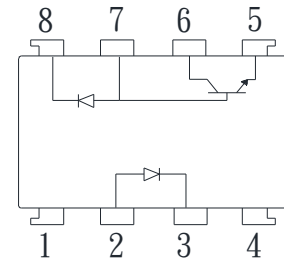


### ● Description

The KPC6N136 series consist of an LED optically coupled to an OPIC chip. It is a high-speed digital output type photocoupler designed specifically for low circuit current. And it is packaged in a 8 pin DIP package and available in wide-lead spacing and SMD option.

### ● Schematic



1. N.C.	5. GND
2. Anode	6. Vo
3. Cathode	7. V <sub>B</sub>
4. N.C.	8. V <sub>CC</sub>

### ● Features

1. Pb free and RoHS compliant
2. High speed response  $t_{PHL}$ ,  $t_{PLH}$  ( Max. 0.8us at  $R_L=1.9K\Omega$  )
3. High common mode rejection voltage (  $CM_H$  : TYP. 1KV/us )
4. Standard dual-in-line package
5. MSL class 1
6. Agency Approvals:
  - UL Approved (No. E169586): UL1577
  - c-UL Approved (No. E169586)
  - FIMKO Approved: EN60065, EN60950

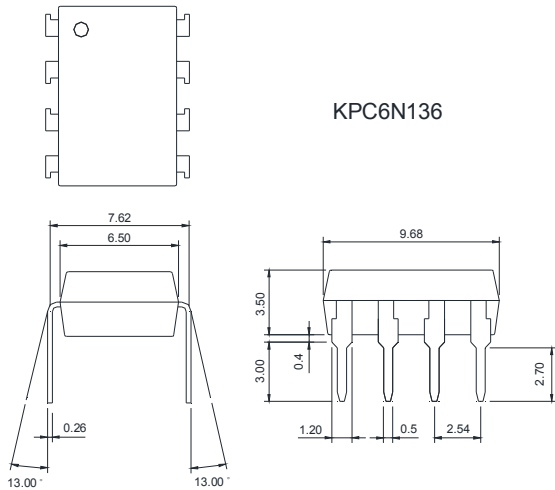
### ● Applications

- Computers, measuring instruments, control equipment
- High speed line receivers, high speed logic
- Telephone sets
- Signal transmission between circuits of different potentials and impedances

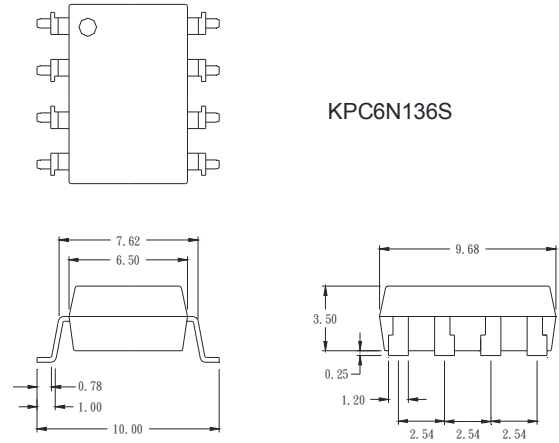
● **Outside Dimension**

Unit : mm

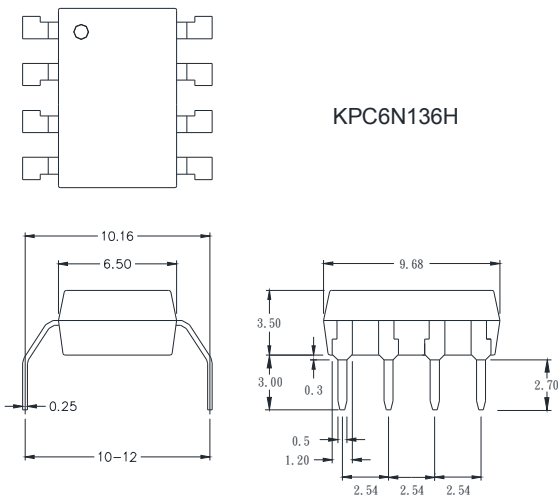
1. Dual-in-line type



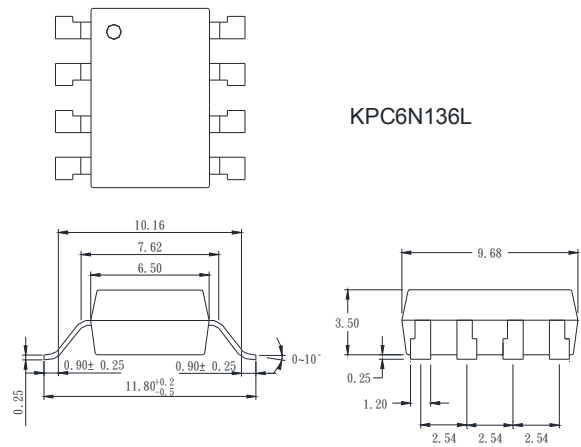
2. Surface mount type



3. Long creepage distance type

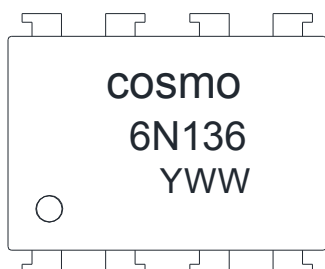


4. Long creepage distance for surface mount type



TOLERANCE: ±0.2mm

● **Device Marking**



**Notes:**

**COSMO**  
**6N136**  
**YWW**      Y: Year code / WW: Week code

### ● Absolute Maximum Ratings

(Ta = 25°C)

Parameter		Symbol	Rating	Unit
Input	Forward current	$I_F$	25	mA
	*1 Peak forward current	$I_F$	50	mA
	*2 Peak transient forward current	$I_{FM}$	1	A
	Reverse voltage	$V_R$	5	V
	Power dissipation	P	45	mW
Output	Supply voltage	$V_{CC}$	-0.5 to 15	V
	Output voltage	$V_O$	-0.5 to 15	V
	Emitter-base reverse with stand voltage ( Pin5 to 7 )	$V_{EBO}$	5	V
	Average output current	$I_O$	8	mA
	Peak output current	$I_{OP}$	16	mA
	Base current ( Pin7 )	$I_B$	5	mA
	Power dissipation	$P_O$	100	mW
	*3 Isolation voltage 1 minute	$V_{iso}$	5000	V
Operating temperature		$T_{opr}$	-55 to +100	°C
Storage temperature		$T_{stg}$	-55 to +125	°C
*4 Soldering temperature 10 seconds		$T_{sol}$	260	°C

\*1 50% duty cycle, Pulse width : 1mS

Decreases at the rate of 1.6mA/°C if the external temperature is 70°C or more.

\*2 Pulse width ≤ 1uS, 300pulse/sec

\*3 40 to 60% RH, AC for 1 minute

\*4 For 10 seconds

### ● Electrical Characteristics

(Ta = 25°C)

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
*5 Current transfer ratio	CTR(1)	Ta=25°C, $I_F=16mA$ $V_O=0.4V$ , $V_{CC}=4.5V$	19	40	-	%
	CTR(2)	$I_F=16mA$ $V_O=0.5V$ , $V_{CC}=4.5V$	15	43	-	%
Logic ( 0 ) output voltage	$V_{OL}$	*6 $V_{CC}=4.5V$ , $I_F=16mA$	-	0.1	0.4	V
Logic ( 1 ) output current	$I_{OH}(1)$	Ta=25°C, $I_F=0$ $V_O=V_{CC}=5.5V$	-	3.0	500	nA
	$I_{OH}(2)$	Ta=25°C, $I_F=0$ $V_O=V_{CC}=15V$	-	0.01	1.0	uA
	$I_{OH}(3)$	$V_{CC}=V_O=15V$ , $I_F=0$	-	-	50	uA
Logic ( 0 ) supply current	$I_{CCL}$	$I_F=16mA$ $V_O=open$ , $V_{CC}=15V$	-	200	-	uA
Logic ( 1 ) supply current	$I_{CCH}(1)$	Ta=25°C, $I_O=0$ $V_F=open$ , $V_{CC}=15V$	-	0.02	1.0	uA
	$I_{CCH}(2)$	$I_O=0$ $V_O=open$ , $V_{CC}=15V$	-	-	2.0	uA
Input forward voltage	$V_F$	Ta=25°C, $I_F=16mA$	-	1.7	1.95	V
Input forward voltage temperature coefficient	$\Delta V_F/\Delta Ta$	$I_F=16mA$	-	-1.9	-	mV/°C
Input reverse voltage	$BV_R$	Ta=25°C, $I_R=10uA$	5.0	-	-	V
Input capacitance	$C_{IN}$	$V_F=0$ , $f=1MHz$	-	60	-	pF
*7 Leak current ( input-output )	$I_{I-O}$	Ta=25°C, 45%RH $V_{I-O}=3KVDC$ , $t=5s$	-	-	1.0	uA
*7 Isolation resistance ( input-output )	$R_{I-O}$	$V_{I-O}=500VDC$	-	$10^{12}$	-	Ω
*7 Capacitance ( input-output )	$C_{I-O}$	$f=1MHz$	-	0.6	-	pF
Transistor current amplification factor	$h_{FE}$	$V_O=5V$ , $I_O=3mA$	-	70	-	

\*5 Current transfer ratio is the ratio of input current and output current expressed in %

\*6  $I_O=2.4mA$

\*7 Measured as 2-pin element ( Short 1, 2, 3, 4 and 5, 6, 7, 8 )

### ● Switching Characteristics

( $T_a=25^\circ\text{C}$ ,  $V_{CC}=5\text{V}$ ,  $I_F=16\text{mA}$   $T_a = 25^\circ\text{C}$ )

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
*8 Propagation delay time *9 Output (1) → (0)	$t_{PHL}$	$R_L=1.9\text{K}\Omega$	-	0.3	0.8	$\mu\text{S}$
*8 Propagation delay time *9 Output (0) → (1)	$t_{PLH}$	$R_L=1.9\text{K}\Omega$	-	0.3	0.8	$\mu\text{S}$
*10 Instantaneous common mode rejection voltage *11 " Output (1) "	$CM_H$	$I_F=0$ , $V_{CM}=10\text{V}_{P-P}$	-	1000	-	$\text{V}/\mu\text{S}$
*10 Instantaneous common mode rejection voltage *11 " Output (0) "	$CM_L$	$I_F=16\text{mA}$ , $V_{CM}=10\text{V}_{P-P}$	-	-1000	-	$\text{V}/\mu\text{S}$
*12 Bandwidth	BW	$R_L=100\Omega$	-	2.0	-	MHz

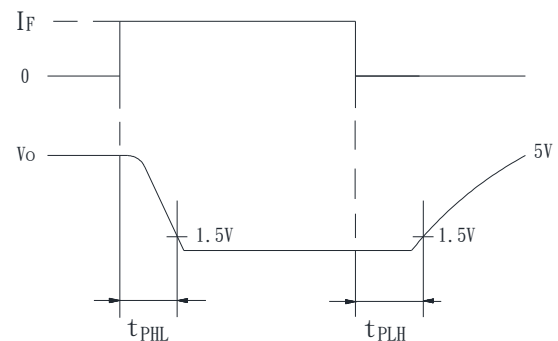
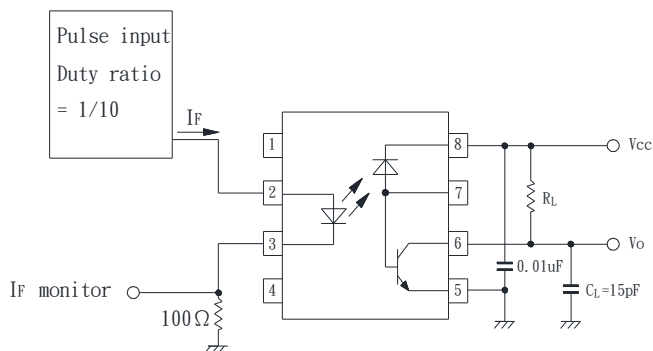
\*8  $R_L=1.9\text{K}\Omega$  is equivalent to one LSTTL and  $5.6\text{K}\Omega$  pull-up resistor.

\*10 Instantaneous common mode rejection voltage " output (1) " represents a common mode voltage variation that can hold the output above (1) level ( $V_o > 2.0\text{V}$ )

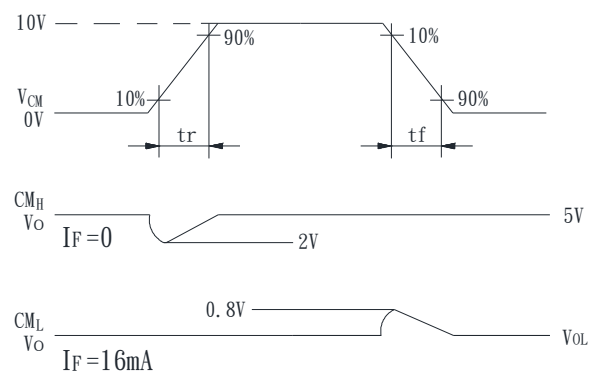
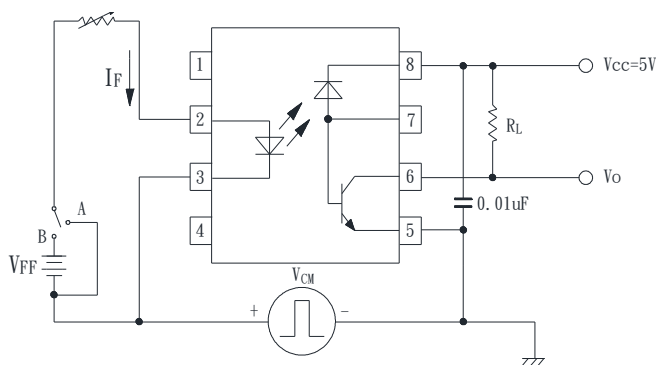
Instantaneous common mode rejection voltage " output (0) " represents a common mode voltage variation that can hold the output above (0) level ( $V_o < 0.8\text{V}$ )

\*12 Bandwidth represents a point where AC input goes down by 3dB.

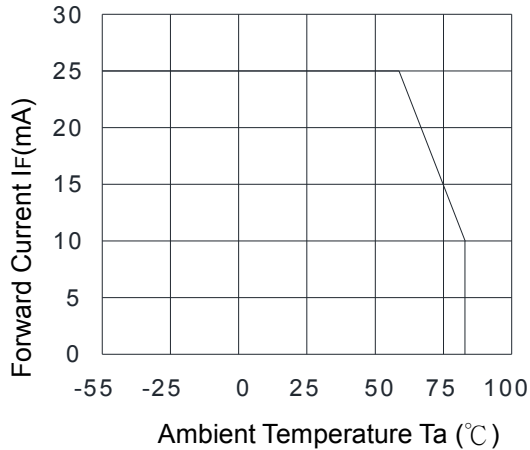
\*9 Test Circuit Propagation Delay Time



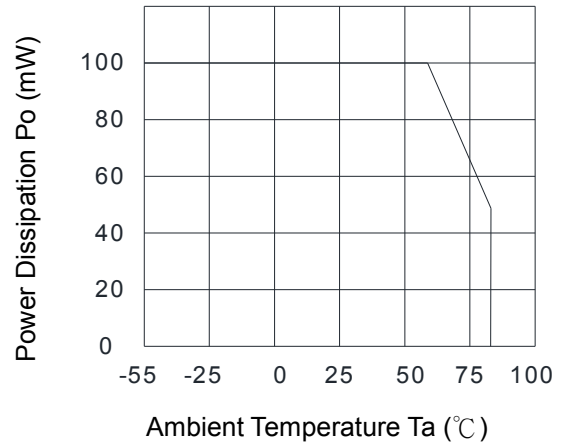
\*11 Test Circuit for Instantaneous Common Mode Rejection Voltage



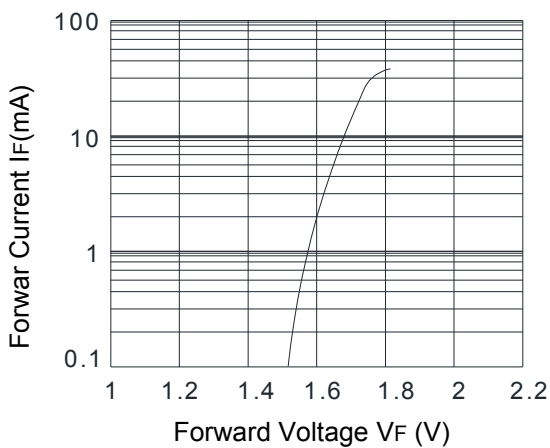
**Fig.1 Forward Current vs. Ambient Temperature**



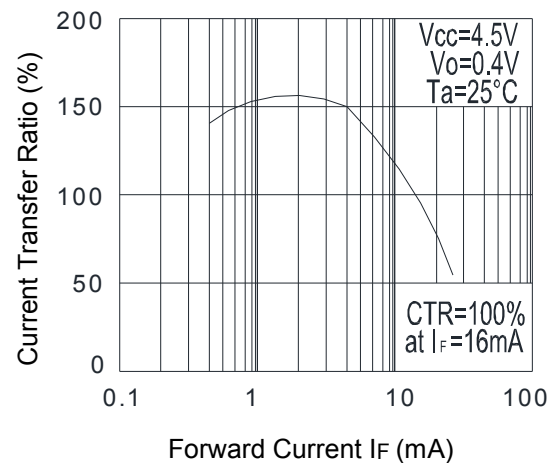
**Fig.2 Power Dissipation vs. Ambient Temperature**



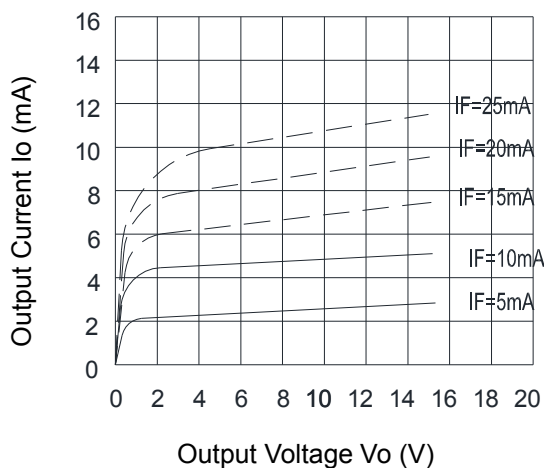
**Fig.3 Forward Current vs. Forward Voltage**



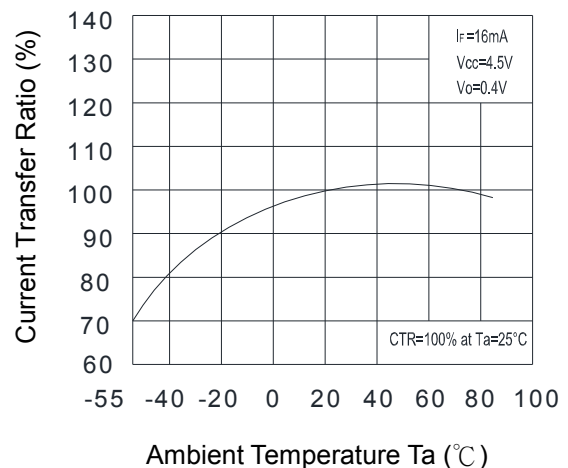
**Fig.4 Current Transfer Ratio vs. Forward Current**



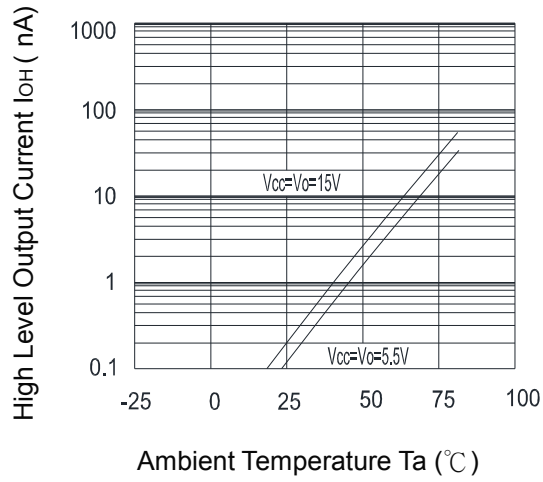
**Fig.5 Output Current vs. Output Voltage**



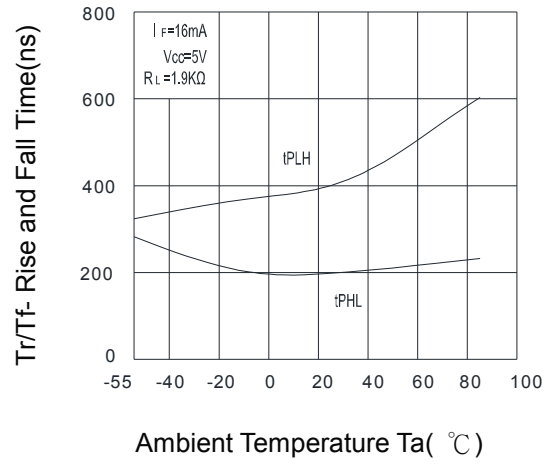
**Fig.6 Current Transfer Ratio vs. Ambient Temperature**



**Fig.7 High Level Output Current vs. Ambient Temperature**



**Fig.8 Propagation Delay Time vs. Ambient Temperature**

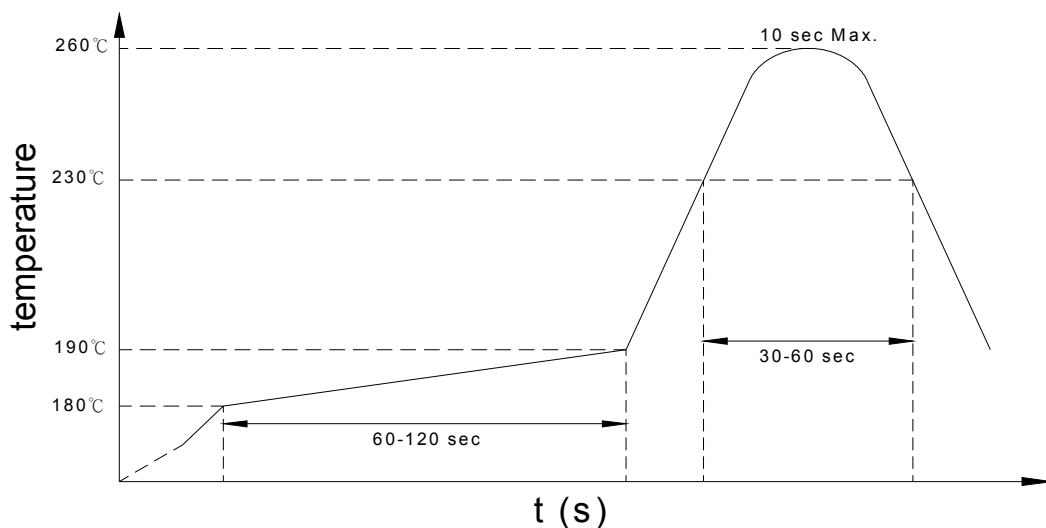


### ● Recommended Soldering Conditions

#### (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**

### KPC6N136 X (Y)

**Notes:**

KPC6N135 = Part No.

X = Lead form option (blank · S · H · L )

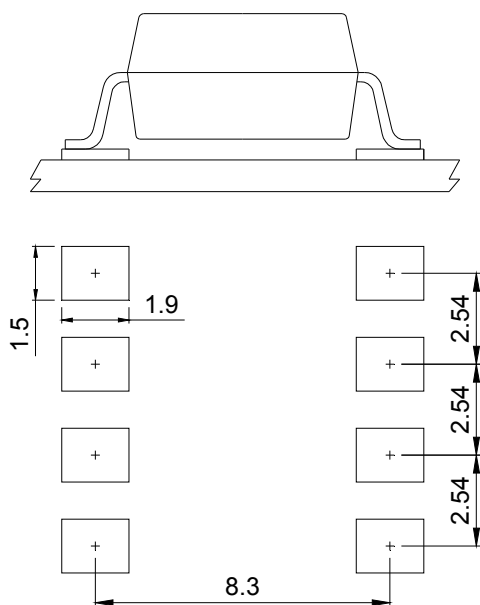
Y = Tape and reel option (TL · TR · TLD · TRU)

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	800 units per reel
L (TRU)	long creepage distance for surface mount type package + TRU tape & reel option	800 units per reel

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

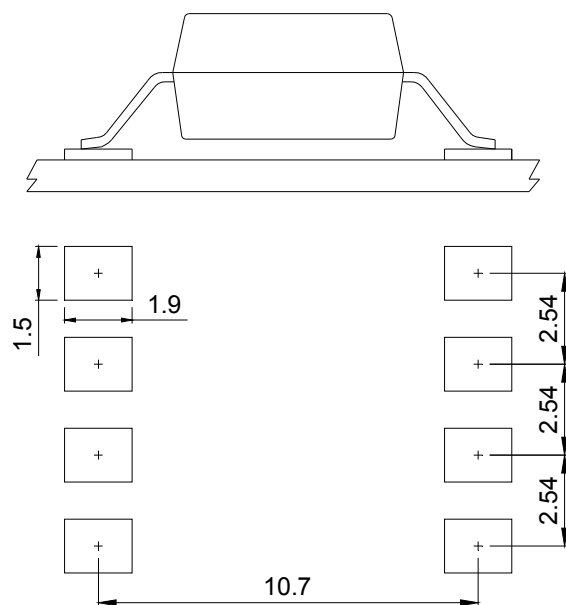
#### 1.Surface mount type

8-pin SMD



#### 2.Long creepage distance for surface mount type

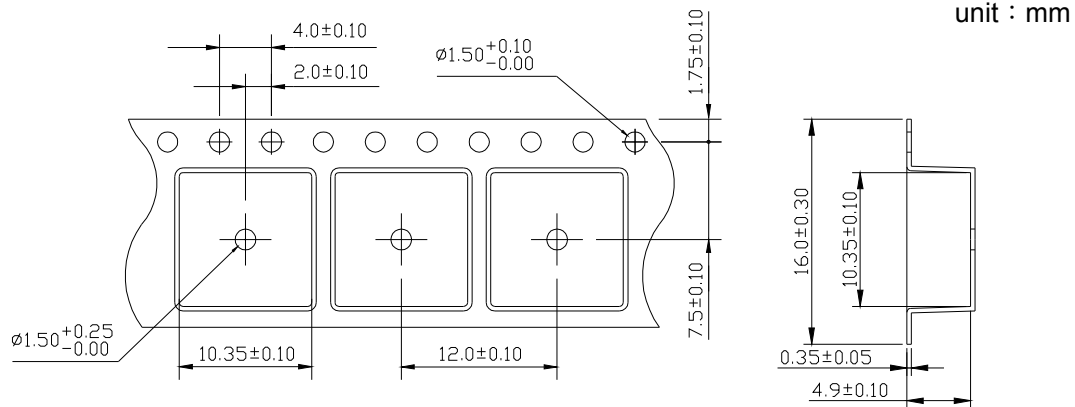
8-pin L



Unit :mm

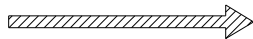
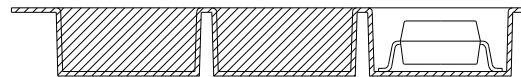
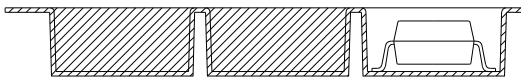
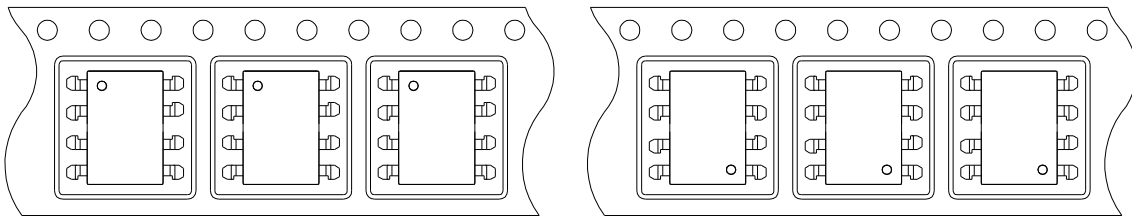


● 8-pin SMD Carrier Tape & Reel

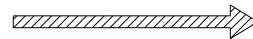


TL

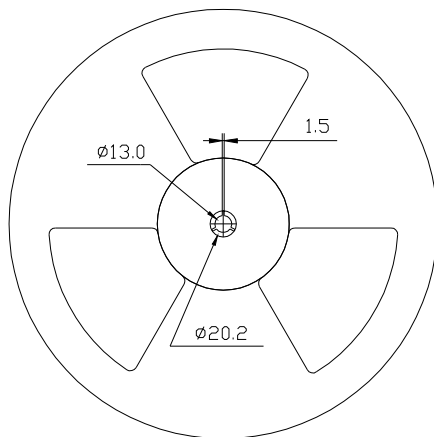
TR



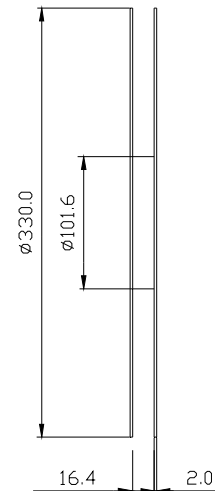
Direction of feed from reel



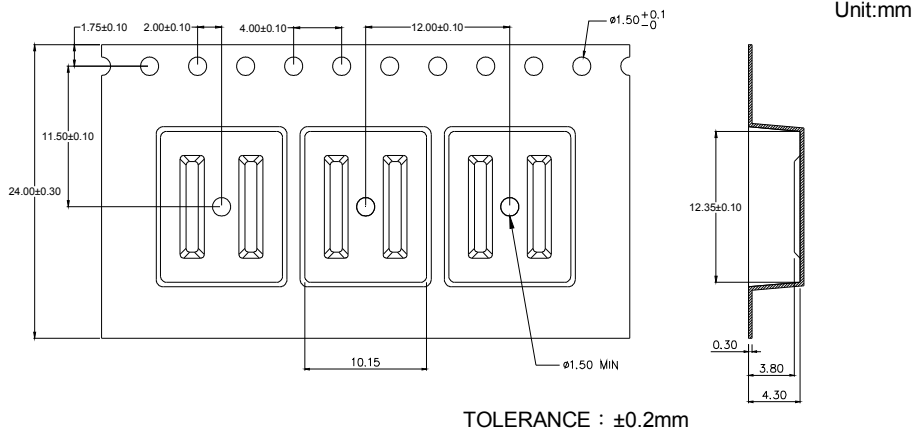
Direction of feed from reel



Quantity : 1000pcs/reel

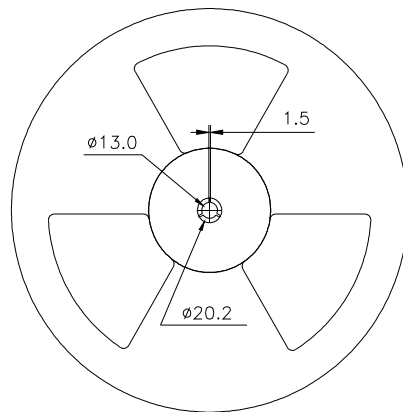
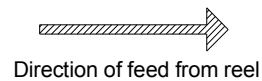
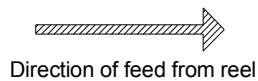
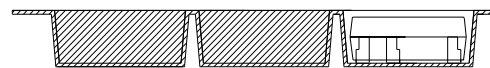
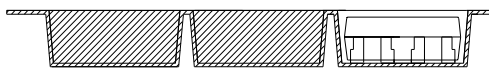
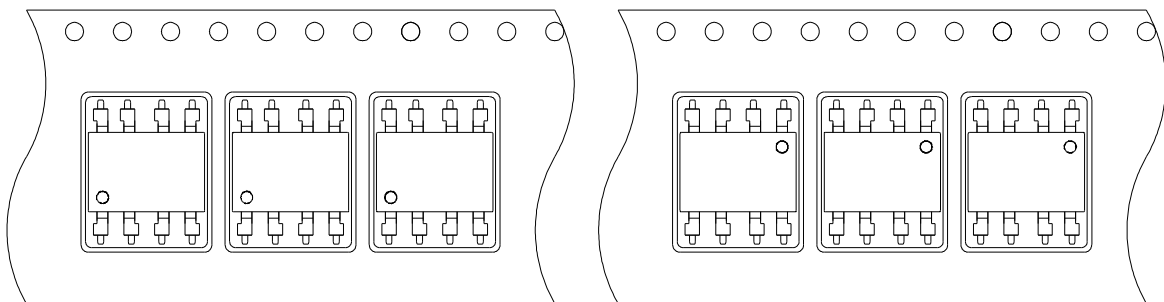


● 8-pin L Carrier Tape & Reel

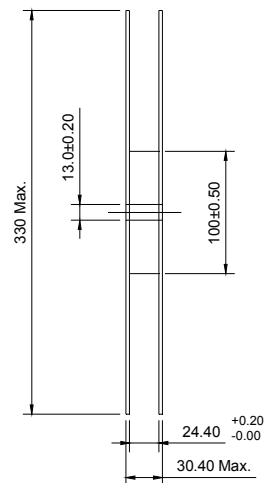


TLD

TRU



Quantity : 800pcs/reel





# KPC6N136 Series

## 8PIN HIGH-SPEED OUTPUT PHOTOCOUPLER

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### ● Application Notice

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

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