

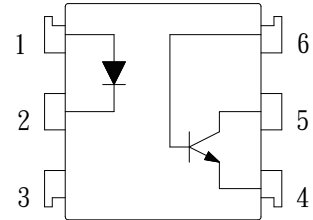
K2010 Series

6PIN PHOTOTRANSISTOR PHOTOCOUPLER

● Description

The K2010 series consist of an infrared emitting diode, optically coupled to a phototransistor detector. They are packaged in a 6-pin DIP package and available in wide-lead spacing and SMD option.

● Schematic



- 1. Anode
- 2. Cathode
- 3. NC
- 4. Emitter
- 5. Collector
- 6. Base

● Features

- 1. Current transfer ratio
(CTR : Min. 60% at $I_F=2\text{mA}$ $V_{CE}=5\text{V}$)
- 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: EN62368-1, EN60601-1

● Applications

- Registers, copies, automatic vending machines
- System appliances, measuring instruments
- Computer terminals, programmable controllers
- Communications, telephone, etc
- Electric home appliances, such as oil fan heaters, microwave oven, washer, refrigerator, air conditioner
- Medical instruments, physical and chemical equipment
- Signal transmission between circuits of different potentials and impedances
- Facsimile equipment, audio, video
- Switching power supply, laser beam printer

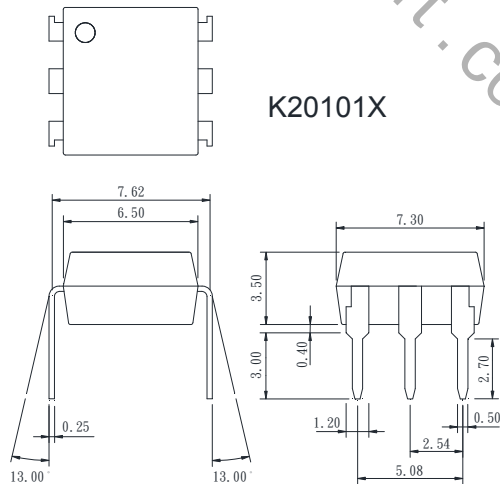
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6PIN PHOTOTRANSISTOR PHOTOCOUPLER

● Outside Dimension

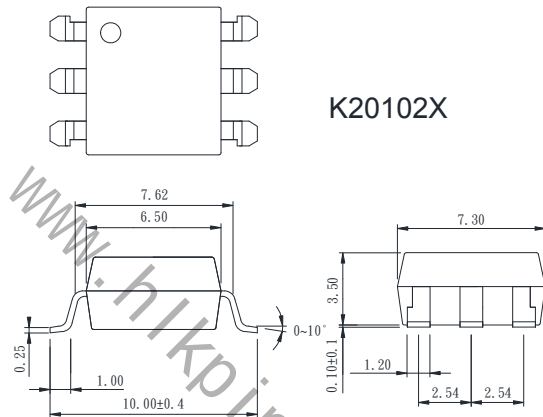
Unit : mm

1. Dual-in-line type.



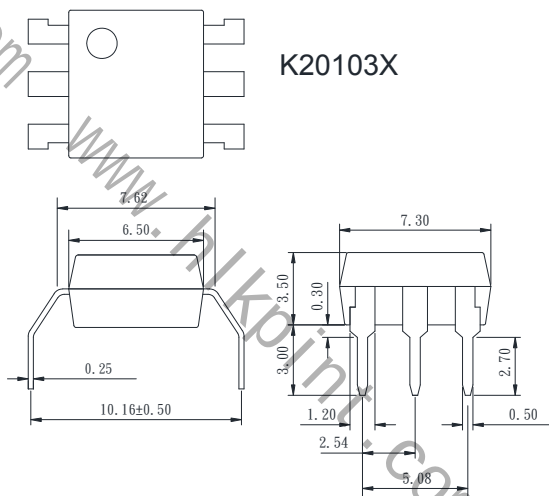
K20101X

2. Surface mount type.



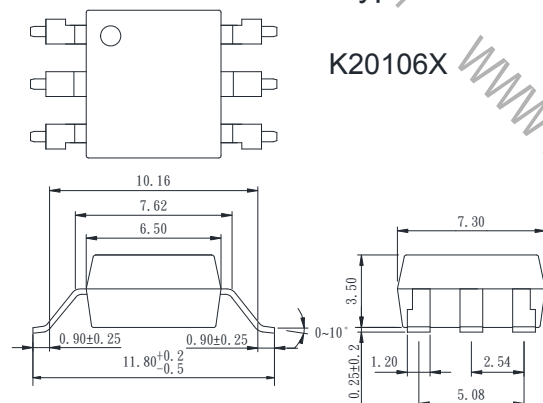
K20102X

3. Long creepage distance type



K20103X

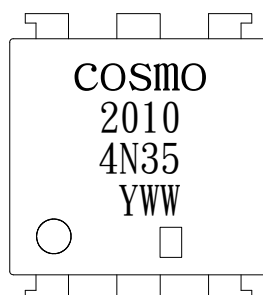
4. Long creepage distance for surface mount type.



K20106X

TOLERANCE : ±0.2mm

● Device Marking



Notes:

cosmo
2010
4N35
YWW

Y: Year code / WW: Week code



□: CTR rank

K2010 Series

6PIN PHOTOTRANSISTOR PHOTOCOUPLER

● 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-base voltage	V_{CBO}	60	V
	Emitter-base voltage	V_{EBO}	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}	$I_{FM}=0.5A$	-	-	3.5	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}	$V_{CE}=20V, I_F=0$	-	-	0.1	μA
Transfer characteristics	Current transfer ratio	CTR	$I_F=2mA, V_{CE}=5V$	60	-	600	%
	Collector-emitter saturation	$V_{CE(sat)}$	$I_F=20mA, I_C=1mA$	-	0.1	0.3	V
	Isolation resistance	R_{iso}	DC500V	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	$V_{CE}=2V, I_C=2mA, R_L=100\Omega$	-	5	20	μs
	Response time (Fall)	t_f		-	4	20	μs

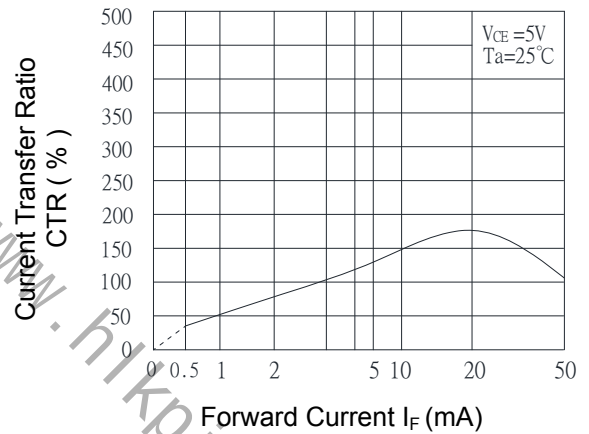
K2010 Series

6PIN PHOTOTRANSISTOR PHOTOCOUPLER

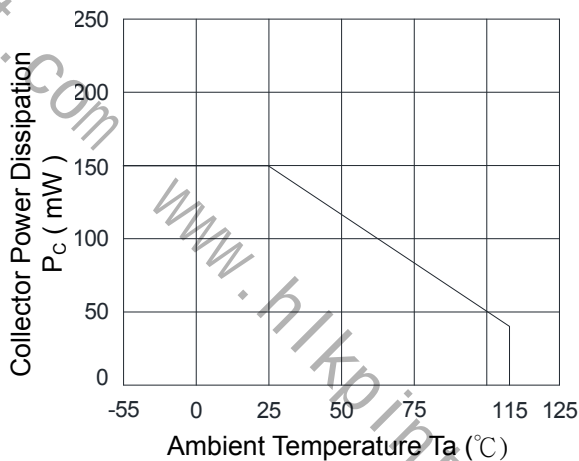
Classification table of current transfer ratio is shown below.

K2010 Model No.	CTR (%)
K2010 A	60 ~ 160
K2010 B	130 ~ 260
K2010 C	200 ~ 400
K2010 D	300 ~ 600
K2010 E	60 ~ 600

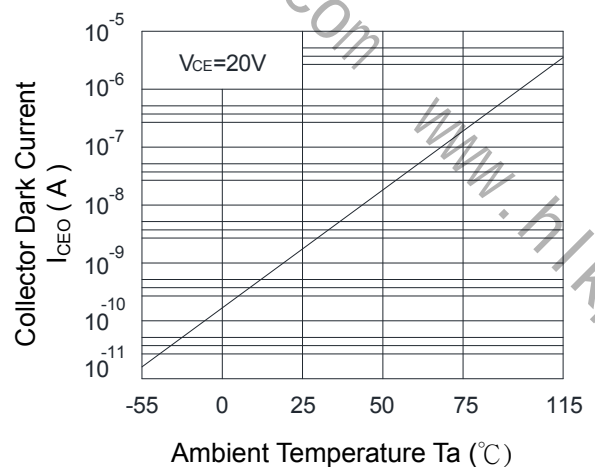
**Fig.1 Current Transfer Ratio
vs. Forward Current**



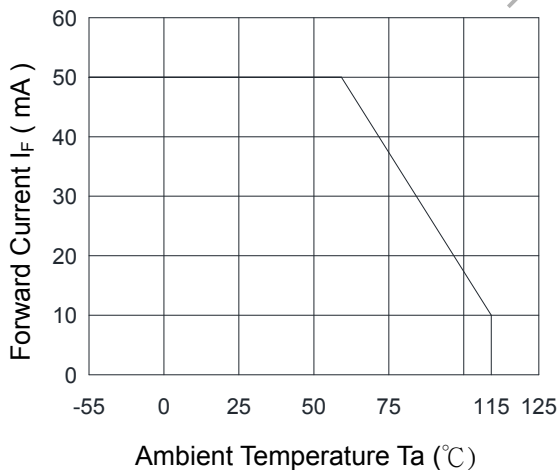
**Fig.2 Collector Power Dissipation
vs. Ambient Temperature**



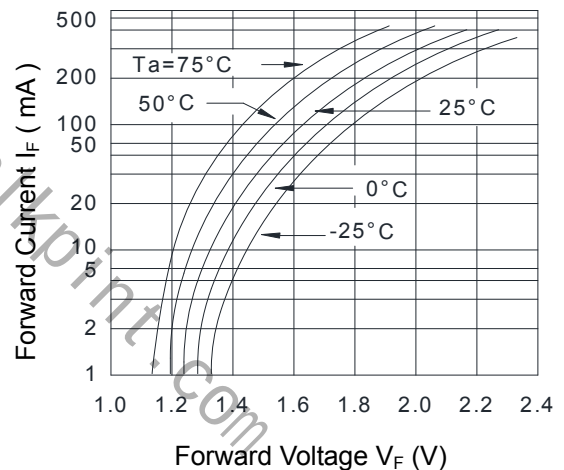
**Fig.3 Collector Dark Current
vs. Ambient Temperature**



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



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



K2010 Series

6PIN PHOTOTRANSISTOR PHOTOCOUPLER

Fig.6 Collector Current vs. Collector-Emitter Voltage

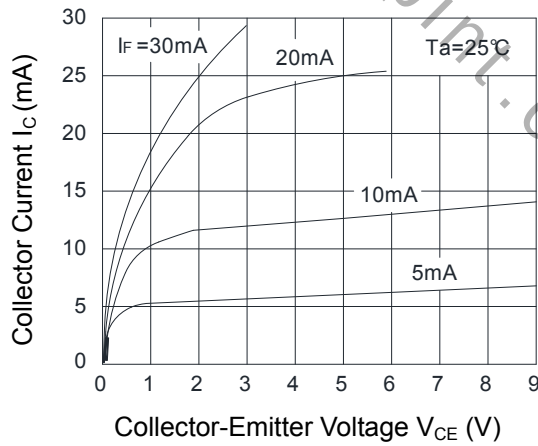


Fig.7 Relative Current Transfer Ratio vs. Ambient Temperature

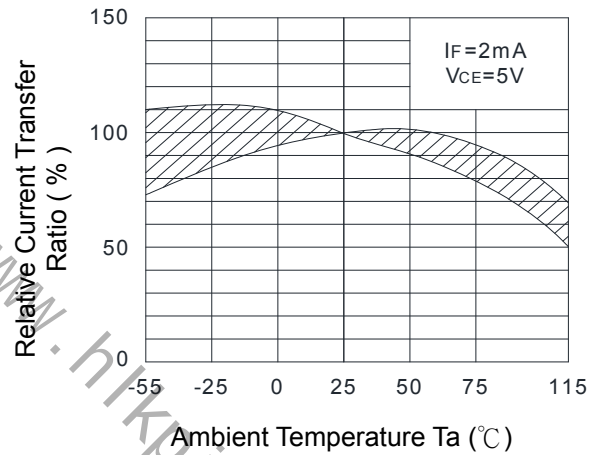


Fig.8 Collector-Emitter Saturation Voltage vs. Ambient Temperature

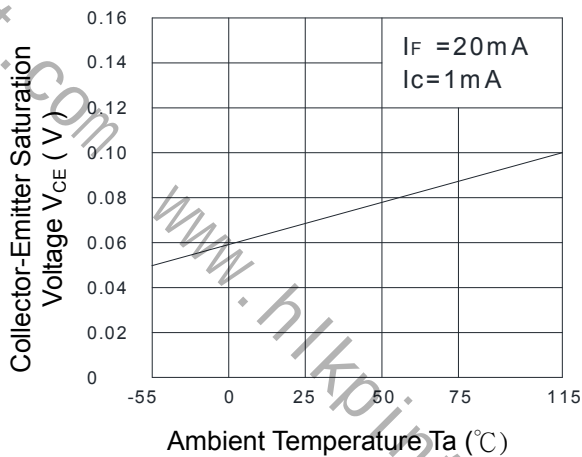


Fig.9 Collector-Emitter Saturation Voltage vs. Forward Current

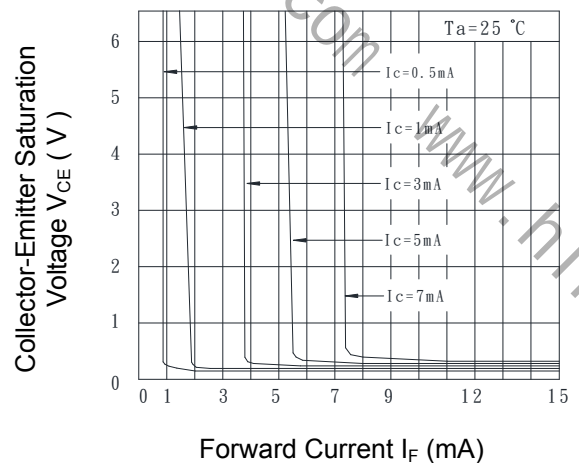


Fig.10 Response Time (Rise) vs. Load Resistance

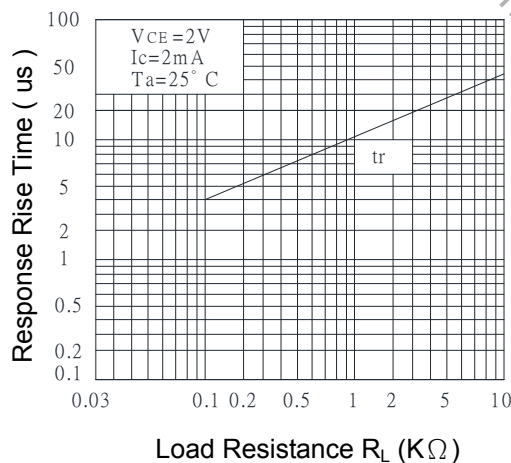
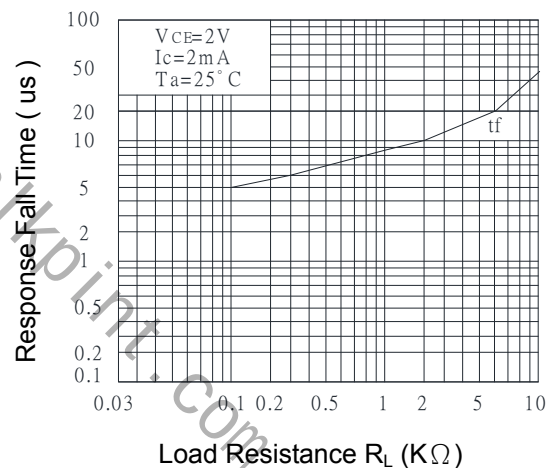


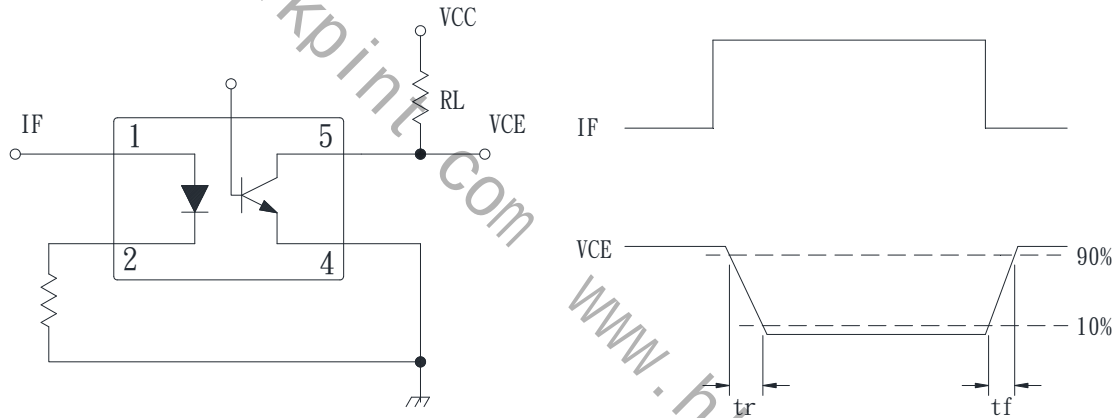
Fig.11 Response Time (Fall) vs. Load Resistance



K2010 Series

6PIN PHOTOTRANSISTOR PHOTOCOUPLER

- **Test Circuit for Response Time**

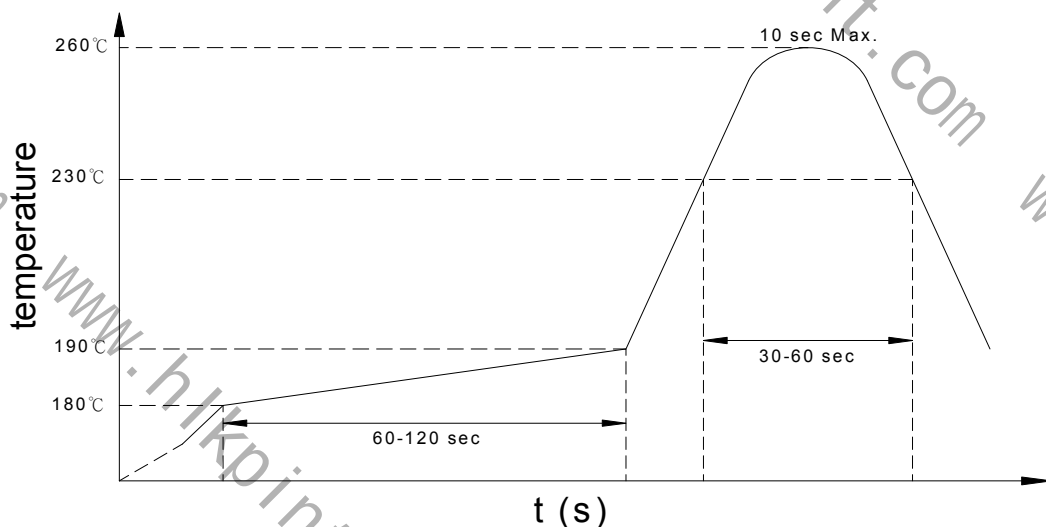


● **Recommended Soldering Conditions**

(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.

K2010 Series

6PIN PHOTOTRANSISTOR PHOTOCOUPLER

● Numbering System

K2010 X Y (Z)

Notes:

K2010 = Part No.

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

Y = CTR rank option (A ~ E)

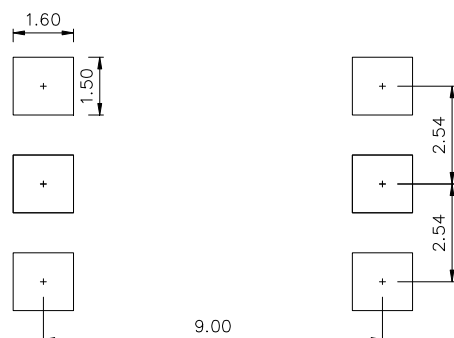
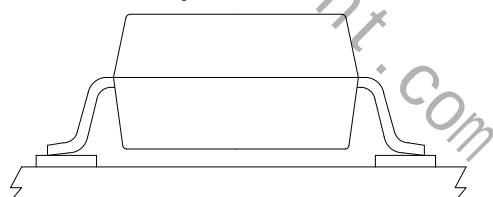
Z = Tape and reel option (TL,TR,TLD,TRU)

Option	Description	Packing quantity
2 (TL)	surface mount type package + TL tape & reel option	1000 units per reel
2 (TR)	surface mount type package + TR tape & reel option	1000 units per reel
6 (TLD)	long creepage distance for surface mount type package + TLD tape & reel option	1000 units per reel
6 (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

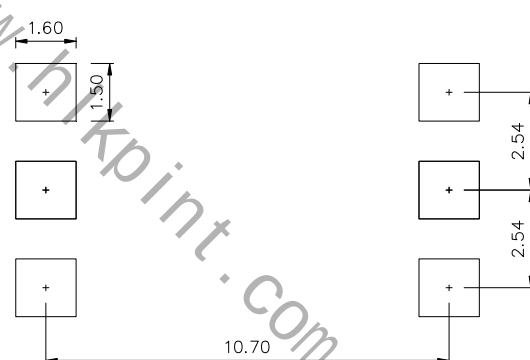
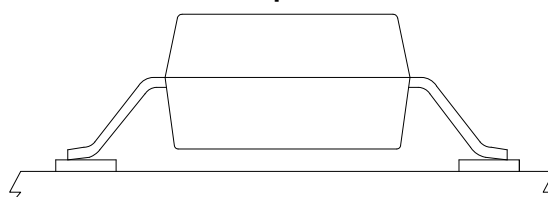
1.Surface mount type.

6 pin SMD



2.Long creepage distance for surface mount type.

6 pin L

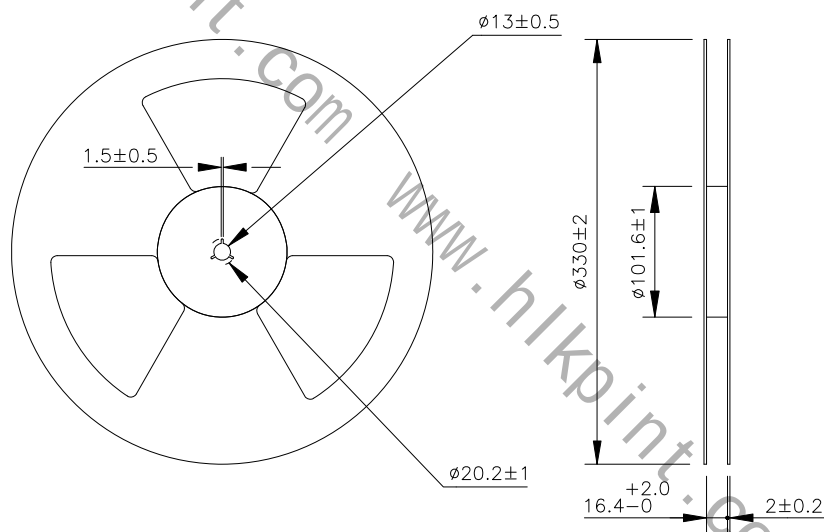
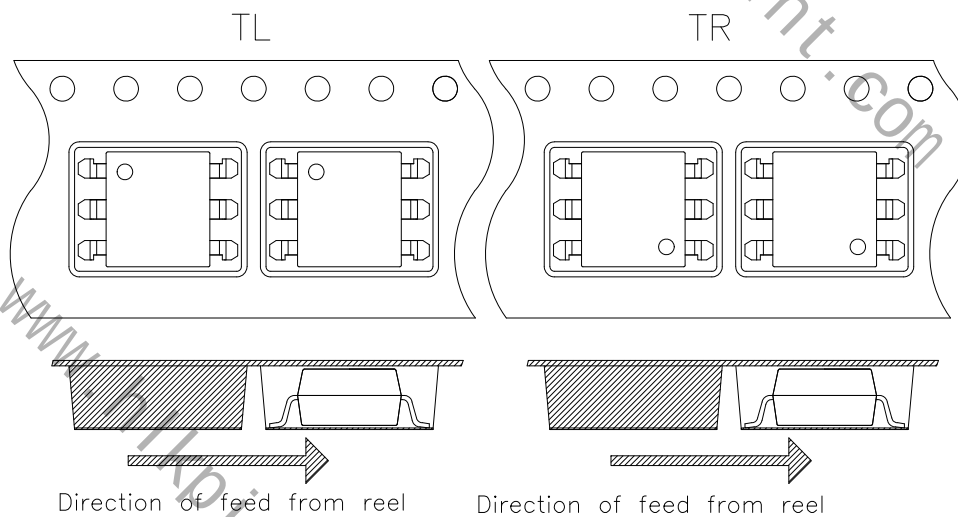
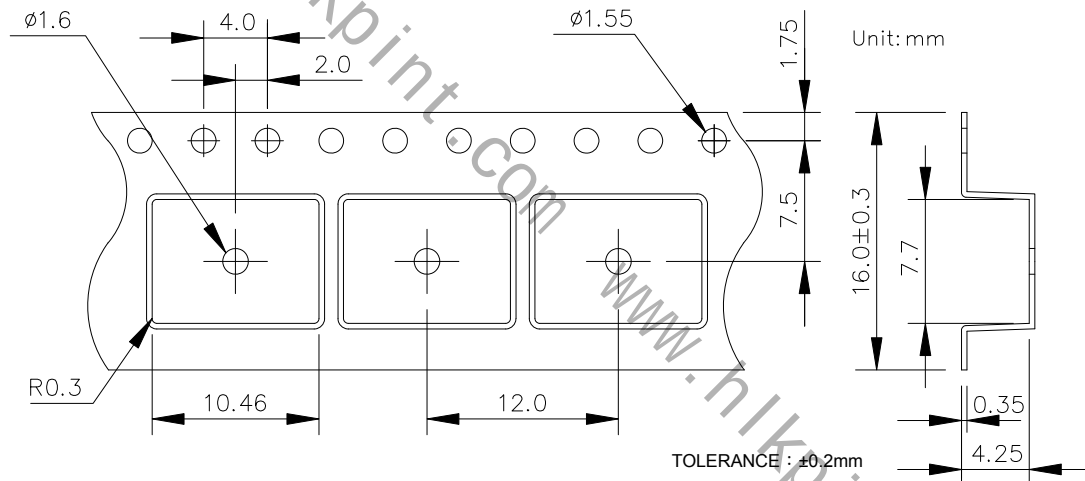


Unit : mm

K2010 Series

6PIN PHOTOTRANSISTOR PHOTOCOUPLER

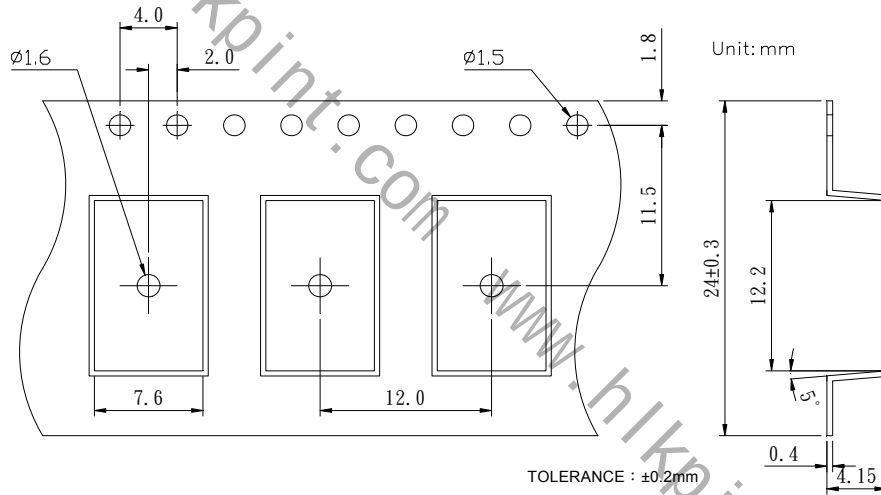
● 6-pin SMD Carrier Tape & Reel



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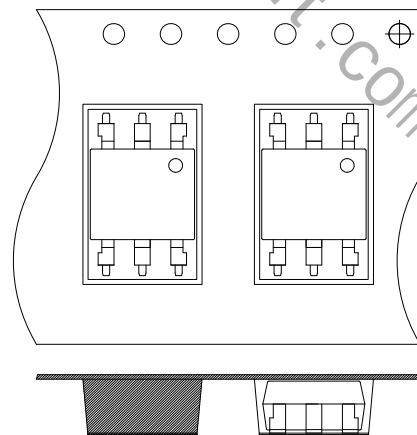
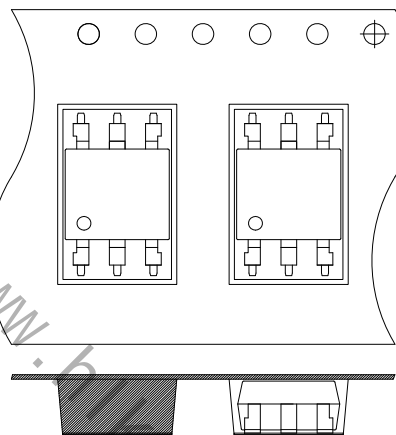
6PIN PHOTOTRANSISTOR PHOTOCOUPLER

● 6-pin L Carrier Tape & Reel



TLD

TRU



Direction of feed from reel

Direction of feed from reel

