

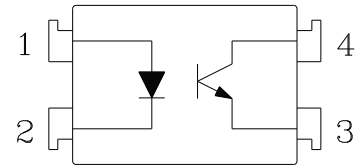
K1010 Series

4PIN PHOTOTRANSISTOR PHOTOCOUPLER

● Description

The K1010 series consist of an infrared emitting diode, optically coupled to a phototransistor detector. They are packaged in a 4-pin DIP package and available in wide-lead spacing and SMD option.

● Schematic



1. Anode
2. Cathode
3. Emitter
4. Collector

● Features

1. Current transfer ratio
(CTR : Min. 50% at $I_F=5mA$ $V_{CE}=5V$)
2. High isolation voltage between input and output
(Viso : 5000Vrms)
3. Pb free and RoHS compliant
4. Agency Approvals
 - UL1577 / CUL C22.2 No.1 & NTC No.5, File No. E169586
 - VDE EN60747, File No.101347
 - FIMKO EN60065, File No. NCS/FI23149 A2
 - FIMKO EN60950, File No. NCS/FI24584 A1
 - SEMKO EN60065, File No. FI016484
 - SEMKO EN60950, File No. FI016433
 - CQC GB4943/GB8898-2011, File No.CQC10001049555 / CQC08001023986

● Applications

- System appliances
- Measuring instruments
- Computer terminals
- Programmable controllers
- Medical instruments
- Physical and chemical equipment
- Signal transmission between circuits of different potentials and impedances

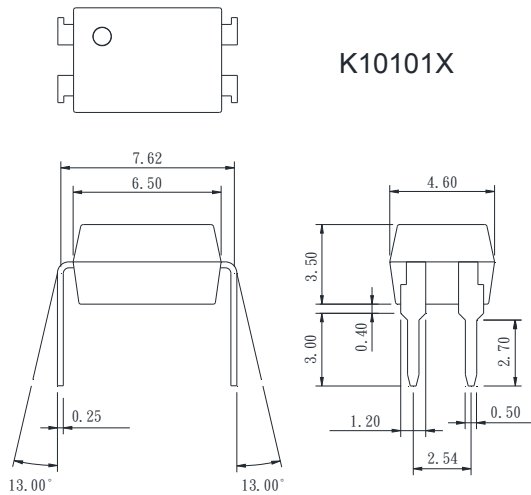
K1010 Series

4PIN PHOTOTRANSISTOR PHOTOCOUPLER

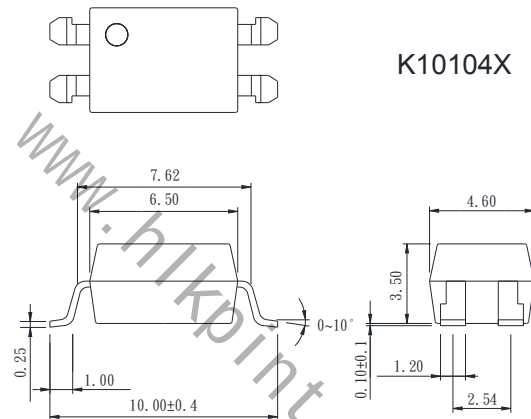
● Outside Dimension

Unit : mm

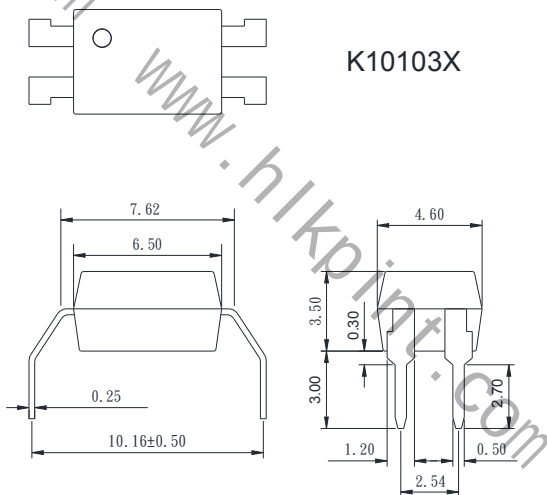
1. Dual-in-line type.



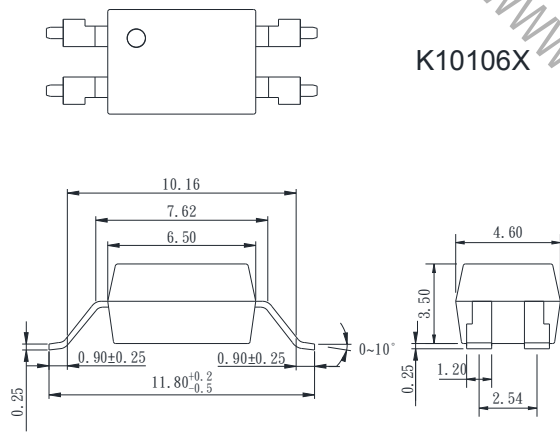
2. Surface mount type.



3. Long creepage distance type

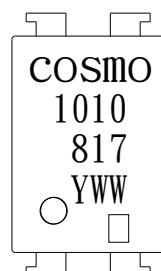


4. Long creepage distance for surface mount type.



TOLERANCE : ±0.2mm

● Device Marking



Notes:

cosmo
1010
817
YWW

Y: Year code / WW: Week code

□: CTR rank

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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}	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	%
			$I_F=1mA, V_{CE}=5V$	15	-	-	
	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

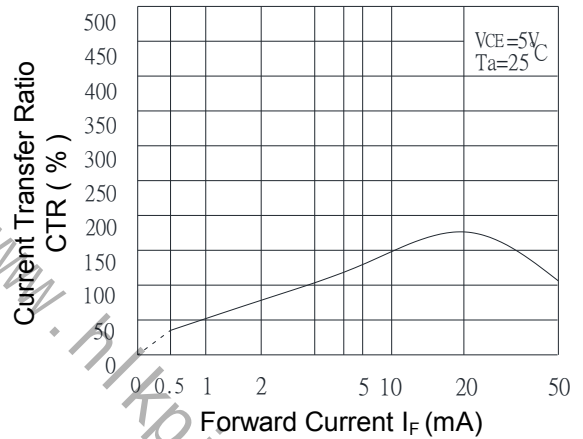
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4PIN PHOTOTRANSISTOR PHOTOCOUPLER

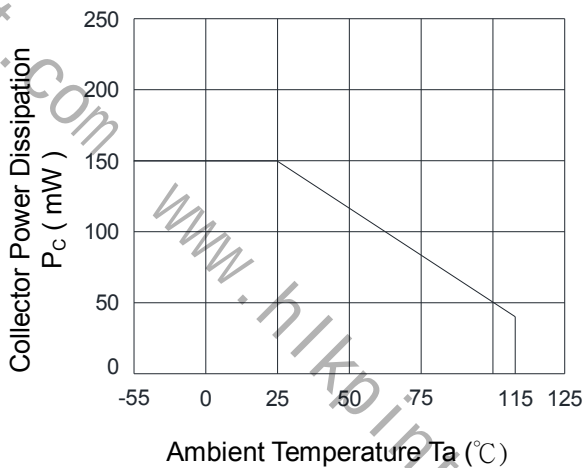
Classification table of current transfer ratio is shown below.

K1010 Model No.	CTR (%)
K1010 A	80 ~ 160
K1010 B	130 ~ 260
K1010 C	200 ~ 400
K1010 D	300 ~ 600
K1010 E	50 ~ 600

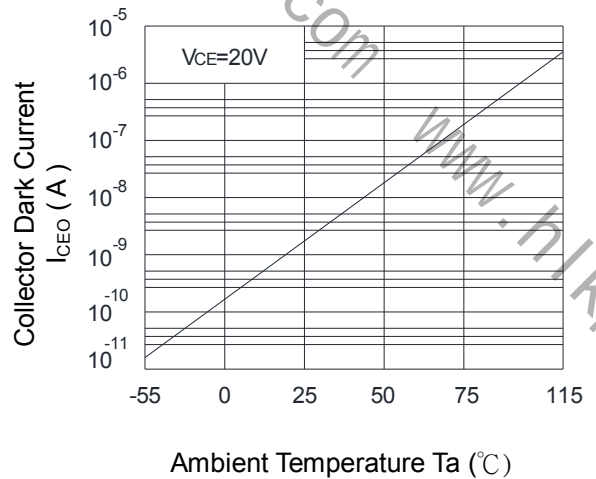
**Fig.1 Current Transfer Ratio
vs. Forward Current**



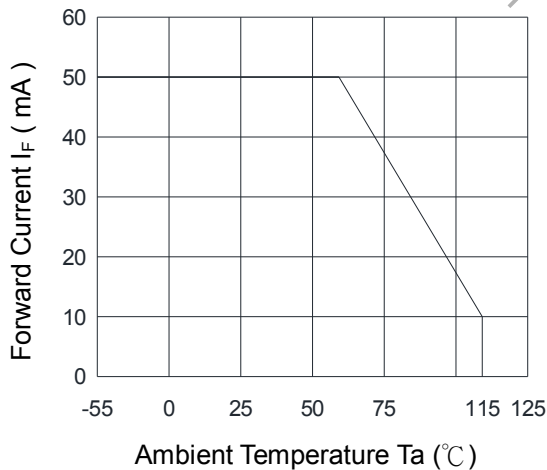
**Fig.2 Collector Power Dissipation
vs. Ambient Temperature**



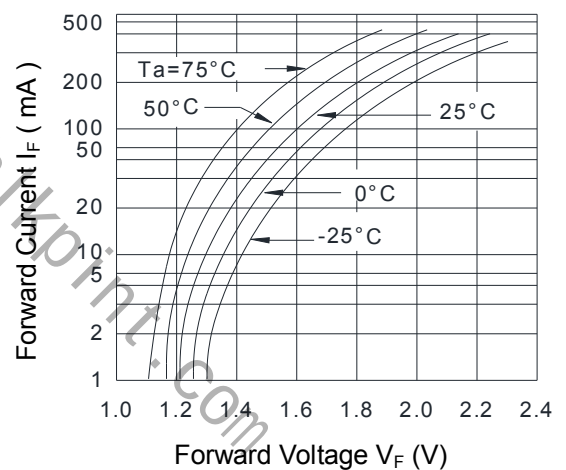
**Fig.3 Collector Dark Current
vs. Ambient Temperature**



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



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



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Fig.6 Collector Current vs. Collector-Emitter Voltage

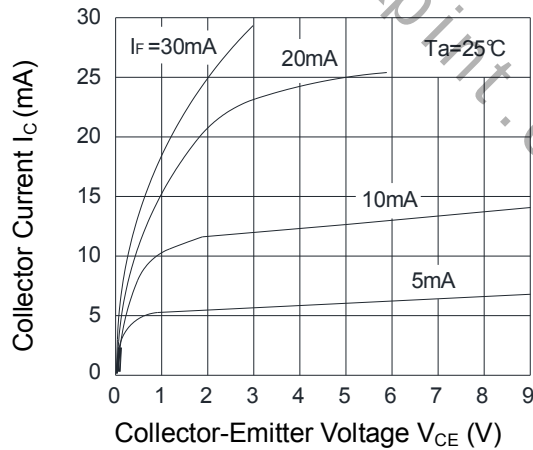


Fig.7 Relative Current Transfer Ratio vs. Ambient Temperature

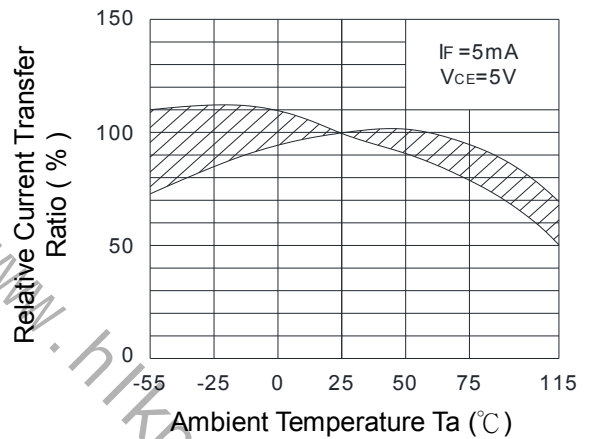


Fig.8 Collector-Emitter Saturation Voltage vs. Ambient Temperature

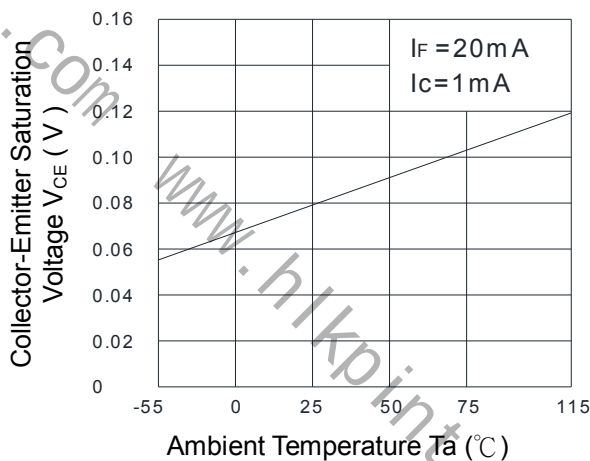


Fig.9 Collector-Emitter Saturation Voltage vs. Forward Current

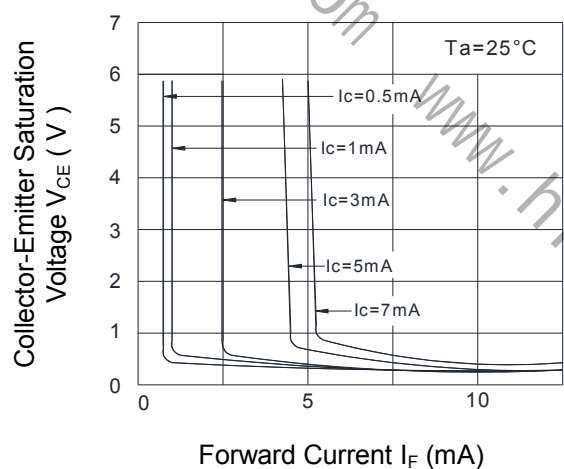


Fig.10 Response Time (Rise) vs. Load Resistance

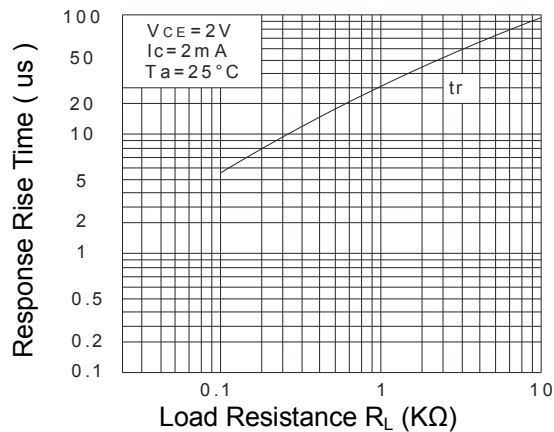
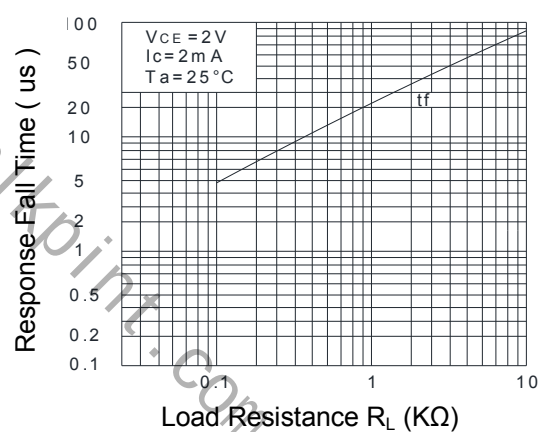


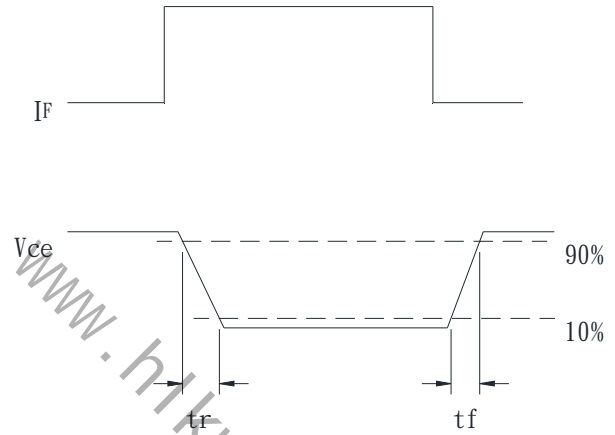
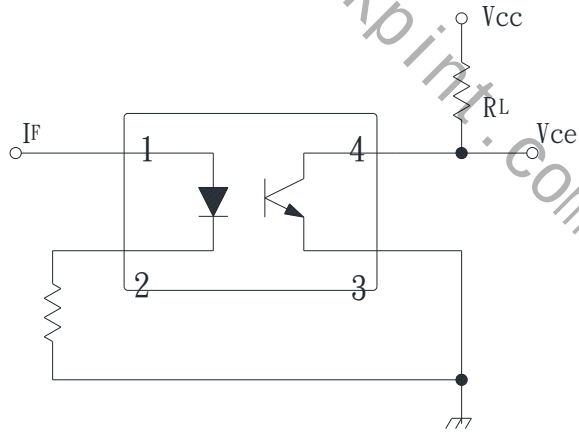
Fig.11 Response Time (Fall) vs. Load Resistance



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- **Test Circuit for Response Time**



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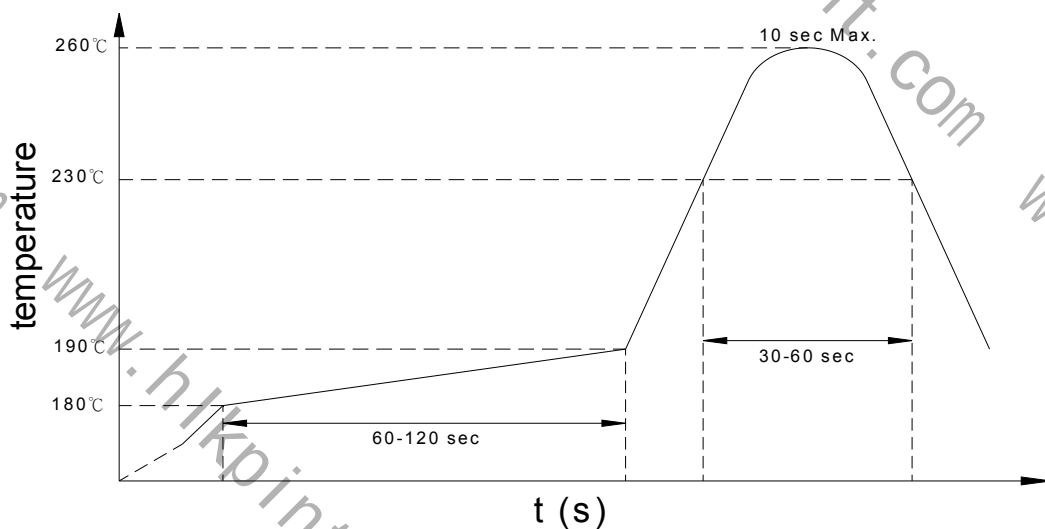
4PIN PHOTOTRANSISTOR PHOTOCOUPLER

● 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.

K1010 Series

4PIN PHOTOTRANSISTOR PHOTOCOUPLER

Numbering System

K1010 X Y (Z)

Notes:

K1010 = Part No.

X = Lead form option (1,3,4,6)

Y = CTR rank option (A ~ E)

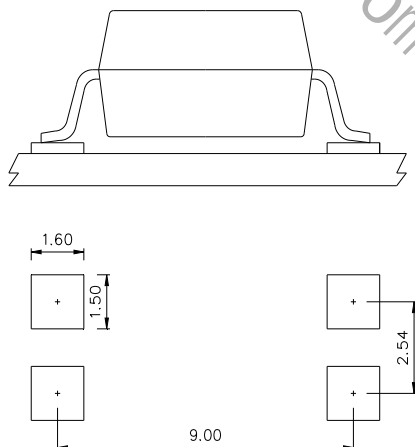
Z = Tape and reel option (TLD, TRU)

Option	Description	Packing quantity
4 (TLD)	surface mount type package + TLD tape & reel option	2000 units per reel
4 (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

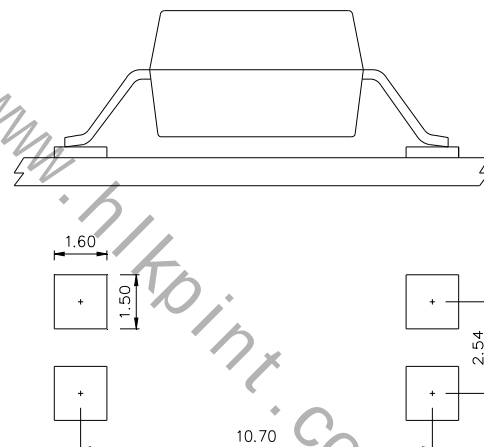
1.Surface mount type.

4 pin SMD



2.Long creepage distance for surface mount type.

4 pin L

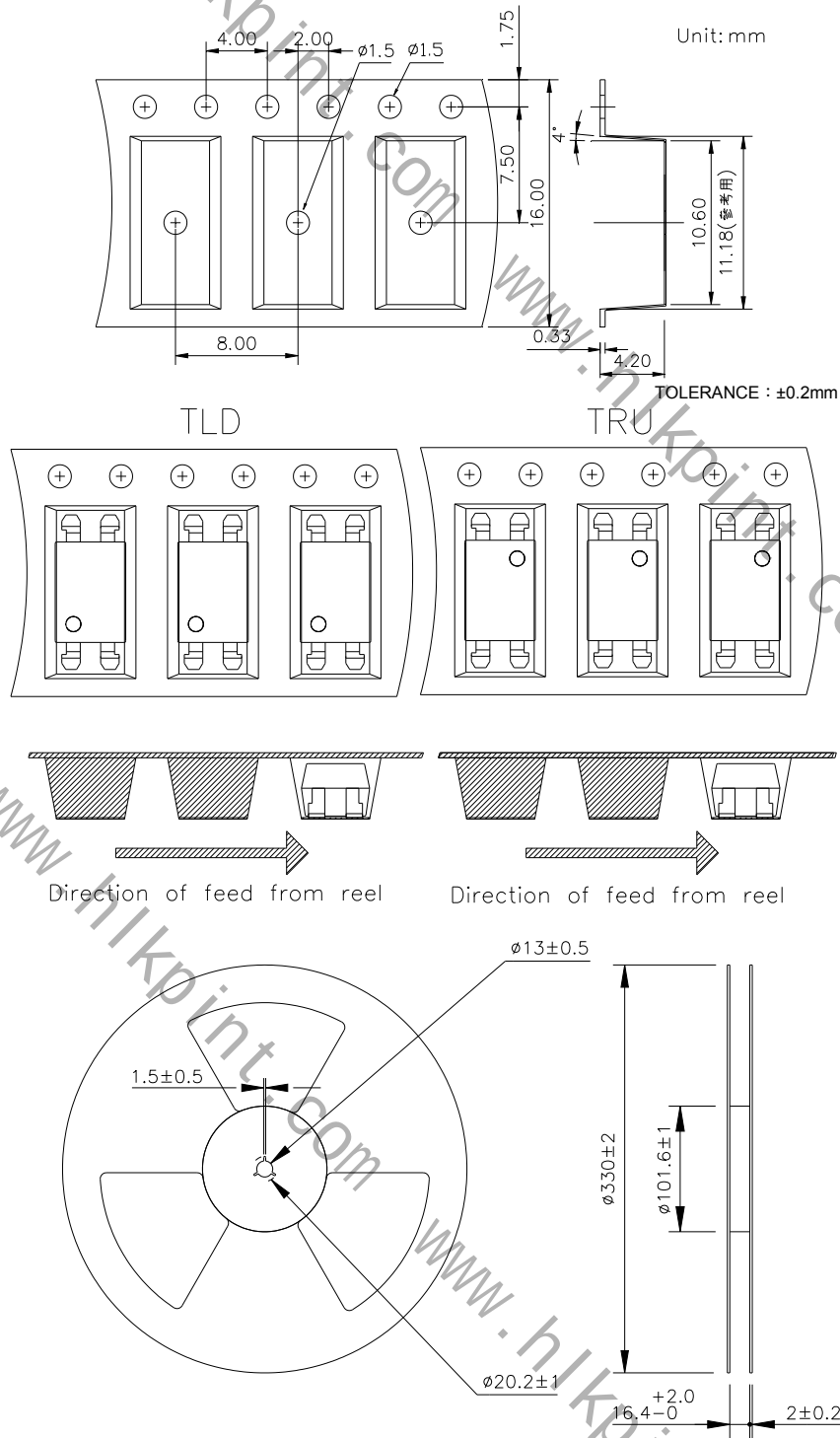


Unit : mm

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4PIN PHOTOTRANSISTOR PHOTOCOUPLER

4-pin SMD Carrier Tape & Reel



K1010 Series

4PIN PHOTOTRANSISTOR PHOTOCOUPLER

4-pin L Carrier Tape & Reel

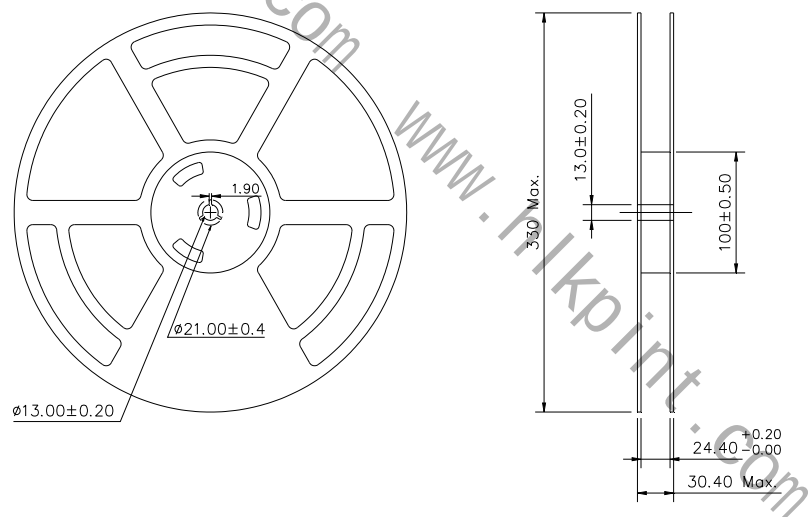
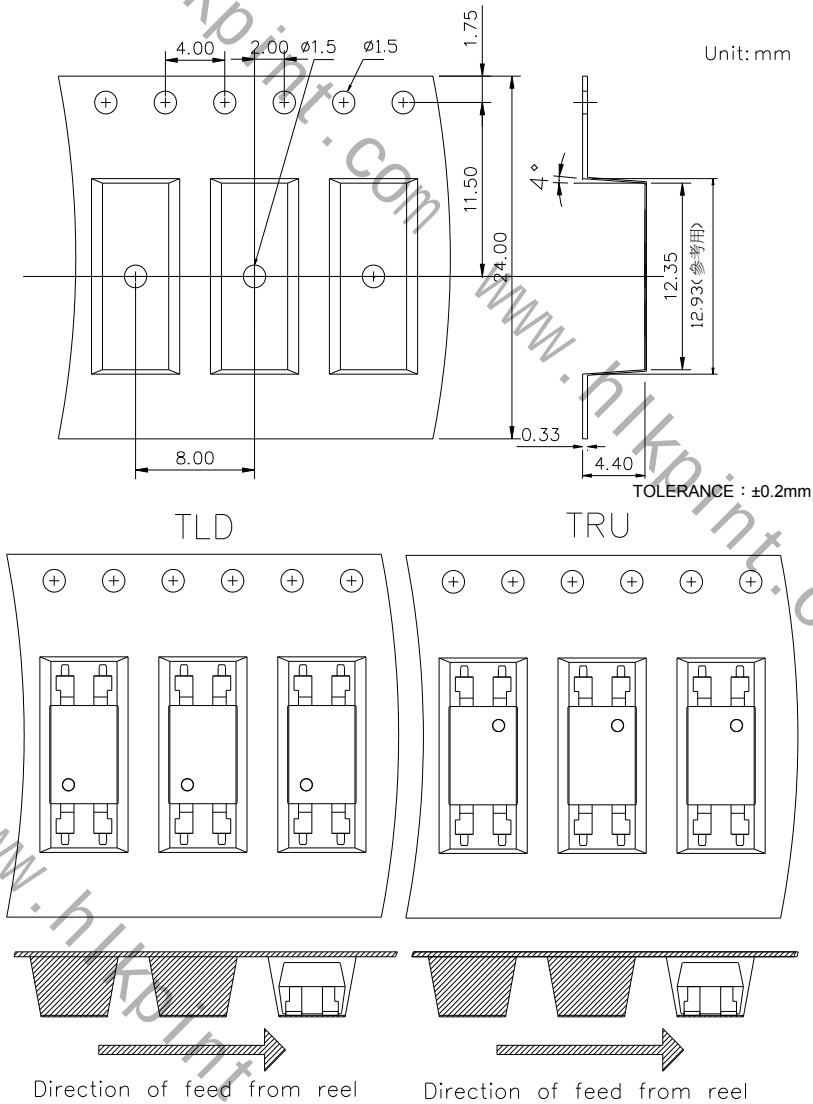


Photo coupler Chemical substances ppm--K1010 serials

Unit Wt. 0.251 g + 0.01g

Substance	Property	ppm	Net Wt. (g)
Lead Frame	Cu (Balance)	303374	0.08
	Fe	7212	0
	Zn	412	0
	Pb	17	0
	P	75	0
Plating	Sn	22	0
	Ag	75	0
Wire	Au	1452	0
	Balance	68	0
Epoxy	Ag(Compound)	1124	0
Chip(PT)	Silicon(Al, Au...)	485	0
Chip(IR)	GaAs(Al, Au...)	639	0
Silicon Coating	Si(Compound)	551	0
	Balance	166	0
Mold Compound (White + Black)	SiO ₂	567988	0.14
	Sb ₂ O ₃	59	0.00001480
	Cl-	3	0
	balance	102645	0.03

