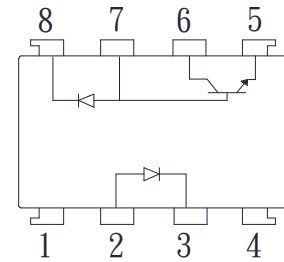


● Description

The KPC6N135 series consist of a 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. 1.5us at $R_L=4.1K\Omega$)
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: EN62368-1, EN60601-1
 - VDE Approved (No. 40020973): DIN EN60747-5-5

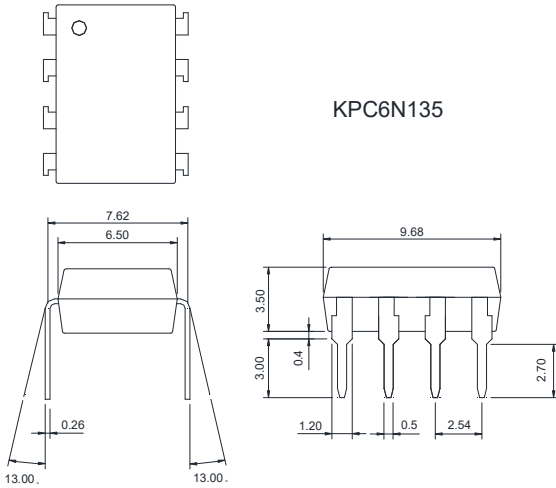
● Applications

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

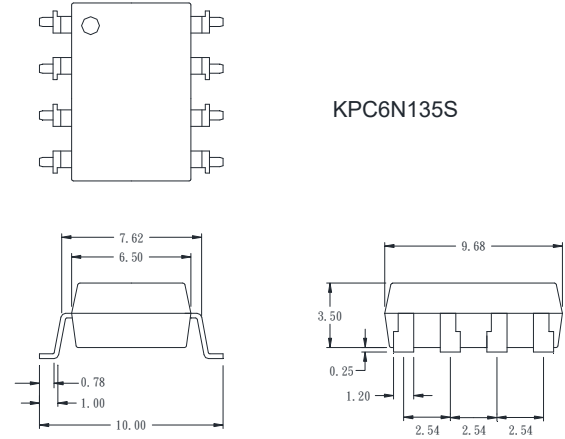
● **Outside Dimension**

Unit : mm

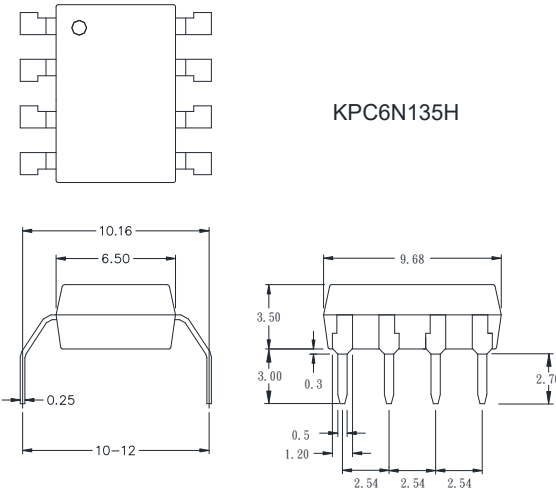
1. Dual-in-line type



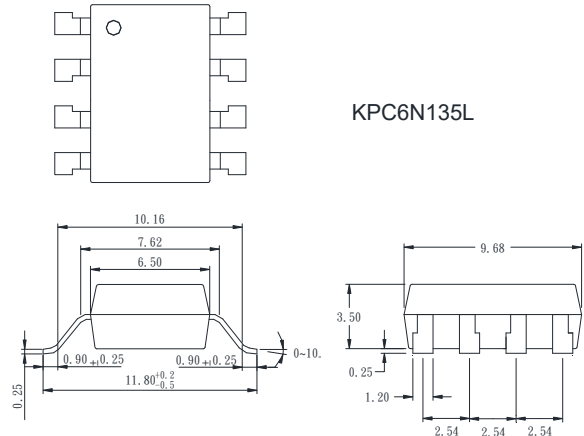
2. Surface mount type



3. Long creepage distance type

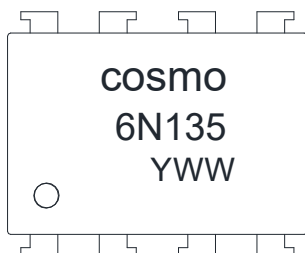


4. Long creepage distance for surface mount type



TOLERANCE : ±0.2mm

● **Device Marking**



Notes:

COSMO
6N135
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	Vrms
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, $I_F=16mA$ $V_O=0.4V$, $V_{CC}=4.5V$	7	40	-	%
	CTR(2)	$I_F=16mA$ $V_O=0.5V$, $V_{CC}=4.5V$	5	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 $I_O=1.1mA$

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

● Switching Characteristics

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

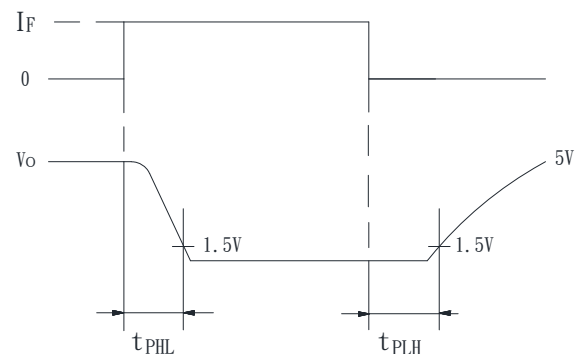
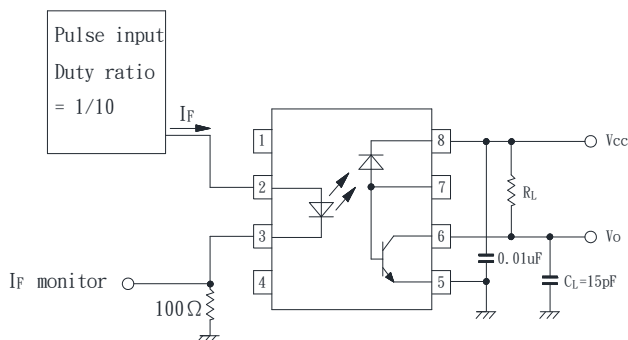
Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
*8 Propagation delay time *9 Output (1) → (0)	t_{PHL}	$R_L=4.1\text{K}\Omega$	-	0.3	1.5	μs
*8 Propagation delay time *9 Output (0) → (1)	t_{PLH}	$R_L=4.1\text{K}\Omega$	-	0.4	1.5	μs
*10 Instantaneous common mode rejection voltage *11 " Output (1) "	CM_H	$I_F=0$, $V_{CM}=10V_{P-P}$	-	1000	-	$\text{V}/\mu\text{s}$
*10 Instantaneous common mode rejection voltage *11 " Output (0) "	CM_L	$I_F=16\text{mA}$, $V_{CM}=10V_{P-P}$	-	-1000	-	$\text{V}/\mu\text{s}$
*12 Bandwidth	BW	$R_L=100\Omega$	-	2.0	-	MHz

*8 $R_L=4.1\text{K}\Omega$ is equivalent to one LSTTL and $6.1\text{K}\Omega$ pull-up resistor.

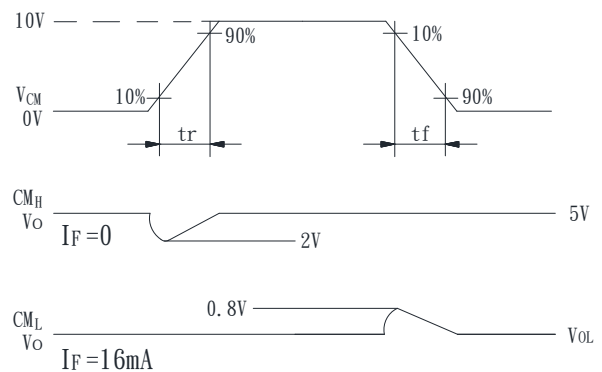
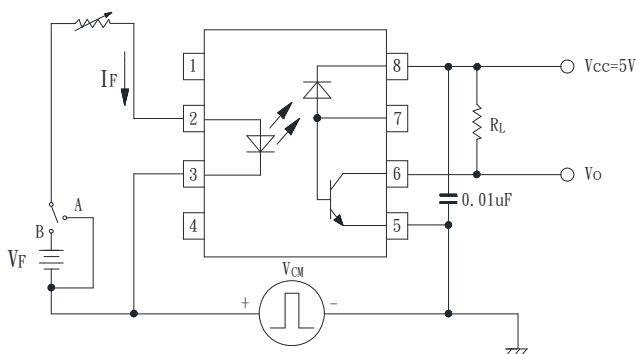
*10 Instantaneous common mode rejection voltage " output (1) " represents a common mode voltage variation that can hold the output above (1) level ($V_o > 2.0\text{V}$)
Instantaneous common mode rejection voltage " output (0) " represents a common mode voltage variation that can hold the output above (0) level ($V_o < 0.8\text{V}$)

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

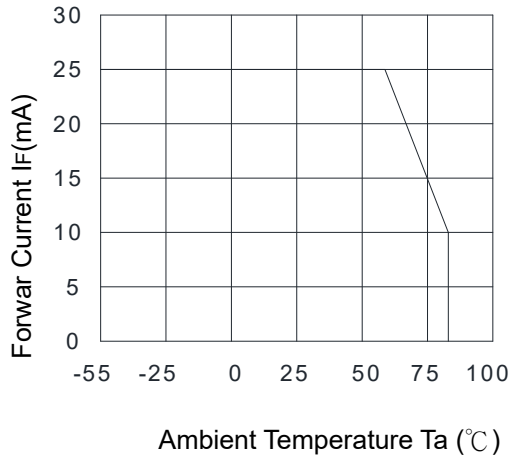
*9 Test Circuit Propagation Delay Time



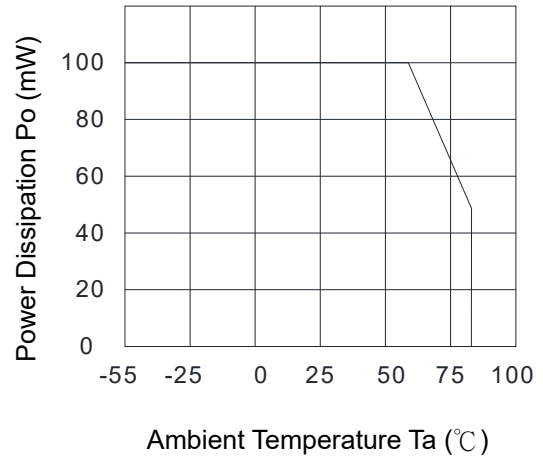
*11 Test Circuit for Instantaneous Common Mode Rejection Voltage



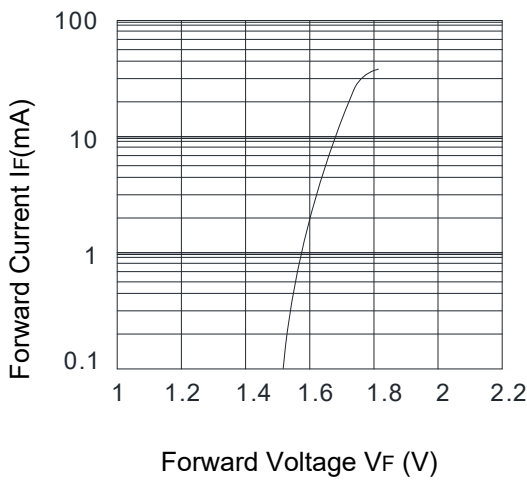
**Fig.1 Forward Current
vs. Ambient Temperature**



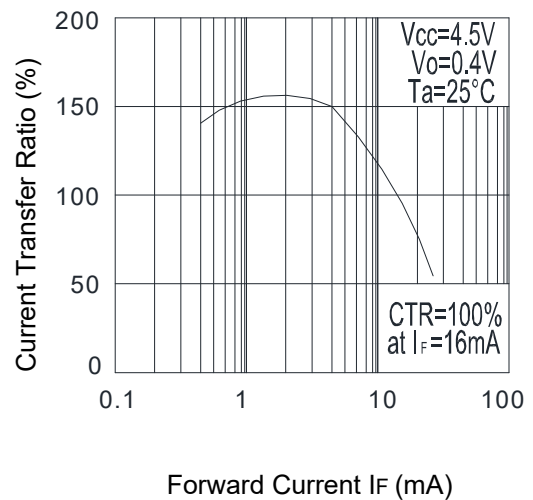
**Fig.2 Power Dissipation
vs. Ambient Temperature**



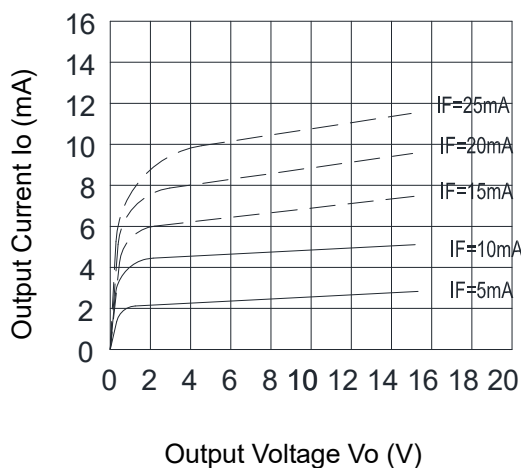
**Fig.3 Forward Current
vs. Forward Voltage**



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



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



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

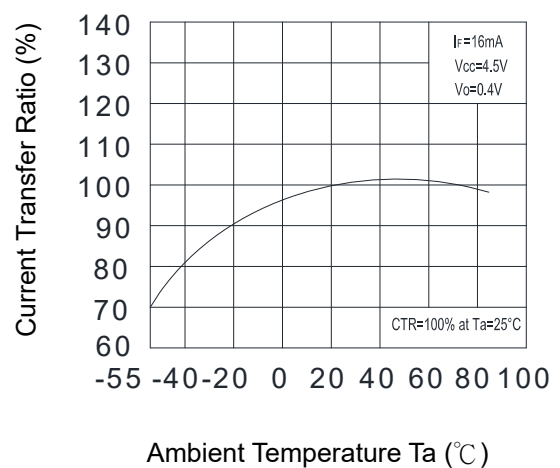


Fig.7 High Level Output Current vs. Ambient Temperature

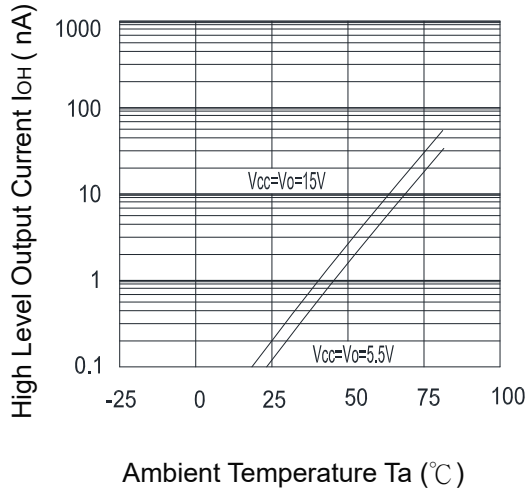
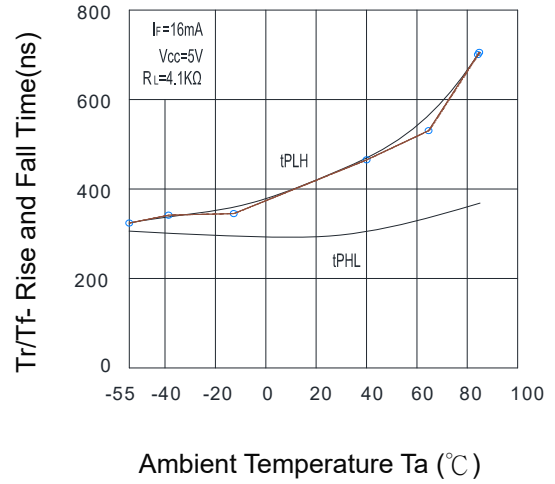


Fig.8 Propagation Delay Time vs. Ambient Temperature

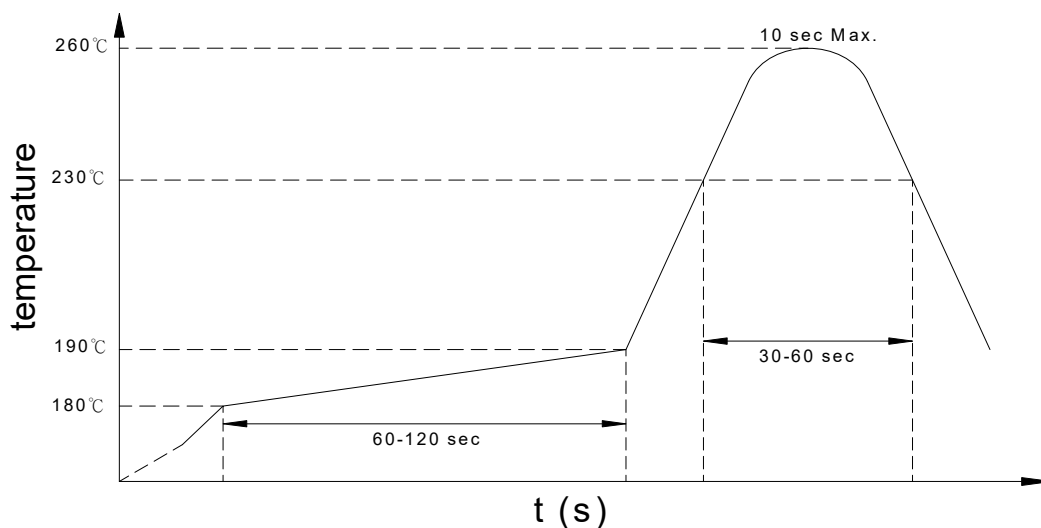


● Recommended Soldering Conditions

(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**

KPC6N135 X (Y)

Notes:

KPC6N135 = Part No.

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

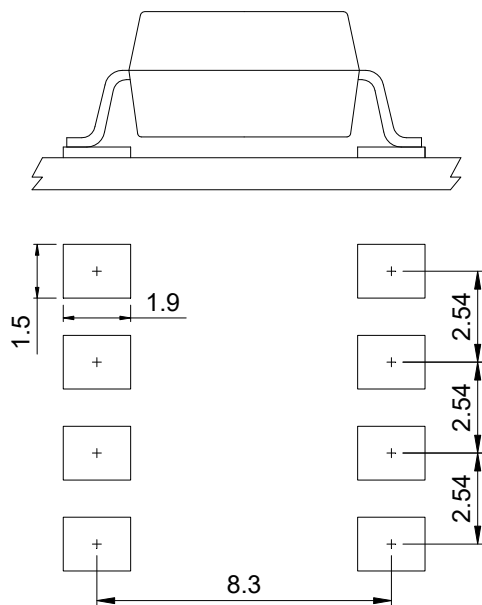
Y = Tape and reel option (TL · TR · TLD · TRU)

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**

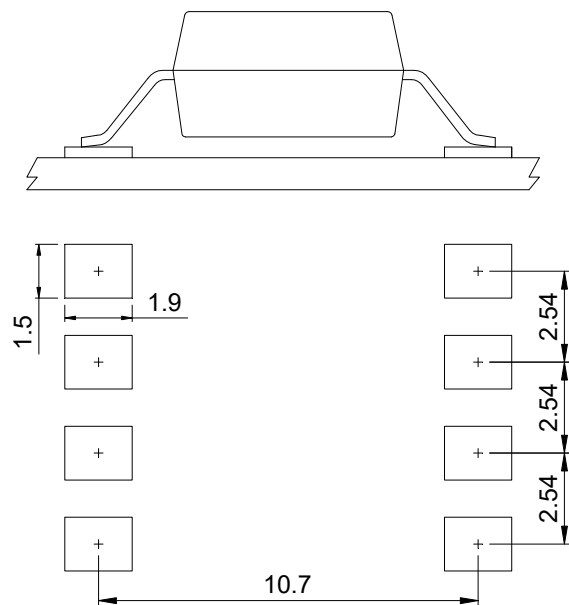
1.Surface mount type

8-pin SMD



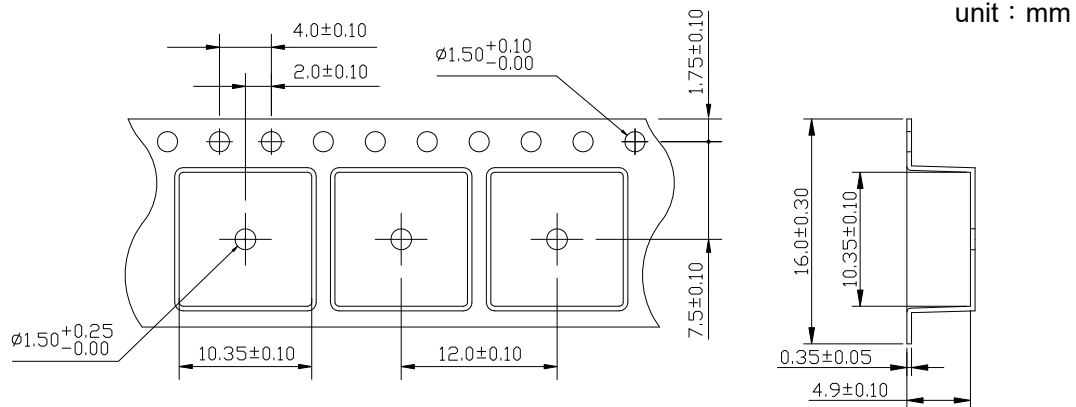
2.Long creepage distance for surface mount type

8-pin L



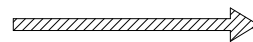
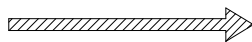
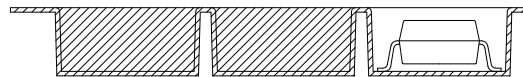
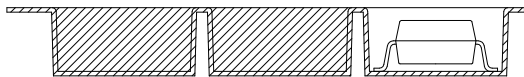
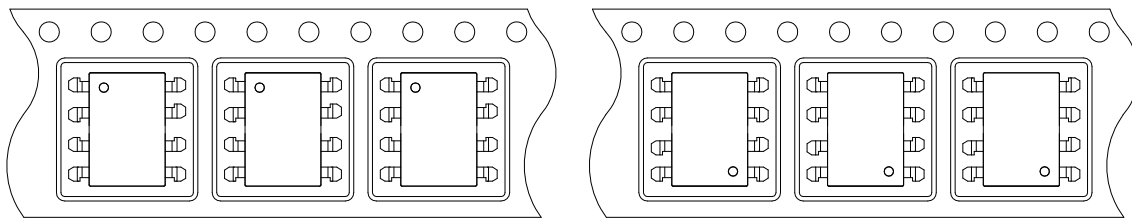
Unit : mm

● 8-pin SMD Carrier Tape & Reel



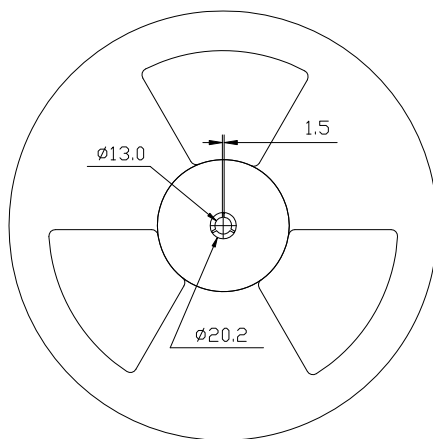
TL

TR

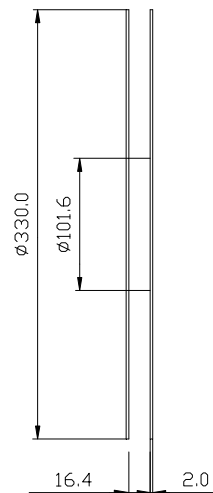


Direction of feed from reel

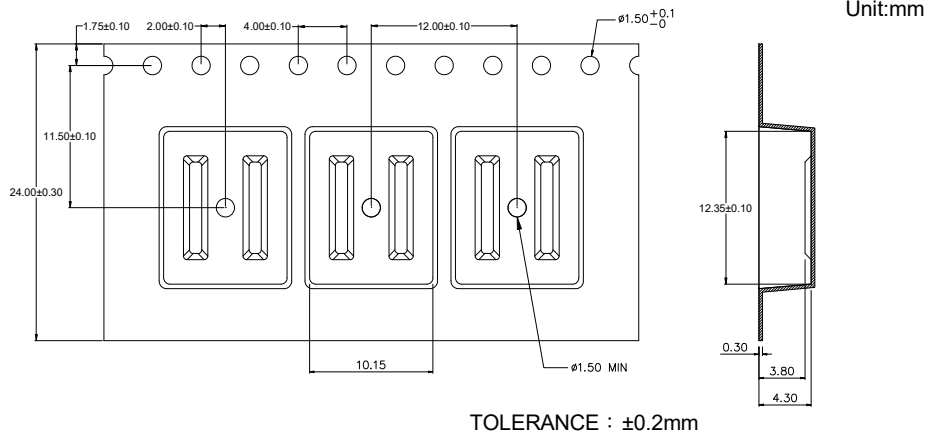
Direction of feed from reel



Quantity : 1000pcs/reel

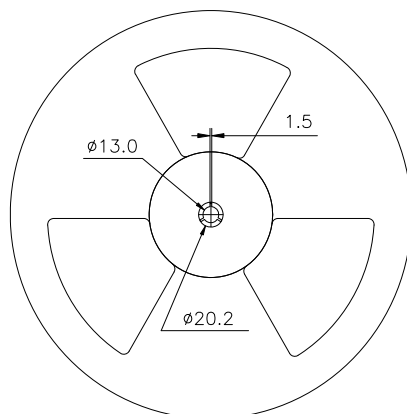
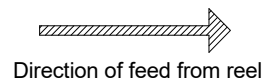
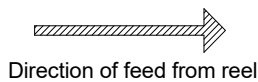
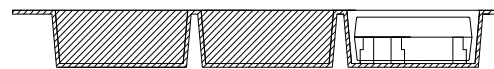
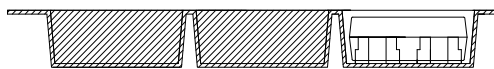
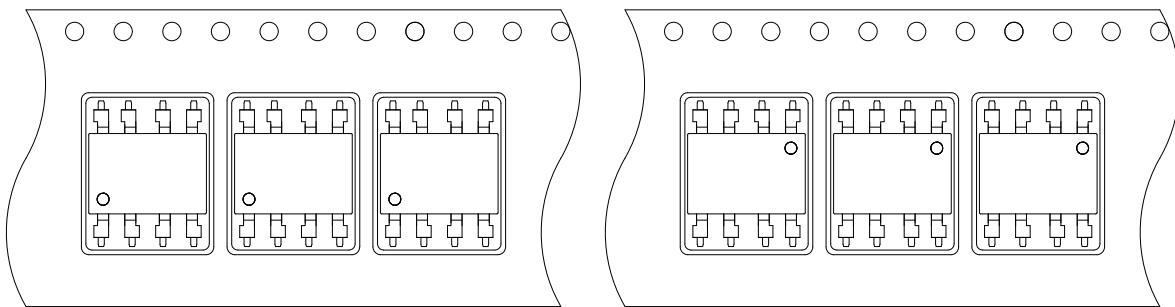


● 8-pin L Carrier Tape & Reel

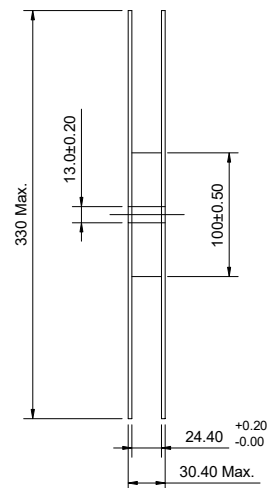


TLD

TRU



Quantity : 800pcs/reel





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