
7. 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

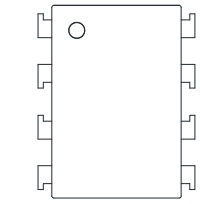
Applications

- System appliances
- Limit Switches
- Sensors
- Programmable controllers applications for Low Input Photocouplers and High Vceo Photocouplers
- Telephone sets
- Telephone exchangers
- Thermostats
- Signal transmission between circuits of different potentials and impedances

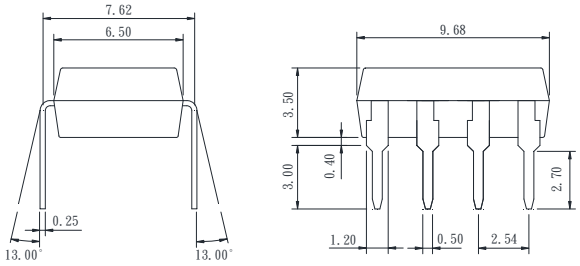
Outside Dimension

Unit : mm

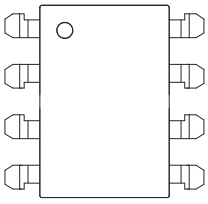
1.Dual-in-line type.



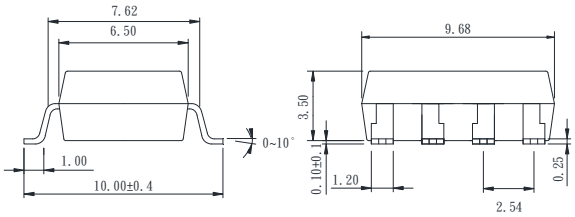
KP3020



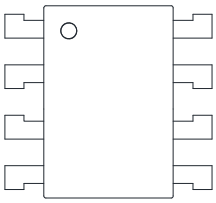
2.Surface mount type.



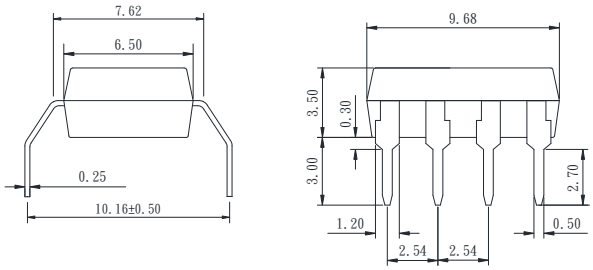
KP3020S



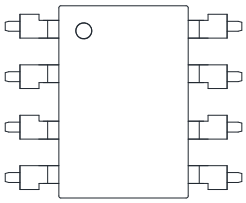
3.Long creepage distance type



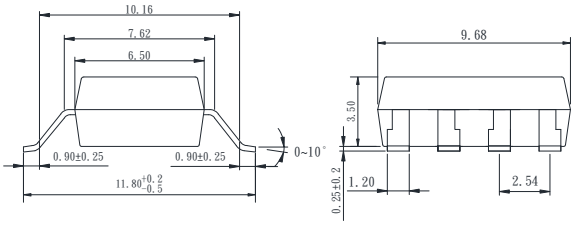
KP3020H



4.Long creepage distance
for surface mount type.

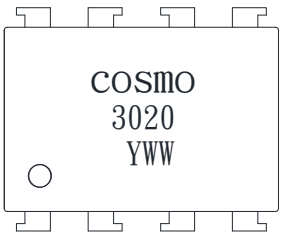


KP3020L



TOLERANCE：±0.2mm

Device Marking



Notes:

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YWW Y: Year code / WW: Week code

● Absolute Maximum Ratings

(Ta=25℃)

Parameter		Symbol	Rating	Unit
Input	Forward current	I_F	±50	mA
	Peak forward current	I_{FM}	±1	A
	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	℃
Storage temperature		T_{stg}	-55 to +125	℃
Soldering temperature 10 seconds		T_{sol}	260	℃

● Electro-optical Characteristics

(Ta=25℃)

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
	Terminal capacitance	C_t	V=0, f=1KHz	-	30	-	pF
Output	Collector dark current	I_{CEO}	V_{CE}=20V	-	-	0.1	μA
Transfer charac-teristics	Current transfer ratio	CTR	I_F=±1mA, 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	$5x10^{10}$	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=100Ω	-	80	-	KHz
	Response time (Rise)	t_r	V_{CE}=2V, I_C=2mA, R_L=100Ω	-	5	20	μs
	Response time (Fall)	t_f		-	4	20	μs

Classification table of current transfer ratio is shown below.

KP3020 Model No.	CTR (%)
KP3020 A	60 ~ 600
KP3020 B	60 ~ 300

Fig.1 Current Transfer Ratio vs. Forward Current

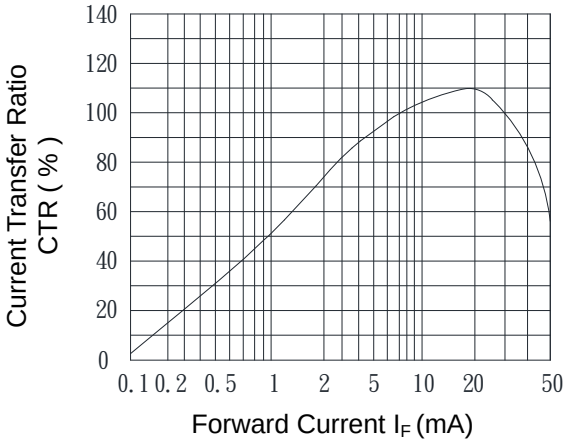


Fig.2 Collector Power Dissipation vs. Ambient Temperature

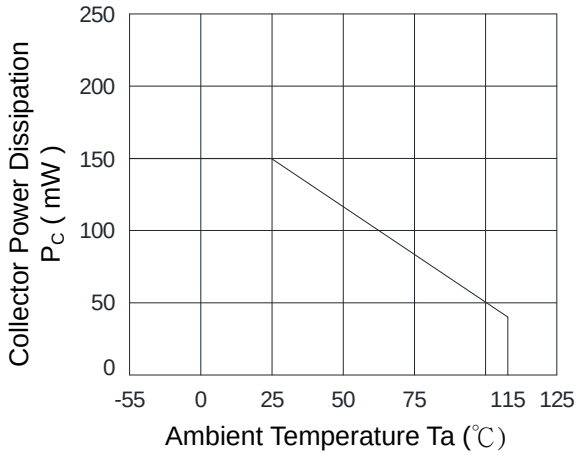


Fig.3 Collector Dark Current vs. Ambient Temperature

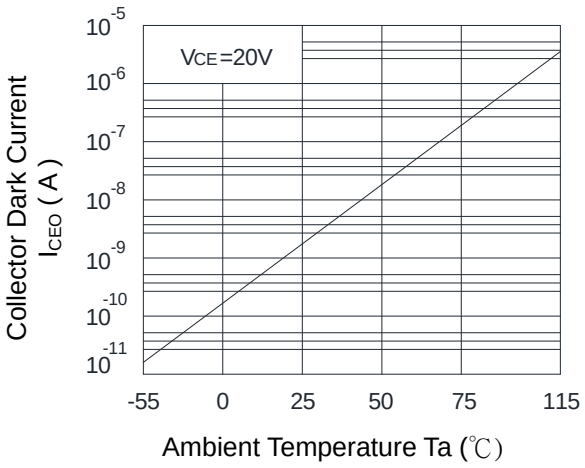


Fig.4 Forward Current vs. Ambient Temperature

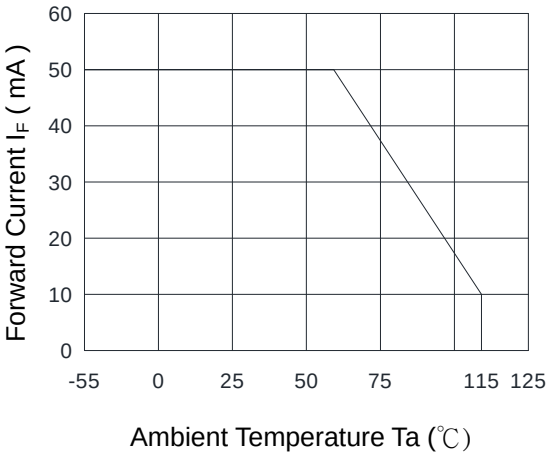


Fig.5 Forward Current vs. Forward Voltage

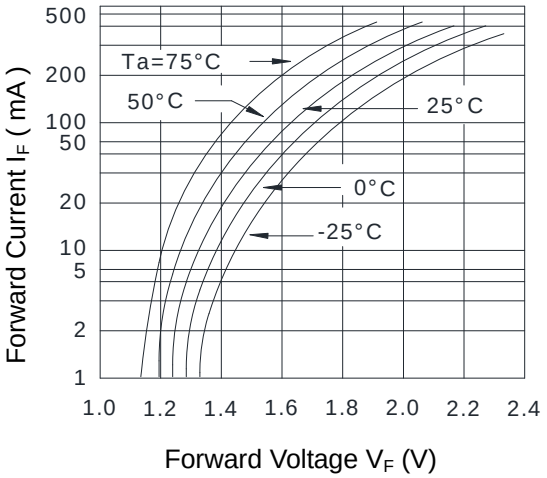


Fig.6 Collector Current vs. Collector-Emitter Voltage

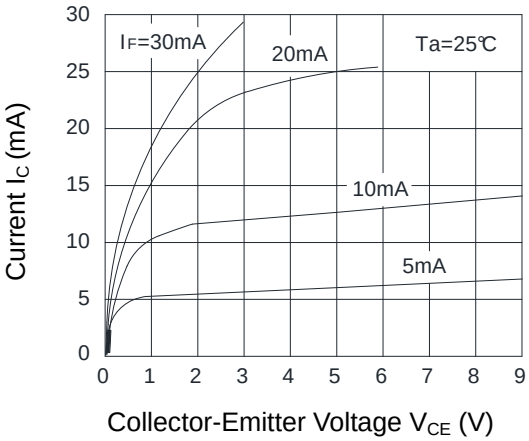


Fig.7 Relative Current Transfer Ratio vs. Ambient Temperature

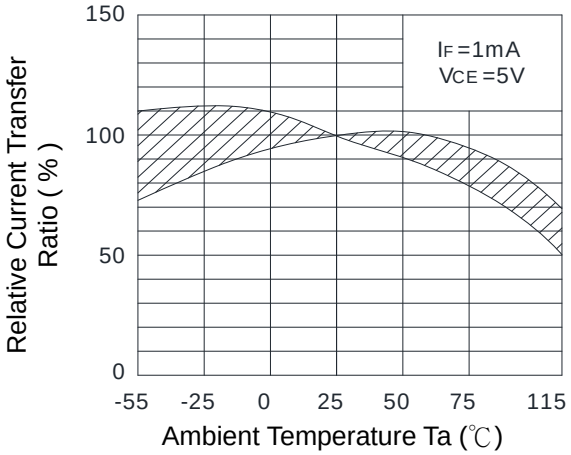


Fig.8 Collector-Emitter Saturation Voltage vs. Ambient Temperature

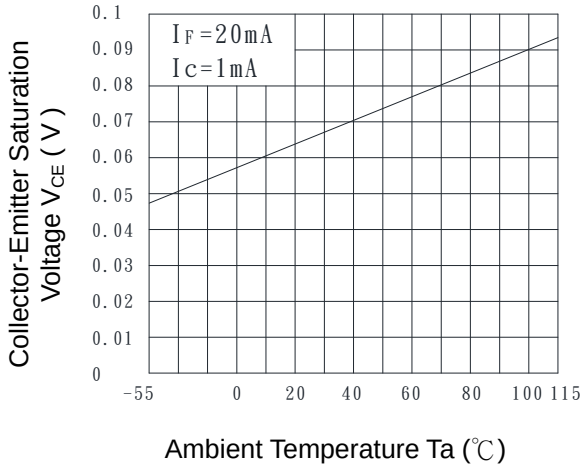


Fig.9 Collector-Emitter Saturation Voltage vs. Forward Current

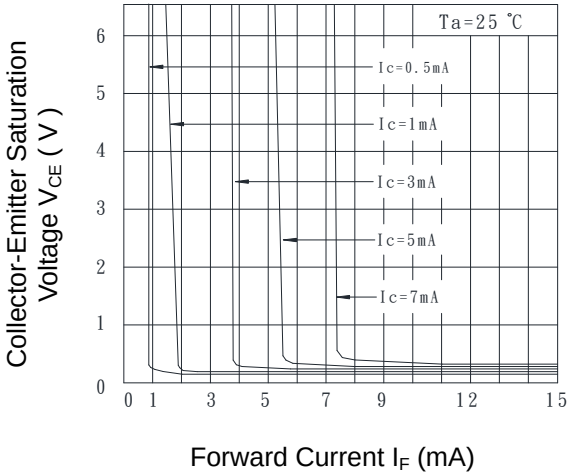


Fig.10 Response Time (Rise) vs. Load Resistance

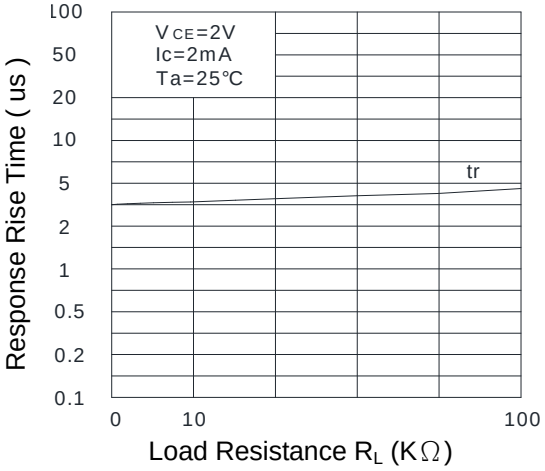
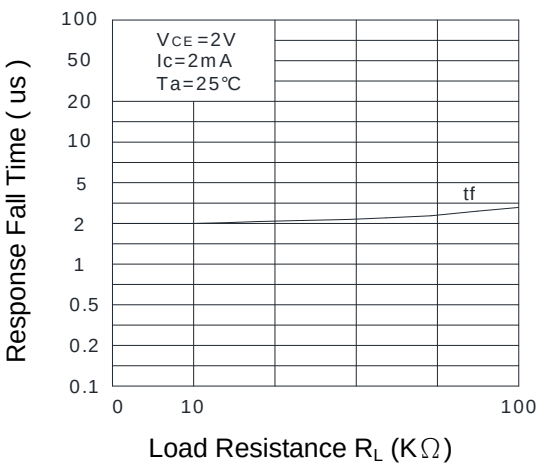
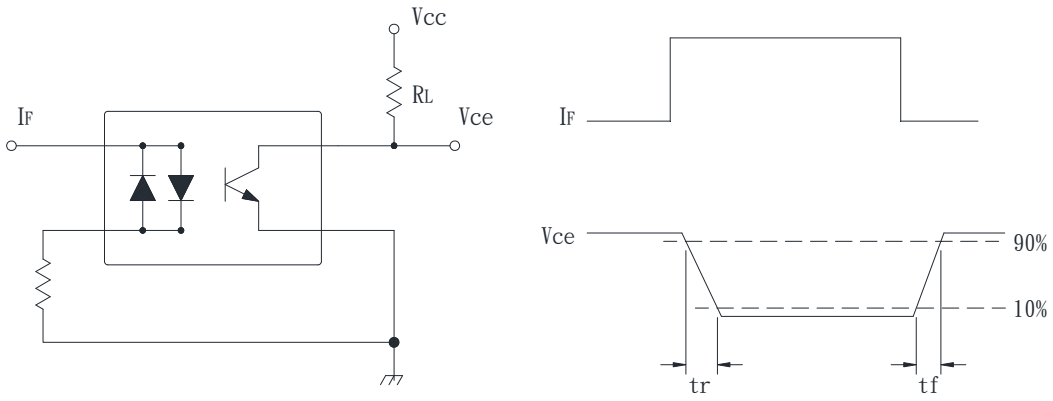


Fig.11 Response Time (Fall) vs. Load Resistance



- **Test Circuit for Response Time**

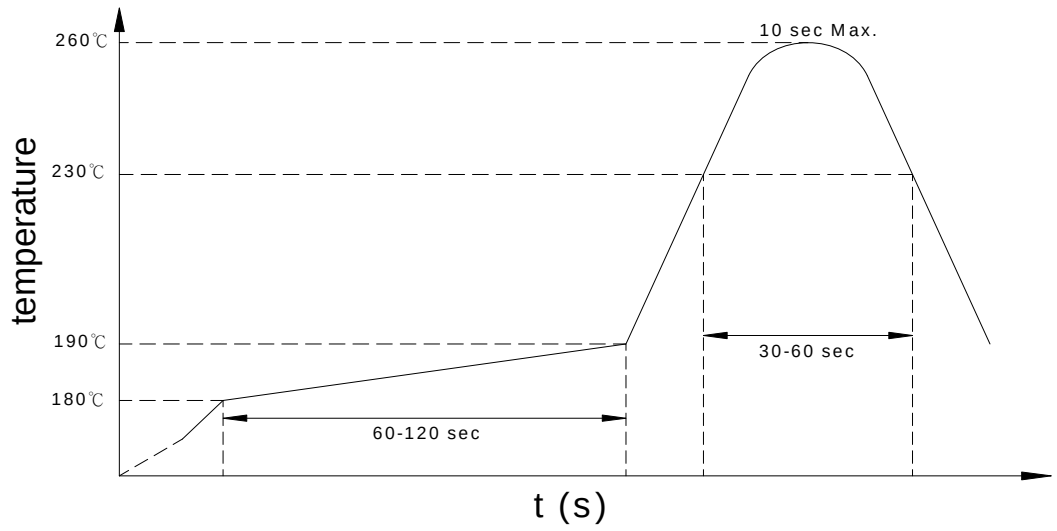


Recommended Soldering Conditions

(a) Infrared reflow soldering：

- Peak reflow soldering： 260℃ or below (package surface temperature)
- Time of peak reflow temperature： 10 sec
- Time of temperature higher than 230℃： 30-60 sec
- Time to preheat temperature from 180~190℃： 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℃ or below (molten solder temperature)
- Time： 10 seconds or less
- Preheating conditions： 120℃ 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**

KP3020 X Y (Z)

Notes:

KP3020 = Part No.

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

Y = CTR rank (A, B)

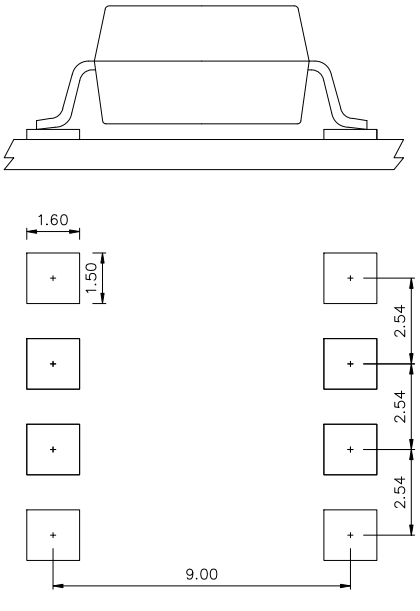
Z = Tape and reel option (TL,TR,TLD,TRU)

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**

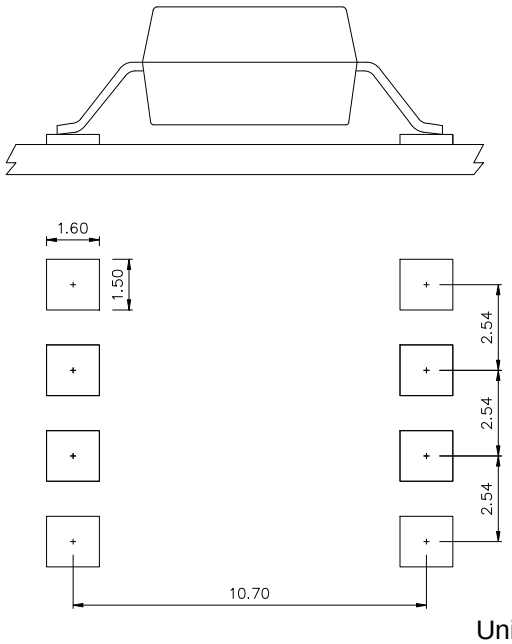
1.Surface mount type.

8 pin SMD



2.Long creepage distance for surface mount type.

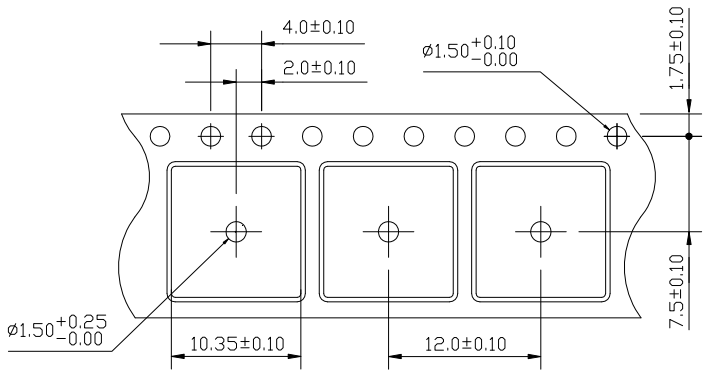
8 pin L

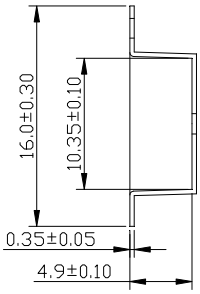


Unit : mm

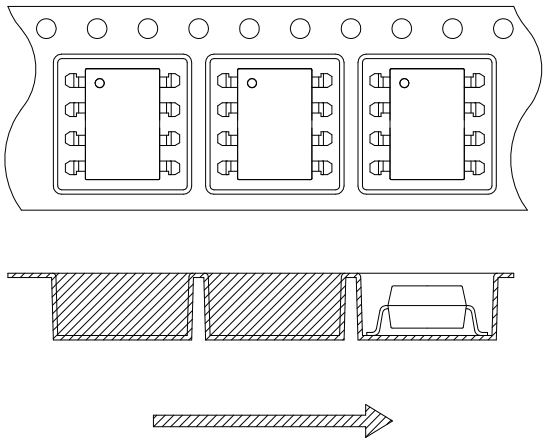
● 8-pin SMD Carrier Tape & Reel

unit：mm



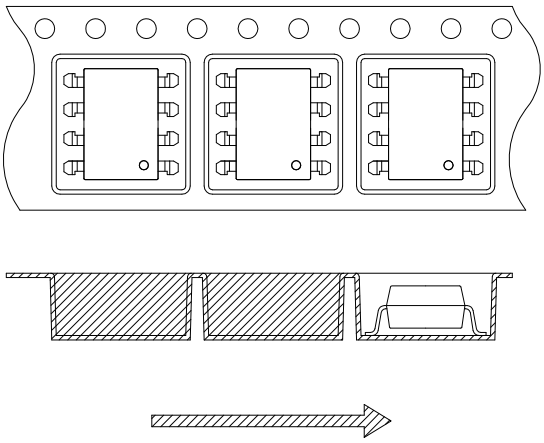


TL

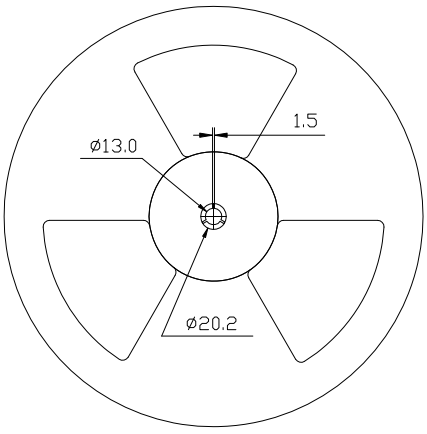


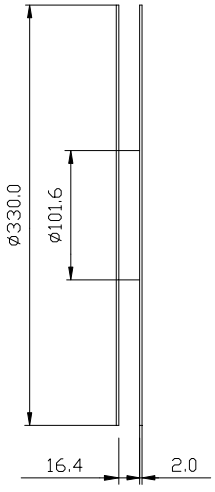
Direction of feed from reel

TR

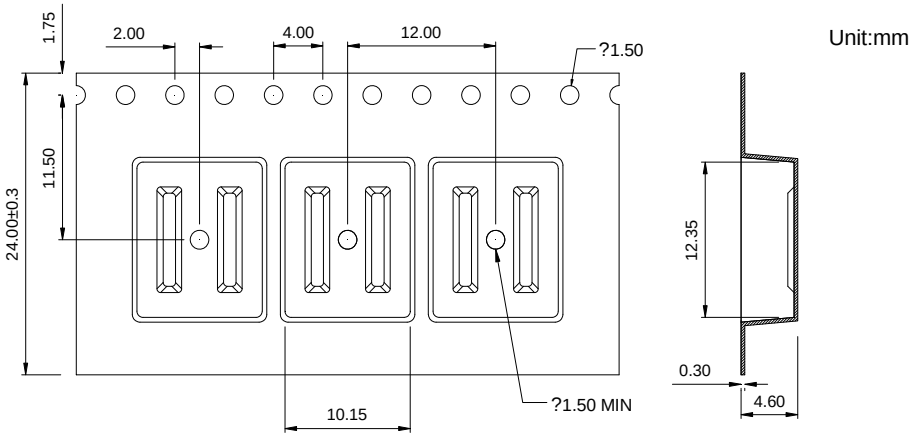


Direction of feed from reel



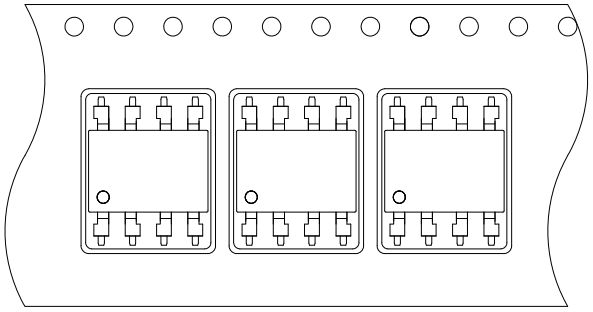


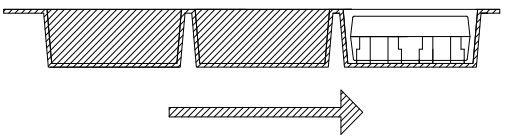
8-pin L Carrier Tape & Reel



TOLERANCE：±0.2mm

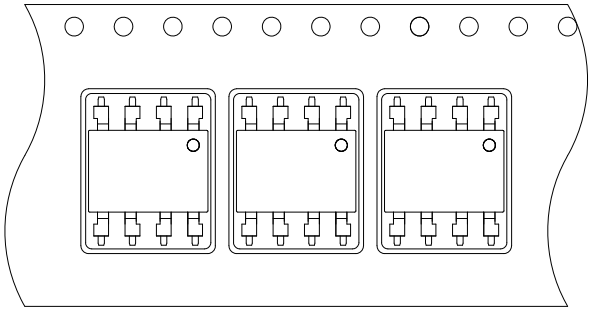
TLD

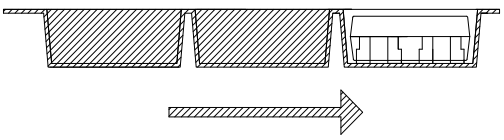




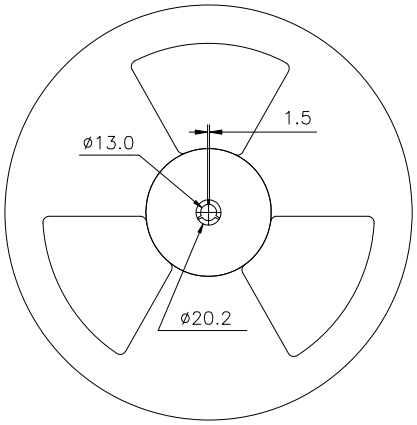
Direction of feed from reel

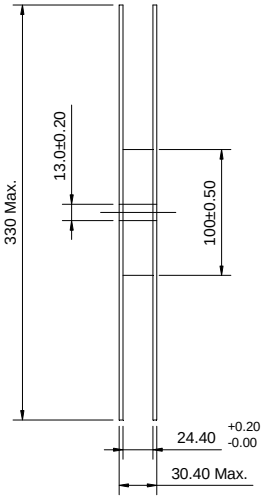
TRU





Direction of feed from reel





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