

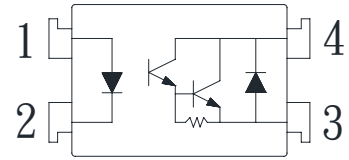
KP4010 Series

4PIN PHOTODARLINGTON PHOTOCOUPLER

● Description

The KP4010 series consist of a photodarlington optically coupled to a gallium arsenide infrared-emitting diode in a 4-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. Anode
- 2. Cathode
- 3. Emitter
- 4. Collector

● Features

1. High current transfer ratio (V_{CE0} : 300V min.)
(CTR : Min. 600% at $I_F=1mA$ $V_{CE}=2V$)
2. High isolation voltage between input and output
(Viso : 5000Vrms)
3. Compact dual-in-line package
4. Pb free and RoHS compliant
5. MSL class 1
6. 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
 - CQC Approved: GB8898-2011, GB4943.1-2011

● Applications

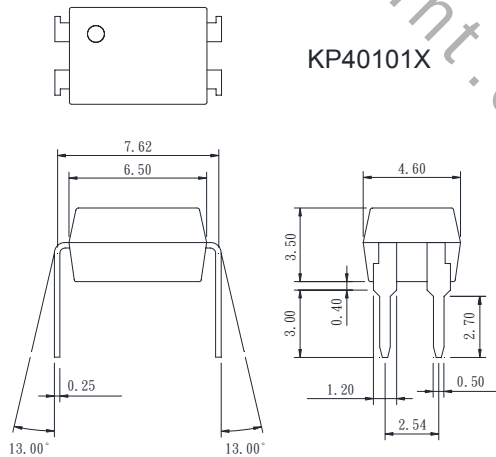
- System appliances, measuring instruments
- Industrial robots
- Copiers, automatic vending machines, facsimiles
- Signal transmission between circuits of different potentials and impedances
- Telephone sets
- Numerical control machines
- Interface with various power supply circuits, power distribution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

KP4010 Series **4PIN PHOTODARLINGTON** **PHOTOCOUPLER**

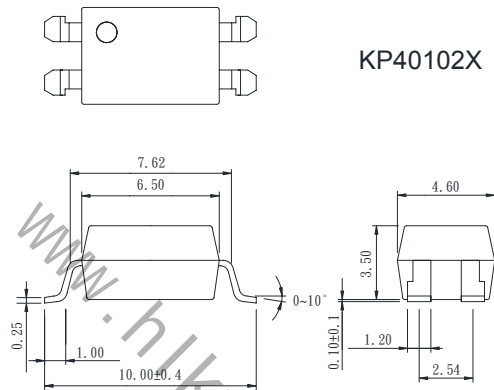
● **Outside Dimension**

Unit : mm

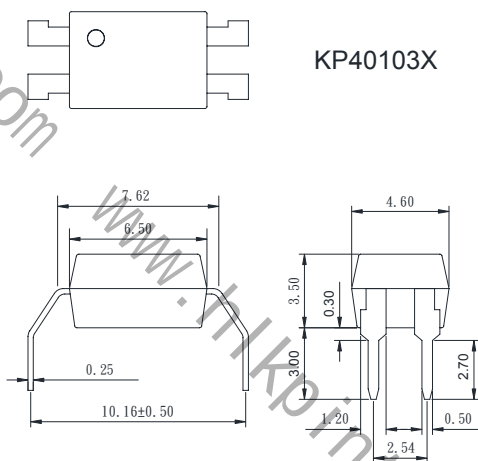
1. Dual-in-line type.



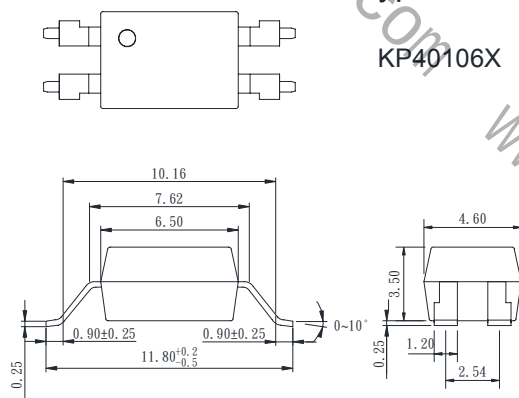
2. Surface mount type.



3. Long creepage distance type

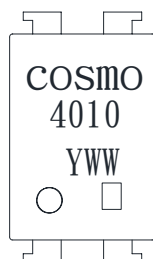


4. Long creepage distance for surface mount type.



TOLERANCE : $\pm 0.2\text{mm}$

● **Device Marking**



Notes:

cosmo
4010
YWW

Y: Year code / WW: Week code



□: CTR rank

KP4010 Series

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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}	$V_{CE}=200V$	-	-	1.0	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	$V_{CO}=5V, I_C=2mA, R_L=100\Omega$	-	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

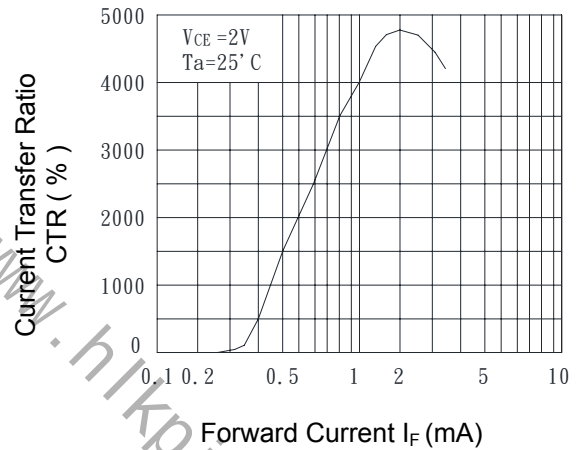
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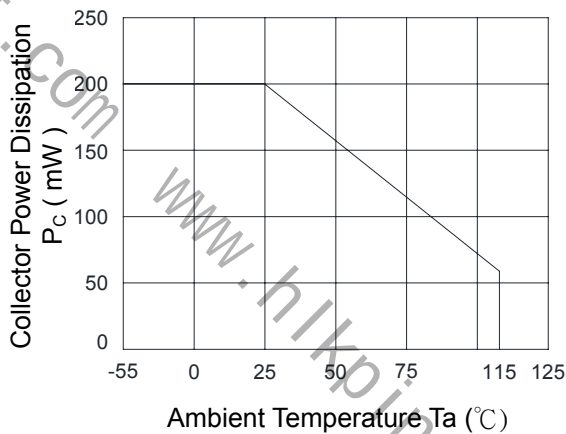
Classification table of current transfer ratio is shown below.

KP4010 Model No.	CTR (%)
KP4010 A	600 ~ 2000
KP4010 B	1500 ~ 4000
KP4010 C	3000 ~ 6000
KP4010 D	5000 ~ 9000
KP4010 E	600 ~ 9000

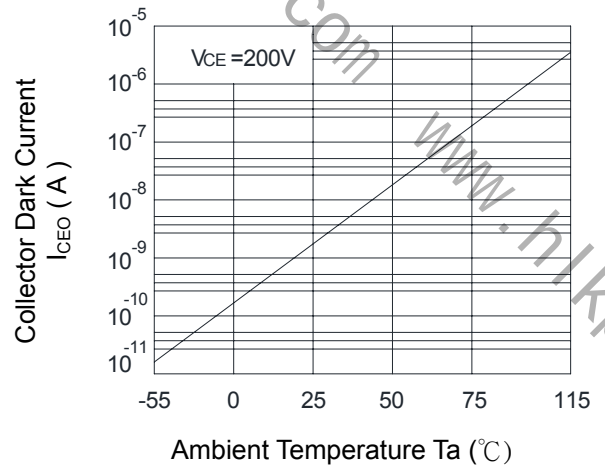
**Fig.1 Current Transfer Ratio
vs. Forward Current**



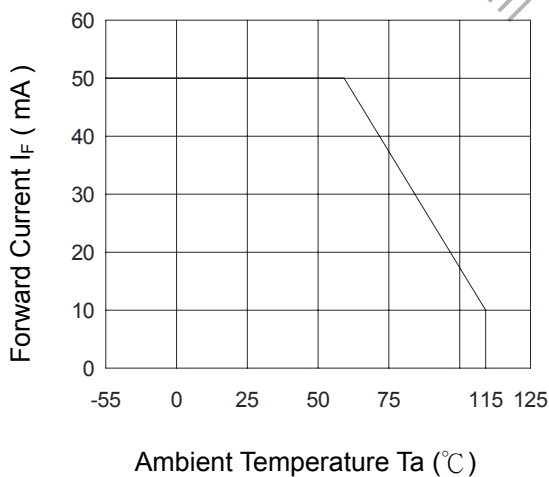
**Fig.2 Collector Power Dissipation
vs. Ambient Temperature**



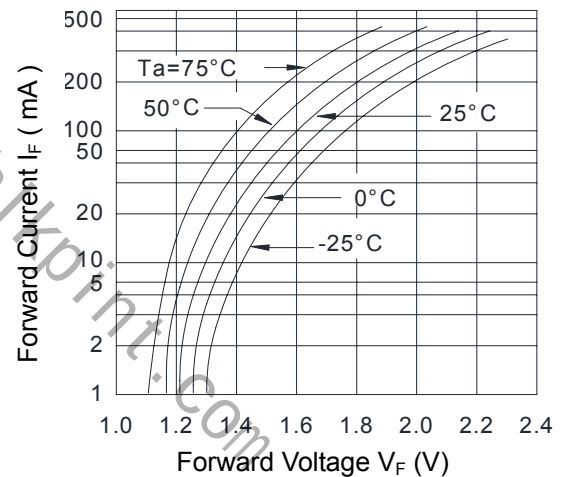
**Fig.3 Collector Dark Current
vs. Ambient Temperature**



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



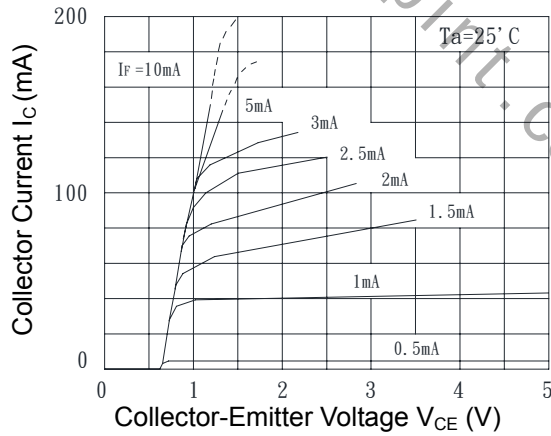
**Fig.5 Forward Current
vs. Forward Voltage**



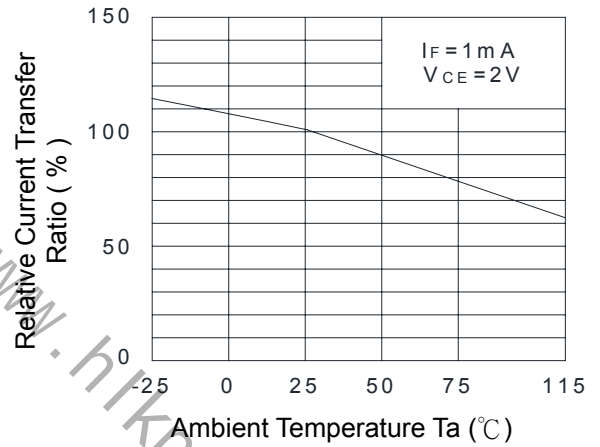
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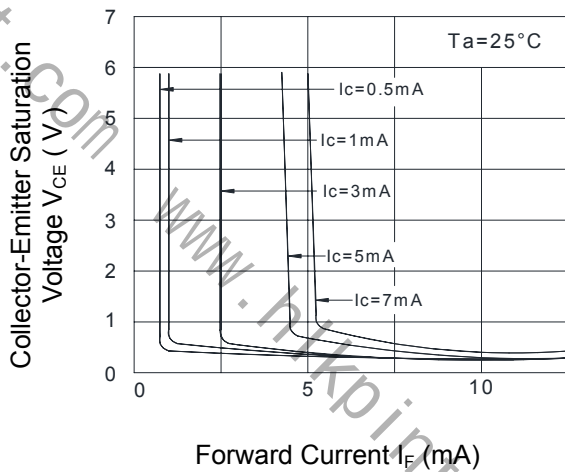
**Fig.6 Collector Current
vs. Collector-Emitter Voltage**



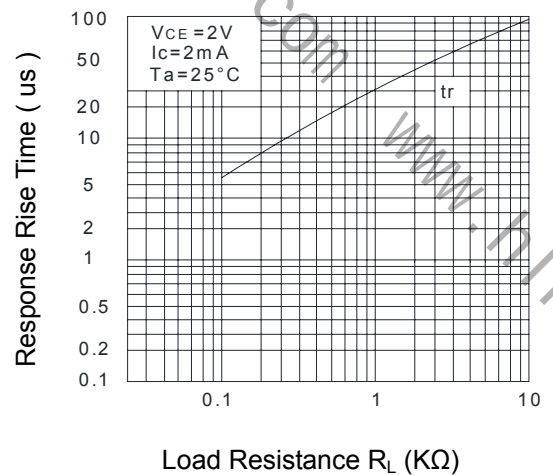
**Fig.7 Relative Current Transfer Ratio
vs. Ambient Temperature**



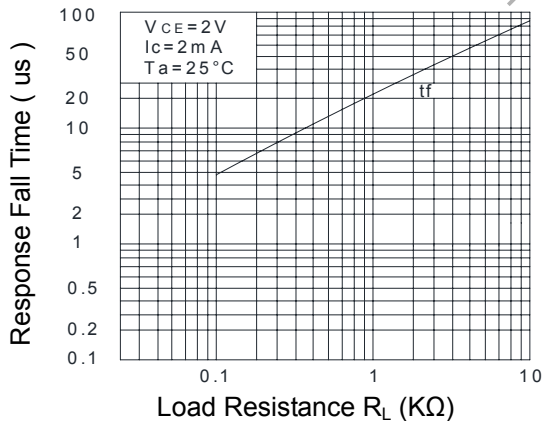
**Fig.8 Collector-Emitter Saturation
Voltage vs. Forward Current**



**Fig.9 Response Time (Rise)
vs. Load Resistance**



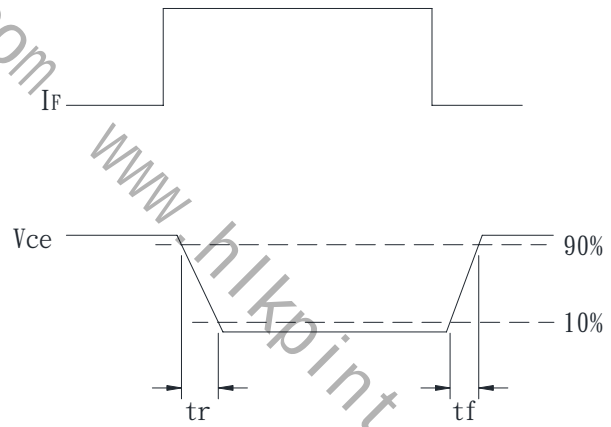
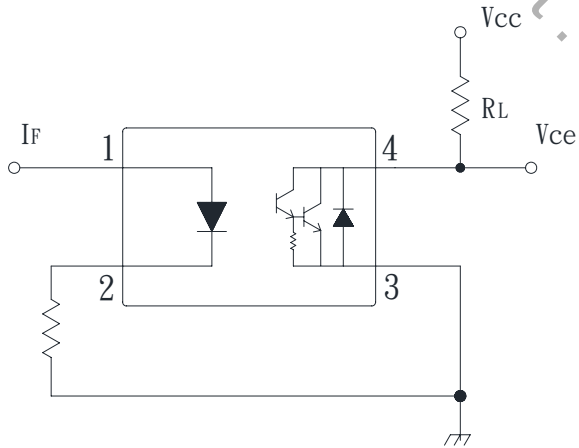
**Fig.10 Response Time (Fall)
vs. Load Resistance**



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- Test Circuit for Response Time



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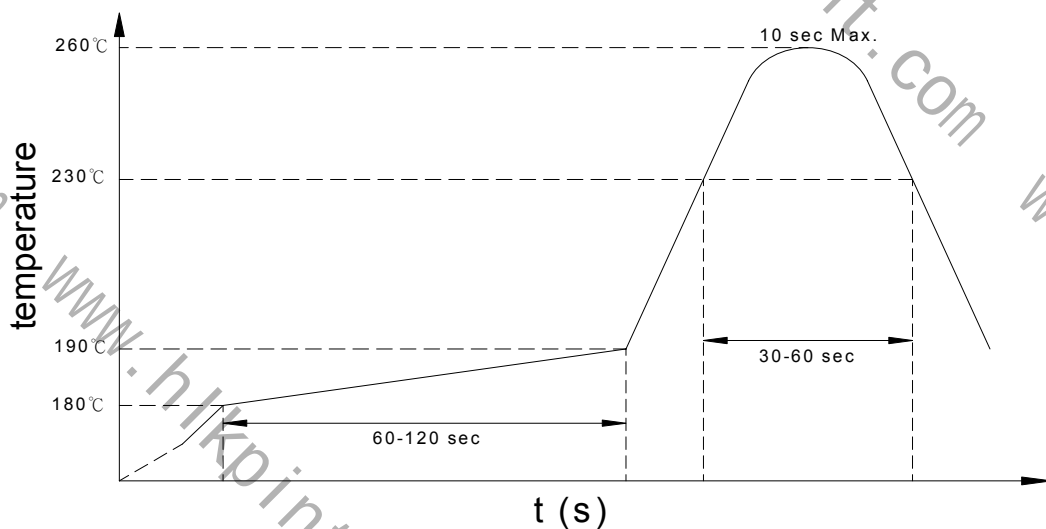
4PIN PHOTODARLINGTON PHOTOCOUPLER

● 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.

KP4010 Series

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● Numbering System

KP4010 X Y (Z)

Notes:

KP4010 = Part No.

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

Y = CTR rank option (A ~ E)

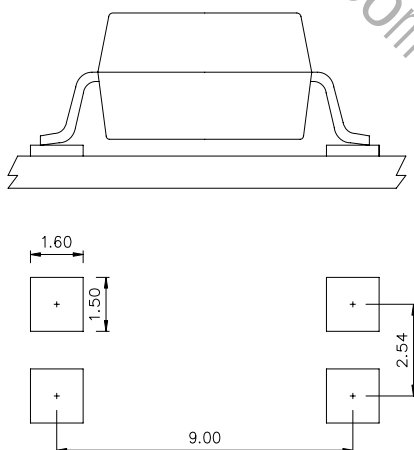
Z = Tape and reel option (TLD, TRU)

Option	Description	Packing quantity
2 (TLD)	surface mount type package + TLD tape & reel option	2000 units per reel
2 (TRU)	surface mount type package + TRU tape & reel option	2000 units per reel
6 (TLD)	long creepage distance for surface mount type package + TLD tape & reel option	2000 units per reel
6 (TRU)	long creepage distance for surface mount type package + TRU tape & reel option	2000 units per reel

● Recommended Pad Layout for Surface Mount Lead Form

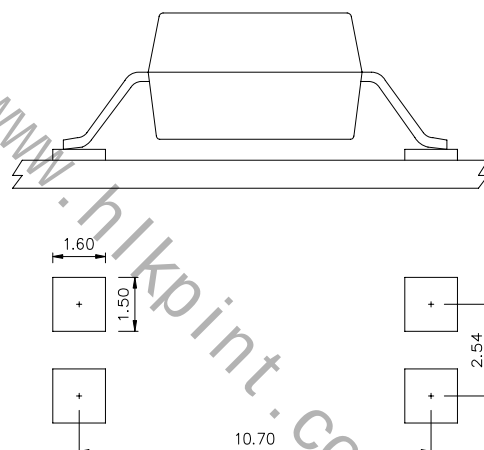
1.Surface mount type.

4 pin SMD



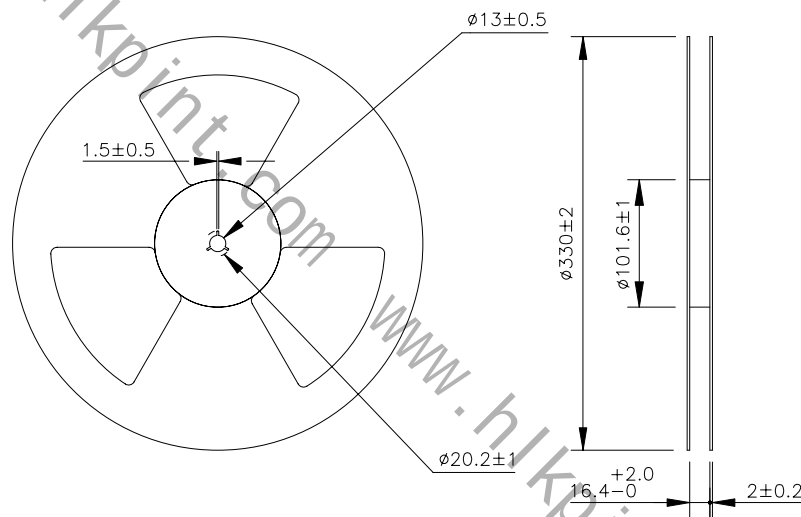
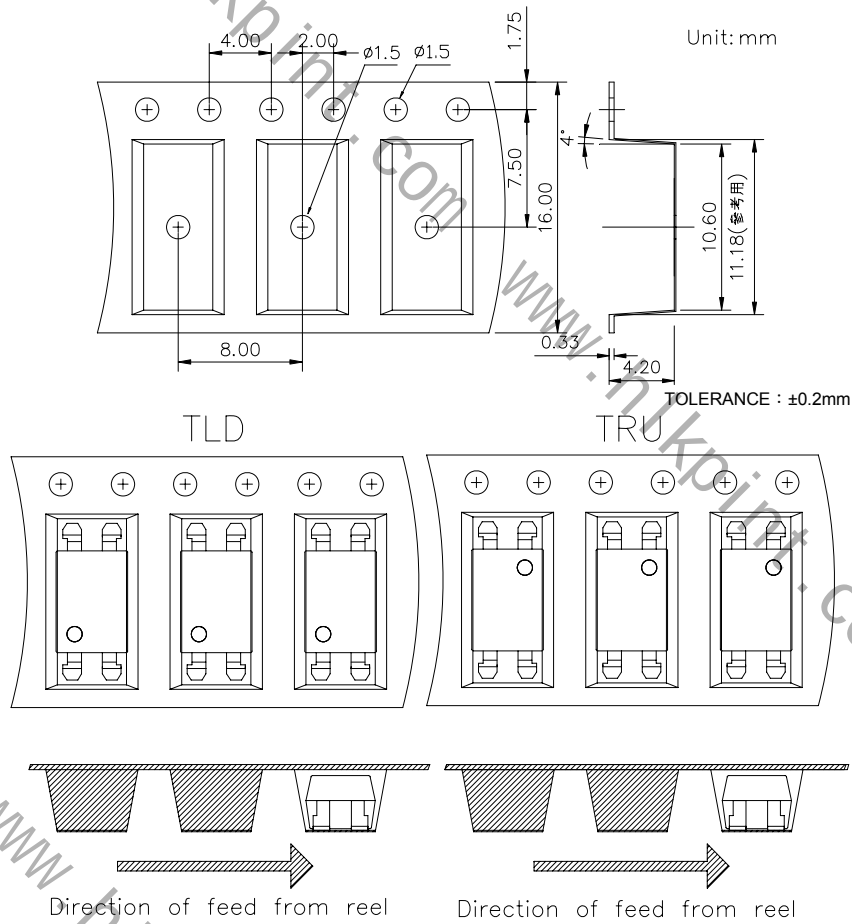
2.Long creepage distance for surface mount type.

4 pin L



Unit : mm

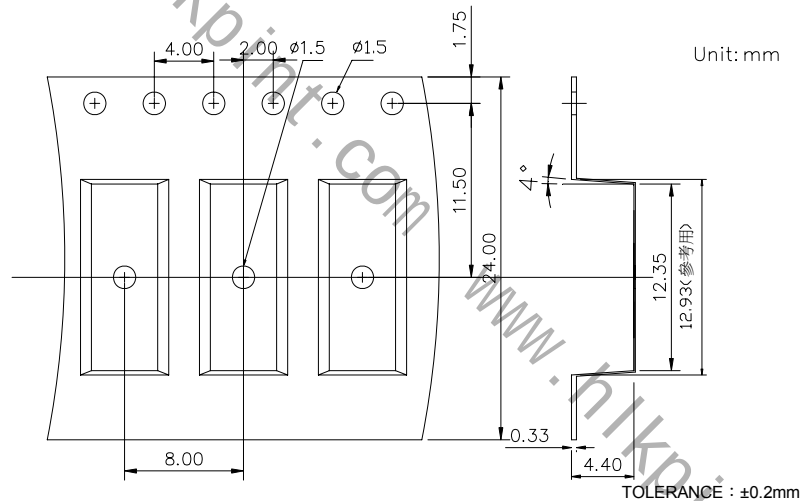
- **4-pin SMD Carrier Tape & Reel**



- **4-pin L Carrier Tape & Reel**

4PIN PHOTODARLINGTON

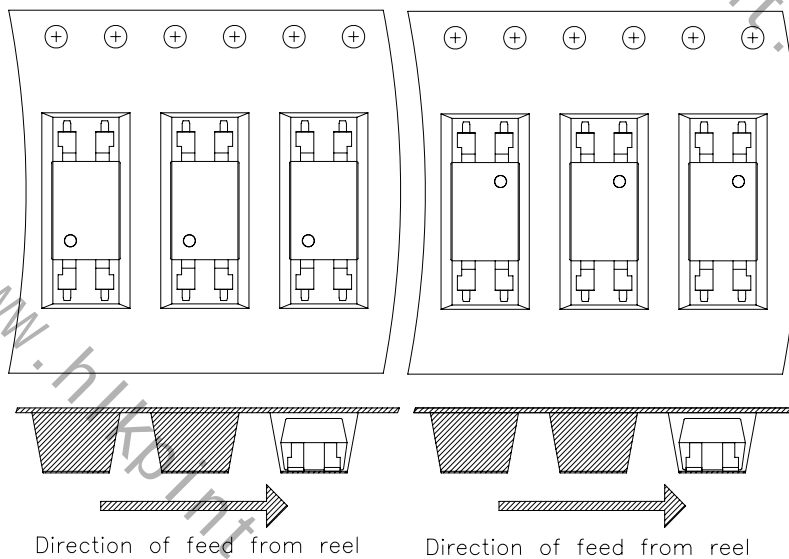
PHOTOCOUPLER



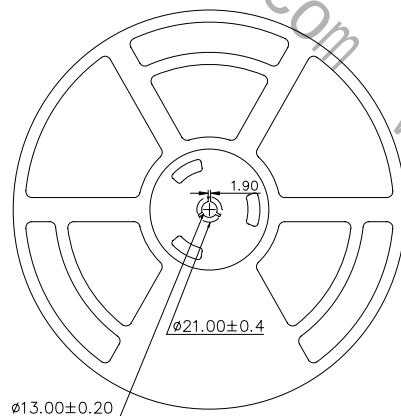
TOLERANCE : $\pm 0.2\text{mm}$

TLD

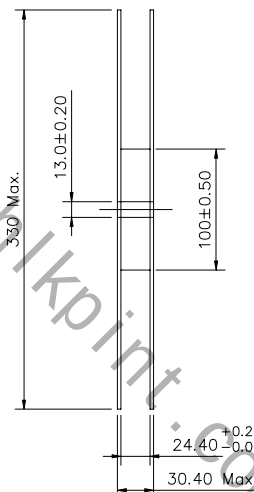
TRU



Direction of feed from reel

 $\phi 21.00 \pm 0.4$

ø13.00±0.20



20

 $\pm 0.$

◆ +0.20

24.40 - 0.00

30.40 Max.
