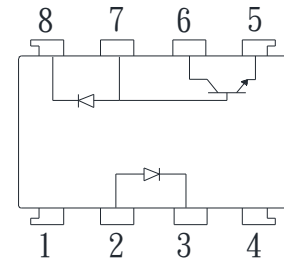


● Description

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 _B
4. N.C.	8. V _{CC}

● 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

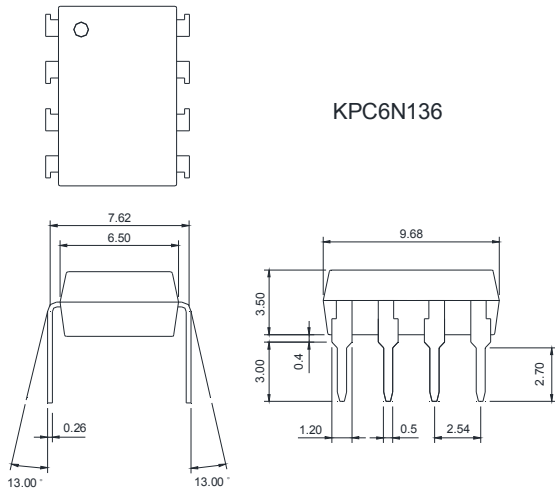
● Applications

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

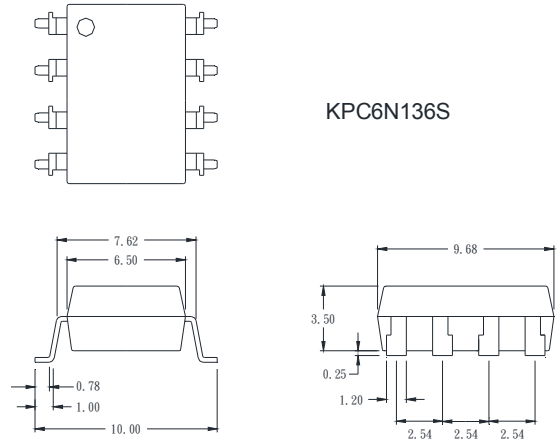
● **Outside Dimension**

Unit : mm

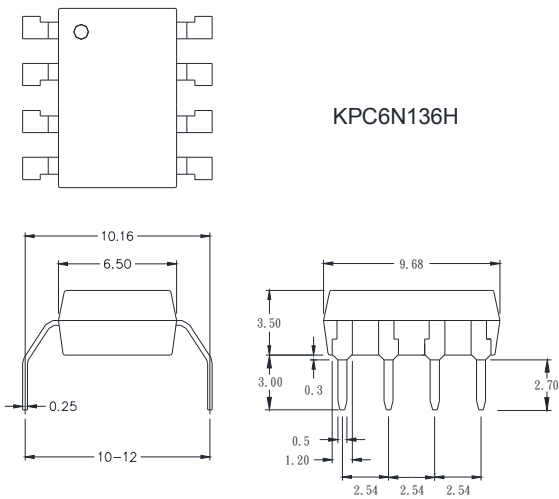
1. Dual-in-line type



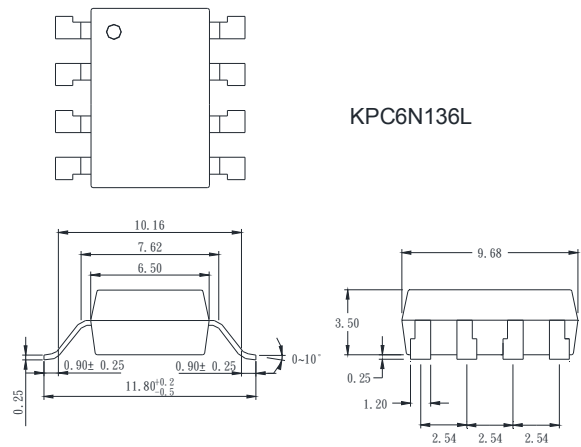
2. Surface mount type



3. Long creepage distance type

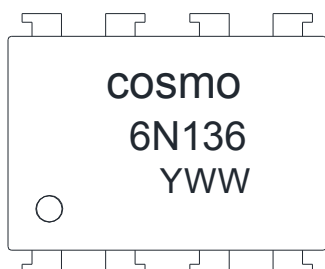


4. Long creepage distance for surface mount type



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

● **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_{Fp}	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	μS
*8 Propagation delay time *9 Output (0) → (1)	t_{PLH}	$R_L=1.9\text{K}\Omega$	-	0.3	0.8	μS
*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.

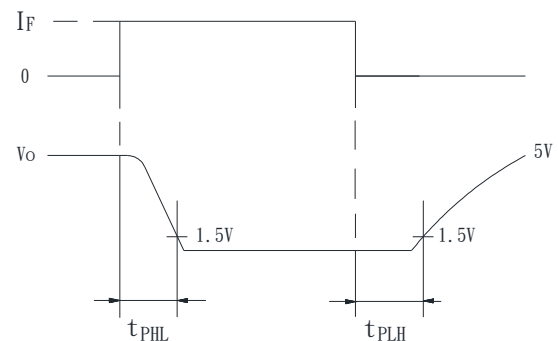
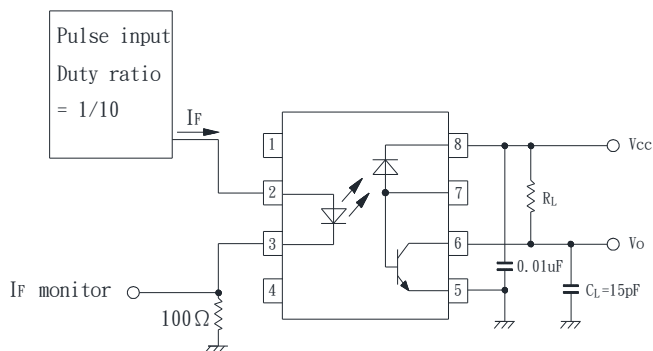
*10 Instantaneous common mode rejection voltage " output (1) " represents a common mode voltage variation that can hold the output above (1) level ($V_o > 2.0\text{V}$)

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

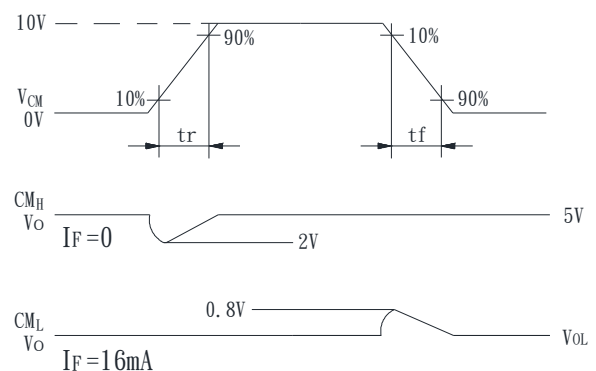
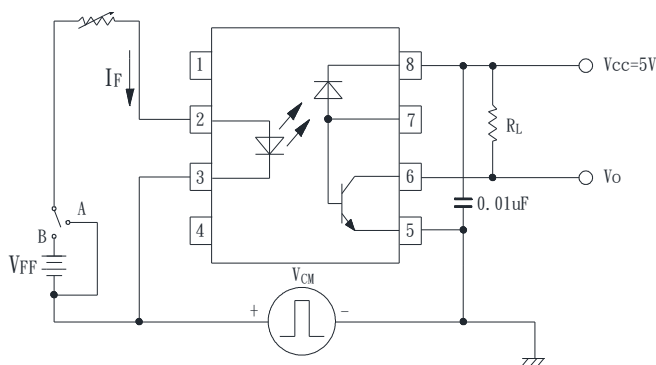


Fig.1 Forward Current vs. Ambient Temperature

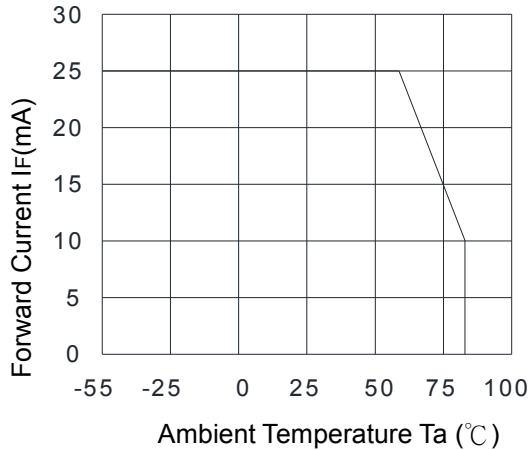


Fig.2 Power Dissipation vs. Ambient Temperature

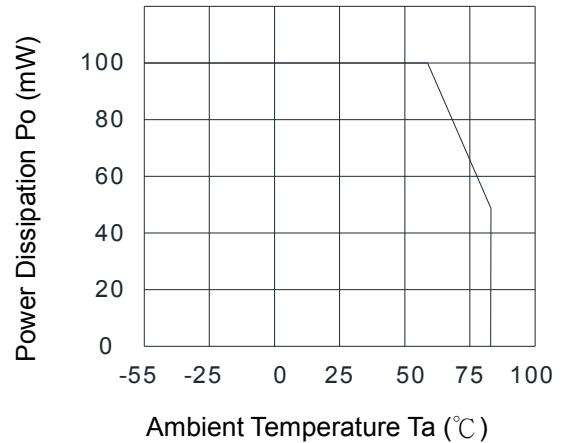


Fig.3 Forward Current vs. Forward Voltage

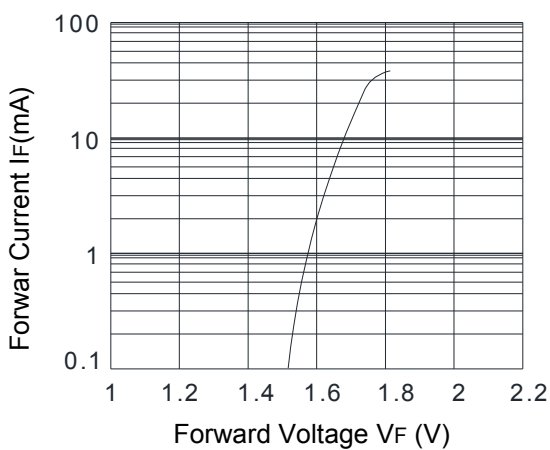


Fig.4 Current Transfer Ratio vs. Forward Current

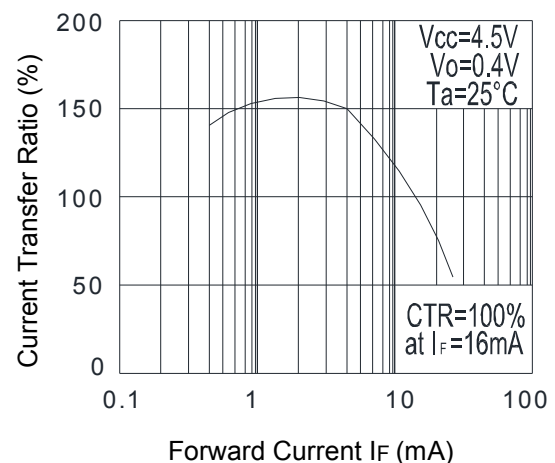


Fig.5 Output Current vs. Output Voltage

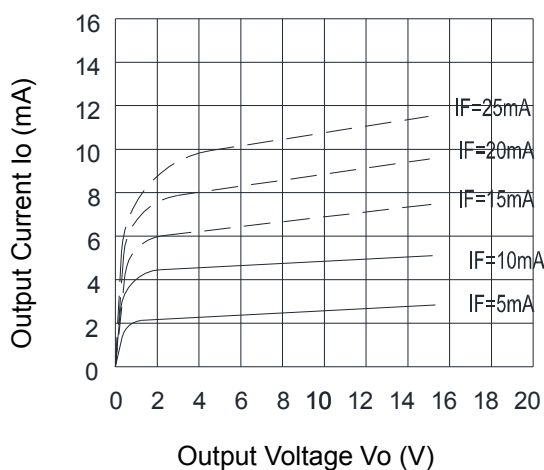


Fig.6 Current Transfer Ratio vs. Ambient Temperature

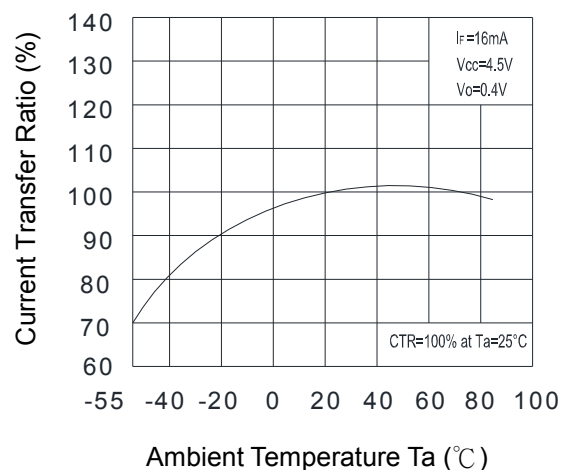


Fig.7 High Level Output Current vs. Ambient Temperature

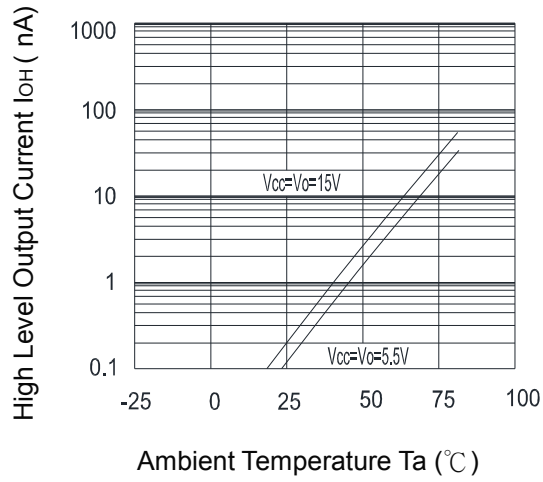
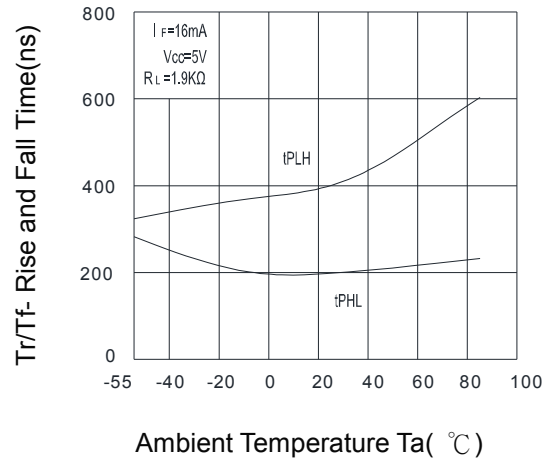


Fig.8 Propagation Delay Time vs. Ambient Temperature

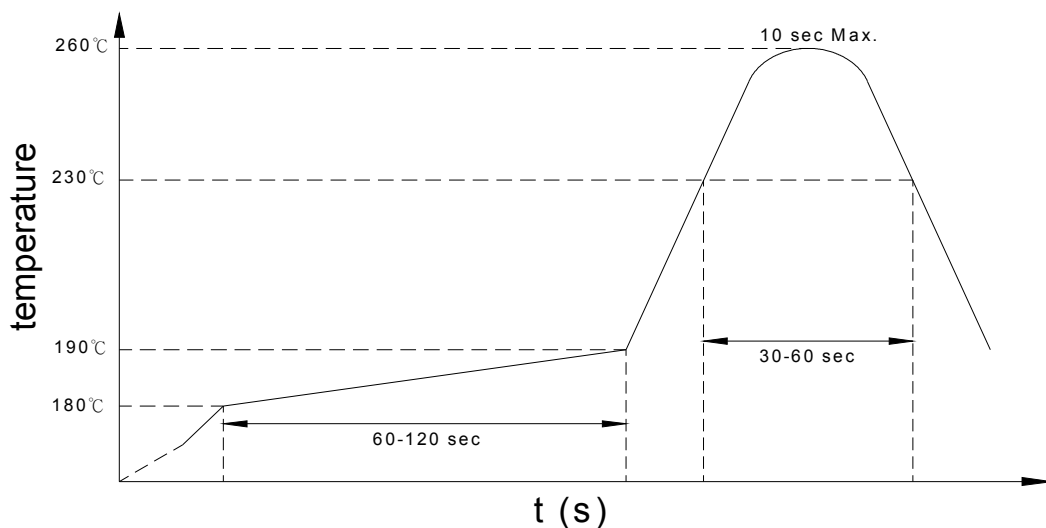


● Recommended Soldering Conditions

(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)

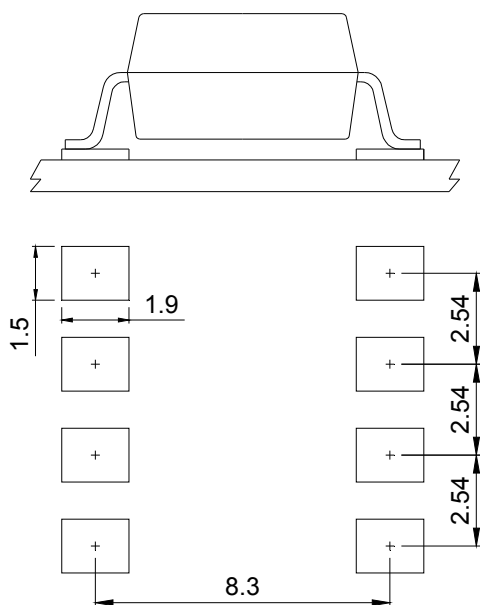
Y = Tape and reel option (TL · TR · TLD · TRU)

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**

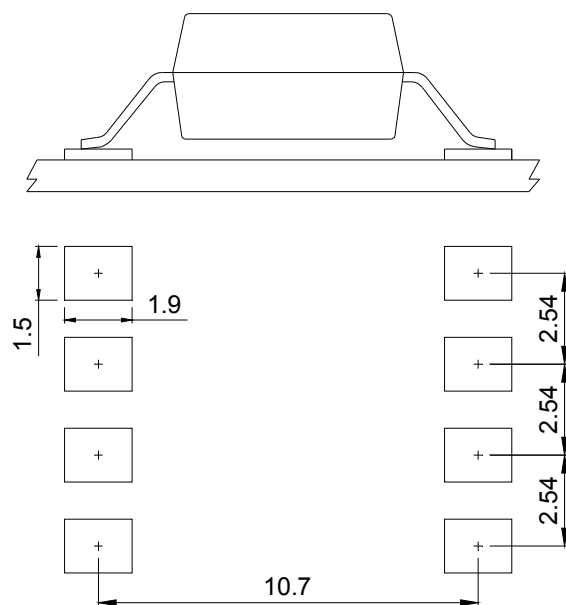
1.Surface mount type

8-pin SMD



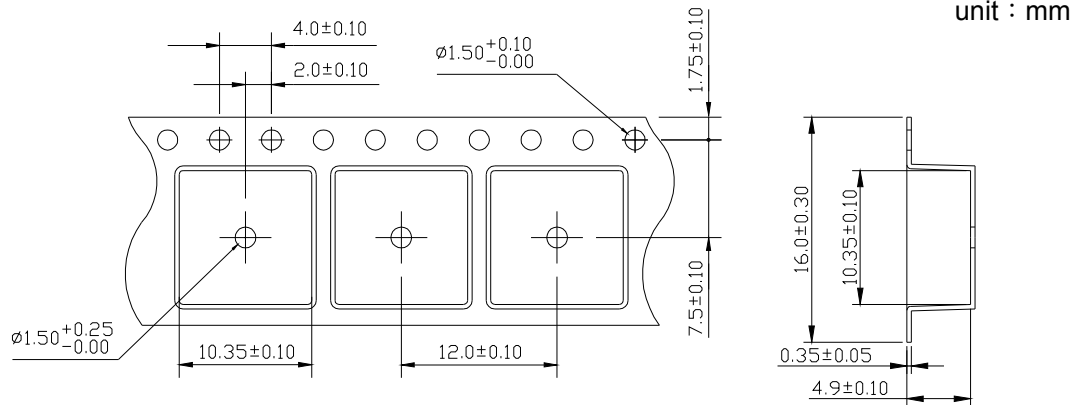
2.Long creepage distance for surface mount type

8-pin L



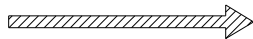
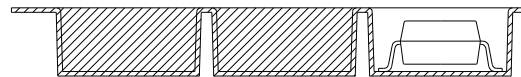
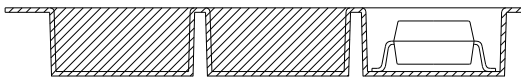
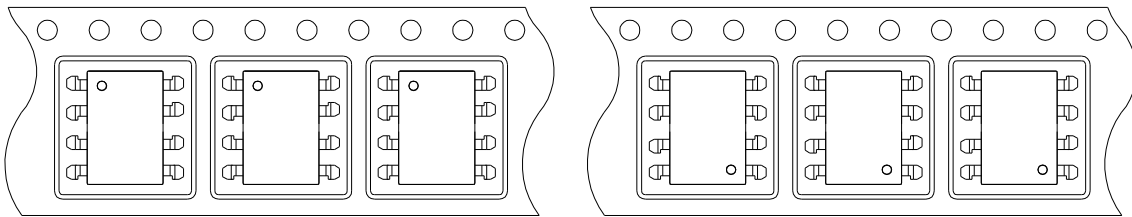
Unit :mm

● 8-pin SMD Carrier Tape & Reel

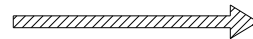


TL

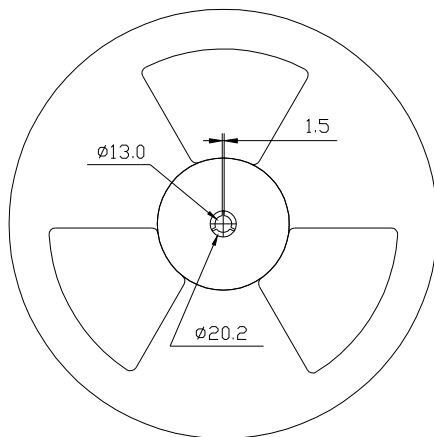
TR



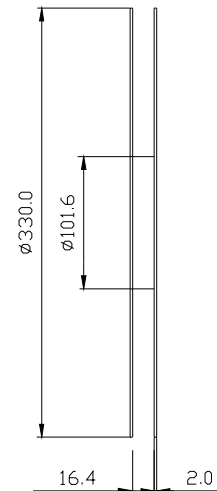
Direction of feed from reel



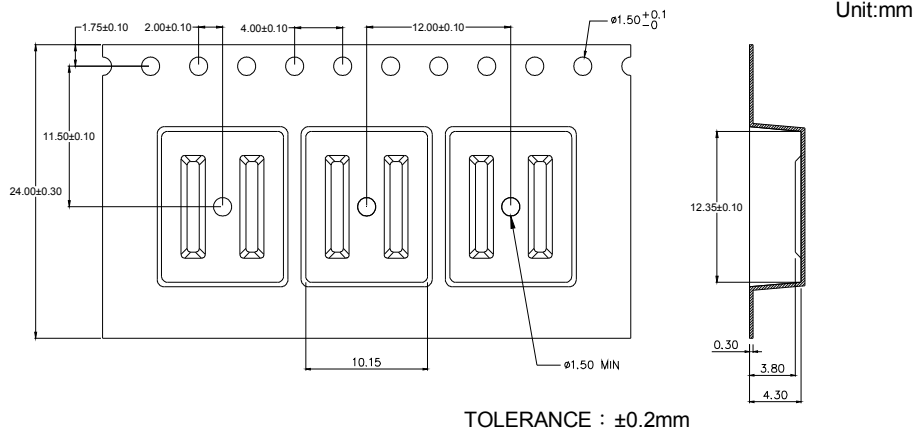
Direction of feed from reel



Quantity : 1000pcs/reel

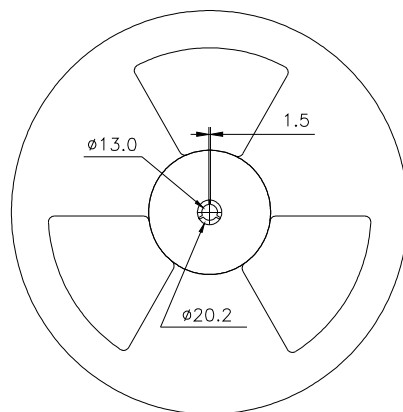
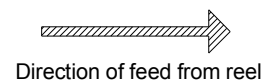
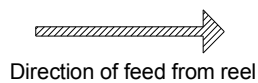
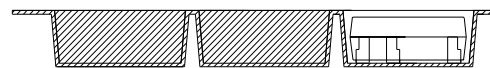
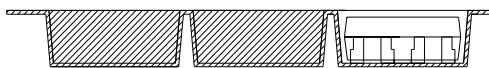
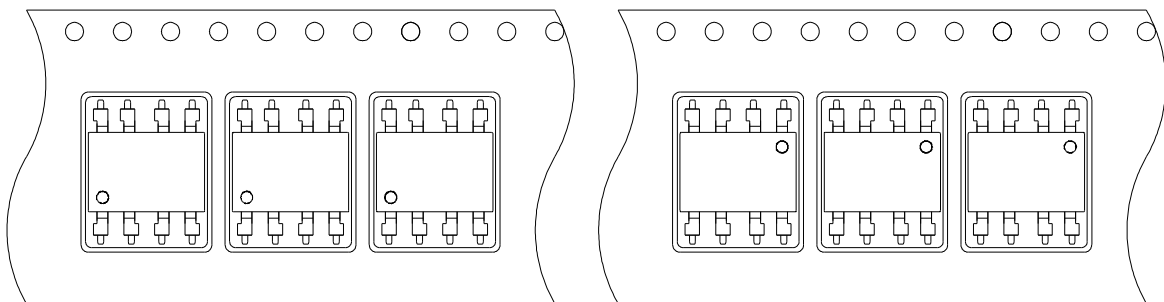


● 8-pin L Carrier Tape & Reel

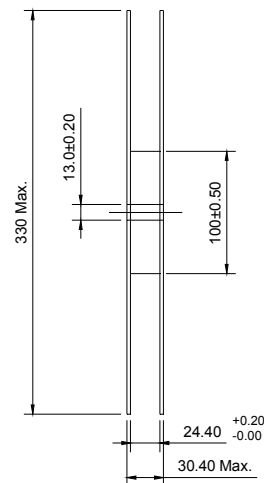


TLD

TRU



Quantity : 800pcs/reel





KPC6N136 Series

8PIN HIGH-SPEED OUTPUT PHOTOCOUPLER

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