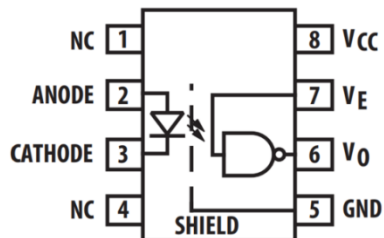


### ● Description

The KPC2611 series consist of an LED optically coupled to an OPIC chip. It is a high-speed digital output type photo coupler designed specifically for low circuit current. And it is packaged in a 8pin DIP type.

### ● Schematic



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

### ● Features

1. Dual voltage operation (3.3V/5V)
2. 15 kV/μs minimum Common Mode Rejection (CMR) at V<sub>CM</sub> = 1000V (3.3V operating voltage)
3. High speed: 10 MBd typical
4. LVTTL/LVCMOS compatible
5. Low input current capability: 5 mA
6. Guaranteed AC and DC performance over temperature: -40°C to +110°C
7. Safety approval  
CQC GB4943.1-2022

### ● Applications

- Communication interfaces: RS485, CANBus, and I2C
- Microprocessor system interfaces
- Line receiver – eliminate noise and transient problems
- PLC, ATE input /output isolation
- High speed A/D and D/A conversion
- Digital control power supply

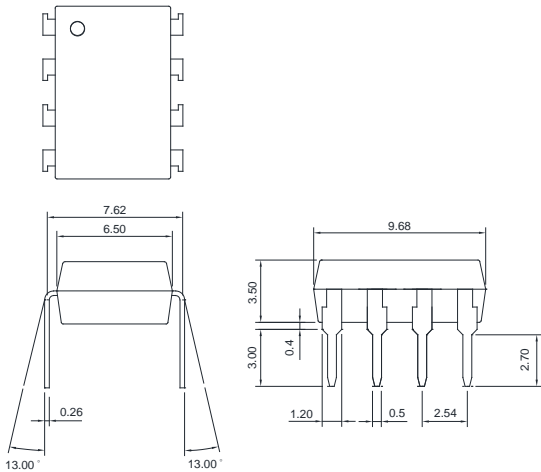
### ● Truth Table

| Input | Enable | Output |
|-------|--------|--------|
| ON    | H      | L      |
| OFF   | H      | H      |
| ON    | L      | H      |
| OFF   | L      | H      |
| ON    | NC     | L      |
| OFF   | NC     | H      |

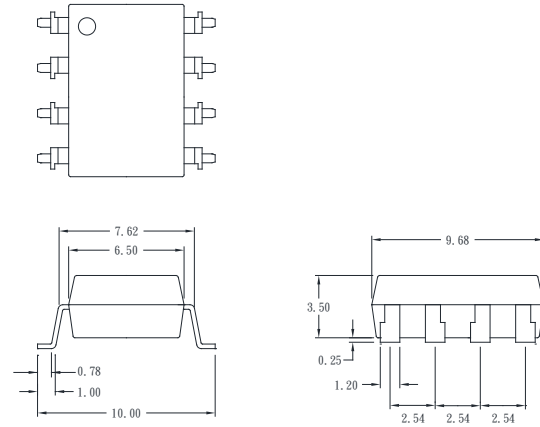
● **Outside Dimension**

Unit : mm

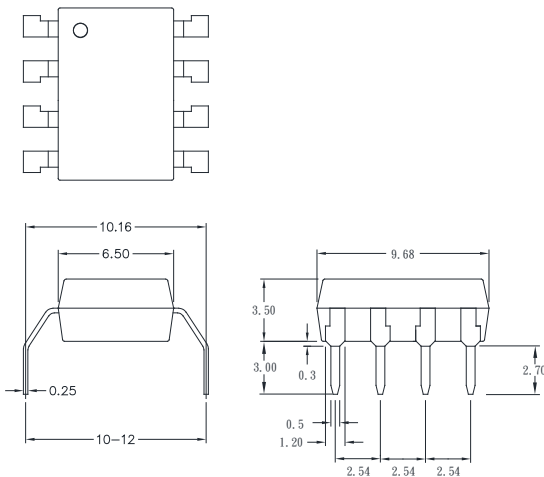
1. Dual-in-line type



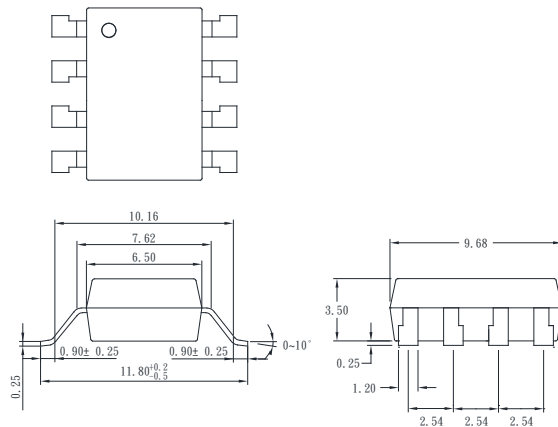
2. Surface mount type



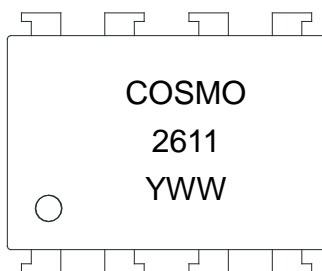
3. Long creepage distance type



4. Long creepage distance for surface mount type



● **Device Marking**



**Notes:**

COSMO  
2611  
YWW      Y: Year code / WW: Week code

### ● Absolute Maximum Ratings

(Ta = 25°C)

| Parameter                        |                                    | Symbol   | Rating       | Unit |
|----------------------------------|------------------------------------|----------|--------------|------|
| Input                            | Average Forward Input Current      | $I_F$    | 20           | mA   |
|                                  | Reverse Input Voltage              | $V_R$    | 5            | V    |
|                                  | Input Power Dissipation            | $P_I$    | 40           | mW   |
|                                  | Enable Input Current               | $I_E$    | 5            | mA   |
|                                  | Enable Input Voltage               | $V_E$    | $V_{CC}+0.5$ | V    |
| Output                           | Supply Voltage                     | $V_{CC}$ | 7            | V    |
|                                  | Output Collector Current           | $I_O$    | 50           | mA   |
|                                  | Output Collector Voltage           | $V_O$    | 7            | V    |
|                                  | Output Collector Power Dissipation | $P_O$    | 85           | mW   |
| Isolation voltage 1 minute *1    |                                    | Viso     | 5000         | Vrms |
| Operating temperature            |                                    | Topr     | -40 to +110  | °C   |
| Storage temperature              |                                    | Tstg     | -55 to +125  | °C   |
| Soldering temperature 10 seconds |                                    | Tsol     | 260          | °C   |

Note 1: This device is considered as a two-terminal device: Pins 1 and 3 are shorted together, and pins 4, 5 and 6 are shorted together.

### ● Recommended Operating Conditions

| Parameter                 | Symbol   | Min | Max      | Unit |
|---------------------------|----------|-----|----------|------|
| Low level input current   | $I_{FL}$ | 0   | 250      | μA   |
| High level input current  | $I_{FH}$ | 5.0 | 15       | mA   |
| High level enable voltage | $V_{EH}$ | 2.0 | $V_{CC}$ | V    |
| Low level enable voltage  | $V_{EL}$ | 0   | 0.8      | V    |
| Supply voltage            | $V_{CC}$ | 2.7 | 3.6      | V    |
|                           |          | 4.5 | 5.5      |      |
| Fanout (TTL load )        | N        | -   | 5        | -    |
| Output Pull up Resistor   | $R_L$    | 330 | 4K       | Ω    |

### ● Electro-optical Characteristics

Over recommended operating condition ( $T_A = -40^{\circ}\text{C}$  to  $+110^{\circ}\text{C}$ ,  $2.7\text{V} \leq V_{DD} \leq 3.6$ ) unless otherwise specified.  
All Typical specifications at  $V_{CC} = 3.3\text{V}$ ,  $T_A = 25^{\circ}\text{C}$ .

| Parameter                                | Symbol                  | Conditions   | Min. | Typ.      | Max. | Unit                   |
|--|-------------------------|--|------|-----------|------|------------------------|
| Input forward voltage (*4)               | $V_F$                   | $I_F=10\text{mA}$  | -    | 1.35      | 1.6  | V                      |
| Input reverse voltage                    | $BV_R$                  | $I_R=10\mu\text{A}$  | 5    | -         | -    | V                      |
| Input capacitance                        | $C_{IN}$                | $V_F=0$ , $f=1\text{MHz}$  | -    | 60        | -    | pF                     |
| Logic (1) output current                 | $I_{OH}$                | $V_{CC}=3.3\text{V}$ , $V_O=3.3\text{V}$ , $I_F=250\mu\text{A}$ , $V_E=2.0\text{V}$                            | -    | 5.5       | 100  | $\mu\text{A}$          |
| Input Threshold Current                  | $I_{TH}$                | $V_{CC} = 3.3\text{V}$ , $V_E = 2.0\text{V}$ , $V_O = 0.6\text{V}$ ,<br>$I_{OL}(\text{Sinking}) = 13\text{mA}$ | -    | 2         | 5    | mA                     |
| Logic (0) output voltage                 | $V_{OL}$                | $V_{CC}=3.3\text{V}$ , $V_E=2\text{V}$ , $I_F=5\text{mA}$ ,<br>$I_{OL}(\text{Sinking})=13\text{mA}$            | -    | 0.3       | 0.6  | V                      |
| Logic (1) enable current                 | $I_{EH}$                | $V_{CC}=3.3\text{V}$ , $V_E=2.0\text{V}$   | -    | -0.7      | -1.6 | mA                     |
| Logic (0) enable current                 | $I_{EL}$                | $V_{CC}=3.3\text{V}$ , $V_E=0.5\text{V}$   | -    | -0.9      | -1.6 | mA                     |
| High Level Enable Voltage                | $V_{EH}$                | -  | 2.0  | -         | -    | V                      |
| Low Level Enable                         | $V_{EL}$                | -  | -    | -         | 0.8  | V                      |
| Logic (1) supply current                 | $I_{CCH}$               | $V_{CC}=3.3\text{V}$ , $V_E=0.5\text{V}$ , $I_F=0\text{mA}$  | -    | 4         | 10   | mA                     |
|  |                         | $V_{CC}=3.3\text{V}$ , $V_E= V_{CC}$ , $I_F=0\text{mA}$  | -    | -         | -    | mA                     |
| Logic (0) supply current                 | $I_{CCL}$               | $V_{CC}=3.3\text{V}$ , $V_E=0.5\text{V}$ , $I_F=10\text{mA}$   | -    | 4         | 13   | mA                     |
|  |                         | $V_{CC}=3.3\text{V}$ , $V_E= V_{CC}$ , $I_F=10\text{mA}$   | -    | -         | -    | mA                     |
| Isolation resistance (input-output) (*5) | $R_{I-O}$               | $V_{I-O}=500\text{V}$ , $T_a=25^{\circ}\text{C}$   | -    | $10^{12}$ | -    | $\Omega$               |
| Capacitance (input-output) (*5)          | $C_{I-O}$               | $f=1\text{MHz}$ , $T_a=25^{\circ}\text{C}$   | -    | 0.6       | -    | pF                     |
| Input Diode Temperature Coefficient      | $\Delta V_F/\Delta T_A$ | $I_F = 10\text{mA}$  | -    | -1.6      | -    | mV/ $^{\circ}\text{C}$ |

Over recommended operating condition ( $T_A = -40^{\circ}\text{C}$  to  $+110^{\circ}\text{C}$ ,  $4.5\text{V} \leq V_{DD} \leq 5.5$ ) unless otherwise specified.  
All Typical specifications at  $V_{CC} = 5\text{V}$ ,  $T_A = 25^{\circ}\text{C}$ .

| Parameter                           | Symbol                  | Conditions   | Min. | Typ.      | Max. | Unit                   |
|-------------------------------------|-------------------------|--|------|-----------|------|------------------------|
| Input forward voltage (*4)          | $V_F$                   | $I_F=10\text{mA}$ , $T_a=25^{\circ}\text{C}$   | 1.4  | 1.5       | 1.75 | V                      |
| Input reverse voltage               | $BV_R$                  | $I_R=10\mu\text{A}$ , $T_a=25^{\circ}\text{C}$   | 5    | -         | -    | V                      |
| Input capacitance                   | $C_{IN}$                | $V_F=0$ , $f=1\text{MHz}$  | -    | 60        | -    | pF                     |
| Logic (1) output current            | $I_{OH}$                | $V_{CC}=5.5\text{V}$ , $V_O=5.5\text{V}$ , $I_F=250\mu\text{A}$ , $V_E=2.0\text{V}$                            | -    | 5.5       | 100  | $\mu\text{A}$          |
| Input Threshold Current             | $I_{TH}$                | $V_{CC} = 5.5\text{V}$ , $V_E = 2.0\text{V}$ , $V_O = 0.6\text{V}$ ,<br>$I_{OL}(\text{Sinking}) = 13\text{mA}$ | -    | 2         | 5    | mA                     |
| Logic (0) output voltage            | $V_{OL}$                | $V_{CC}=5.5\text{V}$ , $V_E=2\text{V}$ , $I_F=5\text{mA}$ ,<br>$I_{OL}(\text{Sinking})=13\text{mA}$            | -    | 0.35      | 0.6  | V                      |
| Logic (1) enable current            | $I_{EH}$                | $V_{CC}=5.5\text{V}$ , $V_E=2.0\text{V}$   | -    | -0.7      | -1.6 | mA                     |
| Logic (0) enable current            | $I_{EL}$                | $V_{CC}=5.5\text{V}$ , $V_E=0.5\text{V}$   | -    | -0.9      | -1.6 | mA                     |
| High Level Enable Voltage           | $V_{EH}$                | -  | 2.0  | -         | -    | V                      |
| Low Level Enable Voltage            | $V_{EL}$                | -  | -    | -         | 0.8  | V                      |
| Logic (1) supply current            | $I_{CCH}$               | $V_{CC}=5.5\text{V}$ , $V_E=0.5\text{V}$ , $I_F=0\text{mA}$  | -    | 4         | 10   | mA                     |
|                                     |                         | $V_{CC}=5.5\text{V}$ , $V_E= V_{CC}$ , $I_F=0\text{mA}$  | -    | -         | -    | mA                     |
| Logic (0) supply current            | $I_{CCL}$               | $V_{CC}=5.5\text{V}$ , $V_E=0.5\text{V}$ , $I_F=10\text{mA}$   | -    | 4         | 13   | mA                     |
|                                     |                         | $V_{CC}=5.5\text{V}$ , $V_E= V_{CC}$ , $I_F=10\text{mA}$   | -    | -         | -    | mA                     |
| Isolation resistance (input-output) | $R_{I-O}$               | $V_{I-O}=500\text{V}$ , $T_a=25^{\circ}\text{C}$   | -    | $10^{12}$ | -    | $\Omega$               |
| Capacitance (input-output) (*5)     | $C_{I-O}$               | $f=1\text{MHz}$ , $T_a=25^{\circ}\text{C}$   | -    | 0.6       | -    | pF                     |
| Input Diode Temperature Coefficient | $\Delta V_F/\Delta T_A$ | $I_F = 10\text{mA}$  | -    | -1.6      | -    | mV/ $^{\circ}\text{C}$ |

● **Switching Specifications**

Over recommended temperature (TA = -40°C to +110°C), VCC = 3.3V, IF = 7.5 mA unless otherwise specified.  
All Typical specifications at TA = 25°C, Vcc=3.3V.

| Parameter                                   | Symbol                              | Conditions   | Min.   | Typ. | Max. | Unit |
|---|-------------------------------------|--|--------|------|------|------|
| Propagation delay time to high output level | t <sub>PLH</sub>                    | R <sub>L</sub> =350Ω, C <sub>L</sub> =15pF   | -      | 100  | 150  | ns   |
| Propagation delay time to low output level  | t <sub>PHL</sub>                    |  | -      | 65   | 100  | ns   |
| Pulse Width Distortion                      | t <sub>PHL</sub> - t <sub>PLH</sub> |  | -      | -    | 50   | ns   |
| Propagation Delay Skew                      | t <sub>PSK</sub>                    |  | -      | -    | 50   | ns   |
| Rise time                                   | t <sub>r</sub>                      | R <sub>L</sub> =350Ω, C <sub>L</sub> =15pF   | -      | 45   | -    | ns   |
| Fall time                                   | t <sub>f</sub>                      |  | -      | 35   | -    | ns   |
| Propagation delay time to high output level | t <sub>ELH</sub>                    | R <sub>L</sub> =350Ω, C <sub>L</sub> =15pF<br>V <sub>EH</sub> =3V, V <sub>EL</sub> =0V                                     | -      | 27   | -    | ns   |
| Propagation delay time to low output level  | t <sub>EHL</sub>                    |  | -      | 9    | -    | Ns   |
| High level Common Mode Transient Immunity   | CM <sub>H</sub>                     | I <sub>F</sub> =0mA, V <sub>CC</sub> =3.3V<br>V <sub>CM</sub> =1,000V, V <sub>O</sub> (Min)=2.0V<br>R <sub>L</sub> =350Ω   | 10,000 | -    | -    | V/us |
| Low level Common Mode Transient Immunity    | CM <sub>L</sub>                     | I <sub>F</sub> =7.5mA, V <sub>CC</sub> =3.3V<br>V <sub>CM</sub> =1,000V, V <sub>O</sub> (Max)=0.8V<br>R <sub>L</sub> =350Ω | 10,000 | -    | -    | V/us |

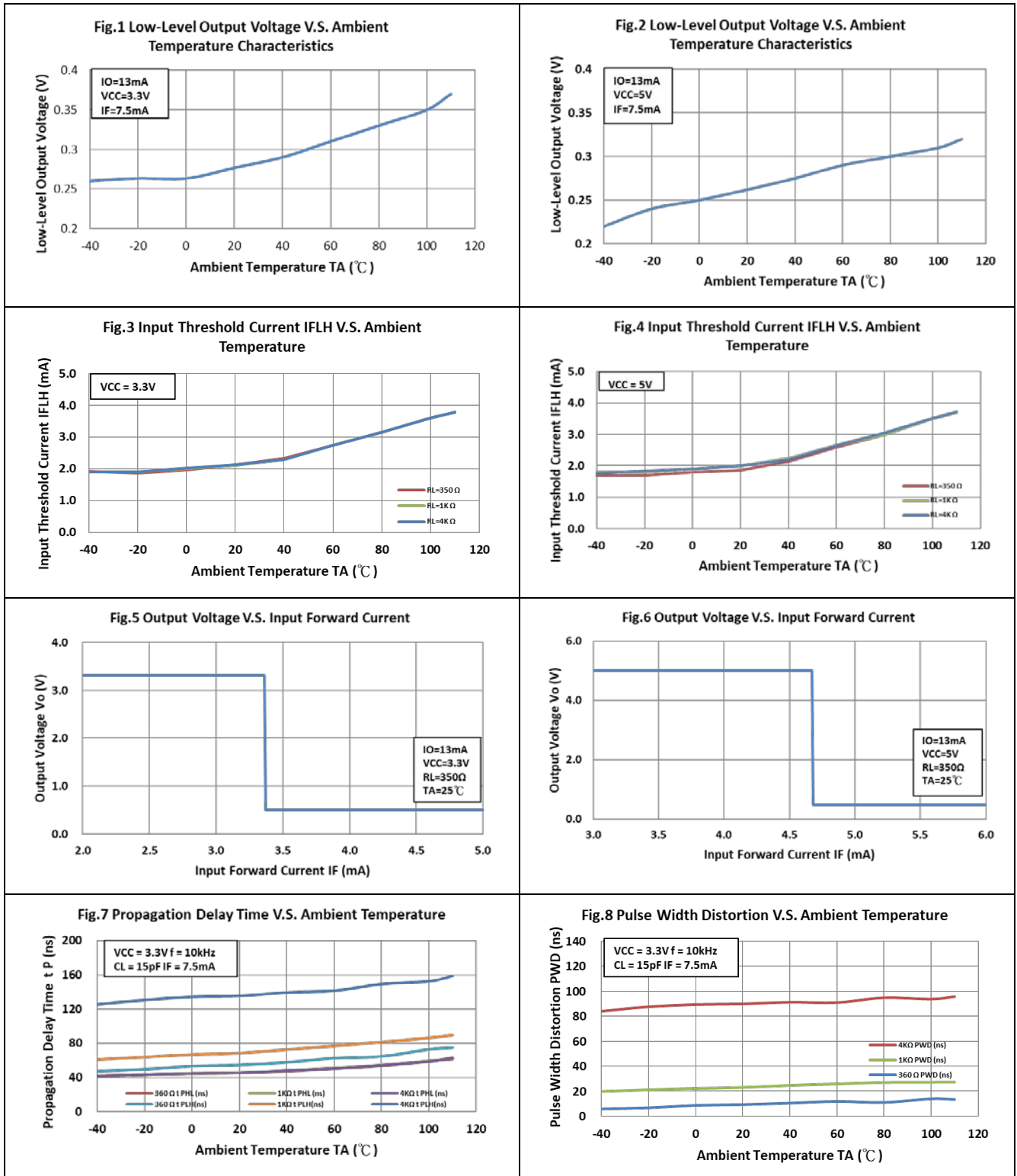
● **Switching Specifications**

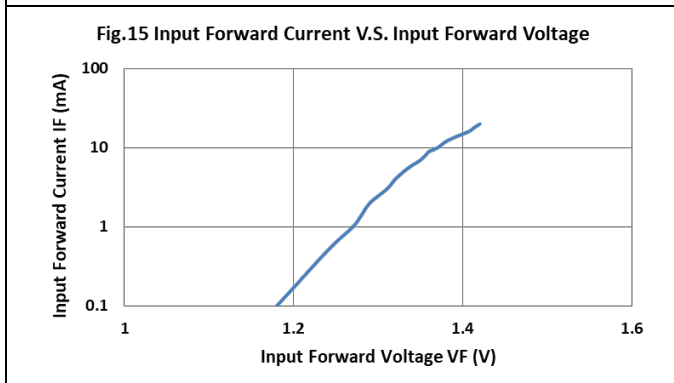
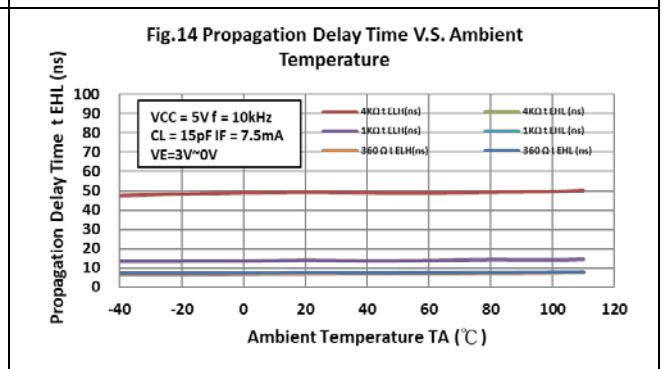
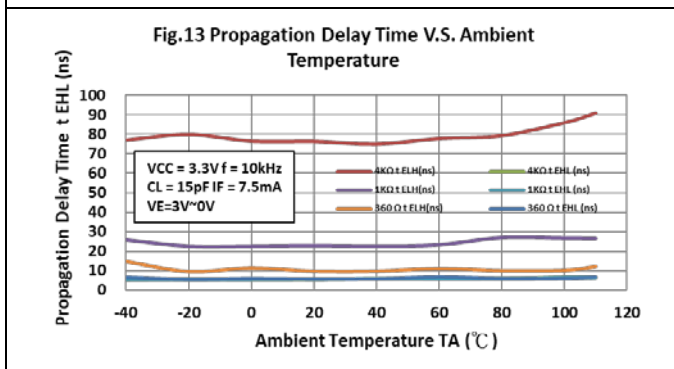
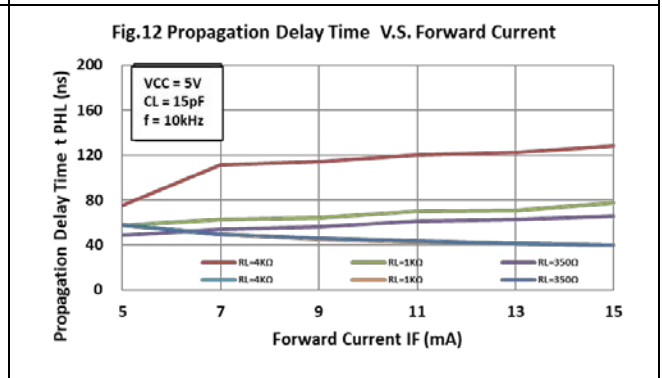
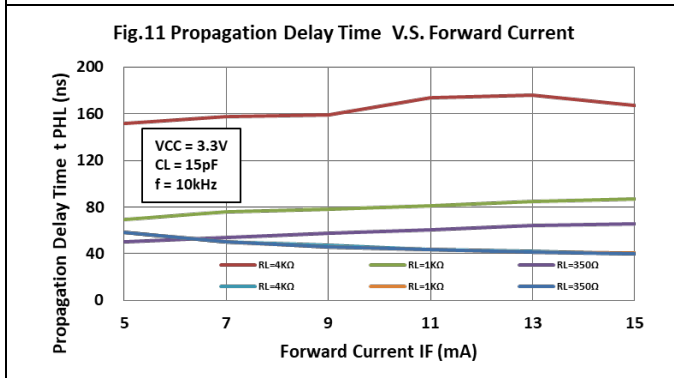
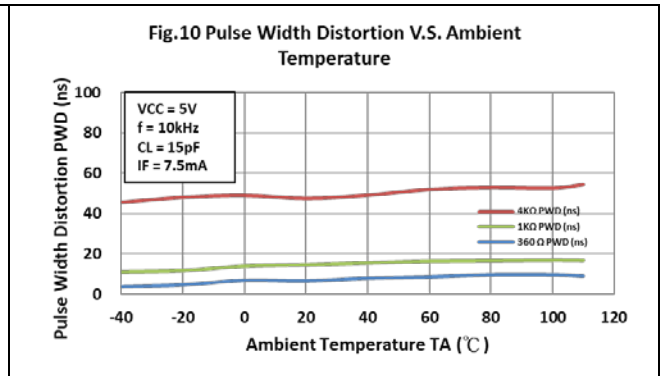
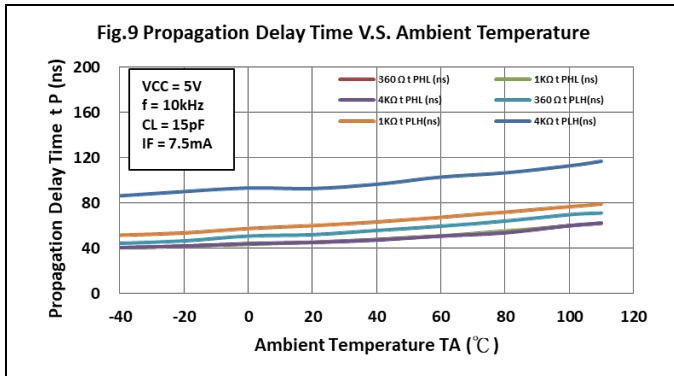
Over recommended temperature (TA = -40°C to +110°C), VCC = 5V, IF = 7.5 mA unless otherwise specified.  
All Typical specifications at TA = 25°C, Vcc=5V.

| Parameter                                   | Symbol                              | Conditions   | Min.   | Typ. | Max. | Unit |
|---|-------------------------------------|--|--------|------|------|------|
| Propagation delay time to high output level | t <sub>PLH</sub>                    | R <sub>L</sub> =350Ω, C <sub>L</sub> =15pF   | -      | 100  | 150  | ns   |
| Propagation delay time to low output level  | t <sub>PHL</sub>                    |  | -      | 65   | 100  | ns   |
| Pulse Width Distortion                      | t <sub>PHL</sub> - t <sub>PLH</sub> |  | -      | -    | 50   | ns   |
| Propagation Delay Skew                      | t <sub>PSK</sub>                    |  | -      | -    | 50   | ns   |
| Rise time                                   | t <sub>r</sub>                      | R <sub>L</sub> =350Ω, C <sub>L</sub> =15pF   | -      | 50   | -    | ns   |
| Fall time                                   | t <sub>f</sub>                      |  | -      | 40   | -    | ns   |
| Propagation delay time to high output level | t <sub>ELH</sub>                    | R <sub>L</sub> =350Ω, C <sub>L</sub> =15pF<br>V <sub>EH</sub> =3V, V <sub>EL</sub> =0V                                   | -      | 28   | -    | ns   |
| Propagation delay time to low output level  | t <sub>EHL</sub>                    |  | -      | 13   | -    | ns   |
| High level Common Mode Transient Immunity   | CM <sub>H</sub>                     | I <sub>F</sub> =0mA, V <sub>CC</sub> =5V<br>V <sub>CM</sub> =1,000V, V <sub>O</sub> (Min)=2.0V<br>R <sub>L</sub> =350Ω   | 15,000 | -    | -    | V/us |
| Low level Common Mode Transient Immunity    | CM <sub>L</sub>                     | I <sub>F</sub> =7.5mA, V <sub>CC</sub> =5V<br>V <sub>CM</sub> =1,000V, V <sub>O</sub> (Max)=0.8V<br>R <sub>L</sub> =350Ω | 15,000 | -    | -    | V/us |

## Notes

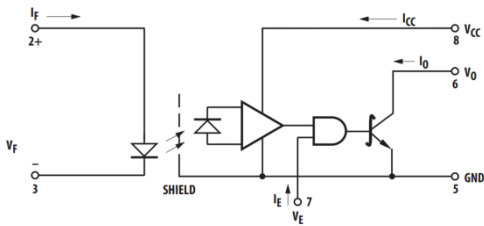
1. Peaking driving circuit may be used to speed up the LED. The peak drive current of LED may go up to 50mA and maximum pulse width 50ns, as long as average current doesn't exceed 20mA.
2. tPLH (propagation delay) is measured from the 3.75 mA point on the falling edge of the input pulse to the 1.5 V point on the rising edge of the output pulse.
3. tPHL (propagation delay) is measured from the 3.75 mA point on the rising edge of the input pulse to the 1.5 V point on the falling edge of the output pulse.
4. The tELH enable propagation delay is measured from the 1.5 V point on the falling edge of the enable input pulse to the 1.5 V point on the rising edge of the output pulse.
5. The tEHL enable propagation delay is measured from the 1.5 V point on the rising edge of the enable input pulse to the 1.5 V point on the falling edge of the output pulse.
6. CMH is the maximum tolerable rate of rise of the common mode voltage to assure that the output will remain in a high logic state (i.e.,  $V_O > 2.0$  V).
7. CML is the maximum tolerable rate of fall of the common mode voltage to assure that the output will remain in a low logic state (i.e.,  $V_O < 0.8$  V).



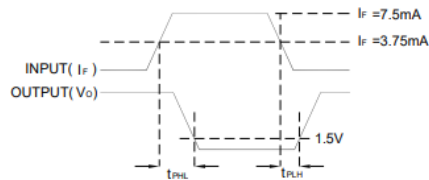
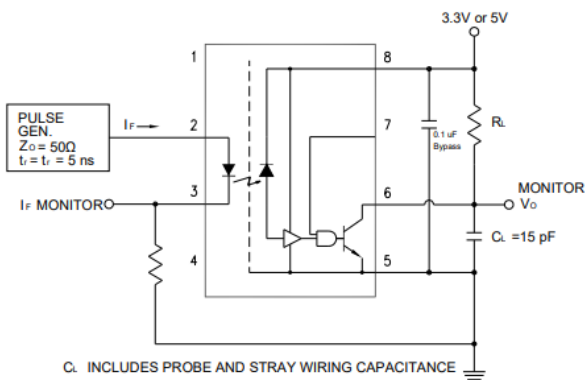




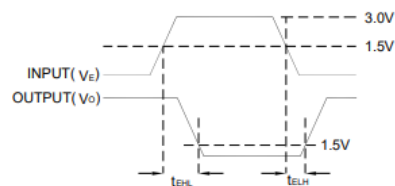
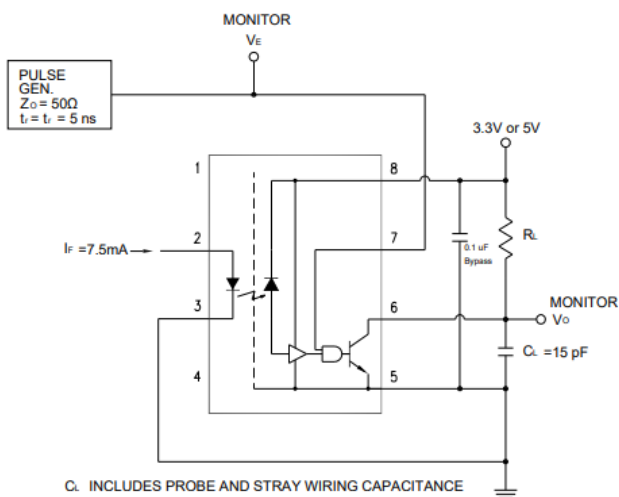
## Circuit Block Diagram



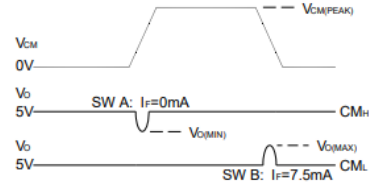
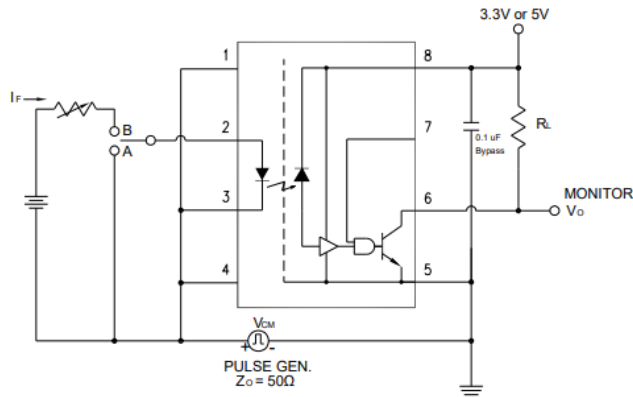
- **Test Circuit for Propagation Delay time  $t_{PHL}$  and  $t_{PLH}$**



- **Test Circuit for Propagation Delay time  $t_{EHL}$  and  $t_{ELH}$**



● **Test Circuit for Instantaneous Common Mode Rejection Voltage**

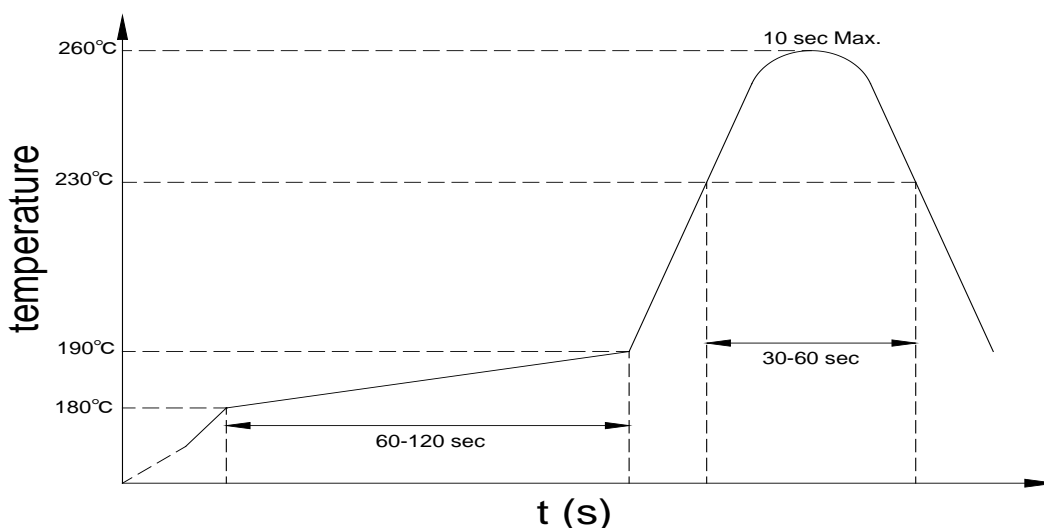


### ● Recommended Soldering Conditions

#### (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**

## KPC2611 X (Y)

**Notes:**

KPC2611 = Part No.

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

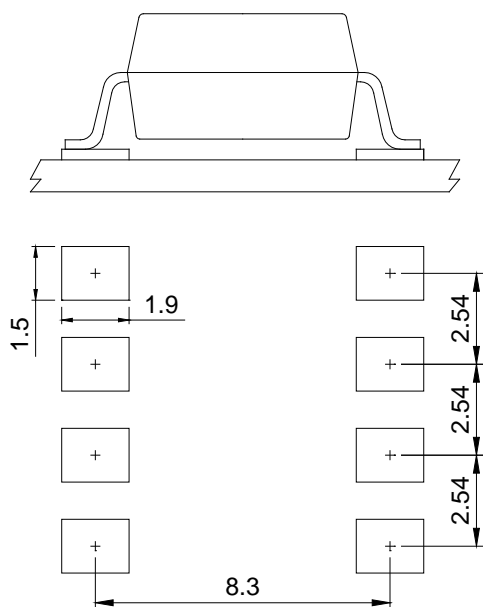
Y = Tape and reel option (TL · TR · TLD · TRU)

| 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**

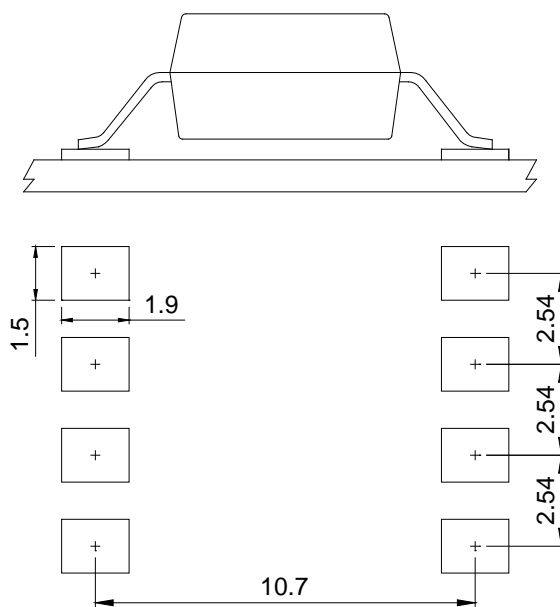
**1.Surface mount type**

8-pin SMD



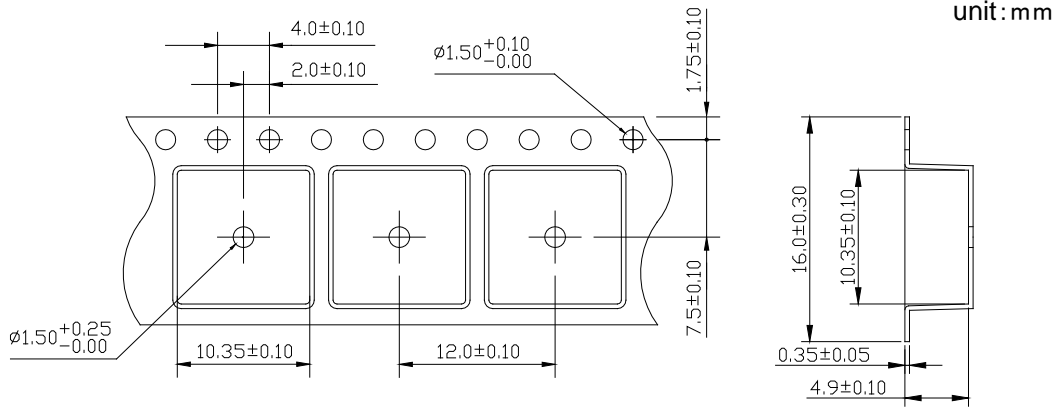
**2.Long creepage distance for surface mount type**

8-pin L



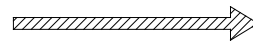
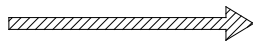
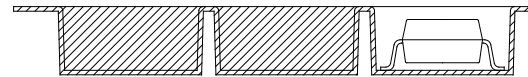
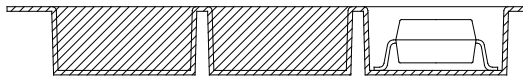
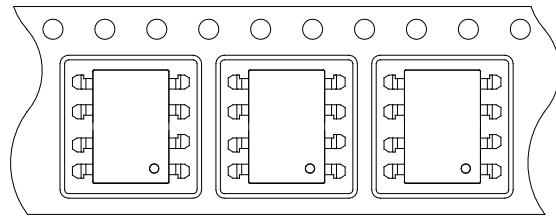
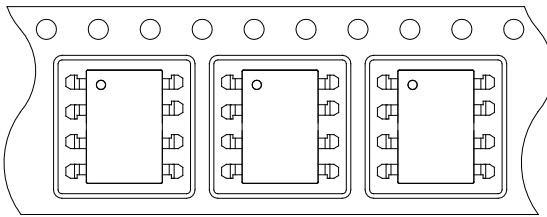
Unit :mm

● 8-pin SMD Carrier Tape & Reel



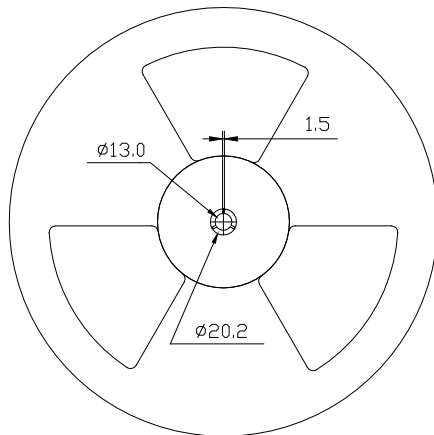
TL

TR

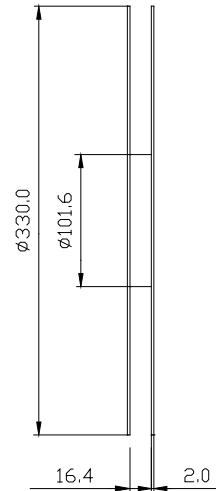


Direction of feed from reel

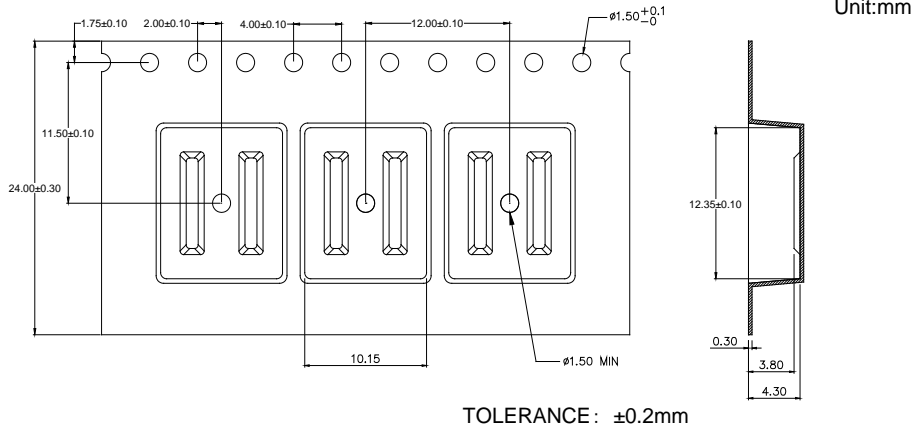
Direction of feed from reel



Quantity: 1000pcs/reel

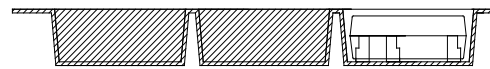
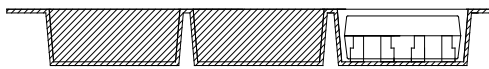
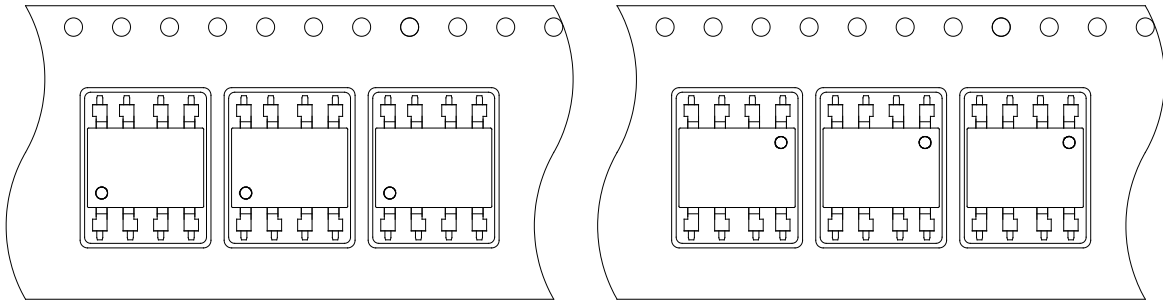


● 8-pin L Carrier Tape & Reel



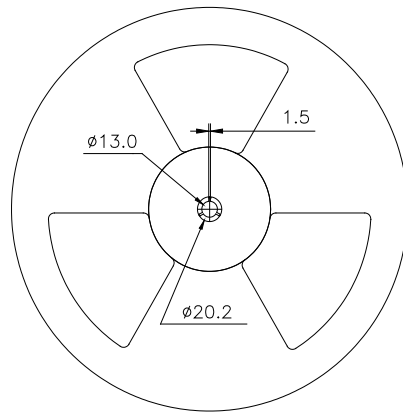
TLD

TRU

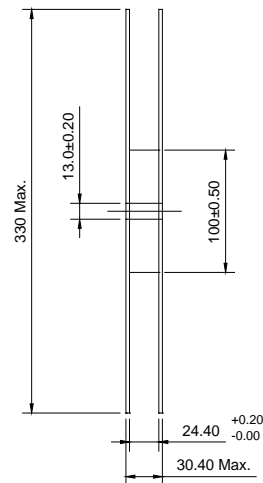


Direction of feed from reel

Direction of feed from reel



Quantity: 800pcs/reel



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