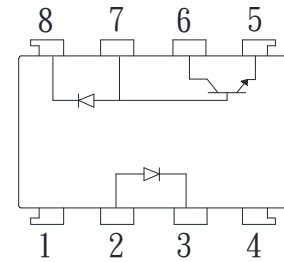


● Description

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

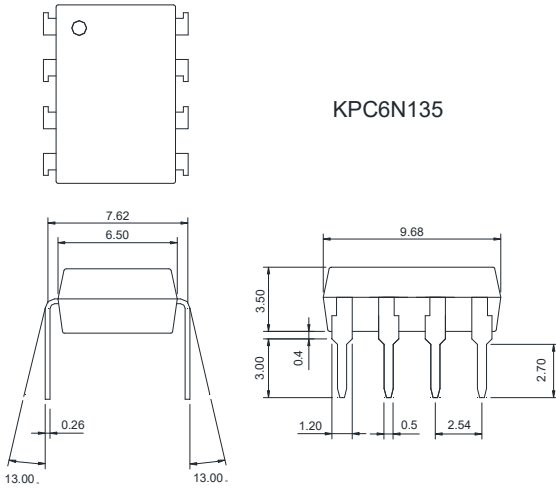
● Applications

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

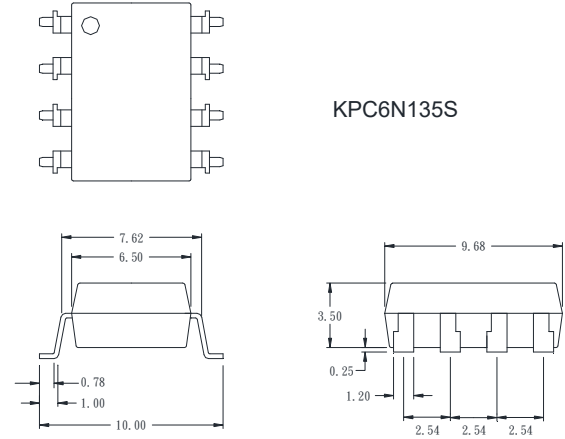
● **Outside Dimension**

Unit : mm

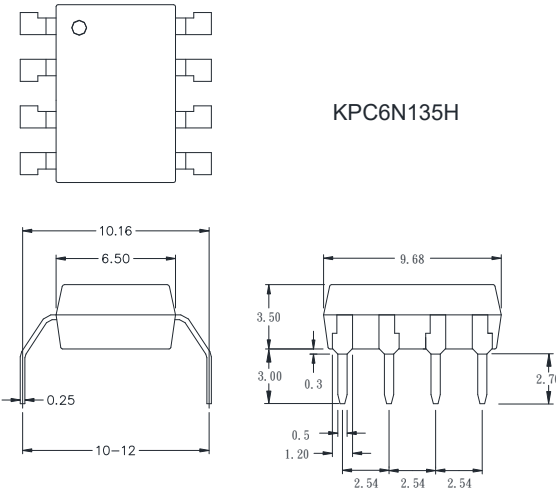
1. Dual-in-line type



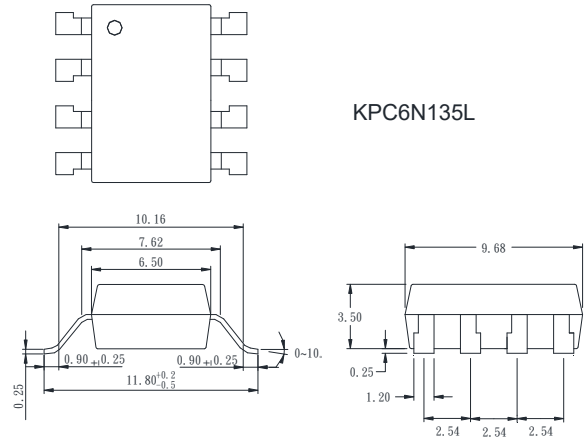
2. Surface mount type



3. Long creepage distance type

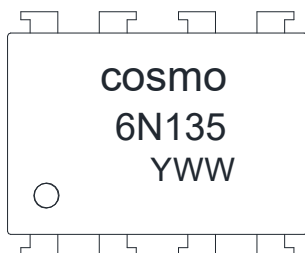


4. Long creepage distance for surface mount type



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

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

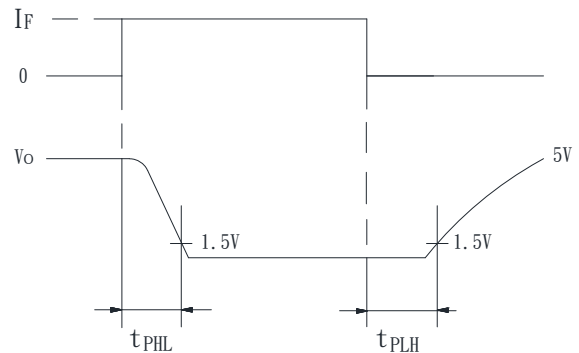
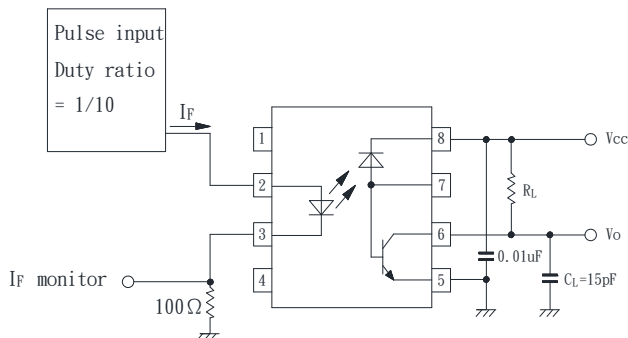
| Parameter | Symbol | Conditions | Min. | Typ. | Max. | Unit |
|--|-----------|---|------|-------|------|------------------------|
| *8 Propagation delay time *9 Output (1) → (0) | t_{PHL} | $R_L=4.1\text{K}\Omega$ | - | 0.3 | 1.5 | μS |
| *8 Propagation delay time *9 Output (0) → (1) | t_{PLH} | $R_L=4.1\text{K}\Omega$ | - | 0.4 | 1.5 | μS |
| *10 Instantaneous common mode rejection voltage *11 " Output (1) " | CM_H | $I_F=0$, $V_{CM}=10\text{V}_{P-P}$ | - | 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 $R_L=4.1\text{K}\Omega$ is equivalent to one LSTTL and $6.1\text{K}\Omega$ pull-up resistor.

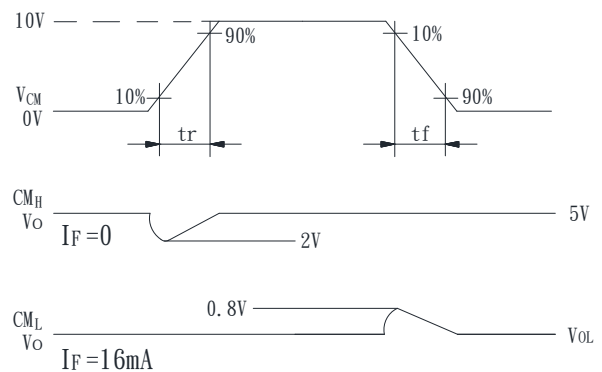
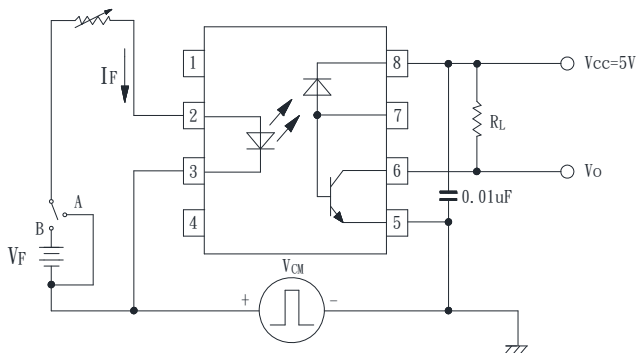
*10 Instantaneous common mode rejection voltage " output (1) " represents a common mode voltage variation that can hold the output above (1) level ($V_o > 2.0\text{V}$)
Instantaneous common mode rejection voltage " output (0) " represents a common mode voltage variation that can hold the output above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

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

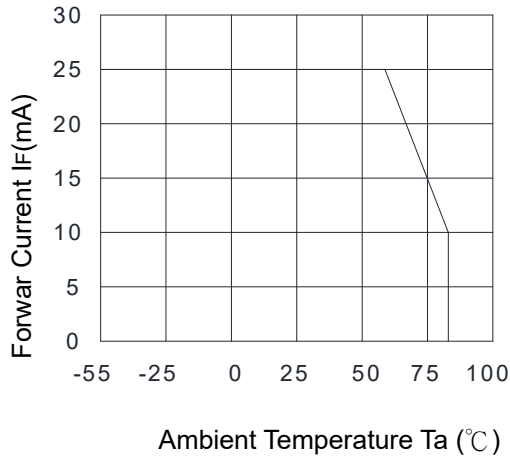
*9 Test Circuit Propagation Delay Time



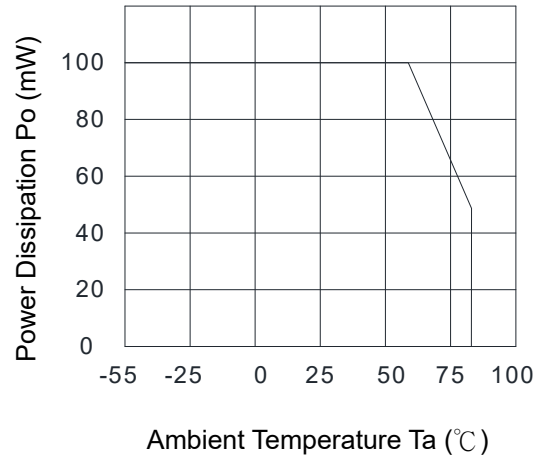
*11 Test Circuit for Instantaneous Common Mode Rejection Voltage



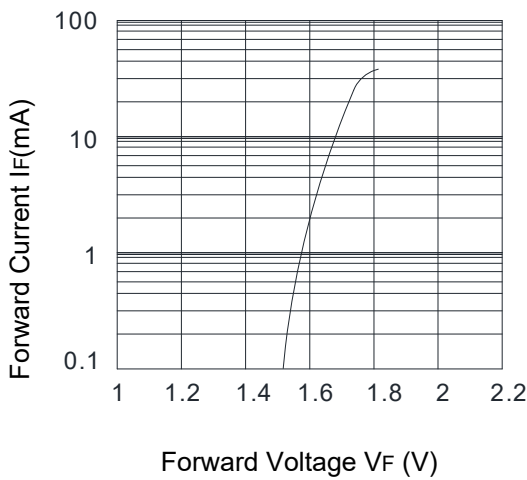
**Fig.1 Forward Current
vs. Ambient Temperature**



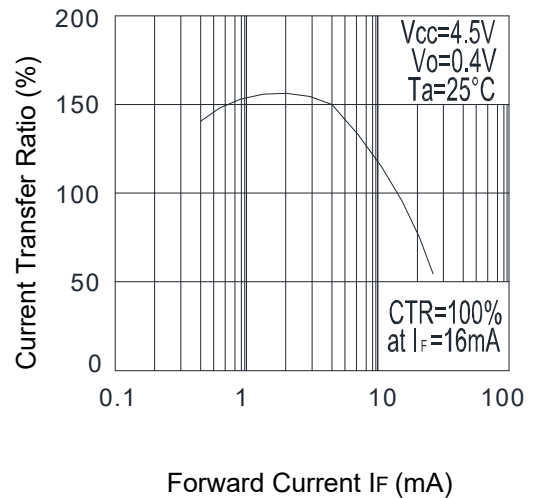
**Fig.2 Power Dissipation
vs. Ambient Temperature**



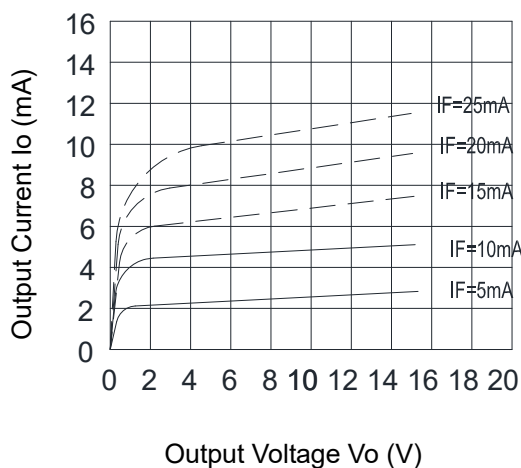
**Fig.3 Forward Current
vs. Forward Voltage**



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



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



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

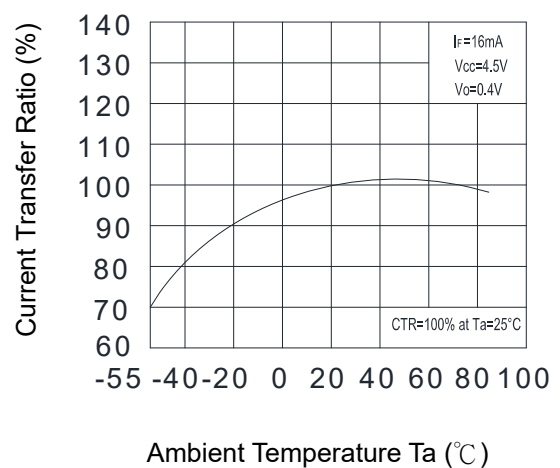


Fig.7 High Level Output Current vs. Ambient Temperature

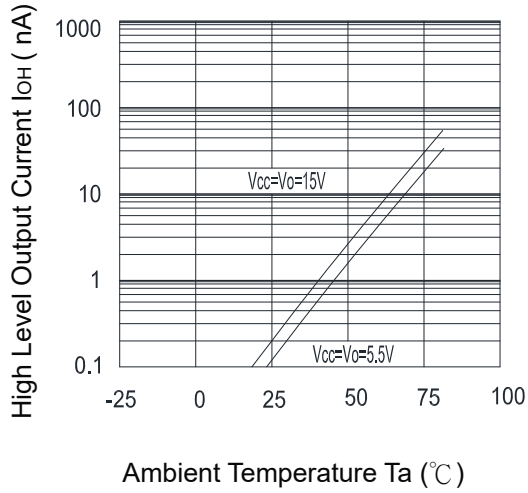
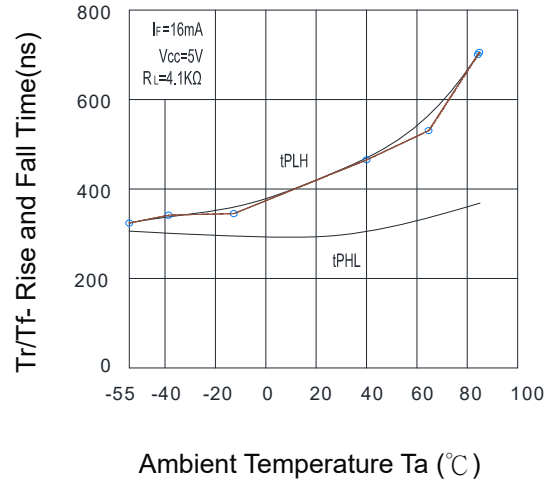


Fig.8 Propagation Delay Time vs. Ambient Temperature

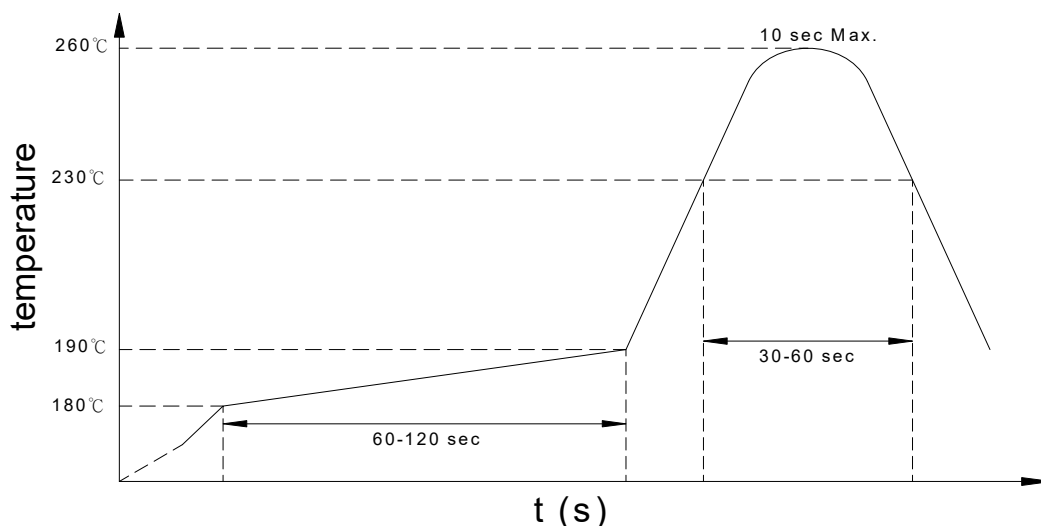


● Recommended Soldering Conditions

(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)

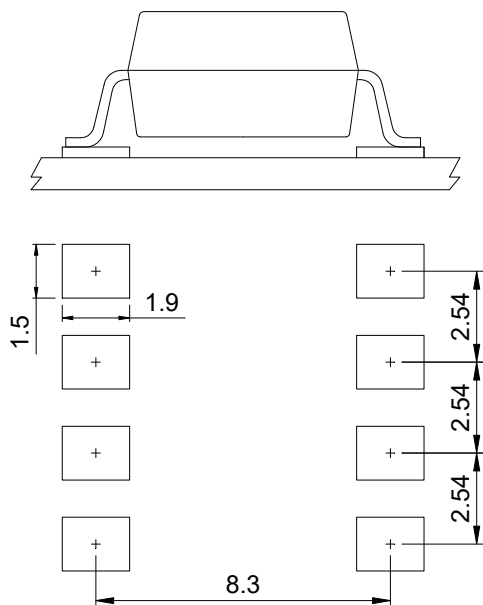
Y = Tape and reel option (TL · TR · TLD · TRU)

| 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**

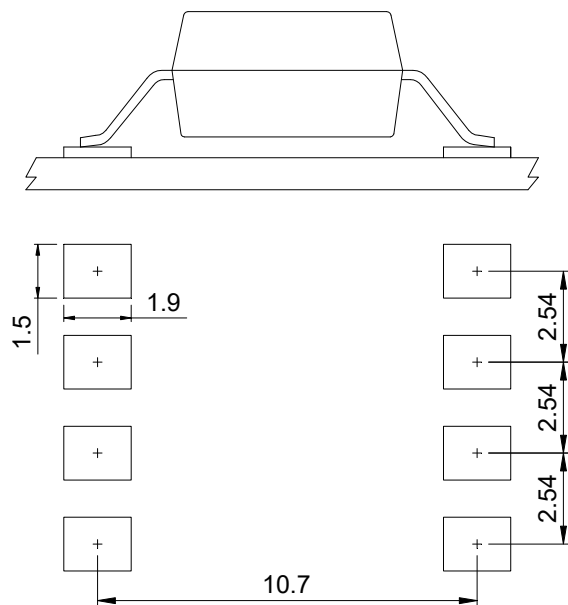
1.Surface mount type

8-pin SMD



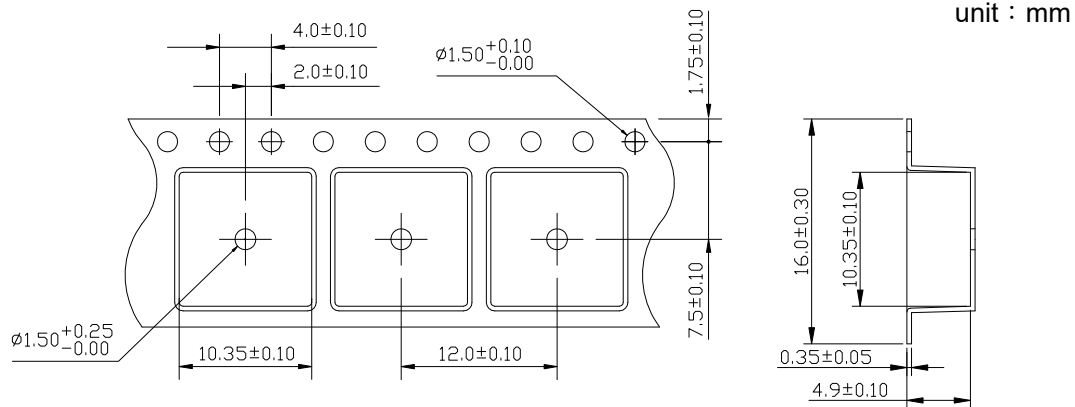
2.Long creepage distance for surface mount type

8-pin L



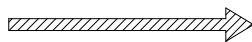
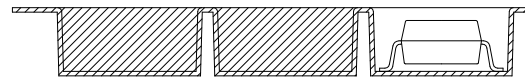
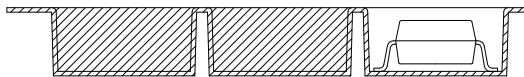
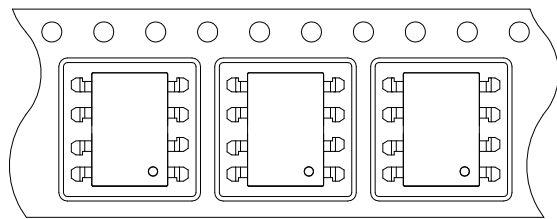
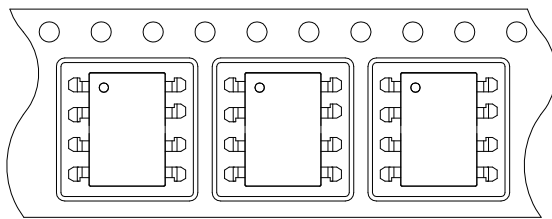
Unit : mm

● 8-pin SMD Carrier Tape & Reel

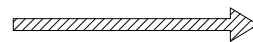


TL

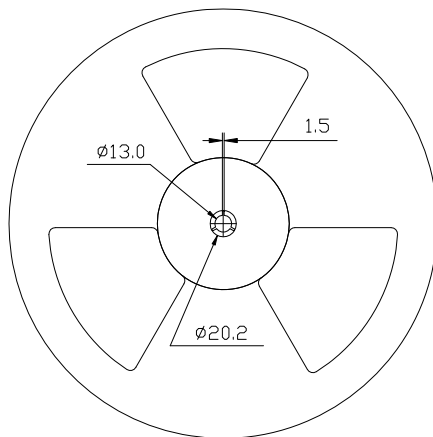
TR



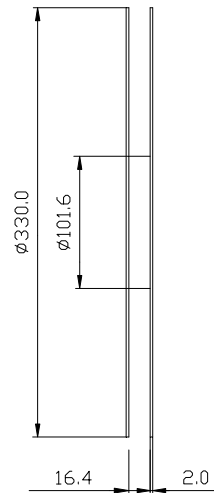
Direction of feed from reel



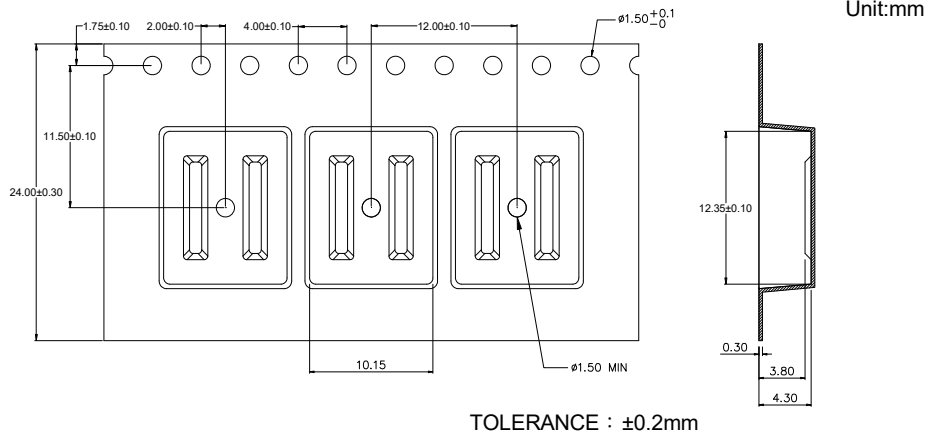
Direction of feed from reel



Quantity : 1000pcs/reel

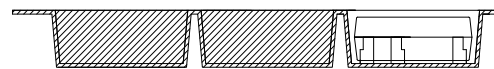
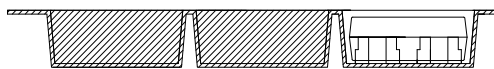
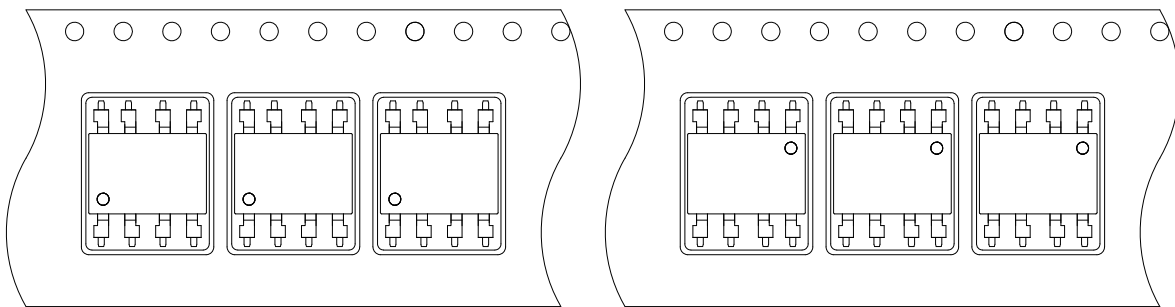


● 8-pin L Carrier Tape & Reel



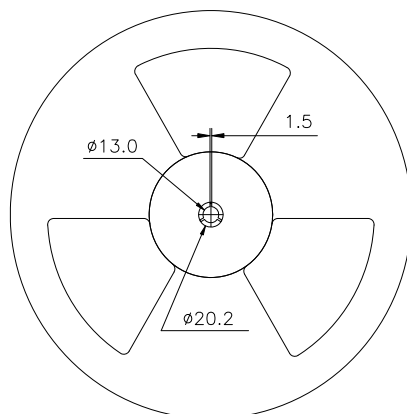
TLD

TRU

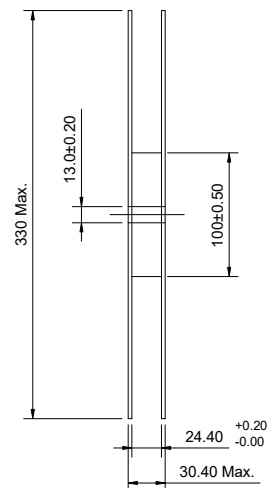


Direction of feed from reel

Direction of feed from reel



Quantity : 800pcs/reel



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