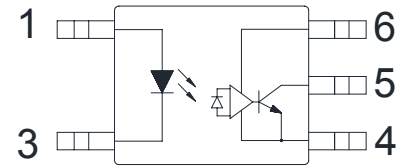


● Description

The KPC410 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 5pin mini-flat package.

● Schematic



- 1. Anode
- 3. Cathode
- 4. GND
- 5. Vo
- 6. Vcc

● Features

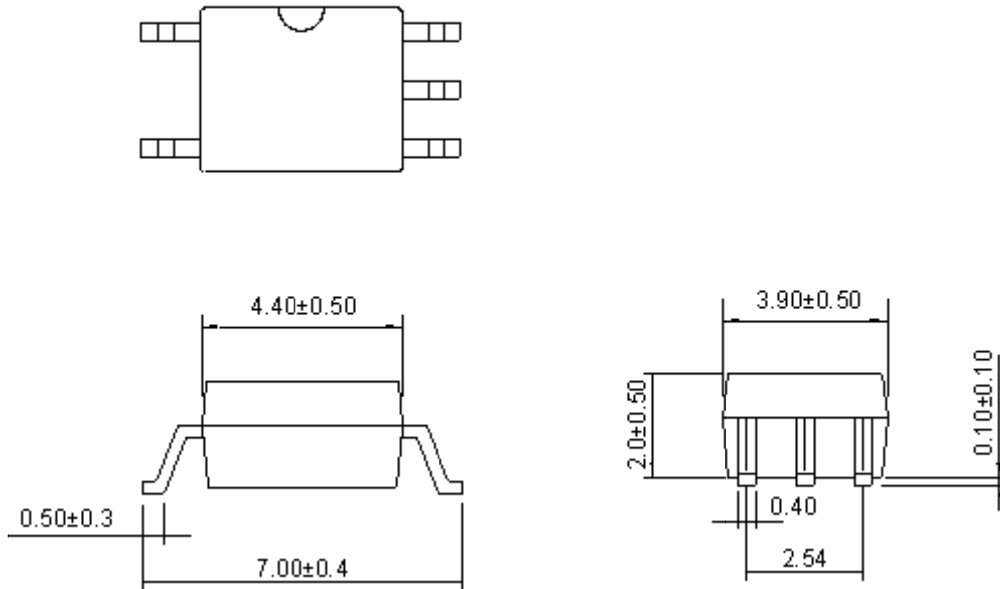
1. Pb free and RoHS compliant
2. 5 pin mini-flat package
3. Super high speed response (t_{PLH}, t_{PHL} : typ. 45ns at $R_L=350\ \text{ohm}$)
4. Instantaneous common mode rejection voltage (CM_H : typ. 500V/us)
5. High isolation voltage between input and output (V_{iso} : 3750Vrms)
6. Low input current drive (I_{FHL} : Max. 5mA)
7. LSTTL and TTL compatible output
8. MSL class 1
9. Agency Approvals:
 - UL Approved (No. E169586): UL1577
 - c-UL Approved (No. E169586)
 - VDE Approved (No. 40020973): DIN EN60747-5-5

● Applications

- High speed interfaces for computer peripherals, microcomputer systems
- High speed line receivers
- Noise reduction
- Interfaces for data transmission equipment.
- Inverter

● **Outside Dimension**

Unit : mm



TOLERANCE: ±0.2mm

● **Device Marking**



Notes:

cosmo
410
YWW

Y: Year code / WW: Week code

● Absolute Maximum Ratings

(Ta=25°C)

| Parameter | | Symbol | Rating | Unit |
|----------------------------------|------------------------------------|-----------|-------------|------|
| Input | Forward current (*1) | I_F | 25 | mA |
| | Peak forward current (*2) | I_{FM} | 40 | mA |
| | Reverse voltage | V_R | 5 | V |
| | Power dissipation | P_D | 45 | mW |
| Output | Supply voltage | V_{CC} | 7 | V |
| | High level output voltage | V_{OIL} | 7 | V |
| | Low level output current | I_{OL} | 50 | mA |
| | Output collector power dissipation | P_C | 85 | mW |
| Isolation voltage 1 minute (*3) | | Viso | 3750 | Vrms |
| Operating temperature | | Topr | -40 to +85 | °C |
| Storage temperature | | Tstg | -55 to +125 | °C |
| Soldering temperature 10 seconds | | Tsol | 260 | °C |

● Electro-optical Characteristics

(Ta= 25°C)

| Parameter | Symbol | Conditions | Min. | Typ. | Max. | Unit |
|---|------------|--|------|-----------|------|----------|
| Input forward voltage (*4) | V_F | $I_F=10mA, Ta=25^\circ C$ | - | 1.6 | 1.75 | V |
| Input reverse voltage | V_{BR} | $I_R=10uA, Ta=25^\circ C$ | 5 | - | - | V |
| Input capacitance | C_{IN} | $V_F=0, f=1MHz$ | - | 60 | - | pF |
| Logic (1) output current | I_{OH} | $V_{CC}=5.5V, V_O=5.5V, I_F=250uA$ | - | 2 | 250 | μA |
| Logic (0) output voltage | V_{OL} | $V_{CC}=5.5V, I_F=5mA, I_{OL}(\text{Sinking})=13mA$ | - | 0.4 | 0.6 | V |
| Logic (1) supply current | I_{CCH} | $V_{CC}=5.5V, I_F=0mA$ | - | 7 | 15 | mA |
| Logic (0) supply current | I_{CCL} | $V_{CC}=5.5V, I_F=10mA$ | - | 13 | 18 | mA |
| Leak current (*5) | I_{I-O} | $45\%RH, Ta=25^\circ C, t=5s, VI-O=3000VDC$ | - | - | 1.0 | mA |
| Isolation resistance (input-output) (*5) | R_{I-O} | $V_{I-O}=500V, Ta=25^\circ C$ | - | 10^{12} | - | Ω |
| Capacitance (input-output) (*5) | C_{I-O} | $f=1MHz, Ta=25^\circ C$ | - | 0.6 | - | pF |
| Propagation delay time Output (0)→(1) (*6) | t_{PLH} | $I_F=7.5mA, V_{CC}=5V, R_L=350\Omega, C_L=15pF, Ta=25^\circ C$ | - | 45 | 75 | ns |
| Propagation delay time Output (1)→(0) (*6) | t_{PHL} | | - | 45 | 75 | ns |
| Output rise-fall time (10 to 90%) | t_r, t_f | $I_F=7.5mA, V_{CC}=5V, R_L=350\Omega, C_L=15pF$ | - | 30 | - | ns |
| Instantaneous common mode rejection voltage "output(0)" (*7) | CM_H | $I_F=0mA, V_{CM}=10V, V_O(\text{Min})=2.0V, R_L=350\Omega$ | - | 500 | - | V/us |
| Instantaneous common mode rejection voltage "output(1)" (*7) | CM_L | $I_F=5mA, V_{CM}=10V, V_O(\text{Max})=0.8V, R_L=350\Omega$ | - | -500 | - | V/us |

Note) Typical values are all at $V_{CC} = 5V$, $T_a = 25^\circ C$

*1 $T_a = 25^\circ C$.

*2 Pulse width $\leq 1ms$

*3 40 to 80%RH AC for 1 minute, $f=60HZ$.

*4 At $I_{in} = 10mA$, V_F decreases at the rate of $1.6mV/^\circ C$ if the temperature goes up.

*5 Measured as 2-pin element. Connect pins 2 and 3, connect pins 5, 6, 7 and 8.

*6 Refer to the Fig. 1.

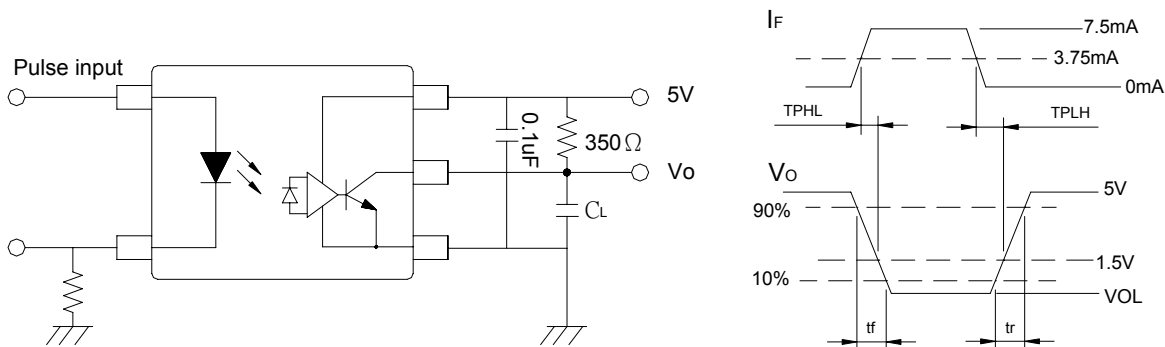
*7 C_{MH} represents a common mode voltage ignorable rise time ratio that can hold logic (1) state in output.

C_{ML} represents a common mode voltage ignorable fall time ratio that can hold logic (0) state in output.

● Recommended Operating Conditions

| Parameter | Symbol | Min | Max | Unit |
|--------------------------|-----------|-----|-----|------------|
| Low level input current | I_{FL} | 0 | 250 | μA |
| High level input current | I_{FH} | 7.0 | 15 | mA |
| Supply voltage | V_{CC} | 4.5 | 5.5 | V |
| Fanout (TTL load) | N | - | 8 | - |
| Operating temperature | T_{opr} | -40 | +85 | $^\circ C$ |

● Test Circuit for Propagation Delay time



● Test Circuit for Instantaneous Common Mode Rejection Voltage

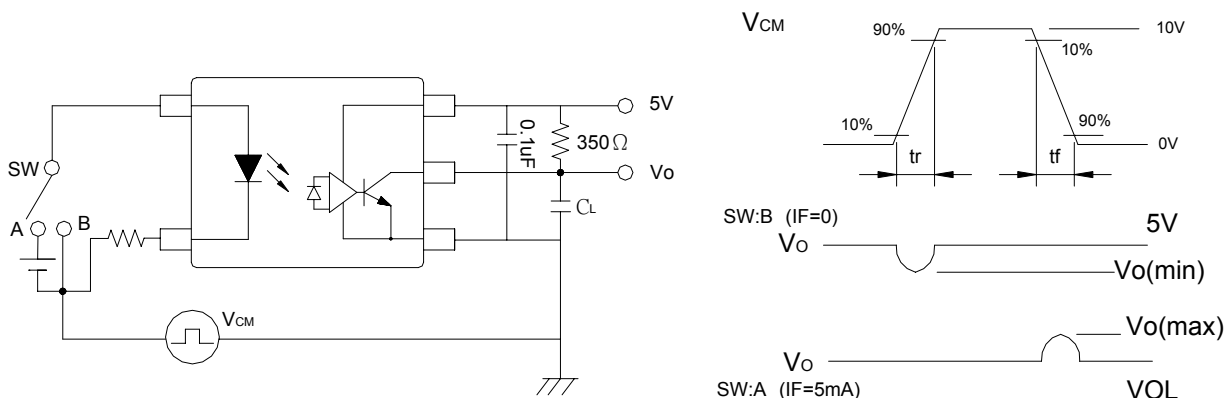


Fig.1 Low Level Output Voltage vs. Ambient Temperature

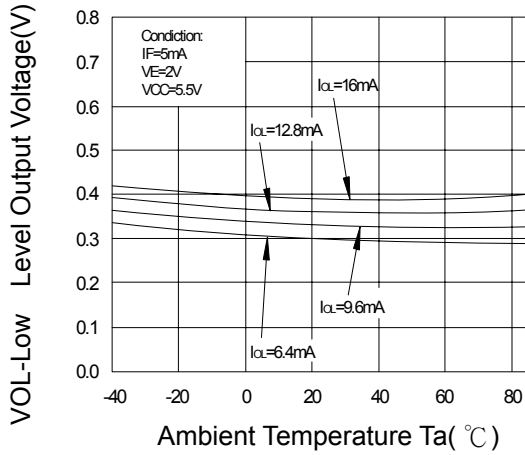


Fig.2 Forward Current vs. Input Diode Forward Voltage

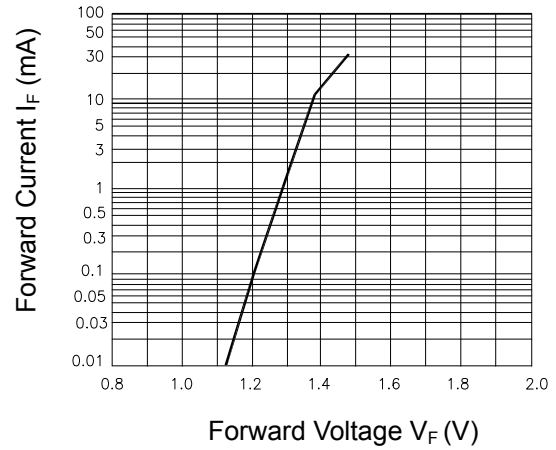


Fig.3 Switching Time vs. Forward Current

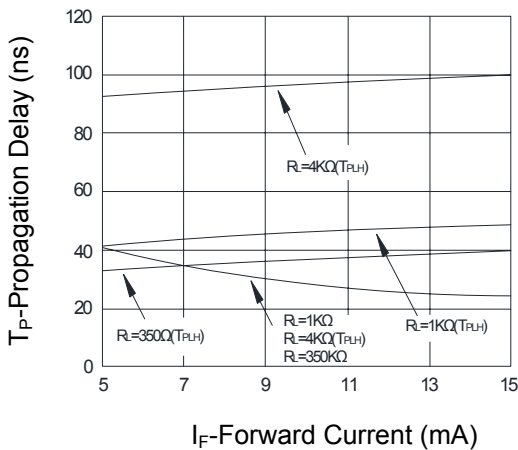


Fig.4 Low Level Output Current vs. Ambient Temperature

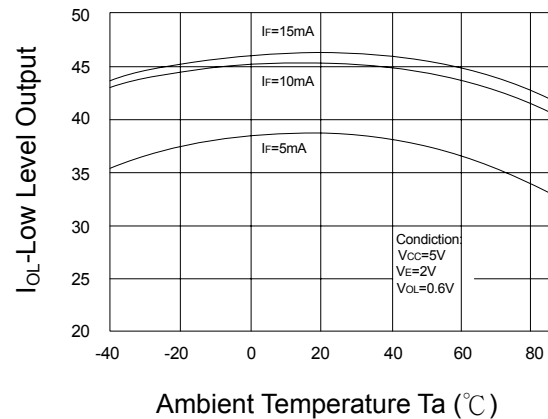


Fig.5 Input Threshold Current vs. Ambient Temperature

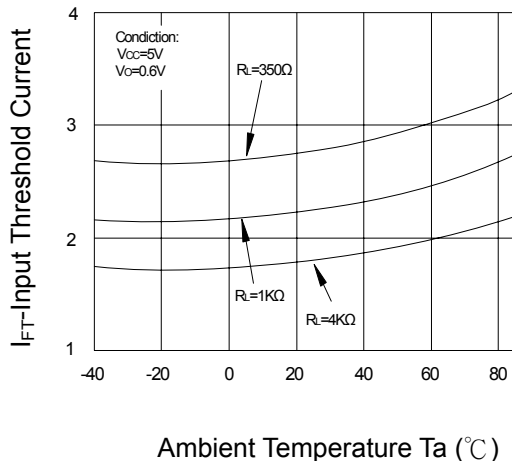


Fig.6 Output Voltage vs. Input Forward Current

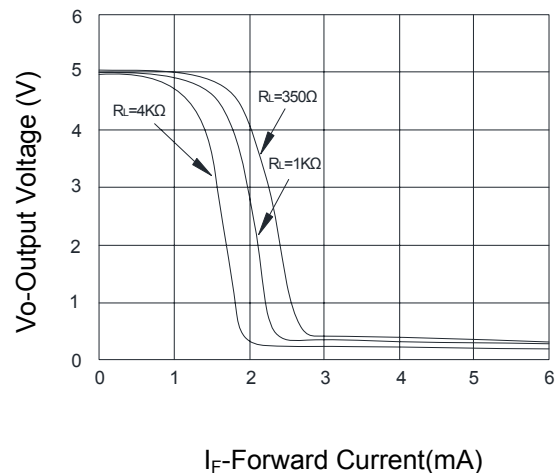


Fig.7 Pulse Width Distortion vs. Ambient Temperature

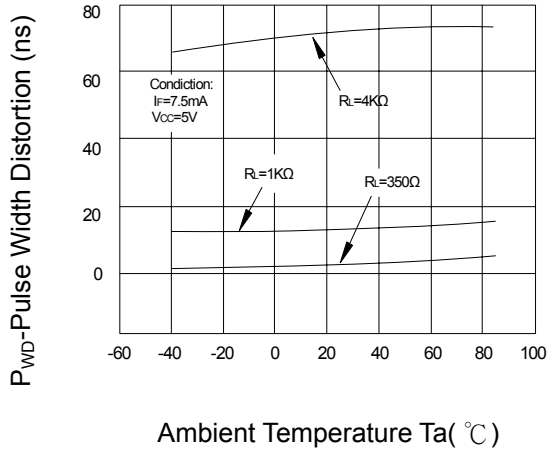


Fig.8 Rise and Fall Time vs. Ambient Temperature

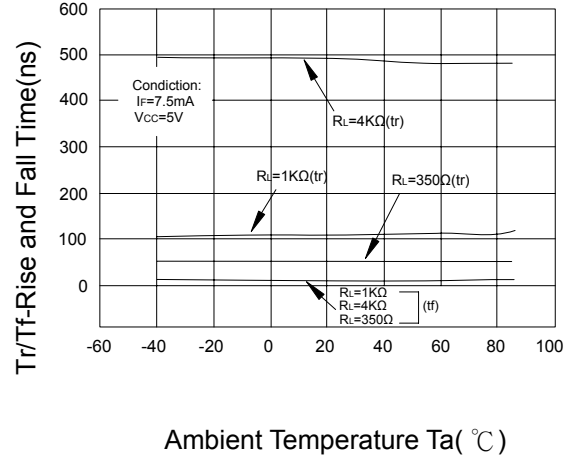


Fig.9 Switch Time vs. Ambient Temperature

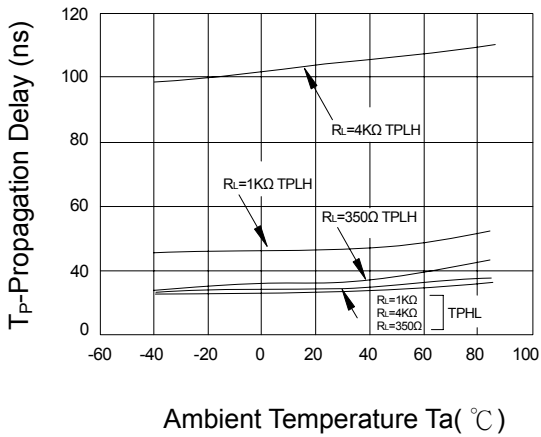
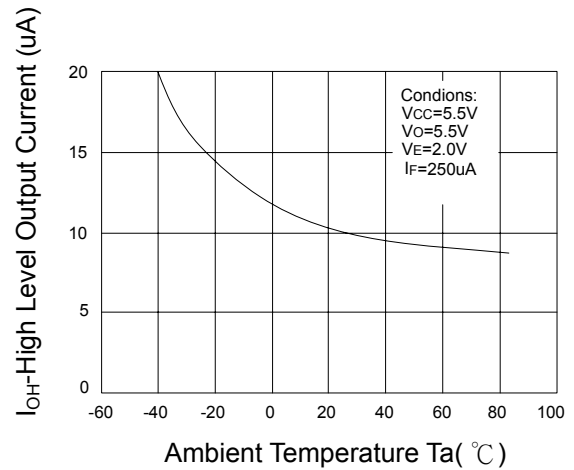


Fig.10 High Level Output Current vs. Ambient Temperature

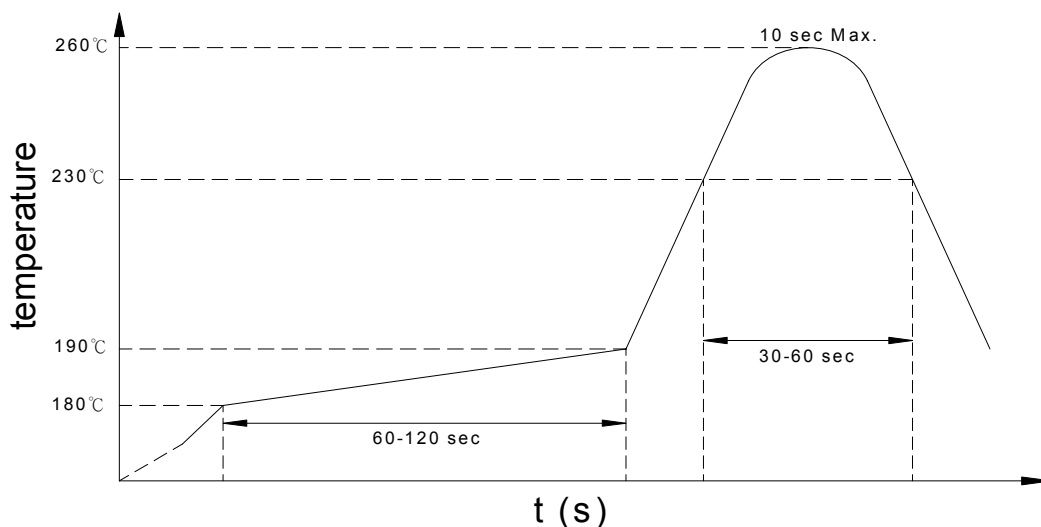


● **Recommended Soldering Conditions**

(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**

KPC410 (Z)

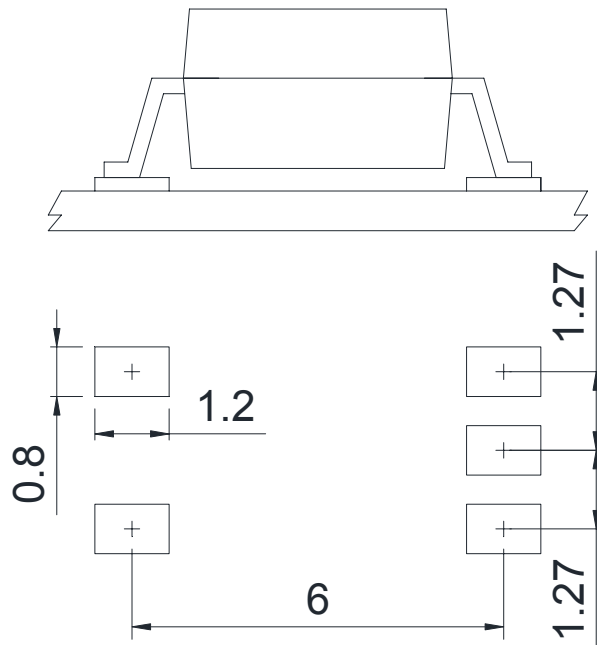
Notes:

KPC410 = Part No.

Z = Tape and reel option (TLD, TRU)

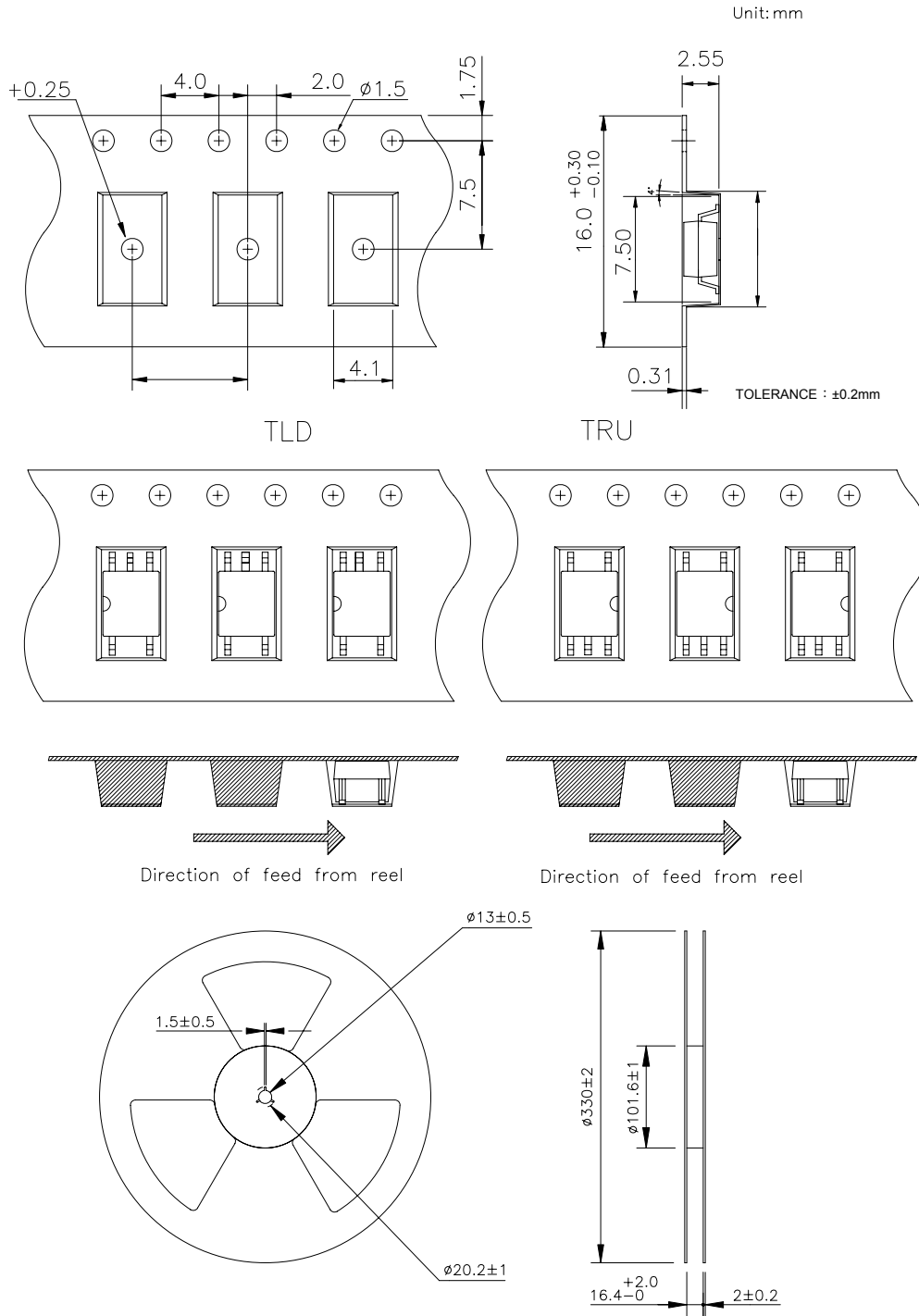
| Option | Description | Packing quantity |
|--------|------------------------|---------------------|
| TLD | TLD tape & reel option | 3000 units per reel |
| TRU | TRU tape & reel option | 3000 units per reel |

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



Unit : mm

● SOP Carrier Tape & Reel



- **Application Notice**

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